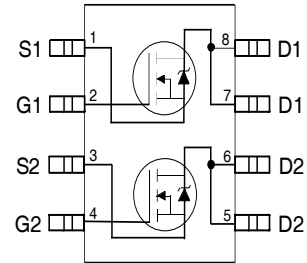


**Features**

- $V_{DS}(V)=30V$
- $R_{DS(ON)} < 29m\ \Omega$  ( $V_{GS} = 10V$ )
- $R_{DS(ON)} < 46\ m\ \Omega$  ( $V_{GS} = 4.5V$ )
- Generation V Technology
- Ultra Low On-Resistance
- Surface Mount
- Fully Avalanche Rated
- Lead-Free



Top View

**Description**

The SOP-8 has been modified through a customized eadframe for enhanced thermal characteristics and multiple-die capability making it ideal in a variety of powerapplications. With theseimprovements,multiple devices can be usedinapplication with dramatica v reduced board space. The package is designed for vapor phase, infra red, or wave sodering techniques.

**Absolute Maximum Ratings (  $T_A = 25^\circ C$  Unless Otherwise Noted)**

	Symbol	Maximum	Units
Drain-Source Voltage	$V_{DS}$	30	V
Gate-Source Voltage	$V_{GS}$	$\pm 20$	
Continuous Drain Current <sup>①</sup>	$I_D$	$T_A = 25^\circ C$	A
		$T_A = 70^\circ C$	
Pulsed Drain Current	$I_{DM}$	30	A
Continuous Source Current (Diode Conduction)	$I_S$	2.5	
Maximum Power Dissipation <sup>②</sup>	$P_D$	$T_A = 25^\circ C$	W
		$T_A = 70^\circ C$	
Single Pulse Avalanche Energy <sup>②</sup>	$E_{AS}$	82	mJ
Avalanche Current	$I_{AR}$	4.0	A
Repetitive Avalanche Energy	$E_{AR}$	0.20	mJ
Peak Diode Recovery $dv/dt$ <sup>③</sup>	$dv/dt$	5.8	V/ ns
Junction and Storage Temperature Range	$T_J, T_{STG}$	-55 to + 150	$^\circ C$

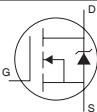
**Thermal Resistance Ratings**

Parameter	Symbol	Limit	Units
Maximum Junction-to-Ambient <sup>①</sup>	$R_{\theta JA}$	62.5	$^\circ C/W$

