

AN1226: WF200 with FEM User's Guide

This document provides information to help users select a Front End Module (FEM) compliant with WF200, measure its output power in open loop, verify the control of FEM output power in closed loop and configure WF200 Platform Data Set (PDS) according to FCC, ETSI and Japan regional certification requirements and Wi-Fi performance measured.

KEY POINTS

- Hardware guidelines to select FEM compliant with WF200
- Software guidelines to configure PDS according to WF200+FEM schematics
- Specific PDS section to characterize FEM output power in open loop and control FEM output power in closed loop
- Performance guidelines to measure main Wi-Fi and regional certification requirements and configure PDS accordingly

1. Introduction

WF200 is usually combined with an external Front End Module (FEM) to benefit from higher output power when transmitting at high data rate. However, the increase in output power compared to a WF200 standalone application usually depends on the following:

- Wi-Fi requirements such as Spectrum Emission Mask (SEM) and Error Vector magnitude (EVM)
- Regional requirements applicable to Device Under Test (DUT), such as maximum output power (rms for ETSI, peak for FCC), maximum power spectral density (PSD) and maximum level of out of band emissions
- Maximum gain of antenna used for DUT regional certification
- Accuracy of DUT output power control over operating conditions

WF200 firmware is able to characterize the output power of an external power amplifier (PA) in open loop as detailed in [5. Power Characterization in Open Loop](#) and control it in closed loop as detailed in [6. Power Verification in Closed Loop](#). Such PA is usually embedded inside a front end module (FEM) together with a low noise amplifier (LNA) and a RX/TX switch. Hardware and software guidelines to interface WF200 with FEM are provided respectively in [2. Hardware Guidelines](#) and [3. Software Guidelines](#).

WF200 has no backoff value stored in its OTP memory to attenuate maximum output power according to RF channel frequency and 802.11b/g/n modulation and code rate transmitted. Therefore, once DUT output power has been characterized in open loop, PDS should be filled to control FEM output power in closed loop, and regional TX performance of DUT should be measured as detailed in [7. TX Performance Guidelines](#) to fill PDS section RF_POWER_CFG with maximum output power and backoff values required to meet main Wi-Fi and regional requirements for maximum antenna gain used for DUT regional certification.

FEM tested by Silicon Labs in this application note have typical performance reported in table below.

Table 1.1. Main Typical Specifications of FEM Tested

Main Typical FEM Performance	FEM1	FEM2	FEM3	FEM4
Small Signal TX Gain (dB)	26	27	29.5	27.5
DSSS 1 Mbps rms Output Power SEM Compliant (dBm)	23	25	27	26
MCS7 HT20 rms Output Power EVM Compliant (dBm)	19	21	24.5	21.5
LNA Gain (dB)	14	14	16.5	16
LNA Noise Figure (dB)	2	2	1.5	3
LNA Output P1dB (dBm)	12	12	12.5	11

Despite differences in typical FEM TX gain and output power, WF200+FEM performance detailed in [8. Appendix A: FEM1 TX Closed Loop Test Results](#) through [11. Appendix D: FEM4 TX Closed Loop Test Results](#) shows that maximum DUT output power level in Japan and ETSI is within a dB for all four FEMs, whatever channel frequency. This is also the case when using FCC and ISM band edge channels 1, 2 and 10, 11. However, when transmitting in channels 3 to 9, maximum DUT output power depends on FEM gain and output power level SEM/EVM compliant.

2. Hardware Guidelines

2.1 WF200 Output Power Characteristics

WF200 Low Power PA (LPPA) is used to drive an external FEM and achieves rms output power up to the following:

- 3 dBm typically for 802.11b modes DSSS 1 and 2 Mbps, with 2.4 dB peak to rms crest factor
- 3.7 dBm typically for 802.11b modes CCK 5.5 and 11 Mbps, with 1.7 dB peak to rms crest factor
- -7 dBm typically in OFDM (802.11g and 802.11n modes), with
 - 9.5 dB peak to rms crest factor for 802.11g 6/9/12/18/24 Mbps and 802.11n MCS0 to MCS2
 - 10.2 dB peak to rms crest factor for 802.11g 36/48/54 Mbps and 802.11n MCS3 to MCS7

Based on WF200 output power capabilities and regional requirements, main TX performance of WF200+FEM can be derived as shown in the table below.

Table 2.1. Main TX Performance Derived from Specification of FEM Tested

Derived TX Features when Combining WF200 with	FEM1	FEM2	FEM3	FEM4
Max WF200 DSSS 1 Mbps rms Output Power SEM Compliant (dBm)	23	25	27	26
Max WF200 Backoff for DSSS 1 Mbps Peak Output Power FCC Compliant (30 dBm)	0	0	0	0
Max WF200 Backoff for DSSS 1 Mbps rms PSD ETSI/JAPAN Compliant (17.5 dBm)	6.0	8.0	10.0	9.0
Max WF200 MCS7 rms Output Power Achievable (dBm)	19	20	22.5	20.5
Max WF200 Backoff for MCS7 HT20 Peak Output Power FCC Compliant (30 dBm)	0	1	4	2
Max WF200 Backoff for MCS7 HT20 rms Output Power ETSI Compliant (20 dBm)	0	0	2.5	0.5

Note: The WF200 data sheet provides main typical WF200 performance versus LPPA output power.

- Out-of-band emission in restricted bands when transmitting on channel 1 in MCS7
- EVM margin in MCS7
- SEM margin in DSSS 11 Mbps

LPPA is not available on the certified module WFM200. FEM is only supported when combined with the WF200.

2.2 FEM Interface

WF200 FEM interface is composed of seven pins:

- FEM_PDET is an analog input that is connected to the PA detector output for TX power control. The range of VDET voltage on this input pin is 0 to 1.2 V, which matches most of power amplifiers' detector output range.
- FEM_4 is the signal to be used as PA enable. Other FEM_x pin can be selected as TX enable with timings of these signals detailed in table 3.12 of [UG404](#).
- FEM_1 to FEM_3, FEM_5 and FEM_6 are used to dynamically control the FEM during TX and RX. This facilitates PCB layout as a given FEM control signal can be generated by any of these pins.

WF200 firmware typically measures voltage on pin FEM_PDET from 2.5 to 8.5 μ s after the beginning of TX burst, i.e., during Tx frame preamble. Purpose is to reduce voltage variation due to modulation and code used during transmission. With 1 MHz typical PA detector bandwidth, voltage rising time is less than 500 ns but its spread can reach 12 mV for some FEM, equivalent to 0.5 dB error on target output power. By reducing PA power detector bandwidth to 250 kHz, such spread can be reduced to 2 mV while keeping voltage rising time lower than 2.5 μ s. Therefore, **to minimize voltage spread measured at WF200 pin FEM_PDET, it is recommended to reduce PA power detector bandwidth to 250 kHz** and contact FEM manufacturer to get SMD values to connect at the PA power detector output to achieve 250 kHz bandwidth.

TX performance being driven by FEM, either WF200 port RF_1 or RF_2 can be used to drive FEM.

FEM may require additional discrete or SAW filter at its antenna input/output pin to attenuate TX harmonics levels and emission level in low restricted band below FCC requirements while keeping channel output power to its maximum. Therefore, **it is recommended to add placeholder for discrete harmonic suppression filter and contact FEM manufacturer to get filter BOM, layout guidelines and insertion loss in Wi-Fi band.**

On the RX side, FEM usually integrates a low noise amplifier (LNA) achieving lower noise figure than WF200 (8 dB typ). The WF200 port RF_1 or RF_2 can be used to receive Wi-Fi signals. For best sensitivity, it is recommended to always enable FEM LNA. However, WF200 maximum input signal on any RF port being 10 dBm, it is recommended to add placeholder for a Pi attenuator between FEM RX output and WF200 RX input and set Pi attenuation to be greater than FEM LNA output compression point (P1 dB) minus 10 dBm.

Table 2.2. Main RX Performance Derived from Specification of FEM Tested

Derived RX Features when Combining WF200 with	FEM1	FEM2	FEM3	FEM4
Pi Attenuator between FEM RX and WF200 RX Pins to Comply with 10 dBm Max Input	2	2	2.5	1
FEM+Pi Attenuator+WF200 NF (dB)	3.0	3.0	2.2	3.4

3. Software Guidelines

Configuration of WF200 RF and FEM interfaces is achieved thanks to specific sections of the Platform Data Set (PDS) file downloaded at firmware startup. For more details about fields of each PDS section, refer to UG404:

- Section RF_ANTENNA_SEL_DIV_CFG is used to configure the WF200 RF port used for TX and for RX.

Below is an example of the PDS section RF_ANTENNA_SEL_DIV_CFG to select WF200 RX and TX ports.

```
/* **** */
/* RF configuration */
/* **** */
RF_ANTENNA_SEL_DIV_CFG: {
    /*
     * Antenna selection:
     * - TX1_RX1
     * - TX2_RX2
     * - TX1_RX2
     * - TX2_RX1: WF200 receives on port RF_1 and transmits on port RF_2
     * - TX12_RX12
     */
    RF_PORTS: TX2_RX1,
},
```

- Section RF_POWER_CFG is used to set the following:
 - Maximum DUT output power and relative backoff values per RF channel, group of modulations and FCC/ETSI region as shown in chapter 6.3 for each FEM tested.
 - RX and TX loss between WF200 output port and DUT antenna port.
- Section TEST_FEATURE_CFG is used to switch WF200 in RF test mode when this section is added to PDS file so that RF tests can be performed to measure DUT Tx performance as explained in chapter 4 of UG404.

- Section PROG_PINS_CFG is used to interface.
 - WF200 GPIO pins FEM_x with FEM control pins
 - WF200 analog pin FEM_PDET with FEM power detector pin

In the abstract of the PDS section PROG_PINS_CFG to select WF200 pins controlling FEM example below, the following pins are used: GPIO_FEM_1, GPIO_FEM_3 and GPIO_FEM_5

```
// Configuration of programmable pins
// in example below, FEM is controlled by GPIO_FEM1, GPIO_FEM3, GPIO_FEM5 and GPIO_PDET
// For each programmable pin in this section
// SLEW_RATE sets the maximum slew rate on the pin as integer value between 0 and 6 (6=max drive strength)
// PULL_UP_DOWN allows to add a pull resistor on the pad as enum 'none', 'down', 'up'
// SLEEP_CFG allows to set pad level in sleep mode as 'none', 'down', 'up', 'maintain'
// PIN_MODE allows to configure the pin in tristate, functional mode or gpio as 'tri', 'func', 'gpio'
// GPIO_ID allows to assign a GPIO_ID to a given pin when configured as gpio, must be an UPPER case letter
PROG_PINS_CFG: {
  GPIO_FEM_1: {
    SLEW_RATE: 4,
    PULL_UP_DOWN: none,
    SLEEP_CFG: none,
    PIN_MODE: func,
    GPIO_ID: A
  },
  GPIO_FEM_2: {
    SLEW_RATE: 4,
    PULL_UP_DOWN: none,
    SLEEP_CFG: none,
    PIN_MODE: tri,
    GPIO_ID: B
  },
  GPIO_FEM_3: {
    SLEW_RATE: 4,
    PULL_UP_DOWN: none,
    SLEEP_CFG: none,
    PIN_MODE: func,
    GPIO_ID: C
  },
  GPIO_FEM_4: {
    SLEW_RATE: 4,
    PULL_UP_DOWN: none,
    SLEEP_CFG: none,
    PIN_MODE: tri,
    GPIO_ID: D
  },
  GPIO_FEM_5: {
    SLEW_RATE: 4,
    PULL_UP_DOWN: none,
    SLEEP_CFG: none,
    PIN_MODE: func,
    GPIO_ID: E
  },
  GPIO_FEM_6: {
    SLEW_RATE: 4,
    PULL_UP_DOWN: none,
    SLEEP_CFG: none,
    PIN_MODE: tri,
    GPIO_ID: F
  },
  GPIO_PDET: {
    SLEW_RATE: 4,
    PULL_UP_DOWN: none,
    SLEEP_CFG: none,
    PIN_MODE: func,
    GPIO_ID: G
  },
}
```

- Section FEM_CFG is used to configure RX and TX logic levels and timings of WF200 pins FEM_x according to the FEM data sheet DUT schematics, and Wi-Fi state. In example below:
 - GPIO_FEM_5 is used to transmit in Wi-Fi
 - GPIO_FEM_3 is used to enable FEM LNA
 - GPIO_FEM_1 is used to receive in Wi-Fi
- See example below of the PDS section FEM_CFG to configure WF200 pins controlling FEM.

```

/*****
/* FEM configuration */
/*****
FEM_CFG: {
    FEM_CTRL_PINS: {
        // defines state of FEM pins 1 to 6 depending on priority given to COEX and WLAN, and WLAN
        //interface TX/RX state
        // notes:
        // - each bit indicates the pin level for each state
        // - pin FEM_4 is not present because it is the PA_enable signal
        // - keys with prefix WLAN_ONLY are the only used if PTA is not enabled
        //
        //      .-- FEM_6
        //      |  .- FEM_5
        //      |  |.- FEM_3
        //      |  ||.- FEM_2
        //      |  |||.- FEM_1
        //      |  ||||
        WLAN_ONLY_IDLE: 0b0_0000, // FEM control signals for WLAN when not transmitting nor receiving
        WLAN_ONLY_RX:   0b0_0101, // FEM control signals for WLAN when receiving
        WLAN_ONLY_TX:   0b0_1000, // FEM control signals for WLAN when transmitting
        COEX_ONLY:      0b0_0000, // FEM control signals to provide the antenna to coexisting RF
        COMBINED_WLAN_IDLE: 0b0_0000, // control signals to set FEM in Rx for both WLAN and COEX (WLAN not
        receiving)
        COMBINED_WLAN_RX: 0b0_0000 // control signals to set FEM in Rx for both WLAN and COEX (WLAN actually
        receiving)
    },
    FEM_TIMINGS: {
        // define related timings on FEM signals
        // Delays are in 12.5ns units
        // Format integer
        TX_EN_DELAY: 16, // max 65535, default value 16 => 0.2 us
        TX_DIS_DELAY: 13, // max 255, default value 13 => 0.1625 us
        PA_EN_DELAY: 130, // max 255, default value 130 => 1.625 us
        PA_DIS_DELAY: 5, // max 255, default value 5 => 0.0625 us
        RX_EN_DELAY: 0, // max 255, default value 0
        RX_DIS_DELAY: 0 // max 255, default value 0
    }
},

```

- Section EXT_PA_CFG is further detailed in next chapter and is used to characterize FEM in open loop and to control FEM in closed loop.

4. PDS Section EXT_PA_CFG

The PDS section EXT_PA_CFG is used to configure FEM power control.

- In open loop so that WF200+FEM can be characterized by filling tables VDET_VAL[] and POUT_VAL[]:
 - VDET_VAL[] should be measured by WF200 firmware so that same measurement process is used in open and closed loop.
 - POUT_VAL values are usually measured by Wi-Fi test equipment at DUT antenna port as specified by ANSI C63.10-2013 for conducted mode measurements. In this application note, Rohde&Schwarz FSV was used as Wi-Fi test equipment.
- In closed loop in order to assess the following:
 - The error between DUT target rms output power and measured rms output power.
 - The maximum rms output power achieved by DUT and relative backoff values to fill in PDS section RF_POWER_CFG in order to meet Wi-Fi and regional requirements for maximum antenna gain used by DUT, RF channel frequency, modulation and code rate.

See example of PDS section EXT_PA_CFG below:

```
EXT_PA_CFG: {
// PA_USED indicates if external PA is used, which triggers the use of the internal Low Power PA
PA_USED: yes,
// MAX_GAIN (in quarters of dB) corresponds to maximum external gain added, rounded to quarter of dB above
MAX_GAIN: 112,
// POUT versus VDET curve of the external PA
CFG_POUT_VS_VDET: {
// NB_OF_POINTS allows to set the number of points used to calibrate the curve (max 16). When !=0 it triggers
the closed loop control of TX output power.
NB_OF_POINTS: 16,
// VDET_VAL (in millivolt) is the Vdet value measured by the chip on FEM_PDET pin, ranging from highest to
lowest value
VDET_VAL: [1080, 925, 818, 752, 682, 624, 570, 518, 478, 438, 377, 328, 289, 259, 234, 216],
// POUT_VAL (in 1/4dBm) is the output power level measured at FEM output port
POUT_VAL: [96, 92, 88, 84, 80, 76, 72, 68, 64, 60, 52, 44, 36, 28, 20, 12]
}
}
```

Field	Description	Enumerates and values	Default value	Comments
PA_USED	This field defines if an external PA is used with WF200	no: no external PA is connected to WF200 yes: WF200 is interfaced with an external PA	no	Shall be set to yes when WF200 is combined with an external power amplifier
MAX_GAIN	This field defines maximum gain added to WF200 output power Pout	Gain value in quarter of dB unit, less than 256	0	In open loop, field is fine tuned to FEM gain so that POUT_VAL measured corresponds to target output power set in field MAX_OUTPUT_POWER_QDBM of PDS section RF_POWER_CFG. In closed loop, field is set to maximum FEM gain to ensure that during loop convergence (3.2ms typ.) the output power remains below maximum DUT output power MAX_OUTPUT_POWER_QDBM configured in PDS section RF_POWER_CFG
NB_OF_POINTS	This field defines the number of points used to linearly interpolate curve Vdet=f(Pout)	Number of interpolation points, up to 16: 0: open loop 1 to 16: closed loop	0	Open loop is used to fill tables VDET_VAL[] and POUT_VAL[] In closed loop, 16 points is recommended to accurately control FEM output power according to RF channel frequency, modulation and code rate transmitted.
VDET_VAL	Table of Interpolation points	VDET value in mV, less than 1200mV	0	Ranked from highest to lowest value
POUT_VAL		POUT value in quarter of dBm, less than 256	0	

Instead of directly modifying contents of PDS sections at firmware startup or while application is running as explained in chapter 2.2.2 of UG404, specific FEM functions have been added in RF test agent to modify PDS sections EXT_PA_CFG while application is running in test feature mode:

- `dut.fem_pa_used()` is used to enable or disable the use of PDS section EXT_PA_CFG
- `dut.fem_pa_table()` is used to
 - Control FEM in open or closed loop
 - Set interpolation points [VDET_VAL, POUT_VAL] when in closed loop
- `dut.fem_pa_max_gain()` is used to set FEM typical gain when controlled in open loop and maximum gain when controlled in closed loop
- `dut.fem_read_vpdet()` is used to get voltage measured by firmware on pin VPDET

Any modification of FEM test conditions shall begin with test agent function `dut.tx_stop()` and end with `dut.tx_start()`. Additional details regarding RF test agent features are available at links:

- https://github.com/SiliconLabs/wfx-common-tools/blob/HEAD/test-feature/README.md#dut-wfx_test_agent-installation
- https://github.com/SiliconLabs/wfx-fullMAC-tools/tree/master/Tools/RF_test_agent

5. Power Characterization in Open Loop

Output power of WF200+FEM in open loop varies according to process spread, operating frequency, temperature, supply voltage as well as VSWR at FEM output pin. With a typical variation of WF200+FEM output power in open loop of ± 5 dB, use of FEM power detector voltage VDET to control FEM in closed loop reduces such variation of output power according to DUT output power and voltage spread of FEM power detector over all operation conditions.

FEM curve $VDET_VAL=f(POUT_VAL)$ is usually measured at DUT antenna input port under nominal operating conditions. WF200 firmware is able to interpolate curve $VDET_VAL=f(POUT_VAL)$ with up to 16 interpolation points, ranked from highest to lowest value, POUT_VAL value being rounded to the closest 0.25 dBm unit. **To minimize interpolation error, it is recommended to use 16 interpolation points for FEM curve $VDET_VAL=f(POUT_VAL)$.** To reduce interpolation error, more than 16 measurements should be performed to characterize FEM: in this application note, VDET_VAL and POUT_VAL were measured in 0.5 dB step at 2412, 2442 and 2462 MHz in 802.11b 1 and 11 Mbps, 802.11g 6 and 54 Mbps and 802.11n MCS0 and MCS7. Then each VDET_VAL value was fine tuned to center around 0 the 802.11b output power error between interpolation curve and all (VDET, POUT) measurements. To fill tables VDET_VAL[] and POUT_VAL[], the following tips could help:

- In PDS section RF_POWER_CFG
 - Values in section BACKOFF_QDB should be set to 0, using for example test agent function dut.tx_backoff().
 - Value of field MAX_OUTPUT_POWER_QDBM should be set to POUT_VAL value of interpolation point to characterize, using test agent function dut.tx_power().
 - POUT_VAL of first interpolation point should be set to maximum DSSS 1 Mbps rms output power compliant with SEM +1 dB or 28 dBm, whichever is lower. Note that there is no need to characterize FEM beyond 28 dBm considering that highest DUT regional power level is 30 dBm peak (FCC), i.e., 27.6 dBm rms for DSSS 1 peak to average ratio of 2.4 dB.
 - POUT_VAL level of next ten interpolation points should correspond to level of previous point minus 1 dB.
 - For the last five interpolation points, POUT_VAL level should correspond to level of previous point minus 2 dB.
- In PDS section EXT_PA_CFG
 - Value of field PA_USED should be set to 'yes' using test agent function dut.fem_pa_used()
 - Value of field MAX_GAIN should be set in open loop to typical FEM gain using test agent function dut.fem_pa_max_gain(). Value should be adjusted in quarter of dB unit so that POUT_VAL measured is within a quarter dB of target output power requested in value of field MAX_OUTPUT_POWER_QDBM. For each POUT_VAL value tested, get voltage measured by firmware on pin VDET using test agent function dut.fem_read_vpdet() and record POUT measured by Wi-Fi tester. These values will be used to derive VDET_VAL value which minimizes output power error between interpolation curve and all (VDET, POUT) measurements.
 - Value of field NB_OF_POINTS should be set to 0 using test agent function dut.fem_pa_table() to configure FEM in open loop.
- In specific PDS section TEST_FEATURE_CFG used to configure WF200 firmware in test mode and perform for example Tx test at 2442 MHz in DSSS 1 Mbps the following settings should be applied:
 - field TEST_CHANNEL_FREQ: 7 using test agent function dut.channel()
 - field RATE of sub section CFG_TX_PACKET: B_1Mbps using test agent function dut.tx_mode()
 - field REG_MODE of sub section CFG_TX_PACKET: CERTIFIED_Unrestricted using test agent function dut.regulatory_mode()

5.1 FEM1

FEM1 is a 3.3 V FEM featuring 26 dB typical/28 dB maximum small signal gain and 23 dBm output power spectral mask compliant in DSSS 1 Mbps. FEM detector bandwidth is reduced to 250 kHz by adding a 220 pF capacitor to ground on FEM pin VDET. VDET_VAL and POUT_VAL measurements are performed with the following conditions:

- Typical operating conditions: 25 °C, 3.3 V supply
- Channels: 2412, 2442 and 2462 MHz
- Modes: 802.11b 1 and 11 Mbps, 802.11g 6 and 54 Mbps, 802.11n MCS0 and MCS7
- Target output power varying in 0.5 dB step from 4 to 28 dBm (DSSS) and from 2 to 20 dBm (OFDM)
- 20 measurements of VDET performed for each target output power

Interpolation points $VDET_VAL=f(POUT_VAL)$ are set as shown in the codeblock below. VDET_VAL of each interpolation point has been fine tuned to average DSSS output power error to 0 dB. According to measurements performed, maximum and minimum error due to this interpolation curve is ± 0.25 dB over voltage range 216 to 1080 mV as shown in following figure.

PDS section EXT_PA_CFG for FEM1 controlled in open loop:

```
EXT_PA_CFG: {  
    PA_USED: yes,  
    MAX_GAIN: 104,  
    CFG_POUT_VS_VDET: {  
        NB_OF_POINTS: 0,  
        VDET_VAL: [1080, 925, 818, 752, 682, 624, 570, 518, 478, 438, 377, 328, 289, 259, 234, 216],  
        POUT_VAL: [96, 92, 88, 84, 80, 76, 72, 68, 64, 60, 52, 44, 36, 28, 20, 12]  
    }  
}
```

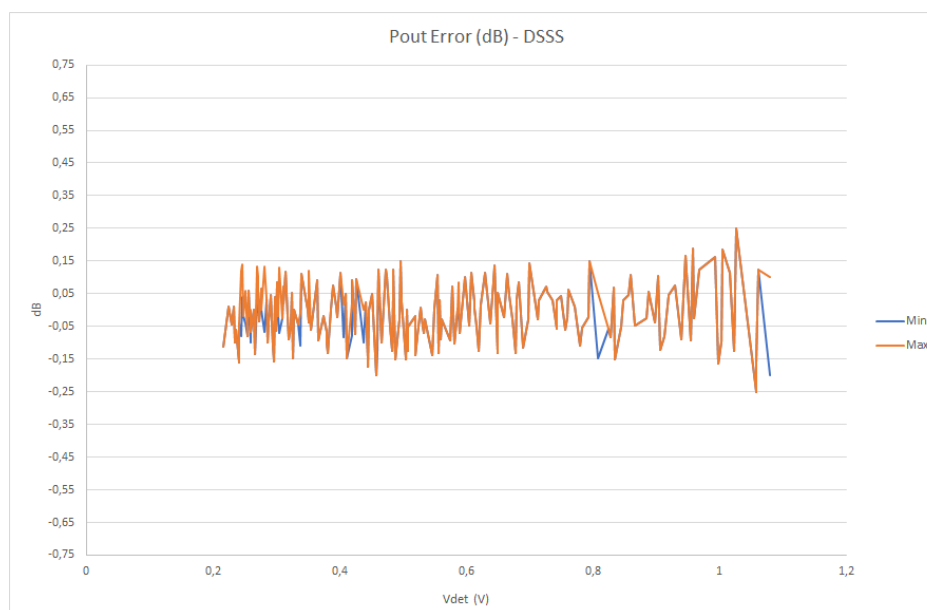


Figure 5.1. Error between FEM1 Output Power Measured in DSSS Modes and FEM1 interpolation Curve

When interpolation points are applied to OFDM modes tested, output power error increases to $-0.6/+0.2$ dB with an average error of -0.24 dB over voltage range 216 to 608 mV. This is not a major issue considering that such bias is compensated during assessment of backoff values required to meet Wi-Fi and regional requirements.

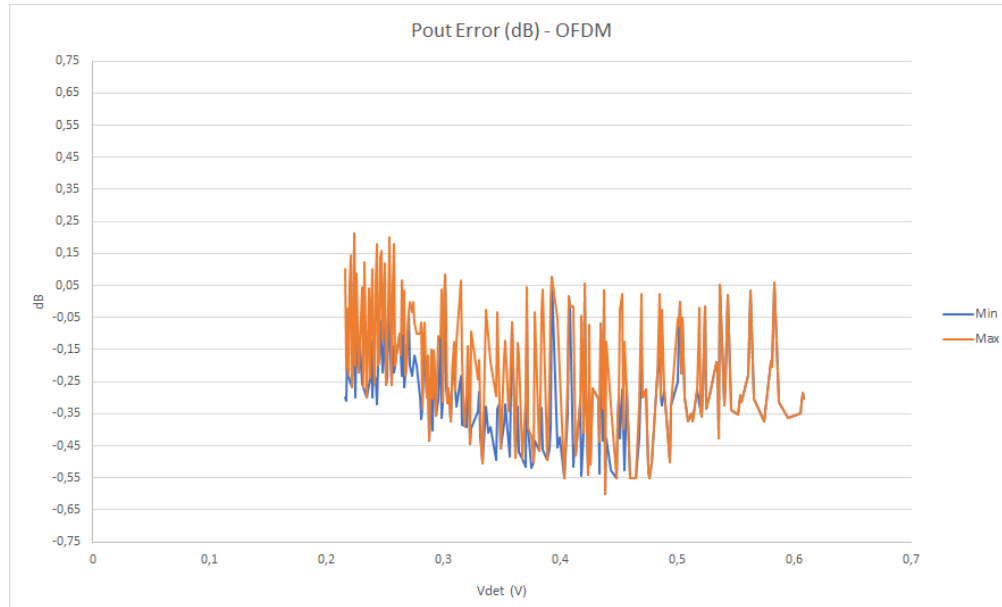


Figure 5.2. Error between FEM1 Output Power Measured in OFDM Modes and FEM1 Interpolation curve

5.2 FEM2

FEM2 is a 5 V FEM featuring 27 dB typical small signal gain on evaluation board tested and 25 dBm output power spectral mask compliant in DSSS 1Mbps. VDET_VAL and POUT_VAL measurements are performed with the following conditions:

- Typical operating conditions: 25 °C, 5 V supply
- Channels: 2412, 2442 and 2462 MHz
- Modes: 802.11b 1 and 11 Mbps, 802.11g 6 and 54 Mbps, 802.11n MCS0 and MCS7
- Target output power varying in 0.5 dB step from 5 to 29 dBm (DSSS) and from 3 to 21 dBm (OFDM)
- 20 measurements of VDET performed for each target output power

PDS section EXT_PA_CFG for FEM2 controlled in open loop:

```
EXT_PA_CFG: {  
    PA_USED: yes,  
    MAX_GAIN: 120,  
    CFG_POUT_VS_VDET: {  
        NB_OF_POINTS: 0,  
        VDET_VAL: [1198, 1096, 948, 856, 785, 717, 657, 603, 552, 508, 468, 404, 354, 315, 283, 260]],  
        POUT_VAL: [104, 100, 96, 92, 88, 84, 80, 76, 72, 68, 64, 56, 48, 40, 32, 24]  
    }  
}
```

Interpolation points VDET_VAL=f(POUT_VAL) are set as shown in the codeblock above to minimize DSSS output power error between -0.36/+0.35 dB with an average of 0 dB over voltage range 260 to 1198 mV as shown in the figure below.

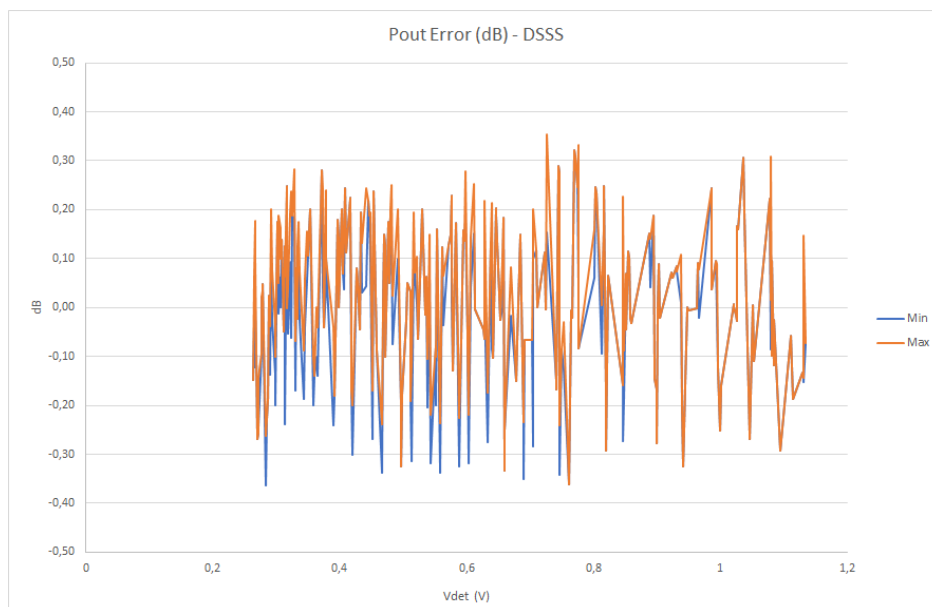


Figure 5.3. Error between FEM2 Output Power Measured in DSSS Modes and FEM2 Interpolation Curve

When interpolation points are applied to OFDM measurements, output power error ranges between -0.65 and 0.19 dB with an average error of -0.26 dB over voltage range 260 to 651 mV.

