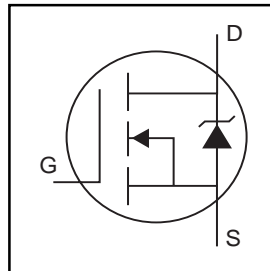


- Advanced Process Technology
- Surface Mount
- Optimized for 4.5V-7.0V Gate Drive
- Ideal for CPU Core DC-DC Converters
- Fast Switching

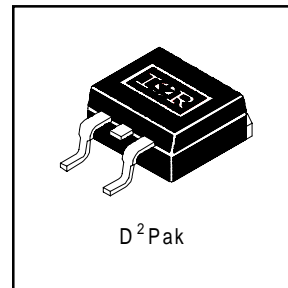
## Description

These HEXFET Power MOSFETs were designed specifically to meet the demands of CPU core DC-DC converters in the PC environment. Advanced processing techniques combined with an optimized gate oxide design results in a die sized specifically to offer maximum efficiency at minimum cost.

The D<sup>2</sup>Pak is a surface mount power package capable of accommodating die sizes up to HEX-4. It provides the highest power capability and the lowest possible on-resistance in any existing surface mount package. The D<sup>2</sup>Pak is suitable for high current applications because of its low internal connection resistance and can dissipate up to 2.0W in a typical surface mount application.



$V_{DSS} = 20V$
$R_{DS(on)} = 0.016\Omega$
$I_D = 48A$



## Absolute Maximum Ratings

	Parameter	Max.	Units
$I_D @ T_C = 25^\circ C$	Continuous Drain Current, $V_{GS} @ 4.5V$ ⑤	48	A
$I_D @ T_C = 100^\circ C$	Continuous Drain Current, $V_{GS} @ 4.5V$ ⑤	30	
$I_{DM}$	Pulsed Drain Current ①⑤	190	
$P_D @ T_C = 25^\circ C$	Power Dissipation	69	W
	Linear Derating Factor	0.56	W/°C
$V_{GS}$	Gate-to-Source Voltage	$\pm 10$	V
$V_{GSM}$	Gate-to-Source Voltage (Start Up Transient, $t_p = 100\mu s$ )	14	V
$E_{AS}$	Single Pulse Avalanche Energy②⑤	270	mJ
$I_{AR}$	Avalanche Current①	29	A
$E_{AR}$	Repetitive Avalanche Energy①	6.9	mJ
dv/dt	Peak Diode Recovery dv/dt ③⑤	5.0	V/ns
$T_J$	Operating Junction and Storage Temperature Range	-55 to + 150	°C
$T_{STG}$			

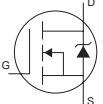
## Thermal Resistance

	Parameter	Typ.	Max.	Units
$R_{\theta JC}$	Junction-to-Case	—	1.8	°C/W
$R_{\theta JA}$	Junction-to-Ambient ( PCB Mounted, steady-state)**	—	40	

