

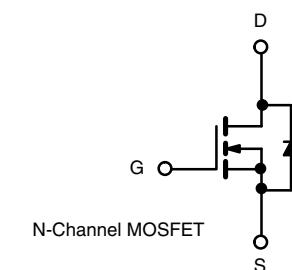
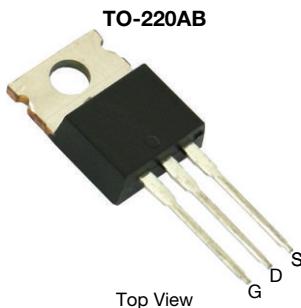
NCE1520-VB Datasheet

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

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



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	I_D	20	A
		14	
Continuous Source Current (Diode Conduction) ^a	I_S	50	A
Pulsed Drain Current ^b	I_{DM}	60	
Single Pulse Avalanche Energy	I_{AS}	30	mJ
Single Pulse Avalanche Current	E_{AS}	45	
Maximum Power Dissipation ^b	P_D	107	W
		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	R_{thJA}	50	°C/W
Junction-to-Case (Drain)	R_{thJC}	1.4	

Notes

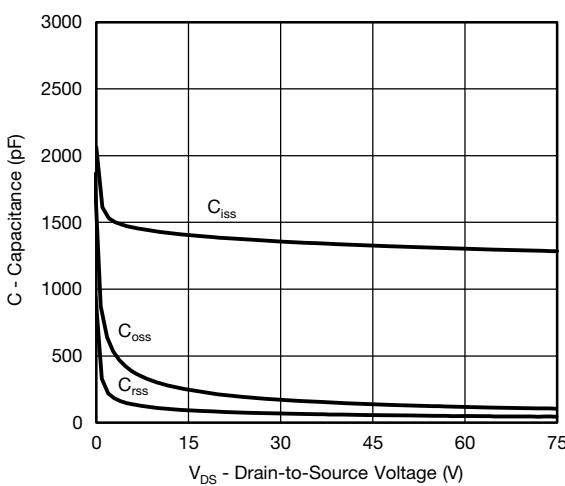
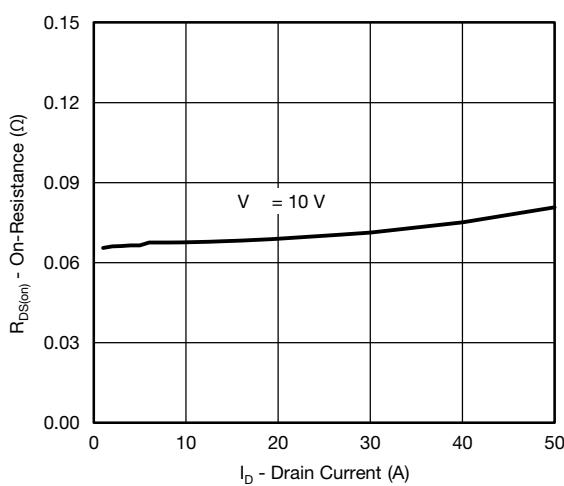
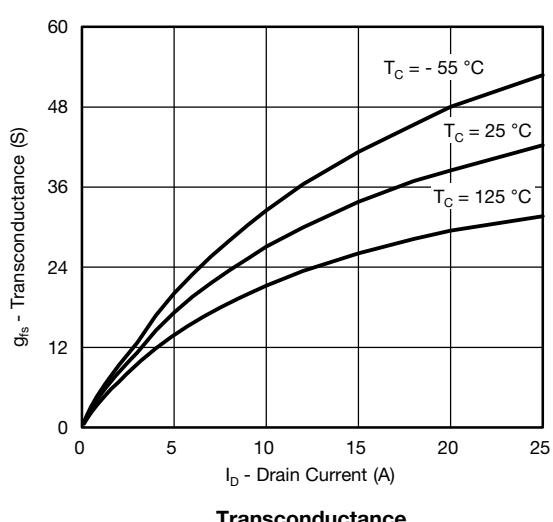
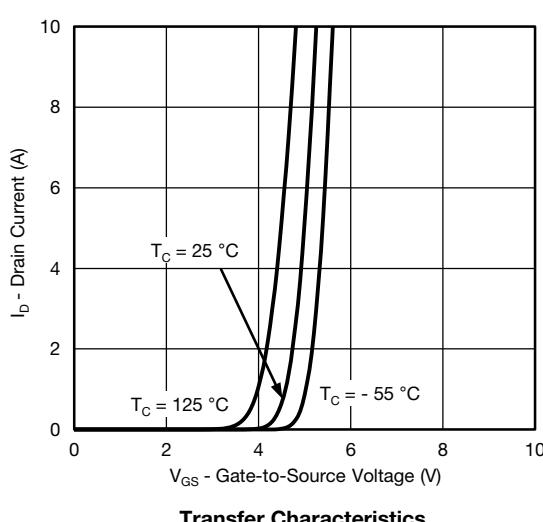
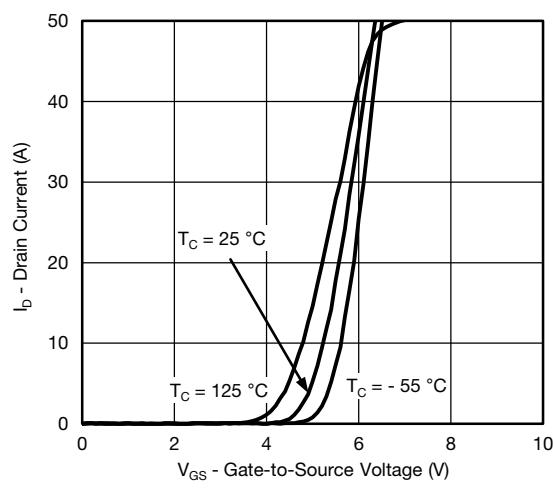
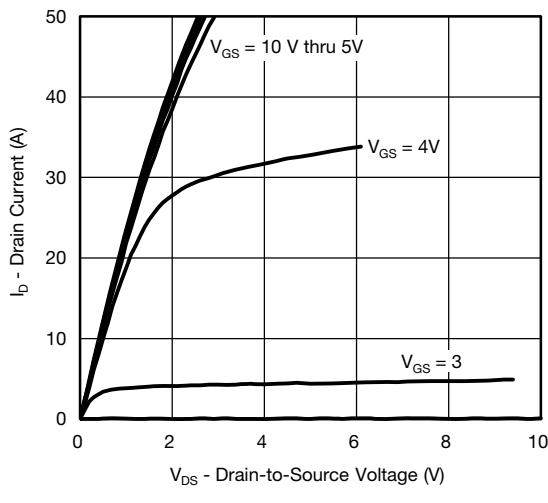
- Package limited.
- Pulse test; pulse width ≤ 300 μ s, duty cycle ≤ 2 %.
- When mounted on 1" square PCB (FR4 material).
- Parametric verification ongoing.

