

## Power MOSFET

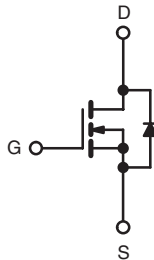
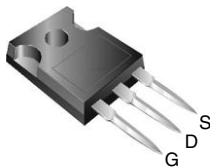
PRODUCT SUMMARY	
$V_{DS}$ (V) at $T_J$ max.	560 V
$R_{DS(on)}$ ( $\Omega$ )	$V_{GS} = 10$ V 0.38
$Q_g$ (Max.) (nC)	68
$Q_{gs}$ (nC)	17.6
$Q_{gd}$ (nC)	21.8
Configuration	Single

### FEATURES

- Low Figure-of-Merit  $R_{on} \times Q_g$
- 100 % Avalanche Tested
- Gate Charge Improved
- $T_{rr}/Q_{rr}$  Improved
- Compliant to RoHS Directive 2002/95/EC



Available  
**RoHS\***  
COMPLIANT

**TO-247AC**


N-Channel MOSFET

ORDERING INFORMATION	
Package	TO-247AC
Lead (Pb)-free	SiHG16N50C-E3

ABSOLUTE MAXIMUM RATINGS $T_C = 25$ °C, unless otherwise noted				
PARAMETER	SYMBOL	LIMIT	UNIT	
Drain-Source Voltage	$V_{DS}$	500	V	
Gate-Source Voltage	$V_{GS}$	$\pm 30$		
Continuous Drain Current ( $T_J = 150$ °C) <sup>a</sup>	$V_{GS}$ at 10 V	$T_C = 25$ °C	16	A
		$T_C = 100$ °C	10	
Pulsed Drain Current <sup>c</sup>	$I_{DM}$	40		
Linear Derating Factor		2	W/°C	
Single Pulse Avalanche Energy <sup>b</sup>	$E_{AS}$	320	mJ	
Maximum Power Dissipation	$P_D$	250	W	
Operating Junction and Storage Temperature Range	$T_J, T_{stg}$	- 55 to + 150	°C	
Soldering Recommendations (Peak Temperature) <sup>d</sup>	for 10 s	300		

### Notes


- Limited by maximum junction temperature.
- $V_{DD} = 50$  V, starting  $T_J = 25$  °C,  $L = 2.5$  mH,  $R_g = 25$   $\Omega$ ,  $I_{AS} = 16$  A.
- Repetitive rating; pulse width limited by maximum junction temperature.
- 1.6 mm from case.

\* Pb containing terminations are not RoHS compliant, exemptions may apply

**THERMAL RESISTANCE RATINGS**

PARAMETER	SYMBOL	TYP.	MAX.	UNIT
Maximum Junction-to-Ambient	$R_{thJA}$	-	40	°C/W
Maximum Junction-to-Case (Drain)	$R_{thJC}$	-	0.5	

