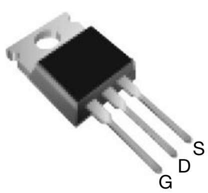
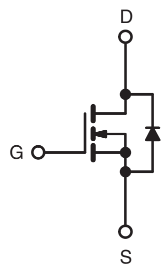
Power MOSFET

PRODUCT SUMMARY		
V_{DS} (V) at T_J max.	560	
$R_{DS(on)}$ (Ω)	V_{GS} = 10 V	0.225
Q_g (Max.) (nC)	76	
Q_{gs} (nC)	21	
Q_{gd} (nC)	29	
Configuration	Single	

TO-220AB





N-Channel MOSFET

FEATURES

- Low Figure-of-Merit R_{on} x Q_g
- 100 % Avalanche Tested
- High Peak Current Capability
- dV/dt Ruggedness
- Improved t_{rr}/Q_{rr}
- Improved Gate Charge
- High Power Dissipations Capability
- Compliant to RoHS Directive 2002/95/EC

Pb Available RoHS* COMPLIANT

ORDERING INFORMATION	
Package	TO-220AB
Lead (Pb)-free	SiHP18N50C-E3

ABSOLUTE MAXIMUM RATINGS (T_C = 25 °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 (T_J = 150 °C)[a]	V_{GS} at 10 V	T_C = 25 °C	I_D	18	A
		T_C = 100 °C		11	
Pulsed Drain Current[b]			I_{DM}	72	
Linear Derating Factor		TO-220AB		1.8	W/°C
Single Pulse Avalanche Energy[c]			E_{AS}	361	mJ
Maximum Power Dissipation		TO-220AB	P_D	223	W
Peak Diode Recovery dV/dt[d]			dV/dt	5	V/ns
Operating Junction and Storage Temperature Range			T_J, T_{stg}	- 55 to + 150	°C
Soldering Recommendations (Peak Temperature)[d]	for 10 s			300	

Notes

a. Drain current limited by maximum junction temperature.
b. Repetitive rating; pulse width limited by maximum junction temperature.
c. V_{DD} = 50 V, starting T_J = 25 °C, L = 2.5 mH, R_g = 25 Ω, I_{AS} = 17 A.
d. $I_{SD} \leq$ 18 A, dI/dt $\leq$ 380 A/μs, $V_{DD} \leq V_{DS}$, $T_J \leq$ 150 °C.
e. 1.6 mm from case.

* Pb containing terminations are not RoHS compliant, exemptions may apply

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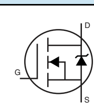
THERMAL RESISTANCE RATINGS					
PARAMETER		**SYMBOL**	**TYP.**	**MAX.**	**UNIT**
Maximum Junction-to-Ambient	TO-220	R_{thJA}	-	62	°C/W
Maximum Junction-to-Case (Drain)	TO-220	R_{thJC}	-	0.56	

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	$\Delta V_{DS}/T_J$	Reference to 25 °C, I_D = 1 mA		-	0.6	-	V/°C
Gate-Source Threshold Voltage (N)	$V_{GS(th)}$	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		-	-	25	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 = 10 A	-	0.225	0.270	Ω
Forward Transconductance[a]	g_{fs}	V_{DS} = 50 V, I_D = 10 A		-	6.4	-	S
Dynamic							
Input Capacitance	C_{iss}	V_{GS} = 0 V, V_{DS} = 25 V, f = 1.0 MHz		-	2451	2942	pF
Output Capacitance	C_{oss}			-	300	360	
Reverse Transfer Capacitance	C_{rss}			-	26	32	
Internal Gate Resistance	R_g	f = 1.0 MHz, open drain		-	1.1	-	Ω
Total Gate Charge	Q_g	V_{GS} = 10 V	I_D = 18 A, V_{DS} = 400 V	-	65	76	nC
Gate-Source Charge	Q_{gs}			-	21	-	
Gate-Drain Charge	Q_{gd}			-	29	-	
Turn-On Delay Time	$t_{d(on)}$	V_{DD} = 250 V, I_D = 18 A R_g = 7.5 Ω, V_{GS} = 10 V		-	80	-	ns
Rise Time	t_r			-	27	-	
Turn-Off Delay Time	$t_{d(off)}$			-	32	-	
Fall Time	t_f			-	44	-	
Drain-Source Body Diode Characteristics							
Continuous Source-Drain Diode Current	I_S	MOSFET symbol showing the integral reverse p - n junction diode		-	-	18	A
Pulsed Diode Forward Current	I_{SM}			-	-	72	
Body Diode Voltage	V_{SD}	T_J = 25 °C, I_S = 18 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 = 35 V		-	503	-	ns
Body Diode Reverse Recovery Charge	Q_{rr}			-	6.7	-	μC
Reverse Recovery Current	I_{RRM}			-	30	-	A

Note

a. Repetitive rating; pulse width limited by maximum junction temperature.

