

**Product Summary** (@ T<sub>A</sub> = +25°C)

V <sub>BR</sub> (MIN)	I <sub>PP</sub> (MAX)	V <sub>C</sub> (MAX)
6.4V to 224V	1.2A to 43.5A	9.2V to 328V

**Features**

- 400W Peak Pulse Power Dissipation (10µs x 1000µs Waveform)
- 5V to 200V Standoff Voltages
- Provides ESD Protection per IEC61000-4-2 Standard: Air ±30kV, Contact ±30kV
- Excellent Clamping Capability
- Fast Response Time: Typically Less Than 1.0ns for Uni-Direction, Less Than 5.0ns for Bi-Direction, Form 0 Volts to BV Min.
- **Lead-Free Finish; RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- **For automotive applications requiring specific change control (i.e. parts qualified to AEC-Q100/101/200, PPAP capable, and manufactured in IATF 16949 certified facilities), please [contact us](mailto:contact_us) or your local Diodes representative. <https://www.diodes.com/quality/product-definitions/>**

**Description and Applications**

This new generation TVS is designed for transient overvoltage protection. The combination of small size and high ESD surge capability makes it ideal for use in :

- Power management
- Automotive applications
- Battery contacts

**Mechanical Data**

- Package: DO-219AA
- Package Material: Molded Plastic, "Green" Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Matte Tin Finish Annealed over Copper Alloy Leadframe. Solderable per MIL-STD-202, Method 208 <sup>Ⓔ</sup>
- Weight: 0.016 grams (Approximate)
- Polarity: Cathode Band Denotes Uni-Directional Device; None Cathode Band Denotes Bi-Directional Device

**DO-219AA**


Top View



Bi-Directional



Uni-Directional

**Ordering Information** (Note 4)

Part Number	Compliance	Reel Size(inches)	Tape Width(mm)	Quantity per Reel
SMF4Lx.x(C)A-7	Commercial	7	12	3000/Tape & Reel
SMF4Lxx(C)A-7	Commercial	7	12	3000/Tape & Reel
SMF4Lxxx(C)A-7	Commercial	7	12	3000/Tape & Reel

- Notes:
1. EU Directive 2002/95/EC (RoHS), 2011/65/EU (RoHS 2) & 2015/863/EU (RoHS 3) compliant. All applicable RoHS exemptions applied.
  2. See <https://www.diodes.com/quality/lead-free/> for more information about Diodes Incorporated's definitions of Halogen- and Antimony-free, "Green" and Lead-free.
  3. Halogen- and Antimony-free "Green" products are defined as those which contain <900ppm bromine, <900ppm chlorine (<1500ppm total Br + Cl) and <1000ppm antimony compounds.
  4. For packaging details, go to our website at <https://www.diodes.com/design/support/packaging/diodes-packaging/>.

## Marking Information



ZZ = Product Type Marking Code (See Electrical Characteristics Table)  
 YWXX = Date Code Marking  
 Y = Year (ex: 1 = 2021)  
 W = Week Code  
 XX = Journal Lot Code (ex: 0 to 9 and A to Z, (Skip O, I))  
 Bar Denotes Cathode Side

### Date Code Key

Year	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Code	1	2	3	4	5	6	7	8	9	0	1	2

Week	1-26	27-52	53
Code	A-Z	a-z	z

## Maximum Ratings (@ T<sub>A</sub> = +25°C, unless otherwise specified.)

Single phase, half wave, 60Hz, resistive or inductive load.  
 For capacitive load, derate current by 20%.

