UMW IRF7309TR

30V N-Channel MOSFET
-30V P-Channel MOSFET

1.1Features(N-Ch)

- $V_{DS\ (V)}$=30V
- I_D=4.7A
- $R_{DS(ON)}$<50mΩ(V_{GS}=4.5V)
- $R_{DS(ON)}$<80mΩ(V_{GS}=2.7V)
- Compatible with Existing Surface Mount Techniques

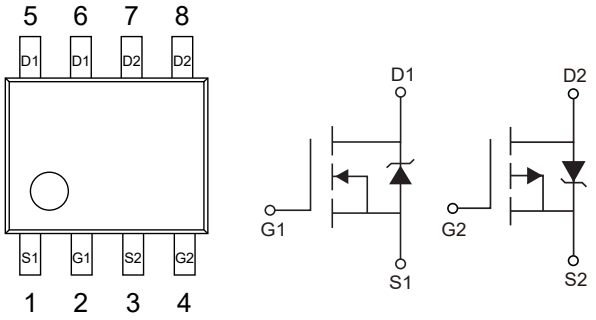
1.2Features(P-Ch)

- $V_{DS\ (V)}$=-30V
- I_D=-3.5A
- $R_{DS(ON)}$<100mΩ(V_{GS}=4.5V)
- $R_{DS(ON)}$<140mΩ(V_{GS}=2.7V)
- Industry-standard pinout SO-8 Package

2.Pinning information

Pin	Symbol	Description
2,4	G1,G2	GATE
1,3	S1,S2	SOURCE
5,6,7,8	D1,D2	DRAIN

SOP-8



3.Absolute Maximum Ratings

Parameter		Symbol	N-Channel	P-Channel	Units
10 Sec. Pulse Drain Current, V_{GS}=10V	T_A= 25°C	I_D	4.7	-3.5	A
Continuous Drain Current, V_{GS}=10V	T_A= 25°C		4	-3	A
Continuous Drain Current, V_{GS}=10V	T_A=70°C		3.2	-2.4	A
Pulsed Drain Current ①		I_{DM}	16	-12	A
Power Dissipation(PCB Mount)**	T_A= 25°C	P_D	1.4		W
Linear Derating Factor (PCB Mount)**			0.011		W/°C
Gate-to-Source Voltage		V_{GS}	±20		V
Peak Diode Recovery dv/dt ②		dv/dt	6.9	-6	V/ns
Junction and Storage Temperature Range		T_J, T_{STG}	-55 to 150		°C

4.Thermal Characteristics

Parameter	Symbol	Max.	Units
Junction-to-Amb.(PCB Mount, steady state)**	$R_{\theta JA}$	90	°C/W

5.Electrical Characteristics T_J=25°C

Parameter	Symbol		Conditions	Min	Typ	Max	Units
Drain-to-Source Breakdown Voltage	$V_{(BR)DSS}$	N-Ch	I_D=250μA, V_{GS}=0V	30			V
		P-Ch	I_D=-250μA, V_{GS}=0V	-30			V
Breakdown Voltage Temp Coefficient Current	$\frac{\Delta V_{(BR)DSS}}{\Delta T_J}$	N-Ch	I_D=1mA,Reference to 25°C		0.032		V/°C
		P-Ch	I_D=-1mA,Reference to 25°C		-0.037		V/°C
Static Drain-to-Source On-Resistance	$R_{DS(ON)}$	N-Ch	V_{GS}=10V, I_D=2.4A ③			50	mΩ
		N-Ch	V_{GS}=4.5V, I_D=2A ③			80	mΩ
		P-Ch	V_{GS}=-10V, I_D=-1.8A ③			100	mΩ
		P-Ch	V_{GS}=-4.5V, I_D=-1.5A ③			140	mΩ
Gate Threshold Voltage	$V_{GS(th)}$	N-Ch	V_{DS}=V_{GS}, I_D=250μA	1			V
		P-Ch	V_{DS}=V_{GS}, I_D=-250μA	-1			V
Forward Transconductance	g_{fs}	N-Ch	V_{GS}=15V, I_D=2.4A ③	5.2			S
		P-Ch	V_{GS}=-24V, I_D=-1.8A ③	2.5			S
Drain-to-Source Leakage Current	I_{DSS}	N-Ch	V_{DS}=24V, V_{GS}=0V			1	μA
			V_{DS}=-24V, V_{GS}=0V			-1	μA
		P-Ch	V_{DS}=24V, V_{GS}=0V, T_J=125°C			25	μA
			V_{DS}=-24V, V_{GS}=0V, T_J=125°C			-25	μA
Gate-to-Source ForwardLeakage	I_{GSS}	N-P	V_{GS}=±20V			±100	nA
Total Gate Charge	Q_g	N-Ch	N-Ch: ③ I_D=2.6A, V_{DS}=16V, V_{GS}=4.5V P-Ch: I_D=-2.2A,V_{DS}=-16V,V_{GS}=-4.5V			25	nC
		P-Ch				25	nC
Gate-to-Source Charge	Q_{gs}	N-Ch				2.9	nC
		P-Ch				2.9	nC
Gate-to-Drain ("Miller") Charge	Q_{gd}	N-Ch				7.9	nC
		P-Ch				9	nC
Turn-On Delay Time	$t_{D(on)}$	N-Ch	N-Ch: ③ V_{DD}=10A, I_D=2.6A R_G=6Ω, R_D=3.8Ω		6.8		ns
		P-Ch			11		ns
Rise Time	t_r	N-Ch			21		ns
		P-Ch			17		ns

