



YOUSHANG SEMICONDUCTOR

**设计研发新型功率器件**

**各类小信号开关**

**中低压及高压大电流等场效应管**

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企业微信二维码



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## Product Summary

$V_{(BR)DSS}$	$R_{DS(on)}$	$I_D$ $T_A = +25^\circ\text{C}$
-100V	350m $\Omega$ @ $V_{GS} = -10\text{V}$	-2.4A
	450m $\Omega$ @ $V_{GS} = -6\text{V}$	-2.1A

## Features and Benefits

- Fast Switching Speed
- Low Input Capacitance
- Low Gate Drive

## Description and Applications

This MOSFET is designed to minimize the on-state resistance and yet maintain superior switching performance, making it ideal for high-efficiency power management applications.

- Motor controls
  - DC-DC converters
- Power management functions  
Relay and solenoid driving

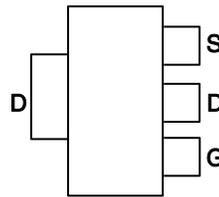
## Mechanical Data

- Package: SOT223 (Type DN)  
Package Material: Molded Plastic; UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020  
Terminals: Finish - Matte Tin Annealed over Copper Leadframe; Solderable per MIL-STD-202, Method 208 
- Weight: 0.112 grams (Approximate)

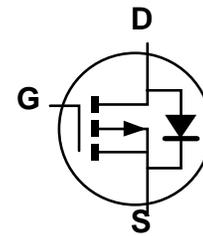
SOT223 (Type DN)



Top View



Pin Out - Top View



Equivalent Circuit

**Maximum Ratings** (@ $T_A = +25^{\circ}\text{C}$  unless otherwise specified.)

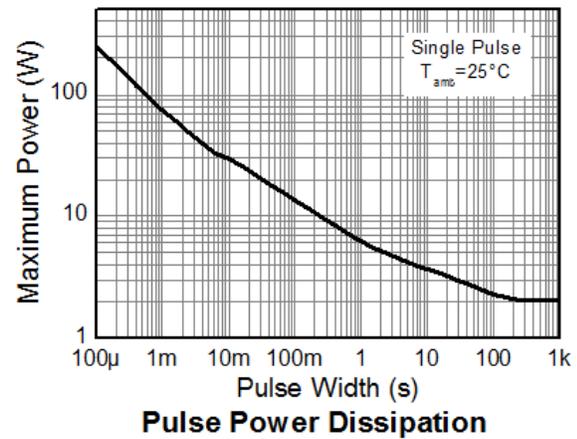
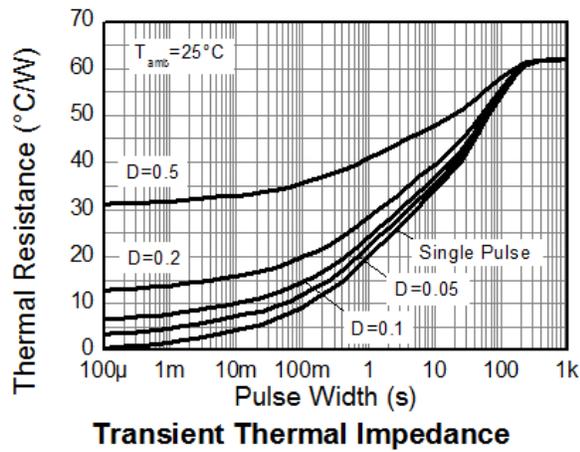
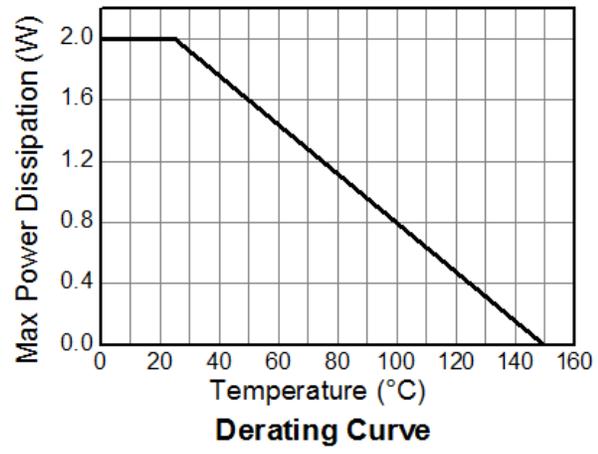
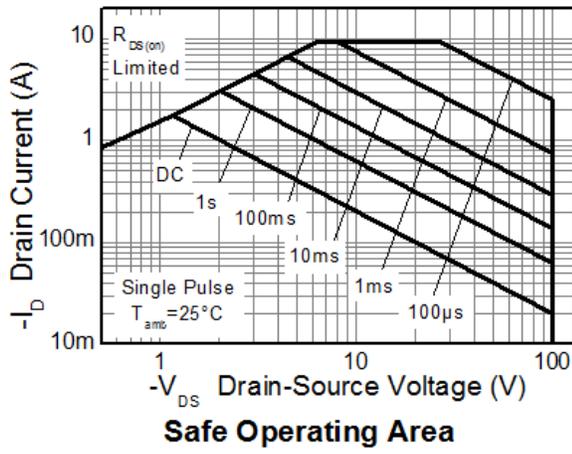
Characteristic			Symbol	Value	Unit	
Drain-Source Voltage			$V_{DSS}$	-100	V	
Gate-Source Voltage			$V_{GS}$	$\pm 20$	V	
Continuous Drain Current	$V_{GS} = 10\text{V}$	(Note 6)	$I_D$	-2.4	A	
		$T_A = +70^{\circ}\text{C}$ (Note 6)		-1.9		
		(Note 5)		-1.7		
Pulsed Drain Current	$V_{GS} = 10\text{V}$	(Note 7)	$I_{DM}$	-9.4	A	
Continuous Source Current (Body Diode)			(Note 6)	$I_S$	-2.4	A
Pulsed Source Current (Body Diode)			(Note 7)	$I_{SM}$	-9.4	A

