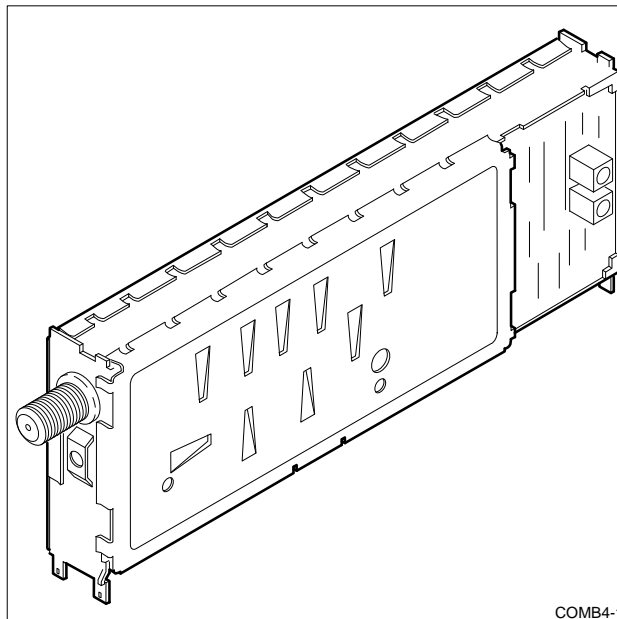


FEATURES

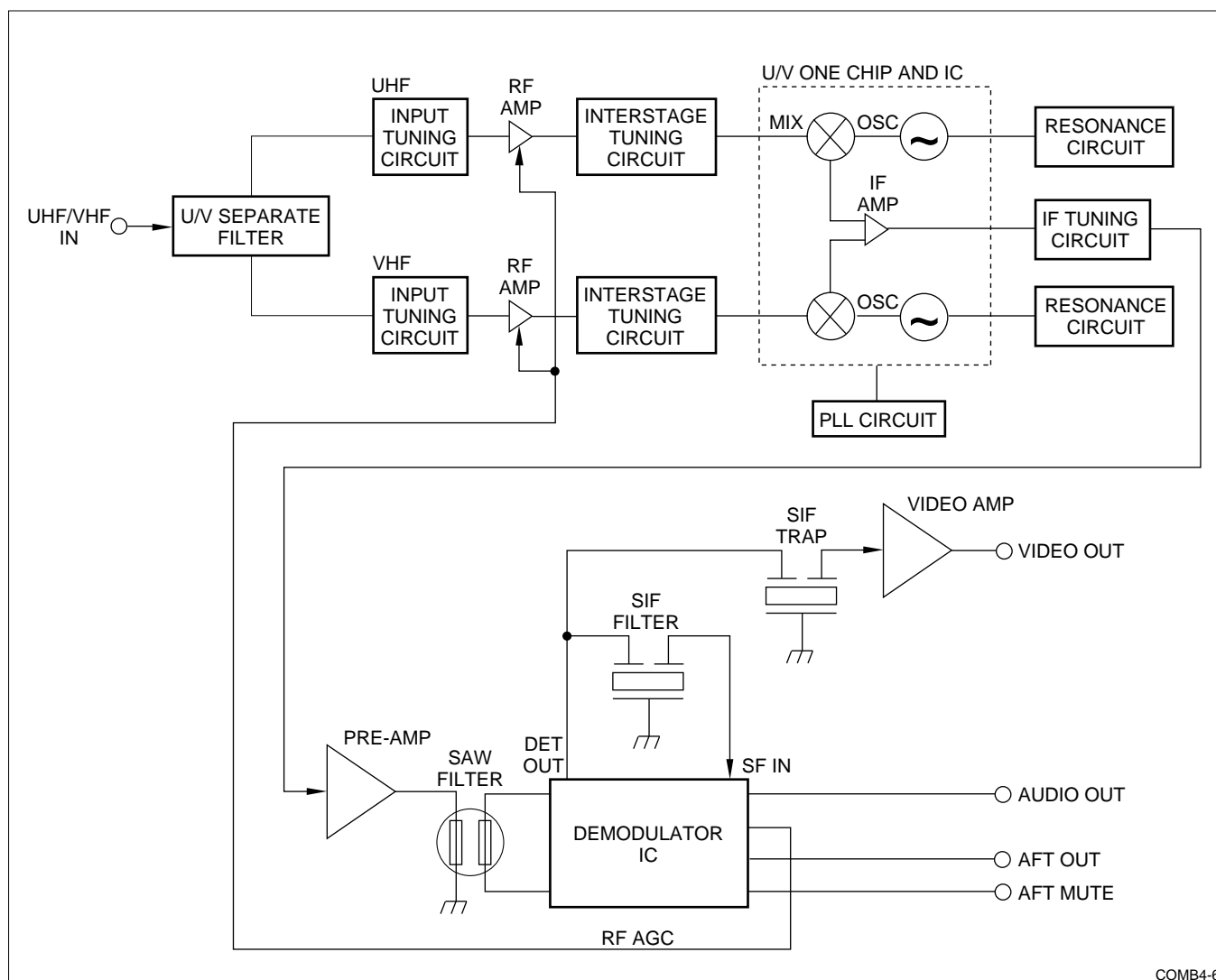
- Receiving Standard: USA
- Receiving Channels:
 - VHF Section
 - Low Band – Air: 2 to 6
CATV: (A-8) A-5 to B
 - High Band – Air: 7 to 13
CATV: C to W + 11
 - UHF Section
 - Air: 14 to 69
CATV: W + 12 to W + 84
- Receiving System:
USA Standard M-System (NTSC)
- Channel Selection System:
PLL Tuning
- Detection System: Dummy
Synchronization Detection System,
Inter-carrier Sound Receiving System
- Nominal Input Impedance:
RF: 75 Ω
- Output Load Impedance:
 - Video: 1 k Ω
 - Audio: 4.7 k Ω
- Intermediate Frequency:
 - Picture: 45.75 MHz
 - Sound: 41.25 MHz
- Weight: 92 g \pm 10 g
- Applicable Standards:
 - EIA Standard No. 544
 - EIA Standard No. 16A
 - FCC Standards
 - UL Standard



