

Silicon Carbide Schottky Diode (SiC SBD)

1. Product Features:

- Revolutionary semiconductor material - Silicon Carbide
- Temperature independent switching behavior
- Low forward voltage even at high operating temperature
- Excellent thermal performance
- Specified dv/dt ruggedness
- Qualified according to JEDEC for target applications
- Pb-free lead plating; RoHS compliant

HDW40S120B

Pin 1 and Pin 3 – Anode
Pin 2 – Cathode

Package: TO-247-3

2. Product Applications

- Solar Inverters
- Uninterruptable Power Supplies (UPS)
- Motor drives
- Power Factor Correction (PFC)
- Switch Mode Power Supplies (SMPS)
- On Board Charger (OBC)

3. Typical Performance Parameters

Tab.1. Typical Performance Parameters

Type	V_{DC}	I_F	Q_C	T_{vjmax}	Marking	Package
HDW40S120B	1200V	20*/40**A	87*/174**nC	175°C	D40S120	TO-247-3

*Per Leg, ** Per Device

4. Maximum Ratings

Tab.2. Maximum Ratings

Parameters	Symbol	Value	Unit
Repetitive Peak Reverse Voltage	V_{RRM}	1200	V
Surge Peak Reverse Voltage	V_{RSM}	1200	V
Continuous Forward Current , $T_c = 25^\circ\text{C}$ $T_c = 125^\circ\text{C}$ $T_c = 140^\circ\text{C}$	I_F	60*/120** 33*/66** 27*/54**	A
Repetitive Peak Forward Surge Current $T_c = 25^\circ\text{C}, t_p = 10\text{ms}$	I_{FRM}	100*/200**	
Non-Repetitive Peak Forward Surge Current $T_c = 25^\circ\text{C}, t_p = 10\text{ms}, \text{Half Sine Wave}$	I_{FSM}	176*/352**	
Non-Repetitive Peak Forward Current $T_c = 25^\circ\text{C}, t_p = 10\mu\text{s}$	$I_{F, max}$	1200*/2400**	
Power Dissipation $T_c = 25^\circ\text{C}$ $T_c = 110^\circ\text{C}$	P_{tot}	357*/714** 155*/310**	W
Operating Junction	T_j	-55 to +175	°C
Storage Temperature	T_{stg}	-55 to +175	

*Per Leg, ** Per Device

5. Thermal Properties

Tab.3. Thermal Properties

Parameters	Symbol	Conditions	Typ. value	Unit
Thermal resistance (junction - case)	$R_{th(j-c)}$		0.42* 0.21**	°C/W

*Per Leg, ** Per Device

6. Electrical Characteristics

Tab.4. Static Characteristic (Per Leg, $T_{vj} = 25^{\circ}\text{C}$, unless otherwise specified)

Parameters	Symbol	Conditions	Min. value	Typ. value	Max. value	Unit
DC blocking voltage	V_{DC}	$T_j = 25^{\circ}\text{C}$	1200	-	-	V
Diode forward voltage	V_F	$I_F = 20\text{A}, T_j = 25^{\circ}\text{C}$ $I_F = 20\text{A}, T_j = 175^{\circ}\text{C}$	-	1.5 2.4	1.8 3.0	V
Reverse current	I_R	$V_R = 1200\text{V}, T_j = 25^{\circ}\text{C}$ $V_R = 1200\text{V}, T_j = 175^{\circ}\text{C}$	-	1.5 21.8	50 100	μA

Tab.5. Dynamic Characteristic (Per Leg, $T_{vj} = 25^{\circ}\text{C}$, unless otherwise specified)

Parameters	Symbol	Conditions	Min. value	Typ. value	Max. value	Unit
Total capacitive charge	Q_C	$V_R = 800\text{V}, Q_C = \int_0^{V_R} C(V)dV$	-	87	-	nC
Total Capacitance	C	$V_R = 0\text{V}, f = 1\text{MHz}$ $V_R = 400\text{V}, f = 1\text{MHz}$ $V_R = 800\text{V}, f = 1\text{MHz}$	-	1280 82 64	-	pF
Capacitance Stored Energy	E_C	$V_R = 800\text{V}$	-	45	-	μJ

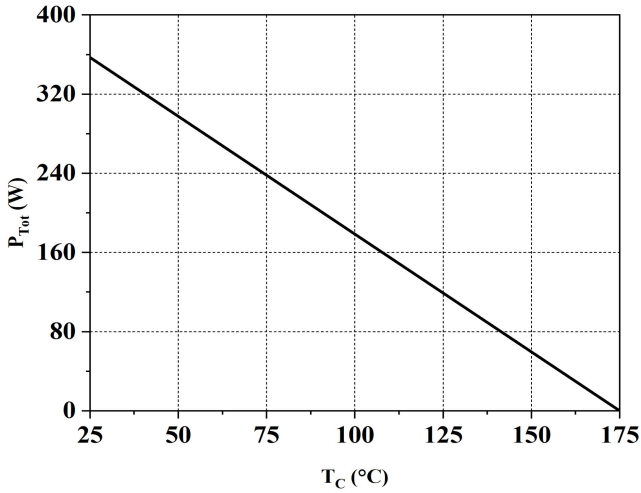


Fig.1. Power dissipation as a function of case temperature (Per Leg)

