

LXA03T600, LXA03B600

Qspeed™ Family

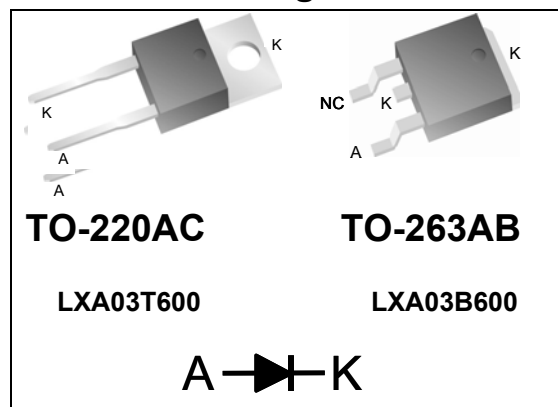
600 V, 3 A X-Series PFC Diode



Product Summary

$I_{F(AVG)}$	3	A
V_{RRM}	600	V
Q_{RR} (Typ at 125 °C)	43	nC
I_{RRM} (Typ at 125 °C)	2.3	A
Softness t_b/t_a (Typ at 125 °C)	0.9	

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 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/ μ 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	$T_J = 150\text{ °C}$, $T_C = 125\text{ °C}$	3	A
I_{FSM}	Non-repetitive peak surge current	60 Hz, 1/2 cycle	23	A
I_{FSM}	Non-repetitive peak surge current	1/2 cycle of $t=28\text{ }\mu$ s Sinusoid, $T_C=25\text{ °C}$	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
P_D	Power dissipation	$T_C = 25\text{ °C}$	37	W

Thermal Resistance

Symbol	Resistance from:	Conditions	Rating	Units
$R_{\theta JA}$	Junction to ambient	TO-220 (Only)	62	°C/W
$R_{\theta JC}$	Junction to case		3.3	°C/W

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

Symbol	Parameter	Conditions	Min	Typ	Max	Units	
DC Characteristics							
I _R	Reverse current	V _R = 600V, T _J = 25 °C	-	-	250	μA	
		V _R = 600V, T _J = 125 °C	-	0.25	-	mA	
V _F	Forward voltage	I _F = 3A, T _J = 25 °C	-	2.5	3.1	V	
		I _F = 3A, T _J = 150 °C	-	2.1	-	V	
C _J	Junction capacitance	V _R = 10V, 1 MHz	-	12	-	pF	
Dynamic Characteristics							
t _{RR}	Reverse recovery time	di/dt = 200 A/μs V _R =400 V, I _F =3 A	T _J =25 °C	-	20	-	ns
			T _J =125 °C	-	27	-	ns
Q _{RR}	Reverse recovery charge	di/dt = 200 A/μs V _R =400 V, I _F =3 A	T _J =25 °C	-	21	30	nC
			T _J =125 °C	-	43	-	nC
I _{RRM}	Maximum reverse recovery current	di/dt = 200 A/μs V _R =400 V, I _F =3 A	T _J =25 °C	-	1.65	2.3	A
			T _J =125 °C	-	2.3	-	A
S	Softness factor = $\frac{t_b}{t_a}$	di/dt = 200 A/μs V _R =400 V, I _F =3 A	T _J =25 °C	-	0.9	-	
			T _J =125 °C	-	0.9	-	

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 those for traditional Schottky test setups. (For additional details, see Application Note AN-300.)