## Electrical Characteristics @ T<sub>J</sub> = 25°C (unless otherwise specified)

	Parameter	Min.	Typ.	Max.	Units	Conditions
V <sub>(BR)DSS</sub>	Drain-to-Source Breakdown Voltage	20	—	—	V	V <sub>GS</sub> = 0V, I <sub>D</sub> = 250μA
dV <sub>(BR)DSS</sub> /dT <sub>J</sub>	Breakdown Voltage Temp. Coefficient	—	0.029	—	V/°C	Reference to 25°C, I <sub>D</sub> = 1mA <sup>⑤</sup>
R <sub>DS(on)</sub>	Static Drain-to-Source On-Resistance	—	—	0.019	mΩ	V <sub>GS</sub> = 4.5V, I <sub>D</sub> = 29A <sup>④</sup>
		—	—	0.016		V <sub>GS</sub> = 7.0V, I <sub>D</sub> = 29A <sup>④</sup>
V <sub>GS(th)</sub>	Gate Threshold Voltage	0.70	—	—	V	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 250μA
g <sub>fs</sub>	Forward Transconductance	28	—	—	S	V <sub>DS</sub> = 16V, I <sub>D</sub> = 29A <sup>⑤</sup>
I <sub>DSS</sub>	Drain-to-Source Leakage Current	—	—	25	μA	V <sub>DS</sub> = 20V, V <sub>GS</sub> = 0V
		—	—	250		V <sub>DS</sub> = 10V, V <sub>GS</sub> = 0V, T <sub>J</sub> = 150°C
I <sub>GSS</sub>	Gate-to-Source Forward Leakage	—	—	100	nA	V <sub>GS</sub> = 10V
	Gate-to-Source Reverse Leakage	—	—	-100		V <sub>GS</sub> = -10V
Q <sub>g</sub>	Total Gate Charge	—	—	43	nC	I <sub>D</sub> = 29A
Q <sub>gs</sub>	Gate-to-Source Charge	—	—	12		V <sub>DS</sub> = 16V
Q <sub>gd</sub>	Gate-to-Drain ("Miller") Charge	—	—	13		V <sub>GS</sub> = 4.5V, See Fig. 6 <sup>④⑤</sup>
t <sub>d(on)</sub>	Turn-On Delay Time	—	9.8	—	ns	V <sub>DD</sub> = 10V
t <sub>r</sub>	Rise Time	—	100	—		I <sub>D</sub> = 29A
t <sub>d(off)</sub>	Turn-Off Delay Time	—	63	—		R <sub>G</sub> = 9.5mΩ, V <sub>GS</sub> = 4.5V
t <sub>f</sub>	Fall Time	—	82	—		R <sub>D</sub> = 0.3mΩ, <sup>④⑤</sup>
L <sub>S</sub>	Internal Source Inductance	—	7.5	—	nH	Between lead, and center of die contact
C <sub>iSS</sub>	Input Capacitance	—	2000	—	pF	V <sub>GS</sub> = 0V
C <sub>oSS</sub>	Output Capacitance	—	800	—		V <sub>DS</sub> = 15V
C <sub>rSS</sub>	Reverse Transfer Capacitance	—	290	—		f = 1.0MHz, See Fig. 5 <sup>⑤</sup>

## Source-Drain Ratings and Characteristics

	Parameter	Min.	Typ.	Max.	Units	Conditions
I <sub>S</sub>	Continuous Source Current (Body Diode)	—	—	48	A	MOSFET symbol showing the integral reverse p-n junction diode. 
I <sub>SM</sub>	Pulsed Source Current (Body Diode) <sup>①⑤</sup>	—	—	190		
V <sub>SD</sub>	Diode Forward Voltage	—	—	1.3	V	T <sub>J</sub> = 25°C, I <sub>S</sub> = 29A, V <sub>GS</sub> = 0V <sup>④</sup>
t <sub>rr</sub>	Reverse Recovery Time	—	68	100	ns	T <sub>J</sub> = 25°C, I <sub>F</sub> = 29A
Q <sub>rr</sub>	Reverse Recovery Charge	—	130	190	nC	di/dt = 100A/μs <sup>④⑤</sup>
t <sub>on</sub>	Forward Turn-On Time	Intrinsic turn-on time is negligible (turn-on is dominated by L <sub>S</sub> +L <sub>D</sub> )				

### Notes:

① Repetitive rating; pulse width limited by max. junction temperature.

② Starting T<sub>J</sub> = 25°C, L = 0.64mH  
R<sub>G</sub> = 25mΩ, I<sub>AS</sub> = 29A.

