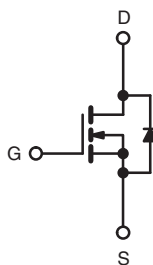
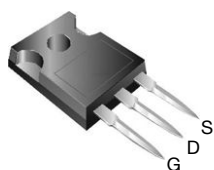


Power MOSFET

PRODUCT SUMMARY

V_{DS} (V)	500	
$R_{DS(on)}$ (Ω)	$V_{GS} = 10\text{ V}$	0.28
Q_g (Max.) (nC)	130	
Q_{gs} (nC)	33	
Q_{gd} (nC)	59	
Configuration	Single	

TO-247AC



N-Channel MOSFET

FEATURES

- SuperFast Body Diode Eliminates the Need For External Diodes in ZVS Applications
- Low Gate Charge Results in Simple Drive Requirement
- Enhanced dV/dt Capabilities Offer Improved Ruggedness
- Higher Gate Voltage Threshold Offers Improved Noise Immunity
- Compliant to RoHS Directive 2002/95/EC



RoHS*
COMPLIANT

APPLICATIONS

- Zero Voltage Switching SMPS
- Telecom and Server Power Supplies
- Uninterruptible Power Supply
- Motor Control applications

ORDERING INFORMATION

Package	TO-247AC
Lead (Pb)-free	IRFP17N50LPbF SiHFP17N50L-E3
SnPb	IRFP17N50L SiHFP17N50L

ABSOLUTE MAXIMUM RATINGS ($T_C = 25^\circ\text{C}$, unless otherwise noted)

PARAMETER			SYMBOL	LIMIT	UNIT
Drain-Source Voltage			V_{DS}	500	V
Gate-Source Voltage			V_{GS}	± 30	
Continuous Drain Current	V_{GS} at 10 V	$T_C = 25\text{ }^{\circ}\text{C}$	I_D	16	A
		$T_C = 100\text{ }^{\circ}\text{C}$		11	
Pulsed Drain Current ^a			I_{DM}	64	
Linear Derating Factor				1.8	W/ $^{\circ}\text{C}$
Single Pulse Avalanche Energy ^b			E_{AS}	390	mJ
Repetitive Avalanche Current ^a			I_{AR}	16	A
Repetitive Avalanche Energy ^a			E_{AR}	22	mJ
Maximum Power Dissipation	$T_C = 25\text{ }^{\circ}\text{C}$		P_D	220	W
Peak Diode Recovery dV/dt^c			dV/dt	13	V/ns
Operating Junction and Storage Temperature Range			T_J, T_{stg}	- 55 to + 150	$^{\circ}\text{C}$
Soldering Recommendations (Peak Temperature)	for 10 s			300 ^d	
Mounting Torque	6-32 or M3 screw			10	
				1.1	N · m

Notes

- Repetitive rating; pulse width limited by maximum junction temperature (see fig. 11).
- Starting $T_J = 25^\circ\text{C}$, $L = 3.0\text{ mH}$, $R_g = 25\ \Omega$, $I_{AS} = 16\text{ A}$ (see fig. 12).
- $I_{SD} \leq 16\text{ A}$, $dI/dt \leq 347\text{ A}/\mu\text{s}$, $V_{DD} \leq V_{DS}$, $T_J \leq 150^\circ\text{C}$.
- 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}	-	62	°C/W
Case-to-Sink, Flat, Greased Surface	R_{thCS}	0.50	-	
Maximum Junction-to-Case (Drain)	R_{thJC}	-	0.56	

