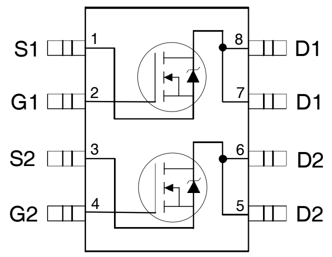
30V 2N-Channel Enhancement Mode MOSFET

General Description

The IRF8313TR is the highest performance trench N-ch MOSFETs with extreme high cell density, which provide excellent RDSON and gate charge for most of the small power switching and load switch applications. The meet the RoHS and Product requirement with full function reliability approved.



SOP-8

General Features

V_{DS} = 30V I_D = 9A

$R_{DS(ON)}$ < 13mΩ @ V_{GS}=10 V

$R_{DS(ON)}$ < 18mΩ @ V_{GS}=4. 5V

Application

Battery protection

Load switch

Uninterruptible power supply

Absolute Maximum Ratings (T_A=25℃unless otherwise noted)

Symbol	Parameter	Rating	Units
V_{DS}	Drain-Source Voltage	30	V
V_{GS}	Gate-Source Voltage	±20	V
I_D@T_C=25°C	Continuous Drain Current, V_{GS} @ 10V[1]	9	A
I_D@T_C=100°C	Continuous Drain Current, V_{GS} @ 10V[1]	8.2	A
I_D@T_A=25°C	Continuous Drain Current, V_{GS} @ 10V[1]	6.5	A
I_D@T_A=70°C	Continuous Drain Current, V_{GS} @ 10V[1]	5.6	A
I_{DM}	Pulsed Drain Current[2]	30	A
EAS	Single Pulse Avalanche Energy[3]	15	mJ
I_{AS}	Avalanche Current	22	A
P_D@T_C=25°C	Total Power Dissipation[4]	1.6	W
P_D@T_A=70°C	Total Power Dissipation[4]	1.0	W
T_{STG}	Storage Temperature Range	-55 to 150	°C
T_J	Operating Junction Temperature Range	-55 to 150	°C
$R_{θJA}$	Thermal Resistance Junction-Ambient [1]	75	°C/W
$R_{θJC}$	Thermal Resistance Junction-Case[1]	4.8	°C/W

Electrical Characteristics (T_J=25 °C, unless otherwise noted)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
BV_{DSS}	Drain-Source Breakdown Voltage	V_{GS}=0V , I_D=250uA	30			V
$\triangle BV_{DSS}/\triangle T_J$	BVDSS Temperature Coefficient	Reference to 25℃ , I_D=1mA		0.023		V/℃
$R_{DS(ON)}$	Static Drain-Source On-Resistance[2]	V_{GS}=10V , I_D=15A			13	mΩ
		V_{GS}=4.5V , I_D=10A			18	mΩ
$V_{GS(th)}$	Gate Threshold Voltage	V_{GS}=V_{DS} , I_D =250uA	1.0		2.5	V
$\triangle V_{GS(th)}$	$V_{GS(th)}$ Temperature Coefficient	V_{GS}=V_{DS} , I_D =250uA		-5.08		mV/℃
I_{DSS}	Drain-Source Leakage Current	V_{DS}=24V , V_{GS}=0V , T_J=25℃			1	uA
		V_{DS}=24V , V_{GS}=0V , T_J=55℃			5	uA
I_{GSS}	Gate-Source Leakage Current	V_{GS}=±20V , V_{DS}=0V			±100	nA
gfs	Forward Transconductance	V_{DS}=5V , I_D=15A		32		S
R_g	Gate Resistance	V_{DS}=0V , V_{GS}=0V , f=1MHz		1.7		Ω
Q_g	Total Gate Charge (4.5V)	V_{DS}=15V , V_{GS}=4.5V , I_D=12A		5.3		nC
Q_{gs}	Gate-Source Charge			0.78		nC
Q_{gd}	Gate-Drain Charge			2.2		nC
$T_{d(on)}$	Turn-On Delay Time	V_{DD}=15V , V_{GS}=10V , R_G=1.5□ I_D=20A		6.4		ns
T_r	Rise Time			39		ns
$T_{d(off)}$	Turn-Off Delay Time			21		ns
T_f	Fall Time			4.7		ns
C_{iss}	Input Capacitance	V_{DS}=15V , V_{GS}=0V , f=1MHz		580		pF
C_{oss}	Output Capacitance			97		pF
C_{rss}	Reverse Transfer Capacitance			39		pF
I_S	Continuous Source Current[1,5]	V_G=V_D=0V , Force Current			37	A
I_{SM}	Pulsed Source Current[2,5]				75	A
V_{SD}	Diode Forward Voltage[2]	V_{GS}=0V , I_S=1A , T_J=25℃			1	V

Note :

1 .The data tested by surface mounted on a 1 $inch^2$ FR-4 board with 2OZ copper.

