EM35xx Reference Design Ceramic Balun, Spiral Inverted F Antenna, Revised July 31, 2014
EM35XX_REF_DES_CER_SPIRAL-INV-F, Revision A1

Bill of Materials
Initial Release July 31, 2014

Item	Part Number	Qty	Refdes	Description	MANUFACTURER	PART_NUMBER
1	566-0075-000	1	BLN1	BALUN, CHIP MULTILAYER CERAMIC, 2.4 GHZ. 50/100 OHM, -40C TO 85C, 0805 (2012 METRIC)	WURTH ELEKTRONIC, JOHANSON TECHNOLOGY, MURATA, TDK	748421245, 2450BL15B100E, LDB212G4010C-001, HHM1520
2	550-0036-000	3	C1,C16,C20	CAPACITOR, CERAMIC, 10NF, +/-10%, 6.3V, -55C TO 125C, X7R, 0402 (1005 METRIC)	MURATA	GRM155R70J103KA01D
3	550-0037-000	1	C2	CAPACITOR, CERAMIC, 0.47UF, +/- 10%, 6.3V, -55C TO 85C, X5R, 0402 (1005 METRIC)	MURATA	GRM155R60J474KE19D
4	550-0034-000	4	C3-C5,C7	CAPACITOR, CERAMIC, 0.1UF, +/-10%, 6.3V, -55C TO 125C, X7R, 0402 (1005 METRIC)	MURATA	GRM155R70J104KA01D
5	550-0033-000	1	C6	CAPACITOR, CERAMIC, 1.0UF, +/-10%, 10V, -55C TO 125C, X7R, 0603 (1608 METRIC)	TAIYO YUDEN LTD	LMK107B7105KA-T
6	550-0038-000	1	C8	CAPACITOR, CERAMIC, 2.2UF, +/-10%, 6.3V, -55C TO 125C, X7R, 0603 (1608 METRIC)	MURATA	CL10B225KQ8NNNC
7[1]	550-0039-000	1	C9	CAPACITOR, CERAMIC, 33PF, +/-5%, 50V, -55C TO 125C, C0G, NP0, 0402 (1005 METRIC)	SAMSUNG ELECTRONICS	CL05C330JB5NNNC
8[1]	550-2201-050	1	C10	CAPACITOR, CERAMIC, 22PF, +/-5%, 50V, -55C TO 125C, 0402 (1005 METRIC)	MURATA	GRM1555C1H220JA01D
9	550-2201-050	2	C11-C12	CAPACITOR, CERAMIC, 22PF, +/-5%, 50V, -55C TO 125C, 0402 (1005 METRIC)	MURATA	GRM1555C1H220JA01D
10	550-1001-050	2	C13,C22	CAPACITOR, CERAMIC, 10PF, +/-5%, 50V, -55C TO 125C, 0402 (1005 METRIC)	MURATA	GRM1555C1H100JA01D
11	550-0040-000	2	C17-C18	CAPACITOR, CERAMIC, 1PF, +/-0.25PF, 50V, -55C TO 125C, C0G, NP0, 0402 (1005 METRIC)	SAMSUNG ELECTRONICS	CL05C010CB5NNNC
12[2]	550-0036-000	1	C37	CAPACITOR, CERAMIC, 10NF, +/-10%, 6.3V, -55C TO 125C, X7R, 0402 (1005 METRIC)	MURATA	GRM155R70J103KA01D
13[3]	610-0045-000	1	J1	CONNECTOR, HEADER, SHROUDED, 10 POSITION, DUAL ROW, VERTICAL, 0.050IN	SAMTEC	FTSH-105-01-L-DV-K
14[4]	610-0086-000	1	J2	CONNECTOR, RECEPTACLE, BD075-19, SURFACE MOUNT VERTICAL	GLOBAL CONNECTOR TECH	BD075-19-A-1-L-C
15[4]	610-0087-000	1	J3	CONNECTOR, RECEPTACLE, BD075-14, SURFACE MOUNT VERTICAL	GLOBAL CONNECTOR TECH	BD075-14-A-1-L-C
16[5]	610-0081-000	1	J4	CONNECTOR, RECEPTACLE, U.FL, RF COAXIAL, SMT	MOLEX-KOCH INDUSTRIES	73412-0110
17	566-0076-000	1	L4	INDUCTOR, MULTI-LAYER FILM, 2.7NH, +/-0.3NH, -40C TO 85C, 0603 (1608 METRIC)	MURATA	LQG18HN2N7S00D
18	566-2N7A-000	1	L7	INDUCTOR, MULTI-LAYER FILM, 2N7H, +/-0.3NH, 300MA, -55C TO 125C, 0402 (1005 METRIC)	MURATA	LQG15HS2N7S02D
19	710-0651-001	1	PCB1	MECHANICAL, PCB		
