



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

$V_{(BR)DSS}$	$R_{DS(ON) \max}$	$I_D \max$ $T_A = +25^\circ\text{C}$
20V	$8\text{m}\Omega @ V_{GS} = 10\text{V}$	12A
	$9\text{m}\Omega @ V_{GS} = 4.5\text{V}$	10A
	$12\text{m}\Omega @ V_{GS} = 2.5\text{V}$	8A

### Features

- Low On-Resistance
- Low Gate Threshold Voltage
- Low Input Capacitance
- Fast Switching Speed
- Low Input/Output Leakage

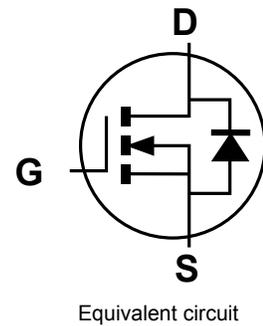
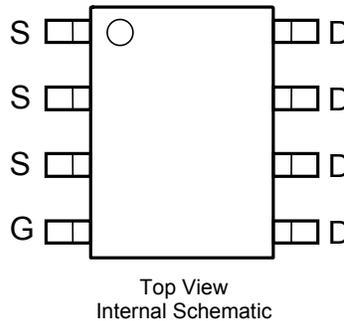
### Description and Applications

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.

- Backlighting
- Power Management Functions
- DC-DC Converters

### Mechanical Data

- Case: SO-8
- Case Material: Molded Plastic, "Green" Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminal Connections Indicator: See diagram
- Terminals: Finish — Matte Tin annealed over Copper leadframe. Solderable per MIL-STD-202, Method 208
- Weight: 0.074 grams (approximate)



**Maximum Ratings** (@ $T_A = +25^\circ\text{C}$ , unless otherwise specified.)

Characteristic			Symbol	Value	Units
Drain-Source Voltage			$V_{DS}$	20	V
Gate-Source Voltage			$V_{GS}$	$\pm 12$	V
Drain Current (Note 5)	Steady State	$T_A = +25^\circ\text{C}$	$I_D$	12	A
		$T_A = +70^\circ\text{C}$		9.6	
Pulsed Drain Current (Note 6)			$I_{DM}$	42	A

**Thermal Characteristics**

Characteristic	Symbol	Value	Unit
Total Power Dissipation (Note 5)	$P_D$	2	W
Thermal Resistance, Junction to Ambient	$R_{\theta JA}$	62.5	$^\circ\text{C/W}$
Operating and Storage Temperature Range	$T_J, T_{STG}$	-55 to +150	$^\circ\text{C}$

**Electrical Characteristics** (@ $T_A = +25^\circ\text{C}$ , unless otherwise specified.)

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
<b>OFF CHARACTERISTICS (Note 7)</b>						
Drain-Source Breakdown Voltage	$BV_{DSS}$	20	—	—	V	$V_{GS} = 0V, I_D = 250\mu\text{A}$
Zero Gate Voltage Drain Current	$I_{DSS}$	—	—	1	$\mu\text{A}$	$V_{DS} = 20V, V_{GS} = 0V$
Gate-Source Leakage	$I_{GSS}$	—	—	$\pm 100$	nA	$V_{GS} = \pm 12V, V_{DS} = 0V$
<b>ON CHARACTERISTICS (Note 7)</b>						
Gate Threshold Voltage	$V_{GS(th)}$	0.5	—	1.2	V	$V_{DS} = V_{GS}, I_D = 250\mu\text{A}$
Static Drain-Source On-Resistance	$R_{DS(on)}$	—	—	8	m $\Omega$	$V_{GS} = 10V, I_D = 12A$
				9		$V_{GS} = 4.5V, I_D = 10A$
				12		$V_{GS} = 2.5V, I_D = 8A$
Forward Transconductance	$g_{fs}$	—	27	—	S	$V_{DS} = 5V, I_D = 6.5A$
Diode Forward Voltage	$V_{SD}$	0.5	0.7	1.2	V	$V_{GS} = 0V, I_S = 3A$
<b>DYNAMIC CHARACTERISTICS (Note 8)</b>						
Input Capacitance	$C_{iss}$	—	2555	—	pF	$V_{DS} = 10V, V_{GS} = 0V, f = 1.0\text{MHz}$
Output Capacitance	$C_{oss}$	—	523	—	pF	
Reverse Transfer Capacitance	$C_{rss}$	—	496	—	pF	
Gate Resistance	$R_G$	—	1.1	—	$\Omega$	$V_{GS} = 0V, V_{DS} = 0V, f = 1\text{MHz}$
<b>SWITCHING CHARACTERISTICS (Note 8)</b>						
Total Gate Charge	$Q_g$	—	28.9 58.3	—	nC	$V_{DS} = 10V, V_{GS} = 4.5V, I_D = 12A$
Gate-Source Charge	$Q_{gs}$	—	3.7	—		$V_{DS} = 10V, V_{GS} = 10V, I_D = 12A$
Gate-Drain Charge	$Q_{gd}$	—	11.4	—		$V_{DS} = 10V, V_{GS} = 10V, I_D = 12A$
						$V_{DS} = 10V, V_{GS} = 10V, I_D = 12A$

