



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	Package	I _D T _A = +25°C
-20V	52mΩ @V _{GS} = -4.5V	SOT23	-5.0A
	100mΩ @V _{GS} = -2.5V		-3.6A

Features

- Low On-Resistance
- Low Input Capacitance
- Fast Switching Speed

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:

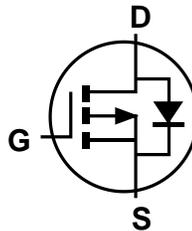
- Backlighting
- Power Management Functions
- DC-DC Converters
- Motor Control

Mechanical Data

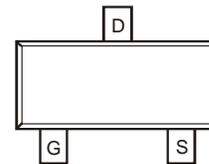
- Case: SOT23
- Case Material: Molded Plastic, "Green" Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020D
- Terminals: Finish – Matte Tin Annealed over Copper Leadframe. Solderable per MIL-STD-202, Method 208 
- Terminals Connections: See Diagram Below
- Weight: 0.009 grams (Approximate)



Top View



Internal Schematic



Top View

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

Characteristic		Symbol	Value	Unit
Drain-Source Voltage		V_{DSS}	-20	V
Gate-Source Voltage		V_{GSS}	± 8	V
Continuous Drain Current (Note 6) $V_{GS} = -4.5\text{V}$	Steady State	$T_A = +25^\circ\text{C}$ $T_A = +70^\circ\text{C}$	-4.2 -3.3	A
	$t < 10\text{s}$	$T_A = +25^\circ\text{C}$ $T_A = +70^\circ\text{C}$	-5.0 -4.0	A
Pulsed Drain Current (Note 7)		I_{DM}	-15	A

Thermal Characteristics

Characteristic		Symbol	Value	Unit
Power Dissipation (Note 6)		P_D	1.4	W
Thermal Resistance, Junction to Ambient (Note 6)	Steady State	$R_{\theta JA}$	90	$^\circ\text{C/W}$
	$t < 10\text{s}$		64	$^\circ\text{C/W}$
Thermal Resistance, Junction to Case (Note 8)		$R_{\theta JC}$	33	$^\circ\text{C/W}$
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
OFF CHARACTERISTICS (Note 8)						
Drain-Source Breakdown Voltage	BV_{DSS}	-20	—	—	V	$V_{GS} = 0\text{V}, I_D = -250\mu\text{A}$
Zero Gate Voltage Drain Current ($T_J = +25^\circ\text{C}$)	I_{DSS}	—	—	-1.0	μA	$V_{DS} = -20\text{V}, V_{GS} = 0\text{V}$
Gate-Source Leakage	I_{GSS}	—	—	± 100	nA	$V_{GS} = \pm 8\text{V}, V_{DS} = 0\text{V}$
ON CHARACTERISTICS (Note 8)						
Gate Threshold Voltage	$V_{GS(TH)}$	-0.5	—	-0.9	V	$V_{DS} = V_{GS}, I_D = -250\mu\text{A}$
Static Drain-Source On-Resistance	$R_{DS(ON)}$	—	40	52	m Ω	$V_{GS} = -4.5\text{V}, I_D = -4.2\text{A}$
			52	100		$V_{GS} = -2.5\text{V}, I_D = -3.4\text{A}$
			68	200		$V_{GS} = -1.8\text{V}, I_D = -2\text{A}$
Forward Transfer Admittance	$ Y_{FS} $	—	9	—	S	$V_{DS} = -5\text{V}, I_D = -4\text{A}$
DYNAMIC CHARACTERISTICS (Note 9)						
Input Capacitance	C_{iss}	—	808	—	pF	$V_{DS} = -15\text{V}, V_{GS} = 0\text{V}$ $f = 1.0\text{MHz}$
Output Capacitance	C_{oss}	—	85	—	pF	
Reverse Transfer Capacitance	C_{rss}	—	77	—	pF	
Gate Resistance	R_G	—	15.2	—	Ω	$V_{GS} = 0\text{V}, V_{DS} = 0\text{V}, f = 1.0\text{MHz}$
SWITCHING CHARACTERISTICS (Note 9)						
Total Gate Charge	Q_G	—	10.2	—	nC	$V_{GS} = -4.5\text{V}, V_{DS} = -4\text{V},$ $I_D = -3.5\text{A}$
Gate-Source Charge	Q_{GS}	—	1.3	—	nC	
Gate-Drain Charge	Q_{GD}	—	2.2	—	nC	
Turn-On Delay Time	$t_{D(ON)}$	—	10.8	—	ns	$V_{DS} = -4\text{V}, V_{GS} = -4.5\text{V},$ $R_G = 6\Omega, I_D = -1\text{A}$
Turn-On Rise Time	t_R	—	13.7	—	ns	
Turn-Off Delay Time	$t_{D(OFF)}$	—	79.3	—	ns	
Turn-Off Fall Time	t_F	—	34.7	—	ns	

