SL-01P/SL-01D

PMR 8 Channel – LPD 69Channel

Service Manual

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SPECIFICATIONS

STANDARD TEST CONDITIONS

Supply Voltage - Battery	3.7Vdc
Antenna Impedance	50 Ohm
Audio Frequency	1 KHz
Main Signal Input	1mV
Deviation PMR	AF 1 KHz / 1.5 KHz Dev
LPD	AF 1 KHz / 3.0 KHz Dev
Audio Output Power	~2Vrms
Audio Output Impedance	16 ohms, non-inductive
Test Temperature	25 ℃

GENERAL SPECIFICATIONS

Transmitter	CPU Controlled PLL Synthesizer
Receiver system	CPU Controlled double conversion, super-heterodyne
Intermediate Frequency 1st	21.4 MHz
2nd	450 KHz
Operating Frequencies PMR	446.00625MHz ~ 446.09375 MHz
LPD	433.07500 MHz ~ 433.77500 MHz
Frequency Stability	0.0005%
Battery Life	30 hours (typical)
Battery	3.7 V DC @ 720mAh Li-ion Battery
Transmitter/Receiver Switching	Electrical
Ambient Conditions, Temperature / Humidity	-15°c ~ 55°C / 40% ~ 70%

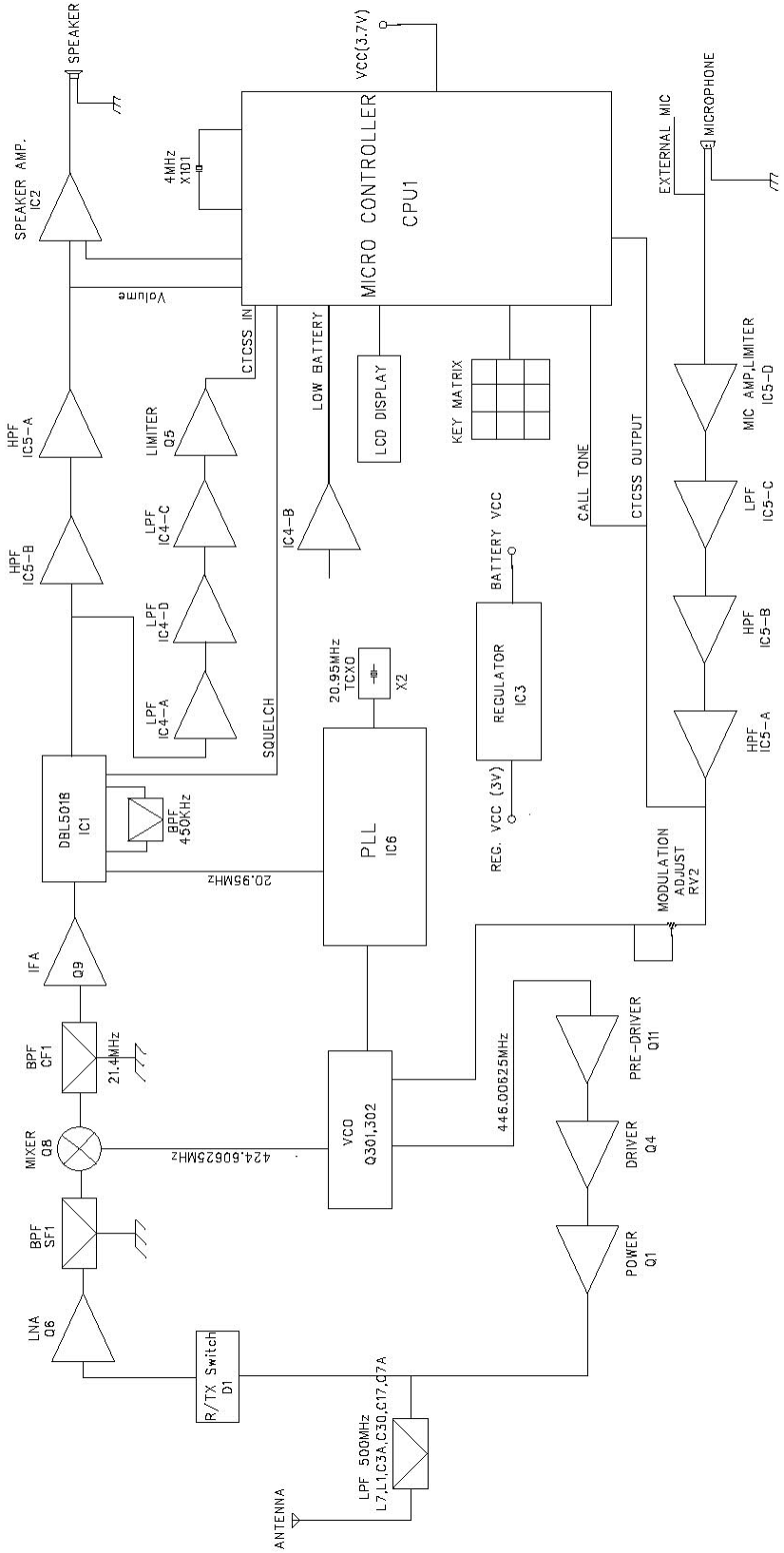
RECEIVER SPECIFICATIONS

Sensitivity	<-119 @12dB SINAD
Audio Output	~2Vrms (w/o load)
Frequency Response	300 Hz ~ 2500 Hz
Image Rejection	54dB
Adjacent Channel Rejection	60dB
Inter Modulation Distortion	60dB
Conducted Rx Spurious	-54dB

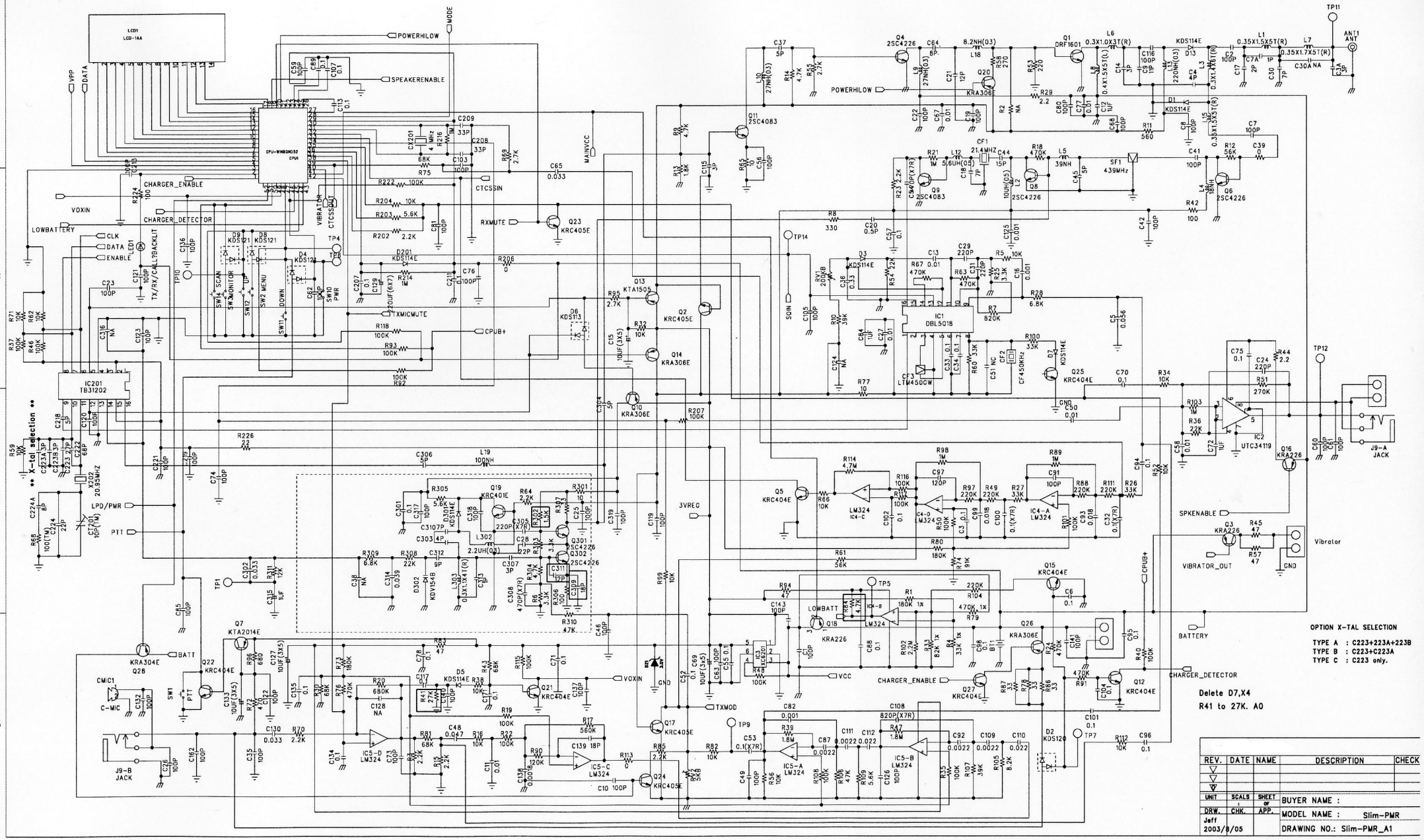
TRANSMITTER SPECIFICATIONS

Output Power(Conducted) PMR Band	500mW
LPD Band	10mW
Max. Deviation PMR	± 2.5 KHz(MAX)
LPD	± 5.0 KHz(MAX)
Frequency Error	5ppm(-15~+55℃)
Current Drain	<500 mA
Spurious Emission(Conducted)	50dB
Antenna Impedance	50 Ohm

