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}	$R_{DS(on)}$	I_D T_A = +25°C
60V	0.04Ω @ V_{GS} = 10V	7.5A
	0.06Ω @ V_{GS} = 4.5V	6.2A

Features and Benefits

- 100% Unclamped Inductive Switch (UIS) Test in Production
- High Voltage
- Low On-Resistance
- Fast Switching Speed
- Low Gate Drive
- Low Threshold

Description

This new generation trench MOSFET features a unique structure combining the benefits of low on-resistance and fast switching, making it ideal for high-efficiency power management applications.

Applications

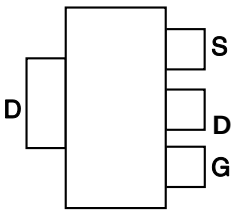
- DC-DC converters
- Power management functions
- Disconnect switches
- Motor control

Mechanical Data

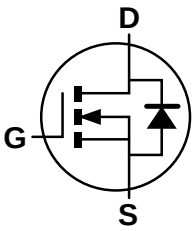
- Package: SOT223 (Type DN)
- Package Material: Molded Plastic, “Green” Molding Compound; UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Finish – Matte Tin Annealed over Copper Leadframe. Solderable per MIL-STD-202, Method 208 e3
- Weight: 0.112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

SOT223 (Type DN)

Top View



Pin Out - Top View



Equivalent Circuit

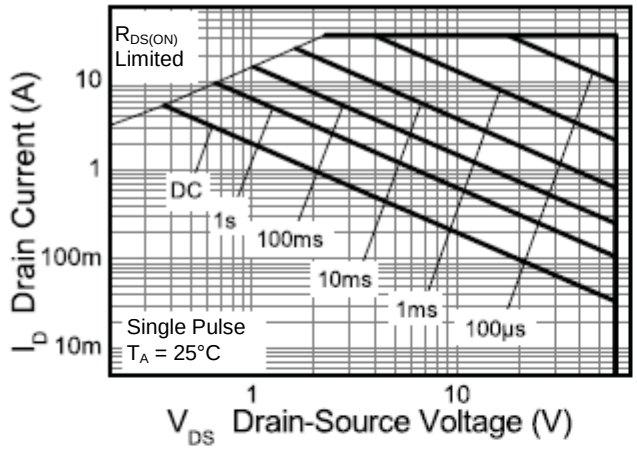
Maximum Ratings (@T_A = +25°C, unless otherwise specified.)

Characteristic	Symbol	Value	Unit
Drain-Source Voltage	V_{DSS}	60	V
Gate-Source Voltage	V_{GSS}	±20	V
Continuous Drain Current @V_{GS} = 10V; T_A = +25°C (Note 6) @V_{GS} = 10V; T_A = +70°C (Note 6) @V_{GS} = 10V; T_A = +25°C (Note 5)	I_D	7.5 6 5.4	A
Pulsed Drain Current (Note 7)	I_{DM}	33	A
Continuous Source Current (Body Diode) (Note 6)	I_S	3.5	A
Pulsed Source Current (Body Diode) (Note 7)	I_{SM}	33	A
Avalanche Current, L = 0.1mH	I_{AS}	1.17	A
Avalanche Energy, L = 0.1mH	E_{AS}	0.07	mJ

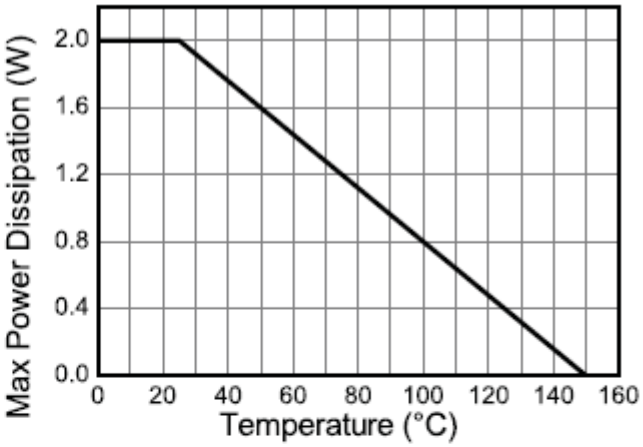
Thermal Characteristics (@T_A = +25°C, unless otherwise specified.)

