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

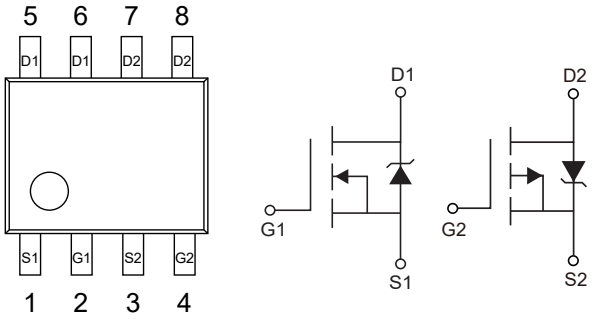
1.2Features(P-Ch)

- $V_{DS\ (V)}$=-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)

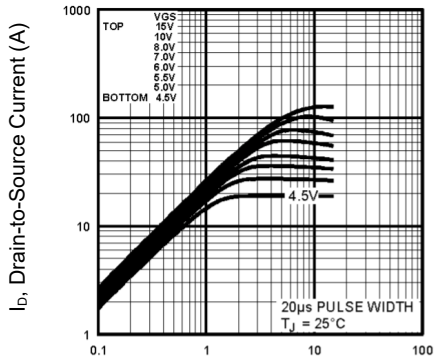


Figure 1: Typical Output Characteristics

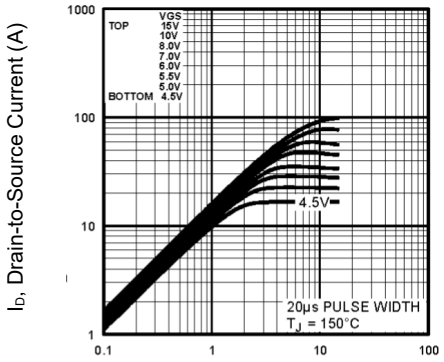


Figure 2: Typical Output Characteristics

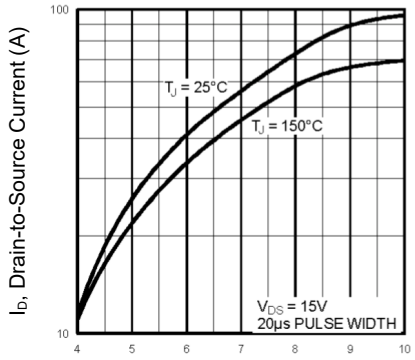


Figure 3: Typical Output Characteristics

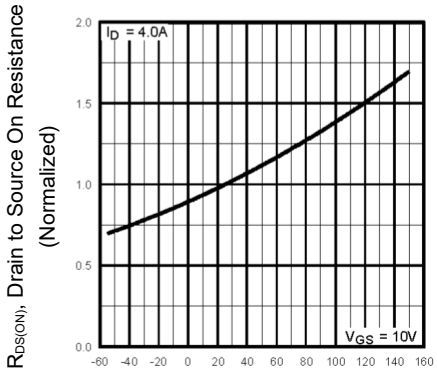


Figure 4: Normalized On-ResistanceVs. Temperature

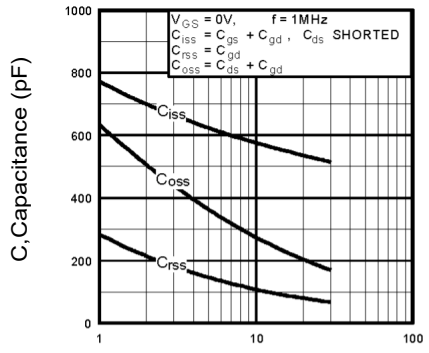


Figure 5: Typical Capacitance vs. Drain-to-Source Voltage

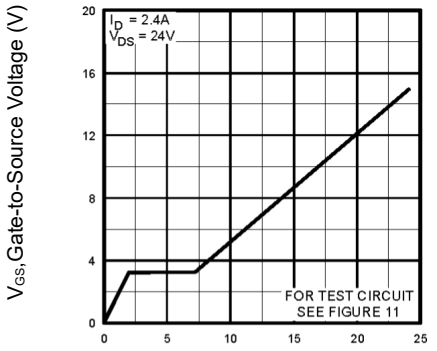
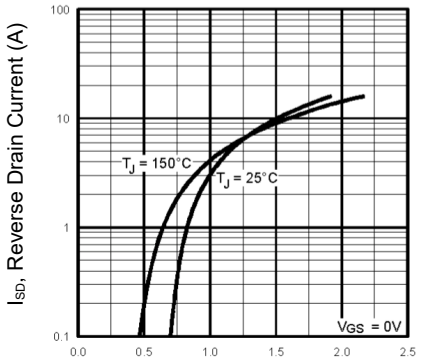