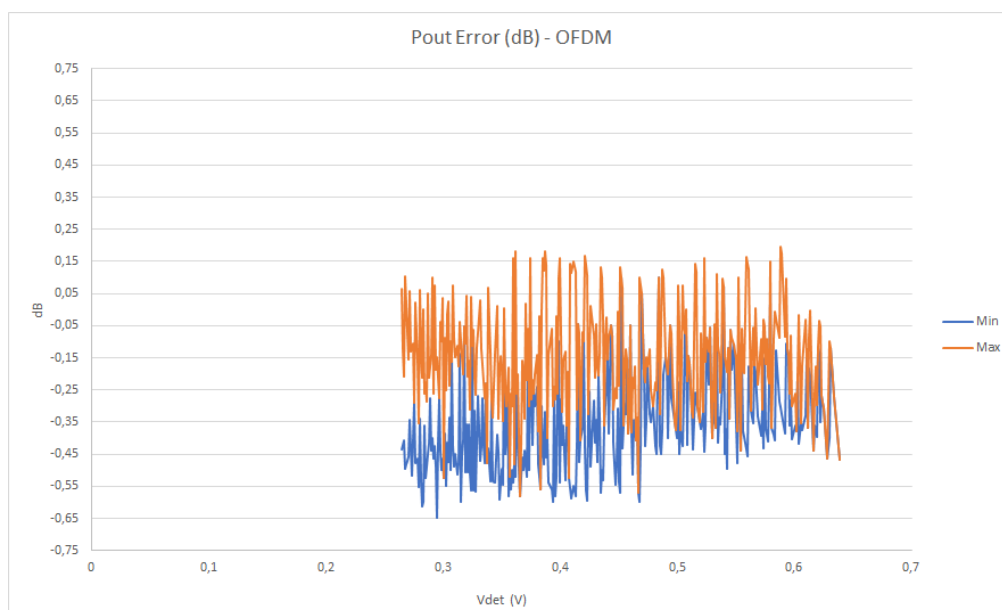


Figure 5.4. Error between FEM2 Output Power Measured in OFDM Modes and FEM2 Interpolation Curve

5.3 FEM3

FEM3 tested is a 5 V FEM featuring 31 dB typical small signal gain measured on evaluation board (29.5 dB currently specified in data-sheet) and 27 dBm output power spectral mask compliant in DSSS 1 Mbps. FEM detector bandwidth is reduced to 250 kHz by adding a 220 pF capacitor to ground on FEM pin VDET. VDET_VAL and POUT_VAL measurements are performed with similar Wi-Fi test conditions as FEM2, with target output power varying in 0.5 dB step from 9 to 29 dBm (DSSS) and from 7 to 25 dBm (OFDM).

Interpolation points $VDET_VAL=f(POUT_VAL)$ are set as shown in the codeblock below to minimize DSSS output power error between $-0.97/+0.54$ dB with an average error of 0 dB over voltage range 303 to 801 mV as shown in the figure below.

PDS section EXT_PA_CFG for FEM3 controlled in open loop:

```
EXT_PA_CFG: {
    PA_USED: yes,
    MAX_GAIN: 124,
    CFG_POUT_VS_VDET: {
        NB_OF_POINTS: 0,
        VDET_VAL: [801, 775, 748, 726, 696, 673, 644, 619, 598, 570, 548, 490, 446, 390, 352, 303],
        POUT_VAL: [112, 108, 104, 100, 96, 92, 88, 84, 80, 76, 72, 64, 56, 48, 40, 32]
    }
}
```

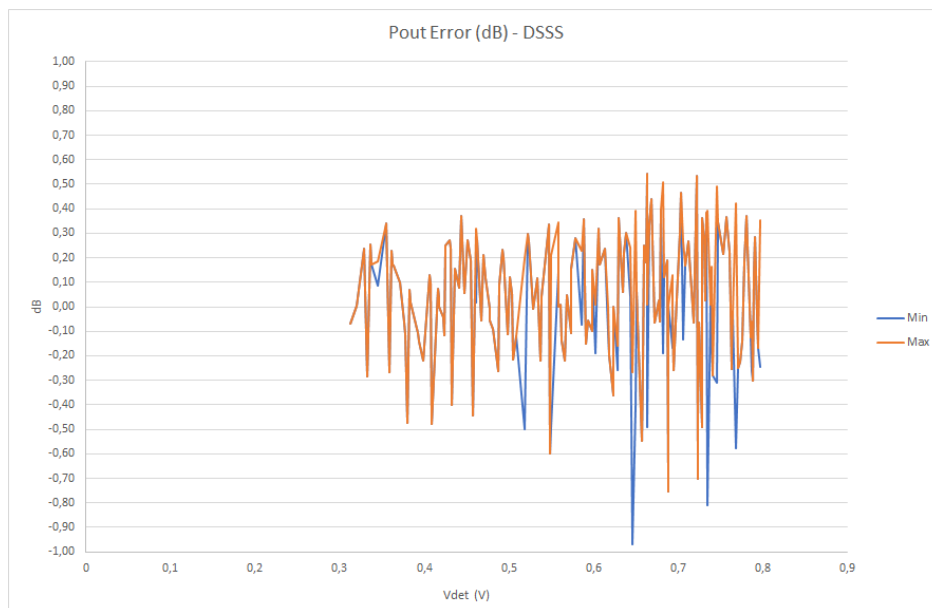


Figure 5.5. Error between FEM3 Output Power Measured in DSSS Modes and FEM3 Interpolation Curve

When interpolation points are applied to OFDM modes, output power error ranges between $-0.63/+0.46$ dB with an average error of 0 dB over voltage range 303 to 608 mV.

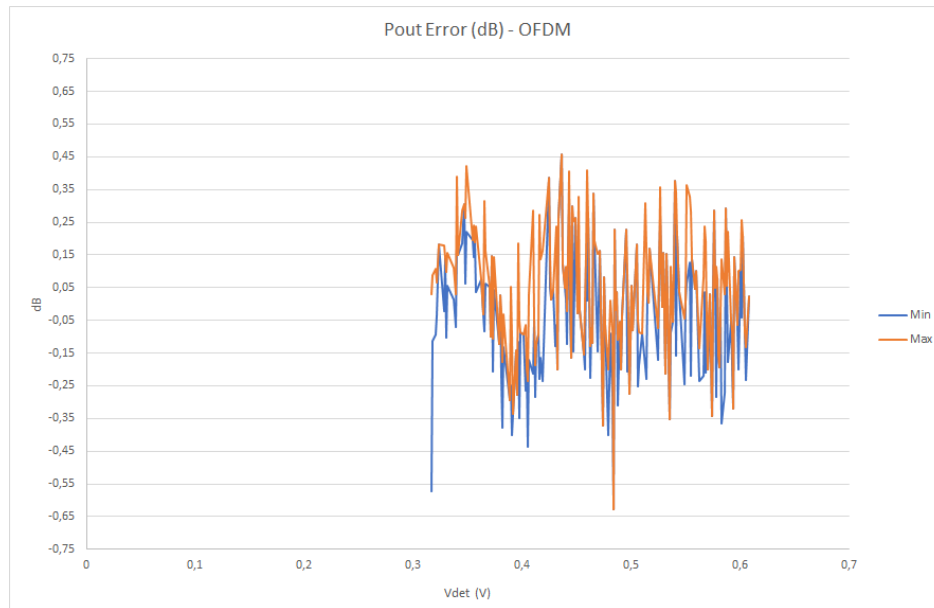


Figure 5.6. Error between FEM3 Output Power Measured in OFDM Modes and FEM3 Interpolation Curve

5.4 FEM4

FEM4 is a 5 V FEM featuring 27.5 dB typical small signal gain and 26 dBm spectral mask compliant DSSS 1 Mbps output level. FEM detector bandwidth is reduced to 250 kHz by adding a 220 pF capacitor to ground on FEM pin VDET. VDET_VAL and POUT_VAL measurements are performed with same Wi-Fi test conditions as FEM2, with target output power varying in 0.5 dB step from 5 to 29 dBm (DSSS) and from 3 to 23 dBm (OFDM).

Interpolation points $VDET_VAL=f(POUT_VAL)$ are set as shown in codeblock below to minimize DSSS output power error between -0.07/+0.66 dB with an average error of 0 dB over voltage range 320 to 751 mV as shown in the figure below.

PDS section EXT_PA_CFG for FEM4 controlled in open loop:

```
EXT_PA_CFG: {
  PA_USED: yes,
  MAX_GAIN: 110,
  CFG_POUT_VS_VDET: {
    NB_OF_POINTS: 0,
    VDET_VAL: [751, 729, 702, 691, 660, 646, 624, 607, 588, 563, 539, 496, 450, 403, 360, 320],
    POUT_VAL: [112, 108, 104, 100, 96, 92, 88, 84, 80, 76, 72, 64, 56, 48, 40, 32]
  }
}
```

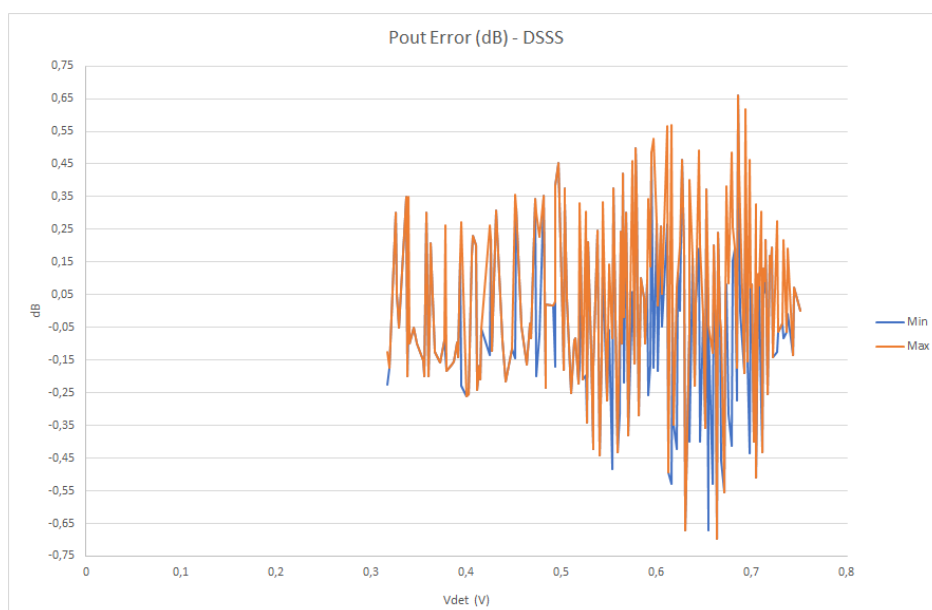


Figure 5.7. Error between FEM4 Output Power Measured in DSSS Modes and FEM4 Interpolation Curve

When interpolation points are applied to OFDM modes, output power error ranges between -0.54 and 0.55 dB with an average error of -0.04 dB over voltage range 320 to 590 mV.

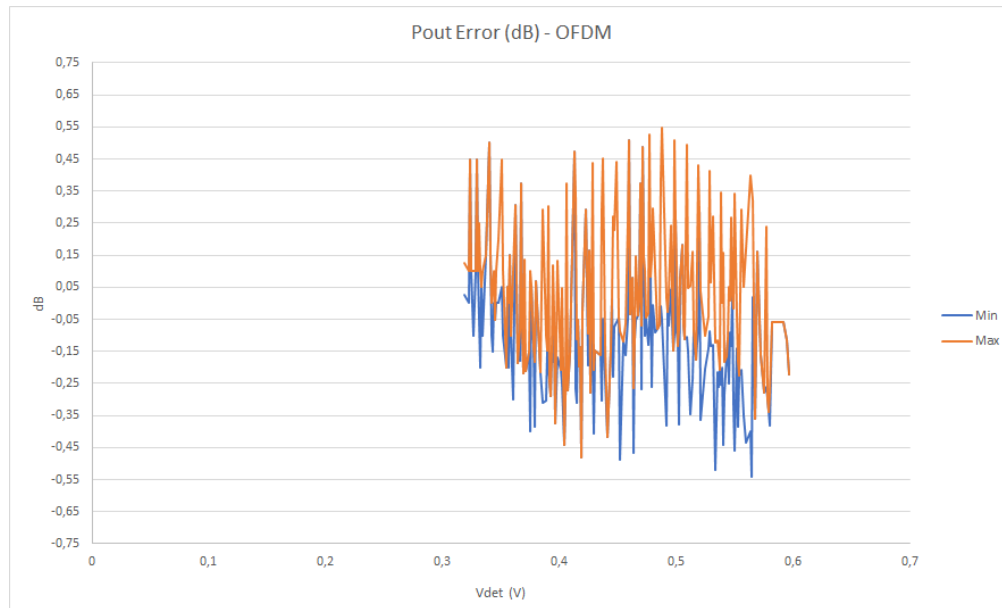


Figure 5.8. Error between FEM4 Output Power Measured in OFDM Modes and FEM4 Interpolation Curve

6. Power Verification in Closed Loop

Once FEM has been characterized in open loop, WF200 firmware is able to control FEM output power in closed loop using same tips described in the previous chapter:

- In PDS section RF_POWER_CFG
 - Values in section BACKOFF_QDB should be set to 0, using for example test agent function `dut.tx_backoff()`.

Value of field MAX_OUTPUT_POWER_QDBM should be set to target output power level to be tested. For each MAX_OUTPUT_POWER_QDBM value tested, get voltage measured by firmware on pin VDET using test agent function `dut.fem_read_vpdet()` and record POUT measured by Wi-Fi tester. These values will be used to assess output power error of FEM interpolation curve applied.
- In PDS section EXT_PA_CFG
 - Value of field PA_USED should be set to 'yes' using test agent function `dut.fem_pa_used()`
 - Value of field MAX_GAIN should be set to maximum FEM gain using test agent function `dut.fem_pa_max_gain()`. Purpose is to ensure that during convergence of output power control loop, DUT output power does not exceed regional output power requirement.
 - FEM interpolation points (VDET_VAL, POUT_VAL) should be set using test agent function `dut.fem_pa_table()`, meaning for FEM1: `dut.fem_pa_table([[1080, 96], [925, 92], [818, 88], [752, 84], [682, 80], [624, 76], [570, 72], [518, 68], [478, 64], [438, 60], [377, 52], [328, 44], [289, 36], [259, 28], [234, 20], [216, 12]])`

Note: In such cases, function `dut.fem_pa_table()` counts the number of interpolation points and sets the value of field NB_OF_POINTS accordingly.
- In specific PDS section TEST_FEATURE_CFG used to configure WF200 firmware in test mode and perform for example TX test at 2442 MHz in DSSS 1 Mbps the following settings should be applied:
 - Field TEST_CHANNEL_FREQ: 7 using test agent function `dut.channel()`
 - Field RATE of sub section CFG_TX_PACKET: B_1Mbps using test agent function `dut.tx_mode()`
 - Field REG_MODE of sub section CFG_TX_PACKET: CERTIFIED_Unrestricted using test agent function `dut.regulatory_mode()`

In this chapter, output power error versus power target is measured to assess the typical accuracy of DUT output power control when operating DUT under nominal conditions. As shown in test results below, typical accuracy of control loop depends on the following:

- DUT output power level which itself depends on regional requirements applicable. For example, as detailed in [7.3.1 FEM1](#) to [7.3.4 FEM4](#), FCC band edge channels require 5 to 7 dB less DUT output power than on mid channel in order to meet out of band requirements.
- Standard used, OFDM standards 802.11g and 802.11n achieving better accuracy at low output power levels than DSSS standard 802.11b. However, there is no such difference in the range of output power required to meet FCC, ETSI or Japan regional requirements.

6.1 FEM1

Measurements are performed with the following conditions:

- Typical operating conditions: 25 °C, 3.3V supply
- Channels: 2412, 2442 and 2462 MHz
- Modes: 802.11b 1 and 11 Mbps, 802.11g 6 and 54 Mbps, 802.11n MCS0 and MCS7
- Target output power varying in 0.5 dB step from 5 to 24 dBm

Compared to open loop tests, PDS section EXT_PA_CFG is updated:

- Field MAX_GAIN is set to 112, i.e., maximum FEM small signal gain of 28 dB
- Field NB_OF_POINTS is set 16 to control FEM in closed loop using 16 interpolation points

The PDS section EXT_PA_CFG for FEM1 controlled in closed loop is shown below:

```
EXT_PA_CFG: {
  PA_USED: yes,
  MAX_GAIN: 112,
  CFG_POUT_VS_VDET: {
    NB_OF_POINTS: 16,
    VDET_VAL: [1080, 925, 818, 752, 682, 624, 570, 518, 478, 438, 377, 328, 289, 259, 234, 216],
    POUT_VAL: [96, 92, 88, 84, 80, 76, 72, 68, 64, 60, 52, 44, 36, 28, 20, 12]
  }
}
```

DSSS measurements performed in closed loop show the same averaged output power error centered around 0 dB but greater min/max output power error at low Vdet compared to measurements in open loop. This is due to LPPA attenuation step at such low output power levels, step of 1.3 dB typically at 5 dBm output power, the lower the output power target the higher the LPPA step. According to measurements performed, output power error varies between -1.32 and +1.22 dB with 0.01 dB average.

However, the higher the target output power, the smaller the error:

- For Vdet>300 mV/9.5 dBm, error is -0.96/+0.78 dB with -0.01 dB average
- For Vdet>400 mV/13.75 dBm, error is -0.40/+0.57 dB with 0.00 dB average
- For Vdet>500 mV/16.5 dBm, error is -0.37/+0.57 dB with 0.01 dB average
- For Vdet>900 mV/22.8 dBm, error is -0.32/+0.37 dB with 0.02 dB average

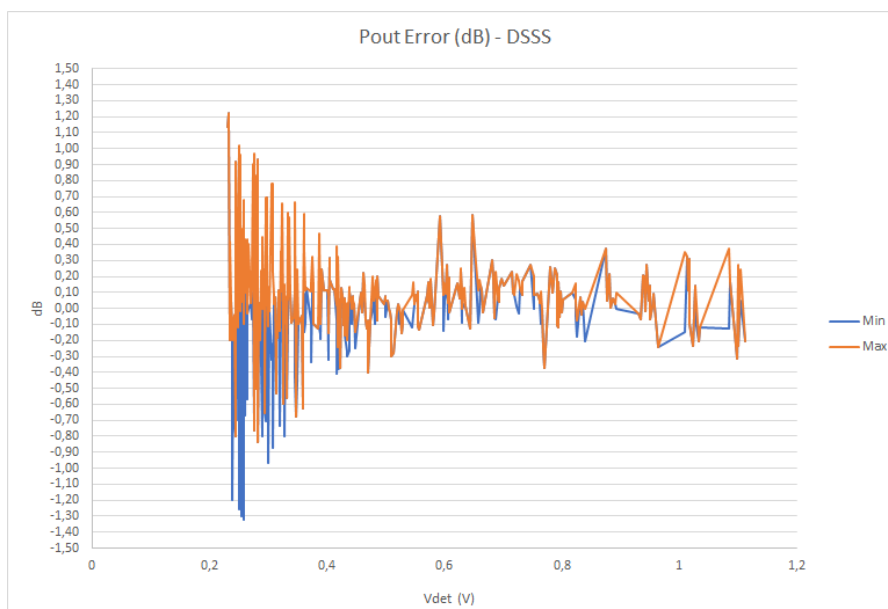


Figure 6.1. Error between Output Power Measured in DSSS Modes and FEM1 Interpolation Curve

OFDM measurements performed in closed loop do not show such error at low output power levels due to 10 dB difference between maximum LPPA output power in OFDM compared to DSSS. Closed loop power error in OFDM is similar to open loop: between -0.76 and +0.34 dB with an average of -0.26 dB over voltage range 233 to 581 mV.

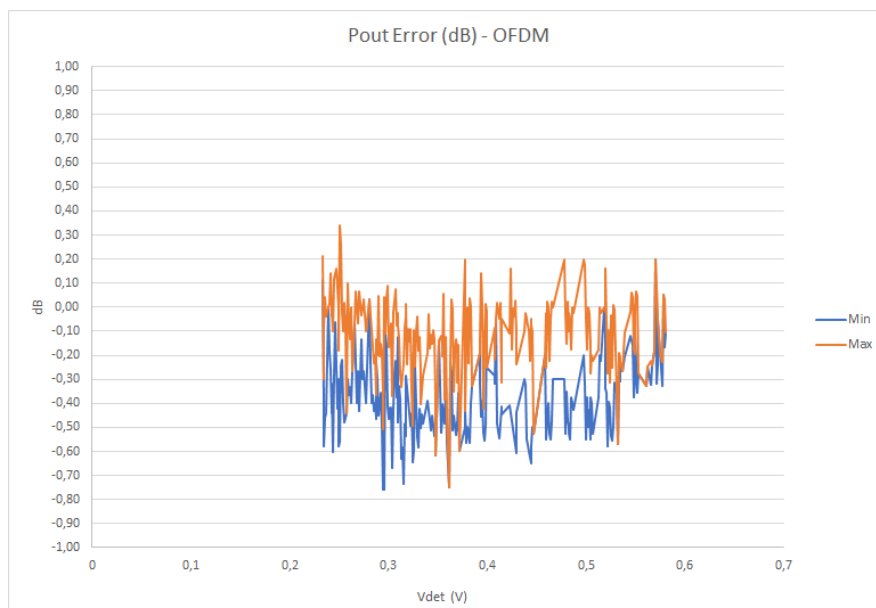


Figure 6.2. Error between Output Power Measured in OFDM Modes and FEM1 Interpolation Curve

6.2 FEM2

Measurements are performed with the following conditions:

- Typical operating conditions: 25 °C, 5 V supply
- Channels: 2412, 2442 and 2462 MHz
- Modes: 802.11b 1 and 11 Mbps, 802.11g 6 and 54 Mbps, 802.11n MCS0 and MCS7
- Target output power varying from 6 to 24 dBm in 0.5 dB step

Compared to open loop tests, PDS section EXT_PA_CFG is updated:

- Field MAX_GAIN is set to 120, i.e., maximum FEM small signal gain of 30 dB
- Field NB_OF_POINTS is set 16 to control FEM in closed loop using 16 interpolation points

The PDS section EXT_PA_CFG for FEM2 controlled in closed loop is shown below

```
EXT_PA_CFG: {
  PA_USED: yes,
  MAX_GAIN: 120,
  CFG_POUT_VS_VDET: {
    NB_OF_POINTS: 16,
    VDET_VAL: [1198, 1096, 948, 856, 785, 717, 657, 603, 552, 508, 468, 404, 354, 315, 283, 260],
    POUT_VAL: [104, 100, 96, 92, 88, 84, 80, 76, 72, 68, 64, 56, 48, 40, 32, 24]
  }
}
```

DSSS measurements performed in closed loop show greater output power error at low Vdet compared to measurements in open loop for same reason as with FEM1, resulting in error between -1.53 and +0.97 dB with an average of -0.02 dB. However, the higher the target output power, the smaller the error:

- For Vdet>300 mV/ 9 dBm, error is – 0.90 /+ 0.85 dB with -0.01 dB average
- For Vdet>400 mV/ 14 dBm, error is – 0.52 /+ 0.39 dB with -0.02 dB average
- For Vdet>500 mV/ 16.8 dBm, error is – 0.52 /+ 0.35 dB with -0.03 dB average
- For Vdet>900 mV/ 23.5 dBm, error is – 0.27 /+ 0.31 dB with 0 dB average

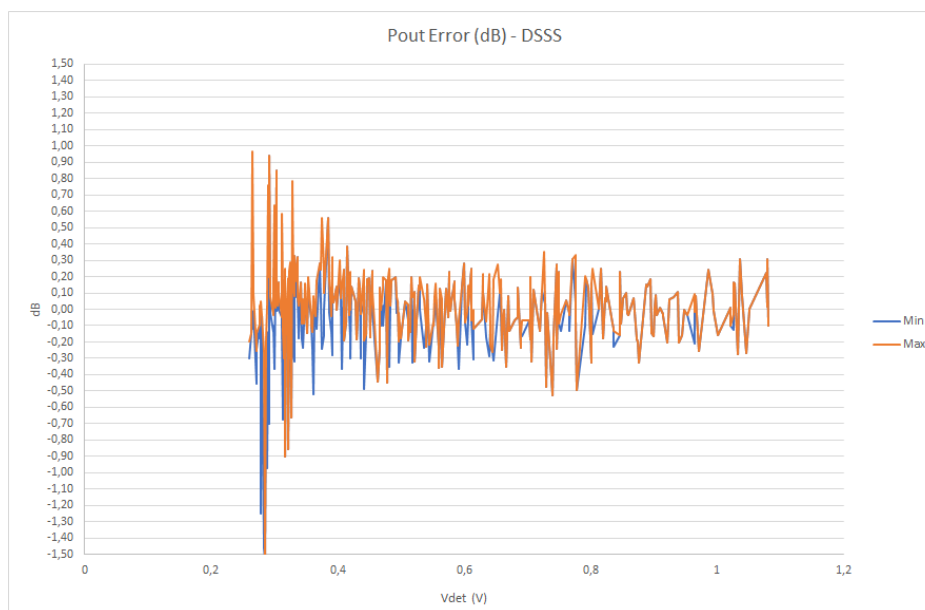


Figure 6.3. Error between Output Power Measured in DSSS Modes and FEM2 Interpolation Curve

OFDM measurements performed in closed loop do not show such error at low output power levels due to around 10 dB lower maximum LPPA output power in OFDM compared to DSSS. Closed loop power error is similar to open loop: between -0.77 and $+0.18$ dB with an average of -0.26 dB over voltage range 260 to 625 mV.

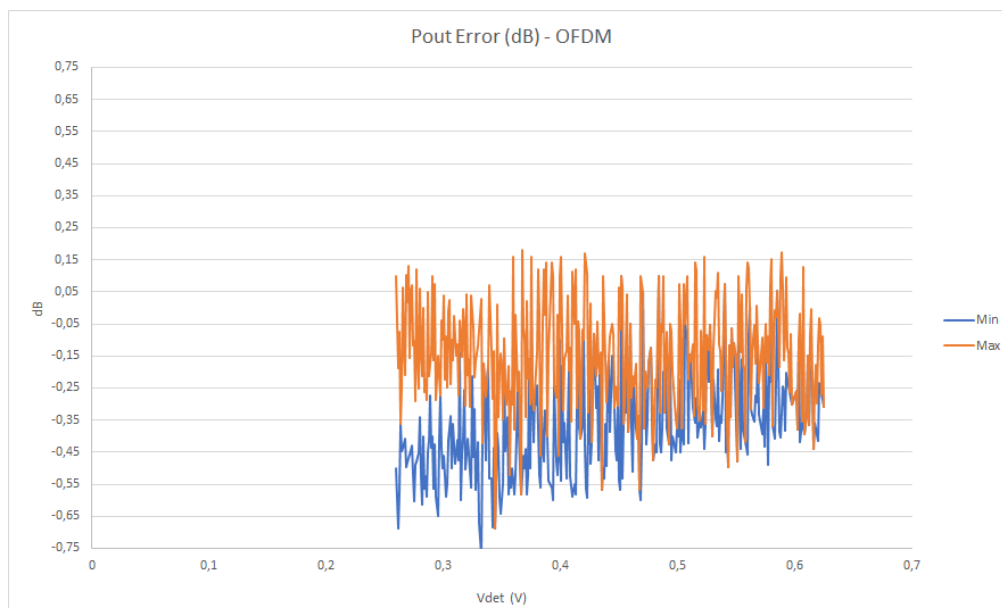


Figure 6.4. Error between Output Power Measured in OFDM Modes and FEM2 Interpolation Curve

6.3 FEM3

Measurements are performed with the following conditions:

- Typical operating conditions: 25 °C, 5 V supply
- Channels: 2412, 2442 and 2462 MHz
- Modes: 802.11b 1 and 11 Mbps, 802.11g 6 and 54 Mbps, 802.11n MCS0 and MCS7
- Target output power varying from 8 to 28 dBm in 0.5 dB step

Compared to open loop tests, PDS section EXT_PA_CFG is updated:

- Field MAX_GAIN is set to 140, i.e., maximum FEM small signal gain of 35 dB
- Field NB_OF_POINTS is set 16 to control FEM in closed loop

The PDS section EXT_PA_CFG for FEM3 controlled in closed loop is shown below

```
EXT_PA_CFG: {
  PA_USED: yes,
  MAX_GAIN: 140,
  CFG_POUT_VS_VDET: {
    NB_OF_POINTS: 16,
    VDET_VAL: [801, 775, 748, 726, 696, 673, 644, 619, 598, 570, 548, 490, 446, 390, 352, 303],
    POUT_VAL: [112, 108, 104, 100, 96, 92, 88, 84, 80, 76, 72, 64, 56, 48, 40, 32]
  }
}
```

DSSS measurements performed in closed loop show greater output power error at low Vdet compared to measurements in open loop for same reason as with FEM1, resulting in error between -1.44 and + 1.31 dB with an average of 0.08 dB. However, the higher the target output power, the smaller the error:

- For Vdet>440 mV/ 13.75 dBm, error is - 1 /+0.91 dB with 0.09 dB average
- For Vdet>512 mV/ 16.75 dBm, error is - 0.73 /+ 0.78 dB with 0.1 dB average
- For Vdet>665 mV/ 22.8 dBm, error is - 0.3 /+ 0.7 dB with 0.14 dB average

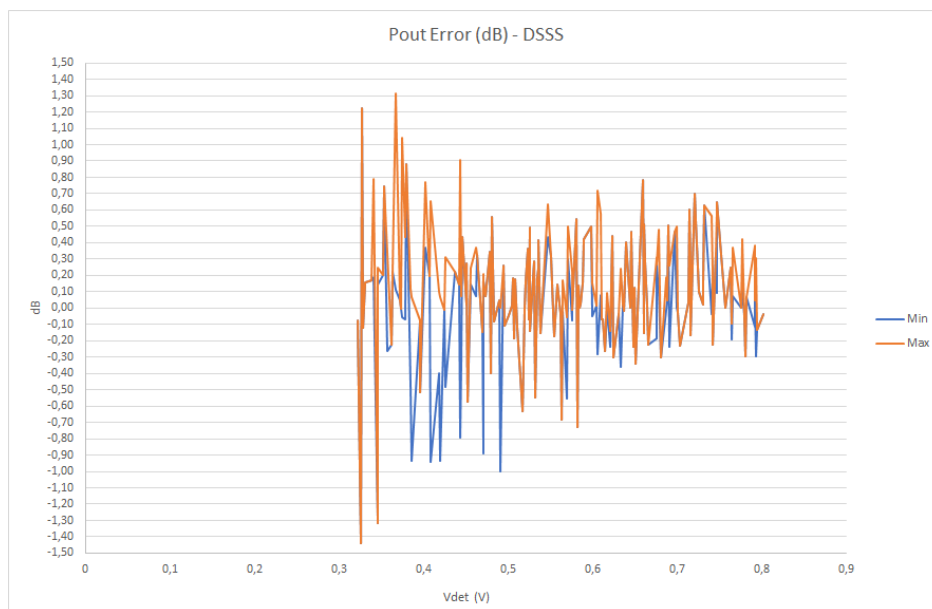


Figure 6.5. Error between Output Power Measured in DSSS Modes and FEM3 Interpolation Curve

OFDM measurements performed in closed loop do not show such error at low output power levels. Closed loop power error is between -0.7 and $+0.7$ dB with an average of -0.02 dB over voltage range 303 to 700 mV.

