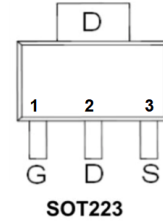


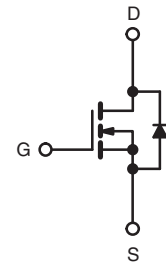
DESCRIPTION

The SOT-223 package is designed for surface-mounting using vapor phase, infrared, or wave soldering techniques. Its unique package design allows for easy automatic pick-and-place as with other SOT or SOIC packages but has the added advantage of improved thermal performance due to an enlarged tab for heatsinking. Power dissipation of greater than 1.25 W is possible in a typical surface mount application.



FEATURES

- $V_{DS}(V) = 100V$
- $R_{DS(ON)} < 54m\Omega$ ($V_{GS} = 5V$)
- $R_{DS(ON)} < 76m\Omega$ ($V_{GS} = 4V$)
- Surface mount
- Available in tape and reel
- Dynamic dV/dt rating
- Repetitive avalanche rated
- Logic-level gate drive
- $R_{DS(on)}$ specified at $V_{GS} = 4 V$ and $5 V$
- Fast switching
- Material categorization: for definitions of compliance



N-Channel MOSFET

ABSOLUTE MAXIMUM RATINGS ($T_C = 25\text{ }^\circ\text{C}$, unless otherwise noted)

PARAMETER	SYMBOL	LIMIT	UNIT
Drain-Source Voltage	V_{DS}	100	V
Gate-Source Voltage	V_{GS}	± 10	
Continuous Drain Current	I_D	$T_C = 25\text{ }^\circ\text{C}$	1.5
		$T_C = 100\text{ }^\circ\text{C}$	0.93
Pulsed Drain Current ^a	I_{DM}	12	A
Linear Derating Factor		0.025	W/ $^\circ\text{C}$
Linear Derating Factor (PCB Mount) ^e		0.017	
Single Pulse Avalanche Energy ^b	E_{AS}	50	mJ
Repetitive Avalanche Current ^a	I_{AR}	1.5	A
Repetitive Avalanche Energy ^a	E_{AR}	0.31	mJ
Maximum Power Dissipation	P_D	$T_C = 25\text{ }^\circ\text{C}$	3.1
Maximum Power Dissipation (PCB Mount) ^e		$T_A = 25\text{ }^\circ\text{C}$	2.0
Peak Diode Recovery dV/dt ^c	dV/dt	5.5	V/ns
Operating Junction and Storage Temperature Range	T_J, T_{stg}	-55 to +150	$^\circ\text{C}$
Soldering Recommendations (Peak Temperature) ^d	for 10 s	300	

Notes

- Repetitive rating; pulse width limited by maximum junction temperature (see fig. 11).
- $V_{DD} = 25\text{ V}$, starting $T_J = 25\text{ }^\circ\text{C}$, $L = 25\text{ mH}$, $R_g = 25\text{ }\Omega$, $I_{AS} = 1.5\text{ A}$ (see fig. 12).
- $I_{SD} \leq 5.6\text{ A}$, $dI/dt \leq 75\text{ A}/\mu\text{s}$, $V_{DD} \leq V_{DS}$, $T_J \leq 150\text{ }^\circ\text{C}$.
- 1.6 mm from case.
- When mounted on 1" square PCB (FR-4 or G-10 material).

THERMAL RESISTANCE RATINGS				
PARAMETER	SYMBOL	TYP.	MAX.	UNIT
Maximum Junction-to-Ambient (PCB Mount) ^a	R _{thJA}	-	60	°C/W
Maximum Junction-to-Case (Drain)	R _{thJC}	-	40	

Note

a. When mounted on 1" square PCB (FR-4 or G-10 material).

