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

BV_{DSS}	$R_{DS(on)}$ Max	I_D T_A = +25°C
-40V	60mΩ @ V_{GS}= -10V	-6.4A
	100mΩ @ V_{GS}= -4.5V	-5.6A

Features and Benefits

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

Description and Applications

This MOSFET is designed to meet the stringent requirements of automotive applications. It is qualified to AEC-Q101, supported by a PPAP, and is ideal for use in:

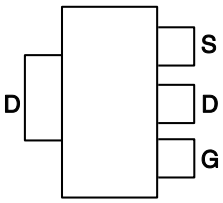
- DC-DC converters
- Disconnect switches
- Audio output stages
- Motor controls

Mechanical Data

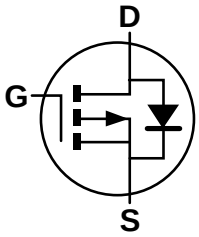
- Package: SOT223
- Package Material: Molded Plastic, UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Finish - Matte Tin Annealed over Copper Leadframe. Solderable per MIL-STD-202, Method 208 e3
- Weight: 0.112 grams (Approximate)

SOT223 (Type DN)

Top View



Pin Out - Top View



Equivalent Circuit

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

Characteristic			Symbol	Value	Unit
Drain-Source Voltage			V_{DSS}	-40	V
Gate-Source Voltage			V_{GS}	±20	V
Continuous Drain Current	V_{GS} = 10V	(Note 6)	I_D	-6.4	A
		T_A = +70°C (Note 6)		-4.6	
		(Note 5)		-1.7	
Pulsed Drain Current	V_{GS}= 10V	(Note 7)	I_{DM}	-21	A
Continuous Source Current (Body Diode)		(Note 6)	I_S	-5.2	A
Pulsed Source Current (Body Diode)		(Note 7)	I_{SM}	-21	A

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

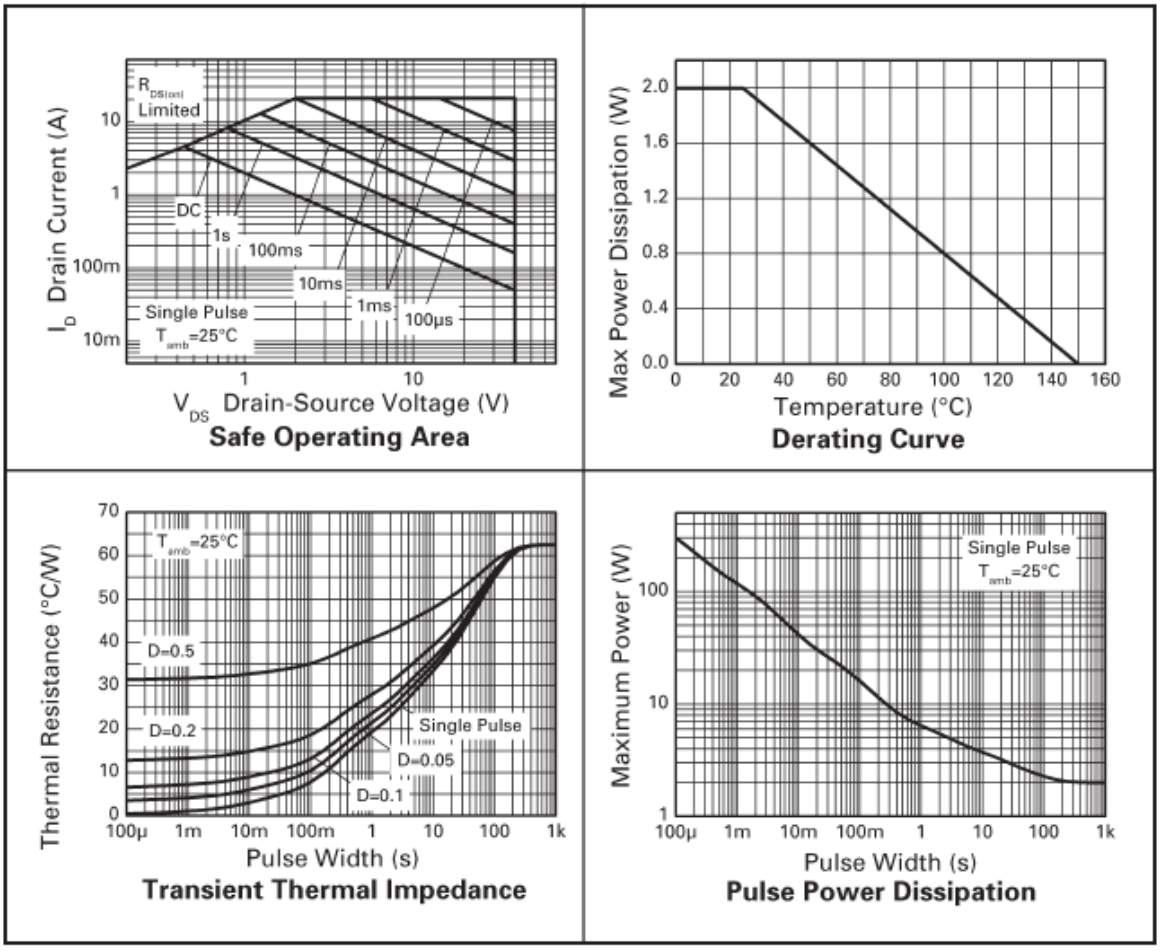
Characteristic		Symbol	Value	Unit
Power Dissipation	(Note 5)	P_D	2.0	W
Linear Derating Factor			16	mW/°C
	(Note 6)		3.9	W
			31	mW/°C
Thermal Resistance, Junction to Ambient	(Note 5)	$R_{\theta JA}$	62.5	°C/W
	(Note 6)		32.2	
Operating and Storage Temperature Range		T_J, T_{STG}	-55 to +150	°C

