

LQA05TC600

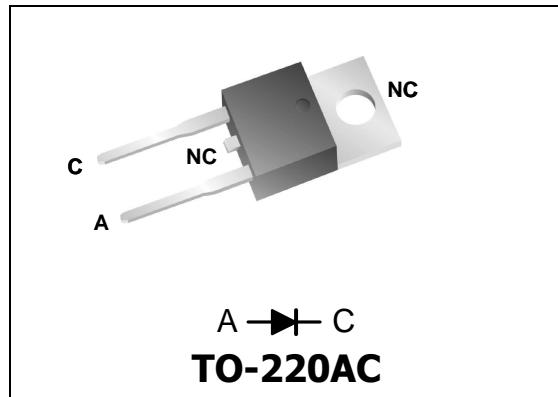
Qspeed™ Family

600 V, 5 A Q-Series PFC Diode

Product Summary

| | | |
|------------------------------------|------|----|
| $I_{F(AVG)}$ | 5 | A |
| V_{RRM} | 600 | V |
| Q_{RR} (Typ at 125 °C) | 27 | nC |
| I_{RRM} (Typ at 125 °C) | 1.65 | A |
| Softness t_b/t_a (Typ at 125 °C) | 1.4 | |

Pin Assignment



RoHS Compliant

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

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 |
| $I_{F(AVG)}$ | Average forward current | $T_J = 150$ °C, $T_C = 115$ °C | 5 | A |
| I_{FSM} | Non-repetitive peak surge current | 60 Hz, ½ cycle | 50 | A |
| I_{FSM} | Non-repetitive peak surge current | ½ cycle of $t = 28$ µs Sinusoid, $T_C = 25$ °C | 350 | A |
| $T_{J(MAX)}$ | Maximum junction temperature | | 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) | DC, + to tab | 2500 | V |
| P_D | Power dissipation | $T_C = 25$ °C | 43.1 | W |

General Description

This device has the lowest Q_{RR} of any 600 V silicon diode. Its recovery characteristics increase efficiency, reduce EMI and eliminate snubbers.

Applications

- Power Factor Correction (PFC) boost diode
- Motor drive circuits
- DC-AC inverters

Features

- Low Q_{RR} , low I_{RRM} , low t_{RR}
- High dI_F/dt capable (1000 A / µs)
- Soft recovery

Benefits

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

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 | 2.9 | °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 | - | - | 15 | μA | |
| | | $V_R = 600$ V, $T_J = 125$ °C | - | 0.4 | - | mA | |
| V_F | Forward voltage | $I_F = 5$ A, $T_J = 25$ °C | - | 2.825 | 3.14 | V | |
| | | $I_F = 5$ A, $T_J = 150$ °C | - | 2.28 | - | V | |
| C_J | Junction capacitance | $V_R = 10$ V, 1 MHz | - | 21 | - | pF | |
| Dynamic Characteristics | | | | | | | |
| t_{RR} | Reverse recovery time | $dI/dt = 200$ A/μs | $T_J = 25$ °C | - | 11 | 15 | ns |
| | | $V_R = 400$ V, $I_F = 5$ A | $T_J = 125$ °C | - | 24 | - | ns |
| Q_{RR} | Reverse recovery charge | $dI/dt = 200$ A/μs | $T_J = 25$ °C | - | 6 | 10 | nC |
| | | $V_R = 400$ V, $I_F = 5$ A | $T_J = 125$ °C | - | 27 | - | nC |
| I_{RRM} | Maximum reverse recovery current | $dI/dt = 200$ A/μs | $T_J = 25$ °C | - | 0.95 | 1.3 | A |
| | | $V_R = 400$ V, $I_F = 5$ A | $T_J = 125$ °C | - | 1.65 | - | A |
| S | Softness factor = $\frac{t_B}{t_A}$ | $dI/dt = 200$ A/μs | $T_J = 25$ °C | - | 1 | - | |
| | | $V_R = 400$ V, $I_F = 5$ A | $T_J = 125$ °C | - | 1.4 | - | |

Note to component engineers: Q-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.)

