Ordering number:ENN3516B

Monolithic Linear IC

LA8630, 8630M

Low Voltage and Current Dissipation Compandor IC

Applications

- Cordless telephone.
- FM transceiver.

Functions

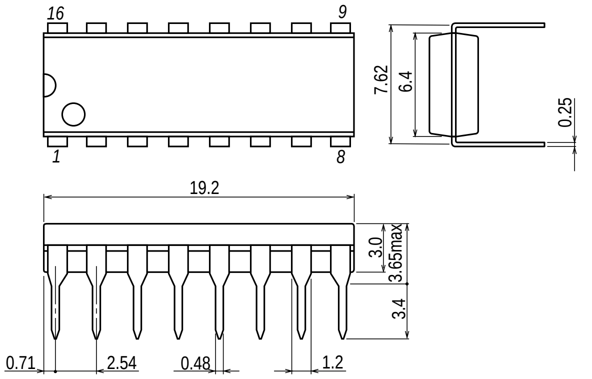
- Compressor (VCA circuit, full-wave rectifying circuit, adder amplifier).
- Expandor (VCA circuit, full-wave rectifying circuit, adder amplifier).
- Operational amplifier (in the compressor).
- Operational amplifier with muting function (in the expandor).
- Analog switch for data signal input (in the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

Package Dimensions

unit:mm

3006B-DIP16

[LA8630]

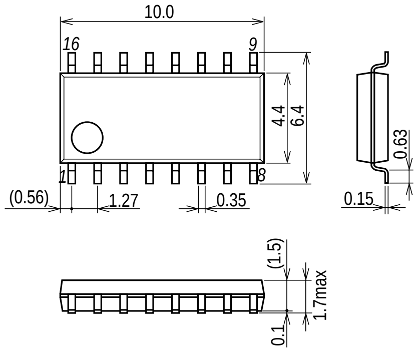


SANYO : DIP16

unit:mm

3035B-MFP16

[LA8630M]



SANYO : MFP16

SANYO Electric Co.,Ltd. Semiconductor Company
TOKYO OFFICE Tokyo Bldg., 1-10, 1 Chome, Ueno, Taito-ku, TOKYO, 110-8534 JAPAN

Specifications

Maximum Ratings at Ta = 25˚C

Parameter	Symbol	Conditions	Ratings	Unit
Maximum supply voltage	V_{CC} max		8	V
Allowable power dissipation	Pd max		300	mW
Operating temperature	Topr		–20 to +75	˚C
Storage temperature	Tstg		–40 to +125	˚C

Operating Conditions at Ta = 25˚C

Parameter	Symbol	Conditions	Ratings	Unit
Recommended supply voltage	V_{CC}		3	V
Operating voltage range	V_{CC} op		2.2 to 6	V

