Ordering number : EN1820C

Monolithic Linear IC

LA1265

FM/AM Tuner of Electronic Tuning Type

Functions

FM : IF amplifier, quadrature detector, AF preamplifier, signal meter, tuning indicator drive output (common with stop signal, muting drive output).

AM : RF amplifier, MIX, OSC (with ALC), IF amplifier, detector, AGC, signal meter, tuning indicator drive output (common with stop signal).

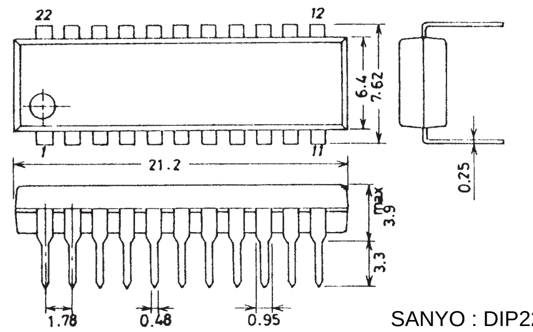
Features

- Minimum number of external parts required.
- Excellent S/N.
- Local OSC with ALC.
- Local OSC buffer.
- Tuning indicator pin (common with narrow-band stop signal and muting drive output).
- Variable stop sensitivity (variable separately for FM, AM)
- Low whistle.
- Signal meter pin.

Package Dimensions

unit : mm

3059-DIP22S



Specifications

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

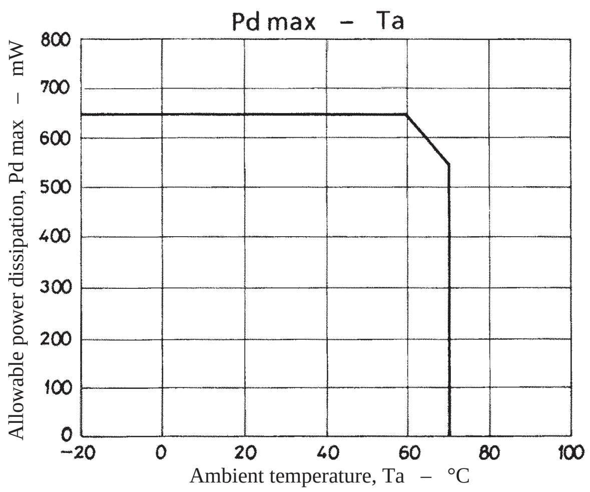
Parameter	Symbol	Conditions	Ratings	Unit
Maximum supply voltage	V_{CC} max	Pins 7, 8, 17	16	V
Flow-in current	I_8	Pin 8	20	mA
Flow-out current	I_{20}	Pin 20	1	mA
	I_{22}	Pin 22	2	mA
Allowable power dissipation	Pd max	Ta≤60°C	650	mW
Operating temperature	Topr		–20 to +70	°C
Storage temperature	Tstg		–40 to +125	°C

Operating Conditions at Ta=25°C

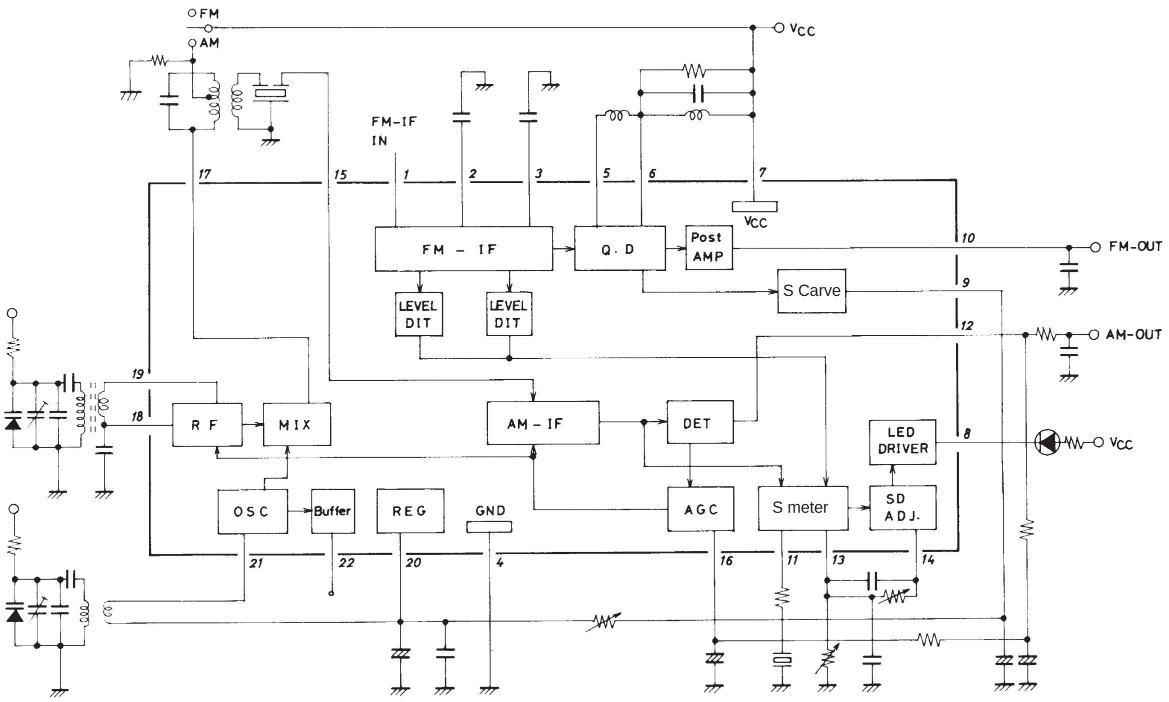
Parameter	Symbol	Conditions	Ratings	Unit
Recommended operating voltage	V_{CC}		8.5	V
Operating voltage range	V_{CC} op		6 to 14	V

Operating Characteristics at Ta=25°C, V_{CC}=8.5V, See specified Test Circuit

Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
[AM : f=1MHz]						
Quiescent current	Icco	No input		18	26	mA
Detection output	V_O1	V_{IN}=20dBμ, 400Hz, 30% mod.	30	50	90	mV
	V_O2	V_{IN}=80dBμ, 400Hz, 30% mod.	110	160	220	mV
S/N	S/N1	V_{IN}=20dBμ	16	20		dB
	S/N2	V_{IN}=80dBμ	49	54		dB
Total harmonic distortion	THD1	V_{IN}=80dBμ, 400Hz, 30% mod.		0.3	1.0	%
	THD2	V_{IN}=107dBμ, 400Hz, 30% mod.		0.5	2.0	%
Signal meter output	V_{SM} 1	No input	0	0	0.2	V
	V_{SM} 2	V_{IN}=80dBμ	2.4	2.8	3.1	V
LED lighting sensitivity	VLED on	I_{LED}=1mA	15	24	33	dBμ
Local OSC buffer output	V_{OSC}	f_{OSC}=1.45MHz	220	275	330	mV
[FM : f=10.7MHz]						
Quiescent current	Icco	No input		20	28	mA
Input limiting sensitivity	–3dBL.S.	3dB down, 400Hz, 100% mod.		31	37	dBμ
Demodulation output	V_O	V_{IN}=10dBμ, 400Hz, 100% mod.	240	330	460	mV
S/N	S/N	V_{IN}=100dBμ	78	84		dB
Total harmonic distortion	THD	V_{IN}=100%dBμ, 400Hz, 100% mod.		0.03	0.3	%
Signal meter output	V_{SM} 1	No input	0	0	0.2	V
	V_{SM} 2	V_{IN}=100dBμ	1.5	2.7	3.1	V
LED lighting sensitivity	LED-on	I_{LED}=1mA	35	50	65	dBμ
LED lighting bandwidth	LED-BW	V_{IN}=100dB, I_{LED}=1mA	90	120	160	kHz
AM rejection ratio	AMR	V_{IN}=100dBμ, FM=400Hz 100% mod. AM=1kHz 30% mod.	45	60		dB