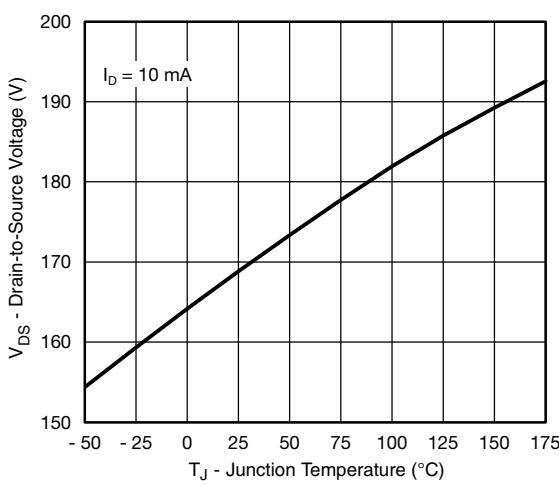
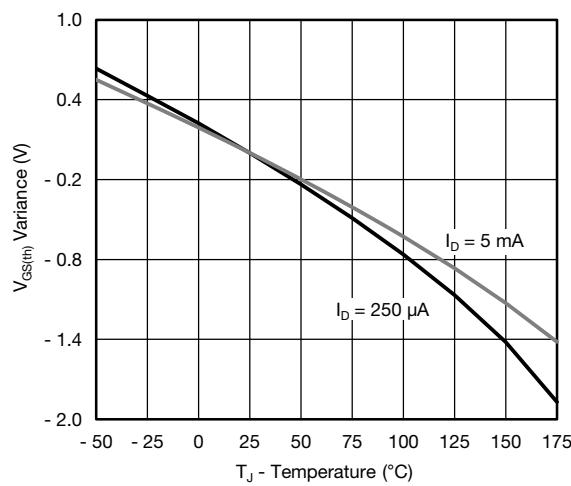
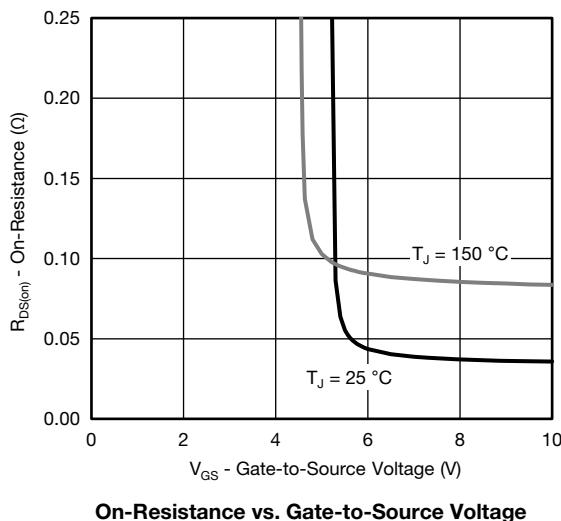
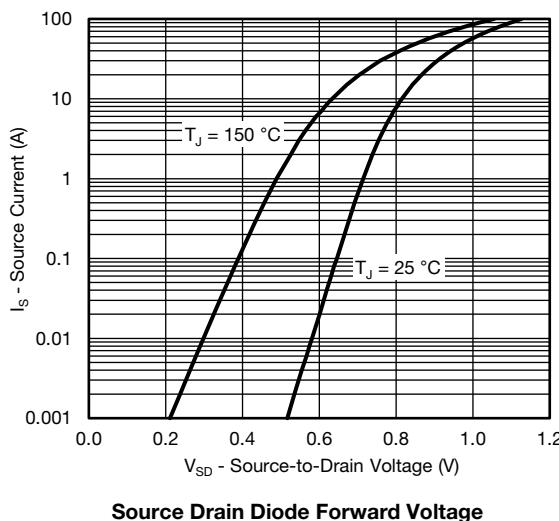
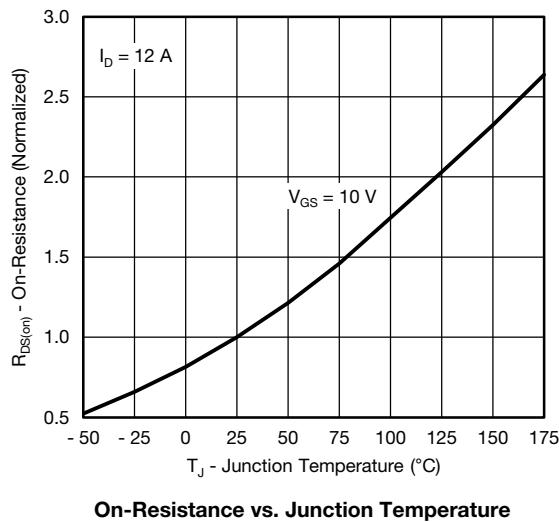
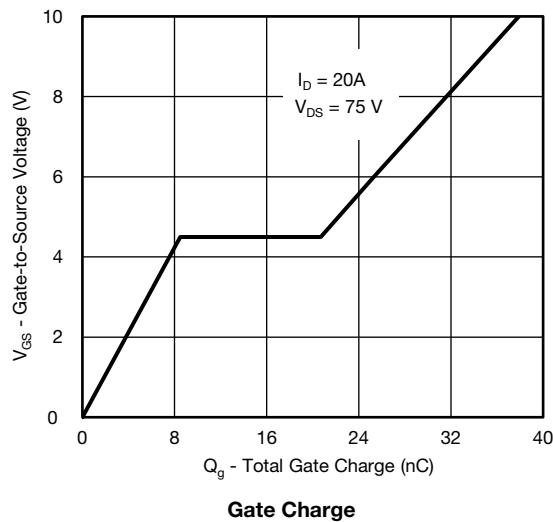
SPECIFICATIONS ($T_C = 25^\circ\text{C}$, unless otherwise noted)								
PARAMETER	SYMBOL	TEST CONDITIONS		MIN.	TYP.	MAX.	UNIT	
Static								
Drain-Source Breakdown Voltage	V_{DS}	$V_{GS} = 0 \text{ V}$, $I_D = 250 \mu\text{A}$		150	-	-	V	
Gate-Source Threshold Voltage	$V_{GS(\text{th})}$	$V_{DS} =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