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

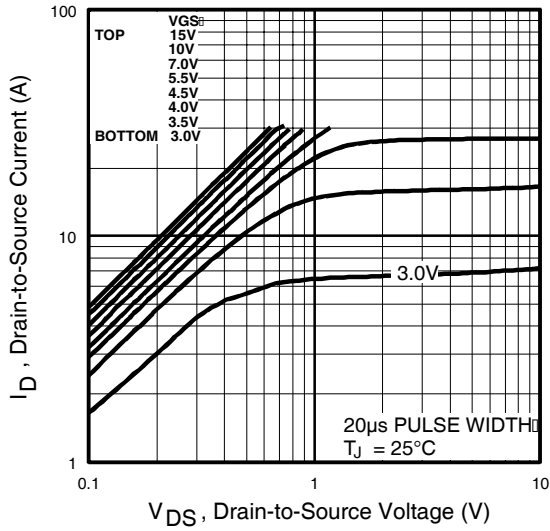
	Parameter	Min.	Typ.	Max.	Units	Conditions
V <sub>(BR)DSS</sub>	Drain-to-Source Breakdown Voltage	30			V	V <sub>GS</sub> = 0V, I <sub>D</sub> = 250μA
ΔV <sub>(BR)DSS</sub> /ΔT <sub>J</sub>	Breakdown Voltage Temp. Coefficient		0.022		V/°C	Reference to 25°C, I <sub>D</sub> = 1mA
R <sub>DS(on)</sub>	Static Drain-to-Source On-Resistance		23	29	mΩ	V <sub>GS</sub> = 10V, I <sub>D</sub> = 5.8A ④
			32	46		V <sub>GS</sub> = 4.5V, I <sub>D</sub> = 4.7A ④
V <sub>GS(th)</sub>	Gate Threshold Voltage	1.0			V	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 250μA
g <sub>fs</sub>	Forward Transconductance		14		S	V <sub>DS</sub> = 15V, I <sub>D</sub> = 5.8A
I <sub>DSS</sub>	Drain-to-Source Leakage Current			1.0	μA	V <sub>DS</sub> = 24V, V <sub>GS</sub> = 0V
				25		V <sub>DS</sub> = 24V, V <sub>GS</sub> = 0V, T <sub>J</sub> = 55°C
I <sub>GSS</sub>	Gate-to-Source Forward Leakage			100	nA	V <sub>GS</sub> = 20V
	Gate-to-Source Reverse Leakage			-100		V <sub>GS</sub> = -20V
Q <sub>g</sub>	Total Gate Charge		22	33	nC	I <sub>D</sub> = 5.8A
Q <sub>gs</sub>	Gate-to-Source Charge		2.6	3.9		V <sub>DS</sub> = 15V
Q <sub>gd</sub>	Gate-to-Drain ("Miller") Charge		6.4	9.6		V <sub>GS</sub> = 10V, See Fig. 10 ④
t <sub>d(on)</sub>	Turn-On Delay Time		8.1	12	ns	V <sub>DD</sub> = 15V
t <sub>r</sub>	Rise Time		8.9	13		I <sub>D</sub> = 1.0A
t <sub>d(off)</sub>	Turn-Off Delay Time		26	39		R <sub>G</sub> = 6.0Ω
t <sub>f</sub>	Fall Time		17	26		R <sub>D</sub> = 15Ω ④
C <sub>iss</sub>	Input Capacitance		650		pF	V <sub>GS</sub> = 0V
C <sub>oss</sub>	Output Capacitance		320			V <sub>DS</sub> = 25V
C <sub>rss</sub>	Reverse Transfer Capacitance		130			f = 1.0MHz, See Fig. 9

**Source-Drain Ratings and Characteristics**

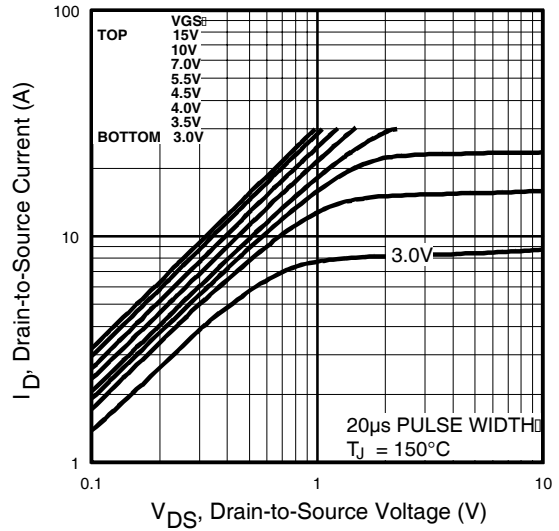
	Parameter	Min.	Typ.	Max.	Units	Conditions
I <sub>S</sub>	Continuous Source Current (Body Diode)			2.5	A	MOSFET symbol showing the integral reverse p-n junction diode. 
I <sub>SM</sub>	Pulsed Source Current (Body Diode) ①			30		
V <sub>SD</sub>	Diode Forward Voltage		0.78	1.0	V	T <sub>J</sub> = 25°C, I <sub>S</sub> = 1.7A, V <sub>GS</sub> = 0V ③
t <sub>rr</sub>	Reverse Recovery Time		45	68	ns	T <sub>J</sub> = 25°C, I <sub>F</sub> = 1.7A
Q <sub>rr</sub>	Reverse Recovery Charge		58	87	nC	di/dt = 100A/μs ③

