International
IOR Rectifier

IRFP32N50K

SMPS MOSFET

HEXFET® Power MOSFET

Applications

- Switch Mode Power Supply (SMPS)
- Uninterruptible Power Supply
- High Speed Power Switching
- Hard Switched and High Frequency Circuits

V_{DSS}	$R_{DS(on)}$ typ.	I_D
500V	**0.135Ω**	**32A**

Benefits

- Low Gate Charge Qg results in Simple Drive Requirement
- Improved Gate, Avalanche and Dynamic dv/dt Ruggedness
- Fully Characterized Capacitance and Avalanche Voltage and Current
- Low $R_{DS(on)}$

TO-247AC

Absolute Maximum Ratings

	Parameter	Max.	Units
I_D @ T_C = 25°C	Continuous Drain Current, V_{GS} @ 10V	32	
I_D @ T_C = 100°C	Continuous Drain Current, V_{GS} @ 10V	20	A
I_{DM}	Pulsed Drain Current ①	130	
P_D @T_C = 25°C	Power Dissipation	460	W
	Linear Derating Factor	3.7	W/°C
V_{GS}	Gate-to-Source Voltage	± 30	V
dv/dt	Peak Diode Recovery dv/dt ③	13	V/ns
T_J T_{STG}	Operating Junction and Storage Temperature Range	-55 to + 150	
	Soldering Temperature, for 10 seconds (1.6mm from case)	300	°C
	Mounting torque, 6-32 or M3 screw		10lb*in (1.1N*m)

Avalanche Characteristics

Symbol	Parameter	Typ.	Max.	Units
E_{AS}	Single Pulse Avalanche Energy②	–––	450	mJ
I_{AR}	Avalanche Current①	–––	32	A
E_{AR}	Repetitive Avalanche Energy①	–––	46	mJ

Thermal Resistance

Symbol	Parameter	Typ.	Max.	Units
$R_{\theta JC}$	Junction-to-Case	–––	0.26	
$R_{\theta CS}$	Case-to-Sink, Flat, Greased Surface	0.24	–––	°C/W
$R_{\theta JA}$	Junction-to-Ambient	–––	40	

05/24/01

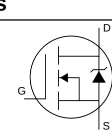
Static @ T_J = 25°C (unless otherwise specified)

Symbol	Parameter	Min.	Typ.	Max.	Units	Conditions
$V_{(BR)DSS}$	Drain-to-Source Breakdown Voltage	500	–––	–––	V	V_{GS} = 0V, I_D = 250μA
$\Delta V_{(BR)DSS}/\Delta T_J$	Breakdown Voltage Temp. Coefficient	–––	0.54	–––	V/°C	Reference to 25°C, I_D = 1mA⑥
$R_{DS(on)}$	Static Drain-to-Source On-Resistance	–––	0.135	0.16	Ω	V_{GS} = 10V, I_D = 32A ④
$V_{GS(th)}$	Gate Threshold Voltage	3.0	–––	5.0	V	V_{DS} = V_{GS}, I_D = 250μA
I_{DSS}	Drain-to-Source Leakage Current	–––	–––	50	μA	V_{DS} = 500V, V_{GS} = 0V
		–––	–––	250	μA	V_{DS} = 400V, V_{GS} = 0V, T_J = 150°C
I_{GSS}	Gate-to-Source Forward Leakage	–––	–––	100	nA	V_{GS} = 30V
	Gate-to-Source Reverse Leakage	–––	–––	-100		V_{GS} = -30V

Dynamic @ T_J = 25°C (unless otherwise specified)

