

### Necessary Bandwidth

The necessary bandwidth calculation under 2.202(b) for the H25T2050 transmitter falls under the general FM formula:

$$BW = 2M + 2DK \quad K = 1$$

$$D = 2.5 \text{ kHz}$$

$$M = 3 \text{ kHz}$$

$$\text{Estimated BW} = 11 \text{ kHz}$$

### Emissions Designator

The emissions designator based on measurement is 11K2F3E. This emissions designator indicates that this is a NBFM audio channel transmitter with an occupied bandwidth of 11.2 kHz.

### Intended Use

This device is intended to be used under the Police Radio Service section of the Public Safety section of Part 90 for short-term undercover surveillance operations.

### Description of Circuitry

The active RF circuitry consists of an integrated circuit  $\frac{1}{2}$  f VCO, U4 and frequency doubler/driver stage, Q1, and the RF-Mosfet final amplifier stage Q2. The final amplifier is followed with a multi-section harmonic filter. The antenna connection is to an integral loop. High phase angle mismatches are handled with the final amplifier circuit.

Modulation is via an electret microphone/antenna and an AGC integrated circuit U1. This integrated circuit provides dynamic range compression and active over-deviation limiting. Pre-emphasis is provided by U2. Ultimate over-deviation limiting is provided by D1. Low-pass filtering is provided by U3. Deviation is set by RV1. The processed audio directly frequency modulates the  $\frac{1}{2}$  f VCO via varactor diodes, D2A and D2B.

Frequency generation and stability is achieved by using a 12.8MHz temperature compensated crystal oscillator (TCXO) U6 in conjunction with U5, the frequency synthesizer IC. Components, L3, R21, R23, C48, C49 and C50 comprise the synthesizer's loop filter.

Factory synthesizer programming and channellization is performed by U8, the microcontroller IC. This device has its own 65.535 kHz reference crystal. Any 12.5 kHz channel bandwidth frequency in the band 150-174 MHz may be factory programmed.

Voltage regulation is performed by U9, a switching step-up regulator and the two micropower regulators, U10 and U11.

The transmitter is active when the battery is inserted. Transmitter life with a fresh battery is less than 5 hours.