



# LA1600

## 1-Band AM Radio

### Overview

The LA1600, being an AM tuner IC placed in a 9-pin SIP, provides the functions of an AM tuner. It is usable in the band range up to SW band and is especially suited for use in low-cost AM radios and radio-controlled receivers.

### Functions

- AM : RF amp, MIX, OSC, IF amp, detector, AGC.

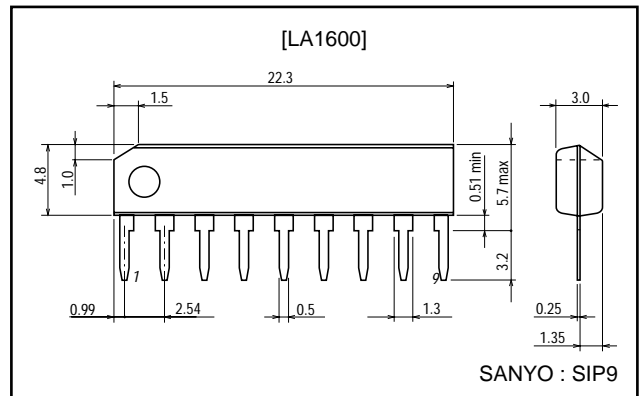
### Features

- Minimum number of external parts required.
- Low current drain (3.7mA).
- Low supply voltage (1.8V min).
- Adoption of double-balanced mixer.
- Usable in the band range up to SW band.

### Package Dimensions

unit : mm

#### 3017B-SIP9



### Specifications

**Maximum Ratings** at Ta=25°C, See specified Test Circuit.

Parameter	Symbol	Conditions	Ratings	Unit
Maximum supply voltage	V <sub>CC</sub> max	Pin 3	9	V
		Pin 4	9	V
		Pin 8	7	V
Allowable power dissipation	P <sub>d</sub> max	Ta≤70°C	100	mW
Operating temperature	T <sub>opr</sub>		-20 to +70	°C
Storage temperature	T <sub>stg</sub>		-40 to +125	°C

### Operating Conditions

at Ta=25°C

Parameter	Symbol	Conditions	Ratings	Unit
Recommended operating voltage	V <sub>CC</sub>		3	V
Operating voltage range	V <sub>CC</sub> op		1.8 to 6.0	V

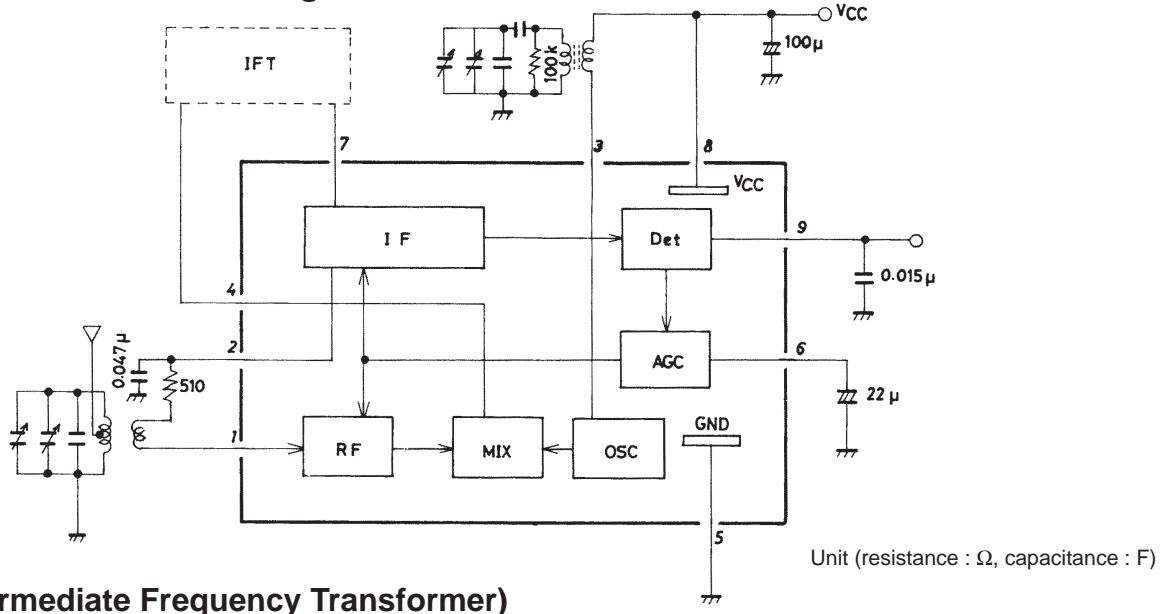
### Operating Characteristics

at Ta=25°C, V<sub>CC</sub>=3V, See specified Test Circuit.

Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
[AM Characteristics/f=1MHz]						
Quiescent current	I <sub>cco</sub>	V <sub>IN</sub> =No input		3.7	4.6	mA
Detection output	V <sub>O1</sub>	V <sub>IN</sub> =23dBμ, 1kHz-30% mod	-30	-25	-20	dBm
			24	43	78	mV
	V <sub>O2</sub>	V <sub>IN</sub> =80dBμ, 1kHz-30% mod	-18	-14	-10	dBm
			97	155	250	mV
S/N	S/N1	V <sub>IN</sub> =23dBμ	18	21.5		dB
	S/N2	V <sub>IN</sub> =80dBμ	48	53		dB
Total harmonic distortion	THD1	V <sub>IN</sub> =80dBμ, 1kHz-30% mod		0.3	1.2	%
	THD2	V <sub>IN</sub> =100dBμ, 1kHz-30% mod		0.4	1.5	%

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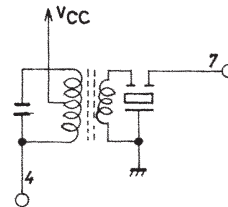
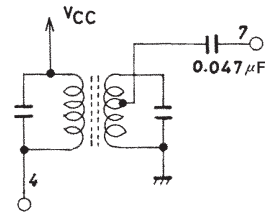
## Equivalent Circuit Block Diagram



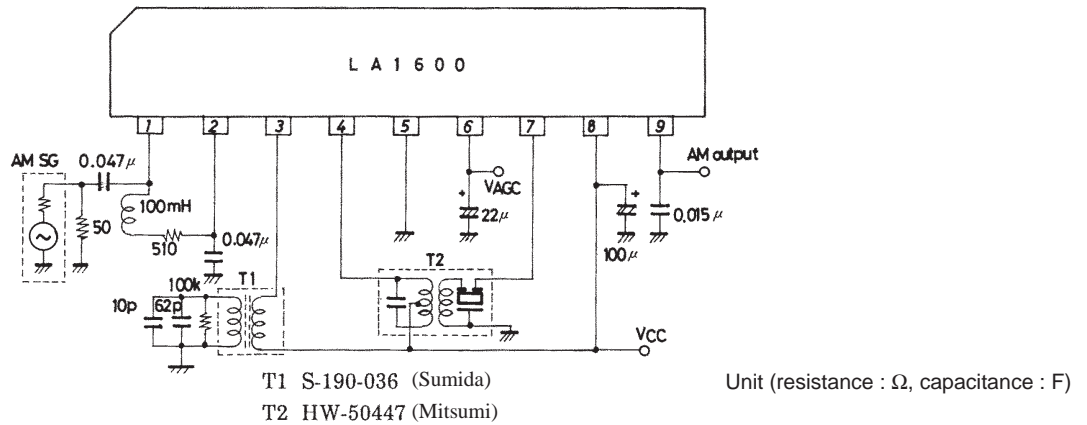
## IFT (Intermediate Frequency Transformer)

