SMF4L3.3AQ - SMF4L200(C)AQ

400W SURFACE-MOUNT TRANSIENT VOLTAGE SUPPRESSOR

Product Summary (@T_A = +25°C)

V_{BR} (MIN)	I_{PP} (MAX)	V_C (MAX)
4.5V to 224V	1.2A to 43.8A	8.0V to 328V

Features

- 400W Peak Pulse Power Dissipation (10µs × 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)**
- **The SMF4L3.3AQ - SMF4L200(C)AQ are suitable for automotive applications requiring specific change control; these parts are AEC-Q101 qualified, PPAP capable, and manufactured in IATF 16949 certified facilities.** **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
- 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 e3
- 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)

Orderable Part Number	Package	Reel Size (inches)	Tape Width (mm)	Packing	
				Qty.	Carrier
SMF4Lx.x(C)AQ-7	DO-219AA	7	12	3000	Tape & Reel
SMF4Lxx(C)AQ-7	DO-219AA	7	12	3000	Tape & Reel
SMF4Lxxx(C)AQ-7	DO-219AA	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/.

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Marking Information



Bi-Directional



Uni-Directional

ZZ = Product Type Marking Code (See Electrical Characteristics Table)
YWXX = Date Code Marking
Y = Year (ex: 5 = 2025)
W = Week Code
XX = Joumal Lot Code (ex: 0~9 and A~Z, (Skip O, I))
Bar Denotes Cathode Side

Date Code Key

Year	2021	-	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034
Code	1	-	5	6	7	8	9	0	1	2	3	4

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

Maximum Ratings (@T_A = +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_{PK}	400	W
Peak Forward Surge Current, 8.3ms Single Half Sine Wave (Note 6)	I_{FSM}	40	A
Maximum Instantaneous Forward Voltage at 16A for Uni-directional Device Only (Note 7)	V_F	3	V

Thermal Characteristics

Characteristic	Symbol	Value	Unit
DC Steady-State Power Dissipation (Note 8)	P_D	1.0	W
Typical Thermal Resistance (Note 9)	$R_{\Theta JA}$ $R_{\Theta JL}$ $R_{\Theta JC}$	96 14 18	°C/W
Thermal Resistance, Junction to Soldering Point (Note 10)	$R_{\Theta JS}$	70	°C/W
Operating and Storage Temperature Range	T_J, T_{STG}	-55 to +175	°C

Notes:
5. Non-repetitive current pulse, per figure 4 and derated above T_A = +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_F max = 3V at I_F = 16A 300µs square wave pulse.
8. Device mounted on 1" × 1", FR-4 PCB; 2 oz. Cu pad layout.
9. Thermal resistance from junction to ambient, lead and case.
10. Theoretical $R_{\theta JS}$ calculated from the top center of the die straight down to the PCB/cathode tab solder junction.

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Electrical Characteristics (T_A = +25°C, unless otherwise specified.)

