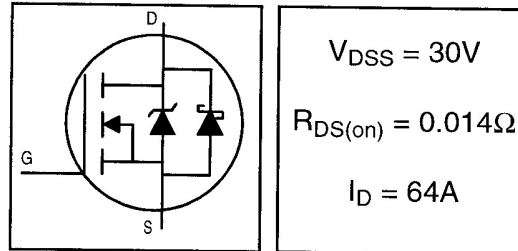


# IRL3103D1PbF

## FETKY<sup>TM</sup> MOSFET & SCHOTTKY RECTIFIER

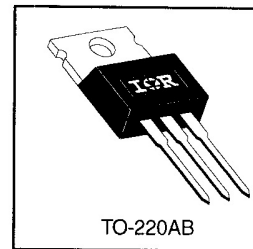
- Copackaged HEXFET<sup>®</sup> Power MOSFET and Schottky Diode
- Generation 5 Technology
- Logic Level Gate Drive
- Minimize Circuit Inductance
- Ideal For Synchronous Regulator Application
- Lead-Free



### Description

The FETKY family of copackaged HEXFET power MOSFETs and Schottky Diodes offer the designer an innovative board space saving solution for switching regulator applications. A low on resistance Gen 5 MOSFET with a low forward voltage drop Schottky diode and minimized component interconnect inductance and resistance result in maximized converter efficiencies.

The TO-220 package is universally preferred for all commercial-industrial applications at power dissipation levels to approximately 50 watts. The low thermal resistance and low package cost of the TO-220 contribute to its wide acceptance throughout the industry.



### Absolute Maximum Ratings

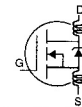
	Parameter	Max.	Units
$I_D$ @ $T_C = 25^\circ\text{C}$	Continuous Drain Current, $V_{GS}$ @ 10V <sup>③</sup>	64	A
$I_D$ @ $T_C = 100^\circ\text{C}$	Continuous Drain Current, $V_{GS}$ @ 10V <sup>③</sup>	45	
$I_{DM}$	Pulsed Drain Current <sup>①②</sup>	220	
$P_D$ @ $T_A = 25^\circ\text{C}$	Power Dissipation	2.0	W
$P_D$ @ $T_C = 25^\circ\text{C}$	Power Dissipation	89	W
	Linear Derating Factor	0.56	W/ $^\circ\text{C}$
$V_{GS}$	Gate-to-Source Voltage	$\pm 16$	V
$T_J$	Operating Junction and	-55 to + 150	
$T_{STG}$	Storage Temperature Range		
	Soldering Temperature, for 10 seconds	300 (1.6mm from case )	$^\circ\text{C}$
	Mounting torque, 6-32 or M3 screw	10 lb•in (1.1N•m)	

### Thermal Resistance

	Parameter	Typ.	Max.	Units
$R_{\theta JC}$	Junction-to-Case	—	1.4	$^\circ\text{C}/\text{W}$
$R_{\theta JA}$	Junction-to-Ambient	—	62	

