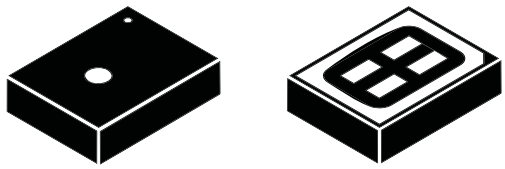
MP34DT01

MEMS audio sensor
omnidirectional stereo digital microphone

Features

- Single-supply voltage operation
- Low power consumption
- 120 dBSPL acoustic overload point
- Omnidirectional sensitivity
- PDM stereo output
- HCLGA package (SMD-compliant)
- EMI-shielded package
- ECOPACK®, RoHS, and “Green” compliant



HCLGA 3x4x1 4LD

Applications

- Mobile terminals
- Laptop and notebook computers
- Portable media players
- VoIP
- Speech recognition
- A/V eLearning devices
- Gaming and virtual reality input devices
- Digital still and video cameras
- Antitheft systems

Description

The MP34DT01 is an ultra-compact, low-power, stereo microphone built with a sensing element and an IC interface.

The sensing element, capable of detecting acoustic waves, is manufactured using a specialized silicon micromachining process to produce audio sensors.

The IC interface is manufactured using a CMOS process that allows designing a dedicated circuit able to provide a digital signal externally in PDM format.

The MP34DT01 has an acoustic overload point of 120 dBSPL with a 63 dB signal-to-noise ratio.

The MP34DT01 is available in an SMD-compliant, EMI-shielded package and is guaranteed to operate over an extended temperature range from -30 °C to +70 °C.

Table 1. Device summary

Order code	Temperature range [°C]	Package	Packing
MP34DT01	-30 to +70	HCLGA (3 x 4 x 1) mm	Tray
MP34DT01TR	-30 to +70	HCLGA (3 x 4 x 1) mm	Tape and reel

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1 Pin description

Figure 1. Pin connections

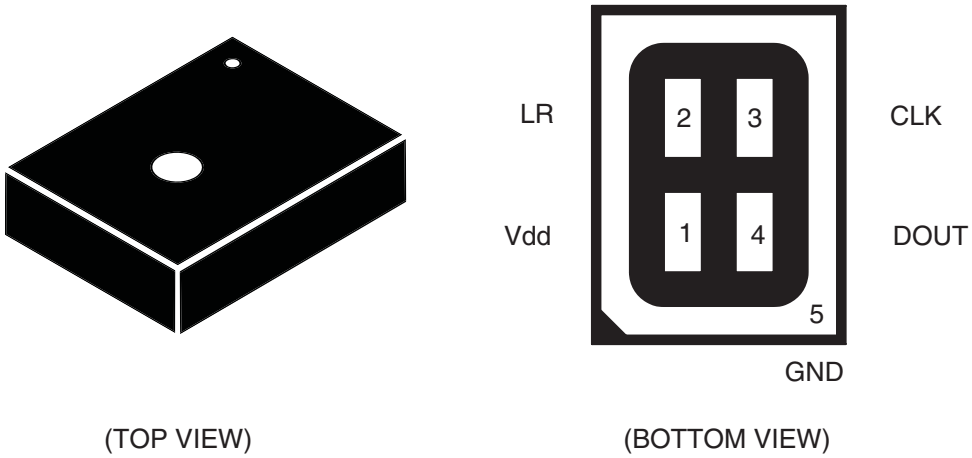


Table 2. Pin description

Pin #	Pin name	Function
1	Vdd	Power supply
2	LR	Left/Right channel selection
3	CLK	Synchronization input clock
4	DOUT	Left/Right PDM data output
5 (ground ring)	GND	0 V supply

2 Acoustic and electrical specifications

2.1 Acoustic and electrical characteristics

The values listed in the table below are specified for Vdd = 1.8 V, Clock = 2.4 MHz, T = 25 °C, unless otherwise noted.

Table 3. Acoustic and electrical characteristics

Symbol	Parameter	Test condition	Min.	Typ.(1)	Max.	Unit
Vdd	Supply voltage		1.64	1.8	2.86	V
Idd	Current consumption in normal mode	Mean value		0.6		mA
IddPdn	Current consumption in power-down mode(2)			20		µA
Scc	Short-circuit current		1		10	mA
AOP	Acoustic overload point			120		dBSPL
So	Sensitivity			-26		dBFS
SNR	Signal-to-noise ratio	A-weighted at 1 kHz, 1 Pa		63		dB
PSR	Power supply rejection	Guaranteed by design		-70		dBFS
Clock	Input clock frequency(3)		1	2.4	3.25	MHz
Ton	Turn-on time (4)	Guaranteed by design			10	ms
Top	Operating temperature range		-30		+70	°C

1. Typical specifications are not guaranteed.
2. Input clock in static mode.
3. Duty cycle: min = 40% max = 60%.
4. Time from the first clock edge to valid output data.

