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

0755-83047638
ysbdt@szyoushang.cn
www.szyoushang.cn

Features

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

Mechanical Data

- Case: SOT523
- Case 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 Alloy 42 leadframe. Solderable per MIL-STD-202, Method 208 ⓔ③
- Terminal Connections: See Diagram
- Weight: 0.002 grams (Approximate)

ESD PROTECTED

SOT523

Top View

Equivalent Circuit

Gate Protection Diode

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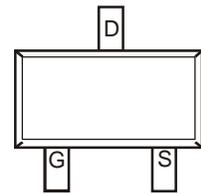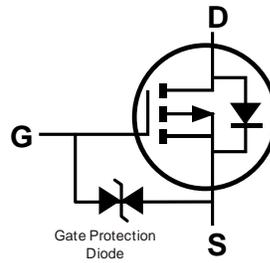
Maximum Ratings ($@T_A$ = +25°C, unless otherwise specified.)

Characteristic			Symbol	Value	Unit
Drain-Source Voltage			V_{DSS}	-20	V
Gate-Source Voltage			V_{GSS}	±8	V
Drain Current (Note 5)	Steady State	T_A = +25°C	I_D	-430	mA
		T_A = +85°C		-310	
Pulsed Drain Current (Note 6)			I_{DM}	-750	mA

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

Characteristic		Symbol	Value	Unit
Total Power Dissipation (Note 5)		P_D	230	mW
Thermal Resistance, Junction to Ambient (Note 5)	Steady State	$R_{\theta JA}$	558	°C/W
Total Power Dissipation (Note 6)		P_D	320	mW
Thermal Resistance, Junction to Ambient (Note 6)	Steady State	$R_{\theta JA}$	393	°C/W
Operating and Storage Temperature Range		T_J, T_{STG}	-55 to +150	°C

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

| Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
OFF CHARACTERISTICS (Note 7)						
Drain-Source Breakdown Voltage	BV_{DSS}	-20	—	—	V	V_{GS} = 0V, I_D = -250µA
Zero Gate Voltage Drain Current	I_{DSS}	—	—	-1.0	µA	V_{DS} = -20V, V_{GS} = 0V
Gate-Source Leakage	I_{GSS}	—	—	±1.0	µA	V_{GS} = ±4.5V, V_{DS} = 0V
ON CHARACTERISTICS (Note 7)						
Gate Threshold Voltage	$V_{GS(TH)}$	-0.5	—	-1.0	V	V_{DS} = V_{GS}, I_D = -250µA
Static Drain-Source On-Resistance	$R_{DS(ON)}$	—	0.7	1.1	Ω	V_{GS} = -4.5V, I_D = -430mA
			1.0	1.6		V_{GS} = -2.5V, I_D = -300mA
			1.3	2.4		V_{GS} = -1.8V, I_D = -150mA
Diode Forward Voltage	V_{SD}	—	-0.8	-1.4	V	V_{GS} = 0V, I_S = -115mA
DYNAMIC CHARACTERISTICS (Note 8)						
Input Capacitance	C_{iss}	—	47	—	pF	V_{DS} = -16V, V_{GS} = 0V f = 1.0MHz
Output Capacitance	C_{oss}	—	6.8	—	pF	
Reverse Transfer Capacitance	C_{rss}	—	4.9	—	pF	
Gate Resistance	R_g	—	240	—	Ω	V_{DS} = 0V, V_{GS} = 0V
Total Gate Charge V_{GS} = -4.5V	Q_g	—	0.55	—	nC	V_{DS} = -10V, I_D = -250mA
Total Gate Charge V_{GS} = -8V	Q_g	—	0.97	—	nC	
Gate-Source Charge	Q_{gs}	—	0.05	—	nC	
Gate-Drain Charge	Q_{gd}	—	0.1	—	nC	
Turn-On Delay Time	$t_{D(ON)}$	—	5.9	—	ns	V_{DD} = -3V, V_{GS} = -2.5V, R_G = 25Ω, I_D = -100mA
Turn-On Rise Time	t_R	—	3.3	—	ns	
Turn-Off Delay Time	$t_{D(OFF)}$	—	25.5	—	ns	
Turn-Off Fall Time	t_F	—	19.3	—	ns	
Reverse Recovery Time	t_{RR}	—	7.3	—	ns	I_F=-1A, di/dt=-100A/µs
Reverse Recovery Charge	Q_{RR}	—	1.9	—	nC	I_F=-1A, di/dt=-100A/µs

