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# LQA32T300C

## Qspeed™ Family



### 300 V, 32 A Q-Series Common-Cathode Diode

#### Product Summary

|                                    |      |    |
|------------------------------------|------|----|
| $I_{F(AVG)}$ per diode             | 16   | A  |
| $V_{RRM}$                          | 300  | V  |
| $Q_{RR}$ (Typ at 125 °C)           | 44   | nC |
| $I_{RRM}$ (Typ at 125 °C)          | 2.65 | A  |
| Softness $t_b/t_a$ (Typ at 125 °C) | 0.7  |    |

#### General Description

This device has the lowest  $Q_{RR}$  of any 300V Silicon diode. Its recovery characteristics increase efficiency, reduce EMI and eliminate snubbers.

#### Applications

- AC/DC and DC/DC output rectification
  - Output & freewheeling diodes
- Motor drive circuits
- DC-AC inverters

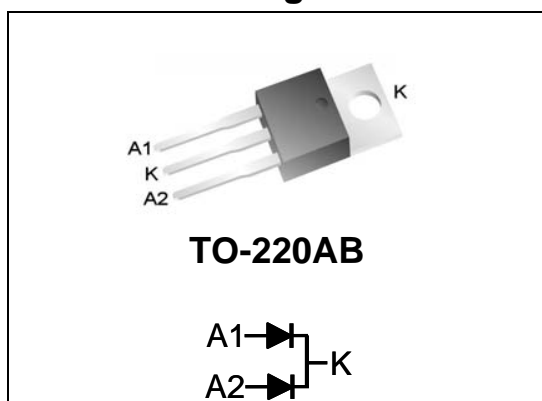
#### Features

- Low  $Q_{RR}$ , Low  $I_{RRM}$ , Low  $t_{RR}$
- High  $di_F/dt$  capable (1000A/ $\mu$ s)
- Soft recovery

#### Benefits

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

#### 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   |   | 300        | V     |
| $I_{F(AVG)}$ | Average forward current           | Per Diode, $T_J = 150\text{ °C}$ , $T_C = 104\text{ °C}$          | 16         | A     |
|              |                                   | Per Device, $T_J = 150\text{ °C}$ , $T_C = 104\text{ °C}$         | 32         | A     |
| $I_{FSM}$    | Non-repetitive peak surge current | 60 Hz, 1/2 cycle  | 100        | A     |
| $I_{FSM}$    | Non-repetitive peak surge current | 1/2 cycle of $t = 28\ \mu\text{s}$ Sinusoid, $T_C = 25\text{ °C}$ | 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    |
| $P_D$        | Power dissipation                 | $T_C = 25\text{ °C}$  | 65.8       | W     |

#### Thermal Resistance

| Symbol          | Resistance from:    | Conditions | Rating | Units |
|-----------------|---------------------|------------|--------|-------|
| $R_{\theta JA}$ | Junction to ambient | TO-220AB   | 62     | °C/W  |
| $R_{\theta JC}$ | Junction to case    | Per Diode  | 1.9    | °C/W  |
|                 |                     | Per Device | 1.0    | °C/W  |

