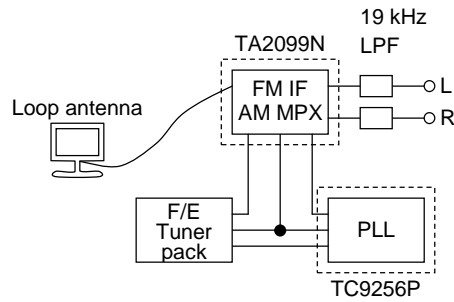


Audio IC Application Circuit

TAN-322

Application Circuit Example for 3-Band (FM, MW and LW) 5-V Tuner
TA2099N + TC9256P

1. Outline



The above is an application circuit example for a 3-band (FM, MW and LW) 5-V tuner.

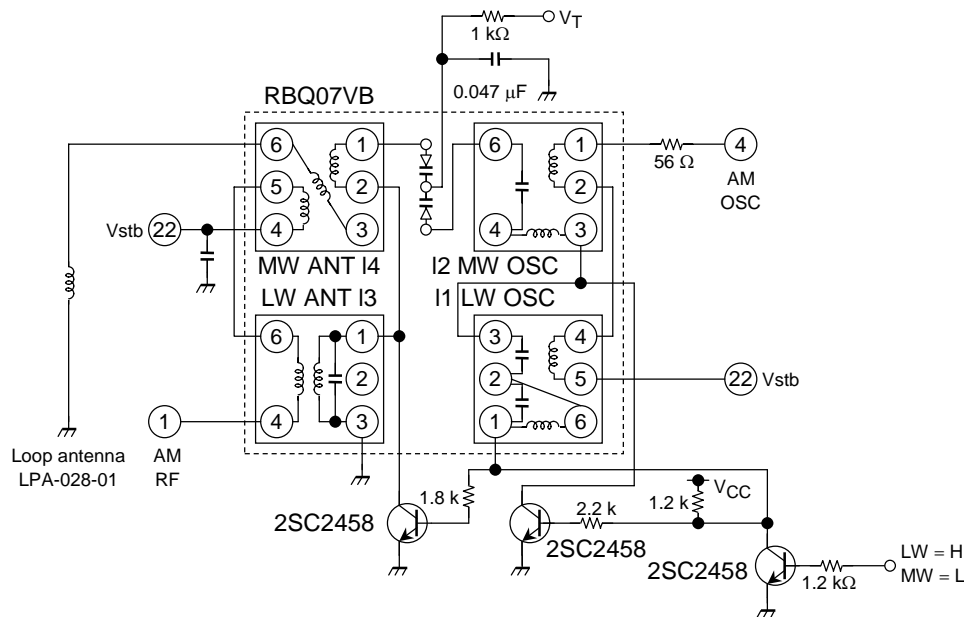
The circuit is comprised of a TFFJ4E567A tuner pack for F/E (by Alps Electric Co. Ltd.), a single-chip TA2099N featuring FMIF, MPX and AM, and a TC9256P as the PLL block.

2. Ratings

| Characteristics | Rating | | |
|------------------------|------------------------------------|--|--|
| | FM | MW | LW |
| Power supply voltage | 5 V | | |
| Signal frequency range | 87.5~108 MHz | 522~1620 kHz | 153~281 kHz |
| Intermediate frequency | 10.7 MHz | 450 kHz | |
| Sensitivity | 14 dB μ V EMF (S/N = 30 dB) | 35 dB μ V/m ($V_o = 20$ mVrms) | 39 dB μ V/m ($V_o = 20$ mVrms) |

3. Points to Note

1) MW/LW switching circuit



This circuit is used to allow switching between MW and LW. The coil used in this circuit is a RBQ07VB by Toko Inc. Matsushita Electric Industrial Co. Ltd. permit the use of this circuit on condition that it incorporates a RBQ07VB. Patent issued number 1468083 (Japan) Patent laid open number 85-194836 (Japan) Patent laid open number 86-156927 (Japan) It is recommended that the RBQ07VB-484BFR-024 be used as the board for this application.

