

TVS Diode Array

Ultra Low Capacitance Discrete TVS Series

Absolute Maximum Ratings

Symbol	Parameter	Value	Units
I_{PP}	Peak Current ($t_p=8/20\mu s$)	2.0	A
T_{OP}	Operating Temperature	-30 to 85	°C
T_{STOR}	Storage Temperature	-55 to 150	°C

CAUTION: Stresses above those listed in "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 above those indicated in the operational sections of this specification is not implied.

Thermal Information

Parameter	Rating	Units
Storage Temperature Range	-55 to 150	°C
Maximum Junction Temperature	150	°C
Maximum Lead Temperature (Soldering 20-40s)	260	°C

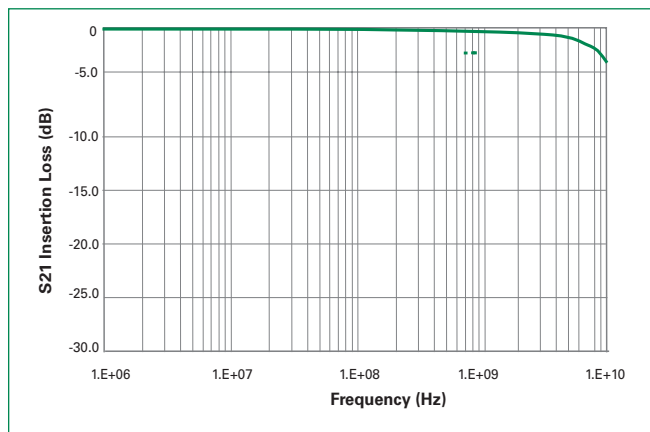
Unidirectional Electrical Characteristics - ($T_{OP}=25^{\circ}C$)

Parameter	Test Conditions	Min	Typ	Max	Units
Input Capacitance	@ $V_R = 0V$, $f = 3GHz$		0.20	0.25	pF
Breakdown Voltage	V_{BR} @ $I_T=1mA$		9.00		V
Reverse Working Voltage				7.0	V
Reverse Leakage Current	I_L @ $V_{RWM}=5.0V$		25	50	nA
Clamping Voltage	V_{CL} @ $I_{PP}=2.0A$		9.20		V
ESD Withstand Voltage	IEC61000-4-2 (Contact)	±20			kV
	IEC61000-4-2 (Air)	±20			

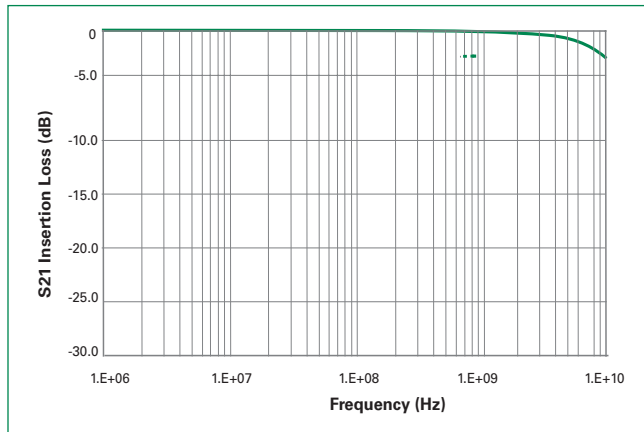
Bidirectional Electrical Characteristics - ($T_{OP}=25^{\circ}C$)

Parameter	Test Conditions	Min	Typ	Max	Units
Input Capacitance	@ $V_R = 0V$, $f = 3GHz$		0.10	0.13	pF
Breakdown Voltage	V_{BR} @ $I_T=1mA$		9.80		V
Reverse Working Voltage		-7.0		7.0	V
Reverse Leakage Current	I_L @ $V_{RWM}=5.0V$		25	50	nA
Clamping Voltage	V_{CL} @ $I_{PP}=2.0A$		10.0		V
ESD Withstand Voltage	IEC61000-4-2 (Contact)	±20			kV
	IEC61000-4-2 (Air)	±20			

