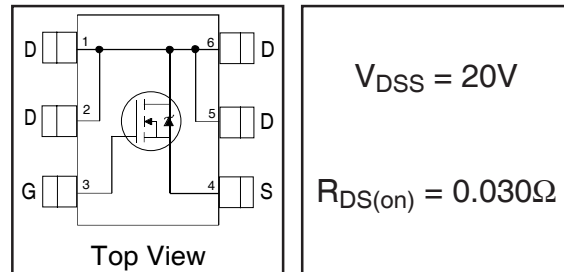


# IRLMS2002PbF

HEXFET® Power MOSFET

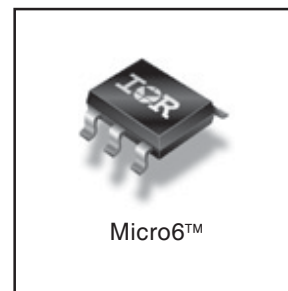
- Ultra Low On-Resistance
- N-Channel MOSFET
- Surface Mount
- Available in Tape & Reel
- 2.5V Rated
- Lead-Free



## Description

These N-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. Its 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	20	V
$I_D @ T_A = 25^\circ\text{C}$	Continuous Drain Current, $V_{GS} @ 4.5\text{V}$	6.5	A
$I_D @ T_A = 70^\circ\text{C}$	Continuous Drain Current, $V_{GS} @ 4.5\text{V}$	5.2	
$I_{DM}$	Pulsed Drain Current ①	20	
$P_D @ T_A = 25^\circ\text{C}$	Power Dissipation	2.0	W
$P_D @ T_A = 70^\circ\text{C}$	Power Dissipation	1.3	
	Linear Derating Factor	0.016	W/°C
$V_{GS}$	Gate-to-Source Voltage	$\pm 12$	V
$T_J, T_{STG}$	Junction and Storage Temperature Range	-55 to + 150	°C

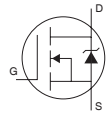
## Thermal Resistance

	Parameter	Max.	Units
$R_{\theta JA}$	Maximum Junction-to-Ambient③	62.5	°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	20	—	—	V	$V_{GS} = 0V, I_D = 250\mu A$
$\Delta V_{(BR)DSS}/\Delta T_J$	Breakdown Voltage Temp. Coefficient	—	0.016	—	V/°C	Reference to $25^\circ\text{C}, I_D = 1\text{mA}$
$R_{DS(on)}$	Static Drain-to-Source On-Resistance	—	—	0.030	$\Omega$	$V_{GS} = 4.5V, I_D = 6.5A$ ②
		—	—	0.045		$V_{GS} = 2.5V, I_D = 5.2A$ ②
$V_{GS(th)}$	Gate Threshold Voltage	0.60	—	1.2	V	$V_{DS} = V_{GS}, I_D = 250\mu A$
$g_{fs}$	Forward Transconductance	13	—	—	S	$V_{DS} = 10V, I_D = 6.5A$
$I_{DSS}$	Drain-to-Source Leakage Current	—	—	1.0	$\mu A$	$V_{DS} = 16V, V_{GS} = 0V$
		—	—	25		$V_{DS} = 16V, V_{GS} = 0V, T_J = 70^\circ\text{C}$
$I_{GSS}$	Gate-to-Source Forward Leakage	—	—	-100	nA	$V_{GS} = -12V$
	Gate-to-Source Reverse Leakage	—	—	100		$V_{GS} = 12V$
$Q_g$	Total Gate Charge	—	15	22	nC	$I_D = 6.5A$
$Q_{gs}$	Gate-to-Source Charge	—	2.2	3.3		$V_{DS} = 10V$
$Q_{gd}$	Gate-to-Drain ("Miller") Charge	—	3.5	5.3		$V_{GS} = 5.0V$ ②
$t_{d(on)}$	Turn-On Delay Time	—	8.5	—	ns	$V_{DD} = 10V$
$t_r$	Rise Time	—	11	—		$I_D = 1.0A$
$t_{d(off)}$	Turn-Off Delay Time	—	36	—		$R_G = 6.0\Omega$
$t_f$	Fall Time	—	16	—		$R_D = 10\Omega$ ②
$C_{iss}$	Input Capacitance	—	1310	—	pF	$V_{GS} = 0V$
$C_{oss}$	Output Capacitance	—	150	—		$V_{DS} = 15V$
$C_{rss}$	Reverse Transfer Capacitance	—	36	—		$f = 1.0\text{MHz}$

