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September 2016

# FDB0630N1507L

## N-Channel PowerTrench<sup>®</sup> MOSFET 150 V, 130 A, 6.4 mΩ

### Features

- Max  $r_{DS(on)}$  = 6.4 mΩ at  $V_{GS} = 10$  V,  $I_D = 18$  A
- Fast Switching Speed
- Low Gate Charge
- High Performance Trench Technology for Extremely Low  $R_{DS(on)}$
- High Power and Current Handling Capability
- RoHS Compliant

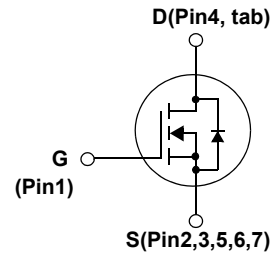
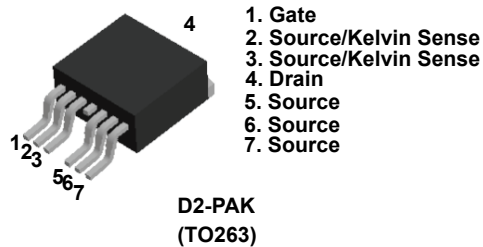


### General Description

This N-Channel MOSFET is produced using Fairchild Semiconductor's advance PowerTrench<sup>®</sup> process that has been especially tailored to minimize the on-state resistance while maintaining superior ruggedness and switching performance for industrial applications.

### Applications

- Industrial Motor Drive
- Industrial Power Supply
- Industrial Automation
- Battery Operated tools
- Battery Protection
- Solar Inverters
- UPS and Energy Inverters
- Energy Storage
- Load Switch



### MOSFET Maximum Ratings $T_C = 25^\circ\text{C}$ unless otherwise noted.

Symbol	Parameter	Ratings	Units
$V_{DS}$	Drain to Source Voltage	150	V
$V_{GS}$	Gate to Source Voltage	$\pm 20$	V
$I_D$	Drain Current -Continuous $T_C = 25^\circ\text{C}$ (Note 5)	130	A
	-Continuous $T_C = 100^\circ\text{C}$ (Note 5)	90	
	-Pulsed (Note 4)	720	
$E_{AS}$	Single Pulse Avalanche Energy (Note 3)	693	mJ
$P_D$	Power Dissipation $T_C = 25^\circ\text{C}$	300	W
	Power Dissipation $T_A = 25^\circ\text{C}$ (Note 1a)	3.8	
$T_J, T_{STG}$	Operating and Storage Junction Temperature Range	-55 to +150	$^\circ\text{C}$

### Thermal Characteristics

$R_{\theta JC}$	Thermal Resistance, Junction to Case (Note 1)	0.5	$^\circ\text{C/W}$
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient (Note 1a)	40	

### Package Marking and Ordering Information

Device Marking	Device	Package	Reel Size	Tape Width	Quantity
FDB0630N1507L	FDB0630N1507L	D2-PAK-7L	330mm	24mm	800 units

**Electrical Characteristics**  $T_J = 25\text{ }^{\circ}\text{C}$  unless otherwise noted.

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
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**Off Characteristics**

$BV_{DSS}$	Drain to Source Breakdown Voltage	$I_D = 250\text{ }\mu\text{A}$ , $V_{GS} = 0\text{ V}$	150			V
$\frac{\Delta BV_{DSS}}{\Delta T_J}$	Breakdown Voltage Temperature Coefficient	$I_D = 250\text{ }\mu\text{A}$ , referenced to $25\text{ }^{\circ}\text{C}$		92		mV/ $^{\circ}\text{C}$
$I_{DSS}$	Zero Gate Voltage Drain Current	$V_{DS} = 120\text{ V}$ , $V_{GS} = 0\text{ V}$			1	$\mu\text{A}$
$I_{GSS}$	Gate to Source Leakage Current	$V_{GS} = \pm 20\text{ V}$ , $V_{DS} = 0\text{ V}$			$\pm 100$	nA

