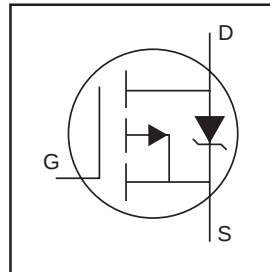




IRLML6402

Power MOSFET

- Ultra Low On-Resistance
- P-Channel MOSFET
- SOT-23 Footprint
- Low Profile (<1.1mm)
- Available in Tape and Reel
- Fast Switching



$V_{DS} = -20V$
$R_{DS(on)} = 0.065\Omega$

Description

These P-Channel MOSFETs from International Rectifier utilize advanced processing techniques to achieve extremely low on-resistance per silicon area. This benefit, combined with the fast switching speed and ruggedized device design that power MOSFETs are well known for, provides the designer with an extremely efficient and reliable device for use in battery and load management.

A thermally enhanced large pad leadframe has been incorporated into the standard SOT-23 package to produce a Power MOSFET with the industry's smallest footprint. This package, , is ideal for applications where printed circuit board space is at a premium. The low profile (<1.1mm) of the allows it to fit easily into extremely thin application environments such as portable electronics and PCMCIA cards. The thermal resistance and power dissipation are the best available.

Absolute Maximum Ratings

	Parameter	Max.	Units
V_{DS}	Drain- Source Voltage	-20	V
$I_D @ T_A = 25^\circ C$	Continuous Drain Current, $V_{GS} @ -4.5V$	-3.7	A
$I_D @ T_A = 70^\circ C$	Continuous Drain Current, $V_{GS} @ -4.5V$	-2.2	
I_{DM}	Pulsed Drain Current ①	-22	
$P_D @ T_A = 25^\circ C$	Power Dissipation	1.3	W
$P_D @ T_A = 70^\circ C$	Power Dissipation	0.8	
	Linear Derating Factor	0.01	W/°C
E_{AS}	Single Pulse Avalanche Energy④	11	mJ
V_{GS}	Gate-to-Source Voltage	± 12	V
T_J, T_{STG}	Junction and Storage Temperature Range	-55 to + 150	°C

Thermal Resistance

	Parameter	Typ.	Max.	Units
$R_{\theta JA}$	Maximum Junction-to-Ambient③	75	100	°C/W

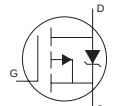


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Electrical Characteristics @ $T_J = 25^\circ\text{C}$ (unless otherwise specified)

	Parameter	Min.	Typ.	Max.	Units	Conditions
$V_{(BR)DSS}$	Drain-to-Source Breakdown Voltage	-20	—	—	V	$V_{GS} = 0V, I_D = -250\mu A$
$\Delta V_{(BR)DSS}/\Delta T_J$	Breakdown Voltage Temp. Coefficient	—	-0.009	—	V/ $^\circ\text{C}$	Reference to 25°C , $I_D = -1mA$ ②
$R_{DS(on)}$	Static Drain-to-Source On-Resistance	—	0.050	0.065	Ω	$V_{GS} = -4.5V, I_D = -3.7A$ ②
		—	0.080	0.135		$V_{GS} = -2.5V, I_D = -3.1A$ ②
$V_{GS(th)}$	Gate Threshold Voltage	-0.40	-0.55	-1.2	V	$V_{DS} = V_{GS}, I_D = -250\mu A$
g_{fs}	Forward Transconductance	6.0	—	—	S	$V_{DS} = -10V, I_D = -3.7A$ ②
I_{DSS}	Drain-to-Source Leakage Current	—	—	-1.0	μA	$V_{DS} = -20V, V_{GS} = 0V$
		—	—	-25		$V_{DS} = -20V, V_{GS} = 0V, T_J = 70^\circ\text{C}$
I_{GSS}	Gate-to-Source Forward Leakage	—	—	-100	nA	$V_{GS} = -12V$
	Gate-to-Source Reverse Leakage	—	—	100		$V_{GS} = 12V$
Q_g	Total Gate Charge	—	8.0	12	nC	$I_D = -3.7A$
Q_{gs}	Gate-to-Source Charge	—	1.2	1.8		$V_{DS} = -10V$
Q_{gd}	Gate-to-Drain ("Miller") Charge	—	2.8	4.2		$V_{GS} = -5.0V$ ②
$t_{d(on)}$	Turn-On Delay Time	—	350	—	ns	$V_{DD} = -10V$
t_r	Rise Time	—	48	—		$I_D = -3.7A$
$t_{d(off)}$	Turn-Off Delay Time	—	588	—		$R_G = 89\Omega$
t_f	Fall Time	—	381	—		$R_D = 2.7\Omega$
C_{iss}	Input Capacitance	—	633	—	pF	$V_{GS} = 0V$
C_{oss}	Output Capacitance	—	145	—		$V_{DS} = -10V$
C_{rss}	Reverse Transfer Capacitance	—	110	—		$f = 1.0MHz$