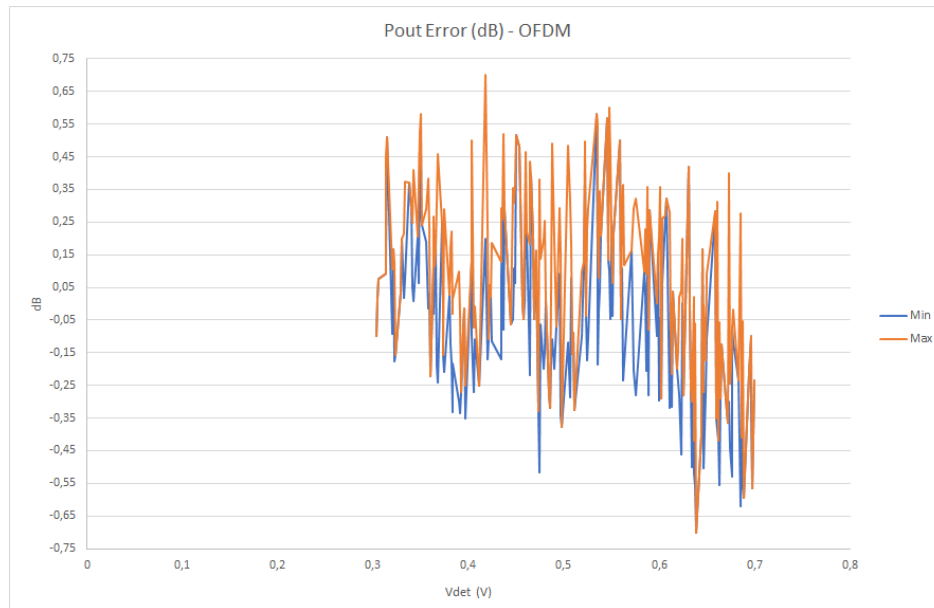


Figure 6.6. Error between Output Power Measured in OFDM Modes and FEM3 Interpolation Curve

6.4 FEM4

Measurements are performed with the following conditions:

- Typical operating conditions: 25 °C, 5 V supply
- Channels: 2412, 2442 and 2462 MHz
- Modes: 802.11b 1 and 11 Mbps, 802.11g 6 and 54 Mbps, 802.11n MCS0 and MCS7
- Target output power varying from 8 to 28 dBm in 0.5 dB step

Compared to open loop tests, PDS section EXT_PA_CFG is updated:

- Field MAX_GAIN is set to 116, i.e., maximum FEM small signal gain of 29 dB
- Field NB_OF_POINTS is set 16 to control FEM in closed loop

The PDS section EXT_PA_CFG for FEM4 controlled in closed loop is shown below

```
EXT_PA_CFG: {
  PA_USED: yes,
  MAX_GAIN: 116,
  CFG_POUT_VS_VDET: {
    NB_OF_POINTS: 16,
    VDET_VAL: [751, 729, 702, 691, 660, 646, 624, 607, 588, 563, 539, 496, 450, 403, 360, 320],
    POUT_VAL: [112, 108, 104, 100, 96, 92, 88, 84, 80, 76, 72, 64, 56, 48, 40, 32]
  }
}
```

DSSS measurements performed in closed loop show greater output power error at low Vdet compared to measurements in open loop for same reason as with FEM1, resulting in error between -1.1 and + 1.05 dB with an average of -0.18 dB. However, the higher the target output power, the smaller the maximum error:

- For Vdet>450 mV/ 14 dBm, error is -1.06 /+0.60 dB with -0.24 dB average
- For Vdet>512 mV/ 16.75 dBm, error is -1.06 /+0.25 dB with -0.27 dB average
- For Vdet>651 mV/ 23.4 dBm, error is -0.86 /+0.09 dB with -0.31 dB average

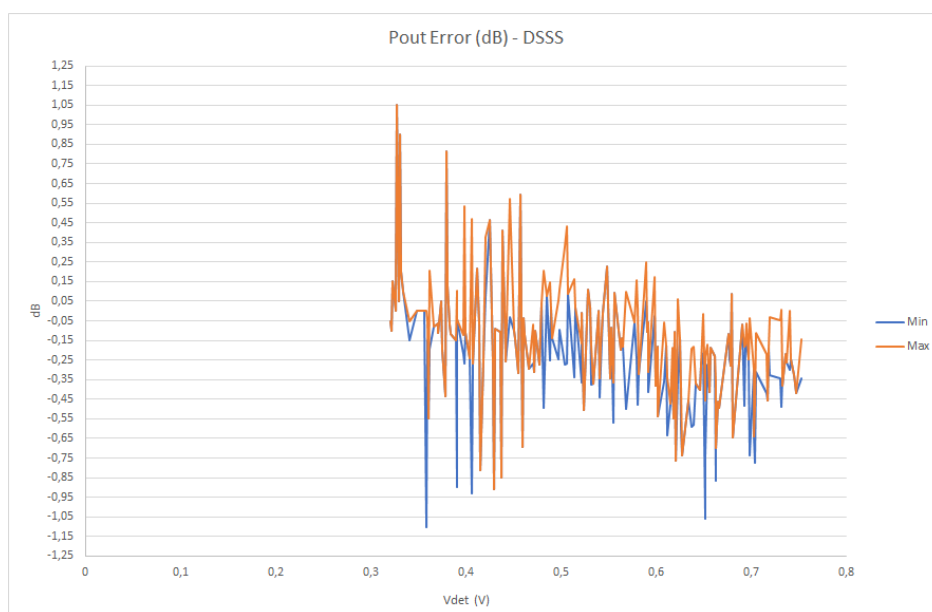


Figure 6.7. Error between Output Power Measured in DSSS Modes and FEM4 Interpolation Curve

OFDM measurements performed in closed loop do not show such error at low output power levels. Closed loop power error is similar to open loop: between -0.51 and + 0.32 dB with an average of -0.11 dB over voltage range 320 to 597 mV.

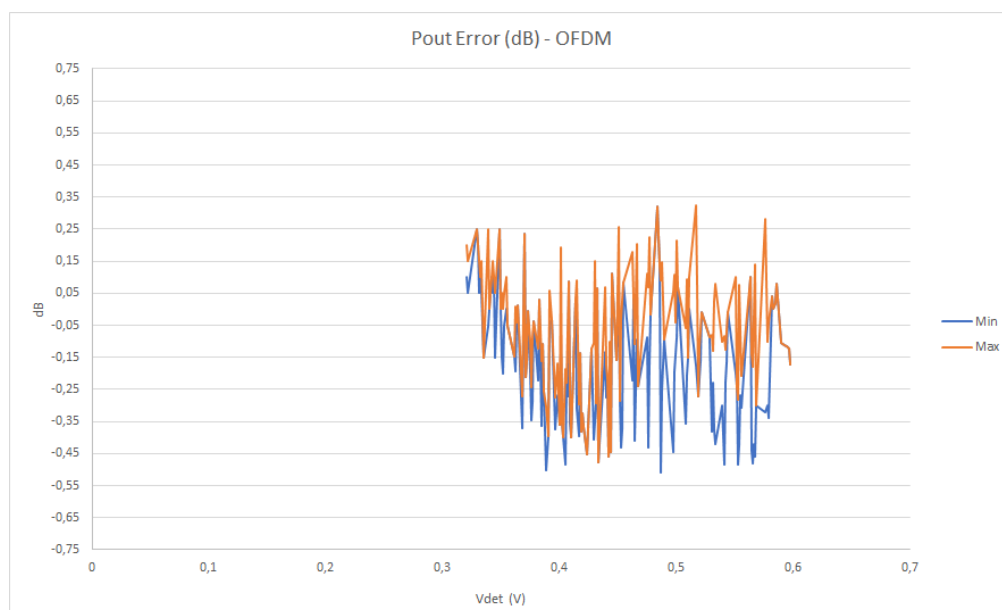


Figure 6.8. Error between Output Power Measured in OFDM Modes and FEM4 Interpolation Curve

7. TX Performance Guidelines

DUT shall comply with

- Wi-Fi TX requirements such as Spectrum Emission Mask (SEM) and Error Vector magnitude (EVM)
- Regional TX requirements applicable to Device Under Test (DUT), such as maximum output power (Pout rms for ETSI, Pout peak for FCC), maximum power spectral density (PSD) and maximum level of out of band emissions (OOB) according to maximum gain of antenna used for DUT regional certification

So DUT performance shall be assessed to fill PDS section RF_POWER_CFG with

- Field MAX_OUTPUT_POWER_QDBM is set according to DUT rms burst power measured at 2442 MHz in MCS7 using the formula
 - $\text{MAX_OUTPUT_POWER_QDBM} = \text{MIN}(27; \text{ROUND}(\text{MCS7 rms burst power} + 7.5; 0)) * 4$
 Such measurement is usually performed using Wi-Fi tester and setting field MAX_OUTPUT_POWER_QDBM of PDS section RF_POWER_CFG to a value beyond FEM capability, 120 (30 dBm) for example. The purpose of the 27 dBm limit applied in formula is to comply with the 30 dBm FCC peak power requirement, whereas factor 7.5 dB corresponds to the difference in peak to average power ratio between OFDM and DSSS modulation and code rates when measured at DUT output.
- As shown in the figure below, section BACKOFF_QDB shall contain the backoff values required to meet regional requirements for maximum antenna gain used by DUT, per
 - RF channel number
 - Group of modulation and code rate
 - MOD_GROUP_0: 802.11b 1Mbps, 2Mbps, 5.5Mbps and 11Mbps
 - MOD_GROUP_1: 802.11g 6, 9 and 12Mbps, 802.11n MCS0 and MCS1
 - MOD_GROUP_2: 802.11g 18 and 24Mbps, 802.11n MCS2 and MCS3
 - MOD_GROUP_3: 802.11g 36 and 48Mbps, 802.11n MCS4 and MCS5
 - MOD_GROUP_4: 802.11g 54Mbps, 802.11n MCS6
 - MOD_GROUP_5: 802.11n MCS7

WF200 recommended TX backoff (in unit of dB) with maximum Tx output power of 26dBm DUT tested in conducted mode with 1dB OOB margin, no margin for Pout/PSD/SEM/EVM and 0dBi maximum antenna gain																
PDS group	Frequency (MHz)															
	FCC							ETSI					Japan			
	CH1	CH2	CH3	CH4-8	CH9	CH10	CH11	CH1	CH2	CH3-11	CH12	CH13	CH1	CH2	CH3-11	CH12
MOD_GROUP_0	5	3	2	2	2	3	4	9	9	9	9	9	9	9	9	9
MOD_GROUP_1	12	9	6	6	6	7	12	7	7	7	7	7	7	7	7	7
MOD_GROUP_2	13	9	6	6	6	7	12	7	7	7	7	7	7	7	7	7
MOD_GROUP_3	12	9	6	6	6	7	12	7	7	7	7	7	7	7	7	7
MOD_GROUP_4	12	9	6	6	6	7	11	7	7	7	7	7	7	7	7	7
MOD_GROUP_5	12	9	6	6	6	7	11	7	7	7	7	7	7	7	7	7

Figure 7.1. Example of Backoff Table to Comply with Wi-Fi and Regional FCC/ETSI/Japan Requirements

Considering that each region usually requires different backoff values, it is recommended to configure WF200 with one PDS per region. If this is not achievable, then section BACKOFF_QDB shall contain for each channel number and for each MOD_GROUP the highest backoff value across all regions supported.

Note: In this application note, all measurements were performed in conducted mode at DUT RF output port and therefore assumed 0 dBi maximum antenna gain (except for FCC measurements in restricted bands where 2 dBi shall be considered). **Therefore, a DUT using greater than 0 dBi maximum antenna gain should add more backoff to values found with 0 dBi maximum antenna gain.**

7.1 Wi-Fi Requirements

7.1.1 Spectrum Emission Mask

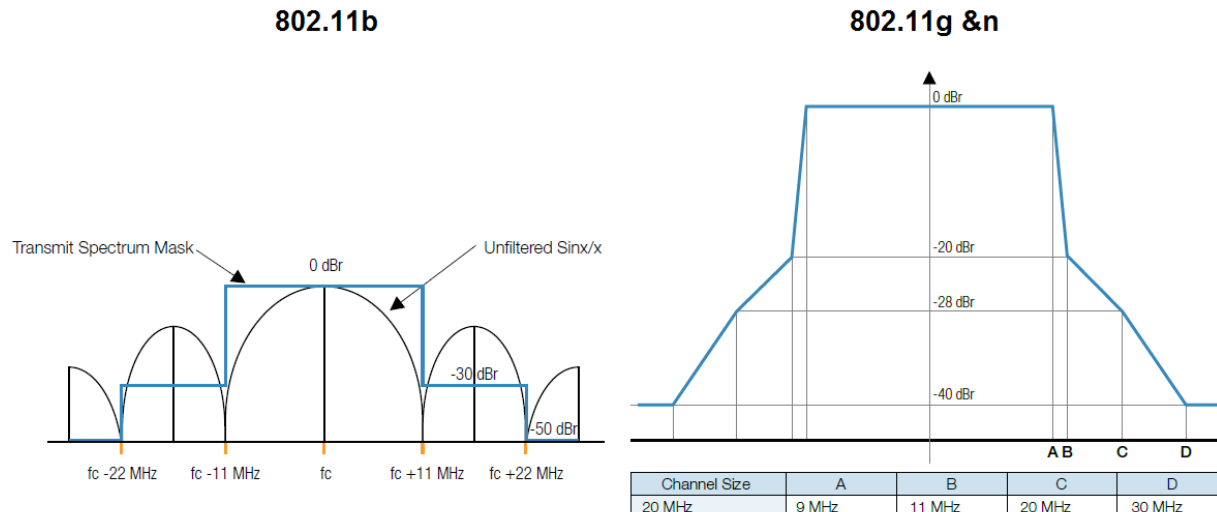


Figure 7.2. Wi-Fi SEM Requirements

7.1.2 Error Vector Magnitude

EVM requirements (dB)																		
Standard	802.11b				802.11g								802.11n					
Mode	1Mbps	2Mbps	5.5Mbps	11Mbps	6Mbps	9Mbps	12Mbps	18Mbps	24Mbps	36Mbps	48Mbps	54Mbps	MCS0	MCS1	MCS2	MCS3	MCS4	MCS5
Limit	35%				-5,0	-10,0	-13,0	-16,0	-19,0	-22,0	-25,0	-27,0	-5,0	-10,0	-13,0	-16,0	-19,0	-22,0

Figure 7.3. Wi-Fi EVM Requirements

7.2 Regional Requirements

7.2.1 FCC

7.2.1.1 Maximum Output Power

For system using digital modulation in the 2400-2483.5 MHz band with a maximum antenna gain of 6dBi, the maximum peak conducted output power shall not exceed 1 watt (30 dBm).

Some regulatory agencies permit the maximum conducted (average) output power to be measured as an alternative to the maximum peak conducted output power for determining compliance to the limit. In this application note, maximum peak conducted output power is assumed.

7.2.1.2 Power Spectral Density

The Power Spectral Density (PSD) at the antenna port shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

Compliance to FCC PSD requirement was manually checked without any backoff on FEM delivering maximum output power (FEM3). Measurements use method 11.10.2 of ANSI C.63.10-2013 with a duration of 170 seconds corresponding to 50 sweeps of 3.4 seconds each. Better than 1.5 dB margin was measured, worst case being in DSSS. Therefore, this requirement is not tested for other FEMs.

7.2.1.3 Out Of Band emission

OOB margin is measured at DUT antenna port, ie with 0dBi DUT antenna gain: OOB_margin_0dBi.

Considering maximum antenna gain G (in dBi) used by DUT for certification, DUT OOB margin becomes:

- DUT OOB margin in FCC restricted bands = OOB_margin_0dBi – max(G , 2 dBi), per ANSI C63.10-2013
- DUT OOB margin in FCC nonrestricted bands = OOB_margin_0dBi for antenna gain up to 6 dBi
- DUT OOB margin in ETSI and Japan region = OOB_margin_0dBi – G

For RF channels 1 to 11 [2412-2462 MHz], level of TX spurious emission shall be

- Less than 74 dBuV/m at 3 meters (or -21.2 dBm/MHz) peak for restricted bands [2310 to 2390 MHz] and [2483.5 to 2500 MHz]
- Less than 54 dBuV/m at 3 meters (or -41.2 dBm/MHz) average for restricted bands [2310 to 2390 MHz] and [2483.5 to 2500 MHz]
- 20 dB below in band peak level (RBW=100 kHz) or less than 74 dBuV/m (-31.2 dBm/100 kHz) peak for nonrestricted bands [2390 to 2400 MHz] and [2500 to 2690 MHz]
- 30 dB below in band average level (RBW=100 kHz) or less than 54 dBuV/m (-51.2 dBm/100 kHz) average for nonrestricted bands [2390 to 2400 MHz] and [2500 to 2690 MHz]

Test consists in transmitting at maximum output power and measuring OOB_margin_0dBi with spectrum analyzer

- For restricted bands: RBW=1 MHz, VBW=3 MHz, rms detector, trace mode power average, 110 counts
- For nonrestricted bands: RBW=100 kHz, VBW=300 kHz, rms detector, trace mode power average, 110 counts

For nonrestricted bands, if average spurious level is less than -51.2 dBm/100 kHz, margin is computed as maximum between margin versus 30 dB below in-band average level and margin versus -51.2 dBm/100 kHz out of band threshold.

7.2.2 ETSI

7.2.2.1 Maximum Output Power

The maximum output power, defined as the mean Equivalent Isotropic Radiated Power (EIRP), shall not exceed 20 dBm rms. This limit shall apply for any combination of power level and intended antenna assembly.

Maximum output power (Pout_max) is measured at DUT antenna port for several backoff values and therefore assumes 0 dBi DUT antenna gain. Considering maximum antenna gain G used by DUT, maximum output power shall be reduced according to formula:

$$Pout_max = Pout_max_0dBi - G$$

For example, a DUT with 0 dBi maximum antenna gain which requires a minimum backoff of 2 dB in DSSS will require a minimum backoff of 4 dB when certified with a 2 dBi maximum antenna gain.

7.2.2.2 Power Spectral Density

The Power Spectral Density (PSD) is the mean equivalent isotropically radiated power (EIRP) spectral density in bandwidth of 1 MHz measured during a transmission burst.

For RF channels 1 to 13 [2412-2472 MHz], PSD level shall be less than 10 dBm per 1 MHz.

ETSI margin on PSD requirements is checked according to TX power backoff applied in PDS for a given RF channel, modulation and code rate. PSD margin is measured assuming 0dBi DUT antenna gain, ie PSD_margin_0dBi. Considering maximum antenna gain G used by DUT, DUT PSD margin formula becomes:

$$\text{DUT PSD margin} = \text{PSD_margin_0dBi} - G$$

For example, a DUT PSD_margin_0dBi measured at 2 dB requires at least a backoff of 1 dB when DUT is used with a 2 dBi antenna and a minimum of 1 dB margin is applied to compensate for various spread.

Test consists in

- Transmitting at maximum output power for each MOD_GROUP (DSSS 1Mbps, Legacy 9-18-36-54 Mbps, MCS7) in channels 1, 7 and 13.
- Measuring frequency F at which PSD is maximum using spectrum analyzer (span 40 MHz centered at RF channel frequency, RBW=1 MHz, VBW=3 MHz, peak detector, trace mode max hold, 110 counts).
- Measuring PSD at frequency F in frequency domain (span 3 MHz, sweep time 10 s instead of 60 s to speed up test at the expense of slightly pessimistic measurement, rms detector, trace mode max hold, 1 count) and deriving PSD margin from PSD measurement compensated by transmit duty cycle.

Note: ETSI PSD margin is on average 1 dB lower than Japan PSD margin.

7.2.2.3 Out-of-Band Emission

For RF channels 1 to 13 [2412-2472 MHz], considering 99% occupied channel bandwidth BW, level of TX spurious emission shall be

- Less than -10 dBm per MHz for bands [2400-BW to 2400 MHz[and]2483.5 to 2483.5+BW MHz]
- Less than -20 dBm per MHz for bands [2400-2BW to 2400-BW MHz[&]2483.5+BW to 2483.5+2BW MHz]
- Less than -30 dBm per MHz for bands [1000 to 2400-2BW MHz[&]2483.5+2BW to 12500 MHz]

Test procedure assumes 99% occupied channel bandwidth BW is

- 12.4 MHz for DSSS modes
- 16.4 MHz for 802.11g LEGACY modes
- 17.6 MHz for 802.11n modes

Test consists in transmitting at maximum output power and measuring OOB_margin_0dBi with spectrum analyzer (RBW=1 MHz, VBW=3 MHz, rms detector, trace mode max hold, 110 counts) between [2400-3BW to 2400 MHz[and]2483.5 to 2483.5+3BW MHz].

OOB_margin_0dBi is measured first in frequency domain to identify frequency F at which margin is lowest. Then, margin is measured again at frequency F in time domain (span 0 MHz, sweep time 30 ms, rms detector, trace mode power average, 110 counts).

Time domain measurements are usually performed by certification laboratories on gated video signal using mean level of burst power received over a single sweep. Therefore, measurement results in this report are typically 1 dB pessimistic.

7.2.3 Japan

7.2.3.1 Maximum Output Power

There is no requirement in Japan.

7.2.3.2 Power Spectral Density

For RF channels 1 to 14 [2412-2484 MHz], PSD level shall be less than 10 dBm per 1 MHz with +20% to -80% tolerance on antenna power density declared for certification.

Margin on PSD requirements is checked according to TX power backoff applied in PDS for a given RF channel, modulation and code rate. PSD margin is measured assuming 0dBi DUT antenna gain, ie PSD_margin_0dBi. Considering maximum antenna gain G used by DUT, DUT PSD margin formula becomes:

$$\text{DUT PSD margin} = \text{PSD_margin_0dBi} - G$$

For example, a DUT PSD_margin_0dBi measured at 2 dB requires at least a backoff of 1 dB when DUT is used with a 2 dBi antenna and a minimum of 1 dB margin is applied to compensate for various spread.

Test consists in

- Transmitting at maximum output power for each MOD_GROUP (DSSS 1Mbps, Legacy 9-18-36-54 Mbps, MCS7) in channels 1, 7 and 13. Channel 14 is tested only for DSSS 1 Mbps.
- Measuring frequency F at which PSD is maximum using spectrum analyzer (span 60 MHz centered at RF channel frequency, RBW=VBW=1 MHz, peak detector, trace mode max hold, 110 counts).
- Measuring PSD margin at frequency F in time domain (span 0 MHz, sweep time 30 ms, sample detector, trace mode average, 110 counts).

Time domain measurements are usually performed by certification laboratories on gated video signal using mean level of burst power received over a single sweep. Therefore, measurement results in this report are slightly pessimistic.

7.2.3.3 Out-of-Band Emission

For RF channels 1 to 13 [2412-2472 MHz], level of TX spurious emission shall be

less than 2.5 uW (-26 dBm) for frequencies lower than 2387 MHz and greater than 2496.5 MHz

less than 25 uW (-16 dBm) for bands [2387 to 2400 MHz[and]2483.5 to 2496.5 MHz]

For RF channel 14 [2484 MHz], level of TX spurious emission shall be

less than 2.5 uW (-26 dBm) for frequencies lower than 2458 MHz and greater than 2510 MHz

less than 25 uW (-16 dBm) for bands [2458 to 2471 MHz[and]2497 to 2510 MHz]

Test consists in transmitting at maximum output power and measuring OOB_margin_0dBi with spectrum analyzer (RBW=VBW=1MHz, peak detector, trace mode max hold, 110 counts) for the following frequency bands

channels 1 to 13: [1000 to 2387MHz], [2387 to 2400 MHz], [2483.5 to 2496.5 MHz], [2496.5 to 2689.5 MHz]

channel 14: [1000 to 2458MHz], [2458 to 2471 MHz], [2497 to 2510 MHz], [2510 to 2690 MHz]

OOB_margin_0dBi is measured first in frequency domain to identify frequency F at which margin is lowest. Then, margin is measured again at frequency F in time domain (span 0MHz, sweep time 30ms, sample detector, trace mode power average, 110 counts).

Note that time domain measurements are usually performed by certification laboratories on gated video signal using mean level of burst power received over a single sweep. Therefore, measurement results in this report are typically 1dB pessimistic.

7.3 Recommendations for PDS Section RF_POWER_CFG

Details of Tx closed loop performance measured with WF200+FEM1 to FEM4 is provided in Appendix A to D. According to these measurements, the following backoff tables (in dB) may be used as minimum default values to fill PDS nodes MAX_OUTPUT_POWER_QDBM and BACKOFF_QDB of section RF_POWER_CFG.

Considering for example FEM1 results in chapter 6.3.1

- Maximum rms output power used as reference is 26 dBm (MAX_OUTPUT_POWER_QDBM=104)
- Maximum 802.11b (MOD_GROUP_0) rms output power in channels 4 to 8 is
 - FCC: 24 dBm (26 dBm – 2 dB backoff)
 - ETSI, Japan: 17 dBm (26 dBm – 9 dB backoff)
- Maximum 802.11g and 802.11n (MOD_GROUP_1 to 5) rms output power in channels 4 to 8 is
 - FCC: 20 dBm (26 dBm -6 dB backoff)
 - ETSI, Japan: 19 dBm (26 dBm – 7 dB backoff)

Values of table BACKOFF_QDB were set according to Wi-Fi and regional requirements, assuming

- Maximum DUT antenna gain of 0 dBi
- 1 dB minimum out of band margin
- No margin for maximum output power, power spectral density, spectrum emission mask and error vector magnitude
- No margin for power control loop error over temperature, power supply and part to part spread

Therefore, according to DUT operating conditions and maximum DUT antenna gain, some additional backoff may be required on top of minimum default backoff values found in this chapter.

Note: PDS node BACKOFF_QDB is in 0.25 dB unit, so table values are multiplied by 4 when filling PDS.

Note: OOB measurements in Appendix A to D are rounded to the nearest decimal, so 0.97 dB is displayed in measurement result as 1.0 dB. Therefore, in order to achieve a minimum of 1 dB margin, next backoff value should be selected.

