



Power MOSFET

PRODUCT SUMMARY	
V _{DS} (V) at T _J max.	560
R _{DS(on)} (Ω)	V _{GS} = 10 V 0.38
Q _g (Max.) (nC)	68
Q _{gs} (nC)	17.6
Q _{gd} (nC)	21.8
Configuration	Single

FEATURES

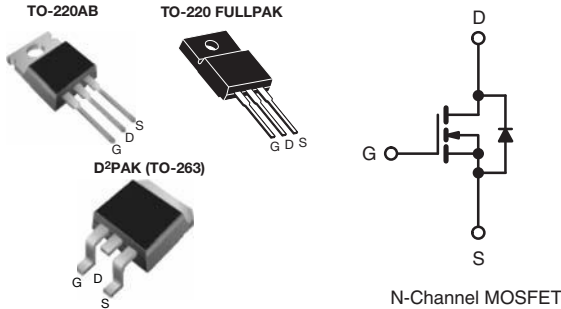
- Low Figure-of-Merit R_{on} x Q_g
- 100 % Avalanche Tested
- Gate Charge Improved
- T_{rr}/Q_{rr} Improved
- Compliant to RoHS Directive 2002/95/EC



RoHS* COMPLIANT

Note

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



ORDERING INFORMATION			
Package	TO-220AB	D ² PAK (TO-263)	TO-220 FULLPAK
	SiHP16N50C-E3	SiHB16N50C-E3	SiHF16N50C-E3
Lead (Pb)-free	-	SiHB16N50CTR-E3	-
	-	SiHB16N50CTL-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	
Continuous Drain Current (T _J = 150 °C) ^a	V _{GS} at 10 V	T _C = 25 °C	16	A
		T _C = 100 °C	10	
Pulsed Drain Current ^c		I _{DM}	40	
Linear Derating Factor			2	W/°C
Single Pulse Avalanche Energy ^b		E _{AS}	320	mJ
Maximum Power Dissipation	TO220-AB, D ² PAK (TO-263)	P _D	250	W
	TO-220 FULLPAK		38	
Operating Junction and Storage Temperature Range		T _J , T _{stg}	- 55 to + 150	°C
Soldering Recommendations (Peak Temperature) ^d		for 10 s	300	

Notes


- Limited by maximum junction temperature.
- V_{DD} = 50 V, starting T_J = 25 °C, L = 2.5 mH, R_g = 25 Ω, I_{AS} = 16 A.
- Repetitive rating; pulse width limited by maximum junction temperature.
- 1.6 mm from case.



THERMAL RESISTANCE RATINGS				
PARAMETER	SYMBOL	TO220-AB D ² PAK (TO-263)	TO-220 FULLPAK	UNIT
Maximum Junction-to-Ambient	R _{thJA}	62	65	°C/W
Maximum Junction-to-Case (Drain)	R _{thJC}	0.5	3.3	
Junction-to-Ambient (PCB mount) ^a	R _{thJA}	40	-	

Note

a. When mounted on 1" square PCB (FR-4 or G-10 material).

