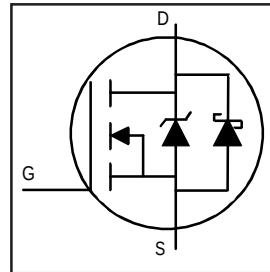


- Copackaged HEXFET® Power MOSFET and Schottky Diode
- Generation 5 Technology
- Logic Level Gate Drive
- Minimize Circuit Inductance
- Ideal For Synchronous Regulator Application

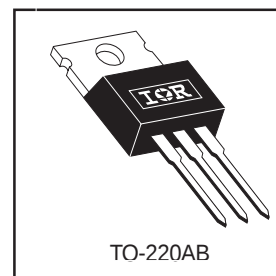


$V_{DSS} = 30V$
$R_{DS(on)} = 0.014\Omega$
$I_D = 54A$

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
$I_D @ T_C = 25^\circ C$	Continuous Drain Current, $V_{GS} @ 10V$	54	A
$I_D @ T_C = 100^\circ C$	Continuous Drain Current, $V_{GS} @ 10V$	34	
I_{DM}	Pulsed Drain Current ①	220	
$P_D @ T_A = 25^\circ C$	Power Dissipation	2.0	W
$P_D @ T_C = 25^\circ C$	Power Dissipation	70	W
	Linear Derating Factor	0.56	W/°C
V_{GS}	Gate-to-Source Voltage	± 16	V
T_J	Operating Junction and	-55 to + 150	°C
T_{STG}	Storage Temperature Range		
	Soldering Temperature, for 10 seconds	300 (1.6mm from case)	
	Mounting torque, 6-32 or M3 screw	10 lbf•in (1.1N•m)	

Thermal Resistance

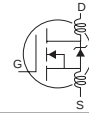
	Parameter	Typ.	Max.	Units
$R_{\theta JC}$	Junction-to-Case	—	1.8	°C/W
$R_{\theta JA}$	Junction-to-Ambient	—	62	

IRL3103D2

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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°C , $I_D = 1\text{mA}$ ③
$R_{DS(on)}$	Static Drain-to-Source On-Resistance	—	—	0.014	Ω	$V_{GS} = 10V, I_D = 32A$ ②
		—	—	0.019		$V_{GS} = 4.5V, I_D = 27A$ 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	$V_{DS} = 25V, I_D = 34A$ ③
I_{DSS}	Drain-to-Source Leakage Current	—	—	0.25	mA	$V_{DS} = 30V, V_{GS} = 0V$
		—	—	35		$V_{DS} = 24V, V_{GS} = 0V, T_J = 125^\circ\text{C}$
I_{GSS}	Gate-to-Source Forward Leakage	—	—	100	nA	$V_{GS} = 16V$
	Gate-to-Source Reverse Leakage	—	—	-100		$V_{GS} = -16V$
Q_g	Total Gate Charge	—	—	44	nC	$I_D = 32A$
Q_{gs}	Gate-to-Source Charge	—	—	14		$V_{DS} = 24V$
Q_{gd}	Gate-to-Drain ("Miller") Charge	—	—	24		$V_{GS} = 4.5V$, See Fig. 6 ②
$t_{d(on)}$	Turn-On Delay Time	—	9.0	—	ns	$V_{DD} = 15V$
t_r	Rise Time	—	210	—		$I_D = 34A$
$t_{d(off)}$	Turn-Off Delay Time	—	20	—		$R_G = 3.4\Omega, V_{GS} = 4.5V$
t_f	Fall Time	—	54	—		$R_D = 0.43\Omega$, ② ③
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	—	2300	—	pF	$V_{GS} = 0V$
C_{oss}	Output Capacitance	—	1100	—		$V_{DS} = 25V$
C_{rss}	Reverse Transfer Capacitance	—	310	—		$f = 1.0\text{MHz}$, See Fig. 5
C_{iss}	Input Capacitance	—	3500	—		$V_{GS} = 0V, V_{DS} = 0V$



Body Diode & Schottky Diode Ratings and Characteristics

	Parameter	Min.	Typ.	Max.	Units	Conditions
$I_F(AV)$	(Schottky)	—	—	5.0	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	—	—	0.6	V	$T_J = 25^\circ\text{C}, I_S = 3.0A, V_{GS} = 0V$ ②
t_{rr}	Reverse Recovery Time	—	51	77	ns	$T_J = 25^\circ\text{C}, I_F = 32A$
Q_{rr}	Reverse Recovery Charge	—	47	71	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

