

- Advanced Process Technology
- Dynamic dv/dt Rating
- 175°C Operating Temperature
- Fast Switching
- Fully Avalanche Rated

Description

Fifth Generation HEXFETs from International Rectifier utilize advanced processing techniques to achieve the lowest possible on-resistance per silicon area. This benefit, combined with the fast switching speed and ruggedized device design that HEXFET Power MOSFETs are well known for, provides the designer with an extremely efficient device for use in a wide variety of applications.

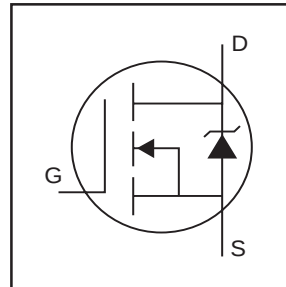
The TO-247 package is preferred for commercial-industrial applications where higher power levels preclude the use of TO-220 devices. The TO-247 is similar but superior to the earlier TO-218 package because of its isolated mounting hole.

Absolute Maximum Ratings

	Parameter	Max.	Units
I_D @ $T_C = 25^\circ\text{C}$	Continuous Drain Current, V_{GS} @ 10V ^⑤	33	A
I_D @ $T_C = 100^\circ\text{C}$	Continuous Drain Current, V_{GS} @ 10V ^⑤	23	
I_{DM}	Pulsed Drain Current ^{① ⑤}	110	
P_D @ $T_C = 25^\circ\text{C}$	Power Dissipation	140	W
	Linear Derating Factor	0.91	W/°C
V_{GS}	Gate-to-Source Voltage	±20	V
E_{AS}	Single Pulse Avalanche Energy ^{② ⑤}	300	mJ
I_{AR}	Avalanche Current ^①	16	A
E_{AR}	Repetitive Avalanche Energy ^①	14	mJ
dv/dt	Peak Diode Recovery dv/dt ^{③ ⑤}	5.0	V/ns
T_J	Operating Junction and	-55 to + 175	°C
T_{STG}	Storage Temperature Range		
	Soldering Temperature, for 10 seconds		
	Mounting torque, 6-32 or M3 screw.	300 (1.6mm from case) 10 lbf•in (1.1N•m)	

Thermal Resistance

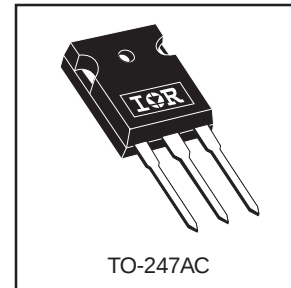
	Parameter	Min.	Typ.	Max.	Units
$R_{\theta JC}$	Junction-to-Case	—	—	1.1	°C/W
$R_{\theta CS}$	Case-to-Sink, Flat, Greased Surface	—	0.24	—	
$R_{\theta JA}$	Junction-to-Ambient	—	—	40	



$$V_{DSS} = 100V$$

$$R_{DS(on)} = 0.052\Omega$$

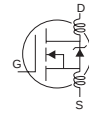
$$I_D = 33A$$



TO-247AC

Electrical Characteristics @ $T_J = 25^\circ\text{C}$ (unless otherwise specified)

