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)
30V	120mΩ @ V_{GS} = 10V	3.3A
	180mΩ @ V_{GS} = 4.5V	2.7A

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

Features and Benefits

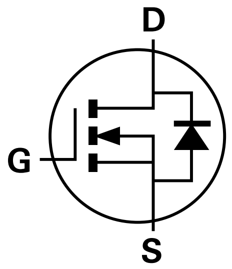
- Low On-Resistance
- Low Threshold
- Fast Switching Speed
- Low Gate Drive

Mechanical Data

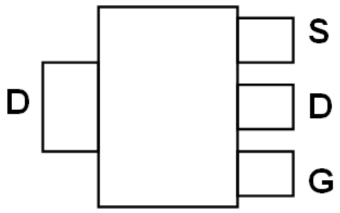
- Case: SOT89
- Case Material: Molded Plastic, “Green” Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Matte Tin Finish
- Weight: 0.052 grams (approximate)

SOT89

Top View



Device symbol



Pin-out Top

Maximum Ratings @T_A = 25°C unless otherwise specified

Characteristic			Symbol	Value	Unit
Drain-Source Voltage			V_{DSS}	30	V
Gate-Source Voltage			V_{GSS}	±20	V
Continuous Drain Current	Steady State	@ V_{GS} = 10V ; T_A = 25°C (Note 5)	I_D	3.3	A
		@ V_{GS} = 10V ; T_A = 75°C (Note 5)		2.7	
		@ V_{GS} = 10V ; T_A = 75°C (Note 4)		2.2	
Pulsed Drain Current (Note 6)			I_{DM}	20	A
Continuous Source Current (Body Diode) (Note 5)			I_S	3.3	A
Pulsed Source Current (Body Diode) (Note 6)			I_{SM}	20	A

Thermal Characteristics @T_A = 25°C unless otherwise specified

Characteristic		Symbol	Value	Unit
Power Dissipation	(Note 4)	P_D	0.97	W
	(Note 5)		2.12	W
Thermal Resistance, Junction to Ambient	(Note 4)	$R_{\theta JA}$	129	°C/W
	(Note 5)		59	°C/W
Operating and Storage Temperature Range		T_J, T_{STG}	-55 to +150	°C

Notes: 4. Device mounted on FR-4 substrate PC board, 2oz copper, with minimum recommended pad layout
5. Device mounted on 25mm X 25mm FR-4 substrate PC board with 2oz copper
6. Single pulse rating - 25mm x 25mm FR4 PCB, D=0.02, pulse width 300us – pulse width limited by maximum junction temperature.