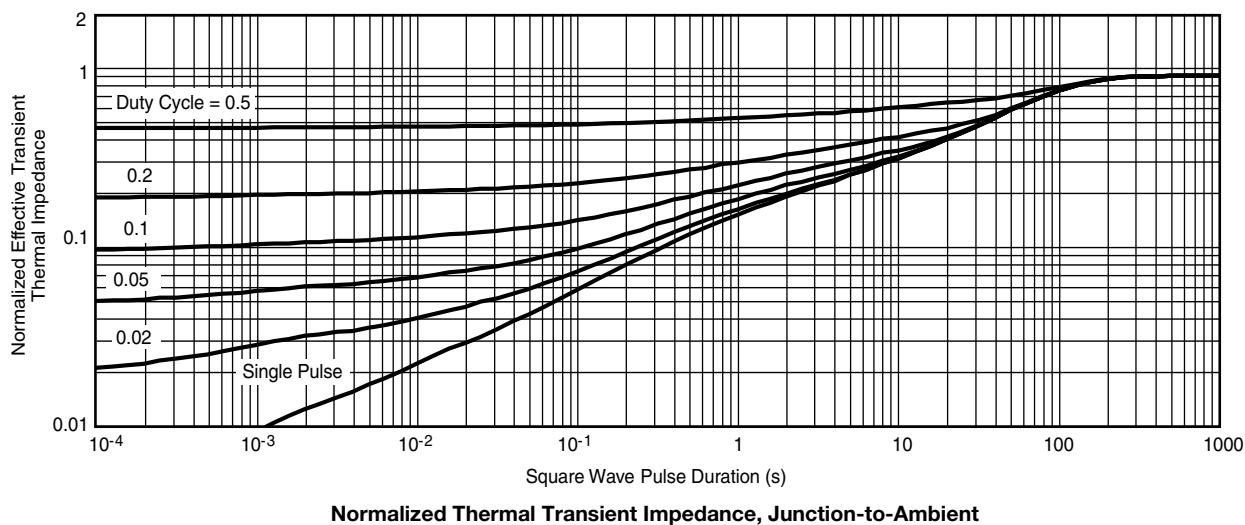
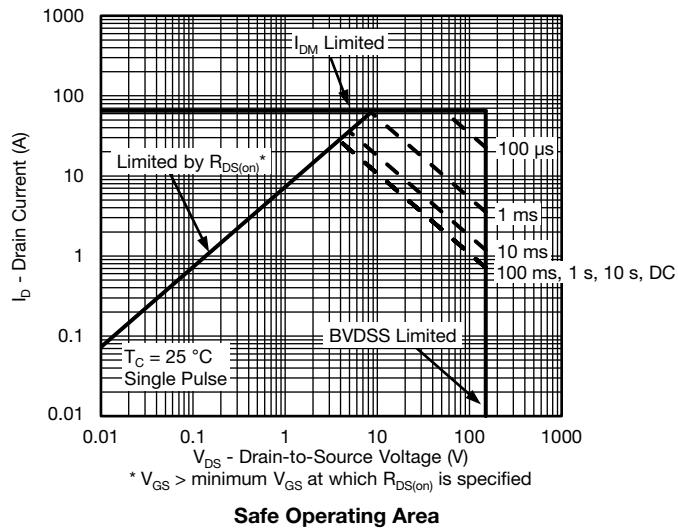
Notes

