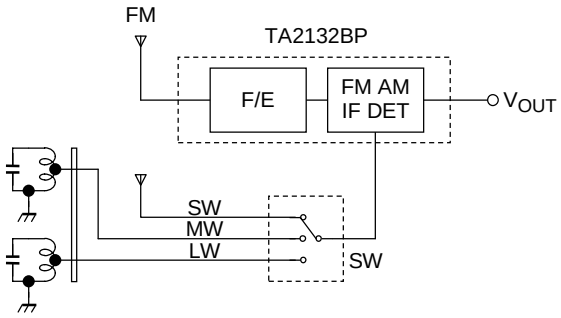
Audio IC Application Circuit

T A N – 3 2 3

Application Circuit Example of 4-Band (FM, SW, MW, LW) 3 V Tuner
TA2132BP

1. Outline



The above is an application circuit example of a 4-band (FM, SW, MW, LW) 3 V tuner.

The TA2132BP is a single-chip FM/AM mono tuner IC. The four-band antenna and local oscillator are switched by a lever switch (6-circuit, 4-contact).

Tracking is adjusted using a multi-band variable capacitor.

2. Ratings

Characteristic	Rating			
	FM	SW	MW	LW
Supply voltage	3 V			
Signal frequency range	87~108.8 MHz	5.7~15.5 MHz	508~1650 kHz	140~285 kHz
Intermediate frequency	10.7 MHz	455 kHz		
Sensitivity	13.5dBμV EMF (S/N = 30dB)	7dBμV EMF (V_O = 10 mVrms)	33.5dBμV/m (V_O = 10 mVrms)	48dBμV/m (V_O = 10 mVrms)

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3. Precautions for Use

FM:

(1) Be sure to insert a bypass capacitor between V_{CC} and the IC's GND pins (pins 5 and 8). If a bypass capacitor is not inserted, oscillation may occur at low input. Also be sure to minimize common impedance from the printed circuit board pattern.

(2) Insert an inductor (10 μH) as decoupling in the power line connecting the V_{CC} (pin 5) to the RF tank circuit, OSC circuit, and pin 14. This improves the stability of the S curve.

(3) Insert a bypass capacitor (0.033 μF or higher) between RF V_{CC} and the RF GND pins (pins 14 and 2). If 0.022 μF or lower is used, beat or oscillation may occur.

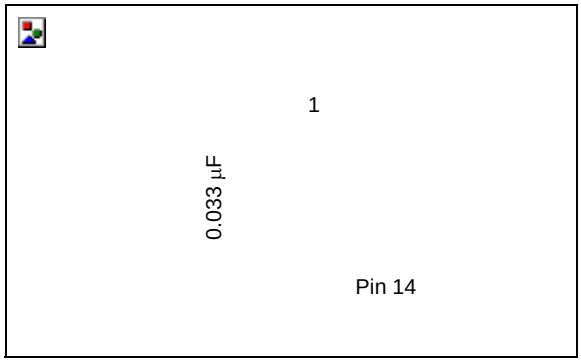


Figure 1

(4) For adjustment-free operation, a discriminator CDA 10.7MG92C (Murata) is used for the detector.

MW:

(1) The decoupling capacitor (0.033 μF) connected to the V_{CC} line between pin 5 and the RF tank and OSC circuits reduces interference such as high-frequency noise.

(2) As the AM ceramic filter, SFU455B (Murata) is used.

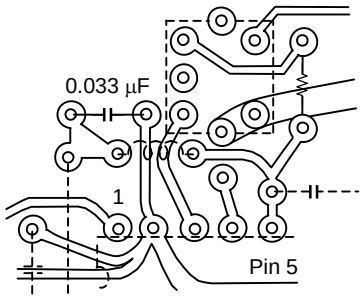
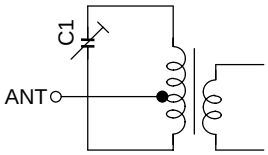


Figure 2

SW:

The antenna circuit (primary tuning transformer side) has a full tap to improve sensitivity. Stray capacitance, which depends on the printed circuit board pattern, cannot be ignored. The trimmer capacitance (C1) may exceed the range when adjusting the sensitivity.
In such a case, reduce the stray capacitance using a transformer with a tap.



