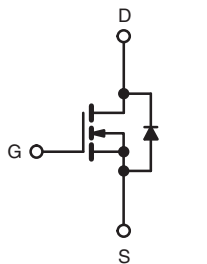
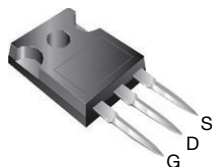


Power MOSFET

PRODUCT SUMMARY

V_{DS} (V)	800	
$R_{DS(on)}$ (Ω)	$V_{GS} = 10\text{ V}$	2.0
Q_g (Max.) (nC)	130	
Q_{gs} (nC)	17	
Q_{gd} (nC)	72	
Configuration	Single	

TO-247AC


N-Channel MOSFET

FEATURES

- Dynamic dV/dt rating
- Repetitive avalanche rated
- Isolated central mounting hole
- Fast switching
- Ease of paralleling
- Simple drive requirements
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912


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	IRFPE40PbF

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

PARAMETER	SYMBOL	LIMIT	UNIT
Drain-Source Voltage	V_{DS}	800	V
Gate-Source Voltage	V_{GS}	± 20	
Continuous Drain Current	V_{GS} at 10 V	$T_C = 25\text{ }^{\circ}\text{C}$	A
		$T_C = 100\text{ }^{\circ}\text{C}$	
Pulsed Drain Current ^a	I_{DM}	22	
Linear Derating Factor		1.2	W/ $^{\circ}\text{C}$
Single Pulse Avalanche Energy ^b	E_{AS}	490	mJ
Repetitive Avalanche Current ^a	I_{AR}	5.4	A
Repetitive Avalanche Energy ^a	E_{AR}	15	mJ
Maximum Power Dissipation	P_D	150	W
Peak Diode Recovery dV/dt ^c	dV/dt	2.0	V/ns
Operating Junction and Storage Temperature Range	T_J, T_{stg}	-55 to +150	$^{\circ}\text{C}$
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).
- $V_{DD} = 50\text{ V}$, starting $T_J = 25\text{ }^{\circ}\text{C}$, $L = 31\text{ mH}$, $R_g = 25\text{ }\Omega$, $I_{AS} = 5.4\text{ A}$ (see fig. 12).
- $I_{SD} \leq 5.4\text{ A}$, $dI/dt \leq 120\text{ A}/\mu\text{s}$, $V_{DD} \leq 600$, $T_J \leq 150\text{ }^{\circ}\text{C}$.
- 1.6 mm from case.

