



LA1600

 — Monolithic Linear IC

Single-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 amplifier, MIX, OSC, IF amplifier, 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.

Specifications

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

Parameter	Symbol	Conditions	Ratings	Unit
Maximum supply voltage	VCC 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 supply voltage	VCC		3	V
Operating supply voltage range	VCC op		1.8 to 6.0	V

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LA1600

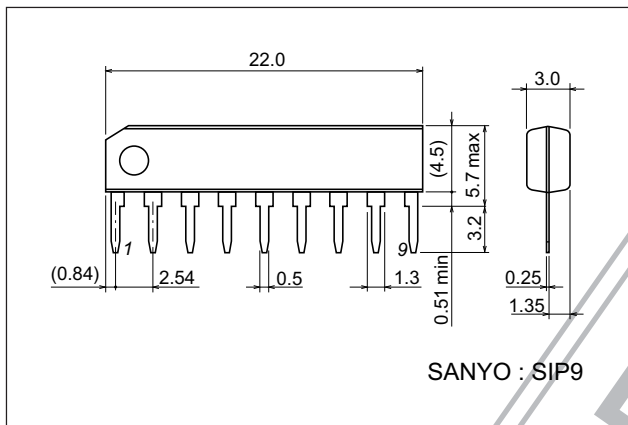
Operating Characteristics at $T_a=25^\circ\text{C}$, $V_{CC}=3\text{V}$, See specified Test Circuit.

Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
[AM Characteristics/f=1MHz]						
Quiescent current	I_{CCO}	$V_{IN}=\text{No input}$		3.7	4.6	mA
Detection output	V_{O1}	$V_{IN}=23\text{dB}\mu$, 1kHz-30% mod	-30	-25	-20	dBm
			24	43	78	mV
	V_{O2}	$V_{IN}=80\text{dB}\mu$, 1kHz-30% mod	-18	-14	-10	dBm
			97	155	250	mV
Signal-to-noise ratio	S/N1	$V_{IN}=23\text{dB}\mu$	18	21.5		dB
	S/N2	$V_{IN}=80\text{dB}\mu$	48	53		dB
Total harmonic distortion	THD1	$V_{IN}=80\text{dB}\mu$, 1kHz-30% mod		0.3	1.2	%
	THD2	$V_{IN}=100\text{dB}\mu$, 1kHz-30% mod		0.4	1.5	%