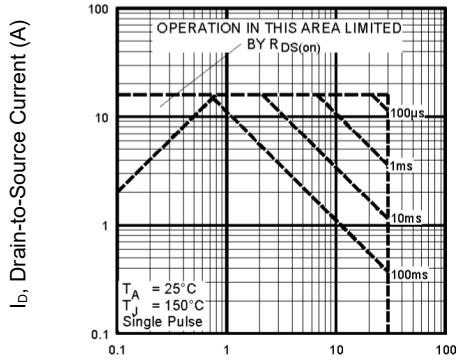
Figure 6: Typical Gate Charge Vs. Gate-to-Source Voltage

6.2Typical Characterisitics (N-Channel)



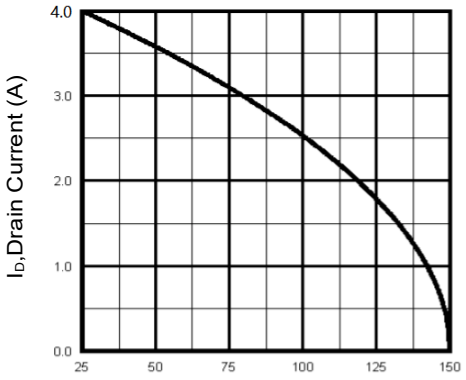
V_{SD},Source-to-Drain Voltage (V)

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)

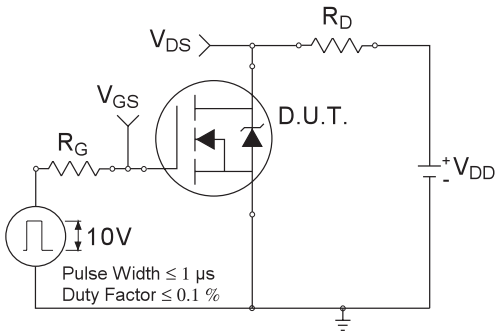


Figure 10a: Switching Time Test Circuit

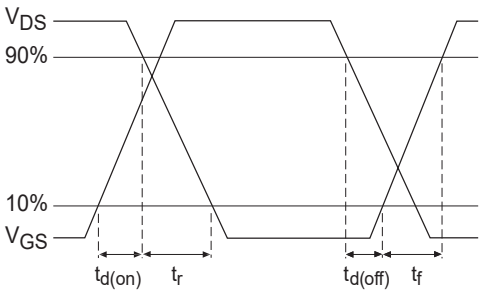


Figure 10b: Switching Time Waveforms

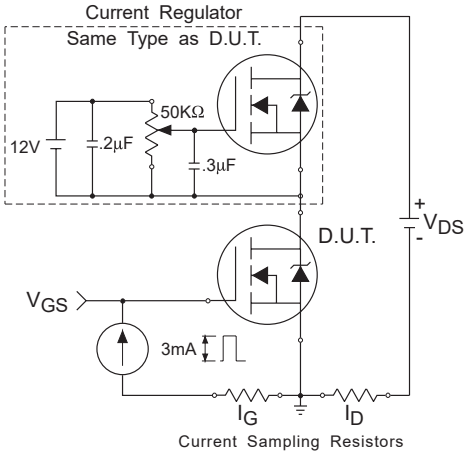


Figure 11a: Gate Charge Test Circuit

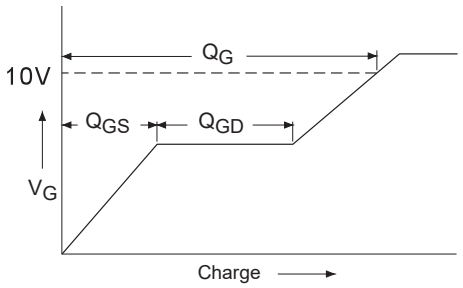


Figure 11b: Basic Gate Charge Wavefomm

6.4Typical Characterisitics (P-Channel)

