

# Surface-Mount PAR<sup>®</sup> Transient Voltage Suppressors

High Temperature Stability and High Reliability Conditions



DFN3820A



## LINKS TO ADDITIONAL RESOURCES



PRIMARY CHARACTERISTICS	
$V_{BR}$	12 V to 100 V
$V_{WM}$	10.2 V to 85.5 V
$P_{PPM}$ (10 x 1000 $\mu$ s)	600 W
$T_J$ max.	185 °C
Polarity	Bidirectional
Package	DFN3820A
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
- Bidirectional
- Excellent clamping capability
- Peak pulse power: 600 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 SMP (DO-220AA) package case outline
- Material categorization: for definitions of compliance please see [www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)

AUTOMOTIVE  
GRADE



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: DFN3820A

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:** no cathode band for bidirectional types

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>	$P_{PPM}$	600	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** ( $T_A = 25\text{ }^{\circ}\text{C}$ , unless otherwise noted)

DEVICE TYPE	DEVICE MARKING CODE	BREAKDOWN VOLTAGE $V_{BR}^{(1)}$ 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 $V_{WM}$ $T_J = 150\text{ }^{\circ}\text{C}$ $I_R$ ( $\mu\text{A}$ )	MAXIMUM PEAK PULSE SURGE CURRENT $I_{PPM}^{(2)}$ (A)	MAXIMUM CLAMPING VOLTAGE AT $I_{PPM}$ $V_C$ (V)
		MIN.	NOM.	MAX.						
T6N12CA	ABP	11.4	12.0	12.6	1.0	10.2	2.0	6.0	35.9	16.7
T6N13CA	ABQ	12.4	13.0	13.7	1.0	11.1	2.0	5.0	33.0	18.2
T6N15CA	ABR	14.3	15.0	15.8	1.0	12.8	1.0	5.0	28.3	21.2
T6N16CA	ABS	15.2	16.0	16.8	1.0	13.6	1.0	5.0	26.7	22.5
T6N18CA	ABT	17.1	18.0	18.9	1.0	15.3	1.0	5.0	23.5	25.5
T6N20CA	ABV	19.0	20.0	21.0	1.0	17.1	1.0	5.0	21.7	27.7
T6N22CA	ABW	20.9	22.0	23.1	1.0	18.8	1.0	5.0	19.6	30.6
T6N24CA	ABY	22.8	24.0	25.2	1.0	20.5	1.0	5.0	18.1	33.2
T6N27CA	ABZ	25.7	27.0	28.4	1.0	23.1	1.0	5.0	16.0	37.5
T6N30CA	ACF	28.5	30.0	31.5	1.0	25.6	1.0	5.0	14.5	41.4
T6N33CA	ACG	31.4	33.0	34.7	1.0	28.2	1.0	5.0	13.1	45.7
T6N36CA	ACH	34.2	36.0	37.8	1.0	30.8	1.0	5.0	12.0	49.9
T6N39CA	ACL	37.1	39.0	41.0	1.0	33.3	1.0	5.0	11.1	53.9
T6N43CA	ACM	40.9	43.0	45.2	1.0	36.8	1.0	5.0	10.1	59.3
T6N47CA	ACN	44.7	47.0	49.4	1.0	40.2	1.0	10.0	9.3	64.8
T6N51CA	ACP	48.5	51.0	53.6	1.0	43.6	1.0	10.0	8.6	70.1
T6N56CA	ACQ	53.2	56.0	58.8	1.0	47.8	1.0	10.0	7.8	77.0
T6N62CA	ACR	58.9	62.0	65.1	1.0	53.0	1.0	10.0	7.1	85.0
T6N68CA	ACS	64.6	68.0	71.4	1.0	58.1	1.0	10.0	6.5	92.0
T6N75CA	ACT	71.3	75.0	78.8	1.0	64.1	1.0	10.0	5.8	104
T6N82CA	ACU	77.9	82.0	86.1	1.0	70.1	1.0	10.0	5.3	113
T6N91CA	ACV	86.5	91.0	95.5	1.0	77.8	1.0	10.0	4.8	125
T6N100CA	ACW	95.0	100	105	1.0	85.5	1.0	10.0	4.4	137

