

## 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:

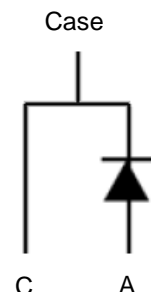
- Soft switching topologies
- Secondary side rectification

PRODUCT SUMMARY		
$V_{BR}$ (V)	$V_F$ (V)	$I_{F(AV)}$ (A)
650	1.8	20



RoHS  
COMPLIANT  
HALOGEN  
FREE

TO-247-2L



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>	$T_C=25^\circ\text{C}$	$I_{F(AV)}$	20	A
Single Pulse Forward Current <sup>b</sup>	$T_C=25^\circ\text{C}$	$I_{FSM}$	90	A
Joule Integral		$i^2t$	40	$\text{A}^2\cdot\text{s}$
Power Dissipation <sup>a</sup>	$T_C=25^\circ\text{C}$	$P_D$	104	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	$R_{\theta JC}$	1.45	

### Notes

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

## Electrical Characteristics

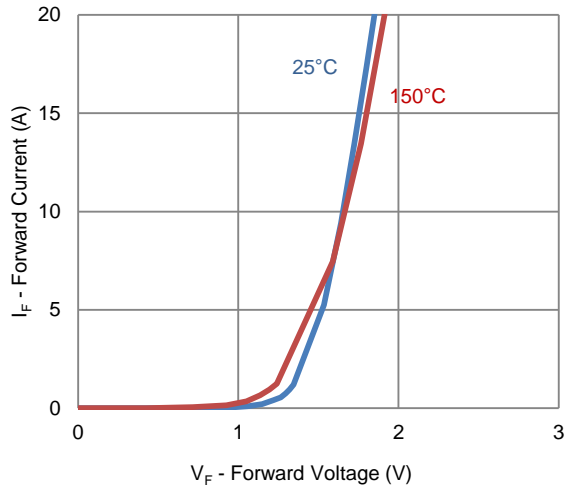
Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
<b>Static</b>						
Forward Voltage <sup>a</sup>	$V_F$	$I_F = 20\text{ A}$		1.8		V
		$I_F = 20\text{ A}, T_J = 150^\circ\text{C}$		1.88		
Repetitive Peak Reverse Voltage	$V_{RRM}$	$T_J = -40^\circ\text{C to } 150^\circ\text{C}$	650			V
Junction Capacitance	$C_J$	$V_R = 200\text{ V}, V_{\text{sine}} = 0.6 V_{\text{eff}},$ $f = 100\text{ kHz}$		12		pF
Reverse Leakage Current	$I_R$	$V_R = 650\text{ V}$			10	$\mu\text{A}$
		$V_R = 650\text{ V}, T_J = 150^\circ\text{C}$			60	$\mu\text{A}$
<b>Dynamic <sup>b</sup></b>						
Reverse Recovery Time	$T_{rr}$	$I_F = 20\text{ A}, dI/dt = 100\text{ A/us},$ $T_J = 25^\circ\text{C}$		84		ns
Reverse Recovery Charge	$Q_{rr}$			213		nC
Peak Recovery Current	$I_{RRM}$			4.3		A
Reverse Recovery Time	$T_{rr}$	$I_F = 20\text{ A}, dI/dt = 100\text{ A/us},$ $T_J = 150^\circ\text{C}$		82		ns
Reverse Recovery Charge	$Q_{rr}$			197		nC
Peak Recovery Current	$I_{RRM}$			3.9		A
Reverse Recovery Time	$T_{rr}$	$I_F = 20\text{ A}, dI/dt = 500\text{ A/us},$ $T_J = 25^\circ\text{C}$		47		ns
Reverse Recovery Charge	$Q_{rr}$			482		nC
Peak Recovery Current	$I_{RRM}$			17.9		A
Reverse Recovery Time	$T_{rr}$	$I_F = 20\text{ A}, dI/dt = 500\text{ A/us},$ $T_J = 150^\circ\text{C}$		45		ns
Reverse Recovery Charge	$Q_{rr}$			435		nC
Peak Recovery Current	$I_{RRM}$			15.9		A

