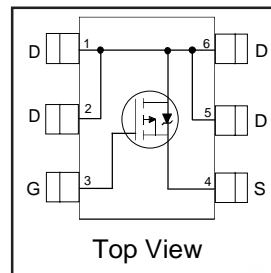


# IRLMS4502

HEXFET® Power MOSFET

- Ultra Low On-Resistance
- P-Channel MOSFET
- Surface Mount
- Available in Tape & Reel

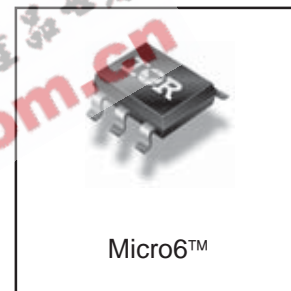


$V_{DS} = -12V$
$R_{DS(on)} = 0.042\Omega$

## Description

These P-Channel MOSFETs from International Rectifier utilize advanced processing techniques to achieve the extremely low on-resistance per silicon area. This benefit provides the designer with an extremely efficient device for use in battery and load management applications..

The Micro6 package with its customized leadframe produces a HEXFET power MOSFET with  $R_{DS(on)}$  60% less than a similar size SOT-23. This package is ideal for applications where printed circuit board space is at a premium. It's unique thermal design and  $R_{DS(on)}$  reduction enables a current-handling increase of nearly 300% compared to the SOT-23.



## Absolute Maximum Ratings

	Parameter	Max.	Units
$V_{DS}$	Drain- Source Voltage	-12	V
$I_D @ T_A = 25^\circ C$	Continuous Drain Current, $V_{GS} @ -4.5V$	-5.5	A
$I_D @ T_A = 70^\circ C$	Continuous Drain Current, $V_{GS} @ -4.5V$	-4.4	
$I_{DM}$	Pulsed Drain Current ①	-44	
$P_D @ T_A = 25^\circ C$	Power Dissipation	1.7	W
$P_D @ T_A = 70^\circ C$	Power Dissipation	1.1	
	Linear Derating Factor	0.013	W/°C
$E_{AS}$	Single Pulse Avalanche Energy④	28	mJ
$V_{GS}$	Gate-to-Source Voltage	$\pm 12$	V
$T_J, T_{STG}$	Junction and Storage Temperature Range	-55 to + 150	°C

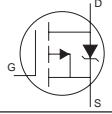
## Thermal Resistance

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

## 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	-12	—	—	V	$V_{GS} = 0V, I_D = -250\mu A$
$\Delta V_{(BR)DSS}/\Delta T_J$	Breakdown Voltage Temp. Coefficient	—	-0.003	—	V/ $^\circ\text{C}$	Reference to $25^\circ\text{C}, I_D = -1\text{mA}$
$R_{DS(on)}$	Static Drain-to-Source On-Resistance	—	—	0.042	$\Omega$	$V_{GS} = -4.5V, I_D = -5.5A$ ②
		—	—	0.075		$V_{GS} = -2.5V, I_D = -4.7A$ ②
$V_{GS(th)}$	Gate Threshold Voltage	-0.60	—	—	V	$V_{DS} = V_{GS}, I_D = -250\mu A$
$g_{fs}$	Forward Transconductance	8.8	—	—	S	$V_{DS} = -10V, I_D = -5.5A$
$I_{DSS}$	Drain-to-Source Leakage Current	—	—	-1.0	$\mu A$	$V_{DS} = -12V, V_{GS} = 0V$
		—	—	-25		$V_{DS} = -9.6V, V_{GS} = 0V, T_J = 125^\circ\text{C}$
$I_{GSS}$	Gate-to-Source Forward Leakage	—	—	-100	nA	$V_{GS} = -12V$
	Gate-to-Source Reverse Leakage	—	—	100		$V_{GS} = 12V$
$Q_g$	Total Gate Charge	—	22	33	nC	$I_D = -5.5A$
$Q_{gs}$	Gate-to-Source Charge	—	3.9	5.8		$V_{DS} = -10V$
$Q_{gd}$	Gate-to-Drain ("Miller") Charge	—	11	16		$V_{GS} = -5.0V$ ②
$t_{d(on)}$	Turn-On Delay Time	—	18	—	ns	$V_{DD} = -6.0V$
$t_r$	Rise Time	—	460	—		$I_D = -1.0A$
$t_{d(off)}$	Turn-Off Delay Time	—	130	—		$R_G = 4.5\Omega$
$t_f$	Fall Time	—	250	—		$R_D = 6.0\Omega$ ②
$C_{iss}$	Input Capacitance	—	1820	—		$V_{GS} = 0V$
$C_{oss}$	Output Capacitance	—	1110	—	pF	$V_{DS} = -10V$
$C_{rss}$	Reverse Transfer Capacitance	—	1070	—		$f = 1.0\text{kHz}$

