


Monolithic Linear IC

	No.3516B	<b>LA8630,8630M</b>
	<b>Low Voltage and Current Dissipation Compandor IC</b>	

**Applicaitons**

- Cordless telephone
- FM transceiver

**Functions**

- Compressor (VCA circuit, full-wave rectifying circuit, adder amplifier)
- Expander (VCA circuit, full-wave rectifying circuit, adder amplifier)
- Operational amplifier (in the compressor)
- Operational amplifier with muting function (in the expander)
- Analog switch for data signal input (in the compressor)
- Regulator

**Maximum Ratings at Ta=25°C**

			unit
Maximum Supply Voltage	Vccmax	8	V
Allowable Power Dissipation	Pdmax	300	mW
Operating Temperature	Topr	-20 to +75	°C
Storage Temperature	Tstg	-40 to +125	°C

**Operating Conditions at Ta=25°C**

			unit
Recommended Supply Voltage	Vcc	3	V
Operating Voltage Range	Vcc op	2.2 to 6	V

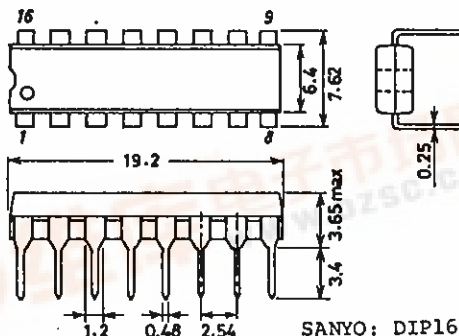
**Operating Characteristics at Ta=25°C, Vcc=3.0V, f=1kHz, Vin=100mVrms (0dB) min**

			min	typ	max	unit
Current Dissipation	Icc	With no signal input		2.5	3.7	mA
Input Reference Voltage	Vinref			100		mVrms

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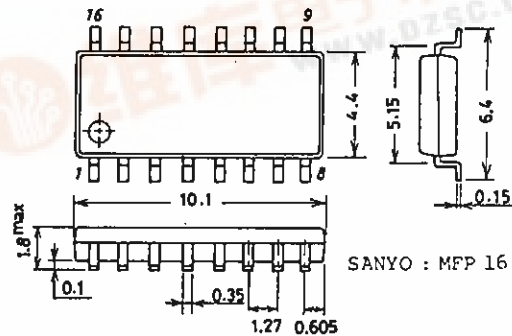
**Package Dimensions  
(unit: mm)  
3006B**

[LA8630]



**Package Dimensions  
(unit: mm)  
3035A**

[LA8630M]



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[Expander] (Operational amplifier gain: 0dB)			min	typ	max	unit
Output Level	Vorefe	Vin=0dB(Operational amplifier gain: -6dB)	-26.5	-24.5	-22.5	dBV
Gain Error	Vgee(1)	Vin=+5dB	-0.5	0	+0.5	dB
	Vgee(2)	Vin=-20dB	-1.0	0	+1.0	dB
	Vgee(3)	Vin=-30dB	-1.5	0	+2.0	dB
Distortion Factor	THDe	Vin=0dB		0.35	1.0	%
Output Noise Voltage	VNOe	Vin=-∞, Rg=620Ω, f=20 to 20000Hz		12	80	μVrms
Frequency Characteristic	f	Vin=0dB, f=200 to 3500Hz		0.0		dB
Maximum Output Voltage	Vomax	RL=10kΩ, THD=10%	0.6	1.0		Vrms

[Compressor] (Operational amplifier gain: 0dB)			min	typ	max	unit
Output Level	Vorefc	Vin=0dB	-23	-21	-19	dBV
Gain Error	Vgec(1)	Vin=+20dB	-0.5	0	+0.5	dB
	Vgec(2)	Vin=-20dB	-0.5	0	+0.5	dB
	Vgec(3)	Vin=-40dB	-1.0	0	+1.0	dB
Distortion Factor	THDc	Vin=0dB		0.35	1.0	%
Output Noise Voltage	VNOc	Vin=-∞, Rg=620Ω, f=20 to 20000Hz		0.3	0.7	mVrms
Frequency Characteristic	f	Vin=0dB, f=200 to 3500Hz		0.0		dB

