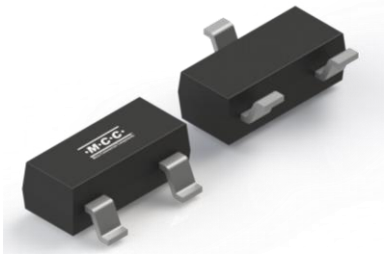
2-Line Uni-directional Standard Capacitance ESD

Features

- Transient protection:
  - IEC 61000-4-2 (ESD) ±30kV (Air), ±30kV (Contact)
  - IEC 61643-321(Surge) 0.74~3A (10/1000μs)
- Uni-directional ESD protection of two lines
- Reverse working voltage, V_{RWM}: 5.6V~47V
- Standard capacitance: 36~315pF
- Low clamping voltage: 8~54V
- Low reverse leakage current: 0.05~5uA
- Solid-state silicon-avalanche



SOT-23

Applications

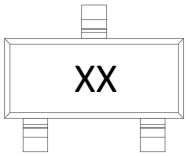
- Netbooks and Handhelds
- Portable Instrumentation
- Set Top Box
- Industrial Controls

Mechanical Data

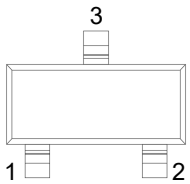
- Package: SOT-23
- Moisture Sensitivity Level 1, per J-STD-020
- Halogen Free. “Green” Device (Note1)
- Epoxy Meets UL 94 V-0 Flammability Rating
- Lead Free Finish/RoHS Compliant ("P" Suffix Designates RoHS Compliant. See Ordering Information)

Body Marking and Pin Layout

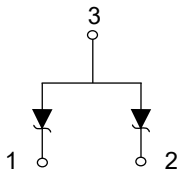
Marking Code	Simplified Outline	Internal Structure



MCC Part No.	Device Marking
MMBZ5V6A	M5.6
MMBZ6V2A	M6.2
MMBZ6V8A	M6.8
MMBZ9V1A	M9.1
MMBZ12VA	M12
MMBZ15VA	M15
MMBZ16VA	M16
MMBZ18VA	M18
MMBZ20VA	M20
MMBZ27VA	M27
MMBZ33VA	M33
MMBZ39VA	M39
MMBZ47VA	M47



Transparent top view



Ordering Information

Product Name	Packing info
MMBZ5V6A-TP THRU MMBZ47VA-TP	3K pcs/reel

For packaging details, visit our website at https://www.mccsemi.com/Package/List

Maximum Ratings (T_A=25°C unless otherwise specified)

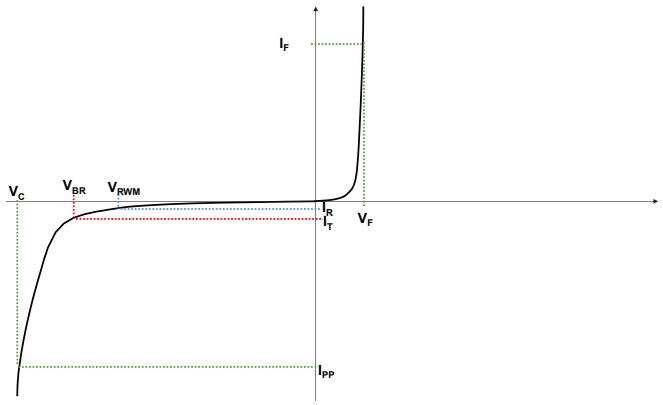
Parameter		Symbol	Rating	Unit
IEC61000-4-2(ESD)	Air	V_{ESD}	±30	kV
	Contact	V_{ESD}	±30	kV
Operating Temperature Range		T_J	-55 to +150	°C
Storage Temperature Range		T_{STG}	-55 to +150	°C

Note:

1. Halogen free "Green" products are defined as those which contain <900ppm bromine, <900ppm chlorine (<1500ppm total Br + Cl) and 1000ppm antimony compounds.