SPECIFICATIONS (T _J = 25 °C, unless otherwise noted)							
PARAMETER	SYMBOL	TEST CONDITIONS		MIN.	TYP.	MAX.	UNIT
Static							
Drain-Source Breakdown Voltage	V _{DS}	V _{GS} = 0 V, I _D = 250 μA		100	-	-	V
V _{DS} Temperature Coefficient	ΔV _{DS} /T _J	Reference to 25 °C, I _D = 1 mA		-	0.12	-	V/°C
Gate-Source Threshold Voltage	V _{GS(th)}	V _{DS} = V _{GS} , I _D = 250 μA		1.0	-	2.0	V
Gate-Source Leakage	I _{GSS}	V _{GS} = ± 10 V		-	-	± 100	nA
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} = 100 V, V _{GS} = 0 V		-	-	25	μA
		V _{DS} = 80 V, V _{GS} = 0 V, T _J = 125 °C		-	-	250	
Drain-Source On-State Resistance	R _{DS(on)}	V _{GS} = 5.0 V	I _D = 0.90 A ^b			54	mΩ
		V _{GS} = 4.0 V	I _D = 0.75 A			76	
Forward Transconductance	g _{fs}	V _{DS} = 25 V, I _D = 0.90 A		0.57	-	-	S
Dynamic							
Input Capacitance	C _{iss}	V _{GS} = 0 V, V _{DS} = 25 V, f = 1.0 MHz, see fig. 5		-	250	-	pF
Output Capacitance	C _{oss}			-	80	-	
Reverse Transfer Capacitance	C _{rss}			-	15	-	
Total Gate Charge	Q _g	V _{GS} = 5.0 V	I _D = 5.6 A, V _{DS} = 80 V, see fig. 6 and 13 ^b	-	-	6.1	nC
Gate-Source Charge	Q _{gs}			-	-	2.6	
Gate-Drain Charge	Q _{gd}			-	-	3.3	
Turn-On Delay Time	t _{d(on)}	V _{DD} = 50 V, I _D = 5.6 A, R _g = 12 Ω, R _D = 8.4 Ω		-	9.3	-	ns
Rise Time	t _r			-	47	-	
Turn-Off Delay Time	t _{d(off)}			-	16	-	
Fall Time	t _f			-	18	-	
Internal Drain Inductance	L _D	Between lead, 6 mm (0.25") from package and center of die contact		-	4.0	-	nH
Internal Source Inductance	L _S			-	6.0	-	
Drain-Source Body Diode Characteristics							
Continuous Source-Drain Diode Current	I _S	MOSFET symbol showing the integral reverse p - n junction diode		-	-	1.5	A
Pulsed Diode Forward Current ^a	I _{SM}			-	-	12	
Body Diode Voltage	V _{SD}	T _J = 25 °C, I _S = 1.5 A, V _{GS} = 0 V ^b		-	-	2.5	V
Body Diode Reverse Recovery Time	t _{rr}	T _J = 25 °C, I _F = 5.6 A, dI/dt = 100 A/μs ^b		-	110	130	ns
Body Diode Reverse Recovery Charge	Q _{rr}			-	0.50	0.65	μC
Forward Turn-On Time	t _{on}	Intrinsic turn-on time is negligible (turn-on is dominated by L _S and L _D)					

Notes

- a. Repetitive rating; pulse width limited by maximum junction temperature (see fig. 11).
- b. Pulse width ≤ 300 μs; duty cycle ≤ 2 %.

TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)

