Dual-Voltage ESD Protection Array for USB Port

Features

- 4 channels of ESD Protection
- 8kV ESD protection (IEC 61000-4-2, contact discharge)
- 16kV ESD protection (HBM)
- SOT-563
- TDFN-8, 1.70mm x 1.35mm, 0.4mm pitch
- TDFN-8, 2mm x 2mm, 0.5mm pitch
- Lead free
- 16V clamp on Vcc

Applications

- USB and Mini-USB applications
- I/O port protection for mobile handsets
- Wireless handsets

Product Description

California Micro Devices' CM1240 is a four channel ESD protection array. Three channels of the CM1240 are low voltage (LV) diodes, which have a capacitance of 7pF enabling them to protect high speed I/O ports while providing robust ESD protection. The other channel of the CM1240 is a high voltage (HV) diode which has a capacitance of 25pF enabling it to protect power supply inputs or OLED power rails, etc.

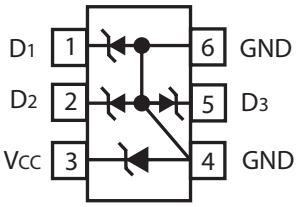
The parts integrate avalanche-type ESD diodes, which provide a very high level of protection for sensitive electronic components that may be subjected to electrostatic discharge (ESD). The ESD protection diodes are designed and characterized to safely dissipate ESD strikes of 8kV, the maximum requirement of the IEC61000-4-2 international standard. Using the MIL-STD-883 (Method 3015) specification for Human Body Model (HBM) ESD, the pins are protected for contact discharges of greater than 16kV.

This device is particularly well suited for portable electronics (e.g. wireless handsets, PDAs, notebook computers) because of its small package format and easy-to-use pin assignments. In particular, the CM1240 is ideal for protecting USB or mini USB ports operating at full speed (12Mbps).

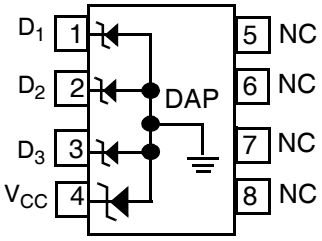
The CM1240 is available in a space saving, low profile, lead-free TDFN-8 or SOT-563 package.

PACKAGE / PINOUT DIAGRAMS

SOT-563



TDFN-8



Ordering Information

PART NUMBERING INFORMATION

Leads	Package	Lead-free Finish	
		Ordering Part Number	Part Marking
6	SOT-563	CM1240-F4SE	L40
8	TDFN-0.5mm	CM1240-04DE	L40 4E
8	TDFN-0.4mm	CM1240-04D4	L4

PIN DESCRIPTIONS

Specifications

SOT-563 PIN#	TDFN PIN#	NAME	DESCRIPTION
1	1	D1	Cathode connection for Low Voltage ESD diode
2	2	D2	Cathode connection for Low Voltage ESD diode
5	3	D3	Cathode connection for Low Voltage ESD diode
3	4	Vcc	Cathode connection for High Voltage ESD diode
–	5	NC	No connect
–	6	NC	No connect
–	7	NC	No connect
–	8	NC	No connect
4	DAP	GND	Anode-side connection for all ESD diodes
6	–	GND	Anode-side connection for all ESD diodes

ABSOLUTE MAXIMUM RATINGS		
PARAMETER	**RATING**	**UNITS**
ESD Protection (HBM)	±16	kV
Pin Voltages Vcc to GND All other pins to GND	 [GND - 0.3] to +13 [GND - 0.3] to +5.5	 V V
Storage Temperature Range	–65 to +150	°C
Lead Temperature (soldering, 10sec)	300	°C

STANDARD OPERATING CONDITIONS		
PARAMETER	**RATING**	**UNITS**
Operating temperature range	–40 to +85	°C

