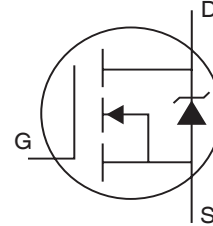


Description

The SOT-223 package is designed for surface-mount using vapor phase, infra red, or wave soldering techniques. Its 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 heatsinking. Power dissipation of 1.0W is possible in a typical surface mount application.



Benefits

- Surface Mount
- Advanced Process Technology
- Ultra Low On-resistance
- Dynamic dv/dt Rating
- Fast Switching
- $V_{DS(V)} = 55V$
- $I_D = 2.0A$ ($V_{GS} = 10V$)
- $R_{DS(ON)} < 140m\Omega$ ($V_{GS} = 10V$)

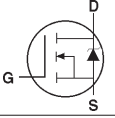
Absolute Maximum Ratings $T_A = 25^\circ C$ unless otherwise noted

	Parameter	Max.	Units
$I_D @ T_A = 25^\circ C$	Continuous Drain Current, $V_{GS} @ 10V^{**}$	2.8	A
$I_D @ T_A = 25^\circ C$	Continuous Drain Current, $V_{GS} @ 10V^*$	2.0	
$I_D @ T_A = 70^\circ C$	Continuous Drain Current, $V_{GS} @ 10V^*$	1.6	
I_{DM}	Pulsed Drain Current ①	16	
$P_D @ T_A = 25^\circ C$	Power Dissipation (PCB Mount)**	2.1	W
$P_D @ T_A = 25^\circ C$	Power Dissipation (PCB Mount)*	1.0	W
	Linear Derating Factor (PCB Mount)*	8.3	mW/°C
V_{GS}	Gate-to-Source Voltage	± 16	V
E_{AS}	Single Pulse Avalanche Energy ②	32	mJ
I_{AR}	Avalanche Current ①	2.0	A
E_{AR}	Repetitive Avalanche Energy ①*	0.1	mJ
dv/dt	Peak Diode Recovery dv/dt ③	7.2	V/ns
T_J, T_{STG}	Junction and Storage Temperature Range	-55 to + 150	°C

