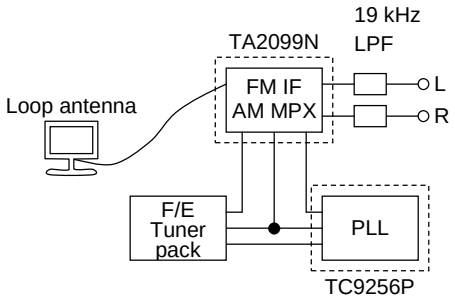
Audio IC Application Circuit

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.

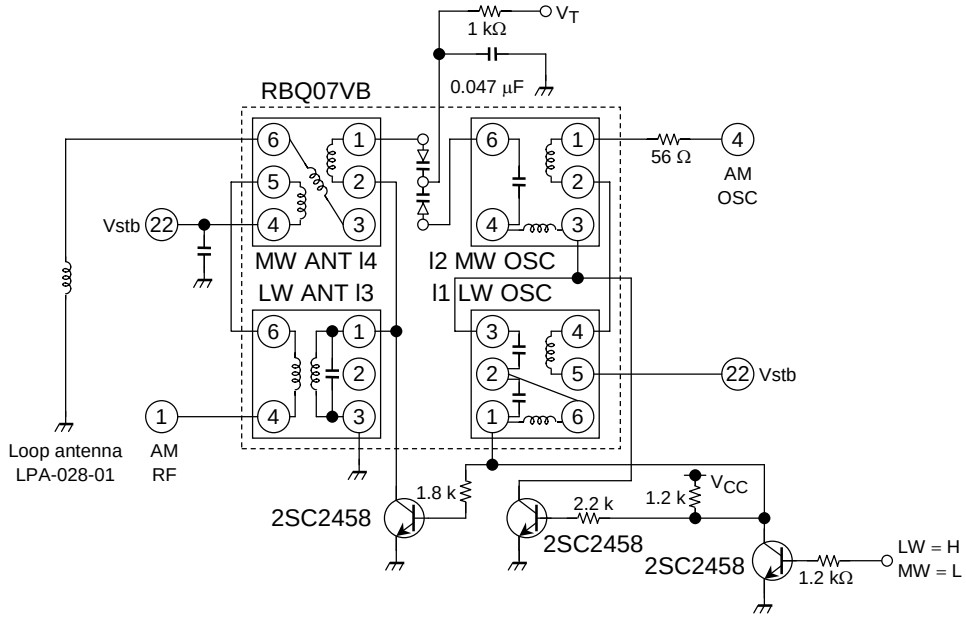
The circuit is comprised of a TFFJ4E567A tuner pack for F/E (by Alps Electric Co. Ltd.), a single-chip TA2099N featuring FMIF, MPX and AM, and a TC9256P as the PLL block.

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 dBμV EMF (S/N = 30 dB)	35 dBμV/m (V_O = 20 mVrms)	39 dBμV/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 MHz, f_m = 1 kHz, Δf = 75 kHz	—	22	28	dB/μV
Image block ratio	—	f_r = 108 MHz	75	80	—	dB
Output voltage for local oscillator	—	—	40	90	—	mV_{rms}

