

1. OVERVIEW

1.1 Features

- Improved Sound Quality by.
 - Pre-emphasis Circuit
 - Limiter Circuit
 - Low-Pass Filter Circuit
- Transmission Frequency : ASIA/US (87.5~108MHz)
- Pilot Tone System FM Stereo Modulator Circuit
 - ┆ Audio Input Frequency Band: 20~15kHz
 - ┆ Stereo Mode / Monophonic Mode
 - ┆ Stable Transmission Frequency by PLL System FM TxCircuit
 - ┆ 3-wire Serial Interface

1.2 Applications

- Low Power Portable TV, Mobile Phone
- MP3 Player
- PMP, NAVIGATION,etc

2. DESCRIPTION OF ELECTRICAL SPECIFICATION

Vcc=3.3V, GND=0V, Temp=25°C unless otherwise specified

| No. | Parameter | Symbol | Min | Typ | Max | Unit | Conditions |
|-----|----------------------------------|--------|--------|-----|--------|------|----------------------------------|
| 1 | Supply voltage | Vcc | 2.8 | 3.3 | 3.6 | V | |
| 2 | Power consumption | Ic | - | 10 | 15 | mA | |
| 3 | Audio input level | Vin-A | - | -20 | - | dBV | |
| 4 | Pre-emphasis time constant | T pre | 40 | 50 | 60 | usec | |
| 5 | Transmission Frequency | F tx | 88.1 | - | 107.9 | MHz | It's based on FCC Setp 100KHz |
| 6 | Channel separation | Sep | 25 | 40 | - | dB | Vin=-20dBV |
| 7 | Harmonic distortion | THD | - | 0.3 | 1.0 | % | Vin=-20dBV |
| 8 | Pilot modulation rate | Mp | 12 | 15 | 18 | % | Vin=-20dBV |
| 9 | Sub carrier rejection ratio | SCR | - | -30 | -20 | dB | Vin=-20dBV |
| 10 | Channel balance | C.B | -2 | 0 | +2 | dB | Vin=-20dBV |
| 11 | Transmission output level | Vtx | -7 | -3 | 0 | dBm | Ftx=100MHz Zo=50 ohm |
| 12 | Control terminal "H" level input | Vih | 0.8Vcc | - | Vcc | V | |
| 13 | Control terminal "L" level input | Vil | GND | - | 0.2Vcc | V | |
| 14 | Operating temperature | Topr | -40 | 25 | +80 | °C | |

3. ELECTRICAL CHARACTERISTICS

- Dimensions and terminal connection.
Refer to the attached drawing No. (NR-B108TM3)
UNIT : 10.0(L) x 10.0(W) x 1.7(H) ±0.3mm
- Schematic diagram.
As show in the attached drawing No. (NR-B108TM3)

4. ENVIRONMENT TEST

4.1 TEMPERATURE TEST

After the tuner shall be exposed for each 120 minutes in a test Chamber of temperature cycle at 20°C, 40°C, 0°C, 20°C and then the tuner shall be operated satisfactorily electrical performance.

4.2 TEMPERATURE SHOCK TEST

After 12 hours exposure in a test chamber at 50°C±2°C or -10°C±2°C and them exposed in a room temperature for more than 4 hour, the tuner shall be operate satisfactorily.

4.3 HUMIDITY TEST

After 5 hours exposure in a test chamber at 40°C±5°C and 90±5% R.H., then exposed for 4 hours in a room temperature, there shall be no deterioration in electrical performance.

In addition, the gain variation shall be less than 3dB and frequency drift shall be less than 500 kHz.