THERMAL RESISTANCE RATINGS

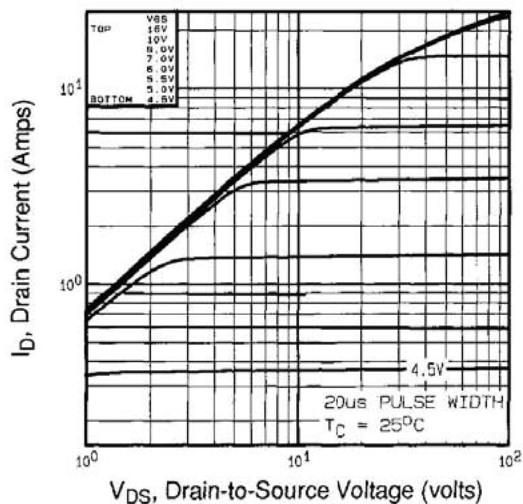
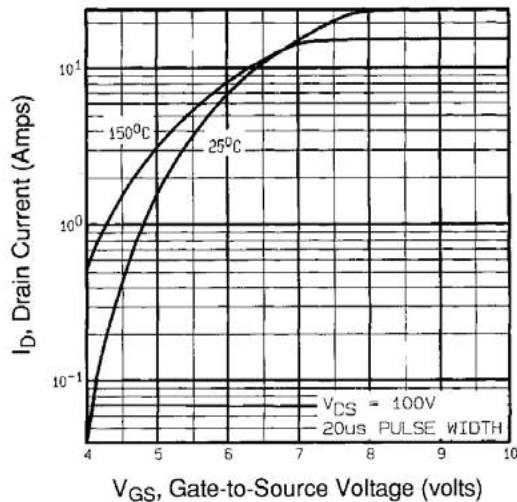
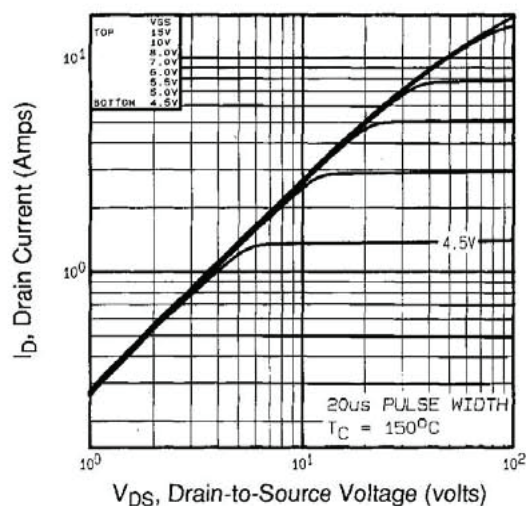
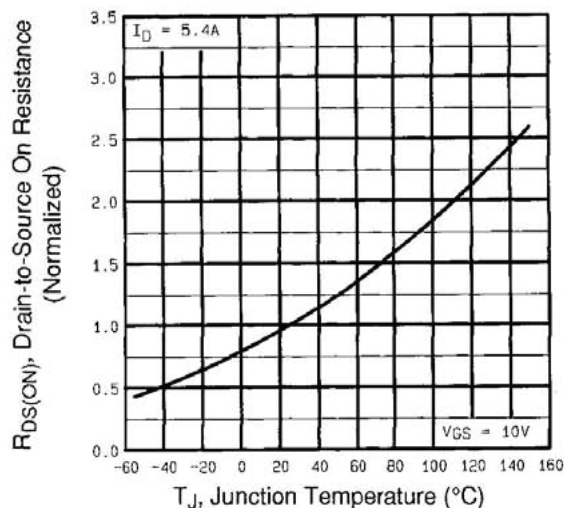
PARAMETER	SYMBOL	TYP.	MAX.	UNIT
Maximum Junction-to-Ambient	R_{thJA}	-	40	°C/W
Case-to-Sink, Flat, Greased Surface	R_{thCS}	0.24	-	
Maximum Junction-to-Case (Drain)	R_{thJC}	-	0.83	

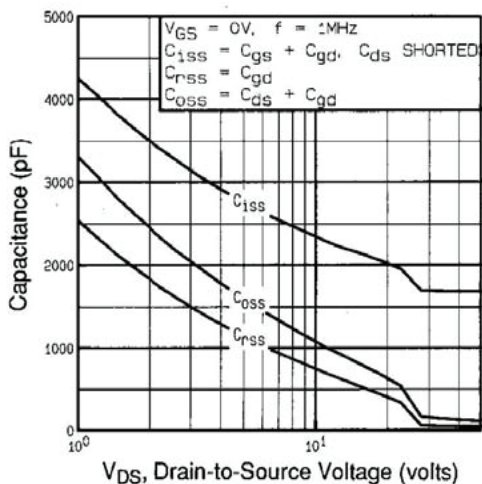
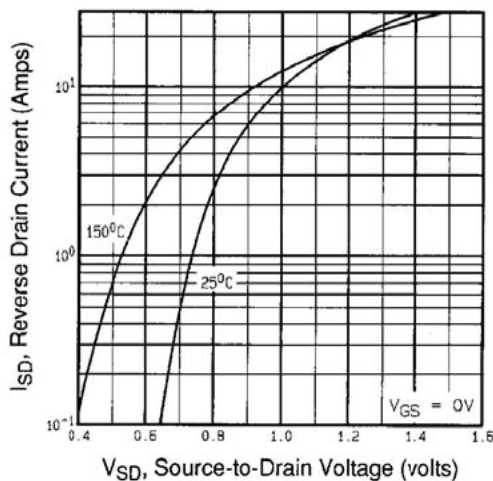
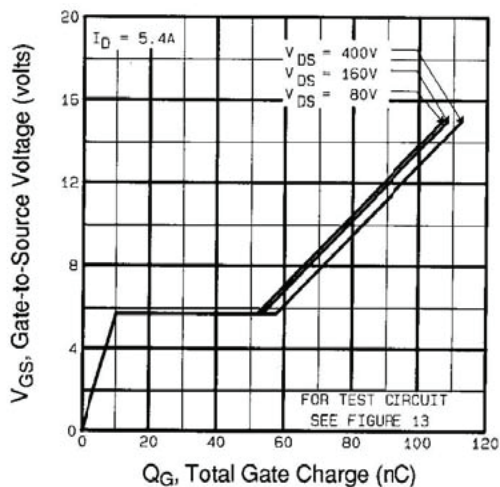
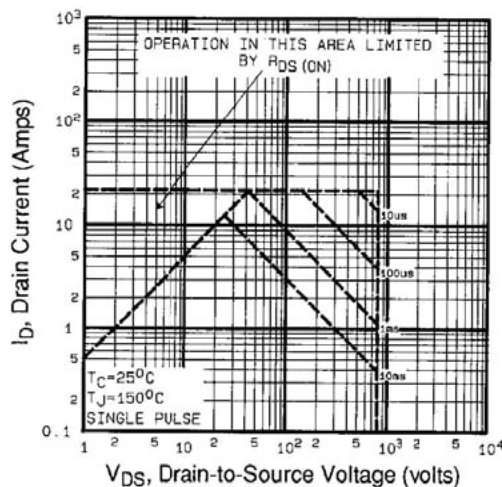
SPECIFICATIONS ($T_J = 25\text{ }^{\circ}\text{C}$, unless otherwise noted)

