

SiC Schottky Barrier Diode

碳化硅，肖特基二极管



Transformation of Power Semiconductor to SiC

Prepared By : MK Lai
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碳化硅，肖特基二极管

- 1) SiC SBD – 650V, 10A Data Sheet
- 2) SiC SBD – 650V, 20A Data Sheet
- 3) SiC SBD – 1200V, 20A Data Sheet
- 4) Proposed Packaging (TO-247-2LD)

SiC Schottky Barrier Diode

650V/10A

Characteristic

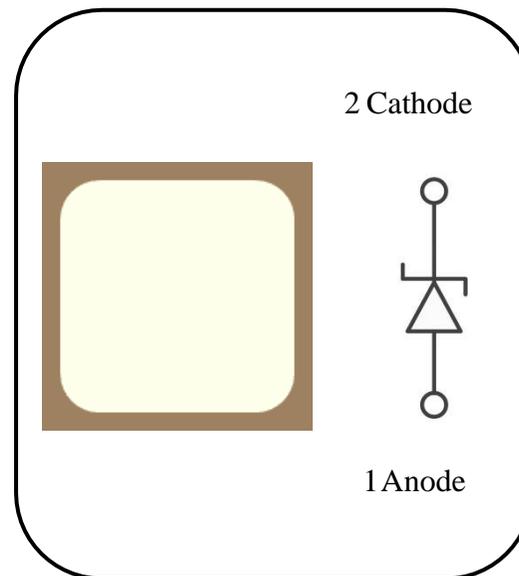
- Zero Reverse Recovery Current
- Positive temperature coefficient
- Temperature-independent performance
- High-speed switching
- Low switching loss
- Low heat dissipation requirements

Application

- Switching power supply
- Power factor correction
- Automotive
- Charging pile

Product Description

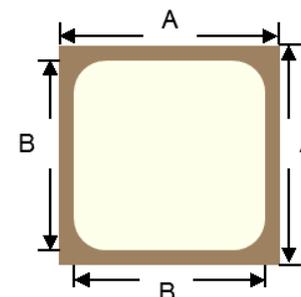
V_{RRM}	650	V
$I_F(125^\circ C)$	16	A
Q_C	29	nC



Mechanical Parameters

Parameter	Type	Unit
Die Size	1.7155*1.7155	mm
Anode Pad Size	1.4507*1.4507	mm
Anode Pad Opening	1.2307*1.2307	mm
Thickness	150 ± 10%	um
Wafer Size	100	mm
Anode Metallization (Al)	3.6~4.4	um
Cathode Metallization (Ni/Ag)	1.44~1.76	um
Frontside Passivation (Polyimide)	2.9~4.1	um

Chip Dimensions



Symbol	Dimensions	
	mm	inch
A	1.7155	0.068
B	1.4507	0.057

Part Number	Die Size	Electrodes
SxxJ010B3	1.7155*1.7155mm ²	Anode : Al Cathode : Ni/Ag



Absolute Maximum Ratings

Parameter	Symbol	Value	Unit	Test Conditions
Reverse voltage (Repetitive peak)	V_{RRM}	650	V	$T_C=25^{\circ}\text{C}$
Reverse Voltage (Surge peak)	V_{RSM}	650		$T_C=25^{\circ}\text{C}$
Reverse voltage (DC)	V_{DC}	650		$T_C=25^{\circ}\text{C}$
Continuous forward current	I_F	29	A	$T_C=25^{\circ}\text{C}$
		16		$T_C=125^{\circ}\text{C}$
		10		$T_C=155^{\circ}\text{C}$
Surge non-repetitive forward current	I_{FSM}	80	A	$T_C=25^{\circ}\text{C}, t_p=10\text{ms}, \text{half Sine Pulse}$
Total power dissipation	P_{TOT}	107	W	$T_C=25^{\circ}\text{C}$
i^2t value	$\int i^2 dt$	32	A^2s	$T_C=25^{\circ}\text{C}, t_p=10\text{ms}$
Operating temperature	T_j	-55~175	$^{\circ}\text{C}$	
storage temperature	T_{stg}	-55~175	$^{\circ}\text{C}$	
Mounting Torque	M	1	Nm	M3 Screw