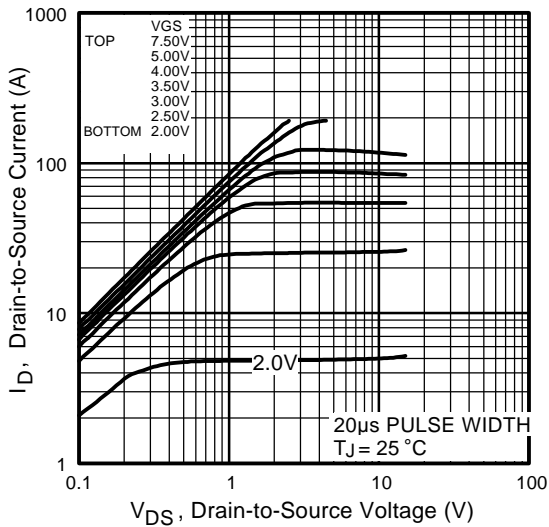
③ I<sub>SD</sub> ≤ 29A, di/dt ≤ 63A/μs, V<sub>DD</sub> ≤ V<sub>(BR)DSS</sub>,  
T<sub>J</sub> ≤ 150°C

④ Pulse width ≤ 300μs; duty cycle ≤ 2%.

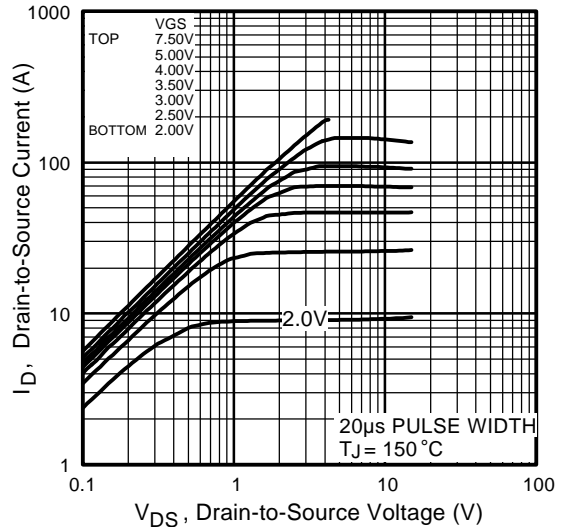
⑤ Uses IRL3202 data and test conditions

\*\* When mounted on FR-4 board using minimum recommended footprint.

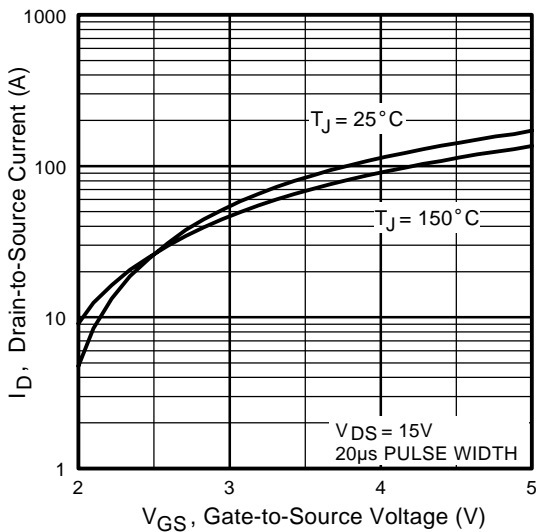
For recommended footprint and soldering techniques refer to application note #AN-994.



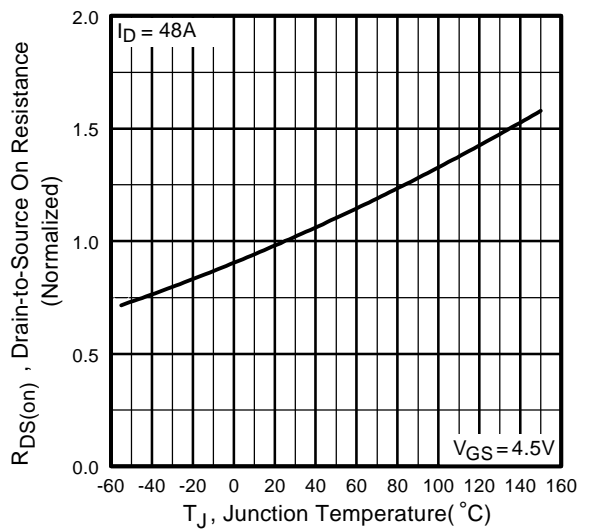
**Fig 1.** Typical Output Characteristics



