

HM3288

High Fidelity Stereo SPDT Switch with Pop and Click Elimination

Descriptions

The HM3288 is a Dual SPDT analog switch with ultra-low distortion, high OFF-Isolation for special stereo audio applications with negative swing audio signals capacity that features ultra-low Ron of 0.2Ω (typical) at 3.3V VCC.

The HM3288 operates a single power supply over a wide range from 3.0V to 4.5V and 1.8V logic compatible with high PSRR. With a special pop-click shunt circuitry at each signal pin that eliminates pops and clicks associated at any application conditions likes switched, enable/disable, power-down and power-up.

With superior THD+N performance and other high performance, the HM3288 is an ideal device for Hi-Fi system applications.

The HM3288 is available in QFN1826-16L package. All product is Pb-free and Halogen-free

Order Information

Package		Part Number	Top-Side Marking
QFN 1.8 x2.6-16 Lead	Tape and Reel	HM3288	288U

Features

- Pin-to-Pin **ISL54405IRUE, WSP6580**, QFN 1.8 x 2.6-16L Package
- Single supply range operating from 3.0V to 4.5V
- -118dB THD+N into 100kΩ load at 2Vrms
- -114dB THD+N into 32Ω load at 2Vrms
- Signal-to-Noise (SNR) Ratio 132dBA
- 100dB PSRR at 10kHz
- 145dB crosstalk & separation
- Pop/Click shunt circuit
- Audio Path Soft Turn-On/Off for Pop & Click Elimination

