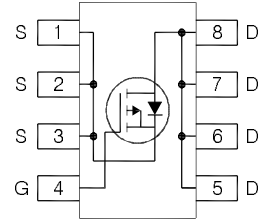


Applications

Charge and Discharge Switch for Notebook PC Battery Application

Features

- $V_{DS(V)} = -30V$
- $I_D = -15A$ ($V_{GS} = -10V$)
- $R_{DS(ON)} < 7.2m\Omega$ ($V_{GS} = -10V$)
- $R_{DS(ON)} < 11.2m\Omega$ ($V_{GS} = -4.5V$)
- Industry-Standard SOP-8 Package
- RoHS Compliant Containing no Lead, no Bromide and no Halogen



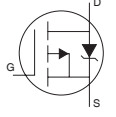
Resulting Benefits

- Environmentally Friendlier
- Multi-Vendor Compatibility

Absolute Maximum Ratings

	Parameter	Max.	Units
V_{DS}	Drain-to-Source Voltage	-30	V
V_{GS}	Gate-to-Source Voltage	± 20	
$I_D @ T_A = 25^\circ C$	Continuous Drain Current, $V_{GS} @ -10V$	-15	A
$I_D @ T_A = 70^\circ C$	Continuous Drain Current, $V_{GS} @ -10V$	-12	
I_{DM}	Pulsed Drain Current ①	-120	
$P_D @ T_A = 25^\circ C$	Power Dissipation ④	2.5	W
$P_D @ T_A = 70^\circ C$	Power Dissipation ④	1.6	
	Linear Derating Factor	0.02	W/°C
T_J	Operating Junction and	-55 to + 150	°C
T_{STG}	Storage Temperature Range		

Electrical Characteristics $T_A = 25^\circ\text{C}$ unless otherwise noted

	Parameter	Min.	Typ.	Max.	Units	Conditions
BV_{DSS}	Drain-to-Source Breakdown Voltage	-30			V	$V_{GS} = 0V, I_D = -250\mu A$
$\Delta BV_{DSS}/\Delta T_J$	Breakdown Voltage Temp. Coefficient		0.021		V/ $^\circ\text{C}$	Reference to $25^\circ\text{C}, I_D = -1\text{mA}$
$R_{DS(on)}$	Static Drain-to-Source On-Resistance		5.9	7.2	m Ω	$V_{GS} = -10V, I_D = -15A$ ③
			9.3	11.2		$V_{GS} = -4.5V, I_D = -12A$ ③
$V_{GS(th)}$	Gate Threshold Voltage	-1.3	-1.8	-2.4	V	$V_{DS} = V_{GS}, I_D = -50\mu A$
$\Delta V_{GS(th)}$	Gate Threshold Voltage Coefficient		-5.9		mV/ $^\circ\text{C}$	
I_{DSS}	Drain-to-Source Leakage Current			-1.0	μA	$V_{DS} = -24V, V_{GS} = 0V$
				-150		$V_{DS} = -24V, V_{GS} = 0V, T_J = 125^\circ\text{C}$
I_{GSS}	Gate-to-Source Forward Leakage			-100	nA	$V_{GS} = -20V$
	Gate-to-Source Reverse Leakage			100		$V_{GS} = 20V$
g_{fs}	Forward Transconductance	30			S	$V_{DS} = -10V, I_D = -12A$
Q_g	Total Gate Charge ⑥		34		nC	$V_{DS} = -15V, V_{GS} = -4.5V, I_D = -12A$
Q_g	Total Gate Charge ⑥		65	98	nC	$V_{DS} = -10V$
Q_{gs}	Gate-to-Source Charge ⑥		10			$V_{DS} = -15V$
Q_{gd}	Gate-to-Drain Charge ⑥		16			$I_D = -12A$
R_G	Gate Resistance ⑥		18		Ω	
$t_{d(on)}$	Turn-On Delay Time		21		ns	$V_{DD} = -30V, V_{GS} = -4.5V$ ③
t_r	Rise Time		79			$I_D = -1.0A$
$t_{d(off)}$	Turn-Off Delay Time		185			$R_G = 6.8\Omega$
t_f	Fall Time		145			See Figs. 19a & 19b
C_{iss}	Input Capacitance		2590		pF	$V_{GS} = 0V$
C_{oss}	Output Capacitance		590			$V_{DS} = -25V$
C_{rss}	Reverse Transfer Capacitance		360			$f = 1.0\text{MHz}$
E_{AS}	Single Pulse Avalanche Energy ②					310 mJ
I_{AR}	Avalanche Current ①					-12 A
I_S	Continuous Source Current (Body Diode)			-2.5	A	MOSFET symbol showing the integral reverse p-n junction diode. 
I_{SM}	Pulsed Source Current (Body Diode) ①			-120		
V_{SD}	Diode Forward Voltage			-1.2	V	$T_J = 25^\circ\text{C}, I_S = -2.5A, V_{GS} = 0V$ ③
t_{rr}	Reverse Recovery Time		38	57	ns	$T_J = 25^\circ\text{C}, I_F = -2.5A, V_{DD} = -24V$
Q_{rr}	Reverse Recovery Charge		24	36	nC	$di/dt = 100/\mu s$ ③
$R_{\theta JL}$	Junction-to-Drain Lead ⑤					20 $^\circ\text{C/W}$
$R_{\theta JA}$	Junction-to-Ambient ④					50 $^\circ\text{C/W}$