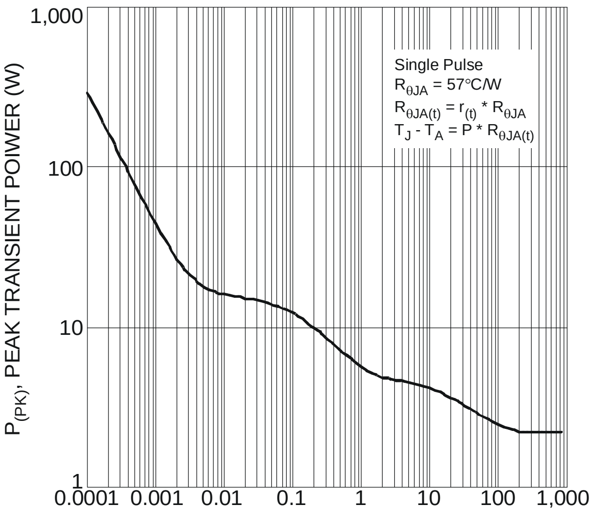


Fig. 1 Single Pulse Maximum Power Dissipation

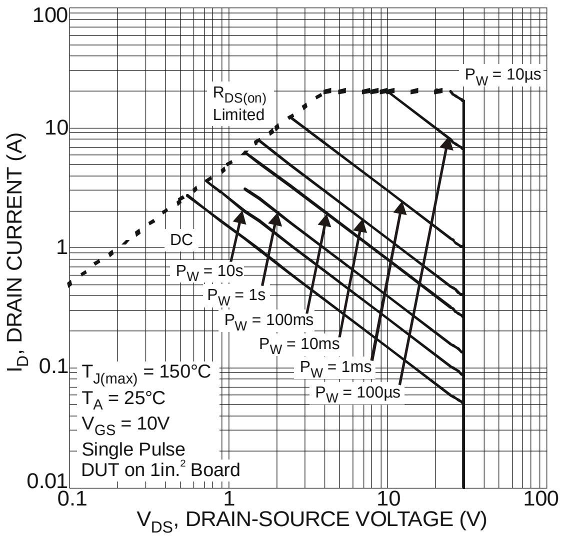


Fig. 2 SOA, Safe Operation Area

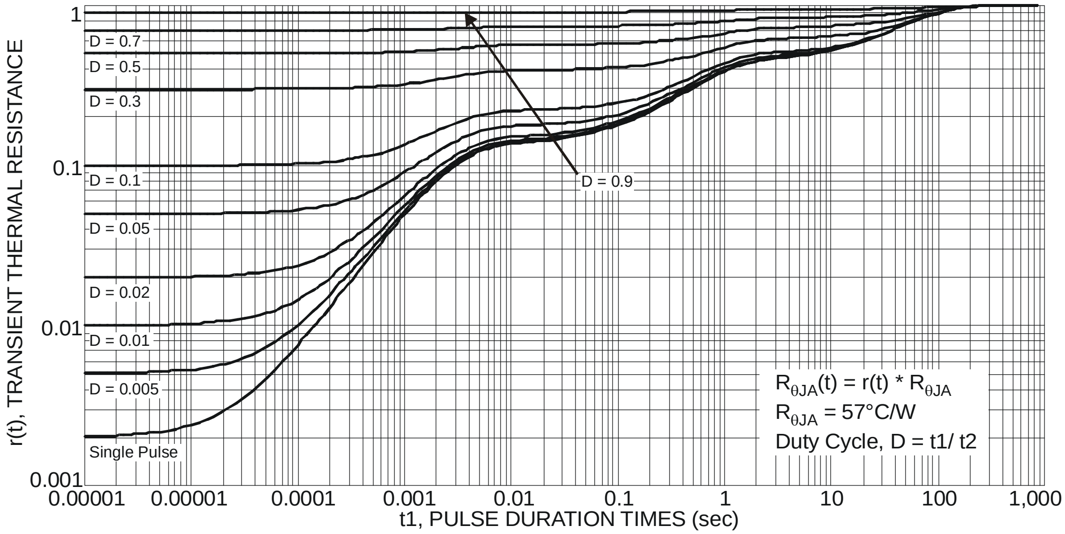


Fig. 3 Transient Thermal Resistance

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}	30	-	-	V	V_{GS} = 0V, I_D = 250μA
Zero Gate Voltage Drain Current T_J = 25°C	I_{DSS}	-	-	0.5	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	-	-	V	V_{DS} = V_{GS}, I_D = 250μA
Static Drain-Source On-Resistance (Note 7)	$R_{DS\ (ON)}$	-	0.106	120	mΩ	V_{GS} = 10V, I_D = 2.5A
			-	180		V_{GS} = 4.5V, I_D = 2A
Forward Transconductance (Note 7 & 9)	g_{FS}	-	3.5	-	S	V_{DS} = 4.5V, I_D = 2.5A
Diodes Forward Voltage (Note 7)	V_{SD}	-	0.85	0.95	V	T_J = 25°C, I_S = 1.7A, V_{GS} = 0V
DYNAMIC CHARACTERISTICS						
Input Capacitance (Note 8 & 9)	C_{iss}	-	186	-	pF	V_{DS} = 25V, V_{GS} = 0V, f = 1.0MHz
Output Capacitance (Note 8 & 9)	C_{oss}	-	48	-	pF	
Reverse Transfer Capacitance (Note 8 & 9)	C_{rss}	-	29	-	pF	
Gate Charge (Note 8 & 9)	Q_g	-	2.6	-	nC	V_{GS} = 4.5V, V_{DS} = 15V, I_D = 2.5A
Total Gate Charge (Note 8 & 9)	Q_g	-	5.0	-	nC	V_{GS} = 10V, V_{DS} = 15V, I_D = 2.5A
Gate-Source Charge (Note 8 & 9)	Q_{gs}	-	0.8	-	nC	
Gate-Drain Charge (Note 8 & 9)	Q_{gd}	-	1.2	-	nC	
Reverse Recovery Time (Note 9)	t_{rr}		17.7		ns	T_J = 25°C, I_S = 2.5A, di/dt = 100A/μs
Reverse Recovery Charge (Note 9)	Q_{rr}		13.0		nC	
Turn-On Delay Time (Note 8 & 9)	$t_{D(on)}$	-	2.6	-	ns	V_{GS} = 10V, V_{DD} = 15V, R_G = 6Ω , I_D = 2.5A
Turn-On Rise Time (Note 8 & 9)	t_r	-	4.1	-	ns	
Turn-Off Delay Time (Note 8 & 9)	$t_{D(off)}$	-	13.5	-	ns	
Turn-Off Fall Time (Note 8 & 9)	t_f	-	3.6	-	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.

