UMW IRF9321TR

-30V P-Channel MOSFET

1.Features

- $V_{DS\ (V)}$=-30V
- I_D=-15A
- $R_{DS(ON)}$<7.2mΩ(V_{GS}=-10V)
- $R_{DS(ON)}$<11.2mΩ(V_{GS}=-4.5V)
- Industry-Standard SO8 Package
- RoHS Compliant Containing no Lead, no Bromide and no Halogen

2.Application

- Charge and Discharge Switch for Notebook PC Battery Application

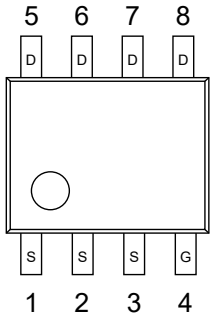
3.Benefits

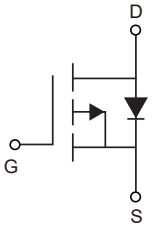
- Multi-Vendor Compatibility
- Environmentally Friendlier

4.Pinning information

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

SOP-8





5.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	-15	A
Continuous Drain Current, V_{GS}=-10V	T_A=70°C		-12	A
Pulsed Drain Current ①		I_{DM}	-120	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

6.Electrical Characteristics TA = 25°C unless otherwise noted

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		0.021		V/°C
Static Drain-to-Source On-Resistance	$R_{DS(ON)}$	V_{GS}=-10V, I_D=-15A ③		5.9	7.2	mΩ
		V_{GS}=-4.5V, I_D=-12A ③		9.3	11.2	
Gate Threshold Voltage	$V_{GS(th)}$	V_{DS}=V_{GS}, I_D=-50μA	-1.3	-1.8	-2.4	V
Gate Threshold Voltage Coefficient	$\Delta V_{GS(th)}$			-5.9		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=-12A	30			S
Total Gate Charge ⑥	Q_g	V_{DS}=-15V,V_{GS}=-4.5V,I_D=-12A		34		nC
Total Gate Charge ⑥	Q_g	V_{DS}=-10V		65	98	nC
Gate-to-Source Charge ⑥	Q_{gs}	V_{GS}=-15V		10		nC
Gate-to-Drain Charge ⑥	Q_{gd}	I_D=-12A		16		nC
Gate Resistance ⑥	R_g			18		Ω
Turn-On Delay Time	$t_{D(on)}$	V_{DD}=-30V, V_{GS}=-4.5V ③		21		ns
Rise Time	t_r	I_D=-1A		79		ns
Turn-Off Delay Time	$t_{D(off)}$	R_G=6.8Ω		185		ns
Fall Time	t_f	See Figs. 19a &19b		145		ns
Input Capacitance	C_{iss}	V_{GS}=0V		2590		pF
Output Capacitance	C_{oss}	V_{DS}=-25V		590		pF
Reverse Transfer Capacitance	C_{rss}	f=1.0MHz		360		pF
Avalanche Characteristics						
Single Pulse Avalanche Energy ②	E_{AS}				310	mJ
Avalanche Current ①	I_{AR}				-12	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}				-120	A
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		38	57	ns
Reverse Recovery Charge	Q_{rr}	dI/dt=100A/μs ③		24	36	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=4.3mH, R_G=25Ω, I_{AS}=-12A.

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.

