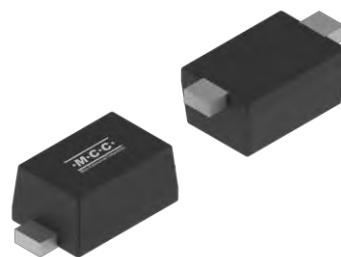


1-Line Uni-directional Standard Capacitance ESD

Features

- Transient protection:
 - IEC 61000-4-2 (ESD) $\pm 30\text{kV}$ (Air), $\pm 30\text{kV}$ (Contact)
 - IEC 61000-4-5 (Lightning) 5~25A (8/20 μs)
- Fully automotive qualified to AEC-Q101
- Uni-directional ESD protection of one line
- Reverse working voltage, V_{RWM} : 3.3~36V
- Reverse leakage current: 500nA max
- Solid-state silicon-avalanche



SOD-523



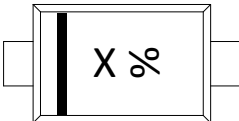
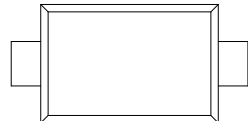
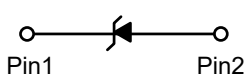
Applications

- Automotive Application
- CAN Bus Protection
- Computer Peripherals

Mechanical Data

- Package: SOD-523
- Moisture Sensitivity Level 1, per J-STD-020
- Halogen Free. "Green" Device ^(Note1)
- Epoxy Meets UL 94 V-0 Flammability Rating
- Lead Free Finish/RoHS Compliant ("P" Suffix Designates RoHS Compliant. See Ordering Information)

Body Marking and Pin Layout

Marking Code	Simplified Outline	Internal Structure																		
 X=Device Marking %=placeholder for data code <table><thead><tr><th>MCC Part No.</th><th>Device Marking</th></tr></thead><tbody><tr><td>ESD3V3D5Q</td><td>A</td></tr><tr><td>ESD5V0D5Q</td><td>B</td></tr><tr><td>ESD7V0D5Q</td><td>C</td></tr><tr><td>ESD12VD5Q</td><td>D</td></tr><tr><td>ESD15VD5Q</td><td>E</td></tr><tr><td>ESD24VD5Q</td><td>F</td></tr><tr><td>ESD27VD5Q</td><td>G</td></tr><tr><td>ESD36VD5Q</td><td>H</td></tr></tbody></table>	MCC Part No.	Device Marking	ESD3V3D5Q	A	ESD5V0D5Q	B	ESD7V0D5Q	C	ESD12VD5Q	D	ESD15VD5Q	E	ESD24VD5Q	F	ESD27VD5Q	G	ESD36VD5Q	H	 Transparent top view	 Pin1Pin2
MCC Part No.	Device Marking																			
ESD3V3D5Q	A																			
ESD5V0D5Q	B																			
ESD7V0D5Q	C																			
ESD12VD5Q	D																			
ESD15VD5Q	E																			
ESD24VD5Q	F																			
ESD27VD5Q	G																			
ESD36VD5Q	H																			

Ordering Information

Product Name	Reel Size	Packing Type	Qty/Reel
ESD3V3D5Q-TP THRU ESD36VD5Q-TP	7"	Tape & Reel	8,000

For packaging details, visit our website at <https://www.mccsemi.com/Package/List>

1-Line Uni-directional Standard Capacitance ESD

Maximum Ratings (T_A=25°C unless otherwise specified)

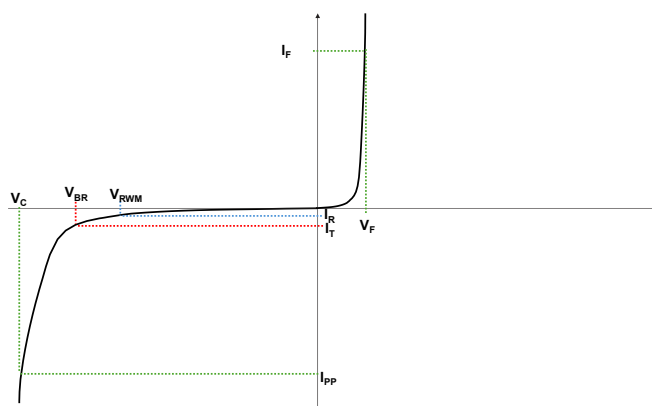
Parameter		Symbol	Rating	Unit
IEC61000-4-2(ESD)	Air	V _{ESD}	±30	kV
	Contact	V _{ESD}	±30	kV
Operating Temperature Range		T _J	-55 to +150	°C
Storage Temperature Range		T _{STG}	-55 to +150	°C

Note:

- Halogen free "Green" products are defined as those which contain <900ppm bromine, <900ppm chlorine (<1500ppm total Br + Cl) and 1000ppm antimony compounds.

