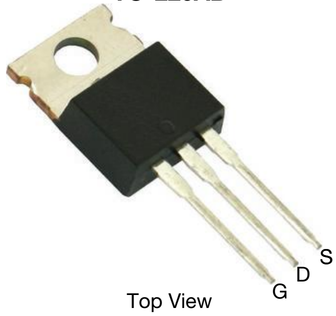
270N8F7-VB Datasheet

N-Channel 80 V (D-S) MOSFET

PRODUCT SUMMARY			
V_{DS} (V)	$R_{DS(on)}$ (Ω) MAX.	I_D (A)	Q_g (TYP.)
80	0.0028 at V_{GS} = 10 V	195	94
	0.0030 at V_{GS} = 7.5 V	185	



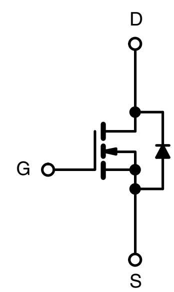
FEATURES

- TrenchFET® power MOSFET
- Maximum 175 °C junction temperature
- Very low Q_{gd} reduces power loss from passing through $V_{plateau}$
- 100 % R_g and UIS tested

RoHS COMPLIANT
HALOGEN FREE

APPLICATIONS

- Power supply
  - Secondary synchronous rectification
- DC/DC converter
- Power tools
- Motor drive switch
- DC/AC inverter
- Battery management



N-Channel MOSFET

ABSOLUTE MAXIMUM RATINGS (T_C = 25 °C, unless otherwise noted)				
PARAMETER		SYMBOL	LIMIT	UNIT
Drain-Source Voltage		V_{DS}	80	V
Gate-Source Voltage		V_{GS}	± 20	
Continuous Drain Current (T_J = 150 °C)	T_C = 25 °C	I_D	195	A
	T_C = 70 °C		120 [d]	
Pulsed Drain Current (t = 100 μs)		I_{DM}	600	
Avalanche Current		I_{AS}	70	
Single Avalanche Energy [a]	L = 0.1 mH	E_{AS}	245	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

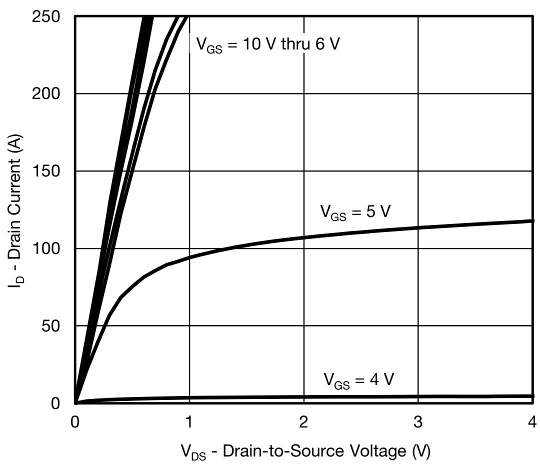
a. Duty cycle ≤ 1 %.
b. See SOA curve for voltage derating.
c. When mounted on 1" square PCB (FR4 material).
d. Package limited.