## Notes

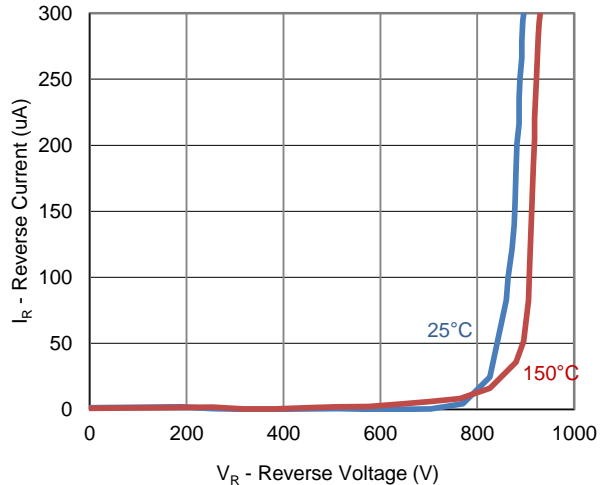
- Pulse test:  $PW \leq 300\mu\text{s}$  duty cycle  $\leq 2\%$ .
- Guaranteed by design, not subject to production testing.

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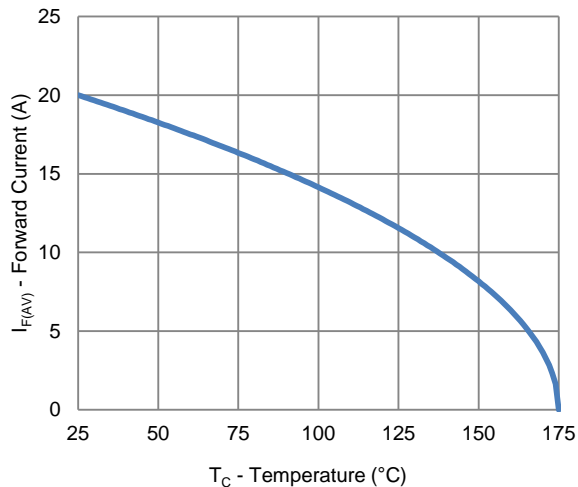
Typical Electrical Characteristics