Parameter Definition

Symbol	Parameter
V _{RWM}	Peak Reverse Working Voltage
I _R	Reverse Leakage Current @ V _{RWM}
V _{BR}	Breakdown Voltage @ I _T
I _T	Test Current
I _{PP}	Maximum Reverse Peak Pulse Current
V _C	Clamping Voltage @ I _{PP}
P _{PK}	Peak Pulse Power
C _J	Junction Capacitance
I _F	Forward Current
V _F	Forward Voltage @ I _F



Electrical Characteristics (T_A=25°C unless otherwise specified)

ESD3V3D5Q

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Reverse Working Voltage	V _{RWM}				3.3	V
Reverse Breakdown Voltage	V _{BR}	I _T =1mA	5		6.2	V
Reverse Leakage Current	I _R	V _{RWM} =3.3V			0.5	μA
Forward Voltage	V _F	I _F =10mA			1.1	V
Peak Pulse Power (8/20μs) (Note2)	P _{PK}				300	W
Clamping Voltage (Note2)	V _C	I _{PP} =1A, t _p =8/20μs			8	V
		I _{PP} =25A, t _p =8/20μs			12	
Junction Capacitance	C _J	V _R =0V, f=1MHz		190	220	pF
Dynamic Resistance (Note3)	R _{DYN}	TLP, t _p =100ns		0.1		Ω

1-Line Uni-directional Standard Capacitance ESD

ESD5V0D5Q

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Reverse Working Voltage	V_{RWM}				5	V
Reverse Breakdown Voltage	V_{BR}	$I_T = 1\text{mA}$	6.2		7.5	V
Reverse Leakage Current	I_R	$V_{RWM} = 5\text{V}$			0.5	μA
Forward Voltage	V_F	$I_F = 10\text{mA}$			1.1	V
Peak Pulse Power (8/20 μs) (Note2)	P_{PK}				300	W
Clamping Voltage (Note2)	V_C	$I_{PP} = 1\text{A}, t_P = 8/20\mu\text{s}$			9	V
		$I_{PP} = 20\text{A}, t_P = 8/20\mu\text{s}$			15	
Junction Capacitance	C_J	$V_R = 0\text{V}, f = 1\text{MHz}$		147	160	pF
Dynamic Resistance (Note3)	R_{DYN}	TLP, $t_p = 100\text{ns}$		0.1		Ω

ESD7V0D5Q

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Reverse Working Voltage	V_{RWM}				7	V
Reverse Breakdown Voltage	V_{BR}	$I_T = 1\text{mA}$	7.5		9	V
Reverse Leakage Current	I_R	$V_{RWM} = 7\text{V}$			0.5	μA
Forward Voltage	V_F	$I_F = 10\text{mA}$			1.1	V
Peak Pulse Power (8/20 μs) (Note2)	P_{PK}				210	W
Clamping Voltage (Note2)	V_C	$I_{PP} = 1\text{A}, t_P = 8/20\mu\text{s}$			11	V
		$I_{PP} = 15\text{A}, t_P = 8/20\mu\text{s}$			14	
Junction Capacitance	C_J	$V_R = 0\text{V}, f = 1\text{MHz}$		120	140	pF
Dynamic Resistance (Note3)	R_{DYN}	TLP, $t_p = 100\text{ns}$		0.1		Ω

