UMW IRF9310TR

P-Channel 30 V (D-S) MOSFET

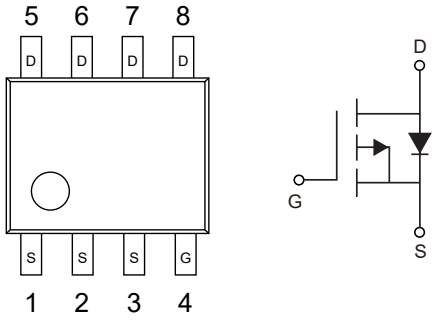
1.Features

- $V_{DS\ (V)}$=-30V
- I_D=-20A
- Q_g=58nC
- $R_{DS(ON)}$<4.6mΩ(V_{GS}=-10V)
- $R_{DS(ON)}$<6.8mΩ(V_{GS}=-4.5V)
- Industry-standard pinout SOP-8 Packag
- Compatible with Existing Surface Mount Techniques
- RoHS Compliant, Halogen-Free
- MSL1, Industrial qualification

2.Pinning information

Pin	Symbol	Description
1,2,3	S	SOURCE
4	G	GATE
5,6,7,8	D	DRAIN

SOP-8



3.Absolute Maximum Ratings

Parameter		Symbol	Rating	Units
Drain- Source Voltage		V_{DS}	-30	V
Gate-to-Source Voltage		V_{GS}	±20	V
Continuous Drain Current, V_{GS}=10V	T_A=25°C	I_D	-20	A
Continuous Drain Current, V_{GS}=10V	T_A=70°C		-16	A
Pulsed Drain Current ①		I_{DM}	-160	A
Power Dissipation ④	T_A=25°C	P_D	2.5	W
Power Dissipation ④	T_A=70°C		1.6	W
Linear Derating Factor			0.02	W/°C
Junction and Storage Temperature Range		T_J, T_{STG}	-55 to 150	°C

4.Electrical Characteristics T_J=25°C

Parameter	Symbol	Conditions	Min	Typ	Max	Units
Static						
Drain-Source Breakdown Voltage	BV_{DSS}	I_D=-250μA, V_{GS}=0V	-30			V
Breakdown Voltage Temp. Coefficient	$\Delta BV_{DSS}/\Delta T_J$	I_D=-1mA,Reference to 25°C		0.02		V/°C
Static Drain-to-Source On-Resistance	$R_{DS(ON)}$	V_{GS}=-10V, I_D=-20A ③		3.9	4.6	mΩ
		V_{GS}=-4.5V, I_D=-16A ③		5.8	6.8	
Gate Threshold Voltage	$V_{GS(th)}$	V_{DS}=V_{GS}, I_D=-100μA	-1.3	-1.8	-2.4	V
Gate Threshold Voltage Coefficient	$\Delta V_{GS(th)}$			-5.8		mV/°C
Drain-to-Source Leakage Current	I_{DSS}	V_{DS}=-24V, V_{GS}=0V			-1	μA
		V_{DS}=-24V,V_{GS}=0V,T_J=125°C			-150	μA
Gate-to-Source Forward Leakage	I_{GSS}	V_{GS}=-20V			-100	nA
Gate-to-Source Reverse Leakage		V_{GS}=20V			100	nA
Forward Transconductance	g_{FS}	V_{DS}=-10V, I_D=-16A	39			S
Total Gate Charge	Q_g	V_{DS}=-15V,V_{GS}=-4.5V,I_D=-16A		58		nC
Total Gate Charge	Q_g	V_{DS}=-10V		110	165	nC
Gate-to-Source Charge	Q_{gs}	V_{GS}=-15V		17		nC
Gate-to-Drain Charge	Q_{gd}	I_D=-16A		28		nC
Gate Resistance	R_g			2.8		Ω
Turn-On Delay Time	$t_{D(on)}$	V_{DD}=-15V, V_{GS}=-4.5V ③		25		ns
Rise Time	t_r	I_D=-1A		47		ns
Turn-Off Delay Time	$t_{D(off)}$	R_G=1.8Ω		65		ns
Fall Time	t_f	See Figs. 20a &20b		70		ns
Input Capacitance	C_{iss}	V_{GS}=0V		5250		pF
Output Capacitance	C_{oss}	V_{DS}=-15V		1300		pF
Reverse Transfer Capacitance	C_{rss}	f=1.0MHz		880		pF
Avalanche Characteristics						
Single Pulse Avalanche Energy ②	E_{AS}				630	mJ
Avalanche Current ①	I_{AR}				-16	A