	Parameter	Min.	Typ.	Max.	Units	Conditions
g_{fs}	Forward Transconductance	14	–––	–––	S	V_{DS} = 50V, I_D = 32A
Q_g	Total Gate Charge	–––	–––	190	nC	I_D = 32A
Q_{gs}	Gate-to-Source Charge	–––	–––	59		V_{DS} = 400V
Q_{gd}	Gate-to-Drain ("Miller") Charge	–––	–––	84		V_{GS} = 10V ④
$t_{d(on)}$	Turn-On Delay Time	–––	28	–––	ns	V_{DD} = 250V
t_r	Rise Time	–––	120	–––		I_D = 32A
$t_{d(off)}$	Turn-Off Delay Time	–––	48	–––		R_G = 4.3Ω
t_f	Fall Time	–––	54	–––		V_{GS} = 10V ④
C_{iss}	Input Capacitance	–––	5280	–––	pF	V_{GS} = 0V
C_{oss}	Output Capacitance	–––	550	–––		V_{DS} = 25V
C_{rss}	Reverse Transfer Capacitance	–––	45	–––		ƒ = 1.0MHz, See Fig. 5
C_{oss}	Output Capacitance	–––	5630	–––		V_{GS} = 0V, V_{DS} = 1.0V, ƒ = 1.0MHz
C_{oss}	Output Capacitance	–––	155	–––		V_{GS} = 0V, V_{DS} = 400V, ƒ = 1.0MHz
C_{oss} eff.	Effective Output Capacitance	–––	265	–––		V_{GS} = 0V, V_{DS} = 0V to 400V ⑤

Diode Characteristics

Symbol	Parameter	Min.	Typ.	Max.	Units	Conditions
I_S	Continuous Source Current (Body Diode)	–––	–––	32	A	MOSFET symbol showing the integral reverse p-n junction diode. 
I_{SM}	Pulsed Source Current (Body Diode) ①	–––	–––	130		
V_{SD}	Diode Forward Voltage	–––	–––	1.5	V	T_J = 25°C, I_S = 32A, V_{GS} = 0V ④
t_{rr}	Reverse Recovery Time	–––	530	800	ns	T_J = 25°C, I_F = 32A
Q_{rr}	Reverse RecoveryCharge	–––	9.0	13.5	μC	di/dt = 100A/μs ④
I_{RRM}	Reverse RecoveryCurrent	–––	30	–––	A	
t_{on}	Forward Turn-On Time	Intrinsic turn-on time is negligible (turn-on is dominated by L_S+L_D)				

Notes:

① Repetitive rating; pulse width limited by max. junction temperature.

② Starting T_J = 25°C, L = 0.87mH, R_G = 25Ω, I_{AS} = 32A,

③ I_{SD} ≤ 32A, di/dt ≤ 197A/μs, V_{DD} ≤ $V_{(BR)DSS}$, T_J ≤ 150°C

④ Pulse width ≤ 400μs; duty cycle ≤ 2%.

⑤ C_{oss} eff. is a fixed capacitance that gives the same charging time as C_{oss} while V_{DS} is rising from 0 to 80% V_{DSS}.

