

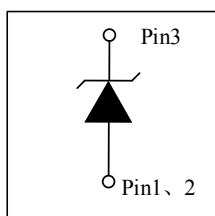
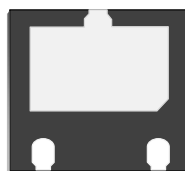
## Description

The WPE1291ZP4 is an uni-directional TVS diode, utilizing leading monolithic silicon technology to provide fast response time and low ESD clamping voltage, making this device an ideal solution for protecting voltage sensitive data and power line. The WPE1291ZP4 complies with the IEC 61000-4-2 (ESD) standard with  $\pm 30\text{kV}$  air and  $\pm 30\text{kV}$  contact discharge. It is assembled into an ultra-small 2.0x2.0x0.5mm lead-free DFN package. The small size and high ESD surge protection make WPE1291ZP4 an ideal choice to protect cell phone, digital cameras, audio players and many other portable applications.

## Features

- 6000 Watts Peak Power ( $t_p = 8/20\mu\text{s}$ )
- Fast Response time: Typically,  $<1\text{ns}$
- Excellent Clamping Capability
- Low Inductance
- Low profile package
- Complies with following standards:
  - IEC 61000-4-2 (ESD) immunity test  
Air discharge:  $\pm 30\text{kV}$   
Contact discharge:  $\pm 30\text{kV}$
  - IEC61000-4-4 (EFT) 40A (5/50ns)
  - IEC61000-4-5 (Lightning) 200A (8/20 $\mu\text{s}$ )
- RoHS Compliant

## Dimensions & Symbol (Unit: mm Max)



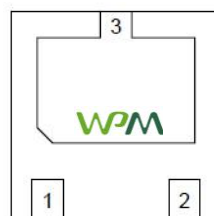
## Mechanical Characteristics

- Package: DFN2020-3L
- Case Material: “Green” Molding Compound
- Moisture Sensitivity: Level 3 per J-STD-020
- Terminal Connections: See Diagram Below
- Marking Information: See Below

## Applications

- I/O interface
- Power lines
- Automotive and Telecommunication
- Computer & Consumer Electronics
- Industrial Electronics
- Microcontroller input protection

## Marking Information



Details marking code reference specification of approval

## Ordering Information

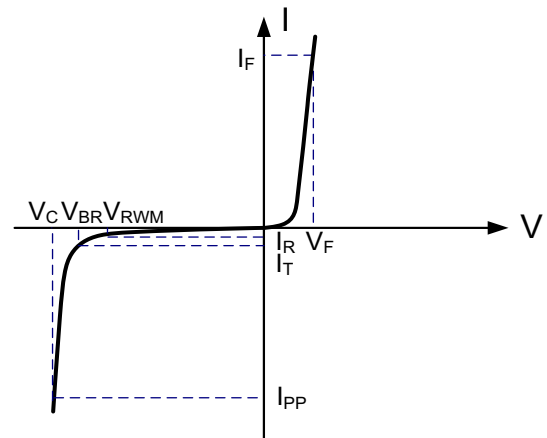
Part Number	Packaging	Reel Size
WPE1291ZP4	3000/Tape&Reel	7inch

**Absolute Maximum Ratings** ( $T_A=25^{\circ}\text{C}$ , RH=45%-75%, unless otherwise noted)

Parameter	Symbol	Value	Unit
Peak Pulse Power ( $t_p=8/20 \mu\text{s}$ waveform)	$P_{pp}$	6000	W
Peak Pulse Current (8/20 $\mu\text{s}$ )	$I_{pp}$	200	A
ESD per IEC 61000-4-2(Air)	VESD	$\pm 30$	kV
ESD per IEC 61000-4-2(Contact)		$\pm 30$	
Operating Temperature Range	$T_J$	-55 to +125	$^{\circ}\text{C}$
Storage Temperature Range	$T_{stg}$	-55 to +150	$^{\circ}\text{C}$