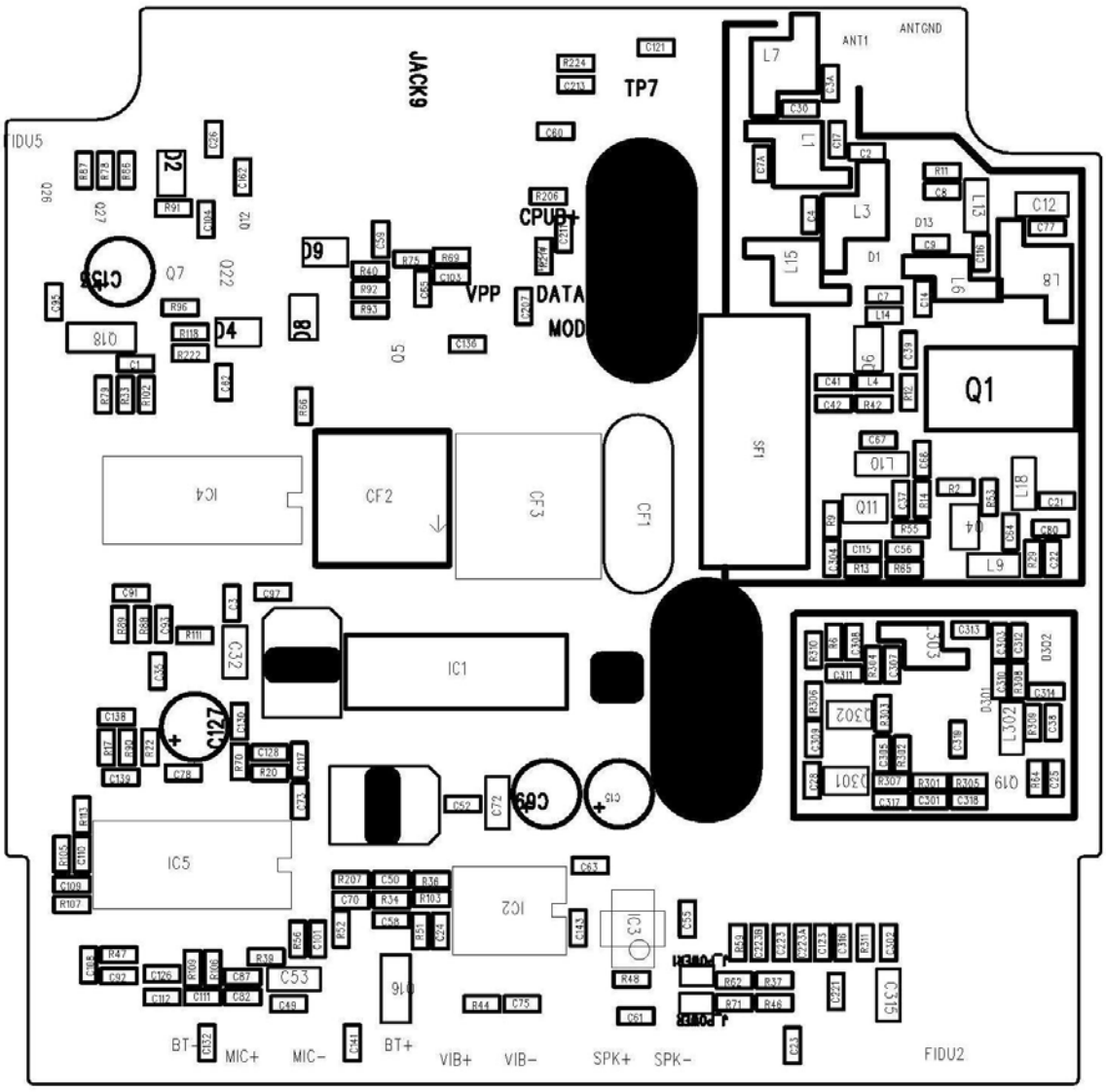
BLOCK DIAGRAM



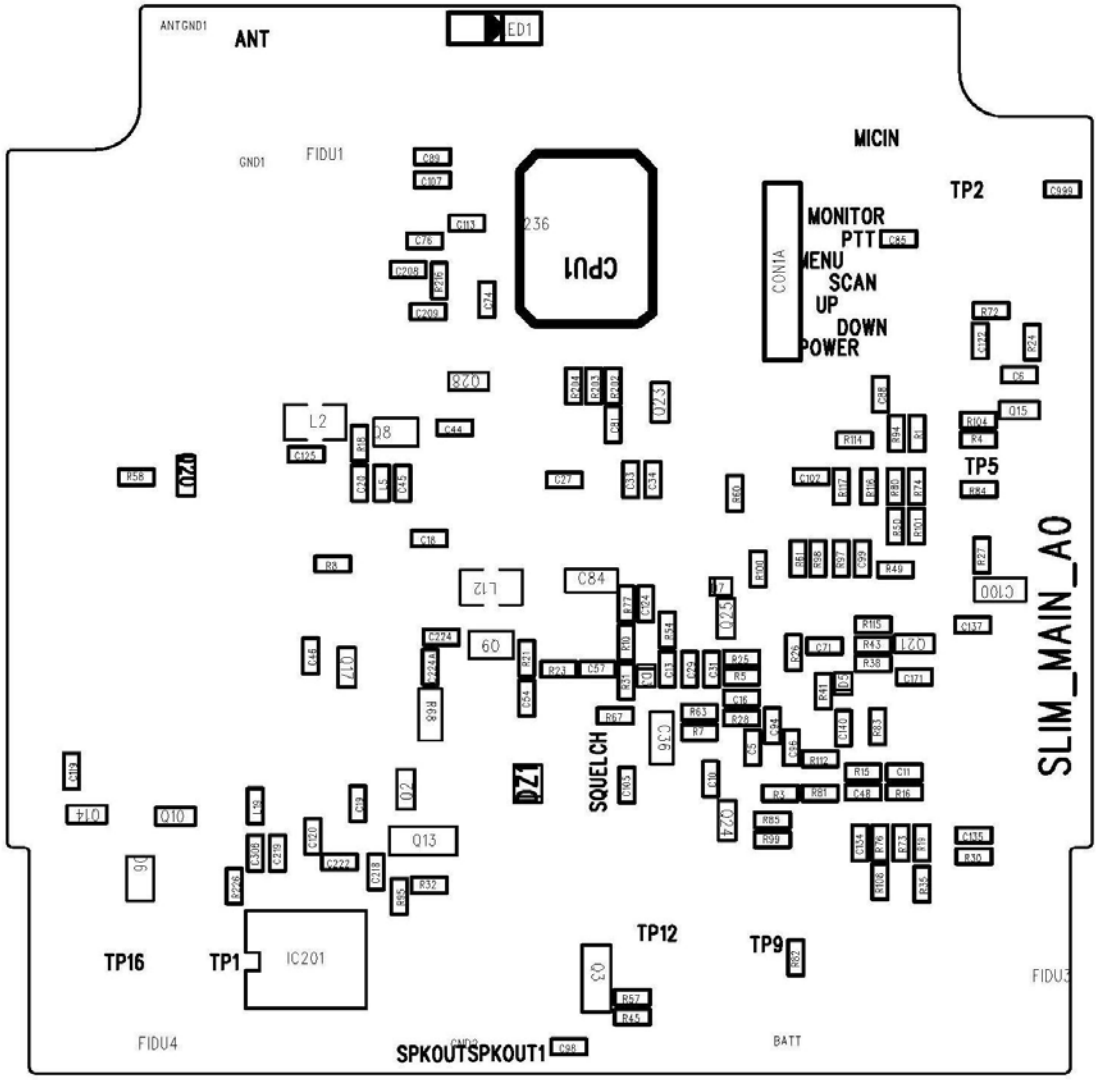
SCHEMATIC DIAGRAM



Printed Circuit Board (Bottom Side)



Printed Circuit Board (Top Side)



CHANNEL FREQUENCY CHARTS

PMR Frequency Chart

Channel	Frequency (MHz)	Channel	Frequency (MHz)
1	446.00625Mhz	2	446.01875Mhz
3	446.03125Mhz	4	446.04375Mhz
5	446.05625Mhz	6	446.06875Mhz
7	446.08125Mhz	8	446.09375Mhz

CTCSS Tone Frequency Chart

NO	FREQ.(Hz)	NO	FREQ. (Hz)	NO	FREQ. (Hz)
1	67.0	14	107.2	27	167.9
2	71.9	15	110.9	28	186.2
3	74.4	16	114.8	29	179.9
4	77.0	17	118.8	30	186.2
5	79.7	18	123.0	31	192.8
6	82.5	19	127.3	32	203.5
7	85.4	20	131.8	33	210.7
8	88.5	21	136.5	34	218.1
9	91.5	22	141.3	35	225.7
10	94.8	23	146.2	36	233.6
11	97.4	24	151.4	37	241.8
12	100.0	25	156.7	38	250.3
13	103.5	26	162.2		

LPD Frequency Chart

Channel	Frequency (MHz)	Channel	Frequency (MHz)
01	433.07500	36	433.95000
02	433.10000	37	433.97500
03	433.12500	38	434.00000
04	433.15000	39	434.02500
05	433.17500	40	434.05000
06	433.20000	41	434.07500
07	433.22500	42	434.10000
08	433.25000	43	434.12500
09	433.27500	44	434.15000
10	433.30000	45	434.17500
11	433.32500	46	434.20000
12	433.35000	47	434.22500
13	433.37500	48	434.25000
14	433.40000	49	434.27500
15	433.42500	50	434.30000
16	433.45000	51	434.32500
17	433.47500	52	434.35000
18	433.50000	53	434.37500
19	433.52500	54	434.40000
20	433.55000	55	434.42500
21	433.57500	56	434.45000
22	433.60000	57	434.47500
23	433.62500	58	434.50000
24	433.65000	59	434.52500
25	433.67500	60	434.55000
26	433.70000	61	434.57500
27	433.72500	62	434.60000
28	433.75000	63	434.62500
29	433.77500	64	434.65000
30	433.80000	65	434.67500
31	433.82500	66	434.70000
32	433.85000	67	434.72500
33	433.87500	68	434.75000
34	433.90000	69	434.77500
35	433.92500		