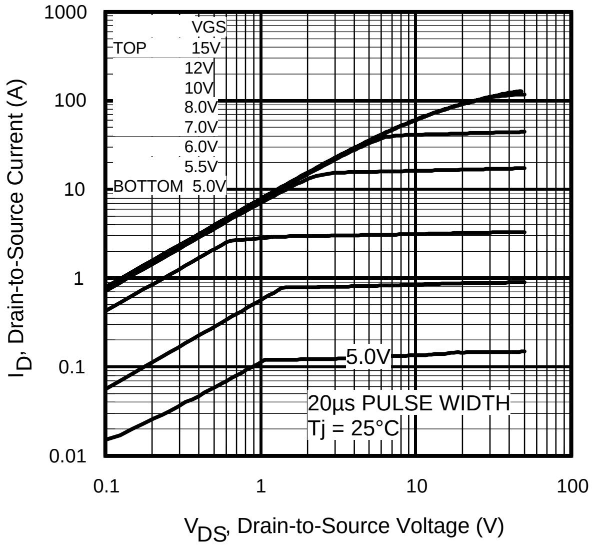


Fig 1. Typical Output Characteristics

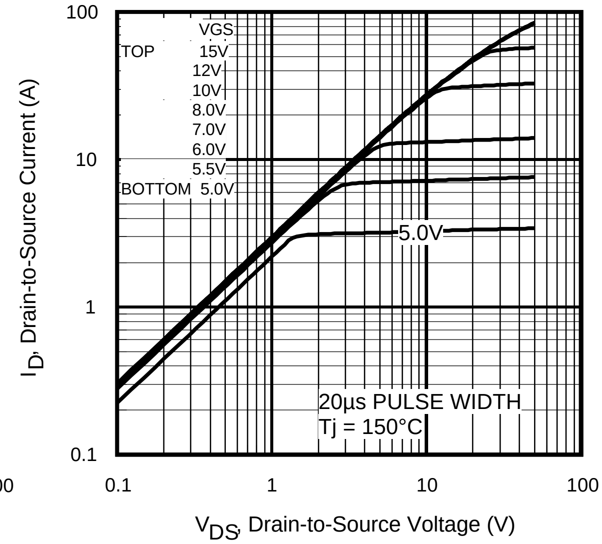


Fig 2. Typical Output Characteristics

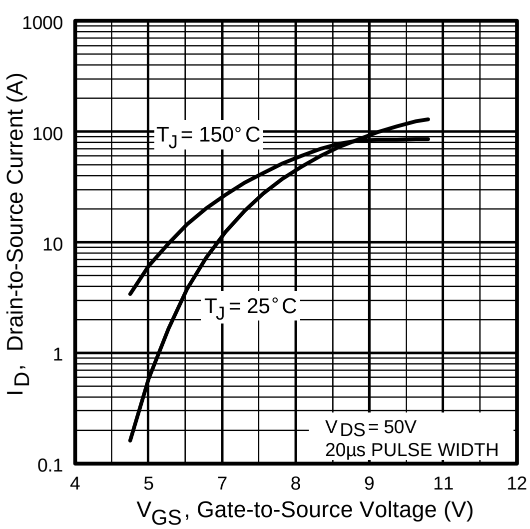


Fig 3. Typical Transfer Characteristics

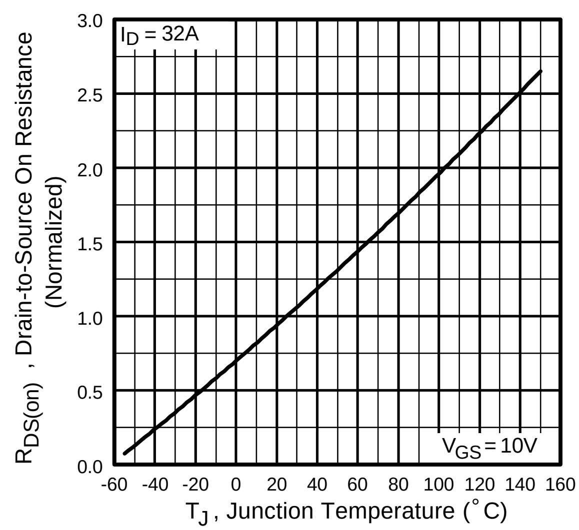


Fig 4. Normalized On-Resistance Vs. Temperature

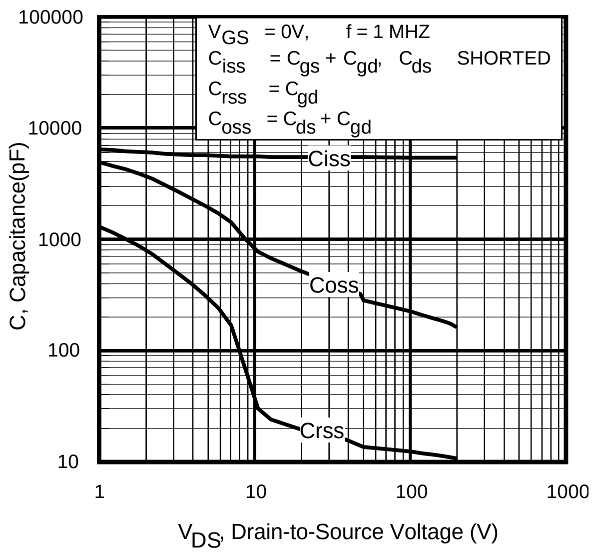


