



LA8637M

Low-Voltage/Low-Power Componder IC

Overview

The LA8637M is a compander IC that was developed to improve audio quality in transceiver systems such as cordless telephones by expanding the dynamic range of the audio signal and suppressing noise. In addition to including both a compressor circuit that compresses with a compression ratio of 1/2 (logarithmic) and an expander with an expansion factor of 2 (logarithmic), the LA8637M also integrates the following functions on the same chip: an ALC preamplifier, a BTL amplifier, a data shaper for received data, a muting function and a standby function. Thus the LA8637M is optimal as the compander/system IC in cordless telephone products.

Applications

- Cordless telephones

Functions

- Compressor
ALC preamplifier, preemphasis amplifier, limiter, transmission data input analog switch, filter buffer amplifier
- Expander
Filter buffer amplifier, de-emphasis amplifier, mute, BTL amplifier (100 Ω load)
- Level following data shaper (with hysteresis)
- Standby mode

Features

- Easy implementation of transmission system and reception system base band signal processing
- Built-in BTL amplifier that supports mobile unit handsets
- Standby function to support battery saving
- Low voltage operation: $V_{CC\text{ OP}} = 1.8$ to 6 V

Specifications

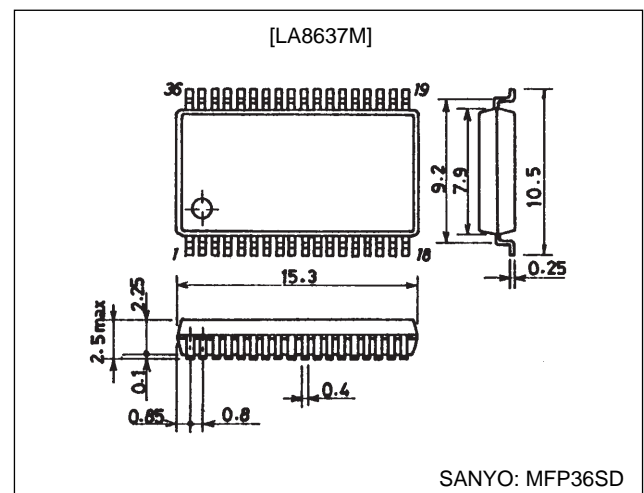
Maximum Ratings at $T_a = 25^\circ\text{C}$

Parameter	Symbol	Conditions	Ratings	Unit
Maximum supply voltage	$V_{CC\text{ max}}$		7	V
Allowable power dissipation	$P_d\text{ max}$	$T_a \leq 75^\circ\text{C}$	250	mW
Operating temperature	T_{opr}		-20 to +75	$^\circ\text{C}$
Storage temperature	T_{stg}		-40 to +125	$^\circ\text{C}$

Package Dimensions

unit: mm

3129-MFP36SD



LA8637M

Operating Conditions at Ta = 25°C

Parameter	Symbol	Conditions	Ratings	Unit
Recommended supply voltage	V _{CC}		3	V
Operating supply voltage	V _{CC OP}		1.8 to 6	V