TEST AND ALIGNMENT PROCEDURE

1. RECOMMENDED TEST EQUIPMENT

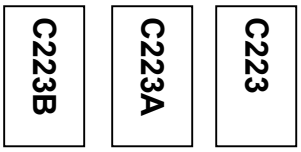
1.1 HP8920A,B Radio Communication Tester or equivalent
1.2 Fluke 187 Digital Voltmeter or equivalent
1.3 HPE3615A Power Supply or equivalent

2. TEST PREPARATION

2.1 Connect a 3.7Vdc power supply to the positive battery terminal input point and the negative battery terminal input point (GND) into the negative terminal.
2.3 Connect the HP8920A,B RF Output port to the ANT point.
2.4 TP12 should be connected to the ***Audio In Hi*** and TP10 should be connected to the ***Audio In Lo*** of the HP8920B.
2.5 Set the unit at Ch1 (**446.00625MHz**)

3. CRYSTAL SELECT

3.1 X202 crystal is marked with red, blue, and no color marking. Matching capacitors **C223, C223A, and C223B** that are in PCB will be determined by the markings and are as follows:



Crystal		C223A	C223B
A	Red	**Connect**	**Connect**
B	NO COLOR	**Connect**	**NC**
C	Blue	**NC**	**NC**

4. VCO ADJUSTMENT

4.1 Set the unit at PMR Ch1 (446.00625MHz) and connect a digital voltmeter to TP1 (VCO PD). **(SEE FIGURE 1)**
4.2 Press the PTT Button so the unit is in transmit mode.
4.3 ***Adjust L303 until the voltmeter reads around 2.2~2.5V (without VCO Plate). L303 is located under the shieldcan.***
Solder VCO Plate and let temperature stabilize. Recheck TX VCO at Ch1, should be 2.1~2.4Vdc
4.4 Release the PTT switch so the unit will be in receive mode.
4.5 Observe the voltage at TP1, the voltage should be **2.0~2.4Vdc**.
4.6 Set the unit at PMR Ch8 (446.09375MHz).
4.7 Press the PTT switch so the unit is in transmit mode.
4.8 Observe the voltage at TP1, the voltage should be **2.1~2.4Vdc**.
4.9 Release the PTT switch so the unit will be in receive mode.
4.10 Observe the voltage at TP1, the voltage should be **2.0~2.4Vdc**.
4.11 Set the unit at LPD Ch1 (433.075MHz)
4.12 Press the PTT switch so the unit is in transmit mode.
4.13 Observe the voltage at TP1, the voltage should be **>0.5Vdc**.
4.14 Release the PTT switch so the unit will be in receive mode.
4.15 Observe the voltage at TP1, the voltage should be **>0.4Vdc**.

NOTE : Above Specifications are measured with VCO Plate soldered.

5. TRANSMITTER FREQUENCY ALIGNMENT

Equipment Setting:
Filter : 50Hz~15kHz
IF Filter : PMR 15kHz; LPD : 230kHz
De-Emphasis : OFF
Monitor : Pk-Pk/2
Input : 200mVrms; 1kHz Deviation

5.1 Set the unit/equipment for TX Test **(SEE FIGURE 2).** Set the unit at PMR Ch1. Press the PTT button so the unit will be in transmit mode.
5.2 Adjust CT201 trimmer capacitor until such that the output frequency is equal to the channel frequency with maximum error of +/-200Hz **(OQA Limit of +/-800Hz).**
Production will control as follows:
- PCBA Alignment : +/-200Hz
- Casing Test : +/-500Hz
- OQA Limit : +/-800Hz

6. TRANSMITTER OUTPUT POWER CHECK

6.1 Set the unit at PMR Ch1. (use short cable)
6.2 Press the PTT button so the unit is in transmit mode.
6.3 Transmit Power should be between **0.5~0.9W.**
6.4 Set the unit at LPD Ch1.
6.5 Press the PTT button so the unit is in transmit mode. Ensure the TX Power is **>0.04W**

7. TRANSMITTER DEVIATION ADJUSTMENT

7.1 Set the unit at PMR Ch1. Connect an audio generator (600ohms) to the microphone terminal pads. The audio frequency should be set at 1kHz with a level of 200mVrms.
7.2 Connect an FM Deviation Meter (on the HP8920B) on ANT point. Set the monitor to read ***(Pk to Pk)/2*** deviation. Set ***Filter 1*** to 50Hz and ***Filter 2*** to 15kHz. ***De-emphasis*** should be set to Off.
7.3 Press the PTT button so the unit will be in transmit mode.
7.4 Adjust RV2 and observe the reading at the Deviation Meter, the reading should be between **1.6** to **1.7kHz (QA limit : 1.5~1.8kHz)**.
7.5 Set the unit to LPD Ch1. Set the monitor to read ***(Pk to Pk)/2*** deviation. Set ***Filter 1*** to 50Hz and ***Filter 2*** to 15kHz. ***De-emphasis*** should be set to Off. Set the **IF Filter** to **230kHz**. Press the PTT button and check the Deviation Meter, the reading should be **2.8 ~ 5.0kHz.**
7.6 At PMR Ch1, decrease the audio generator level until the deviation reads +/-**1.2** kHz. The generator level should be between **2~5mV**
. 7.7 Check that the transmit audio distortion is less than 5%. Modulation should be checked at **1.2kHz** Modulation, using Narrowband Filter with De-Emphasis ON.
7.8 Set the CTCSS to Code 1. Turn OFF the audio generator. Press the PTT button so the unit will be in transmit mode.
7.9 Confirm that the CTCSS Code modulation is between 0.4 to 0.7kHz
7.10 Set the CTCSS to Code 38. Press the PTT button so the unit will be in transmit mode.
7.11 Confirm that the CTCSS Code modulation is between 0.4 to 0.7kHz.

8. RECEIVER ALIGNMENT

8.1 Set the unit/equipment for RX Test **(SEE FIGURE 3).** Set the RF Generator level to –47dBm. The generator should be set for 1.5kHz deviation at 1kHz modulation. Set the Impedance at **16ohms**.
8.2 Set ***Filter 1*** to 25Hz and ***Filter 2*** to 15kHz.
8.3 Set the unit at PMR Ch1. Set the **Volume level for 4** (default Level). Align CF2 for maximum level. Check the audio level, should be **0.27~0.6Vrms**
8.4 Confirm that the RX Distortion is less than 5%.
8.5 Reduce the RF Generator signal level until a 12dB Sinad reading is achieved. The RF Generator level should be less than –120dBm.
8.6 Set the RF Generator level to –47dBm, and set the unit Volume Level to maximum.
8.7 Check the maximum Audio Output Level, should be **>1.91Vrms**.
8.8 Set the unit at LPD Channel 1.
8.9 Set the RF generator at 3.0kHz deviation at 1kHz modulation.

8.10 Repeat Procedure 9.5 and confirm that the RF Generator is less than –122dBm at 12dB SINAD.

9. SQUELCH THRESHOLD AND HYSTERISIS

9.1 Set unit same as 9.1.
9.2 Set the RF Generator level until unit is at 4~5dB Sinad.
9.3 Slowly increase the RF Signal Generator level until the unit un-squelches (RX On), confirm that the sensitivity is between **10~16dB SINAD**.

10. VOX TEST

10.1 Set the unit into VOX Mode. The VOX icon should be displayed on the LCD.
10.2 Connect an audio generator into the microphone terminal. The audio frequency should be set for 1kHz frequency with a level of 0mVrms and the output should be turned off.
10.3 Turn on the output of the audio generator.
10.4 Increase the Audio Generator level until unit goes into TX Mode.
10.5 Check the Generator level, it should be between **2.5~4.0mV**.

11. LOW BATTERY LEVEL TEST

11.1 Set the unit into receive mode or standby mode. Connect TP2 into oscilloscope. See **FIGURE 4**.
11.2 Set the Power Supply voltage to 3.7Vdc.
11.3 Slowly decrease the Power Supply Voltage until the display on TP2 changes from **High to Low level** and Battery icon appears and blink.
11.4 Observe the Power Supply Level. The level must be between **3.0** to **3.4**Vdc

12. CHARGING STOP TEST

Charging Stop operation cannot be confirmed for the initial 5 minutes, so we need to do 2 test methods:
Test 1 (Charging Stop)
12.1 Connect TP2 to Oscilloscope. Connect Artificial Battery into unit.
12.2 Set Power Supply to **3.7Vdc measured at battery termina**l and connect to TP3
12.3 Monitor the display in TP2. Increase the voltage level on the Power Supply until the display on TP2 moves from High to Low level.
12.4 Confirm that the voltage in the **Battery Terminal Port** is between ***4.1~4.2Vdc***
Test 2 (Charge current check)
12.1 Connect a **Fully Charged Battery** into the unit.
12.2 Insert the Charger plug into the Microphone Jack. The unit must be set to OFF.
12.3 Monitor the current on the **Adaptor** line.
12.4 Confirm that the Charging Current is ***100mA +/- 20mA***.

