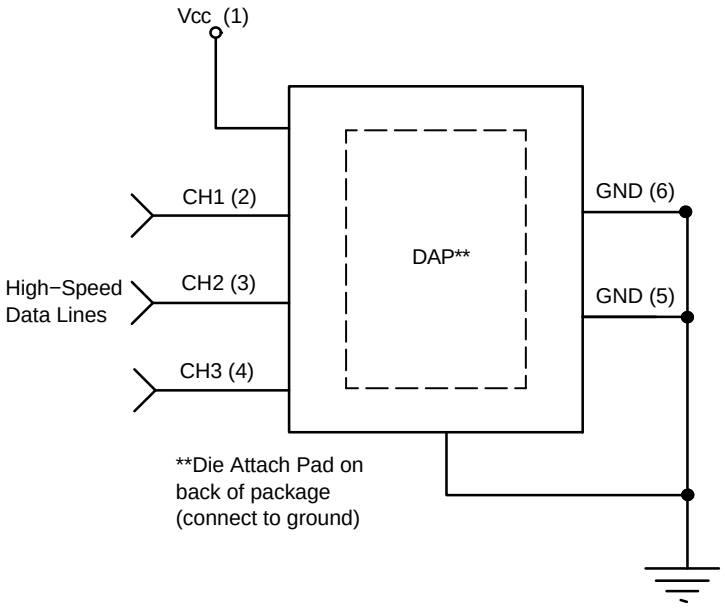
ESD7124

4-Channel Low Capacitance Dual-Voltage ESD and Surge Protection Array

Features

- 3 Channels of Low Voltage ESD Protection
- 1 Channel of High Voltage ESD Protection
- Provides ESD Protection to IEC61000−4−2 Level 4: ±25 kV Contact Discharge
- IEC 61000−4−5 (lighting)
- Low Channel Input Capacitance
- High Voltage Zener Diode Protects Supply Rail up to 100 A (8/20 μs)
- These Devices are Pb−Free and are RoHS Compliant

APPLICATION DIAGRAM

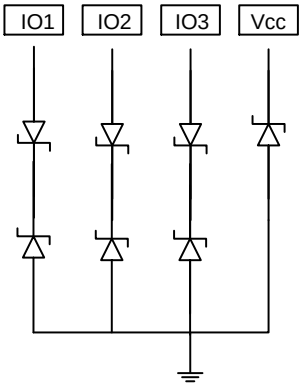


ON Semiconductor®

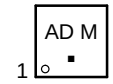
http://onsemi.com

UDFN−6
D4 SUFFIX
CASE 517CS

BLOCK DIAGRAM



MARKING DIAGRAM



AD = Specific Device Code
M = Date Code
▪ = Pb−Free Package

ORDERING INFORMATION

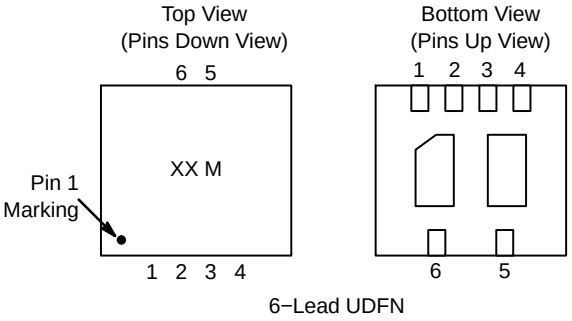
Device	Package	Shipping†
ESD7124MUTBG	UDFN−6 (Pb−Free)	3000/Tape & Reel

†For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specification Brochure, BRD8011/D.

Table 1. PIN DESCRIPTIONS

4−Channel, 6−Lead, UDFN−8 Package			
Pin	**Name**	**Type**	**Description**
1	V_{CC}	HV V_{DD}	HV ESD Channel
2	CH1	I/O	LV Low−capacitance ESD Channel
3	CH2	I/O	LV Low−capacitance ESD Channel
4	CH3	I/O	LV Low−capacitance ESD Channel
5	GND		Ground
6	GND		Ground

PACKAGE / PINOUT DIAGRAMS



6−Lead UDFN

SPECIFICATIONS

Table 2. ABSOLUTE MAXIMUM RATINGS

Parameter	Rating	Units
Operating Temperature Range	–55 to +125	°C
Storage Temperature Range	–65 to +150	°C

Stresses exceeding Maximum Ratings may damage the device. Maximum Ratings are stress ratings only. Functional operation above the Recommended Operating Conditions is not implied. Extended exposure to stresses above the Recommended Operating Conditions may affect device reliability.