**On Characteristics**

$V_{GS(th)}$	Gate to Source Threshold Voltage	$V_{GS} = V_{DS}$ , $I_D = 250\text{ }\mu\text{A}$	2	2.9	4	V
$\frac{\Delta V_{GS(th)}}{\Delta T_J}$	Gate to Source Threshold Voltage Temperature Coefficient	$I_D = 250\text{ }\mu\text{A}$ , referenced to $25\text{ }^{\circ}\text{C}$		-13		mV/ $^{\circ}\text{C}$
$r_{DS(on)}$	Static Drain to Source On Resistance	$V_{GS} = 10\text{ V}$ , $I_D = 18\text{ A}$		4.9	6.4	m $\Omega$
$g_{FS}$	Forward Transconductance	$V_{DS} = 10\text{ V}$ , $I_D = 18\text{ A}$		63		S

**Dynamic Characteristics**

$C_{iss}$	Input Capacitance	$V_{DS} = 75\text{ V}$ , $V_{GS} = 0\text{ V}$ , $f = 1\text{ MHz}$		7065	9895	pF
$C_{oss}$	Output Capacitance			552	775	pF
$C_{rss}$	Reverse Transfer Capacitance			27	50	pF
$R_g$	Gate Resistance			2.5		$\Omega$

**Switching Characteristics**

$t_{d(on)}$	Turn-On Delay Time	$V_{DD} = 75\text{ V}$ , $I_D = 18\text{ A}$ , $V_{GS} = 10\text{ V}$ , $R_{GEN} = 6\text{ }\Omega$		33	52	ns
$t_r$	Rise Time			31	53	ns
$t_{d(off)}$	Turn-Off Delay Time			60	96	ns
$t_f$	Fall Time			17	30	ns
$Q_g$	Total Gate Charge	$V_{DD} = 75\text{ V}$ , $I_D = 18\text{ A}$ , $V_{GS} = 10\text{ V}$		97	135	nC
$Q_{gs}$	Gate to Source Gate Charge			30		nC
$Q_{gd}$	Gate to Drain "Miller" Charge			17		nC

**Drain-Source Diode Characteristics**

I <sub>S</sub>	Maximum Continuous Drain to Source Diode Forward Current				130	A
I <sub>SM</sub>	Maximum Pulsed Drain to Source Diode Forward Current				720	A
V <sub>SD</sub>	Source to Drain Diode Forward Voltage	V <sub>GS</sub> = 0 V, I <sub>S</sub> = 18 A (Note 2)		0.8	1.2	V
t <sub>rr</sub>	Reverse Recovery Time	I <sub>F</sub> = 18 A, di/dt = 100 A/μs		107	172	ns
Q <sub>rr</sub>	Reverse Recovery Charge			229	366	nC

**Notes:**

- $R_{\theta JA}$  is the sum of the junction-to-case and case-to-ambient thermal resistance where the case thermal reference is defined as the solder mounting surface of the drain pins.  $R_{\theta JC}$  is guaranteed by design while  $R_{\theta CA}$  is determined by the user's board design.

- 40  $^{\circ}\text{C}/\text{W}$  when mounted on a 1 in<sup>2</sup> pad of 2 oz copper.
- 62.5  $^{\circ}\text{C}/\text{W}$  when mounted on a minimum pad of 2 oz copper.

- Pulse Test: Pulse Width < 300  $\mu\text{s}$ , Duty cycle < 2.0 %.

- $E_{AS}$  of 693 is based on starting  $T_J = 25\text{ }^{\circ}\text{C}$ ,  $L = 0.3\text{ mH}$ ,  $I_{AS} = 68\text{ A}$ ,  $V_{DD} = 135\text{ V}$ ,  $V_{GS} = 10\text{ V}$ . 100% test at  $L = 0.1\text{ mH}$ ,  $I_{AS} = 99\text{ A}$ .

- Pulsed  $I_D$  please refer to Figure "Forward Bias Safe Operating Area" for more details.

- Computed continuous current limited to Max Junction Temperature only, actual continuous current will be limited by thermal & electro-mechanical application board design.