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	-	0.6	-	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	-	-	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 = 8 A	-	0.31	0.38	Ω
Forward Transconductance ^a	g _{fs}	V _{DS} = 50 V, I _D = 3 A	-	3	-	S
Dynamic						
Input Capacitance	C _{iss}	V _{GS} = 0 V, V _{DS} = 25 V, f = 1.0 MHz	-	1900	-	pF
Output Capacitance	C _{oss}		-	230	-	
Reverse Transfer Capacitance	C _{rss}		-	24	-	
Total Gate Charge	Q _g	V _{GS} = 10 V, I _D = 16 A, V _{DS} = 400 V	-	45	68	nC
Gate-Source Charge	Q _{gs}		-	18	-	
Gate-Drain Charge	Q _{gd}		-	22	-	
Turn-On Delay Time	t _{d(on)}	V _{DD} = 250 V, I _D = 16 A, R _g = 9.1 Ω, V _{GS} = 10 V	-	27	-	ns
Rise Time	t _r		-	156	-	
Turn-Off Delay Time	t _{d(off)}		-	29	-	
Fall Time	t _f		-	31	-	
Gate Input Resistance	R _g	f = 1 MHz, open drain	-	1.6	-	Ω
Drain-Source Body Diode Characteristics						
Continuous Source-Drain Diode Current	I _S	MOSFET symbol showing the integral reverse p - n junction diode 	-	-	16	A
Pulsed Diode Forward Current	I _{SM}		-	-	30	
Body Diode Voltage	V _{SD}	T _J = 25 °C, I _S = 10 A, V _{GS} = 0 V	-	-	1.8	V
Body Diode Reverse Recovery Time	t _{rr}	T _J = 25 °C, I _F = I _S , dI/dt = 100 A/μs, V _R = 20 V	-	555	-	ns
Body Diode Reverse Recovery Charge	Q _{rr}		-	5.5	-	μC
Body Diode Reverse Recovery Current	I _{RRM}		-	18	-	A

Note

- The information shown here is a preliminary product proposal, not a commercial product data sheet. Vishay Siliconix is not committed to produce this or any similar product. This information should not be used for design purposes, nor construed as an offer to furnish or sell such products.



TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)

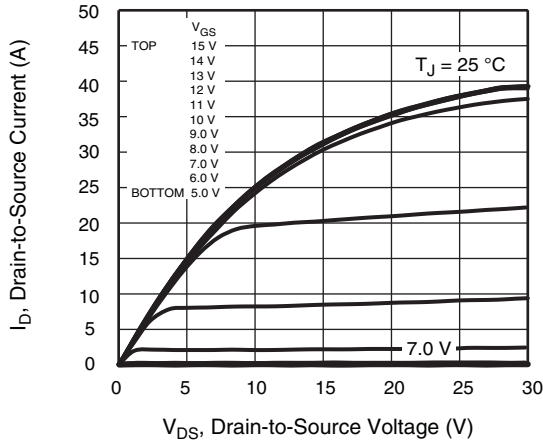


Fig. 1 - Typical Output Characteristics (TO-220)

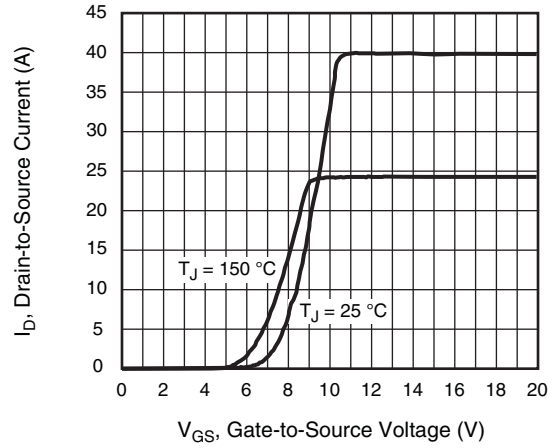


Fig. 3 - Typical Transfer Characteristics

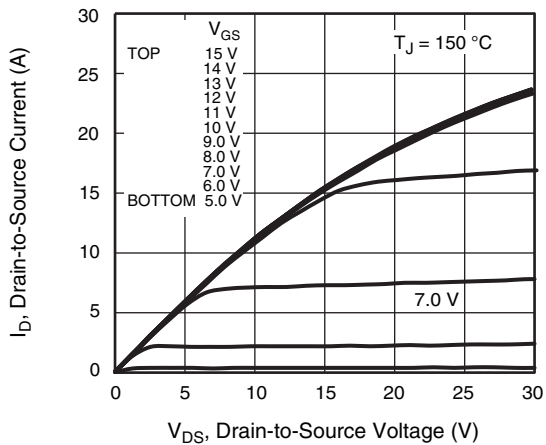


Fig. 2 - Typical Output Characteristics (TO-220)