Notes: 5. Device mounted on FR-4 PCB, with minimum recommended pad layout.
6. Device mounted on 1" x 1" FR-4 PCB with high coverage 2oz. Copper, single sided.
7. Short duration pulse test used to minimize self-heating effect.
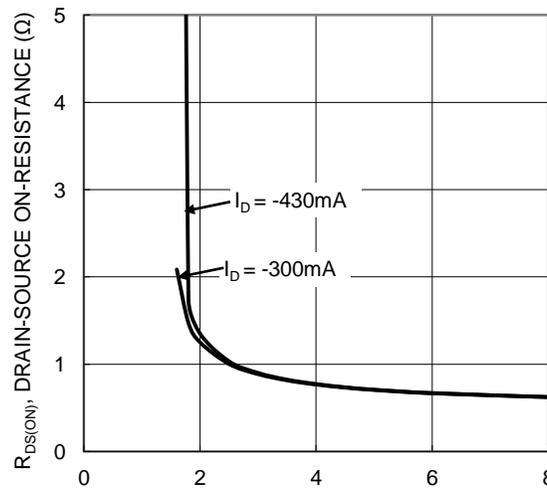8. Guaranteed by design. Not subject to product testing.
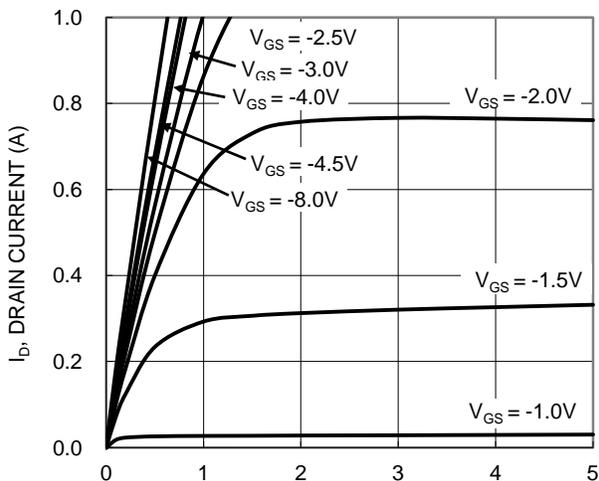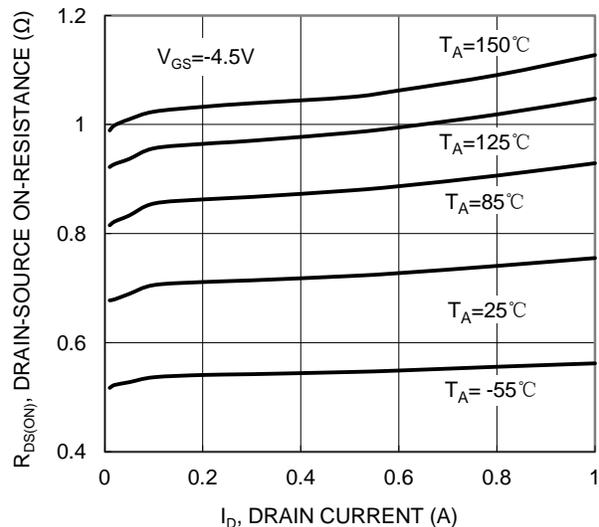
Figure 1.Typical Output Characteristic
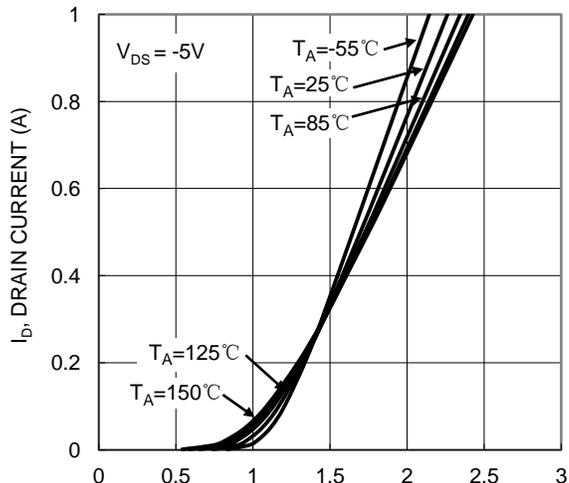
Figure 2. Typical Transfer Characteristic
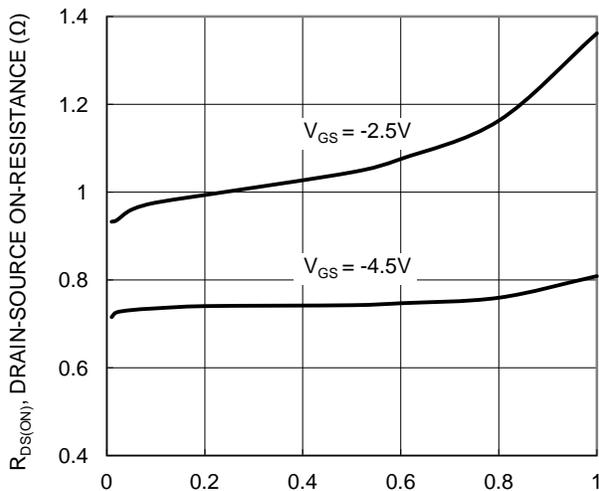
Figure 3. Typical On-Resistance vs. Drain Current and Gate Voltage

