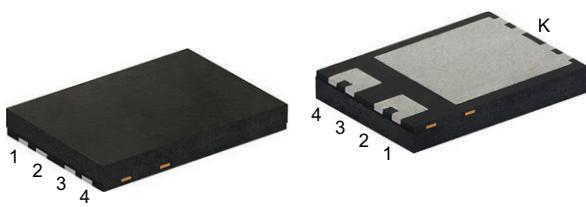
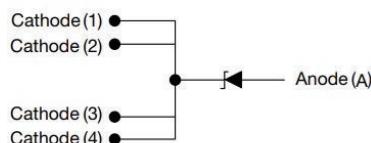


## Surface-Mount PAR® Transient Voltage Suppressors

High Temperature Stability and High Reliability Conditions



DFN6546A



### LINKS TO ADDITIONAL RESOURCES



### PRIMARY CHARACTERISTICS

$V_{BR}$	12 V to 24 V
$V_{WM}$	10.2 V to 20.5 V
$P_{PPM}$ (10 x 1000 $\mu$ s)	2000 W
$T_J$ max.	185 °C
Polarity	Unidirectional
Package	DFN6546A
Circuit configuration	Single

### FEATURES

- Low-profile package - typical height of 0.88 mm
- Leadless DFN package with side-wettable flanks suitable for customer AOI (Automatic Optical Inspection)
- Ideal for automated placement
- Junction passivation optimized design passivated anisotropic rectifier technology
- $T_J = 185$  °C capability suitable for high reliability and automotive requirement
- Unidirectional
- Excellent clamping capability
- Peak pulse power: 2000 W (10/1000  $\mu$ s)
- Meets MSL level 1, per J-STD-020, LF maximum peak of 260 °C
- AEC-Q101 qualified
  - Automotive ordering code: base P/NHM3
- Compatible to SMPC (TO-277A) package case outline
- Material categorization: for definitions of compliance please see [www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)



**RoHS**  
COMPLIANT  
HALOGEN  
FREE

### TYPICAL APPLICATIONS

Use in sensitive electronics protection against voltage transients induced by inductive load switching and lightning on ICs, MOSFET, signal lines of sensor units for automotive.

### MECHANICAL DATA

#### Case: DFN6546A

Molding compound meets UL 94 V-0 flammability rating  
Base P/NHM3 - halogen-free, RoHS-compliant, and AEC-Q101 qualified

**Terminals:** matte tin plated leads, solderable per J-STD-002 and JESD 22-B102

HM3 suffix meets JESD 201 class 2 whisker test

**Polarity:** color band denotes cathode end, heatsink is anode

### MAXIMUM RATINGS ( $T_A = 25$ °C, unless otherwise noted)

PARAMETER	SYMBOL	VALUE	UNIT
Peak pulse power dissipation with a 10/1000 $\mu$ s waveform (fig. 1) <sup>(1)</sup>	$P_{PPM}$	2000	W
Peak pulse current with a 10/1000 $\mu$ s waveform (fig. 3) <sup>(1)</sup>	$I_{PPM}$	See table next page	A
Operating junction and storage temperature range	$T_J, T_{STG}$	-65 to +185	°C

#### Note

<sup>(1)</sup> Non-repetitive current pulse, per fig. 3 and derated above  $T_A = 25$  °C per fig. 2

