TYPE OF EXHIBIT:	TUNE-UP PROCEDURE AND SEMICUNDUCTOR LIST
FCC PART:	2.1033 (c)(9)
MANUFACTURER:	RITRON, INC. 505 West Carmel Drive Carmel, IN 46032
MODEL:	PBS-146D
TYPE OF UNIT:	VHF-FM Base Transceiver
FCC ID:	AIERIT16-146
DATE:	February 4, 2003

Included in this exhibit is the tune-up procedure, parts list and semiconductor function list for the PBS-146D base radio.

The tune-up procedure included in this exhibit is an excerpt of the Maintenance and Operating Manual for RITRON Model Patriot PBS-146D VHF-FM Base Transceiver. The complete Maintenance and Operating Manual is included with this application for Certification as a separate exhibit.

Signed: Kevin G. Matson

Kevin G. Matson - Project Engineer

TYPE OF EXHIBIT: SEMICONDUCTOR FUNCTION

FCC PART: 2.1033 (c) (10)

MANUFACTURER: RITRON, INC.
505 West Carmel Drive
Carmel, IN 46032

MODEL: PBS-146D

TYPE OF UNIT: VHF-FM Base Transceiver

FCC ID: AIERIT16-146

DATE: February 4, 2003

DESCRIPTION:

The following list specifies the manufacturer, identification and function of each semiconductor device used in the PBS-146D base transceiver.

Schem ID	RITRON PN#	Manufacturer	Manufacturer ID	Function
CR1	48A1005C	ON Semiconductors	MMBD7000LT1	Voltage clamp
CR101	48D100A2	M/A Com, Inc.	MA4CP101A	TX/RX switching
CR102	48E1005G	ON Semiconductors	MMBD-352LT1	Voltage clamp
CR201	48D100A2	M/A Com, Inc.	MA4CP101A	TX/RX switching
CR301	48B61012	Philips Semiconductors	BZD27-C12	Over voltage protection
CR303	48A1005B	ON Semiconductors	MMBD6100LT1	Turn-on detection
CR304	48A100A3	ON Semiconductors	MMBD2835LT1	PTT switching
CR307	48AA01SA	General Semiconductors	ASBCS1B	Reverse voltage protection
CR401	48A1005C	ON Semiconductors	MMBD7000LT1	Biasing
CR402	48C10AQ3	Alpha Diode	SMV1236-004	VCO tuning
CR403	48C1004G	ON Semiconductors	MMBV-2101L	VCO modulation
CR404	48A1004D	ON Semiconductors	MMBV3401TI	TX/RX VCO switching
CR501	48A1005C	ON Semiconductors	MMBD7000LT1	Voltage Clamp
CR502	02450101	Panasonic	LN514GK-GREEN	7-segment LED display
Q 1	4841006B	ON Semiconductors	MMBF5484LT1	AGC switch
Q 2	4801001Q	ON Semiconductors	MMBT-5088LT1	AGC audio detection
Q 3	04801042	Microsemi Devices	SD1127	TX Final RF Amplifier
Q 4	482300FF	Philips Semiconductors	BFQ18A	TX Driver RF Amplifier
Q 5	310E0002	National Semiconductors	LP2985AIM5-5.0	+5 VDC voltage regulator
Q 6	482100P2	Philips Semiconductors	BFR92A	TX Pre-Driver Amplifier
Q 7	482100P2	Philips Semiconductors	BFR92A	TX Pre-Driver Amplifier
Q 8	4841006B	ON Semiconductors	MMBF5484LT1	Wide/Narrow Switching
Q 9	48180006	Central Semiconductor	CZT122	Voltage Regulation
Q 101	4801002A	Philips Semiconductors	PMBT3906	RX +V switching
Q 102	482100W2	Philips Semiconductors	PBR951	RX RF amplifier
Q 104	4821003B	Motorola Semiconductors	MMBT918LT1	RX IF amplifier
Q 105	4821003B	Motorola Semiconductors	MMBT918LT1	RX 1st LO multiplier/amp
Q 106	480A0001	Rohm Electronics	UMZ1NTR	Biased noise detector
Q 201	48130001	Central Semiconductor	CBCX69	TX +V switching
Q 202	4801001Q	ON Semiconductors	MMBT-5088LT1	TX +V switching
Q 301	48010A8A	ON Semiconductors	MMUN2211T1	PTT detection
Q 302	4801002A	Philips Semiconductors	PMBT3906	PTT detection
Q 303	4801001Q	ON Semiconductors	MMBT-5088LT1	+V switching