**SPECIFICATIONS**  $T_J = 25\text{ °C}$ , unless otherwise noted

PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
<b>Static</b>						
Drain-Source Breakdown Voltage	$V_{DS}$	$V_{GS} = 0\text{ V}, I_D = 250\text{ }\mu\text{A}$	500	-	-	V
$V_{DS}$ Temperature Coefficient	$\Delta V_{DS}/T_J$	Reference to $25\text{ °C}$ , $I_D = 1\text{ mA}$	-	0.6	-	V/°C
Gate-Source Threshold Voltage (N)	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = 250\text{ }\mu\text{A}$	3.0	-	5.0	V
Gate-Source Leakage	$I_{GSS}$	$V_{GS} = \pm 30\text{ V}$	-	-	$\pm 100$	nA
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS} = 500\text{ V}, V_{GS} = 0\text{ V}$	-	-	50	$\mu\text{A}$
		$V_{DS} = 400\text{ V}, V_{GS} = 0\text{ V}, T_J = 125\text{ °C}$	-	-	250	
Drain-Source On-State Resistance	$R_{DS(on)}$	$V_{GS} = 10\text{ V}, I_D = 8\text{ A}$	-	0.317	0.38	$\Omega$
Forward Transconductance <sup>a</sup>	$g_{fs}$	$V_{DS} = 50\text{ V}, I_D = 3\text{ A}$	-	3	-	S
<b>Dynamic</b>						
Input Capacitance	$C_{iss}$	$V_{GS} = 0\text{ V}, V_{DS} = 25\text{ V}, f = 1.0\text{ MHz}$	-	1900	-	$\mu\text{F}$
Output Capacitance	$C_{oss}$		-	230	-	
Reverse Transfer Capacitance	$C_{rss}$		-	24	-	
Total Gate Charge	$Q_g$	$V_{GS} = 10\text{ V}, I_D = 16\text{ A}, V_{DS} = 400\text{ V}$	-	45	68	nC
Gate-Source Charge	$Q_{gs}$		-	18	-	
Gate-Drain Charge	$Q_{gd}$		-	22	-	
Turn-On Delay Time	$t_{d(on)}$	$V_{DD} = 250\text{ V}, I_D = 16\text{ A}, R_g = 9.1\text{ }\Omega, V_{GS} = 10\text{ V}$	-	27	-	ns
Rise Time	$t_r$		-	156	-	
Turn-Off Delay Time	$t_{d(off)}$		-	29	-	
Fall Time	$t_f$		-	31	-	
Gate Input Resistance	$R_g$	$f = 1\text{ MHz}, \text{open drain}$	-	1.6	-	$\Omega$
<b>Drain-Source Body Diode Characteristics</b>						
Continuous Source-Drain Diode Current	$I_S$	MOSFET symbol showing the integral reverse p - n junction diode 	-	-	16	A
Pulsed Diode Forward Current	$I_{SM}$		-	-	30	
Body Diode Voltage	$V_{SD}$	$T_J = 25\text{ °C}, I_S = 10\text{ A}, V_{GS} = 0\text{ V}$	-	-	1.8	V
Body Diode Reverse Recovery Time	$t_{rr}$	$T_J = 25\text{ °C}, I_F = I_S, dI/dt = 100\text{ A}/\mu\text{s}, V_R = 20\text{ V}$	-	555	-	ns
Body Diode Reverse Recovery Charge	$Q_{rr}$		-	5.5	-	$\mu\text{C}$
Body Diode Reverse Recovery Current	$I_{RRM}$		-	18	-	A

**Note**

- The information shown here is a preliminary product proposal, not a commercial product data sheet. Vishay Siliconix is not committed to produce this or any similar product. This information should not be used for design purposes, nor construed as an offer to furnish or sell such products.