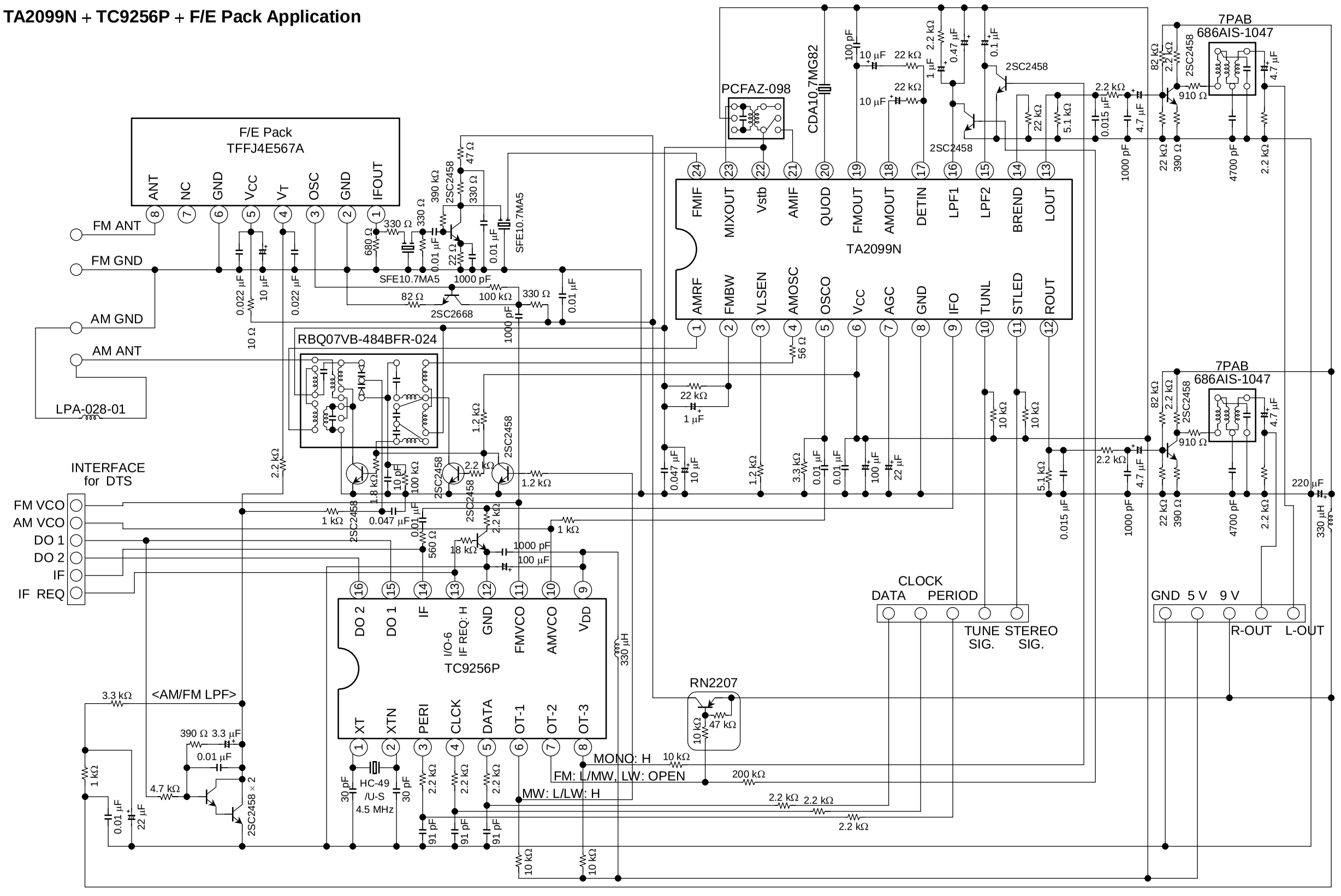
3) Pin lever setting for each function switch of TC9256P

<Crystal oscillator>
4.5 MHz

<IF pins>
On an IF request, I/O-6 (13-pin) is set to H.
$IF_{IN}1$ 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.

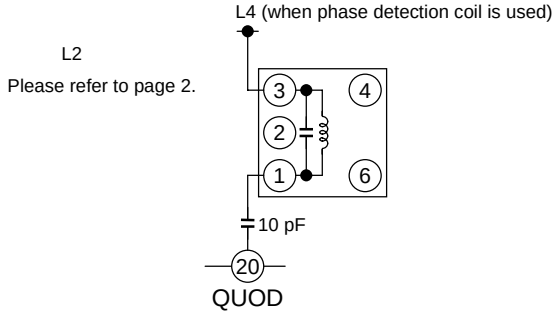
TA2099N + TC9256P + F/E Pack Application