## Source-Drain Ratings and Characteristics

	Parameter	Min.	Typ.	Max.	Units	Conditions
$I_S$	Continuous Source Current (Body Diode)	—	—	-1.7	A	MOSFET symbol showing the integral reverse p-n junction diode. 
$I_{SM}$	Pulsed Source Current (Body Diode) ①	—	—	-44		
$V_{SD}$	Diode Forward Voltage	—	—	-1.2	V	$T_J = 25^\circ\text{C}, I_S = -1.7A, V_{GS} = 0V$ ③
$t_{rr}$	Reverse Recovery Time	—	31	46	ns	$T_J = 25^\circ\text{C}, I_F = -5.5A$
$Q_{rr}$	Reverse Recovery Charge	—	21	32	nC	$di/dt = -100A/\mu s$ ②

### Notes:

- ① Repetitive rating; pulse width limited by max. junction temperature. ( See fig. 11 )
- ② Pulse width  $\leq 400\mu s$ ; duty cycle  $\leq 2\%$ .
- ③ Surface mounted on FR-4 board,  $t \leq 5\text{sec}$ .
- ④ Starting  $T_J = 25^\circ\text{C}, L = 1.8\text{mH}$   
 $R_G = 25\Omega, I_{AS} = -5.5A$ . (See Figure 12)