Tum-Off Delay Time	$t_{D(off)}$	N-Ch	P-Ch: ③ V_{DD}=-10A, I_D=-2.2A R_G=6Ω, R_D=4.5Ω		22		ns
		P-Ch			25		ns
Fall Time	t_f	N-Ch			7.7		ns
		P-Ch			18		ns
Internal Drain Inductace	L_S	N-P	Between lead tipand		4		nH
Interna l Source Inductance	L_D	N-P	center of die contact		6		nH
Input Capacitance	C_{iss}	N-Ch	N-Ch: ③ V_{GS}=0V, V_{DS}=15V, f=1MHz P-Ch: V_{GS}=0V, V_{DS}=-15V, f=1MHz		520		pF
		P-Ch			440		pF
Output Capacitance	C_{oss}	N-Ch			180		pF
		P-Ch			200		pF
ReverseTransferCapacitance	C_{rss}	N-Ch			72		pF
		P-Ch			93		pF
Continuous Source Current (Body Diode)	I_S	N-Ch				1.8	A
		P-Ch				-1.8	A
Pulsed Source Current (Body Diode) ①	I_{SM}	N-Ch				16	A
		P-Ch				-12	A
Diode Forward Voltage	V_{SD}	N-Ch	T_J=25°C, I_S=1.8A,V_{GS}=0V ③			1	V
		P-Ch	T_J=25°C, I_S=-1.8A,V_{GS}=0V ③			-1	V
Reverse Recovery Time	t_{rr}	N-Ch	N-Ch: T_J=25°C I_F=2.6A, di/dt =100A/μs P-Ch: T_J=25°C I_F=-2.2A, di/dt=100A/μs ③		47	71	ns
		P-Ch			53	80	ns
Reverse Recovery Charge	Q_{rr}	N-Ch			56	84	nC
		P-Ch			66	99	nC
Forward Turn-On Time	t_{on}	N-P	Intrinsic turn-on time is neglegible (turn-on is dominated by L_S+L_D)				

Notes:

① Repetitive rating; pulse width limited bymax.junction temperature.(See fig. 23)

② N-Channel I_{SD}≤2.4A, di/dt ≤73A/μs, V_{DD}≤$V_{(BR)DSS}$, T_J≤ 150°C.

P-Channel I_{SD}≤ -1.8A, di/dt ≤ 90Aμs, V_{DD}≤$V_{(BR)DSS}$, T_J≤ 150°C.

③ Pulse width ≤ 300μs; duty cycle ≤ 2%.