- Notes:
- Device mounted on 2 oz, FR-4 PCB, with  $R_{\theta JA} = 62.5^\circ\text{C/W}$
  - Pulse width  $\leq 10\mu\text{s}$ , Duty Cycle  $\leq 1\%$ .
  - Short duration pulse test used to minimize self-heating effect.
  - Guaranteed by design. Not subject to product testing.

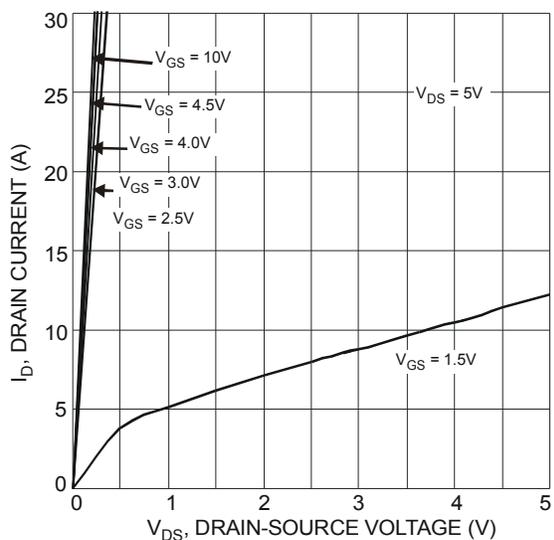


Fig. 1 Typical Output Characteristics

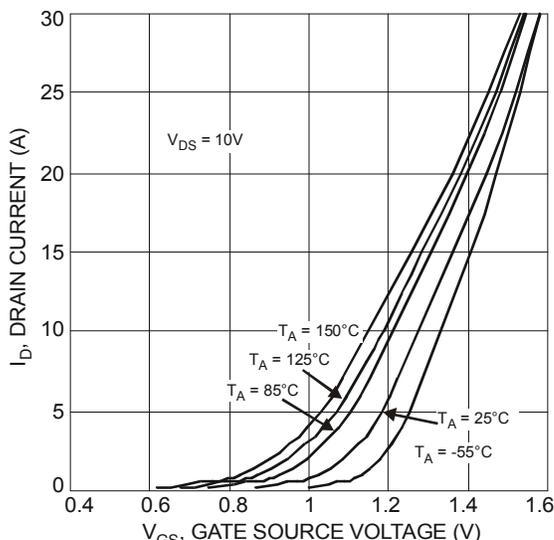


Fig. 2 Typical Transfer Characteristics