ESD12VD5Q

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Reverse Working Voltage	V_{RWM}				12	V
Reverse Breakdown Voltage	V_{BR}	$I_T = 1\text{mA}$	13.3		16.5	V
Reverse Leakage Current	I_R	$V_{RWM} = 12\text{V}$			0.5	μA
Forward Voltage	V_F	$I_F = 10\text{mA}$			1.1	V
Peak Pulse Power (8/20 μs) (Note2)	P_{PK}				280	W
Clamping Voltage (Note2)	V_C	$I_{PP} = 1\text{A}, t_P = 8/20\mu\text{s}$			18.5	V
		$I_{PP} = 10\text{A}, t_P = 8/20\mu\text{s}$			28	
Junction Capacitance	C_J	$V_R = 0\text{V}, f = 1\text{MHz}$		57	70	pF
Dynamic Resistance (Note3)	R_{DYN}	TLP, $t_p = 100\text{ns}$		0.23		Ω

1-Line Uni-directional Standard Capacitance ESD

ESD15VD5Q

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Reverse Working Voltage	V_{RWM}				15	V
Reverse Breakdown Voltage	V_{BR}	$I_T = 1mA$	16.5		19	V
Reverse Leakage Current	I_R	$V_{RWM} = 15V$			0.05	μA
Forward Voltage	V_F	$I_F = 10mA$			1.1	V
Peak Pulse Power (8/20 μs) (Note2)	P_{PK}				297	W
Clamping Voltage (Note2)	V_C	$I_{PP} = 1A, t_P = 8/20\mu s$			24	V
		$I_{PP} = 9A, t_P = 8/20\mu s$			33	
Junction Capacitance	C_J	$V_R = 0V, f = 1MHz$		47	55	pF
Dynamic Resistance (Note3)	R_{DYN}	TLP, $t_p = 100ns$		0.4		Ω

ESD24VD5Q

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Reverse Working Voltage	V_{RWM}				24	V
Reverse Breakdown Voltage	V_{BR}	$I_T = 1mA$	26.5		30	V
Reverse Leakage Current	I_R	$V_{RWM} = 24V$			0.05	μA
Forward Voltage	V_F	$I_F = 10mA$			1.1	V
Peak Pulse Power (8/20 μs) (Note2)	P_{PK}				308	W
Clamping Voltage (Note2)	V_C	$I_{PP} = 1A, t_P = 8/20\mu s$			32	V
		$I_{PP} = 7A, t_P = 8/20\mu s$			44	
Junction Capacitance	C_J	$V_R = 0V, f = 1MHz$		35	50	pF
Dynamic Resistance (Note3)	R_{DYN}	TLP, $t_p = 100ns$		0.36		Ω

ESD27VD5Q

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Reverse Working Voltage	V_{RWM}				27	V
Reverse Breakdown Voltage	V_{BR}	$I_T = 1mA$	28		38	V
Reverse Leakage Current	I_R	$V_{RWM} = 27V$			0.05	μA
Forward Voltage	V_F	$I_F = 10mA$			1.1	V
Peak Pulse Power (8/20 μs) (Note2)	P_{PK}				300	W
Clamping Voltage (Note2)	V_C	$I_{PP} = 1A, t_P = 8/20\mu s$			43	V
		$I_{PP} = 6A, t_P = 8/20\mu s$			50	
Junction Capacitance	C_J	$V_R = 0V, f = 1MHz$		32	50	pF
Dynamic Resistance (Note3)	R_{DYN}	TLP, $t_p = 100ns$		0.6		Ω

1-Line Uni-directional Standard Capacitance ESD

ESD36VD5Q

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Reverse Working Voltage	V_{RWM}				36	V
Reverse Breakdown Voltage	V_{BR}	$I_T = 1\text{mA}$	40		44	V
Reverse Leakage Current	I_R	$V_{RWM} = 36\text{V}$			0.05	μA
Forward Voltage	V_F	$I_F = 10\text{mA}$			1.1	V
Peak Pulse Power (8/20 μs) (Note2)	P_{PK}				375	W
Clamping Voltage (Note2)	V_C	$I_{PP} = 1\text{A}$, $t_P = 8/20\mu\text{s}$			55	V
		$I_{PP} = 5\text{A}$, $t_P = 8/20\mu\text{s}$			75	
Junction Capacitance	C_J	$V_R = 0\text{V}$, $f = 1\text{MHz}$		24	35	pF
Dynamic Resistance (Note3)	R_{DYN}	TLP, $t_P = 100\text{ns}$		0.9		Ω

Note:

- Non-repetitive current pulse 8/20 μs exponential decay waveform according to IEC61000-4-5.
- TLP parameter: $Z_0 = 50\Omega$, $t_P = 100\text{ns}$, $t_r = 2\text{ns}$, averaging window from 60ns to 80ns. R_{DYN} is calculated from 4A to 16A.