Characteristic	Symbol	Value	Unit
Peak Pulse Power Dissipation (Note 5) 10/1000µs	P <sub>PK</sub>	400	W
Peak Forward Surge Current, 8.3ms Single Half Sine Wave (Note 6)	I <sub>FSM</sub>	40	A
Maximum Instantaneous Forward Voltage at 16A for Unidirectional Device Only (Note 7)	V <sub>F</sub>	3	V

## Thermal Characteristics

Characteristic	Symbol	Value	Unit
DC Steady-State Power Dissipation (Note 8)	P <sub>D</sub>	1.0	W
Typical Thermal Resistance (Note 9)	R <sub>θJA</sub>	96	°C/W
	R <sub>θJL</sub>	14	
	R <sub>θJC</sub>	18	
Thermal Resistance, Junction to Soldering Point (Note 10)	R <sub>θJS</sub>	70	°C/W
Operating and Storage Temperature Range	T <sub>J</sub> , T <sub>STG</sub>	-55 to +175	°C

- Notes:
5. Non-repetitive current pulse, per figure 4 and derated above T<sub>A</sub> = +25°C, per figure 1.
  6. 1/2 sine wave (or equivalent square wave), pulse width = 8.3ms, duty cycle = 4 pulses/minute maximum.
  7. V<sub>F</sub> max = 3V at I<sub>F</sub> = 16A 300µs square wave pulse.
  8. Device mounted on 1" x 1", FR-4 PCB; 2 oz. Cu pad layout.
  9. Thermal resistance from junction to ambient, lead and case.
  10. Theoretical R<sub>θJS</sub> calculated from the top center of the die straight down to the PCB/cathode tab solder junction.

