UMW IRF9393TR

-30V P-Channel MOSFET

1.Features

- $V_{DS\ (V)}$=-30V
- I_D=-9.2A
- $R_{DS(ON)}$<19.4mΩ(V_{GS}=10V)
- $R_{DS(ON)}$<32.5mΩ(V_{GS}=4.5V)
- RoHS Compliant Containing no Lead,
- no Bromide and no Halogen

2.Application

- Adaptor Input Switch

  for Notebook PC

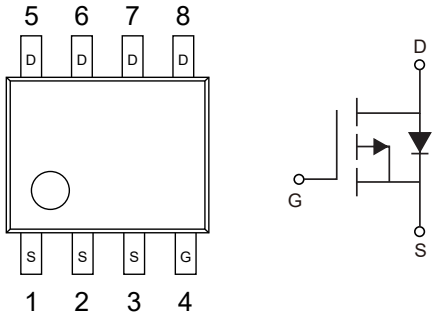
3.Benefits

- Direct Drive at High V_{GS}
- 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}	±25	V
Continuous Drain Current, V_{GS}=10V	T_A=25°C	I_D	-9.2	A
Continuous Drain Current, V_{GS}=10V	T_A=70°C		-7.3	A
Pulsed Drain Current ①		I_{DM}	-75	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 T_J = 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		0.019		V/°C
Static Drain-to-Source On-Resistance	$R_{DS(ON)}$	V_{GS}=-10V, I_D=-9.2A ③		15.6	19.4	mΩ
		V_{GS}=-4.5V, I_D=-7.5A ③		25.6	32.5	
Gate Threshold Voltage	$V_{GS(th)}$	V_{DS}=V_{GS}, I_D=-25μA	-1.3	-1.8	3.25	V
Gate Threshold Voltage Coefficient	$\Delta V_{GS(th)}$			-5.7	-2.4	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}=-25V			-10	μA
Gate-to-Source Reverse Leakage		V_{GS}=25V			10	μA
Forward Transconductance	g_{FS}	V_{DS}=-10V, I_D=-7.5A	13			S
Total Gate Charge ⑥	Q_g	V_{DS}=-15V,V_{GS}=-4.5V,I_D=-7.5A		14		nC
Total Gate Charge ⑥	Q_g	V_{DS}=-10V		25	38	nC
Gate-to-Source Charge ⑥	Q_{gs}	V_{GS}=-15V		3.5		nC
Gate-to-Drain Charge ⑥	Q_{gd}	I_D=-7.5A		6.4		nC
Gate Resistance ⑥	R_g			15		Ω
Turn-On Delay Time	$t_{D(on)}$	V_{DD}=-15V, V_{GS}=-4.5V ③		16		ns
Rise Time	t_r	I_D=-1A		44		ns
Turn-Off Delay Time	$t_{D(off)}$	R_G=6.8Ω		55		ns
Fall Time	t_f	See Figs. 20a & 20b		49		ns
Input Capacitance	C_{iss}	V_{GS}=0V		1110		pF
Output Capacitance	C_{oss}	V_{DS}=-25V		230		pF
Reverse Transfer Capacitance	C_{rss}	f=1.0MHz		160		pF
Avalanche Characteristics						
Single Pulse Avalanche Energy ②	E_{AS}				100	mJ
Avalanche Current ①	I_{AR}				-7.5	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}				-75	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 dI/dt=100A/μs ③		24	36	ns
Reverse Recovery Charge	Q_{rr}			15	23	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=3.5mH, R_G=25Ω, I_{AS}=-7.5A.

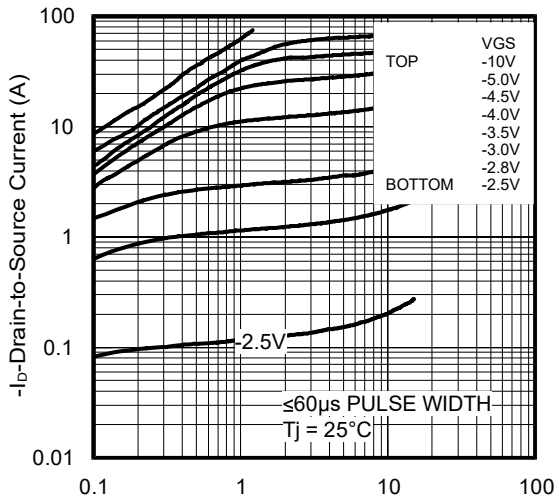
③ Pulse width ≤ 400μs; duty cycle ≤ 2%.