Applications

- Hi-Fi Smartphones and Portable Device
- Hi-Fi SACD/DVD players

Functional Diagram

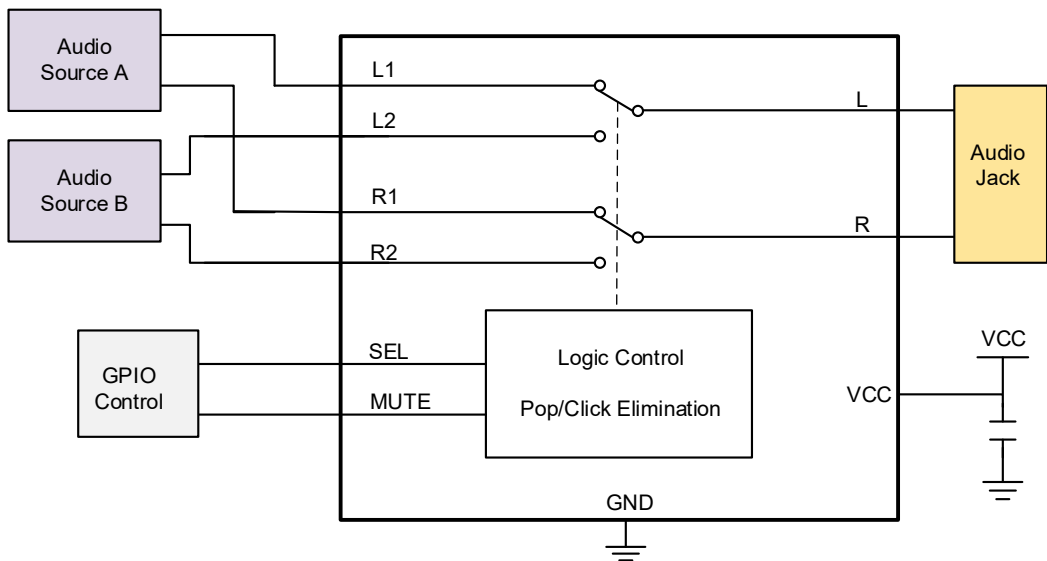


Fig.1 Functional Diagram

Pin Configuration

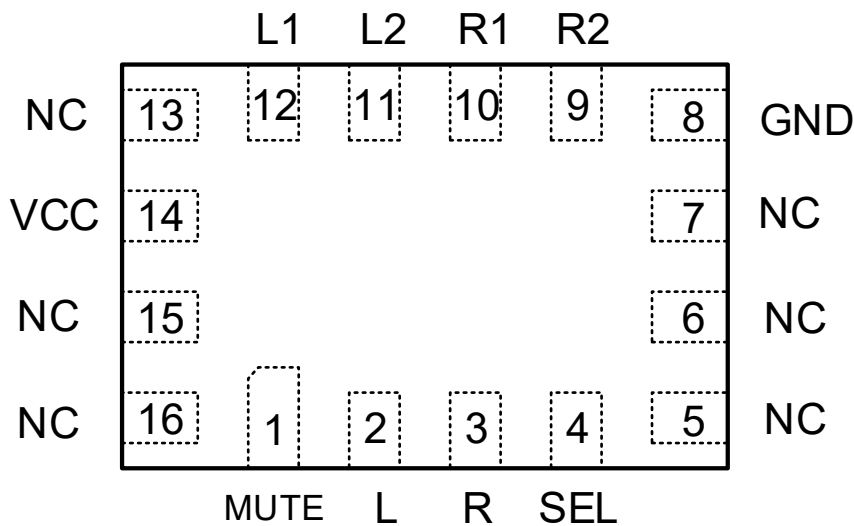


Fig.2 Top-Through View

Pin Descriptions

Pin Number	Symbol	Descriptions
2, 3	L, R	left and right channel Common port
10,12	R1, L1	Left and right channel port 1, normally closed
9,11	R2, L2	Left and right channel port 2, normally open
1	MUTE	Enable control, active high
4	SEL	Port selection control pin
14	VCC	Power supply
8	GND	Ground
5,6,7,13,15,16	NC	Not connection

Table-1 Pin Descriptions

Truth Table

MUTE	SEL	L1, R1	L2, R2
0	0	ON	OFF
0	1	OFF	ON
1	X	OFF	OFF

Absolute Maximum Ratings ⁽¹⁾

Parameter	Symbol	Value	Unit
Supply Voltage	V_{CC}	-0.3 ~ 5.5	V
Digital Control Input Voltage	V_{IN}	-0.3 ~ 5.5	V
Analog Input/Output Voltage (L1,L2,R1,R2,L,R)	V_{IS}	-4.0 ~ 4.0	V
Switch Continuous Current (L1,L2,R1,R2,L,R)	I_{IO}	±300	mA
Switch Peak Current (L1,L2,R1,R2,L,R) (pulsed at 1ms, 10% duty cycle, Max)	I_{IO_PK}	±500	mA
Power Dissipation in Still Air	P_D	250	mW
Storage Temperature Range	T_{STG}	-55 ~ 150	°C
Junction Temperature	T_J	150	°C
Lead Temperature (Soldering, 10 seconds)	T_L	260	°C
Thermal Resistance	$R_{\theta JA}$	80	°C/W
ESD protection (HBM)	I/O to VCC, I/O to GND	±6000	V
	I/O to I/O	±4000	V

Recommend operating ratings ⁽²⁾

Parameter	Symbol	Value	Unit
Supply Voltage	V_{CC}	3.3 ~ 4.5	V
Digital Control Input Voltage	V_{IN}	0.0 ~ V_{CC}	V
Analog Input/Output Voltage (L1,L2,R1,R2,L,R)	V_{IS}	-3.3 ~ V_{CC}	V
Operating Temperature	T_A	-40 ~ 85	°C

Note:

1. "Absolute Maximum Ratings" may cause permanent damage to the device. This is a stress only rating and operation of the device at these or any other conditions beyond those indicated in the operational sections of this specification is not implied.
2. The input and output negative voltage ratings may be exceeded if the input and output diode current ratings are observed.

