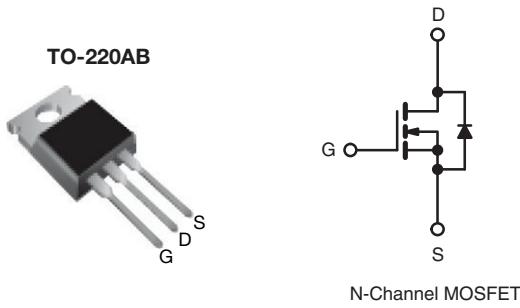


E Series Power MOSFET

PRODUCT SUMMARY	
V _{DS} (V) at T _J max.	550
R _{DS(on)} max. at 25 °C (Ω)	V _{GS} = 10 V 0.145
Q _g (Max.) (nC)	86
Q _{gs} (nC)	14
Q _{gd} (nC)	25
Configuration	Single



FEATURES

- Low figure-of-merit (FOM): R_{on} x Q_g
- Low input capacitance (C_{iss})
- Reduced switching and conduction losses
- Low gate charge (Q_g)
- Avalanche energy rated (UIS)
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912



RoHS
COMPLIANT
HALOGEN
FREE

APPLICATIONS

- Hard switched topologies
- Power factor correction power supplies (PFC)
- Switch mode power supplies (SMPS)
- Computing
 - PC silver box / ATX power supplies
- Lighting
 - Two stage LED lighting

ORDERING INFORMATION

Package	TO-220AB
Lead (Pb)-free and Halogen-free	SiHP25N50E-GE3

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	
Continuous Drain Current (T _J = 150 °C)	V _{GS} at 10 V	26	A
		16	
Pulsed Drain Current ^a	I _{DM}	50	
Linear Derating Factor		0.2	W/°C
Single Pulse Avalanche Energy ^b	E _{AS}	273	mJ
Maximum Power Dissipation	P _D	250	W
Operating Junction and Storage Temperature Range	T _J , T _{stg}	-55 to +150	°C
Drain-Source Voltage Slope	V _{DS} = 0 V to 80 % V _{DS}		dV/dt
Reverse Diode dV/dt ^d	65		
Soldering Recommendations (Peak Temperature) ^c		25	V/ns
for 10 s		300	°C

Notes

- Repetitive rating; pulse width limited by maximum junction temperature.
- V_{DD} = 50 V, starting T_J = 25 °C, L = 28.2 mH, R_g = 25 Ω, I_{AS} = 4.4 A.
- 1.6 mm from case.
- I_{SD} ≤ I_D, dI/dt = 100 A/μs, starting T_J = 25 °C.