**Notes:**

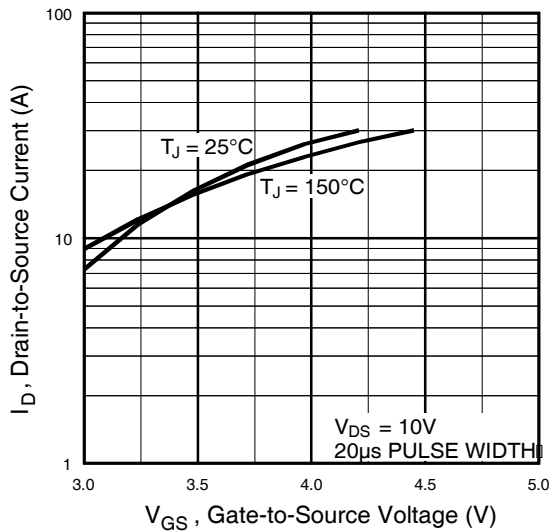
- ① Repetitive rating; pulse width limited by max. junction temperature. ( See fig. 11 )
- ② Starting T<sub>J</sub> = 25°C, L = 10mH  
R<sub>G</sub> = 25Ω, I<sub>AS</sub> = 4.0A.
- ③ I<sub>SD</sub> ≤ 4.0A, di/dt ≤ 74A/μs, V<sub>DD</sub> ≤ V<sub>(BR)DSS</sub>,  
T<sub>J</sub> ≤ 150°C
- ④ Pulse width ≤ 300μs; duty cycle ≤ 2%.
- ⑤ Surface mounted on FR-4 board, t ≤ 10sec.



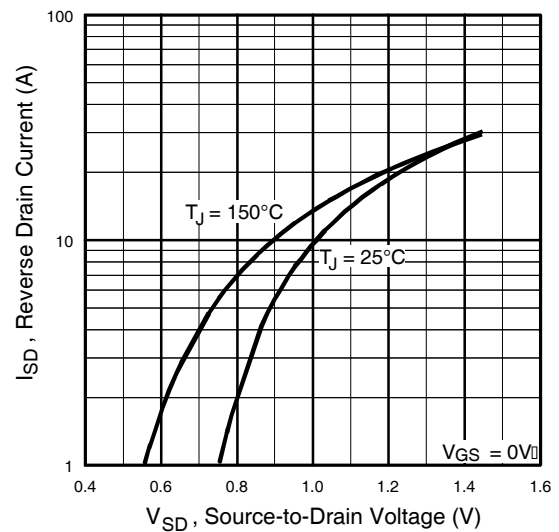
**Fig 1.** Typical Output Characteristics



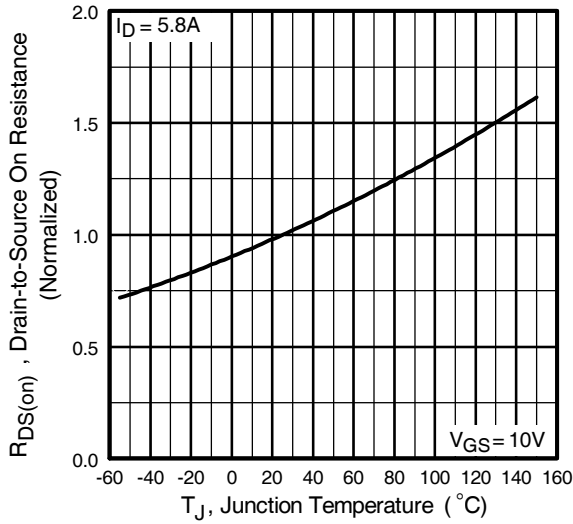
**Fig 2.** Typical Output Characteristics