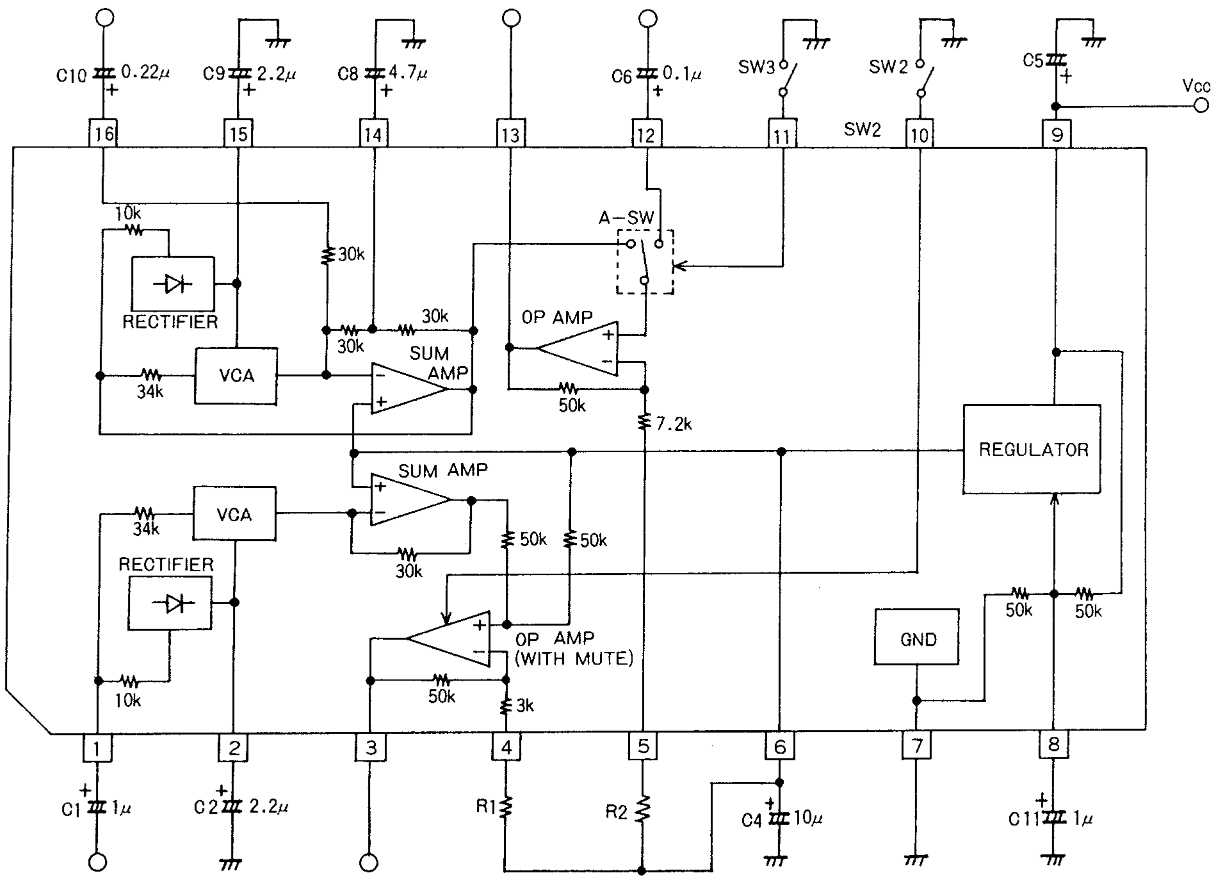
Operating Characteristics at Ta = 25˚C, V_{CC}=3.0V, f=1kHz, Vin=100mVrms (0dB)

Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Current drain	I_{CC}	With no signal input		2.5	3.7	mA
Input reference voltage	Vinref			100		mVrms
[Expandor] (Operational amplifier gain : 0dB)						
Output level	Vorefe	Vin=0dB (Operational amplifier gain : –6dB)	–26.5	–24.5	–22.5	dBV
Gain error	Vgee1	Vin=+5dB	–0.5	0	+0.5	dB
	Vgee2	Vin=–20dB	–1.0	0	+1.0	dB
	Vgee3	Vin=–30dB	–1.5	0	+2.0	dB
Distortion factor	THDe	Vin=0dB		0.35	1.0	%
Output noise voltage	V_{NO}e	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	V_O max	R_L=10kΩ, THD=10%	0.6	1.0		Vrms
[Compressor] (Operational amplifier gain : 0dB)						
Output level	Vorefc	Vin=0dB	–23	–21	–19	dBV
Gain error	Vgec1	Vin=+20dB	–0.5	0	+0.5	dB
	Vgec2	Vin=–20dB	–0.5	0	+0.5	dB
	Vgec3	Vin=–40dB	–1.0	0	+1.0	dB
Distortion factor	THDc	Vin=0dB		0.35	1.0	%
Output noise voltage	V_{NO}c	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)						
Muting attenuation	CT1	Vin=0dB, f=1kHz	60	90		dB
Threshold voltage	Vthm		1.25	1.35	1.45	V
[Analog switch circuit] (operational amplifier gain : 0dB)						
Crosstalk	CT2	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 V_{CC} (Vth=0.45V_{CC}).

