

BOM Explosion
Report

Created By: Shabestar, Fred
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PM EDT
Item Number: 14035-3200-01
Description: PWB ASSY, 7/8/900
MHZ MAIN BOARD
Item Revision: 4 C-136527
Date as of: 03/31/2017 02:52:39
PM EDT

Level	Number	Description	Qty	Ref Des	Item Type
0	14035-3200-01	PWB ASSY, 7/8/900 MHZ MAIN BOARD			
. 1	14035-4080-01	ANTENNA, INTERNAL WI-FI BLUETOOTH	1	E39	Antenna
. 1	14035-1112-01	ASSY, CONNECTOR, BATTERY CONTACT	1	J8	Assembly
. 1	14035-2310-A1	WIRE HARNESS ASSY, REAR SPEAKER, LOW PROFILE	1	MP1	Cable and Wire
. 1	C13-0214-106	CAP CER X5R 10UF 16V 10% 0805	13	C41,C48,C55,C75,C176,C505, C519,C608,C609,C619,C623, C624,C672	Capacitor
. 1	C13-0214-225	CAP CER X5R 2.2UF 16V 10%	1	C153	Capacitor

. 1	C13-0270-104	CAP CER X5R 0.1UF 25V 10% 0402	158	C2,C27,C34- C38,C40,C56,C57,C65,C76,C9 9,C126,C134,C137,C141,C14 8,C159,C160,C170,C210,C21 3,C214,C218,C283,C301,C31 1,C341,C346,C351,C362,C39 1,C393,C396,C413,C419,C43 3,C440-C449,C454- C460,C462-C470,C474- C477,C480,C481,C483- C489,C497- C501,C503,C507,C508,C517, C518,C525-C528,C530- C532,C547-C557,C559- C563,C571-C580,C587- C589,C591-C597,C602- C607,C610,C611,C622,C625, C626,C647,C650,C658- C660,C665,C673,C678,C684, C702,C708- C710,C713,C723,C729,C748	Capacitor
. 1	C13-0271-103	CAP CER X7R/X5R 0.01UF 25V 10% 0402	54	C47,C109,C114,C121,C140,C 158,C163,C168,C171,C175,C 181,C184,C188,C189,C192,C 196,C201,C205- C208,C211,C216,C219,C225, C230,C231,C259,C307,C336, C355,C358,C359,C364,C375, C389,C390,C408,C411,C543, C544,C564,C565,C583,C629, C653,C654,C674,C711,C718, C719,C726,C743,C744	Capacitor
. 1	C13-0278-102	CAP CER X7R 1000PF 100V 10% 0402	46	C3,C20,C68,C77- C79,C82,C87,C89,C94- C96,C105,C106,C110- C112,C119,C135,C142,C143, C147,C151,C155,C224,C237, C238,C256,C258,C272,C302, C303,C313,C315,C316,C325, C333,C337,C357,C363,C368, C376,C668-C670,C677	Capacitor
. 1	C13-0301-104	CAP CER SD 0.1UF 25V 10% 1206	2	C260,C273	Capacitor

. 1	C13-0301-563	CAP CER SD 0.056UF 25V 10% 1206	1	C282	Capacitor
. 1	C13-0305-010	CAP CER COG 1.0PF 25V +/-0.1PF 0402	1	C372	Capacitor
. 1	C13-0305-012	CAP CER COG 1.2PF 25V +/-0.1PF 0402	1	C371	Capacitor
. 1	C13-0308-104	CAP CER X7R 0.10UF 100V 10% 0603	8	C167,C177,C414,C422- C424,C430,C432	Capacitor
. 1	C13-0317-105	CAP CER X5R 1UF 35V 10% 0603	21	C88,C165,C198,C204,C209,C 215,C280,C300,C342,C392,C 409,C415- C418,C420,C427,C428,C431, C461,C506	Capacitor
. 1	C13-0324-106	CAP CER X7R 10UF 25V 10% 1206	1	C261	Capacitor
. 1	C13-0354-016	CAP CER X5R 4.7UF 6.3V 10% 0402	2	C584,C714	Capacitor
. 1	C13-0367-105	CAP CER X7R 1UF 50V 10% 0603	1	C178	Capacitor
. 1	C13-0394-047	CAP CER X5R 4.7UF 16V 10% 0603	7	C343- C345,C394,C395,C690,C731	Capacitor
. 1	C13-0705-333	CAP CER X7R 0.033UF 50V 10% 0603	1	C174	Capacitor
. 1	C13-1506-120	CAP CER COG 12PF 50V 5% 0402	2	C620,C621	Capacitor
. 1	C13-1506-681	CAP CER COG 680PF 50V 5% 0402	2	C67,C271	Capacitor
. 1	C13-1507-070	CAP CER COG 7PF 50V +/-0.1PF 0402	1	C317	Capacitor
. 1	C13-6118-334	CAP CER X7R 0.33UF 50V 10% 0805	1	C69	Capacitor
. 1	C13-6156-100	CAP CER COG 10PF 50V 5% 0402	5	C223,C257,C294,C295,C734	Capacitor

. 1	C13-6156-101	CAP CER COG 100PF 50V 5% 0402	60	C22,C28-C30,C49,C50,C58- C61,C97,C98,C107,C108,C11 5,C118,C120,C136,C138,C13 9,C150,C232,C233,C235,C23 6,C240,C241,C267,C276,C28 5,C287,C304- C306,C332,C334,C347- C350,C369,C370,C681- C683,C689,C699- C701,C707,C722,C724,C725, C727,C733,C737,C738,C742, C746,C747	Capacitor
. 1	C13-6157-152	CAP CER X7R 1500PF 50V 10% 0402	1	C323	Capacitor
. 1	C13-6157-181	CAP CER X7R 180PF 50V 10% 0402	4	C685-C688	Capacitor
. 1	C13-6157-331	CAP CER X7R 330PF 50V 10% 0402	6	C410,C425,C426,C429,C692, C693	Capacitor
. 1	C13-6157-332	CAP CER X7R 3300PF 50V 10% 0402	2	C331,C536	Capacitor
. 1	C13-6157-471	CAP CER X7R 470PF 50V 10% 0402	5	C186,C529,C558,C590,C655	Capacitor
. 1	C13-6157-562	CAP CER X7R 5600PF 50V 10% 0402	4	C384,C397-C399	Capacitor
. 1	C13-6176-300	CAP CER COG 30PF 25V 5% 0402	2	C644,C721	Capacitor
. 1	C13-6198-105	CAP CER X5R 1UF 10V 10% 0402	11	C13,C263,C265,C284,C286,C 694,C695,C697,C698,C740,C 741	Capacitor
. 1	C13-6198-224	CAP CER X5R 0.22UF 10V 10% 0402	2	C222,C717	Capacitor
. 1	C13-6198-474	CAP CER X5R 0.47UF 10V 10% 0402	7	C8-C10,C15,C19,C703,C715	Capacitor
. 1	C13-6221-226	CAP CER X5R 22UF 10V 20% 0805	1	C212	Capacitor
. 1	C13-9024-332	CAP CER COG 3300PF 1% 16V 0603	4	C360,C361,C374,C383	Capacitor
. 1	C13-9034-225	CAP CER X7R 2.2UF 10V 20% 0603	3	C11,C570,C676	Capacitor
. 1	C13-9038-225	CAP CER X7S 2.2UF 6.3V 10% 0402	4	C534,C537,C539,C612	Capacitor