- Notes:
6. Device mounted on FR-4 substrate PC board, 2oz copper, with 1-inch square copper plate.
 7. Repetitive rating, pulse width limited by junction temperature.
 8. Short duration pulse test used to minimize self-heating effect.
 9. Guaranteed by design. Not subject to product testing.

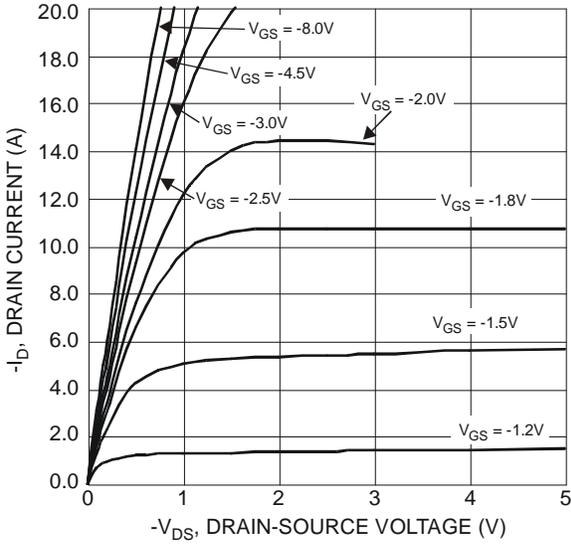


Figure 1 Typical Output Characteristics

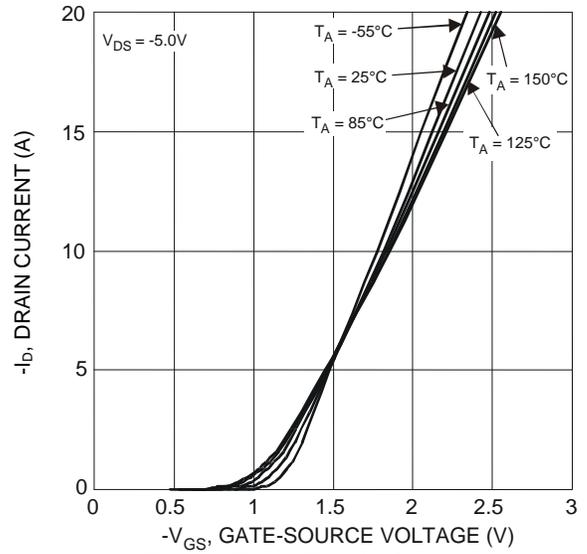


Figure 2 Typical Transfer Characteristics

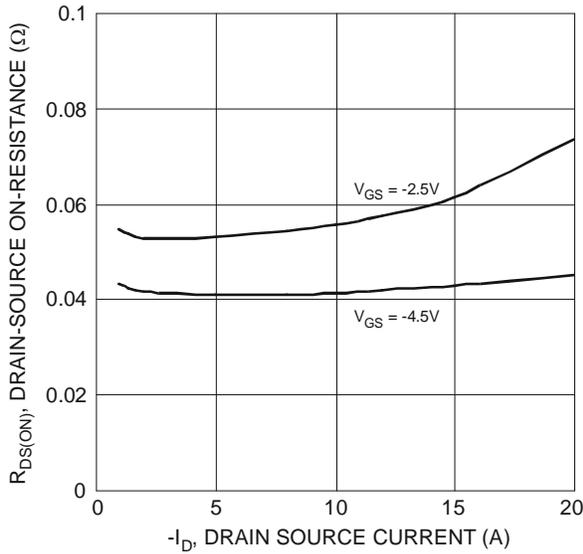


Figure 3 Typical On-Resistance vs. Drain Current and Gate Voltage

