PD - 94678

International
IOR Rectifier

HEXFET® POWER MOSFET SURFACE MOUNT (LCC-18)

IRF7E3704 20V, N-CHANNEL

Product Summary

Part Number	BV_{DSS}	$R_{DS(on)}$	I_D
IRF7E3704	20V	0.05Ω	12A*

LCC-18

Seventh Generation HEXFET® power MOSFETs from International Rectifier 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 $R_{DS(on)}$
- Avalanche Energy Ratings
- Dynamic dv/dt Rating
- Simple Drive Requirements
- Ease of Paralleling
- Hermetically Sealed
- Light Weight
- Surface Mount

Absolute Maximum Ratings

Pre-Irradiation

	Parameter		Units
I_D @ V_{GS} = 10V, T_C = 25°C	Continuous Drain Current	12*	A
I_D @ V_{GS} = 10V, T_C = 100°C	Continuous Drain Current	10	
I_{DM}	Pulsed Drain Current ①	48	
P_D @ T_C = 25°C	Max. Power Dissipation	20	W
	Linear Derating Factor	0.16	W/°C
V_{GS}	Gate-to-Source Voltage	±20	V
E_{AS}	Single Pulse Avalanche Energy ②	120	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	1.0	V/ns
T_J T_{STG}	Operating Junction Storage Temperature Range	-55 to 150	°C
	Pckg. Mounting Surface Temp.	300 (for 5s)	
	Weight	0.42 (Typical)	g

* Current is limited by package
For footnotes refer to the last page

07/02/03

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

	Parameter	Min	Typ	Max	Units	Test Conditions
BV_{DSS}	Drain-to-Source Breakdown Voltage	20	—	—	V	V_{GS} = 0V, I_D = 250μA
$\Delta BV_{DSS}/\Delta T_J$	Temperature Coefficient of Breakdown Voltage	—	0.023	—	V/°C	Reference to 25°C, I_D = 1.0mA
$R_{DS(on)}$	Static Drain-to-Source On-State Resistance	—	—	0.05	Ω	V_{GS} = 10V, I_D = 10A ④
		—	—	0.055		V_{GS} = 4.5V, I_D = 10A ④
$V_{GS(th)}$	Gate Threshold Voltage	1.0	—	3.0	V	V_{DS} = V_{GS}, I_D = 250μA
g_{fs}	Forward Transconductance	14	—	—	S (℧)	V_{DS} = 10V, I_{DS} = 10A 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} = 20V
I_{GSS}	Gate-to-Source Leakage Reverse	—	—	-100		V_{GS} = -20V
Q_g	Total Gate Charge	—	—	22	nC	V_{GS} = 4.5V, I_D = 12A
Q_{gs}	Gate-to-Source Charge	—	—	10		V_{DS} = 10V
Q_{gd}	Gate-to-Drain ('Miller') Charge	—	—	6.0		
$t_{d(on)}$	Turn-On Delay Time	—	—	16	ns	V_{DD} = 10V, I_D = 12A,
t_r	Rise Time	—	—	100		V_{GS} = 4.5V, R_G = 1.8Ω
$t_{d(off)}$	Turn-Off Delay Time	—	—	26		
t_f	Fall Time	—	—	12		
$L_S + L_D$	Total Inductance	—	6.1	—	nH	Measured from the center of drain pad to center of source pad
C_{iss}	Input Capacitance	—	1850	—	pF	V_{GS} = 0V, V_{DS} = 10V
C_{oss}	Output Capacitance	—	1005	—		f = 1.0MHz
C_{rss}	Reverse Transfer Capacitance	—	63	—		
R_G	Gate Resistance	—	2.6	—	Ω	f = 1.6MHz, open drain

Source-Drain Diode Ratings and Characteristics

	Parameter	Min	Typ	Max	Units	Test Conditions
I_S	Continuous Source Current (Body Diode)	—	—	12*	A	
I_{SM}	Pulse Source Current (Body Diode) ①	—	—	48		
V_{SD}	Diode Forward Voltage	—	—	1.4	V	T_j = 25°C, I_S = 12A, V_{GS} = 0V ④
t_{rr}	Reverse Recovery Time	—	—	50	ns	T_j = 25°C, I_F = 12A, di/dt ≤ 100A/μs
Q_{RR}	Reverse Recovery Charge	—	—	60	nC	V_{DD} ≤ 16V ④
t_{on}	Forward Turn-On Time	Intrinsic turn-on time is negligible. Turn-on speed is substantially controlled by $L_S + L_D$.				