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TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)

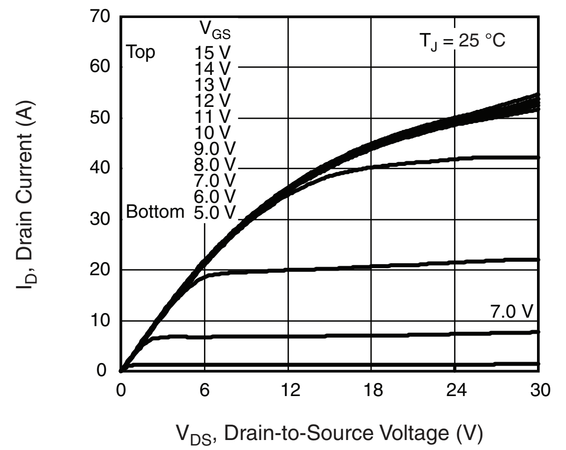

Fig. 1 - Typical Output Characteristics, T_C = 150 °C

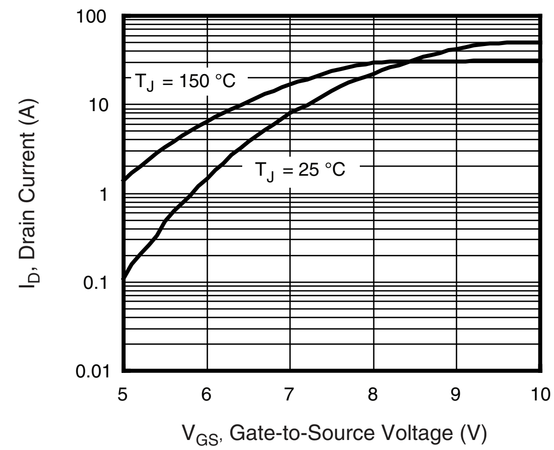

Fig. 3 - Typical Transfer Characteristics

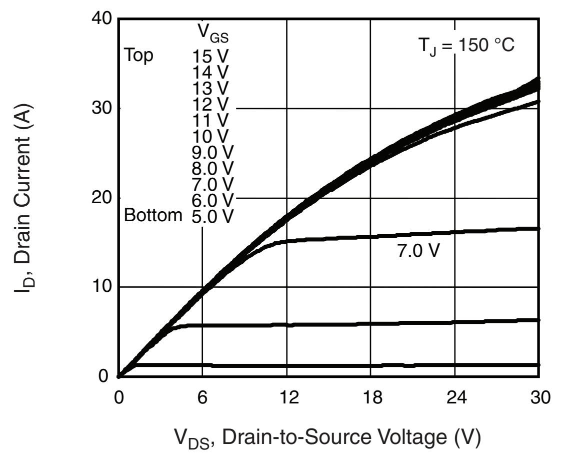

Fig. 2 - Typical Output Characteristics, T_C = 150 °C

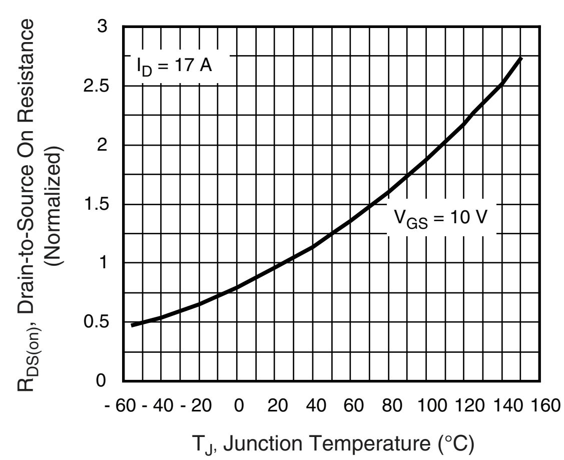

Fig. 4 - Normalized On-Resistance vs. Temperature

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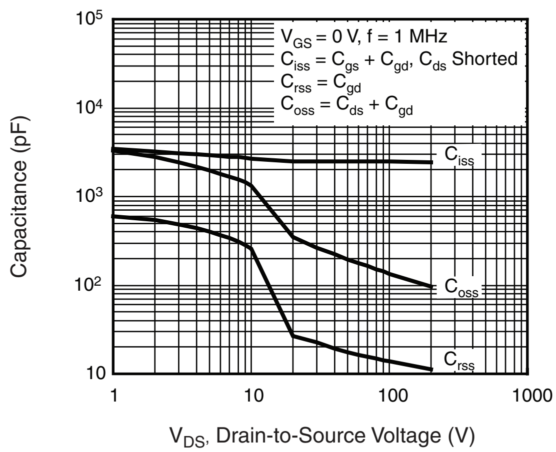