Diode Characteristics						
Continuous Source Current (Body Diode)	I_S	MOSFET symbol showing the integral reverse p-n junction diode.			-2.5	A
Pulsed Source Current (Body Diode) ①	I_{SM}				-160	
Diode Forward Voltage	V_{SD}	T_J=25°C,I_S=-2.5A,V_{GS}=0V③			-1.2	V
Reverse Recovery Time	t_{rr}	T_J=25°C, I_F=-2.5A,V_{DD}=-24V		71	107	ns
Reverse Recovery Charge	Q_{rr}	dI/dt=100A/μs ③		12	18	nC
Thermal Resistance						
Junction-to-Drain Lead ⑤	$R_{\theta JL}$				20	°C/W
Junction-to-Ambient ④	$R_{\theta JA}$				50	°C/W

Notes:

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

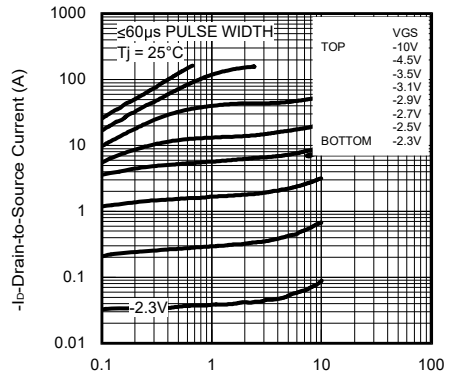
② Starting T_J=25°C, L=4.9mH, R_G=25Ω, I_{AS}=-16A.

③ Pulse width ≤ 400μs; duty cycle ≤ 2%.

④ When mounted on 1 inch square copper board.

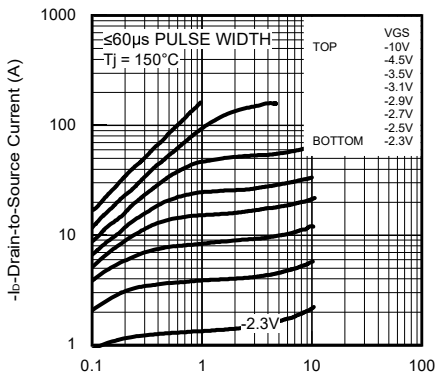
⑤ R_θ is measured at T_J of approximately 90°C.

5.1Typical Characterisitics



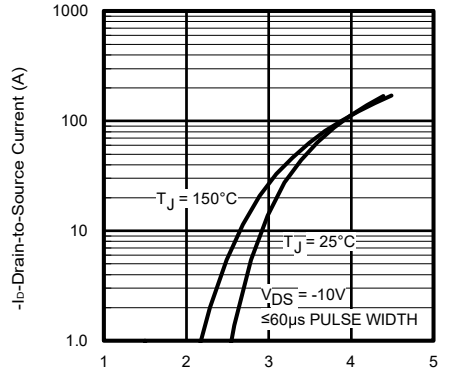
$-V_{DS}$ - Drain-to-Source Voltage (V)

Fig 1. Typical Output Characteristics



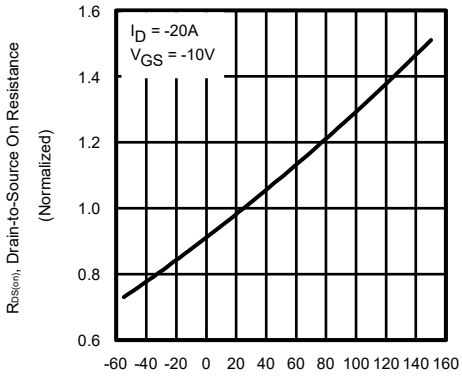
$-V_{DS}$ - Drain-to-Source Voltage (V)

Fig 2. Typical Output Characteristics



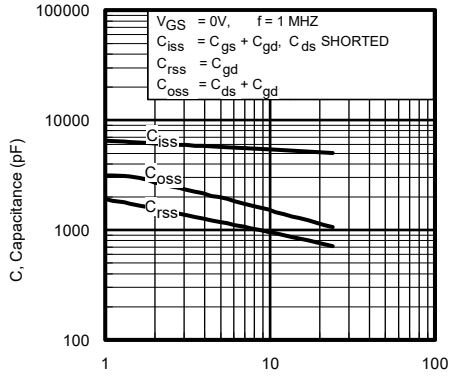
$-V_{GS}$, Gate-to-Source Voltage (V)