. 1	C13-9086-008	CAR CER COG HI-Q 0.8PF 250V +/-0.1PF 0603	1	C51	Capacitor
. 1	C13-9089-475	CAP CER X5R 4.7UF 35V 10% 0805	9	C161,C182,C183,C190,C194, C195,C274,C275,C712	Capacitor
. 1	C13-9090-226	CAP CER X5R 22UF 16V 10% 0805	11	C162,C166,C169,C179,C180, C191,C193,C197,C199,C657, C691	Capacitor
. 1	C13-9809-106	CAP CER X5R 10UF 6.3V 20% 0603	9	C122,C124,C200,C226,C228, C504,C521,C524,C661	Capacitor
. 1	C50-0057-020	CAP CER COG 2.0PF 50V 0.1PF	1	C720	Capacitor
. 1	C50-0057-027	CAP CER COG 2.7PF +/-0.1PF 0402	4	C18,C679,C680,C739	Capacitor
. 1	C50-0057-033	CAP CER COG 3.3PF +/-0.1PF 0402	2	C239,C249	Capacitor
. 1	C50-0057-039	CAP CER COG 3.9PF +/-0.1PF 0402	1	C1	Capacitor
. 1	C50-0057-051	CAP CER COG 5.1PF 50V +/-0.1PF 0402	2	C373,C380	Capacitor
. 1	C50-0057-068	CAP CER COG 6.8PF +/-0.1PF 0402	1	C154	Capacitor
. 1	C50-0057-075	CAP CER COG 7.5PF 50V +/-0.1PF 0402	2	C318,C736	Capacitor
. 1	C50-0058-150	CAP CER COG 15PF 50V 1% 0402	1	C365	Capacitor
. 1	C50-0058-200	CAP CER COG 20PF 50V 1% 0402	5	C234,C262,C264,C716,C735	Capacitor
. 1	C50-0058-270	CAP CER COG 27PF 50V 1% 0402	3	C149,C728,C732	Capacitor
. 1	C50-9400-007	CAP CER LOW ESR 0.8 PF +/- .1PF 50V	1	C378	Capacitor
. 1	C50-9600-003	CAP CER COG LOW ESR 1.2PF 200V +/- 0.1PF 0603	3	C21,C80,C81	Capacitor
. 1	C50-9600-004	CAP CER COG LOW ESR 1.3PF 200V +/- 0.1PF 0603	1	C31	Capacitor
. 1	C50-9600-014	CAP CER COG LOW ESR 2.4 PF 200V +/- 0.1PF 0603	1	C83	Capacitor
. 1	C50-9600-016	CAP CER COG LOW ESR 3 PF 200V +/- 0.1PF 0603	1	C62	Capacitor
. 1	C50-9600-017	CAP CER COG LOW ESR 3.3 PF 200V +/- 0.1PF 0603	1	C42	Capacitor

. 1	C50-9600-024	CAP CER COG LOW ESR 6.2PF 200V +/- 0.1PF 0603	1	C90	Capacitor
. 1	C50-9600-030	CAP CER LOW ESR 11 PF 1% 200V	1	C144	Capacitor
. 1	C50-9600-032	CAP CER COG LOW ESR 13PF 200V 1% 0603	1	C101	Capacitor
. 1	C50-9600-033	CAP CER LOW ESR 15 PF 1% 200V	1	C100	Capacitor
. 1	C50-9600-034	CAP CER COG LOW ESR 18PF 200V 1% 0603	1	C116	Capacitor
. 1	P20-0002-007	EPOXY #3621,CHIPBONDER 30 ML SYRINGE	1	MP2	Chemicals, HAZMAT
. 1	E37-0012-010	PIN SPRING LOADED .255 OAL .055 STROKE 20U AU TR	1	E38	Connector, Termination
. 1	J46-0227-104	CONN RCPT VERT 0.4MM X 2X25 1.5MM STACK	1	J5	Connector, Termination
. 1	J46-0227-201	CONN RCPT VERT 0.4MM X 2X10 2.0MM STACK	3	J1-J3	Connector, Termination
. 1	J46-0227-206	CONN RCPT VERT 0.4MM X 2X40 2.0MM STACK	1	J4	Connector, Termination
. 1	J92-0037-007	CONN ULTRA SMALL COAX RCPT U.FL SERIES	1	J7	Connector, Termination
. 1	Z50-0006-025	CONTACT UNIVERSAL, BECU, 2.5 MM FREE HEIGHT	25	E7-E15,E18,E20-E25,E27- E32,E34-E36	Connector, Termination
. 1	D05-0007-160	DIODE ZENER 1/2W 16.0V 5%	1	VR27	Diode
. 1	D12-0071-001	DIODE PIN DUAL 50V 0,25W 3GHZ	1	CR23	Diode
. 1	D20-0055-001	DIODE SCHOTTKY 40V 0.5A	5	CR1,CR16,CR18,CR20,CR22	Diode
. 1	D20-0056-001	DIODE SCHOTTKY 40V 0.030A 0.2W 1.5PF	2	CR17,CR19	Diode
. 1	D22-0137-001	DIODE RECTIFIER SCHOTTKY 30V 3.0A	1	CR2	Diode

. 1	D14035-3200	PWB ASSY, 7/8/900 MHZ MAIN BOARD	1	0	Documents
. 1	D14035-3201	SCHEMATIC DIAGRAM, 7/8/900 MHZ MAIN BOARD	1	2	Documents
. 1	D14035-3208	PWB MECHANICAL ENVELOPE, 7/8/900 MHZ MAIN BOARD	1	3	Documents
. 1	G13-0025-001	EMI FILTER, 6-CHANN PI, ESD PROTECT, 35MHZ LP	4	U91-U94	Filters & Frequency Standard
. 1	G25-0018-126	FILTER SAW DUAL 772 / 856 MHZ	2	FL1,FL6	Filters & Frequency Standard
. 1	G25-0018-324	FILTER SAW DUAL 768-776,851-861 MHZ	1	FL5	Filters & Frequency Standard
. 1	G25-0023-014	FILTER, SAW, 772MHZ CENTER, +/- 4MHZ PASS BAND	1	FL2	Filters & Frequency Standard
. 1	G25-0023-015	FILTER, SAW, 856MHZ CENTER, +/- 5MHZ PASSBAND	1	FL3	Filters & Frequency Standard
. 1	G25-0023-016	FILTER, SAW, 807MHZ CENTER, +/- 9MHZ PASSBAND	1	FL4	Filters & Frequency Standard
. 1	G25-0100-001	FILTER SAW 1588.65 MHZ	1	FL7	Filters & Frequency Standard
. 1	G25-0106-001	FILTER, SAW, 940 MHZ, 5 MHZ BW	2	FL8,FL9	Filters & Frequency Standard
. 1	G25-0107-001	FILTER, SAW, 920 MHZ, 24 MHZ BW	1	FL10	Filters & Frequency Standard
. 1	Y01-0147-021	OSCILLATOR, CRYSTAL 32.768KHZ	1	Y6	Filters & Frequency Standard
. 1	Y01-0166-001	VCO, DUAL BAND, 1512 - 2088MHZ	1	Y3	Filters & Frequency Standard
. 1	Y01-0191-001	OSC TCXO 26.000 MHZ CLIP SINE 1.8 VDC,+/- .5 PPM	1	Y2	Filters & Frequency Standard

