

SM24CANA Series 200W TVS Diode Array

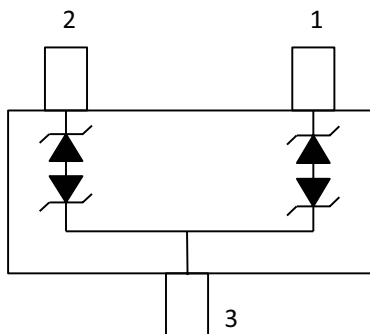


Description

The SM24CANA TVS Diode Array is designed to protect automotive Controller Area Network (CAN) lines from damage due to electrostatic discharge (ESD), electrical fast transient (EFT), and other overvoltage transients.

The SM24CANA Series can absorb repetitive ESD strikes above the maximum level specified in the IEC61000-4-2 international standard without performance degradation and safely dissipate 3A of 8/20s surge current (IEC61000-4-5) with very low clamping voltages.

Pinout and Functional Block Diagram



Features

- ESD, IEC61000-4-2, $\pm 24\text{kV}$ contact, $\pm 30\text{kV}$ air
- EFT, IEC61000-4-4, 50A (5/50ns)
- Lightning, IEC61000-4-5, 3A ($t_p=8/20\mu\text{s}$)
- Low clamping voltage
- Low leakage current
- AEC-Q101 qualified

Applications

- CAN Bus Protection
- Automotive Applications

Life Support Note:

Not Intended for Use in Life Support or Life Saving Applications

The products shown herein are not designed for use in life sustaining or life saving applications unless otherwise expressly indicated.

Absolute Maximum Ratings

Symbol	Parameter	Value	Units
P_{PK}	Peak Pulse Power ($t_p=8/20\mu s$)	200	W
I_{PP}	Peak Pulse Current ($t_p=8/20\mu s$)	3.0	A
T_{OP}	Operating Temperature	-40 to 125	°C
T_{STOR}	Storage Temperature	-55 to 150	°C

Notes:

CAUTION: Stresses above those listed in "Absolute Maximum Ratings" may cause permanent damage to the device. This is a stress only rating and operation of the device at these or any other conditions above those indicated in the operational sections of this specification is not implied.

Thermal Information

Parameter	Rating	Units
Storage Temperature Range	-55 to 150	°C
Maximum Junction Temperature	150	°C
Maximum Lead Temperature (Soldering 20-40s)	260	°C

SM24CANA Electrical Characteristics ($T_{OP}=25^\circ C$)

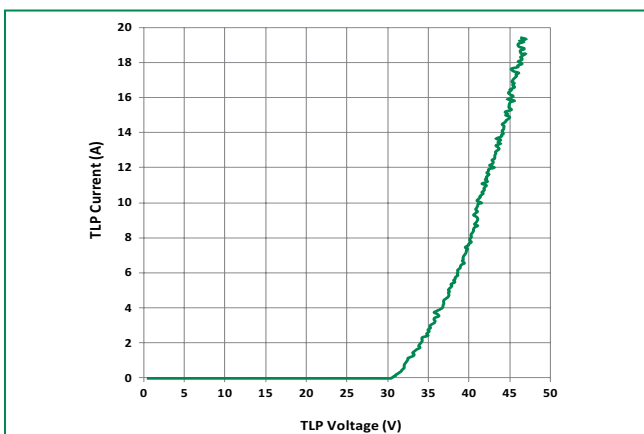
Parameter	Symbol	Test Conditions	Min	Typ	Max	Units
Reverse Standoff Voltage	V_{RWM}	$I_R \leq 1\mu A$, Pin1 or Pin2 to Pin3			24.0	V
Reverse Breakdown Voltage	V_{BR}	$I_R = 1mA$, Pin1 or Pin2 to Pin3	26.7			V
Leakage Current	I_{LEAK}	$V_R = 24V$			1.0	μA
Clamp Voltage ¹	V_C	$I_{PP} = 1A$, $t_p = 8/20\mu s$, Pin 1 or Pin 2 to Pin 3			36.0	V
		$I_{PP} = 3A$, $t_p = 8/20\mu s$, Pin 1 or Pin 2 to Pin 3			50.0	V
Dynamic Resistance ²	R_{DYN}	TLP, $t_p = 100ns$, I/O to GND		0.7		Ω
ESD Withstand Voltage ¹	V_{ESD}	IEC61000-4-2 (Contact Discharge)	± 24			kV
		IEC61000-4-2 (Air Discharge)	± 30			kV
Diode Capacitance ¹	$C_{I/O-GND}$	Reverse Bias=0V, f=1MHz; Pin 1 or Pin2 to Pin 3		11	17	pF

Note:

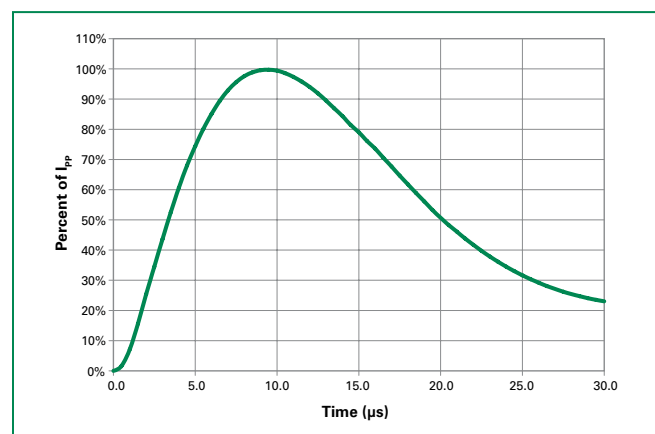
¹ Parameter is guaranteed by design and/or device characterization.

² Transmission Line Pulse (TLP) with 100ns width and 200ps rise time.

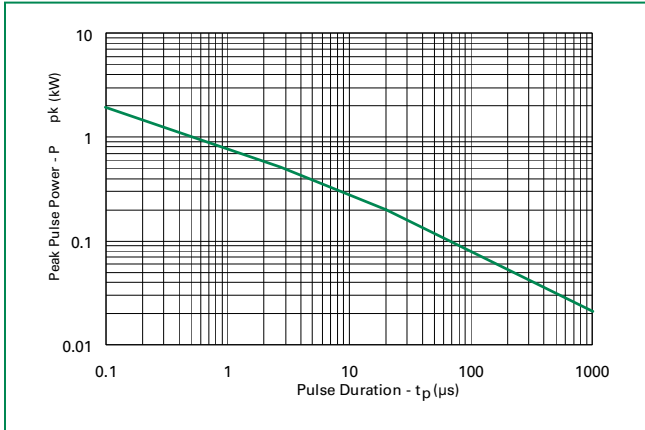
Transmission Line Pulsing (TLP) Plot



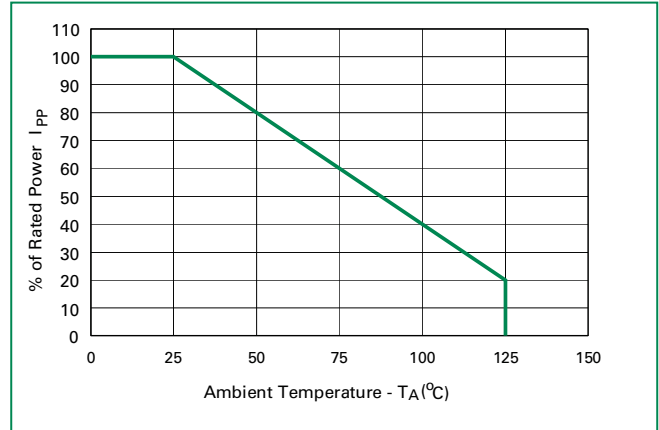
Pulse Waveform



Non-Repetitive Peak Pulse Power vs. Pulse Time



Power Derating Curve



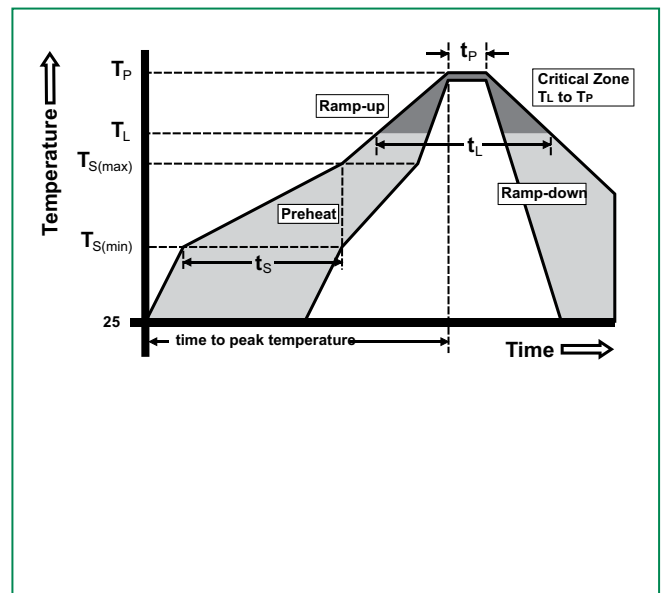
Product Characteristics

Lead Plating	Matte Tin
Lead Material	Copper Alloy
Lead Coplanarity	0.0004 inches (0.102mm)
Substrate material	Silicon
Body Material	Molded Epoxy
Flammability	UL 94 V-0

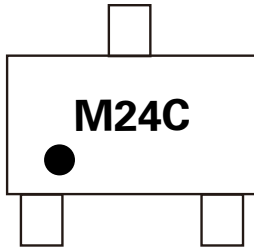
- Notes :
1. All dimensions are in millimeters
 2. Dimensions include solder plating.
 3. Dimensions are exclusive of mold flash & metal burr.
 4. Bto is facing up for mold and facing down for trim/form, i.e. reverse trim/form.
 5. Package surface matte finish VDI 11-13.

