

## 650-V Direct WBG Diode

### Key Features:

- SiC performance
- Easy paralleling
- High current carrying capability
- Very low junction capacitance
- Highly stable  $V_F$  and  $Q_{RR}$  at elevated temperatures

### Typical Applications:

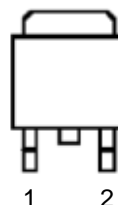
- Soft switching topologies
- Secondary side rectification

PRODUCT SUMMARY		
$V_{BR}$ (V)	$V_F$ (V)	$I_{F(AV)}$ (A)
650	1.8	10

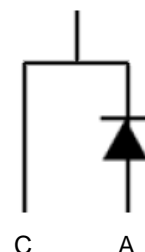


RoHS  
COMPLIANT  
HALOGEN  
FREE

TO-263



Case



ABSOLUTE MAXIMUM RATINGS ( $T_A = 25^\circ\text{C}$ UNLESS OTHERWISE NOTED)				
Parameter		Symbol	Limit	Units
Cathode-Anode Voltage		$V_{BR}$	650	V
Diode Forward Current <sup>a</sup>	$T_C=25^\circ\text{C}$	$I_{F(AV)}$	10	A
Single Pulse Forward Current <sup>b</sup>	$T_C=25^\circ\text{C}$	$I_{FSM}$	50	A
Joule Integral		$i^2t$	12	$\text{A}^2\cdot\text{s}$
Power Dissipation <sup>a</sup>	$T_C=25^\circ\text{C}$	$P_D$	37	W
Storage Temperature Range		$T_{stg}$	-55 to 175	$^\circ\text{C}$
Operating Junction Temperature		$T_J$	-40 to 175	$^\circ\text{C}$

THERMAL RESISTANCE RATINGS			
Parameter	Symbol	Maximum	Units
Maximum Junction-to-Ambient <sup>c</sup>	$R_{\theta JA}$	40	$^\circ\text{C}/\text{W}$
Maximum Junction-to-Case	$R_{\theta JC}$	3.7	

### Notes

- Package Limited
- Pulse width limited by maximum junction temperature
- Surface Mounted on 1" x 1" FR4 Board.

## Electrical Characteristics

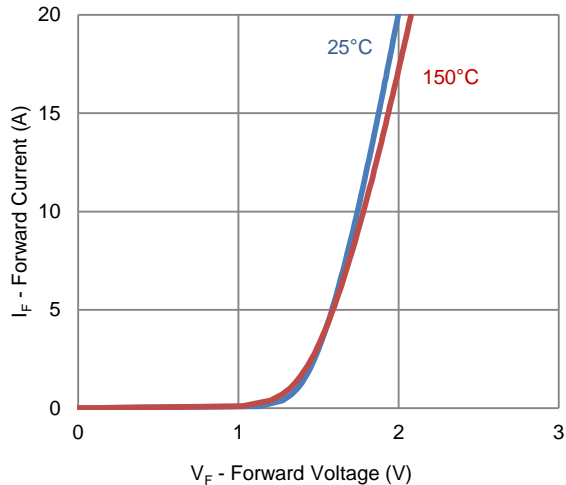
Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
<b>Static</b>						
Forward Voltage <sup>a</sup>	$V_F$	$I_F = 10\text{ A}$		1.8		V
		$I_F = 10\text{ A}, T_J = 150^\circ\text{C}$		1.84		
Repetitive Peak Reverse Voltage	$V_{RRM}$	$T_J = -40^\circ\text{C to } 150^\circ\text{C}$	650			V
Junction Capacitance	$C_J$	$V_R = 200\text{ V}, V_{\text{sine}} = 0.6 V_{\text{eff}},$ $f = 100\text{ kHz}$		6.3		pF
Reverse Leakage Current	$I_R$	$V_R = 650\text{ V}$			2	uA
		$V_R = 650\text{ V}, T_J = 150^\circ\text{C}$			10	uA
<b>Dynamic <sup>b</sup></b>						
Reverse Recovery Time	$T_{rr}$	$I_F = 10\text{ A}, dI/dt = 100\text{ A/us},$ $V_R = 400\text{V}, T_J = 25^\circ\text{C}$		76		ns
Reverse Recovery Charge	$Q_{rr}$			149		nC
Peak Recovery Current	$I_{RRM}$			3.3		A
Reverse Recovery Time	$T_{rr}$	$I_F = 10\text{ A}, dI/dt = 100\text{ A/us},$ $V_R = 400\text{V}, T_J = 150^\circ\text{C}$		71		ns
Reverse Recovery Charge	$Q_{rr}$			121		nC
Peak Recovery Current	$I_{RRM}$			2.8		A
Reverse Recovery Time	$T_{rr}$	$I_F = 10\text{ A}, dI/dt = 500\text{ A/us},$ $V_R = 400\text{V}, T_J = 25^\circ\text{C}$		30		ns
Reverse Recovery Charge	$Q_{rr}$			204		nC
Peak Recovery Current	$I_{RRM}$			11.2		A
Reverse Recovery Time	$T_{rr}$	$I_F = 10\text{ A}, dI/dt = 500\text{ A/us},$ $V_R = 400\text{V}, T_J = 150^\circ\text{C}$		30		ns
Reverse Recovery Charge	$Q_{rr}$			183		nC
Peak Recovery Current	$I_{RRM}$			9.9		A

