



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

$V_{(BR)DSS}$	$R_{DS(ON)}$	$I_D$ $T_A = +25^\circ\text{C}$
40V	$0.05\Omega @ V_{GS} = 10V$	7A

## Description

This new generation MOSFET has been designed to minimize the on-state resistance ( $R_{DS(ON)}$ ) and yet maintain superior switching performance, making it ideal for high efficiency power management applications.

## Applications

- DC-DC Converters
- Audio Output Stages
- Relay and Solenoid driving
- Motor Control

## Features

- Low On-Resistance
- Fast Switching Speed
- Low Threshold
- Low Gate Drive

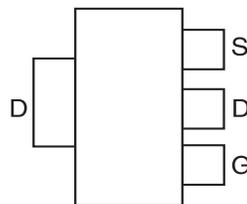
## Mechanical Data

- 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 lead frame. Solderable per MIL-STD-202, Method 208 <sup>Ⓔ3</sup>
- Weight: 0.112 grams (approximate)

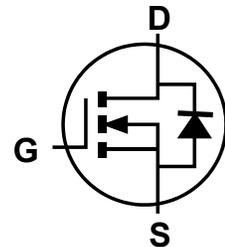
SOT223



Top View



Pin Out - Top View



Equivalent Circuit

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

Characteristic			Symbol	Value	Unit	
Drain-Source Voltage			V <sub>DSS</sub>	40	V	
Gate-Source Voltage			V <sub>GS</sub>	±20	V	
Continuous Drain Current	V <sub>GS</sub> = 10V	(Note 7)	I <sub>D</sub>	7	A	
		T <sub>A</sub> = +70°C (Note 7)		5.6		
		(Note 6)		5		
Pulsed Drain Current	V <sub>GS</sub> = 10V	(Note 8)	I <sub>DM</sub>	22	A	
Continuous Source Current (Body diode)			(Note 7)	I <sub>S</sub>	5.4	A
Pulsed Source Current (Body diode)			(Note 8)	I <sub>SM</sub>	22	A

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

Characteristic		Symbol	Value	Unit
Power Dissipation	(Note 6)	P <sub>D</sub>	2	W
	Linear Derating Factor		16	
(Note 7)			3.9	
			31	
Thermal Resistance, Junction to Ambient	(Note 6)	R <sub>θJA</sub>	62.5	°C/W
	(Note 7)		32.2	
Operating and Storage Temperature Range		T <sub>J</sub> , T <sub>STG</sub>	-55 to +150	°C

**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>	40	—	—	V	I <sub>D</sub> = 250μA, V <sub>GS</sub> = 0V
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	—	—	1	μA	V <sub>DS</sub> = 40V, 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 9)	R <sub>DS(on)</sub>	—	—	0.05	Ω	V <sub>GS</sub> = 10V, I <sub>D</sub> = 4.5A
				0.075		V <sub>GS</sub> = 4.5V, I <sub>D</sub> = 3.2A
Forward Transconductance (Notes 11)	g <sub>fs</sub>	—	8.7	—	S	V <sub>DS</sub> = 15V, I <sub>D</sub> = 2.5A
Diode Forward Voltage (Note 9)	V <sub>SD</sub>	—	0.8	0.95	V	I <sub>S</sub> = 2.5A, V <sub>GS</sub> = 0V, T <sub>J</sub> = +25°C
Reverse recovery time (Note 11)	t <sub>rr</sub>	—	14.5	—	ns	I <sub>F</sub> = 2.5A, di/dt = 100A/μs, T <sub>J</sub> = +25°C
Reverse recovery charge (Note 11)	Q <sub>rr</sub>	—	7.8	—	nC	
<b>DYNAMIC CHARACTERISTICS (Note 10)</b>						
Input Capacitance	C <sub>iss</sub>	—	746	—	pF	V <sub>DS</sub> = 40V, V <sub>GS</sub> = 0V f = 1MHz
Output Capacitance	C <sub>oss</sub>	—	93	—	pF	
Reverse Transfer Capacitance	C <sub>rss</sub>	—	60	—	pF	
Total Gate Charge (Note 11)	Q <sub>g</sub>	—	19	—	nC	V <sub>DS</sub> = 30V, V <sub>GS</sub> = 10V, I <sub>D</sub> = 2.5A (refer to test circuit)
Gate-Source Charge (Note 11)	Q <sub>gs</sub>	—	2.3	—	nC	
Gate-Drain Charge (Note 11)	Q <sub>gd</sub>	—	4.1	—	nC	
Turn-On Delay Time (Note 11)	t <sub>D(on)</sub>	—	3.4	—	ns	V <sub>DD</sub> = 30V, V <sub>GS</sub> = 10V I <sub>D</sub> = 2.5A, R <sub>G</sub> ≅ 6Ω (refer to test circuit)
Turn-On Rise Time (Note 11)	t <sub>r</sub>	—	2.8	—	ns	
Turn-Off Delay Time (Note 11)	t <sub>D(off)</sub>	—	20	—	ns	
Turn-Off Fall Time (Note 11)	t <sub>f</sub>	—	7.7	—	ns	