7.1Typical Characterisitics

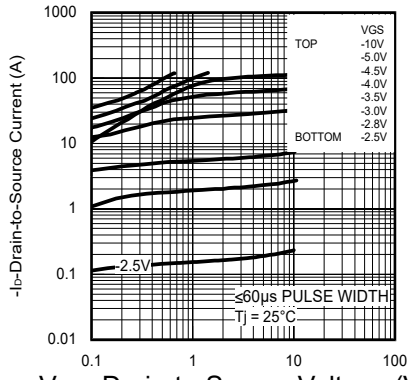


Fig 1. Typical Output Characteristics

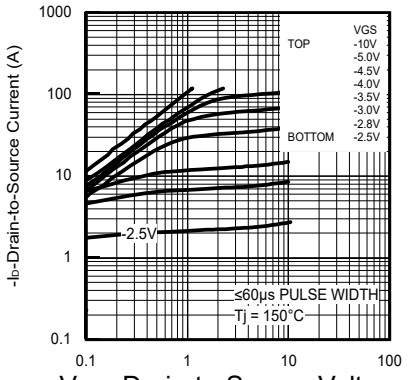


Fig 2. Typical Output Characteristics

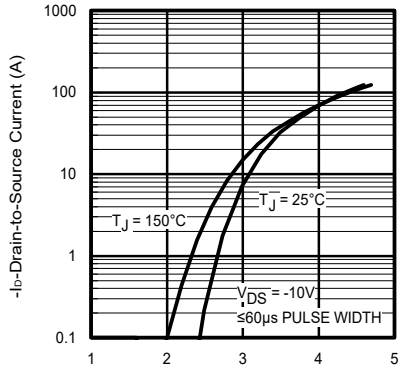


Fig 3. Typical Transfer Characteristics

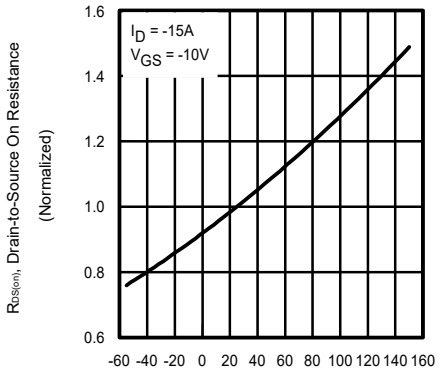


Fig 4. Nomalized On-ResistanceVs. Temperature

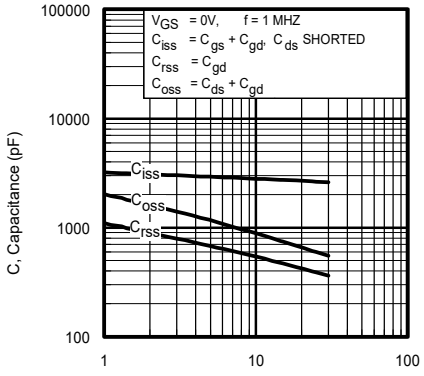


Fig 5. Typical Capacitance Vs. Drain-to-Source Voltage

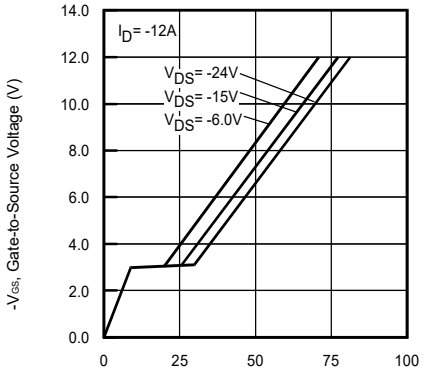
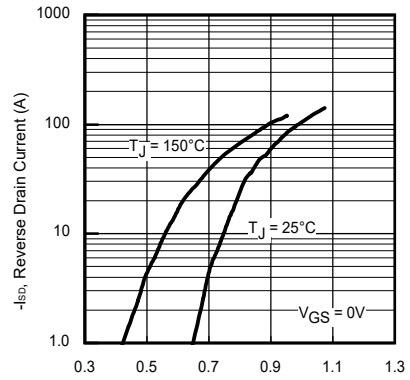


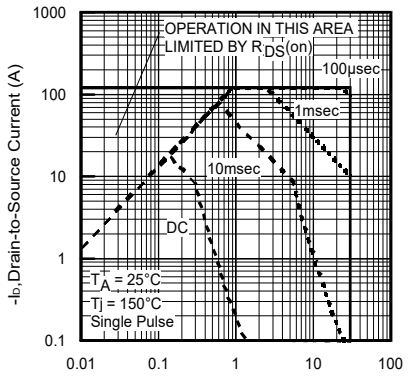
Fig 6. Typical Gate Charge Vs. Gate-to-Source Voltage