Fig 5. Typical Capacitance Vs. Drain-to-Source Voltage

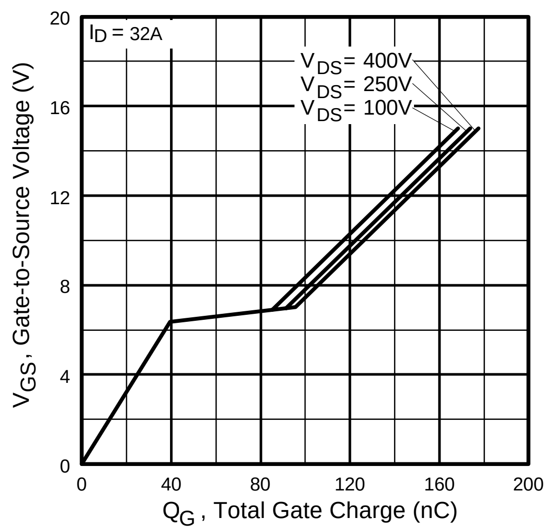


Fig 6. Typical Gate Charge Vs. Gate-to-Source Voltage

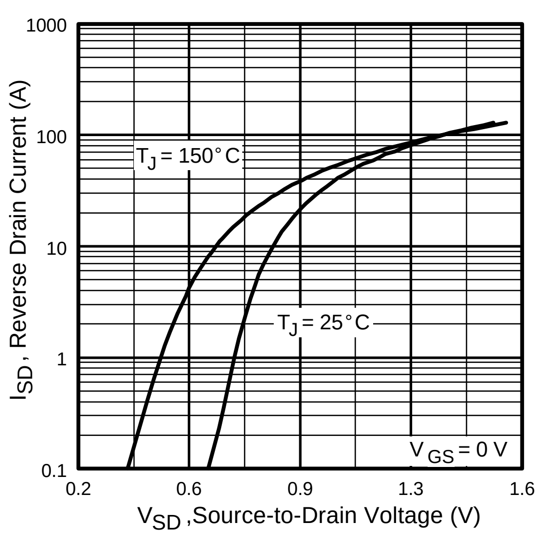


Fig 7. Typical Source-Drain Diode Forward Voltage

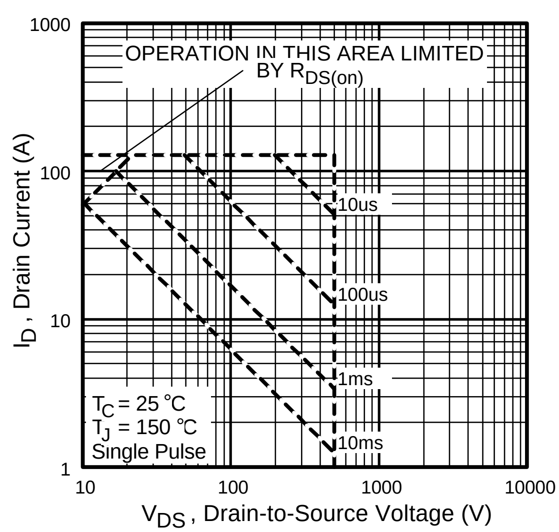


Fig 8. Maximum Safe Operating Area

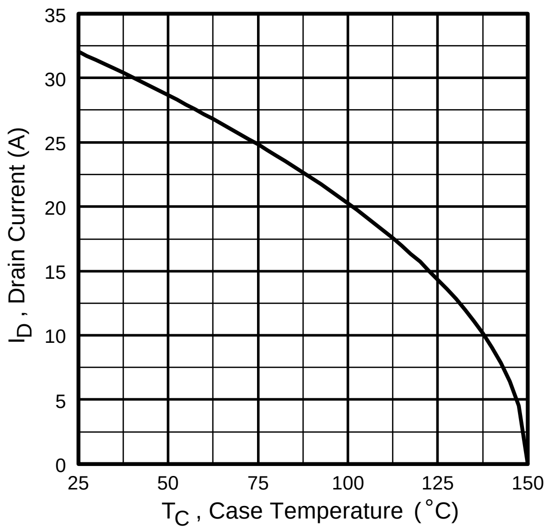


