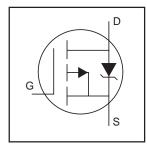
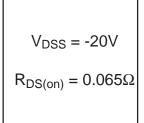
PD-93755C

IRLML6402

HEXFET® Power MOSFET

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





Description

These P-Channel MOSFETs from International Rectifier utilize advanced processing techniques to achieve extremely low onresistance 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.



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
$P_D @ T_A = 70^{\circ}C$	Power Dissipation	0.8	VV
	Linear Derating Factor	0.01	W/°C
E _{AS}	Single Pulse Avalanche Energy⊕	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	Тур.	Max.	Units
$R_{\theta JA}$	Maximum Junction-to-Ambient®	75	100	°C/W

IRLML6402

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	$V_{GS} = 0V, I_D = -250\mu A$
$\Delta V_{(BR)DSS}/\Delta T_J$	Breakdown Voltage Temp. Coefficient		-0.009		V/°C	Reference to 25°C, I _D = -1mA @
R _{DS(on)}	Static Drain-to-Source On-Resistance		0.050	0.065	Ω	V _{GS} = -4.5V, I _D = -3.7A ②
(OS)	Statio Brain to Godree On Registerios		0.080	0.135	52	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
1	Drain-to-Source Leakage Current			-1.0		$V_{DS} = -20V, V_{GS} = 0V$
I _{DSS}	Dialii-to-Source Leakage Current			-25	μA	$V_{DS} = -20V, V_{GS} = 0V, T_{J} = 70^{\circ}C$
lasa	Gate-to-Source Forward Leakage			-100	nA	V _{GS} = -12V
I _{GSS}	Gate-to-Source Reverse Leakage			100	IIA	V _{GS} = 12V
Qg	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		115	$R_G = 89\Omega$
t _f	Fall Time	_	381			$R_D = 2.7\Omega$
C _{iss}	Input Capacitance		633			V _{GS} = 0V
Coss	Output Capacitance		145		pF	$V_{DS} = -10V$
C _{rss}	Reverse Transfer Capacitance		110			f = 1.0MHz

Source-Drain Ratings and Characteristics

	Parameter	Min.	Тур.	Max.	Units	Conditions
Is	Continuous Source Current			-1.3		MOSFET symbol
	(Body Diode)			-1.3	Α	showing the
I _{SM}	Pulsed Source Current			00		integral reverse
	(Body Diode) ①)	-22	-22	p-n junction diode.	
V _{SD}	Diode Forward Voltage			-1.2	V	$T_J = 25$ °C, $I_S = -1.0$ A, $V_{GS} = 0$ V ②
t _{rr}	Reverse Recovery Time		29	43	ns	$T_J = 25^{\circ}C, I_F = -1.0A$
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 \leq 400 μ s; duty cycle \leq 2%.
- ③ Surface mounted on 1" square single layer 1oz. copper FR4 board, steady state.

^{**} For recommended footprint and soldering techniques refer to application note #AN-994.

