优尚

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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Product Summary

$V_{(BR)DSS}$	$R_{DS(on)}$ max	I_D max T_A = +25°C (Note 6)
-30V	45mΩ @ V_{GS} = -10V	-7.5A
	70mΩ @ V_{GS} = -4.5V	-5.9A

Features and Benefits

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

Description and Applications

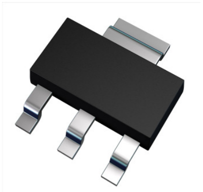
This MOSFET is designed to minimize the on-state resistance and yet maintain superior switching performance, making it ideal for high-efficiency power management applications.

- Motor Control
- DC-DC Converters
- Power Management Functions
- Relay and Solenoid Driving

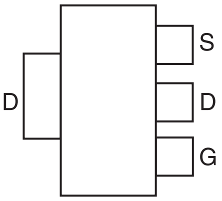
Mechanical Data

- 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 208 e3
- Weight: 0.112 grams (Approximate)

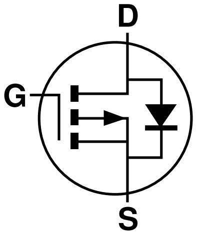
SOT223



Top View



Pin Out - Top View



Equivalent Circuit

Maximum Ratings (@T_A = +25℃, unless otherwise specified.)

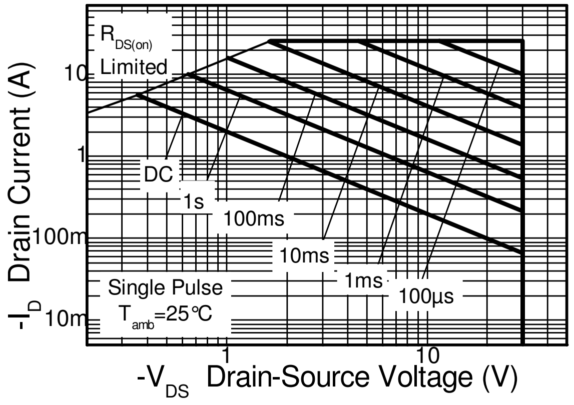
Characteristic			Symbol	Value	Unit
Drain-Source Voltage			V_{DSS}	-30	V
Gate-Source Voltage			V_{GS}	±20	V
Continuous Drain Current	V_{GS} = 10V	(Note 6)	I_D	-7.5	A
		T_A = +70℃ (Note 6)		-6.0	
		(Note 5)		-5.4	
Pulsed Drain Current	V_{GS} = 10V	(Note 7)	I_{DM}	-24.9	A
Continuous Source Current (Body diode)		(Note 6)	I_S	-3.2	A
Pulsed Source Current (Body diode)		(Note 7)	I_{SM}	-24.9	A

Thermal Characteristics (@T_A = +25℃, unless otherwise specified.)

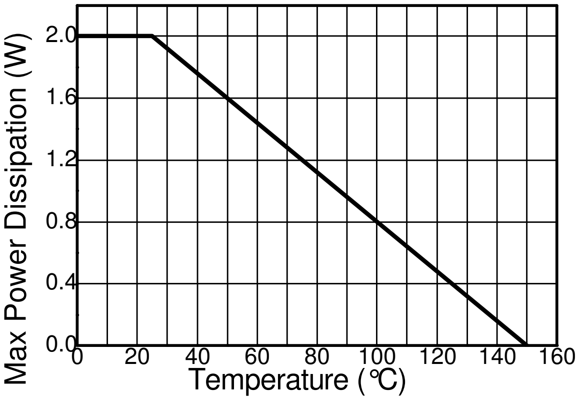
Characteristic		Symbol	Value	Unit
Power Dissipation Linear Derating Factor	(Note 5)	P_D	2.0 16	W mW/°C
	(Note 6)		3.9 31	
Thermal Resistance, Junction to Ambient	(Note 5)	$R_{\theta JA}$	62.5	°C/W
	(Note 6)		32.2	
Thermal Resistance, Junction to Lead	(Note 8)	$R_{\theta JL}$	8.51	
Operating and Storage Temperature Range		T_J, T_{STG}	-55 to 150	°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 ≤ 10 sec.
7. Same as Note (5), except the device is pulsed with D= 0.02 and pulse width 300 µs. 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).

