



LA8630, 8630M

Low Voltage and Current Dissipation Compandor IC

Applications

- Cordless telephone.
- FM transceiver.

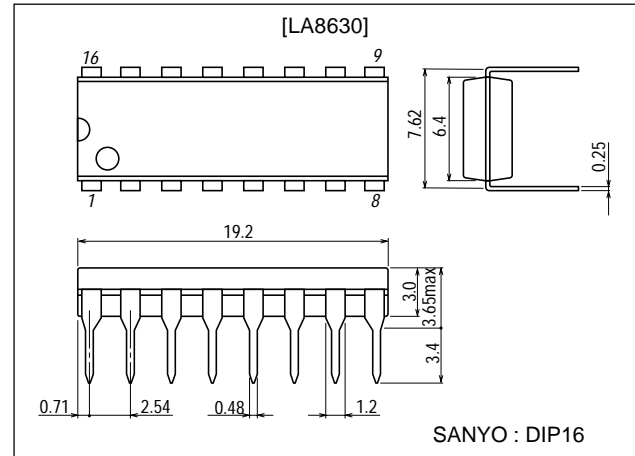
Functions

- 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.

Package Dimensions

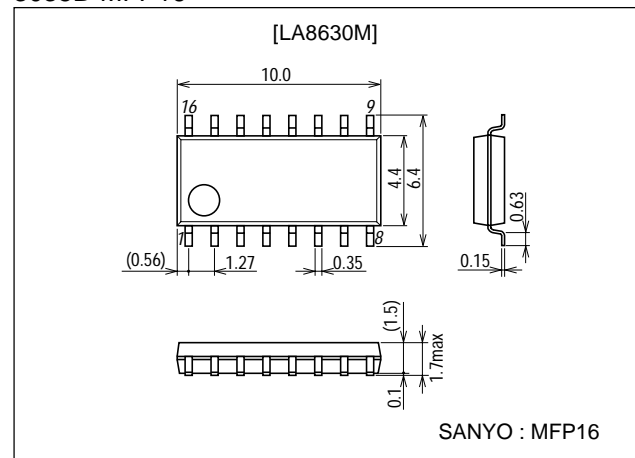
unit:mm

3006B-DIP16



unit:mm

3035B-MFP16



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SANYO Electric Co.,Ltd. Semiconductor Company

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LA8630, 8630M

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)

