

SMP1255PUTG TVS Arrays

Description

The SMP1255P integrates 3 channels of ultra-low capacitance steering diodes and a low voltage TVS diode to provide maximum protection of the USB data and ID pins against ESD per the IEC61000-4-2 standard. An additional 12V TVS diode is included to provide lightning surge protection for the USB VBUS pin up to 100A ($t_P=8/20\mu s$) per the IEC61000-4-5 standard. The SMP1255P provides superior protection for current intensive applications such as fast charging peripherals.

The SMP1255P comes in a space saving 2.0x1.8mm μ DFN package with a typical height of 0.55mm making it an ideal solution for smart phones, tablets, and other portable electronics.

Features

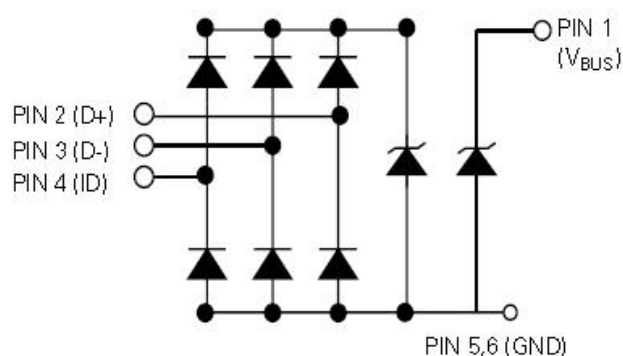
For USB Voltage Bus Pin (V_{BUS})

- IEC 61000-4-2 (ESD) $\pm 30kV$ (air), $\pm 30kV$ (contact)
- IEC 61000-4-5 (lightning) 100A (8/20 μs)
- IEC 61000-4-4 (EFT) 80A (5/50ns)
- Protection for VBUS operating up to 12V
- Benchmark setting protection
- High current handling capability for fast charging applications

For USB Data Pin (D+, D-, ID)

- IEC 61000-4-2 (ESD) $\pm 15kV$ (air), $\pm 12kV$ (contact)
- IEC 61000-4-5 (lightning) 4A (8/20 μs)
- IEC 61000-4-4 (EFT) 40A (5/50ns)
- 0.5pF capacitance
- Low clamping voltage and dynamic resistance (0.3 Ω)

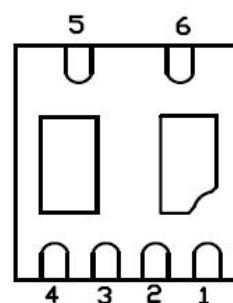
Functional Block Diagram



Applications

- USB 2.0
- USB OTG
- μ USB
- Protection for the VBUS circuit on USB2.0
- Fast Charging

Pinout



Ordering Information

Device	Package	Packaging Options	P0/P1	Packaging Specifications	Min. Order Qty.
SMP1255PUTG	μ DFN-6	Tape & Reel - 8mm tape/7" reel	2mm/4mm	EIA RS-481	3000

For information on tape and reel specifications, including part orientation and tape sizes, please refer to our tape and reel packaging specification.

Absolute Maximum Ratings @T_A=25°C unless otherwise specified

Parameter	Symbol	Value	Units
Peak Current (tp=8/20 μ s)	I _{PP} (Pin1)	100	A
Peak Current (tp=8/20 μ s)	I _{PP} (Pin2-4)	4	A
Operating Temperature	T _{OP}	-40 to + 125	°C
Storage Temperature	T _{STOR}	-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.

Electrical Characteristics (T_{OP}=25°C)

Characteristics	Symbol	Condition	Min.	Typ.	Max.	Units
USB V _{BUS} (Pin 1)						
Reverse Stand-Off Voltage	V _{RWM}	Pin 1 to GND	-	-	12	V
Reverse Breakdown Voltage	V _{BR}	I _T =1mA, Pin 1 to GND	13	13.5	16.5	V
Reverse Leakage Current	I _{LEAK}	V _R =12V, Pin 1 to GND	-	-	0.1	μ A
Forward Voltage	V _F	I _F =10mA, GND to Pin 1	0.6	0.7	1.0	V
Clamping Voltage ¹	V _C	I _{PP} = 30A, tp=8/20 μ s, Fwd	-	16.5	18	V
		I _{PP} = 100A, tp=8/20 μ s, Fwd	-	19.5	25	V
ESD With stand Voltage ¹	V _{ESD}	IEC61000-4-2 (Contact)	$\pm$ 30	-	-	kV
		IEC61000-4-2 (Air)	$\pm$ 30	-	-	kV
Diode Capacitance ¹	C _D	Reverse Bias=0V, f=1 MHz	-	1300	2500	pF
USB D+, D-, ID (Pin 2, 3, 4)						
Reverse Stand-Off Voltage	V _{RWM}	Pin 2, 3 and 4 to GND	-	-	4	V
Reverse Breakdown Voltage	V _{BR}	I _T =2 μ A, Pin 2, 3 and 4 to GND	4.5	6.0	7.5	V
Reverse Leakage Current	I _{LEAK}	V _R =2V, Pin 2, 3 and 4 to GND	-	-	0.02	μ A
		V _R =4V, Pin 2, 3 and 4 to GND	-	-	0.1	
Clamping Voltage ¹	V _C	I _{PP} = 1A, tp=8/20 μ s, Fwd	-	6.6	8.0	V
		I _{PP} = 2A, tp=8/20 μ s, Fwd	-	7.0	8.5	V
Dynamic Resistance	R _{DYN}	TLP, tp=100ns, Pin 2, 3 and 4 to GND ²	-	0.3	-	Ω
ESD With stand Voltage ¹	V _{ESD}	IEC61000-4-2 (Contact)	$\pm$ 12	-	-	kV
		IEC61000-4-2 (Air)	$\pm$ 15	-	-	kV
Diode Capacitance ¹	C _{I/O-GND}	Reverse Bias=0V, f=1 MHz	-	0.5	0.6	pF

