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SERVICE MANUAL

MULTI CHANNEL AM/FM TRANSCEIVER

TCB-660

TTI Tech Co.,Ltd.

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SECTION1 SPECIFICATIONS

G E N E R A L	Channel	40 (See the frequency band chart)
	Frequency Range	26.96 MHz ~ 27.99125 MHz
	Operating mode	F3E (FM), A3E (AM)
	Frequency Control	PLL Synthesizer
	Frequency Tolerance	0.002%
	Operating Temperature Range	-10 to + 55 °C
	Microphone	Plug-in Type
	Input Voltage	13.2V DC ± 15%
	Size	140 (W) x 186 (L) x 37 (H)
	Weight	990 g
	Antenna Connector	Antenna Connector
T R A N S M I T T E R	Power Output	Duty cycle 10% 4 Watts @13.2V DC
	Modulation	AM:from 85% to 95% FM:1.8KHz ± 0.2KHz
	Frequency Response	300Hz to 3000Hz
	Output Impedance	50ohms, Unbalanced
	Harmonic Suppression	More than -36dBm
	Current Drain	AM Full Mod. 1.6A Max.
R E C E I V E R	Receiving System	Dual conversion superheterodyne
	IF Frequencies	Double Conversion 1st 10.695MHz/2nd 455KHz
	Sensitivity	0.7µV for 10dB(S+N)/N in AM Mode 0.5µV for 20dB SINAD in FM Mode
	Audio Output Power	2.0W @ 8 Ohm
	Audio Distortion	Less than 8% @ 1KHz
	Image Rejection	60 dB
	Adjacent Channel Rejection	60 dB
	Conducted Spurious	More than 60 dB
	Frequency Response	300 to 2500Hz
	Built-in Speaker	8 Ohms, round
Squelch	Adjustable; Threshold less than 1 microvolt	

* Specification is subject to change without prior notice.

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1. General

1-1. Receiver

Display : 40 Channels and other functions indication

Frequency Range : 26.965 to 27.405 [MHz]

Frequency Response : 300 to 2,500 [Hz]

Power Source : 13.2 [V] DC

Audio Output Load : 8 [OHM]

Audio Output : 4.0 [W] (or More)

Squelch : Adjustable from 0.2[uV] to 100 [uV]

Sensitivity :

- FM : 20 dB [SINAD] under 1.0 [uV] RF Signal or less
- AM : 10 dB [S/N] under 1.0 [uV] RF Signal or less

Intermediate Frequency :

- 1st IF : 10.695 [MHz]
- 2nd IF : 455 [KHz]

1-2. Transmitter

Carrier Power(Conducted) : AM 4 [W] / FM 4 [W]

Current Drain (13.2 [V] Supply Voltage)

- No Modulation : 1,100 [mA]
- Max Modulation : 1,600 [mA]

Modulation Capabilities

- AM : ± 90 [%]
- FM : ± 1.8 [KHz/Dev]

Spurious Radiation : Less than 74 [dBc]

Antenna Impedance : 50 [OHM]

Frequency Tolerance : 0.002 [%]

2. Technical Description

2-1. General

Model TCB-660 is an mobile type AM/FM radio transceiver for use of the Citizen Radio Service.

- Front Panel Controls

- LCD (Channel and RX/TX).

- Receiver Audio Control (With Power ON/OFF Control) Volume

- Squelch Control Volume

- Channel UP/Down Key Switch

- AM/FM Select Key

- Scan Key

- Accessorily Connectors

- Antenna Socket

- External Speaker Jack

- Microphone(Condenser Microphone)

2-2. Type of emission : AM(A3E) , FM(F3E)

2-3. Frequency Table

Channel	Frequency (MHz)	Channel	Frequency (MHz)
1	26.965	21	27.215
2	26.975	22	27.225
3	26.985	23	27.235
4	27.005	24	27.245
5	27.015	25	27.255
6	27.025	26	27.265
7	27.035	27	27.275
8	27.055	28	27.285
9	27.065	29	27.295
10	27.075	30	27.305
11	27.085	31	27.315
12	27.105	32	27.325
13	27.115	33	27.335
14	27.125	34	27.345
15	27.135	35	27.355
16	27.155	36	27.365
17	27.165	37	27.375
18	27.175	38	27.385
19	27.185	39	27.395
20	27.205	40	27.405

2-4. RF Power Output

- AM : 4.0 [W]
- FM : 4.0 [W]

2-5. DC Input Voltage and Current with 13.2V DC Input to Power AMP

- Transmitter Power Amp : Voltage 12.5 V
Current 820 mA
- Transmitter Driver Amp : Voltage 12.5 V
Current 130 mA

2-6. Receiver IF and Local Oscillator Frequencies

- First IF : 10.695 [MHz]
- Second IF : 455 [KHz]
- First Local Oscillator : 10.695 [MHz] Below Receiving Frequency
- Second Local Oscillation : 10.240 [MHz]

3. Semiconductors and Function

3-1. Transistor

Ref No.	Description	Manufacturer	Function
Q101	KTC3880S	KEC	RX Amplifier
Q102	KTK211	KEC	1'st Mixer
Q103	KTK211	KEC	1'st Mixer
Q104	KRC101S	KEC	RX Band1 Switching
Q105	KRC101S	KEC	RX Band2 Switching
Q151	KTC3875S	KEC	RX FM AF Amplifier
Q152	KRC112S	KEC	FM AF Mute at AM Mode
Q153	KRC101S	KEC	FM AF Mute at AM Mode
Q154	KRC112S	KEC	RX AF Mute at TX Mode
Q161	KTC3880S	KEC	AM IF Amplifier
Q162	KTC3880S	KEC	AM IF Amplifier
Q163	KRA102S	KEC	RX AM B+
Q164	KTA1504S	KEC	Automatic Noise Level Control
Q181	KTC3875S	KEC	RX RF Mute at TX Mode
Q182	KTC3875S	KEC	AGC
Q183	KTC3875S	KEC	AGC
Q201	KRC101S	KEC	AF Mute
Q202	KRC202S	KEC	AF Path
Q233	KTA1504S	KEC	Automatic Level Control
Q234	KTC3875S	KEC	Automatic Level Control
Q301	KTC3880S	KEC	VCO
Q302	KTC3880S	KEC	RX/TX VCO Buffer
Q303	KTC3880S	KEC	VCO Buffer
Q305	KRC101S	KEC	TX VCO Control
Q311	KRC101S	KEC	RX Band1 Switching
Q312	KRC101S	KEC	RX Band2 Switching
Q313	KRC101S	KEC	RX Band3 Switching
Q502	KTC3875S	KEC	FM TX AF Mute at AM TX
Q701	KTC3880S	KEC	TX Doublers
Q702	KTC3880S	KEC	TX Pre-Amplifier
Q703	KTC1006	KEC	TX Driver Amplifier
Q704	2SC2078	SANYO	TX Power Amplifier
Q742	KTC3875S	KEC	TX RF Mute at RX Mode
Q801	KRC101S	KEC	CPU Reset
Q802	KRC101S	KEC	CPU RX/TX Control
Q803	KRA101S	KEC	MIC Lock Control
Q911	KTA1658	KEC	Main Regulator
Q912	KRA1504S	KEC	Main Regulator
Q913	KRC112S	KEC	Main Regulator Control
Q914	KRC102S	KEC	Power Low Control
Q921	KTC3875S	KEC	8.2V Regulator
Q923	KTC3875S	KEC	RX B+
Q924	KRA1504S	KEC	TX B+

Q951	KTA1241	KEC	Back Light LED Control
Q952	KTA1241	KEC	Back Light LED Control
Q953	KRC101S	KEC	Back Light LED Control
Q954	KRC101S	KEC	Back Light LED Control
Q961	KRC110S	KEC	TX AF Mute at RX Mode
Q962	KRC111S	KEC	MIC AF Path at AM Mode

3-2. IC

Ref No.	Description	Manufacturer	Function
IC101	TK144889V	TOKO	IF IC
IC102	KIA358F	KEC	AGC, Squelch Control
IC201	TDA2003	ST	AF Power Amplifier
IC301	LC7152NM	SANYO	PLL
IC401	KIA4558F	KEC	FM TX AF
IC801	JT5BL9	TOSHIBA	CPU
IC802	24WC02	ATMEL	EEPROM

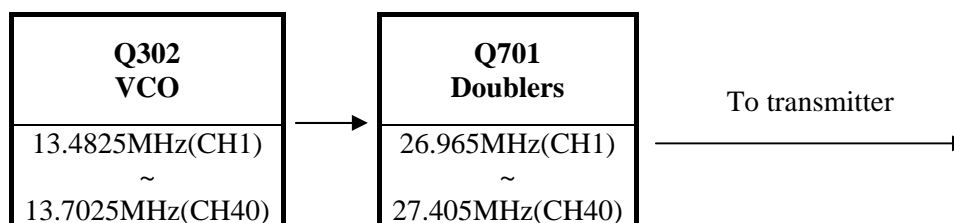
3-3. Manufacture Information

- KEC ----- KEC Co., LTD.
- SANYO ----- SANYO Semiconductor Co., LTD.
- TOKO ----- TOKO, Inc.
- TOSHIBA ----- Toshiba Semiconductor. Co., LTD.
- ATMEL ----- ATMEL Co., LTD

4. Description of Frequency Determining and Stabilizing Circuit

4-1. Introduction

The Frequencies for transmitter and receiver first local frequencies are all derived from a signal 4.5MHz crystal by means of a phase locked loop(PLL). The first local oscillator frequencies are 16.270MHz(CH1) to 16.710MHz(CH40). The second local frequency is fixed at 10.240MHz to generate second IF 455KHz. Transmit, the VCO of the PLL operates 13.4825MHz(CH1) to 13.7025MHz(40CH). The VCO frequency goes to the doublers circuit Q701, L701, L702 with doubles the frequency to generate 26.965MHz(CH1) to 27.405MHz(40CH).



The VCO operating frequency for the receiver is 16.27MHz(CH1) to 16.710MHz(CH40) as the first local oscillator, injected through the buffer amplifier Q302 into the first FET balanced mixer Q102, Q103.

4-2. Basic Synthesis Scheme

The crystal frequency(4.5MHz) is divided by 1800 times to make 2.5KHz which is fed to one side of the phase detector. The VCO output is divided by a programmable divider, and fed to other side of the phase detector Pin 9, 10 of IC301. Passing the phase detector output closes the feedback loop through an active low pass filter and using the output to control the VCO frequency through varicap diode D301. Under locked conditions, both of phase detector input signal must be identical at 2.5KHz.

The VCO frequency is then given by ;

Receiver : $F_{vco} / N = 0.005$ [MHz] OR $F_{vco} = 0.005 \times N$ [MHz]
 Transmitter : $F_{vco} / N = 0.0025$ [MHz] OR $F_{vco} = 0.0025 \times N$ [MHz]

Since “N” is an integer, the VCO frequency can be stepped up with in receiver mode 5KHz and transmitter mode 2.5KHz increments. By suitable choice of “N” the desired output frequency can be obtained.

	Channel 1		Channel 40	
	N	Fvco	N	Fvco
Transmit	5393	13.4825	5481	13.7025
Receiver	3254	16.2700	3342	16.7100
See the [Table 1]for other Channels				

The VCO frequency goes to the doublers circuit, with doubles the incoming signals.

	VCO Output Frequency	Doublers Output Frequency

Transmit	CH 1 , 13.4825 MHz	26.965 MHz

Transmit	CH 40 , 13.7025 MHz	27.405 MHz

Since all frequencies are obtained from the crystal controlled PLL oscillator, all outputs are coherent with the crystal oscillator frequency and matching the sample percentage accuracy.

Note that the reference frequency of 5KHz(receiver) and 2.5KHz(transmitter) is obtained by dividing the 4.5MHz by 900 times and 1800 times

See Table 1 for transmitter/receiver mode VCO frequencies.

Program Data & Frequency[Table 1]

Channel	Frequency [MHz]	RX		TX	
		N	Fvco	N	Fvco
1	26.965	3254	16.27	5393	13.4825
2	26.975	3256	16.28	5395	13.4875
3	26.985	3258	16.29	5397	13.4925
4	27.005	3262	16.31	5401	13.5025
5	27.015	3264	16.32	5403	13.5075
6	27.025	3266	16.33	5405	13.5125
7	27.035	3268	16.34	5407	13.5175
8	27.055	3272	16.36	5411	13.5275
9	27.065	3274	16.37	5413	13.5325
10	27.075	3276	16.38	5415	13.5375
11	27.085	3278	16.39	5417	13.5425
12	27.105	3282	16.41	5421	13.5525
13	27.115	3284	16.42	5423	13.5575
14	27.125	3286	16.43	5425	13.5625
15	27.135	3288	16.44	5427	13.5675
16	27.155	3292	16.46	5431	13.5775
17	27.165	3294	16.47	5433	13.5825
18	27.175	3296	16.48	5435	13.5875
19	27.185	3298	16.49	5437	13.5925
20	27.205	3302	16.51	5441	13.6025
21	27.215	3304	16.52	5443	13.6075
22	27.225	3306	16.53	5445	13.6125
23	27.255	3312	16.56	5451	13.6275
24	27.235	3308	16.54	5447	13.6175
25	27.245	3310	16.55	5449	13.6225
26	27.265	3314	16.57	5453	13.6325
27	27.275	3316	16.58	5455	13.6375
28	27.285	3318	16.59	5457	13.6425
29	27.295	3320	16.60	5459	13.6475
30	27.305	3322	16.61	5461	13.6525
31	27.315	3324	16.62	5463	13.6575
32	27.325	3326	16.63	5465	13.6625
33	27.335	3328	16.64	5467	13.6675
34	27.345	3330	16.65	5469	13.6725
35	27.355	3332	16.66	5471	13.6775
36	27.365	3334	16.67	5473	13.6825
37	27.375	3336	16.68	5475	13.6875
38	27.385	3338	16.69	5477	13.6925
39	27.395	3340	16.70	5479	13.6975
40	27.405	3342	16.71	5481	13.7025

4-3. Descriptions of Each Block

4-3-1. Introduction

The synthesizer is implemented with the following components;

PLL IC (IC301)
X-TAL (X301)
VCO, VARICAP DIODE (D301)

IC1301 is CMOS LSI that includes most of PLL block.

