

# **Model T9753**

## **Detailed Technical specification**

**Rev : 02**

**Date: 20030310**

**Prepared by:**\_\_\_\_\_

**Approved by:**\_\_\_\_\_

**1:Standard Measurement Condition:**

|   |  |                    |
|---|--|--------------------|
| 1 | Standard DC Power  | 7.4VDC             |
| 2 | Test Temperature   | 25°C ±5°C          |
| 3 | Standard Audio Frequency                                 | 1kHz               |
| 4 | Standard RF Input  | 1mV                |
| 5 | Standard ref. Modulation<br>-- Audio Nominal<br>-- CTCSS | ±2.5kHz<br>±0.6kHz |
| 6 | Standard ref. Audio Output                               | 500mW              |
| 7 | Standard ref. Audio Load                                 | 4Ω resistive       |
| 8 | Antenna Impedance  | 50Ω                |

**2:General specification**

|    |                     |  |
|----|---------------------|--|
| 1  | Operating Frequency | 400 to 470MHz(T9753 UHF)                         |
| 2  | RF Channel          | 118 Channels                                     |
| 3  | CTCSS               | 50 Codes   |
| 4  | DCS                 | 104+1 Codes                                      |
| 5  | Channel separation  | 12.5KHz(Narrow bandwidth) /25KHz(Wide bandwidth) |
| 6  | Operating Voltage   | DC 7.4V  |
| 7  | Working Temperate   | -20°C~+50°C                                      |
| 8  | Operate Mode        | Simplex or Semi-duplex                           |
| 9  | Dimension           | 100mm×55mm×32mm(Not included Antenna)            |
| 10 | Weight              | 220g(Including battery)                          |

**Note: All measurements are without CTCSS unless otherwise specified**

**3.: RECEIVER:**

|    |  | <u>Unit</u>                      | <u>Nominal</u>      | <u>Limit</u>           |
|----|--|----------------------------------|---------------------|------------------------|
| 1  | Sensitivity<br>For 12dB Sinad  | uV                               | 0.20                | 0.30                   |
| 2  | Rated Audio Output<br>@ 5% THD speaker<br>@ Deviation sense. For rated output (VR @ max)     | mW<br>±kHz                       | 500<br>1.5          | 400<br>2.0             |
| 3  | Squelch<br>a) Sensitivity<br>Lo must open<br>Hi must open<br>b) Attack Time<br>c) Decay Time | dB sinad<br>dB sinad<br>ms<br>ms | 8<br>14<br>60<br>40 | ±2<br>±2<br>150<br>250 |
| 4  | CTCSS sensitivity<br>@ code 12, 400 Hz dev.<br>Must open squelch<br>Lo<br>Hi                 | dB sinad<br>dB sinad             | 8<br>14             | ±2<br>±2               |
| 5  | Audio Frequency Response<br>@ 350 Hz<br>@ 2500 Hz  | dB<br>dB                         | -2<br>-6            | ±3<br>±3               |
| 6  | Adjacent Channel Rejection   | dB                               | 70                  | ≥60                    |
| 7  | Inter-modulation Rejection (3 Gen. method)   | dB                               | 65                  | ≥60                    |
| 8  | Spurious Response Rejection  | dB                               | 70                  | ≥60                    |
| 9  | Blocking   | dB                               | 90                  | ≥85                    |
| 10 | Spurious Emission  | dBm                              | -60                 | -57                    |
| 11 | Audio Distortion at Vol. Max   | %                                | 3                   | 5                      |

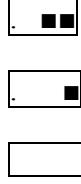
**3). General specification**

All measurements are without CTCSS unless otherwise specified

**B. TRANSMITTER:**

|    |   | <u>Unit</u> | <u>Nominal</u> | <u>Limit</u> |
|----|---|-------------|----------------|--------------|
| 1  | Carrier Power (no mod)                              | W           | 4.0            | ≤4.0         |
| 2  | Carrier Frequency Stability                         | ±ppm        | 2              | 2.5          |
| 3  | Modulation limiting (including CTCSS)               | ±kHz        | 2.2            | □2.5         |
| 4  | Carrier Attack Time                                 | ms          | 25             | 100          |
| 5  | Audio Freq. Responses.<br>@ 300 Hz<br>@ 2500 kHz    | dB<br>dB    | -10<br>+4      | ±3<br>±3     |
| 6  | Audio Distortion @2.5kHz dev.                       | %           | 3              | 5            |
| 7  | Microphone Sensitivity For 2.5kHz                   | mV          | 5              | ±3           |
| 8  | spurious emission                                   | dBm         | -38            | -36          |
| 9  | Transient Freq. Behavior :<br>a) Tx On<br>b) Tx Off | ms<br>ms    | 30<br>5        | 35<br>10     |
| 10 | CTCSS<br>a) Frequency Error<br>b) dev.              | %<br>kHz    | ±1<br>0.6      | ±2<br>±0.2   |

