PHP28NQ15T-VB Datasheet

N-Channel 150 V (D-S) MOSFET

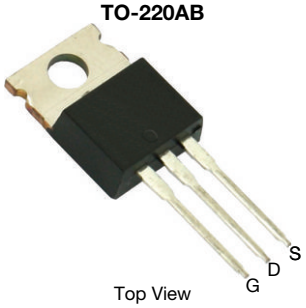
PRODUCT SUMMARY	
V_{DS} (V)	150
$R_{DS(on)}$ (Ω) at V_{GS} = 10 V	0.075
I_D (A)	20
Configuration	Single
Package	TO-220

FEATURES

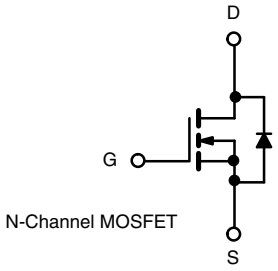
- Trench power MOSFET
- Package with low thermal resistance
- 100 % R_g and UIS tested

RoHS COMPLIANT

TO-220AB



Top View



N-Channel MOSFET

ABSOLUTE MAXIMUM RATINGS (T_C = 25 °C, unless otherwise noted)				
PARAMETER		**SYMBOL**	**LIMIT**	**UNIT**
Drain-Source Voltage		V_{DS}	150	V
Gate-Source Voltage		V_{GS}	± 20	
Continuous Drain Current	T_C = 25 °C	I_D	20	A
	T_C = 125 °C		14	
Continuous Source Current (Diode Conduction) [a]		I_S	50	
Pulsed Drain Current [b]		I_{DM}	60	
Single Pulse Avalanche Energy	L = 0.1 mH	I_{AS}	30	
Single Pulse Avalanche Current		E_{AS}	45	mJ
Maximum Power Dissipation [b]	T_C = 25 °C	P_D	107	W
	T_C = 125 °C		35	
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}	50	°C/W
Junction-to-Case (Drain)		R_{thJC}	1.4	

Notes

a. Package limited.
b. Pulse test; pulse width ≤ 300 μs, duty cycle ≤ 2 %.
c. When mounted on 1" square PCB (FR4 material).
d. Parametric verification ongoing.

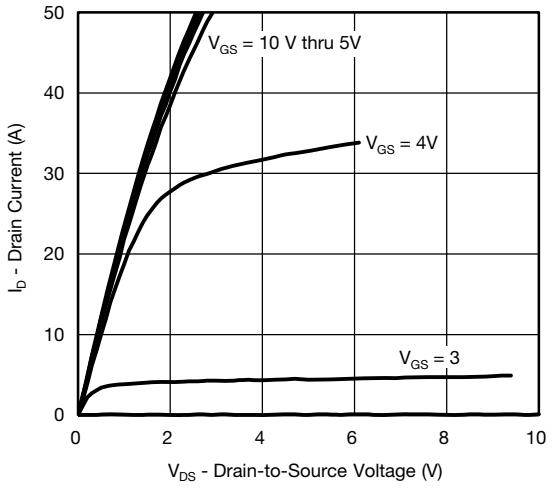
SPECIFICATIONS (T_C = 25 °C, unless otherwise noted)							
PARAMETER	**SYMBOL**	**TEST CONDITIONS**		**MIN.**	**TYP.**	**MAX.**	**UNIT**
Static							
Drain-Source Breakdown Voltage	V_{DS}	V_{GS} = 0 V, I_D = 250 µA		150	-	-	V
Gate-Source Threshold Voltage	$V_{GS(th)}$	V_{DS} = V_{GS}, I_D = 250 µA		1.5	-	3.5	
Gate-Source Leakage	I_{GSS}	V_{DS} = 0 V, V_{GS} = ± 20 V		-	-	± 100	nA
Zero Gate Voltage Drain Current	I_{DSS}	V_{GS} = 0 V	V_{DS} = 150 V	-	-	1	µA
		V_{GS} = 0 V	V_{DS} = 150 V, T_J = 125 °C	-	-	50	
		V_{GS} = 0 V	V_{DS} = 150 V, T_J = 175 °C	-	-	250	
On-State Drain Current [a]	$I_{D(on)}$	V_{GS} = 10 V	V_{DS} ≥ 5 V	30	-	-	A
Drain-Source On-State Resistance [a]	$R_{DS(on)}$	V_{GS} = 10 V	I_D = 12 A	-	0.075	-	Ω
		V_{GS} = 10 V	I_D = 12 A, T_J = 125 °C	-	0.116	-	
		V_{GS} = 10 V	I_D = 12 A, T_J = 175 °C	-	0.158	-	
Forward Transconductance [b]	g_{fs}	V_{DS} = 12 V, I_D = 15 A		-	33	-	S
Dynamic [b]							
Input Capacitance	C_{iss}	V_{GS} = 0 V	V_{DS} = 25 V, f = 1 MHz	-	1090	1660	pF
Output Capacitance	C_{oss}			-	165	200	
Reverse Transfer Capacitance	C_{rss}			-	82	120	
Total Gate Charge [c]	Q_g	V_{GS} = 10 V	V_{DS} = 75 V, I_D = 20 A	-	27	50	nC
Gate-Source Charge [c]	Q_{gs}			-	7.5	-	
Gate-Drain Charge [c]	Q_{gd}			-	10.2	-	
Gate Resistance	R_g	f = 1 MHz		0.35	1.0	3.2	Ω
Turn-On Delay Time [c]	$t_{d(on)}$	V_{DD} = 75 V, R_L = 3 Ω I_D ≅ 20A, V_{GEN} = 10 V, R_g = 1 Ω		-	11	17	ns
Rise Time [c]	t_r			-	21	33	
Turn-Off Delay Time [c]	$t_{d(off)}$			-	20	30	
Fall Time [c]	t_f			-	12	20	
Source-Drain Diode Ratings and Characteristics [b]							
Pulsed Current [a]	I_{SM}			-	-	65	A
Forward Voltage	V_{SD}	I_F = 20 A, V_{GS} = 0 V		-	0.85	1.5	V

