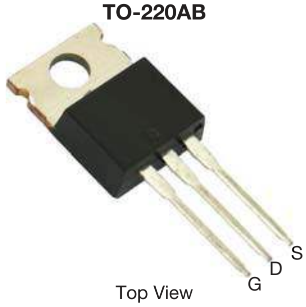
N-Channel 250 V (D-S) 175 °C MOSFET

PRODUCT SUMMARY			
V_{DS} (V)	**$R_{DS(on)}$ (Ω) MAX.**	**I_D (A)**	**Q_g (TYP.)**
250	0.0315 at V_{GS} = 10 V	63	57.6 nC
	0.0325 at V_{GS} = 7.5 V	62	

TO-220AB



Top View

Ordering Information:
SUP10250E-GE3 (lead (Pb)-free and halogen-free)

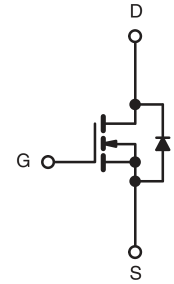
FEATURES

- ThunderFET® power MOSFET
- Tuned for the lowest R_{DS}-C_{oss} FOM
- Maximum 175 °C junction temperature
- 100 % R_g and UIS tested
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912

RoHS COMPLIANT HALOGEN FREE

APPLICATIONS

- Power supplies:
  - Uninterruptible power supplies
  - AC/DC switch-mode power supplies
  - Lighting
- Synchronous rectification
- DC/DC converter
- Motor drive switch
- DC/AC inverter
- Solar micro inverter
- Class D audio amplifier



N-Channel MOSFET

ABSOLUTE MAXIMUM RATINGS (T_C = 25 °C, unless otherwise noted)				
PARAMETER		**SYMBOL**	**LIMIT**	**UNIT**
Drain-Source Voltage		V_{DS}	250	V
Gate-Source Voltage		V_{GS}	± 20	
Continuous Drain Current (T_J = 150 °C)	T_C = 25 °C	I_D	63	A
	T_C = 70 °C		36.3	
Pulsed Drain Current (t = 100 μs)		I_{DM}	150	
Avalanche Current	L = 0.1 mH	I_{AS}	60	
Single Avalanche Energy [a]		E_{AS}	180	mJ
Maximum Power Dissipation [a]	T_C = 25 °C	P_D	375 [b]	W
	T_C = 125 °C		125 [b]	
Operating Junction and Storage Temperature Range		T_J, T_{stg}	-55 to +175	°C

THERMAL RESISTANCE RATINGS			
PARAMETER	**SYMBOL**	**LIMIT**	**UNIT**
Junction-to-Ambient (PCB mount) [c]	R_{thJA}	40	°C/W
Junction-to-Case (Drain)	R_{thJC}	0.4	

Notes

a. Duty cycle ≤ 1 %.
b. See SOA curve for voltage derating.
c. When mounted on 1" square PCB (FR4 material).