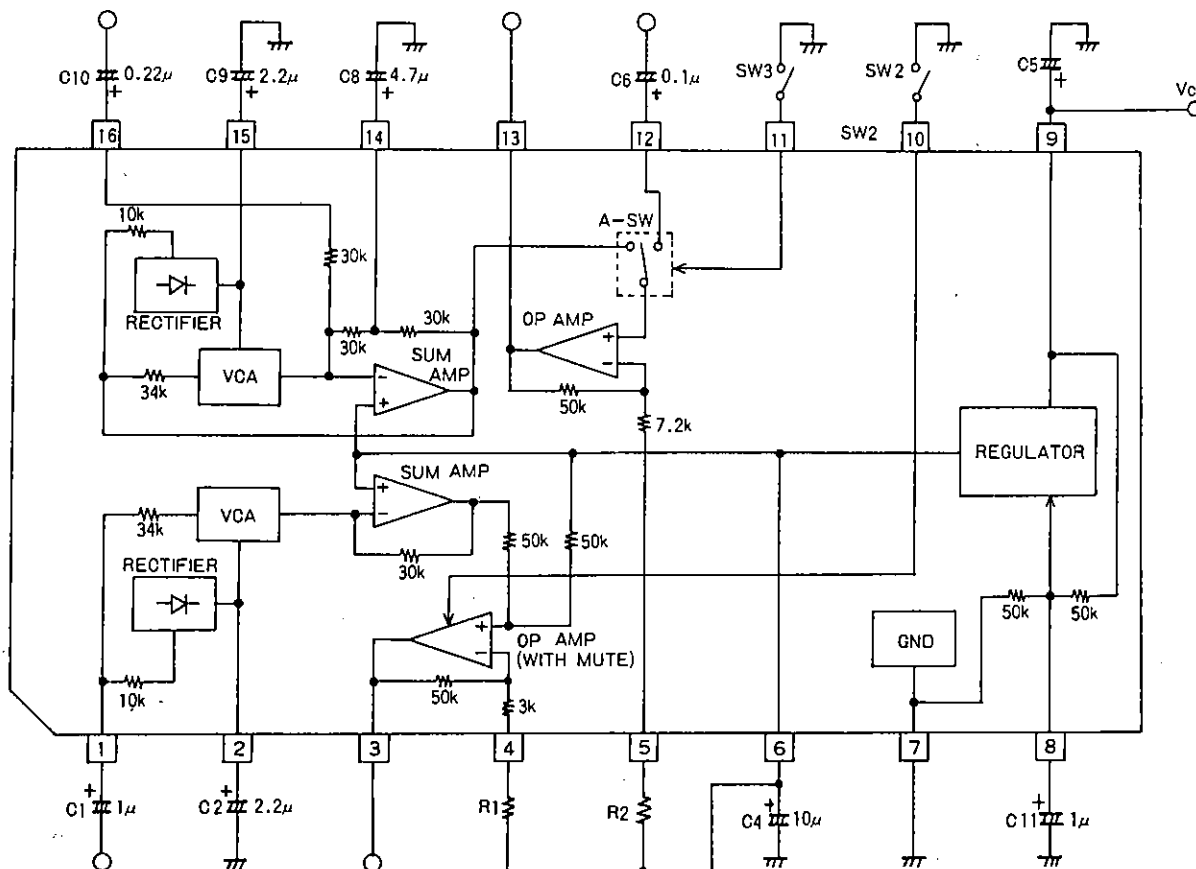
[Muting Circuit] (Operational amplifier gain: 0dB)			min	typ	max	unit
Muting Attenuation	CT(1)	Vin=0dB, f=1kHz	60	90		dB
Threshold Voltage	Vthm		1.25	1.35	1.45	V

[Analog Switch Circuit] (Operational amplifier gain: 0dB)			min	typ	max	unit
Crosstalk	CT(2)	Vin=0dB, f=1kHz	40	47		dB
Threshold Voltage	Vtha		1.25	1.35	1.45	V

\*Be careful that the threshold voltage is determined by Vcc (Vth=0.45Vcc).