IRLML6402

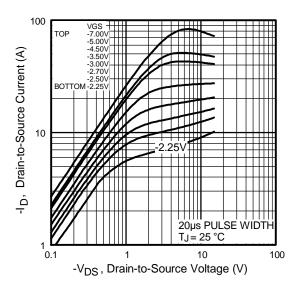


Fig 1. Typical Output Characteristics

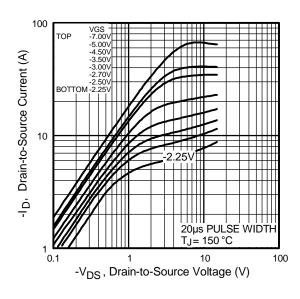


Fig 2. Typical Output Characteristics

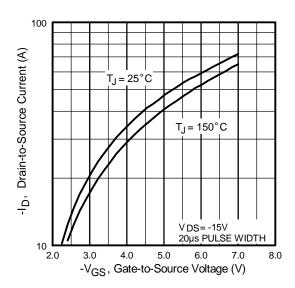


Fig 3. Typical Transfer Characteristics

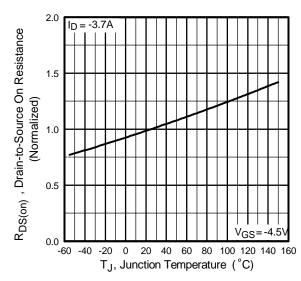


Fig 4. Normalized On-Resistance Vs. Temperature

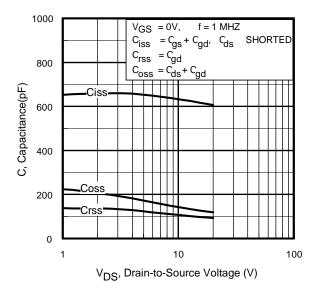


Fig 5. Typical Capacitance Vs. Drain-to-Source Voltage

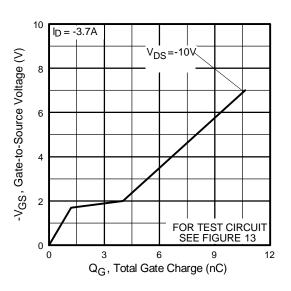


Fig 6. Typical Gate Charge Vs. Gate-to-Source Voltage

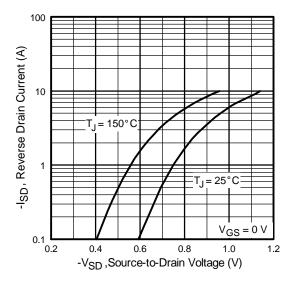


Fig 7. Typical Source-Drain Diode Forward Voltage

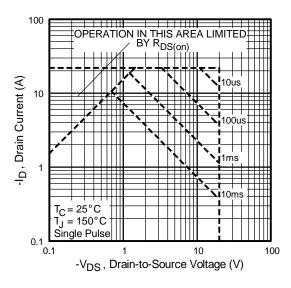
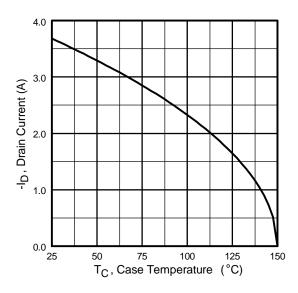


Fig 8. Maximum Safe Operating Area

IRLML6402



25 TOP -1.7A -3.0A BOTTOM -3.7A BOTTOM -3.7A -3.0A -3.0A

Fig 9. Maximum Drain Current Vs. Case Temperature

Fig 10. Maximum Avalanche Energy Vs. Drain Current

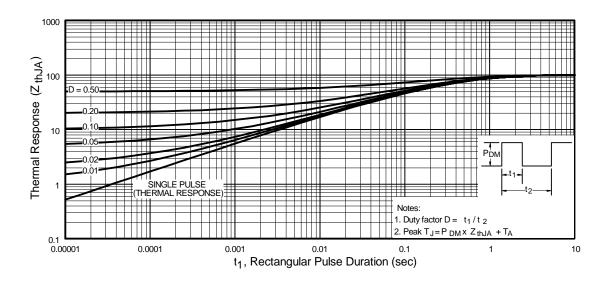
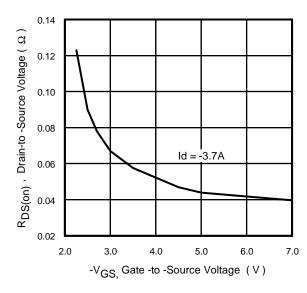


Fig 11. Maximum Effective Transient Thermal Impedance, Junction-to-Ambient



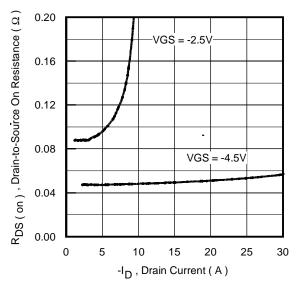
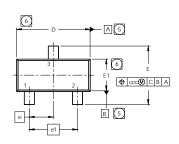


Fig 12. Typical On-Resistance Vs. Gate Voltage

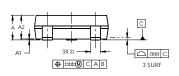
Fig 13. Typical On-Resistance Vs. Drain Current

