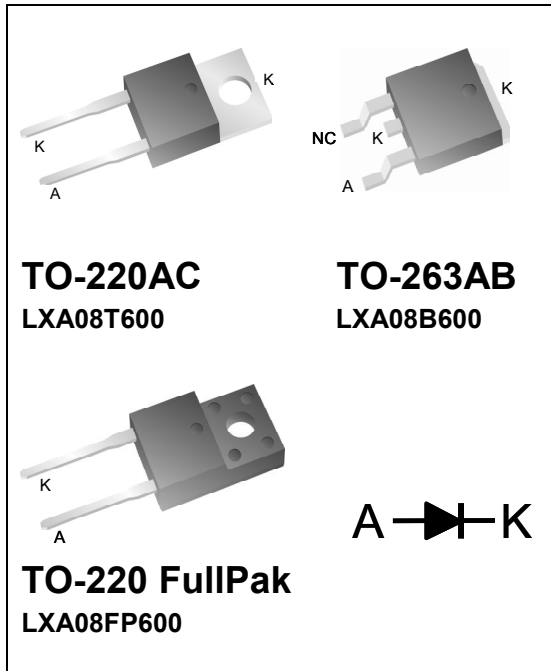


# 600V, 8A X-Series PFC Rectifier

## Product Summary

$I_{F(AVG)}$	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



## General Description

Utilizing proprietary Qspeed technology 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
- FullPak Insulation = 2500V<sub>RMS</sub>

## Benefits

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

## 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		600	V
$I_{F(AVG)}$	Average forward current	$T_J = 150\text{ °C}$ , $T_C = 122\text{ °C}$ (220AC, 263AB) $T_J = 150\text{ °C}$ , $T_C = 81\text{ °C}$ . (FullPak)	8	A
$I_{FSM}$	Non-repetitive peak surge current	60 Hz, 1/2 cycle	60	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	$T_C = 25\text{ °C}$ . (220AC, 263AB)	83	W
		$T_C = 25\text{ °C}$ . (FullPak)	34	W

## Thermal Resistance

Symbol	Resistance from:	Conditions	Rating	Units
R <sub>θJA</sub>	Junction to ambient	TO-220AC (Only)	62	°C/W
R <sub>θJC</sub>	Junction to case	TO-220AC, TO-263AB	1.5	°C/W
		TO-220AC FullPak	3.7	°C/W

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

Symbol	Parameter	Conditions	Min	Typ	Max	Units	
<b>DC Characteristics</b>							
I <sub>R</sub>	Reverse current	V <sub>R</sub> = 600V, T <sub>J</sub> = 25 °C	-	-	250	μA	
		V <sub>R</sub> = 600V, T <sub>J</sub> = 125 °C	-	0.85	-	mA	
V <sub>F</sub>	Forward voltage	I <sub>F</sub> = 8A, T <sub>J</sub> = 25 °C	-	2.35	2.94	V	
		I <sub>F</sub> = 8A, T <sub>J</sub> = 150 °C	-	2.1	-	V	
C <sub>J</sub>	Junction capacitance	V <sub>R</sub> = 10V, 1 MHz	-	40	-	pF	
<b>Dynamic Characteristics</b>							
t <sub>RR</sub>	Reverse recovery time	dI/dt = 200A/μs V <sub>R</sub> = 400V, I <sub>F</sub> = 8A	T <sub>J</sub> = 25 °C	-	21.5	34	ns
			T <sub>J</sub> = 125 °C	-	33	53 <sup>(1)</sup>	ns
Q <sub>RR</sub>	Reverse recovery charge	dI/dt = 200A/μs V <sub>R</sub> = 400V, I <sub>F</sub> = 8A	T <sub>J</sub> = 25 °C	-	31	48	nC
			T <sub>J</sub> = 125 °C	-	82	130 <sup>(1)</sup>	nC
I <sub>RRM</sub>	Maximum reverse recovery current	dI/dt = 200A/μs V <sub>R</sub> = 400V, I <sub>F</sub> = 8A	T <sub>J</sub> = 25 °C	-	2.2	2.8	A
			T <sub>J</sub> = 125 °C	-	3.5	4.5 <sup>(1)</sup>	A
S	Softness factor = $\frac{t_b}{t_a}$	dI/dt = 200A/μs V <sub>R</sub> = 400V, I <sub>F</sub> = 8A	T <sub>J</sub> = 25 °C	-	0.74	-	
			T <sub>J</sub> = 125 °C	-	0.55	-	

(1) = Statistical limit. Not tested in production.

