

SANYO	No. 660A	LA1231N
		FM IF System

Function

- . IF amplification, Limiter
- . Quadrature detection
- . AF preamplifier
- . Muting at weak input
- . Muting at the detuning
- . Signal meter drive output
- . AFC tuning meter drive output
- . Delay AGC output
- . Inverting circuit for muting drive voltage
- . IF amplifier stop circuit

Features

- . High sensitivity on limiting: 18uV typ.
- . Low distortion: 0.05% typ. determined by the linearity of phase characteristics in phase shifting circuit.
- . High demodulation output: 330 mVrms typ.
- . High S/N ratio: 78.5 dB typ.
- . Muting at detuning with little shock noise.
- . Single meter drive output proportional with the input signal level dB.
- . Detuning muting band having good symmetrics.
- . Tuning meter driving output having wide swing width.
- . Delay AGC drive output for front end.
- . Constant voltage circuit is built-in: operation voltage= 9 to 14 V.
- . Muting characteristics between adjacent stations are distinguished.

General

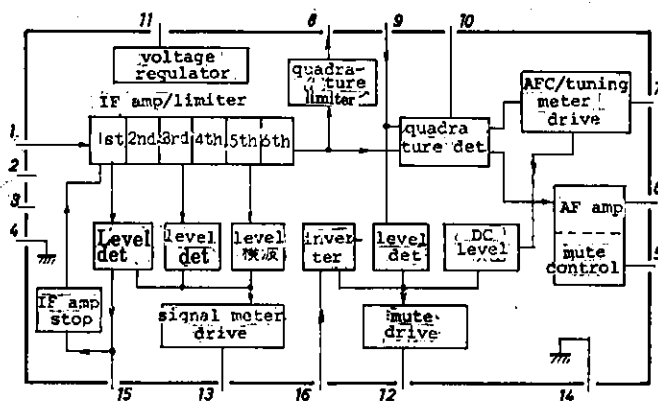
Being developed for FM IF system, LA1231 is a highly integrated circuit in which almost all functions are contained concerning the FM tuner IF stage. The block diagram of equivalent circuit is shown below. Usual peripheral circuits are shown also in examples of application circuits.

The IF amplifier and limiter stages are composed of 6-stage double-end type differential amplifier, which is superior on its AMR. The signal meter driving stage which is located in parallel therewith consists of a 3-stage level detector circuit and a drive circuit in order to extend the linear area.

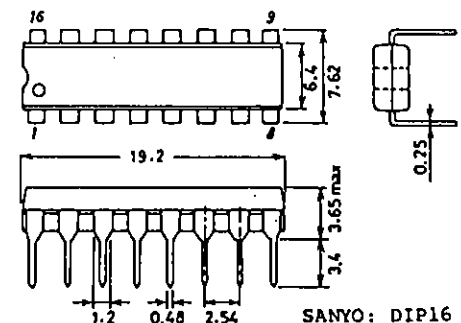
The FM detection stage composed of a double-balance type quadrature detecting circuit is attached with a low frequency preamplifier and muting control circuit.

(continued on the next page)

Equivalent Circuit Block Diagram



Package Dimensions (unit: mm) 3006B



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The muting drive stage is composed of the following 3 circuits.

- 1) A level detection circuit which detects the S/N ratio of carrier wave when the input is weak.
- 2) A circuit which detects the dc output of FM detector's 'S' curve when detuning is made.
- 3) A driving circuit

Thus, this muting driving stage can reduce foreign factors such as the interstation noises, the shock noise caused from muting when detuning is made, and so forth.

Besides, a voltage-inverting circuit is built in LA1231N so that the muting may be enabled at any appropriate input signal level. The output of this voltage-inverting circuit is connected with the muting drive output terminal. Thus, the muting can be placed to the ON or OFF status when a control voltage is applied from other section to the input terminal of the voltage-inverting circuit. For the control voltage, the output of the signal meter driver is appropriate. Both the AFC output stage and tuning meter driving stage are of the current-driven type. So, not only the sensitivity of AFC but also the muting band (when detuning is made) can be controlled by an outer resistor.