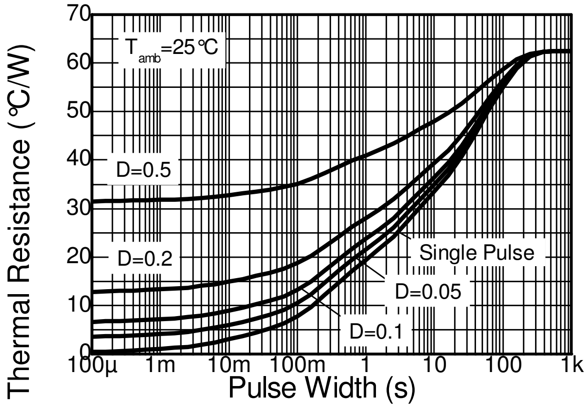
Thermal Characteristics



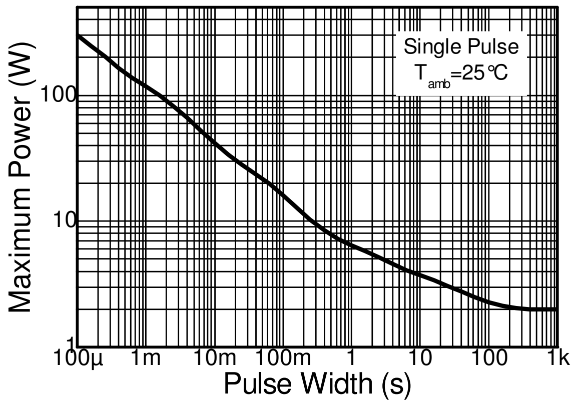
Safe Operating Area



Derating Curve



Transient Thermal Impedance



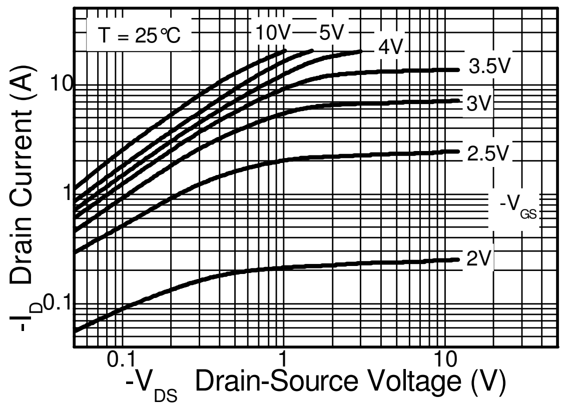
Pulse Power Dissipation

Electrical Characteristics (@T_A = +25℃, unless otherwise specified.)

