Ordering number : EN2056B

Monolithic Linear IC

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.

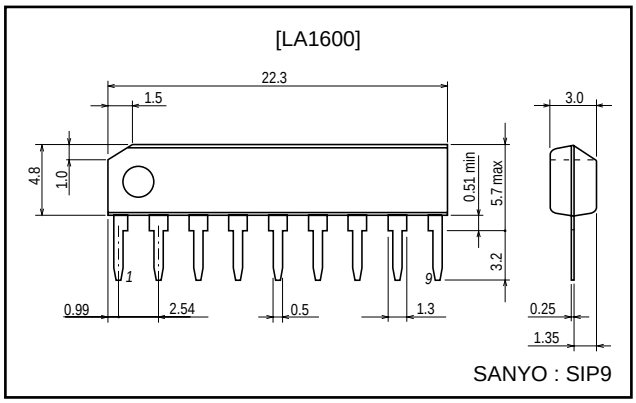
Features

• 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_{CC} max	Pin 3	9	V
		Pin 4	9	V
		Pin 8	7	V
Allowable power dissipation	Pd max	Ta≤70°C	100	mW
Operating temperature	Topr		–20 to +70	°C
Storage temperature	Tstg		–40 to +125	°C

Operating Conditions at Ta=25°C

Parameter	Symbol	Conditions	Ratings	Unit
Recommended operating voltage	V_{CC}		3	V
Operating voltage range	V_{CC} op		1.8 to 6.0	V

Operating Characteristics at Ta=25°C, V_{CC}=3V, See specified Test Circuit.

Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
[AM Characteristics/f=1MHz]						
Quiescent current	Icco	V_{IN}=No input		3.7	4.6	mA
Detection output	V_O1	V_{IN}=23dBμ, 1kHz-30% mod	–30	–25	–20	dBm
			24	43	78	mV
	V_O2	V_{IN}=80dBμ, 1kHz-30% mod	–18	–14	–10	dBm
			97	155	250	mV
S/N	S/N1	V_{IN}=23dBμ	18	21.5		dB
	S/N2	V_{IN}=80dBμ	48	53		dB
Total harmonic distortion	THD1	V_{IN}=80dBμ, 1kHz-30% mod		0.3	1.2	%
	THD2	V_{IN}=100dBμ, 1kHz-30% mod		0.4	1.5	%

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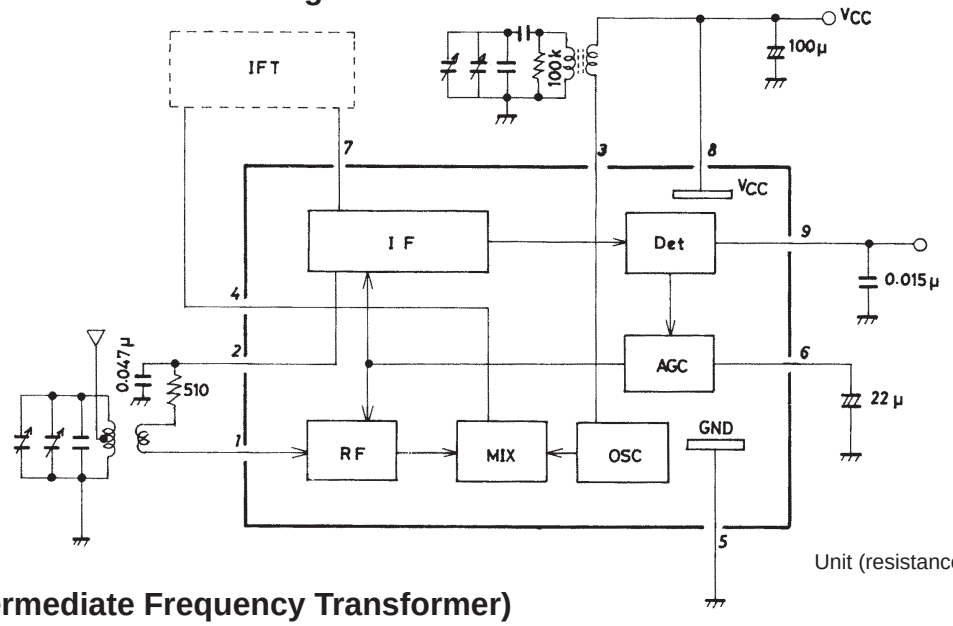
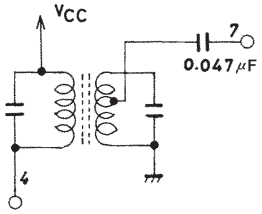
Equivalent Circuit Block Diagram



