

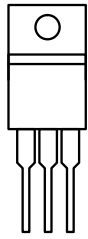
Automotive P-Channel 30 V (D-S) 175 °C MOSFET



PRODUCT SUMMARY	
V_{DS} (V)	- 30
$R_{DS(on)}$ (Ω) at $V_{GS} = -10$ V	0.0070
$R_{DS(on)}$ (Ω) at $V_{GS} = -4.5$ V	0.0110
I_D (A)	- 50
Configuration	Single

FEATURES

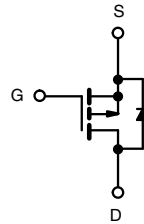
- Halogen-free According to IEC 61249-2-21 Definition
- TrenchFET® Power MOSFET
- Package with Low Thermal Resistance
- 100 % R_g and UIS Tested
- AEC-Q101 Qualified^d
- Compliant to RoHS Directive 2002/95/EC

TO-220AB


G D S

Top View

DRAIN connected to TAB



P-Channel MOSFET

ORDERING INFORMATION	
Package	TO-220AB
Lead (Pb)-free and Halogen-free	SQP50P03-07-GE3

ABSOLUTE MAXIMUM RATINGS ($T_C = 25$ °C, unless otherwise noted)				
PARAMETER	SYMBOL	LIMIT	UNIT	
Drain-Source Voltage	V_{DS}	- 30	V	
Gate-Source Voltage	V_{GS}	± 20		
Continuous Drain Current ^a	I_D	$T_C = 25$ °C	- 50	
		$T_C = 125$ °C	- 50	
Continuous Source Current (Diode Conduction) ^a	I_S	- 50	A	
Pulsed Drain Current ^b	I_{DM}	- 200		
Single Pulse Avalanche Current	I_{AS}	- 50		
Single Pulse Avalanche Energy	E_{AS}	L = 0.1 mH	125	mJ
Maximum Power Dissipation ^b			$T_C = 25$ °C	
		$T_C = 125$ °C	50	W
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}	62	°C/W
Junction-to-Case (Drain)			

Notes

- Package limited.
- Pulse test; pulse width ≤ 300 μ s, duty cycle ≤ 2 %.
- When mounted on 1" square PCB (FR-4 material).
- 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, I _D = - 250 μA	- 30	-	-	V
Gate-Source Threshold Voltage	V _{GS(th)}	V _{DS} = V _{GS} , I _D = - 250 μA	- 1.5	- 2.0	- 2.5	
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} = - 30 V	-	-	- 1	μA
		V _{GS} = 0 V, V _{DS} = - 30 V, T _J = 125 °C	-	-	- 50	
		V _{GS} = 0 V, V _{DS} = - 30 V, T _J = 175 °C	-	-	- 250	
On-State Drain Current ^a	I _{D(on)}	V _{GS} = - 10 V, V _{DS} ≤ - 5 V	- 80	-	-	A
Drain-Source On-State Resistance ^a	R _{DS(on)}	V _{GS} = - 10 V, I _D = - 30 A	-	0.0050	0.0070	Ω
		V _{GS} = - 10 V, I _D = - 30 A, T _J = 125 °C	-	-	0.0102	
		V _{GS} = - 10 V, I _D = - 30 A, T _J = 175 °C	-	-	0.0118	
		V _{GS} = - 4.5 V, I _D = - 20 A	-	0.0089	0.0110	
Forward Transconductance ^b	g _{fs}	V _{DS} = - 15 V, I _D = - 30 A	-	62	-	S
Dynamic^b						
Input Capacitance	C _{iss}	V _{GS} = 0 V, V _{DS} = - 25 V, f = 1 MHz	-	4304	5380	pF
Output Capacitance	C _{oss}		-	764	955	
Reverse Transfer Capacitance	C _{rss}		-	680	850	
Total Gate Charge ^c	Q _g	V _{GS} = - 10 V, V _{DS} = - 15 V, I _D = - 75 A, f = 1 MHz	-	103.5	155	nC
Gate-Source Charge ^c	Q _{gs}		-	14.3	-	
Gate-Drain Charge ^c	Q _{gd}		-	26.9	-	
Gate Resistance	R _g	f = 1 MHz	1.42	2.85	4.28	Ω
Turn-On Delay Time ^c	t _{d(on)}	V _{DD} = - 15 V, R _L = 0.2 Ω, I _D ≅ - 75 A, V _{GEN} = - 10 V, R _g = 1 Ω	-	11	17	ns
Rise Time ^c	t _r		-	10	15	
Turn-Off Delay Time ^c	t _{d(off)}		-	63	95	
Fall Time ^c	t _f		-	26	39	
Source-Drain Diode Ratings and Characteristics^b						
Pulsed Current ^a	I _{SM}		-	-	- 200	A
Forward Voltage	V _{SD}	I _F = - 45 A, V _{GS} = 0	-	- 0.9	- 1.5	V