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

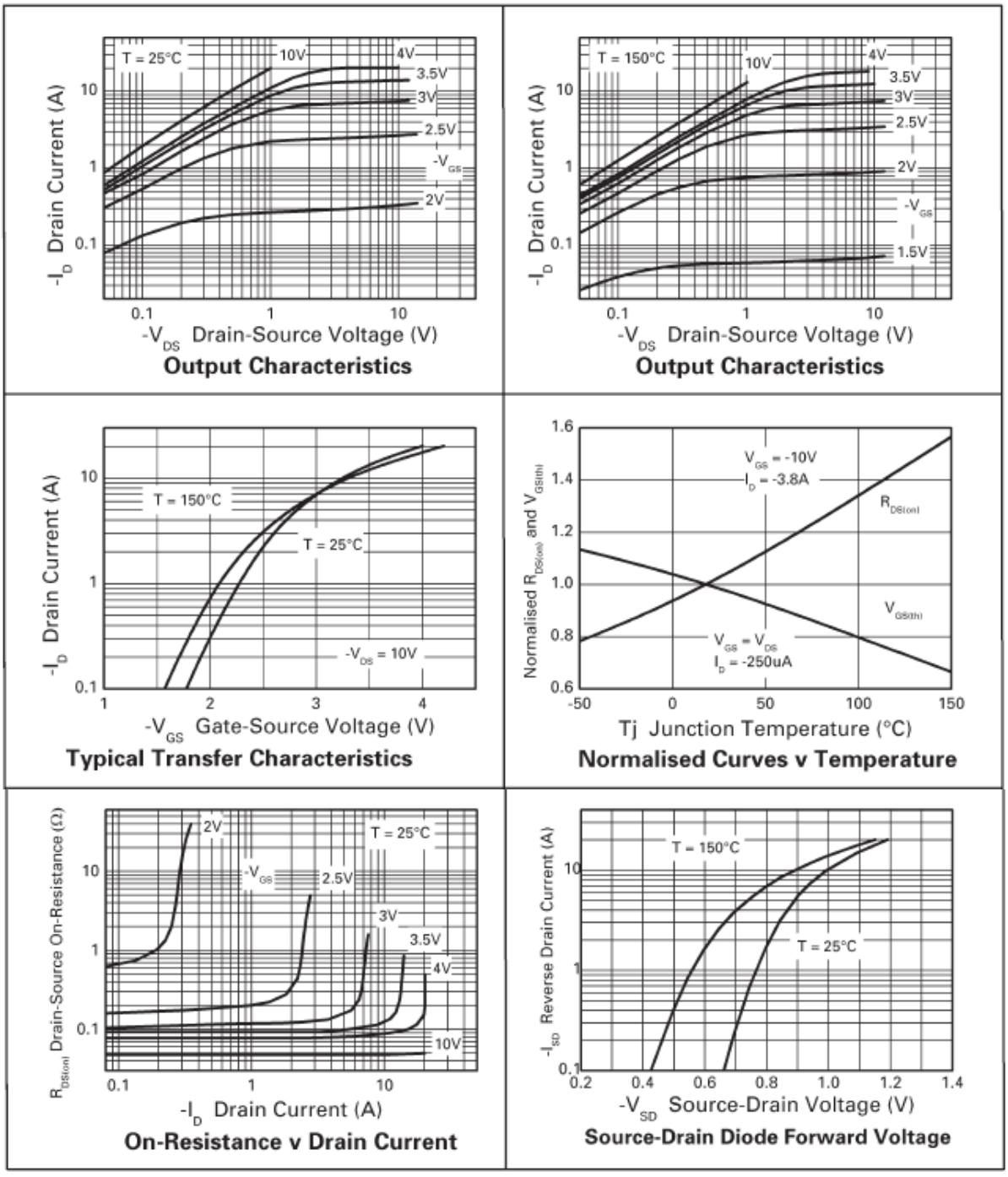
Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
OFF CHARACTERISTICS						
Drain-Source Breakdown Voltage	BV_{DSS}	-40	—	—	V	I_D = -250μA, V_{GS}= 0V
Zero Gate Voltage Drain Current	I_{DSS}	—	—	-1	μA	V_{DS}= -40V, V_{GS}= 0V
Gate-Source Leakage	I_{GSS}	—	—	100	nA	V_{GS}= ±20V, V_{DS}= 0V
ON CHARACTERISTICS						
Gate Threshold Voltage	$V_{GS(th)}$	-1.0	—	—	V	I_D= -250μA, V_{DS}= V_{GS}
Static Drain-Source On-Resistance (Note 8)	$R_{DS(ON)}$	—	—	60	mΩ	V_{GS}= -10V, I_D= -3.8A
				100		V_{GS}= -4.5V, I_D= -2.9A
Forward Transconductance (Notes 8 & 10)	g_{fs}	—	8.85	—	S	V_{DS}= -15V, I_D= -3.8A
Diode Forward Voltage (Note 8)	V_{SD}	—	-0.85	-1.2	V	T_J = +25°C , I_S= -3.4A, V_{GS}= 0V
Reverse Recovery Time (Note 10)	t_{rr}	—	27.2	—	ns	T_J = +25°C , I_F= -3A, di/dt= 100A/μs