Fig. 5 - Typical Capacitance vs. Drain-to-Source Voltage

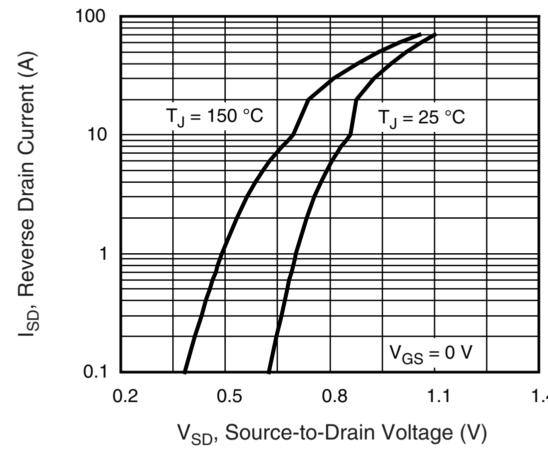

Fig. 7 - Typical Source-Drain Diode Forward Voltage

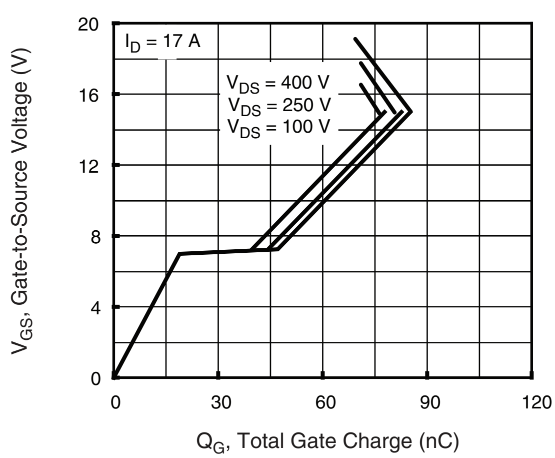

Fig. 6 - Typical Gate Charge vs. Gate-to-Source Voltage

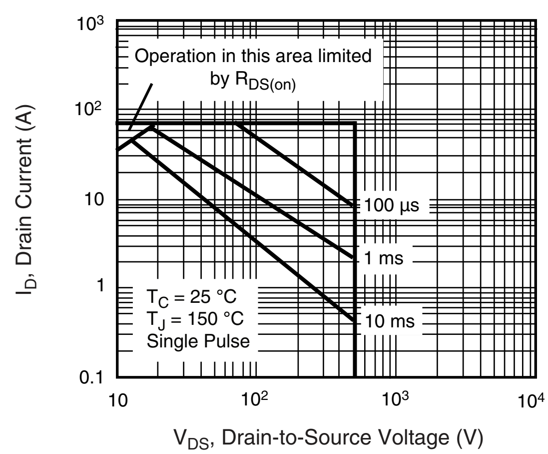

Fig. 8 - Maximum Safe Operating Area

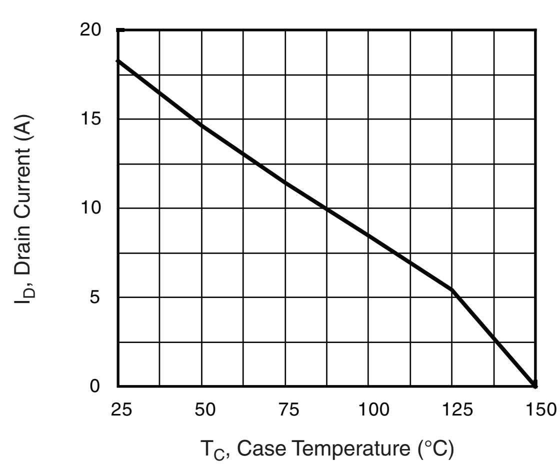

Fig. 9 - Maximum Drain Current vs. Case Temperature

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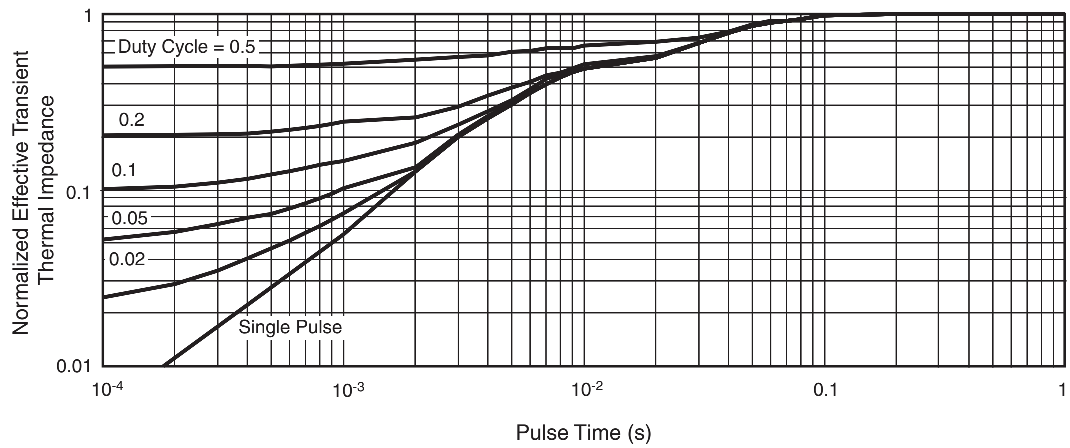