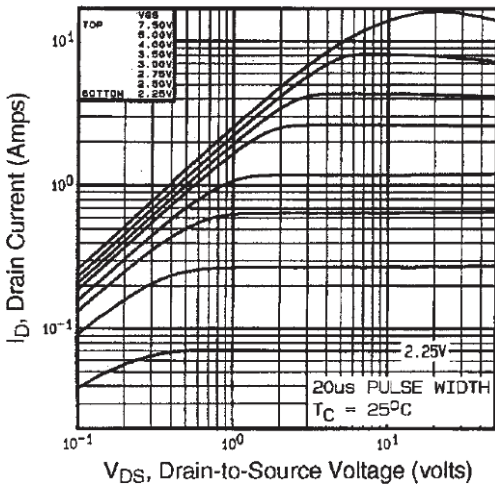


Fig. 1 - Typical Output Characteristics

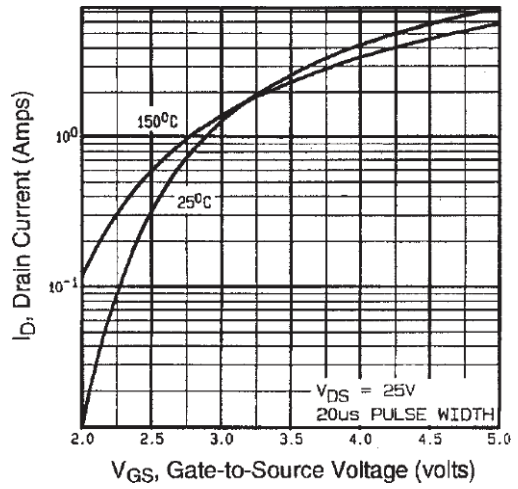


Fig. 3 - Typical Transfer Characteristics

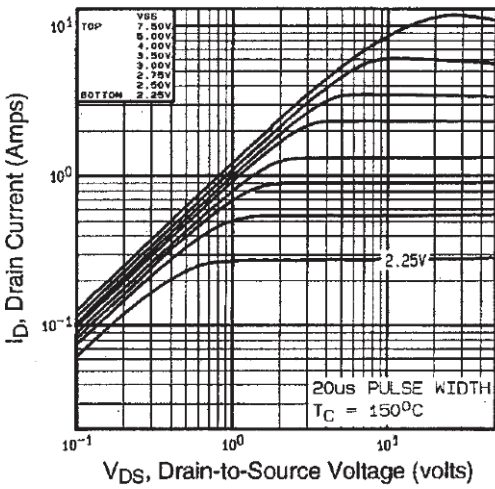


Fig. 2 - Typical Output Characteristics

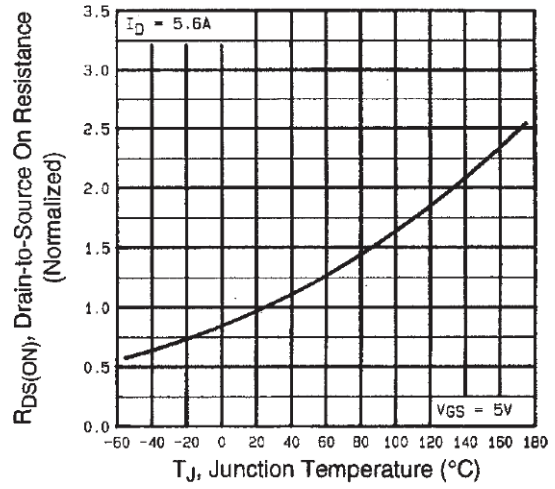


Fig. 4 - Normalized On-Resistance vs. Temperature

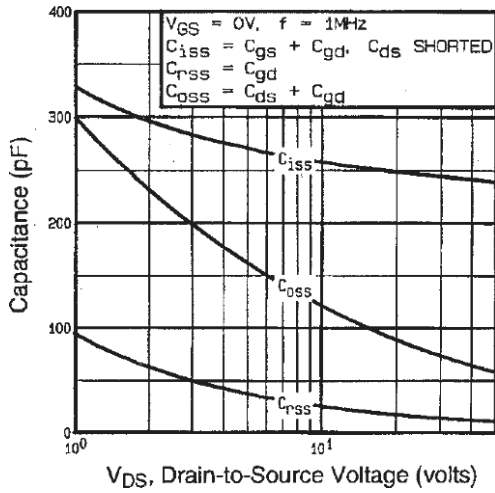


Fig. 5 - Typical Capacitance vs. Drain-to-Source Voltage

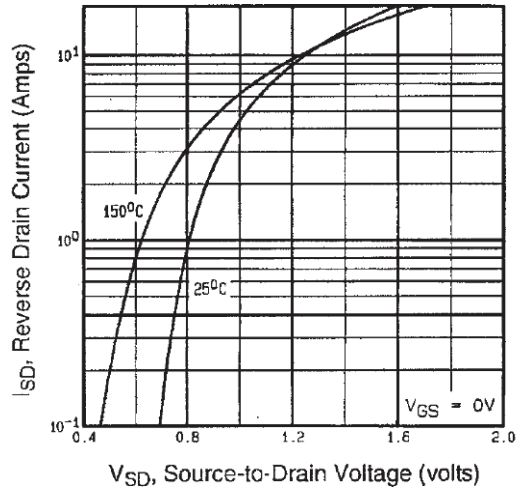


Fig. 7 - Typical Source-Drain Diode Forward Voltage

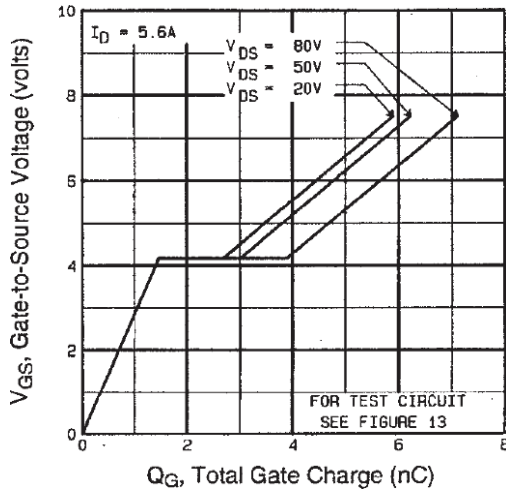