**Thermal Characteristics** (@ $T_A = +25^{\circ}\text{C}$  unless otherwise specified.)

Characteristic		Symbol	Value	Unit
Power Dissipation	(Note 5)	$P_D$	2.0	W
			16	
Linear Derating Factor	(Note 6)		3.9	$\text{mW}/^{\circ}\text{C}$
			31	
Thermal Resistance, Junction to Ambient	(Note 5)	$R_{\theta JA}$	62.5	$^{\circ}\text{C}/\text{W}$
	(Note 6)		32.0	
Thermal Resistance, Junction to Case	(Note 8)	$R_{\theta JL}$	9.8	
Operating and storage temperature range		$T_J, T_{STG}$	-55 to 150	$^{\circ}\text{C}$

- Notes:
5. For a device surface mounted on 25mm x 25mm x 1.6mm FR4 PCB with high coverage of single sided 1oz copper, in still air conditions; the device is measured when operating in a steady-state condition.
  6. Same as Note 5, except the device is measured at  $t \leq 10$  seconds.
  7. Same as Note 5, except the device is pulsed with  $D = 0.02$  and pulse width 300  $\mu\text{s}$ . The pulse current is limited by the maximum junction temperature.
  8. Thermal resistance from junction to solder-point (at the end of the drain lead).