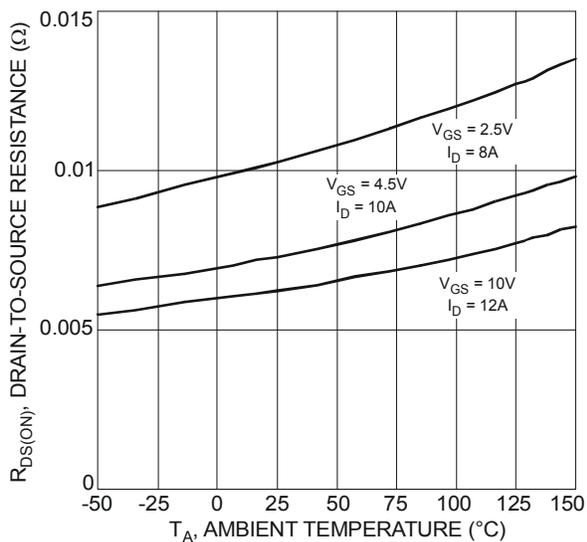


Fig. 3 On-Resistance Variation with Temperature

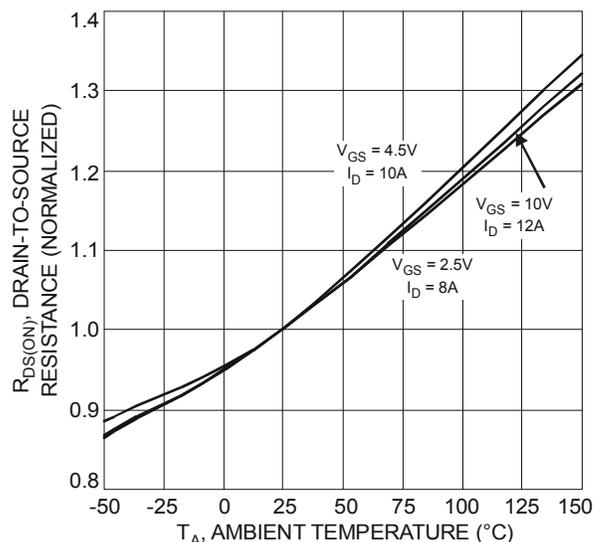


Fig. 4 On-Resistance Variation with Temperature

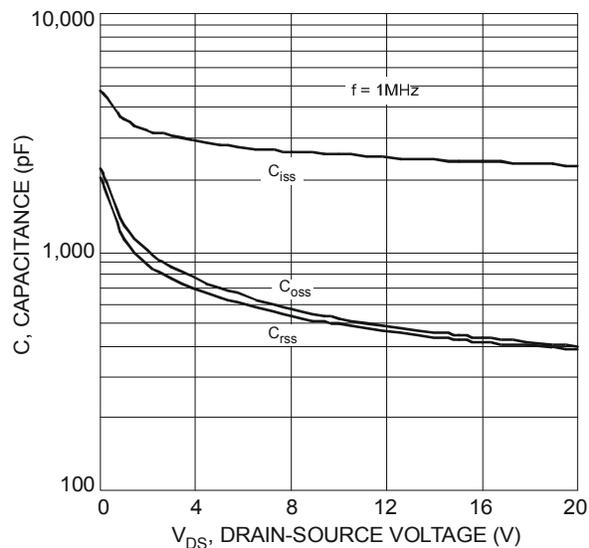


Fig. 5 Typical Capacitance

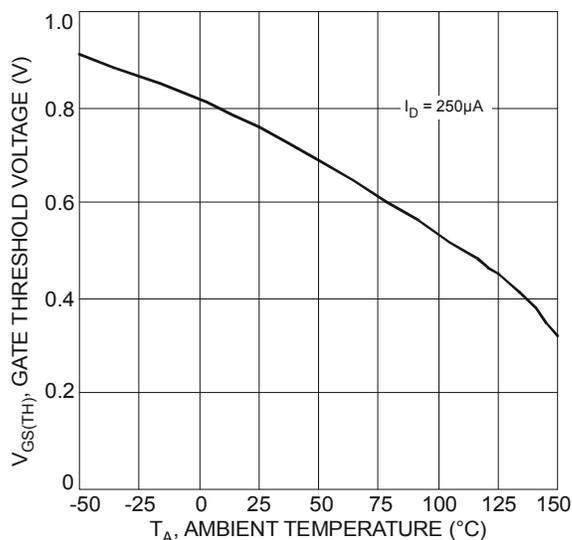


Fig. 6 Gate Threshold Variation vs. Ambient Temperature

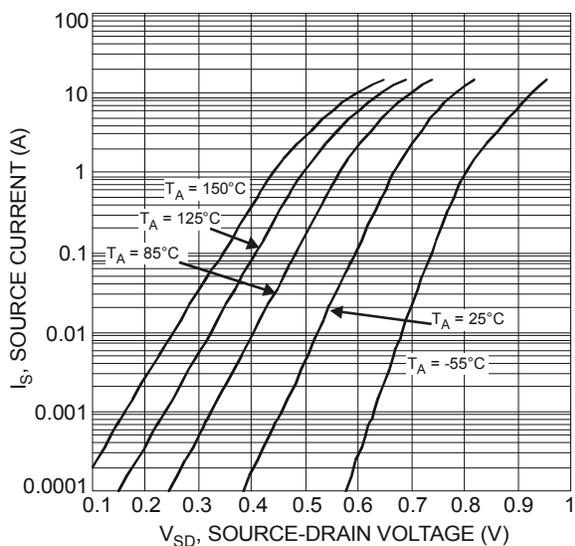


Fig. 7 Diode Forward Voltage vs. Current

