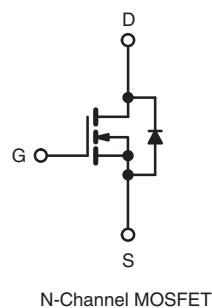
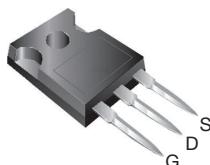


Power MOSFET

PRODUCT SUMMARY		
V_{DS} (V)	60	
$R_{DS(on)}$ (Ω)	$V_{GS} = 10$ V	0.018
Q_g (Max.) (nC)	110	
Q_{gs} (nC)	29	
Q_{gd} (nC)	38	
Configuration	Single	

TO-247AC



FEATURES

- Dynamic dV/dt Rating
- Isolated Central Mounting Hole
- 175 °C Operating Temperature
- Ease of Parallelizing
- Simple Drive Requirements
- Compliant to RoHS Directive 2002/95/EC


RoHS*
COMPLIANT

DESCRIPTION

Third generation Power MOSFETs from Vishay provide the designer with the best combination of fast switching, ruggedized device design, low on-resistance and cost-effectiveness.

The TO-247AC package is preferred for commercial-industrial applications where higher power levels preclude the use of TO-220AB devices. The TO-247AC is similar but superior to the earlier TO-218 package because its isolated mounting hole. It also provides greater creepage distances between pins to meet the requirements of most safety specifications.

ORDERING INFORMATION	
Package	TO-247AC
Lead (Pb)-free	IRFP048PbF SiHFP048-E3
SnPb	IRFP048 SiHFP048

ABSOLUTE MAXIMUM RATINGS ($T_C = 25$ °C, unless otherwise noted)				
PARAMETER		SYMBOL	LIMIT	UNIT
Drain-Source Voltage		V_{DS}	60	
Gate-Source Voltage		V_{GS}	± 20	V
Continuous Drain Current ^a	V_{GS} at 10 V	I_D	70	A
Continuous Drain Current			52	
Pulsed Drain Current ^a		I_{DM}	290	
Linear Derating Factor			1.3	W/°C
Single Pulse Avalanche Energy ^b		E_{AS}	200	mJ
Maximum Power Dissipation	$T_C = 25$ °C	P_D	190	W
Peak Diode Recovery dV/dt ^c		dV/dt	4.5	V/ns
Operating Junction and Storage Temperature Range		T_J, T_{stg}	- 55 to + 175	°C
Soldering Recommendations (Peak Temperature) ^d	for 10 s		300	
Mounting Torque	6-32 or M3 screw		10	lbf · in
			1.1	N · m

Notes

- Repetitive rating; pulse width limited by maximum junction temperature (see fig. 11).
- $V_{DD} = 25$ V, starting $T_J = 25$ °C, $L = 43 \mu\text{H}$, $R_g = 25 \Omega$, $I_{AS} = 73$ A (see fig. 12).
- $I_{SD} \leq 72$ A, $dI/dt \leq 200$ A/ μ s, $V_{DD} \leq V_{DS}$, $T_J \leq 175$ °C.
- 1.6 mm from case.
- Current limited by the package (die current = 73 A).

* 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
Case-to-Sink, Flat, Greased Surface	R_{thCS}	0.24	-	
Maximum Junction-to-Case (Drain)	R_{thJC}	-	0.80	

SPECIFICATIONS ($T_J = 25$ °C, unless otherwise noted)