④ When mounted on 1 inch square copper board.

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

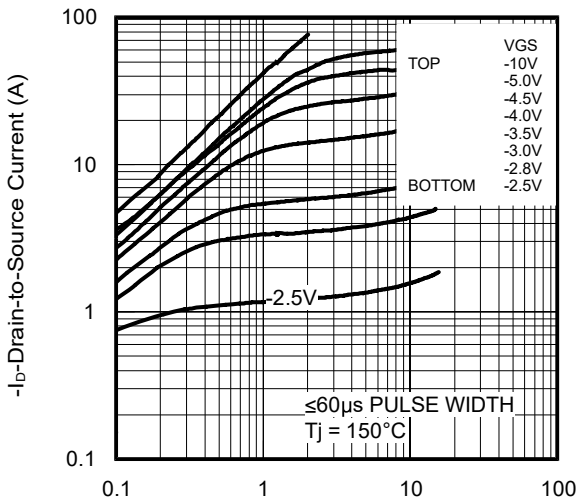
⑥ For DESIGN AID ONLY, not subject to production testing.

7.1Typical Characterisitics



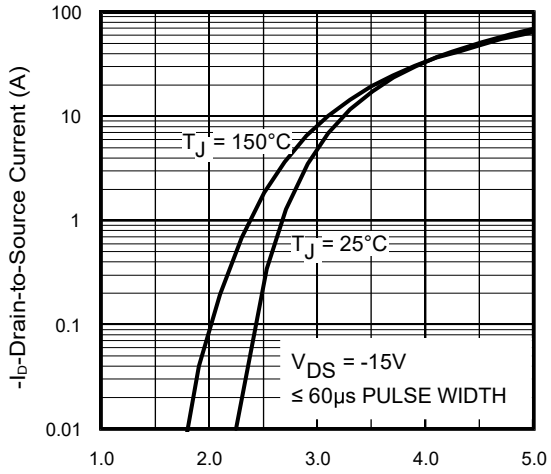
-V_{DS} - Drain-to-Source Voltage (V)

Fig 1. Typical Output Characteristics



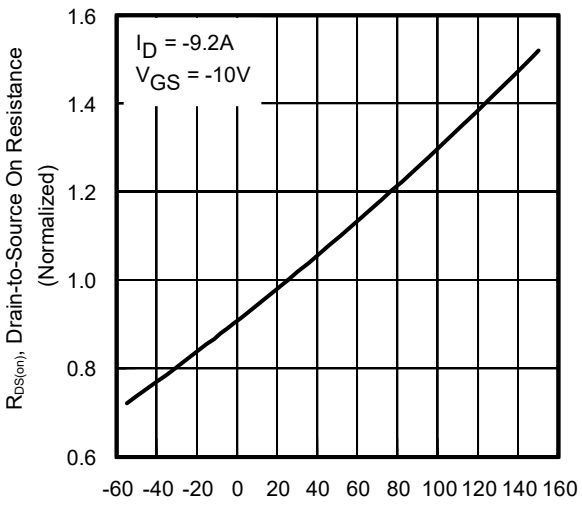
-V_{DS} - Drain-to-Source Voltage (V)

Fig 2. Typical Output Characteristics



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

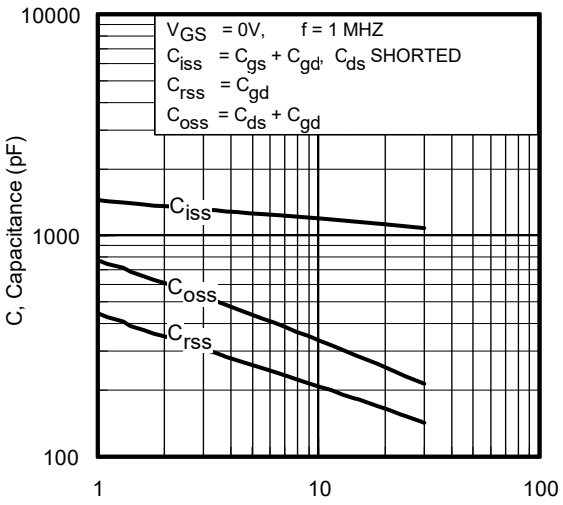
Fig 3. Typical Transfer Characteristics



T_J, Junction Temperature (°C)

