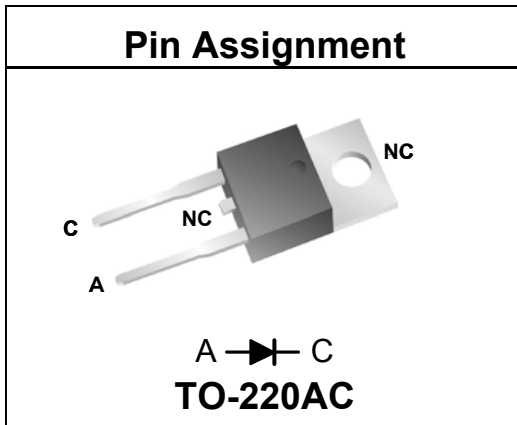


600V, 8A Qspeed “Q-Series” PFC Rectifier

Product Summary

| | | |
|-----------------------------------|-----|----|
| $I_{F(AV)}$ | 8 | A |
| V_{RRM} | 600 | V |
| Q_{RR} (Typ at 125°C) | 36 | nC |
| I_{RRM} (Typ at 125°C) | 2 | A |
| Softness t_b/t_a (Typ at 125°C) | 1.3 | |



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 | $T_J = 150^\circ\text{C}$, $T_C = 100^\circ\text{C}$ | 8 | A |
| I_{FSM} | Non-repetitive peak surge current | 60Hz, $\frac{1}{2}$ cycle, $T_C = 25^\circ\text{C}$ | 80 | A |
| I_{FSM} | Non-repetitive peak surge current | $\frac{1}{2}$ cycle of $T=28\mu\text{s}$ Sinusoid, $T_C = 25^\circ\text{C}$ | 350 | A |
| T_J | Maximum junction temperature | | 150 | $^\circ\text{C}$ |
| T_{STG} | Storage temperature | | -55 to 150 | $^\circ\text{C}$ |
| | Lead soldering temperature | Leads at 1.6mm from case, 10 sec | 300 | $^\circ\text{C}$ |
| V_{ISOL} | Peak isolation voltage (leads-to-tab) | DC, + to tab | 2500 | V |
| P_D | Power dissipation | $T_C = 25^\circ\text{C}$ | 50 | W |

Thermal Resistance

| Symbol | Resistance from: | Conditions | Rating | Units |
|-----------------|---------------------|------------|--------|---------------------------|
| $R_{\theta JA}$ | Junction to ambient | TO-220 | 62 | $^\circ\text{C}/\text{W}$ |
| $R_{\theta JC}$ | Junction to case | TO-220 | 2.5 | $^\circ\text{C}/\text{W}$ |

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 | - | - | 25 | μA | |
| | | V _R = 600V, T _J = 125°C | - | 0.6 | - | mA | |
| V _F | Forward voltage | I _F = 8A, T _J = 25°C | - | 2.85 | 3.05 | V | |
| | | I _F = 8A, T _J = 150°C | - | 2.3 | - | V | |
| C _J | Junction capacitance | V _R = 10V, 1MHz | - | 33 | - | pF | |
| Dynamic Characteristics | | | | | | | |
| t _{RR} | Reverse recovery time | dI/dt = 200A/μs V _R =400, I _F =8A | T _J =25°C | - | 11 | 15 | ns |
| | | | T _J =125°C | - | 27 | - | ns |
| Q _{RR} | Reverse recovery charge | dI/dt = 200A/μs V _R =400, I _F =8A | T _J =25°C | - | 7 | 11 | nC |
| | | | T _J =125°C | - | 36 | - | nC |
| I _R RM | Maximum reverse recovery current | dI/dt = 200A/μs V _R =400, I _F =8A | T _J =25°C | - | 1 | 1.5 | A |
| | | | T _J =125°C | - | 2 | - | A |
| s | Softness factor = $\frac{t_b}{t_a}$ | dI/dt = 200A/μs V _R =400, I _F =8A | T _J =25°C | - | 1.6 | - | |
| | | | T _J =125°C | - | 1.3 | - | |

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.)