Equivalent Circuit Block Diagram/Sample Application Circuit

Unit (resistance: Ω, capacitance: F)

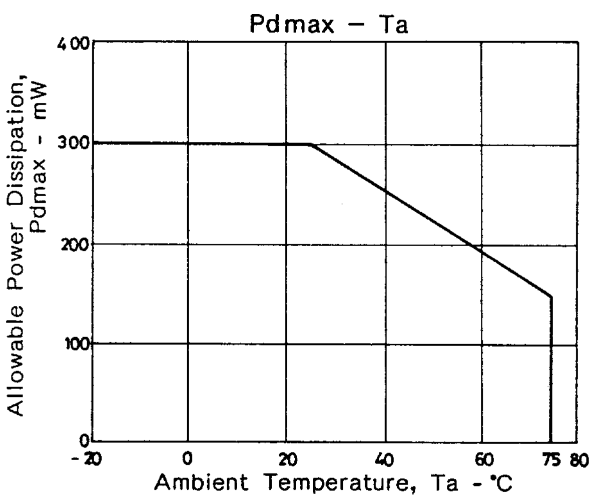


Pin Name

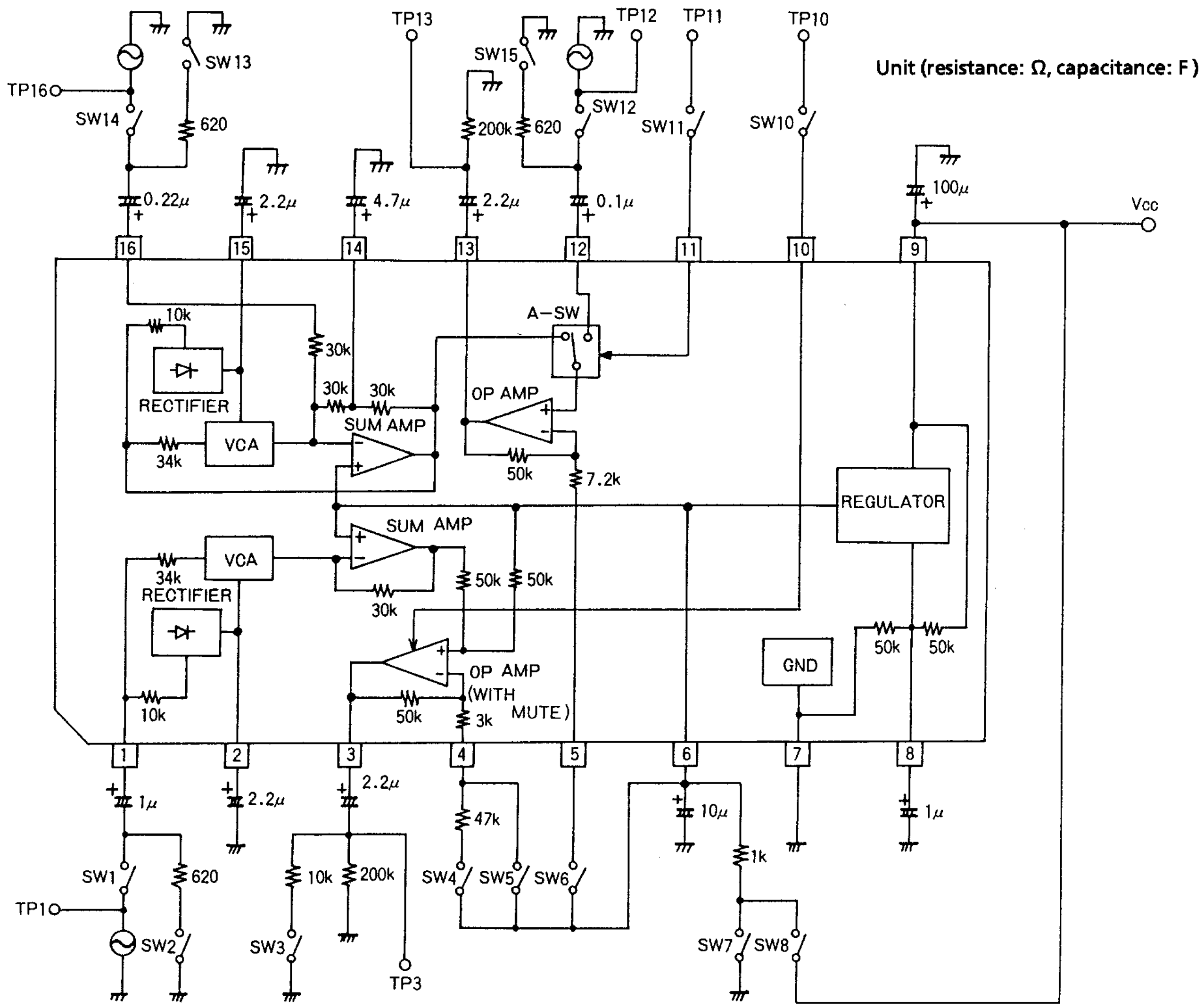
Pin No.	Name
1	EXP. VIN
2	EXP. VREC
3	EXO. VOUT
4	OP. AMP NF (EXP)
5	OP. AMP NF (COMP)
6	VREF
7	GND
8	1/2VCC
9	VCC
10	MUTE CONT
11	DATA CONT.
12	DATA IN
13	COMP. VOUT
14	COMP. NF
15	COMP. VREC
16	COMP. VIN