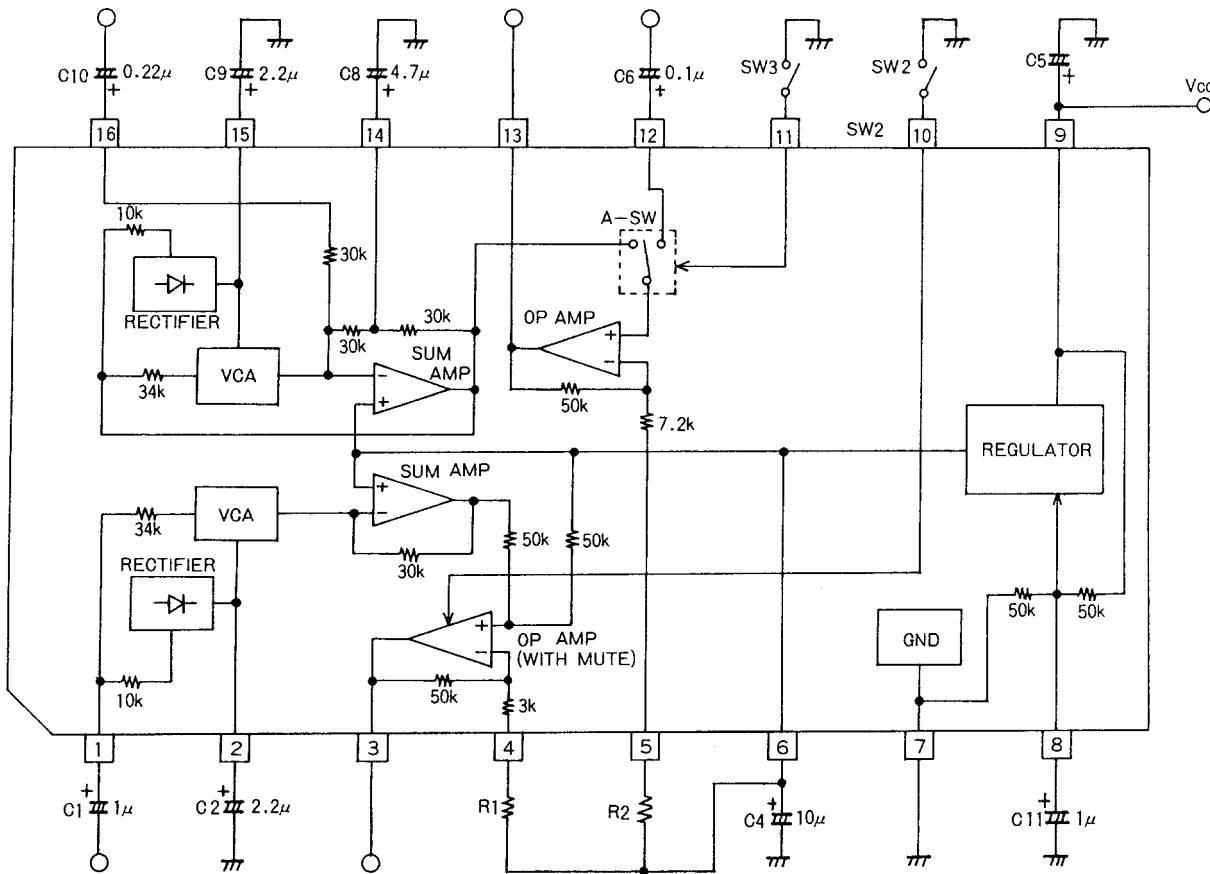
Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Current drain	I _{CC}	With no signal input		2.5	3.7	mA
Input reference voltage	V _{inref}			100		mVrms
[Expander] (Operational amplifier gain : 0dB)						
Output level	V _{orefe}	V _{in} =0dB (Operational amplifier gain : -6dB)	-26.5	-24.5	-22.5	dBV
Gain error	V _{gee1}	V _{in} =+5dB	-0.5	0	+0.5	dB
	V _{gee2}	V _{in} =-20dB	-1.0	0	+1.0	dB
	V _{gee3}	V _{in} =-30dB	-1.5	0	+2.0	dB
Distortion factor	THDe	V _{in} =0dB		0.35	1.0	%
Output noise voltage	V _{NOe}	V _{in} =∞, R _g =620Ω, f=20 to 20000Hz		12	80	μVrms
Frequency characteristic	f	V _{in} =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	V _{orefc}	V _{in} =0dB	-23	-21	-19	dBV
Gain error	V _{gec1}	V _{in} =+20dB	-0.5	0	+0.5	dB
	V _{gec2}	V _{in} =-20dB	-0.5	0	+0.5	dB
	V _{gec3}	V _{in} =-40dB	-1.0	0	+1.0	dB
Distortion factor	THDc	V _{in} =0dB		0.35	1.0	%
Output noise voltage	V _{NOc}	V _{in} =∞, R _g =620Ω, f=20 to 20000Hz		0.3	0.7	mVrms
Frequency characteristic	f	V _{in} =0dB, f=200 to 3500Hz		0.0		dB
[Muting circuit] (Operational amplifier gain : 0dB)						
Muting attenuation	CT1	V _{in} =0dB, f=1kHz	60	90		dB
Threshold voltage	V _{thm}		1.25	1.35	1.45	V
[Analog switch circuit] (operational amplifier gain : 0dB)						
Crosstalk	CT2	V _{in} =0dB, f=1kHz	40	47		dB
Threshold voltage	V _{tha}		1.25	1.35	1.45	V

* Be careful that the threshold voltage is determined by V_{CC} (V_{th}=0.45V_{CC}).