Figure 4. Typical Transfer Characteristic

Figure 5. Typical On-Resistance vs. Drain Current and Temperature
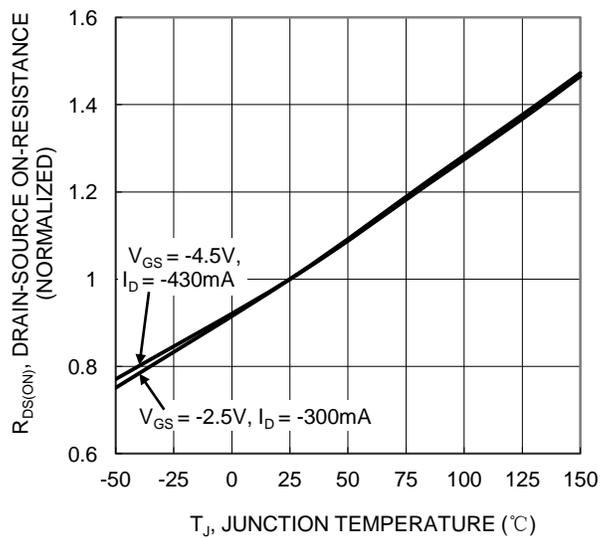
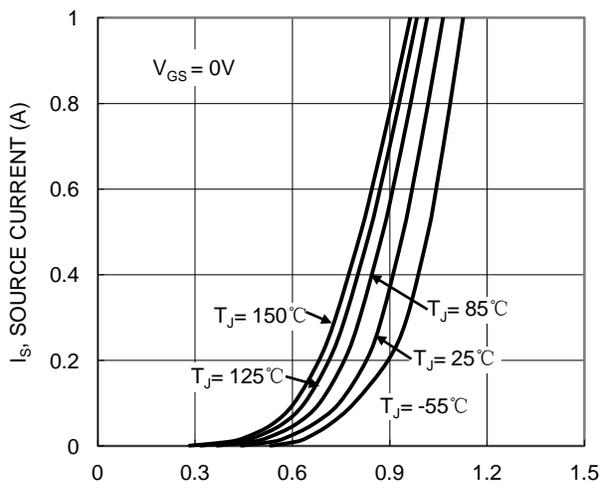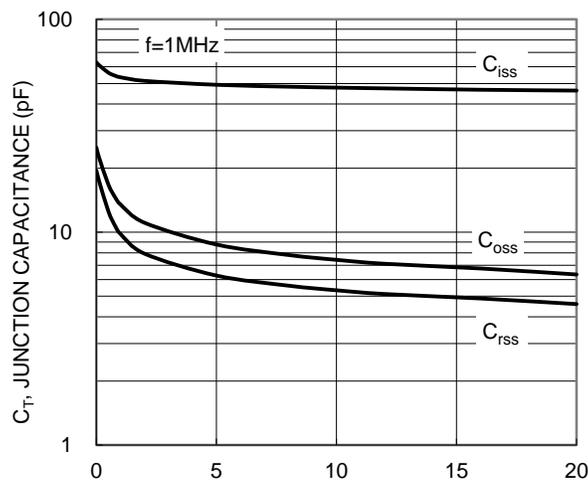Figure 6. On-Resistance Variation with Temperature
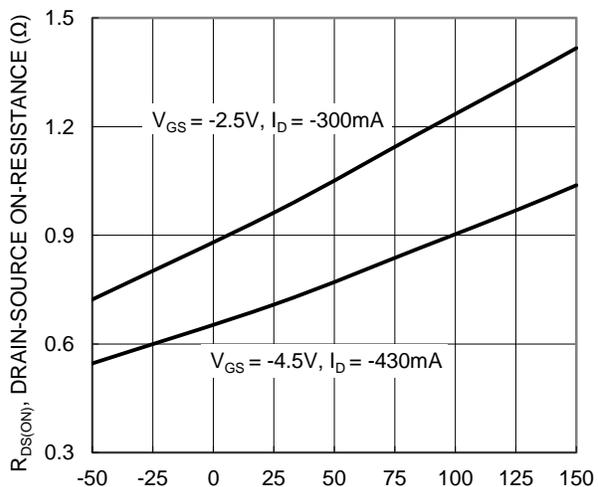
Figure 7. On-Resistance Variation with Temperature
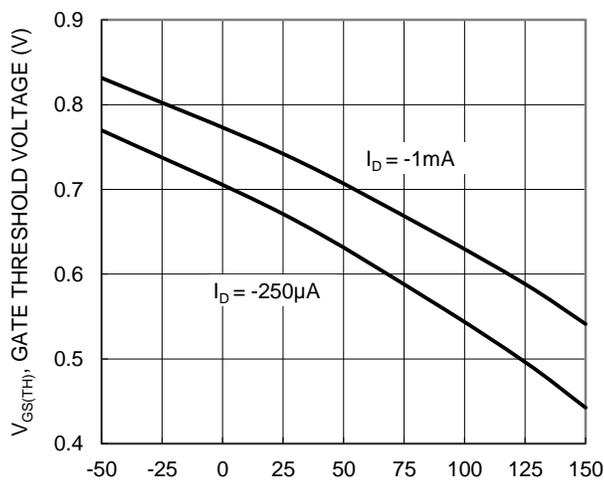
Figure 8. Gate Threshold Variation vs. JunctionTemperature