1. Using double tuning coil

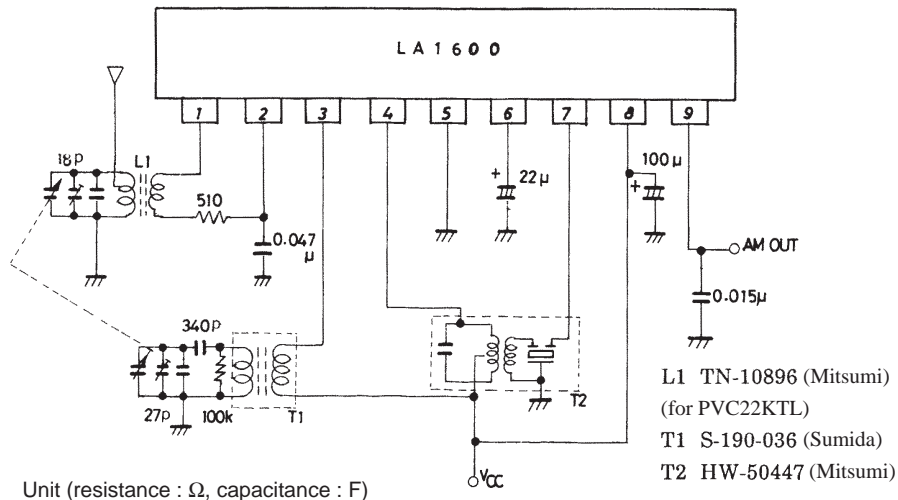
2. Using ceramic filter



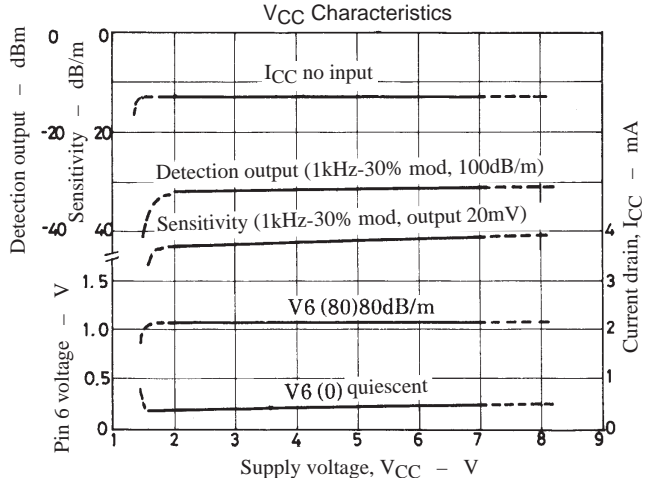
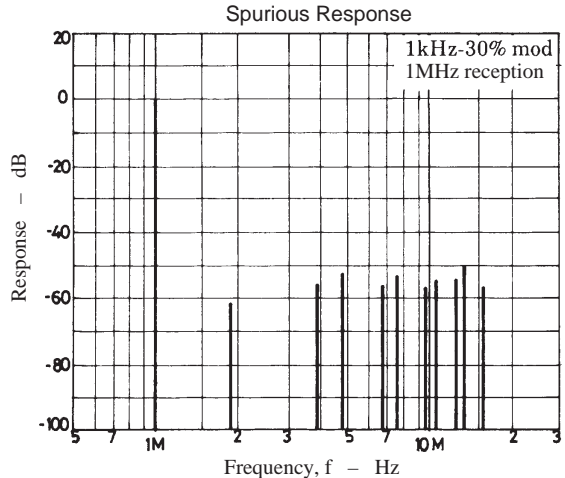
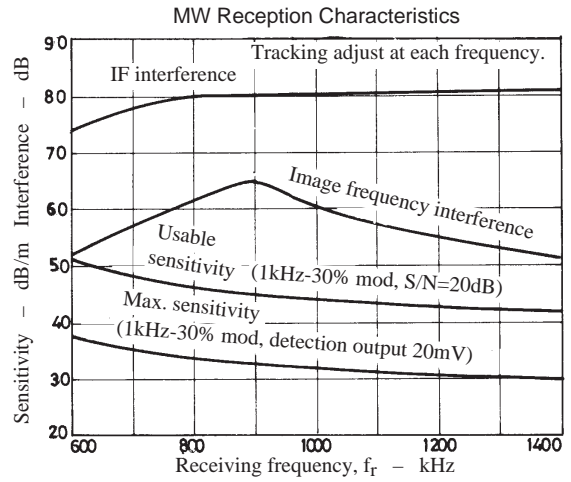
