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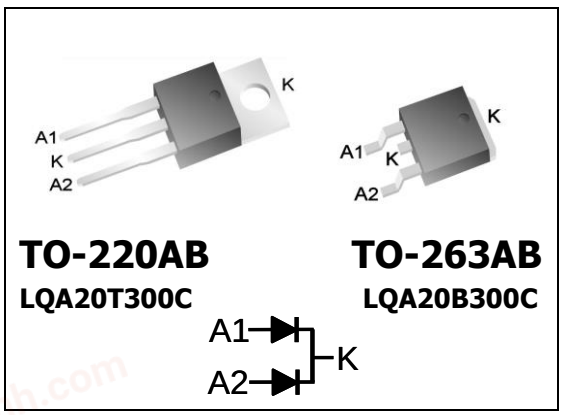
# LQA20T300C, LQA20B300C
# Qspeed™ Family

## 300 V, 20 A Q-Series Common-Cathode Diode

## Product Summary

| | | |
|---|---|---|
| $I_{F(AVG)}$ per diode | 10 | A |
| $V_{RRM}$ | 300 | V |
| $Q_{RR}$ (Typ at 125 °C) | 38 | nC |
| $I_{RRM}$ (Typ at 125 °C) | 2.3 | A |
| Softness $t_b/t_a$ (Typ at 125 °C) | 0.7 | |

## 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 300 V 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/μs)
- 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 | | 300 | V |
| $I_{F(AVG)}$ | Average forward current | Per Diode, $T_J$ = 150 °C, $T_C$ = 115 °C | 10 | A |
| | | Per Device, $T_J$ = 150 °C, $T_C$ = 115 °C | 20 | A |
| $I_{FSM}$ | Non-repetitive peak surge current | 60 Hz, ½ cycle | 80 | A |
| $I_{FSM}$ | Non-repetitive peak surge current | ½ cycle of t = 28 μs 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 1.6 mm from case, 10 sec | 300 | °C |
| $P_D$ | Power dissipation | $T_C$ = 25 °C | 52 | W |

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## Thermal Resistance

| Symbol | Resistance from: | Conditions | Rating | Units |
|---|---|---|---|---|
| $R_{\theta JA}$ | Junction to ambient | TO-220AB (only) | 62 | °C/W |
| $R_{\theta JC}$ | Junction to case | Per Diode | 2.4 | °C/W |
| | | Per Device | 1.2 | °C/W |

## Electrical Specifications at $T_J$ = 25 °C (unless otherwise specified)

| Symbol | Parameter | Conditions | | Min | Typ | Max | Units |
|---|---|---|---|---|---|---|---|
| **DC Characteristics per diode** | | | | | | | |
| $I_R$ | Reverse current per diode | $V_R$ = 300 V, $T_J$ = 25 °C | | - | - | 25 | µA |
| | | $V_R$ = 300 V, $T_J$ = 125 °C | | - | 0.32 | - | mA |
| $V_F$ | Forward voltage per diode | $I_F$ = 10 A, $T_J$ = 25 °C | | - | 1.58 | 1.9 | V |
| | | $I_F$ = 10 A, $T_J$ = 150 °C | | - | 1.36 | - | V |
| $C_J$ | Junction capacitance per diode | $V_R$ = 10 V, 1 MHz | | - | 33 | - | pF |
| **Dynamic Characteristics per diode** | | | | | | | |
| $t_{RR}$ | Reverse recovery time, per diode | $dI_F/dt$ =200 A/µs, $V_R$ = 200, $I_F$ = 10 A | $T_J$ = 25 °C | - | 12.6 | - | ns |
| | | | $T_J$ = 125 °C | - | 24 | - | ns |
| $Q_{RR}$ | Reverse recovery charge, per diode | $dI_F/dt$ = 200 A/µs, $V_R$ = 200, $I_F$ = 10 A | $T_J$ = 25 °C | - | 10.2 | 16 | nC |
| | | | $T_J$ = 125 °C | - | 38 | - | nC |
| $I_{RRM}$ | Maximum reverse recovery current, per diode | $dI_F/dt$ = 200 A/µs, $V_R$ = 200, $I_F$ = 10 A | $T_J$ = 25 °C | - | 1.3 | 1.7 | A |
| | | | $T_J$ = 125 °C | - | 2.3 | - | A |
| S | Softness per diode = $\frac{t_B}{t_A}$ | $dI_F/dt$ = 200 A/µs, $V_R$ = 200, $I_F$ = 10 A | $T_J$ = 25 °C | - | 0.7 | - | |
| | | | $T_J$ = 125 °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.)