**Electrical Characteristics** ( $T_A=25^{\circ}\text{C}$ )

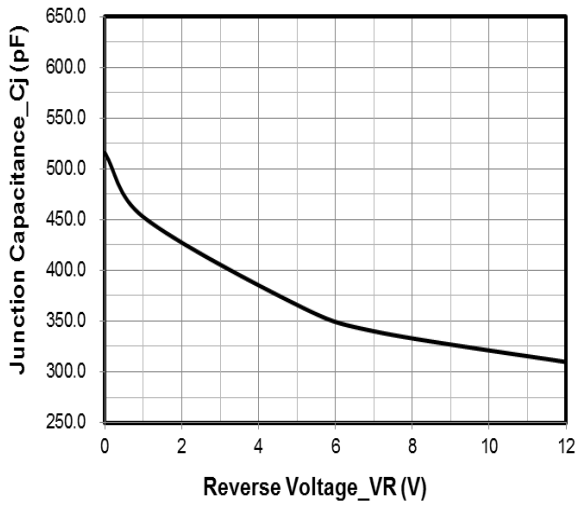
Symbol	Parameter
$I_{PP}$	Reverse Peak Pulse Current
$V_C$	Clamping Voltage @ $I_{PP}$
$V_{RWM}$	Reverse Stand-Off Voltage
$I_R$	Reverse Leakage Current @ $V_{RWM}$
$V_{BR}$	Breakdown Voltage @ $I_T$
$I_T$	Test Current
$I_F$	Forward Current
$V_F$	Forward Voltage @ $I_F$



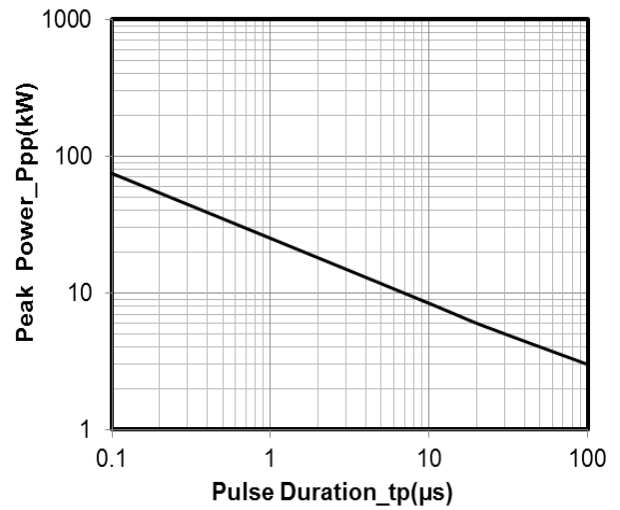
**Electrical Characteristics**

Parameter	Symbol	Min	Typ	Max	Unit	Test Condition
Reverse Working Voltage	$V_{RWM}$			12	V	
Breakdown Voltage	$V_{BR}$	13.4	14		V	$I_T = 1\text{mA}$
Reverse Leakage Current	$I_R$			0.5	$\mu\text{A}$	$V_{RWM} = 12\text{V}$ $T = 25^{\circ}\text{C}$
Clamping Voltage	$V_C$			15	V	$I_{PP} = 20\text{A}$ (8 x 20 $\mu\text{s}$ pulse)
Clamping Voltage	$V_C$		17	19	V	$I_{PP} = 40\text{A}$ (8 x 20 $\mu\text{s}$ pulse)
Clamping Voltage	$V_C$		19	22	V	$I_{PP} = 90\text{A}$ (8 x 20 $\mu\text{s}$ pulse)
Clamping Voltage	$V_C$		22	25	V	$I_{PP} = 140\text{A}$ (8 x 20 $\mu\text{s}$ pulse)
Clamping Voltage	$V_C$		25	30	V	$I_{PP} = 200\text{A}$ (8 x 20 $\mu\text{s}$ pulse)
Junction Capacitance	$C_J$			550	pF	$V_R = 0\text{V}$ , $f = 1\text{MHz}$

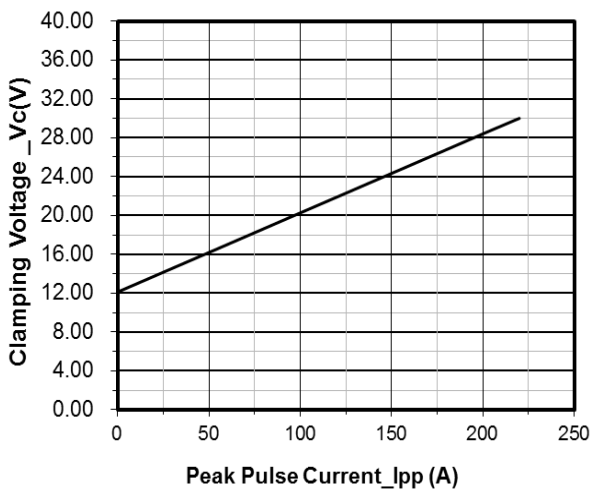
**Typical Performance Characteristics** ( $T_A=25^\circ\text{C}$  unless other wise specified)