SW antenna coil

Figure 3

Other precautions

- AM gain increase
  When sensitivity is insufficient for MW or LW, increase the number of turns of antenna coil on the secondary transformer.

- Padding capacitor
  The AM antenna and the local oscillator circuits are switched using the multi-band variable capacitor. Thus, capacitance must be determined according each band frequency. Use a padding capacitor with small capacitance error and high Q.

- SW test circuit (ANT)
  The SW characteristics are measured using the pseudo antenna circuit shown in Figure 4 below.

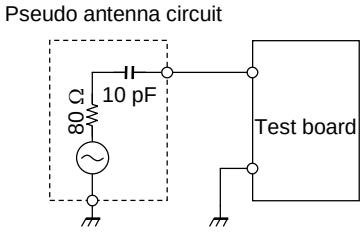


Figure 4

- AM local oscillator
  The distance from the oscillator for multi bands to pin 12 is long due to restrictions on component allocation. As a result, some faults such as parasitic oscillation, oscillation halt, and undesirable local oscillation may be caused.
  Especially when the pattern line is long, the AC impedance component cannot be ignored. Oscillation may occur in the parasitic circuit shown in Figure 5. The oscillation can be avoided by inserting a resistor (75 Ω) in series.

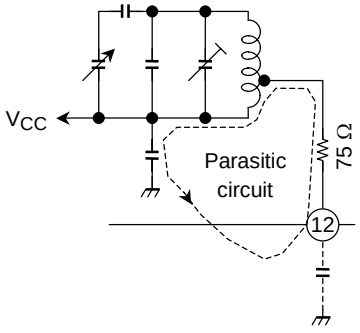
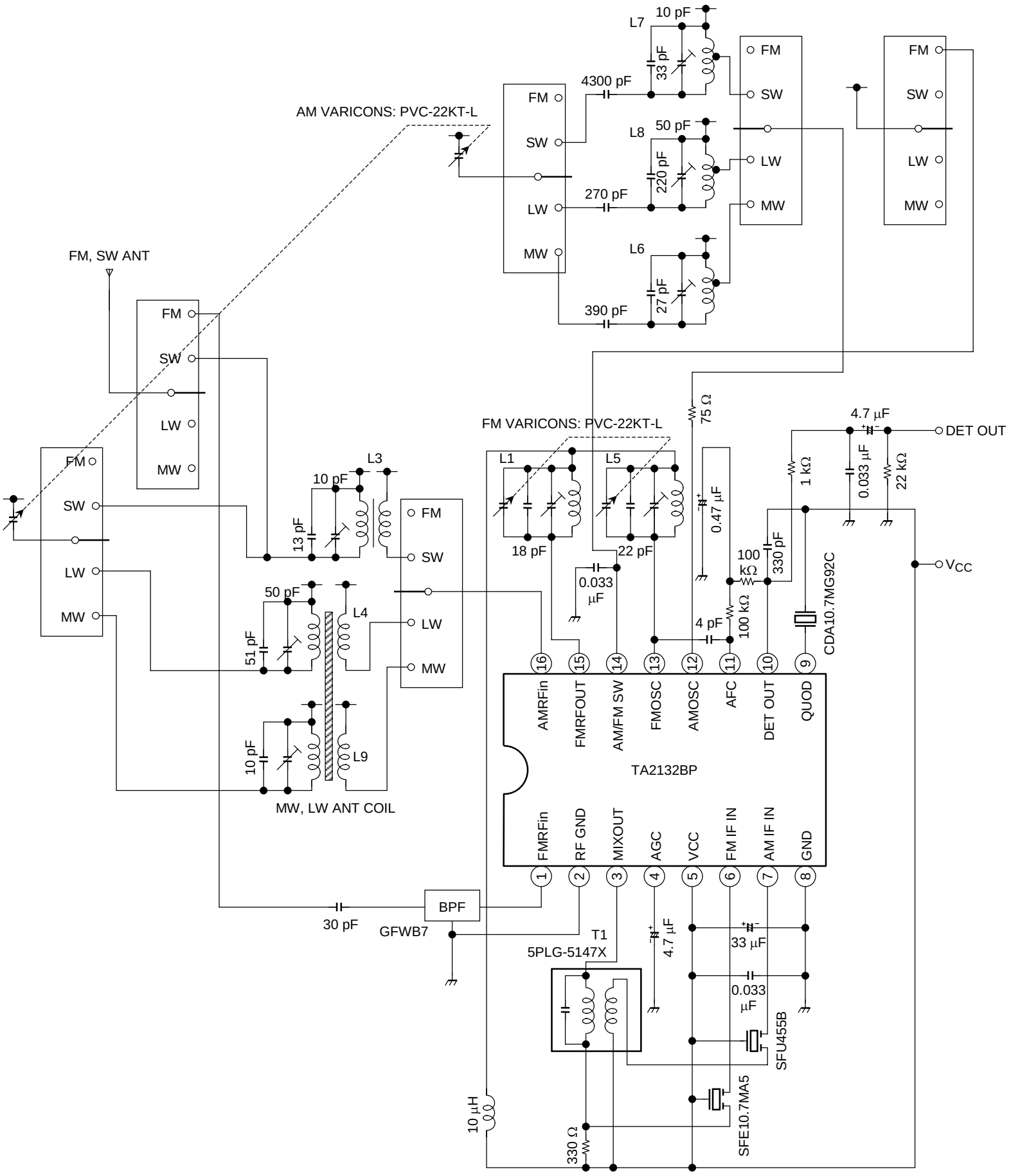


