

1.Description

The IRLML0060TR 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.

2.2Features

- Compatible with existing Surface Mount Techniques
- compliant containing no lead, no bromide and no halogen

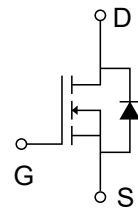
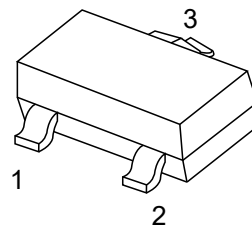
2.1Features

- $V_{DS(V)}=60V$
- $R_{DS(on)}<92m\Omega(V_{GS}=10V)$
- $R_{DS(on)}<116m\Omega(V_{GS}=4.5V)$

4.Pinning information

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

SOT-23



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

Parameter		Symbol	Value	Units
Drain-Source Voltage		V_{DS}	60	V
Continuous Drain Current, V_{GS} @ 10V	$T_A=25^{\circ}C$	I_D	2.7	A
Continuous Drain Current, V_{GS} @ 10V	$T_A=70^{\circ}C$		2.1	
Pulsed Drain Current		I_{DM}	11	
Maximum Power Dissipation	$T_A=25^{\circ}C$	P_D	1.25	W
Maximum Power Dissipation	$T_A=70^{\circ}C$		0.8	
Linear Derating Factor			0.01	W/ $^{\circ}C$
Gate-to-Source Voltage		V_{GS}	± 16	V
Junction and Storage Temperature Range		T_J, T_{STG}	-55 to 150	$^{\circ}C$



6.Thermal resist ance rating

Parameter	Symbol	Typ	Max	Units
Junction-to-Ambient ③	$R_{\theta JA}$		100	°C/W
Junction-to-Ambient (t<10s) ④	$R_{\theta JA}$		99	°C/W



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

Parameter	Symbol	Conditions	Min	Typ	Max	Units
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	$I_D=250\mu\text{A}$, $V_{GS}=0\text{V}$	60			V
Breakdown Voltage Temp. Coefficient	$\Delta V_{(BR)DSS}/\Delta T_J$	$I_D=1\text{mA}$, Reference to 25°C		0.06		$\text{V}/^{\circ}\text{C}$
Static Drain-to-Source On-Resistance	$R_{DS(ON)}$	$V_{GS}=4.5\text{V}$, $I_D=2.2\text{A}$ ②		60	116	$\text{m}\Omega$
		$V_{GS}=10\text{V}$, $I_D=2.7\text{A}$ ②		70	92	
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}$, $I_D=25\mu\text{A}$	1		2.5	V
Drain-to-Source Leakage Current	I_{DSS}	$V_{DS}=60\text{V}$, $V_{GS}=0\text{V}$			20	μA
		$V_{DS}=60\text{V}$, $V_{GS}=0\text{V}$, $T_J=125^{\circ}\text{C}$			250	
Gate-to-Source Forward Leakage	I_{GSS}	$V_{GS}=20\text{V}$			100	nA
Gate-to-Source Reverse Leakage		$V_{GS}=-20\text{V}$			-100	
Internal Gate Resistance	R_G			1.6		Ω
Forward Transconductance	g_{fs}	$V_{DS}=25\text{V}$, $I_D=2.7\text{A}$	7.6			S
Total Gate Charge	Q_g	$V_{DS}=30\text{V}$		2.5		nC
Gate-to-Source Charge	Q_{gs}	$V_{GS}=4.5\text{V}$ ②		0.7		
Gate-to-Drain ("Miller") Charge	Q_{gd}	$I_D=2.7\text{A}$		1.3		
Turn-On Delay Time	$t_{D(on)}$	$V_{DD}=30\text{V}$ ②		5.4		ns
Rise Time	t_r	$I_D=1\text{A}$		6.3		
Turn-Off Delay Time	$t_{D(off)}$	$R_G=6.8\Omega$		6.8		
Fall Time	t_f	$V_{GS}=4.5\text{V}$		4.2		
Input Capacitance	C_{iss}	$V_{GS}=0\text{V}$		290		pF
Output Capacitance	C_{oss}	$V_{DS}=25\text{V}$		37		
Reverse Transfer Capacitance	C_{rss}	$f=1\text{MHz}$		21		



