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 5)
60V	120mΩ @ V_{GS} = 10V	3.6A
	180mΩ @ V_{GS} = 4.5V	2.9A

Features and Benefits

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

Description and Applications

This 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.

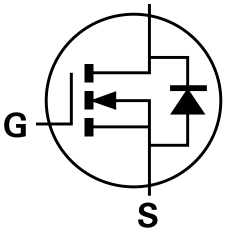
- DC-DC Converters
- Power Management functions
- Motor control
- Disconnect switches

Mechanical Data

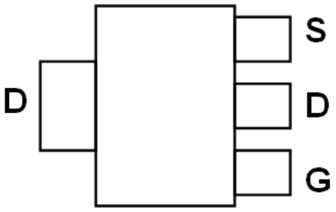
- Case: SOT89
- Case Material: Molded Plastic, “Green” Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Matte Tin Finish
- Weight: 0.052 grams (approximate)

SOT89

Top View



Device symbol



Top View
Pin-Out

Maximum Ratings @T_A = 25°C unless otherwise specified

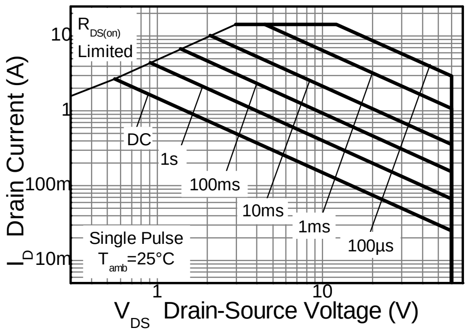
Characteristic			Symbol	Value	Unit
Drain-Source Voltage			V_{DSS}	60	V
Gate-Source Voltage			V_{GSS}	±20	V
Continuous Drain Current	Steady State	@ V_{GS} = 10V ; T_A = 25°C (Note 5)	I_D	3.6	A
		@ V_{GS} = 10V ; T_A = 75°C (Note 5)		2.9	
		@ V_{GS} = 10V ; T_A = 25°C (Note 4)		2.7	
Pulsed Drain Current (Note 6)			I_{DM}	14.5	A
Continuous Source Current (Body Diode) (Note 5)			I_S	3.7	A
Pulsed Source Current (Body Diode) (Note 6)			I_{SM}	14.5	A

Thermal Characteristics @T_A = 25°C unless otherwise specified

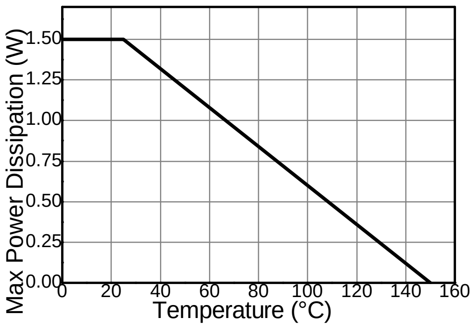
Characteristic	Symbol	Value	Unit
Power Dissipation (Note 4) Linear Derating Factor	P_D	1.5 12	W mW/°C
Power Dissipation (Note 5) Linear Derating Factor	P_D	2.6 21	W mW/°C
Thermal Resistance, Junction to Ambient (Note 4)	$R_{\theta JA}$	83.3	°C/W
Thermal Resistance, Junction to Ambient (Note 5)	$R_{\theta JA}$	47.4	°C/W
Operating and Storage Temperature Range	T_J, T_{STG}	-55 to +150	°C

Notes:
4. For a device surface mounted on 25mm x 25mm FR4 PCB with high coverage of single sided 1oz copper, in still air conditions.
5. For a device surface mounted on FR4 PCB measured at t ≤ 10 sec.
6. Repetitive rating - 25mm x 25mm FR4 PCB, D = 0.02, pulse width 300µs – pulse width limited by maximum junction temperature.