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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	250	-	-	V
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}$, I_D = 250 μA	2	-	4	
Gate-Body Leakage	I_{GSS}	V_{DS} = 0 V, V_{GS} = ± 20 V	-	-	± 250	nA
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS} = 250 V, V_{GS} = 0 V	-	-	1	μA
		V_{DS} = 250 V, V_{GS} = 0 V, T_J = 125 °C	-	-	150	
		V_{DS} = 250 V, V_{GS} = 0 V, T_J = 175 °C	-	-	5	mA
On-State Drain Current [a]	$I_{D(on)}$	$V_{DS} \geq$ 10 V, V_{GS} = 10 V	90	-	-	A
Drain-Source On-State Resistance [a]	$R_{DS(on)}$	V_{GS} = 10 V, I_D = 30 A	-	0.0250	0.0315	Ω
		V_{GS} = 7.5 V, I_D = 30 A	-	0.0260	0.0325	
Forward Transconductance [a]	g_{fs}	V_{DS} = 15 V, I_D = 30 A	-	63	-	S
Dynamic [b]						
Input Capacitance	C_{iss}	V_{GS} = 0 V, V_{DS} = 125 V, f = 1 MHz	-	3002	-	pF
Output Capacitance	C_{oss}		-	184	-	
Reverse Transfer Capacitance	C_{rss}		-	18	-	
Total Gate Charge [c]	Q_g	V_{DS} = 125 V, V_{GS} = 10 V, I_D = 60 A	-	57.6	88	nC
Gate-Source Charge [c]	Q_{gs}		-	15.1	-	
Gate-Drain Charge [c]	Q_{gd}		-	18.4	-	
Gate Resistance	R_g	f = 1 MHz	1.5	3.1	5	Ω
Turn-On Delay Time [c]	$t_{d(on)}$	V_{DD} = 125 V, R_L = 2.08 Ω $I_D \cong$ 60 A, V_{GEN} = 10 V, R_g = 1 Ω	-	13	26	ns
Rise Time [c]	t_r		-	93	186	
Turn-Off Delay Time [c]	$t_{d(off)}$		-	30	60	
Fall Time [c]	t_f		-	72	144	
Drain-Source Body Diode Ratings and Characteristics [b] (T_C = 25 °C)						
Pulsed Current (t = 100 μs)	I_{SM}		-	-	100	A
Forward Voltage [a]	V_{SD}	I_F = 10 A, V_{GS} = 0 V	-	0.79	1.2	V
Reverse Recovery Time	t_{rr}	I_F = 30 A, di/dt = 100 A/μs	-	212	420	ns
Peak Reverse Recovery Charge	$I_{RM(REC)}$		-	14.5	29	A
Reverse Recovery Charge	Q_{rr}		-	1.6	3.2	μC

Notes

a. Pulse test; pulse width ≤ 300 μs, duty cycle ≤ 2 %.
b. Guaranteed by design, not subject to production testing.
c. Independent of operating temperature.

Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

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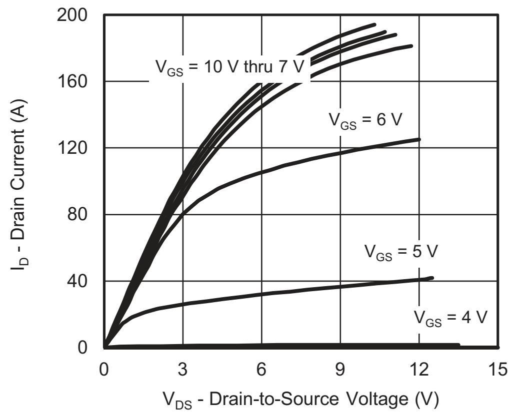
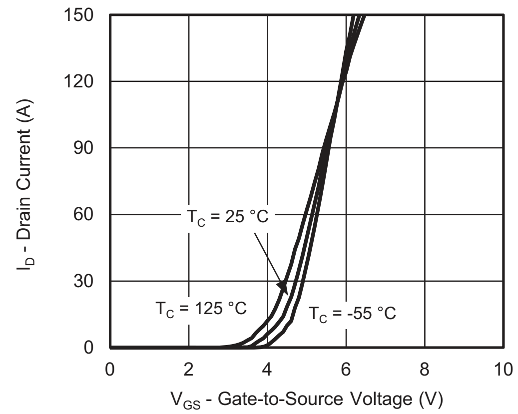
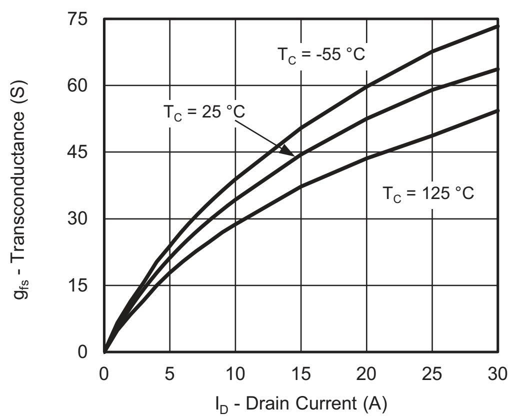
TYPICAL CHARACTERISTICS (T_A = 25 °C, unless otherwise noted)



