

24V Transient Voltage Suppressor

Features

- 7000 Watts Peak Power ($t_p = 8/20\mu s$)
- Excellent Clamping Capability
- Low profile package
- Solid-state silicon technology

IEC COMPATIBILITY (EN61000-4)

- IEC 61000-4-2 (ESD) $\pm 30kV$ (air), $\pm 30kV$ (contact)
- IEC 61000-4-4 (EFT) 40A (5/50ns)
- IEC 61000-4-5 (Lightning) 200A (8/20 μs)

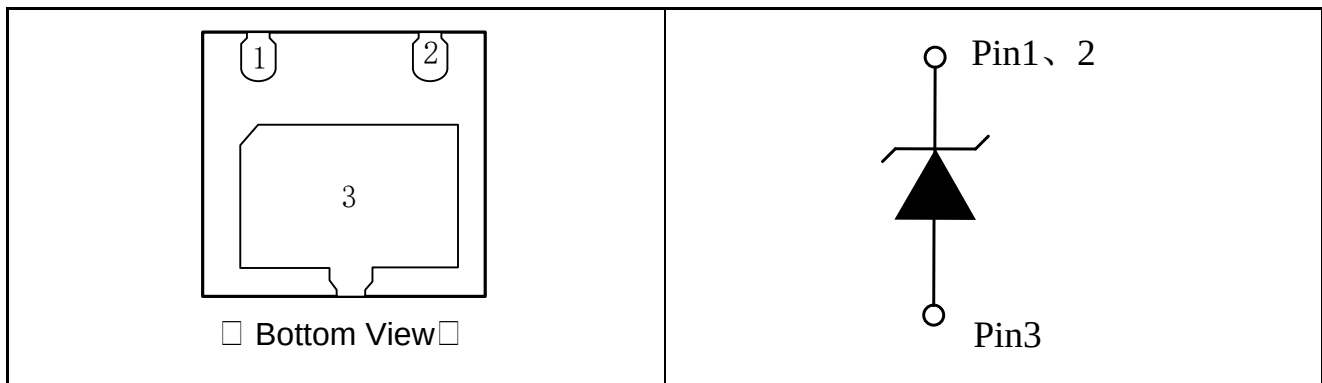
Mechanical Characteristics

- DFN2020-3L package
- Marking : Marking Code
- Packaging : Tape and Reel
- RoHS Compliant & HF
- Device meets MSL1 requirement

Applications

- I/O Interfaces
- Power lines
- Automotive and Telecommunication
- Computer & Consumer Electronics
- Industrial Electronics
- Microcontroller Input Protection

Schematic & PIN Configuration



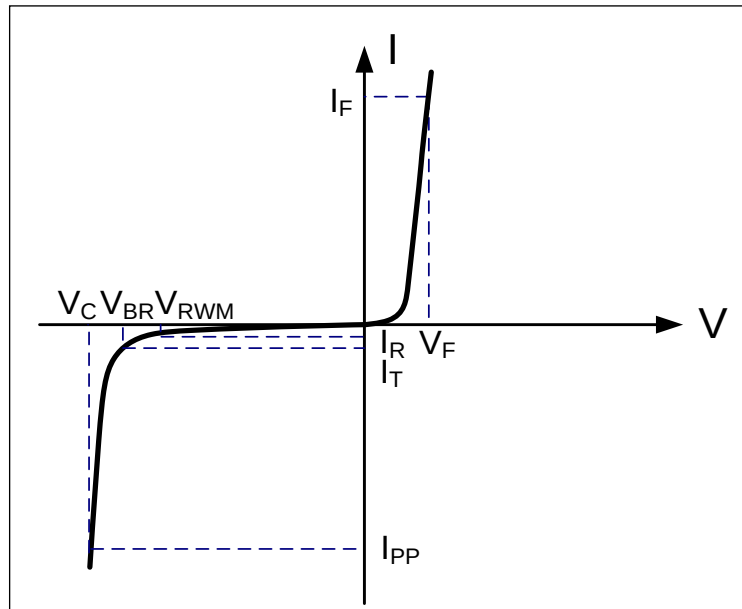
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Absolute Maximum Rating

