



LA8633V

Low-voltage, Low-current Componder

Overview

The LA8633V is a low-voltage, low-current compander IC for battery-powered, cordless telephone applications.

The LA8633V features a good signal-to-noise ratio and a high dynamic range at voice-signal frequencies. The output compression is given by $V_O = 0.5 \log V_I$, and the expansion, by the inverse operation.

The LA8633V also features an FSK comparator for receiving FSK-modulated digital data, a microphone amplifier, selectable intercom or telephone operation expander outputs, and an output mute control.

The LA8633V operates from a 1.8 to 6.0V supply and is available in 24-pin SSOPs.

Features

- Low-voltage operation and low-power consumption.
- On-chip frequency-shifted keyed (FSK) comparator.
- On-chip microphone amplifier with audio limiter and mute option.
- Expander output analog switch for telephone or intercom operation.
- Low-power, standby mode.
- 1.8 to 6.0V supply.
- 24-pin SSOP

Specifications

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

Parameter	Symbol	Conditions	Ratings	Unit
Maximum supply voltage	$V_{CC \text{ max}}$		8	V
Allowable power dissipation	$P_d \text{ max}$		300	mW
Operating temperature	T_{opr}		-20 to +75	$^\circ\text{C}$
Storage temperature	T_{stg}		-40 to +125	$^\circ\text{C}$

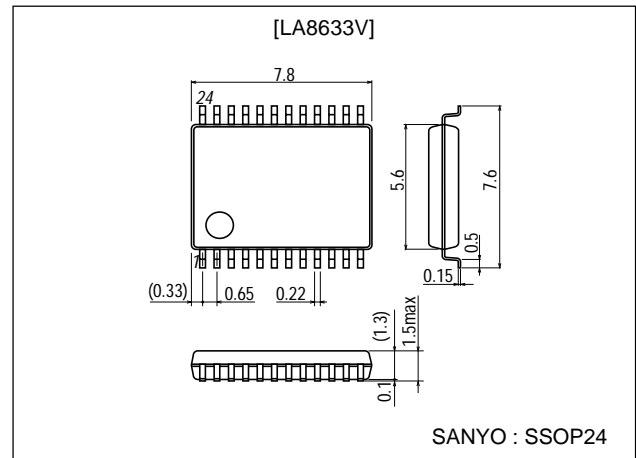
Operating Conditions at $T_a = 25^\circ\text{C}$

Parameter	Symbol	Conditions	Ratings	Unit
Recommended supply voltage	V_{CC}		3	V
Operating supply voltage range	$V_{CC \text{ op}}$		1.8 to 6.0	V