Notes

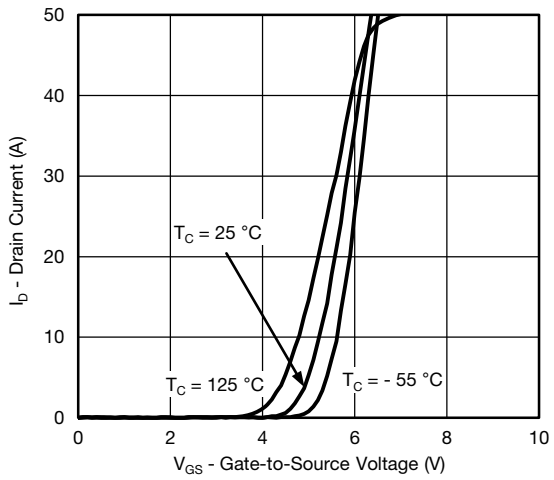
a. Pulse test; pulse width ≤ 300 µs, duty cycle ≤ 2 %.
b. Guaranteed by design, not subject to production testing.
c. Independent of operating temperature.

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.

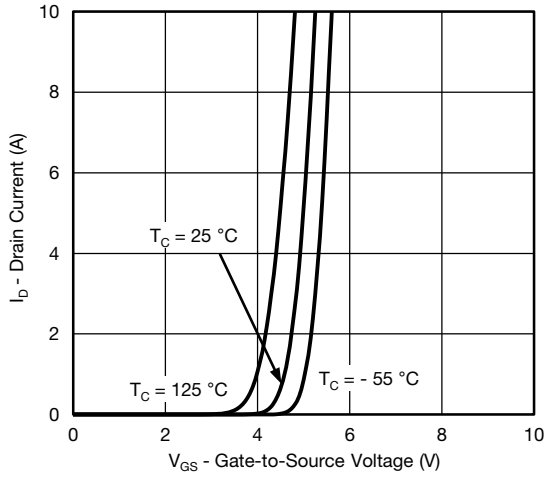
TYPICAL CHARACTERISTICS (T_A = 25 °C, unless otherwise noted)



