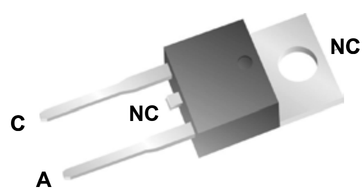
600V, 3A Qspeed **“Q-Series” PFC Rectifier**

Product Summary

$I_{F(AV)}$	3	A
V_{RRM}	600	V
Q_{RR} (Typ at 125°C)	17.2	nC
I_{RRM} (Typ at 125°C)	1.28	A
Softness t_b/t_a (Typ at 125°C)	1.5	

Pin Assignment



A —▶|— C

TO-220AC

RoHS Compliant
Package uses Lead-free plating and Green mold compound.

General Description

Using advanced Silicon technology, the Q-Series power rectifier is specifically designed to replace SiC Schottky Diodes in PFC Boost applications where it will provide similar gains in efficiency and power density, but at a lower cost and with the proven long term reliability of Silicon.

Utilizing proprietary Qspeed Silicon technology, this device offers extremely low reverse recovery current. Its soft recovery reduces electrical stress on surrounding circuit elements (especially the switching transistors), and helps to reduce heat, lower unnecessary component guard-banding and snubbing, and increase efficiency.

Applications

- Power Factor Correction (PFC) Boost Diode
- AC/DC power supplies and adapters
- Freewheeling diodes

Features

- Enables PFC operation beyond 200kHz
- Low EMI, Low Q_{RR}, Low I_{RRM}
- High dI/dt capable (1000A/us)
- Soft recovery
- Snubberless operation
- Internally self-isolated – needs no isolation pad

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		600	V
$I_{F(AV)}$	Average forward current	T_J = 150°C, T_C = 122°C	3	A
I_{FSM}	Non-repetitive peak surge current	60Hz, ½ cycle	30	A
I_{FSM}	Non-repetitive peak surge current	½ cycle of T=28us Sinusoid, T_C=25°C	350	A
T_J	Maximum junction temperature		150	°C
T_{STG}	Storage temperature		–55 to 150	°C
	Lead soldering temperature	Leads at 1.6mm from case, 10 sec	300	°C
V_{ISOL}	Peak isolation voltage (leads-to-tab)	DC, + to tab	2500	V
P_D	Power dissipation	T_C = 25°C	32	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	TO-220	3.85	°C/W

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

Symbol	Parameter	Conditions		Min	Typ	Max	Units
DC Characteristics							
I_R	Reverse current	V_R = 600V, T_J = 25°C		-	-	20	µA
		V_R = 600V, T_J = 125°C		-	0.25	-	mA
V_F	Forward voltage	I_F = 3A, T_J = 25°C		-	2.77	3.1	V
		I_F = 3A, T_J = 150°C		-	2.3	-	V
C_J	Junction capacitance	V_R = 10V, 1MHz		-	13	-	pF
Dynamic Characteristics							
t_{RR}	Reverse recovery time	dI/dt =200A/µs V_R=400, I_F=3A	T_J=25°C	-	9.3	13	ns
			T_J=125°C	-	21.4	-	ns
Q_{RR}	Reverse recovery charge	dI/dt =200A/µs V_R=400, I_F=3A	T_J=25°C	-	4.8	7.5	nC
			T_J=125°C	-	17.5	-	nC
I_{RRM}	Maximum reverse recovery current	dI/dt =200A/µs V_R=400, I_F=3A	T_J=25°C	-	0.85	1.1	A
			T_J=125°C	-	1.28	-	A
S	Softness factor = $\frac{t_b}{t_a}$	dI/dt =200A/µs V_R=400, I_F=3A	T_J=25°C	-	0.8	-	
			T_J=125°C	-	1.5	-	

Note to component engineers: Qspeed Q-Series rectifiers employ Schottky technologies in their design and construction. Component engineers therefore should plan their test setups to be similar to traditional Schottky test setups. (For further details, see Qspeed application note AN-300.)