Characteristic	Symbol	Value	Unit
Power Dissipation at T_A = +25°C (Note 5) Linear Derating Factor	P_D	2.0 16	W mW/°C
Power Dissipation at T_A = +25°C (Note 6) Linear Derating Factor	P_D	3.9 31	W mW/°C
Thermal Resistance, Junction to Ambient (Note 5)	$R_{\theta JA}$	62.5	°C/W
Thermal Resistance, Junction to Ambient (Note 6)	$R_{\theta JA}$	32.2	°C/W
Operating and Storage Temperature Range	T_J, T_{STG}	-55 to +150	°C

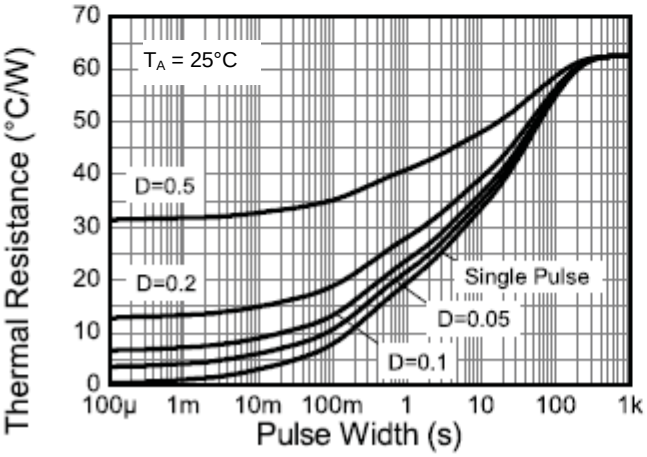
Notes: 5. For a device surface mounted on 25mm × 25mm FR-4 PCB with high coverage of single sided 1oz copper, in still air conditions.
6. For a device surface mounted on FR-4 PCB measured at t ≦10s.
7. Repetitive rating 25mm × 25mm FR-4 PCB, D = 0.02 pulse width = 300μs - pulse width limited by maximum junction temperature.