**Electrical Characteristics** (@ T<sub>A</sub> = +25°C, unless otherwise specified.)

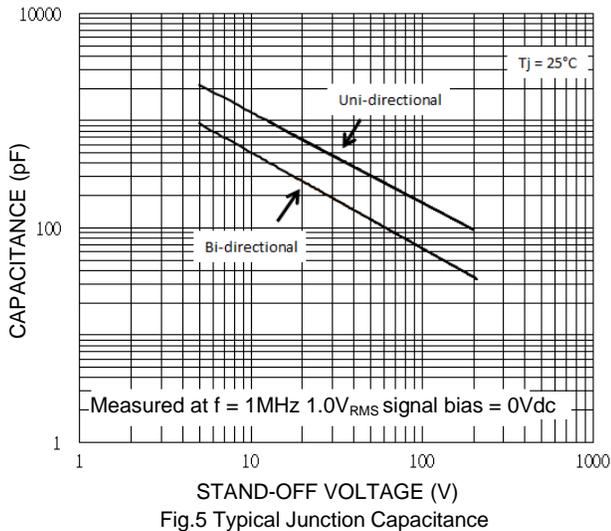
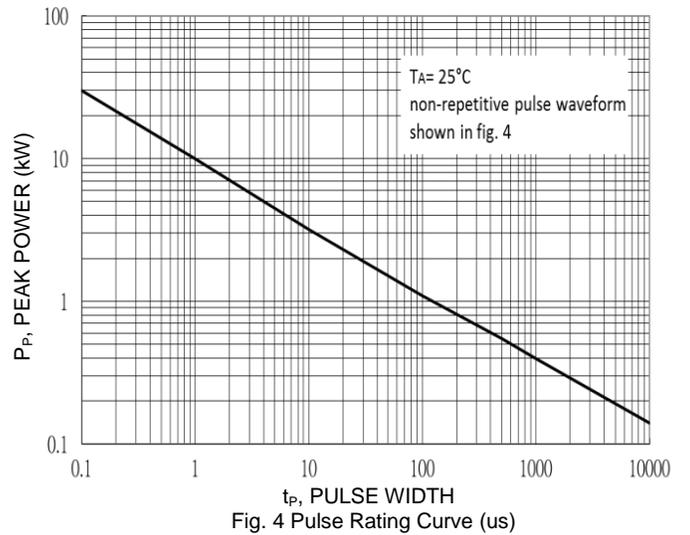
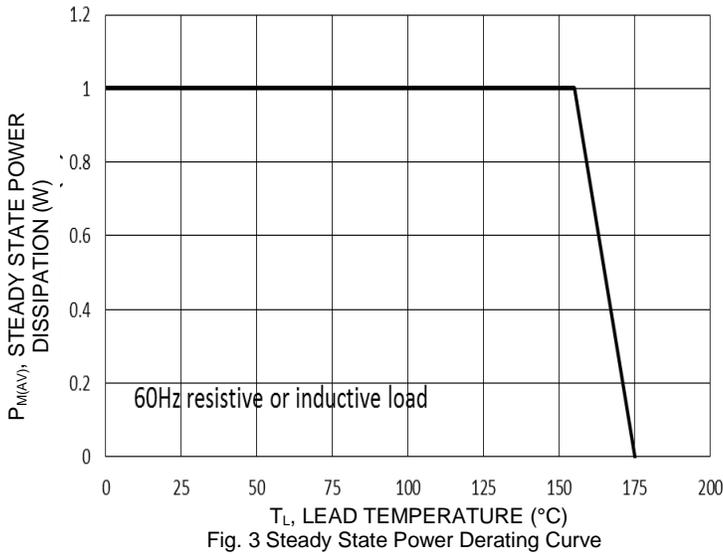
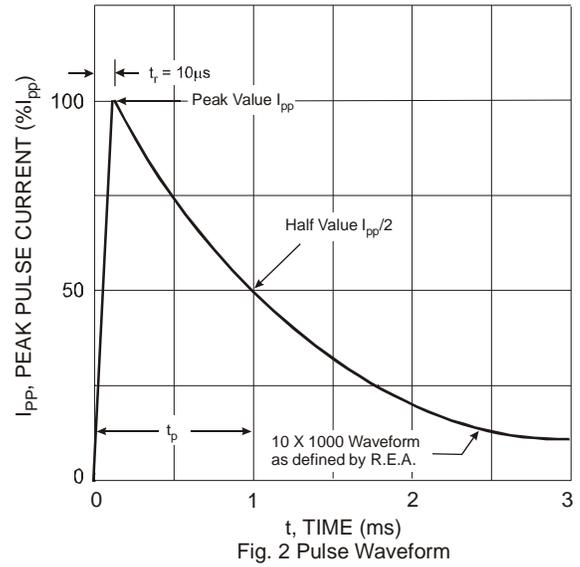
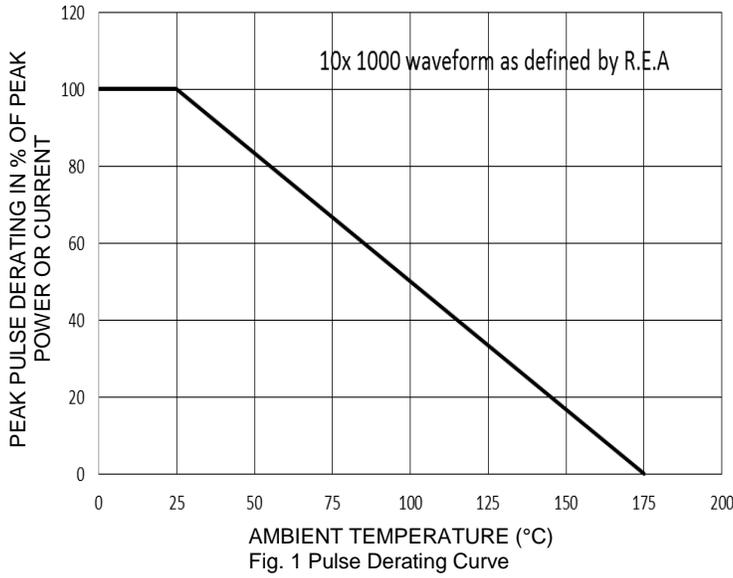
Type Number		Working Peak Reverse Voltage	Breakdown Voltage V <sub>BR</sub> Volts (Note 11)			Maximum Reverse Voltage at I <sub>RSM</sub> (Clamping Voltage)	Maximum Reverse Surge Current	Maximum Reverse Leakage at V <sub>RWM</sub> (Note 12)	Device Marking Code	
			V <sub>RWM</sub> (Volts)	Min	Max				@ I <sub>T</sub> (mA)	V <sub>RSM</sub> (Volts)
SMF4L5.0A	SMF4L5.0CA	5	6.4	7.07	10	9.2	43.5	800	HE	TE
SMF4L6.0A	SMF4L6.0CA	6	6.67	7.37	10	10.3	38.3	800	HG	TG
SMF4L6.5A	SMF4L6.5CA	6.5	7.22	7.98	10	11.2	35.7	500	HK	TK
SMF4L7.0A	SMF4L7.0CA	7	7.78	8.6	10	12	33.3	200	HM	TM
SMF4L7.5A	SMF4L7.5CA	7.5	8.3	9.21	1	12.9	31	100	HP	TP
SMF4L8.0A	SMF4L8.0CA	8	8.89	9.83	1	13.6	29.4	50	HR	TR
