SMP1255PUTG

Technical Data
Data Sheet N1749 Rev.-

Green Products

Description

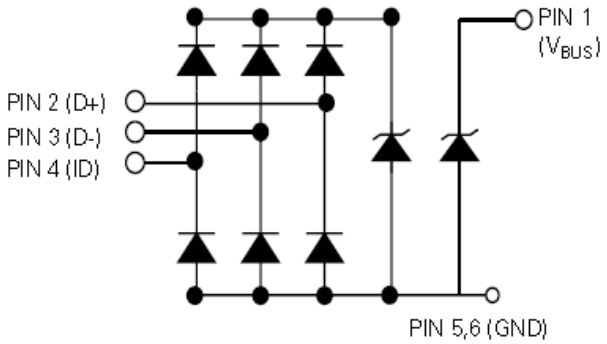
The SMP1255P integrates 3 channels of ultra-low capacitance steering diodes and a low voltage TVS diode to provide maximum protection of the USB data and ID pins against ESD per the IEC61000-4-2 standard. An additional 12V TVS diode is included to provide lightning surge protection for the USB V_{BUS} pin up to 100A (t_P=8/20μs) per the IEC61000-4-5 standard. The SMP1255P provides superior protection for current intensive applications such as fast charging peripharals.
The SMP1255P comes in a space saving 2.0x1.8mm μDFN 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) ±30kV (air), ±30kV (contact)
- IEC 61000-4-5 (lightning) 100A (8/20μs)
- IEC 61000-4-4 (EFT) 80A (5/50ns)
- Protection for V_{BUS} 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) ±15kV (air), ±12kV (contact)
- IEC 61000-4-5 (lightning) 4A (8/20μs)
- IEC 61000-4-4 (EFT) 40A (5/50ns)
- 0.5pF capacitance
- Low clamping voltage and dynamic resistance (0.3Ω)

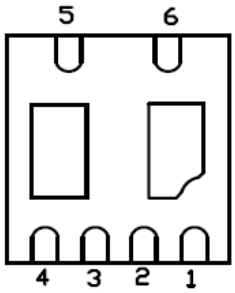
Functional Block Diagram



Applications

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

Pinout



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Ordering Information:

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

Absolute Maximum Ratings:

Parameter	Symbol	Value	Unit
Peak Current (tp=8/20µs)	I_{PP} (Pin1)	100	A
Peak Current (tp=8/20µs)	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	µA
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=8/20µs, Fwd	-	16.5	18	V
		I_{PP} = 100A, tp=8/20µs, Fwd	-	19.5	25	V
ESD With stand Voltage[1]	V_{ESD}	IEC61000-4-2 (Contact)	±30	-	-	kV
		IEC61000-4-2 (Air)	±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=2µA, 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	µA
		V_R=4V, Pin 2, 3 and 4 to GND	-	-	0.1	
Clamping Voltage[1]	V_C	I_{PP} = 1A, tp=8/20µs, Fwd	-	6.6	8.0	V
		I_{PP} = 2A, tp=8/20µs, 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)	±12	-	-	kV
		IEC61000-4-2 (Air)	±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: t_P=100ns, t_r=0.2ns I_{TLP} and V_{TLP} averaging window: star t_1=70ns to t_2=90ns

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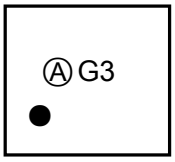
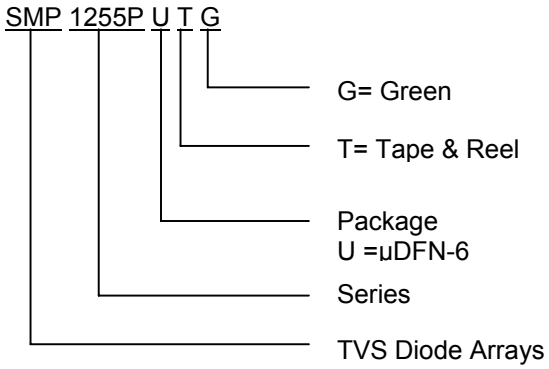
Marking Diagram:



