

1.Description

The IRLML2402TR uses advanced trench technology to provide excellent $R_{DS(on)}$ with low gate charge. This device is suitable for use as a load switch or in PWM applications.

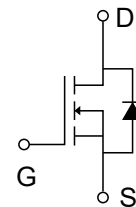
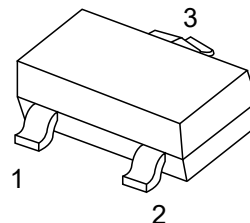
2.Features

- $V_{DS(V)}=20V$
- $I_D=1.2A(T_A=25^{\circ}C)$
- $Q_g(\text{typical})=2.6nC$
- $R_{DS(ON)}<145m\Omega(V_{GS}=4.5V)$

3.Pinning information

Pin	Symbol	Description
1	G	GATE
2	S	SOURCE
3	D	DRAIN

SOT-23



4.Maximum ratings ($T_A=25^{\circ}C$ unless otherwise noted)

Parameter		Symbol	Value	Units
Continuous Drain Current, V_{GS} @ 4.5V	$T_A=25^{\circ}C$	I_D	1.2	A
Continuous Drain Current, V_{GS} @ 4.5V	$T_A=70^{\circ}C$		0.95	
Pulsed Drain Current ①		I_{DM}	7.4	
Power Dissipation	$T_A=25^{\circ}C$	P_D	540	mW
Linear Derating Factor			4.3	mW/ $^{\circ}C$
Gate-to-Source Voltage		V_{GS}	± 12	V
Peak Diode Recovery dv/dt ②		dv/dt	5	V/ns
Junction and Storage Temperature Range		T_J, T_{STG}	-55 to 150	$^{\circ}C$

5.Thermal resistance rating

Parameter	Symbol	Typ	Max	Units
Maximum Junction-to-Ambient ④	$R_{\theta JA}$		230	$^{\circ}C/W$



6. Electrical Characteristics $T_J=25^{\circ}\text{C}$

Parameter	Symbol	Conditions	Min	Typ	Max	Units
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	$I_D=250\mu\text{A}$, $V_{GS}=0\text{V}$	20			V
Breakdown Voltage Temp. Coefficient	$\Delta V_{(BR)DSS}/\Delta T_J$	$I_D=1\text{mA}$, Reference to 25°C		0.024		$\text{V}/^{\circ}\text{C}$
Static Drain-to-Source On-Resistance	$R_{DS(ON)}$	$V_{GS}=4.5\text{V}$, $I_D=0.93\text{A}$ ③			145	m Ω
		$V_{GS}=2.7\text{V}$, $I_D=0.47$ ③			175	
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}$, $I_D=250\mu\text{A}$	0.7			V
Forward Transconductance	g_{fs}	$V_{DS}=10\text{V}$, $I_D=0.47$	1.3			S
Drain-to-Source Leakage Current	I_{DSS}	$V_{DS}=16\text{V}$, $V_{GS}=0\text{V}$			1	μA
		$V_{DS}=16\text{V}$, $V_{GS}=0\text{V}$, $T_J=125^{\circ}\text{C}$			25	
Gate-to-Source Forward Leakage	I_{GSS}	$V_{GS}=-12\text{V}$			-100	nA
Gate-to-Source Reverse Leakage		$V_{GS}=12\text{V}$			100	
Total Gate Charge	Q_g	$I_D=0.93\text{A}$		2.6	3.9	nC
Gate-to-Source Charge	Q_{gs}	$V_{DS}=16\text{V}$		0.41	0.62	
Gate-to-Drain ("Miller") Charge	Q_{gd}	$V_{GS}=4.5\text{V}$, See Fig.6 and 9 ③		1.1	1.7	
Turn-On Delay Time	$t_{D(on)}$	$V_{DD}=10\text{V}$		2.5		ns
Rise Time	t_r	$I_D=0.93\text{A}$		9.5		
Turn-Off Delay Time	$t_{D(off)}$	$R_G=6.2\Omega$		9.7		
Fall Time	t_f	$R_D=11\Omega$, See Fig.10 ③		4.8		pF
Input Capacitance	C_{iss}	$V_{GS}=0\text{V}$		110		
Output Capacitance	C_{oss}	$V_{DS}=15\text{V}$		51		
Reverse Transfer Capacitance	C_{rss}	$f=1\text{MHz}$, See Fig.5		25		