Being utilized for disabling the FM IF amplifier when AM reception is made, the IF amplification/stop circuit can decrease the shock noise caused at the conversion between FM and AM reception modes.

Maximum Ratings at Ta=25°C

Maximum Supply Voltage	VCCmax	pin11	16	V
Maximum Input Voltage	VI	pin1-2	±1	Vp-p
Maximum Supply Current	ICC	pin11	40	mA
Maximum Flow-in Current	I15	pin15	1	mA
	I16	pin16	1	mA
	I10	pin10	2	mA
Maximum Flow-out Current	I12	pin12	2	mA
	I13	pin13	2	mA
	I15	pin15	2	mA
	Allowable Power Dissipation	Pdmax	650	mW
Operating Temperature	Topr.	-20 to +70	°C	
Storage Temperature	Tstg	-40 to +125	°C	

Recommended Operation Condition at Ta=25°C

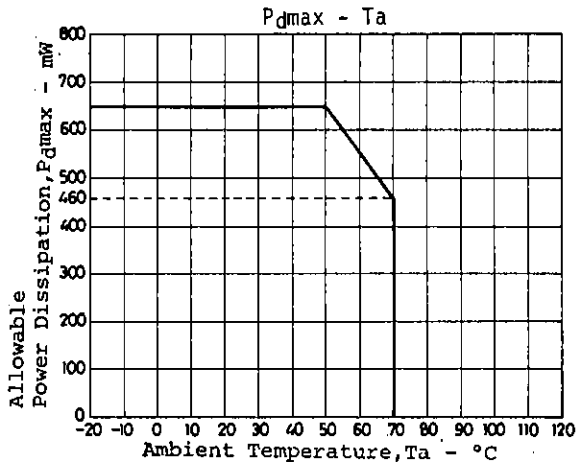
Supply Voltage	VCC	12	V
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Operation Characteristics at Ta=25°C, VCC=12V, f=10.7MHz

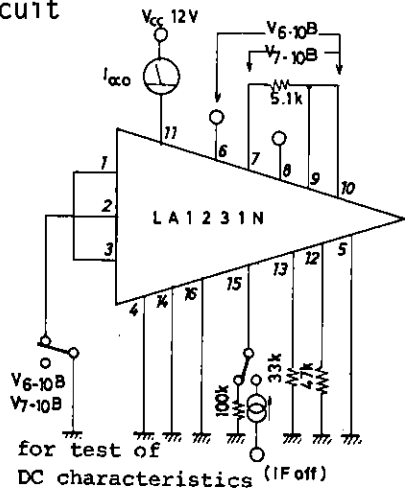
			min	typ	max	unit
Quiescent Current	Icco			22	30	mA
Current Dissipation	ICC	vin=100dBu		26.5	33	mA
Demodulated Output	vo	vin=100dBu, 400Hz-100%mod	240	330	460	mVrms
			S/N	"	"	72
Input Limiting Voltage	vin(lim)	vo 3dB down, 400Hz-100%mod				
						25
Total Harmonic Distortion						
	THD	vin=100dBu, 400Hz-100%mod		0.05	0.3	%
Muting Sensitivity	vin(mute)	V12=1.4V	23	29	35	dBu
Muting Attenuation	Mute(att)	V5=2V, vin=100dBu, 400Hz-100%mod	60	65		dB
Muting Bandwidth	BW(mute)	vin=100dBu, V12=1.4V	140	220	370	kHz
AM Rejection Ratio	AMR	vin=100dBu, FM: 400Hz-100%mod AM: 1kHz-30%mod	45	60		dB
Muting Driving Output	V12	quiescent	4.0	4.9	6.0	V
		vin=100dBu	0	0	0.3	V
Signal Meter Driving Output	V13	quiescent	0	0	0.1	V
		vin=70dBu	1.9	3.0	4.2	V
		vin=100dBu	4.5	5.5		V