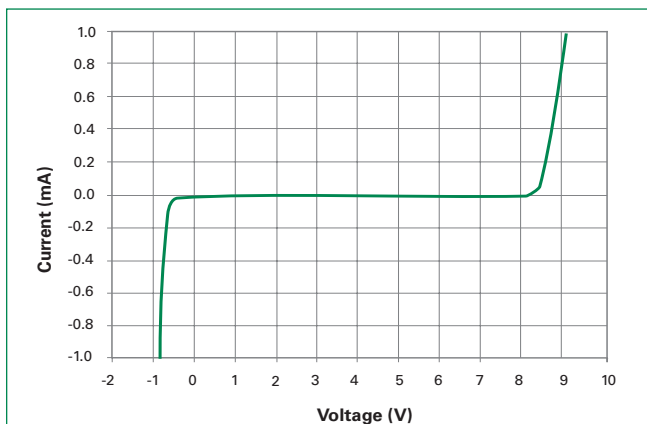
Insertion Loss Diagram - Unidirectional



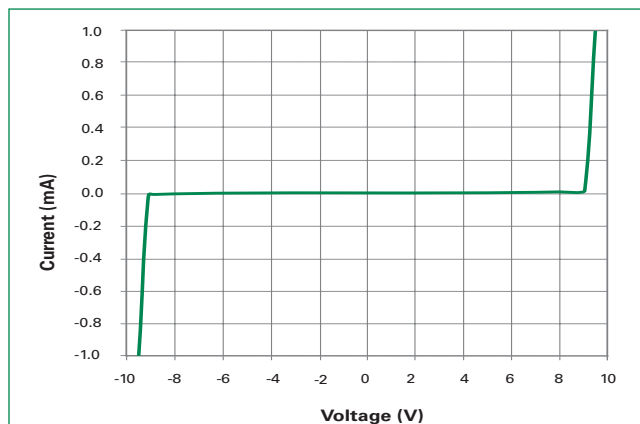
Insertion Loss Diagram - Bidirectional



Device IV Curve - Unidirectional

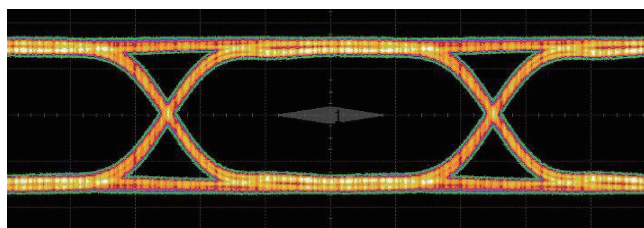


Device IV Curve - Bidirectional

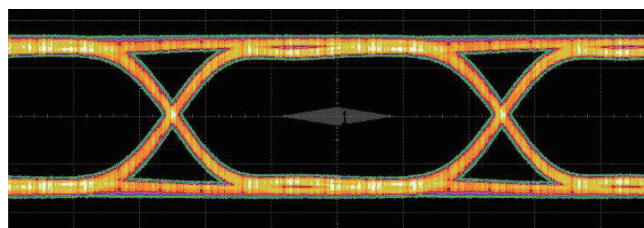


USB3.0 Eye Diagram

5.0 Gb/s, 1000mV differential, CPO Compliant Test Pattern



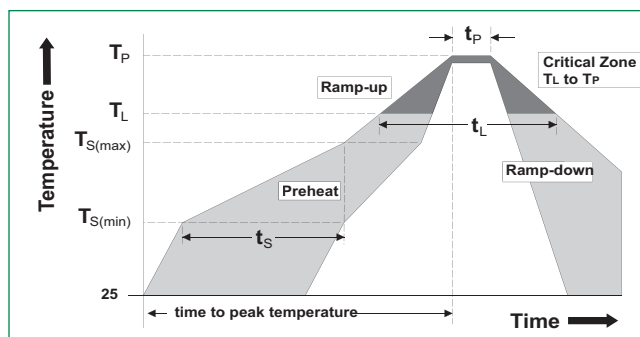
Without Component



With Component

Soldering Parameters

Reflow Condition		Pb – Free assembly
Pre Heat	- Temperature Min ($T_{s(min)}$)	150°C
	- Temperature Max ($T_{s(max)}$)	200°C
	- Time (min to max) (t_s)	60 – 180 secs
Average ramp up rate (Liquidus) Temp (T_L) to peak		3°C/second max
$T_{s(max)}$ to T_L - Ramp-up Rate		3°C/second max
Reflow	- Temperature (T_L) (Liquidus)	217°C
	- Temperature (t_L)	60 – 150 seconds
Peak Temperature (T_p)		260 ^{+0/-5} °C
Time within 5°C of actual peak Temperature (t_p)		20 – 40 seconds
Ramp-down Rate		6°C/second max
Time 25°C to peak Temperature (T_p)		8 minutes Max.
Do not exceed		260°C



