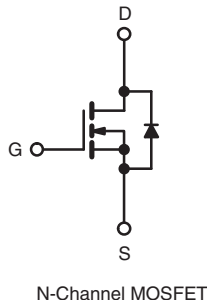
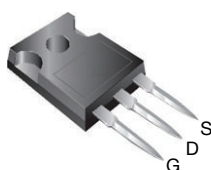


## Power MOSFET

### PRODUCT SUMMARY

$V_{DS}$ (V)	600	
$R_{DS(on)}$ ( $\Omega$ )	$V_{GS} = 10\text{ V}$	0.21
$Q_g$ (Max.) (nC)	180	
$Q_{gs}$ (nC)	61	
$Q_{gd}$ (nC)	85	
Configuration	Single	

**TO-247AC**


### FEATURES

- Superfast body diode eliminates the need for external diodes in ZVS applications
- Lower gate charge results in simpler drive requirements
- Enhanced dV/dt capabilities offer improved ruggedness
- Higher gate voltage threshold offers improved noise immunity
- Material categorization: for definitions of compliance please see [www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)

#### Note

\* This datasheet provides information about parts that are RoHS-compliant and / or parts that are non-RoHS-compliant. For example, parts with lead (Pb) terminations are not RoHS-compliant. Please see the information / tables in this datasheet for details.

### APPLICATIONS

- Zero voltage switching (SMPS)
- Telecom and server power supplies
- Uninterruptible power supplies
- Motor control applications

### ORDERING INFORMATION

Package	TO-247AC
Lead (Pb)-free	IRFP26N60LPbF
	SiHFP26N60L-E3
SnPb	IRFP26N60L
	SiHFP26N60L

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

PARAMETER	SYMBOL	LIMIT	UNIT
Drain-Source Voltage	$V_{DS}$	600	V
Gate-Source Voltage	$V_{GS}$	$\pm 30$	
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 <sup>a</sup>	$I_{DM}$	100	
Linear Derating Factor		3.8	W/ $^{\circ}\text{C}$
Single Pulse Avalanche Energy <sup>b</sup>	$E_{AS}$	570	mJ
Repetitive Avalanche Current <sup>a</sup>	$I_{AR}$	26	A
Repetitive Avalanche Energy <sup>a</sup>	$E_{AR}$	47	mJ
Maximum Power Dissipation	$T_C = 25\text{ }^{\circ}\text{C}$	$P_D$	470
Peak Diode Recovery dV/dt <sup>c</sup>	$dV/dt$	21	V/ns
Operating Junction and Storage Temperature Range	$T_J, T_{stg}$	-55 to +150	$^{\circ}\text{C}$
Soldering Recommendations (Peak Temperature) <sup>d</sup>	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).
- Starting  $T_J = 25\text{ }^{\circ}\text{C}$ ,  $L = 1.7\text{ mH}$ ,  $R_g = 25\text{ }\Omega$ ,  $I_{AS} = 26\text{ A}$ ,  $dV/dt = 21\text{ V/ns}$  (see fig. 12).
- $I_{SD} \leq 26\text{ A}$ ,  $dI/dt \leq 480\text{ A}/\mu\text{s}$ ,  $V_{DD} \leq V_{DS}$ ,  $T_J \leq 150\text{ }^{\circ}\text{C}$ .
- 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)	$R_{thJC}$	-	0.27	