Control Mode

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

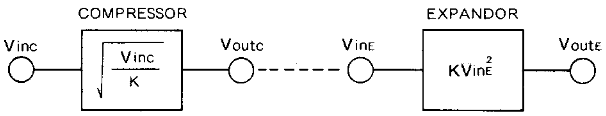


Test Circuit



Summary of Compandor

(1) Operation



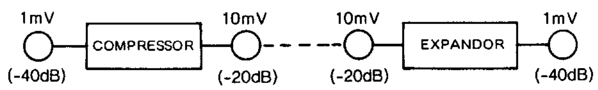
<for example>

Vref = 100mV

K = 10

Vinc = 1mV (-40dB) Voutc = $\sqrt{\frac{1}{10} \times 1 \times 10^{-3}} \fallingdotseq 10mV = -20dB$

VinE = 10mV VoutE = $(10 \times 10^{-3})^2 \times 10 = 1mV = -40dB$



$$Voutc = \sqrt{Vinc/K}$$

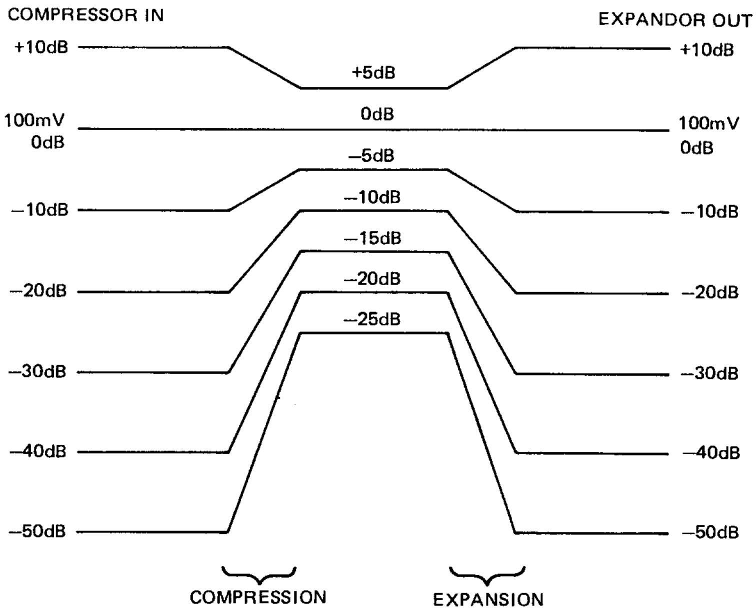
$$Vin_E = Voutc^2$$

$$Vout_E = KVin_E^2 = K\sqrt{\frac{Vinc}{K}}^2 = Vinc$$

at Reference level (Vref) Vinc = Voutc, VinE = VoutE

Vinc <Vref	COMPRESSOR →	Amplifier
VinE <Vref	EXPANDOR →	Attenuator
Vinc >Vref	COMPRESSOR →	Attenuator
VinE >Vref	EXPANDOR →	Amplifier

