12V Transient Voltage Suppressor

Features

- 2760 Watts Peak Power (tp = 8/20μs)
- Small Body Outline Dimensions
- Working Voltage: 12V
- Low Leakage Current
- Protects one I/O or power line

IEC COMPATIBILITY (EN61000-4)

- IEC 61000-4-2 (ESD) ±30kV (air), ±30kV (contact)
- IEC 61000-4-4 (EFT) 40A (5/50ns)
- IEC 61000-4-5 (Lightning) 120A (8/20μs)

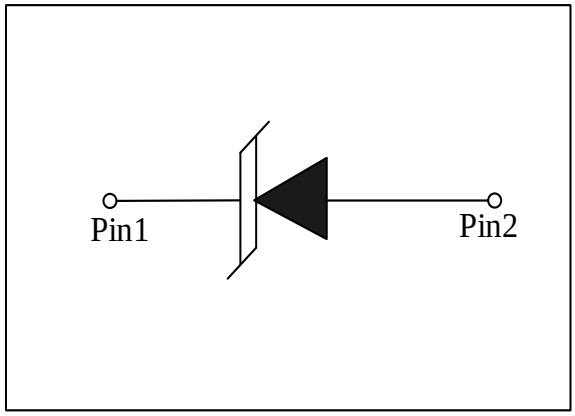
Mechanical Characteristics

- DFN1610-2L package
- Marking : Marking Code
- Packaging : Tape and Reel per EIA 481
- RoHS Compliant & HF
- Device meets MSL1 requirement

Applications

- Power lines
- Industrial Electronics
- Microcontroller Input Protections
- Personal Digital Assistants (PDAs)