LA8630, 8630M

Equivalent Circuit Block Diagram/Sample Application Circuit

Unit (resistance: Ω , capacitance: F)

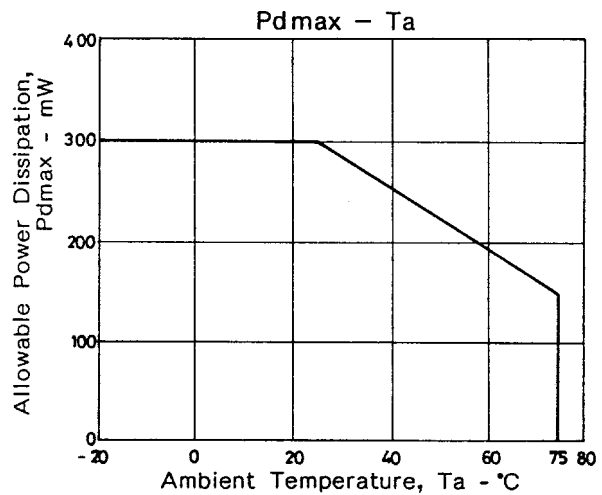


Pin Name

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

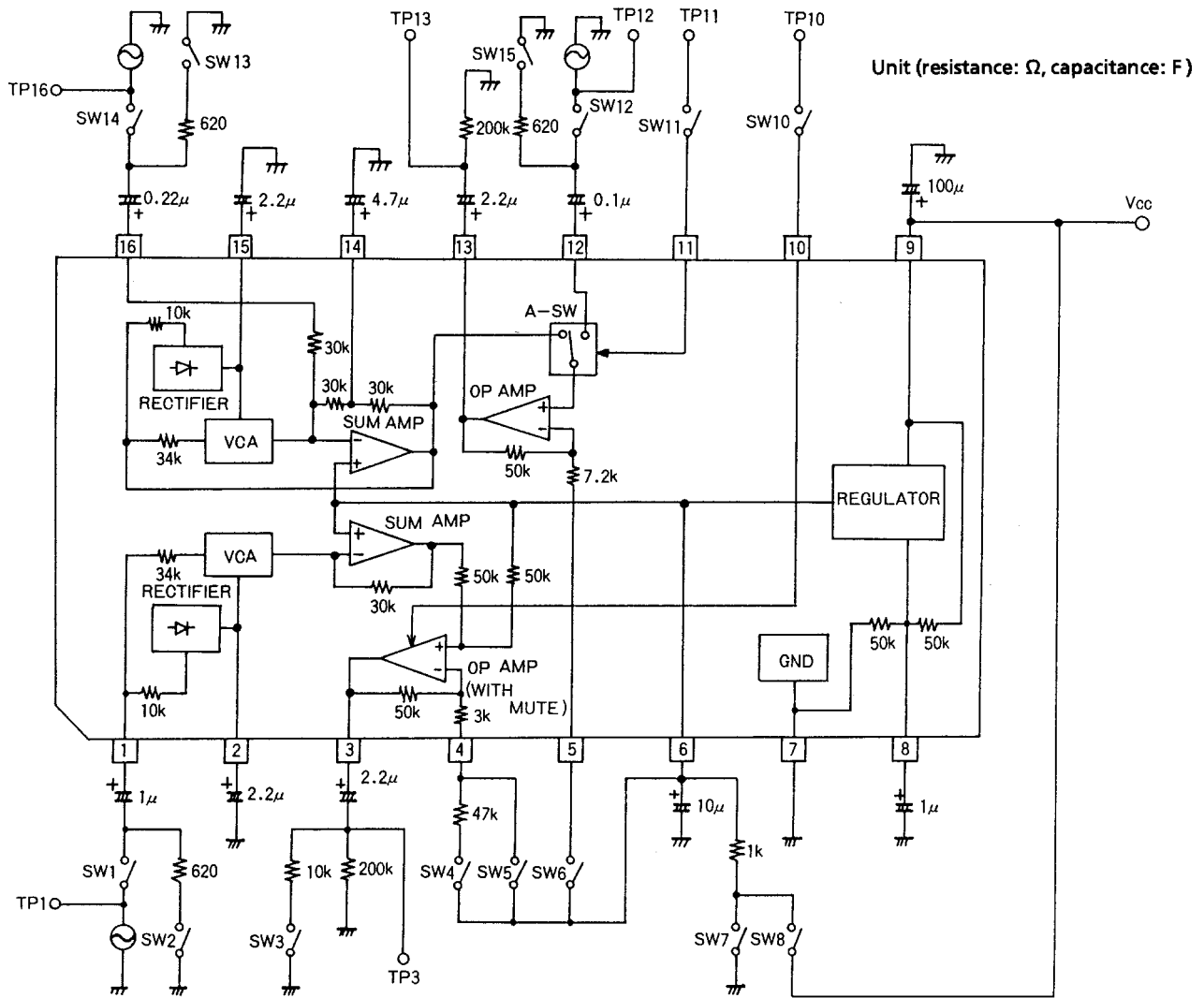
Control Mode

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



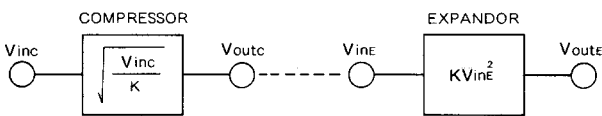
LA8630, 8630M

Test Circuit



Summary of Compressor

(1) Operation



<for example>

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

$$K = 10$$

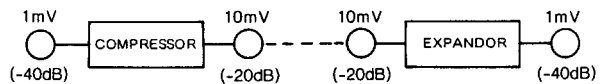
$$V_{inc} = 1\text{mV} \quad V_{outc} = \sqrt{\frac{1}{10} \times 1 \times 10^{-3}} \approx 10\text{mV} = -20\text{dB}$$