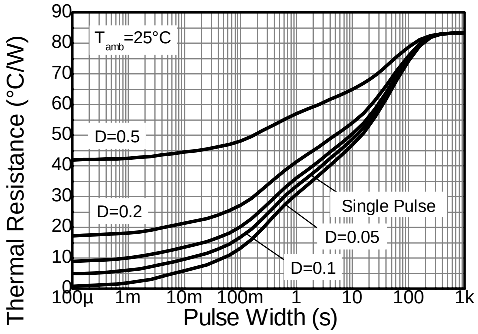
Thermal Characteristics



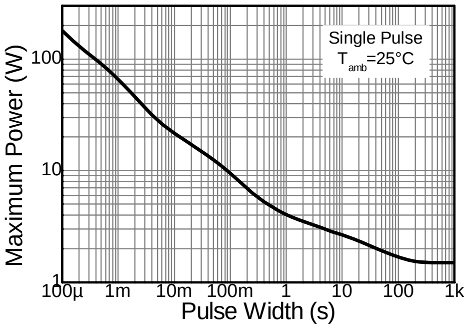
Safe Operating Area



Derating Curve



Transient Thermal Impedance



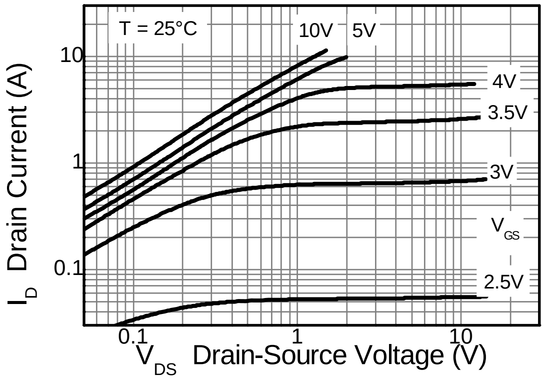
Pulse Power Dissipation

Electrical Characteristics @T_A = 25°C unless otherwise specified

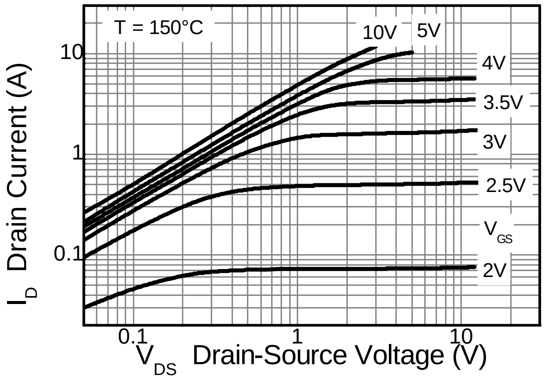
Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
OFF CHARACTERISTICS						
Drain-Source Breakdown Voltage	BV_{DSS}	60	-	-	V	V_{GS} = 0V, I_D = 250μA
Zero Gate Voltage Drain Current T_J = 25°C	I_{DSS}	-	-	1.0	μA	V_{DS} = 60V, V_{GS} = 0V
Gate-Source Leakage	I_{GSS}	-	-	100	nA	V_{GS} = ±20V, V_{DS} = 0V
ON CHARACTERISTICS						
Gate Threshold Voltage	$V_{GS(th)}$	1	-	2.2	V	V_{DS} = V_{GS}, I_D = 250μA
Static Drain-Source On-Resistance (Note 7)	$R_{DS\ (ON)}$	-	-	120	mΩ	V_{GS} = 10V, I_D = 2.5A
			-	180		V_{GS} = 4.5V, I_D = 2A
Forward Transconductance (Note 7 & 9)	g_{FS}	-	4.9	-	S	V_{DS} = 15V, I_D = 2.5A
Diodes Forward Voltage (Note 7)	V_{SD}	-	0.85	0.95	V	T_J = 25°C, I_S = 2.8A, V_{GS} = 10V
DYNAMIC CHARACTERISTICS						
Input Capacitance (Note 8 & 9)	C_{iss}	-	330	-	pF	V_{DS} = 40V, V_{GS} = 0V, f = 1.0MHz
Output Capacitance (Note 8 & 9)	C_{oss}	-	35.2	-	pF	
Reverse Transfer Capacitance (Note 8 & 9)	C_{rss}	-	17.1	-	pF	
Gate Charge (Note 8 & 9)	Q_g	-	3	-	nC	V_{GS} = 5V, V_{DS} = 15V, I_D = 2.5A
Total Gate Charge (Note 8 & 9)	Q_g	-	5.7	-	nC	V_{GS} = 10V, V_{DS} = 15V, I_D = 2.5A
Gate-Source Charge (Note 8 & 9)	Q_{gs}	-	1.25	-	nC	
Gate-Drain Charge (Note 8 & 9)	Q_{gd}	-	0.86	-	nC	
Reverse Recovery Time (Note 9)	t_{rr}		21.5		ns	T_J = 25°C, I_S = 2.5A, di/dt = 100A/μs
Reverse Recovery Charge (Note 9)	Q_{rr}		20.5		nC	
Turn-On Delay Time (Note 8 & 9)	$t_{D(on)}$	-	1.95	-	ns	V_{GS} = 10V, V_{DD} = 30V, R_G = 6Ω , I_D = 2.5A
Turn-On Rise Time (Note 8 & 9)	t_r	-	3.5	-	ns	
Turn-Off Delay Time (Note 8 & 9)	$t_{D(off)}$	-	8.2	-	ns	
Turn-Off Fall Time (Note 8 & 9)	t_f	-	4.6	-	ns	

Notes: 7. Measured under pulsed conditions. Pulse width ≤ 300μs; duty cycle ≤2%.
8. Switching characteristics are independent of operating junction temperature.
9. For design aid only, not subject to production testing.

