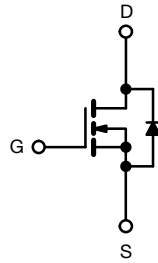
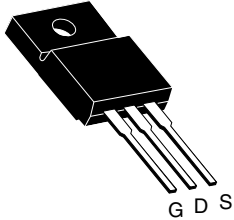


Power MOSFET

TO-220 FULLPAK


N-Channel MOSFET

FEATURES

- Low figure-of-merit $R_{on} \times Q_g$
- 100 % avalanche tested
- Gate charge improved
- t_{rr}/Q_{rr} improved
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912


RoHS*
Available

Note

* This datasheet provides information about parts that are RoHS-compliant and / or parts that are non-RoHS-compliant. For example, parts with lead (Pb) terminations are not RoHS-compliant. Please see the information / tables in this datasheet for details.

PRODUCT SUMMARY

V_{DS} (V) at T_J max.	560	
$R_{DS(on)}$ (Ω)	$V_{GS} = 10\text{ V}$	1
Q_g max. (nC)	34	
Q_{gs} (nC)	7.8	
Q_{gd} (nC)	10.4	
Configuration	Single	

ORDERING INFORMATION

Package	TO-220 FULLPAK
Lead (Pb)-free	SiHF8N50L-E3

ABSOLUTE MAXIMUM RATINGS ($T_C = 25\text{ }^\circ\text{C}$, unless otherwise noted)

PARAMETER	SYMBOL	LIMIT	UNIT
Drain-Source Voltage	V_{DS}	500	V
Gate-Source Voltage	V_{GS}	± 30	V
Continuous Drain Current ^a	V_{GS} at 10 V, $T_C = 25\text{ }^\circ\text{C}$	I_D	8
Pulsed Drain Current ^b		I_{DM}	22
Linear Derating Factor			0.32
Single Pulse Avalanche Energy ^c		E_{AS}	180
Maximum Power Dissipation	$T_C = 25\text{ }^\circ\text{C}$	P_D	40
Peak Diode Recovery dV/dt ^d		dV/dt	24
Operating Junction and Storage Temperature Range	T_J, T_{stg}	-55 to +150	$^\circ\text{C}$
Soldering Recommendations (Peak temperature) ^e	For 10 s	300	
Mounting Torque	M3 screw	0.6	Nm


Notes

- Drain current limited by maximum junction temperature.
- Repetitive rating; pulse width limited by maximum junction temperature.
- $V_{DD} = 50\text{ V}$, starting $T_J = 25\text{ }^\circ\text{C}$, $L = 10\text{ mH}$, $R_g = 25\text{ }\Omega$, $I_{AS} = 6\text{ A}$.
- $I_{SD} \leq 8\text{ A}$, $dI/dt \leq 460\text{ A}/\mu\text{s}$, $V_{DD} \leq V_{DS}$, $T_J \leq 150\text{ }^\circ\text{C}$.
- 1.6 mm from case.

THERMAL RESISTANCE RATINGS

PARAMETER	SYMBOL	TYP.	MAX.	UNIT
Maximum Junction-to-Ambient	R_{thJA}	-	65	$^\circ\text{C}/\text{W}$
Maximum Junction-to-Case (Drain)	R_{thJC}	-	3.1	