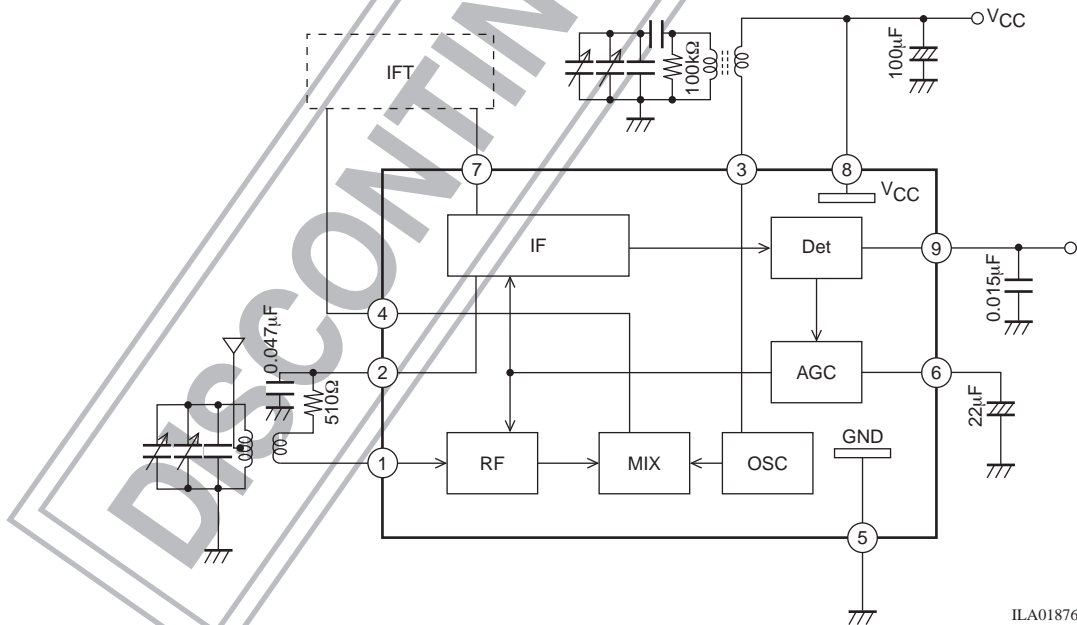
Package Dimensions

unit : mm

3017D



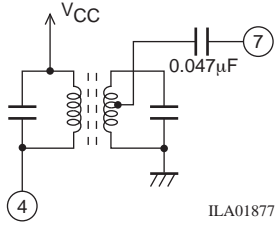
Equivalent Circuit Block Diagram



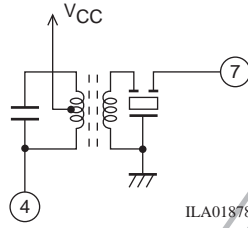
LA1600

IFT (Intermediate Frequency Transformer)