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

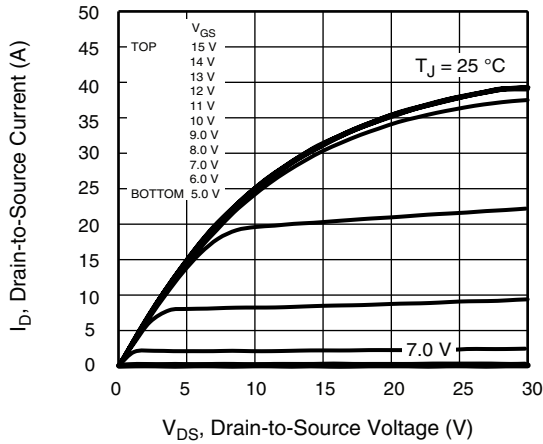


Fig. 1 - Typical Output Characteristics

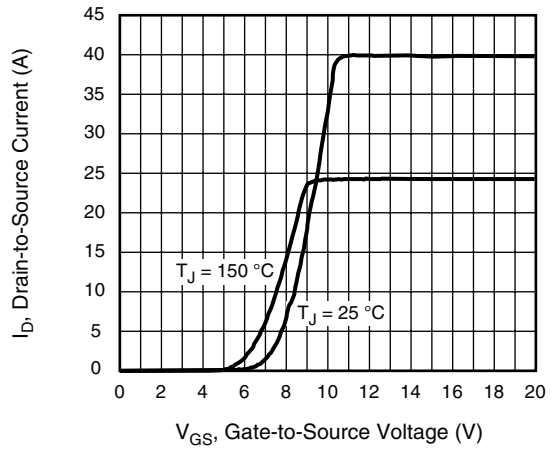


Fig. 3 - Typical Transfer Characteristics

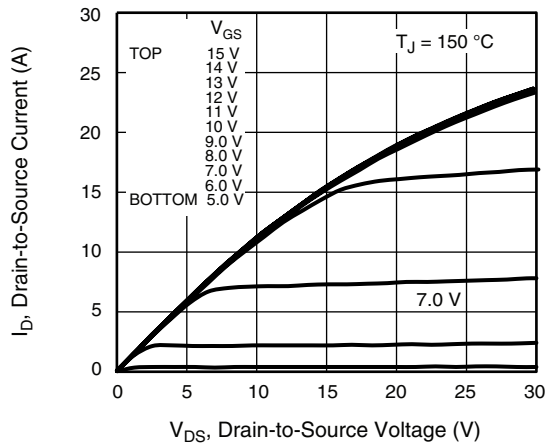


Fig. 2 - Typical Output Characteristics

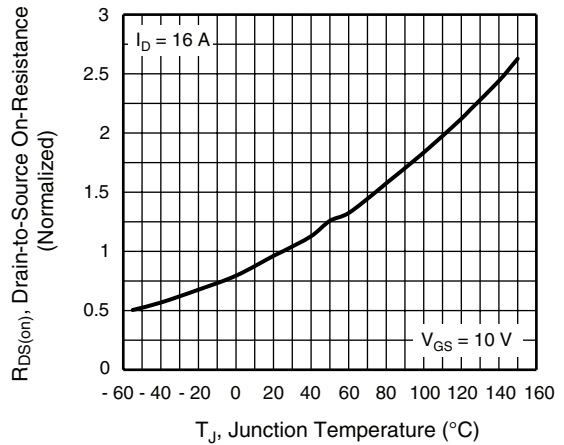


Fig. 4 - Normalized On-Resistance vs. Temperature

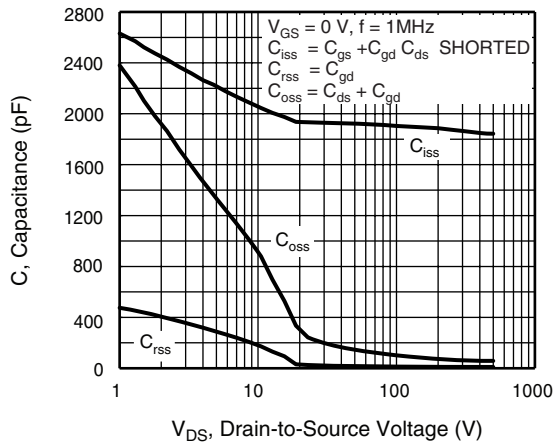


Fig. 5 - Typical Capacitance vs. Drain-to-Source Voltage

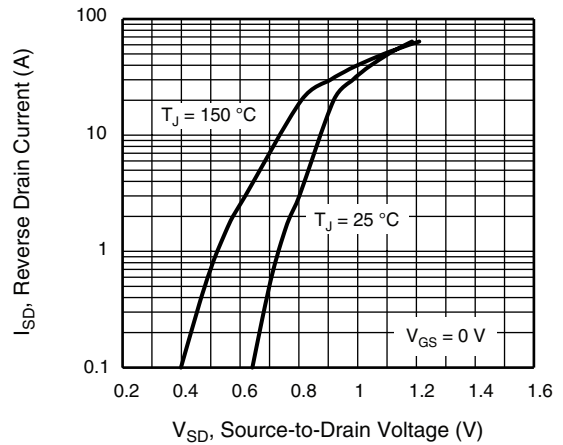


Fig. 7 - Typical Source-Drain Diode Forward Voltage