7.3.1 FEM1

WF200 recommended TX backoff (in unit of dB) with maximum Tx output power of 26dBm DUT tested in conducted mode with 1dB OOB margin, no margin for Pout/PSD/SEM/EVM and 0dBi maximum antenna gain																		
PDS group	Frequency (MHz)																	
	FCC							ETSI					Japan					
	CH1	CH2	CH3	CH4-8	CH9	CH10	CH11	CH1	CH2	CH3-11	CH12	CH13	CH1	CH2	CH3-11	CH12	CH13	CH14
MOD_GROUP_0	5	3	2	2	2	3	4	9	9	9	9	9	9	9	9	9	9	4
MOD_GROUP_1	12	9	6	6	6	7	12	7	7	7	7	7	7	7	7	7	7	NA
MOD_GROUP_2	13	9	6	6	6	7	12	7	7	7	7	7	7	7	7	7	7	
MOD_GROUP_3	12	9	6	6	6	7	12	7	7	7	7	7	7	7	7	7	7	
MOD_GROUP_4	12	9	6	6	6	7	11	7	7	7	7	7	7	7	7	7	7	
MOD_GROUP_5	12	9	6	6	6	7	11	7	7	7	7	7	7	7	7	7	7	

Figure 7.4. Maximum TX Output Power and Minimum Backoff Values Recommended for FEM1

RF_POWER_CFG: [

```

RF_PORT: RF_PORT_BOTH,
MAX_OUTPUT_POWER_QDBM: 104,
FRONT_END_LOSS_TX_QDB: 0,

```

FCC region	ETSI region	Japan region
BACKOFF_QDB: [{ CHANNEL_NUMBER: 1, BACKOFF_VAL: [20,48,52,48,48,48] }, { CHANNEL_NUMBER: 2, BACKOFF_VAL: [12,36,36,36,36,36] }, { CHANNEL_NUMBER: 3, BACKOFF_VAL: [8,24,24,24,24,24] }, { CHANNEL_NUMBER: [4, 8], BACKOFF_VAL: [8,24,24,24,24,24] }, { CHANNEL_NUMBER: 9, BACKOFF_VAL: [8,28,28,28,28,28] }, { CHANNEL_NUMBER: 10, BACKOFF_VAL: [12,28,28,28,28,28] }, { CHANNEL_NUMBER: 11, BACKOFF_VAL: [16,48,48,48,44,44] }, { CHANNEL_NUMBER: [12, 14], BACKOFF_VAL: [80, 80, 80, 80, 80, 80] }]	BACKOFF_QDB: [{ CHANNEL_NUMBER: 1, BACKOFF_VAL: [36,28,28,28,28,28] }, { CHANNEL_NUMBER: 2, BACKOFF_VAL: [36,28,28,28,28,28] }, { CHANNEL_NUMBER: [3, 11], BACKOFF_VAL: [36,28,28,28,28,28] }, { CHANNEL_NUMBER: 12, BACKOFF_VAL: [36,28,28,28,28,28] }, { CHANNEL_NUMBER: 13, BACKOFF_VAL: [36,28,28,28,28,28] }, { CHANNEL_NUMBER: 14, BACKOFF_VAL: [80, 80, 80, 80, 80, 80] }]	BACKOFF_QDB: [{ CHANNEL_NUMBER: 1, BACKOFF_VAL: [36,28,28,28,28,28] }, { CHANNEL_NUMBER: 2, BACKOFF_VAL: [36,28,28,28,28,28] }, { CHANNEL_NUMBER: [3, 11], BACKOFF_VAL: [36,28,28,28,28,28] }, { CHANNEL_NUMBER: 12, BACKOFF_VAL: [36,28,28,28,28,28] }, { CHANNEL_NUMBER: 13, BACKOFF_VAL: [36,28,28,28,28,28] }, { CHANNEL_NUMBER: 14, BACKOFF_VAL: [16, 80, 80, 80, 80, 80] }]

Figure 7.5. PDS Section Derived from Table Above

7.3.2 FEM2

WF200 recommended TX backoff (in unit of dB) with maximum Tx output power of 26dBm DUT tested in conducted mode with 1dB OOB margin, no margin for Pout/PSD/SEM/EVM and 0dBi maximum antenna gain																		
PDS group	Frequency (MHz)																	
	FCC							ETSI					Japan					
	CH1	CH2	CH3	CH4-8	CH9	CH10	CH11	CH1	CH2	CH3-11	CH12	CH13	CH1	CH2	CH3-11	CH12	CH13	CH14
MOD_GROUP_0	2	2	1	1	1	2	2	9	9	9	9	9	9	9	9	9	9	3
MOD_GROUP_1	12	9	6	6	6	7	12	6	6	6	6	6	6	6	6	6	6	NA
MOD_GROUP_2	13	8	6	6	6	7	12	6	6	6	6	6	6	6	6	6	6	
MOD_GROUP_3	12	8	6	6	6	7	12	6	6	6	6	6	6	6	6	6	6	
MOD_GROUP_4	12	8	6	6	6	7	12	6	6	6	6	6	6	6	6	6	6	
MOD_GROUP_5	12	8	6	6	6	7	12	6	6	6	6	6	6	6	6	6	6	

Figure 7.6. Maximum TX Output Power and Minimum Backoff Values Recommended for FEM2

RF_POWER_CFG: [

```

RF_PORT: RF_PORT_BOTH,
MAX_OUTPUT_POWER_QDBM: 104,
FRONT_END_LOSS_TX_QDB: 0,

```

FCC region	ETSI region	Japan region
BACKOFF_QDB: [BACKOFF_QDB: [BACKOFF_QDB: [
{	{	{
CHANNEL_NUMBER: 1,	CHANNEL_NUMBER: 1,	CHANNEL_NUMBER: 1,
BACKOFF_VAL: [8,48,52,48,48,48]	BACKOFF_VAL: [36,24,24,24,24,24]	BACKOFF_VAL: [36,24,24,24,24,24]
},	},	},
{	{	{
CHANNEL_NUMBER: 2,	CHANNEL_NUMBER: 2,	CHANNEL_NUMBER: 2,
BACKOFF_VAL: [8,36,32,32,32,32]	BACKOFF_VAL: [36,24,24,24,24,24]	BACKOFF_VAL: [36,24,24,24,24,24]
},	},	},
{	{	{
CHANNEL_NUMBER: 3,	CHANNEL_NUMBER: [3, 11],	CHANNEL_NUMBER: [3, 11],
BACKOFF_VAL: [4,24,24,24,24,24]	BACKOFF_VAL: [36,24,24,24,24,24]	BACKOFF_VAL: [36,24,24,24,24,24]
},	},	},
{	{	{
CHANNEL_NUMBER: [4, 8],	CHANNEL_NUMBER: 12,	CHANNEL_NUMBER: 12,
BACKOFF_VAL: [4,24,24,24,24,24]	BACKOFF_VAL: [36,24,24,24,24,24]	BACKOFF_VAL: [36,24,24,24,24,24]
},	},	},
{	{	{
CHANNEL_NUMBER:9,	CHANNEL_NUMBER: 13,	CHANNEL_NUMBER: 13,
BACKOFF_VAL: [4,28,28,28,28,28]	BACKOFF_VAL: [36,24,24,24,24,24]	BACKOFF_VAL: [36,24,24,24,24,24]
},	},	},
{	{	{
CHANNEL_NUMBER: 10,	CHANNEL_NUMBER: 14,	CHANNEL_NUMBER: 14,
BACKOFF_VAL: [8,28,28,28,28,28]	BACKOFF_VAL: [80, 80, 80, 80, 80 , 80]	BACKOFF_VAL: [12, 80, 80, 80, 80 , 80]
},	}	}
{]]
CHANNEL_NUMBER: 11,		
BACKOFF_VAL: [8,48,48,48,48,48]		
},		
{		
CHANNEL_NUMBER: [12, 14],		
BACKOFF_VAL: [80, 80, 80, 80, 80 , 80]		
}		
]		
},		

Figure 7.7. PDS Section Derived from Table Above

7.3.3 FEM3

WF200 recommended TX backoff (in unit of dB) with maximum Tx output power of 27dBm DUT tested in conducted mode with 1dB OOB margin, no margin for Pout/PSD/SEM/EVM and 0dBi maximum antenna gain																	
PDS group	Frequency (MHz)																
	FCC							ETSI					Japan				
	CH1	CH2	CH3	CH4-8	CH9	CH10	CH11	CH1	CH2	CH3-11	CH12	CH13	CH1	CH2	CH3-11	CH12	CH13
MOD_GROUP_0	3	3	0	0	0	3	3	10	10	10	11	11	10	10	10	10	10
MOD_GROUP_1	13	10	7	7	7	10	14	8	8	8	8	8	7	7	7	7	7
MOD_GROUP_2	14	9	7	7	7	10	14	8	8	7	7	7	6	6	5	5	5
MOD_GROUP_3	13	9	8	7	7	10	14	8	8	8	7	7	5	5	5	5	5
MOD_GROUP_4	13	9	7	7	7	9	14	8	8	8	8	8	5	5	5	5	5
MOD_GROUP_5	13	9	7	7	7	9	14	8	8	8	7	7	6	6	5	5	5

Figure 7.8. Maximum TX Output Power and Minimum Backoff Values Recommended for FEM3

RF_POWER_CFG: [

```

RF_PORT: RF_PORT_BOTH,
MAX_OUTPUT_POWER_QDBM: 108,
FRONT_END_LOSS_TX_QDB: 0,

```

FCC region	ETSI region	Japan region
BACKOFF_QDB: [BACKOFF_QDB: [BACKOFF_QDB: [
{	{	{
CHANNEL_NUMBER: 1,	CHANNEL_NUMBER: 1,	CHANNEL_NUMBER: 1,
BACKOFF_VAL: [12,52,56,52,52,52]	BACKOFF_VAL: [40,32,32,32,32,32]	BACKOFF_VAL: [40,28,24,20,20,24]
},	},	},
{	{	{
CHANNEL_NUMBER: 2,	CHANNEL_NUMBER: 2,	CHANNEL_NUMBER: 2,
BACKOFF_VAL: [12,40,36,36,36,36]	BACKOFF_VAL: [40,32,32,32,32,32]	BACKOFF_VAL: [40,28,24,20,20,24]
},	},	},
{	{	{
CHANNEL_NUMBER: 3,	CHANNEL_NUMBER: [3, 11],	CHANNEL_NUMBER: [3, 11],
BACKOFF_VAL: [0,28,28,32,28,28]	BACKOFF_VAL: [40,32,28,32,32,32]	BACKOFF_VAL: [40,28,20,20,20,20]
},	},	},
{	{	{
CHANNEL_NUMBER: [4, 8],	CHANNEL_NUMBER: 12,	CHANNEL_NUMBER: 12,
BACKOFF_VAL: [0,28,28,28,28,28]	BACKOFF_VAL: [44,32,28,28,32,28]	BACKOFF_VAL: [40,28,20,20,20,20]
},	},	},
{	{	{
CHANNEL_NUMBER: 9,	CHANNEL_NUMBER: 13,	CHANNEL_NUMBER: 13,
BACKOFF_VAL: [0,40,40,40,36,36]	BACKOFF_VAL: [44,32,28,28,32,28]	BACKOFF_VAL: [40,28,20,20,20,20]
},	},	},
{	{	{
CHANNEL_NUMBER: 10,	CHANNEL_NUMBER: 14,	CHANNEL_NUMBER: 14,
BACKOFF_VAL: [12,40,40,40,36,36]	BACKOFF_VAL: [80, 80, 80, 80, 80 , 80]	BACKOFF_VAL: [16, 80, 80, 80, 80 , 80]
},	}	}
{]]
CHANNEL_NUMBER: 11,		
BACKOFF_VAL: [12,56,56,56,56,56]		
},		
{		
CHANNEL_NUMBER: [12, 14],		
BACKOFF_VAL: [80, 80, 80, 80, 80 , 80]		
}		
]		

Figure 7.9. PDS Section Derived from Table Above

7.3.4 FEM4

WF200 recommended TX backoff (in unit of dB) with maximum Tx output power of 27dBm DUT tested in conducted mode with 1dB OOB margin, no margin for Pout/PSD/SEM/EVM and 0dBi maximum antenna gain																		
PDS group	Frequency (MHz)																	
	FCC							ETSI					Japan					
	CH1	CH2	CH3	CH4-8	CH9	CH10	CH11	CH1	CH2	CH3-11	CH12	CH13	CH1	CH2	CH3-11	CH12	CH13	CH14
MOD_GROUP_0	6	6	3	0	3	5	5	10	10	10	10	10	10	10	10	9	9	4
MOD_GROUP_1	13	10	6	6	6	10	13	6	6	6	6	6	6	6	6	6	6	NA
MOD_GROUP_2	13	10	8	6	6	9	13	6	6	6	6	6	6	6	6	6	6	
MOD_GROUP_3	13	10	8	6	6	9	13	6	6	6	6	6	6	6	6	6	6	
MOD_GROUP_4	12	10	6	6	6	9	12	6	6	6	6	6	6	6	6	6	6	
MOD_GROUP_5	12	10	6	6	6	9	12	6	6	6	6	6	6	6	6	6	6	

Figure 7.10. Maximum TX Output Power and Minimum Backoff Values Recommended for FEM4

RF_POWER_CFG: [

```

RF_PORT: RF_PORT_BOTH,
MAX_OUTPUT_POWER_QDBM: 108,
FRONT_END_LOSS_TX_QDB: 0,

```

FCC region	ETSI region	Japan region
BACKOFF_QDB: [BACKOFF_QDB: [BACKOFF_QDB: [
{	{	{
CHANNEL_NUMBER: 1,	CHANNEL_NUMBER: 1,	CHANNEL_NUMBER: 1,
BACKOFF_VAL: [24,52,52,52,48,48]	BACKOFF_VAL: [40,24,24,24,24,24]	BACKOFF_VAL: [40,24,24,24,24,24]
},	},	},
{	{	{
CHANNEL_NUMBER: 2,	CHANNEL_NUMBER: 2,	CHANNEL_NUMBER: 2,
BACKOFF_VAL: [24,40,40,40,40,40]	BACKOFF_VAL: [40,24,24,24,24,24]	BACKOFF_VAL: [40,24,24,24,24,24]
},	},	},
{	{	{
CHANNEL_NUMBER: 3,	CHANNEL_NUMBER: [3, 11],	CHANNEL_NUMBER: [3, 11],
BACKOFF_VAL: [12,24,32,32,24,24]	BACKOFF_VAL: [40,24,24,24,24,24]	BACKOFF_VAL: [40,24,24,24,24,24]
},	},	},
{	{	{
CHANNEL_NUMBER: [4, 8],	CHANNEL_NUMBER: 12,	CHANNEL_NUMBER: 12,
BACKOFF_VAL: [0,24,24,24,24,24]	BACKOFF_VAL: [40,24,24,24,24,24]	BACKOFF_VAL: [36,24,24,24,24,24]
},	},	},
{	{	{
CHANNEL_NUMBER: 9,	CHANNEL_NUMBER: 13,	CHANNEL_NUMBER: 13,
BACKOFF_VAL: [12,40,36,36,36,36]	BACKOFF_VAL: [40,24,24,24,24,24]	BACKOFF_VAL: [36,24,24,24,24,24]
},	},	},
{	{	{
CHANNEL_NUMBER: 10,	CHANNEL_NUMBER: 14,	CHANNEL_NUMBER: 14,
BACKOFF_VAL: [20,40,36,36,36,36]	BACKOFF_VAL: [80, 80, 80, 80, 80, 80]	BACKOFF_VAL: [16, 80, 80, 80, 80, 80]
},	}	}
{]]
CHANNEL_NUMBER: 11,		
BACKOFF_VAL: [20,52,52,52,48,48]		
},		
{		
CHANNEL_NUMBER: [12, 14],		
BACKOFF_VAL: [80, 80, 80, 80, 80, 80]		
}		
]		
},		

Figure 7.11. PDS Section Derived from Table Above

8. Appendix A: FEM1 TX Closed Loop Test Results

8.1 FCC

MOD_GROUP_0 (DSSS 1 Mps tested)

DSSS OOB Margin according to backoff applied in PDS - Restricted Band

FCC		Frequency (MHz)										
	backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462
DSSS_1	0			-6,2			6,1			-0,5		
	1	-11,1	-11,2	-6,3			6,1			-0,3	-7,4	-7,2
	2	-6,5	-4,9	4,2			11,3			6,3	-0,5	-2,9
	3	-1,6	3,6	6,7						8,6	5,7	1,3
	4	2,4	5,7								6,6	3,3
	5	5,5	7,5								8,5	6,7
	6											
	7											
	8											
	9											
	10											

DSSS OOB Margin according to PDS backoff - Non-Restricted Band

FCC		Frequency (MHz)										
DSSS_1	backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462
	0						41,5					
	1	-2,7	3,5				41,2				34,5	33,8
	2	6,3	19,7				46,1				40,6	33,0
	3	10,4	18,0								42,8	38,7
	4											

DSSS Peak Burst Power according to PDS backoff - Restricted Band

FCC		Frequency (MHz)										
DSSS_1	backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462
	0			27,6			27,5			27,4		
	1	27,7	27,7	27,6			27,5			27,4	27,3	27,3
	2	26,2	26,2	26,2			26,3			26,3	26,4	26,3
	3	25,5	25,4	25,5						25,6	25,5	25,5
	4	24,7	24,6								24,7	24,7
	5	23,9	23,8								23,9	24,0
	6											
	7											
	8											
	9											
	10											

DSSS Peak Burst Power according to PDS backoff - Non-Restricted Band

FCC		Frequency (MHz)										
DSSS_1	backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462
	0						27,4					
	1	27,7	27,7				27,6				27,3	27,2
	2	26,3	26,3				26,3				26,4	26,4
	3	25,5	25,4								25,5	25,6
	4											

DSSS EVM Margin according to backoff applied in PDS - Restricted Band

FCC		Frequency (MHz)										
	backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462
DSSS_1	0			31,1			31,0			30,3		
	1	31,1	31,3	31,1			31,0			30,8	30,4	31,1
	2	30,5	31,3	30,9			31,2			31,2	31,1	31,0
	3	31,0	30,8	30,8						30,9	30,7	30,9
	4	31,0	31,3								30,8	31,3
	5	30,8	31,1								31,1	30,8
	6											
	7											
	8											
	9											
	10											

DSSS EVM Margin according to PDS backoff - Non-Restricted Band

FCC		Frequency (MHz)										
DSSS_1	backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462
	0						31,1					
	1	31,1	31,1				31,1				30,9	31,0
	2	30,9	31,0				30,6				31,0	30,7
	3	31,0	30,7								31,0	31,0
	4											

DSSS SEM Margin according to backoff applied in PDS - Restricted Band

FCC		Frequency (MHz)										
DSSS_1	backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462
	0			-3,0			-2,7			-2,5		
	1	-2,6	-2,5	-3,1			-2,6			-2,4	-2,1	-2,3
	2	0,5	0,8	1,0			1,5			2,4	2,7	2,1
	3	5,1	5,6	5,5						6,5	7,3	7,1
	4	9,9	9,9								10,5	9,9
	5	11,3	11,1								10,8	10,5
	6											
	7											
	8											
	9											
	10											

DSSS SEM Margin according to PDS backoff - Non-Restricted Band

FCC		Frequency (MHz)										
DSSS_1	backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462
	0						-3,1					
	1	-2,6	-3,0				-2,8				-2,5	-1,9
	2	0,8	-0,1				1,5				2,6	1,9
	3	5,2	5,9								7,3	7,1
	4											

MOD_GROUP_1 (802.11g 6 Mbps tested)

LEG_OFDM OOB Margin according to backoff applied in PDS - Restricted Band

FCC		Frequency (MHz)										
LEG_6Mbps	backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462
	4											
	5											
	6			4,2						7,1		
	7		1,5	3,9			11,3			7,1	4,8	
	8		1,9	4,6			11,5			7,4	4,6	
	9	-0,3	3,3	5,9			12,5			7,7	4,8	1,1
	10	1,3	4,5	7,1			12,1			8,7	5,3	2,1
	11	2,7	5,7									3,4
	12	3,6										4,3
	13	4,8										5,7
	14											6,0

LEG_OFDM OOB Margin according to PDS backoff - Non-Restricted Band

FCC		Frequency (MHz)										
LEG_6Mbps	backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462
	6						36,3					
	7		12,9				35,9				33,0	
	8		13,2								33,0	
	9	9,3										31,2
	10	10,0										31,4

LEG_OFDM Peak Burst Power according to PDS backoff - Restricted Band

FCC		Frequency (MHz)										
LEG_6Mbps	backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462
	4											
	5											
	6											
	7											
	8											
	9											
	10											
	11											
	12											
	13											
	14											
	4											
	5											
	6											

LEG_OFDM Peak Burst Power according to PDS backoff - Non-Restricted Band

FCC		Frequency (MHz)										
LEG_6Mbps	backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462
	6											
	7		26,6				26,3					
	8		26,6				26,4				25,9	
	9	26,1									26,2	
	10	25,5										26,1

LEG_OFDM EVM Margin according to backoff applied in PDS - Restricted Band

FCC		Frequency (MHz)										
LEG_6Mbps	backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462
	4											
	5											
	6			24,5			25,3			26,0		
	7		24,1	24,4			25,5			26,0	26,2	
	8		24,9	24,8			25,5			26,1	25,7	
	9	26,6	26,2	26,5			26,3			26,5	26,1	26,4
	10	27,1	27,2	27,1			27,1			26,9	26,9	26,8
	11	27,6	27,6								27,2	27,1
	12	27,6										27,4
	13	27,8										27,2
	14											27,7

LEG_OFDM EVM Margin according to PDS backoff - Non-Restricted Band

FCC		Frequency (MHz)										
LEG_6Mbps	backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462
	6											
	7											
	8											
	9											
	10											

LEG_OFDM SEM Margin according to backoff applied in PDS - Restricted Band

FCC		Frequency (MHz)										
LEG_6Mbps	backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462
	4											
	5											
	6											
	7		14,3	13,4			14,0			14,1		
	8		14,3	13,9			14,3			14,1	14,1	
	9	14,3	14,3	13,9			13,9			14,5	14,2	14,0
	10	13,7	13,9	13,7			14,2			14,0	14,1	14,1
	11	14,8	14,0								14,0	13,9
	12	14,8										14,9
	13	14,4										13,9
	14											13,9

LEG_OFDM SEM Margin according to PDS backoff - Non-Restricted Band

FCC		Frequency (MHz)										
	backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462
LEG_6Mbps	6						14,3					
	7		14,1				13,6				13,9	
	8		14,1								14,5	
	9	14,1										14,2
	10	14,3										13,8

MOD_GROUP_2 (802.11n MCS3 tested)

MM_OFDM OOB Margin according to backoff applied in PDS - Restricted Band

FCC		Frequency (MHz)										
	backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462
MM_MCS3	4											
	5											
	6			3,9			12,0			7,0		
	7		0,5	3,6			12,0			7,0	4,5	
	8		1,4	4,5			12,0			6,9	4,7	
	9		3,5	6,2			13,2			7,9	5,0	
	10	0,5	4,6	7,2			13,6			8,7	6,0	1,5
	11	2,0	5,8							7,2	2,6	
	12	2,9									3,5	
	13	4,3									4,7	
	14	5,2									5,4	

MM_OFDM OOB Margin according to PDS backoff - Non-Restricted Band

FCC		Frequency (MHz)										
	backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462
MM_MCS3	6						32,6					
	7		7,3				32,6				30,8	
	8		8,9								30,6	
	9											
	10	6,8										28,7
	11											

MM_OFDM Peak Burst Power according to PDS backoff - Restricted Band

FCC		Frequency (MHz)										
	backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462
MM_MCS3	4											
	5											
	6			26,9			26,7			26,4		
	7		27,0	27,0			26,7			26,5	26,4	
	8		26,6	26,6			26,6			26,4	26,3	
	9		26,0	25,9			26,2			26,1	26,0	
	10	25,1	25,3	25,3			25,3			25,4	25,3	25,2
	11	24,2	24,4							24,6	24,4	
	12	23,8									23,5	
	13	22,5									22,8	
	14	21,8									21,4	

MM_OFDM Peak Burst Power according to PDS backoff - Non-Restricted Band

FCC		Frequency (MHz)										
	backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462
MM_MCS3	6						26,7					
	7		27,0				26,6				26,4	
	8		26,7								26,4	
	9											
	10	25,0										25,2
	11											

MM_OFDM EVM Margin according to backoff applied in PDS - Restricted Band

FCC		Frequency (MHz)										
	backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462
MM_MCS3	4											
	5											
	6			13,1			14,0			14,5		
	7		12,8	13,3			14,0			14,8	14,8	
	8		13,7	13,9			14,2			14,7	14,4	
	9		15,4	15,4			15,0			15,1	15,4	
	10	15,8	15,8	15,8			15,9			15,7	15,1	15,6
	11	16,1	16,4							15,6	15,9	
	12	16,1									16,2	
	13	16,5									16,0	
	14	16,5									16,1	

MM_OFDM EVM Margin according to PDS backoff - Non-Restricted Band

FCC		Frequency (MHz)										
	backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462
MM_MCS3	6						14,3					
	7		12,8				14,3				14,8	
	8		14,0								14,8	
	9											
	10	15,7										15,6
	11											

MM_OFDM SEM Margin according to backoff applied in PDS - Restricted Band

FCC		Frequency (MHz)										
	backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462
MM_MCS3	4											
	5											
	6			6,4			6,4			6,5		
	7		6,1	6,3			6,4			6,8	6,7	
	8		6,0	5,6			6,3			6,5	6,6	
	9		6,3	6,5			6,2			6,8	6,5	
	10	6,8	7,0	7,0			6,7			6,9	6,4	6,9
	11	7,9	7,3							7,3	7,1	
	12	7,6									6,7	
	13	7,4									6,8	
	14	7,0									5,9	

MM_OFDM SEM Margin according to PDS backoff - Non-Restricted Band

FCC		Frequency (MHz)										
	backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462
MM_MCS3	6						6,4					
	7		6,0				6,5				6,8	
	8		6,4								6,9	
	9											
	10	7,3										7,2
	11											

MOD_GROUP_3 (802.11n MCS4 tested)

MM_OFDM OOB Margin according to backoff applied in PDS - Restricted Band

FCC		Frequency (MHz)										
	backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462
MM_MCS4	4											
	5											
	6			3,4		12,0				6,9		
	7		0,3	3,3		12,0				7,1	4,4	
	8		1,5	4,4		11,9				6,9	4,3	
	9		3,3	6,0		13,0				7,8	5,2	
	10	0,7	4,7	7,5		13,9				9,1	6,3	0,9
	11	2,7	6,3							7,4	3,0	
	12	3,3										3,6
	13	4,5										5,4
	14	5,8										6,2

MM_OFDM OOB Margin according to PDS backoff - Non-Restricted Band

FCC		Frequency (MHz)										
	backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462
MM_MCS4	6						31,8					
	7		7,8				31,9				30,5	
	8		9,8								30,6	
	9											
	10	7,6										28,8

MM_OFDM Peak Burst Power according to PDS backoff - Restricted Band

FCC		Frequency (MHz)										
	backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462
MM_MCS4	4											
	5											
	6			27,3		27,0				26,8		
	7		27,1	27,2		26,9				26,7	26,7	
	8		27,0	26,9		26,8				26,7	26,6	
	9		26,2	26,4		26,4				26,4	26,4	
	10	25,4	25,8	25,4		25,8				25,8	25,6	25,8
	11	24,6	24,5							24,8	24,9	
	12	23,9										24,0
	13	23,0										22,9
	14	22,1										22,0

MM_OFDM Peak Burst Power according to PDS backoff - Non-Restricted Band

FCC		Frequency (MHz)										
	backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462
MM_MCS4	6						27,0					
	7		27,1				27,0				26,5	
	8		26,8								26,6	
	9											
	10	25,5										25,8

MM_OFDM EVM Margin according to backoff applied in PDS - Restricted Band

FCC		Frequency (MHz)										
	backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462
MM_MCS4	4											
	5											
	6			11,3		12,2				12,4		
	7		10,8	11,1		12,1				12,6	12,6	
	8		12,1	12,3		12,7				12,5	12,4	
	9		13,2	12,7		13,2				13,1	13,0	
	10	13,5	13,2	13,5		12,9				13,3	13,2	13,2
	11	13,3	13,4								13,2	13,4
	12	13,5										13,1
	13	13,4										13,3
	14	13,5										13,5

MM_OFDM EVM Margin according to PDS backoff - Non-Restricted Band

FCC		Frequency (MHz)										
	backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462
MM_MCS4	6						11,8					
	7		10,7				12,3				12,8	
	8		12,0								12,7	
	9											
	10	13,4										13,2

MM_OFDM SEM Margin according to backoff applied in PDS - Restricted Band

FCC		Frequency (MHz)										
	backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462
MM_MCS4	4											
	5											
	6			5,8		6,6				6,7		
	7		5,9	5,9		5,9				6,6	6,9	
	8		6,4	6,4		6,2				6,5	6,6	
	9		7,0	6,6		6,6				6,7	7,0	
	10	6,8	6,5	6,5		6,5				6,9	6,5	6,6
	11	7,8	7,3							7,3	7,5	
	12	7,3										7,2
	13	7,1										7,0
	14	7,5										6,6

MM_OFDM SEM Margin according to PDS backoff - Non-Restricted Band

FCC		Frequency (MHz)										
	backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462
MM_MCS4	6						5,8					
	7		6,1				5,9				6,8	
	8		6,2								6,9	
	9											
	10	6,9										6,9

MOD_GROUP_4 (802.11n MCS6 tested)

MM_OFDM OOB Margin according to backoff applied in PDS - Restricted Band

FCC		Frequency (MHz)										
	backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462
MM_MCS6	4											
	5											
	6			3,7		12,1				7,0		
	7		0,1	3,5		12,2				7,1	4,5	
	8		1,4	4,4		12,2				7,1	4,4	
	9		3,1	6,1		13,1				8,3	5,3	
	10	0,8	5,2	7,4		14,1				9,3	6,5	1,5
	11	2,9	6,1							7,8	3,1	
	12	3,8									4,3	
	13	4,9									5,5	
	14	5,9									6,2	

MM_OFDM OOB Margin according to PDS backoff - Non-Restricted Band

FCC		Frequency (MHz)										
	backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462
MM_MCS6	6							31,2				
	7		7,8					32,0			31,2	
	8		9,2								30,1	
	9											
	10	7,8										28,4
	11											

MM_OFDM Peak Burst Power according to PDS backoff - Restricted Band

FCC		Frequency (MHz)										
	backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462
MM_MCS6	4											
	5											
	6			27,0		27,0				26,8		
	7		27,3	27,2		26,9				26,5	26,6	
	8		26,8	26,9		26,7				26,7	26,5	
	9		26,0	26,2		26,3				26,2	26,2	
	10	25,4	25,5	25,5		25,6				25,6	25,6	25,7
	11	24,4	25,0							24,6	24,6	
	12	23,9									24,1	
	13	22,8									22,8	
	14	22,0									22,3	

MM_OFDM Peak Burst Power according to PDS backoff - Non-Restricted Band

FCC		Frequency (MHz)										
	backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462
MM_MCS6	6							26,8				
	7		27,1					26,9			26,6	
	8		26,8								26,6	
	9											
	10	25,6										25,6
	11											

MM_OFDM EVM Margin according to backoff applied in PDS - Restricted Band

FCC		Frequency (MHz)										
	backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462
MM_MCS6	4											
	5											
	6			5,1		5,9				6,5		
	7		4,7	5,0		6,1				6,4	6,8	
	8		6,2	5,9		6,1				6,3	6,4	
	9		7,0	6,8		7,1				7,2	6,7	
	10	7,4	7,3	7,1		7,2				7,0	6,8	7,0
	11	7,1	6,8							7,2	6,7	
	12	7,3									7,0	
	13	7,6									6,9	
	14	7,3									7,5	

MM_OFDM EVM Margin according to PDS backoff - Non-Restricted Band

FCC		Frequency (MHz)										
	backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462
MM_MCS6	6							6,2				
	7		4,8					6,2			6,2	
	8		6,2								6,6	
	9											
	10	7,2										7,1
	11											

MM_OFDM SEM Margin according to backoff applied in PDS - Restricted Band

FCC		Frequency (MHz)										
	backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462
MM_MCS6	4											
	5											
	6			6,1		6,3				7,1		
	7		6,0	5,8		6,3				6,8	6,9	
	8		6,2	6,5		6,2				6,8	6,5	
	9		7,0	6,1		6,8				6,5	6,8	
	10	6,9	6,7	6,7		6,3				6,4	6,7	7,0
	11	8,0	7,7							7,3	7,6	
	12	7,9									7,1	
	13	7,3									7,2	
	14	7,5									6,5	

MM_OFDM SEM Margin according to PDS backoff - Non-Restricted Band

FCC		Frequency (MHz)										
	backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462
MM_MCS6	6							6,4				
	7		6,1					6,9			6,3	
	8		6,2								6,5	
	9											
	10	6,5										6,8
	11											

MOD_GROUP_5 (802.11n MCS7)

MM_OFDM OOB Margin according to backoff applied in PDS - Restricted Band

FCC		Frequency (MHz)										
	backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462
MM_MCS7	4											
	5											
	6			3,7		12,2			7,3			
	7		0,2	3,4		12,3			7,1	4,7		
	8		1,6	4,7		12,2			7,2	4,6		
	9		3,5	6,3		13,3			8,3	5,1		
	10	1,0	4,9	7,9		14,0			9,5	6,5	1,5	
	11	2,3	6,3						7,9	3,1		
	12	3,9								4,0		
	13	5,2								5,4		
	14	5,5									5,9	

MM_OFDM OOB Margin according to PDS backoff - Non-Restricted Band

FCC		Frequency (MHz)										
	backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462
MM_MCS7	6						30,1					
	7		8,4				31,4				30,2	
	8		10,2								30,2	
	9											
	10	7,6										28,2

MM_OFDM Peak Burst Power according to PDS backoff - Restricted Band

FCC		Frequency (MHz)										
	backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462
MM_MCS7	4											
	5											
	6			27,3		26,9			26,6			
	7		27,2	27,1		26,8			26,5	26,4		
	8		26,7	26,9		26,8			26,5	26,5		
	9		26,1	26,1		26,0			26,0	26,2		
	10	25,1	25,1	25,5		25,4			25,2	25,3	25,3	
	11	24,6	24,5						24,5	24,5		
	12	23,7								24,3		
	13	22,6								22,7		
	14	21,8								21,9		

MM_OFDM Peak Burst Power according to PDS backoff - Non-Restricted Band

FCC		Frequency (MHz)										
	backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462
MM_MCS7	6						26,7					
	7		27,1				27,0				26,4	
	8		26,6								26,6	
	9											
	10	25,5										25,3

MM_OFDM EVM Margin according to backoff applied in PDS - Restricted Band

FCC		Frequency (MHz)										
	backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462
MM_MCS7	4											
	5											
	6			2,8		4,2			4,3			
	7		2,5	3,2		4,1			4,6	4,4		
	8		4,0	4,0		4,3			4,4	4,4		
	9		5,2	4,9		4,7			4,9	5,2		
	10	5,0	5,3	5,5		5,2			4,8	5,2	5,1	
	11	5,4	5,3							5,3	5,4	
	12	5,5									5,4	
	13	5,9									5,3	
	14	5,8									5,4	

MM_OFDM EVM Margin according to PDS backoff - Non-Restricted Band

FCC		Frequency (MHz)										
	backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462
MM_MCS7	6						4,0					
	7		2,7				3,8				4,5	
	8		3,7								4,2	
	9											
	10	5,3										5,1

MM_OFDM SEM Margin according to backoff applied in PDS - Restricted Band

FCC		Frequency (MHz)										
	backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462
MM_MCS7	4											
	5											
	6			6,0		6,1			6,7			
	7		6,1	5,7		6,5			6,7	6,9		
	8		6,3	6,4		6,6			6,5	6,6		
	9		6,6	6,6		6,7			6,7	7,1		
	10	7,2	6,6	6,7		6,7			6,8	6,7	7,1	
	11	7,9	7,9							7,2	7,8	
	12	7,6									7,3	
	13	7,4									7,4	
	14	7,3									6,3	

MM_OFDM SEM Margin according to PDS backoff - Non-Restricted Band

FCC		Frequency (MHz)										
	backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462
MM_MCS7	6						6,6					
	7						6,3				6,3	
	8		6,2								7,0	
	9		6,9									
	10	6,6										7,4

8.2 ETSI

When DUT is already transmitting at maximum achievable output power, burst power measured does not increase when backoff value applied decreases.