Source-Drain Ratings and Characteristics						
Continuous Source Current (Body Diode)	I_S	MOSFET symbol showing the integral reverse p-n junction diode.			0.54	A
Pulsed Source Current (Body Diode) ①	I_{SM}				7.4	
Diode Forward Voltage	V_{SD}		$T_J=25^{\circ}\text{C}, I_S=0.93\text{A}, V_{GS}=0\text{V}$ ③		1.2	V
Reverse Recovery Time	t_{rr}	$T_J=25^{\circ}\text{C}, I_F=0.93\text{A}$			25	38
Reverse Recovery Charge	Q_{rr}	$di/dt=100\text{A}/\mu\text{s}$ ③			16	24
						nC

Notes:

① Repetitive rating; pulse width limited by max. junction temperature. (See fig.11)

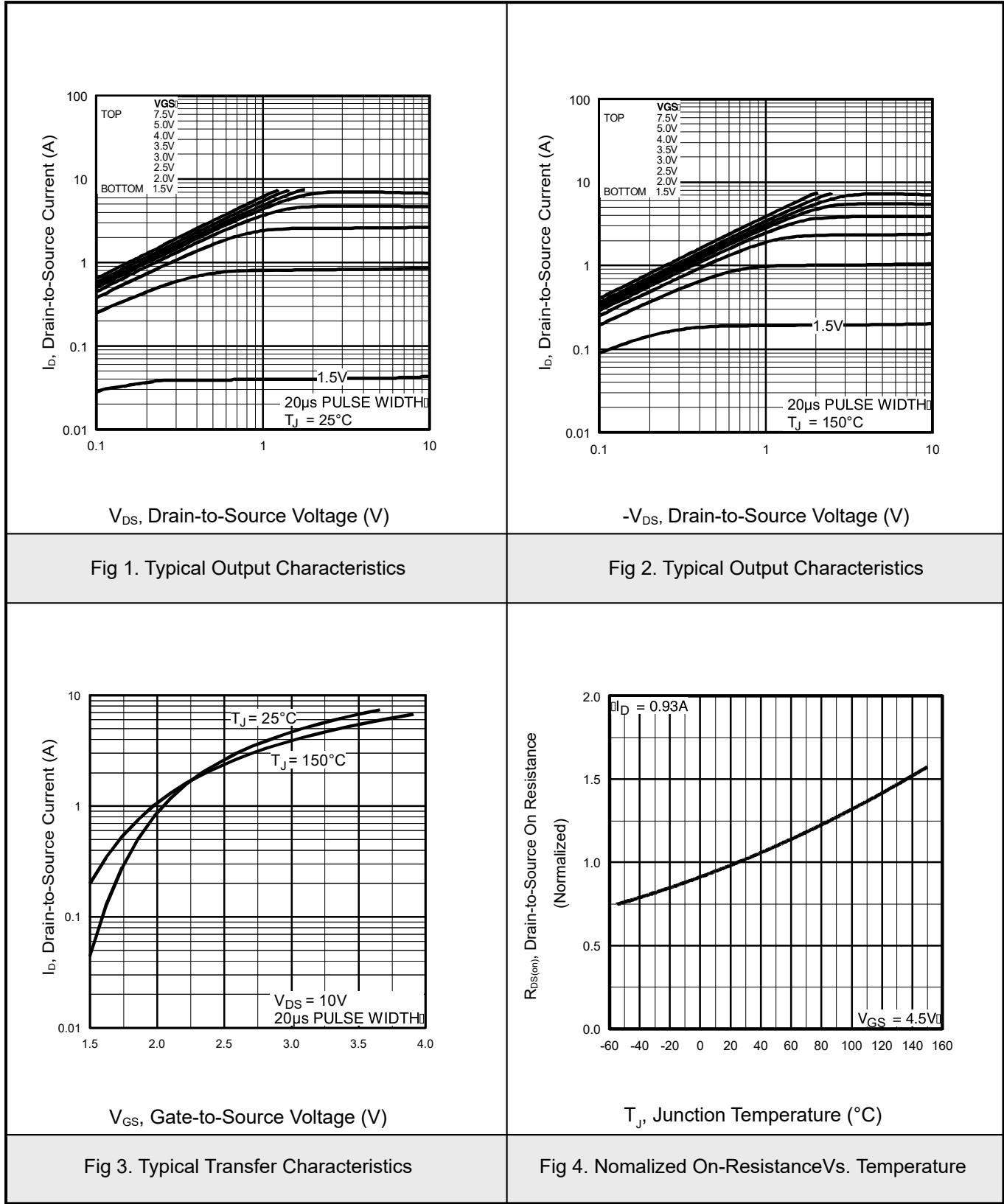
② $I_{SD} \leq 0.93\text{A}$, $di/dt \leq 90\text{A}/\mu\text{s}$, $V_{DD} \leq V_{(BR)DSS}$, $T_J \leq 150^{\circ}\text{C}$.

