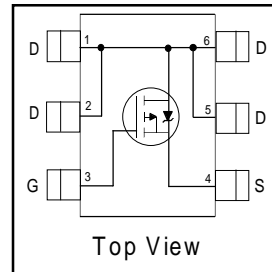


IRLMS4502

HEXFET® Power MOSFET

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

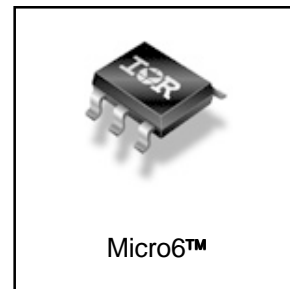


| |
|----------------------------|
| $V_{DSS} = -12V$ |
| $R_{DS(on)} = 0.042\Omega$ |

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 | ± 12 | V |
| T_J, T_{STG} | Junction and Storage Temperature Range | -55 to + 150 | °C |

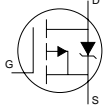
Thermal Resistance

| | 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°C , $I_D = -1\text{mA}$ |
| $R_{DS(on)}$ | Static Drain-to-Source On-Resistance | — | — | 0.042 | Ω | $V_{GS} = -4.5V, I_D = -5.5A$ 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 | μA | $V_{DS} = -12V, V_{GS} = 0V$ |
| | | — | — | -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 | — | pF | $V_{GS} = 0V$ |
| C_{oss} | Output Capacitance | — | 1110 | — | | $V_{DS} = -10V$ |
| C_{riss} | 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)

