

## N-Channel 75 V (D-S) MOSFET

### PRODUCT SUMMARY

$V_{DS}$ (V)	$R_{DS(on)}$ ( $\Omega$ )	$I_D$ (A)	$Q_g$ (Typ)
75	0.0048 at $V_{GS} = 10$ V	90 <sup>d</sup>	105
	0.006 at $V_{GS} = 8$ V	90 <sup>d</sup>	

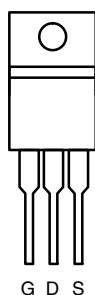
### FEATURES

- TrenchFET<sup>®</sup> Power MOSFET
- 175 °C Junction Temperature
- 100 % UIS Tested
- Compliant to RoHS Directive 2002/95/EC

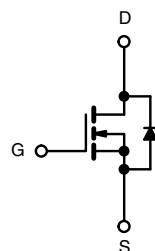

**RoHS**  
COMPLIANT

### APPLICATIONS

- Power Supply
  - Half-Bridge
  - Secondary Synchronous Rectification
- Industrial

**TO-220AB**


Top View

**Ordering Information:** SUP90N08-4m8P-E3 (Lead (Pb)-free)


N-Channel MOSFET

### ABSOLUTE MAXIMUM RATINGS ( $T_C = 25$ °C, unless otherwise noted)

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	$V_{DS}$	75	V
Gate-Source Voltage	$V_{GS}$	$\pm 20$	
Continuous Drain Current ( $T_J = 175$ °C)	$I_D$	$T_C = 25$ °C 90 <sup>d</sup>	A
		$T_C = 70$ °C 90 <sup>d</sup>	
Pulsed Drain Current	$I_{DM}$	240	
Avalanche Current	$I_{AS}$	70	
Single Pulse Avalanche Energy <sup>a</sup>	$E_{AS}$	245	mJ
Maximum Power Dissipation <sup>a</sup>	$P_D$	$T_C = 25$ °C 300 <sup>b</sup>	W
		$T_A = 25$ °C <sup>c</sup> 3.75	
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) <sup>c</sup>	$R_{thJA}$	40	°C/W
Junction-to-Case (Drain)	$R_{thJC}$	0.5	

Notes:

- Duty cycle  $\leq 1$  %.
- See SOA curve for voltage derating.
- When mounted on 1" square PCB (FR-4 material).
- Package limited.

