



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

$BV_{DSS}$	$R_{DS(on)}$	$I_D$ $T_A = +25^\circ C$
-60V	125mΩ @ $V_{GS} = -10V$	-4.3A
	190mΩ @ $V_{GS} = -4.5V$	-3.5A

### Features and Benefits

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

### Description

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

### Applications

- Motor Control
- DC-DC Converters
- Power Management Functions
- Uninterrupted Power Supply

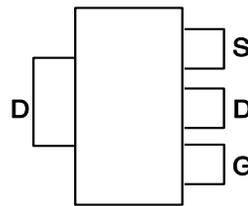
### Mechanical Data

- Case: SOT223
- Case 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 208②③
- Weight: 0.112 grams (Approximate)

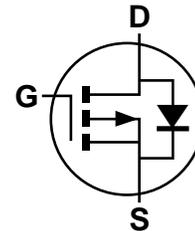
SOT223



Top View



Pin Out—Top View



Equivalent Circuit

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

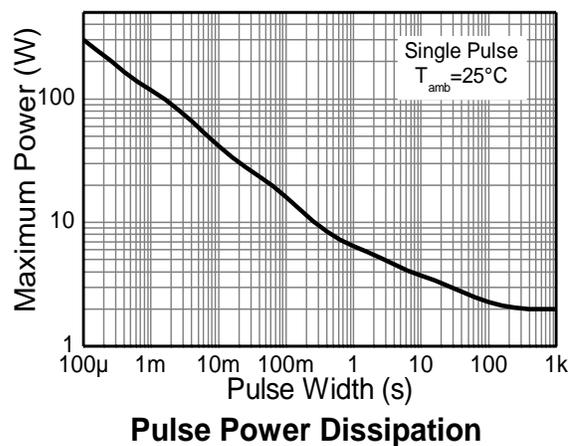
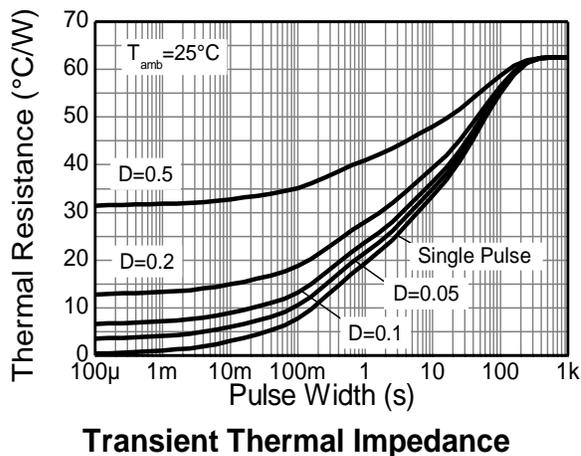
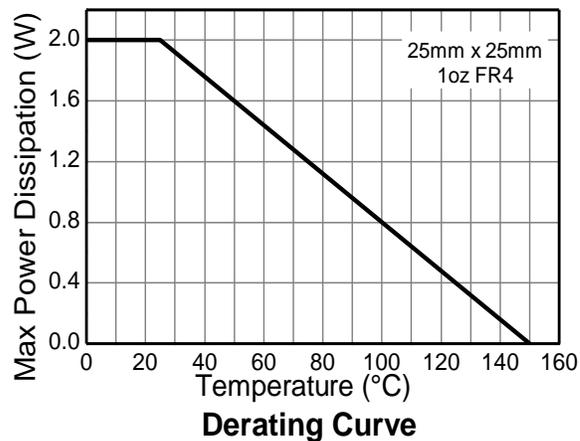
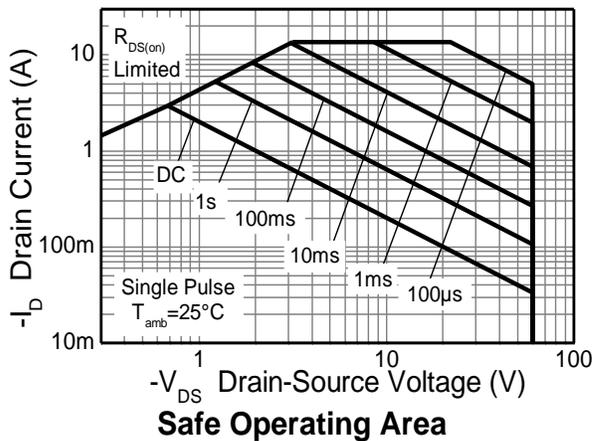
Characteristic			Symbol	Value	Unit	
Drain-Source Voltage			$V_{DS}$	-60	V	
Gate-Source Voltage			$V_{GS}$	$\pm 20$	V	
Continuous Drain Current	$V_{GS} = 10\text{V}$	(Note 7)	$I_D$	-4.3	A	
		$T_A = +70^\circ\text{C}$ (Note 7)		-3.5		
		(Note 6)		-3		
Pulsed Drain Current	$V_{GS} = 10\text{V}$	(Note 8)	$I_{DM}$	-13.7	A	
Continuous Source Current (Body Diode)			(Note 7)	$I_S$	-4.8	A
Pulsed Source Current (Body Diode)			(Note 8)	$I_{SM}$	-13.7	A

