SUG90090E-VB Datasheet

N-Channel 200 V (D-S) MOSFET

PRODUCT SUMMARY			
V_{DS} (V)	$R_{DS(on)}$ (Ω) MAX.	I_D (A)	Q_g (TYP.)
200	0.010at V_{GS} = 10 V	110	75nC

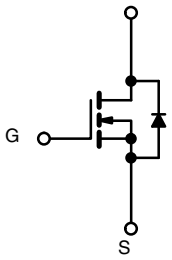
FEATURES

- SGT technology Power MOSFET
- 100 % R_g and UIS tested
- Maximum 175 °C junction temperature

RoHS COMPLIANT
HALOGEN FREE

TO-247

Top View



N-Channel MOSFET

APPLICATIONS

- Power supplies:
  - Uninterruptible power supplies
  - AC/DC switch-mode power supplies
  - Lighting
- Synchronous rectification
- DC/DC converter
- Motor drive switch
- DC/AC inverter
- Solar micro inverter
- Class D audio amplifier

ABSOLUTE MAXIMUM RATINGS (T_C = 25 °C, unless otherwise noted)				
PARAMETER		SYMBOL	LIMIT	UNIT
Drain-Source Voltage		V_{DS}	200	V
Gate-Source Voltage		V_{GS}	± 20	
Continuous Drain Current (T_J = 150 °C)	T_C = 25 °C	I_D	110	A
	T_C = 70 °C		90	
Pulsed Drain Current (t = 100 μs)		I_{DM}	330	
Avalanche Current	L = 0.5 mH	I_{AS}	780	
Single Avalanche Energy [a]		E_{AS}	110	mJ
Maximum Power Dissipation [a]	T_C = 25 °C	P_D	300[b]	W
	T_C = 100 °C		150[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}	0.5	

Notes

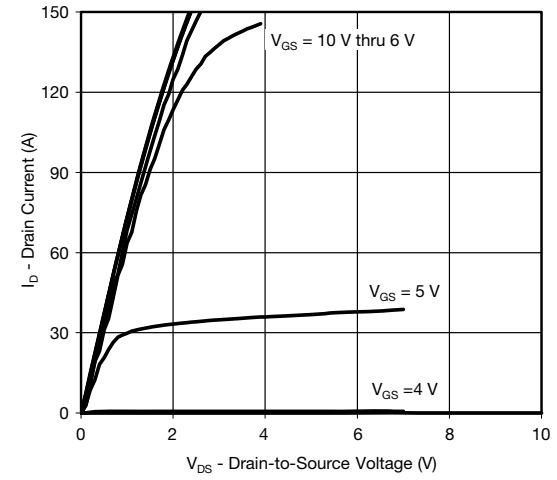
a. Duty cycle ≤ 1 %.
b. See SOA curve for voltage derating.
c. When mounted on 1" square PCB (FR4 material).

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	200	-	-	V
Gate Threshold Voltage	$V_{GS(th)}$	V_{DS} = V_{GS}, I_D = 250 μA	2.5	-	4.5	
Gate-Body Leakage	I_{GSS}	V_{DS} = 0 V, V_{GS} = ± 20 V	-	-	± 250	nA
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS} = 200 V, V_{GS} = 0 V	-	-	1	μA
		V_{DS} = 160 V, V_{GS} = 0 V, T_J = 125 °C	-	-	150	
		V_{DS} = 160 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	90	-	-	A
Drain-Source On-State Resistance [a]	$R_{DS(on)}$	V_{GS} = 10 V, I_D = 30 A	-	0.010	-	Ω
		V_{GS} = 7.5 V, I_D =30 A	-	0.015	-	
Forward Transconductance [a]	g_{fs}	V_{DS} = 15 V, I_D = 30 A	-	75	-	S
Dynamic [b]						
Input Capacitance	C_{iss}	V_{GS} = 0 V, V_{DS} = 60 V, f = 1 MHz	-	6800	-	pF
Output Capacitance	C_{oss}		-	246	-	
Reverse Transfer Capacitance	C_{rss}		-	21	-	
Total Gate Charge [c]	Q_g	V_{DS} = 60 V, V_{GS} = 10 V, I_D = 60 A	-	75	96	nC
Gate-Source Charge [c]	Q_{gs}		-	16.7	-	
Gate-Drain Charge [c]	Q_{gd}		-	16.9	-	
Gate Resistance	R_g	f = 1 MHz	1.5	3	6	Ω
Turn-On Delay Time [c]	$t_{d(on)}$	V_{DD} = 60 V, R_L = 1.66 Ω I_D≅ 60 A, V_{GEN} = 10 V, R_g = 1 Ω	-	21	33	ns
Rise Time [c]	t_r		-	115	220	
Turn-Off Delay Time [c]	$t_{d(off)}$		-	33	71	
Fall Time [c]	t_f		-	90	134	
Drain-Source Body Diode Ratings and Characteristics [b] (T_C = 25 °C)						
Pulsed Current (t = 100 μs)	I_{SM}		-	-	330	A
Forward Voltage [a]	V_{SD}	I_F = 10 A, V_{GS} = 0 V	-	0.8	1.2	V
Reverse Recovery Time	t_{rr}	I_F = 30 A, di/dt = 100 A/μs	-	170	340	ns
Peak Reverse Recovery Charge	$I_{RM(REC)}$		-	11	20	A
Reverse Recovery Charge	Q_{rr}		-	0.9	1.8	μC