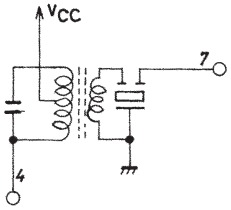
Unit (resistance : Ω, capacitance : F)

IFT (Intermediate Frequency Transformer)

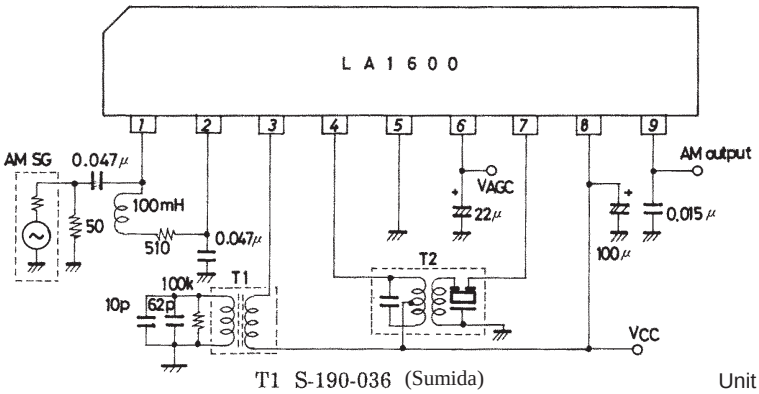
1. Using double tuning coil



2. Using ceramic filter



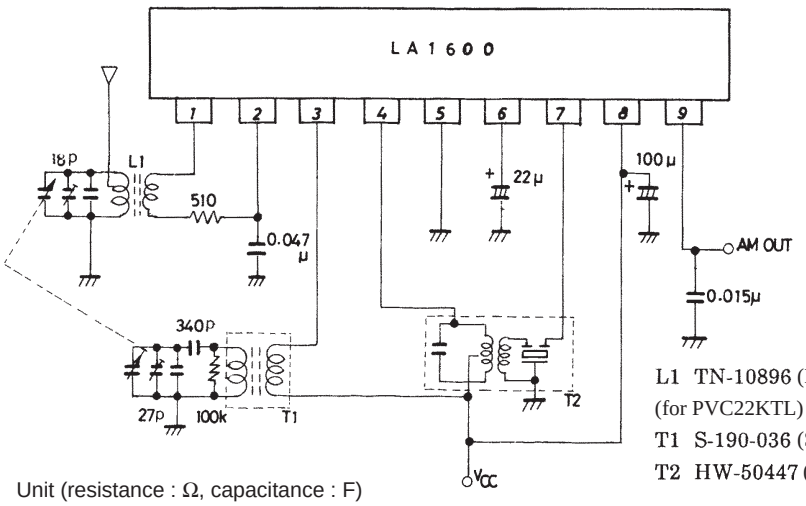
Specified Test Circuit Diagram



T1 S-190-036 (Sumida)
T2 HW-50447 (Mitsumi)

Unit (resistance : Ω, capacitance : F)