### Equivalent Circuit Block Diagram/Sample Application Circuit

Unit (resistance: Ω, capacitance: F)



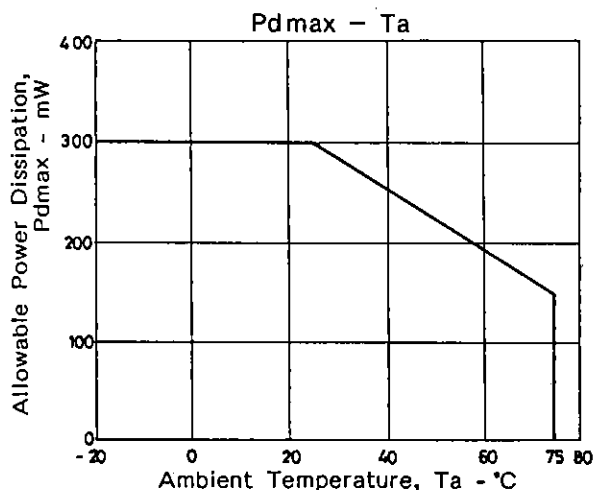
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Pin Name

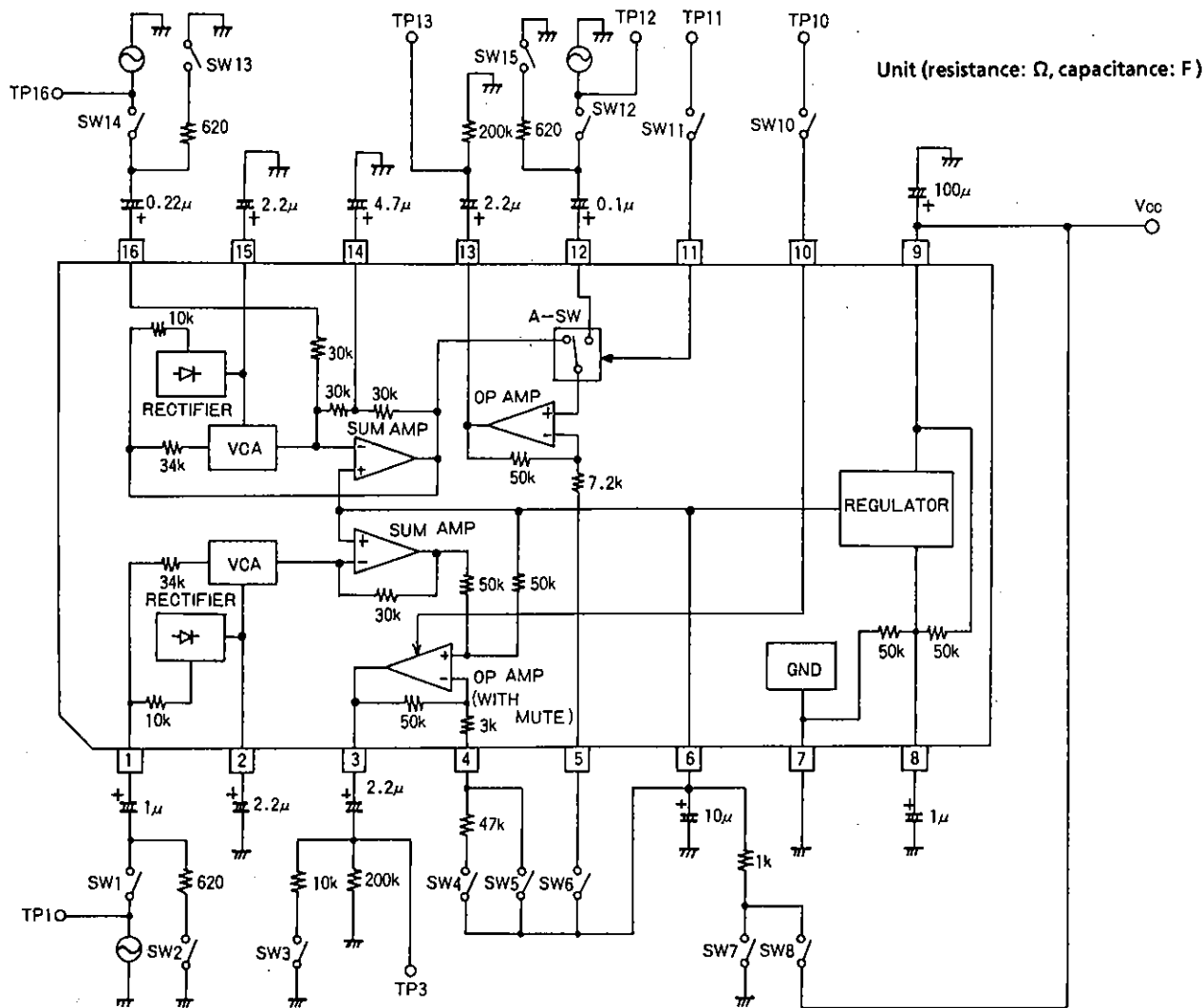
Pin No.	Name
1	EXP.VIN
2	EXP.VREC
3	EXP.VOUT
4	OP.AMP NF(EXP)
5	OP.AMP NF(COMP)
6	VREF
7	GND
8	1/2VCC
9	VCC
10	MUTE CONT.
11	DATA CONT.
12	DATA IN
13	COMP.VOUT
14	COMP.NF
15	COMP.VREC
16	COMP.VIN