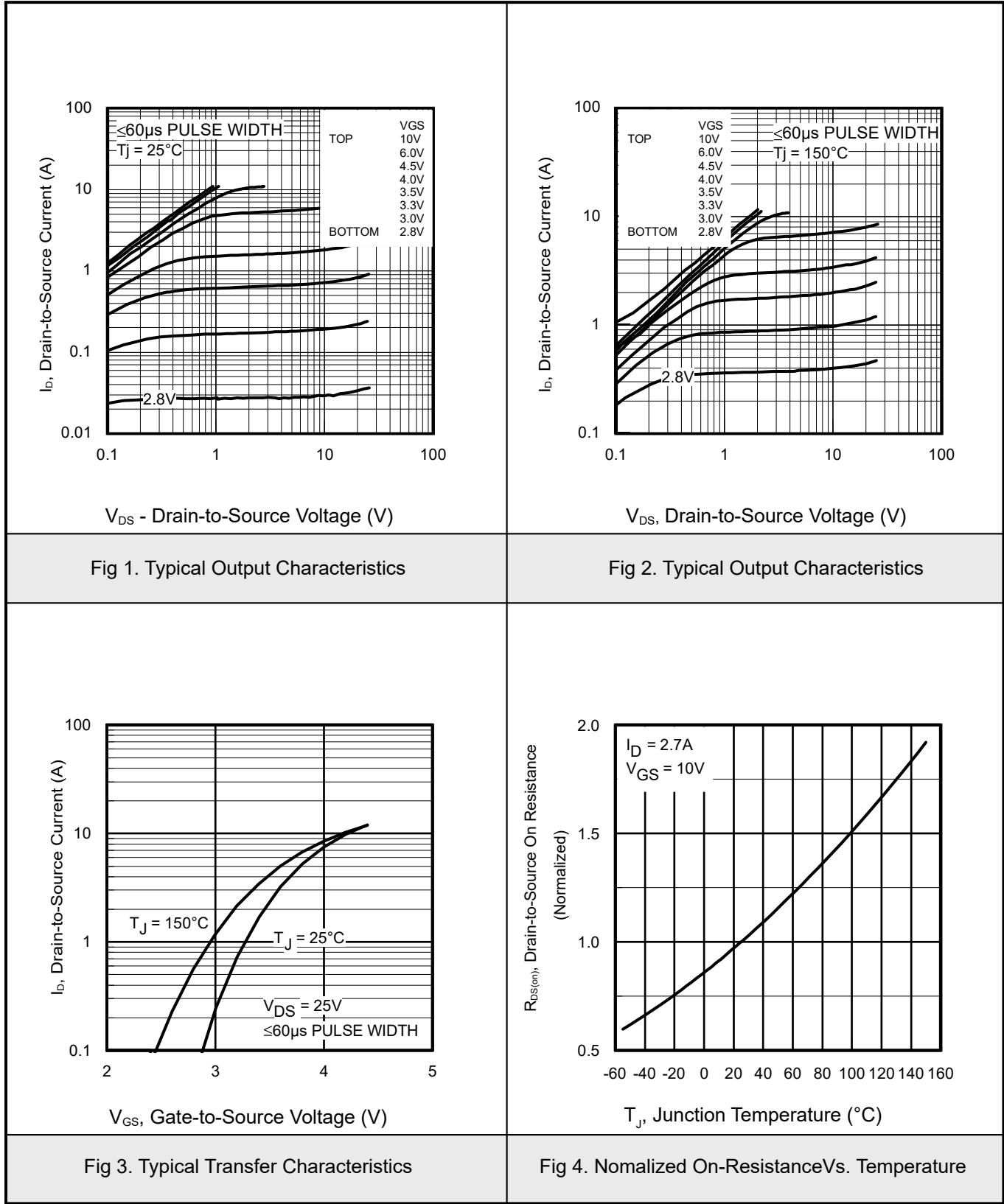
Source-Drain Ratings and Characteristics						
Continuous Source Current (Body Diode)	I_S	MOSFET symbol showing the integral reverse p-n junction diode.			1.6	A
Pulsed Source Current (Body Diode) ①	I_{SM}				11	
Diode Forward Voltage	V_{SD}	$T_J=25^{\circ}\text{C}, I_S=2.7\text{A}, V_{GS}=0\text{V}$ ②			1.3	V
Reverse Recovery Time	t_{rr}	$T_J=25^{\circ}\text{C}, V_R=30\text{V}, I_F=1.6\text{A}$		14	21	ns
Reverse Recovery Charge	Q_{rr}	$dI/dt=100\text{A}/\mu\text{s}$ ②		13	20	nC

Notes:

- ① Repetitive rating; pulse width limited by max. junction temperature.
- ② Pulse width $\leq 400\mu\text{s}$; duty cycle $\leq 2\%$.
- ③ Surface mounted on 1 in square Cu board.