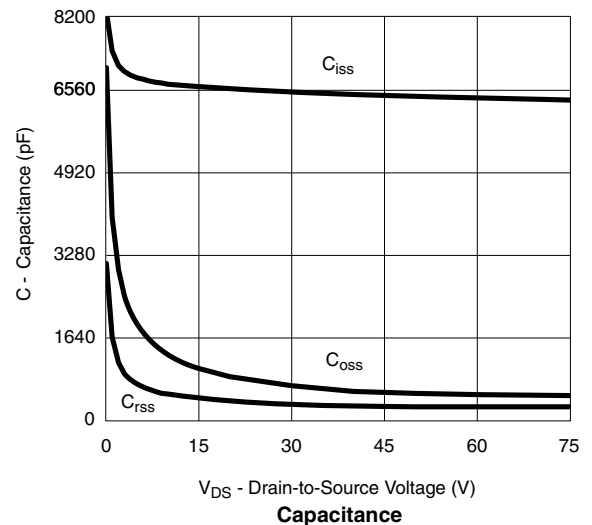
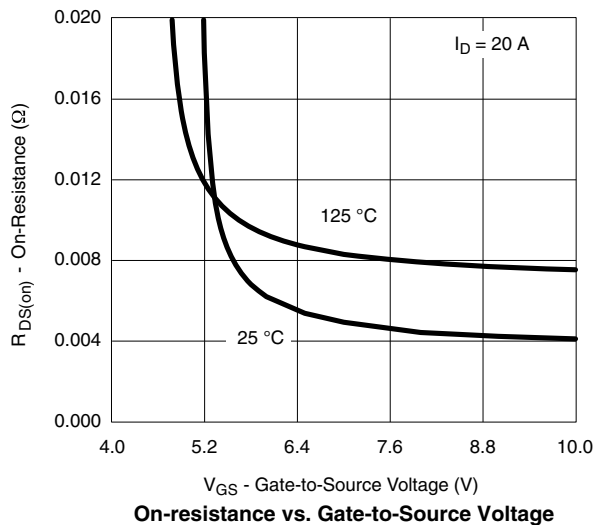
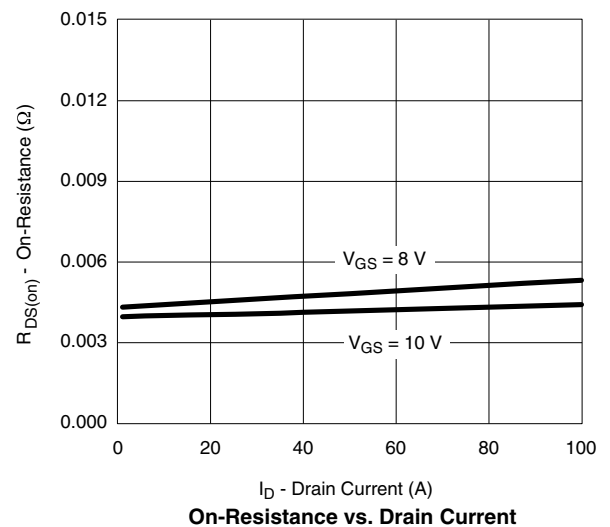
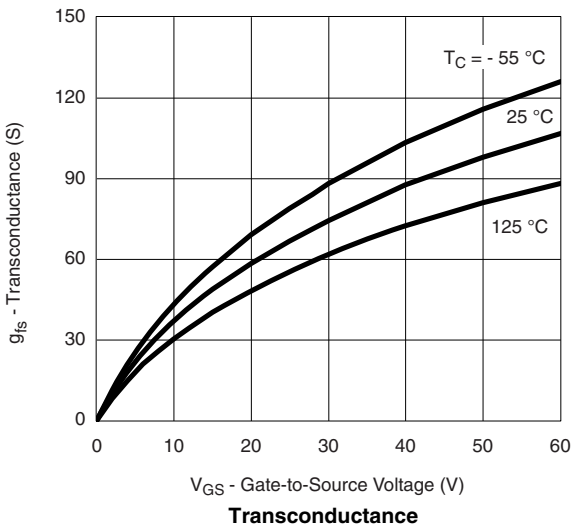
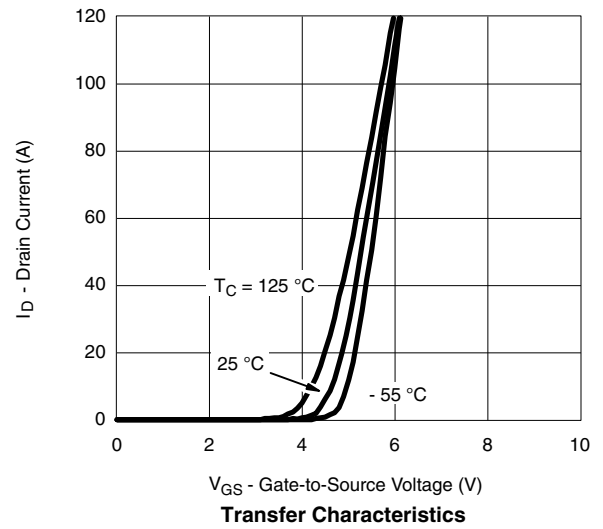
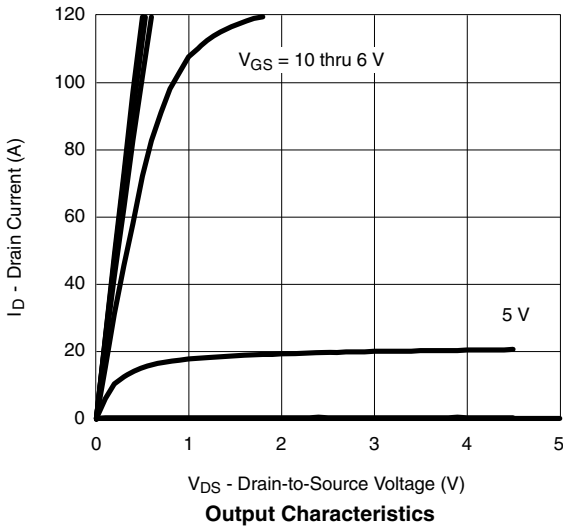
SPECIFICATIONS (T <sub>C</sub> = 25 °C, unless otherwise noted)						
Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Static						
Drain-Source Breakdown Voltage	V <sub>DS</sub>	V <sub>DS</sub> = 0 V, I <sub>D</sub> = 250 μA	75			V
Gate Threshold Voltage	V <sub>GS(th)</sub>	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 250 μA	2		4	
Gate-Body Leakage	I <sub>GSS</sub>	V <sub>DS</sub> = 0 V, V <sub>GS</sub> = ± 20 V			± 250	nA
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	V <sub>DS</sub> = 75 V, V <sub>GS</sub> = 0 V			1	μA
		V <sub>DS</sub> = 75 V, V <sub>GS</sub> = 0 V, T <sub>J</sub> = 125 °C			50	
		V <sub>DS</sub> = 75 V, V <sub>GS</sub> = 0 V, T <sub>J</sub> = 150 °C			250	
On-State Drain Current <sup>a</sup>	I <sub>D(on)</sub>	V <sub>DS</sub> ≥ 10 V, V <sub>GS</sub> = 10 V	70			A
Drain-Source On-State Resistance <sup>a</sup>	R <sub>DS(on)</sub>	V <sub>GS</sub> = 10 V, I <sub>D</sub> = 20 A		0.004	0.0048	Ω
		V <sub>GS</sub> = 10 V, I <sub>D</sub> = 20 A, T <sub>J</sub> = 125 °C			0.0096	
		V <sub>GS</sub> = 8 V, I <sub>D</sub> = 20 A, T <sub>J</sub> = 150 °C			0.0106	
		V <sub>GS</sub> = 8 V, I <sub>D</sub> = 20 A		0.0046	0.006	