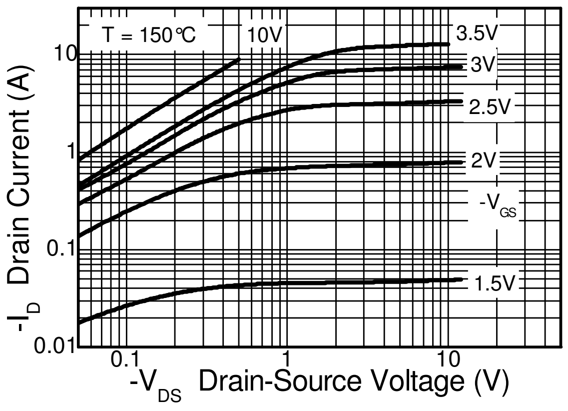
Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
OFF CHARACTERISTICS						
Drain-Source Breakdown Voltage	BV_{DSS}	-30	—	—	V	I_D = -250µA, V_{GS} = 0V
Zero Gate Voltage Drain Current	I_{DSS}	—	—	-1	µA	V_{DS} = -30V, V_{GS} = 0V
Gate-Source Leakage	I_{GSS}	—	—	±100	nA	V_{GS} = ±20V, V_{DS} = 0V
ON CHARACTERISTICS						
Gate Threshold Voltage	$V_{GS(th)}$	-1.0	—	—	V	I_D = -250µA, V_{DS} = V_{GS}
Static Drain-Source On-Resistance (Note 9)	$R_{DS\ (ON)}$	—	—	45	mΩ	V_{GS} = -10V, I_D = -4.2A
				70		V_{GS} = -4.5V, I_D = -3.4A
Forward Transconductance (Notes 9 & 10)	g_{fs}	—	9.2	—	S	V_{DS} = -15V, I_D = -4.2A
Diode Forward Voltage (Note 9)	V_{SD}	—	-0.85	-0.95	V	I_S = -3.6A, V_{GS} = 0V, T_J = +25℃
Reverse Recovery Time (Note 10)	t_{rr}		21.7	—	ns	I_F = -2A, di/dt = 100A/µs, T_J = +25℃
Reverse Rsecovery Charge (Note 10)	Q_{rr}	—	16.1	—	nC	
DYNAMIC CHARACTERISTICS (Note 10)						
Input Capacitance	C_{iss}	—	1,022	—	pF	V_{DS} = -15V, V_{GS} = 0V f = 1MHz
Output Capacitance	C_{oss}	—	267	—	pF	
Reverse Transfer Capacitance	C_{rss}	—	229	—	pF	
Total Gate Charge (Note 11)	Q_g	—	17.2	—	nC	V_{GS} = -5V V_{DS} = -15V I_D = -4.2A
Total Gate Charge (Note 11)	Q_g	—	29.6	—	nC	V_{GS} = -10V
Gate-Source Charge (Note 11)	Q_{gs}	—	2.8	—	nC	
Gate-Drain Charge (Note 11)	Q_{gd}	—	8.6	—	nC	
Turn-On Delay Time (Note 11)	$t_{D(on)}$	—	3.8	—	ns	V_{DD} = -15V, V_{GS} = -10V I_D = -1A, R_G ≅ 6.0Ω
Turn-On Rise Time (Note 11)	t_r	—	6.5	—	ns	
Turn-Off Delay Time (Note 11)	$t_{D(off)}$	—	37.1	—	ns	
Turn-Off Fall Time (Note 11)	t_f	—	21.4	—	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.