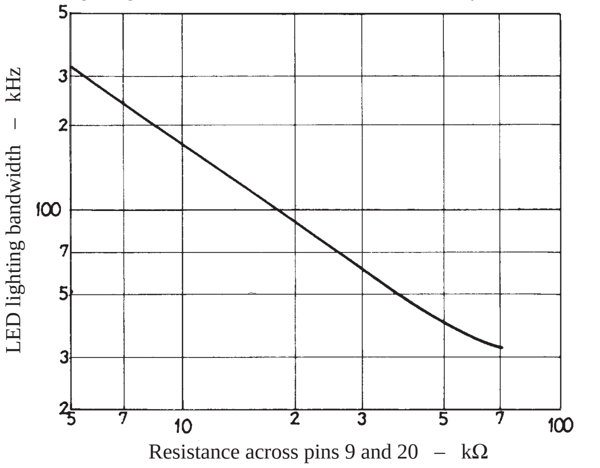


Equivalent Circuit Block Diagram



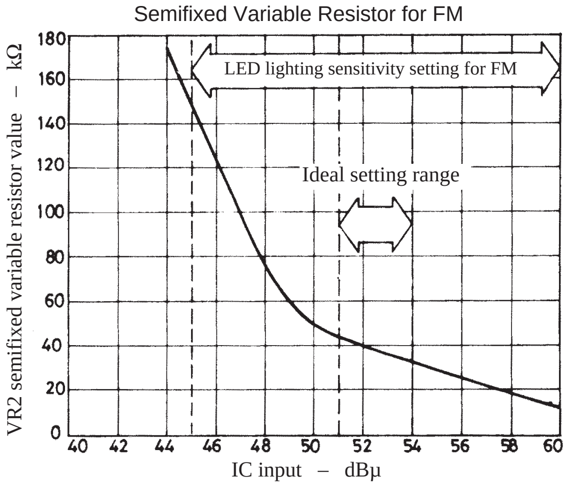
How to use the LA1265

LED Lighting Bandwidth – Resistance across pins 9 and 20



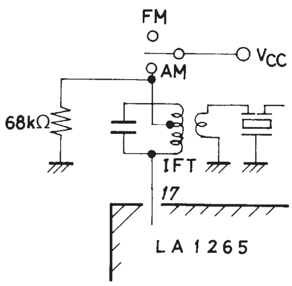
1. LED lighting, muting drive output, stop signal (SD).
   - For LED lighting, muting drive output, stop signal, the output at pin 8 is used.
   - The voltage on pin 8, when tuned, turns from "H" to "L". (Active-Low)
   - Signal bandwidth at pin 8.
     - For AM, the bandwidth depends on the CF (BFU450CN) at pin 11. If a capacitor is connected in place of the CF, the bandwidth will get wider.
     - For FM, the bandwidth depends on the resistance across pins 9 and 20. If the resistance is increased, the bandwidth will get narrower. R=15kΩ makes the bandwidth approximately 120kHz.
   - Sensitivity adjustment of LED, muting, stop signal.
     - For FM, the semifixed variable resistor across pin 13 and GND is used.
     - For AM, the semifixed variable resistor across pins 13 and 14 is used. Be sure to start adjustment for FM, and then make adjustment for AM. For the stop signal sensitivity and FM stop signal bandwidth, the variations should be considered and it is recommended to use the semifixed variable resistor for adjustment.
   - LED lighting sensitivity setting for AM.
     For the LED lighting sensitivity setting for AM, it is desirable that the IC input be 30dBμ (antenna input : approximately 50dB/m). In this case, the value of VR1 is 30kΩ.

- LED lighting sensitivity setting for FM.
  – For the LED lighting sensitivity setting for FM, the IC input may be 45dBμ to 60dBμ. With the variations in the front end considered, it is ideal that the IC input in a standard receiving set be 51dBμ to 54dBμ. The lower value of VR2 for the LED lighting sensitivity setting is as illustrated right. Since the variations in the front end cause the IC input setting sensitivity to vary, it is recommended to use a value of VR2 at an input voltage lower than a standard setting by 6dB or greater. For example, if IC input 53dBμ is taken as a standard, use VR2≤100kΩ at IC input 47dBμ.

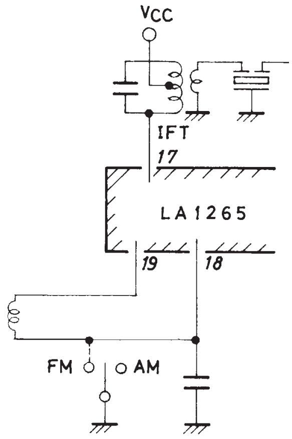


2. AM/FM changeover
- Two selections are available for changeover as shown below : (A) pin 17-used method and (B) pin 18-used method.
- For (A), the voltage on pin 17 relative to V_{CC} (pin 7) must be within the range of –0.8V to +0.1V. If not within this range, distortion and selectivity will get worse.
- For (A), a resistance of 68kΩ at the IFT cold terminal, which is used to prevent the changeover circuit from malfunctioning, must be connected.

(A) pin 17-use method for AM/FM changeover



(B) Pin 18-used method for AM/FM changeover

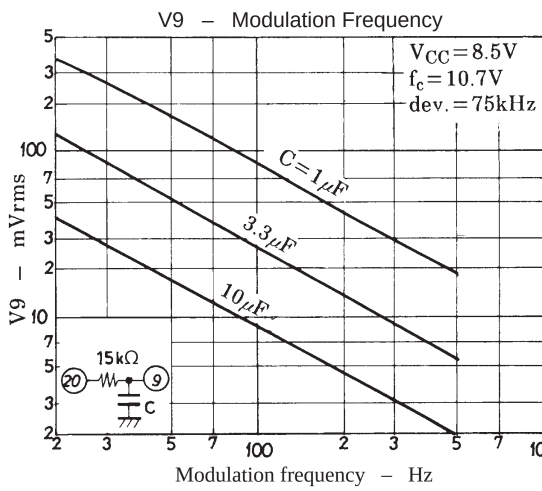


3. Local OSC buffer output
- When local OSC buffer output wave form is saw-toothed at the SW mode, connect a resistance of 1.2kΩ or thereabouts across pin 22 and GND.

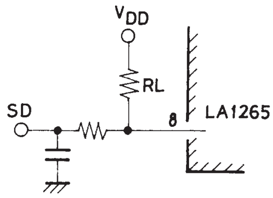
4. AM input pin
- It is desirable that the AM input pin (pin 19) be L-coupled to pin 18.
- Inputting to pin 19 can be done by DC-cutting with a capacitor. However, an unbalance in the RF amplifier (differential amplifier) causes gain drop and whistle worsening.

5. Capacitance across pin 9 and GND.

A large capacitance across pin 9 and GND may cause a misstop at an adjacent channel when the channel select speed is made faster at the automatic channel select mode. In this case, decrease the capacitance across pin 9 and GND. However, if too decreased, the LED will flutter at low modulation frequencies at the time of detuning. Therefore, it is recommended to fix the capacitance across pin 9 and GND to be 3.3μF to 10μF. The relation between modulation frequency and demodulation output voltage on pin 9 with the capacitance across pin 9 and GND as a parameter is shown right.



6. If the coupling coefficient of the local OSC coil is small and an antiresonance point of approximately 100MHz is present or the stray capacitance across pins 22 and 21 is large, a parasitic oscillation of approximately 100MHz may occur in the buffer output (pin 22). In this case, connect a capacitance of approximately 30pF across pin 22 and GND.
7. AM OSC coil
   Generally speaking, the following should be noted. Avoid winding with loose coupling between primary side and secondary side (especially SW1, SW2). To put it concretely, the pot core type is better than the screw core type which is loose in coupling. This prevents the local OSC frequency from turning third resonance frequency related to the coupling coefficient.
8. Resistance across pin 8 and V_{DD}.
   If pin 8 is used for the stop signal (SD) only, without using LED, it is recommended to fix resistance R_L across pin 8 and GND to be 51kΩ to 100kΩ.
9. To prevent whistle from worsening, make the pattern of AM output pin 12 as short as possible.



