

# LQA12T300C, LQA12B300C Qspeed™ Family

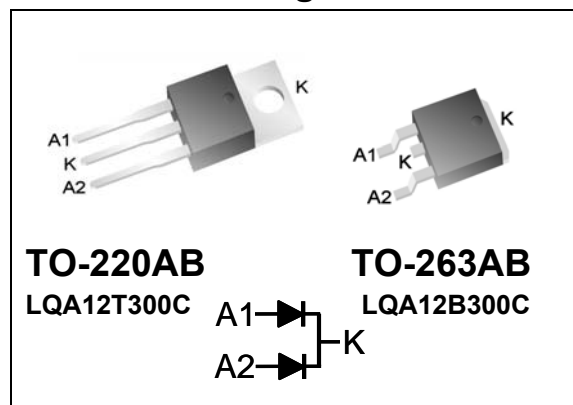


300 V, 12 A Q-Series Common-Cathode Diode

## Product Summary

$I_{F(AVG)}$ per diode	6	A
$V_{RRM}$	300	V
$Q_{RR}$ (Typ at 125 °C)	27	nC
$I_{RRM}$ (Typ at 125 °C)	1.87	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.

## 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, $T_J = 150\text{ °C}$ , $T_C = 117\text{ °C}$	6	A
		Per Device, $T_J = 150\text{ °C}$ , $T_C = 117\text{ °C}$	12	A
$I_{FSM}$	Non-repetitive peak surge current	Per Diode, 60 Hz, ½ cycle	37	A
$I_{FSM}$	Non-repetitive peak surge current	Per Diode, ½ cycle of $t = 28\text{ }\mu\text{s}$ 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	$T_C = 25\text{ °C}$	33.8	W

## 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	3.7	°C/W
		Per Device	1.9	°C/W

## 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/ $\mu\text{s}$ )
- Soft recovery

## Benefits

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

**Electrical Specifications at T<sub>J</sub>= 25 °C (unless otherwise specified)**

Symbol	Parameter	Conditions	Min	Typ	Max	Units	
<b>DC Characteristics per diode</b>							
I <sub>R</sub>	Reverse current per diode	V <sub>R</sub> = 300 V, T <sub>J</sub> = 25 °C	-	-	25	μA	
		V <sub>R</sub> = 300 V, T <sub>J</sub> = 125 °C	-	0.24	-	mA	
V <sub>F</sub>	Forward voltage per diode	I <sub>F</sub> = 6 A, T <sub>J</sub> = 25 °C	-	1.6	1.9	V	
		I <sub>F</sub> = 6 A, T <sub>J</sub> = 150 °C	-	1.34	-	V	
C <sub>J</sub>	Junction capacitance per diode	V <sub>R</sub> = 10 V, 1 MHz	-	19	-	pF	
<b>Dynamic Characteristics per diode</b>							
t <sub>RR</sub>	Reverse recovery time, per diode	dI <sub>F</sub> /dt = 200 A/μs V <sub>R</sub> = 200, I <sub>F</sub> = 6 A	T <sub>J</sub> = 25 °C	-	11.5	-	ns
			T <sub>J</sub> = 125 °C	-	21	-	ns
Q <sub>RR</sub>	Reverse recovery charge, per diode	dI <sub>F</sub> /dt = 200 A/μs V <sub>R</sub> = 200, I <sub>F</sub> = 6 A	T <sub>J</sub> = 25 °C	-	8.5	13	nC
			T <sub>J</sub> = 125 °C	-	27	-	nC
I <sub>R</sub> RM	Maximum reverse recovery current, per diode	dI <sub>F</sub> /dt = 200 A/μs V <sub>R</sub> = 200, I <sub>F</sub> = 6 A	T <sub>J</sub> = 25 °C	-	1.15	1.6	A
			T <sub>J</sub> = 125 °C	-	1.87	-	A
S	Softness per diode = $\frac{t_b}{t_a}$	dI <sub>F</sub> /dt = 200 A/μs V <sub>R</sub> = 200, I <sub>F</sub> = 6 A	T <sub>J</sub> = 25 °C	-	0.7	-	
			T <sub>J</sub> = 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.)

