

# LXA12T600C

## Qspeed™ Family

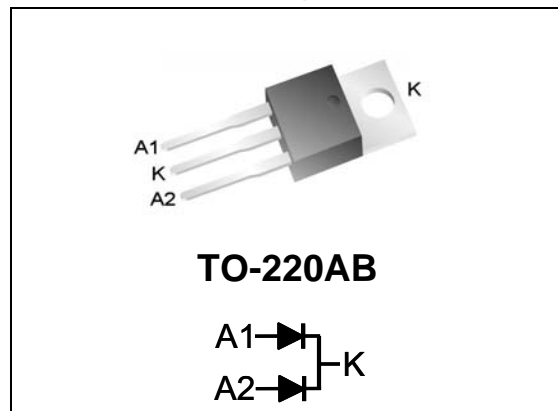


600 V, 12 A X-Series Common-Cathode Diode

### Product Summary

$I_{F(AVG)}$ per diode	6	A
$V_{RRM}$	600	V
$Q_{RR}$ (Typ at 125 °C)	71	nC
$I_{RRM}$ (Typ at 125 °C)	3.1	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 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/ $\mu$ 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, $T_J = 150\text{ °C}$ , $T_C = 121\text{ °C}$	6	A
		Per Device, $T_J = 150\text{ °C}$ , $T_C = 121\text{ °C}$	12	A
$I_{FSM}$	Non-repetitive peak surge current	60 Hz, 1/2 cycle	50	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	$T_C = 25\text{ °C}$	62.5	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	2.0	°C/W
		Per Device	1.0	°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</b>							
$I_R$	Reverse current per diode	$V_R = 600\text{ V}, T_J = 25\text{ }^\circ\text{C}$	-	-	250	$\mu\text{A}$	
		$V_R = 600\text{ V}, T_J = 125\text{ }^\circ\text{C}$	-	0.7	-	$\text{mA}$	
$V_F$	Forward voltage per diode	$I_F = 6\text{ A}, T_J = 25\text{ }^\circ\text{C}$	-	2.27	2.94	$\text{V}$	
		$I_F = 6\text{ A}, T_J = 150\text{ }^\circ\text{C}$	-	2.0	-	$\text{V}$	
$C_J$	Junction capacitance per diode	$V_R = 10\text{ V}, 1\text{ MHz}$	-	30	-	$\text{pF}$	
<b>Dynamic Characteristics</b>							
$t_{RR}$	Reverse recovery time, per diode	$dI_F/dt = 200\text{ A}/\mu\text{s}$ $V_R = 400, I_F = 6\text{ A}$	$T_J = 25\text{ }^\circ\text{C}$	-	23	-	$\text{ns}$
			$T_J = 125\text{ }^\circ\text{C}$	-	32	-	$\text{ns}$
$Q_{RR}$	Reverse recovery charge, per diode	$dI_F/dt = 200\text{ A}/\mu\text{s}$ $V_R = 400, I_F = 6\text{ A}$	$T_J = 25\text{ }^\circ\text{C}$	-	30	47	$\text{nC}$
			$T_J = 125\text{ }^\circ\text{C}$	-	71	-	$\text{nC}$
$I_{RRM}$	Maximum reverse recovery current, per diode	$dI_F/dt = 200\text{ A}/\mu\text{s}$ $V_R = 400, I_F = 6\text{ A}$	$T_J = 25\text{ }^\circ\text{C}$	-	2.0	2.5	$\text{A}$
			$T_J = 125\text{ }^\circ\text{C}$	-	3.1	-	$\text{A}$
S	Softness per diode = $\frac{t_b}{t_a}$	$dI_F/dt = 200\text{ A}/\mu\text{s}$ $V_R = 400, I_F = 6\text{ A}$	$T_J = 25\text{ }^\circ\text{C}$	-	0.8	-	
			$T_J = 125\text{ }^\circ\text{C}$	-	0.7	-	