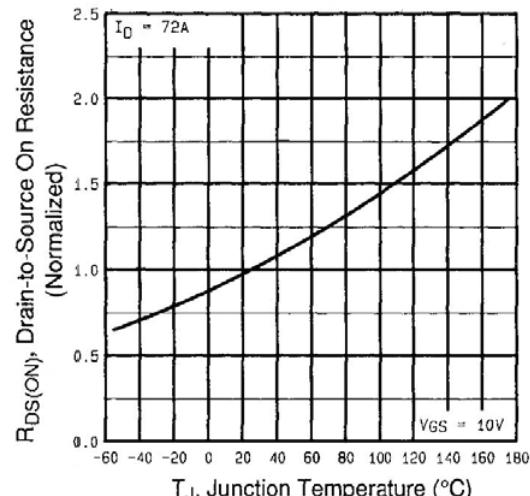
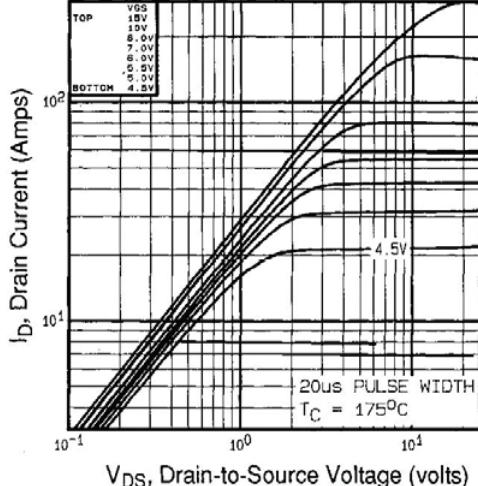
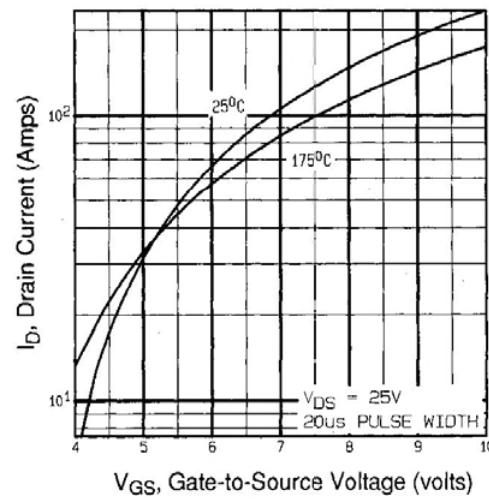
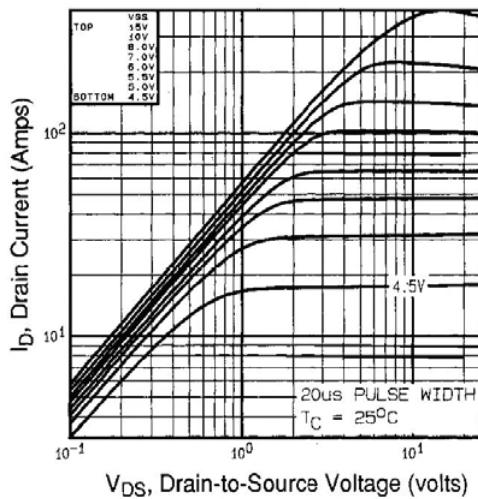
PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
Static						
Drain-Source Breakdown Voltage	V_{DS}	$V_{GS} = 0$ V, $I_D = 250$ µA	60	-	-	V
V_{DS} Temperature Coefficient	$\Delta V_{DS}/T_J$	Reference to 25 °C, $I_D = 1$ mA	-	0.060	-	V/°C
Gate-Source Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}$, $I_D = 250$ µA	2.0	-	4.0	V
Gate-Source Leakage	I_{GSS}	$V_{GS} = \pm 20$ V	-	-	± 100	nA
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS} = 60$ V, $V_{GS} = 0$ V	-	-	25	µA
		$V_{DS} = 48$ V, $V_{GS} = 0$ V, $T_J = 150$ °C	-	-	250	
Drain-Source On-State Resistance	$R_{DS(on)}$	$V_{GS} = 10$ V	$I_D = 44$ A ^b	-	-	0.018
Forward Transconductance	g_{fs}	$V_{DS} = 25$ V	$I_D = 44$ A ^b	20	-	-
Dynamic						
Input Capacitance	C_{iss}	$V_{GS} = 0$ V, $V_{DS} = 25$ V, $f = 1.0$ MHz, see fig. 5	-	2400	-	pF
Output Capacitance	C_{oss}		-	1300	-	
Reverse Transfer Capacitance	C_{rss}		-	190	-	
Total Gate Charge	Q_g	$V_{GS} = 10$ V	$I_D = 72$ A, $V_{DS} = 48$ V see fig. 6 and 13 ^b	-	-	110
Gate-Source Charge	Q_{gs}			-	-	29
Gate-Drain Charge	Q_{gd}			-	-	38
Turn-On Delay Time	$t_{d(on)}$	$V_{DD} = 30$ V, $I_D = 72$ A, $R_g = 9.1$ Ω, $R_D = 0.34$ Ω, see fig. 10 ^b	-	8.1	-	ns
Rise Time	t_r		-	250	-	
Turn-Off Delay Time	$t_{d(off)}$		-	210	-	
Fall Time	t_f		-	250	-	
Internal Drain Inductance	L_D	Between lead, 6 mm (0.25") from package and center of die contact		-	5.0	-
Internal Source Inductance	L_S			-	13	-
Drain-Source Body Diode Characteristics						
Continuous Source-Drain Diode Current	I_S	MOSFET symbol showing the integral reverse p - n junction diode		-	-	70 ^c
Pulsed Diode Forward Current ^a	I_{SM}			-	-	290
Body Diode Voltage	V_{SD}	$T_J = 25$ °C, $I_S = 73$ A, $V_{GS} = 0$ V ^b	-	-	2.0	V
Body Diode Reverse Recovery Time	t_{rr}	$T_J = 25$ °C, $I_F = 72$ A, $dI/dt = 100$ A/µs ^b	-	120	180	ns
Body Diode Reverse Recovery Charge	Q_{rr}		-	0.50	0.80	µC
Forward Turn-On Time	t_{on}	Intrinsic turn-on time is negligible (turn-on is dominated by L_S and L_D)				