4.4 VIBRATION TEST

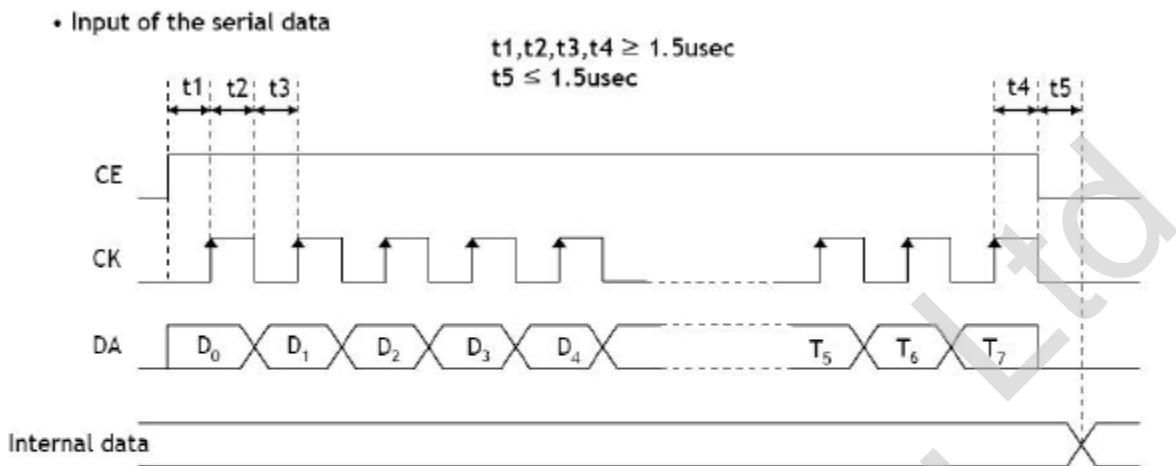
At condition, amplitude and oscillation shall be 2mm and 1,000 C.P.M. respectively. There shall be no looseness after each 2 hours of top-bottom back-forth and right-left vibrations.

After this test the gain variation shall be less than 3dB and frequency drift shall be less than 200 kHz.

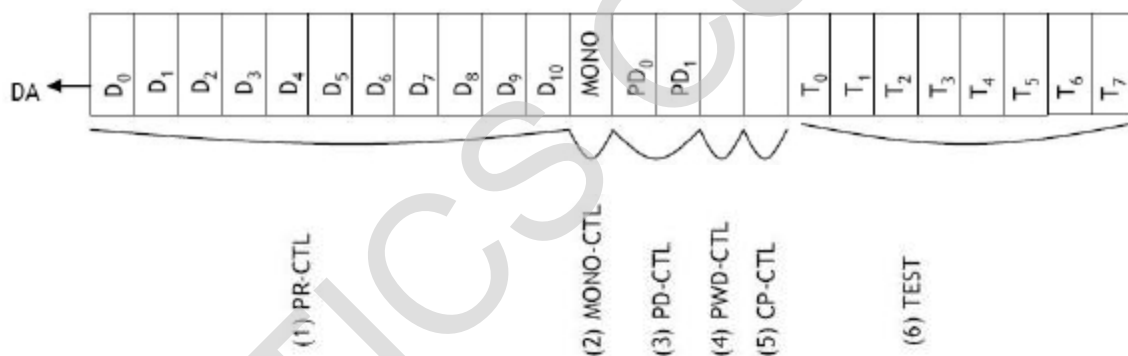
4.5 DROP TEST

After the packed tuner at 50Cm height is dropped six times from each side, gain variation shall be less then 3dB and frequency drift shall be less than 200 kHz.