Package Dimensions

unit:mm

3175B-SSOP24



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Electrical Characteristics

Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
[Supply current] Ta=25°C, V _{CC} =3V, V _{B1} =1.2V, f=1kHz						
Current drain with no signal	I _{CCO}	No signal	2.5	3.4	5.0	mA
Standby current	I _{STBY}	No signal, data shaper ON (pin 9=H), standby mode (pin 12=L)	300	500	700	μA
[Compressor] Vinrefe=10mVrms=0dB, Pre AMP Gain=20dB, Output : pin 18, R _L =10kΩ						
Input impedance	r _i			50		kΩ
COU _T rms output voltage	V _{OC}	V _I =Vinrefe=0dB	210	265	335	mVrms
Gain error	Gec1	V _I =-20dB	-0.5	0.0	+0.5	dB
	Gec2	V _I =-40dB	-1.0	0.0	+1.0	dB
Total harmonic distortion	THD	V _I =0dB		0.25	1.00	%
COU _T rms output noise voltage	V _{NOC}	R _g =620Ω, f=20Hz to 20kHz		1.5	3.0	mVrms
Limiting voltage	V _L		1.25	1.40	1.55	Vp-p
Maximum preamplifier voltage gain	V _{GP} max			28		dB
Data voltage gain	V _{GD}		-2	0	+2	dB
Mute attenuation	A _{TTC}	V _I =0dB	-60	-73		dB
Crosstalk	C _{TC}	Expander rms input voltage=100mV	-25	-34		dB
[Expander] Vinrefe=10mVrms=0dB, Filter AMP Gain=0dB, R _L =10kΩ						
Expander rms output voltage	V _{OE}	V _I =Vinrefe=0dB	100	125	160	mVrms
Maximum expander rms output voltage	V _O max	THD=10%, R _L =10kΩ	600	1000		mVrms
Gain error	Gee1	V _I =5dB	-0.5	0	+0.5	dB
	Gee2	V _I =-20dB	-1.0	0	+1.0	dB
	Gee3	V _I =-30dB	-1.5	0	+2.0	dB
Total harmonic distortion	THD	V _I =0dB, data shaper ON (pin 9=H)		0.40	1.00	%
Expander rms output noise voltage	V _{NOe}	R _g =620Ω, f=20Hz to 20kHz		13	80	μVrms
Mute attenuation	A _{TTe}	V _I =0dB	-60	-70		dB
Crosstalk	C _{Te}		-60	-83		dB
[Compressor lowpass filter]						
Input/output ratio		f=3.4kHz		-3		dB
Attenuation	A _{TT}			-18		dB/octave
Total harmonic distortion	THD	Vin=10mVrms (in : 15pin)		0.15	1.00	%
Maximum LPF2OUT rms output voltage	V _O max	THD=10%, R _L =10kΩ	600	1000		mVrms
[Expander lowpass filter]						
Input/output ratio		f=3.4kHz		-3		dB
Attenuation	A _{TT}			-18		dB/octave
Total harmonic distortion	THD	Vin=10mVrms		0.35	1.00	%
Maximum LPF1OUT rms output voltage	V _O max	THD=10%, R _L =7.7kΩ	200	340		mVrms
[Frequency-shifted keyd comparator]						
CCGCTL duty cycle	Duty	V _{IN} =100mVrms	43	48	53	%
CHGCTL ON voltage	V _{ON}	Pin 9	1			V
CHGCTL OFF voltage	V _{OFF}	Pin 9			0.4	V
CHGCTL input impedance	R _i	Pin 9		200		kΩ
VHOLD input/output current	I _{IO}	Pin7, pin9=2V		80		μA
FSKOUT LOW-level output voltage	V _{OL}	R _L =100kΩ, pin10			0.3	V
FSKOUT HIGH-level output voltage	V _{OH}	R _L =100kΩ, pin10	2.8			V
[Standby mode characteristics]						
STBY voltage	V _{STBY}	Pin 12			0.7	V
STBY output current	I _{STBY}	Pin 12, flowing out current			50	μA
[Digital input characteristics]						
Input L-level voltage	V _{IL}	Pins16, 17			0.65	V
Input H-level voltage	V _{IH}	Pins16, 17	0.6V _{CC}			V
Input L-level current	I _{IL}	V _I =0.2V, Pins16, 17			100	μA
Input H-level current	I _{IH}	V _I =2V, Pins16, 17			5	μA

Note 1 : This IC enters mute mode when the pins 16 and 17 become low.

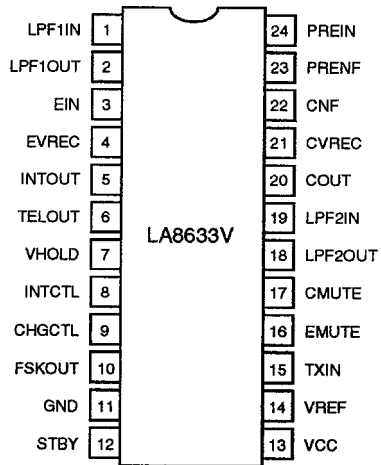
2 : Pin 6 is used as an output pin when 8 is high (=open), pin 5 is used as an output pin when pin 8 is low.

3 : FSK waveform shaper circuit becomes on when pin 9 is high.

4 : FSK waveform shaping polarity : outputs low in the positive cycle of signal.

