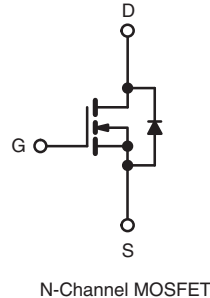
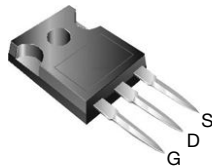


## E Series Power MOSFET

PRODUCT SUMMARY	
$V_{DS}$ (V) at $T_J$ max.	650
$R_{DS(on)}$ max. at 25 °C ( $\Omega$ )	$V_{GS} = 10$ V   0.125
$Q_g$ max. (nC)	130
$Q_{gs}$ (nC)	15
$Q_{gd}$ (nC)	39
Configuration	Single

**TO-247AC**


### FEATURES

- Halogen-free According to IEC 61249-2-21 Definition
- Low Figure-of-Merit (FOM)  $R_{on} \times Q_g$
- Low Input Capacitance ( $C_{iss}$ )
- Reduced Switching and Conduction Losses
- Ultra Low Gate Charge ( $Q_g$ )
- Avalanche Energy Rated (UIS)
- Compliant to RoHS Directive 2002/95/EC



**RoHS**  
COMPLIANT  
HALOGEN  
**FREE**

### APPLICATIONS

- Server and Telecom Power Supplies
- Switch Mode Power Supplies (SMPS)
- Power Factor Correction Power Supplies (PFC)
- Lighting
  - High-Intensity Discharge (HID)
  - Fluorescent Ballast Lighting
  - LED Lighting
- Industrial
  - Welding
  - Induction Heating
  - Motor Drives
- Battery Chargers
- Renewable Energy
  - Solar (PV Inverters)

ORDERING INFORMATION	
Package	TO-247AC
Lead (Pb)-free and Halogen-free	SiHG30N60E-GE3


ABSOLUTE MAXIMUM RATINGS ( $T_C = 25$ °C, unless otherwise noted)			
PARAMETER	SYMBOL	LIMIT	UNIT
Drain-Source Voltage	$V_{DS}$	600	V
Gate-Source Voltage	$V_{GS}$	$\pm 20$	
Gate-Source Voltage AC ( $f > 1$ Hz)		30	
Continuous Drain Current ( $T_J = 150$ °C)	$V_{GS}$ at 10 V	$T_C = 25$ °C	A
		$T_C = 100$ °C	
Pulsed Drain Current <sup>a</sup>	$I_{DM}$	65	W/°C
Linear Derating Factor		2	
Avalanche Energy (repetitive)	$E_{AR}$	0.25	mJ
Single Pulse Avalanche Energy <sup>b</sup>	$E_{AS}$	690	
Maximum Power Dissipation	$P_D$	250	W
Operating Junction and Storage Temperature Range	$T_J, T_{stg}$	- 55 to + 150	°C
Drain-Source Voltage Slope	$dV/dt$	$T_J = 125$ °C	37
Reverse Diode $dV/dt$ <sup>d</sup>		18	
Soldering Recommendations (Peak Temperature)	for 10 s	300°	°C

#### Notes

- Repetitive rating; pulse width limited by maximum junction temperature.
- $V_{DD} = 50$  V, starting  $T_J = 25$  °C,  $L = 28.2$  mH,  $R_g = 25$   $\Omega$ ,  $I_{AS} = 7$  A.
- 1.6 mm from case.
- $I_{SD} \leq I_D$ ,  $dI/dt = 100$  A/ $\mu$ s, starting  $T_J = 25$  °C.