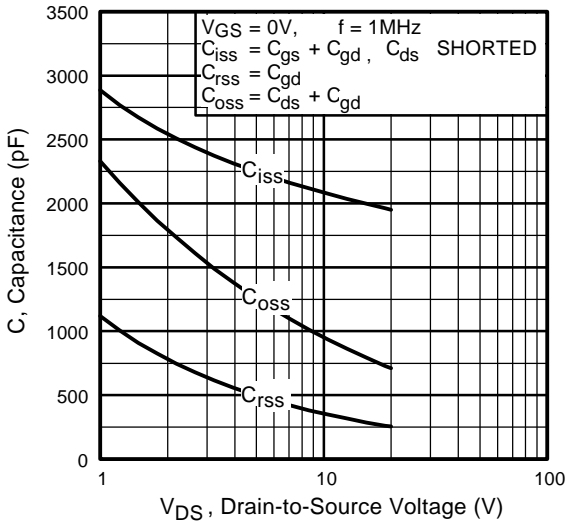
**Fig 2.** Typical Output Characteristics



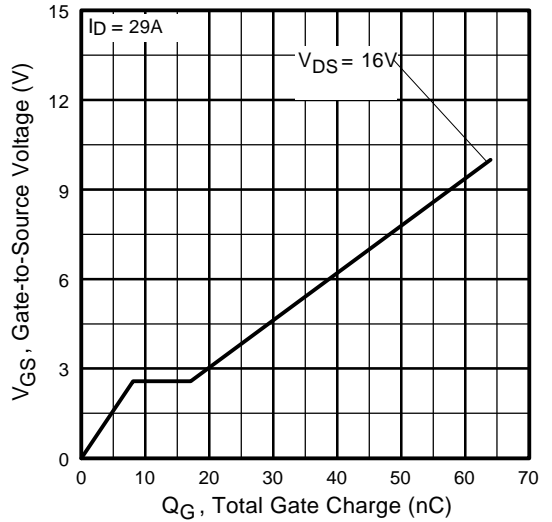
**Fig 3.** Typical Transfer Characteristics



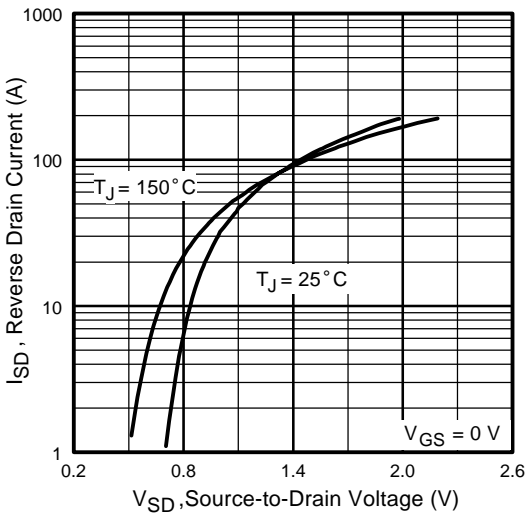
**Fig 4.** Normalized On-Resistance Vs. Temperature



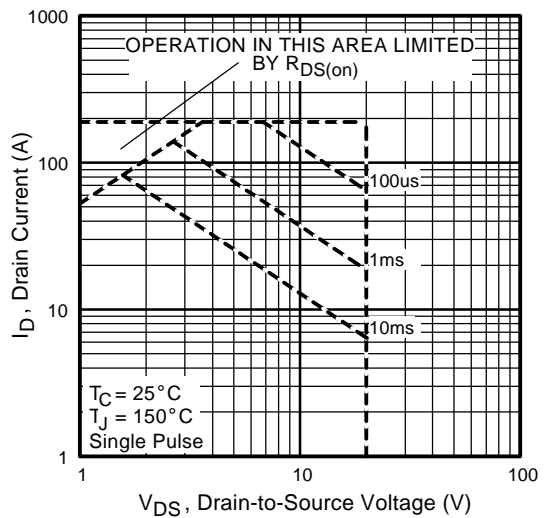
**Fig 5.** Typical Capacitance Vs. Drain-to-Source Voltage