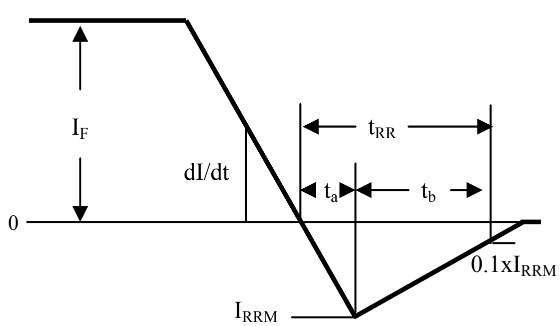


Figure 1. Reverse Recovery Definitions

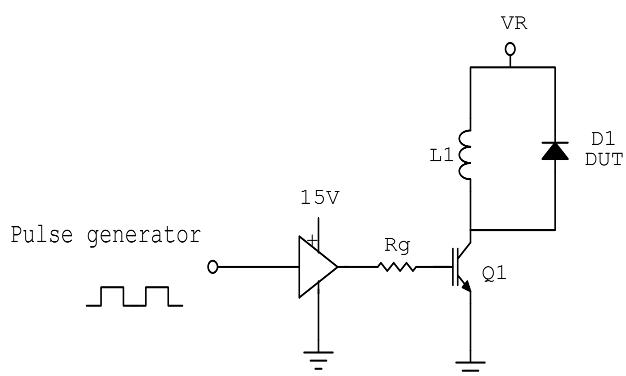


Figure 2. Reverse Recovery Test Circuit

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

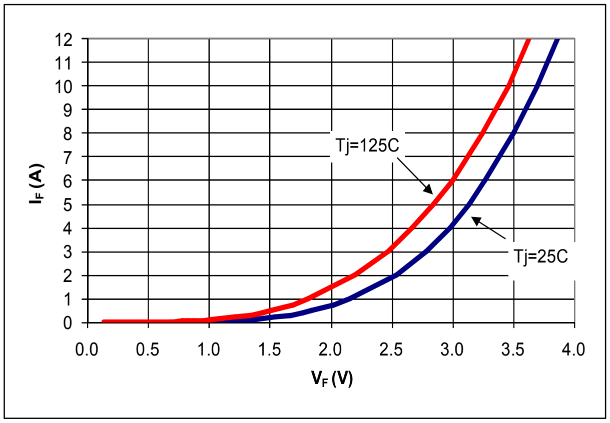


Figure 3. Typical I_F vs V_F

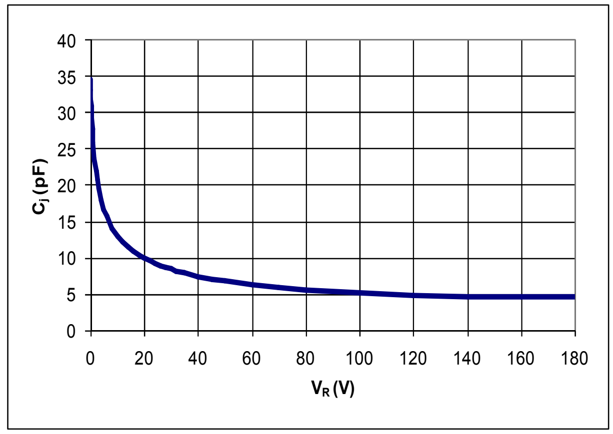


Figure 4. Typical C_j vs V_R

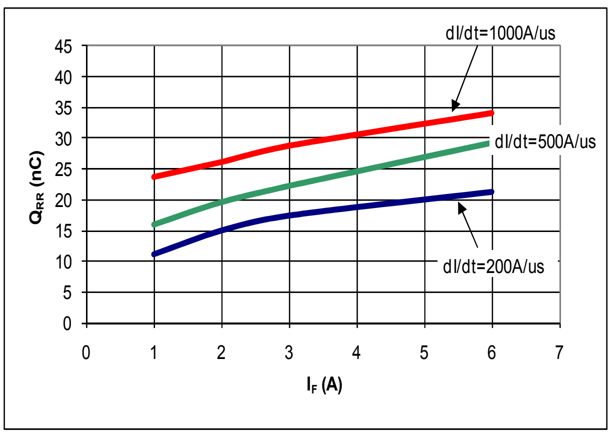