Table 4. Distortion specifications

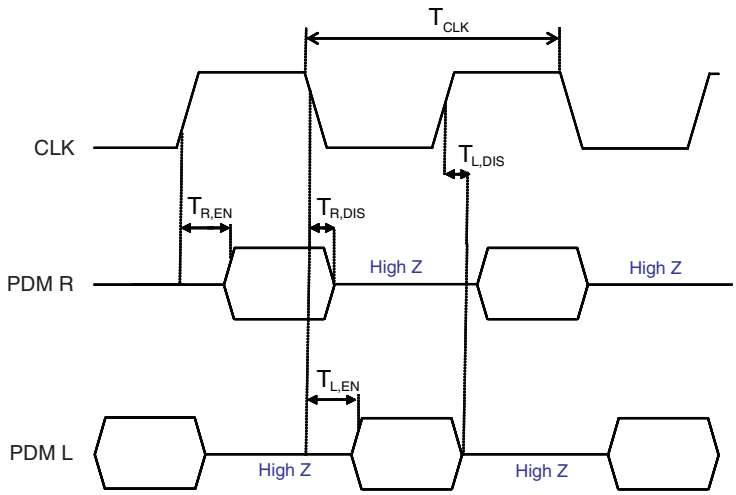
Parameter	Test condition	Value
Distortion	100 dBSPL (50 Hz - 4 kHz)	<1 % THD + N
Distortion	115 dBSPL (1 kHz)	<5 % THD + N

2.2 Timing characteristics

Table 5. Timing characteristics

Parameter	Description	Min	Max	Unit
f_{CLK}	Clock frequency for normal mode	1	3.25	MHz
f_{PD}	Clock frequency for power-down mode		0.23	MHz
T_{CLK}	Clock period for normal mode	308	1000	ns
$T_{R,EN}$	Data enabled on DATA line, L/R pin = 1	16		ns
$T_{R,DIS}$	Data disabled on DATA line, L/R pin = 1		16	ns
$T_{L,EN}$	Data enabled on DATA line, L/R pin = 0	18		ns
$T_{L,DIS}$	Data disabled on DATA line, L/R pin = 0		16	ns