	Parameter	Min.	Typ.	Max.	Units	Conditions
$V_{(BR)DSS}$	Drain-to-Source Breakdown Voltage	100	—	—	V	$V_{GS} = 0V$, $I_D = 250\mu A$
$\Delta V_{(BR)DSS}/\Delta T_J$	Breakdown Voltage Temp. Coefficient	—	0.11	—	V/ $^\circ\text{C}$	Reference to 25°C , $I_D = 1mA$ ⑤
$R_{DS(on)}$	Static Drain-to-Source On-Resistance	—	—	0.052	Ω	$V_{GS} = 10V$, $I_D = 16A$ ④
$V_{GS(th)}$	Gate Threshold Voltage	2.0	—	4.0	V	$V_{DS} = V_{GS}$, $I_D = 250\mu A$
g_{fs}	Forward Transconductance	11	—	—	S	$V_{DS} = 50V$, $I_D = 16A$ ⑤
I_{DSS}	Drain-to-Source Leakage Current	—	—	25	μA	$V_{DS} = 100V$, $V_{GS} = 0V$
		—	—	250		$V_{DS} = 80V$, $V_{GS} = 0V$, $T_J = 150^\circ\text{C}$
I_{GSS}	Gate-to-Source Forward Leakage	—	—	100	nA	$V_{GS} = 20V$
	Gate-to-Source Reverse Leakage	—	—	-100		$V_{GS} = -20V$
Q_g	Total Gate Charge	—	—	94	nC	$I_D = 16A$
Q_{gs}	Gate-to-Source Charge	—	—	15		$V_{DS} = 80V$
Q_{gd}	Gate-to-Drain ("Miller") Charge	—	—	43		$V_{GS} = 10V$, See Fig. 6 and 13 ④⑤
$t_{d(on)}$	Turn-On Delay Time	—	8.2	—	ns	$V_{DD} = 50V$
t_r	Rise Time	—	39	—		$I_D = 16A$
$t_{d(off)}$	Turn-Off Delay Time	—	44	—		$R_G = 5.1\Omega$
t_f	Fall Time	—	33	—		$R_D = 3.0\Omega$, See Fig. 10 ④⑤
L_D	Internal Drain Inductance	—	5.0	—	nH	Between lead, 6mm (0.25in.) from package and center of die contact
L_S	Internal Source Inductance	—	13	—		
C_{iss}	Input Capacitance	—	1400	—	pF	$V_{GS} = 0V$
C_{oss}	Output Capacitance	—	330	—		$V_{DS} = 25V$
C_{rss}	Reverse Transfer Capacitance	—	170	—		$f = 1.0MHz$, See Fig. 5⑤



Source-Drain Ratings and Characteristics

	Parameter	Min.	Typ.	Max.	Units	Conditions
I_S	Continuous Source Current (Body Diode)	—	—	33	A	MOSFET symbol showing the integral reverse p-n junction diode.
I_{SM}	Pulsed Source Current (Body Diode) ①⑤	—	—	110		
V_{SD}	Diode Forward Voltage	—	—	1.3	V	$T_J = 25^\circ\text{C}$, $I_S = 16A$, $V_{GS} = 0V$ ④
t_{rr}	Reverse Recovery Time	—	170	250	ns	$T_J = 25^\circ\text{C}$, $I_F = 16A$
Q_{rr}	Reverse Recovery Charge	—	1.1	1.6	μC	$di/dt = 100A/\mu s$ ④⑤

Notes:

① Repetitive rating; pulse width limited by max. junction temperature. (See fig. 11)

② $V_{DD} = 25V$, starting $T_J = 25^\circ\text{C}$, $L = 2.0mH$
 $R_G = 25\Omega$, $I_{AS} = 16A$. (See Figure 12)

③ $I_{SD} \leq 16A$, $di/dt \leq 210A/\mu s$, $V_{DD} \leq V_{(BR)DSS}$,
 $T_J \leq 175^\circ\text{C}$

④ Pulse width $\leq 300\mu s$; duty cycle $\leq 2\%$.

⑤ Uses IRF540N data and test conditions.