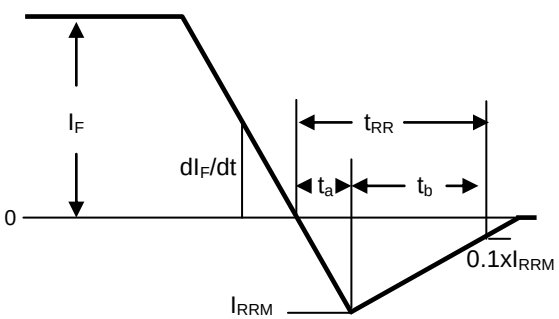



**Figure 1. Reverse Recovery Definitions.**

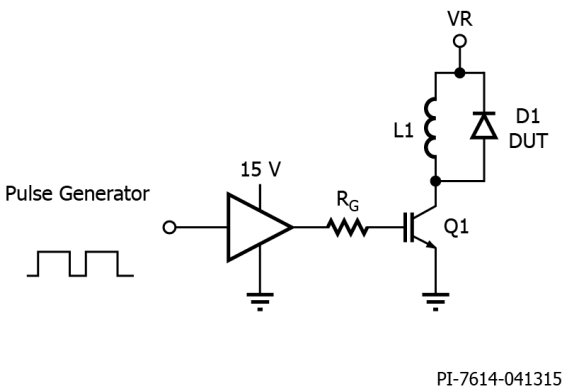



**Figure 2. Reverse Recovery Test Circuit.**

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# Electrical Specifications at $T_J$ = 25 °C (unless otherwise specified)