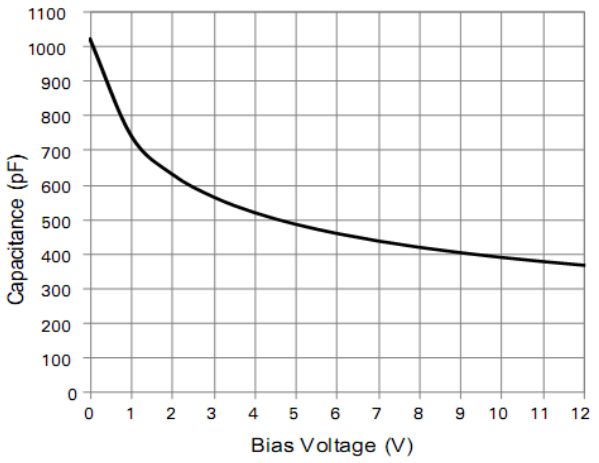
Where Ⓐ G3 is SMP1255PUTQ

Ⓐ = Product Series SMP1255P
G3 = Assembly Site

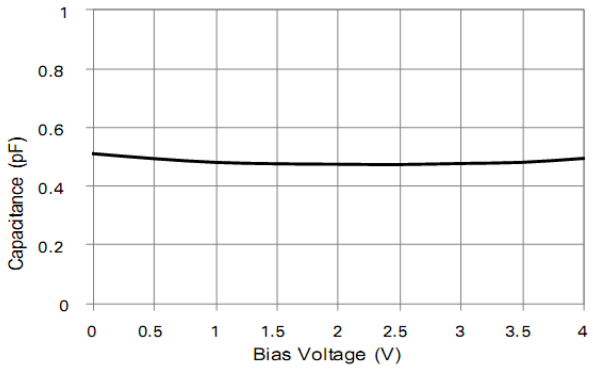
Part Name Information



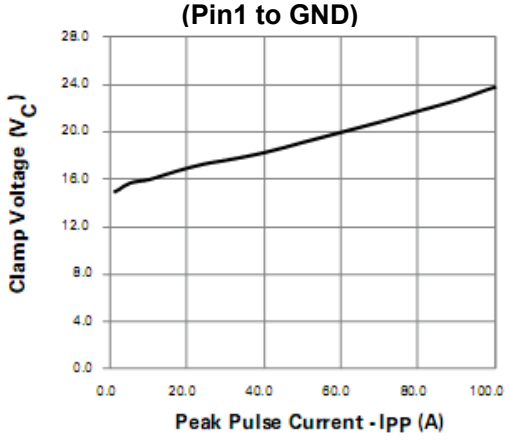
Capacitance vs. Reverse Bias (Pin1 to GND)



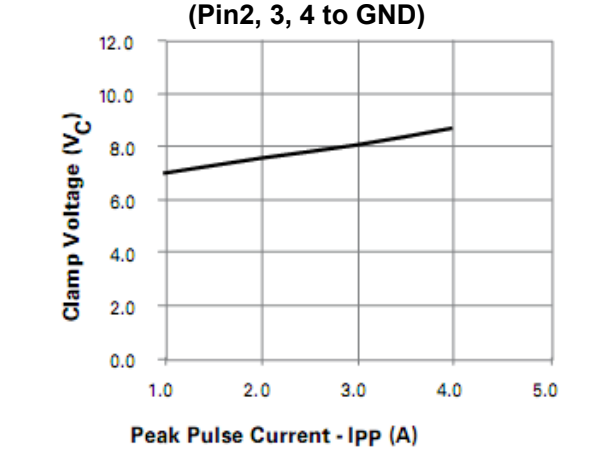
Capacitance vs. Reverse Bias (Pin2, 3, 4 to GND)