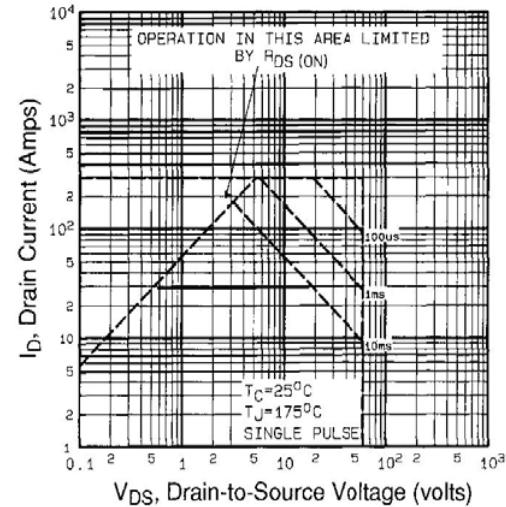
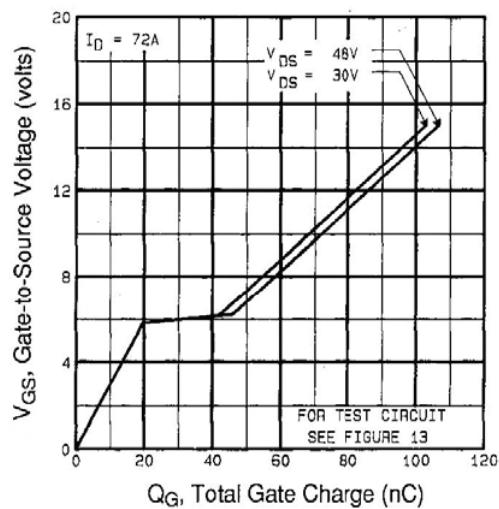
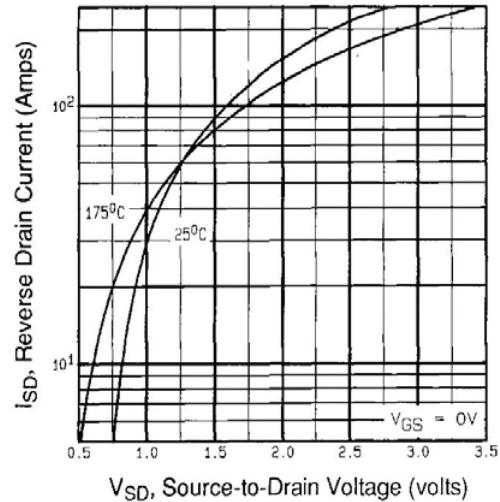
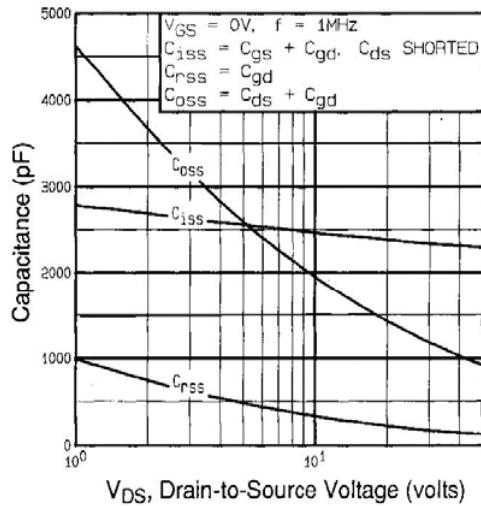
Notes