Schematic & PIN Configuration

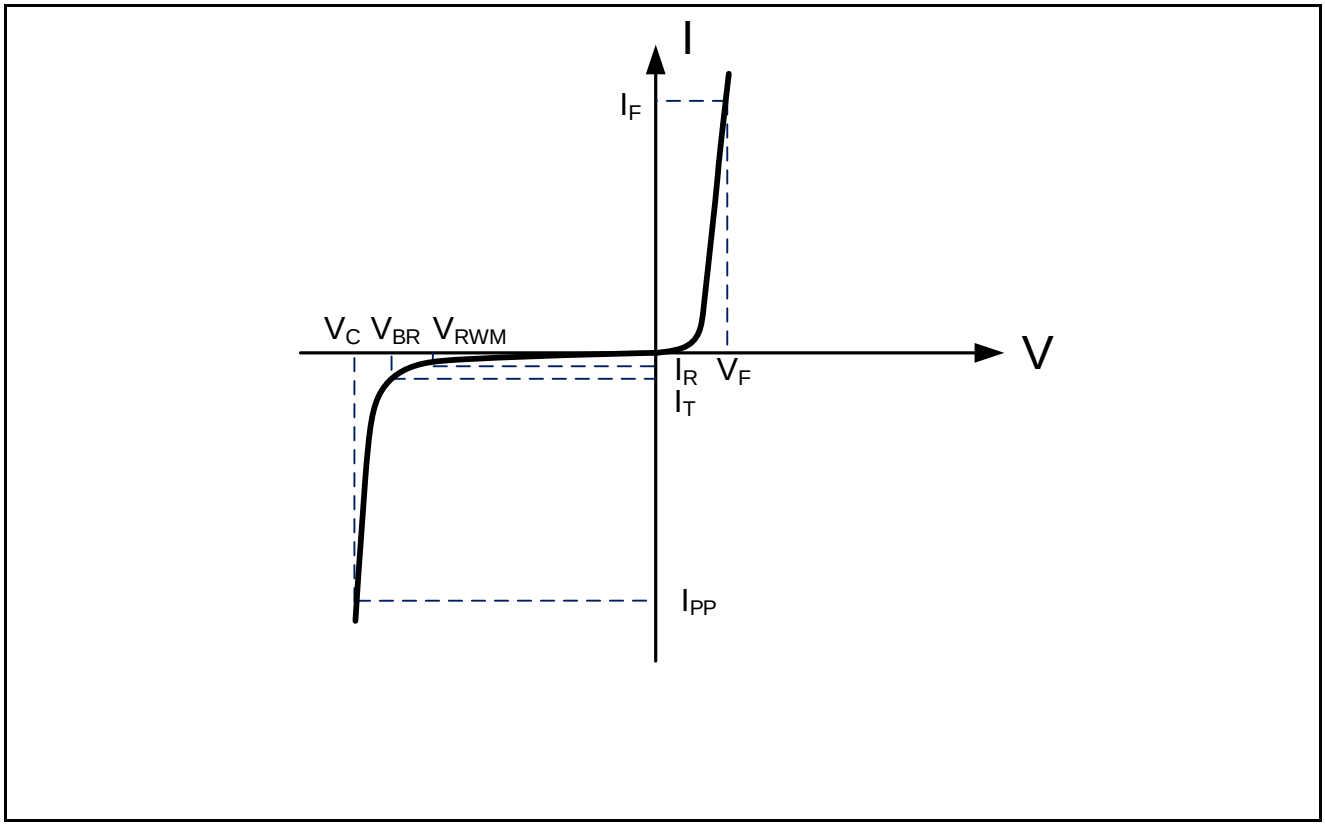


Absolute Maximum Rating

Parameter	Symbol	Value	Unit
Peak Pulse Power (t_p = 8/20μs)	P_{PP}	2760	Watts
Peak Pulse Current (t_p = 8/20μs)	I_{PP}	120	A
Operating Temperature	T_J	-55 to + 125	°C
Storage Temperature	T_{STG}	-55 to +150	°C

Electrical Parameters (T=25℃)

Symbol	Parameter
I_{PP}	Reverse Peak Pulse Current
V_C	Clamping Voltage @ I_{PP}
V_{RWM}	Reverse Stand-Off Voltage
I_R	Reverse Leakage Current @ V_{RWM}
V_{BR}	Breakdown Voltage @ I_T
I_T	Test Current
I_F	Forward Current
V_F	Forward Voltage @ IF



Electrical Characteristics

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Reverse Stand-Off Voltage	V_{RWM}				12	V
Reverse Breakdown Voltage	V_{BR}	I_T=1mA	13.4		16	V
Reverse Leakage Current	I_R	V_{RWM}=12V			200	nA
Forward Voltage	V_F	I_F=10mA	0.6		1.2	V
Clamping Voltage(1)	V_C	I_{PP}=120A, t_p=8/20μs		21.3	23	V
ESD Clamping Voltage (2)	V_C	I_{PP} = 4A t_p = 0.2/100ns		14.6		V
ESD Clamping Voltage (2)	V_C	I_{PP} = 16A t_p = 0.2/100ns		15.1		V
Dynamic Resistance (2) (3)	R_{DYN}	TLP=0.2/100ns		0.04		Ω
Junction Capacitance	C_j	V_R = 0V, f = 1MHz		690	750	pF

Note1. Measured from pin 1 to pin 2；

Note2. TLP Setting:t_p=100ns, t_r=0.2ns, I_{TLP} and V_{TLP} sample window:t_1=70ns to t_2=90ns.

Note3. Dynamic resistance calculated from I_{PP}=4A to I_{PP}=16A using “Best Fit”.