## Source-Drain Ratings and Characteristics

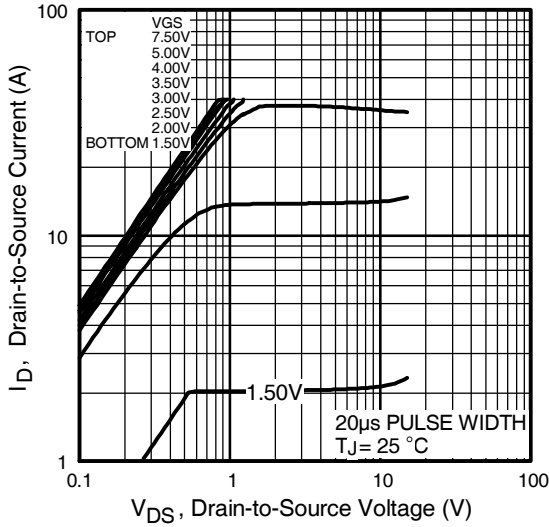
	Parameter	Min.	Typ.	Max.	Units	Conditions
$I_S$	Continuous Source Current (Body Diode)	—	—	2.0	A	MOSFET symbol showing the integral reverse p-n junction diode. 
$I_{SM}$	Pulsed Source Current (Body Diode) ①	—	—	20		
$V_{SD}$	Diode Forward Voltage	—	—	1.2	V	$T_J = 25^\circ\text{C}, I_S = 1.7A, V_{GS} = 0V$ ②
$t_{rr}$	Reverse Recovery Time	—	19	29	ns	$T_J = 25^\circ\text{C}, I_F = 1.7A$
$Q_{rr}$	Reverse Recovery Charge	—	13	20	nC	$di/dt = 100A/\mu s$ ②

### Notes:

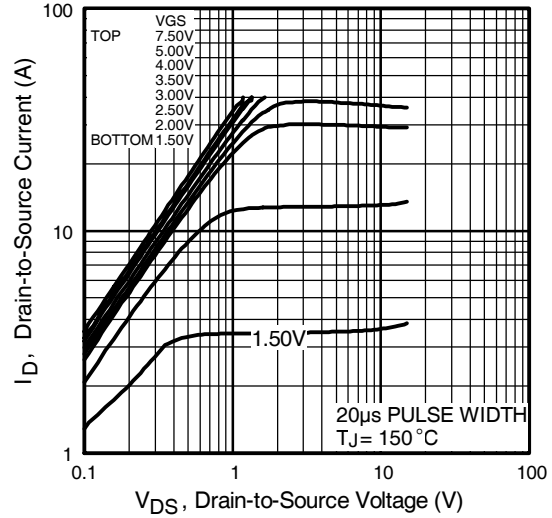
① Repetitive rating; pulse width limited by max. junction temperature. ( See fig. 11 )

② Pulse width  $\leq 400\mu s$ ; duty cycle  $\leq 2\%$ .