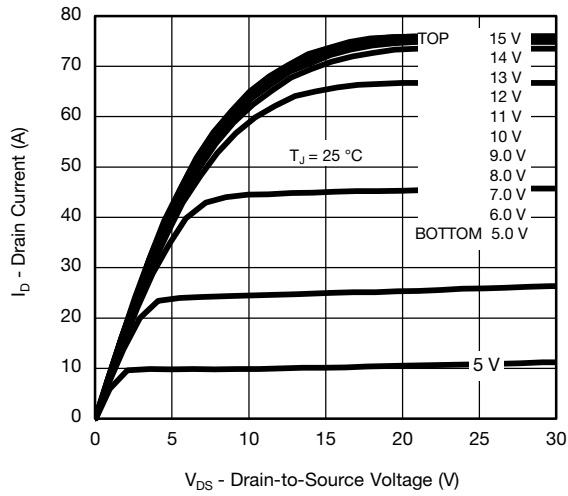


THERMAL RESISTANCE RATINGS				
PARAMETER	SYMBOL	TYP.	MAX.	UNIT
Maximum Junction-to-Ambient	$R_{thJA}$	-	62	°C/W
Maximum Junction-to-Case (Drain)	$R_{thJC}$	-	0.5	

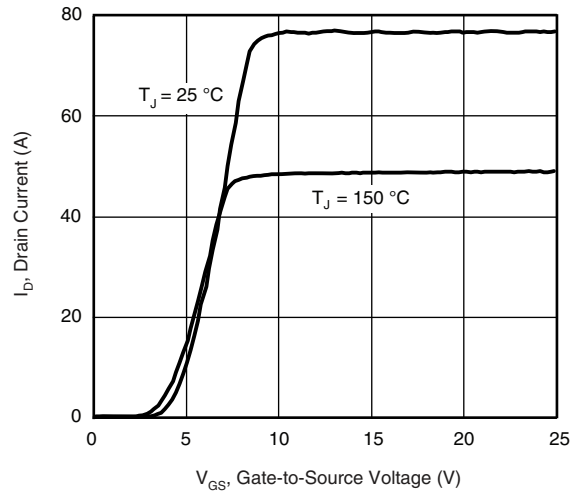
SPECIFICATIONS ( $T_J = 25\text{ }^\circ\text{C}$ , unless otherwise noted)							
PARAMETER	SYMBOL	TEST CONDITIONS		MIN.	TYP.	MAX.	UNIT
<b>Static</b>							
Drain-Source Breakdown Voltage	$V_{DS}$	$V_{GS} = 0\text{ V}, I_D = 250\text{ }\mu\text{A}$		600	-	-	V
$V_{DS}$ Temperature Coefficient	$\Delta V_{DS}/T_J$	Reference to $25\text{ }^\circ\text{C}, I_D = 250\text{ }\mu\text{A}$		-	0.64	-	V/°C
Gate-Source Threshold Voltage (N)	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = 250\text{ }\mu\text{A}$		2.0	-	4.0	V
Gate-Source Leakage	$I_{GSS}$	$V_{GS} = \pm 20\text{ V}$		-	-	$\pm 100$	nA
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS} = 600\text{ V}, V_{GS} = 0\text{ V}$		-	-	1	$\mu\text{A}$
		$V_{DS} = 600\text{ V}, V_{GS} = 0\text{ V}, T_J = 150\text{ }^\circ\text{C}$		-	-	100	
Drain-Source On-State Resistance	$R_{DS(on)}$	$V_{GS} = 10\text{ V}$	$I_D = 15\text{ A}$	-	0.104	0.125	$\Omega$
Forward Transconductance <sup>a</sup>	$g_{fs}$	$V_{DS} = 8\text{ V}, I_D = 3\text{ A}$		-	5.4	-	S
<b>Dynamic</b>							
Input Capacitance	$C_{iss}$	$V_{GS} = 0\text{ V}, V_{DS} = 100\text{ V}, f = 1.0\text{ MHz}$		-	2600	-	$\mu\text{F}$
Output Capacitance	$C_{oss}$			-	138	-	
Reverse Transfer Capacitance	$C_{rss}$			-	3	-	
Total Gate Charge	$Q_g$	$V_{GS} = 10\text{ V}$	$I_D = 15\text{ A}, V_{DS} = 480\text{ V}$	-	85	130	nC
Gate-Source Charge	$Q_{gs}$			-	15	-	
Gate-Drain Charge	$Q_{gd}$			-	39	-	
Turn-On Delay Time	$t_{d(on)}$	$V_{DD} = 380\text{ V}, I_D = 15\text{ A}, V_{GS} = 10\text{ V}, R_g = 4.7\text{ }\Omega$		-	19	40	ns
Rise Time	$t_r$			-	32	65	
Turn-Off Delay Time	$t_{d(off)}$			-	63	95	
Fall Time	$t_f$			-	36	75	
Gate Input Resistance	$R_g$	$f = 1\text{ MHz}, \text{open drain}$		-	0.63	-	$\Omega$
<b>Drain-Source Body Diode Characteristics</b>							
Continuous Source-Drain Diode Current	$I_S$	MOSFET symbol showing the integral reverse p - n junction diode 		-	-	29	A
Pulsed Diode Forward Current	$I_{SM}$			-	-	65	
Diode Forward Voltage	$V_{SD}$	$T_J = 25\text{ }^\circ\text{C}, I_S = 15\text{ A}, V_{GS} = 0\text{ V}$		-	-	1.3	V
Body Diode Reverse Recovery Time	$t_{rr}$	$T_J = 25\text{ }^\circ\text{C}, I_F = I_S = 15\text{ A}, di/dt = 100\text{ A}/\mu\text{s}, V_R = 20\text{ V}$		-	402	605	ns
Body Diode Reverse Recovery Charge	$Q_{rr}$			-	7	15	$\mu\text{C}$
Reverse Recovery Current	$I_{RRM}$			-	32	65	A