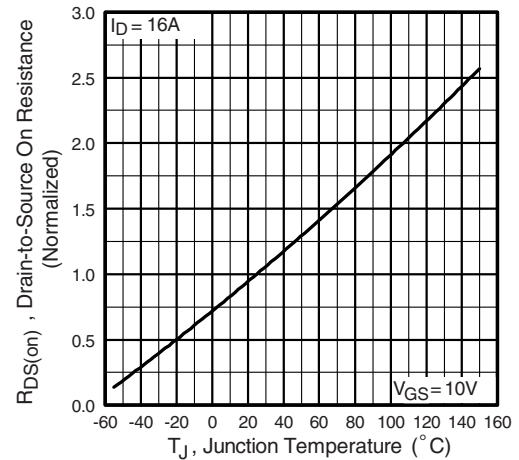
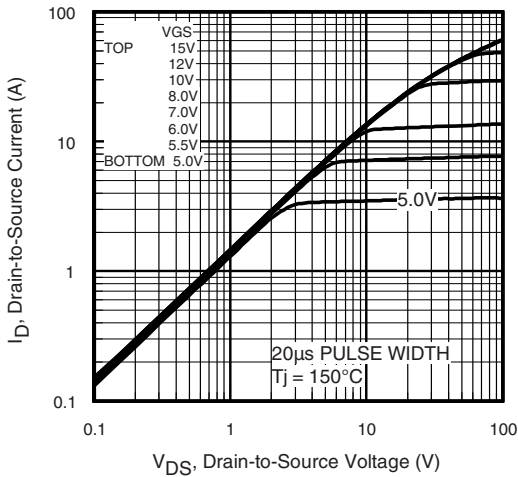
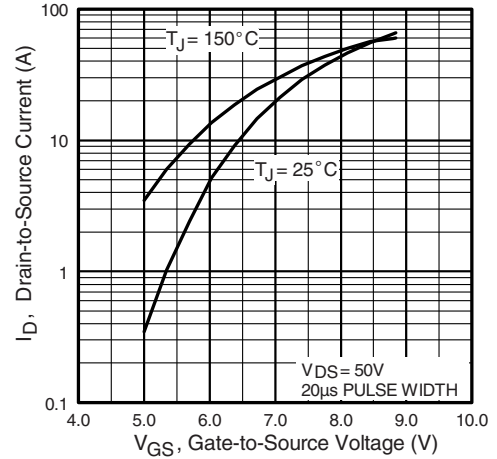
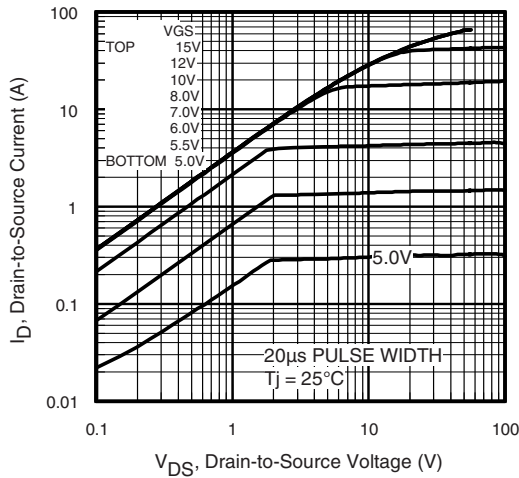
SPECIFICATIONS ($T_J = 25\text{ }^{\circ}\text{C}$, unless otherwise noted)