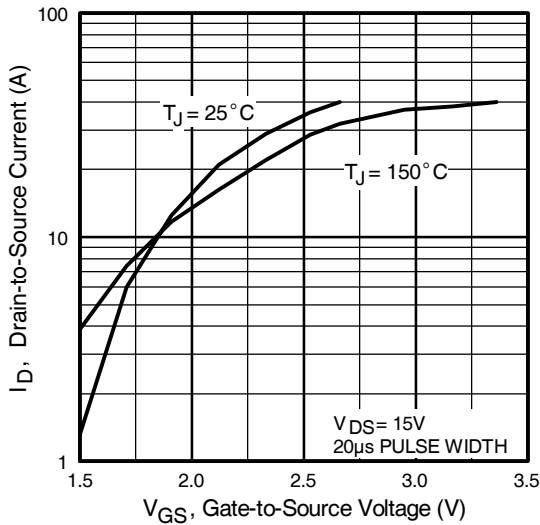
③ Surface mounted on FR-4 board,  $t \leq 5\text{sec}$ .



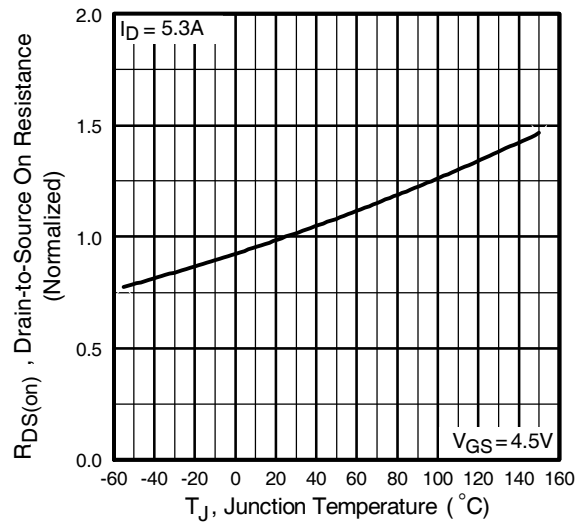
**Fig 1.** Typical Output Characteristics