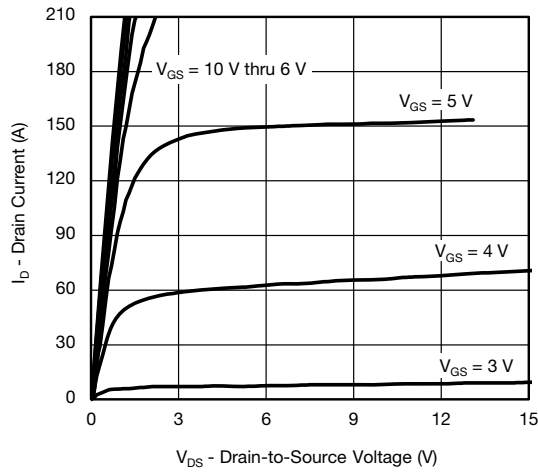
Notes

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

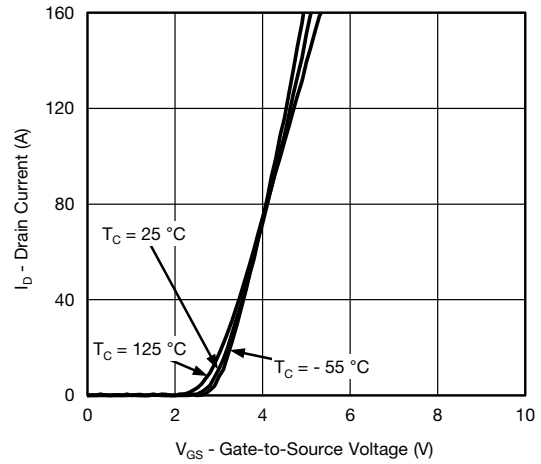
Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure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



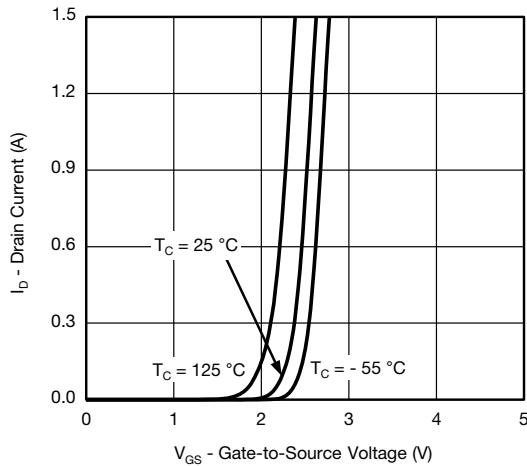
TYPICAL CHARACTERISTICS ($T_A = 25\text{ }^\circ\text{C}$, unless otherwise noted)