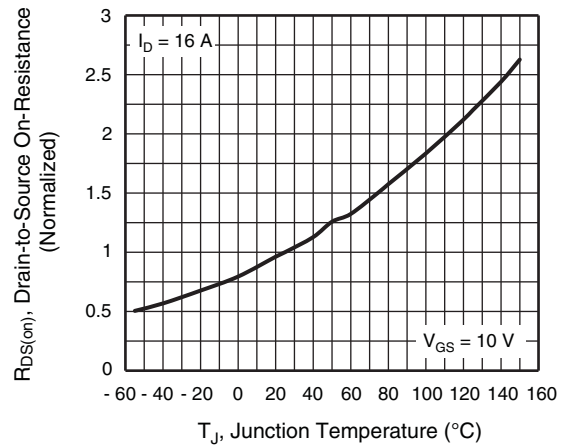


Fig. 4 - Normalized On-Resistance vs. Temperature

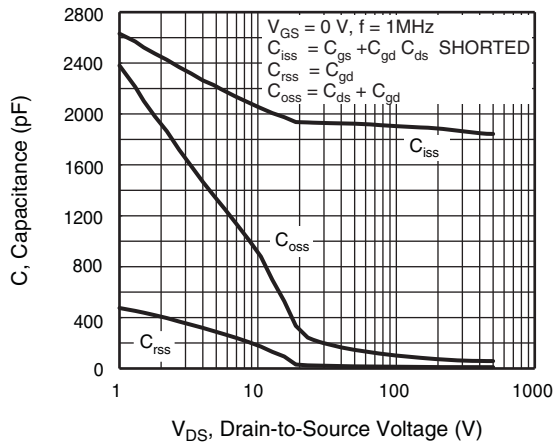


Fig. 5 - Typical Capacitance vs. Drain-to-Source Voltage

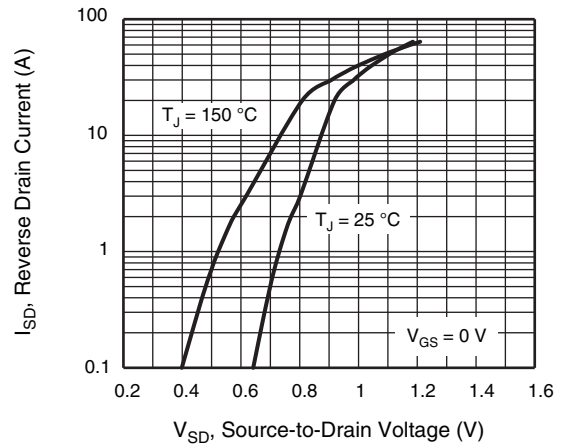


Fig. 7 - Typical Source-Drain Diode Forward Voltage

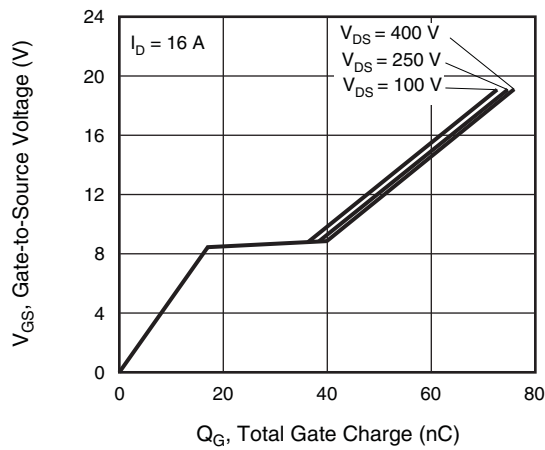


Fig. 6 - Typical Gate Charge vs. Gate-to-Source Voltage

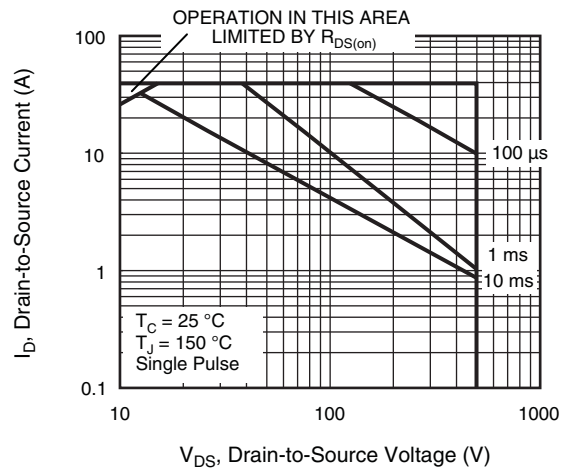