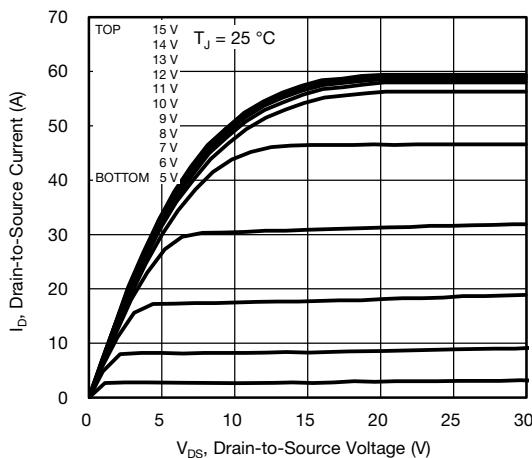
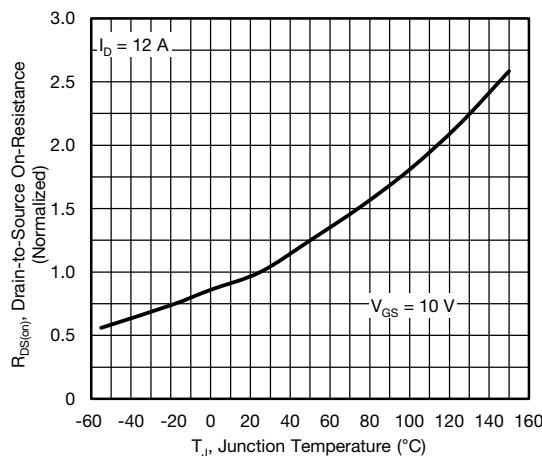
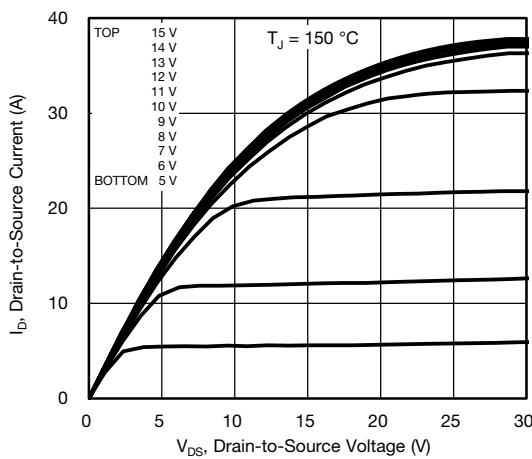
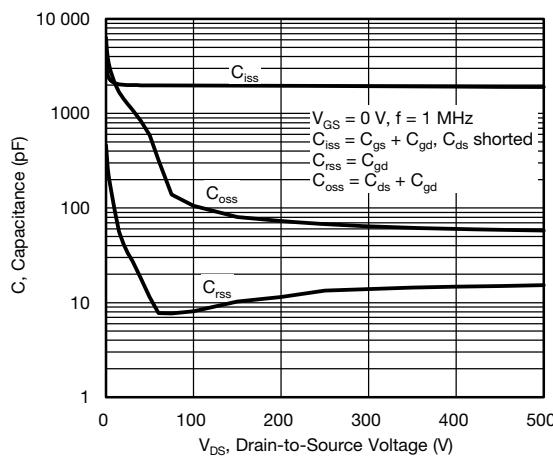
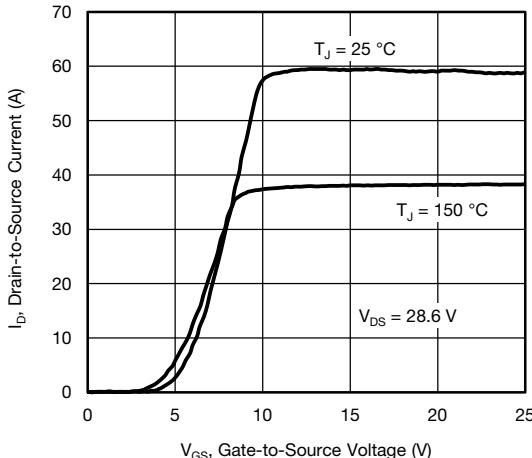
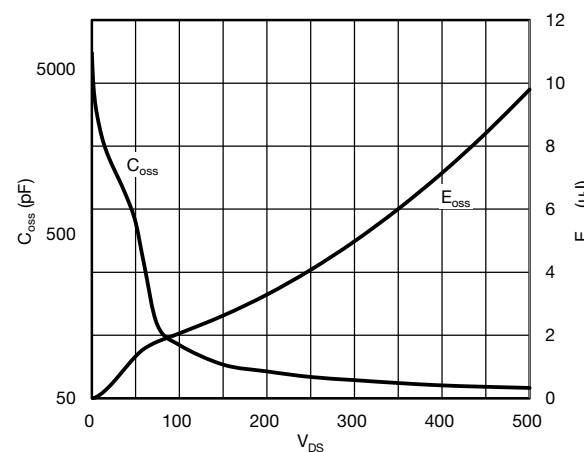
THERMAL RESISTANCE RATINGS

PARAMETER	SYMBOL	TYP.	MAX.	UNIT
Maximum Junction-to-Ambient	R _{thJA}	-	62	°C/W
Maximum Junction-to-Case (Drain)	R _{thJC}	-	0.5	