**Fig 2.** Typical Output Characteristics

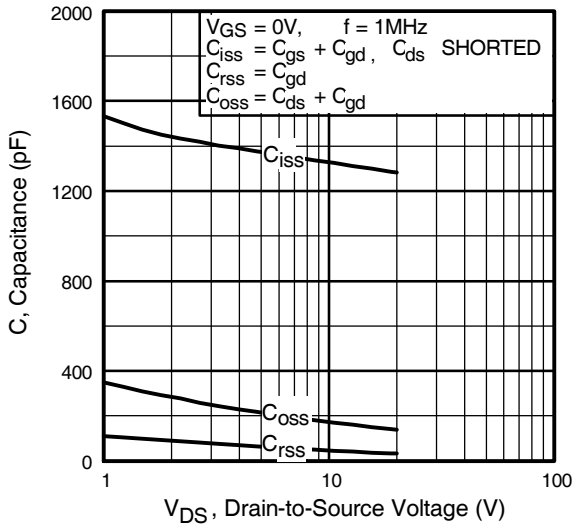


**Fig 3.** Typical Transfer Characteristics

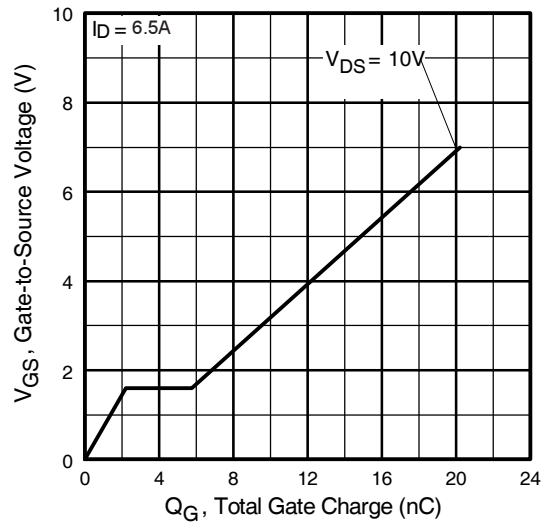


**Fig 4.** Normalized On-Resistance Vs. Temperature

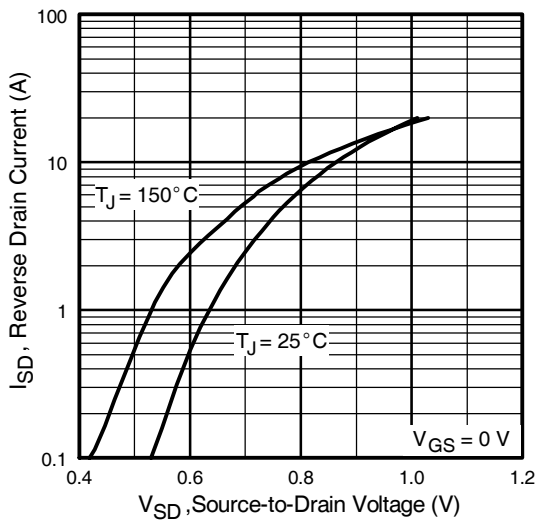
# IRLMS2002PbF



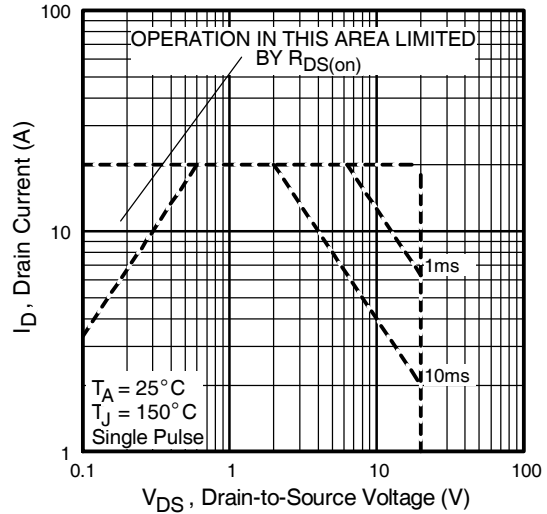
**Fig 5.** Typical Capacitance Vs. Drain-to-Source Voltage



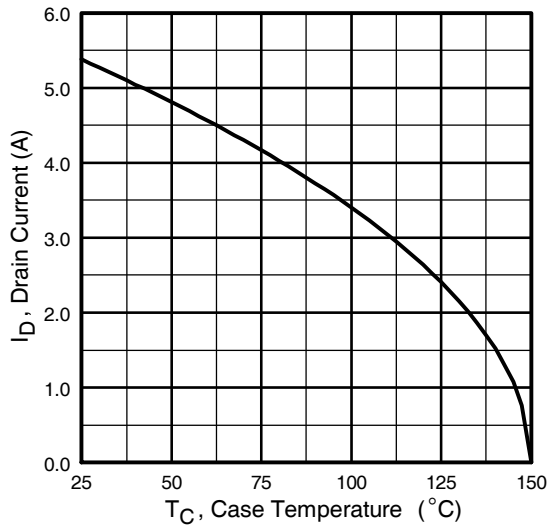
**Fig 6.** Typical Gate Charge Vs. Gate-to-Source Voltage



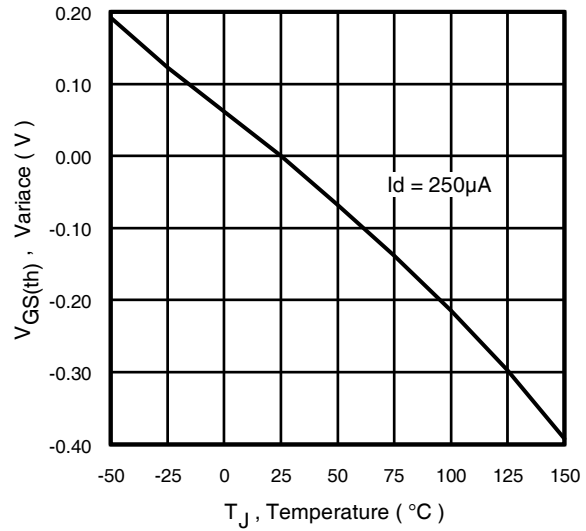
**Fig 7.** Typical Source-Drain Diode Forward Voltage