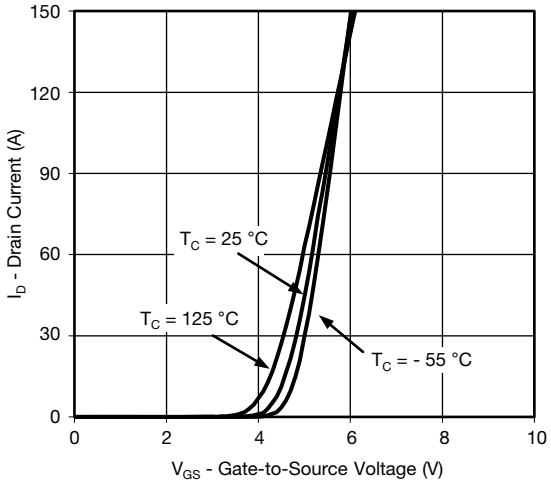
Notes

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

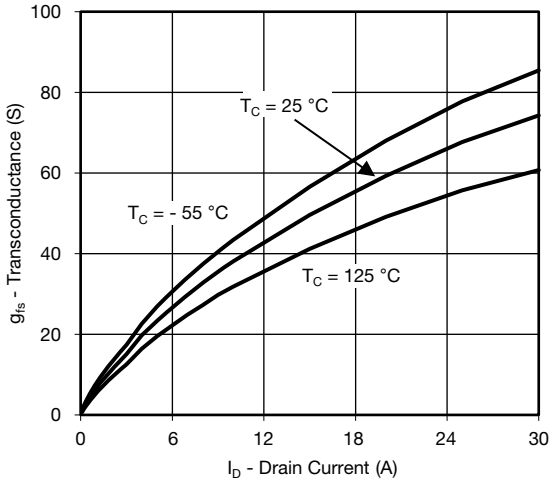
TYPICAL CHARACTERISTICS (T_A = 25 °C, unless otherwise noted)