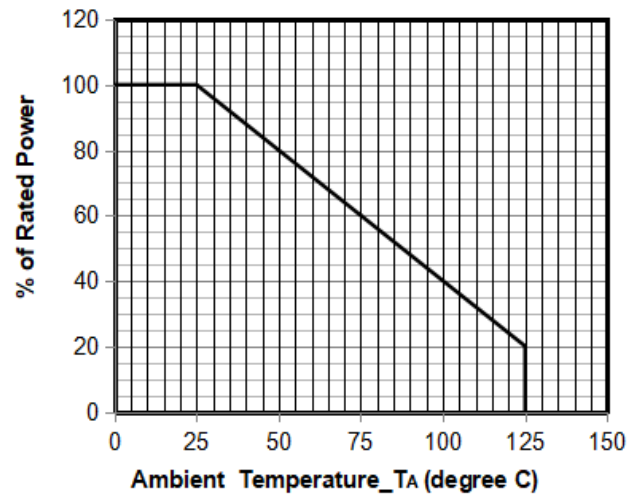
**Junction Capacitance vs. Reverse Voltage**



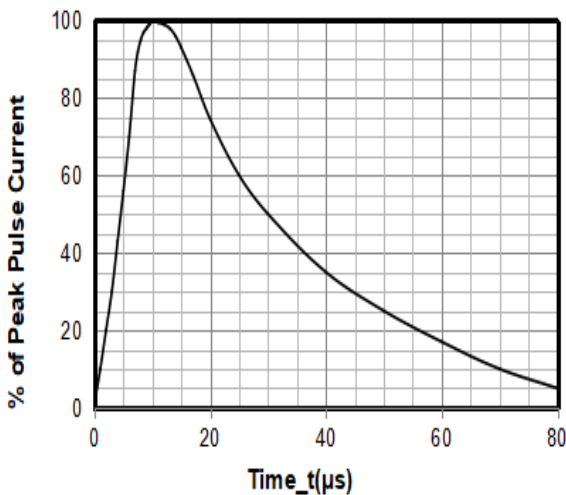
**Peak Pulse Power vs. Pulse Time**



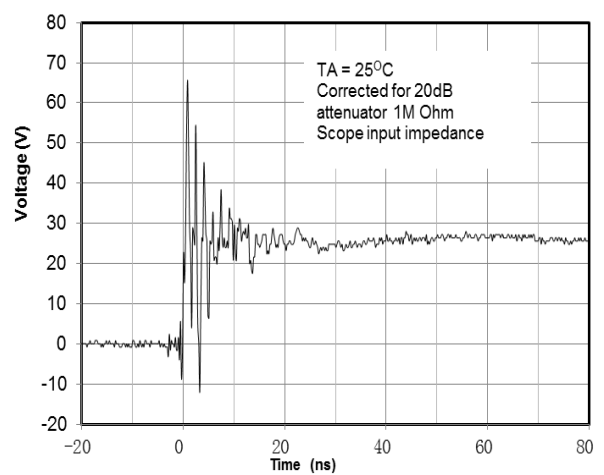
**Clamping Voltage vs. Peak Pulse Current**