FUNCTIONAL DESCRIPTION

The RFSP7US1 is a combination tuner and demodulator in one package. It is compatible with North American NTSC television broadcast signals. An internal Phase-Locked Loop circuit performs all of the required tuning functions. The tuner and demodulator blocks are internally connected. An IF sample port is provided for monitoring the signal level or frequency characteristics of the recovered IF signal. The RF connector is mounted on the end of the housing so that the smallest possible area is used on the rear panel of a final installation. Demodulated audio, video, and AFT outputs are provided. The AFT Mute function is available as well. The AGC control line from the demodulator to the tuner is not accessible to the system designer.

For additional specific information on programming the PLL and system interface suggestions, refer to the Application Note "VTSS, RFSO/SP Series PLL Electronic Tuners."



COMB4-6

Figure 1. RFSP7US1 Block Diagram

ELECTRICAL CHARACTERISTICS

| ITEM | TYPICAL | LIMITS | REMARKS |
|-----------------------------|------------------|--------------|--|
| Nominal Supply Voltages | | | |
| BT | 31 V | | |
| BP | 5 V | | |
| B | 12 V | | |
| Operating Voltage | | | |
| BT | 31 V \pm 2.0 V | | |
| BP | 5 V \pm 0.5 V | | |
| B | 12 V \pm 0.5 V | | |
| Control | 5 V \pm 0.2 V | | |
| Breakdown Voltage | | | |
| BT | 34 V (minimum) | | |
| BP | 6 V (minimum) | | |
| B | 13.2 V (minimum) | | |
| Test Conditions | | | |
| BT | 31 V | | |
| BP | 5 V | | |
| B | 12 V | | |
| Ambient Temperature | 25°C \pm 5°C | | |
| Relative Humidity | 65% \pm 10% | | |
| Current Consumption | | | |
| BT | 5 mA (maximum) | | |
| BP | 86 mA (maximum) | | |
| B | 190 mA (maximum) | | |
| Temperature | | | |
| Storage | -20 to 75°C | | |
| Operating | -10 to 60°C | | |
| Noise Figure (UHF AIR) (dB) | | | |
| Maximum | 8 | 13 (maximum) | <ul style="list-style-type: none"> $\bar{X} = \Sigma x_i / n$ $S = \sqrt{(\Sigma (x_i - \bar{x})^2) / (n - 1)}$, $n = 10$ * (Tested channels including worst) Shall satisfy the requirements stated in FCC NF Sampling Plan C (Effective January, 1980) Noise figure measurement shall be based on FCC OST 50 (effective January, 1980) * A representative tuner test shall be conducted on the following channels and on the worst channel found CH 14 through CH 69: CH 14, 20, 26, 32, 38, 44, 50, 56, 62, and 69 |
| XIRS | 8 | 13(maximum) | |
| Image Rejection (dB) | | | |
| At -47 dBm Input | | | |
| VHF Air | 70 | 60(minimum) | |
| VHF CATV | 60 | 50(minimum) | |
| UHF | 60 | 45(minimum) | |
| At -17 dBm Input | | | |
| VHF Air | 60 | 50(minimum) | |
| VHF CATV | 50 | 40(minimum) | |
| UHF | 50 | 40(minimum) | |