2) FM F/E tuner pack: TFFJ4E567A

The tuner pack is made by Alps Electric Co. Ltd. For details of this product, please contact the company directly.

Operating Conditions

| Parameter | Symbol | Rating | Unit |
|-------------------------------|-----------|----------|----------|
| Receiving frequency | f_r | 87.5~108 | MHz |
| Intermediate frequency | f_{ZF} | 10.7 | MHz |
| Supply voltage | V_{CC} | 9 | V |
| | V_T | 1.5~8.5 | |
| Input impedance (unbalanced) | Z_{in} | 75 | Ω |
| Output impedance (unbalanced) | Z_{out} | 300 | Ω |

Electrical Characteristics

| Characteristics | Symbol | Test Condition | Min | Typ. | Max | Unit |
|-------------------------------------|--------|--|-----|------|-----|-------------------|
| Power gain | — | — | 18 | 24 | 30 | dB |
| 50 dB S/N sensitivity | — | $f_r = 98 \text{ MHz}, f_m = 1 \text{ kHz}, \Delta f = 75 \text{ kHz}$ | — | 22 | 28 | dB/ μV |
| Image block ratio | — | $f_r = 108 \text{ MHz}$ | 75 | 80 | — | dB |
| Output voltage for local oscillator | — | — | 40 | 90 | — | mV _{rms} |

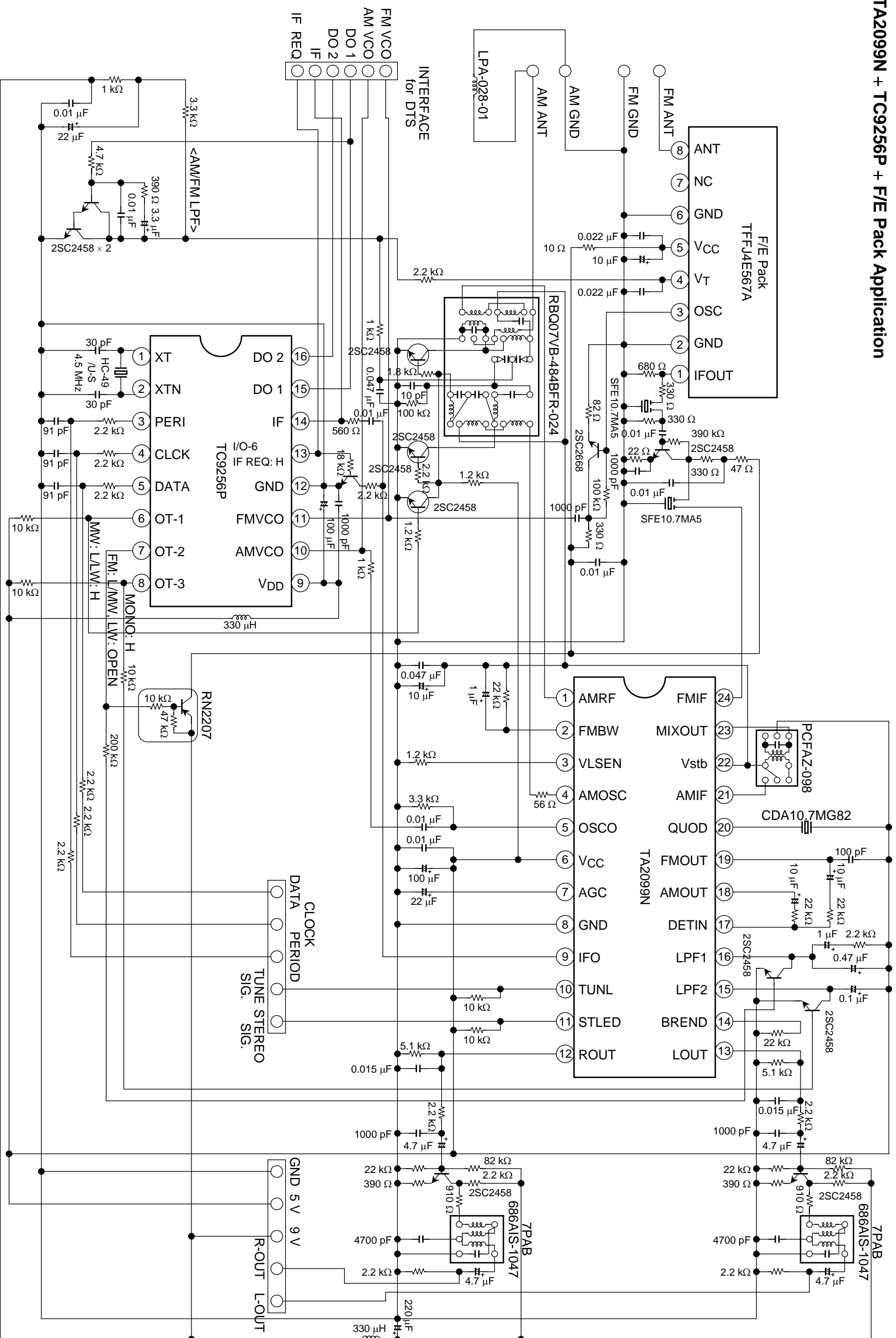
3) Pin lever setting for each function switch of TC9256P