6.1Typical Characterisitics (N-Channel)

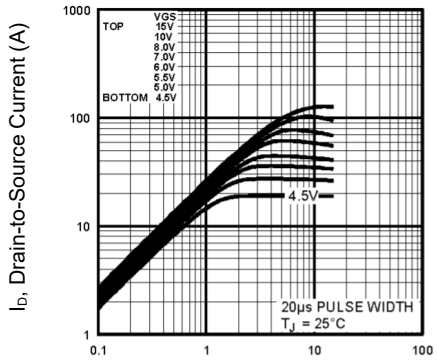


Figure 1: Typical Output Characteristics

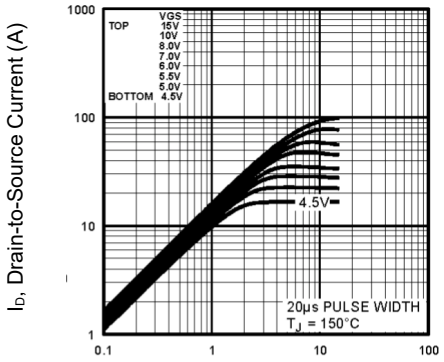


Figure 2: Typical Output Characteristics

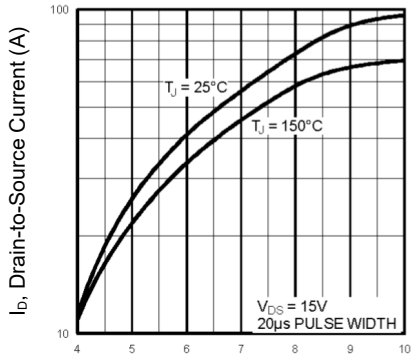


Figure 3: Typical Output Characteristics

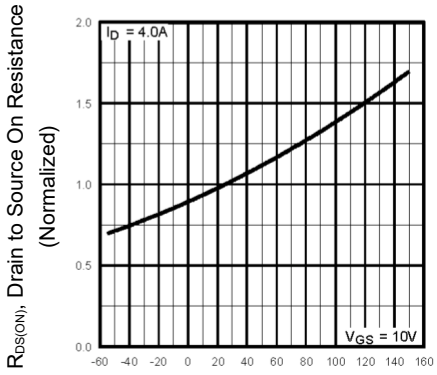


Figure 4: Normalized On-ResistanceVs. Temperature

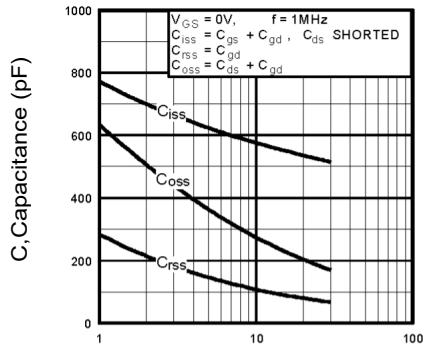


Figure 5: Typical Capacitance vs. Drain-to-Source Voltage

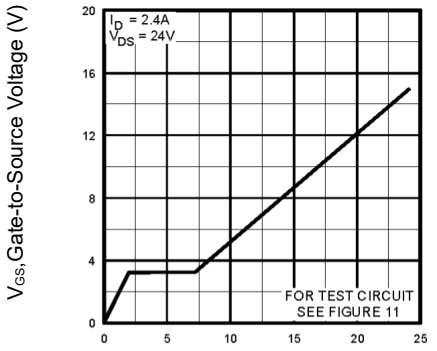
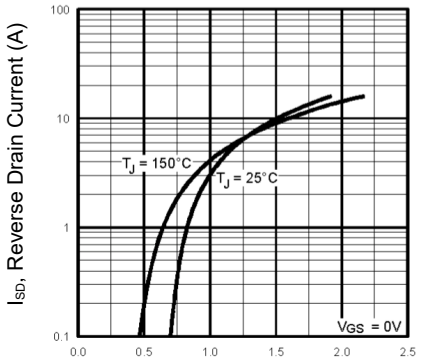


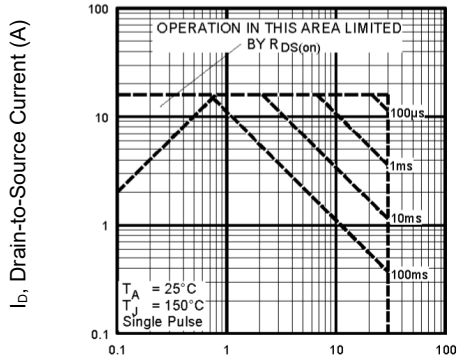
Figure 6: Typical Gate Charge Vs. Gate-to-Source Voltage