Fig 3. Typical Transfer Characteristics



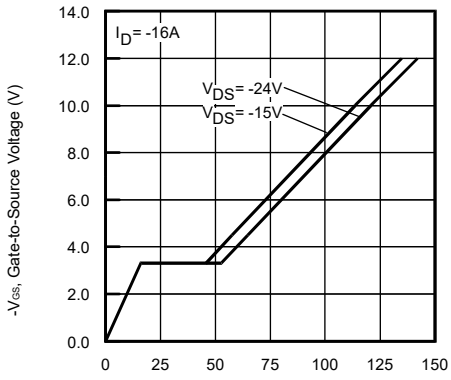
T_J, Junction Temperature (°C)

Fig 4. Nomalized On-ResistanceVs. Temperature



$-V_{DS}$,Drain-to-Source Voltage (V)

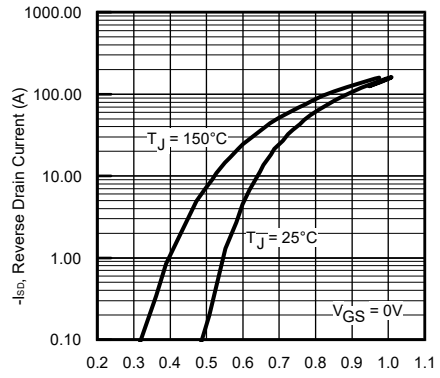
Fig 5. Typical Capacitance Vs. Drain-to-Source Voltage



Q_G, Total Gate Charge (nC)

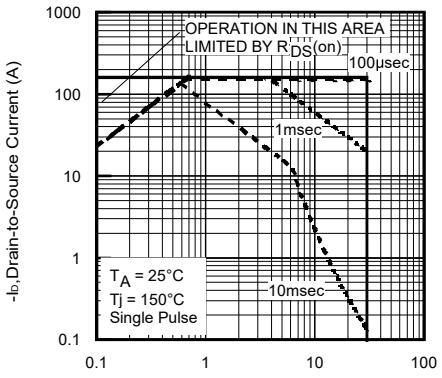
Fig 6. Typical Gate Charge Vs. Gate-to-Source Voltage

5.2Typical Characterisitics



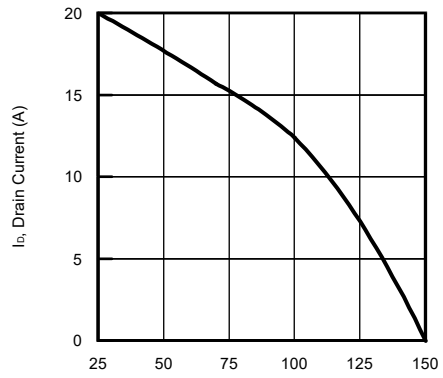
$-V_{SD}$, Source-to-Drain Voltage (V)

Fig 7. Typical Source-Drain Diode Forward Voltage



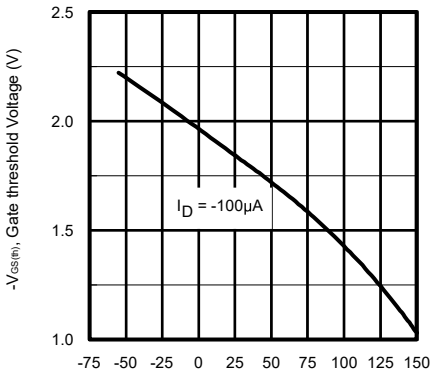
$-V_{DS}$, Drain-to-Source Voltage (V)

Fig 8. Maximum Safe Operating Area



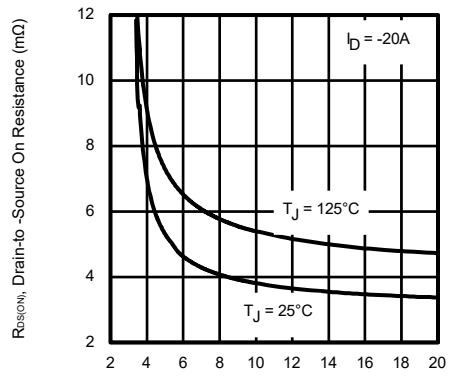
T_A , Ambient Temperature (°C)

Fig 9. Maximum Drain Current vs. Ambient Temperature



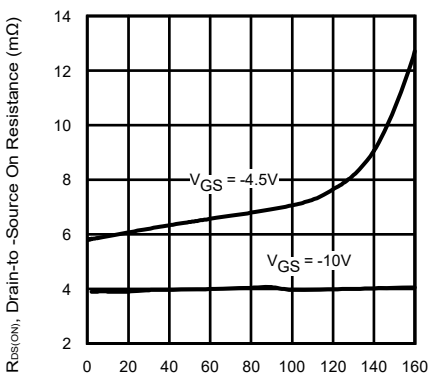
T_J , Temperature (°C)