. 1	Y15-0061-001	XTAL, 24.000MHZ 10PPM, C=9PF R=40 OHM -40/+105C	1	Y5	Filters & Frequency Standard
. 1	L12-0005-002	INDUCTOR RF 2.55NH 2% AIR SPRING 0906	1	L19	Inductor
. 1	L12-0014-081	INDUCTOR RF 8.1NH 2% 4.4A AIR CORE 0908SQ	1	L12	Inductor
. 1	L12-0016-060	INDUCTOR RF 6NH 2.9A 2% SQ CORE 0806	1	L17	Inductor
. 1	L12-0016-069	INDUCTOR RF 6.9NH 2.7A 2% SQ CORE 0807	2	L14,L24	Inductor
. 1	L12-6003-501	INDUCTOR RF 1.65NH 5% 1.6A AIR CORE	2	L21,L109	Inductor
. 1	L25-0053-900	INDUCTOR COMMON MODE CHOKE	1	L90	Inductor
. 1	L25-9000-100	INDUCTOR 10UH .7A 20% 1008	2	L50,L53	Inductor
. 1	L25-9002-022	INDUCTOR POWER 2.2UH 1.57A 20% SMD	3	L42,L48,L49	Inductor
. 1	L25-9059-047	INDUCTOR POWER 4.7UH 2.2A 20% SMD	2	L44,L45	Inductor
. 1	L25-9061-033	INDUCTOR POWER 3.3UH 4.2A 20% SMD	1	L46	Inductor
. 1	L25-9072-022	INDUCTOR POWER 2.2UH 2.5A 30%	1	L47	Inductor
. 1	L45-0085-001	INDUCTOR 1.0NH 1.36A 5% 0402	1	L100	Inductor
. 1	L45-0091-033	INDUCTOR RF 3.3NH 1.9A 2% 0603	2	L56,L81	Inductor
. 1	L45-0091-036	INDUCTOR RF 3.6NH 1.9A 2% 0603	1	L41	Inductor
. 1	L45-0091-056	INDUCTOR RF 5.6NH 1.7A 2% 0603	2	L76,L82	Inductor
. 1	L45-0091-060	INDUCTOR RF 6NH 1.7A 2% 0603	1	L7	Inductor

. 1	L45-0091-101	INDUCTOR RF 100NH 0.47A 2% 0603	4	L28,L29,L33,L39	Inductor
. 1	L45-0091-230	INDUCTOR RF 23NH 0.85A 2% 0603	1	L79	Inductor
. 1	L45-0091-560	INDUCTOR RF 56NH 0.61A 2% 0603	2	L77,L78	Inductor
. 1	L45-0094-010	INDUCTOR RF 1NH 1.6A 5% 0603	1	L36	Inductor
. 1	L45-0094-020	INDUCTOR RF 2NH 1.9A 5% 0603	1	L35	Inductor
. 1	L45-0096-082	INDUCTOR RF 8.2NH 1.5A 5% 0402	3	L61,L62,L106	Inductor
. 1	L45-0100-100	INDUCTOR RF 10NH 1.3A 2% 0402	4	L6,L98,L99,L107	Inductor
. 1	L45-0106-039	INDUCTOR RF 39NH 0.45A 5% 0402	1	L1	Inductor
. 1	L45-0106-093	INDUCTOR RF 7.5NH 1.4A 5% 0402	3	L103,L104,L108	Inductor
. 1	L45-0106-100	INDUCTOR RF 100NH 0.31A 5% 0402	4	L34,L58,L59,L105	Inductor
. 1	L45-6023-001	INDUCTOR RF 1.6NH 0.7A 5% 0603	1	L30	Inductor
. 1	L45-9582-223	INDUCTOR POWER 22UH 0.28A 20% SMD	1	L43	Inductor
. 1	L50-0020-221	BEAD FERRITE 0603	9	Z11-Z13,Z15,Z31-Z34,Z36	Inductor
. 1	L50-0020-331	BEAD FERRITE	6	Z8,Z14,Z17,Z22,Z35,Z41	Inductor
. 1	L50-6007-007	BEAD FERRITE	22	Z1,Z5,Z6,Z9,Z10,Z16,Z18,Z20, Z23-Z30,Z37-Z40,Z42,Z47	Inductor
. 1	L50-9124-002	BEAD FERRITE 0.2A 0402	7	Z2,Z3,Z43-Z46,Z49	Inductor
. 1	L50-9124-003	BEAD FERRITE 0.4A 0402	1	Z48	Inductor
. 1	14035-3050-01	IC, PROGRAMMED, ECLIPSE, FLASH MEMORY	1	U82	Integrated Circuit

. 1	14035-3060-01	IC, PROGRAMMED, DAYTONA, PROCESSOR	1	U35	Integrated Circuit
. 1	I01-1026-125	IC, BUFFER 3-STATE, U-PAK	1	U96	Integrated Circuit
. 1	I01-1047-017	IC, ULP, BUFFER, SCHMITT TRIGG	1	U67	Integrated Circuit
. 1	I01-1053-002	IC, DUAL NON- INVERTING BUFFER, 3 STATE OUTPUT	2	U85,U86	Integrated Circuit
. 1	I01-1163-001	IC, 8-BIT SERIAL/ PARALLEL SHIFT REG, 3-STATE	2	U61,U62	Integrated Circuit
. 1	I01-1513-010	IC, DUAL SUPPLY BUFFER, LOW POWER, SOT886	1	U98	Integrated Circuit
. 1	I01-1576-001	IC, SINGLE INVERTER, HIGH PERFORMANCE	2	U7,U103	Integrated Circuit
. 1	I03-0192-001	IC, 10-BIT D-A CONVERTER, OCTAL, R-R OUTPUTS	1	U48	Integrated Circuit
. 1	I06-0103-001	IC, POWER- DISTRIBUTION SWITCH, DUAL, 0.5A	1	U89	Integrated Circuit
. 1	I06-0164-002	IC, POWER- DISTRIBUTION SWITCH, ADJ CURRENT-LIMIT	1	U88	Integrated Circuit
. 1	I06-0186-001	IC, RF SWITCH, SP4T, 4.5 OHM ON-RES, 50- 3000MHZ	4	U15,U19,U38,U49	Integrated Circuit
. 1	I06-0272-001	IC, ANALOG SWITCH, QUAD, 2NC 2NO	2	U10,U40	Integrated Circuit
. 1	I06-0284-001	IC, ULTRACMOS(R) SPDT RF-SWITCH, 0.10-6.0GHZ	2	U47,U101	Integrated Circuit
. 1	I06-0295-001	IC, SPDT RF SWITCH, 30-2700MHZ, +45DBM	1	U5	Integrated Circuit
. 1	I06-0328-001	IC, SPDT ANALOG SWITCH, RON=10.0 OHM, BW=250MHZ	1	U97	Integrated Circuit