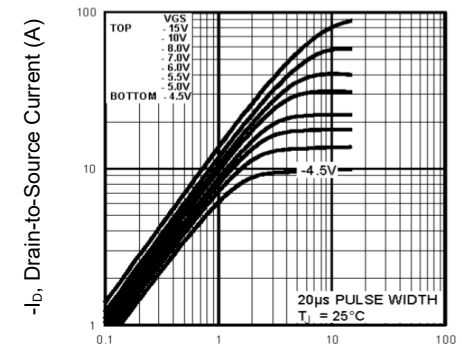


Figure 12: Typical Output Characteristics

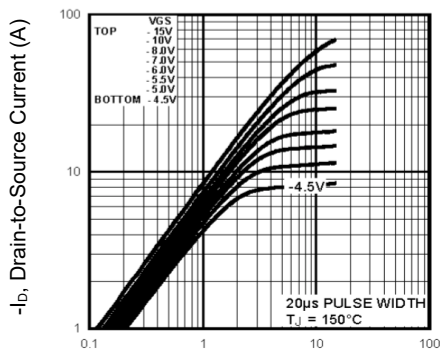


Figure 13: Typical Output Characteristics

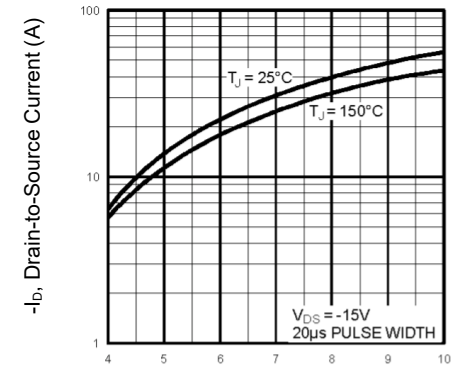


Figure 14: Typical Transfer Characteristics

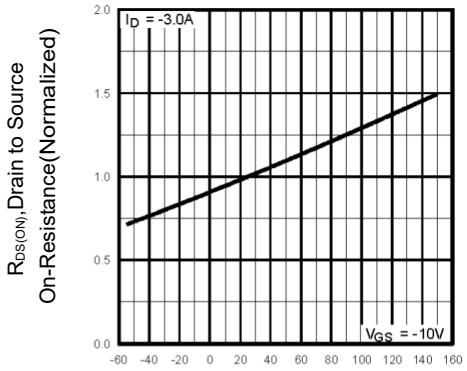


Figure 15: Normalized On-Resistance Vs. Temperature

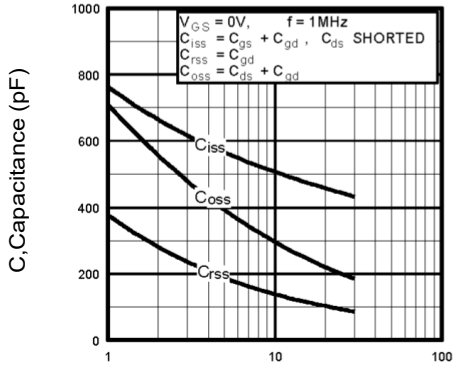


Figure 16: Typical Capacitance Vs. Drain-to-Source Voltage

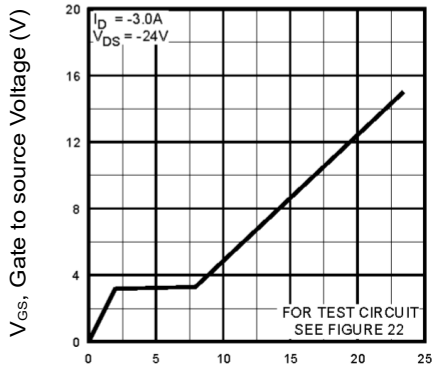
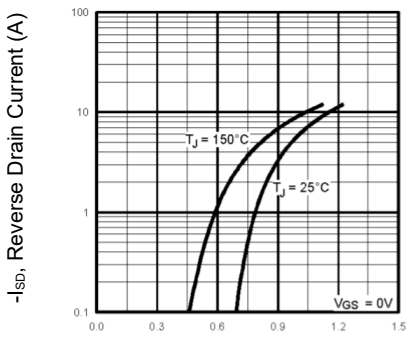