③ Pulse width $\leq 300\mu\text{s}$; duty cycle $\leq 2\%$.

④ Surface mounted on FR-4 board, $t \leq 5\text{sec}$.

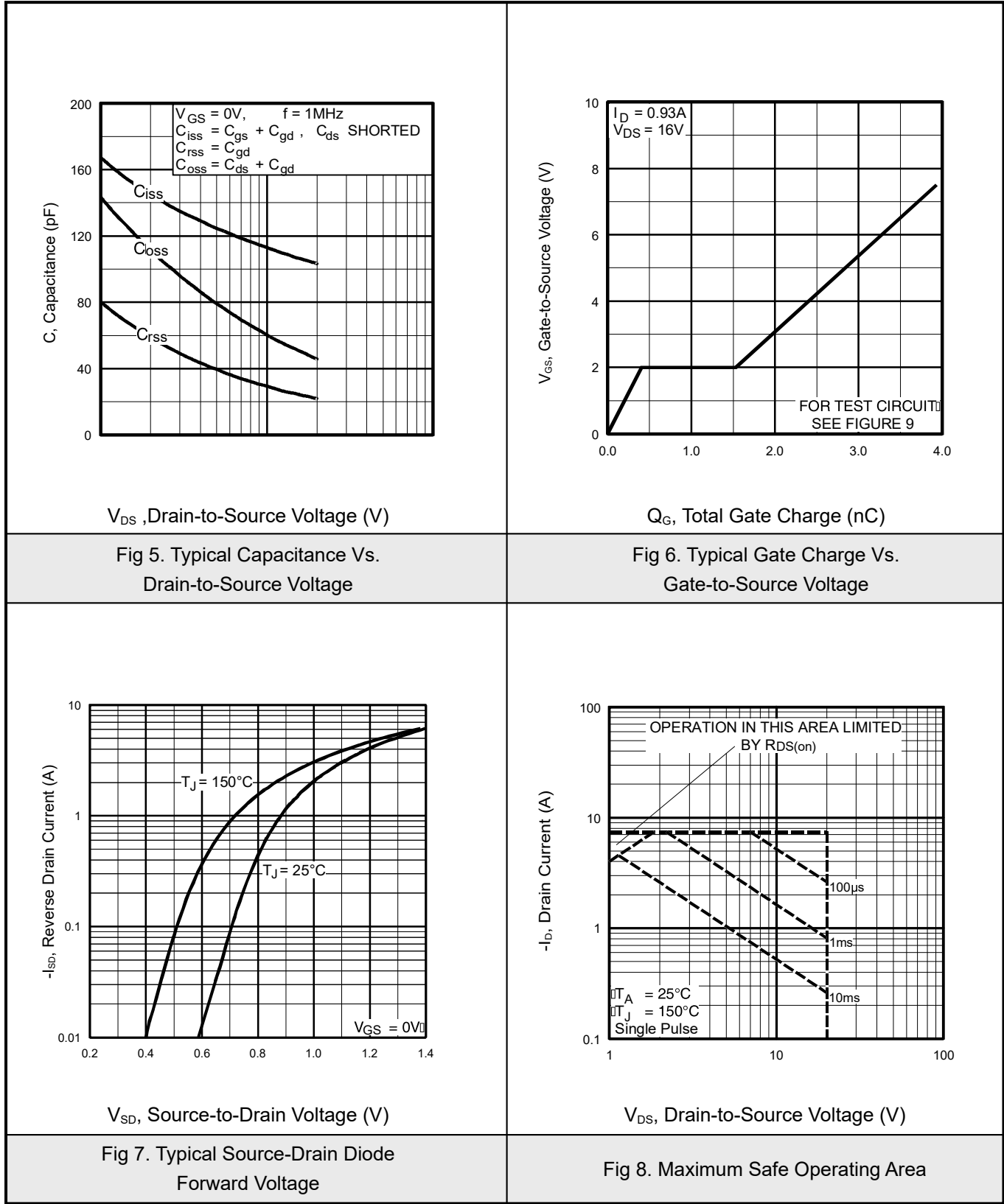


7.1Typical Characteristics





7.2Typical Characteristics





7.3 Typical Characteristics

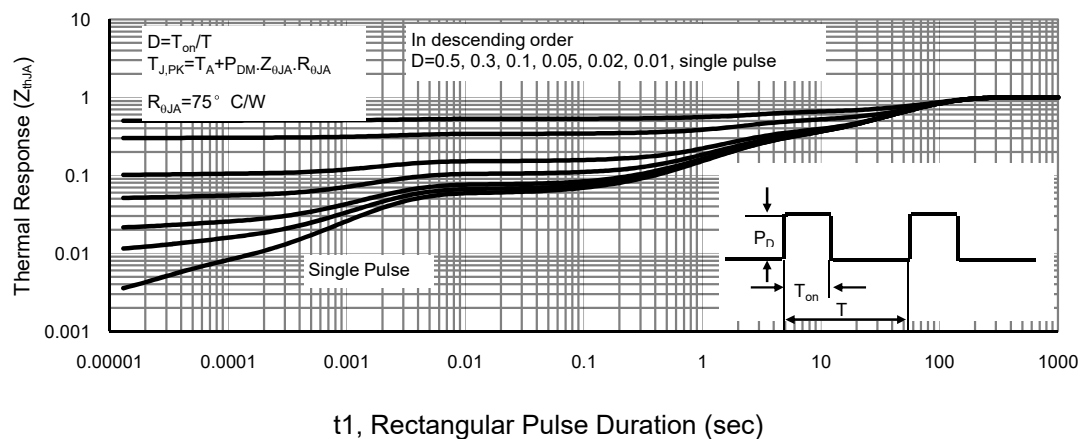


Figure 9. Maximum Effective Transient Thermal Impedance, Junction-to-Ambient



7.4 Typical Characteristics

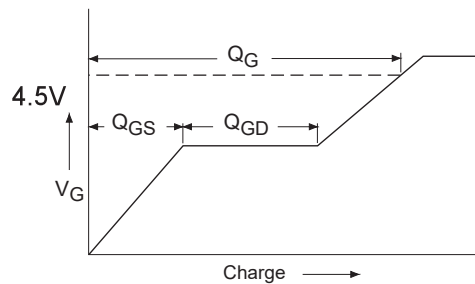