The Q301, L301, C311, C312, C313, C314, varicap diode D301 are clap oscillator circuit to operate as a VCO of the IC301. Q305 is a switching transistor to connect or disconnect the tuning capacitor in the VCO oscillator tank circuit for transmitter or receiver.

Q302 works as a buffer amplifier for RX local frequencies (16MHz) and TX carrier generating frequencies(13MHz)

4-3-2. Reference Frequency

The crystal X301(4.5MHz) and other components at Pin 1 and 24 of IC301 can make a reference frequency oscillator with internal amplifier.

4-3-3. VCO

Q301 and surrounding parts are consisting a clap oscillator works as a VCO of IC301. With appropriate control voltage on D301 the VCO can be oscillate over the required range of 13.4825MHz to 16.710MHz.

4-3-4. Programmable Divider and Its Control

The programmable input for each channel are steted by the PLL Clock(Pin 11), PLL Data(Pin 12), PLL Enable(Pin 13) of IC801. Each input signal to control the PLL ic is done with provide key input Pin 18, 19, 25, 26, 27, 28, 29, 32, 33, 34, 35, 37. For each key input, an internal code converts EEPROM appropriate control to the programmable divider for that channel.

Since the change transmit and receive, and additional bit is required at Pin 8 of IC801 to allow the ROM to recognize the status TX or RX.

During transmit the push to talk switch makes Pin 8 ground with BRT(Q802), PLL IC works under transmit status.

The programmable divider output fed to the phase detector for compare with the 2,5KHz reference frequency IC301. See table 1 for actual input and divide ratio on all channels.

4-3-5. Phase Detector and VCO Control

The phase detector is a digital phase comparator witch compares the phase of the reference signal with programmable divider output square waves and develops a series of pulses whose dc level depends on the phase error of each signal.

The phase detector pulse output is fed to an active low pass filter and RC low pass filter output signal of IC301 is filtered and fed to varicap D301 control the VCO frequency.

4-3-6. Transmitter / Receiver Buffer AMP

Output signal of Q301 is fed into the buffer amplifier Q302, L302 to generate TX carrier frequency and 1'st local frequencies.

4-3-7. Transmitter Doublers

The output signal of Q302, L302 goes to an amplifier with tuning circuit Q701, L701, L702 which doubles incoming 13MHz signals.

4-3-8. Switching of Turning Capacitor in VCO

The VCO circuit must tune with a wide range of frequencies 13.4825MHz ~ 13.7025MHz for transmitter and 16.27MHz ~16.71MHz for receiver.

To comply above range of VCO, the tuning capacitance should switch for transmission. The tuning circuit consists with L301, C311, C312, C313, and C314. When the VCO is working as a receiver Q305 becomes turn OFF. So, L301 and C311, D301 makes turning function.

When transmitting, Q305 becomes ON. So, L301 and a parallel capacitance of C316 and C311 make turning function.

4-3-9. Receiver Local Oscillator Outputs

- FIRST MIXER :

The secondary output signal of L107 is injected to the sources of 1st mixer Q102, Q103 in the 1st IF mixer section.

- SECOND MIXER :

The output of 10.24MHz oscillator circuit with X101 is injected into the IF IC(IC101) internally. Incoming IF signal and 10.24MHz signal are mixed inside the IF IC to extract 2nd IF signal 455KHz.

FM audio Signals are recovered with the way of quadrature detector.

AM signals are recovered with envelope detector.

4-4. Frequency Stability

Let : F_o = Crystal oscillator frequency
 F_r = Phase detector reference frequency
 F_{vco} = VCO frequency
 F_t = Transmit frequency

Then : Receiver : $F_r = F_o/900$
 Transmitter : $F_r = F_o/1800$

And under locked conditions : $F_r = F_{vco} / N$

Where, "N" is the programmable divider divide ratio.

Then : $F_{vco} = N \times F_r$

From which it can be seen, the percentage error in F_t is the same as the percentage error in F_o . The stability of the crystal oscillator is determined primarily by the crystal itself and having lesser deviation by the active and passive components of the oscillator. The choice of crystal and components is such that the required frequency stability is maintained over the required voltage and temperature range.

4-5. Description of other Circuits

4-5-1. Transmitter

A. RF Amplification

RF carrier frequencies are obtained at the output of doublers amplifier Q701 and turning IFT coil L701, L702. The input of VCO frequencies 13MHz is selected at the doublers output, which creates the necessary 27MHz. The output of doublers amplifier Q701 is fed through turning IFT coil L701, L702 to the base of pre driver amplifier Q702. It's output; 27MHz is coupled to RF driver amplifier Q703, a low-level class C power amplifier. Driver Q703 supplies the necessary power gain to operate RF final Q704 at the maximum efficient. The output of Q704 is supplied to the antenna through L-C turning circuit.

B. Circuit for Suppression of Spurious Radiation

The turning circuit between the output of final amplifier Q704 and antenna, 4-stage “ ” network C722, C723, C724, L711, C725, C726, L712, C729, C731, L732, C732, C733, C734, L714, C735 serves as a spurious radiation suppressor. This network also servers to match the impedance between TX power amplifier Q704 and the antenna.

C. Circuits for Limiting Power

After finished all alignment, the constant voltage supply circuit limits the available power 4W or slightly less. RV911 and corresponding three-transistor control supply voltage of RF power amplifier. When power low switch function Q914 changed the supply voltage. Tune all the trimming parts for maximum indication of RF power meter and adjust RV571 to make 4W indication of RF power meter. After finishing the above adjustments check the RF power meter reading is changed 1W under “LOW” state.

The turning is adjustment so that the actual power is from 3.8W to 4.0W. There are no other additional controls for adjusting the TX output power.

D. Modulation Control

Modulation of the RF is a process that begins with the audio picked up by the microphone.

<FM>

The microphone input is fed to mic audio amplifier IC401 that drives modulation vricap diode D302 in the VCO circuit RV401 limits the incoming modulation audio levels to inhibit over modulation. While reading the modulation factor on the modulation analyzing equipment, adjustment RV401 shall not exceed 2.0KHz deviation.

<AM>

Modulation signals are filtered with RC network and goes to the audio power amplifier IC201 in to make normal signal level to achieve wanted modulation. IC201 drives T201, which is a combination AF output/modulation transformer. During transmit, one of the secondary windings of T201 is tied between the 13.2V DC supply and the collectors of RF driver Q703 and RF power amplifier Q704. As the audio passes through T201 it causes the collector supplies of Q703 and Q704 to vary with audio, producing an AM signal at carrier frequency.

To avoid over modulation of the carrier, a protection of the modulating signal is fed back from the T201 through the AMC circuit, Q233 and Q234, to control the gain of IC201 and sets the maximum level of modulation. Form the center tab of RV231 and Q233 the feedback signal is rectified by diode D233, filtered by C233, and supplied the Q234. The collector of Q234 is tied directly TX audio input to control gain. That is, when the audio output is higher that the preset level of RV231, the information is reflected through Q233 and Q234, reducing the gain of IC201

4-5-2. Receiver

Overload protection is provided to receiver's semiconductors by diode D101. These diodes have a little effect on the incoming signal from another CB station; they protect the receiver from stray transmitter energy.

In the receiver mode of operation, Q923 transistor is turned on. Also bias voltage is applied to Q101, Q102, Q103, Q106.

Q101 is a 27MHz RF input amplifier, and any excessive input signal is limited by diode D101.

CB receiver is dual conversion super-heterodyne type with the first IF 10.695MHz and the second IF 455KHz.

Receiver is separated to blocks, 1'st IF section and 2'nd IF section. The PLL synthesizer supplies 1'st local frequency 16.270MHz ~ 16.710MHz. The amplified 27MHz is mixed. With the provide 1'st local frequencies Q102, Q103 mixes the incoming RF signal to generate 1'st IF signal. The resulting first IF is 10.695MHz. Q102 and Q103 is the first converter, and 10.695MHz is sharply filtered by L108 and crystal filter CF101. The first IF is again mixed with a second local oscillator of 10.24MHz.

With the 10.240MHz signal, IC101 FM IF IC converts the incoming signals to generate 2'nd IF signal and recovered audio signals. 2'nd IF is filtered by a razor sharp ceramic filter CF101 coupled. The 455KHz signal from the 2'nd IF filter was amplified and limits internally. After amplification the signals fed to the quadrature detector loop L109. Then could see the recovered signals Pin 11 of IC101.

With the amplitude of recovered signals, Q151 serves as an amplifier.

AM signals from the Pin 6 of IC101 were tapped with C161 and amplified two-stage amplifier Q161, Q162. Q161 is a first 455KHz amplifier, and the Q161 being the last amplifier. D161 is a detector diode witch produce audio signal as well as negative DC voltage for AGC action. The negative voltage also provides forward biasing to the emitter of ANL clipping transistor Q164. The biasing voltage has a time constant determined R174 and C176. Therefore any sharp negative going pulse from D161 will back bias Q164 and clipped. The way to recover the AM information audio is envelope detector.

5. Test Equipment Setup and Alignment Instructions

5-1 General Section

5-1-1 Test Equipment Required

- DC power supply(13.8V/3A)
- DC Voltmeter or Oscilloscope
- RF attenuator (30dB)

5-1-2 Alignment Procedure

Step	Setting	Connection	Adjuster	Adjust for
1	RX VCO voltage Adj. Channel & Frequency : 1CH, 26.956 MHz Mic : Receive Volume : Optional Squelch : Optional RF Gain : Optional Mic Gain : Optional	DC voltmeter to VCO Test point (Figure 1)	L301	1.5~2.0 V DC
2	TX VCO voltage Adj. Channel & Frequency : 1CH, 26.956 MHz Mic : Transmit(No Mod) Volume : Optional Squelch : Optional RF Gain : Optional Mic Gain : Optional	DC voltmeter to VCO Test point (Figure 1)	L301	1.5~2.0 V DC

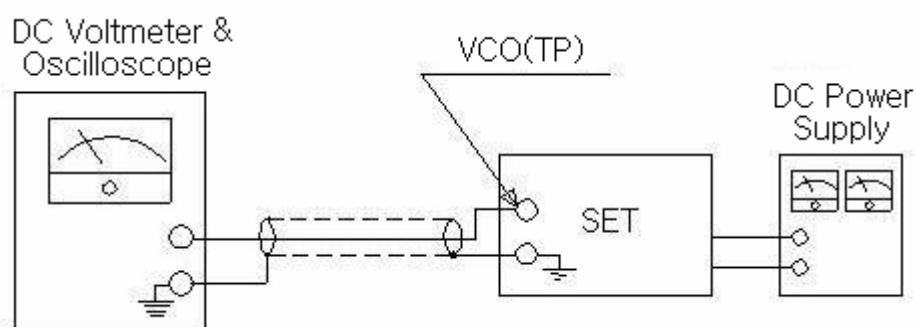


Figure 1

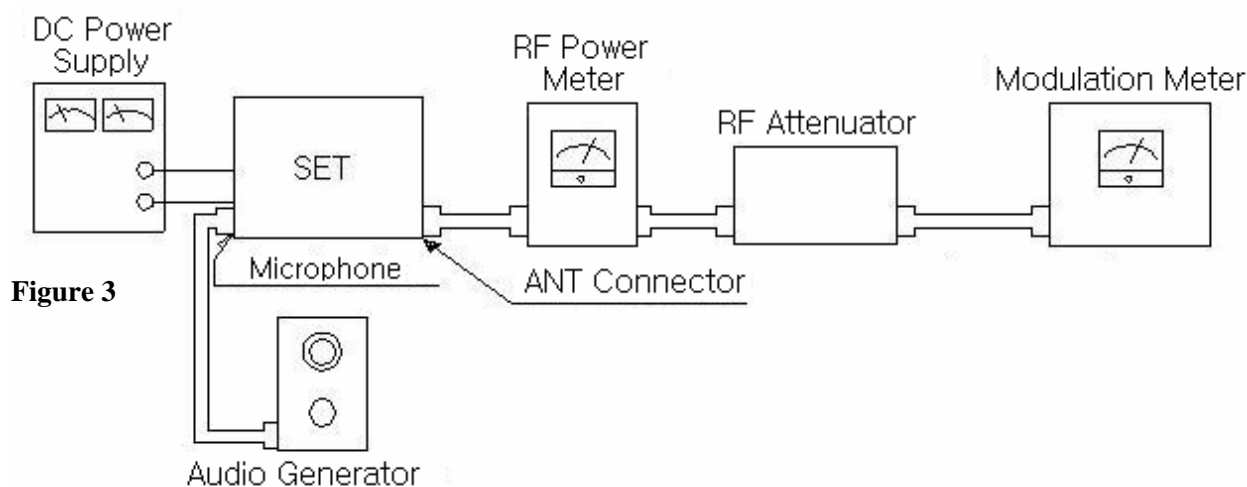
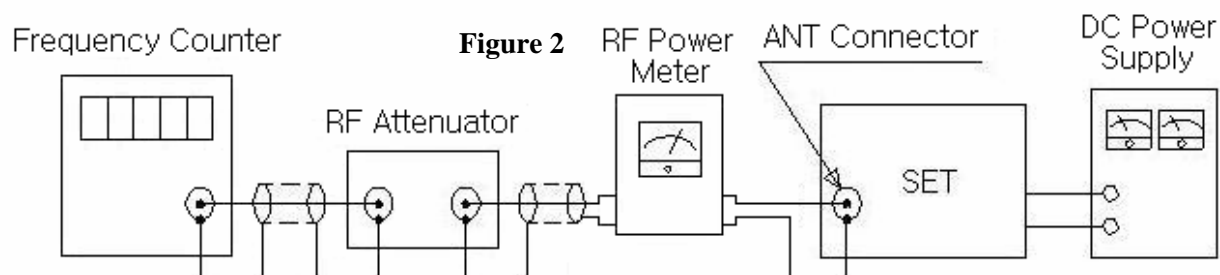
5-2 Transmitter Section**5-2-1 Test Equipment Required**

- RF Power Meter
- 50 ohms load (non-inductive)
- RF attenuator (30dB)
- Oscilloscope
- Audio generator
- DC power supply(13.8V/3A)
- Spectrum analyzer
- Frequency counter
- Coupler
- Modulation meter