1-Line Uni-directional Standard Capacitance ESD

Curve Characteristics

Fig. 1 - 8 X 20 μ s Pulse Waveform

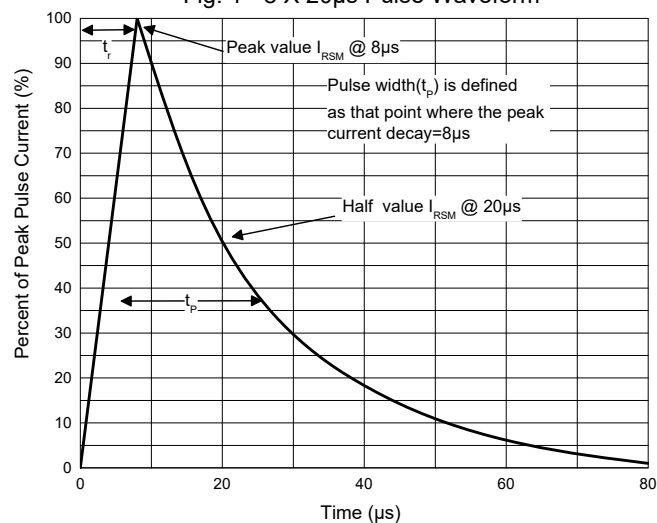


Fig. 2 - Pulse Derating Curve

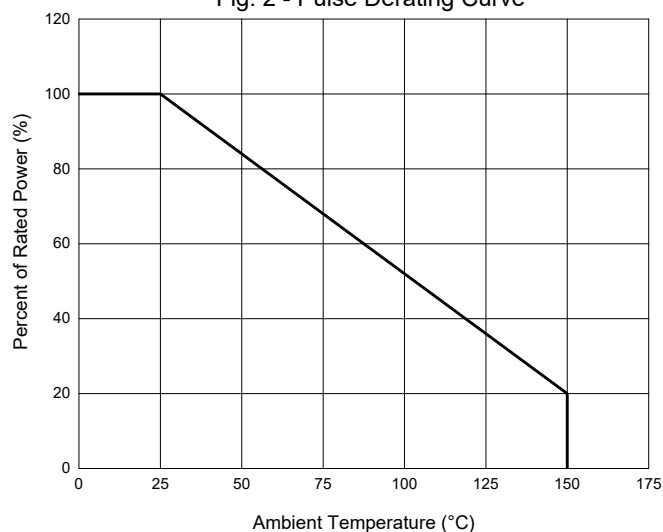


Fig. 3 - Capacitance Characteristics

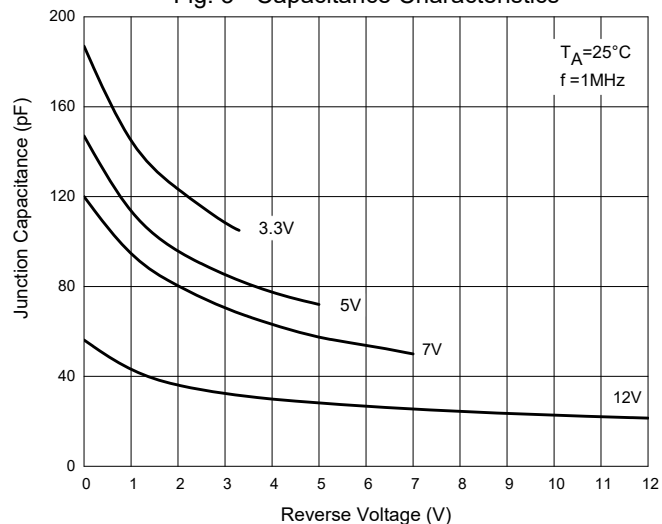