Schem	RITRON		Manufacturer	

ID	PN#	Manufacturer	ID	Function
Q 304	480100DH	ON Semiconductors	BCW68GLT1	+V switching
Q 307	48010A8A	ON Semiconductors	MMUN2211T1	Audio amplifier enable
Q 308	480100DH	ON Semiconductors	BCW68GLT1	Audio amplifier +V switching
Q 401	482100P2	Philips Semiconductors	BFR92A	VCO buffer amplifier
Q 402	482100P2	Philips Semiconductors	BFR92A	VCO buffer amplifier
Q 403	482100P2	Philips Semiconductors	BFR92A	VCO oscillator
Q 404	4801001Q	ON Semiconductors	MMBT-5088LT1	VCO voltage de-coupling
Q 405	48010A6A	ON Semiconductors	MMUN2111LT1	TX/RX VCO switching
Q 406	480A0002	Rohm Electronics	UMG9N	TX/RX VCO switching
Q 501	4821003B	Motorola Semiconductors	MMBT918LT1	Micro clock amplifier
Q 502	480100DH	ON Semiconductors	BCW68GLT1	+5V switching
U1	03131009	National Semiconductors	LM386N-3	Audio Amplifier
U2	3151AAAS	Maxim	MAX2681	Mixer
U 101	31030006	Toshiba	TA31136FN	RX FM-IF subsystem
U 303	310K0004	National Semiconductors	LMV324MT	Audio processing
U 304	311K0001	Philips Components	74LV4066PW	Audio signal switching
U 305	310K0004	National Semiconductors	LMV324MT	Audio processing
U 306	310K0001	Dallas Semiconductor	DS1806E	Audio signal level control
U 308	310K0002	Maxim Integrated Products	MAX7410CUA	Tone low pass filter
U 401	313K0006	National Semiconductors	LMX2306TM	Frequency synthesizer
U 501	314L0003	Motorola Semiconductors	MC68HC908GR8FA	Microcontroller
U 502	31210005	Atmel Corporation	AT24C04AN-10SC	EEPROM
U 503	311K0004	Phllips Semiconductors	74HC595	Audio process switching
U 504	31120003	Philips Semiconductors	74HC164PW	7-segment LED driver

WARNING!

An authorized RF service technician must perform test and alignment of the PBS-146D. Do not attempt service of the PBS-146D if not completely familiar with the operation of frequency synthesized radio operation. The PBS-146D can operate in both Narrow Band (2.5 KHz deviation) and Wide Band (5 KHz deviation) systems.

RECOMMENDED TEST EQUIPMENT

1) 0 to +15 VDC, 2A current-limited power supply
2) RF Communications Test Set (to 165 MHz) with:
   - FM Deviation Meter
   - RF Wattmeter
   - Frequency Counter (to 165 MHz)
   - SINAD Measuring Device
3) Oscilloscope (to 20 MHz)
4) VTVM or DMM
5) RITRON PC Programming Kit

RADIO PREPARATION

1) Connect the RPS-1A wall mounted power supply to the PBS-146D.
2) Connect the serial programming cable from the PC computer (with the RITRON PC programming kit software installed) to the 3.5mm audio accessory jack.
3) Remove the PBS-146D antenna and connect the FM communications test set to the BNC antenna connector.
4) Turn on the radio to place it in operating mode.
5) From the PC Programmer on-screen menu, select “Tune Radio” to display the Alignment screen.
6) Set the RF Communications Test set to the Alignment Frequency indicated on the Alignment screen.
7) Press the appropriate “Select” button on the Alignment screen to make the following adjustments:

SELECT	Alignment
Frequency	Transmit frequency
Mod Bal	Modulation balance
Tone	QC/DQC tone encode deviation wide and narrow band
Voice	Voice deviation with no tone wide and narrow band
	Voice deviation with tone wide and narrow band

8) After you have completed alignment of the PBS-146D, turn the radio off. This will remove the test frequencies and return to operation on the customer’s programmed frequencies.