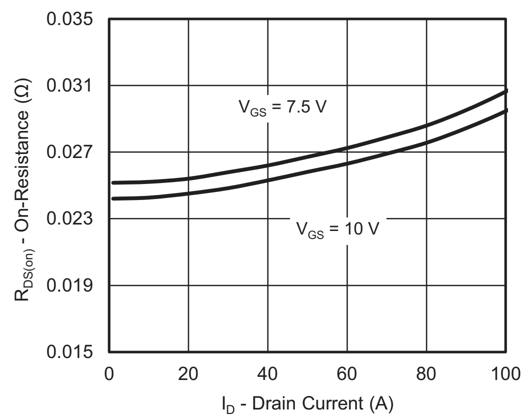
Output Characteristics



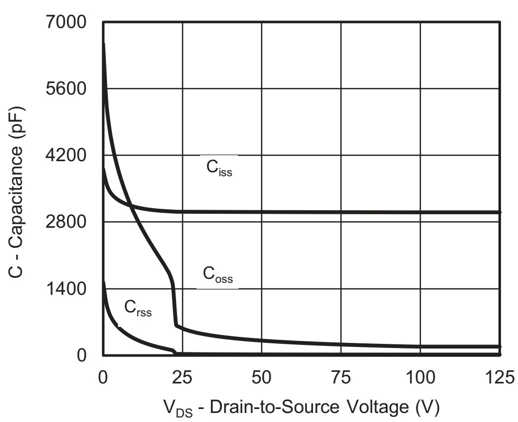
Transfer Characteristics



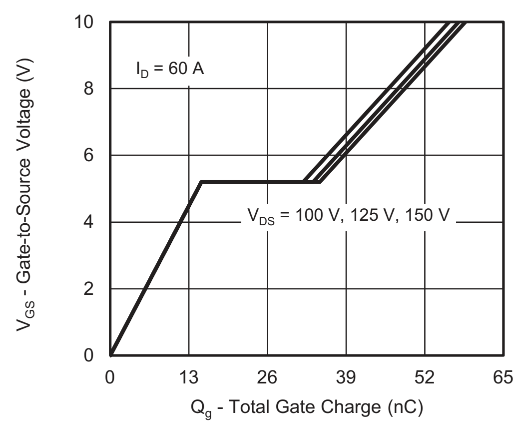
Transconductance



On-Resistance vs. Drain Current



Capacitance



Gate Charge

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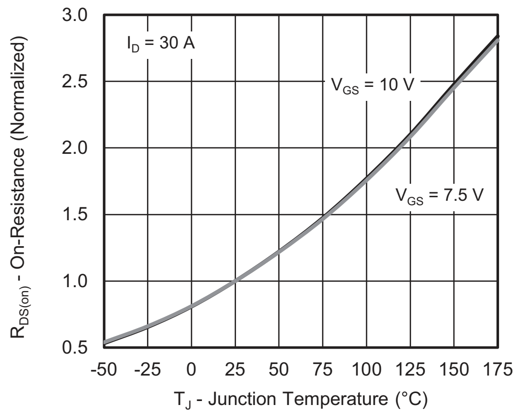
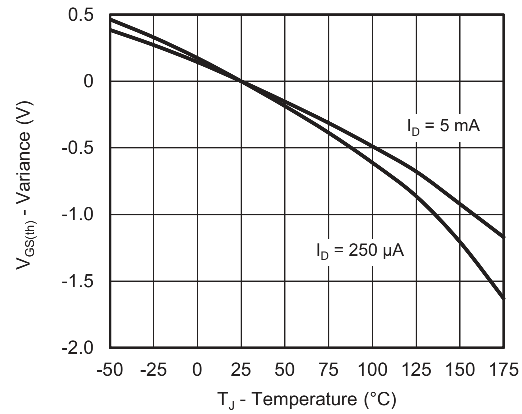
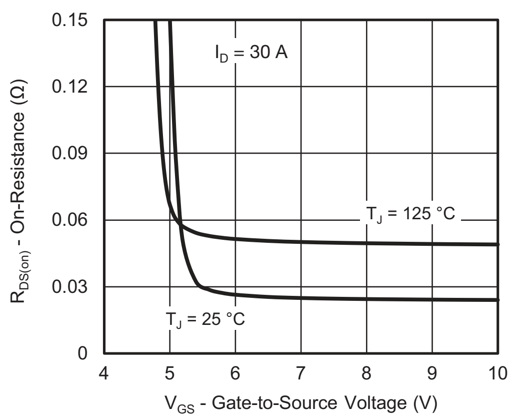