6.2Typical Characterisitics (N-Channel)



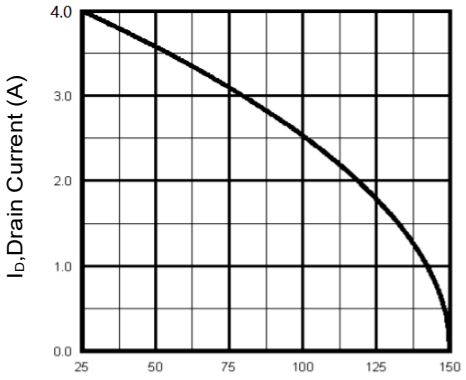
V_{SD},Source-to-Drain Voltage (V)

Figure 7: Typical Capacitance vs. Drain-to-Source Voltage



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

Figure 8: Maximum Safe Operating Area



T_A ,Ambient Temperature (°C)

Figure 9: Maximum Drain Current Vs. Ambient Temperature

6.3Typical Characterisitics (N-Channel)

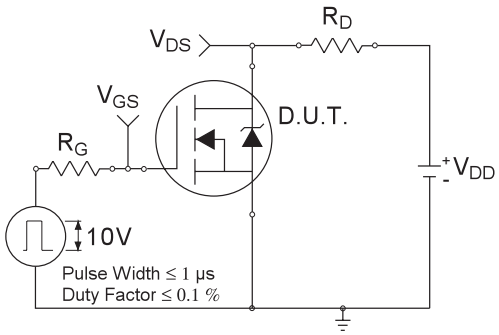


Figure 10a: Switching Time Test Circuit

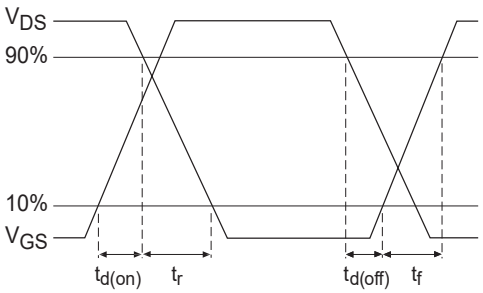


Figure 10b: Switching Time Waveforms

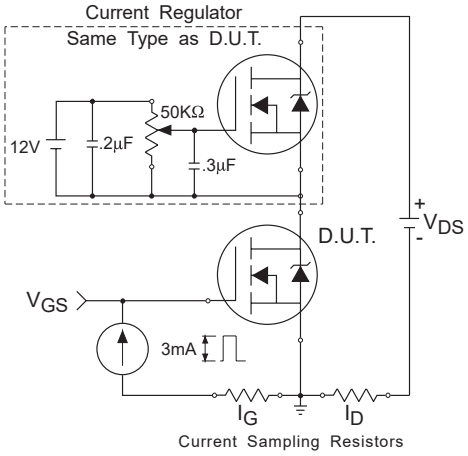


Figure 11a: Gate Charge Test Circuit

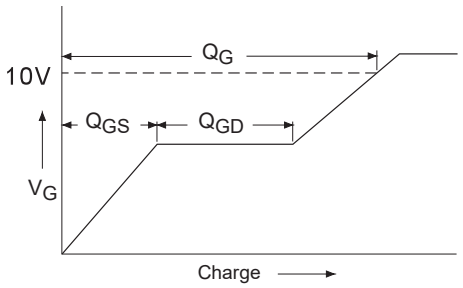


Figure 11b: Basic Gate Charge Wavefomm

6.4Typical Characterisitics (P-Channel)

