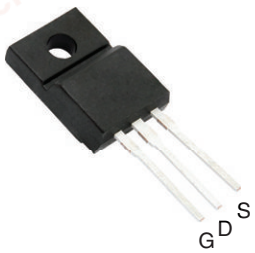
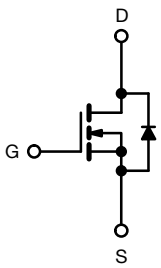
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E Series Power MOSFET

TO-220 FULLPAK





N-Channel MOSFET

FEATURES

- 4th generation E series technology
- Low figure-of-merit (FOM) R_{on} x Q_g
- Low effective capacitance ($C_{o(er)}$)
- Reduced switching and conduction losses
- Avalanche energy rated (UIS)
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912

RoHS COMPLIANT HALOGEN FREE

APPLICATIONS

- Server and telecom power supplies
- Switch mode power supplies (SMPS)
- Power factor correction power supplies (PFC)
- Lighting
  - High-intensity discharge (HID)
  - Fluorescent ballast lighting
- Industrial
  - Welding
  - Induction heating
  - Motor drives
  - Battery chargers
  - Solar (PV inverters)

PRODUCT SUMMARY		
V_{DS} (V) at T_J max.	700	
$R_{DS(on)}$ typ. (Ω) at 25 °C	V_{GS} = 10 V	0.070
Q_g max. (nC)	80	
Q_{gs} (nC)	20	
Q_{gd} (nC)	19	
Configuration	Single	

ORDERING INFORMATION	
Package	TO-220 FULLPAK
Lead (Pb)-free and halogen-free	SiHF074N65E-GE3

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

PARAMETER			SYMBOL	LIMIT	UNIT
Drain-source voltage			V_{DS}	650	V
Gate-source voltage			V_{GS}	± 30	
Continuous drain current (T_J = 150 °C) [e]	V_{GS} at 10 V	T_C = 25 °C	I_D	14	A
		T_C = 100 °C		9	
Pulsed drain current [a]			I_{DM}	91	
Linear derating factor				2	W/°C
Single pulse avalanche energy [b]			E_{AS}	173	mJ
Maximum power dissipation			P_D	39	W
Operating junction and storage temperature range			T_J, T_{stg}	-55 to +150	°C
Drain-source voltage slope		T_J = 125 °C	dv/dt	100	V/ns
Reverse diode dv/dt [d]				12	

Notes

a. Repetitive rating; pulse width limited by maximum junction temperature
b. V_{DD} = 120 V, starting T_J = 25 °C, L = 28.2 mH, R_g = 25 Ω, I_{AS} = 3.5 A
c. 1.6 mm from case
d. $I_{SD} \leq I_D$, di/dt = 100 A/µs, starting T_J = 25 °C
e. Limited by maximum junction temperature

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THERMAL RESISTANCE RATINGS				
PARAMETER	SYMBOL	TYP.	MAX.	UNIT
Maximum junction-to-ambient	R_{thJA}	-	65	°C/W
Maximum junction-to-case (drain)	R_{thJC}	-	3.2	