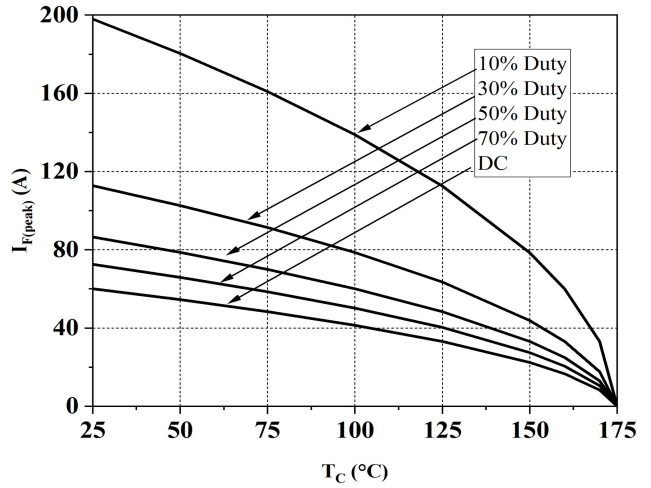


Fig.2. Diode forward current as function of case temperature (Per Leg)

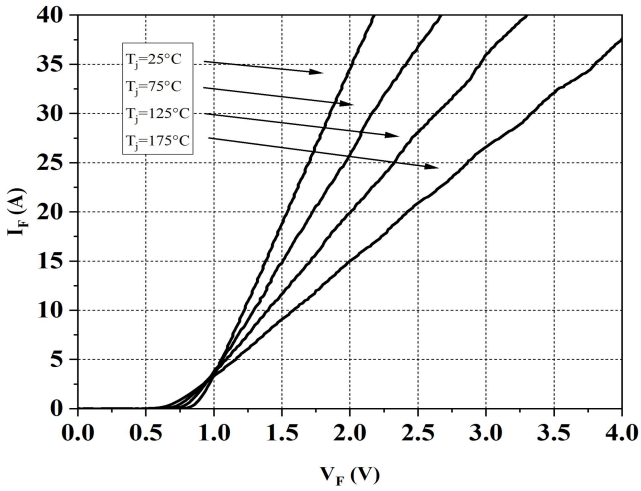


Fig.3. Typical forward characteristics (Per Leg)

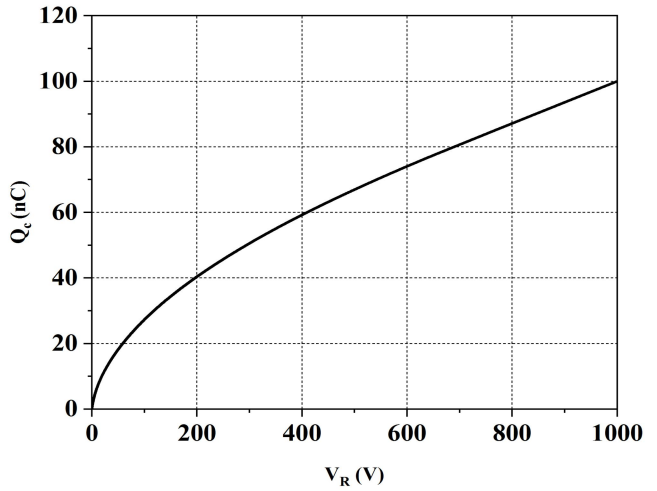


Fig.4. Typical capacitance charge as function of reverse voltage (Per Leg)

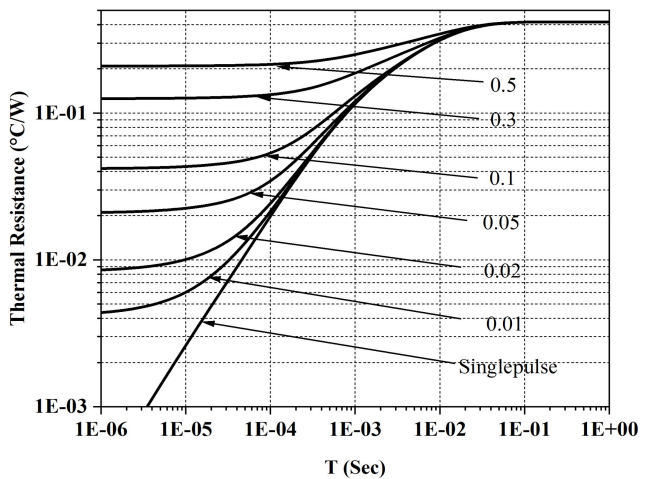
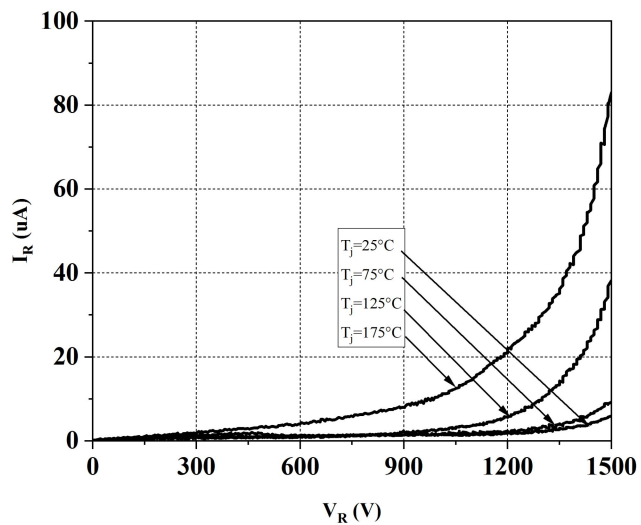