SPECIFICATIONS ($T_J = 25^\circ\text{C}$, unless otherwise noted)							
PARAMETER	SYMBOL	TEST CONDITIONS		MIN.	TYP.	MAX.	UNIT
Static							
Drain-Source Breakdown Voltage	V_{DS}	$V_{GS} = 0 \text{ V}$, $I_D = 250 \mu\text{A}$		500	-	-	V
V_{DS} Temperature Coefficient	$\Delta V_{DS}/T_J$	Reference to 25°C , $I_D = 1 \text{ mA}$		-	0.59	-	$\text{V}/^\circ\text{C}$
Gate-Source Threshold Voltage (N)	$V_{GS(\text{th})}$	$V_{DS} = V_{GS}$, $I_D = 250 \mu\text{A}$		2.0	-	4.0	V
Gate-Source Leakage	I_{GSS}	$V_{GS} = \pm 20 \text{ V}$		-	-	± 100	nA
		$V_{GS} = \pm 30 \text{ V}$		-	-	± 1	μA
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS} = 500 \text{ V}$, $V_{GS} = 0 \text{ V}$		-	-	1	μA
		$V_{DS} = 400 \text{ V}$, $V_{GS} = 0 \text{ V}$, $T_J = 125^\circ\text{C}$		-	-	25	
Drain-Source On-State Resistance	$R_{DS(\text{on})}$	$V_{GS} = 10 \text{ V}$	$I_D = 12 \text{ A}$	-	0.125	0.145	Ω
Forward Transconductance	g_{fs}	$V_{DS} = 30 \text{ V}$, $I_D = 12 \text{ A}$		-	6.6	-	S
Dynamic							
Input Capacitance	C_{iss}	$V_{GS} = 0 \text{ V}$, $V_{DS} = 100 \text{ V}$, $f = 1 \text{ MHz}$		-	1980	-	pF
Output Capacitance	C_{oss}			-	105	-	
Reverse Transfer Capacitance	C_{rss}			-	8	-	
Effective Output Capacitance, Energy Related ^a	$C_{o(er)}$	$V_{DS} = 0 \text{ V to } 400 \text{ V}$, $V_{GS} = 0 \text{ V}$		-	105	-	
Effective Output Capacitance, Time Related ^b	$C_{o(tr)}$			-	285	-	
Total Gate Charge	Q_g			-	57	86	nC
Gate-Source Charge	Q_{gs}	$V_{GS} = 10 \text{ V}$	$I_D = 12 \text{ A}$, $V_{DS} = 400 \text{ V}$	-	14	-	
Gate-Drain Charge	Q_{gd}			-	25	-	
Turn-On Delay Time	$t_{d(on)}$			-	19	38	ns
Rise Time	t_r	$V_{DD} = 400 \text{ V}$, $I_D = 12 \text{ A}$ $R_g = 9.1 \Omega$, $V_{GS} = 10 \text{ V}$		-	36	72	
Turn-Off Delay Time	$t_{d(off)}$		-	57	86		
Fall Time	t_f		-	29	58		
Gate Input Resistance	R_g	$f = 1 \text{ MHz}$, open drain		-	0.56	-	Ω
Drain-Source Body Diode Characteristics							
Continuous Source-Drain Diode Current	I_S	MOSFET symbol showing the integral reverse p - n junction diode		-	-	12	A
Pulsed Diode Forward Current	I_{SM}			-	-	50	
Diode Forward Voltage	V_{SD}	$T_J = 25^\circ\text{C}$, $I_S = 16.5 \text{ A}$, $V_{GS} = 0 \text{ V}$		-	-	1.2	V
Reverse Recovery Time	t_{rr}	$T_J = 25^\circ\text{C}$, $I_F = I_S$, $dl/dt = 100 \text{ A}/\mu\text{s}$, $V_R = 25 \text{ V}$		-	338	-	ns
Reverse Recovery Charge	Q_{rr}			-	5.3	-	μC
Reverse Recovery Current	I_{RRM}			-	29	-	A

Notes

a. $C_{oss(er)}$ is a fixed capacitance that gives the same energy as C_{oss} while V_{DS} is rising from 0 % to 80 % V_{DSS} .
b. $C_{oss(tr)}$ is a fixed capacitance that gives the same charging time as C_{oss} while V_{DS} is rising from 0 % to 80 % V_{DSS} .