**Note to component engineers:** Qspeed rectifiers 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 Qspeed Application Note AN-300.)

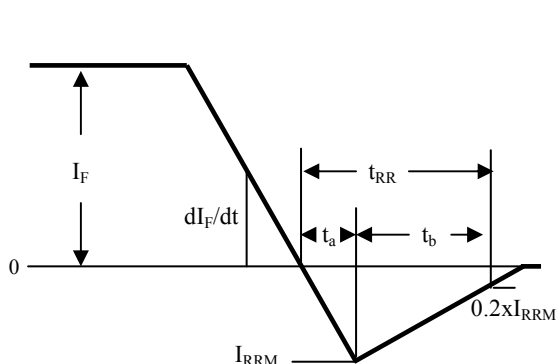


Figure 1. Reverse Recovery Definitions

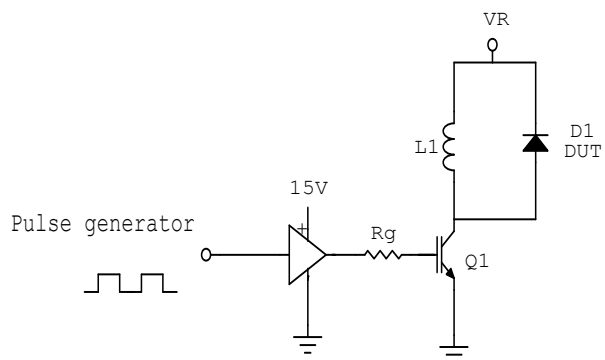
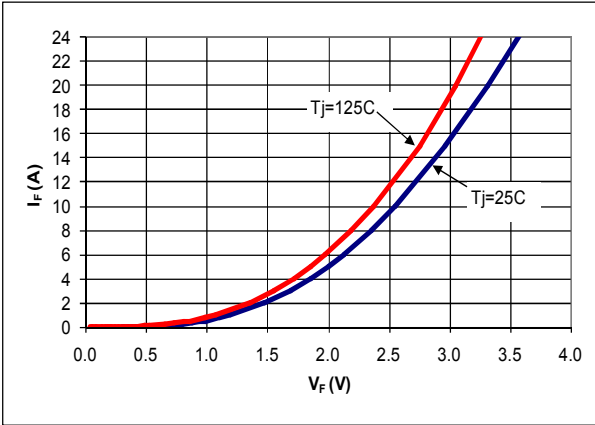
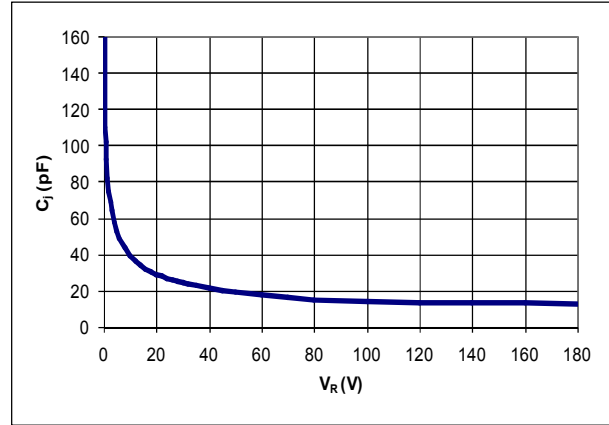


Figure 2. Reverse Recovery Test Circuit

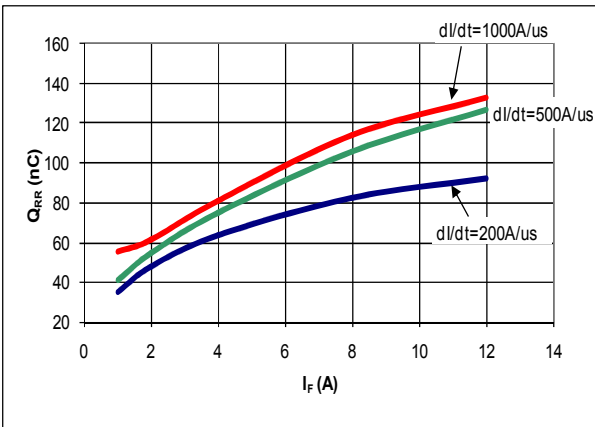
**Electrical Specifications at  $T_J = 25\text{ }^\circ\text{C}$  (unless otherwise specified)**