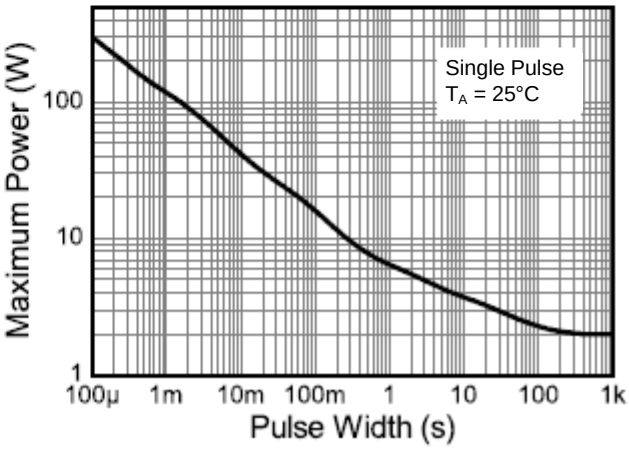
Safe Operating Area



Derating Curve



Transient Thermal Impedance

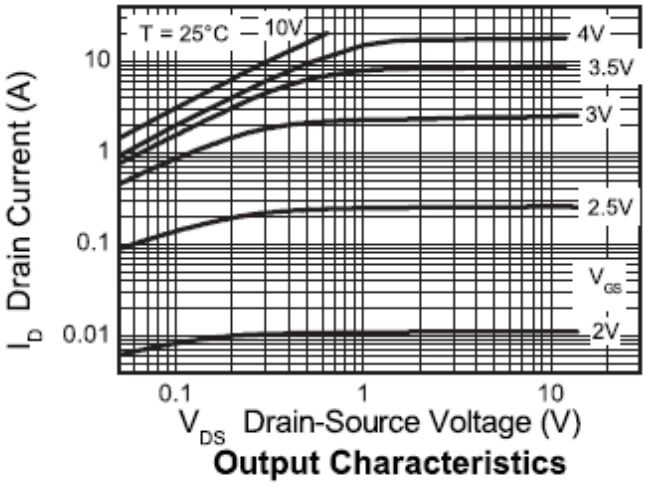


Pulse Power Dissipation

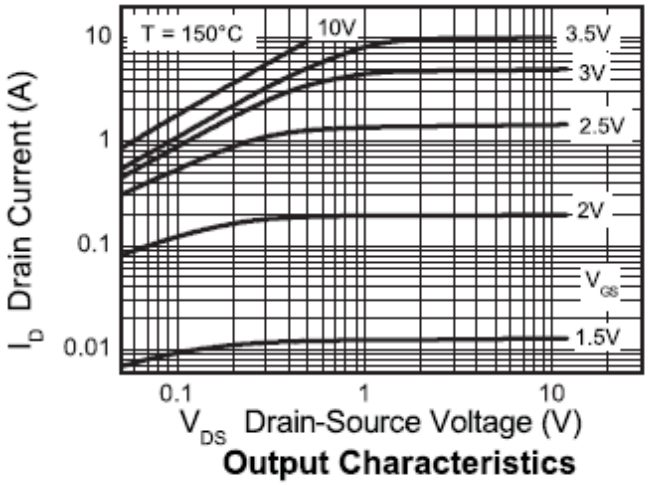
Electrical Characteristics (@T_A = +25°C, unless otherwise specified.)

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
OFF CHARACTERISTICS						
Drain-Source Breakdown Voltage	BV_{DSS}	60	—	—	V	V_{GS} = 0V, I_D = 250μA
Zero Gate Voltage Drain Current	I_{DSS}	—	—	1	μA	V_{DS} = 60V, 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	—	3	V	V_{DS} = V_{GS}, I_D = 250μA
Static Drain-Source On-Resistance (Note 8)	$R_{DS(ON)}$	—	0.02	0.04	Ω	V_{GS} = 10V, I_D = 8.2A
		—	0.03	0.06	Ω	V_{GS} = 4.5V, I_D = 7.4A
Diode Forward Voltage (Note 8)	V_{SD}	—	0.85	0.95	V	I_S = 6.6A, V_{GS} = 0V, T_J = +25°C
DYNAMIC CHARACTERISTICS						
Input Capacitance (Note 10)	C_{iss}	—	1407	—	pF	V_{DS} = 40V, V_{GS} = 0V, f = 1.0MHz
Output Capacitance (Note 10)	C_{oss}	—	121	—	pF	
Reverse Transfer Capacitance (Note 10)	C_{rss}	—	59	—	pF	
Total Gate Charge (Notes 9 &10) V_{GS} = 5V	Q_g	—	12.4	—	nC	V_{DS} = 15V, I_D = 3.5A
Total Gate Charge (Notes 9 &10) V_{GS} = 10V	Q_g	—	24.2	—	nC	
Gate-Source Charge (Notes 9 &10)	Q_{gs}	—	5.2	—	nC	
Gate-Drain Charge (Notes 9 &10)	Q_{gd}	—	3.5	—	nC	
Turn-On Delay Time (Notes 9 & 10)	$t_{D(ON)}$	—	4.9	—	ns	V_{DD} = 15V, I_D = 3.5A, V_{GS} = 5V
Turn-On Rise Time (Note 9 & 10)	t_R	—	5.0	—	ns	
Turn-Off Delay Time (Notes 9 & 10)	$t_{D(OFF)}$	—	25.3	—	ns	
Turn-Off Fall Time (Notes 9 & 10)	t_F	—	4.6	—	ns	
Reverse Recovery Time (Note 10)	t_{RR}	—	26.3	—	ns	I_F = 3.5A, di/dt = 100A/μs, T_J = +25°C
Reverse Recovery Charge (Note 10)	Q_{RR}	—	26.6	—	nC	