Forward Transconductance <sup>a</sup>	g <sub>fs</sub>	V <sub>DS</sub> = 15 V, I <sub>D</sub> = 20 A		58		S
Dynamic <sup>b</sup>						
Input Capacitance	C <sub>iss</sub>	V <sub>GS</sub> = 0 V, V <sub>DS</sub> = 40 V, f = 1 MHz		6460		pF
Output Capacitance	C <sub>oss</sub>			571		
Reverse Transfer Capacitance	C <sub>rss</sub>			275		
Total Gate Charge <sup>c</sup>	Q <sub>g</sub>	V <sub>DS</sub> = 30 V, V <sub>GS</sub> = 10 V, I <sub>D</sub> = 85 A		105	160	nC
Gate-Source Charge <sup>c</sup>	Q <sub>gs</sub>			32		
Gate-Drain Charge <sup>c</sup>	Q <sub>gd</sub>			28		
Gate Resistance	R <sub>g</sub>	f = 1 MHz		1.3	2.6	Ω
Turn-On Delay Time <sup>c</sup>	t <sub>d(on)</sub>	V <sub>DD</sub> = 30 V, R <sub>L</sub> = 0.4 Ω I <sub>D</sub> ≅ 85 A, V <sub>GEN</sub> = 10 V, R <sub>g</sub> = 1 Ω		23	35	ns
Rise Time <sup>c</sup>	t <sub>r</sub>			17	26	
Turn-Off Delay Time <sup>c</sup>	t <sub>d(off)</sub>			34	52	
Fall Time <sup>c</sup>	t <sub>f</sub>			8	15	
Source-Drain Diode Ratings and Characteristics (T <sub>C</sub> = 25 °C) <sup>b</sup>						
Continuous Current	I <sub>S</sub>				85	A
Pulsed Current	I <sub>SM</sub>				240	
Forward Voltage <sup>a</sup>	V <sub>SD</sub>	I <sub>F</sub> = 30 A, V <sub>GS</sub> = 0 V		0.85	1.5	V
Reverse Recovery Time	t <sub>rr</sub>	I <sub>F</sub> = 75 A, di/dt = 100 A/μs		68	100	ns
Peak Reverse Recovery Current	I <sub>RM(REC)</sub>			2.6	4	A
Reverse Recovery Charge	Q <sub>rr</sub>				88	132