PARAMETER	SYMBOL	TEST CONDITIONS		MIN.	TYP.	MAX.	UNIT
Static							
Drain-Source Breakdown Voltage	V _{DS}	V _{GS} = 0 V, I _D = 250 μA		500	-	-	V
V _{DS} Temperature Coefficient	ΔV _{DS} /T _J	Reference to 25 °C, I _D = 1 mA ^d		-	0.60	-	V/°C
Gate-Source Threshold Voltage	V _{GS(th)}	V _{DS} = V _{GS} , I _D = 250 μA		3.0	-	5.0	V
Gate-Source Leakage	I _{GSS}	V _{GS} = ± 30 V		-	-	± 100	nA
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} = 500 V, V _{GS} = 0 V		-	-	50	μA
		V _{DS} = 400 V, V _{GS} = 0 V, T _J = 125 °C		-	-	2.0	mA
Drain-Source On-State Resistance	R _{DS(on)}	V _{GS} = 10 V	I _D = 9.9 A ^b	-	0.28	0.32	Ω
Forward Transconductance	g _{fs}	V _{DS} = 50 V, I _D = 9.9 A ^b		11	-	-	S
Dynamic							
Input Capacitance	C _{iss}	V _{GS} = 0 V, V _{DS} = 25 V, f = 1.0 MHz, see fig. 5		-	2760	-	pF
Output Capacitance	C _{oss}			-	325	-	
Reverse Transfer Capacitance	C _{rss}			-	37	-	
Output Capacitance	C _{oss}	V _{GS} = 0 V	V _{DS} = 1.0 V , f = 1.0 MHz	-	3690	-	
			V _{DS} = 400 V , f = 1.0 MHz	-	84	-	
Effective Output Capacitance	C _{oss} eff.		V _{DS} = 0 V to 400 V	-	159	-	
Effective Output Capacitance (Energy Related)	C _{oss} eff. (ER)	-		120	-		
Internal Gate Resistance	R _g	f = 1 MHz, open drain		-	1.4	-	Ω
Total Gate Charge	Q _g	V _{GS} = 10 V	I _D = 16 A, V _{DS} = 400 V see fig. 7 and 15 ^b	-	-	130	nC
Gate-Source Charge	Q _{gs}			-	-	33	
Gate-Drain Charge	Q _{gd}			-	-	59	
Turn-On Delay Time	t _{d(on)}	V _{DD} = 250 V, I _D = 16 A R _G = 7.5 Ω, V _{GS} = 10 V see fig. 14a and 14b ^b		-	21	-	ns
Rise Time	t _r			-	51	-	
Turn-Off Delay Time	t _{d(off)}			-	50	-	
Fall Time	t _f			-	28	-	
Drain-Source Body Diode Characteristics							
Continuous Source-Drain Diode Current	I _S	MOSFET symbol showing the integral reverse p - n junction diode 		-	-	16	A
Pulsed Diode Forward Current ^a	I _{SM}			-	-	64	
Body Diode Voltage	V _{SD}	T _J = 25 °C, I _S = 16 A, V _{GS} = 0 V ^b		-	-	1.5	V
Body Diode Reverse Recovery Time	t _{rr}	T _J = 25 °C	I _F = 16 A, dI/dt = 100 A/μs ^b	-	170	250	ns
		T _J = 125 °C		-	220	330	
Body Diode Reverse Recovery Charge	Q _{rr}	T _J = 25 °C		-	470	710	μC
		T _J = 125 °C		-	810	1210	
Reverse Recovery Current	I _{RRM}	T _J = 25 °C		-	7.3	11	
Forward Turn-On Time	t _{on}	Intrinsic turn-on time is negligible (turn-on is dominated by L _S and L _D)					

Notes

- a. Repetitive rating; pulse width limited by maximum junction temperature (see fig. 11).
b. Pulse width $\leq 300\text{ }\mu\text{s}$; duty cycle $\leq 2\%$.
c. $C_{oss\text{ eff.}}$ is a fixed capacitance that gives the same charging time as C_{oss} while V_{DS} is rising from 0 % to 80 % V_{DS} .
 $C_{oss\text{ eff. (ER)}}$ is a fixed capacitance that stores the same energy as C_{oss} while V_{DS} is rising from 0 % to 80 % V_{DS} .

TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



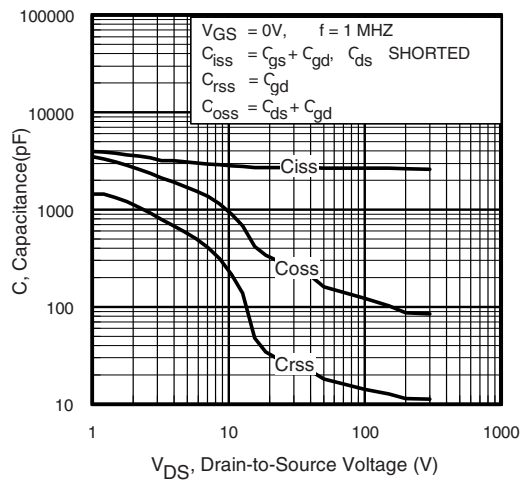


Fig. 5 - Typical Capacitance vs. Drain-to-Source Voltage

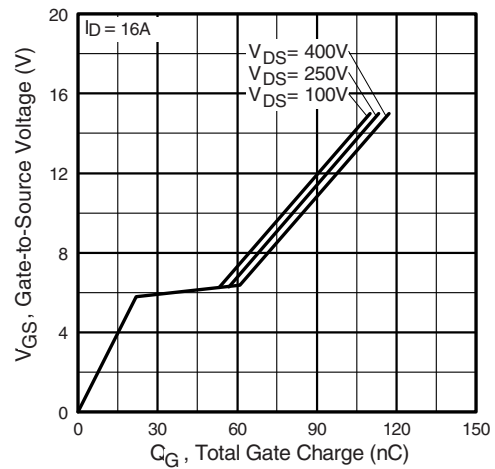


Fig. 7 - Typical Gate Charge vs. Gate-to-Source Voltage

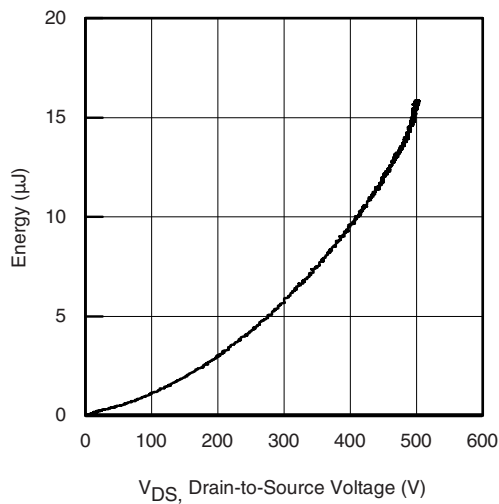


Fig. 6 - Typ. Output Capacitance Stored Energy vs. V_{DS}

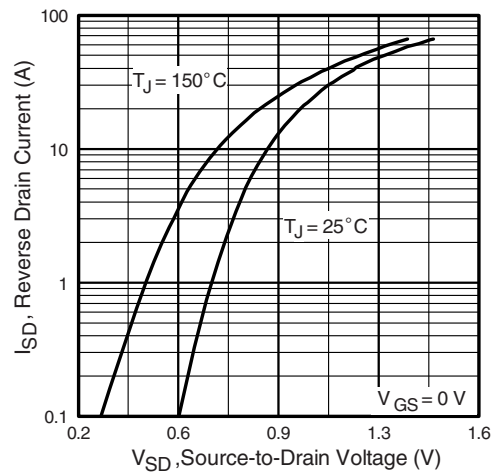


Fig. 8 - Typical Source-Drain Diode Forward Voltage

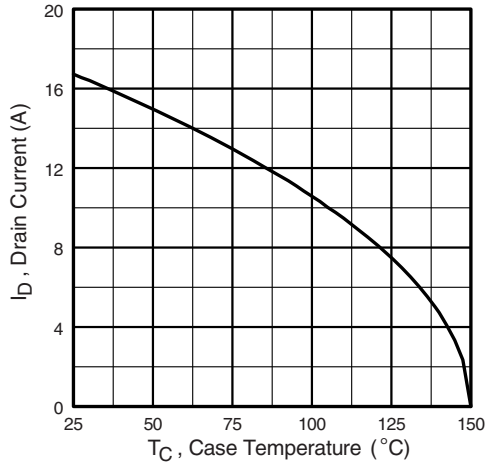


Fig. 9 - Maximum Drain Current vs. Case Temperature

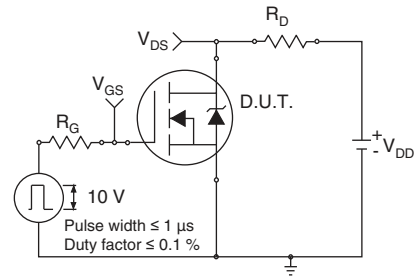