Control Mode

Mode		Audio signal	Data
Pin 10	Open	Output	—
	[LOW]	Mute	—
Pin 11	Open	Output	Mute
	[LOW]	Mute	Output

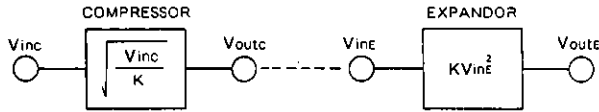


Test Circuit



Summary of Compondor

(1) Operation



<for example>

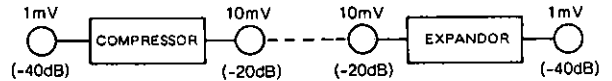
$V_{ref} = 100\text{mV}$

$K = 10$

$V_{inc} = 1\text{mV} \quad V_{outc} = \sqrt{\frac{1}{10} \times 1 \times 10^{-3}} \approx 10\text{mV} = -20\text{dB}$   
 (-40dB)

$V_{ine} = 10\text{mV} \quad V_{oute} = (10 \times 10^{-3})^2 \times 10 = 1\text{mV} = -40\text{dB}$

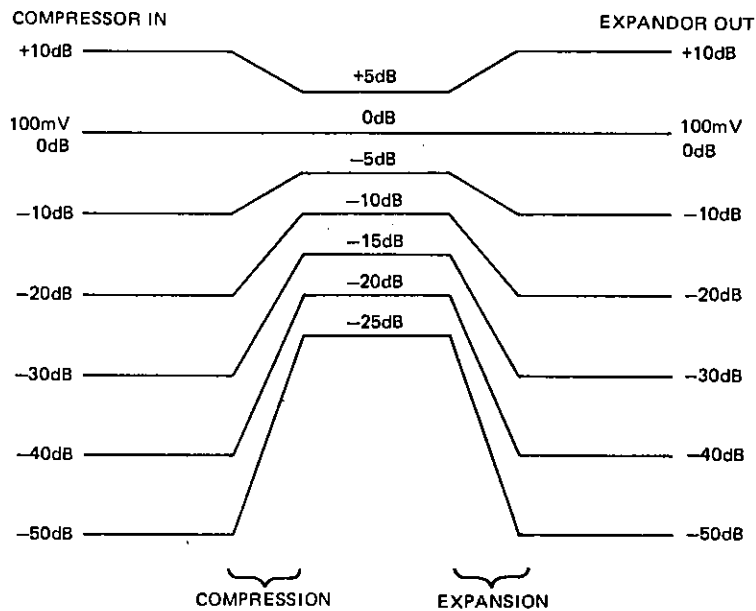
$V_{outc} = \sqrt{V_{inc}/K}$   
 $V_{ine} = V_{outc}$   
 $V_{oute} = K V_{ine}^2 = K \sqrt{\frac{V_{inc}}{K}} = V_{inc}$



at Reference level ( $V_{ref}$ )  $V_{inc} = V_{outc}$ ,  $V_{ine} = V_{oute}$

- $V_{inc} < V_{ref}$  COMPRESSOR → Amplifier
- $V_{ine} < V_{ref}$  EXPANDOR → Attenuator
- $V_{inc} > V_{ref}$  COMPRESSOR → Attenuator
- $V_{ine} > V_{ref}$  EXPANDOR → Amplifier