Electrical Characteristics at Ta = 25°C, V_{CC} = 3 V, f = 1 kHz

Parameter	Symbol	Conditions	min	typ	max	Unit
Quiescent current	I _{CCO}	No signal	5	8	12	mA
Standby current	I _{STBY}	No signal, standby mode (pin 24: low)	0.8	1	1.2	mA
[Preamplifier]						
Voltage gain	V _{GP}	V _i = -60 dBV	37	39	41	dB
Maximum voltage gain	V _{GP max}	V _i = -60 dBV		50		dB
Total harmonic distortion	THD	V _i = -40 dBV, ALC: ON		0.3	1.0	%
Input conversion noise voltage	V _{NI}	R _g = 0 Ω		1.5	5	μVrms
ALC level	V _{ALC}	V _i = -40 dBV, ALC: ON	350	420	490	mVrms
ALC range	ALC	Until the THD from the ALC circuit becomes 1%	35	40		dB
[Compressor] Vinrefc = -20 dBV = 0 dB, output: pin 16						
Input impedance	r _i			30		kΩ
Output voltage	V _{oc}	V _{in} = Vinrefc = 0 dB	-22	-20	-18	dBV
Gain error (1)	Gec1	V _{in} = -20 dB	-0.5	0	+0.5	dB
Gain error (2)	Gec2	V _{in} = -40 dB	-1.0	0	+1.0	dB
Total harmonic distortion	THD	V _{in} = 0 dB		0.25	1.0	%
Output noise voltage	V _{NOC}	R _g = 620 Ω, f = 20 Hz to 20 kHz		0.15	1.0	mVrms
Crosstalk	CT _C	RX-Vin = -20 dBV, 1 kHz BPF		-75	-60	dB
[Analog Switch]						
Muting attenuation	ATT _C	V _{in} = -20 dB, 1 kHz BPF	60	75		dB
[Expander] Vinrefe = -20 dBV = 0 dB						
Output voltage	V _{oe}	V _{in} = Vinrefe = 0 dB	-22	-20	-18	dBV
Gain error (1)	Gee1	V _{in} = -20 dB	-1.0	0	+1.0	dB
Gain error (2)	Gee2	V _{in} = -30 dB	-1.5	0	+1.5	dB
Total harmonic distortion	THD	V _{in} = 0 dB		0.3	1.0	%
Output noise voltage	V _{NOe}	R _g = 620 Ω, f = 20 Hz to 20 kHz		13	80	μVrms
Muting attenuation	ATT _e	V _{in} = 0 dB, 1 kHz BPF	60	75		dB
Crosstalk	CT _e	PRE AMP-Vin = -60 dBV, 1 kHz BPF		-95	-80	dB
Maximum output voltage	V _{O max}	THD = 10%, R _L = 10 kΩ	0.7	1.0		Vrms
[Limiter]						
Limiting voltage	V _L	ΔV = 0.6 V (voltage between pin 9 and pin 10)	0.27	0.3	0.33	Vp-p
[BTL Amplifier] Gain = 30 dB						
Voltage Gain	V _{PWR}	V _{in} = -40 dBV, R _L = 100 Ω	27.5	29.5	31.5	dB
Total harmonic distortion	THD	V _{in} = -40 dBV, R _L = 100 Ω		0.5	1.0	%
Maximum output power	P _{O max}	THD = 10%, R _L = 100 Ω	15	30		mW
Maximum output voltage	V _{O max}	THD = 10%, R _L = 620 Ω	4.0	5.5		Vp-p
Output noise voltage	V _{NO}	R _g = 0 Ω, R _L = 100 Ω		120	800	μVrms
[Compressor Low-Pass Filter]						
Maximum output voltage	V _{O max}	THD = 1%, R _L = 10 kΩ	450	550		mVrms
[Expander Low-Pass Filter] V _B = 1.5 V (V _B : low-pass filter bias voltage)						
Maximum output voltage	V _{O max}	THD = 1%, R _L = 10 kΩ	400	500		mVrms
[Data Shaper]						
Duty	D _{UTY}	V _{in} = -15 dBV	45	50	55	%
Hysteresis	W _{HYS}		45	70	100	mV
Output high level voltage	V _{OH}	R _L = 100 kΩ	2.8			V
Output low level voltage	V _{OL}	R _L = 100 kΩ			0.3	V
[Standby]						
Standby voltage	V _{ST}	Pin 24			0.7	V
Standby current	I _{ST}	Pin 24 outflow current			30	μA