Input/Output Admittance

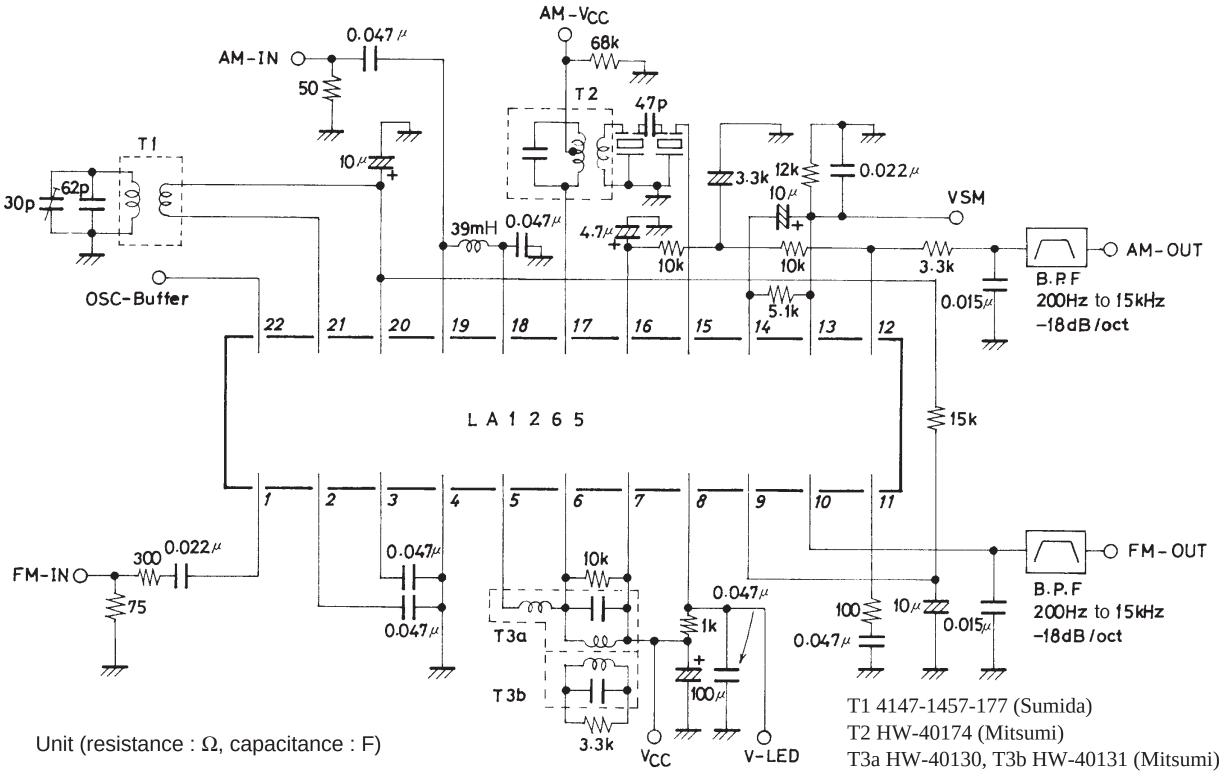
FM

–	Parameter	Frequency	–	Admittance	Unit
IF	γi1	10.7MHz	r_i	330	Ω
			c_i	20	pF

AM

–	Parameter	Frequency	–	Admittance		Unit
				AGC-off (V16=1.4V)	AGC-on (V16=2.5V)	
RF	γi19	1MHz	r_i	15	16	kΩ
			c_i	4	4	pF
MIX	γo17	500kHz	r_o	–	–	kΩ
			c_o	3	3	pF
IF	γi15	500kHz	r_i	2	2	kΩ
			c_o	10	8	pF

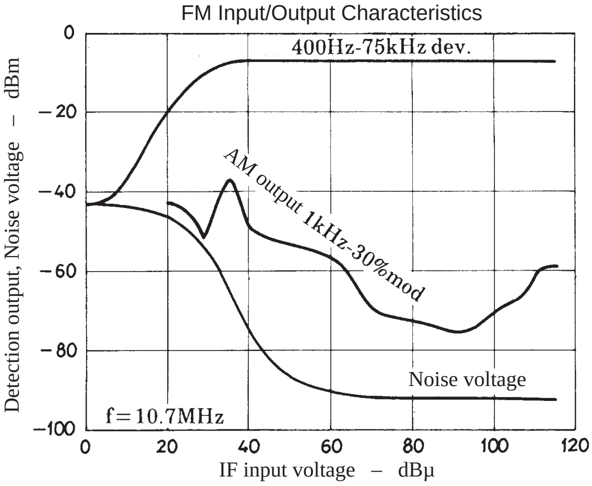
Test Circuit : FM, AM-MW



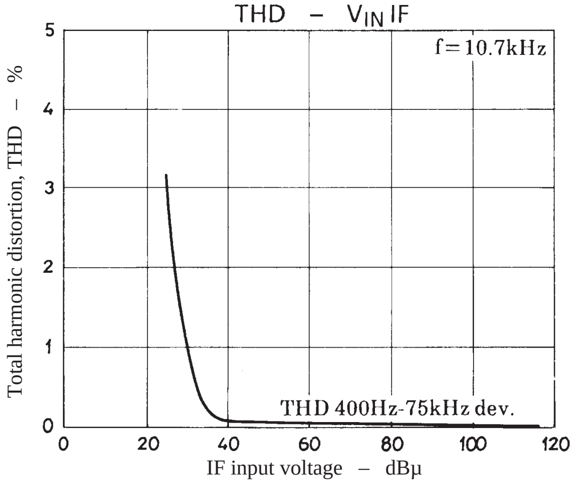
Unit (resistance : Ω, capacitance : F)

T1 4147-1457-177 (Sumida)
T2 HW-40174 (Mitsumi)
T3a HW-40130, T3b HW-40131 (Mitsumi)