5. CIRCUIT OPERATIONS

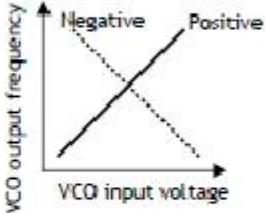


• Composition of the serial data



• Explanation of the serial data

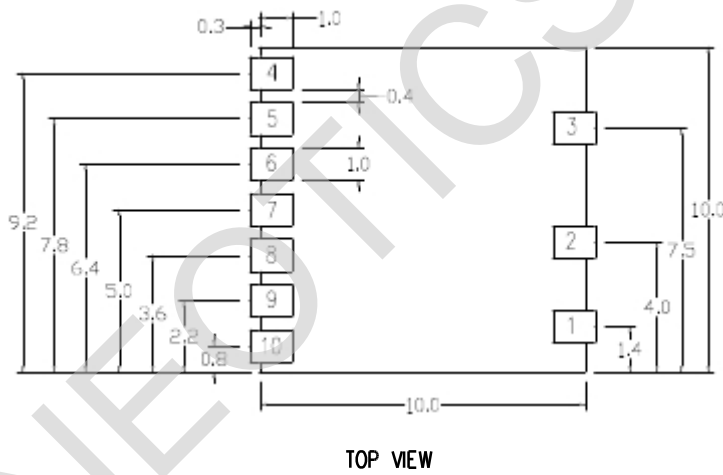
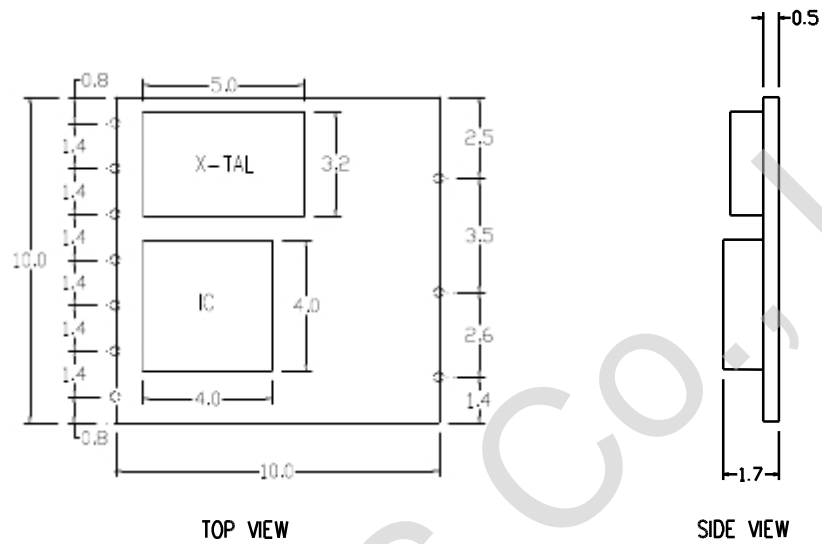
| NO | Control unit / Data | Contents | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|-------|--------------------------------------|--|-------|-------|-------|-------|-------|-------|-------|----------|---|--|---|---|---|---|---|---|---|---|---|---|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|----------|
| (1) | PROGRAM COUNTER $D_0 \sim D_{10}$ | <ul style="list-style-type: none"> It is the data which sets the program counter number of the dividing. This data can set a transmission frequency. It is binary value. It sets D_{10} with MSB and it sets D_0 LSB. Example) In the case of 99.7MHz oscillation. $99.7\text{MHz} \div 100\text{kHz}(\text{fref}) = 997 \rightarrow 3\text{E}5(\text{HEX})$ <div style="text-align: center;"> <table border="1" style="margin: auto;"> <tr> <td colspan="5">5</td> <td colspan="3">E</td> <td colspan="2">3</td> </tr> <tr> <td>1</td><td>0</td><td>1</td><td>0</td><td>0</td><td>1</td><td>1</td><td>1</td><td>1</td><td>0</td> </tr> <tr> <td>D_0</td><td>D_1</td><td>D_2</td><td>D_3</td><td>D_4</td><td>D_5</td><td>D_6</td><td>D_7</td><td>D_8</td><td>D_9</td><td>D_{10}</td> </tr> </table> <p>LSB MSB</p> </div> | 5 | | | | | E | | | 3 | | 1 | 0 | 1 | 0 | 0 | 1 | 1 | 1 | 1 | 0 | D_0 | D_1 | D_2 | D_3 | D_4 | D_5 | D_6 | D_7 | D_8 | D_9 | D_{10} |
| 5 | | | | | E | | | 3 | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 | 0 | 1 | 0 | 0 | 1 | 1 | 1 | 1 | 0 | | | | | | | | | | | | | | | | | | | | | | | | |
| D_0 | D_1 | D_2 | D_3 | D_4 | D_5 | D_6 | D_7 | D_8 | D_9 | D_{10} | | | | | | | | | | | | | | | | | | | | | | | |