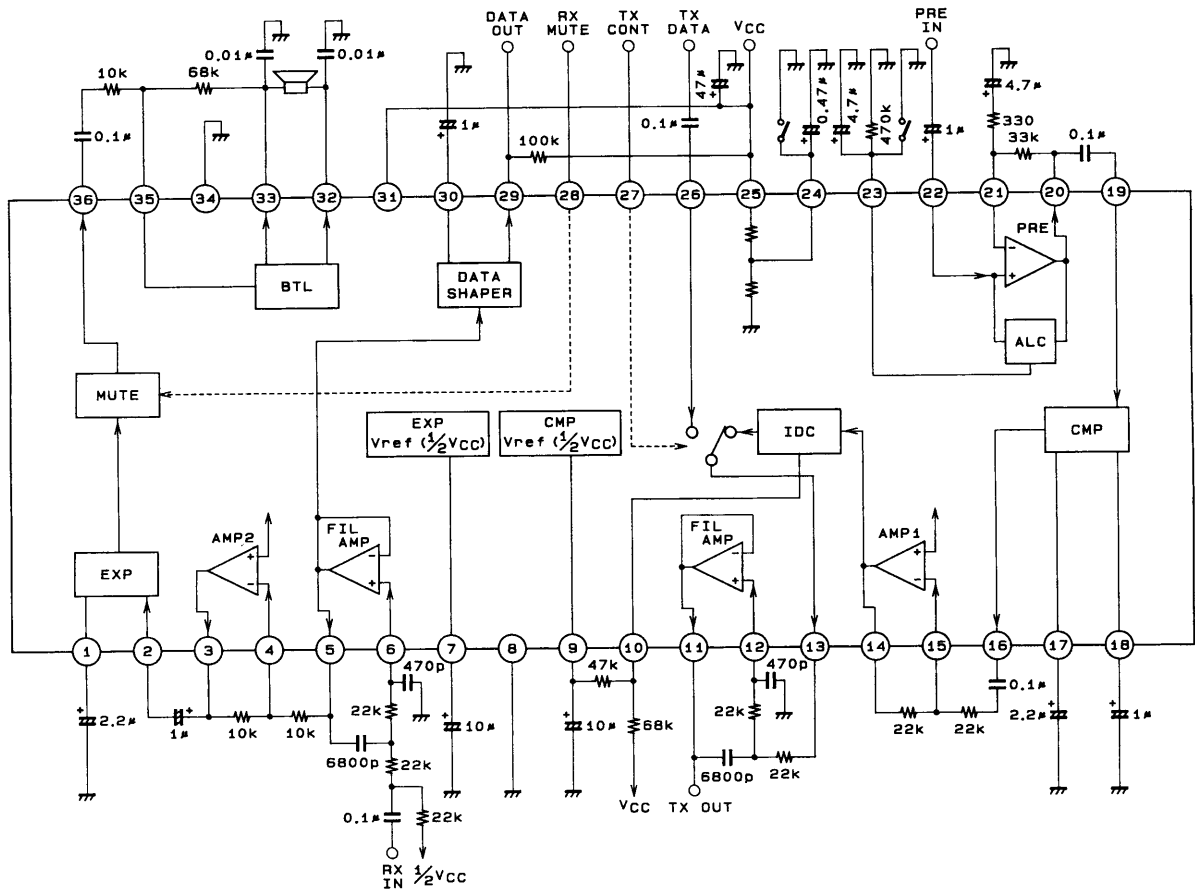
Continued on next page.

LA8637M

Continued from preceding page.

Parameter	Symbol	Conditions	min	typ	max	Unit
[Digital Input Characteristics]						
Input low level voltage	V_{IL}	Pins 27 and 28			0.65	V
Input high level voltage	V_{IH}	Pins 27 and 28	0.6 V_{CC}			V
Input low level current	I_{IL}	Pins 27 and 28, $V_I = 0.2$ V			100	μ A
Input high level current	I_{IH}	Pins 27 and 28, $V_I = 2$ V			5	μ A

Internal Equivalent Circuit Block Diagram



A02813

Unit (resistance : Ω , capacitance : F)

LA8637M

Pin Functions

Pin No.	Symbol	Internal equivalent circuit	Protective diode	
			V _{CC} side	Ground side
1 2	EXP.V _{REC} EXP.IN		○ ○	○ ○
3 4	OP OUT1 OP IN1		○ ○	○ ○
5 6	FIL.OUT1 FIL.IN1		○ ○	○ ○
7 9 24	EXP.V _{REF} CMP.V _{REF} STAND-BY		○ ○ ○	○ ○ ○
10	IDC.ADJ		○	○

Continued on next page.

LA8637M

Continued from preceding page.