Fig 10. Threshold Voltage vs. Temperature



$-V_{GS}$, Gate -to -Source Voltage (V)

Fig 11. On-Resistance vs. Gate Voltage



$-I_D$, Drain Current (A)

Fig 12. Typical On-Resistance vs. Drain Current

5.3Typical Characterisitics

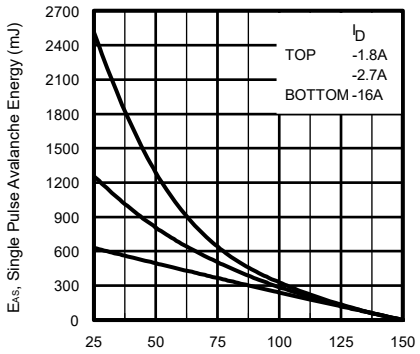


Fig 13. Maximum Avalanche Energy vs. Drain Current

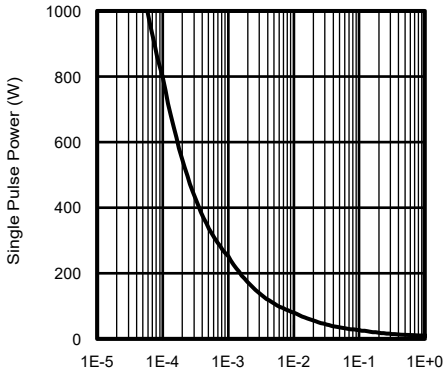


Fig 14. Typical Power vs. Time

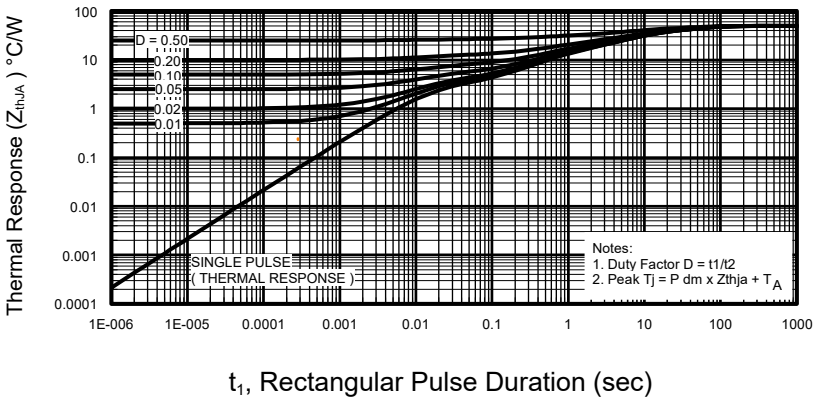


Fig 15. Maximum Effective Transient Themal Impedance, Junction-to-Ambient

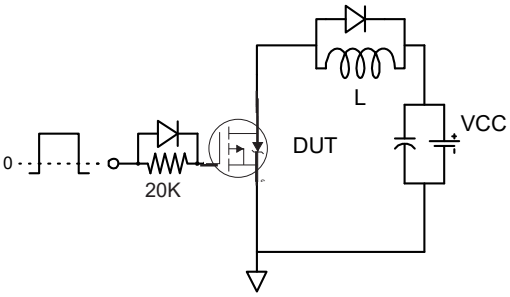


Fig 16a. Gate Charge Test Circuit

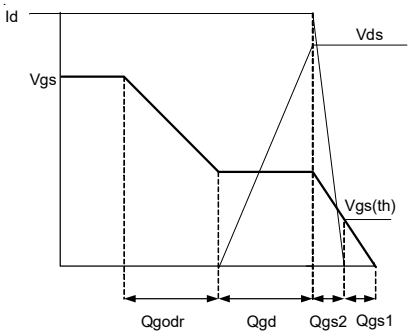


Fig 16b. Gate Charge Waveform

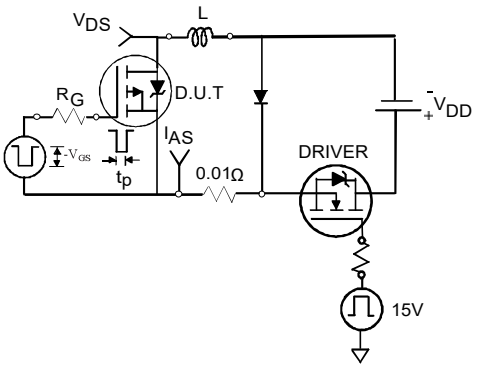


Fig 17a. Unclamped Inductive Test Circuit

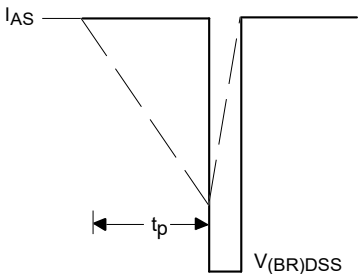