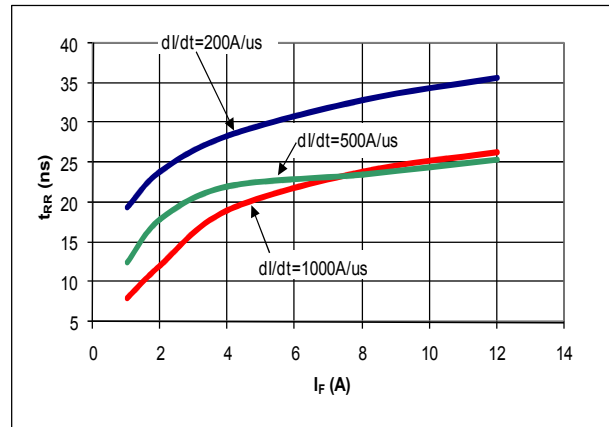
**Figure 3. Typical  $I_F$  vs  $V_F$**



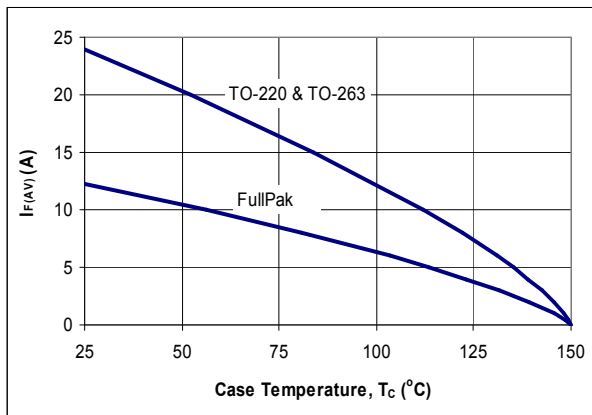
**Figure 4. Typical  $C_J$  vs  $V_R$**



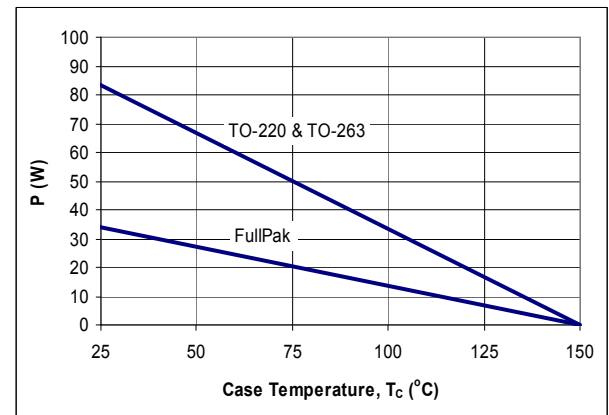
**Figure 5. Typical  $Q_{RR}$  vs  $I_F$  at  $T_J = 125\text{ }^\circ\text{C}$**



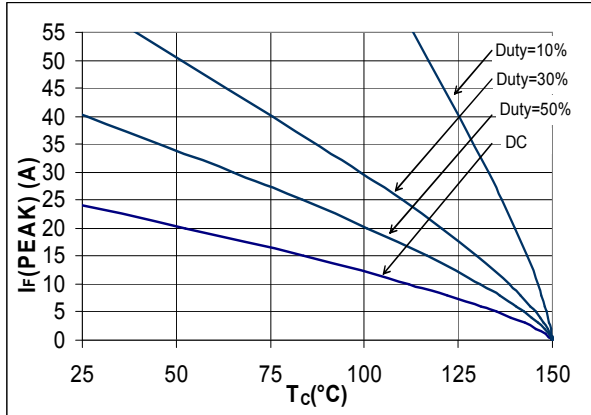
**Figure 6. Typical  $t_{RR}$  vs  $I_F$  at  $T_J = 125\text{ }^\circ\text{C}$**