Figure 2. Timing waveforms



2.3 Frequency response

Figure 3. Frequency response mask for digital microphone

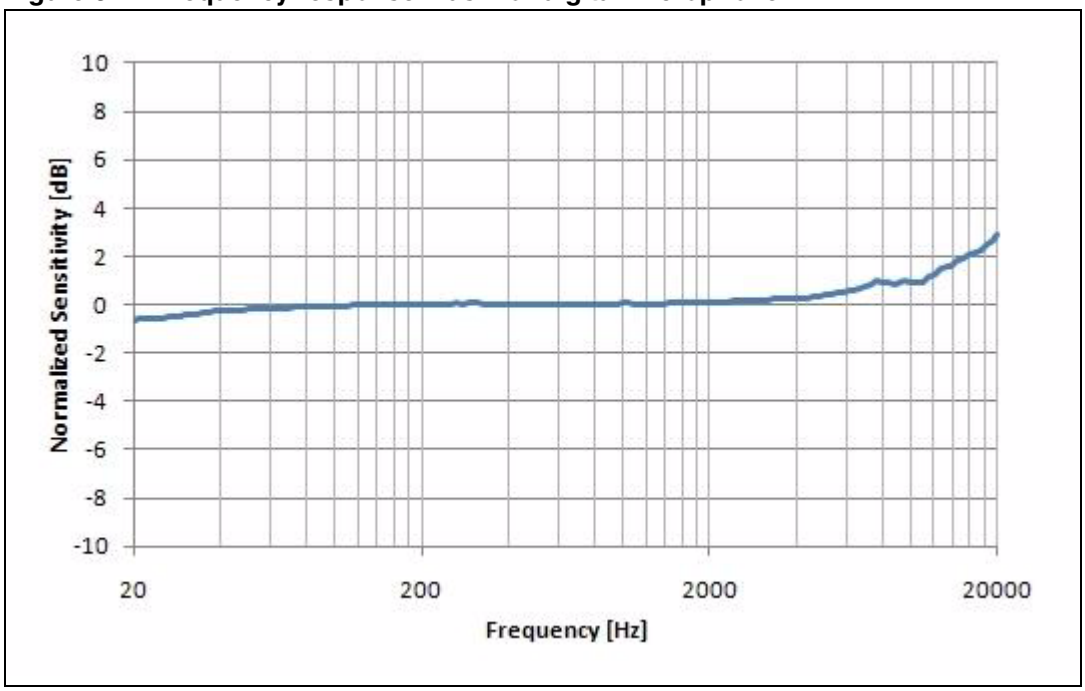


Table 6. Frequency response mask for digital microphones

Frequency / Hz (1)	Lower limit	Upper limit	Unit
20...100	-5	+5	dBr 1kHz
100...8000	-2	+2	dBr 1kHz
8000...20000	-5	+5	dBr 1kHz

1. At T = 20 °C and acoustic stimulus = 1 Pa (94 dB SPL)

3 Absolute maximum ratings

Stresses above those listed as “Absolute maximum ratings” may cause permanent damage to the device. This is a stress rating only and functional operation of the device under these conditions is not implied. Exposure to maximum rating conditions for extended periods may affect device reliability.

Table 7. Absolute maximum ratings

Symbol	Ratings	Maximum value	Unit
Vdd	Supply voltage	-0.3 to 6	V
Vin	Input voltage on any control pin	-0.3 to Vdd +0.3	V
T_{STG}	Storage temperature range	-40 to +125	°C
ESD	Electrostatic discharge protection	2 (HBM)	kV



This device is sensitive to mechanical shock, improper handling can cause permanent damage to the part.



This device is ESD-sensitive, improper handling can cause permanent damage to the part.

4 Functionality

4.1 L/R channel selection

The L/R digital pad lets the user select the DOUT signal pattern as shown in *Table 8*. The L/R pin must be connected to Vdd or GND.

Table 8. L/R channel selection

L/R	CLK low	CLK high
GND	Data valid	High impedance
Vdd	High impedance	Data valid

5 Package mechanical data

In order to meet environmental requirements, ST offers these devices in different grades of ECOPACK® packages, depending on their level of environmental compliance. ECOPACK® specifications, grade definitions and product status are available at: *www.st.com*. ECOPACK® is an ST trademark.

Soldering information

The HCLGA 3x4 4LD package is also compliant with the RoHS and “Green” standards and is qualified for soldering heat resistance according to JEDEC J-STD-020.

Landing pattern and soldering recommendations are available at *www.st.com*.