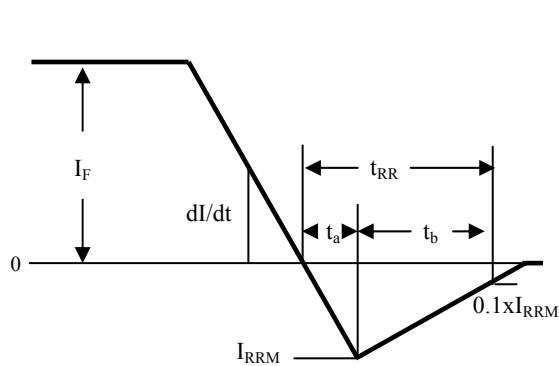


Figure 1. Reverse Recovery Definitions

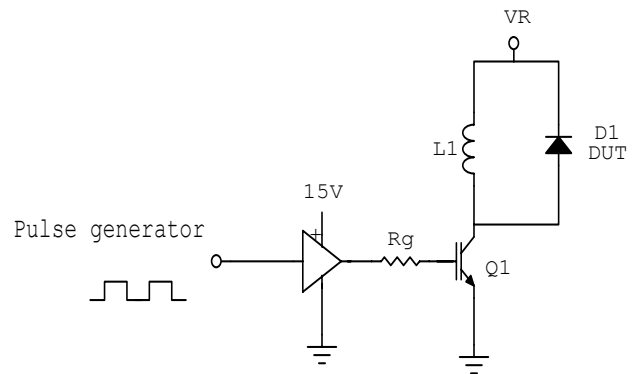


Figure 2. Reverse Recovery Test Circuit

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

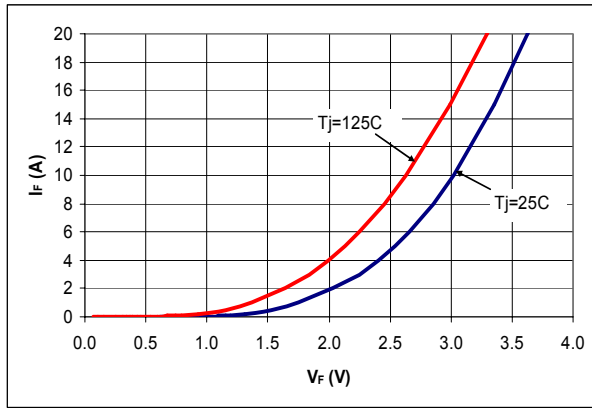


Figure 3. Typical I_F vs V_F

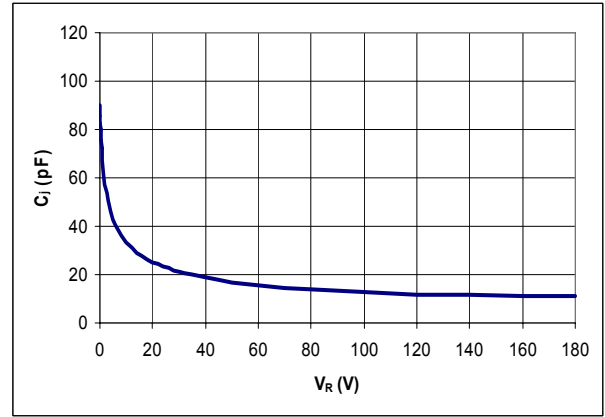


Figure 4. Typical C_j vs V_R

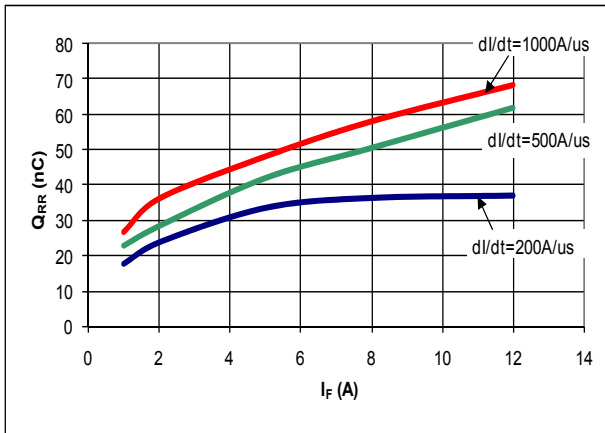