ELECTRICAL CHARACTERISTICS ( $T_A = 25^\circ\text{C}$ , unless otherwise noted)											
DEVICE TYPE	DEVICE MARKING CODE	BREAKDOWN VOLTAGE $V_{BR}$ <sup>(1)</sup> AT $I_T$ (V)			TEST CURRENT $I_T$ (mA)	STAND-OFF VOLTAGE $V_{WM}$ (V)	MAXIMUM REVERSE LEAKAGE AT $V_{WM}$ $I_R$ ( $\mu\text{A}$ )	MAXIMUM REVERSE LEAKAGE AT $V_{WM}$ $T_J = 150^\circ\text{C}$ $I_R$ ( $\mu\text{A}$ )	MAXIMUM PEAK PULSE SURGE CURRENT $I_{PPM}$ <sup>(2)</sup> (A)	MAXIMUM CLAMPING VOLTAGE AT $I_{PPM}$ $V_C$ (V)	TYPICAL TEMP. COEFFICIENT OF $V_{BR}$ <sup>(3)</sup> $\alpha T$ (%/°C)
		MIN.	NOM.	MAX.							
T2KN12A	T2NA	11.4	12.0	12.6	1.0	10.2	5.0	50	120	16.7	0.070
T2KN13A	T2NB	12.4	13.0	13.7	1.0	11.1	5.0	50	110	18.2	0.072
T2KN15A	T2NC	14.3	15.0	15.8	1.0	12.8	2.0	20	94.3	21.2	0.076
T2KN16A	T2ND	15.2	16.0	16.8	1.0	13.6	2.0	20	88.9	22.5	0.078
T2KN18A	T2NE	17.1	18.0	18.9	1.0	15.3	1.0	10	78.4	25.5	0.080
T2KN20A	T2NF	19.0	20.0	21.0	1.0	17.1	1.0	10	72.2	27.7	0.082
T2KN22A	T2NG	20.9	22.0	23.1	1.0	18.8	1.0	10	65.4	30.6	0.084
T2KN24A	T2NH	22.8	24.0	25.2	1.0	20.5	1.0	10	60.2	33.2	0.085

**Notes**
<sup>(1)</sup> Pulse test:  $t_p \leq 50$  ms

<sup>(2)</sup> Surge current waveform per fig. 3 and derated per fig. 2

<sup>(3)</sup> To calculate  $V_{BR}$  vs. junction temperature, use the following formula:  $V_{BR}$  at  $T_J = V_{BR}$  at  $25^\circ\text{C} \times (1 + \alpha T \times (T_J - 25))$ 
<sup>(4)</sup> All terms and symbols are consistent with ANSI/IEEE C62.35

THERMAL CHARACTERISTICS ( $T_A = 25^\circ\text{C}$ unless otherwise noted)				
PARAMETER	SYMBOL	TYP.	MAX.	UNIT
Thermal resistance	$R_{\theta JA}$ <sup>(1)</sup>	76	95	°C/W
	$R_{\theta JM}$ <sup>(2)</sup>	1.2	1.5	°C/W

**Notes**
<sup>(5)</sup> Thermal resistance junction-to-ambient to follow JEDEC® 51-2A, device mounted on FR4 PCB, 2 oz., 4.8 mm x 4.72 mm

<sup>(6)</sup> Thermal resistance junction-to-mount to follow JEDEC® 51-14 using transient dual interface test method (TDIM)

IMMUNITY TO STATIC ELECTRICAL DISCHARGE TO THE FOLLOWING STANDARDS				
$(T_A = 25^\circ\text{C}$ unless otherwise noted)				
STANDARD	TEST TYPE	TEST CONDITIONS	SYMBOL	VALUE
IEC 61000-4-2	Contact discharge	$C = 150 \text{ pF}$ , $R = 330 \Omega$	ESD	30 kV
	Air discharge			30 kV

**ORDERING INFORMATION TABLE**

Device code	T	2K	N	xxx	A	H	M3
	(1)	(2)	(3)	(4)	(5)	(6)	(7)

- 1** - Vishay PAR® TVS product
- 2** - Peak pulse power rating (2K = 2000 W)
- 3** - Package type (N = DFN package)
- 4** - Nominal breakdown voltage
- 5** - Breakdown voltage tolerance and polarity (A  $\pm$  5 %, unidirectional)
- 6** - Quality grade (H = AEC-Q101 qualified, otherwise = industry grade)
- 7** - Material / Environment category (M3 = halogen-free, RoHS-compliant, and termination lead (Pb)-free)

<b>ORDERING INFORMATION</b> (Example)				
PREFERRED P/N	UNIT WEIGHT (g)	PREFERRED PACKAGE CODE	BASE QUANTITY	DELIVERY MODE
T2KN12AHM3/H <sup>(1)</sup>	0.094	H	1500	7" diameter plastic tape and reel
T2KN12AHM3/I <sup>(1)</sup>	0.094	I	6000	13" diameter plastic tape and reel