Figure 5

TA2132BP-4BAND (FM, SW, MW, LW)
Application Circuit

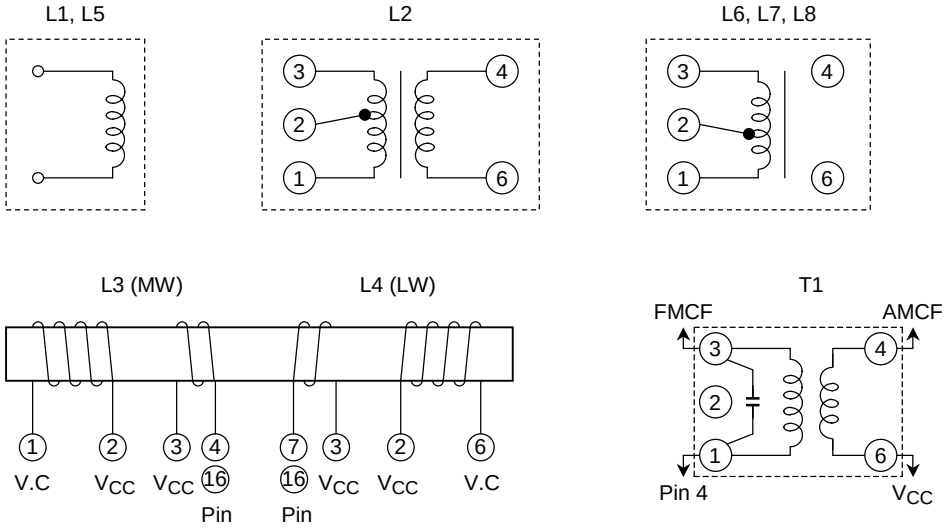


Coil Specification

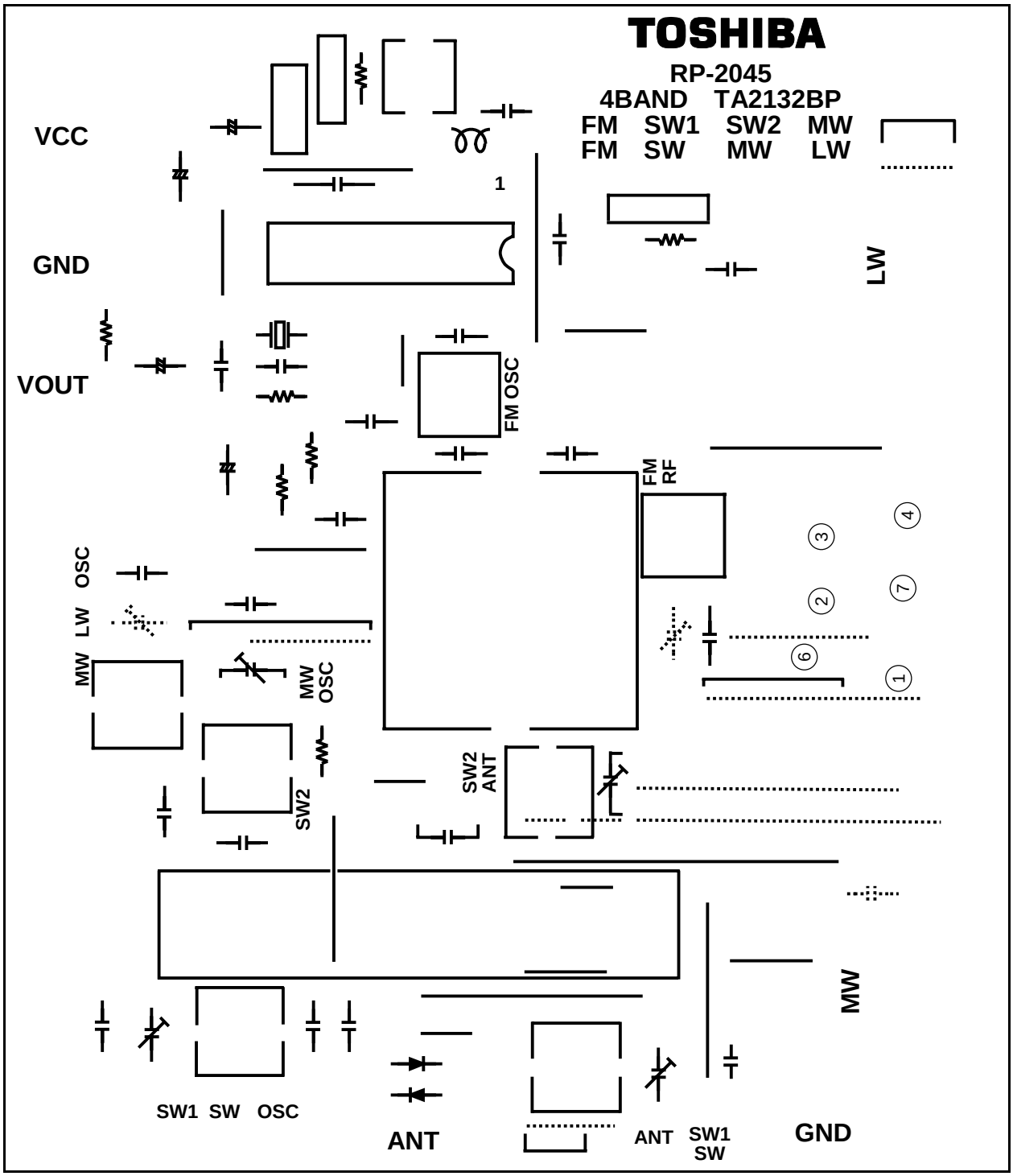
No.	Stage	f (Hz)	L (μH)	C (pF)	Q	Turns				Wire (mm)	Note
						1-2	2-3	1-3	4-6		
L1	FM RF	100 M	0.06	—	100	—	—	$2\frac{1}{4}$	—	0.5 ϕ UEW	(S) 0258-000-021
L2	SW ANT	7.96 M	2.1	—	105	3	7	10	8	0.08 ϕ MUEW	(S) 4148-3167-063
L3	MW ANT	796 k	285	—	200	69	—	13 (3-4)	—	7/0.07 ϕ UATC	(M) MSE-0118-1
L4	LW ANT	252 k	2910	—	100	—	—	218 (2-6)	16 (7-3)	4/0.07 ϕ USTC	
L5	FM OSC	100 M	0.045	—	100	—	—	$1\frac{3}{4}$	—	0.5 ϕ UEW	(S) 0258-000-020
L6	SW OSC	7.96 M	1.85	—	85	6	5	11	—	0.1 ϕ UEW	(S) 2158-4095-508
L7	MW OSC	796 k	120	—	120	13	56	—	—	0.07 ϕ UEW	(T) A7BRS-12552Y
L8	LW OSC	796 k	170	—	120	29	63	92	—	0.07 ϕ UEW	(S) 4155-2239-074A
T1	MW IFT	455 k	—	470	60	—	—	109	7	0.05 ϕ UEW	(T) 5PLG-5147X