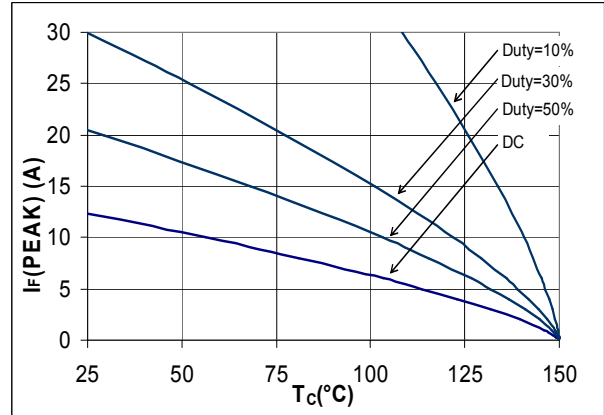
**Figure 7. DC Current Derating Curve**



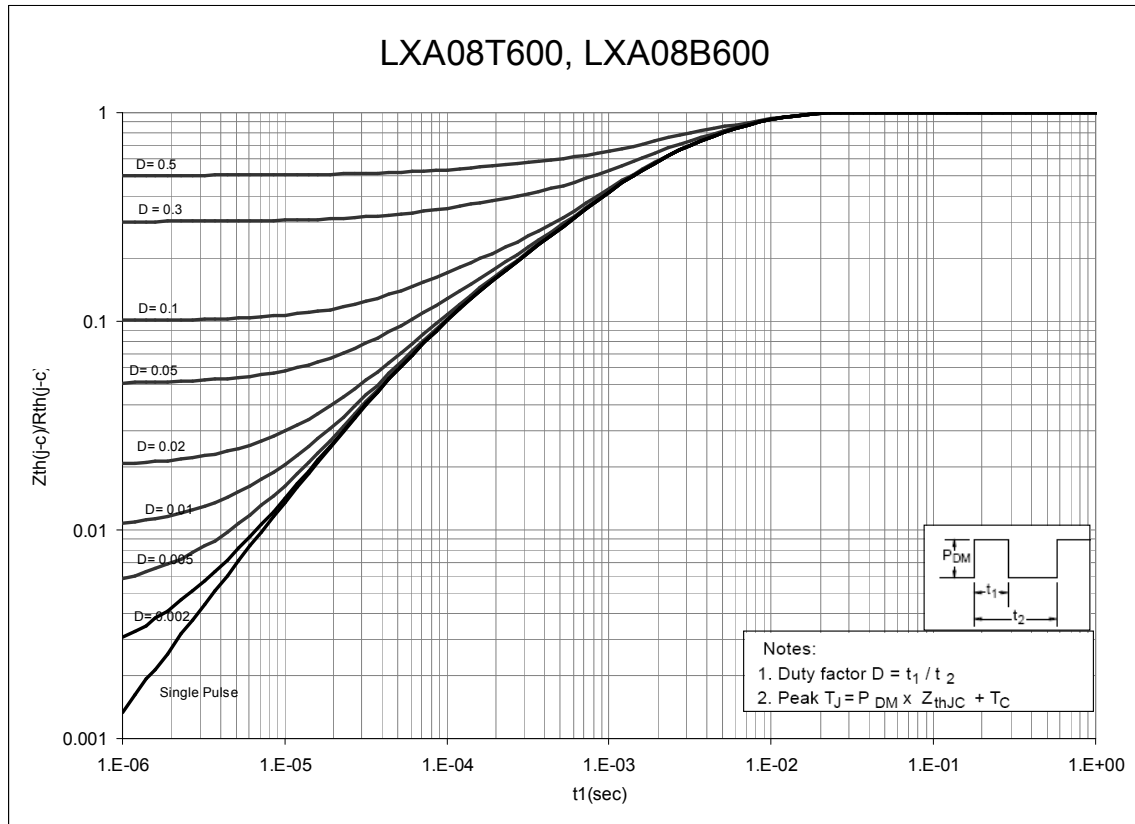