# Typical Characteristics $T_J = 25^\circ\text{C}$ unless otherwise noted.

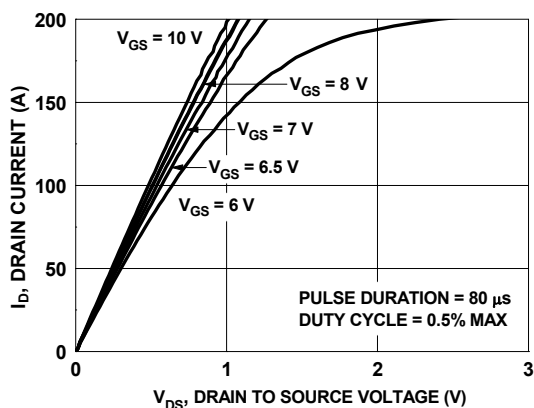


Figure 1. On Region Characteristics

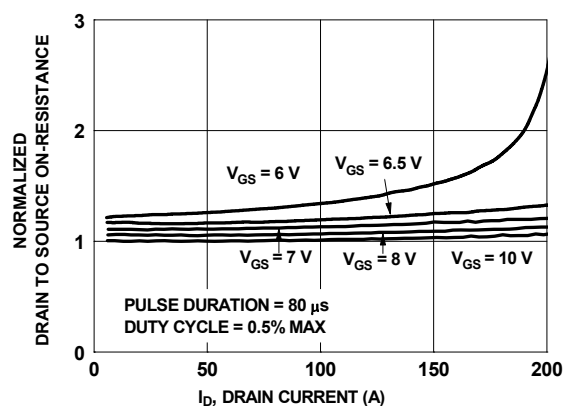


Figure 2. Normalized On-Resistance vs. Drain Current and Gate Voltage

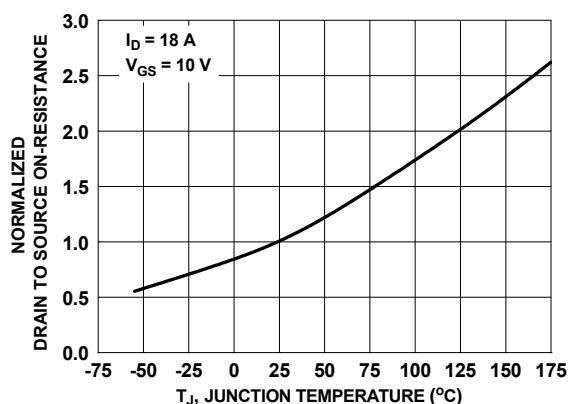


Figure 3. Normalized On Resistance vs. Junction Temperature

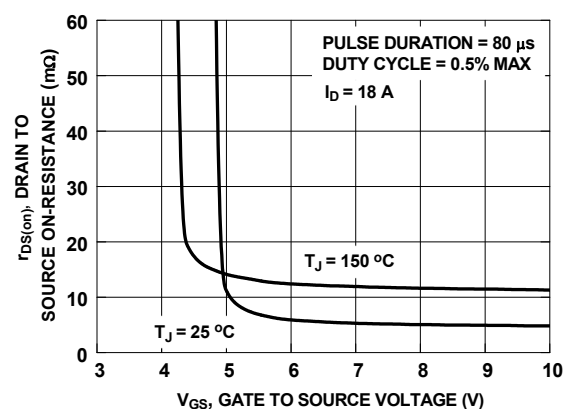


Figure 4. On-Resistance vs. Gate to Source Voltage

