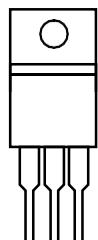


## N-Channel 40-V (D-S) MOSFET

PRODUCT SUMMARY		
$V_{DS}$	40	V
$R_{DS(on)} V_{GS} = 10$ V	2	$\text{m}\Omega$
$I_D$	180	A
Configuration	Single	

TO-220AB



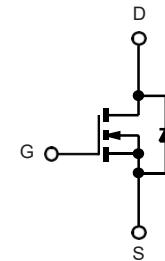
### FEATURES

- TrenchFET® Power MOSFET
- 100 %  $R_g$  and UIS Tested



### APPLICATIONS

- Synchronous Rectification
- Power Supplies



N-Channel MOSFET

ABSOLUTE MAXIMUM RATINGS $T_A = 25$ °C, unless otherwise noted				
Parameter	Symbol	Limit	Unit	
Drain-Source Voltage	$V_{DS}$	40		V
Gate-Source Voltage	$V_{GS}$	$\pm 20$		
Continuous Drain Current ( $T_J = 175$ °C)	$T_C = 25$ °C	180 <sup>a, c</sup>		A
	$T_C = 70$ °C			
	$T_A = 25$ °C			
	$T_A = 70$ °C			
Pulsed Drain Current	$I_{DM}$	350		
Avalanche Current Pulse	$I_{AS}$	80		mJ
Single Pulse Avalanche Energy	$E_{AS}$	320		
Continuous Source-Drain Diode Current	$T_C = 25$ °C	110 <sup>a, c</sup>		A
	$T_A = 25$ °C			
Maximum Power Dissipation	$T_C = 25$ °C	312 <sup>a</sup>		W
	$T_C = 70$ °C			
	$T_A = 25$ °C			
	$T_A = 70$ °C			
Operating Junction and Storage Temperature Range	$T_J, T_{stg}$	- 55 to 150		°C

THERMAL RESISTANCE RATINGS				
Parameter	Symbol	Typical	Maximum	Unit
Maximum Junction-to-Ambient <sup>b</sup>	$R_{thJA}$	32	40	°C/W
Maximum Junction-to-Case	$R_{thJC}$	0.33	0.4	

Notes:

a. Based on  $T_C = 25$  °C.

b. Surface Mounted on 1" x 1" FR4 board.

c. Calculated based on maximum junction temperature. Package limitation current is 110 A.