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

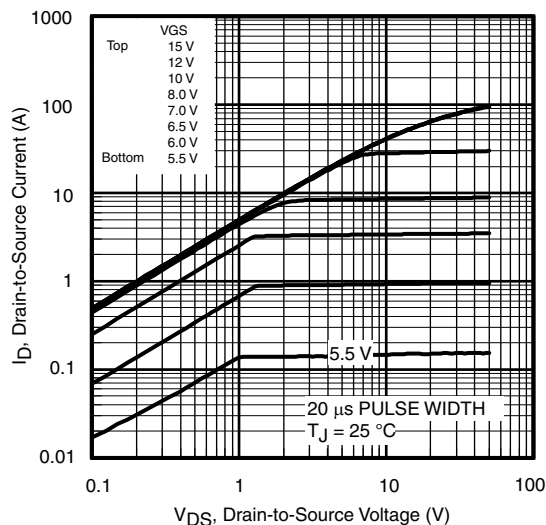
PARAMETER	SYMBOL	TEST CONDITIONS		MIN.	TYP.	MAX.	UNIT
Static							
Drain-Source Breakdown Voltage	V <sub>DS</sub>	V <sub>GS</sub> = 0 V, I <sub>D</sub> = 250 μA		600	-	-	V
V <sub>DS</sub> Temperature Coefficient	ΔV <sub>DS</sub> /T <sub>J</sub>	Reference to 25 °C, I <sub>D</sub> = 1 mA		-	0.33	-	V/°C
Gate-Source Threshold Voltage	V <sub>GS(th)</sub>	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 250 μA		3.0	-	5.0	V
Gate-Source Leakage	I <sub>GSS</sub>	V <sub>GS</sub> = ± 30 V		-	-	± 100	nA
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	V <sub>DS</sub> = 600 V, V <sub>GS</sub> = 0 V		-	-	50	μA
		V <sub>DS</sub> = 480 V, V <sub>GS</sub> = 0 V, T <sub>J</sub> = 125 °C		-	-	2.0	mA
Drain-Source On-State Resistance	R <sub>DS(on)</sub>	V <sub>GS</sub> = 10 V	I <sub>D</sub> = 10 A <sup>b</sup>	-	0.21	0.25	Ω
Forward Transconductance	g <sub>fs</sub>	V <sub>DS</sub> = 50 V, I <sub>D</sub> = 16 A		13	-	-	S
Dynamic							
Input Capacitance	C <sub>iss</sub>	V <sub>GS</sub> = 0 V, V <sub>DS</sub> = 25 V, f = 1.0 MHz, see fig. 5		-	5020	-	pF
Output Capacitance	C <sub>oss</sub>			-	450	-	
Reverse Transfer Capacitance	C <sub>rss</sub>			-	34	-	
Effective Output Capacitance	C <sub>oss</sub> eff.	V <sub>GS</sub> = 0 V	V <sub>DS</sub> = 0 V to 480 V <sup>c</sup>	-	230	-	
Effective Output Capacitance (Energy related)	C <sub>oss</sub> eff. (ER)			-	170	-	
Total Gate Charge	Q <sub>g</sub>	V <sub>GS</sub> = 10 V	I <sub>D</sub> = 26 A, V <sub>DS</sub> = 480 V, see fig. 7 and 15 <sup>b</sup>	-	-	180	nC
Gate-Source Charge	Q <sub>gs</sub>			-	-	61	
Gate-Drain Charge	Q <sub>gd</sub>			-	-	85	
Turn-On Delay Time	t <sub>d(on)</sub>	V <sub>DD</sub> = 300 V, I <sub>D</sub> = 26 A, R <sub>g</sub> = 4.3 Ω, V <sub>GS</sub> = 10 V see fig. 11a and 11b <sup>b</sup>		-	31	-	ns
Rise Time	t <sub>r</sub>			-	110	-	
Turn-Off Delay Time	t <sub>d(off)</sub>			-	47	-	
Fall Time	t <sub>f</sub>			-	42	-	
Drain-Source Body Diode Characteristics							
Continuous Source-Drain Diode Current	I <sub>S</sub>	MOSFET symbol showing the integral reverse p - n junction diode 		-	-	26	A
Pulsed Diode Forward Current <sup>a</sup>	I <sub>SM</sub>			-	-	100	
Body Diode Voltage	V <sub>SD</sub>	T <sub>J</sub> = 25 °C, I <sub>S</sub> = 26 A, V <sub>GS</sub> = 0 V <sup>b</sup>		-	-	1.5	V
Body Diode Reverse Recovery Time	t <sub>rr</sub>	T <sub>J</sub> = 25 °C, I <sub>F</sub> = 26 A		-	170	250	ns
		T <sub>J</sub> = 125 °C, dI/dt = 100 A/μs <sup>b</sup>		-	210	320	
Body Diode Reverse Recovery Charge	Q <sub>rr</sub>	T <sub>J</sub> = 25 °C, I <sub>F</sub> = 26 A, V <sub>GS</sub> = 0 V <sup>b</sup>		-	670	1000	nC
		T <sub>J</sub> = 125 °C, dI/dt = 100 A/μs <sup>b</sup>		-	1050	1570	
Reverse Recovery Current	I <sub>RRM</sub>	T <sub>J</sub> = 25 °C		-	7.3	11	A
Forward Turn-On Time	t <sub>on</sub>	Intrinsic turn-on time is negligible (turn-on is dominated by L <sub>S</sub> and L <sub>D</sub> )					