5-2-2 Alignment Procedure

Step	Setting	Connection	Adjuster	Adjust for
1	RF Power Adj. Channel : 19CH Function : AM or FM Mode CB/ANL Off/DX MIC : Transmit Volume : Optional Squelch : Optional RF Gain : Optional MIC Gain : Minimum	Connect dummy load and RF Power Meter to the EXT-ANT connector on the set(Figure 3)	L701 L702 L703	Maximum indication on the Power Meter(4.0W). If indication is not in 4W range, ACP Adjustment(RV911)
2	Frequency Adj. Channel & Frequency : 19CH, 26.956 MHz Function : AM or FM Mode CB/ANL Off/DX Mic : Transmit(No Mod) Volume : Optional Squelch : Optional RF Gain : Optional MIC Gain : Optional	Connect dummy load and Frequency Counter through Coupler to RF Power Meter. Connect RF Power Meter to EXT-ANT connector on the set(Figure 2).	CT302	Be sure that the indication of the transmitter frequency is 27.185MHz \pm 300 Hz on the Frequency Counter
3	AM Modulation Adj. Channel & Frequency : 19CH, 27.185MHz MIC: Transmit Function : AM Mode CB/ANL Off/DX Volume : Optional Squelch : Optional RF Gain : Optional MIC Gain : Max	Connection the audio generator (set to 1 KHz)to the microphone. Connect the modulation meter through the RF attenuator to the ANT Connector. Adjust the audio signal level to obtain by 50% modulation. When you increase the audio signal by 20 dB, the modulation should not exceed 95% Modulation(Figure 3).	RV231	85% ~ 95%

<p>4</p>	<p>FM Deviation Adj. Channel & Frequency : 19CH, 27.185MHz MIC : Transmit Function : FM Mode CB/ANL Off/DX Volume : Optional Squelch : Optional RF Gain : Optional MIC Gain : Max</p>	<p>Connection the audio generator (set to 1 KHz)to the microphone. Connect the modulation meter through the RF attenuator to the ANT Connector. Adjust the audio signal level to obtain by 1KHz deviation. When you increase the audio signal by 20 dB, the deviation should not exceed 2.0KHz deviation(Figure 3).</p>	<p>RV401</p>	<p>1.8KHz ~ 2.0KHz</p>



5-3 Receiver Section

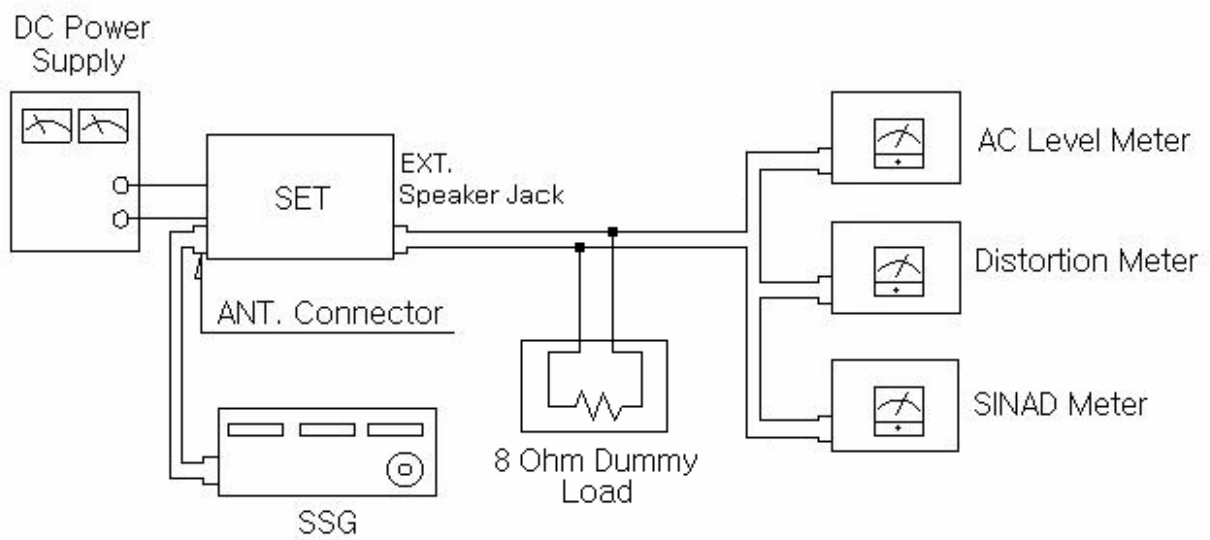
5-3-1 Test Equipment Required

- Standard Signal Generator(SSG)
- DC power supply(13.8V/3A)
- AC Level Meter
- Distortion Meter
- Oscilloscope
- SINAD Meter
- 8 ohm Dummy Load

5-3-2 Alignment Procedure

Step	Setting	Connection	Adjuster	Adjust for
1	AM Audio Output Adj. Channel & Frequency : 19CH, 27.185MHz MIC : Receive Function : AM Mode CB/ANL Off/DX Volume : Full clockwise Squelch : Turn to counter clockwise RF Gain : Full clockwise	Connect RF Signal Generator to EXT-ANT Connector. Connect AC Level Meter and Distortion Meter and SINAD Meter across EXT SPK jack with 8 ohm Dummy Load(Figure 4)	L101 L103 L104 L105 L107 L108 L112	Maximum indication on AC Level Meter. Reduce output from SSG until the audio output becomes about 2V.
2	FM Audio Output Adj. Channel & Frequency : 19CH, 27.185MHz MIC : Receive Function : FM Mode CB/ANL Off/DX Volume : Full clockwise Squelch : Turn to counter clockwise RF Gain : Full clockwise	Connect RF Signal Generator to EXT-ANT Connector. Connect AC Level Meter and Distortion Meter and SINAD Meter across EXT SPK jack with 8 ohm Dummy Load(Figure 4)	L109	Maximum indication on AC Level Meter. Reduce output from SSG until the audio output becomes about 2V.
3	Squelch Adj. Channel & Frequency : 19CH, 27.185MHz MIC : Receive Function : FM Mode CB/ANL Off/DX SSG : 27.185MHz, 1KHz, 100uV, 1.5KHz Dev. Volume : Full clockwise Squelch : Full clockwise clockwise RF Gain : Full clockwise	Connect RF Signal Generator to EXT-ANT Connector. Connect AC Level Meter and Distortion Meter and SINAD Meter across EXT SPK jack with 8 ohm Dummy Load(Figure 5)	RV131	Adjust until the audio output appears.

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SECTION3 PART LIST

PART LIST of TCB-660

Rev. 05

09-Feb-07

ITEM	NAME & DESCRIPTION	VENDOE CODE		MAKER	VENDOR	ASS'Y	Q'ty	Location NO	REMARKS
* ELECT Parts									
COVER ASS'Y									
1	SPEAKER	66mm	66AR000-8P-4K11	ASAHI	ASAHI	MAN	1	SPK201	
2	WIRE HARNESS	PH-2PIN TO OPE	UL1007 #26 L=200mm	FINE	FINE	MAN	1	J204	
ESCUTCHEON ASS'Y									
3	PCB VOLUME	1LAYER		CAPITAL		MAN	1		
4	VR	A10K	F-09115S A10K L15KQ	POLYSHINE		MAN	1	VR101	
5	VR	B50K	F-09115N 3B50K L15KQ	POLYSHINE		MAN	1	VR102	
6	CHIP RESISTOR	1K	1/16W 5% T 1608	PHILIPS		SMD	1	R400	
7	COIL AXIAL	6.8UH	LAL03TB6R8K			MAN	4	L501, L502, L504, L506	
8	WAFER	10PIN	PH-10A 180C	FINE	FINE	MAN	1	J101	
9	WIRE HARNESS	PH-10PIN*2	UL1007 #26 L=50MM	FINE	FINE	MAN	1	J101 --- J102	
10	WIRE HARNESS	PH-6PIN TO OPE	UL1007 #26 L=70MM	FINE	FINE	MAN	1	J502	
11	CONNECTOR SOCKET		HS6-TTI 16-6R	HYESUNG		MAN	1	J501	
13	HEAT SINK TUBE		diameter 4 mm x 15mm			MAN	6		
LCD PCB ASS'Y									
14	PCB LED	1 LAYER		CAPITAL		MAN	1		
15	PCB DISPLAY	FR-4 / R-1		CAPITAL		MAN	1		
16	CHIP RESISTOR	1K	1/16W 5% T 1608	PHILIPS		SMD	1	R810	
17	CHIP RESISTOR	10K	1/16W 5% T 1608	PHILIPS		SMD	5	R1, R805, R806, R811, R814	
18	CHIP RESISTOR	100K	1/16W 5% T 1608	PHILIPS		SMD	4	R2,R3,R4,R804	
19	CHIP RESISTOR	1M	1/16W 5% T 1608	PHILIPS		SMD	1	R803	
20	CHIP RESISTOR	2.2K	1/16W 5% T 1608	PHILIPS		SMD	10	R832, R833, R834, R835, R836, R8, R9, R10, R11, R12	
21	CHIP RESISTOR	220K	1/16W 5% T 1608	PHILIPS		SMD	1	R808	
22	CHIP RESISTOR	47K	1/16W 5% T 1608	PHILIPS		SMD	8	R812, R816, R831, R851, R852, R853, R854, R864,	
23	CHIP CERAMIC	0.01UF	1608	PHILIPS		SMD	2	C806, C807	
24	CHIP CERAMIC	1UF	1608	PHILIPS		SMD	1	C805	
25	CHIP CERAMIC	68PF	1608	PHILIPS		SMD	2	C801, C802	
26	CHIP TANTAL	10uF/16V	A TYPE			SMD	1	C811	
27	CHIP TRANSISTOR	KRA101S	SOT-23	KEC		SMD	1	Q803	
28	CHIP TRANSISTOR	KRC101S	SOT-23	KEC		SMD	1	Q802	
29	CHIP TRANSISTOR	KRC104S	SOT-23	KEC		SMD	1	Q801	
30	LED BACK LIGHT	CHIP LED	AOT-0603P-B01-V	BLUEWIZ		SMD	7	D951, D952, D953, D954, D956, D965, D966	

ITEM	NAME & DESCRIPTION	VENDOE CODE		MAKER	VENDOR	ASS'Y	Q'ty	Location NO	REMARKS
31	IC EEPROM	AT24C02 (SOP-8)		ATMEL		SMD	1	IC802	
32	IC CPU (FLASH) WITH TCB660 SOFTWARE	JT5BL9		TOSHIBA	TTI	SMD	1	IC801	
33	LCD DISPLAY	SDM8A3926C	FOR TCB-660	SANTECH		MAN	1	LCD801	
34	SW TACT	TS-1109		HENGRONG		MAN	5	SW801, SW802, SW806, SW807, SW808	
35	RESONATOR	4.0MHz	ZTA4.00MG	D.TRON	D.TRON	MAN	1	X801	
	MAIN BODY ASS'Y								
36	CONNECTOR	HS6-TTI 239(A)		HYESUNG		MAN	1	J701	
37	TRANSISTOR	KTA1658		KEC		MAN	1	Q911	
38	TRANSISTOR	2SC2078		SANYO	YANG WON	MAN	1	Q704	
39	IC	TDA2003V		ST		MAN	1	IC201	
40	POWER CORD	UL1015#20 RED,BLACK CABLE	2PIN PLUG ASS'Y	PAN-ASIA	PAN-ASIA	MAN	1	J900	
	MAIN PCB AUTO ASS'Y								
41	PCB MAIN	FR-4 / R-1		CAPITAL		SMD	1		
42	CHIP RESISTOR	0	1/16W 5% T 1608	PHILIPS		SMD	2	R137, R201	
43	CHIP RESISTOR	1	1/16W 5% T 1608	PHILIPS		SMD	2	R711, R206	
44	CHIP RESISTOR	10	1/16W 5% T 1608	PHILIPS		SMD	2	R133, R301	
45	CHIP RESISTOR	100	1/16W 5% T 1608	PHILIPS		SMD	6	R104, R109, R134, R168, R314, R401	
46	CHIP RESISTOR	1K	1/16W 5% T 1608	PHILIPS		SMD	17	R126, R164, R182, R187, R200, R222, R234, R238, R308, R312, R410, R501, R931, R955, R956, R957, R958	
47	CHIP RESISTOR	10K	1/16W 5% T 1608	PHILIPS		SMD	17	R157, R161, R185, R315, R321, R322, R323, R324, R325, R326, R327, R412, R413, R414, R703, R821, R823,	
48	CHIP RESISTOR	100K	1/16W 5% T 1608	PHILIPS		SMD	9	R140, R141, R159, R186, R188, R202, R233, R309, R311	
49	CHIP RESISTOR	2M	1/16W 5% T 1608	PHILIPS		SMD	1	R405	
50	CHIP RESISTOR	150	1/16W 5% T 1608	PHILIPS		SMD	1	R706	
51	CHIP RESISTOR	1.5K	1/16W 5% T 1608	PHILIPS		SMD	2	R742, R924	
52	CHIP RESISTOR	15K	1/16W 5% T 1608	PHILIPS		SMD	3	R155, R166, R235	
53	CHIP RESISTOR	150K	1/16W 5% T 1608	PHILIPS		SMD	1	R701	
54	CHIP RESISTOR	2.2	1/16W 5% T 1608	PHILIPS		SMD	1	R204	
55	CHIP RESISTOR	220	1/16W 5% T 1608	PHILIPS		SMD	3	R169, R702, R914	