# LQA32T300C

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

| Symbol                         | Parameter                                   | Conditions   | Min                               | Typ  | Max  | Units         |             |
|--------------------------------|---|--|-----------------------------------|------|------|---------------|-------------|
| <b>DC Characteristics</b>      |   |  |                                   |      |      |               |             |
| $I_R$                          | Reverse current per diode                   | $V_R = 300\text{ V}, T_J = 25\text{ }^\circ\text{C}$                   | -                                 | -    | 25   | $\mu\text{A}$ |             |
|                                |   | $V_R = 300\text{ V}, T_J = 125\text{ }^\circ\text{C}$                  | -                                 | 0.45 | -    | $\text{mA}$   |             |
| $V_F$                          | Forward voltage per diode                   | $I_F = 16\text{ A}, T_J = 25\text{ }^\circ\text{C}$                    | -                                 | 1.6  | 1.9  | $\text{V}$    |             |
|                                |   | $I_F = 16\text{ A}, T_J = 150\text{ }^\circ\text{C}$                   | -                                 | 1.4  | -    | $\text{V}$    |             |
| $C_J$                          | Junction capacitance per diode              | $V_R = 10\text{ V}, 1\text{ MHz}$                                      | -                                 | 50   | -    | $\text{pF}$   |             |
| <b>Dynamic Characteristics</b> |   |  |                                   |      |      |               |             |
| $t_{RR}$                       | Reverse recovery time, per diode            | $di_F/dt = 200\text{ A}/\mu\text{s}$<br>$V_R = 200, I_F = 16\text{ A}$ | $T_J = 25\text{ }^\circ\text{C}$  | -    | 13   | -             | $\text{ns}$ |
|                                |   |  | $T_J = 125\text{ }^\circ\text{C}$ | -    | 25   | -             | $\text{ns}$ |
| $Q_{RR}$                       | Reverse recovery charge, per diode          | $di_F/dt = 200\text{ A}/\mu\text{s}$<br>$V_R = 200, I_F = 16\text{ A}$ | $T_J = 25\text{ }^\circ\text{C}$  | -    | 11.5 | 15            | $\text{nC}$ |
|                                |   |  | $T_J = 125\text{ }^\circ\text{C}$ | -    | 44   | -             | $\text{nC}$ |
| $I_{RRM}$                      | Maximum reverse recovery current, per diode | $di_F/dt = 200\text{ A}/\mu\text{s}$<br>$V_R = 200, I_F = 16\text{ A}$ | $T_J = 25\text{ }^\circ\text{C}$  | -    | 1.5  | 1.85          | $\text{A}$  |
|                                |   |  | $T_J = 125\text{ }^\circ\text{C}$ | -    | 2.65 | -             | $\text{A}$  |
| S                              | Softness per diode = $\frac{t_b}{t_a}$      | $di_F/dt = 200\text{ A}/\mu\text{s}$<br>$V_R = 200, I_F = 16\text{ A}$ | $T_J = 25\text{ }^\circ\text{C}$  | -    | 0.7  | -             |             |
|                                |   |  | $T_J = 125\text{ }^\circ\text{C}$ | -    | 0.7  | -             |             |

**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 traditional Schottky test setups. (For further details, see application note AN-300.)