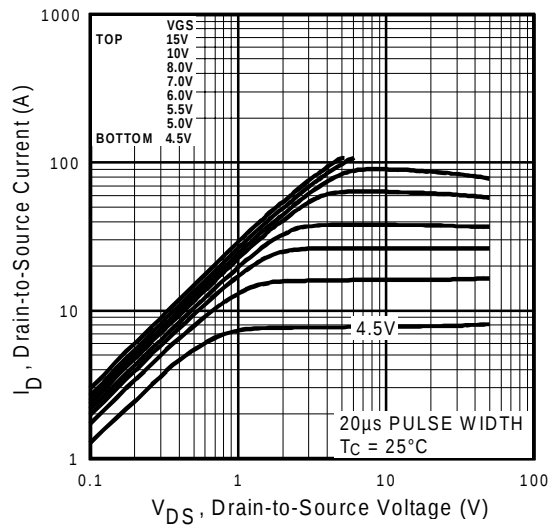


Fig 1. Typical Output Characteristics

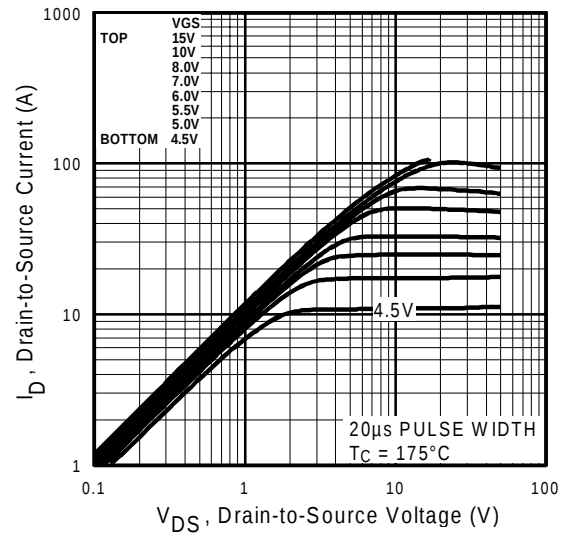


Fig 2. Typical Output Characteristics

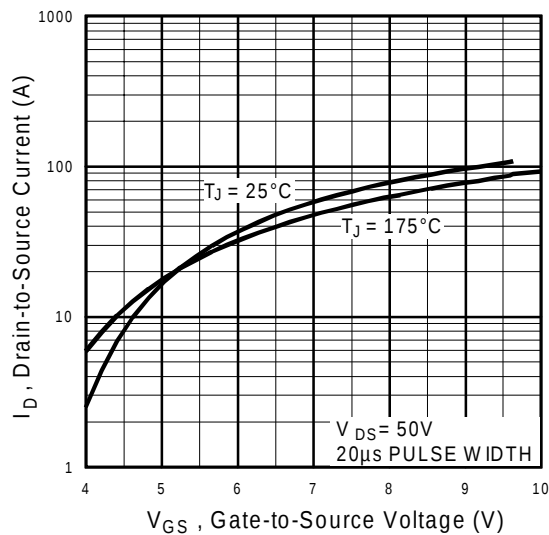


Fig 3. Typical Transfer Characteristics

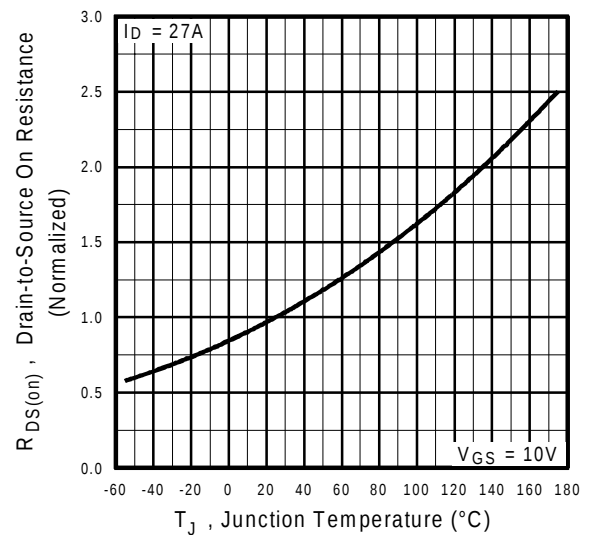


Fig 4. Normalized On-Resistance Vs. Temperature

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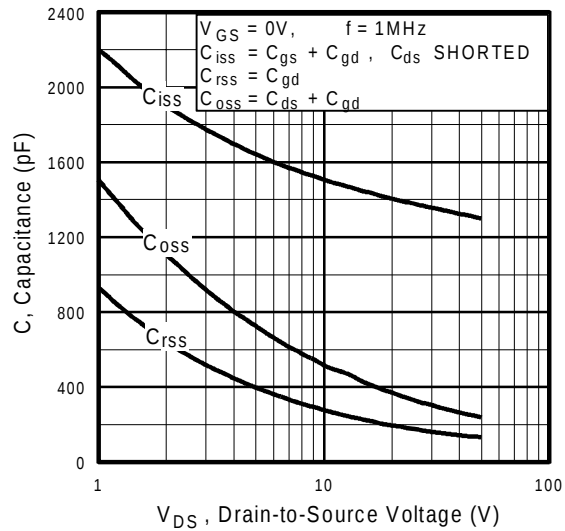