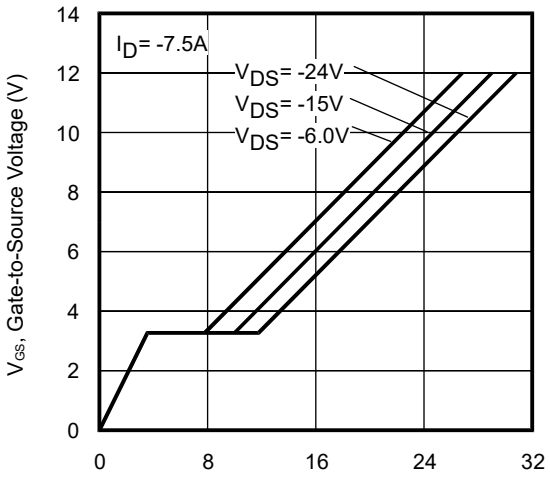
Fig 4. Nomalized On-ResistanceVs. Temperature

7.2Typical Characterisitics



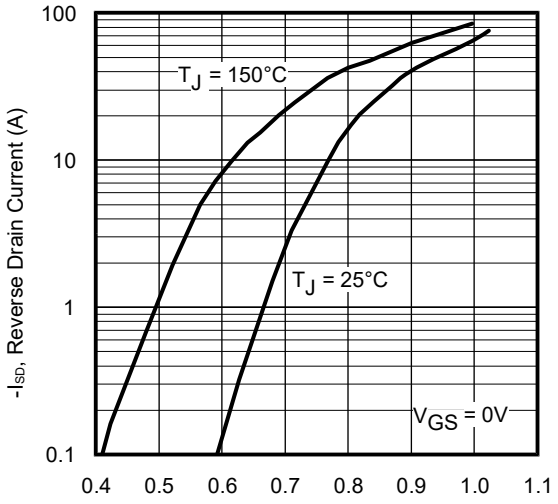
-V_{DS} ,Drain-to-Source Voltage (V)

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



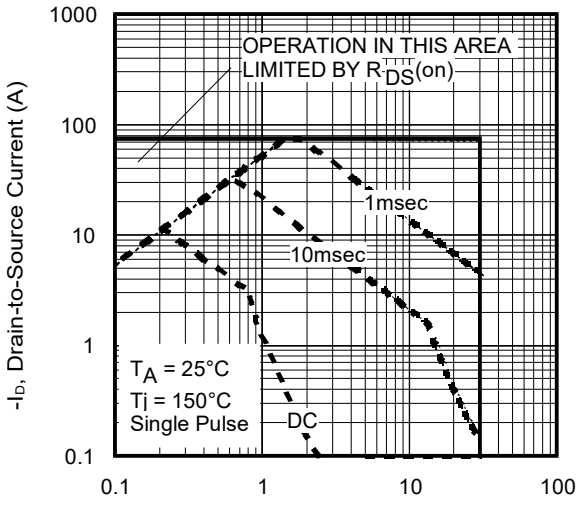
Q_G, Total Gate Charge (nC)