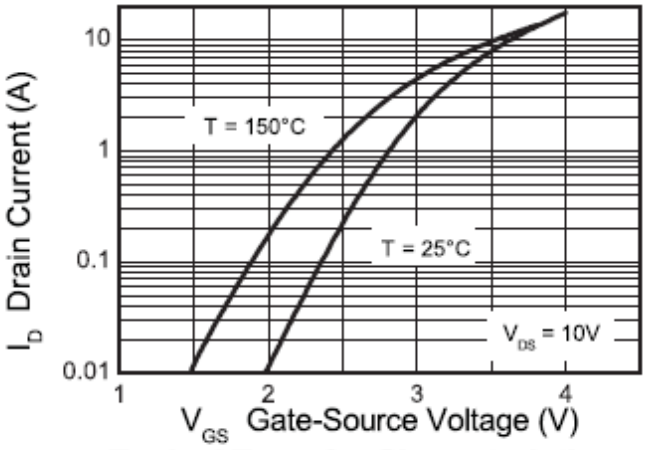
Notes: 8. Measured under pulsed conditions. Pulse width ≤ 300μs; duty cycle ≤ 2%.
9. Switching characteristics are independent of operating junction temperature.
10. For design aid only, not subject to production testing.



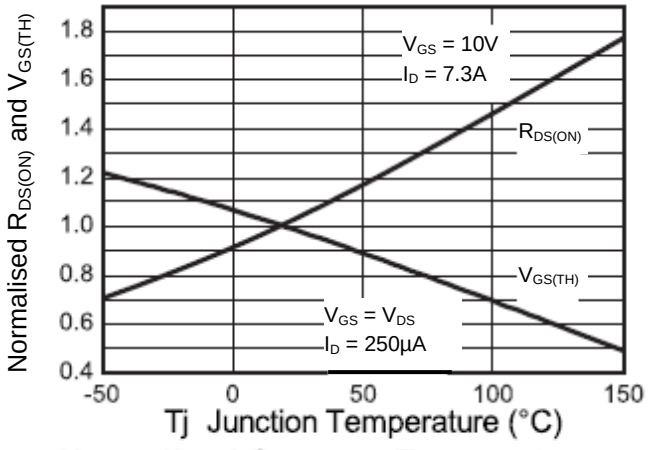
Output Characteristics



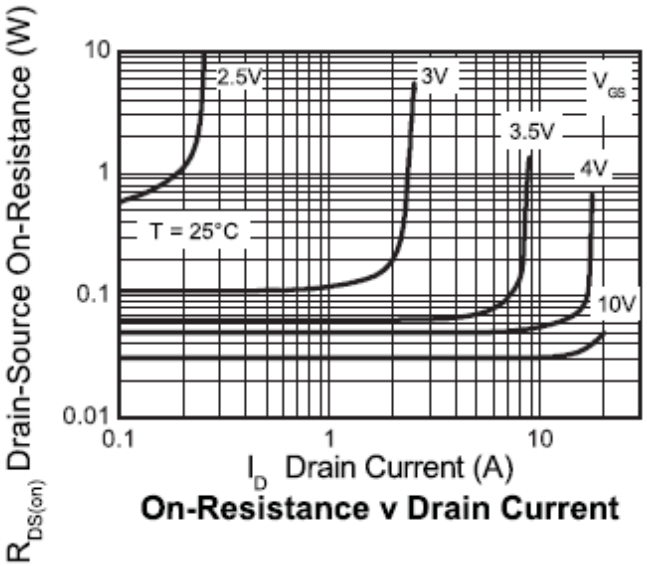
Output Characteristics