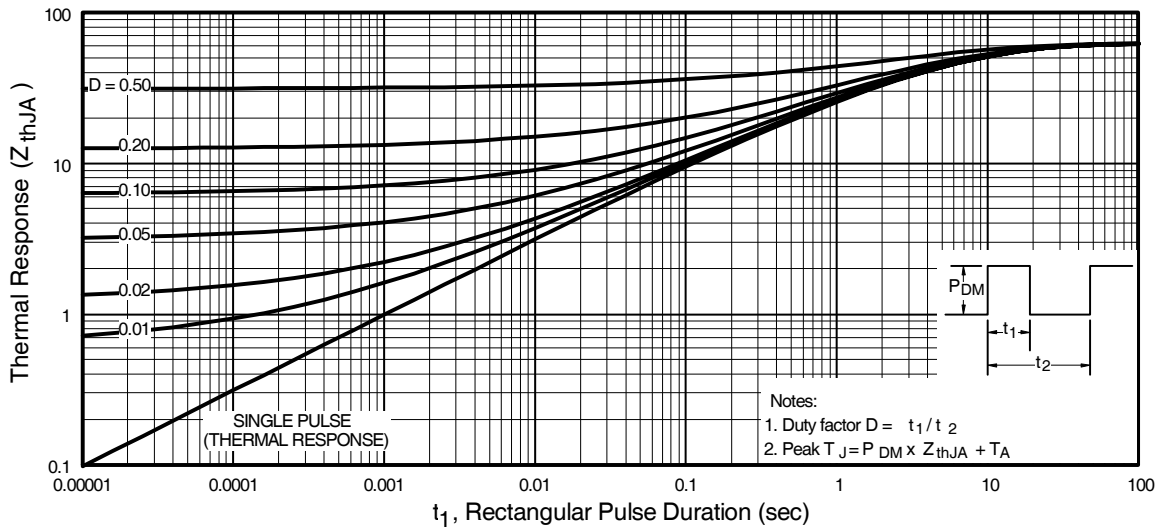
**Fig 8.** Maximum Safe Operating Area



**Fig 9.** Maximum Drain Current Vs. Case Temperature

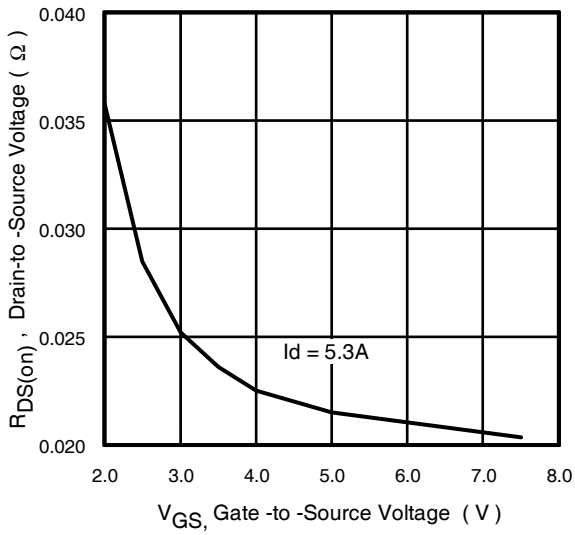


**Fig 10.** Typical  $V_{GS(th)}$  Variance Vs. Junction Temperature

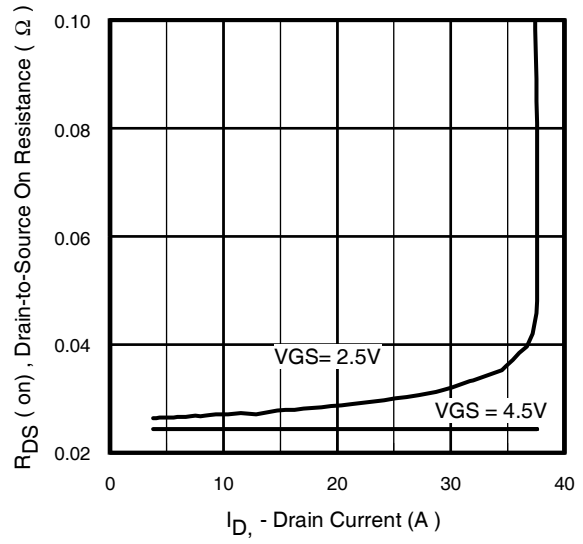


**Fig 11.** Maximum Effective Transient Thermal Impedance, Junction-to-Ambient

# IRLMS2002PbF



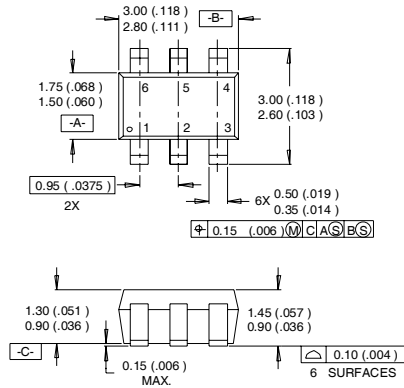
**Fig 12.** Typical On-Resistance Vs. Gate Voltage



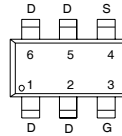
**Fig 13.** Typical On-Resistance Vs. Drain Current

## Micro6 (SOT23 6L) Package Outline

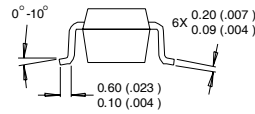
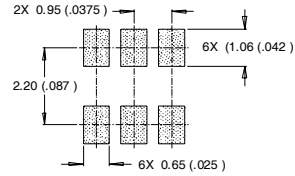
Dimensions are shown in millimeters (inches)