**Notes**

- (1) Pulse test:  $t_p \leq 50\text{ ms}$   
(2) Surge current waveform per fig. 3 and derated per fig. 2  
(3) All terms and symbols are consistent with ANSI/IEEE C62.35

**THERMAL CHARACTERISTICS** ( $T_A = 25\text{ }^{\circ}\text{C}$  unless otherwise noted)

PARAMETER	SYMBOL	TYP.	MAX.	UNIT
Thermal resistance	$R_{\theta JA}^{(1)}$	140	175	$^{\circ}\text{C/W}$
	$R_{\theta JM}^{(2)}$	5	6.5	$^{\circ}\text{C/W}$

**Notes**

- (1) Thermal resistance junction-to-ambient to follow JEDEC<sup>®</sup> 51-2A, device mounted on FR4 PCB, 2 oz. standard footprint  
(2) Thermal resistance junction-to-mount to follow JEDEC<sup>®</sup> 51-14 using transient dual interface test method (TDIM)

**IMMUNITY TO STATIC ELECTRICAL DISCHARGE TO THE FOLLOWING STANDARDS**( $T_A = 25\text{ }^{\circ}\text{C}$  unless otherwise noted)

STANDARD	TEST TYPE	TEST CONDITIONS	SYMBOL	VALUE
IEC 61000-4-2	Contact discharge	$C = 150\text{ pF}$ , $R = 330\text{ }\Omega$	ESD	30 kV
	Air discharge			30 kV



## ORDERING INFORMATION TABLE

Device code	T	6	N	xxx	CA	H	M3
	1	2	3	4	5	6	7
1	- Vishay PAR <sup>®</sup> TVS product						
2	- Peak pulse power rating (6 = 600 W)						
3	- Package type (N = DFN package)						
4	- Nominal breakdown voltage						
5	- Breakdown voltage tolerance and polarity (CA $\pm$ 5 %, bidirectional)						
6	- Quality grade (H = AEC-Q101 qualified, - = industry grade)						
7	- Material / Environment category (M3 = halogen-free, RoHS-compliant, and termination lead (Pb)-free)						

ORDERING INFORMATION (Example)				
PREFERRED P/N	UNIT WEIGHT (g)	PREFERRED PACKAGE CODE	BASE QUANTITY	DELIVERY MODE
T6N12CAHM3/H <sup>(1)</sup>	0.023	H	3500	7" diameter plastic tape and reel
T6N12CAHM3/I <sup>(1)</sup>	0.023	I	14 000	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)