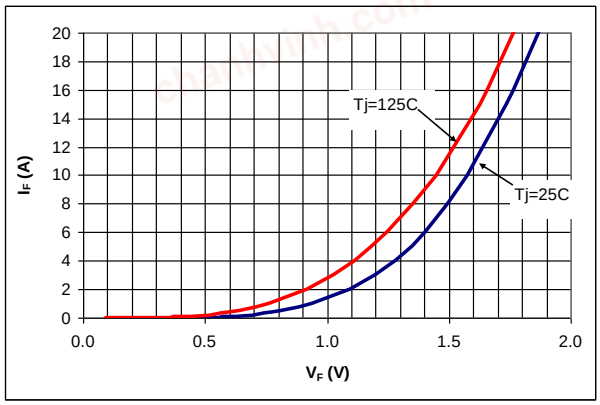



**Figure 3. Typical $I_F$ vs. $V_F$**

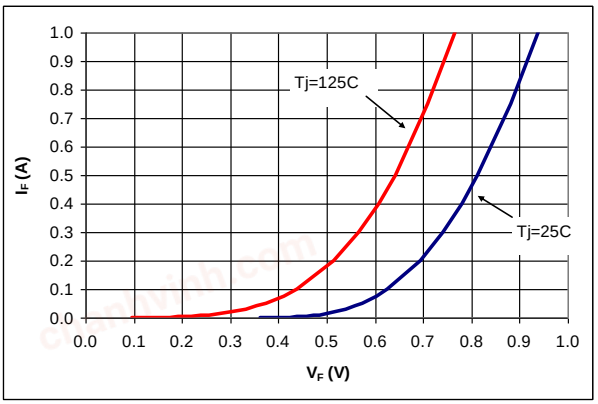



**Figure 4. Typical $I_F$ vs. $V_F$.**

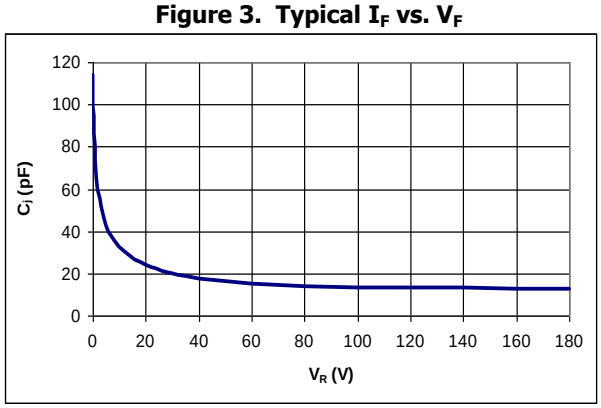



**Figure 5. Typical $C_j$ vs. $V_R$.**

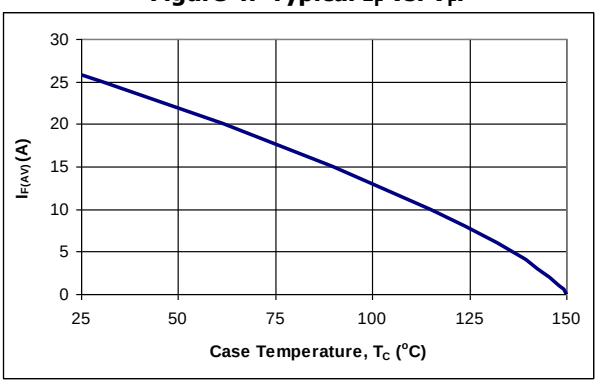



**Figure 6. DC Current Derating Curve.**

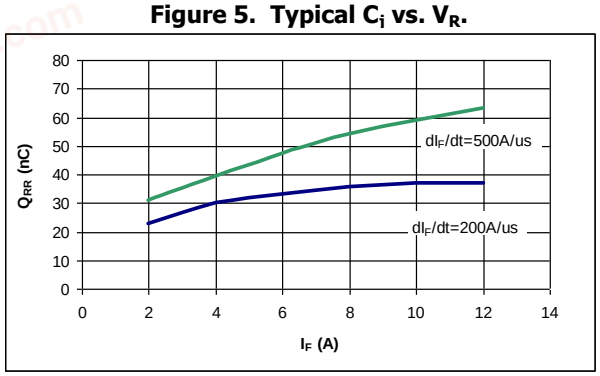



**Figure 7. Typical $Q_{RR}$ vs. $I_F$ at $T_j$ = 125 °C.**

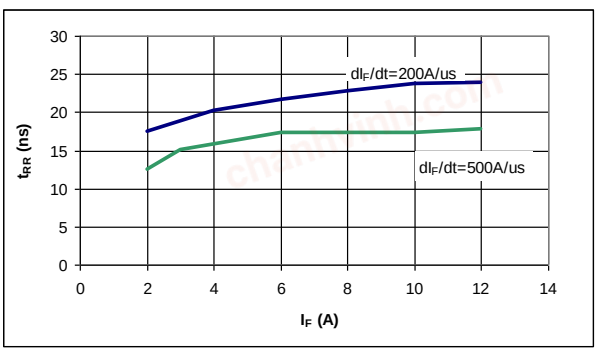



**Figure 8. Typical tRR vs. IF at Tj = 125 °C.**

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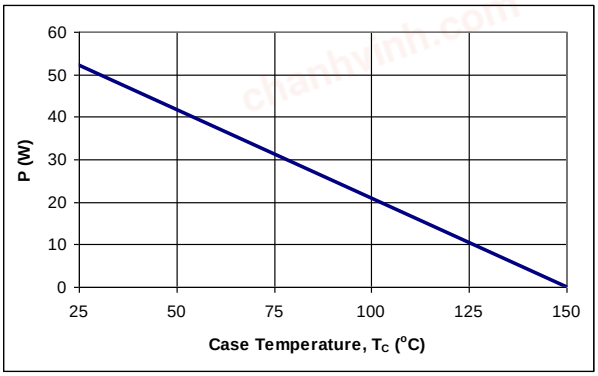