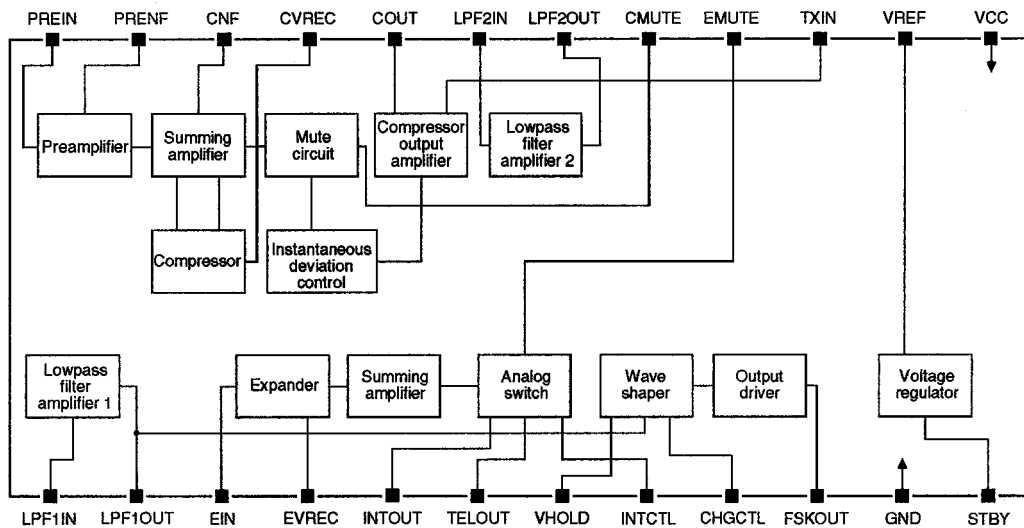
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Pin Assignment



Top view

Block Diagram



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Pin Function

Number	Name	Equivalent circuit	Description
1	LPF1IN		Lowpass filter 1 buffer amplifier (class A) input. Nominal voltage is 1.2V.
2	LPF1OUT		Lowpass filter 1 buffer amplifier (class A) output. Nominal voltage is 1.2V.
3	EIN		Expander voltage-to-current converter input. Nominal voltage is 1.5V.
4	EVREC		Expander full-wave rectifier.
5	INTOUT		Expander intercom op-amplifier (class AB) output. Nominal voltage is 1.5V.
6	TELOUT		Expander telephone op-amplifier (class AB) output. Nominal voltage is 1.5V.
7	VHOLD		Voltage hold capacitor connection. Nominal voltage is 1.2V.
9	CHGCTL		Charge control input. Nominal voltage is V_{CC} .
10	FSKOUT		Frequency-shifted keyed comparator, open-collector output.

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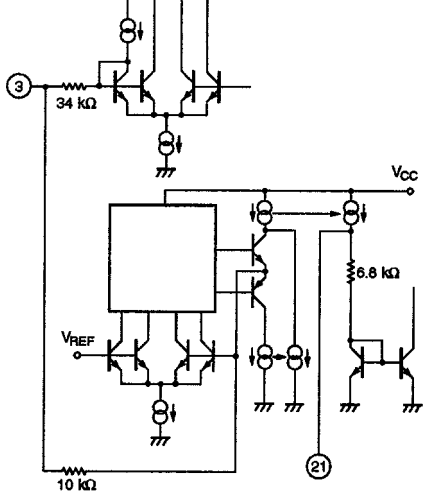
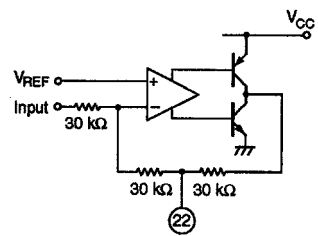
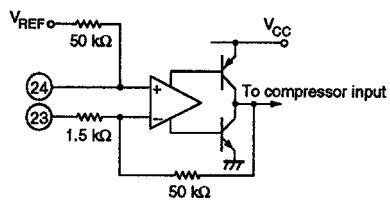
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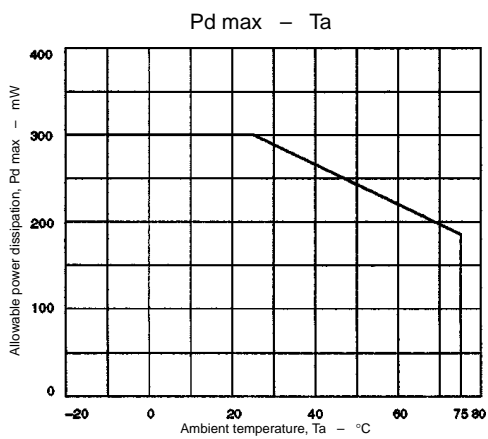
Number	Name	Equivalent circuit	Description
8	INTCTL		Intercom control input. Nominal voltage is 3V.
11	GND		Ground
12	STBY		Standby control input. Nominal voltage is 1.5V.
14	VREF		Reference voltage amplifier (class B) capacitor connection. Nominal voltage is 1.5V.
13	V _{CC}		Voltage supply
15	TXIN		Transmit data input. Nominal voltage is 1.5V.
20	COUT		Compander amplifier (class AB) output. Nominal voltage is 1.5V.
16	EMUTE		Expander mute control input. Nominal voltage is 3V.
17	CMUTE		Compressor mute control input. Nominal voltage is 3.3V.
18	LPF2OUT		Lowpass filter 2 buffer amplifier (class AB) output. Nominal voltage is 1.5V.
19	LPF2IN		Lowpass filter 2 buffer amplifier (class AB) input. Nominal voltage is 1.5V.