Parameter	Symbol	Value	Unit
Peak Pulse Power ($t_p = 8/20\mu s$)	P_{PP}	7000	Watts
Peak Pulse Current ($t_p = 8/20\mu s$)	I_{PP}	200	A
Operating Temperature	T_J	-55 to + 125	°C
Storage Temperature	T_{STG}	-55 to +150	°C

Electrical Parameters (T=25°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



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Electrical Characteristics

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Reverse Stand-Off Voltage	V_{RWM}				24	V
Reverse Breakdown Voltage	V_{BR}	$I_T=1\text{mA}$	25			V
Forward Voltage	V_F	$I_F=10\text{mA}$	0.5	0.7	1.0	V
Reverse Leakage Current	I_R	$V_{RWM}=24\text{V}$			500	nA
Clamping Voltage ⁽¹⁾	V_C	$I_{PP}=200\text{A}$, $t_p=8/20\mu\text{s}$		32	35	V
Dynamic Resistance ^{(2) (3)}	R_{DYN}	$TLP=0.2/100\text{ns}$		0.17		Ω
Junction Capacitance	C_j	$V_R = 0\text{V}$, $f = 1\text{MHz}$		800	1000	pF

Note1: Measured from pin 1& pin 2 to pin 3.

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

Note3: Dynamic resistance calculated from $I_{PP}=4\text{A}$ to $I_{PP}=16\text{A}$ using "Best Fit".