Fig 5. Typical Capacitance Vs. Drain-to-Source Voltage

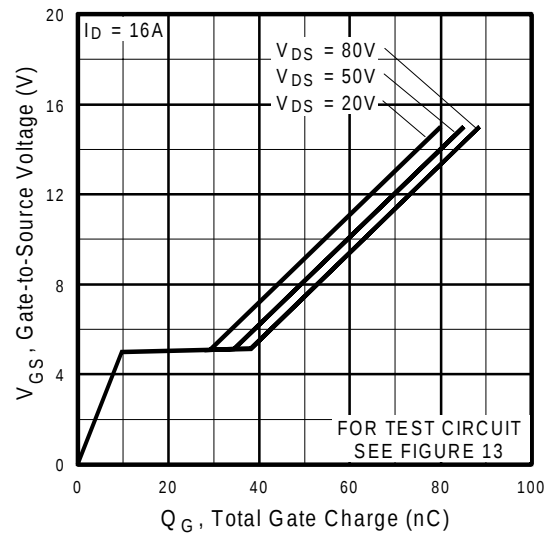


Fig 6. Typical Gate Charge Vs. Gate-to-Source Voltage

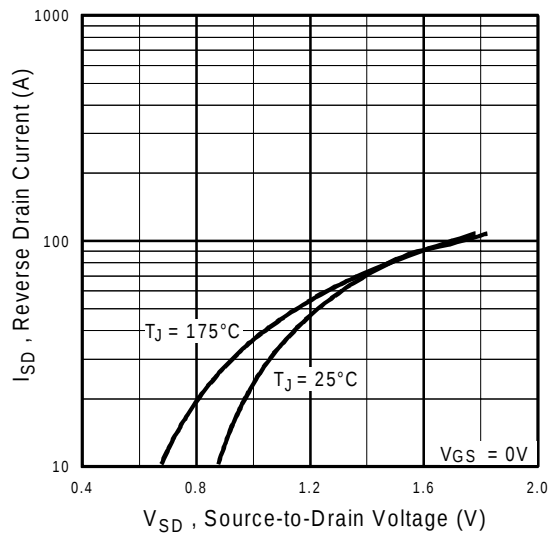


Fig 7. Typical Source-Drain Diode Forward Voltage

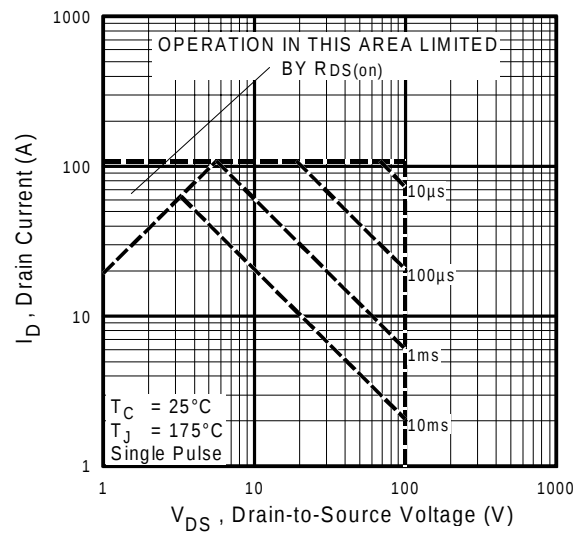


Fig 8. Maximum Safe Operating Area

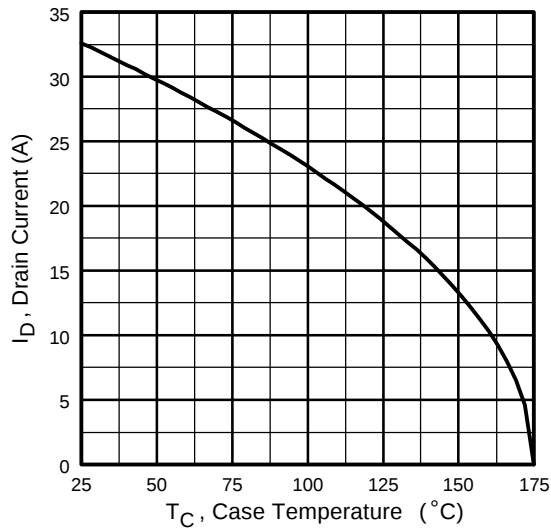


Fig 9. Maximum Drain Current Vs. Case Temperature

