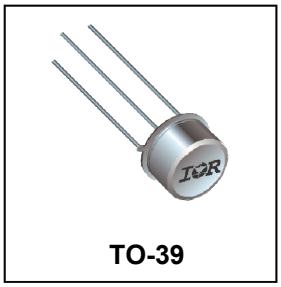
IRF7F3704

20V, N-CHANNEL

HEXFET® POWER MOSFET
THRU-HOLE TO-205AF (TO-39)



TO-39

Product Summary

Part Number	BVDSS	RDS(on)	ID
IRF7F3704	20V	0.035Ω	12A*

Description

Seventh Generation HEXFET® power MOSFETs from International Rectifier HiRel utilize advanced processing techniques to achieve the lowest possible on-resistance per silicon unit 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.

These devices are well-suited for applications such as switching power supplies, motor controls, inverters, choppers, audio amplifiers and high-energy pulse circuits.

Features

- Low RDS(on)
- Avalanche Energy Ratings
- Dynamic dv/dt Rating
- Simple Drive Requirements
- Hermetically Sealed
- Light Weight

Absolute Maximum Ratings

Symbol	Parameter	Value	Units
I_{D1} @ V_{GS} = 10V, T_C = 25°C	Continuous Drain Current	12*	A
I_{D2} @ V_{GS} = 10V, T_C = 100°C	Continuous Drain Current	12*	
I_{DM} @ T_C = 25°C	Pulsed Drain Current ①	48	
P_D @T_C = 25°C	Maximum Power Dissipation	20	W
	Linear Derating Factor	0.16	W/°C
V_{GS}	Gate-to-Source Voltage	± 16	V
E_{AS}	Single Pulse Avalanche Energy ②	190	mJ
I_{AR}	Avalanche Current ①	12	A
E_{AR}	Repetitive Avalanche Energy ①	2.0	mJ
dv/dt	Peak Diode Recovery dv/dt ③	0.5	V/ns
T_J T_{STG}	Operating Junction and Storage Temperature Range	-55 to + 150	°C
	Lead Temperature	300 (0.063 in. /1.6 mm from case for 10s)	
	Weight	0.98 (Typical)	g

*Current is limited by package

For Footnotes refer to the page 2.

Electrical Characteristics @ Tj = 25°C (Unless Otherwise Specified)

Symbol	Parameter	Min.	Typ.	Max.	Units	Test Conditions
BV_{DSS}	Drain-to-Source Breakdown Voltage	20	——	——	V	V_{GS} = 0V, I_D = 250µA
$\Delta BV_{DSS}/\Delta T_J$	Breakdown Voltage Temp. Coefficient	——	0.024	——	V/°C	Reference to 25°C, I_D = 1.0mA
$R_{DS(on)}$	Static Drain-to-Source On-Resistance	——	——	0.035	Ω	V_{GS} = 10V, I_{D2} = 12A ④
		——	——	0.04		V_{GS} = 4.5V, I_{D2} = 12A ④
$V_{GS(th)}$	Gate Threshold Voltage	1.0	——	3.0	V	V_{DS} = V_{GS}, I_D = 250µA
Gfs	Forward Transconductance	20	——	——	S	V_{DS} = 10V, I_{D2} = 12A ④
I_{DSS}	Zero Gate Voltage Drain Current	——	——	20	µA	V_{DS} = 20V, V_{GS} = 0V
		——	——	100		V_{DS} = 16V,V_{GS} = 0V,T_J =125°C
I_{GSS}	Gate-to-Source Leakage Forward	——	——	100	nA	V_{GS} = 16V
	Gate-to-Source Leakage Reverse	——	——	-100		V_{GS} = -16V
Q_G	Total Gate Charge	——	——	19	nC	I_{D1} = 12A
Q_{GS}	Gate-to-Source Charge	——	——	8.0		V_{DS} = 10V
Q_{GD}	Gate-to-Drain ('Miller') Charge	——	——	6.0		V_{GS} = 4.5V
$t_{d(on)}$	Turn-On Delay Time	——	——	30	ns	V_{DD} = 10V
tr	Rise Time	——	——	175		I_{D1} = 12A
$t_{d(off)}$	Turn-Off Delay Time	——	——	175		R_G = 1.8Ω
t_f	Fall Time	——	——	100		V_{GS} = 4.5V
Ls +L_D	Total Inductance	——	7.0	——	nH	Measured from Drain lead (6mm / 0.25 in from package) to Source lead (6mm/ 0.25 in from package) with Source wire internally bonded from Source pin to Drain pin
C_{iss}	Input Capacitance	——	1860	——	pF	V_{GS} = 0V
C_{oss}	Output Capacitance	——	990	——		V_{DS} = 10V
C_{rss}	Reverse Transfer Capacitance	——	55	——		f = 1.0MHz

