

650V SiC Schottky Diode

GP3D040A065U

VDC	650 V
Q _C	106 nC***
I _F	40 A***
T _{j,max}	175 °C

Amp+™ Features

- Unipolar rectifier with surge current
- Zero reverse recovery current
- Fast, temperature-independent switching
- Avalanche tested to 135mJ*
- All parts tested to greater than 715V

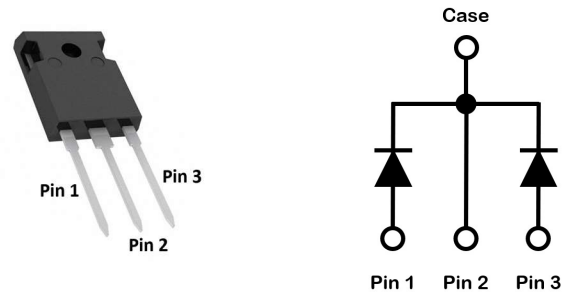
Amp+™ Benefits

- Near zero switching loss
- Higher efficiency
- Reduced heat sink requirements
- Easy to parallel

Amp+™ Applications

- Switch mode power supplies, UPS
- Power factor correction
- EV charging stations
- Output rectification

Package



Part #	Package	Marking
GP3D040A065U	TO-247-3L	3D040A065



Maximum Ratings, at T_j=25 °C, unless otherwise specified

Characteristics Per Leg	Symbol	Conditions	Values	Unit
Continuous forward current	I _F **	T _C =25 °C, T _J =175 °C	55	A
		T _C =125 °C, T _J =175 °C	28	
		T _C =150 °C, T _J =175 °C	18	
Surge non-repetitive forward current sine halfwave	I _{FSM}	T _C =25 °C, t _p =8.3 ms	135	A
		T _C =110 °C, t _p =8.3 ms	125	
Non-repetitive peak forward current	I _{F,max}	T _C =25 °C, t _p =10 μs	1100	A
i ² t value	∫i ² dt	T _C =25 °C, t _p =8.3 ms	76	A ² s
		T _C =110 °C, t _p =8.3 ms	65	
Repetitive peak reverse voltage	V _{RRM}	T _J =25 °C	650	V
Diode dv/dt ruggedness	dv/dt	Turn-on slew rate, repetitive	200	V/ns
Power dissipation	P _{tot} **	T _C =25 °C	171	W
Operating junction & storage temperature	T _j , T _{storage}	Continuous	-55...175	°C
Soldering temperature	T _{solder}	Wave soldering leads	260	°C
Mounting torque		M3 Screw	1	N-m

Notes:

* EAS of 135 mJ is based on starting T_j = 25°C, L = 1.0 mH, I_{AS} = 16.43 A, V = 50 V.

** Typical R_{thjC} used

***Per Device

Electrical Characteristics, at $T_j=25\text{ }^\circ\text{C}$, unless otherwise specified

Characteristics Per Leg	Symbol	Conditions	Values			Unit
			min.	typ.	max.	
DC blocking voltage	V_{DC}	$T_j=25\text{ }^\circ\text{C}$	650	-	-	V
Breakdown voltage	V_{BR}	$I_R=660\mu\text{A}, T_j=25\text{ }^\circ\text{C}$	715	-	-	V
Diode forward voltage	V_F	$I_F=20\text{A}, T_j=25\text{ }^\circ\text{C}$	-	1.40	1.55	V
		$I_F=20\text{A}, T_j=125\text{ }^\circ\text{C}$	-	1.51	-	
		$I_F=20\text{A}, T_j=175\text{ }^\circ\text{C}$	-	1.64	1.90	
Reverse current	I_R	$V_R=650\text{V}, T_j=25\text{ }^\circ\text{C}$	-	2	50	μA
		$V_R=715\text{V}, T_j=25\text{ }^\circ\text{C}$	-	7	-	
		$V_R=650\text{V}, T_j=125\text{ }^\circ\text{C}$	-	19	-	
		$V_R=650\text{V}, T_j=175\text{ }^\circ\text{C}$	-	72	500	
Total capacitive charge	Q_C	$V_R=400\text{V}, T_j=25\text{ }^\circ\text{C}$	-	53	-	nC
Total capacitance	C	$V_R=1\text{V}, f=1\text{ MHz}$	-	866	-	pF
		$V_R=200\text{V}, f=1\text{ MHz}$	-	102	-	
		$V_R=400\text{V}, f=1\text{ MHz}$	-	78	-	

Thermal Characteristics

Characteristics Per Leg	Symbol	Conditions	Values			Unit
			min.	typ.	max.	
Thermal resistance, junction-case	R_{thJC}	-	-	0.88	1.05	$^\circ\text{C/W}$