**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.)

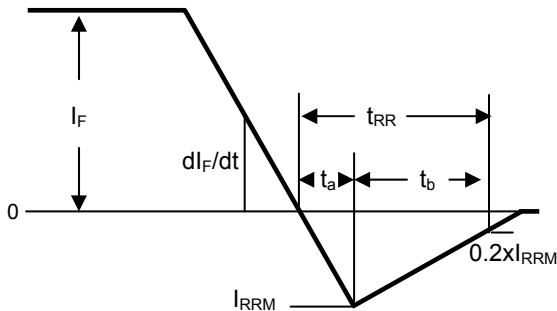


Figure 1. Reverse Recovery Definitions

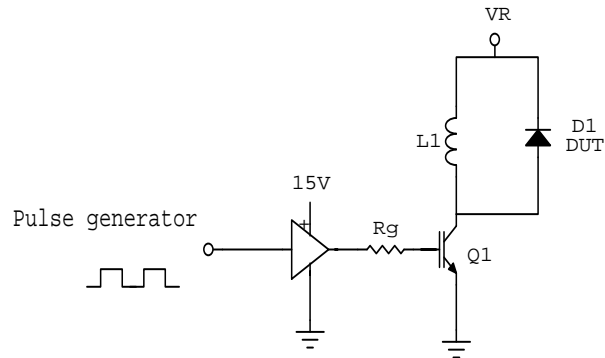
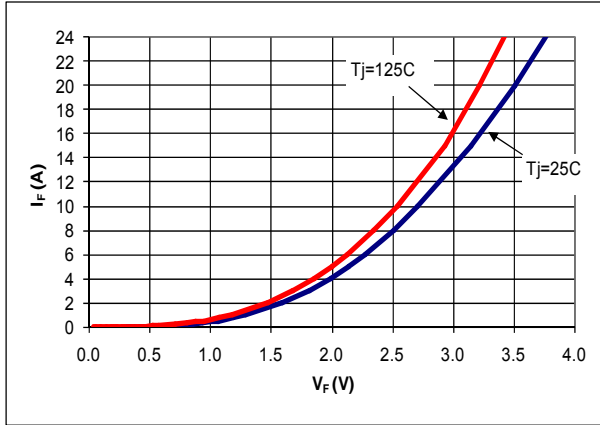
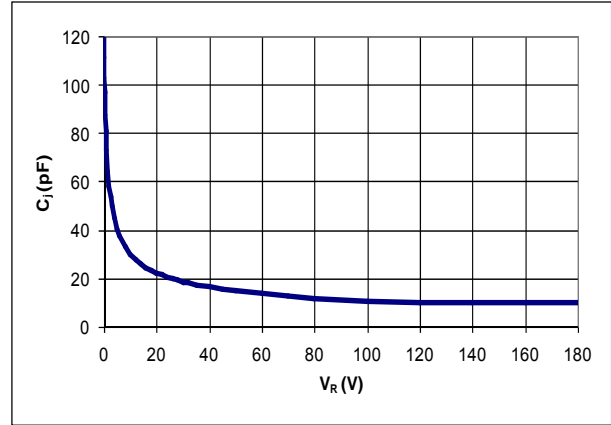


Figure 2. Reverse Recovery Test Circuit

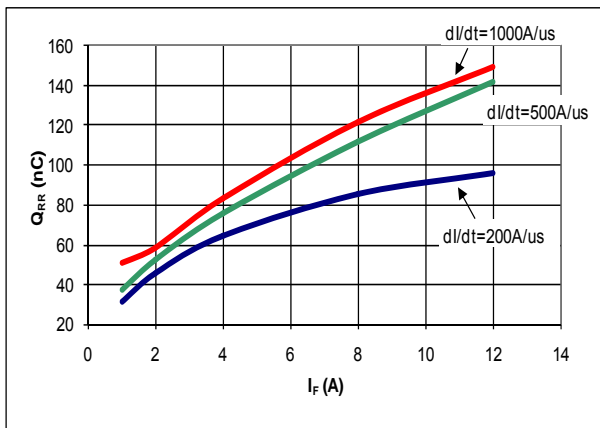
**Electrical Specifications at  $T_J = 25\text{ }^\circ\text{C}$  (unless otherwise specified)**



