

## N-Channel 100 V (D-S) 175 °C MOSFET

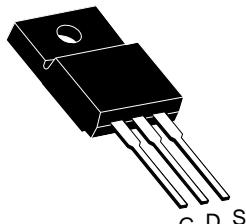
PRODUCT SUMMARY	
$V_{DS}$ (V)	100
$R_{DS(on)}$ ( $\Omega$ ) at $V_{GS} = 10$ V	0.0038
$I_D$ (A)	120
Configuration	Single

### FEATURES

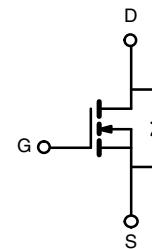
- TrenchFET® Power MOSFET
- Package with Low Thermal Resistance
- 100 %  $R_g$  and UIS Tested



TO-220 FULLPAK



Top View



N-Channel MOSFET

### ABSOLUTE MAXIMUM RATINGS ( $T_C = 25$ °C, unless otherwise noted)

PARAMETER		SYMBOL	LIMIT	UNIT
Drain-Source Voltage		$V_{DS}$	100	V
Gate-Source Voltage		$V_{GS}$	$\pm 20$	
Continuous Drain Current	$T_C = 25$ °C <sup>a</sup>	$I_D$	120	A
	$T_C = 125$ °C		102	
Continuous Source Current (Diode Conduction) <sup>a</sup>		$I_S$	120	
Pulsed Drain Current <sup>b</sup>		$I_{DM}$	480	
Single Pulse Avalanche Current	$L = 0.1$ mH	$I_{AS}$	73	mJ
Single Pulse Avalanche Energy		$E_{AS}$	266	
Maximum Power Dissipation <sup>b</sup>	$T_C = 25$ °C	$P_D$	84	W
	$T_C = 125$ °C		35	
Operating Junction and Storage Temperature Range		$T_J, T_{stg}$	- 55 to + 175	°C

### THERMAL RESISTANCE RATINGS

PARAMETER		SYMBOL	LIMIT	UNIT
Junction-to-Ambient	PCB Mount <sup>c</sup>	$R_{thJA}$	40	°C/W
Junction-to-Case (Drain)		$R_{thJC}$	0.6	

#### Notes

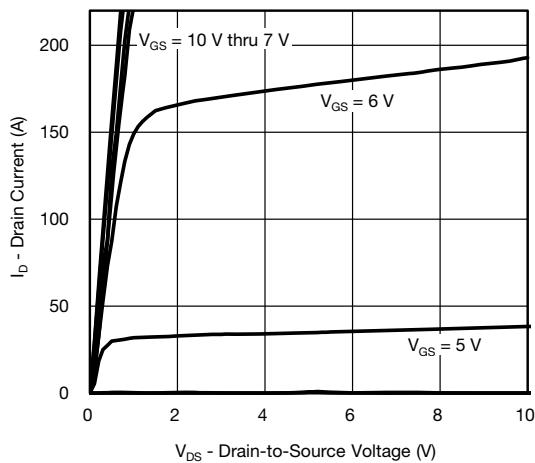
- Package limited.
- Pulse test; pulse width  $\leq 300$   $\mu$ s, duty cycle  $\leq 2$  %.
- When mounted on 1" square PCB (FR-4 material).
- Parametric verification ongoing.

