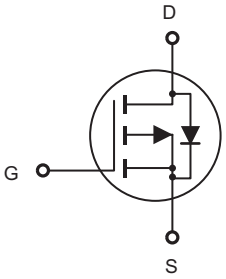
IRLML6401

P-Channel MOSFET

Features

- Ultra Low On-Resistance
- P-Channel MOSFET
- SOT-23 Footprint
- Low Profile (<1.1mm)
- Available in Tape and Reel
- Fast Switching
- 1.8V Gate Rated



1.Gate
2.Source
3.Drain

SOT-23

Absolute Maximum Ratings

	Parameter	Max.	Units
V_{DS}	Drain- Source Voltage	-12	V
I_D @ T_A = 25°C	Continuous Drain Current, V_{GS} @ -4.5V	-4.3	A
I_D @ T_A= 70°C	Continuous Drain Current, V_{GS} @ -4.5V	-3.4	
I_{DM}	Pulsed Drain Current ①	-34	
P_D @T_A = 25°C	Power Dissipation	1.3	W
P_D @T_A = 70°C	Power Dissipation	0.8	
	Linear Derating Factor	0.01	W/°C
E_{AS}	Single Pulse Avalanche Energy④	33	mJ
V_{GS}	Gate-to-Source Voltage	± 8.0	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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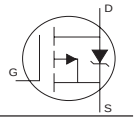
Electrical Characteristics @ T_J = 25°C (unless otherwise specified)

	Parameter	Min.	Typ.	Max.	Units	Conditions
$V_{(BR)DSS}$	Drain-to-Source Breakdown Voltage	-12	——	——	V	V_{GS} = 0V, I_D = -250μA
$\Delta V_{(BR)DSS}/\Delta T_J$	Breakdown Voltage Temp. Coefficient	——	-0.007	——	V/°C	Reference to 25°C, I_D = -1mA
$R_{DS(on)}$	Static Drain-to-Source On-Resistance	——	——	0.050	Ω	V_{GS} = -4.5V, I_D = -4.3A ②
		——	——	0.085		V_{GS} = -2.5V, I_D = -2.5A ②
		——	——	0.125		V_{GS} = -1.8V, I_D = -2.0A ②
$V_{GS(th)}$	Gate Threshold Voltage	-0.40	-0.55	-0.95	V	V_{DS} = V_{GS}, I_D = -250μA
g_{fs}	Forward Transconductance	8.6	——	——	S	V_{DS} = -10V, I_D = -4.3A
I_{DSS}	Drain-to-Source Leakage Current	——	——	-1.0	μA	V_{DS} = -12V, V_{GS} = 0V
		——	——	-25		V_{DS} = -9.6V, V_{GS} = 0V, T_J = 55°C
I_{GSS}	Gate-to-Source Forward Leakage	——	——	-100	nA	V_{GS} = -8.0V
	Gate-to-Source Reverse Leakage	——	——	100		V_{GS} = 8.0V
Q_g	Total Gate Charge	——	10	15	nC	I_D = -4.3A
Q_{gs}	Gate-to-Source Charge	——	1.4	2.1		V_{DS} = -10V
Q_{gd}	Gate-to-Drain ("Miller") Charge	——	2.6	3.9		V_{GS} = -5.0V②
$t_{d(on)}$	Turn-On Delay Time	——	11	——	ns	V_{DD} = -6.0V
t_r	Rise Time	——	32	——		I_D = -1.0A
$t_{d(off)}$	Turn-Off Delay Time	——	250	——		R_D = 6.0Ω
t_f	Fall Time	——	210	——		R_G = 89Ω ②
C_{iss}	Input Capacitance	——	830	——	pF	V_{GS} = 0V
C_{oss}	Output Capacitance	——	180	——		V_{DS} = -10V
C_{rss}	Reverse Transfer Capacitance	——	125	——		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	——	——	-34		
V_{SD}	Diode Forward Voltage	——	——	-1.2	V	T_J = 25°C, I_S = -1.3A, V_{GS} = 0V ②
t_{rr}	Reverse Recovery Time	——	22	33	ns	T_J = 25°C, I_F = -1.3A
Q_{rr}	Reverse RecoveryCharge	——	8.0	12	nC	di/dt = -100A/μs ②

Notes:

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

② Pulse width ≤ 300μs; duty cycle ≤ 2%.