<Crystal oscillator>
4.5 MHz

<IF pins>
On an IF request, I/O-6 (13-pin) is set to H.
IFIN1 is the IF input pin.

<I/O pins>
1) OT-1 (6 pin) MW = L, LW = H
2) OT-2 (7 pin) FM = L, MW/LW = open
3) OT-3 (8 pin) STEREO = L, MONO = H
4) DO: DO1 (15 pin) is used.

TA2099N + TC9256P + F/E Pack Application

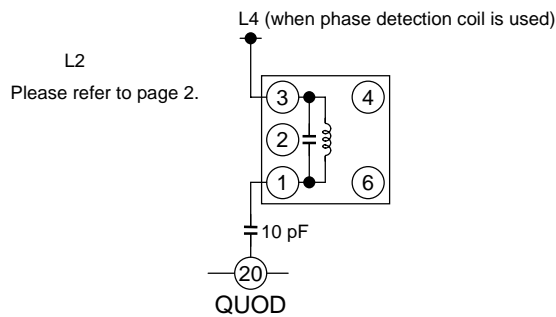


3-Band TA2099N (FM, MW and LW)

| No. | Stage | f (Hz) | L (μH) | C (pF) | Q | Turns | | | | | Wire (mm) | Note | |
|-----|-----------------|--------|--------|--------|----------|-----------|-------|--------|-----|-----------|------------|----------------------|-------------------------|
| | | | | | | 1-2 | 2-3 | 1-3 | 1-4 | 4-6 | | | |
| L1 | Loop Antenna | 1M | 11.0 | — | 50 (min) | 5 | — | — | — | — | — | LPA-S028-01@T | |
| L2 | LW OSC (orange) | I1 | 796k | 312.0 | — | 83 | 82 pF | 270 pF | — | 35 (4-5) | 105½ (6-1) | 0.055φ3UEW | RBQ07VB 484BFR-024@T |
| | MW OSC (red) | I2 | 796k | 117.0 | — | 85 (min) | 20 | — | — | 60½ (3-4) | 430 pF | 0.09φ2UEW | |
| | LW RF (black) | I3 | 252k | 7500 | — | 60 (min) | 363 | 17 | 380 | — | 105 | 0.06φ3UEW | |
| | MW RF (black) | I4 | 796k | 390.0 | — | 130 (min) | 108 | — | — | 24 (4-5) | 17½ (3-6) | 0.08φ2MUEW | |
| L4 | FM DET Coil | 10.7M | — | 51 | 45 | — | — | 30 | — | — | 0.08φ2UEW | 600BEAS-10018 Z@T | |

(Underside)