**Notes**

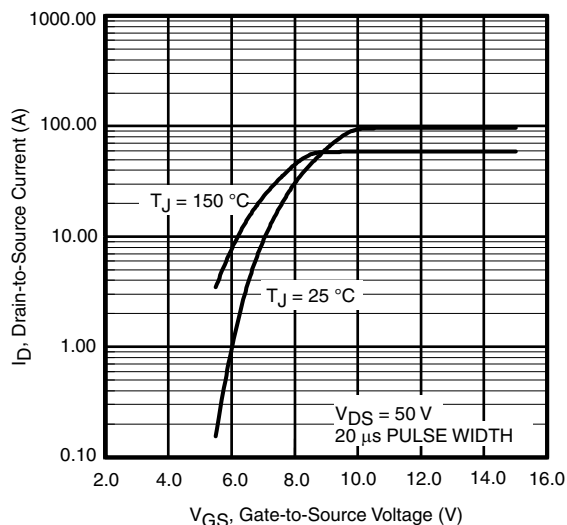
- a. Repetitive rating; pulse width limited by maximum junction temperature (see fig. 11).  
b. Pulse width  $\leq 300\text{ }\mu\text{s}$ ; duty cycle  $\leq 2\%$ .  
c.  $C_{oss\text{ eff.}}$  is a fixed capacitance that gives the same charging time as  $C_{oss}$  while  $V_{DS}$  is rising from 0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



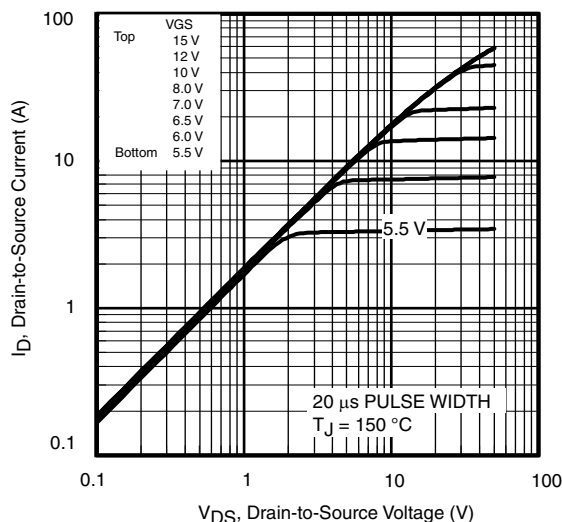
**TYPICAL CHARACTERISTICS** (25 °C, unless otherwise noted)



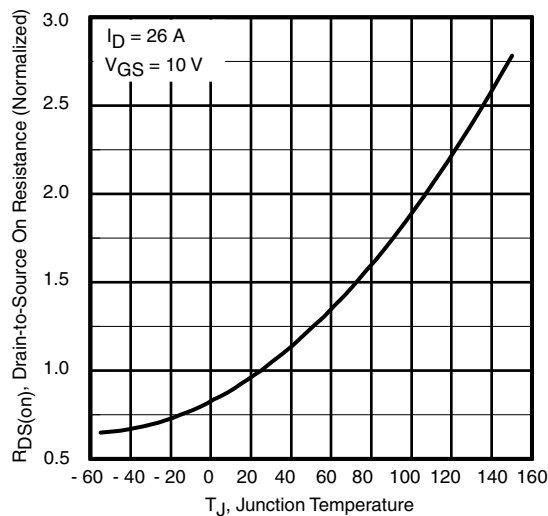
**Fig. 1 - Typical Output Characteristics**