③ Surface mounted on 1" square single layer 1oz. copper FR4 board, steady state.

④ Starting T_J = 25°C, L = 3.5mH R_G = 25Ω, I_{AS} = -4.3A.

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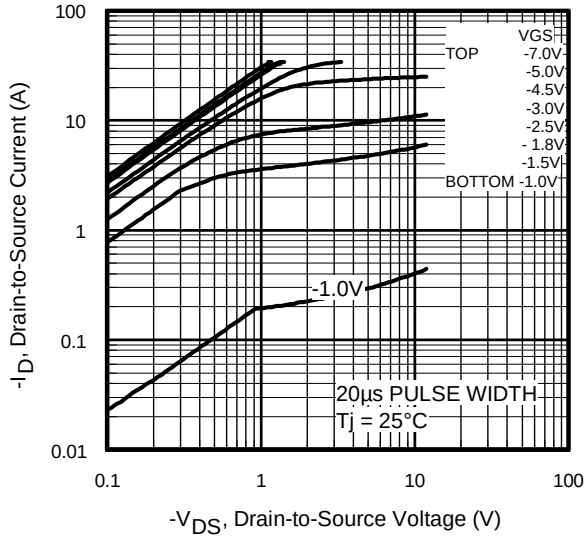

Fig 1. Typical Output Characteristics

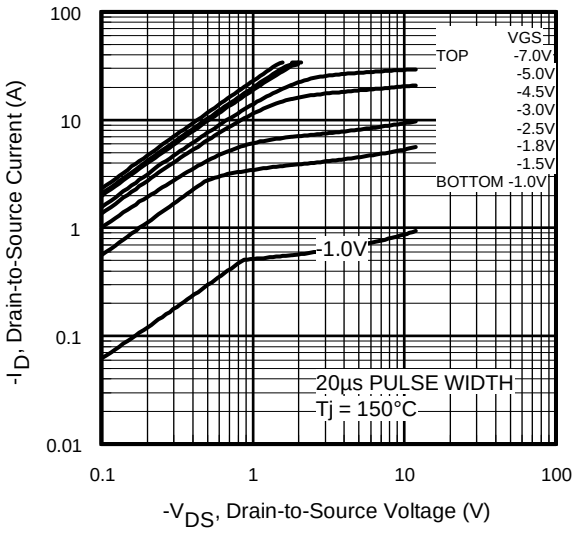

Fig 2. Typical Output Characteristics

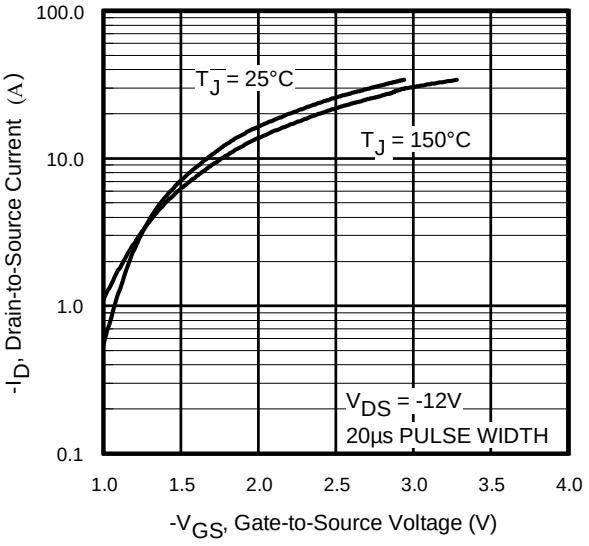

Fig 3. Typical Transfer Characteristics

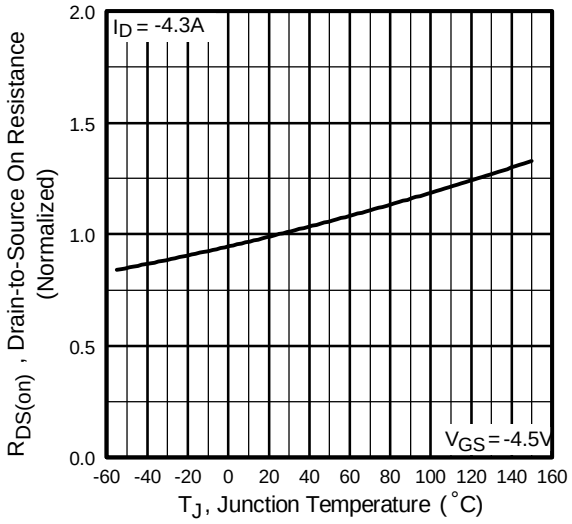

Fig 4. Normalized On-Resistance Vs. Temperature

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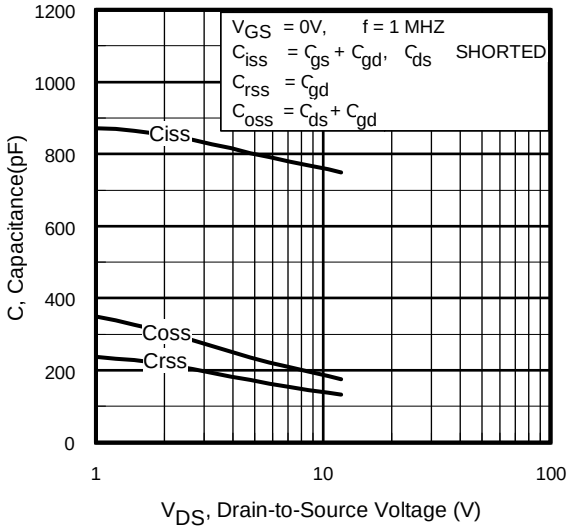