Fig. 10 - Normalized Thermal Transient Impedance, Junction-to-Case

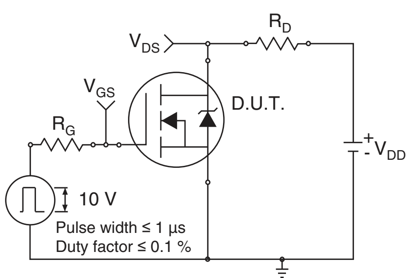

Fig. 11a - Switching Time Test Circuit

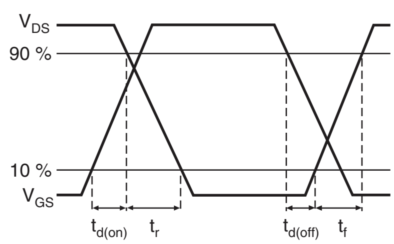

Fig. 11b - Switching Time Waveforms

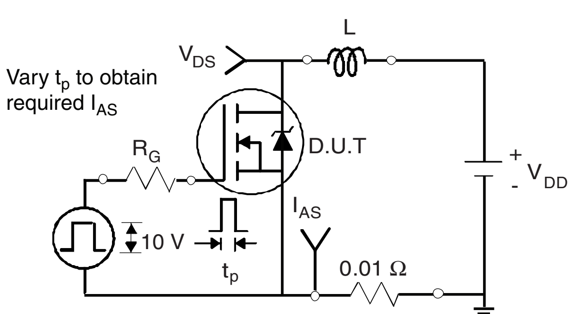

Fig. 12a - Unclamped Inductive Test Circuit

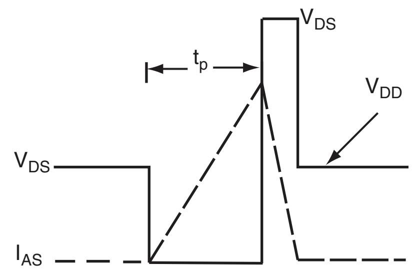