<b>SPECIFICATIONS</b> ( $T_C = 25^\circ\text{C}$ , unless otherwise noted)								
PARAMETER	SYMBOL	TEST CONDITIONS		MIN.	TYP.	MAX.	UNIT	
<b>Static</b>								
Drain-Source Breakdown Voltage	$V_{DS}$	$V_{GS} = 0$ , $I_D = 250 \mu\text{A}$		100	-	-	V	
Gate-Source Threshold Voltage	$V_{GS(\text{th})}$	$V_{DS} = V_{GS}$ , $I_D = 250 \mu\text{A}$		2.5	3.0	3.5		
Gate-Source Leakage	$I_{GSS}$	$V_{DS} = 0 \text{ V}$ , $V_{GS} = \pm 20 \text{ V}$		-	-	$\pm 100$	nA	
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{GS} = 0 \text{ V}$	$V_{DS} = 100 \text{ V}$	-	-	1	$\mu\text{A}$	
		$V_{GS} = 0 \text{ V}$	$V_{DS} = 100 \text{ V}$ , $T_J = 125^\circ\text{C}$	-	-	50		
		$V_{GS} = 0 \text{ V}$	$V_{DS} = 100 \text{ V}$ , $T_J = 175^\circ\text{C}$	-	-	500		
On-State Drain Current <sup>a</sup>	$I_{D(\text{on})}$	$V_{GS} = 10 \text{ V}$	$V_{DS} \geq 5 \text{ V}$	120	-	-	A	
Drain-Source On-State Resistance <sup>a</sup>	$R_{DS(\text{on})}$	$V_{GS} = 10 \text{ V}$	$I_D = 20 \text{ A}$	-	0.0038	-	$\Omega$	
		$V_{GS} = 10 \text{ V}$	$I_D = 20 \text{ A}$ , $T_J = 125^\circ\text{C}$	-	0.0064	-		
		$V_{GS} = 10 \text{ V}$	$I_D = 20 \text{ A}$ , $T_J = 175^\circ\text{C}$	-	0.0080	-		
Forward Transconductance <sup>b</sup>	$g_{fs}$	$V_{DS} = 15 \text{ V}$ , $I_D = 20 \text{ A}$		-	82	-	S	
<b>Dynamic<sup>b</sup></b>								
Input Capacitance	$C_{iss}$	$V_{GS} = 0 \text{ V}$	$V_{DS} = 25 \text{ V}$ , $f = 1 \text{ MHz}$	-	5780	7230	pF	
Output Capacitance	$C_{oss}$			-	3070	3840		
Reverse Transfer Capacitance	$C_{rss}$			-	305	385		
Total Gate Charge <sup>c</sup>	$Q_g$	$V_{GS} = 10 \text{ V}$	$V_{DS} = 50 \text{ V}$ , $I_D = 70 \text{ A}$	-	125	190	nC	
Gate-Source Charge <sup>c</sup>	$Q_{gs}$			-	28	-		
Gate-Drain Charge <sup>c</sup>	$Q_{gd}$			-	46	-		
Gate Resistance	$R_g$	$f = 1 \text{ MHz}$		1.6	3.3	5	$\Omega$	
Turn-On Delay Time <sup>c</sup>	$t_{d(\text{on})}$	$V_{DD} = 50 \text{ V}$ , $R_L = 0.7 \Omega$ $I_D \cong 70 \text{ A}$ , $V_{GEN} = 10 \text{ V}$ , $R_g = 1 \Omega$		-	16	25	ns	
Rise Time <sup>c</sup>	$t_r$			-	110	165		
Turn-Off Delay Time <sup>c</sup>	$t_{d(\text{off})}$			-	40	60		
Fall Time <sup>c</sup>	$t_f$			-	12	20		
<b>Source-Drain Diode Ratings and Characteristics<sup>b</sup></b>								
Pulsed Current <sup>a</sup>	$I_{SM}$			-	-	480	A	
Forward Voltage	$V_{SD}$	$I_F = 100 \text{ A}$ , $V_{GS} = 0$		-	0.9	1.5	V	

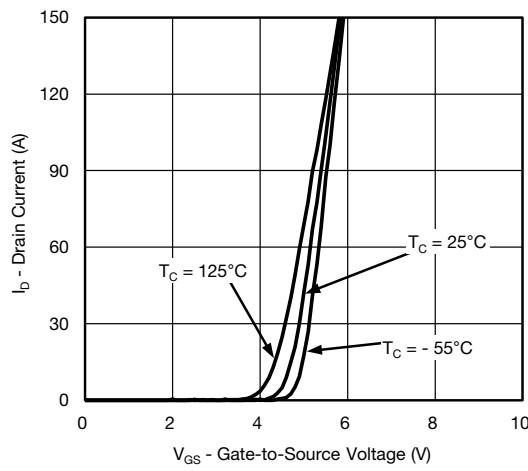
**Notes**

- a. Pulse test; pulse width  $\leq 300 \mu\text{s}$ , duty cycle  $\leq 2\%$ .
- b. Guaranteed by design, not subject to production testing.
- c. Independent of operating temperature.