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

$$V_{outc} = \sqrt{V_{inc}/K}$$

$$V_{InE} = V_{outc}^2$$

$$V_{outE} = K V_{InE} = K \sqrt{\frac{V_{inc}}{K}} = V_{inc}$$

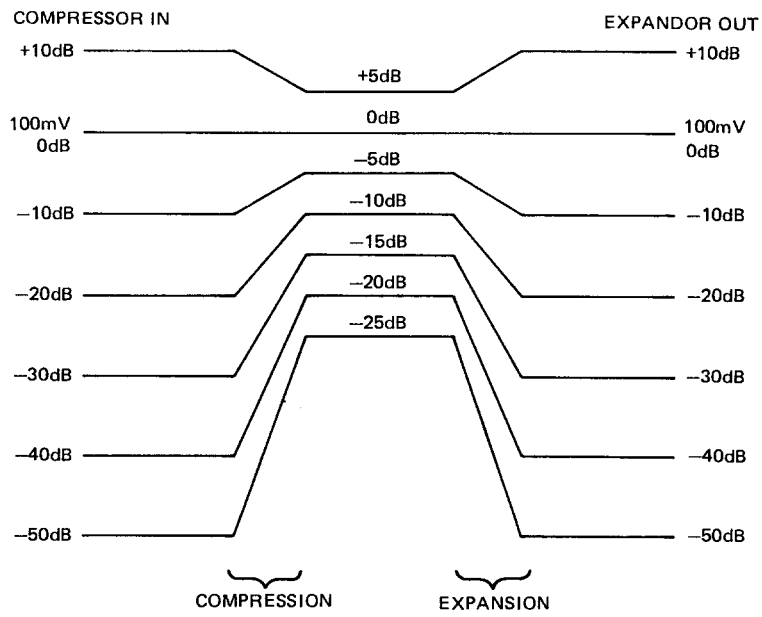


at Reference level (V_{ref}) $V_{inc} = V_{outc}$, $V_{InE} = V_{outE}$