Type Number		Working Peak Reverse Voltage	Breakdown Voltage V_{BR} Volts (Note 11)			Maximum Reverse Voltage at I_{RSM} (Clamping Voltage)	Maximum Reverse Surge Current	Maximum Reverse Leakage at V_{RWM} (Note 12)	Device Marking Code	
Uni	Bi	V_{RWM} (Volts)	Min	Max	@I_T (mA)	V_{RSM} (Volts)	I_{RSM} (Amps)	I_R (µA)	Uni	Bi
SMF4L3.3AQ	—	3.3	4.5	6.0	10	8	43.8	100	HD	—
SMF4L5.0AQ	SMF4L5.0CAQ	5	6.4	7.07	10	9.2	43.5	800	HE	TE
SMF4L6.0AQ	SMF4L6.0CAQ	6	6.67	7.37	10	10.3	38.3	800	HG	TG
SMF4L6.5AQ	SMF4L6.5CAQ	6.5	7.22	7.98	10	11.2	35.7	500	HK	TK
SMF4L7.0AQ	SMF4L7.0CAQ	7	7.78	8.6	10	12	33.3	200	HM	TM
SMF4L7.5AQ	SMF4L7.5CAQ	7.5	8.3	9.21	1	12.9	31	100	HP	TP
SMF4L8.0AQ	SMF4L8.0CAQ	8	8.89	9.83	1	13.6	29.4	50	HR	TR
SMF4L8.5AQ	SMF4L8.5CAQ	8.5	9.44	10.43	1	14.4	27.7	10	HT	TT
SMF4L9.0AQ	SMF4L9.0CAQ	9	10	11.1	1	15.4	26	5	HV	TV
SMF4L10AQ	SMF4L10CAQ	10	11.1	12.3	1	17	23.5	5	HX	TX
SMF4L11AQ	SMF4L11CAQ	11	12.2	13.5	1	18.2	22	0.5	HZ	TZ
SMF4L12AQ	SMF4L12CAQ	12	13.3	14.7	1	19.9	20.1	0.5	IE	UE
SMF4L13AQ	SMF4L13CAQ	13	14.4	15.9	1	21.5	18.6	0.5	IG	UG
SMF4L14AQ	SMF4L14CAQ	14	15.6	17.2	1	23.2	17.2	0.5	IK	UK
SMF4L15AQ	SMF4L15CAQ	15	16.7	18.5	1	24.4	16.4	0.5	IM	UM
SMF4L16AQ	SMF4L16CAQ	16	17.8	19.7	1	26	15.3	0.5	IP	UP
SMF4L17AQ	SMF4L17CAQ	17	18.9	20.9	1	27.6	14.5	0.5	IR	UR
SMF4L18AQ	SMF4L18CAQ	18	20	22.1	1	29.2	13.7	0.5	IT	UT
SMF4L20AQ	SMF4L20CAQ	20	22.2	24.5	1	32.4	12.3	0.5	IV	UV
SMF4L22AQ	SMF4L22CAQ	22	24.4	27	1	35.5	11.2	0.5	IX	UX
SMF4L24AQ	SMF4L24CAQ	24	26.7	29.5	1	38.9	10.3	0.5	IZ	UZ
SMF4L26AQ	SMF4L26CAQ	26	28.9	31.9	1	42.1	9.5	0.5	JE	VE
SMF4L28AQ	SMF4L28CAQ	28	31.1	34.4	1	45.4	8.8	0.5	JG	VG
SMF4L30AQ	SMF4L30CAQ	30	33.3	36.8	1	48.4	8.3	0.5	JK	VK
SMF4L33AQ	SMF4L33CAQ	33	36.7	40.6	1	53.3	7.5	0.5	JM	VM

Notes: 11. V_{BR} measured at pulse test current I_T with $t_P \leq 5.0$ms at T_A = +25°C.
12. The I_R limit is double for Bi-directional devices.

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Electrical Characteristics (@T_A = +25°C, unless otherwise specified.) (continued)

Type Number		Working Peak Reverse Voltage	Breakdown Voltage V_{BR} Volts (Note 11)			Maximum Reverse Voltage at I_{RSM} (Clamping Voltage)	Maximum Reverse Surge Current	Maximum Reverse Leakage at V_{RWM} (Note 12)	Device Marking Code	
Uni	Bi	V_{RWM} (Volts)	Min	Max	@I_T (mA)	V_{RSM} (Volts)	I_{RSM} (Amps)	I_R (µA)	Uni	Bi
SMF4L36AQ	SMF4L36CAQ	36	40	44.2	1	58.1	6.9	0.5	JP	VP
SMF4L40AQ	SMF4L40CAQ	40	44.4	49.1	1	64.5	6.2	0.5	JR	VR
SMF4L43AQ	SMF4L43CAQ	43	47.8	52.8	1	69.4	5.7	0.5	JT	VT
SMF4L45AQ	SMF4L45CAQ	45	50	55.3	1	72.7	5.5	0.5	JV	VV
SMF4L48AQ	SMF4L48CAQ	48	53.3	58.9	1	77.4	5.2	0.5	JX	VX
SMF4L51AQ	SMF4L51CAQ	51	56.7	62.7	1	82.4	4.9	0.5	JZ	VZ
SMF4L54AQ	SMF4L54CAQ	54	60	66.3	1	87.1	4.6	0.5	RE	WE
SMF4L58AQ	SMF4L58CAQ	58	64.4	71.2	1	93.6	4.3	0.5	RG	WG
SMF4L60AQ	SMF4L60CAQ	60	66.7	73.7	1	96.8	4.1	0.5	PK	WK
SMF4L64AQ	SMF4L64CAQ	64	71.1	78.6	1	103	3.9	0.5	RM	WM
SMF4L70AQ	SMF4L70CAQ	70	77.8	86	1	113	3.5	0.5	RP	WP
SMF4L75AQ	SMF4L75CAQ	75	83.3	92.1	1	121	3.3	0.5	RR	WR
SMF4L78AQ	SMF4L78CAQ	78	86.7	95.8	1	126	3.2	0.5	RT	WT
SMF4L85AQ	SMF4L85CAQ	85	94.4	104	1	137	2.9	0.5	RV	WV
SMF4L90AQ	SMF4L90CAQ	90	100	111	1	146	2.7	0.5	RX	WX
SMF4L100AQ	SMF4L100CAQ	100	111	123	1	162	2.5	0.5	RZ	WZ
SMF4L110AQ	SMF4L110CAQ	110	122	135	1	177	2.3	0.5	SE	XE
SMF4L120AQ	SMF4L120CAQ	120	133	147	1	193	2.0	0.5	SG	XG
SMF4L130AQ	SMF4L130CAQ	130	144	159	1	209	1.9	0.5	SK	XK
SMF4L150AQ	SMF4L150CAQ	150	167	185	1	243	1.6	0.5	SM	XM
SMF4L160AQ	SMF4L160CAQ	160	178	197	1	259	1.5	0.5	SP	XP
SMF4L170AQ	SMF4L170CAQ	170	189	209	1	275	1.4	0.5	SR	XR
SMF4L188AQ	SMF4L188CAQ	188	209	231	1	328	1.2	0.5	SS	VS
SMF4L200AQ	SMF4L200CAQ	200	224	248	1	324	1.2	0.5	ST	YT