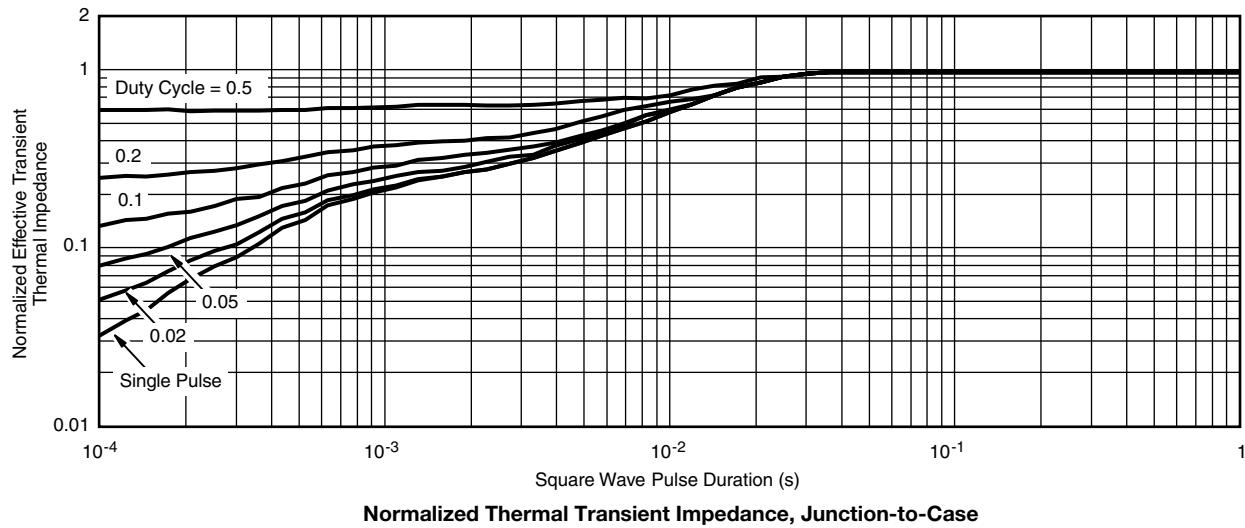
- Pulse test; pulse width $\leq 300 \mu\text{s}$, duty cycle $\leq 2 \%$.
- Guaranteed by design, not subject to production testing.
- Independent of operating temperature.