Notes:

- ① Repetitive rating; pulse width limited by max. junction temperature.
- ② Starting $T_J = 25^\circ\text{C}$, $L = 4.3\text{mH}$, $R_G = 25\Omega$, $I_{AS} = -12A$.
- ③ Pulse width $\leq 400\mu s$; duty cycle $\leq 2\%$.
- ④ When mounted on 1 inch square copper board.
- ⑤ R_{θ} is measured at T_J of approximately 90°C .

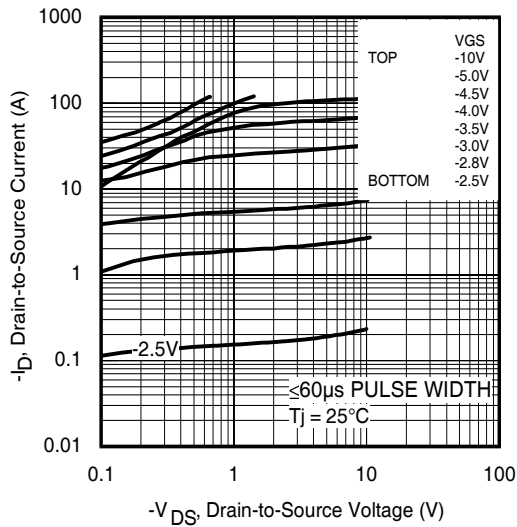