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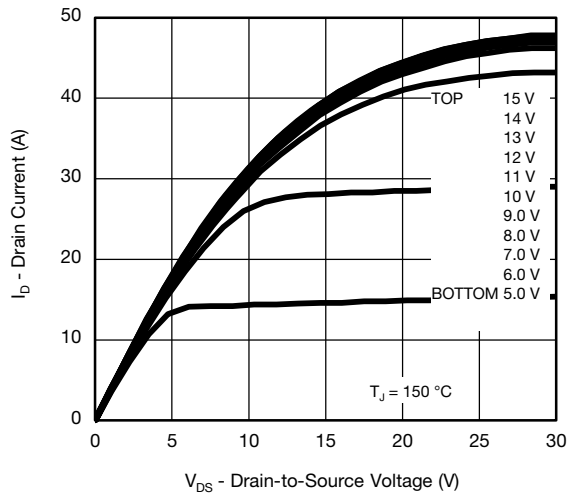
**TYPICAL CHARACTERISTICS** (25 °C, unless otherwise noted)



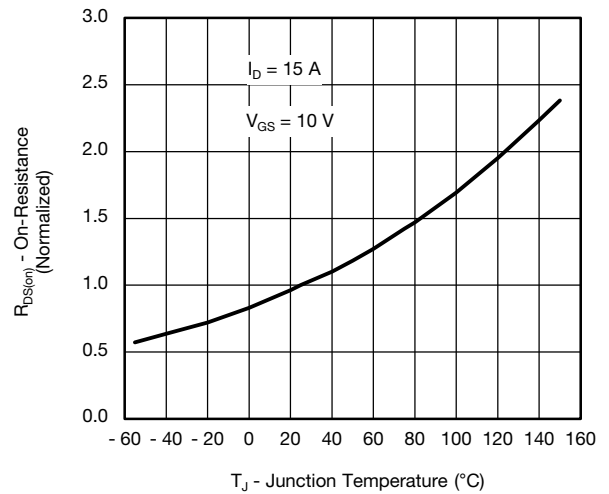
**Fig. 1 - Typical Output Characteristics,  $T_C = 25\text{ }^\circ\text{C}$**



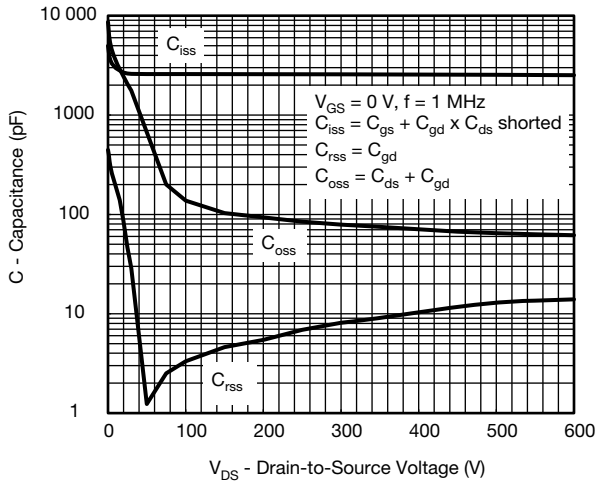
**Fig. 3 - Typical Transfer Characteristics**