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		650	-	-	V
V_{DS} temperature coefficient	$\Delta V_{DS}/T_J$	Reference to 25 °C, I_D = 1 mA		-	0.63	-	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} = ± 20 V		-	-	± 100	nA
		V_{GS} = ± 30 V		-	-	± 1	µA
Zero gate voltage drain current	I_{DSS}	V_{DS} = 650 V, V_{GS} = 0 V		-	-	1	µA
		V_{DS} = 520 V, V_{GS} = 0 V, T_J = 125 °C		-	-	10	
Drain-source on-state resistance	$R_{DS(on)}$	V_{GS} = 10 V	I_D = 15 A	-	0.070	0.079	Ω
Forward transconductance	g_{fs}	V_{DS} = 10 V, I_D = 19 A		-	16	-	S
Dynamic							
Input capacitance	C_{iss}	V_{GS} = 0 V, V_{DS} = 100 V, f = 100 KHz		-	2904	-	pF
Output capacitance	C_{oss}			-	106	-	
Reverse transfer capacitance	C_{rss}			-	2	-	
Effective output capacitance, energy related	$C_{o(er)}$	V_{DS} = 0 V to 400 V, V_{GS} = 0 V		-	115	-	
Effective output capacitance, time related	$C_{o(tr)}$			-	772	-	
Total gate charge	Q_g	V_{GS} = 10 V	I_D = 19 A, V_{DS} = 520 V	-	53	80	nC
Gate-source charge	Q_{gs}			-	20	-	
Gate-drain charge	Q_{gd}			-	19	-	
Turn-on delay time	$t_{d(on)}$	V_{DD} = 520 V, I_D = 19 A, V_{GS} = 10 V, R_g = 9.1 Ω		-	29	58	ns
Rise time	t_r			-	53	106	
Turn-off delay time	$t_{d(off)}$			-	42	84	
Fall time	t_f			-	29	58	
Gate input resistance	R_g	f = 1 MHz, open drain		0.3	0.6	1.2	Ω
Drain-Source Body Diode Characteristics							
Continuous source-drain diode current	I_S	MOSFET symbol showing the integral reverse p - n junction diode 		-	-	35	A
Pulsed diode forward current	I_{SM}			-	-	91	
Diode forward voltage	V_{SD}	T_J = 25 °C, I_S = 19 A, V_{GS} = 0 V		-	-	1.2	V
Reverse recovery time	t_{rr}	T_J = 25 °C, I_F = I_S = 19 A, di/dt = 100 A/µs, V_R = 25 V		-	447	894	ns
Reverse recovery charge	Q_{rr}			-	7	14	µC
Reverse recovery current	I_{RRM}			-	25	-	A

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TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)