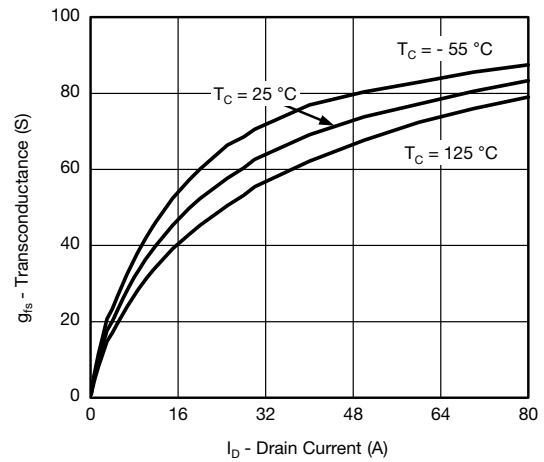
Output Characteristics



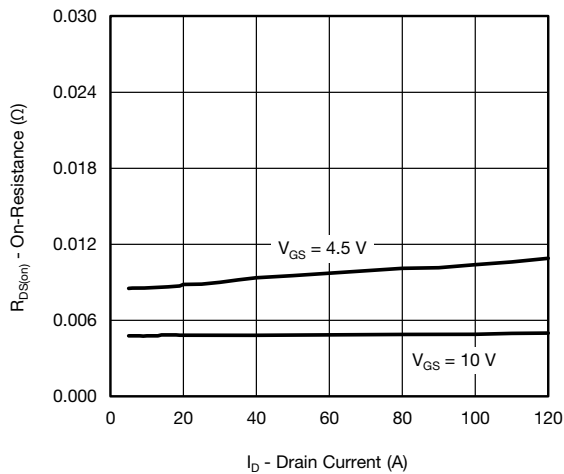
Transfer Characteristics



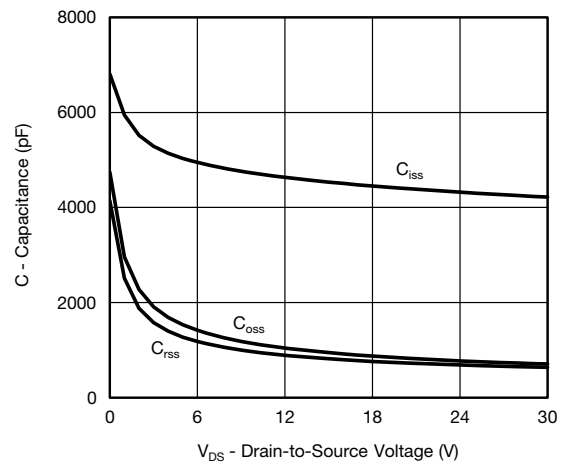
Transfer Characteristics



Transconductance



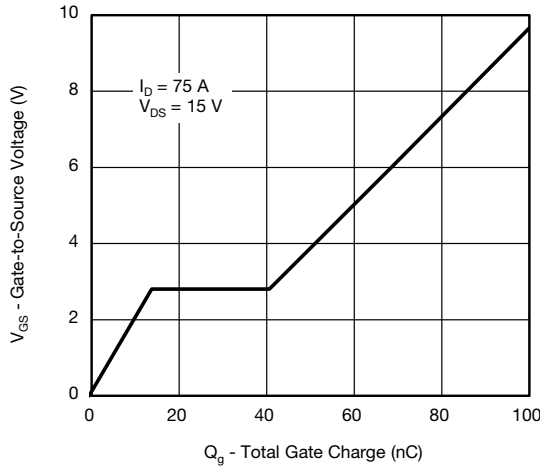
On-Resistance vs. Drain Current



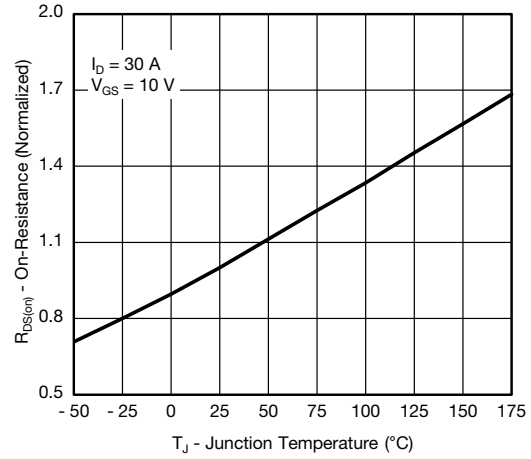
Capacitance



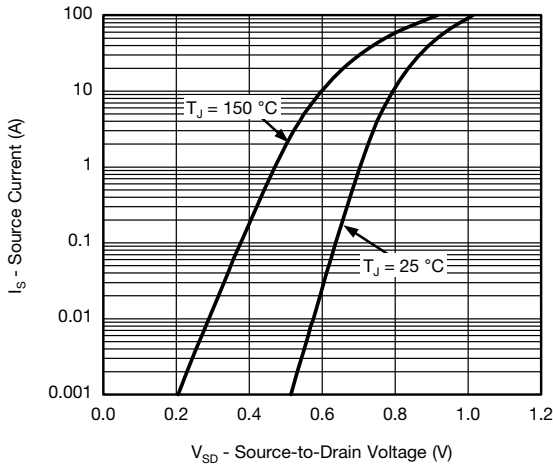
TYPICAL CHARACTERISTICS (T_A = 25 °C, unless otherwise noted)



