

# LXA16T600C

## Qspeed™ Family

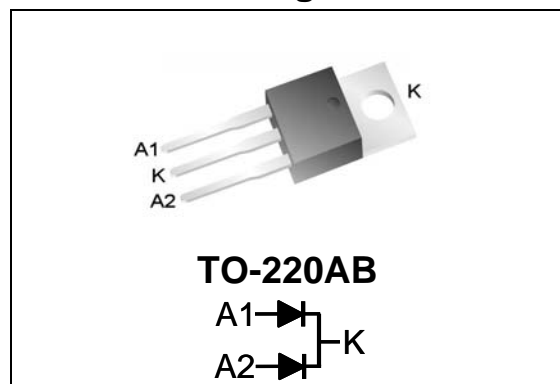


600 V, 16 A X-Series Common-Cathode Diode

### Product Summary

|                                    |      |    |
|------------------------------------|------|----|
| $I_{F(AVG)}$ per diode             | 8    | A  |
| $V_{RRM}$                          | 600  | V  |
| $Q_{RR}$ (Typ at 125 °C)           | 82   | nC |
| $I_{RRM}$ (Typ at 125 °C)          | 3.5  | A  |
| Softness $t_b/t_a$ (Typ at 125 °C) | 0.55 |    |

### Pin Assignment



### 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 600V 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 (1000A/ $\mu$ s)
- Soft recovery

### 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   |   | 600        | V     |
| $I_{F(AVG)}$ | Average forward current           | Per Diode, $T_J = 150\text{ °C}$ , $T_C = 122\text{ °C}$  | 8          | A     |
|              |                                   | Per Device, $T_J = 150\text{ °C}$ , $T_C = 122\text{ °C}$ | 16         | A     |
| $I_{FSM}$    | Non-repetitive peak surge current | 60 Hz, ½ cycle  | 60         | A     |
| $I_{FSM}$    | Non-repetitive peak surge current | ½ cycle of $t = 28\ \mu$ 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                 | $T_C = 25\text{ °C}$                                      | 83         | 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  | 1.5    | °C/W  |
|                 |                     | Per Device | 0.8    | °C/W  |

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

| Symbol                                   | Parameter                                   | Conditions  | Min                               | Typ  | Max  | Units         |             |
|--|---|---|-----------------------------------|------|------|---------------|-------------|
| <b>DC Characteristics per diode</b>      |   |   |                                   |      |      |               |             |
| $I_R$                                    | Reverse current per diode                   | $V_R = 600\text{ V}, T_J = 25\text{ }^\circ\text{C}$                  | -                                 | -    | 250  | $\mu\text{A}$ |             |
|  |   | $V_R = 600\text{ V}, T_J = 125\text{ }^\circ\text{C}$                 | -                                 | 0.85 | -    | $\text{mA}$   |             |
| $V_F$                                    | Forward voltage per diode                   | $I_F = 8\text{ A}, T_J = 25\text{ }^\circ\text{C}$                    | -                                 | 2.35 | 2.94 | $\text{V}$    |             |
|  |   | $I_F = 8\text{ A}, T_J = 150\text{ }^\circ\text{C}$                   | -                                 | 2.1  | -    | $\text{V}$    |             |
| $C_J$                                    | Junction capacitance per diode              | $V_R = 10\text{ V}, 1\text{ MHz}$                                     | -                                 | 40   | -    | $\text{pF}$   |             |
| <b>Dynamic Characteristics per diode</b> |   |   |                                   |      |      |               |             |
| $t_{RR}$                                 | Reverse recovery time, per diode            | $di_F/dt = 200\text{ A}/\mu\text{s}$<br>$V_R = 400, I_F = 8\text{ A}$ | $T_J = 25\text{ }^\circ\text{C}$  | -    | 21.5 | -             | $\text{ns}$ |
|  |   |   | $T_J = 125\text{ }^\circ\text{C}$ | -    | 33   | -             | $\text{ns}$ |
| $Q_{RR}$                                 | Reverse recovery charge, per diode          | $di_F/dt = 200\text{ A}/\mu\text{s}$<br>$V_R = 400, I_F = 8\text{ A}$ | $T_J = 25\text{ }^\circ\text{C}$  | -    | 31   | 48            | $\text{nC}$ |
|  |   |   | $T_J = 125\text{ }^\circ\text{C}$ | -    | 82   | -             | $\text{nC}$ |
| $I_{RRM}$                                | Maximum reverse recovery current, per diode | $di_F/dt = 200\text{ A}/\mu\text{s}$<br>$V_R = 400, I_F = 8\text{ A}$ | $T_J = 25\text{ }^\circ\text{C}$  | -    | 2.2  | 2.8           | $\text{A}$  |
|  |   |   | $T_J = 125\text{ }^\circ\text{C}$ | -    | 3.5  | -             | $\text{A}$  |
| S  | Softness per diode = $\frac{t_b}{t_a}$      | $di_F/dt = 200\text{ A}/\mu\text{s}$<br>$V_R = 400, I_F = 8\text{ A}$ | $T_J = 25\text{ }^\circ\text{C}$  | -    | 0.74 | -             |             |
|  |   |   | $T_J = 125\text{ }^\circ\text{C}$ | -    | 0.55 | -             |             |