2.The data tested by pulsed , pulse width ≦ 300us , duty cycle ≦ 2%

3 .The EAS data shows Max. rating . The test condition is V_{DD}=25V,V_{GS}=10V,L=0.1mH,I_{AS}=22A

4.The power dissipation is limited by 175°C junction temperature

5 .The data is theoretically the same as I_D and I_{DM} , in real applications , should be limited by total power dissipation.

Typical Characteristics

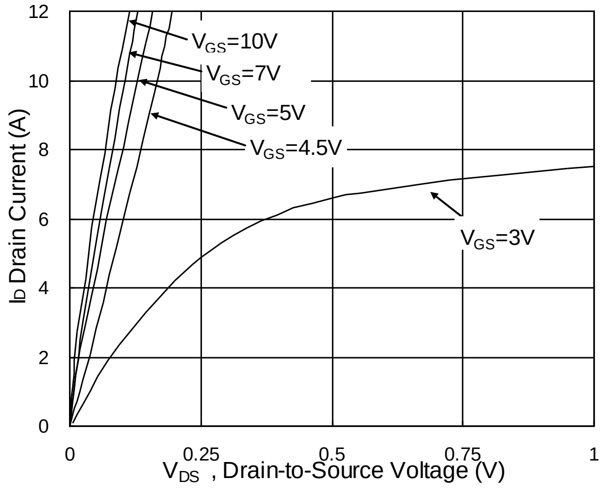


Fig.1 Typical Output Characteristics

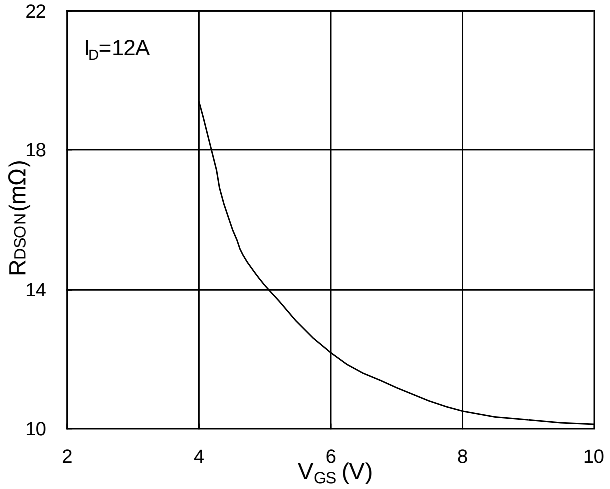


Fig.2 On-Resistance vs. G-S Voltage

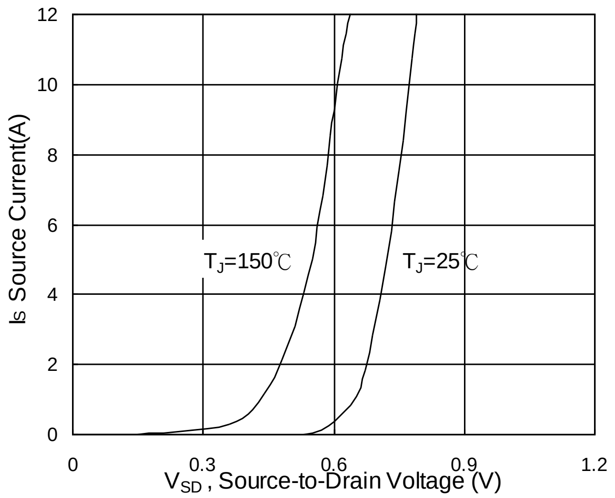


Fig.3 Forward Characteristics of Reverse

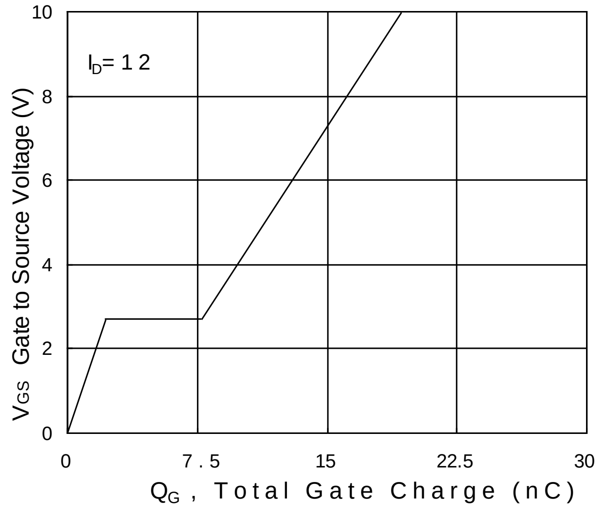


Fig.4 Gate-charge Characteristics

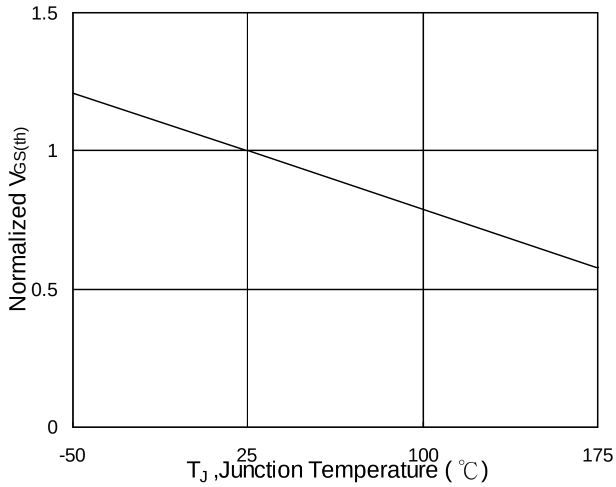