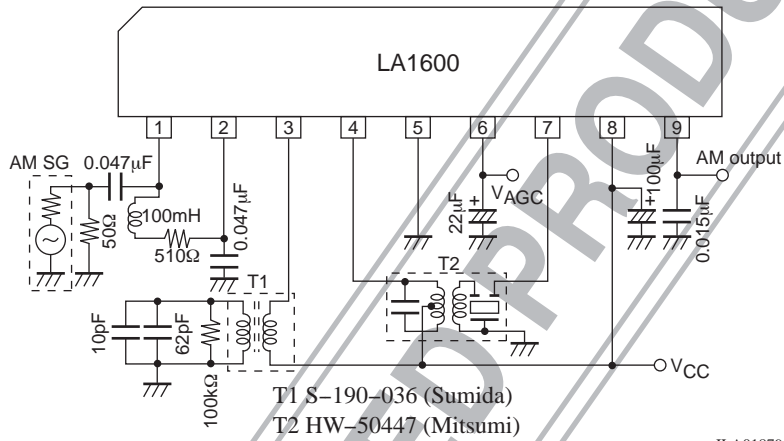
1. Using double tuning coil



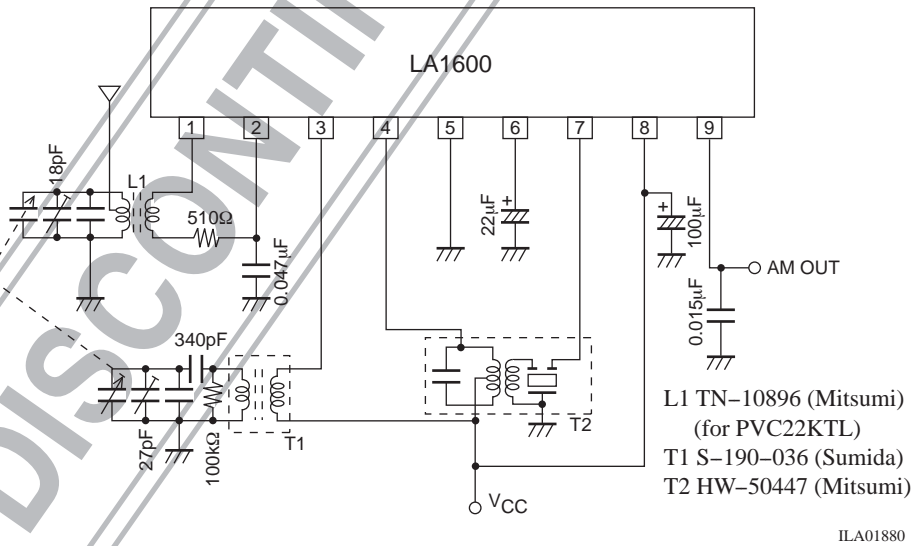
2. Using ceramic filter



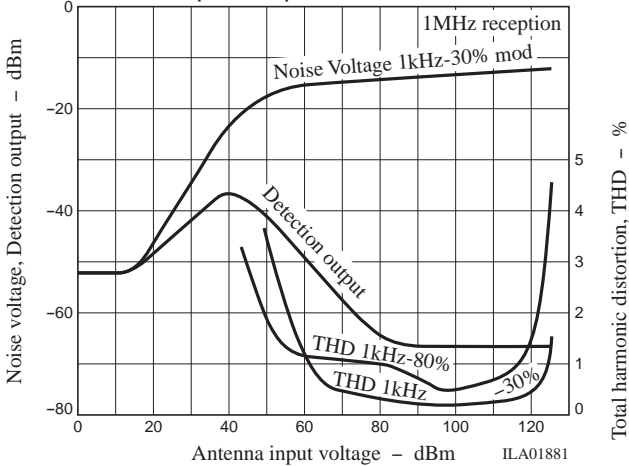
Specified Test Circuit Diagram



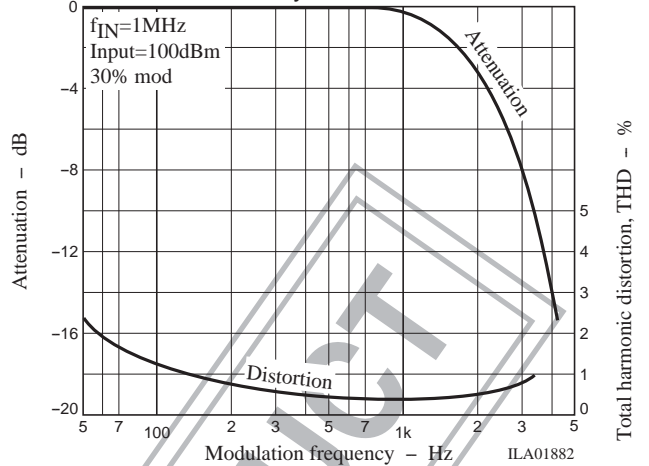
Test Circuit 1 : AM-MW



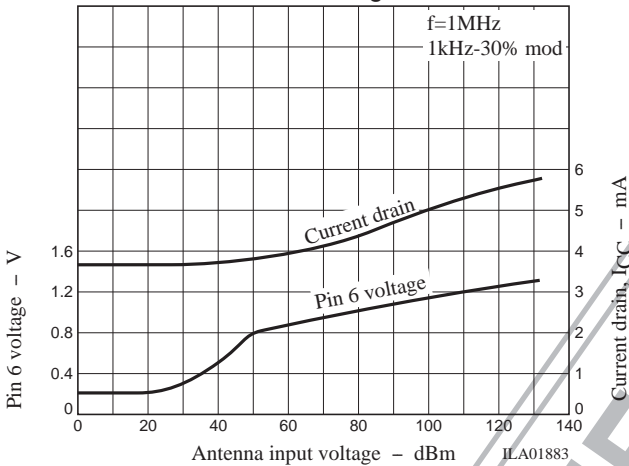
MW Input/Output Characteristics 1



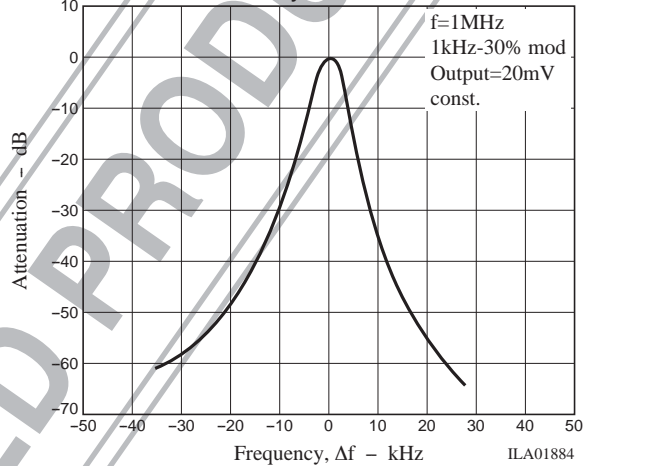
MW Fidelity Characteristics



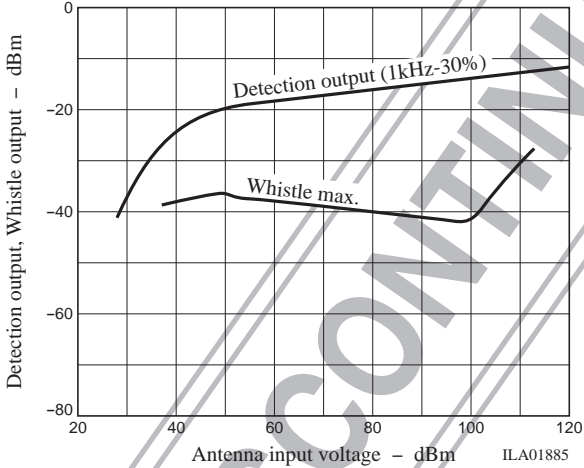
Current Drain, Pin 6 Voltage Characteristics