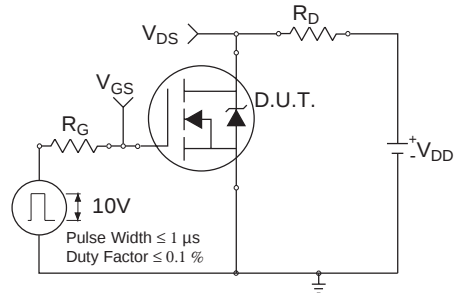


Fig 10a. Switching Time Test Circuit

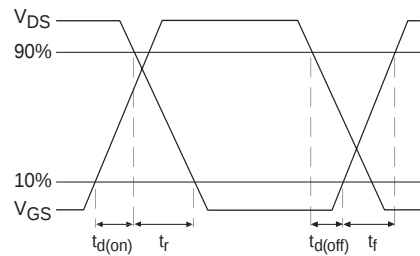


Fig 10b. Switching Time Waveforms

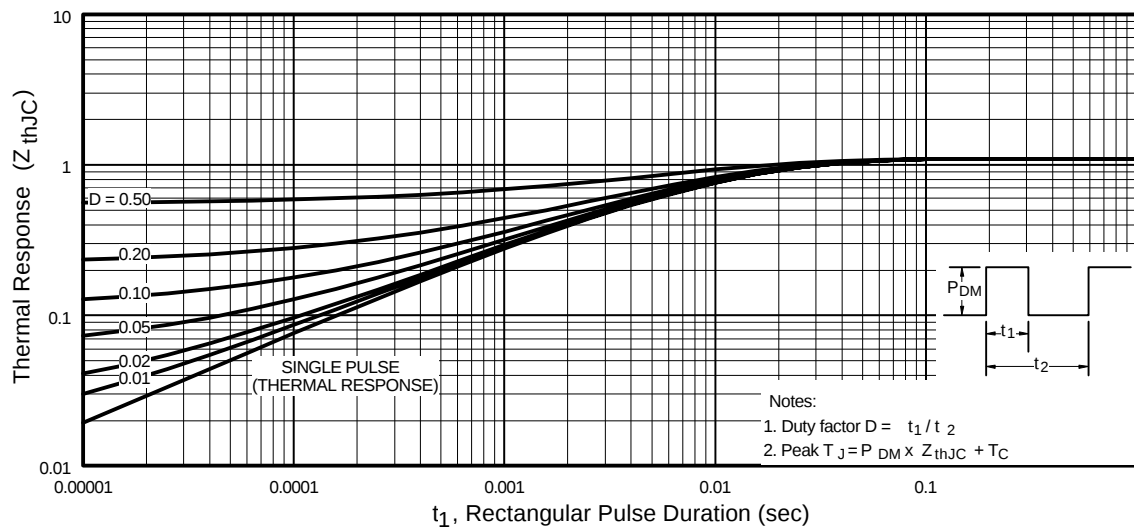


Fig 11. Maximum Effective Transient Thermal Impedance, Junction-to-Case

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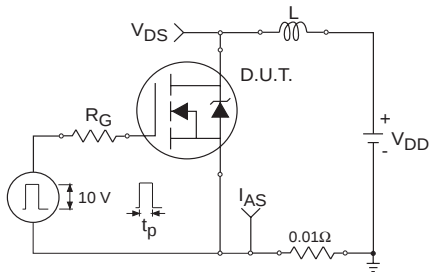