Thermal Resistance

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

Electrical Characteristics $T_J = 25^\circ\text{C}$ unless otherwise specified

	Parameter	Min.	Typ.	Max.	Units	Conditions
$V_{(BR)DSS}$	Drain-to-Source Breakdown Voltage	55			V	$V_{GS} = 0V, I_D = 250\mu A$
$\Delta V_{(BR)DSS}/\Delta T_J$	Breakdown Voltage Temp. Coefficient		0.015		V/°C	Reference to $25^\circ\text{C}, I_D = 1mA$
$R_{DS(on)}$	Static Drain-to-Source On-Resistance			140	mΩ	$V_{GS} = 10V, I_D = 2.0A$ ④
				200		$V_{GS} = 5.0V, I_D = 1.2A$ ④
				280		$V_{GS} = 4.0V, I_D = 1.0A$ ④
$V_{GS(th)}$	Gate Threshold Voltage	1.0	2.0		V	$V_{DS} = V_{GS}, I_D = 250\mu A$
g_{fs}	Forward Transconductance	2.3			S	$V_{DS} = 25V, I_D = 1.0A$
I_{DSS}	Drain-to-Source Leakage Current			25	μA	$V_{DS} = 55V, V_{GS} = 0V$
				250		$V_{DS} = 44V, V_{GS} = 0V, T_J = 150^\circ\text{C}$
I_{GSS}	Gate-to-Source Forward Leakage			100	nA	$V_{GS} = 16V$
	Gate-to-Source Reverse Leakage			-100		$V_{GS} = -16V$
Q_g	Total Gate Charge		9.5	14	nC	$I_D = 2.0A$
Q_{gs}	Gate-to-Source Charge		1.1	1.7		$V_{DS} = 44V$
Q_{gd}	Gate-to-Drain ("Miller") Charge		3.0	4.4		$V_{GS} = 10V$, See Fig. 6 and 9 ④
$t_{d(on)}$	Turn-On Delay Time		5.1		ns	$V_{DD} = 28V$
t_r	Rise Time		4.9			$I_D = 2.0A$
$t_{d(off)}$	Turn-Off Delay Time		14			$R_G = 6.0\Omega$
t_f	Fall Time		2.9			$R_D = 14\Omega$, See Fig. 10 ④
C_{iss}	Input Capacitance		230			pF
C_{oss}	Output Capacitance		66		$V_{DS} = 25V$	
I_S	Reverse Transfer Capacitance		30		$f = 1.0MHz$, See Fig. 5	
C_{rSS}	Continuous Source Current (Body Diode)			1.3	A	MOSFET symbol showing the integral reverse p-n junction diode. 
I_{SM}	Pulsed Source Current (Body Diode) ①			16		
V_{SD}	Diode Forward Voltage			1.0	V	$T_J = 25^\circ\text{C}, I_S = 2.0A, V_{GS} = 0V$ ④
t_{rr}	Reverse Recovery Time		41	61	ns	$T_J = 25^\circ\text{C}, I_F = 2.0A$
Q_{rr}	Reverse Recovery Charge		73	110	nC	$di/dt = 100A/\mu s$ ④
t_{on}	Forward Turn-On Time	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. 11)
- ② $V_{DD} = 25V$, starting $T_J = 25^\circ\text{C}$, $L = 4.0mH$ $R_G = 25\Omega$, $I_{AS} = 4.0A$. (See Figure 12)
- ③ $I_{SD} \leq 2.0A$, $di/dt \leq 170A/\mu s$, $V_{DD} \leq V_{(BR)DSS}$, $T_J \leq 150^\circ\text{C}$
- ④ Pulse width $\leq 300\mu s$; duty cycle $\leq 2\%$.