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



-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

7.3Typical Characterisitics

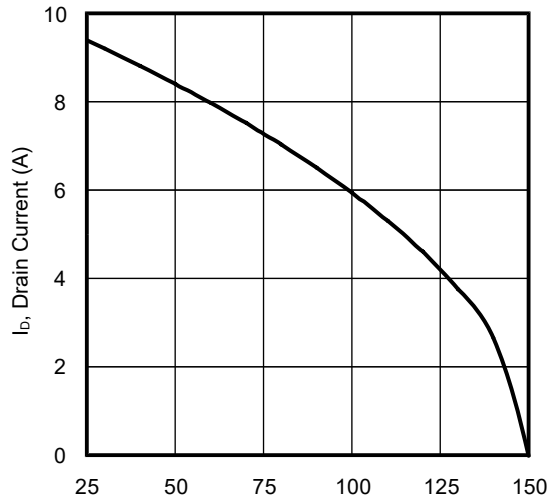


Fig 9. Maximum Drain Current Vs. Case Temperature

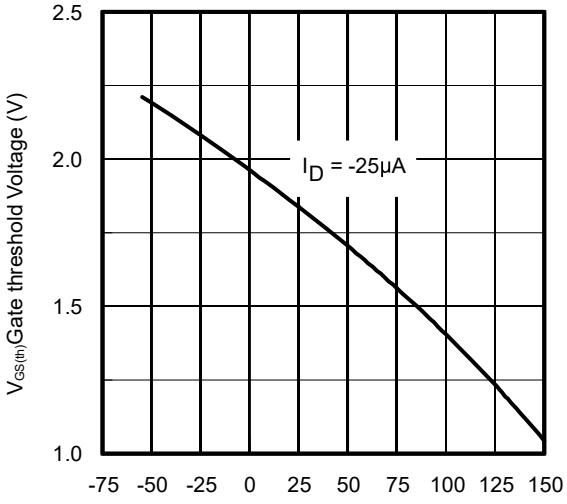


Fig 10. Threshold Voltage Vs. Temperature

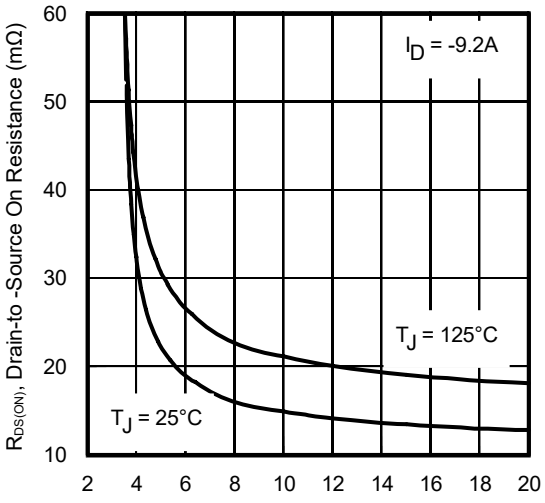


Fig 11. On-Resistance Vs. Drain Current

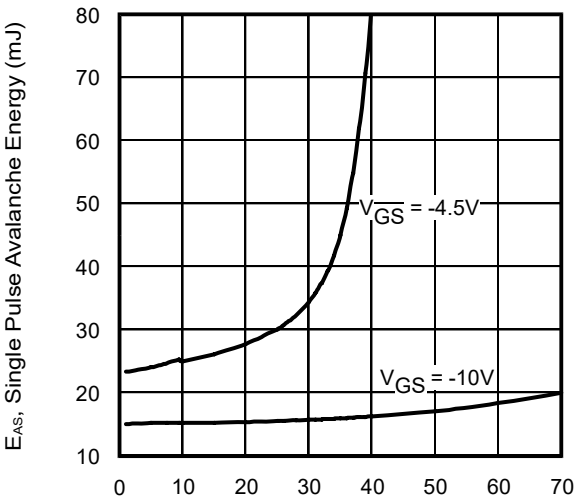


Fig 12. Maximum Avalanche Energy Vs. Drain Current