DC Electronics Characteristics

(Ta=25°C, VCC=3.6V, V_{AC}=V_{DIR}=0V, V_{IS}=2Vrms, R_L=32Ω, f=1kHz, CAP=0.1uF, unless otherwise noted)

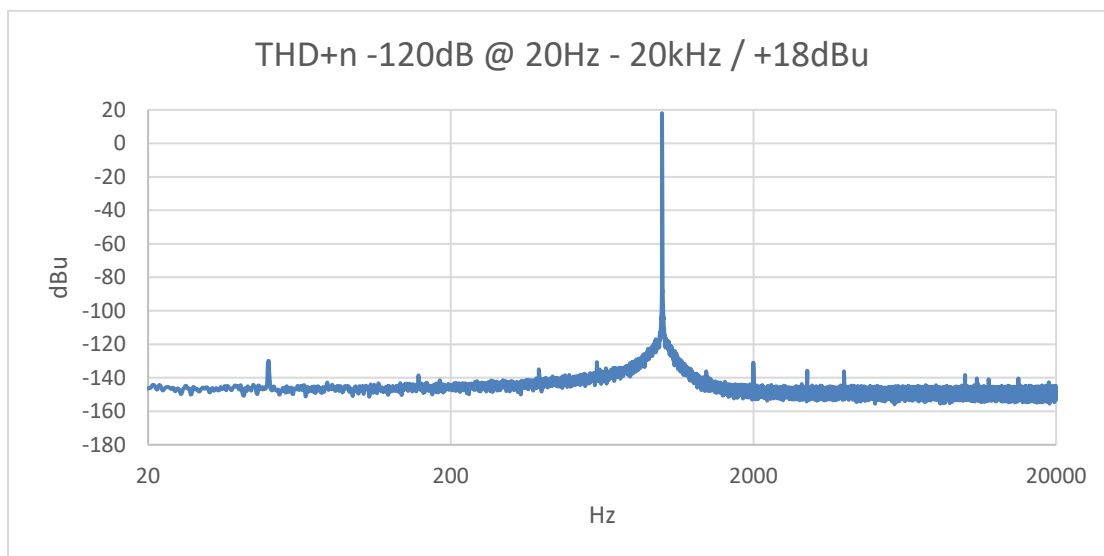
Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Analog Switch Characteristics						
Analog Signal Range	V _{IS}	VCC: 3.3 ~ 4.2		2.5		Vrms
On-Resistance	R _{ON}	V _{IS} = -3.3V~+3.3V I _{OUT} =100mA		0.2		Ω
R _{ON} Matching Between Channels	Δ R _{ON}	V _{IS} = -3.3V~+3.3V I _{OUT} =100mA		0.0015		Ω
R _{ON} Flatness	R _{FLAT(ON)}	V _{IS} = -3.3V~+3.3V I _{OUT} =100mA		0.0015		Ω
Dynamic Characteristics						
Total Harmonic Distortion	THD+N	f=10Hz to 22KHz V _{IS} =2Vrms @R _L =100kΩ		-118		dB
Total Harmonic Distortion	THD+N	f=10Hz to 22KHz V _{IS} =2Vrms @R _L =32Ω		-114		dB
Total Harmonic Distortion	THD+N	f=10Hz to 500kHz V _{IS} =1.55Vrms @RL=100kΩ		-104		dB
Intermodulation Distortion	IMD	Mode=CCIF 19k+20k Ratio=1 V _{IS} =500mVrms @R _L =100kΩ		-122		dB
Dynamic/Transient Intermodulation Distortion	IMD	Mode=DIM100 V _{IS} =1Vrms @ RL=100kΩ		-103		dB
Signal-to-Noise Ratio	SNR	f=10Hz to 22KHz, Inputs grounded R _L =32Ω or 100kΩ		132		dB
Stereo Channel Imbalance L1 and R1, L2 and R2	IMB	f=10Hz to 22KHz, R _L =100kΩ		±0.003		dB
Off isolation (Muting)	OIRR	f=10Hz to 22KHz, V _L = V _R = 2Vrms @R _L =100kΩ MUTE=AC=VCC DIR=0, SEL="X"		145		dB
		f=10Hz to 22KHz, V _{LX} = V _{RX} = 2Vrms @R _L =100kΩ MUTE=AC=VCC DIR=VCC, SEL="X"		145		dB
		f=10Hz to 22KHz, V _L = V _R = 2Vrms		127		dB

