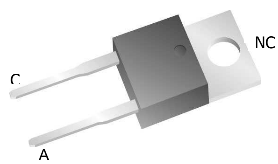
QH12TZ600Q
Qspeed™ Family

600 V, 12 A H-Series SiC Replacement Diode for Automotive

Product Summary

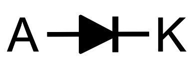
$I_{F(AVG)}$	12	A
RRM	600	V
Q_{RR} (Typ at 125 °C)	30	nC
I_{RRM} (Typ at 125 °C)	2.2	A
Softness t_B/t_A (Typ at 125 °C)	0.65	

Pin Assignment



TO-220AC

QH12TZ600Q



RoHS Compliant

Package uses Lead-free plating and Green mold compound.
Halogen free per IEC 61249-2-21.

General Description

This device has the lowest Q_{RR} of any 600 V silicon diode. Its recovery characteristics increase efficiency, reduces EMI and eliminates snubbers. Replaces SiC diodes for similar efficiency performance in high switching frequency applications.

Applications

- Power Factor Correction boost diode in on-board charger
- Output rectifier of on-board charger

Features

- Low Q_{RR}, low I_{RRM}, low t_{RR}
- High dI_F/dt capable (1000 A / µs)
- Soft recovery
- AEC-Q101 qualified
- Fab, assembly and test certified to IATF 16949

Benefits

- Increases efficiency
  - Eliminates need for snubber circuits
  - Reduces EMI filter component size & count
- Enables extremely fast switching

Absolute Maximum Ratings

Absolute maximum ratings are the values beyond which the device may be damaged or have its useful life impaired. Functional operation under these conditions is not implied.

Symbol	Parameter	Conditions	Rating	Units
V_{RRM}	Peak repetitive reverse voltage	T_J = 25 °C	600	V
$I_{F(AVG)}$	Average forward current	T_J = 150 °C, T_C = 90 °C	12	A
I_{FSM}	Non-repetitive peak surge current	60 Hz, ½ cycle, T_C = 25 °C	100	A
I_{FSM}	Non-repetitive peak surge current	½ cycle of t = 28 µs Sinusoid, T_C = 25 °C	350	A
T_J	Operating junction temperature range		-55 to 150	°C
T_{STG}	Storage temperature		-55 to 150	°C
	Lead soldering temperature	Leads at 1.6 mm from case, 10 sec	300	°C
V_{ISOL}	Isolation voltage (leads-to-tab)	AC, TO-220	2500	V
P_D	Power dissipation	T_C = 25 °C	61	W

Thermal Resistance

Symbol	Resistance from:	Conditions	Rating	Units
$R_{\theta JA}$	Junction to ambient	TO-220	62	°C/W
$R_{\theta JC}$	Junction to case		2.05	°C/W

Electrical Specifications at T_J= 25 °C (unless otherwise specified)

Symbol	Parameter	Conditions		Min	Typ	Max	Units
DC Characteristics							
I_R	Reverse current	V_R = 600 V, T_J = 25 °C		-	-	250	µA
		V_R = 600 V, T_J = 125 °C		-	0.6	-	mA
V_F	Forward voltage	I_F = 12 A, T_J = 25 °C		-	2.65	3.1	V
		I_F = 12 A, T_J = 150 °C		-	2.33	-	V
C_J	Junction capacitance	V_R = 10 V, 1 MHz		-	34	-	pF
Dynamic Characteristics							
t_{RR}	Reverse recovery time	dI/dt = 200 A/µs V_R = 400 V, I_F = 12 A	T_J = 25 °C	-	11.6	-	ns
			T_J = 125 °C	-	20.5	-	ns
Q_{RR}	Reverse recovery charge	dI/dt = 200 A/µs V_R = 400 V, I_F = 12 A	T_J = 25 °C	-	9.2	14	nC
			T_J = 125 °C	-	30	-	nC
I_{RRM}	Maximum reverse recovery current	dI/dt =200 A/µs V_R = 400 V, I_F = 12 A	T_J = 25 °C	-	1.27	1.8	A
			T_J = 125 °C	-	2.2	-	A
S	Softness factor = $\frac{t_B}{t_A}$	dI/dt = 200 A/µs V_R = 400 V, I_F = 12 A	T_J = 25 °C	-	0.6	-	
			T_J = 125 °C	-	0.65	-	

<u>Note to component engineers</u>: H-Series diodes employ Schottky technologies in their design and construction. Therefore, Component Engineers should plan their test setups to be similar to those for traditional Schottky test setups. (For additional details, see Application Note AN-300.)