Source-Drain Ratings and Characteristics

	Parameter	Min.	Typ.	Max.	Units	Conditions
I_S	Continuous Source Current (Body Diode)	—	—	-1.3	A	MOSFET symbol showing the integral reverse p-n junction diode. 
I_{SM}	Pulsed Source Current (Body Diode) ①	—	—	-22		
V_{SD}	Diode Forward Voltage	—	—	-1.2	V	$T_J = 25^\circ\text{C}, I_S = -1.0A, V_{GS} = 0V$ ②
t_{rr}	Reverse Recovery Time	—	29	43	ns	$T_J = 25^\circ\text{C}, I_F = -1.0A$
Q_{rr}	Reverse Recovery Charge	—	11	17	nC	$di/dt = -100A/\mu s$ ②

Notes:

- ① Repetitive rating; pulse width limited by max. junction temperature.
- ② Pulse width $\leq 400\mu s$; duty cycle $\leq 2\%$.
- ③ Surface mounted on 1" square single layer 1oz. copper FR4 board, steady state.
- ④ Starting $T_J = 25^\circ\text{C}$, $L = 1.65mH$
 $R_G = 25\Omega$, $I_{AS} = -3.7A$.



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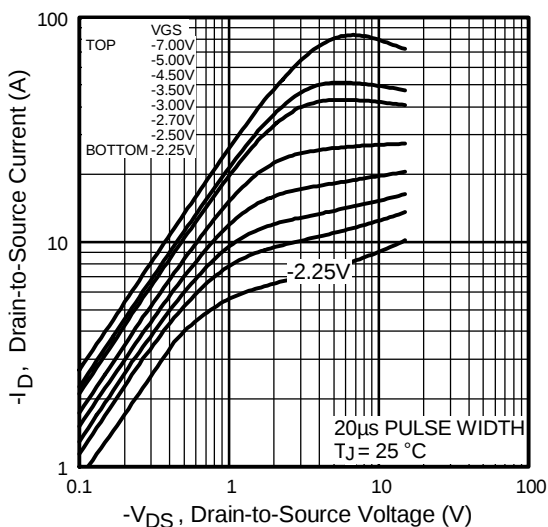