. 1	I06-0345-001	IC DPDT DIFFERENTIAL RF SWITCH 0.1 TO 3GHZ	2	U54,U102	Integrated Circuit
. 1	I08-0085-001	IC, BOOST LED DRIVER, SINGLE-WIRE INTERFACE	2	U31,U33	Integrated Circuit
. 1	I09-0075-001	IC, GP PORT EXPANDER, 16- CHAN., LEVEL TRANSLATE	1	U83	Integrated Circuit
. 1	I10-0225-001	IC, LDO VOLTAGE REFERENCE, 5.00VDC, MICRO PWR	1	U46	Integrated Circuit
. 1	I10-0251-001	IC, LDO VOLT REG., ADJ-VOLTAGE, 0.50A, LOW PWR	1	U44	Integrated Circuit
. 1	I10-0254-001	IC, LDO VOLTAGE REGULATOR, 3.3V OUTPUT FIXED	3	U16,U37,U70	Integrated Circuit
. 1	I10-0261-001	IC, LDO VOLTAGE REG., 1.8VDC, LOW PWR	1	U90	Integrated Circuit
. 1	I10-0264-001	IC, LDO VOLTAGE REG, 1.1V, 0.35A	1	U32	Integrated Circuit
. 1	I10-0266-001	IC, LDO REGULATOR, 5.0VDC, 0.50A, FILTERED	1	U99	Integrated Circuit
. 1	I11-0080-001	IC, SWITCHING REGULATOR, 4A, 40V	1	U25	Integrated Circuit
. 1	I13-0168-001	IC, DC-DC STEP- DOWN REGULATOR, ADJ-VOLT, 1.0A	2	U23,U27	Integrated Circuit
. 1	I14-0192-001	IC, STEPDOWN CONVERTER, 3V TO 17V, 2A, ADJ OUT	2	U26,U28	Integrated Circuit
. 1	I14-0229-001	IC, RESET VOLTAGE DETECTOR 3.0V OPEN DRAIN	1	U75	Integrated Circuit
. 1	I17-0260-001	IC, 8-BIT BIDIRECTIONAL LEVEL XLATOR, OPEN- DRAIN	2	U72,U73	Integrated Circuit

. 1	I20-0100-001	IC, WINDOW COMPARATOR, HI/LOW-VOLTAGE DETECTION	1	U95	Integrated Circuit
. 1	I23-0093-001	IC, DIGITAL POWER MONITOR, I2C(TM), 60V	1	U12	Integrated Circuit
. 1	I23-0103-001	IC, 3-AXIS ACCELEROMETER, 2/4/8/16G, LOW PWR	1	U71	Integrated Circuit
. 1	I26-0200-001	IC, LPDDR2 SDRAM S- 4B 1GB 16BIT 1.2V	1	U30	Integrated Circuit
. 1	I27-0281-002	IC, BLACKFIN(R) PROCESSOR, 32BIT RISC, 400MHZ	1	U34	Integrated Circuit
. 1	I27-0289-001	IC, BLACKFIN(R) RISC PROCESSR, DUAL MAC, 400MHZ	1	U29	Integrated Circuit
. 1	I30-0207-901	IC, RRIO OP-AMP, HIGH CAP LOAD	1	U9	Integrated Circuit
. 1	I30-0358-001	IC, QUAD OP-AMP, RR, LOW PWR, GP, 1.8VDC	1	U50	Integrated Circuit
. 1	I32-0030-001	IC, MONO AUDIO PWR AMP, CLASS-D, 10W, VOLUME ADJ	3	U63,U65,U66	Integrated Circuit
. 1	I38-0048-003	IC, 100 MHZ TO 2.5GHZ LOG DETECTOR, 45 DB	1	U52	Integrated Circuit
. 1	I51-0148-001	IC, QUADRATURE MODULATOR, 20- 1000MHZ, SERIAL I/O	1	U58	Integrated Circuit
. 1	I53-0075-001	IC, GNSS LOCATION PLATFORM ENGINE	1	U4	Integrated Circuit
. 1	I53-0082-001	IC, DUAL BAND WLAN BASEBAND PROC, 802.11A/B/G/N	1	U84	Integrated Circuit
. 1	I61-0091-001	IC, USB 2.0/ UART/ AUDIO SWITCH, DP3T, HI SPEED	1	U22	Integrated Circuit

. 1	I62-0276-001	IC, BOOST CONVERTER, ADJ- VOUT, 1.2A, 1.2MHZ	1	U24	Integrated Circuit
. 1	I63-0121-001	IC, GAAS E-PHEMT LINEAR AMP, 0.40- 1.0GHZ, 0.50W	1	U20	Integrated Circuit
. 1	I63-0136-001	IC, E-PHEMT LNA, 0.7DB NF, 0.05- 4.0GHZ	1	U17	Integrated Circuit
. 1	I63-0158-001	IC, SIGE HBT MMIC AMP, DC-3500MHZ, 50 OHM	1	U13	Integrated Circuit
. 1	I63-0168-001	IC, GAAS PHEMT LNA AMP 0.3-2.2GHZ G=20.5 NF=0.23	3	U41,U42,U100	Integrated Circuit
. 1	I69-0050-002	IC, DIRECT CONVERSION RECEIVER, LNA + I/Q DEMODO	1	U56	Integrated Circuit
. 1	I70-0114-001	IC, HV FRACT-N/ INTEGER-N SYNTHESIZER, 3-WIRE	1	U8	Integrated Circuit
. 1	I87-0058-001	IC, STEREO AUDIO CODEC, 24BIT, 8- 96KHZ SAMPLING	1	U57	Integrated Circuit
. 1	I87-0093-001	IC, STEREO CODEC, 4- ADC/ 2-DAC, LOW LATENCY	1	U69	Integrated Circuit
. 1	I98-0062-001	IC, VOLTAGE VARIABLE ATTENUATOR. 0.050 - 4.0GHZ	1	U14	Integrated Circuit
. 1	I98-0073-001	IC, DIGITAL ATTENUATOR, 2-BIT, 18DB, 35-6000 MHZ	1	U39	Integrated Circuit
. 1	N21-0084-001	LED, RIGHT ANGLE, SMT 1208, RED/GRN/BLUE, .020A	1	DS1	LED, Optical Devices
. 1	14035-1974-01	LABEL, MAIN PWB BARCODE	1	MP3	Labeling
. 1	14035-1501-01	SHIELD, GPS, XGR- LMR PWB	1	SHLD1	Mechanical Part

. 1	14035-1502-01	SHIELD, SYNTHESIZER, XGR- LMR PWB	1	SHLD3	Mechanical Part
. 1	14035-1504-01	SHIELD, DIGITAL, XGR- LMR PWB	1	SHLD4	Mechanical Part
. 1	14035-1505-01	SHIELD, RECEIVER, XGR-LMR PWB	1	SHLD5	Mechanical Part
. 1	14035-1506-01	SHIELD, VCO, XGR- LMR PWB	1	SHLD6	Mechanical Part
. 1	14035-1507-01	SHIELD, DCRX/CODEC, XGR- LMR PWB	1	SHLD8	Mechanical Part
. 1	14035-1508-01	SHIELD, IQ MODULATOR, XGR- LMR PWB	1	SHLD7	Mechanical Part
. 1	14035-1511-01	SHIELD, TRANSMIT, RND, XGR-LMR PWB	1	SHLD2	Mechanical Part
. 1	14035-3209-02	PWB, 7/8/900 MHZ MAIN BOARD	1	1	PWB
. 1	R53-0027-101	RES NETWORK 100 5% .063W 4 ISOLATED RES	1	R226	Resistor
. 1	R85-0097-357	RES FILM 38.3K 0.1% 1/16W 25PPM 0402	1	R393	Resistor
. 1	R85-0097-401	RES FILM 100K 0.1% 1/16W 25PPM 0402	3	R103,R164,R392	Resistor
. 1	R85-1500-023	RES FILM 240 1% 1/16W 0402	2	R307,R330	Resistor
. 1	R85-6021-068	RES FILM 49.9 1% 1/10W 0603	1	R7	Resistor
. 1	R85-6021-235	RES FILM 2.32K 1% 1/10W 0603	1	R987	Resistor
. 1	R85-6037-010	RES FILM 0.010 OHM 1% .5W 1206	1	R47	Resistor
. 1	R85-6040-000	RES 0 JUMPER 1A 0402	1	R980	Resistor
. 1	R85-6040-001	RES FILM 10.0 1% 1/16W 0402	37	R28,R32,R35,R41,R44,R59,R6 7,R74,R94,R96,R133,R135,R1 52,R153,R181,R186,R210,R2 14,R225,R235,R236,R276,R3 35,R407,R925,R926,R943,R9 44,R946,R947,R964,R967,R9 68,R984,R996-R998	Resistor
. 1	R85-6040-002	RES FILM 4.7 1% 1/16W 0402	2	R48,R49	Resistor