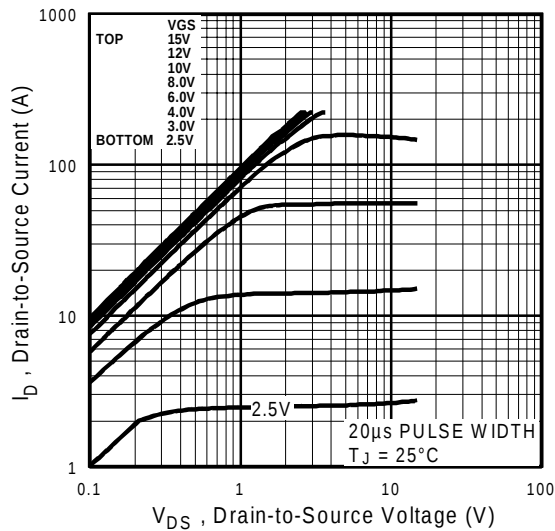


Fig 1. Typical Output Characteristics

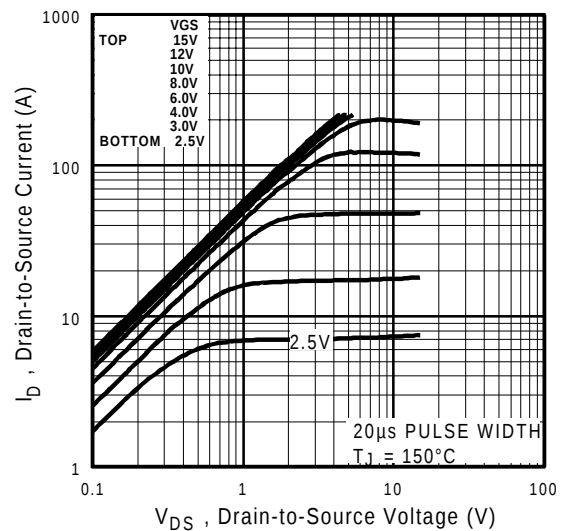


Fig 2. Typical Output Characteristics

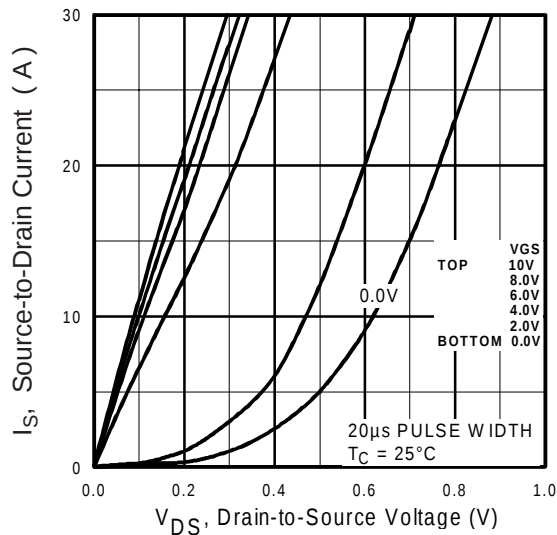


Fig 3. Typical Reverse Output Characteristics

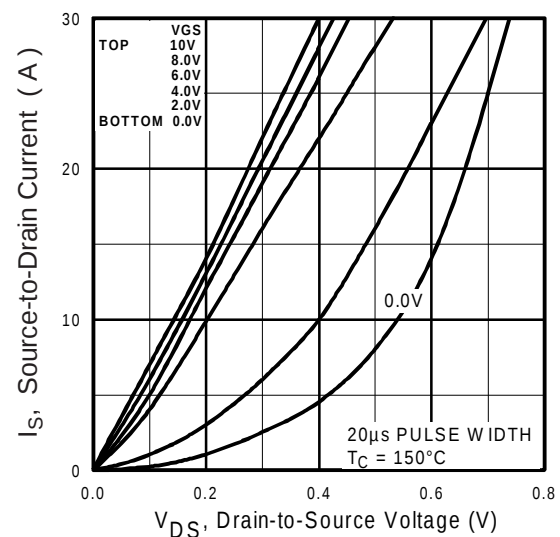


Fig 4. Typical Reverse Output Characteristics

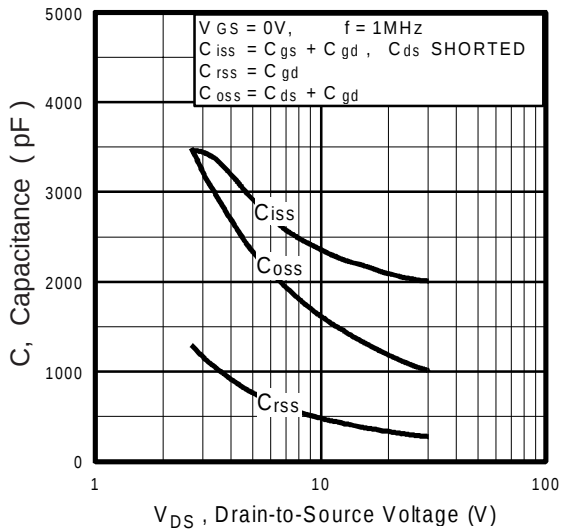


Fig 5. Typical Capacitance Vs. Drain-to-Source Voltage

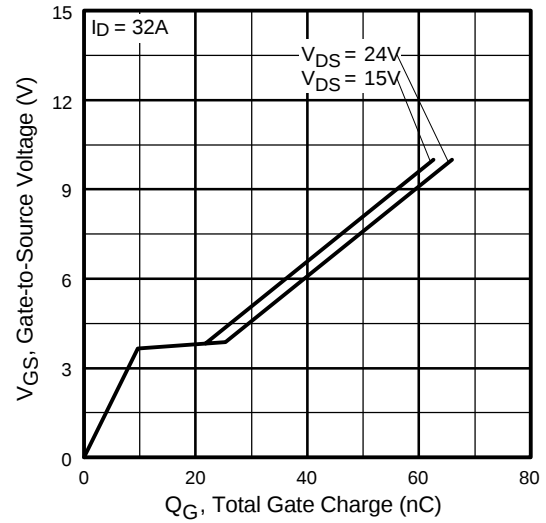


Fig 6. Typical Gate Charge Vs. Gate-to-Source Voltage

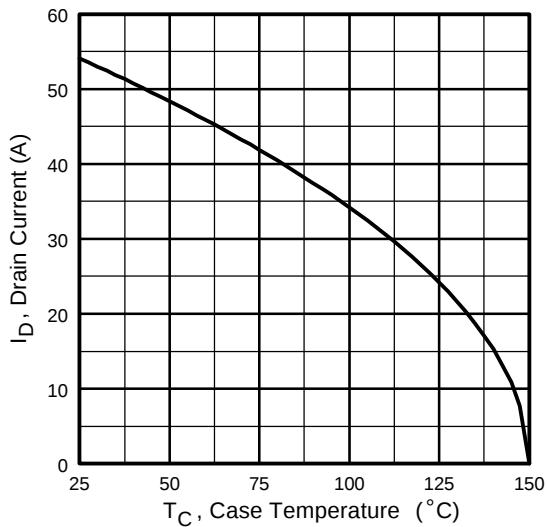


Fig 7. Maximum Drain Current Vs. Case Temperature

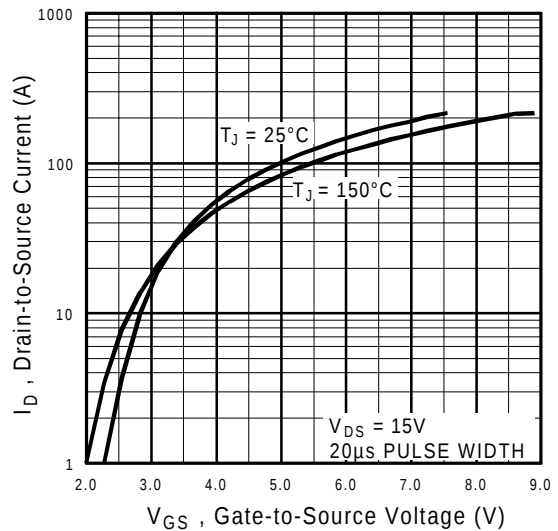


Fig 8. Typical Transfer Characteristics