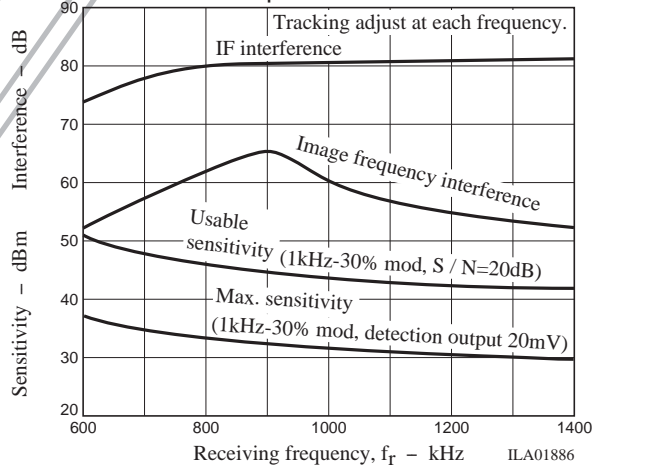
Selectivity Characteristic



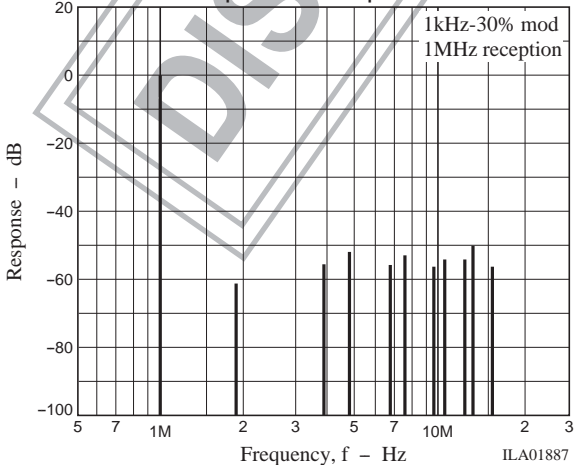
Whistle Characteristics



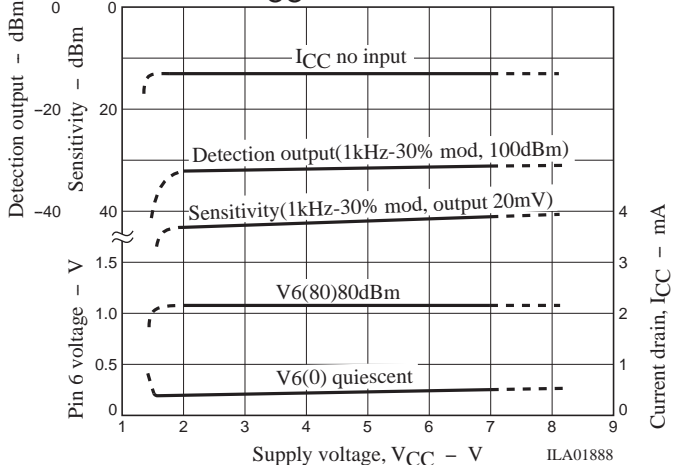
MW Reception Characteristics