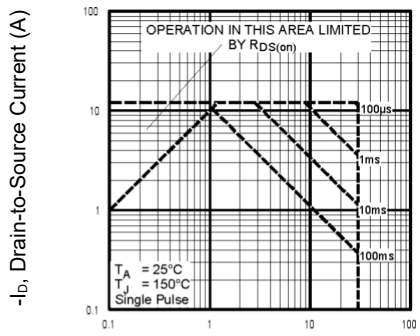
Figure 17: Typical Gate Charge Vs. Gate-to-Source Voltage

6.5Typical Characterisitics (P-Channel)



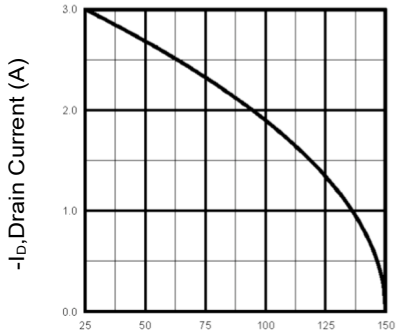
-V_{SD},Source-to-Drain Voltage (V)

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)

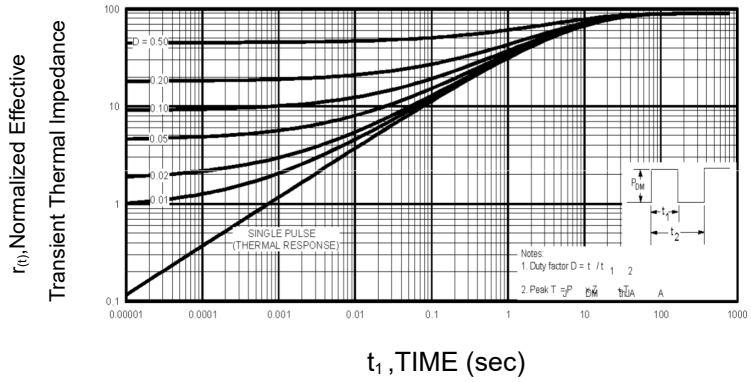


Figure 21: Transient Thermal Response Curve

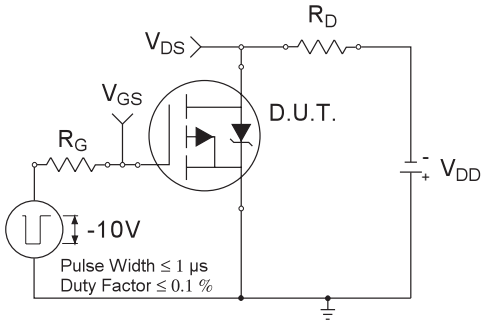


Figure 22a: Switching Time Test Circuit

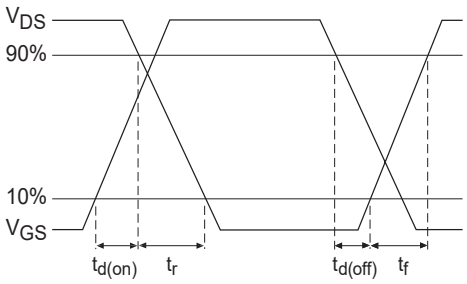


Figure 22b: Switching Time Waveforms

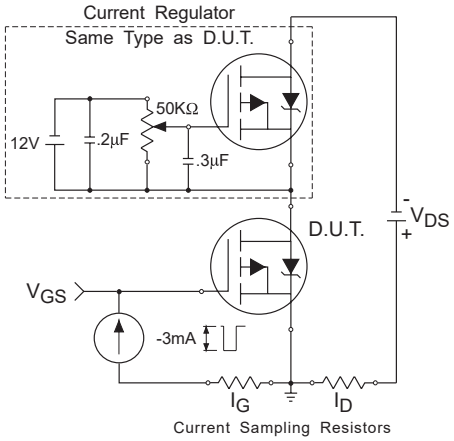


Figure 23a: Gate Charge Test Circuit