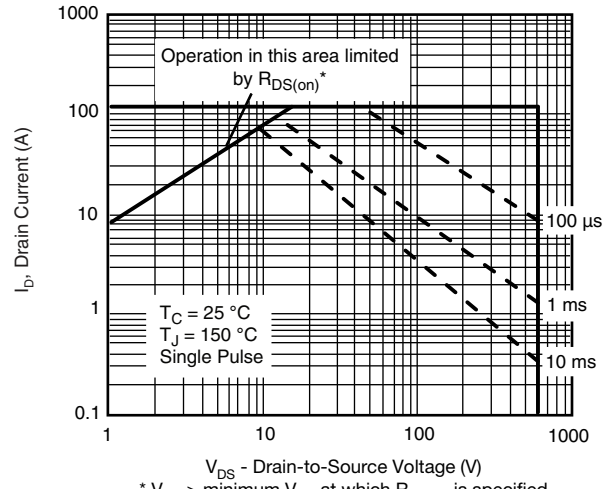
**Fig. 2 - Typical Output Characteristics,  $T_C = 150\text{ }^\circ\text{C}$**



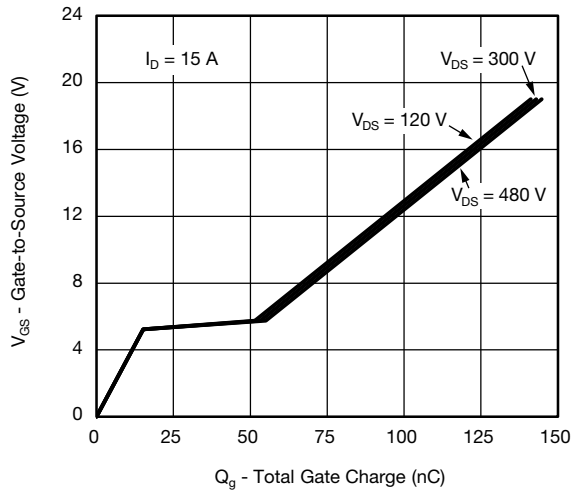
**Fig. 4 - Normalized On-Resistance vs. Temperature**



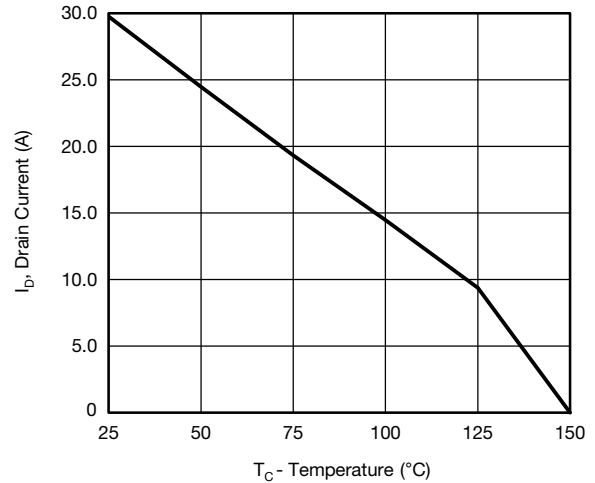
**Fig. 5 - Typical Capacitance vs. Drain-to-Source Voltage**