Parameter Definition

Symbol	Parameter
V_{RWM}	Peak Reverse Working Voltage
I_R	Reverse Leakage Current @ V_{RWM}
V_{BR}	Breakdown Voltage @ I_T
I_T	Test Current
I_{PP}	Maximum Reverse Peak Pulse Current
V_C	Clamping Voltage @ I_{PP}
P_{PK}	Peak Pulse Power
C_J	Junction Capacitance
I_F	Forward Current
V_F	Forward Voltage @ I_F



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

MMBZ5V6A

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Reverse Working Voltage	V_{RWM}				3	V
Reverse Breakdown Voltage	V_{BR}	I_T =1mA	5.32		5.88	V
Reverse Leakage Current	I_R	V_{RWM}=3V			5	μA
Peak Pulse Power (10/1000μs) (Note 2)	P_{PK}				24	W
Clamping Voltage (Note2)	V_C	I_{PP}=3A, t_P=10/1000μs			8	V
Junction Capacitance	C_J	V_R=0V, f=1MHz		315		pF

MMBZ6V2A

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Reverse Working Voltage	V_{RWM}				3	V
Reverse Breakdown Voltage	V_{BR}	I_T =1mA	5.89		6.51	V
Reverse Leakage Current	I_R	V_{RWM}=3V			0.5	μA
Peak Pulse Power (10/1000μs) (Note 2)	P_{PK}				24	W
Clamping Voltage (Note2)	V_C	I_{PP}=2.76A, t_P=10/1000μs			8.7	V
Junction Capacitance	C_J	V_R=0V, f=1MHz		275		pF

MMBZ6V8A

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Reverse Working Voltage	V_{RWM}				4.5	V
Reverse Breakdown Voltage	V_{BR}	I_T =1mA	6.46		7.14	V
Reverse Leakage Current	I_R	V_{RWM}=4.5V			0.5	μA
Peak Pulse Power (10/1000μs) (Note 2)	P_{PK}				24	W
Clamping Voltage (Note2)	V_C	I_{PP}=2.5A, t_P=10/1000μs			9.6	V
Junction Capacitance	C_J	V_R=0V, f=1MHz		250		pF

MMBZ9V1A

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Reverse Working Voltage	V_{RWM}				6	V
Reverse Breakdown Voltage	V_{BR}	I_T =1mA	8.65		9.56	V
Reverse Leakage Current	I_R	V_{RWM}=6V			0.3	μA
Peak Pulse Power (10/1000μs) (Note 2)	P_{PK}				24	W
Clamping Voltage (Note2)	V_C	I_{PP}=1.7A, t_P=10/1000μs			14	V
Junction Capacitance	C_J	V_R=0V, f=1MHz		185		pF

MMBZ12VA

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Reverse Working Voltage	V_{RWM}				8.5	V
Reverse Breakdown Voltage	V_{BR}	I_T =1mA	11.3		13	V
Reverse Leakage Current	I_R	V_{RWM}=8.5V			0.05	μA
Peak Pulse Power (10/1000μs) (Note 2)	P_{PK}				40	W
Clamping Voltage (Note2)	V_C	I_{PP}=2.35A, t_P=10/1000μs			17	V
Junction Capacitance	C_J	V_R=0V, f=1MHz		114		pF

MMBZ15VA

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Reverse Working Voltage	V_{RWM}				12	V
Reverse Breakdown Voltage	V_{BR}	I_T =1mA	14.25		15.75	V
Reverse Leakage Current	I_R	V_{RWM}=12V			0.05	μA
Peak Pulse Power (10/1000μs) (Note 2)	P_{PK}				40	W
Clamping Voltage (Note2)	V_C	I_{PP}=1.9A, t_P=10/1000μs			21	V
Junction Capacitance	C_J	V_R=0V, f=1MHz		95		pF

MMBZ16VA

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Reverse Working Voltage	V_{RWM}				13	V
Reverse Breakdown Voltage	V_{BR}	I_T =1mA	15.2		16.8	V
Reverse Leakage Current	I_R	V_{RWM}=13V			0.05	μA
Peak Pulse Power (10/1000μs) (Note 2)	P_{PK}				40	W
Clamping Voltage (Note2)	V_C	I_{PP}=1.7A, t_P=10/1000μs			23	V
Junction Capacitance	C_J	V_R=0V, f=1MHz		90		pF

MMBZ18VA

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Reverse Working Voltage	V_{RWM}				14.5	V
Reverse Breakdown Voltage	V_{BR}	I_T =1mA	17		18.9	V
Reverse Leakage Current	I_R	V_{RWM}=14.5V			0.05	μA
Peak Pulse Power (10/1000μs) (Note 2)	P_{PK}				40	W
Clamping Voltage (Note2)	V_C	I_{PP}=1.6A, t_P=10/1000μs			25	V
Junction Capacitance	C_J	V_R=0V, f=1MHz		80		pF