Figure 5. Typical Q_{RR} vs I_F at T_j = 125C

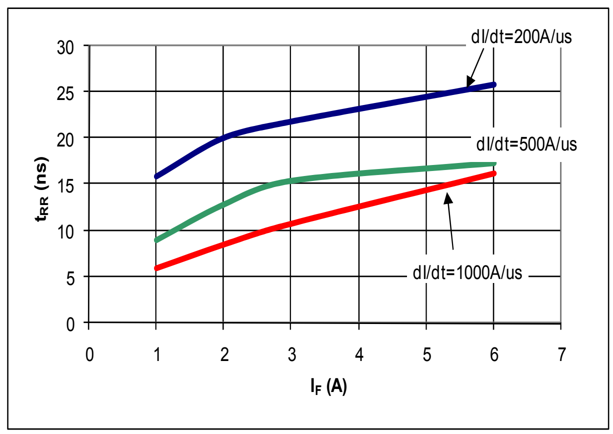


Figure 6. Typical t_{RR} vs I_F at T_j = 125C

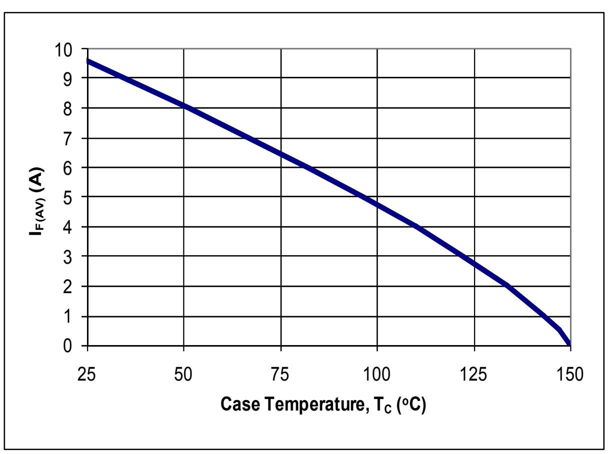


Figure 7. DC Current Derating Curve

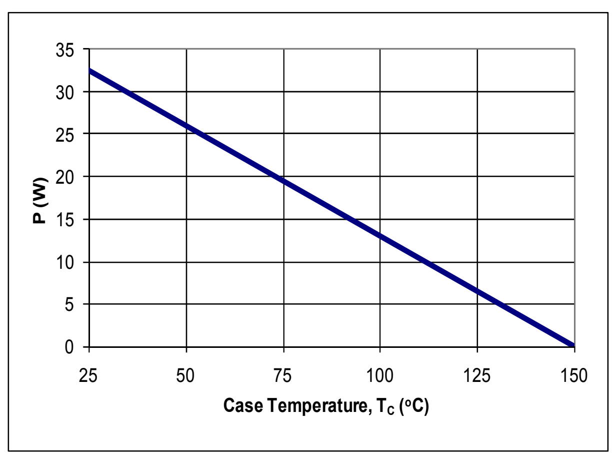


Figure 8. Power Derating Curve

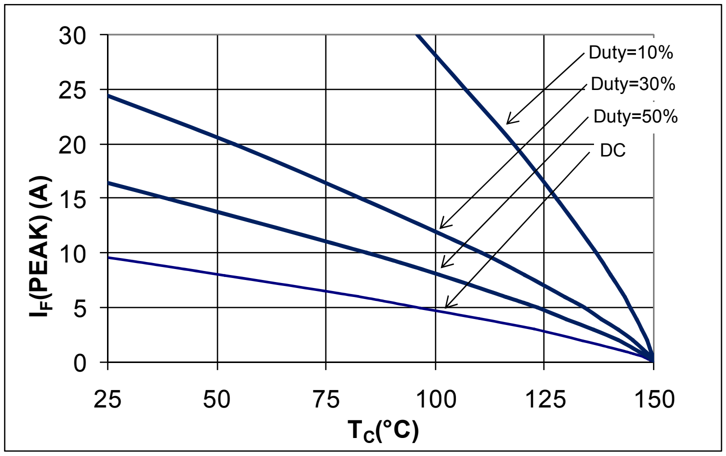


Figure 9. I_F(PEAK) vs T_C, f=70kHz.