Source-Drain Diode Ratings and Characteristics

Symbol	Parameter	Min.	Typ.	Max.	Units	Test Conditions
I_S	Continuous Source Current (Body Diode)	——	——	12*	A	
I_{SM}	Pulsed Source Current (Body Diode) ①	——	——	48		
V_{SD}	Diode Forward Voltage	——	——	1.3	V	T_J = 25°C,I_S = 12A, V_{GS} = 0V④
t_{rr}	Reverse Recovery Time	——	——	57	ns	T_J = 25°C, I_F = 12A, V_{DD} ≤ 16V
Q_{rr}	Reverse Recovery Charge	——	——	60	nC	di/dt = 100A/µs ④
t_{on}	Forward Turn-On Time	Intrinsic turn-on time is negligible (turn-on is dominated by L_S+L_D)				

Thermal Resistance

Symbol	Parameter	Min.	Typ.	Max.	Units
$R_{\theta JC}$	Junction-to-Case	——	——	6.25	°C/W
$R_{\theta JA}$	Junction-to-Ambient (Typical socket mount)	——	——	175	

Footnotes:

① Repetitive Rating; Pulse width limited by maximum junction temperature.

② V_{DD} = 15V, starting T_J = 25°C, L = 2.7mH, Peak I_L = 12A, V_{GS} = 10V, R_G = 25Ω