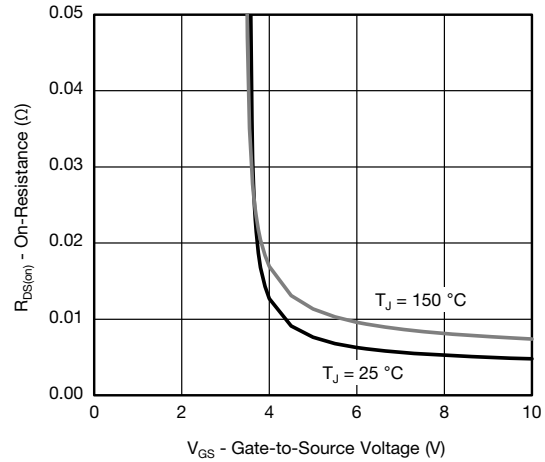
Gate Charge



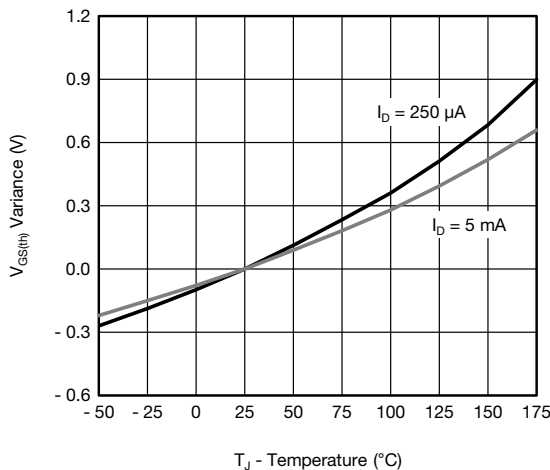
On-Resistance vs. Junction Temperature



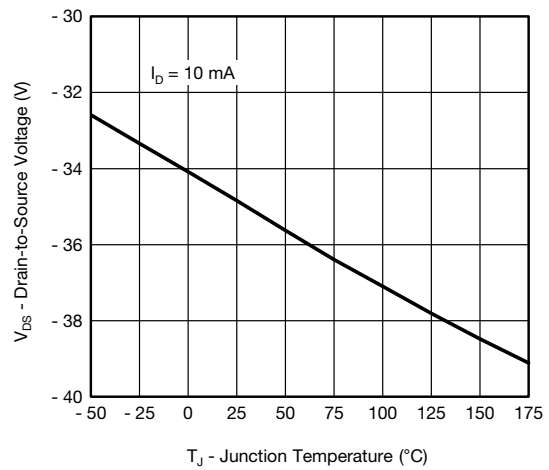
Source Drain Diode Forward Voltage



On-Resistance vs. Gate-to-Source Voltage