## Notes

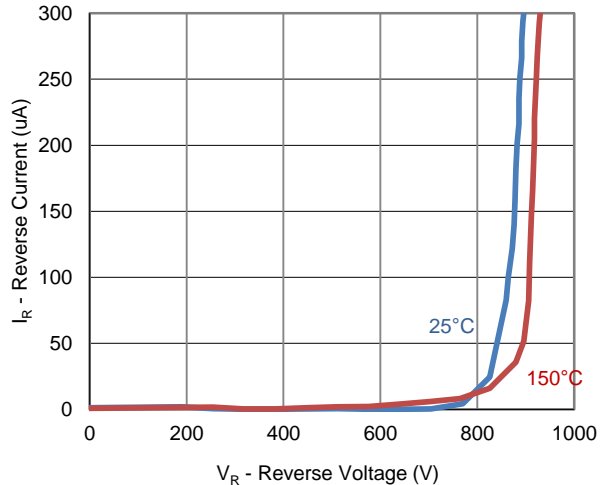
- Pulse test: PW <= 300us duty cycle <= 2%.
- Guaranteed by design, not subject to production testing.

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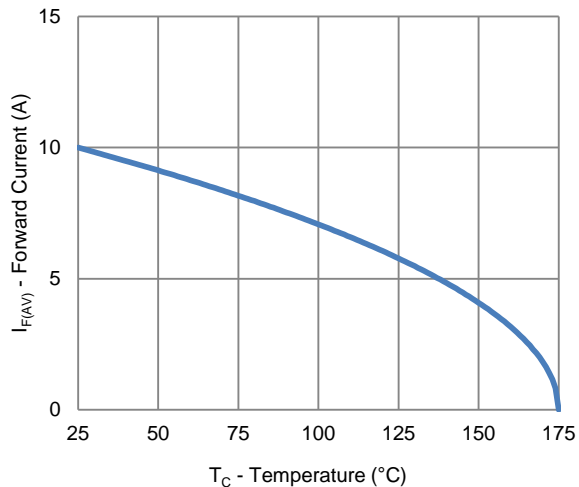
Typical Electrical Characteristics