Typical Characteristics

Figure 1: Peak Pulse Power vs. Pulse Time

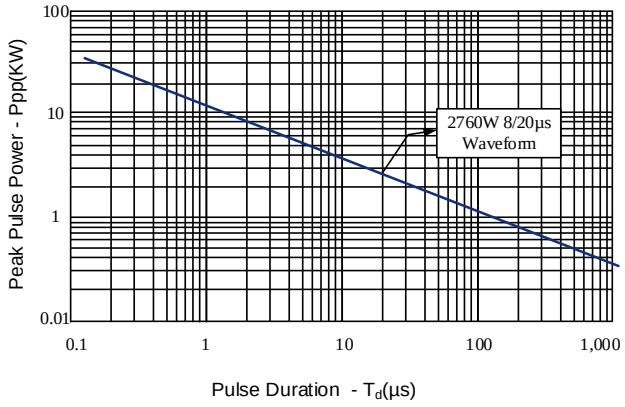


Figure 2: Power Derating Curve

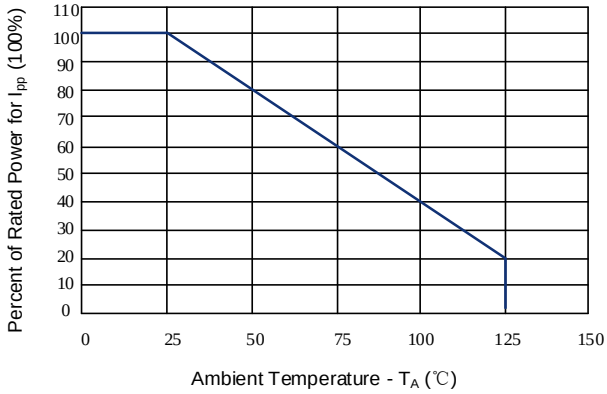


Figure 3: Clamping Voltage vs. Peak Pulse Current

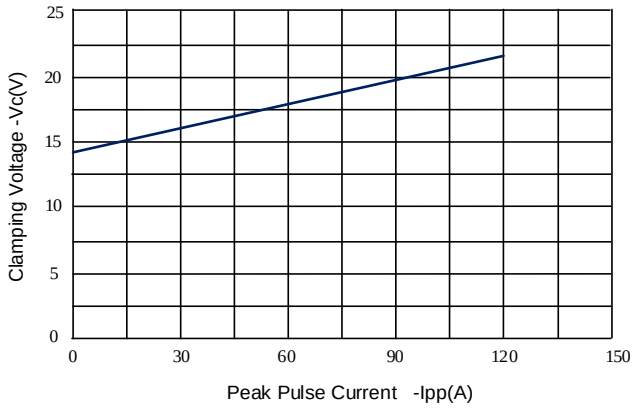


Figure 4: Normalized Junction Capacitance vs. Reverse Voltage

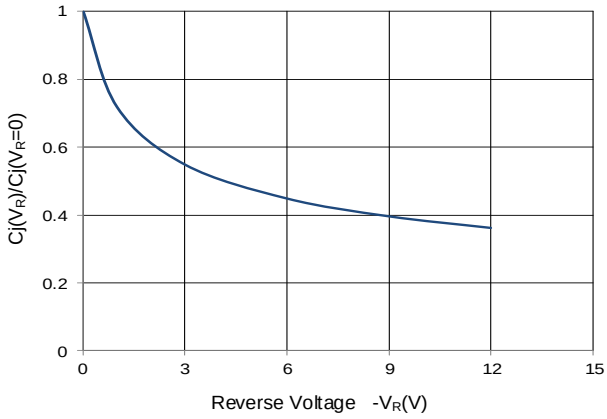


Figure 5: Pulse Waveform

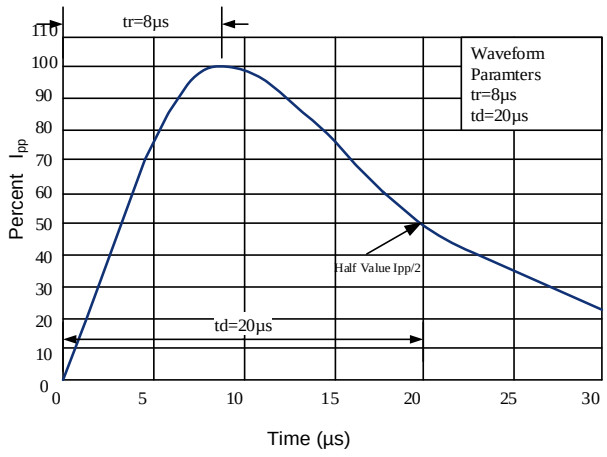
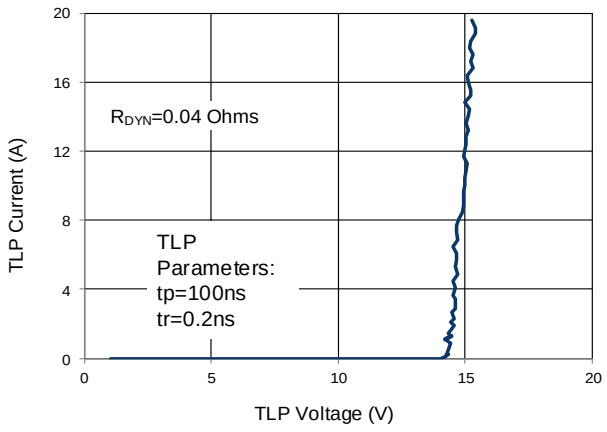