SPECIFICATIONS (T _J = 25 °C, unless otherwise noted)							
PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT	
Static							
Drain-Source Breakdown Voltage	V _{DS}	V _{GS} = 0 V, I _D = 250 μA	500	-	-	V	
V _{DS} Temperature Coefficient	ΔV _{DS} /T _J	Reference to 25 °C, I _D = 1 mA	-	0.5	-	V/°C	
Gate-Source Threshold Voltage	V _{GS(th)}	V _{DS} = V _{GS} , I _D = 250 μA	3.0	-	5.0	V	
Gate-Source Leakage	I _{GSS}	V _{GS} = ± 30 V	-	-	± 100	nA	
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} = 500 V, V _{GS} = 0 V	-	-	50	μA	
		V _{DS} = 400 V, V _{GS} = 0 V, T _J = 125 °C	-	-	250		
Drain-Source On-State Resistance	R _{DS(on)}	V _{GS} = 10 V I _D = 4.0 A	-	0.85	1	Ω	
Forward Transconductance	g _{fs}	V _{DS} = 50 V, I _D = 3 A	-	2	-	S	
Dynamic							
Input Capacitance	C _{iss}	V _{GS} = 0 V, V _{DS} = 25 V, f = 1.0 MHz	-	873	-	pF	
Output Capacitance	C _{oss}		-	105	-		
Reverse Transfer Capacitance	C _{rss}		-	11	-		
Total Gate Charge	Q _g	V _{GS} = 10 V I _D = 6 A, V _{DS} = 400 V	-	22	34	nC	
Gate-Source Charge	Q _{gs}		-	7.8	-		
Gate-Drain Charge	Q _{gd}		-	10.4	-		
Turn-On Delay Time	t _{d(on)}	V _{DD} = 250 V, I _D = 6 A R _G = 14 Ω, V _{GS} = 10 V	-	17.3	-	ns	
Rise Time	t _r		-	35	-		
Turn-Off Delay Time	t _{d(off)}		-	23.6	-		
Fall Time	t _f		-	17	-		
Gate Input Resistance	R _g	f = 1 MHz, open drain	-	0.7	-	Ω	
Drain-Source Body Diode Characteristics							
Continuous Source-Drain Diode Current	I _S	MOSFET symbol showing the integral reverse p - n junction diode		-	-	8	A
Pulsed Diode Forward Current	I _{SM}			-	-	22	
Body Diode Voltage	V _{SD}	T _J = 25 °C, I _S = 8 A, V _{GS} = 0 V		-	-	1.5	V
Body Diode Reverse Recovery Time	t _{rr}	T _J = 25 °C, I _F = I _S , dI/dt = 100 A/μs, V _R = 15 V		-	63	-	ns
Body Diode Reverse Recovery Charge	Q _{rr}			-	114	-	nC
Body Diode Reverse Recovery Current	I _{RRM}			-	3.3	-	A

TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)