Fig 9. Maximum Drain Current Vs. Case Temperature

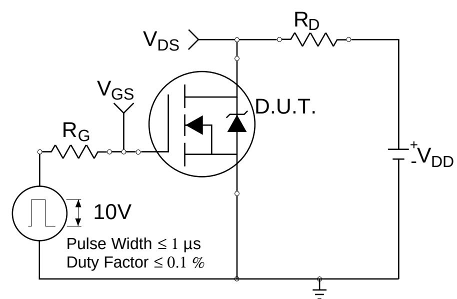


Fig 10a. Switching Time Test Circuit

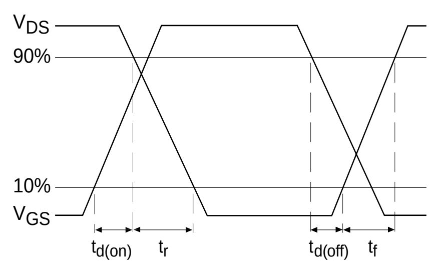


Fig 10b. Switching Time Waveforms

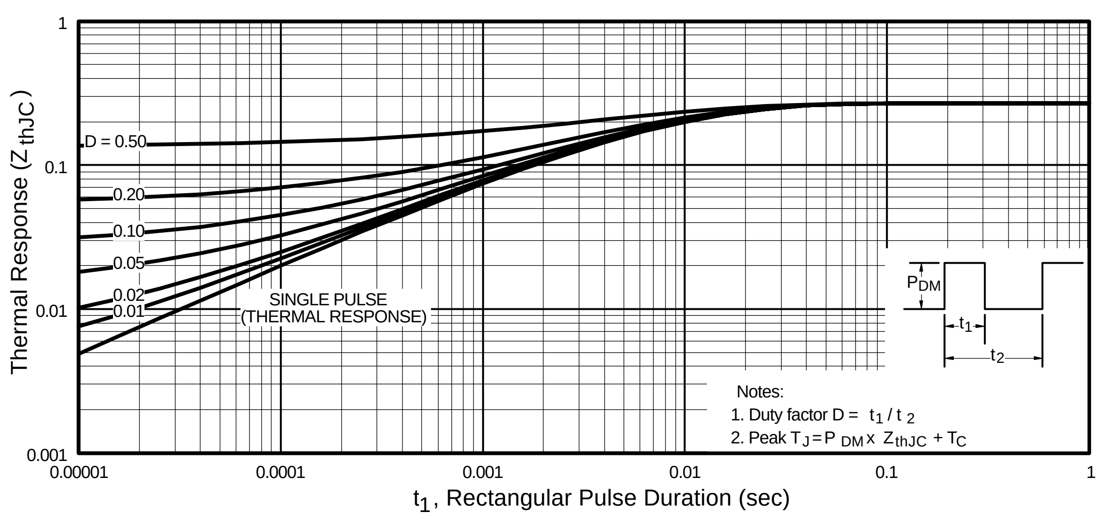


Fig 11. Maximum Effective Transient Thermal Impedance, Junction-to-Case

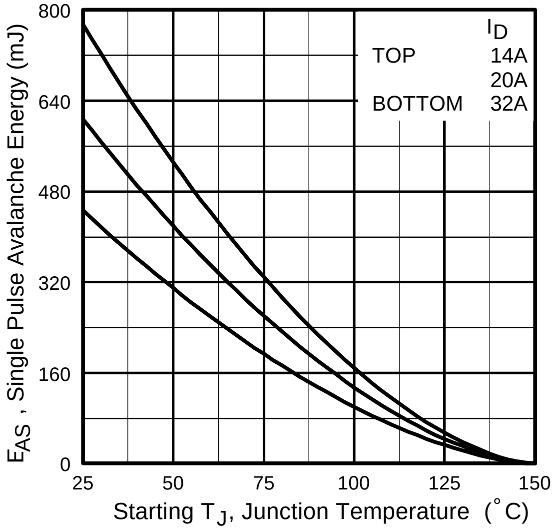