- Notes:
6. For a device surface mounted on 25mm x 25mm FR-4 PCB with high coverage of single sided 1oz copper, in still air conditions.
  7. For a device surface mounted on FR-4 PCB measured at t ≤ 5 secs.
  8. Repetitive rating 25mm x 25mm FR-4 PCB, D = 0.05, pulse width 10μs - pulse width limited by maximum junction temperature.
  9. Measured under pulsed conditions. Pulse width ≤ 300μs; duty cycle ≤ 2%.
  10. Switching characteristics are independent of operating junction temperatures.
  11. For design aid only, not subject to production testing.

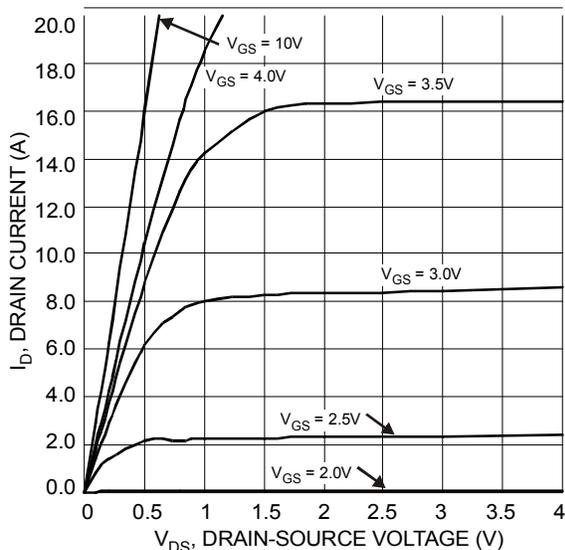


Figure 1 Typical Output Characteristic

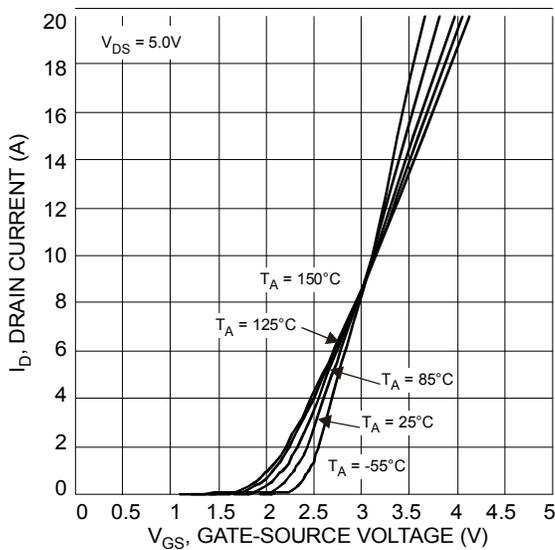


Figure 2 Typical Transfer Characteristics

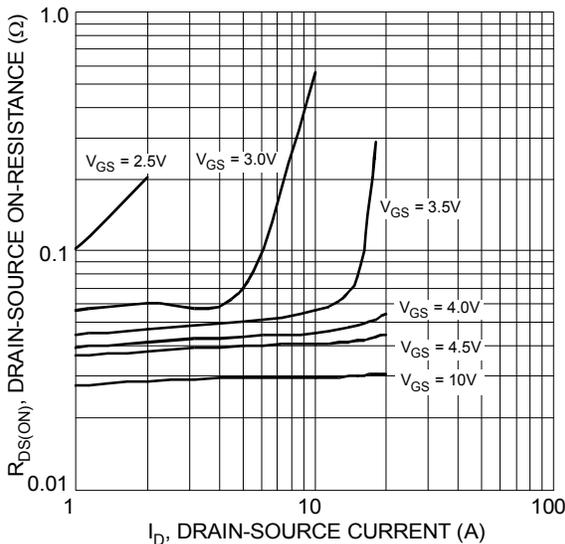


Figure 3 Typical On-Resistance vs. Drain Current and Gate Voltage

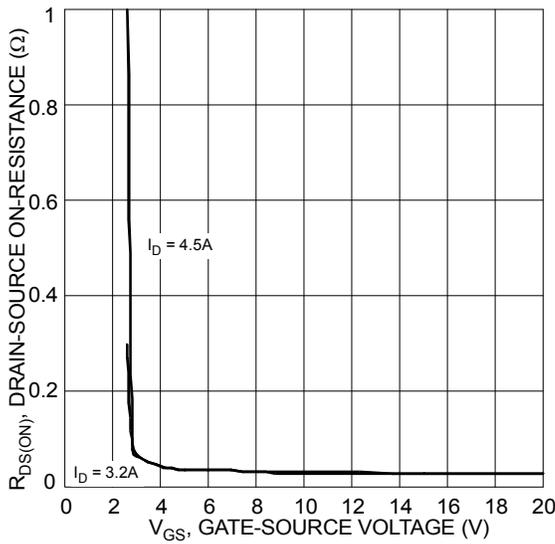


Figure 4 Typical Transfer Characteristic

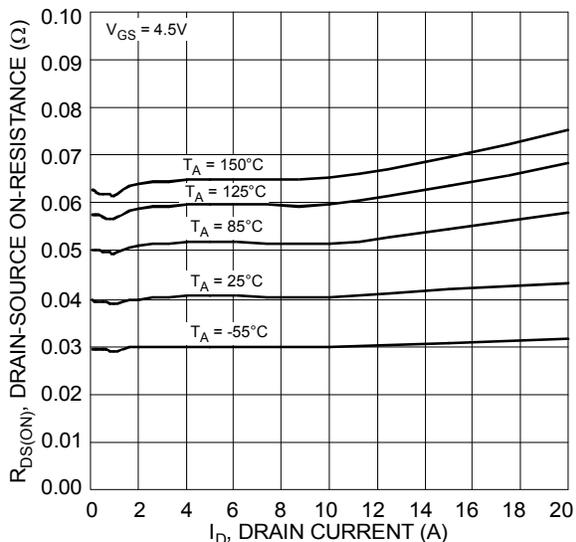


Figure 5 Typical On-Resistance vs. Drain Current and Temperature