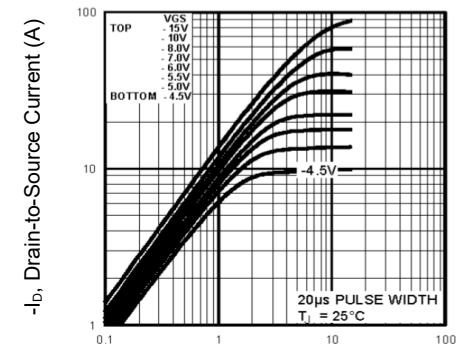


Figure 12: Typical Output Characteristics

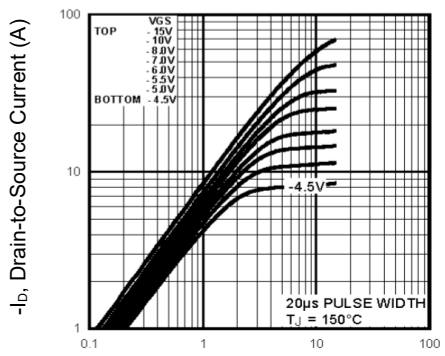


Figure 13: Typical Output Characteristics

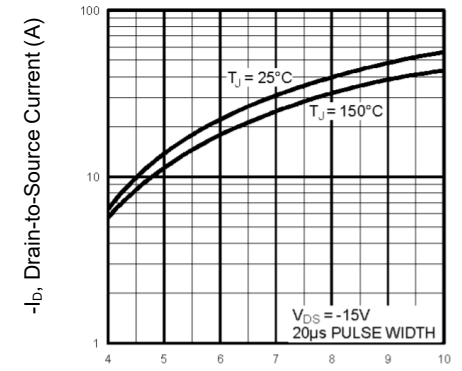


Figure 14: Typical Transfer Characteristics

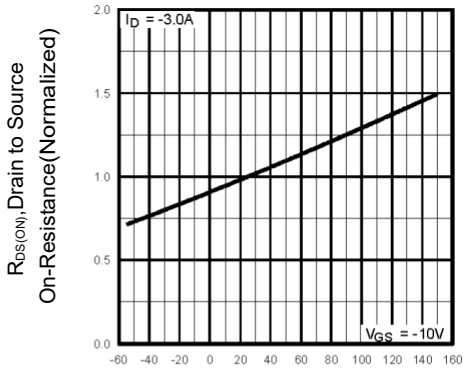


Figure 15: Normalized On-Resistance Vs. Temperature

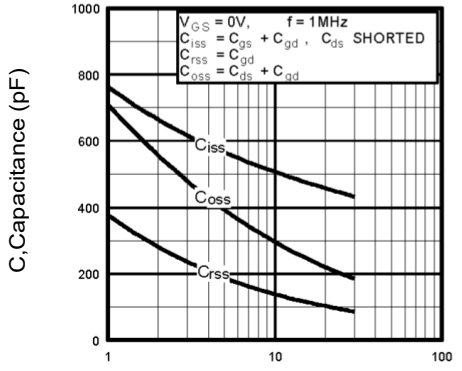


Figure 16: Typical Capacitance Vs. Drain-to-Source Voltage

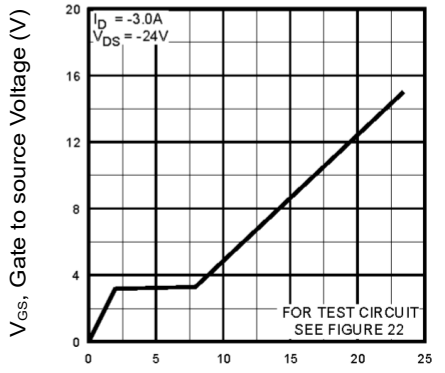
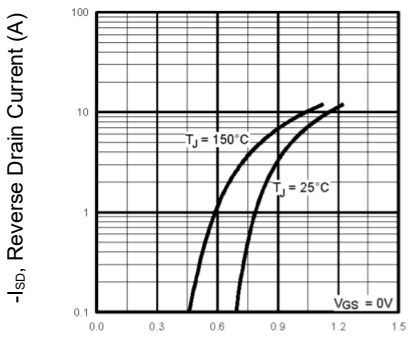


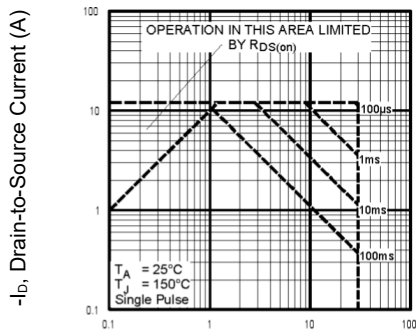
Figure 17: Typical Gate Charge Vs. Gate-to-Source Voltage

6.5Typical Characterisitics (P-Channel)