Typical Performance Per Leg

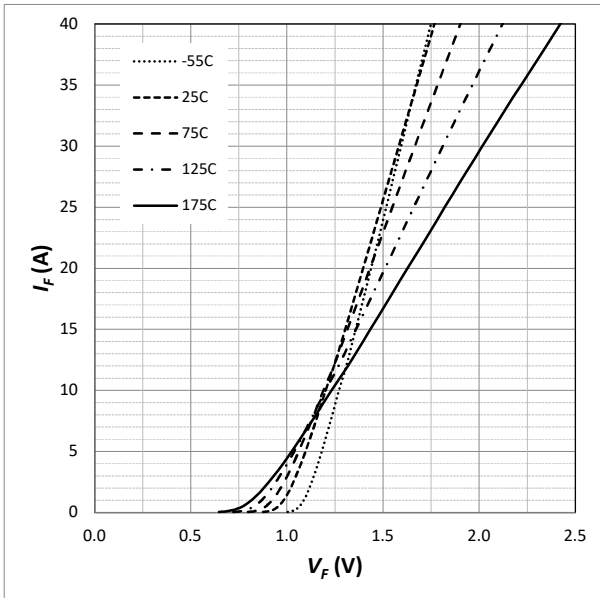


Fig. 1 Forward Characteristics (parameterized on T_j)

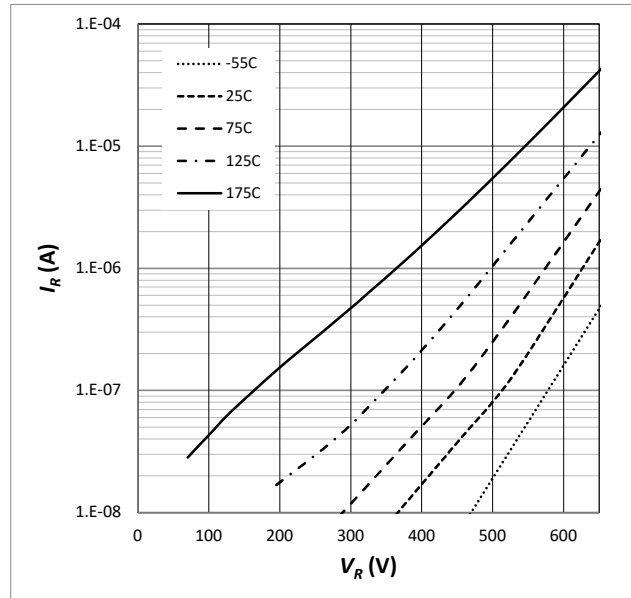


Fig. 2 Reverse Characteristics (parameterized on T_j)

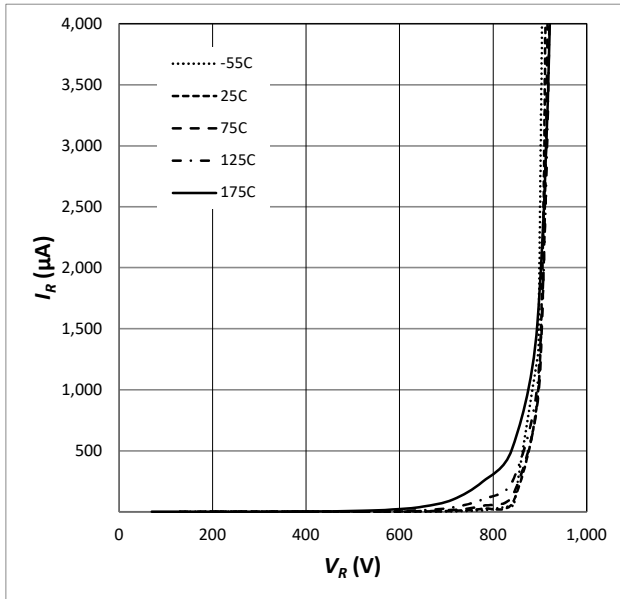


Fig. 3 Reverse Characteristics (parameterized on T_j)

