

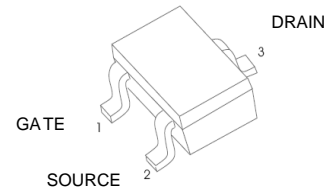
## Features

- Low On-Resistance
- Low Gate Threshold Voltage
- Low Input Capacitance
- Fast Switching Speed
- Low Input/Output Leakage
- Lead Free By Design/RoHS Compliant (Note 2)

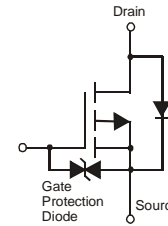
## Marking Code

- Marking Code: PA1

## Package



SOT - 523



## Maximum Ratings @T<sub>A</sub> = 25°C unless otherwise specified

Characteristic			Symbol	Value	Units
Drain-Source Voltage			V <sub>DSS</sub>	-20	V
Gate-Source Voltage			V <sub>GSS</sub>	±6	V
Drain Current (Note 1)	Steady State	T <sub>A</sub> = 25°C	I <sub>D</sub>	-0.46	A
		T <sub>A</sub> = 85°C		-0.33	
Pulsed Drain Current			I <sub>DM</sub>	-6	A

## Thermal Characteristics @T<sub>A</sub> = 25°C unless otherwise specified

Characteristic	Symbol	Value	Units
Total Power Dissipation (Note 1)	P <sub>D</sub>	0.27	W
Thermal Resistance, Junction to Ambient	R <sub>θJA</sub>	461	°C/W
Operating and Storage Temperature Range	T <sub>J</sub> , T <sub>STG</sub>	-55 to +150	°C

- Notes: 1. Device mounted on FR-4 PCB.  
2. No purposefully added lead.



Electrical Characteristics @ $T_A = 25^\circ\text{C}$  unless otherwise specified

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
<b>OFF CHARACTERISTICS (Note 4)</b>						
Drain-Source Breakdown Voltage	BV <sub>DSS</sub>	-20	-	-	V	V <sub>GS</sub> = 0V, I <sub>D</sub> = -250 $\mu$ A
Zero Gate Voltage Drain Current T <sub>J</sub> = 25 $^\circ$ C	I <sub>DSS</sub>	-	-	-100	nA	V <sub>DS</sub> = -20V, V <sub>GS</sub> = 0V
Gate-Source Leakage	I <sub>GSS</sub>	-	-	$\pm$ 2.0	$\mu$ A	V <sub>GS</sub> = $\pm$ 4.5V, V <sub>DS</sub> = 0V
<b>ON CHARACTERISTICS (Note 4)</b>						
Gate Threshold Voltage	V <sub>GS(th)</sub>	-0.5	-	-1.0	V	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = -250 $\mu$ A
Static Drain-Source On-Resistance	R <sub>DS(on)</sub>	-	0.5	0.7	$\Omega$	V <sub>GS</sub> = -4.5V, I <sub>D</sub> = -350mA
			0.7	0.9		V <sub>GS</sub> = -2.5V, I <sub>D</sub> = -300mA
			1.0	1.3		V <sub>GS</sub> = -1.8V, I <sub>D</sub> = -150mA
Forward Transfer Admittance	Y <sub>fs</sub>	-	0.9	-	S	V <sub>DS</sub> = -10V, I <sub>D</sub> = -250mA
Diode Forward Voltage (Note 4)	V <sub>SD</sub>	-	-0.8	-1.2	V	V <sub>GS</sub> = 0V, I <sub>S</sub> = -150mA
<b>DYNAMIC CHARACTERISTICS</b>						
Input Capacitance	C <sub>iss</sub>	-	59.76	-	pF	V <sub>DS</sub> = -16V, V <sub>GS</sub> = 0V, f = 1.0MHz
Output Capacitance	C <sub>oss</sub>	-	12.07	-	pF	
Reverse Transfer Capacitance	C <sub>rss</sub>	-	6.36	-	pF	
Total Gate Charge	Q <sub>g</sub>	-	622.4	-	pC	V <sub>GS</sub> = -4.5V, V <sub>DS</sub> = -10V, I <sub>D</sub> = -250mA
Gate-Source Charge	Q <sub>gs</sub>	-	100.3	-	pC	
Gate-Drain Charge	Q <sub>gd</sub>	-	132.2	-	pC	
Turn-On Delay Time	t <sub>D(on)</sub>	-	5.1	-	ns	V <sub>DD</sub> = -10V, V <sub>GS</sub> = -4.5V, R <sub>L</sub> = 47 $\Omega$ , R <sub>G</sub> = 10 $\Omega$ , I <sub>D</sub> = -200mA
Turn-On Rise Time	t <sub>r</sub>	-	8.1	-	ns	
Turn-Off Delay Time	t <sub>D(off)</sub>	-	28.4	-	ns	
Turn-Off Fall Time	t <sub>f</sub>	-	20.7	-	ns	

