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SM24CANB Series 500W TVS Diode Array

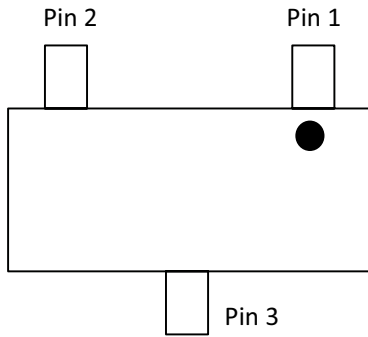


Description

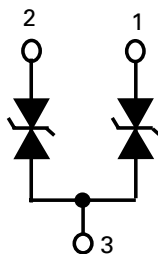
The SM24CANB TVS Diode Array is designed to protect automotive Controller Area Network (CAN) lines from damage due to electrostatic discharge (ESD), electrical fast transient (EFT), and other overvoltage transients.

The SM24CANB Series can absorb repetitive ESD strikes above the maximum level specified in the IEC 61000-4-2 international standard without performance degradation and safely dissipate 10A of 8/20s surge current (IEC 61000-4-5) with very low clamping voltages.

Pinout and Functional Block Diagram



Functional Block Diagram



Features

- ESD, IEC 61000-4-2, ±30kV contact, ±30kV air
- EFT, IEC 61000-4-4, 40A (5/50ns)
- RoHS compliant and Lead-free
- Lightning, IEC 61000-4-5 2nd edition, 10A (tp=8/20µs)
- Low clamping voltage
- Low leakage current
- AEC-Q101 qualified

Applications

- CAN Bus Protection
- Automotive Networks
- On-Board Diagnostics
- Sensors, Actuators
- EnergyBus
- Industrial Control Networks
- Device Net
- Safety BUS
- CAN open

Additional Information



Datasheet



Resources



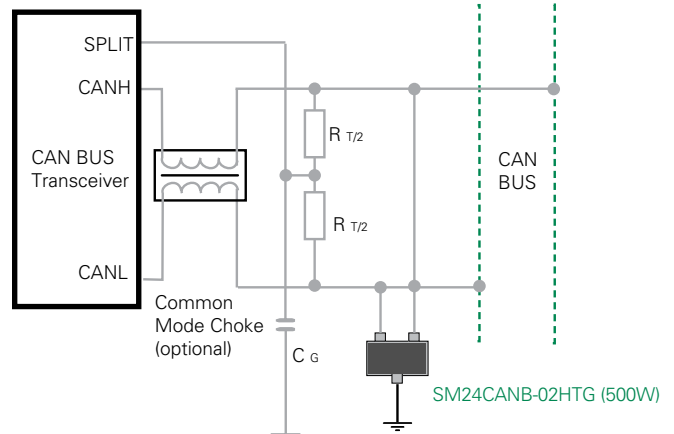
Samples

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.

Application Example



Absolute Maximum Ratings

Symbol	Parameter	Value	Units
P_{PK}	Peak Pulse Power ($t_p=8/20\mu s$)	500	W
I_{PP}	Peak Pulse Current ($t_p=8/20\mu s$)	10.0	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

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

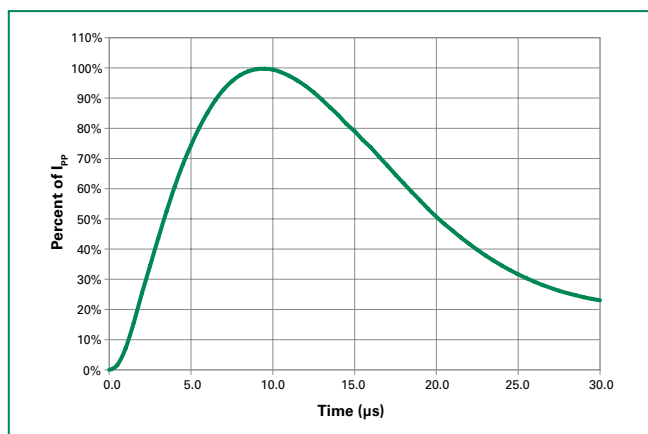
Parameter	Symbol	Test Conditions	Min	Typ	Max	Units
Reverse Standoff Voltage	V_{RWM}	$I_R \leq 1\mu A$, Pin1 or Pin2 to Pin3			24.0	V
Reverse Breakdown Voltage	V_{BR}	$I_T=1mA$, Pin1 or Pin2 to Pin3	26.7			V
Leakage Current	I_{LEAK}	$V_R=24V$, Pin1 or Pin2 to Pin3			0.1	μA
Clamp Voltage ¹	V_C	$I_{PP}=1A$, $t_p=8/20\mu s$, Pin 1 or Pin 2 to Pin 3			34.0	V
		$I_{PP}=8A$, $t_p=8/20\mu s$, Pin 1 or Pin 2 to Pin 3			46.0	V
		$I_{PP}=10A$, $t_p=8/20\mu s$, Pin 1 or Pin 2 to Pin 3			50	V
Dynamic Resistance ²	R_{DYN}	TLP, $t_p=100ns$, Pin 1 or Pin2 to Pin3		0.6		Ω
ESD Withstand Voltage ¹	V_{ESD}	IEC 61000-4-2 (Contact Discharge)	± 30			kV
		IEC 61000-4-2 (Air Discharge)	± 30			kV
Diode Capacitance ¹	$C_{I/O-GND}$	Reverse Bias=0V, $f=1MHz$; Pin 1 or Pin2 to Pin 3		30		pF