(2) Level Diagram



(3) Block Diagram  
 <COMPRESSOR>

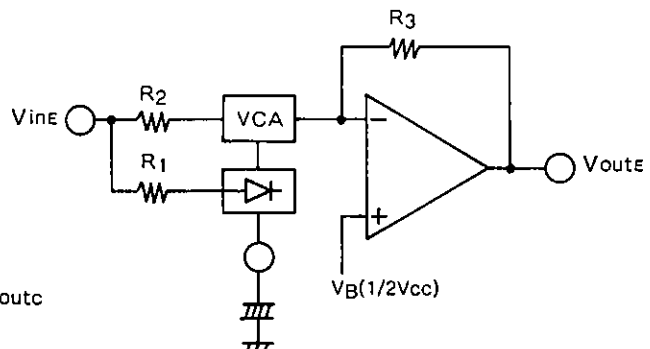
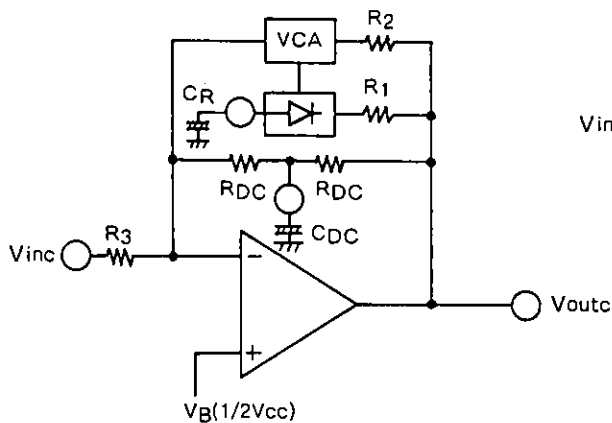
$$V_{outc} = \sqrt{\frac{R_1 R_2 I_1}{2 R_3}} V_{inc}$$
  