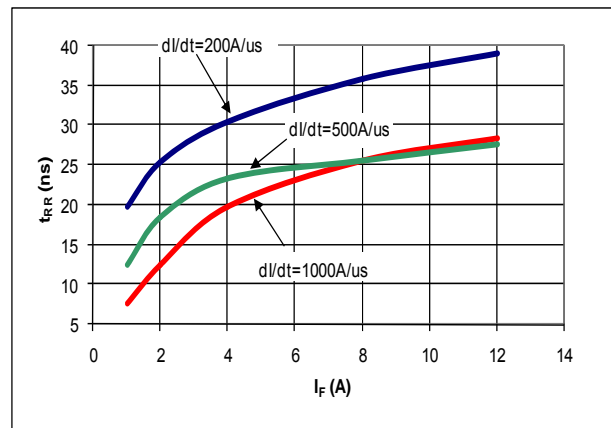
**Figure 3. Typical  $I_F$  vs  $V_F$**



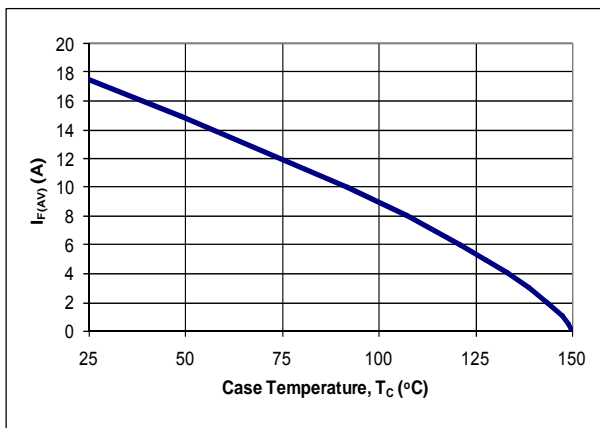
**Figure 4. Typical  $C_i$  vs  $V_R$**



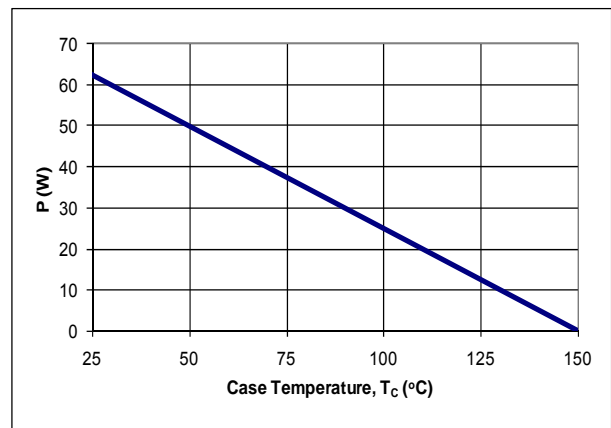
**Figure 5. Typical  $Q_{RR}$  vs  $I_F$  at  $T_J = 125\text{ }^\circ\text{C}$**