Note:

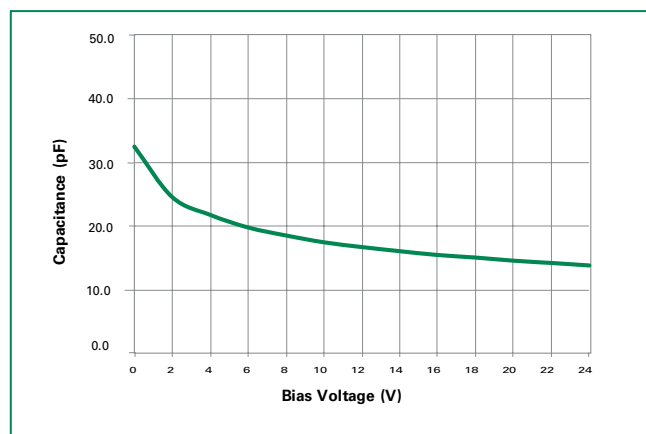
¹ Parameter is guaranteed by design and/or device characterization.

² Transmission Line Pulse (TLP) test setting : Std.TDR(50 Ω), $t_p=100ns$, $t_r=0.2ns$ ITLP and VTLP averaging window: star $t_1=70ns$ to end $t_2=80ns$

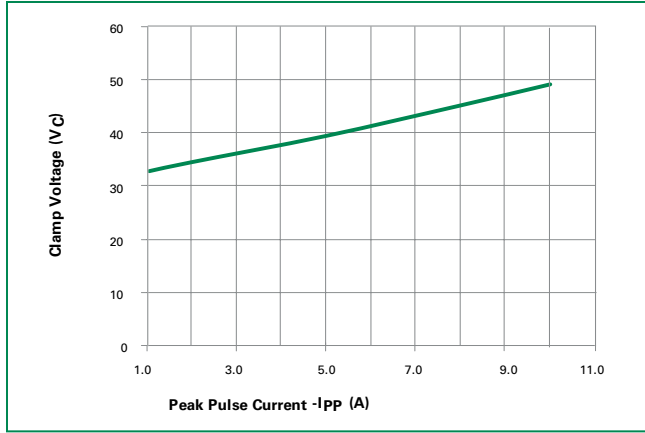
Pulse Waveform



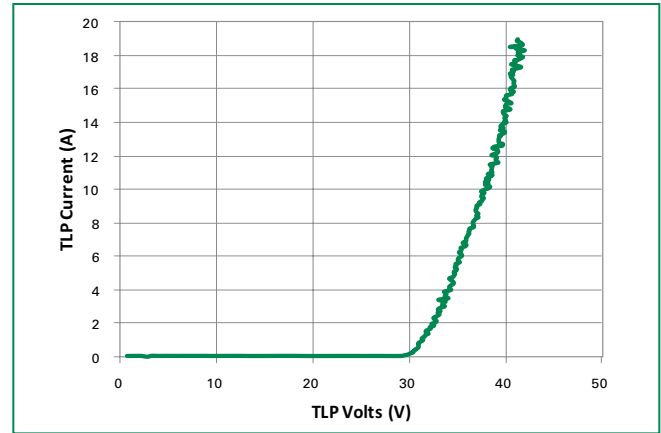
Capacitance vs. Reverse Bias (Pin1 or Pin2 to Pin3)



Clamping Voltage vs. Peak Pulse Current (Pin1 or Pin2 to Pin3)

