



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**

0755-83047638

ysbdt@szyoushang.cn

www.szyoushang.cn



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## Product Summary

$BV_{DSS}$	$R_{DS(ON) MAX}$	$I_D$ $T_A = +25^\circ C$
-240V	$9\Omega @ V_{GS} = -10V$	-480mA

## Features and Benefits

- 240 Volt  $V_{DS}$
- $R_{DS(ON)} = 8.8\Omega$  Typical at  $V_{GS} = -3.5V$
- Low Threshold and Fast Switching

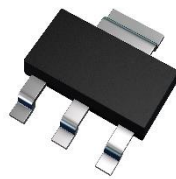
## Description and Applications

- Electronic Hook Switches
- Telecoms and Battery Powered Equipment

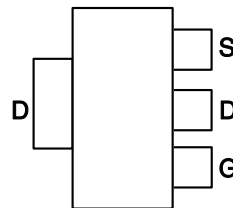
## Mechanical Data

- Package: SOT223
- Package Material: Molded Plastic, "Green" Molding Compound. 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

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

Characteristic	Symbol	Value	Unit
Drain-Source Voltage	V <sub>DSS</sub>	-240	V
Gate-Source Voltage	V <sub>GSS</sub>	±40	V
Continuous Drain Current (@ T <sub>A</sub> = +25°C) (Note 5)	I <sub>D</sub>	-480	mA
Maximum Body Diode Forward Current (@ T <sub>A</sub> = +25°C) (Note 5)	I <sub>S</sub>	-480	mA
Pulsed Drain Current (10μs Pulse, Duty Cycle = 1%)	I <sub>DM</sub>	-1.5	A
Pulsed Source Current (10μs Pulse, Duty Cycle = 1%)	I <sub>SM</sub>	-1.5	A