Fig 1. Typical Output Characteristics

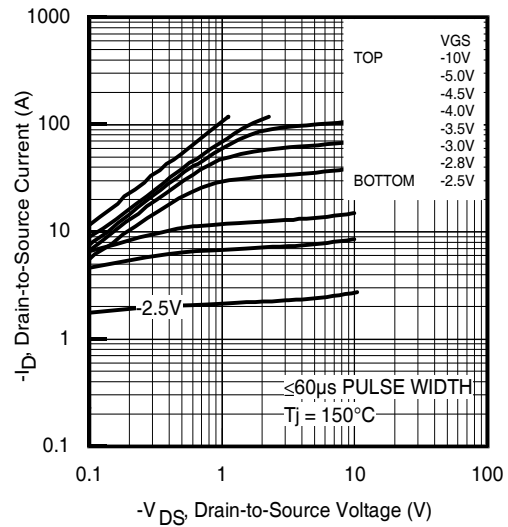


Fig 2. Typical Output Characteristics

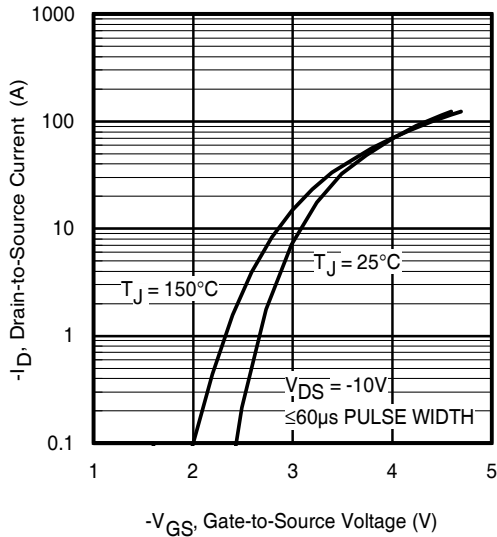


Fig 3. Typical Transfer Characteristics

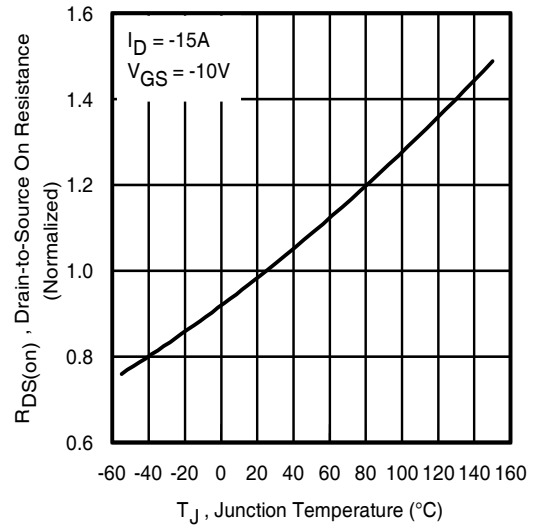


Fig 4. Normalized On-Resistance vs. Temperature

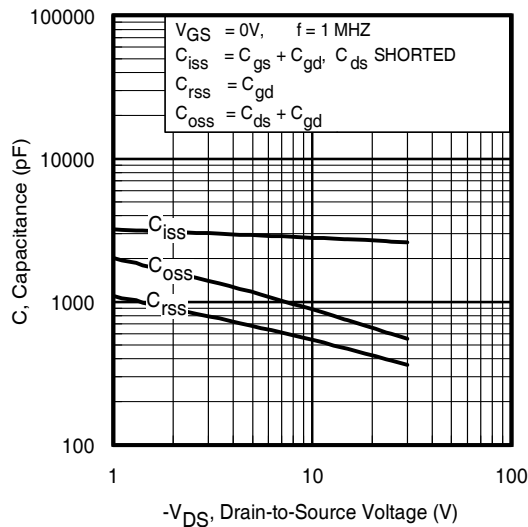


Fig 5. Typical Capacitance vs. Drain-to-Source Voltage