REFERENCE FREQUENCY

1) Make sure the unit has been switched on and is at room temperature (approximately +25° C)
2) Select “Frequency” from the PC Programmer “Alignment” screen.
3) Set the RF communications test set to the Alignment Frequency on the Alignment screen.
4) Press the “Tune” button on the Alignment screen to activate the transmitter.
5) Transmitter frequency error should be less than +/- 500 Hz.
6) If frequency adjustment is required, press the left arrow on the tuning bar to lower the frequency or the right arrow to raise the frequency.
7) Press the “Save” button to store the new alignment setting or “Cancel” to leave setting unchanged.

MODULATION BALANCE

Transmitter modulation balance has been set at the factory and should not require adjustment.

1) Select “Mod Bal” from the PC Programmer “Alignment” screen.
2) Set the RF communications test set to the Alignment Frequency on the Alignment screen.
3) Press the “Tune” button on the Alignment screen to activate the transmitter.
4) Check the de-modulated waveform for a 20 Hz square wave.
5) If adjustment of the modulation balance is required, press the left arrow on the tuning bar to flatten the top of the waveform or the right arrow to reduce overshoot.
6) Press the “Save” button to store the new alignment setting or “Cancel” to leave setting unchanged.

TRANSMITTER TONE DEVIATION

Transmitter tone deviation has been set at the factory and should not require adjustment.

1) Select “Tone” from the PC Programmer “Alignment” screen.
2) Set the RF communications test set to the transmit frequency on the screen.
3) Select either “Wide Band” or “Narrow Band” by pressing the desired option button.
4) Press the “Tune” button on the Alignment screen to activate the transmitter.
5) If adjustment of the tone deviation is required, press the left arrow on the tuning bar to lower deviation or the right arrow to raise deviation.
6) Press the “Save” button to store the new alignment setting or “Cancel” to leave setting unchanged.

TRANSMITTER VOICE DEVIATION

Transmitter voice deviation has been set at the factory and should not require adjustment.

1) Select “Voice” from the PC Programmer “Alignment” screen.
2) Set the RF communications test set to the transmit frequency on the screen.
3) Select “Voice Only - Wide Band“, “Voice Only - Narrow Band”, “Voice & Tone – Wide Band”, or “Voice & Tone – Narrow Band” by pressing the desired option button.
4) Press the “Tune” button on the Alignment screen to activate the transmitter.
5) If adjustment of the voice deviation is required, press the left arrow on the tuning bar to lower deviation or the right arrow to raise deviation.
6) Press the “Save” button to store the new alignment setting or “Cancel” to leave setting unchanged.

RECEIVER SENSITIVITY

The PBS-146D receiver is factory tuned for a frequency range of 150 - 162 MHz. There are no adjustments for receiver sensitivity.

1) Program the radio to a receive frequency in the middle of the desired band.
2) Disconnect the programming cable from the audio accessory jack and connect an 8-Ohm speaker.
3) Set the RF Communications Test Set’s generator to the programmed receive frequency at a RF level of –120 dB. Modulate the RF signal with a 1 kHz tone at 3 kHz deviation for wide band, 1.5 kHz deviation for low band.
4) Check receiver sensitivity for the best receiver SINAD as measured across the 8-Ohm speaker.

RECEIVER NOISE SQUELCH

The noise squelch sensitivity is set at the factory for a 12dB SINAD signal at a “Squelch Tightener” number of 0. Using the PC Programmer, squelch sensitivity can be adjusted on a per channel basis by adjusting the “Squelch Tightener” number to between –2 and 5. The higher number will require a stronger received signal to open squelch.

1) Select “Channel” from the PC Programmer “Edit” menu on the main screen.
2) Select the channel to be set and press “Edit” button.
3) Set the RF communications test set to the transmit frequency on the screen.
4) Enter a Squelch Tightener number between –2 and 5.
5) Press the “OK” button on the Channel Edit screen to return to the Channel List screen.
6) Select any other channels to be set.
7) Press the “OK” button on the Channel List screen to return to the Main screen.
8) Select “Program Radio” from the PC Programmer “Radio” menu to save all setting changes.