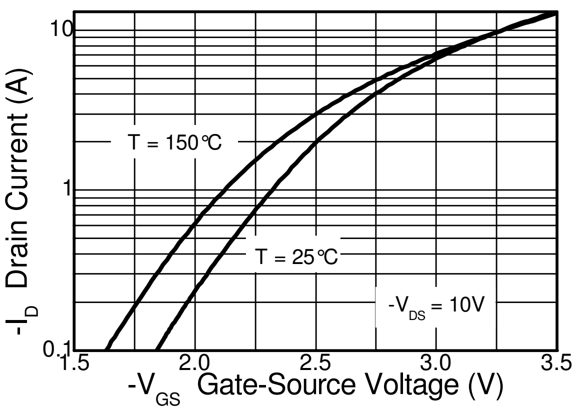
Typical Characteristics



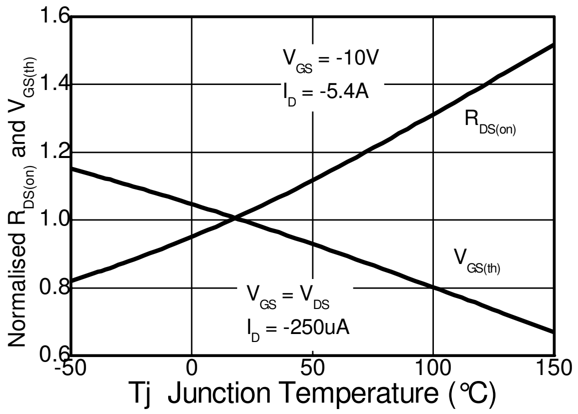
Output Characteristics



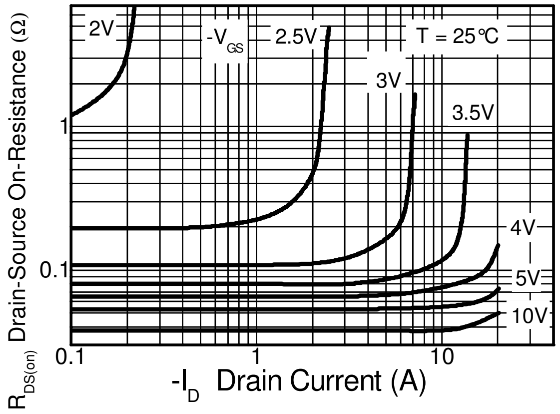
Output Characteristics



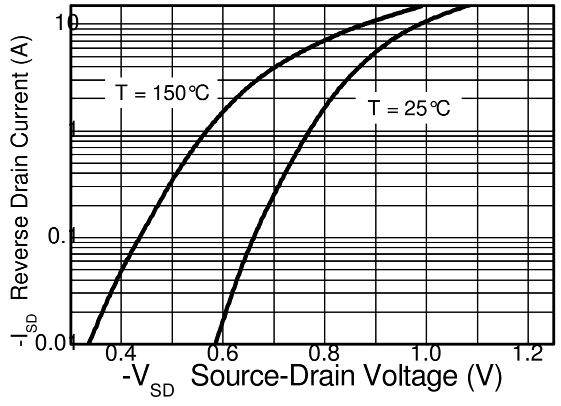
Typical Transfer Characteristics



Normalised Curves v Temperature

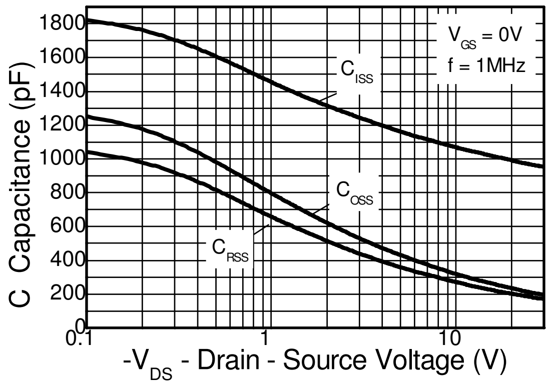


On-Resistance v Drain Current

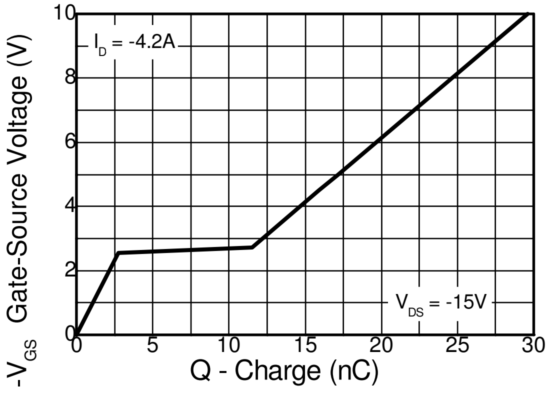


Source-Drain Diode Forward Voltage

Typical Characteristics (continued)

