**TY Semicondutor®** TY

# IRLML6402PbF

HEXFET**®** Power MOSFET

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

G 1

S 2

3 D

V_{DSS} = -20V

$R_{DS(on)}$ = 0.065Ω
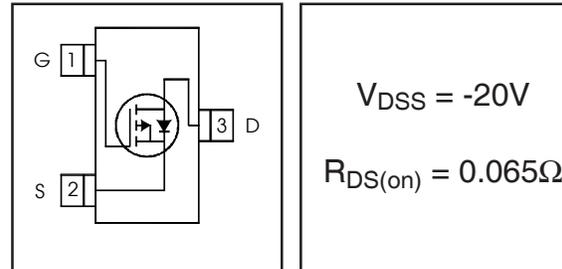
Description

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 HEXFET® 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 HEXFET Power MOSFET with the industry's smallest footprint. This package, dubbed the Micro3™, is ideal for applications where printed circuit board space is at a premium. The low profile (<1.1mm) of the Micro3 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.

Micro3™
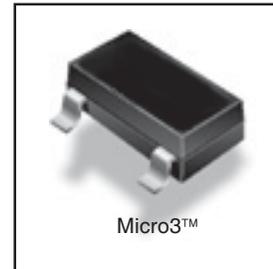
Absolute Maximum Ratings

	Parameter	Max.	Units
V_{DS}	Drain- Source Voltage	-20	V
I_D @ T_A = 25°C	Continuous Drain Current, V_{GS} @ -4.5V	-3.7	
I_D @ T_A= 70°C	Continuous Drain Current, V_{GS} @ -4.5V	-2.2	A
I_{DM}	Pulsed Drain Current ①	-22	
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	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
$R_{θJA}$	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	-20	——	——	V	V_{GS} = 0V, I_D = -250µA
$\Delta V_{(BR)DSS}/\Delta T_J$	Breakdown Voltage Temp. Coefficient	——	-0.009	——	V/°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 = -250µA
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°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		I_D = -3.7A
Q_{gs}	Gate-to-Source Charge	——	1.2	1.8	nC	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	——		V_{DD} = -10V
t_r	Rise Time	——	48	——	ns	I_D = -3.7A
$t_{d(off)}$	Turn-Off Delay Time	——	588	——		R_G = 89Ω
t_f	Fall Time	——	381	——		R_D = 2.7Ω
C_{iss}	Input Capacitance	——	633	——		V_{GS} = 0V
C_{oss}	Output Capacitance	——	145	——	pF	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°C, I_S = -1.0A, V_{GS} = 0V ②
t_{rr}	Reverse Recovery Time	——	29	43	ns	T_J = 25°C, I_F = -1.0A
Q_{rr}	Reverse RecoveryCharge	——	11	17	nC	di/dt = -100A/µs ②
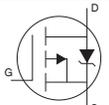
Notes:

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

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

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

④ Starting T_J = 25°C, L = 1.65mH R_G = 25Ω, I_{AS} = -3.7A.