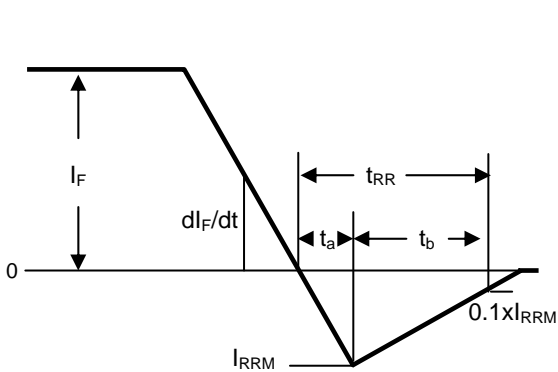


Figure 1. Reverse Recovery Definitions

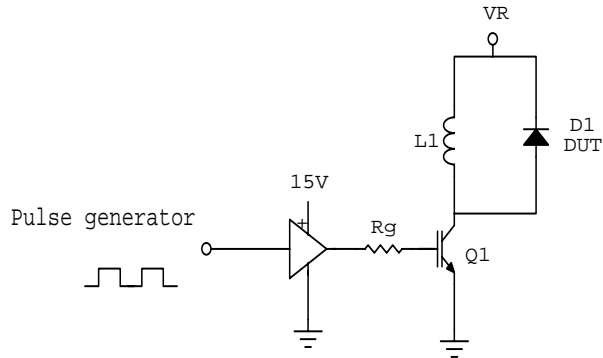


Figure 2. Reverse Recovery Test Circuit

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

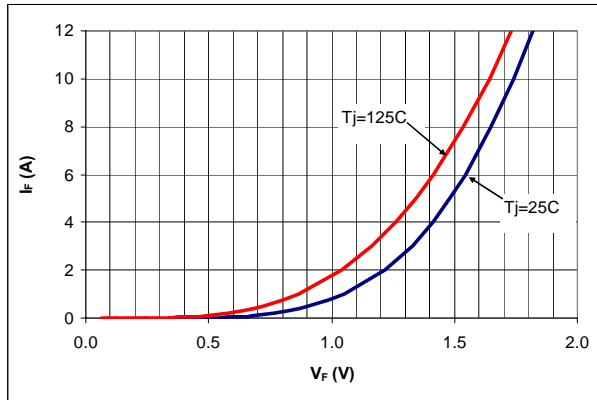


Figure 3. Typical  $I_F$  vs  $V_F$

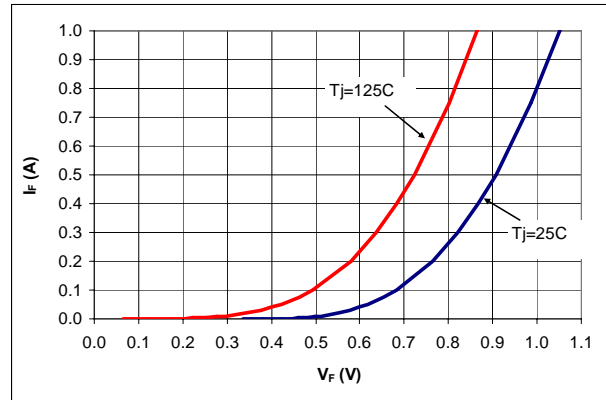


Figure 4. Typical  $I_F$  vs  $V_F$

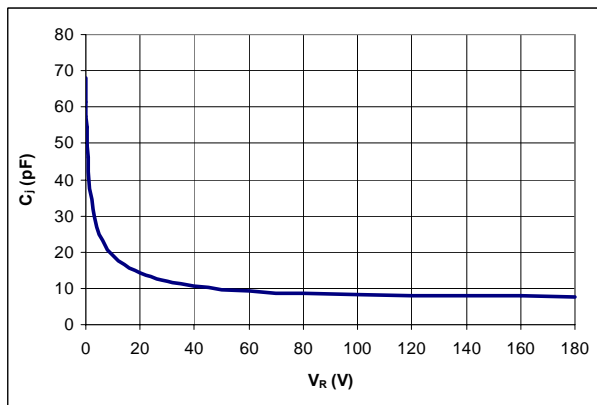


Figure 5. Typical Typical  $C_j$  vs  $V_R$

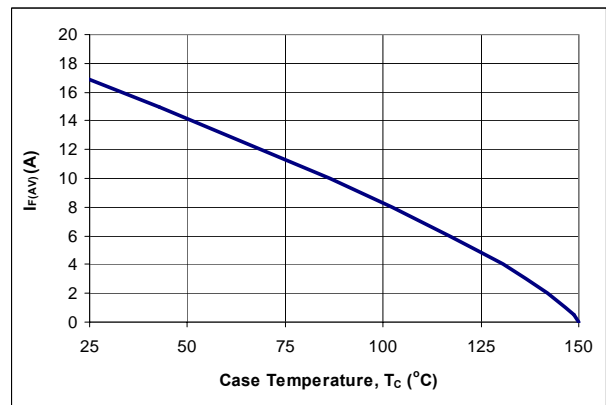


Figure 6. Typical DC Current Derating Curve