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

LA8630, 8630M

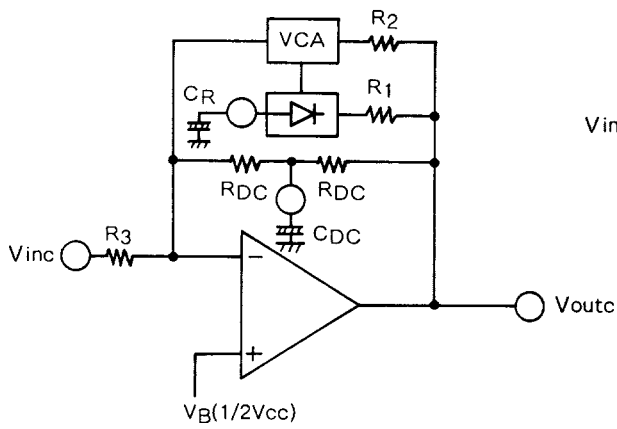
(2) Level Diagram



(3) Block Diagram <COMPRESSOR>

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

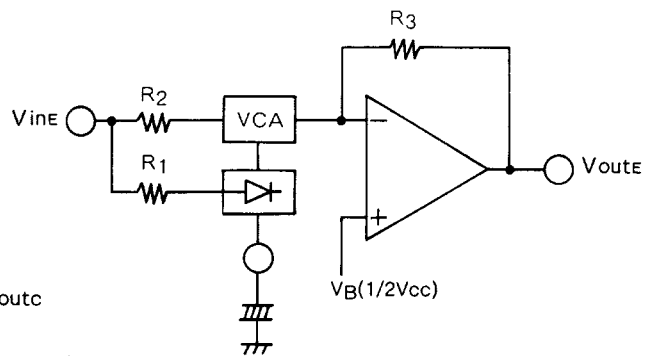
$$= \sqrt{\frac{1}{10}} V_{in}$$



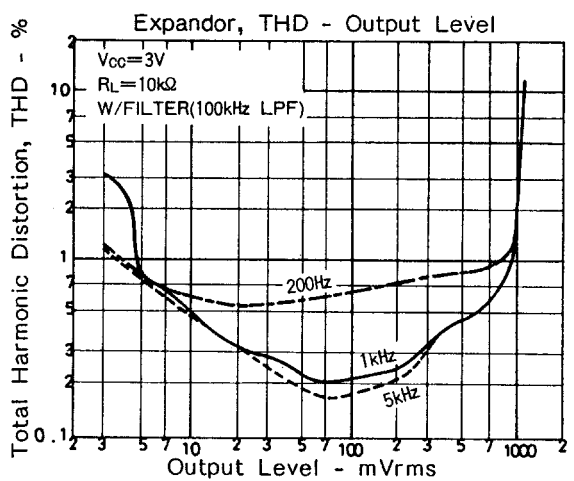