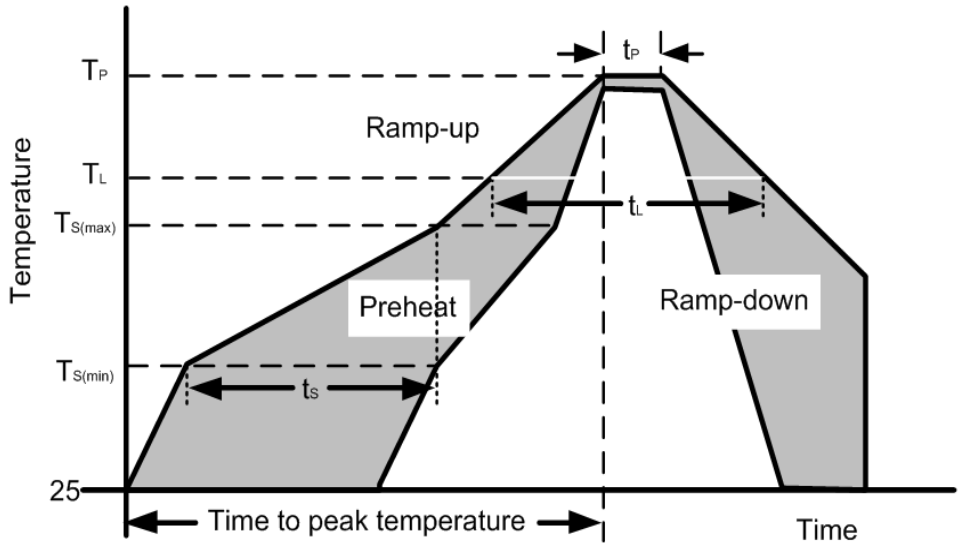


Figure 6: TLP I-V Curve



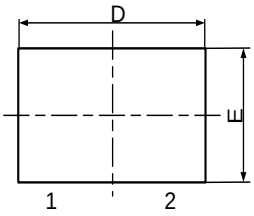
Soldering Parameters

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 – 190 secs
Average ramp up rate (Liquidus Temp) (T_L) to peak		5°C/second max
$T_{S(max)}$ to T_L——Ramp-up Rate		5°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 actual peak Temperature (t_P)		20 – 40 seconds
Ramp-down Rate		5°C/second max
Time 25°C to peak Temperature (T_P)		8 minutes Max.
Do not exceed		280°C