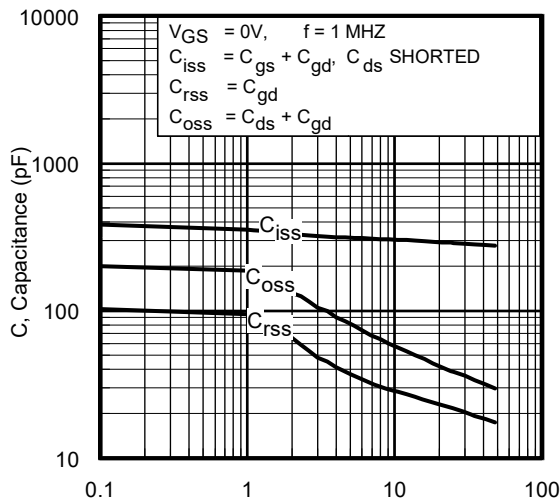


8.1 Typical Characteristics



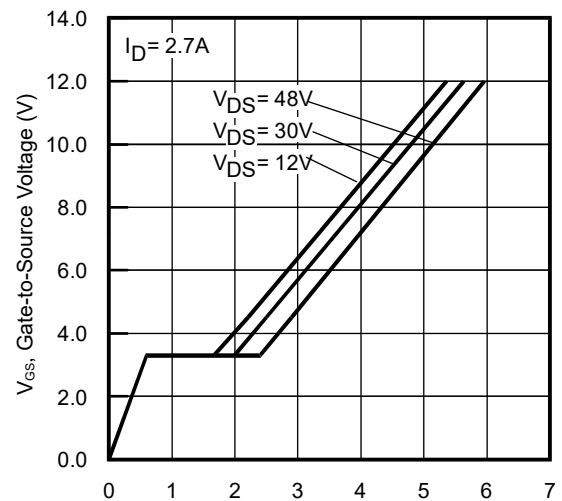


8.2 Typical Characteristics



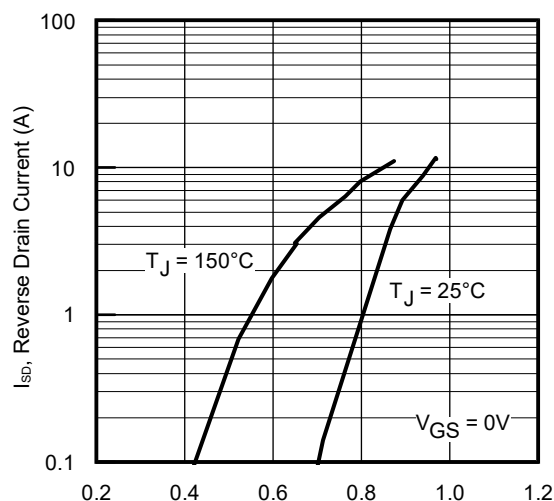
V_{DS} , Drain-to-Source Voltage (V)

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



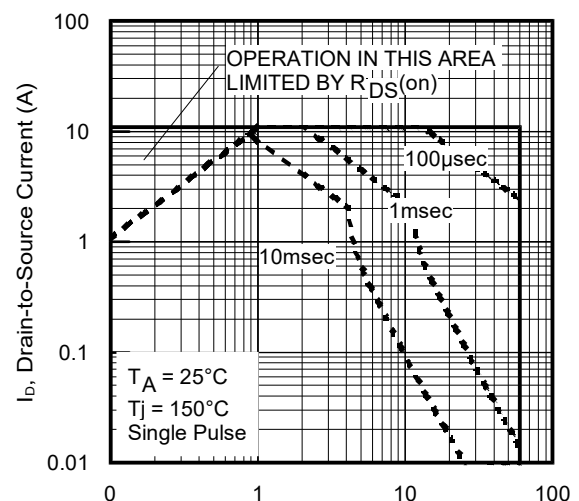
Q_G , Total Gate Charge (nC)