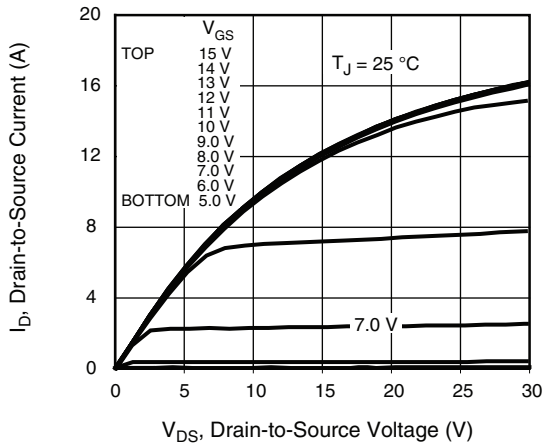


Fig. 1 - Typical Output Characteristics

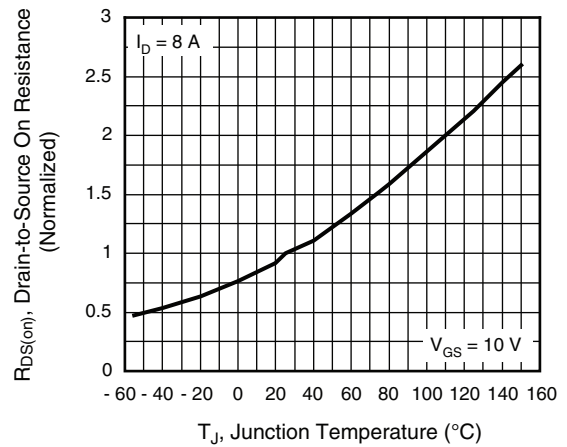


Fig. 4 - Normalized On-Resistance vs. Temperature

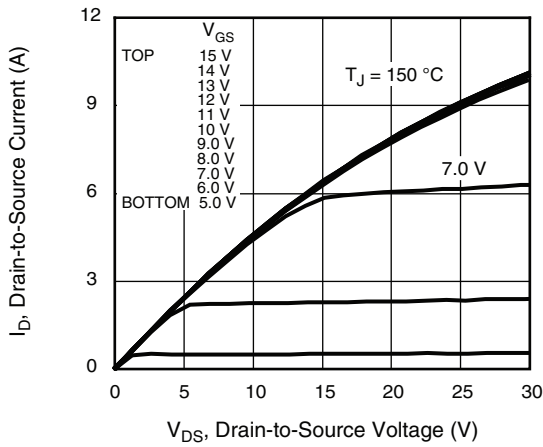


Fig. 2 - Typical Output Characteristics

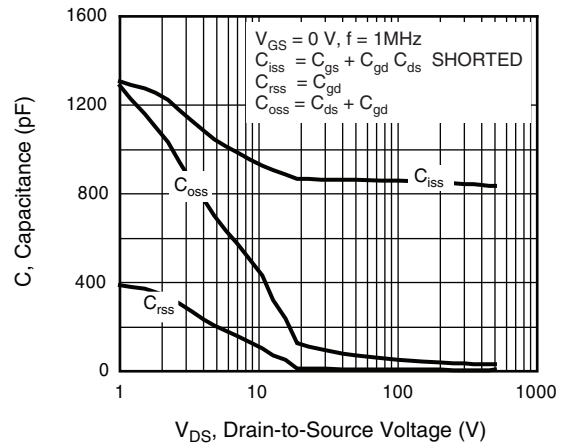


Fig. 5 - Typical Capacitance vs. Drain-to-Source Voltage

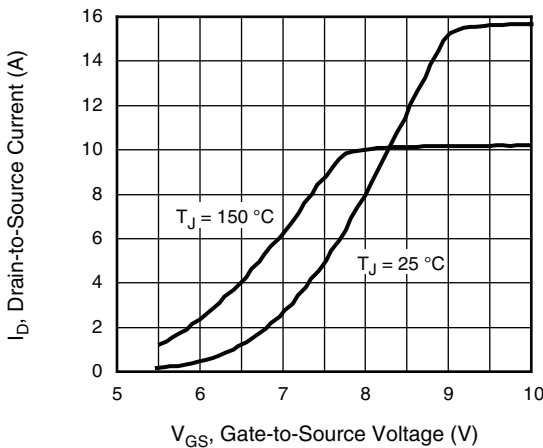


Fig. 3 - Typical Transfer Characteristics