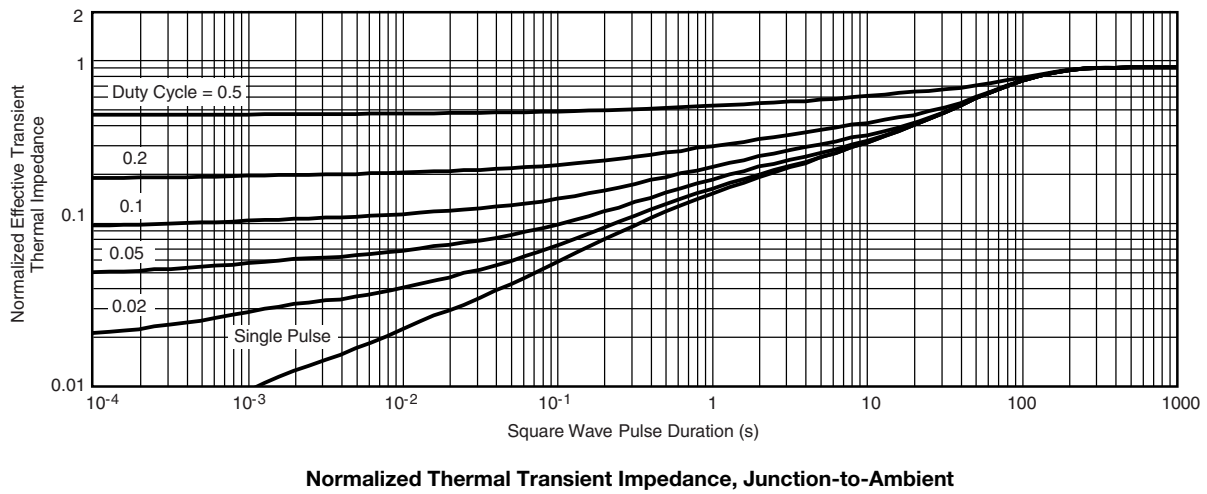
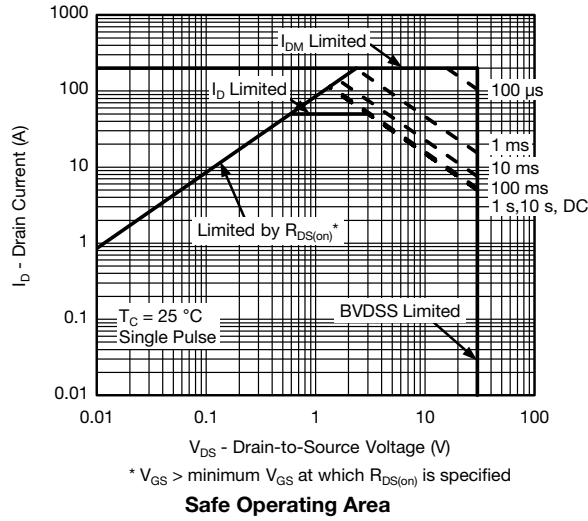
Threshold Voltage



Drain Source Breakdown vs. Junction Temperature

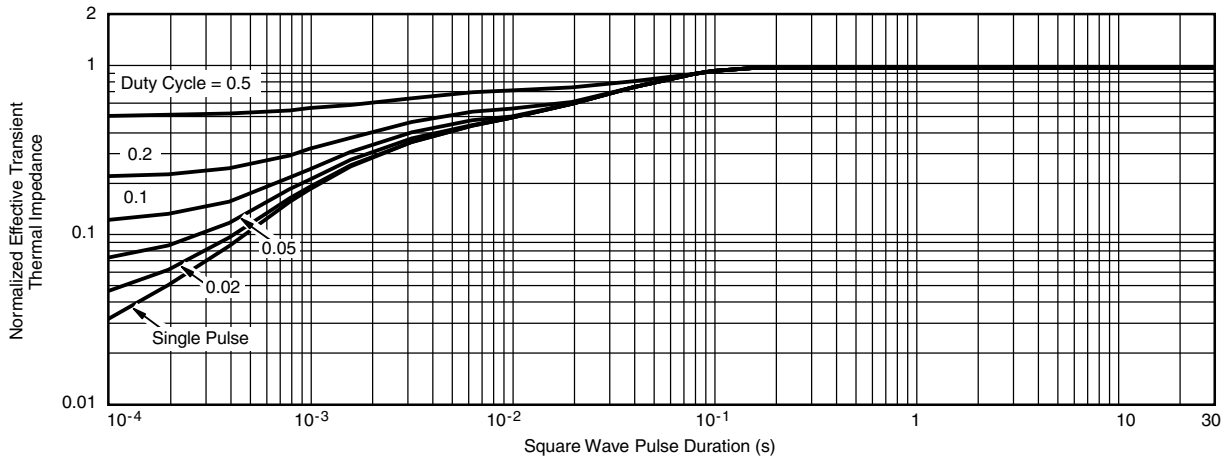


THERMAL RATINGS ($T_A = 25\text{ }^\circ\text{C}$, unless otherwise noted)