Reverse Recovery Charge (Note 10)	Q_{rr}	—	25.4	—	nC	
DYNAMIC CHARACTERISTICS (Note 10)						
Input Capacitance	C_{iss}	—	1007	—	pF	V_{DS}= -20V, V_{GS}= 0V f = 1MHz
Output Capacitance	C_{oss}	—	130	—	pF	
Reverse Transfer Capacitance	C_{rss}	—	85	—	pF	
Total Gate Charge (Note 9)	Q_g	—	13.6	—	nC	V_{GS}= -5V; V_{DS}= -20V, I_D= -3.8A
Total Gate Charge (Note 9)	Q_g	—	26.1	—	nC	V_{GS}= -10V; V_{DS}= -20V, I_D= -3.8A
Gate-Source Charge (Note 9)	Q_{gs}	—	2.8	—	nC	V_{GS}= -10V; V_{DS}= -20V, I_D= -3.8A
Gate-Drain Charge (Note 9)	Q_{gd}	—	4.8	—	nC	V_{GS}= -10V; V_{DS}= -20V, I_D= -3.8A
Turn-On Delay Time (Note 9)	$t_{D(on)}$	—	3.0	—	ns	V_{DD}= -20V, V_{GS}= -10V, I_D= -1A, $R_G \cong$ 6.0Ω
Turn-On Rise Time (Note 9)	t_r	—	3.5	—	ns	
Turn-Off Delay Time (Note 9)	$t_{D(off)}$	—	13.4	—	ns	
Turn-Off Fall Time (Note 9)	t_f	—	7.2	—	ns	