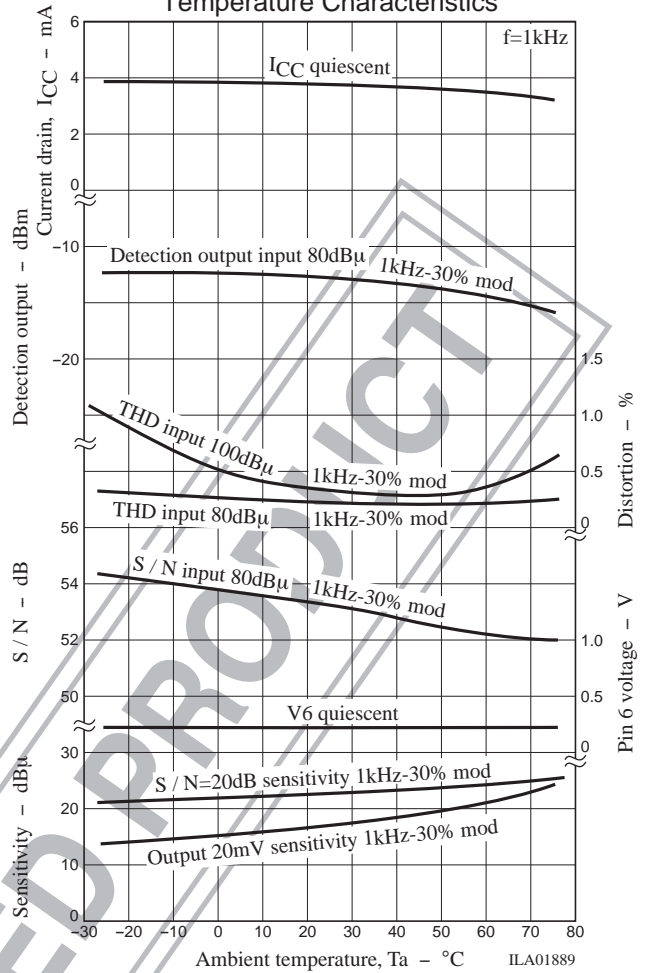
Spurious Response



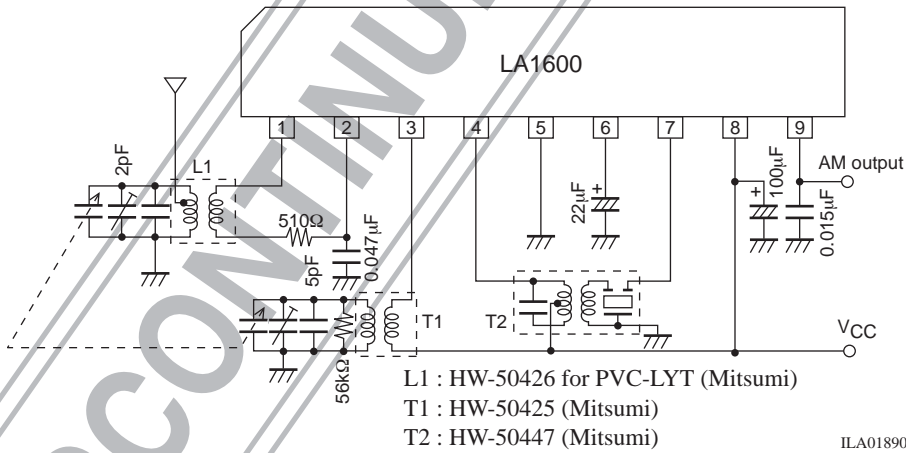
VCC Characteristics



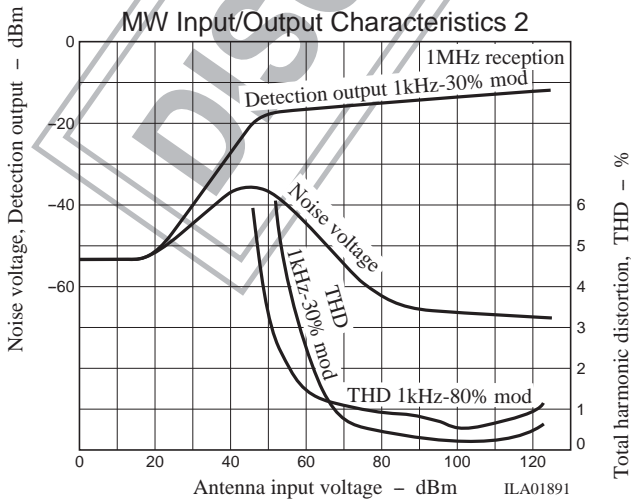
Temperature Characteristics



Test Circuit 2 : AM-MW

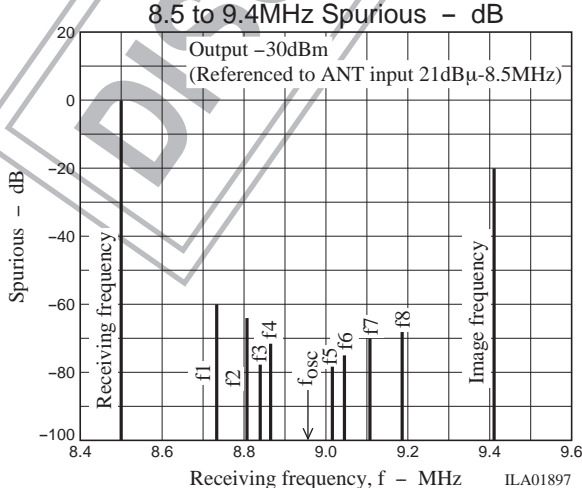