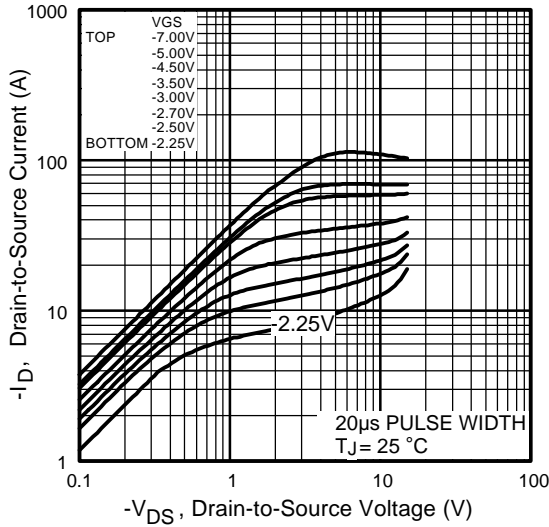


Fig 1. Typical Output Characteristics

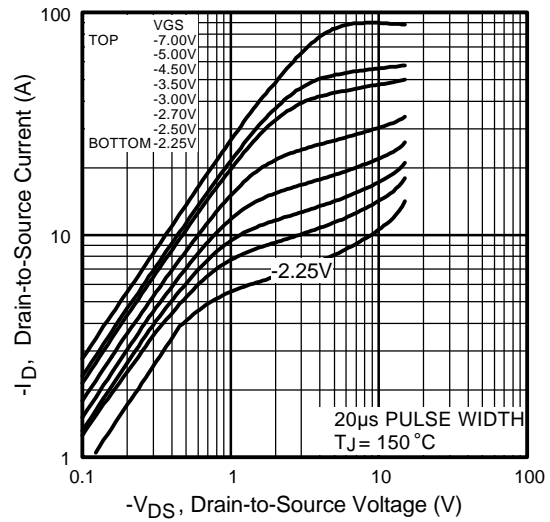


Fig 2. Typical Output Characteristics

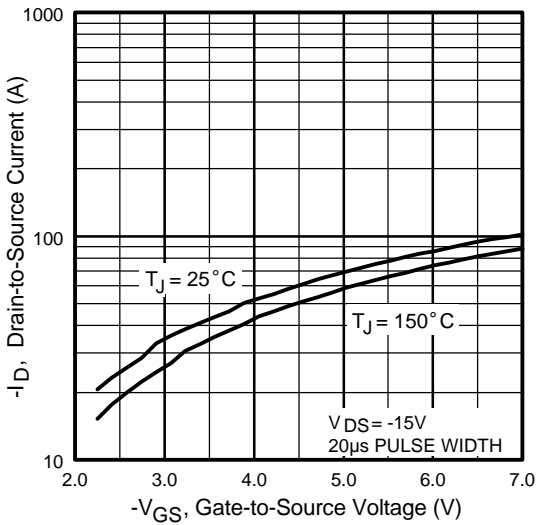


Fig 3. Typical Transfer Characteristics

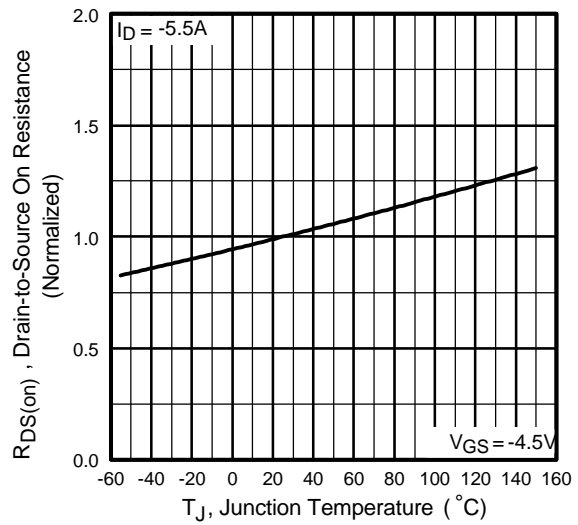


Fig 4. Normalized On-Resistance Vs. Temperature

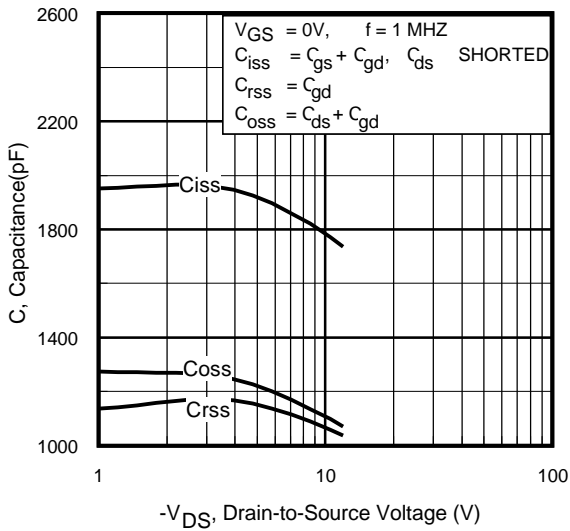


Fig 5. Typical Capacitance Vs. Drain-to-Source Voltage

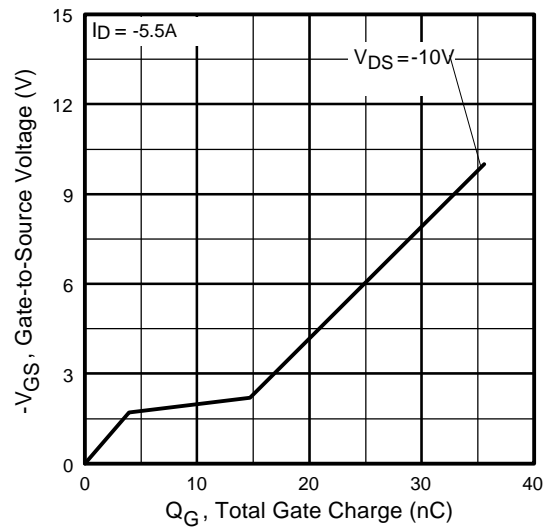


Fig 6. Typical Gate Charge Vs. Gate-to-Source Voltage

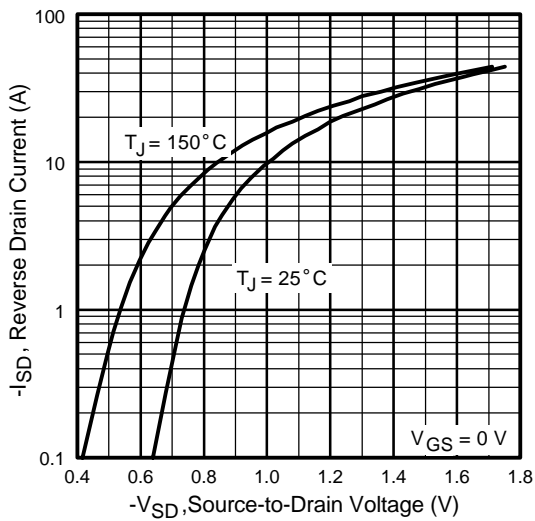


Fig 7. Typical Source-Drain Diode Forward Voltage

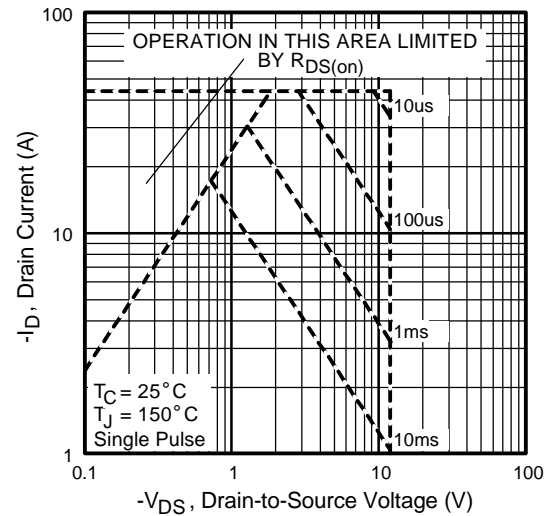


Fig 8. Maximum Safe Operating Area

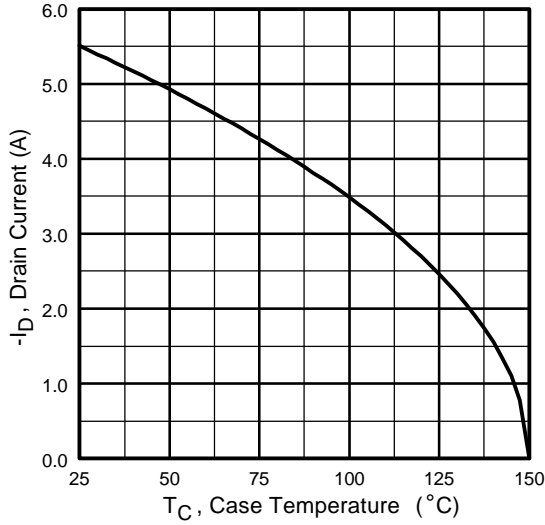


Fig 9. Maximum Drain Current Vs. Case Temperature

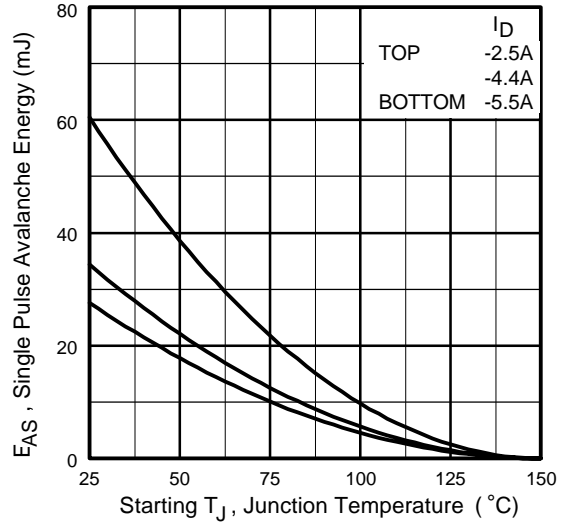


Fig 10. Maximum Avalanche Energy Vs. Drain Current