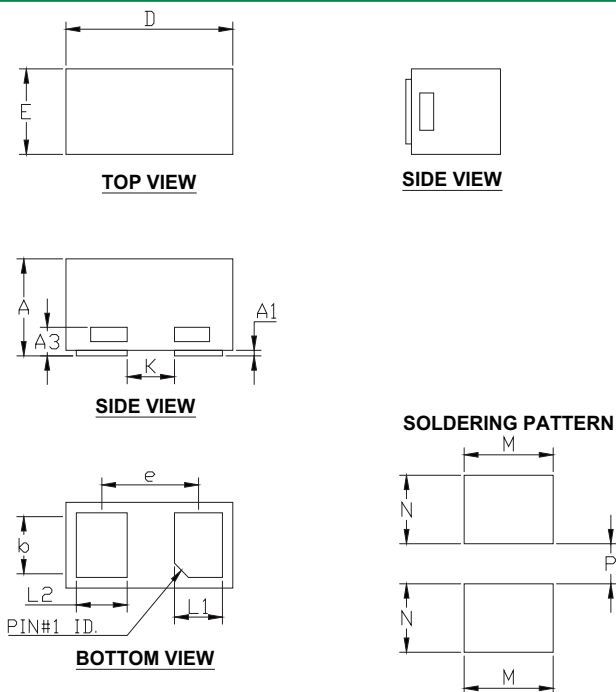
Product Characteristics of 0402 DFN Package

Lead Plating	Pre-Plated Frame
Lead Material	Copper Alloy
Lead Coplanarity	0.004 inches(0.102mm)
Substrate material	Silicon
Body Material	Molded Epoxy
Flammability	UL 94 V-0

Notes :

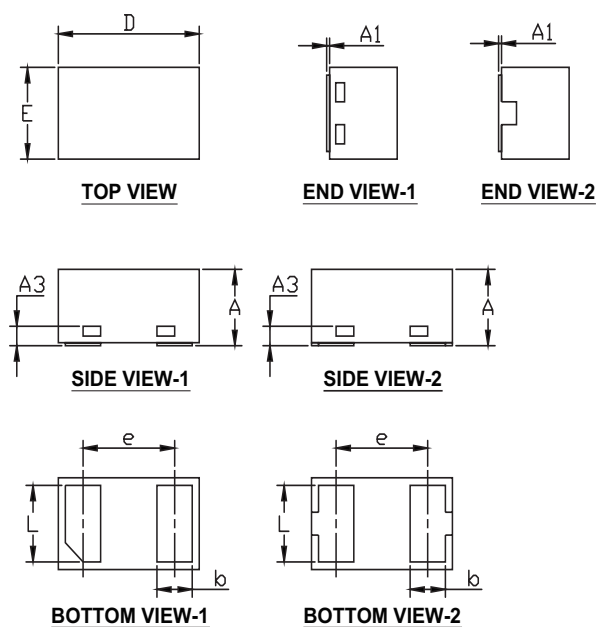
1. All dimensions are in millimeters
2. Dimensions include solder plating.
3. Dimensions are exclusive of mold flash & metal burr.
4. Blo is facing up for mold and facing down for trim/form, i.e. reverse trim/form.
5. Package surface matte finish VDI 11-13.

Package Dimensions — 0201 DFN

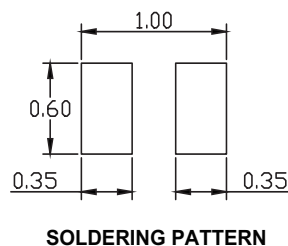


Symbol	Millimeters		Inches	
	Min	Max	Min	Max
A	0.23	0.33	0.009	0.013
A1	0.00	0.05	0.000	0.002
A3	0.100 ref.		0.004 ref.	
b	0.2	0.3	0.008	0.012
D	0.55	0.65	0.022	0.026
E	0.25	0.35	0.010	0.014
e	0.35-0.40 BSC		0.014-0.016 BSC	
L1	0.12	0.23	0.005	0.009
L2	0.12	0.24	0.005	0.009
K	0.17 BSC		0.007 BSC	
M	0.32		0.013	
N	0.24		0.009	
P	0.14		0.006	

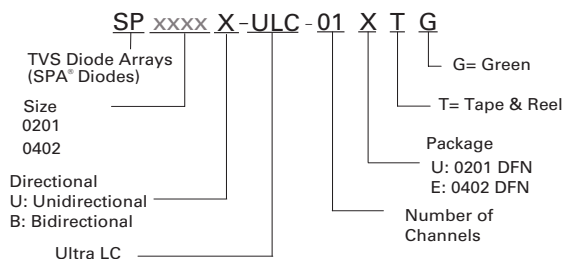
Package Dimensions — 0402 DFN



Symbol	Millimeters			Inches		
	Min	Typ	Max	Min	Typ	Max
A	0.33	-	0.55	0.013	-	0.022
A1	0	-	0.05	0.000	-	0.002
A3	0.13REF			0.005REF		
b	0.20	0.25	0.30	0.008	0.010	0.012
D	0.95	1.00	1.05	0.037	0.039	0.041
E	0.55	0.60	0.65	0.022	0.024	0.026
e	0.65BSC			0.026BSC		
L	0.45	0.50	0.55	0.018	0.020	0.022