Note: 1. Parameter is guaranteed by design and/or device characterization.

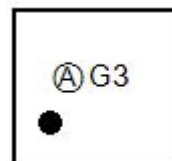
2. Transmission Line Pulse (TLP) Test Setting: tp=100ns, tr=0.2ns I_{TLP} and V_{TLP} averaging window: start t₁=70ns to t₂=90ns

Part Name Information

SMP 1255P U T G

- G= Green
- T= Tape & Reel
- Package
U = μ DFN-6
- Series
- TVS Arrays Product

Marking Diagram



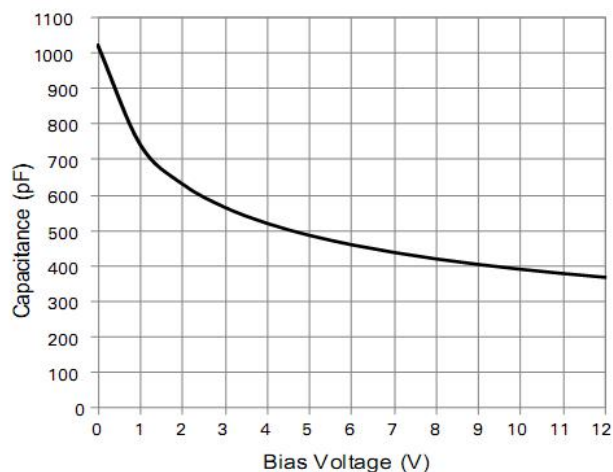
Where $\textcircled{A}$ G3 is SMP1255PUTQ

$\textcircled{A}$ = Product Series SMP1255P

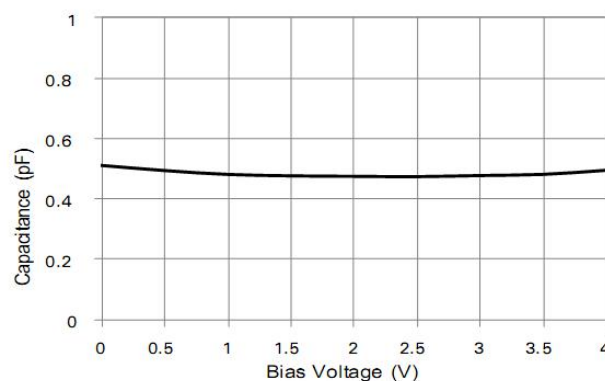
G3 = Assembly Site

Ratings and Characteristics Curves

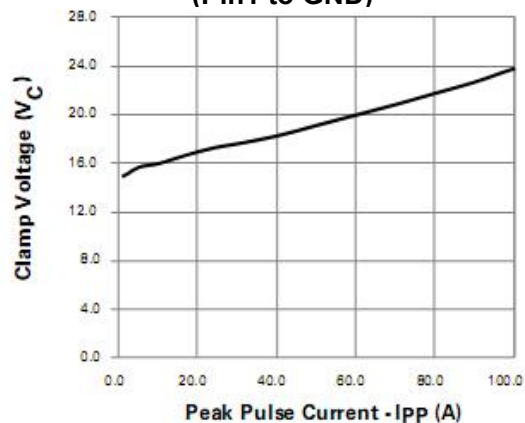
Capacitance vs. Reverse Bias (Pin1 to GND)