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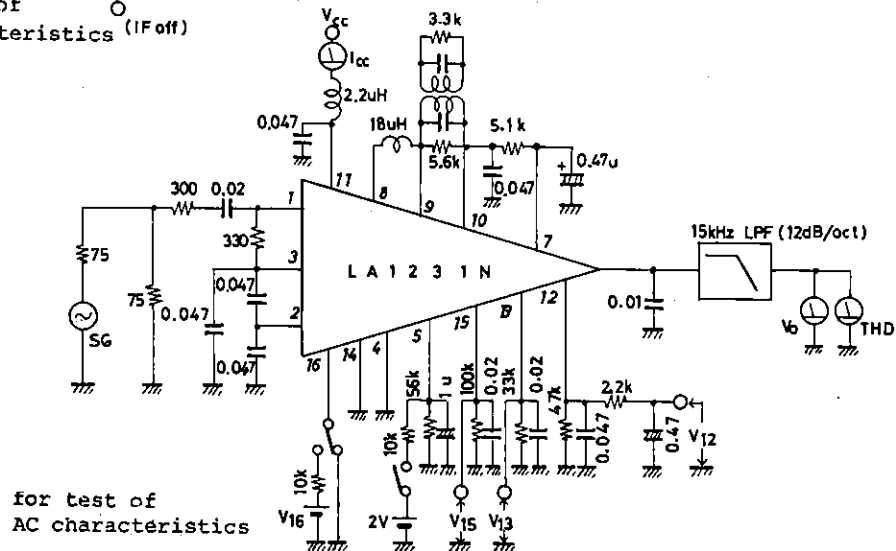
			min	typ	max	unit
AGC Output	V15	quiescent	4.2	5.0	5.5	V
		$V_{in}=100\text{dBu}$	0	0	0.5	V
IF Off Current	I15(off)	quiescent, $V_{8-10} \leq 20\text{mV}$	10	35	60	μA
Voltage of muting operation	V16(mute)	$V_{in}=100\text{dBu}, V_{12}=1.4\text{V}$	0.7	0.84	1.0	V
Offset Voltage	V6-10 B	quiescent, pin 6-10	-0.5	0	+0.5	V
	V7-10 B	" , pin 7-10, $R_{7-10}=5.1\text{k}$	-0.25	0	+0.25	V
Pin Voltage	V1	quiescent		2.6		V
	V2	"		2.6		V
	V3	"		2.6		V
	V6	"		5.6		V
	V7	"		5.6		V
	V8	"		5.4		V
	V10	"		5.6		V
	V12	"		4.9		V
	V13	"		0		V
	V15	"		5.0		V