Soldering Parameters

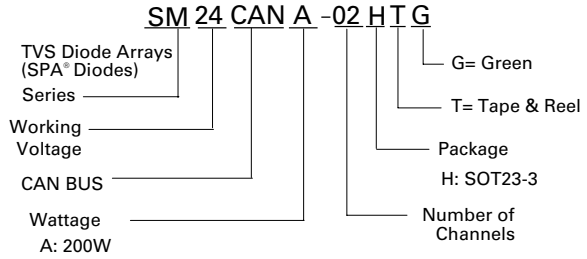
Reflow Condition	Pb – Free assembly	
Pre Heat	- Temperature Min ($T_{s(min)}$)	150°C
	- Temperature Max ($T_{s(max)}$)	200°C
	- Time (min to max) (t_s)	60 – 180 secs
Average ramp up rate (Liquidus) Temp (T_L) to peak	3°C/second max	
$T_{s(max)}$ to T_L - Ramp-up Rate	3°C/second max	
Reflow	- Temperature (T_L) (Liquidus)	217°C
	- Temperature (t_t)	60 – 150 seconds
Peak Temperature (T_p)	260 $^{+0/-5}$ °C	
Time within 5°C of actual peak Temperature (t_p)	20 – 40 seconds	
Ramp-down Rate	6°C/second max	
Time 25°C to peak Temperature (T_p)	8 minutes Max.	
Do not exceed	260°C	



Part Marking System



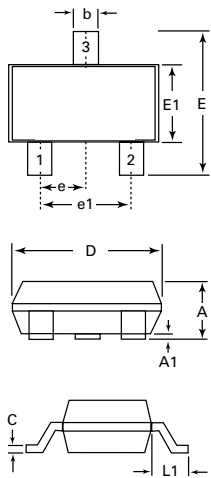
Part Numbering System



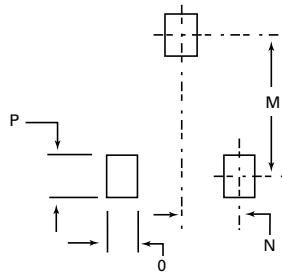
Ordering Information

Part Number	Package	Marking	Min. Order Qty.
SM24CANA-02HTG	SOT23-3	M24C	3000

Package Dimensions – SOT23-3

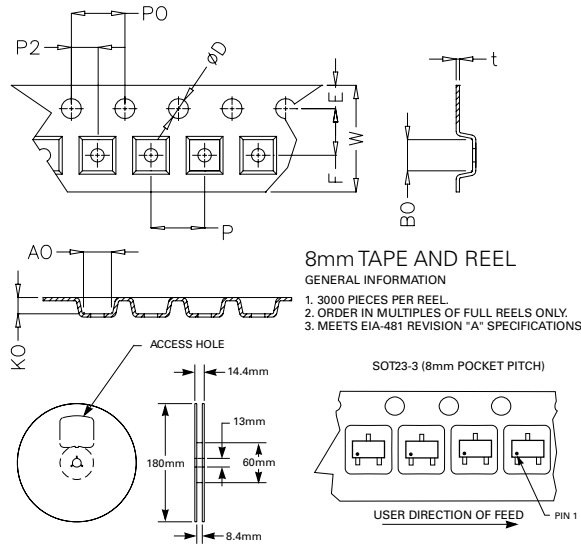


Recommended Pad Layout



Package	SOT23-3			
Pins	3			
JEDEC	TO-236			
	Millimeters		Inches	
	Min	Max	Min	Max
A	0.89	1.12	0.035	0.044
A1	0.01	0.10	0.0004	0.004
b	0.30	0.50	0.012	0.020
c	0.08	0.2	0.003	0.008
D	2.80	3.04	0.110	0.120
E	2.10	2.64	0.083	0.104
E1	1.20	1.40	0.047	0.055
e	0.95 BSC		0.038 BSC	
e1	1.90 BSC		0.075 BSC	
L1	0.54 REF		0.021 REF	
M		2.29		0.090
N		0.95		0.038
O		0.78		0.030TYP
P		0.78		0.030TYP

Embossed Carrier Tape & Reel Specification – SOT23-3



Symbol	Millimetres		Inches	
	Min	Max	Min	Max
E	1.65	1.85	0.065	0.073
F	3.40	3.60	0.134	0.142
P2	1.90	2.10	0.075	0.083
D	1.40	1.60	0.055	0.063
P0	3.90	4.10	0.154	0.161
W	7.70	8.30	0.303	0.327
P	3.90	4.10	0.154	0.161
A0	3.05	3.25	0.120	0.128
B0	2.67	2.87	0.105	0.113
K0	1.12	1.32	0.044	0.052
t	0.22	0.24	0.009	0.009