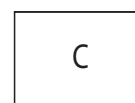
Part Numbering System



Part Marking System



Unidirectional

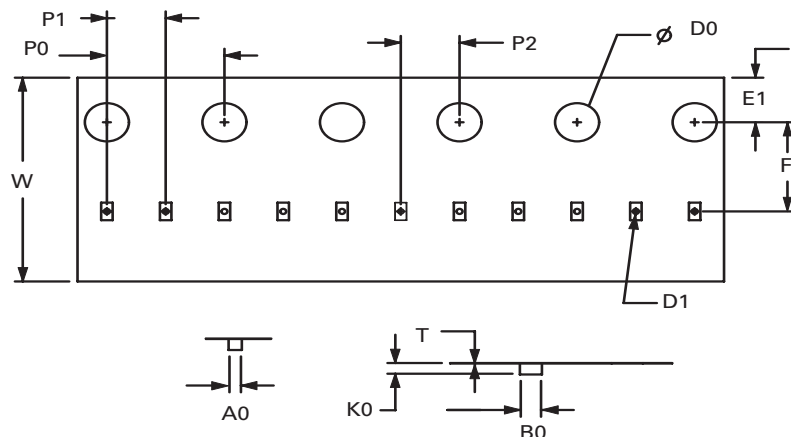


Bidirectional

Ordering Information

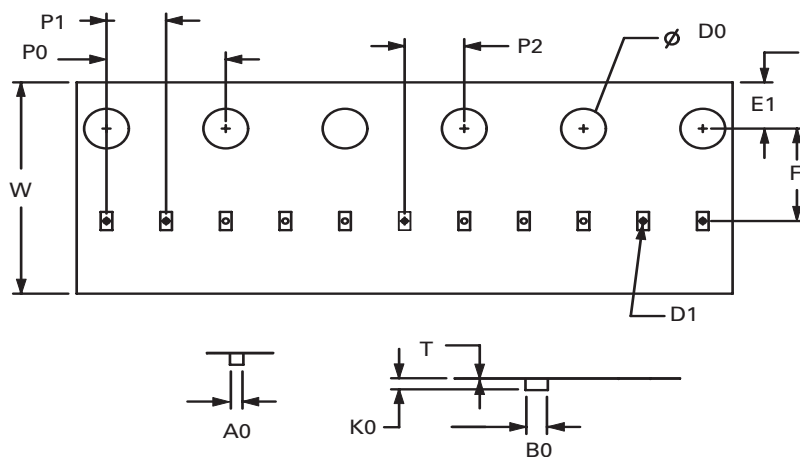
Part Number	Package	Marking	Reel Quantity
SP0201U-ULC-01UTG	0201 DFN	I C	15000
SP0201B-ULC-01UTG	0201 DFN	C	15000
SP0402U-ULC-01ETG	0402 DFN	I C	10000
SP0402B-ULC-01ETG	0402 DFN	C	10000

Embossed Carrier Tape & Reel Specification — 0201 DFN



Symbol	Millimeters
A0	0.33 min/0.41 max
B0	0.63 min/0.71 max
D0	ø 1.50 +0.10/-0
D1	ø 0.20 +/- 0.05
E1	1.75+/-0.10
F	3.50+/-0.05
K0	0.30 min/0.39 max
P0	4.00+/-0.10
P1	2.00+/-0.10
P2	2.00+/-0.05
W	8.00+0.30/-0.10
T	0.13 min/0.25 max

Embossed Carrier Tape & Reel Specification — 0402 DFN



Symbol	Millimeters
A0	0.70+/-0.05
B0	1.15+/-0.05
D0	ø 1.50+/-0.10
D1	ø 0.40 +/-0.10
E1	1.75+/-0.10
F	3.50+/-0.10
K0	0.55+/-0.05
P0	4.00+/-0.10
P1	2.00+/-0.10
P2	2.00+/-0.05
W	8.00+0.30/-0.10
T	0.20+/-0.05

Disclaimer Notice - Information furnished is believed to be accurate and reliable. However, users should independently evaluate the suitability of and test each product selected for their own applications. Littelfuse products are not designed for, and may not be used in, all applications. Read complete Disclaimer Notice at <http://www.littelfuse.com/disclaimer-electronics>.