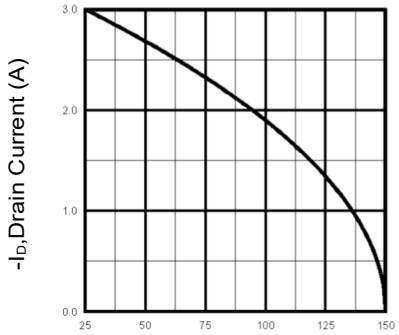
-V_{SD},Source-to-Drain Voltage (V)

Figure 18: Typical Capacitance vs. Drain-to-Source Voltage



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

Figure 19: Maximum Safe Operating Area



T_A ,Ambient Temperature (°C)

Figure 20: Maximum Drain Current Vs. Ambient Temperature

6.6Typical Characterisitics (P-Channel)

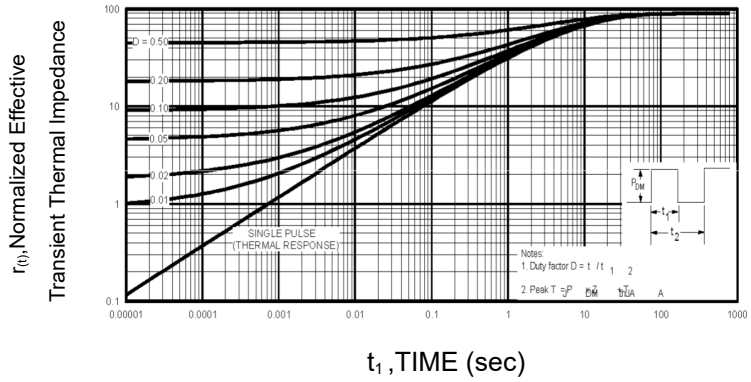


Figure 21: Transient Thermal Response Curve

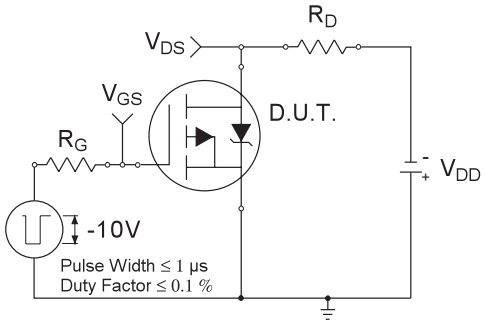


Figure 22a: Switching Time Test Circuit

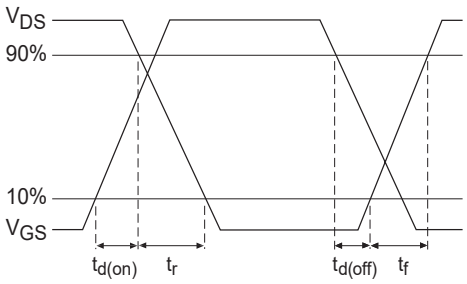


Figure 22b: Switching Time Waveforms

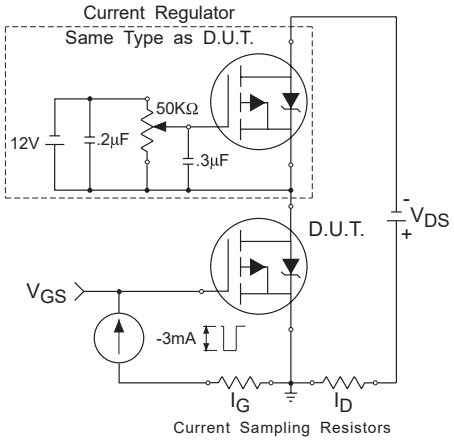


Figure 23a: Gate Charge Test Circuit