ELECTRICAL CHARACTERISTICS (cont'd)

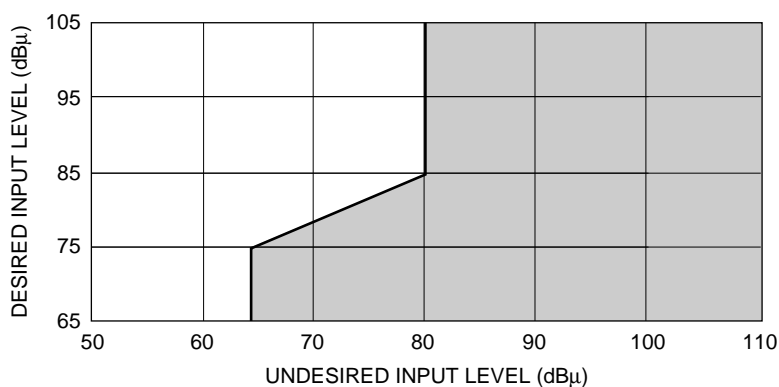
| ITEM | TYPICAL | LIMITS | REMARKS |
|--|---------|---------------------|---|
| IF Rejection (dB) | | | |
| At -47 dBm Input | | | |
| VHF Low | 80 | 55 (minimum) | |
| VHF High | 90 | 60 (minimum) | |
| UHF | 85 | 60 (minimum) | |
| At -17 dBm Input | | | |
| VHF Low | 60 | 45 (minimum) | |
| VHF High | 70 | 50 (minimum) | |
| UHF | 65 | 40 (minimum) | |
| CB Rejection (dB) | | | |
| SI | 50 | 40 (minimum) | |
| Undesirable: 0.535 MHz to 30 MHz | | -7 input (minimum) | |
| Desirable: 55.25 MHz to 83.25 MHz (CH 2 to CH 6) | | -66 input (minimum) | |
| Specific Channel Rejection (dB) | | | Undesirable: 49 dBμ input Desirable: 54 dBμ input |
| D UD | | | |
| CH A-3 ← CH A-5 | 60 | 55 (minimum) | |
| CH 6 ← CH A-5 | 55 | 50 (minimum) | |
| CH A-5 ← CH A-5 | 60 | 50 (minimum) | |
| CHP 6 ← CHS 6 | 55 | 52 (minimum) | |
| CHP 5 ← CHP 6 | 60 | 45 (minimum) | |
| Cross Modulation Between Next Adjacent Channels | | | See Figure 2 |
| Cross Modulation Between Adjacent Channels | | | See Figure 3 |
| Band Edge Tuning Margin (MHz) | | | |
| CH 2 | -4.0 | -3.25 (minimum) | |
| CH B | 3.0 | 2.0 (minimum) | |
| CH C | -4.0 | -3.25 (minimum) | |
| CH W + 11 | 3.0 | 2.0 (minimum) | |
| CH W + 12 | -5.0 | -3.25 (minimum) | |
| CH 69 | 5.0 | 2.0 (minimum) | |
| Radiation (3m Method) | | | See Figure 4 |
| Antenna Terminal Voltage (dBμ) | | | |
| Fundamental Wave | | 60 (maximum) | |
| Higher Harmonic | | 60 (maximum) | |
| PLL Data | | | Frequency step: 62.5 kHz Crystal oscillator frequency: 4 MHz |
| Bit 1 – UHF | | | |
| Bit 2 – Dummy (FM Trap) | | | |
| Bit 3 – VHF High | | | |
| Bit 4 – VHF Low | | | |
| Bits 5 to 13 – Main Counter | | | |
| Bits 14 to 19 – Swallow Counter | | | |