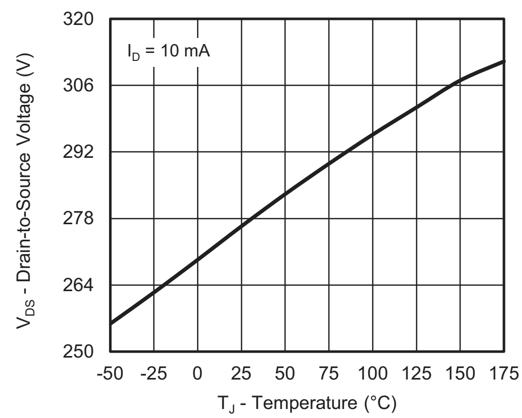
On-Resistance vs. Junction Temperature



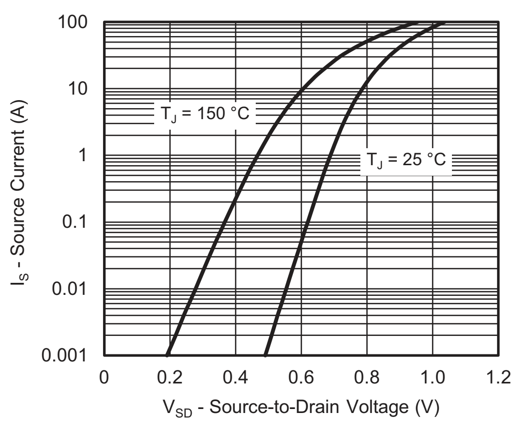
Threshold Voltage



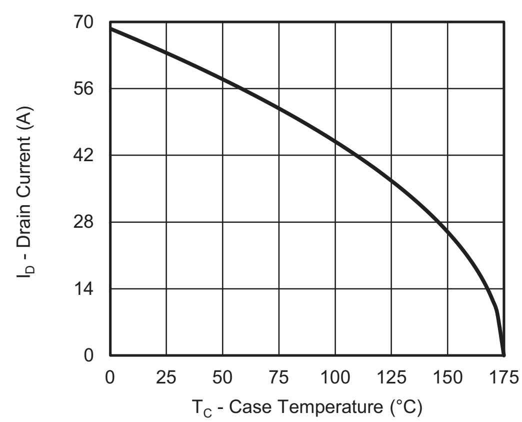
On-Resistance vs. Gate-to-Source Voltage