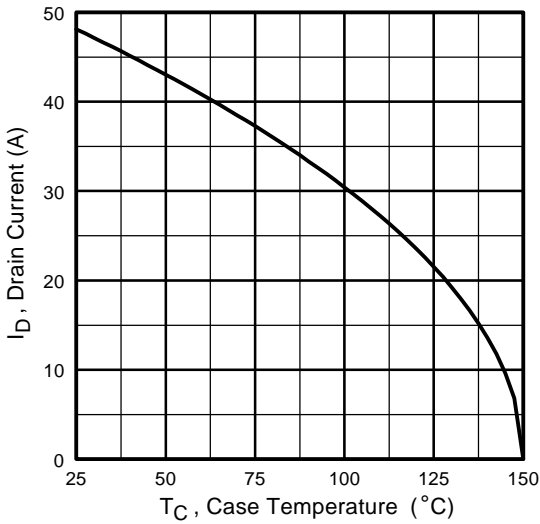
**Fig 6.** Typical Gate Charge Vs. Gate-to-Source Voltage



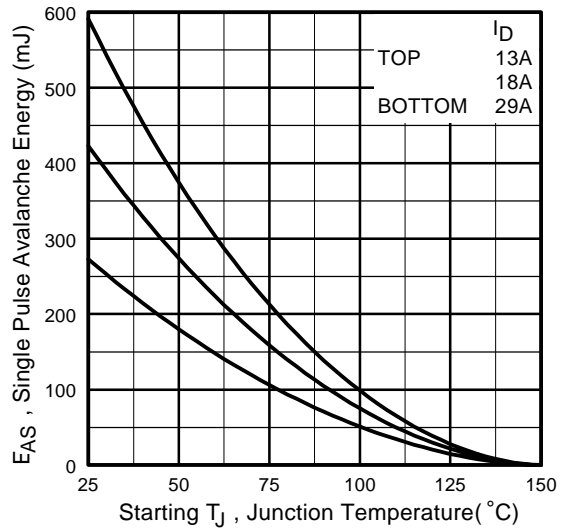
**Fig 7.** Typical Source-Drain Diode Forward Voltage