Pin No.	Symbol	Internal equivalent circuit	Protective diode	
			V _{CC} side	Ground side
11 12	FIL.OUT2 FIL.IN2	<p>A02820</p>	○ ○	○ ○
13 26	TX.OUT DATA IN	<p>A02821</p>	○ ○	○ ○
14 15	OP OUT2 OP IN2	<p>A02822</p>	○ ○	○ ○
16 17 18 19	CMP.OUT CMP.V _{REC} CMP.NF CMP.IN	<p>A02823</p>	○ ○ ○ ○	○ ○ ○ ○
20 21 22	PRE OUT PRE NF PRE IN	<p>A02824</p>	○ — —	○ ○ ○

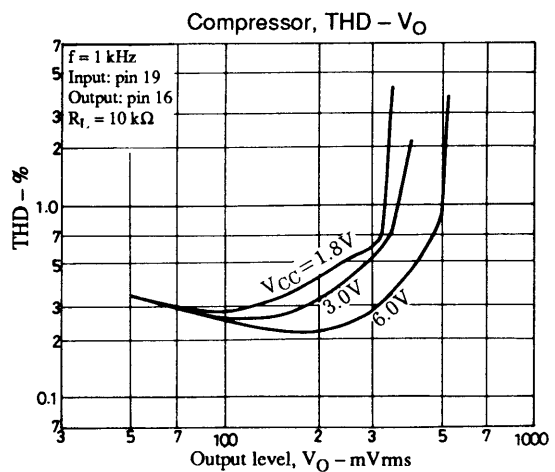
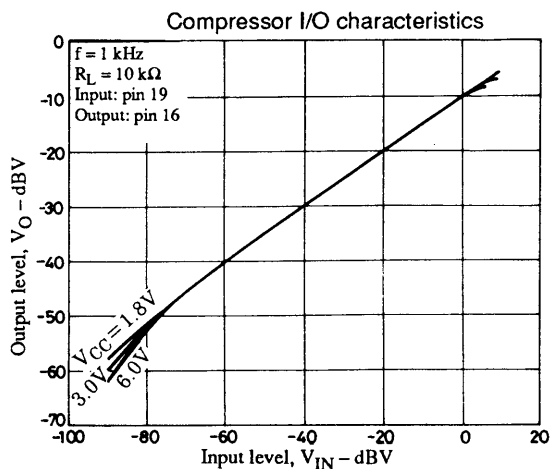
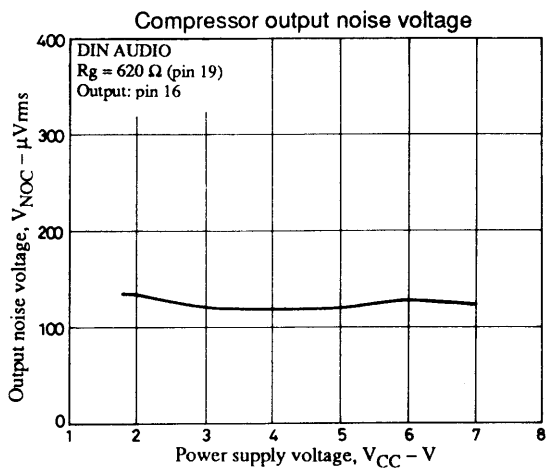
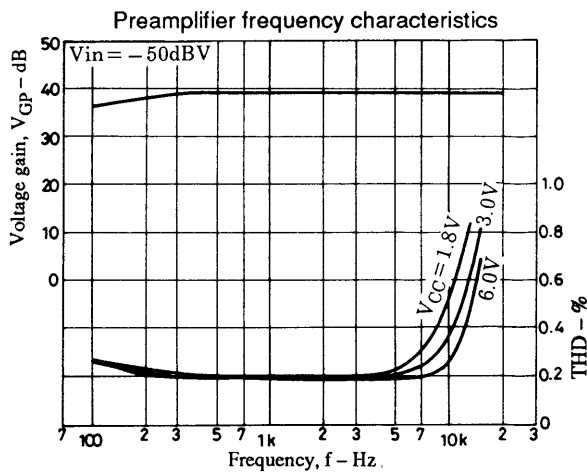
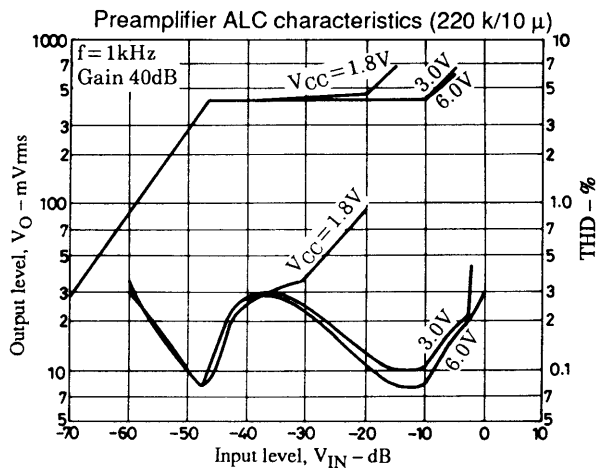
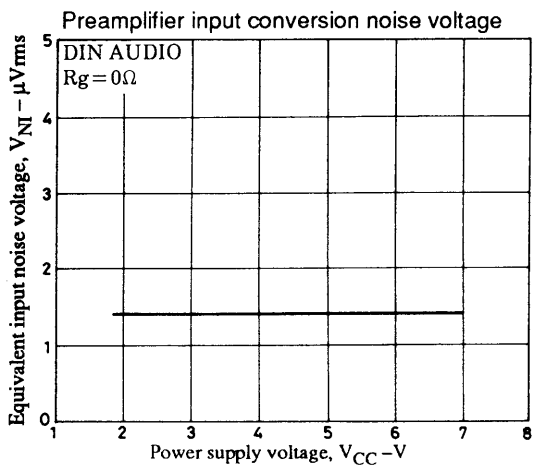
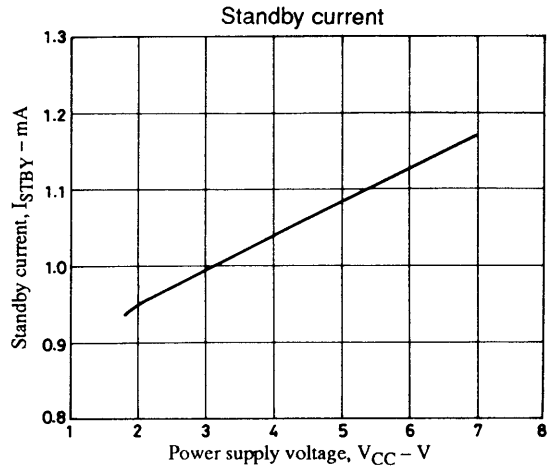
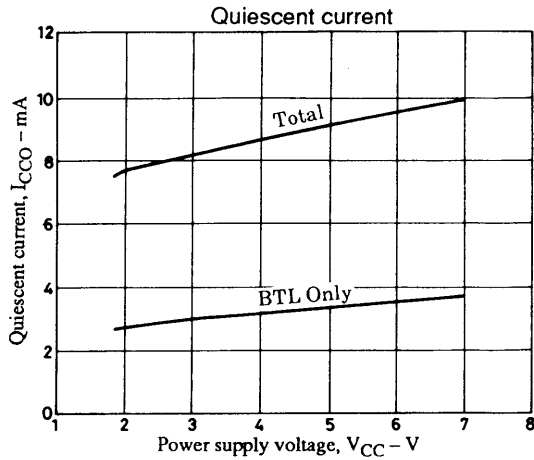
Continued on next page.