Fig 12a. Maximum Avalanche Energy Vs. Drain Current

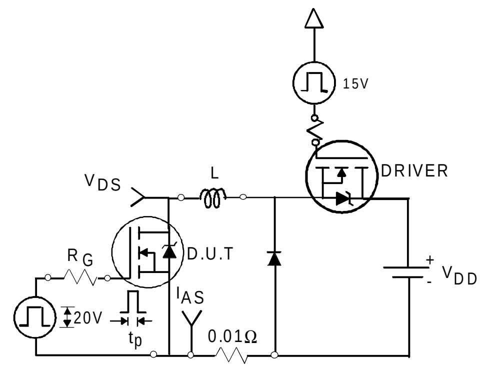


Fig 12c. Unclamped Inductive Test Circuit

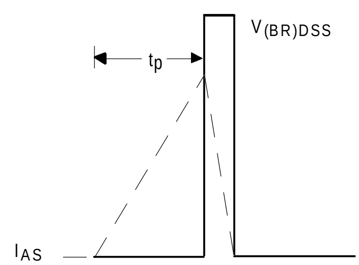


Fig 12d. Unclamped Inductive Waveforms

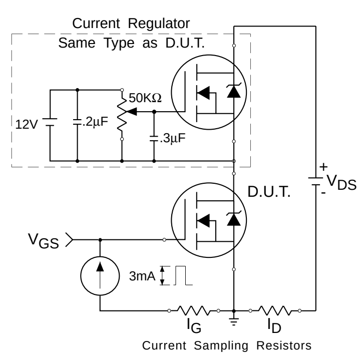


Fig 13a. Gate Charge Test Circuit

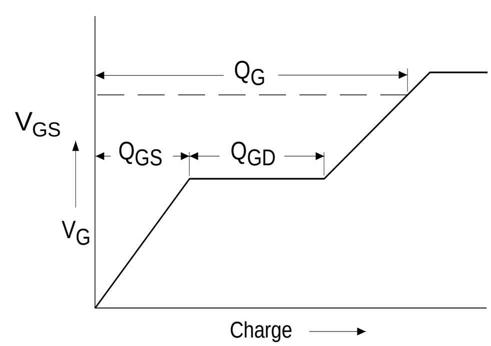
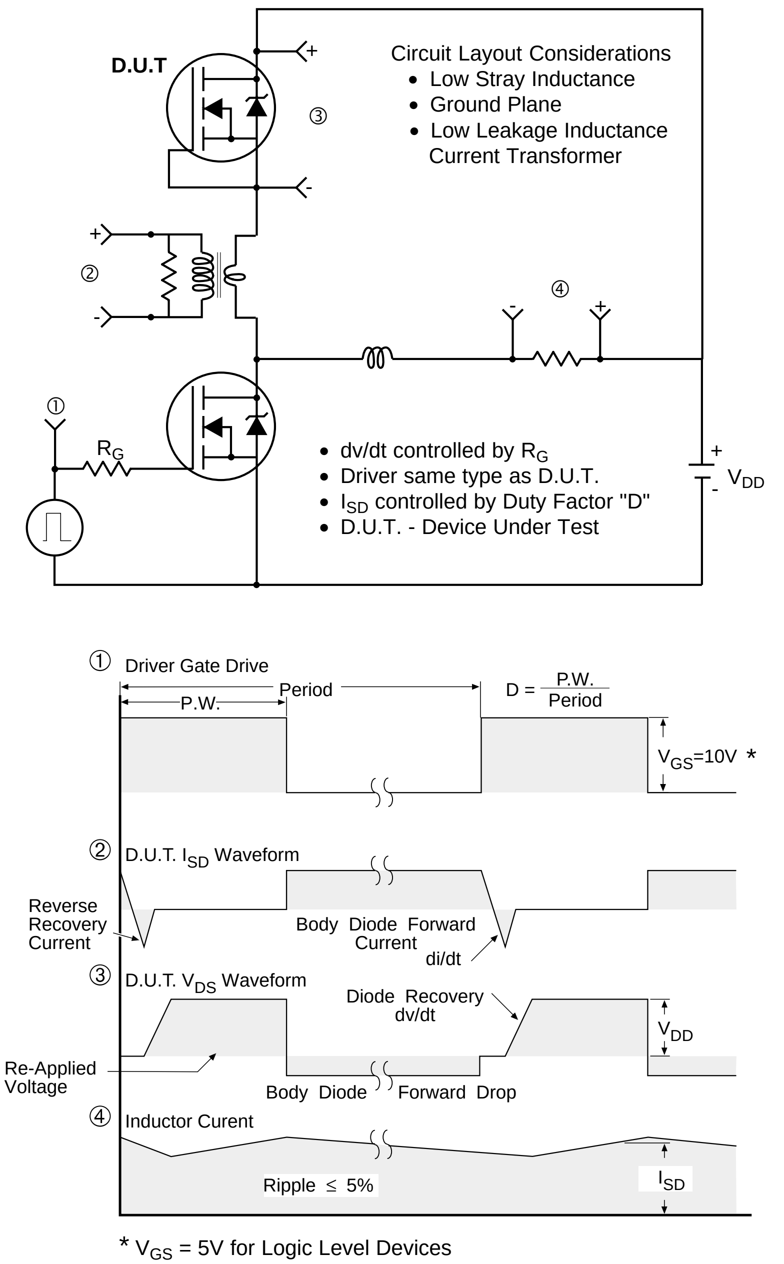