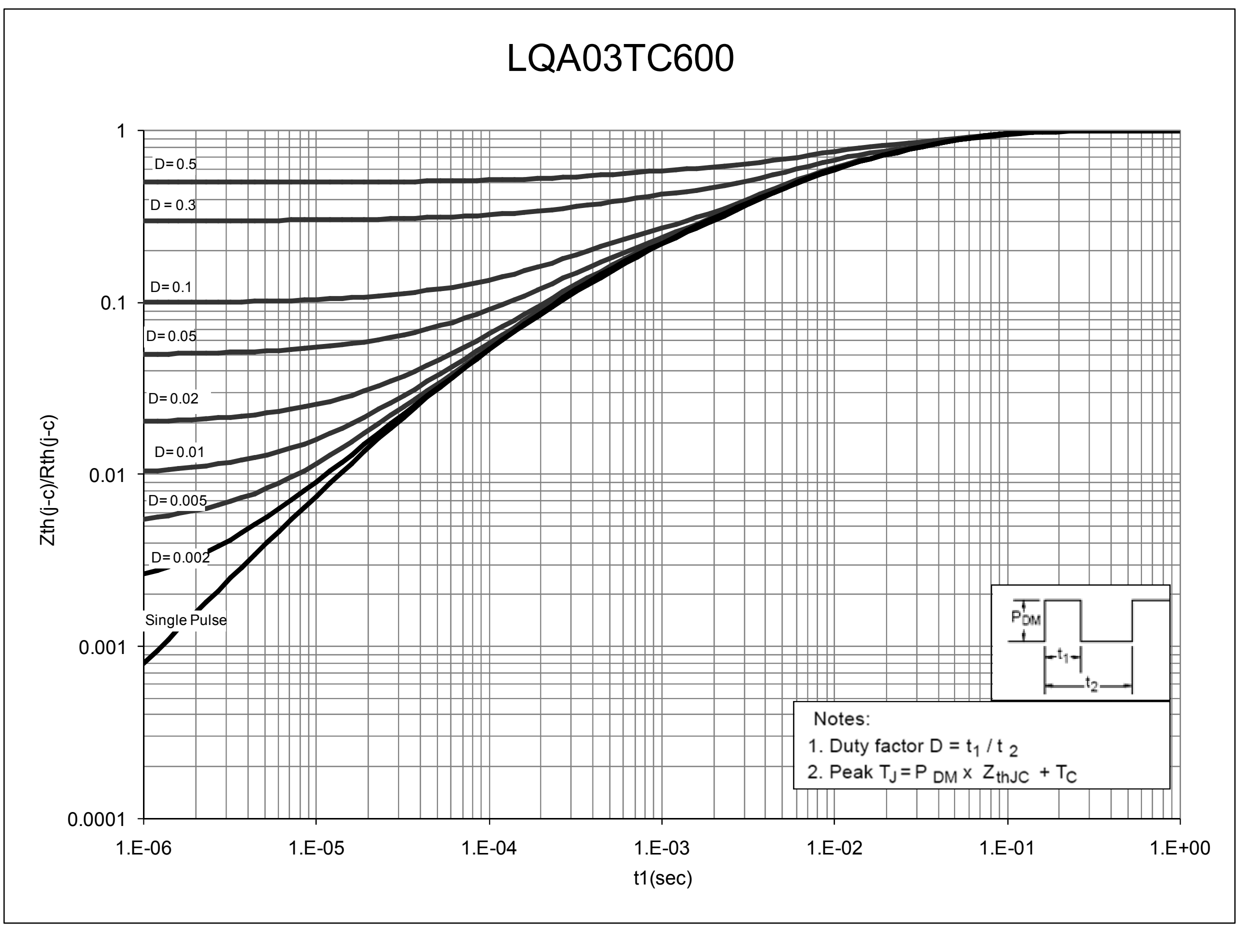
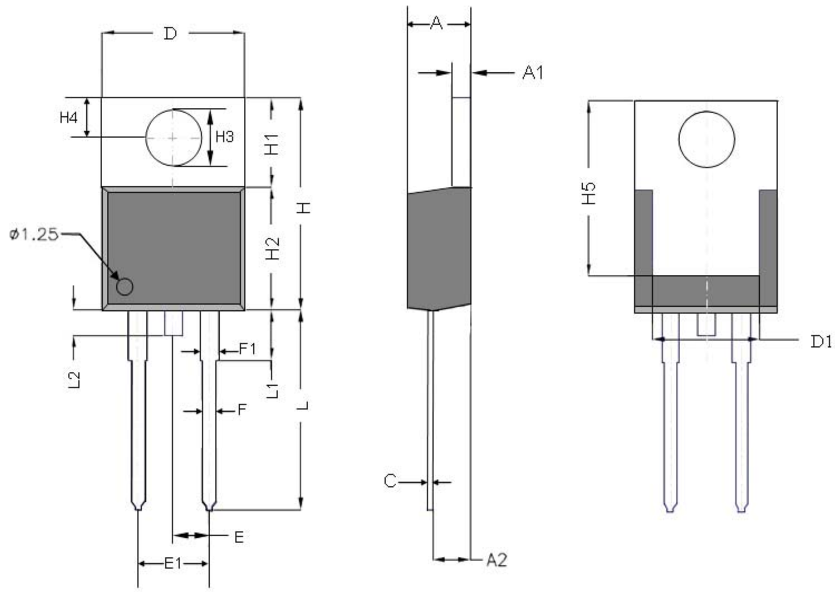


Figure 10. Normalized Maximum Transient Thermal Impedance

Dimensional Outline Drawings



Dim	Millimeters		Inches	
	Min	**Max**	**Min**	**Max**
A	4.32	4.57	0.170	0.180
A1	1.14	1.40	0.045	0.055
A2	2.59	2.74	0.102	0.108
C	0.37	0.44	0.015	0.017
D	10.13	10.24	0.399	0.403
D1	7.57	7.68	0.298	0.302
E	2.49	2.59	0.098	0.102
E1	5.03	5.13	0.198	0.202
F	0.787	1.00	0.031	0.039
F1	1.23	1.36	0.048	0.054
H	14.71	15.31	0.579	0.603
H1	6.20	6.55	0.244	0.258
H2	8.51	8.76	0.335	0.345
H3	3.71	3.96	0.146	0.156
H4	2.54	2.79	0.100	0.110
H5	12.34	12.45	0.486	0.490
L	13.72	14.22	0.540	0.560
L1	---	6.35	---	0.250
L2	1.27	1.78	0.050	0.070

Controlling dimensions are in millimeters

Ordering Information

Part Number	Package	Packing
LQA03TC600	TO-220AC	50 units/tube

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