Fig. 10a - Switching Time Test Circuit



Fig. 10b - Switching Time Waveforms

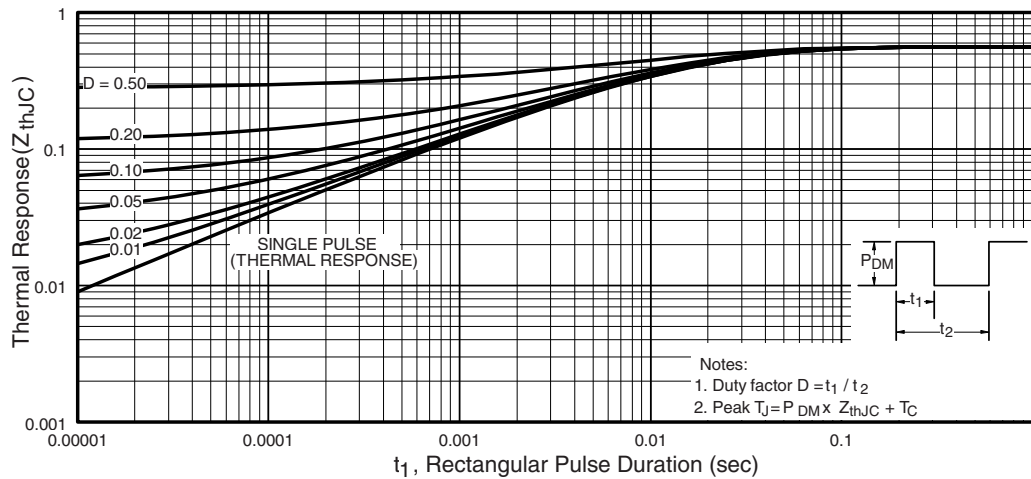


Fig. 11 - Maximum Effective Transient Thermal Impedance, Junction-to-Case

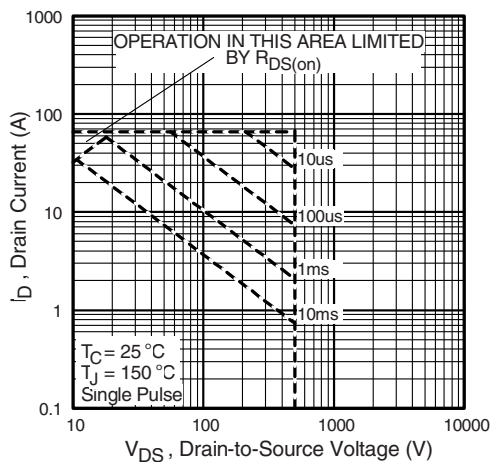


Fig. 12 - Maximum Safe Operating Area

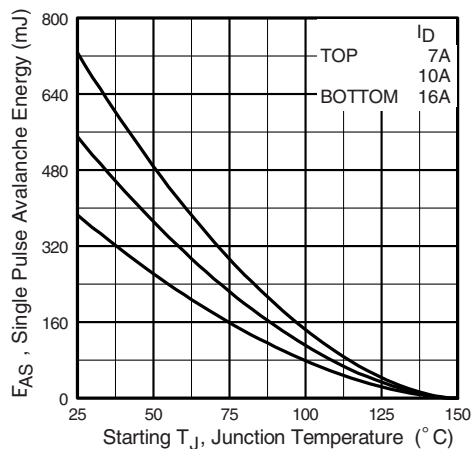


Fig. 13 - Maximum Avalanche Energy vs. Drain Current

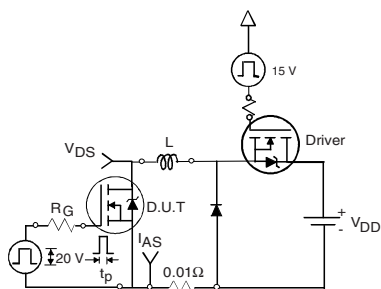


Fig. 14a - Unclamped Inductive Test Circuit

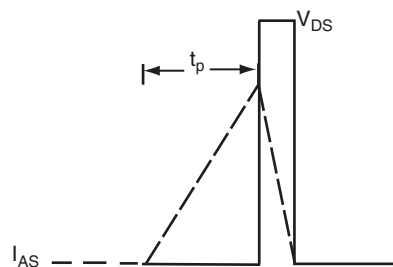


Fig. 14b - Unclamped Inductive Waveforms