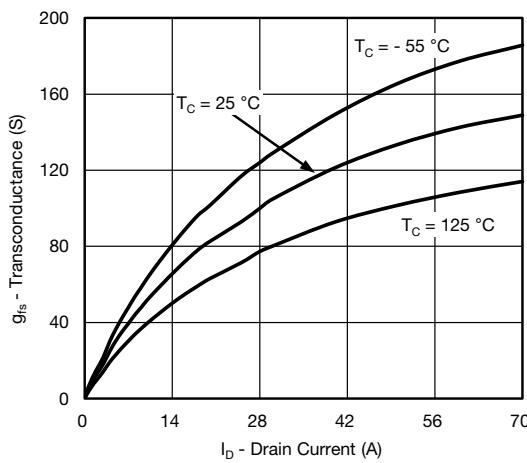
Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

**TYPICAL CHARACTERISTICS** ( $T_A = 25^\circ\text{C}$ , unless otherwise noted)


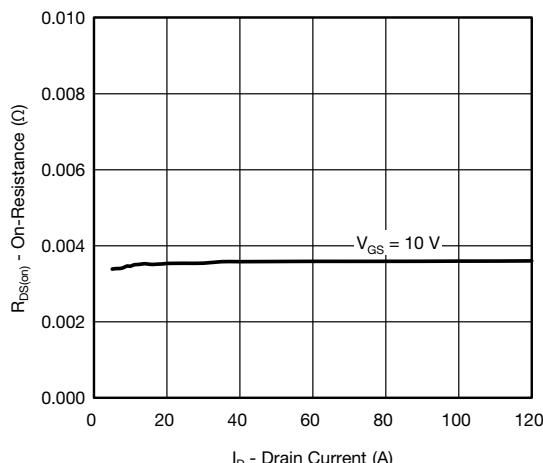
Output Characteristics



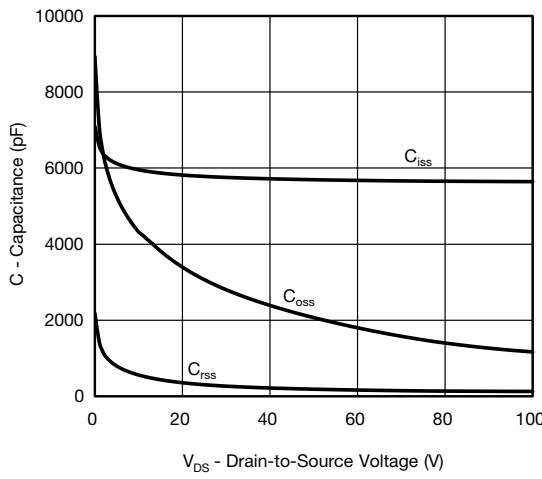
Transfer Characteristics



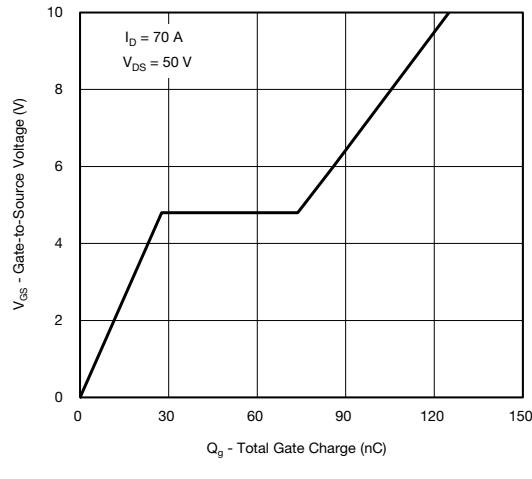
Transconductance



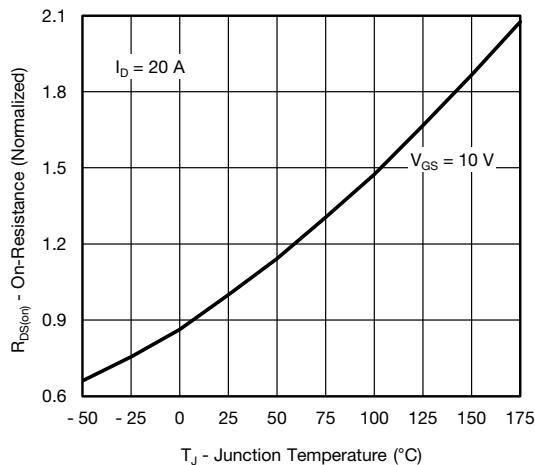
On-Resistance vs. Drain Current