**Power Derating Curve**



**8 X 20μs Pulse Waveform**

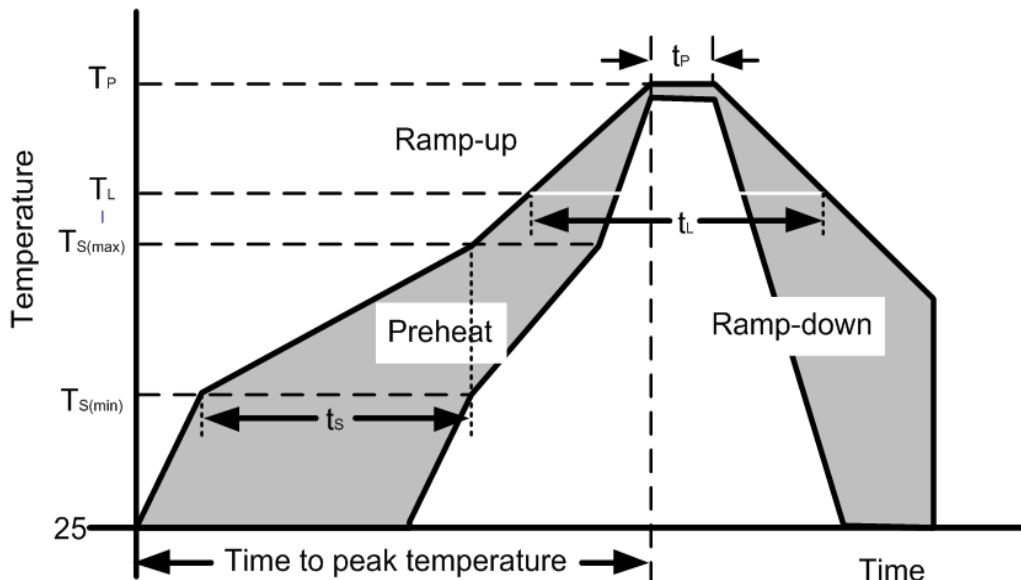


**ESD Clamping Voltage**

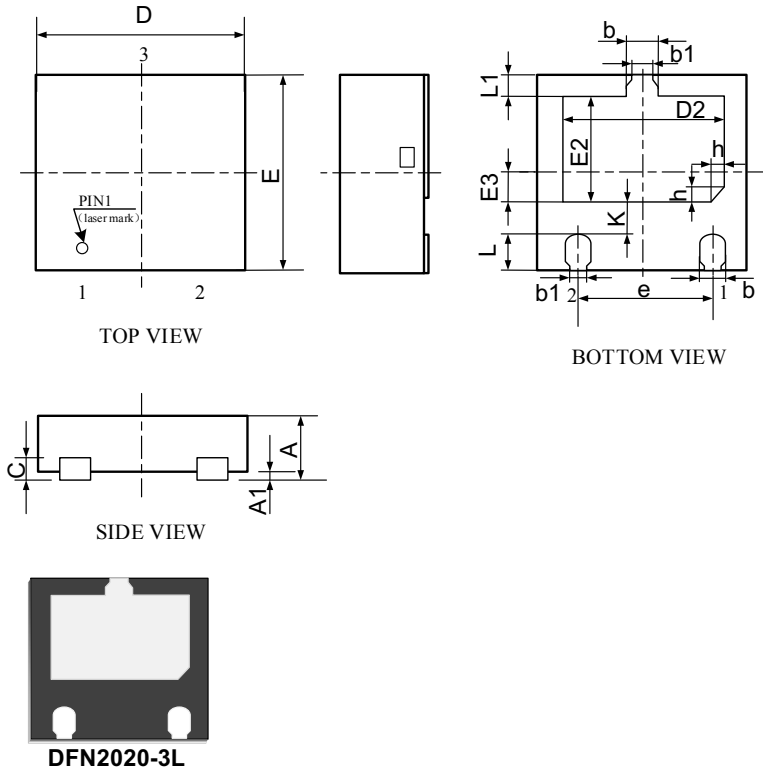
**8 kV Contact per IEC61000-4-2**

**Soldering Parameters**

Reflow Condition		Pb-Free assembly (see FIG.2)
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 (Liquid us Temp ( $T_L$ ) to peak)		5°C/second. Max
$T_{S(max)}$ to $T_L$ - Ramp-up Rate		5°C/ second. Max
Reflow	-Temperature( $T_L$ ) (Liquid us)	+217°C
	-Temperature( $t_L$ )	60-150 seconds.
Peak Temp ( $T_P$ )		+260(+0/-5)°C
Time within 5°C of actual Peak Temp ( $t_p$ )		20-40 seconds. Max
Ramp-down Rate		5°C/ second. Max
Time 25°C to Peak Temp ( $T_P$ )		8 min. Max
Do not exceed		+280°C

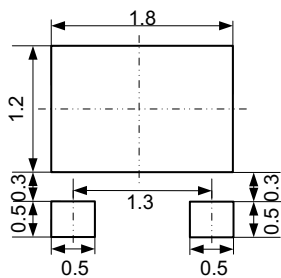


**Package Mechanical Data**



SYMBOL	DIMENSIONS		
	MILLIMETERS		
	MIN	NOM	MAX
A	0.55	0.60	0.65
A1	0.00	0.02	0.05
b	0.25	0.30	0.35
b1	0.20REF		
c	0.152REF		
D	1.90	2.00	2.10
D2	1.40	1.50	1.60
e	1.30BSC		
E	1.90	2.00	2.10
E2	0.95	1.05	1.15
E3	0.20	0.30	0.40
L	0.35	0.40	0.45
L1	0.20	0.25	0.30
h	0.20REF		
K	0.20	0.30	0.40

**Suggested LandPattern**



**Contact Information**

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