Fig 13b. Basic Gate Charge Waveform

Peak Diode Recovery dv/dt Test Circuit

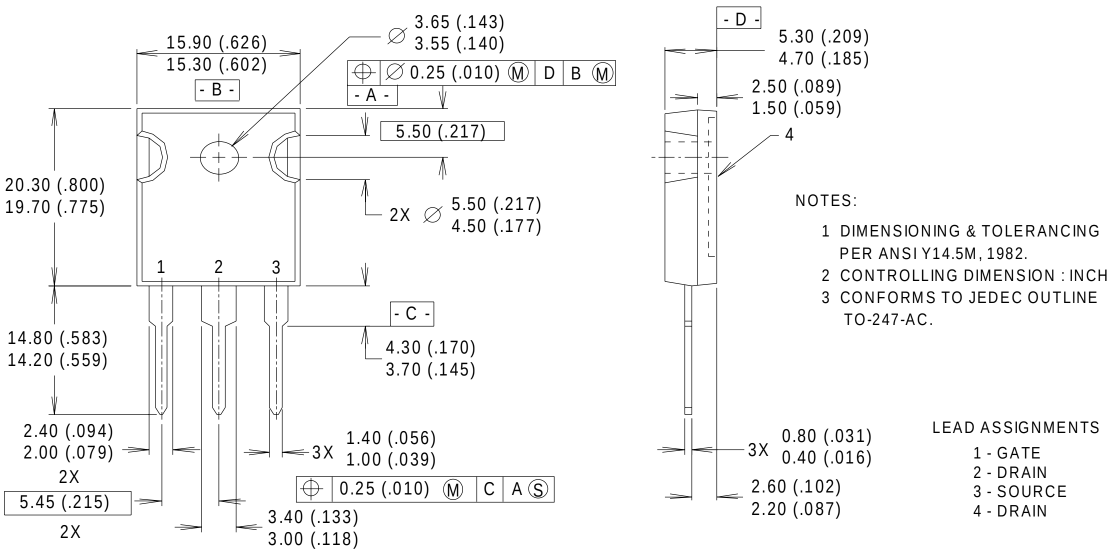


* V_{GS} = 5V for Logic Level Devices

Fig 14. For N-Channel HEXFET® Power MOSFETs

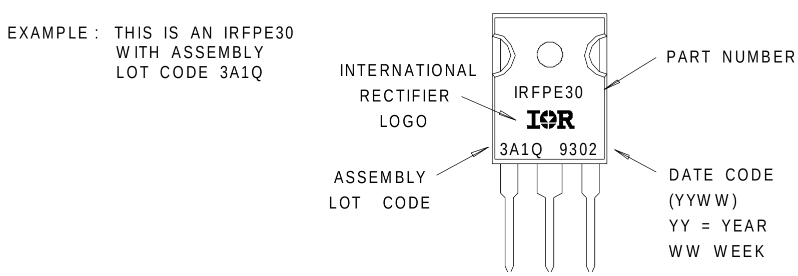
TO - 247 Package Outline

Dimensions are shown in millimeters (inches)



Part Marking Information

TO-247AC



This product has been designed and qualified for the industrial market.
Qualification Standards can be found on IR's Web site.

International Rectifier

IR WORLD HEADQUARTERS: 233 Kansas St., El Segundo, California 90245, USA Tel: (310) 252-7105
TAC Fax: (310) 252-7903
Visit us at www.irf.com for sales contact information.

Data and specifications subject to change without notice. 05/01