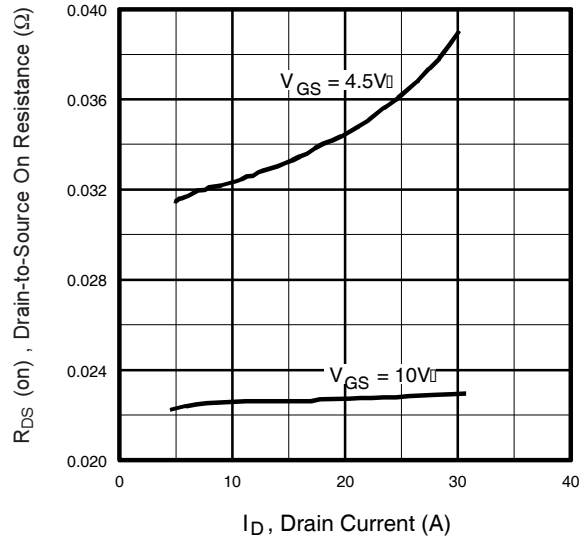
**Fig 3.** Typical Transfer Characteristics



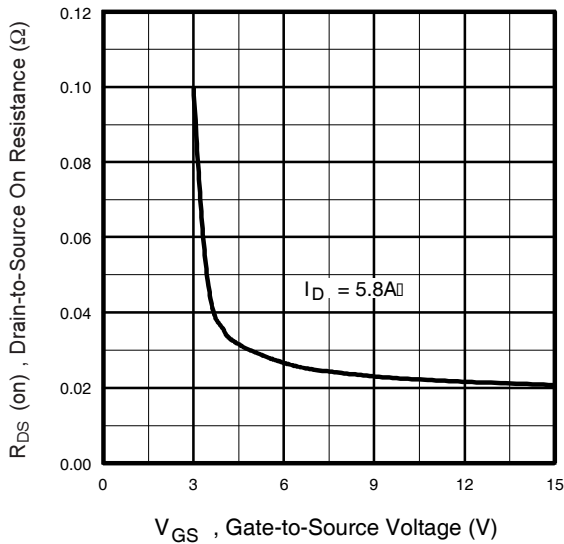
**Fig 4.** Typical Source-Drain Diode Forward Voltage



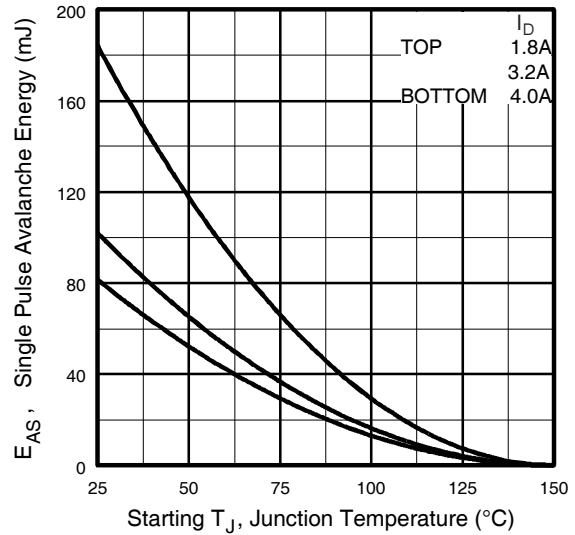
**Fig 5.** Normalized On-Resistance Vs. Temperature



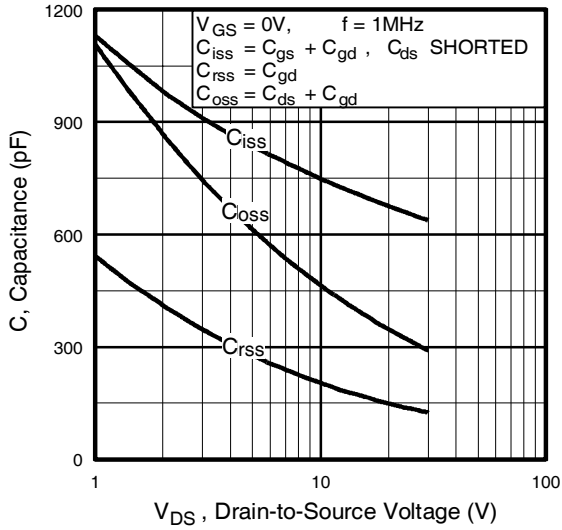
**Fig 6.** Typical On-Resistance Vs. Drain Current