Table 3. ELECTRICAL CHARACTERISTICS

	Reverse Working Voltage	Breakdown Voltage Vbr (V)		Reverse Current Leakage Ir (μA)	Rdyn	Junction Capactance Cj(pF)	
	Vrwm (V)	at 1 mA		at Vrwm	Ω	Vr = 0 V, f = 1 MHz	
Device Name	**Max**	**Min**	**Typ**	**Max**	**Typ**	**Typ**	**Max**
Pin2-4 (LV)	3.3	5.5	6.5	1	1	0.35	0.5
Pin1 (HV)	12	13.3	14	1			

	Clamping Voltage Vc (V) tp = 8 x 20 μs		Max Ratings tp = 8 x 20 μs	
	Ipp = 1 A	Ipp = 16 A	Ipp (A)	Vc @ Max Ipp (V)
Device Name	**Typ**	**Typ**	**Max**	**Max**
Pin1 (HV)	15	16	100	27
Pin2-4 (LV)	9.5			

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Clamping Voltage TLP (Note 1) All Devices Pin2-4(LV) See Figures 3 − 6	V_C	I_{PP} = ±8 A } IEC 61000−4−2 Level 2 equivalent (±4 kV Contact, ±4 kV Air)		16.8		V
		I_{PP} = ±16 A } IEC 61000−4−2 Level 4 equivalent (±8 kV Contact, ±15 kV Air)		24.9		

1. ANSI/ESD STM5.5.1 − Electrostatic Discharge Sensitivity Testing using Transmission Line Pulse (TLP) Model. TLP conditions: Z_0 = 50 Ω, t_p = 100 ns, t_r = 4 ns, averaging window; t_1 = 30 ns to t_2 = 60 ns.

TYPICAL CHARACTERISTICS

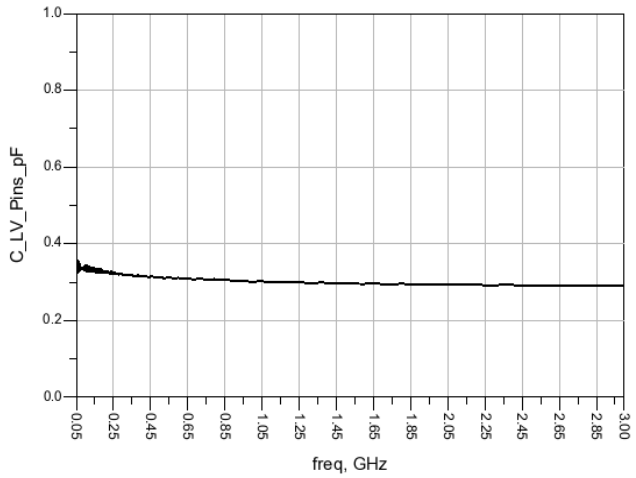


Figure 1. Capacitance Over Frequency

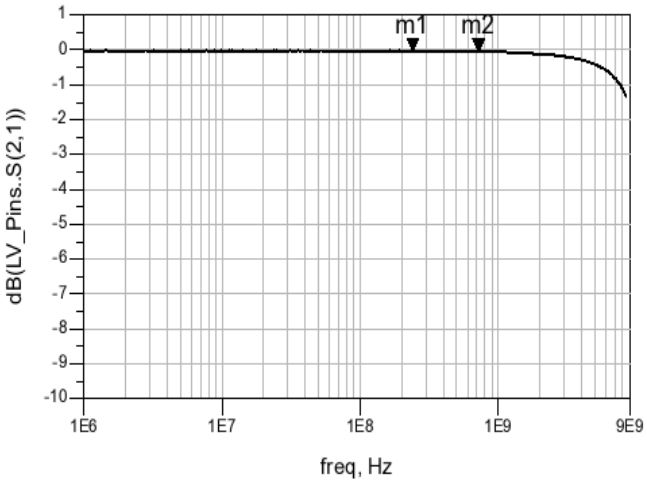


Figure 2. Insertion Loss

Interface	Data Rate (Mb/s)	Fundamental Frequency (MHz)	3rd Harmonic Frequency (MHz)	ESD7124 Insertion Loss (dB)
USB 2.0	480	240 (m1)	720 (m2)	m1 = 0.031 m2 = 0.047