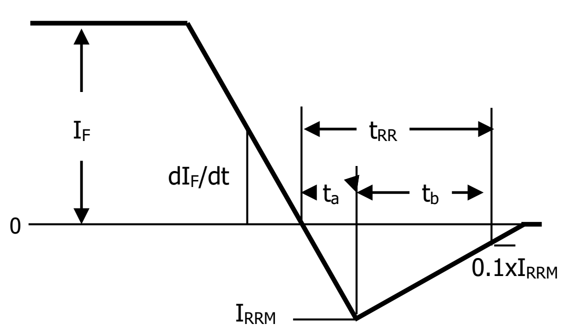


Figure 1. Reverse Recovery Definitions.

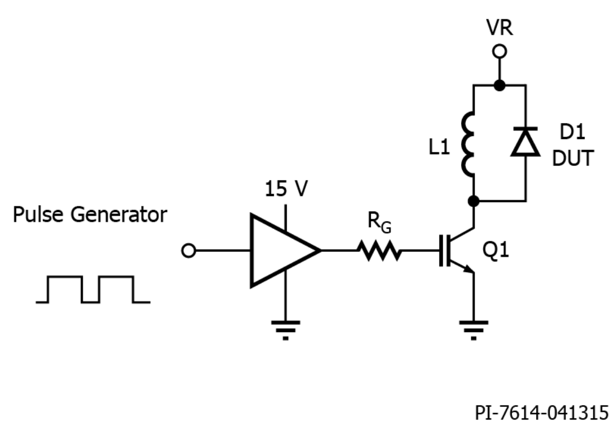


Figure 2. Reverse Recovery Test Circuit.

Electrical Specifications at T_J= 25 °C (unless otherwise specified)

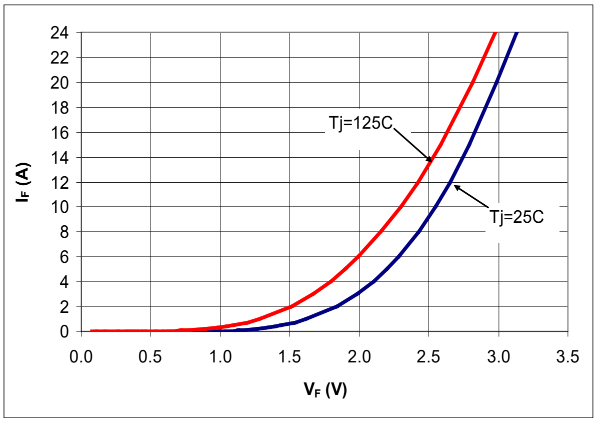


Figure 3. Typical I_F vs. V_F.

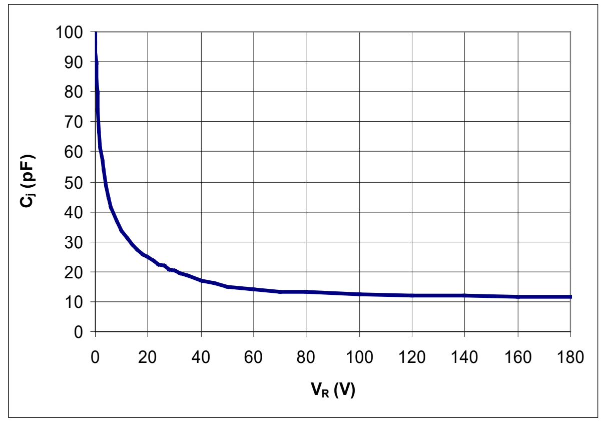


Figure 4. Typical C_J vs. V_R.

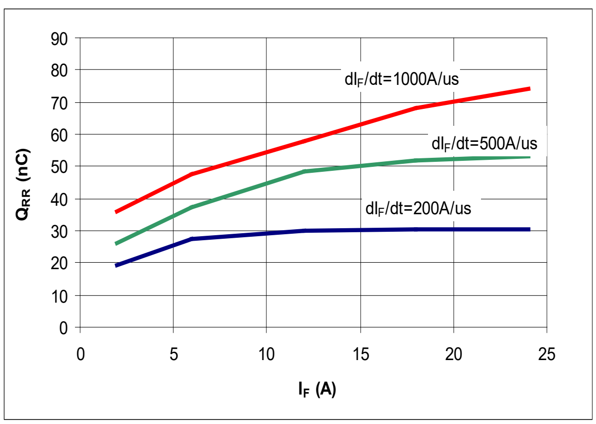


Figure 5. Typical Q_{RR} vs. I_F at T_J = 125 °C.