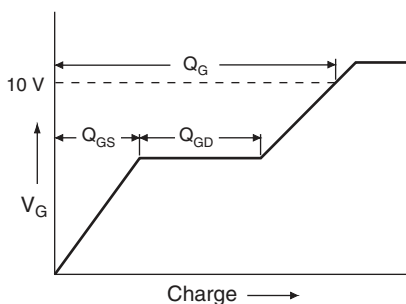


Fig. 15a - Basic Gate Charge Waveform

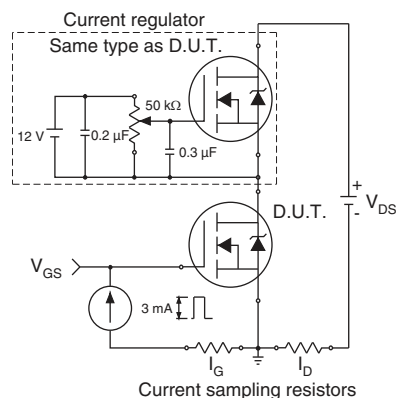


Fig. 15b - Gate Charge Test Circuit



Fig. 16. For N-Channel

Vishay Siliconix maintains worldwide manufacturing capability. Products may be manufactured at one of several qualified locations. Reliability data for Silicon Technology and Package Reliability represent a composite of all qualified locations. For related documents such as package/tape drawings, part marking, and reliability data, see www.vishay.com/ppg?91205.



TO-247AC (High Voltage)