**Figure 8. Power Derating Curve**



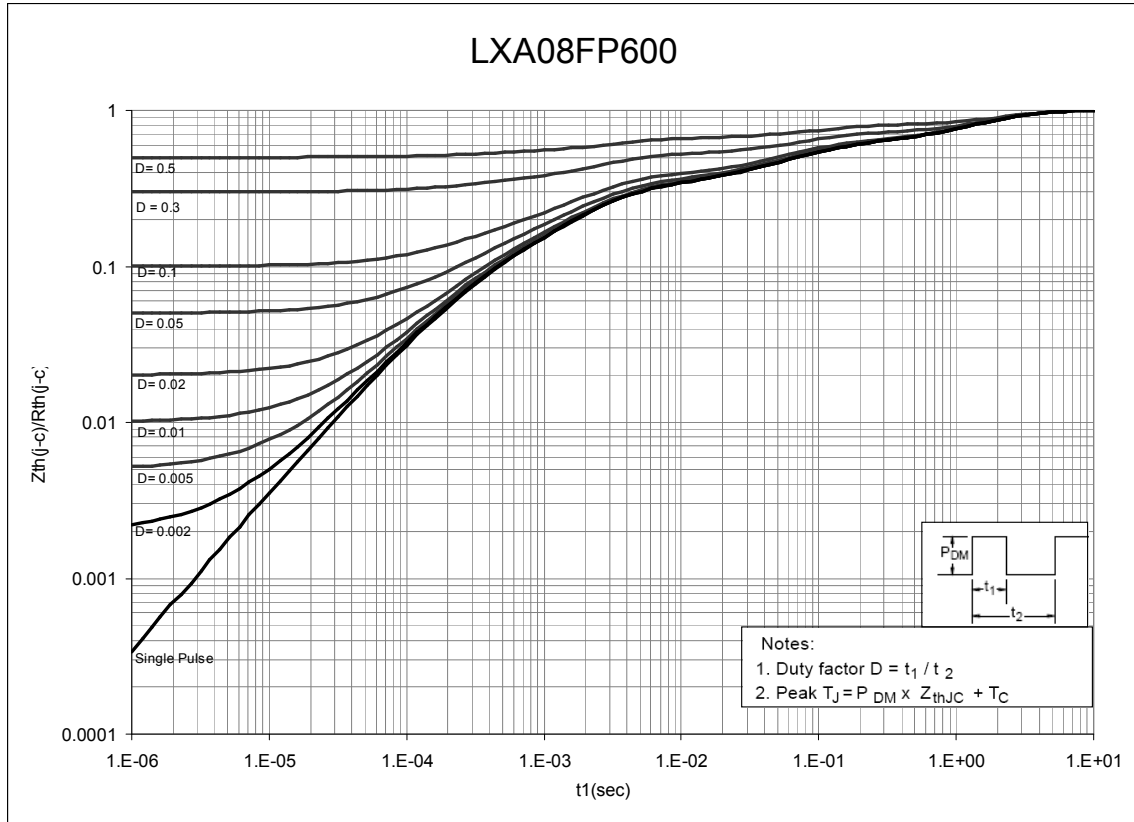
**Figure 9.  $I_F(\text{PEAK})$  vs  $T_C$ ,  $f=70$  kHz,  
TO-220 and TO-263**



