

1.Description

The SOT-223 package is designed for surface mount using vapor phase, infra red, or wave soldering techniques. The unique package design allows for easy automatic pick-and-place as with other packages but has the added advantage of improved thermal performance due to an enlarged tab for heat sinking. Power dissipation of 1.0W is possible in a typical surface mount application.

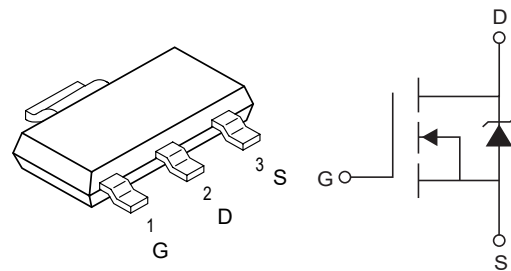
2.Features

- $V_{DS(V)}=55V$
- $I_D=2A$
- $R_{DS(ON)}<140m\Omega(V_{GS}=10V)$
- Surface Mount
- Advanced Process Technology
- Ultra Low On-resistance
- Dynamic dv/dt Rating
- Fast Switching

3.Pinning information

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

SOT-223
top view



4.Absolute Maximum Ratings $T_A=25^{\circ}C$ unless otherwise noted

Parameter		Symbol	Rating	Units
Continuous Drain Current, $V_{GS} @ 10V^{**}$	$T_A=25^{\circ}C$	I_D	2.8	A
Continuous Drain Current, $V_{GS}10V^*$	$T_A=25^{\circ}C$		2	A
Continuous Drain Current, $V_{GS}10V^*$	$T_A=70^{\circ}C$		1.6	A
Pulsed Drain Current ①		I_{DM}	16	A
Power Dissipation (PcB Mount)**	$T_A=25^{\circ}C$	P_D	2.1	W
Power Dissipation (PCB Mount)*	$T_A=25^{\circ}C$		1	W
Linear Derating Factor (PCB Mount)*			8.3	mW $^{\circ}C$
Gate-to-Source Voltage		V_{GS}	± 16	V
Single Pulse Avalanche Energy ②		E_{AS}	32	mJ



Avalanche Current①	I_{AR}	2	A
Repetitive Avalanche Energy①*	E_{AR}	0.1	mJ
Peak Diode Recovery dv/dt ③	dv/dt	7.2	V/ns
Junction and Storage Temperature Range	T_J, T_{STG}	-55 to 150	°C

5.Thermal resistance rating

Parameter	Symbol	Typ	Max	Units
Junction-to-Amb. (PCB Mount, Steady State)*	$R_{\theta JA}$	90	120	°C/W
Junction-to-Amb. (PCB Mount, Steady State)**	$R_{\theta JA}$	50	60	°C/W



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

Parameter	Symbol	Conditions	Min	Typ	Max	Units
Drain-to-Source Breakdown Voltage	$V_{(BR)DSS}$	$I_D=250\mu\text{A}$, $V_{GS}=0\text{V}$	55			V
Breakdown Voltage Temp. Coefficient	$\Delta V_{(BR)DSS}/\Delta T_J$	Reference to 25°C , $I_D=1\text{mA}$		0.015		V/ $^{\circ}\text{C}$
Static Drain-to-Source On-Resistance	$R_{DS(ON)}$	$V_{GS}=10\text{V}$, $I_D=2\text{A}$ ④			140	m Ω
		$V_{GS}=5\text{V}$, $I_D=1.2\text{A}$ ④			200	m Ω
		$V_{GS}=4\text{V}$, $I_D=1\text{A}$ ④			280	m Ω
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}$, $I_D=250\mu\text{A}$	1		2	V
Forward Transconductance	g_{FS}	$V_{DS}=25\text{V}$, $I_D=1\text{A}$	2.3			S
Drain-to-Source Leakage Current	I_{DSS}	$V_{DS}=55\text{V}$, $V_{GS}=0\text{V}$			25	μA
		$V_{DS}=44\text{V}$, $V_{GS}=0\text{V}$, $T_J=150^{\circ}\text{C}$			250	μA
Gate-to-Source Forward Leakage	I_{GSS}	$V_{GS}=16\text{V}$			100	nA
Gate-to-Source Reverse Leakage		$V_{GS}=-16\text{V}$			-100	nA
Total Gate Charge	Q_g	$I_D=2\text{A}$, $V_{DS}=44\text{V}$, $V_{GS}=10\text{V}$ See Fig. 6 and 11 ④		9.5	14	nC
Gate-to-Source Charge	Q_{gs}			1.1	1.7	nC
Gate-to-Drain ("Miller") Charge	Q_{gd}			3	4.4	nC
Turn-On Delay Time	$t_{D(on)}$	$V_{DD}=28\text{V}$, $I_D=2\text{A}$, $R_G=6\Omega$ $R_D=14\Omega$, See Fig. 12 ④		5.1		ns
Rise Time	t_r			4.9		ns
Turn-Off Delay Time	$t_{D(off)}$			14		ns
Fall Time	t_f			2.9		ns
Input Capacitance	C_{iss}	$V_{GS}=0\text{V}$, $V_{DS}=25\text{V}$, $f=1\text{MHz}$ See Fig. 5		230		pF
Output Capacitance	C_{oss}			66		pF
Reverse Transfer Capacitance	I_s			30		pF