VERSION 1: FACILITY CODE = 9

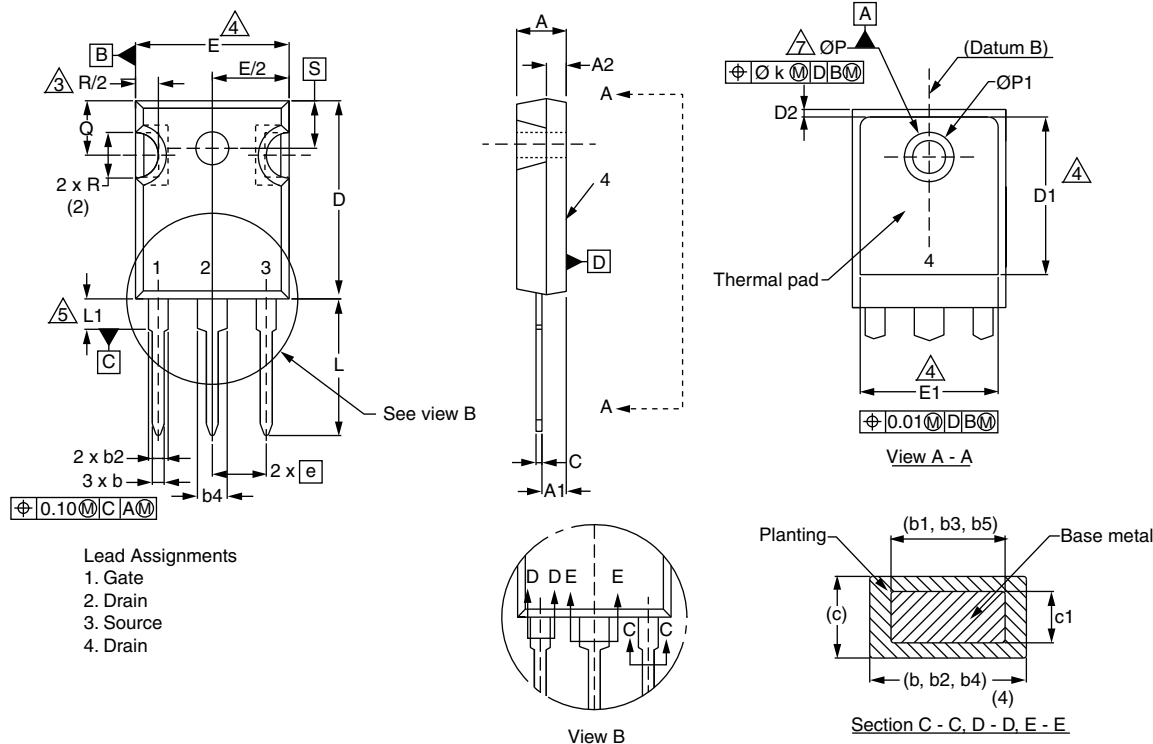


MILLIMETERS			
DIM.	MIN.	MAX.	NOTES
A	4.83	5.21	
A1	2.29	2.55	
A2	1.50	2.49	
b	1.12	1.33	
b1	1.12	1.28	
b2	1.91	2.39	6
b3	1.91	2.34	
b4	2.87	3.22	6, 8
b5	2.87	3.18	
c	0.55	0.69	6
c1	0.55	0.65	
D	20.40	20.70	4

MILLIMETERS			
DIM.	MIN.	MAX.	NOTES
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


MILLIMETERS			
DIM.	MIN.	MAX.	NOTES
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	-	

MILLIMETERS			
DIM.	MIN.	MAX.	NOTES
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		

ECN: E19-0614-Rev. E, 08-Jan-2020
DWG: 5971

Notes

- Dimensioning and tolerancing per ASME Y14.5M-1994
- Contour of slot optional
- 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
- Thermal pad contour optional with dimensions D1 and E1
- Lead finish uncontrolled in L1
- 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")
- Outline conforms to JEDEC outline TO-247 with exception of dimension c



Disclaimer

ALL PRODUCT, PRODUCT SPECIFICATIONS AND DATA ARE SUBJECT TO CHANGE WITHOUT NOTICE TO IMPROVE RELIABILITY, FUNCTION OR DESIGN OR OTHERWISE.

Vishay Intertechnology, Inc., its affiliates, agents, and employees, and all persons acting on its or their behalf (collectively, "Vishay"), disclaim any and all liability for any errors, inaccuracies or incompleteness contained in any datasheet or in any other disclosure relating to any product.

Vishay makes no warranty, representation or guarantee regarding the suitability of the products for any particular purpose or the continuing production of any product. To the maximum extent permitted by applicable law, Vishay disclaims (i) any and all liability arising out of the application or use of any product, (ii) any and all liability, including without limitation special, consequential or incidental damages, and (iii) any and all implied warranties, including warranties of fitness for particular purpose, non-infringement and merchantability.

Statements regarding the suitability of products for certain types of applications are based on Vishay's knowledge of typical requirements that are often placed on Vishay products in generic applications. Such statements are not binding statements about the suitability of products for a particular application. It is the customer's responsibility to validate that a particular product with the properties described in the product specification is suitable for use in a particular application. Parameters provided in datasheets and / or specifications may vary in different applications and performance may vary over time. All operating parameters, including typical parameters, must be validated for each customer application by the customer's technical experts. Product specifications do not expand or otherwise modify Vishay's terms and conditions of purchase, including but not limited to the warranty expressed therein.

Except as expressly indicated in writing, Vishay products are not designed for use in medical, life-saving, or life-sustaining applications or for any other application in which the failure of the Vishay product could result in personal injury or death. Customers using or selling Vishay products not expressly indicated for use in such applications do so at their own risk. Please contact authorized Vishay personnel to obtain written terms and conditions regarding products designed for such applications.

No license, express or implied, by estoppel or otherwise, to any intellectual property rights is granted by this document or by any conduct of Vishay. Product names and markings noted herein may be trademarks of their respective owners.