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

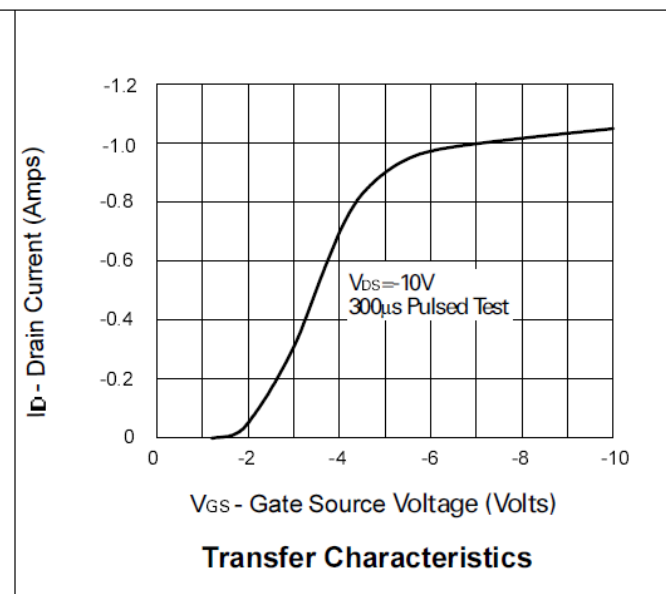
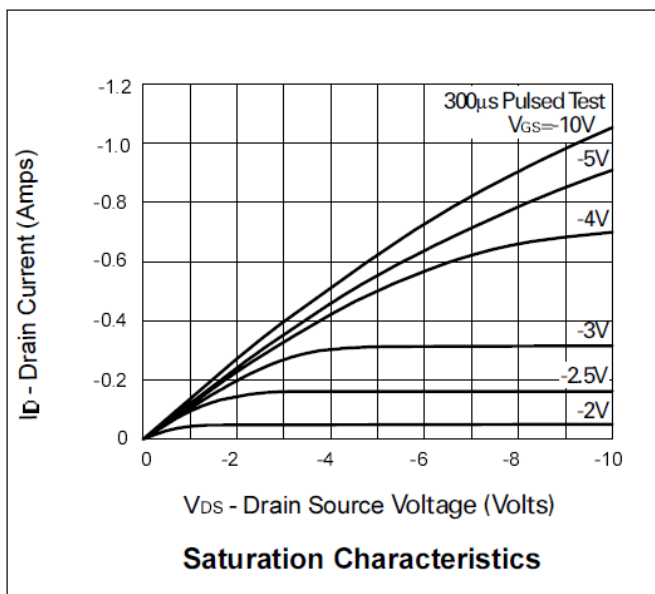
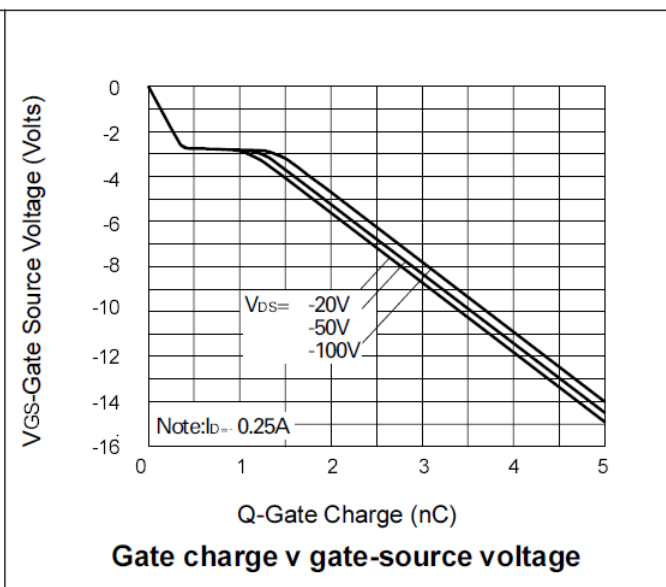
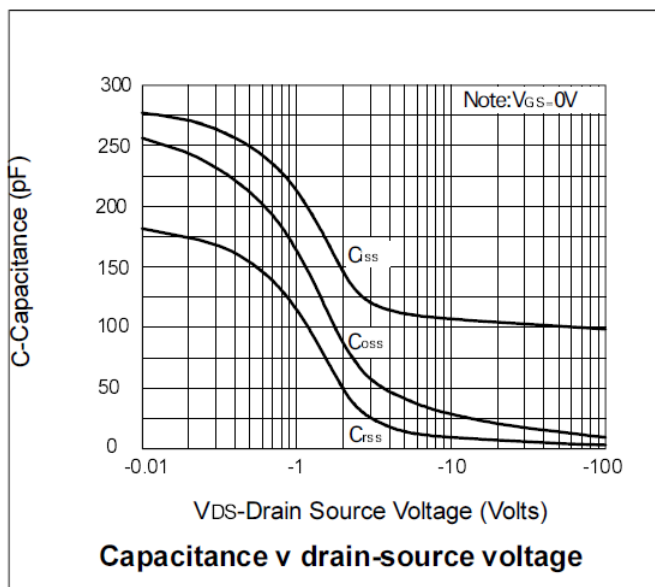
Characteristic	Symbol	Value	Unit
Power Dissipation (@ T <sub>A</sub> = +25°C) (Note 5)	P <sub>D</sub>	2.5	W
Thermal Resistance, Junction to Ambient @T <sub>A</sub> = +25°C (Note 5)	R <sub>θJA</sub>	50	°C/W
Operating and Storage Temperature Range	T <sub>J</sub> , T <sub>STG</sub>	-55 to +150	°C