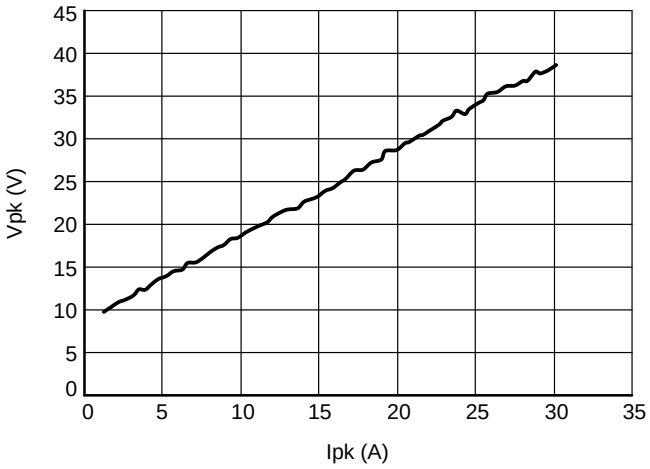


Figure 3. Positive TLP I−V Curve

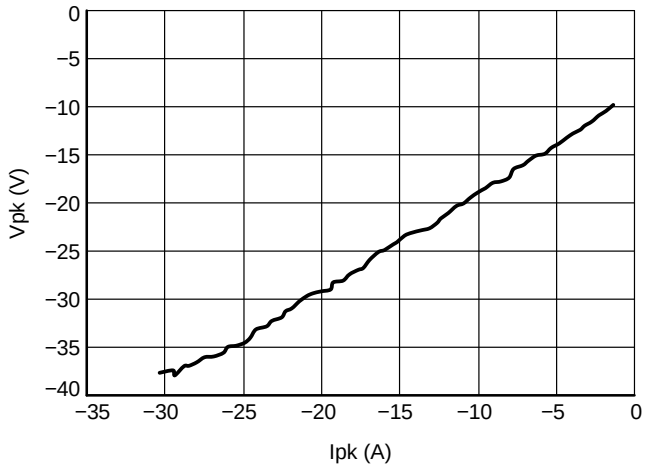


Figure 4. Negative TLP I−V Curve

Transmission Line Pulse (TLP) Measurement

Transmission Line Pulse (TLP) provides current versus voltage (I−V) curves in which each data point is obtained from a 100 ns long rectangular pulse from a charged transmission line. A simplified schematic of a typical TLP system is shown in Figure 5. TLP I−V curves of ESD protection devices accurately demonstrate the product's ESD capability because the 10s of amps current levels and under 100 ns time scale match those of an ESD event. This is illustrated in Figure 6 where an 8 kV IEC 61000−4−2 current waveform is compared with TLP current pulses at 8 A and 16 A. A TLP I−V curve shows the voltage at which the device turns on as well as how well the device clamps voltage over a range of current levels. For more information on TLP measurements and how to interpret them please refer to AND9007/D.

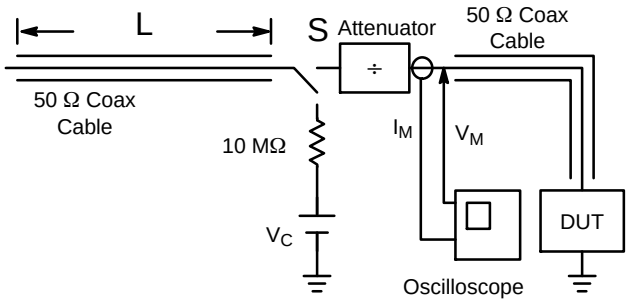


Figure 5. Simplified Schematic of a Typical TLP System

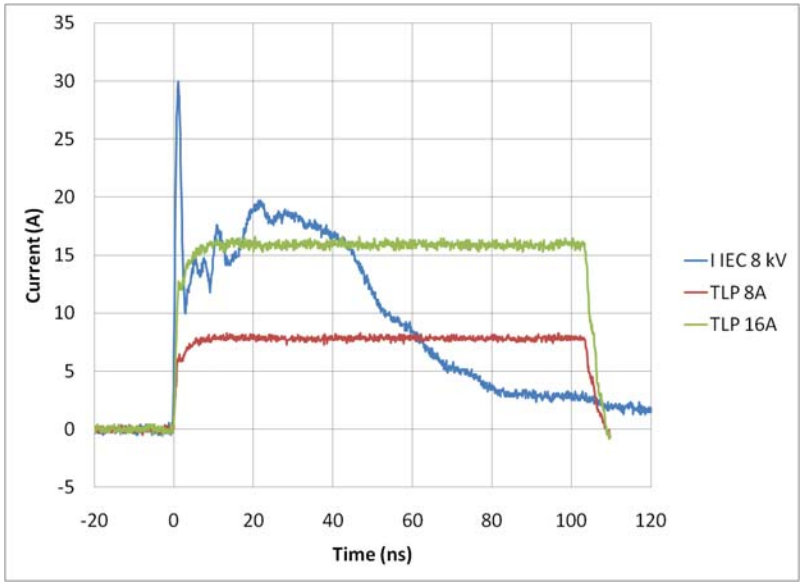
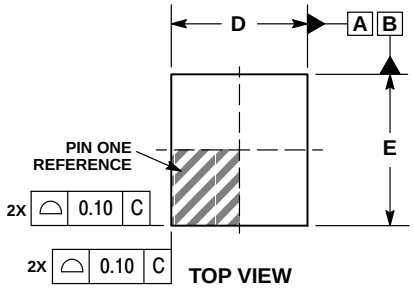