Figure 4. Recommended soldering profile limits

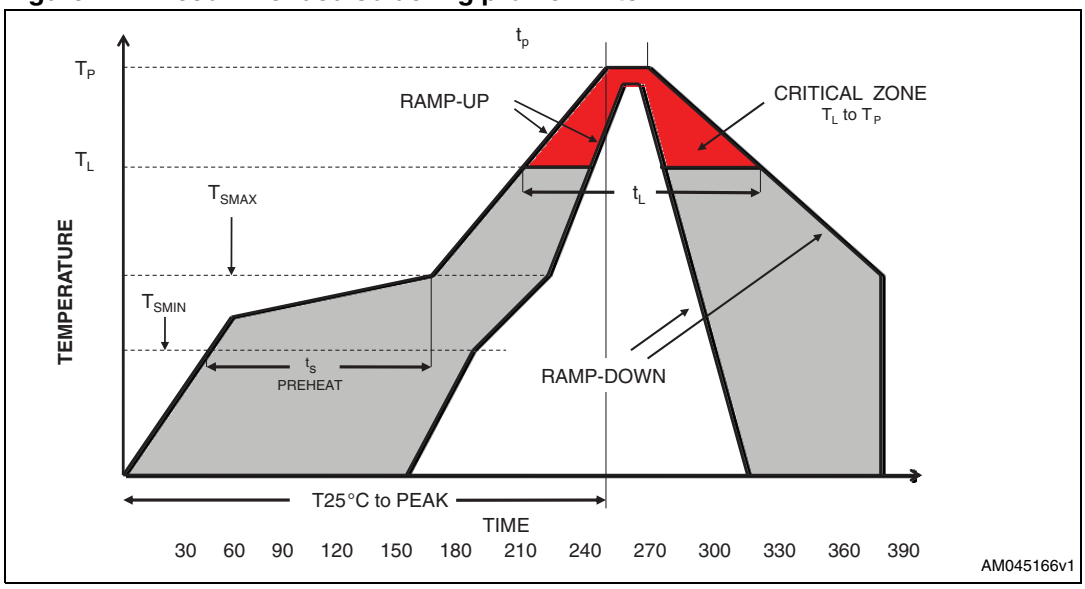


Table 9. Recommended soldering profile limits

Description	Parameter	Pb free
Average ramp rate	T_L to T_P	3 °C/sec max
Preheat Minimum temperature Maximum temperature Time (T_{SMIN} to T_{SMAX})	 T_{SMIN} T_{SMAX} t_S	 150 °C 200 °C 60 sec to 120 sec
Ramp-up rate	T_{SMAX} to T_L	
Time maintained above liquidous temperature Liquidous temperature	t_L T_L	60 sec to 150 sec 217 °C
Peak temperature	T_P	260 °C max
Time within 5 °C of actual peak temperature		20 sec to 40 sec
Ramp-down rate		6 °C/sec max
Time 25 °C (t25 °C) to peak temperature		8 minutes max

Figure 5. HCLGA 3 mm x 4 mm x 1 mm 4-lead package outline

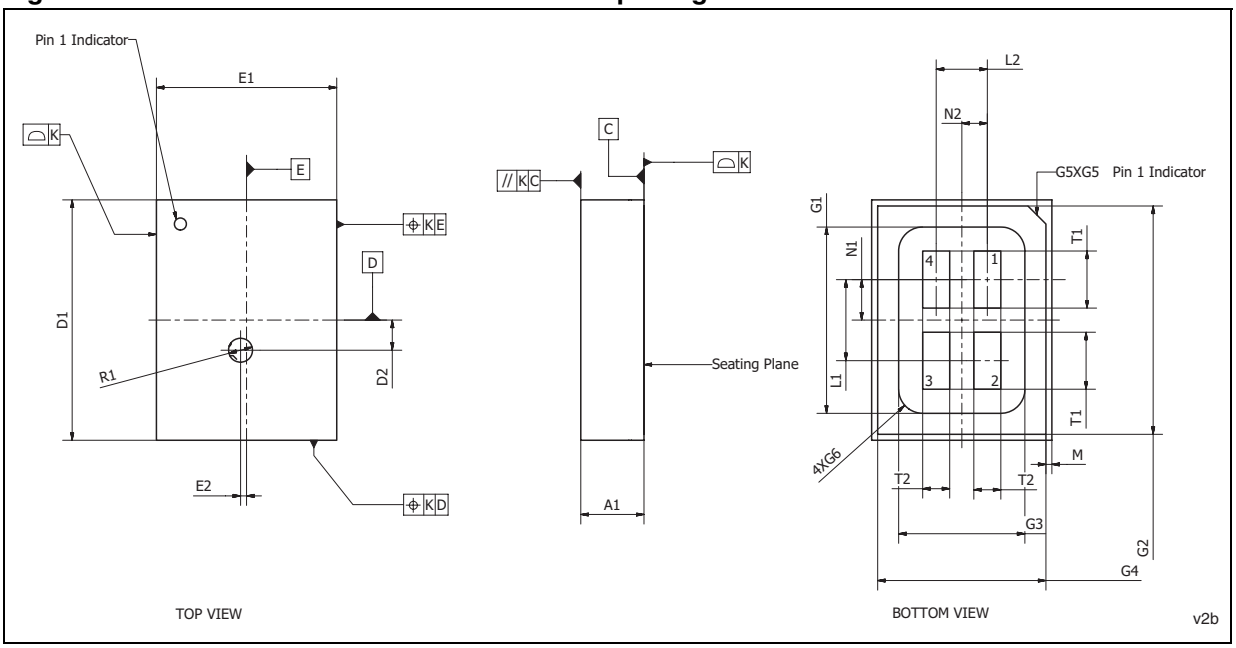


Table 10. HCLGA 3 mm x 4 mm x 1 mm 4-lead package dimensions

Symbol	mm		
	Min	Typ	Max
A1	0.900	1.000	1.100
D1	3.900	4.000	4.100
D2	0.300	0.500	0.700
R1	0.300	0.400	0.500
E1	2.900	3.000	3.100
E2	1.300	1.500	1.700
L1	1.300	1.350	1.400
L2	0.800	0.850	0.900
N1	0.625	0.675	0.725
N2	0.375	0.425	0.475
T1	0.900	0.950	1.000
T2	0.350	0.400	0.450
G1	3.050	3.100	3.150
G2	3.750	3.800	3.850
G3	2.050	2.100	2.150
G4	2.750	2.800	2.850
G5	0.250	0.300	0.350
G6		0.400	
M		0.100	
K		0.050	

6 Revision history

Table 11. Document revision history

Date	Revision	Changes
06-Oct-2011	1	Initial release.

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