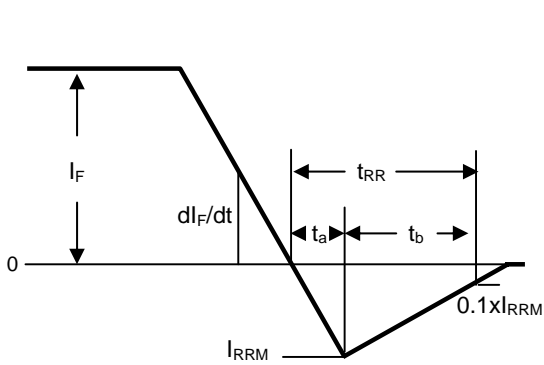


Figure 1. Reverse Recovery Definitions

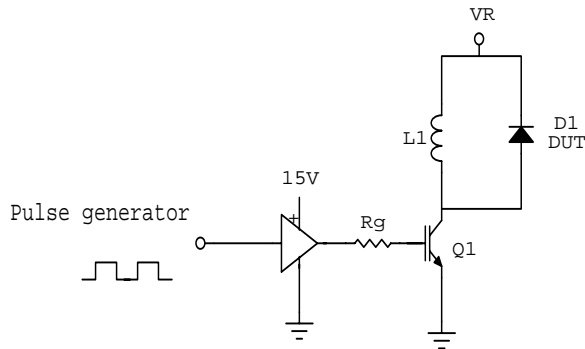


Figure 2. Reverse Recovery Test Circuit

**LQA32T300C**

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

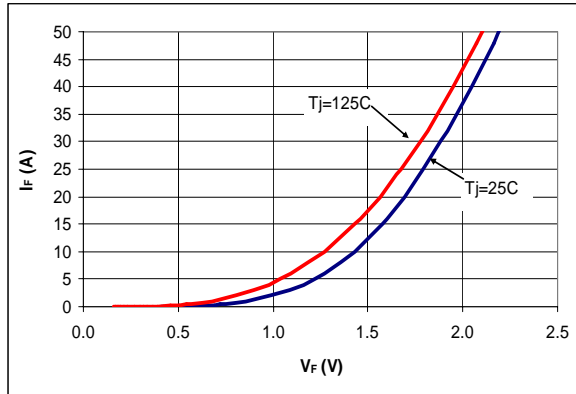


Figure 3. Typical  $I_F$  vs  $V_F$

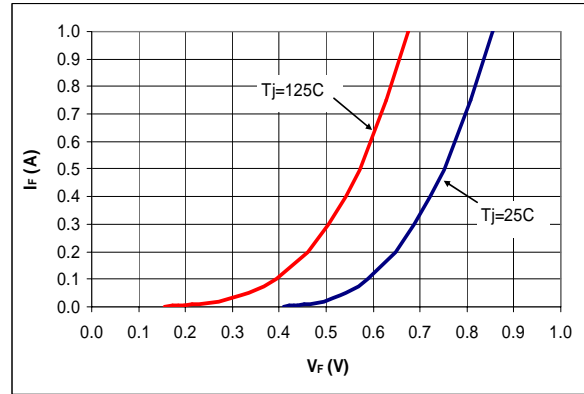