ITEM	NAME & DESCRIPTION	VENDOE CODE		MAKER	VENDOR	ASS'Y	Q'ty	Location NO	REMARKS
56	CHIP RESISTOR	2.2K	1/16W 5% T 1608	PHILIPS		SMD	12	R131, R203, R237, R307, R402, R817, R822, R912, R922, R923, R961, R01	
57	CHIP RESISTOR	22K	1/16W 5% T 1608	PHILIPS		SMD	6	R132, R162, R175, R302, R304, R305	
58	CHIP RESISTOR	220K	1/16W 5% T 1608	PHILIPS		SMD	2	R171, R177	
59	CHIP RESISTOR	2.2M	1/16W 5% T 1608			SMD	1	R153	
60	CHIP RESISTOR	2.7K	1/16W 5% T 1608	PHILIPS		SMD	2	R167, R915	
61	CHIP RESISTOR	27K	1/16W 5% T 1608	PHILIPS		SMD	2	R102, R403	
62	CHIP RESISTOR	3.3K	1/16W 5% T 1608	PHILIPS		SMD			
63	CHIP RESISTOR	33K	1/16W 5% T 1608	PHILIPS		SMD	3	R172, R404, R407	
64	CHIP RESISTOR	820K	1/16W 5% T 1608	PHILIPS		SMD	1	R135	
65	CHIP RESISTOR	390	1/16W 5% T 1608	PHILIPS		SMD	1	R156	
66	CHIP RESISTOR	39K	1/16W 5% T 1608	PHILIPS		SMD	2	R163, R306	
67	CHIP RESISTOR	47	1/16W 5% T 1608	PHILIPS		SMD	3	R184, R705, R913	
68	CHIP RESISTOR	470	1/16W 5% T 1608	PHILIPS		SMD	8	R101, R105, R106, R107, R108, R165, R236, R709,	
69	CHIP RESISTOR	4.7K	1/16W 5% T 1608	PHILIPS		SMD	5	R138, R205, R406, R704, R962	
70	CHIP RESISTOR	47K	1/16W 5% T 1608	PHILIPS		SMD	9	R122, R139, R174, R176, R300, R303, R409, R411, R415	
71	CHIP RESISTOR	470K	1/16W 5% T 1608	PHILIPS		SMD	2	R154, R178	
72	CHIP RESISTOR	5.6K	1/16W 5% T 1608	PHILIPS		SMD	1	R408	
73	CHIP RESISTOR	56K	1/16W 5% T 1608	PHILIPS		SMD	2	R103, R313	
74	CHIP RESISTOR	6.8K	1/16W 5% T 1608	PHILIPS		SMD	1	R152	
75	CHIP RESISTOR	68K	1/16W 5% T 1608	PHILIPS		SMD	1	R189	
76	CHIP RESISTOR	82K	1/16W 5% T 1608	PHILIPS		SMD	1	R173	
77	THERMISTOR	100 OHM	NCP18XF101J03RB	MURATA		SMD	1	TH131	
78	THERMISTOR	10K OHM	NCP18XH103J03RB	MURATA		SMD	1	TH101	
79	CHIP CERAMIC	0.001UF	1608	PHILIPS/SAMSUNG		SMD	4	C181, C230, C239, C404	
80	CHIP CERAMIC	0.01UF	1608	PHILIPS/SAMSUNG		SMD	37	C111, C114, C115, C116, C117, C118, C153, C154, C155, C156, C157, C161, C162, C184, C201, C231, C234, C235, C323, C412, C415, C501, C502, C503, C504, C506, C703, C704, C708, C713, C901, C902, C903, C911, C922, C924, C932	
81	CHIP CERAMIC	0.1UF	1608	PHILIPS/SAMSUNG		SMD	18	C122, C132, C134, C135, C137, C138, C168, C169, C180, C186, C236, C308, C322, C325, C401, C402, C405, C413	
82	CHIP CERAMIC	1UF	1608	PHILIPS/SAMSUNG		SMD	2	C159, C961	
83	CHIP CERAMIC	0.022UF	1608	PHILIPS/SAMSUNG		SMD	5	C166, C203, C214, C238, C403	

ITEM	NAME & DESCRIPTION	VENDOE CODE		MAKER	VENDOR	ASS'Y	Q'ty	Location NO	REMARKS
84	CHIP CERAMIC	0.047UF	1608	PHILIPS/SAMSUNG		SMD	7	C152, C163, C164, C165, C310, C721, C914	
84	CHIP CERAMIC	0.47UF	1608	PHILIPS/SAMSUNG		SMD	1	C212	
85	CHIP CERAMIC	0.068UF	1608	PHILIPS/SAMSUNG		SMD	1	C410	
86	CHIP CERAMIC	10PF	1608	PHILIPS/SAMSUNG		SMD	3	C96, C113, C324	
87	CHIP CERAMIC	100PF	1608	PHILIPS/SAMSUNG		SMD	7	C101, C109, C313, C314, C711, C731, C733	
88	CHIP CERAMIC	150PF	1608	PHILIPS/SAMSUNG		SMD	6	C102,C104,C106,C131,C311,C722	
89	CHIP CERAMIC	16PF	1608	PHILIPS/SAMSUNG		SMD	1	C316	
90	CHIP CERAMIC	18PF	1608	PHILIPS/SAMSUNG		SMD	4	C98, C99, C112, C119	
91	CHIP CERAMIC	180PF	1608	PHILIPS/SAMSUNG		SMD	1	C734	
92	CHIP CERAMIC	22PF	1608	PHILIPS/SAMSUNG		SMD	1	C312	
93	CHIP CERAMIC	220PF	1608	PHILIPS/SAMSUNG		SMD	4	C329,C714, C717, C724	
94	CHIP CERAMIC	3PF	1608	PHILIPS/SAMSUNG		SMD	1	C319	
95	CHIP CERAMIC	30PF	1608	PHILIPS/SAMSUNG		SMD	1	C315	
96	CHIP CERAMIC	33PF	1608	PHILIPS/SAMSUNG		SMD	4	C108, C302, C318,C707	
97	CHIP CERAMIC	330PF	1608	PHILIPS/SAMSUNG		SMD	5	C715, C723, C725, C726, C729	
98	CHIP CERAMIC	39PF	1608	PHILIPS/SAMSUNG		SMD	1	C705	
99	CHIP CERAMIC	47PF	1608	PHILIPS/SAMSUNG		SMD	6	C103, C105, C107, C182, C328, C736	
100	CHIP CERAMIC	470PF	1608	PHILIPS/SAMSUNG		SMD	1	C718	
101	CHIP CERAMIC	56PF	1608	PHILIPS/SAMSUNG		SMD	1	C130	
102	CHIP CERAMIC	6PF	1608	PHILIPS/SAMSUNG		SMD	2	C317, C321	
103	CHIP CERAMIC	68PF	1608	PHILIPS/SAMSUNG		SMD	1	C97	
104	CHIP CERAMIC	680PF	1608	PHILIPS/SAMSUNG		SMD	1	C414	
105	CHIP CERAMIC	82PF	1608	PHILIPS/SAMSUNG		SMD	5	C406, C720, C727, C732, C701	
106	CHIP CERAMIC	8PF	1608	PHILIPS/SAMSUNG		SMD	1	C326	
107	CHIP CERAMIC	9PF	1608	PHILIPS/SAMSUNG		SMD	1	C110	
108	CHIP TANTAL	2.2uF/16V	A TYPE			SMD	1	C301	
109	CHIP TRANSISTOR	2SK211-Y	SOT-23	TOSHIBA		SMD	2	Q102, Q103	
110	CHIP TRANSISTOR	KRA102S	SOT-23	KEC		SMD	1	Q163	
111	CHIP TRANSISTOR	KRC101S	SOT-23	KEC		SMD	9	Q104, Q105, Q153, Q305, Q311, Q312, Q313, Q953, Q954	
112	CHIP TRANSISTOR	KRC102S	SOT-23	KEC		SMD	1	Q914	
113	CHIP TRANSISTOR	KRC110S	SOT-23	KEC		SMD	2	Q121, Q961	
114	CHIP TRANSISTOR	KRC111S	SOT-23	KEC		SMD	3	Q202, Q502, Q962	
115	CHIP TRANSISTOR	KRC112S	SOT-23	KEC		SMD	3	Q152, Q154, Q913	

ITEM	NAME & DESCRIPTION	VENDOE CODE		MAKER	VENDOR	ASS'Y	Q'ty	Location NO	REMARKS
116	CHIP TRANSISTOR	KTA1504S	SOT-23	KEC		SMD	4	Q164, Q233, Q912, Q924	
117	CHIP TRANSISTOR	KTC3875S	SOT-23	KEC		SMD	9	Q151, Q181, Q182, Q183, Q234, Q742, Q921, Q923, Q931	
118	CHIP TRANSISTOR	KTC3880S	SOT-23	KEC		SMD	8	Q101, Q161, Q162, Q301, Q302, Q303, Q701, Q702	
119	DIODE ZENER	Z02W5.1V	SOT-23	KEC		SMD	1	DZ181	
120	DIODE ZENER	Z02W4.3V	SOT-23	KEC		SMD	1	DZ931	
121	DIODE ZENER	Z02W8.2V	SOT-23	KEC		SMD	1	DZ921	
122	DIODE SI CHIP	KDS181	SOT-23	KEC		SMD	1	D401	
123	DIODE SI CHIP	KDS184	SOT-23	KEC		SMD	10	D102, D103, D105, D171, D180, D233, D741, D742, D921, D961	
124	DIODE SI CHIP	KDS226	SOT-23	KEC		SMD	1	D101	
125	DIODE VARICAP	KDV251S	SOT-23	KEC		SMD	2	D301, D302	
126	IC PLL	LC7152NM		SANYO	YANG WON	SMD	1	IC301	
127	IC OP AMP	KIA358F		KEC		SMD	1	IC102	
128	IC OP AMP	KIA4558F		KEC		SMD	1	IC401	
129	IC FM IF	TK14489V		TOKO		SMD	1	IC101	
	MAIN PCB MANUAL ASS'Y								
130	FILM RESISTOR	2.2	1/2W 5% ST MINI			MAN	1	R712	
131	FILM RESISTOR	10	1/2W 5% ST MINI			MAN	1	R921	
132	FILM RESISTOR	470	1/2W 5% ST MINI			MAN	2	R953, R954	
133	FILM RESISTOR	1K	1W 5% ST MINI			MAN	2	R951, R952	
134	CHIP RESISTOR	10K	1/16W 5% T 1608	PHILIPS		SMD	1	R713	
135	METAL OXID RESISTOR	10	2W 5% ST BULK			MAN	1	R208	
136	RESISTOR SEMI	47KB	PH0630NOX0X-HA1-B4	SOUNDWELL		MAN	1	RV131,	
137	RESISTOR SEMI	2.2KB	PH0630NOX0X-HA1-B4	SOUNDWELL		MAN	1	RV231	
138	RESISTOR SEMI	22KB	PH0630NOX0X-HA1-B4	SOUNDWELL		MAN	1	RV401	
139	RESISTOR SEMI	4.7KB	PH0630NOX0X-HA1-B4	SOUNDWELL		MAN	1	RV911	
140	ELECT CAPACITOR	1UF	KR1-16V010MA 5X11	DONGXIANG		MAN	3	C167, C407, C408	
141	ELECT CAPACITOR	10UF	KR1-16V100MA 5X11	DONGXIANG		MAN	9	C208, C210, C232, C331, C332, C333, C913, C921, C931	
142	ELECT CAPACITOR	100UF	KR3-16V101MA 5X11	DONGXIANG		MAN	2	C821, C923	
143	ELECT CAPACITOR	1000UF	KR1-16V102MF 10X20	DONGXIANG		MAN	4	C207, C213, C217, C912	
144	ELECT CAPACITOR	0.22UF	KR1-16VR22MA 5X11	DONGXIANG		MAN	1	C124	
145	ELECT CAPACITOR	2.2UF	KR1-16V2R2MA 5X11	DONGXIANG		MAN	1	C741	
146	ELECT CAPACITOR	22UF	KR1-16V220MA 5X11	DONGXIANG		MAN	0		
147	ELECT CAPACITOR	220UF	KR1-16V221MB 6.3X20	DONGXIANG		MAN	2	C953, C954	
148	ELECT CAPACITOR	4.7UF	KR1-16V4R7MA 5X11	DONGXIANG		MAN	2	C411, C960	
149	ELECT CAPACITOR	47UF	KR1-16V470MA 5X11	DONGXIANG		MAN	5	C143, C185, C206, C233, C933	
150	CHIP CERAMIC	100PF	1608	PHILIPS/SAMSUNG		SMD	1	C735	
151	DIP TRIMMER	20PF	KCVN620	FOKITS		MAN	1	CT301	

ITEM	NAME & DESCRIPTION	VENDOE CODE		MAKER	VENDOR	ASS'Y	Q'ty	Location NO	REMARKS
152	TRANSFORMER	CHOKE	T1	FINE	FINE	MAN	1	T901	
153	TRANSFORMER	EI-24(MOD.)	T2	FINE	FINE	MAN	1	T201	
154	IFT COIL RF FREE TX	27MHz	TX1	FINE	FINE	MAN	2	L701, L702	
155	COIL AXIAL	0.47uH	LAL03TR0R47K			MAN	2	L703,L302	
156	IFT COIL	27MHz-B	RX1	FINE	FINE	MAN	1	L101	
157	IFT COIL	27MHz RX (7RC)	RX2	FINE	FINE	MAN	1	L107	
158	IFT COIL	10.7MHz RX-B	RX3	FINE	FINE	MAN	1	L108	
159	IFT COIL DETECTOR	455KHz	RX4	FINE	FINE	MAN	1	L109	
160	IFT COIL	455KHz-B	RX5	FINE	FINE	MAN	1	L112	
161	IFT COIL	16.5MHz VCO	VCO1	FINE	FINE	MAN	1	L301	
162									
163	COIL AXIAL	1.5UH	LAL03TR1R5K			MAN	2	L102, L106	
164	COIL AXIAL	6.8UH	LAL03TB6R8K			MAN	1	L706	
165	COIL SPRING	2.5X0.8X7T:R	0.11UH	FINE	FINE	MAN	1	L704	
166	COIL SPRING	4X0.5X6T:R		FINE	FINE	MAN	1	L712	
167	COIL SPRING	4X0.5X7T:R		FINE	FINE	MAN	1	L713	
168	COIL SPRING	4X0.5X10T:R		FINE	FINE	MAN	1	L714	
169	COIL SPRING	6X0.8X5T:R	0.225UH	FINE	FINE	MAN	1	L711	
170	COIL SPRING	5X0.6X13.5T:R	0.5UH	FINE	FINE	MAN	1	L707	
171	CORE SPRING	5.5TX0.45XM5E@X2.3 0.17UH		FINE	FINE	MAN	3	L103, L104, L105	
172	COIL CHOKE	6UH	BOBBIN CORE	FINE	FINE	MAN	1	L201	
173	TRANSISTOR	2SC2314F		SANYO		MAN	1	Q703	
174	TRANSISTOR	KTA1241		KEC		MAN	2	Q951, Q952	
175	DIODE	1N4004T/R 400V 1A				MAN	2	D232, D901	
176	DIODE	1N60				MAN	1	D161	
177	CRYSTAL	10.240MHz	32PF:30PPM HC-49	D.TRON	D.TRON	MAN	1	X101	
178	CRYSTAL	4.50MHZ	12PF:30PPM HC-49	D.TRON	D.TRON	MAN	1	X301	
179	FILTER CRYSTAL	10L08A	10.695MHZ 49/T-3L	D.TRON	D.TRON	MAN	1	XF101	
180	FILTER CERAMIC	LT455HTW		D.TRON	D.TRON	MAN	1	CF101	
181	JACK DC	PJ-3074A		HENGRONG	HENGRONG	MAN	1	J202	
182	WIRE STRIP	D0.8 * L20 mm				MAN	1	JP1	
183	WAFER	2PIN	PH-2A 180C	FINE	FINE	MAN	1	J205	
184	WAFER	6PIN	PH-6A 180C	FINE	FINE	MAN	1	J503	
185	WAFER	10PIN	PH-10A 180C	FINE	FINE	MAN	1	J102	