**Thermal Characteristics**

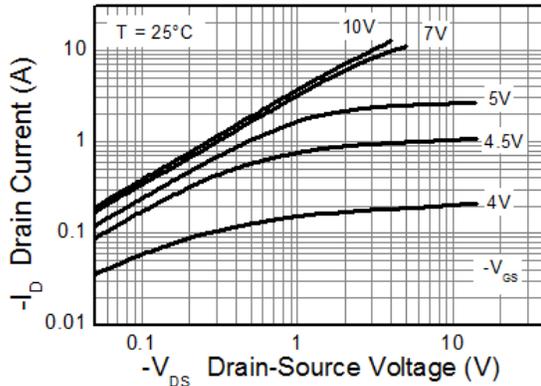


**Electrical Characteristics** (@T<sub>A</sub> = +25°C unless otherwise specified.)

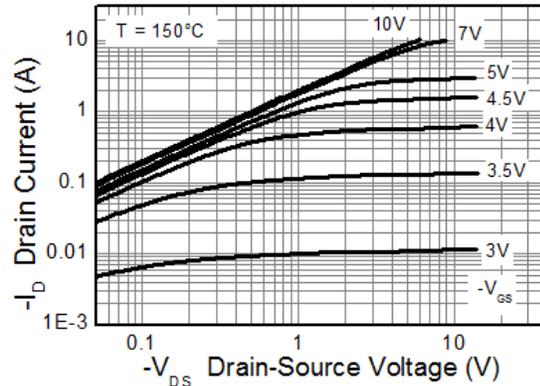
Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition	
<b>OFF CHARACTERISTICS</b>							
Drain-Source Breakdown Voltage	BV <sub>DSS</sub>	-100	—	—	V	I <sub>D</sub> = -250μA, V <sub>GS</sub> = 0V	
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	—	—	-0.5	μA	V <sub>DS</sub> = -100V, V <sub>GS</sub> = 0V	
Gate-Source Leakage	I <sub>GSS</sub>	—	—	±100	nA	V <sub>GS</sub> = ±20V, V <sub>DS</sub> = 0V	
<b>ON CHARACTERISTICS</b>							
Gate Threshold Voltage	V <sub>GS(th)</sub>	-2.0	—	-4.0	V	I <sub>D</sub> = -250μA, V <sub>DS</sub> = V <sub>GS</sub>	
Static Drain-Source On-Resistance (Note 9)	R <sub>DS(on)</sub>	—	—	0.350	Ω	V <sub>GS</sub> = -10V, I <sub>D</sub> = -1.4A	
				0.450		V <sub>GS</sub> = -6V, I <sub>D</sub> = -1.2A	
Forward Transconductance (Notes 9 & 10)	g <sub>fs</sub>	—	2.8	—	S	V <sub>DS</sub> = -15V, I <sub>D</sub> = -1.4A	
Diode Forward Voltage (Note 9)	V <sub>SD</sub>	—	-0.85	-0.95	V	I <sub>S</sub> = -1.7A, V <sub>GS</sub> = 0V	
Reverse Recovery Time (Note 10)	t <sub>rr</sub>	—	33	—	ns	I <sub>F</sub> = -1.5A, di/dt = 100A/μs	
Reverse Recovery Charge (Note 10)	Q <sub>rr</sub>	—	48	—	nC		
<b>DYNAMIC CHARACTERISTICS (Note 10)</b>							
Input Capacitance	C <sub>iss</sub>	—	424	—	pF	V <sub>DS</sub> = -50V, V <sub>GS</sub> = 0V f = 1MHz	
Output Capacitance	C <sub>oss</sub>	—	36.6	—	pF		
Reverse Transfer Capacitance	C <sub>rss</sub>	—	29.8	—	pF		
Total Gate Charge (Note 11)	Q <sub>g</sub>	—	7.1	—	nC	V <sub>GS</sub> = -6.0V	V <sub>DS</sub> = -50V I <sub>D</sub> = -1.4A
Total Gate Charge (Note 11)	Q <sub>g</sub>	—	10.7	—	nC	V <sub>GS</sub> = -10V	
Gate-Source Charge (Note 11)	Q <sub>gs</sub>	—	1.7	—	nC		
Gate-Drain Charge (Note 11)	Q <sub>gd</sub>	—	3.8	—	nC		
Turn-On Delay Time (Note 11)	t <sub>D(on)</sub>	—	3.0	—	ns	V <sub>DD</sub> = -15V, V <sub>GS</sub> = -10V I <sub>D</sub> = -1A, R <sub>G</sub> ≅ 6.0Ω	
Turn-On Rise Time (Note 11)	t <sub>r</sub>	—	3.5	—	ns		
Turn-Off Delay Time (Note 11)	t <sub>D(off)</sub>	—	13.4	—	ns		
Turn-Off Fall Time (Note 11)	t <sub>f</sub>	—	7.2	—	ns		

Notes: 9. Measured under pulsed conditions. Pulse width ≤ 300μs; duty cycle ≤ 2%.  
10. For design aid only, not subject to production testing.  
11. Switching characteristics are independent of operating junction temperatures.