SYNTHESIZER

The synthesizer is preset at the factory for operation between 150 and 162 MHz. There is no manual adjustment to center the control voltage, with all adjustment performed by the factory selection of fixed capacitor C424. Do not attempt to adjust the synthesizer control unless a key component in the synthesizer has been replaced. Key components do not include the Y302 reference frequency TCVCXO or U401 synthesizer IC. Synthesizer alignment errors cause poor operation at temperature extremes.

Should adjustment of the VCO control voltage be necessary, the radio must first be disassembled and powered up at 13 VDC. The following procedure defines testing of the VCO control voltage:

1) Select the channel that has the lowest receive frequency.

2) Connect a VTVM, DVM or oscilloscope to Test Point 1 and measure the VCO control voltage. This voltage should be no less than 1.0 VDC.

3) Select the channel that has the highest receive frequency and measure Test Point 1. The control voltage should be no higher than 4.0 VDC.

4) a) If adjustment of the VCO control voltage is required, remove the synthesizer shield top.

   b) Replace C424 with a capacitor value that allows VCO control voltages between 1.0 and 4.0 VDC for the operating frequencies desired. Decreasing the value of C424 will raise the operating frequency of the VCO while increasing the value will lower the VCO frequency.

   c) Replace the top of the synthesizer shield.

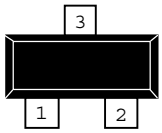
Measurement Conditions

Supply voltage at 13 VDC, radio in operating mode, volume control at minimum, power strobe enabled, transmitter set for full power.

IMPORTANT: Because the PBS-146D base station is constructed with grounding sub-planes, use a system ground in the same proximity as the circuit being measured. All readings indicated as GND are true system ground.

KEY: All measurements are in VDC unless indicated otherwise.

NC = No connection
GND = Ground
* = Voltage is strobed in Power Saver mode
→ = See note in right column



SOT-23

REF	PIN	TX	RX	SB	DESCRIPTION
CR1	1	GND	GND	GND	Voltage clamp
	2	NC	NC	NC	
	3	0.7	0.7	*	
CR101	1	0.7	0.0	0.0	TX/RX switching
	2	NC	NC	NC	
	3	GND	GND	GND	
CR102	1	GND	GND	GND	Voltage clamp
	2	GND	GND	GND	
	3	0.0	0.0	*	
CR201	1	1.4	0.0	0.0	TX/RX switching
	2	NC	NC	NC	
	3	0.7	0.0	0.0	
CR301	C	12.0	12.0	12.0	Over voltage protection
	A	GND	GND	GND	
CR303	1	11.2	11.2	11.2	Turn-on detection
	2	3.0	3.0	3.0	
	3	11.0	11.0	11.0	
CR304	1	1.4	4.6	4.6	PTT switching
	2	1.6	4.6	4.6	
	3	1.8	5.0	5.0	
CR307	C	12.0	12.0	12.0	Reverse volt protection
	A	0.0	→	*	→ RX audio amp out
CR401	1	5.0	5.0	*	Biasing
	2	4.8	4.8	*	
	3	NC	NC	NC	
CR402	C	→	→	*	VCO tuning
	A	GND	GND	GND	→ 1.5 to 4.0 VDC VCO tuning voltage
CR403	1	GND	GND	GND	VCO modulation
	2	NC	NC	NC	
	3	2.4	2.4	*	
CR404	1	0.8	0.0	*	TX/RX VCO switching
	2	NC	NC	NC	
	3	0.0	4.8	*	