Fig 12a. Unclamped Inductive Test Circuit

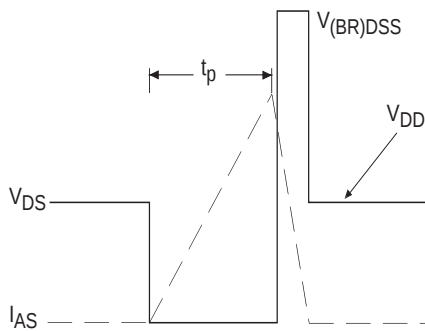


Fig 12b. Unclamped Inductive Waveforms

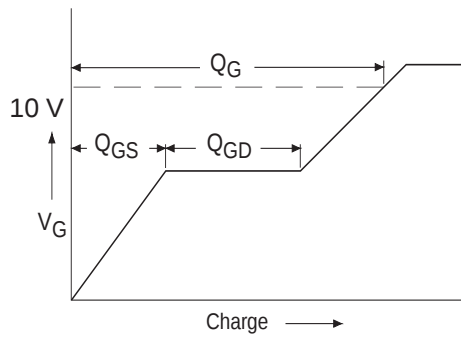


Fig 13a. Basic Gate Charge Waveform

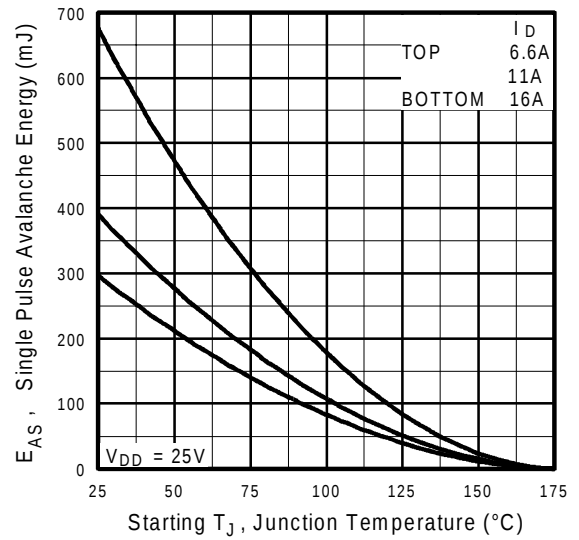


Fig 12c. Maximum Avalanche Energy Vs. Drain Current

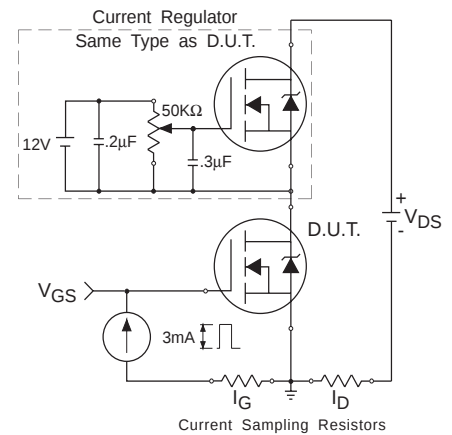


Fig 13b. Gate Charge Test Circuit

Peak Diode Recovery dv/dt Test Circuit

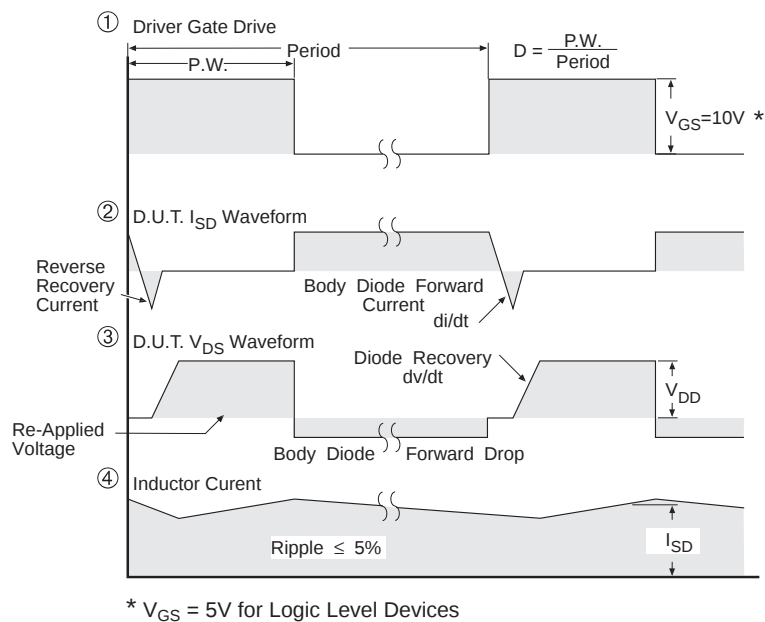
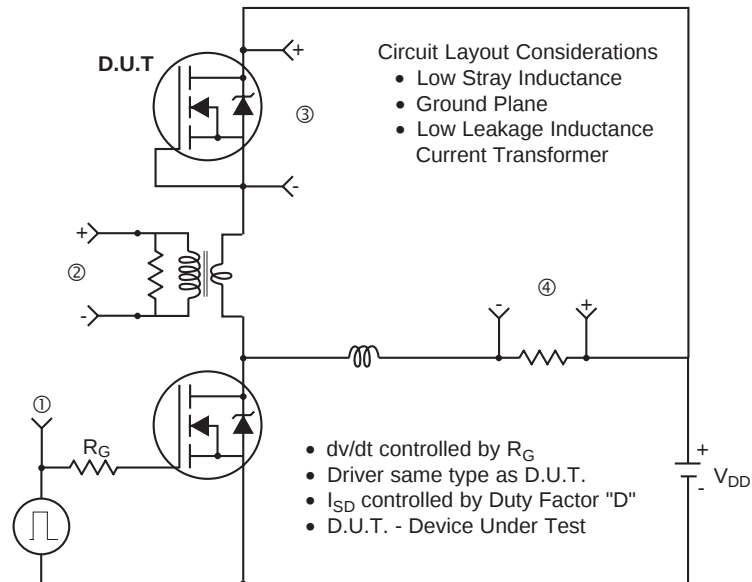