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

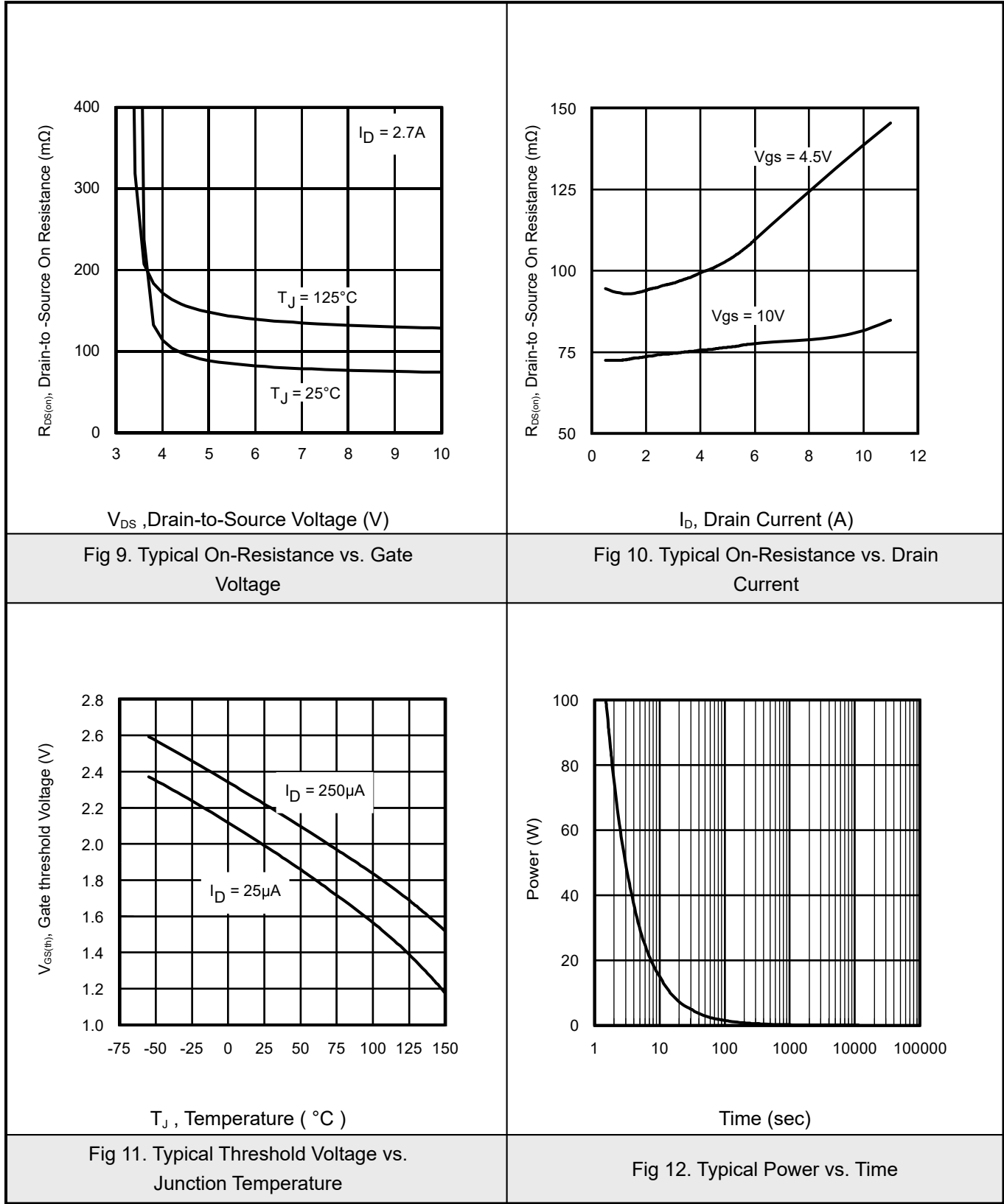


V_{DS} , Drain-to-Source Voltage (V)