REF	PIN	TX	RX	SB	DESCRIPTION
CR501	1	GND	GND	GND	Voltage clamp
	2	5.0	5.0	5.0	
	3	0.0	0.0	0.0	
CR502	1	5.0	5.0	5.0	7-Segment LED (all segments lit)
	2	5.0	5.0	5.0	
	3	GND	GND	GND	
	4	NC	NC	NC	
	5	NC	NC	NC	
	6	5.0	5.0	5.0	
	7	5.0	5.0	5.0	
	8	5.0	5.0	5.0	
	9	NC	NC	NC	
	10	5.0	5.0	5.0	
	11	5.0	5.0	5.0	
	12	NC	NC	NC	
	13	5.0	5.0	5.0	
	14	GND	GND	GND	
U1	1	0.0	1.4	0.0	Audio amplifier
	2	0.0	0.0	0.0	
	3	GND	GND	GND	
	4	GND	GND	GND	
	5	0.0	5.0	0.0	
	6	0.0	11.5	0.0	
	7	0.0	5.5	0.0	
	8	0.0	1.4	0.0	
U2	1	0.0	4.3	4.3	RX Mixer
	2	0.0	0.0	0.0	
	3	0.0	1.6	1.6	
	4	0.0	5.0	5.0	
	5	0.0	5.0	5.0	
	6	NC	NC	NC	
U101	1	0.0	4.7	*	RX FM-IF subsystem
	2	NC	NC	NC	
	3	0.0	3.5	*	
	4	0.0	4.7	*	
	5	0.0	4.4	*	
	6	0.0	4.4	*	
	7	0.0	0.7	*	
	8	0.0	0.6	*	
	9	0.0	→	*	→ 0.8 VDC with RX audio
	10	0.0	4.7	*	
	11	0.0	3.9	*	
	12	NC	NC	NC	
	13	NC	NC	NC	
	14	0.0	0.8	*	
	15	GND	GND	GND	
	16	0.0	0.9	*	
U501	1	5.0	5.0	5.0	Microcontroller
	2	5.0	0.0	0.0	
	3	0.0	0.0	0.0	
	4	0.0	5.0	5.0	
	5	5.0	5.0	5.0	
	6	0.0	0.0	0.0	
	7	5.0	5.0	*	
	8	5.0	5.0	*	
	9	GND	GND	GND	
	10	5.0	5.0	5.0	
	11	0.0	0.0	0.0	
	12	2.5	2.5	*	
	13	→	2.5	*	→ 0-5 VDC tone encode waveform
	14	5.0	5.0	5.0	
	15	0.0	0.0	0.0	
	16	5.0	0.0	0.0	
	17	3.7	3.7	3.7	
	18	2.5	2.5	*	

REF	PIN	TX	RX	SB	DESCRIPTION
U501	19	0.0	1.8	*	Microcontroller
	20	5.0	5.0	5.0	
	21	GND	GND	GND	
	22	0.0	0.0	0.0	
	23	0.0	0.0	0.0	
	24	0.0	0.0	*	
	25	5.0	5.0	5.0	
	26	5.0	0.0	5.0	
	27	0.0	0.0	0.0	
	28	5.0	5.0	5.0	
	29	GND	GND	GND	
	30	NC	NC	NC	
	31	NC	NC	NC	
	32	→	→	→	→ 14.4 MHz clock
U502	1	GND	GND	GND	EEPROM
	2	GND	GND	GND	
	3	GND	GND	GND	
	4	GND	GND	GND	
	5	5.0	5.0	*	
	6	0.0	0.0	0.0	
	7	GND	GND	GND	
	8	5.0	5.0	5.0	
U503	1	0.0	0.0	0.0	Audio gate control
	2	0.0	0.0	0.0	
	3	5.0	0.0	0.0	
	4	0.0	5.0	5.0	
	5	0.0	5.0	5.0	
	6	5.0	0.0	0.0	
	7	GND	GND	GND	
	8	0.0	0.0	0.0	
	9	5.0	5.0	5.0	
	10	0.0	5.0	5.0	
	11	0.0	0.0	0.0	
	12	0.0	0.0	0.0	
	13	0.0	0.0	0.0	
	14	5.0	5.0	5.0	
U504	1	0.0	0.0	0.0	7-Segment LED driver
	2	0.0	0.0	0.0	(all segments lit)
	3	5.0	5.0	5.0	
	4	5.0	5.0	5.0	
	5	5.0	5.0	5.0	
	6	5.0	5.0	5.0	
	7	GND	GND	GND	
	8	0.0	0.0	0.0	
	9	5.0	5.0	5.0	
	10	5.0	5.0	5.0	
	11	5.0	5.0	5.0	
	12	5.0	5.0	5.0	
	13	5.0	5.0	5.0	
	14	5.0	5.0	5.0	
U303	1	2.5	2.5	*	Audio processing
	2	2.5	2.5	*	
	3	2.5	2.5	*	
	4	5.0	5.0	*	
	5	2.5	2.5	*	
	6	2.5	2.5	*	
	7	2.5	2.5	*	
	8	2.5	2.5	*	
	9	2.5	2.5	*	
	10	2.5	2.5	*	
	11	GND	GND	GND	
	12	2.5	2.5	*	
	13	2.5	2.5	*	
	14	2.5	2.5	*	