(2) Level Diagram



(3) Block Diagram

<COMPRESSOR>

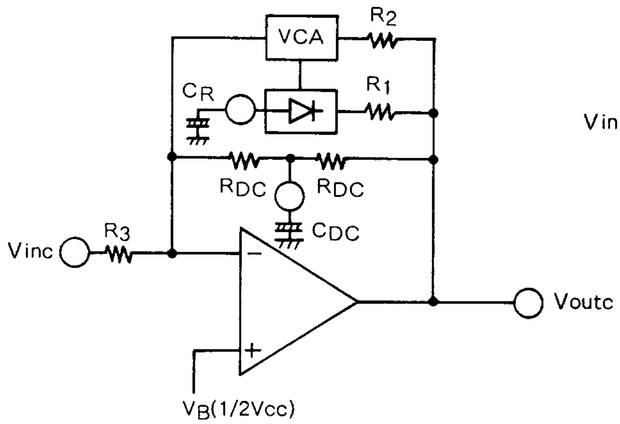
$$V_{outc} = \sqrt{\frac{R_1 R_2 I_1}{2R_3} V_{inc}}$$

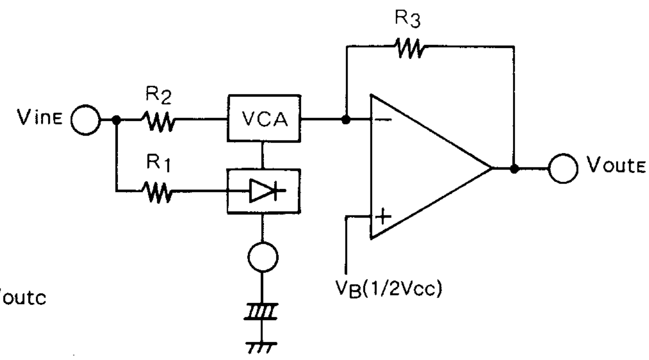
$$= \sqrt{\frac{1}{10} V_{in}}$$

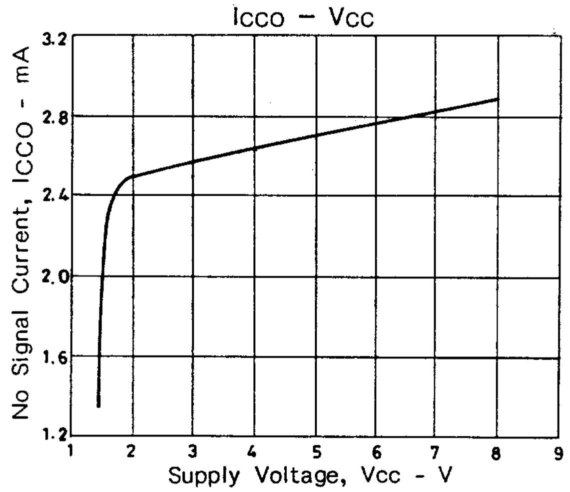
<EXPANDOR>

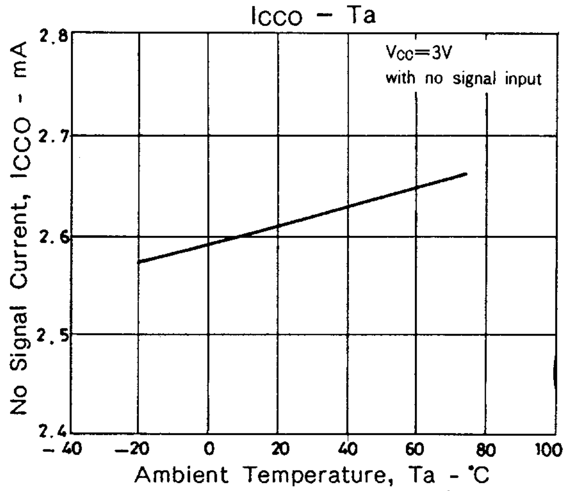
$$V_{outE} = \frac{2R_3}{R_1 R_2 I_1} V_{inE}^2$$

