



# 650V SiC Schottky Diode

## GP3D012A065A

VDC	650 V
Q <sub>C</sub>	35 nC
I <sub>F</sub>	12 A
T <sub>j,max</sub>	175 °C

### Amp+™ Features

- Unipolar rectifier with surge current
- Zero reverse recovery current
- Fast, temperature-independent switching
- Avalanche tested to 80mJ\*
- All parts tested to greater than 715V

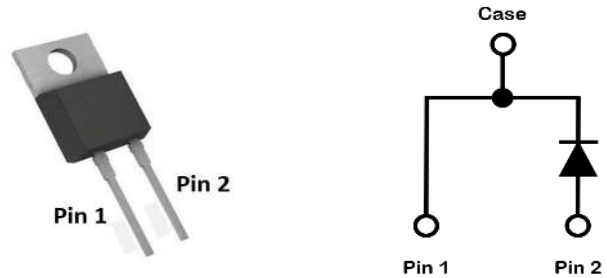
### Amp+™ Benefits

- 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
GP3D012A065A	TO-220-2L	3D012A065



### Maximum Ratings, at T<sub>j</sub>=25 °C, unless otherwise specified

Characteristics	Symbol	Conditions	Values	Unit
Continuous forward current	I <sub>F</sub> **	T <sub>C</sub> =25 °C, T <sub>J</sub> =175 °C	42	A
		T <sub>C</sub> =125 °C, T <sub>J</sub> =175 °C	22	
		T <sub>C</sub> =150 °C, T <sub>J</sub> =175 °C	14	
Surge non-repetitive forward current sine halfwave	I <sub>F,SM</sub>	T <sub>C</sub> =25 °C, t <sub>p</sub> =8.3 ms	100	A
		T <sub>C</sub> =110 °C, t <sub>p</sub> =8.3 ms	90	
Non-repetitive peak forward current	I <sub>F,max</sub>	T <sub>C</sub> =25 °C, t <sub>p</sub> =10 μs	850	A
i <sup>2</sup> t value	∫i <sup>2</sup> dt	T <sub>C</sub> =25 °C, t <sub>p</sub> =8.3 ms	42	A <sup>2</sup> s
		T <sub>C</sub> =110 °C, t <sub>p</sub> =8.3 ms	34	
Repetitive peak reverse voltage	V <sub>RRM</sub>	T <sub>J</sub> =25 °C	650	V
Diode dv/dt ruggedness	dv/dt	Turn-on slew rate, repetitive	200	V/ns
Power dissipation	P <sub>tot</sub> **	T <sub>C</sub> =25 °C	147	W
Operating junction & storage temperature	T <sub>J</sub> , T <sub>storage</sub>	Continuous	-55...175	°C
Soldering temperature	T <sub>solder</sub>	Wave soldering leads	260	°C
Mounting torque		M3 Screw	1	N-m

**Notes:**

\* EAS of 80 mJ is based on starting T<sub>J</sub> = 25°C, L = 1.0 mH, I<sub>AS</sub> = 12.65 A, V = 50 V.

\*\* Typical R<sub>thjC</sub> used

Electrical Characteristics, at T<sub>j</sub>=25 °C, unless otherwise specified

Characteristics	Symbol	Conditions	Values			Unit
			min.	typ.	max.	
DC blocking voltage	V <sub>DC</sub>	T <sub>j</sub> =25 °C	650	-	-	V
Breakdown voltage	V <sub>BR</sub>	I <sub>R</sub> =396µA, T <sub>j</sub> =25 °C	715	-	-	V
Diode forward voltage	V <sub>F</sub>	I <sub>F</sub> =12A, T <sub>j</sub> =25 °C	-	1.38	1.50	V
		I <sub>F</sub> =12A, T <sub>j</sub> =125 °C	-	1.47	-	
		I <sub>F</sub> =12A, T <sub>j</sub> =175 °C	-	1.57	1.90	
Reverse current	I <sub>R</sub>	V <sub>R</sub> =650V, T <sub>j</sub> =25 °C	-	3	30	µA
		V <sub>R</sub> =715V, T <sub>j</sub> =25 °C	-	9	-	
		V <sub>R</sub> =650V, T <sub>j</sub> =125 °C	-	18	-	
		V <sub>R</sub> =650V, T <sub>j</sub> =175 °C	-	64	300	
Total capacitive charge	Q <sub>C</sub>	V <sub>R</sub> =400V, T <sub>j</sub> =25 °C	-	35	-	nC
Total capacitance	C	V <sub>R</sub> =1V, f=1 MHz	-	554	-	pF
		V <sub>R</sub> =200V, f=1 MHz	-	66	-	
		V <sub>R</sub> =400V, f=1 MHz	-	60	-	