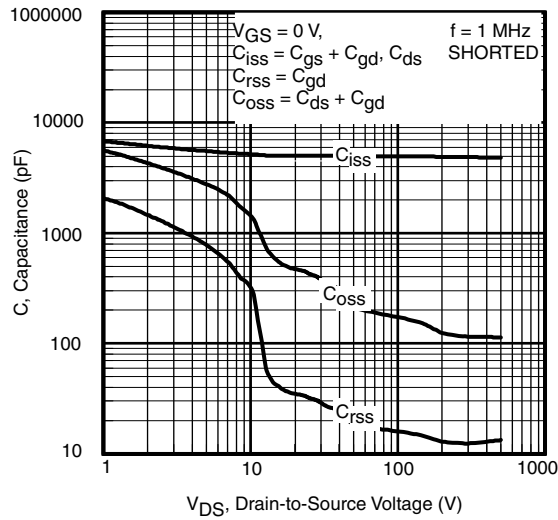
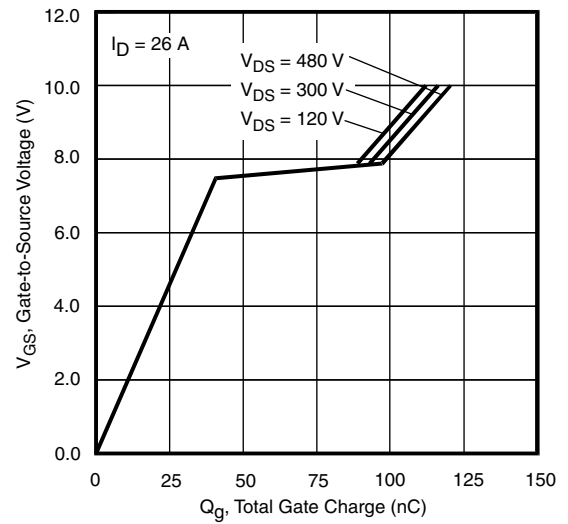
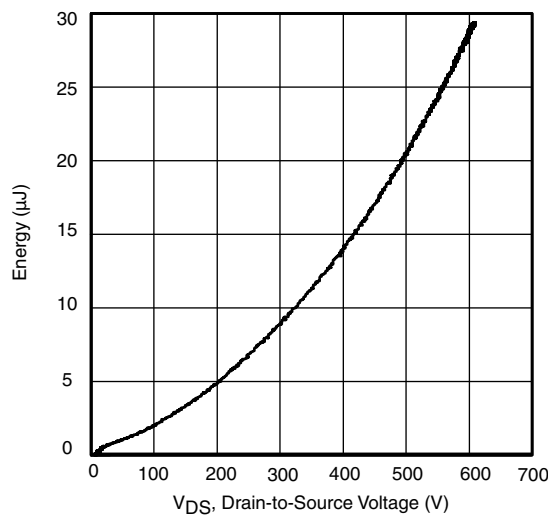
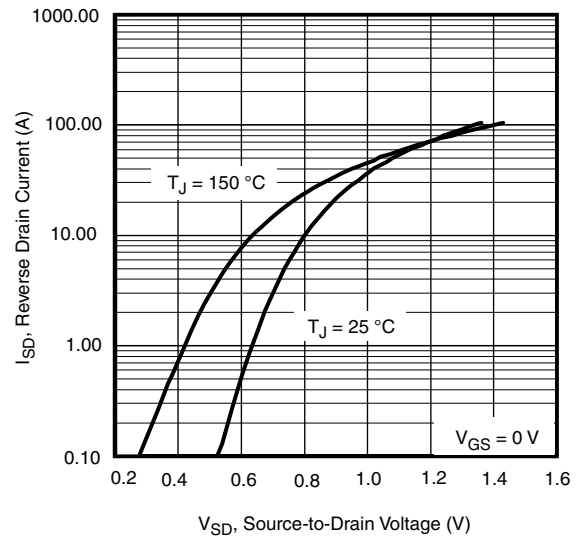
**Fig. 3 - Typical Transfer Characteristics**