FIGURE 1 (VCO TEST)

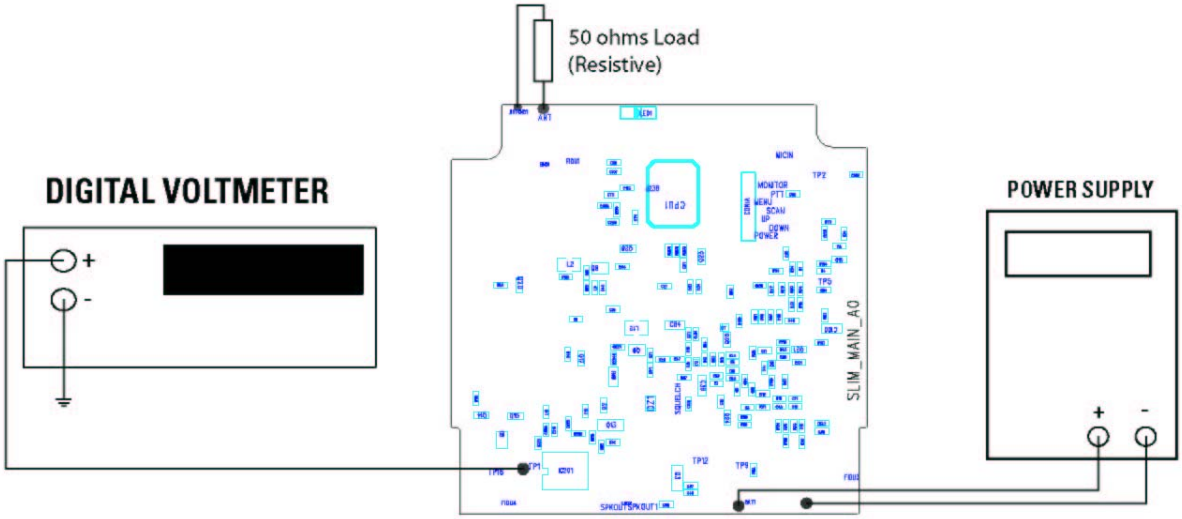


FIGURE 2 (TX TEST)

FIGURE 3 (RX TEST)

PARTS LIST

Ref.No	Items	Description	q'ty
C1	100P	Capacitor Chip NP0 0402	1
C10	100P	Capacitor Chip NP0 0402	1
C100	0.1(X7R)	Capacitor Chip X7R 0603	1
C101	0.1	Capacitor Chip Y5V 0402	1
C102	0.1	Capacitor Chip Y5V 0402	1
C103	100P	Capacitor Chip NP0 0402	1
C104	0.1	Capacitor Chip Y5V 0402	1
C105	100P	Capacitor Chip NP0 0402	1
C107	0.1	Capacitor Chip Y5V 0402	1
C108	820P(X7R)	Capacitor Chip X7R 0402	1
C109	0.0022	Capacitor Chip X7R 0402	1
C11	0.01	Capacitor Chip X7R 0402	1
C110	0.022	Capacitor Chip X7R 0402	1
C111	0.0022	Capacitor Chip X7R 0402	1
C112	0.022	Capacitor Chip X7R 0402	1
C113	0.1	Capacitor Chip Y5V 0402	1
C115	3P	Capacitor Chip NP0 0402	1
C116	100P	Capacitor Chip NP0 0402	1
C117	0.1	Capacitor Chip Y5V 0402	1
C119	100P	Capacitor Chip NP0 0402	1
C12	1UF	Capacitor Chip Y5V 0603	1
C120	100P	Capacitor Chip NP0 0402	1
C121	100P	Capacitor Chip NP0 0402	1
C122	100P	Capacitor Chip NP0 0402	1
C123	100P	Capacitor Chip NP0 0402	1
C125	0.001	Capacitor Chip X7R 0402	1
C126	100P	Capacitor Chip NP0 0402	1
C127	10UF(3X5)	Capacitor Elect. 3X5	1
C129	220/6.3(6X7)	Capacitor Elect	1
C13	0.01	Capacitor Chip X7R 0402	1
C130	0.033	Capacitor Chip X7R 0402	1
C132	100P	Capacitor Chip NP0 0402	1
C133	10UF(3X5)	Capacitor Elect. 3X5	1
C134	0.1	Capacitor Chip Y5V 0402	1
C135	0.1	Capacitor Chip Y5V 0402	1
C136	100P	Capacitor Chip NP0 0402	1
C137	100P	Capacitor Chip NP0 0402	1
C138	0.0018	Capacitor Chip X7R 0402	1
C139	18P	Capacitor Chip NP0 0402	1
C14	3P	Capacitor Chip NP0 0402	1
C140	100P	Capacitor Chip NP0 0402	1
C141	100P	Capacitor Chip NP0 0402	1
C143	100P	Capacitor Chip NP0 0402	1
C15	10UF(3X5)	Capacitor Elect. 3X5	1
C16	0.001	Capacitor Chip X7R 0402	1
C162	100P	Capacitor Chip NP0 0402	1
C17	2P	Capacitor Chip NP0 0402	1
C171	0.1	Capacitor Chip Y5V 0402	1
C18	7P	Capacitor Chip NP0 0402	1
C19	100P	Capacitor Chip NP0 0402	1
C2	100P	Capacitor Chip NP0 0402	1
C20	0.5P	Capacitor Chip NP0 0402	1
C207	0.1	Capacitor Chip Y5V 0402	1
C208	33P	Capacitor Chip NP0 0402	1
C209	33P	Capacitor Chip NP0 0402	1
C21	12P	Capacitor Chip NP0 0402	1
C211	0.1	Capacitor Chip Y5V 0402	1
C213	100P	Capacitor Chip NP0 0402	1
C218	5P	Capacitor Chip NP0 0402	1
C219	100P	Capacitor Chip NP0 0402	1
C22	100P	Capacitor Chip NP0 0402	1
C221	100P	Capacitor Chip NP0 0402	1
C222	68P	Capacitor Chip NP0 0402	1
C223	27P	Capacitor Chip NP0 0402	1
C223A	3P	Capacitor Chip NP0 0402	1
C223B	3P	Capacitor Chip NP0 0402	1

C224	22P	Capacitor Chip NP0 0402	1
C224A	8P	Capacitor Chip NP0 0402	1
C23	100P	Capacitor Chip NP0 0402	1
C24	220P	Capacitor Chip NPO 0402	1
C25	100P	Capacitor Chip NP0 0402	1
C26	100P	Capacitor Chip NP0 0402	1
C27	0.01	Capacitor Chip X7R 0402	1
C28	22P	Capacitor Chip NP0 0402	1
C29	220P	Capacitor Chip NPO 0402	1
C3	0.1	Capacitor Chip Y5V 0402	1
C30	7P	Capacitor Chip NP0 0402	1
C301	0.1	Capacitor Chip Y5V 0402	1
C302	0.033 (X7R)	Capacitor Chip X7R 0402	1
C303	4P	Capacitor Chip NP0 0402	1
C304	5P	Capacitor Chip NP0 0402	1
C305	220P(X7R)	Capacitor Chip X7R 0402	1
C306	5P	Capacitor Chip NP0 0402	1
C307	3P	Capacitor Chip NP0 0402	1
C308	470P(X7R)	Capacitor Chip X7R 0402	1
C309	18P	Capacitor Chip NP0 0402	1
C31	220P	Capacitor Chip NPO 0402	1
C310	8P	Capacitor Chip NP0 0402	1
C311	12P	Capacitor Chip NP0 0402	1
C312	9P	Capacitor Chip NP0 0402	1
C313	1P	Capacitor Chip NP0 0402	1
C314	0.039	Capacitor Chip X7R 0402	1
C315	1UF	Capacitor Chip Y5V 0603	1
C317	100P	Capacitor Chip NP0 0402	1
C318	100P	Capacitor Chip NP0 0402	1
C319	100P	Capacitor Chip NP0 0402	1
C32	0.1(X7R)	Capacitor Chip X7R 0603	1
C33	0.1	Capacitor Chip Y5V 0402	1
C34	0.1	Capacitor Chip Y5V 0402	1
C35	100P	Capacitor Chip NP0 0402	1
C36	0.33	Capacitor Chip Y5V 0603	1
C37	5P	Capacitor Chip NP0 0402	1
C3A	3P	Capacitor Chip NP0 0402	1
C4	4P	Capacitor Chip NP0 0402	1
C41	100P	Capacitor Chip NP0 0402	1
C42	100P	Capacitor Chip NP0 0402	1
C44	15P	Capacitor Chip NP0 0402	1
C45	5P	Capacitor Chip NP0 0402	1
C46	100P	Capacitor Chip NP0 0402	1
C48	0.047	Capacitor Chip X7R 0402	1
C49	100P	Capacitor Chip NP0 0402	1
C5	0.056	Capacitor Chip X7R 0402	1
C50	0.01	Capacitor Chip X7R 0402	1
C52	0.1	Capacitor Chip Y5V 0402	1
C53	0.1(X7R)	Capacitor Chip X7R 0603	1
C54	470P(X7R)	Capacitor Chip X7R 0402	1
C55	0.1	Capacitor Chip Y5V 0402	1
C56	100P	Capacitor Chip NP0 0402	1
C57	0.1	Capacitor Chip Y5V 0402	1
C58	0.01	Capacitor Chip X7R 0402	1
C59	100P	Capacitor Chip NP0 0402	1
C6	0.1	Capacitor Chip Y5V 0402	1
C60	100P	Capacitor Chip NP0 0402	1
C61	100P	Capacitor Chip NP0 0402	1
C62	100P	Capacitor Chip NP0 0402	1
C63	100P	Capacitor Chip NP0 0402	1
C64	8P	Capacitor Chip NP0 0402	1
C65	0.033	Capacitor Chip X7R 0402	1
C67	0.01	Capacitor Chip X7R 0402	1
C68	100P	Capacitor Chip NP0 0402	1
C69	10UF(3x5)	Capacitor Elect. 3X5	1
C7	100P	Capacitor Chip NP0 0402	1
C70	0.1	Capacitor Chip Y5V 0402	1
C71	0.1	Capacitor Chip Y5V 0402	1
C72	1UF	Capacitor Chip Y5V 0603	1
C73	100P	Capacitor Chip NP0 0402	1
C74	100P	Capacitor Chip NP0 0402	1
C75	0.1	Capacitor Chip Y5V 0402	1