**Note**
<sup>(1)</sup> AEC-Q101 qualified

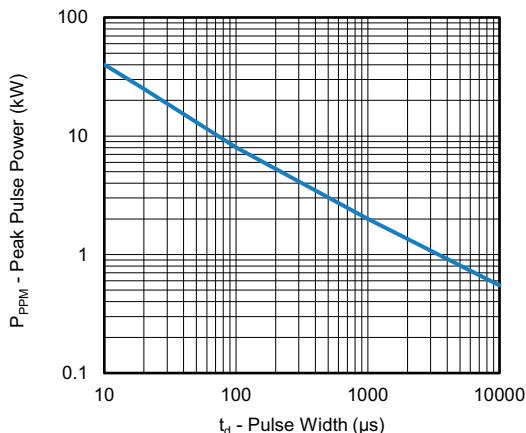
**RATINGS AND CHARACTERISTICS CURVES** ( $T_A = 25^\circ\text{C}$ , unless otherwise noted)


Fig. 1 - Peak Pulse Power Rating Curve

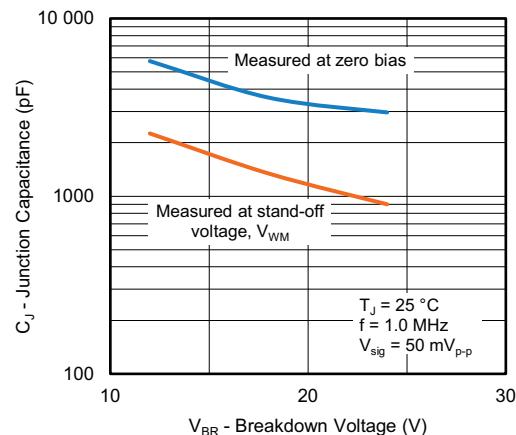


Fig. 4 - Typical Junction Capacitance

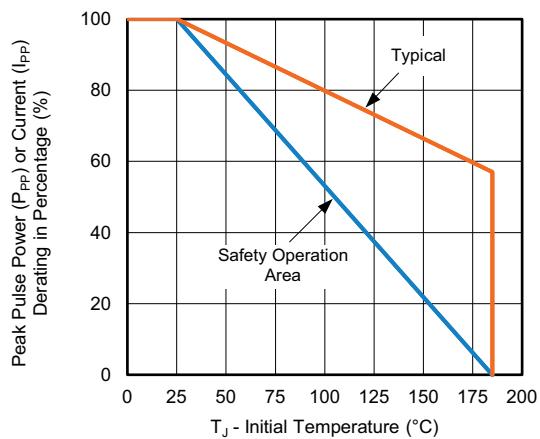


Fig. 2 - Pulse Power or Current vs. Initial Junction Temperature