## MOSFET 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	30	—	—	V	$V_{GS} = 0V, I_D = 250\mu A$
$\Delta V_{(BR)DSS}/\Delta T_J$	Breakdown Voltage Temp. Coefficient	—	0.037	—	V/ $^\circ\text{C}$	Reference to $25^\circ\text{C}$ , $I_D = 1\text{mA}$ ④
$R_{DS(on)}$	Static Drain-to-Source On-Resistance	—	—	0.014 0.019	$\Omega$	$V_{GS} = 10V, I_D = 34A$ ② $V_{GS} = 4.5V, I_D = 28A$ ②
$V_{GS(th)}$	Gate Threshold Voltage	1.0	—	—	V	$V_{DS} = V_{GS}, I_D = 250\mu A$
$g_{fs}$	Forward Transconductance	23	—	—	S	$V_{DS} = 25V, I_D = 32A$ ③
$I_{DSS}$	Drain-to-Source Leakage Current	—	—	0.10 22	mA	$V_{DS} = 30V, V_{GS} = 0V$ $V_{DS} = 24V, V_{GS} = 0V, T_J = 125^\circ\text{C}$
$I_{GSS}$	Gate-to-Source Forward Leakage	—	—	100	nA	$V_{GS} = 16V$
	Gate-to-Source Reverse Leakage	—	—	-100	nA	$V_{GS} = -16V$
$Q_g$	Total Gate Charge	—	—	43	nC	$I_D = 32A$
$Q_{gs}$	Gate-to-Source Charge	—	—	14	nC	$V_{DS} = 24V$
$Q_{gd}$	Gate-to-Drain ("Miller") Charge	—	—	23	nC	$V_{GS} = 4.5V$ , See Fig. 6 ②
$t_{d(on)}$	Turn-On Delay Time	—	9.0	—	ns	$V_{DD} = 15V$ $I_D = 32A$ $R_G = 3.4\Omega, V_{GS} = 4.5V$ $R_D = 0.43\Omega$ , ②③
$t_r$	Rise Time	—	210	—		
$t_{d(off)}$	Turn-Off Delay Time	—	20	—		
$t_f$	Fall Time	—	54	—		
$L_D$	Internal Drain Inductance	—	4.5	—	nH	Between lead, 6mm (0.25in.) from package and center of die contact
$L_S$	Internal Source Inductance	—	7.5	—		
$C_{iss}$	Input Capacitance	—	1900	—	pF	$V_{GS} = 0V$ $V_{DS} = 25V$ $f = 1.0\text{MHz}$ , See Fig. 5
$C_{oss}$	Output Capacitance	—	810	—		
$C_{rss}$	Reverse Transfer Capacitance	—	240	—		
$C_{iss}$	Input Capacitance	—	3500	—		

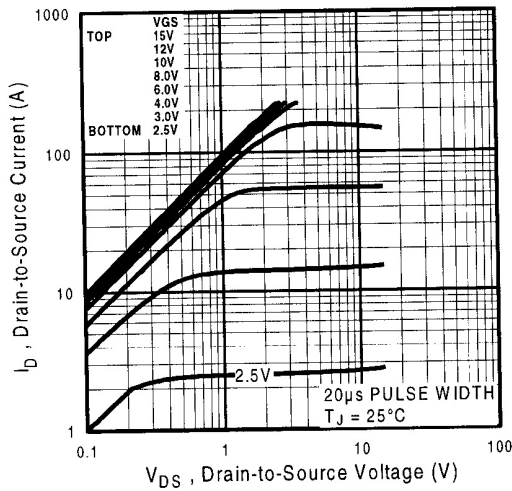


## Body Diode & Schottky Diode Ratings and Characteristics

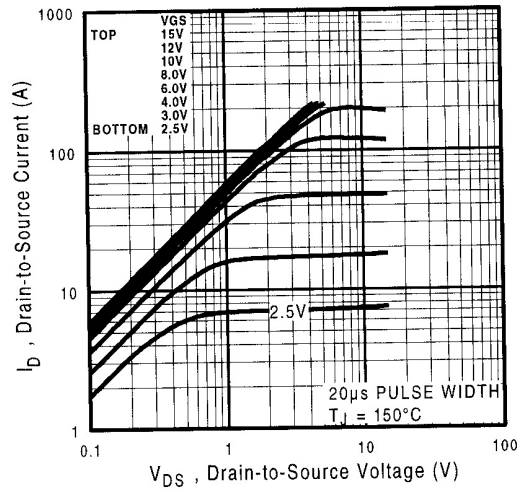
	Parameter	Min.	Typ.	Max.	Units	Conditions
$I_F$ (AV)	( Schottky)	—	—	2.0	A	MOSFET symbol showing the integral reverse p-n junction and Schottky diode.
$I_{SM}$	Pulsed Source Current (Body Diode) ①	—	—	220		
$V_{SD1}$	Diode Forward Voltage	—	—	1.3	V	$T_J = 25^\circ\text{C}, I_S = 32A, V_{GS} = 0V$ ②
$V_{SD2}$	Diode Forward Voltage	—	—	0.50	V	$T_J = 25^\circ\text{C}, I_S = 1.0A, V_{GS} = 0V$ ②
$t_{rr}$	Reverse Recovery Time	—	51	77	ns	$T_J = 25^\circ\text{C}, I_F = 32A$
$Q_{rr}$	Reverse Recovery Charge	—	49	73	nC	$di/dt = 100A/\mu s$ ②
$t_{on}$	Forward Turn-On Time	Intrinsic turn-on time is negligible (turn-on is dominated by $L_S+L_D$ )				