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

Characteristic		Symbol	Value	Unit
Power Dissipation	(Note 6)	$P_D$	2	W
	Linear Derating Factor		16	
Linear Derating Factor	(Note 7)		3.9	$\text{mW}/^\circ\text{C}$
			31	
Thermal Resistance, Junction to Ambient	(Note 6)	$R_{\theta JA}$	62.5	$^\circ\text{C}/\text{W}$
	(Note 7)		32	
Thermal Resistance, Junction to Lead	(Note 9)	$R_{\theta JL}$	9.8	
Operating and Storage Temperature Range		$T_J, T_{STG}$	-55 to +150	$^\circ\text{C}$

- Notes:
6. 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.
  7. Same as Note 6 except the device is measured at  $t \leq 10\text{s}$ .
  8. Same as Note 6 except the device is pulsed with  $D = 0.02$  and pulse width of  $300\mu\text{s}$ . The pulse current is limited by the maximum junction temperature.
  9. Thermal resistance from junction to solder point (at the end of the drain lead).

**Thermal Characteristics**

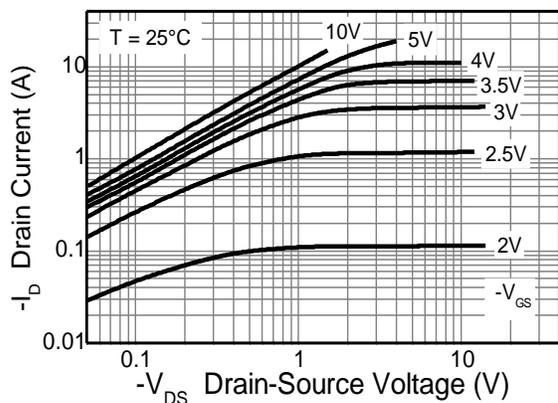


**Electrical Characteristics** (@T<sub>A</sub> = +25°C, unless otherwise specified.)

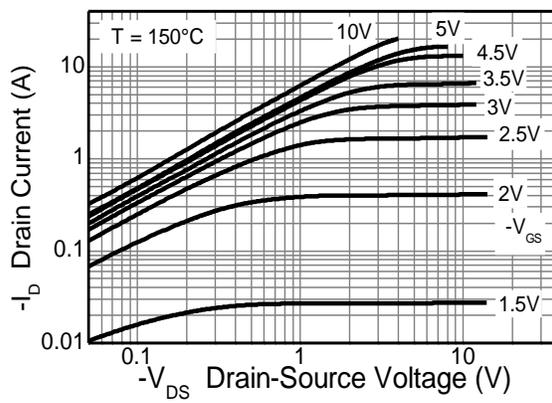
Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
<b>OFF CHARACTERISTICS</b>						
Drain-Source Breakdown Voltage	BV <sub>DSS</sub>	-60	—	—	V	I <sub>D</sub> = -250μA, V <sub>GS</sub> = 0V
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	—	—	-0.5	μA	V <sub>DS</sub> = -60V, V <sub>GS</sub> = 0V
Gate-Source 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>	-1	—	—	V	I <sub>D</sub> = -250μA, V <sub>DS</sub> = V <sub>GS</sub>
Static Drain-Source On-Resistance (Note 10)	R <sub>DS(on)</sub>	—	0.096	0.125	Ω	V <sub>GS</sub> = -10V, I <sub>D</sub> = -2.2A
			0.12	0.19		V <sub>GS</sub> = -4.5V, I <sub>D</sub> = -1.8A
Forward Transconductance (Notes 10 & 11)	g <sub>fs</sub>	—	4.7	—	S	V <sub>DS</sub> = -15V, I <sub>D</sub> = -2.2A
Diode Forward Voltage (Note 10)	V <sub>SD</sub>	—	-0.85	-0.95	V	I <sub>S</sub> = -2A, V <sub>GS</sub> = 0V, T <sub>J</sub> = +25°C
Reverse Recovery Time (Note 11)	t <sub>rr</sub>	—	25.1	—	ns	I <sub>S</sub> = -1.7A, di/dt = 100A/μs,
Reverse Recovery Charge (Note 11)	Q <sub>rr</sub>	—	27.2	—	nC	T <sub>J</sub> = +25°C
<b>DYNAMIC CHARACTERISTICS (Note 11)</b>						
Input Capacitance	C <sub>iss</sub>	—	637	—	pF	V <sub>DS</sub> = -30V, V <sub>GS</sub> = 0V f = 1MHz
Output Capacitance	C <sub>oss</sub>	—	70	—	pF	
Reverse Transfer Capacitance	C <sub>rss</sub>	—	53	—	pF	
Total Gate Charge (Note 12)	Q <sub>g</sub>	—	9	—	nC	V <sub>GS</sub> = -4.5V
Total Gate Charge (Note 12)	Q <sub>g</sub>	—	17.7	—	nC	V <sub>GS</sub> = -10V V <sub>DS</sub> = -30V I <sub>D</sub> = -2.2A
Gate-Source Charge (Note 12)	Q <sub>gs</sub>	—	1.6	—	nC	
Gate-Drain Charge (Note 12)	Q <sub>gd</sub>	—	4.4	—	nC	
Turn-On Delay Time (Note 12)	t <sub>D(on)</sub>	—	2.6	—	ns	V <sub>DD</sub> = -30V, V <sub>GS</sub> = -10V I <sub>D</sub> = -1A, R <sub>G</sub> ≅ 6Ω
Turn-On Rise Time (Note 12)	t <sub>r</sub>	—	3.4	—	ns	
Turn-Off Delay Time (Note 12)	t <sub>D(off)</sub>	—	26.2	—	ns	
Turn-Off Fall Time (Note 12)	t <sub>f</sub>	—	11.3	—	ns	