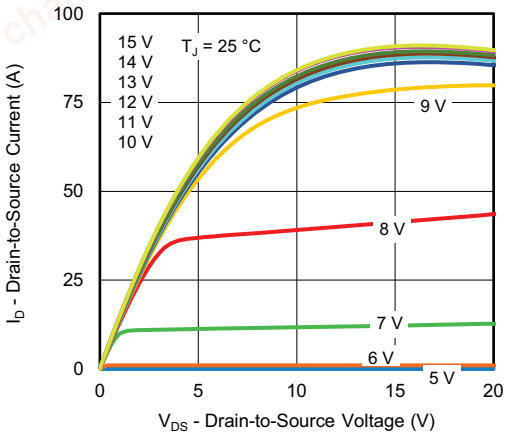


Fig. 1 - Typical Output Characteristics

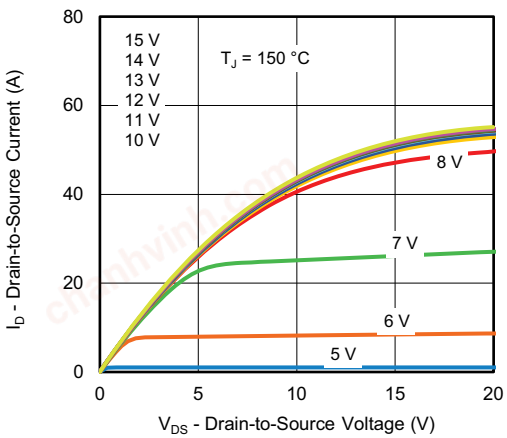


Fig. 2 - Typical Output Characteristics

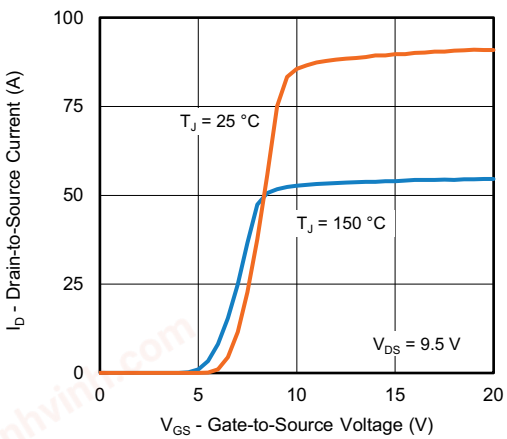


Fig. 3 - Typical Transfer Characteristics

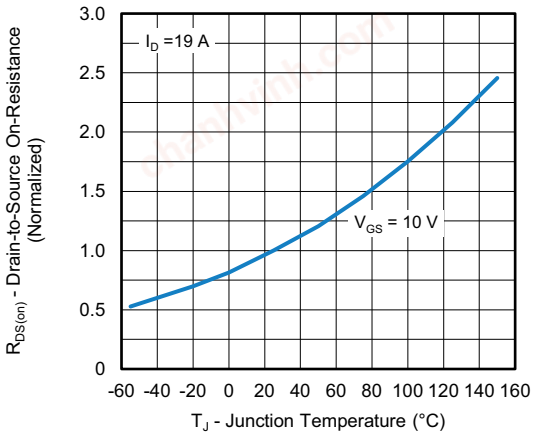


Fig. 4 - Normalized On-Resistance vs. Temperature

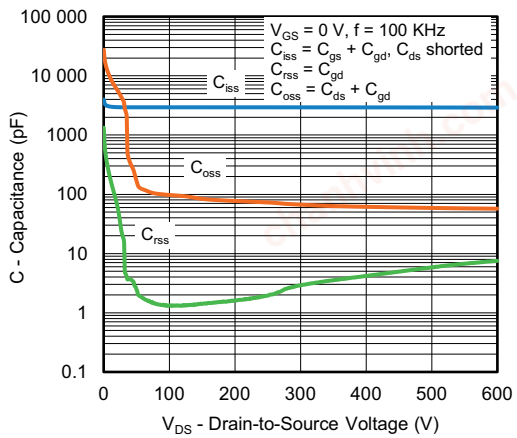


Fig. 5 - Typical Capacitance vs. Drain-to-Source Voltage

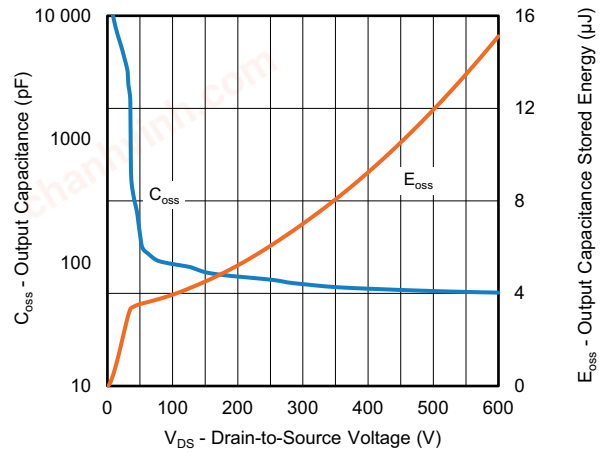


Fig. 6 - C_{oss} and E_{oss} vs. V_{DS}

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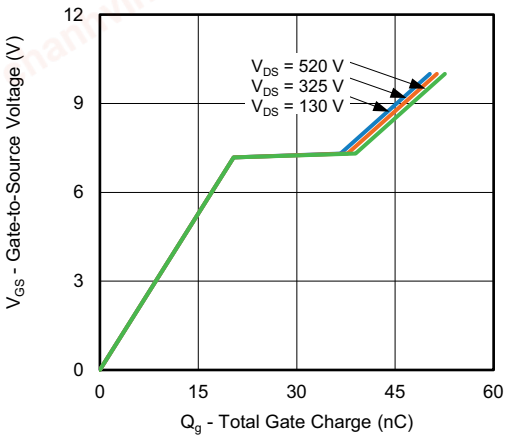