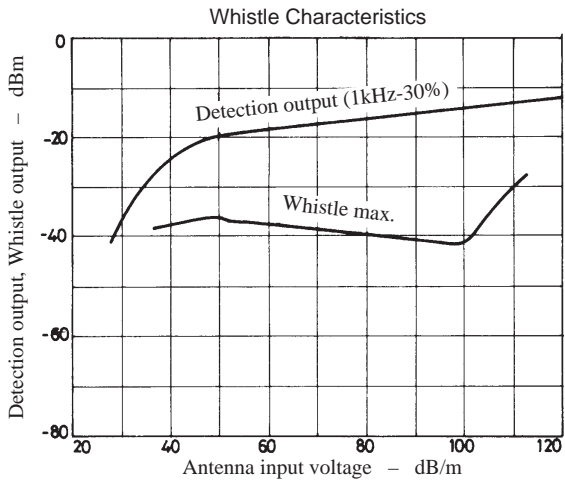
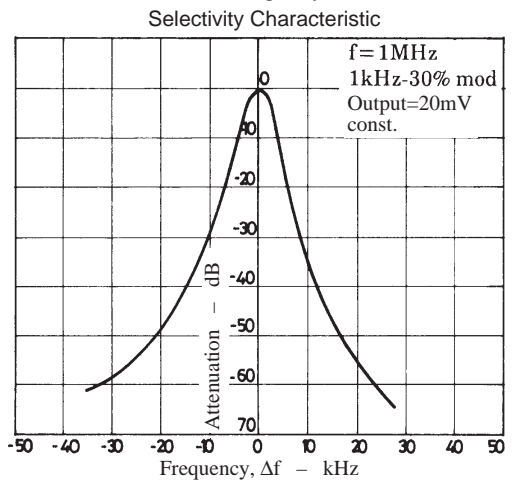
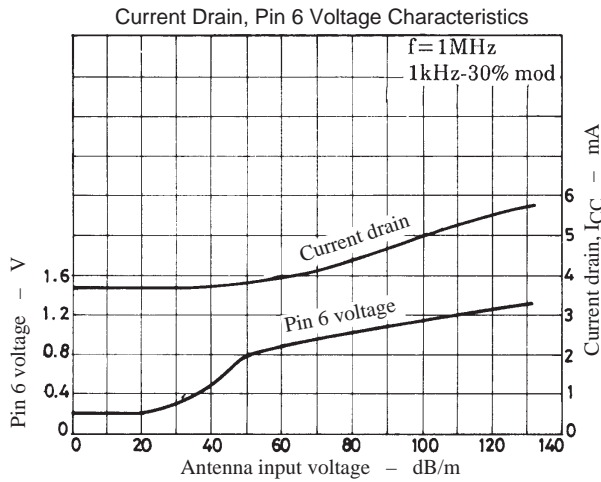
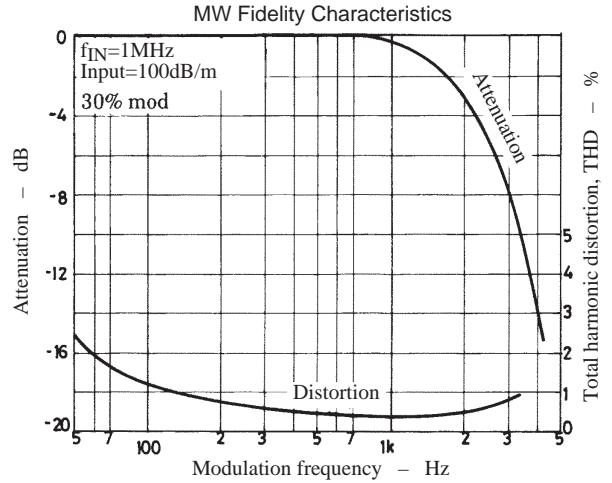
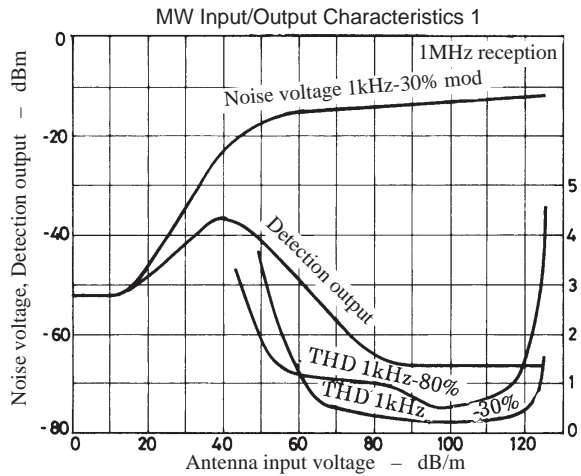
## Specified Test Circuit Diagram