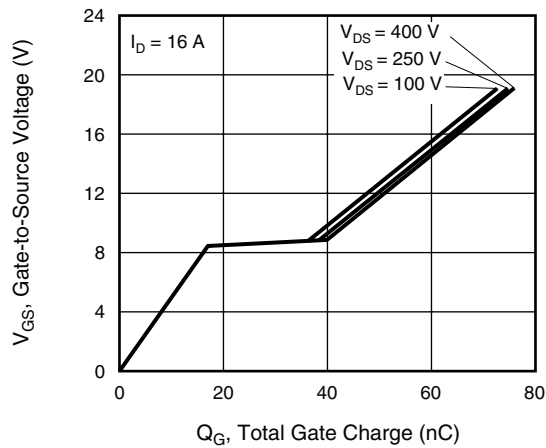


Fig. 6 - Typical Gate Charge vs. Gate-to-Source Voltage

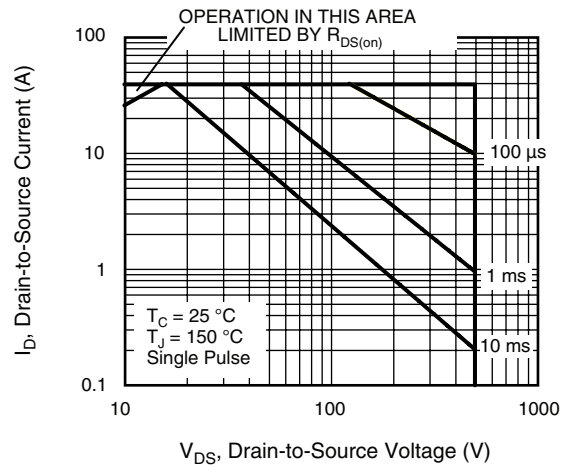


Fig. 8 - Maximum Safe Operating Area

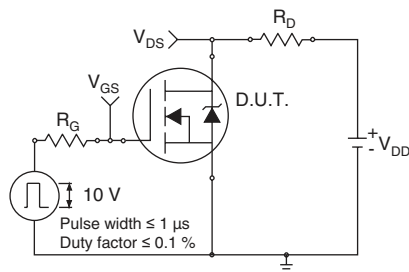


Fig. 9a - Switching Time Test Circuit

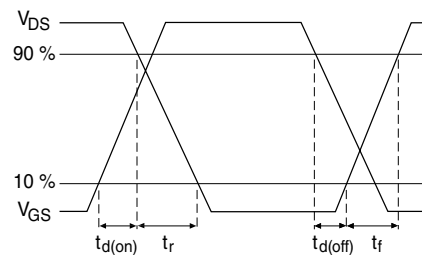
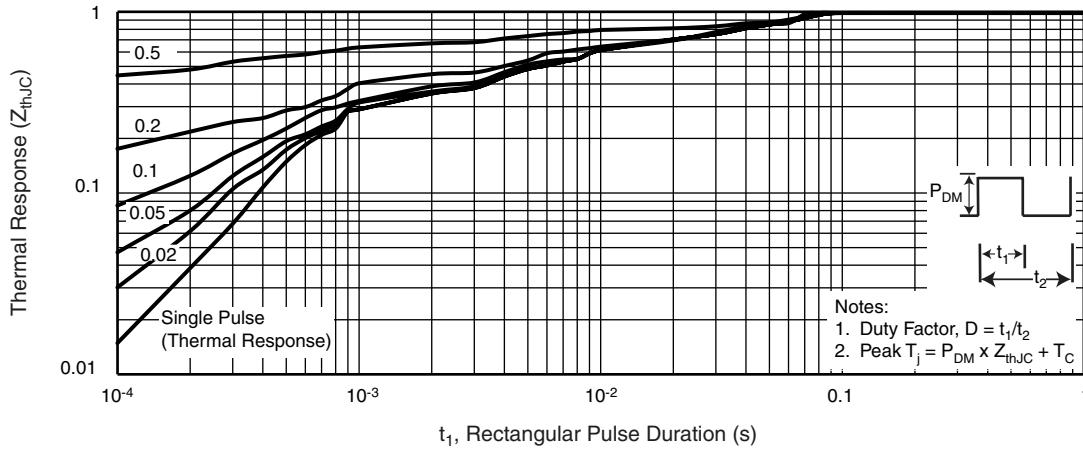
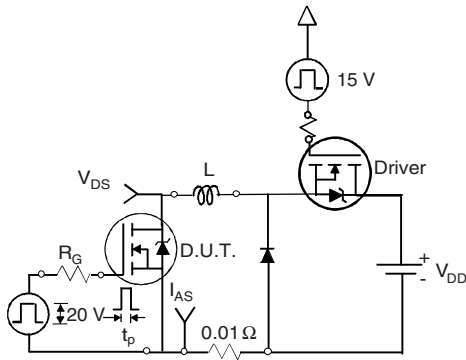


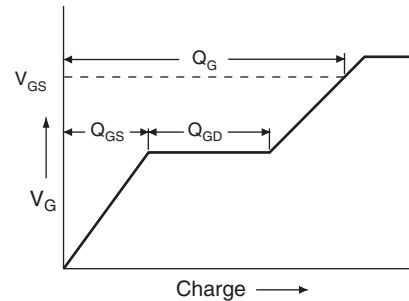
Fig. 9b - Switching Time Waveforms



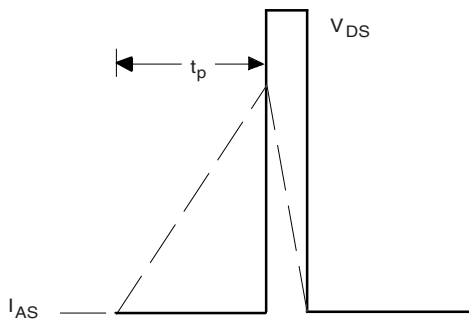
**Fig. 10 - Maximum Effective Transient Thermal Impedance, Junction-to-Case**