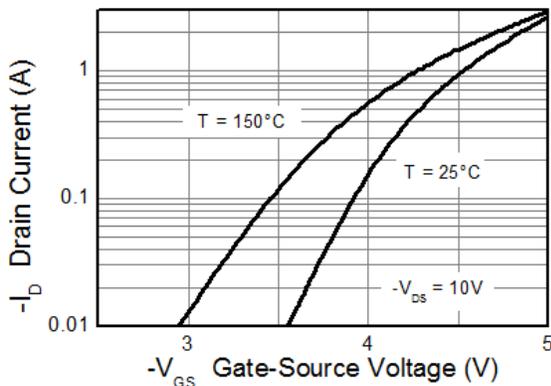
**Typical Characteristics**



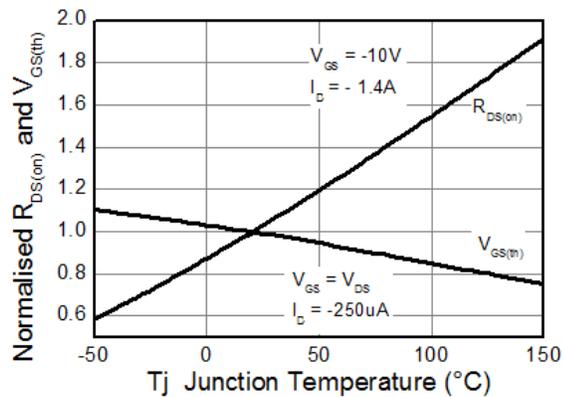
**Output Characteristics**



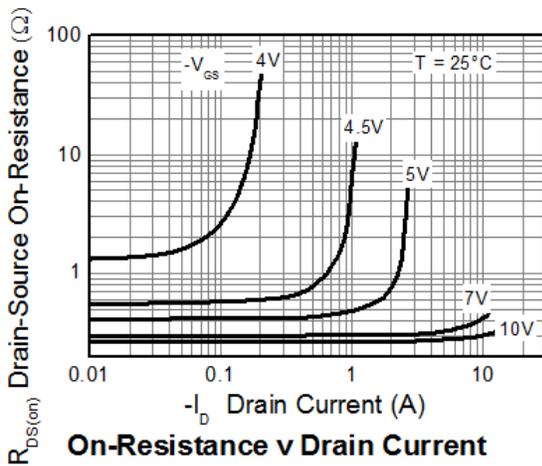
**Output Characteristics**



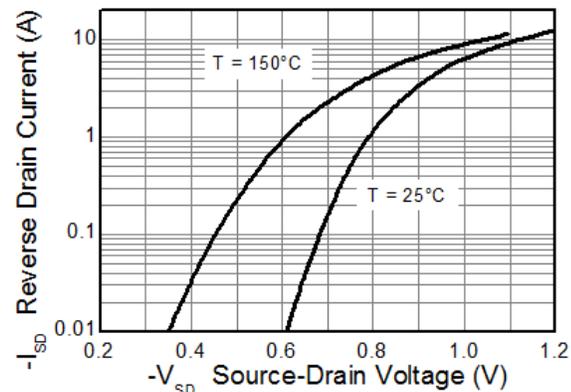
**Typical Transfer Characteristics**



**Normalised Curves v Temperature**

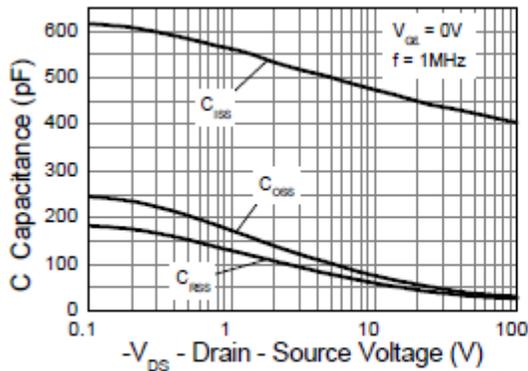


**On-Resistance v Drain Current**

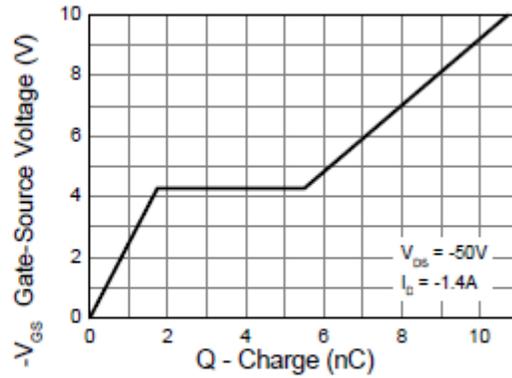


**Source-Drain Diode Forward Voltage**

**Typical Characteristics** (continued)

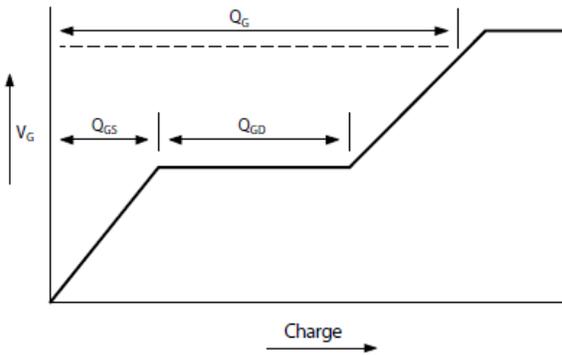


Capacitance v Drain-Source Voltage

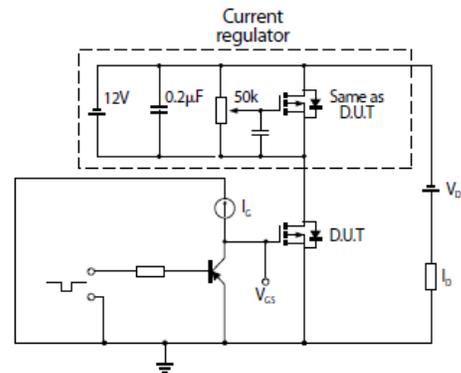


Gate-Source Voltage v Gate Charge