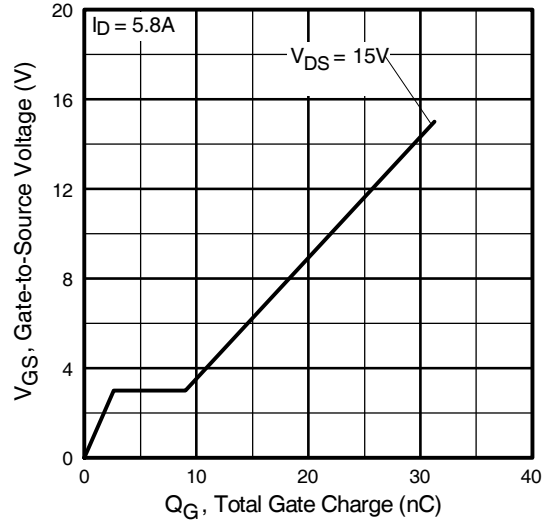
**Fig 7.** Typical On-Resistance Vs. Gate Voltage



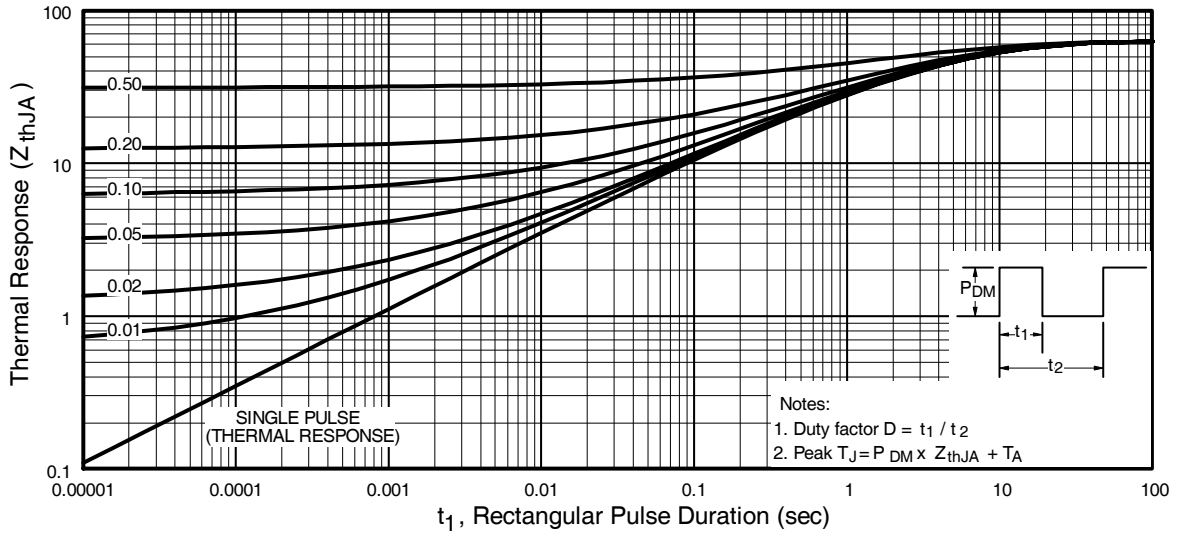
**Fig 8.** Maximum Avalanche Energy Vs. Drain Current