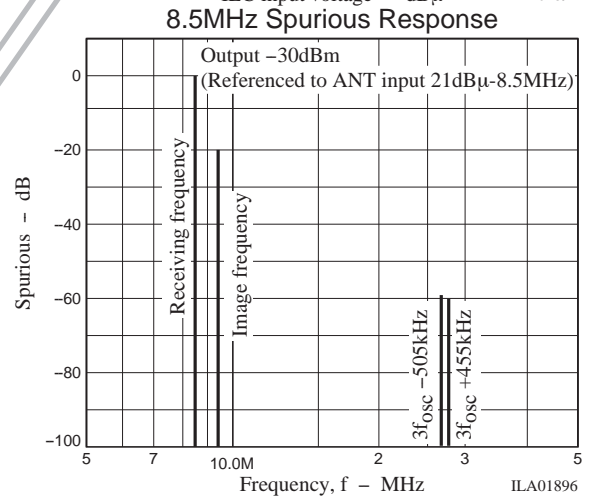
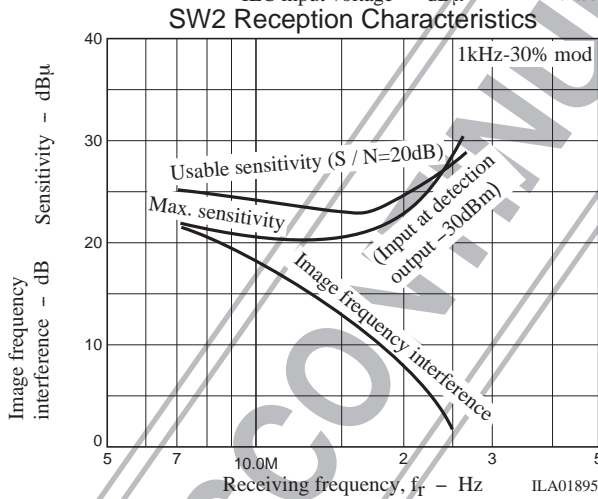
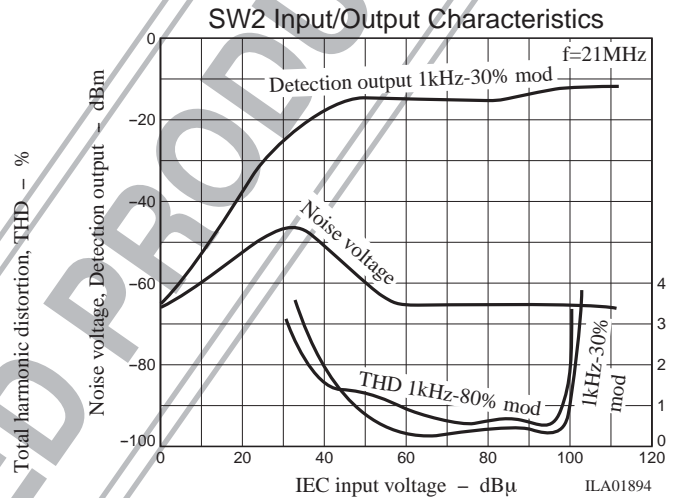
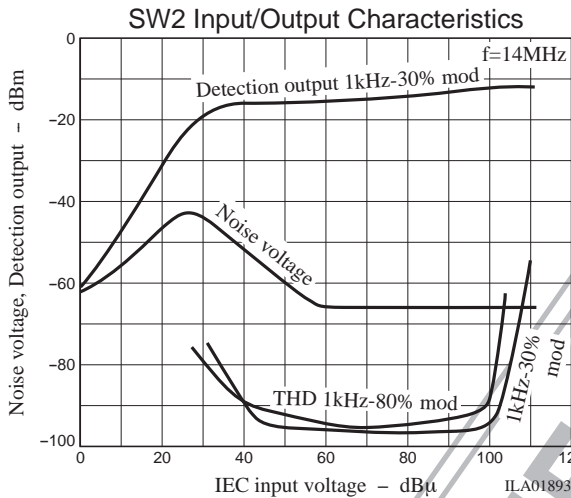
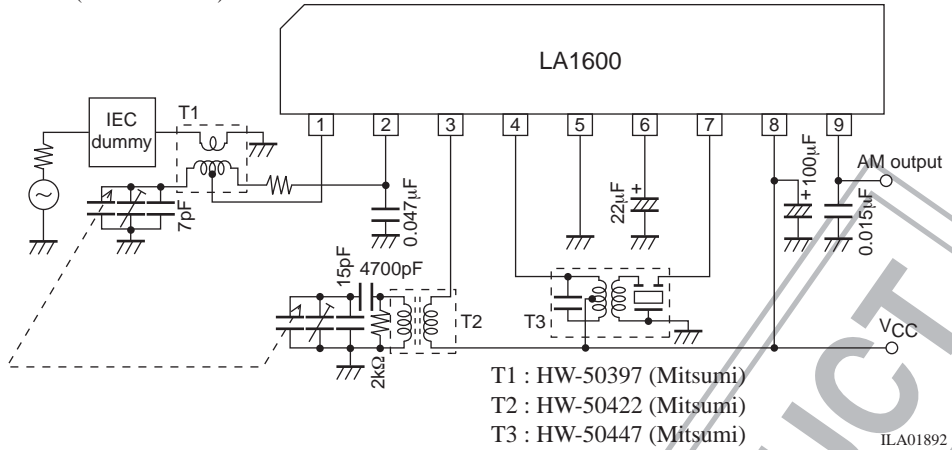