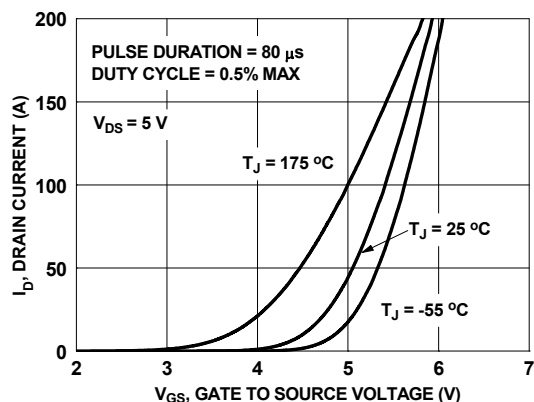


Figure 5. Transfer Characteristics

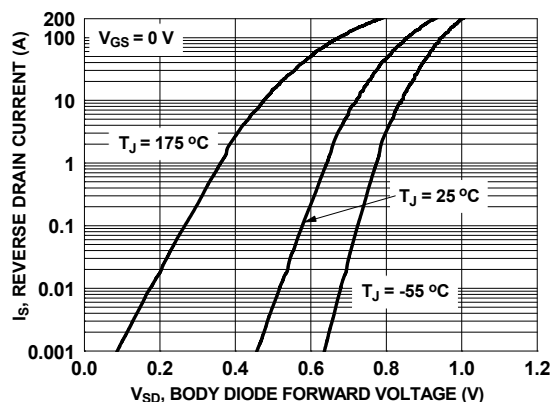
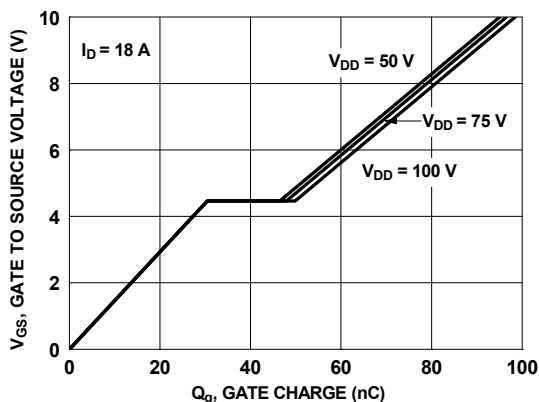
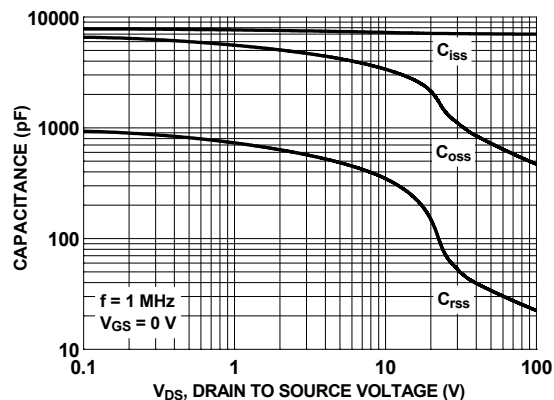


Figure 6. Source to Drain Diode Forward Voltage vs. Source Current

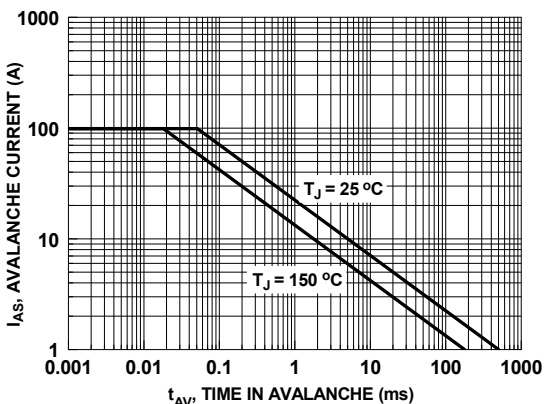
# **Typical Characteristics** $T_J = 25\text{ }^{\circ}\text{C}$ unless otherwise noted.



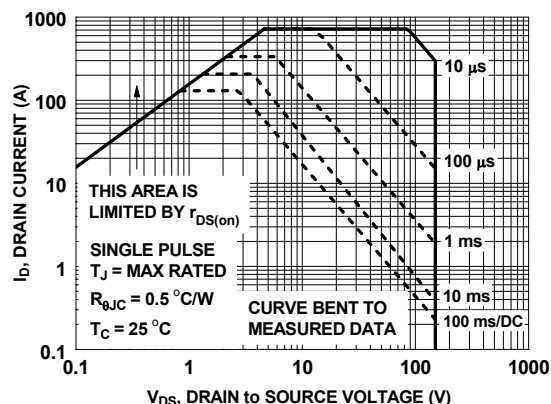
**Figure 7. Gate Charge Characteristics**