REF	PIN	TX	RX	SB	DESCRIPTION
U304	1	2.5	2.5	*	Audio signal switching
	2	0.0	2.5	*	
	3	2.5	5.0	*	Audio signal switching
	4	2.5	2.5	*	
	5	5.0	0.0	*	
	6	5.0	0.0	*	
	7	GND	GND	GND	
	8	2.5	2.5	*	
	9	2.5	2.5	*	
	10	2.5	2.5	*	
	11	2.5	2.5	*	
	12	0.0	5.0	*	
	13	0.0	5.0	*	
	14	5.0	5.0	5.0	
U305	1	2.5	2.5	*	Audio processing
	2	2.5	2.5	*	
	3	2.5	2.5	*	
	4	5.0	5.0	*	
	5	2.5	2.5	*	
	6	2.5	2.5	*	
	7	2.5	2.5	*	
	8	2.5	2.5	*	
	9	2.5	2.5	*	
	10	2.5	2.5	*	
	11	GND	GND	GND	
	12	2.5	2.5	*	
	13	2.5	2.5	*	
	14	2.5	2.5	*	
U306	1	2.8	2.8	*	Audio signal level
	2	NC	NC	NC	control
	3	GND	GND	GND	
	4	0.0	0.0	*	
	5	2.5	2.5	*	
	6	2.5	2.5	*	
	7	2.5	2.5	*	
	8	0.0	0.0	*	
	9	5.0	5.0	*	
	10	GND	GND	GND	
	11	NC	NC	NC	
	12	5.0	5.0	*	
	13	2.4	2.4	*	
	14	2.4	2.4	*	
	15	2.5	2.5	*	
	16	2.4	2.4	*	
	17	0.0	0.0	*	
	18	NC	NC	NC	
	19	5.0	5.0	*	
	20	5.0	5.0	*	
U308	1	2.5	2.5	*	Tone low pass filter
	2	2.5	2.5	*	
	3	GND	GND	GND	
	4	5.0	5.0	*	
	5	2.5	2.5	*	
	6	2.5	2.5	*	
	7	5.0	5.0	*	
	8	3.2	3.2	*	
U401	1	0.0	0.0	*	
	2	→	→	*	→ 1.5 to 4.0 VDC VCO tuning voltage
	3	GND	GND	GND	
	4	GND	GND	GND	
	5	1.5	1.5	*	
	6	1.5	1.5	*	
	7	5.0	5.0	5.0	
	8	2.2→	2.2→	*	→ 14.4 MHz reference
	9	GND	GND	GN	
	10	5.0	5.0	*	