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	80	-	-	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} = 80 V, V_{GS} = 0 V	-	-	1	μA
		V_{DS} = 80 V, V_{GS} = 0 V, T_J = 125 °C	-	-	150	
		V_{DS} = 80 V, V_{GS} = 0 V, T_J = 175 °C	-	-	5	mA
On-State Drain Current [a]	$I_{D(on)}$	V_{DS} ≥ 10 V, V_{GS} = 10 V	120	-	-	A
Drain-Source On-State Resistance [a]	$R_{DS(on)}$	V_{GS} = 10 V, I_D = 30 A	-	0.0028	-	Ω
		V_{GS} = 7.5 V, I_D = 20 A	-	0.0030	-	
Forward Transconductance [a]	g_{fs}	V_{DS} = 15 V, I_D = 30 A	-	82	-	S
Dynamic [b]						
Input Capacitance	C_{iss}	V_{GS} = 0 V, V_{DS} = 40 V, f = 1 MHz	-	7910	-	pF
Output Capacitance	C_{oss}		-	3250	-	
Reverse Transfer Capacitance	C_{rss}		-	348	-	
Total Gate Charge [c]	Q_g	V_{DS} = 40 V, V_{GS} = 10 V, I_D = 20 A	-	94	141	nC
Gate-Source Charge [c]	Q_{gs}		-	31	-	
Gate-Drain Charge [c]	Q_{gd}		-	10	-	
Gate Resistance	R_g	f = 1 MHz	0.28	1.4	2.8	Ω
Turn-On Delay Time [c]	$t_{d(on)}$	V_{DD} = 40 V, R_L = 4 Ω I_D ≅ 10 A, V_{GEN} = 10 V, R_g = 1 Ω	-	24	40	ns
Rise Time [c]	t_r		-	24	40	
Turn-Off Delay Time [c]	$t_{d(off)}$		-	34	60	
Fall Time [c]	t_f		-	14	28	
Drain-Source Body Diode Ratings and Characteristics [b] (T_C = 25 °C)						
Pulsed Current (t = 100 μs)	I_{SM}		-	-	250	A
Forward Voltage [a]	V_{SD}	I_F = 10 A, V_{GS} = 0 V	-	0.8	1.5	V
Reverse Recovery Time	t_{rr}	I_F = 34 A, di/dt = 100 A/μs	-	126	190	ns
Peak Reverse Recovery Charge	$I_{RM(REC)}$		-	5	10	A
Reverse Recovery Charge	Q_{rr}		-	0.315	0.475	μC

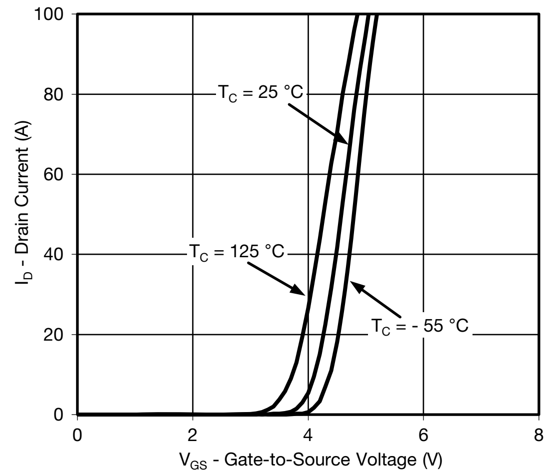
Notes

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

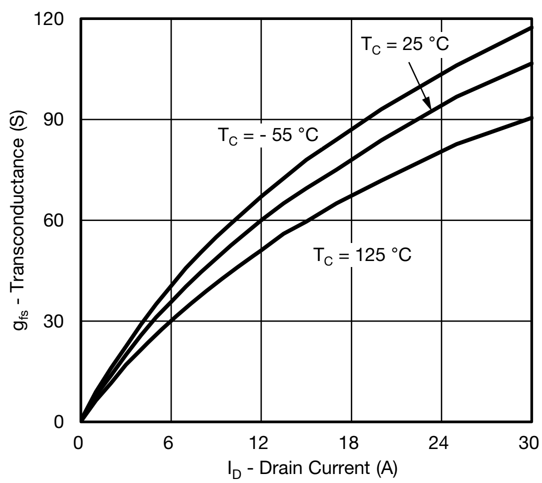
TYPICAL CHARACTERISTICS (T_A = 25 °C, unless otherwise noted)