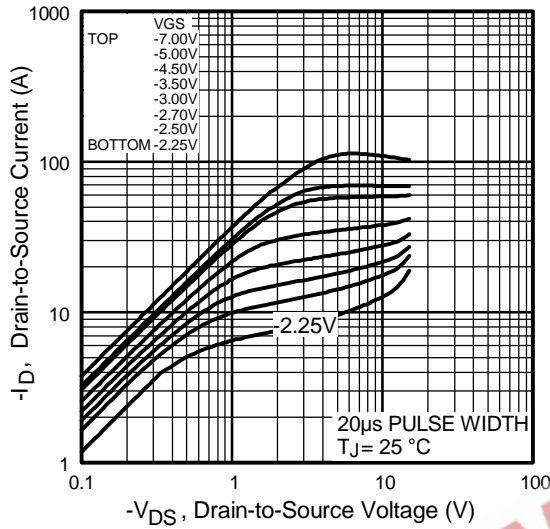


Fig 1. Typical Output Characteristics

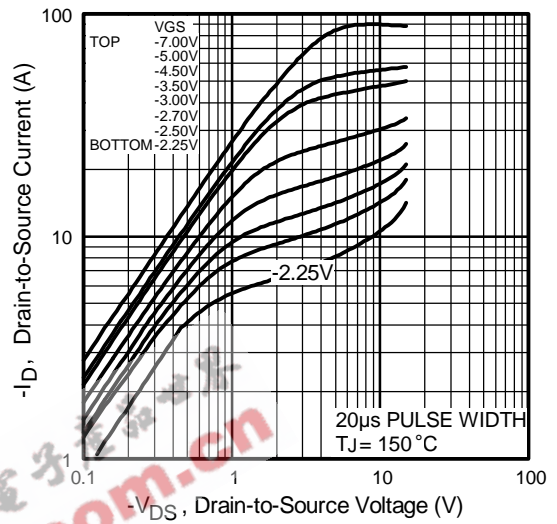


Fig 2. Typical Output Characteristics

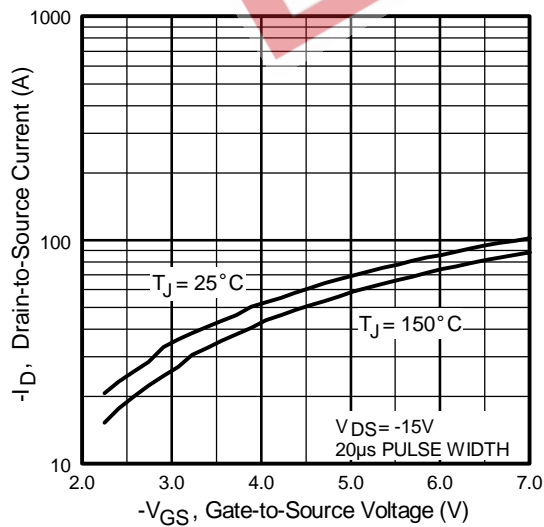


Fig 3. Typical Transfer Characteristics

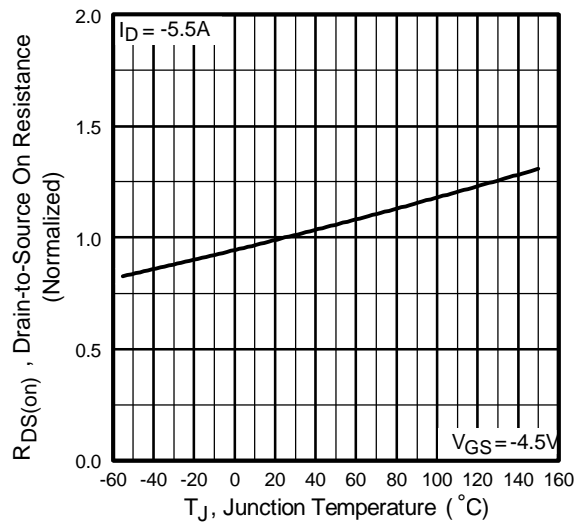
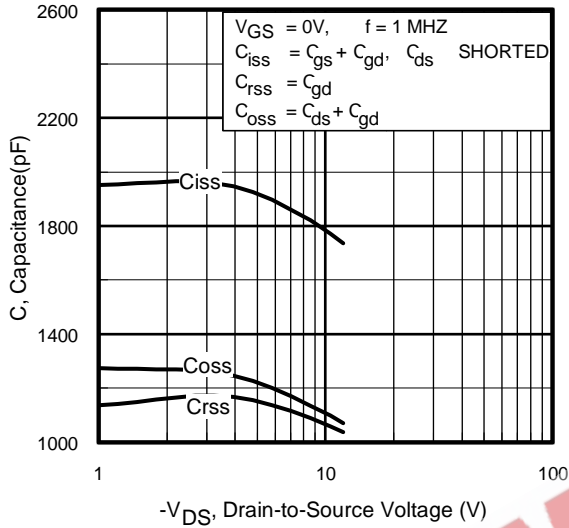
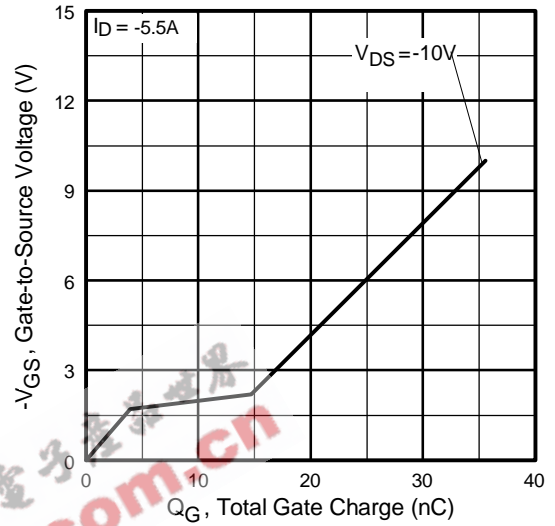


