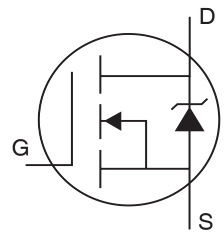
Description

The SOT-223 package is designed for surface-mountusing vapor phase , infra red , or wave soldering techniquests unique package design allows for easy automatic pickand-place as with other packages but hasthe added advantage of improved thermal performancedue to an enlarged tab for heatsinking . Power dissipationof 1 . OW 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)
- $R_{DS(ON)}$ < 140mΩ (V_{GS}=10V)

Absolute Maximum Ratings

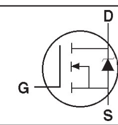
T_A=25°C unless otherwise noted

	Parameter	Max.	Units
I_D @ T_A = 25°C	Continuous Drain Current, V_{GS} @ 10V**	2.8	A
I_D @ T_A = 25°C	Continuous Drain Current, V_{GS} @ 10V*	2.0	
I_D @ T_A = 70°C	Continuous Drain Current, V_{GS} @ 10V*	1.6	
I_{DM}	Pulsed Drain Current ①	16	
P_D @T_A = 25°C	Power Dissipation (PCB Mount)**	2.1	W
P_D @T_A = 25°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 Energy②	32	mJ
I_{AR}	Avalanche Current①	2.0	A
E_{AR}	Repetitive Avalanche Energy①*	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°C unless otherwise specifed

	Parameter	Min.	Typ.	Max.	Units	Conditions
$V_{(BR)DSS}$	Drain-to-Source Breakdown Voltage	55			V	V_{GS} = 0V, I_D = 250μA
$\Delta V_{(BR)DSS}/\Delta T_J$	Breakdown Voltage Temp. Coefficient		0.015		V/°C	Reference to 25°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 = 250μA
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°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 = 6.0Ω
t_f	Fall Time		2.9			R_D = 14Ω, See Fig. 10 ④
C_{iss}	Input Capacitance		230		pF	V_{GS} = 0V
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°C, I_S = 2.0A, V_{GS} = 0V ④
t_{rr}	Reverse Recovery Time		41	61	ns	T_J = 25°C, I_F = 2.0A
Q_{rr}	Reverse RecoveryCharge		73	110	nC	di/dt = 100A/μs 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°C, L = 4.0mH R_G = 25Ω, I_{AS} = 4.0A. (See Figure 12)

③ $I_{SD} \leq$ 2.0A, di/dt $\leq$ 170A/μs, $V_{DD} \leq V_{(BR)DSS}$, $T_J \leq$ 150°C

④ Pulse width $\leq$ 300μs; duty cycle $\leq$ 2%.