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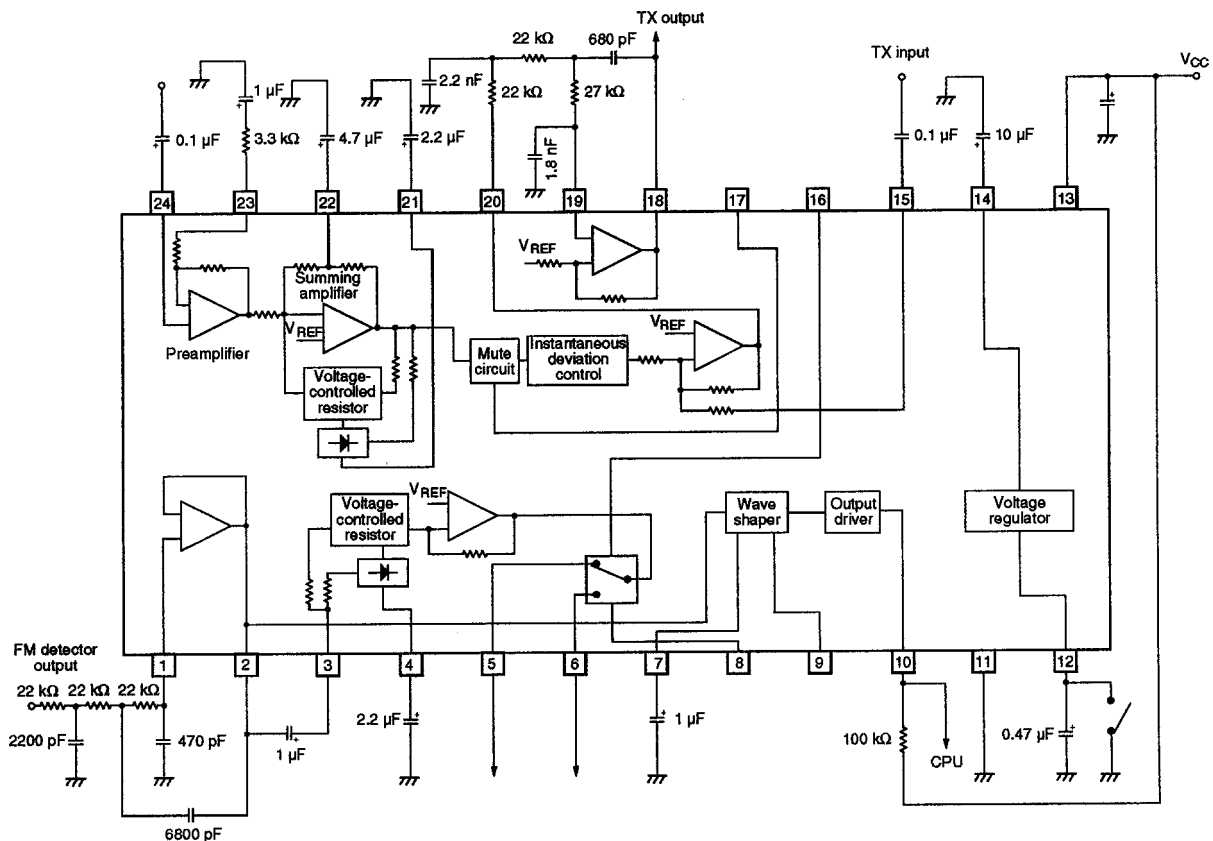
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Number	Name	Equivalent circuit	Description
21	CVREC		Compressor full-wave rectifier capacitor.
22	CNF		Compressor negative feedback capacitor connection. Nominal voltage is 1.5V
23	PRENF		Compressor preamplifier negative feedback network connection. Nominal voltage is 1.5V.
24	PREIN		Compressor preamplifier input. Nominal voltage is 1.5V.



Typical Application



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