**Note to component engineers:** X-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.)

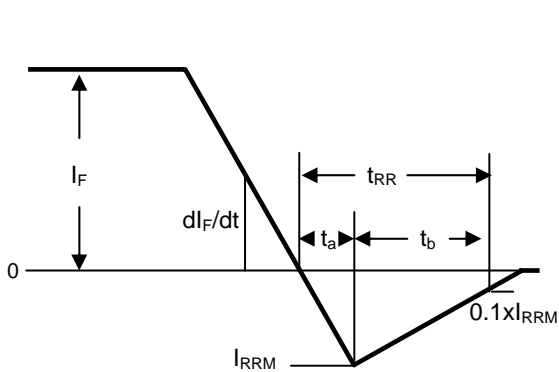


Figure 1. Reverse Recovery Definitions

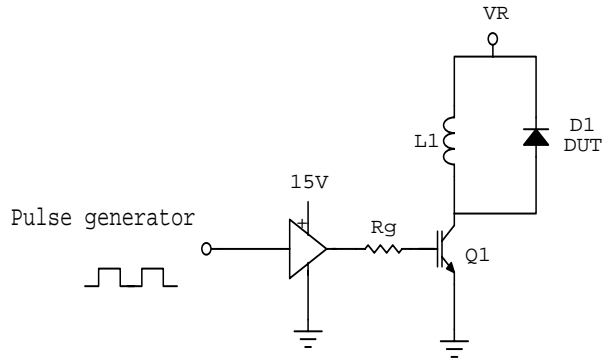
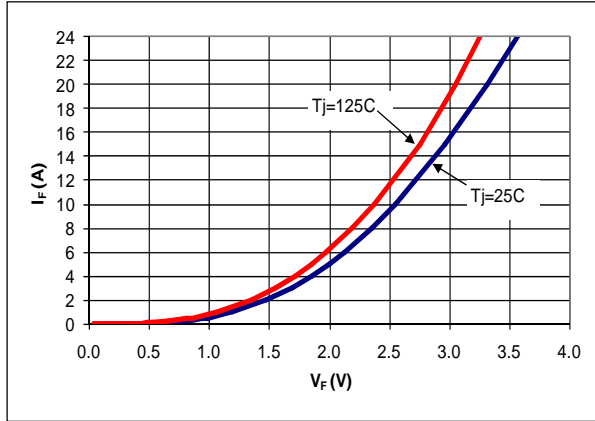
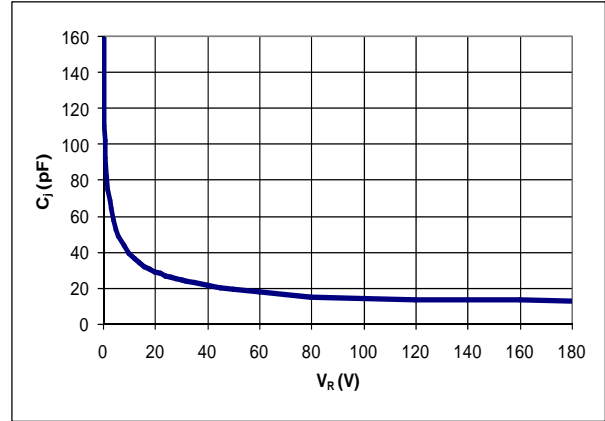