. 1	R85-6040-010	RES FILM 12.4 1% 1/16W 0402	1	R119	Resistor
. 1	R85-6040-025	RES FILM 17.8 1% 1/16W 0402	2	R138,R141	Resistor
. 1	R85-6040-040	RES FILM 25.5 1% 1/16W 0402	1	R113	Resistor
. 1	R85-6040-051	RES FILM 33.2 1% 1/16W 0402	22	R14,R15,R31,R125- R127,R129,R130,R266,R267, R271,R272,R394-R396,R931- R934,R942,R945,R985	Resistor
. 1	R85-6040-068	RES FILM 49.9 1% 1/16W 0402	3	R23,R24,R363	Resistor
. 1	R85-6040-070	RES FILM 52.3 1% 1/16W 0402	1	R199	Resistor
. 1	R85-6040-077	RES FILM 61.9 1% 1/16W 0402	1	R140	Resistor
. 1	R85-6040-082	RES FILM 69.8 1% 1/16W 0402	4	R6,R178,R184,R340	Resistor
. 1	R85-6040-101	RES FILM 100 1% 1/16W 0402	37	R4,R5,R18,R26,R34,R38,R132 ,R147,R176,R177,R187,R198, R231,R232,R244,R245,R250, R253-R256,R375-R382,R385- R387,R408,R940,R941,R971, R981	Resistor
. 1	R85-6040-147	RES FILM 301 1% 1/16W 0402	3	R1-R3	Resistor
. 1	R85-6040-156	RES FILM 374 1% 1/16W 0402	1	R68	Resistor
. 1	R85-6040-159	RES FILM 402 1% 1/16W 0402	2	R40,R42	Resistor
. 1	R85-6040-173	RES FILM 562 1% 1/16W 0402	3	R155,R156,R992	Resistor
. 1	R85-6040-174	RES FILM 576 1% 1/16W 0402	1	R76	Resistor
. 1	R85-6040-180	RES FILM 665 1% 1/16W 0402	1	R162	Resistor
. 1	R85-6040-191	RES FILM 866 1% 1/16W 0402	1	R88	Resistor
. 1	R85-6040-201	RES FILM 1K 1% 1/16W 0402	31	R21,R39,R43,R50- R52,R72,R73,R134,R136,R13 7,R139,R151,R173,R179,R18 0,R185,R195,R205,R213,R21 5,R291,R299,R301,R308,R32 0,R327,R336-R338,R359	Resistor
. 1	R85-6040-225	RES FILM 1.78K 1% 1/16W 0402	5	R60,R229,R237,R239,R240	Resistor

. 1	R85-6040-232	RES FILM 2.1K 1% 1/16W 0402	4	C502,R929,R930,R995	Resistor
. 1	R85-6040-234	RES FILM 2.21K 1% 1/16W 0402	1	R332	Resistor
. 1	R85-6040-249	RES FILM 3.16K 1% 1/16W 0402	1	R171	Resistor
. 1	R85-6040-251	RES FILM 3.32K 1% 1/16W 0402	5	R33,R200,R281,R287,R990	Resistor
. 1	R85-6040-266	RES FILM 4.75K 1% 1/16W 0402	1	R192	Resistor
. 1	R85-6040-268	RES FILM 4.99K 1% 1/16W 0402	3	R84,R172,R937	Resistor
. 1	R85-6040-280	RES FILM 6.65K 1% 1/16W 0402	1	R373	Resistor
. 1	R85-6040-301	RES FILM 10K 1% 1/16W 0402	14	R85,R90,R148,R157,R174,R207,R209,R211,R212,R230,R238,R936,R986,R994	Resistor
. 1	R85-6040-308	RES FILM 11.8K 1% 1/16W 0402	1	R165	Resistor
. 1	R85-6040-312	RES FILM 13K 1% 1/16W 0402	1	R163	Resistor
. 1	R85-6040-317	RES FILM 14.7K 1% 1/16W 0402	1	R150	Resistor
. 1	R85-6040-318	RES FILM 15.0K 1% 1/16W 0402	69	R11,R12,R16,R17,R36,R87,R100,R111,R112,R114-R118,R122-R124,R197,R220,R228,R233,R234,R248,R252,R270,R273,R275,R286,R292,R295-R297,R310-R313,R350,R352,R355,R372,R390,R391,R403,R404,R894,R899,R900,R902,R903,R909,R910,R914,R915,R938,R939,R948,R949,R952,R961,R969,R970,R973-R978,R982,R983	Resistor
. 1	R85-6040-326	RES FILM 18.2K 1% 1/16W 0402	2	R104,R928	Resistor
. 1	R85-6040-332	RES FILM 21K 1% 1/16W 0402	1	R263	Resistor
. 1	R85-6040-339	RES FILM 24.9K 1% 1/16W 0402	1	R206	Resistor
. 1	R85-6040-345	RES FILM 28.7K 1% 1/16W 0402	1	R102	Resistor
. 1	R85-6040-347	RES FILM 30.1K 1% 1/16W 0402	6	R249,R251,R258-R260,R991	Resistor
. 1	R85-6040-353	RES FILM 34.8K 1% 1/16W 0402	1	R959	Resistor

. 1	R85-6040-359	RES FILM 40.2K 1% 1/16W 0402	1	R175	Resistor
. 1	R85-6040-361	RES FILM 42.2K 1% 1/16W 0402	1	R91	Resistor
. 1	R85-6040-362	RES FILM 43.2K 1% 1/16W 0402	1	R927	Resistor
. 1	R85-6040-372	RES FILM 54.9K 1% 1/16W 0402	1	R908	Resistor
. 1	R85-6040-382	RES FILM 69.8K 1% 1/16W 0402	1	R965	Resistor
. 1	R85-6040-385	RES FILM 75K 1% 1/16W 0402	1	R106	Resistor
. 1	R85-6040-387	RES FILM 78.7K 1% 1/16W 0402	1	R97	Resistor
. 1	R85-6040-401	RES FILM 100K 1% 1/16W 0402	16	R27,R37,R61,R208,R284,R285,R374,R906,R951,R953-R957,R962,R972	Resistor
. 1	R85-6040-402	RES FILM 102K 1% 1/16W 0402	1	R101	Resistor
. 1	R85-6040-405	RES FILM 110K 1% 1/16W 0402	1	R989	Resistor
. 1	R85-6040-418	RES FILM 150K 1% 1/16W 0402	1	R105	Resistor
. 1	R85-6040-419	RES FILM 154K 1% 1/16W 0402	1	R95	Resistor
. 1	R85-6040-427	RES FILM 187K 1% 1/16W 0402	1	R988	Resistor
. 1	R85-6040-457	RES FILM 383K 1% 1/16W 0402	3	R958,R960,R966	Resistor
. 1	R85-6040-469	RES FILM 511K 1% 1/16W 0402	2	R29,R30	Resistor
. 1	R85-6040-603	RES FILM 2M 1% 1/16W 0402	1	R364	Resistor
. 1	R85-6040-980	RES FILM 3.01 1% 1/16W 0402	3	R217-R219	Resistor
. 1	S06-0051-015	SWITCH TACT NO 32V .010A SIDE ACT	1	S1	Switch
. 1	T12-9001-001	XFMR BALUN 50 TO 200 OHM BALANCED SMD	1	T1	Transformer
. 1	T12-9237-001	TRANSFORMER BALUN 300 - 2200MHZ 50 OHM 1:1 SMD	1	T2	Transformer
. 1	Q25-0155-002	XSTR RF MOSFET 25V 3A 7W 135- 527MHZ	1	Q1	Transistor
. 1	Q25-0159-001	TRANSISTOR NPN 20V 4.3A SOT23	1	Q12	Transistor