Specifications

ELECTRICAL OPERATING CHARACTERISTICS (NOTE 1)						
Symbol	**Parameter**	**Conditions**	**Min**	**Typ**	**Max**	**Units**
C_{LV}	LV diode Capacitance at 3Vdc; 1MHz, 30mVac			6		pF
C_{HV}	HV diode Capacitance at 3Vdc; 1MHz, 30mVac			25		pF
I_{LV}	LV Diode Leakage at +3.3V reverse bias voltage			0.01	0.4	µA
I_{HV}	HV Diode Leakage at +11V reverse bias voltage			0.01	0.4	µA
$V_{CL(LV)}$	LV Diode Signal Clamp Voltage: Positive Clamp, 10mA Negative Clamp, –10mA		 5.6 –1.5	 6.8 –0.8	 9 –0.4	 V V
$V_{CL(HV)}$	HV Diode Signal Clamp Voltage: Positive Clamp, 10mA Negative Clamp, –10mA		 13 –1.5	 16 –0.8	 19 –0.4	 V V
V_{ESD}	In-system ESD withstand voltage: Human Body Model (MIL-STD-883, method 3015) IEC 61000-4-2, contact discharge method	Note 2	 ±25 ±12			 kV kV
$R_{DYN(LV)}$	LV Diode Dynamic Resistance: Positive Negative			 2.8 1.2		 Ω Ω
$R_{DYN(HV)}$	HV Diode Dynamic Resistance: Positive Negative			 1 0.7		 Ω Ω

Note 1: Guaranteed at 25°C only

Note 2: ESD applied to input/output pins with respect to GND, one at a time. These parameters are guaranteed by design.

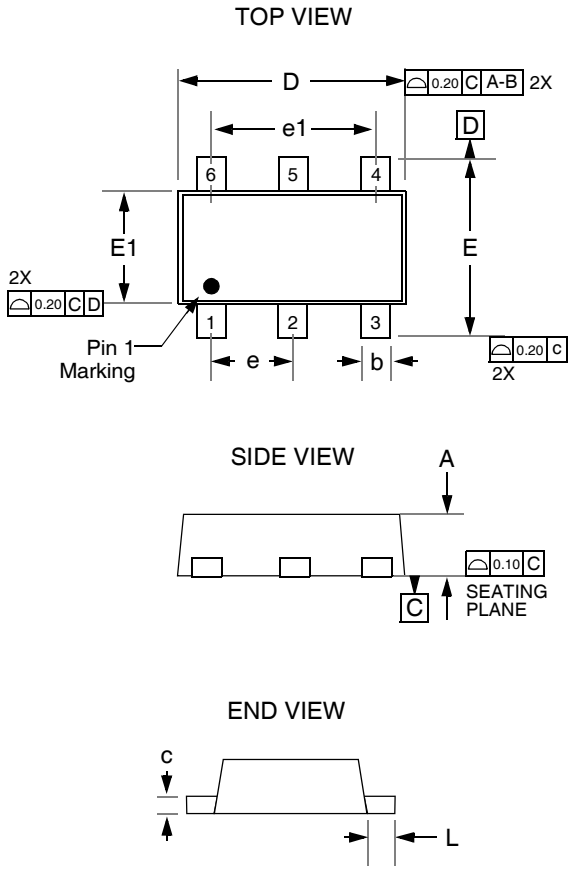
Mechanical Details

SOT-563 Mechanical Specifications

The CM1240 is supplied in a 6-pin SOT-563 package. Dimensions are presented below.

PACKAGE DIMENSIONS						
Package	SOT-563					
Leads	6					
Dim.	**Millimeters**			**Inches**		
	Min	**Nom**	**Max**	**Min**	**Nom**	**Max**
A	0.50	0.55	0.60	0.020	0.022	0.024
b	0.17	0.22	0.27	0.007	0.009	0.011
c	0.08		0.18	0.003		0.007
D	1.60 BSC			0.063 BSC		
E	1.50	1.60	1.70	0.059	0.063	0.067
E1	1.20 BSC			0.047 BSC		
e	0.50 BSC			0.020 BSC		
e1	1.00 BSC			0.040 BSC		
L	0.20 BSC			0.008 BSC		
# per tape and reel	5000 pieces					
Controlling dimension: millimeters						

Mechanical Package Diagrams



* For best results, both grounds should be connected

Package Dimensions for SOT-563.