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

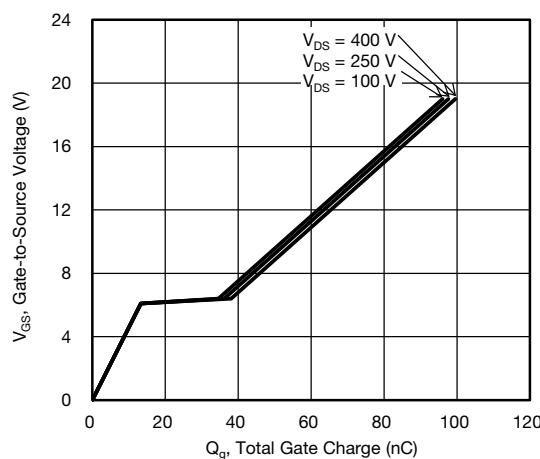


Fig. 7 - Typical Gate Charge vs. Gate-to-Source Voltage

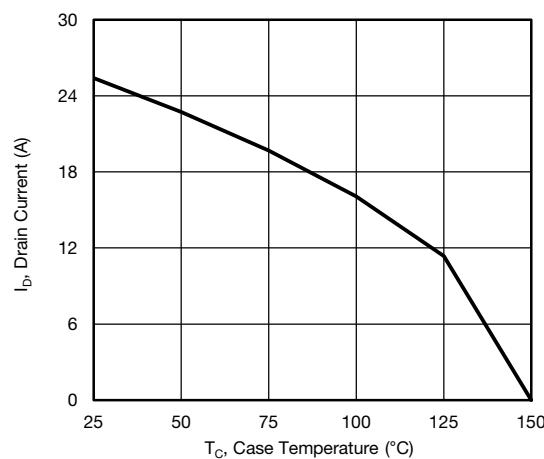


Fig. 10 - Maximum Drain Current vs. Case Temperature

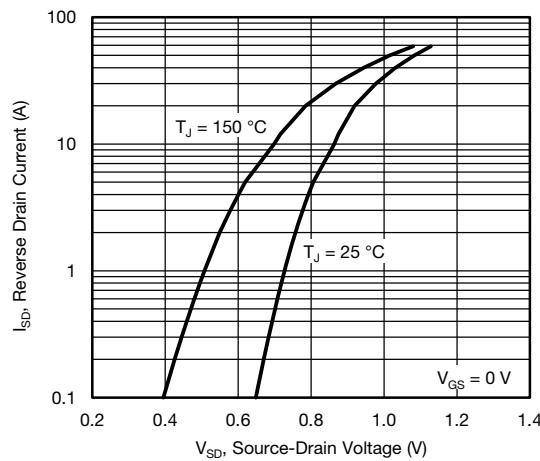


Fig. 8 - Typical Source-Drain Diode Forward Voltage

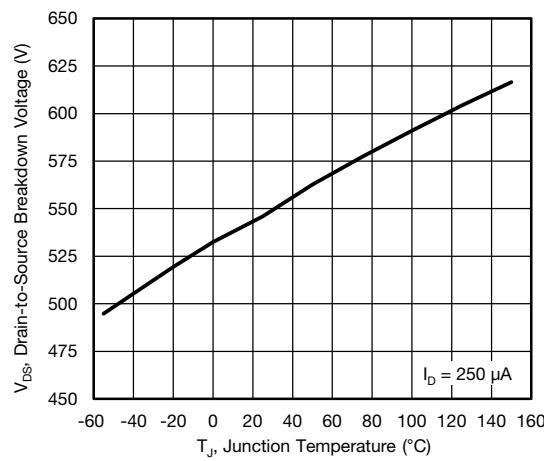