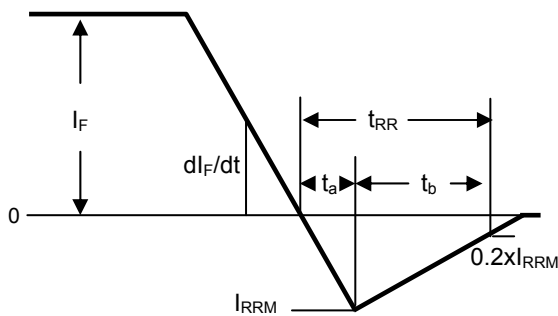


Figure 1. Reverse Recovery Definitions

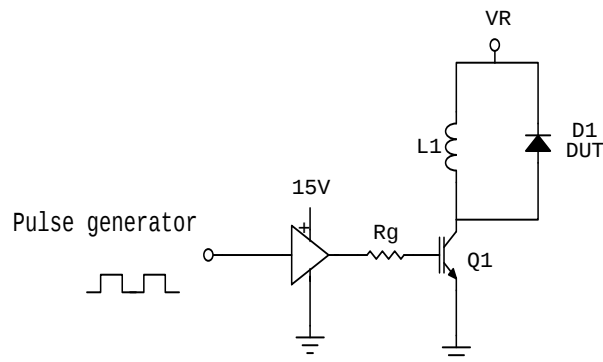


Figure 2. Reverse Recovery Test Circuit

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

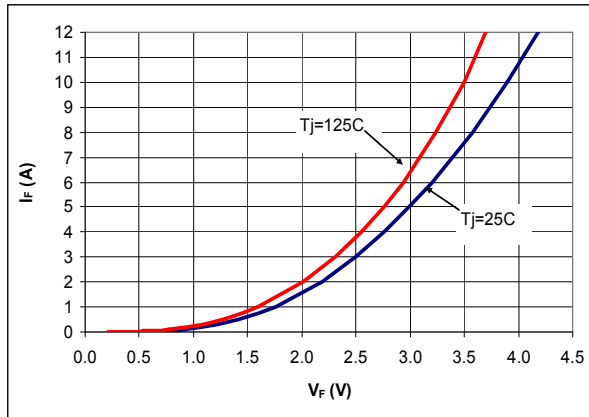


Figure 3. Typical I_F vs V_F

