

**IRF2804S**  
**IRF2804L**

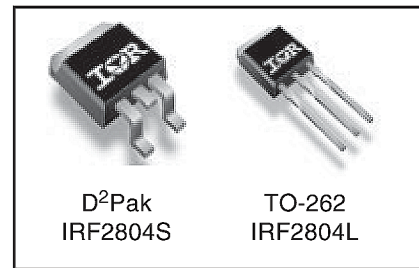
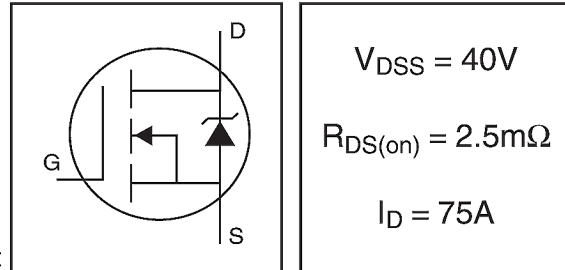
HEXFET® Power MOSFET

**Features**

- Advanced Process Technology
- Ultra Low On-Resistance
- 175°C Operating Temperature
- Fast Switching
- Repetitive Avalanche Allowed up to Tjmax

**Description**

Specifically designed for Automotive applications, this HEXFET® Power MOSFET utilizes the latest processing techniques to achieve extremely low on-resistance per silicon area. Additional features of this design are a 175°C junction operating temperature, fast switching speed and improved repetitive avalanche rating. These features combine to make this design an extremely efficient and reliable device for use in Automotive applications and a wide variety of other applications.



**Absolute Maximum Ratings**

	Parameter	Max.	Units
$I_D @ T_C = 25^\circ C$	Continuous Drain Current, $V_{GS} @ 10V$ (Silicon limited)	210	A
$I_D @ T_C = 100^\circ C$	Continuous Drain Current, $V_{GS} @ 10V$ (See Fig.9)	150	
$I_D @ T_C = 25^\circ C$	Continuous Drain Current, $V_{GS} @ 10V$ (Package limited)	75	
$I_{DM}$	Pulsed Drain Current ①	1080	
$P_D @ T_C = 25^\circ C$	Power Dissipation	200	W
	Linear Derating Factor	1.3	W/°C
$V_{GS}$	Gate-to-Source Voltage	$\pm 20$	V
$E_{AS}$	Single Pulse Avalanche Energy②	670	mJ
$E_{AS}$ (tested)	Single Pulse Avalanche Energy Tested Value②	1160	
$I_{AR}$	Avalanche Current③	See Fig.12a, 12b, 15, 16	A
$E_{AR}$	Repetitive Avalanche Energy③		mJ
$T_J$	Operating Junction and	-55 to + 175	°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	—	0.75	°C/W
$R_{\theta CS}$	Case-to-Sink, Flat, Greased Surface	0.50	—	
$R_{\theta JA}$	Junction-to-Ambient	—	62	

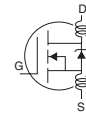
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# IRF2804S/IRF2804L

International  
 Rectifier

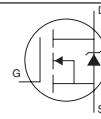
## Electrical Characteristics @ T<sub>J</sub> = 25°C (unless otherwise specified)

	Parameter	Min.	Typ.	Max.	Units	Conditions
V <sub>(BR)DSS</sub>	Drain-to-Source Breakdown Voltage	40	—	—	V	V <sub>GS</sub> = 0V, I <sub>D</sub> = 250μA
ΔV <sub>(BR)DSS/ΔT<sub>J</sub></sub>	Breakdown Voltage Temp. Coefficient	—	0.031	—	V/°C	Reference to 25°C, I <sub>D</sub> = 1mA
R <sub>DS(on)</sub>	Static Drain-to-Source On-Resistance	—	1.8	2.5	mΩ	V <sub>GS</sub> = 10V, I <sub>D</sub> = 75A ④
V <sub>GS(th)</sub>	Gate Threshold Voltage	2.0	—	4.0	V	V <sub>DS</sub> = 10V, I <sub>D</sub> = 250μA
g <sub>fs</sub>	Forward Transconductance	130	—	—	S	V <sub>DS</sub> = 10V, I <sub>D</sub> = 75A
I <sub>DSS</sub>	Drain-to-Source Leakage Current	—	—	20	μA	V <sub>DS</sub> = 40V, V <sub>GS</sub> = 0V
		—	—	250		V <sub>DS</sub> = 40V, V <sub>GS</sub> = 0V, T <sub>J</sub> = 125°C
I <sub>GSS</sub>	Gate-to-Source Forward Leakage	—	—	200	nA	V <sub>GS</sub> = 20V
	Gate-to-Source Reverse Leakage	—	—	-200		V <sub>GS</sub> = -20V
Q <sub>g</sub>	Total Gate Charge	—	160	240	nC	I <sub>D</sub> = 75A
Q <sub>gs</sub>	Gate-to-Source Charge	—	41	62		V <sub>DS</sub> = 32V
Q <sub>gd</sub>	Gate-to-Drain ("Miller") Charge	—	66	99		V <sub>GS</sub> = 10V ④
t <sub>d(on)</sub>	Turn-On Delay Time	—	13	—	ns	V <sub>DD</sub> = 20V
t <sub>r</sub>	Rise Time	—	120	—		I <sub>D</sub> = 75A
t <sub>d(off)</sub>	Turn-Off Delay Time	—	130	—		R <sub>G</sub> = 2.5Ω
t <sub>f</sub>	Fall Time	—	130	—		V <sub>GS</sub> = 10V ④
L <sub>D</sub>	Internal Drain Inductance	—	4.5	—	nH	Between lead, 6mm (0.25in.) from package and center of die contact
L <sub>S</sub>	Internal Source Inductance	—	7.5	—		
C <sub>ISS</sub>	Input Capacitance	—	6450	—	pF	V <sub>GS</sub> = 0V
C <sub>OSS</sub>	Output Capacitance	—	1690	—		V <sub>DS</sub> = 25V
C <sub>RSS</sub>	Reverse Transfer Capacitance	—	840	—		f = 1.0MHz, See Fig. 5
C <sub>OSS</sub>	Output Capacitance	—	5350	—		V <sub>GS</sub> = 0V, V <sub>DS</sub> = 1.0V, f = 1.0MHz
C <sub>OSS</sub>	Output Capacitance	—	1520	—		V <sub>GS</sub> = 0V, V <sub>DS</sub> = 32V, f = 1.0MHz
C <sub>OSS eff.</sub>	Effective Output Capacitance ⑤	—	2210	—		V <sub>GS</sub> = 0V, V <sub>DS</sub> = 0V to 32V