C76	100P	Capacitor Chip NP0 0402	1
C77	0.01	Capacitor Chip X7R 0402	1
C78	0.1	Capacitor Chip Y5V 0402	1
C7A	1P	Capacitor Chip NP0 0402	1
C8	100P	Capacitor Chip NP0 0402	1
C80	100P	Capacitor Chip NP0 0402	1
C81	100P	Capacitor Chip NP0 0402	1
C82	0.001	Capacitor Chip X7R 0402	1
C84	1UF	Capacitor Chip Y5V 0603	1
C85	100P	Capacitor Chip NP0 0402	1
C87	0.0022	Capacitor Chip X7R 0402	1
C88	0.1	Capacitor Chip Y5V 0402	1
C89	0.1	Capacitor Chip Y5V 0402	1
C9	11P	Capacitor Chip NP0 0402	1
C91	100P	Capacitor Chip NPO 0402	1
C92	0.0022	Capacitor Chip X7R 0402	1
C93	0.018	Capacitor Chip X7R 0402	1
C94	0.1	Capacitor Chip Y5V 0402	1
C95	0.1	Capacitor Chip Y5V 0402	1
C96	0.1	Capacitor Chip Y5V 0402	1
C97	120P	Capacitor Chip NPO 0402	1
C98	0.1	Capacitor Chip Y5V 0402	1
C99	0.018	Capacitor Chip X7R 0402	1
CF1	21.4MHZ	X-tal filter 21.4MHz UM-5	1
CF2	CF450KHz	450KHz IFT 5mm	1
CF3	LTM450HTU	Ceramic filter LTM450HTU	1
CF4	439MHz (HDF-440DS)	SAW filter F-11SMD type	1
CMIC1	C-MIC	F9745AL342-33 Wire Type	1
CPU1	W742S81A	IC CPU	1
CT201	2dia trimmer	TZY2Z100A001R00 10P(TM)	
CX201	4 MHz X-tal	D4.00C(20pF) HS-49/S	1
D1	KDS114E	Diode Switching	1
D13	KDS114E	Diode Switching	1
D2	KDS120	CHIP DIODE	1
D201	KDS114E	Diode Switching	1
D3	KDS114E	Diode Switching	1
D301	KDS114E	Diode Switching	1
D302	KDV154B	Diode Vari-cap	1
D4	KDS121	CHIP DIODE	1
D5	KDS114E	Diode Switching	1
D6	KDS113E	Diode Switching	1
D7	KDS114E	Diode Switching	1
D8	KDS121	CHIP DIODE	1
D9	KDS121	CHIP DIODE	1
DZ1	KDZ3.0VRTK	Zener Diode	1
IC1	S5018	IC IF	1
IC2	UTC3419	IC SPK	1
IC201	TB31202	IC PLL	1
IC3	XC6201	IC Regulator 3V	1
IC4	S324	IC OP	1
IC5	S324	IC OP	1
J9-A	EXT Jack	Jack ST-018-1(2.5mm)	1
L1	0.35X1.5X5T(R)	Inductor Air	1
L10	27NH(03)	Inductor Chip 0603	1
L12	5.6UH(05)	Inductor Chip 0805	1
L13	220NH(03)	Inductor Chip 0603	1
L15	0.35X1.5X5T(R)	Inductor Air	1
L18	8.2NH(03)	Inductor Chip 0603	1
L19	100NH	Inductor Chip 0402	1
L2	10UH(05)	Inductor Chip 0805	1
L3	0.3x1.4x6TR	Inductor Air	1
L302	2.2UH(03)	Inductor Chip 0603	1
L303	0.3x1.1x4TR	Inductor Air	1
L4	18NH	Inductor Chip 0402	1
L5	39NH	Inductor Chip 0402	1
L6	0.3X1.0X3T(R)	Inductor Air	1
L7	0.35x1.7x5T(R)	Inductor Air	1
L8	0.4x1.5x5T(L)	Inductor Air	1
L9	27NH(03)	Inductor Chip 0603	1
LED1	LTST-S320GKT	Diode LED SMT	1
PCB1	PCB	PCB 4 layer	1
PCB2	SUB PCB	2 Layer 0.6T	

Q1	THN6601B	Transistor Chip	1
Q10	KRA306E	Transistor BRT	1
Q11	2SC4083	Transistor Chip	1
Q12	KRC404E	Transistor BRT	1
Q13	KTA1505S	Transistor BRT	1
Q14	KRA306E	Transistor BRT	1
Q15	KRC404E	Transistor BRT	1
Q16	KRA226S	Transistor BRT	1
Q17	KRC405E	Transistor BRT	1
Q18	KRA226S	Transistor BRT	1
Q19	KRC401E	Transistor BRT	1
Q2	KRC405E	Transistor BRT	1
Q20	KRA306E	Transistor BRT	1
Q21	KRC404E	Transistor BRT	1
Q22	KRC404E	Transistor BRT	1
Q23	KRC405E	Transistor BRT	1
Q24	KRC405E	Transistor BRT	1
Q25	KRC404E	Transistor BRT	1
Q26	KRA306E	Transistor BRT	1
Q27	KRC404E	Transistor BRT	1
Q28	KRA304E	Transistor BRT	1
Q3	KRA226S	Transistor BRT	1
Q301	2SC4226	Transistor Chip	1
Q302	2SC4226	Transistor Chip	1
Q4	2SC4226	Transistor Chip	1
Q5	KRC404E	Transistor BRT	1
Q6	2SC4226	Transistor Chip	1
Q7	KTA2014E	Transistor Chip	1
Q8	2SC4226	Transistor Chip	1
Q9	2SC4083	Transistor Chip	1
R1	180K 1%	Resistor Chip 0402 1%	1
R10	68K	Resistor Chip 0402	1
R100	33K	Resistor Chip 0402	1
R101	100K	Resistor Chip 0402	1
R102	2.2M	Resistor Chip 0402	1
R103	1M	Resistor Chip 0402	1
R104	220K	Resistor Chip 0402	1
R105	8.2K	Resistor Chip 0402	1
R106	47K	Resistor Chip 0402	1
R107	39K	Resistor Chip 0402	1
R108	100K	Resistor Chip 0402	1
R109	5.6K	Resistor Chip 0402	1
R11	560	Resistor Chip 0402	1
R111	220K	Resistor Chip 0402	1
R112	10K	Resistor Chip 0402	1
R113	0	Resistor Chip 0402	1
R114	4.7M	Resistor Chip 0402	1
R115	100K	Resistor Chip 0402	1
R116	100K	Resistor Chip 0402	1
R117	100K	Resistor Chip 0402	1
R118	100K	Resistor Chip 0402	1
R12	56K	Resistor Chip 0402	1
R13	1.8K	Resistor Chip 0402	1
R14	4.7K	Resistor Chip 0402	1
R15	2.2K	Resistor Chip 0402	1
R16	10K	Resistor Chip 0402	1
R17	560K	Resistor Chip 0402	1
R18	470K	Resistor Chip 0402	1
R19	100K	Resistor Chip 0402	1
R20	680K	Resistor Chip 0402	1
R202	560	Resistor Chip 0402	1
R203	5.6K	Resistor Chip 0402	1
R204	10K	Resistor Chip 0402	1
R206	0	Resistor Chip 0402	1
R207	100K	Resistor Chip 0402	1
R21	1M	Resistor Chip 0402	1
R214	1M	Resistor Chip 0402	1
R216	1M	Resistor Chip 0402	1
R22	100K	Resistor Chip 0402	1
R222	100K	Resistor Chip 0402	1
R224	100	Resistor Chip 0402	1
R226	22	Resistor Chip 0402	1

R23	2.2K	Resistor Chip 0402	1
R24	470K	Resistor Chip 0402	1
R25	3.3K	Resistor Chip 0402	1
R26	33K	Resistor Chip 0402	1
R27	33K	Resistor Chip 0402	1
R28	6.8K	Resistor Chip 0402	1
R29	2.2	Resistor Chip 0402	1
R3	2.2K	Resistor Chip 0402	1
R30	68K	Resistor Chip 0402	1
R301	10	Resistor Chip 0402	1
R302	1.5K	Resistor Chip 0402	1
R303	3.3K	Resistor Chip 0402	1
R304	4.7K	Resistor Chip 0402	1
R305	5.6K	Resistor Chip 0402	1
R306	100	Resistor Chip 0402	1
R307	33	Resistor Chip 0402	1
R308	22K	Resistor Chip 0402	1
R309	6.8K	Resistor Chip 0402	1
R310	22K	Resistor Chip 0402	1
R311	12K	Resistor Chip 0402	1
R32	10K	Resistor Chip 0402	1
R33	82K 1%	Resistor Chip 0402 1%	1
R34	10K	Resistor Chip 0402	1
R35	100K	Resistor Chip 0402	1
R36	22K	Resistor Chip 0402	1
R37	100K	Resistor Chip 0402	1
R38	10K	Resistor Chip 0402	1
R39	1.8M	Resistor Chip 0402	1
R4	33K 1%	Resistor Chip 0402 1%	1
R40	100K	Resistor Chip 0402	1
R41	27K	Resistor Chip 0402	1
R42	100	Resistor Chip 0402	1
R43	68K	Resistor Chip 0402	1
R44	2.2	Resistor Chip 0402	1
R45	47	Resistor Chip 0402	1
R46	100K	Resistor Chip 0402	1
R47	1.8M	Resistor Chip 0402	1
R48	100K	Resistor Chip 0402	1
R49	220K	Resistor Chip 0402	1
R5	10K	Resistor Chip 0402	1
R50	100K	Resistor Chip 0402	1
R51	270K	Resistor Chip 0402	1
R52	10K	Resistor Chip 0402	1
R53	220	Resistor Chip 0402	1
R54	22K	Resistor Chip 0402	1
R55	2.7K	Resistor Chip 0402	1
R56	10K	Resistor Chip 0402	1
R57	47	Resistor Chip 0402	1
R58	270	Resistor Chip 0402	1
R59	10K	Resistor Chip 0402	1
R6	3.3K	Resistor Chip 0402	1
R60	33K	Resistor Chip 0402	1
R61	56K	Resistor Chip 0402	1
R62	10K	Resistor Chip 0402	1
R63	470K	Resistor Chip 0402	1
R64	2.2K	Resistor Chip 0402	1
R65	10	Resistor Chip 0402	1
R66	10K	Resistor Chip 0402	1
R67	470K	Resistor Chip 0402	1
R68	100(TM)	NSM3101J280J3Z	1
R69	2.7K	Resistor Chip 0402	1
R7	820K	Resistor Chip 0402	1
R70	2.2K	Resistor Chip 0402	1
R71	10K	Resistor Chip 0402	1
R72	470	Resistor Chip 0402	1
R73	180K	Resistor Chip 0402	1
R74	91K	Resistor Chip 0402	1
R75	68K	Resistor Chip 0402	1
R76	470K	Resistor Chip 0402	1
R77	10	Resistor Chip 0402	1
R78	33	Resistor Chip 0402	1
R79	470K 1%	Resistor Chip 0402 1%	1