③ I_{SD} ≤ 12A, di/dt ≤ 80A/µs, V_{DD} ≤ 20V, T_J ≤ 150°C

④ Pulse width ≤ 300 µs; Duty Cycle ≤ 2%

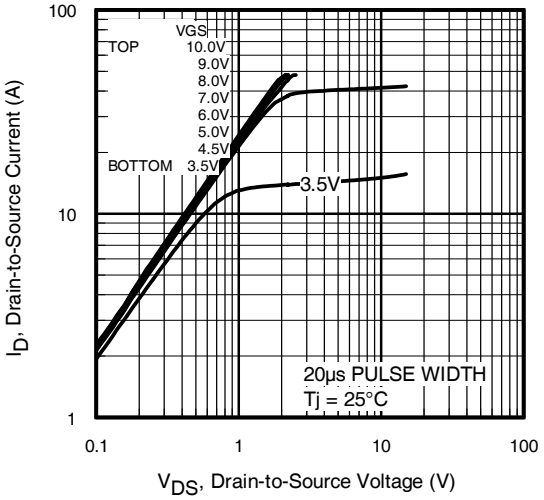


Fig 1. Typical Output Characteristics

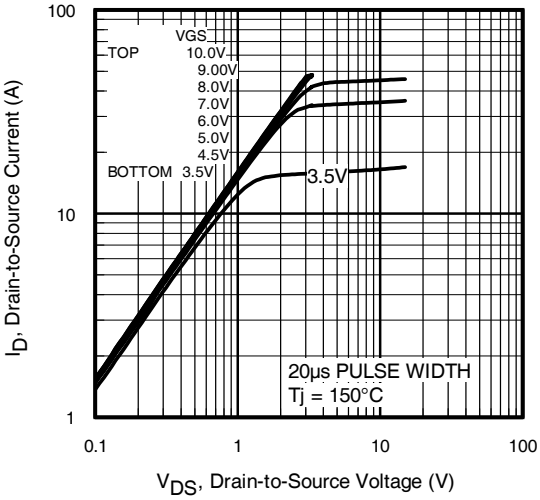


Fig 2. Typical Output Characteristics

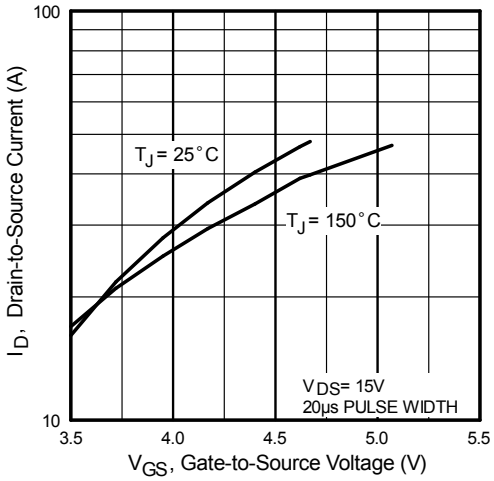


Fig 3. Typical Transfer Characteristics

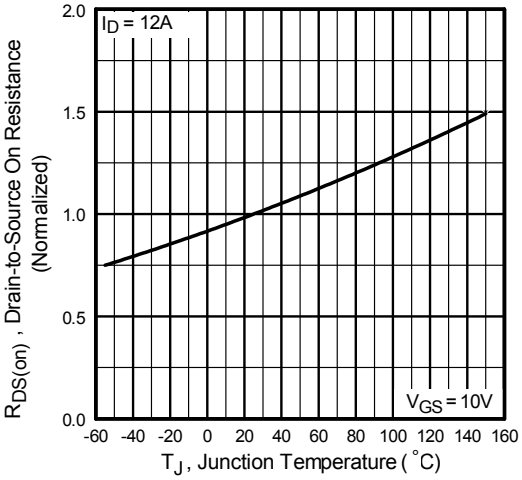


Fig 4. Normalized On-Resistance Vs. Temperature

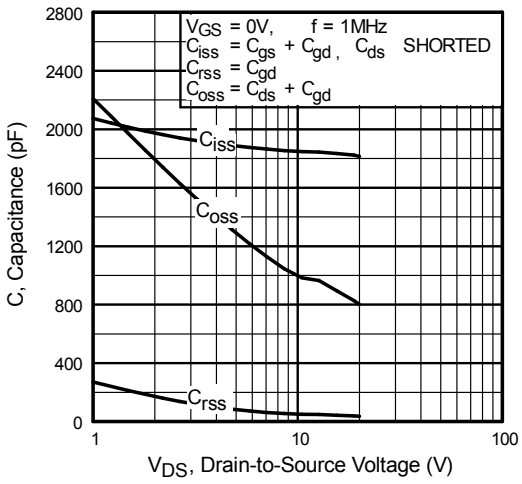


Fig 5. Typical Capacitance Vs. Drain-to-Source Voltage