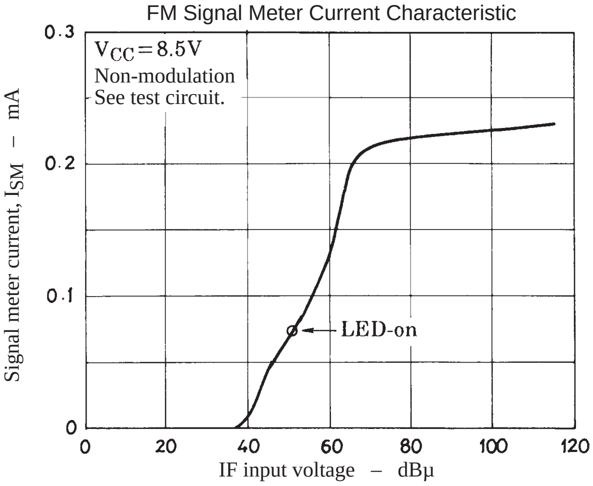
FM Input/Output Characteristics



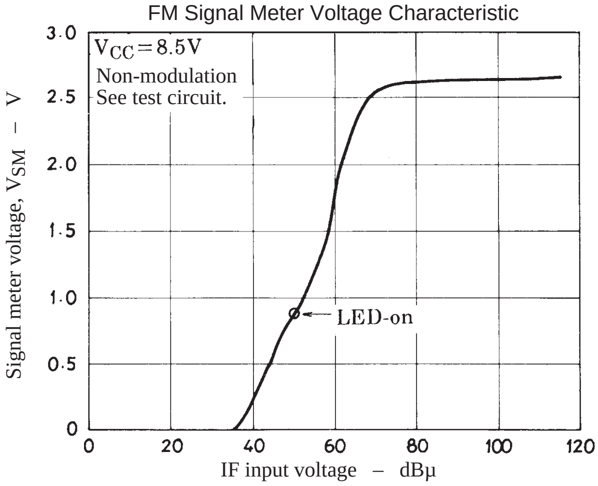
THD – V_{IN} IF



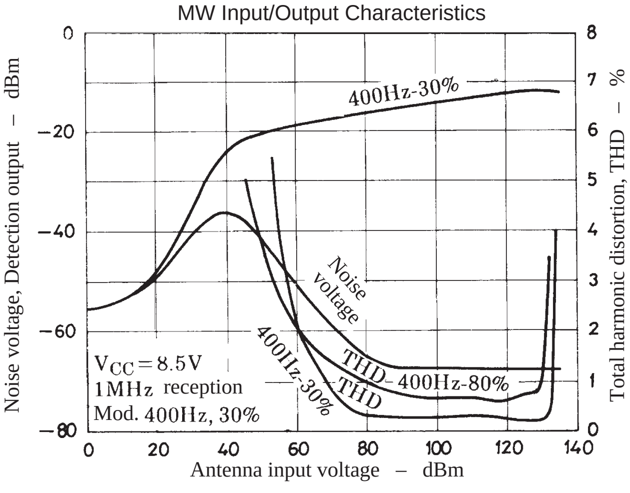
FM Signal Meter Current Characteristic



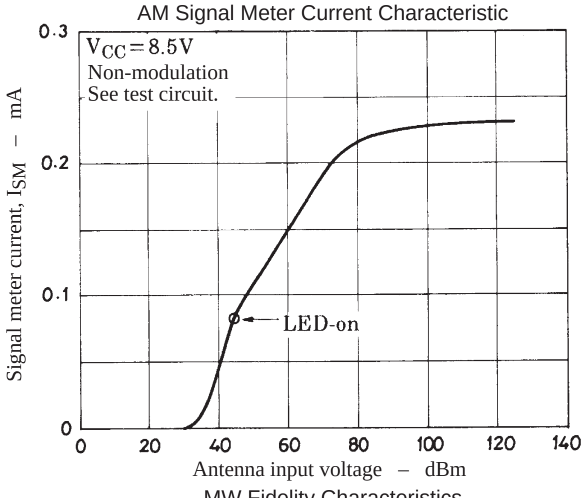
FM Signal Meter Voltage Characteristic



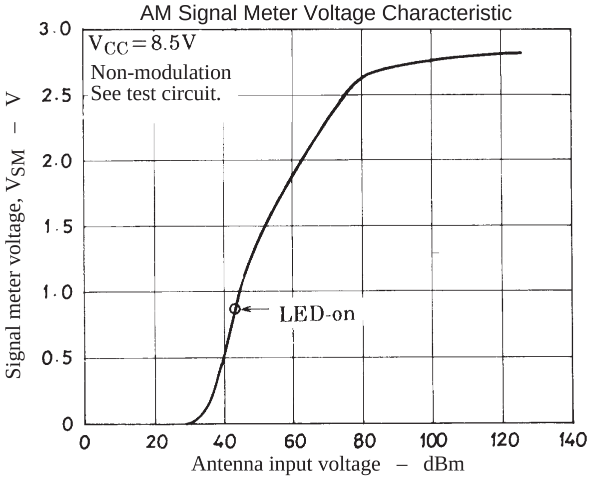
MW Input/Output Characteristics



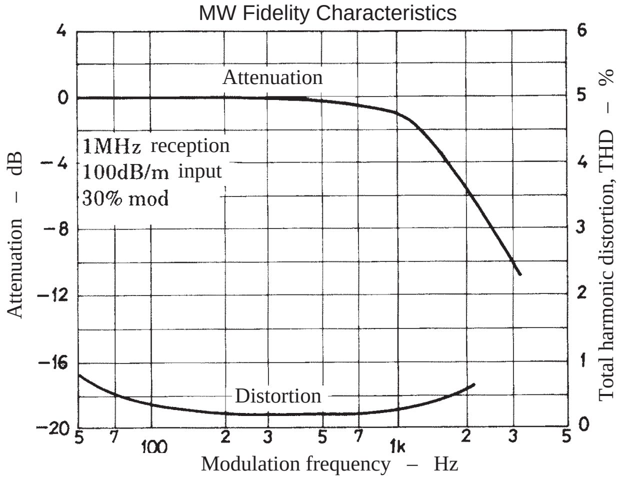
AM Signal Meter Current Characteristic



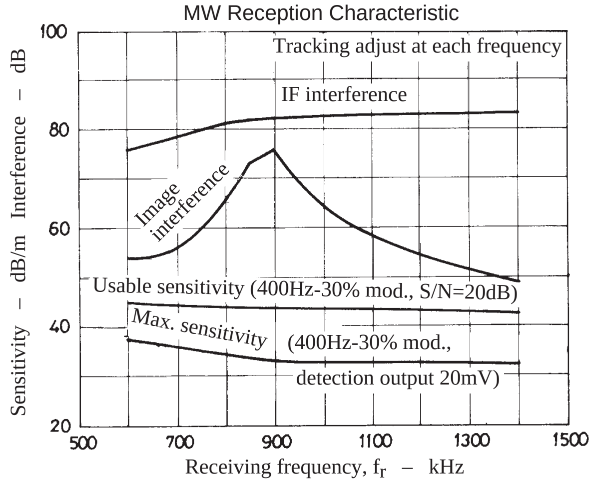
AM Signal Meter Voltage Characteristic