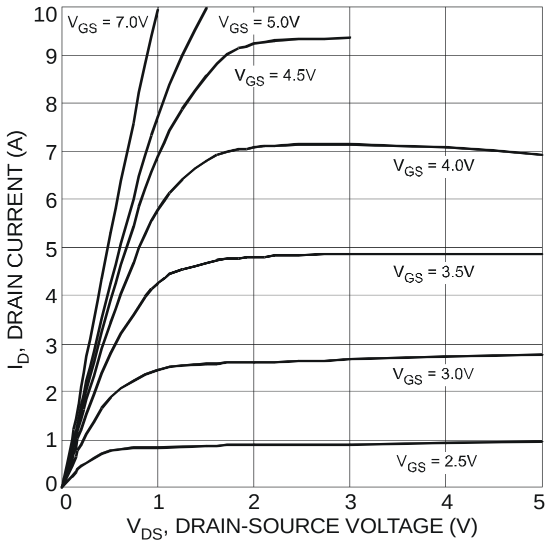


Fig. 4 Typical Output Characteristic, T_A = 25°C

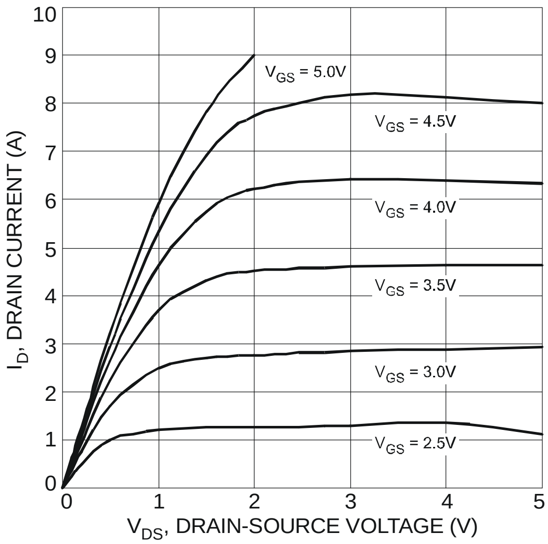


Fig. 5 Typical Output Characteristic, T_A = 150°C

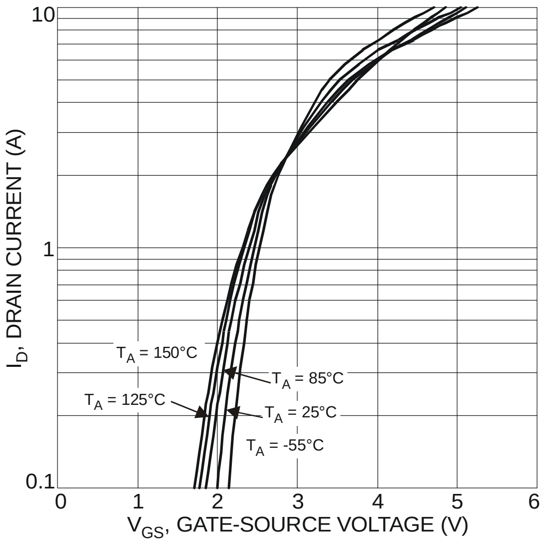


Fig. 6 Typical Transfer Characteristics

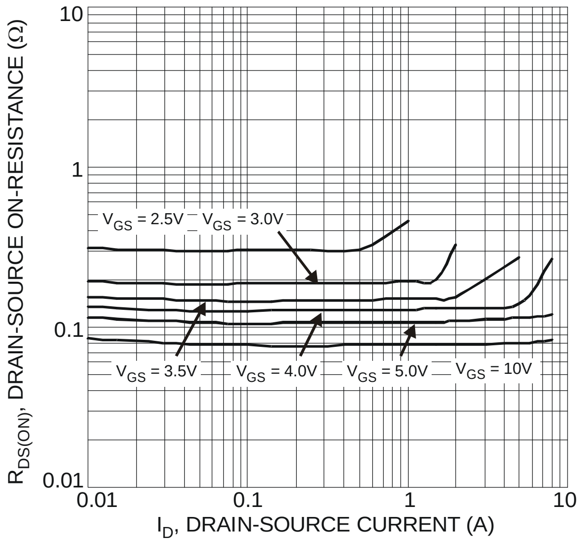


Fig. 7 Typical On-Resistance vs.
Drain Current and Gate Voltage

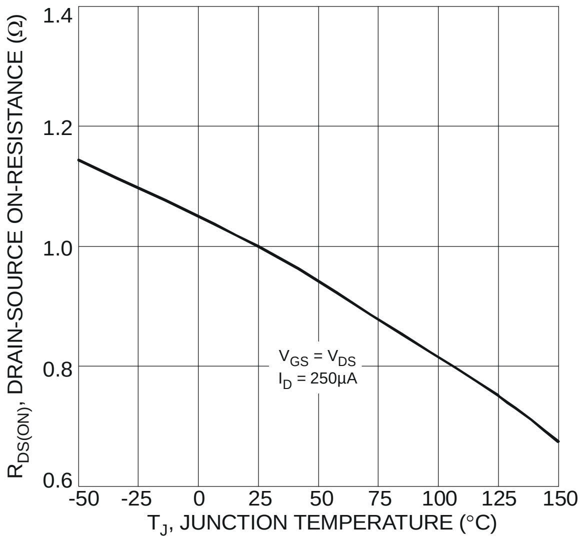