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)	l1	796k	312.0	—	83	82 pF	270 pF	—	35 (4-5)	105½ (6-1)	0.055φ3UEW	RBQ07VB 484BFR-024@T
	MW OSC (red)	l2	796k	117.0	—	85 (min)	20	—	—	60½ (3-4)	430 pF	0.09φ2UEW	
	LW RF (black)	l3	252k	7500	—	60 (min)	363	17	380	—	105	0.06φ3UEW	
	MW RF (black)	l4	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

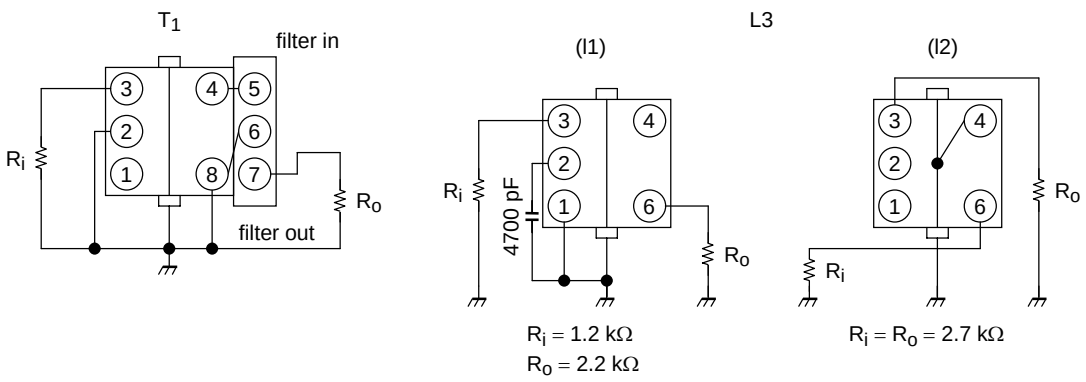
(Underside) T: Toko, inc



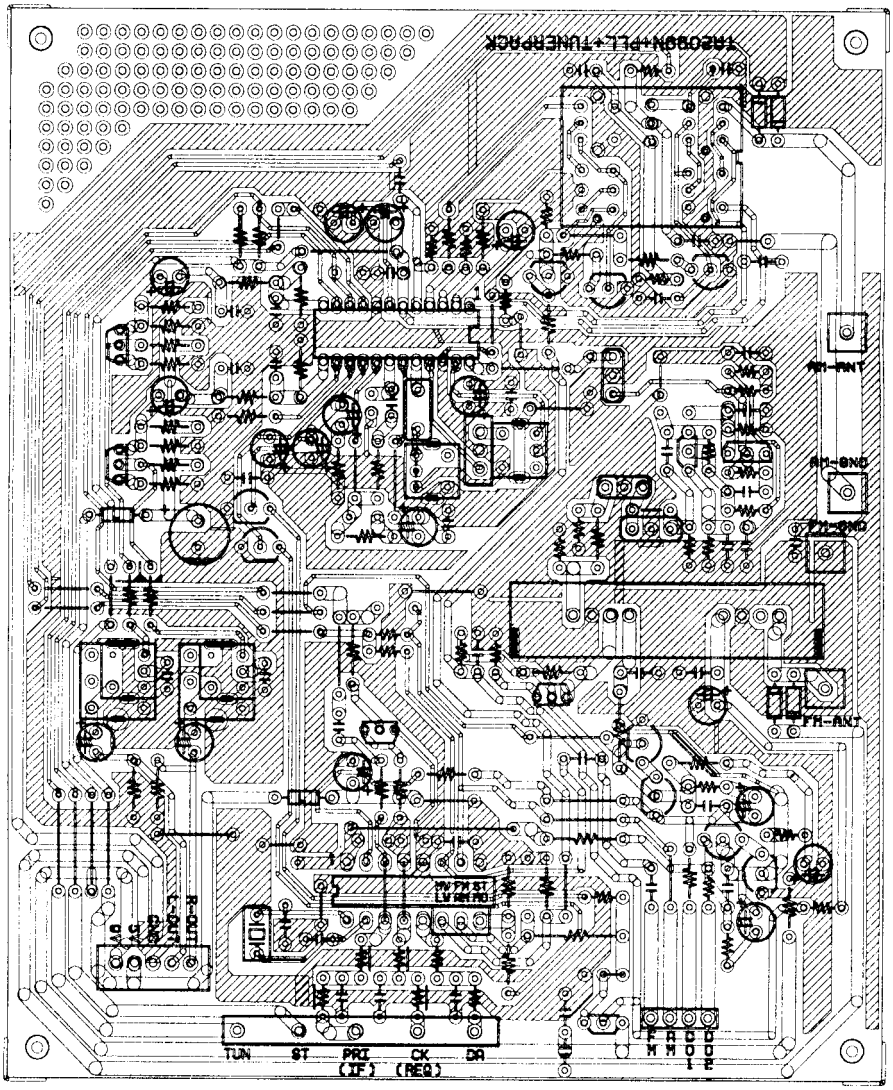
No.	Stage	Center Frequency (fo)	6 dB Bandwidth	Selectivity (±9 kHz)	Ripple in 6 dB Band	Note
T_1	AM IFT + Filter	450.0 + 1.2 kHz	5 kHz (min)	16 dB (min)	0.8 dB (max)	PCFAZ-098@T