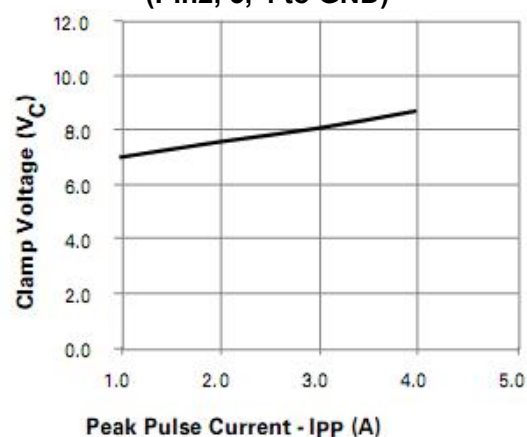
Capacitance vs. Reverse Bias
(Pin2, 3, 4 to GND)



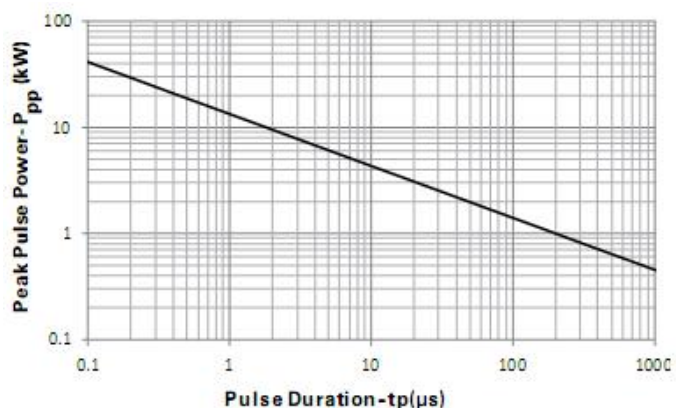
Clamping Voltage vs. Peak Pulse Current
(Pin1 to GND)



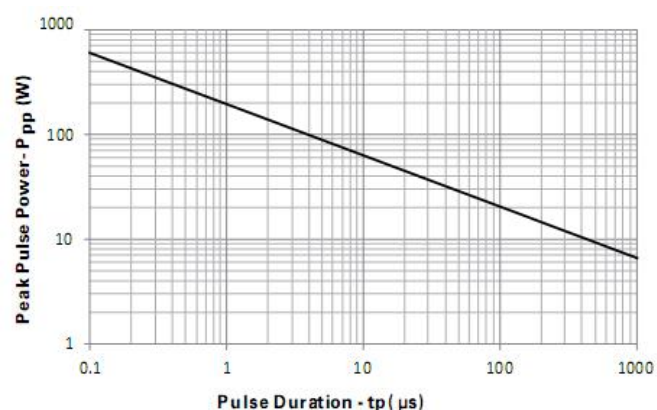
Clamping Voltage vs. Peak Pulse Current
(Pin2, 3, 4 to GND)



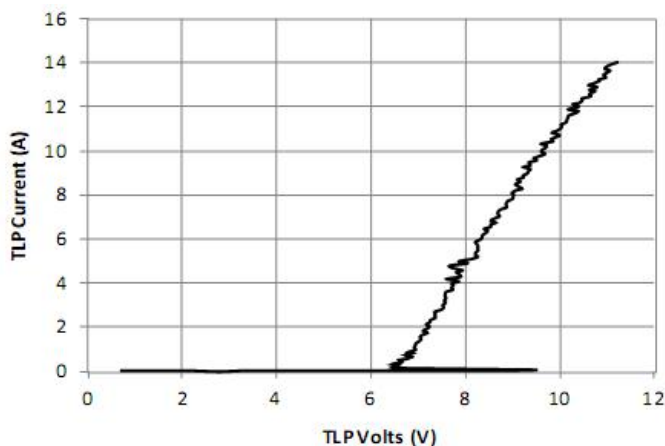
Non-Repetitive Peak Pulse Power vs. Pulse Duration (Pin1 to GND)



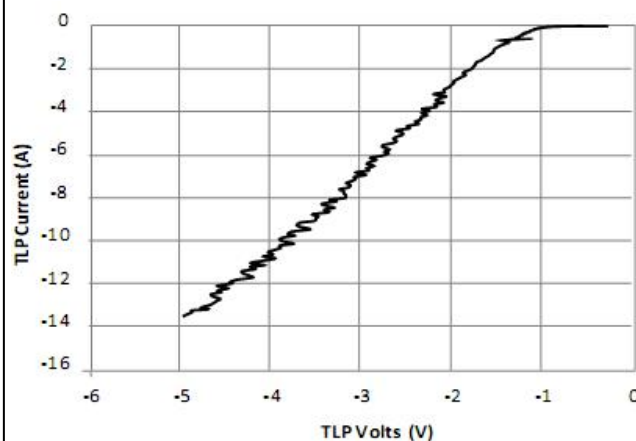
Non-Repetitive Peak Pulse Power vs. Pulse Duration (Pin2, 3, 4 to GND)