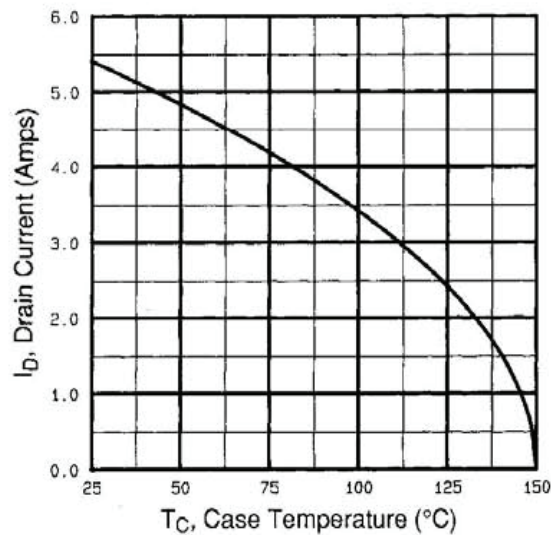
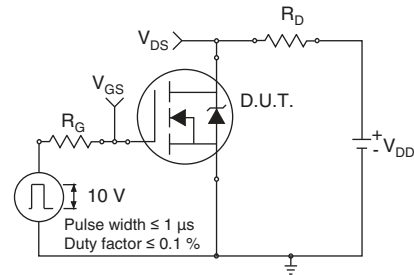
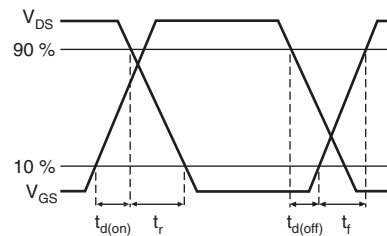
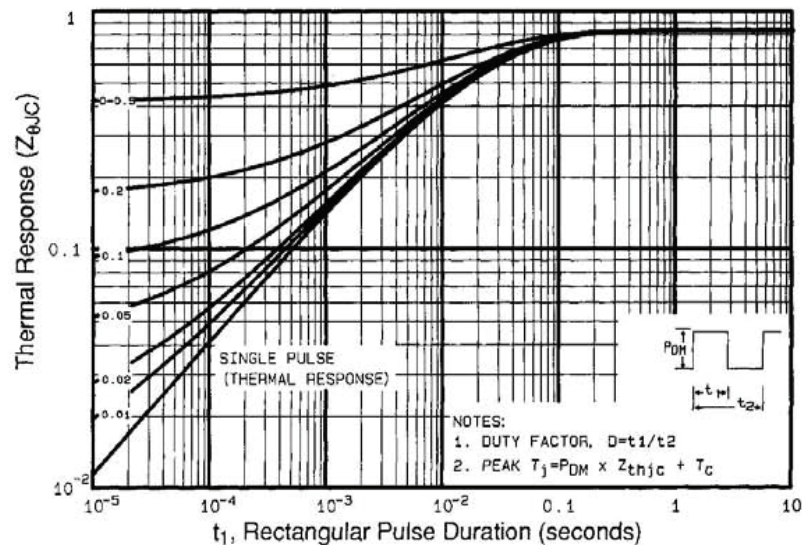
PARAMETER	SYMBOL	TEST CONDITIONS		MIN.	TYP.	MAX.	UNIT
Static							
Drain-Source Breakdown Voltage	V _{DS}	V _{GS} = 0 V, I _D = 250 μA		800	-	-	V
V _{DS} Temperature Coefficient	ΔV _{DS} /T _J	Reference to 25 °C, I _D = 1 mA		-	0.98	-	V/°C
Gate-Source Threshold Voltage	V _{GS(th)}	V _{DS} = V _{GS} , I _D = 250 μA		2.0	-	4.0	V
Gate-Source Leakage	I _{GSS}	V _{GS} = ± 20 V		-	-	± 100	nA
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} = 800 V, V _{GS} = 0 V		-	-	100	μA
		V _{DS} = 640 V, V _{GS} = 0 V, T _J = 125 °C		-	-	500	
Drain-Source On-State Resistance	R _{DS(on)}	V _{GS} = 10 V	I _D = 3.2 A ^b	-	-	2.0	Ω
Forward Transconductance	g _{fs}	V _{DS} = 100 V, I _D = 3.2 A ^b		3.0	-	-	S
Dynamic							
Input Capacitance	C _{iss}	V _{GS} = 0 V, V _{DS} = 25 V, f = 1.0 MHz, see fig. 5		-	1900	-	pF
Output Capacitance	C _{oss}			-	470	-	
Reverse Transfer Capacitance	C _{rss}			-	280	-	
Total Gate Charge	Q _g	V _{GS} = 10 V	I _D = 5.4 A, V _{DS} = 400 V, see fig. 6 and 13 ^b	-	-	130	nC
Gate-Source Charge	Q _{gs}			-	-	17	
Gate-Drain Charge	Q _{gd}			-	-	72	
Turn-On Delay Time	t _{d(on)}	V _{DD} = 400 V, I _D = 5.4 A, R _g = 9.1 Ω, R _D = 75 Ω, see fig. 10 ^b		-	16	-	ns
Rise Time	t _r			-	36	-	
Turn-Off Delay Time	t _{d(off)}			-	100	-	
Fall Time	t _f			-	32	-	
Internal Drain Inductance	L _D	Between lead, 6 mm (0.25") from package and center of die contact		-	5.0	-	nH
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		-	-	5.4	A
Pulsed Diode Forward Current ^a	I _{SM}			-	-	22	
Body Diode Voltage	V _{SD}	T _J = 25 °C, I _S = 5.4 A, V _{GS} = 0 V ^b		-	-	1.8	V
Body Diode Reverse Recovery Time	t _{rr}	T _J = 25 °C, I _F = 5.4 A, dI/dt = 100 A/μs ^b		-	550	830	ns
Body Diode Reverse Recovery Charge	Q _{rr}			-	2.4	3.6	μC
Forward Turn-On Time	t _{on}	Intrinsic turn-on time is negligible (turn-on is dominated by L _S and L _D)					