Fig. 6 - Typical Gate Charge vs. Gate-to-Source Voltage

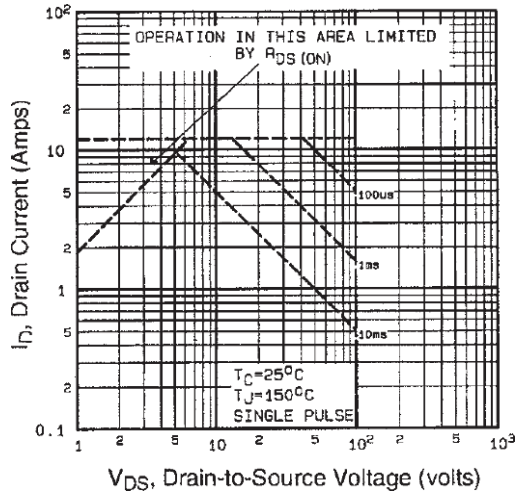


Fig. 8 - Maximum Safe Operating Area

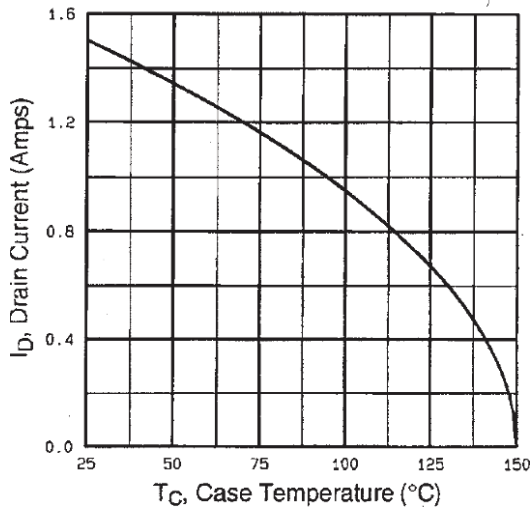


Fig. 9 - Maximum Drain Current vs. Case Temperature

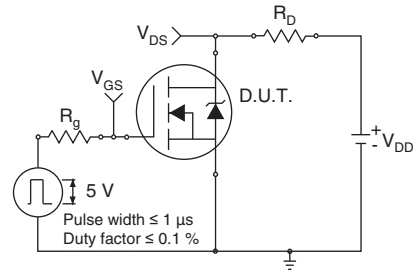


Fig. 10a - Switching Time Test Circuit

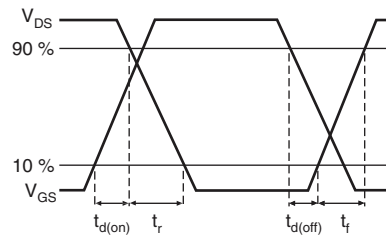


Fig. 10b - Switching Time Waveforms

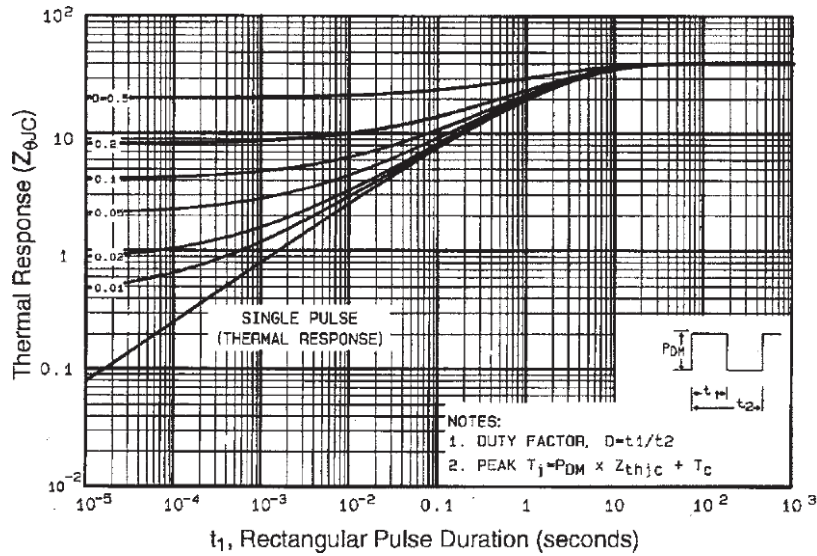


Fig. 11 - Maximum Effective Transient Thermal Impedance, Junction-to-Case

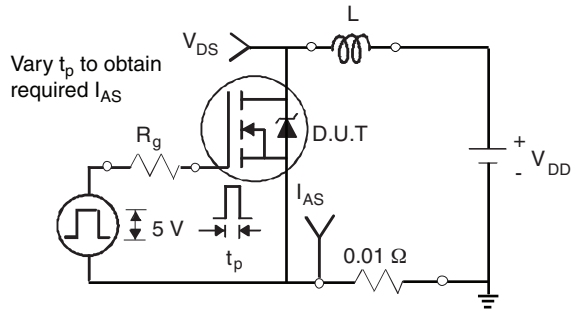


Fig. 12a - Unclamped Inductive Test Circuit

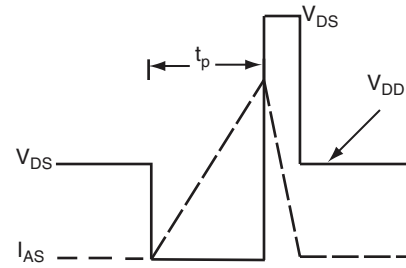