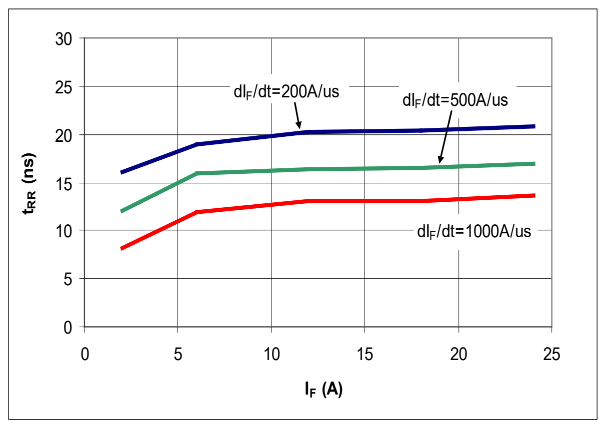


Figure 6. Typical t_{RR} vs. I_F at T_J = 125 °C.

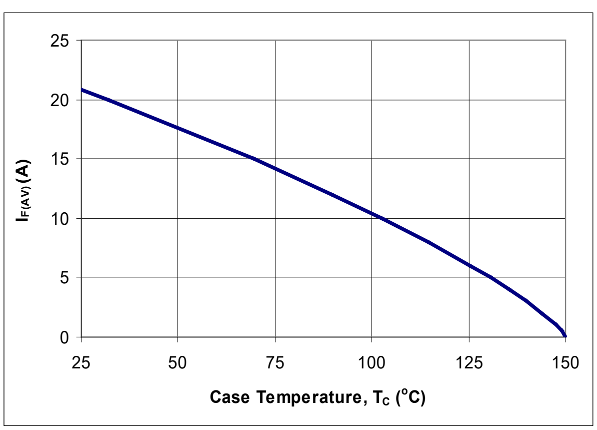


Figure 7. DC Current Derating Curve.

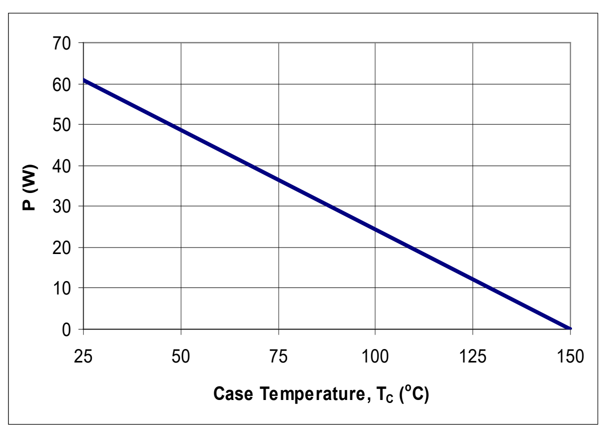


Figure 8. Power Derating Curve.

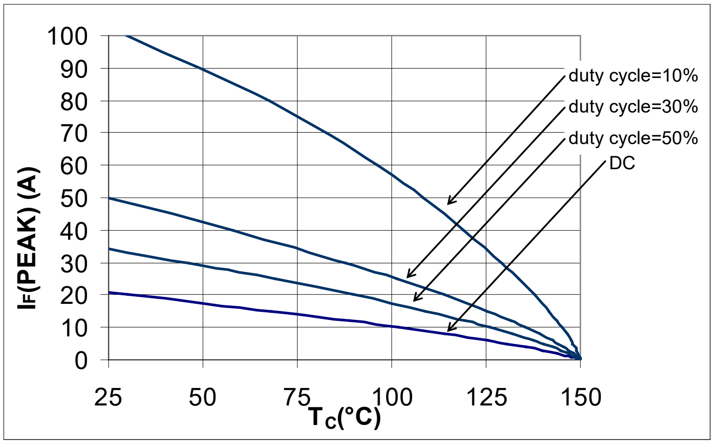


Figure 9. I_F(PEAK) vs. T_C, f = 70 kHz.