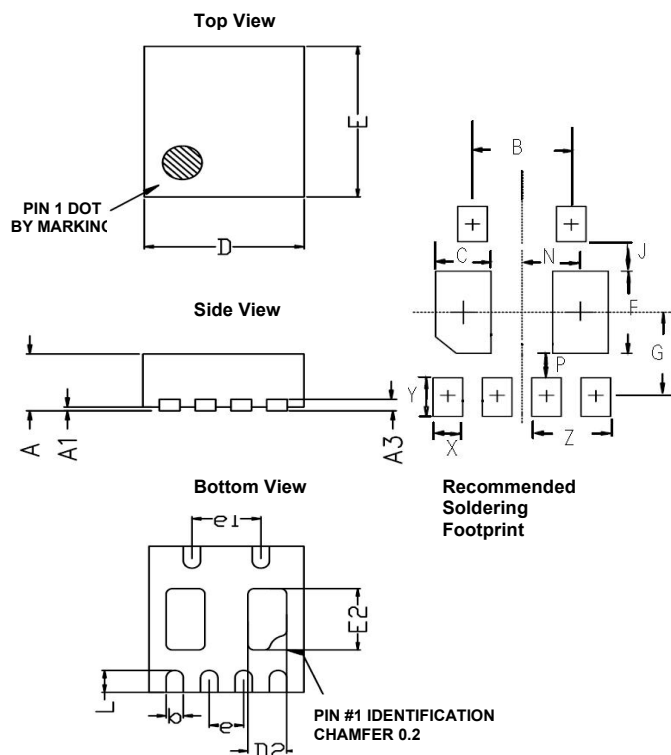
Positive Transmission Line Pulsing (TLP) Plot (Pin 2, 3, 4 to GND)



Negative Transmission Line Pulsing (TLP) Plot (Pin 2, 3, 4 to GND)

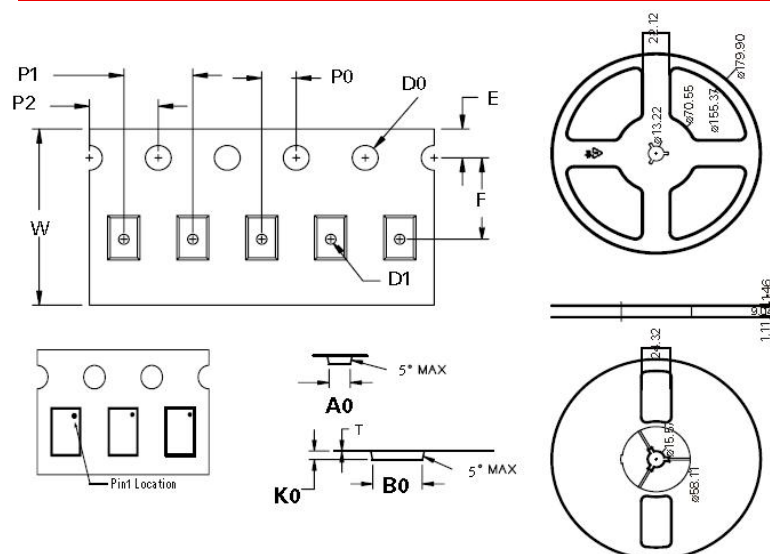


Mechanical Dimensions μ DFN-6



μ DFN-6(1.8×2.0×0.55mm)						
JEDEC MO-229						
Symbol	Millimeters			Inches		
	Min	Typ	Max	Min	Typ	Max
A	0.50	0.55	0.60	0.020	0.022	0.024
A1	0.00	-	0.05	0.000	-	0.002
A3	0.15Ref			0.006Ref		
D	1.75	1.80	1.85	0.069	0.071	0.073
E	1.95	2.00	2.05	0.077	0.079	0.081
b	0.15	0.20	0.25	0.006	0.008	0.010
L	0.20	0.30	0.40	0.008	0.012	0.016
D2	0.35	0.45	0.55	0.014	0.018	0.022
E2	0.74	0.84	0.94	0.029	0.033	0.037
e	0.40 BSC			0.016 BSC		
e1	0.80 BSC			0.031 BSC		
B	0.80 BSC			0.031 BSC		
C	0.35	0.45	0.55	0.014	0.018	0.022
F	0.81	0.84	0.87	0.032	0.033	0.034
G	0.82	0.85	0.88	0.032	0.033	0.034
J	0.24	0.25	0.26	0.010	0.010	0.010
N	0.47	0.48	0.49	0.018	0.019	0.020
P	0.24	0.25	0.26	0.010	0.010	0.010
X	0.23	0.24	0.25	0.009	0.009	0.009
Y	0.35	0.36	0.37	0.014	0.014	0.014
Z	0.62	0.64	0.66	0.024	0.025	0.026

Embossed Carrier Tape & Reel Specification — μ DFN-6



Technical Data
Data Sheet N1749, REV. A



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