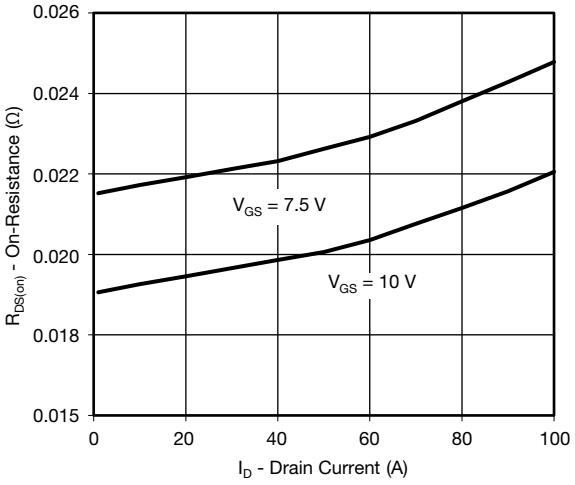
Output Characteristics



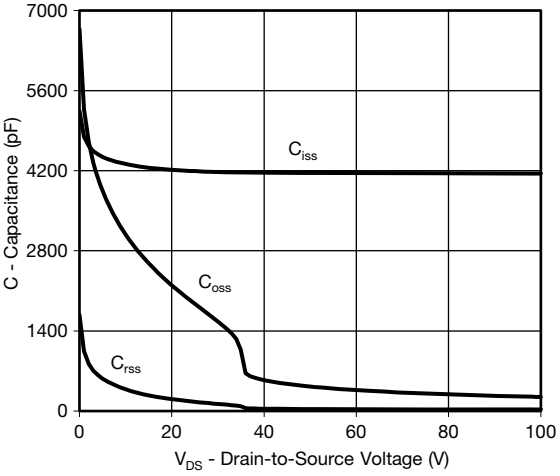
Transfer Characteristics



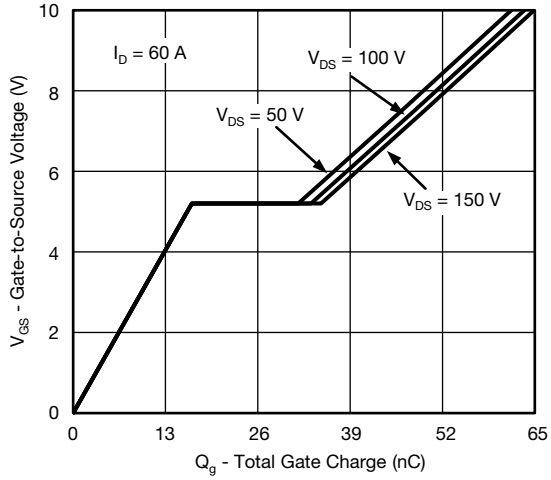
Transconductance



On-Resistance vs. Drain Current

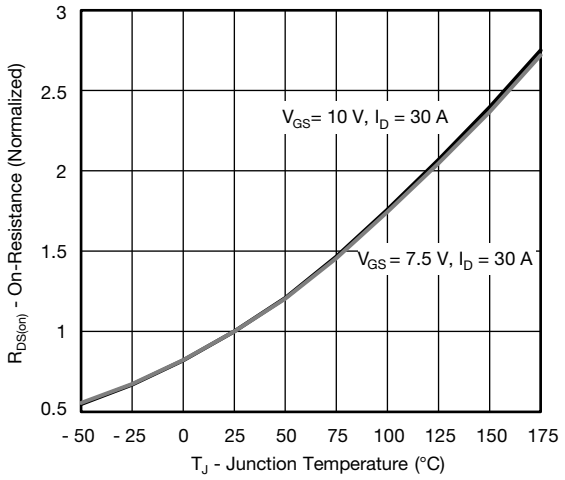


Capacitance

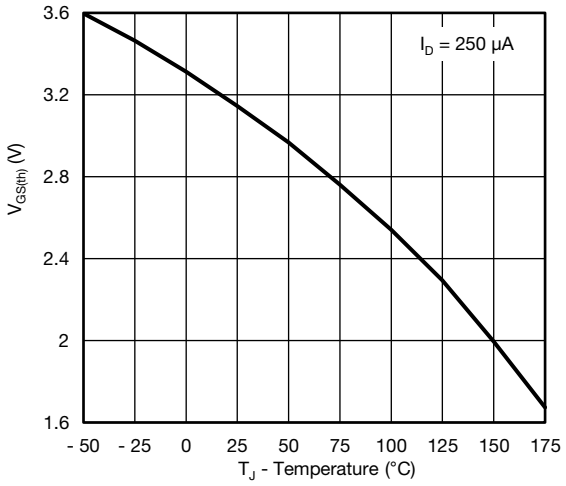


Gate Charge