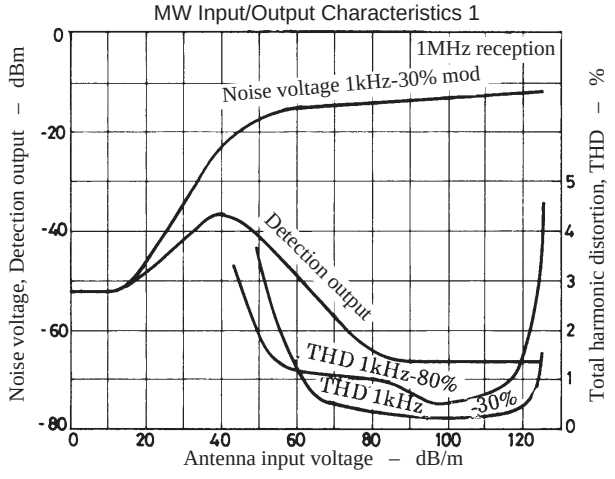
Test Circuit 1 : AM-MW



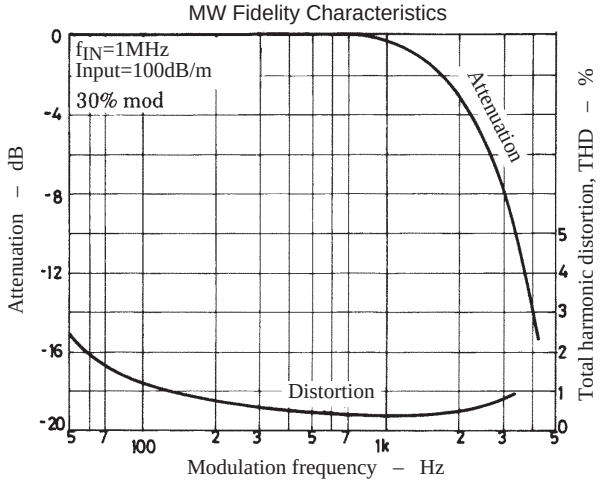
L1 TN-10896 (Mitsumi)
(for PVC22KTL)
T1 S-190-036 (Sumida)
T2 HW-50447 (Mitsumi)

Unit (resistance : Ω, capacitance : F)

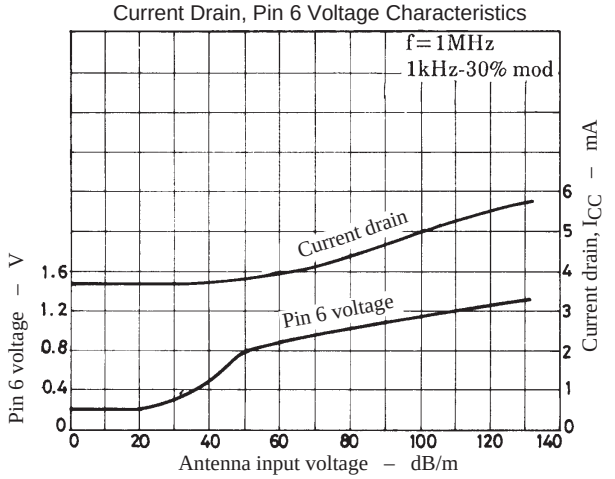
MW Input/Output Characteristics 1



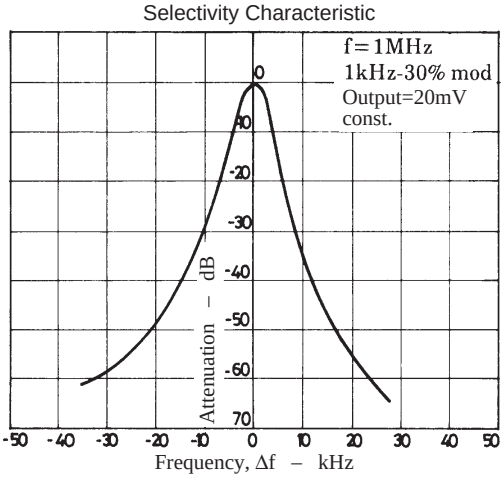
MW Fidelity Characteristics



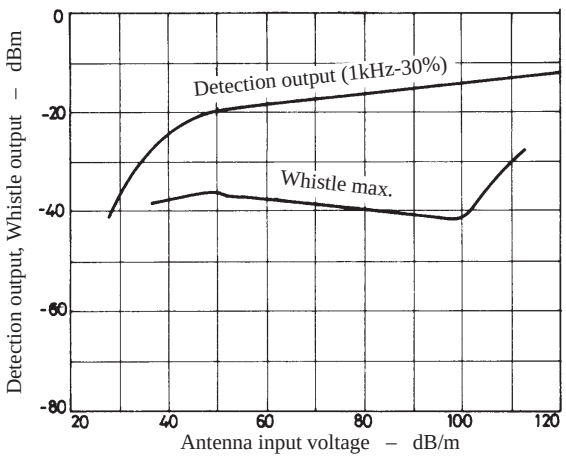
Current Drain, Pin 6 Voltage Characteristics