Figure 2. Reverse Recovery Test Circuit

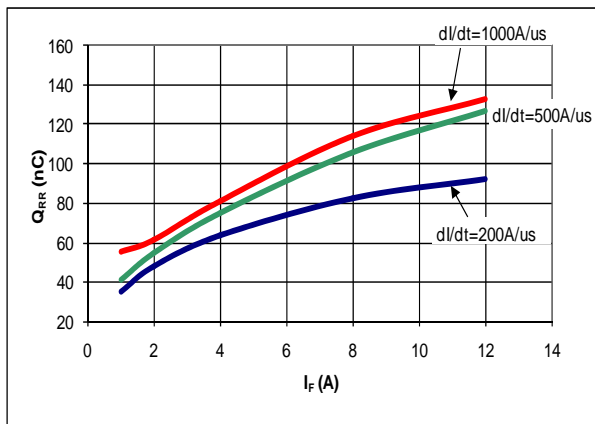
**Electrical Specifications at  $T_J = 25\text{ }^\circ\text{C}$  (unless otherwise specified)**



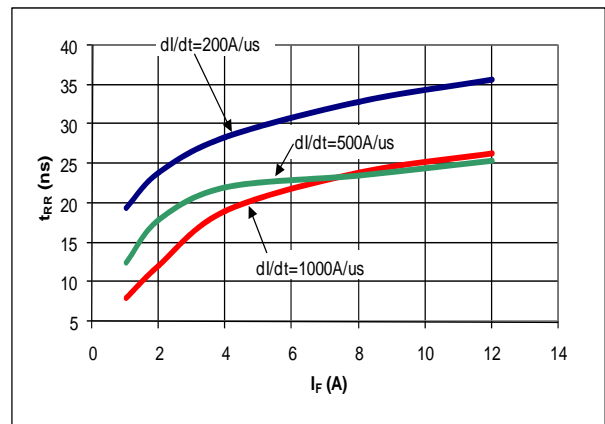
**Figure 3. Typical  $I_F$  vs  $V_F$**



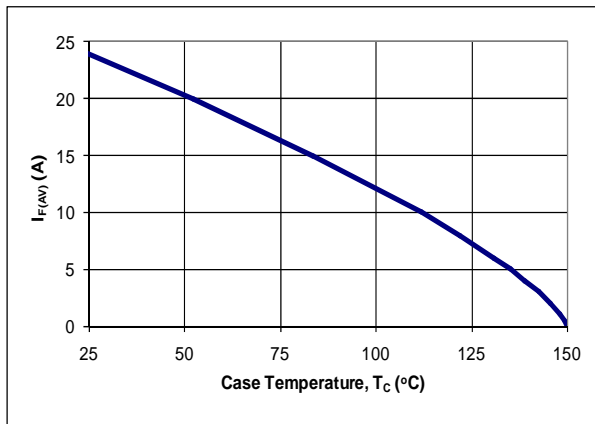
**Figure 4. Typical  $C_i$  vs  $V_R$**



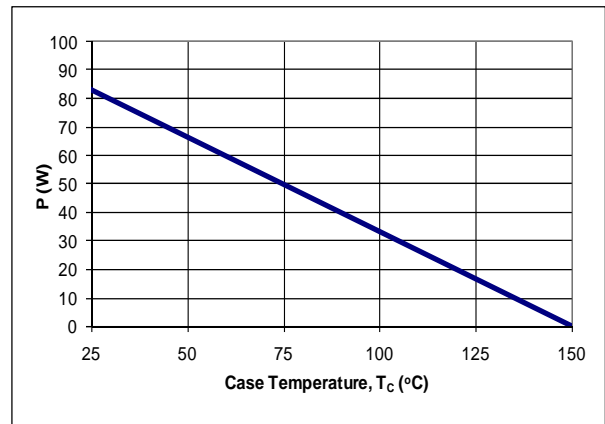
**Figure 5. Typical  $Q_{RR}$  vs  $I_F$  at  $T_J = 125\text{ }^\circ\text{C}$**