Fig. 7 - Typical Gate Charge vs. Gate-to-Source Voltage

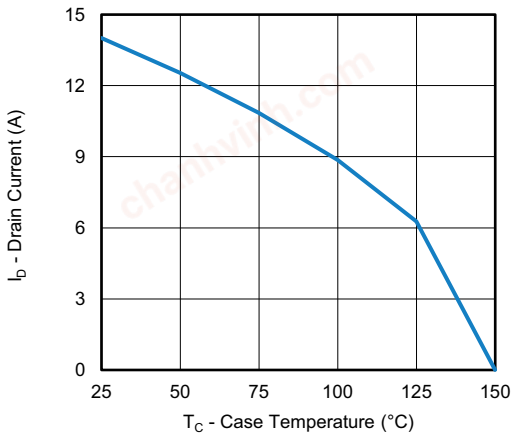


Fig. 9 - Maximum Drain Current vs. Case Temperature

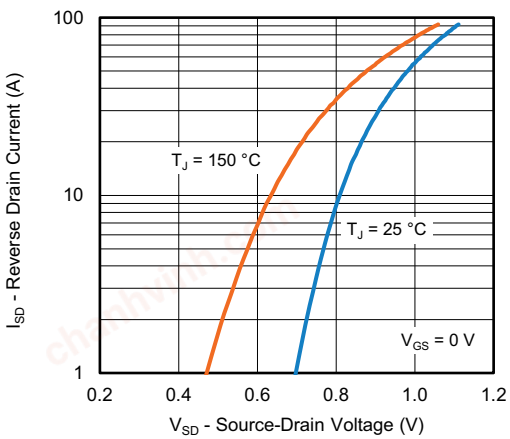


Fig. 8 - Typical Source-Drain Diode Forward Voltage

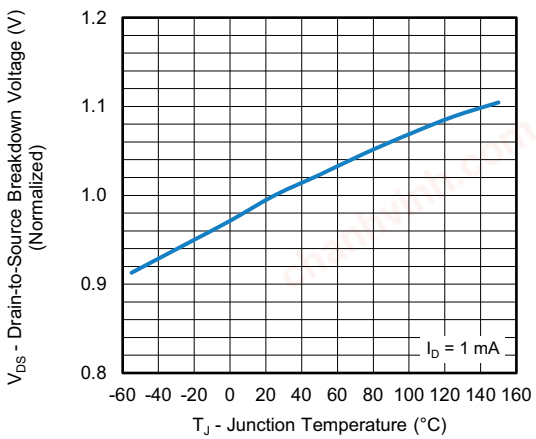


Fig. 10 - Temperature vs. Drain-to-Source Voltage

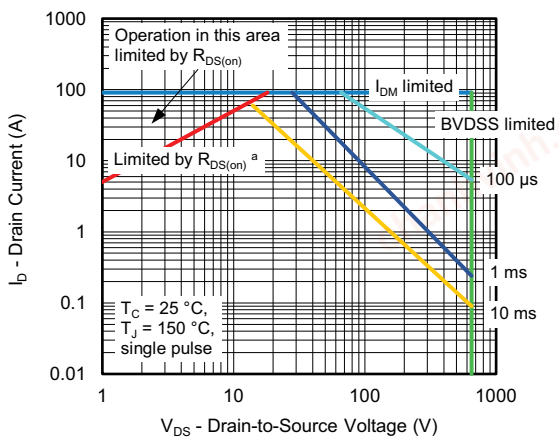


Fig. 11 - Maximum Safe Operating Area

Note

a. V_{GS} > minimum V_{GS} at which $R_{DS(on)}$ is specified

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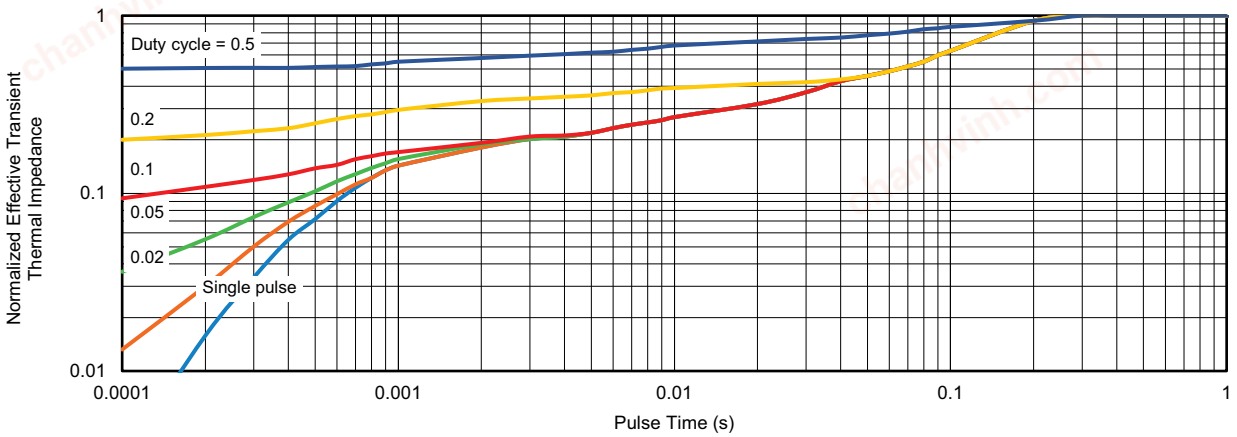