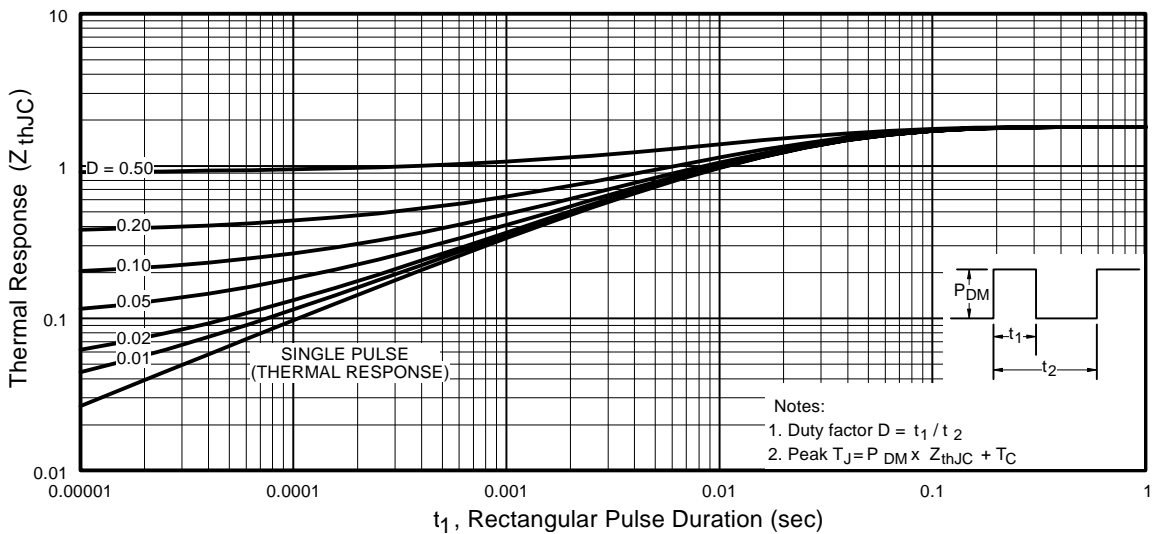
**Fig 8.** Maximum Safe Operating Area



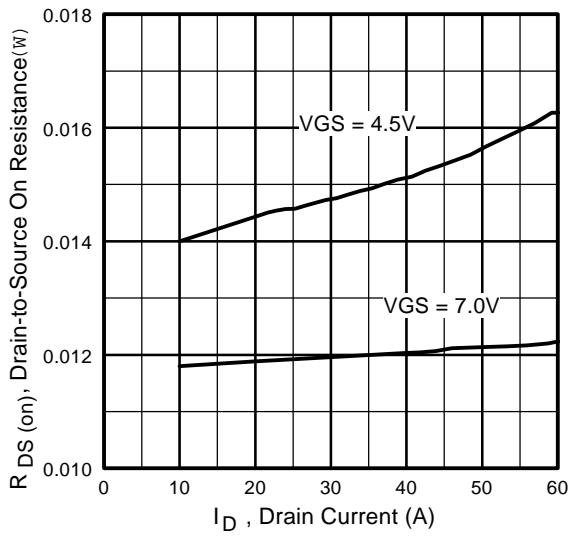
**Fig 9.** Maximum Drain Current Vs. Case Temperature



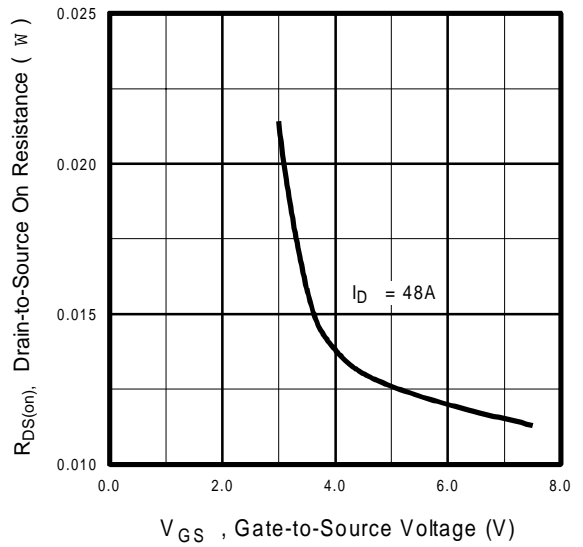
**Fig 10.** Maximum Avalanche Energy Vs. Drain Current