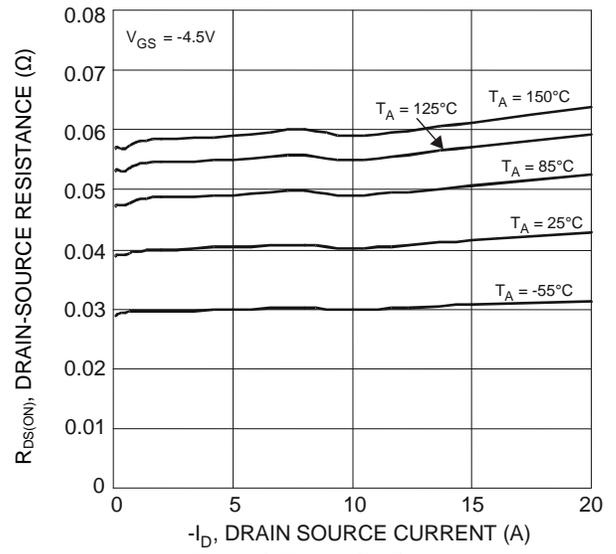


Figure 4 Typical On-Resistance vs. Drain Current and Temperature

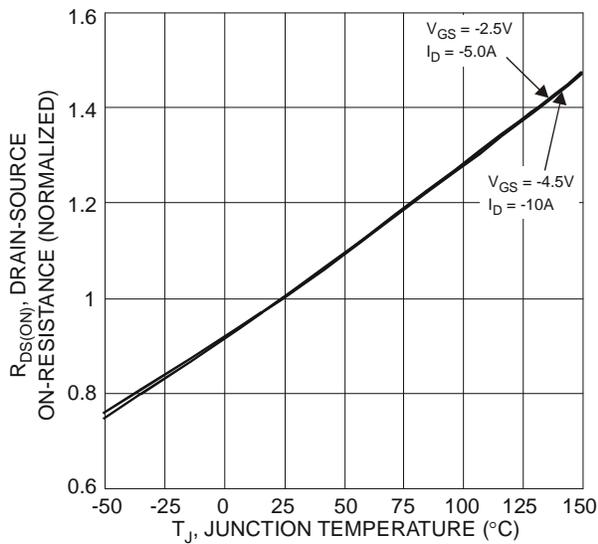


Figure 5 On-Resistance Variation with Temperature

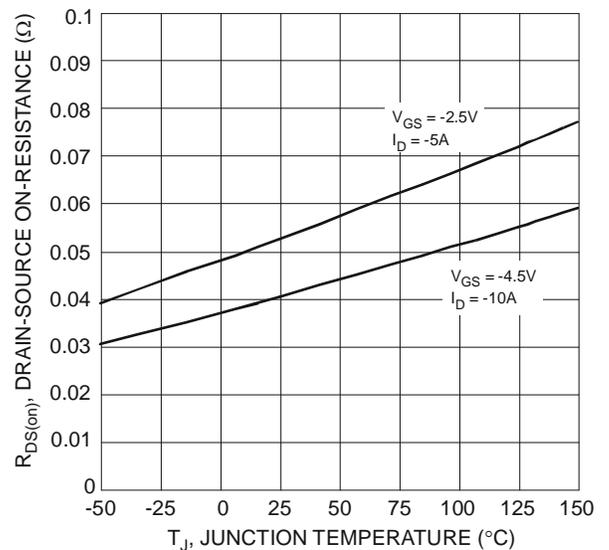


Figure 6 On-Resistance Variation with Temperature

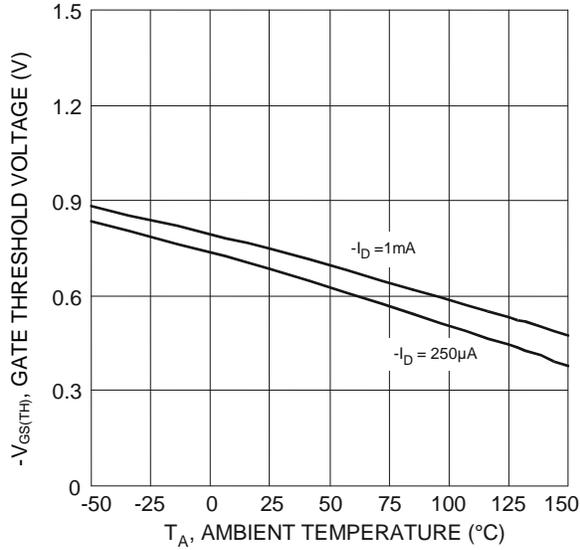


Figure 7 Gate Threshold Variation vs. Ambient Temperature

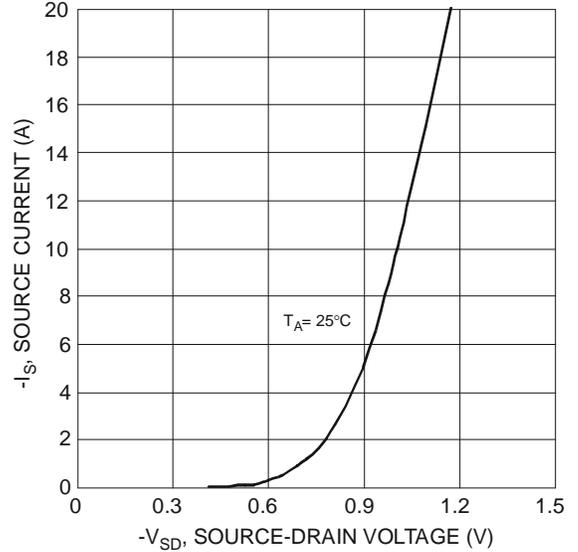


Figure 8 Diode Forward Voltage vs. Current

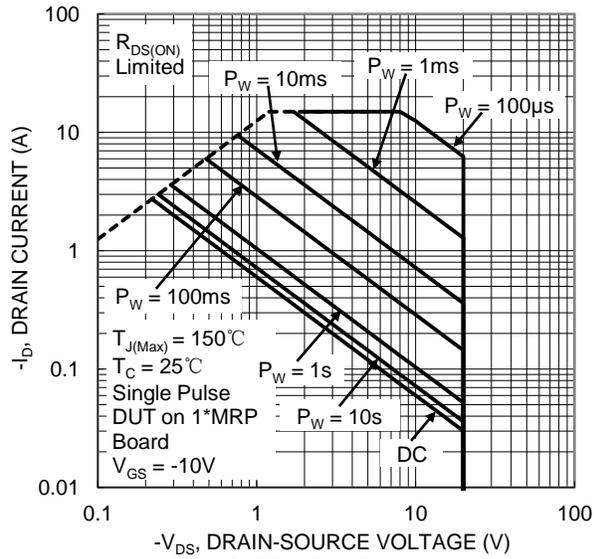