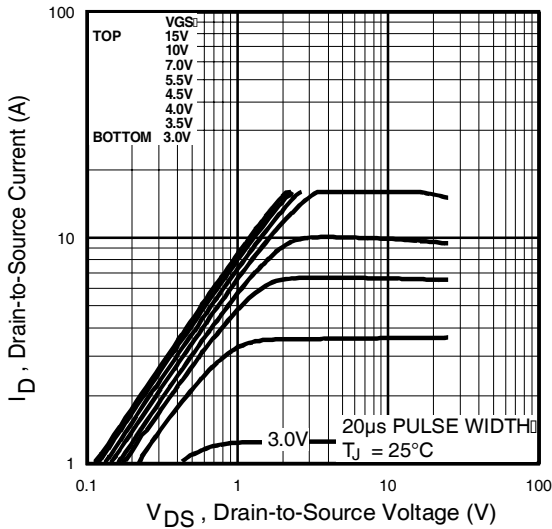


Fig 1. Typical Output Characteristics,

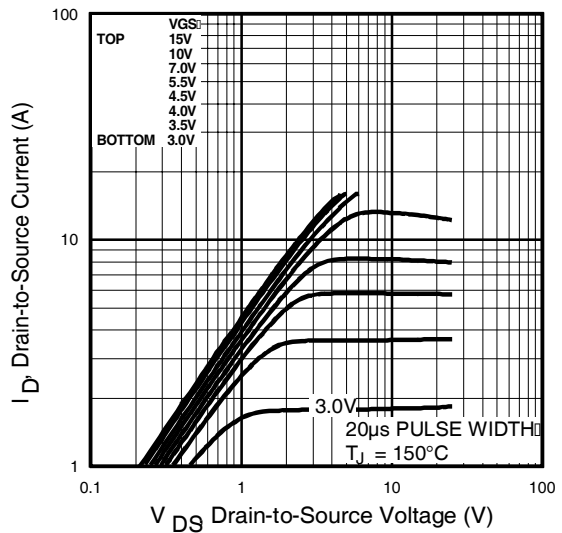


Fig 2. Typical Output Characteristics,

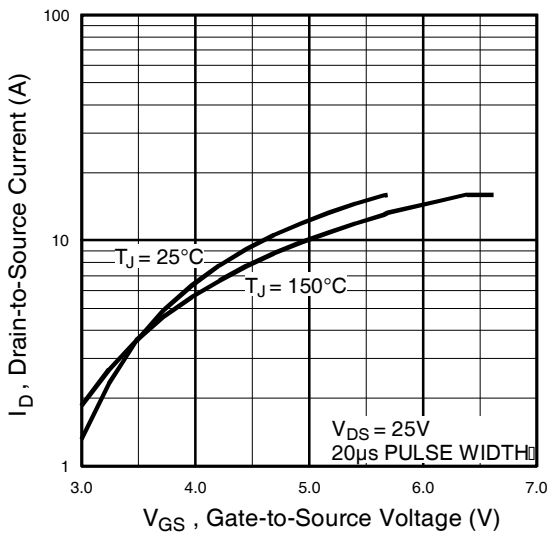


Fig 3. Typical Transfer Characteristics

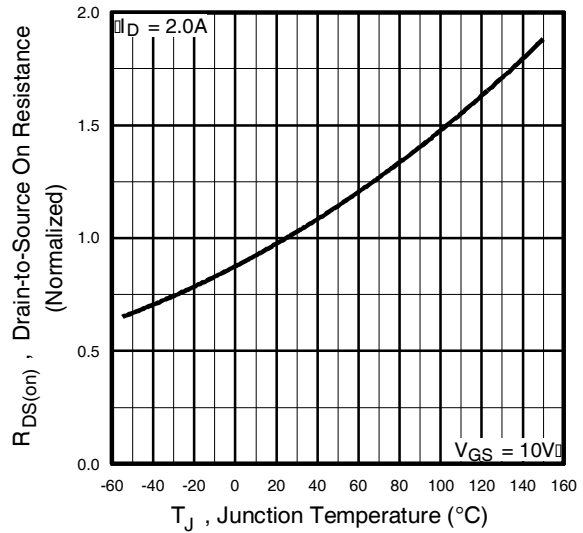


Fig 4. Normalized On-Resistance Vs. Temperature

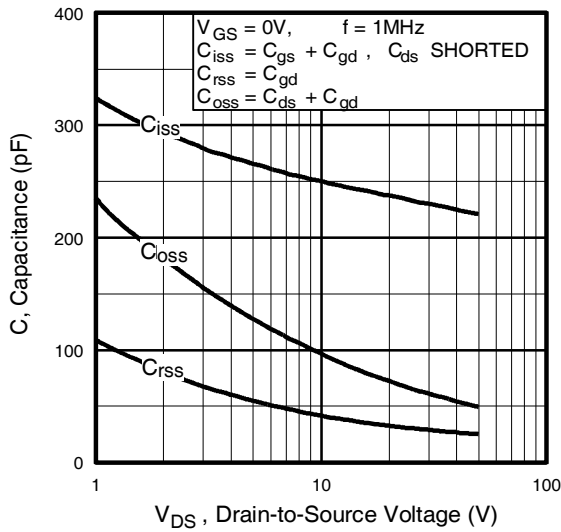


Fig 5. Typical Capacitance Vs. Drain-to-Source Voltage

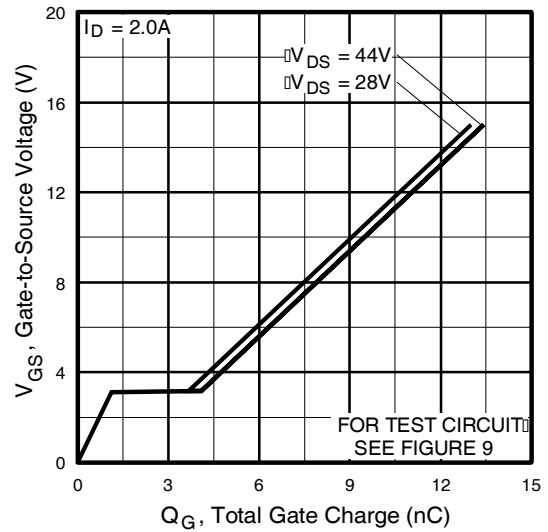


Fig 6. Typical Gate Charge Vs. Gate-to-Source Voltage