### Notes:

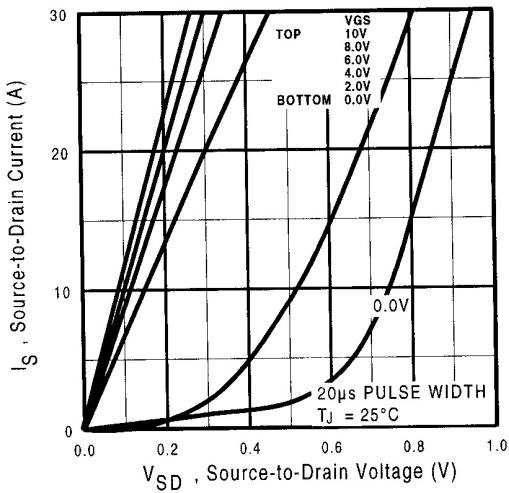
- ① Repetitive rating; pulse width limited by max. junction temperature. ( See fig. 10 )
- ② Pulse width  $\leq 300\mu s$ ; duty cycle  $\leq 2\%$ .
- ③ Uses IRL3103 data and test conditions



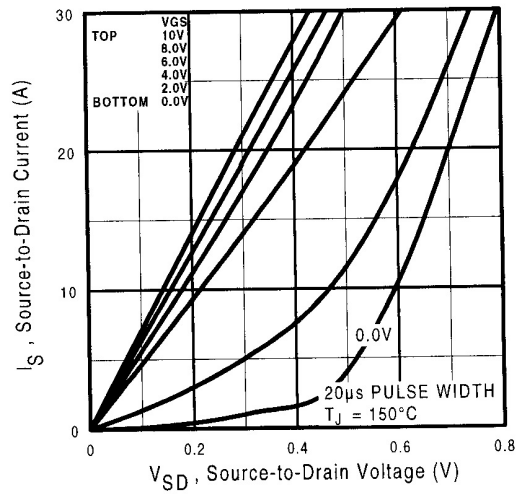
**Fig 1.** Typical Output Characteristics



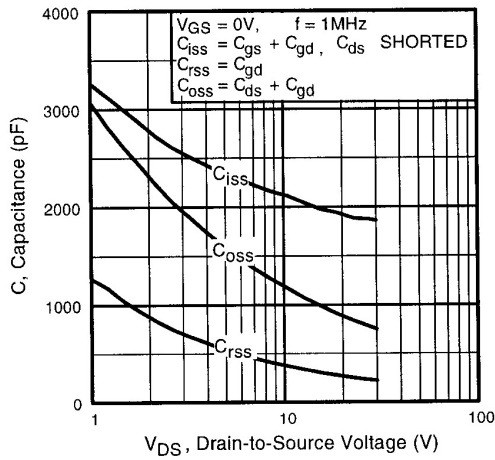
**Fig 2.** Typical Output Characteristics