Fig 5. Typical Capacitance Vs. Drain-to-Source Voltage

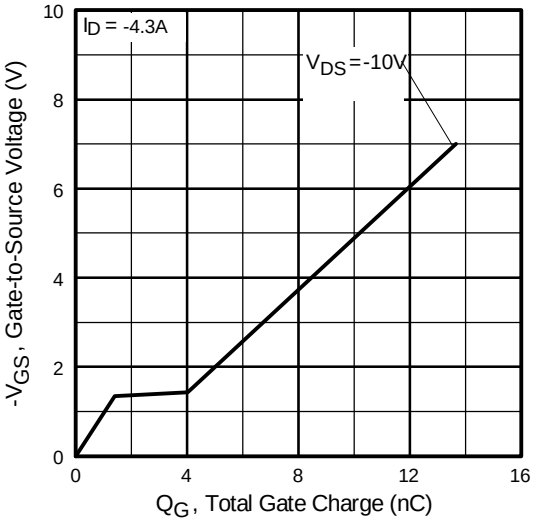

Fig 6. Typical Gate Charge Vs. Gate-to-Source Voltage

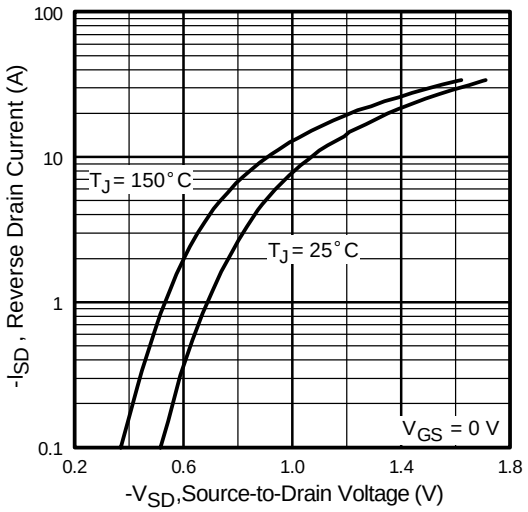

Fig 7. Typical Source-Drain Diode Forward Voltage

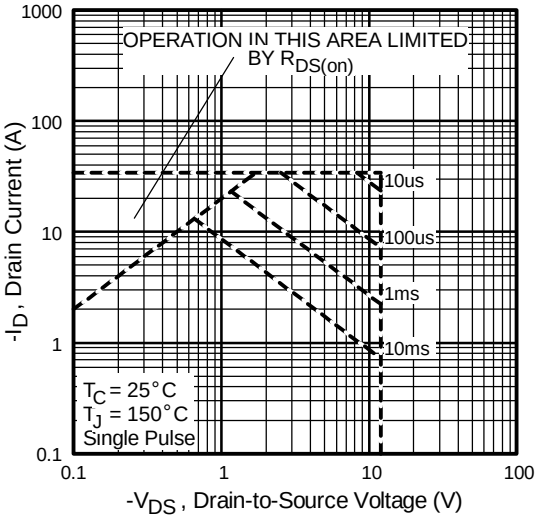

Fig 8. Maximum Safe Operating Area