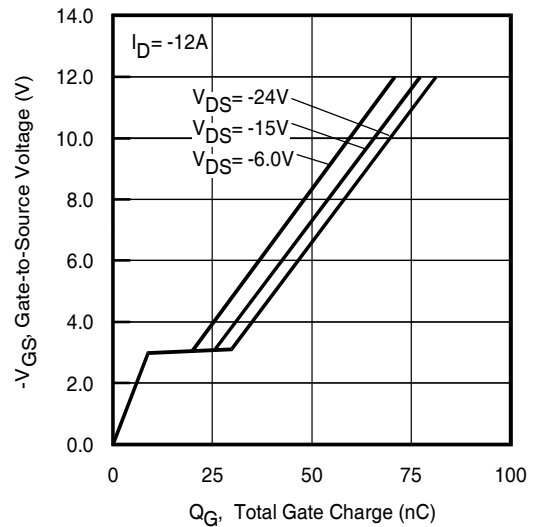


Fig 6. Typical Gate Charge vs. Gate-to-Source Voltage

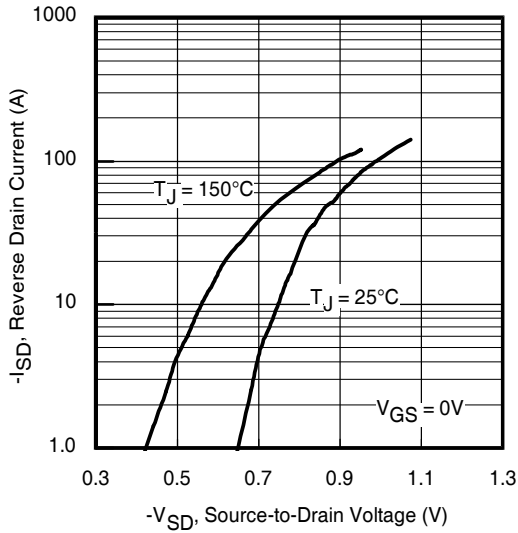


Fig 7. Typical Source-Drain Diode Forward Voltage

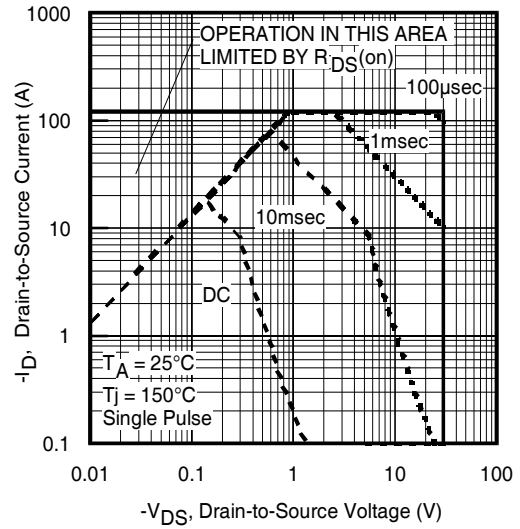


Fig 8. Maximum Safe Operating Area

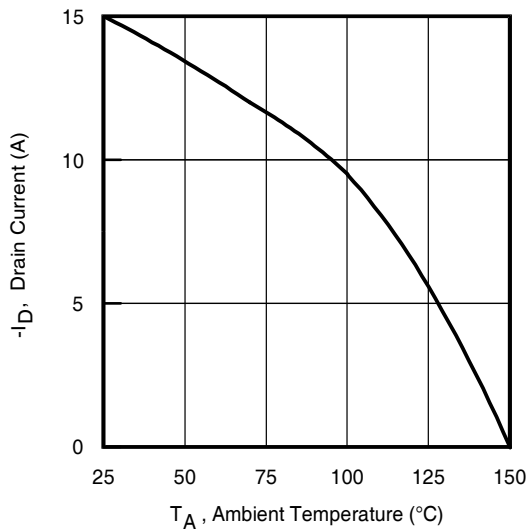


Fig 9. Maximum Drain Current vs. Ambient Temperature

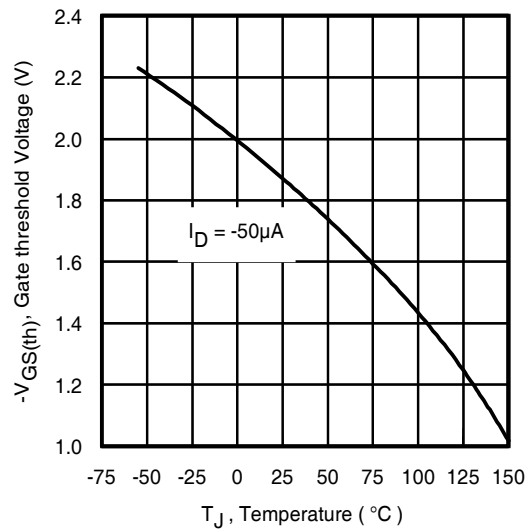