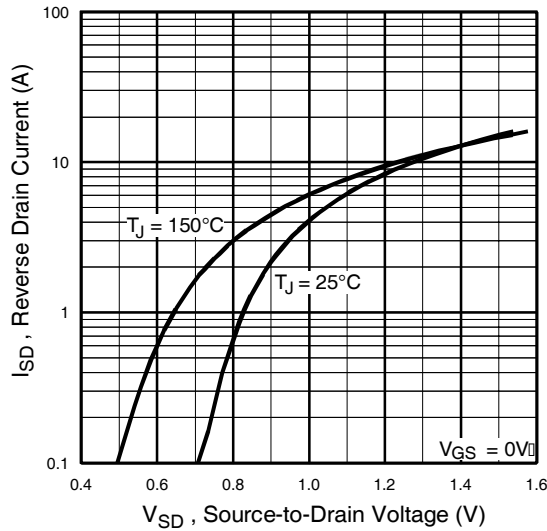


Fig 7. Typical Source-Drain Diode Forward Voltage

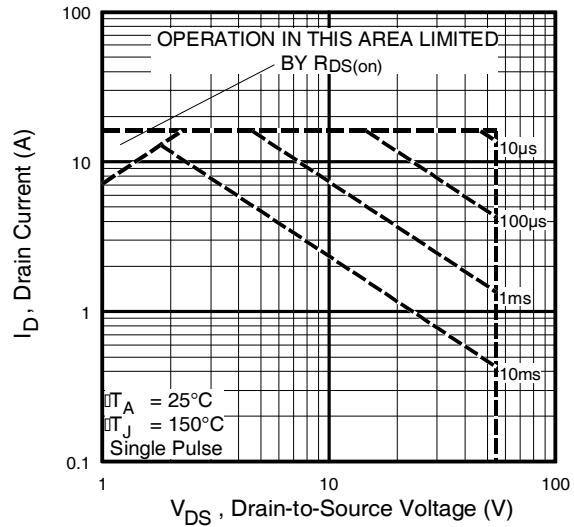


Fig 8. Maximum Safe Operating Area

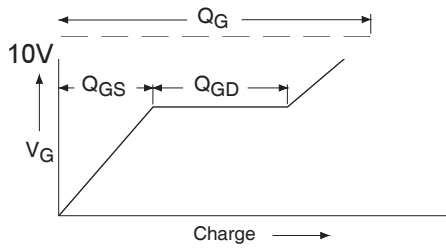


Fig 9a. Basic Gate Charge Waveform

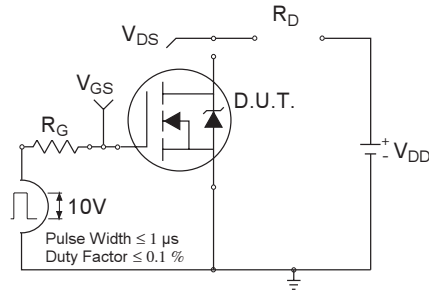


Fig 10a. Switching Time Test Circuit

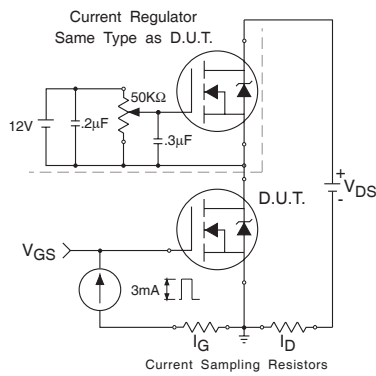


Fig 9b. Gate Charge Test Circuit

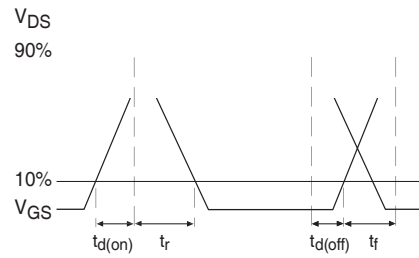


Fig 10b. Switching Time Waveforms

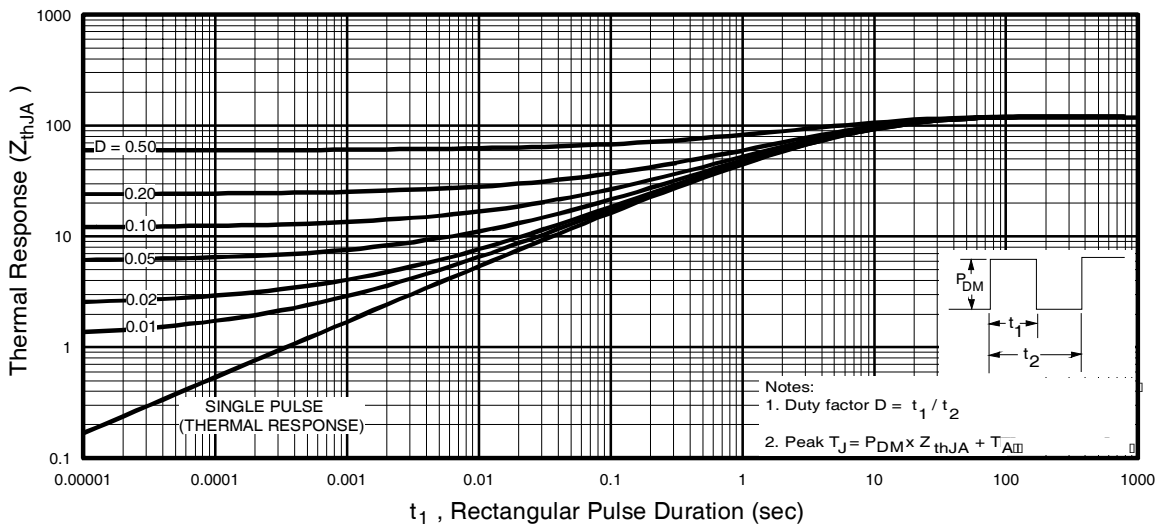