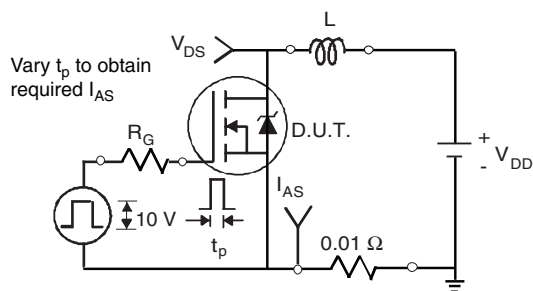
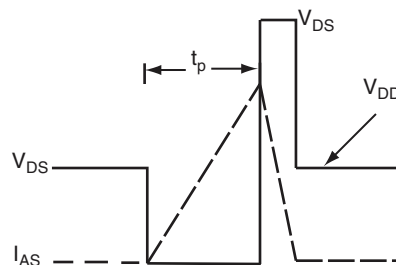
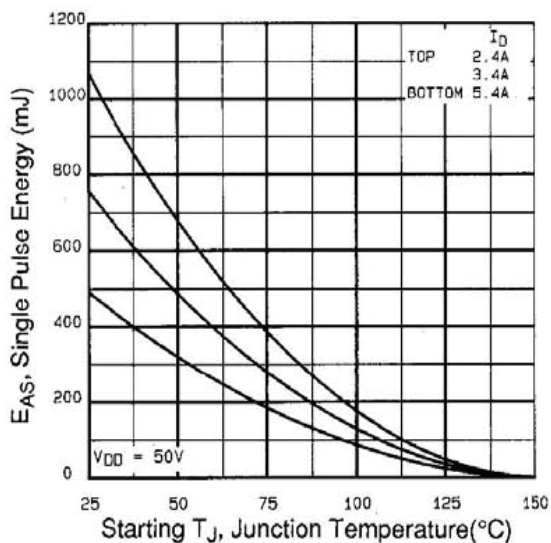
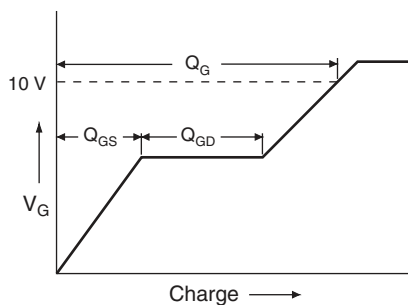
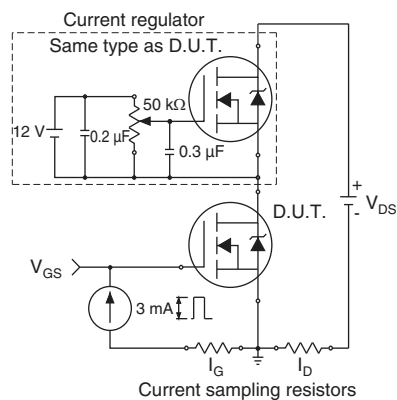
Notes