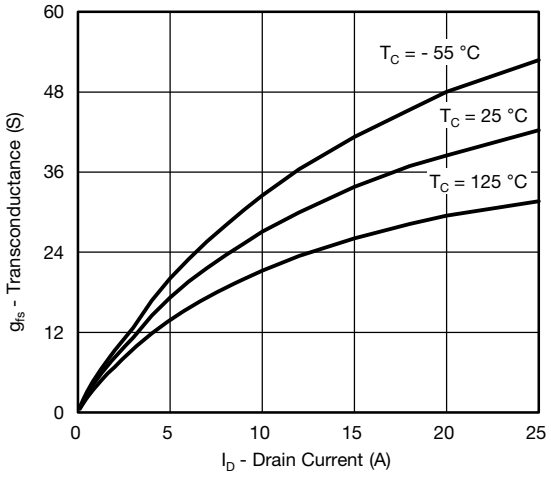
Output Characteristics



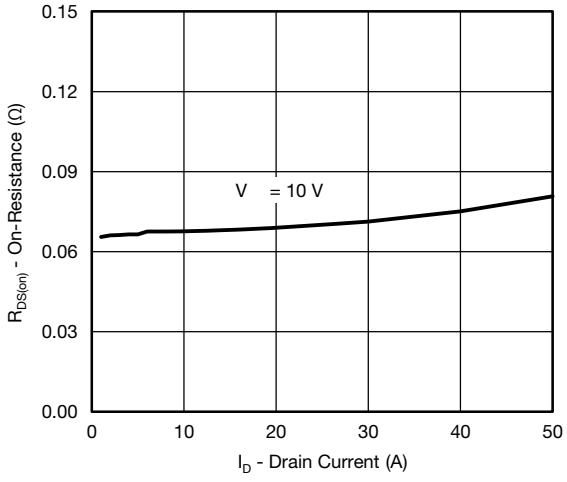
Transfer Characteristics



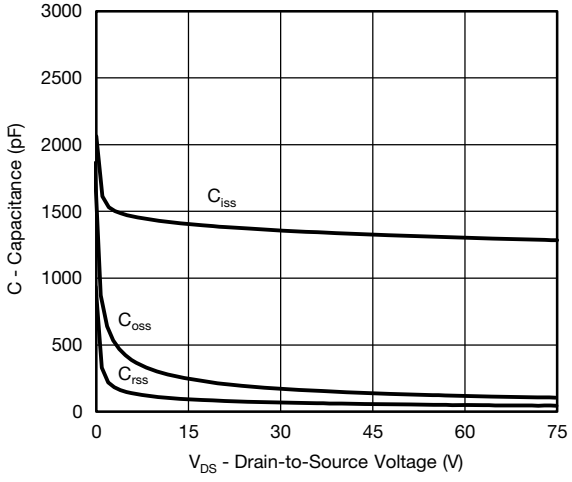
Transfer Characteristics



Transconductance

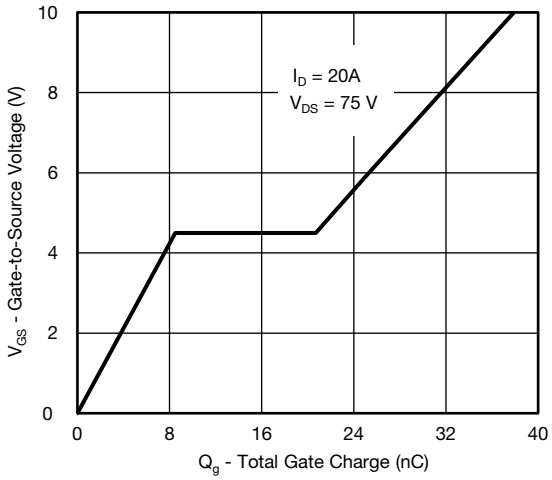


On-Resistance vs. Drain Current

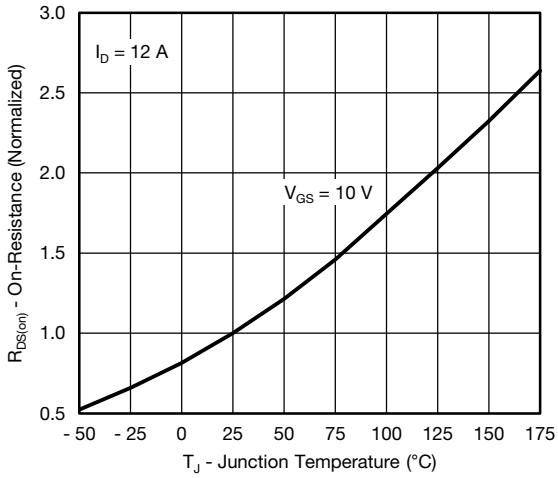


Capacitance

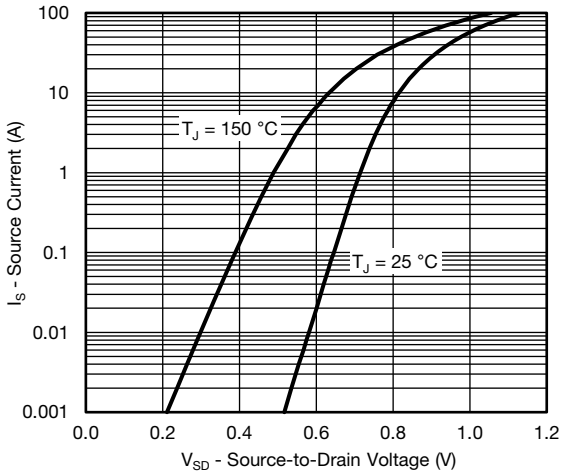
TYPICAL CHARACTERISTICS (T_A = 25 °C, unless otherwise noted)