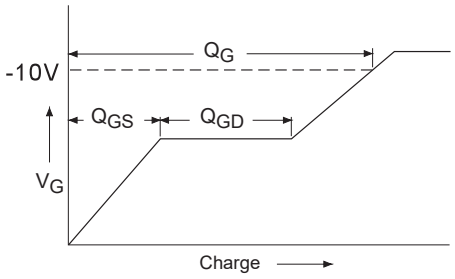
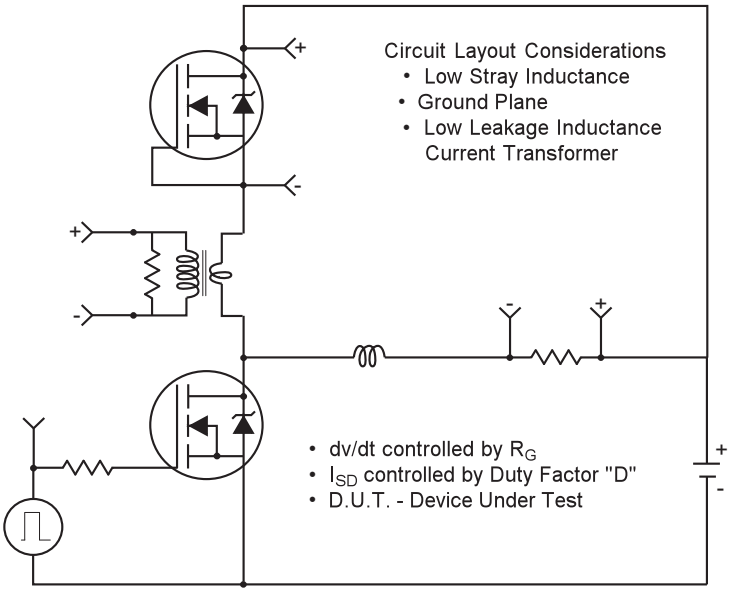


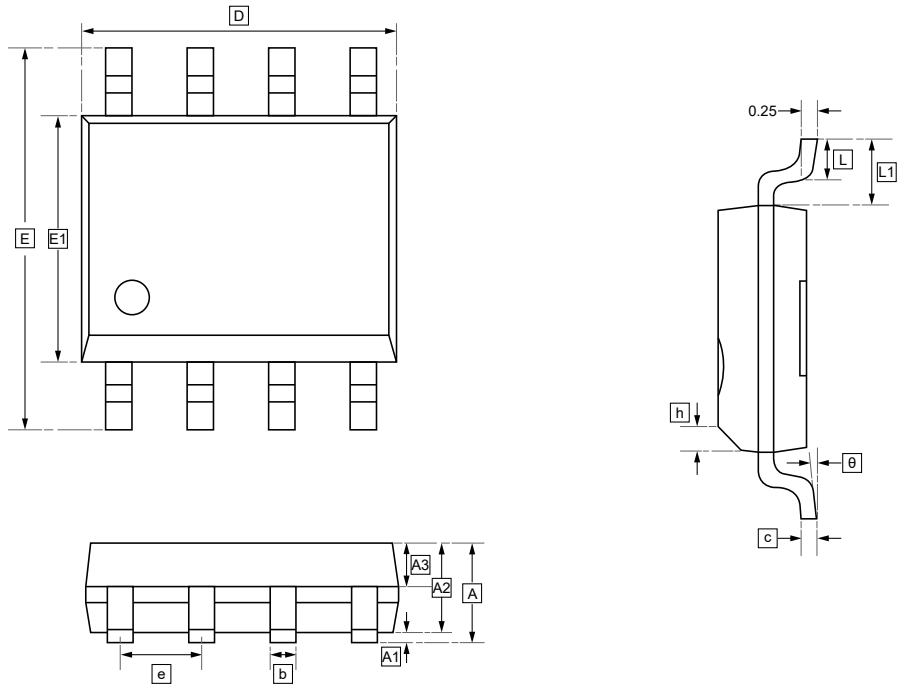
Figure 23b: Basic Gate Charge Wavefomm

6.7Typical Characterisitics (P-Channel)



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

7.SOP-8 Package Outline Dimensions

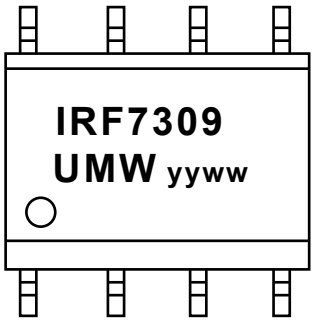


DIMENSIONS (mm are the original dimensions)

Symbol	A	A1	A2	A3	b	c	D	E	E1	e	h	L
Min	-	0.05	1.30	0.60	0.39	0.20	4.80	5.80	3.80	1.24	0.30	0.50
Max	1.75	0.20	1.50	0.70	0.47	0.24	5.00	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

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