Electrical Characteristics $T_J=25^{\circ}\text{C}$

Parameter	Symbol	Values			Unit	Test Condition
		Min.	Typ.	Max.		
DC blocking voltage	V_{DC}	650	/	/	V	$I_R=100\ \mu\text{A}$
Forward voltage	V_F	/	1.3	1.45	V	$I_F=10\text{A}, T_j=25^{\circ}\text{C}$
		/	1.55	1.80		$I_F=10\text{A}, T_j=175^{\circ}\text{C}^*$
Reverse current	I_R	/	1	20	μA	$V_R=650\text{V}, T_j=25^{\circ}\text{C}$
		/	10	100		$V_R=650\text{V}, T_j=175^{\circ}\text{C}^*$
Total capacitance	C	/	556	/	pF	$V_R=0\text{V}, f=1\text{MHz}$
		/	55	/		$V_R=200\text{V}, f=1\text{MHz}$
		/	45	/		$V_R=400\text{V}, f=1\text{MHz}$
Total capacitive charge	Q_C	/	29	/	nC	$V_R=400\text{V}$
Capacitance Stored Energy	E_C	/	4.3	/	μJ	$V_R=400\text{V}$

* The Parameter is tested under TO-220.



Typical Electrical Characteristics Curves

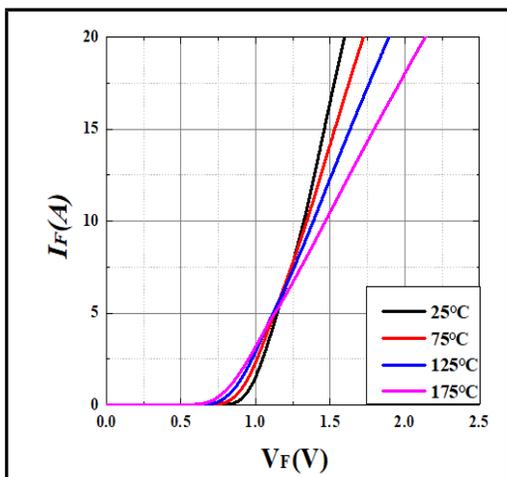


Figure 1. Forward Characteristics

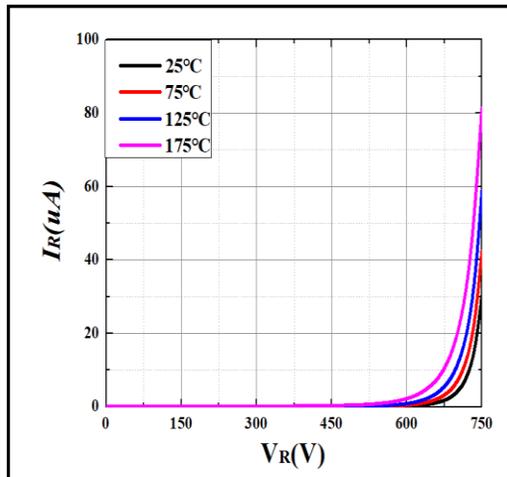


Figure 2. Reverse Characteristics

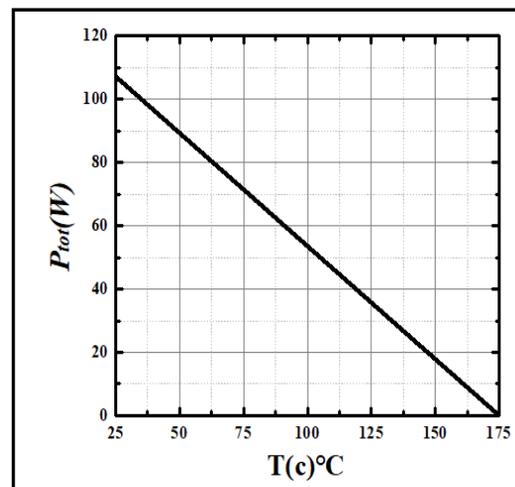


Figure 5. Power Derating

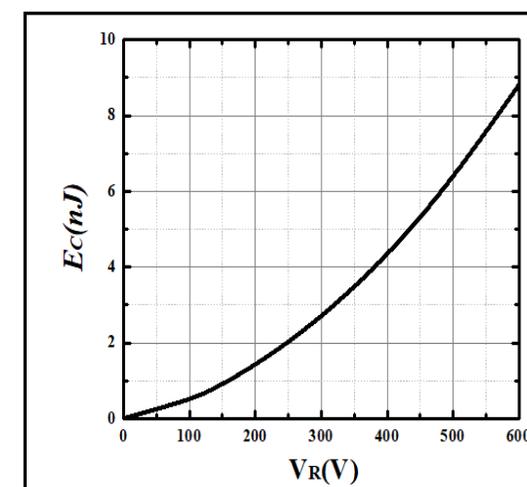


Figure 6. Capacitance Stored Energy

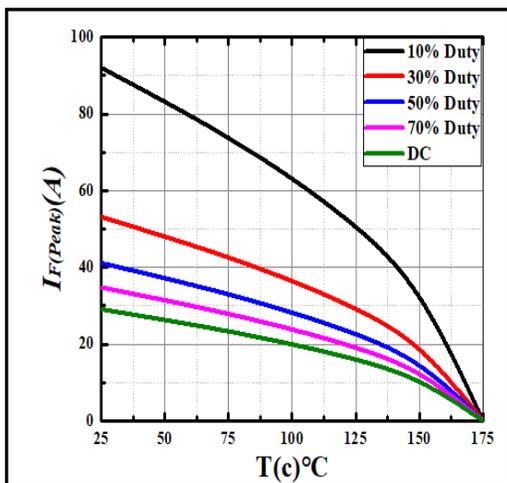


Figure 3. Current Derating

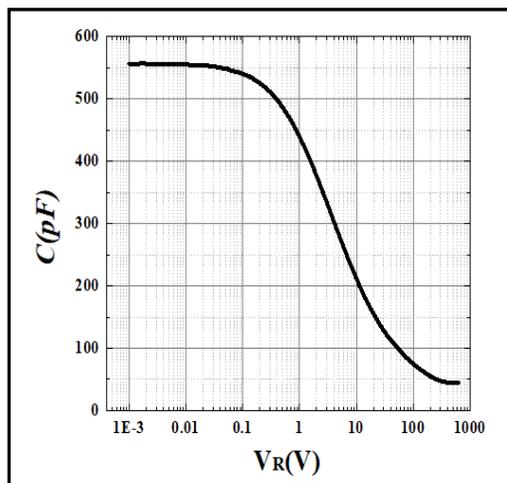


Figure 4. Capacitance vs. Reverse Voltage

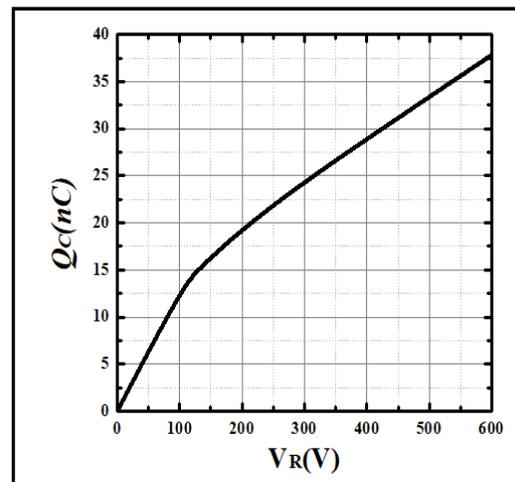


Figure 7. Total Capacitance Charge vs. Reverse Voltage

SiC Schottky Barrier Diode

650V/20A

Product Description

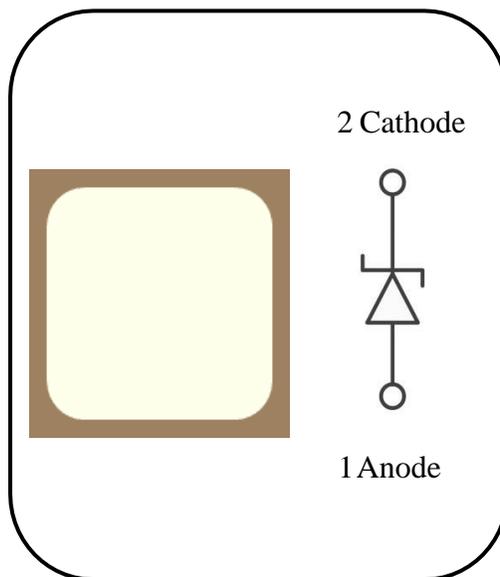
V_{RRM}	650	V
$I_F(135^\circ\text{C})$	22	A