Fig. 4 - Capacitance Characteristics

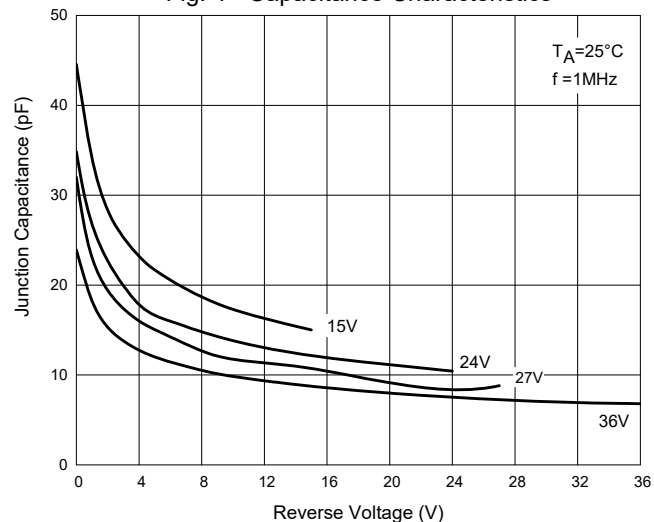


Fig. 5 - Clamping Voltage Characteristics

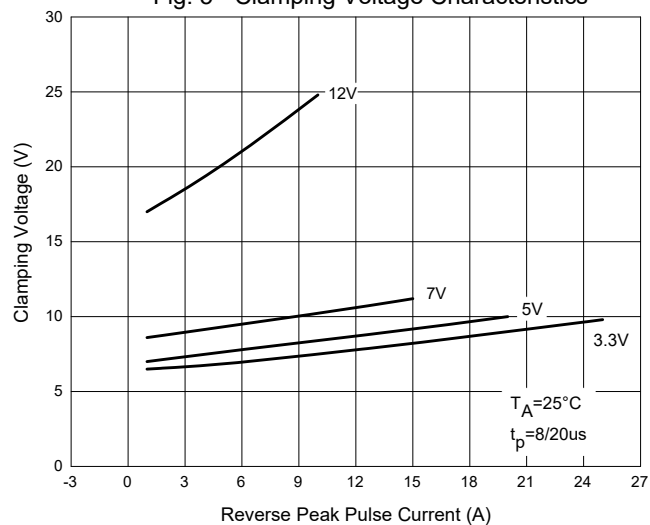
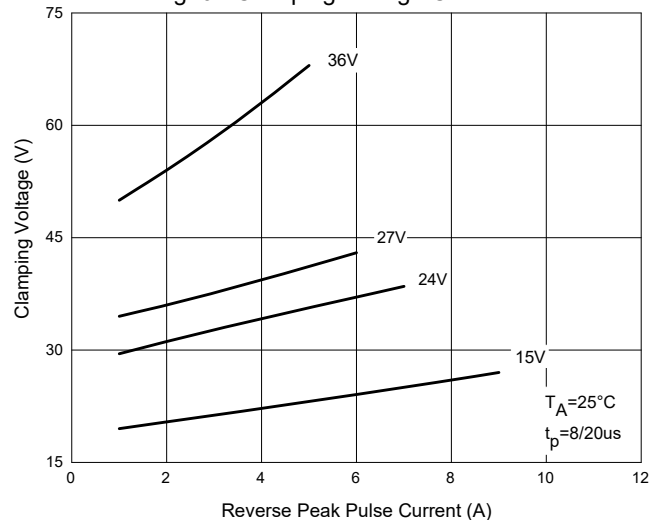
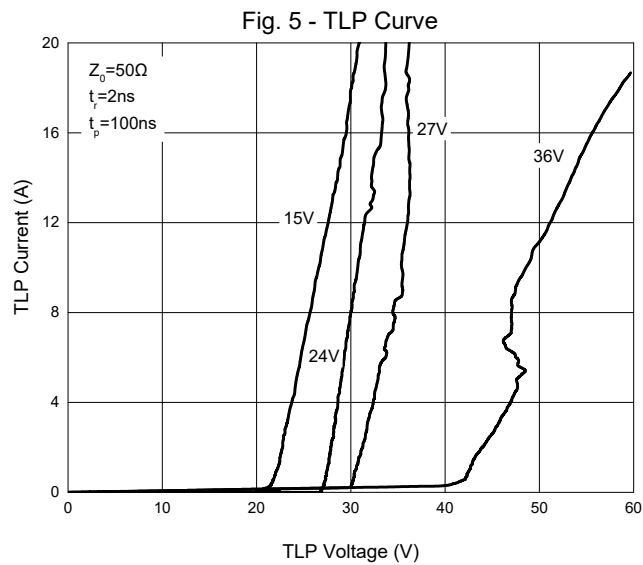
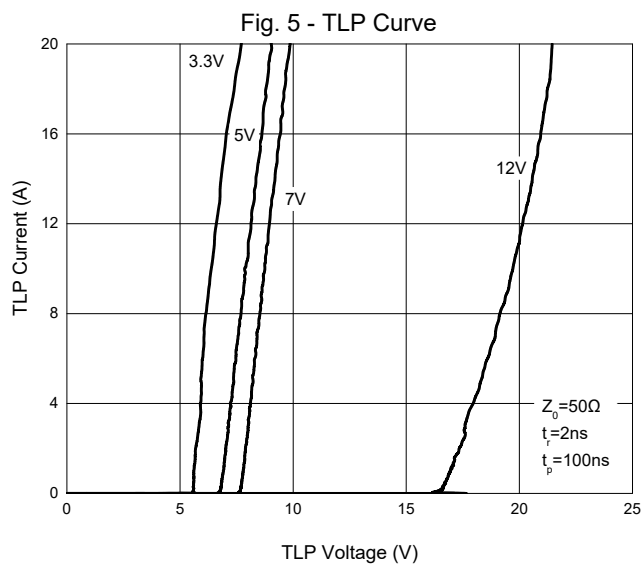