Fig 17b. Unclamped Inductive Waveforms

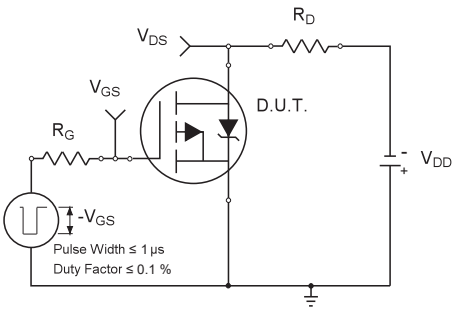


Fig 18a. Switching Time Test Circuit

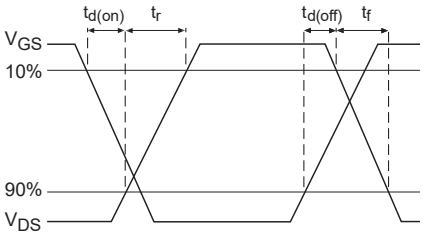
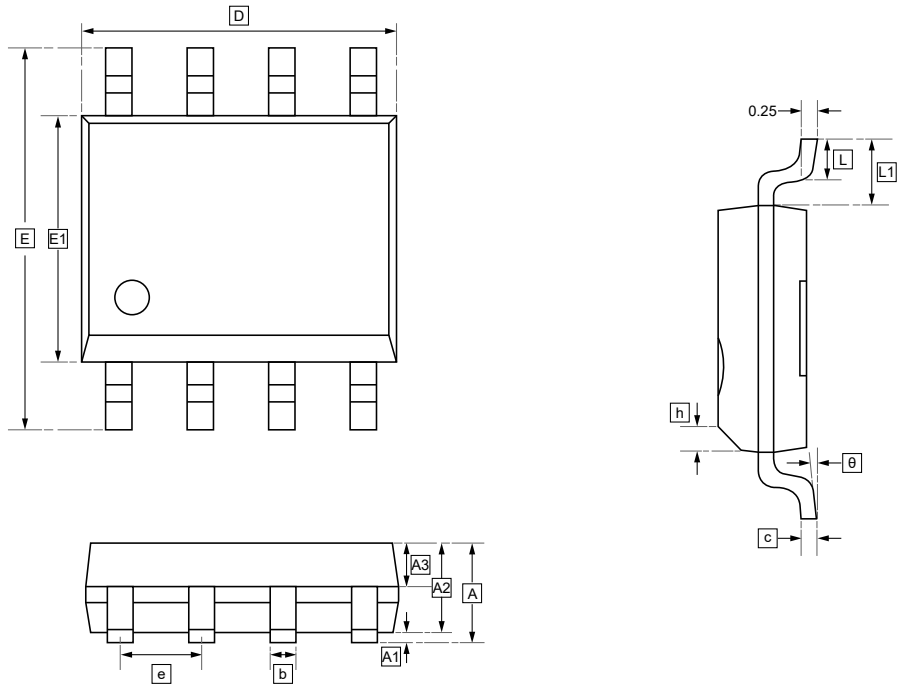


Fig 18b. Switching Time Waveforms

6.SOP-8 Package Outline Dimensions

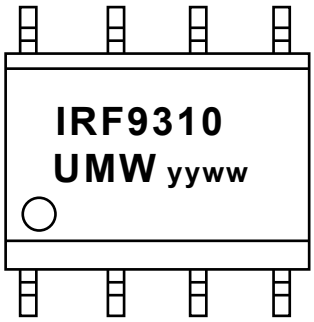


DIMENSIONS (mm are the original dimensions)

Symbol	A	A1	A2	A3	b	c	D	E	E1	e	h	L
Min	-	0.05	1.30	0.60	0.39	0.20	4.70	5.80	3.80	1.24	0.30	0.50
Max	1.75	0.20	1.50	0.70	0.47	0.24	5.10	6.20	4.00	1.30	0.50	0.80

Symbol	L1	θ
Min	1.00	0°
Max	1.10	8°

7.Ordering information



yy: Year Code
ww: Week Code

Order Code	Package	Base QTY	Delivery Mode
UMW IRF9310TR	SOP-8	3000	Tape and reel

8.Disclaimer

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