

# THEORY OF OPERATION

## Circuit Composition and Operation Theory

The basic explanation for the circuit composition

FR558WB consists mainly of the two board controlling the RF circuit parts and the digital circuit parts.

## FRS Receiver

FR558WB receiver parts are composed in the double conversion system, which has the 1st IF Frequency of 10.7MHz and the 2nd IF frequency of 450KHz, with the Frontend circuit which has an excellent band characteristic and skit characteristic, the 1 pole MCF used in the 1st IF, and the 4 pole ceramic filter in the 2nd IF, the reception interrupting factors such as the image and the sensitivity repression are reduced for the more stable reception.

### RF Frontend

The signal received by the antenna will be transmitted to the frontend through the antenna switching circuit consisted of C30,L42,C61and L14. The frontend consists of the RF amplifier transistor Q7 and input/output band pass filter (CF5). Band pass filter has the bandwidth of approximately 10MHz, primarily diminishes the other signal rather than the 1st IF image and other signal within the reception band and amplifies only the necessary signal within the RF.

### 1st Mixer

The receiver signal which has been amplified in the RF frontend is provided to the base of the 1st mixer Q8. The 1st L/O signal provided from the VCO circuit (Q2) is supplied to the emitter of Q8 and converted to the 1st IF 10.7MHz.

### 1st IF Filter and 1st IF Amplifier

The signal converted by Q8 to 10.7MHz, the 1st frequency, changes its impedance through L7 and then is infused to the fundamental MCF which has the center frequency of 10.7MHz and the band width of +/-180KHz.

Here, the signal reduces the image and other unwanted signal for the 2nd IF, and changes its impedance again through the L8 and C20. Then the signal is infused to the Q1, the 1<sup>st</sup> IF amplifier. The signal infused to the Q1 is amplified approximately by 20dB in order to acquire the required reception sensitivity, and infused to the IC1 which function as he 2<sup>nd</sup> mixer, the 2nd IF amplifier, and the FM detector.

### 2nd Mixer, 2nd IF, FM Detector(IC1)

The receiver IF signal of 10.7MHz, which has been infused to IC1 is mixed with the 2<sup>nd</sup> L/O signal of 10.250MHz, and converted to 450KHz, the 2nd IF frequency. The receiver signal converted to the 2nd IF frequency passed through the CF2, the ceramic filter of 455KHz again. After the limiting inside the IC1 and the FM demodulating by the quarter detector inside the IC1, the signal offers the output through the 9th pin of the IC1.

The 2nd L/O signal of 10.250MHz which infused to detect the noises from the received signal

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FCC ID: OTVSBTFR458WB

JOB #: 665BK0

EXHIBIT #: 7A