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Typical Characteristics

Figure 1: Peak Pulse Power vs. Pulse Time

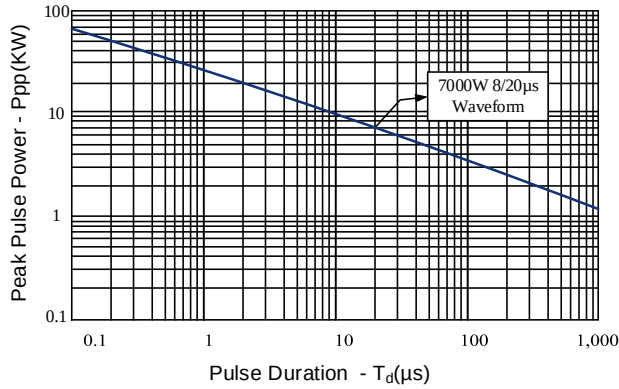


Figure 2: Power Derating Curve

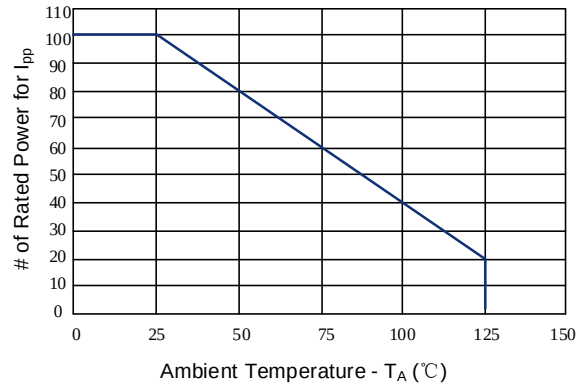


Figure 3: Clamping Voltage vs. Peak Pulse Current

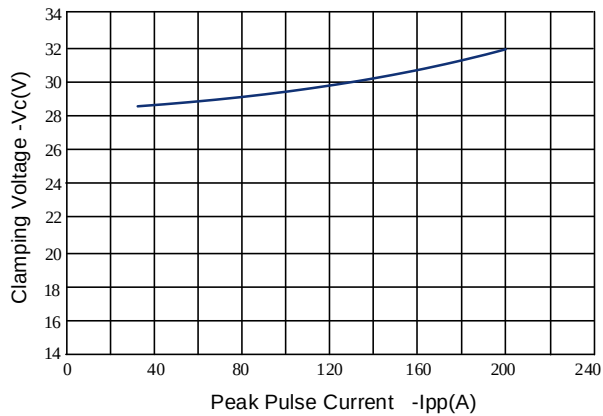


Figure 4: Normalized Junction Capacitance vs. Reverse Voltage

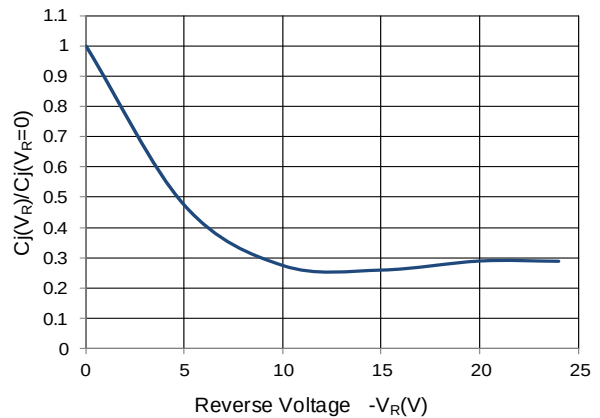


Figure 5: 8/20μs Pulse Waveform

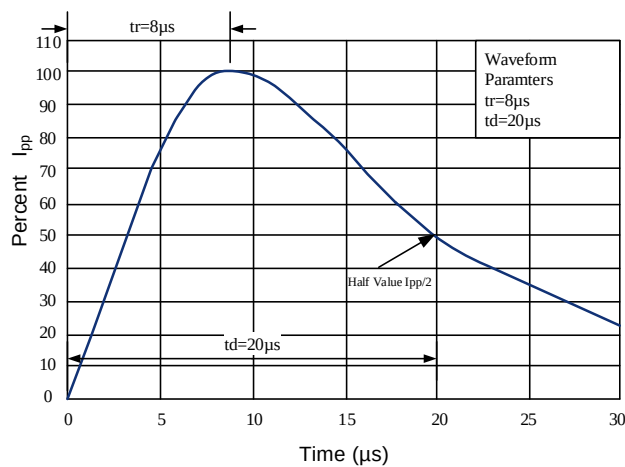
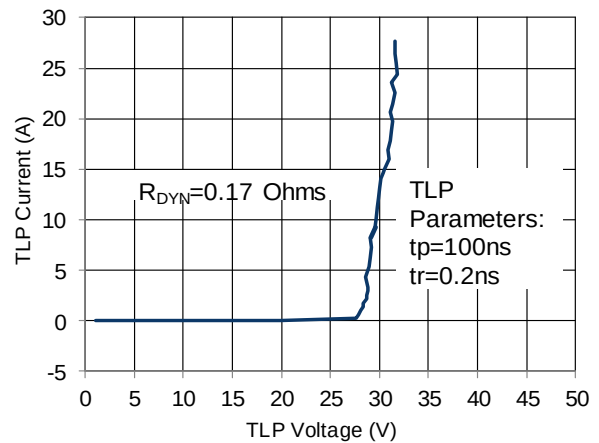