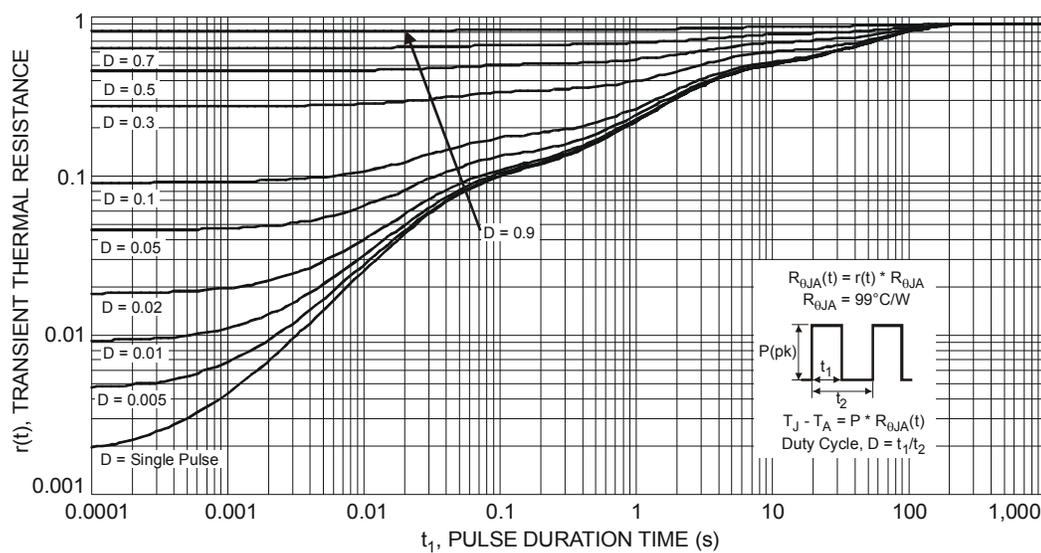
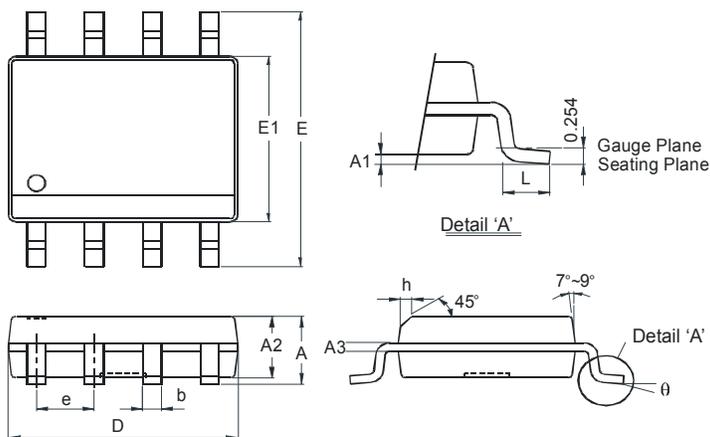


Fig. 8 Transient Thermal Response

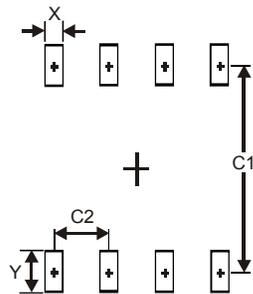
**Package Outline Dimensions**



SO-8		
Dim	Min	Max
A	-	1.75
A1	0.10	0.20
A2	1.30	1.50
A3	0.15	0.25
b	0.3	0.5
D	4.85	4.95
E	5.90	6.10
E1	3.85	3.95
e	1.27 Typ	
h	-	0.35
L	0.62	0.82
θ	0°	8°

All Dimensions in mm

**Suggested Pad Layout**



Dimensions	Value (in mm)
X	0.60
Y	1.55
C1	5.4
C2	1.27