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

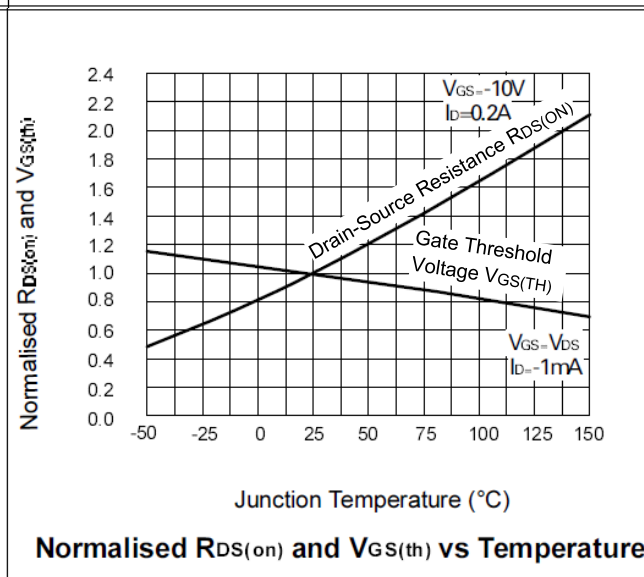
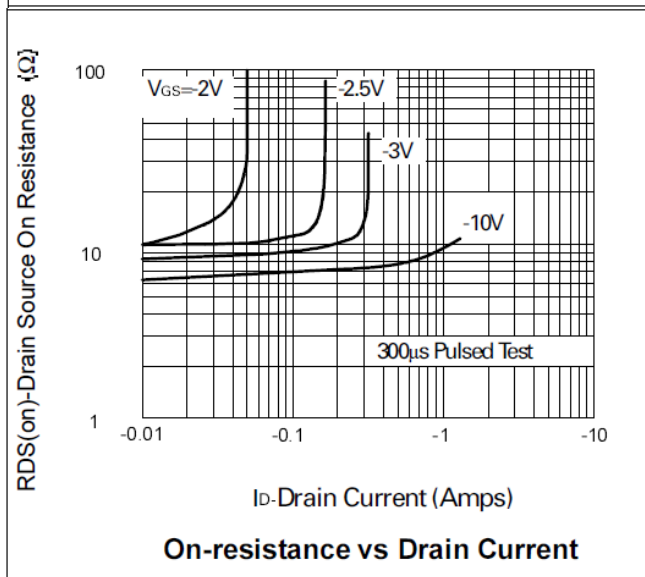
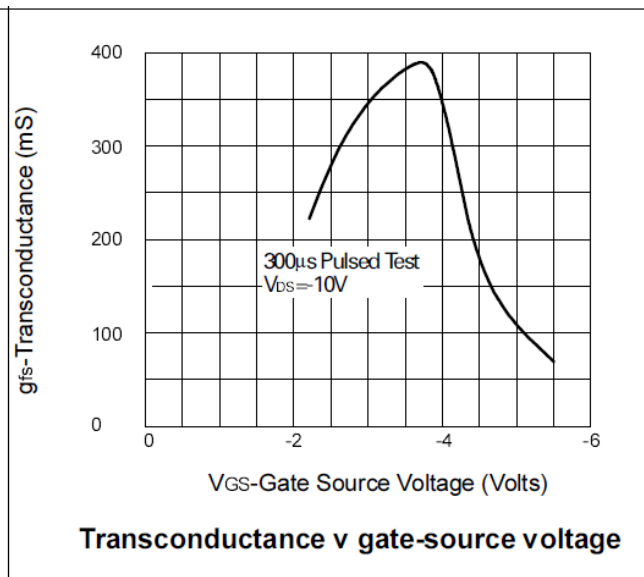
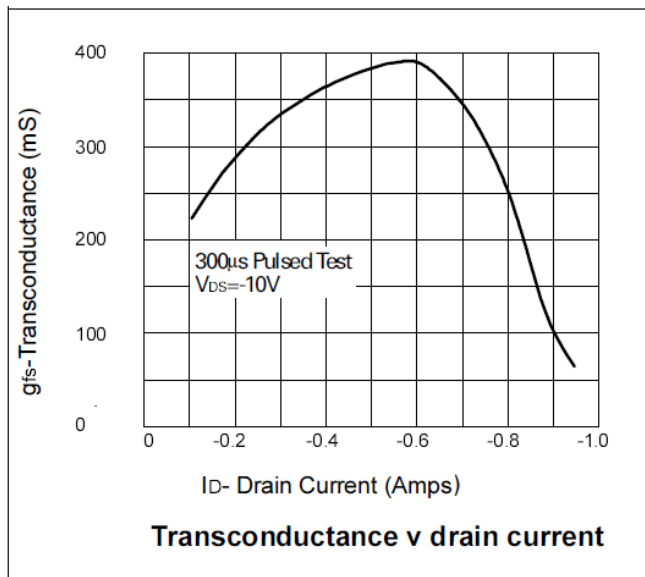
Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
<b>OFF CHARACTERISTICS</b> (Note 6)						
Drain-Source Breakdown Voltage	BV <sub>DSS</sub>	-240	—	—	V	V <sub>GS</sub> = 0V, I <sub>D</sub> = -1mA
Zero Gate Voltage Drain Current T <sub>J</sub> = +25°C	I <sub>DSS</sub>	—	—	-10 -100	μA μA	V <sub>DS</sub> = -240V, V <sub>GS</sub> = 0V V <sub>DS</sub> = -190V, V <sub>GS</sub> = 0V T <sub>A</sub> = +125°C
Gate-Source Leakage	I <sub>GSS</sub>	—	—	100	nA	V <sub>GS</sub> = ±40V, V <sub>DS</sub> = 0V
On-State Drain Current	I <sub>D(ON)</sub>	-0.75	-1.0	—	A	V <sub>GS</sub> = -10V, V <sub>DS</sub> = -10V
<b>ON CHARACTERISTICS</b> (Note 6)						
Gate Threshold Voltage	V <sub>GS(TH)</sub>	-0.7	-1.4	-2.0	V	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = -1mA
Static Drain-Source On-Resistance	R <sub>DS(ON)</sub>	—	7.1 8.8	9 11	Ω Ω	V <sub>GS</sub> = -10V, I <sub>D</sub> = -200mA V <sub>GS</sub> = -3.5V, I <sub>D</sub> = -100mA
Forward Transconductance (Notes 7 & 8)	g <sub>FS</sub>	125	—	—	mS	V <sub>DS</sub> = -10V, I <sub>D</sub> = -0.2A
<b>DYNAMIC CHARACTERISTICS</b> (Note 8)						
Input Capacitance	C <sub>iss</sub>	—	100	200	pF	V <sub>DS</sub> = -25V, V <sub>GS</sub> = 0V, f = 1.0MHz
Output Capacitance	C <sub>oss</sub>	—	18	25	pF	
Reverse Transfer Capacitance	C <sub>rss</sub>	—	5	15	pF	
Turn-On Delay Time (Note 9)	t <sub>D(ON)</sub>	—	8	15	ns	V <sub>DD</sub> ≈ -50V, I <sub>D</sub> = -0.25A, V <sub>GEN</sub> = -10V
Turn-On Rise Time (Note 9)	t <sub>r</sub>	—	8	15	ns	
Turn-Off Delay Time (Note 9)	t <sub>D(OFF)</sub>	—	26	40	ns	
Turn-Off Fall Time (Note 9)	t <sub>f</sub>	—	20	30	ns	