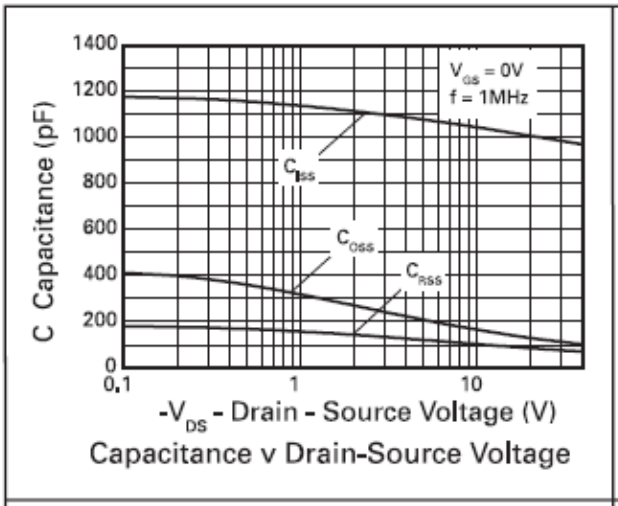
Notes:
5. For a device surface mounted on 25mm x 25mm FR4 PCB with high coverage of single sided 1oz copper, in still air conditions.
6. For a device surface mounted on FR4 PCB measured at t ≤ 10 seconds.
7. For a device surface mounted on 25mm x 25mm FR4 PCB, D= 0.05 pulse width limited by maximum junction temperature.
8. Measured under pulsed conditions. Width ≤ 300μs. Duty cycle ≤ 2%.
9. Switching characteristics are independent of operating junction temperature.
10. For design aid only, not subject to production testing.