a. Repetitive rating; pulse width limited by maximum junction temperature (see fig. 11).

b. Pulse width ≤ 300 µs; duty cycle ≤ 2 %.

c. Current limited by the package (die current = 73 A).

TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)




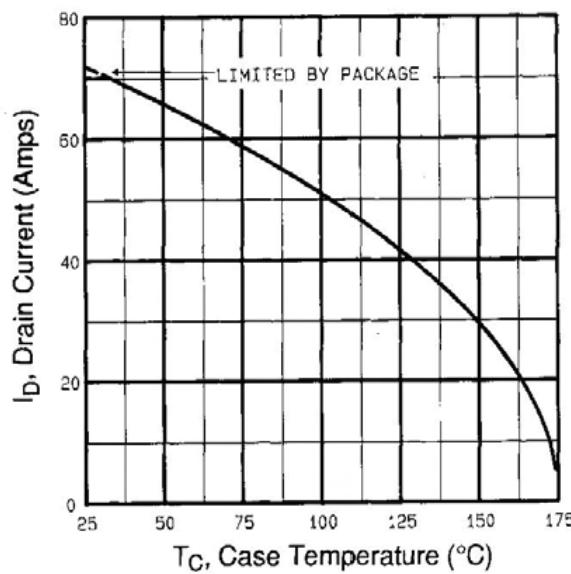


Fig. 9 - Maximum Drain Current vs. Case Temperature

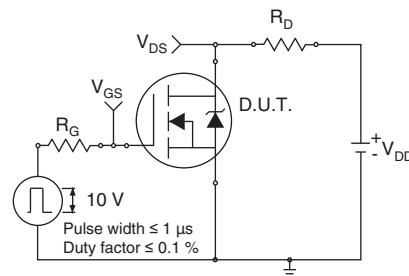