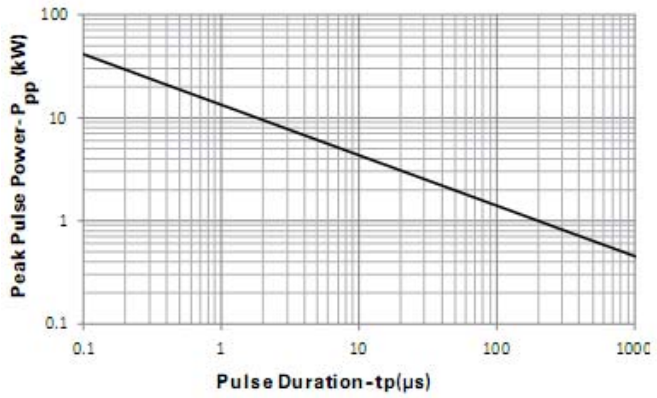
Clamping Voltage vs. Peak Pulse Current (Pin1 to GND)



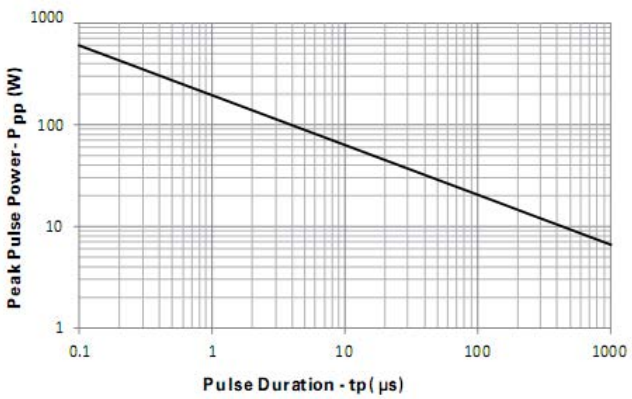
Clamping Voltage vs. Peak Pulse Current (Pin2, 3, 4 to GND)



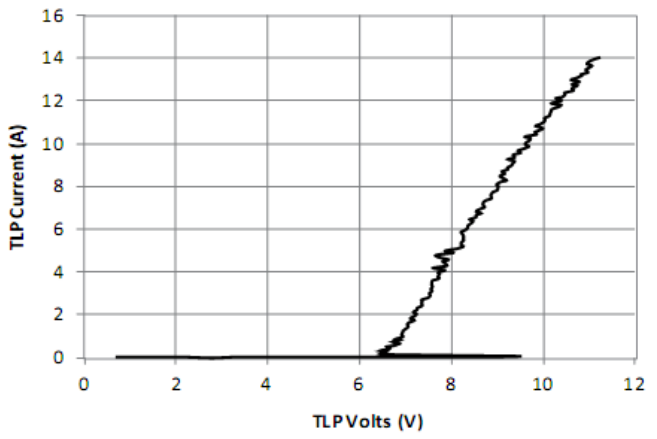
Non-Repetitive Peak Pulse Power vs. Pulse Duration (Pin1 to GND)



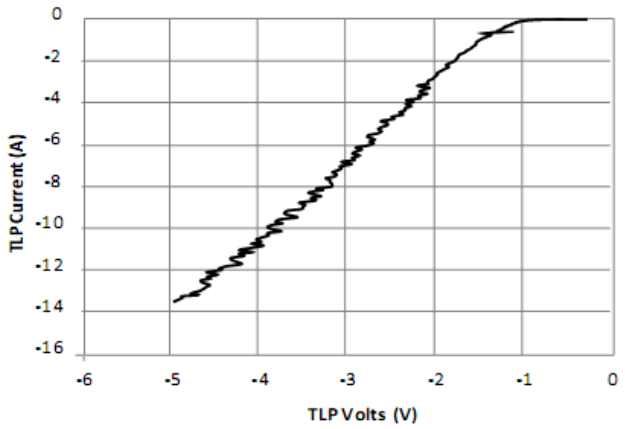
Non-Repetitive Peak Pulse Power vs. Pulse Duration (Pin2, 3, 4 to GND)