Notes: 11. V_{BR} measured at pulse test current I_T with $t_P \leq 5.0$ms at T_A = +25°C.
12. The I_R limit is double for Bi-directional devices.

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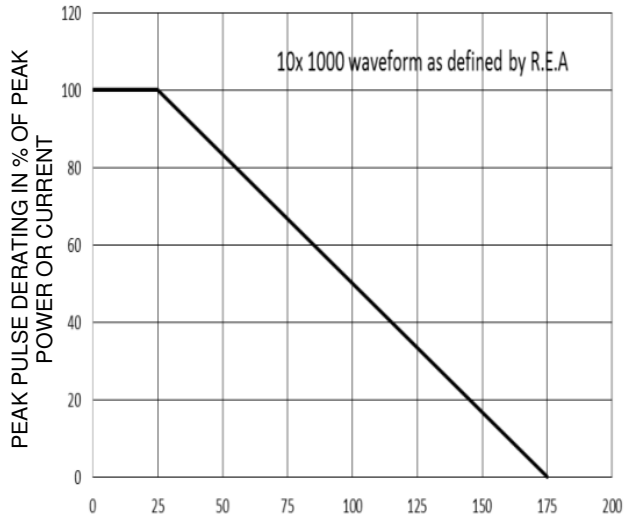