Drain Source Breakdown vs. Junction Temperature



Source Drain Diode Forward Voltage



Current Derating

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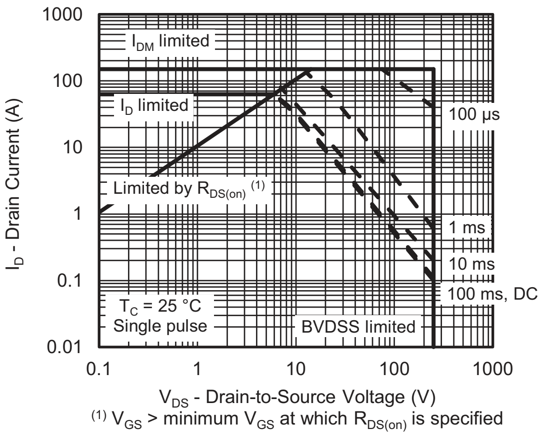
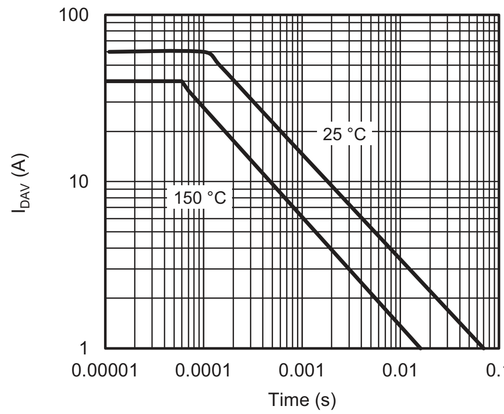
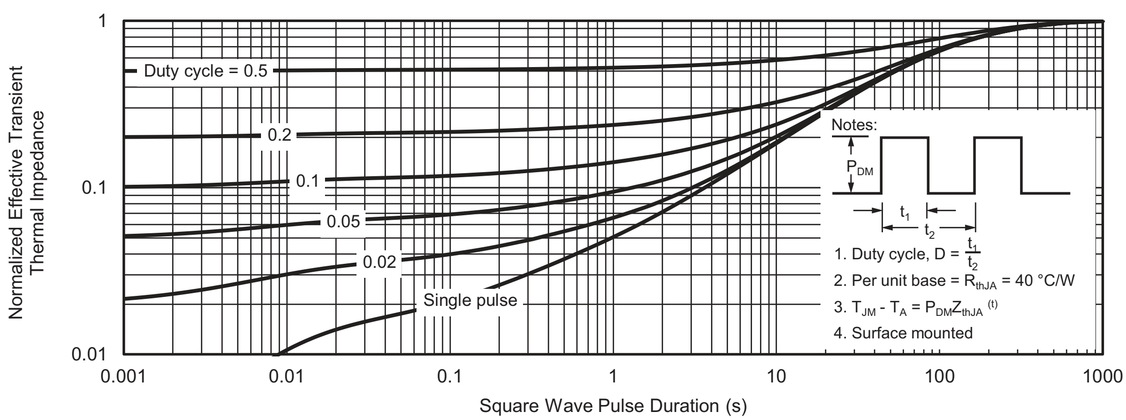


Safe Operating Area



Single Pulse Avalanche Current Capability vs. Time



Normalized Thermal Transient Impedance, Junction-to-Ambient

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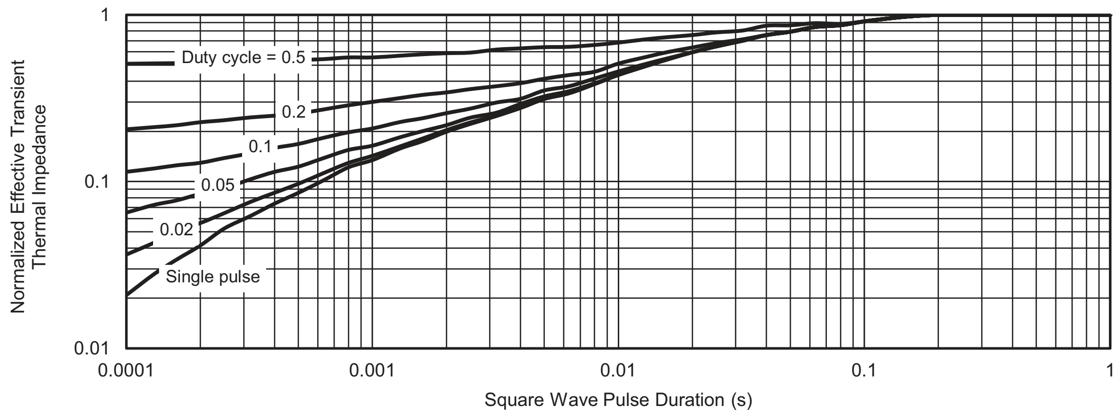

