

EM35xx Reference Design Ceramic Balun, Ceramic Chip Antenna, Revised **August 1, 2014**
EM35XX_REF_DES_CER_AT1B, Revision **A1**

Bill of Materials
Initial Release **August 1, 2014**

Item	Part Number	Qty	Refdes	Description	MANUFACTURER	PART_NUMBER
1 ¹	600-0044-000	1	AT1	ANTENNA, CERAMIC CHIP DIELECTRIC, 3.2X1.6X0.5MM, 2.45GHZ	JOHANSON	2450AT18B100
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	4	C1,C14,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 ²	550-0039-000	1	C9	CAPACITOR, CERAMIC, 33PF, +/-5%, 50V, -55C TO 125C, C0G, NP0, 0402 (1005 METRIC)	SAMSUNG ELECTRONICS	CL05C330JB5NNNC
8 ²	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,C19	CAPACITOR, CERAMIC, 1PF, +/-0.25PF, 50V, -55C TO 125C, C0G, NP0, 0402 (1005 METRIC)	SAMSUNG ELECTRONICS	CL05C010CB5NNNC
12	550-1P8A-050	1	C18	CAPACITOR, CERAMIC, 1.8PF, +/-0.25PF, 50V, -55C TO 125C, C0G, NP0, 0402 (1005 METRIC)	MURATA	GRM1555C1H1R8CA01D
13 ¹	550-0045-000	1	C21	CAPACITOR, CERAMIC, 0.75PF, +/-0.25PF, 50V, -55C TO 125C, C0G, NP0, 0402 (1005 METRIC)	MURATA	GRM1555C1HR75CA01D
14 ³	550-0036-000	1	C37	CAPACITOR, CERAMIC, 10NF, +/-10%, 6.3V, -55C TO 125C, X7R, 0402 (1005 METRIC)	MURATA	GRM155R70J103KA01D
15 ⁴	610-0045-000	1	J1	CONNECTOR, HEADER, SHROUDED, 10 POSITION, DUAL ROW, VERTICAL, 0.050IN	SAMTEC	FTSH-105-01-L-DV-K
16 ⁵	610-0086-000	1	J2	CONNECTOR, RECEPTACLE, BD075-19, SURFACE MOUNT VERTICAL	GLOBAL CONNECTOR TECH	BD075-19-A-1-L-C
17 ⁵	610-0087-000	1	J3	CONNECTOR, RECEPTACLE, BD075-14, SURFACE MOUNT VERTICAL	GLOBAL CONNECTOR TECH	BD075-14-A-1-L-C
18 ⁶	610-0081-000	1	J4	CONNECTOR, RECEPTACLE, U.FL, RF COAXIAL, SMT	MOLEX-KOCH INDUSTRIES	73412-0110
19 ¹	566-0077-000	1	L1	INDUCTOR, MULTI-LAYER FILM, 5NH, +/-0.3NH, 300MA, -55C TO 125C, 0402 (1005 METRIC)	MURATA	LQG15H55N6S02D
20	566-0076-000	1	L4	INDUCTOR, MULTI-LAYER FILM, 2.7NH, +/-0.3NH, -40C TO 85C, 0603 (1608 METRIC)	MURATA	LQG18HN2N7S00D
21	566-2N7A-000	2	L7-L8	INDUCTOR, MULTI-LAYER FILM, 2N7H, +/-0.3NH, 300MA, -55C TO 125C, 0402 (1005 METRIC)	MURATA	LQG15H52N7S02D
22	710-0651-009	1	PCB1	MECHANICAL, PCB		
23 ³	545-0047-000	1	Q3	MOSFET, 2N7002, 300MA, 830MW, 60V, TO-236-3, SC-59, SOT-23-3	NXP SEMI	2N7002,215
24	555-1001-010	1	R1	RESISTOR, THICK FILM, 10 OHM, +/-1%, 0.1W, 1/10W, 0402 (1005 METRIC)	PANASONIC ECG	ERJ-2RKF10R0X
25	555-1R05-016	1	R2	RESISTOR, THICK FILM, 1 OHM, +/-5%, 0.1W, 1/10W, 0402 (1005 METRIC)	PANASONIC ECG	ERJ-2GEJ1R0X
26 ⁶	555-0000-000	2	R3,R7	RESISTOR, THICK FILM, 0 OHM, JUMPER, 1/10W, 0402 (1005 METRIC)	SAMSUNG ELECTRONICS	RC1005J000CS
27 ³	555-0000-000	1	R5	RESISTOR, THICK FILM, 0 OHM, JUMPER, 1/10W, 0402 (1005 METRIC)	SAMSUNG ELECTRONICS	RC1005J000CS
28	555-0000-000	1	R8	RESISTOR, THICK FILM, 0 OHM, JUMPER, 1/10W, 0402 (1005 METRIC)	SAMSUNG ELECTRONICS	RC1005J000CS
29 ³	555-1045-016	4	R10,R19,R24,R36	RESISTOR, THICK FILM, 100K, +/-5%, 0.1W, 1/10W, 0402 (1005 METRIC)	PANASONIC ECG	ERJ-2GEJ104X
30	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
31 ³	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	MX25L2006EM11-12G, W25X20BVSNIIG
32	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
33 ²	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 The antenna port components AT1, C21 and L1, can be replaced with a preferred 50 ohm RF solution.

² C9, C10 and Y2 can be omitted when using the internal 10 KHz RC oscillator for a sleep timer.

³ 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.

⁴ 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.

⁵ 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.

⁶ J4, R3, R7 and R8 make up an RF characterization port. J4, R3 and R7 are not installed in production modules.