Fig 1. Typical Output Characteristics

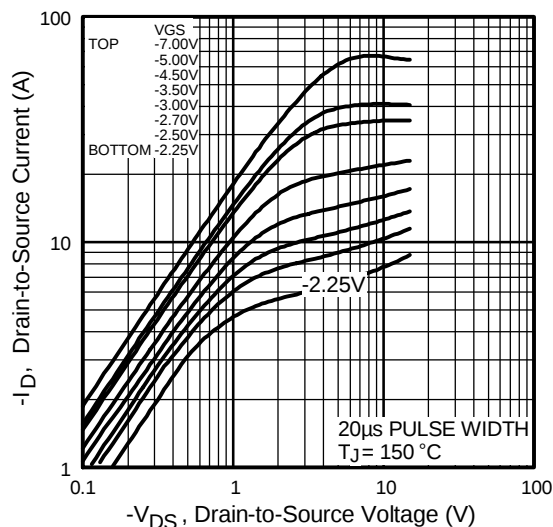


Fig 2. Typical Output Characteristics

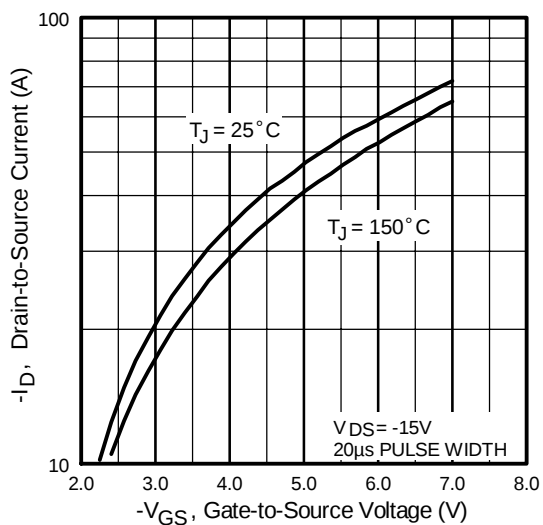


Fig 3. Typical Transfer Characteristics

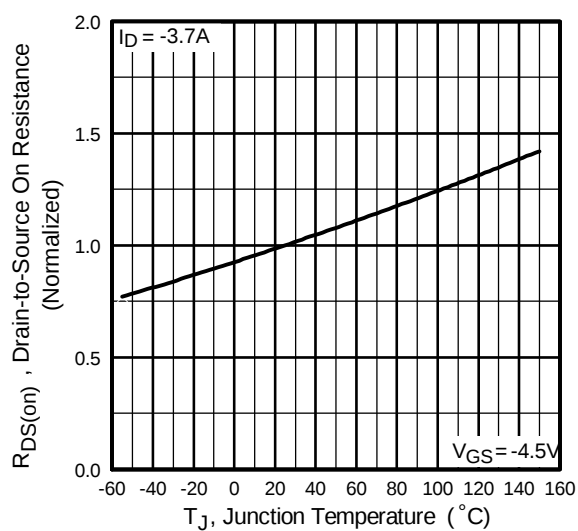


Fig 4. Normalized On-Resistance Vs. Temperature



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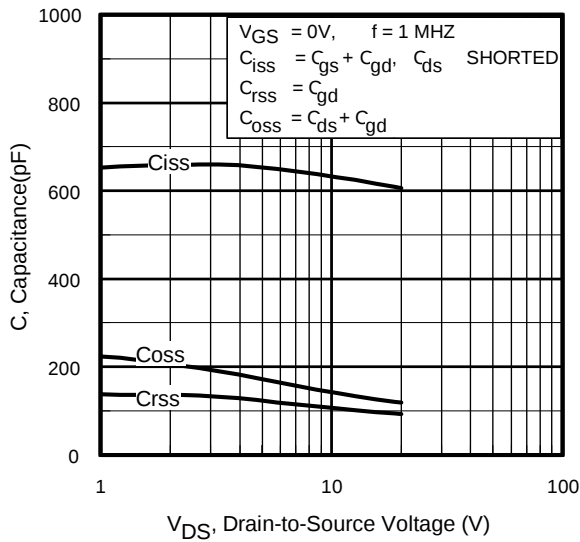