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

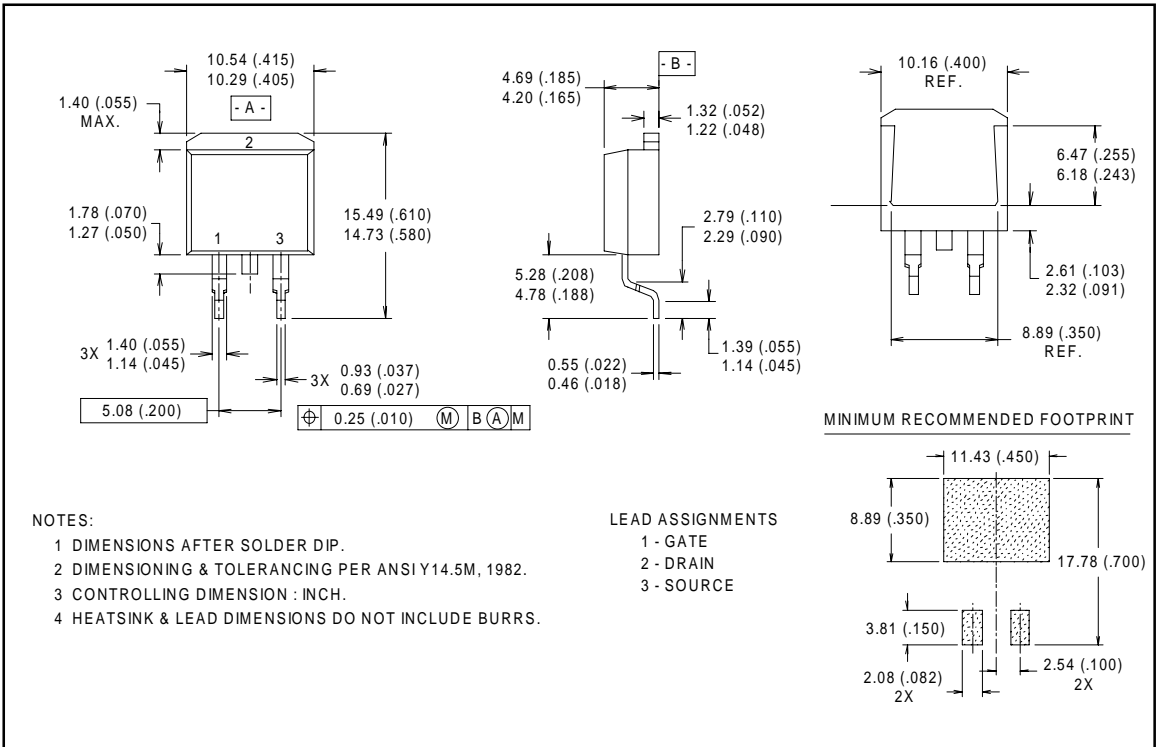


**Fig 12.** On-Resistance Vs. Drain Current



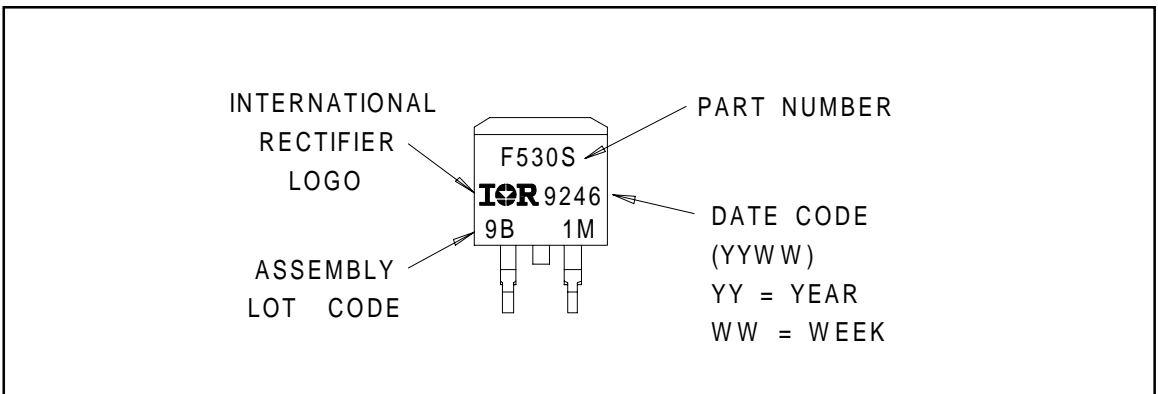
**Fig 13.** On-Resistance Vs. Gate Voltage