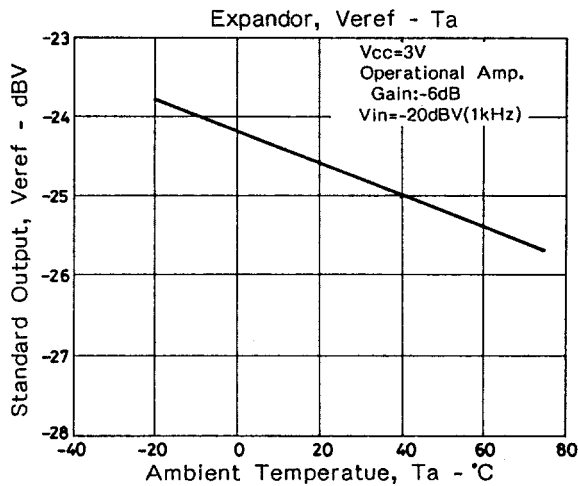
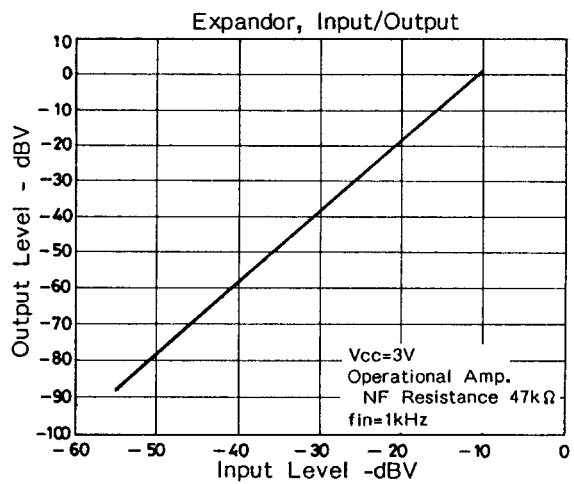
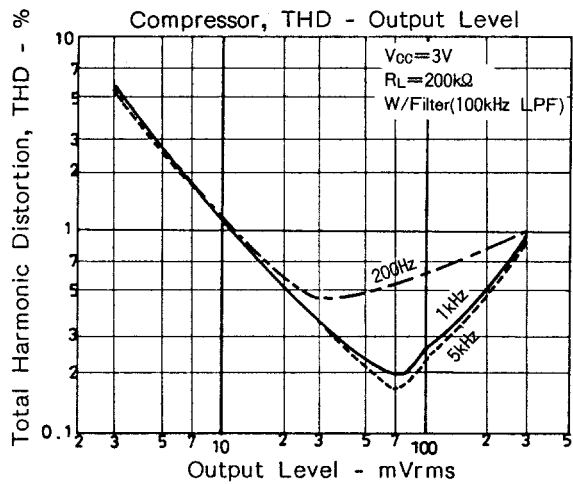
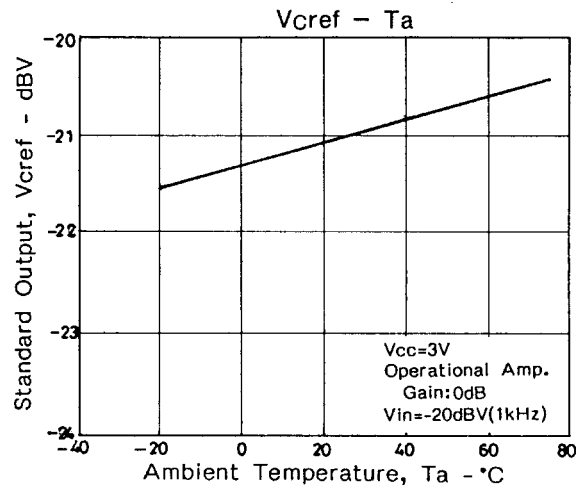
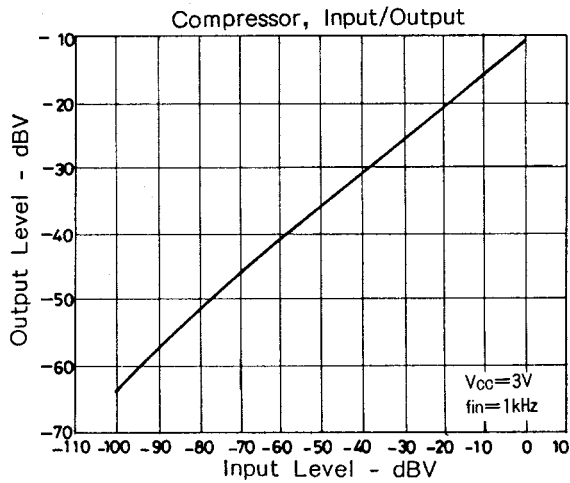
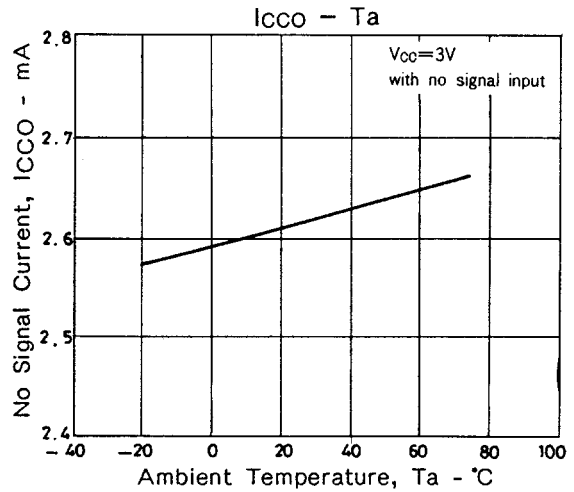
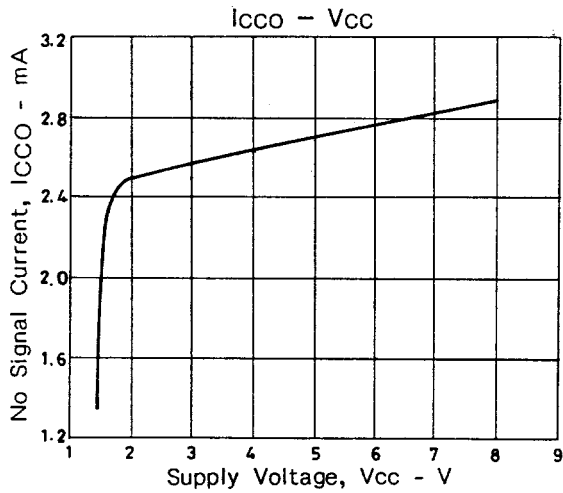
<EXPANDOR>