R8	330	Resistor Chip 0402	1
R80	180K	Resistor Chip 0402	1
R81	68K	Resistor Chip 0402	1
R82	10K	Resistor Chip 0402	1
R83	47	Resistor Chip 0402	1
R84	4.7K	Resistor Chip 0402	1
R85	2.2K	Resistor Chip 0402	1
R86	33	Resistor Chip 0402	1
R87	33	Resistor Chip 0402	1
R88	220K	Resistor Chip 0402	1
R89	1M	Resistor Chip 0402	1
R9	4.7K	Resistor Chip 0402	1
R90	120K	Resistor Chip 0402	1
R91	470K	Resistor Chip 0402	1
R92	100K	Resistor Chip 0402	1
R93	100K	Resistor Chip 0402	1
R94	47	Resistor Chip 0402	1
R95	2.7K	Resistor Chip 0402	1
R96	680	Resistor Chip 0402	1
R97	220K	Resistor Chip 0402	1
R98	1M	Resistor Chip 0402	1
R99	10K	Resistor Chip 0402	1
R999	0	Resistor Chip 0402	1
RV1	220KB	Semi-fixed resistor 3 dia	1
RV2	4.7KB	Semi-fixed resistor 3 dia	1
SPK1	Speaker 28 dia	Speaker 28 dia 16ohm	1
X202	20.95MHZ X-tal	DA20.950TF(16pF) HC-49/S	1
	Battery	BLN-3720 3.7V 720mAh	1
	Vibrator Motor	6SL-50-12WB	1
	LCD	GS-32603	1
Dwg No	Items	Description	
MSHT667200-1001	Shield plate	SPTE 6.5 x 10.5 x 0.2t	1
	SCREW	BH T2.0 x 5.0 Ni-plate	4
	SCREW	FA T2.0 x 10.0 SUS	4
SL10P-030 00	LCD POP Label		1
SL01P-006 00	LCD Holder	ABS black	1
SL01P-002 00	BACK COVER	ABS/ Metallic silver spray	1
SL01P-001 00	FRONT COVER	ABS/ Metallic silver spray	1
SL01P-005 00	LED Lens	Acryl/ Milk Smoky	1
SL01P-003 00	Window	Acryl/ Silk: Pantone Cool Gray 11C	1
SL01P-018 00	Shield plate	SPTE	1
SL01P-016 00	BATTERY TERMINAL	SUS 304 (H) D0.5 Ni-Plate	2
SL01P-004 00	Antenna Cap	Urethane/ Pantone Cool Gray 11C	1
SL01P-034 00	Antenna Coil		1
SL01P-017 00	VCO CAN	SPTE	1
	Metal DOME Switch (223)	Metal Dome switch (D5.0, 10.0x10.0)	1
	CUSHION, BATTERY	EVA 4.0x7.0x0.7t w/double side tape	5
	Spkr Wire	Blk 2-50mm-2 AWG#30/1571	1
	Spkr Wire	Red 2-50mm-2 AWG#30/1571	1
FW13-028	DOUBLE SIDE TAPE, LCD Window	Nitto #500	3
SL01P-024 00	Speaker Felt D24.5	Felt D24.5 x 0.1t Black	1
SL01P-007 00	Button	Silicone Pantone CG 11C/Silk CG 2C	1
SL01P-027 00	Zebra for KEY PCB	Zebra 2.7 x 7.8 x 1.0t	1
SL01P-026 00	Zebra for LCD	Zebra 3.2 x 12.8 x 1.0t	1

SEMICONDUCTOR VOLTAGE CHART

1. ICs

	PIN	RX			PIN	TX	RX		PIN	TX	RX
	1	2.80			1	2.70	2.36		1	0.84	1.57
	2	2.18			2	3.00	2.90		2	1.21	1.45
	3	2.52			3	0.14	0.14		3	0.80	3.68
	4	2.87			4	0.00	0.00		4	2.94	2.92
IC1	5	1.82		IC201	5	0.45	3.00	IC5	5	0.83	1.07
	6	1.82			6	0.00	0.00		6	0.86	1.08
S5018	7	1.82		TB31202	7	0.00	3.68	S324	7	0.85	1.08
	8	2.87			8	0.00	0.00		8	0.83	1.07
	9	0.71			9	2.10	1.83		9	0.85	1.08
	10	0.88			10	2.17	2.00		10	0.83	1.07
	11	1.80			11	2.83	2.78		11	0.00	0.00
	12	0.75			12	3.00	0.30		12	0.83	1.07
	13	0.00			13	0.00	0.00		13	0.84	1.08
	14	0.73			14	2.21	1.90		14	0.83	1.07
	15	0.00			15	2.94	2.90				
	16	1.93			16	2.37	2.18				

	PIN	TX	RX		IC 2	RX			PIN	
	1	2.36	0.00		1	0.00			1	3.00
	2	1.05	1.02		2	1.37			2	0.00
	3	1.03	1.00		3	1.37			3	3.64
	4	2.99	2.98		4	1.37			4	3.64
IC4	5	0.51	0.52	IC2	5	1.31		IC3	5	3.00
	6	0.61	0.47		6	1.51			6	0.00
S324	7	2.30	2.34	UTC	7	0.00		XC		
	8	1.23	1.00	34119	8	1.43		6201		
	9	1.23	1.00							
	10	1.03	1.00							
	11	0.00	0.00							
	12	1.02	1.00							
	13	1.20	1.00							
	14	1.03	1.03							

2. CPU

	PIN	TX	RX	PIN	TX	RX
	1	3.25	3.25	27	2.03	2.13
	2	0.60	3.70	28	0.32	0.00
	3	0.00	0.00	29	3.70	3.70
	4	0.16	0.00	30	1.70	1.70
	5	0.45	0.00	31	1.70	1.70
	6	1.80	1.60	32	3.70	3.70
	7	1.80	1.60	33	1.40	1.90
	8	1.80	1.60	34	1.90	0.00
CPU1	9	1.80	1.60	35	0.10	0.00
	10	1.80	1.60	36	0.30	0.00
W742	11	1.80	1.60	37	0.20	0.00
E81A	12	1.80	1.60	38	3.70	0.80
	13	1.80	1.60	39	0.00	0.00
	14	1.80	1.60	40	3.70	3.70
	15	1.80	1.60	41	3.60	3.60
	16	1.80	1.60	42	0.20	0.00
	17	1.80	1.60	43	2.30	2.30
	18	1.80	1.60	44	3.30	3.70
	19	3.66	3.66	45	2.50	3.70
	20	0.00	3.20	46	3.60	0.50
	21	0.12	0.00	47	0.50	3.70
	22	NC	NC	48	3.00	3.00
	23	NC	NC	49	NC	NC
	24	2.47	2.47	50	3.50	3.70
	25	1.27	1.23	51	0.60	3.70
	26	0.91	0.91	52	NC	NC

3. DIODE

	PIN	TX	RX		PIN	TX	RX
D1	A	0.80	0.00	D4	A	0.15	3.50
KDS114E	K	0.03	0.00	KDS121	K1	0.50	3.50
					K2	0.60	3.60
D13	A	1.60	0.00	D5	A	0.70	0.90
KDS114E	K	0.80	0.00	KDS114E	K	0.30	0.30
D2	K	3.00	3.00	D6	A	1.00	1.00
KDS120	A1	2.50	2.50	KDS113E	K1	0.40	3.00
	A2	3.90	3.20		K2	3.00	0.30
D201	A	3.60	3.60	D7	A	0.00	2.80
KDS114E	K	3.60	3.60	KDS114E	K	0.10	3.00
D3	A	0.00	0.30	D8	A	3.50	3.50
KDS114E	K	0.00	0.50	KDS121	K1	3.50	3.50
					K2	0.50	3.60
D301	A	0.03	1.30	D9	A	3.50	3.50
KDS114E	K	3.00	0.50	KDS121	K1	3.50	3.60
					K2	3.50	3.60
D302	A	0.03	0.00	DZ1	A	0.00	0.00
KDV154B	K	3.00	1.30	KDZ3.0	K	3.00	3.00
				VRTK			