20[2]	545-0047-000	1	Q3	MOSFET, 2N7002, 300MA, 830MW, 60V, TO-236-3, SC-59, SOT-23-3	NXP SEMI	2N7002,215
21	555-1001-010	1	R1	RESISTOR, THICK FILM, 10 OHM, +/-1%, 0.1W, 1/10W, 0402 (1005 METRIC)	PANASONIC ECG	ERJ-2RKF10R0X
22	555-1R05-016	1	R2	RESISTOR, THICK FILM, 1 OHM, +/-5%, 0.1W, 1/10W, 0402 (1005 METRIC)	PANASONIC ECG	ERJ-2GEJ1R0X
23	555-0000-000	1	R3	RESISTOR, THICK FILM, 0_OHM, JUMPER, 1/10W, 0402 (1005 METRIC)	SAMSUNG ELECTRONICS	RC1005J000CS
24[2]	555-0000-000	1	R5	RESISTOR, THICK FILM, 0_OHM, JUMPER, 1/10W, 0402 (1005 METRIC)	SAMSUNG ELECTRONICS	RC1005J000CS
25[2]	555-1045-016	4	R10,R19,R24,R36	RESISTOR, THICK FILM, 100K, +/-5%, 0.1W, 1/10W, 0402 (1005 METRIC)	PANASONIC ECG	ERJ-2GEJ104X
26	540-035XX-000	1	U1	IC, COMMUNICATIONS, EM35XX, -40C TO 85C, SOC, ZIGBEE/802.15.4 RF TRANSCEIVER, ARM CORTEX-M3, TO 12 - 64K RAM, 128 - 512K FLASH, 48-QFN	SILICON LABS	540-035x-000
27[2]	510-1040-000	1	U11	IC - PROGRAMMABLE MEMORY - BLANK, SERIAL FLASH, 2M (256K X 8), 2.7 V - 3.6 V, -40C 85C, 8-SOIC (0.154IN, 3.90MM WIDTH)	MACRONIX, WINBOND	MX25L2006EM1I-12G, W25X20BVSNIG
28	565-2400-009	1	Y1	OSCILLATOR, CRYSTAL, 24.000MHZ, 18PF LOAD, +/-10PPM TOLERANCE, +/-25PPM STABILITY, -40C TO 85C, AT49	ABRACON, ABRACON, ABRACON, ILSI AMERICA, AEL CRYSTALS LTD	ABLS-24.000MHZ-D-R60-1-W-T, ABLS-24.000MHZ-D1X-T, ABLS-438-24.000MHZ-T, HC49USM-24.000000M-2435, X24M000000S067
29[1]	565-3271-001	1	Y2	OSCILLATOR, CRYSTAL, 32.768KHZ, 12.5PF, +/-20PPM, -40C TO 85C, 2-SMD	ABRACON, FOX CRYSTALS, ILSI AMERICA, ILSI AMERICA	ABS07-32.768KHz-T, FX135A-327, IL3X-HX5-12.5-32.768KHz, IL3X-BX5-12.5-32.768KHz

Notes:

Parts highlighted are not required for the Reference Design. Substitutions of non-highlighted parts can be made for cost or availability reasons, but should be avoided as they may impact functionality and RF performance.

[1] C9, C10 and Y2 can be omitted when using the internal 10 KHz RC oscillator for a sleep timer.

[2] C37, Q3, R5, R10, R19, R24, R36 and U11 which make up the external Serial Flash circuit are not needed with larger memory EM358x variants. R5 is installed only if external Serial Flash is implemented without Hardware shutdown control.

[3] The J1 Packet Trace Port interface is required to make use of Ember Desktop software tools and enables a direct connection to an Ember Debug Adapter (ISA3). This part can be made 'Do Not Install' in production.

[4] J2 and J3 are intended for use with the EM35x Development Kit and can be replaced with a different board to board interface arrangement, or removed entirely to facilitate a merger into an already existing PCB layout design.

[5] J4 and R3 make up an RF characterization port. J3 is not installed in production modules.