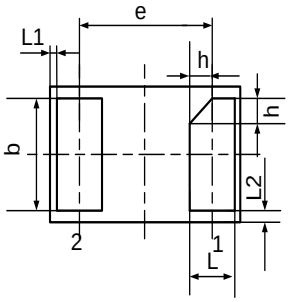


Package Dimension

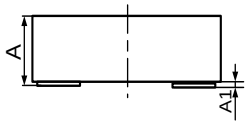
PACKAGE OUTLINE



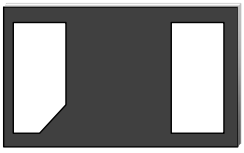
TOP VIEW



BOTTOM VIEW



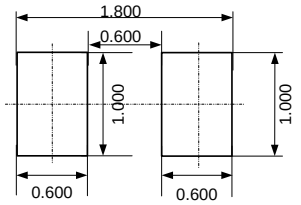
SIDE VIEW



DFN1610-2L

SYMBOL	MILLIMETERS		
	MIN	NOM	MAX
A	0.45		0.55
A1	-	-	0.05
D	1.590	1.620	1.650
E	0.990	1.020	1.050
b	0.750	0.800	0.850
L	0.350	0.400	0.450
h	0.150	0.200	0.250
L1	0.060REF		
L2	0.110REF		
e	1.100BSC		

MOUNTING PAD

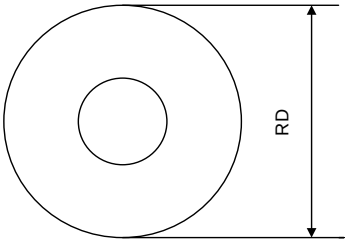


Notes:

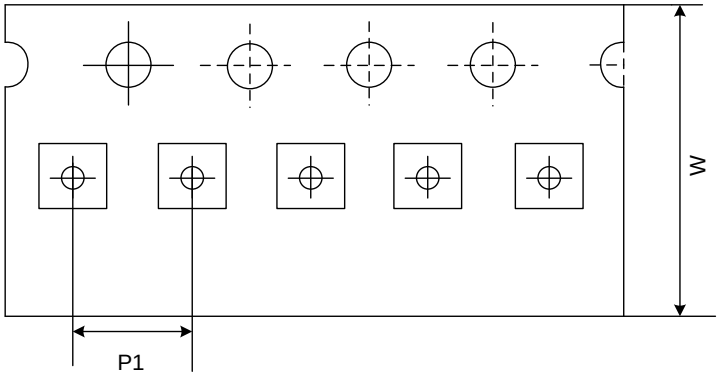
Controlling Dimension: Millimeter.

Tape And Reel Information

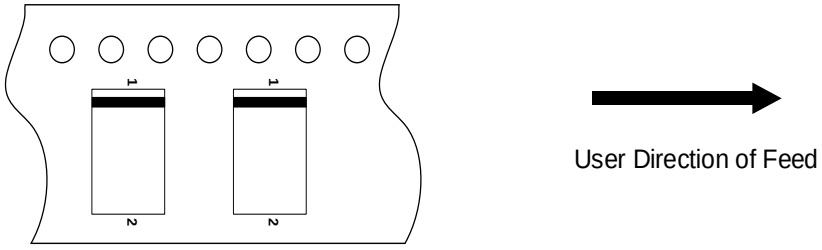
Reel Dimensions



Tape Dimensions



Quadrant Assignments For PIN1 Orientation In Tape



RD	Reel Dimensions	7 inch
W	Overall width of the carrier tape	8 mm
P1	Pitch between successive cavity centers	2mm

Ordering Information

Part	Package	Marking	Packing Information
ES12DPHX	DFN1610-2L	 P=Specific Device Code XX=Date Code	10k/Reel

Revision History and Checking Table

No.	Version	Date	Revision Item	Request	Function & Spec Checking	Package Checking	Tape Checking
1	1.0	2024-06-12	Released Version	Qi Shu Kun	Qi Shu Kun	Liu Jia Ying	Liu Jia Ying