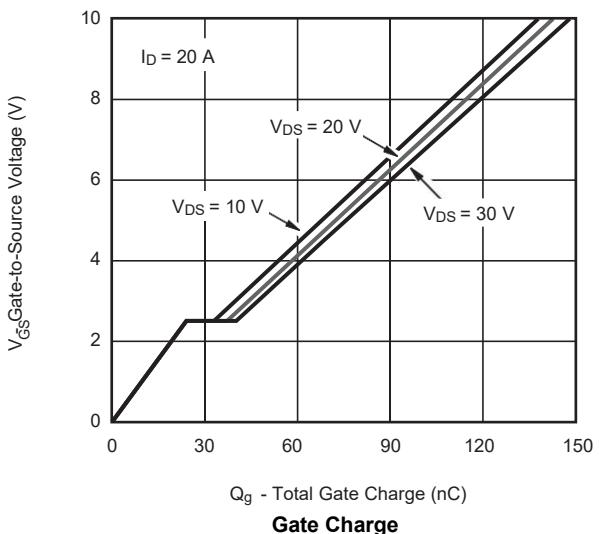
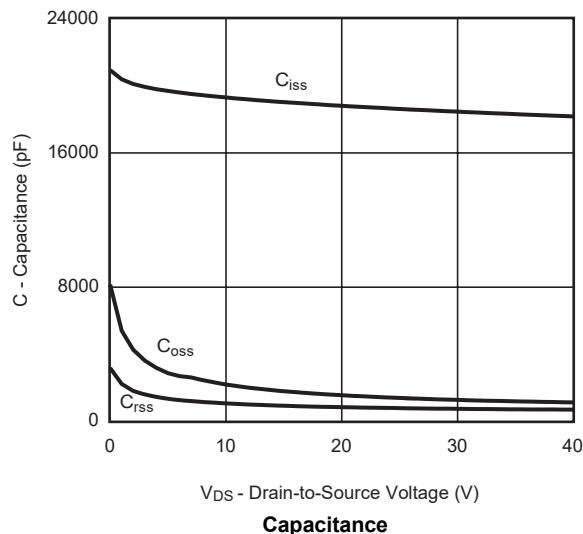
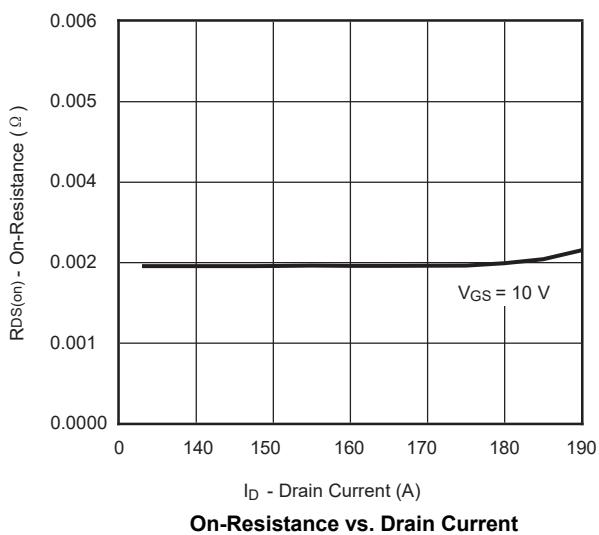
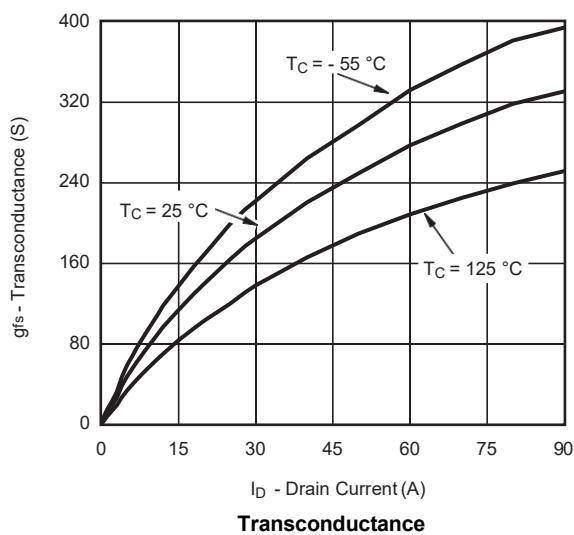
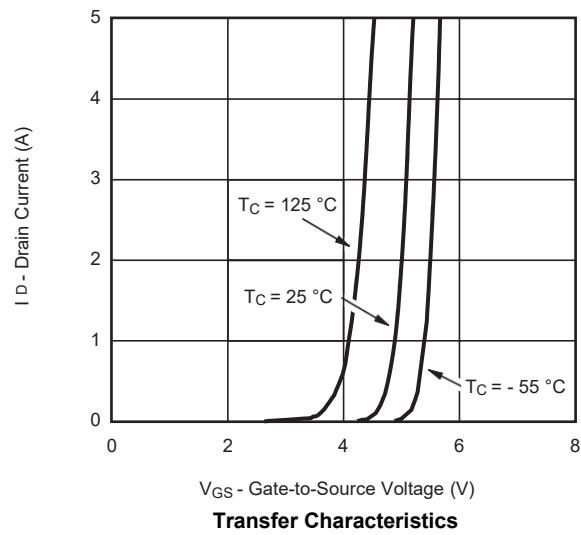
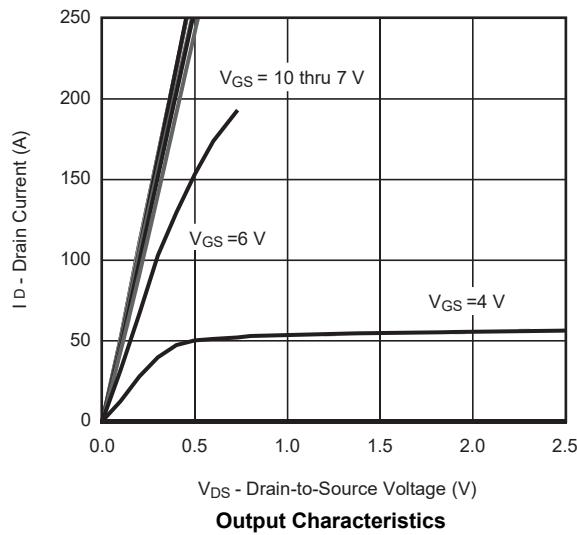
SPECIFICATIONS $T_J = 25^\circ\text{C}$ , unless otherwise noted						
Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
<b>Static</b>						
Drain-Source Breakdown Voltage	$V_{DS}$	$V_{GS} = 0\text{ V}$ , $I_D = 250\text{ }\mu\text{A}$	40			V
$V_{DS}$ Temperature Coefficient	$\Delta V_{DS}/T_J$	$I_D = 250\text{ }\mu\text{A}$		41		$\text{mV/}^\circ\text{C}$
$V_{GS(\text{th})}$ Temperature Coefficient	$\Delta V_{GS(\text{th})}/T_J$			-8		
Gate-Source Threshold Voltage	$V_{GS(\text{th})}$	$V_{DS} = V_{GS}$ , $I_D = 250\text{ }\mu\text{A}$	2.0		4.0	V
Gate-Source Leakage	$I_{GSS}$	$V_{DS} = 0\text{ V}$ , $V_{GS} = \pm 20\text{ V}$			$\pm 100$	nA
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS} = 40\text{ V}$ , $V_{GS} = 0\text{ V}$			1	$\mu\text{A}$
		$V_{DS} = 40\text{ V}$ , $V_{GS} = 0\text{ V}$ , $T_J = 55^\circ\text{C}$			10	
On-State Drain Current <sup>a</sup>	$I_{D(\text{on})}$	$V_{DS} \geq 5\text{ V}$ , $V_{GS} = 10\text{ V}$	120			A
Drain-Source On-State Resistance <sup>a</sup>	$R_{DS(\text{on})}$	$V_{GS} = 10\text{ V}$ , $I_D = 30\text{ A}$		2		$\text{m}\Omega$
		$V_{GS} = 4.5\text{ V}$ , $I_D = 20\text{ A}$		15		
Forward Transconductance <sup>a</sup>	$g_{fs}$	$V_{DS} = 15\text{ V}$ , $I_D = 30\text{ A}$		180		S
<b>Dynamic<sup>b</sup></b>						