Fig. 10a - Switching Time Test Circuit

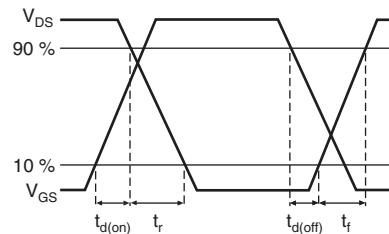


Fig. 10b - Switching Time Waveforms

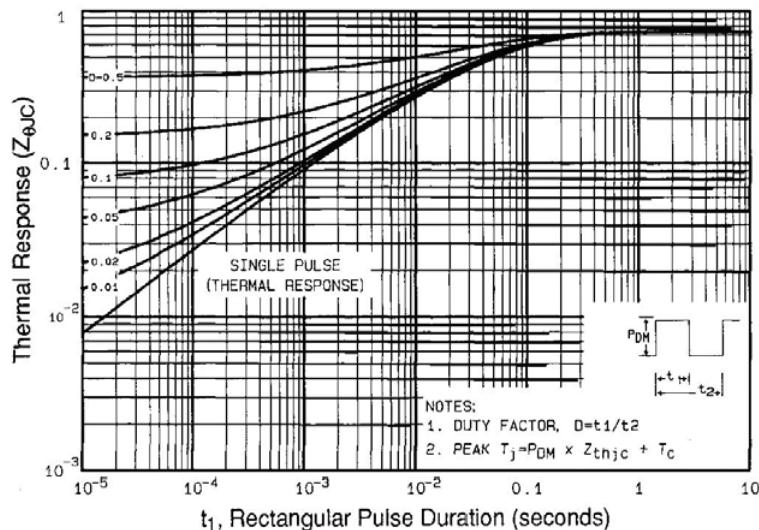


Fig. 11 - Maximum Effective Transient Thermal Impedance, Junction-to-Case

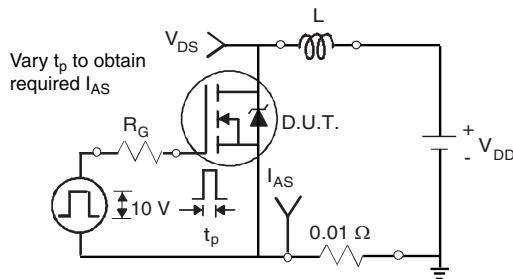


Fig. 12a - Unclamped Inductive Test Circuit