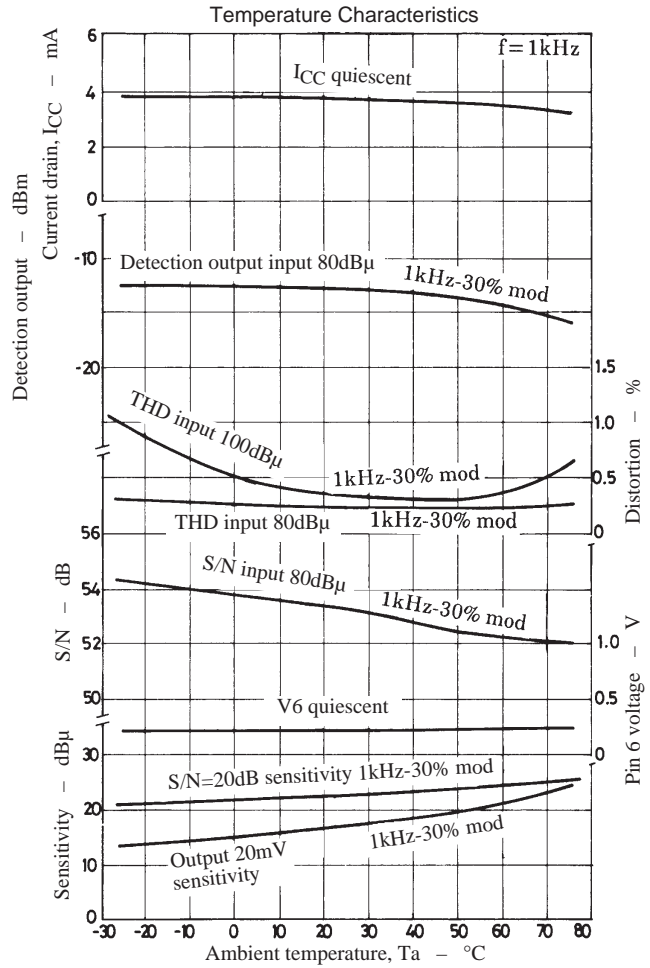
## Test Circuit 1 : AM-MW



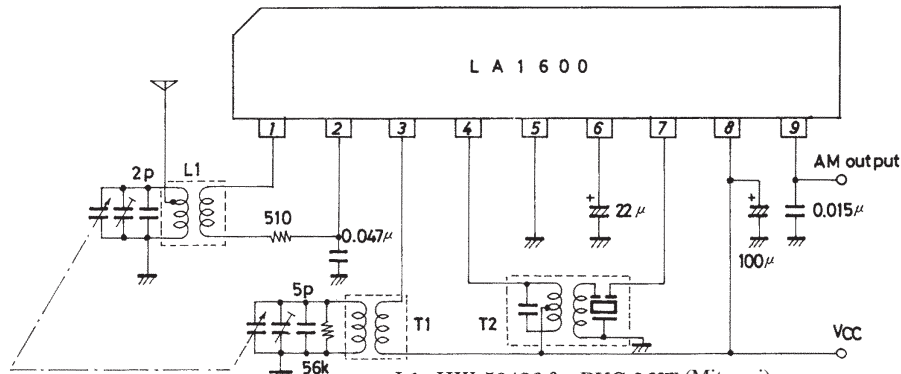
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## Test Circuit 2 : AM-MW

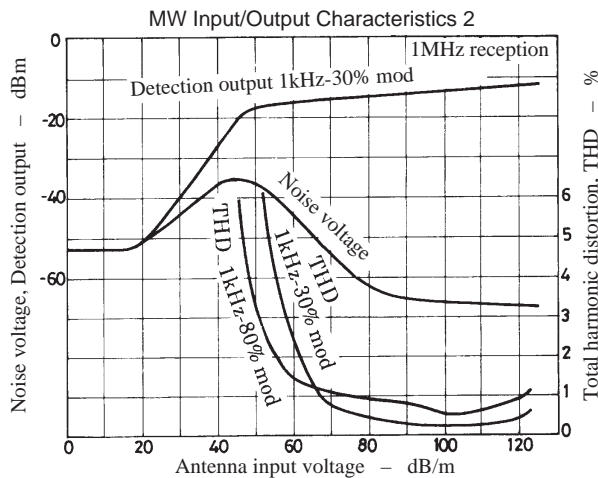


L1 : HW-50426 for PVC-LYT (Mitsumi)

T1 : HW-50425 (Mitsumi)