Fig.5 Normalized $V_{GS(th)}$ vs. T_J

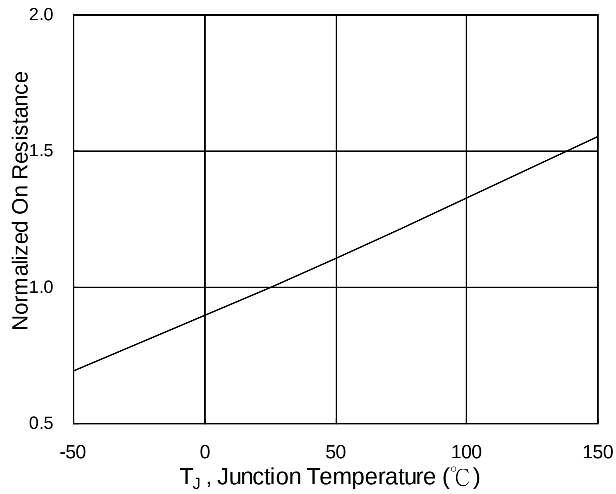


Fig.6 Normalized R_{DSON} vs. T_J

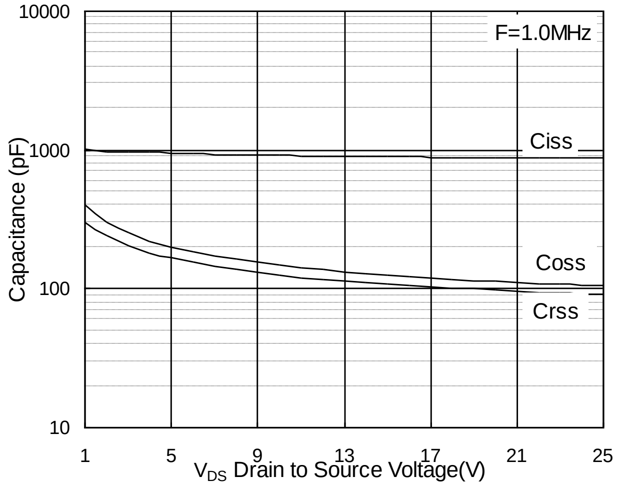


Fig.7 Capacitance

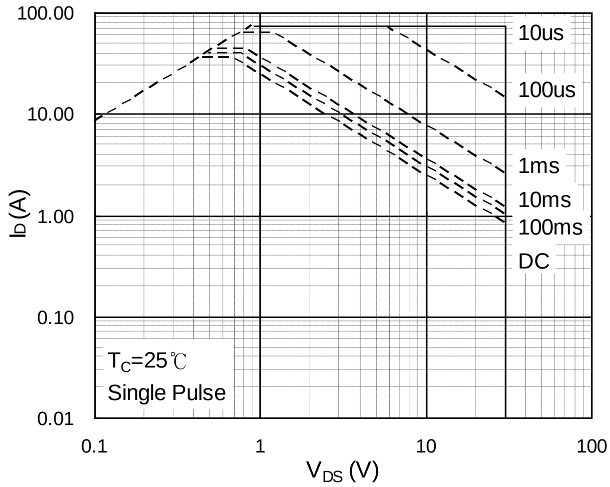


Fig.8 Safe Operating Area

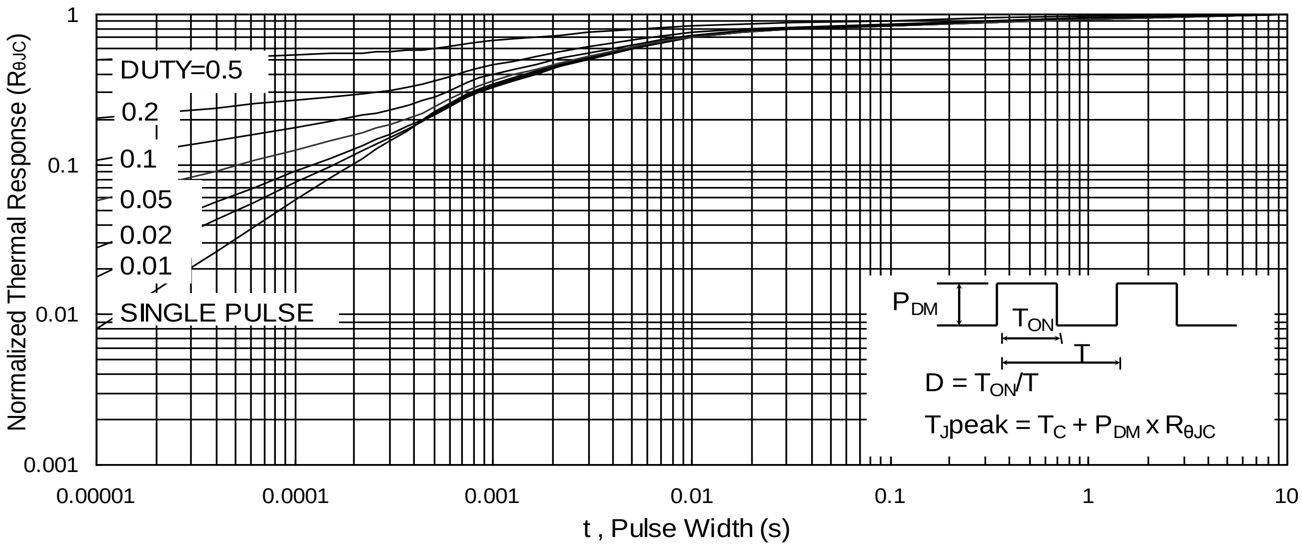


Fig.9 Normalized Maximum Transient Thermal Impedance

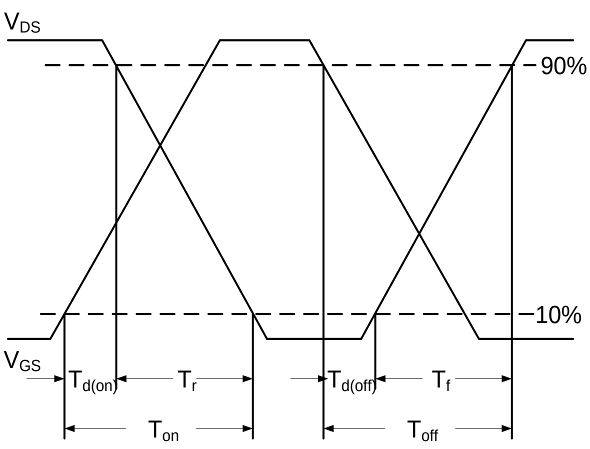