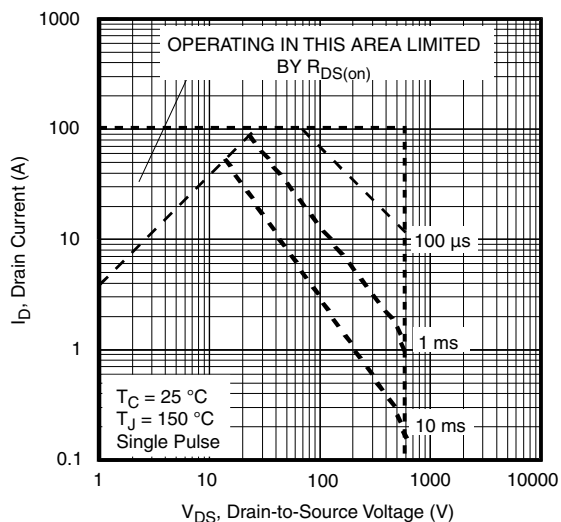


**Fig. 2 - Typical Output Characteristics**

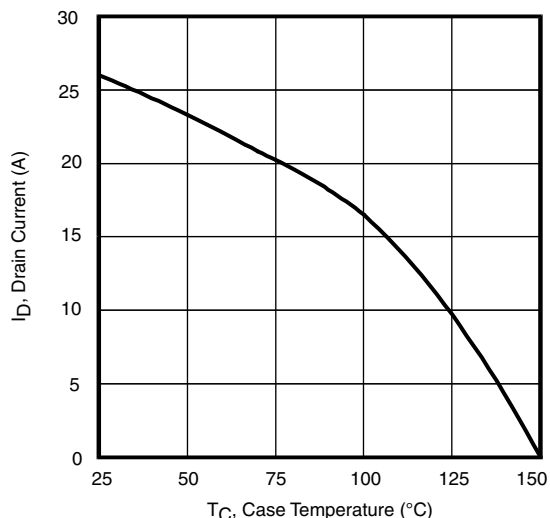


**Fig. 4 - Normalized On-Resistance vs. Temperature**

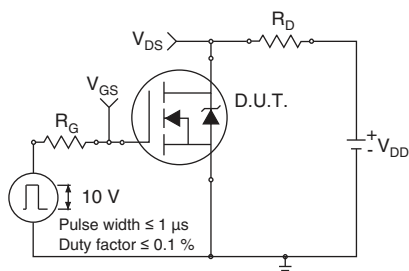

**Fig. 5 - Typical Capacitance vs. Drain-to-Source Voltage**

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

**Fig. 6 - Typical Output Capacitance Stored Energy vs.  $V_{DS}$** 

**Fig. 8 - Typical Source-Drain Diode Forward Voltage**



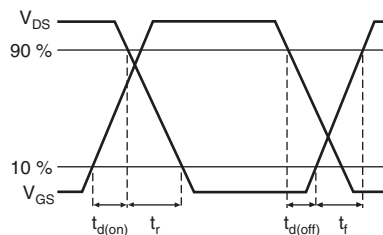
**Fig. 9 - Maximum Safe Operating Area**



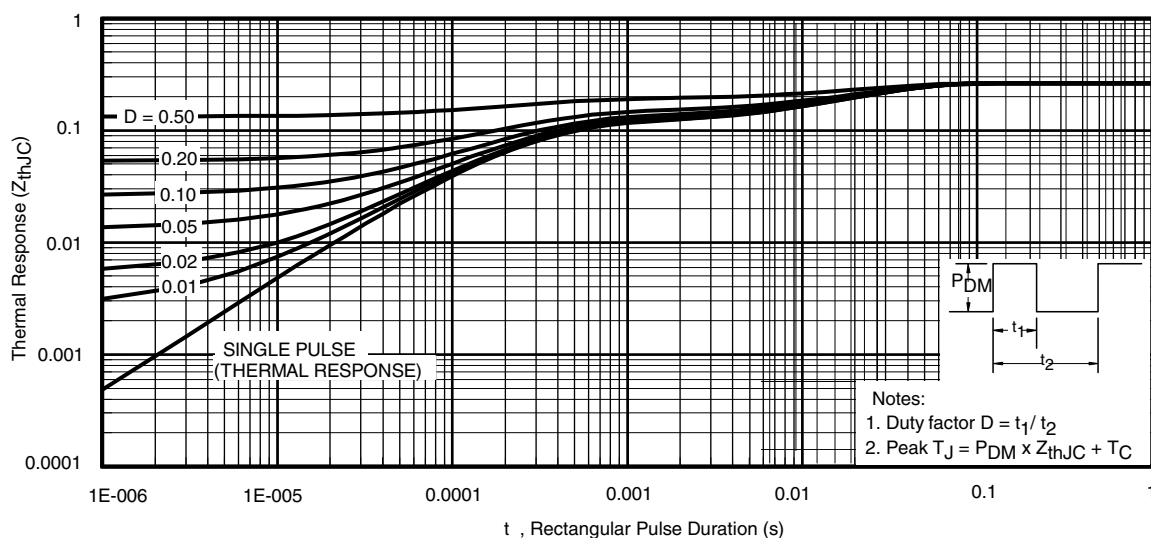
**Fig. 10 - Maximum Drain Current vs. Case Temperature**