Fig. 1 Pulse Derating Curve

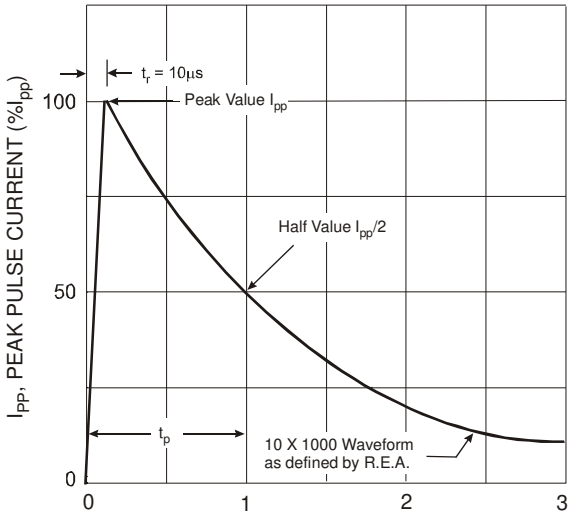


Fig. 2 Pulse Waveform

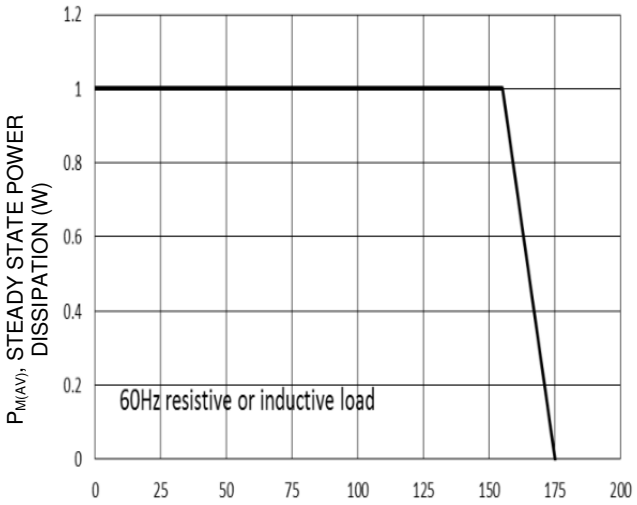


Fig. 3 Steady State Power Derating Curve

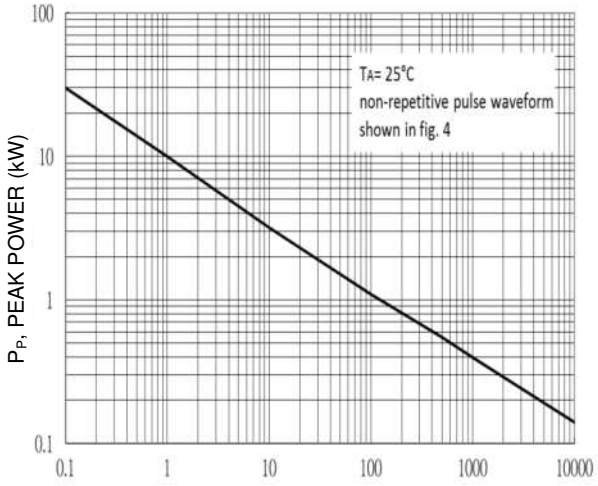


Fig. 4 Pulse Rating Curve

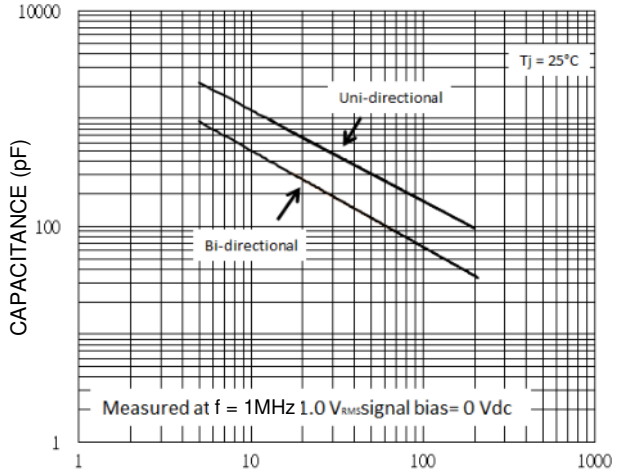


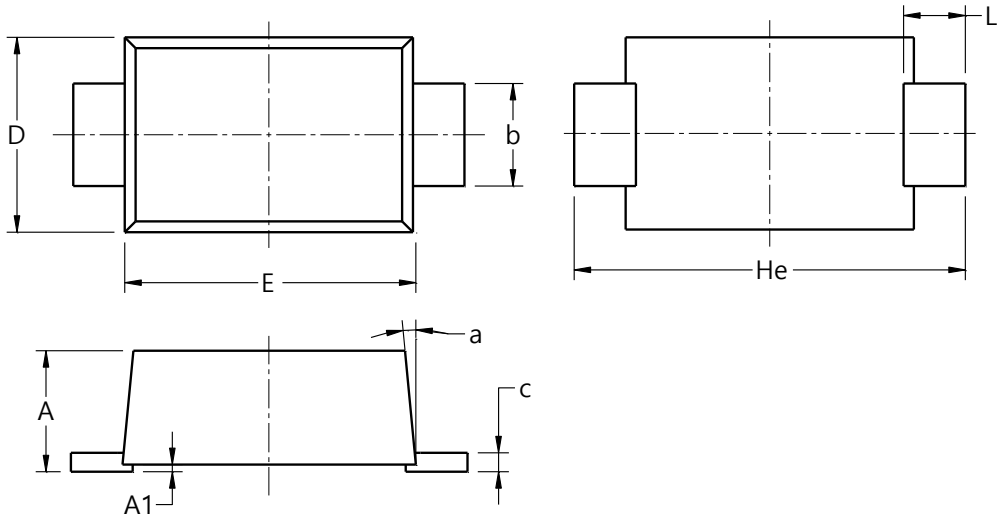
Fig.5 Typical Junction Capacitance

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Package Outline Dimensions

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

DO-219AA

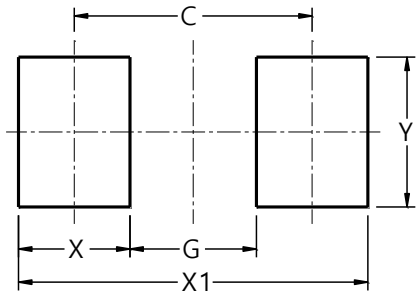


DO-219AA			
Dim	**Min**	**Max**	**Typ**
A	0.81	1.20	1.18
A1	0.03	0.10	0.07
b	0.85	1.15	1.00
c	0.05	0.30	0.15
D	1.70	2.00	1.90
E	2.70	2.90	2.80
He	3.50	3.90	3.80
L	0.45	0.75	0.60
a	0°	8°	5°
All Dimensions in mm			

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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