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

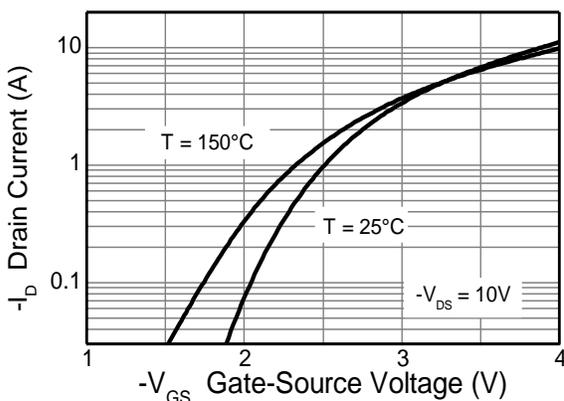
### Typical Characteristics



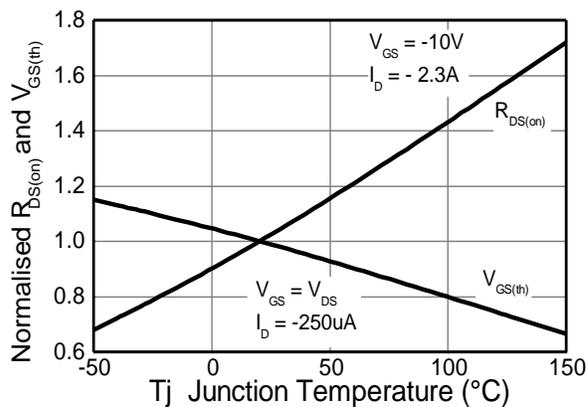
Output Characteristics



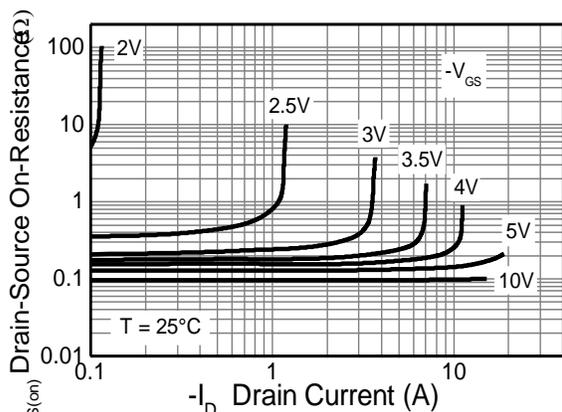
Output Characteristics



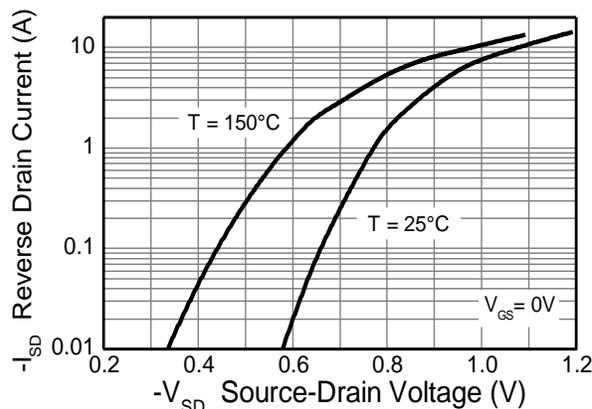
Typical Transfer Characteristics



Normalised Curves v Temperature

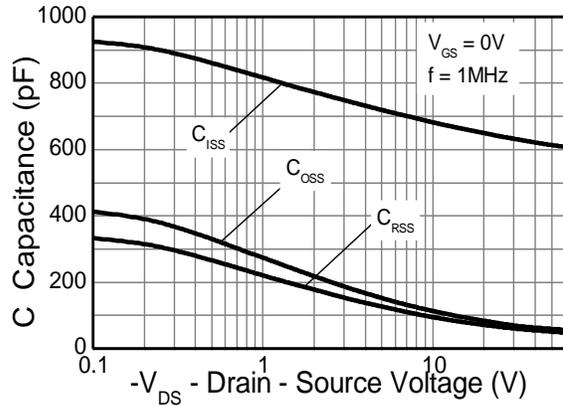


On-Resistance v Drain Current