Thermal Characteristics

Characteristics	Symbol	Conditions	Values			Unit
			min.	typ.	max.	
Thermal resistance, junction-case	R <sub>thJC</sub>	-	-	1.02	1.32	°C/W

Typical Performance

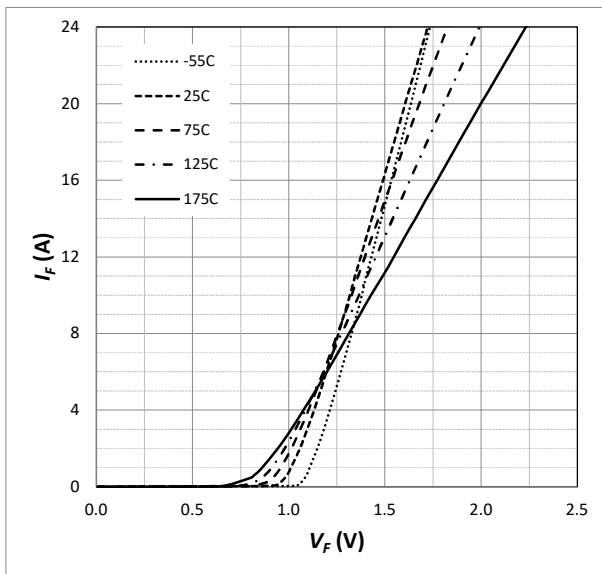


Fig. 1 Forward Characteristics (parameterized on T<sub>j</sub>)

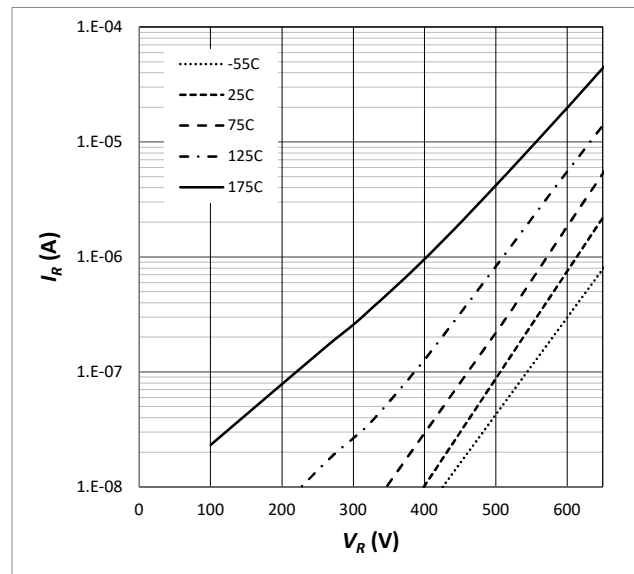


Fig. 2 Reverse Characteristics (parameterized on T<sub>j</sub>)

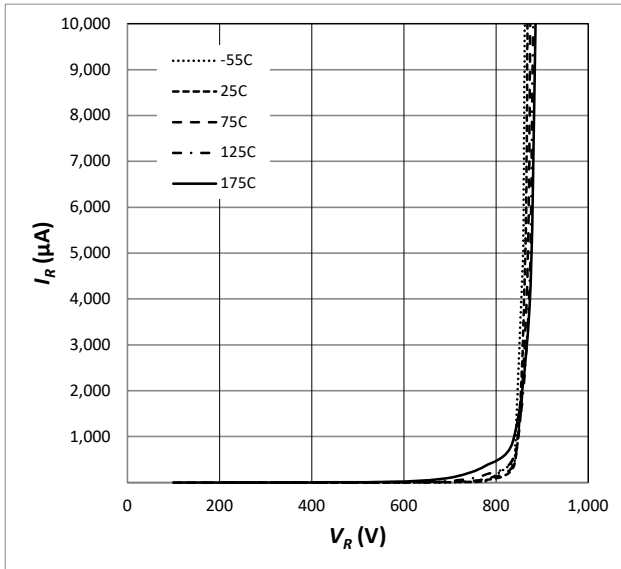


Fig. 3 Reverse Characteristics (parameterized on Tj)