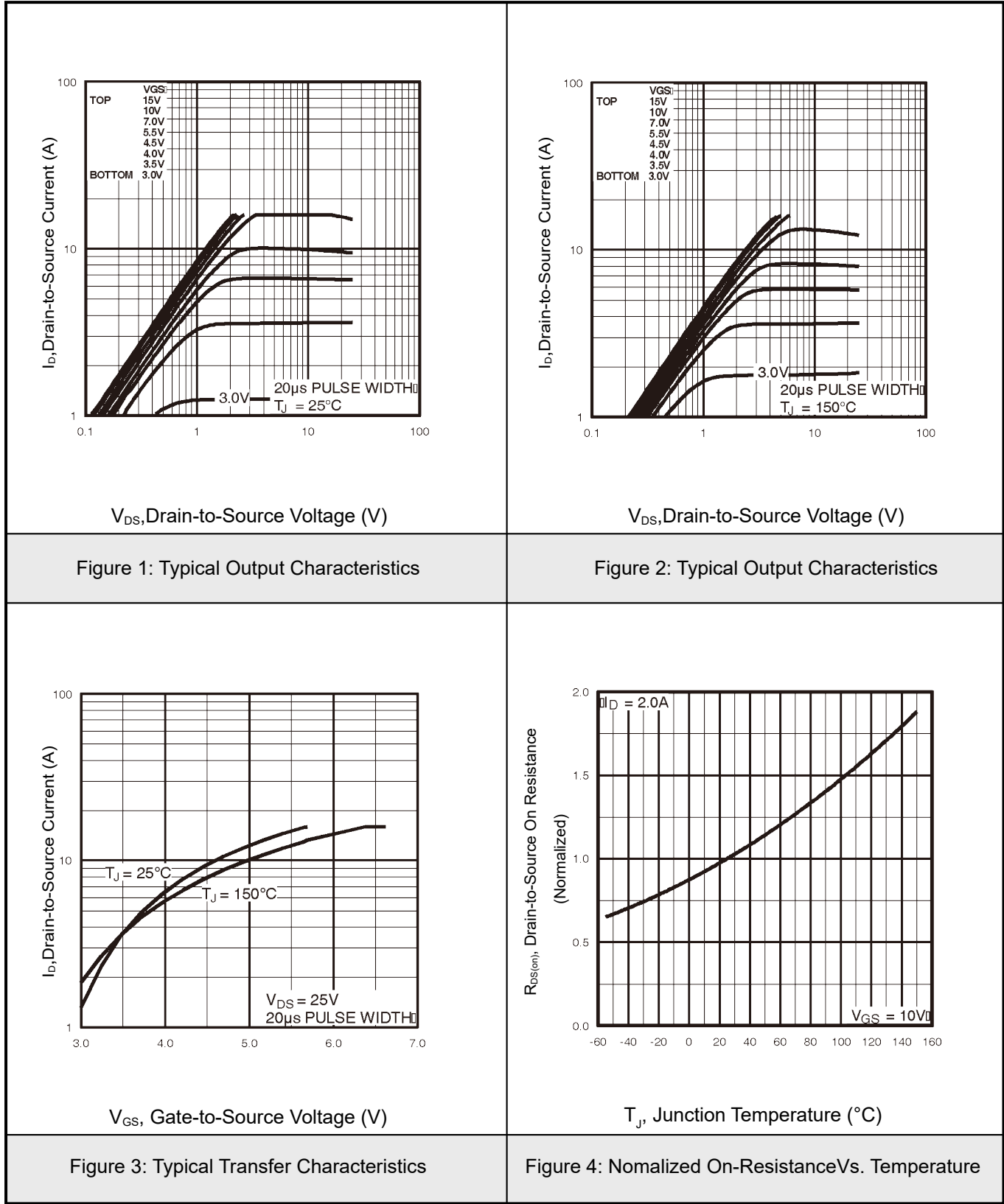
Continuous Source Current (Body Diode)	C_{RSS}	MOSFET symbol showing the			1.3	A
Pulsed Source Current (Body Diode) ①	I_{SM}	integral reverse p-n junction diode.			16	
Diode Forward Voltage	V_{SD}	$T_J=25^{\circ}\text{C}, I_S=2\text{A}, V_{GS}=0\text{V}$ ④			1	V
Reverse Recovery Time	t_{rr}	$T_J=25^{\circ}\text{C}, I_F=2\text{A}$		41	61	ns
Reverse Recovery Charge	Q_{rr}	$di/dt=100\text{A}/\mu\text{s}$ ④		73	110	nC
Forward Turn-On Time	t_{on}	Intrinsic turn-on time is negligible (turn-on is dominated by L_S+L_D)				