Fig. 12 - Normalized Transient Thermal Impedance, Junction-to-Case

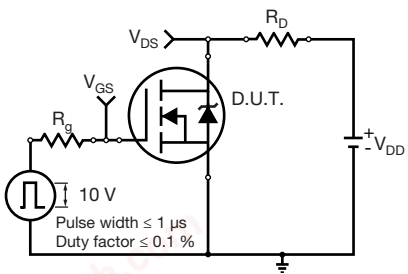


Fig. 13 - Switching Time Test Circuit

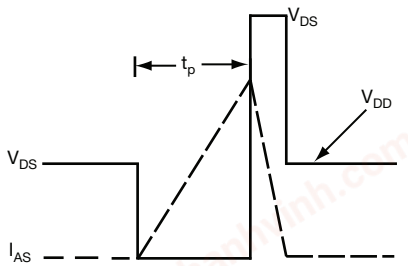


Fig. 16 - Unclamped Inductive Waveforms

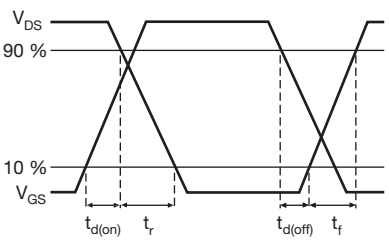


Fig. 14 - Switching Time Waveforms

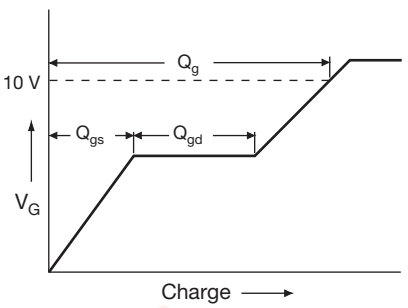