- a. Repetitive rating; pulse width limited by maximum junction temperature (see fig. 11).
b. Pulse width $\leq 300\text{ }\mu\text{s}$; duty cycle $\leq 2\text{ }\%$.

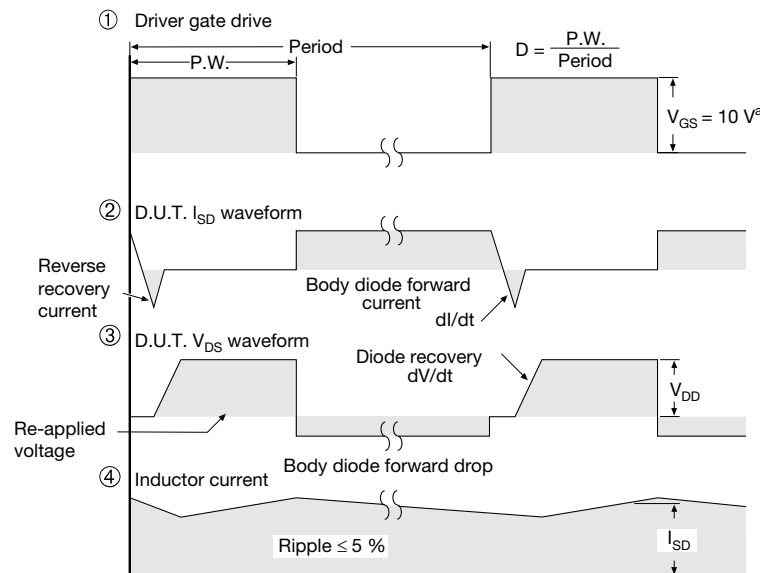
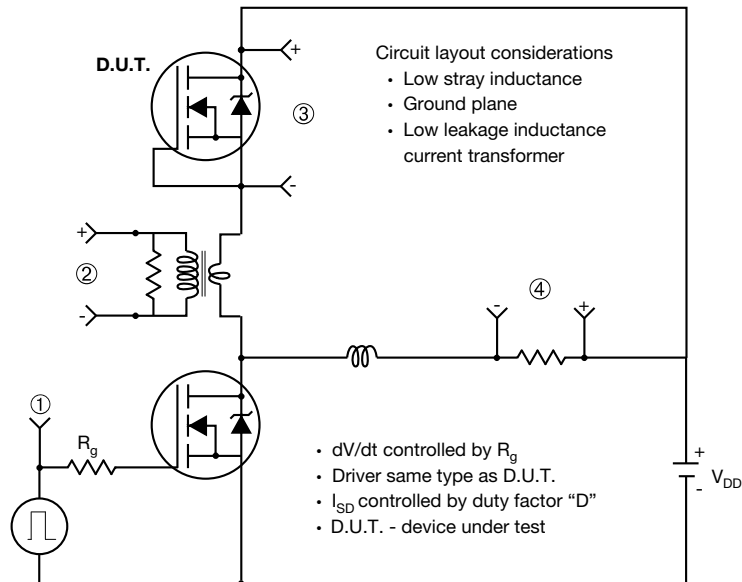
TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)