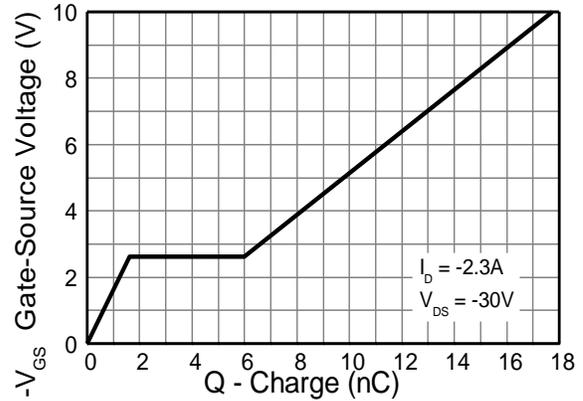


Source-Drain Diode Forward Voltage

**Typical Characteristics** (continued)

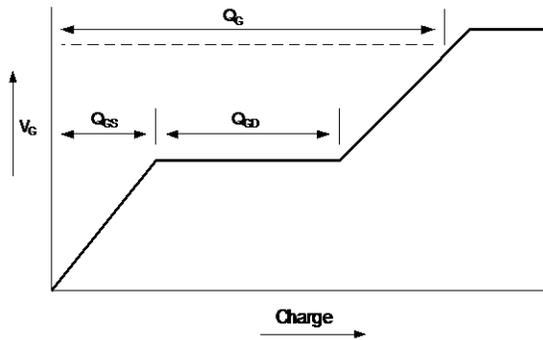


**Capacitance v Drain-Source Voltage**

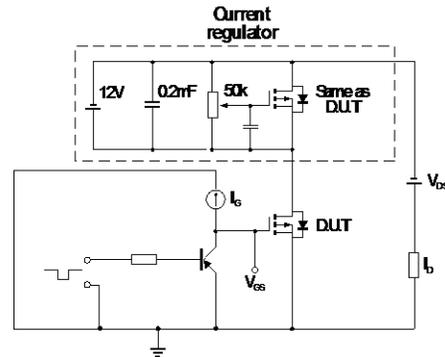


**Gate-Source Voltage v Gate Charge**

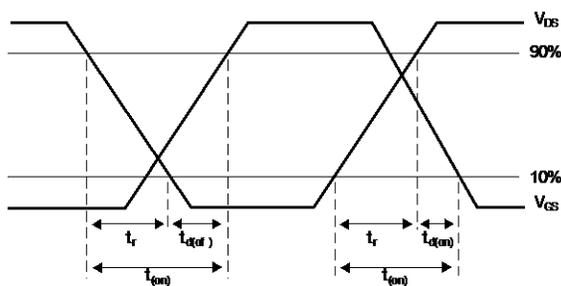
**Test Circuits**



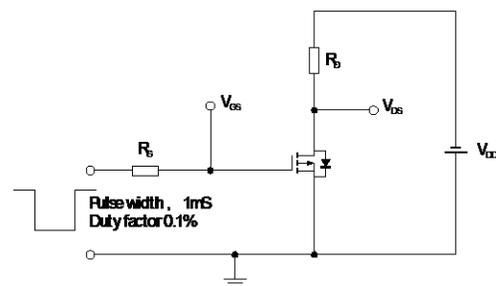
**Basic gate charge waveform**



**Gate charge test circuit**

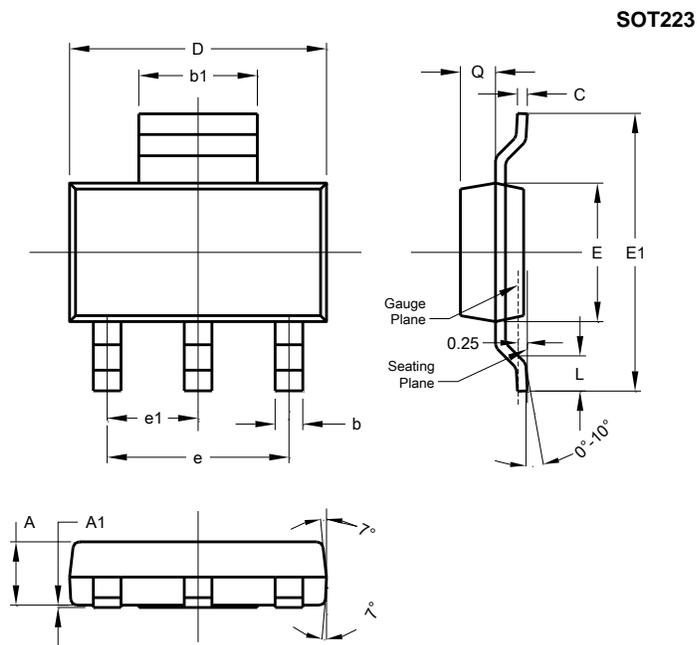