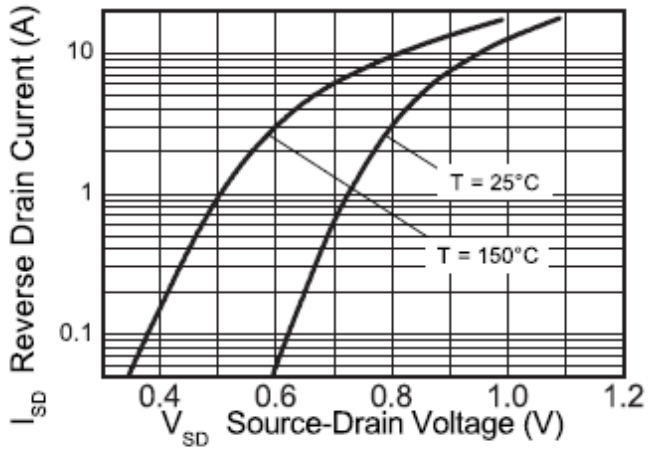
Typical Transfer Characteristics



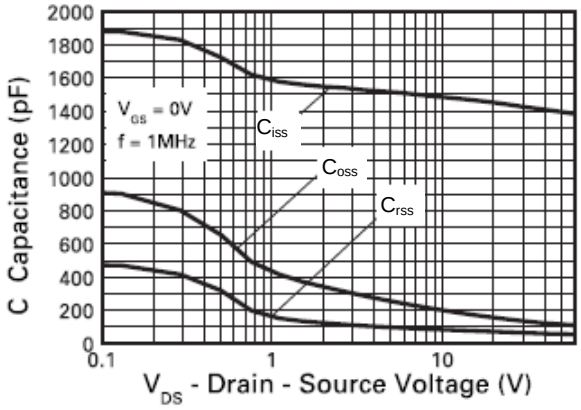
Normalised Curves v Temperature



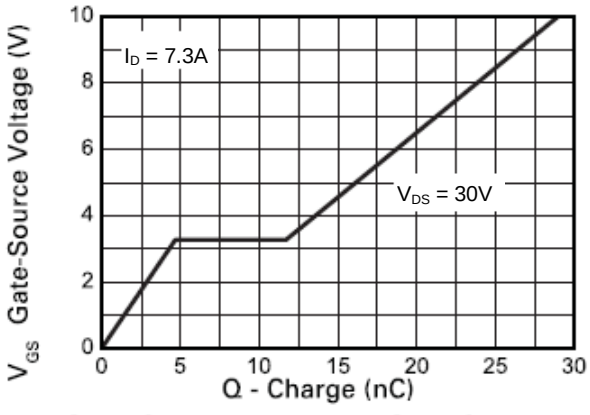
On-Resistance v Drain Current



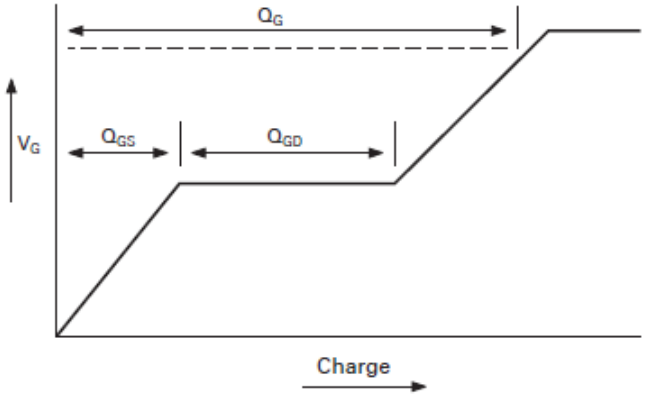
Source-Drain Diode Forward Voltage



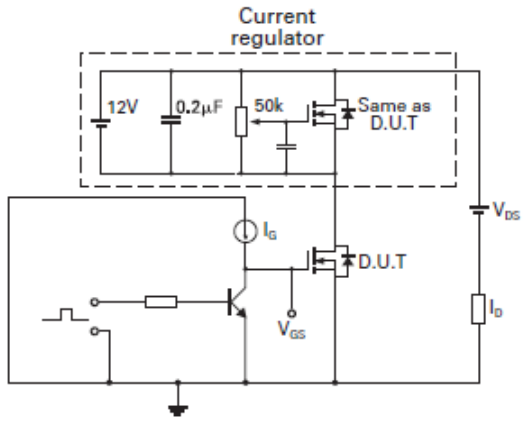
Capacitance v Drain-Source Voltage