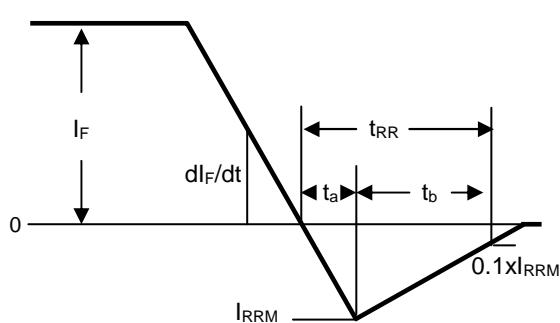
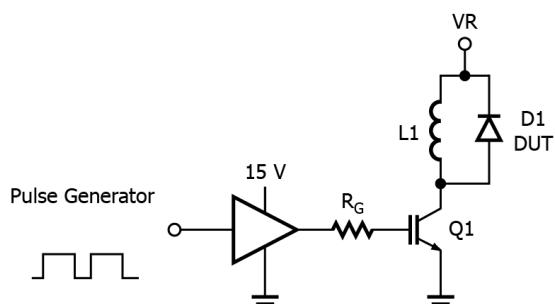


Figure 1. Reverse Recovery Definitions.



PI-7614-041315

Figure 2. Reverse Recovery Test Circuit.

Electrical Specifications at $T_J = 25^\circ\text{C}$ (unless otherwise specified)

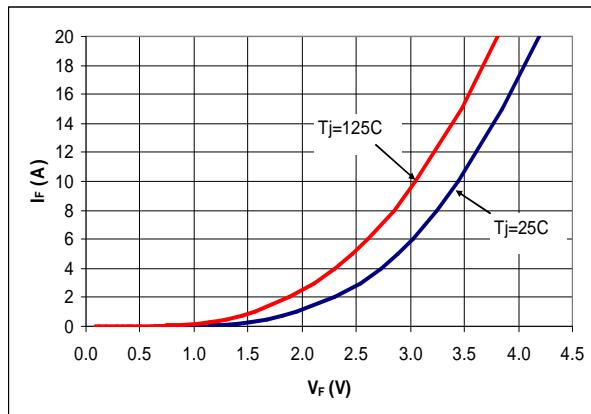


Figure 3. Typical I_F vs. V_F .

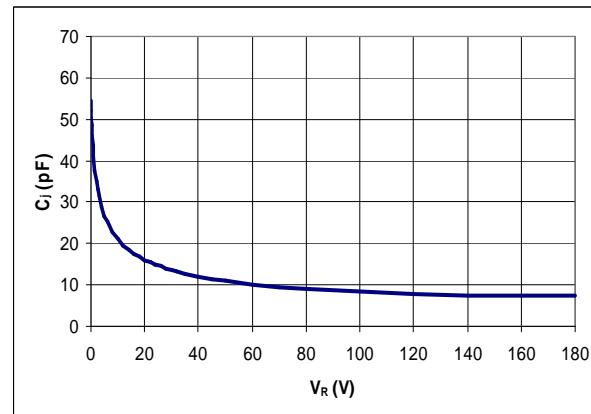


Figure 4. Typical C_J vs. V_R .

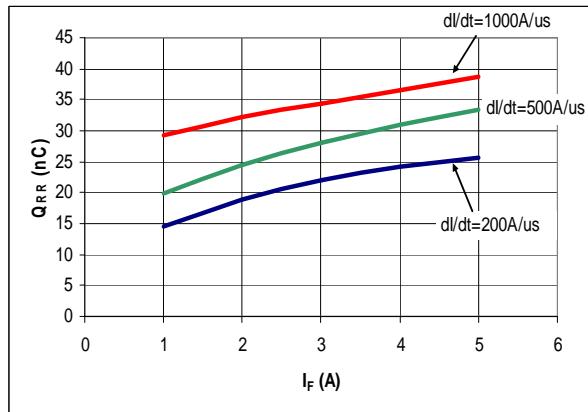


Figure 5. Typical Q_{RR} vs. I_F at $T_J = 125^\circ\text{C}$.