### LEAD ASSIGNMENTS



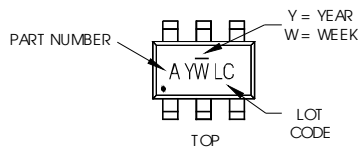
### RECOMMENDED FOOTPRINT



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

## Micro6 (SOT23 6L) Part Marking Information

Micro6™



### PART NUMBER CODE REFERENCE:

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

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	Y	WORK WEEK	W
2001	1	01	A
2002	2	02	B
2003	3	03	C
2004	4	04	D
2005	5		
2006	6		
2007	7		
2008	8		
2009	9		
2010	0	24	X
		25	Y
		26	Z

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

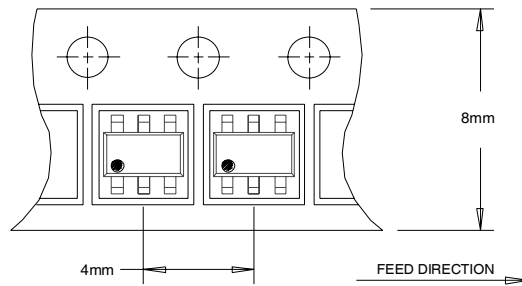
YEAR	Y	WORK WEEK	W
2001	A	27	A
2002	B	28	B
2003	C	29	C
2004	D	30	D
2005	E		
2006	F		
2007	G		
2008	H		
2009	J		
2010	K	50	X
		51	Y
		52	Z