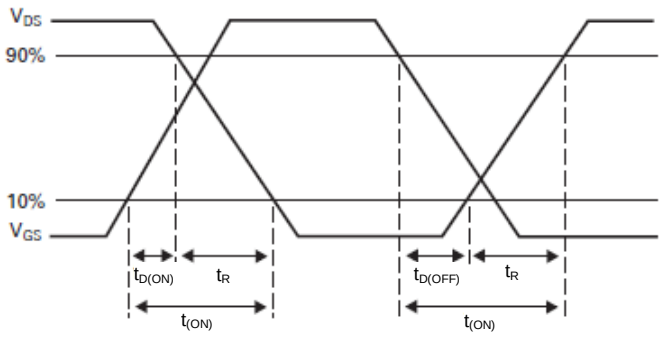
Gate-Source Voltage v Gate Charge



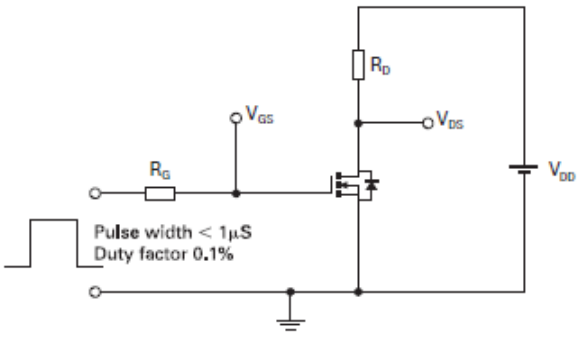
Basic gate charge waveform



Gate charge test circuit



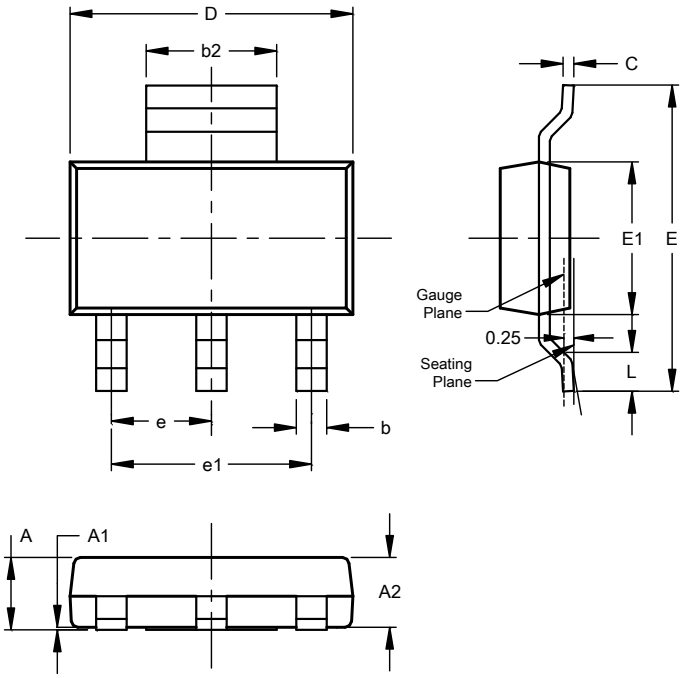
Switching time waveforms



Switching time test circuit

Package Outline Dimensions

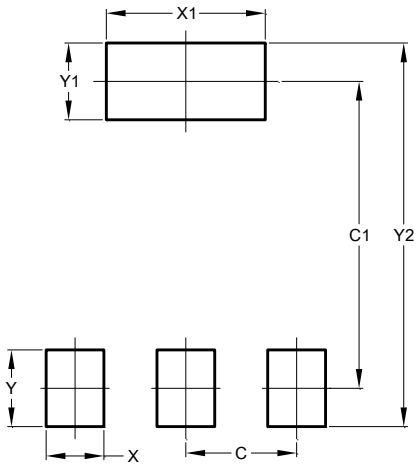
SOT223 (Type DN)



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