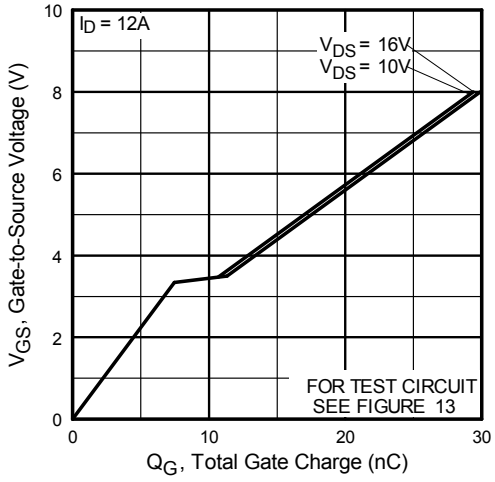


Fig 6. Typical Gate Charge Vs. Gate-to-Source Voltage

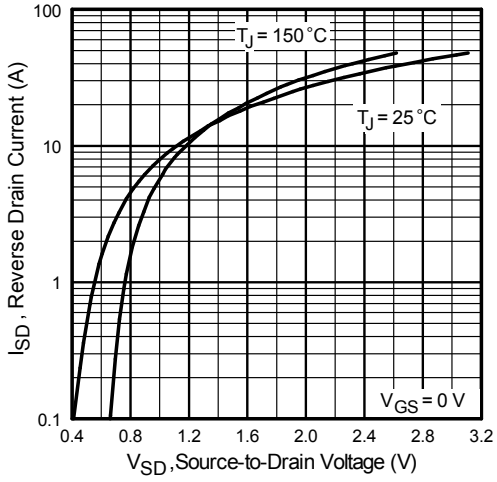


Fig 7. Typical Source-Drain Diode Forward Voltage

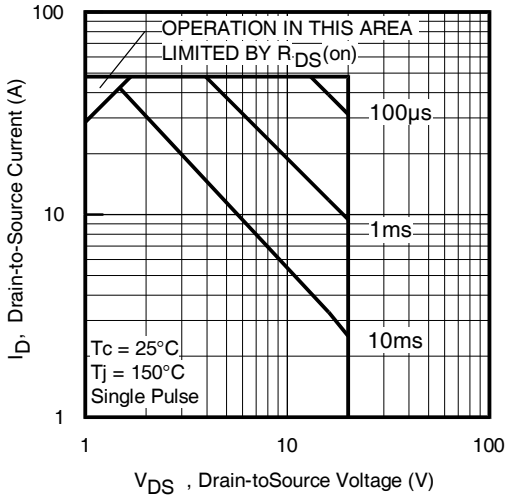


Fig 8. Maximum Safe Operating Area

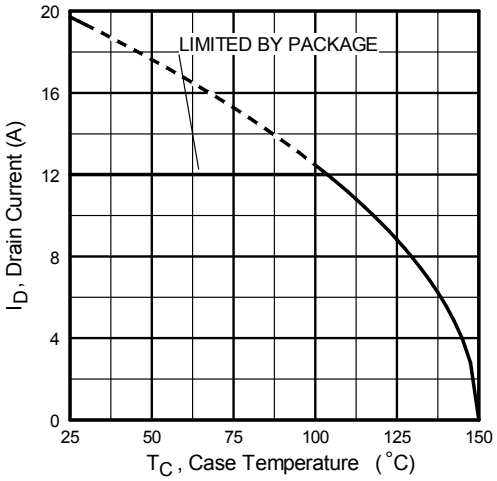


Fig 9. Maximum Drain Current Vs. Case Temperature

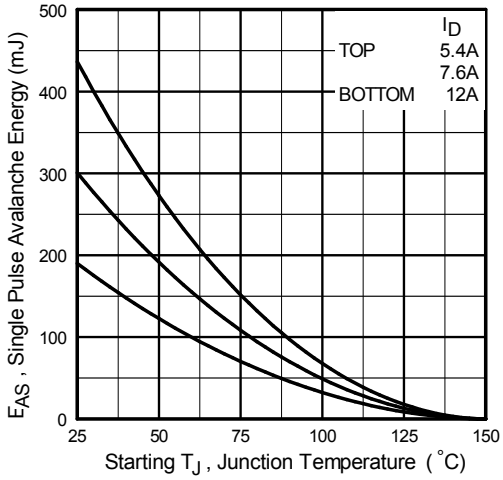


Fig 10. Maximum Avalanche Energy Vs. Drain Current

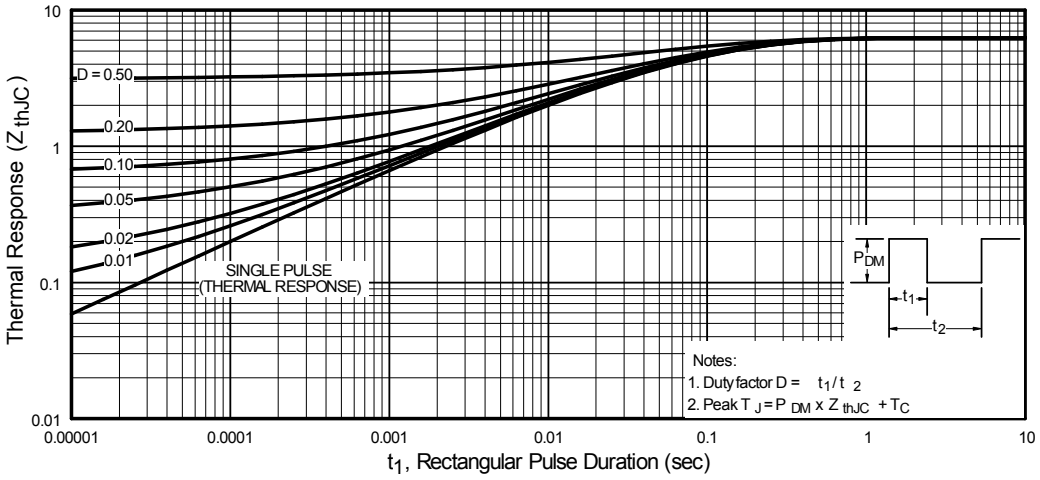