Fig. 12b - Unclamped Inductive Waveforms

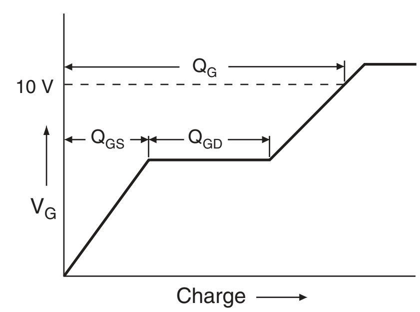

Fig. 13a - Basic Gate Charge Waveform

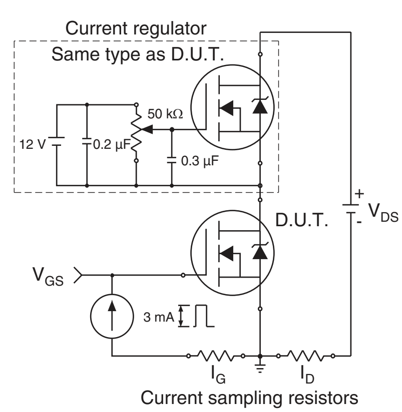

Fig. 13b - Gate Charge Test Circuit

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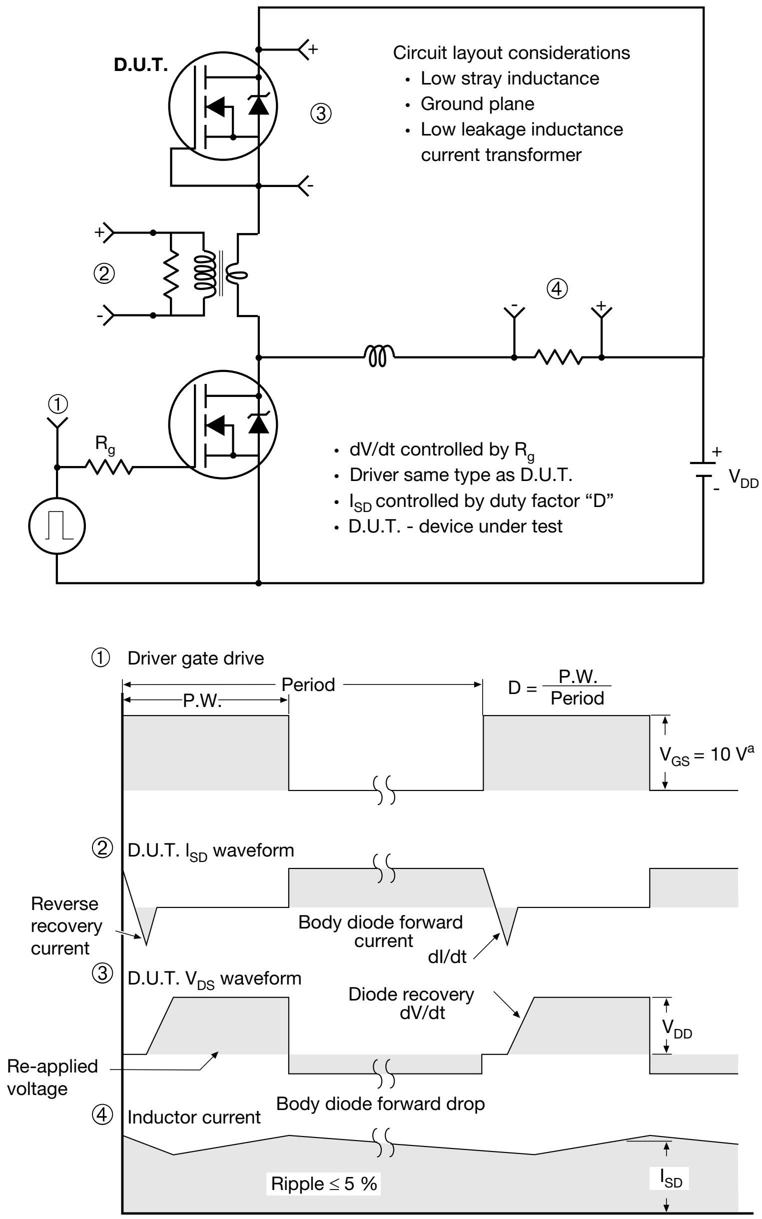
Peak Diode Recovery dV/dt Test Circuit