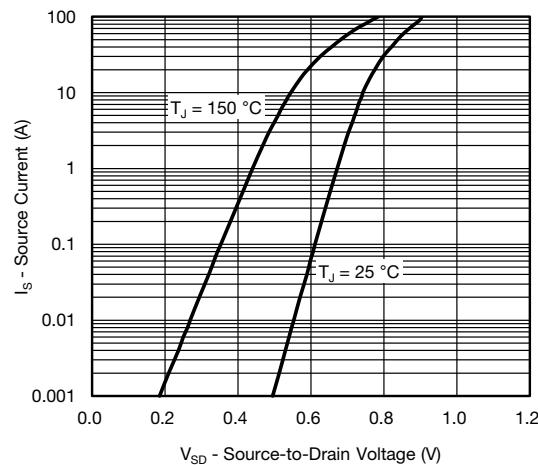
Capacitance



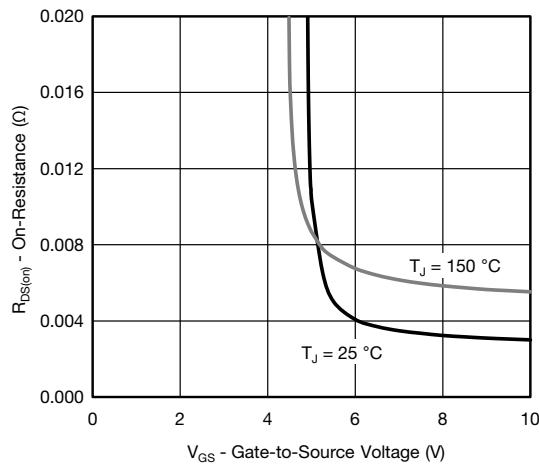
Gate Charge

**TYPICAL CHARACTERISTICS** ( $T_A = 25^\circ\text{C}$ , unless otherwise noted)


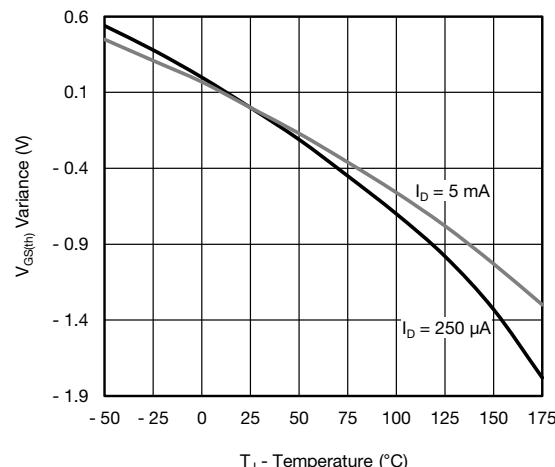
On-Resistance vs. Junction Temperature



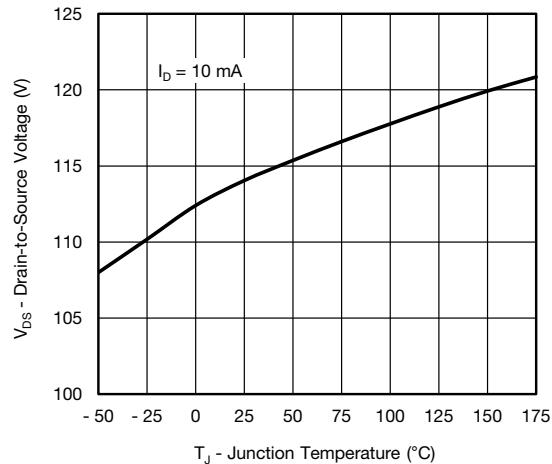
Source Drain Diode Forward Voltage



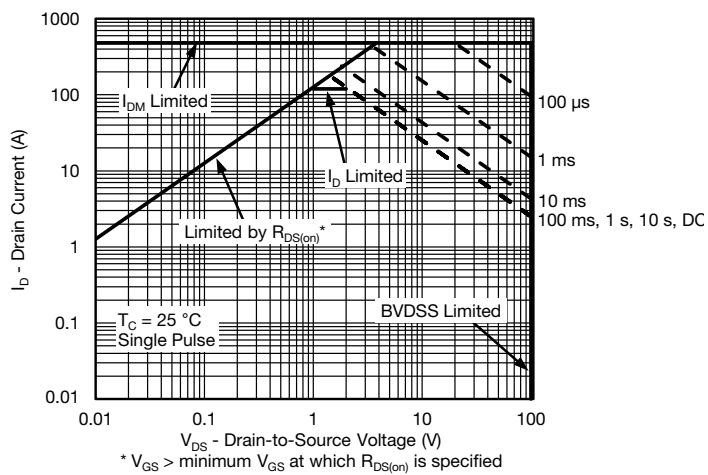
On-Resistance vs. Gate-to-Source Voltage