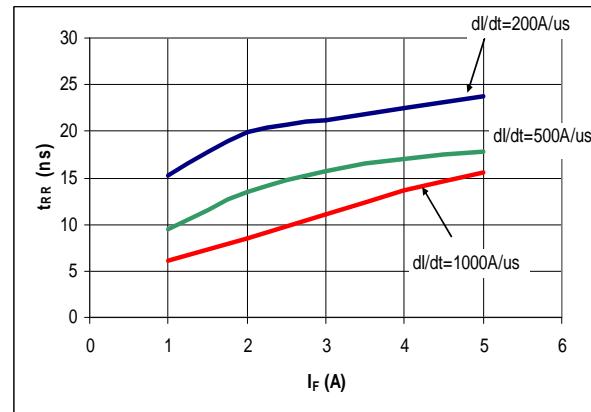


Figure 6. Typical t_{RR} vs. I_F at $T_J = 125^\circ\text{C}$.

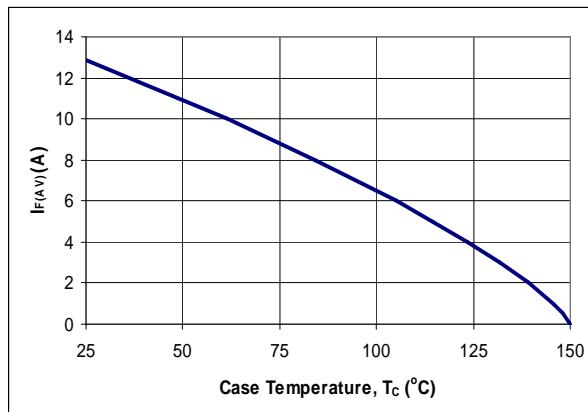


Figure 7. DC Current Derating Curve.

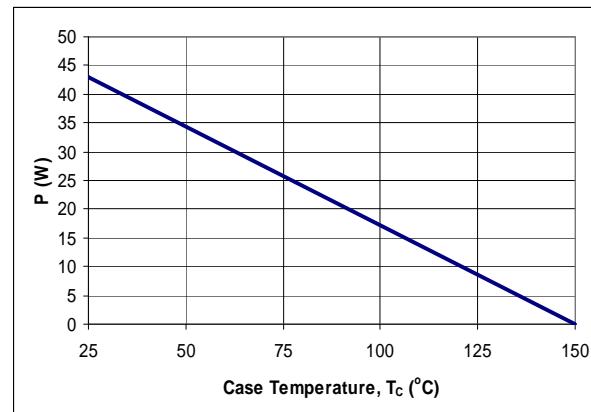


Figure 8. Power Derating Curve.

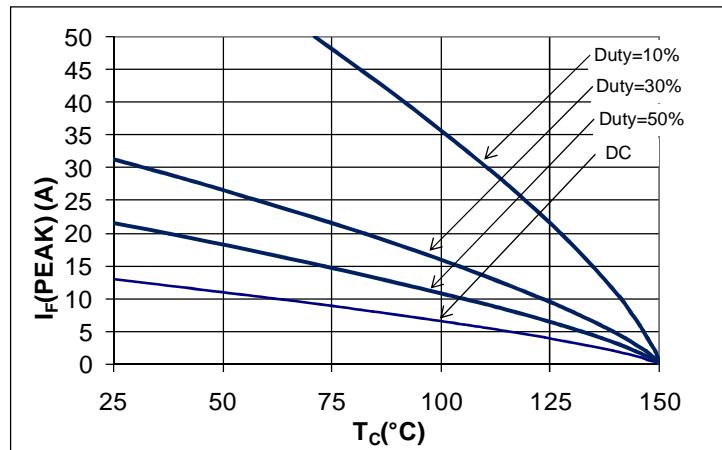


Figure 9. I_F (PEAK) vs. T_C , $f = 70$ kHz.