Characteristic

- Zero Reverse Recovery Current
- Positive temperature coefficient
- Temperature-independent performance
- High-speed switching
- Low switching loss
- Low heat dissipation requirements

Application

- Switching power supply
- Power factor correction
- Automotive
- Charging pile

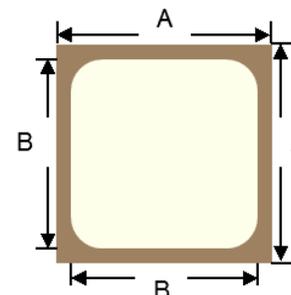


Mechanical Parameters

Parameter	Type	Unit
Die Size	2.2830*2.2830	mm
Anode Pad Size	2.0182*2.0182	mm
Anode Pad Opening	1.7490*1.7490	mm
Thickness	150 ± 10%	um
Wafer Size	100	mm
Anode Metallization (Al)	3.6~4.4	um
Cathode Metallization (Ni/Ag)	1.44~1.76	um
Frontside Passivation (Polyimide)	2.9~4.1	um

Part Number	Die Size	Electrodes
SxxJ020B3	2.2830*2.2830mm ²	Anode : Al Cathode : Ni/Ag

Chip Dimensions



Symbol	Dimensions	
	mm	inch
A	2.2830	0.090
B	2.0182	0.079

Absolute Maximum Ratings

Parameter	Symbol	Value	Unit	Test Conditions
Reverse voltage (Repetitive peak)	V_{RRM}	650	V	$T_C=25^\circ\text{C}$
Reverse Voltage (Surge peak)	V_{RSM}	650		$T_C=25^\circ\text{C}$
Reverse voltage (DC)	V_{DC}	650		$T_C=25^\circ\text{C}$
Continuous forward current	I_F	45	A	$T_C=25^\circ\text{C}$
		22		$T_C=135^\circ\text{C}$
		20		$T_C=143^\circ\text{C}$
Surge non-repetitive forward current	I_{FSM}	140	A	$T_C=25^\circ\text{C}, t_p=10\text{ms}, \text{half Sine Pulse}$
Total power dissipation	P_{TOT}	136	W	$T_C=25^\circ\text{C}$
i^2t value	$\int i^2 dt$	98	A^2s	$T_C=25^\circ\text{C}, t_p=10\text{ms}$
Operating temperature	T_j	-55~175	$^\circ\text{C}$	
storage temperature	T_{stg}	-55~175	$^\circ\text{C}$	
Mounting Torque	M	1	Nm	M3 Screw