- Notes:
- Device mounted on FR-4 substrate PC board, 2oz copper, with 1inch square pad layout.
  - Short duration pulse test used to minimize self-heating effect.
  - Measured under pulsed conditions. Pulse width = 300ms. Duty cycle ≤ 2%.
  - Guaranteed by design. Not subject to production testing.
  - Switching times measured with 50Ω source impedance and <5ns rise time on a pulse generator  
spice parameter data is available upon request for this device.

### Typical Characteristics



**Typical Characteristics** (continued)



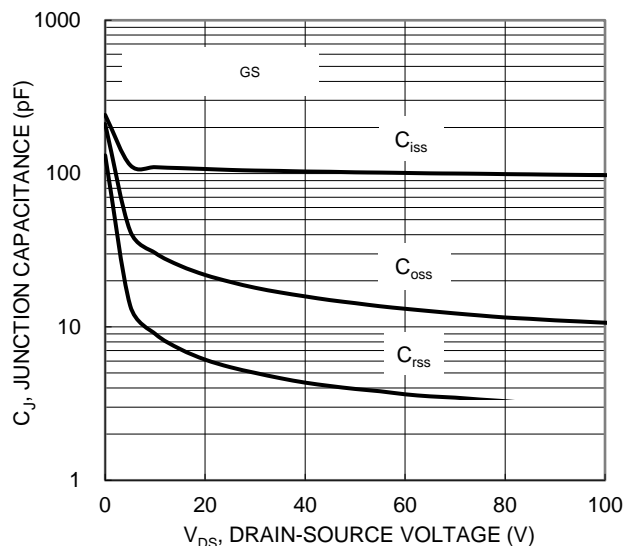