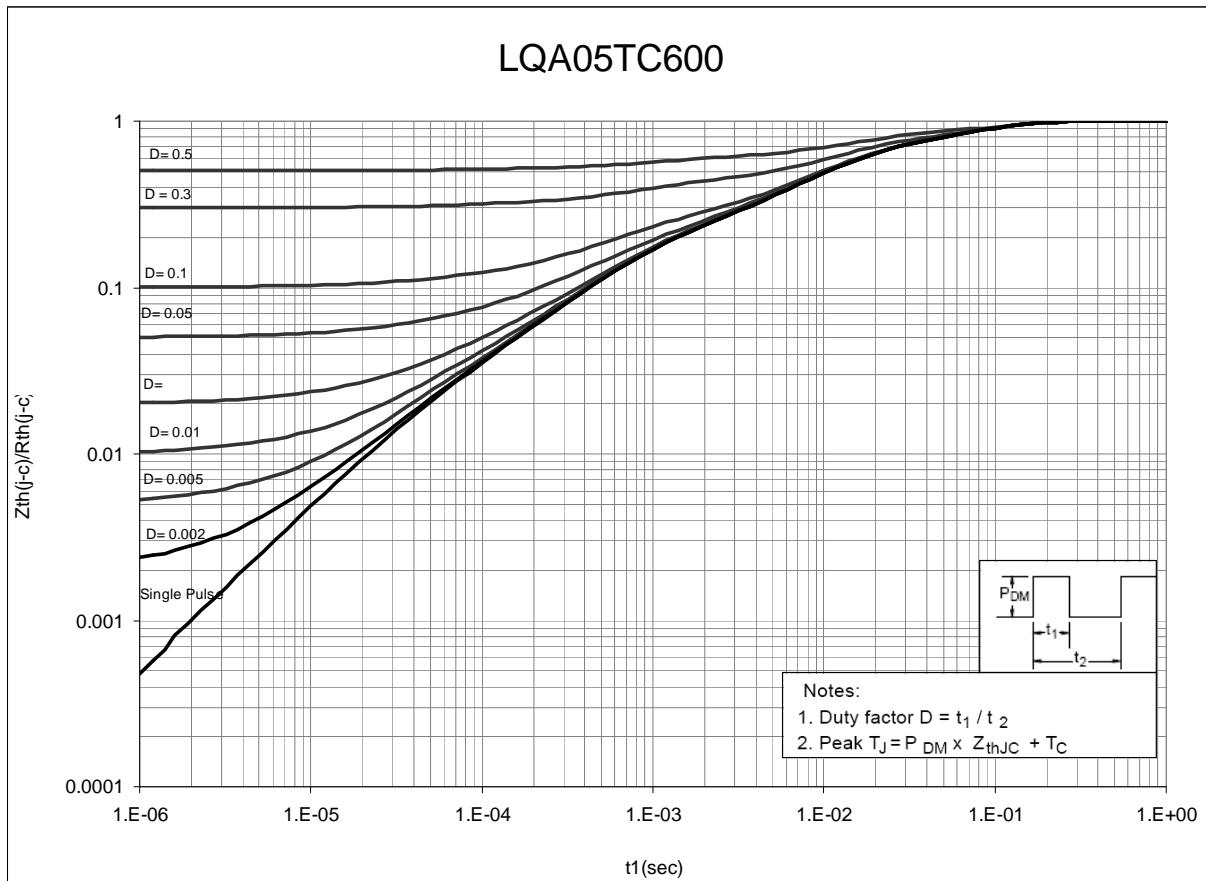
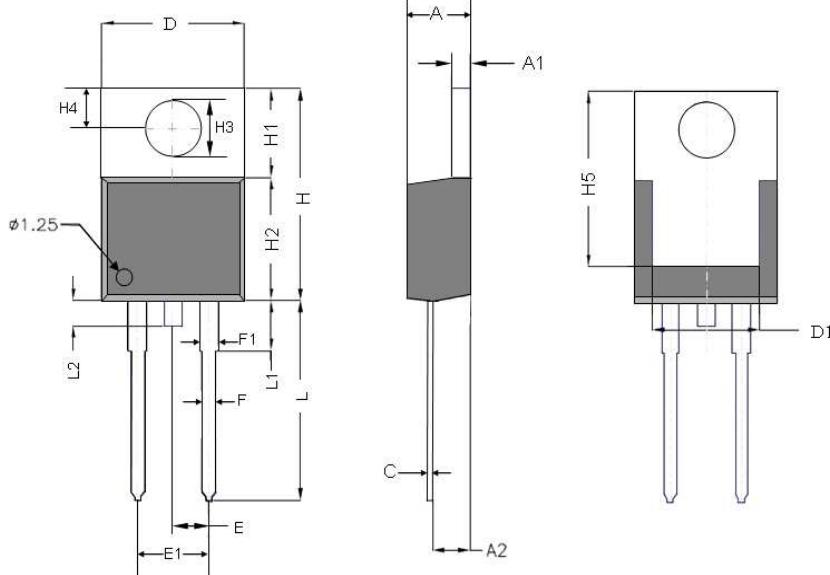


Figure 10. Normalized Maximum Transient Thermal Impedance.