SMF4L8.5A	SMF4L8.5CA	8.5	9.44	10.43	1	14.4	27.7	10	HT	TT
SMF4L9.0A	SMF4L9.0CA	9	10	11.1	1	15.4	26	5	HV	TV
SMF4L10A	SMF4L10CA	10	11.1	12.3	1	17	23.5	5	HX	TX
SMF4L11A	SMF4L11CA	11	12.2	13.5	1	18.2	22	0.5	HZ	TZ
SMF4L12A	SMF4L12CA	12	13.3	14.7	1	19.9	20.1	0.5	IE	UE
SMF4L13A	SMF4L13CA	13	14.4	15.9	1	21.5	18.6	0.5	IG	UG
SMF4L14A	SMF4L14CA	14	15.6	17.2	1	23.2	17.2	0.5	IK	UK
SMF4L15A	SMF4L15CA	15	16.7	18.5	1	24.4	16.4	0.5	IM	UM
SMF4L16A	SMF4L16CA	16	17.8	19.7	1	26	15.3	0.5	IP	UP
SMF4L17A	SMF4L17CA	17	18.9	20.9	1	27.6	14.5	0.5	IR	UR
SMF4L18A	SMF4L18CA	18	20	22.1	1	29.2	13.7	0.5	IT	UT
SMF4L20A	SMF4L20CA	20	22.2	24.5	1	32.4	12.3	0.5	IV	UV
SMF4L22A	SMF4L22CA	22	24.4	27	1	35.5	11.2	0.5	IX	UX
SMF4L24A	SMF4L24CA	24	26.7	29.5	1	38.9	10.3	0.5	IZ	UZ
SMF4L26A	SMF4L26CA	26	28.9	31.9	1	42.1	9.5	0.5	JE	VE
SMF4L28A	SMF4L28CA	28	31.1	34.4	1	45.4	8.8	0.5	JG	VG
SMF4L30A	SMF4L30CA	30	33.3	36.8	1	48.4	8.3	0.5	JK	VK
SMF4L33A	SMF4L33CA	33	36.7	40.6	1	53.3	7.5	0.5	JM	VM