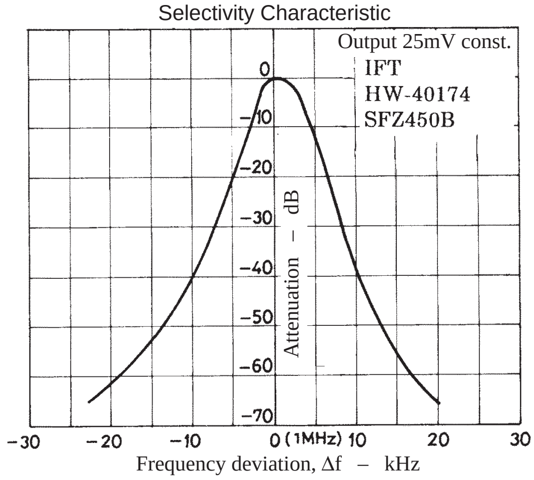
MW Fidelity Characteristics



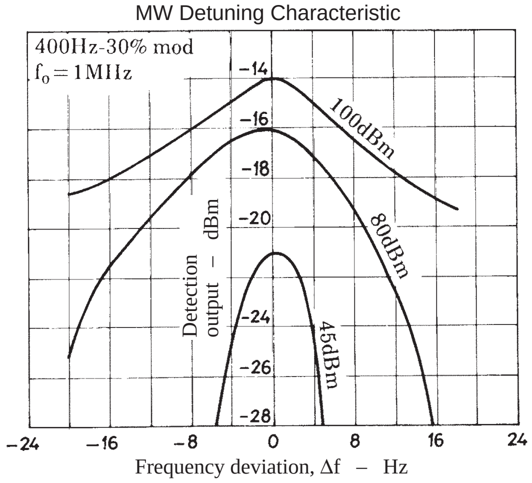
MW Reception Characteristic



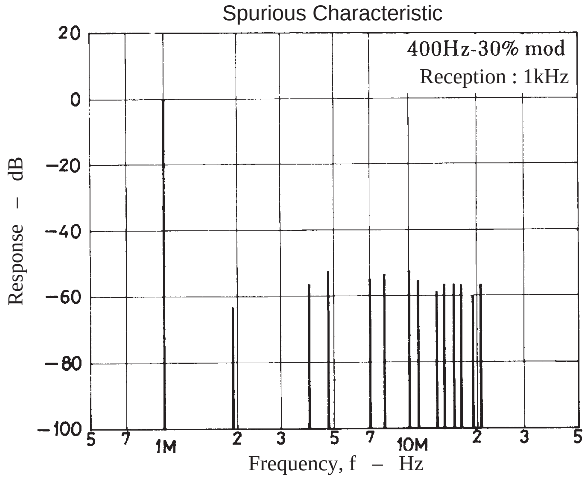
Selectivity Characteristic



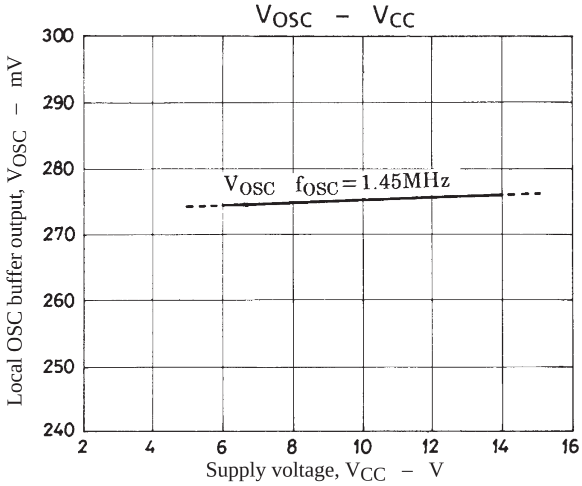
MW Detuning Characteristic



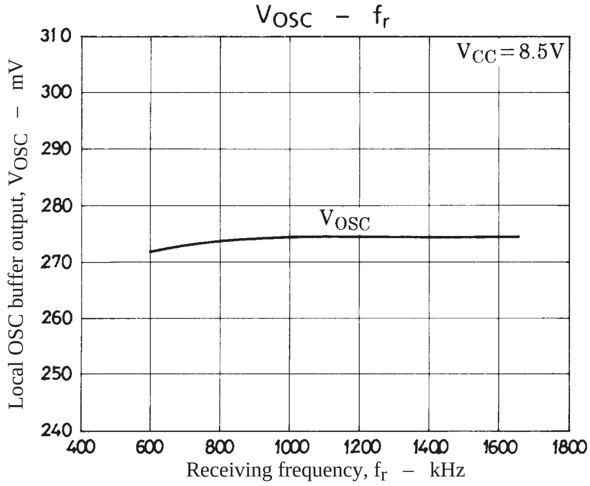
Spurious Characteristic



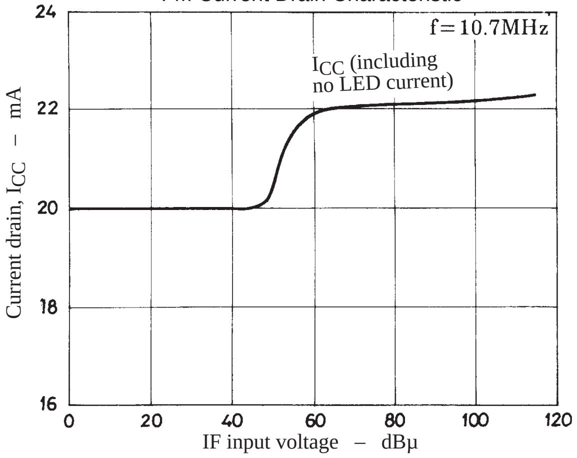
V_{OSC} – V_{CC}



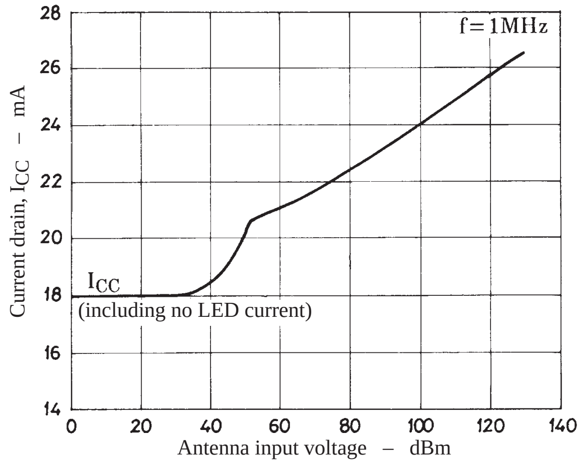
V_{OSC} – f_r



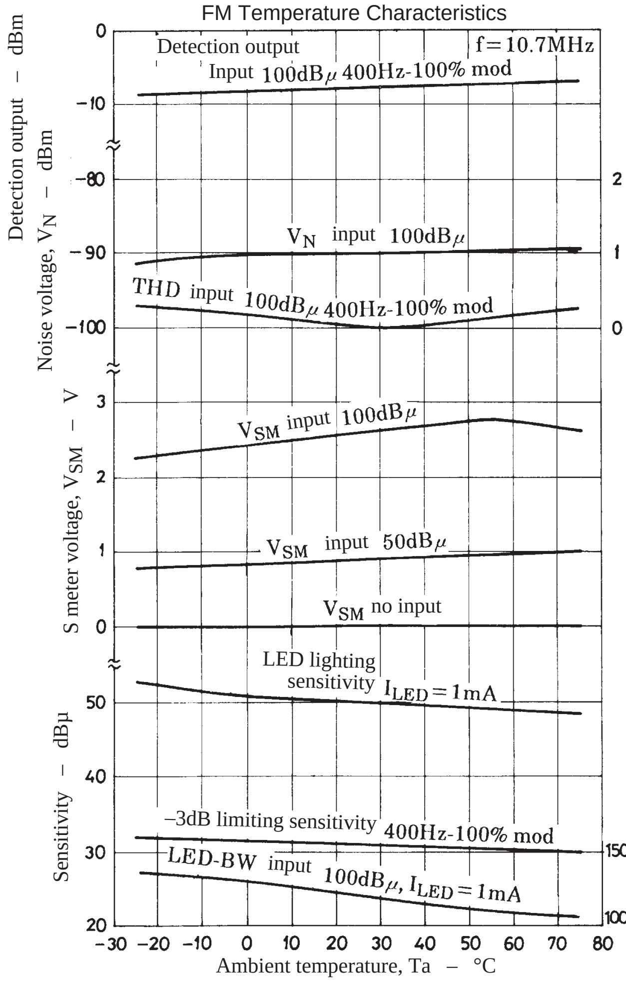
FM Current Drain Characteristic



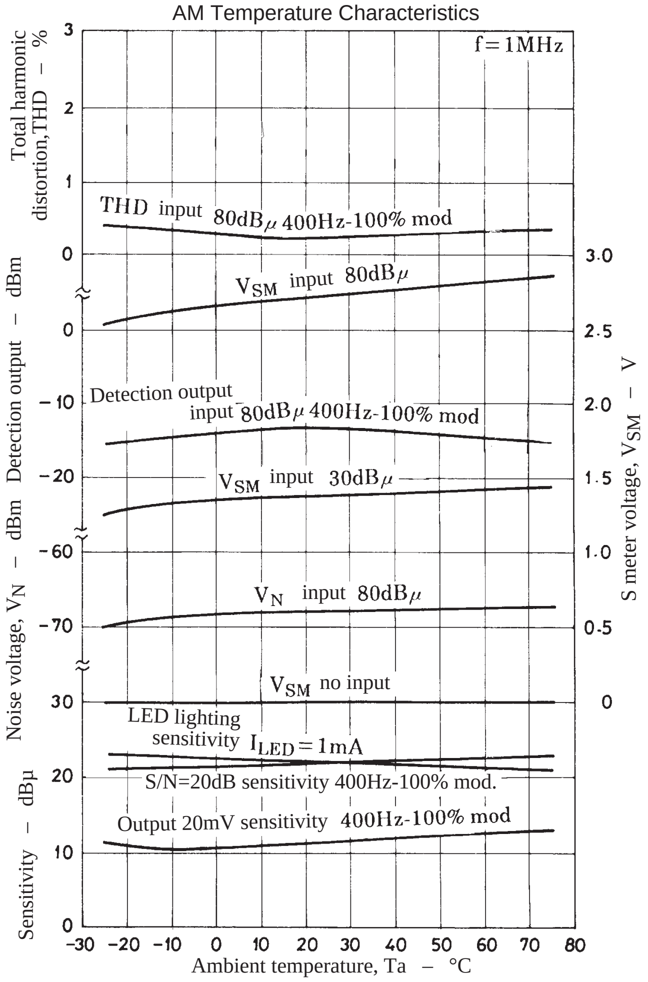