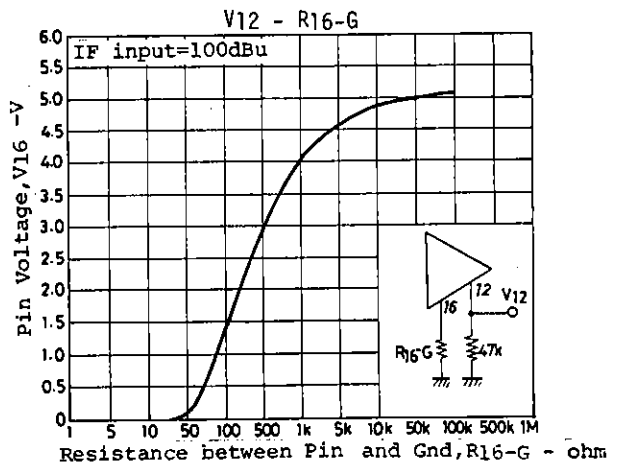
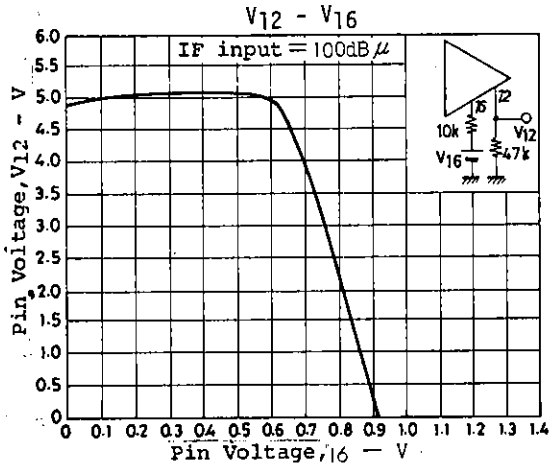
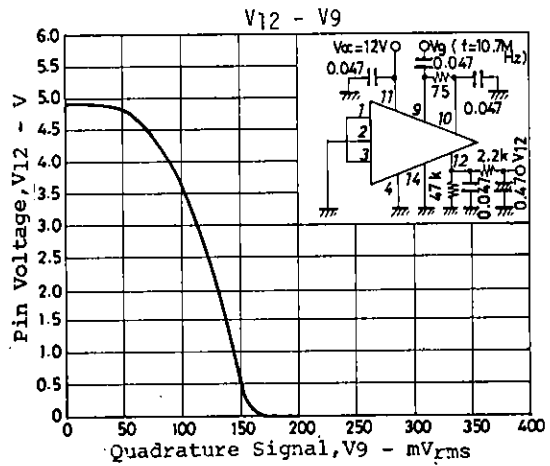
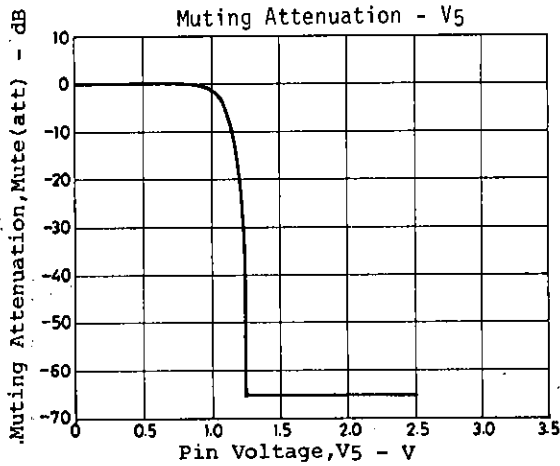