. 1	Q26-0166-901	XSTR, MOSFET P-CHANNEL, 20V	1	Q4	Transistor
. 1	Q26-0332-001	XSTR MOSFET N-CH 20V 4.2A .78W .037 OHM	1	Q11	Transistor
. 1	Q26-0346-001	XSTR, N/P-CH TRENCH MOSFET, +/- 20V, +5.3/-4.5A	3	Q5,Q17,Q21	Transistor
. 1	Q27-0043-001	XSTR P-CH -20V 12A 2.2W	1	Q18	Transistor
. 1	Q34-0047-001	XSTR MOSFET DUAL N-CH 30V .22A 0.3W 2.8 OHM	6	Q15,Q16,Q19,Q20,Q22,Q23	Transistor
. 1	D50-0052-003	ESD PROTECTION DIODE 12V UNI	15	VR3-VR13,VR21-VR24	Varistor
. 1	D50-0067-001	ESD SUPPRESSOR 14V 0402 BI-DIRC POLYMER	1	E1	Varistor
. 1	D50-0084-004	TVS ESD 12V 0.15W	8	VR14-VR19,VR25,VR26	Varistor
. 1	D50-0120-001	ESD PROTECT 30KV	3	VR2,VR28,VR29	Varistor
. 1	D60-0027-011	VARISTOR 11VRMS 20A 0.05J 0402	1	VR1	Varistor



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**Software Unit Design Specification: RF DSP RF
Tuning**

Title:

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TGC TABLE 18

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Title: **Tuning**

Introduction

Overview

TCXO Tune

This routine adjusts the frequency of the temperature-compensated crystal oscillator (TCXO) to minimize frequency error relative to a reference which is assumed to be accurate.

This test is performed at a single frequency and the result is applicable to all transmit and receive frequencies and waveforms. It will be implemented internally in the RFDSP, and will be performed on command from the GPP, returning the tune value when complete.

PA Bias Calibration

This routine adjusts the PA gate bias voltage to obtain the proper drain current for different RF power output levels.

Six total tune points are required: rated power and low power in the VHF, UHF, and 700/800/900 MHz transmit bands. This test will be implemented internally in the RFDSP, and will operate at whatever transmit frequency is currently selected. Therefore it is the responsibility of the operator to set the proper frequency before running the calibration. The high and low power tune values will be returned when the calibration is complete.

Transmit Power Calibration (TGC)

This routine calibrates the transmit power for both rated power and 20dBm at many frequencies across all transmit bands. It requires feedback from an external RF power meter. Therefore the RFDSP will only provide a command to set the appropriate DAC value, and the routine will be run by an external device.

Transmit IQ Calibration

The radio uses a direct I/Q-to-RF modulator. To achieve good performance, gain, phase and DC imbalances between the I and Q channels need to be tuned out. These imbalances vary by frequency, therefore a table with two to three tune points per frequency band is used to store the calibration values.

This tune procedure is run in radio transmit mode and does not require any external equipment except proper antenna termination.

Receive DC Offset Tune

This routine adjusts the analog I/Q DC offset so that the offset as measured by the ADC is minimized.

This test is performed at a single frequency and the result is applicable to all receive frequencies and waveforms. It will be implemented internally in the RFDSP, and will be performed on command from the GPP, returning the tune values when complete.



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Title:

Receive Fractional Delay Calibration

This routine aligns the relative sample timing of I and Q to minimize time difference. The apparent imbalance is caused by the analog baseband I and Q filters, which may not be matched perfectly. This test is performed at a single frequency and the result is applicable to all receive frequencies and waveforms.

Adjustment of the signal generator is required while the test is running. Therefore the RFDSP will only provide commands to read the required gain and phase balance values and the routine will be run by an external device.

Receive Pre-selector Tune and RSSI Calibration

Pre-selector tune and RSSI calibration are both performed at several frequencies in the VHF and UHF bands. RSSI calibration alone is performed at several frequencies in the 700/800/900 MHz band.

The pre-selector tune adjusts a DAC output to tune an analog filter. The output is adjusted to maximize IQ magnitude with an FM input signal at -95dBm.

RSSI calibration generates an offset value which is used by the RFDSP to compute true signal magnitude. This calibration value is generated after the pre-selector tune step is completed (if applicable), and generates an offset value such that the calculated signal magnitude equals -95dBm.

These tests will be implemented internally in the RFDSP, and will operate at whatever receive frequency is currently selected. Therefore it is the responsibility of the operator to set the proper frequency of both radio and signal generator before running the calibration.

Message Format

Command Message

Byte	0
Block	Payload
Data	Tune Routine ID
Example	0x01

Tune Routine ID definition:

- 0:** Transmit IQ calibration (single frequency)
- 1:** TCXO tune
- 2:** PA bias tune
- 3:** Direct conversion receiver DC bias tune
- 4:** RSSI & Preselector tune



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Response Message

Byte	0	1-2	2-3	4-5	6-7	8
Block	Payload					
Data	Tune Routine ID	Tune value 1	Tune value 2	Tune value 3	Tune value 4	Success
Example	0x01	0x100	0x200	0x300	0x400	0x01

Tune Routine ID: Same as defined in command message format.

Tune value 1-4: Results of tune procedure. Values vary as defined below for each procedure:

IQ calibration: 1 = gain; 2 = phase; 3 = DC I; 4 = DC Q

TCXO tune: 1 = tuned DAC value; 2-4 = unused, set to 0

PA bias tune: 1 = tuned DAC value; 2-4 = unused, set to 0

DCRX DC bias tune: 1 = double bias; 2 = I bias; 3 = Q bias; 4 = unused, set to 0

Preselector & RSSI tune: 1 = preselector DAC value; 2 = RSSI value; 3-4 = unused, set to 0

Success: Value of 0 = unspecified failure; value of 1 = success; other values may be defined in the future.