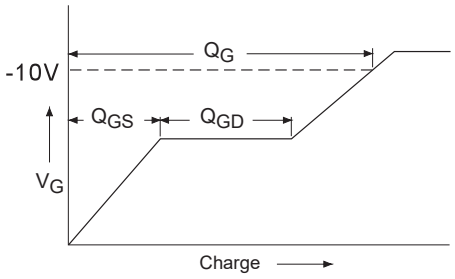
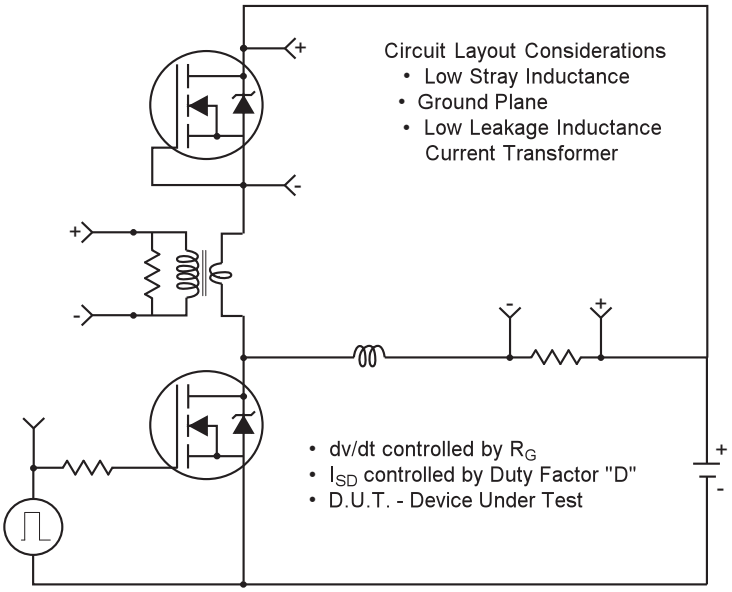


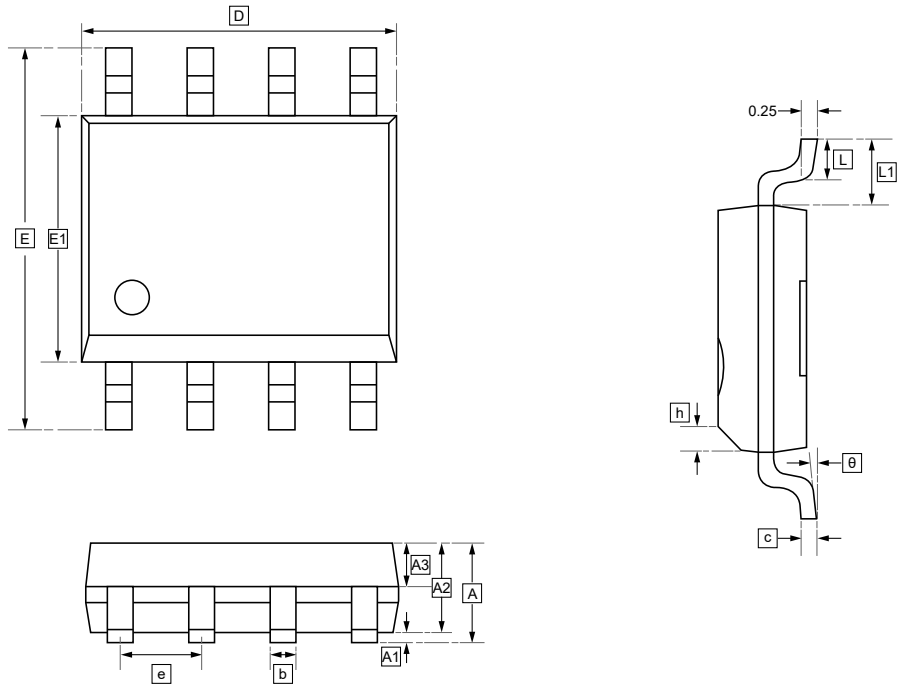
Figure 23b: Basic Gate Charge Wavefomm

6.7Typical Characterisitics (P-Channel)



* Reverse Polarity for P-Channel
** Use P-Channel Driver for P-Channel Measurements

7.SOP-8 Package Outline Dimensions

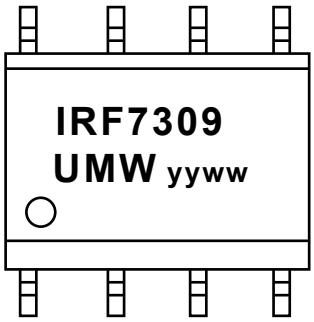


DIMENSIONS (mm are the original dimensions)

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°

8.Ordering information



yy: Year Code
ww: Week Code

Order Code	Package	Base QTY	Delivery Mode
UMW IRF7309TR	SOP-8	3000	Tape and reel

9.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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