Notes: 11. V<sub>BR</sub> measured at pulse test current I<sub>T</sub> with t<sub>p</sub> ≤ 5.0ms at T<sub>A</sub> = +25°C.  
12. The I<sub>R</sub> limit is double for bi directional devices.

**Electrical Characteristics** (@ T<sub>A</sub> = +25°C, unless otherwise specified.) (continued)

Type Number		Working Peak Reverse Voltage	Breakdown Voltage V <sub>BR</sub> Volts (Note 11)			Maximum Reverse Voltage at I <sub>RSM</sub> (Clamping Voltage)	Maximum Reverse Surge Current	Maximum Reverse Leakage at V <sub>RWM</sub> (Note 12)	Device Marking Code	
Uni	Bi	V <sub>RWM</sub> (Volts)	Min	Max	@ I <sub>T</sub> (mA)	V <sub>RSM</sub> (Volts)	I <sub>RSM</sub> (Amps)	I <sub>R</sub> (µA)	Uni	Bi
SMF4L36A	SMF4L36CA	36	40	44.2	1	58.1	6.9	0.5	JP	VP
SMF4L40A	SMF4L40CA	40	44.4	49.1	1	64.5	6.2	0.5	JR	VR
SMF4L43A	SMF4L43CA	43	47.8	52.8	1	69.4	5.7	0.5	JT	VT
SMF4L45A	SMF4L45CA	45	50	55.3	1	72.7	5.5	0.5	JV	VV
SMF4L48A	SMF4L48CA	48	53.3	58.9	1	77.4	5.2	0.5	JX	VX
SMF4L51A	SMF4L51CA	51	56.7	62.7	1	82.4	4.9	0.5	JZ	VZ
SMF4L54A	SMF4L54CA	54	60	66.3	1	87.1	4.6	0.5	RE	WE
SMF4L58A	SMF4L58CA	58	64.4	71.2	1	93.6	4.3	0.5	RG	WG
SMF4L60A	SMF4L60CA	60	66.7	73.7	1	96.8	4.1	0.5	PK	WK
SMF4L64A	SMF4L64CA	64	71.1	78.6	1	103	3.9	0.5	RM	WM
SMF4L70A	SMF4L70CA	70	77.8	86	1	113	3.5	0.5	RP	WP
SMF4L75A	SMF4L75CA	75	83.3	92.1	1	121	3.3	0.5	RR	WR
SMF4L78A	SMF4L78CA	78	86.7	95.8	1	126	3.2	0.5	RT	WT
SMF4L85A	SMF4L85CA	85	94.4	104	1	137	2.9	0.5	RV	WV
SMF4L90A	SMF4L90CA	90	100	111	1	146	2.7	0.5	RX	WX
SMF4L100A	SMF4L100CA	100	111	123	1	162	2.5	0.5	RZ	WZ
SMF4L110A	SMF4L110CA	110	122	135	1	177	2.3	0.5	SE	XE
SMF4L120A	SMF4L120CA	120	133	147	1	193	2.0	0.5	SG	XG
SMF4L130A	SMF4L130CA	130	144	159	1	209	1.9	0.5	SK	XK
SMF4L150A	SMF4L150CA	150	167	185	1	243	1.6	0.5	SM	XM
SMF4L160A	SMF4L160CA	160	178	197	1	259	1.5	0.5	SP	XP
SMF4L170A	SMF4L170CA	170	189	209	1	275	1.4	0.5	SR	XR
SMF4L188A	SMF4L188CA	188	209	231	1	328	1.2	0.5	SS	VS
SMF4L200A	SMF4L200CA	200	224	248	1	324	1.2	0.5	ST	YT

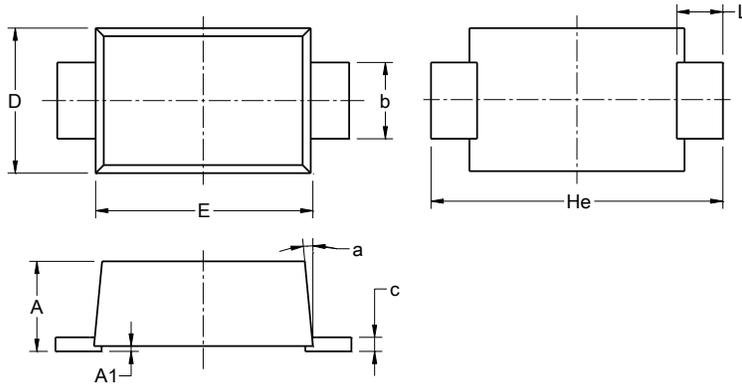
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## Package Outline Dimensions

Please see <http://www.diodes.com/package-outlines.html> for the latest version.

DO-219AA

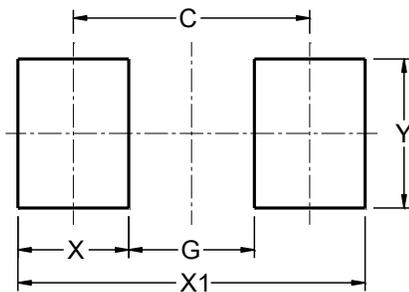


DO-219AA			
Dim	Min	Max	Typ
A	0.81	1.20	1.18
A1	0.03	0.10	0.07
b	0.85	1.15	1.00
c	0.05	0.30	0.15
D	1.70	2.00	1.90
E	2.70	2.90	2.80
He	3.50	3.90	3.80
L	0.45	0.75	0.60
a	0°	8°	5°
All Dimensions in mm			

## Suggested Pad Layout

Please see <http://www.diodes.com/package-outlines.html> for the latest version.

DO-219AA



Dimensions	Value (in mm)
C	2.86
G	1.52
X	1.34
X1	4.20
Y	1.80

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