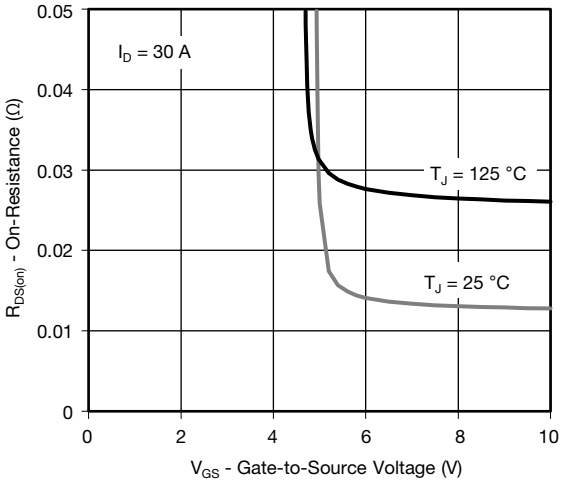
TYPICAL CHARACTERISTICS (T_A = 25 °C, unless otherwise noted)



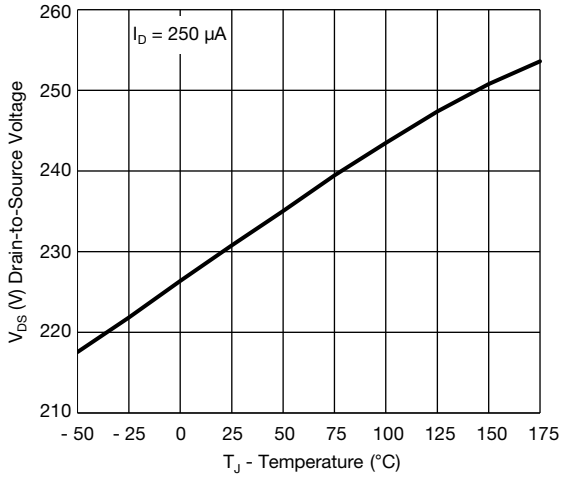
On-Resistance vs. Junction Temperature



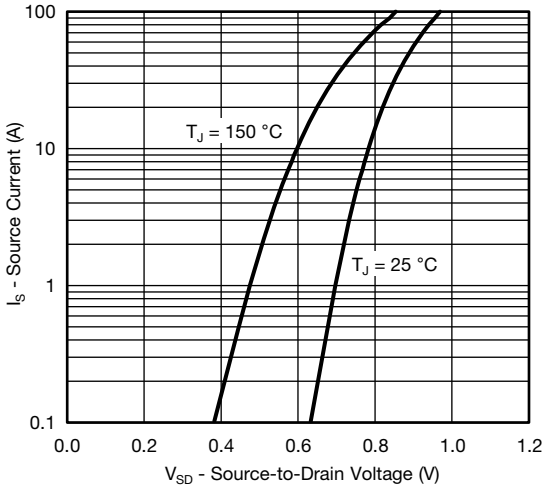
Threshold Voltage



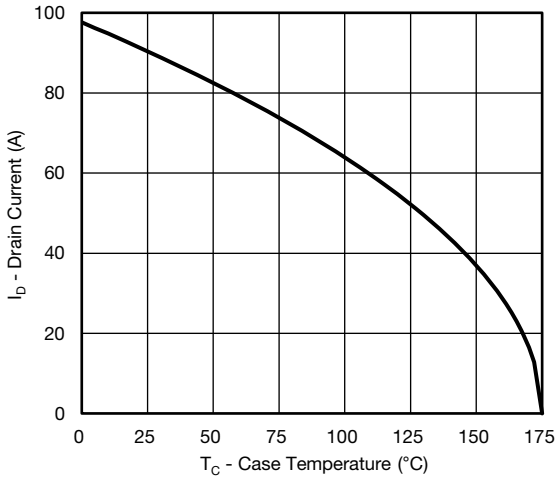
On-Resistance vs. Gate-to-Source Voltage