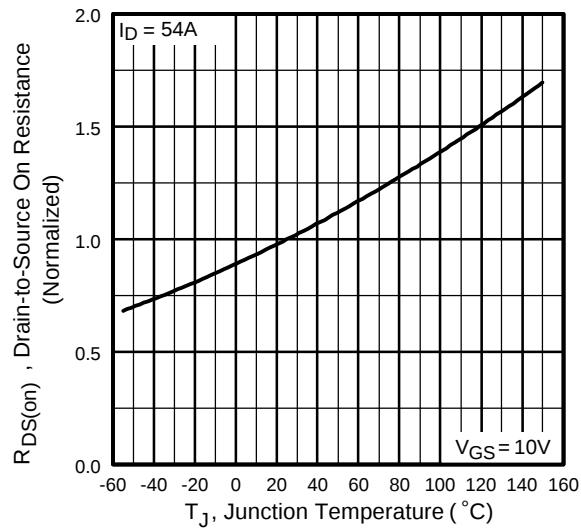


Fig 9. Normalized On-Resistance
Vs. Temperature

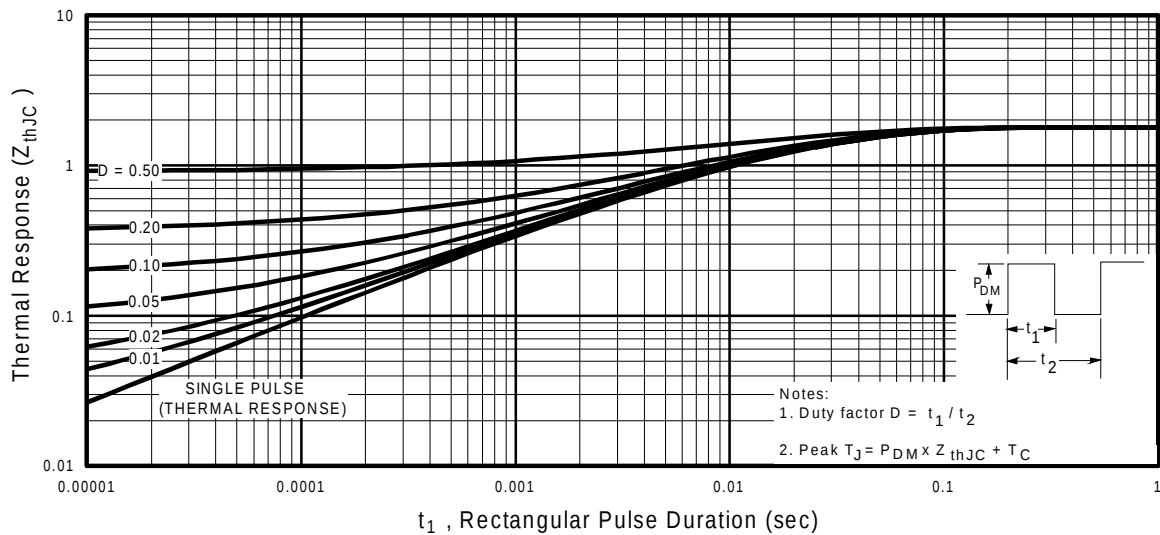


Fig 10. Maximum Effective Transient Thermal Impedance, Junction-to-Case

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TO-220AB Outline

The drawing shows a 20-pin DIP package. The top view includes dimensions for the body width (10.54 (.415) / 10.29 (.405)), pin pitch (1.15 (.045) MIN), and pin width (0.93 (.037) / 0.69 (.027)). The side view shows the package height (15.24 (.600) / 14.84 (.584)) and lead height (1.40 (.055) / 1.15 (.045)). A table of lead assignments is provided on the right.

LEAD ASSIGNMENTS	
1 -	GATE
2 -	DRAIN
3 -	SOURCE
4 -	DRAIN

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.

EXAMPLE : THIS IS AN IRF1010
WITH ASSEMBLY
LOT CODE 9B1M

The diagram shows a MOSFET package with the following markings and labels:

- INTERNATIONAL RECTIFIER LOGO**: Points to the "IR" logo on the package.
- PART NUMBER**: Points to "IRF1010" on the package.
- ASSEMBLY LOT CODE**: Points to "9B 1M" on the package.
- DATE CODE (YYWW)**: Points to "9246" on the package. Below this label, it specifies "YY = YEAR" and "WW = WEEK".

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<http://www.irf.com/> Data and specifications subject to change without notice. 6/97

Note: For the most current drawings please refer to the IR website at:
<http://www.irf.com/package/>