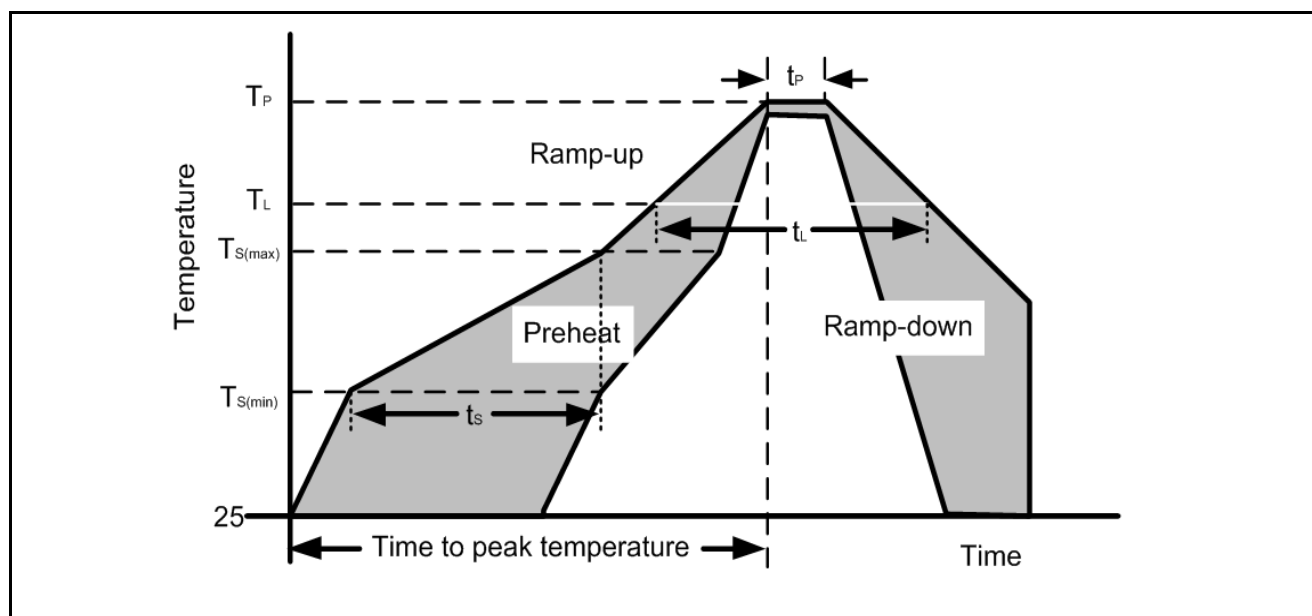
Figure 6: TLP I-V Curve



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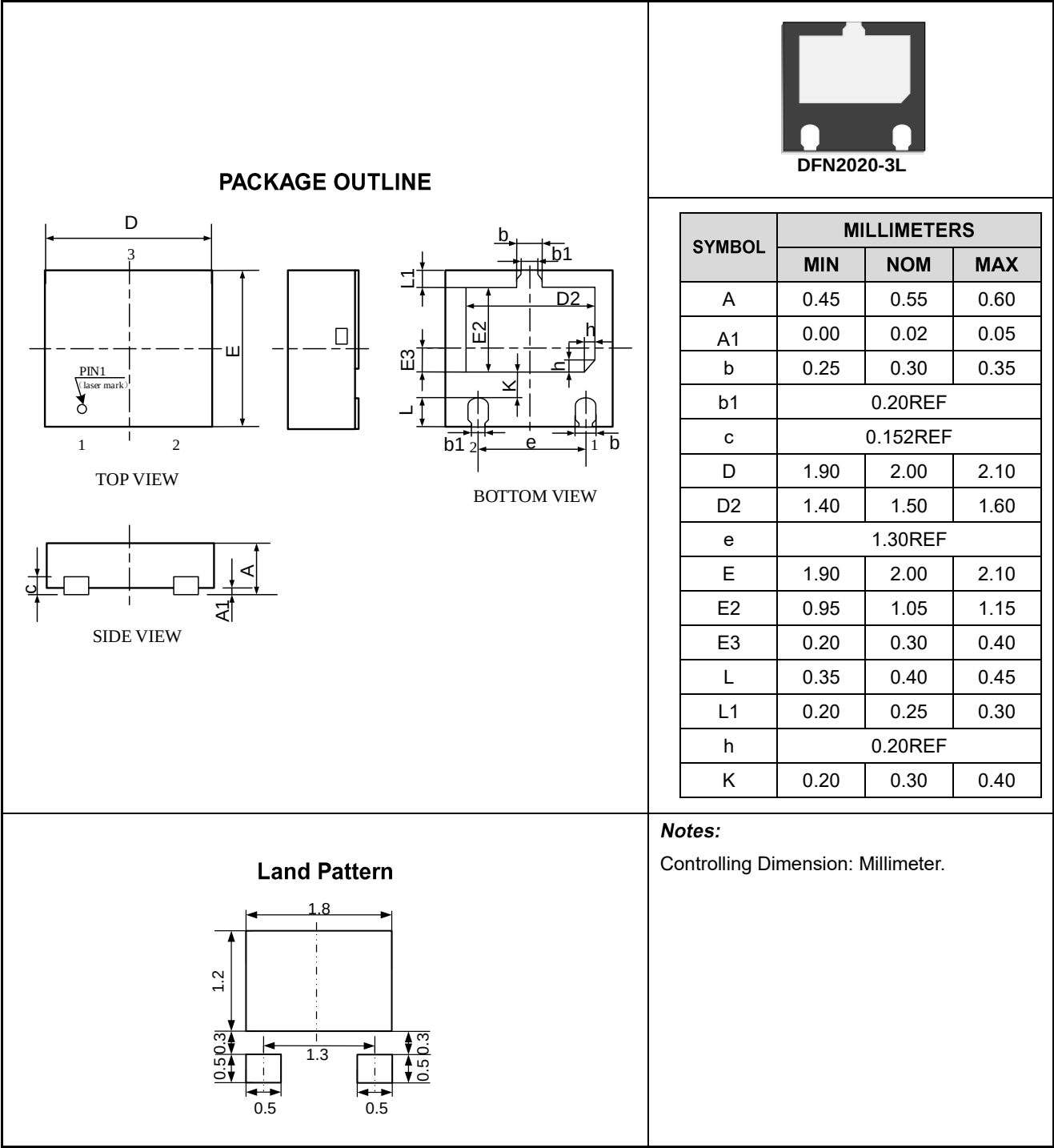
Soldering Parameters