* Current is limited by package

Thermal Resistance

	Parameter	Min	Typ	Max	Units	Test Conditions
R_{thJC}	Junction-to-Case	—	—	6.25	°C/W	

Note: Corresponding Spice and Saber models are available on International Rectifier Web site.
For footnotes refer to the last page

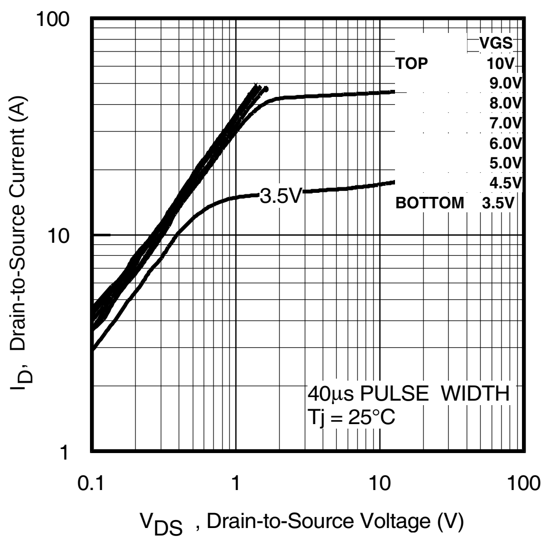


Fig 1. Typical Output Characteristics

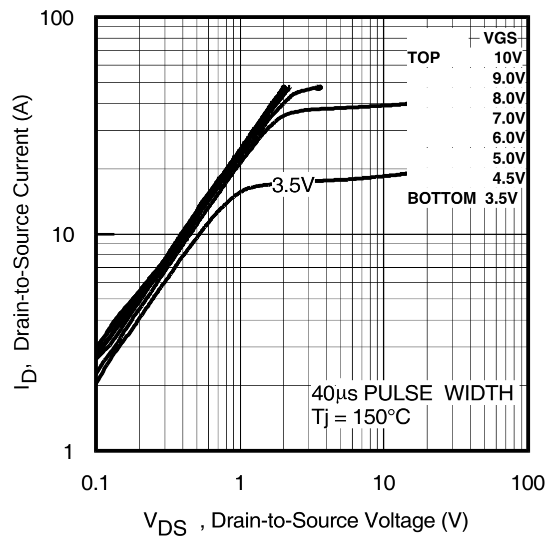


Fig 2. Typical Output Characteristics

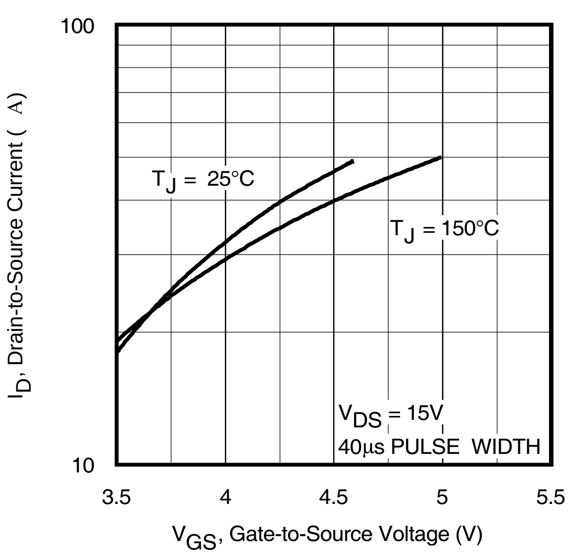