$$= \sqrt{\frac{1}{10}} V_{inc}$$

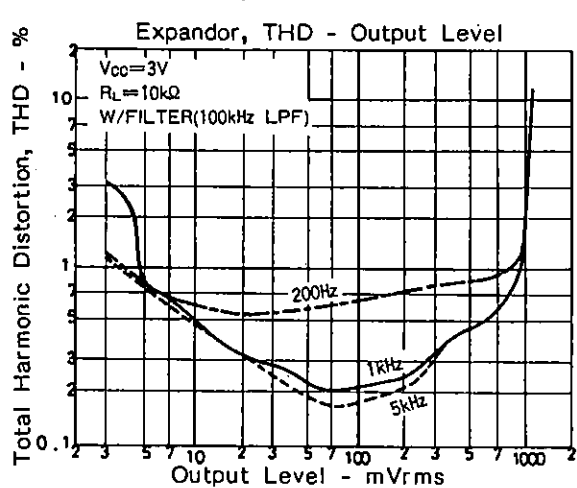
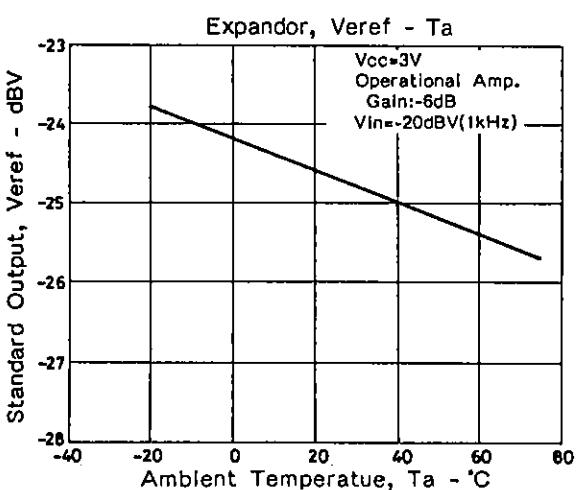
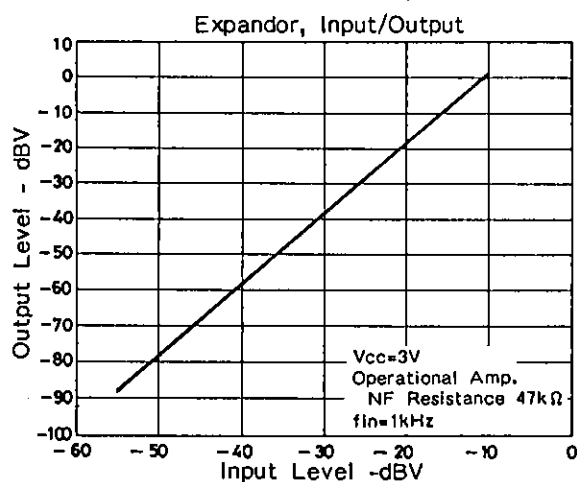
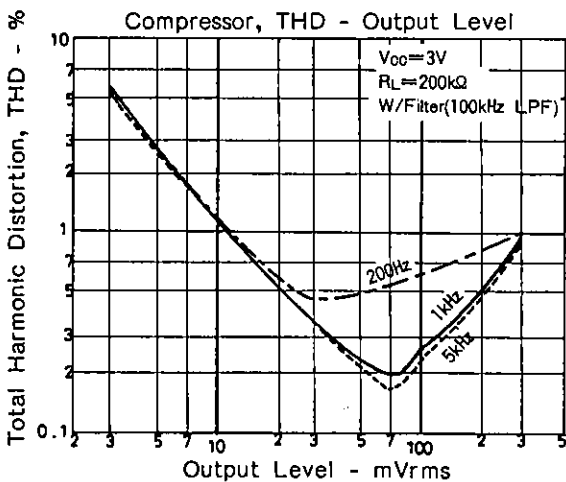
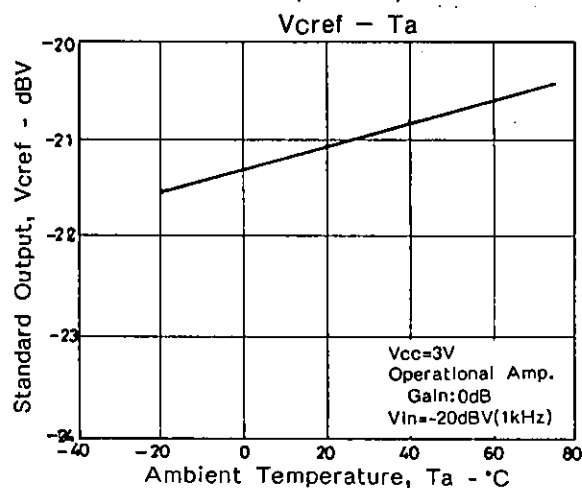
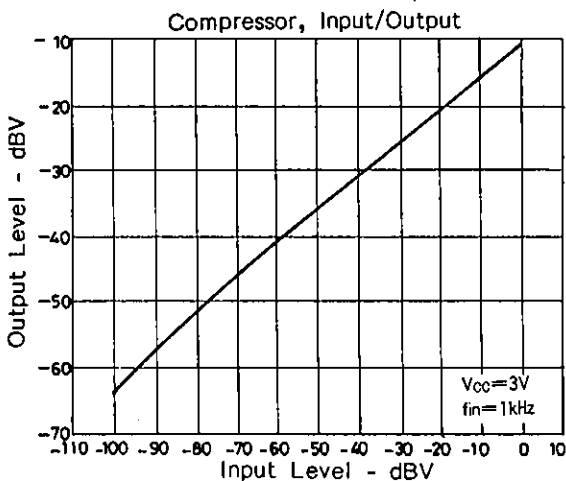
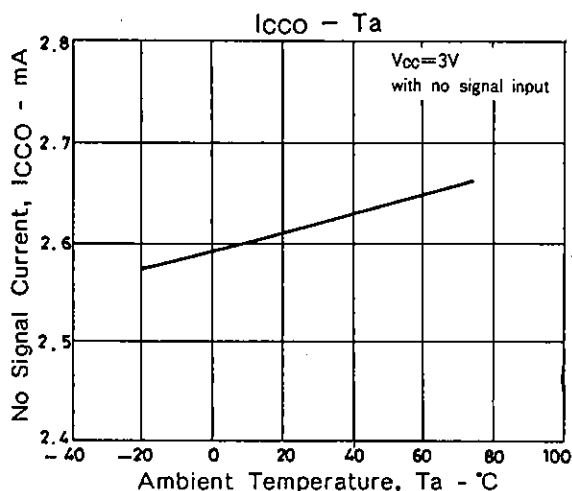
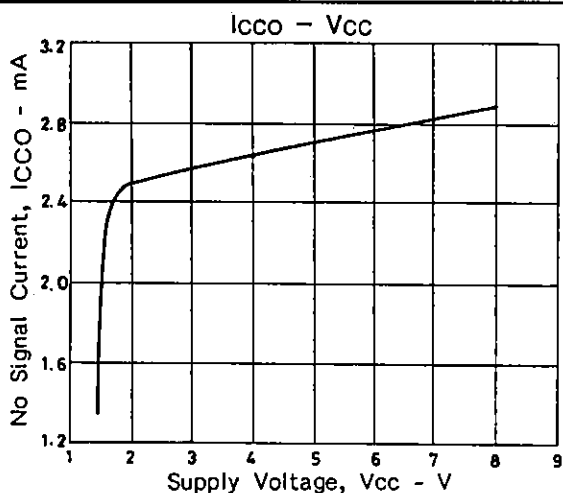
<EXPANDOR>