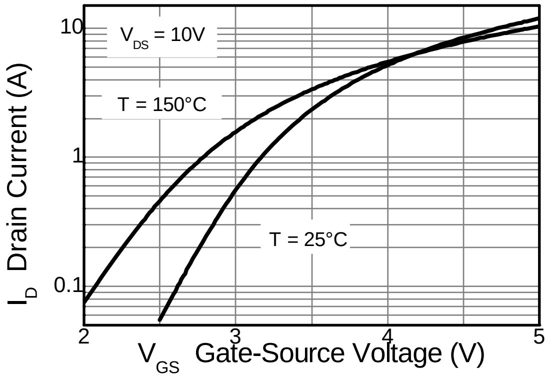
Typical Characteristics



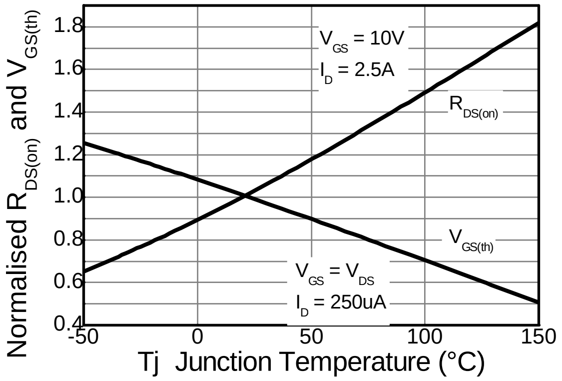
Output Characteristics



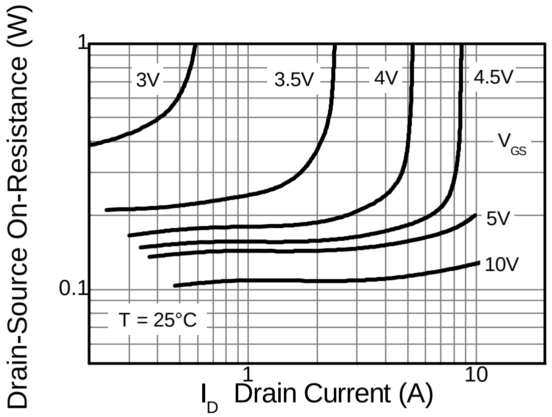
Output Characteristics



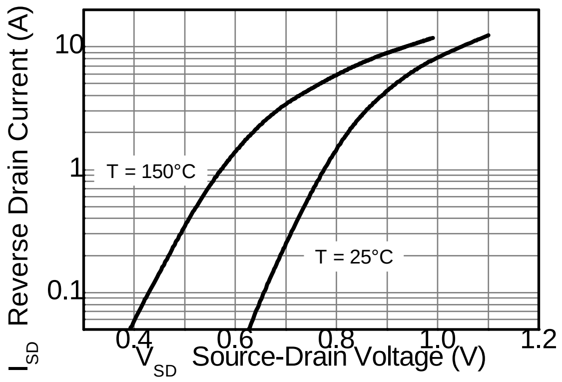
Typical Transfer Characteristics



Normalised Curves v Temperature

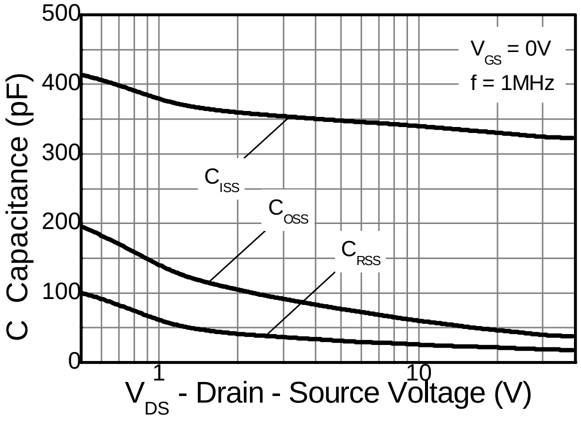


On-Resistance v Drain Current

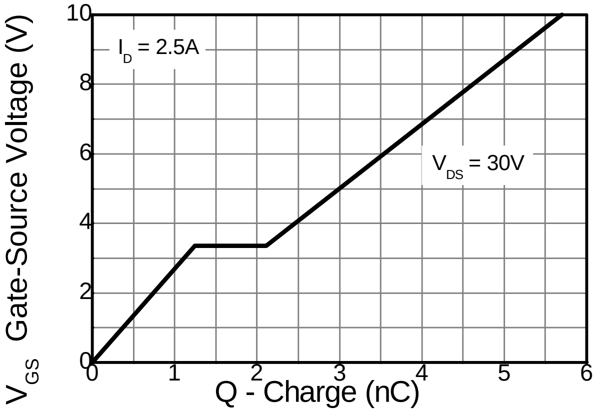


Source-Drain Diode Forward Voltage

Typical Characteristics - Continued

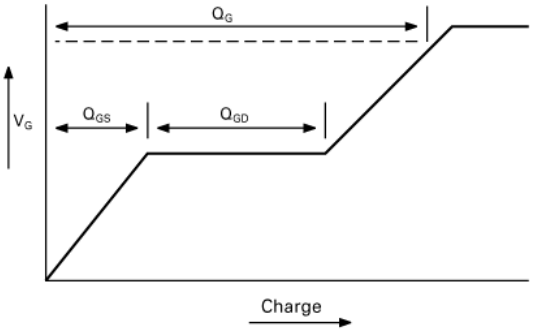


Capacitance v Drain-Source Voltage

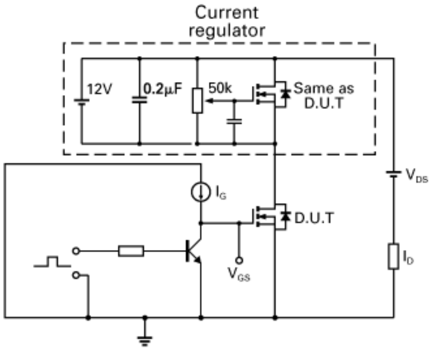


Gate-Source Voltage v Gate Charge