Fig 10a. Basic Gate Charge Waveform

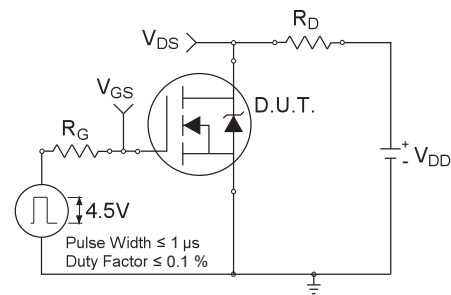


Fig 10a. Switching Time Test Circuit

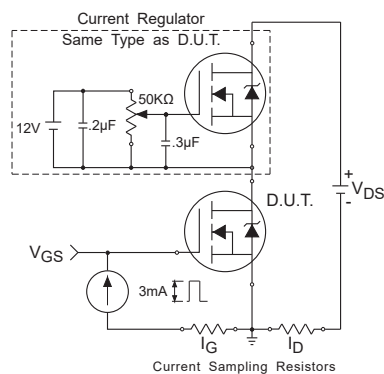


Fig 11a. Gate Charge Test Circuit

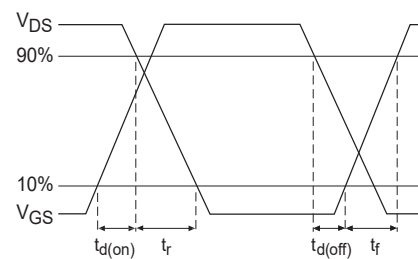
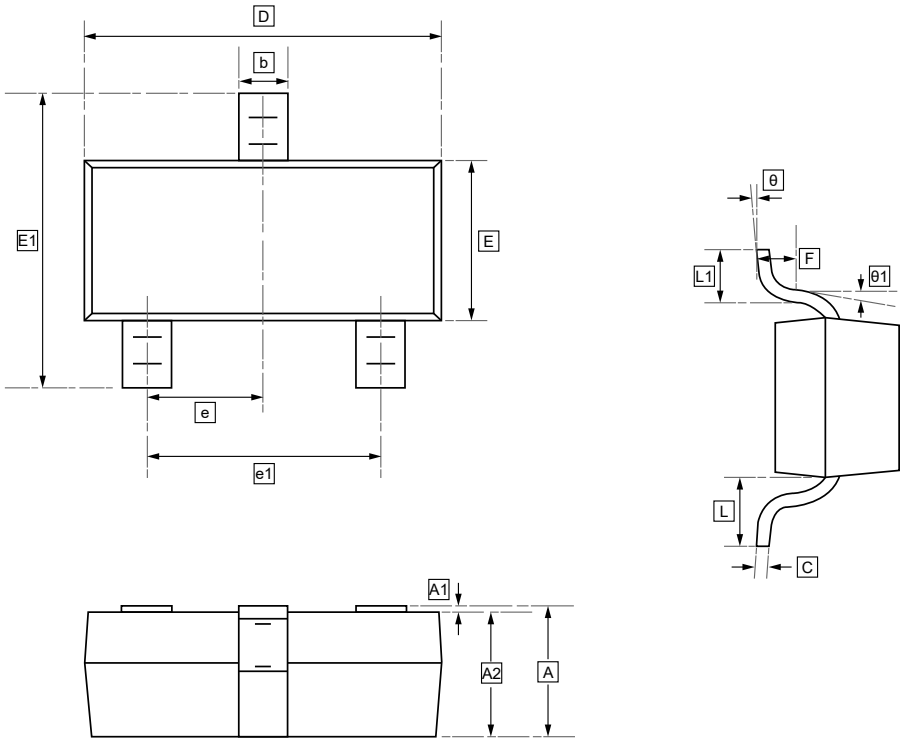


Fig 11b. Switching Time Waveforms



8.SOT-23 Package Outline Dimensions



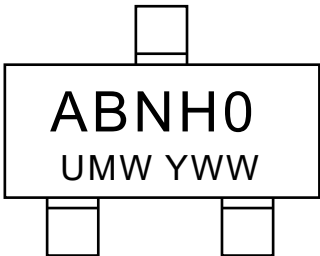
DIMENSIONS (mm are the original dimensions)

Symbol	A	A1	A2	b	C	D	E	E1	e	e1	L	L1
Min	0.90	0.00	0.90	0.30	0.08	2.80	1.20	2.25	0.95	1.80	0.55	0.30
Max	1.15	0.10	1.05	0.50	0.15	3.00	1.40	2.55	TYP.	2.00	REF	0.50

Symbol	F	θ	θ1
Min	0.25	0°	2°
Max		8°	12°



9.Ordering information



YWW: Batch Code

Order Code	Package	Base QTY	Delivery Mode
UMW IRLML2402TR	SOT-23	3000	Tape and reel



10.Disclaimer

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