7.4Typical Characterisitics

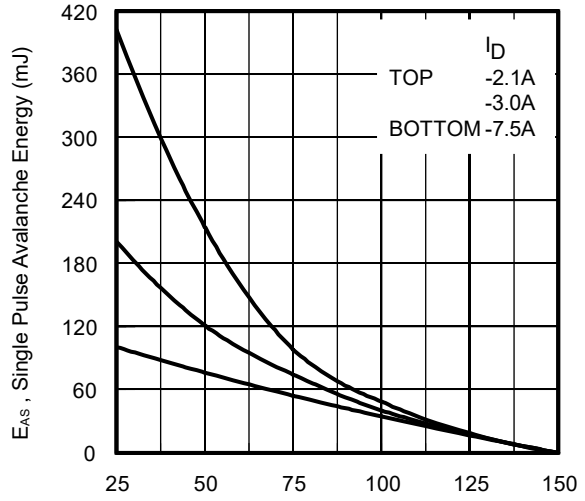


Fig 13. Maximum Avalanche Energy vs. Drain Current

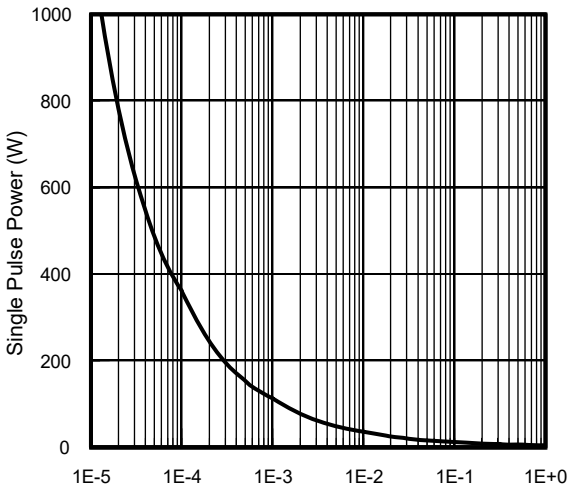


Fig 10. Typical Power vs. Time

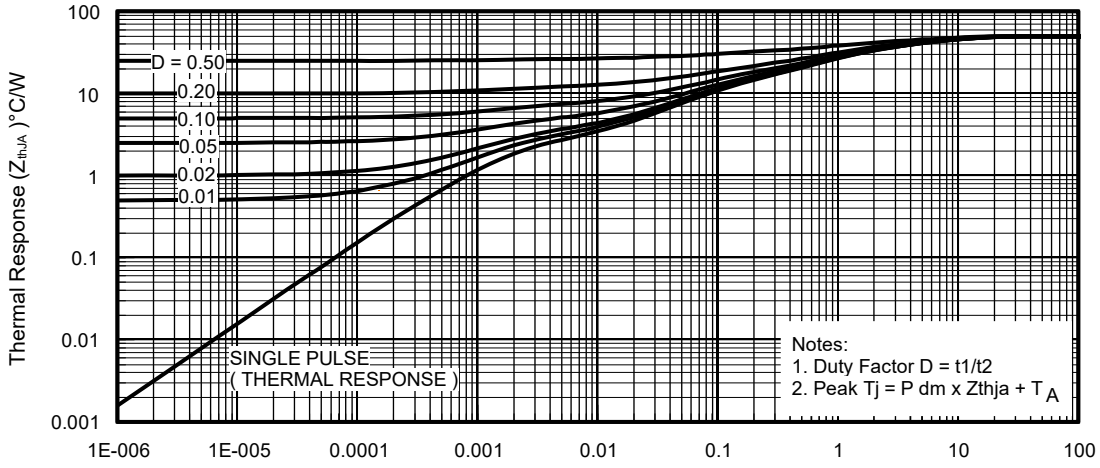


Fig 13. Maximum Effective Transient Themal Impedance, Junction-to-Ambient

7.5Typical Characterisitics

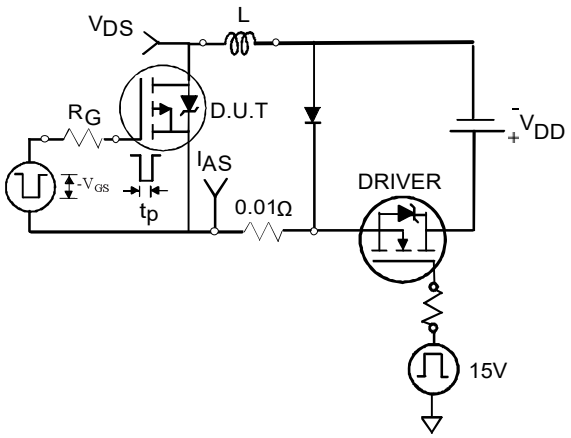


Fig 19a. Unclamped Inductive Test Circuit

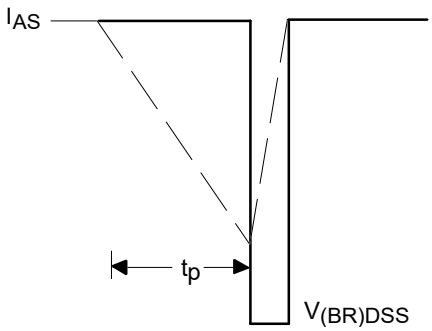


Fig 19b. Unclamped Inductive Waveforms