Fig 14. For N-Channel HEXFETS

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TO-247AC Outline

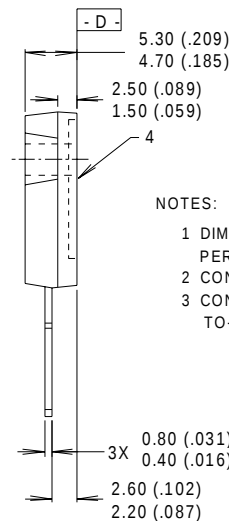
Technical drawing of a mechanical part, likely a valve body, showing dimensions and tolerances. The drawing includes a top view and a side view.

Top View Dimensions:

- Overall width: 15.90 (.626) and 15.30 (.602)
- Overall height: 20.30 (.800) and 19.70 (.775)
- Top hole diameter: $\varnothing 3.65$ (.143) with tolerance 3.55 (.140)
- Top hole position: $\varnothing 0.25$ (.010) (M)
- Top hole feature control: D B (M)
- Top hole feature control symbol: - A -
- Top hole feature control symbol: - B -
- Top hole feature control symbol: 5.50 (.217)
- Top hole feature control symbol: 2X $\varnothing 5.50$ (.217) 4.50 (.177)
- Top hole feature control symbol: 1 2 3
- Top hole feature control symbol: 14.80 (.583) 14.20 (.559)
- Top hole feature control symbol: 2.40 (.094) 2.00 (.079) 2X
- Top hole feature control symbol: 5.45 (.215) 2X
- Top hole feature control symbol: 3.40 (.133) 3.00 (.118)
- Top hole feature control symbol: 3X 1.40 (.056) 1.00 (.039)
- Top hole feature control symbol: $\varnothing 0.25$ (.010) (M) C A (S)

Side View Dimensions:

- Overall height: 14.80 (.583) and 14.20 (.559)
- Overall width: 15.90 (.626) and 15.30 (.602)
- Overall depth: 20.30 (.800) and 19.70 (.775)
- Overall diameter: $\varnothing 3.65$ (.143) with tolerance 3.55 (.140)
- Overall diameter position: $\varnothing 0.25$ (.010) (M)
- Overall diameter feature control: D B (M)
- Overall diameter feature control symbol: - A -
- Overall diameter feature control symbol: - B -
- Overall diameter feature control symbol: 5.50 (.217)
- Overall diameter feature control symbol: 2X $\varnothing 5.50$ (.217) 4.50 (.177)
- Overall diameter feature control symbol: 1 2 3
- Overall diameter feature control symbol: 14.80 (.583) 14.20 (.559)
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- Overall diameter feature control symbol: 3.40 (.133) 3.00 (.118)
- Overall diameter feature control symbol: 3X 1.40 (.056) 1.00 (.039)
- Overall diameter feature control symbol: $\varnothing 0.25$ (.010) (M) C A (S)



1 DIMENSIONING & TOLERANCING
PER ANSI Y14.5M, 1982.
2 CONTROLLING DIMENSION : INCH.
3 CONFORMS TO JEDEC OUTLINE
TO-247-AC.

1 - GATE
2 - DRAIN
3 - SOURCE
4 - DRAIN

TO-247AC

Diagram illustrating the markings on the IRFP30 MOSFET package:

- INTERNATIONAL RECTIFIER LOGO**: Points to the **IR** logo.
- PART NUMBER**: Points to the **IRFP30** marking.
- ASSEMBLY LOT CODE**: Points to the **3A1Q 9302** marking.
- DATE CODE (YYWW)**: Points to the **9302** marking, where **YY** = YEAR and **WW** = WEEK.

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<http://www.irf.com/> Data and specifications subject to change without notice. 8/98