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Title:

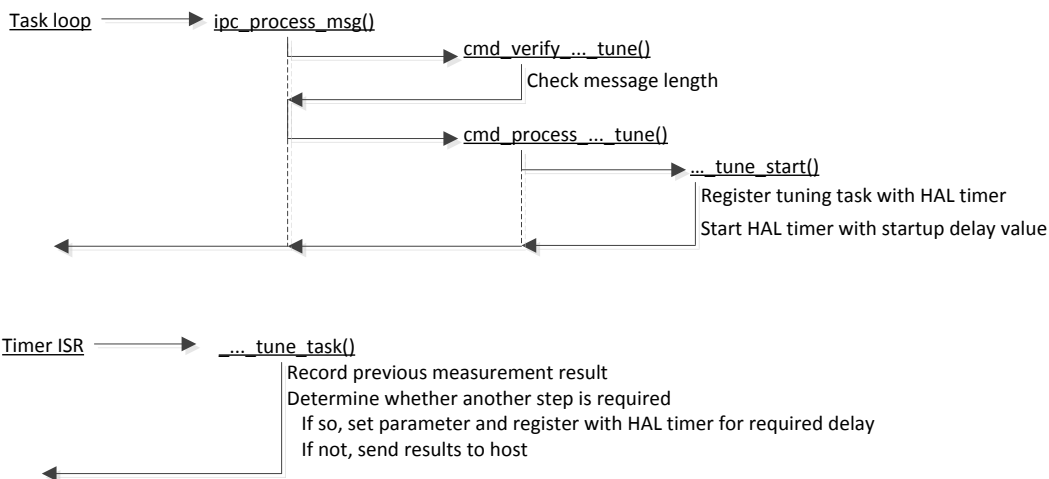
Detailed Design

Common Design Aspects

All of these tuning routines have a common flow:

1. Set some parameter (DAC code, register value, etc.)
2. Delay to allow output to settle
3. Record measurement
4. Determine whether another parameter change is required
 - a. If so, go back to 1.
 - b. If not, report results.

Because of these common flow aspects, a common design pattern is used.



TCXO Tune

TCXO tuning is accomplished by examining the average frequency as calculated by the FM discriminator used in noise squelch. An un-modulated carrier at 861 MHz and -70dBm is fed into the radio. If there is a frequency offset between the radio's TCXO and the input signal, the FM discriminator output will have a DC offset. AGC is disabled.

The tuning process first sets the TCXO DAC value to 0 and records the FM offset, then to the maximum value and records the offset. From this information the line equation is used to calculate the anticipated zero crossing. Since the voltage to frequency relationship of the TCXO is not completely linear, the calculated value will likely still be offset from 0 by a small amount. To reach true zero, single DAC steps are taken in the appropriate direction until the zero crossing is reached.

There are two parameters that can be adjusted to affect the quality of the final calibration result. First is the time constant of the FM discriminator averaging filter, and second is the



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length of time for which to remain at each DAC code. Optimum values for each were determined experimentally, with results as shown below. Based on the tradeoff of accuracy and tune time, $\alpha = 9$ and delay = 50ms were chosen.

Table 1: Average Tune Value

average		Alpha				
		7	8	9	10	11
Delay (ms)	300	463.4	463.1	463.2	463	463
	250	463.4	463	463.1	463.1	463
	200	463.5	463.3	463.3	463.1	463
	150	462.3	462.2	463	463	463
	100	462.4	462.5	462.8	463	463
	50	462.7	462.5	462.2	462.1	463.2

Table 2: Standard Deviation of Tune Values

stdev		Alpha				
		7	8	9	10	11
Delay (ms)	300	0.843274	0.567646	0.421637	0	0
	250	1.173788	0.666667	0.316228	0.316228	0
	200	0.707107	0.674949	0.483046	0.316228	0
	150	1.05935	0.421637	0	0	0
	100	0.843274	0.707107	0.421637	0	0
	50	0.823273	0.527046	0.421637	0.316228	0.788811

Table 3: Average Tune Time

ave test time		Alpha				
		7	8	9	10	11
Delay (ms)	300	9.548438	9.620703	9.622266	8.886719	8.860938
	250	8.243359	8.23125	8.132813	7.490625	7.569922
	200	6.640234	6.576953	6.587891	5.826953	6.396875
	150	4.835938	4.776953	4.763672	4.805078	5.579688
	100	3.45	3.367969	3.417969	3.501563	5.366797
	50	1.972656	1.960938	1.985156	2.814063	5.244141

Tune command: debug command xcvr_device rfdsp tune_request 1



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Title: **Tuning**

PA Bias Calibration

PA bias calibration is accomplished simply by reading the current measurement reported by the ISL28025 monitor chip via I²C.

For each parameter (low and high power), the initial “guess” DAC value is the value stored in the default PA bias table. The DAC value is then adjusted up or down as appropriate in single steps until the difference between the target and measured bias current is minimized.

Band	High power bias	Low power bias
VHF	250 mA	50mA
UHF	250 mA	50 mA
700/800/900 MHz	250 mA	50 mA

Tune command: `debug command xcvr_device rfdsp tune_request 2`

Transmit Power Calibration (TGC)

Since TGC tuning relies on an external power meter, it is not implemented internally to the RF DSP. The RF DSP will provide a command interface to set TGC voltage. The tuning procedure follows.

1. For each frequency listed in [Appendix B](#), perform the following:
2. Key the radio at high power.
3. Adjust the TGC voltage until the measured output power matches the target listed in Appendix B +/- 0.1dBm.
4. Un-key the radio.
5. Record tuned TGC DAC value in the TGC table.

The values should then be stored and programmed to RF DSP flash memory when appropriate.

TGC DAC set command: `debug command xcvr_device rfdsp debug_dac 1 <value>`

Transmit IQ Calibration

The IQ calibration procedure for a single frequency is performed entirely within the RF DSP, and no external equipment is needed. For each frequency listed in [Appendix D](#), perform the following:

1. Set the transmit frequency (command: `chan cfg cur txfreq <value>`)
2. Start transmitting (command: `radio key ptt on`)
3. Run IQ calibration (command: `debug command xcvr_device rfdsp tune_request 0`)
 - a. Record reported gain, phase, I DC and Q DC calibration values



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4. Stop transmitting (command: radio key ptt off)

Receive DC Offset Tune

At the beginning of this test, the radio should be tuned to 772 MHz narrowband analog FM. No input signal is needed. This tune step only needs to be performed at one frequency and is equally applicable to all frequencies and bandwidth settings. The tune command will then be sent to the radio and the RF DSP will carry out the following procedure.

1. Set the CMX994 VGA to maximum attenuation.
2. Set the CMX994 DCOffset register to 0 for I and Q.
3. Disable the ADAU1361 input highpass filter.
4. Record the average magnitude of I and Q.
5. Set the CMX994 VGA to minimum attenuation.
6. Adjust the CMX994 DCOffset register so that the average I Magnitude is as close to the measurement from step 4 as possible.
7. Repeat step 6 for the Q channel.
8. Report the I and Q DC offset calibration values to the user.

The values should then be stored and programmed to RF DSP flash memory when appropriate.

Tune command: `debug command xcvr_device rfdsp tune_request 3`

Receive Fractional Delay Calibration

This tune step will be implemented entirely in the RF DSP. An RF signal generator should be connected to the radio and set to 772 MHz, no modulation, output power -60dBm. The radio should be configured for narrowband analog FM, 772 MHz. The tune procedure executed by the RF DSP follows.

1. Disable AGC
2. Set Rx IQ balancing alpha value for a time constant of ~100ms.
3. Configure synthesizer for Rx frequency + 6250 Hz.
4. Set fractional delay to I = 2061584301 and Q = 2147483647.
5. Read the Rx IQ balancer's phase result and store this as phase_neg.
6. Configure synthesizer for Rx frequency - 6250 Hz.
7. Read the Rx IQ balancer's phase result and store this as phase_pos.
8. Store Ans1 = phase_neg - phase_pos.
9. Set fractional delay to I = 2147483647 and I = 2061584301.
10. Configure synthesizer for Rx frequency + 6250 Hz.