**Figure 9. Power Derating Curve.**

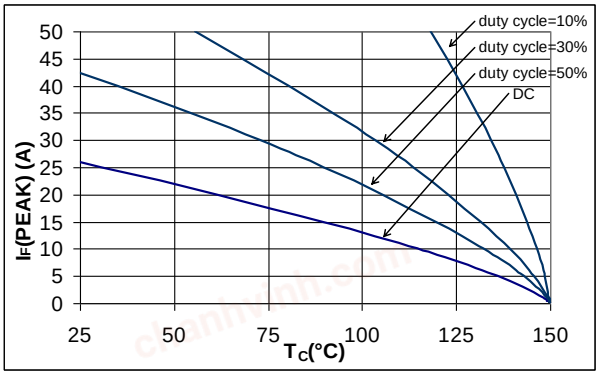



**Figure 10. $I_F$ (Peak) vs. $T_C$, f = 70 kHz.**

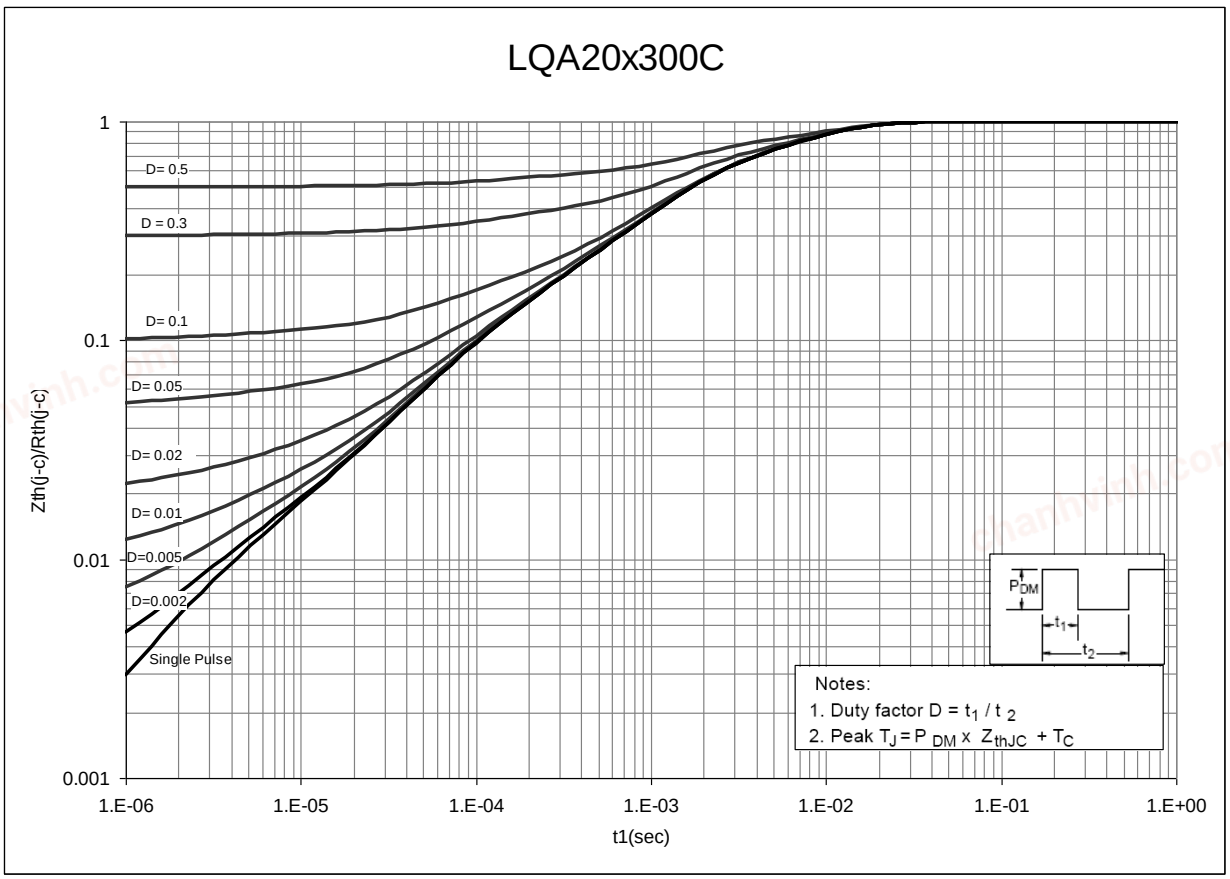


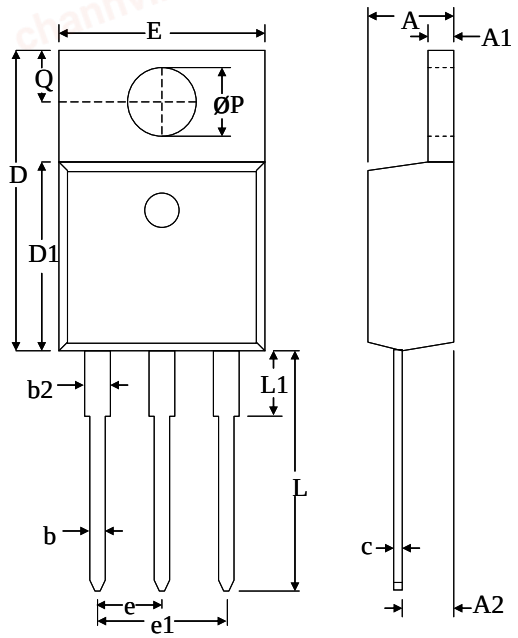

**Figure 11. Normalized Maximum Transient Thermal Impedance.**

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# Dimensional Outline Drawings