**Switching time waveforms**



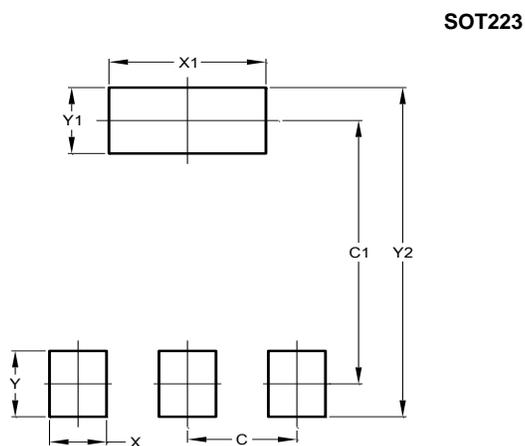
**Switching time test circuit**

## Package Outline Dimensions



SOT223			
Dim	Min	Max	Typ
A	1.55	1.65	1.60
A1	0.010	0.15	0.05
b	0.60	0.80	0.70
b1	2.90	3.10	3.00
C	0.20	0.30	0.25
D	6.45	6.55	6.50
E	3.45	3.55	3.50
E1	6.90	7.10	7.00
e	-	-	4.60
e1	-	-	2.30
L	0.85	1.05	0.95
Q	0.84	0.94	0.89
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