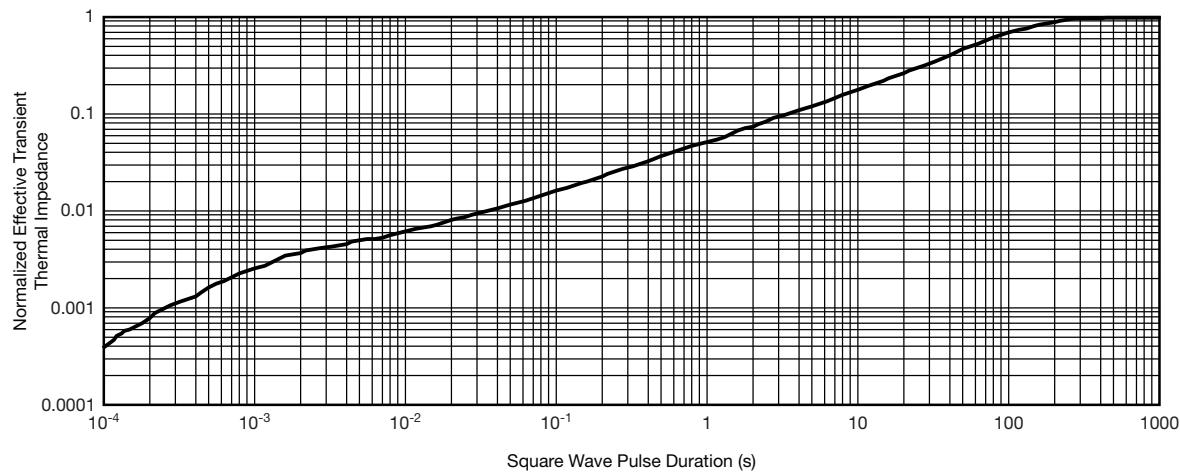
Threshold Voltage



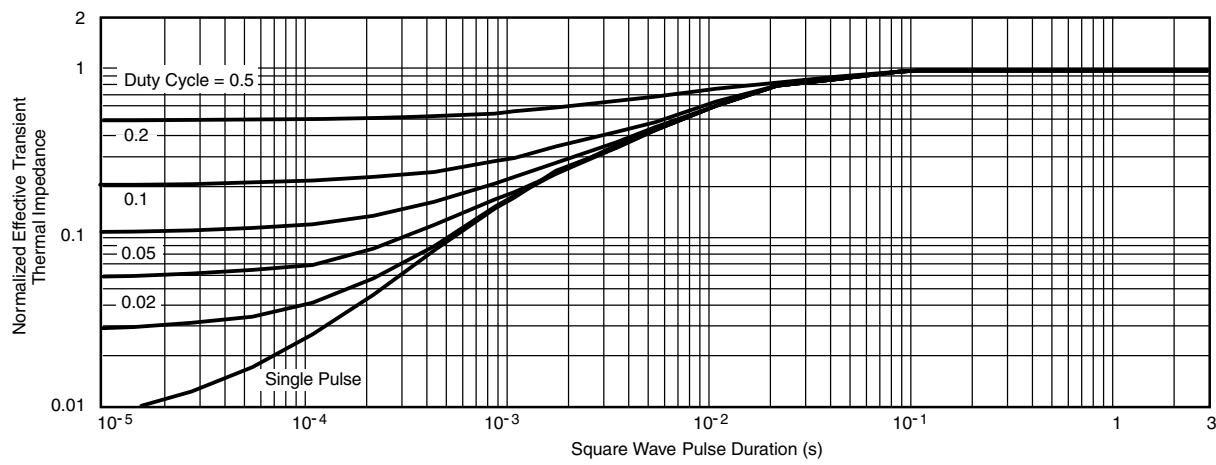
Drain Source Breakdown vs. Junction Temperature