Fig 5. Typical Capacitance Vs. Drain-to-Source Voltage

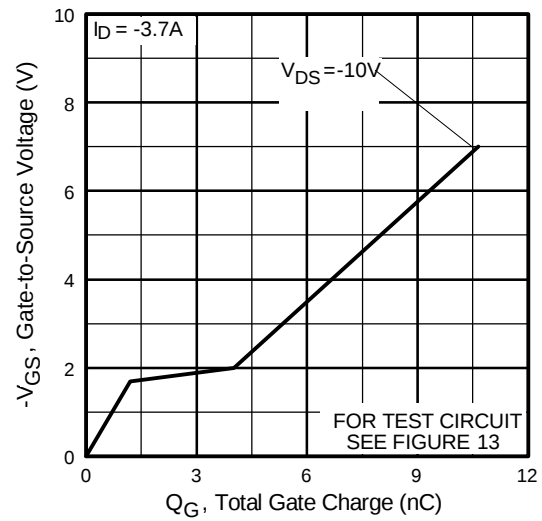


Fig 6. Typical Gate Charge Vs. Gate-to-Source Voltage

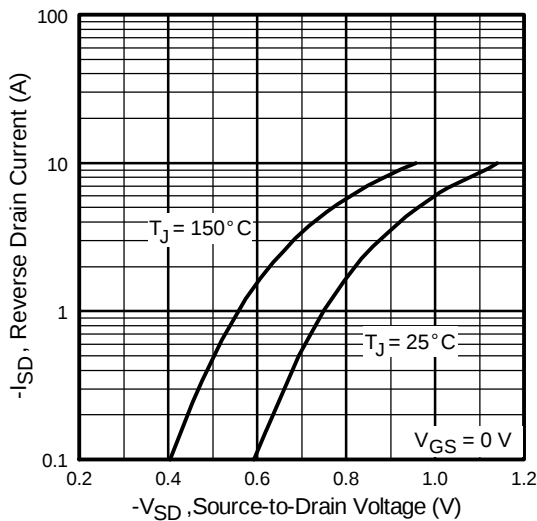


Fig 7. Typical Source-Drain Diode Forward Voltage

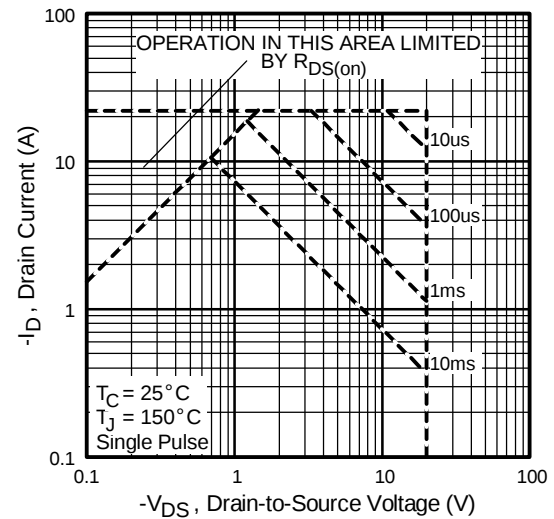


Fig 8. Maximum Safe Operating Area

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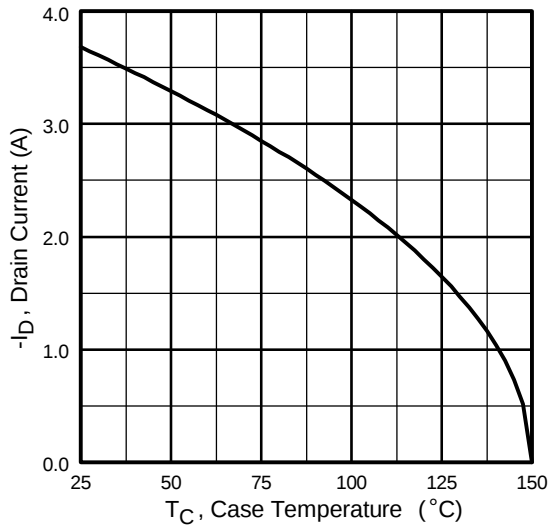