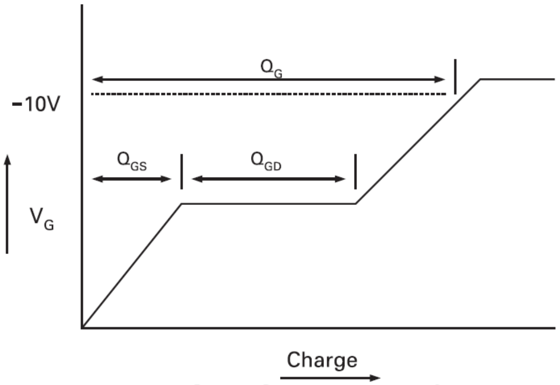


Capacitance v Drain-Source Voltage

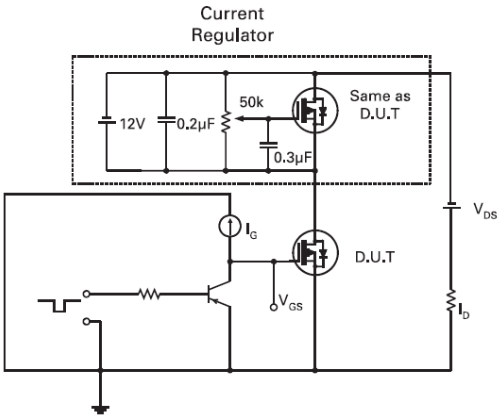


Gate-Source Voltage v Gate Charge

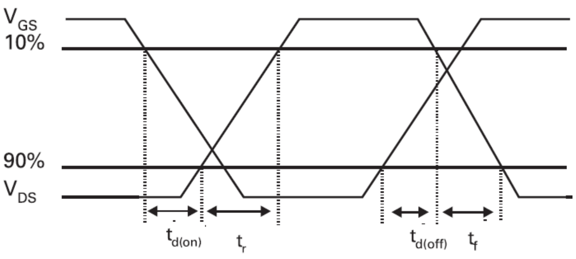
Test Circuits



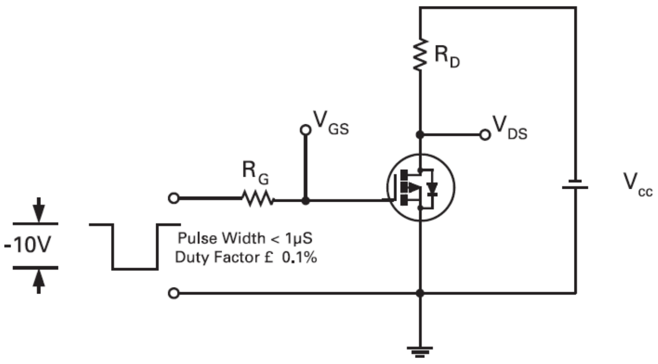
Basic Gate Charge Waveform



Gate Charge Test Circuit

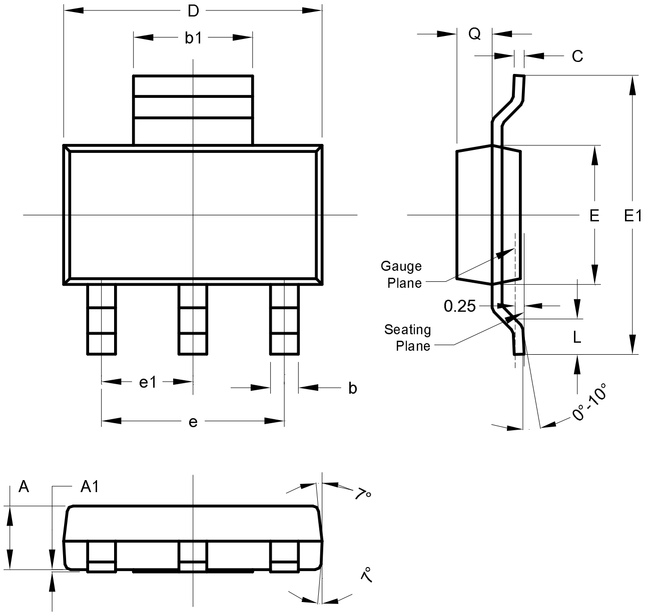


Switching Time Waveforms



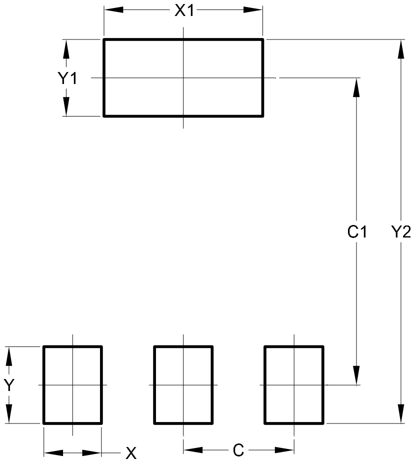
Switching Time Test Circuit

Package Outline Dimensions



SOT223			
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