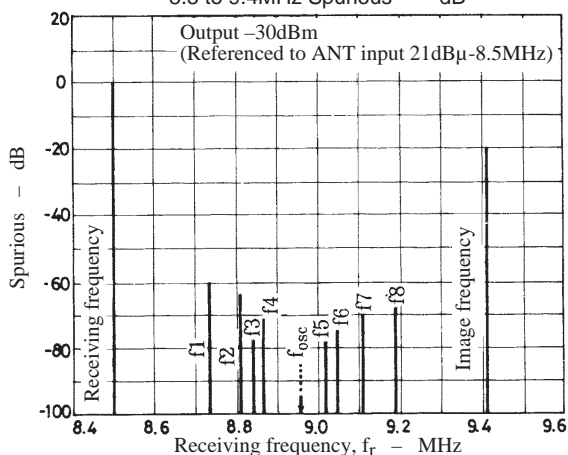
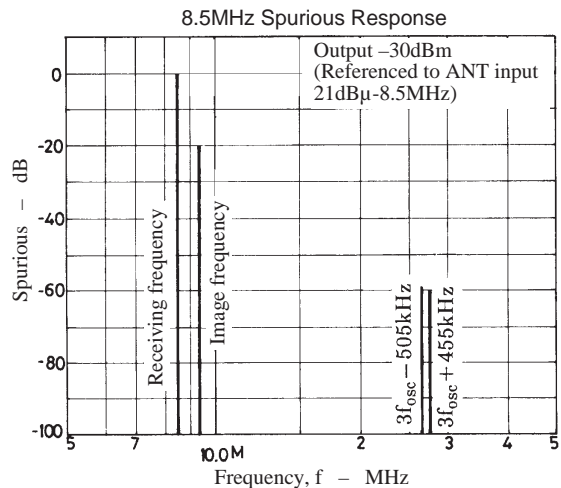
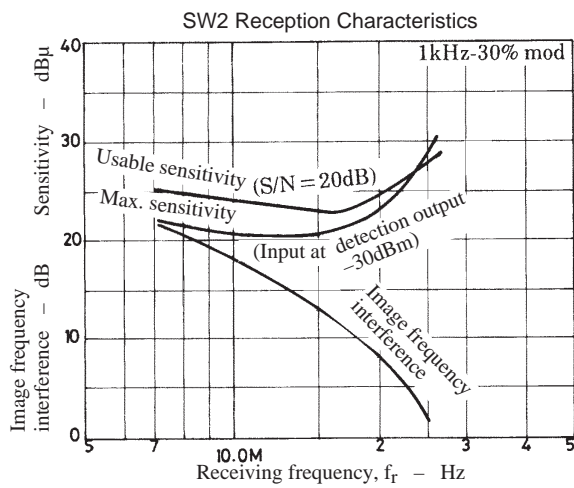
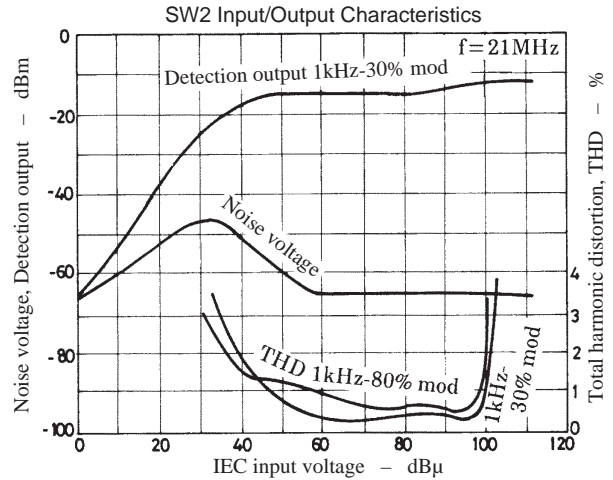
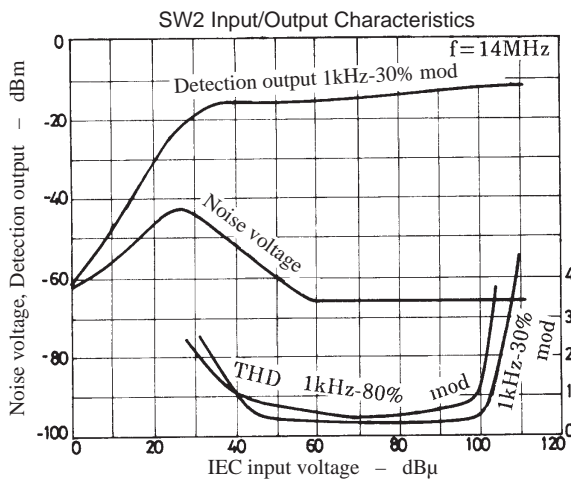
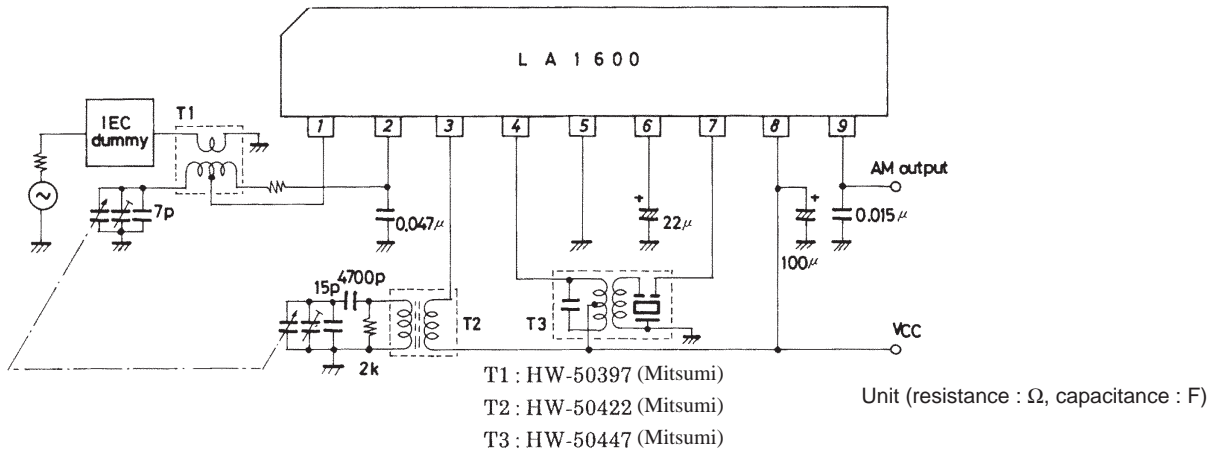
T2 : HW-50447 (Mitsumi)