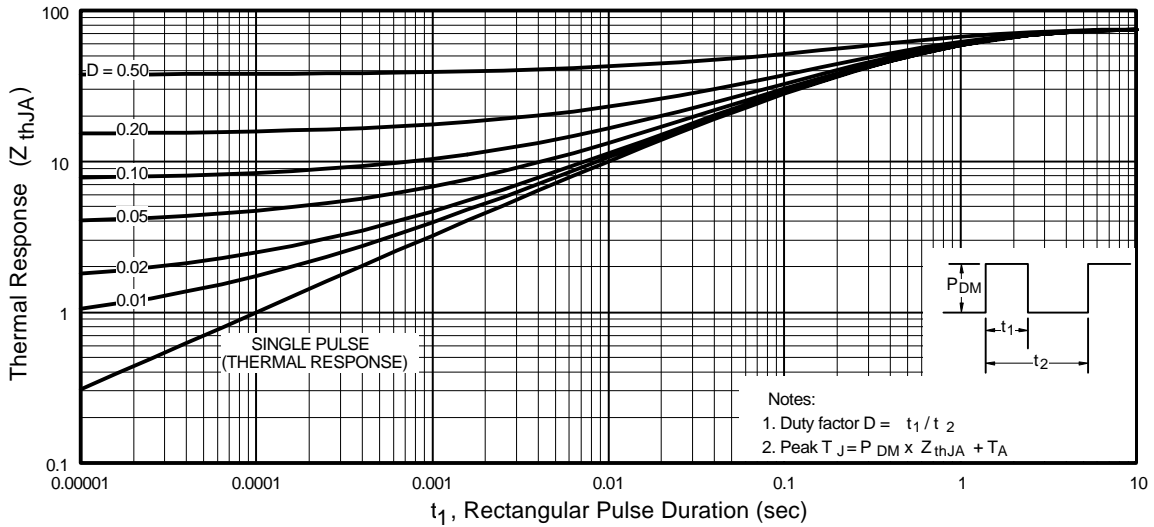


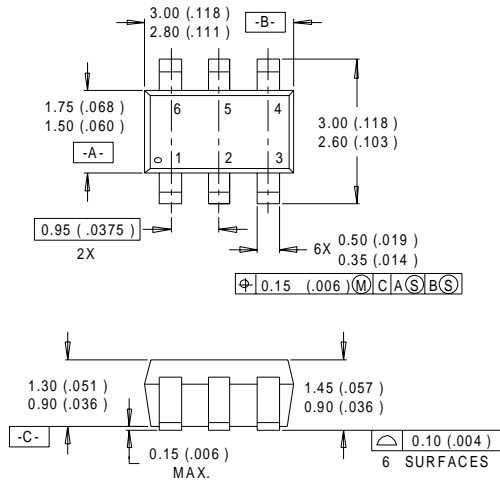
Fig 11. Maximum Effective Transient Thermal Impedance, Junction-to-Ambient

IRLMS4502

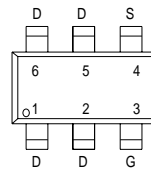
International
IRF Rectifier

Package Outline

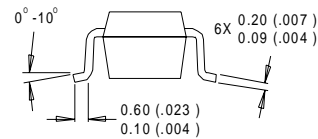
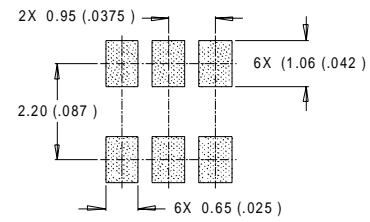
Micro6™



LEAD ASSIGNMENTS



RECOMMENDED FOOTPRINT



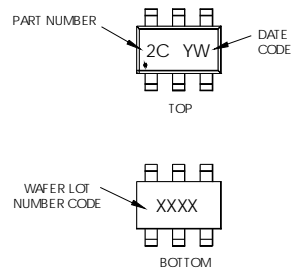
- NOTES :
1. DIMENSIONING & TOLERANCING PER ANSI Y14.5M-1982.
 2. CONTROLLING DIMENSION : MILLIMETER.
 3. DIMENSIONS ARE SHOWN IN MILLIMETERS (INCHES).

Part Marking Information

Micro6™

EXAMPLE: THIS IS AN IRLMS6702

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



| 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 |

PART NUMBER CODE REFERENCE:

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

DATE CODE EXAMPLES:

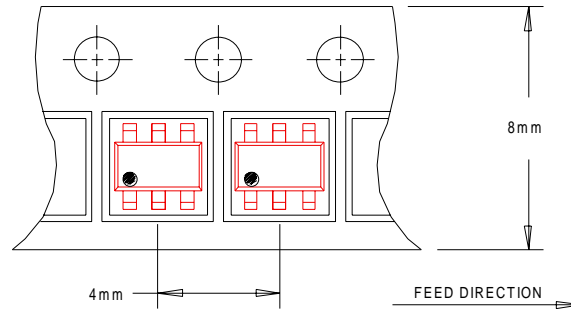