Typical Electrical Characteristics Curves

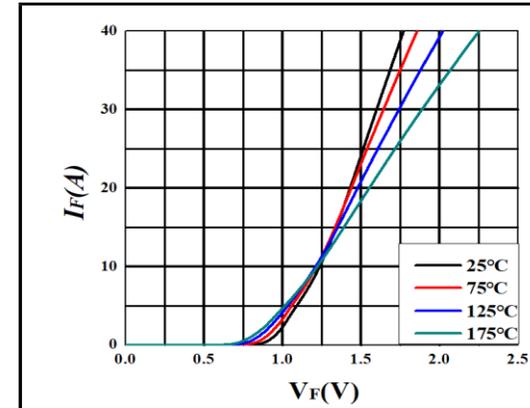


Figure 1. Forward Characteristics

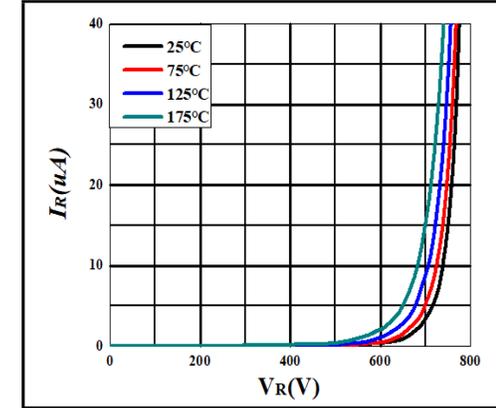


Figure 2. Reverse Characteristics

Electrical Characteristics $T_J=25^\circ\text{C}$

Parameter	Symbol	Values			Unit	Test Condition
		Min.	Typ.	Max.		
DC blocking voltage	V_{DC}	650	/	/	V	$I_R=100 \mu\text{A}$
Forward voltage	V_F	/	1.30	1.50	V	$I_F=20\text{A}, T_j=25^\circ\text{C}$
		/	1.55	1.80		$I_F=20\text{A}, T_j=175^\circ\text{C}^*$
Reverse current	I_R	/	2	60	μA	$V_R=650\text{V}, T_j=25^\circ\text{C}$
		/	10	160		$V_R=650\text{V}, T_j=175^\circ\text{C}^*$

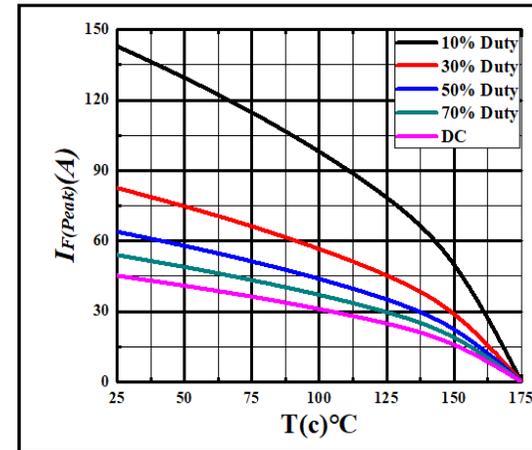


Figure 3. Current Derating

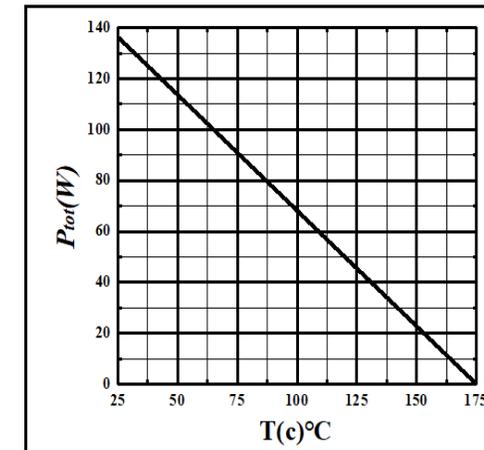


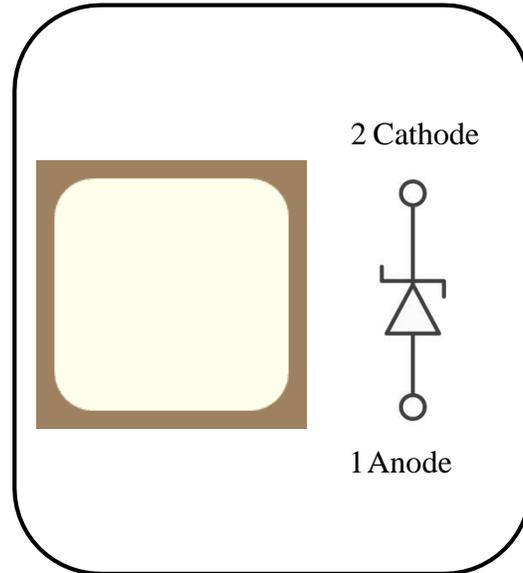
Figure 4. Power Derating

SiC Schottky Barrier Diode

1200V/20A

Product Description

V _{RRM}	1200	V
I _{F(135°C)}	24	A
Q _C	102	nC



Characteristic

- Zero Reverse Recovery Current
- Positive temperature coefficient
- Temperature-independent performance
- High-speed switching
- Low switching loss
- Low heat dissipation requirements