Fig. 8 On-Resistance Variation with Temperature

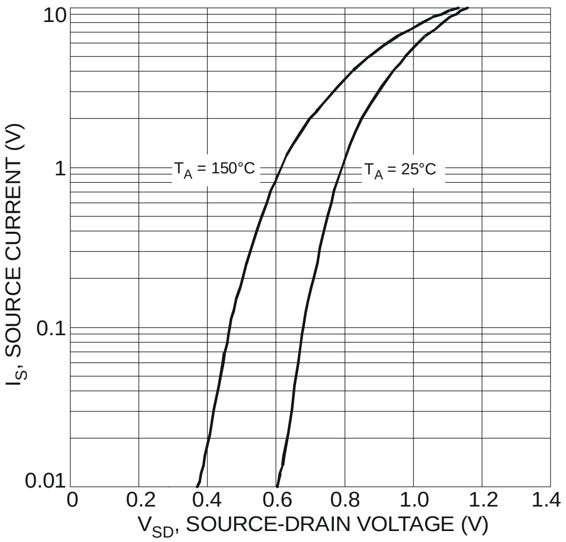


Fig. 9 Diode Forward Voltage vs. Current

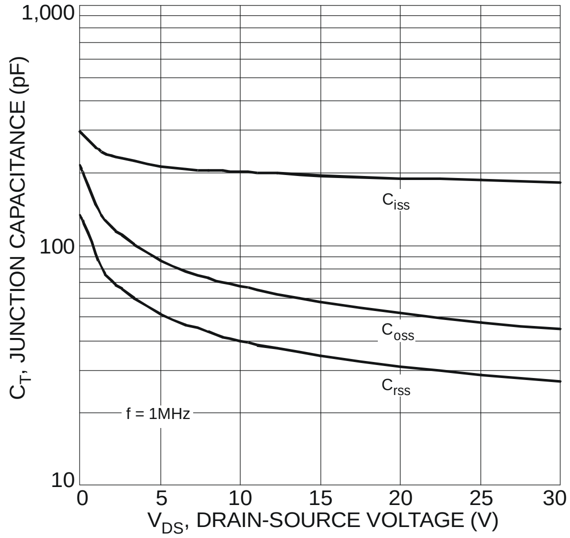


Fig. 10 Typical Junction Capacitance

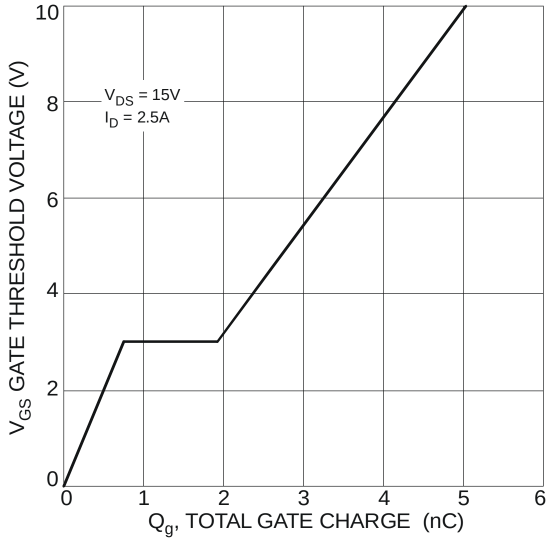
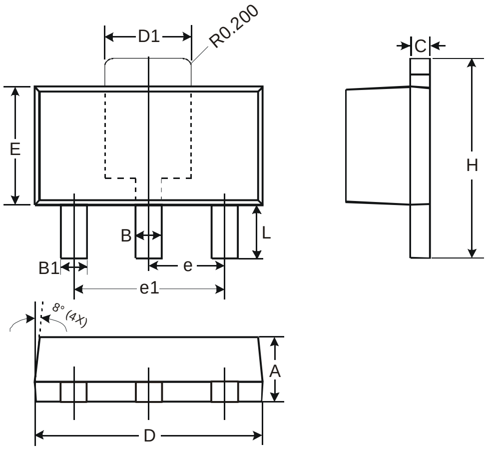


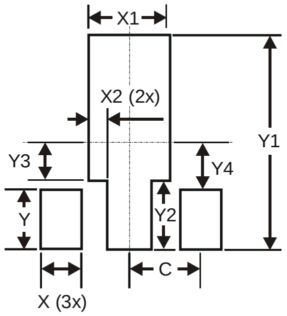
Fig. 11 Gate Charge

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