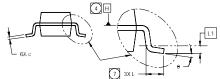
Micro3 (SOT-23/TO-263AB) Package Outline

Dimensions are shown in millimeters (inches)

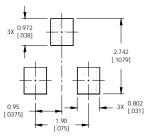


S	DIME NSIONS				
R	MILLIMETERS O MIN MAX		INCHES		
Ľ			MIN	MAX	
Α	0.89	1.12	.036	.044	
A1	0.01	0.10	.0004	.0039	
A2	0.88	1.02	.035	.040	
b	0.30	0.50	.0119	.0196	
С	0.08	0.20	.0032	.0078	
D	2.80	3.04	.111	.119	
E	2.10	2.64	.083	.103	
E1	1.20	1.40	.048	.055	
е	0.95	BSC	.0375 BSC		
e1	1.90	BSC	.075 BS C		
L	0.40	0.60	.0158	.0236	
L1	0.25 BSC		.0118 BSC		
Θ	0°	8°	0°	8°	
aaa	0.10		.004		
bbb	0.20		.008		
cac	0.15		.006		





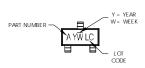
RECOMMENDED FOOTPRINT



- DIMENSIONING AND TOLERANCING PER ASME Y14.5M-1994.
 DIMENSIONS ARE SHOWN IN MILLIMETERS AND INCHES.
- CONTROLLING DIMENSION: MILLIMETER.

- CONTRACTING DIMENSION: MILLIMETER.
 DATUMPLANE H IS LOCATED AT THE MOLD PARTINGLINE.
 DATUM A AND B TO BE DETERMINED AT DATUMPLANE H.
 DIMENSIONS D AND E1 ARE MEASURED AT DATUM PLANE H.
 DIMENSION L IS THE LEAD LENGTH FOR SOLDERING TO A SUBSTRATE.
- 8. OUTLINE CONFORMS TO JEDEC OUTLINE TO 236AB

Micro3 (SOT-23/TO-236AB) Part Marking Information



PART NUMBER CODE REFERENCE:

- A= IRLML2402 B= IRLML2803 C= IRLML6302 D= IRLML5103 E= IRLML6402 F= IRLML6401
- G = IRLML2502
- H = IRLML5203 Note: A line above the work week (as shown here) indicates Lead-Free

W = (1-26) IF PRECEDED BY LAST DIGIT OF CALENDAR YEAR

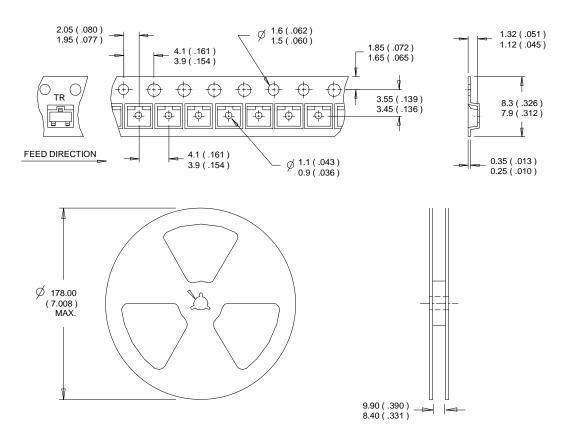
YEAR	Υ	WORK WEEK	w
2001	1	01	
			Α
2002	2	02	В
2003	3	03	С
1994	4	04	D
1995	5		
1996	6		
1997	7		
1998	8		
1999	9	7	
2000	0	24	X
		25	Y
		26	Z

W = (27-52) IF PRECEDED BY ALETTER

YEAR	Υ	WORK WEEK	w
2001	Α	27	Α
2002	В	28	В
2003	С	29	С
1994	D	30	D
1995	E		
1996	F		
1997	G		
1998	H		
1999	J	7	1
2000	K	50	X
		51	Υ
		52	Z

Micro3™(SOT-23/TO-263AB) Tape & Reel Information

Dimensions are shown in millimeters (inches)



NOTES:

- 1. CONTROLLING DIMENSION : MILLIMETER.
- 2. OUTLINE CONFORMS TO EIA-481 & EIA-541.

Data and specifications subject to change without notice.



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