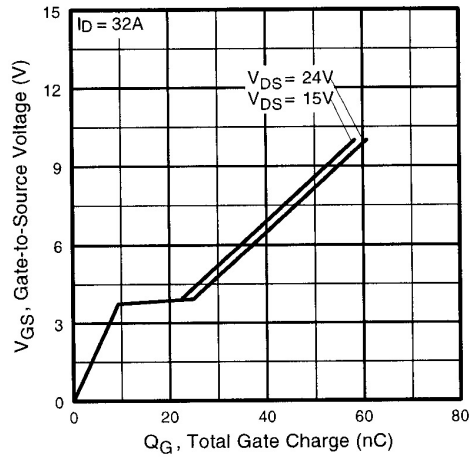
**Fig 3.** Typical Reverse Output Characteristics



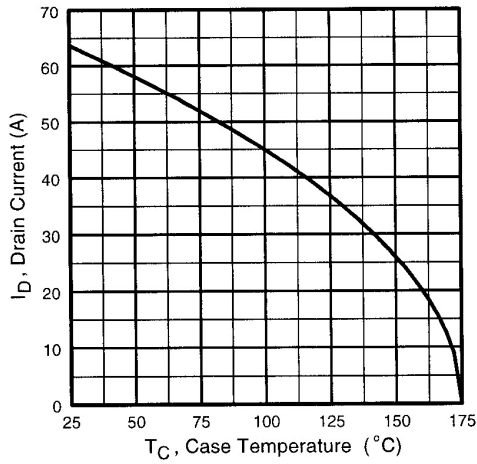
**Fig 4.** Typical Reverse Output Characteristics



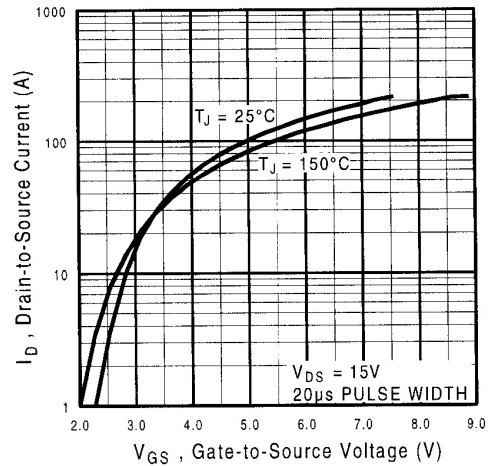
**Fig 5.** Typical Capacitance Vs. Drain-to-Source Voltage