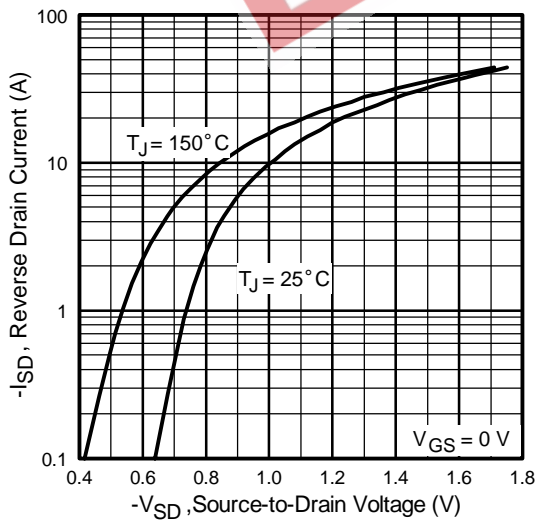
Fig 4. Normalized On-Resistance Vs. Temperature



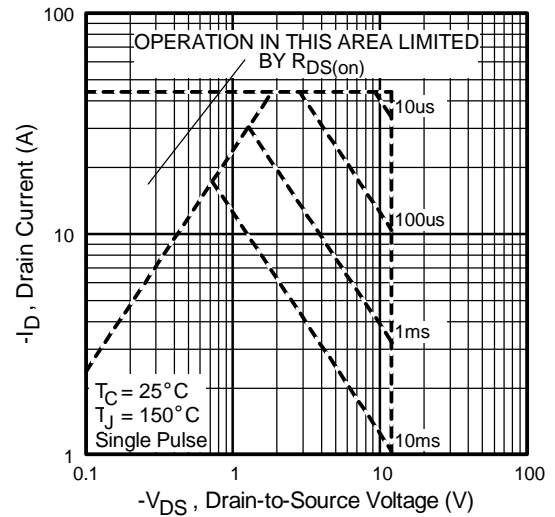
**Fig 5.** Typical Capacitance Vs. Drain-to-Source Voltage