Notes: 4. Short duration pulse test used to minimize self-heating effect.

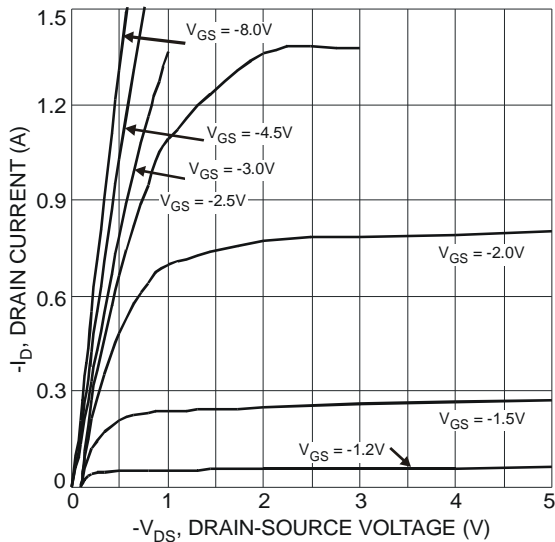


Fig. 1 Typical Output Characteristic

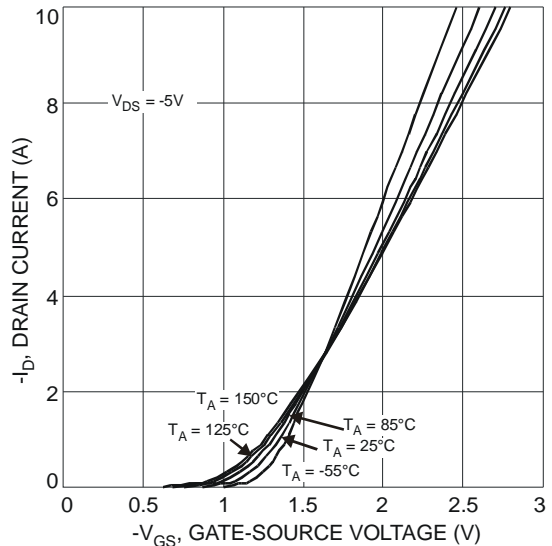


Fig. 2 Typical Transfer Characteristic

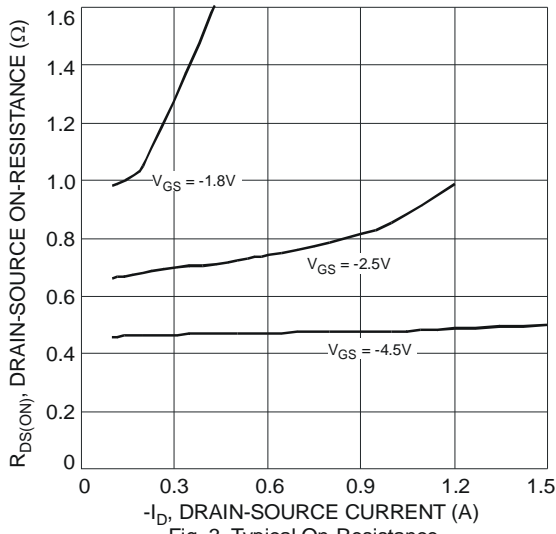


Fig. 3 Typical On-Resistance vs. Drain Current and Gate Voltage

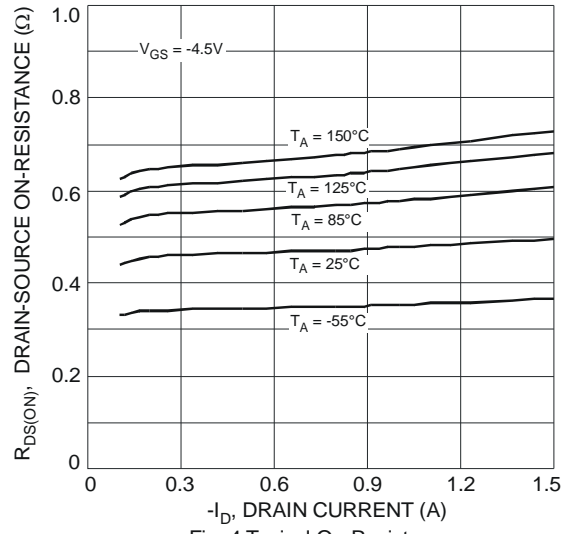


Fig. 4 Typical On-Resistance vs. Drain Current and Temperature