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



Normalized Thermal Transient Impedance, Junction-to-Case

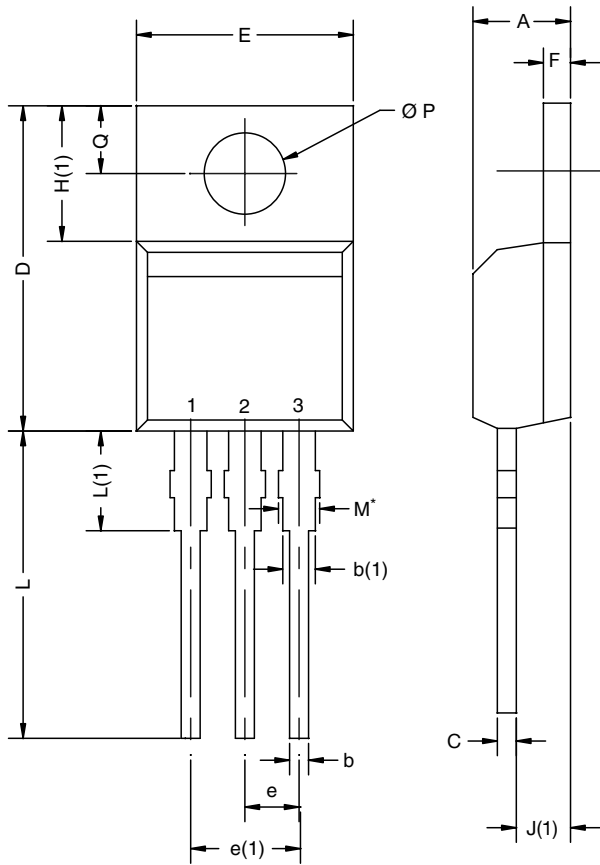
Note

- 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.

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TO-220AB

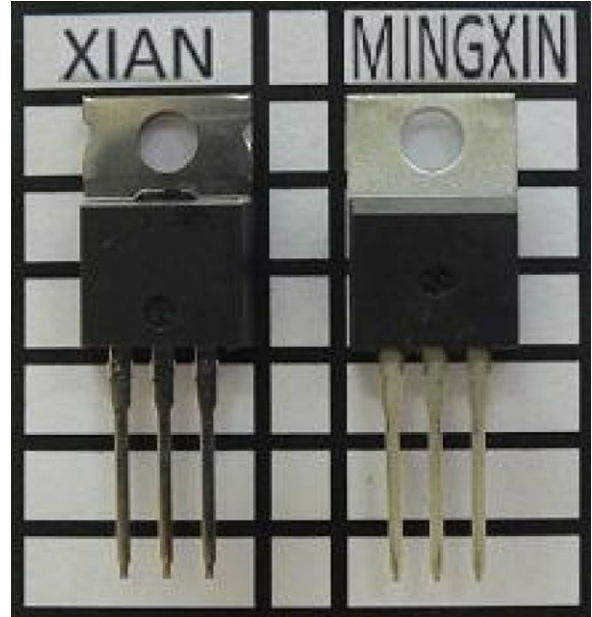


DIM.	MILLIMETERS		INCHES	
	MIN.	MAX.	MIN.	MAX.
A	4.25	4.65	0.167	0.183
b	0.69	1.01	0.027	0.040
b(1)	1.20	1.73	0.047	0.068
c	0.36	0.61	0.014	0.024
D	14.85	15.49	0.585	0.610
E	10.04	10.51	0.395	0.414
e	2.41	2.67	0.095	0.105
e(1)	4.88	5.28	0.192	0.208
F	1.14	1.40	0.045	0.055
H(1)	6.09	6.48	0.240	0.255
J(1)	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
Ø 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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