Mechanical PARTS									
* COVER ASS'Y									
1	BOTTOM COVER	SPC+BLACK, COATING,	SAME AS TCB770					1	-
2	UPPER COVER	SPC+BLACK COATING, 0.	SAME AS TCB770					1	-
3	BRACKET SPK	EGi, 1.0t, COATING	SAME AS TCB770					3	For speaker
4	FELT(SPK)	φ65*0.3t, BLACK	SAME AS TCB770					1	For speaker
5	FELT(COVER)	8*133*0.3t, BLACK	SAME AS TCB770					4	For bottom cover & upper coveradhesive(location: side)

ITEM	NAME & DESCRIPTION	VENDOE CODE	MAKER	VENDOR	ASS'Y	Q'ty	Location NO	REMARKS
6	SCREW Mach(+) M3*8L-TAPTITE, BLACK,	SAME AS TCB770	Bonso			3	Bracket(spK) mounting	
7	SCREW Mach(+) M3*8L-TAPTITE, BLACK,	SAME AS TCB770 / SAME AS ITEM.6	Bonso			6	Main body + Bottom & upper cover mounting	
8	CUSHION 20*24*4.0t, EVA SPONGE, BLAC	SAME AS TCB770	Bonso			1	For upper cover adhesive(location: center)	

*** ESCUTCHEON ASS'Y**

9	ESCUTCHEON ABS. BLACK	NEW	Bonso			1	Front case plastic	
10	CH KNOB ABS, BLACK	same as TCB880 Vol knob	Bonso			2	For Channel	
11	KEY PAD SILICONE, CLEAR, PU coating	NEW	Union			1	-	
12	LCD BRACKET SPTe, 0.3t	SAME AS TCB770	DESHAN			1	For diffuser	
13	DIFFUSER LENS ACRYL, CLEAR	SAME AS TCB770	Bonso			1	Diffuser	
14	REFLECTOR ACRYL, CLEAR	SAME AS TCB770	Bonso			1	For diffuser	
15	ZEBRA SILICONE	SAME AS TCB770	Bonso			1	For diffuser	
16	WINDOW ACRYL, CLEAR	SAME AS TCB770	Bonso			1	-	
17	SCREW MACH(+) M2.6*5L, Black, FH	SAME AS TCB770	Bonso			4	Esc+Main body mounting	
18	SCREW TAP(+) 2.6*8L-2S, Ni plating, BH	SAME AS TCB770	Bonso			2	Key PCB mounting	
19	DOUBLE TAPE(WINDOW) 3M, 0.16t	SAME AS TCB770	Bonso			1	For window	
20	WHITE SHEET POLYESTER, 0.1t	SAME AS TCB770	Bonso			1	For diffuser	
21	RING NUT BsBm	SAME AS TCB770	Bonso			3	For channel,Rf,on/off	
22	DOUBLE SIDE TAPE FOR DIFFUSER 29*3.5*0.2T	SAME AS TCB770	Bonso			2	For diffuser	

*** MAIN BODY ASS'Y**

23	MAIN BODY EGI, 1.0t	SAME AS TCB770	DESHAN			1	-	
24	CORD STOPPER PP, BLACK	SAME AS TCB770	Yisheng			1	Wire stopper	
25	SCREW MACH(+) M3*10L, Black, BH	SAME AS TCB770	Bonso			3	TR mounting	
26	SCREW Mach(+) 3*8L-TAPTITE, Black, BH	SAME AS TCB770 / SAME AS ITEM.6	Bonso			4	Main PCB + Main body mounting	
27	NUT M3, SS41	SAME AS TCB770	Bonso			3	TR mounting	
28	SPRING WASHER M3	SAME AS TCB770	Bonso			3	TR mounting	
29	BUSH NLLON66+GRASS 15%	SAME AS TCB770	Yisheng			1	For TR	
30	ANT. TERMINAL SPTe, 0.2t	SAME AS TCB770	DESHAN			1	For Antenna	
31	MICA MICA 0.6t	SAME AS TCB770	Bonso			1	For TR	
32	TX SHIELD CAN(1) SPTe, 0.3t	SAME AS TCB770	DESHAN			1	For Main PCB(location: lower)	
33	TX SHIELD CAN(2) SPTe, 0.3t	SAME AS TCB770	DESHAN			1	For Main PCB(location: upper)	
34	VCO SHIELD CAN SPTe, 0.3t	SAME AS TCB770	DESHAN			1	For Vco	
35	CAP RUBBER 8.0PHI NBR BLACK	NEW	TTI			1		

**** MICROPHONE ASSEMBLY**

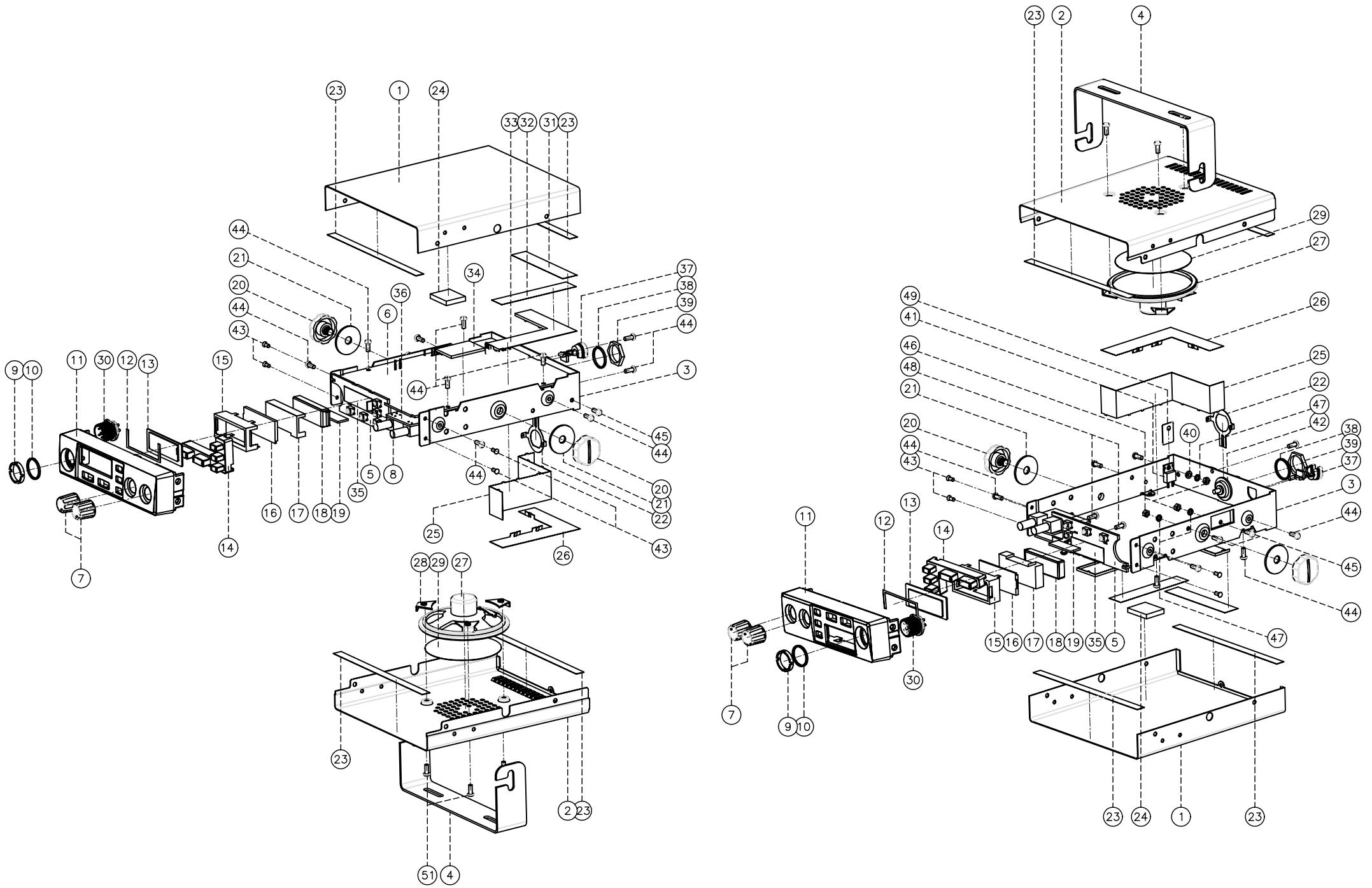
<ELECTRIC>								
1	PCB MIC	EPB0-MIC880-00-00-000				1		
2	Film Resistor 10K 1/8W ±5%	10K				1		
3	Capacitor 103P ±10% 0603	103P				1		
4	Sw Push	SKPS-2210C				1		
5	Sw Tact	SKTS-1102A				3		
6	MIC Condensor 4.5V 2.2K -44db ±2db	PF0-9765P-LP				1		
7	Curl Code	5CORD 1SIELD	FINE	FINE		1		
8	MIC Connector	HS6-TTI 16-6P	HYESUNG			1		
9	LEAD WIRE BLK 3:3 65m AWG28/1571					2		
10	LEAD WIRE RED 3:3 65m AWG28/1571					2		

ITEM	NAME & DESCRIPTION	VENDOE CODE	MAKER	VENDOR	ASS'Y	Q'ty	Location NO	REMARKS
<MECHANICAL>								
1	BOTTOM COVER ABS, BLACK	PBOT130000-003	YiSheng			1		
2	UPPER COVER ABS, BLACK	PTOP130000-003	YiSheng			1		
3	DECO ABS, SILVER	PDEC130000-003	YiSheng			1		
4	PUSH LEVER ABS, BLACK	PPUL130000-003	YiSheng			1		
5	KNOB ABS, BLACK	PKNB130000-003	YiSheng			3		
6	HOLDER PC, BLACK	PHOL130000-003	YiSheng			1		
7	SPK HOLDER RUBBER, BLACK	AHOS880770-003	Longshenda			1		
8	MIC BUSHING RUBBER, BLACK	AMIB880770-003	Longshenda			1		
9	CUSHION SPK 20*24*8.0t(One side double tape), EVA sponge, Black		BONSO			1		
10	MIC SPONGE 30*7*3t(No tape), EVA sponge, Black		BONSO			1		
11	SHRINKAGE TUBE D3x50mm BLACK		BONSO			1		
11	SCREW TAP(+) 2.6*16L-2S, Black, PH		BONSO			4		
12	SCREW TAP(+) 2.6*10L-2S, Black, BH		BONSO			1		
13	Logo label PE, 34.6*6.6*0.3T		BONSO			1		
14	Name label PE, 22*12*0.2T		BONSO			1		
<PACKING>								
1	POLYBAG PE 100 * 900 * 0.05T		BONSO			1		

* ACCESSORY								
1	BRACKET SET		DESHAN			1		
2	STUD BOLT ABS, M6*8L, BLACK	same as TCB880	Yisheng			2		
3	BRACKET(MIC) SUS304, 1.0t	same as TCB880	DESHAN			1		
4	PACKING RUBBER PACKING RUBBER	same as TCB880	Union			2		
5	SCREW Mach(+) M3*8L, Taptite, Black, B	same as TCB880	Bonso			2		
6	SCREW TAP(+) 5*12L-1S, ZN PLATING, T	same as TCB880	Bonso			3		
7	STAR WASHER-S M3, NI PLATING, B type	same as TCB880	Bonso			2		
8	STAR WASHER-L M5, NI PLATING, B type	same as TCB880	Bonso			3		
9	POWER CODE	UL1015#20 RED, BLACK CABLE	2POS HOUSING TO TERMINAL CABLE	PAN-ASIA	PAN-ASIA	1		

* PACKING ASS'Y								
1	OWNER'S MANUAL		Bonso			1		
2	GIFTBOX SW1E 2.0T		Bonso			1		
3	INNER BOX A SW1E 2.0T, BROWN		Bonso			1		
4	INNER BOX B SW1E 2.0T, BROWN		Bonso			1		
5	WARNING LABEL		Bonso			1		
6	CODE 39 SERIAL NO. STICKER		Bonso			2		
7	NAME LABEL							
8	OUT BOX DW1E 7.0T		Bonso			0.1		
9	SILICA-GEL 1g		Bonso			1		
10	ROHS STICKER		Bonso			1.1		
11	OPP TAPE 50MM		Bonso			0.292		
12	YELLOW STRAP	13mm * 2	Bonso			0.0052		