ELECTRICAL CHARACTERISTICS (cont'd)

| ITEM | TYPICAL | LIMITS | REMARKS |
|---------------------------------------|-------------|----------------------|--|
| PLL AC Characteristics | | | |
| Setting Up Enable – Tsuen | | 1 μ S (minimum) | See Figure 5 |
| Holding Enable – Thden | | 1 μ S (minimum) | |
| Setting Up Data – Tsuda | | 1 μ S (minimum) | |
| Holding Data – Thdda | | 1 μ S (minimum) | |
| Clock Level High – Thicl | | 1 μ S (minimum) | |
| Clock Level Low – Tlocl | | 1 μ S (minimum) | |
| Clock Rate – Trate | | 10 μ S (minimum) | |
| Signal Rising – Trise | | 1 μ S (minimum) | |
| Signal Falling – Tfall | | 1 μ S (minimum) | |
| Picture Output | | | |
| Output Level (CH 10) | 2 Vp-p | 2 \pm 0.4 Vp-p | At 1k Ω termination, fp 70 dB μ , White 100% |
| Differential Gain (CH 10) | 3% | 16% (maximum) | fp 90 dB μ , Sterstep 80 IRE |
| Differential Phase (CH 10) | 3° | 16° (maximum) | fp 90 dB μ , Sterstep 80 IRE |
| S/N Ratio (dB) | 48 | 43 (minimum) | fp 70 dB μ , White 100%, 100 kHz to 4.2 MHz filter, Sctrap On |
| Frequency Characteristics (CH10) (dB) | | | fp 70 dB μ , multi-burst |
| 1.0 MHz | -0.5 | -3 to +2 | |
| 2.0 MHz | -0.5 | -3 to +2 | |
| 3.0 MHz | -1.0 | -6 to +0.5 | |
| 3.58 MHz | -2.3 | -6 to +0.5 | |
| Synchronization Ratio (CH 10) | 28.5% | 23.6 to 33.6% | fp 70 dB μ , SMPTE color bar |
| Sound Output | | | fp 70 dB μ , SMPTE color bar 87.5% modulation, P/S 6 dB, fs 1 kHz, sin-curve 60% modulation, 75 μ s pre-emphasis |
| Output level (CH 10) | 250 mVrms | 180 to 320 mVrms | |
| Distortion Rate (CH 10) | 0.5% | 3.0% (maximum) | |
| S/N Ratio (CH 10) | 48 dB | 42 dB (maximum) | |
| Frequency Characteristics (CH 10) | 0 dB | 0 \pm 3 dB | |
| AM Removal Level (CH 10) | 45 dB | 35 dB (maximum) | |
| AFT Output | | | |
| Output Voltage | 0.5 to 11.5 | 1.0 to 11.0 | Center 6 V |
| Frequency Accuracy | 25 kHz | 100 kHz (maximum) | |
| Breakdown Static Voltage (V) | | | |
| 1 | | — | 150 pF, 150 Ω , 10 times each |
| 2 | | — | |
| 3 | | — | |
| 4 | | — | |
| 5 | | — | |
| 6 – BP (5 V) | | \pm 150 (minimum) | |
| 7 – BT (31 V) | | \pm 400 (minimum) | |
| 8 – Clock | | \pm 400 (minimum) | |
| 9 – Data | | \pm 400 (minimum) | |
| 10 – Enable | | \pm 400 (minimum) | |

ELECTRICAL CHARACTERISTICS (cont'd)

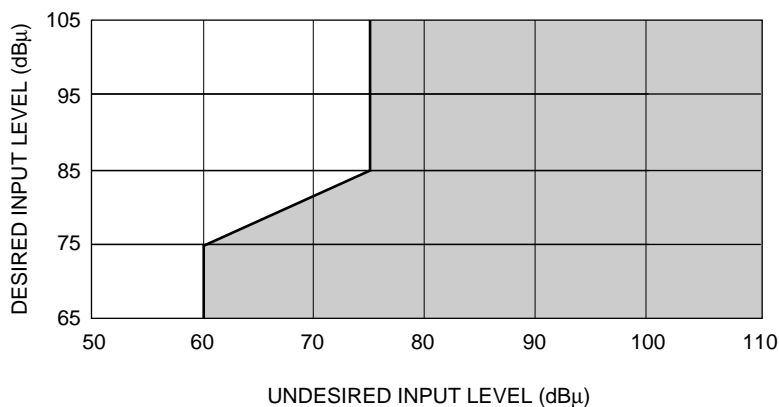
| ITEM | TYPICAL | LIMITS | REMARKS |
|---------------------------------------|---------|----------------------|--------------------------------------|
| Breakdown Static Voltage (V) (cont'd) | | | |
| 11 – (Lock) | | ± 400 (minimum) | |
| 12 – (IF) | | ± 400 (minimum) | |
| 13 – B (12 V) | | ± 150 (minimum) | 150 pF, 150 Ω , 10 times each |
| 14 – Audio Out | | ± 400 (minimum) | |
| 15 – GND | | – | |
| 16 – AFT | | ± 400 (minimum) | |
| 17 – Mute | | ± 400 (minimum) | |
| 18 – Video Out | | ± 400 (minimum) | |
| 19 – RF In | | ± 5000 (minimum) | |



NOTE: Input levels causing 1% cross modulation are shown in shaded area.