7.2Typical Characterisitics



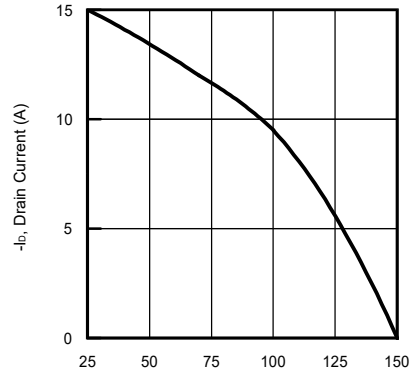
$-V_{SD}$, Source-to-Drain Voltage (V)

Fig 7. Typical Source-Drain Diode Forward Voltage



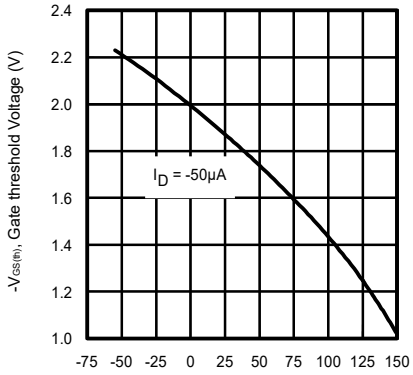
$-V_{DS}$, Drain-to-Source Voltage (V)

Fig 8. Maximum Safe Operating Area



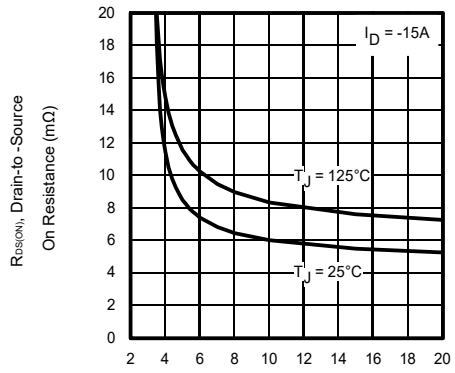
T_A , Ambient Temperature (°C)

Fig 9. Maximum Drain Current vs. Ambient Temperature



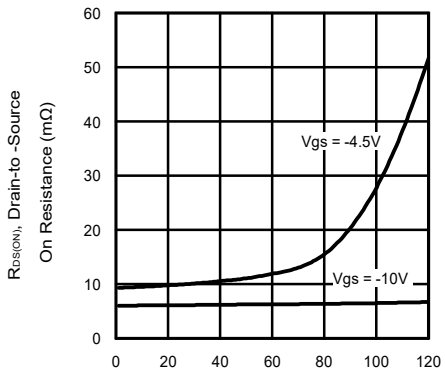
T_J , Temperature (°C)