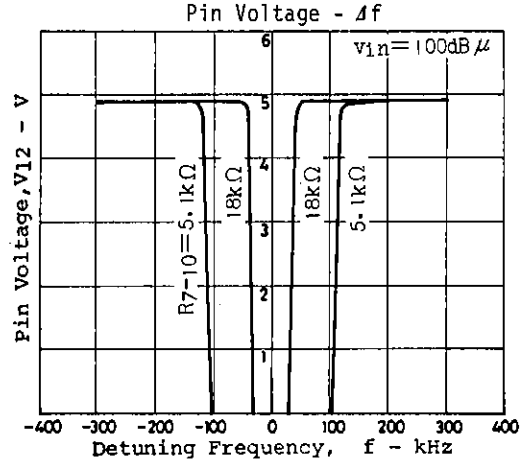
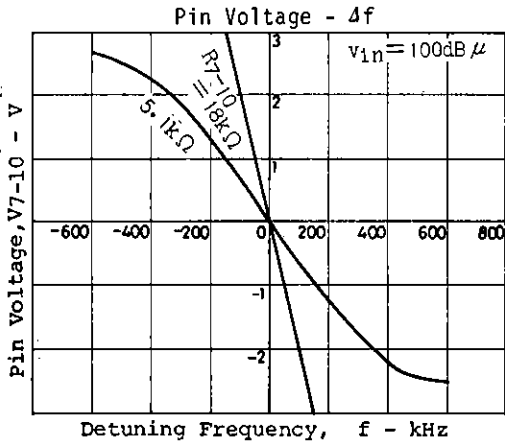
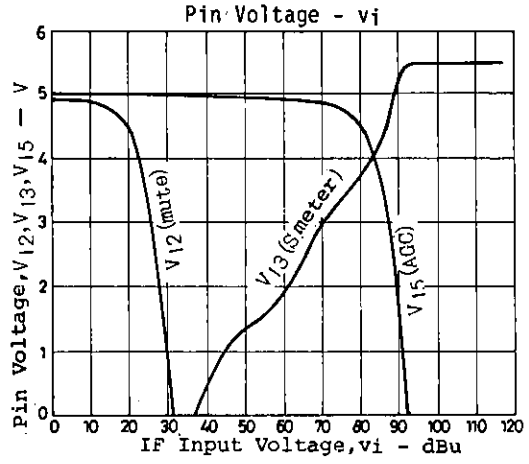
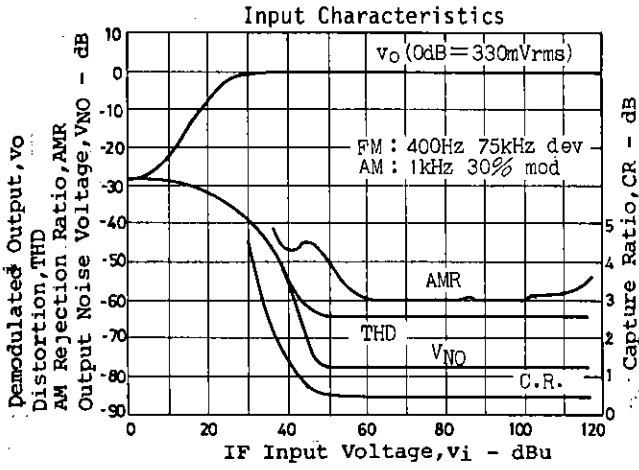