MW Input/Output Characteristics 2



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Test Circuit 3 : SW2 (7.2 to 24.0MHz)



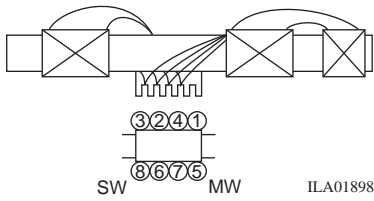
- $f_1 : 8.7336\text{MHz} \rightarrow 2f_{\text{osc}} - 2f_1 = 455\text{kHz}$
- $f_2 : 8.8097\text{MHz} \rightarrow 3f_{\text{osc}} - 3f_2 = 455\text{kHz}$
- $f_3 : 8.8478\text{MHz} \rightarrow 4f_{\text{osc}} - 4f_3 = 455\text{kHz}$
- $f_4 : 8.8702\text{MHz} \rightarrow 5f_{\text{osc}} - 5f_4 = 455\text{kHz}$
- $f_5 : 9.0263\text{MHz} \rightarrow 5f_5 - 5f_{\text{osc}} = 455\text{kHz}$
- $f_6 : 9.0525\text{MHz} \rightarrow 4f_6 - 4f_{\text{osc}} = 455\text{kHz}$
- $f_7 : 9.1130\text{MHz} \rightarrow 3f_7 - 3f_{\text{osc}} = 455\text{kHz}$
- $f_8 : 9.1888\text{MHz} \rightarrow 2f_8 - 2f_{\text{osc}} = 455\text{kHz}$

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

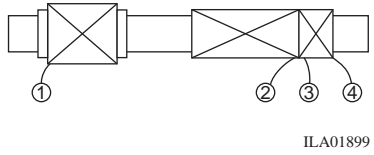
⑦-⑧ 4T tight solenoid winding

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

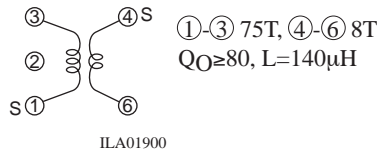
③-④ 30T

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



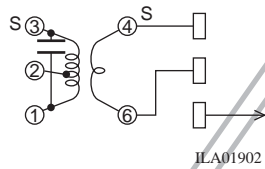
③-② 2T, ④-⑥ 9T

②-① 86T

Q_O≥80, L=270μH

AM-IFT

- HW-50447 (Mitsumi)



①-② 82T, ③-② 70T

④-⑥ 7T

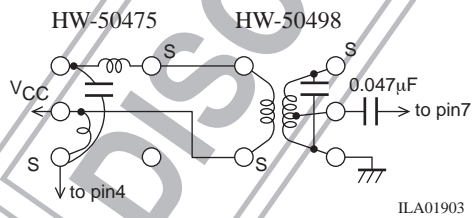
Q_O=110±20%, f=450kHz

Internal 180pF

C.F : SFU450B

AM-IFT

Application where a double tuning coil is used



HW-50475

(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

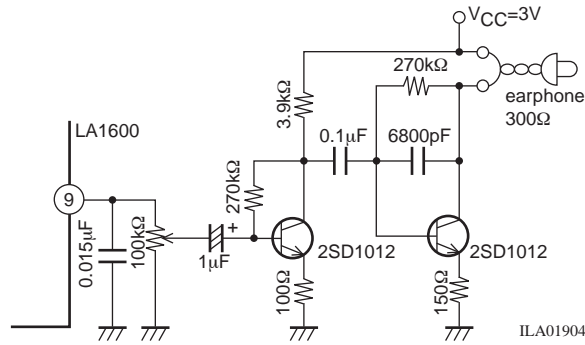
Q_O=70±20%

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Sample Application Circuit 1