Fig 11. Maximum Effective Transient Thermal Impedance, Junction-to-Case

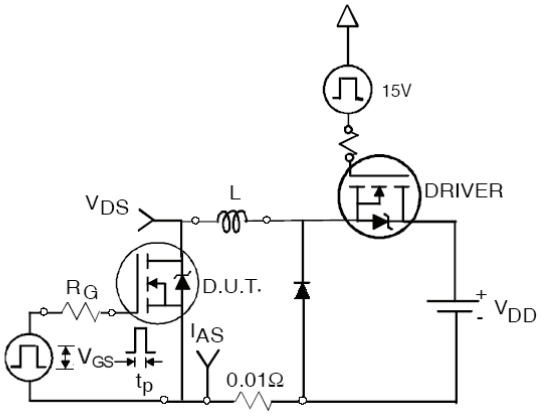


Fig 12a. Unclamped Inductive Test Circuit

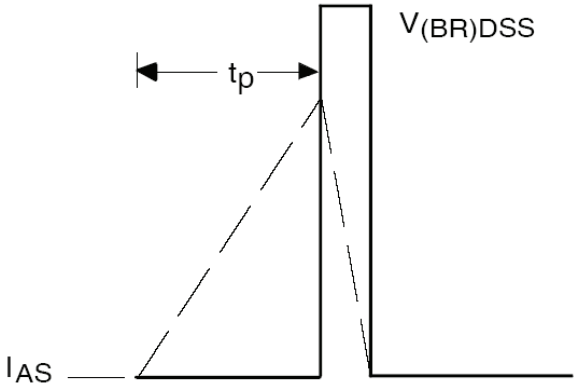


Fig 12b. Unclamped Inductive Waveforms

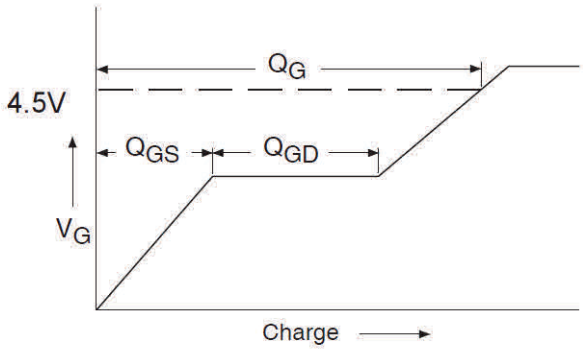


Fig 13a. Gate Charge Waveform

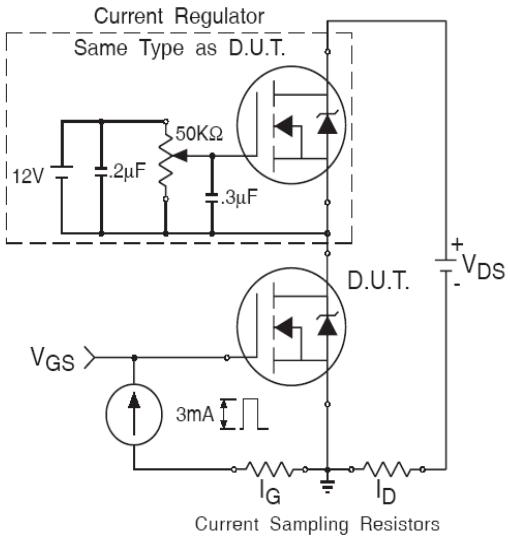


Fig 13b. Gate Charge Test Circuit

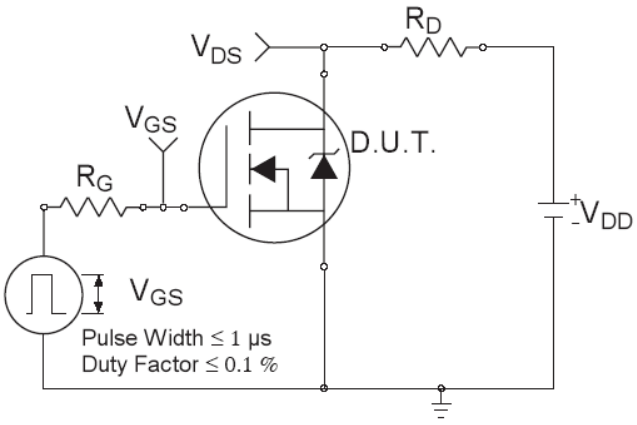


Fig 14a. Switching Time Test Circuit

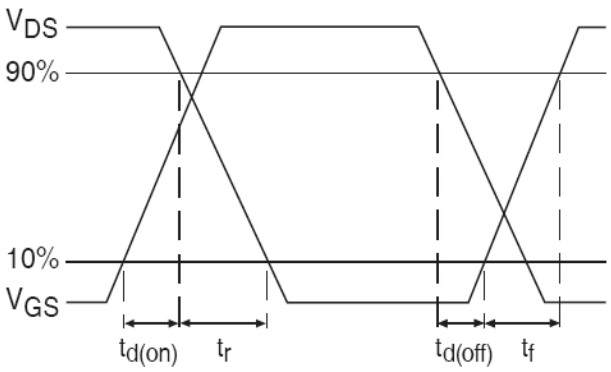