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

Fig. 3 - Typical Transfer Characteristics

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

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. 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

Peak Diode Recovery dV/dt Test Circuit



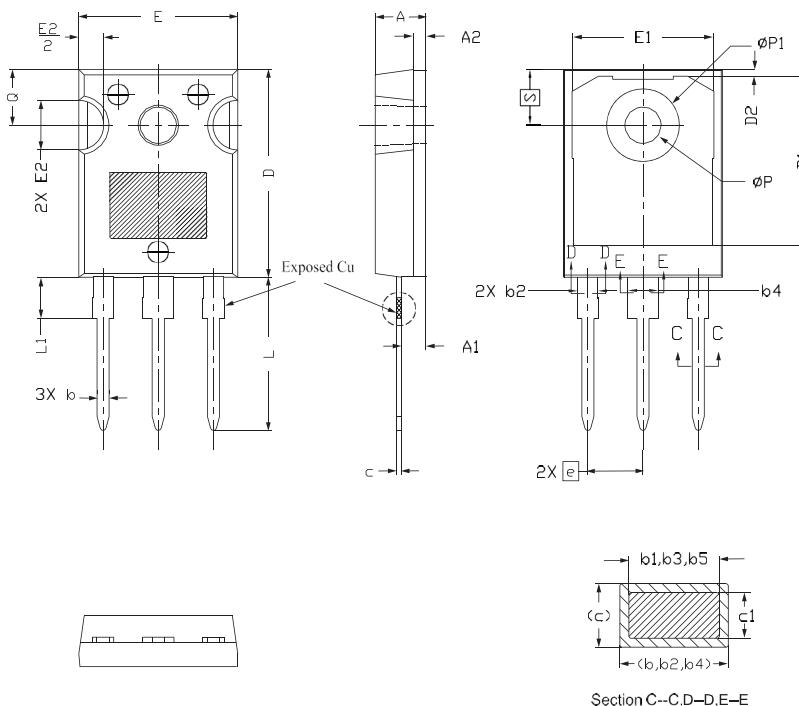
Note

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

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?91247.

TO-247AC (High Voltage)

VERSION 1: FACILITY CODE = 9

Section C--C.D--D.E--E

	MILLIMETERS			
DIM.	MIN.	NOM.	MAX.	NOTES
A	4.83	5.02	5.21	
A1	2.29	2.41	2.55	
A2	1.17	1.27	1.37	
b	1.12	1.20	1.33	
b1	1.12	1.20	1.28	
b2	1.91	2.00	2.39	6
b3	1.91	2.00	2.34	
b4	2.87	3.00	3.22	6, 8
b5	2.87	3.00	3.18	
c	0.40	0.50	0.60	6
c1	0.40	0.50	0.56	
D	20.40	20.55	20.70	4