Application

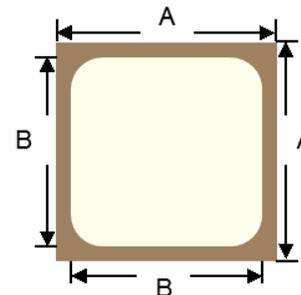
- Switching power supply
- Power factor correction
- Motor drive, traction
- Charging pile

Mechanical Parameters

Parameter	Type	Unit
Die Size	3.0641×3.0641	mm ²
Anode Pad Size	2.7217×2.7217	mm ²
Anode Pad Opening	2.4317×2.4317	mm ²
Thickness	355 ± 10%	um
Wafer Size	100	mm
Anode Metallization (Al)	3.6~4.4	um
Cathode Metallization (Ni/Ag)	1.44~1.76	um
Frontside Passivation (Polyimide)	2.9~4.1	um

Part Number	Die Size	Electrodes
SxxxJ020B2	3.0641×3.0641mm ²	Anode : Al Cathode : Ni/Ag

Chip Dimensions



Symbol	Dimensions	
	mm	inch
A	3.0641	0.1206
B	2.4317	0.0957

Absolute Maximum Ratings

Parameter	Symbol	Value	Unit	Test Conditions
Reverse voltage (Repetitive peak)	V _{RRM}	1200	V	T _j =25°C
Reverse Voltage (Surge peak)	V _{RSM}	1200		T _j =25°C
Reverse voltage (DC)	V _{DC}	1200		T _j =25°C
Continuous forward current *	I _F	52	A	T _c =25°C
		24		T _c =135°C
		20		T _c =146°C
Surge non-repetitive forward current	I _{FSM}	180	A	T _C =25°C, tp=10ms, half Sine Pulse
i ² t value	∫i ² dt	162	A ² s	T _C =25°C, tp=10ms
Operating temperature	T _j	-55~175	°C	
storage temperature	T _{stg}	-55~175	°C	

Electrical Characteristics T_j=25°C

Parameter	Symbol	Values			Unit	Test Condition
		Min.	Typ.	Max.		
DC blocking voltage	V _{DC}	1200	/	/	V	IR=100 μA
Forward voltage	V _F	/	1.45	1.8	V	IF=20A, T _j =25°C
		/	2.2	2.70		IF=20A, T _j =175°C
Reverse current	I _R	/	2	50	μA	VR=1200V, T _j =25°C
		/	15	300		VR=1200V, T _j =175°C
Total capacitance	C	/	1453	/	pF	VR=0V, f=1MHz
		/	95	/		VR=400V, f=1MHz
		/	72	/		VR=800V, f=1MHz
Total capacitive charge	Q _C	/	102	/	nC	VR=800V
Capacitance Stored Energy	E _C	/	29	/	μJ	VR=800V

* Assume Thermal Resistance (R_{θJC}) of 0.63°C/W. IF is theoretically calculated data.