4. TRANSISTOR

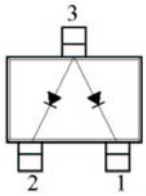
	PIN	TX	RX		PIN	TX	RX
Q1	E	0.00	0.00	Q23	E	0.00	0.00
THN6601B	B	0.90	0.00	KRC405E	B	3.10	3.40
	C	3.70	3.70		C	0.00	0.00
Q10	E	3.00	3.00	Q24	E	0.00	0.00
KRA306E	B	1.14	1.00	KRC405E	B	3.6(PMR)	0.0(LPD)
	C	2.95	2.95		C	0.04(PMR)	0.08(LPD)
Q11	E	0.00	0.00	Q25	E	0.00	0.00
2SC4083	B	0.60	0.00	KRC404E	B	0.00	0.00
	C	3.00	3.00		C	2.46	2.46
Q12	E	0.00	0.00	Q26	E	3.70	3.20
KRC404E	B	0.40	0.40	KRA306E	B	3.25	3.25
	C	2.50	3.60		C	3.70	3.70
Q13	E	3.00	3.00	Q27	E	0.00	0.00
KTA1505S	B	2.40	3.00	KRC404E	B	0.50	0.00
	C	0.00	0.00		C	3.25	3.25
Q14	E	3.00	3.00	Q28	E	3.70	3.70
KRA306E	B	3.00	0.30	KRA304E	B	0.00	3.70
	C	0.00	3.00		C	3.70	0.00
Q15	E	0.00	0.00	Q3	E	3.70	3.70
KRC404E	B	0.40	0.50	KRA226S	B	3.70	0.00
	C	0.50	0.50		C	0.00	3.70
Q16	E	3.00	0.00	Q301	E	2.80	1.60
KRA226S	B	0.00	3.50	2SC4226	B	2.50	2.50
	C	3.00	3.00		C	2.60	2.50
Q17	E	0.00	0.00	Q302	E	1.10	0.90
KRC405E	B	0.60	0.00	2SC4226	B	1.50	1.60
	C	0.00	3.00		C	3.00	1.60
Q18	E	3.70	3.70	Q4	E	0.00	0.00
KRA226S	B	0.08	0.08	2SC4226	B	0.73	0.73
	C	3.70	3.70		C	3.60	3.60
Q19	E	0.00	0.00	Q5	E	0.00	0.00
KRC401E	B	3.60	0.00	KRC404E	B	0.70	0.70
	C	0.00	1.22		C	2.00	2.00
Q2	E	0.00	0.00	Q6	E	0.00	0.00
KRC405E	B	3.00	0.00	2SC4226	B	0.75	0.75
	C	0.00	3.00		C	2.50	2.50
Q20	E	3.0(Hi)	3.0(Lo)	Q7	E	3.00	0.00
KRA306E	B	0(Hi)	3.6(Lo)	KTA2014E	B	3.00	0.00
	C	3(Hi)	0(Lo)		C	0.00	0.00
Q21	E	0.00	0.00	Q8	E	0.00	0.00
KRC404E	B	0.87	0.87	2SC4226	B	0.00	0.70
	C	3.00	3.00		C	0.00	3.00
Q22	E	0.00	0.00	Q9	E	0.00	0.00
KRC404E	B	0.03	0.00	2SC4083	B	0.00	0.70
	C	0.00	3.40		C	0.00	2.40

SEMICONDUCTOR LEAD ASSIGNMENT AND BLOCK DIAGRAM

A. DIODE

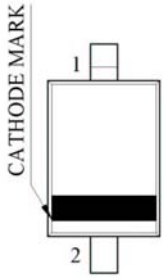
1. KDS113 : VHF TUNER BAND SWITCH APPLICATION

1. CATHODE 1
2. CATHODE 2
3. ANODE



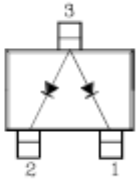
2. KDS114E : VHF TUNER BAND SWITCH APPLICATION

1. ANODE
2. CATHODE



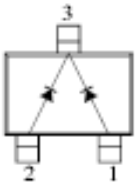
3. KDS120 : ULTRA HIGH SPEED SWITCHING APPLICATION

1. CATHODE 1
2. CATHODE 2
3. ANODE



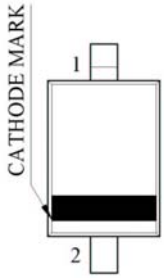
4. KDS121 : ULTRA HIGH SPEED SWITCHING APPLICATION

1. ANODE 1
2. ANODE 2
3. CATHODE

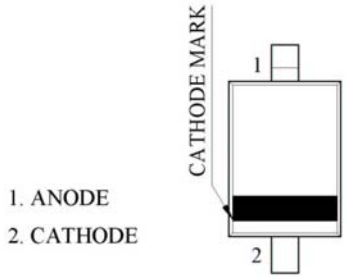


5. KDV154B : VHF,UHF TUNER AFC VCO FOR UHF BAND RADIO

1. ANODE
2. CATHODE

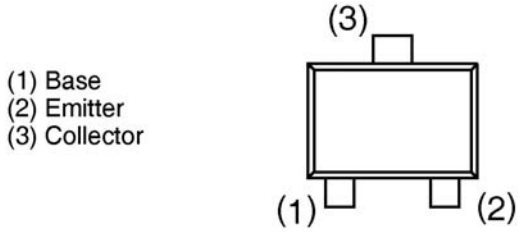


6. KDZ3.0VRTK : CONSTANT VOLTAGE REGULATION APPLICATION

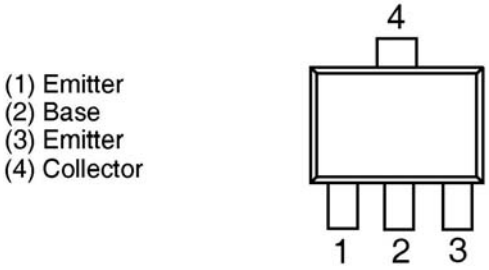


B. TRANSISTOR

1. KRA306E : SWITCHING APPLICATION. INTERFACE CIRCUIT AND DRIVER CIRCUIT APPLICATION.
2. 2SC4083 : HIGH FREQUENCY AMPLIFIER.
3. KRC404E : SWITCHING APPLICATION. INTERFACE CIRCUIT AND DRIVER CIRCUIT APPLICATION.
4. KRC405E : SWITCHING APPLICATION. INTERFACE CIRCUIT AND DRIVER CIRCUIT APPLICATION.
5. KRC401E : SWITCHING APPLICATION. INTERFACE CIRCUIT AND DRIVER CIRCUIT APPLICATION.
6. KRA226S : HIGH CURRENT SWITCHING APPLICATION.
7. KTA1505S : GENERAL PURPOSE SWITCHING APPLICATION.
8. KTA2014E : GENERAL PURPOSE SWITCHING APPLICATION.
9. 2SC4226 : HIGH FREQUENCY LOW NOISE AMPLIFIER.

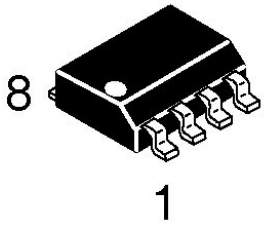


10. THN6601B : UHF POWER AMPLIFIER

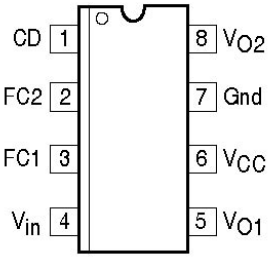


B. IC

1. UTC34119

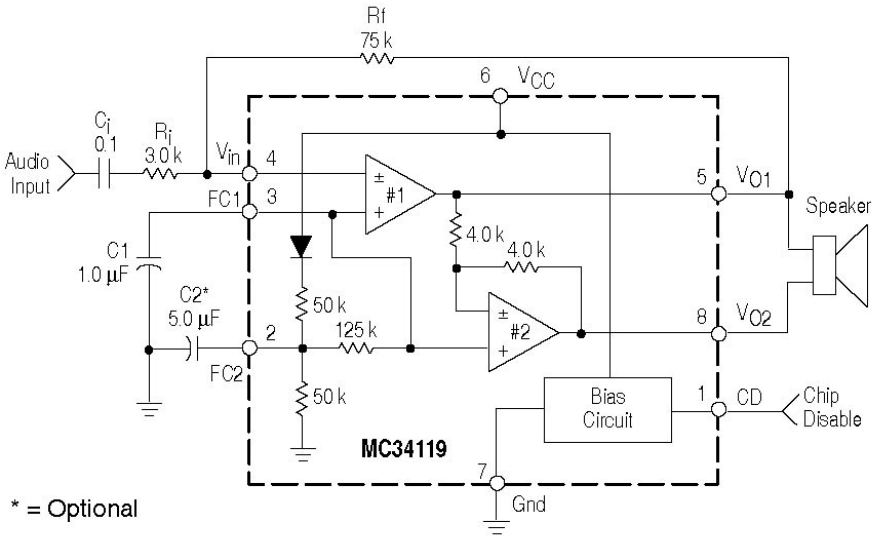


PIN CONNECTIONS

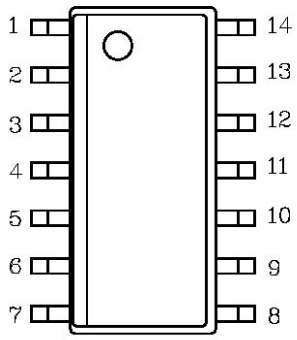


(Top View)

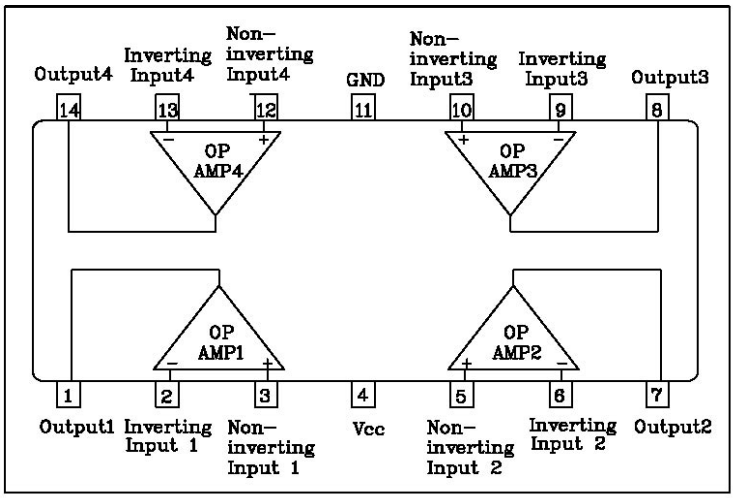
Block Diagram and Simplified Application