- YWW = 9603 = 6C
- YWW = 9632 = FF

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

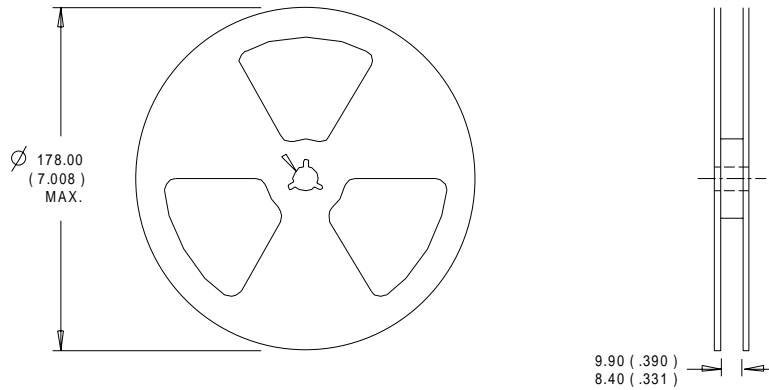
| YEAR | Y | WORK WEEK | W |
|------|---|-----------|---|
| 2001 | A | 27 | A |
| 2002 | B | 28 | B |
| 2003 | C | 29 | C |
| 2004 | D | 30 | D |
| 2005 | E | | |
| 1996 | F | | |
| 1997 | G | | |
| 1998 | H | | |
| 1999 | J | | |
| 2000 | K | 50 | X |
| | | 51 | Y |
| | | 52 | Z |

Tape & Reel Information

Micro6



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



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

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

International
IR Rectifier

IR WORLD HEADQUARTERS: 233 Kansas St., El Segundo, California 90245, USA Tel: (310) 252-7105
 TAC Fax: (310) 252-7903

Visit us at www.irf.com for sales contact information.
 Data and specifications subject to change without notice. 01/01