Typical Electrical Characteristics Curves

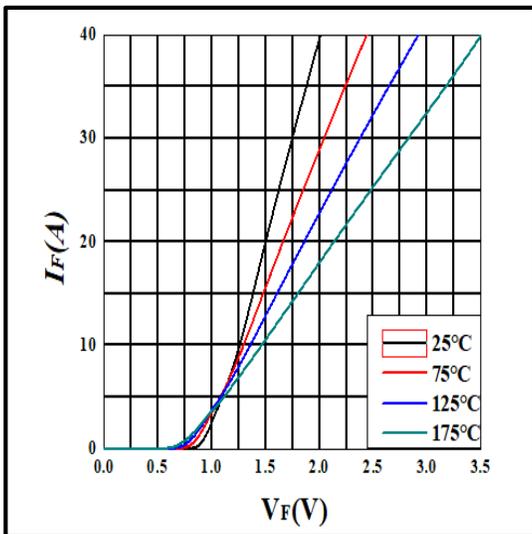


Figure 1. Forward Characteristics

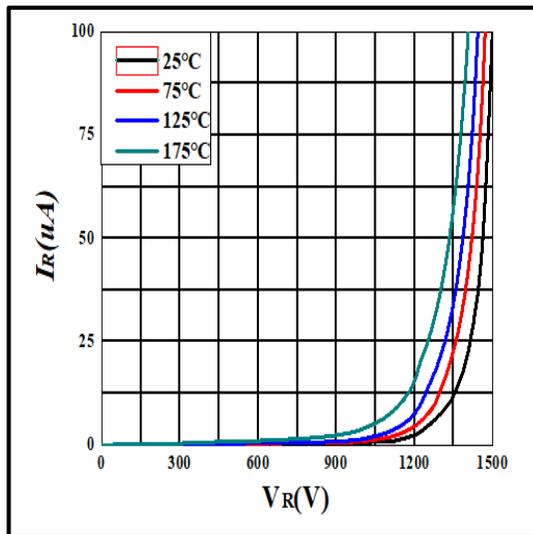


Figure 2. Reverse Characteristics

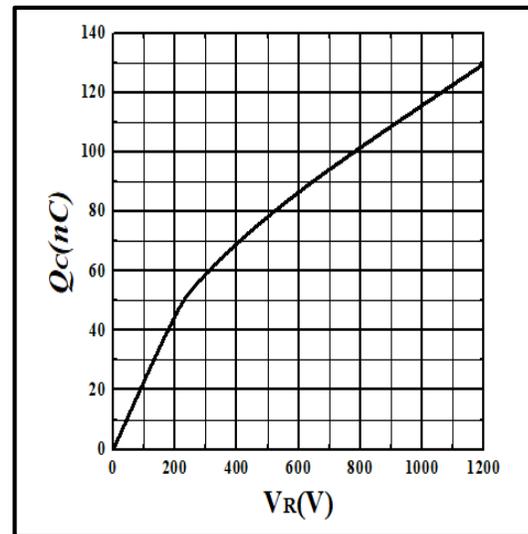


Figure 5. Total Capacitance Charge vs. Reverse Voltage

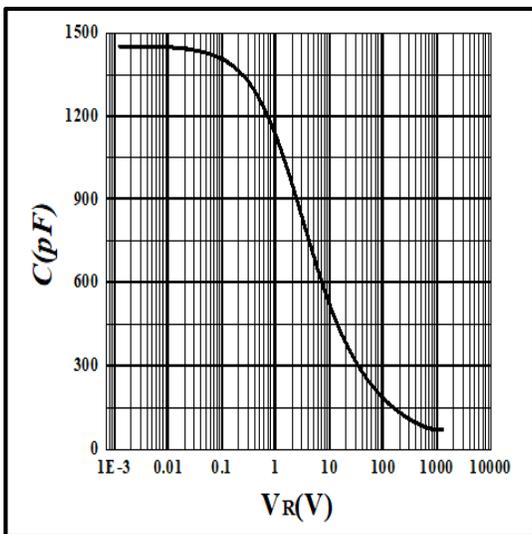


Figure 3. Capacitance vs. Reverse Voltage

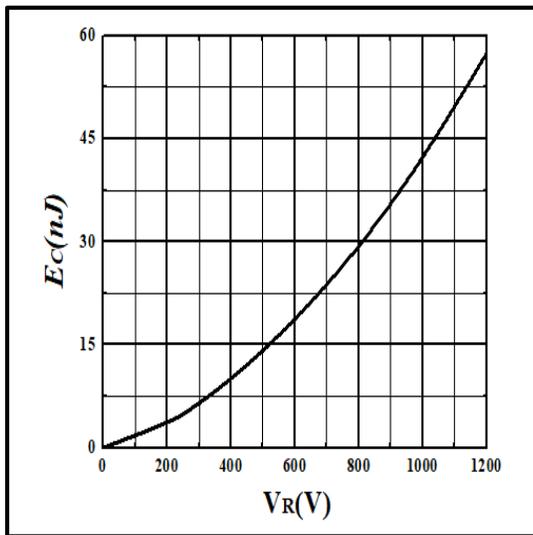
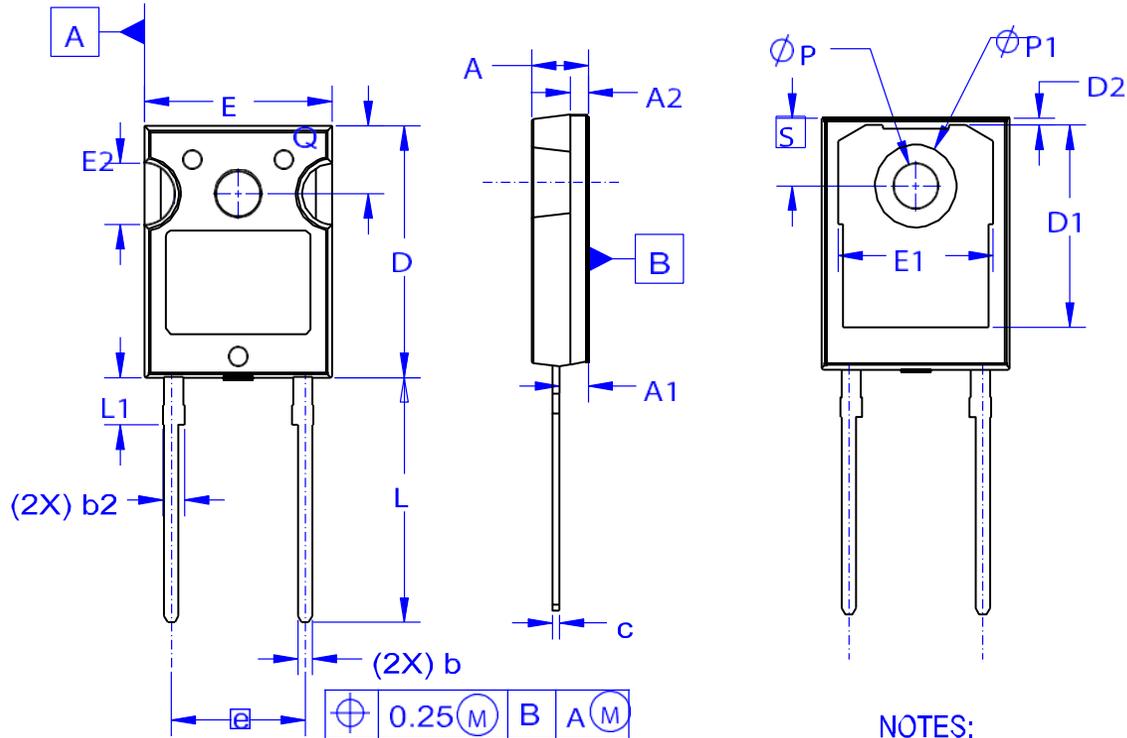


Figure 4. Capacitance Stored Energy



PACKAGE DIMENSIONS

TO-247-2LD



DIM	MILLIMETERS		
	MIN	NOM	MAX
A	4.58	4.70	4.82
A1	2.20	2.40	2.60
A2	1.40	1.50	1.60
b	1.17	1.26	1.35
b2	1.60	1.72	1.84
c	0.51	0.61	0.71
D	20.32	20.57	20.82
D1	13.08	~	~
D2	0.51	0.93	1.35
E	15.37	15.62	15.87
E1	12.81	~	~
E2	4.96	5.08	5.20
e	~	11.12	~
L	19.75	20.00	20.25
L1	3.69	3.81	3.93
ϕ P	3.51	3.58	3.65
ϕ P1	6.60	6.80	7.00
Q	5.34	5.46	5.58
S	5.34	5.46	5.58

NOTES:

- A. DIMENSIONS ARE EXCLUSIVE OF BURRS, MOLD FLASH AND TIE BAR PROTRUSIONS.
- B. ALL DIMENSIONS ARE IN MILLIMETERS.
- C. DIMENSION AND TOLERANCE AS PER ASME Y14.5-2009.
- D. DIMENSION A1 TO BE MEASURED IN THE REGION DEFINED BY L1.
- E. LEAD FINISH IS UNCONTROLLED IN THE REGION DEFINED BY L1.



Thank you!

谢谢