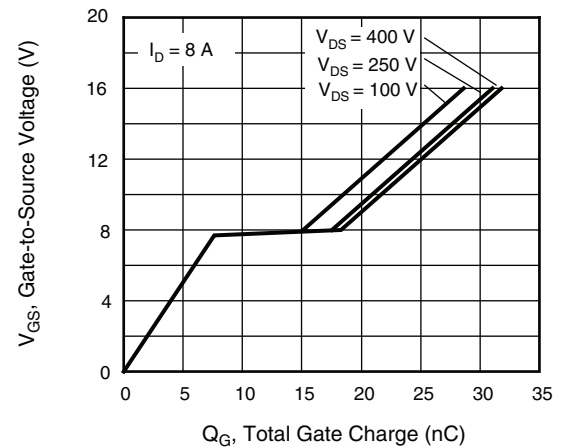


Fig. 6 - Typical Gate Charge vs. Gate-to-Source Voltage

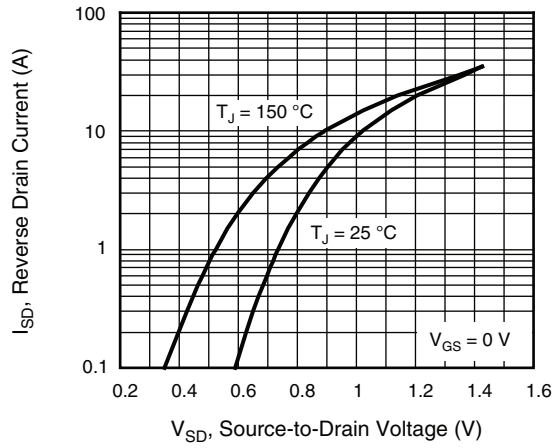


Fig. 7 - Typical Source-Drain Diode Forward Voltage

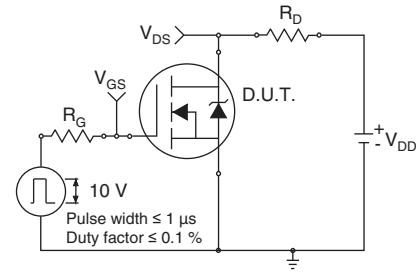


Fig. 9a - Switching Time Test Circuit

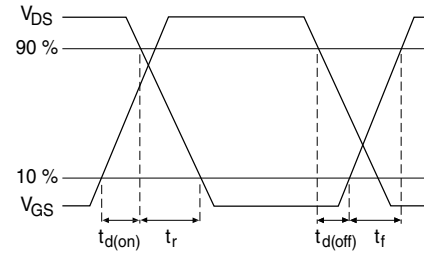


Fig. 9b - Switching Time Waveforms

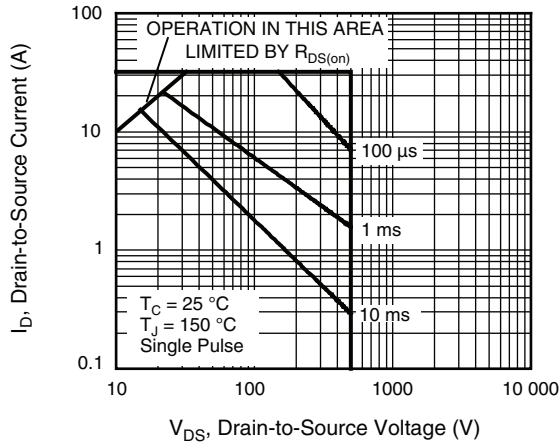


Fig. 8 - Maximum Safe Operating Area

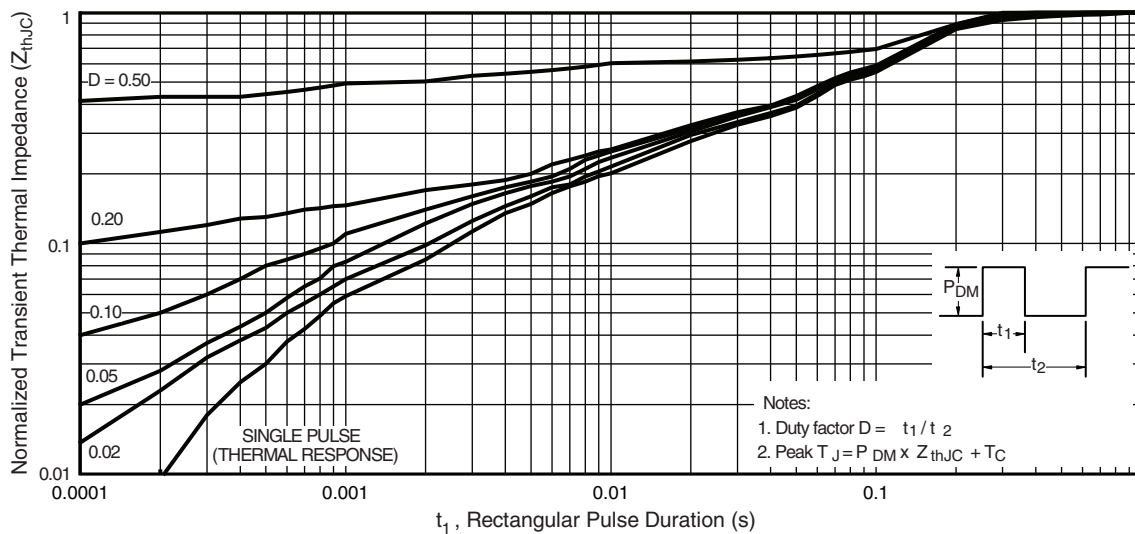