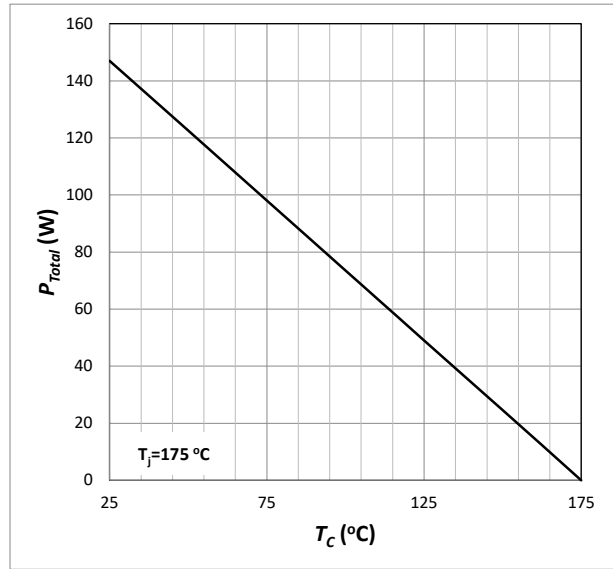


Fig. 4 Power Derating

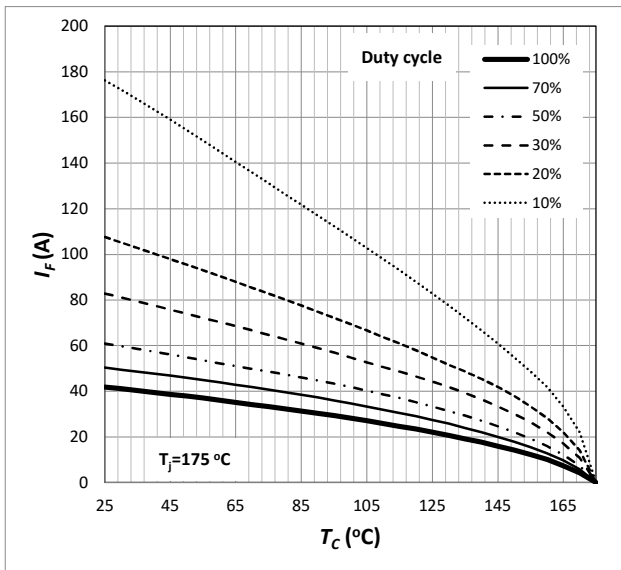


Fig. 5 Current Derating

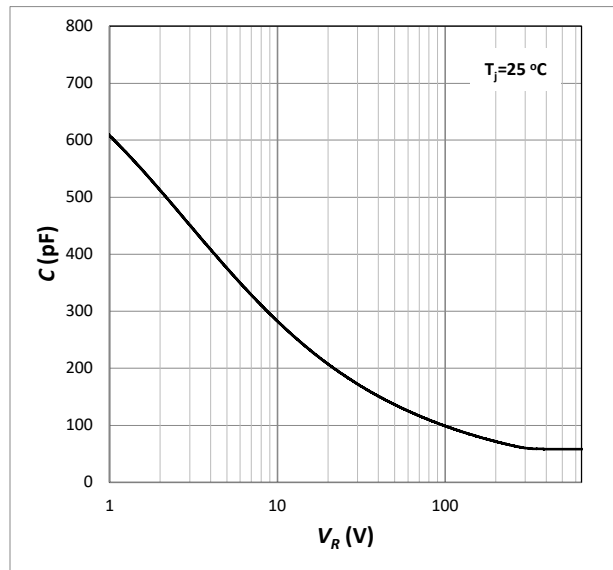


Fig. 6 Capacitance

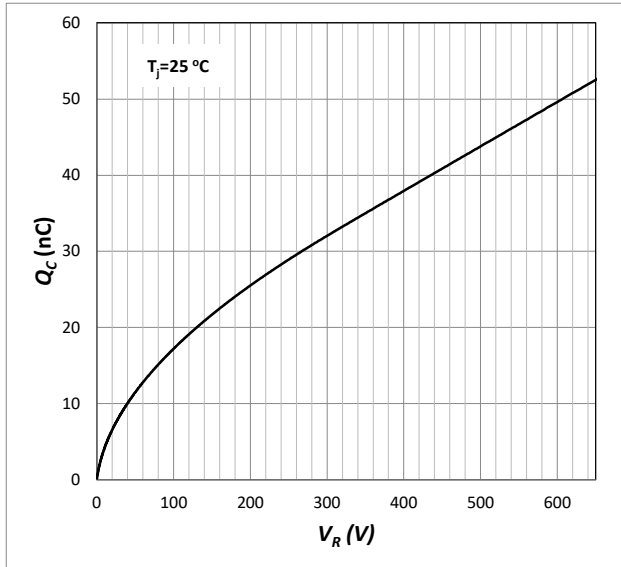


Fig. 7 Capacitive Charge

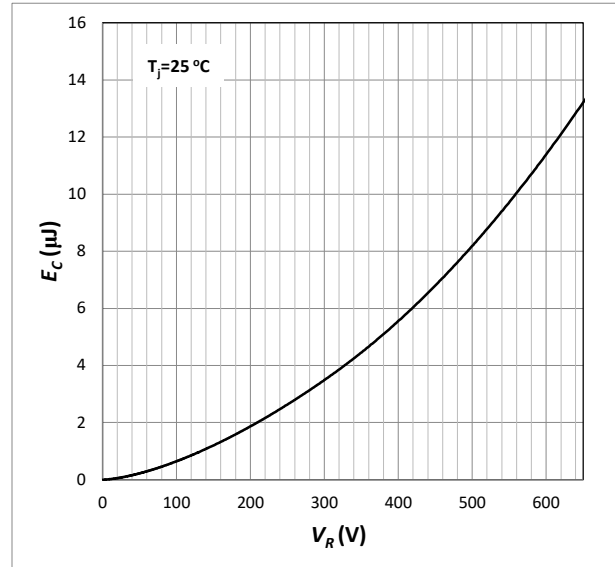


Fig. 8 Typical Capacitance Stored Energy

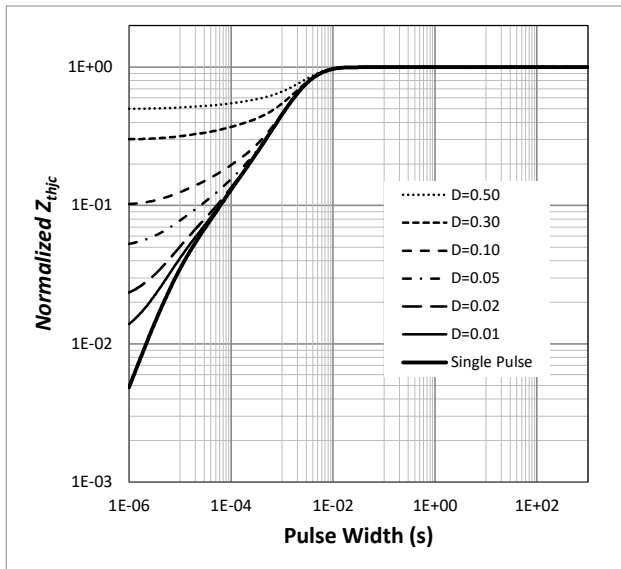


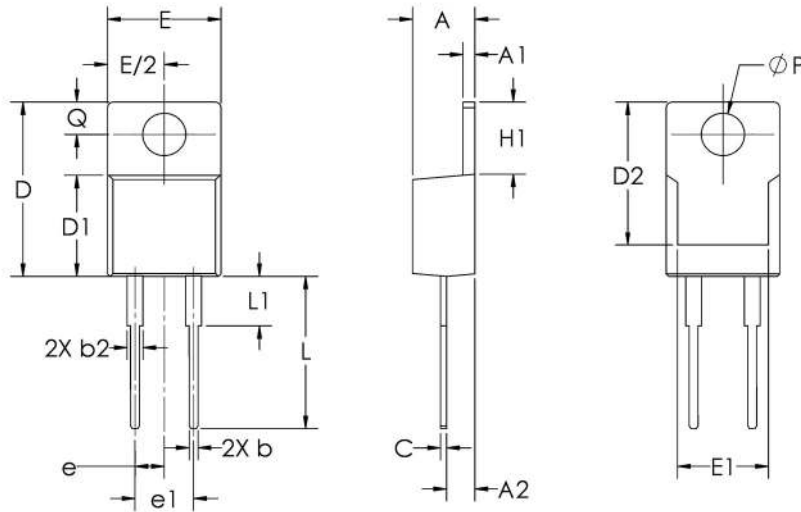
Fig. 9 Transient Thermal Impedance

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Amp+™

GP3D012A065A

## Package Dimensions TO-220-2L



Sym	Millimeters		Inches	
	Min	Max	Min	Max
A	4.20	4.70	0.165	0.185
A1	1.14	1.40	0.045	0.055
A2	2.03	2.92	0.080	0.115
b	0.38	1.02	0.015	0.040
b2	1.02	1.78	0.040	0.070
c	0.36	0.76	0.014	0.030
D	14.22	16.51	0.560	0.650
D1	8.38	9.40	0.330	0.370
D2	12.19	13.13	0.480	0.517
E	9.65	10.67	0.380	0.420
E1	6.86	8.89	0.270	0.350
e	2.54 BSC		.100 BSC	
e1	5.08 BSC		.200 BSC	
H1	5.84	6.86	0.230	0.270
L	12.57	14.73	0.495	0.580
L1	3.60	6.35	0.142	0.250
$\phi P$	3.53	4.09	0.139	0.161
Q	2.54	3.43	0.100	0.135

**Revision History**

Date	Revision	Notes
10/2/2019	1.0	Initial release of datasheet
12/20/2019	1.1	Company name and style change, updated Rthjc spec
2/20/2020	1.2	Using Rthjc typical for IF and Ptot
8/6/2021	1.3	Updated forward voltage spec, surge, Rthjc - 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](http://www.SemiQ.com).

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