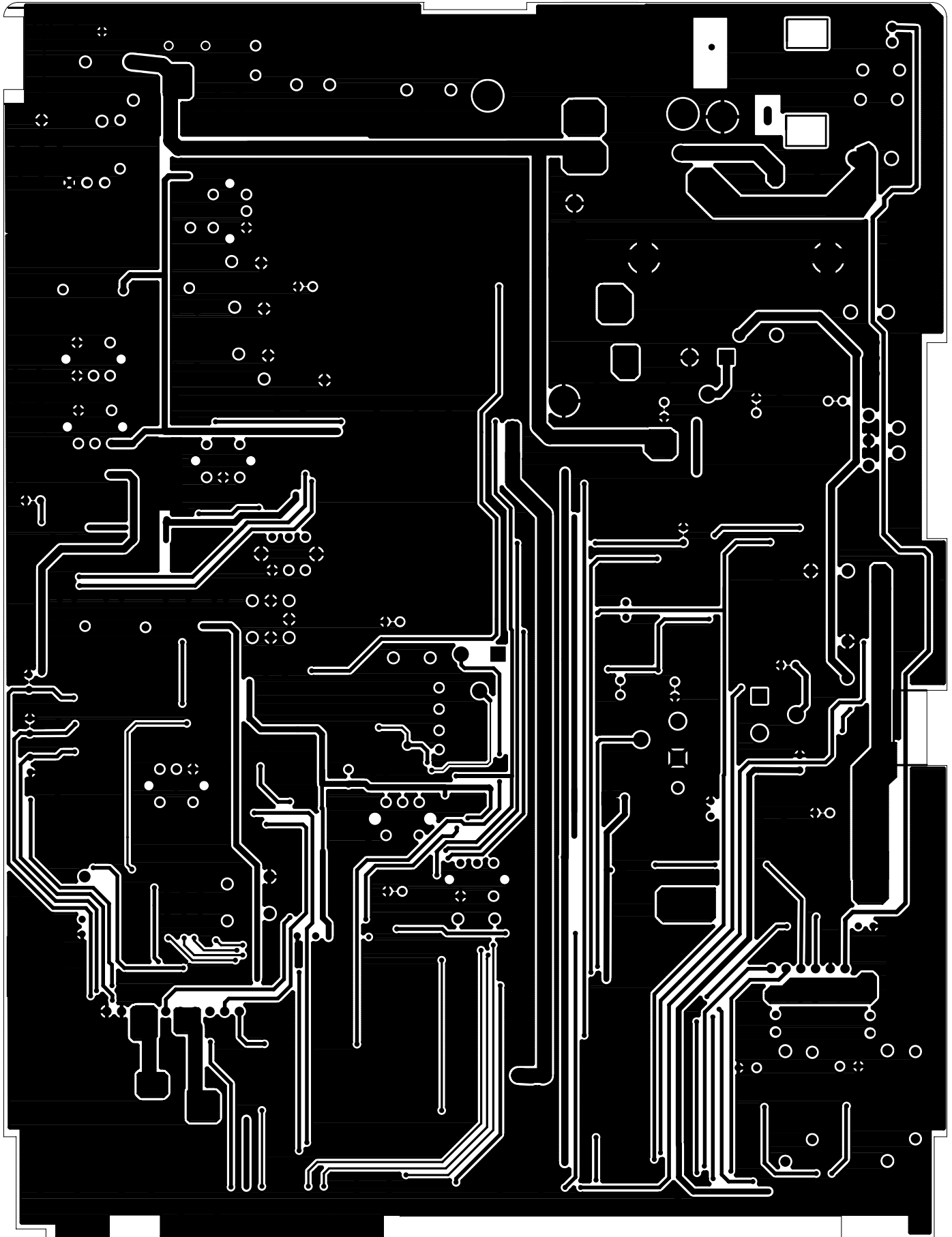
SECTION 4 MECHANICAL DISASSEMBLY



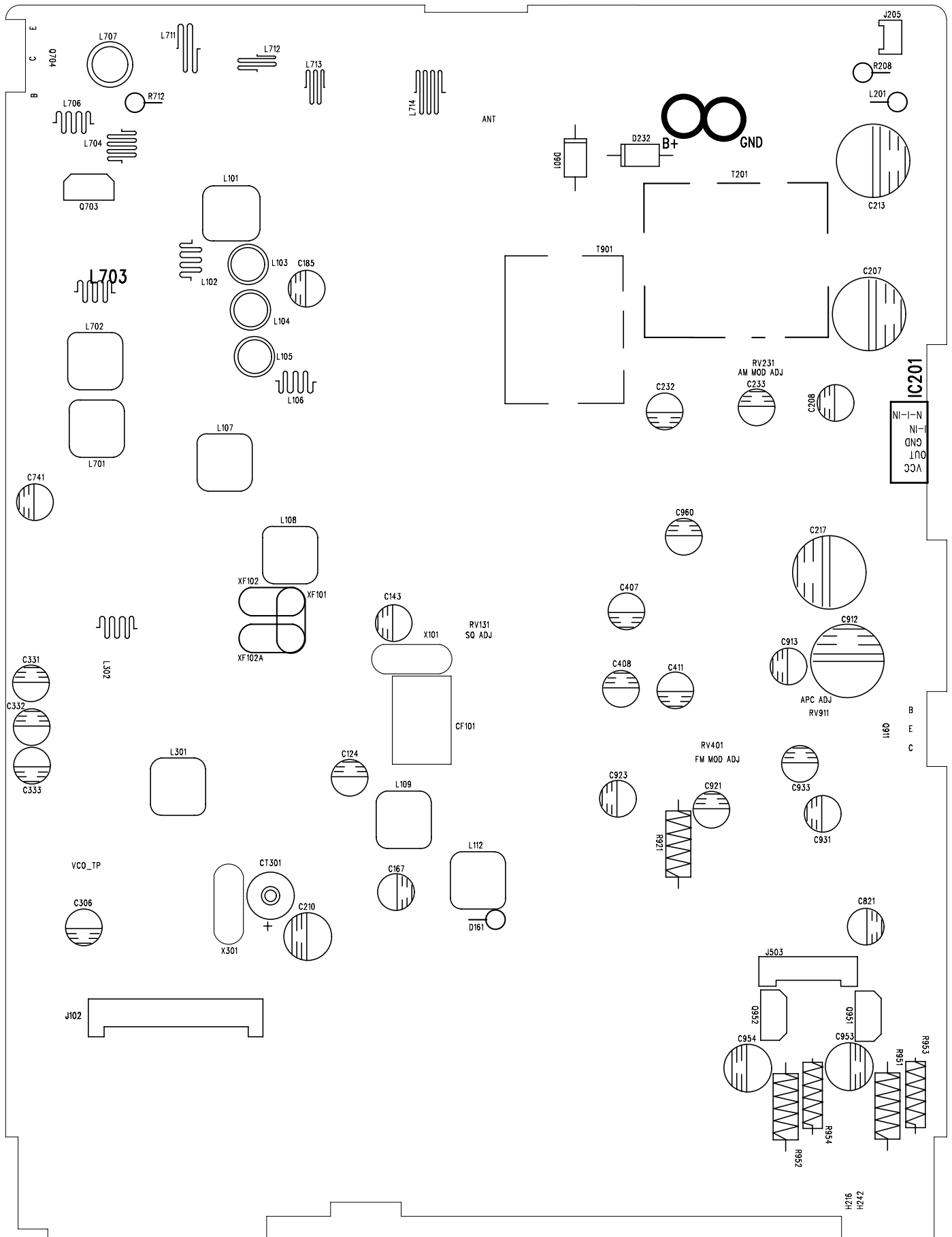
NO	PART NAME	DESCRIPTION	QTY	REMARK
1	Upper cover	SPC 0.75t, Black	1	
2	Bottom cover	SPC 0.75t, Black	1	
3	Main body	EGI, 1.0t	1	
4	Bracket(Set)	SPC 1.6t, Blacke	1	
5	Key PCB	1.6t	1	
6	Main PCB	1.6t	1	
7	Ch knob	ABS, Black	2	
8	LED PCB	1.0t	1	
9	Nut for Mic connector		1	
10	Washer for Mic connector		1	
11	Escutcheon	ABS, Black	1	
12	Double tape(Window)	0.16t	1	
13	Window	Acryl	1	
14	Key pad	Silicone, PU coating	1	
15	LCD Bracket	SPTE, 0.3t	1	
16	LCD		1	
17	Diffuser Lens	Acryl	1	
18	Reflector	Acryl	1	
19	Zebra	Silicone	1	
20	Stud bolt	ABS, BsBm	2	
21	Packing rubber	NBR	2	
22	Ant terminal	SPTC, 0.2t	1	
23	Felt(Cover)	0.3t	4	
24	Cushion	EVA sponge	1	
25	TX shield can(2)	SPTE, 0.3t	1	
26	Shield cover	SPTE, 0.3t	1	
27	Speaker		1	
28	Bracket(Spk)	EGI, 1.0t	3	
29	Felt(Spk)	Dia 65 x 0.3t	1	
30	Mic connector		1	
31	Cu tape-1	Cu, 49x9x0.1t	1	
32	Cu tape-2	Cu, 77x15x0.1t	1	
33	TX shield can(1)	SPTE, 0.3t	1	
34	VCO shield can	SPTE, 0.3t	1	
35	White sheet	PE, 0.1t	1	
36	S/W PCB	1.6t	1	
37	Cord stopper	PVC	1	
38	Washer for Ant connector		1	
39	Nut for Ant connector		1	
40	Bush	Nylon66xGrass15%	1	For TR
41	TR		2	
42	Ant connector		1	
43	Screw Mach(+)	M2.6x5L, FH	4	For Escutcheon
44	Screw Mach(+)	M3x8L_Taptite, BH	13	For speaker bracket,Main PCB,Cover
45	Screw Mach(+)	M3x10, BH	3	For TR
46	Nut	M3	3	For TR
47	Spring washer	M3	3	For TR
48	Screw Tap(+)	2.6x8L, BH	2	For Key PCB
49	Mica	0.4t	1	

SECTION5 BOARD LAYOUT

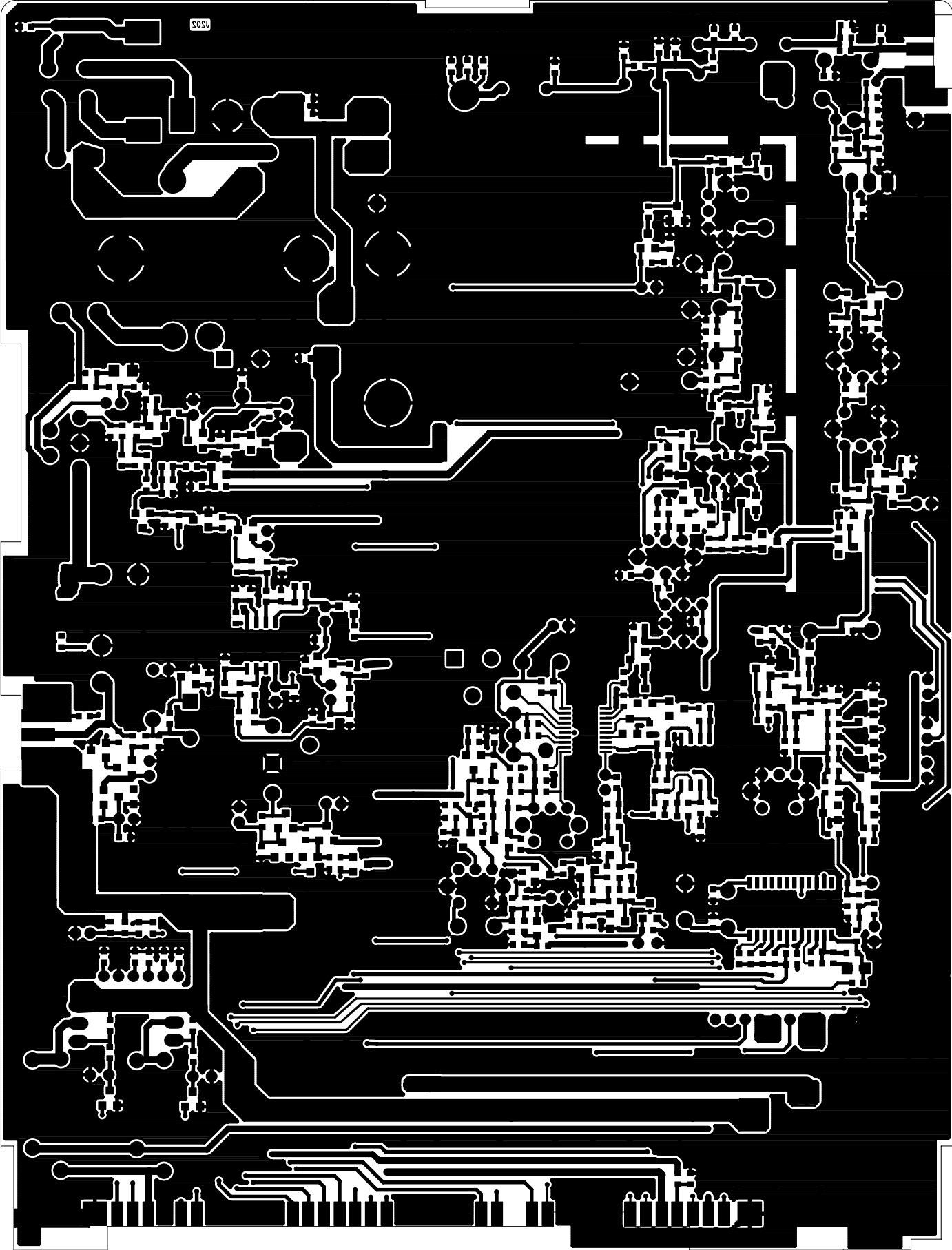
5-1 MainPCB (Top side)