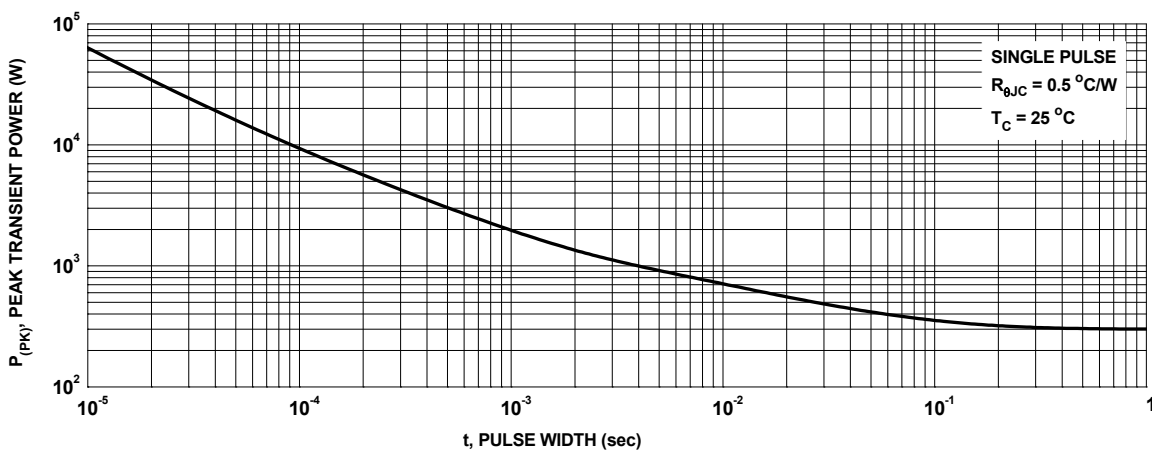
**Figure 8. Capacitance vs. Drain to Source Voltage**



**Figure 9. Unclamped Inductive Switching Capability**



**Figure 10. Forward Bias Safe Operating Area**



**Figure 11. Single Pulse Maximum Power Dissipation**

# Typical Characteristics $T_J = 25^\circ\text{C}$ unless otherwise noted.

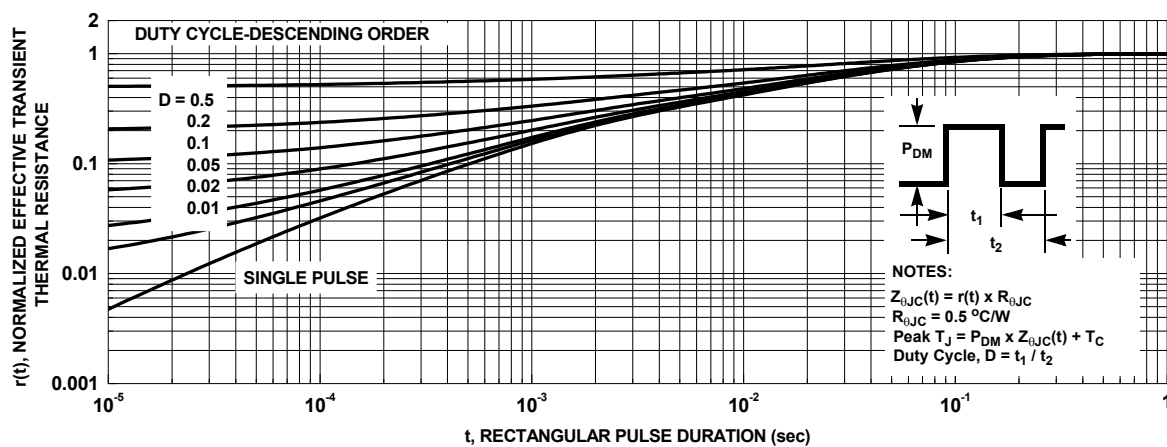
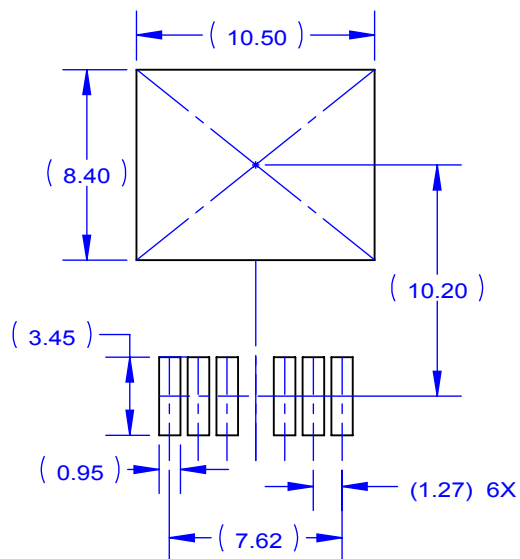
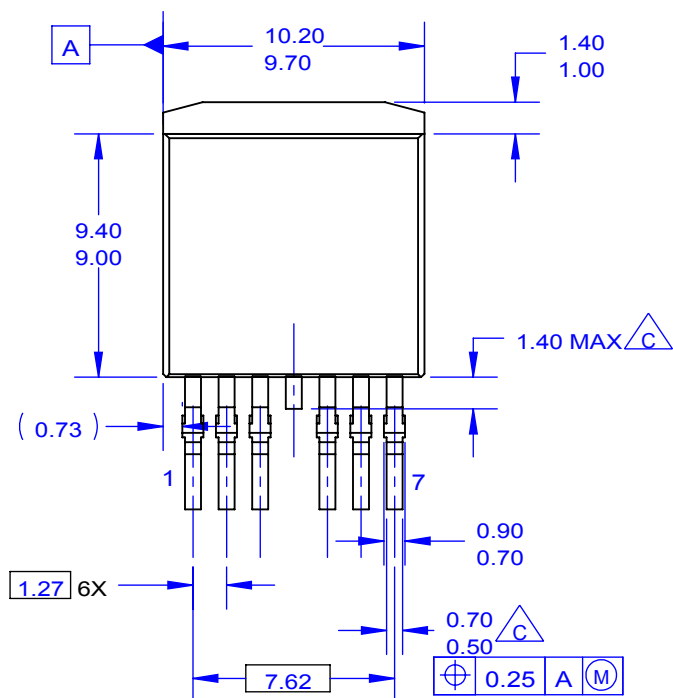
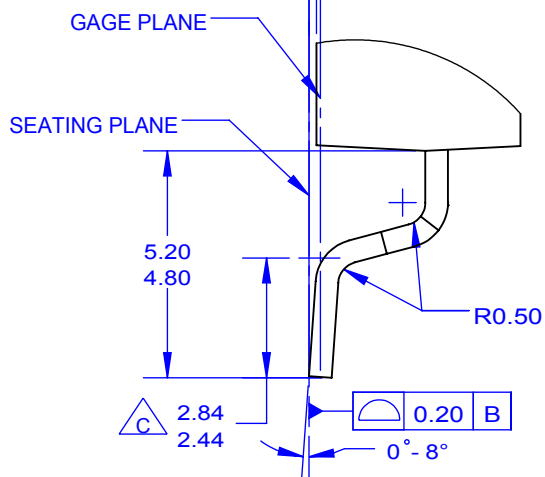
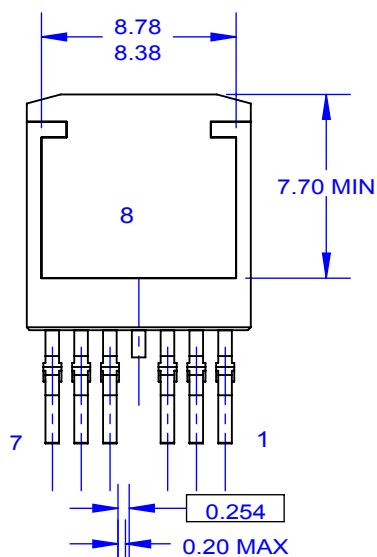