Figure 5. Typical Q_{RR} vs I_F at T_J = 125°C

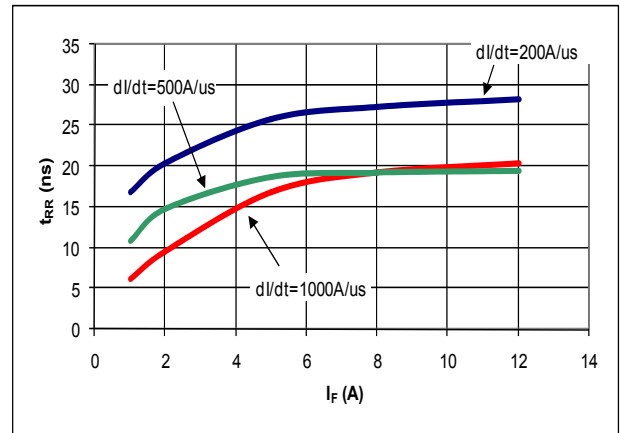


Figure 6. Typical t_{RR} vs I_F at T_J = 125°C

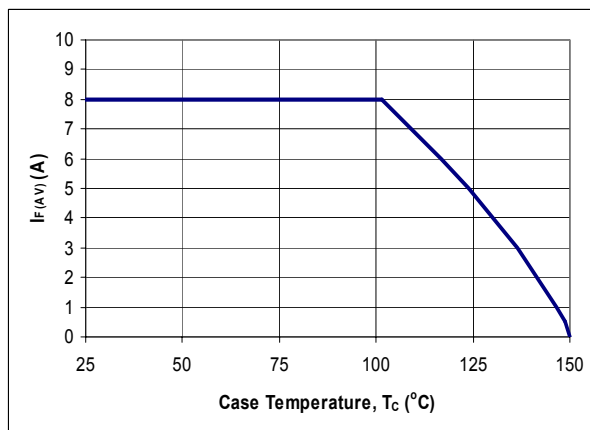


Figure 7. DC Current Derating Curve

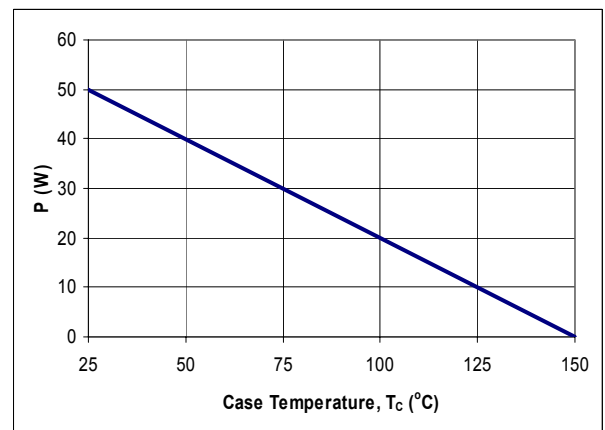


Figure 8. Power Derating Curve

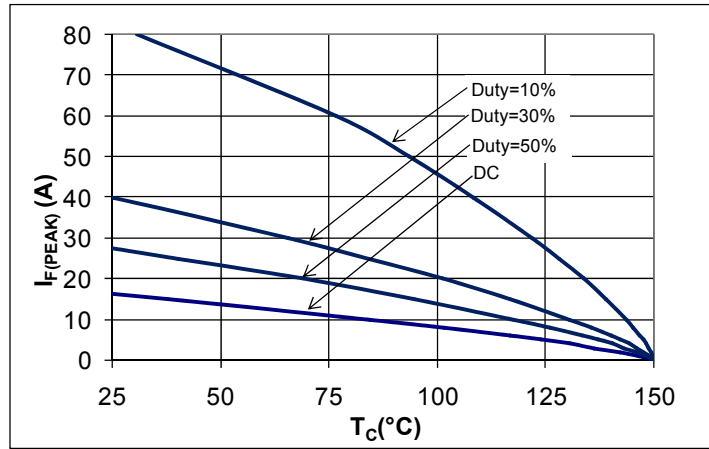


Figure 9. $I_{F(PEAK)}$ vs T_C , $f=70kHz$.