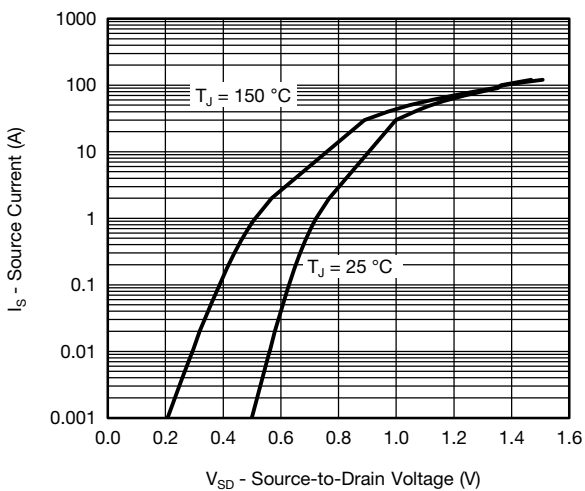
**Fig. 8 - Maximum Safe Operating Area**



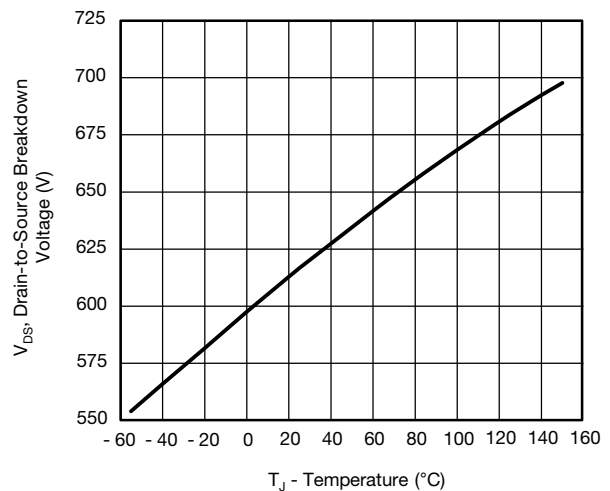
**Fig. 6 - Typical Gate Charge vs. Gate-to-Source Voltage**



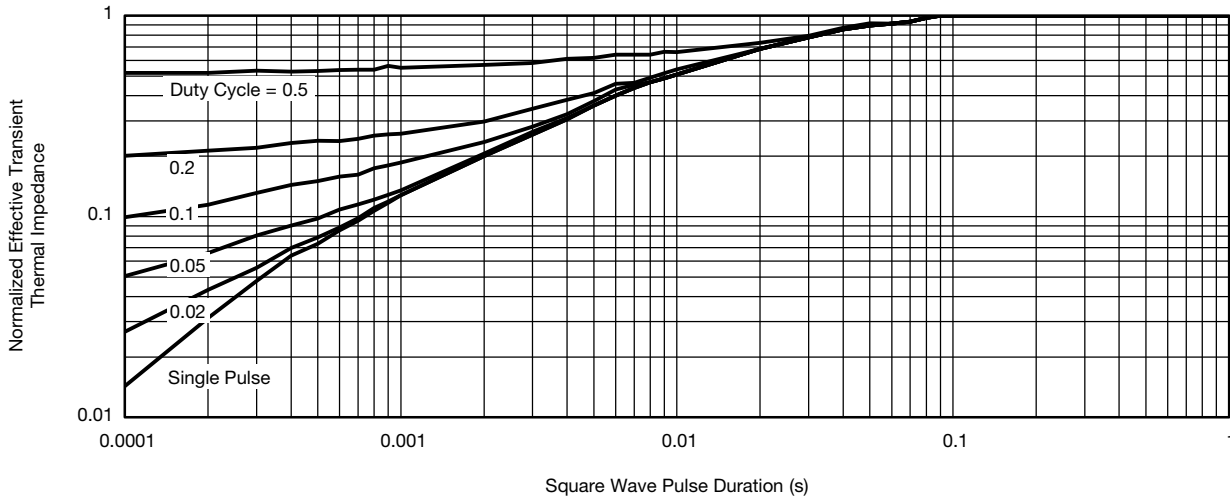
**Fig. 9 - Maximum Drain Current vs. Case Temperature**