Mechanical Details (cont'd)

TDFN-08 Mechanical Specifications

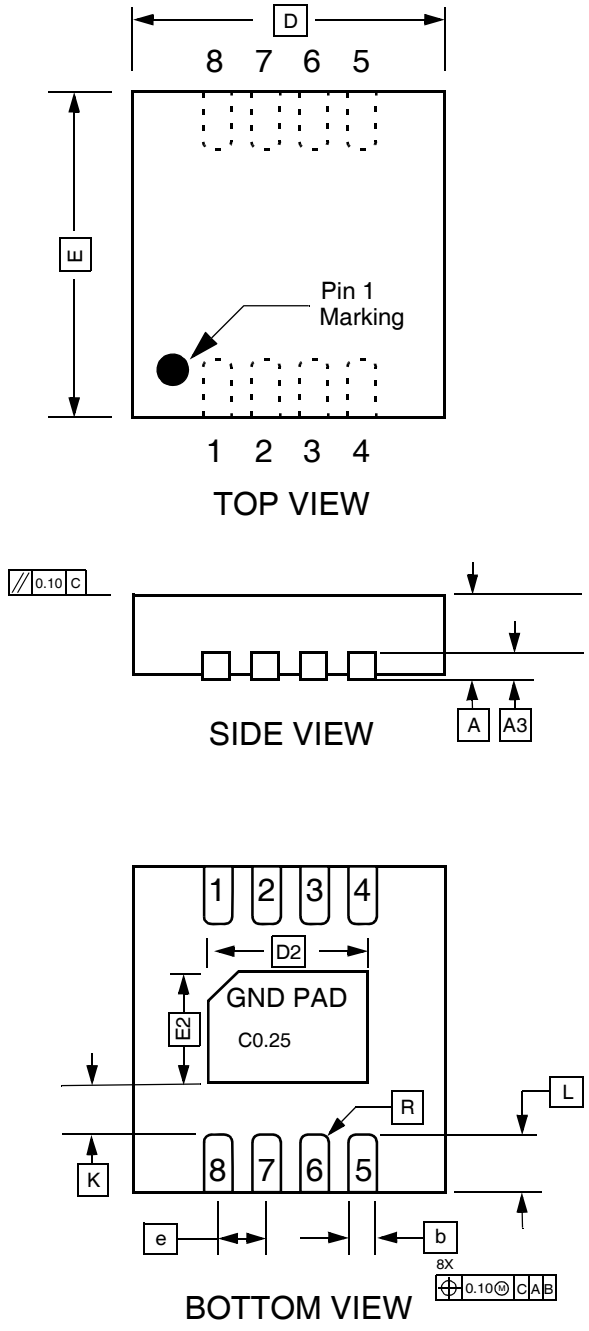
The CM1240 is supplied in an 8-lead 0.5mm TDFN package. Dimensions are presented below.

For complete information on the TDFN-08, see the California Micro Devices TDFN Package Information document.

PACKAGE DIMENSIONS						
Package	TDFN					
JEDEC No.	MO-229 (Var. VCCD-3)*					
Leads	8					
Dim.	**Millimeters**			**Inches**		
	Min	**Nom**	**Max**	**Min**	**Nom**	**Max**
A	0.70	0.75	0.80	0.028	0.030	0.031
A3	0.20 REF			0.008 REF		
b	0.20	0.25	0.30	0.008	0.010	0.012
D	1.90	2.00	2.10	0.075	0.079	0.083
D2	1.50	1.60	1.70	0.059	0.063	0.067
E	1.90	2.00	2.10	0.075	0.079	0.083
E2	0.80	0.90	1.00	0.031	0.035	0.039
e	0.50 BSC			0.020 BSC		
K	0.20			0.008		
L	0.20	0.30	0.40	0.008	0.012	0.016
# per tape and reel	3000 pieces					
Controlling dimension: millimeters						

*This package is compliant with JEDEC standard MO-229, variation VCCD-3 with exception of the D2 and E2 dimensions as called out in the table above and the r1 dimension which is not specified in the MO-229 standard.