## Notes:

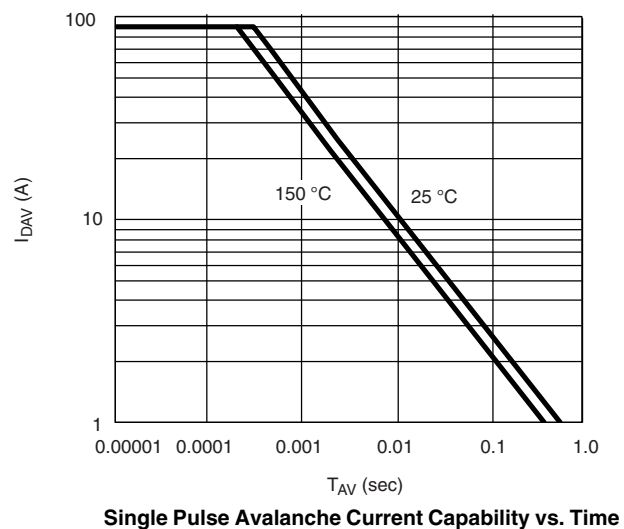
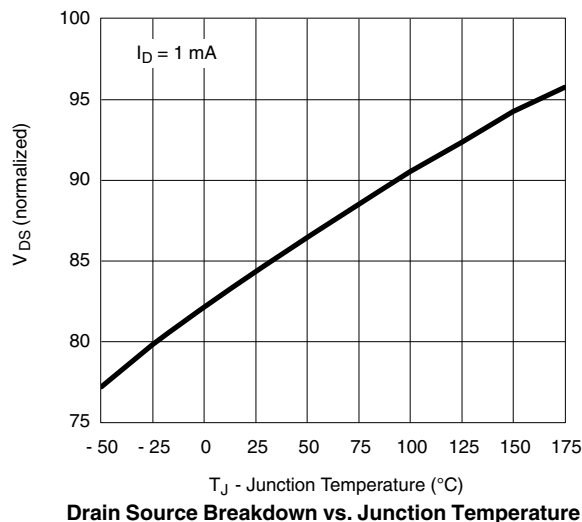
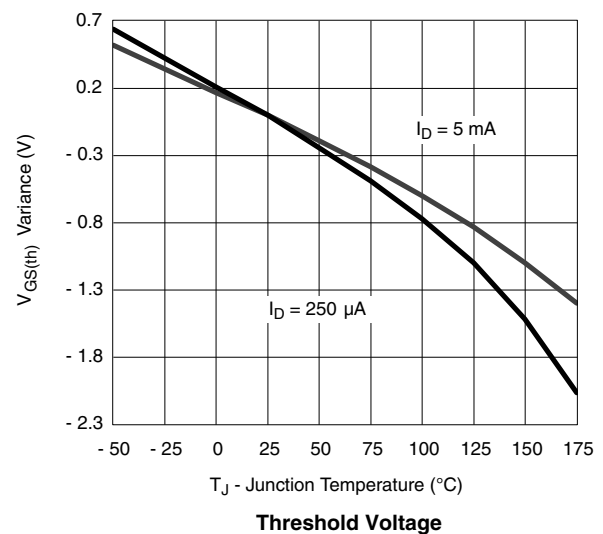
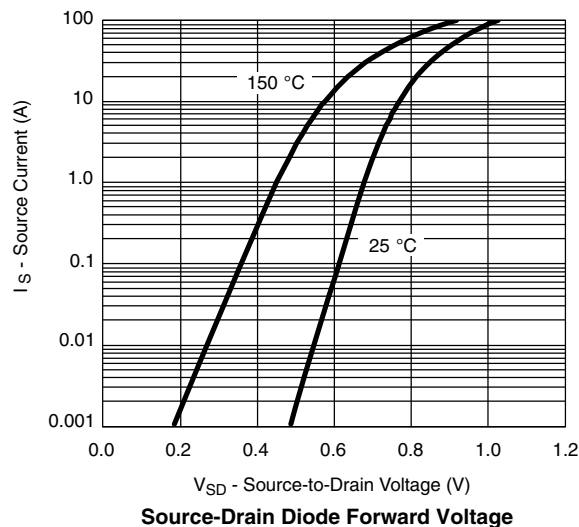
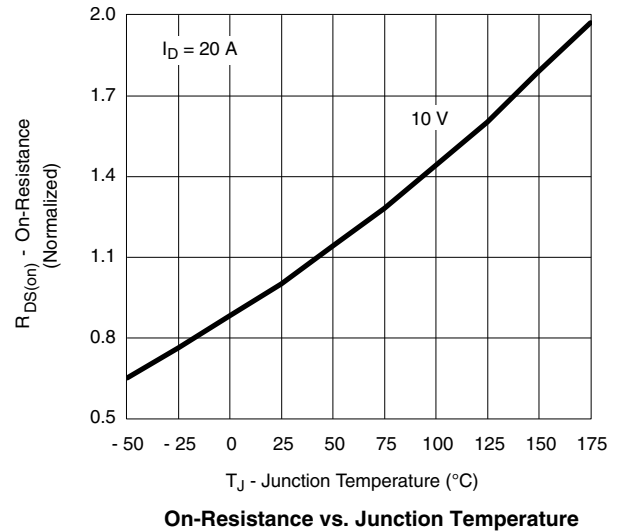
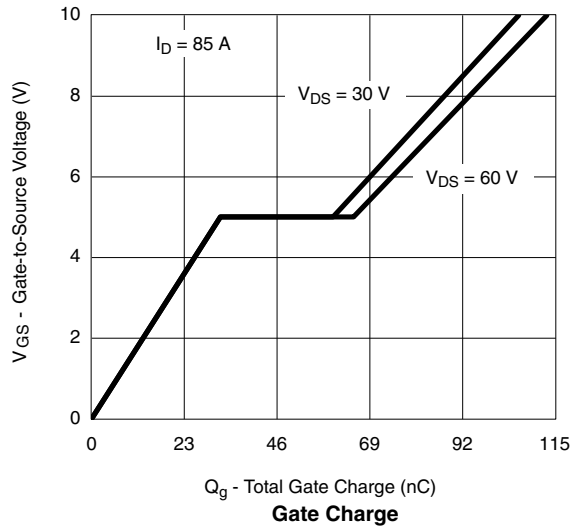
- a. Pulse test; pulse width  $\leq 300\text{ }\mu\text{s}$ , duty cycle  $\leq 2\%$ .  
b. Guaranteed by design, not subject to production testing.  
c. Independent of operating temperature.