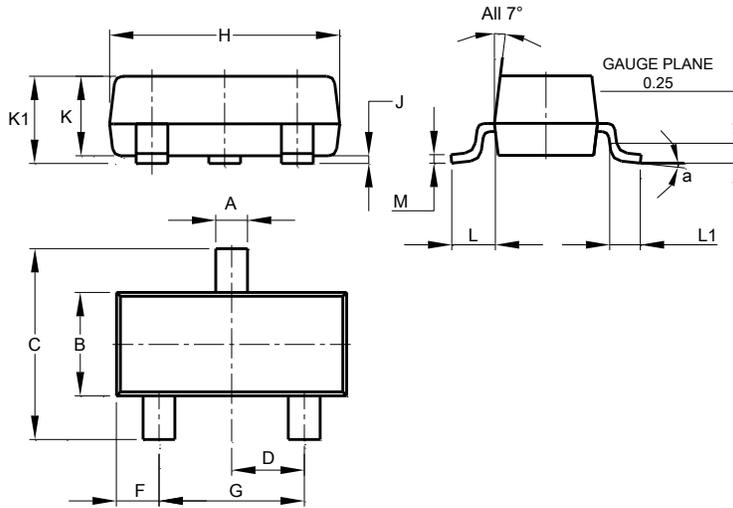


Figure 9 SOA, Safe Operation Area

Package Outline Dimensions

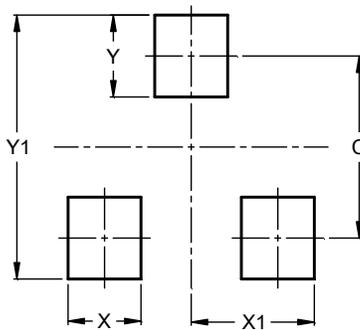
SOT23



SOT23			
Dim	Min	Max	Typ
A	0.37	0.51	0.40
B	1.20	1.40	1.30
C	2.30	2.50	2.40
D	0.89	1.03	0.915
F	0.45	0.60	0.535
G	1.78	2.05	1.83
H	2.80	3.00	2.90
J	0.013	0.10	0.05
K	0.890	1.00	0.975
K1	0.903	1.10	1.025
L	0.45	0.61	0.55
L1	0.25	0.55	0.40
M	0.085	0.150	0.110
a	0°	8°	--
All Dimensions in mm			

Suggested Pad Layout

SOT23



Dimensions	Value (in mm)
C	2.0
X	0.8
X1	1.35
Y	0.9
Y1	2.9