COMB4-2

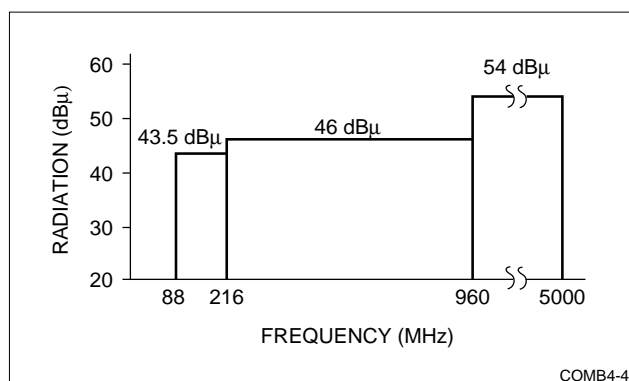
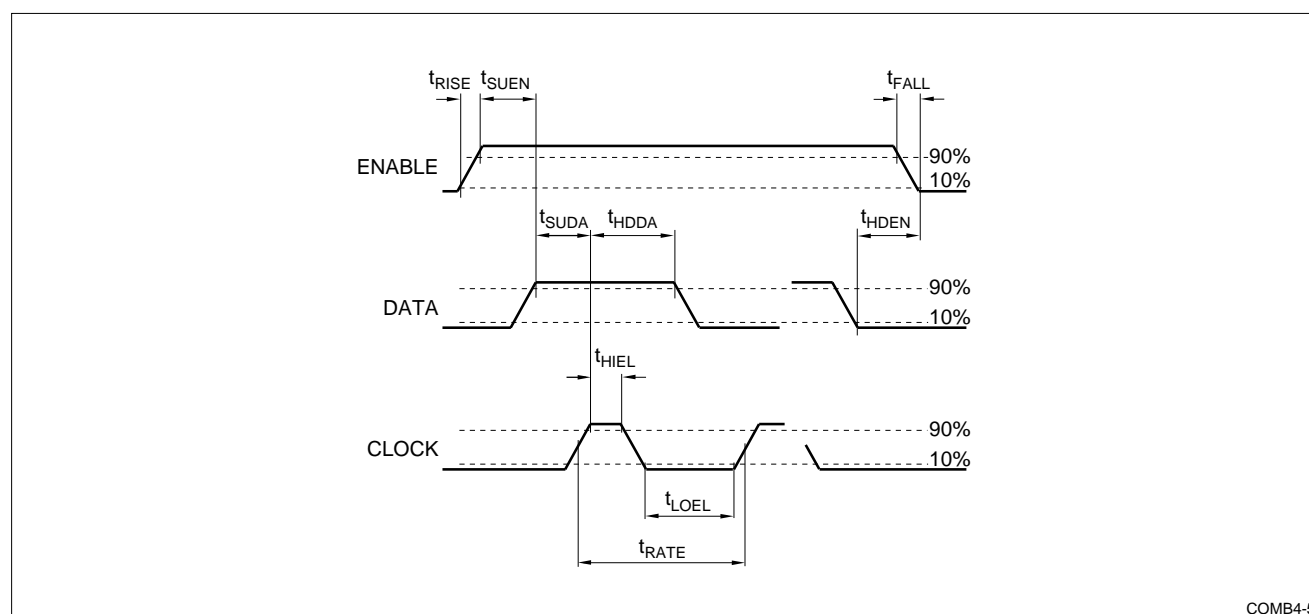
Figure 2. Cross Modulation Between Next Adjacent Channels