Notes:

- ① Repetitive rating; pulse width limited by max. junction temperature.(See fig.9)
- ② $V_{DD}=25\text{V}$, starting $T_J=25^{\circ}\text{C}$, $L=4.0\text{mH}$, $R_G=25\Omega$, $I_{AS}=4.0\text{A}$.(See Figure 13)
- ③ $I_{SD}\leq 2.0\text{A}$, $di/dt\leq 170\text{A}/\mu\text{s}$, $V_{DD}\leq V_{(BR)DSS}$, $T_J\leq 150^{\circ}\text{C}$
- ④ Pulse width $\leq 300\mu\text{s}$; duty cycle $\leq 2\%$.

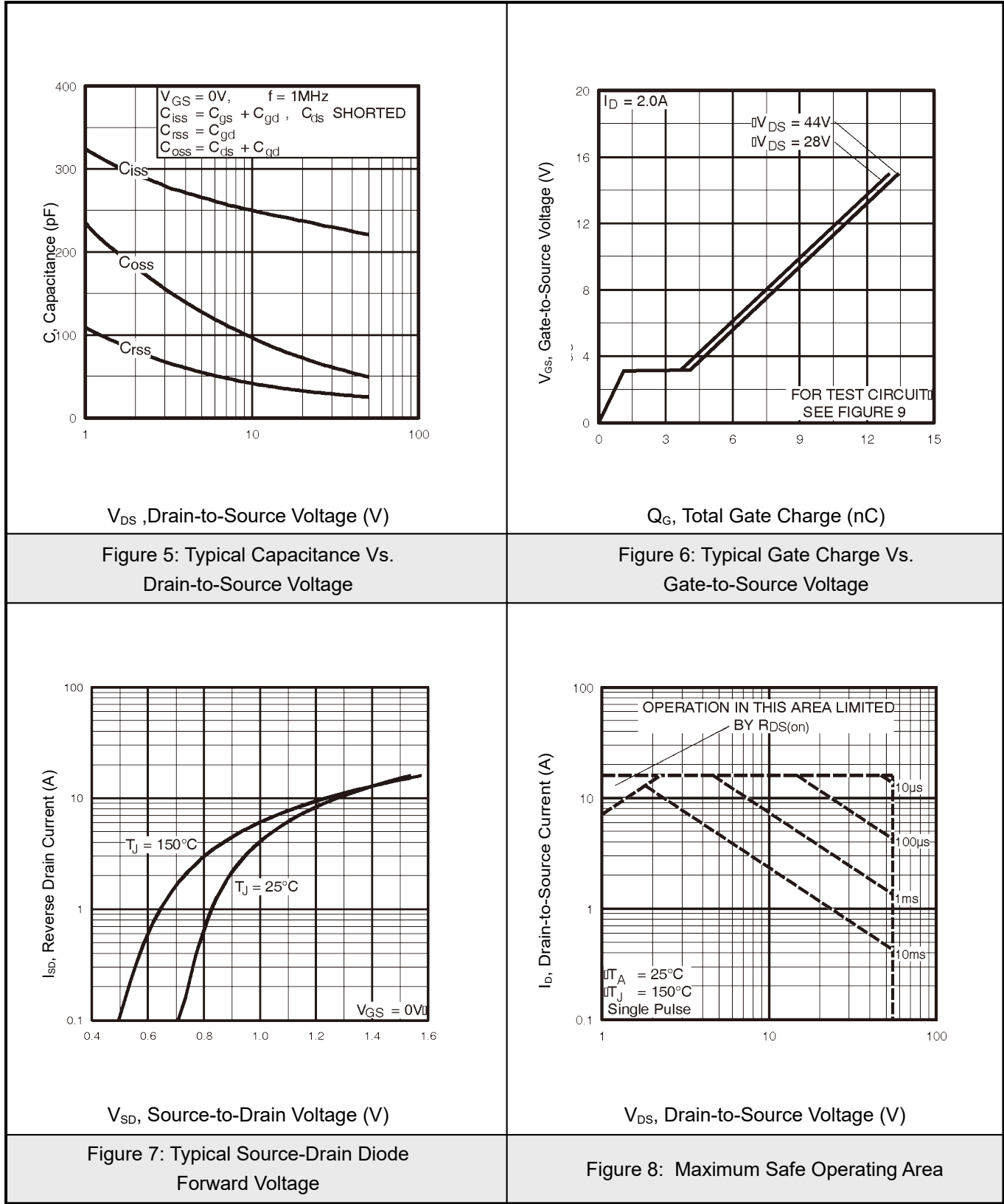


7.1Typical Characterisitics



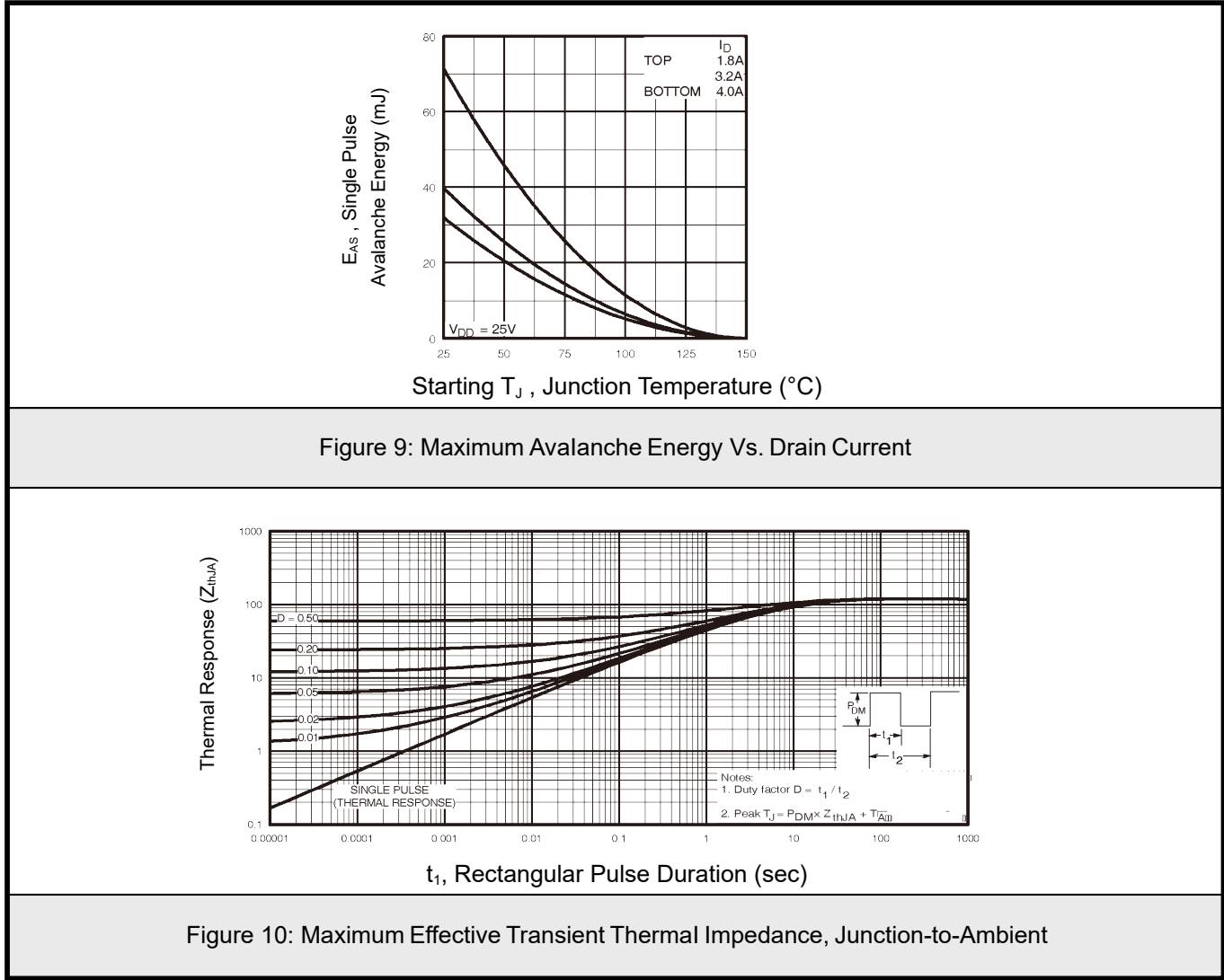


7.2Typical Characteristics





7.3Typical Characterisitics





7.4 Typical Characteristics

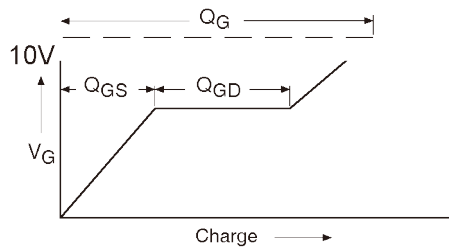


Figure 11a: Basic Gate Charge waveform

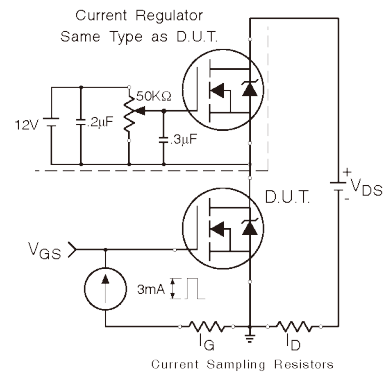


Figure 11b: Switching Time Test Circuit

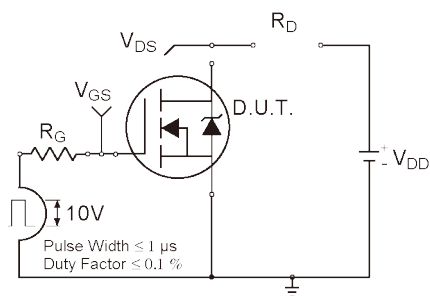