AM Current Drain Characteristic



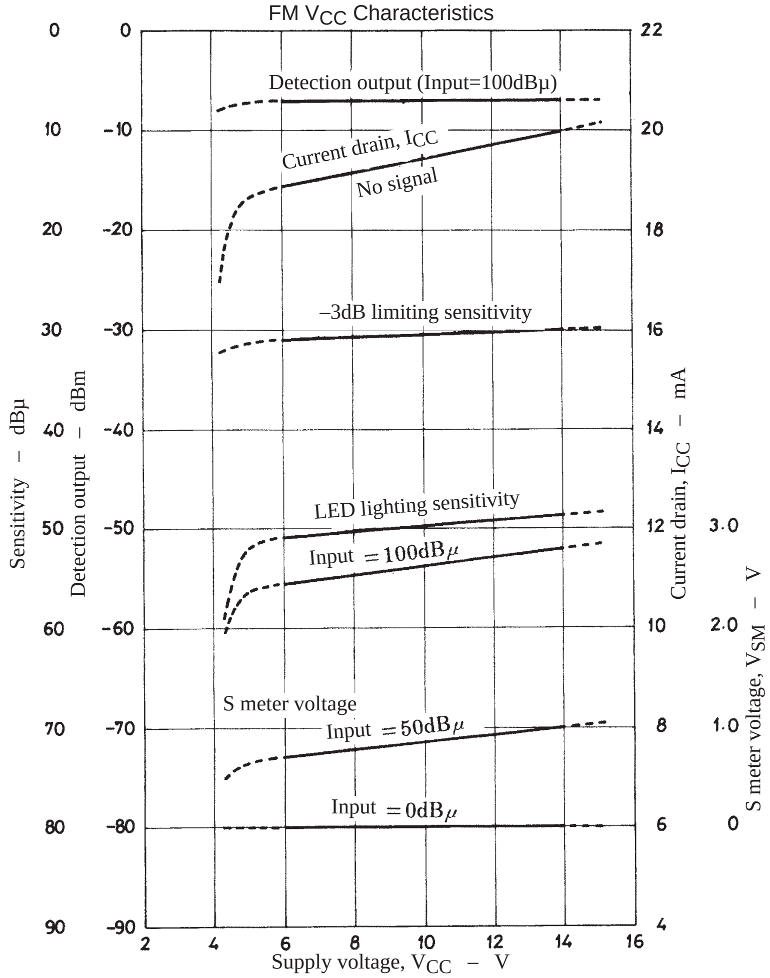
FM Temperature Characteristics

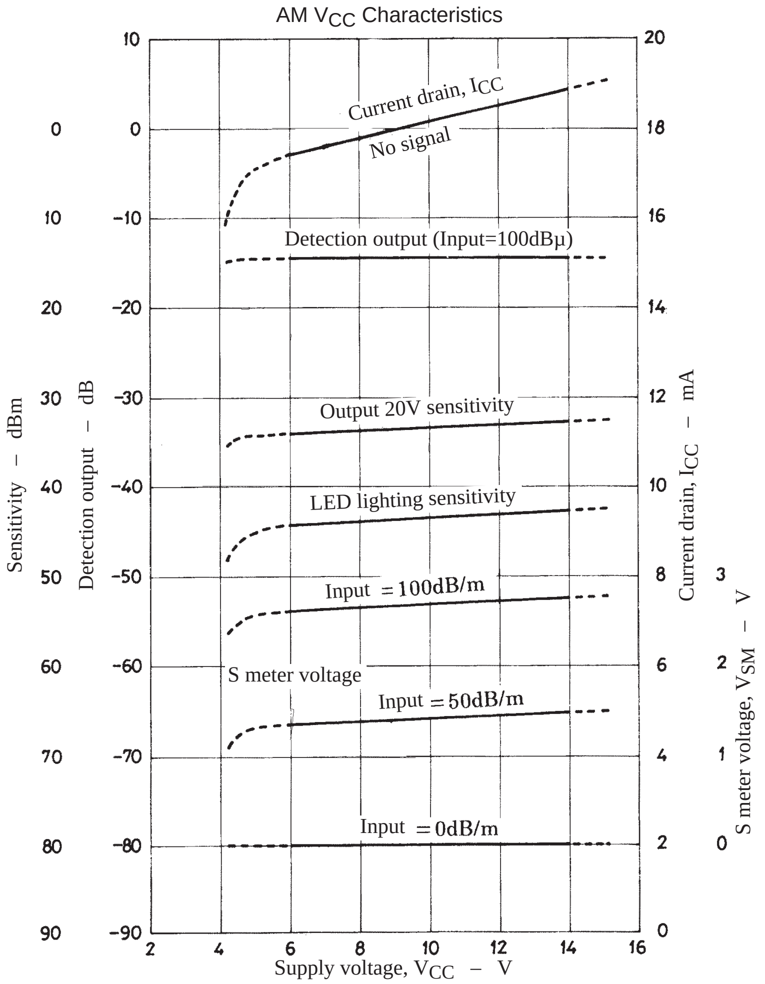


AM Temperature Characteristics

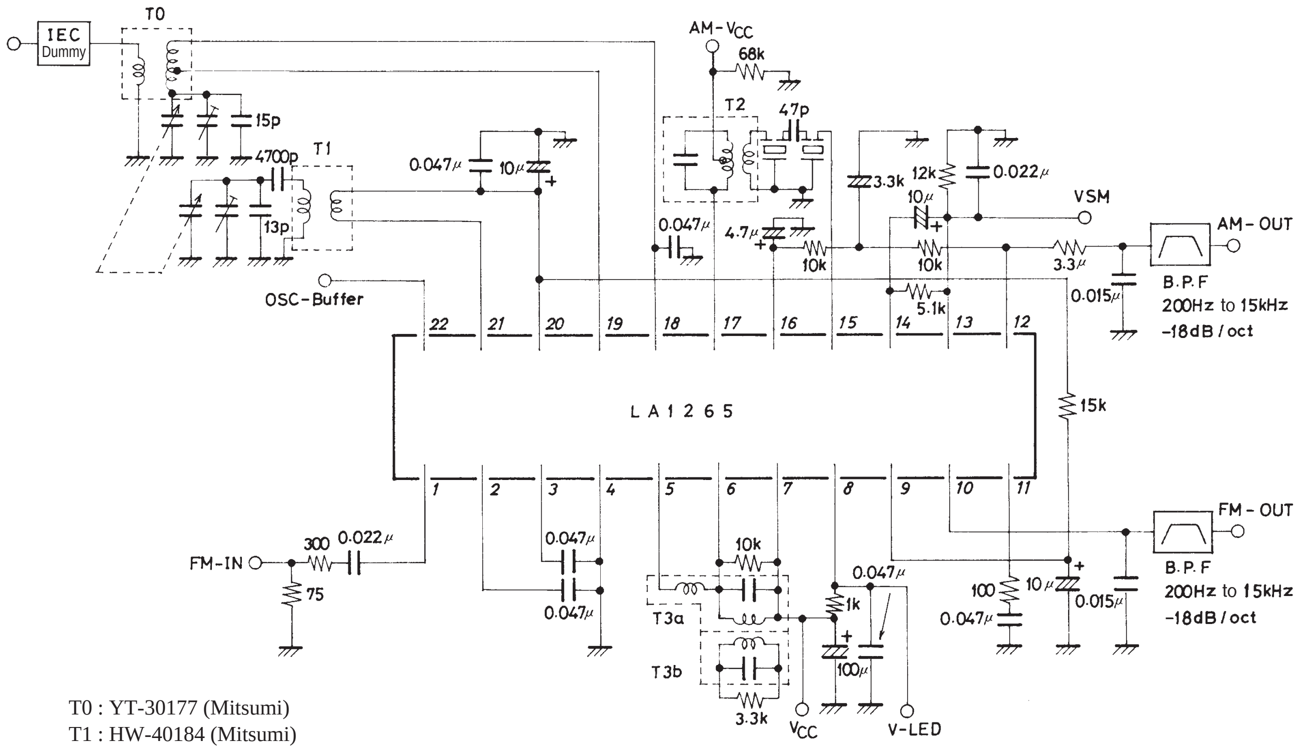


FM V_{CC} Characteristics





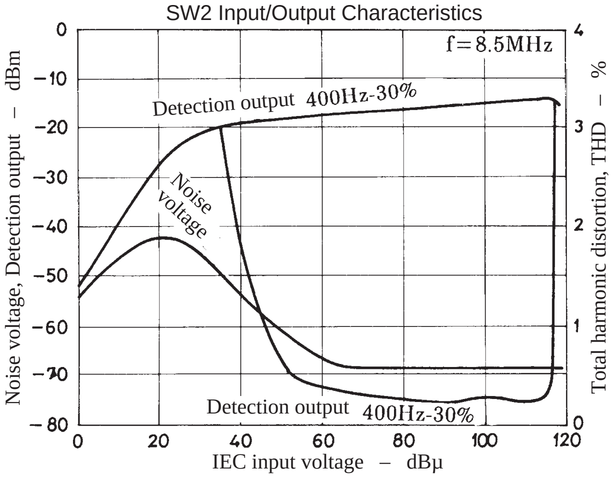
Test Circuit : SW2



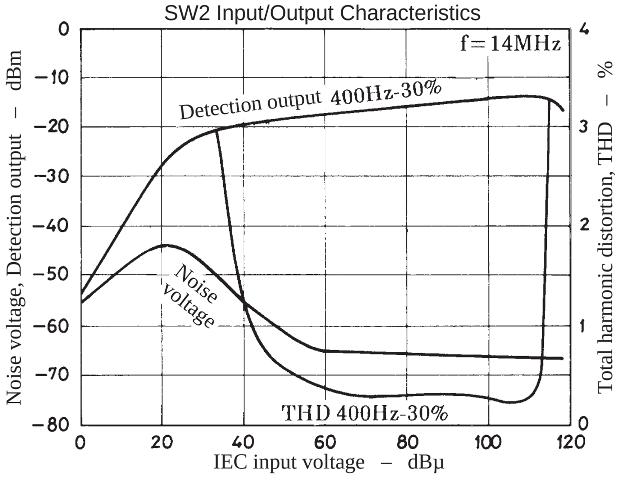
T0 : YT-30177 (Mitsumi)
T1 : HW-40184 (Mitsumi)
T2 : HW-40174 (Mitsumi)
T3a : HW-40130, T3b : HW-40131 (Mitsumi)
Variable capacitor PVC 22KTL (Mitsumi)

Unit (resistance : Ω, capacitance : F)