Fig. 8 - Maximum Safe Operating Area (TO-220AB, D²PAK)

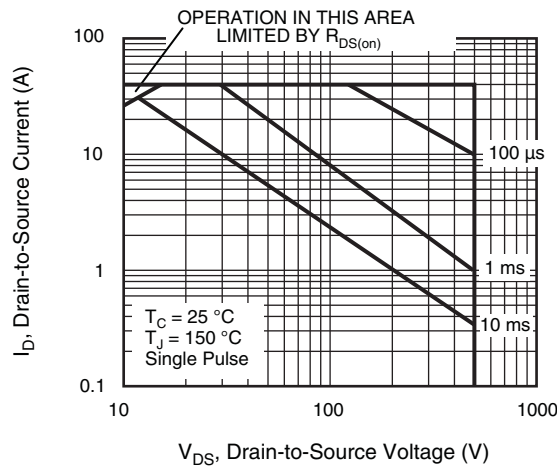


Fig. 9 - Maximum Safe Operating Area (TO-220 FULLPAK)

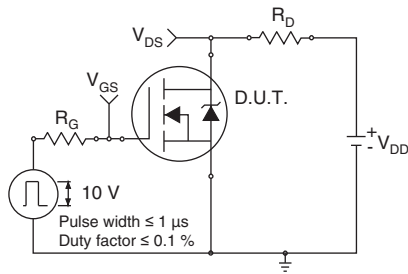


Fig. 10a - Switching Time Test Circuit

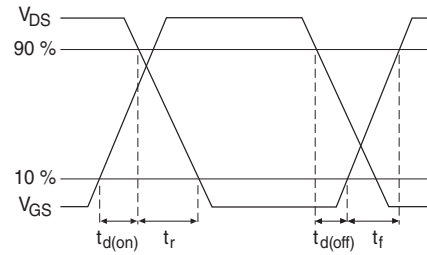


Fig. 10b - Switching Time Waveforms

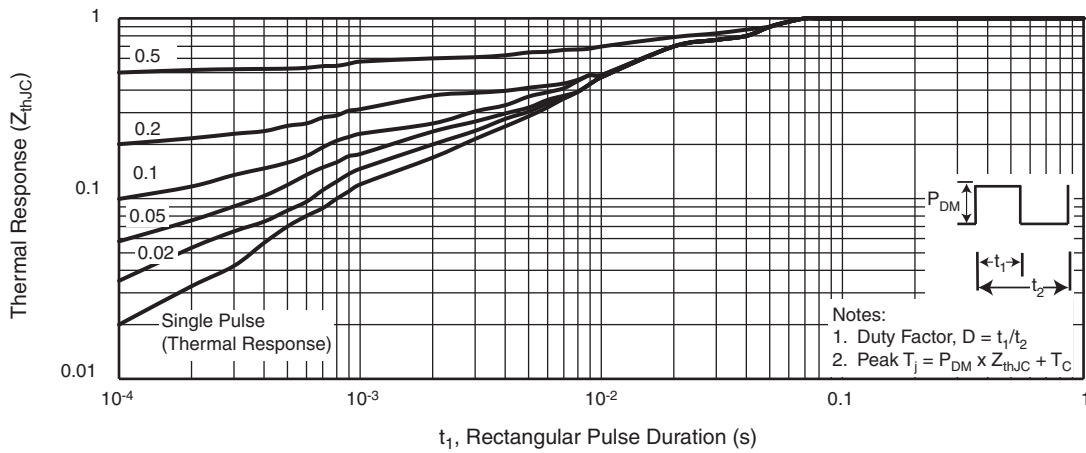


Fig. 11 - Maximum Effective Transient Thermal Impedance, Junction-to-Case (TO-220AB, D²PAK)