Fig 11. Maximum Effective Transient Thermal Impedance, Junction-to-Ambient

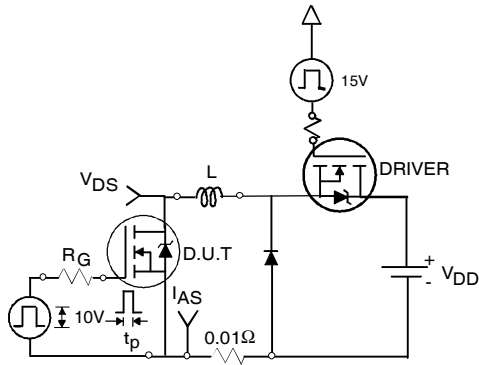


Fig 12a. Unclamped Inductive Test Circuit

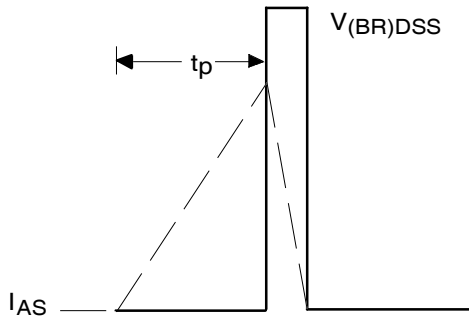


Fig 12b. Unclamped Inductive Waveforms

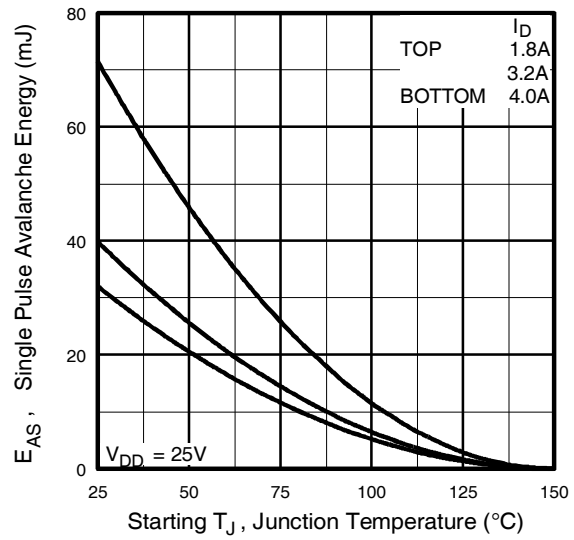
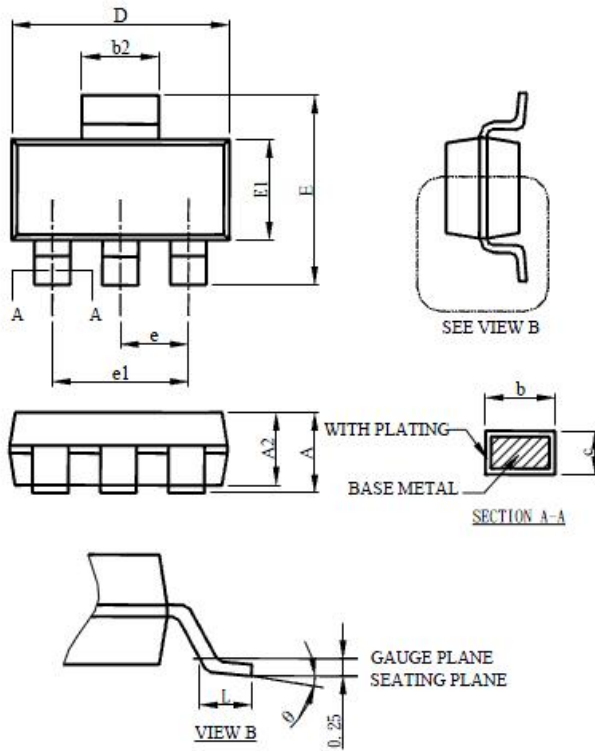


Fig 12c. Maximum Avalanche Energy Vs. Drain Current

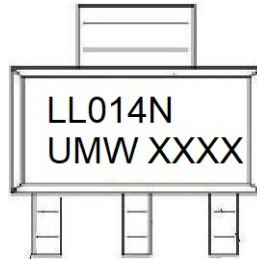
■ SOT223 封裝外形圖



SYMBOL	SOT-223	
	MILLIMETERS	
	MIN.	MAX.
A		1.80
A1	0.02	0.10
A2	1.55	1.65
b	0.68	0.84
b2	2.90	3.10
c	0.23	0.33
D	6.30	6.70
E	6.70	7.30
E1	3.30	3.70
e	2.30 BSC	
e1	4.60 BSC	
L	0.90	
θ	0°	8°

- Note:
1. Refer to JEDEC TO-261AA.
 2. Dimension D and E1 are determined at the outermost extremes of the plastic body exclusive of mold flash, tie bar burrs, gate burrs, and interlead flash, but including any mismatch between the top and bottom of the plastic body.
 3. Controlling dimension is millimeter, converted inch dimensions are not necessarily exact.

Marking



Ordering information

Order code	Package	Baseqty	Deliverymode
UMW IRLL014NTR	SOT-223	2500	Tape and reel