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



**Figure 7. DC Current Derating Curve**



**Figure 8. Power Derating Curve**

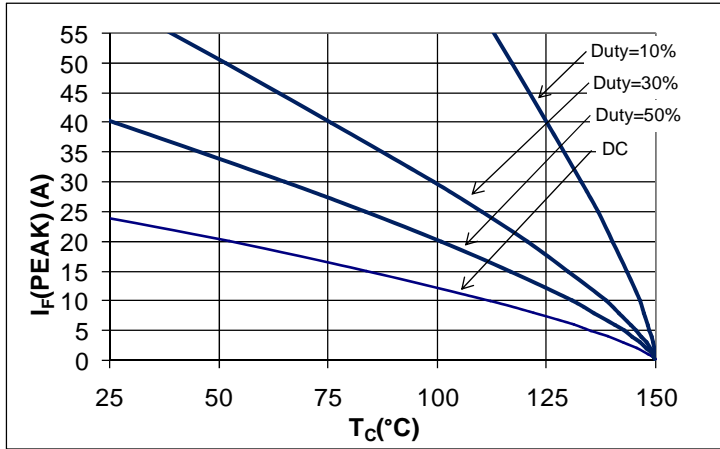


Figure 9.  $I_f(\text{Peak})$  vs  $T_c$ ,  $f=70$  kHz

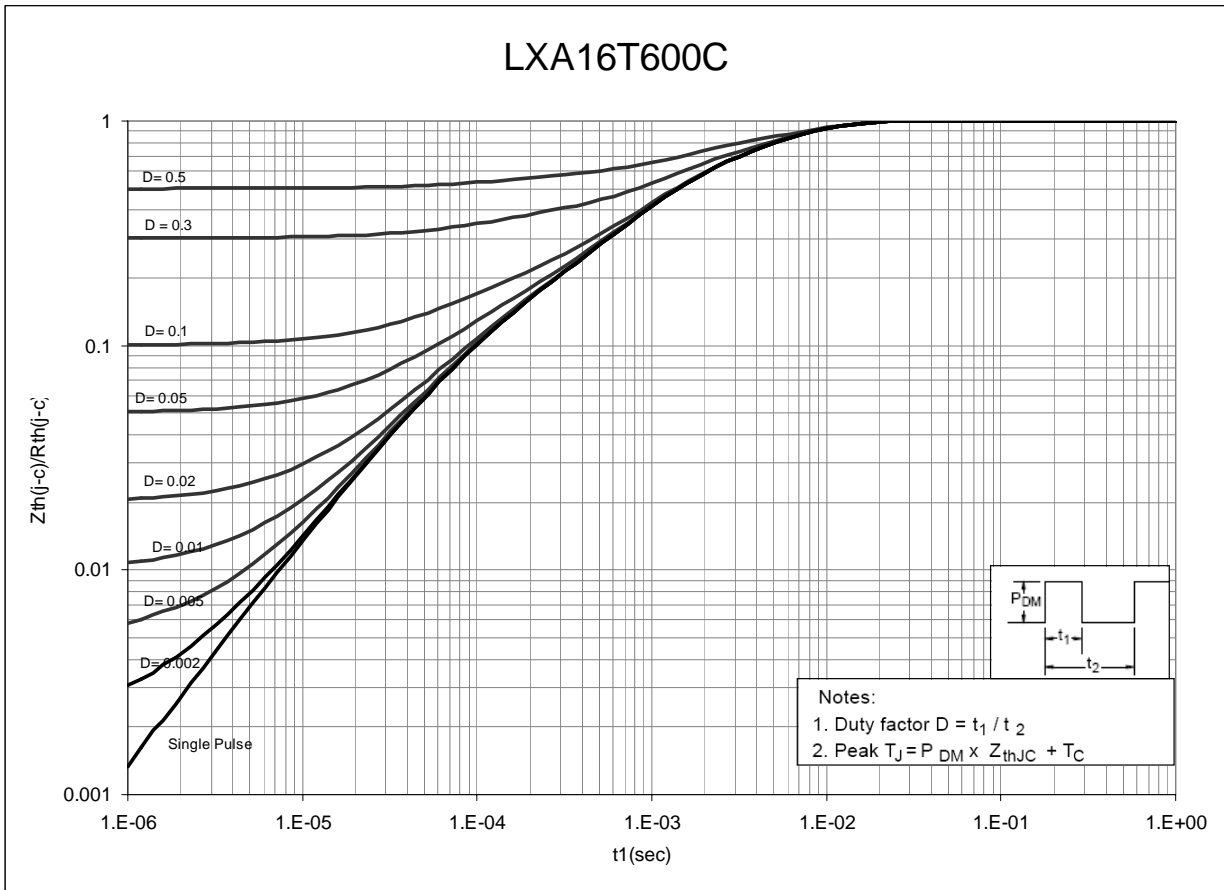
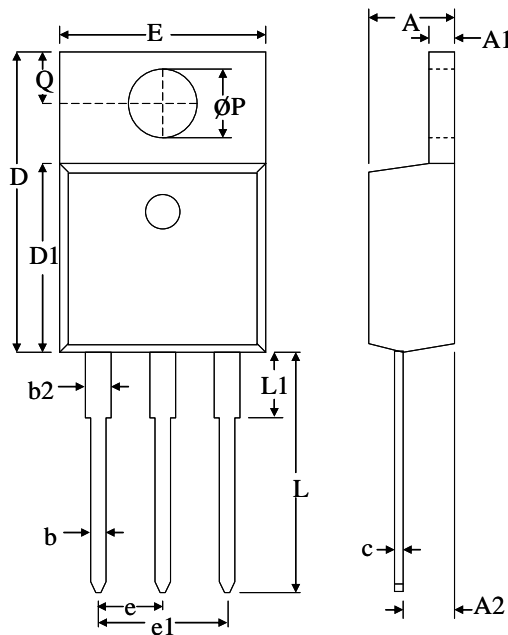


Figure 10. Normalized Maximum Transient Thermal Impedance

**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       |
|-------------|----------|---------------|
| LXA16T600C  | TO-220AB | 50 units/tube |

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

# LXA16T600C

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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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*e-mail:*  
[usasales@powerint.com](mailto:usasales@powerint.com)

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Rueckertstrasse 3  
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Germany  
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*e-mail:*  
[eurosales@powerint.com](mailto:eurosales@powerint.com)

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Japan  
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*e-mail:*  
[taiwansales@powerint.com](mailto:taiwansales@powerint.com)

#### **CHINA (SHANGHAI)**

Rm 1601/1610, Tower 1  
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Shanghai, P.R.C. 200070  
Phone: +86-021-6354-6323  
Fax: +86-021-6354-6325  
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[chinasales@powerint.com](mailto:chinasales@powerint.com)

#### **INDIA**

#1, 14<sup>th</sup> Main Road  
Vasanthanagar  
Bangalore-560052  
India  
Phone: +91-80-4113-8020  
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#### **KOREA**

RM 602, 6FL  
Korea City Air Terminal B/D, 159-6  
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Phone: +82-2-2016-6610  
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#### **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)

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