Fig 10. Threshold Voltage vs. Temperature

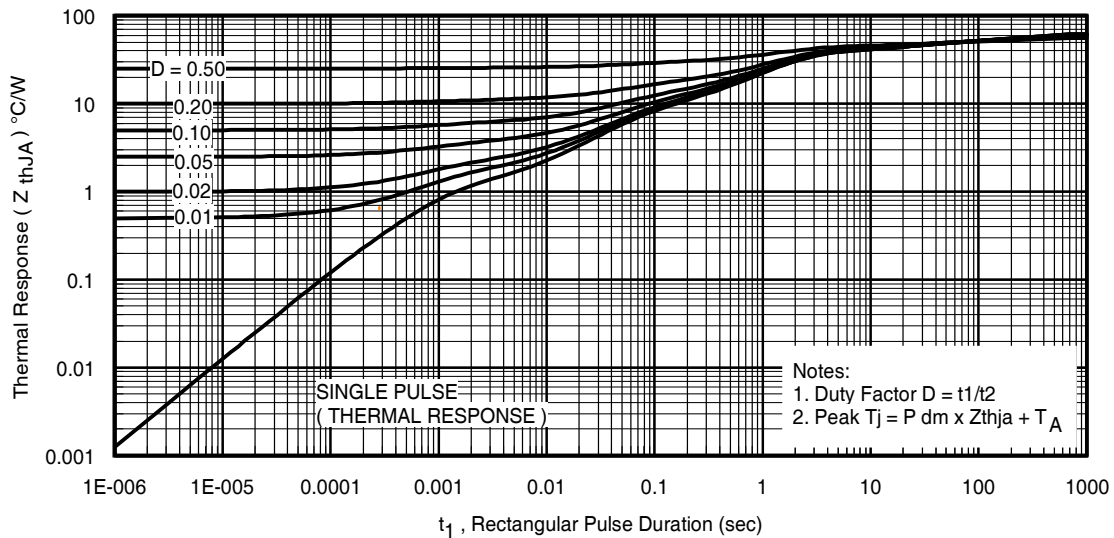


Fig 11. Maximum Effective Transient Thermal Impedance, Junction-to-Ambient

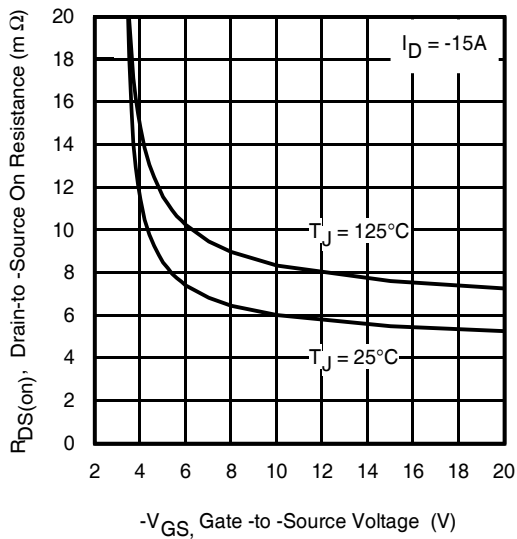


Fig 12. On-Resistance vs. Gate Voltage

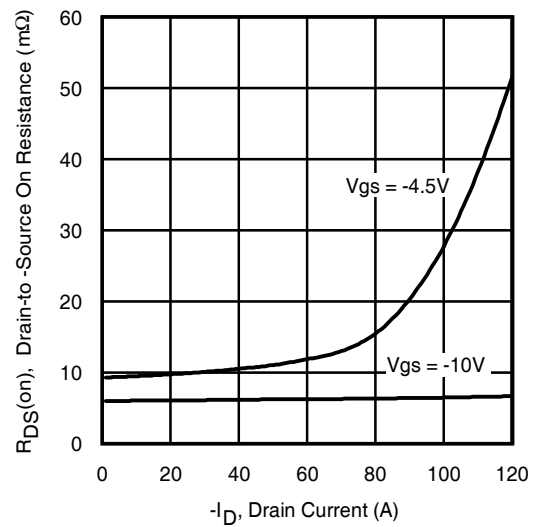


Fig 13. Typical On-Resistance vs. Drain Current

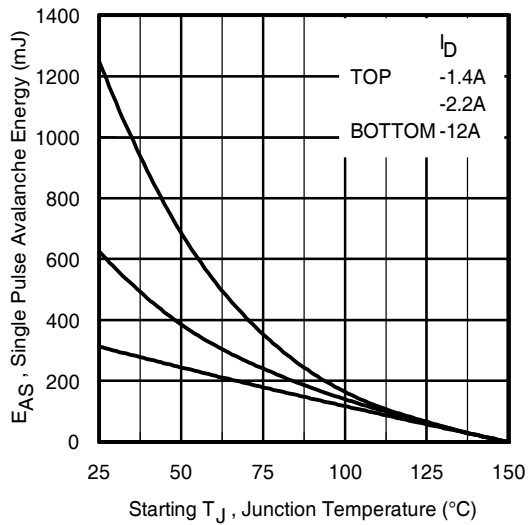