Figure 12a: Gate Charge Test Circuit

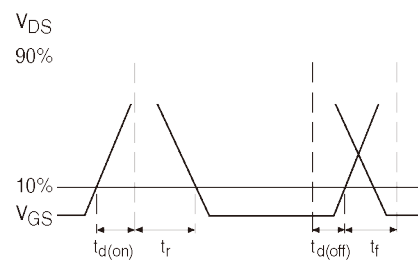


Figure 12b: Switching Time waveforms

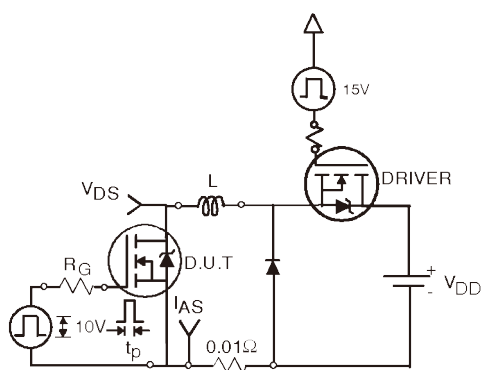


Figure 13a: Unclamped Inductive Test Circuit

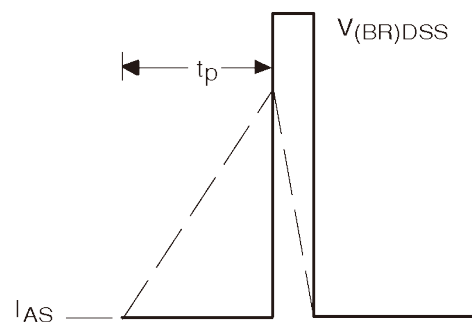
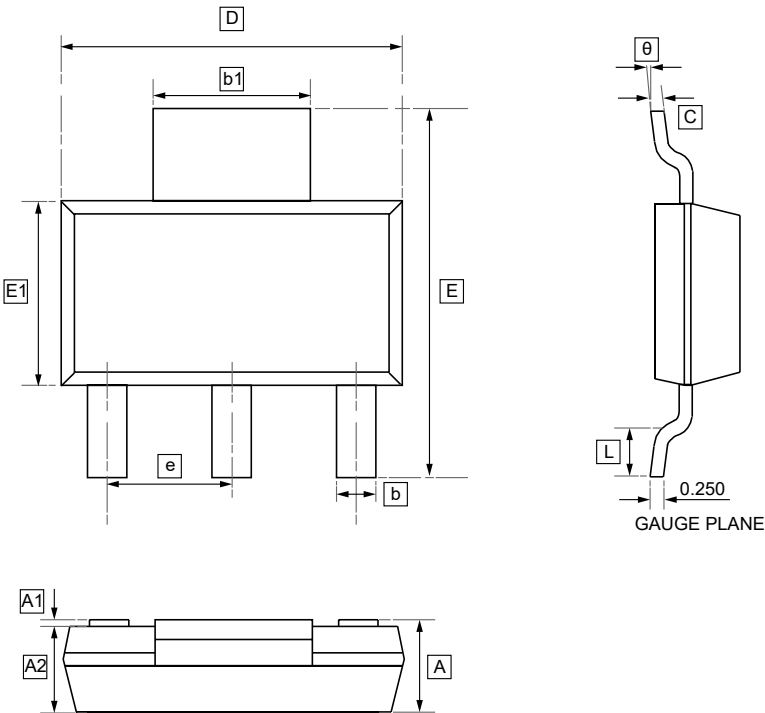


Figure 13b: Unclamped Inductive waveforms



8.SOT-223 Package Outline Dimensions

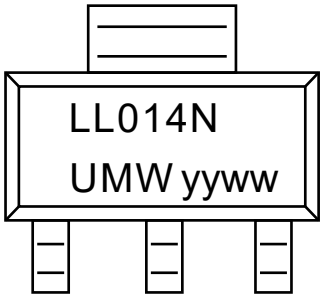


DIMENSIONS (mm are the original dimensions)

Symbol	A	A1	A2	b	b1	c	D	E	E1	e	L	θ
Min	-	0.020	1.500	0.660	2.900	0.230	6.300	6.700	3.300	2.300	0.750	0°
Max	1.800	0.100	1.700	0.840	3.100	0.350	6.700	7.300	3.700	BSC	-	10°



9.Ordering information



yy: Year Code
ww: Week Code

Order Code	Package	Base QTY	Delivery Mode
UMW IRL014NTR	SOT-223	2500	Tape and reel



10.Disclaimer

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