Figure 9. Diode Forward Voltage vs. Current

Figure 10. Typical Junction Capacitance
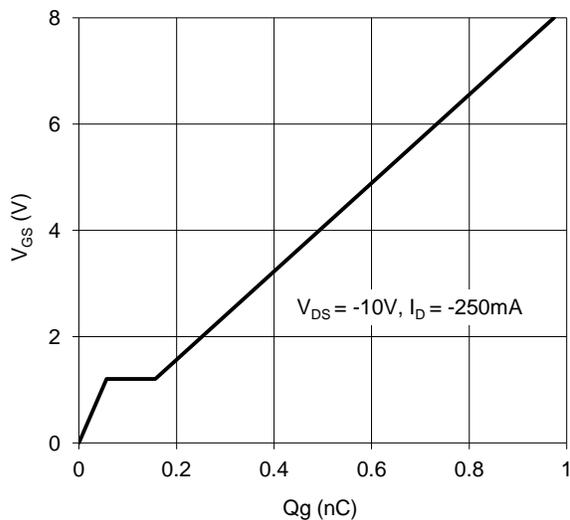
Figure 11. Gate Charge
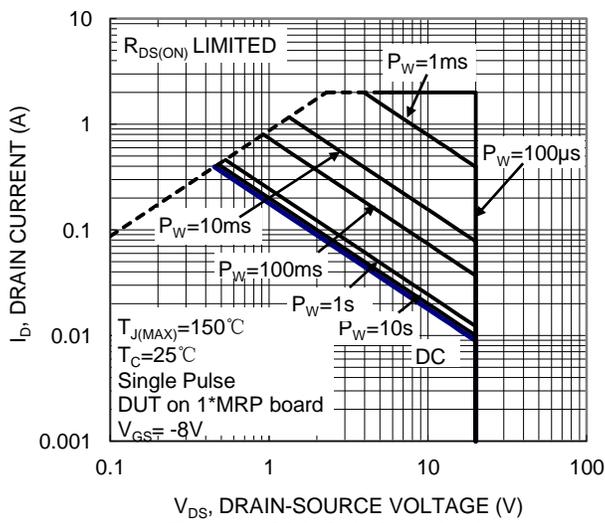
Figure 12. SOA, Safe Operation Area