Earphone

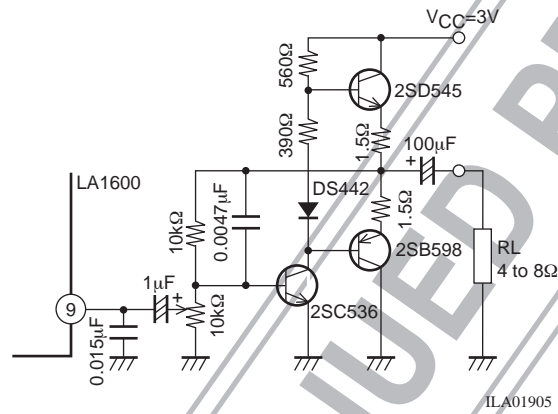
Transistor rank=G280 to 560



Sample Application Circuit 2

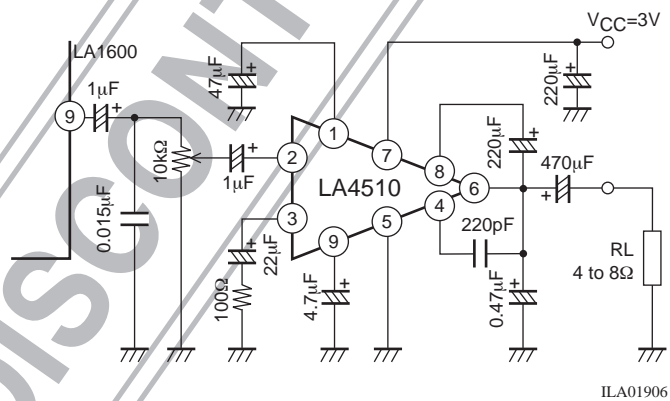
Power amp using 3 discrete devices

Transistor rank=E100 to 200



Sample Application Circuit 3

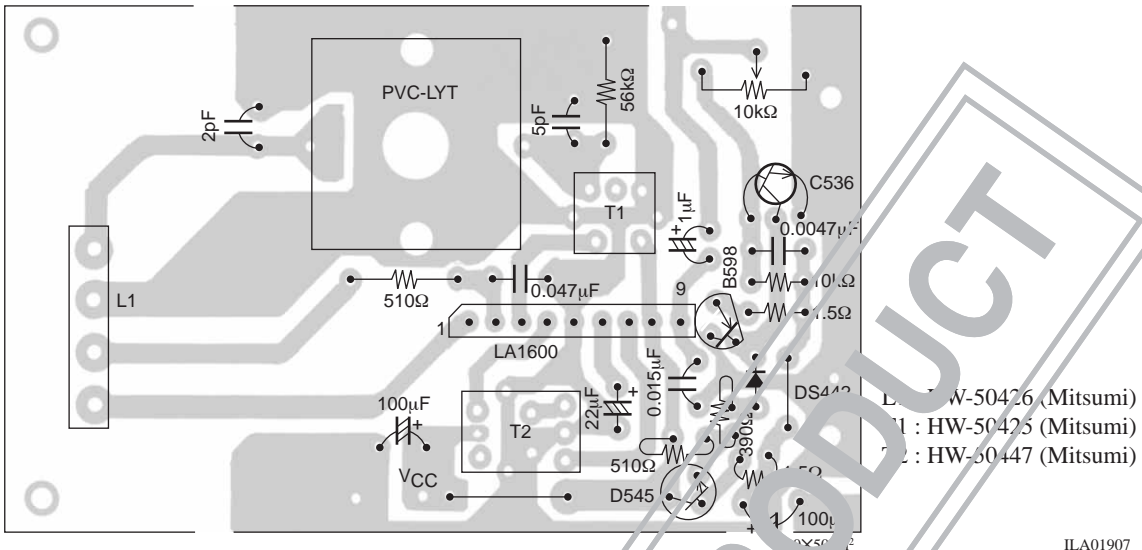
Using the LA4510



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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.)



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