Input Capacitance	$C_{iss}$	$V_{DS} = 20\text{ V}$ , $V_{GS} = 0\text{ V}$ , $f = 1\text{ MHz}$		9000		$\text{pF}$
Output Capacitance	$C_{oss}$			650		
Reverse Transfer Capacitance	$C_{rss}$			450		
Total Gate Charge	$Q_g$	$V_{DS} = 20\text{ V}$ , $V_{GS} = 10\text{ V}$ , $I_D = 20\text{ A}$		120		$\text{nC}$
Gate-Source Charge	$Q_{gs}$			30		
Gate-Drain Charge	$Q_{gd}$			16		
Gate Resistance	$R_g$	$f = 1\text{ MHz}$		0.85	1.3	$\Omega$
Turn-On Delay Time	$t_{d(\text{on})}$	$V_{DD} = 20\text{ V}$ , $R_L = 1.0\ \Omega$ $I_D \geq 20\text{ A}$ , $V_{GEN} = 10\text{ V}$ , $R_g = 1\ \Omega$		20	30	$\text{ns}$
Rise Time	$t_r$			11	17	
Turn-Off Delay Time	$t_{d(\text{off})}$			77	115	
Fall Time	$t_f$			10	15	
Turn-On Delay Time	$t_{d(\text{on})}$	$V_{DD} = 20\text{ V}$ , $R_L = 1.0\ \Omega$ $I_D \geq 20\text{ A}$ , $V_{GEN} = 4.5\text{ V}$ , $R_g = 1\ \Omega$		102	155	$\text{ns}$
Rise Time	$t_r$			62	95	
Turn-Off Delay Time	$t_{d(\text{off})}$			180	270	
Fall Time	$t_f$			60	90	
<b>Drain-Source Body Diode Characteristics</b>						
Continuous Source-Drain Diode Current	$I_S$	$T_C = 25^\circ\text{C}$			110	$\text{A}$
Pulse Diode Forward Current <sup>a</sup>	$I_{SM}$				200	
Body Diode Voltage	$V_{SD}$	$I_S = 20\text{ A}$		0.8	1.2	V
Body Diode Reverse Recovery Time	$t_{rr}$	$I_F = 20\text{ A}$ , $di/dt = 100\text{ A}/\mu\text{s}$ , $T_J = 25^\circ\text{C}$		50	75	$\text{ns}$
Body Diode Reverse Recovery Charge	$Q_{rr}$			70	105	
Reverse Recovery Fall Time	$t_a$			30		$\text{ns}$
Reverse Recovery Rise Time	$t_b$			20		