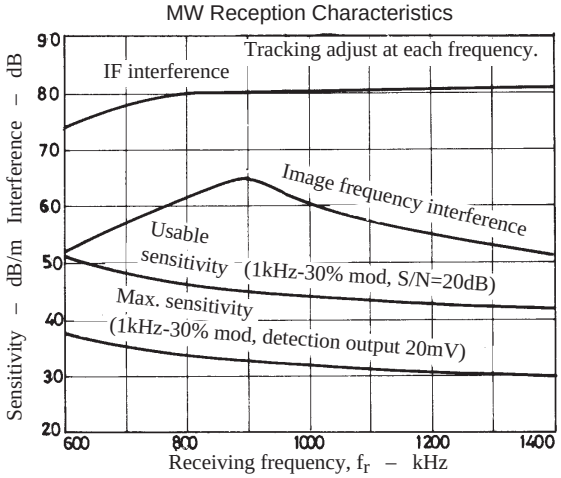
Selectivity Characteristic



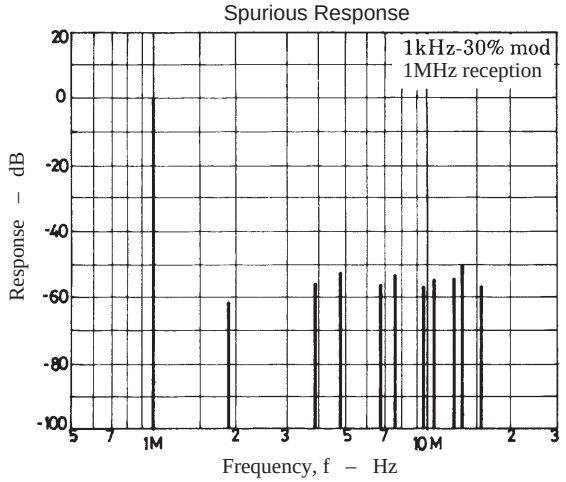
Whistle Characteristics



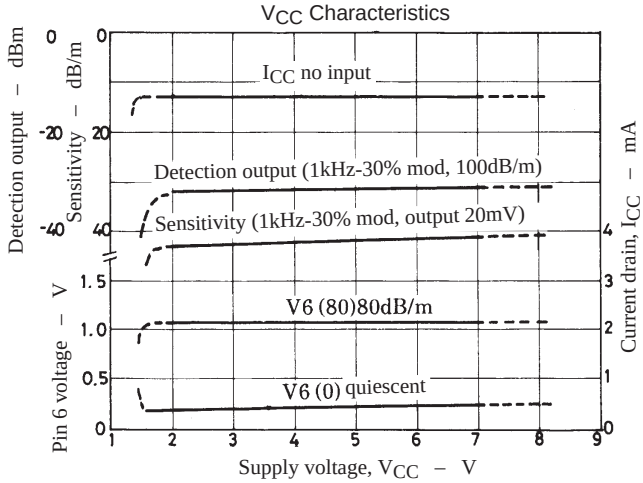
MW Reception Characteristics

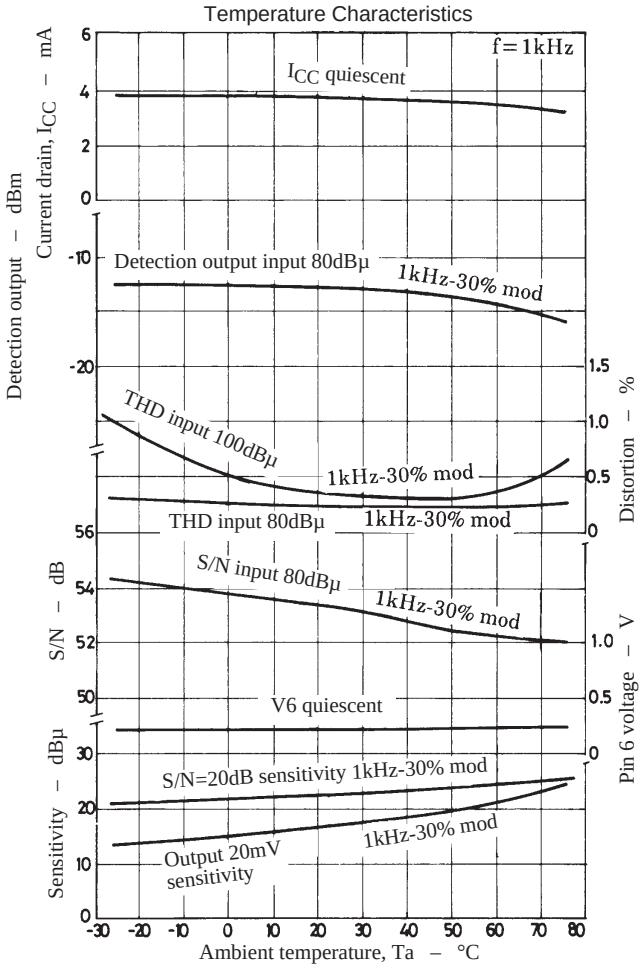


Spurious Response