**Fig 9.** Typical Capacitance Vs. Drain-to-Source Voltage

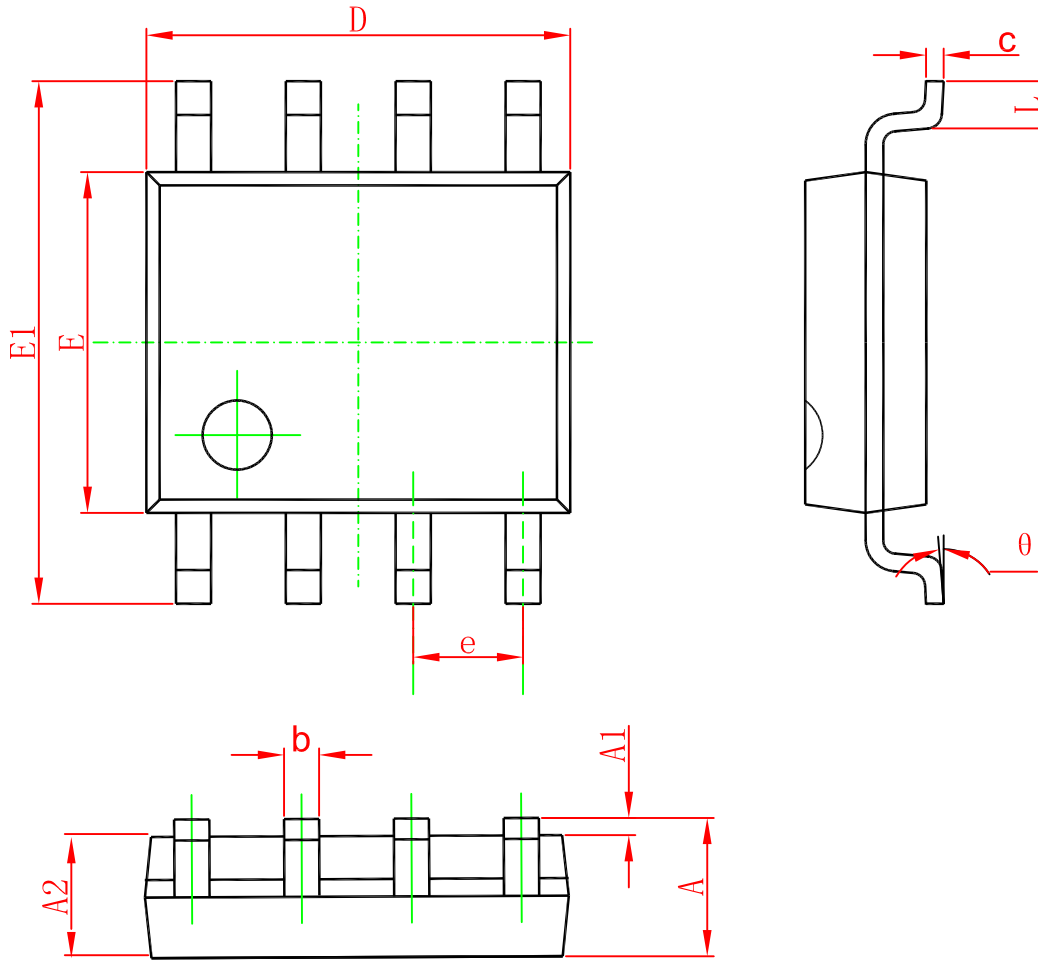


**Fig 10.** Typical Gate Charge Vs. Gate-to-Source Voltage



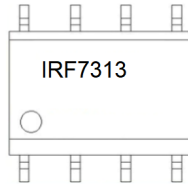
**Fig 11.** Maximum Effective Transient Thermal Impedance, Junction-to-Ambient

**SOP-8**



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	1.350	1.750	0.053	0.069
A1	0.100	0.250	0.004	0.010
A2	1.350	1.550	0.053	0.061
b	0.330	0.510	0.013	0.020
c	0.170	0.250	0.006	0.010
D	4.700	5.100	0.185	0.200
E	3.800	4.000	0.150	0.157
E1	5.800	6.200	0.228	0.244
e	1.270(BSC)		0.050(BSC)	
L	0.400	1.270	0.016	0.050
θ	0°	8°	0°	8°

## Marking



## Ordering information

Order code	Package	Baseqty	Deliverymode
IRF7313TR	SOP-8	3000	Tape and reel