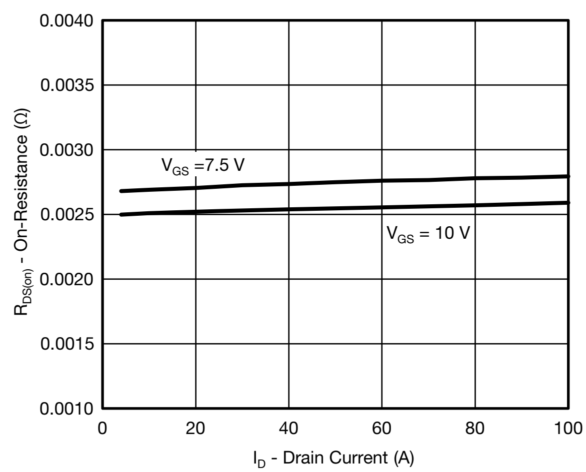
Output Characteristics



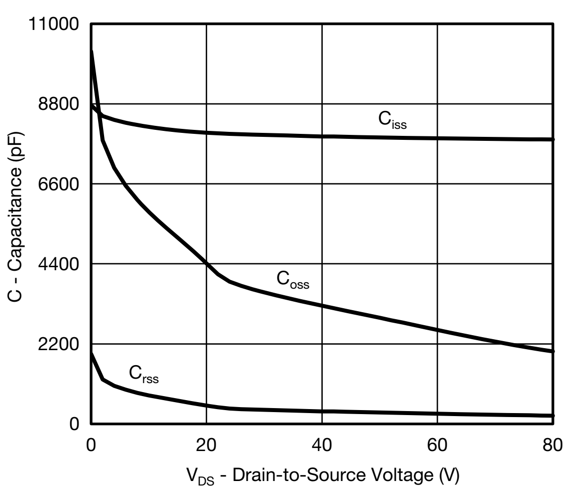
Transfer Characteristics



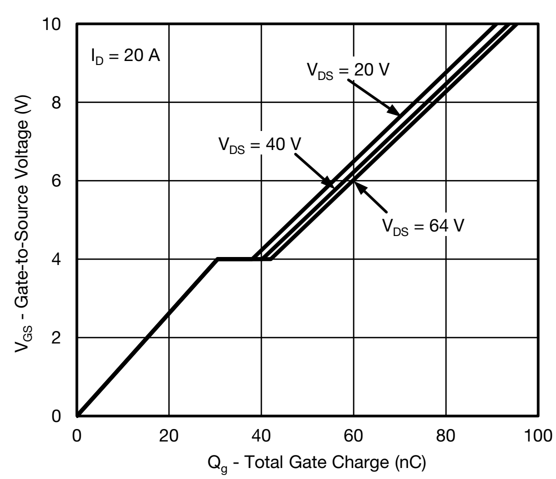
Transconductance



On-Resistance vs. Drain Current

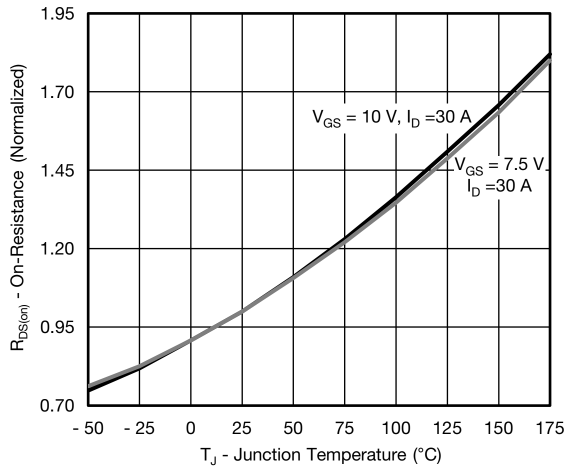


Capacitance

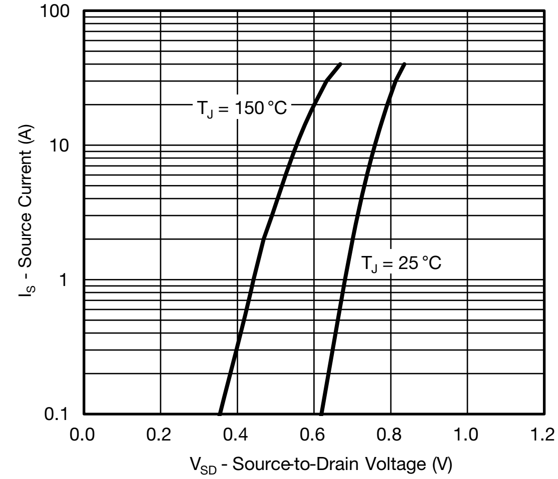


Gate Charge