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.

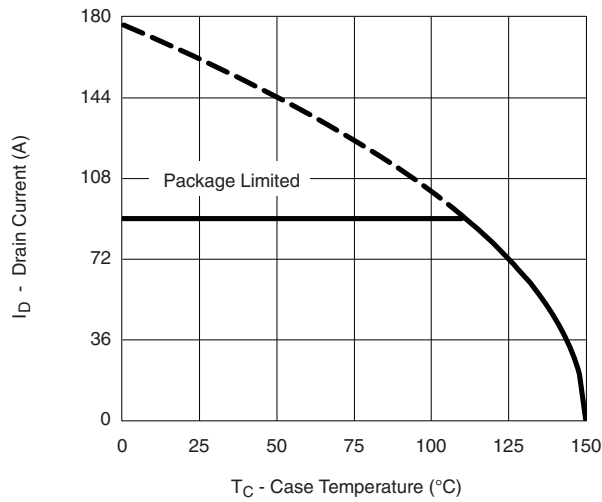
## TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



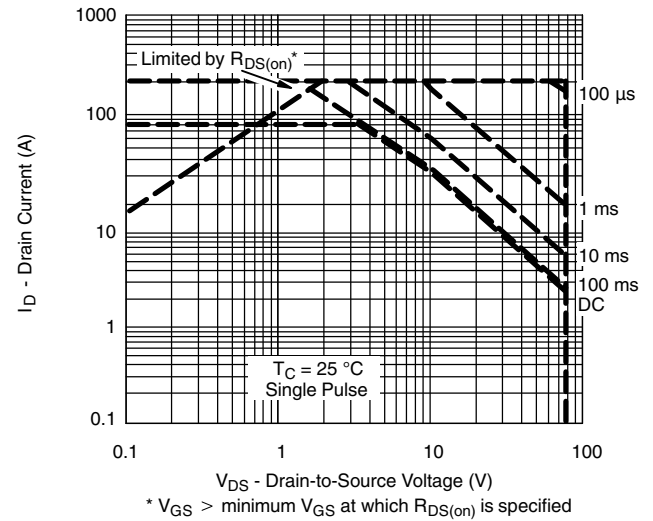
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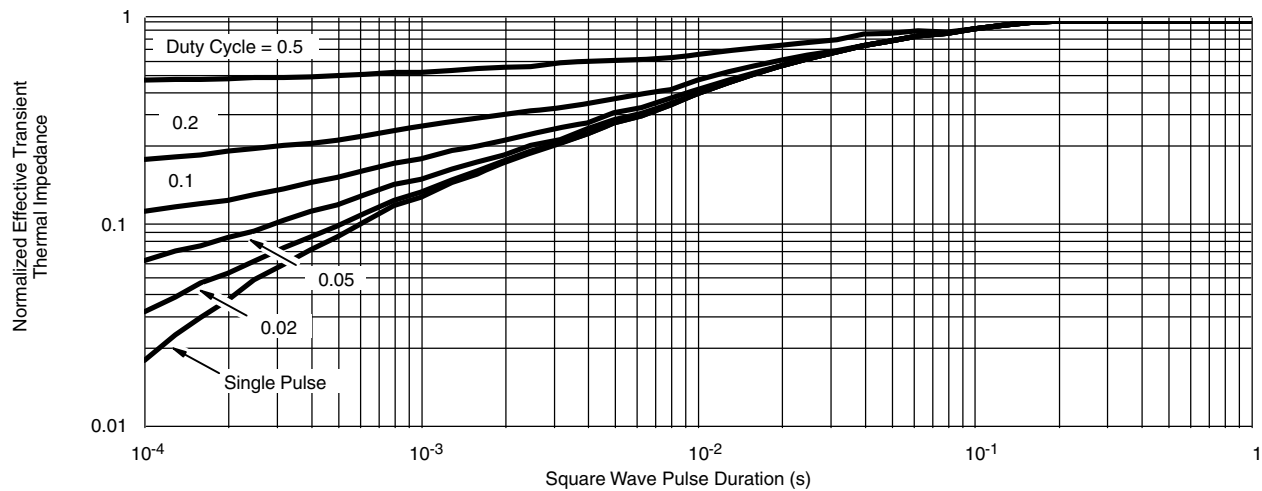
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Maximum Drain Current vs. Case Temperature



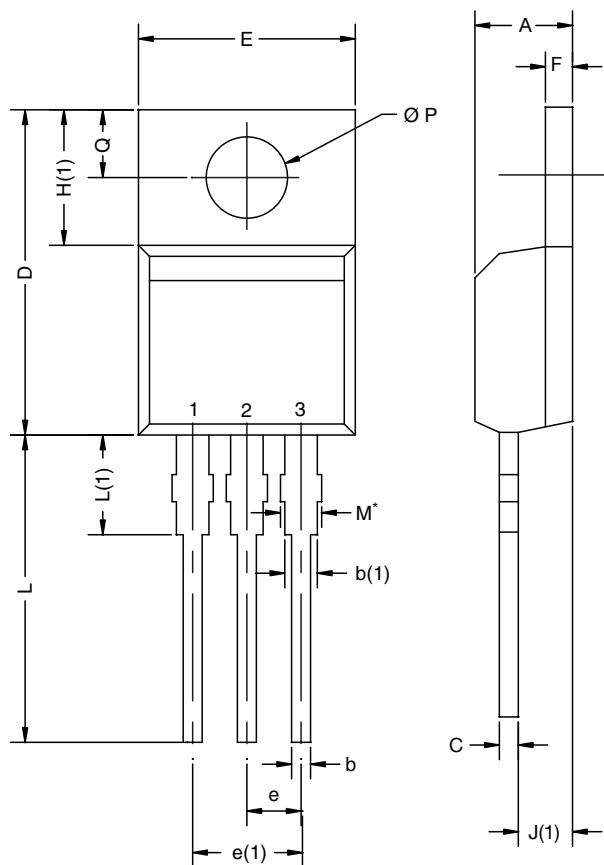
Safe Operating Area



Normalized Thermal Transient Impedance, Junction-to-Case

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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
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
$\varnothing P$	3.54	3.94	0.139	0.155
Q	2.60	3.00	0.102	0.118

ECN: X12-0208-Rev. N, 08-Oct-12  
DWG: 5471

### Notes

- \*  $M = 1.32$  mm to  $1.62$  mm (dimension including protrusion)  
Heatsink hole for HVM
- Xi'an and Mingxin actual photo





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