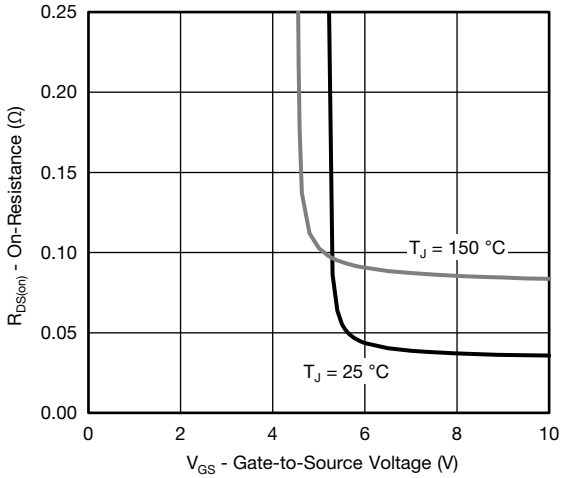
Gate Charge



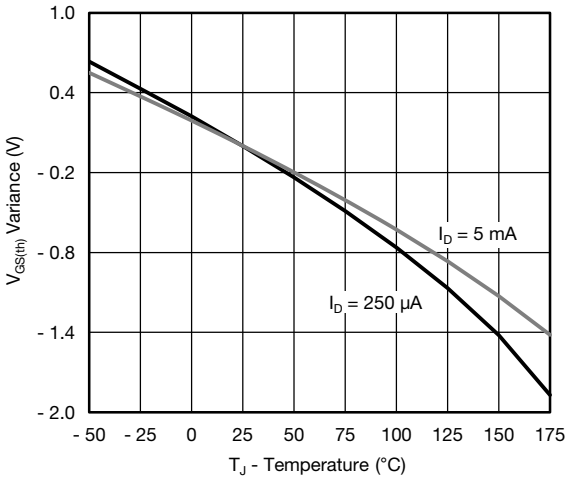
On-Resistance vs. Junction Temperature



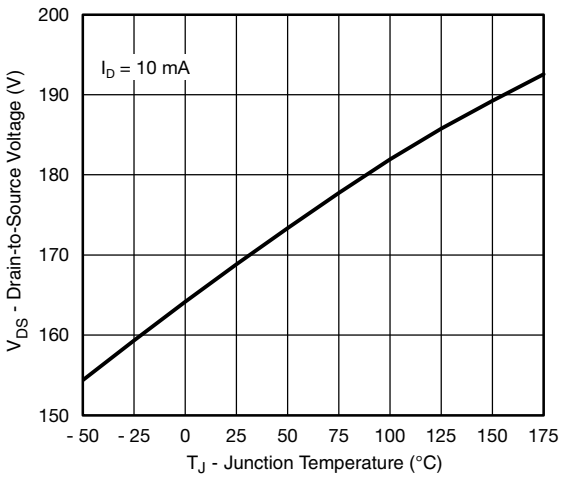
Source Drain Diode Forward Voltage