MOD_GROUP_0 (DSSS 1Mbps tested) and MOD_GROUP_1 (802.11g 6 Mbps tested)

DSSS Out of Band Margin according to backoff applied in PDS (dB)

ETSI		Frequency (MHz)												
DSSS_1	backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462	2467	2472
	5													
	6	27,2	28,1					30,4					28,1	26,7
	7	27,6	28,5					30,6					29,1	27,4
	8													

LEG_OFDM Out of Band Margin according to backoff applied in PDS (dB)

ETSI		Frequency (MHz)												
LEG_6Mbps	backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462	2467	2472
	6													
	7	15,9	20,3					27,3					24,4	21,3
	8	17,7	19,7					27,2					24,7	21,5
	9													

DSSS Burst Power according to backoff applied in PDS (dB)

ETSI		Frequency (MHz)												
DSSS_1	backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462	2467	2472
	5													
	6	20,4	20,3					20,5					20,5	20,6
	7	19,6	19,5					19,6					19,5	19,7
	8													

LEG_OFDM Burst Power according to backoff applied in PDS (dB)

ETSI		Frequency (MHz)												
LEG_6Mbps	backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462	2467	2472
	6													
	7	18,9	18,7					17,9					17,1	16,9
	8	18,3	18,3					17,9					17,1	16,9
	9													

DSSS EVM Margin according to backoff applied in PDS (dB) - Non-Restricted Band

ETSI		Frequency (MHz)												
DSSS_1	backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462	2467	2472
	5													
	6	31,1	31,0					31,1					30,5	31,0
	7	31,3	30,2					31,3					31,0	30,3
	8													

LEG_OFDM EVM Margin according to backoff applied in PDS (dB) - Non-Restricted Band

ETSI		Frequency (MHz)												
LEG_6Mbps	backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462	2467	2472
	6													
	7	23,5	24,1					25,6					26,5	26,6
	8	24,9	24,9					25,5					26,4	26,6
	9													
	10													

DSSS SEM Margin according to backoff applied in PDS (dB) - Non-Restricted Band

ETSI		Frequency (MHz)												
DSSS_1	backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462	2467	2472
	5													
	6	11,4	11,3					11,6					12,2	12,0
	7	11,9	12,5					11,1					11,8	11,3
	8													

LEG_OFDM SEM Margin according to backoff applied in PDS (dB) - Non-Restricted Band

ETSI		Frequency (MHz)												
LEG_6Mbps	backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462	2467	2472
	6													
	7	14,5	14,1					13,8					14,2	13,9
	8	13,8	13,8					13,7					14,1	14,1
	9													
	10													

MOD_GROUP_2 (802.11n MCS3 tested) and MOD_GROUP_3 (802.11n MCS4 tested)

MM_OFDM Out of Band Margin according to backoff applied in PDS (dB)

ETSI		Frequency (MHz)												
MM_MCS3	backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462	2467	2472
	6													
	7	15,5	20,6					27,6					25,5	21,7
	8	17,0	21,4					27,5					25,5	20,8
	9													

MM_OFDM Out of Band Margin according to backoff applied in PDS (dB)

ETSI		Frequency (MHz)												
MM_MCS4	backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462	2467	2472
	6													
	7													
	8	18,6	21,9					27,5					25,3	22,5
	9	21,6	23,0					28,9					25,5	22,7

MM_OFDM Burst Power according to backoff applied in PDS (dB)

ETSI		Frequency (MHz)												
MM_MCS3	backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462	2467	2472
	6													
	7	18,9	18,7					17,9					17,0	16,9
	8	18,1	18,1					17,9					17,0	16,9
	9													

MM_OFDM Burst Power according to backoff applied in PDS (dB)

ETSI		Frequency (MHz)												
MM_MCS4	backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462	2467	2472
	6													
	7													
	8	18,0	18,0					18,0					17,2	17,0
	9	17,0	17,0					17,0					17,0	17,0

MM_OFDM EVM Margin according to backoff applied in PDS (dB) - Non-Restricted Band

ETSI		Frequency (MHz)												
MIMO_MCS	backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462	2467	2472
	6													
	7	12,4	12,9					14,4					15,1	15,1
	8	14,1	14,0					14,4					14,9	15,2
	9													

MM_OFDM EVM Margin according to backoff applied in PDS (dB) - Non-Restricted Band

ETSI		Frequency (MHz)												
MM_MCS4	backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462	2467	2472
	6													
	7													
	8	11,9	12,1					12,2					12,8	13,2
	9	12,8	12,5					12,8					12,7	13,1

MM_OFDM SEM Margin according to backoff applied in PDS (dB) - Non-Restricted Band

ETSI		Frequency (MHz)												
ECS MCS	backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462	2467	2472
	6													
	7	5,6	5,8					6,3					6,7	6,6
	8	6,5	6,4					6,9					7,0	6,5
	9													

MM_OFDM SEM Margin according to backoff applied in PDS (dB) - Non-Restricted Band

ETSI		Frequency (MHz)												
MM_MCS4	backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462	2467	2472
	6													
	7													
	8	6,2	6,0					6,2					6,8	7,2
	9	6,6	7,1					6,9					6,8	6,8

MOD_GROUP_4 (802.11n MCS6 tested) and MOD_GROUP_5 (802.11n MCS7)

MM_OFDM Out of Band Margin according to backoff applied in PDS (dB)

ETSI		Frequency (MHz)												
MM_MCS6	backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462	2467	2472
	6													
	7													
	8	18,6	22,4					27,8					25,4	20,6
	9	21,5	23,1					28,5					26,0	21,5

MM_OFDM Out of Band Margin according to backoff applied in PDS (dB)

ETSI		Frequency (MHz)												
MM_MCS7	backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462	2467	2472
	6													
	7													
	8	19,9	22,1					27,8					26,3	21,4
	9	22,5	24,2					28,5					25,8	22,3

MM_OFDM Burst Power according to backoff applied in PDS (dB)

ETSI		Frequency (MHz)												
MM_MCS6	backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462	2467	2472
	6													
	7													
	8	18,0	18,1					18,0					17,2	17,0
	9	17,0	17,0					17,1					17,1	17,0

MM_OFDM Burst Power according to backoff applied in PDS (dB)

ETSI		Frequency (MHz)												
MM_MCS7	backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462	2467	2472
	6													
	7													
	8	18,0	18,1					18,0					17,2	17,1
	9	17,0	17,0					17,1					17,1	17,0

MM_OFDM EVM Margin according to backoff applied in PDS (dB) - Non-Restricted Band

ETSI		Frequency (MHz)												
MM_MCS6	backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462	2467	2472
	6													
	7													
	8	6,3	5,9					6,2					6,9	6,8
	9	7,0	7,1					7,1					6,7	7,1

MM_OFDM EVM Margin according to backoff applied in PDS (dB) - Non-Restricted Band

ETSI		Frequency (MHz)												
MM_MCS7	backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462	2467	2472
	6													
	7													
	8	3,7	4,1					3,9					4,5	4,8
	9	4,5	5,0					5,1					5,2	4,7

MM_OFDM SEM Margin according to backoff applied in PDS (dB) - Non-Restricted Band

ETSI		Frequency (MHz)												
MM_MCS6	backoff [dB]	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462	2467	2472
	6													
	7													
	8	6,3	6,6					6,6				6,8	6,9	
	9	6,7	6,2					6,3				7,3	7,1	

MM_OFDM SEM Margin according to backoff applied in PDS (dB) - Non-Restricted Band

ETSI		Frequency (MHz)												
MM_MCS7	backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462	2467	2472
	6													
	7													
	8	6,5	6,6					6,2					6,9	6,4
	9	6,5	6,1					6,7					6,7	6,6

Power Spectral Density and RMS Burst Power

WF200 - PSD Margin and RMS power versus backoff (dB)

for 0dBi Max Antenna gain				Japan PSD Margin (dB)								ETSI PSD Margin (dB)								RMS Burst Power (dBm) versus ETSI requirements								
Standard	Rate, Modulation, CR	PDS group	backoff	2412	2422	2432	2442	2452	2462	2472	2484	2412	2422	2432	2442	2452	2462	2472	2484	2412	2422	2432	2442	2452	2462	2472	2484	
802.11b	1Mbps_DSSS	MOD_GROUP 0	3								-0,1	-5,2			-5,3		-5,3		23,0				23,2			22,9		
			4									1,0	-4,4			-4,4		-4,3		22,1				22,0		22,0		
			5									2,0	-3,6			-3,6		-3,5		21,1				21,1		21,0		
			6									3,0	-2,8			-2,7		-2,7		19,9				20,2		20,1		
			7	-1,5			-1,6			-1,8		-1,6			-1,8		-1,8		-1,8		19,0				19,3		19,2	
			8	-0,5			-0,6			-0,7		-0,5			-0,5		-0,5		-0,9		18,0				17,9		18,3	
			9	0,6			0,4			0,6		0,6			0,6		0,6		0,5		16,8				16,8		17,0	
			10	1,7			1,7			1,7																		
			11	2,8			2,7			2,8																		
			802.11g	9Mbps_BPSK_Code3_4	MOD_GROUP 1	4	1,5			2,9			3,4															
						5	2,2			2,5			4,1															
6	1,4						2,6			3,7		1,8			2,6			3,8			18,6			17,8		16,6		
7	1,5						2,3			3,5		1,8			2,6			3,9			18,6			17,8		16,6		
802.11g	18Mbps_QPSK_Code3_4	MOD_GROUP 2	8								2,3			2,6			5,0			18,1			17,8		16,6			
			4	2,8			3,7			4,7																		
			5	2,7			4,2			4,7																		
			6	2,9			4,0			4,7		2,5			3,4			4,6			18,7			17,7		16,5		
802.11g	36Mbps_16QAM_Code3_4	MOD_GROUP 3	7	2,8			3,7			4,7		2,5			3,4			4,7		18,7			17,7		16,6			
			8									3,4			3,4			4,7		17,9			17,8		16,6			
			4	3,2			4,2			5,2																		
			5	3,1			4,5			5,1		2,6			3,5			4,7		18,9			17,9		16,7			
802.11g	54Mbps_64QAM_Code3_4	MOD_GROUP 4	6	3,4			4,0			5,1		2,6			3,5			4,8		18,9			17,9		16,8			
			7	3,0			4,1			5,2		2,6			3,5			4,8		18,9			17,9		16,7			
			8									3,6			3,6			4,5		17,9			17,9		16,7			
			4	3,1			4,5			5,6																		
802.11g	MCS7 65Mbps_64QAM_Code5_6	MOD_GROUP 5	5	3,3			4,2			5,6																		
			6	3,4			4,0			5,5		2,3			3,6			4,3		18,9			17,9		16,7			
			7	3,4			4,7			5,6		2,3			3,3			4,6		18,9			17,9		16,7			
			8									3,2			3,2			4,3		17,9			18,0		16,7			
802.11n	MCS7 65Mbps_64QAM_Code5_6	MOD_GROUP 5	4	2,6			3,8			4,7																		
			5	2,8			4,1			5,1																		
			6	3,5			3,6			5,2		2,6			3,6			4,6		19,0			18,0		16,8			
			7	3,1			3,6			5,1		2,7			3,5			4,8		18,8			18,0		16,8			
802.11n	MCS7 65Mbps_64QAM_Code5_6	MOD_GROUP 5	8																									
			8									3,6			3,6			4,7		17,8			17,8		16,8			

8.3 Japan

Japan rms burst power measurements are not provided as there is no requirement on maximum output power. For PSD results with 0dBi maximum antenna gain, refer to the Japan column in ETSI test results.

MOD_GROUP_0 (DSSS 1Mbps tested) and MOD_GROUP_1 (802.11g 6 Mbps tested)

DSSS Out of Band Margin according to backoff applied in PDS (dB)

JAPAN	Frequency (MHz)													
backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462	2467	2472	2484
3														7,9
4														9,4
5														
6	23,3	23,7					31,5				26,0	24,0		
7	24,5	25,5					32,6				26,8	25,4		
8														

LEG_OFDM Out of Band Margin according to backoff applied in PDS (dB)

JAPAN	Frequency (MHz)													
backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462	2467	2472	2484
6														
7	8,9	13,3							29,9			19,1	15,6	
8	10,4	15,1							28,5			18,4	14,5	
9														

DSSS EVM Margin according to backoff applied in PDS (dB) - Non-Restricted Band

JAPAN	Frequency (MHz)													
backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462	2467	2472	2484
3														31,3
4														31,2
5														
6	31,3	31,4					31,0				31,4	31,3		
7	31,3	31,3					31,4				31,2	31,2		
8														

LEG_OFDM EVM Margin according to backoff applied in PDS (dB) - Non-Restricted Band

JAPAN	Frequency (MHz)													
backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462	2467	2472	2484
6														
7	23,7	24,0							25,6			26,5	26,6	
8	24,7	24,8							25,7			26,4	26,5	
9														

DSSS SEM Margin according to backoff applied in PDS (dB) - Non-Restricted Band

JAPAN	Frequency (MHz)													
backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462	2467	2472	2484
3														5,6
4														5,4
5														
6	12,0	12,0					11,4				11,1	12,3		
7	12,2	11,5					11,8				11,5	12,2		
8														

LEG_OFDM SEM Margin according to backoff applied in PDS (dB) - Non-Restricted Band

JAPAN	Frequency (MHz)													
backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462	2467	2472	2484
6														
7	14,2	13,9									14,1	14,0		
8	14,1	14,1							13,9			14,3	14,4	
9														

MOD_GROUP_2 (802.11n MCS3 tested) and MOD_GROUP_3 (802.11n MCS4 tested)

MM_OFDM Out of Band Margin according to backoff applied in PDS (dB)

JAPAN	Frequency (MHz)													
backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462	2467	2472	2484
6														
7	9,3	13,4					29,1				18,1	13,0		
8	10,8	15,0					29,4				18,4	14,8		
9														

MM_OFDM Out of Band Margin according to backoff applied in PDS (dB)

JAPAN	Frequency (MHz)													
backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462	2467	2472	2484
6														
7														
8	12,8	14,7							28,9			19,0	15,8	
9	15,1	15,6							30,4			19,1	15,6	

MM_OFDM EVM Margin according to backoff applied in PDS (dB) - Non-Restricted Band

JAPAN	Frequency (MHz)													
backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462	2467	2472	2484
6														
7	12,3	12,8					14,4				15,3	15,2		
8	14,0	14,0					14,4				14,9	15,4		
9														

MM_OFDM EVM Margin according to backoff applied in PDS (dB) - Non-Restricted Band

JAPAN	Frequency (MHz)													
backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462	2467	2472	2484
6														
7														
8	12,1	11,9					12,2					12,9	12,9	
9	12,7	12,9					13,1					13,0	13,1	

MM_OFDM SEM Margin according to backoff applied in PDS (dB) - Non-Restricted Band

JAPAN	Frequency (MHz)													
backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462	2467	2472	2484
6														
7	6,5	6,3					6,3				6,8	6,7		
8	6,3	6,2					6,7				6,9	6,7		
9														

MM_OFDM SEM Margin according to backoff applied in PDS (dB) - Non-Restricted Band

JAPAN	Frequency (MHz)													
backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462	2467	2472	2484
6														
7														
8	6,3	6,0					6,4				6,8	6,7		
9	6,6	6,7					6,8				7,0	6,9		

MOD_GROUP_4 (802.11n MCS6 tested) and MOD_GROUP_5 (802.11n MCS7)

MM_OFDM Out of Band Margin according to backoff applied in PDS (dB)

JAPAN	Frequency (MHz)													
backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462	2467	2472	2484
6														
7														
8	11,1	14,8					29,5				18,5	16,9		
9	14,0	19,3					30,1				19,2	14,9		

MM_OFDM Out of Band Margin according to backoff applied in PDS (dB)

JAPAN	Frequency (MHz)													
backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462	2467	2472	2484
6														
7														
8	12,5	15,7					29,3				18,5	17,4		
9	14,7	18,7					29,8				19,6	16,0		

MM_OFDM EVM Margin according to backoff applied in PDS (dB) - Non-Restricted Band

JAPAN	Frequency (MHz)													
backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462	2467	2472	2484
6														
7														
8	5,9	6,2					6,0				6,9	6,7		
9	7,0	6,8					7,1				7,2	6,8		

MM_OFDM EVM Margin according to backoff applied in PDS (dB) - Non-Restricted Band

JAPAN	Frequency (MHz)													
backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462	2467	2472	2484
6														
7														
8	3,9	3,9					3,9				5,0	4,7		
9	5,1	5,0					5,0				4,8	5,0		

MM_OFDM SEM Margin according to backoff applied in PDS (dB) - Non-Restricted Band

JAPAN	Frequency (MHz)													
backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462	2467	2472	2484
6														
7														
8	5,9	6,6					6,2				6,8	7,1		
9	6,5	6,3					6,8				6,8	6,7		

MM_OFDM SEM Margin according to backoff applied in PDS (dB) - Non-Restricted Band

JAPAN		Frequency (MHz)													
MIM_MCS 7	backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462	2467	2472	2484
	6														
	7														
	8	6,4	6,7					6,2					7,2	6,7	
	9	6,8	6,6					6,7					6,8	6,5	

9. Appendix B: FEM2 TX Closed Loop Test Results

9.1 FCC

MOD_GROUP_0 (DSSS 1 Mps tested)

DSSS OOB Margin according to backoff applied in PDS - Restricted Band

FCC		Frequency (MHz)										
	backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462
DSSS_1	0			-1,2			3,9			0,4		
	1	0,1	1,7	7,6			14,5			6,3	1,0	-0,5
	2	3,3	4,1	9,7			15,1			10,1	3,4	3,2
	3	5,8	7,4	11,1						12,0	6,7	6,1
	4	6,6	9,6								9,1	7,5
	5	7,6	10,7								10,9	8,3
	6											
	7											
	8											
	9											
	10											

DSSS OOB Margin according to PDS backoff - Non-Restricted Band

FCC		Frequency (MHz)										
DSSS_1	backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462
	0						44,2					
	1	9,2	16,6				46,1				43,5	41,0
	2	10,9	19,7				44,9				43,5	41,9
	3	12,0	20,5								42,4	41,6
	4											

DSSS Peak Burst Power according to PDS backoff - Restricted Band

FCC		Frequency (MHz)										
DSSS_1	backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462
	0			28,9			28,8			28,6		
	1	27,1	26,9	27,1			27,3			27,3	27,2	27,1
	2	26,2	26,3	26,4			26,4			26,5	26,4	26,3
	3	25,3	25,4	25,5						25,4	25,5	25,5
	4	24,4	24,5								24,6	24,7
	5	23,6	23,7								23,6	23,6
	6											
	7											
	8											
	9											
	10											

DSSS Peak Burst Power according to PDS backoff - Non-Restricted Band

FCC		Frequency (MHz)										
DSSS_1	backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462
	0						28,8					
	1	27,0	27,2				27,3				27,2	27,1
	2	26,2	26,3				26,4				26,4	26,5
	3	25,3	25,5								25,6	25,5
	4											

DSSS EVM Margin according to backoff applied in PDS - Restricted Band

FCC		Frequency (MHz)										
DSSS_1	backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462
	0			31,2			30,7			30,9		
	1	31,0	30,5	30,9			31,0			31,2	30,9	30,8
	2	30,7	31,3	31,2			31,0			30,9	30,4	30,6
	3	31,3	31,4	31,2						31,2	31,1	31,0
	4	30,8	31,2								31,2	31,3
	5	31,1	30,8								31,2	31,0
	6											
	7											
	8											
	9											
	10											

DSSS EVM Margin according to PDS backoff - Non-Restricted Band

FCC		Frequency (MHz)										
DSSS_1	backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462
	0						31,0					
	1	31,1	31,0				30,8				30,8	30,9
	2	30,9	30,9				30,9				31,2	31,1
	3	31,2	31,0								30,7	30,8
	4											

DSSS SEM Margin according to backoff applied in PDS - Restricted Band

FCC		Frequency (MHz)										
DSSS_1	backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462
	0			-2,1			-1,5			-0,8		
	1	8,5	8,6	8,3			8,3			7,3	8,4	8,6
	2	10,0	9,9	9,9			9,5			9,7	9,7	9,4
	3	12,0	11,6	10,4						10,9	10,7	11,1
	4	11,9	12,6								11,8	11,9
	5	12,3	13,4								10,4	11,6
	6											
	7											
	8											
	9											
	10											

DSSS SEM Margin according to PDS backoff - Non-Restricted Band

FCC		Frequency (MHz)										
DSSS_1	backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462
	0						-1,7					
	1	8,3	8,1				8,5				8,3	8,3
	2	10,3	9,9				9,5				9,6	9,0
	3	11,9	11,4								10,8	10,8
	4											

MOD_GROUP_1 (802.11g 6 Mbps tested)

LEG_OFDM OOB Margin according to backoff applied in PDS - Restricted Band

FCC		Frequency (MHz)										
LEG_6Mbps	backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462
	4											
	5											
	6											
	7											
	8											
	9											
	10											
	11											
	12											
	13											
	14											
	4											
	5											
	6											
	7											
	8											
	9											
	10											
	11											
	12											
	13											
	14											

LEG_OFDM OOB Margin according to PDS backoff - Non-Restricted Band

FCC		Frequency (MHz)										
LEG_6Mbps	backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462
	6											
	7											
	8											
	9											
	10											
	6											
	7											
	8											
	9											
	10											
	6											
	7											
	8											
	9											
	10											

LEG_OFDM Peak Burst Power according to PDS backoff - Restricted Band

FCC		Frequency (MHz)										
LEG_6Mbps	backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462
	4											
	5											
	6											
	7											
	8											
	9											
	10											
	11											
	12											
	13											
	14											
	4											
	5											
	6											
	7											
	8											
	9											
	10											
	11											
	12											
	13											
	14											

LEG_OFDM Peak Burst Power according to PDS backoff - Non-Restricted Band

FCC		Frequency (MHz)										
LEG_6Mbps	backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462
	6											
	7											
	8											
	9											
	10											
	6											
	7											
	8											
	9											
	10											
	6											
	7											
	8											
	9											
	10											

LEG_OFDM EVM Margin according to backoff applied in PDS - Restricted Band

FCC		Frequency (MHz)										
LEG_6Mbps	backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462
	4											
	5											
	6											
	7											
	8											
	9											
	10											
	11											
	12											
	13											
	14											
	4											
	5											
	6											
	7											
	8											
	9											
	10											
	11											
	12											
	13											
	14											

LEG_OFDM EVM Margin according to PDS backoff - Non-Restricted Band

FCC		Frequency (MHz)										
LEG_6Mbps	backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462
	6											
	7											
	8											
	9											
	10											
	6											
	7											
	8											
	9											
	10											
	6											
	7											
	8											
	9											
	10											

LEG_OFDM SEM Margin according to backoff applied in PDS - Restricted Band

FCC		Frequency (MHz)										
LEG_6Mbps	backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462
	4											
	5											
	6											
	7											
	8											
	9											
	10											
	11											
	12											
	13											
	14											
	4											
	5											
	6											
	7											
	8											
	9											
	10											
	11											
	12											
	13											
	14											

LEG_OFDM SEM Margin according to PDS backoff - Non-Restricted Band

FCC		Frequency (MHz)										
LEG_6Mbps	backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462
	6											
	7											
	8											
	9											
	10											
	6											
	7											
	8											
	9											
	10											
	6											
	7											
	8											
	9											
	10											

MOD_GROUP_2 (802.11n MCS3 tested)

MM_OFDM OOB Margin according to backoff applied in PDS - Restricted Band

FCC		Frequency (MHz)										
	backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462
MM_MCS3	4											
	5											
	6			4,3		11,5			6,4			
	7		1,4	4,8		11,6			6,7	4,1		
	8		3,5	5,8		12,5			7,4	4,3		
	9		4,6	7,1		13,1			8,1	5,5		
	10	0,6	5,7	8,3		14,0			9,1	6,1	1,2	
	11	1,9	6,8						7,4	1,9		
	12	2,8									3,3	
	13	4,0									4,4	
	14	5,0									5,5	

MM_OFDM OOB Margin according to PDS backoff - Non-Restricted Band

FCC		Frequency (MHz)										
	backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462
MM_MCS3	6						33,5					
	7		9,9				33,4				30,4	
	8		10,7								30,1	
	9											
	10	6,7										28,3

MM_OFDM Peak Burst Power according to PDS backoff - Restricted Band

FCC		Frequency (MHz)										
	backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462
MM_MCS3	4											
	5											
	6			27,8		27,6			27,3			
	7		27,6	27,6		27,6			27,4	27,3		
	8		27,0	26,9		27,1			26,8	27,2		
	9		26,0	26,2		26,3			25,9	26,1		
	10	25,0	25,2	25,2		25,1			25,2	25,2	25,1	
	11	24,5	24,3						24,1	24,3		
	12	23,2									23,1	
	13	22,2									22,2	
	14	21,1									21,0	

MM_OFDM OOB Margin according to PDS backoff - Non-Restricted Band

FCC		Frequency (MHz)										
	backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462
MM_MCS3	6						33,5					
	7		9,9				33,4				30,4	
	8		10,7								30,1	
	9											
	10	6,7										28,3

MM_OFDM EVM Margin according to backoff applied in PDS - Restricted Band

FCC		Frequency (MHz)										
	backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462
MM_MCS3	4											
	5											
	6			14,0		14,3			14,6			
	7		14,3	14,3		14,5			14,7	14,3		
	8		14,5	14,9		14,7			15,1	14,8		
	9		15,0	14,8		14,8			14,9	14,9		
	10	14,7	15,2	14,9		15,0			15,1	15,1	15,1	
	11	15,4	15,3						15,3	15,3		
	12	15,3									15,4	
	13	15,7									15,4	
	14	15,5									15,7	

MM_OFDM EVM Margin according to PDS backoff - Non-Restricted Band

FCC		Frequency (MHz)										
	backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462
MM_MCS3	6						14,2					
	7		14,2				14,6				14,9	
	8		14,6								14,6	
	9											
	10	15,1										15,1

MM_OFDM SEM Margin according to backoff applied in PDS - Restricted Band

FCC		Frequency (MHz)										
	backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462
MM_MCS3	4											
	5											
	6			6,9		7,5			7,3			
	7		7,0	6,9		6,9			7,1	6,0		
	8		7,1	7,1		7,6			7,1	6,3		
	9		6,5	7,3		7,4			7,2	5,4		
	10	6,5	6,3	7,4		7,3			7,0	6,0	3,5	
	11	7,4	6,6							4,2	4,9	
	12	6,3									3,5	
	13	5,9									2,5	
	14	5,7									2,8	

MM_OFDM SEM Margin according to PDS backoff - Non-Restricted Band

FCC		Frequency (MHz)										
	backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462
MM_MCS3	6						7,3					
	7		7,3				7,4				5,6	
	8		6,9								4,5	
	9											
	10	6,5										4,2

MOD_GROUP_3 (802.11n MCS4 tested)

MM_OFDM OOB Margin according to backoff applied in PDS - Restricted Band

FCC		Frequency (MHz)										
	backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462
MM_MCS4	4											
	5											
	6											
	7											
	8											
	9											
	10											
	11											
	12											
	13											
	14											

MM_OFDM OOB Margin according to PDS backoff - Non-Restricted Band

FCC		Frequency (MHz)										
	backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462
MM_MCS4	6											
	7											
	8											
	9											
	10											
	6											
	7											
	8											
	9											
	10											
	6											

MM_OFDM Peak Burst Power according to PDS backoff - Restricted Band

FCC		Frequency (MHz)										
	backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462
MM_MCS4	4											
	5											
	6											
	7											
	8											
	9											
	10											
	11											
	12											
	13											
	14											

MM_OFDM Peak Burst Power according to PDS backoff - Non-Restricted Band

FCC		Frequency (MHz)										
	backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462
MM_MCS4	6											
	7											
	8											
	9											
	10											
	6											
	7											
	8											
	9											
	10											
	6											

MM_OFDM EVM Margin according to backoff applied in PDS - Restricted Band

FCC		Frequency (MHz)										
	backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462
MM_MCS4	4											
	5											
	6											
	7											
	8											
	9											
	10											
	11											
	12											
	13											
	14											

MM_OFDM EVM Margin according to PDS backoff - Non-Restricted Band

FCC		Frequency (MHz)										
	backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462
MM_MCS4	6											
	7											
	8											
	9											
	10											
	6											
	7											
	8											
	9											
	10											
	6											

MM_OFDM SEM Margin according to backoff applied in PDS - Restricted Band

FCC		Frequency (MHz)										
	backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462
MM_MCS4	4											
	5											
	6											
	7											
	8											
	9											
	10											
	11											
	12											
	13											
	14											

MM_OFDM SEM Margin according to PDS backoff - Non-Restricted Band

FCC		Frequency (MHz)										
	backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462
MM_MCS4	6											
	7											
	8											
	9											
	10											
	6											
	7											
	8											
	9											
	10											
	6											

MOD_GROUP_4 (802.11n MCS6 tested)