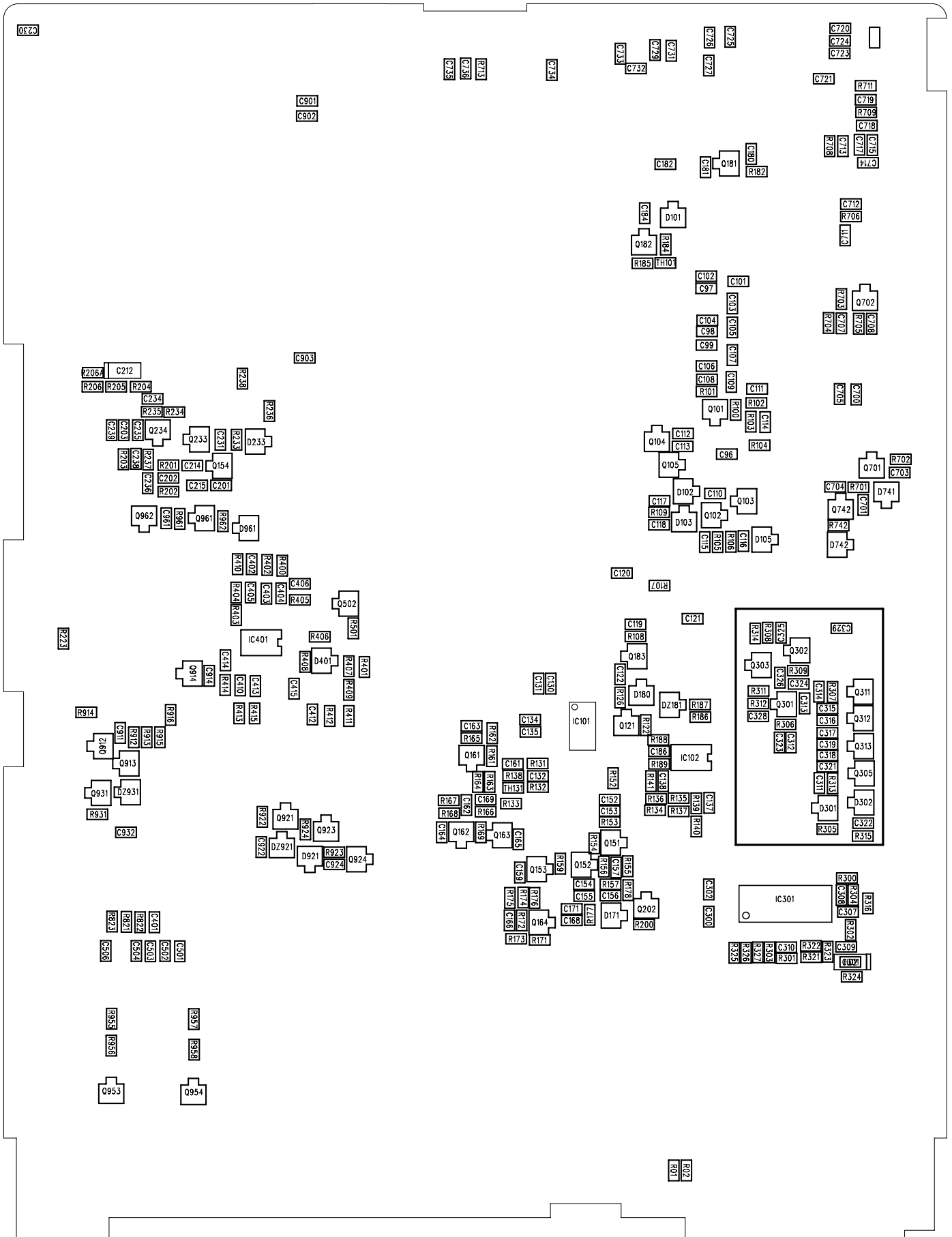
Main PCB (Top Silk)



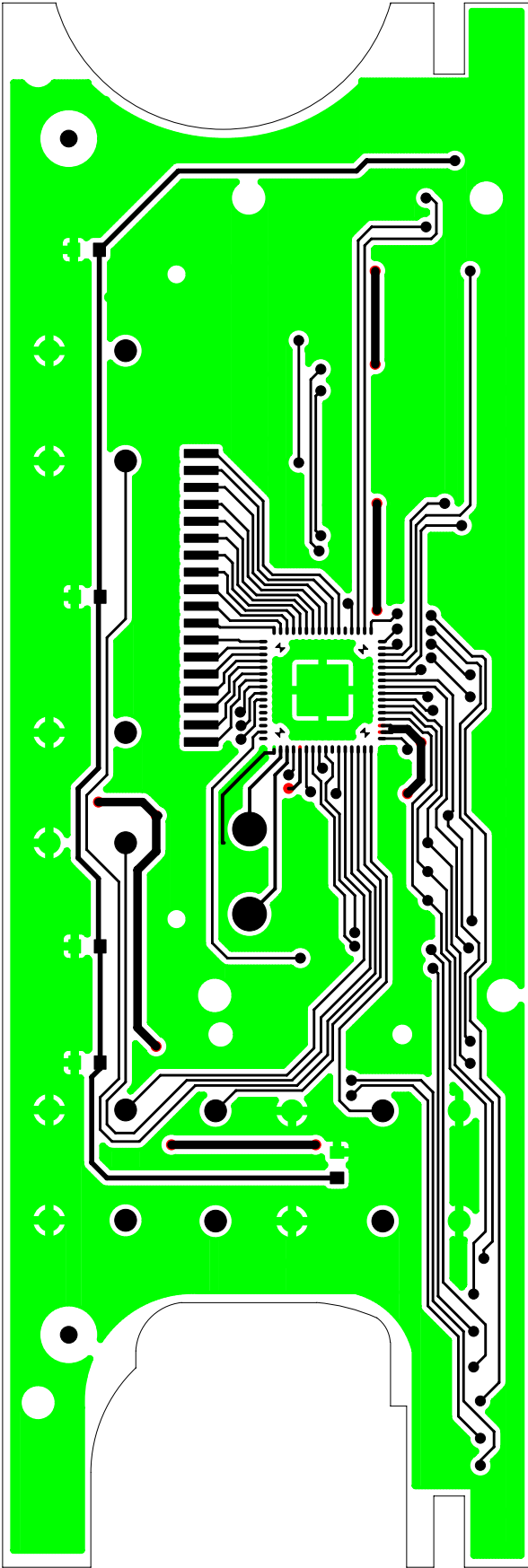
Main PCB (Bottom side)



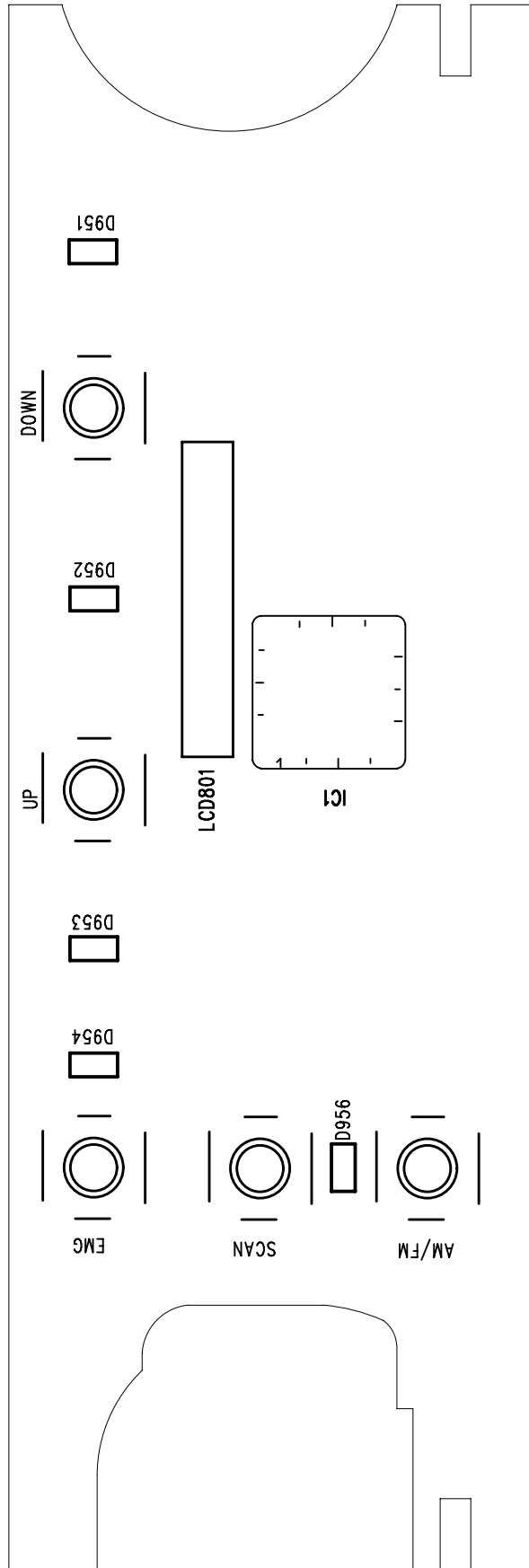
Main PCB (Bottom Silk)



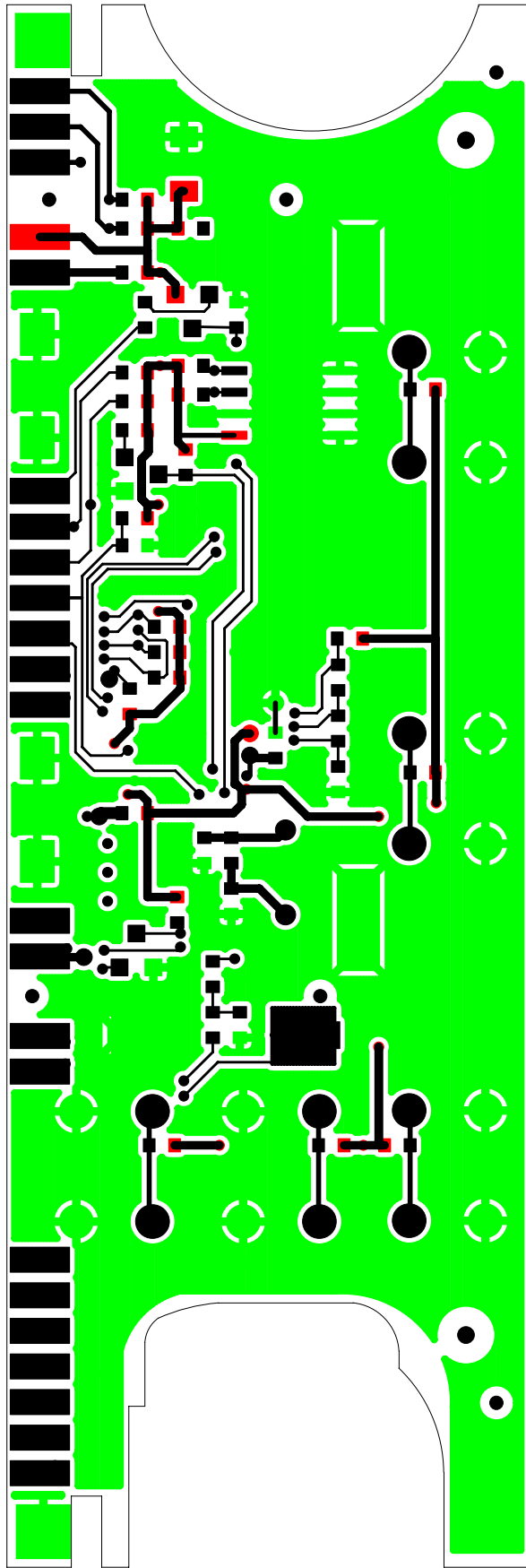
5-2 Front PCB (Top Side)



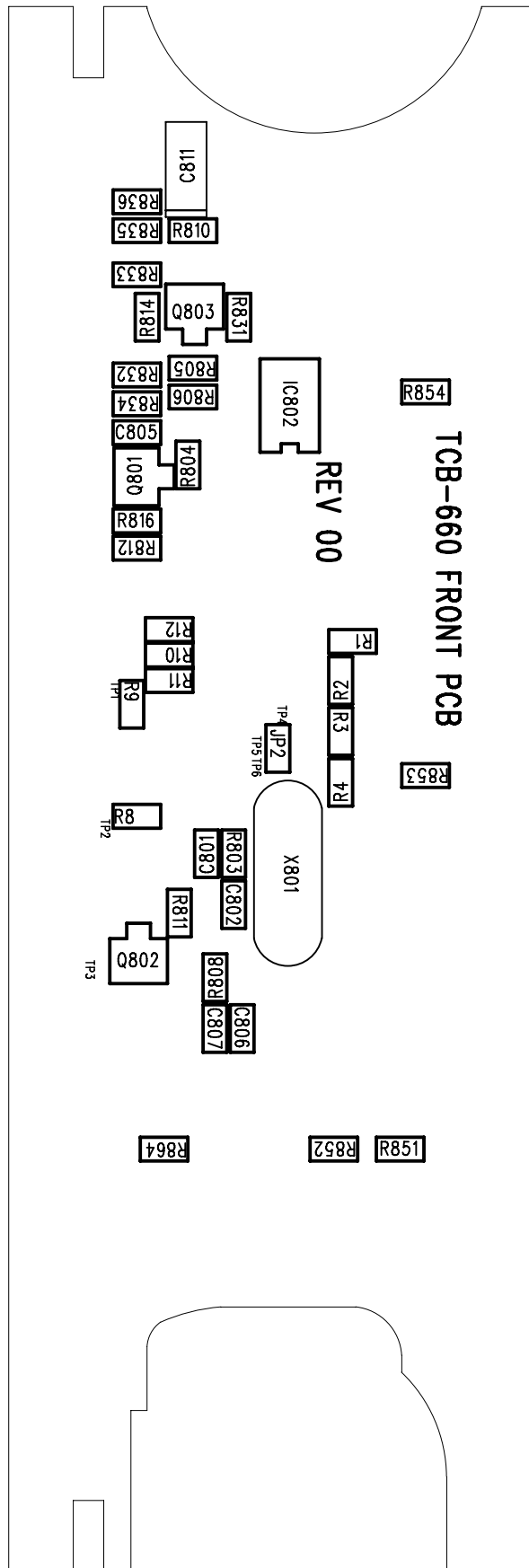
Front PCB (Top Silk)