| NO | Control unit / Data | Contents | | | | | | | | | | | | | | | |
|-----------------|---|---|-----------------|-----------------------------------|--------------------|-----------------------------------|---|---|---|---|-------------------|---|---|--------------------|---|---|----------------|
| (2) | MULTIPLEXER MONO | <ul style="list-style-type: none"> It changes a stereo and monaural operation. <table border="1"> <thead> <tr> <th>MONO</th> <th>Condition of the composite signal</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>Monaural operation L+R, Pilot OFF</td> </tr> <tr> <td>1</td> <td>Stereo operation L+R+(L-R), $\sin\omega_s t + P\sin(\omega_s/2)t$</td> </tr> </tbody> </table> | MONO | Condition of the composite signal | 0 | Monaural operation L+R, Pilot OFF | 1 | Stereo operation L+R+(L-R), $\sin\omega_s t + P\sin(\omega_s/2)t$ | | | | | | | | | |
| MONO | Condition of the composite signal | | | | | | | | | | | | | | | | |
| 0 | Monaural operation L+R, Pilot OFF | | | | | | | | | | | | | | | | |
| 1 | Stereo operation L+R+(L-R), $\sin\omega_s t + P\sin(\omega_s/2)t$ | | | | | | | | | | | | | | | | |
| (3) | PHASE DETECTOR PD ₀ , PD ₁ | <ul style="list-style-type: none"> It controls charge pump output by the phase comparator compulsorily. <table border="1"> <thead> <tr> <th>PD₀</th> <th>PD₁</th> <th>Charge pump output</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>0</td> <td>Usual operation</td> </tr> <tr> <td>0</td> <td>1</td> <td>Compulsion by Low</td> </tr> <tr> <td>1</td> <td>0</td> <td>Compulsion by High</td> </tr> <tr> <td>1</td> <td>1</td> <td>High impedance</td> </tr> </tbody> </table> | PD ₀ | PD ₁ | Charge pump output | 0 | 0 | Usual operation | 0 | 1 | Compulsion by Low | 1 | 0 | Compulsion by High | 1 | 1 | High impedance |
| PD ₀ | PD ₁ | Charge pump output | | | | | | | | | | | | | | | |
| 0 | 0 | Usual operation | | | | | | | | | | | | | | | |
| 0 | 1 | Compulsion by Low | | | | | | | | | | | | | | | |
| 1 | 0 | Compulsion by High | | | | | | | | | | | | | | | |
| 1 | 1 | High impedance | | | | | | | | | | | | | | | |
| (4) | POWER DOWN MODE PWD | <ul style="list-style-type: none"> It controls soft power on / off <table border="1"> <thead> <tr> <th>PWD</th> <th>Condition of power</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>Power off</td> </tr> <tr> <td>0</td> <td>Power on</td> </tr> </tbody> </table> | PWD | Condition of power | 1 | Power off | 0 | Power on | | | | | | | | | |
| PWD | Condition of power | | | | | | | | | | | | | | | | |
| 1 | Power off | | | | | | | | | | | | | | | | |
| 0 | Power on | | | | | | | | | | | | | | | | |
| (5) | CHARGE PUMP POLARITY CP | <ul style="list-style-type: none"> It changes charge pump polarity <table border="1"> <thead> <tr> <th>CP</th> <th>Polarity of VCO</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>Positive (Passive Loop Filter)</td> </tr> <tr> <td>1</td> <td>Negative (Active Loop Filter)</td> </tr> </tbody> </table>  | CP | Polarity of VCO | 0 | Positive (Passive Loop Filter) | 1 | Negative (Active Loop Filter) | | | | | | | | | |
| CP | Polarity of VCO | | | | | | | | | | | | | | | | |
| 0 | Positive (Passive Loop Filter) | | | | | | | | | | | | | | | | |
| 1 | Negative (Active Loop Filter) | | | | | | | | | | | | | | | | |
| (6) | TEST MODE T ₀ , T ₁ , T ₂ , T ₃ , T ₄ , T ₅ , T ₆ , T ₇ | <ul style="list-style-type: none"> It is data for the LSI test T₀, T₁, T₂, T₃, T₄, T₅, T₆, T₇ : 00110011 or 01110011 | | | | | | | | | | | | | | | |

6. EXPLANATION FOR TERMINAL FUNCTION

| Pin No. | Symbol | Description |
|---------|--------|---|
| 1 | GND | Ground (0V) |
| 2 | ANT | RF transmission output terminal |
| 3 | VCC | Supply voltage for module |
| 4 | MUTE | Audio mute control terminal Muting : High, Operating : Low |
| 5 | L-IN | L-ch audio source input terminal |
| 6 | R-IN | R-ch audio source input terminal |
| 7 | GND | Ground (0V) |
| 8 | DATA | Serial data input terminal |
| 9 | CLK | Serial clock input terminal |
| 10 | CE | Chip enable input terminal |

7. DIMENSION



NOTE

1. ALLOWANCEN : +0.3
2. UNIT : mm

| PIN No. | CONNECTION |
|---------|------------|
| 1 | GND |
| 2 | ANT |
| 3 | VCC |
| 4 | MUTE |
| 5 | L-IN |
| 6 | R-IN |
| 7 | GND |
| 8 | DATA |
| 9 | CLK |
| 10 | CE |