# IRLMS2002PbF

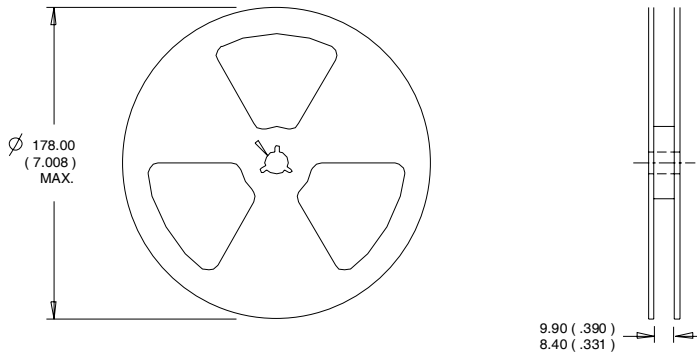
International  
**IOR** Rectifier

## Micro6 Tape & Reel Information

Dimensions are shown in millimeters (inches)



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.  
Data and specifications subject to change without notice.

International  
**IOR** 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](http://www.irf.com) for sales contact information.  
Data and specifications subject to change without notice. 01/05

[www.irf.com](http://www.irf.com)



## **IMPORTANT NOTICE**

The information given in this document shall in no event be regarded as a guarantee of conditions or characteristics ("Beschaffheitsgarantie").

With respect to any examples, hints or any typical values stated herein and/or any information regarding the application of the product, Infineon Technologies hereby disclaims any and all warranties and liabilities of any kind, including without limitation warranties of non-infringement of intellectual property rights of any third party.

In addition, any information given in this document is subject to customer's compliance with its obligations stated in this document and any applicable legal requirements, norms and standards concerning customer's products and any use of the product of Infineon Technologies in customer's applications.

The data contained in this document is exclusively intended for technically trained staff. It is the responsibility of customer's technical departments to evaluate the suitability of the product for the intended application and the completeness of the product information given in this document with respect to such application.

For further information on the product, technology, delivery terms and conditions and prices please contact your nearest Infineon Technologies office ([www.infineon.com](http://www.infineon.com)).

## **WARNINGS**

Due to technical requirements products may contain dangerous substances. For information on the types in question please contact your nearest Infineon Technologies office.

Except as otherwise explicitly approved by Infineon Technologies in a written document signed by authorized representatives of Infineon Technologies, Infineon Technologies' products may not be used in any applications where a failure of the product or any consequences of the use thereof can reasonably be expected to result in personal injury.

## X-ON Electronics

Largest Supplier of Electrical and Electronic Components

*Click to view similar products for [MOSFET](#) category:*

*Click to view products by [Infineon](#) manufacturer:*

Other Similar products are found below :

[614233C](#) [648584F](#) [IRFD120](#) [JANTX2N5237](#) [FCA20N60\\_F109](#) [FDZ595PZ](#) [2SK2545\(Q,T\)](#) [405094E](#) [423220D](#) [TPCC8103,L1Q\(CM](#)  
[MIC4420CM-TR](#) [VN1206L](#) [614234A](#) [715780A](#) [NTNS3166NZT5G](#) [SSM6J414TU,LF\(T](#) [751625C](#) [BUK954R8-60E](#) [GROUP A 5962-](#)  
[8877003PA](#) [NTE6400](#) [SQJ402EP-T1-GE3](#) [2SK2614\(TE16L1,Q\)](#) [2N7002KW-FAI](#) [DMN1017UCP3-7](#) [EFC2J004NUZTDG](#) [ECH8691-TL-W](#)  
[FCAB21350L1](#) [P85W28HP2F-7071](#) [DMN1053UCP4-7](#) [NTE221](#) [NTE222](#) [NTE2384](#) [NTE2903](#) [NTE2941](#) [NTE2945](#) [NTE2946](#) [NTE2960](#)  
[NTE2967](#) [NTE2969](#) [NTE2976](#) [NTE6400A](#) [NTE2910](#) [NTE2916](#) [NTE2956](#) [NTE2911](#) [DMN2080UCB4-7](#) [TK10A80W,S4X\(S](#)  
[SSM6P69NU,LF](#) [DMP22D4UFO-7B](#) [DMN1006UCA6-7](#)