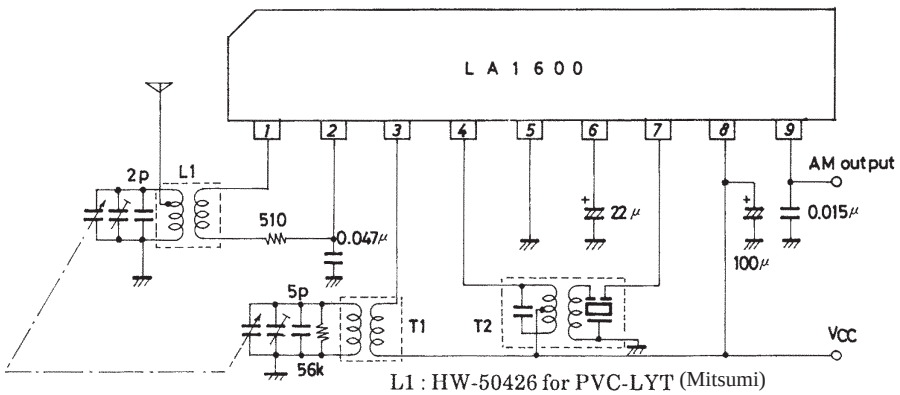


V_{CC} Characteristics



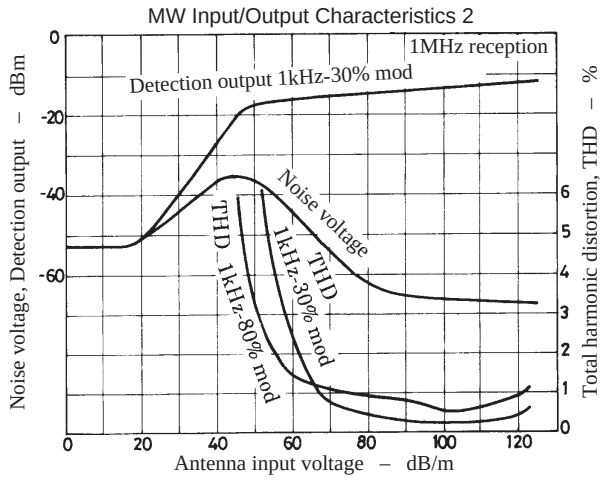


Test Circuit 2 : AM-MW

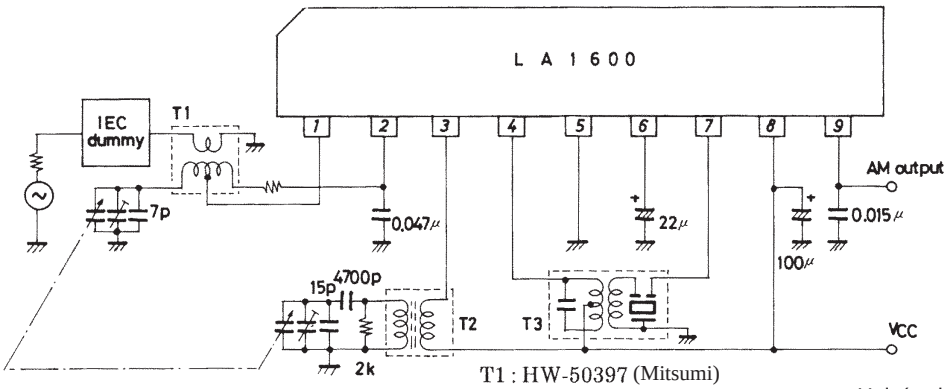


L1 : HW-50426 for PVC-LYT (Mitsumi)
T1 : HW-50425 (Mitsumi)
T2 : HW-50447 (Mitsumi)