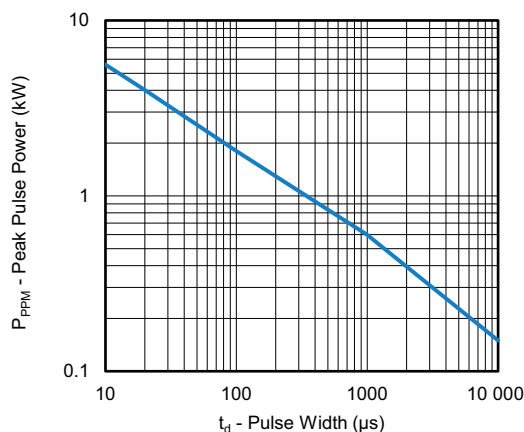


Fig. 1 - Peak Pulse Power Rating Curve

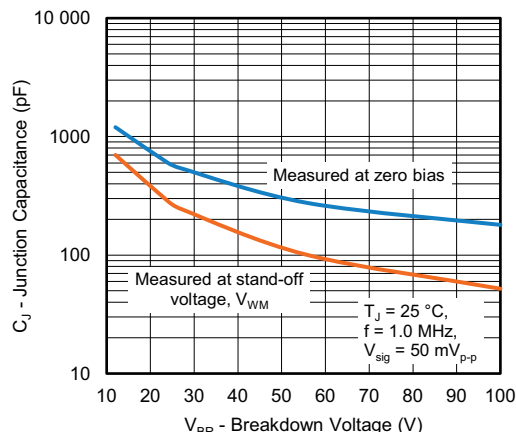


Fig. 4 - Typical Junction Capacitance

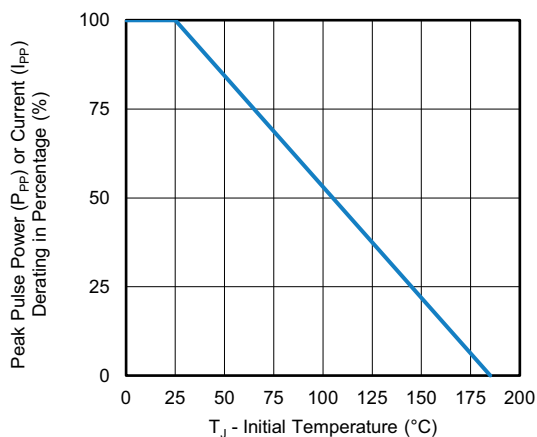


Fig. 2 - Pulse Power or Current vs. Initial Junction Temperature

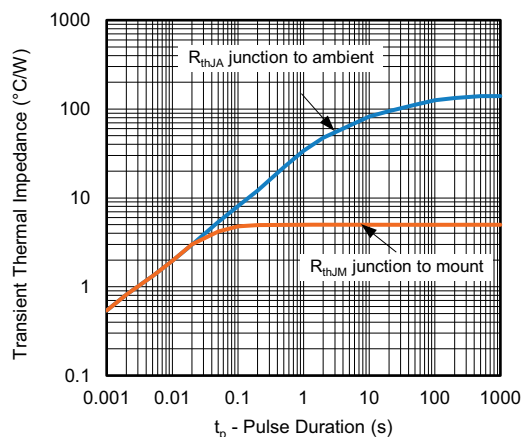


Fig. 5 - Typical Transient Thermal Impedance

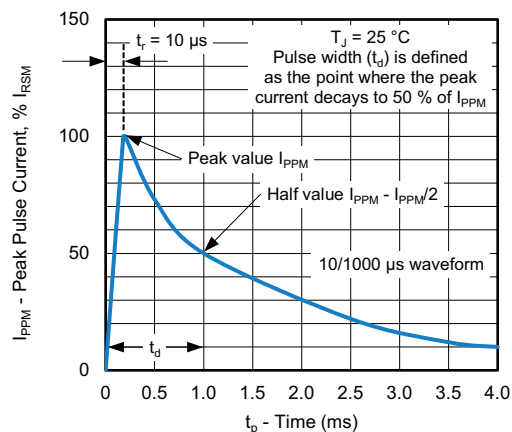


Fig. 3 - Pulse Waveform

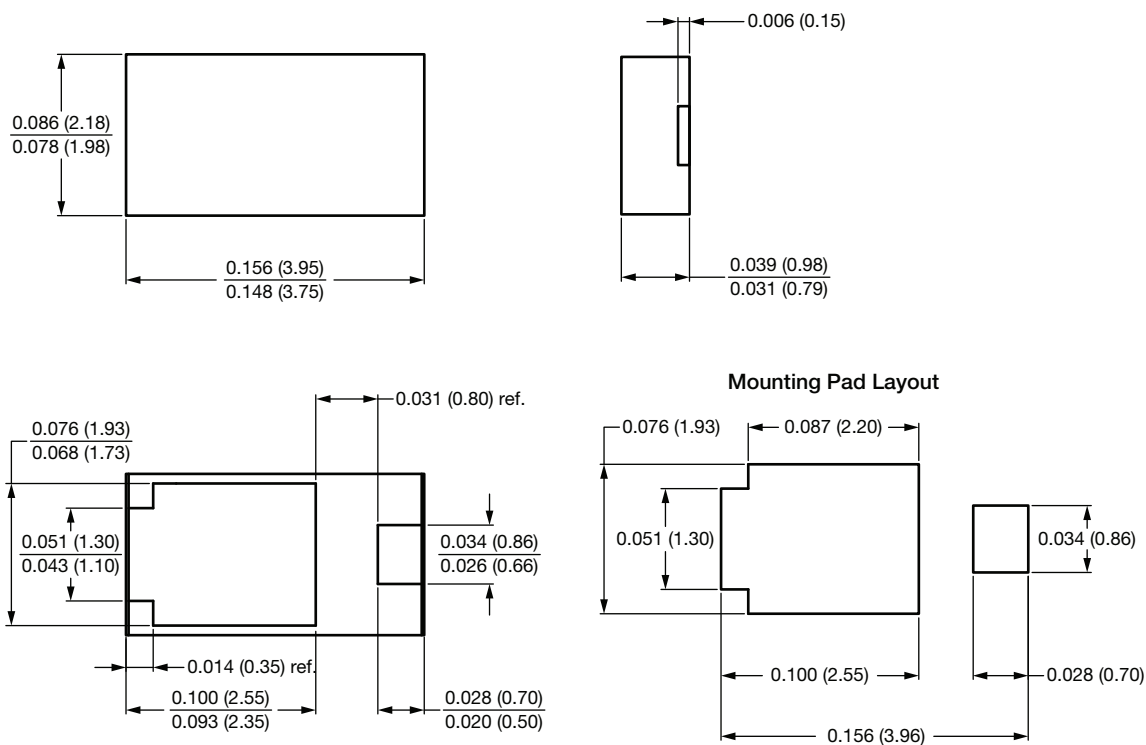
### Note

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



## PACKAGE OUTLINE DIMENSIONS in inches (millimeters)

### DFN3820A





## Disclaimer

ALL PRODUCT, PRODUCT SPECIFICATIONS AND DATA ARE SUBJECT TO CHANGE WITHOUT NOTICE TO IMPROVE RELIABILITY, FUNCTION OR DESIGN OR OTHERWISE.

Vishay Intertechnology, Inc., its affiliates, agents, and employees, and all persons acting on its or their behalf (collectively, "Vishay"), disclaim any and all liability for any errors, inaccuracies or incompleteness contained in any datasheet or in any other disclosure relating to any product.

Vishay makes no warranty, representation or guarantee regarding the suitability of the products for any particular purpose or the continuing production of any product. To the maximum extent permitted by applicable law, Vishay disclaims (i) any and all liability arising out of the application or use of any product, (ii) any and all liability, including without limitation special, consequential or incidental damages, and (iii) any and all implied warranties, including warranties of fitness for particular purpose, non-infringement and merchantability.

Statements regarding the suitability of products for certain types of applications are based on Vishay's knowledge of typical requirements that are often placed on Vishay products in generic applications. Such statements are not binding statements about the suitability of products for a particular