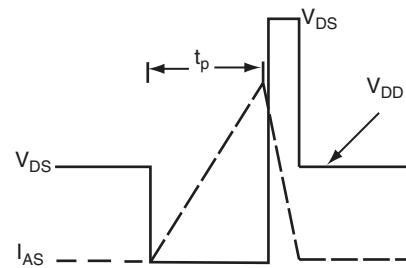


Fig. 12b - Unclamped Inductive Waveforms

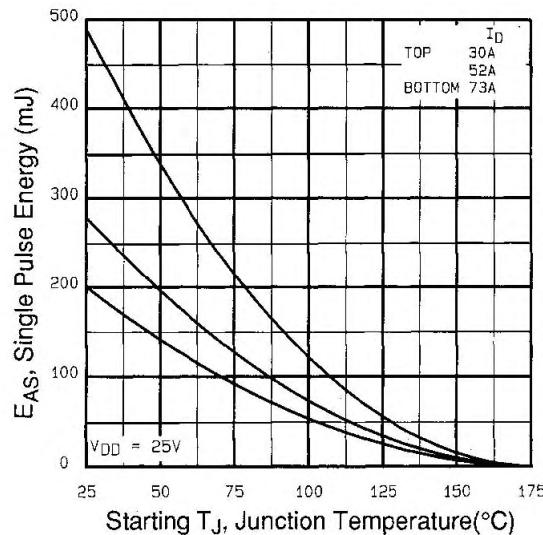


Fig. 12c - Maximum Avalanche Energy vs. Drain Current

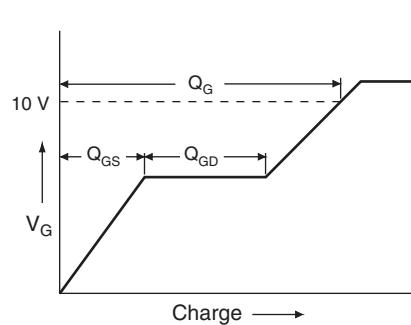


Fig. 13a - Basic Gate Charge Waveform

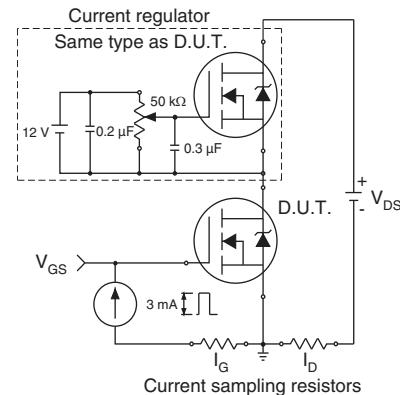
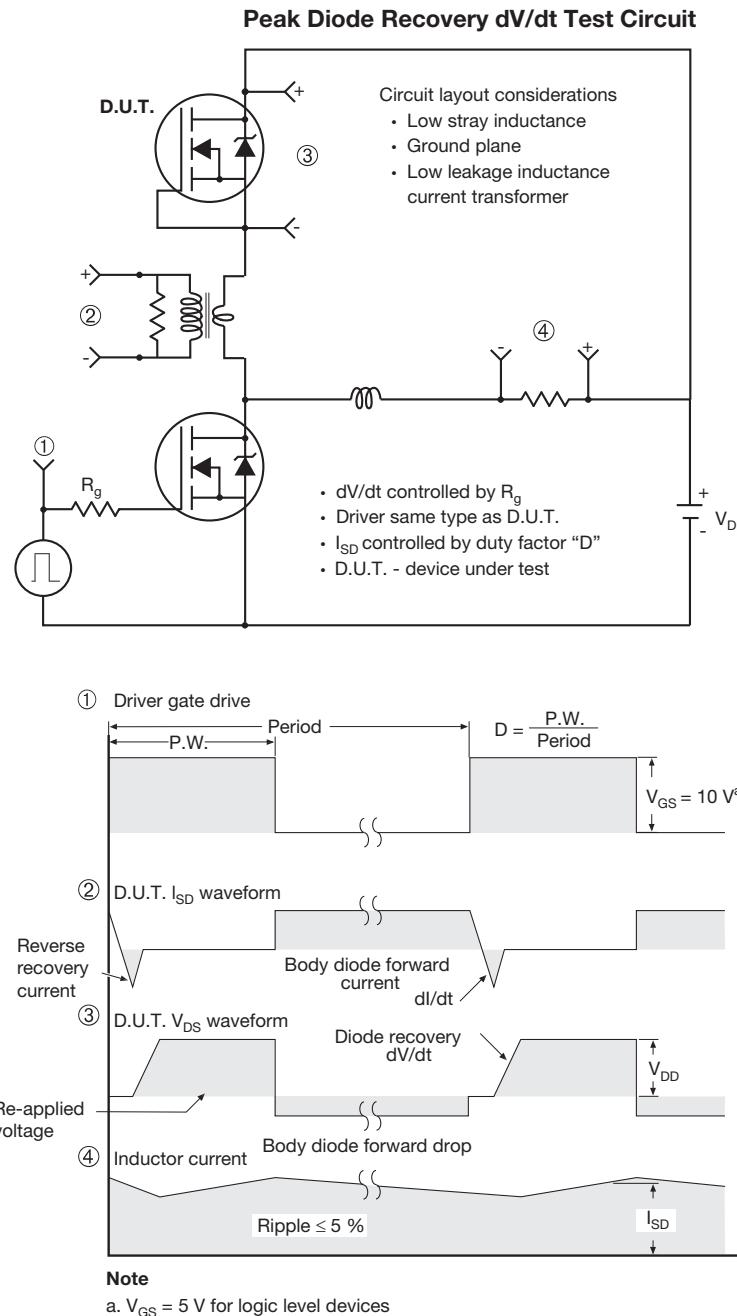
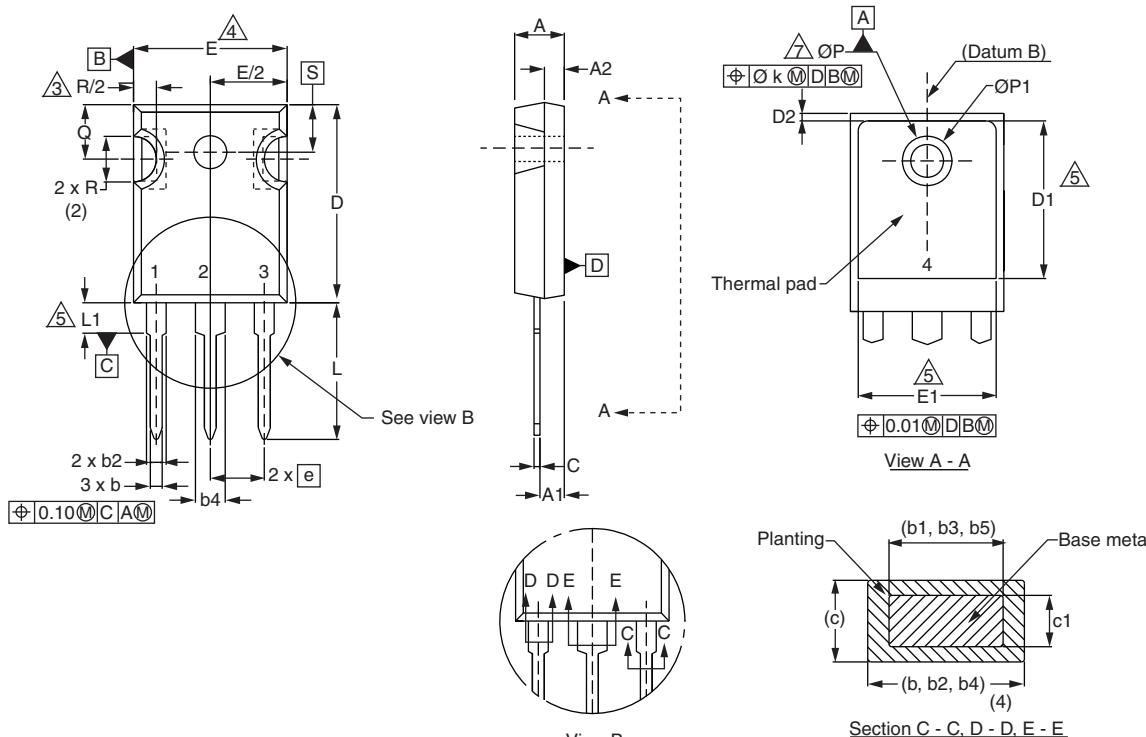