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11. Read the Rx IQ balancer's phase result and store this as phase_neg.
12. Configure synthesizer for Rx frequency – 6250 Hz.
13. Read the Rx IQ balancer's phase result and store this as phase_pos.
14. Store Ans2 = phase_neg – phase_pos.
15. The calibration value is $((Ans1 * -0.08) - 0.04 * (Ans1 - Ans2)) / (Ans1 - Ans2)$.
16. If the value is < 0 then: $Q = 2147483647$, $I = \text{int}(2^{31} * (1 - \text{abs}(\text{value})))$
17. If the value is > 0 then: $I = 2147483647$, $Q = \text{int}(2^{31} * (1 - \text{abs}(\text{value})))$

The values should then be stored and programmed to RF DSP flash memory when appropriate.

Tune command: debug command xcvr_device rfdsp tune_request 5

Receive Pre-selector Tune and RSSI Calibration

This test is implemented in the RF DSP for a single frequency. It is the responsibility of the operator to set the appropriate receive frequencies as listed in [Appendix C](#), then send the appropriate command to begin the RF DSP internal tune.

The preselector tune portion of the test adjusts the preselector DAC value to center the preselector filter frequency for the current receive frequency. For this procedure an unmodulated carrier input at the proper frequency and -95dBm is input to the radio. AGC is disabled.

After the preselector tune is completed, the RF DSP calculates the difference between its internally-calculated RSSI and the actual -95dBm value. This is the RSSI calibration value.

These two results are then reported.

The values should then be stored and programmed to RF DSP flash memory when appropriate.

Tune command: debug command xcvr_device rfdsp tune_request 4



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Appendix A: PA bias tune frequencies

- VHF: 150 MHz
- UHF: 450 MHz
- 700/800/900: 800 MHz

Appendix B: TGC tune frequencies – VHF/UHF/700/800 MHz

Frequency (MHz)	Rated power (dBm)
136	38.0
155	38.0
174	38.0
378	37.2
426	37.2
474	37.2
522	37.2
768	34.2
776	34.2
798	34.2
805.9875	34.2
806	35.0
816	35.0
851	35.0
861	35.0

Appendix C: TGC tune frequencies – 700/800/900 MHz

Frequency (MHz)	Rated power (dBm)
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Title:

768	34.2
776	34.2
798	34.2
805.9875	34.2
806	35.0
816	35.0
851	35.0
861	35.0
896	35.0
899	35.0
902	35.0
935	35.0
939.5	35.0
944	35.0

Appendix D: Preselector/RSSI tune frequencies – VHF/UHF/700/800 MHz

Frequency (MHz)	Preselector	RSSI
136	Yes	Yes
139.8	Yes	Yes
143.6	Yes	Yes
147.7	Yes	Yes
151.2	Yes	Yes
155	Yes	Yes
158.8	Yes	Yes
162.6	Yes	Yes
166.4	Yes	Yes
170.2	Yes	Yes
174	Yes	Yes
378	Yes	Yes



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Title:

394	Yes	Yes
408	Yes	Yes
422	Yes	Yes
436	Yes	Yes
450	Yes	Yes
464	Yes	Yes
478	Yes	Yes
492	Yes	Yes
506	Yes	Yes
522	Yes	Yes
768	No	Yes
769.6	No	Yes
771.2	No	Yes
772.8	No	Yes
774.4	No	Yes
776	No	Yes
852.9	No	Yes
856.7	No	Yes
861	No	Yes

Appendix E: Preselector/RSSI tune frequencies –700/800/900 MHz

Frequency (MHz)	Preselector	RSSI
768	No	Yes
769.6	No	Yes
771.2	No	Yes
772.8	No	Yes
774.4	No	Yes
776	No	Yes
851	No	Yes



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Title:

852.9	No	Yes
856.7	No	Yes
861	No	Yes
935	No	Yes
939.5	No	Yes
944	No	Yes

Appendix F: Transmit IQ Calibration Frequencies – VHF/UHF/700/800 MHz

Frequency (MHz)
136
162
174
378
444
522
768
776
798
816
851
861

Appendix G: Transmit IQ Calibration Frequencies –700/800/900 MHz

Frequency (MHz)
768
776
798
816
851
861
896



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902
935
944



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Appendix H: Example Tune tables

Legend:

Title (not stored in table)
Data

CM Table

Key	Data
Part number	12150-3000
Eng release	0
Serial number	W18768690
PL revision	1
PWB revision	1
Free space	0
ECO	0
Test date	8/14/2014
Tested by	tgiles
FPGA part rev	0
Hardware rev	Proto2
ICT result	0
Functional test result	0
Upflow status	0
Sub assembly status	0
EEPROM layout rev	1
Software features rev	1

Rx Tune Table

Frequency	Preselector Tune value	RSSI tune value
136000000	550	171
139800000	800	171
143599999	1050	171
147400000	1300	171
151199999	1550	171
155000000	1850	171
158800000	2150	171
162599999	2450	171
166400000	2300	171
170199999	2300	171



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Title:

174000000	3700	171
378000000	1250	171
392399999	1450	171
406799999	1700	171
421199999	1900	171
435599999	2300	171
449999999	2800	171
464399999	3400	171
478799999	3200	171
493199999	2800	171
507599999	3000	171
521999999	4092	171
768000000	0	171
768799999	0	171
769599999	0	171
770399999	0	171
771199999	0	171
771999999	0	171
772799999	0	171
773599999	0	171
774399999	0	171
775199999	0	171
775999999	0	171
851000000	0	171
852899999	0	171
854799999	0	171
856699999	0	171
858599999	0	171
860499999	0	171
862399999	0	171
864299999	0	171
866199999	0	171
868099999	0	171
870000000	0	171



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Title:

Misc Table

Key:

TCXO		
Frac delay I	Frac delay Q	
Bias double	I bias	Q bias

Example Data:

1884		
2147483647	2111699765	
0	0	0

Tx Bias Table

This table retains formatting from the XG-100P. As specified in the [relevant section](#) above, there are only two tune points in each band. The low bias (stored in the “very low” column) is used at transmit power less than or equal to 30dBm. The high bias (stored in the “low”, “medium”, and “high” columns) is used at transmit power greater than 30dBm. This table may be simplified in the future.

Band	Off bias	Very low	Low	Medium	High
VHF	0	2550	2900	2900	2900
UHF	0	2580	2925	2925	2925
700/800	0	2500	2906	2906	2906

TGC Table

Frequency	High power	20dBm
136000000	2720	1124
140750000	2745	1169
145500000	2764	1204
150250000	2765	1228
155000000	2800	1363
159750000	2817	1256
164500000	2830	1450
169250000	2861	1420
174000000	2861	1432
378000000	3289	1783
390000000	3301	1794
400000000	3300	1824



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Title:

410000000	3300	1956
420000000	3300	1829
430000000	3311	1952
440000000	3317	1851
450000000	3324	1836
460000000	3336	1855
470000000	3330	1997
490000000	3337	1976
500000000	3342	1886
510000000	3361	1864
522000000	3349	1884
768000000	3037	1835
772000000	3025	1946
776000000	3025	1951
798000000	3015	1910
805997500	3003	1795
806000000	3055	1804
810000000	3058	1909
816000000	3061	1921
851000000	3005	1860
856000000	3005	1884
861000000	3000	1768

IQ Cal Table

Frequency	Gain	Phase	I DC	Q DC
136000000	-52	-3	110	-70
162000000	-47	-5	126	-59
174000000	-46	7	135	-54
378000000	-56	-11	88	33
444000000	-27	-49	59	57
522000000	-9	-71	32	46
764000000	52	-116	11	37
776000000	57	-119	12	34
794000000	73	-119	16	34
816000000	85	-119	17	33
851000000	90	-116	20	35



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Title:

870000000	87	-111	19	37
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