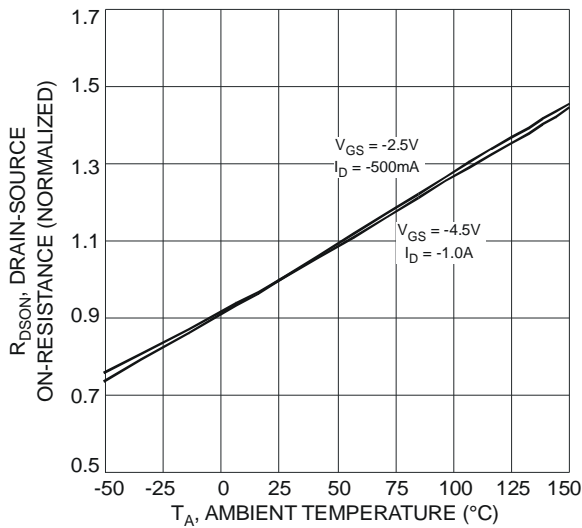


Fig. 5 On-Resistance Variation with Temperature

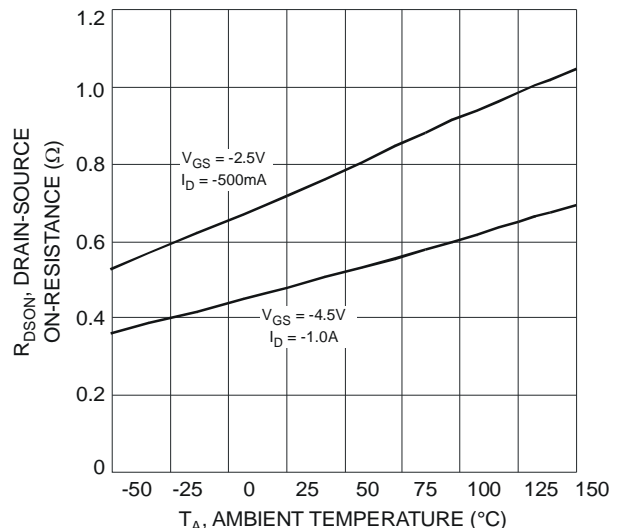


Fig. 6 On-Resistance Variation with Temperature

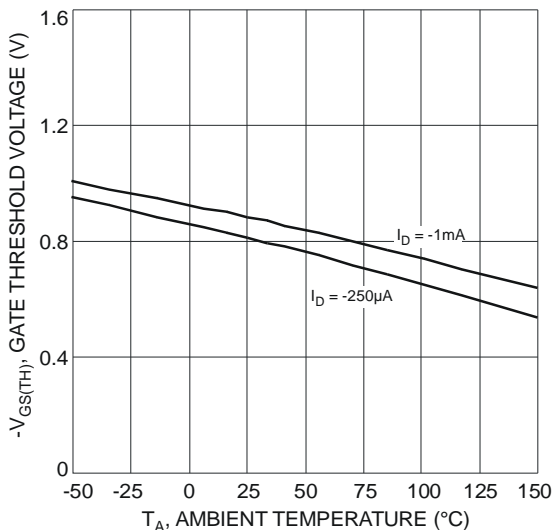


Fig. 7 Gate Threshold Variation vs. Ambient Temperature

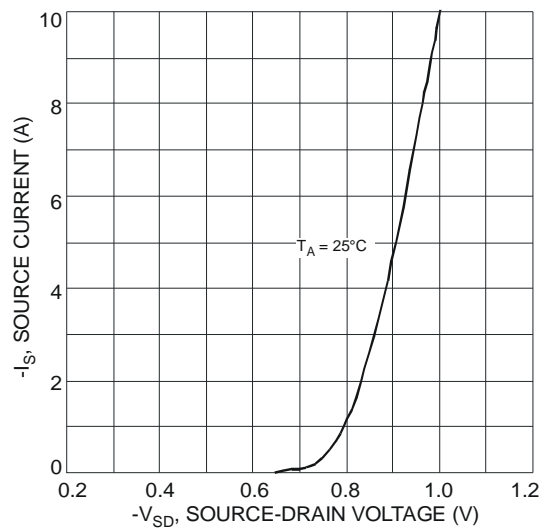


Fig. 8 Diode Forward Voltage vs. Current

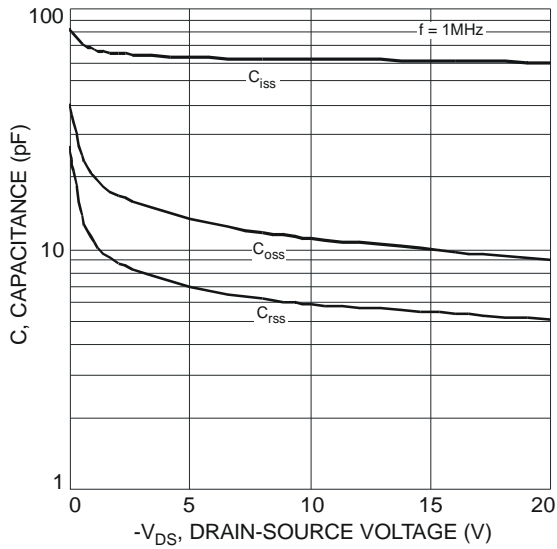


Fig. 9 Typical Total Capacitance

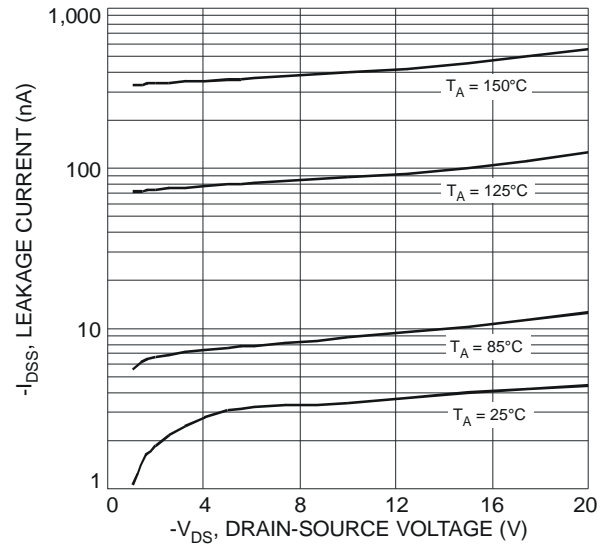