Fig. 10 - Maximum Effective Transient Thermal Impedance, Junction-to-Case

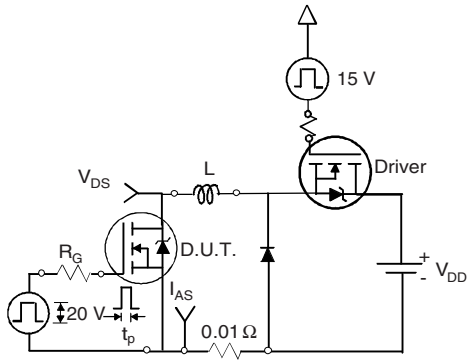


Fig. 11a - Unclamped Inductive Test Circuit

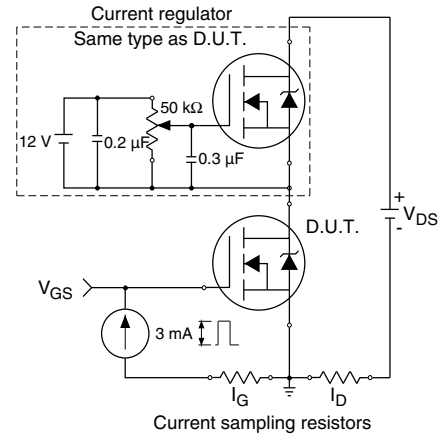


Fig. 12b - Gate Charge Test Circuit

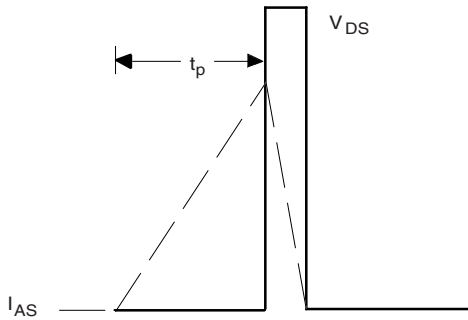


Fig. 11b - Unclamped Inductive Waveforms

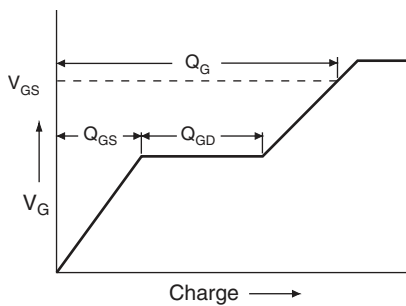
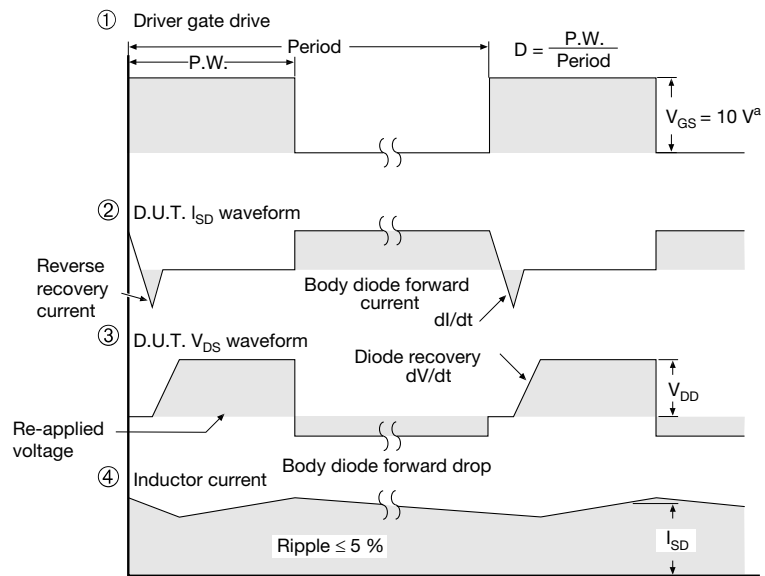
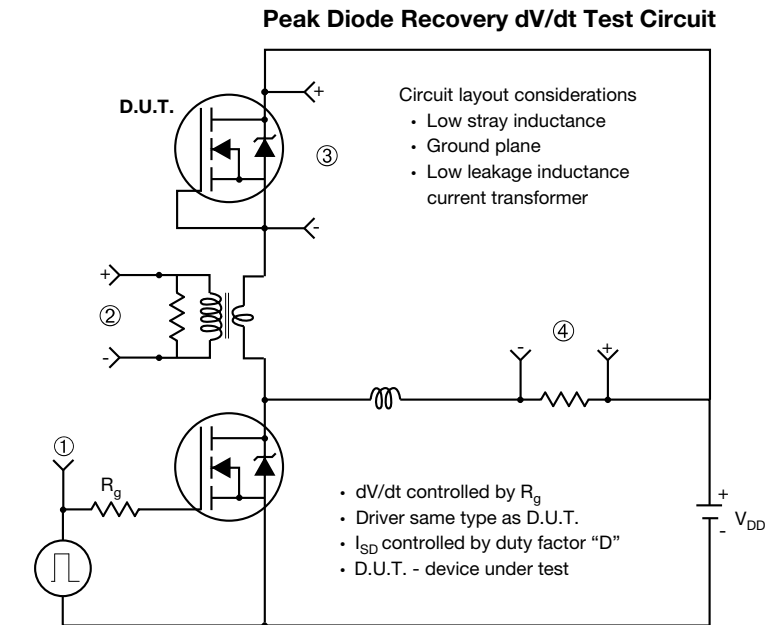