Unit (resistance : Ω, capacitance : F)



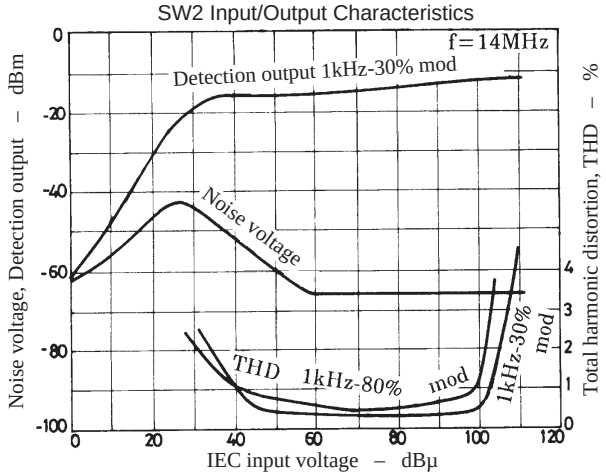
Test Circuit 3 : SW2 (7.2 to 24.0MHz)



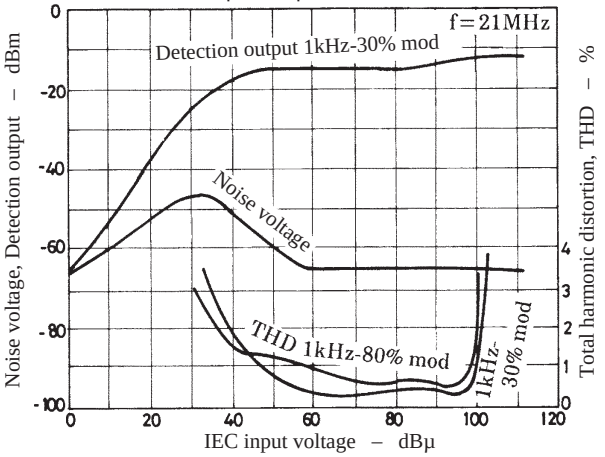
T1 : HW-50397 (Mitsumi)
T2 : HW-50422 (Mitsumi)
T3 : HW-50447 (Mitsumi)

Unit (resistance : Ω, capacitance : F)