Fig. 11 - Typical Drain-to-Source Voltage vs. Temperature

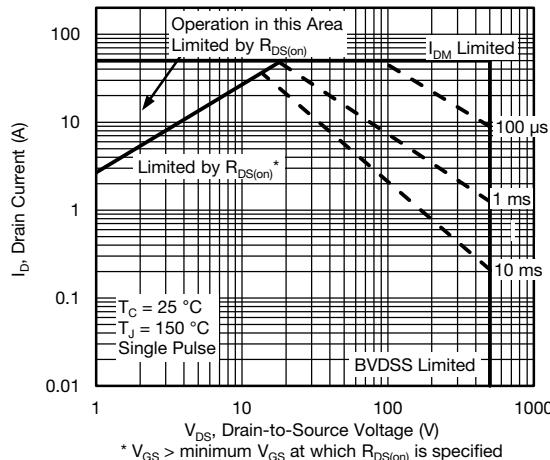


Fig. 9 - Maximum Safe Operating Area

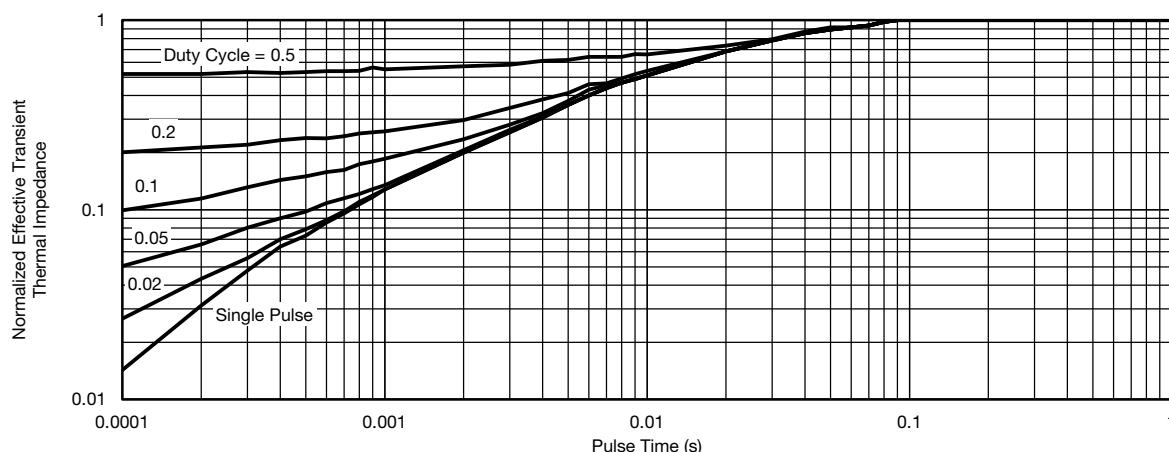


Fig. 12 - Normalized Thermal Transient Impedance, Junction-to-Case

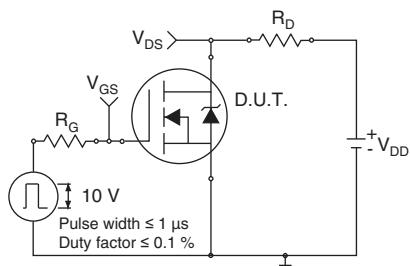


Fig. 13 - Switching Time Test Circuit

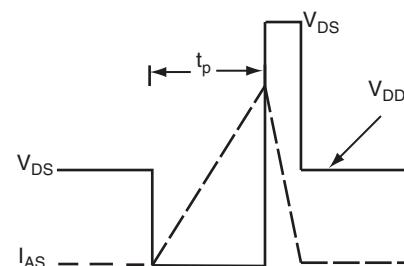


Fig. 16 - Unclamped Inductive Waveforms