## D<sup>2</sup>Pak Package Outline



## Part Marking Information

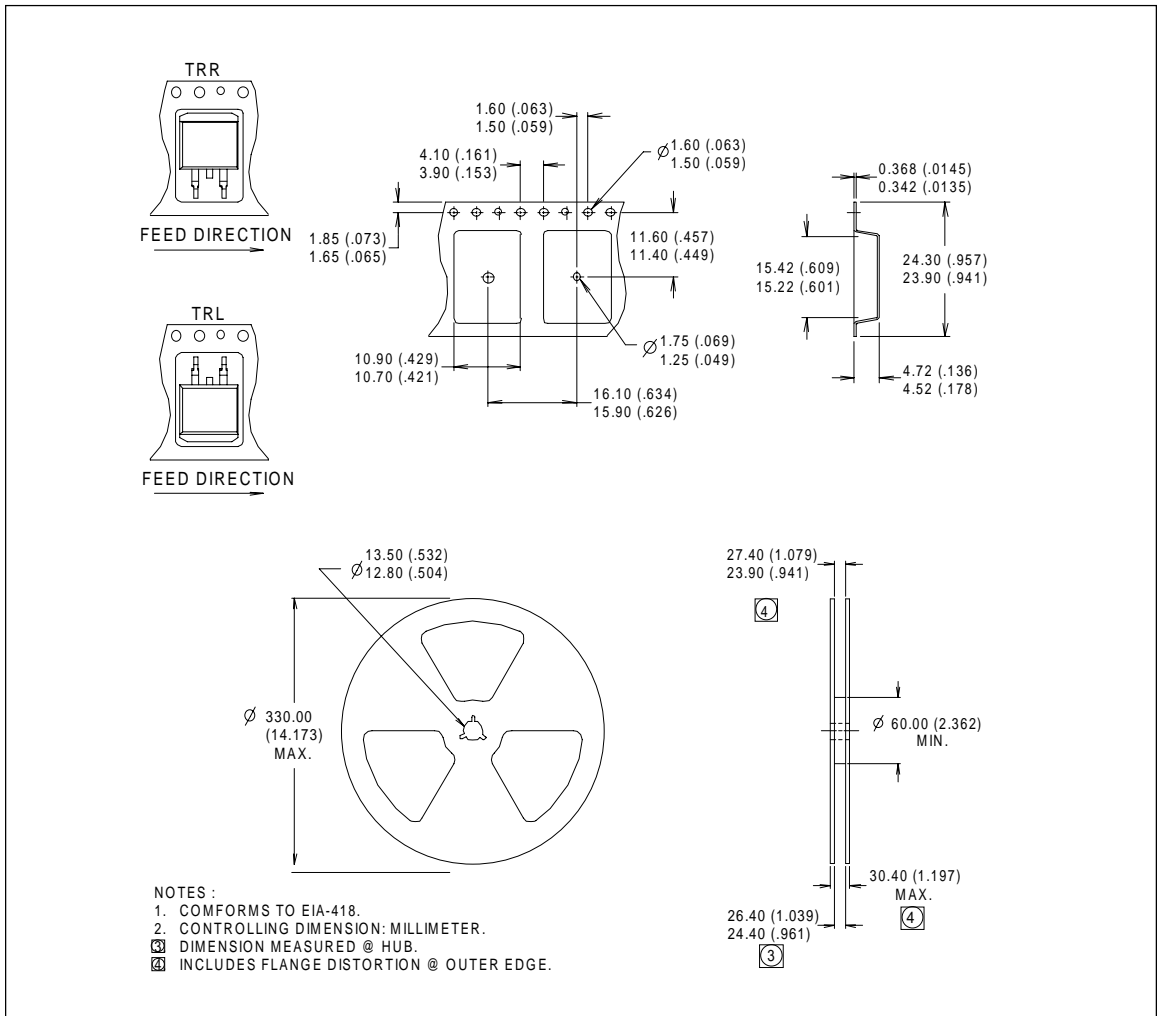
**D<sup>2</sup>Pak**



# IRL3202S

## Tape & Reel Information

D<sup>2</sup>Pak



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