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



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



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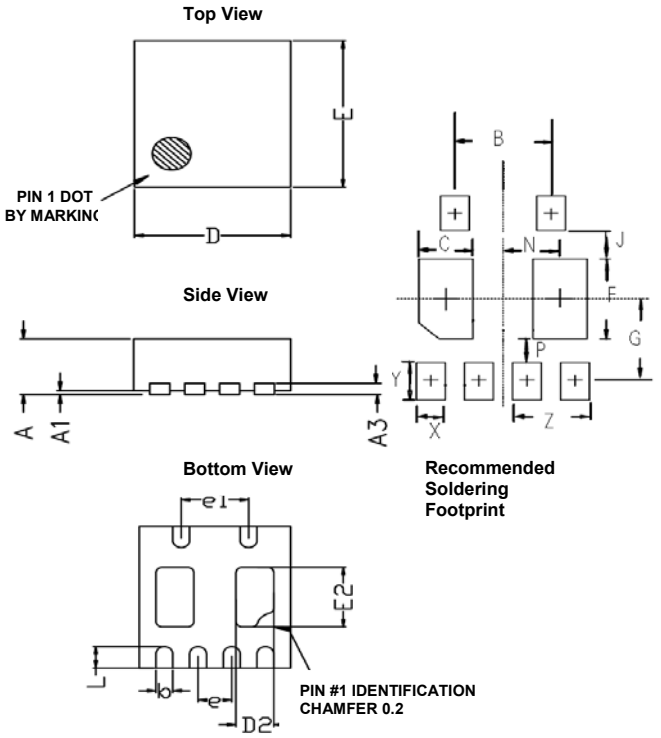
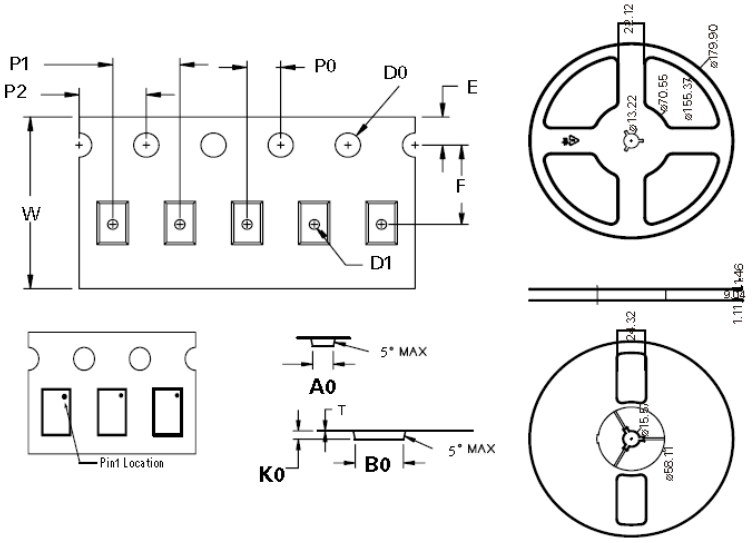
Mechanical Dimensions —µDFN-6(1.8×2.0×0.55mm)



µDFN-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 —µDFN-6



Symbol	Millimeters
A0	1.95+/-0.05
B0	2.30+/-0.05
D0	1.50+0.10
D1	Φ 0.60+0.05
E	1.75+/-0.10
F	3.50+/-0.05
K0	0.75+/-0.05
P0	2.00+/-0.05
P1	4.00+/-0.10
P2	4.00+/-0.10
T	0.25+/-0.02
W	8.00+0.30/-0.10

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