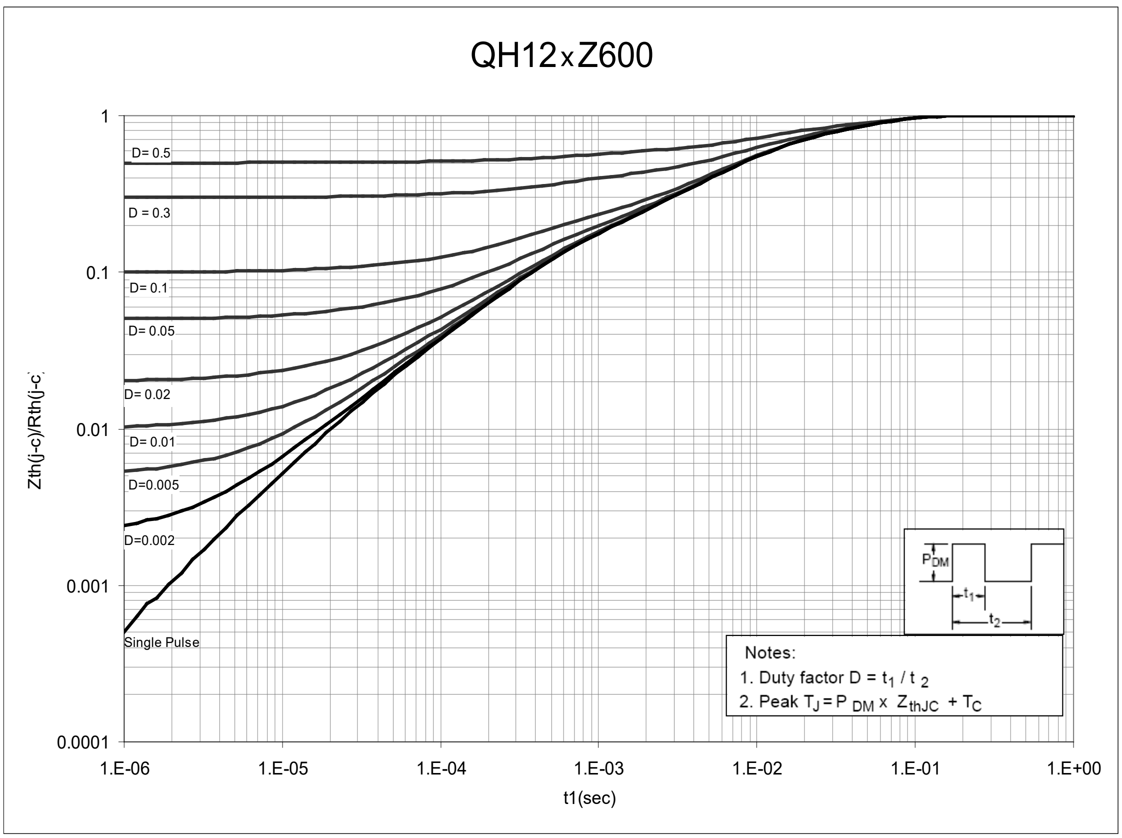
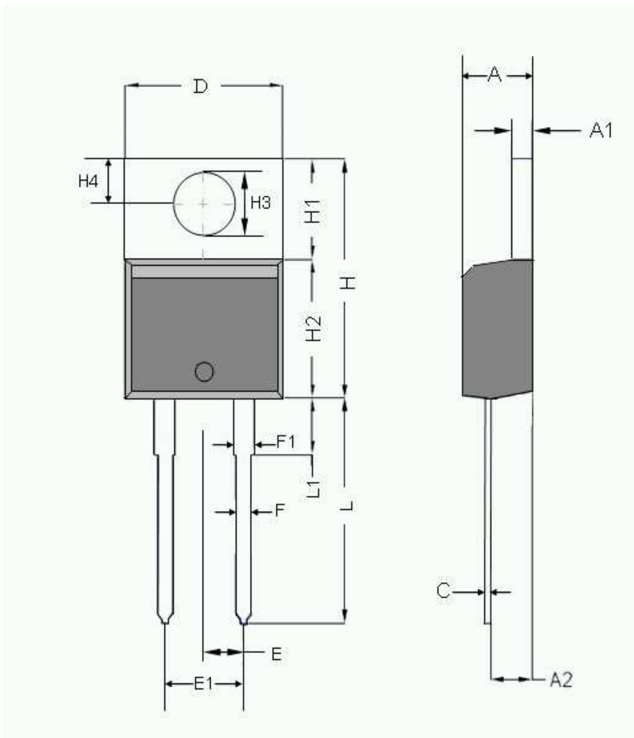


Figure 10. Normalized Maximum Transient Thermal Impedance.

Dimensional Outline Drawings

TO-220AC



	Millimeters	
Dim	**MIN**	**MAX**
A	4.32	4.70
A1	1.14	1.40
A2	2.03	2.79
C	0.34	0.610
D	9.65	10.67
E	2.49	2.59
E1	4.98	5.18
F	0.508	1.016
F1	1.14	1.78
H	14.71	16.51
H1	5.84	6.795
H2	8.40	9.00
H3	3.53	3.96
H4	2.54	3.05
L	12.70	14.22
L1	-	6.35

Mechanical Mounting Method	Maximum Torque / Pressure specification
Screw through hole in package tab	1 Newton Meter (nm) or 8.8 inch-pounds (lb-in)
Clamp against package body	12.3 kilogram-force per square centimeter (kgf/cm^2) or 175 lbf/in^2

Soldering time and temperature: This product has been designed for use with high-temperature, lead-free solder. The component leads can be subjected to a maximum temperature of 300 °C, for up to 10 seconds. See Application Note AN-303, for more details.

Ordering Information

Part Number	Package	Packing
QH12TZ600Q	TO-220AC	50 units/tube

The information contained in this document is subject to change without notice.

Revision	Notes	Date
1.0	Code A release.	01/21

For the latest updates, visit our website: www.power.com

Patent Information

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