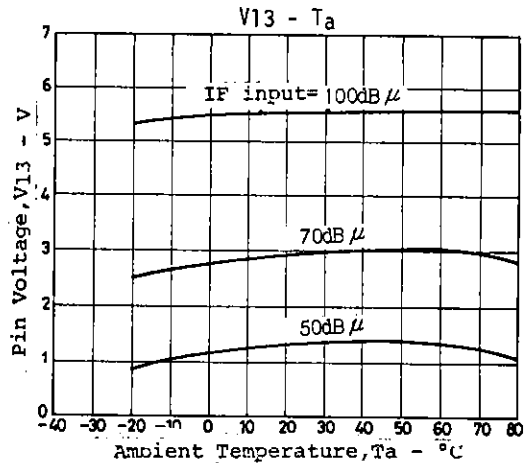
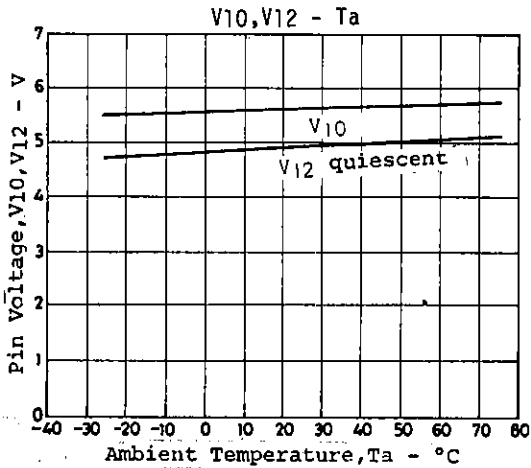
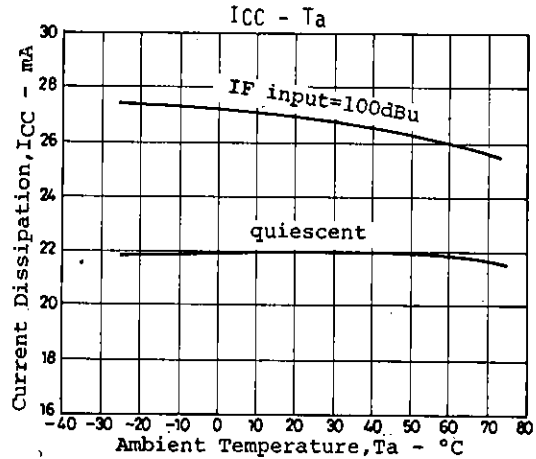
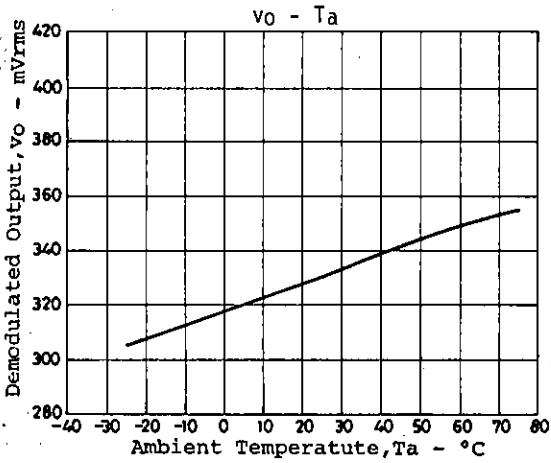
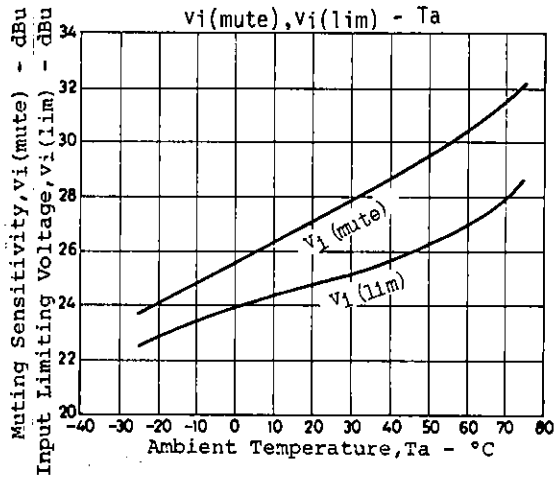
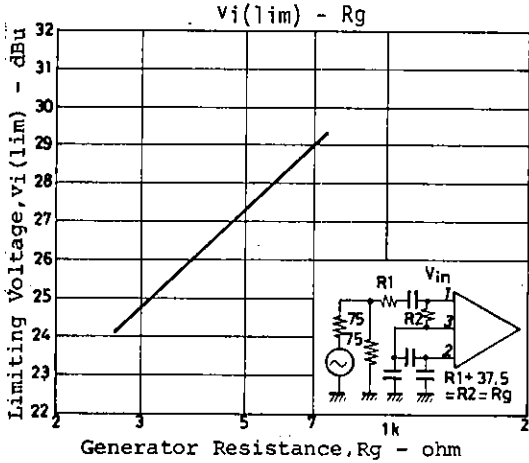
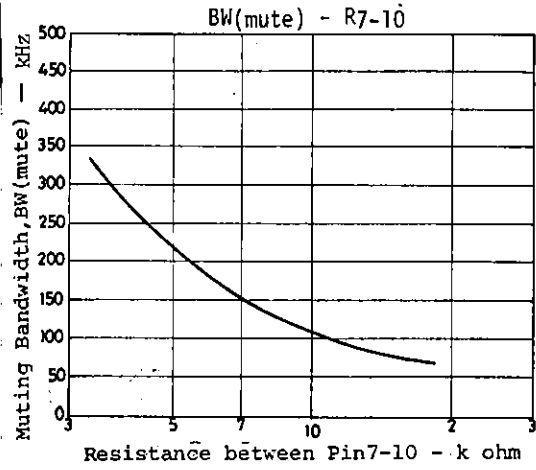
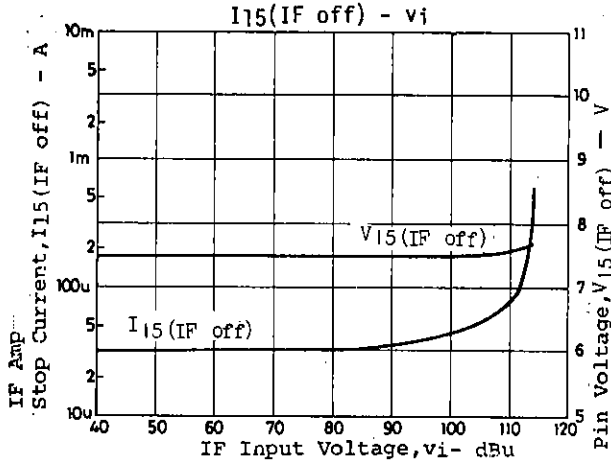
Measuring Circuit