Fig.10 Switching Time Waveform

$$EAS=\frac{1}{2}L \times I_{AS}^2 \times \frac{BV_{DSS}}{BV_{DSS}-V_{DD}}$$

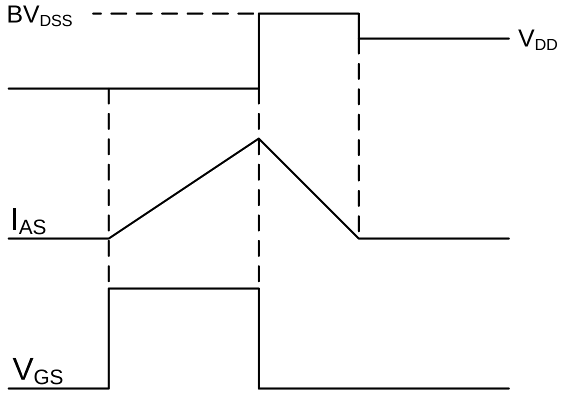
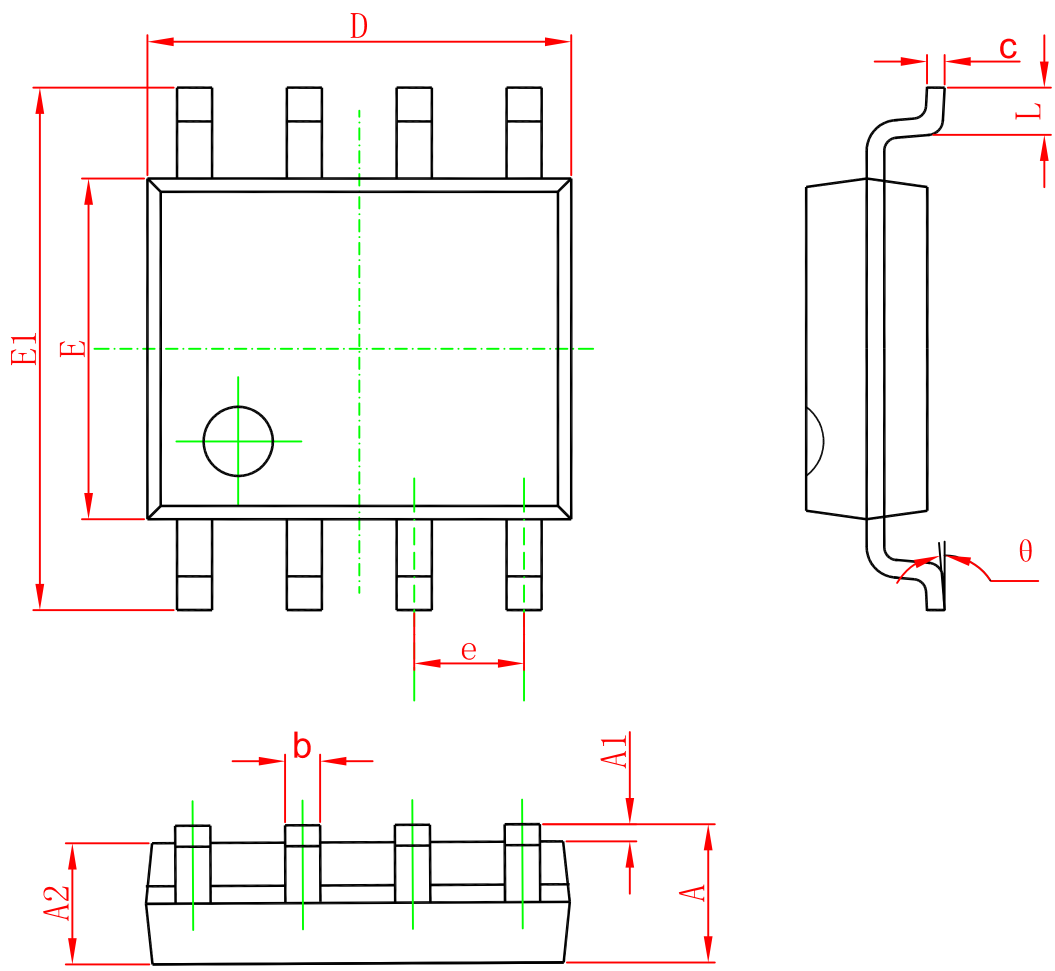


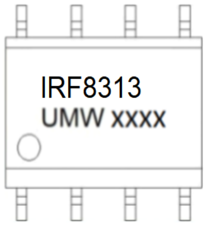
Fig.11 Unclamped Inductive Waveform

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
UMW IRF8313TR	SOP-8	3000	Tape and reel