Note

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

Fig. 14 - For N-Channel

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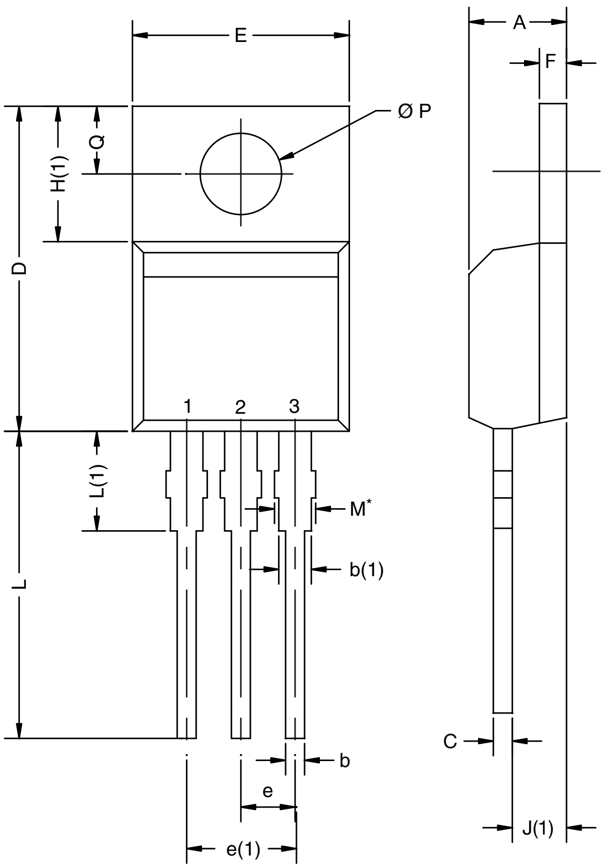
TO-220AB



DIM.	MILLIMETERS		INCHES	
	MIN.	MAX.	MIN.	MAX.
A	4.25	4.65	0.167	0.183
b	0.69	1.01	0.027	0.040
b(1)	1.20	1.73	0.047	0.068
c	0.36	0.61	0.014	0.024
D	14.85	15.49	0.585	0.610
E	10.04	10.51	0.395	0.414
e	2.41	2.67	0.095	0.105
e(1)	4.88	5.28	0.192	0.208
F	1.14	1.40	0.045	0.055
H(1)	6.09	6.48	0.240	0.255
J(1)	2.41	2.92	0.095	0.115
L	13.35	14.02	0.526	0.552
L(1)	3.32	3.82	0.131	0.150
Ø P	3.54	3.94	0.139	0.155
Q	2.60	3.00	0.102	0.118
ECN: T13-0724-Rev. O, 14-Oct-13 DWG: 5471				

Note

* M = 1.32 mm to 1.62 mm (dimension including protrusion) Heatsink hole for HVM

For technical questions, contact: hvm@vishay.com
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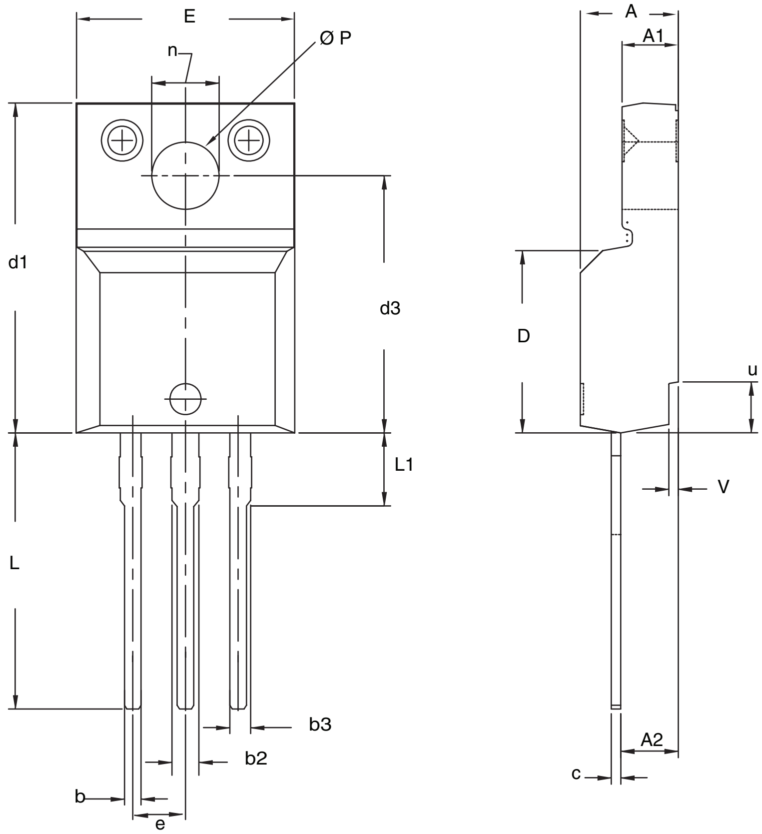
TO-220 FULLPAK (HIGH VOLTAGE)



	MILLIMETERS		INCHES	
DIM.	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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