**Fig. 11a - Switching Time Test Circuit**



**Fig. 11b - Switching Time Waveforms**



**Fig. 12 - Maximum Effective Transient Thermal Impedance, Junction-to-Case**

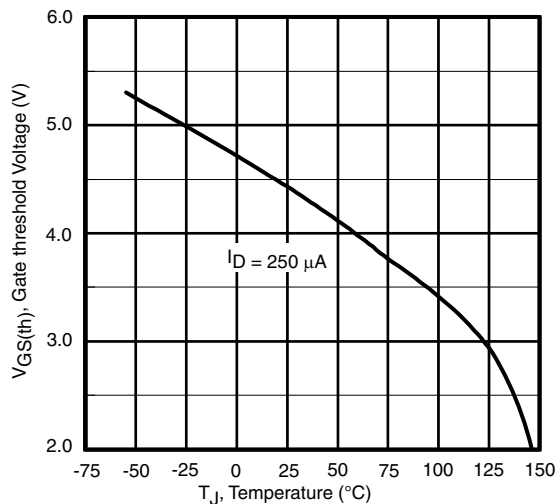


Fig. 13 - Threshold Voltage vs. Temperature

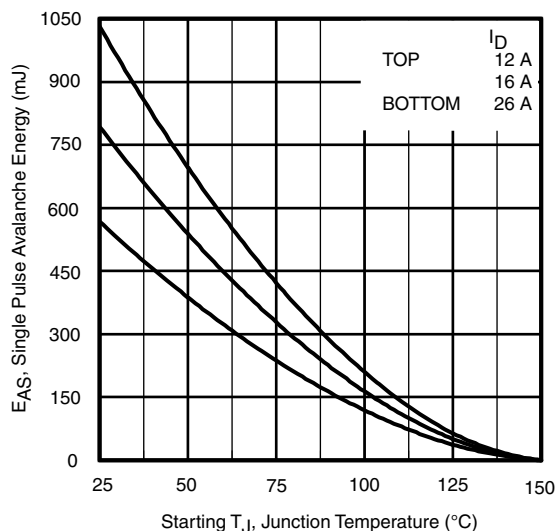


Fig. 14c - Maximum Avalanche Energy vs. Drain Current

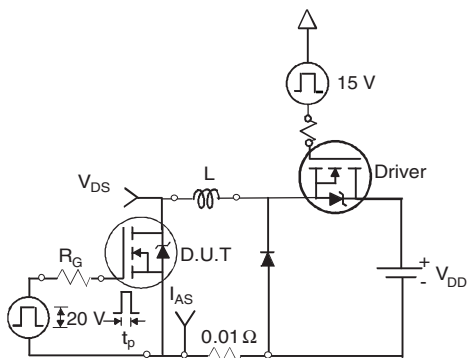


Fig. 14a - Unclamped Inductive Test Circuit

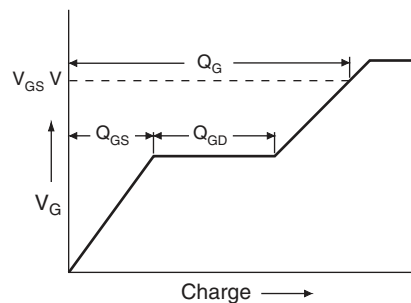


Fig. 15a - Basic Gate Charge Waveform

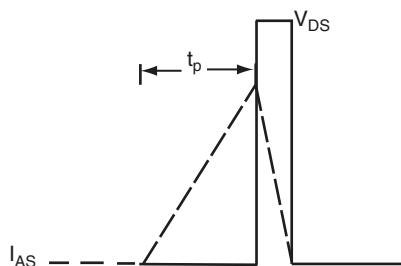


Fig. 14b - Unclamped Inductive Waveforms

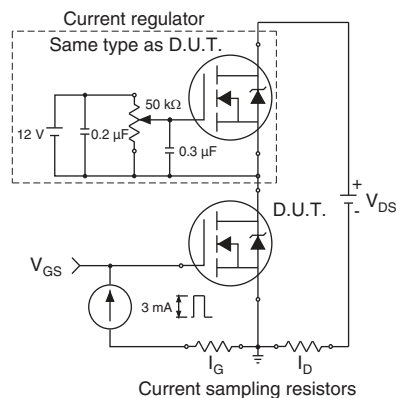
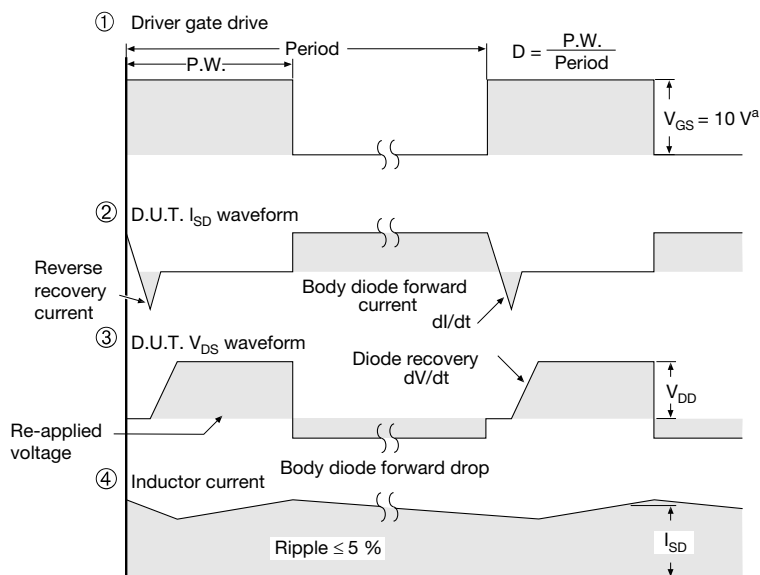
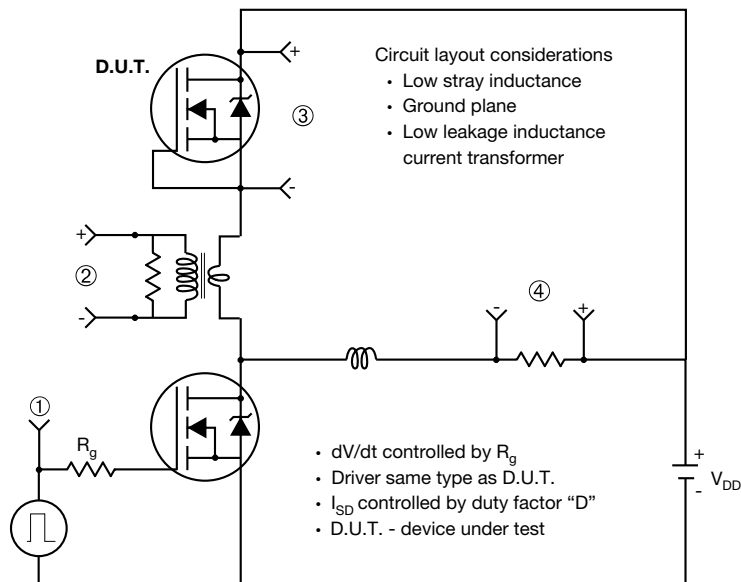