Fig 9. Maximum Drain Current Vs. Case Temperature

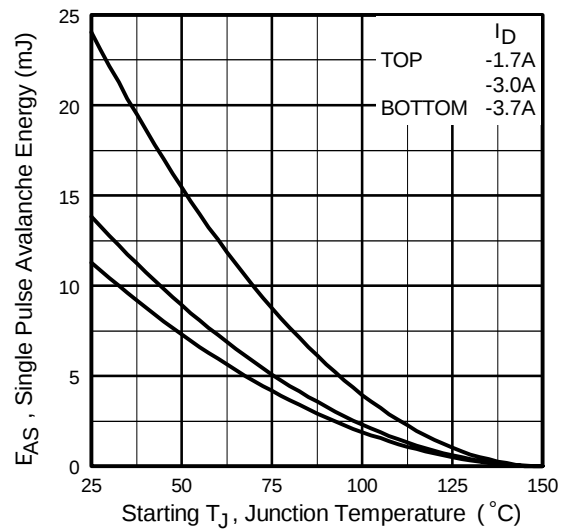


Fig 10. Maximum Avalanche Energy Vs. Drain Current

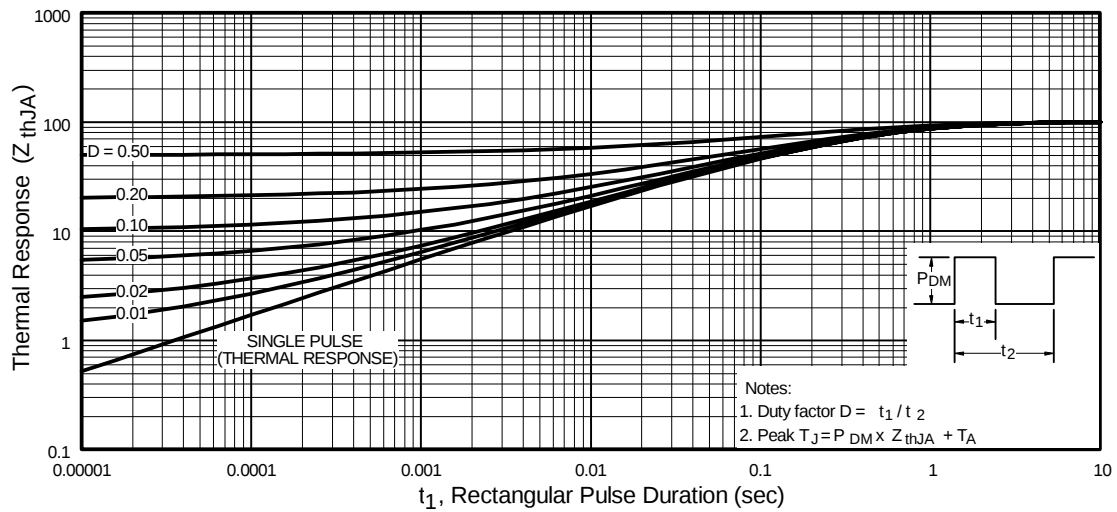


Fig 11. Maximum Effective Transient Thermal Impedance, Junction-to-Ambient

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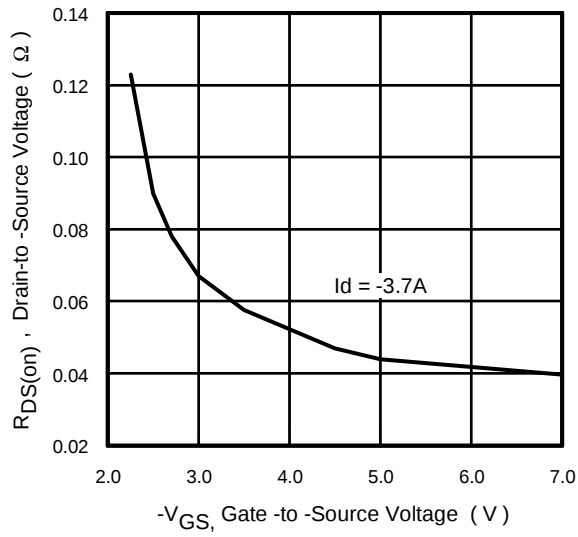


Fig 12. Typical On-Resistance Vs. Gate Voltage

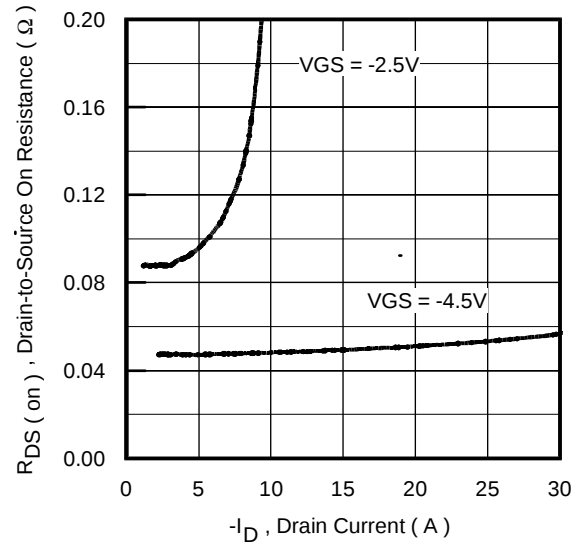


Fig 13. Typical On-Resistance Vs. Drain Current