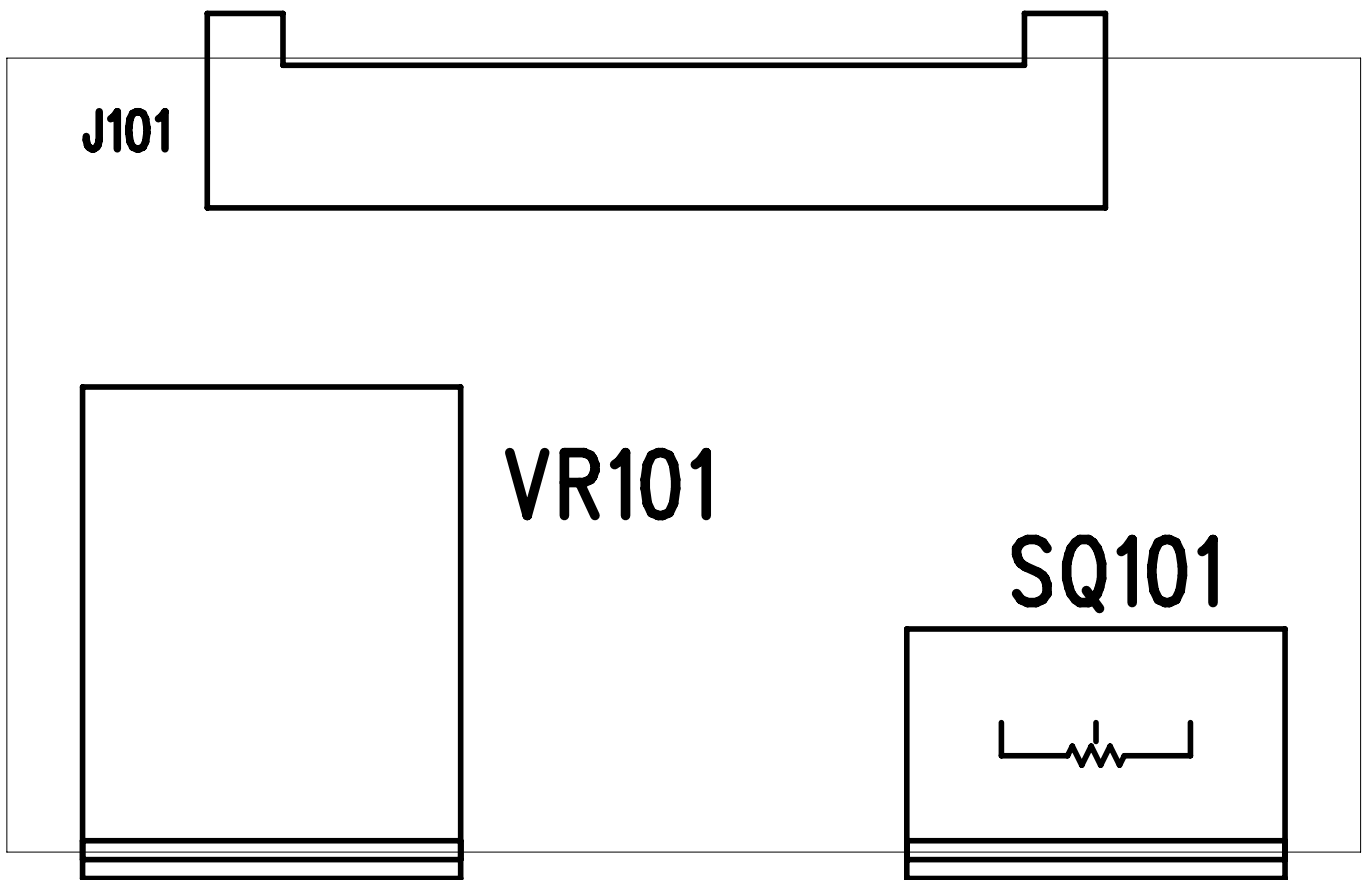
Front PCB (Bottom Side)



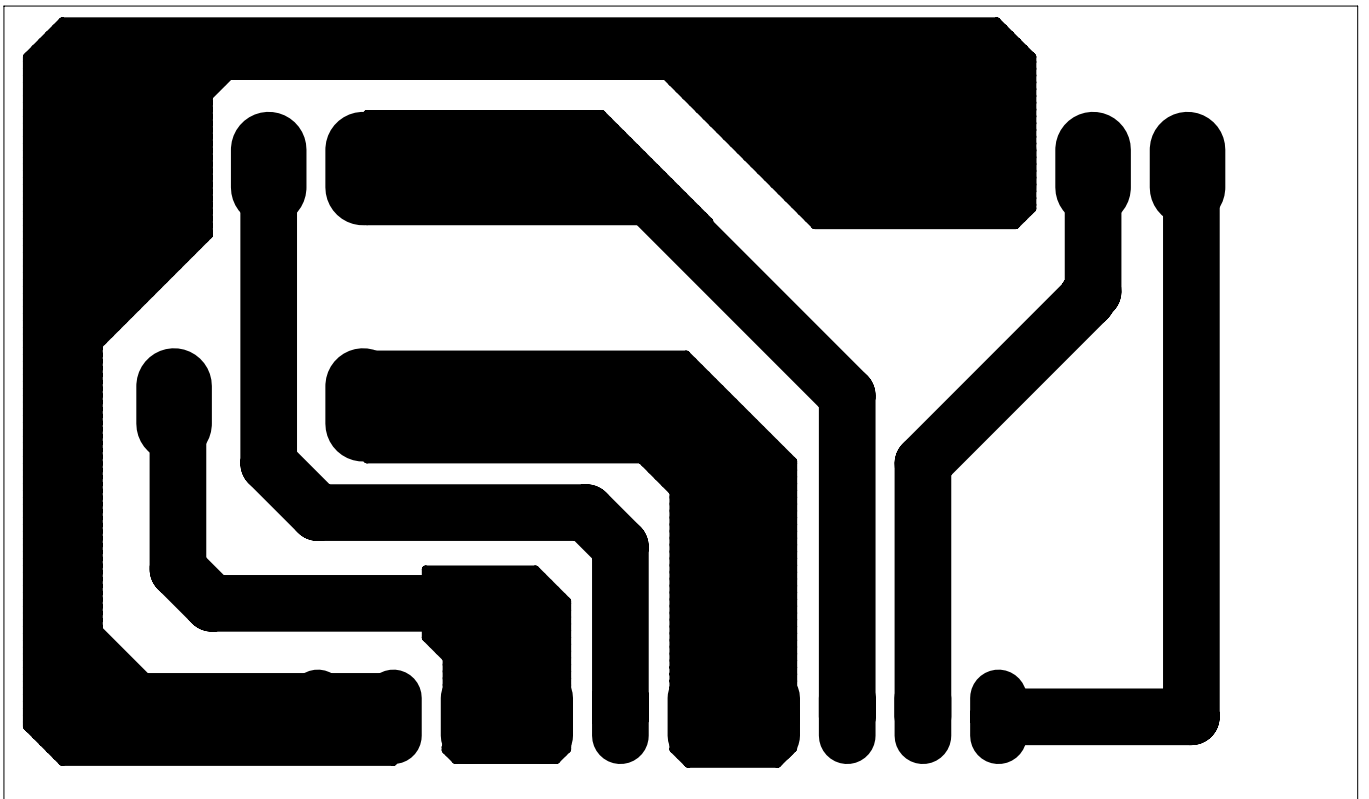
Front PCB (Bottom silk)



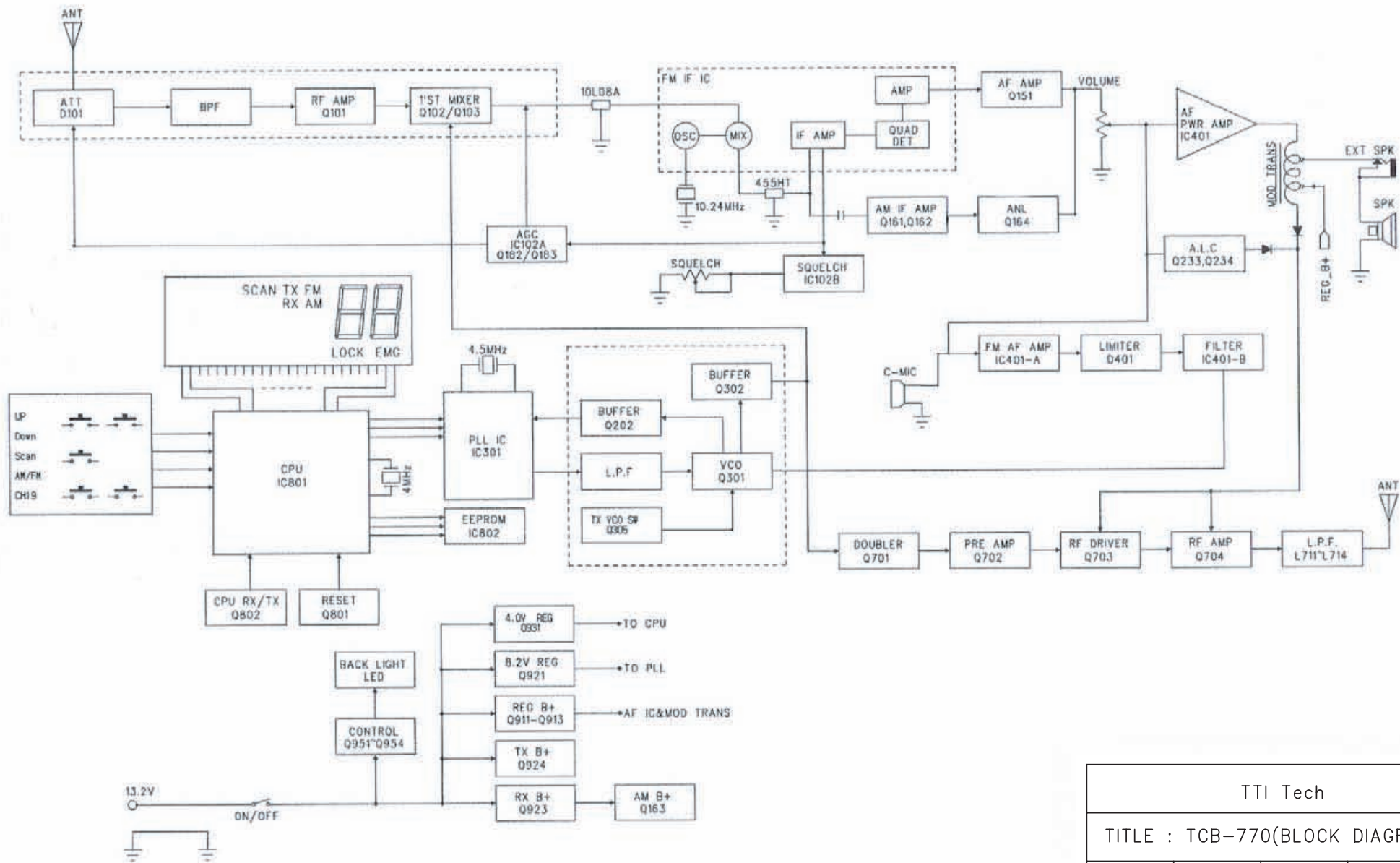
5-3 Volume PCB (Top Side)



Volume PCB (Bottom Side)

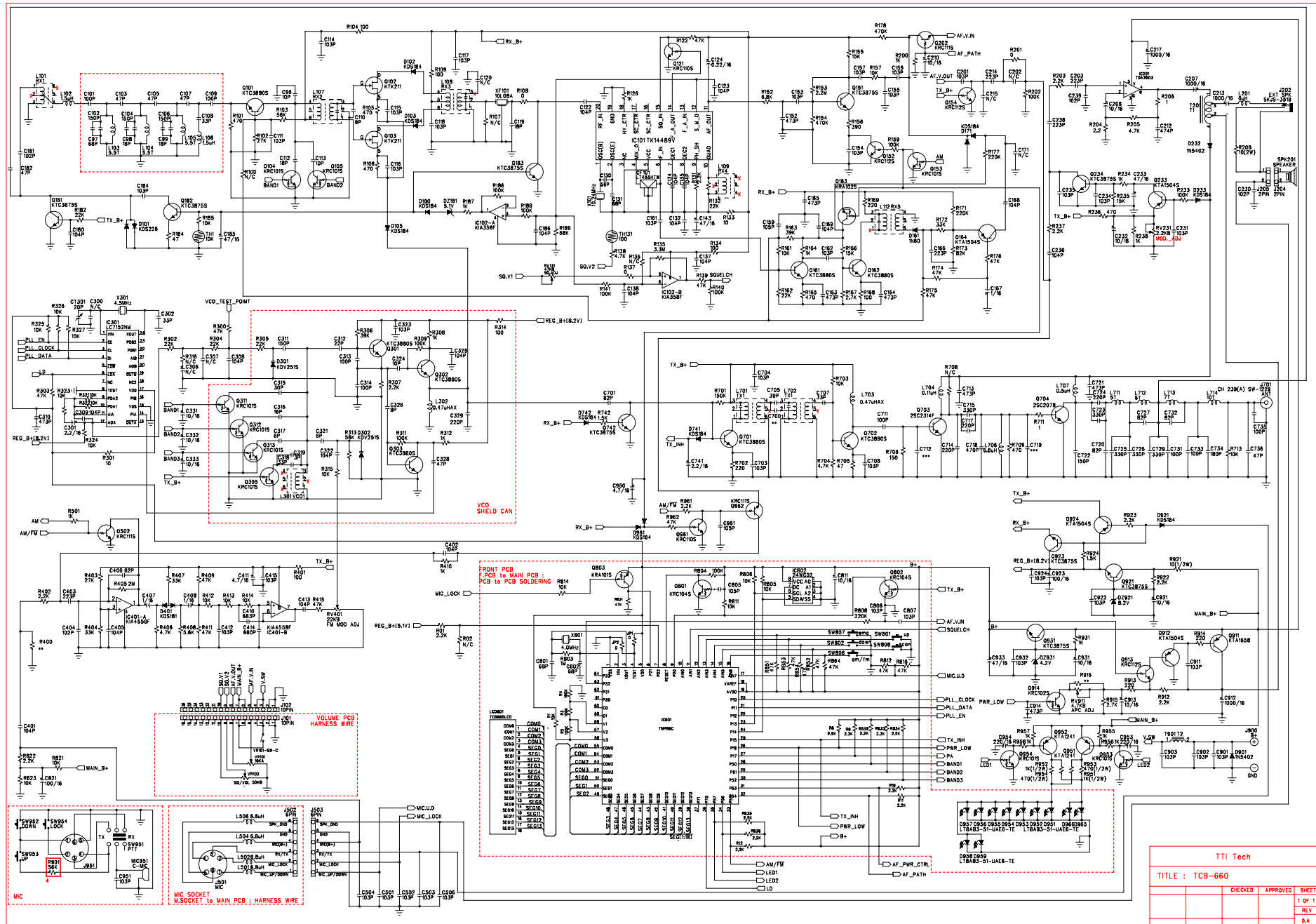


SECTION 6 BLOCK DIAGRAM



TTI Tech				
TITLE : TCB-770(BLOCK DIAGRAM)				
DRAWN	CHECKED	CHECKED	APPROVED	SHEET
				REV
				0.1

SECTION 7 SCHEMATIC



TTI Tech

TITLE : TCB-660

CHECKED	APPROVED	SHEET
		1 OF 1
		REV.
		6.4