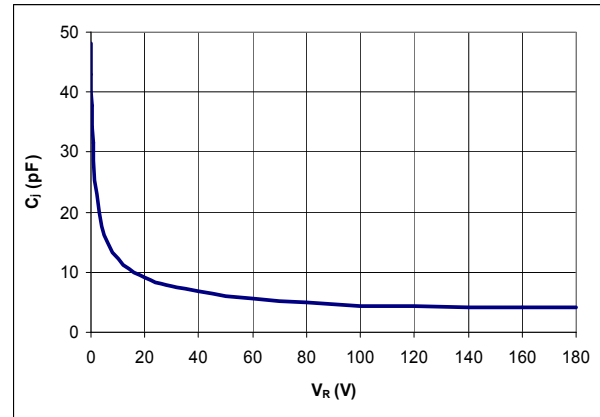


Figure 4. Typical C_j vs V_R

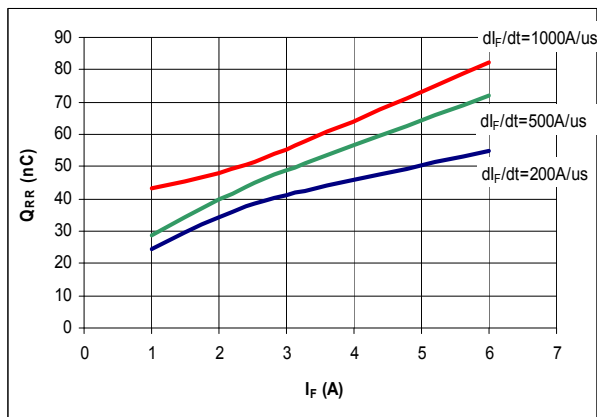


Figure 5. Typical Q_{RR} vs I_F at $T_J = 125^\circ\text{C}$

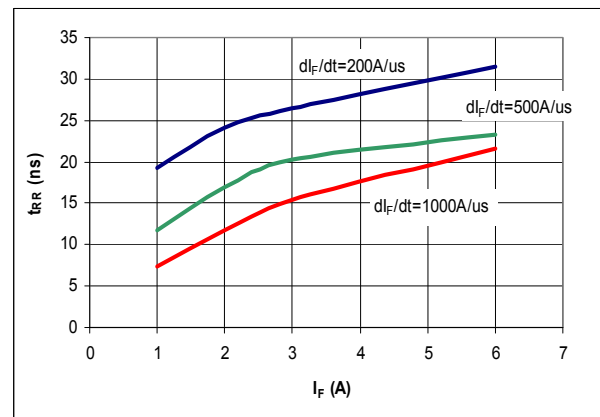


Figure 6. Typical t_{RR} vs I_F at $T_J = 125^\circ\text{C}$