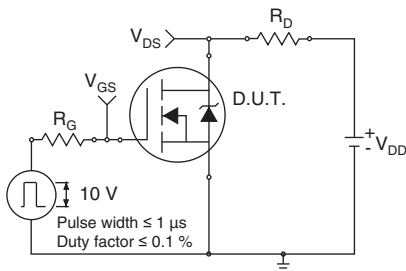
**Fig. 7 - Typical Source-Drain Diode Forward Voltage**



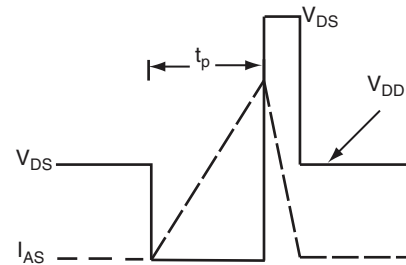
**Fig. 10 - Temperature vs. Drain-to-Source Voltage**



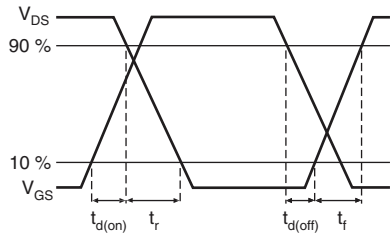
**Fig. 11 - Normalized Thermal Transient Impedance, Junction-to-Case**



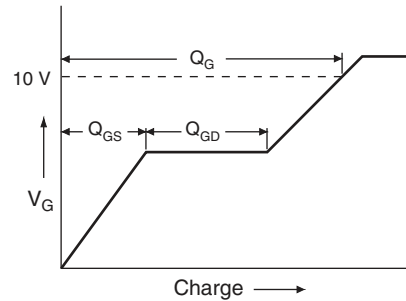
**Fig. 12 - Switching Time Test Circuit**



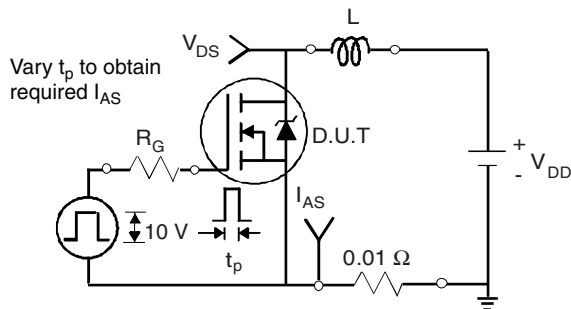
**Fig. 15 - Unclamped Inductive Waveforms**