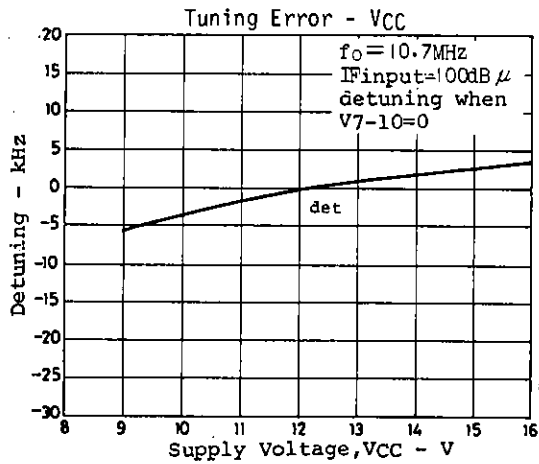
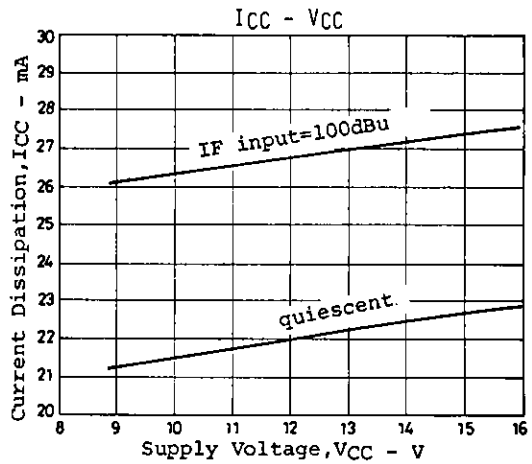
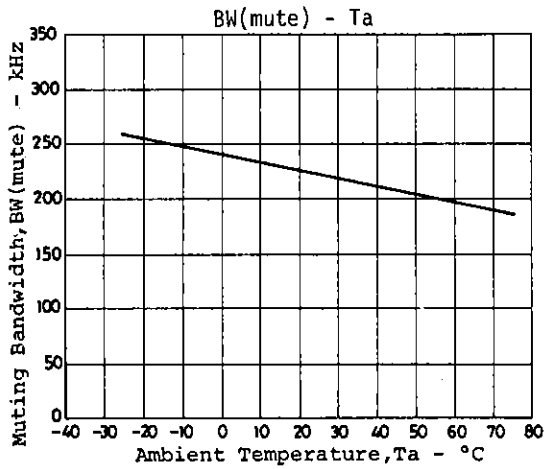
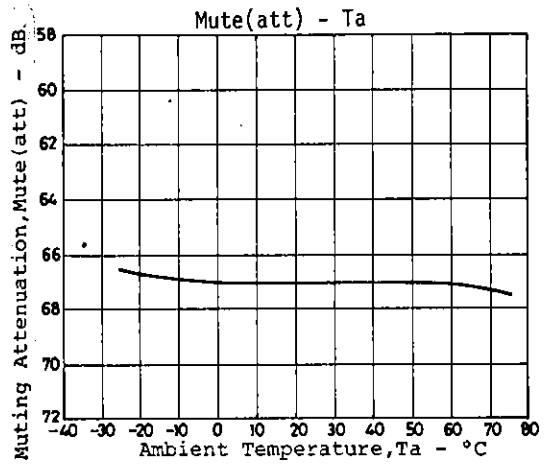
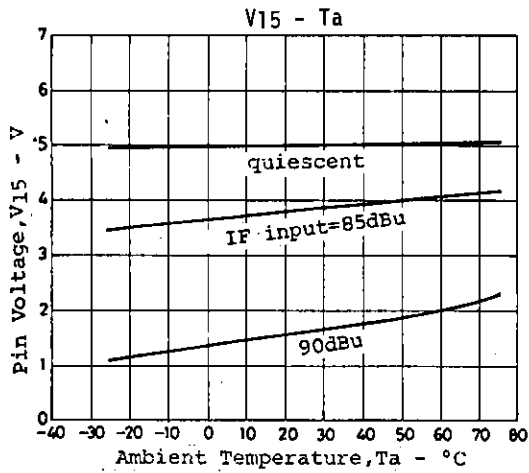


Unit (resistance: Ω , capacitance: F)









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