Fig. 10 Typical Leakage Current vs. Drain-Source Voltage

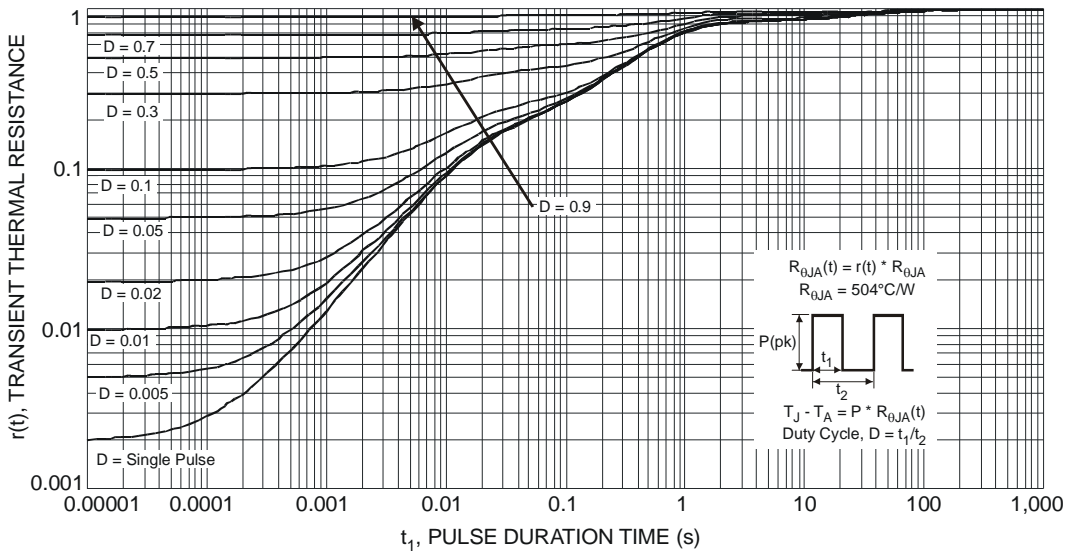
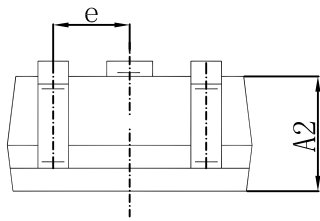
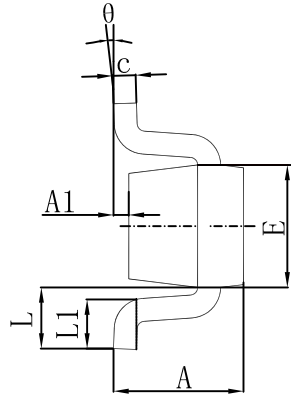
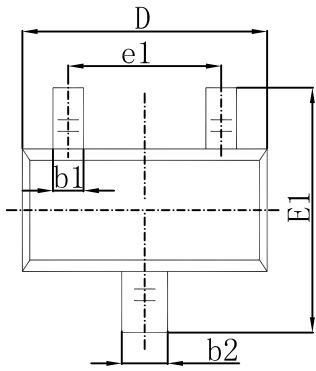


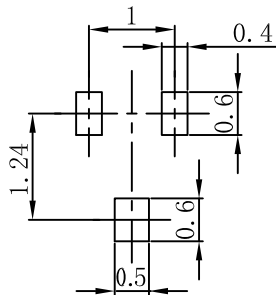
Fig. 11 Transient Thermal Response

**SOT-523 Package Outline Dimensions**



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	0.700	0.900	0.028	0.035
A1	0.000	0.100	0.000	0.004
A2	0.700	0.800	0.028	0.031
b1	0.150	0.250	0.006	0.010
b2	0.250	0.350	0.010	0.014
c	0.100	0.200	0.004	0.008
D	1.500	1.700	0.059	0.067
E	0.700	0.900	0.028	0.035
E1	1.450	1.750	0.057	0.069
e	0.500 TYP.		0.020 TYP.	
e1	0.900	1.100	0.035	0.043
L	0.400 REF.		0.016 REF.	
L1	0.260	0.460	0.010	0.018
theta	0°	8°	0°	8°

**SOT-523 Suggested Pad Layout**



- Note:
1. Controlling dimension: in millimeters.
  2. General tolerance: ±0.05mm.
  3. The pad layout is for reference purposes only.