CHARACTERISTICS

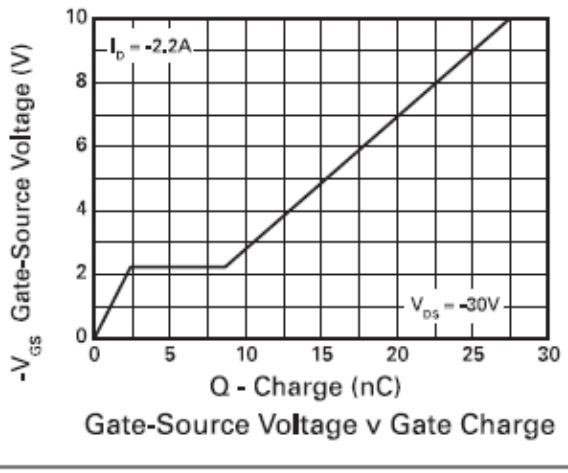


TYPICAL CHARACTERISTICS

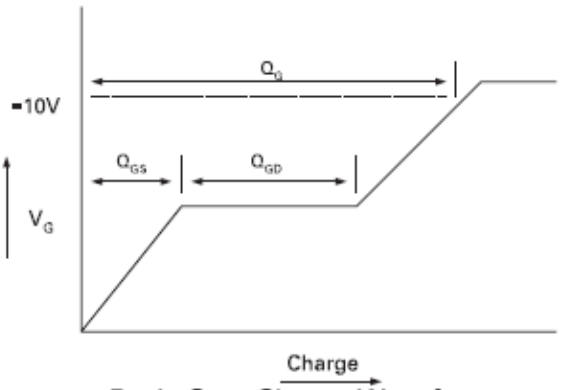




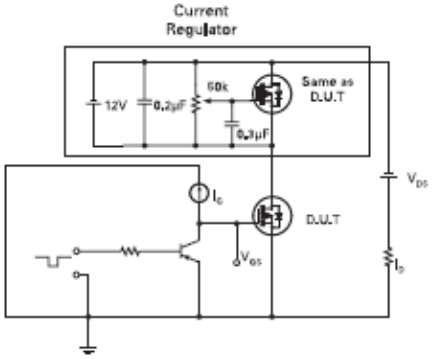
Capacitance v Drain-Source Voltage



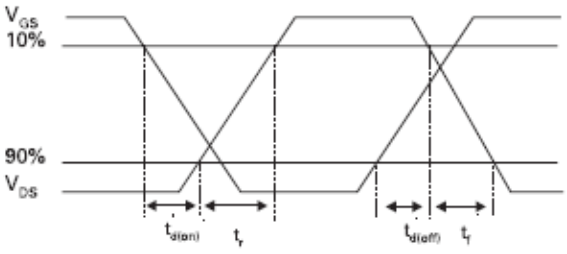
Gate-Source Voltage v Gate Charge



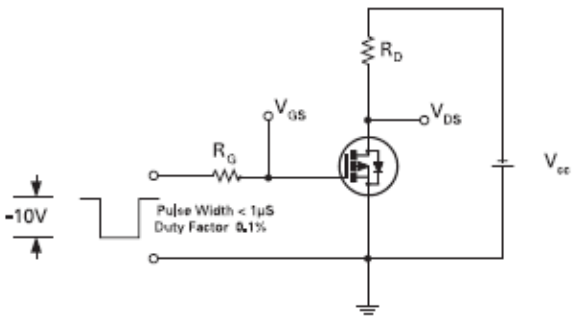
Basic Gate Charge Waveform



Gate Charge Test Circuit



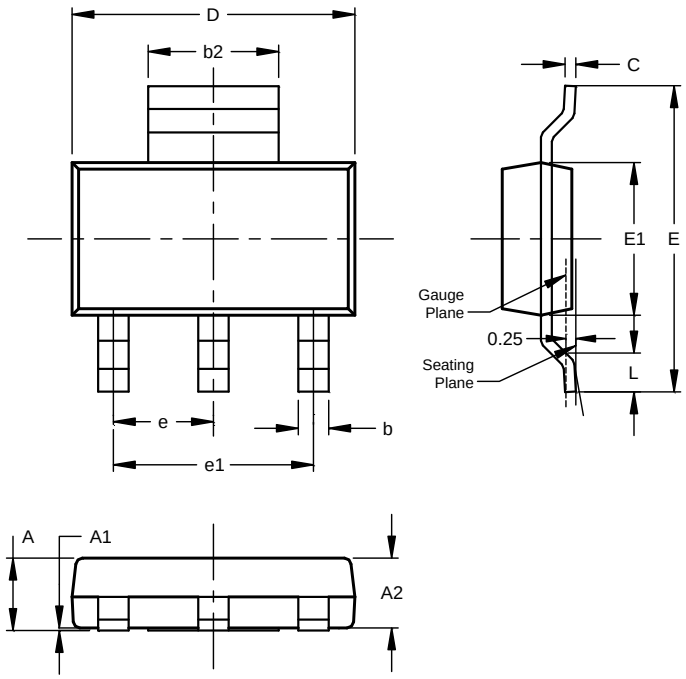
Switching Time Waveforms



Switching Time Test Circuit

Package Outline Dimensions

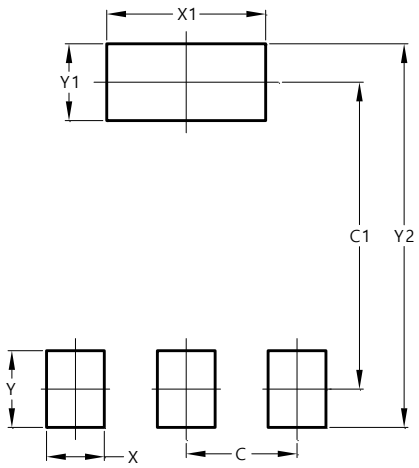
SOT223 (Type DN)



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

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