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

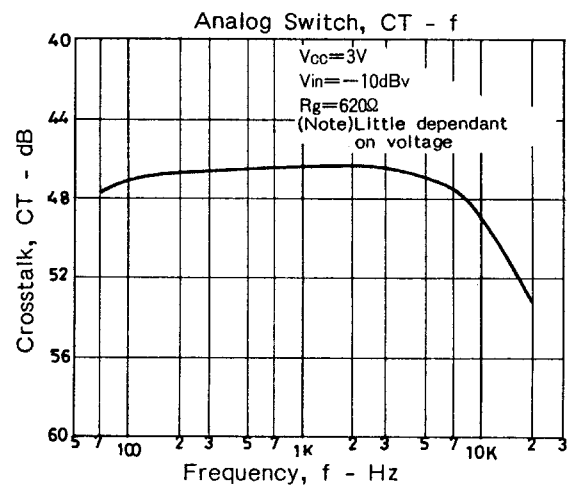
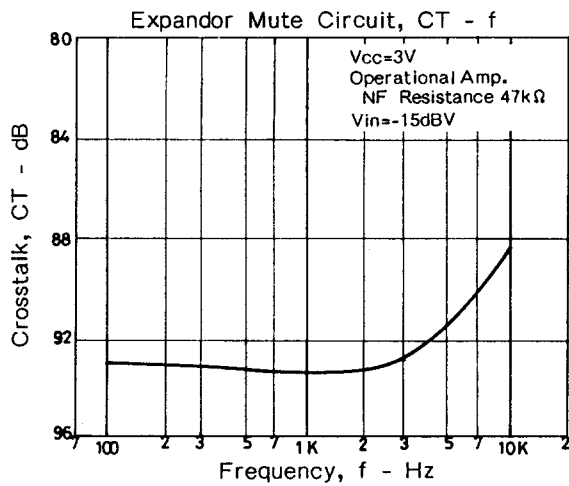
$$= 10 V_{inE}^2$$



LA8630, 8630M



LA8630, 8630M



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