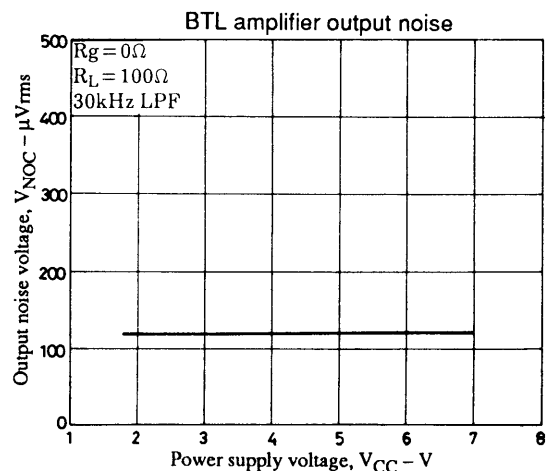
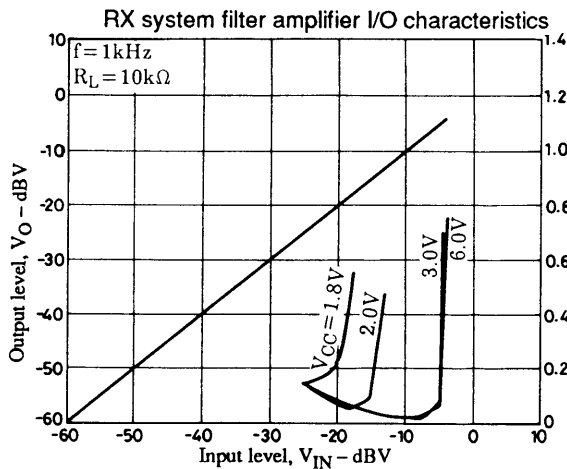
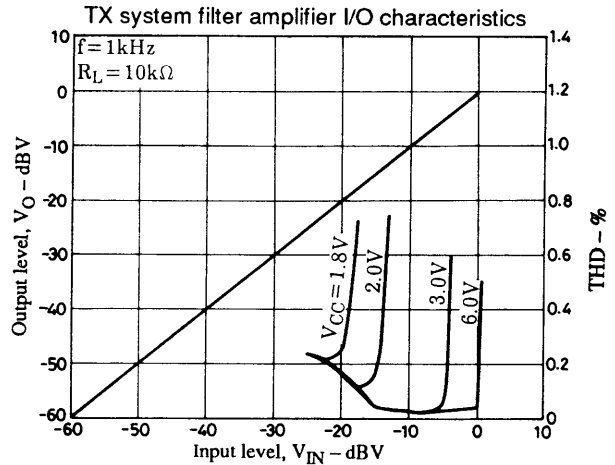
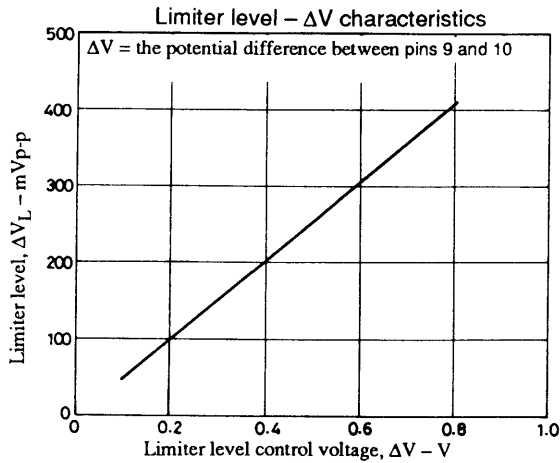
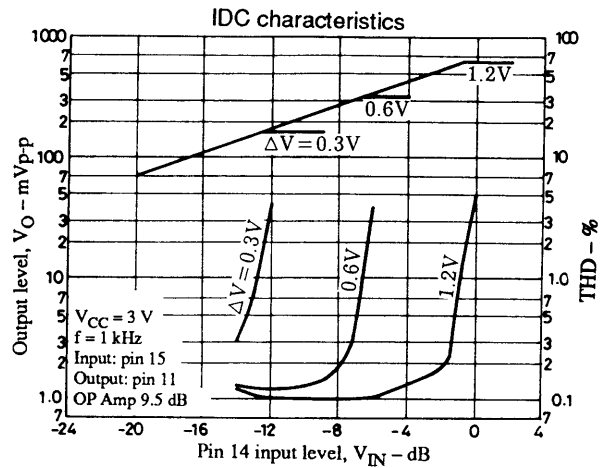
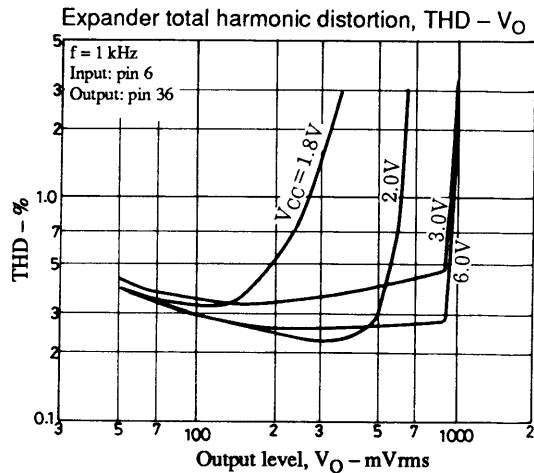
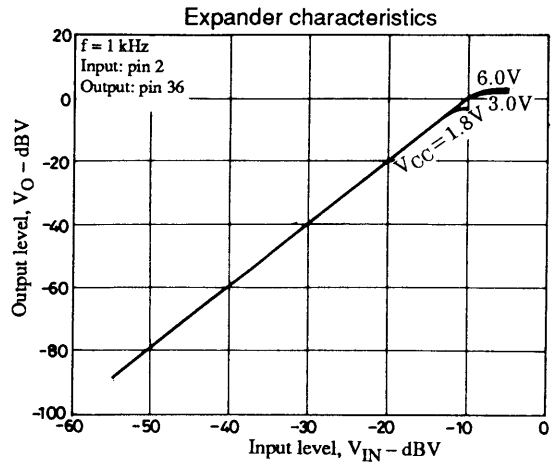
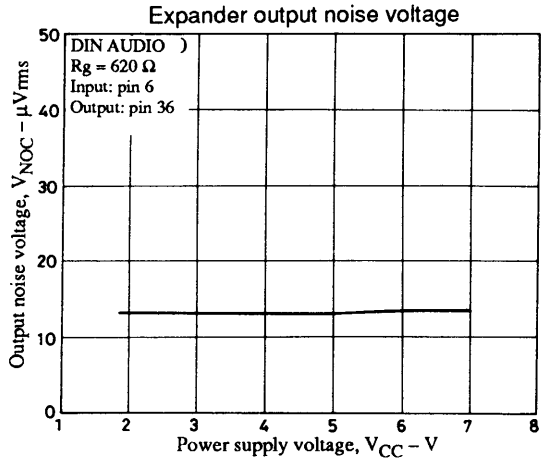
LA8637M