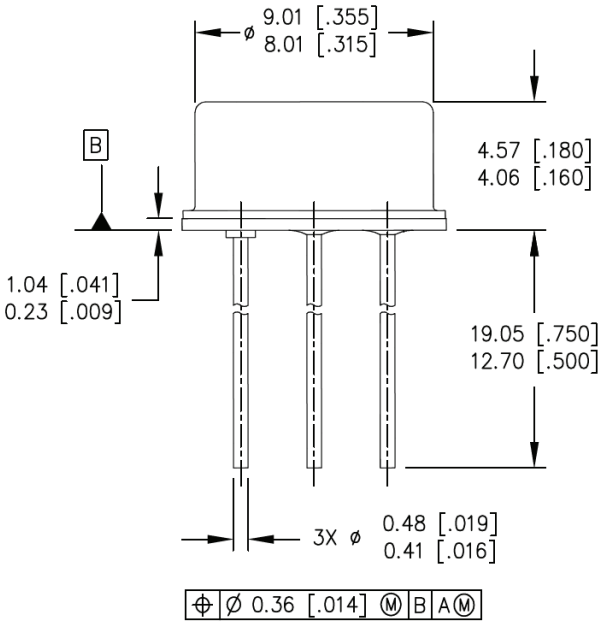
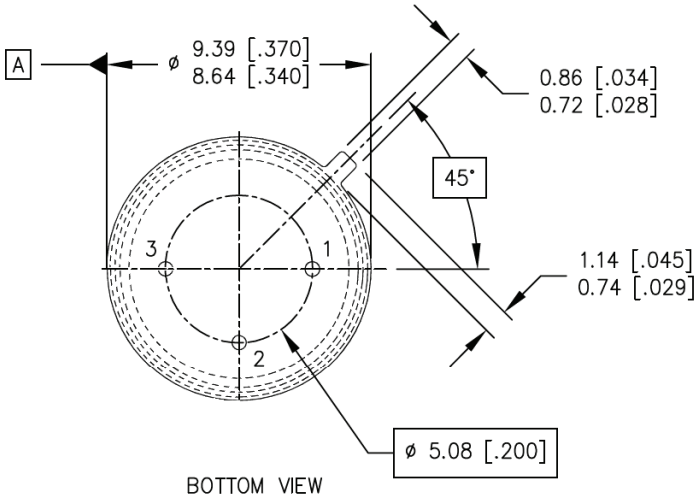


Fig 14b. Switching Time Waveforms

Case Outline and Dimensions - TO-205AF (TO-39)



SIDE VIEW



BOTTOM VIEW

NOTES:

1. DIMENSIONING AND TOLERANCING PER ASME 14.5M–1994.
2. DIMENSIONS ARE SHOWN IN MILLIMETERS [INCHES].
3. CONTROLLING DIMENSION: INCH.
4. CONFORMS TO JEDEC OUTLINE TO–205AF (TO–39).

LEGEND
1- SOURCE
2- GATE
3- DRAIN (CONNECTED TO THE CASE)

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