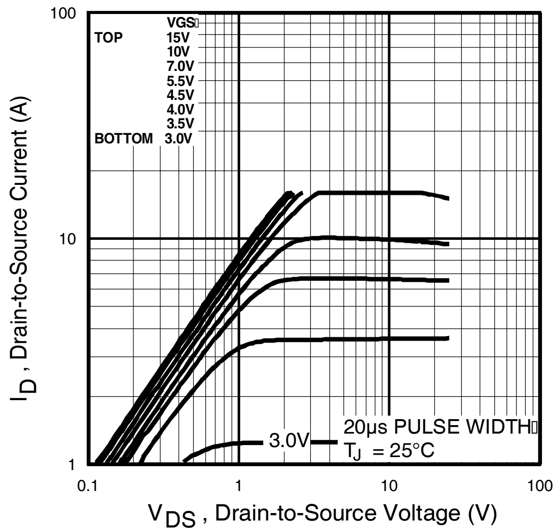


Fig 1. Typical Output Characteristics,

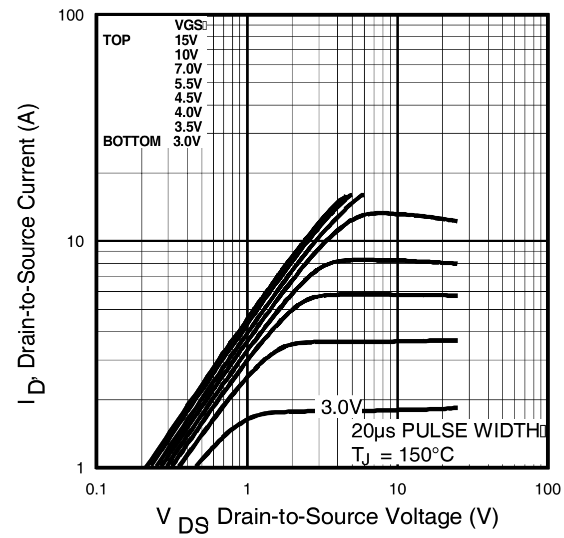


Fig 2. Typical Output Characteristics,

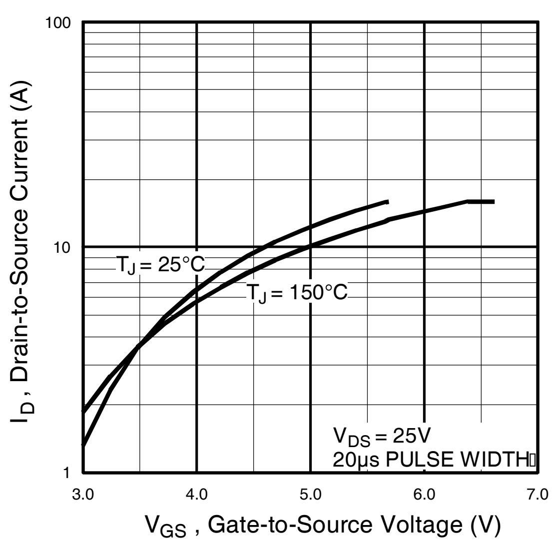


Fig 3. Typical Transfer Characteristics

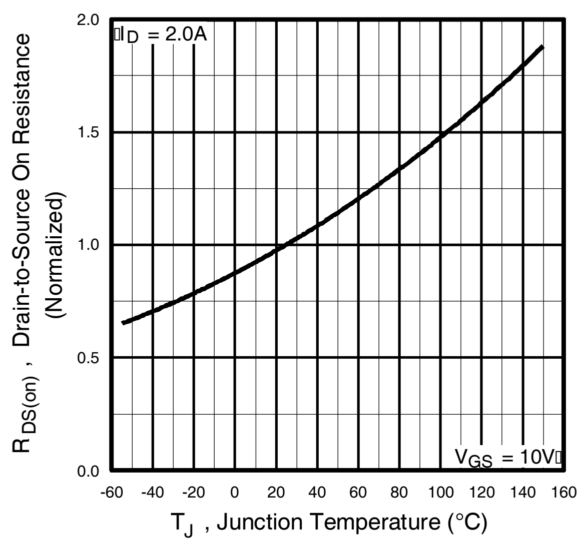


Fig 4. Normalized On-Resistance
Vs. Temperature

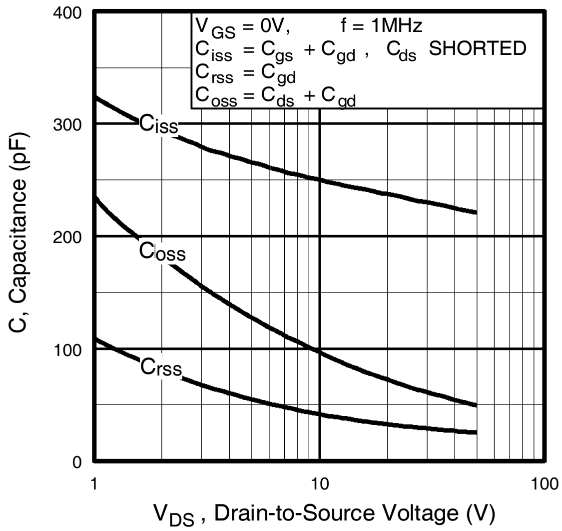


Fig 5. Typical Capacitance Vs. Drain-to-Source Voltage

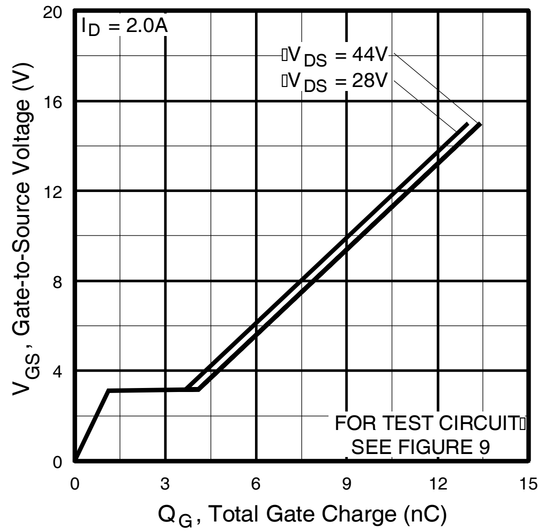


Fig 6. Typical Gate Charge Vs. Gate-to-Source Voltage