Unit (resistance : Ω, capacitance : F)



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## Test Circuit 3 : SW2 (7.2 to 24.0MHz)



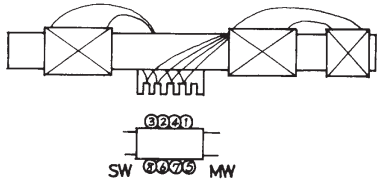
- f1 : 8.7336MHz → 2f<sub>OSC</sub>-2f1 = 455kHz
- f2 : 8.8097MHz → 3f<sub>OSC</sub>-3f2 = 455kHz
- f3 : 8.8478MHz → 4f<sub>OSC</sub>-4f3 = 455kHz
- f4 : 8.8702MHz → 5f<sub>OSC</sub>-5f4 = 455kHz
- f5 : 9.0263MHz → 5f5-5f<sub>OSC</sub> = 455kHz
- f6 : 9.0525MHz → 4f6-4f<sub>OSC</sub> = 455kHz
- f7 : 9.1130MHz → 3f7-3f<sub>OSC</sub> = 455kHz
- f8 : 9.1888MHz → 2f8-2f<sub>OSC</sub> = 455kHz

**Coil Specifications**

MW antenna

Bar antenna (for PVC22KTL)

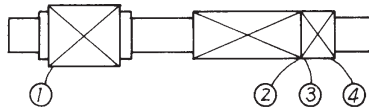
- TN-10896 (Mitsumi)



- ①-② 22T + 49T, ③-④ 10T  
Tight solenoid direct winding
- ⑤-⑥ 17T 0.5φ space winding
- ⑦-⑧ 4T tight solenoid winding
- ①-② L = 260μH, Q<sub>0</sub> = 330 (≥ 200)
- ⑤-⑥ L = 15μH, Q<sub>0</sub> = 250 (≥ 150)

Bar antenna (for PVC-LYT)

- HW-50426 (Mitsumi)

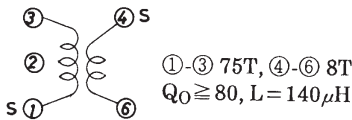


- ①-② 21T + 100T
- ③-④ 30T
- ①-② L = 604μH, Q<sub>0</sub> ≥ 120

MW OSC

- S-190-036 (Sumida)

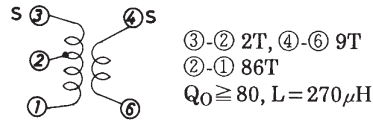
For PVC22KTL



- ①-③ 75T, ④-⑥ 8T
- Q<sub>0</sub> ≥ 80, L = 140μH

- HW-50426 (Mitsumi)

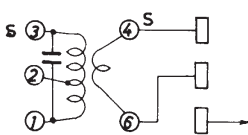
For PVC-LYT



- ③-② 2T, ④-⑥ 9T
- ②-① 86T
- Q<sub>0</sub> ≥ 80, L = 270μH

AM-IFT

- HW-50447 (Mitsumi)



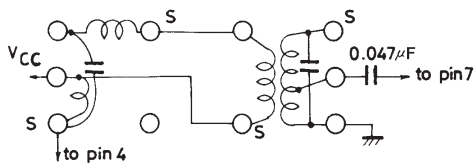
- ①-② 82T, ③-② 70T,
- ④-⑥ 7T
- Q<sub>0</sub> = 110 ± 20%, f = 450kHz
- Internal 180pF
- C.F: SFU450B