MM_OFDM OOB Margin according to backoff applied in PDS - Restricted Band

FCC		Frequency (MHz)										
	backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462
MM_MCS6	4											
	5											
	6											
	7		2,4	4,7			11,5			6,5	4,0	
	8		3,8	6,1			12,4			7,5	4,5	
	9		4,8	7,6			13,4			7,8	5,6	
	10	1,2	5,8	8,3			14,1			9,5	6,8	1,7
	11		2,5	7,0						7,4	2,5	
	12		3,4								3,6	
	13		5,0								4,8	
	14		5,5								6,0	

MM_OFDM OOB Margin according to PDS backoff - Non-Restricted Band

FCC		Frequency (MHz)										
	backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462
MM_MCS6	6						32,4					
	7		10,8				33,1				31,1	
	8		11,6								30,8	
	9											
	10	7,1										29,2
	11											

MM_OFDM Peak Burst Power according to PDS backoff - Restricted Band

FCC		Frequency (MHz)										
	backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462
MM_MCS6	4											
	5											
	6			28,3			28,1			27,8	27,6	
	7		27,9	28,1			27,9			27,8	27,6	
	8		27,4	27,6			27,5			27,5	27,4	
	9		26,6	26,5			26,5			26,7	26,7	
	10	25,4	25,6	25,5			25,5			25,7	25,5	25,8
	11	24,3	24,7							24,3	24,7	
	12	23,7									23,8	
	13	23,0									22,6	
	14	21,7									21,3	

MM_OFDM Peak Burst Power according to PDS backoff - Non-Restricted Band

FCC		Frequency (MHz)										
	backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462
MM_MCS6	6						28,0					
	7		28,1				28,0				27,7	
	8		27,2								27,4	
	9											
	10	25,5										25,8
	11											

MM_OFDM EVM Margin according to backoff applied in PDS - Restricted Band

FCC		Frequency (MHz)										
	backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462
MM_MCS6	4											
	5											
	6			5,6			5,6			6,1	6,3	
	7		5,8	5,9			5,8			6,0	6,3	
	8		6,1	6,1			6,2			6,3	6,1	
	9		6,2	6,4			6,2			6,3	6,2	
	10	6,4	6,3	6,4			6,3			6,0	6,7	6,6
	11	6,5	6,6							6,7	6,6	
	12	6,5									6,4	
	13	6,7									7,0	
	14	7,0									7,1	

MM_OFDM EVM Margin according to PDS backoff - Non-Restricted Band

FCC		Frequency (MHz)										
	backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462
MM_MCS6	6						5,6					
	7		5,9				5,8				6,2	
	8		6,4								6,1	
	9											
	10	6,5										6,5
	11											

MM_OFDM SEM Margin according to backoff applied in PDS - Restricted Band

FCC		Frequency (MHz)										
	backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462
MM_MCS6	4											
	5											
	6			6,8			7,4			7,6	6,0	
	7		7,4	7,4			7,2			7,3	6,0	
	8		6,9	7,3			7,1			7,0	6,6	
	9		6,8	7,8			7,7			7,2	5,1	
	10	7,1	7,3	7,3			7,3			6,9	4,7	5,0
	11	6,4	6,8							5,4	5,0	
	12	7,6									3,8	
	13	6,8									3,7	
	14	5,4									2,5	

MM_OFDM SEM Margin according to PDS backoff - Non-Restricted Band

FCC		Frequency (MHz)										
	backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462
MM_MCS6	6						7,2					
	7		7,3				7,4				6,5	
	8		7,2								5,6	
	9											
	10	7,2										5,1
	11											

MOD_GROUP_5 (802.11n MCS7)

MM_OFDM		OOB Margin according to backoff applied in PDS - Restricted Band										
MM_MCS7	FCC	Frequency (MHz)										
	backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462
	4											
	5											
	6											
	7											
	8											
	9											
	10											
	11											
	12											
	13											
	14											

MM_OFDM		OOB Margin according to PDS backoff - Non-Restricted Band										
MM_MCS7	FCC	Frequency (MHz)										
	backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462
	6											
	7											
	8											
	9											
	10											

MM_OFDM		Peak Burst Power according to PDS backoff - Restricted Band										
MM_MCS7	FCC	Frequency (MHz)										
	backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462
	4											
	5											
	6											
	7											
	8											
	9											
	10											
	11											
	12											
	13											
	14											

MM_OFDM		Peak Burst Power according to PDS backoff - Non-Restricted Band										
MM_MCS7	FCC	Frequency (MHz)										
	backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462
	6											
	7											
	8											
	9											
	10											

MM_OFDM		EVM Margin according to backoff applied in PDS - Restricted Band										
MM_MCS7	FCC	Frequency (MHz)										
	backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462
	4											
	5											
	6											
	7											
	8											
	9											
	10											
	11											
	12											
	13											
	14											

MM_OFDM		EVM Margin according to PDS backoff - Non-Restricted Band										
MM_MCS7	FCC	Frequency (MHz)										
	backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462
	6											
	7											
	8											
	9											
	10											

MM_OFDM		SEM Margin according to backoff applied in PDS - Restricted Band										
MM_MCS7	FCC	Frequency (MHz)										
	backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462
	4											
	5											
	6											
	7											
	8											
	9											
	10											
	11											
	12											
	13											
	14											

MM_OFDM		SEM Margin according to PDS backoff - Non-Restricted Band										
MM_MCS7	FCC	Frequency (MHz)										
	backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462
	6											
	7											
	8											
	9											
	10											

9.2 ETSI

When DUT is already transmitting at maximum achievable output power, burst power measured does not increase when backoff value applied decreases.

MOD_GROUP_0 (DSSS 1 Mbps tested) and MOD_GROUP_1 (802.11g 6 Mbps tested)

DSSS Out of Band Margin according to backoff applied in PDS (dB)

ETSI	Frequency (MHz)												
backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462	2467	2472
5													
6	26,3	28,1				30,3					28,5	28,1	
7	28,0	27,5				30,5					29,3	29,3	
8													

LEG_OFDM Out of Band Margin according to backoff applied in PDS (dB)

ETSI	Frequency (MHz)												
backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462	2467	2472
6													
7	17,5	20,4				27,8					25,6	21,6	
8	19,4	21,1				26,7					23,6	20,8	
9													

DSSS Burst Power according to backoff applied in PDS (dB)

ETSI	Frequency (MHz)												
backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462	2467	2472
5													
6	20,3	20,3				19,9					20,2	20,1	
7	19,2	19,1				19,1					19,1	19,1	
8													

LEG_OFDM Burst Power according to backoff applied in PDS (dB)

ETSI	Frequency (MHz)												
backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462	2467	2472
6													
7	19,0	18,9				18,4					17,7	17,6	
8	17,9	18,1				18,0					17,7	17,6	
9													

DSSS EVM Margin according to backoff applied in PDS (dB) - Non-Restricted Band

ETSI	Frequency (MHz)												
backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462	2467	2472
5													
6	30,7	31,0				30,9					31,2	31,3	
7	31,1	30,8				31,6					30,4	31,1	
8													

LEG_OFDM EVM Margin according to backoff applied in PDS (dB) - Non-Restricted Band

ETSI	Frequency (MHz)												
backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462	2467	2472
6													
7	25,2	25,3				25,8					26,2	26,2	
8	25,8	25,6				26,0					26,1	26,3	
9													

DSSS SEM Margin according to backoff applied in PDS (dB) - Non-Restricted Band

ETSI	Frequency (MHz)												
backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462	2467	2472
5													
6	11,6	12,4				12,7					10,4	11,1	
7	10,4	12,1				12,6					9,7	10,2	
8													

LEG_OFDM SEM Margin according to backoff applied in PDS (dB) - Non-Restricted Band

ETSI	Frequency (MHz)												
backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462	2467	2472
6													
7	14,8	14,7				14,8					14,0	14,1	
8	14,8	14,6				15,2					14,6	13,3	
9													

MOD_GROUP_2 (802.11n MCS3 tested) and MOD_GROUP_3 (802.11n MCS4 tested)

MM_OFDM Out of Band Margin according to backoff applied in PDS (dB)

ETSI	Frequency (MHz)												
backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462	2467	2472
6													
7	17,4	22,1				27,7					24,1	19,0	
8	19,7	22,8				28,4					24,5	20,4	
9													

MM_OFDM Out of Band Margin according to backoff applied in PDS (dB)

ETSI	Frequency (MHz)												
backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462	2467	2472
6													
7													
8	19,8	22,8				27,9					25,3	21,6	
9	23,0	24,9				28,1					26,1	23,8	

MM_OFDM Burst Power according to backoff applied in PDS (dB)

ETSI	Frequency (MHz)												
backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462	2467	2472
6													
7	18,7	18,8				18,7					18,0	17,9	
8	17,8	17,7				17,7					17,7	17,7	
9													

MM_OFDM Burst Power according to backoff applied in PDS (dB)

ETSI	Frequency (MHz)												
backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462	2467	2472
6													
7													
8	17,7	17,6				17,7					17,6	17,7	
9	16,8	16,8				16,9					16,6	16,7	

MM_OFDM EVM Margin according to backoff applied in PDS (dB) - Non-Restricted Band

ETSI	Frequency (MHz)												
backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462	2467	2472
6													
7	14,0	13,8				14,1					14,3	14,4	
8	14,4	14,6				14,4					14,7	14,5	
9													

MM_OFDM EVM Margin according to backoff applied in PDS (dB) - Non-Restricted Band

ETSI	Frequency (MHz)												
backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462	2467	2472
6													
7													
8	12,1	11,9				12,2					12,1	12,2	
9	12,1	12,2				12,2					12,3	12,5	

MM_OFDM SEM Margin according to backoff applied in PDS (dB) - Non-Restricted Band

ETSI	Frequency (MHz)												
backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462	2467	2472
6													
7	7,1	6,5				7,2					6,4	6,4	
8	7,2	6,7				7,1					6,7	5,6	
9													

MM_OFDM SEM Margin according to backoff applied in PDS (dB) - Non-Restricted Band

ETSI	Frequency (MHz)												
backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462	2467	2472
6													
7													
8	7,4	6,9				7,7					6,7	6,0	
9	7,7	6,9				7,6					6,9	6,0	

MOD_GROUP_4 (802.11n MCS6 tested) and MOD_GROUP_5 (802.11n MCS7)

MM_OFDM Out of Band Margin according to backoff applied in PDS (dB)

ETSI	Frequency (MHz)												
backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462	2467	2472
6													
7													
8	21,6	23,9					28,1				25,0	22,7	
9	23,1	23,7					28,4				26,3	21,7	

MM_OFDM Out of Band Margin according to backoff applied in PDS (dB)

ETSI	Frequency (MHz)												
backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462	2467	2472
6													
7													
8	20,9	23,7					28,5				25,6	22,2	
9	20,9	24,7					28,2				25,7	24,1	

MM_OFDM Burst Power according to backoff applied in PDS (dB)

ETSI	Frequency (MHz)												
backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462	2467	2472
6													
7													
8	17,8	17,7					17,7				17,7	17,7	
9	16,9	16,8					16,9				16,6	16,7	

MM_OFDM Burst Power according to backoff applied in PDS (dB)

ETSI	Frequency (MHz)												
backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462	2467	2472
6													
7													
8	17,8	17,6					17,7				17,9	17,7	
9	16,8	16,7					16,8				16,6	16,7	

MM_OFDM EVM Margin according to backoff applied in PDS (dB) - Non-Restricted Band

ETSI	Frequency (MHz)												
backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462	2467	2472
6													
7													
8	6,2	6,0					6,1				6,0	6,5	
9	6,2	6,3					6,1				6,4	6,2	

MM_OFDM EVM Margin according to backoff applied in PDS (dB) - Non-Restricted Band

ETSI	Frequency (MHz)												
backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462	2467	2472
6													
7													
8	4,1	4,0					3,9				4,5	4,4	
9	4,2	4,3					4,2				4,2	4,2	

MM_OFDM SEM Margin according to backoff applied in PDS (dB) - Non-Restricted Band

ETSI	Frequency (MHz)												
backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462	2467	2472
6													
7													
8	7,3	7,5					7,8				6,8	6,6	
9	7,3	7,0					7,1				6,2	5,1	

MM_OFDM SEM Margin according to backoff applied in PDS (dB) - Non-Restricted Band

ETSI	Frequency (MHz)												
backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462	2467	2472
6													
7													
8	7,3	7,5					7,5				7,1	6,1	
9	7,5	6,7					7,5				6,7	6,6	

Power Spectral Density and RMS Burst Power

WF200 - PSD Margin and RMS power versus backoff (dB)				Frequency (MHz)								Frequency (MHz)							
for 0dBi Max Antenna gain				Japan PSD Margin (dB)								ETSI PSD Margin (dB)							
Standard	Rate, Modulation, CR	PDS group	backoff	2412	2422	2432	2442	2452	2462	2472	2484	2412	2422	2432	2442	2452	2462	2472	2484
802.11b	1Mbps_DSSS	MOD_GROUP 0	3								0,4	-5,1			-4,9		-5,0		22,7
			4								1,0	-4,1			-4,0		-4,1		21,7
			5								2,2	-3,0			-3,0		-3,1		20,1
			6								3,3	-2,1			-2,2		-2,1		19,6
			7	-1,1			-1,1			-1,0		-1,1			-1,3		-1,2		18,6
			8	-0,1			-0,2			-0,3		-0,2			-0,1		-0,2		16,6
			9	1,0			1,0			0,9		0,8			0,9		0,7		16,1
			10	2,0			2,0			1,8									
			11	2,7			2,7			2,9									
			3	1,0			2,0			3,2									
			4	0,9			2,7			2,3									
802.11g	9Mbps_BPSK_Code3_4	MOD_GROUP 1	5	1,8			1,6			2,3									
			6	2,2			1,5			2,3		0,6		1,0		3,0		19,8	
			7	1,3			1,4			2,6		1,9		2,7		2,1		19,0	
			3	3,4			2,9			3,8									
			4	2,1			2,8			3,6									
802.11g	18Mbps_QPSK_Code3_4	MOD_GROUP 2	5	2,4			2,7			3,8									
			6	2,2			2,8			3,7		2,1		1,8		2,7		19,4	
			7	3,0			2,9			3,5		2,7		2,6		2,7		18,6	
			3	2,3			4,3			4,2									
802.11g	36Mbps_16QAM_Code3_4	MOD_GROUP 3	4	2,4			3,4			3,8									
			5	2,3			3,2			3,9									
			6	2,9			3,1			3,6		1,8		2,3		2,8		19,6	
			7	3,3			3,0			4,1		2,6		2,8		2,9		18,5	
802.11g	54Mbps_64QAM_Code3_4	MOD_GROUP 4	3	2,9			3,3			4,5									
			4	2,9			3,8			5,0									
			5	2,9			3,6			4,3									
			6	2,9			3,5			4,2		1,4		1,7		2,4		19,6	
802.11n	MCS7 65Mbps_64QAM_Code5_6	MOD_GROUP 5	7	3,7			4,0			4,5		2,7		2,6		2,7		18,5	
			3	2,1			2,9			3,8									
			4	2,2			3,7			3,7									
			5	2,1			2,9			3,3									
			6	2,1			4,2			3,8		1,8		1,9		2,7		19,6	
			7	2,7			3,0			3,8		2,8		2,9		2,8		18,5	

9.3 Japan

Japan rms burst power measurements are not provided as there is no requirement on maximum output power. For PSD results with 0 dBi maximum antenna gain, refer to the Japan column in ETSI test results.

MOD_GROUP_0 (DSSS 1 Mbps tested) and MOD_GROUP_1 (802.11g 6 Mbps tested)

DSSS Out of Band Margin according to backoff applied in PDS (dB)

JAPAN	Frequency (MHz)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462	2467	2472	2484
backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462	2467	2472	2484	
3															6,1
4															7,3
5															
6	22,5	23,7					31,8					22,7	22,3		
7	23,5	27,1					32,5					25,2	24,6		
8															

LEG_OFDM Out of Band Margin according to backoff applied in PDS (dB)

JAPAN	Frequency (MHz)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462	2467	2472	2484
backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462	2467	2472	2484	
6															
7	10,9	16,7					27,8					18,0	14,7		
8	12,4	18,6					27,5					19,4	15,1		
9															

DSSS EVM Margin according to backoff applied in PDS (dB) - Non-Restricted Band

JAPAN	Frequency (MHz)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462	2467	2472	2484
backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462	2467	2472	2484	
3															31,3
4															31,6
5															
6	31,2	31,1					31,1					31,1	31,3		
7	31,5	31,3					31,2					31,0	31,2		
8															

LEG_OFDM EVM Margin according to backoff applied in PDS (dB) - Non-Restricted Band

JAPAN	Frequency (MHz)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462	2467	2472	2484
backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462	2467	2472	2484	
6															
7	25,2	25,4					25,8					26,1	26,1		
8	25,9	25,8					26,1					26,1	26,1		
9															

DSSS SEM Margin according to backoff applied in PDS (dB) - Non-Restricted Band

JAPAN	Frequency (MHz)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462	2467	2472	2484
backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462	2467	2472	2484	
3															3,6
4															3,4
5															
6	11,5	11,9					12,3					10,4	11,7		
7	11,4	11,6					12,2					10,1	11,3		
8															

LEG_OFDM SEM Margin according to backoff applied in PDS (dB) - Non-Restricted Band

JAPAN	Frequency (MHz)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462	2467	2472	2484
backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462	2467	2472	2484	
6															
7	15,2	15,0					14,8					14,5	13,6		
8	14,8	15,0					15,3					14,4	13,3		
9															

MOD_GROUP_2 (802.11n MCS3 tested) and MOD_GROUP_3 (802.11n MCS4 tested)

MM_OFDM Out of Band Margin according to backoff applied in PDS (dB)

JAPAN	Frequency (MHz)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462	2467	2472	2484
backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462	2467	2472	2484	
6															
7	11,8	15,9					29,1					18,6	12,4		
8	13,1	17,5					29,3					17,3	12,4		
9															

MM_OFDM Out of Band Margin according to backoff applied in PDS (dB)

JAPAN	Frequency (MHz)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462	2467	2472	2484
backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462	2467	2472	2484	
6															
7															
8	13,9	19,7					29,7					18,8	16,5		
9	16,6	20,0					29,9					20,8	17,4		

MM_OFDM EVM Margin according to backoff applied in PDS (dB) - Non-Restricted Band

JAPAN	Frequency (MHz)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462	2467	2472	2484
backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462	2467	2472	2484	
6															
7	13,7	14,0					14,0					14,3	14,3		
8	14,2	14,3					14,6					14,3	14,4		
9															

MM_OFDM EVM Margin according to backoff applied in PDS (dB) - Non-Restricted Band

JAPAN	Frequency (MHz)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462	2467	2472	2484
backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462	2467	2472	2484	
6															
7															
8	12,0	12,0					12,3					12,5	11,9		
9	12,2	12,4					12,0					11,9	12,5		

MM_OFDM SEM Margin according to backoff applied in PDS (dB) - Non-Restricted Band

JAPAN	Frequency (MHz)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462	2467	2472	2484
backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462	2467	2472	2484	
6															
7	7,0	7,0					7,2					6,6	6,1		
8	7,0	7,2					7,2					6,4	5,9		
9															

MM_OFDM SEM Margin according to backoff applied in PDS (dB) - Non-Restricted Band

JAPAN	Frequency (MHz)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462	2467	2472	2484
backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462	2467	2472	2484	
6															
7															
8	7,0	7,1					7,3					6,4	5,9		
9	7,0	6,6					6,8					6,1	5,6		

MOD_GROUP_4 (802.11n MCS6 tested) and MOD_GROUP_5 (802.11n MCS7 tested)

MM_OFDM Out of Band Margin according to backoff applied in PDS (dB)

JAPAN	Frequency (MHz)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462	2467	2472	2484
backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462	2467	2472	2484	
6															
7															
8	13,9	17,9					29,3					19,7	14,8		
9	16,1	19,0					29,9					20,2	18,2		

MM_OFDM Out of Band Margin according to backoff applied in PDS (dB)

JAPAN	Frequency (MHz)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462	2467	2472	2484
backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462	2467	2472	2484	
6															
7															
8	14,6	17,6					28,3					19,1	15,5		
9	15,7	21,1					29,2					20,9	16,9		

MM_OFDM EVM Margin according to backoff applied in PDS (dB) - Non-Restricted Band

JAPAN	Frequency (MHz)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462	2467	2472	2484
backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462	2467	2472	2484	
6															
7															
8	5,7	6,0					5,9					6,0	6,5		
9	6,2	6,4					6,2					6,1	6,1		

MM_OFDM EVM Margin according to backoff applied in PDS (dB) - Non-Restricted Band

JAPAN	Frequency (MHz)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462	2467	2472	2484
backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462	2467	2472	2484	
6															
7															
8	3,9	4,2					3,8					4,3	4,1		
9	4,1	4,4					3,9					4,1	4,0		

MM_OFDM SEM Margin according to backoff applied in PDS (dB) - Non-Restricted Band

JAPAN	Frequency (MHz)	2412	2417
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10. Appendix C: FEM3 TX Closed Loop Test Results

10.1 FCC

MOD_GROUP_0 (DSSS 1 Mps tested)

DSSS OOB Margin according to backoff applied in PDS - Restricted Band

FCC		Frequency (MHz)										
DSSS_1	backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462
	0			3,2			10,5			4,3		
	1	-0,9	-0,6	6,9			9,8			6,4	-1,2	-1,1
	2	0,8	1,2	8,6			9,6			8,2	1,1	0,8
	3	3,2	4,2	9,5						8,4	5,3	3,9
	4	5,1	7,6								8,2	5,3
	5	7,2	9,7								8,6	6,5
	6											
	7											
	8											
	9											
	10											

DSSS OOB Margin according to PDS backoff - Non-Restricted Band

FCC		Frequency (MHz)										
DSSS_1	backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462
	0									42,3		
	1	11,4	19,4							40,6		38,8 39,3
	2	12,0	19,0							39,0		39,0 38,1
	3	13,0	18,7									37,0 36,5
	4											

DSSS Peak Burst Power according to PDS backoff - Restricted Band

FCC		Frequency (MHz)										
DSSS_1	backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462
	0			29,8			29,5			29,4		
	1	28,9	28,9	28,9			28,7			28,8	28,4	28,7
	2	28,3	28,3	27,9			27,8			27,5	27,5	27,7
	3	27,0	27,0	27,0						26,6	26,6	26,5
	4	26,1	26,1							25,7	25,7	
	5	24,9	24,9							24,7	24,4	
	6											
	7											
	8											
	9											
	10											

DSSS Peak Burst Power according to PDS backoff - Non-Restricted Band

FCC		Frequency (MHz)										
DSSS_1	backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462
	0						29,5					
	1	28,9	28,8				28,6				28,4	28,4
	2	28,3	28,3				27,9				27,6	27,4
	3	27,0	27,0								26,6	26,5
	4											

DSSS EVM Margin according to backoff applied in PDS - Restricted Band

FCC		Frequency (MHz)										
DSSS_1	backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462
	0			31,0			30,6			30,9		
	1	30,7	31,2	31,2			30,7			30,9	30,6	31,1
	2	30,9	31,0	30,8			31,0			31,2	31,0	30,9
	3	31,2	31,1	30,2						30,8	31,0	31,0
	4	31,0	30,7							30,9	30,9	
	5	30,8	30,9							30,8	31,0	
	6											
	7											
	8											
	9											
	10											

DSSS EVM Margin according to PDS backoff - Non-Restricted Band

FCC		Frequency (MHz)										
DSSS_1	backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462
	0						31,0					
	1	30,1	31,1				29,8				30,5	30,7
	2	30,9	31,2				30,6				30,9	31,2
	3	31,0	31,1								30,9	30,9
	4											

DSSS SEM Margin according to backoff applied in PDS - Restricted Band

FCC		Frequency (MHz)										
DSSS_1	backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462
	0			8,1			8,1			7,5		
	1	7,6	8,1	7,8			7,4			8,2	7,8	7,9
	2	8,4	8,8	8,9			9,1			8,9	8,8	8,9
	3	10,4	9,9	10,6						9,6	10,2	10,0
	4	10,2	11,2								9,9	9,5
	5	9,4	10,5								9,3	9,5
	6											
	7											
	8											
	9											
	10											

DSSS SEM Margin according to PDS backoff - Non-Restricted Band

FCC		Frequency (MHz)										
DSSS_1	backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462
	0						8,1					
	1	7,8	7,8				8,2				8,8	8,2
	2	8,4	8,9				8,9				9,4	9,0
	3	10,4	10,1								10,1	10,4
	4											

MOD_GROUP_1 (802.11g 6 Mps tested)

LEG_OFDM OOB Margin according to backoff applied in PDS - Restricted Band

FCC		Frequency (MHz)										
LEG_6Mbps	backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462
	4											
	5											
	6											
	7		0,8	3,4			7,3			2,0		
	8		1,9	4,8			8,3			3,7	0,7	
	9	-0,3	3,1							1,6	-0,9	
	10	0,5	4,2							3,4	0,1	
	11	1,5									0,4	
	12	2,8									2,3	
	13	3,7									3,3	
	14											

LEG_OFDM OOB Margin according to PDS backoff - Non-Restricted Band

FCC		Frequency (MHz)										
LEG_6Mbps	backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462
	6											
	7		16,6				34,8				32,6	
	8		16,7				34,5				32,8	
	9	11,0										31,0
	10	10,5										30,8

LEG_OFDM Peak Burst Power according to PDS backoff - Restricted Band

FCC		Frequency (MHz)										
LEG_6Mbps	backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462
	4											
	5											
	6			30,4			30,3			30,3		
	7		29,8	29,7			29,6			29,4	29,4	
	8		28,7	28,7			28,6			28,4	28,3	
	9	27,7	27,7							27,5	27,5	
	10	26,8	26,7							26,5	26,4	
	11	25,8									25,4	
	12	24,8									24,4	
	13	23,9									23,7	
	14											

LEG_OFDM Peak Burst Power according to PDS backoff - Non-Restricted Band

FCC		Frequency (MHz)										
LEG_6Mbps	backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462
	6											
	7		29,8				29,6				29,4	
	8		28,7				28,3				28,3	
	9	27,7										27,5
	10	26,8										26,4

LEG_OFDM EVM Margin according to backoff applied in PDS - Restricted Band

FCC		Frequency (MHz)										
LEG_6Mbps	backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462
	4											
	5											
	6											
	7		26,3	26,3			25,9			26,3	26,4	
	8		26,6	26,4			26,3			26,6	26,4	
	9	26,3	26,6							26,2	26,2	
	10	26,4	26,4							26,2	26,4	
	11	26,2									26,1	
	12	26,4									26,0	
	13	26,2									26,2	
	14											

LEG_OFDM EVM Margin according to PDS backoff - Non-Restricted Band

FCC		Frequency (MHz)										
LEG_6Mbps	backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462
	6											
	7		26,4				26,4				26,4	
	8		26,5				26,3				26,5	
	9	26,2										26,4
	10	26,3										26,3

LEG_OFDM SEM Margin according to backoff applied in PDS - Restricted Band

FCC		Frequency (MHz)										
LEG_6Mbps	backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462
	4											
	5											
	6											
	7		13,8	14,1			14,2			14,0	14,4	
	8		14,1	15,5			15,2			14,2	13,5	
	9	14,0	13,6							13,5	12,4	
	10	14,0	13,5							12,0	12,3	
	11	13,4									11,5	
	12	11,9									11,0	
	13	11,4									9,7	
	14											

LEG_OFDM SEM Margin according to PDS backoff - Non-Restricted Band

FCC		Frequency (MHz)										
LEG_6Mbps	backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462
	6											
	7		13,2				13,8				13,1	
	8		13,5				15,3				13,7	
	9	14,9										13,3
	10	14,1										12,8

MOD_GROUP_2 (802.11n MCS3 tested)

MM_OFDM OOB Margin according to backoff applied in PDS - Restricted Band

FCC	backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462
MM_MCS3	4											
	5											
	6			2,5			8,3			2,8		
	7		0,6	3,4			9,1			4,0	0,8	
	8		1,9	4,5			10,1			4,7	2,0	
	9	-1,4										-2,0
	10	-0,4	3,2							2,8	4,0	-0,5
	11	0,9										0,2
	12	2,1										1,1
	13	2,9										2,1
	14	3,8										3,6

MM_OFDM OOB Margin according to PDS backoff - Non-Restricted Band

FCC	backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462
MM_MCS3	6											
	7		12,4				33,3				29,9	
	8		12,0				31,2				29,5	
	9	7,7										28,0
	10	7,7										28,0

MM_OFDM Peak Burst Power according to PDS backoff - Restricted Band

FCC	backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462
MM_MCS3	4											
	5											
	6			30,2			30,0			30,4		
	7		30,0	29,8			29,5			29,5	29,4	
	8		29,0	28,6			28,7			28,6	28,7	
	9	27,9	28,0								27,9	27,9
	10	27,2	27,1								26,8	26,8
	11	25,8									25,9	
	12	24,8									24,8	
	13	24,1									23,7	
	14	22,6									22,7	

MM_OFDM Peak Burst Power according to PDS backoff - Non-Restricted Band

FCC	backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462
MM_MCS3	6											
	7		29,9				29,6				29,4	
	8		29,0				28,7				28,8	
	9	28,0										27,8
	10	27,1										26,8

MM_OFDM EVM Margin according to backoff applied in PDS - Restricted Band

FCC	backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462
MM_MCS3	4											
	5											
	6			14,9			14,8			14,9		
	7		15,4	15,3			15,4			15,4	15,3	
	8		15,2	15,5			15,3			15,5	15,3	
	9	15,7	15,4								15,2	15,3
	10	15,1	15,0								15,0	15,4
	11	14,9										15,2
	12	15,3										15,2
	13	15,4										15,3
	14	15,4										15,3

MM_OFDM EVM Margin according to PDS backoff - Non-Restricted Band

FCC	backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462
MM_MCS3	6											
	7		15,5				15,3				15,2	
	8		15,3				15,3				15,3	
	9	15,6										15,2
	10	15,4										15,2

MM_OFDM SEM Margin according to backoff applied in PDS - Restricted Band

FCC	backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462
MM_MCS3	4											
	5											
	6			7,5			7,5			6,7		
	7		6,0	7,7			7,7			7,2	5,9	
	8		6,0	7,7			7,0			7,1	5,5	
	9	6,8	5,1								4,5	5,6
	10	5,3	5,8								4,2	3,4
	11	5,7										4,4
	12	4,6										2,8
	13	4,2										2,4
	14	3,3										2,0

MM_OFDM SEM Margin according to PDS backoff - Non-Restricted Band

FCC	backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462
MM_MCS3	6											
	7		6,6				7,2				5,8	
	8		5,8				7,6				5,2	
	9	6,8										5,5
	10	5,2										5,0

MOD_GROUP_3 (802.11n MCS4 tested)

MM_OFDM OOB Margin according to backoff applied in PDS - Restricted Band

FCC		Frequency (MHz)										
	backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462
MM_MCS4	4											
	5											
	6											
	7											
	8											
	9											
	10											
	11											
	12											
	13											
	14											