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



**Figure 7. DC Current Derating Curve**



**Figure 8. Power Derating Curve**

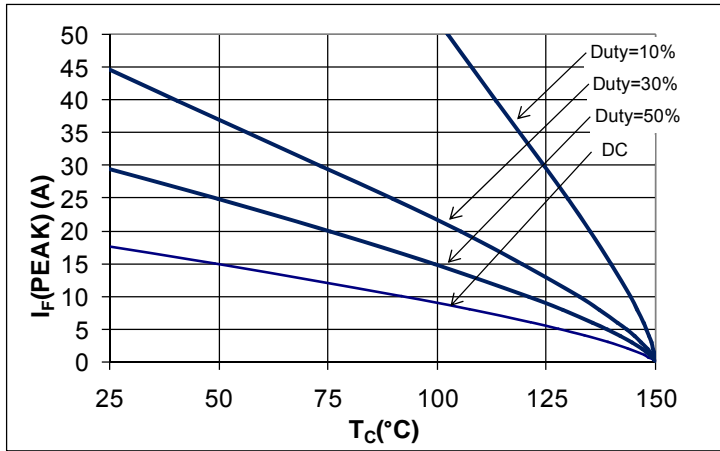


Figure 9. I<sub>f</sub>(Peak) vs T<sub>c</sub>, f=70 kHz

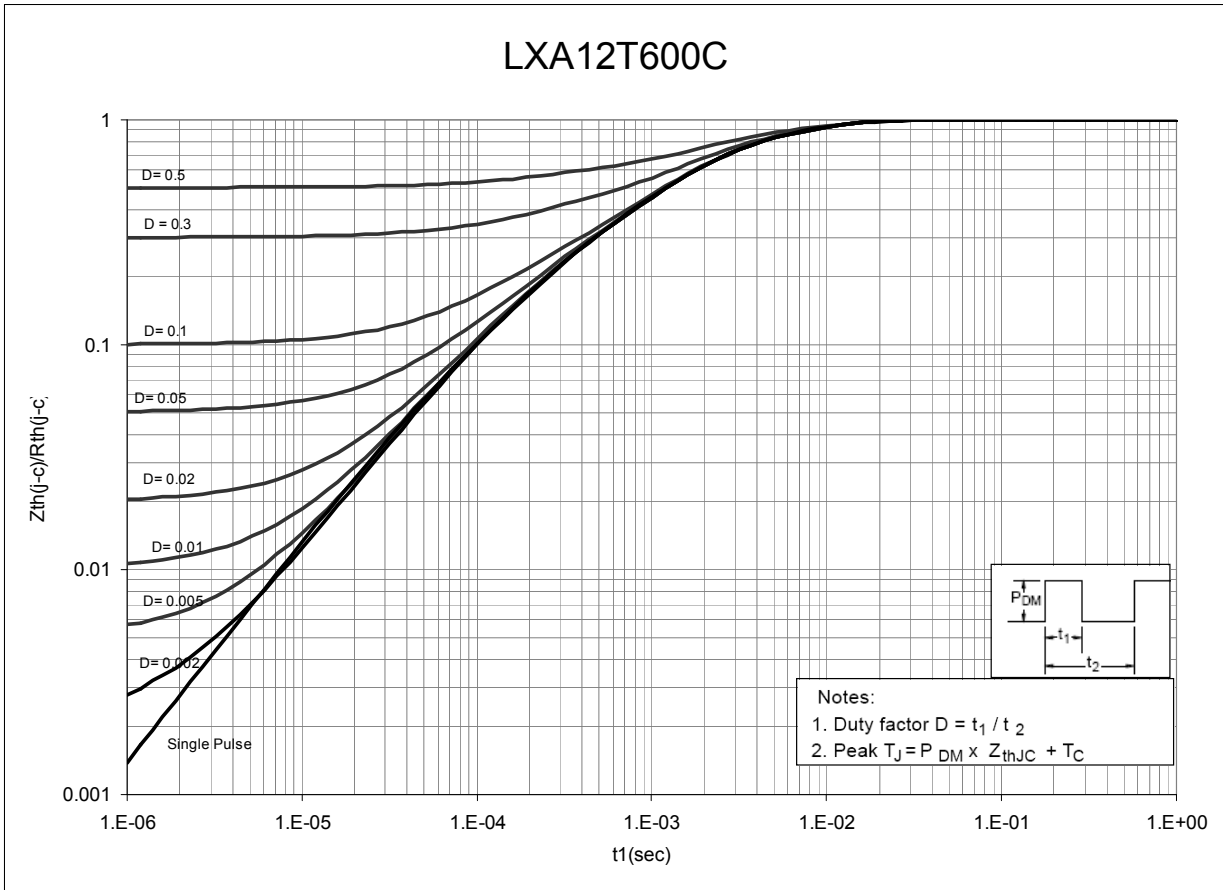
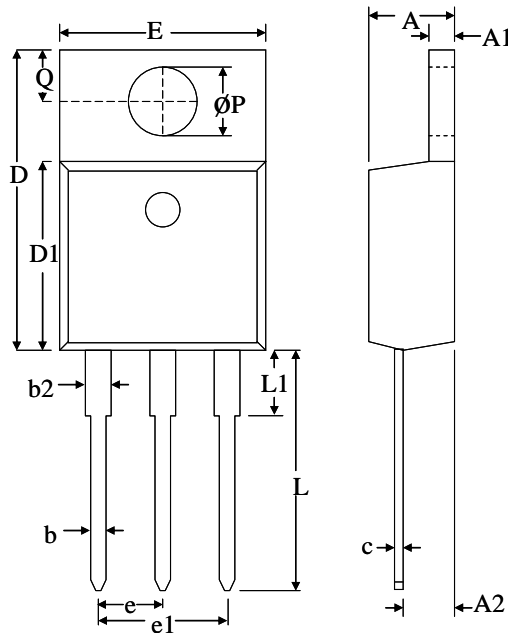


Figure 10. Normalized Maximum Transient Thermal Impedance

**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
LXA12T600C	TO-220AB	50 units/tube

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

# LXA12T600C

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

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