**TO-220AB**

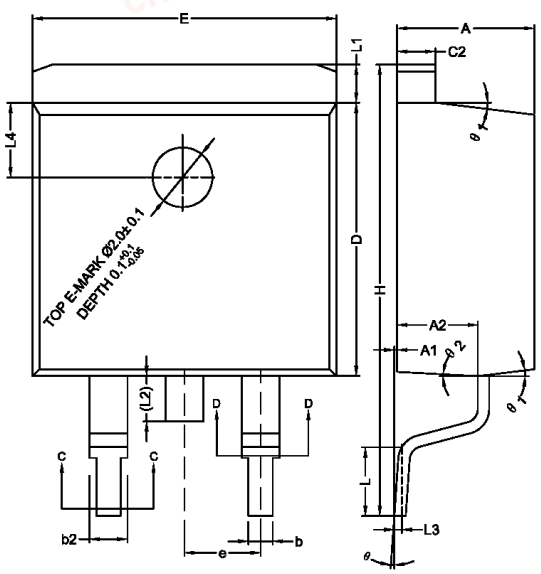



| | Millimeters | |
|---|---|---|
| **Dim** | **MIN** | **MAX** |
| **A** | 4.32 | 4.70 |
| **A1** | 1.11 | 1.38 |
| **A2** | 2.59 | 2.79 |
| **b** | 0.77 | 1.00 |
| **b2** | 1.23 | 1.36 |
| **C** | 0.34 | 0.47 |
| **D** | 14.71 | 15.75 |
| **D1** | 9.05 | 9.25 |
| **E** | 9.96 | 10.36 |
| **e** | 2.44 | 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 |