Figure 4. Typical  $I_F$  vs  $V_F$

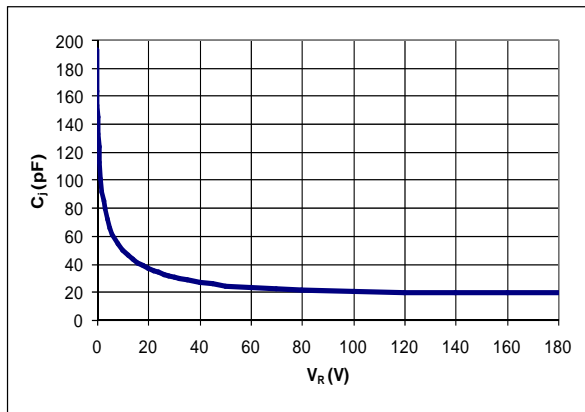


Figure 5. Typical  $C_j$  vs  $V_R$

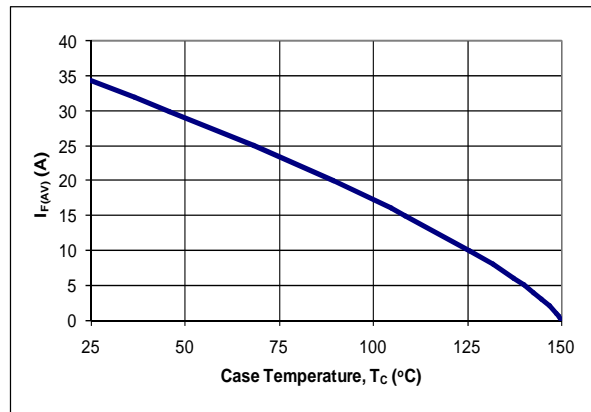


Figure 6. DC Current Derating Curve

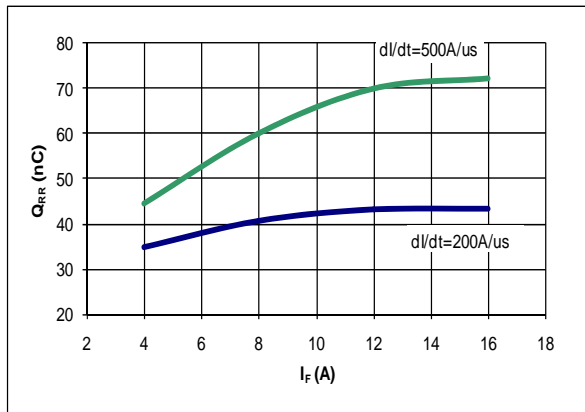


Figure 7. Typical  $Q_{RR}$  vs  $I_F$  at  $T_J = 125\text{ }^\circ\text{C}$

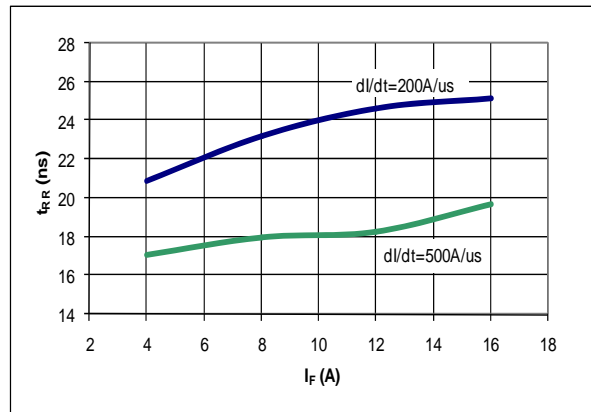