Dimensional Outline Drawings



| Dim | Millimeters | |
|-----------|-------------|-------|
| | MIN | MAX |
| A | 4.32 | 4.57 |
| A1 | 1.14 | 1.40 |
| A2 | 2.59 | 2.74 |
| C | 0.37 | 0.44 |
| D | 10.13 | 10.24 |
| D1 | 7.57 | 7.68 |
| E | 2.49 | 2.59 |
| E1 | 5.03 | 5.13 |
| F | 0.787 | 1.00 |
| F1 | 1.23 | 1.36 |
| H | 14.71 | 15.31 |
| H1 | 6.20 | 6.55 |
| H2 | 8.51 | 8.76 |
| H3 | 3.71 | 3.96 |
| H4 | 2.54 | 2.79 |
| H5 | 12.34 | 12.45 |
| L | 13.72 | 14.22 |
| L1 | - | 6.36 |
| L2 | 1.27 | 1.78 |

TO-220AC package conforms to JEDEC outline TO-220AC

| 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 |
|-------------|----------|---------------|
| LQA05TC600 | TO-220AC | 50 units/tube |

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

| Revision | Notes | Date |
|----------|------------------------------------------|-------|
| 1.8 | Released by Qspeed | 05/09 |
| 1.9 | Converted to Power Integrations Document | 01/11 |
| 2.0 | Updated with new Brand Style. | 11/15 |

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Power Integrations Worldwide Sales Support Locations

WORLD HEADQUARTERS

5245 Hellyer Avenue
San Jose, CA 95138, USA.
Main: +1-408-414-9200
Customer Service:
Phone: +1-408-414-9665
Fax: +1-408-414-9765
e-mail: usasales@power.com

GERMANY

Lindwurmstrasse 114
80337, Munich
Germany
Phone: +49-895-527-39110
Fax: +49-895-527-39200
e-mail: eurosales@power.com

JAPAN

Kosei Dai-3 Building
2-12-11, Shin-Yokohama,
Kohoku-ku
Yokohama-shi, Kanagawa
222-0033 Japan
Phone: +81-45-471-1021
Fax: +81-45-471-3717
e-mail: japansales@power.com

TAIWAN

5F, No. 318, Nei Hu Rd.,
Sec. 1
Nei Hu District
Taipei 11493, Taiwan R.O.C.
Phone: +886-2-2659-4570
Fax: +886-2-2659-4550
e-mail: taiwansales@power.com

CHINA (SHANGHAI)

Rm 2410, Charity Plaza, No. 88,
North Caoxi Road,
Shanghai, PRC 200030
Phone: +86-21-6354-6323
Fax: +86-21-6354-6325
e-mail: chinasales@power.com

INDIA

#1, 14th Main Road
Vasanthanagar
Bangalore-560052
India
Phone: +91-80-4113-8020
Fax: +91-80-4113-8023
e-mail: indisales@power.com

KOREA

RM 602, 6FL
Korea City Air Terminal B/D,
159-6
Samsung-Dong, Kangnam-Gu,
Seoul, 135-728 Korea
Phone: +82-2-2016-6610
Fax: +82-2-2016-6630
e-mail: koreasales@power.com

UK

Cambridge Semiconductor,
a Power Integrations company
Westbrook Centre, Block 5,
2nd Floor
Milton Road
Cambridge CB4 1YG
Phone: +44 (0) 1223-446483
e-mail: eurosales@power.com

CHINA (SHENZHEN)

17/F, Hivac Building, No. 2, Keji
Nan 8th Road, Nanshan District,
Shenzhen, China, 518057
Phone: +86-755-8672-8689
Fax: +86-755-8672-8690
e-mail: chinasales@power.com

ITALY

Via Milanese 20, 3rd. Fl.
20099 Sesto San Giovanni
(MI) Italy
Phone: +39-024-550-8701
Fax: +39-028-928-6009
e-mail: eurosales@power.com

SINGAPORE

51 Newton Road,
#19-01/05 Goldhill Plaza
Singapore, 308900
Phone: +65-6358-2160
Fax: +65-6358-2015
e-mail: singaporesales@power.com