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## TO-263AB




| | Millimeters | |
|---|---|---|
| **Dim** | **MIN** | **MAX** |
| **A** | 4.40 | 4.70 |
| **A1** | 0.00 | 0.25 |
| **A2** | 2.59 | 2.79 |
| **b** | 0.77 | 0.90 |
| **b2** | 1.23 | 1.36 |
| **c2** | 1.22 | 1.32 |
| **D** | 9.05 | 9.25 |
| **E** | 10.06 | 10.26 |
| **e** | 2.54 BSC | 2.54 BSC |
| **H** | 14.70 | 15.50 |
| **L** | 2.00 | 2.60 |
| **L1** | 1.17 | 1.40 |
| **L2** | – | 1.75 |
| **L3** | 0.25 BSC | 0.25 BSC |
| **L4** | 2.00 BSC | 2.00 BSC |
| **Θ** | 0° | 8° |
| **Θ1** | 5° | 9° |
| **Θ2** | 1° | 5° |

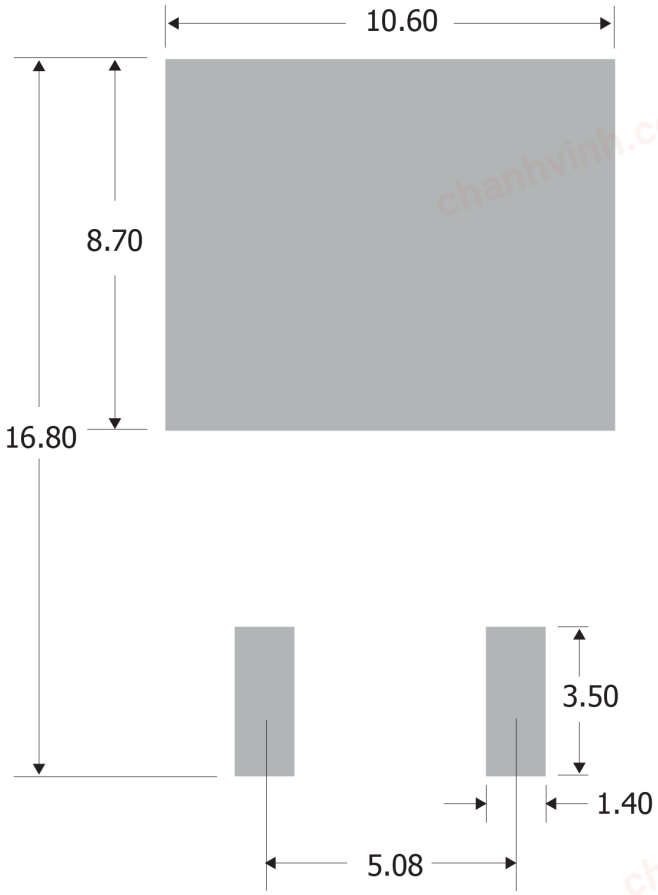
| Mechanical Mounting Method | Maximum Torque / Pressure specification |
|---|---|
| Screw through hole in package tab | 1 Newton Meter (nm) or 8.8 inch-pounds (lb-in) |
| Clamp against package body | 12.3 kilogram-force per square centimeter (kgf/cm$^2$) or 175 lbf/in$^2$ |

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## Footprint and Solder Pad Dimensions

**Pad Dimensions in mm:**
**TO-263AB**




**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 |
|---|---|---|
| LQA20T300C | TO-220AB | 50 units/tube |
| LQA20B300C | TO-263AB | 800 units/reel |

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

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| Revision | Notes | Date |
|---|---|---|
| 1.4 | Released by Qspeed | 06/10 |
| 1.5 | Converted to Power Integrations Document | 01/11 |
| 1.6 | Updated with new Brand Style. Added footprint and solder pad dimension for TO-263AB package. | 11/15 |

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