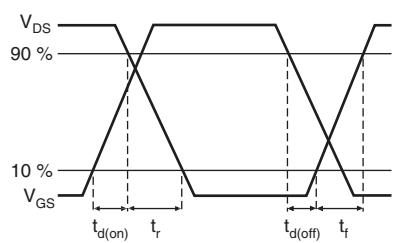


Fig. 14 - Switching Time Waveforms

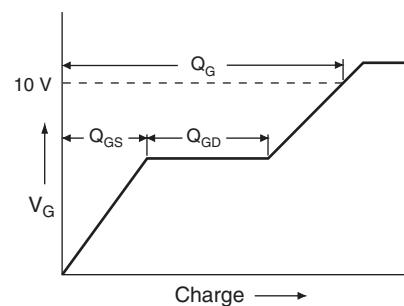


Fig. 17 - Basic Gate Charge Waveform

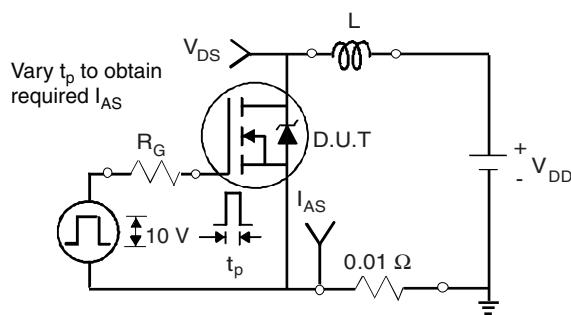


Fig. 15 - Unclamped Inductive Test Circuit

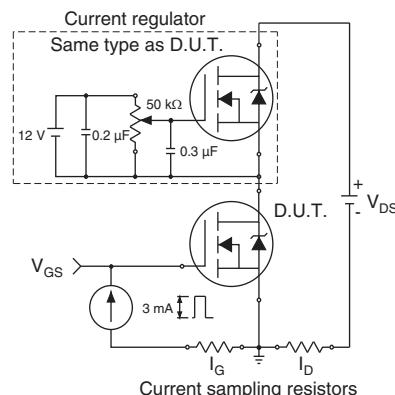
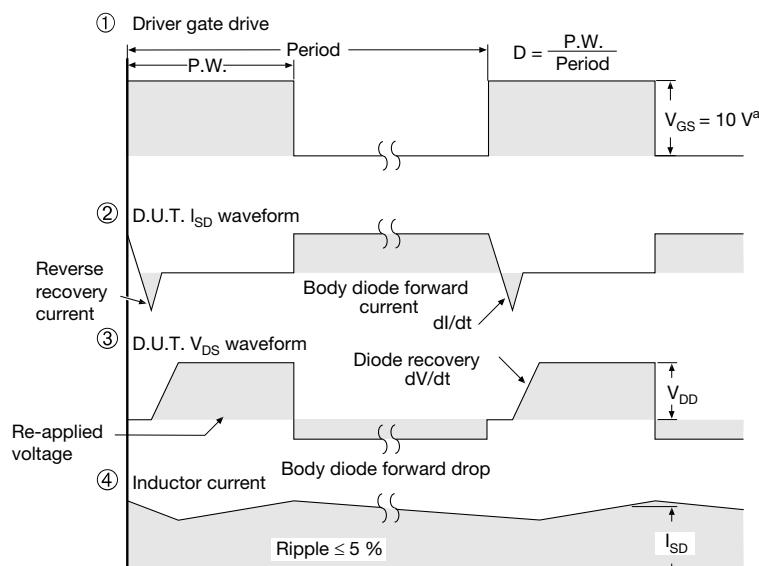
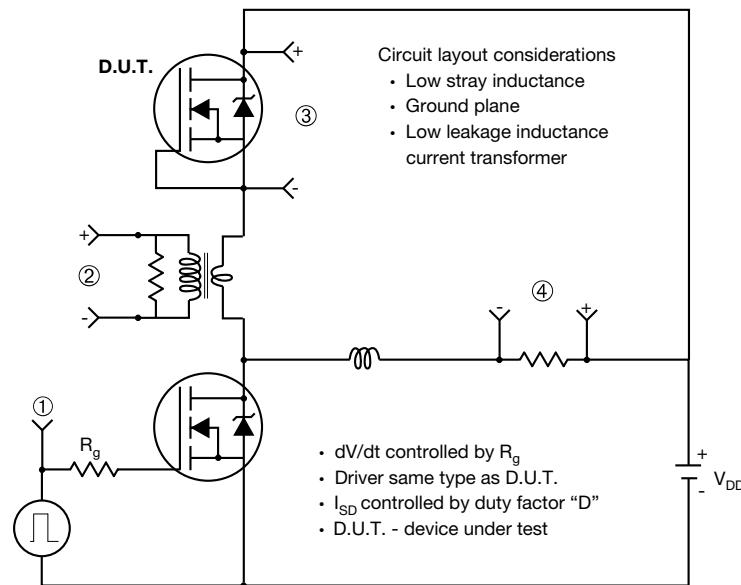
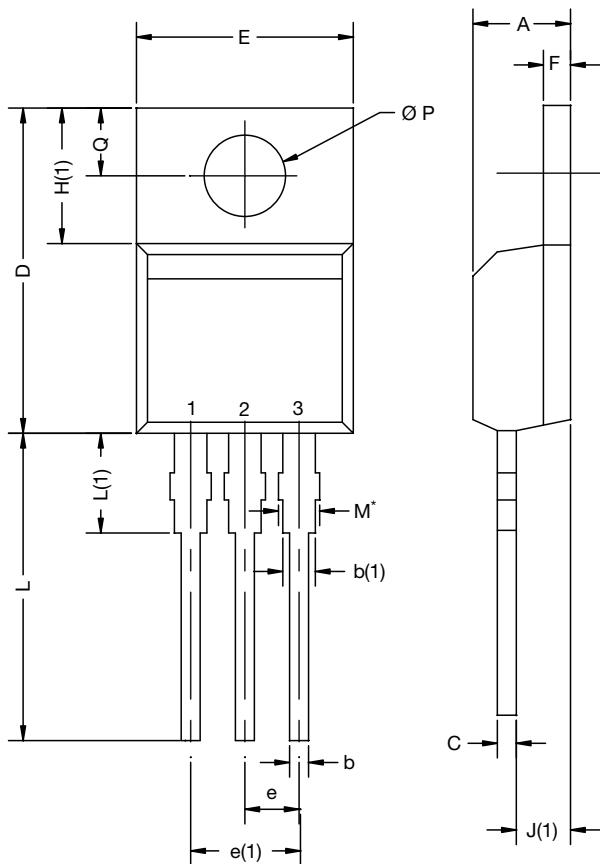