## Source-Drain Ratings and Characteristics

	Parameter	Min.	Typ.	Max.	Units	Conditions
I <sub>S</sub>	Continuous Source Current (Body Diode)	—	—	210	A	MOSFET symbol showing the integral reverse p-n junction diode.
I <sub>SM</sub>	Pulsed Source Current (Body Diode) ①	—	—	1080		
V <sub>SD</sub>	Diode Forward Voltage	—	—	1.3	V	T <sub>J</sub> = 25°C, I <sub>S</sub> = 75A, V <sub>GS</sub> = 0V ④
t <sub>rr</sub>	Reverse Recovery Time	—	56	84	ns	T <sub>J</sub> = 25°C, I <sub>F</sub> = 75A, V <sub>DD</sub> = 20V
Q <sub>rr</sub>	Reverse Recovery Charge	—	67	100	nC	di/dt = 100A/μs ④
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> )				

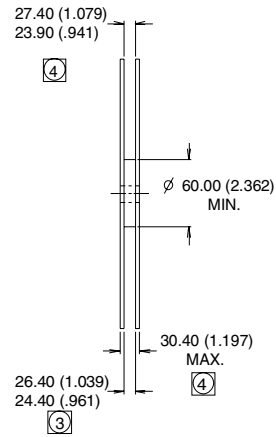
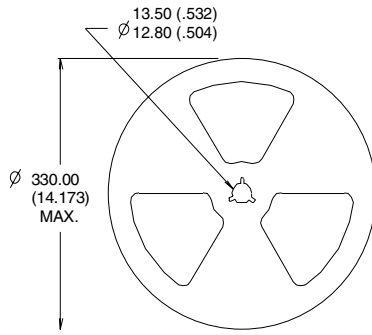
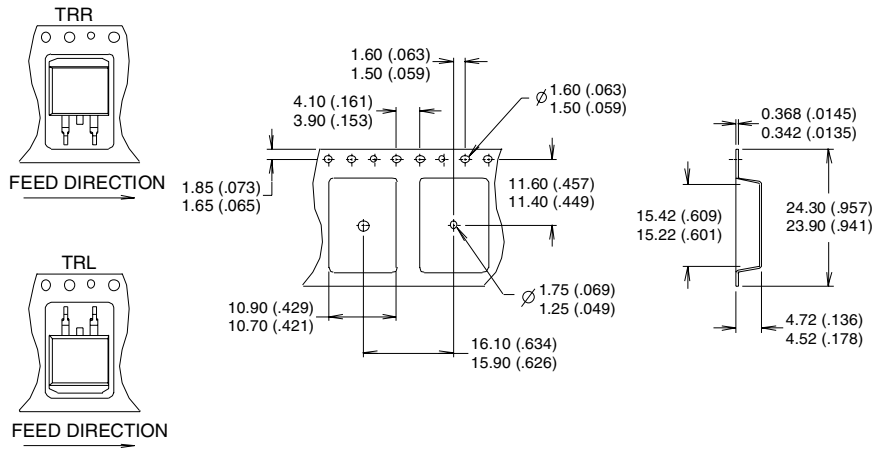


### Notes:

- ① Repetitive rating; pulse width limited by max. junction temperature. (See fig. 11).
- ② Limited by T<sub>Jmax</sub>; starting T<sub>J</sub> = 25°C, L=0.24mH  
R<sub>G</sub> = 25Ω, I<sub>AS</sub> = 75A, V<sub>GS</sub> = 10V. Part not recommended for use above this value.
- ③ I<sub>SD</sub> ≤ 75A, di/dt ≤ 220A/μs, V<sub>DD</sub> ≤ V<sub>(BR)DSS</sub>, T<sub>J</sub> ≤ 175°C
- ④ Pulse width ≤ 1.0ms; duty cycle ≤ 2%.
- ⑤ C<sub>OSS eff.</sub> is a fixed capacitance that gives the same charging time as C<sub>OSS</sub> while V<sub>DS</sub> is rising from 0 to 80% V<sub>DSS</sub>.
- ⑥ Limited by T<sub>Jmax</sub>, see Fig.12a, 12b, 15, 16 for typical repetitive avalanche performance.
- ⑦ This value determined from sample failure population. 100% tested to this value in production.



## D<sup>2</sup>Pak Tape & Reel Information



- NOTES :
1. CONFORMS TO EIA-418.
  2. CONTROLLING DIMENSION: MILLIMETER.
  - ③ DIMENSION MEASURED @ HUB.
  - ④ INCLUDES FLANGE DISTORTION @ OUTER EDGE.

Data and specifications subject to change without notice.  
 This product has been designed and qualified for the Industrial market.  
 Qualification Standards can be found on IR's Web site.