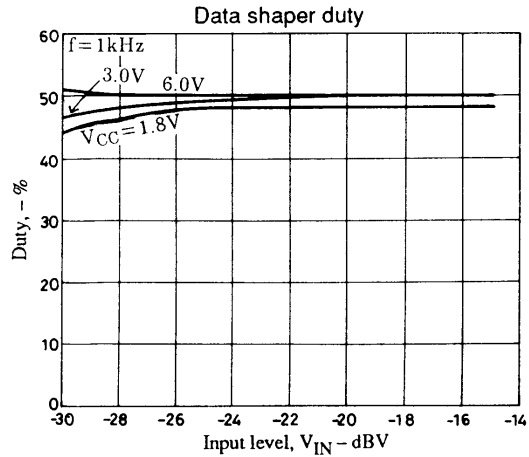
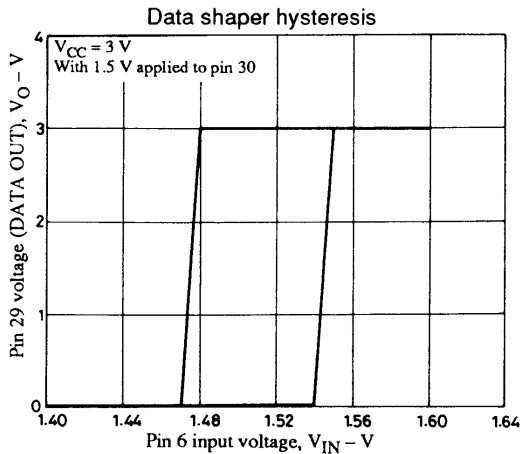
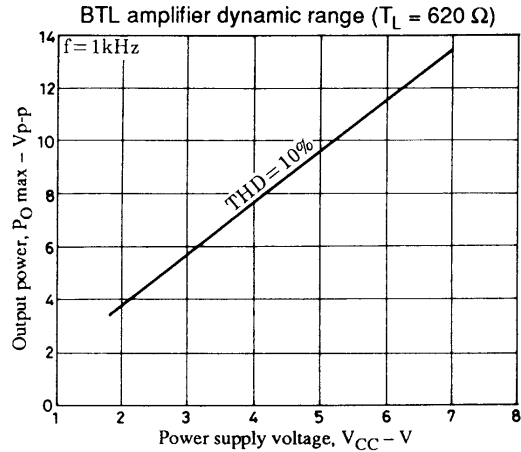
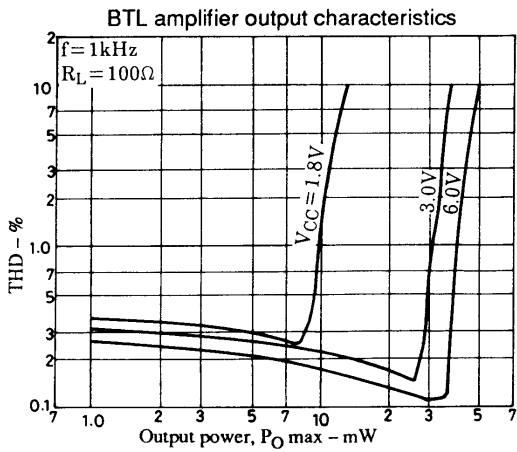
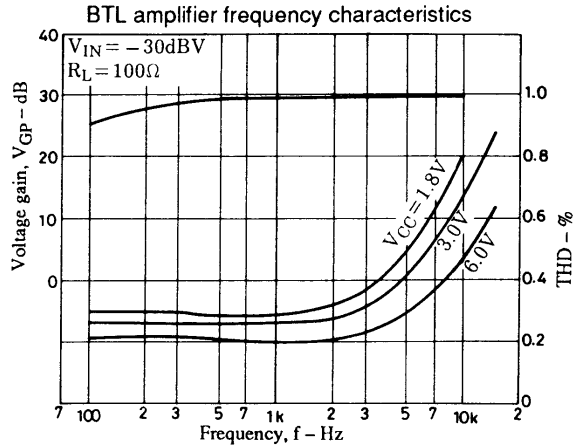
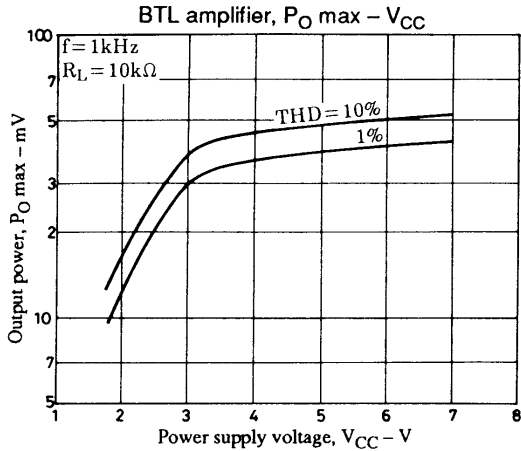
Continued from preceding page.