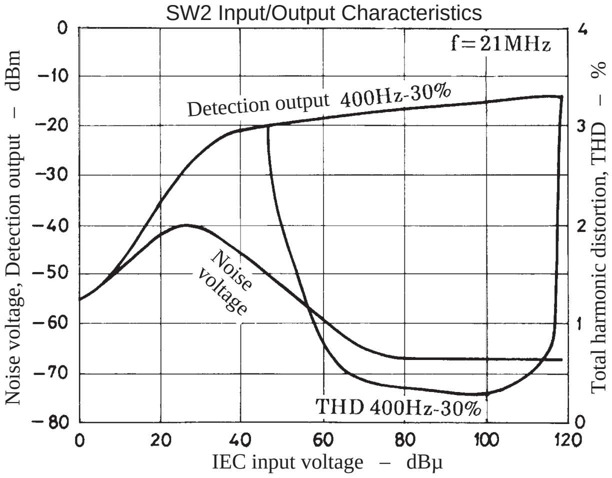
SW2 Input/Output Characteristics



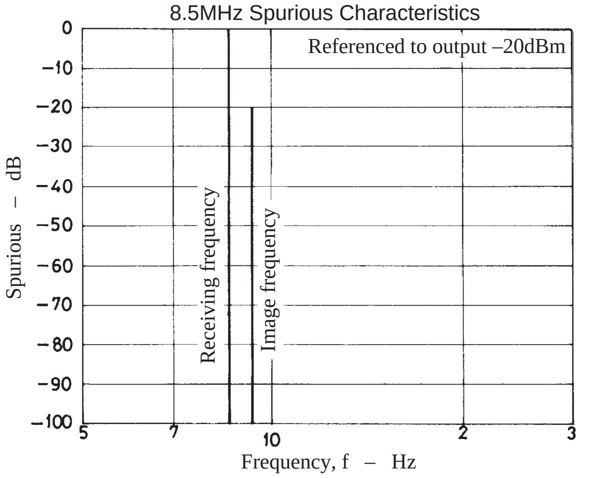
SW2 Input/Output Characteristics



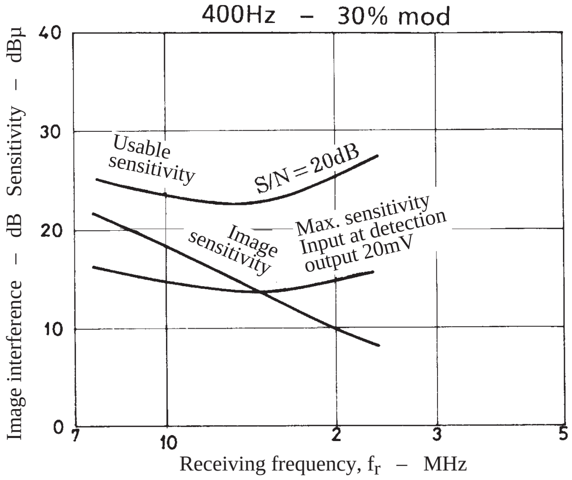
SW2 Input/Output Characteristics



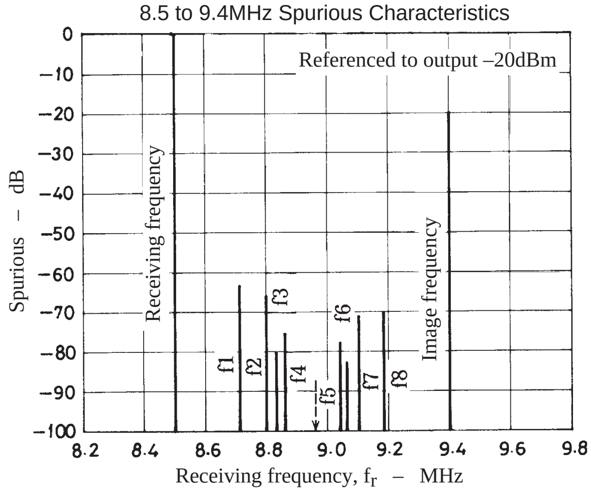
8.5MHz Spurious Characteristics



400Hz – 30% mod



8.5 to 9.4MHz Spurious Characteristics



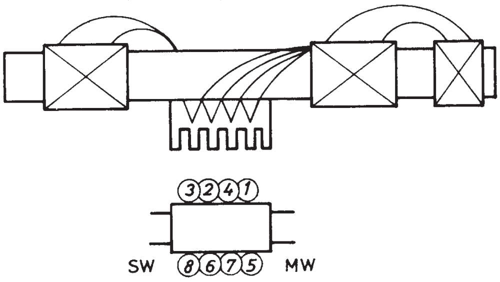
f1 : 8.724MHz → $2f_{OSC}$-2f1＝455kHz
f2 : 8.799MHz → $3f_{OSC}$-3f2＝455kHz
f3 : 8.836MHz → $4f_{OSC}$-4f3＝455kHz
f4 : 8.859MHz → $5f_{OSC}$-5f4＝455kHz
f5 : 9.038MHz → 5f5-$5f_{OSC}$＝455kHz
f6 : 9.061MHz → 4f6-$4f_{OSC}$＝455kHz
f7 : 9.098MHz → 3f7-$3f_{OSC}$＝455kHz
f8 : 9.173MHz → 2f8-$2f_{OSC}$＝455kHz

Coil Specifications

MW antenna

Bar antenna (for PVC22KTL)

• TN-10896 (Mitsumi)



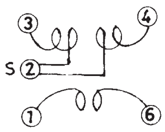
①-② 22T＋49T, ③-④ 10T
Tight solenoid direct winding
⑤-⑥ 17T 0.5ϕ space winding
⑦-⑧ 4T tight solenoid winding
①-② L＝260μH, Q_O＝330 (≧200)
⑤-⑥ L＝15μH, Q_O＝250 (≧150)

Loop antenna (for SVC321)

• LA300 (Korin Giken)

Loop antenna matching coil

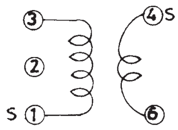
• KT-412



①-⑥ 15.5T, ③-② 7T,
②-④ 58T
Q_O＝200±20%
L＝248μH±10%

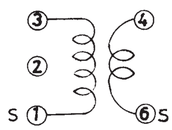
MW OSC

• 4147-1457-177 (Sumida)
For PVC22KTL



④-⑥ 30T, ①-③ 60T
Q_O≧80

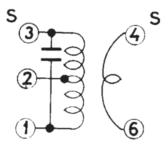
• KO-387 (Korin Giken)
For SVC321



①-③ 48T, ④-⑥ 20T
Q_O＝150±20%

AM-IFT

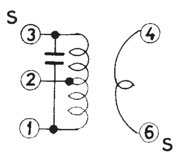
Matching coil for SFU450B (1-element type)



· HW-40173 (Mitsumi)
①-② 82T, ③-② 70T
④-⑥ 7T
Q_O＝110±20%, f＝450kHz
Internal 180pF

· 2150-2162-197 (Sumida)
①-② 103T, ③-② 71T,
④-⑥ 8T
Q_O≧80, f＝450kHz
Internal 180pF

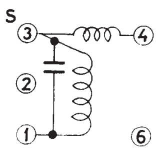
Matching coil for SFZ450B (2-element type)



· HW-40174 (Mitsumi)
①-② 58T, ③-② 94T,
④-⑥ 10T
Q_O＝80±20%, f＝450kHz
Internal 180pF

· 2150-2061-049 (Sumida)
①-② 54T, ③-② 120T,
④-⑥ 12T
Q_O≧40
Internal 180pF

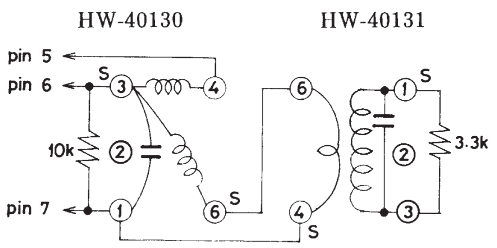
FM single tuning detection coil



· HW-40122 (Mitsumi)
③-④ 84.5T, ③-① 19T,
Q_O＝35±20%, f＝10.7MHz
Internal 82pF±10%
Damping resistance

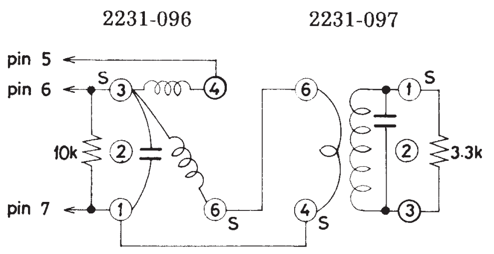
· 2231-016 (Sumida)
③-④ 73.5T, ③-① 19T,
Q_O＝30±20%, f＝10.7MHz
Internal 82pF±10%
Damping resistance