On-Resistance vs. Gate-to-Source Voltage

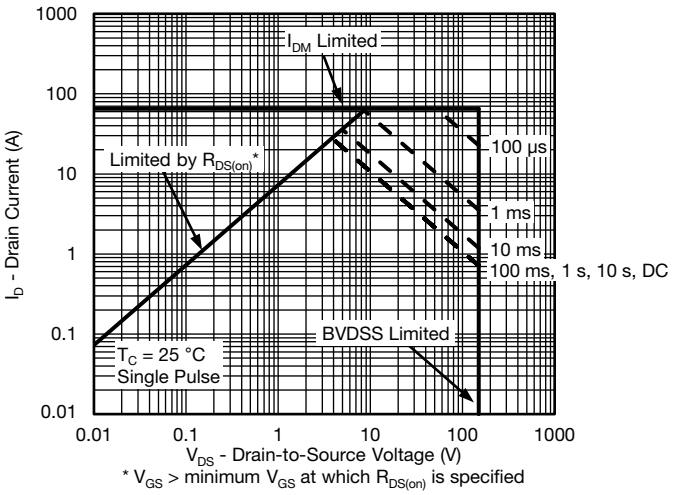


Threshold Voltage

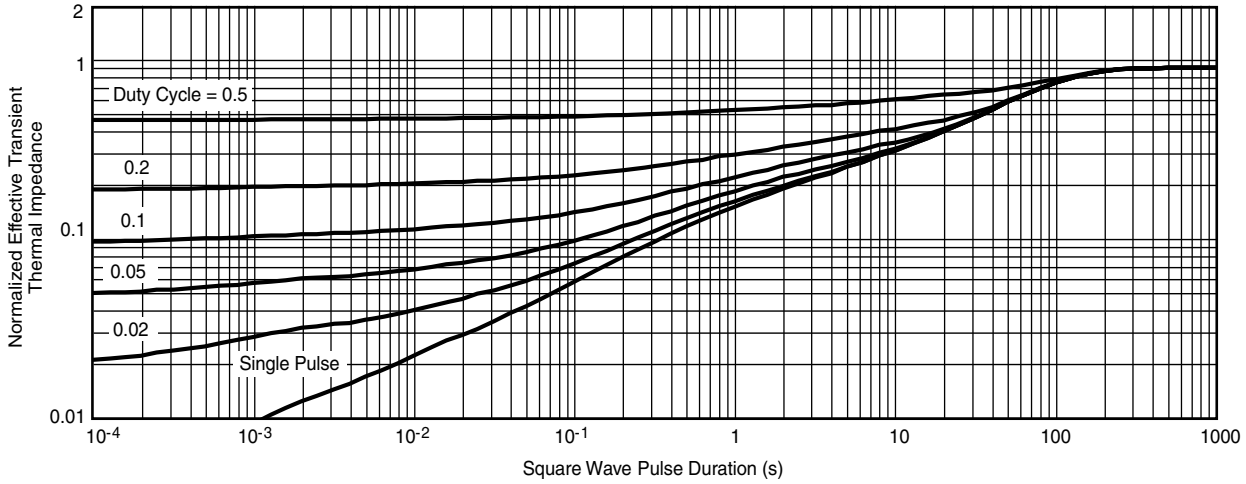


Drain Source Breakdown vs. Junction Temperature

THERMAL RATINGS (T_A = 25 °C, unless otherwise noted)