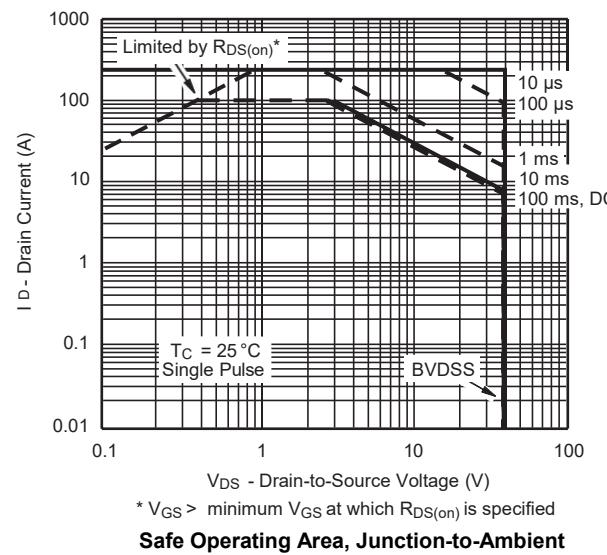
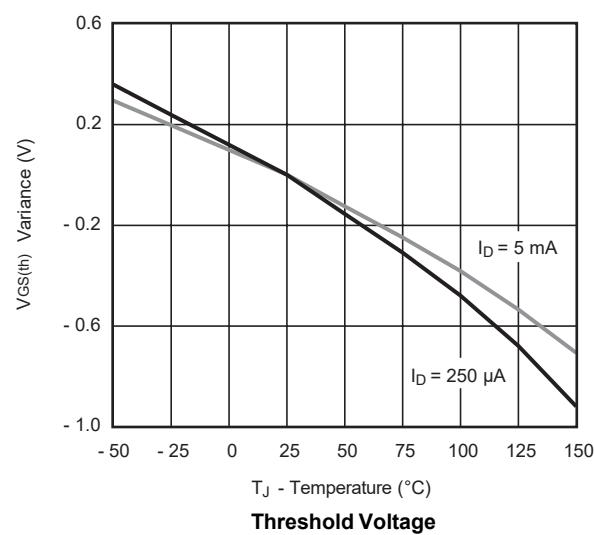
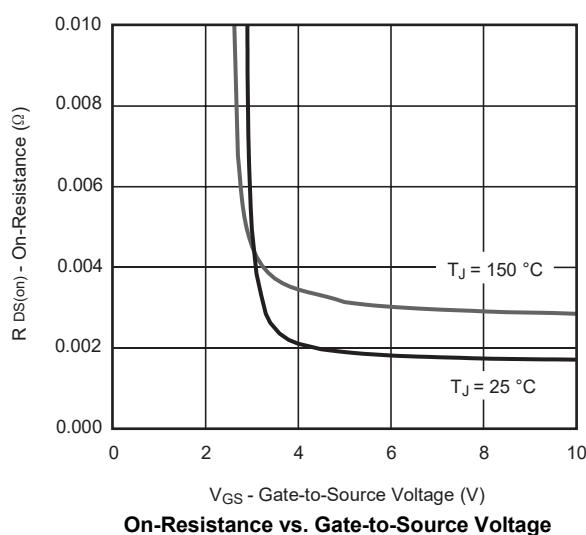
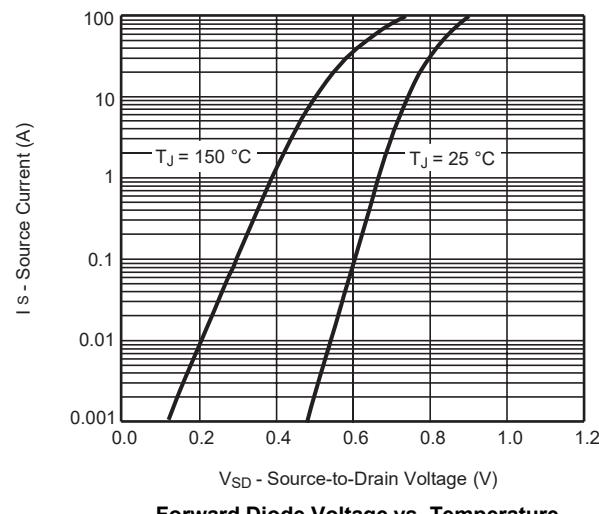
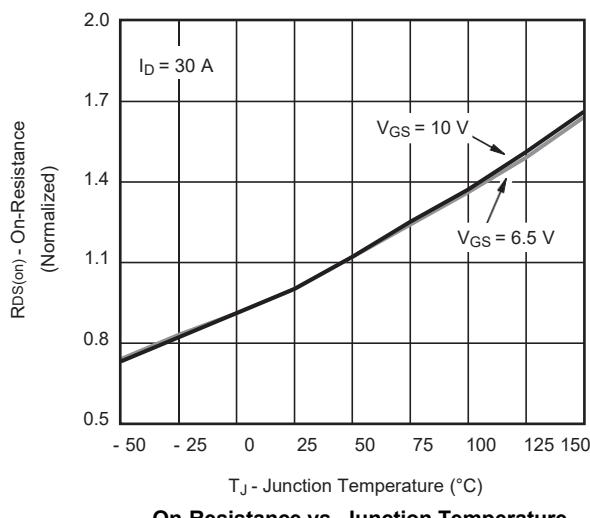
Notes:

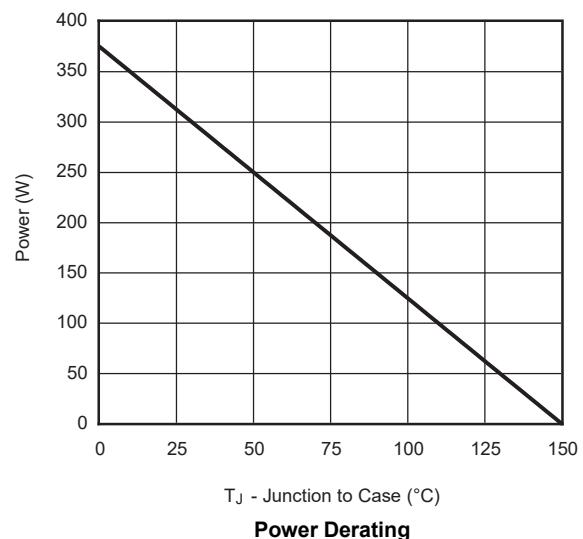
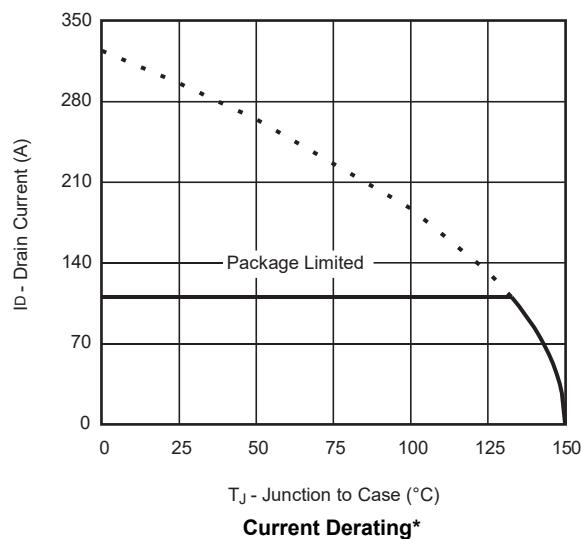
a. Pulse test; pulse width  $\leq 300\text{ }\mu\text{s}$ , duty cycle  $\leq 2\%$ .