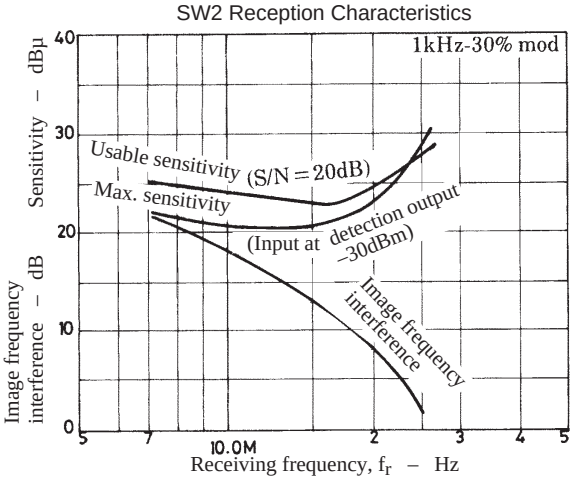
SW2 Input/Output Characteristics



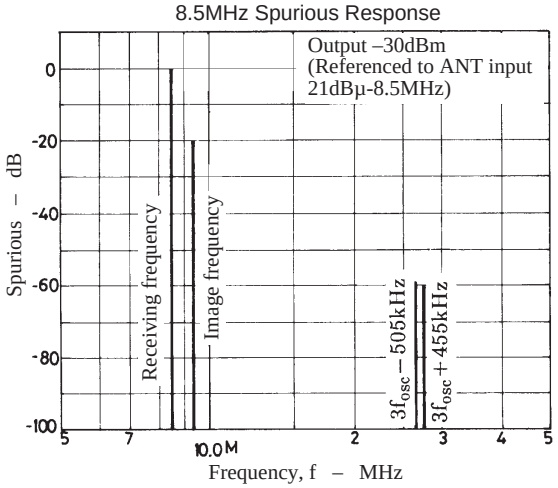
SW2 Input/Output Characteristics



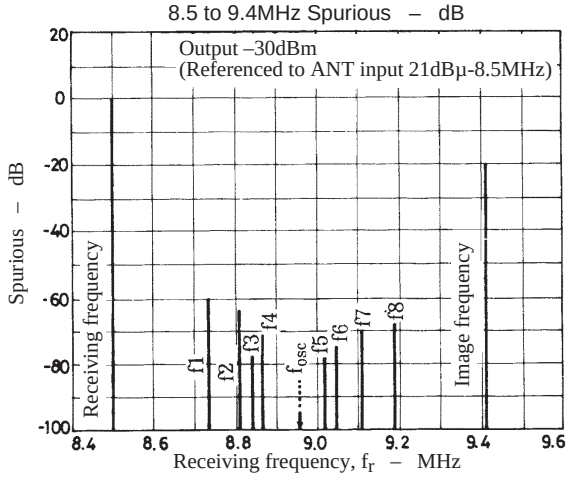
SW2 Reception Characteristics



8.5MHz Spurious Response



8.5 to 9.4MHz Spurious – dB



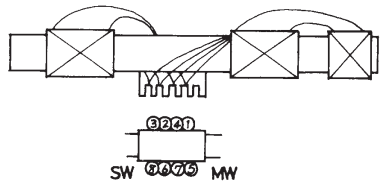
f1 : 8.7336MHz → $2f_{OSC}$-2f1 = 455kHz
f2 : 8.8097MHz → $3f_{OSC}$-3f2 = 455kHz
f3 : 8.8478MHz → $4f_{OSC}$-4f3 = 455kHz
f4 : 8.8702MHz → $5f_{OSC}$-5f4 = 455kHz
f5 : 9.0263MHz → 5f5-$5f_{OSC}$ = 455kHz
f6 : 9.0525MHz → 4f6-$4f_{OSC}$ = 455kHz
f7 : 9.1130MHz → 3f7-$3f_{OSC}$ = 455kHz
f8 : 9.1888MHz → 2f8-$2f_{OSC}$ = 455kHz

Coil Specifications

MW antenna

Bar antenna (for PVC22KTL)

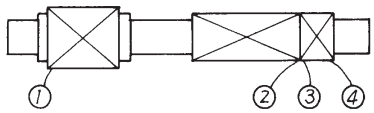
• TN-10896 (Mitsumi)



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_O = 330 (≧ 200)
⑤-⑥ L = 15μH, Q_O = 250 (≧ 150)

Bar antenna (for PVC-LYT)

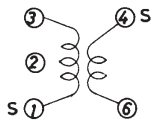
• HW-50426 (Mitsumi)



①-② 21T + 100T
③-④ 30T
①-② L = 604μH, Q_O ≧ 120

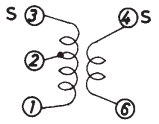
MW OSC

• S-190-036 (Sumida)
For PVC22KTL



①-③ 75T, ④-⑥ 8T
Q_O ≧ 80, L = 140μH

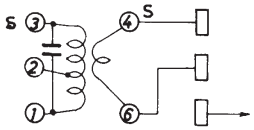
• HW-50426 (Mitsumi)
For PVC-LYT



③-② 2T, ④-⑥ 9T
②-① 86T
Q_O ≧ 80, L = 270μH

AM-IFT

• HW-50447 (Mitsumi)

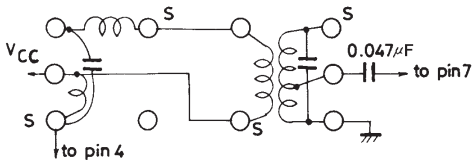


①-② 82T, ③-② 70T,
④-⑥ 7T
Q_O = 110 ± 20%, f = 450kHz
Internal 180pF
C.F : SFU450B