Figure 8. Typical  $t_{RR}$  vs  $I_F$  at  $T_J = 125\text{ }^\circ\text{C}$

**LQA32T300C**

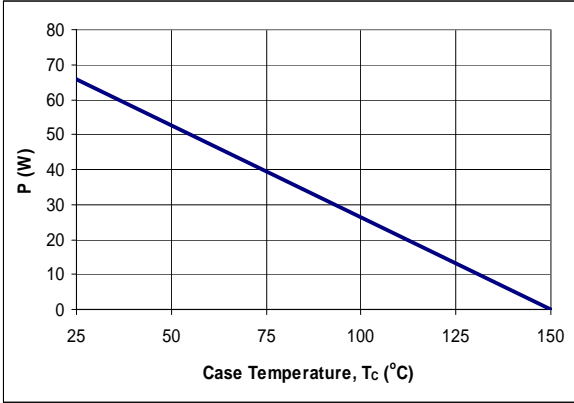


Figure 9. Power Derating Curve

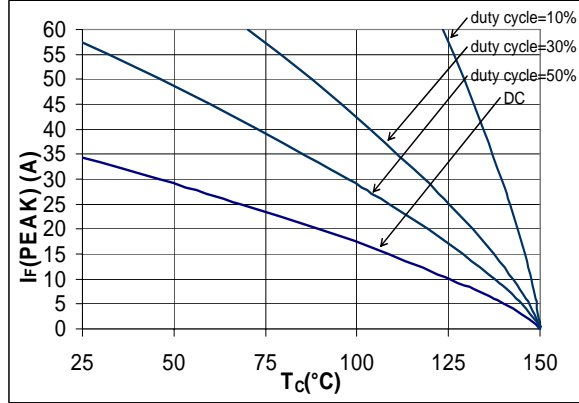


Figure 10. IF(Peak) vs TC, f=70 kHz

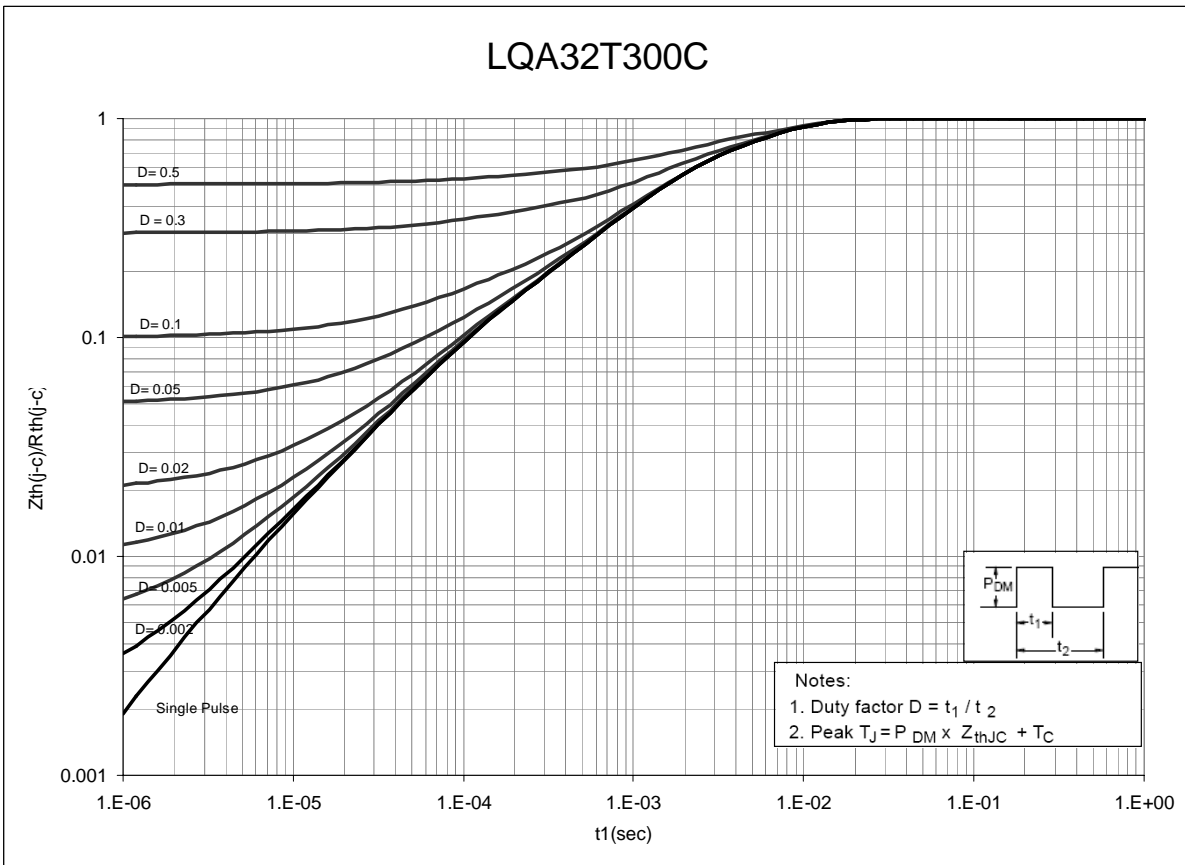
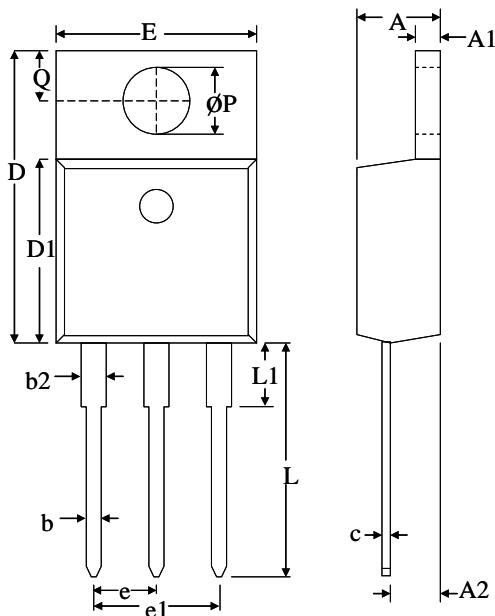