Figure 1. Junction Capacitance vs. Drain-Source Voltage

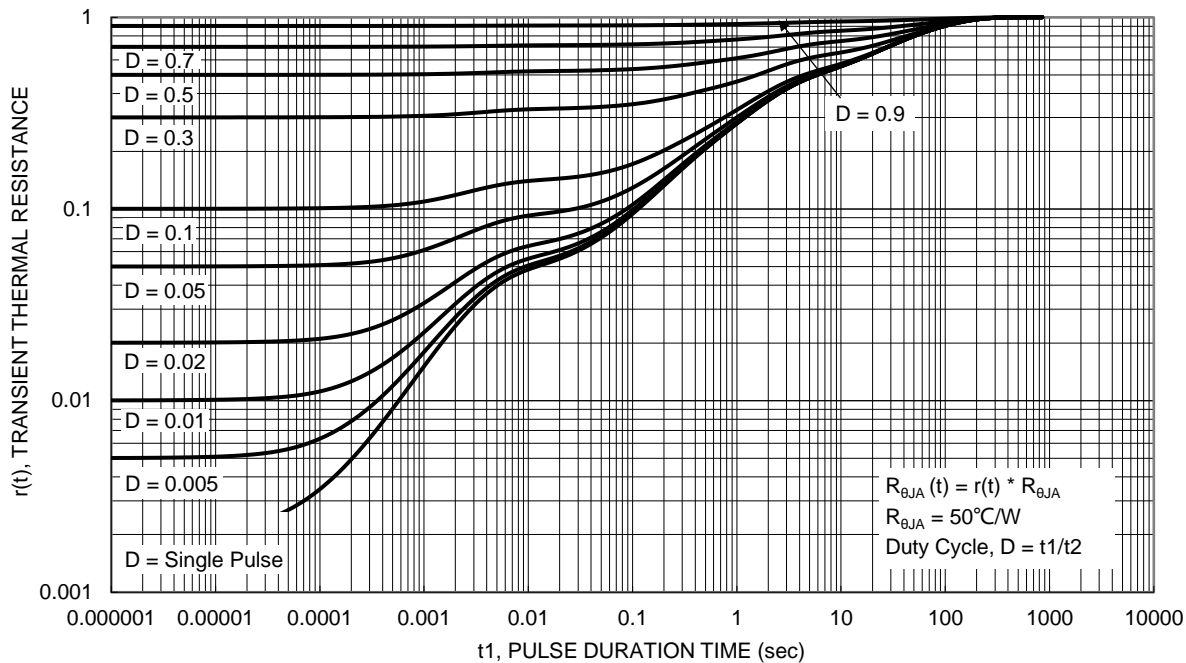
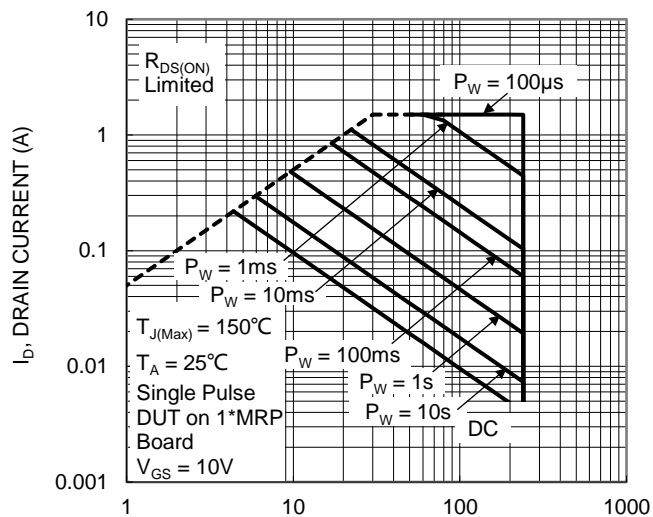
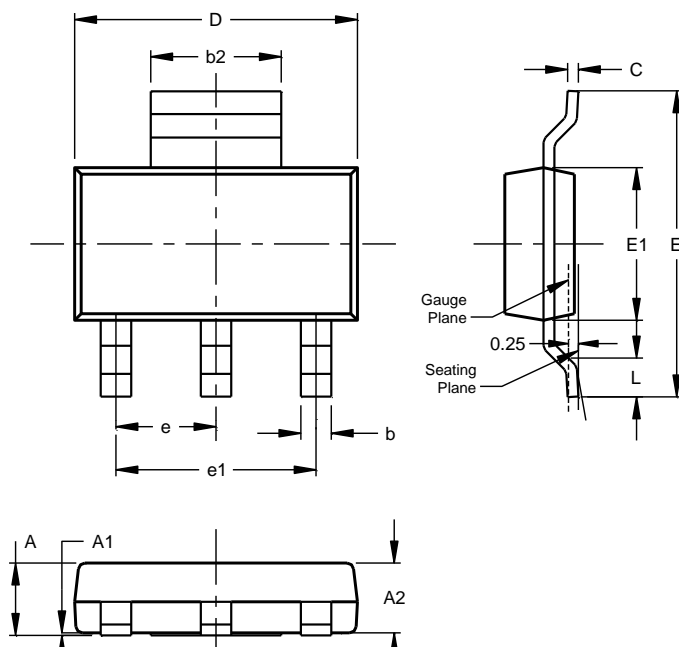


Figure 3. Transient Thermal Resistance

### Package Outline Dimensions

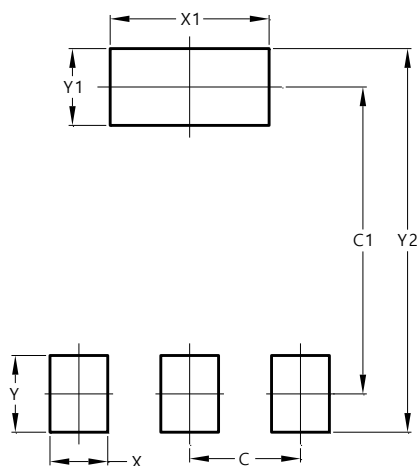
SOT223 (Type DN)



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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

SOT223 (Type DN)



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