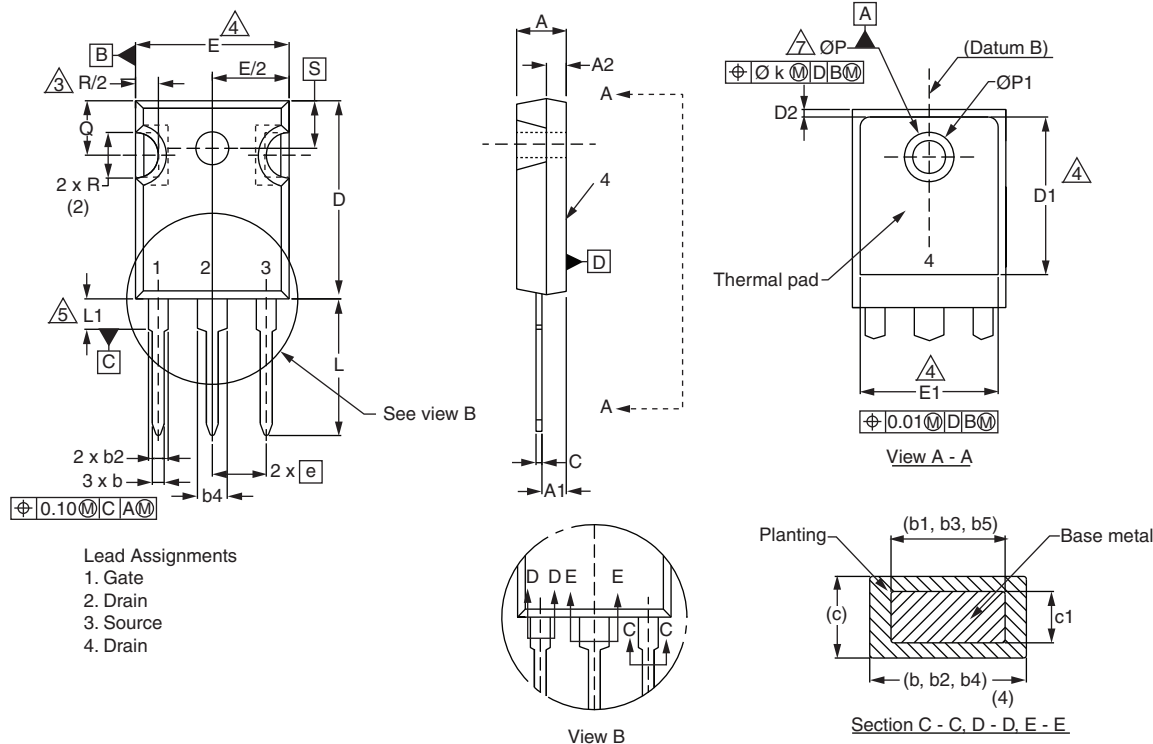
Notes

- (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

	MILLIMETERS			
DIM.	MIN.	NOM.	MAX.	NOTES
D1	16.46	16.76	17.06	5
D2	0.56	0.66	0.76	
E	15.50	15.70	15.87	4
E1	13.46	14.02	14.16	5
E2	4.52	4.91	5.49	3
e	5.46 BSC			
L	14.90	15.15	15.40	
L1	3.96	4.06	4.16	6
Ø P	3.56	3.61	3.65	7
Ø P1	7.19 ref.			
Q	5.31	5.50	5.69	
S	5.51 BSC			



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	-	

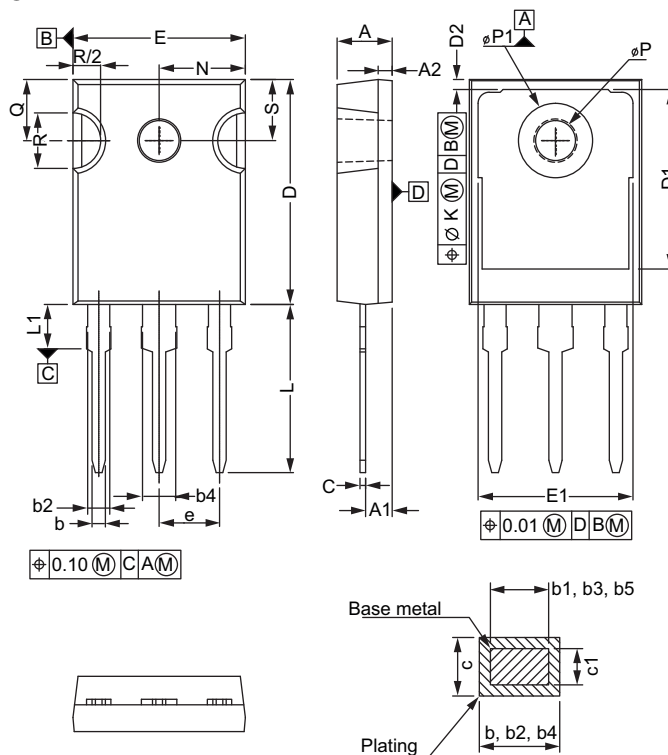
DIM.	MILLIMETERS		NOTES
	MIN.	MAX.	
D2	0.51	1.30	
E	15.29	15.87	
E1	13.72	-	
e	5.46 BSC		
Ø k	0.254		
L	14.20	16.25	
L1	3.71	4.29	
Ø P	3.51	3.66	
Ø P1	-	7.39	
Q	5.31	5.69	
R	4.52	5.49	
S	5.51 BSC		

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: E22-0452-Rev. G, 31-Oct-2022
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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