Fig. 15b - Gate Charge Test Circuit

**Peak Diode Recovery dV/dt Test Circuit**

**Note**

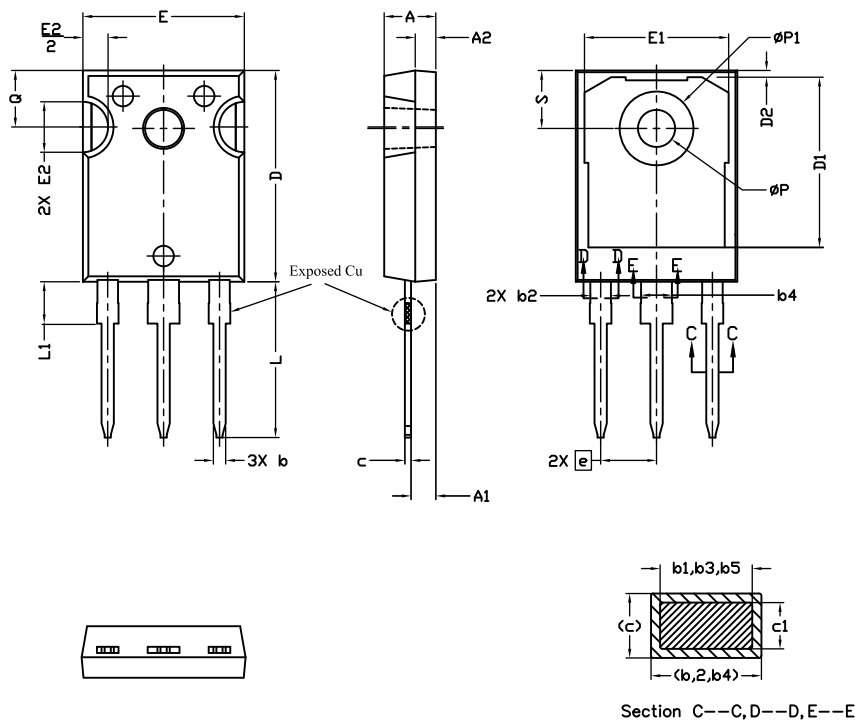
a.  $V_{GS} = 5\text{ V}$  for logic level devices

**Fig. 16 - For N-Channel**

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## TO-247AC (High Voltage)