**Figure 10.  $I_F(\text{PEAK})$  vs  $T_C$ ,  $f=70$  kHz, FullPak**

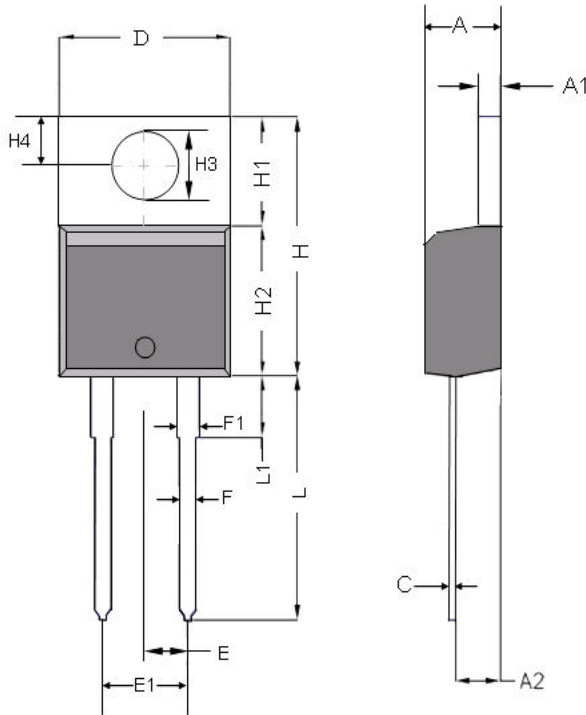


**Figure 11. Normalized Maximum Transient Thermal Impedance, TO-220 and TO-263**



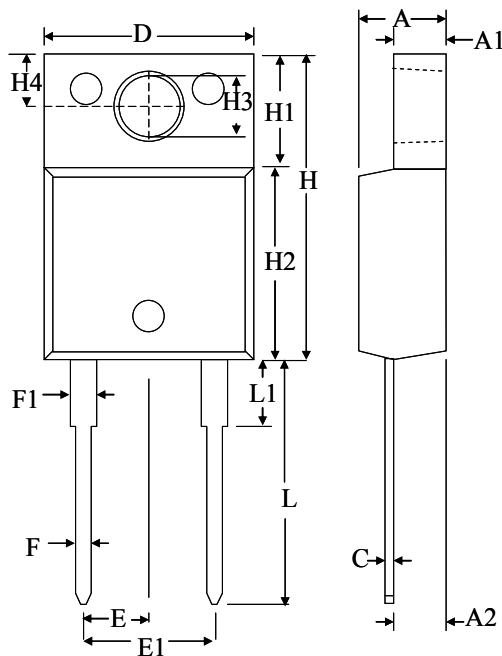
**Figure 12. Normalized Maximum Transient Thermal Impedance, FullPak**

## Dimensional Outline Drawings TO-220AC



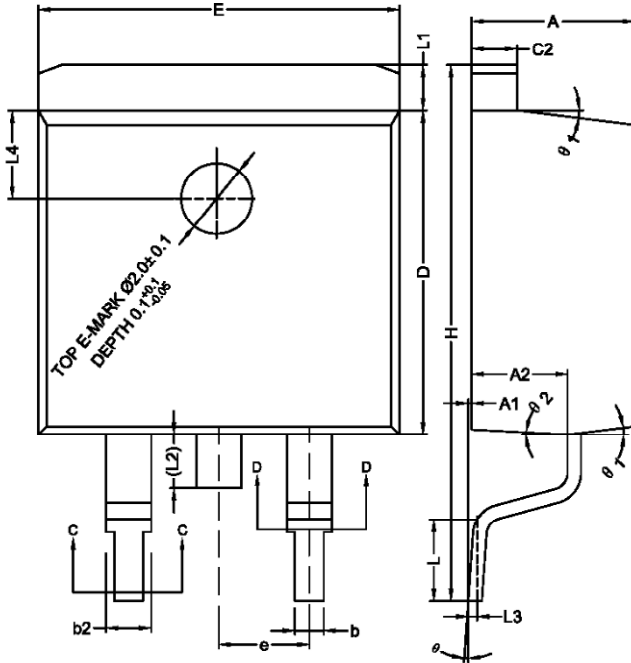
Dim	Millimeters	
	MIN	MAX
A	4.32	4.70
A1	1.14	1.40
A2	2.03	2.79
C	0.34	0.610
D	9.65	10.67
E	2.49	2.59
E1	4.98	5.18
F	0.508	1.016
F1	1.14	1.78
H	14.71	16.51
H1	5.84	6.55
H2	8.51	9.25
H3	3.53	3.96
H4	2.54	3.05
L	12.70	14.22
L1	-	6.35

## FullPak



Dim	Millimeters	
	MIN	MAX
A	4.54	4.80
A1	2.57	2.83
A2	2.51	2.62
C	0.42	0.58
D	10.25	10.72
E	2.54 (BSC)	
E1	5.08 (BSC)	
F	0.624	0.776
F1	1.10	1.65
H	15.86	16.12
H1	6.06	6.56
H2	9.55	9.81
H3	2.95	3.05
H4	3.15	3.25
L	13.33	14.18
L1	3.18	3.43

**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°
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 <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
LXA08T600, LXA08FP600	TO-220AC, FullPak	50 units/tube
LXA08B600	TO-263AB	800 units/reel

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

**LIFE SUPPORT POLICY**

This product is not designed for use in life support appliances, devices or systems where malfunction of the product may result in personal injury. Qspeed Semiconductor cannot be held liable for damages or injuries that might result from the failure of the Qspeed Semiconductor product in such applications.