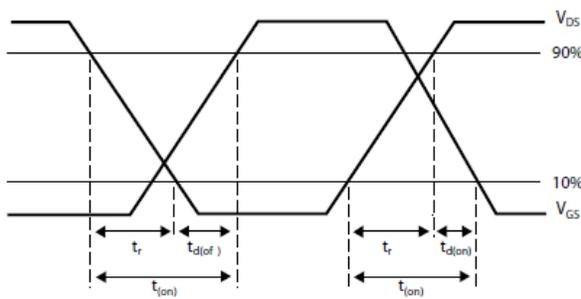
**Test Circuits**



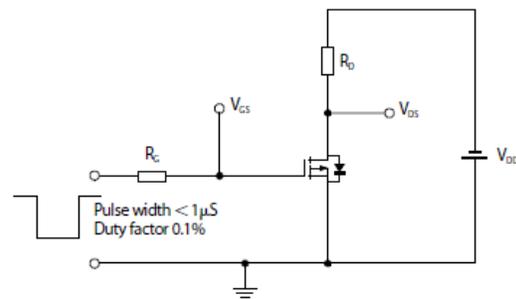
Basic gate charge waveform



Gate charge test circuit

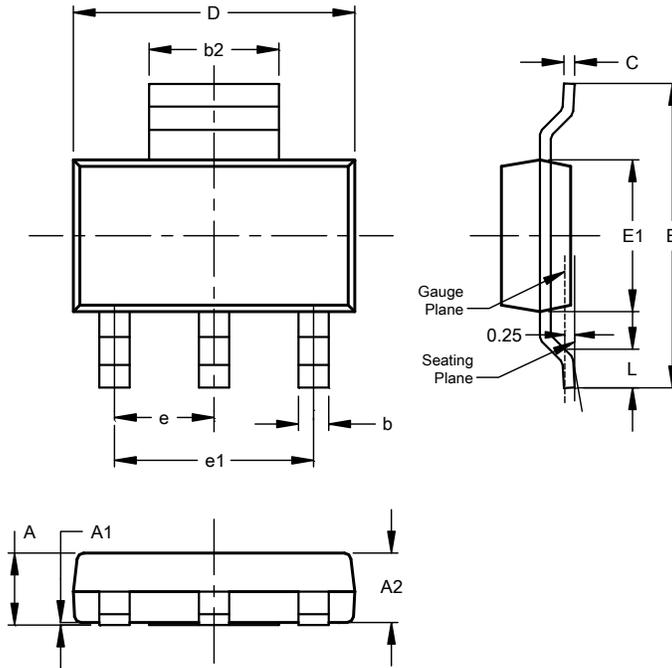


Switching time waveforms



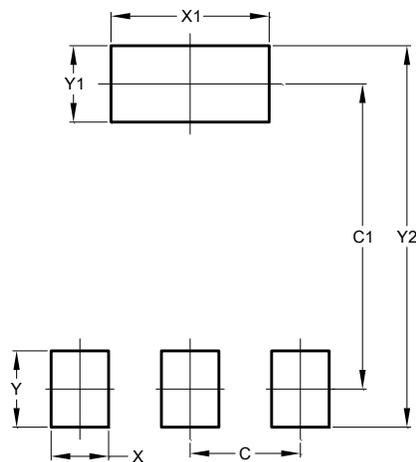
Switching time test circuit

### Package Outline Dimensions



SOT223 (Type DN)			
Dim	Min	Max	Typ
A	--	1.70	--
A1	0.01	0.15	--
A2	1.50	1.68	1.60
b	0.60	0.80	0.70
b2	2.90	3.10	--
c	0.20	0.32	--
D	6.30	6.70	--
E	6.70	7.30	--
E1	3.30	3.70	--
e	--	--	2.30
e1	--	--	4.60
L	0.85	--	--
All Dimensions in mm			

### Suggested Pad Layout



Dimensions	Value (in mm)
C	2.30
C1	6.40
X	1.20
X1	3.30
Y	1.60
Y1	1.60
Y2	8.00