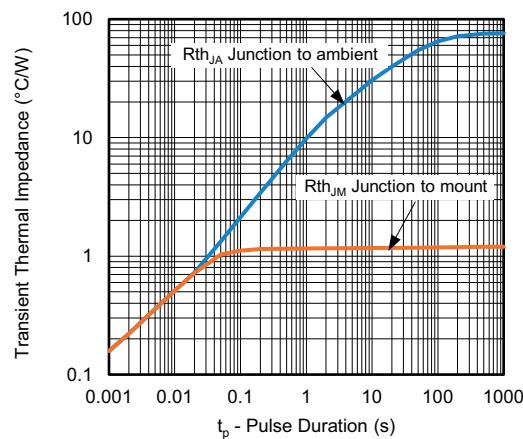


Fig. 5 - Typical Transient Thermal Impedance

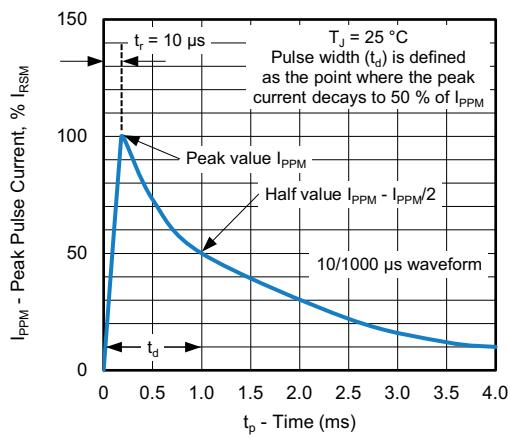
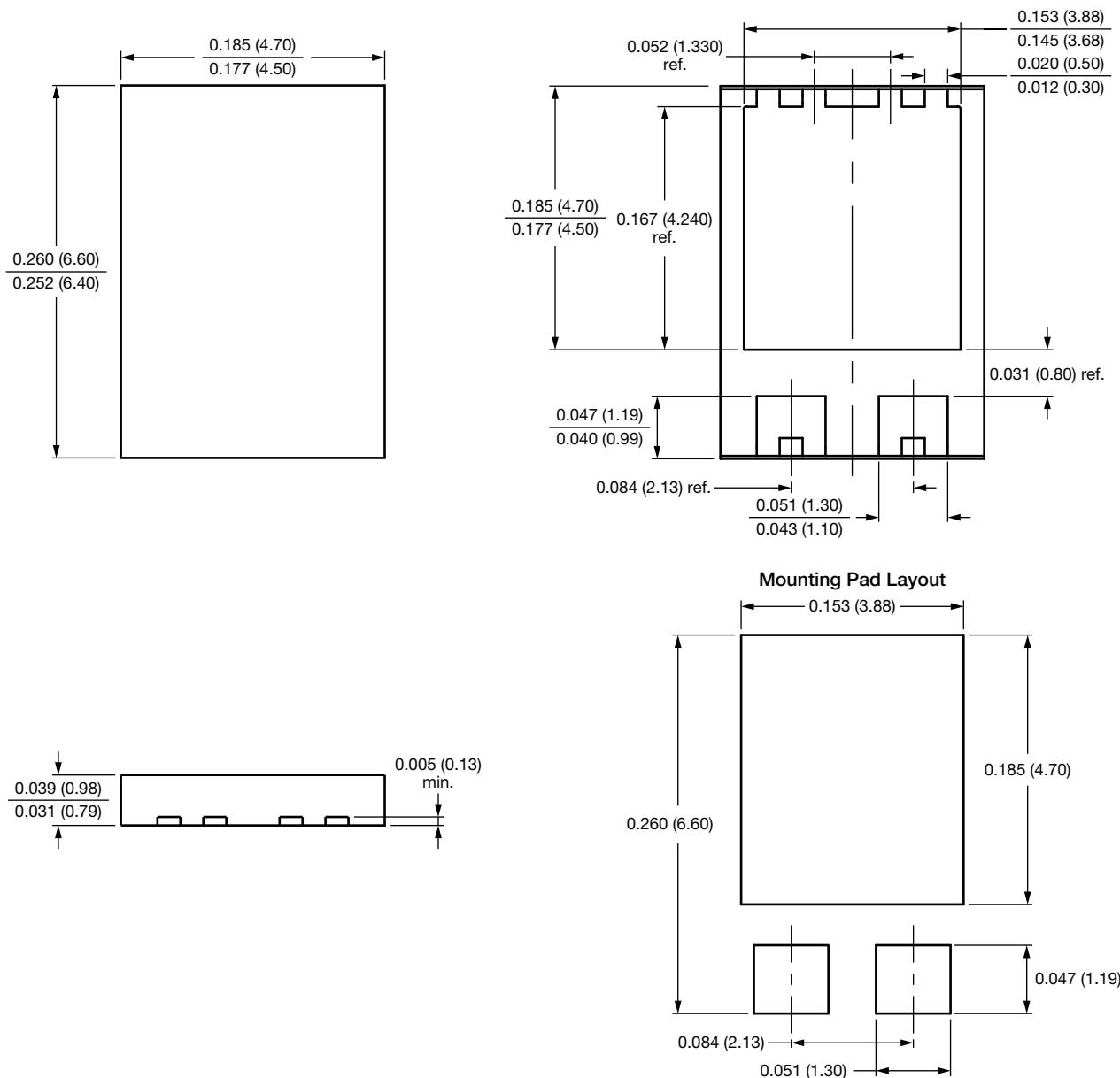


Fig. 3 - Pulse Waveform

**Note**

- Fig. 1, power calculations is based on  $I_{PPM}$  times defined maximum clamping voltage by pulse width

**PACKAGE OUTLINE DIMENSIONS** in inches (millimeters)

**DFN6546A**


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