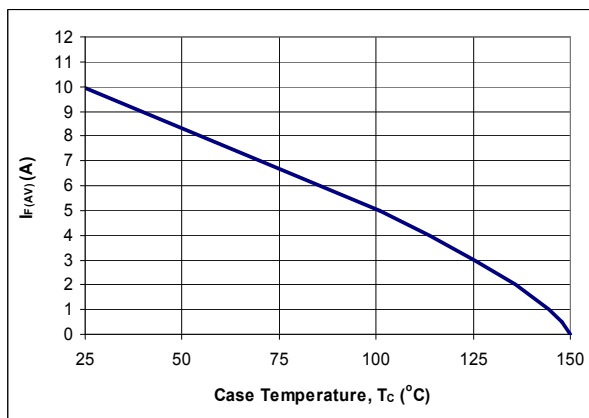


Figure 7. DC Current Derating Curve

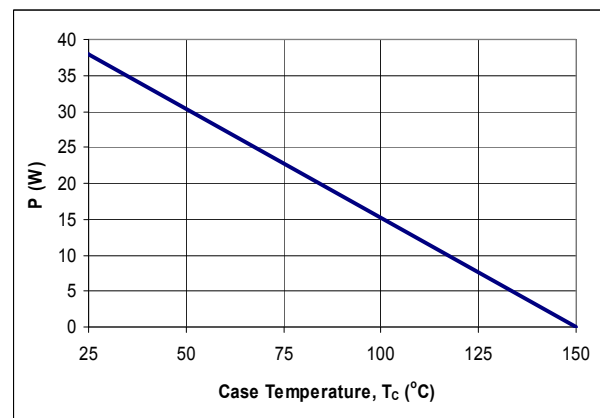


Figure 8. Power Derating Curve

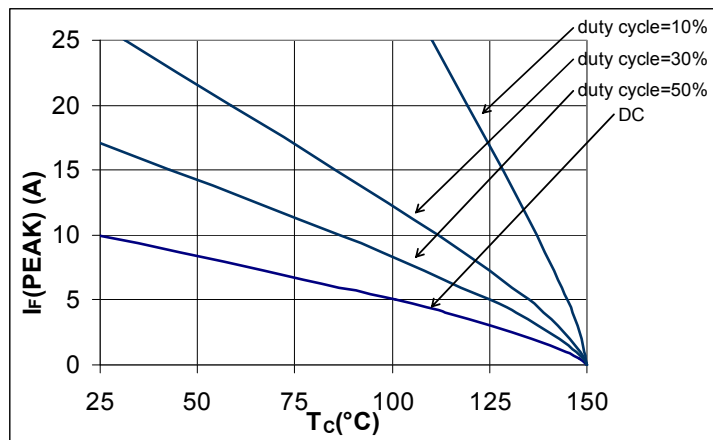


Figure 9. IF(PEAK) vs TC, f=70 kHz

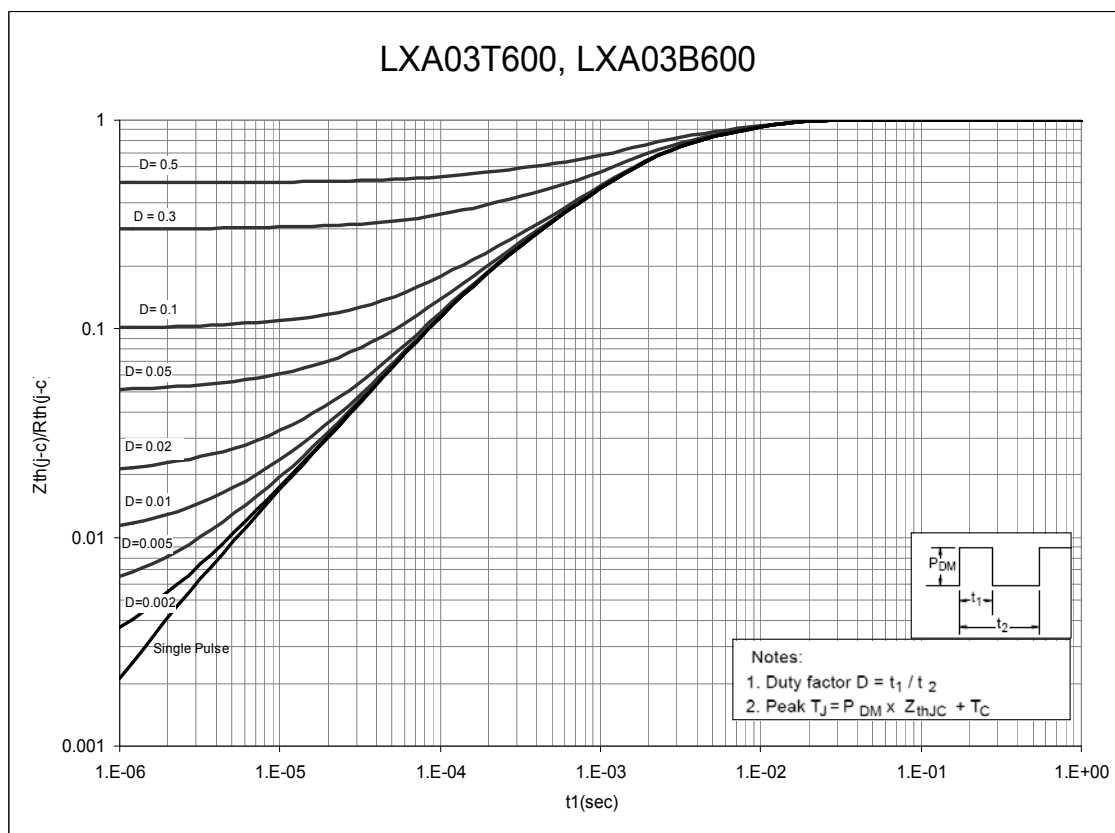
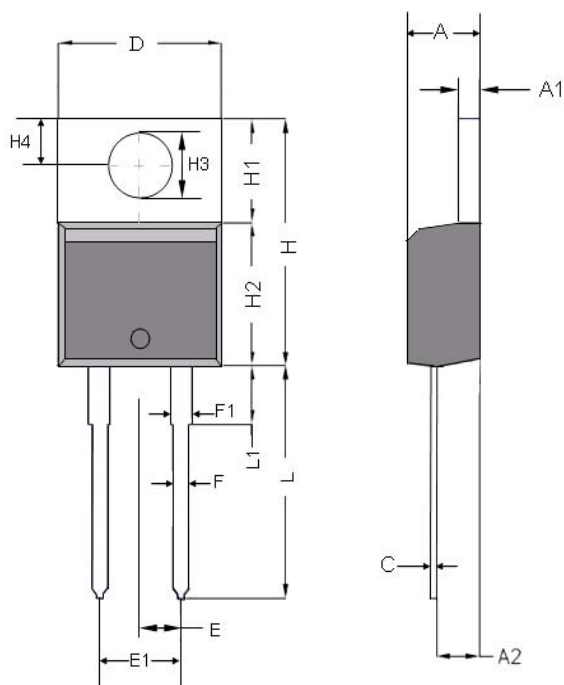