Figure 6. Comparison Between 8 kV IEC 61000−4−2 and 8 A and 16 A TLP Waveforms

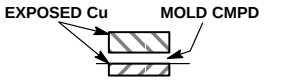
ESD7124

PACKAGE DIMENSIONS

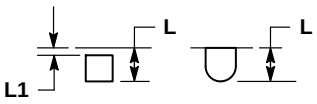
UDFN6, 1.8x2, 0.4P
CASE 517CS
ISSUE O



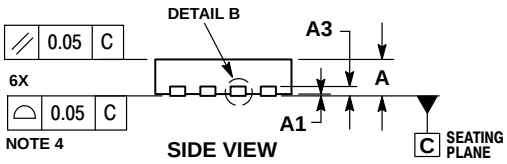
TOP VIEW



DETAIL B
ALTERNATE CONSTRUCTION



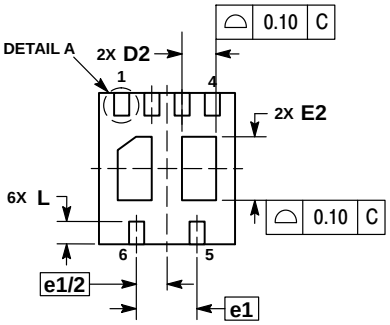
DETAIL A
ALTERNATE CONSTRUCTIONS



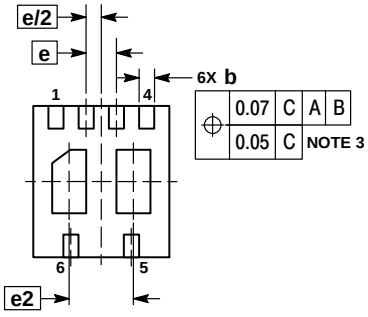
SIDE VIEW

NOTES:
1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
2. CONTROLLING DIMENSION: MILLIMETERS.
3. DIMENSION b APPLIES TO PLATED TERMINALS AND IS MEASURED BETWEEN 0.15 AND 0.30mm FROM THE TERMINAL TIP.
4. COPLANARITY APPLIES TO THE EXPOSED PAD AS WELL AS THE TERMINALS.

	MILLIMETERS	
DIM	MIN	MAX
A	0.45	0.55
A1	0.00	0.05
A3	0.125 REF	
b	0.15	0.25
D	1.80 BSC	
D2	0.35	0.55
E	2.00 BSC	
E2	0.74	0.94
e	0.40 BSC	
e1	0.80 BSC	
e2	0.95 BSC	
L	0.20	0.40
L1	---	0.15

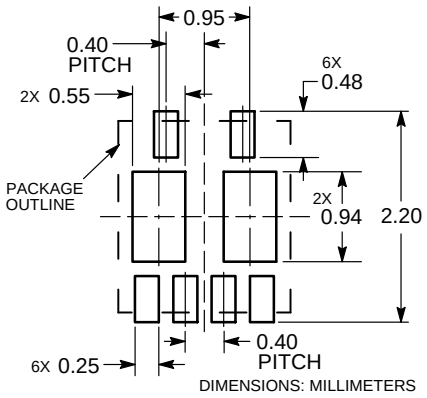


BOTTOM VIEW



SUPPLEMENTAL BOTTOM VIEW

RECOMMENDED MOUNTING FOOTPRINT*



DIMENSIONS: MILLIMETERS

*For additional information on our Pb−Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.

PUBLICATION ORDERING INFORMATION

LITERATURE FULFILLMENT:
Literature Distribution Center for ON Semiconductor
P.O. Box 5163, Denver, Colorado 80217 USA
Phone: 303−675−2175 or 800−344−3860 Toll Free USA/Canada
Fax: 303−675−2176 or 800−344−3867 Toll Free USA/Canada
Email: orderlit@onsemi.com

N. American Technical Support: 800−282−9855 Toll Free USA/Canada
Europe, Middle East and Africa Technical Support:
Phone: 421 33 790 2910
Japan Customer Focus Center
Phone: 81−3−5817−1050

ON Semiconductor Website: **www.onsemi.com**

Order Literature: http://www.onsemi.com/orderlit

For additional information, please contact your local Sales Representative