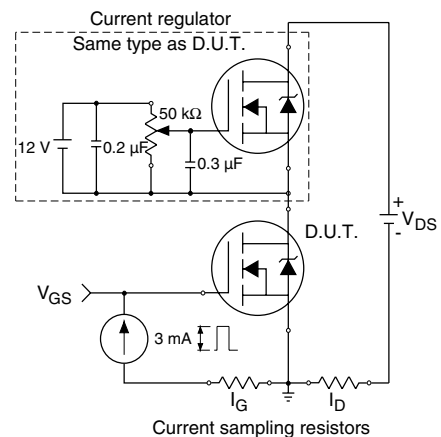
**Fig. 11a - Unclamped Inductive Test Circuit**



**Fig. 12a - Basic Gate Charge Waveform**

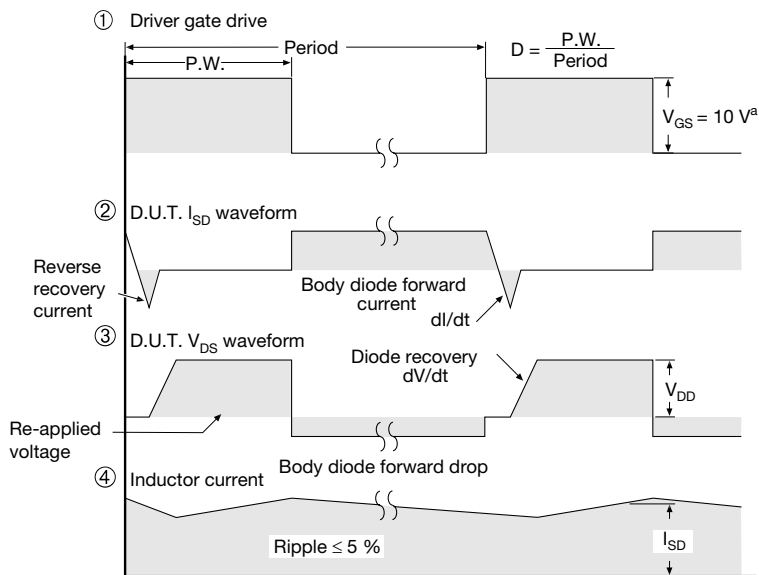
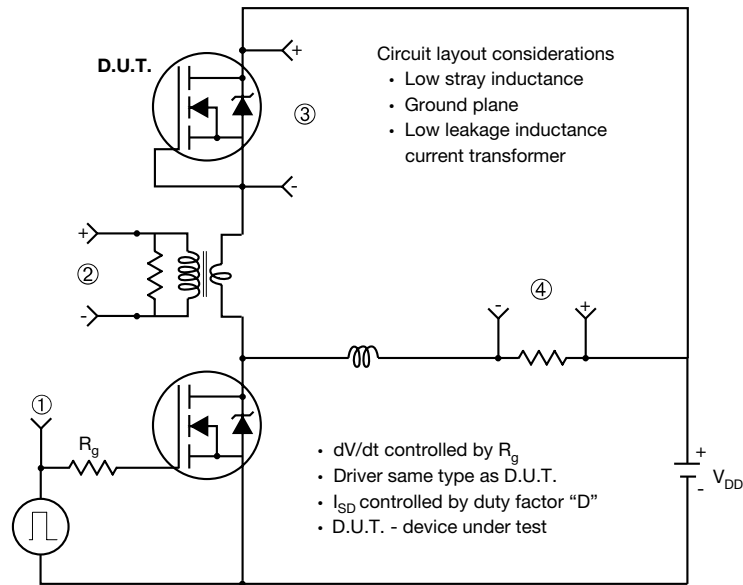