MM_OFDM OOB Margin according to PDS backoff - Non-Restricted Band

FCC		Frequency (MHz)										
	backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462
MM_MCS4	6											
	7											
	8											
	9											
	10											
	6											
	7											
	8											
	9											
	10											
	6											

MM_OFDM Peak Burst Power according to PDS backoff - Restricted Band

FCC		Frequency (MHz)										
	backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462
MM_MCS4	4											
	5											
	6											
	7											
	8											
	9											
	10											
	11											
	12											
	13											
	14											

MM_OFDM Peak Burst Power according to PDS backoff - Non-Restricted Band

FCC		Frequency (MHz)										
	backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462
MM_MCS4	6											
	7											
	8											
	9											
	10											
	6											
	7											
	8											
	9											
	10											
	6											

MM_OFDM EVM Margin according to backoff applied in PDS - Restricted Band

FCC		Frequency (MHz)										
	backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462
MM_MCS4	4											
	5											
	6											
	7											
	8											
	9											
	10											
	11											
	12											
	13											
	14											

MM_OFDM EVM Margin according to PDS backoff - Non-Restricted Band

FCC		Frequency (MHz)										
	backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462
MM_MCS4	6											
	7											
	8											
	9											
	10											
	6											
	7											
	8											
	9											
	10											
	6											

MM_OFDM SEM Margin according to backoff applied in PDS - Restricted Band

FCC		Frequency (MHz)										
	backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462
MM_MCS4	4											
	5											
	6											
	7											
	8											
	9											
	10											
	11											
	12											
	13											
	14											

MM_OFDM SEM Margin according to PDS backoff - Non-Restricted Band

FCC		Frequency (MHz)										
	backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462
MM_MCS4	6											
	7											
	8											
	9											
	10											
	6											
	7											
	8											
	9											
	10											
	6											

MOD_GROUP_4 (802.11n MCS6 tested)

MM OFDM	OOB Margin according to backoff applied in PDS - Restricted Band
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[illegible]

MM_OFDM	OOB Margin according to PDS backoff - Non-Restricted Band
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[illegible]

MM_OFDM	Peak Burst Power according to PDS backoff - Restricted Band
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[illegible]

MM_OFDM	Peak Burst Power according to PDS backoff - Non-Restricted Band
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[illegible]

MM_OFDM	EVM Margin according to backoff applied in PDS - Restricted Band
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[illegible]

MM_OFDM	EVM Margin according to PDS backoff - Non-Restricted Band
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[illegible]

MM_OFDM	SEM Margin according to backoff applied in PDS - Restricted Band
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[illegible]

MM_OFDM	SEM Margin according to PDS backoff - Non-Restricted Band
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[illegible]

MOD_GROUP_5 (802.11n MCS7 tested)

MM_OFDM OOB Margin according to backoff applied in PDS - Restricted Band

FCC	backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462
MM_MCS7	4											
	5											
	6			3,0			8,7			3,4		
	7		1,4	3,9			9,6			4,0	1,3	
	8		2,2	5,0			10,4			5,2	2,7	
	9	-0,9	3,6	6,2			10,9			6,1	3,5	-1,2
	10	0,1	4,4							4,2		0,1
	11	1,4									1,3	
	12	2,7									2,0	
	13	3,7									2,9	
	14	4,9									3,8	

MM_OFDM OOB Margin according to PDS backoff - Non-Restricted Band

FCC	backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462
MM_MCS7	6											
	7		13,5				29,5				30,2	
	8		13,9				28,8				28,7	
	9	9,0										27,9
	10	9,4										27,2

MM_OFDM Peak Burst Power according to PDS backoff - Restricted Band

FCC	backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462
MM_MCS7	4											
	5											
	6			30,3			30,3			30,5		
	7		29,9	29,9			29,7			29,6		
	8		29,4	29,1			28,8			28,7	28,8	
	9	28,5	28,3	28,5			28,0			28,2	27,8	27,8
	10	27,6	27,1							26,8		27,0
	11	26,2									26,1	
	12	24,9									24,6	
	13	24,2									23,9	
	14	22,8									22,7	

MM_OFDM Peak Burst Power according to PDS backoff - Non-Restricted Band

FCC	backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462
MM_MCS7	6											
	7		29,8				29,8				29,7	
	8		29,1				28,7				28,8	
	9	28,4										27,8
	10	27,4										27,0

MM_OFDM EVM Margin according to backoff applied in PDS - Restricted Band

FCC	backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462
MM_MCS7	4											
	5											
	6			4,7			5,0			4,7		
	7		5,2	5,7			5,3			5,4	5,2	
	8		5,4	5,5			5,6			5,4	5,2	
	9	5,5	5,6	5,1			4,9			4,7	4,9	5,1
	10	5,6	5,5								5,5	5,2
	11	5,5										5,6
	12	5,2										5,6
	13	5,6										5,0
	14	5,5										5,8

MM_OFDM EVM Margin according to PDS backoff - Non-Restricted Band

FCC	backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462
MM_MCS7	6											
	7		5,6				5,1				5,3	
	8		5,4				5,3				5,2	
	9	5,3										5,6
	10	5,3										5,5

MM_OFDM SEM Margin according to backoff applied in PDS - Restricted Band

FCC	backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462
MM_MCS7	4											
	5											
	6			6,9			6,8			6,8		
	7		6,4	7,7			7,6			7,4	5,8	
	8		6,4	8,0			7,7			7,3	5,9	
	9	7,2	7,0	7,8			7,8			7,3	5,7	5,3
	10	6,6	4,6								4,2	4,2
	11	5,4										5,8
	12	4,9										3,0
	13	4,3										4,0
	14	3,8										1,8

MM_OFDM SEM Margin according to PDS backoff - Non-Restricted Band

FCC	backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462
MM_MCS7	6											
	7		7,1				7,4				6,4	
	8		6,4				7,4				6,1	
	9	6,7										4,7
	10	6,2										5,1

10.2 ETSI

When DUT is already transmitting at maximum achievable output power, burst power measured does not increase when backoff value applied decreases.

MOD_GROUP_0 (DSSS 1 Mbps tested) and MOD_GROUP_1 (802.11g 6 Mbps tested)

DSSS Out of Band Margin according to backoff applied in PDS (dB)

ETSI	Frequency (MHz)												
backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462	2467	2472
6													
7	25,0	27,2					29,0					26,6	24,0
8	26,8	27,7					29,5					28,2	25,4
9													

LEG_OFDM Out of Band Margin according to backoff applied in PDS (dB)

ETSI	Frequency (MHz)												
backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462	2467	2472
6													
7	18,5	19,5					24,1					20,9	19,2
8	19,0	19,9					24,6					21,6	20,5
9													

DSSS Burst Power according to backoff applied in PDS (dB)

ETSI	Frequency (MHz)												
backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462	2467	2472
6													
7	20,8	20,5					20,2					19,9	20,0
8	19,7	19,3					19,1					19,1	19,2
9													

LEG_OFDM Burst Power according to backoff applied in PDS (dB)

ETSI	Frequency (MHz)												
backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462	2467	2472
6													
7	20,6	20,6					20,3					20,0	20,1
8	19,5	19,5					19,3					19,1	19,0
9													

DSSS EVM Margin according to backoff applied in PDS (dB) - Non-Restricted Band

ETSI	Frequency (MHz)												
backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462	2467	2472
6													
7	30,8	30,8					30,7					30,9	31,0
8	30,3	30,8					30,8					30,7	31,1
9													

LEG_OFDM EVM Margin according to backoff applied in PDS (dB) - Non-Restricted Band

ETSI	Frequency (MHz)												
backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462	2467	2472
6													
7	26,6	26,4					26,3					26,5	26,4
8	26,4	26,5					26,4					26,5	26,6
9													

DSSS SEM Margin according to backoff applied in PDS (dB) - Non-Restricted Band

ETSI	Frequency (MHz)												
backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462	2467	2472
6													
7	7,8	9,6					12,3					7,0	8,6
8	6,7	7,9					11,7					5,6	7,6
9													

LEG_OFDM SEM Margin according to backoff applied in PDS (dB) - Non-Restricted Band

ETSI	Frequency (MHz)												
backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462	2467	2472
6													
7	13,9	14,0					14,3					14,3	13,6
8	14,5	14,2					14,9					13,5	13,6
9													

MOD_GROUP_2 (802.11n MCS3 tested) and MOD_GROUP_3 (802.11n MCS4 tested)

MM_OFDM Out of Band Margin according to backoff applied in PDS (dB)

ETSI	Frequency (MHz)												
backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462	2467	2472
6													
7	18,2	20,8					25,8					22,4	17,1
8	19,2	22,5					26,2					23,3	19,1
9													

MM_OFDM Out of Band Margin according to backoff applied in PDS (dB)

ETSI	Frequency (MHz)												
backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462	2467	2472
6													
7	20,0	21,4					25,6					22,5	19,1
8	21,3	22,6					26,9					23,5	22,0
9													

MM_OFDM Burst Power according to backoff applied in PDS (dB)

ETSI	Frequency (MHz)												
backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462	2467	2472
6													
7	20,3	20,2					20,0					19,8	19,9
8	19,4	19,3					18,9					18,9	18,8
9													

MM_OFDM Burst Power according to backoff applied in PDS (dB)

ETSI	Frequency (MHz)												
backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462	2467	2472
6													
7	20,3	20,3					20,1					20,0	19,8
8	19,3	19,3					19,1					18,9	18,9
9													

MM_OFDM EVM Margin according to backoff applied in PDS (dB) - Non-Restricted Band

ETSI	Frequency (MHz)												
backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462	2467	2472
6													
7	15,2	15,3					15,5					15,4	15,1
8	15,7	15,5					15,1					15,5	15,3
9													

MM_OFDM EVM Margin according to backoff applied in PDS (dB) - Non-Restricted Band

ETSI	Frequency (MHz)												
backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462	2467	2472
6													
7	13,4	13,1					13,4					12,8	12,9
8	13,2	13,2					13,6					12,8	13,5
9													

MM_OFDM SEM Margin according to backoff applied in PDS (dB) - Non-Restricted Band

ETSI	Frequency (MHz)												
backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462	2467	2472
6													
7	7,6	6,8					7,8					6,1	6,1
8	7,1	5,9					7,9					7,0	5,9
9													

MM_OFDM SEM Margin according to backoff applied in PDS (dB) - Non-Restricted Band

ETSI	Frequency (MHz)												
backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462	2467	2472
6													
7	7,3	6,1					7,7					6,1	5,9
8	7,5	6,8					7,7					6,4	5,4
9													

MOD_GROUP_4 (802.11n MCS6 tested) and MOD_GROUP_5 (802.11n MCS7)

MM_OFDM Out of Band Margin according to backoff applied in PDS (dB)

ETSI		Frequency (MHz)												
MM_MCS6	backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462	2467	2472
	6													
	7	20,3	21,6					26,0					23,1	21,4
	8	20,3	22,7					27,0					23,5	19,6
	9													

MM_OFDM Out of Band Margin according to backoff applied in PDS (dB)

ETSI		Frequency (MHz)												
MM_MCS 7	backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462	2467	2472
	6													
	7	20,3	22,0					25,8					23,1	19,1
	8	21,4	22,2					26,7					23,7	22,7
	9													

MM_OFDM Burst Power according to backoff applied in PDS (dB)

ETSI		Frequency (MHz)												
MM_MCS 6	backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462	2467	2472
	6													
	7	20,4	20,3					20,1					20,0	19,9
	8	19,3	19,3					19,1					18,9	19,0
	9													

MM_OFDM Burst Power according to backoff applied in PDS (dB)

ETSI		Frequency (MHz)												
MM_MCS 7	backoff(dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462	2467	2472
	6													
	7	20,4	20,3					20,1					20,0	19,9
	8	19,3	19,3					19,1					18,9	19,0
	9													

MM_OFDM EVM Margin according to backoff applied in PDS (dB) - Non-Restricted Band

ETSI		Frequency (MHz)												
MM_MCS 6	backoff(dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462	2467	2472
	6													
	7	7,4	7,5					7,5					7,0	7,5
	8	7,4	7,8					7,5					6,9	7,4
	9													

MM_OFDM EVM Margin according to backoff applied in PDS (dB) - Non-Restricted Band

ETSI		Frequency (MHz)												
MM_MCS 7	backoff(dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462	2467	2472
	6													
	7	5,3	5,4					5,7					5,3	5,6
	8	5,6	5,0					5,1					5,4	5,3
	9													

MM_OFDM SEM Margin according to backoff applied in PDS (dB) - Non-Restricted Band

ETSI		Frequency (MHz)												
MM_MCS 6	backoff(dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462	2467	2472
	6													
	7	7,1	6,2					7,1					6,6	5,9
	8	7,4	6,4					7,7					6,9	5,9
	9													

MM_OFDM SEM Margin according to backoff applied in PDS (dB) - Non-Restricted Band

ETSI		Frequency (MHz)												
MM_MCS 7	backoff(dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462	2467	2472
	6													
	7	7,3	6,8					7,7					6,7	6,0
	8	6,9	6,7					7,9					6,3	6,6
	9													

Power Spectral Density and RMS Burst Power

WF200 - PSD Margin and RMS power versus backoff (dB)				Frequency (MHz)										Frequency (MHz)										Frequency (MHz)																																																																																																																																																																																																																																																																																	
for 0dBi Max Antenna gain				Japan PSD Margin (dB)										ETSI PSD Margin (dB)										RMS Burst Power (dBm) versus ETSI requirements																																																																																																																																																																																																																																																																																	
Standard	Rate,Modulation, CR	PDS group	backoff	2412	2422	2432	2442	2452	2462	2472	2484	2412	2422	2432	2442	2452	2462	2472	2484	2412	2422	2432	2442	2452	2462	2472	2484																																																																																																																																																																																																																																																																														
802.11b	1Mbps_DSSS	MOD_GROUP 0	4								0,2																19,3																																																																																																																																																																																																																																																																														
			5									1,2															18,3																																																																																																																																																																																																																																																																														
			6									2,3																16,9																																																																																																																																																																																																																																																																													
			7									3,5																15,7																																																																																																																																																																																																																																																																													
			8	-1,5			-1,1			-1,0		-2,2			-1,6			-1,9		19,7				19,1				19,2																																																																																																																																																																																																																																																																													
			9	-0,6			-0,3			-0,1		-0,9			-1,6			-0,8		18,4				18,6				17,8																																																																																																																																																																																																																																																																													
			10	0,3			0,8			1,2		0,0			0,4			-0,3		17,5				17,1				17,2																																																																																																																																																																																																																																																																													
			11	1,8			2,1			2,0		1,3			1,6			1,4		16,3				16,0				16,2																																																																																																																																																																																																																																																																													
802.11g	9Mbps_BPSK_Code3_4	MOD_GROUP 1	12	2,7			2,8			2,9		1,9			2,2			2,1		15,1				15,4				15,6																																																																																																																																																																																																																																																																													
			4	-2,9			-2,6			-2,2		-3,0			-2,6			-2,1		23,3				23,0				22,5																																																																																																																																																																																																																																																																													
			5	-1,2			-1,5			-1,7		-1,3			-1,7			-1,6		22,3				22,1				21,8																																																																																																																																																																																																																																																																													
			6	-0,2			-0,8			-0,2		0,0			-0,7			-0,4		21,4				21,0				20,9																																																																																																																																																																																																																																																																													
			7	0,7			0,1			0,2		-0,3			0,1			0,2		20,6				20,3				20,1																																																																																																																																																																																																																																																																													
			8	1,6			0,9			1,1		0,8			1,1			1,2		19,5				19,3				19,0																																																																																																																																																																																																																																																																													
			4	-1,1			-1,1			-0,8		-1,9			-1,7			-1,4		23,0				22,7				22,6																																																																																																																																																																																																																																																																													
			5	-0,4			0,0			0,0		-0,9			-0,6			-0,5		21,9				21,7				21,5																																																																																																																																																																																																																																																																													
802.11g	18Mbps_QPSK_Code3_4	MOD_GROUP 2	6	0,4			0,7			1,0		-0,1			0,3			0,5		21,2				20,8				20,5																																																																																																																																																																																																																																																																													
			7	1,6			1,7			2,0		0,8			1,3			1,6		20,3				19,9				19,7																																																																																																																																																																																																																																																																													
			8	2,1			2,9			2,8		1,9			2,3			2,3		19,3				18,9				18,9																																																																																																																																																																																																																																																																													
			4	-1,1			-0,7			-0,8		-4,3			-1,5			-1,4		23,1				22,8				22,6																																																																																																																																																																																																																																																																													
802.11g	36Mbps_16QAM_Code3_4	MOD_GROUP 3	5	0,0			0,7			0,7		-1,0			-0,6			-0,5		22,1				21,9				21,6																																																																																																																																																																																																																																																																													
			6	0,7			1,4			1,5		0,3			0,3			0,6		21,1				20,8				20,6																																																																																																																																																																																																																																																																													
			7	2,0			2,0			2,3		0,9			2,7			1,4		20,3				20,1				19,9																																																																																																																																																																																																																																																																													
			8	2,9			3,1			3,4		2,0			2,0			2,4		19,3				19,1				18,8																																																																																																																																																																																																																																																																													
802.11g	54Mbps_64QAM_Code3_4	MOD_GROUP 4	4	-0,8			-0,2			-0,3		-3,5			-2,2			-3,3		23,1				22,8				22,7																																																																																																																																																																																																																																																																													
			5	0,3			0,8			0,8		-1,3			-0,7			-1,0		22,2				21,7				21,6																																																																																																																																																																																																																																																																													
			6	1,5			2,0			1,7		-0,7			-0,8			-2,8		21,2				20,8				20,6																																																																																																																																																																																																																																																																													
			7	2,1			2,6			2,8		0,5			-2,4			-2,3		20,3				20,1				19,9																																																																																																																																																																																																																																																																													
802.11n	MCS7 65Mbps_64QAM_Code5_6	MOD_GROUP 5	8	3,2			3,6			3,7		1,7			0,5			2,1		19,2				19,1				18,8																																																																																																																																																																																																																																																																													
			4	-1,2			-0,7			-0,9		-1,7			-1,5			-1,2		23,1				22,8				22,5																																																																																																																																																																																																																																																																													
			5	-0,4			0,0			0,3		-0,7			-0,5			0,0		22,0				21,8				21,5																																																																																																																																																																																																																																																																													
			6	0,6			1,3			1,3		0,3			0,4			0,6		21,1				21,0				20,8																																																																																																																																																																																																																																																																													
802.11n																																																																																																																																																																																																																																																																																																									

MOD_GROUP_0 (DSSS 1 Mbps tested) and MOD_GROUP_1 (802.11g 6 Mbps tested)

DSSS Out of Band Margin according to backoff applied in PDS (dB)

JAPAN		Frequency (MHz)													
DSSS_1	backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462	2467	2472	2484
	4														7,5
	5														9,0
	6														
	7	20,6	23,2					31,6				22,9	22,1		
	8	22,2	25,7					31,3				26,4	24,1		

LEG_OFDM Out of Band Margin according to backoff applied in PDS (dB)

JAPAN		Frequency (MHz)													
LEG_6Mbps	backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462	2467	2472	2484
	6														
	7	11,5	16,4					24,3					16,7	11,6	
	8	13,5	19,3					25,6					18,7	14,4	
	9														

DSSS EVM Margin according to backoff applied in PDS (dB) - Non-Restricted Band

JAPAN		Frequency (MHz)													
DSSS_1	backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462	2467	2472	2484
	4														31,4
	5														31,5
	6														
	7	31,2	31,0					30,7				31,0	30,9		
	8	30,4	31,2					31,0				31,1	31,1		

LEG_OFDM EVM Margin according to backoff applied in PDS (dB) - Non-Restricted Band

JAPAN		Frequency (MHz)													
LEG_6Mbps	backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462	2467	2472	2484
	6														
	7	26,3	26,3					26,4					26,5	26,6	
	8	26,3	26,4					26,3					26,6	26,6	
	9														

DSSS SEM Margin according to backoff applied in PDS (dB) - Non-Restricted Band

JAPAN		Frequency (MHz)													
DSSS_1	backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462	2467	2472	2484
	4														5,2
	5														4,9
	6														
	7	7,6	9,1					11,9				6,9	8,4		
	8	6,0	7,5					11,4				6,8	7,6		

LEG_OFDM SEM Margin according to backoff applied in PDS (dB) - Non-Restricted Band

JAPAN		Frequency (MHz)													
LEG_6Mbps	backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462	2467	2472	2484
	6														
	7	13,9	13,9					14,5					13,1	13,2	
	8	14,7	14,0					14,9					13,9	13,3	
	9														

MOD_GROUP_2 (802.11n MCS3 tested) and MOD_GROUP_3 (802.11n MCS4 tested)

MM_OFDM Out of Band Margin according to backoff applied in PDS (dB)

JAPAN		Frequency (MHz)													
MM_MCS3	backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462	2467	2472	2484
	6														
	7	13,3	17,3					26,2				16,5	11,1		
	8	12,4	17,7					27,1				17,6	12,9		
	9														

MM_OFDM Out of Band Margin according to backoff applied in PDS (dB)

JAPAN		Frequency (MHz)													
MM_MCS4	backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462	2467	2472	2484
	6														
	7	12,1	16,2					26,5					18,7	14,2	
	8	15,3	19,0					27,3					19,3	15,7	
	9														

MM_OFDM EVM Margin according to backoff applied in PDS (dB) - Non-Restricted Band

JAPAN		Frequency (MHz)													
MM_MCS3	backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462	2467	2472	2484
	6														
	7	15,6	15,5					15,2				15,4	15,6		
	8	15,5	15,4					15,5				15,7	15,5		
	9														

MM_OFDM EVM Margin according to backoff applied in PDS (dB) - Non-Restricted Band

JAPAN		Frequency (MHz)													
MM_MCS4	backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462	2467	2472	2484
	6														
	7	13,5	13,7					13,8					13,1	13,2	
	8	13,7	13,8					13,4					13,7	13,3	
	9														

MM_OFDM SEM Margin according to backoff applied in PDS (dB) - Non-Restricted Band

JAPAN		Frequency (MHz)													
MM_MCS3	backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462	2467	2472	2484
	6														
	7	7,4	6,6					7,6				6,5	5,9		
	8	6,7	5,8					7,6				5,8	5,7		
	9														

MM_OFDM SEM Margin according to backoff applied in PDS (dB) - Non-Restricted Band

JAPAN		Frequency (MHz)													
MM_MCS4	backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462	2467	2472	2484
	6														
	7	6,7	6,9					7,7					6,8	6,1	
	8	7,1	6,4					7,3					6,5	5,1	
	9														

MOD_GROUP_4 (802.11n MCS6 tested) and MOD_GROUP_5 (802.11n MCS7 tested)

MM_OFDM Out of Band Margin according to backoff applied in PDS (dB)

JAPAN		Frequency (MHz)													
MM_MCS6	backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462	2467	2472	2484
	6														
	7	13,2	18,1					26,3				18,3	14,8		
	8	17,0	19,7					27,6				19,5	15,6		
	9														

MM_OFDM Out of Band Margin according to backoff applied in PDS (dB)

JAPAN		Frequency (MHz)													
MM_MCS7	backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462	2467	2472	2484
	6														
	7	13,5	17,0					27,2					16,8	14,3	
	8	15,9	18,2					27,8					19,1	16,5	
	9														

MM_OFDM EVM Margin according to backoff applied in PDS (dB) - Non-Restricted Band

JAPAN		Frequency (MHz)													
MM_MCS6	backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462	2467	2472	2484
	6														
	7	7,4	7,7					7,8				7,6	7,7		
	8	7,7	7,6					7,8				7,6	7,2		
	9														

MM_OFDM

11. Appendix D: FEM4 TX Closed Loop Test Results

11.1 FCC

MOD_GROUP_0 (DSSS 1 Mps tested)

DSSS OOB Margin according to backoff applied in PDS - Restricted Band

FCC		Frequency (MHz)										
DSSS_1	backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462
	0			0,8			5,4			2,2		
	1	-1,8	-1,8	1,4			6,7			2,0	-0,6	-0,4
	2	-2,2	-1,7	2,0			8,9			2,8	-0,7	-0,8
	3	-1,6	-0,7	6,0						6,2	0,1	-0,2
	4	-0,4	0,5								1,1	1,0
	5	1,6	2,3								3,7	3,1
	6	5,8	6,8								7,1	6,6
	7	8,1										8,1
	8											
	9											
	10											

DSSS OOB Margin according to PDS backoff - Non-Restricted Band

FCC		Frequency (MHz)										
DSSS_1	backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462
	0						43,9					
	1	10,0	16,4				44,3				37,3	32,0
	2	10,4	18,0				44,1				38,9	32,3
	3	11,6	19,1								42,4	36,9

DSSS Peak Burst Power according to PDS backoff - Restricted Band

FCC		Frequency (MHz)										
DSSS_1	backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462
	0			29,1			28,8			28,8		
	1	28,5	28,6	28,7			29,6			28,5	28,4	28,5
	2	28,0	28,2	28,2			28,0			28,0	28,0	27,9
	3	26,7	26,7	26,8						26,8	26,7	26,6
	4	26,1	26,1							25,9	25,8	
	5	25,0	25,0							24,9	24,7	
	6	23,7	23,8							23,8	23,3	
	7	22,7										22,5
	8											
	9											
	10											

DSSS Peak Burst Power according to PDS backoff - Non-Restricted Band

FCC		Frequency (MHz)										
DSSS_1	backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462
	0						28,8					
	1	28,6	28,5				28,6				28,5	28,4
	2	28,2	28,0				28,1				27,9	28,0
	3	26,8	26,9								26,7	26,6

DSSS EVM Margin according to backoff applied in PDS - Restricted Band

FCC		Frequency (MHz)										
DSSS_1	backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462
	0			30,4			30,6			30,7		
	1	30,9	30,7	31,1			30,1			30,9	30,7	30,6
	2	31,0	30,9	31,1			30,7			30,5	30,7	30,5
	3	30,8	31,0	30,8						30,8	31,0	31,0
	4	31,1	31,1							31,1	30,5	
	5	31,0	30,6							30,9	30,8	
	6	31,1	31,2							31,1	31,1	
	7	31,1										31,0
	8											
	9											
	10											

DSSS EVM Margin according to PDS backoff - Non-Restricted Band

FCC		Frequency (MHz)										
DSSS_1	backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462
	0						30,8					
	1	31,2	31,0				30,8				30,2	30,9
	2	31,1	30,5				30,5				30,7	30,6
	3	31,1	30,9								31,1	30,9

DSSS SEM Margin according to backoff applied in PDS - Restricted Band

FCC		Frequency (MHz)										
DSSS_1	backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462
	0			5,0			7,3			8,3		
	1	7,3	6,8	6,6			7,6			8,1	8,4	8,1
	2	6,5	6,7	7,1			7,3			7,4	7,4	7,1
	3	5,9	5,7	5,8						6,6	7,3	6,0
	4	5,8	6,2								7,0	7,4
	5	7,3	7,6								8,8	8,6
	6	10,3	10,8								10,7	10,3
	7	11,3										10,0
	8											
	9											
	10											

DSSS SEM Margin according to PDS backoff - Non-Restricted Band

FCC		Frequency (MHz)										
DSSS_1	backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462
	0						6,7					
	1	6,5	7,1				7,4				8,1	8,1
	2	6,6	6,4				7,5				7,4	7,0
	3	6,0	5,5								6,5	6,4

MOD_GROUP_1 (802.11g 6 Mbps tested)

LEG_OFDM OOB Margin according to backoff applied in PDS - Restricted Band

FCC		Frequency (MHz)										
LEG_6Mbps	backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462
	4											
	5											
	6											
	7											
	8		0,5	3,3			9,8			5,1		
	9		1,3	3,6			9,7			4,7	2,1	
	10	-0,8	2,4	4,7			10,8			5,8	3,3	-0,1
	11	0,5	3,7	6,1			10,6			7,0	4,0	0,7
	12	1,6	4,6								5,0	1,6
	13	2,7										2,6
	14	3,6										3,5
	15	4,7										4,3

LEG_OFDM OOB Margin according to PDS backoff - Non-Restricted Band

FCC		Frequency (MHz)										
LEG_6Mbps	backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462
	6						36,4					
	7						35,1				32,6	
	8		15,8								32,8	
	9	10,9	16,6									30,9
	10	10,9										31,1

LEG_OFDM Peak Burst Power according to PDS backoff - Restricted Band

FCC		Frequency (MHz)										
LEG_6Mbps	backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462
	4											
	5											
	6											
	7											
	8											
	9											
	10											
	11											
	12											
	13											
	14											
	4											
	5											

FCC		Frequency (MHz)										
LEG_6Mbps	backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462
	4											
	5											
	6											
	7											
	8											
	9											
	10											
	11											
	12											
	13											
	14											
	4											
	5											

LEG_OFDM Peak Burst Power according to PDS backoff - Non-Restricted Band

FCC		Frequency (MHz)										
LEG_6Mbps	backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462
	6						28,8					
	7		29,2				28,4				28,2	
	8		28,7								28,4	
	9	27,8										28,0
	10	27,3										26,8

LEG_OFDM EVM Margin according to backoff applied in PDS - Restricted Band

FCC		Frequency (MHz)										
LEG_6Mbps	backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462
	4											
	5											
	6			26,5						27,2		
	7		26,4	26,3			27,0			27,3	27,2	
	8		26,7	26,7			26,7			27,1	27,2	
	9	26,8	26,8	26,9			27,1			27,1	27,6	27,1
	10	27,3	26,8	27,2			27,6			27,3	27,5	27,5
	11	27,3	27,3								27,3	27,4
	12	27,4										27,2
	13	27,0										27,4
	14	26,9										27,2

LEG_OFDM EVM Margin according to PDS backoff - Non-Restricted Band

FCC		Frequency (MHz)										
LEG_6Mbps	backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462
	6						26,9					
	7		26,2				26,8				27,3	
	8		26,6								27,2	
	9	26,8										27,3
	10	27,2										27,5

MM_OFDM SEM Margin according to backoff applied in PDS - Restricted Band

FCC		Frequency (MHz)											
MM_MCS1	backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462	
	4												
	5												
	6												
	7												
	8												
	9												
	10												
	11												
	12												
	13												
	14												

MM_OFDM SEM Margin according to PDS backoff - Non-Restricted Band

FCC		Frequency (MHz)										
MM_MCS1	backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462
	6						8,9					
	7		8,9				8,6				8,1	
	8		8,9								7,9	
	9											
	10	8,7										7,6

MOD_GROUP_2 (802.11n MCS3 tested)

MM_OFDM OOB Margin according to backoff applied in PDS - Restricted Band

FCC		Frequency (MHz)										
	backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462
MM_MCS3	4											
	5											
	6			2,8			9,4			4,2		
	7		0,2	3,0			9,6			4,5	2,1	
	8		1,5	3,8			9,8			4,5	2,0	
	9		2,6	4,7			10,7			5,5	3,3	
	10	0,1	3,6	6,0			11,6			6,3	3,9	0,6
	11	0,8	4,6							4,9	1,5	
	12	1,8									2,3	
	13	3,2									3,4	
	14	3,8										4,1