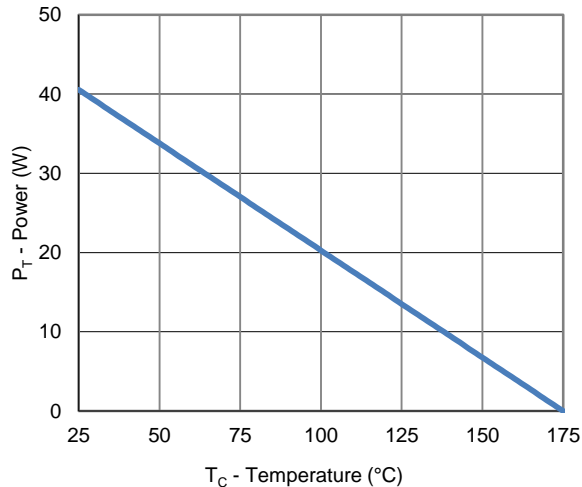
1. Forward Characteristics



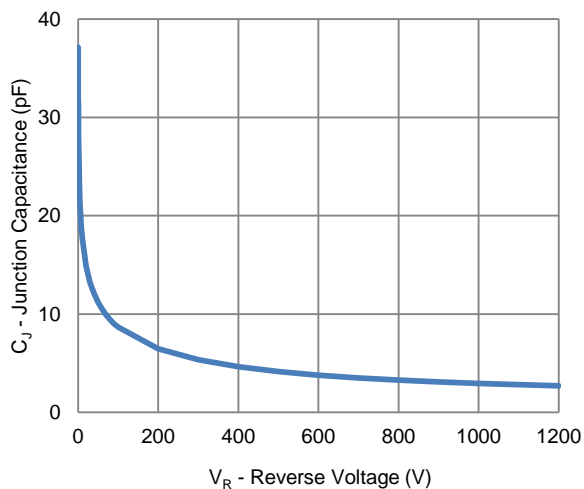
2. Reverse Characteristics



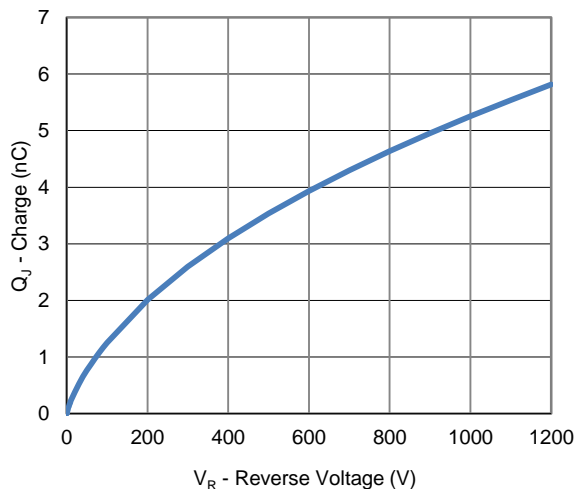
3. Current Derating



4. Power Derating

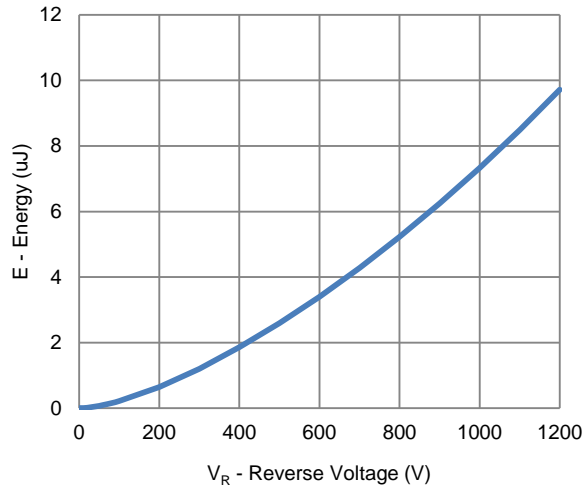


5. Junction Capacitance vs. Reverse Voltage

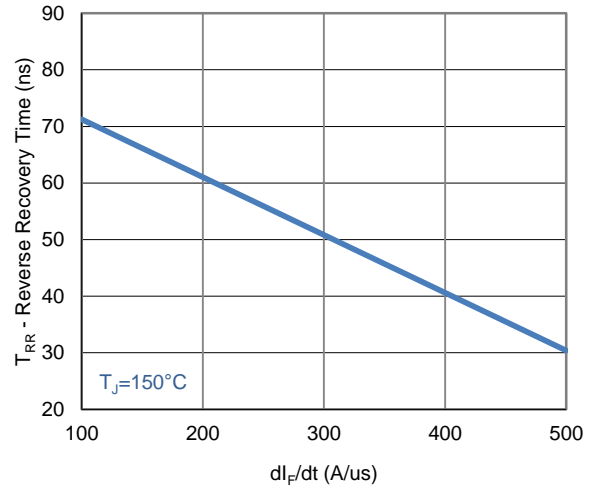


6. Total Capacitance Charge vs. Reverse Voltage

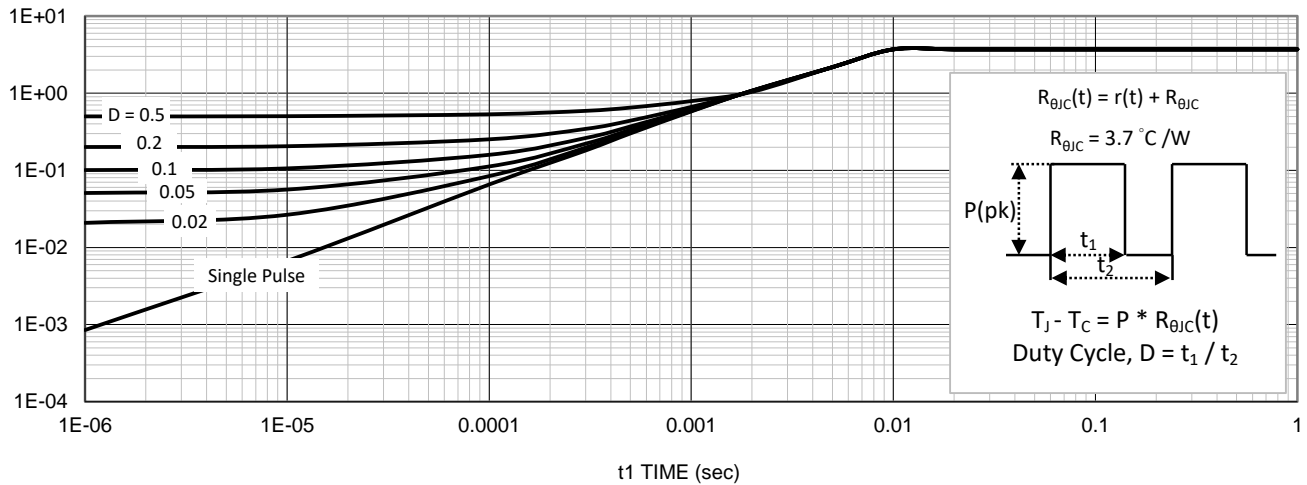
Typical Electrical Characteristics



7. Capacitance Stored Energy vs. Reverse Voltage

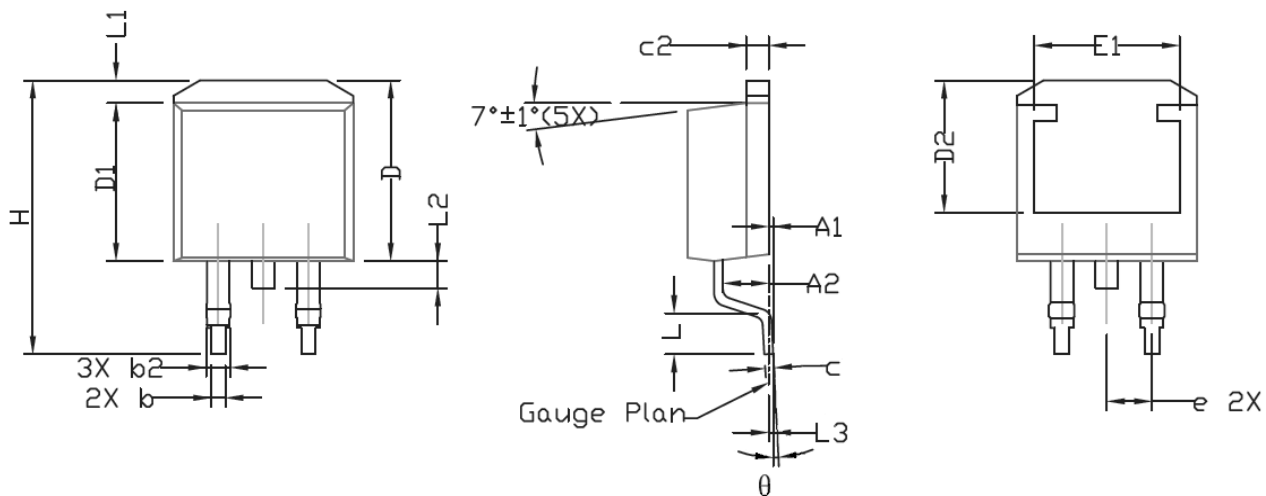


8. Reverse Recovery Time vs.  $di_F/dt$



9. Thermal Transient Junction to Ambient

Package Information