Fig. 6 - Clamping Voltage Characteristics

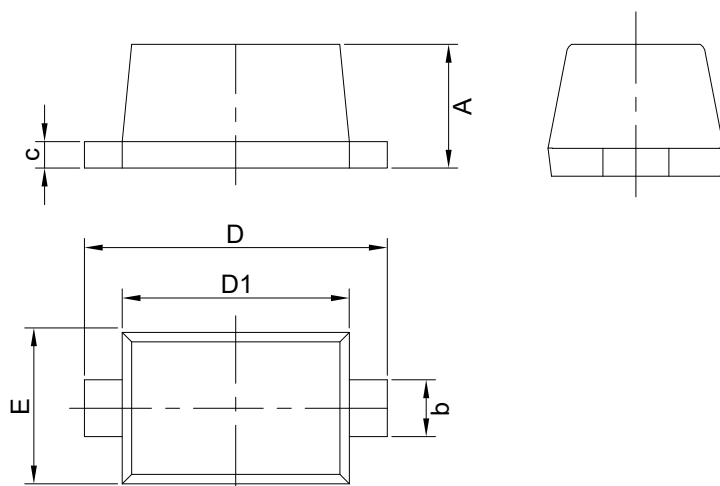


1-Line Uni-directional Standard Capacitance ESD

Curve Characteristics

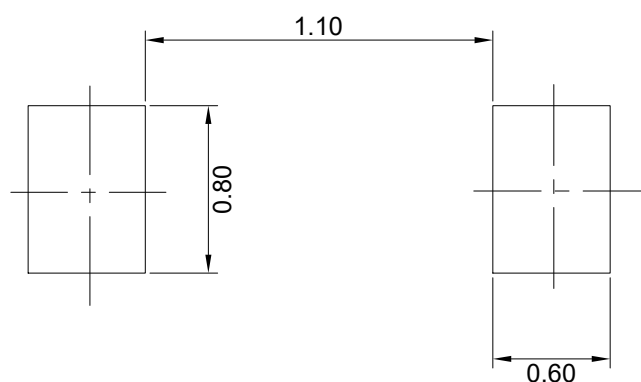


Package Outline



DIM	INCH		MM		NOTE
	MIN	MAX	MIN	MAX	
A	0.020	0.026	0.50	0.65	
b	0.010	0.014	0.25	0.35	
c	0.003	0.008	0.08	0.20	
D	0.059	0.067	1.50	1.70	
D1	0.043	0.051	1.10	1.30	
E	0.030	0.033	0.75	0.85	

Suggested Pad Layout (Unit:mm)



Notes:

1. The suggested land pattern dimensions have been provided for reference only.
2. For further information, please refer to document IPC-7351A.

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