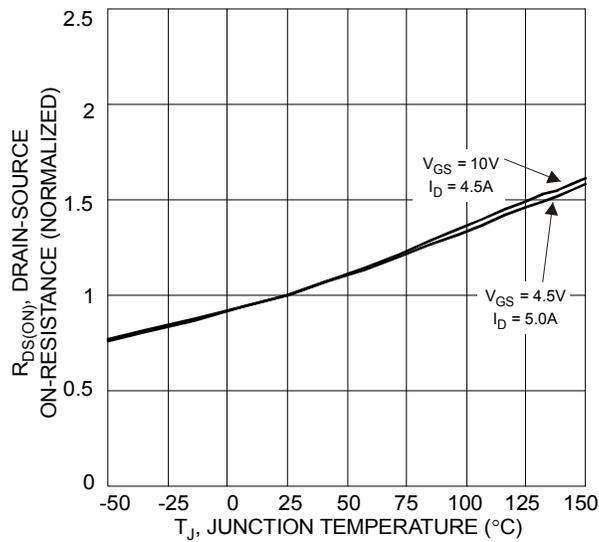


Figure 6 On-Resistance Variation with Temperature

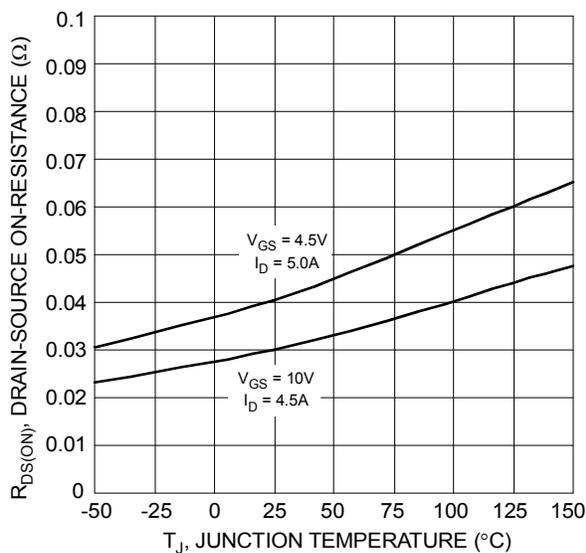


Figure 7 On-Resistance Variation with Temperature

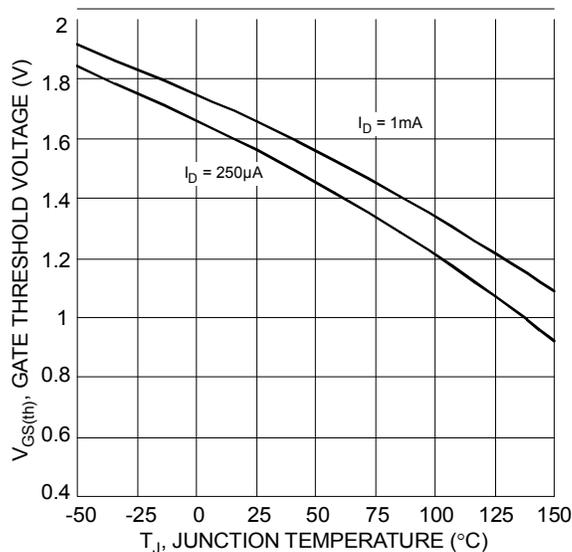


Figure 8 Gate Threshold Variation vs. Ambient Temperature

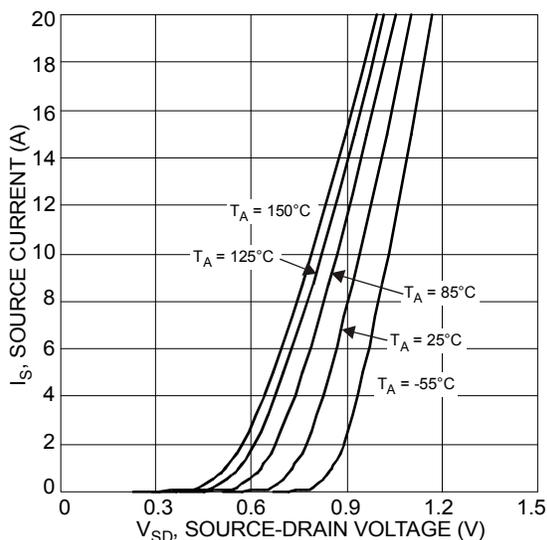


Figure 9 Diode Forward Voltage vs. Current

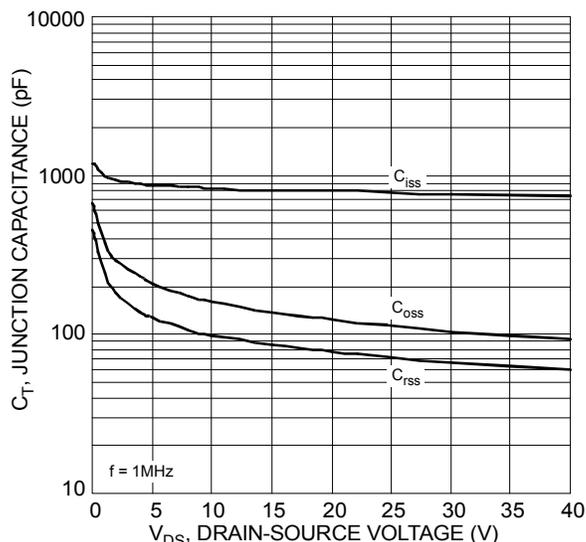


Figure 10 Typical Junction Capacitance

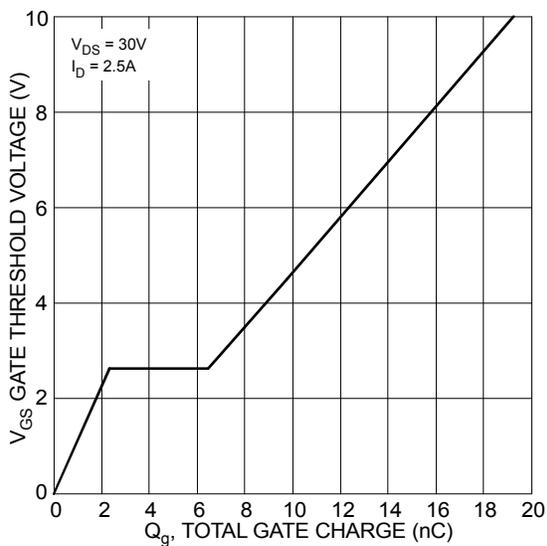


Figure 11 Gate Charge