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



**Fig 7.** Maximum Drain Current Vs. Case Temperature



**Fig 8.** Typical Transfer Characteristics

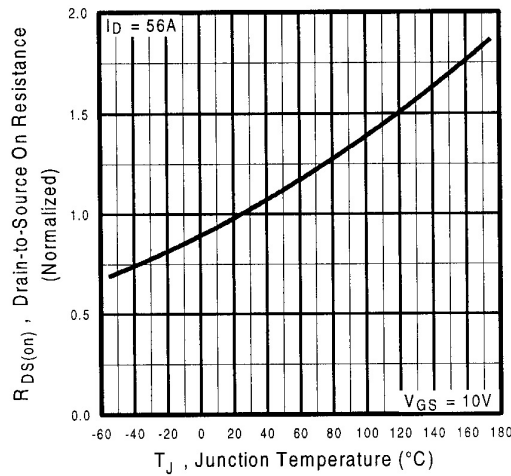


Fig 9. Normalized On-Resistance Vs. Temperature

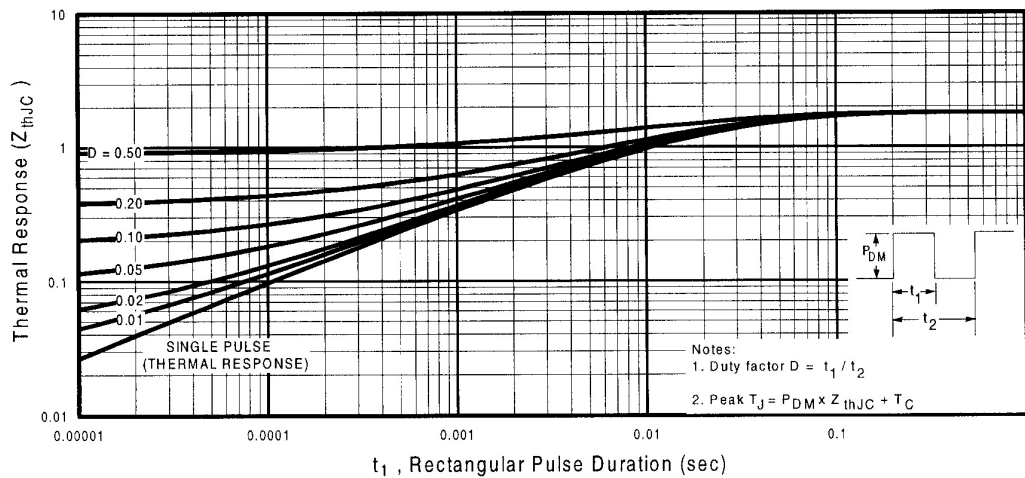


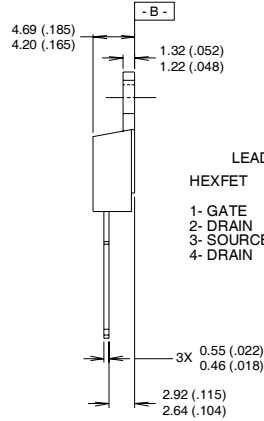
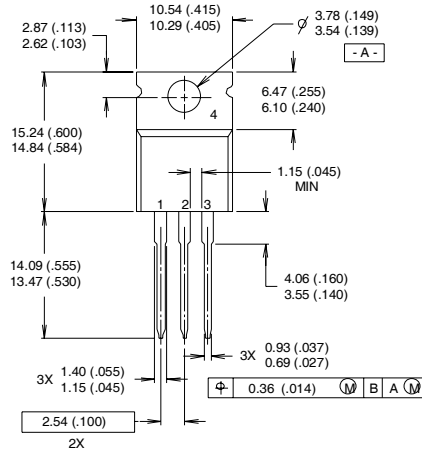
Fig 10. Maximum Effective Transient Thermal Impedance, Junction-to-Case

# IRL3103D1PbF



## TO-220AB Package Outline

Dimensions are shown in millimeters (inches)

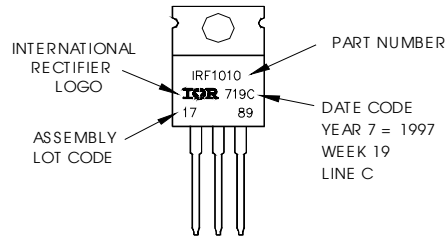


LEAD ASSIGNMENTS	
HEXFET	IGBTs, CoPACK
1- GATE	1- GATE
2- DRAIN	2- COLLECTOR
3- SOURCE	3- EMITTER
4- DRAIN	4- COLLECTOR

- NOTES:
- 1 DIMENSIONING & TOLERANCING PER ANSI Y14.5M, 1982.
  - 2 CONTROLLING DIMENSION : INCH
  - 3 OUTLINE CONFORMS TO JEDEC OUTLINE TO-220AB.
  - 4 HEATSINK & LEAD MEASUREMENTS DO NOT INCLUDE BURRS.

## TO-220AB Part Marking Information

EXAMPLE: THIS IS AN IRF1010  
 LOT CODE 1789  
 ASSEMBLED ON WW 19, 1997  
 IN THE ASSEMBLY LINE "C"  
**Note:** "P" in assembly line  
 position indicates "Lead-Free"



Data and specifications subject to change without notice.



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

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<http://www.irf.com/package/>