		@R _L =32Ω MUTE=VCC AC=DIR=0, SEL="X"				
		f=10Hz to 22KHz, V _{Lx} = V _{Rx} = 2Vrms @R _L =32Ω MUTE=VCC AC=DIR=0, SEL="X"		127		dB
Crosstalk (Channel-to-Channel)	Xtalk	f=10Hz to 22KHz, V _{IS} = 2Vrms, Source Impedance=0Ω R _L = 100kΩ		145		dB
Power Supply Ripple Rejection	PSRR	f=10kHz, V _{IS} = 0.1Vrms, Inputs grounded		100		dB
-3dB Bandwidth	BW	R _L =50Ω		50		MHz
On-to-Mute Time	T _{TRS-OM}	CAP=0.1uF		50		ns
Mute-to-On Time	T _{TRS-MO}	CAP=0.1uF		160		ms
Turn-Off Time	T _{OFF}	V _{IS} =1.5V, R _L =20KΩ MUTE=0		60		ns
Turn-On Time	T _{ON}	V _{IS} =1.5V, R _L =20KΩ MUTE=0		60		us
Break-Before-Make time	T _{BBM}	V _{IS} =1.5V, R _L =20KΩ MUTE=0		50		us
Lx, Rx Off capacitance	C _{OFF}	f=100kHz, V _{Lx} or V _{Rx} = V _L or V _R =0V		15		pF
L, R On capacitance	C _{ON}	f=100kHz, V _{Lx} or V _{Rx} = V _L or V _R =0V		30		pF
Power Supply Characteristics						
Supply quiescent current	I _{CC}	MUTE=0V		190		uA
		MUTE=VCC		55		uA
Digital Input Characteristics						
Digital input logic high level	V _{IH}	VCC=3.6~4.5	1.6			V
		VCC=3.0~3.6	1.5			V
Digital input logic low level	V _{IL}	VCC=3.6~4.5			0.5	V
		VCC=3.0~3.6			0.4	V
Digital Input leakage current	I _{IN}				±2.0	uA
AC, DIR, SEL pull-down resistor	R _{PD}			4		MΩ
MUTE pull-up resistor	R _{PU}			4		MΩ

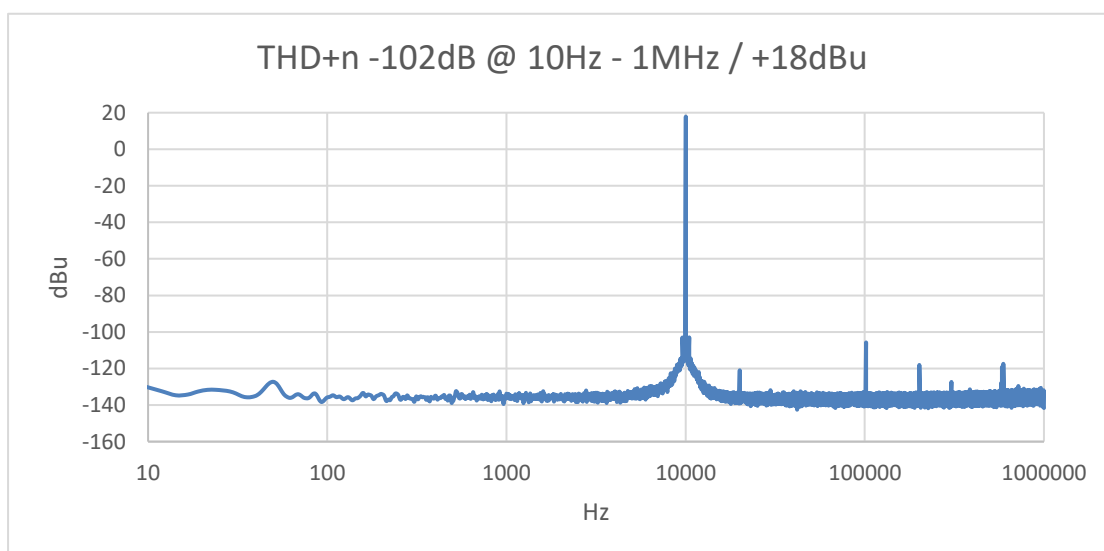
Note:

- Flatness is defined as the difference between maximum and minimum value of ON-resistance at the specified analog signal voltage points.