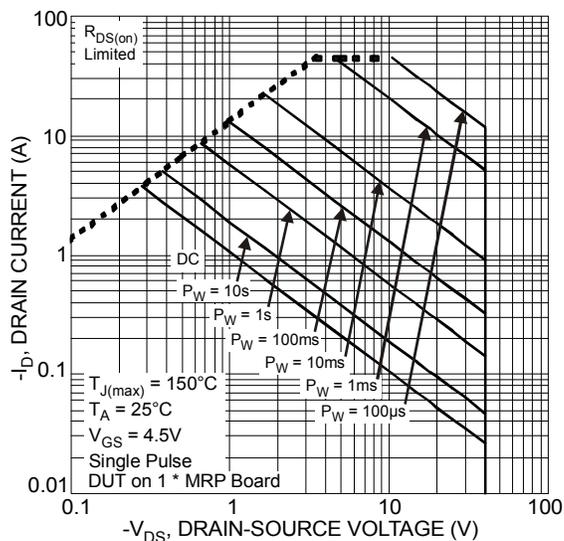


Figure 12 SOA, Safe Operation Area

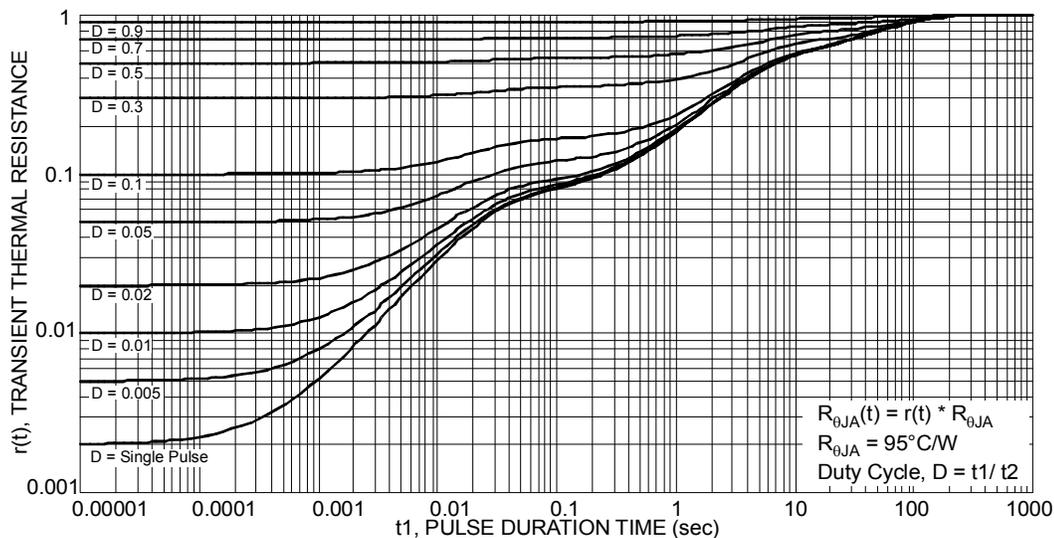
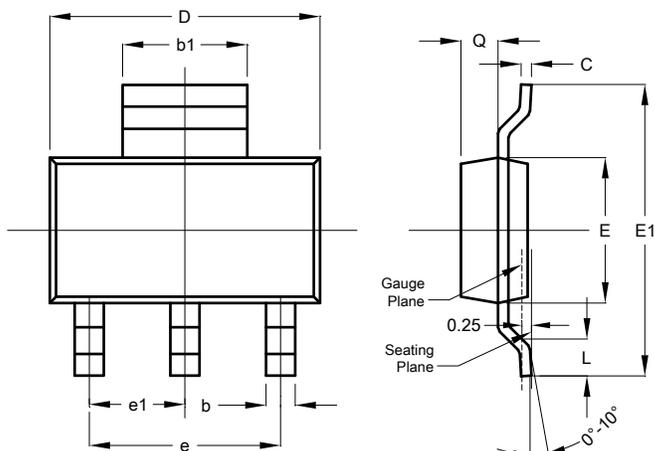
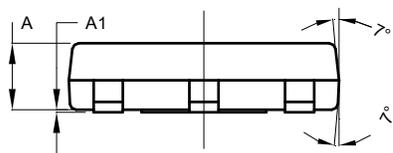


Figure 13 Transient Thermal Resistance

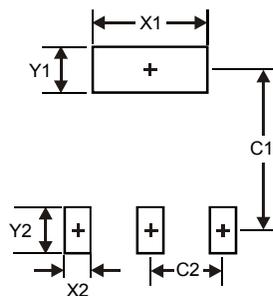
### Package Outline Dimensions



SOT223			
Dim	Min	Max	Typ
A	1.55	1.65	1.60
A1	0.010	0.15	0.05
b1	2.90	3.10	3.00
b2	0.60	0.80	0.70
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)
X1	3.3
X2	1.2
Y1	1.6
Y2	1.6
C1	6.4
C2	2.3