$$R_{\theta JA}(t) = r(t) \cdot R_{\theta JA}$$
$$R_{\theta JA} = 559^{\circ}C/W$$
Duty Cycle, D = t1 / t2
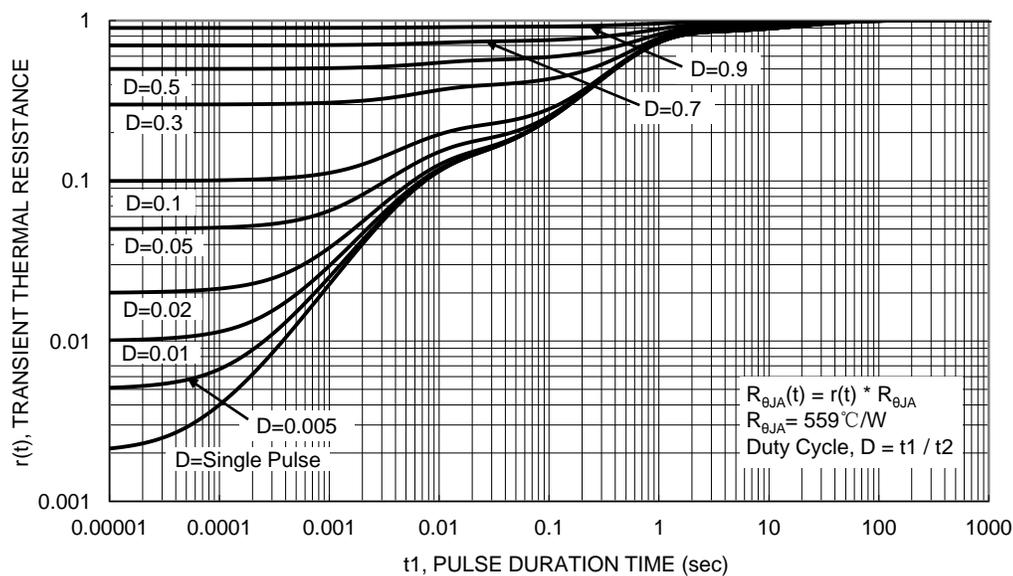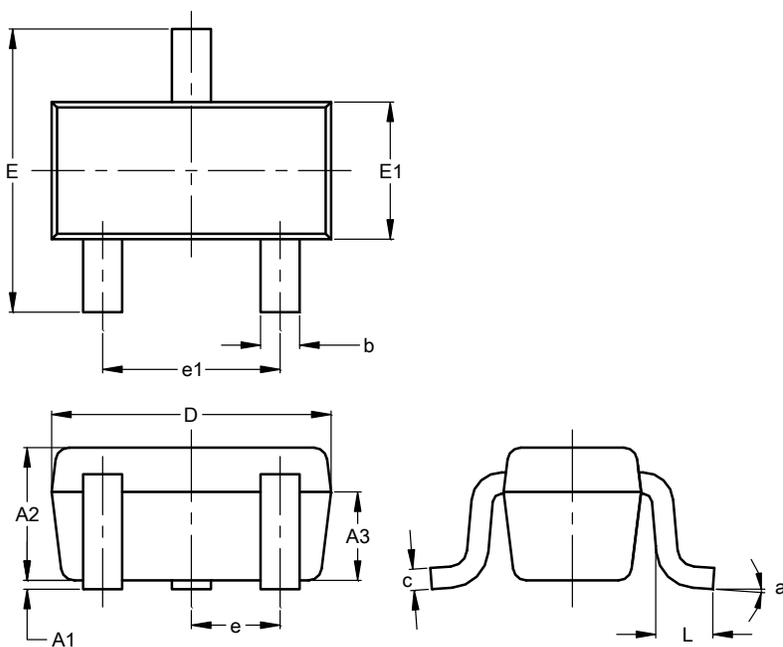
Figure 13. Transient Thermal Resistance

Package Outline Dimensions

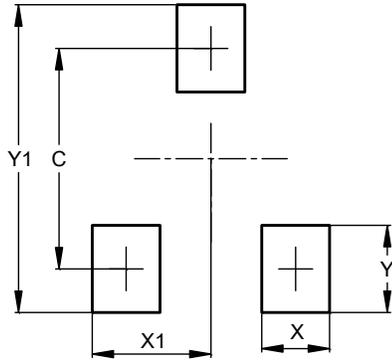**SOT523**

SOT523			
Dim	Min	Max	Typ
A1	0.00	0.10	0.05
A2	0.60	0.80	0.75
A3	0.45	0.65	0.50
b	0.15	0.30	0.22
c	0.10	0.20	0.12
D	1.50	1.70	1.60
E	1.45	1.75	1.60
E1	0.75	0.85	0.80
e	0.50 BSC		
e1	0.90	1.10	1.00
L	0.20	0.40	0.33
a	0°	--	8°
All Dimensions in mm			

Suggested Pad Layout

SOT523

Dimensions	Value (in mm)
C	1.29
X	0.40
X1	0.70
Y	0.51
Y1	1.80