Fig. 12a - Basic Gate Charge Waveform



Note
a. $V_{GS} = 5 V$ for logic level devices

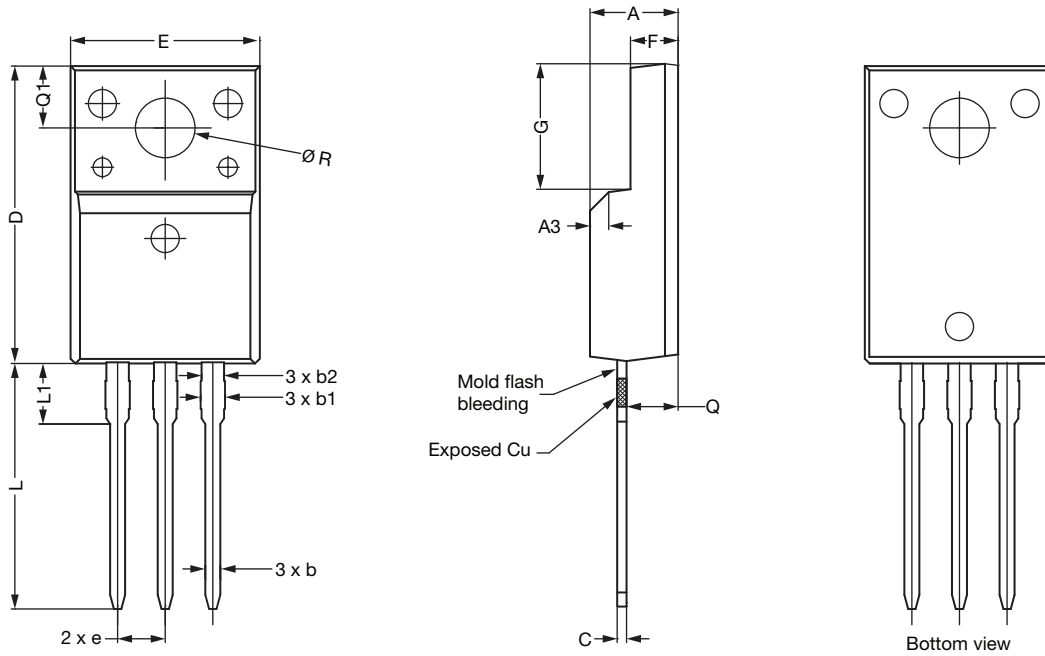
Fig. 13 - For N-Channel

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TO-220 FULLPAK (High Voltage)

OPTION 1: FACILITY CODE = 9



DIM.	MILLIMETERS		
	MIN.	NOM.	MAX.
A	4.60	4.70	4.80
b	0.70	0.80	0.91
b1	1.20	1.30	1.47
b2	1.10	1.20	1.30
C	0.45	0.50	0.63
D	15.80	15.87	15.97
e	2.54 BSC		
E	10.00	10.10	10.30
F	2.44	2.54	2.64
G	6.50	6.70	6.90
L	12.90	13.10	13.30
L1	3.13	3.23	3.33
Q	2.65	2.75	2.85
Q1	3.20	3.30	3.40
$\varnothing R$	3.08	3.18	3.28

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
6. Facility code will be the 1st character located at the 2nd row of the unit marking



OPTION 2: FACILITY CODE = Y



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: E19-0180-Rev. D, 08-Apr-2019
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 $C_{pk} > 1.33$
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