**THERMAL RATINGS** ( $T_A = 25^\circ\text{C}$ , unless otherwise noted)


Safe Operating Area

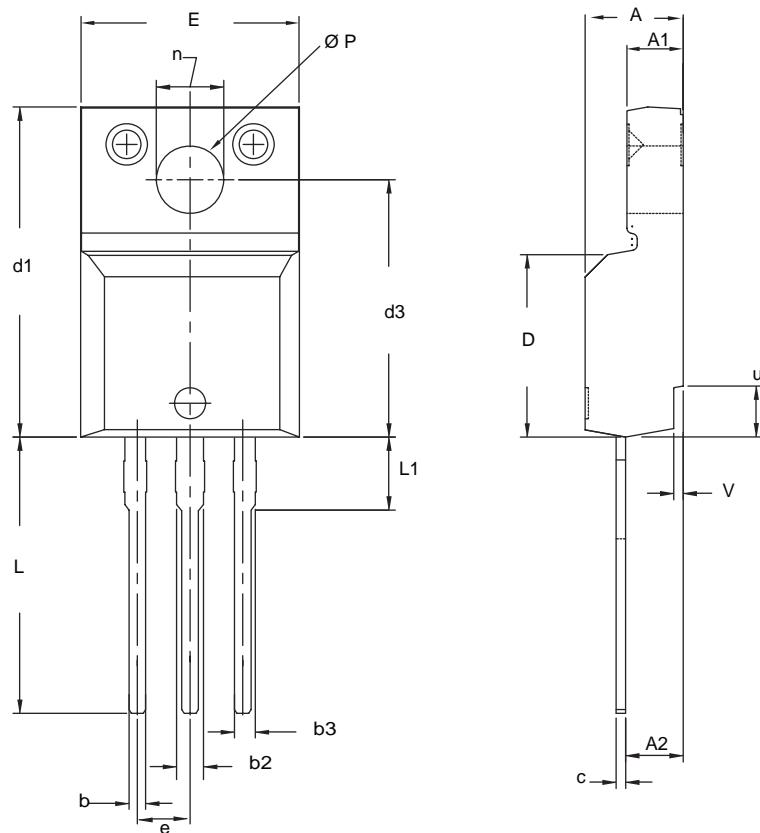


Normalized Thermal Transient Impedance, Junction-to-Ambient

**THERMAL RATINGS** ( $T_A = 25^\circ\text{C}$ , unless otherwise noted)

**Normalized Thermal Transient Impedance, Junction-to-Case**
**Note**

- The characteristics shown in the two graphs
  - Normalized Transient Thermal Impedance Junction to Ambient ( $25^\circ\text{C}$ )
  - Normalized Transient Thermal Impedance Junction to Case ( $25^\circ\text{C}$ )

are given for general guidelines only to enable the user to get a "ball park" indication of part capabilities. The data are extracted from single pulse transient thermal impedance characteristics which are developed from empirical measurements. The latter is valid for the part mounted on printed circuit board - FR4, size 1" x 1" x 0.062", double sided with 2 oz. copper, 100 % on both sides. The part capabilities can widely vary depending on actual application parameters and operating conditions.

**TO-220 FULLPAK (HIGH VOLTAGE)**

DIM.	MILLIMETERS		INCHES	
	MIN.	MAX.	MIN.	MAX.
A	4.570	4.830	0.180	0.190
A1	2.570	2.830	0.101	0.111
A2	2.510	2.850	0.099	0.112
b	0.622	0.890	0.024	0.035
b2	1.229	1.400	0.048	0.055
b3	1.229	1.400	0.048	0.055
c	0.440	0.629	0.017	0.025
D	8.650	9.800	0.341	0.386
d1	15.88	16.120	0.622	0.635
d3	12.300	12.920	0.484	0.509
E	10.360	10.630	0.408	0.419
e	2.54 BSC		0.100 BSC	
L	13.200	13.730	0.520	0.541
L1	3.100	3.500	0.122	0.138
n	6.050	6.150	0.238	0.242
Ø P	3.050	3.450	0.120	0.136
u	2.400	2.500	0.094	0.098
v	0.400	0.500	0.016	0.020

ECN: X09-0126-Rev. B, 26-Oct-09  
 DWG: 5972

**Notes**

1. To be used only for process drawing.
2. These dimensions apply to all TO-220, FULLPAK leadframe versions 3 leads.
3. All critical dimensions should C meet  $C_{pk} > 1.33$ .
4. All dimensions include burrs and plating thickness.
5. No chipping or package damage.

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