MMBZ20VA

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Reverse Working Voltage	V_{RWM}				17	V
Reverse Breakdown Voltage	V_{BR}	I_T =1mA	19		21	V
Reverse Leakage Current	I_R	V_{RWM}=17V			0.05	μA
Peak Pulse Power (10/1000μs) (Note 2)	P_{PK}				40	W
Clamping Voltage (Note2)	V_C	I_{PP}=1.4A, t_P=10/1000μs			28	V
Junction Capacitance	C_J	V_R=0V, f=1MHz		77		pF

MMBZ27VA

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Reverse Working Voltage	V_{RWM}				22	V
Reverse Breakdown Voltage	V_{BR}	I_T =1mA	25.65		28.35	V
Reverse Leakage Current	I_R	V_{RWM}=22V			0.05	μA
Peak Pulse Power (10/1000μs) (Note 2)	P_{PK}				40	W
Clamping Voltage (Note2)	V_C	I_{PP}=1 A, t_P=10/1000μs			40	V
Junction Capacitance	C_J	V_R=0V, f=1MHz		70		pF

MMBZ33VA

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Reverse Working Voltage	V_{RWM}				26	V
Reverse Breakdown Voltage	V_{BR}	I_T =1mA	31.35		34.55	V
Reverse Leakage Current	I_R	V_{RWM}=26V			0.05	μA
Peak Pulse Power (10/1000μs) (Note 2)	P_{PK}				40	W
Clamping Voltage (Note2)	V_C	I_{PP}=0.87A, t_P=10/1000μs			46	V
Junction Capacitance	C_J	V_R=0V, f=1MHz		50		pF

MMBZ39VA

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Reverse Working Voltage	V_{RWM}				31.2	V
Reverse Breakdown Voltage	V_{BR}	I_T =1mA	36		42	V
Reverse Leakage Current	I_R	V_{RWM}=31.2V			0.05	μA
Peak Pulse Power (10/1000μs) (Note 2)	P_{PK}				38	W
Clamping Voltage (Note2)	V_C	I_{PP}=0.76A, t_P=10/1000μs			53	V
Junction Capacitance	C_J	V_R=0V, f=1MHz		42		pF

MMBZ47VA

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Reverse Working Voltage	V_{RWM}				38	V
Reverse Breakdown Voltage	V_{BR}	I_T =1mA	44.65		49.35	V
Reverse Leakage Current	I_R	V_{RWM}=38V			0.05	μA
Peak Pulse Power (10/1000μs) (Note 2)	P_{PK}				40	W
Clamping Voltage (Note2)	V_C	I_{PP}=0.74A, t_P=10/1000μs			54	V
Junction Capacitance	C_J	V_R=0V, f=1MHz		36		pF

Note:
2. In accordance with IEC 61643-321 (10/1000 μs current waveform)