S: SUMIDA ELECTRIC CO., LTD
M: MITSUMI (SEGAMAT) SDN. BHD
T: Toko, inc

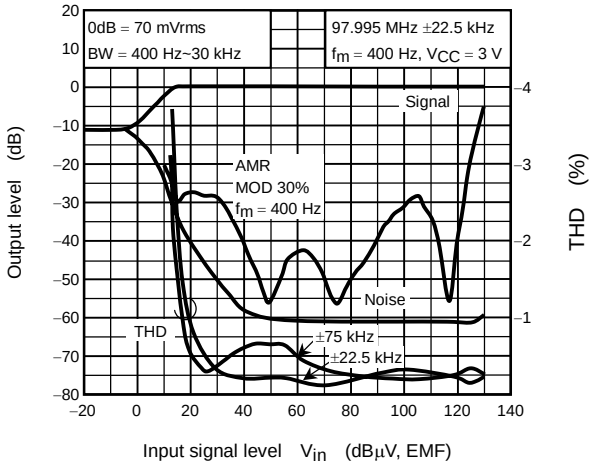
Pin Connections (Bottom view)



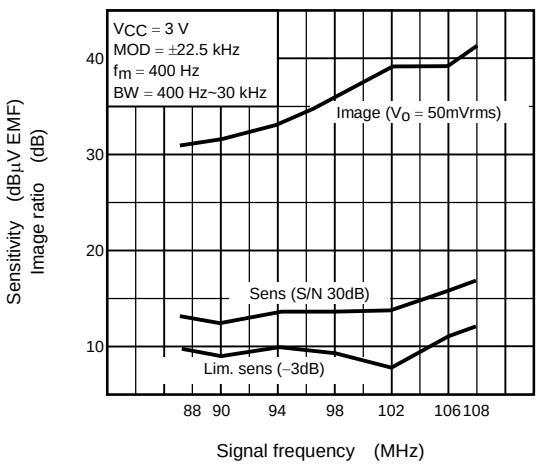
Example of Printed Circuit Board Pattern