Mechanical Package Diagrams



Package Dimensions for 8-Lead, 0.5mm pitch TDFN package

Mechanical Details (cont'd)

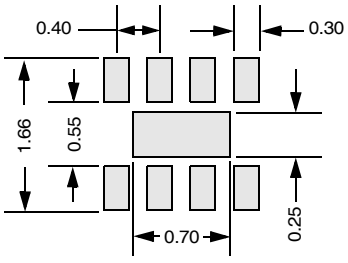
TDFN-08 Mechanical Specifications

Dimensions for the CM1240 supplied in a 8-lead, 0.4mm pitch TDFN package are presented below.

PACKAGE DIMENSIONS						
Package	TDFN					
JEDEC No.	MO-229C*					
Leads	8					
Dim.	**Millimeters**			**Inches**		
	Min	**Nom**	**Max**	**Min**	**Nom**	**Max**
A	0.70	0.75	0.80	0.028	0.030	0.031
A1	0.00	0.02	0.05	0.000	0.001	0.002
A3	0.200 REF			0.008 REF		
b	0.15	0.20	0.25	0.006	0.008	0.010
D	1.60	1.70	1.80	0.063	0.067	0.071
D2	1.10	1.20	1.30	0.043	0.047	0.051
E	1.25	1.35	1.45	0.049	0.053	0.057
E2	0.30	0.40	0.50	0.012	0.016	0.020
e	0.40 BSC			0.016 BSC		
K	0.20			0.008		
L	0.15	0.25	0.35	0.006	0.010	0.014
# per tape and reel	3000 pieces					
Controlling dimension: millimeters						

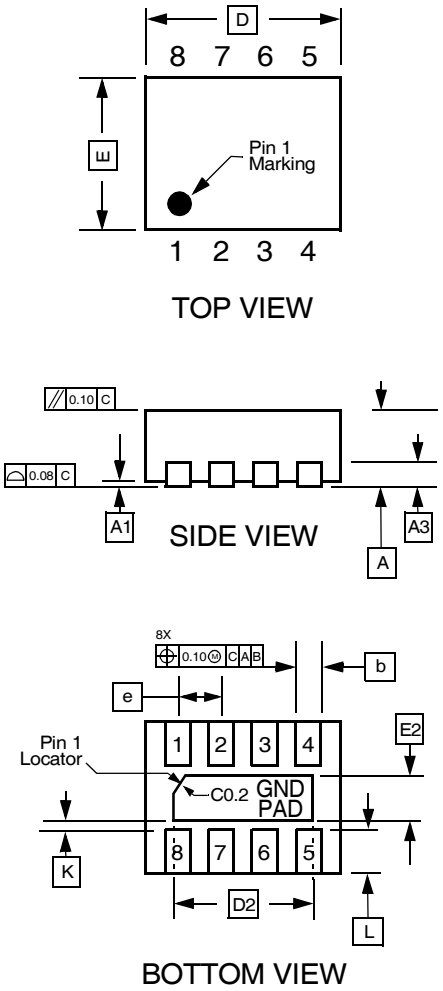
*This package is compliant with JEDEC standard MO-229C with the exception of the D, D2, E, E2, K and L dimensions as called out in the table above.

Recommend PCB Land Pattern



Note: Dimensions in millimeters. Drawing not to scale.

Mechanical Package Diagrams



Dimensions for 8-Lead, 0.4mm pitch TDFN package