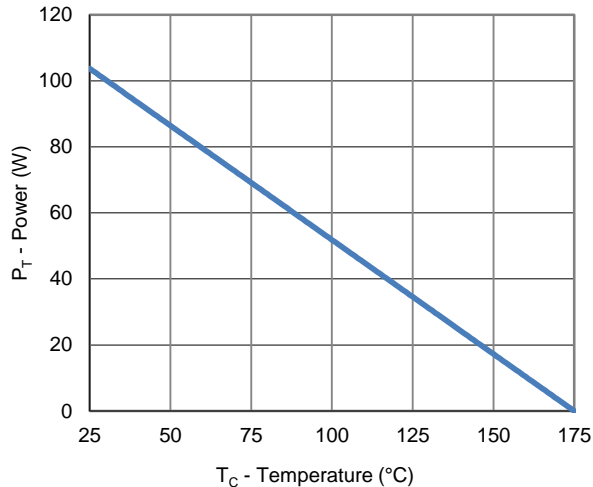
1. Forward Characteristics



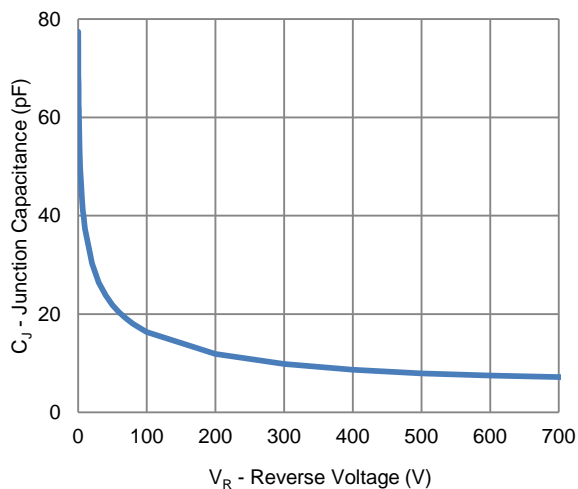
2. Reverse Characteristics



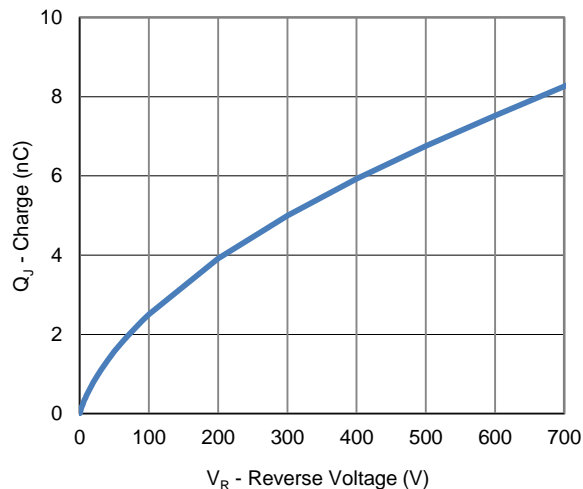
3. Current Derating



4. Power Derating

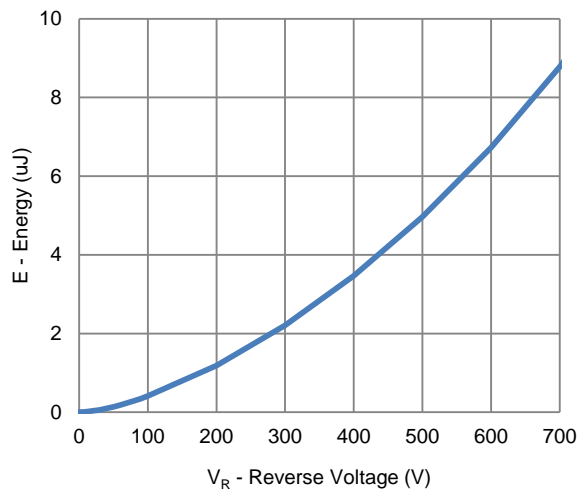


5. Junction Capacitance vs. Reverse Voltage

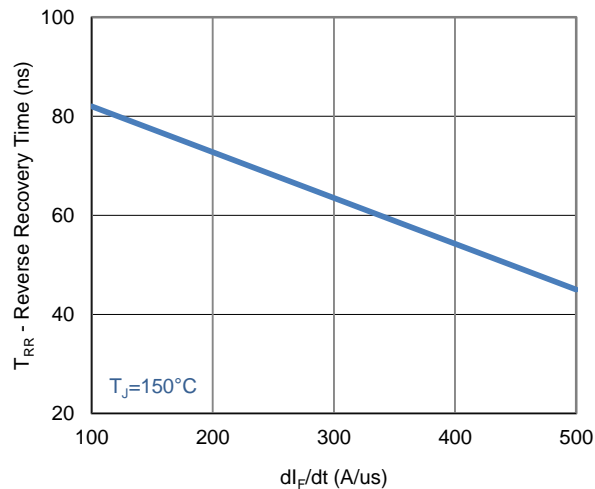


6. Total Capacitance Charge vs. Reverse Voltage

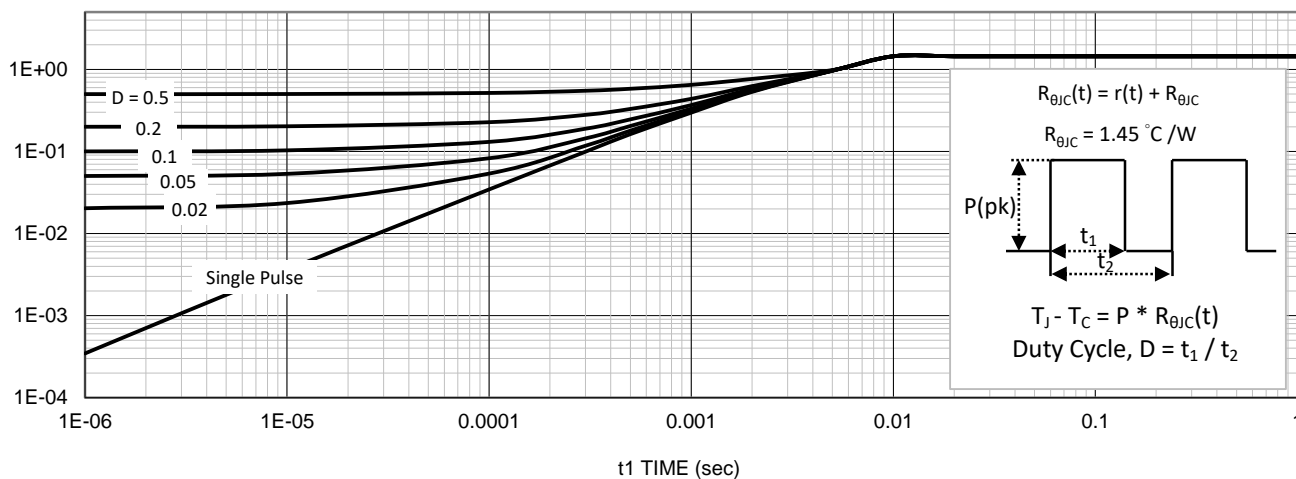
Typical Electrical Characteristics



7. Capacitance Stored Energy vs. Reverse Voltage