Fig 3. Typical Transfer Characteristics

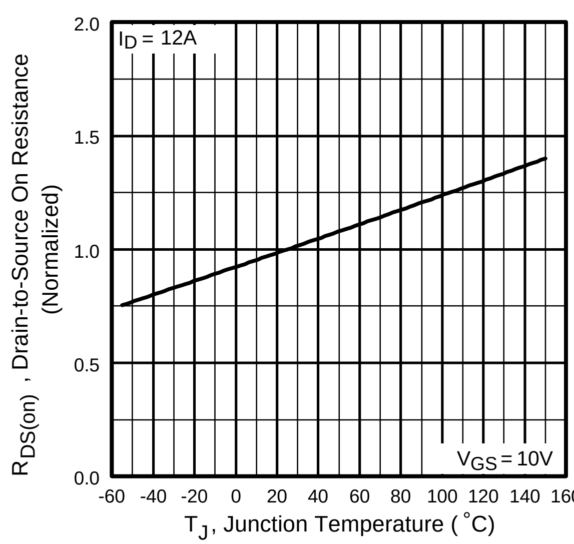


Fig 4. Normalized On-Resistance Vs. Temperature

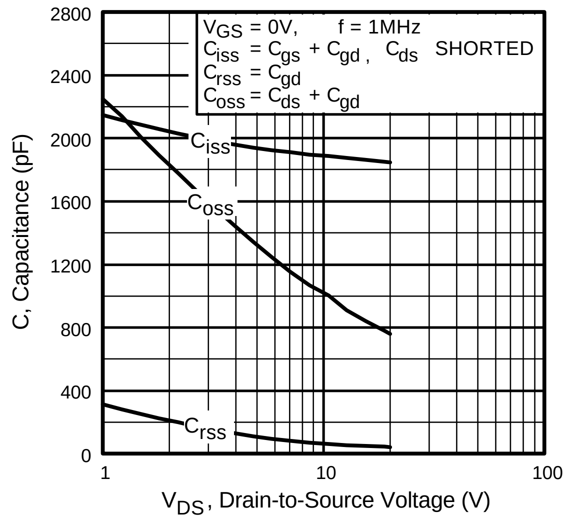


Fig 5. Typical Capacitance Vs. Drain-to-Source Voltage

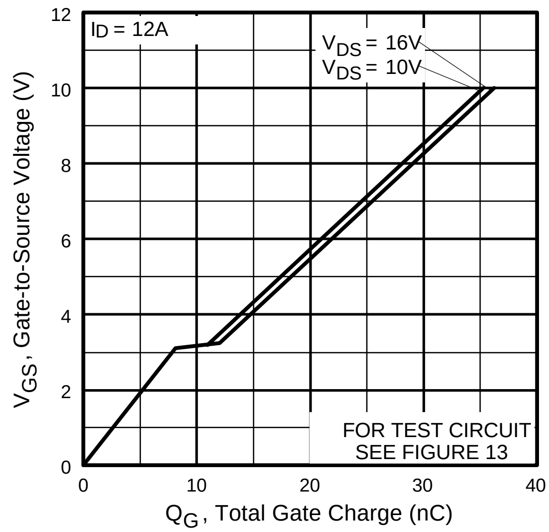


Fig 6. Typical Gate Charge Vs. Gate-to-Source Voltage

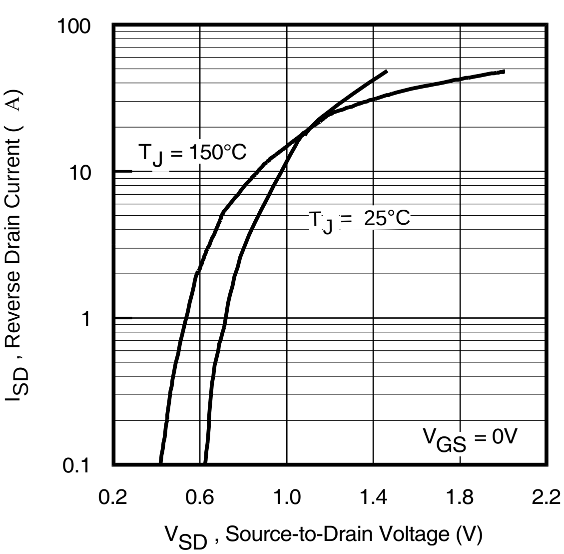


Fig 7. Typical Source-Drain Diode Forward Voltage

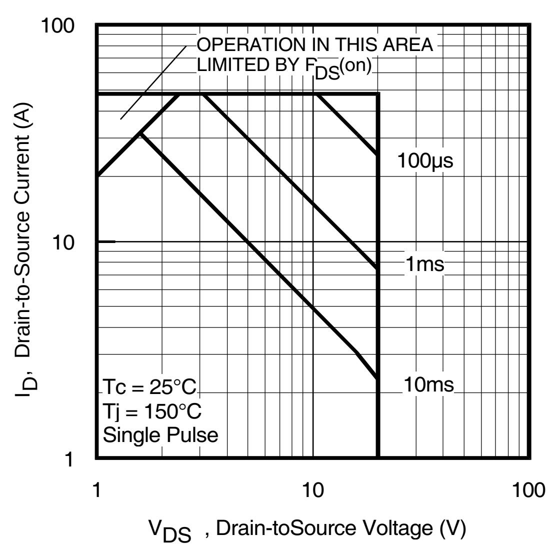