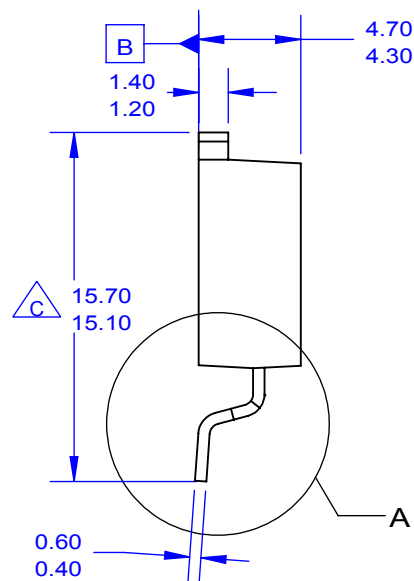
Figure 12. Junction-to-Case Transient Thermal Response Curve



LAND PATTERN RECOMMENDATION



DETAIL A  
SCALE 2:1



NOTES:

- A. PACKAGE CONFORMS TO JEDEC TO-263 VARIATION CB EXCEPT WHERE NOTED.
- B. ALL DIMENSIONS ARE IN MILLIMETERS.
- C. OUT OF JEDEC STANDARD VALUE.
- D. DIMENSION AND TOLERANCE AS PER ASME Y14.5-1994.
- E. DIMENSIONS ARE EXCLUSIVE OF BURRS, MOLD FLASH AND TIE BAR PROTRUSIONS.
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- G. DRAWING FILE NAME: TO263A07REV5.

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