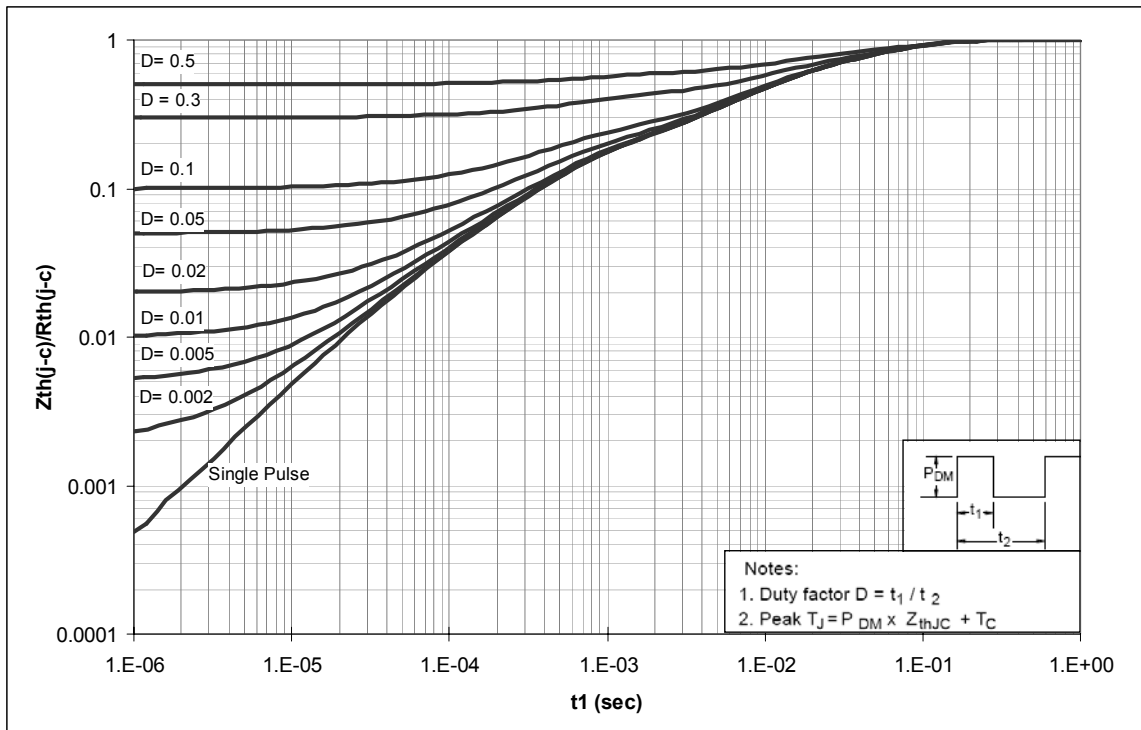
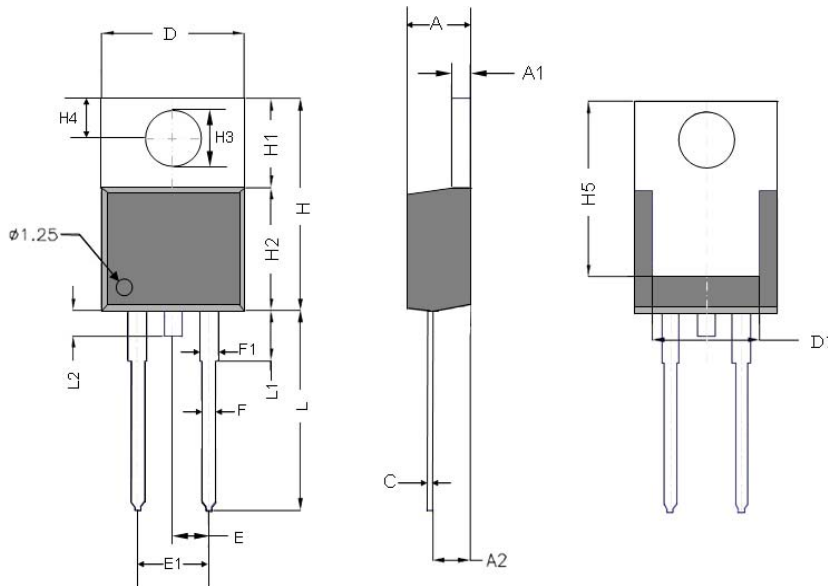


Figure 10. Normalized Maximum Transient Thermal Impedance

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 |
|-------------|----------|---------------|
| LQA08TC600 | TO-220AC | 50 units/tube |

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