b. Guaranteed by design, not subject to production testing.

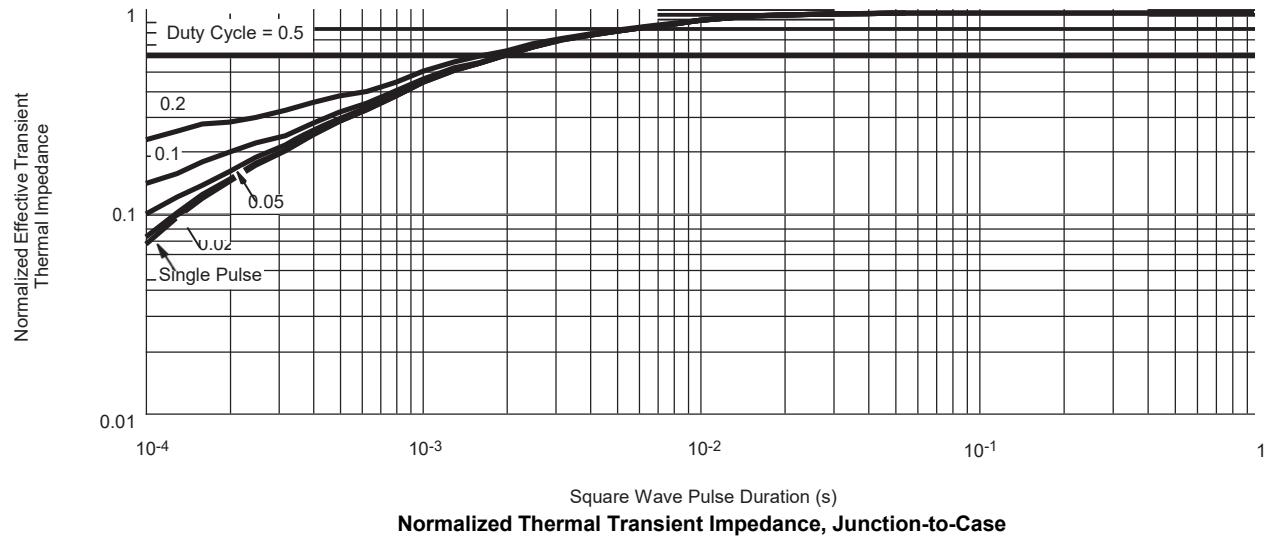
Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure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

**TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted**


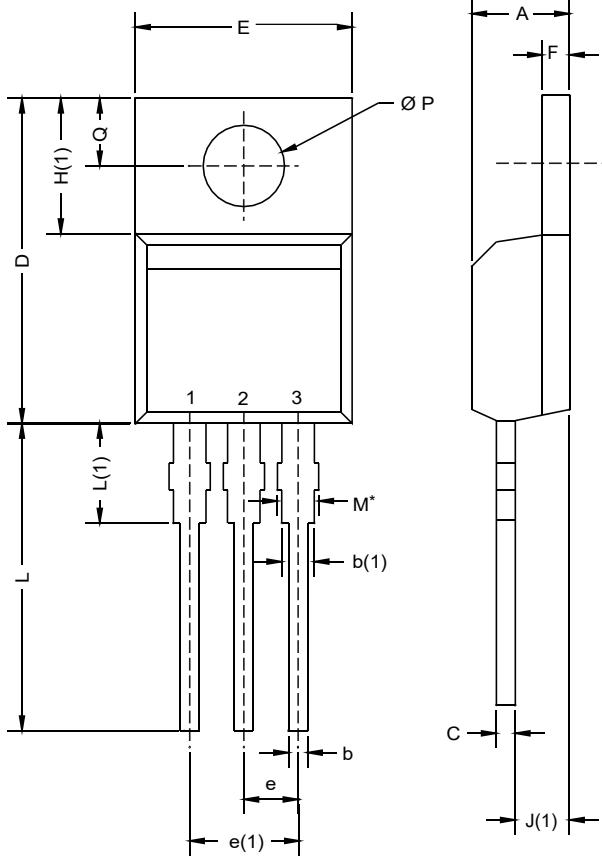
**TYPICAL CHARACTERISTICS** 25 °C, unless otherwise noted


**TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted**


\* The power dissipation  $P_D$  is based on  $T_{J(max)} = 150$  °C, using junction-to-case thermal resistance, and is more useful in settling the upper dissipation limit for cases where additional heatsinking is used. It is used to determine the current rating, when this rating falls below the package limit.



# 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
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

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## Notes

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

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