No.	Stage			15 kHz ATT	19 kHz ATT	38 kHz ATT	Note
L3	19 kHz LPF	l1	(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)	
		l2	(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

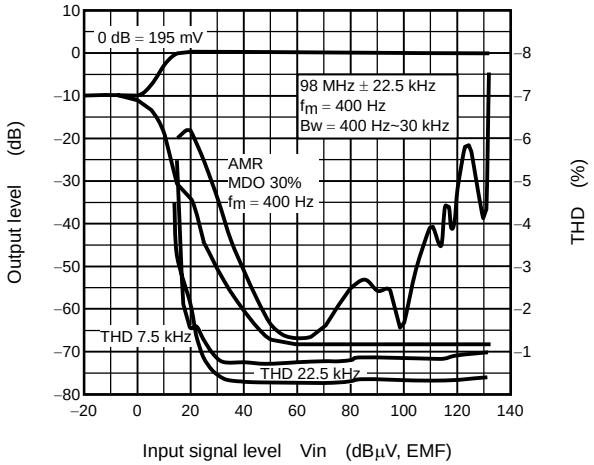


Example of Printed Circuit Board Pattern

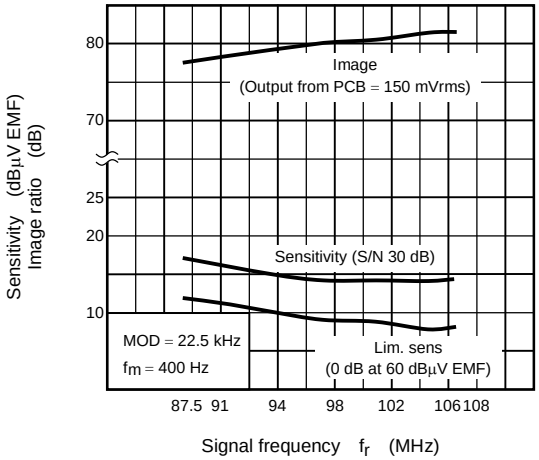


TA2099N + TC9256P + tuner pack

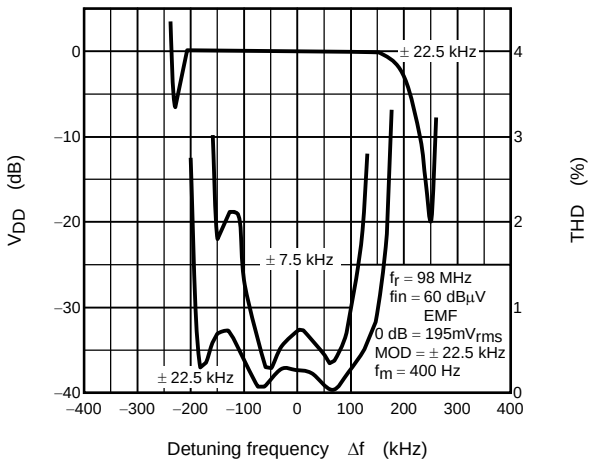