Pin No.	Symbol	Internal equivalent circuit	Protective diode	
			V _{CC} side	Ground side
23	ALC.CT	<p style="text-align: right;">A02825</p>	○	○
27 28	TX.CONT RX.MUTE	<p style="text-align: right;">A02826</p>	○ ○	○ ○
29 30	DATA OUT V.HOLD	<p style="text-align: right;">A02827</p>	— ○	○ ○
32 33 35	BTL OUT2 BTL OUT1 BTL IN	<p style="text-align: right;">A02828</p>	— — —	○ ○ ○
36	EXP.OUT	<p style="text-align: right;">A02829</p>	○	○

Note: All V_{CC} side diodes are connected to V_{CC} at pin 25.







- No products described or contained herein are intended for use in surgical implants, life-support systems, aerospace equipment, nuclear power control systems, vehicles, disaster/crime-prevention equipment and the like, the failure of which may directly or indirectly cause injury, death or property loss.
- Anyone purchasing any products described or contained herein for an above-mentioned use shall:
 - ① Accept full responsibility and indemnify and defend SANYO ELECTRIC CO., LTD., its affiliates, subsidiaries and distributors and all their officers and employees, jointly and severally, against any and all claims and litigation and all damages, cost and expenses associated with such use:
 - ② Not impose any responsibility for any fault or negligence which may be cited in any such claim or litigation on SANYO ELECTRIC CO., LTD., its affiliates, subsidiaries and distributors or any of their officers and employees jointly or severally.
- Information (including circuit diagrams and circuit parameters) herein is for example only; it is not guaranteed for volume production. SANYO believes information herein is accurate and reliable, but no guarantees are made or implied regarding its use or any infringements of intellectual property rights or other rights of third parties.

This catalog provides information as of March, 1995. Specifications and information herein are subject to change without notice.