**Fig. 11b - Unclamped Inductive Waveforms**



**Fig. 12b - Gate Charge Test Circuit**

Peak Diode Recovery dV/dt Test Circuit



**Note**  
a.  $V_{GS} = 5\text{ V}$  for logic level devices

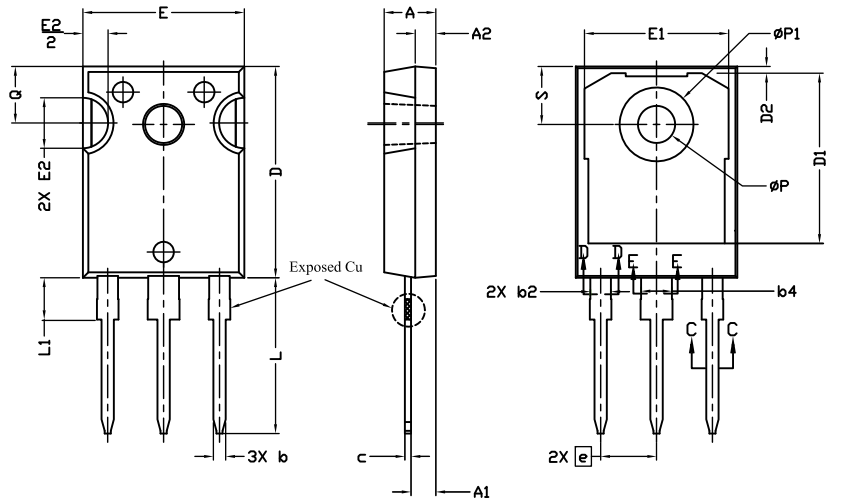
Fig. 13 - For N-Channel

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# TO-247AC (High Voltage)

VERSION 1: FACILITY CODE = 9



Section C--C, D--D, E--E

DIM.	MILLIMETERS		NOTES
	MIN.	MAX.	
A	4.83	5.21	
A1	2.29	2.55	
A2	1.50	2.49	
b	1.12	1.33	
b1	1.12	1.28	
b2	1.91	2.39	6
b3	1.91	2.34	
b4	2.87	3.22	6, 8
b5	2.87	3.18	
c	0.55	0.69	6
c1	0.55	0.65	
D	20.40	20.70	4

DIM.	MILLIMETERS		NOTES
	MIN.	MAX.	
D1	16.25	16.85	5
D2	0.56	0.76	
E	15.50	15.87	4
E1	13.46	14.16	5
E2	4.52	5.49	3
e	5.44 BSC		
L	14.90	15.40	
L1	3.96	4.16	6
Ø P	3.56	3.65	7
Ø P1	7.19 ref.		
Q	5.31	5.69	
S	5.54	5.74	

**Notes**

- (1) Package reference: JEDEC® TO247, variation AC
- (2) All dimensions are in mm
- (3) Slot required, notch may be rounded
- (4) Dimension D and E do not include mold flash. Mold flash shall not exceed 0.127 mm per side. These dimensions are measured at the outermost extremes of the plastic body
- (5) Thermal pad contour optional with dimensions D1 and E1
- (6) Lead finish uncontrolled in L1
- (7) Ø 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
- (8) Dimension b2 and b4 does not include dambar protrusion. Allowable dambar protrusion shall be 0.1 mm total in excess of b2 and b4 dimension at maximum material condition



**VERSION 2: FACILITY CODE = Y**



DIM.	MILLIMETERS		NOTES
	MIN.	MAX.	
A	4.58	5.31	
A1	2.21	2.59	
A2	1.17	2.49	
b	0.99	1.40	
b1	0.99	1.35	
b2	1.53	2.39	
b3	1.65	2.37	
b4	2.42	3.43	
b5	2.59	3.38	
c	0.38	0.86	
c1	0.38	0.76	
D	19.71	20.82	
D1	13.08	-	

DIM.	MILLIMETERS		NOTES
	MIN.	MAX.	
D2	0.51	1.30	
E	15.29	15.87	
E1	13.72	-	
e	5.46 BSC		
Ø k	0.254		
L	14.20	16.25	
L1	3.71	4.29	
Ø P	3.51	3.66	
Ø P1	-	7.39	
Q	5.31	5.69	
R	4.52	5.49	
S	5.51 BSC		

**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) Ø 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





VERSION 3: FACILITY CODE = N



MILLIMETERS		
DIM.	MIN.	MAX.
A	4.65	5.31
A1	2.21	2.59
A2	1.17	1.37
b	0.99	1.40
b1	0.99	1.35
b2	1.65	2.39
b3	1.65	2.34
b4	2.59	3.43
b5	2.59	3.38
c	0.38	0.89
c1	0.38	0.84
D	19.71	20.70
D1	13.08	-

MILLIMETERS		
DIM.	MIN.	MAX.
D2	0.51	1.35
E	15.29	15.87
E1	13.46	-
e	5.46 BSC	
k	0.254	
L	14.20	16.10
L1	3.71	4.29
N	7.62 BSC	
P	3.56	3.66
P1	-	7.39
Q	5.31	5.69
R	4.52	5.49
S	5.51 BSC	

ECN: E20-0545-Rev. F, 19-Oct-2020  
 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) Ø 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")



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