SYMBOL	DIMENSIONAL REQMTS			INCHES REQMTS		
	MTN	NOM	MAX	MTN	NOM	MAX
A	4.30	4.57	4.72	0.169	0.180	0.186
A1	0	---	0.25	0	---	0.010
A2	2.47	2.57	2.67	0.097	0.101	0.105
b	0.69	0.813	0.94	0.027	0.032	0.037
b2	1.17	1.27	1.45	0.046	0.050	0.057
c	0.48	0.50	0.60	0.019	0.020	0.024
c2	1.17	1.27	1.37	0.046	0.050	0.054
D	9.80	10.05	10.30	0.386	0.396	0.406
D1	8.64	8.78	9.65	0.340	0.346	0.380
D2	7.12	7.37	7.62	0.280	0.290	0.300
E	9.70	10.15	10.54	0.382	0.400	0.415
E1	8.00	8.20	8.40	0.315	0.323	0.331
e	2.54 BSC			0.100 BSC		
H	14.99	15.24	15.49	0.590	0.600	0.610
L	1.78	2.29	2.79	0.070	0.090	0.110
L1	1.02	1.27	1.52	0.040	0.050	0.060
L2	---	---	1.75	---	---	0.069
L3	---	0.254	---	---	0.010	---
θ	0°	---	8°	0°	---	8°