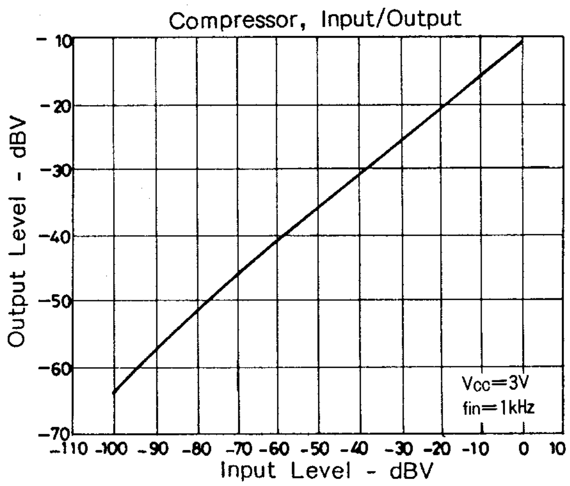
$$= 10 V_{inE}^2$$

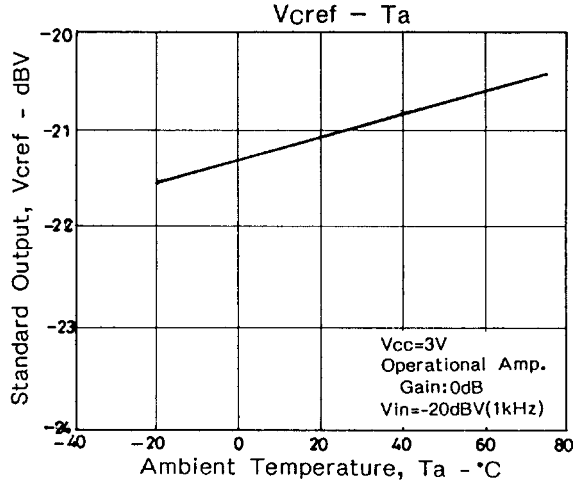


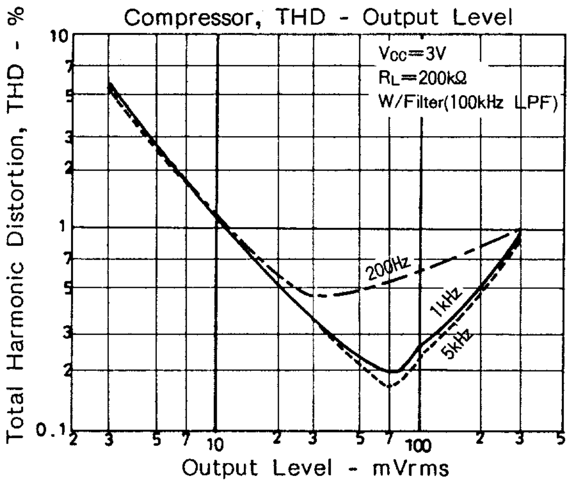


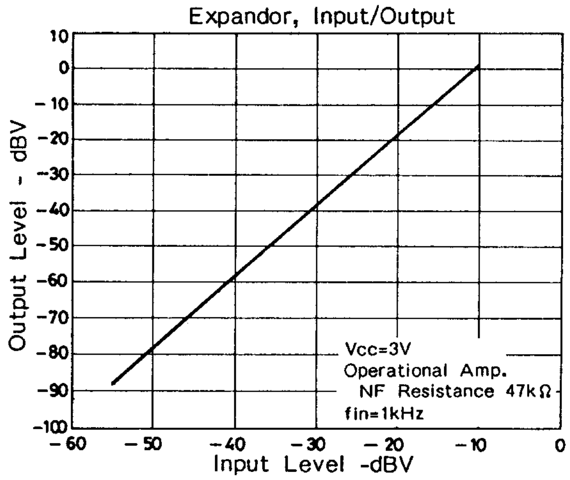

Icco – Vcc
No Signal Current, ICCO - mA
Supply Voltage, Vcc - V

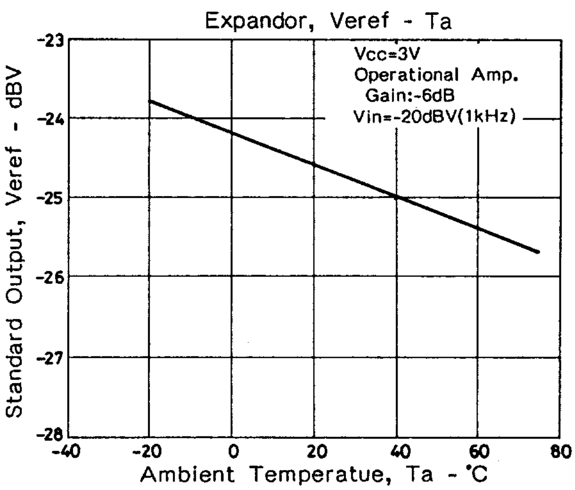

Icco – Ta
Vcc=3V
with no signal input
No Signal Current, ICCO - mA
Ambient Temperature, Ta - °C