application. It is the customer's responsibility to validate that a particular product with the properties described in the product specification is suitable for use in a particular application. Parameters provided in datasheets and / or specifications may vary in different applications and performance may vary over time. All operating parameters, including typical parameters, must be validated for each customer application by the customer's technical experts. Product specifications do not expand or otherwise modify Vishay's terms and conditions of purchase, including but not limited to the warranty expressed therein.

Hyperlinks included in this datasheet may direct users to third-party websites. These links are provided as a convenience and for informational purposes only. Inclusion of these hyperlinks does not constitute an endorsement or an approval by Vishay of any of the products, services or opinions of the corporation, organization or individual associated with the third-party website. Vishay disclaims any and all liability and bears no responsibility for the accuracy, legality or content of the third-party website or for that of subsequent links.

Except as expressly indicated in writing, Vishay products are not designed for use in medical, life-saving, or life-sustaining applications or for any other application in which the failure of the Vishay product could result in personal injury or death. Customers using or selling Vishay products not expressly indicated for use in such applications do so at their own risk. Please contact authorized Vishay personnel to obtain written terms and conditions regarding products designed for such applications.

No license, express or implied, by estoppel or otherwise, to any intellectual property rights is granted by this document or by any conduct of Vishay. Product names and markings noted herein may be trademarks of their respective owners.