**4). POWER SUPPLY**

|   |   | <u>Unit</u>    | <u>Nominal</u>    | <u>Limit</u>            |
|---|---|----------------|-------------------|-------------------------|
| 1 | Battery Life (5%:5%:90% Ratio)  | Hrs            | 10                | □8                      |
| 2 | Standby Current(squelch)  | mA             | 80                | 100                     |
| 3 | Charging current  | mA             | 300               | +/30                    |
| 4 | Current Drain<br>-- at Rated Audio<br>-- at Rated Tx<br>-- at Power save  | mA<br>mA<br>mA | 250<br>1400<br>10 | 300<br>1600<br>15       |
| 5 | Battery Low Indication<br><br><br><br><br><br> Flasn | V<br>V<br>V    | 6.0<br>5.7<br>5.3 | +/-.1<br>+/-.1<br>+/-.1 |

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## FUNCTION DESCRIPTION

Circuit Composition and Operation Theory

### 1. RECEIVER

T9753 Receiver parts is composed in the double conversion system, which has the 1<sup>st</sup> IF frequency of 29.250 MHz and the 2nd IF frequency of 450 KHz With the RF front-end which has an excellent band characteristics and skirt characteristics, the 2 pole MCF used in the 1<sup>st</sup> IF , and the 3pole ceramic fitter in the 2<sup>nd</sup>IF the reception interrupting factors such as the image and the sensitivity repression are reduced for the more stable reception.

#### RF Front-end

The signal received by the antenna will be transmitted to the band pass filter through the antenna switching circuit consisted of D155□D211□L167□C167□L165□C165□L163□C163□C169□C168□C166□C164□C162□ The front RF amplifier transistor T221 consists of the L212□C215□L215 Input band pass filter and C226□L229□C232□L2421 output band pass filter primarily diminishes the other signal rather than the 1<sup>st</sup> IF image and other signal within the reception ban and amplifies only the necessary signal within the RF.

#### 1<sup>st</sup> Mixer

The receiver which has been amplifier in the RF front end is provided to the base of the 1<sup>st</sup> mixer T241. The 1st L/O signal provide from the VCO is supplied to the emitter of T241 and converted to the 1st IF 29.250 MHz..

#### 1<sup>st</sup> IF filter and 1<sup>st</sup> IF Amplifier

The signal recovered by T241 to 29.250 MHz, the 1<sup>st</sup> frequency , then is infused to the fundamental MCF(FL251) has the center frequency of 29.250 MHz.

Here .the signal reduces the image and other unwanted signal for the 2<sup>nd</sup> IF, and changes its impedance again through the C251 Then signal is infused to T251 the 1<sup>st</sup> IF Amplifier. The signal infused to the T251 is amplified approximately by 20dB in order to acquire the required reception sensitivity, and infused to the U261 which functions as the 2<sup>nd</sup> mixer ,the 2<sup>nd</sup> IF amplifier and the FM detector.

#### 2<sup>nd</sup> Mixer, 2<sup>nd</sup> IF, FM Detector(U261)

The received IF signal of 29.250 MHz, which has been infused to U261 is mixed with the 2<sup>nd</sup> L/O converted to 450KHz, the 2<sup>nd</sup> IF frequency. The receiver signal converted to the 2<sup>nd</sup> IF signal frequency passed through the FL261, the ceramic filter of 450 KHz again, After the limiting inside the U261 and the FM demodulating by the quadrature detector inside the U261 the signal offers the output through the Pin 9 of U261  
The squelch circuit is composed to detect the noises from the received signal demodulated in the Pin 9 of the U261. For this purpose the noise filter is using the OP amplifier inside the U261.

#### Audio Power Amplifier(U451)

The received audio signal, which has been filtered by U511 and adjusted to the appropriate volume by Volume control SW451, amplified approximately by 20dB, Then, it turns up the speaker with the maximum output between maximum of 500mW.

## 2. TRANSMITTER

#### Pre-emphasis(U411)

The voice signal input from the microphone is pre-emphasized at the MCU, the signal which comes out is limited to a certain amplitude for the voice signal not to exceed the allowable bandwidth assigned for transmission.

#### TX Power(T141)

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The transmitted signal of approximately 500mW, combined at the driver TR is supplied to the base of T141 amplifier. The transmitted signal amplifier to 5W here passes the TX LPF of the 2<sup>nd</sup> characteristics of the L163□L165 and L167, and RX/TX switching takes place by D155. After this signal is provided to the antenna through the TX LPF of the 1st characteristics consisted of the L155.

### 3. FREQUENCY SYNTHESIZER

#### Voltage Control Oscillator(VCO)

The VCO oscillates 400.01250MHz to 469.98750MHz under the transmission condition and 370.7625MHz to 440.7375MHz the VCO is controlled by the U311 PLL IC in order to oscillate accurate frequency. The output frequency of the VCO is supplied to the U311 PLL IC immediately. At the U311□CR471(14.4MHz) is compared to the output frequency of the VCO, the VCO control the loop filter consisted of the R381□R382□R383□E381□ and the R385□E384□R38 in order to oscillate the stable frequency wanted for the radio.

The VCO is controlled voltage which as passed the loop filter is supplied to the D321□D322 varactor diode, and the VCO oscillate the PLL programmed frequency by the capacity variance in the D321□D322. in addition, the L325 on the VCO circuit function as frequency for the VCO to be properly controlled by the U311 PLL IC.