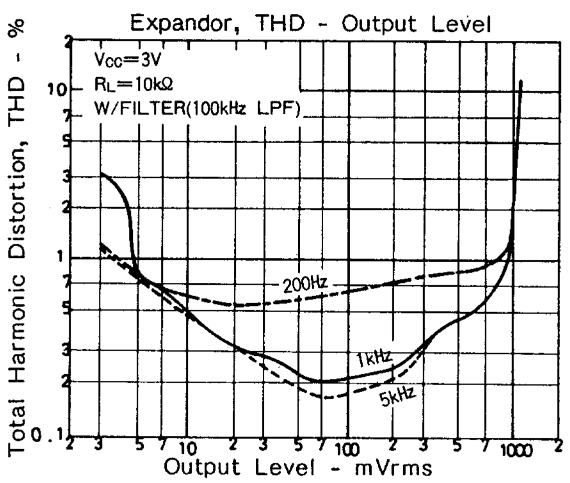

Compressor, Input/Output
Vcc=3V
fin=1kHz
Output Level - dBV
Input Level - dBV

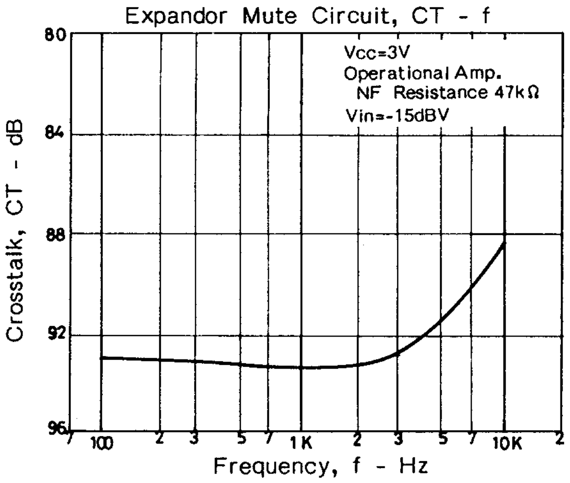

Vcref – Ta
Vcc=3V
Operational Amp.
Gain:0dB
Vin=-20dBV(1kHz)
Standard Output, Vcref - dBV
Ambient Temperature, Ta - °C

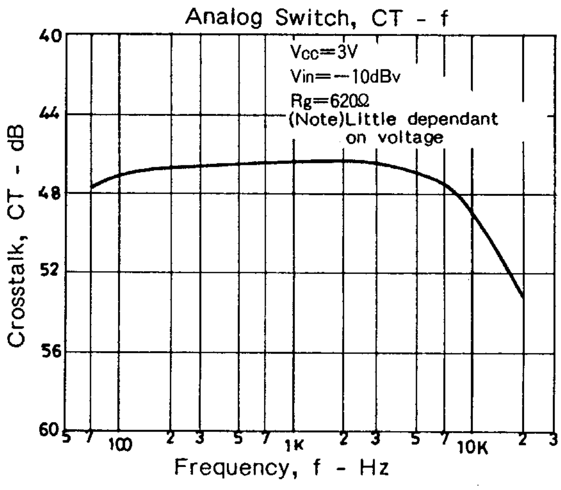

Compressor, THD - Output Level
Vcc=3V
RL=200kΩ
W/Filter(100kHz LPF)
200Hz
1kHz
5kHz
Total Harmonic Distortion, THD - %
Output Level - mVrms


Expandor, Input/Output
Vcc=3V
Operational Amp.
NF Resistance 47kΩ
fin=1kHz
Output Level - dBV
Input Level -dBV


Expandor, Veref - Ta
Vcc=3V
Operational Amp.
Gain:-6dB
Vin=-20dBV(1kHz)
Standard Output, Veref - dBV
Ambient Temperatue, Ta - °C


Expandor, THD - Output Level
Vcc=3V
RL=10kΩ
W/FILTER(100kHz LPF)
200Hz
1kHz
5kHz
Total Harmonic Distortion, THD - %
Output Level - mVrms





This catalog provides information as of January, 2001. Specifications and information herein are subject to change without notice.