T: Toko, inc

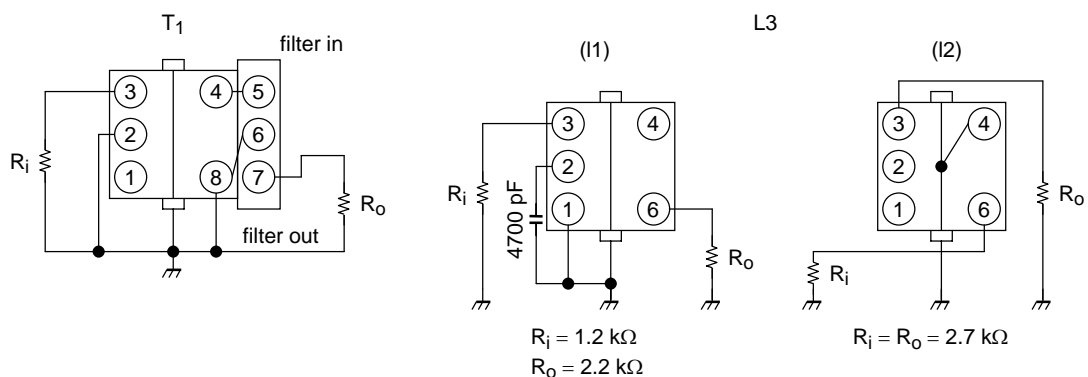


| No. | Stage | Center Frequency (fo) | 6 dB Bandwidth | Selectivity (±9 kHz) | Ripple in 6 dB Band | Note |
|----------------|-----------------|-----------------------|----------------|----------------------|---------------------|-------------|
| T ₁ | AM IFT + Filter | 450.0 + 1.2 kHz | 5 kHz (min) | 16 dB (min) | 0.8 dB (max) | PCFAZ-098@T |

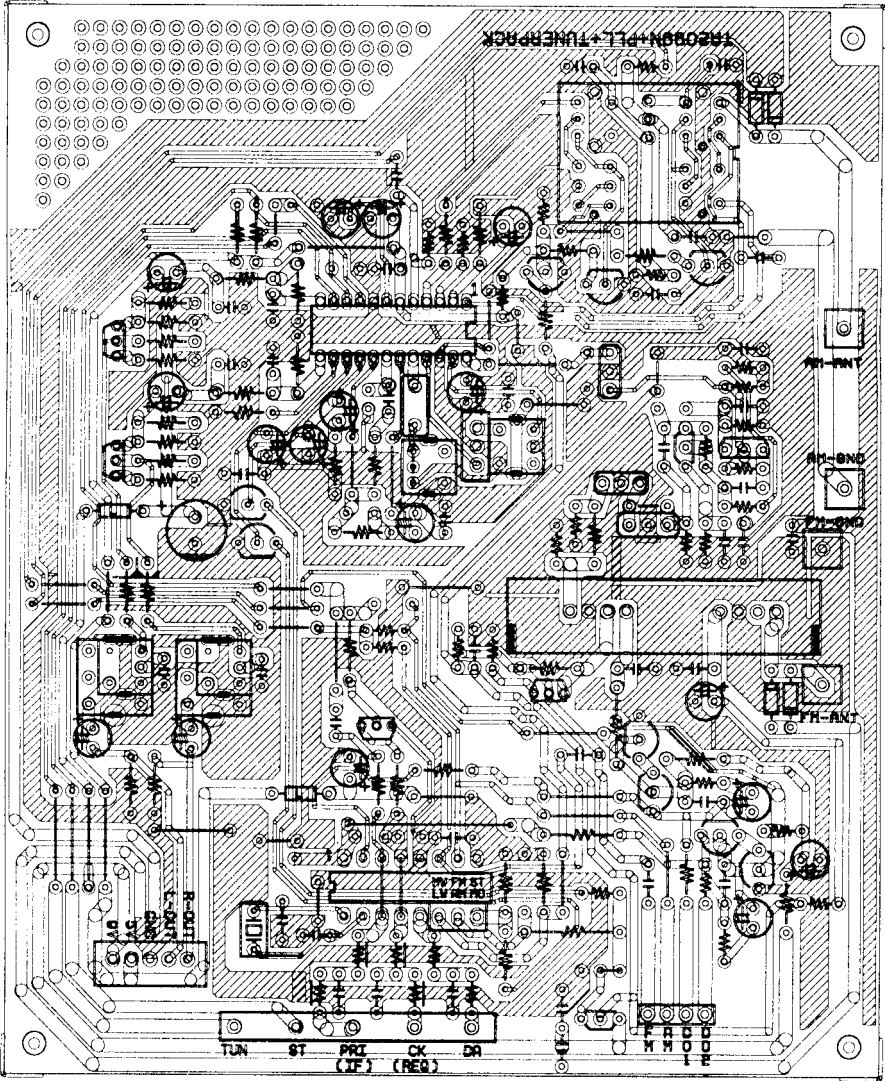
| No. | Stage | 15 kHz ATT | 19 kHz ATT | 38 kHz ATT | Note | | |
|-----|------------|------------|------------|------------|-------------|-------------|----------------|
| L3 | 19 kHz LPF | I1 | (A type) | 3 dB (max) | 27 dB (min) | 25 dB (min) | 686AIS-1047@T |
| | | | (B type) | 4 dB (max) | 25 dB (min) | 23 dB (min) | |
| | | I2 | (A type) | 3 dB (max) | 27 dB (min) | 25 dB (min) | 253AGGS-1377@T |
| | | | (B type) | 4 dB (max) | 25 dB (min) | 23 dB (min) | |