Drain Source Breakdown vs. Junction Temperature

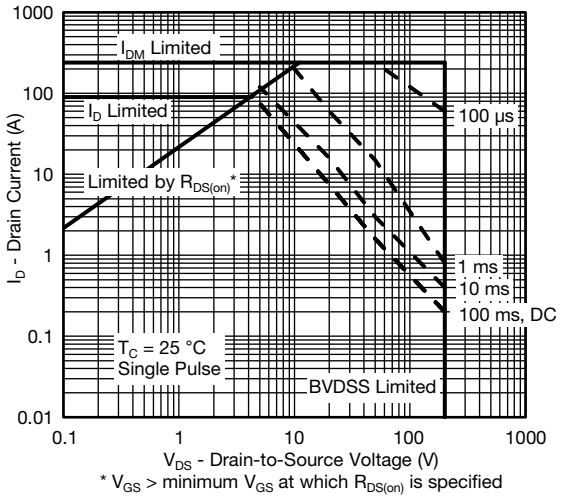


Source Drain Diode Forward Voltage

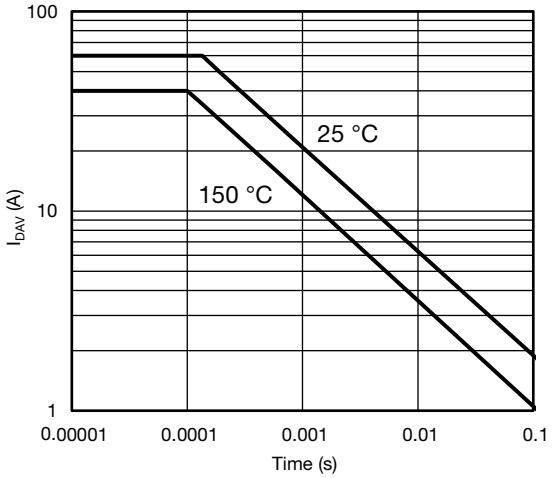


Current De-rating

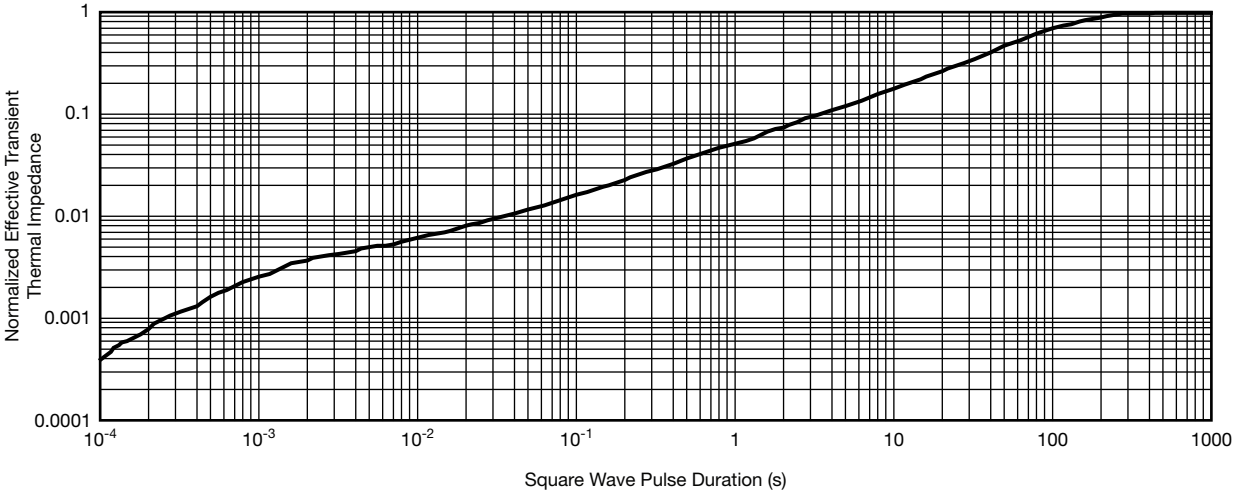
THERMAL RATINGS (T_A = 25 °C, unless otherwise noted)