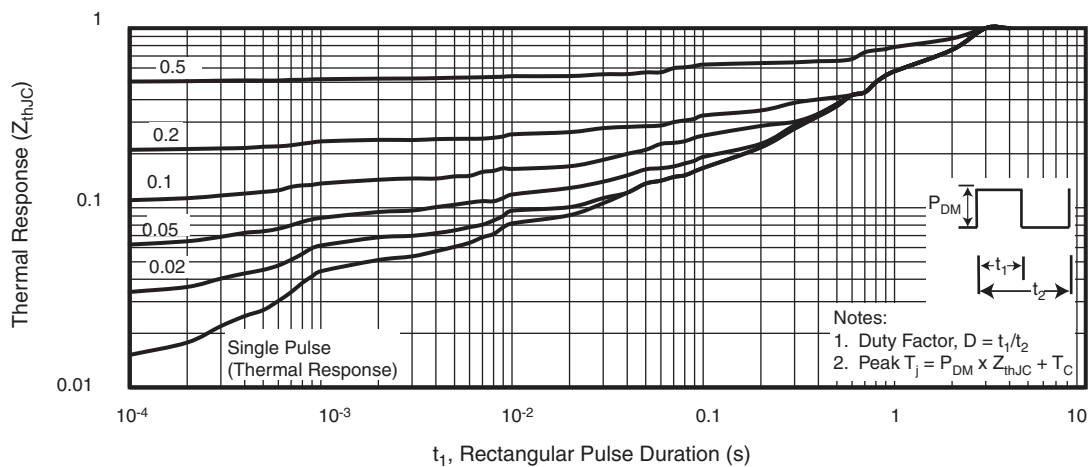


Fig. 12 - Maximum Effective Transient Thermal Impedance, Junction-to-Case (TO-220 FULLPAK)