REF	PIN	TX	RX	SB	DESCRIPTION
U401	11	5.0	5.0	*	
	12	5.0	5.0	*	
	13	5.0	5.0	5.0	
	14	5.0	5.0	*	
	15	5.0	5.0	5.0	
	16	5.0	5.0	5.0	
Q 1	1	0.7	0.7	*	AGC switch
	2	GND	GND	GND	
	3	2.5	2.5	*	
Q 2	1	5.0	5.0	*	AGC audio detection
	2	2.0	2.0	*	
	3	2.5	2.5	*	
Q 3	1	0.7	0.0	0.0	TX Final RF amplifier
	2	GND	GND	GND	
	3	11.8	0.0	0.0	
Q 4	1	0.7	0.0	0.0	TX RF driver amplifier
	2	GND	GND	GND	
	3	9.0	0.0	0.0	
Q 5	1	11.8	11.8	11.8	+5 VDC voltage regulator
	2	GND	GND	GND	
	3	11.8	11.8	11.8	
	4	0.0	0.0	0.0	
	5	5.0	5.0	5.0	
Q 6	1	0.7	0.0	0.0	TX Pre-Driver amplifier
	2	GND	GND	GND	
	3	9.0	0.0	0.0	
Q 7	1	0.7	0.0	0.0	TX Pre-Driver amplifier
	2	GND	GND	GND	
	3	9.0	0.0	0.0	
Q 8	1	0.0	0.0	2.0	Wide/Narrow Switching
	2	0.0	0.0	5.0	
	3	0.0	0.0	0.0	
Q 9	1	12.0	12.0	12.0	Over voltage protection
	2	13.0	13.0	13.0	
	3	11.8	11.8	11.8	
	4	13.0	13.0	13.0	
Q 101	1	5.0	4.3	*	RX +V switching
	2	5.0	5.0	*	
	3	0.0	4.9	*	
Q 102	1	0.0	0.7	*	RX RF amplifier
	2	GND	GND	GND	
	3	0.0	3.2	*	
Q 104	1	0.0	0.7	*	RX IF amplifier
	2	GND	GND	GND	
	3	0.0	1.2	*	
Q 105	1	0.0	0.7	*	RX 2nd LO multiplier/amp
	2	GND	GND	GND	
	3	0.0	4.4	*	
Q 106	1	0.0	1.4	*	Voltage detection
	2	0.0	2.0	*	
	3	GND	GND	GND	
	4	0.0	1.4	*	
	5	0.0	0.7	*	
	6	0.0	2.0	*	

REF	PIN	TX	RX	SB	DESCRIPTION
Q 201	1	11.0	11.8	11.8	TX +V switching
	2	11.8	11.8	11.8	
	3	9.0	0.0	0.0	
Q 202	1	3.3	0.0	0.0	TX +V switching
	2	4.0	0.0	0.0	
	3	11.0	11.8	11.8	
Q 301	1	5.0	0.0	0.0	PTT detection
	2	GND	GND	GND	
	3	0.0	5.0	5.0	
Q 302	1	4.3	5.0	5.0	PTT detection
	2	5.0	5.0	5.0	
	3	5.0	0.0	0.0	
Q 303	1	5.0	5.0	5.0	Battery +V switching
	2	4.3	4.3	4.3	
	3	11.0	11.0	11.0	
Q 304	1	11.0	11.0	11.0	Battery +V switching
	2	11.8	11.8	11.8	
	3	11.8	11.8	11.8	
Q 307	1	0.0	5.0	0.0	Audio amplifier enable
	2	0.0	4.3	0.0	
	3	7.5	6.8	7.5	
Q 308	1	7.5	6.8	7.5	Audio amplifier +V switching
	2	7.5	7.5	7.5	
	3	0.0	7.5	0.0	
Q 401	1	0.7	0.7	*	VCO buffer amplifier
	2	GND	GND	GND	
	3	2.9	2.9	*	
Q 402	1	0.7	0.7	*	VCO buffer amplifier
	2	GND	GND	GND	
	3	2.8	2.8	*	
Q 403	1	1.5	1.5	*	VCO oscillator
	2	0.9	0.9	*	
	3	3.8	3.8	*	
Q 404	1	4.7	4.7	*	VCO voltage de-coupling
	2	4.3	4.3	*	
	3	5.0	5.0	*	
Q 405	1	0.0	4.3	*	TX/RX VCO switching
	2	4.3	4.3	*	
	3	4.2	0.0	*	
Q 406	1	5.0	0.0	*	TX/RX VCO switching
	2	GND	GND	GND	
	3	0.0	2.2	*	
	4	4.0	0.0	*	
	5	0.0	2.2	*	
Q 501	1	0.7	0.7	0.7	Micro Clock Amplifier
	2	GND	GND	GND	
	3	2.2	2.2	2.2	
Q 502	1	4.3	4.3	5.0	+5V switching
	2	5.0	5.0	5.0	
	3	5.0	5.0	*	