(Underside)

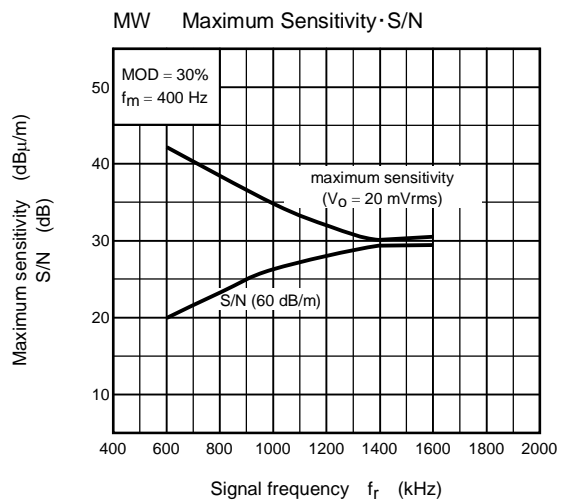
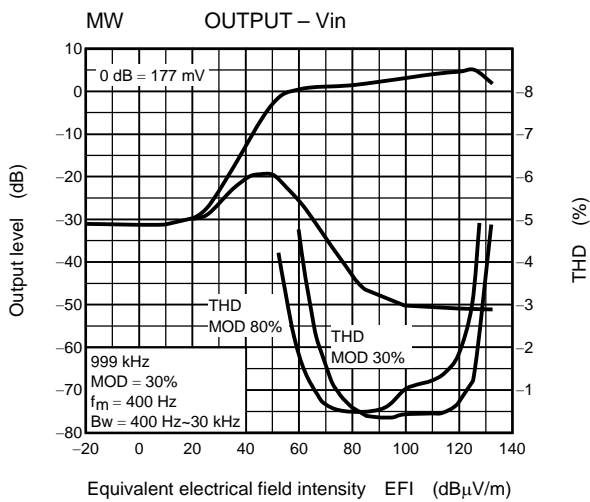
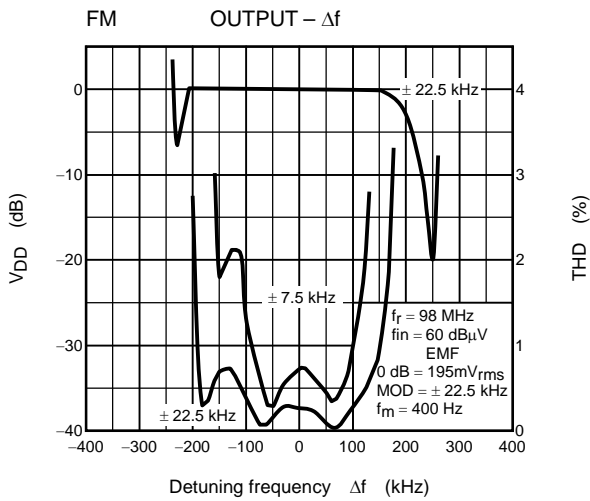
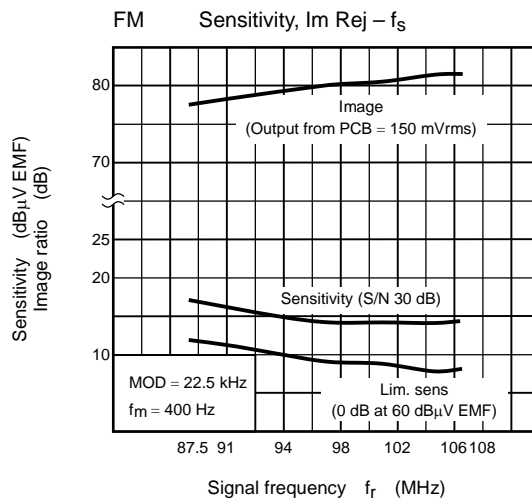
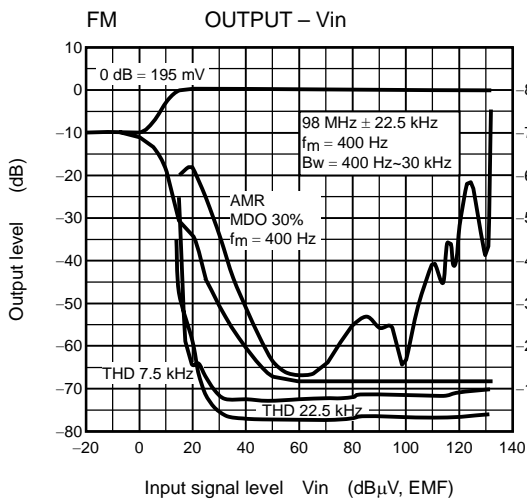
T: Toko, inc