Typical THD+n / 1kHz Tone @ 20Hz - 20kHz (Measurement Limit)



Typical THD+n / 10kHz Tone @ 10Hz - 1MHz (Measurement Limit)



Source Impedance

Higher source impedance will degrade THD performance, so please design the source circuit carefully, add front buffer circuit for lowest source impedance is good solution generally.

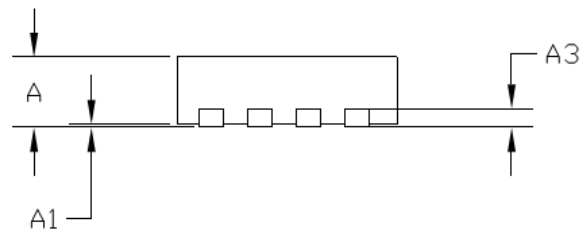
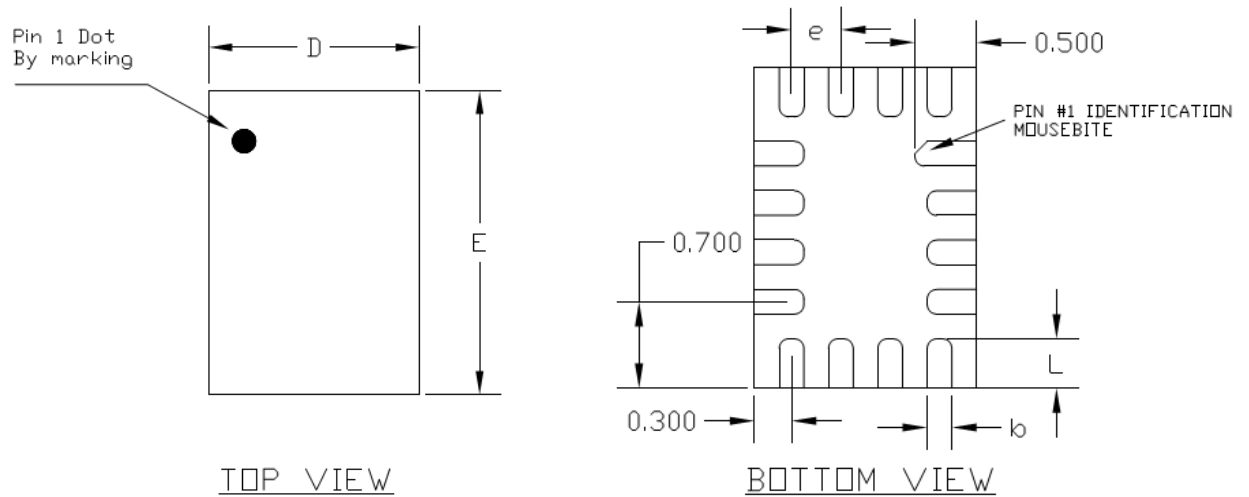
Signal Swing

The HM3288 design for +18dBu(6.15Vrms) Differential audio system. The damage limit is +20.5dBu(8.2Vrms) Differential, >2dB safe margin is retained. Recommend Table:

VCC = 3.3V	VCC = 3.6V	VCC = 3.9V	VCC = 4.2V	VCC = 4.5V
2.3Vrms SE	2.4Vrms SE	2.7Vrms SE	2.9Vrms SE	3.1Vrms SE
4.6Vrms DIFF	4.8Vrms DIFF	5.4Vrms DIFF	5.8Vrms DIFF	6.2Vrms DIFF

Package outline dimensions

QFN 1.8 x 2.6 -16L



SIDE VIEW

Symbol	Dimension in Millimeters		
	Min.	Typ.	Max.
A	0.50	0.55	0.60
A1	0.00	-	0.05
A3	0.15 Typ.		
D	1.75	1.80	1.85
E	2.55	2.60	2.65
L	0.30	0.40	0.50
b	0.15	0.20	0.25
e	0.40 Typ.		