AM-IFT

Application where a double tuning coil is used

HW-50475

HW-50498



HW-50475  
(Mitsumi)

- ①-② 80T
- ④-③ 70 1/2T
- Internal 180pF
- Q<sub>0</sub> = 120 ± 20%

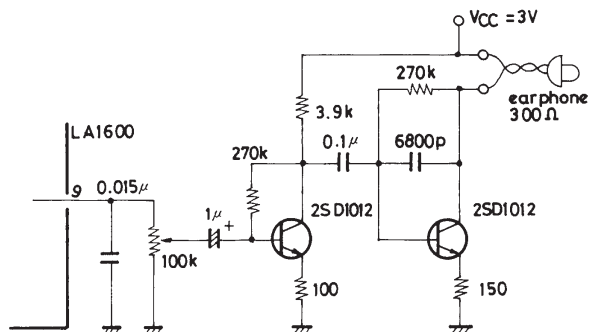
HW-50498  
(Mitsumi)

- ①-② 134T
- ④-⑥ 3T
- ②-③ 18T
- Internal 180pF
- Q<sub>0</sub> = 70 ± 20%

**Sample Application Circuit 1**

Earphone

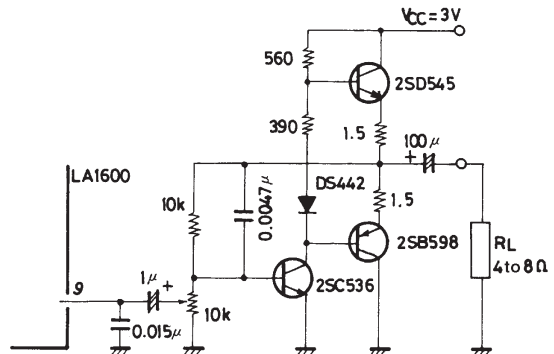
Transistor rank=G280 to 560



**Sample Application Circuit 2**

Power amp using 3 discrete devices

Transistor rank=E100 to 200

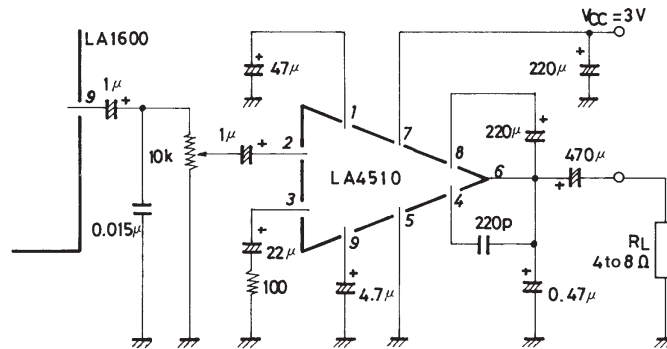


Unit (resistance : Ω, capacitance : F)

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## Sample Application Circuit 3

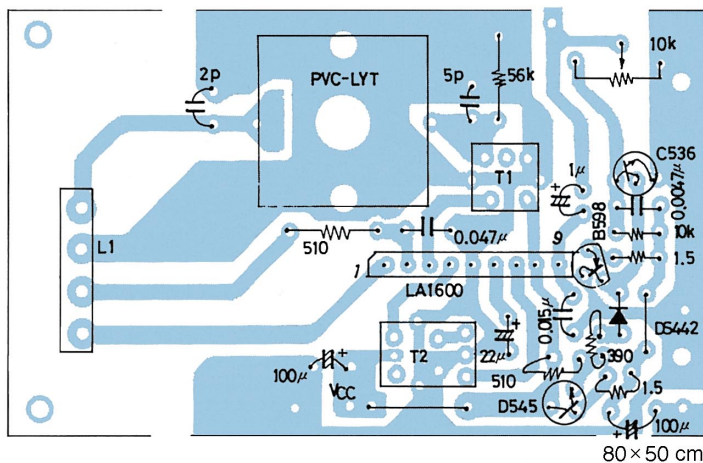
Using the LA4510



Unit (resistance : Ω, capacitance : F)

## Sample Printed Circuit Pattern : LA1600 + Power amp using 3 discrete devices

(For the circuit diagram, refer to Test Circuit 2 and Sample Application Circuit 2.)



L1 : HW-50426 (Mitsumi)  
L1 : HW-50425 (Mitsumi)  
T2 : HW-50447 (Mitsumi)

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