Figure 10. Normalized Maximum Transient Thermal Impedance

Dimensional Outline Drawings

TO-220AC



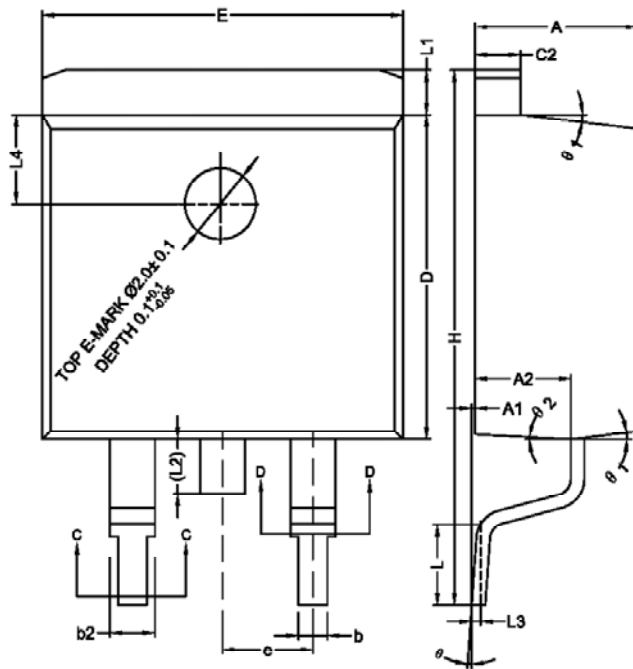
Dim	Millimeters	
	MIN	MAX
A	4.32	4.70
A1	1.14	1.40
A2	2.03	2.79
C	0.34	0.610
D	9.65	10.67
E	2.49	2.59
E1	4.98	5.18
F	0.508	1.016
F1	1.14	1.78
H	14.71	16.51
H1	5.84	6.55
H2	8.51	9.25
H3	3.53	3.96
H4	2.54	3.05
L	12.70	14.22
L1	-	6.35

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.

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

TO-263AB



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
Θ	0°	8°
Θ_1	5°	9°
Θ_2	1°	5°

Ordering Information

Part Number	Package	Packing
LXA03T600	TO-220AC	50 units/tube
LXA03B600	TO-263AB	800 units/reel

Revision	Notes	Date
1.1	Released by Qspeed	06/10
1.2	Converted to Power Integrations Document	01/11
1.2	Stop Point of t_{RR} error corrected due to typo in Figure 1	11/13

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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

GERMANY

Lindwurmstrasse 114
80337, Munich
Germany
Phone: +49-895-527-39110
Fax: +49-895-527-39200
e-mail:
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

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@powerint.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@powerint.com

INDIA

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

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

CHINA (SHENZHEN)

3rd Floor, Block A,
Zhongtuo International Business
Center, No. 1061, Xiang Mei Rd,
FuTian District, ShenZhen,
China, 518040
Phone: +86-755-8379-3243
Fax: +86-755-8379-5828
e-mail: chinasales@powerint.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@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

APPLICATIONS HOTLINE

World Wide +1-408-414-9660

APPLICATIONS FAX

World Wide +1-408-414-9760

AMEYA360

Components Supply Platform

Authorized Distribution Brand :



Website :

Welcome to visit www.ameya360.com

Contact Us :

➤ Address :

401 Building No.5, JiuGe Business Center, Lane 2301, Yishan Rd
Minhang District, Shanghai , China

➤ Sales :

Direct +86 (21) 6401-6692

Email amall@ameya360.com

QQ 800077892

Skype ameyasales1 ameyasales2

➤ Customer Service :

Email service@ameya360.com

➤ Partnership :

Tel +86 (21) 64016692-8333

Email mkt@ameya360.com