Fig. 17 - Basic Gate Charge Waveform

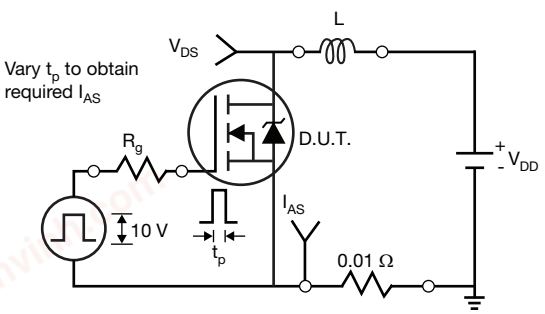


Fig. 15 - Unclamped Inductive Test Circuit

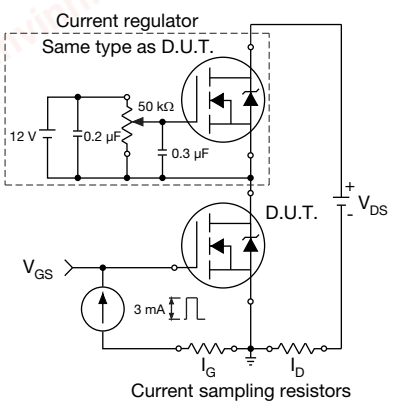
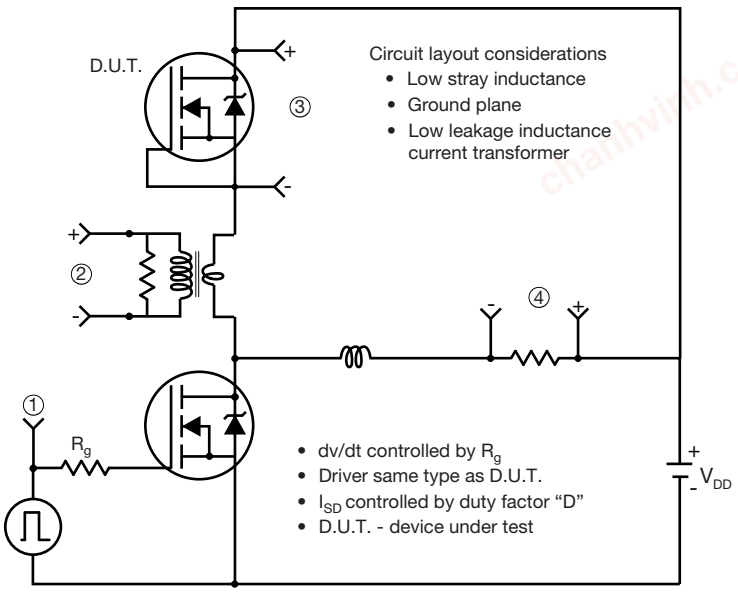


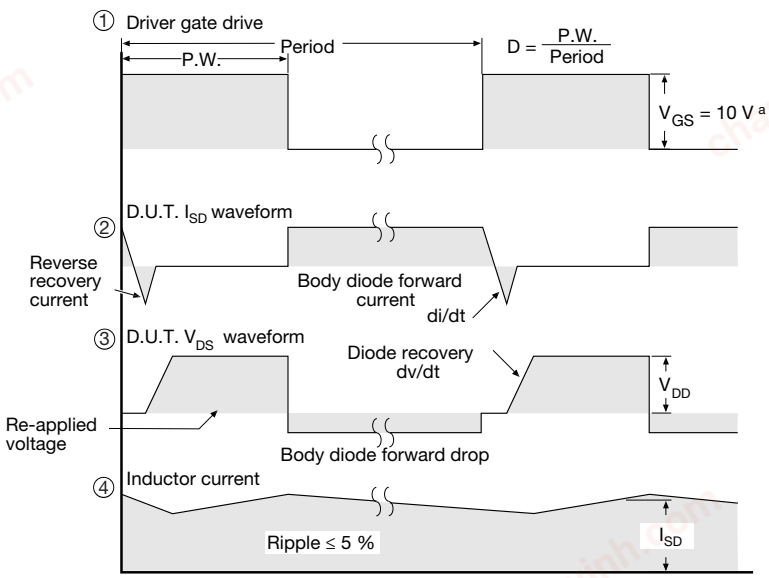
Fig. 18 - Gate Charge Test Circuit

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Peak Diode Recovery dv/dt Test Circuit