Fig 8. Maximum Safe Operating Area

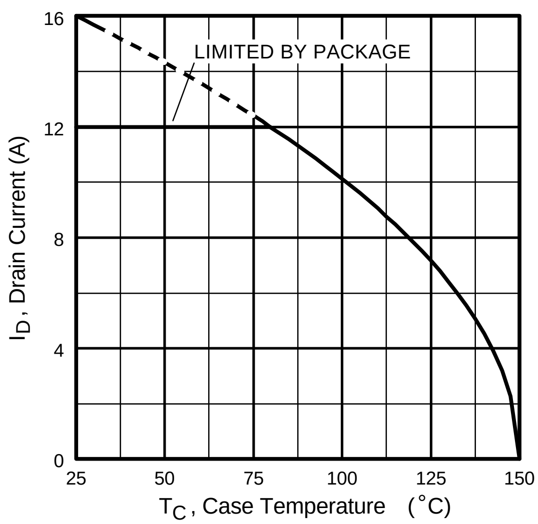


Fig 9. Maximum Drain Current Vs. Case Temperature

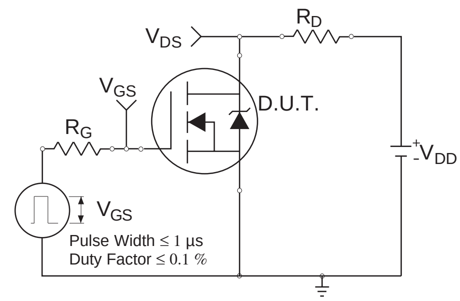


Fig 10a. Switching Time Test Circuit

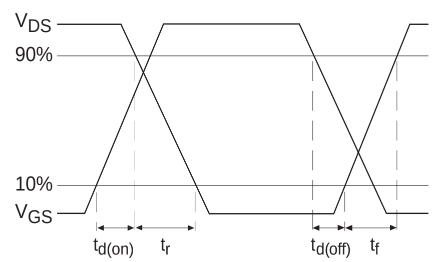


Fig 10b. Switching Time Waveforms

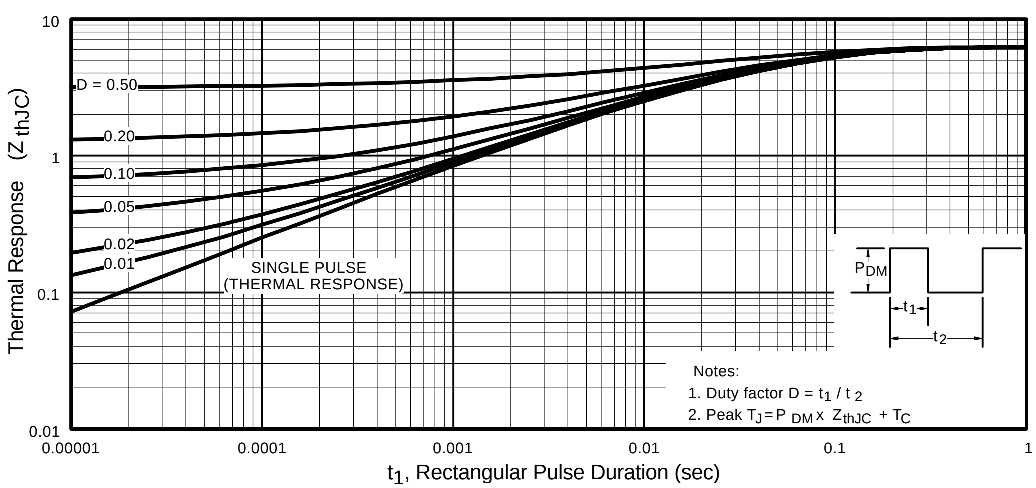


Fig 11. Maximum Effective Transient Thermal Impedance, Junction-to-Case

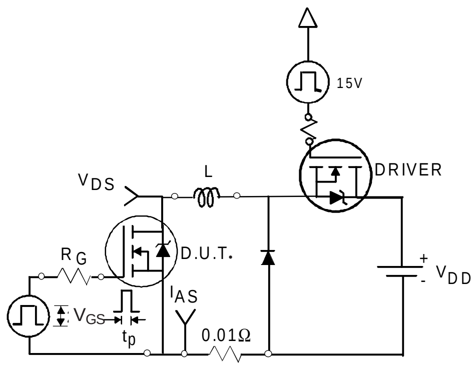