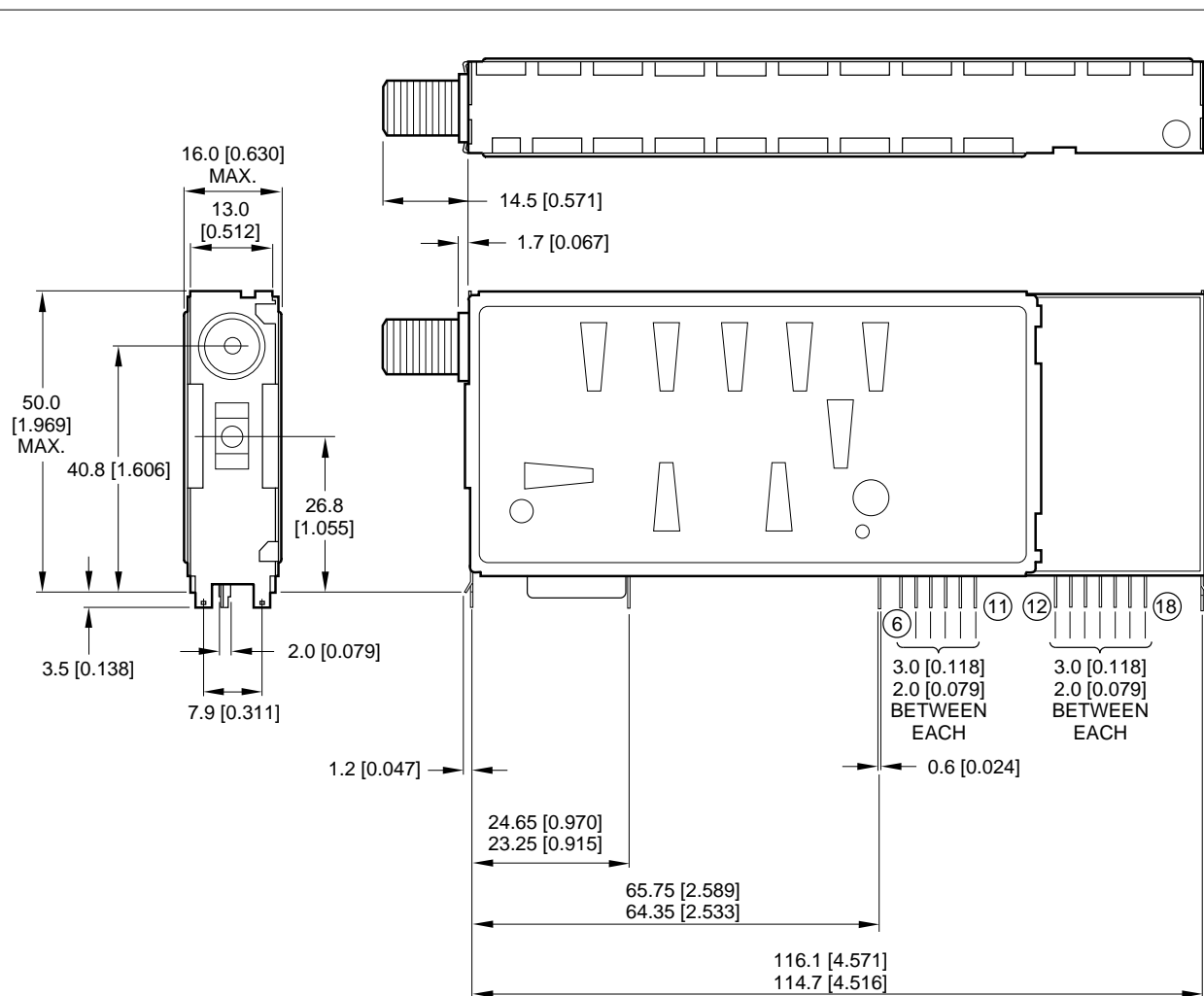
NOTE: Input levels causing 1% cross modulation are shown in shaded area.

COMB4-3

Figure 3. Cross Modulation Between Adjacent Channels

**Figure 4. Radiation (3m Method)****Figure 5. PLL AC Characteristics**

OUTLINE DIMENSIONS



| NO. | NAME | VOLT. | NO. | NAME | VOLT. |
|-----|-------|-------|-----|-----------|-------|
| ① | — | — | ⑩ | ENABLE | — |
| ② | — | — | ⑪ | (LOCK) | — |
| ③ | — | — | ⑫ | (IF) | — |
| ④ | — | — | ⑬ | B | +12 |
| ⑤ | — | — | ⑭ | AUDIO OUT | — |
| ⑥ | BP | +5 | ⑮ | GND | — |
| ⑦ | BT | +31 | ⑯ | AFT | — |
| ⑧ | CLOCK | — | ⑰ | MUTE | — |
| ⑨ | DATA | — | ⑱ | AUDIO OUT | — |

NOTE: DIMENSIONS IN MM [INCHES] MAXIMUM LIMIT
MINIMUM LIMIT

COMBM4