Fig 8. Maximum Safe Operating Area



8.3Typical Characterisitics





8.4Typical Characterisitics

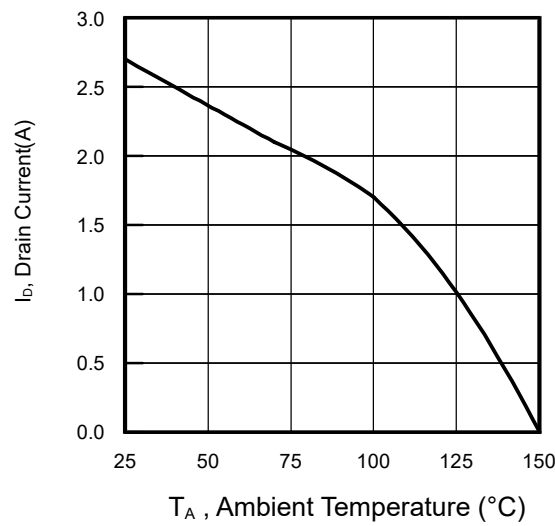


Fig 13. Maximum Drain Current vs. Ambient Temperature

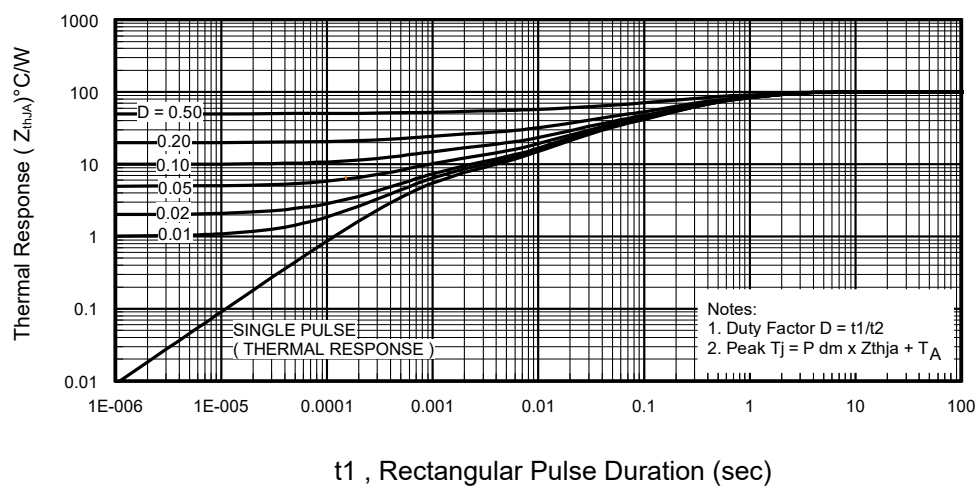


Fig 14. Typical Effective Transient Thermal Impedance, Junction-to-Ambient



8.5 Typical Characteristics

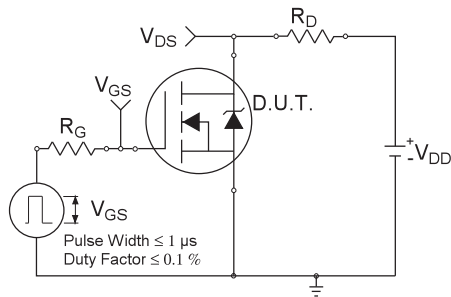


Fig 15a. Switching Time Test Circuit

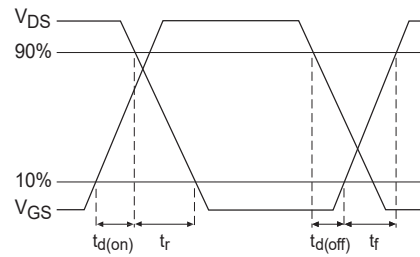


Fig 15b. Switching Time Waveforms

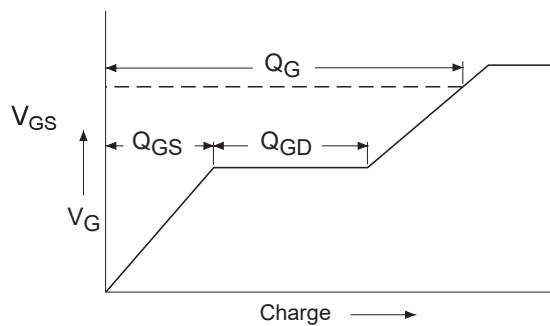


Fig 16a. Basic Gate Charge Waveform