AM-IFT

Application where a double tuning coil is used

HW-50475 HW-50498



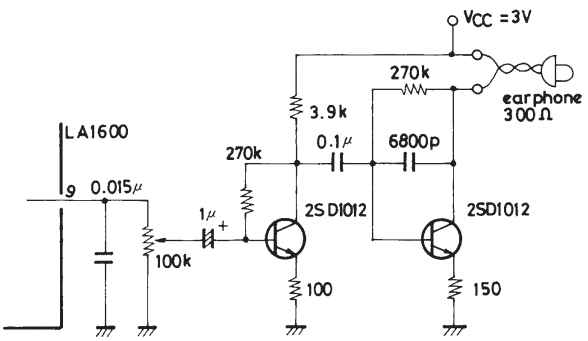
HW-50475
(Mitsumi)
①-② 80T
④-③ 70 1/2T
Internal 180pF
Q_O = 120 ± 20%

HW-50498
(Mitsumi)
①-② 134T
④-⑥ 3T
②-③ 18T
Internal 180pF
Q_O = 70 ± 20%

Sample Application Circuit 1

Earphone

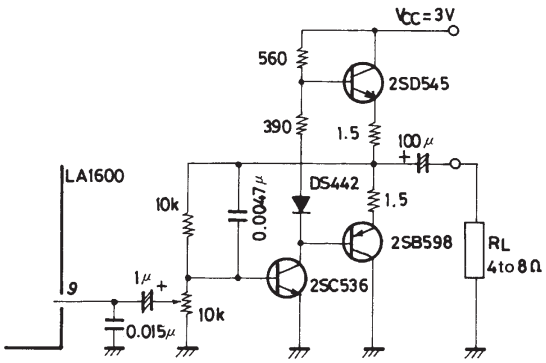
Transistor rank=G280 to 560



Sample Application Circuit 2

Power amp using 3 discrete devices

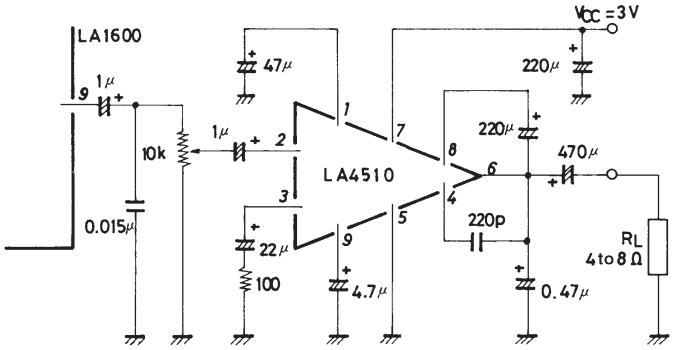
Transistor rank=E100 to 200



Unit (resistance : Ω, capacitance : F)

Sample Application Circuit 3

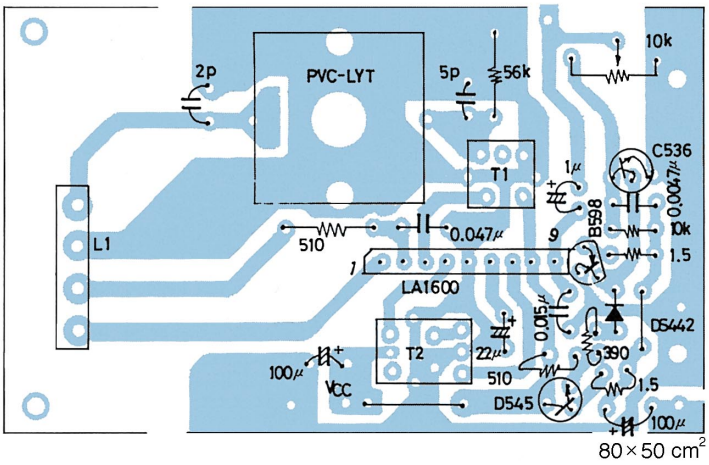
Using the LA4510



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)