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

7.3Typical Characterisitics

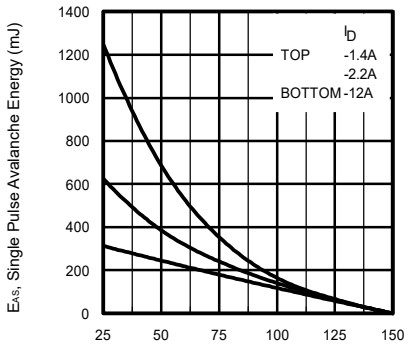


Fig 13. Maximum Avalanche Energy vs. Drain Current

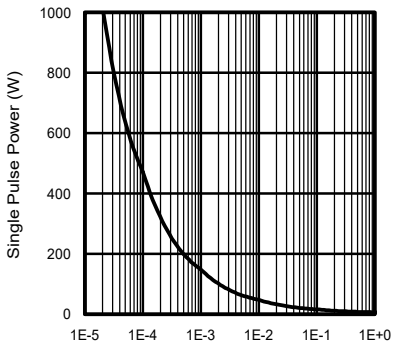


Fig 14. Typical Power vs. Time

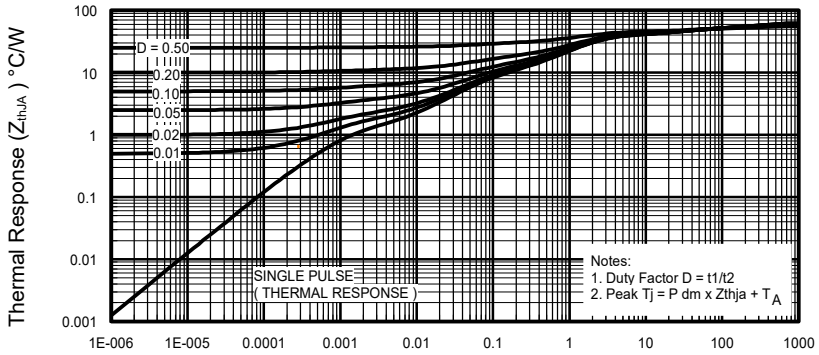
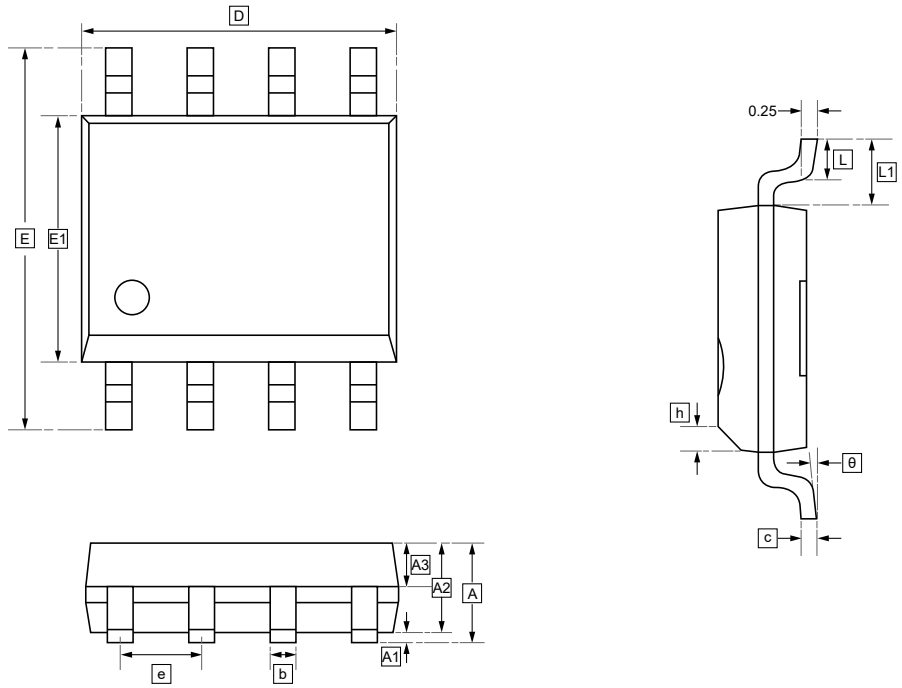


Fig 15. Maximum Effective Transient Themal Impedance, Junction-to-Ambient

8.SOP-8 Package Outline Dimensions

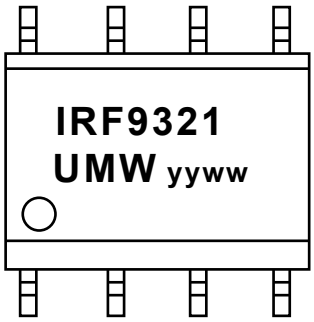


DIMENSIONS (mm are the original dimensions)

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°

9.Ordering information



yy: Year Code
ww: Week Code

Order Code	Package	Base QTY	Delivery Mode
UMW IRF9321TR	SOP-8	3000	Tape and reel

10.Disclaimer

UMW reserves the right to make changes to all products, specifications. Customers should obtain the latest version of product documentation and verify the completeness and currency of the information before placing an order.

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