FM double tuning detection coil



· HW-40130 (Mitsumi)
③-④ 86.5T
③-⑥ 13.5T
$Q_O = 50 \pm 20\%$
Internal 100pF±10%

· HW-40131 (Mitsumi)
④-⑥ 1T
①-③ 19T
$Q_O = 35 \pm 20\%$
Internal 100pF±10%

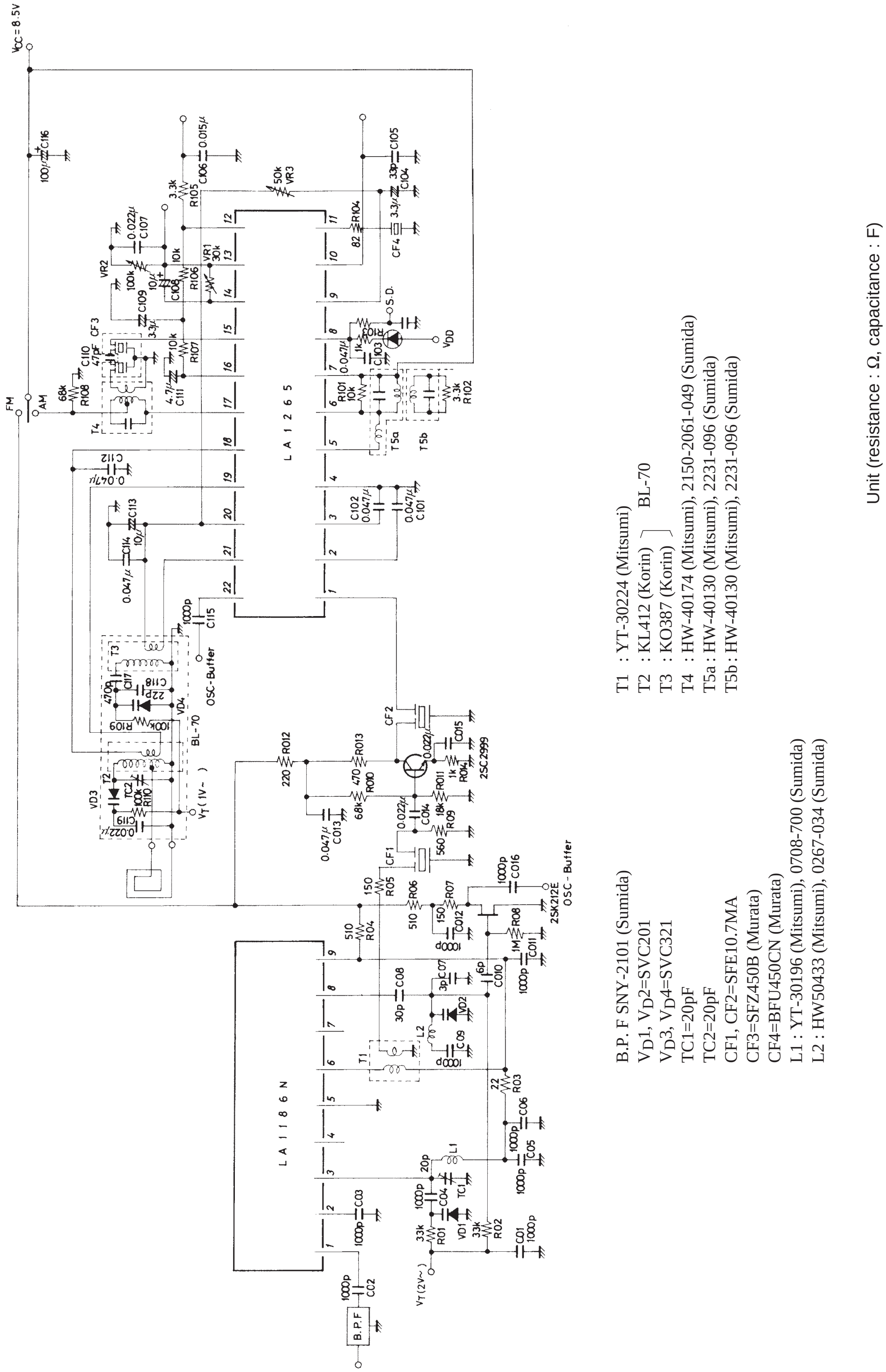


· 2231-096 (Sumida)
③-④ 73.5T
③-⑥ 23.5T
$Q_O = 50 \pm 20\%$
Internal 62pF±10%

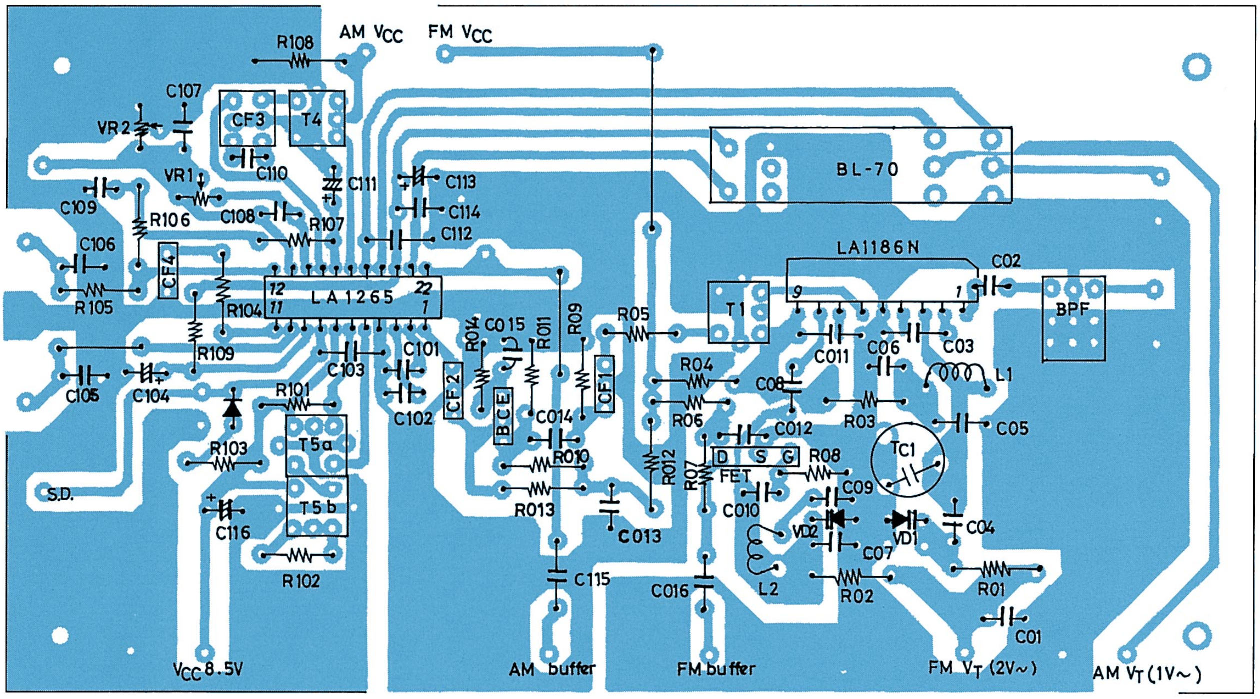
· 2231-097 (Sumida)
④-⑥ 2T
①-③ 21T
$Q_O = 47 \pm 20\%$
Internal 82pF±10%

Unit (resistance : Ω)

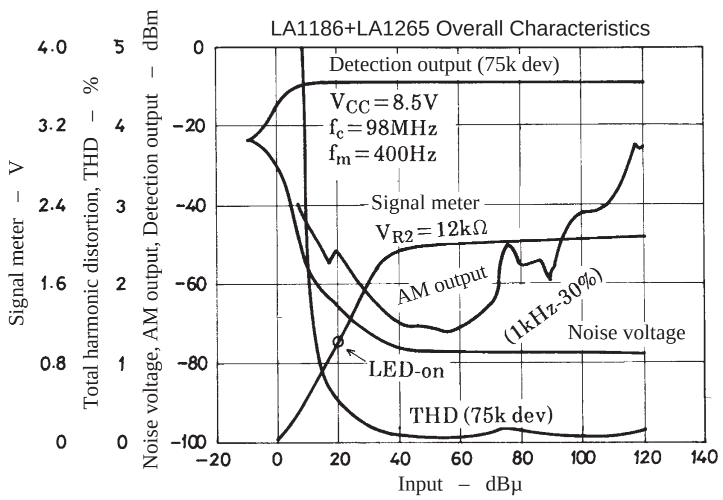
Sample Application Circuit : LA1186N + LA1265 (US Band)

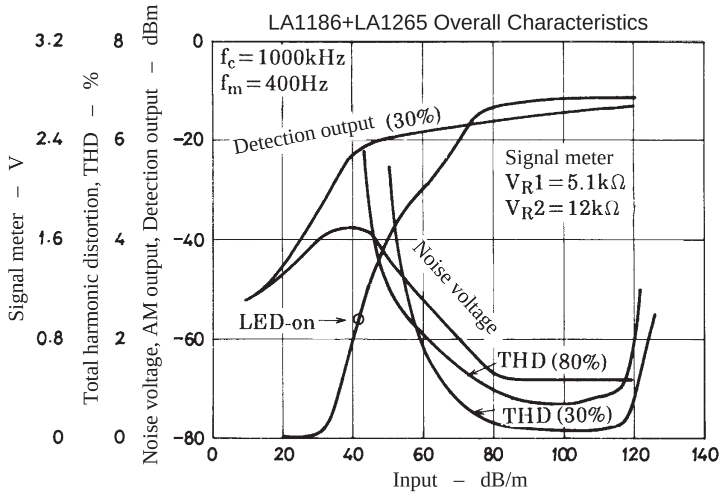


Sample Printed Circuit Pattern (Cu-foiled area)



85×155mm²





This catalog provides information as of November, 1997. Specifications and information herein are subject to change without notice.