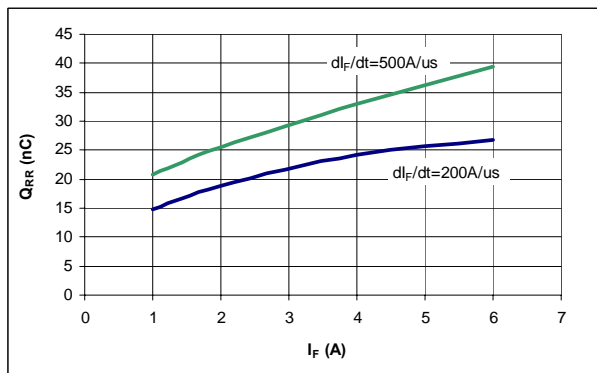


Figure 7. Typical  $Q_{RR}$  vs  $I_F$  at  $T_J = 125\text{ }^\circ\text{C}$

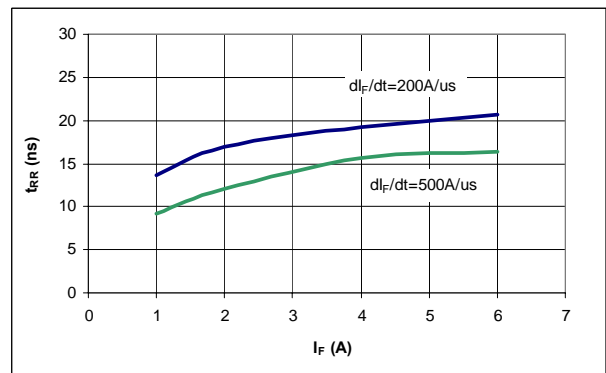


Figure 8.  $t_{RR}$  vs  $I_F$  at  $T_J = 125\text{ }^\circ\text{C}$

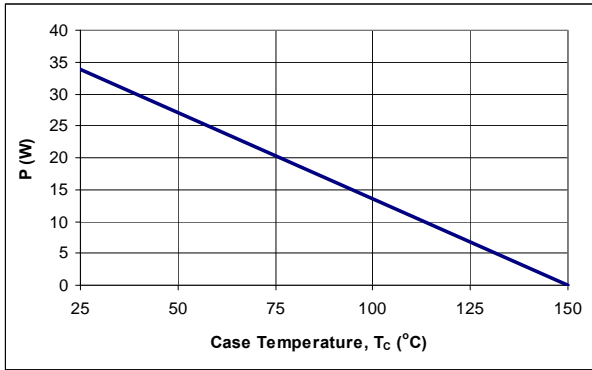


Figure 9. Power Derating Curve

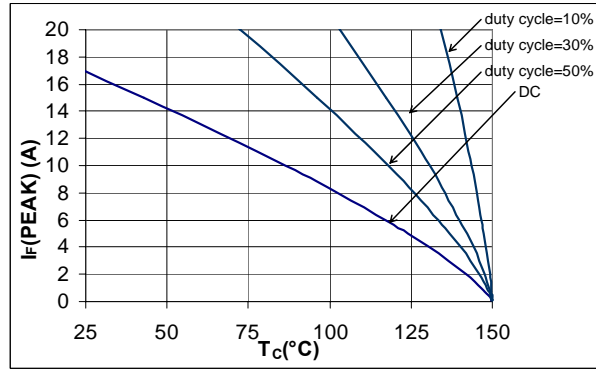


Figure 10. IF(Peak) vs TC, f=70 kHz

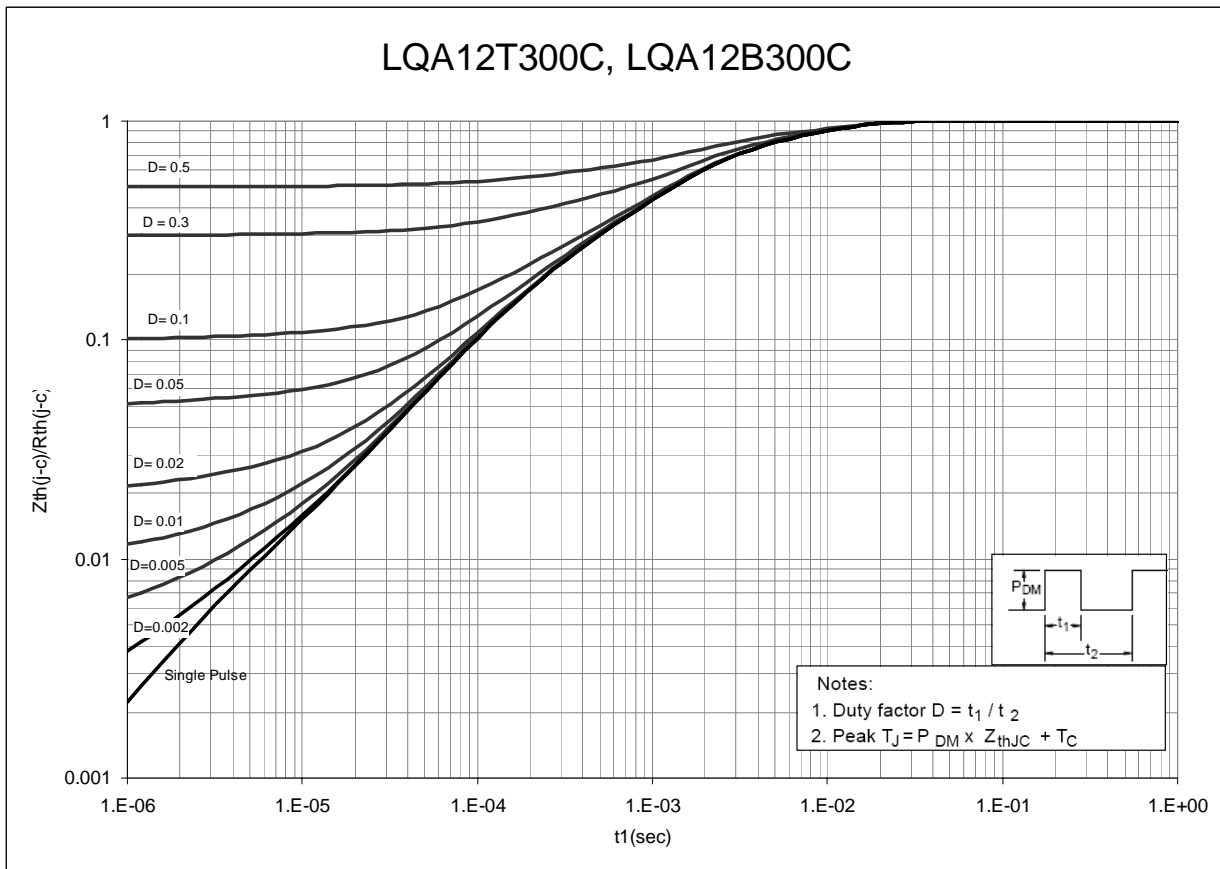
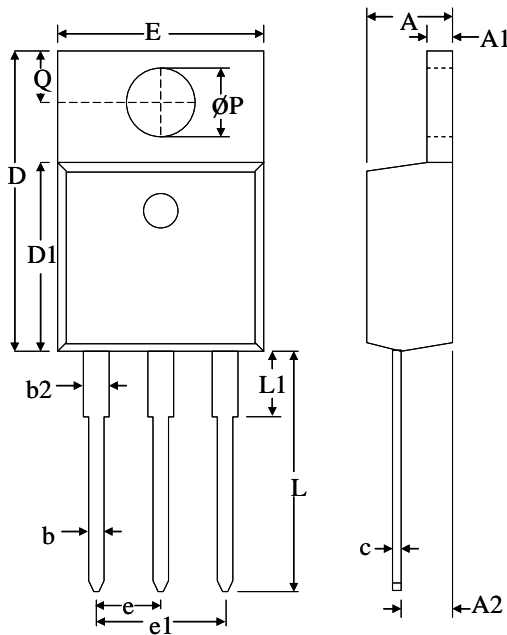


Figure 11. Normalized Maximum Transient Thermal Impedance

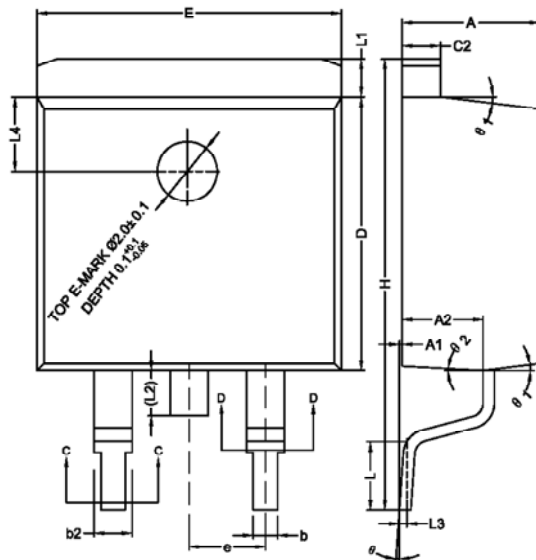
## Dimensional Outline Drawings

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>



Dim	Millimeters	
	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
Ø	0°	8°
Ø1	5°	9°
Ø2	1°	5°

**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
LQA12T300C	TO-220AB	50 units/tube
LQA12B300C	TO-263AB	800 units/reel

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

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<b>Revision</b>	<b>Notes</b>	<b>Date</b>
1.1	Released by Qspeed	10/10
1.2	Converted to Power Integrations Document	01/11

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