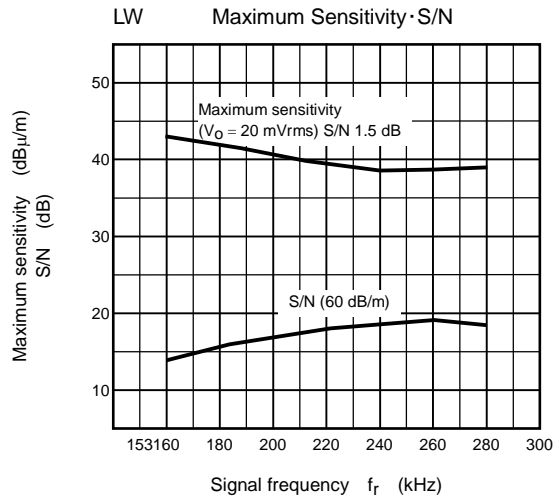
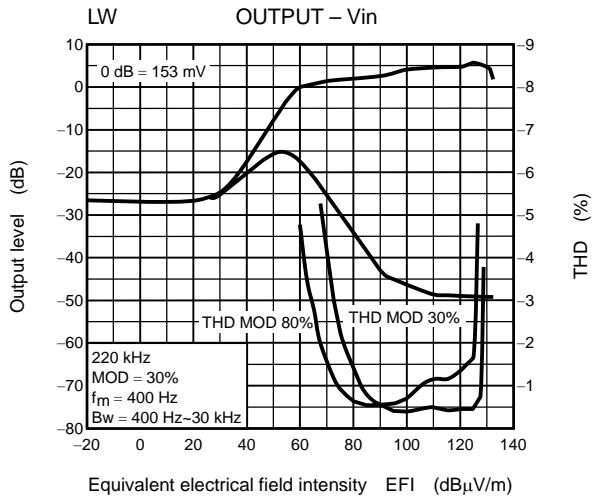


Example of Printed Circuit Board Pattern



TA2099N + TC9256P + tuner pack





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