Fig.5. Typical reverse current as function of reverse voltage (Per Leg)

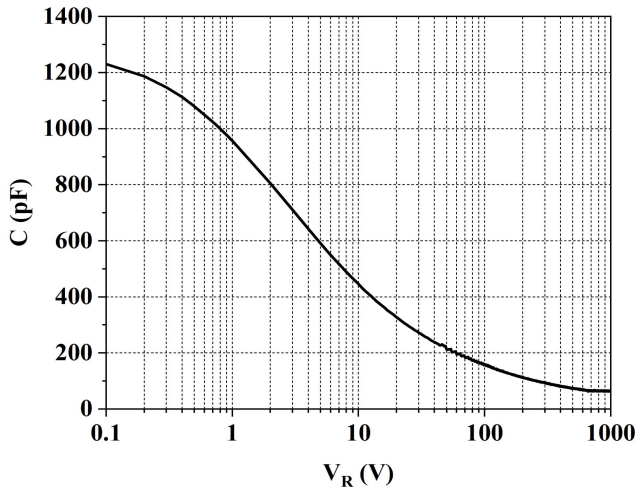


Fig.7. Typical capacitance as function of reverse voltage (Per Leg)

Fig.6. Max. transient thermal impedance (Per Leg)

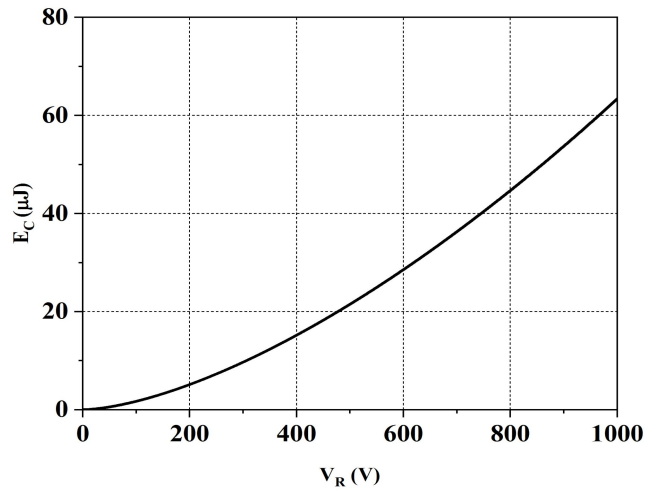
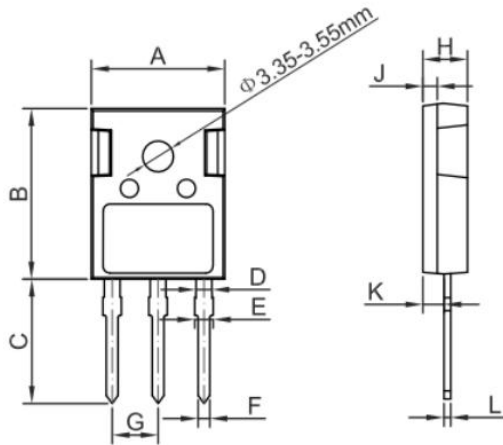


Fig.8. Typical capacitance stored energy as function of reverse voltage (Per Leg)

7. Package Dimensions



Ref.	Dimensions					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	15.50	15.80	16.10	0.610	0.622	0.634
B	20.80	21.00	21.20	0.819	0.827	0.835
C	19.70	20.00	20.30	0.776	0.787	0.799
D	1.80	2.00	2.20	0.071	0.079	0.087
E	1.90	2.10	2.30	0.075	0.083	0.091
F	1.00	1.20	1.40	0.039	0.047	0.055
G		5.44			0.214	
H	4.80	5.00	5.20	0.189	0.197	0.205
J	1.90	2.00	2.10	0.075	0.079	0.083
K	2.20	2.35	2.50	0.087	0.093	0.098
L	0.41	0.60	0.79	0.016	0.024	0.031

8. Version Information

Version No.	Status	Date changed	Version revision record
V1.0	Preview edition	2022/01	
V1.1	Preview edition	2022/01	