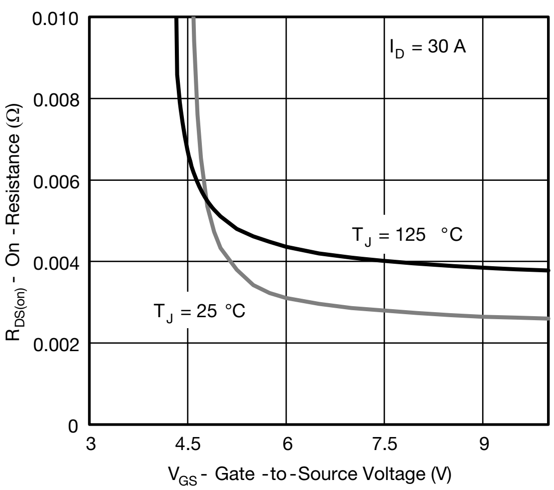
TYPICAL CHARACTERISTICS (T_A = 25 °C, unless otherwise noted)



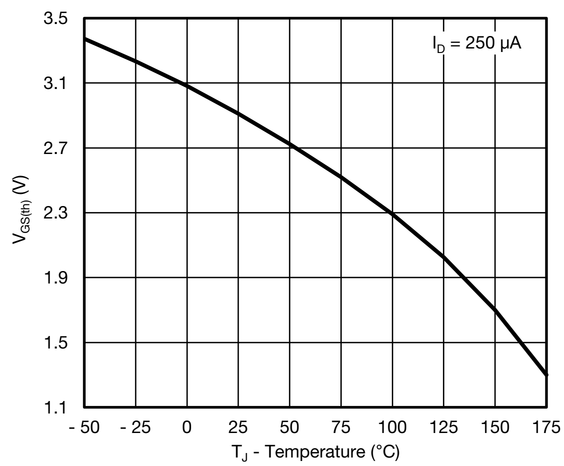
On-Resistance vs. Junction Temperature



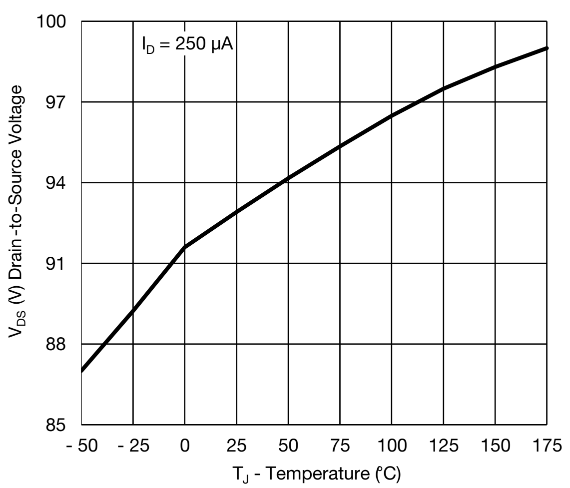
Source Drain Diode Forward Voltage



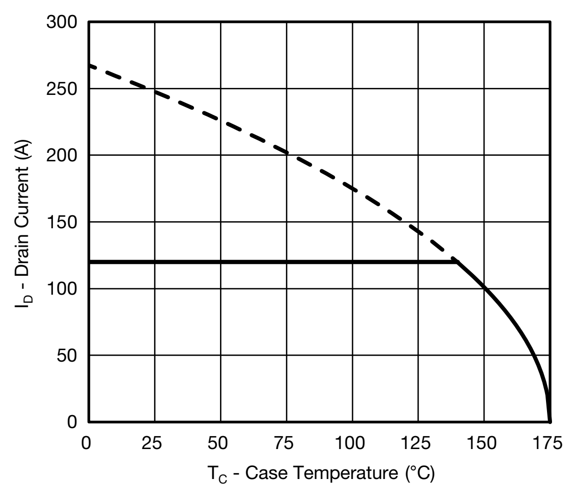
On-Resistance vs. Gate-to-Source Voltage