Fig 14. Maximum Avalanche Energy vs. Drain Current

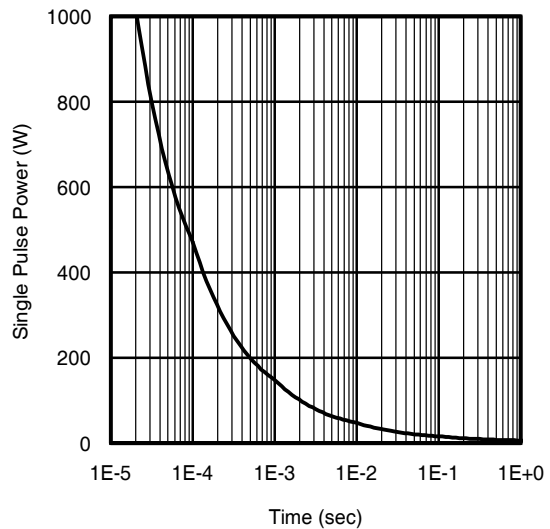
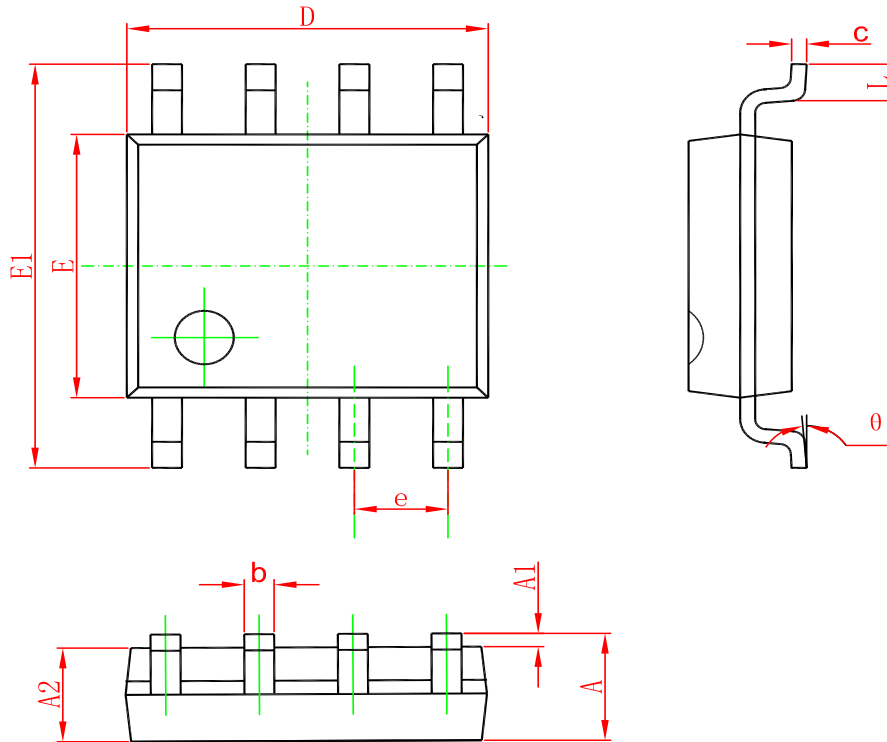


Fig 15. Typical Power vs. Time

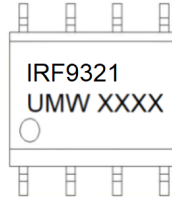
PACKAGE OUTLINE DIMENSIONS

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 IRF9321TR	SOP-8	3000	Tape and reel

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