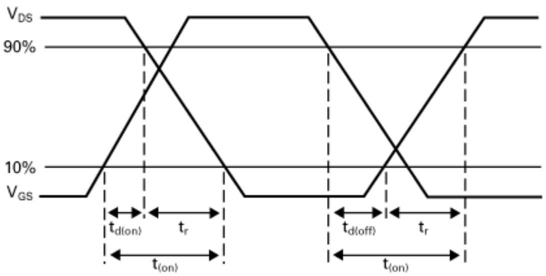
Test Circuits



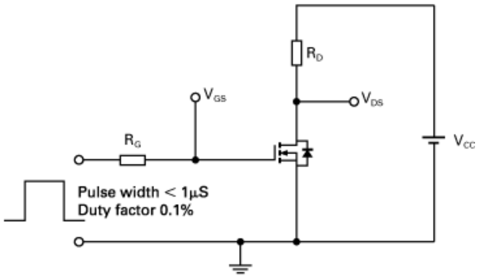
Basic gate charge waveform



Gate charge test circuit

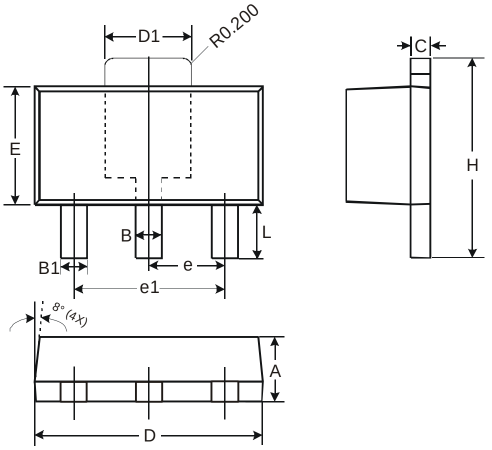


Switching time waveforms



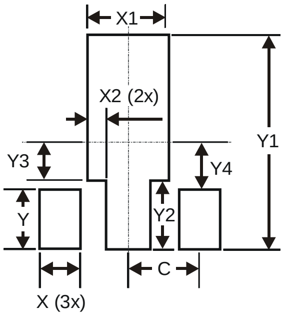
Switching time test circuit

Package Outline Dimensions



SOT89		
Dim	**Min**	Max
A	1.40	1.60
B	0.44	0.62
B1	0.35	0.54
C	0.35	0.43
D	4.40	4.60
D1	1.52	1.83
E	2.29	2.60
e	1.50 Typ	
e1	3.00 Typ	
H	3.94	4.25
L	0.89	1.20
All Dimensions in mm		

Suggested Pad Layout



Dimensions	Value (in mm)
X	0.900
X1	1.733
X2	0.416
Y	1.300
Y1	4.600
Y2	1.475
Y3	0.950
Y4	1.125
C	1.500