Figure 11. Normalized Maximum Transient Thermal Impedance

**LQA32T300C**

**Dimensional Outline Drawings**

TO-220AB



| Dim | Millimeters |       |
|-----|-------------|-------|
|     | MIN         | MAX   |
| A   | 4.32        | 4.70  |
| A1  | 1.11        | 1.38  |
| A2  | 2.59        | 2.79  |
| b   | 0.77        | 1.00  |
| b2  | 1.23        | 1.36  |
| C   | 0.34        | 0.47  |
| D   | 14.71       | 15.75 |
| D1  | 9.05        | 9.25  |
| E   | 9.96        | 10.36 |
| e   | 2.44        | 2.64  |
| e1  | 4.98        | 5.18  |
| L   | 12.70       | 14.22 |
| L1  | -           | 3.90  |
| ØP  | 3.71        | 3.96  |
| Q   | 2.54        | 2.90  |

| 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 <sup>2</sup> ) or 175 lbf/in <sup>2</sup> |

**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       |
|-------------|----------|---------------|
| LQA32T300C  | TO-220AB | 50 units/tube |

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

## LQA32T300C

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| Revision | Notes                                    | Date  |
|----------|--|-------|
| 1.0      | Released by Qspeed                       | 06/10 |
| 1.1      | Converted to Power Integrations Document | 01/11 |

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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@powerint.com](mailto:usasales@powerint.com)

**GERMANY**

Rueckertstrasse 3  
 D-80336, Munich  
 Germany  
 Phone: +49-89-5527-3911  
 Fax: +49-89-5527-3920  
 e-mail:  
[eurosales@powerint.com](mailto:eurosales@powerint.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@powerint.com](mailto:japansales@powerint.com)

**TAIWAN**

5F, No. 318, Nei Hu Rd., Sec. 1  
 Nei Hu District  
 Taipei 114, Taiwan R.O.C.  
 Phone: +886-2-2659-4570  
 Fax: +886-2-2659-4550  
 e-mail:  
[taiwansales@powerint.com](mailto:taiwansales@powerint.com)

**CHINA (SHANGHAI)**

Rm 1601/1610, Tower 1  
 Kerry Everbright City  
 No. 218 Tianmu Road West  
 Shanghai, P.R.C. 200070  
 Phone: +86-021-6354-6323  
 Fax: +86-021-6354-6325  
 e-mail:  
[chinasales@powerint.com](mailto:chinasales@powerint.com)

**INDIA**

#1, 14<sup>th</sup> Main Road  
 Vasanthanagar  
 Bangalore-560052  
 India  
 Phone: +91-80-4113-8020  
 Fax: +91-80-4113-8023  
 e-mail:  
[indiasales@powerint.com](mailto:indiasales@powerint.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@powerint.com](mailto:koreasales@powerint.com)

**EUROPE HQ**

1st Floor, St. James's House  
 East Street, Farnham  
 Surrey GU9 7TJ  
 United Kingdom  
 Phone: +44 (0) 1252-730-141  
 Fax: +44 (0) 1252-727-689  
 e-mail:  
[eurosales@powerint.com](mailto:eurosales@powerint.com)

**CHINA (SHENZHEN)**

Rm A, B & C 4<sup>th</sup> Floor, Block C,  
 Electronics Science and  
 Technology Building  
 2070 Shennan Zhong Road  
 Shenzhen, Guangdong,  
 P.R.C. 518031  
 Phone: +86-755-8379-3243  
 Fax: +86-755-8379-5828  
 e-mail:  
[chinasales@powerint.com](mailto:chinasales@powerint.com)

**ITALY**

Via De Amicis 2  
 20091 Bresso MI  
 Italy  
 Phone: +39-028-928-6000  
 Fax: +39-028-928-6009  
 e-mail:  
[eurosales@powerint.com](mailto:eurosales@powerint.com)

**SINGAPORE**

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

**APPLICATIONS HOTLINE**

World Wide +1-408-414-9660

**APPLICATIONS FAX**

World Wide +1-408-414-9760