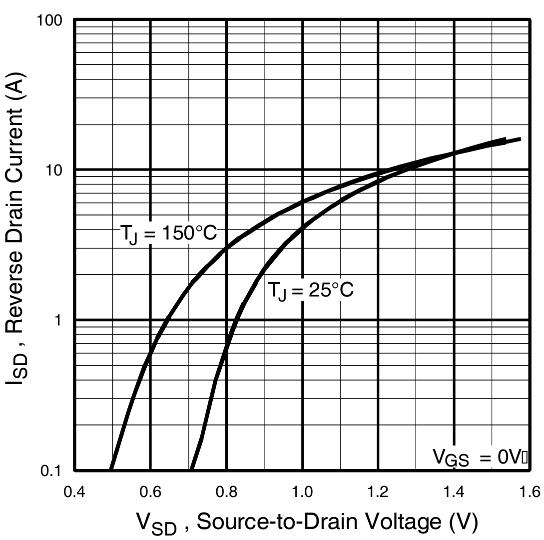


Fig 7. Typical Source-Drain Diode Forward Voltage

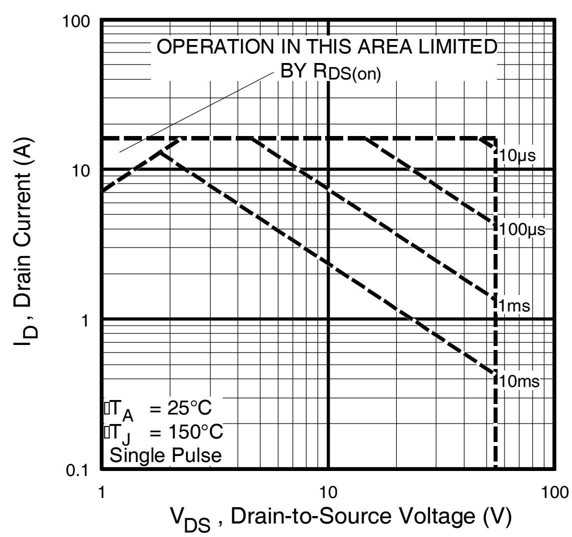


Fig 8. Maximum Safe Operating Area

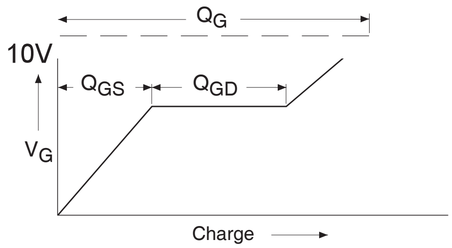


Fig 9a. Basic Gate Charge Waveform

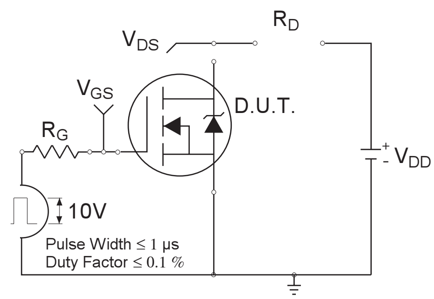


Fig 10a. Switching Time Test Circuit

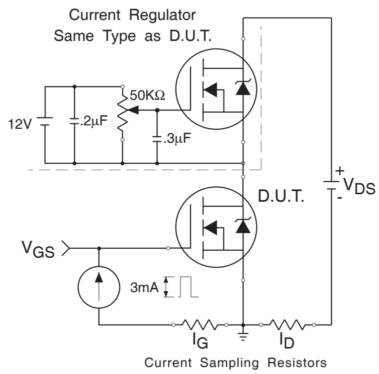


Fig 9b. Gate Charge Test Circuit

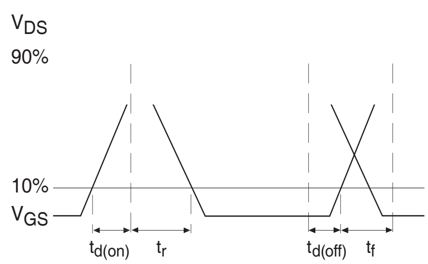


Fig 10b. Switching Time Waveforms