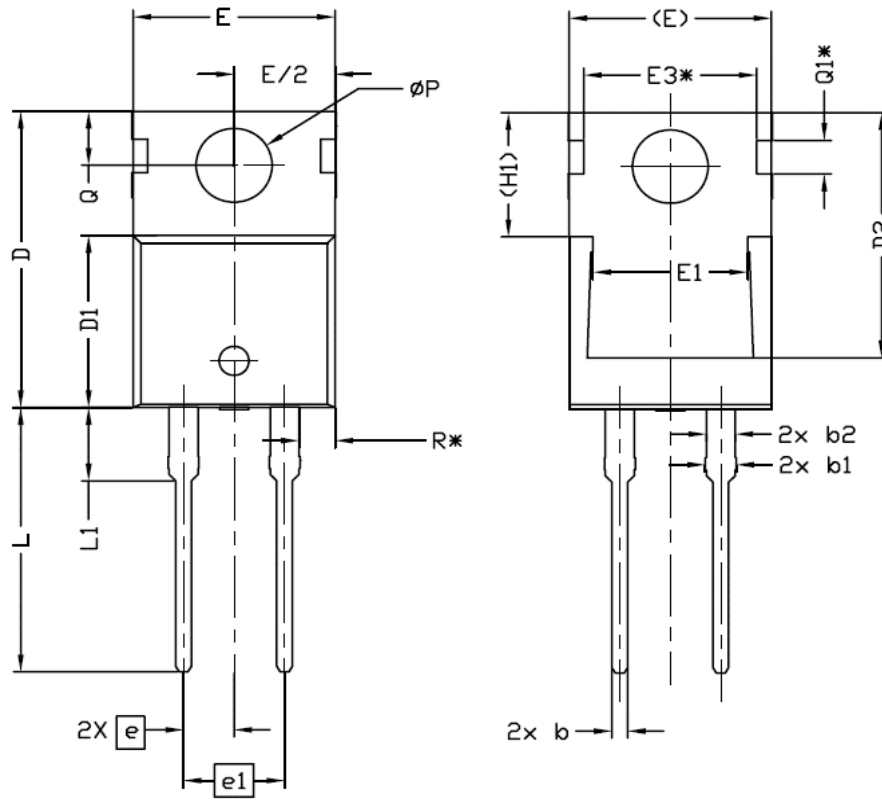


8. Reverse Recovery Time vs.  $di_F/dt$



9. Thermal Transient Junction to Ambient

Package Information



SYMBOL	DIMENSIONS		
	MIN.	NOM.	MAX.
A	4,24	4,44	4,64
A1	1,15	1,27	1,40
A2	2,30	2,48	2,70
b	0,70	0,80	0,90
b1	1,20	1,55	1,75
b2	1,20	1,45	1,70
c	0,40	0,50	0,60
D	14,70	15,37	16,00
D1	8,82	8,92	9,02
D2	12,43	12,73	12,83
E	9,96	10,16	10,36
E1	6,86	7,77	8,89
E3*	8.70REF.		
e	2.54BSC		
e1	5.08BSC		
H1	6,30	6,45	6,60
L	13,47	13,72	13,97
L1	3,60	3,80	4,00
$\phi P$	3,75	3,84	3,93
Q	2,60	2,80	3,00
Q1*	1.73REF.		
R*	1.82REF.		