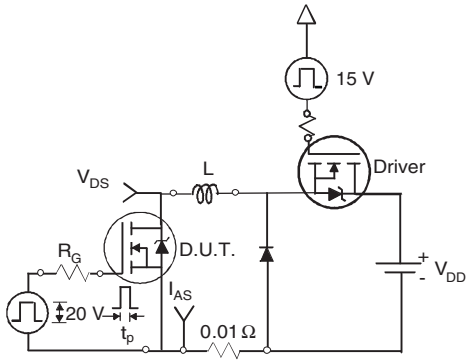


Fig. 13a - Unclamped Inductive Test Circuit

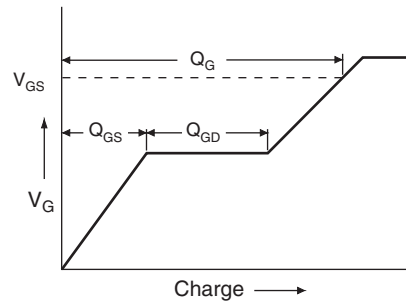


Fig. 14a - Basic Gate Charge Waveform

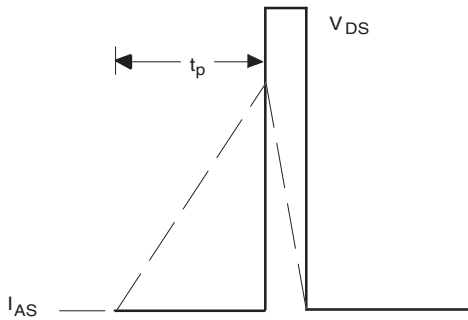


Fig. 13b - Unclamped Inductive Waveforms

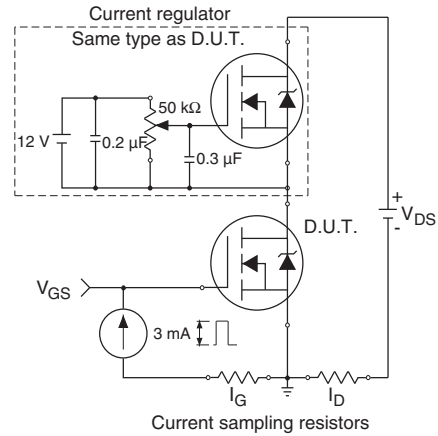
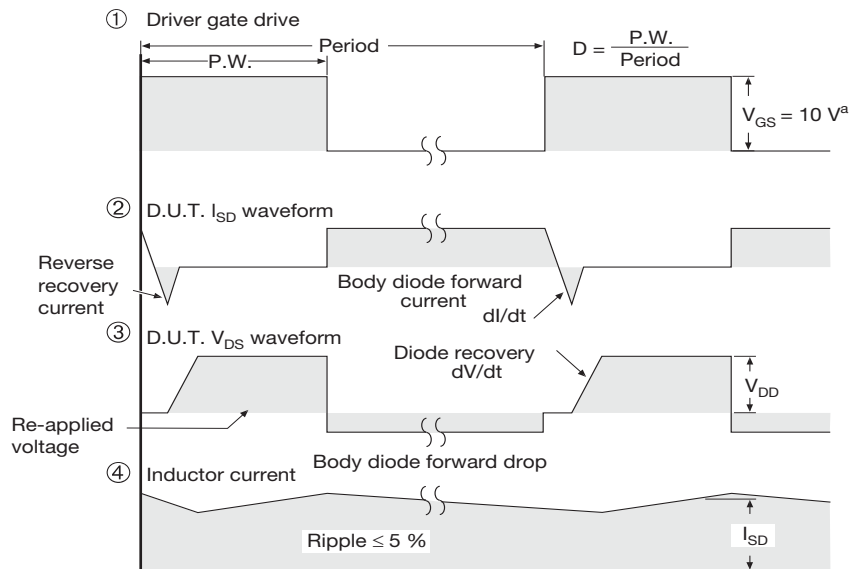
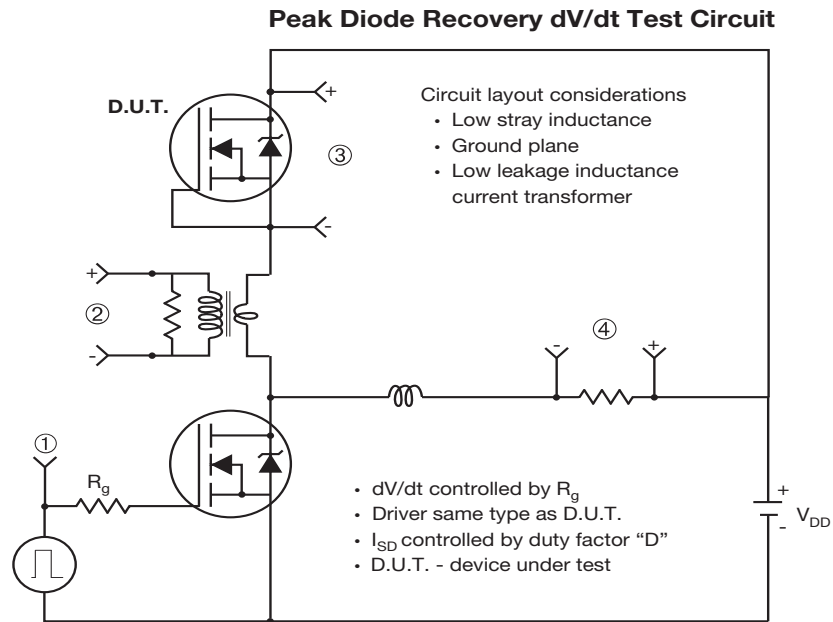


Fig. 14b - Gate Charge Test Circuit



Note

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

Fig. 15 - 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





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