**VERSION 1: FACILITY CODE = 9**


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

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	

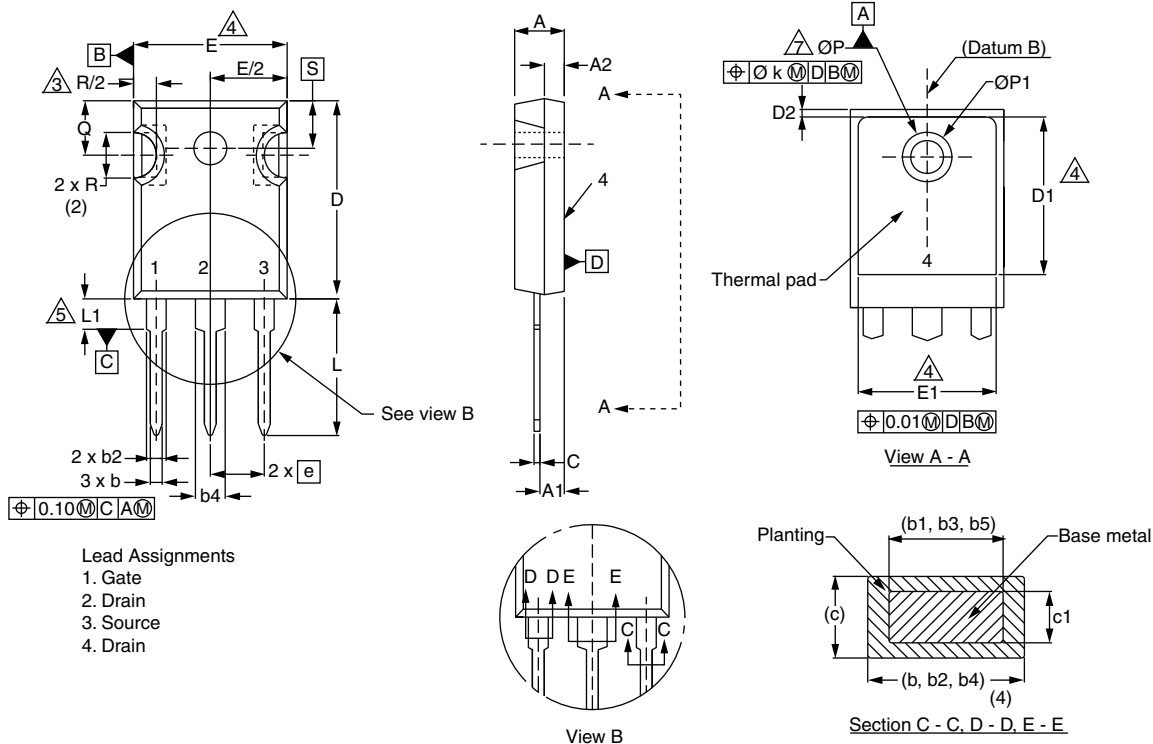
### Notes

- (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



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	-	

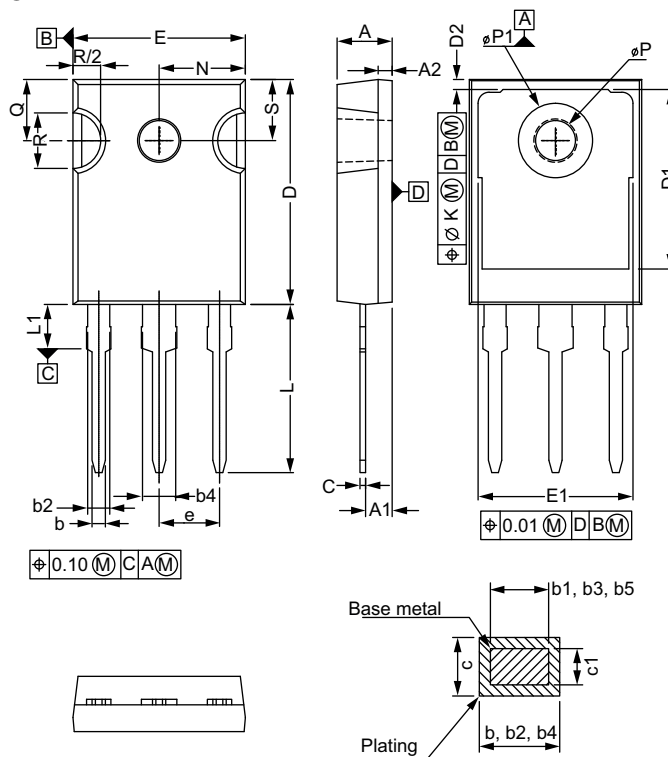
DIM.	MILLIMETERS		NOTES
	MIN.	MAX.	
D2	0.51	1.30	
E	15.29	15.87	
E1	13.72	-	
e	5.46 BSC		
Ø k	0.254		
L	14.20	16.25	
L1	3.71	4.29	
Ø P	3.51	3.66	
Ø P1	-	7.39	
Q	5.31	5.69	
R	4.52	5.49	
S	5.51 BSC		

### 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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