Threshold Voltage

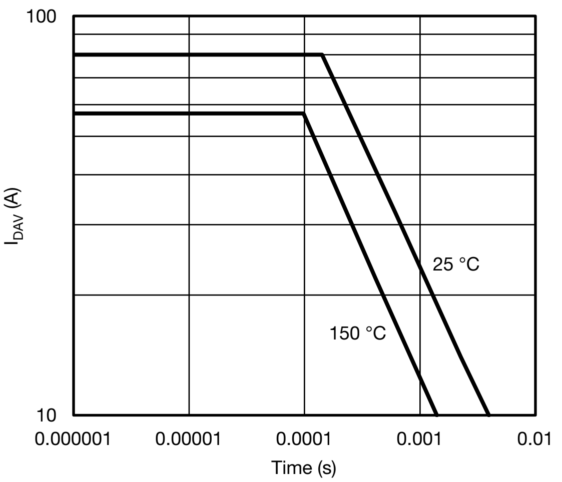


Drain Source Breakdown vs. Junction Temperature

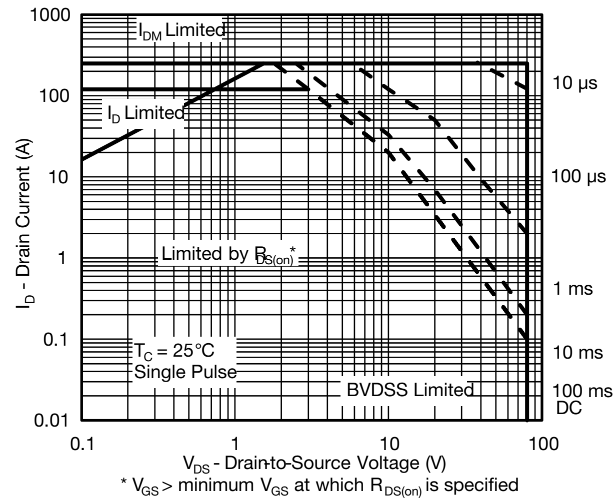


Current De-rating

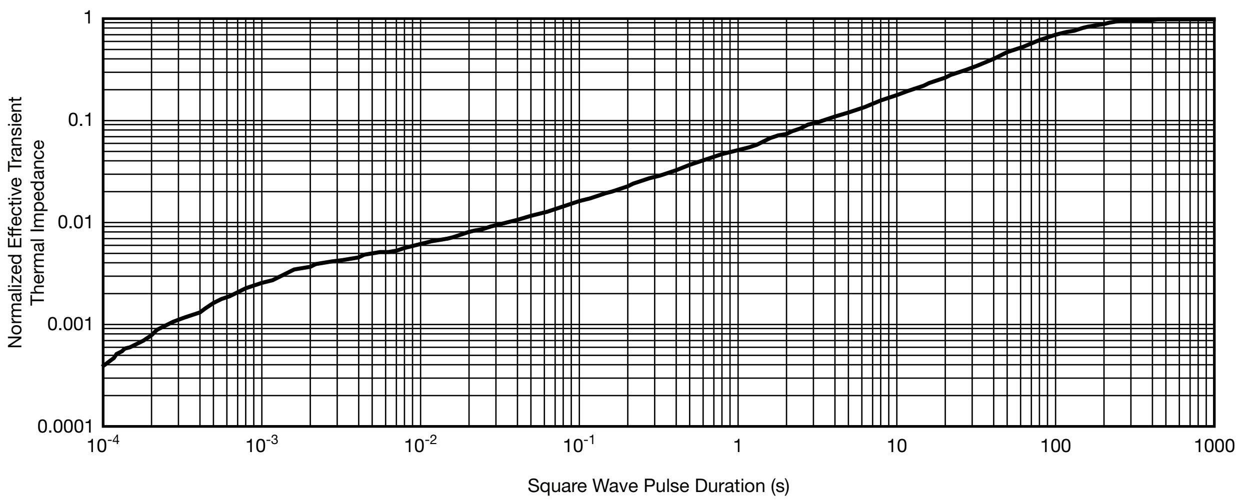
THERMAL RATINGS (T_A = 25 °C, unless otherwise noted)