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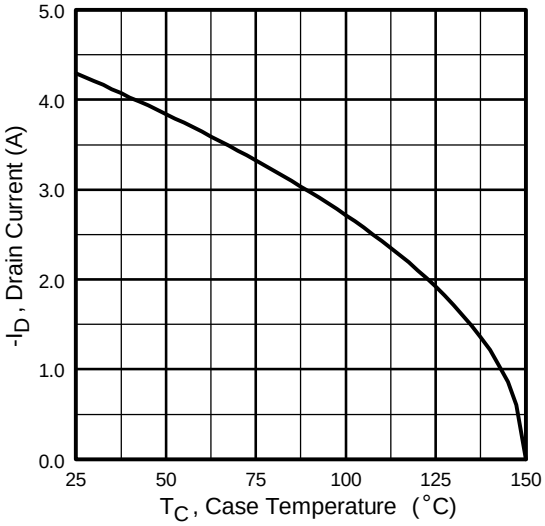

Fig 9. Maximum Drain Current Vs. Case Temperature

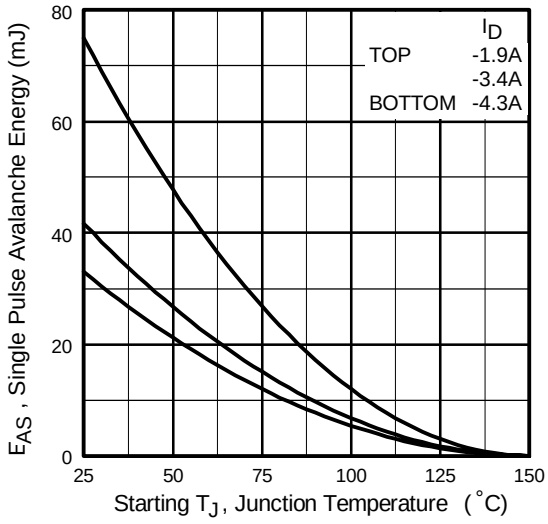

Fig 10. Maximum Avalanche Energy Vs. Drain Current

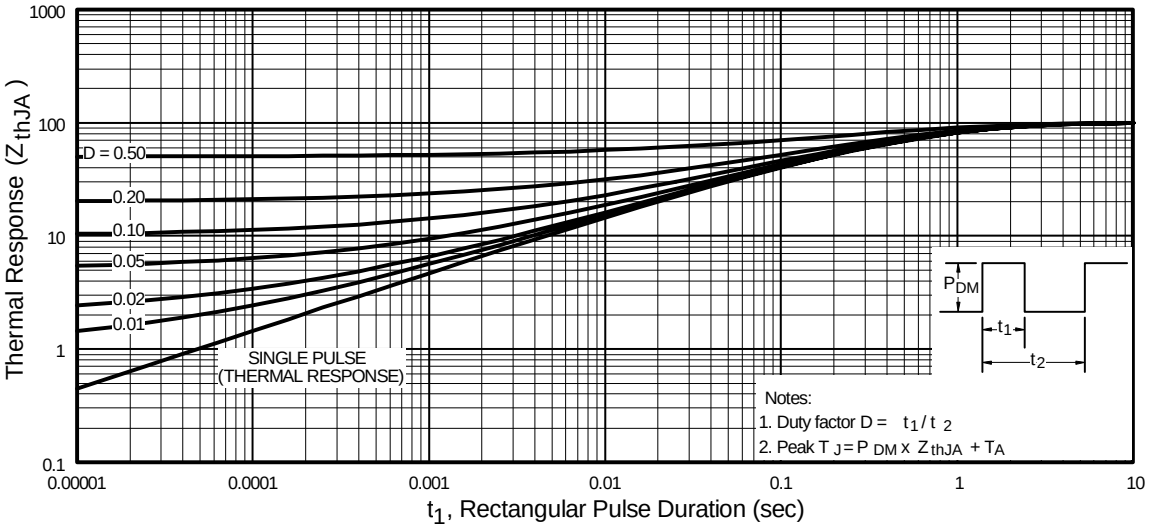

Fig 11. Maximum Effective Transient Thermal Impedance, Junction-to-Ambient