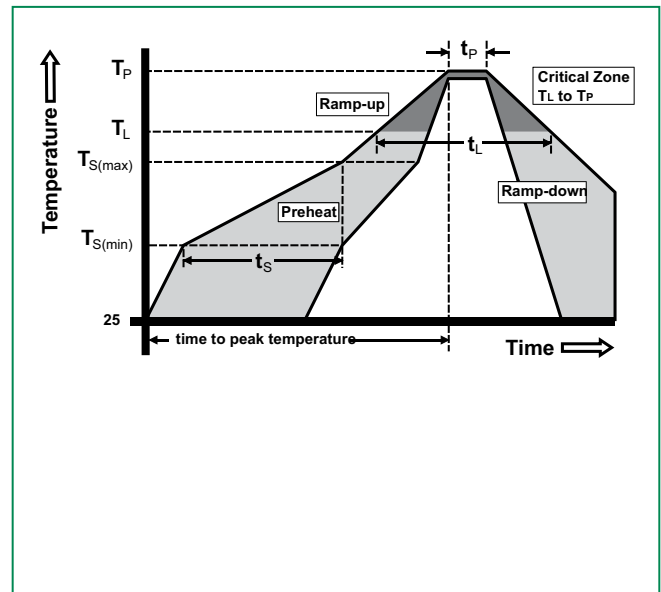


Transmission Line Pulsing (TLP) Plot (Pin1 or Pin2 to Pin3)



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_L)	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	



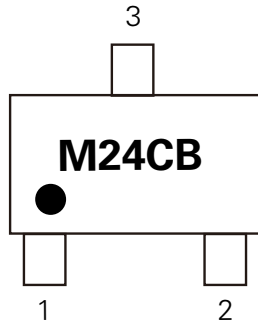
Product Characteristics

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

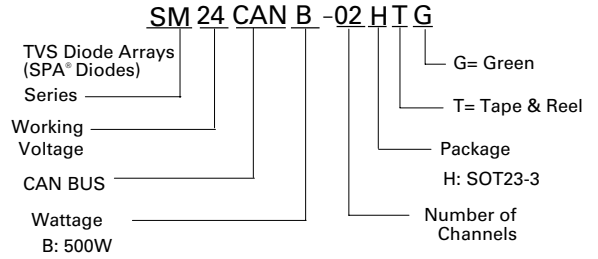
Notes :

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

Part Marking System

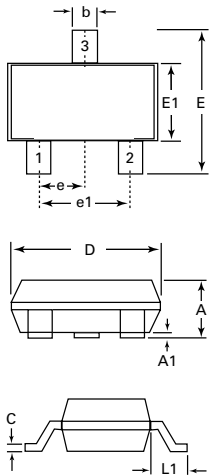


Part Numbering System

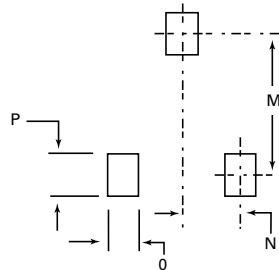


Part Number	Package	Marking	Min. Order Qty.	Packaging Option	P/P0	Packaging Specification
SM24CANB-02HTG	SOT23-3	M24CB	3000	Tape & Reel – 8mm tape/7" reel	4mm/4mm	EIA RS-481

Package Dimensions – SOT23-3

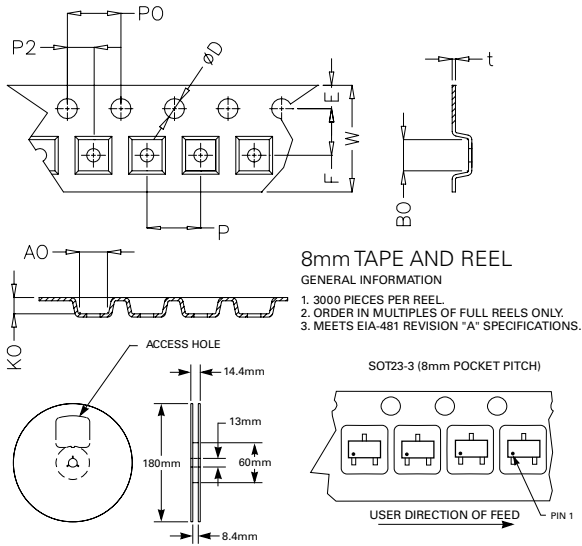


Recommended Pad Layout



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