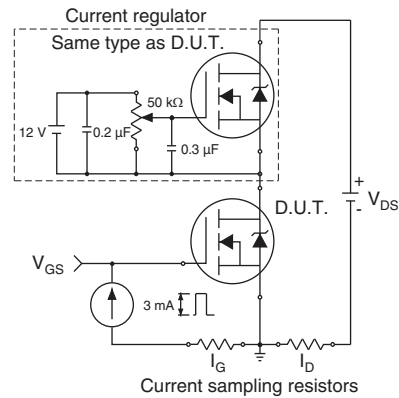
**Fig. 13 - Switching Time Waveforms**



**Fig. 16 - Basic Gate Charge Waveform**



**Fig. 14 - Unclamped Inductive Test Circuit**



**Fig. 17 - Gate Charge Test Circuit**



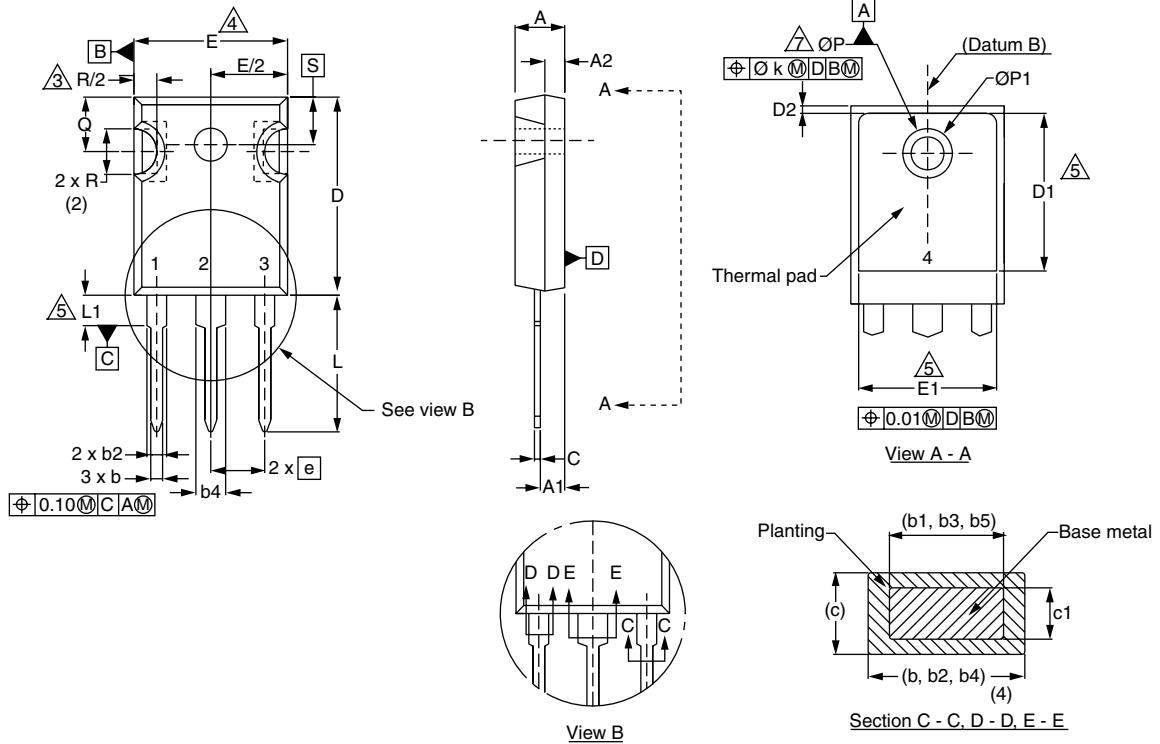
**Note**

a.  $V_{GS} = 5 V$  for logic level devices

**Fig. 18 - For N-Channel**

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### TO-247AC (HIGH VOLTAGE)



DIM.	MILLIMETERS		INCHES	
	MIN.	MAX.	MIN.	MAX.
A	4.65	5.31	0.183	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
b1	0.99	1.35	0.039	0.053
b2	1.65	2.39	0.065	0.094
b3	1.65	2.37	0.065	0.093
b4	2.59	3.43	0.102	0.135
b5	2.59	3.38	0.102	0.133
c	0.38	0.86	0.015	0.034
c1	0.38	0.76	0.015	0.030
D	19.71	20.70	0.776	0.815
D1	13.08	-	0.515	-

DIM.	MILLIMETERS		INCHES	
	MIN.	MAX.	MIN.	MAX.
D2	0.51	1.30	0.020	0.051
E	15.29	15.87	0.602	0.625
E1	13.72	-	0.540	-
e	5.46 BSC		0.215 BSC	
$\Delta$ k	0.254		0.010	
L	14.20	16.10	0.559	0.634
L1	3.71	4.29	0.146	0.169
N	7.62 BSC		0.300 BSC	
$\Delta$ P	3.56	3.66	0.140	0.144
$\Delta$ P1	-	7.39	-	0.291
Q	5.31	5.69	0.209	0.224
R	4.52	5.49	0.178	0.216
S	5.51 BSC		0.217 BSC	

ECN: S-81920-Rev. A, 15-Sep-08  
DWG: 5971

#### Notes

1. Dimensioning and tolerancing per ASME Y14.5M-1994.
2. Contour of slot optional.
3. Dimension D and E do not include mold flash. Mold flash shall not exceed 0.127 mm (0.005") per side. These dimensions are measured at the outermost extremes of the plastic body.
4. Thermal pad contour optional with dimensions D1 and E1.
5. Lead finish uncontrolled in L1.
6.  $\Delta$  P to have a maximum draft angle of 1.5 to the top of the part with a maximum hole diameter of 3.91 mm (0.154").
7. Outline conforms to JEDEC outline TO-247 with exception of dimension c.



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