Single Pulse Avalanche Current Capability vs. Time

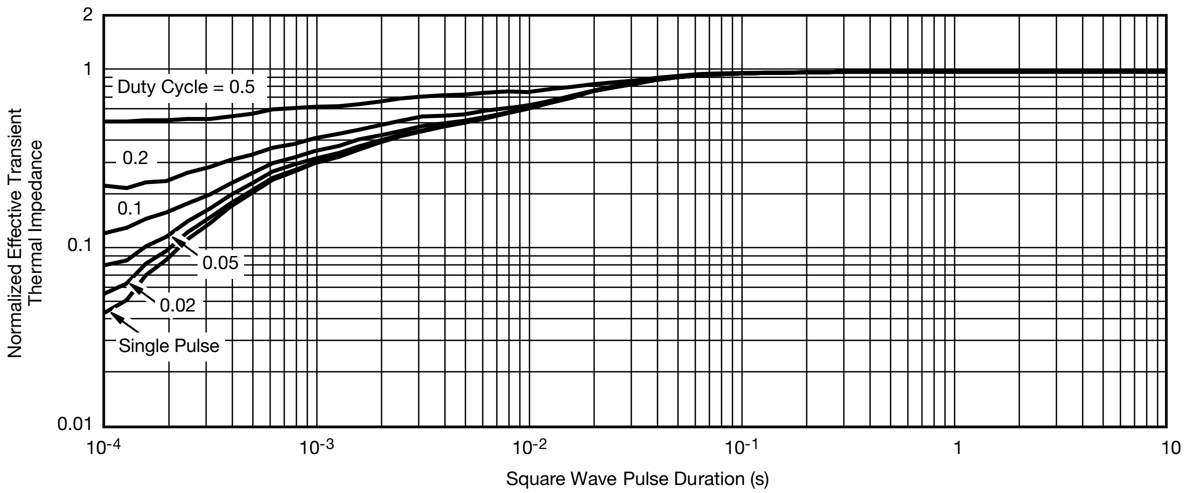


Safe Operating Area



Normalized Thermal Transient Impedance, Junction-to-Ambient

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



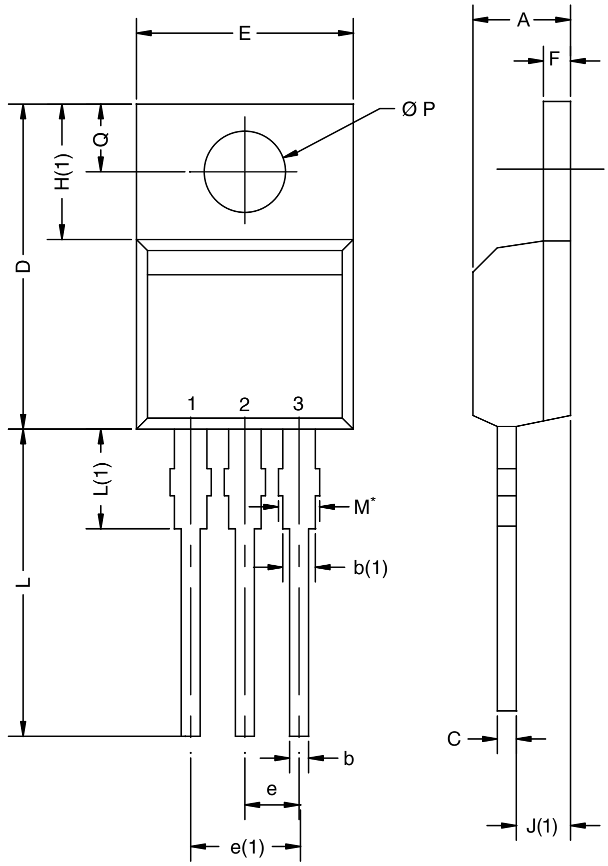
Normalized Thermal Transient Impedance, Junction-to-Case

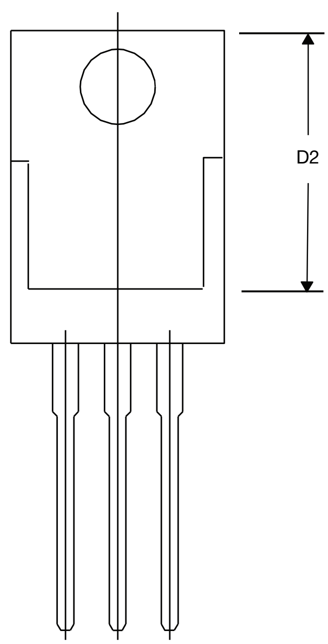
Note

- 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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