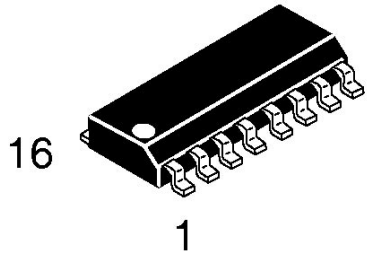
2. S324



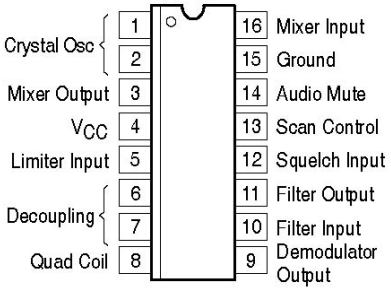
Block Diagram



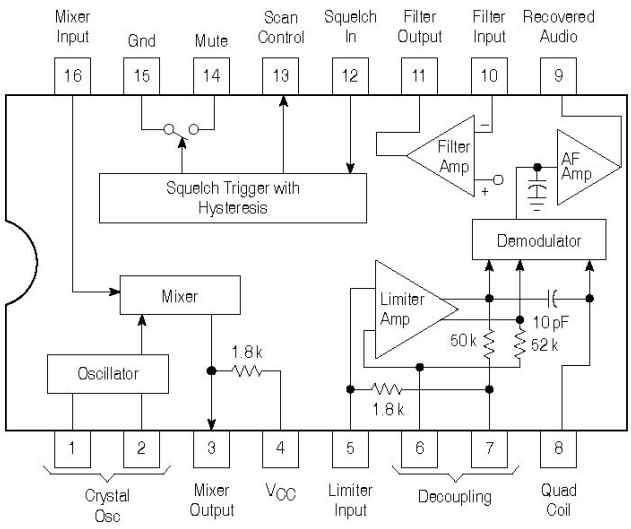
3. 35018



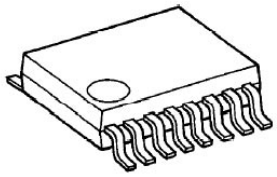
PIN CONNECTIONS

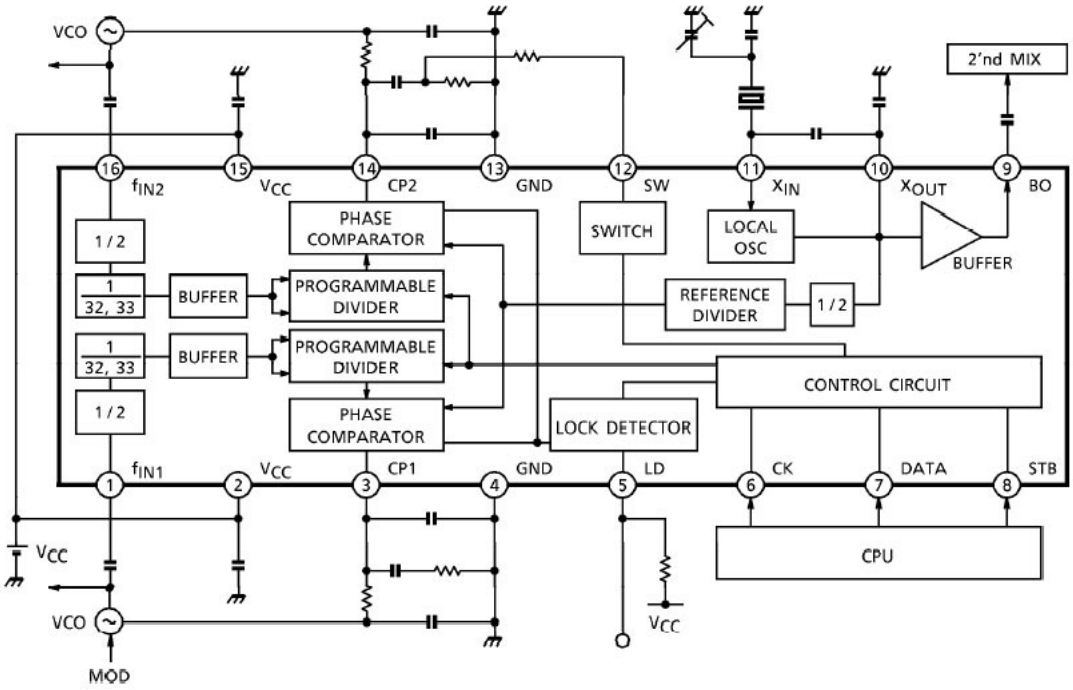


(Top View)

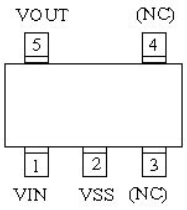


4. TB32102

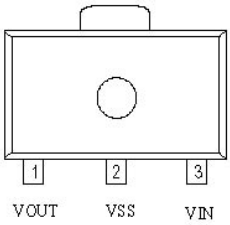




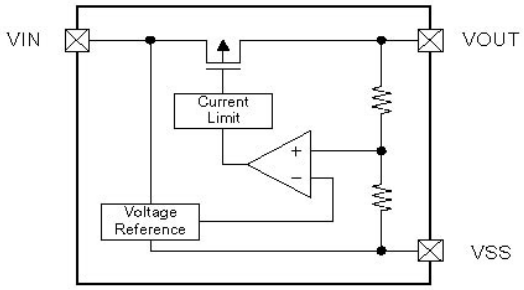
5. XC201



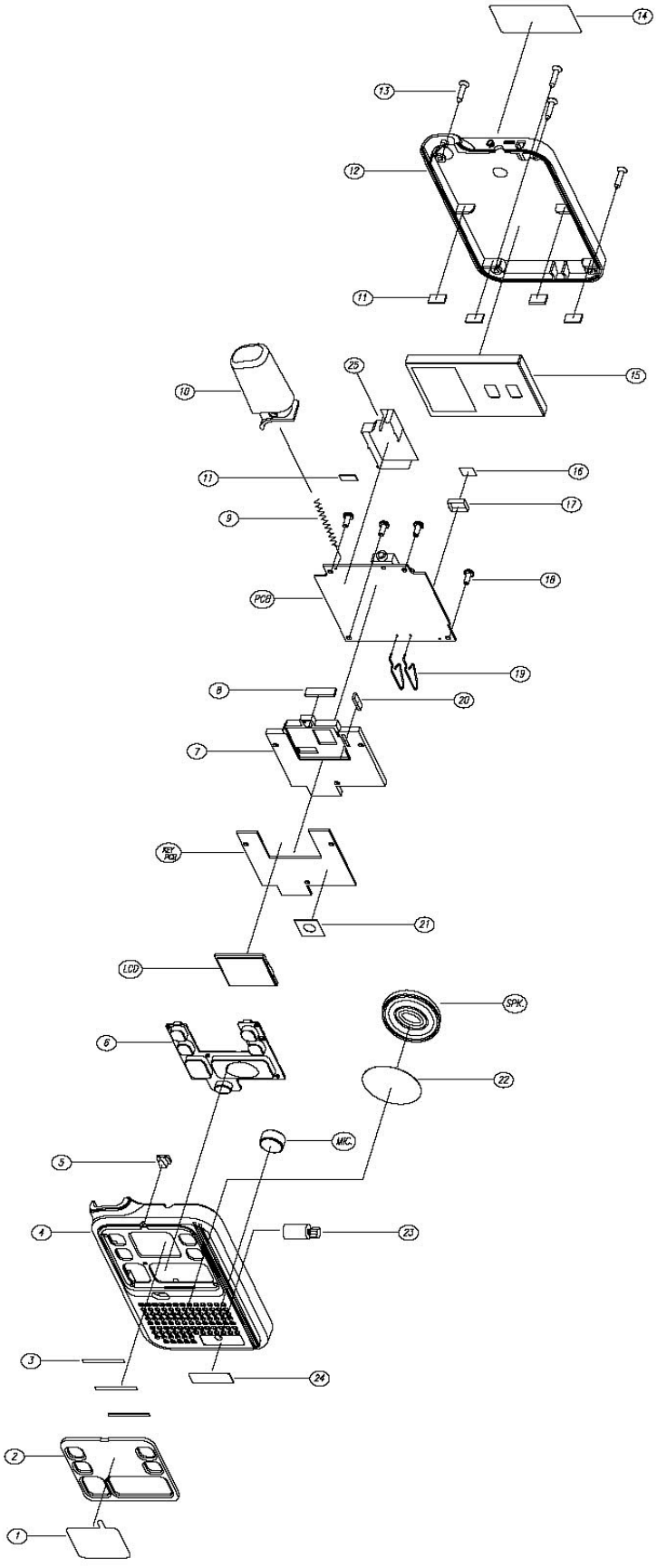
SOT-25
(TOP VIEW)



SOT - 89
(TOP VIEW)



EXPLODED VIEW



EXPLODED VIEW PARTS LIST

NO.	ITEM NO.	DESCRIPTION	Q'TY	REV.	REMARK
1	SL01P-030 00	LCD POP LABEL	1		
2	SL01P-003 00	WINDOW	1		
3	FW13-028	DOUBLE SIDE TAPE, LCD WINDOW	3		
4	SL01P-001 00	FRONT COVER	1		
5	SL01P-005 00	LED LENS	1		
6	SL01P-007 00	BUTTON	1		
7	SL01P-006 00	LCD HOLDER	1		
8	SL01P-026 00	ZEBRA for LCD	1		
9	SL01P-034 00	ANTENNA COIL	1		
10	SL01P-004 00	ANTENNA CAP	1		
11		CUSHION, BATTERY	5		4.0X7.0X0.7t
12	SL01P-002 00	BACK COVER	1		
13		SCREW	4		FA T2.0X10.0 SUS
14		RATING LABEL	1		
15		BATTERY	1		
16		VCO PLATE	1		
17		VCO CAN	1		
18		SCREW	4		BH T2.0X5.0 Ni-Plate
19	SL01P-016 00	BATTERY TERMINAL	2		
20	SL01P-027 00	ZEBRA for KEY PCB	1		
21		METAL DOME SWITCH (223)	1		COMMON TO 223
22	SL01P-024 00	SPEAKER FELT D24.5	1		
23		VIBRATOR	1		
24	SL01P-025 00	LOGO PLATE	1		PC 0.3t
25	SL01P-018 00	SHIELD PLATE	1		
LCD		LCD	1		
KEY PCB		KEY PCB	1		
PCB		PCB	1		
SPK.		SPEAKER	1		
MIC.		MIC	1		