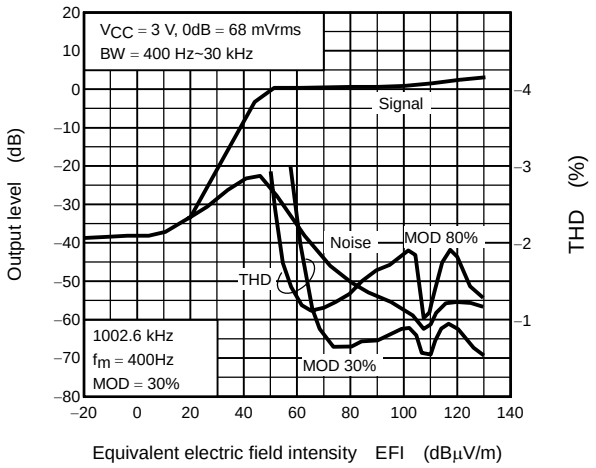
FM OUTPUT – V_{in}



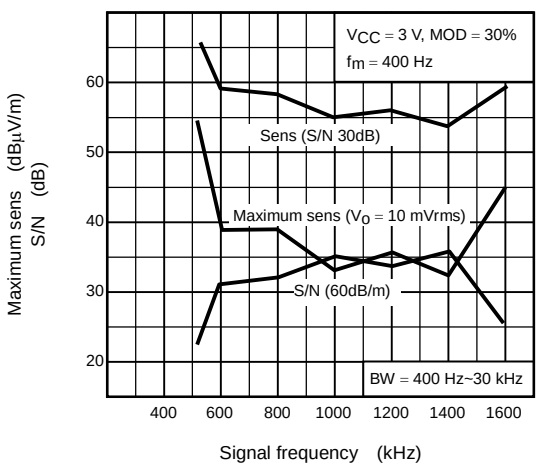
FM Sens, Im Rej – f_s



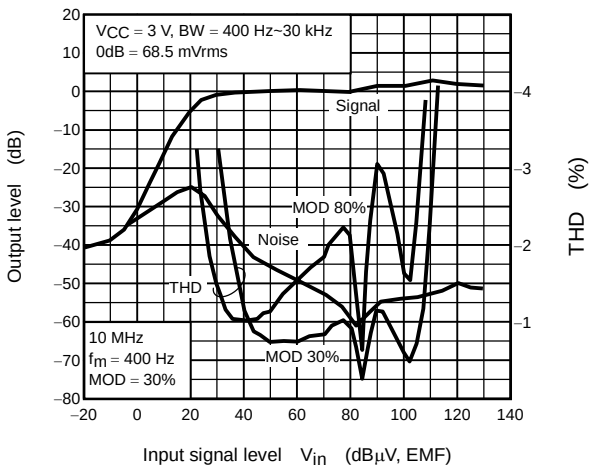
MW OUTPUT – V_{in}



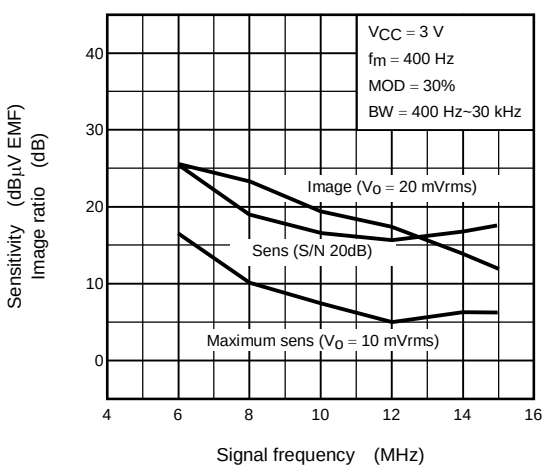
MW Maximum Sensitivity ·S/N



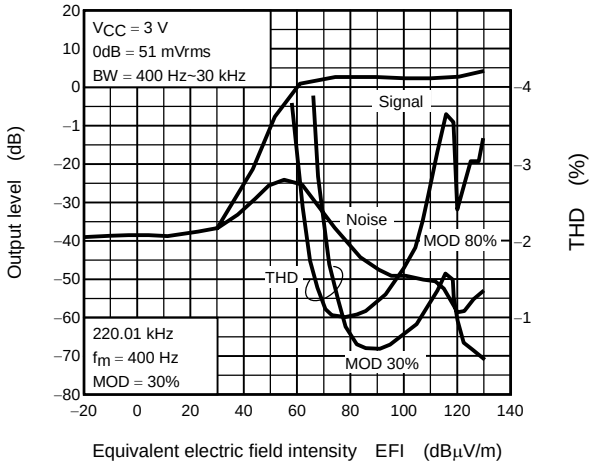
SW OUTPUT – V_{in}



SW Sensitivity – Image ratio



LW OUTPUT – V_{in}



LW Maximum Sensitivity ·S/N