Safe Operating Area

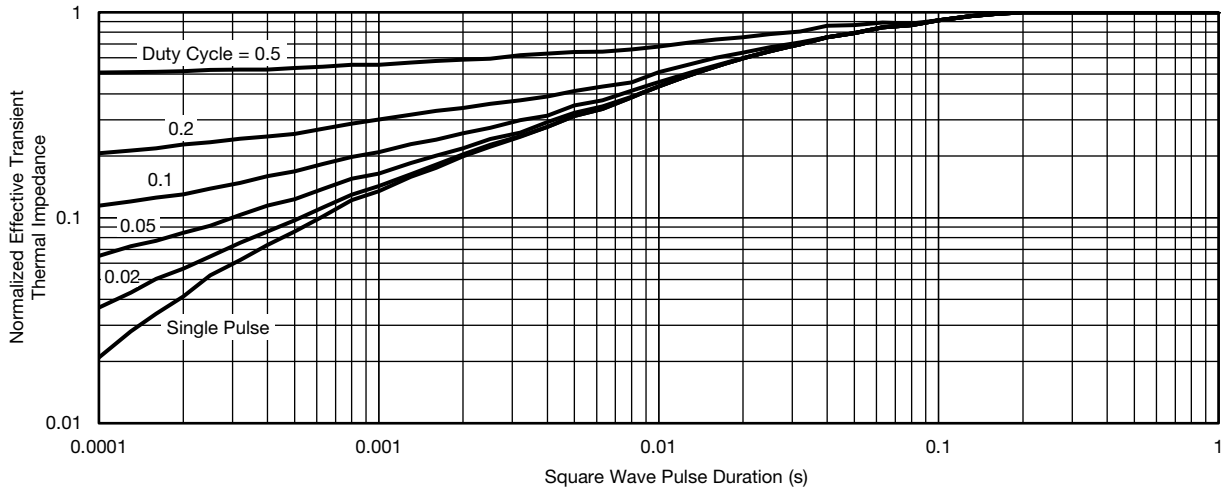


Single Pulse Avalanche Current Capability vs. Time



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.

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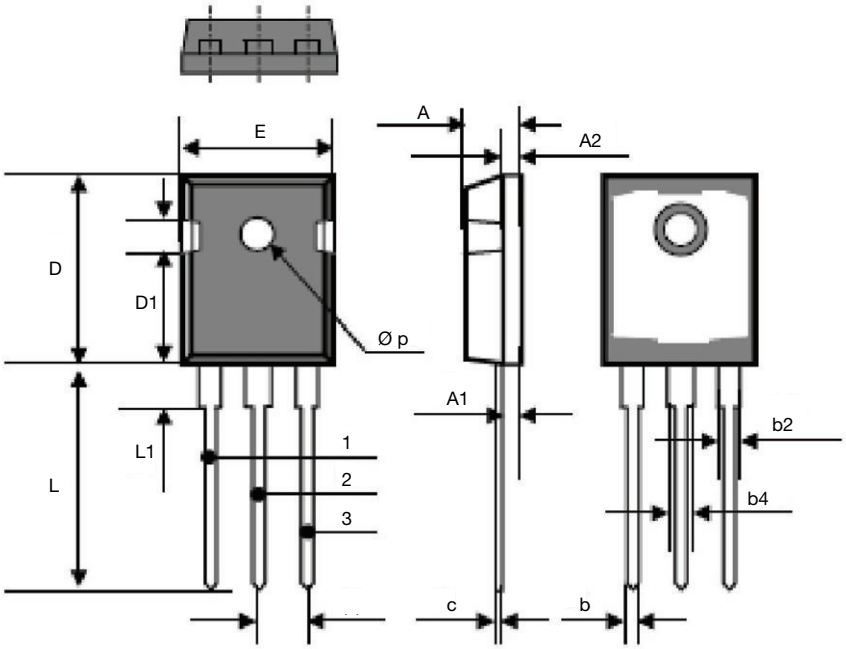

DIM.	MILLIMETERS		INCHES	
	MIN.	MAX.	MIN.	MAX.
A	4.70	5.31	0.185	0.209
A1	2.21	2.59	0.087	0.102
A2	1.50	2.49	0.059	0.098
b	0.99	1.40	0.039	0.055
b2	1.65	2.41	0.065	0.095
b4	2.59	3.43	0.102	0.135
c	0.61 BSC		0.024 BSC	
D	20.80	21.46	0.819	0.845
D1	3.68	5.49	0.145	0.216
(e)	5.46 BSC		0.215 BSC	
E	15.49	16.26	0.610	0.640
L	19.81	20.32	0.780	0.800
L1	4.06	4.50	0.160	0.177
Ø p	3.51	3.66	0.138	0.144

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