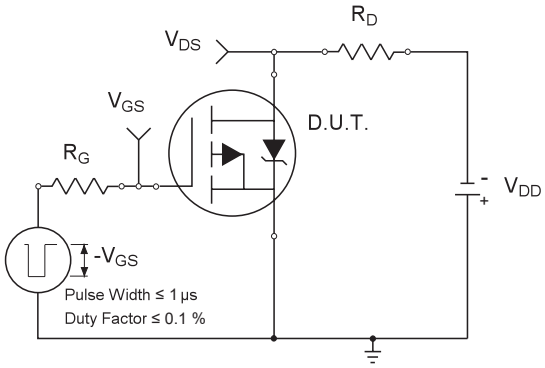


Fig 20a. Switching Time Test Circuit

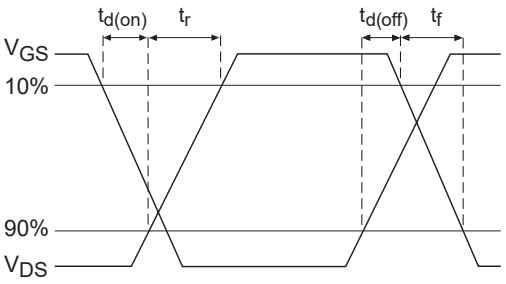
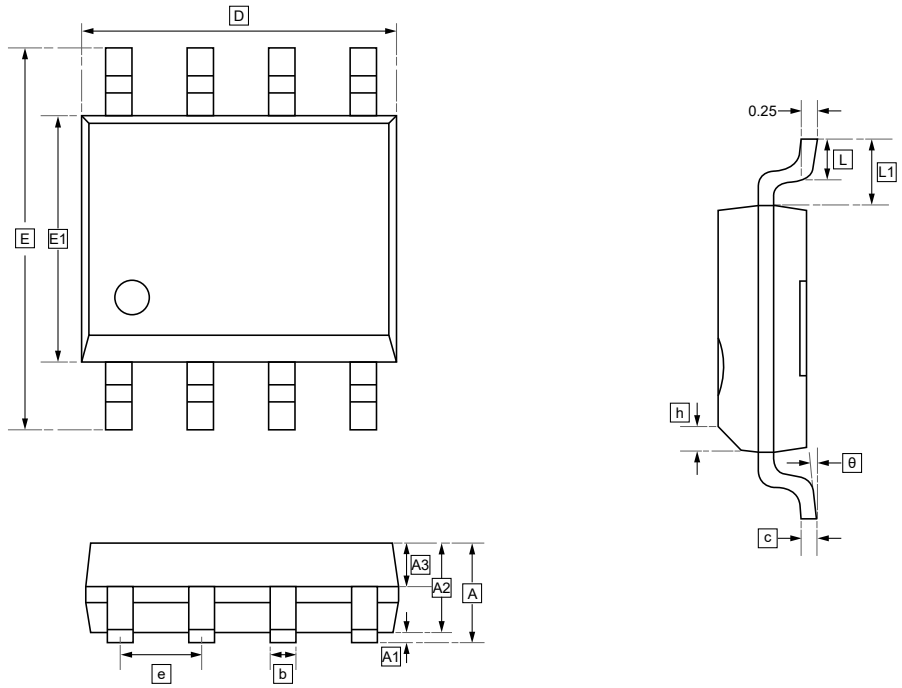


Fig 20b. Switching Time Waveforms

8.SOP-8 Package Outline Dimensions

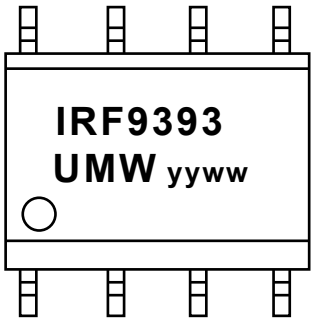


DIMENSIONS (mm are the original dimensions)

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 IRF9393TR	SOP-8	3000	Tape and reel

10.Disclaimer

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