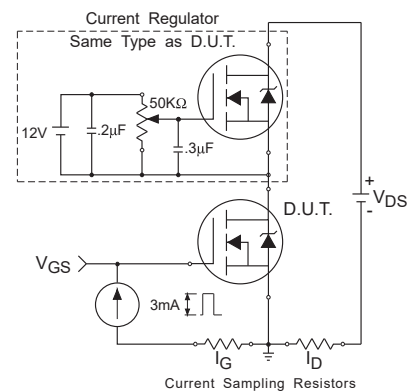
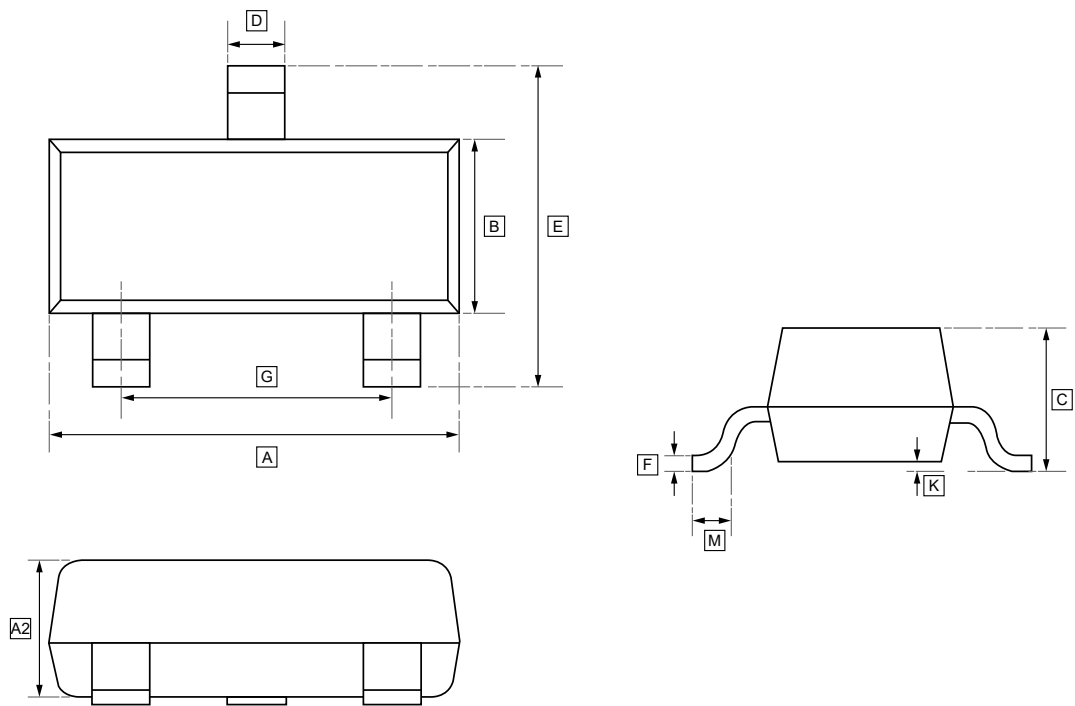


Fig 16b. Gate Charge Test Circuit



9.SOT-23 Package Outline Dimensions

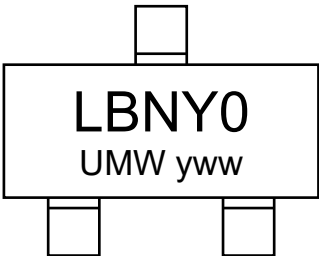


DIMENSIONS (mm are the original dimensions)

Symbol	A	B	C	D	E	G	K	M	A2	F
Min	2.85	1.20	0.90	0.40	2.25	1.80	0.00	0.30	0.95	0.095
Max	3.04	1.40	1.10	0.50	2.55	2.00	0.10	-	1.05	0.115



10.Ordering information



yww: Batch Code

Order Code	Package	Base QTY	Delivery Mode
UMW IRLML0060TR	SOT-23	3000	Tape and reel



11.Disclaimer

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