Fig 12a. Unclamped Inductive Test Circuit

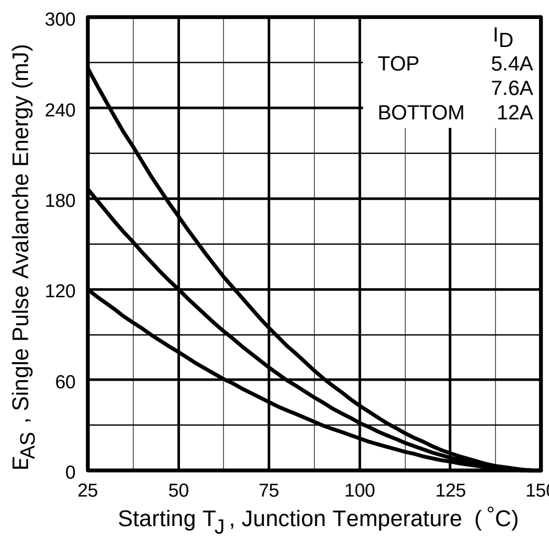


Fig 12c. Maximum Avalanche Energy Vs. Drain Current

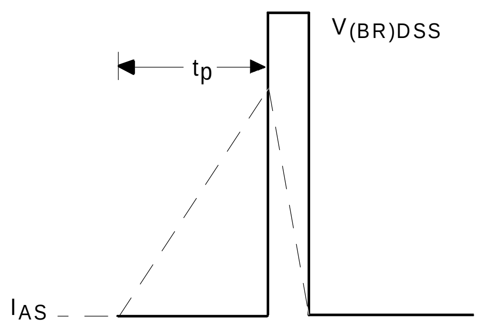


Fig 12b. Unclamped Inductive Waveforms

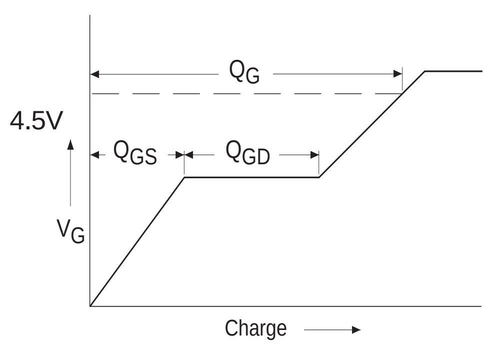


Fig 13a. Basic Gate Charge Waveform

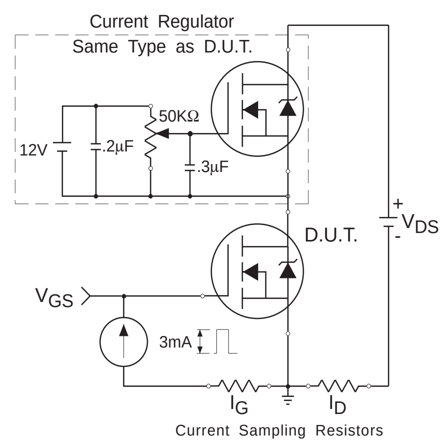


Fig 13b. Gate Charge Test Circuit

Footnotes:

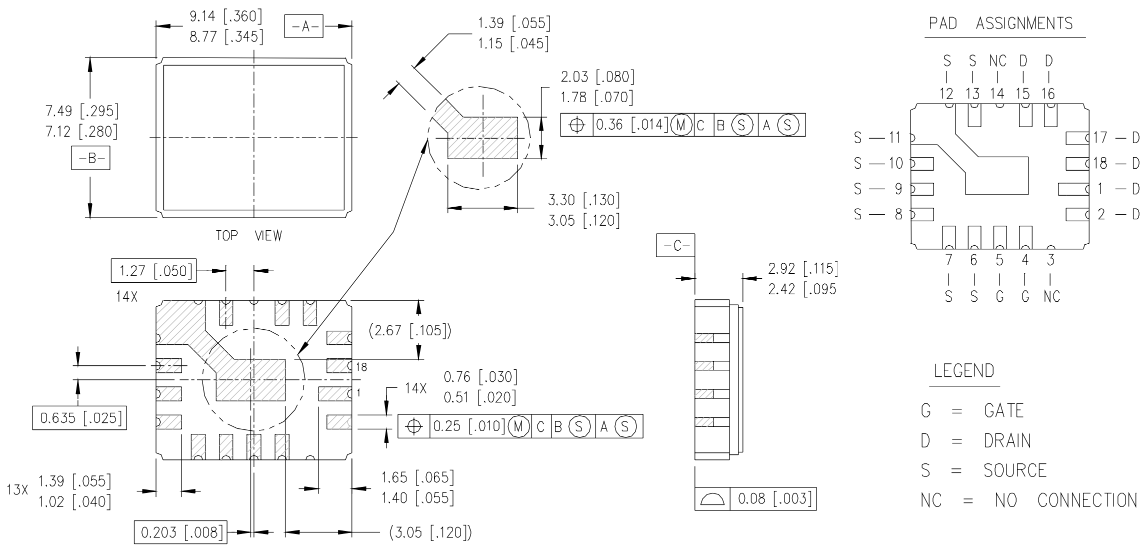
① Repetitive Rating; Pulse width limited by maximum junction temperature.

② V_{DD} = 15V, starting T_J = 25°C, L = 1.7mH Peak I_{AS} = 12A, V_{GS} =10V, R_G = 25Ω

③ $I_{SD} \leq$ 12A, di/dt ≤ 100A/µs, $V_{DD} \leq$ 20V, $T_J \leq$ 150°C

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

Case Outline and Dimensions — LCC-18



NOTES:
1. DIMENSIONING & TOLERANCING PER ANSI Y14.5M-1982.
2. CONTROLLING DIMENSION: INCH.
3. DIMENSIONS ARE SHOWN IN MILLIMETERS [INCHES].

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