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 ($T_A = 25^\circ\text{C}$, unless otherwise noted)


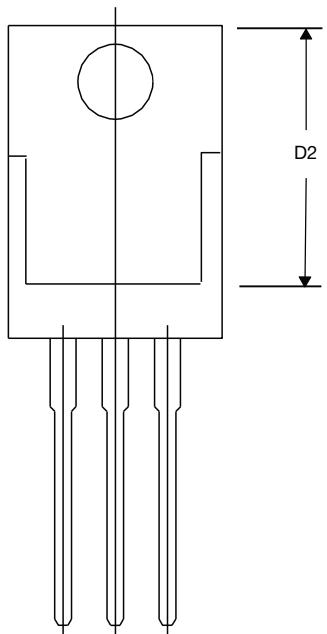
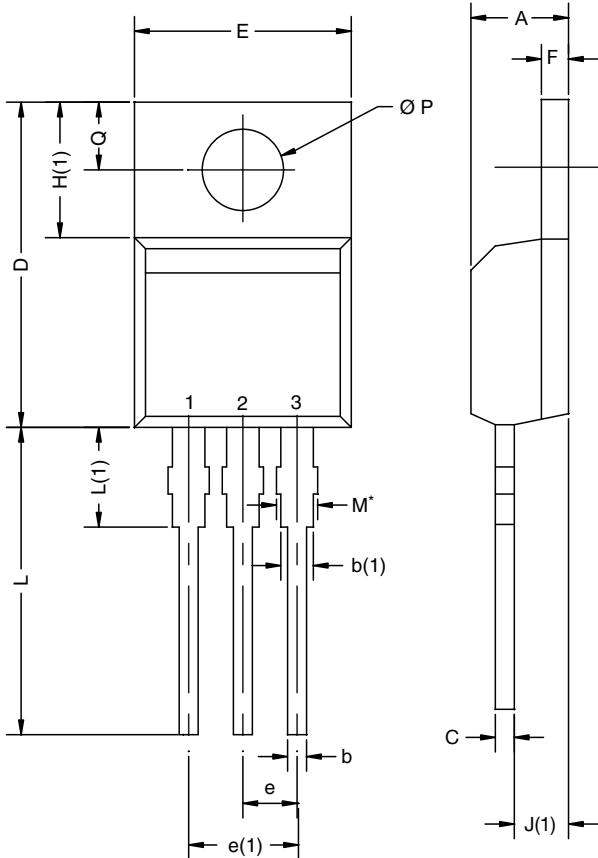
TYPICAL CHARACTERISTICS ($T_A = 25^\circ\text{C}$, unless otherwise noted)


THERMAL RATINGS ($T_A = 25^\circ\text{C}$, unless otherwise noted)


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

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

Note

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

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