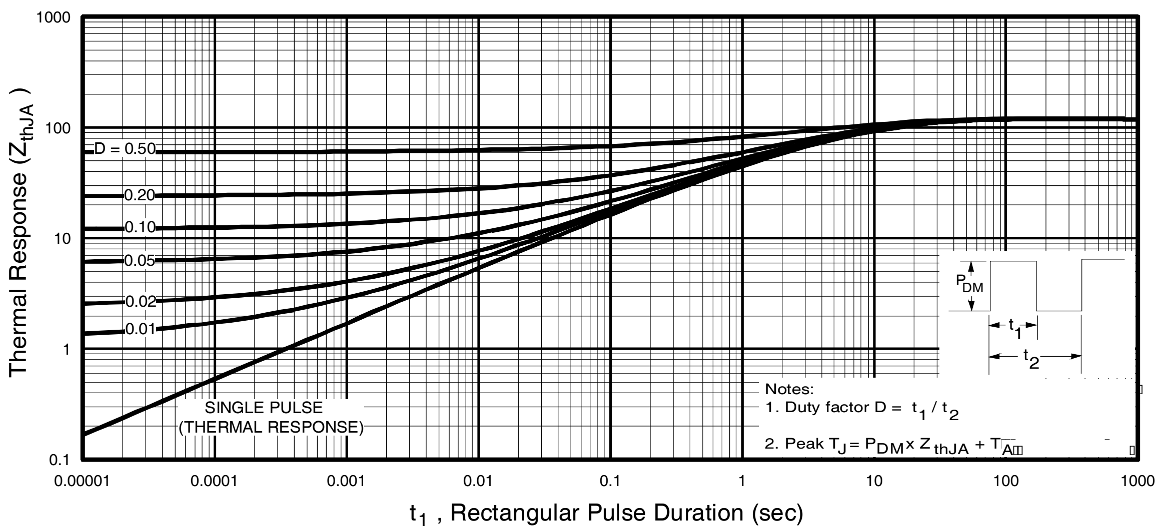


Fig 11. Maximum Effective Transient Thermal Impedance, Junction-to-Ambient

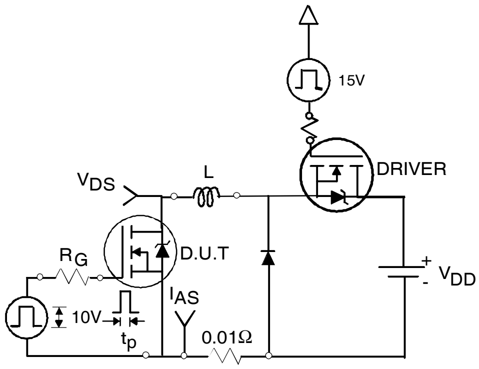


Fig 12a. Unclamped Inductive Test Circuit

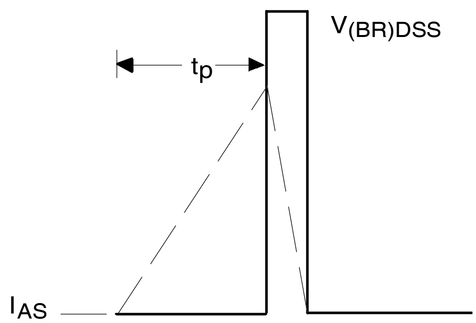


Fig 12b. Unclamped Inductive Waveforms

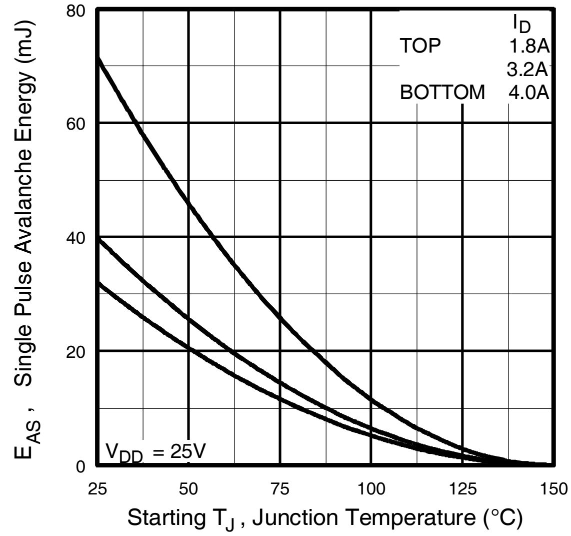
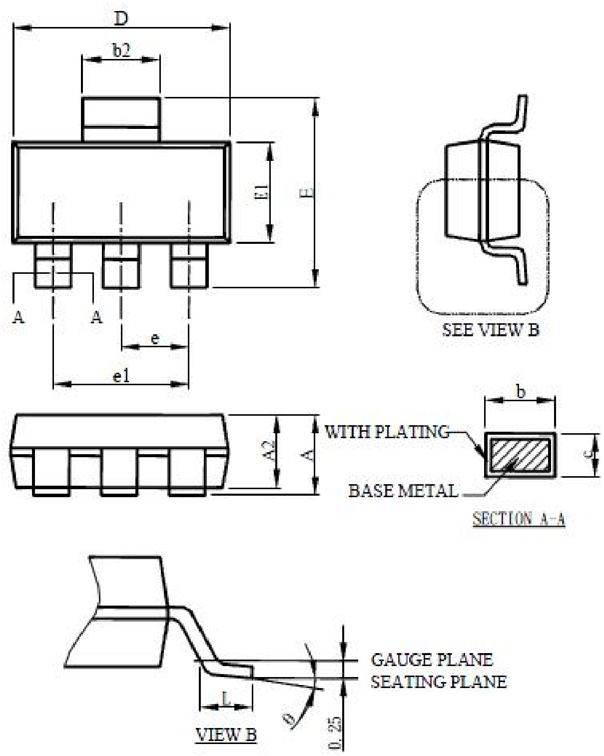


Fig 12c. Maximum Avalanche Energy Vs. Drain Current

■ 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	0.66	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