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



**Fig 7.** Typical Source-Drain Diode Forward Voltage



**Fig 8.** Maximum Safe Operating Area

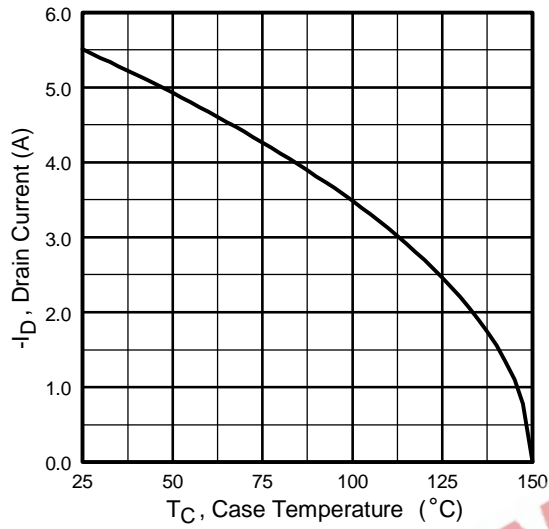


Fig 9. Maximum Drain Current Vs. Case Temperature

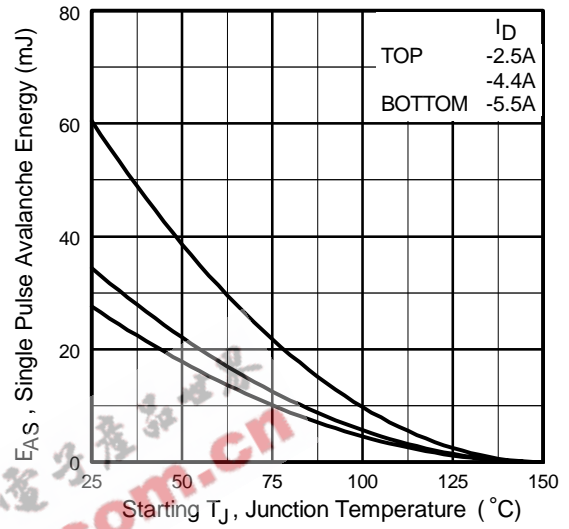


Fig 10. Maximum Avalanche Energy Vs. Drain Current

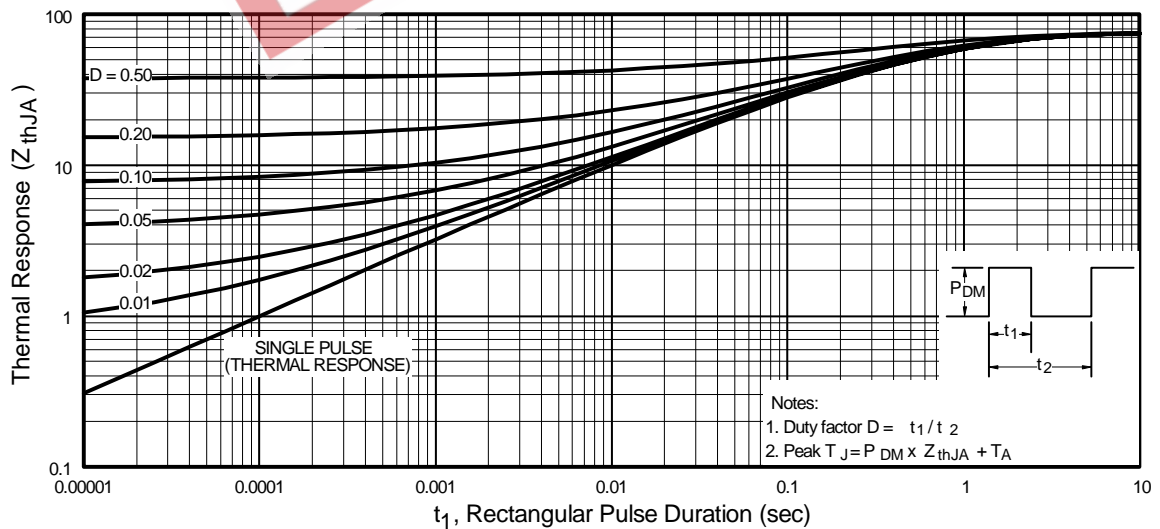
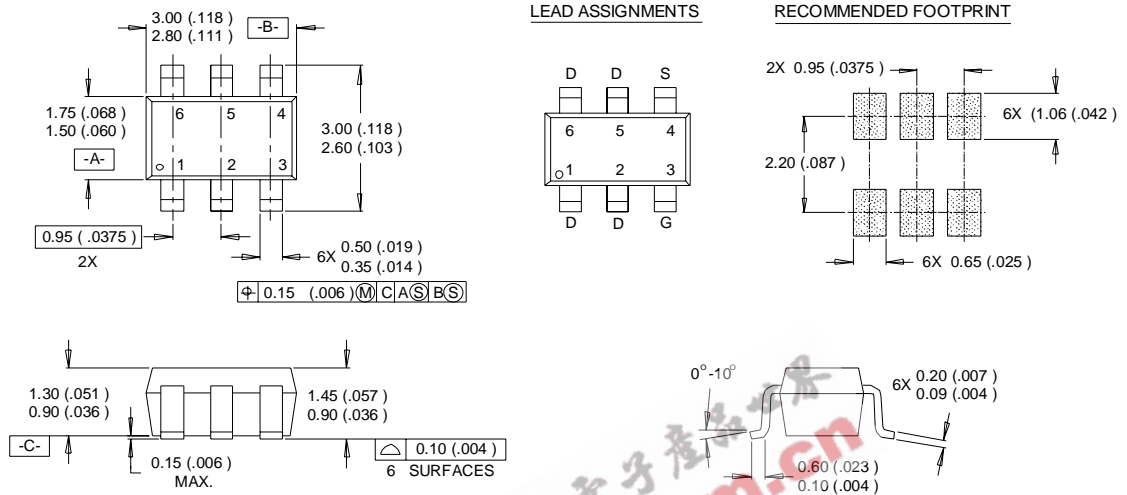