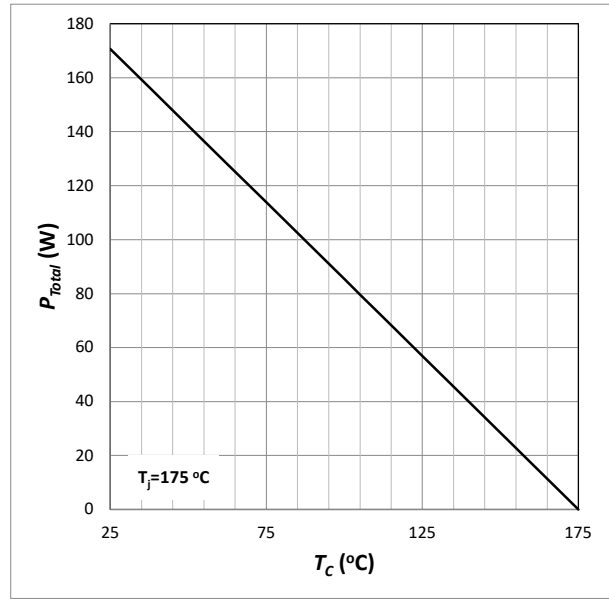


Fig. 4 Power Derating

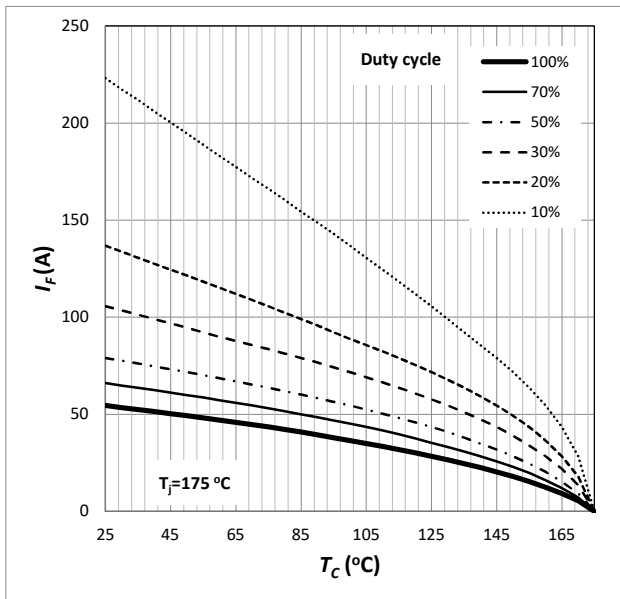


Fig. 5 Current Derating

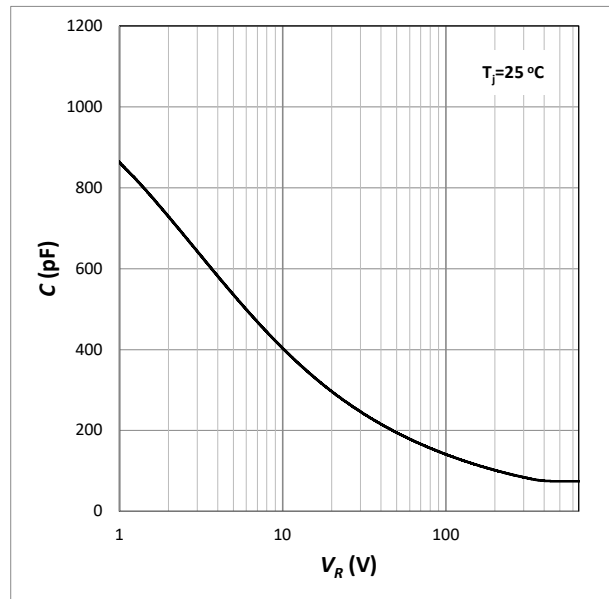


Fig. 6 Capacitance

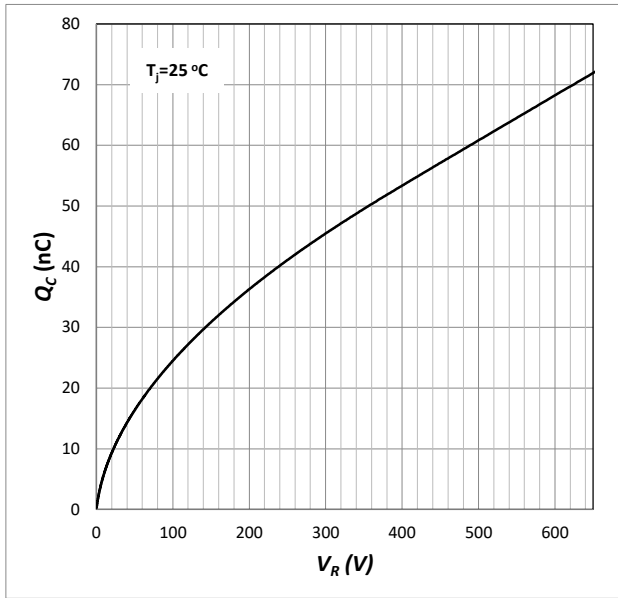


Fig. 7 Capacitive Charge

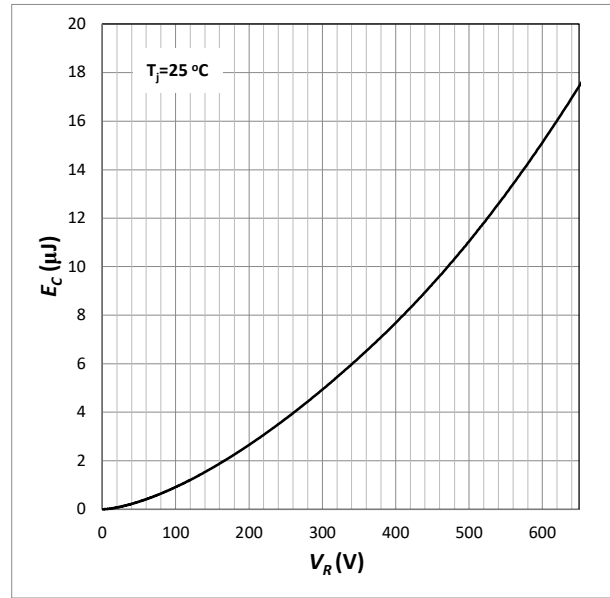


Fig. 8 Typical Capacitance Stored Energy

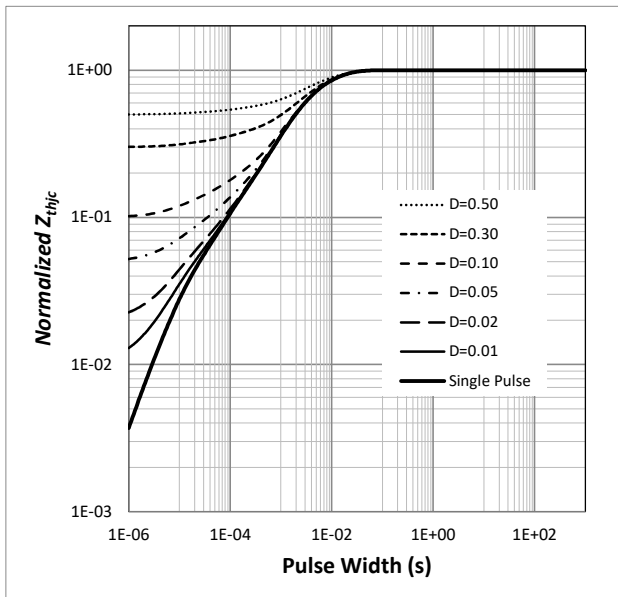


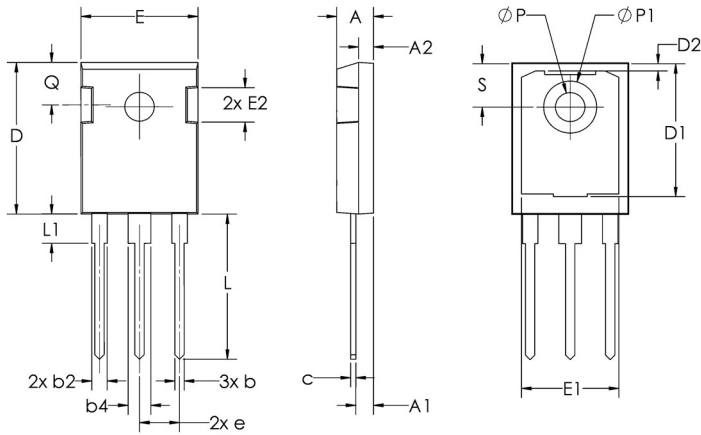
Fig. 9 Transient Thermal Impedance

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Amp+™

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Package Dimensions TO-247-3L



Sym	Millimeters		Inches	
	Min	Max	Min	Max
A	4.70	5.31	0.185	0.209
A1	2.21	2.59	0.087	0.102
A2	1.50	2.49	0.059	0.098
b	0.99	1.40	0.039	0.055
b2	1.65	2.39	0.065	0.094
b4	2.59	3.43	0.102	0.135
c	0.38	0.89	0.015	0.035
D	20.80	21.46	0.819	0.845
D1	13.08	17.65	0.515	0.695
D2	0.51	1.35	0.020	0.053
E	15.49	16.26	0.610	0.640
E1	13.46	14.16	0.530	0.557
E2	3.43	5.49	0.135	0.216
e	5.44 BSC		0.214 BSC	
L	19.81	20.32	0.780	0.800
L1	4.10	4.50	0.161	0.177
φP	3.56	3.66	0.140	0.144
φP1	7.06	7.39	0.278	0.291
Q	5.39	6.20	0.212	0.244
S	6.04	6.30	0.238	0.248

Revision History

Date	Revision	Notes
12/20/2019	1.0	Initial release of datasheet
2/20/2020	1.1	Using Rthjc typical for I _F and P _{tot}
4/20/2021	1.2	Updated forward voltage spec - valid for date codes after 2101 (YYWW format)

Notes**RoHS Compliance**

The levels of RoHS restricted materials in this product are below the maximum concentration values (also referred to as the threshold limits) permitted for such substances, or are used in an exempted application, in accordance with EU Directive 2011/65/EC (RoHS2), as implemented March, 2013. RoHS Declarations for this product can be obtained from the Product Documentation sections of www.SemiQ.com.

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