MM_OFDM OOB Margin according to PDS backoff - Non-Restricted Band

FCC		Frequency (MHz)										
	backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462
MM_MCS3	6						31,3					
	7		11,6				32,8				29,6	
	8		12,5								29,5	
	9											
	10	7,4										28,2

MM_OFDM Peak Burst Power according to PDS backoff - Restricted Band

FCC		Frequency (MHz)										
	backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462
MM_MCS3	4											
	5											
	6			29,4			28,8			28,6		
	7		29,4	29,2			28,8			28,5	28,4	
	8		28,5	28,7			28,7			28,6	28,4	
	9		27,6	27,8			27,8			27,6	27,6	
	10	27,0	26,9	26,8			26,8			26,8	26,7	26,7
	11	26,2	26,1							26,1	26,1	
	12	25,3									25,1	
	13	23,9									24,0	
	14	22,7										22,8

MM_OFDM Peak Burst Power according to PDS backoff - Non-Restricted Band

FCC		Frequency (MHz)										
	backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462
MM_MCS3	6						29,0					
	7		29,4				28,8				28,4	
	8		28,7								28,4	
	9											
	10	26,9										26,8

MM_OFDM EVM Margin according to backoff applied in PDS - Restricted Band

FCC		Frequency (MHz)										
	backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462
MM_MCS3	4											
	5											
	6			14,8			15,5			15,5		
	7		14,6	14,8			15,4			15,6	15,6	
	8		15,4	15,5			15,2			15,6	15,9	
	9		15,4	15,3			15,6			16,1	15,7	
	10	15,5	15,7	15,8			15,7			16,0	16,0	15,5
	11	15,8	15,8							16,1	16,3	
	12	15,8									16,1	
	13	15,8									15,6	
	14	15,9										15,8

MM_OFDM EVM Margin according to PDS backoff - Non-Restricted Band

FCC		Frequency (MHz)										
	backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462
MM_MCS3	6						15,7					
	7		14,9				15,3				15,1	
	8		15,3								15,6	
	9											
	10	15,4										15,9

MM_OFDM SEM Margin according to backoff applied in PDS - Restricted Band

FCC		Frequency (MHz)										
	backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462
MM_MCS3	4											
	5											
	6			6,4			6,8			6,3		
	7		6,8	6,6			6,5			6,4	5,7	
	8		7,3	6,2			6,3			6,1	6,0	
	9		6,7	6,6			6,6			6,3	5,8	
	10	6,9	6,4	6,5			6,4			5,9	5,6	5,5
	11	6,5	6,6							5,1	4,8	
	12	6,7									4,7	
	13	6,7									5,0	
	14	5,5										3,8

MM_OFDM SEM Margin according to PDS backoff - Non-Restricted Band

FCC		Frequency (MHz)										
	backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462
MM_MCS3	6						6,4					
	7		6,9				6,6				5,6	
	8		6,7								5,7	
	9											
	10	6,8										5,3

MOD_GROUP_3 (802.11n MCS4 tested)

MM_OFDM OOB Margin according to backoff applied in PDS - Restricted Band

FCC		Frequency (MHz)										
	backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462
MM_MCS4	4											
	5											
	6			2,8			9,4			4,6		
	7		-0,2	2,6			9,7			4,4	2,1	
	8		1,5	3,8			10,0			4,6	1,9	
	9		2,9	5,1			11,0			5,7	3,1	
	10	0,4	3,9	6,1			11,5			6,5	4,2	0,6
	11	1,3	4,7							4,9	2,0	
	12	2,7										3,0
	13	3,5										3,9
	14	4,6										5,1

MM_OFDM OOB Margin according to PDS backoff - Non-Restricted Band

FCC		Frequency (MHz)										
	backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462
MM_MCS4	6						31,6					
	7		11,8				32,1				29,4	
	8		12,9								29,6	
	9											
	10	8,1										27,5

MM_OFDM Peak Burst Power according to PDS backoff - Restricted Band

FCC		Frequency (MHz)										
	backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462
MM_MCS4	4											
	5											
	6			29,7			29,4			29,0		
	7		29,8	29,7			29,4			28,9	29,1	
	8		29,1	29,1			29,0			28,9	28,9	
	9		28,2	27,9			28,3			28,0	28,3	
	10	27,7	27,4	27,5			27,6			27,1	27,5	27,6
	11	27,0	26,6							26,7	26,1	
	12	25,8										25,6
	13	24,7										24,2
	14	23,6										23,3

MM_OFDM Peak Burst Power according to PDS backoff - Non-Restricted Band

FCC		Frequency (MHz)										
	backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462
MM_MCS4	6						29,4					
	7		29,8				29,4				29,1	
	8		29,1								28,9	
	9											
	10	27,5										27,5

MM_OFDM EVM Margin according to backoff applied in PDS - Restricted Band

FCC		Frequency (MHz)										
	backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462
MM_MCS4	4											
	5											
	6			11,3			11,5			11,4		
	7		11,3	11,3			11,4			11,5	11,4	
	8		11,2	11,0			11,3			11,3	11,2	
	9		11,5	11,5			11,1			11,2	11,6	
	10	11,9	11,6	11,8			11,7			11,8	11,8	11,7
	11	12,1	11,6							11,9	12,1	
	12	12,3										12,3
	13	12,8										12,6
	14	12,9										12,8

MM_OFDM EVM Margin according to PDS backoff - Non-Restricted Band

FCC		Frequency (MHz)										
	backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462
MM_MCS4	6						11,2					
	7		11,2				11,3				11,5	
	8		11,1								11,4	
	9											
	10	11,6										12,0

MM_OFDM SEM Margin according to backoff applied in PDS - Restricted Band

FCC		Frequency (MHz)										
	backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462
MM_MCS4	4											
	5											
	6			6,8			6,6			6,7		
	7		7,0	6,7			6,5			6,4	6,1	
	8		6,8	6,9			6,7			6,8	5,9	
	9		6,8	6,6			6,6			6,4	5,5	
	10	7,1	6,4	7,0			6,2			6,4	5,7	5,1
	11	6,7	6,5							5,1	5,1	
	12	6,4										5,3
	13	6,3										4,2
	14	6,0										4,4

MM_OFDM SEM Margin according to PDS backoff - Non-Restricted Band

FCC		Frequency (MHz)										
	backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462
MM_MCS4	6						6,8					
	7		7,1				6,6				5,9	
	8		7,1								6,1	
	9											
	10	6,7										5,9

MOD_GROUP_4 (802.11n MCS6 tested)

MM_OFDM OOB Margin according to backoff applied in PDS - Restricted Band

FCC		Frequency (MHz)										
	backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462
MM_MCS6	4											
	5											
	6			3,1			9,7			4,6		
	7		0,4	3,3			9,6			4,8	1,9	
	8		1,6	4,0			9,8			4,7	2,2	
	9		2,8	5,2			10,9			6,0	3,2	
	10	0,4	4,2	6,5			11,7			6,9	4,4	1,1
	11	1,9	5,1							5,3	1,9	
	12	3,1										3,1
	13	4,1										4,2
	14	5,1										5,0

MM_OFDM OOB Margin according to PDS backoff - Non-Restricted Band

FCC		Frequency (MHz)										
	backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462
MM_MCS6	6						29,8					
	7		12,4				31,2				29,3	
	8		12,2								30,5	
	9											
	10	8,4										27,8

MM_OFDM Peak Burst Power according to PDS backoff - Restricted Band

FCC		Frequency (MHz)										
	backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462
MM_MCS6	4											
	5											
	6			29,6			29,3			28,8		
	7		29,6	29,5			29,2			28,9	28,8	
	8		29,1	28,8			29,0			28,7	28,8	
	9		28,6	28,1			28,1			28,1	27,9	
	10	27,3	27,6	27,4			27,2			27,0	26,9	27,2
	11	26,5	26,4							26,5	26,6	
	12	25,4										25,5
	13	24,1										24,2
	14	23,5										22,8

MM_OFDM Peak Burst Power according to PDS backoff - Non-Restricted Band

FCC		Frequency (MHz)										
	backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462
MM_MCS6	6						29,1					
	7		29,7				29,1				28,7	
	8		29,0								28,9	
	9											
	10	27,5										27,2

MM_OFDM EVM Margin according to backoff applied in PDS - Restricted Band

FCC		Frequency (MHz)										
	backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462
MM_MCS6	4											
	5											
	6			5,1			5,1			5,3		
	7		5,1	5,1			5,1			5,6	5,4	
	8		5,0	5,5			5,2			5,2	5,3	
	9		5,4	5,4			5,3			5,6	5,4	
	10	5,6	5,7	5,5			5,9			5,8	5,9	5,7
	11	6,0	6,3							6,1	6,1	
	12	6,4										6,5
	13	6,8										6,5
	14	6,6										6,5

MM_OFDM EVM Margin according to PDS backoff - Non-Restricted Band

FCC		Frequency (MHz)										
	backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462
MM_MCS6	6						5,2					
	7		4,9				4,9				5,5	
	8		5,3								5,4	
	9											
	10	5,7										5,7

MM_OFDM SEM Margin according to backoff applied in PDS - Restricted Band

FCC		Frequency (MHz)										
	backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462
MM_MCS6	4											
	5											
	6			6,7			6,5			6,7		
	7		7,1	7,0			6,5			6,8	6,0	
	8		6,7	7,2			6,3			6,7	5,9	
	9		6,7	6,5			6,7			6,7	5,6	
	10	7,1	6,7	6,7			6,8			6,8	5,6	5,8
	11	6,8	6,2							5,7	5,7	
	12	6,5										4,9
	13	6,7										5,6
	14	6,6										4,1

MM_OFDM SEM Margin according to PDS backoff - Non-Restricted Band

FCC		Frequency (MHz)										
	backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462
MM_MCS6	6						6,5					
	7		6,7				6,7				6,0	
	8		6,8								5,9	
	9											
	10	7,3										5,8

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When DUT is already transmitting at maximum achievable output power, burst power measured does not increase when backoff value applied decreases.

MOD_GROUP_0 (DSSS 1 Mbps tested) and MOD_GROUP_1 (802.11g 6 Mbps tested)

DSSS Out of Band Margin according to backoff applied in PDS (dB)

ETSI		Frequency (MHz)												
DSSS_1	backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462	2467	2472
	6													
	7	21,1	24,9					29,6					27,5	26,0
	8	23,6	26,8					30,1					27,4	26,5
	9													

LEG_OFDM Out of Band Margin according to backoff applied in PDS (dB)

ETSI		Frequency (MHz)												
LEG_6Mbps	backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462	2467	2472
	6													
	7	17,9	19,8					25,5					22,5	22,0
	8	18,7	20,1					25,6					22,4	22,6
	9													

DSSS Burst Power according to backoff applied in PDS (dB)

ETSI		Frequency (MHz)												
DSSS_1	backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462	2467	2472
	6													
	7	20,7	20,3					20,4					20,2	20,2
	8	19,5	19,5					19,2					19,3	19,2
	9													

LEG_OFDM Burst Power according to backoff applied in PDS (dB)

ETSI		Frequency (MHz)												
LEG_6Mbps	backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462	2467	2472
	6													
	7	19,9	19,8					19,0					18,2	18,1
	8	19,1	19,2					19,0					18,2	18,0
	9													

DSSS EVM Margin according to backoff applied in PDS (dB) - Non-Restricted Band

ETSI		Frequency (MHz)												
DSSS_1	backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462	2467	2472
	6													
	7	31,1	31,2					30,9					30,9	31,0
	8	31,4	30,6					30,9					30,4	31,2
	9													

LEG_OFDM EVM Margin according to backoff applied in PDS (dB) - Non-Restricted Band

ETSI		Frequency (MHz)												
LEG_6Mbps	backoff(dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462	2467	2472
	6													
	7	26,2	26,2					27,1					27,2	27,3
	8	26,6	26,5					27,1					27,0	27,3
	9													

DSSS SEM Margin according to backoff applied in PDS (dB) - Non-Restricted Band

ETSI		Frequency (MHz)												
DSSS_1	backoff(dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462	2467	2472
	6													
	7	10,3	11,2					11,0					10,6	10,8
	8	11,1	11,4					11,0					10,3	11,0
	9													

LEG_OFDM SEM Margin according to backoff applied in PDS (dB) - Non-Restricted Band

ETSI		Frequency (MHz)												
LEG_6Mbps	backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462	2467	2472
	6													
	7	14,7	14,4					14,0					14,3	13,1
	8	14,5	14,9					13,9					13,7	13,4
	9													

MOD_GROUP_2 (802.11n MCS3 tested) and MOD_GROUP_3 (802.11n MCS4 tested)

MM_OFDM Out of Band Margin according to backoff applied in PDS (dB)

ETSI		Frequency (MHz)												
MM_MCS	backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462	2467	2472
	6													
	7	18,4	20,1					26,5					23,6	21,0
	8	19,9	21,1					26,4					25,0	21,7
	9													

MM_OFDM Out of Band Margin according to backoff applied in PDS (dB)

ETSI		Frequency (MHz)												
MM_MCS4	backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462	2467	2472
	6													
	7													
	8	19,0	20,9					27,2					23,7	19,8
	9	20,2	23,0					27,8					26,4	20,1

MM_OFDM Burst Power according to backoff applied in PDS (dB)

ETSI		Frequency (MHz)												
MM_MCS	backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462	2467	2472
	6													
	7	19,9	19,8					19,0					18,2	18,1
	8	18,9	18,8					18,8					18,2	18,1
	9													

MM_OFDM Burst Power according to backoff applied in PDS (dB)

ETSI		Frequency (MHz)												
MM_MCS4	backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462	2467	2472
	6													
	7													
	8	19,0	19,0					18,9					18,5	18,3
	9	17,9	18,0					17,9					17,7	17,7

MM_OFDM EVM Margin according to backoff applied in PDS (dB) - Non-Restricted Band

ETSI		Frequency (MHz)												
MM_MCS 3	backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462	2467	2472
	6													
	7	14,6	14,9					15,6					15,8	15,5
	8	14,9	15,2					15,7					15,8	15,8
	9													

MM_OFDM EVM Margin according to backoff applied in PDS (dB) - Non-Restricted Band

ETSI		Frequency (MHz)												
MM_MCS4	backoff(dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462	2467	2472
	6													
	7													
	8	11,2	11,1					11,2					11,7	11,6
	9	11,5	11,5					11,7					11,7	11,6

MM_OFDM SEM Margin according to backoff applied in PDS (dB) - Non-Restricted Band

ETSI		Frequency (MHz)												
MM_MCS3	backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462	2467	2472
	6													
	7	7,0	6,6					6,5					6,2	6,0
	8	6,7	6,6					6,5					6,5	5,5
	9													

MM_OFDM SEM Margin according to backoff applied in PDS (dB) - Non-Restricted Band

ETSI		Frequency (MHz)												
MM_MCS4	backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462	2467	2472
	6													
	7													
	8	7,0	6,8					6,3					6,4	6,1
	9	7,1	6,9					6,1					6,3	6,1

MOD_GROUP_4 (802.11n MCS6 tested) and MOD_GROUP_5 (802.11n MCS7)

MM OFDM	Out of Band Margin according to backoff applied in PDS (dB)
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ETSI		Frequency (MHz)												
backoff (dB)		2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462	2467	2472
MM_MCS6	6													
	7													
	8	20.5	21.2					26.5					24.4	21.1
	9	21.2	22.4					27.6					24.7	20.0
	10	22.4	23.6					28.7					25.9	21.1

MM OFDM	Out of Band Margin according to backoff applied in PDS (dB)
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ETSI		Frequency (MHz)											
backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462	2467	2472
6													
7													
8	19.1	21.1					26.3					23.8	20.5
9	21.6	23.1					27.9					26.9	20.5

MM_OFDM	Burst Power according to backoff applied in PDS (dB)
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burst Power according to backoff applied in PUS (dB)	
ETSI	
backoff (dB)	Frequency (MHz)
6	
7	
8	
9	

MM_OFDM	Burst Power according to backoff applied in PDS (dB)
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ETSI		Frequency (MHz)												
backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462	2467	2472	
MM_MCS 7	6													
	7													
	8	19,0	19,1				18,9					18,6	18,7	
	9	18,0	18,1				18,0					17,7	17,8	

MM_OFDM	EVM Margin according to backoff applied in PDS (dB) - Non-Restricted Band
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ETSI		Frequency (MHz)												
backoff (dB)		2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462	2467	2472
MM_MCS6	6													
	7													
	8	5,2	4,7					5,1					5,3	4,9
	9	5,3	5,0					5,3					5,5	5,7
	10	5,4	5,1					5,4					5,6	5,8

MM_OFDM	EVM Margin according to backoff applied in PDS (dB) - Non-Restricted Band
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ETSI		Frequency (MHz)												
backoff (dB)		2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462	2467	2472
MM_MCS 7	6													
	7													
	8	3,4	3,4					3,6					4,0	3,7
	9	3,7	3,6					3,7					3,6	3,8
	10	3,8	3,7					3,8					3,8	3,9

MM_OFDM SEM Margin according to backoff applied in PDS (dB) - Non-Restricted Band

ETSI		Frequency (MHz)													
backoff (dB)		2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462	2467	2472	
MIM_MCS6	6														
	7														
	8	7.1	6.5					6.5					6.4	6.1	
	9	7.1	6.9					6.7					6.3	6.4	

MM OFDM SEM Margin according to backoff applied in PDS (dB) - Non-Restricted Band

ETSI		Frequency (MHz)											
backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462	2467	2472
6													
7													
8	7.0	6.8					6.2					6.5	6.4
9	7.3	7.1					6.4					6.6	6.4

Power Spectral Density and RMS Burst Power

WF200 - PSD Margin and RMS power versus backoff (dB)				Frequency (MHz)								Frequency (MHz)								Frequency (MHz)								
for 0dBi Max Antenna gain				Japan PSD Margin (dB)								ETSI PSD Margin (dB)								RMS Burst Power (dBm) versus ETSI requirements								
Standard	Rate, Modulation, CR	PSD group	backoff	2412	2422	2432	2442	2452	2462	2472	2484	2412	2422	2432	2442	2452	2462	2472	2484	2412	2422	2432	2442	2452	2462	2472	2484	
802.11b	1Mbps_DSSS	MOD_GROUP 0	4								0,5																18,9	
			5									1,4															18,0	
			6									2,5																17,0
			7									3,4																16,2
			8	-1,4			-1,5				-1,2											19,5			19,3			19,2
			9	-0,4			-0,1				0,0			-1,2				-1,1			-0,9	18,8			18,6			18,4
			10	0,8			0,8				1,0			0,0				0,1			0,5	17,3			17,3			17,1
			11	1,6			1,6				2,0			1,3				1,7			1,7	16,6			16,1			16,1
12	2,7			2,7				2,8			2,3				2,4			2,7	15,2			15,2			15,1			
802.11g	9Mbps_BPSK_Code3_4	MOD_GROUP 1	4	1,8			1,9			3,5										19,3			18,5			17,6		
			5	1,0			1,8			2,7			2,1				2,3			2,8	19,3			18,5			17,6	
			6	1,8			2,0			2,8			1,1				3,3			2,8	19,3			18,3			17,6	
			7	1,1			1,9			3,0			1,1				2,0			2,8	19,3			18,3			17,6	
			8	1,7			2,9			2,8			1,1				2,0			2,9	19,3			18,5			17,4	
802.11g	18Mbps_QPSK_Code3_4	MOD_GROUP 2	4	2,2			3,1			3,8										19,4			18,5			17,6		
			5	2,3			3,2			4,0			2,2				2,8			3,6	19,5			18,5			17,6	
			6	2,2			3,0			4,2			1,9				2,8			3,7	19,5			18,5			17,6	
			7	2,1			3,8			4,2			1,9				2,8			3,8	19,5			18,5			17,6	
			8	2,5			3,3			4,0			1,9				2,8			3,6	19,3			18,5			17,6	
802.11g	36Mbps_16QAM_Code3_4	MOD_GROUP 3	4	2,4			3,4			4,3										19,7			18,7			17,8		
			5	2,9			3,6			4,2			1,9				2,8			3,5	19,7			18,7			17,9	
			6	2,5			3,5			4,4			1,8				2,8			3,5	19,6			18,6			17,9	
			7	2,3			3,6			4,2			1,7				2,7			3,6	19,6			18,6			17,9	
			8	2,9			3,5			4,1			1,7				2,7			3,5	19,4			18,8			17,9	
802.11g	54Mbps_64QAM_Code3_4	MOD_GROUP 4	4	2,9			3,6			4,8										19,7			18,7			17,9		
			5	2,8			3,9			4,8			2,1				2,5			3,2	19,6			18,8			17,9	
			6	2,7			5,4			4,8			1,5				2,5			3,4	19,7			18,8			17,9	
			7	2,8			4,0			4,7			1,5				2,7			3,6	19,7			18,7			17,9	
			8	3,3			3,6			4,7			1,6				2,5			3,4	19,4			18,7			17,9	
802.11n	MCS7 65Mbps_64QAM_Code5_6	MOD_GROUP 5	4	2,2			3,2			3,8										19,6			18,6			17,7		
			5	2,6			3,2			3,9			2,1				3,0			3,9	19,6			18,6			17,7	
			6	2,2			3,1			4,1			2,1				3,1			3,8	19,6			18,6			17,7	
			7	2,1			2,9			4,9			2,2				3,2			3,8	19,6			18,6			17,7	
			8	2,3			3,1			4,9			2,2				3,1			3,9	19,3			18,6			17,8	

11.3 Japan

Japan rms burst power measurements are not provided as there is no requirement on maximum output power. For PSD results with 0 dBi maximum antenna gain, refer to the Japan column in ETSI test results.

MOD_GROUP_0 (DSSS 1 Mbps tested) and MOD_GROUP_1 (802.11g 6 Mbps tested)

DSSS Out of Band Margin according to backoff applied in PDS (dB)

JAPAN		Frequency (MHz)													
DSSS_1	backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462	2467	2472	2484
	4														9,4
	5														10,0
	6														
	7	20,7	21,6				33,5					23,5	22,4		
	8	21,4	22,5				33,4					24,4	24,9		
	9														

LEG_OFDM Out of Band Margin according to backoff applied in PDS (dB)

JAPAN		Frequency (MHz)													
LEG_6Mbps	backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462	2467	2472	2484
	6														
	7	11,9	17,1							24,7			18,9	15,6	
	8	15,1	17,4							25,9			21,6	16,1	
	9														

DSSS EVM Margin according to backoff applied in PDS (dB) - Non-Restricted Band

JAPAN		Frequency (MHz)													
DSSS_1	backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462	2467	2472	2484
	4														31,6
	5														31,3
	6														
	7	30,9	31,1				31,3					31,3	30,9		
	8	30,9	31,0				30,8					30,8	31,0		
	9														

LEG_OFDM EVM Margin according to backoff applied in PDS (dB) - Non-Restricted Band

JAPAN		Frequency (MHz)													
LEG_6Mbps	backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462	2467	2472	2484
	6														
	7	26,1	26,2							27,2			27,3	27,3	
	8	26,6	26,5							27,0			27,4	27,5	
	9														

DSSS SEM Margin according to backoff applied in PDS (dB) - Non-Restricted Band

JAPAN		Frequency (MHz)													
DSSS_1	backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462	2467	2472	2484
	4														5,2
	5														5,4
	6														
	7	10,5	11,1				11,0					10,2	10,9		
	8	10,9	11,4				11,7					10,9	10,8		
	9														

LEG_OFDM SEM Margin according to backoff applied in PDS (dB) - Non-Restricted Band

JAPAN		Frequency (MHz)													
LEG_6Mbps	backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462	2467	2472	2484
	6														
	7	14,6	14,4							14,0			14,4	14,0	
	8	14,7	14,7							14,1			13,8	13,7	
	9														

MOD_GROUP_2 (802.11n MCS3 tested) and MOD_GROUP_3 (802.11n MCS4 tested)

MM_OFDM Out of Band Margin according to backoff applied in PDS (dB)

JAPAN		Frequency (MHz)													
MM_MCS3	backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462	2467	2472	2484
	6														
	7	11,5	16,5				31,1					19,7	14,0		
	8	13,1	17,9				28,5					19,1	16,5		
	9														

MM_OFDM Out of Band Margin according to backoff applied in PDS (dB)

JAPAN		Frequency (MHz)													
MM_MCS4	backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462	2467	2472	2484
	6														
	7														
	8	15,0	18,4							24,9			19,0	13,1	
	9	16,1	19,2							29,6			20,3	13,9	

MM_OFDM EVM Margin according to backoff applied in PDS (dB) - Non-Restricted Band

JAPAN		Frequency (MHz)													
MM_MCS3	backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462	2467	2472	2484
	6														
	7	14,6	14,8				15,9					15,9	15,9		
	8	15,0	15,4				15,3					15,9	15,8		
	9														

MM_OFDM EVM Margin according to backoff applied in PDS (dB) - Non-Restricted Band

JAPAN		Frequency (MHz)													
MM_MCS4	backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462	2467	2472	2484
	6														
	7														
	8	11,2	11,2				11,5						11,7	11,7	
	9	11,4	11,3				11,6						11,8	11,6	

MM_OFDM SEM Margin according to backoff applied in PDS (dB) - Non-Restricted Band

JAPAN		Frequency (MHz)													
MM_MCS3	backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462	2467	2472	2484
	6														
	7	6,7	7,0				6,3					6,2	6,0		
	8	6,9	6,6				6,6					6,6	6,2		
	9														

MM_OFDM SEM Margin according to backoff applied in PDS (dB) - Non-Restricted Band

JAPAN		Frequency (MHz)													
MM_MCS4	backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462	2467	2472	2484
	6														
	7														
	8	7,3	6,7				6,4					6,2	6,1		
	9	7,0	6,7				6,4					6,5	6,2		

MOD_GROUP_4 (802.11n MCS6 tested) and MOD_GROUP_5 (802.11n MCS7)

MM_OFDM Out of Band Margin according to backoff applied in PDS (dB)

JAPAN		Frequency (MHz)													
MM_MCS6	backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462	2467	2472	2484
	6														
	7														
	8	12,9	17,7				27,8					19,9	16,7		
	9	14,8	19,3				28,6					20,8	17,5		

MM_OFDM Out of Band Margin according to backoff applied in PDS (dB)

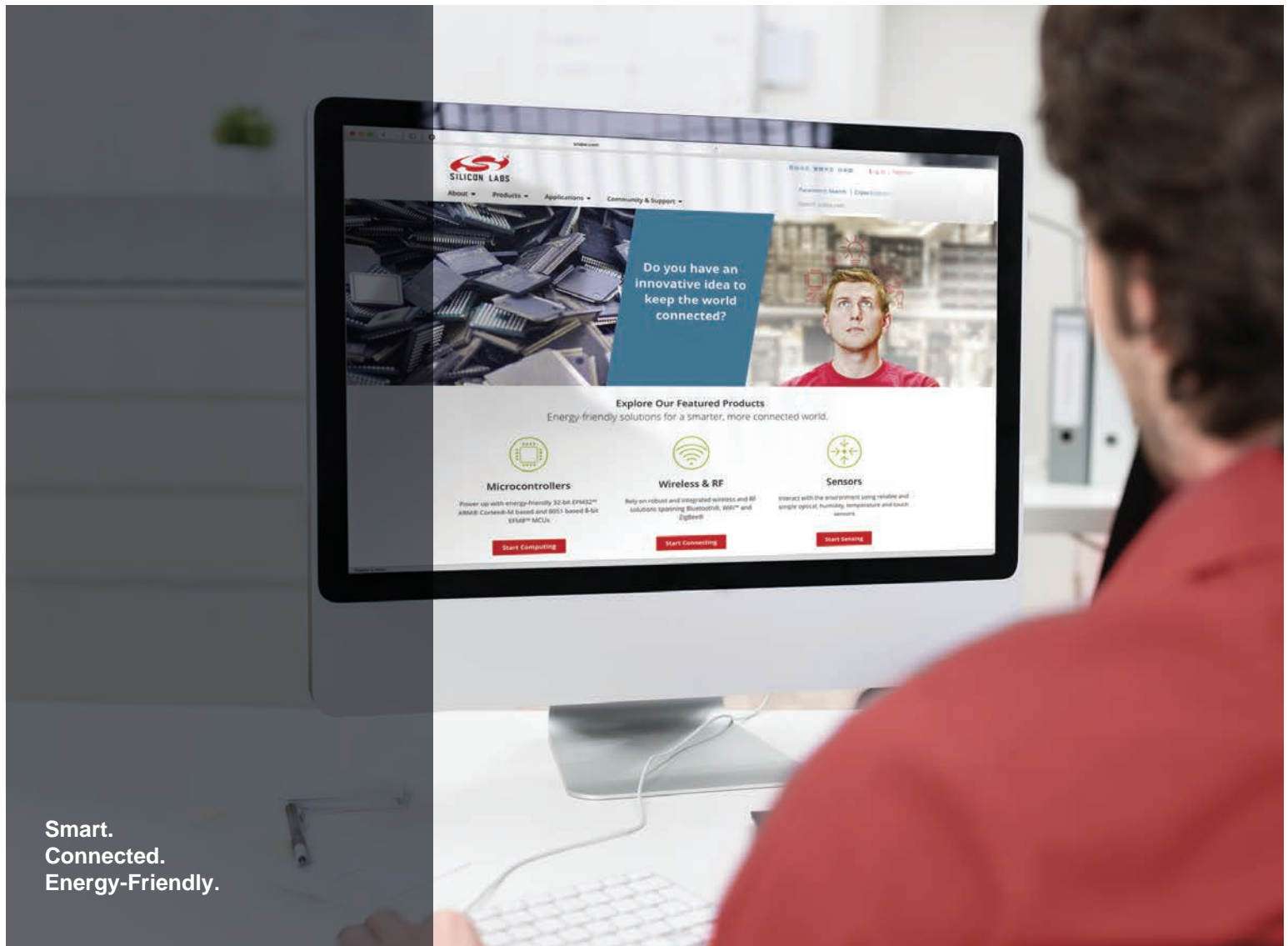
JAPAN		Frequency (MHz)													
MM_MCS7	backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462	2467	2472	2484
	6														
	7														
	8	15,0	17,1							27,7			19,6	14,1	
	9	14,6	19,3							28,1			19,8	17,6	

MM_OFDM EVM Margin according to backoff applied in PDS (dB) - Non-Restricted Band

JAPAN		Frequency (MHz)													
MM_MCS6	backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462	2467	2472	2484
	6														
	7														
	8	5,0	5,0				5,0					5,5	5,2		
	9	5,2	5,1				5,3					5,5	5,6		

MM_OFDM EVM Margin according to backoff applied in PDS (dB) - Non-Restricted Band

JAPAN		Frequency (MHz)													
MIMO_MCS 7	backoff (dB)	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462	2467	2472	248
	6														
	7														
	8	2,9	3,3					3,5					3,5	3,6	
	9	3,3	3,7					3,4					3,6	3,8	



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