$$V_{oute} = \frac{2 R_3}{R_1 R_2 I_1} V_{ine}^2$$
  

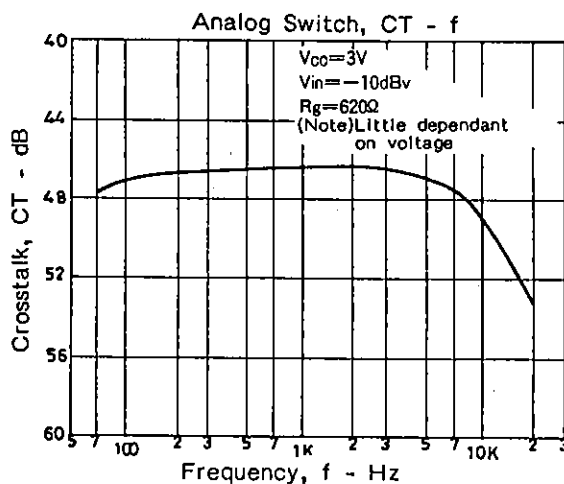
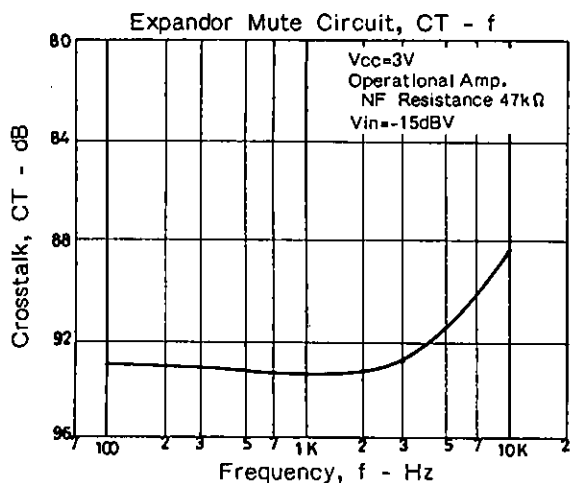
$$= 10 V_{ine}^2$$



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