Fig 11. Maximum Effective Transient Thermal Impedance, Junction-to-Ambient

# IRLMS4502

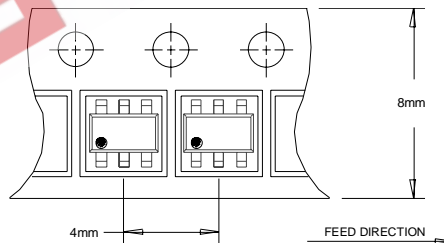
International  
**IRF** Rectifier

## Micro6™ Package Outline

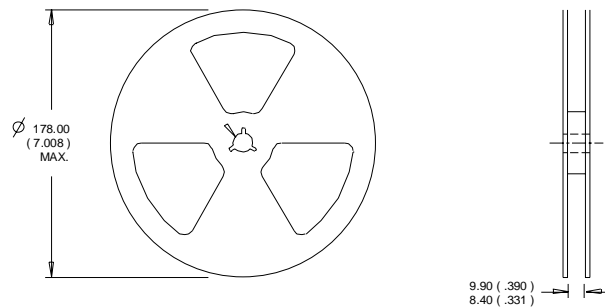


- NOTES:
1. DIMENSIONING & TOLERANCING PER ANSI Y14.5M-1982.
  2. CONTROLLING DIMENSION: MILLIMETER.
  3. DIMENSIONS ARE SHOWN IN MILLIMETERS (INCHES).

## Micro6™ Tape & Reel Information



- NOTES:
1. OUTLINE CONFORMS TO EIA-481 & EIA-541.



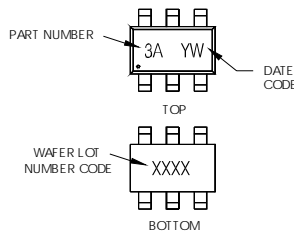
- NOTES:
1. CONTROLLING DIMENSION: MILLIMETER.
  2. OUTLINE CONFORMS TO EIA-481 & EIA-541.

Micro6™ Part Marking Information

Notes: This part marking information applies to devices produced before 02/26/2001

EXAMPLE: THIS IS AN IRLMS6702

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



PART NUMBER CODE REFERENCE:

- 2A = IRLMS1902
- 2B = IRLMS1503
- 2C = IRLMS6702
- 2D = IRLMS5703
- 2E = IRLMS6802
- 2F = IRLMS4502
- 2G = IRLMS2002
- 2H = IRLMS6803

DATE CODE EXAMPLES:

- YWW = 9603 = 6C
- YWW = 9632 = FF

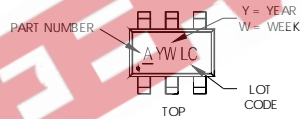
YEAR	Y	WORK WEEK	W
2001	1	01	A
2002	2	02	B
2003	3	03	C
2004	4	04	D
2005	5		
1996	6		
1997	7		
1998	8		
1999	9		
2000	0	24	X
		25	Y
		26	Z

WW = (27-52) IF PRECEDED BY A LETTER

YEAR	Y	WORK WEEK	W
2001	A	27	A
2002	B	28	B
2003	C	29	C
2004	D	30	D
2005	E		
1996	F		
1997	G		
1998	H		
1999	J		
2000	K	50	X
		51	Y
		52	Z

Notes: This part marking information applies to devices produced after 02/26/2001

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



PART NUMBER CODE REFERENCE:

- A = IRLMS1902
- B = IRLMS1503
- C = IRLMS6702
- D = IRLMS5703
- E = IRLMS6802
- F = IRLMS4502
- G = IRLMS2002
- H = IRLMS6803

YEAR	Y	WORK WEEK	W
2001	1	01	A
2002	2	02	B
2003	3	03	C
2004	4	04	D
2005	5		
1996	6		
1997	7		
1998	8		
1999	9		
2000	0	24	X
		25	Y
		26	Z

W = (27-52) IF PRECEDED BY A LETTER

YEAR	Y	WORK WEEK	W
2001	A	27	A
2002	B	28	B
2003	C	29	C
2004	D	30	D
2005	E		
1996	F		
1997	G		
1998	H		
1999	J		
2000	K	50	X
		51	Y
		52	Z

This product has been designed and qualified for the consumer market. Qualification Standards can be found on IR's Web site.