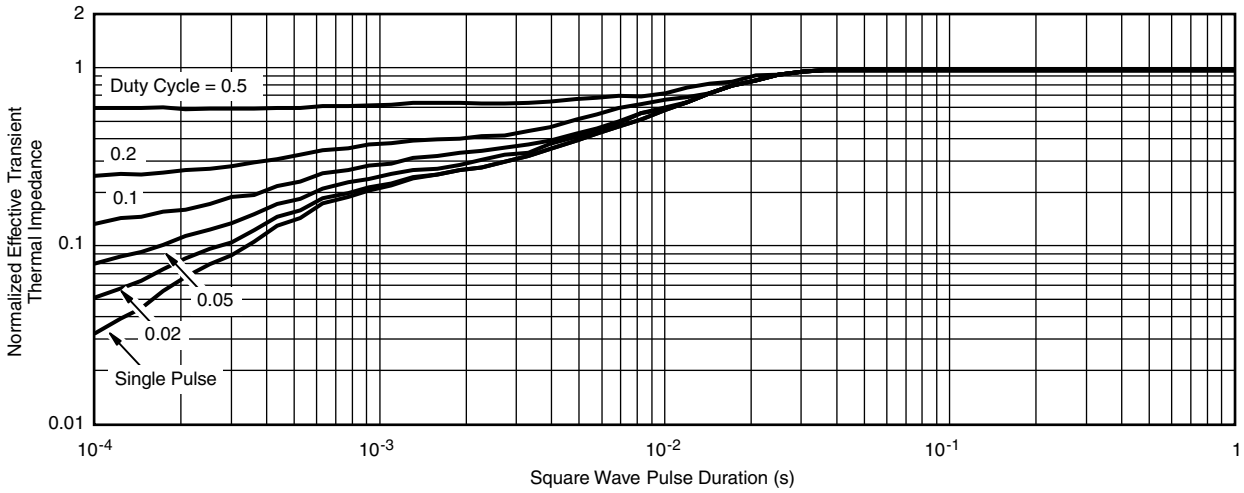


Safe Operating Area



Normalized Thermal Transient Impedance, Junction-to-Ambient

THERMAL RATINGS (T_A = 25 °C, unless otherwise noted)



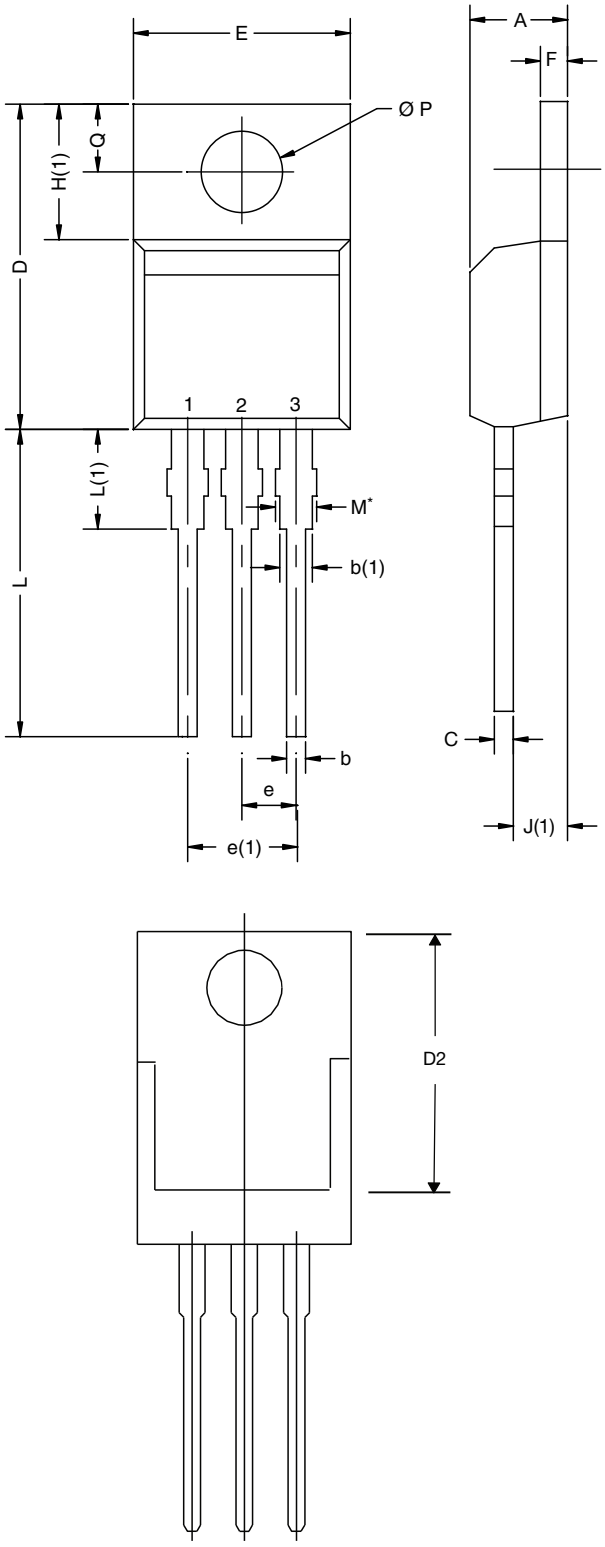
Normalized Thermal Transient Impedance, Junction-to-Case

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.

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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