Note

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

Fig. 19 - For N-Channel

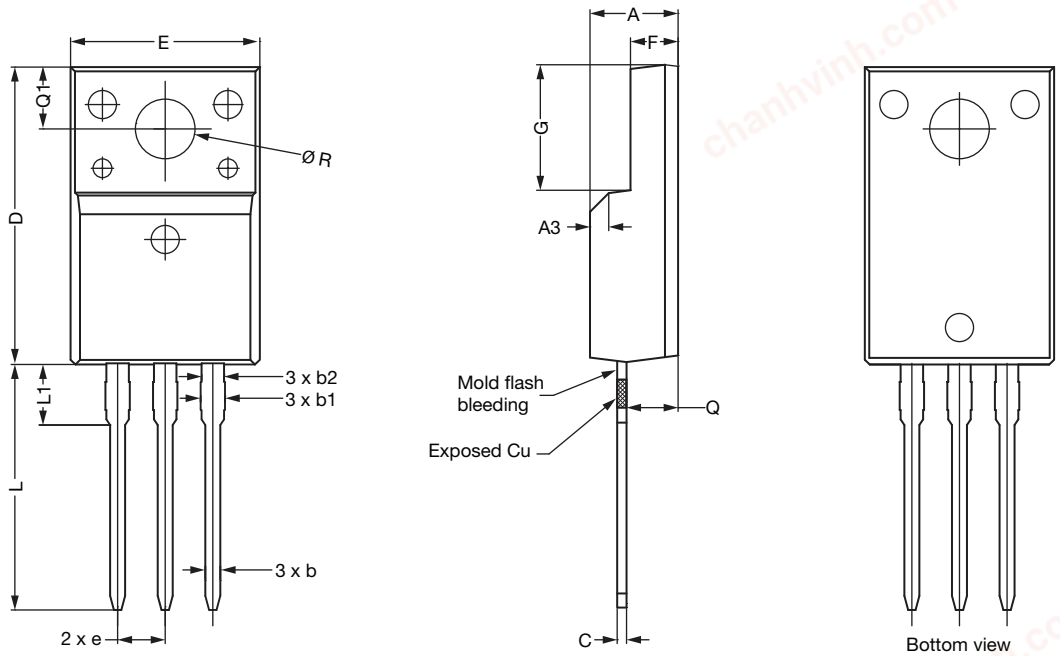
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TO-220 FULLPAK (High Voltage)

OPTION 1: FACILITY CODE = 9



	MILLIMETERS		
DIM.	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
Ø R	3.08	3.18	3.28

Notes

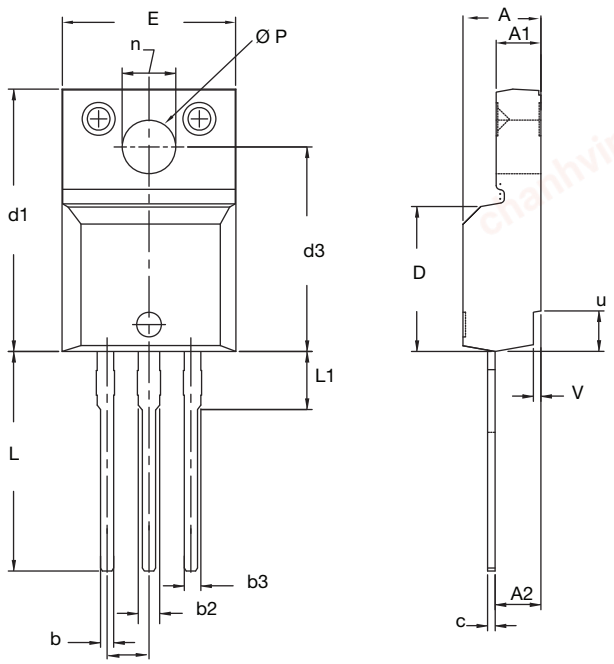
1. To be used only for process drawing
2. These dimensions apply to all TO-220 FULLPAK leadframe versions 3 leads
3. All critical dimensions should C meet $C_{pk} > 1.33$
4. All dimensions include burrs and plating thickness
5. No chipping or package damage
6. Facility code will be the 1st character located at the 2nd row of the unit marking

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OPTION 2: FACILITY CODE = Y



	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: 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 $C_{pk} > 1.33$
4. All dimensions include burrs and plating thickness
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