Curve Characteristics

Fig. 1- Pulse Waveform

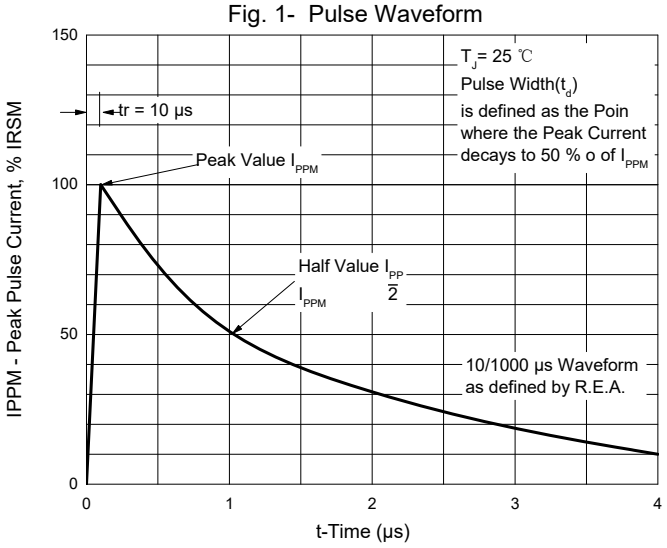


Fig. 2 - Non-Repetitive Peak Pulse Power

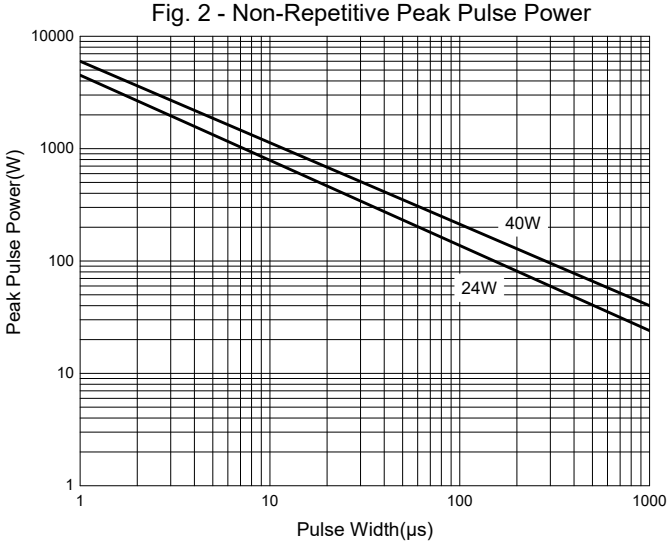


Fig. 3 - Capacitance Characteristics

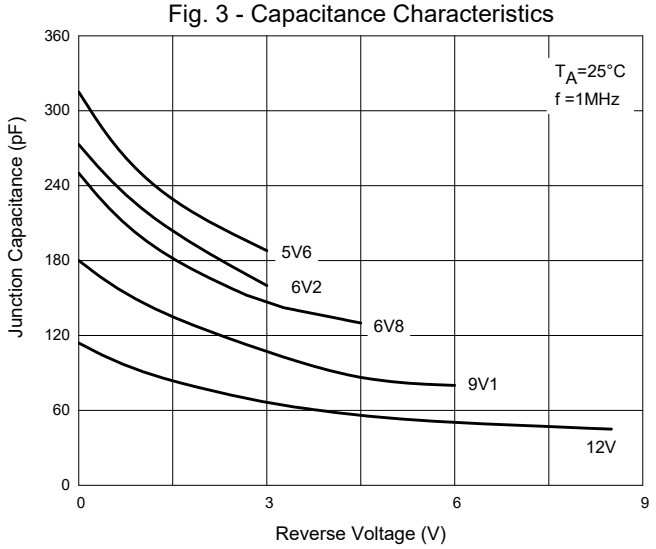


Fig. 4 - Capacitance Characteristics

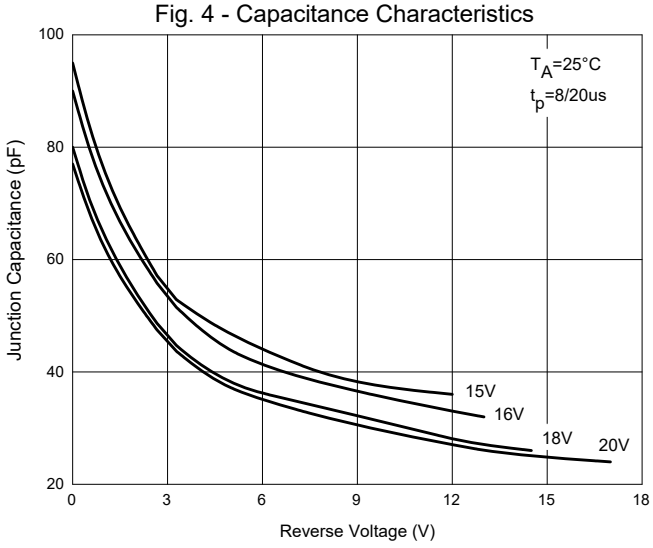


Fig. 5 - Capacitance Characteristics

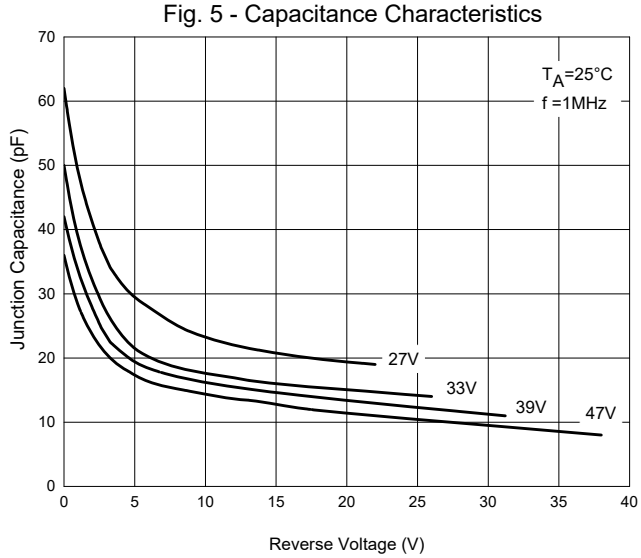
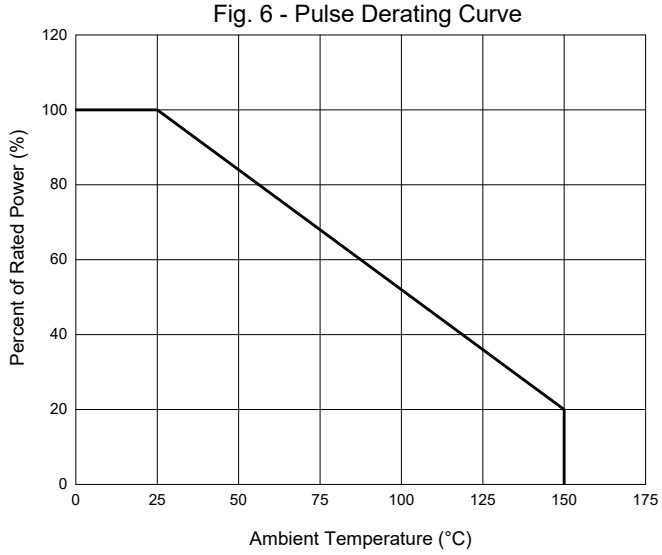
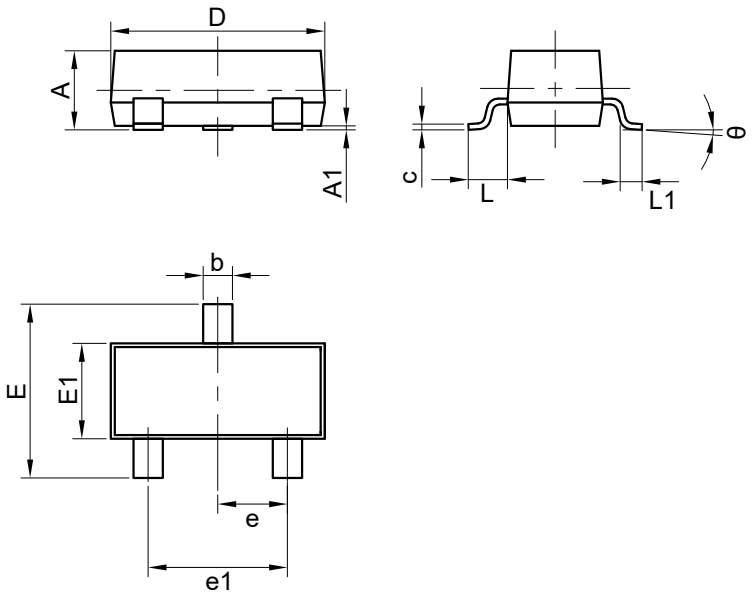


Fig. 6 - Pulse Derating Curve



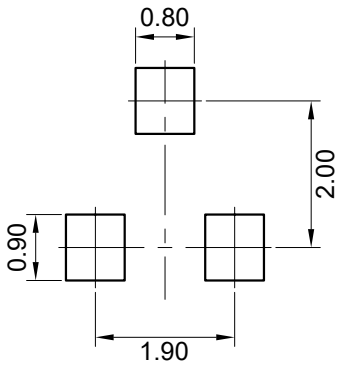
Package Outline



DIM	INCH		MM		
	MIN	MAX	MIN	MAX	NOTE
A	0.035	0.045*	0.90	1.15*	Note 1
A1	0.000	0.004	0.01	0.10	
b	0.012	0.020	0.30	0.50	
c	0.003	0.007	0.08	0.18	
D	0.110	0.120	2.80	3.04	
E	0.047	0.055	2.10	2.64	
E1	0.083	0.104	1.20	1.40	
e	0.037		0.95		TYP
e1	0.075		1.90		TYP
L	0.017	0.026	0.45	0.65	
L1	0.011	0.020	0.30	0.50	
θ	0°	8°	0°	8°	

Notes:
1. Dimension A for products from manufacturing site VN is controlled at maximum 1.10 mm.

Suggested Pad Layout (Unit:mm)



Notes:
1. The suggested land pattern dimensions have been provided for reference only.
2. For further information, please refer to document IPC-7351A.

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