Fig. 12b - Unclamped Inductive Waveforms

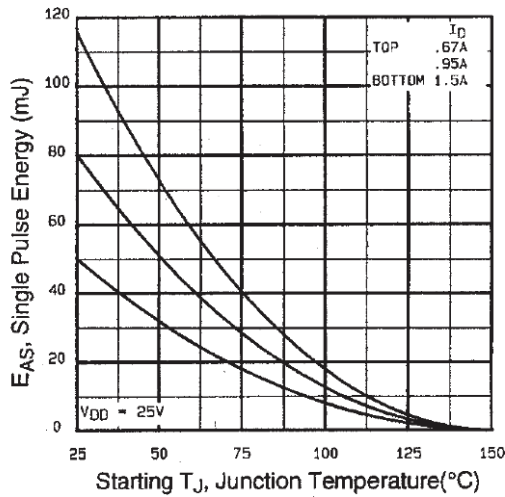


Fig. 12c - Maximum Avalanche Energy vs. Drain Current

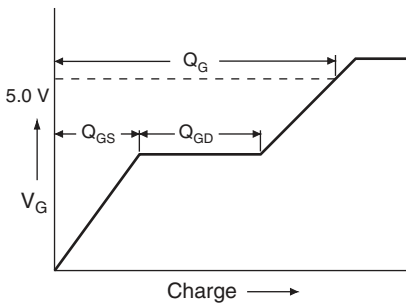


Fig. 13a - Basic Gate Charge Waveform

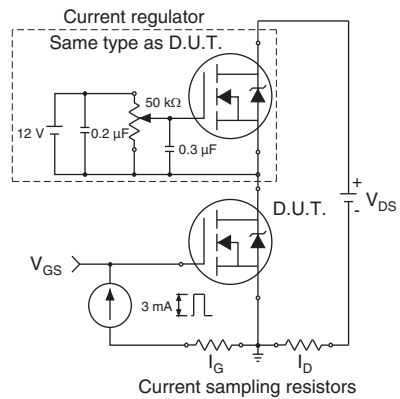
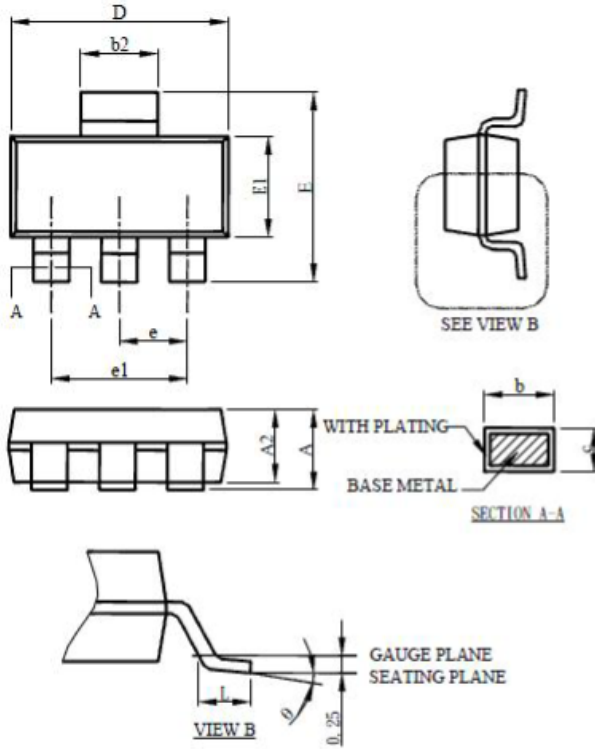


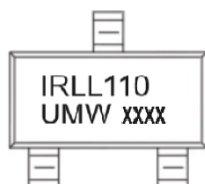
Fig. 13b - Gate Charge Test Circuit

PACKAGE OUTLINE DIMENSIONS



SOT-223		
SYMBOL	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°

Marking



Ordering information

Order code	Package	Baseqty	Deliverymode
UMW IRLL110TR	SOT-223	2500	Tape and reel