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



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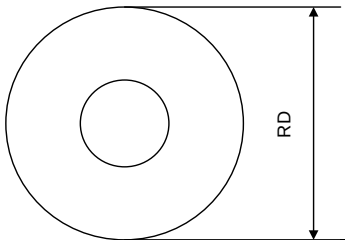
Package Dimension



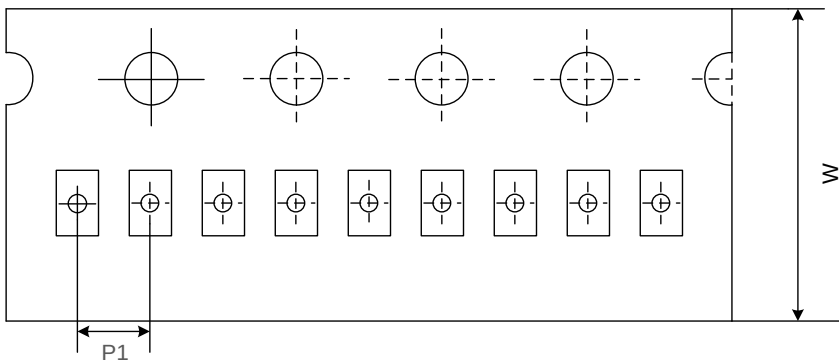
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Tape And Reel Information

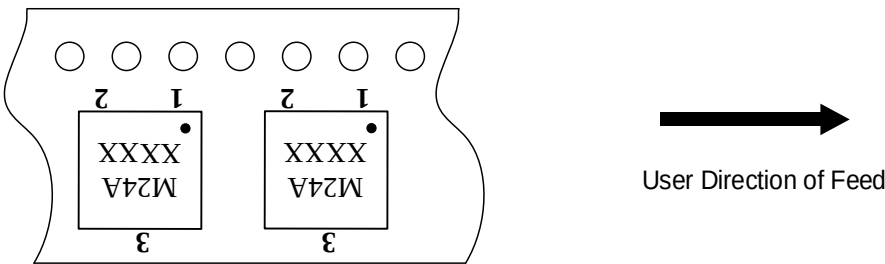
Reel Dimensions



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	4 mm

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Ordering Information

Part	Package	Marking	Packing Information
ES24P4N3A	DFN2020-3L	 M24A=Specific Device Code XXXX=Lot Code	3k/Reel

Revision History and Checking Table

Version	Date	Revision Item	Modifier	Function & Spec Checking	Package & Tape Checking
1.0	2021-09-15	Released Version	Qi Shu Kun	Qi Shu Kun	Liu Jia Ying