FM OUTPUT – Vin



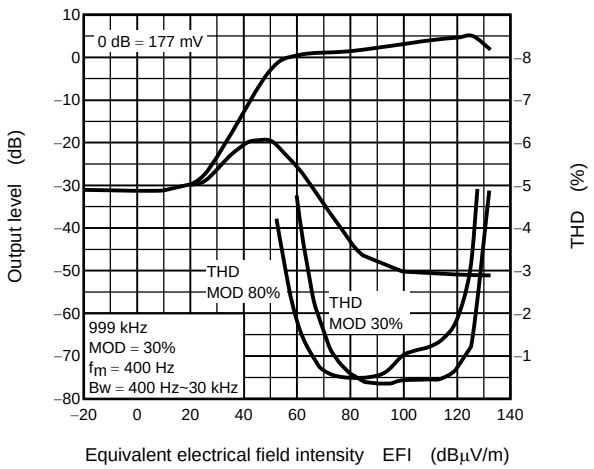
FM Sensitivity, Im Rej – f_S



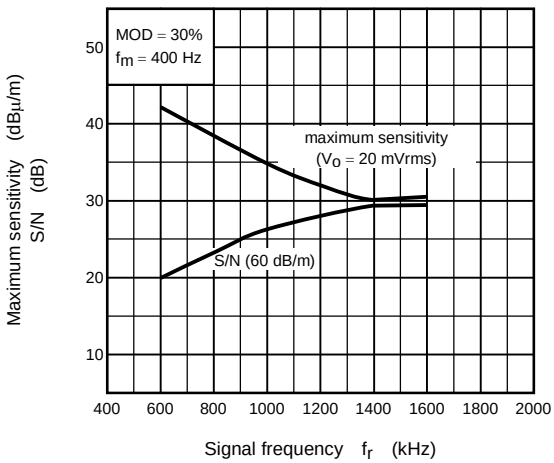
FM OUTPUT – Δf



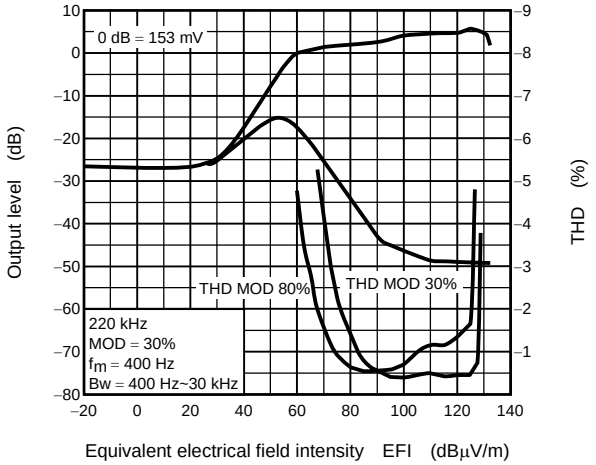
MW OUTPUT – Vin



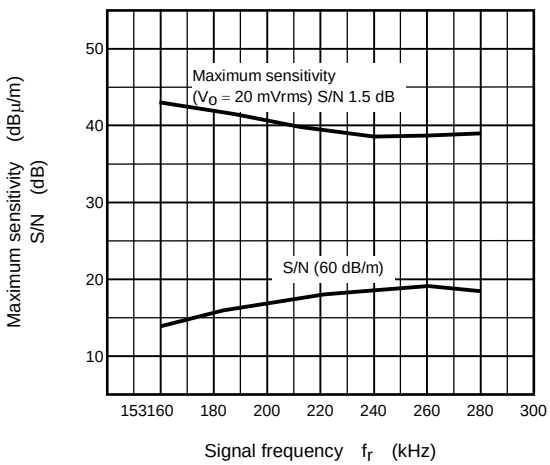
MW Maximum Sensitivity･S/N



LW OUTPUT – Vin



LW Maximum Sensitivity·S/N



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