Fig. 18 - Gate Charge Test Circuit

Peak Diode Recovery dV/dt Test Circuit

Fig. 19 - For N-Channel

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TO-220-1



DIM.	MILLIMETERS		INCHES	
	MIN.	MAX.	MIN.	MAX.
A	4.24	4.65	0.167	0.183
b	0.69	1.02	0.027	0.040
b(1)	1.14	1.78	0.045	0.070
c	0.36	0.61	0.014	0.024
D	14.33	15.85	0.564	0.624
E	9.96	10.52	0.392	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)	6.10	6.71	0.240	0.264
J(1)	2.41	2.92	0.095	0.115
L	13.36	14.40	0.526	0.567
L(1)	3.33	4.04	0.131	0.159
Ø P	3.53	3.94	0.139	0.155
Q	2.54	3.00	0.100	0.118

ECN: X15-0364-Rev. C, 14-Dec-15
DWG: 6031

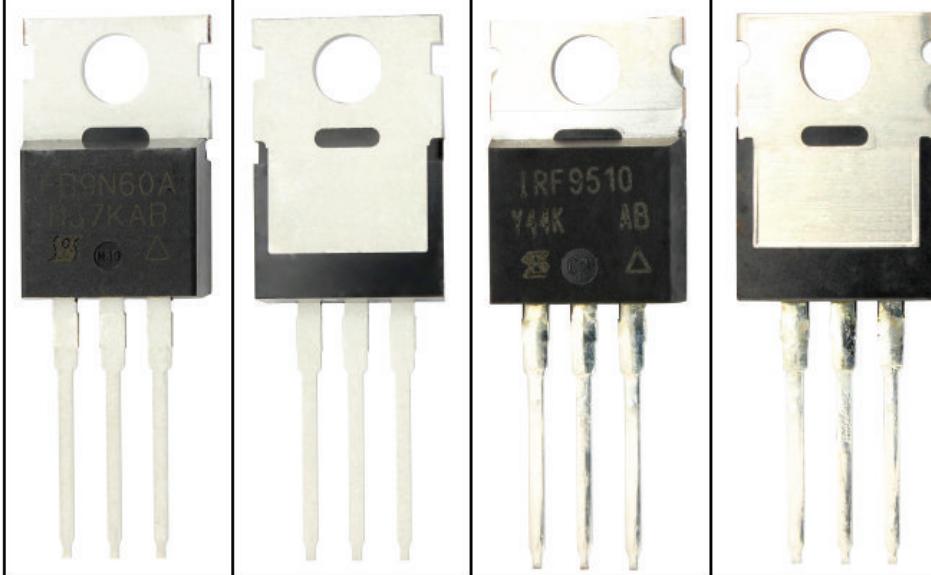
Note

- $M^* = 0.052$ inches to 0.064 inches (dimension including protrusion), heatsink hole for HVM

Package Picture

ASE

Xi'an



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