Fig. 13b - Gate Charge Test Circuit


Fig. 14 - 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?91198.

TO-247AC (High Voltage)



	MILLIMETERS		INCHES	
DIM.	MIN.	MAX.	MIN.	MAX.
A	4.58	5.31	0.180	0.209
A1	2.21	2.59	0.087	0.102
A2	1.17	2.49	0.046	0.098
b	0.99	1.40	0.039	0.055
b1	0.99	1.35	0.039	0.053
b2	1.53	2.39	0.060	0.094
b3	1.65	2.37	0.065	0.093
b4	2.42	3.43	0.095	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	20.82	0.776	0.820
D1	13.08	-	0.515	-

ECN: X13-0045-Rev. C, 18-Mar-13
 DWG: 5971

	MILLIMETERS		INCHES	
DIM.	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	
Ø k	0.254		0.010	
L	14.20	16.25	0.559	0.640
L1	3.71	4.29	0.146	0.169
N	7.62 BSC		0.300 BSC	
Ø P	3.51	3.66	0.138	0.144
Ø 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	

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.
- Xian and Mingxin actually photo.





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Please note that some Vishay documentation may still make reference to RoHS Directive 2002/95/EC. We confirm that all the products identified as being compliant to Directive 2002/95/EC conform to Directive 2011/65/EU.

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- Оперативные поставки широкого спектра электронных компонентов отечественного и импортного производства напрямую от производителей и с крупнейших мировых складов;
- Поставка более 17-ти миллионов наименований электронных компонентов;
- Поставка сложных, дефицитных, либо снятых с производства позиций;
- Оперативные сроки поставки под заказ (от 5 рабочих дней);
- Экспресс доставка в любую точку России;
- Техническая поддержка проекта, помошь в подборе аналогов, поставка прототипов;
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- Подбор оптимального решения, техническое обоснование при выборе компонента;
- Подбор аналогов;
- Консультации по применению компонента;
- Поставка образцов и прототипов;
- Техническая поддержка проекта;
- Защита от снятия компонента с производства.



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