Normalized Thermal Transient Impedance, Junction-to-Case

Note

- The characteristics shown in the two graphs
  - Normalized Transient Thermal Impedance Junction to Ambient (25 °C)
  - Normalized Transient Thermal Impedance Junction to Case (25 °C)

  are given for general guidelines only to enable the user to get a “ball park” indication of part capabilities. The data are extracted from single pulse transient thermal impedance characteristics which are developed from empirical measurements. The latter is valid for the part mounted on printed circuit board - FR4, size 1" x 1" x 0.062", double sided with 2 oz. copper, 100 % on both sides. The part capabilities can widely vary depending on actual application parameters and operating conditions.

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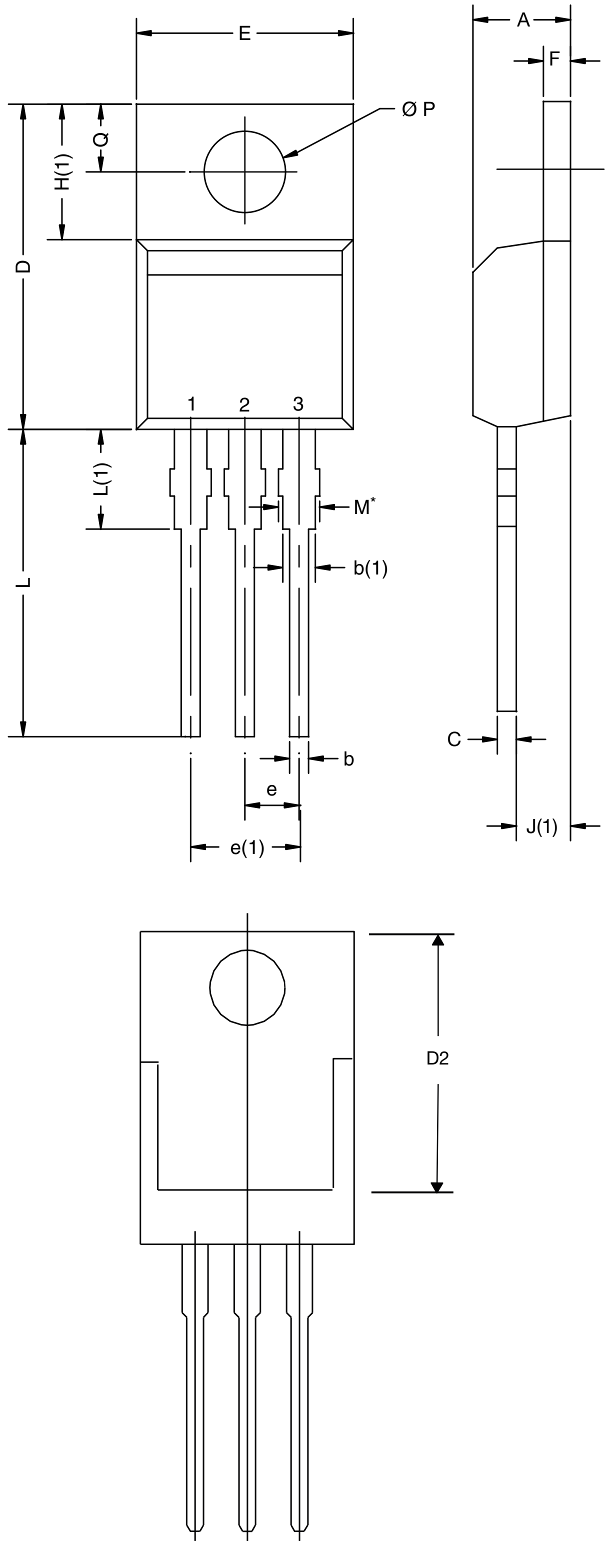
TO-220AB



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
D2	12.19	12.70	0.480	0.500
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: T14-0413-Rev. P, 16-Jun-14 DWG: 5471				

Note

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

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