AT5P4SP020MSA

P-Channel Enhancement Mode MOSFET

Product Summary

$V_{(BR)DSS}$	$R_{DS(on)MAX}$	I_D
-20V	39mΩ@-4.5V	-5.4A
	49mΩ@-2.5V	
	63mΩ@-1.8V	

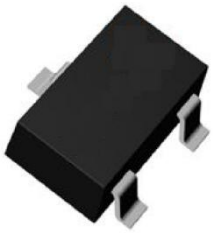
Feature

- Trench power LV MOSFET technology
- High power and current handing capability
- Low gate charge

Application

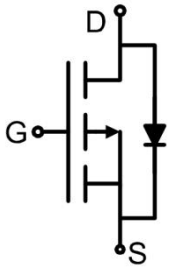
- Battery protection
- Power management
- Load switch

Package

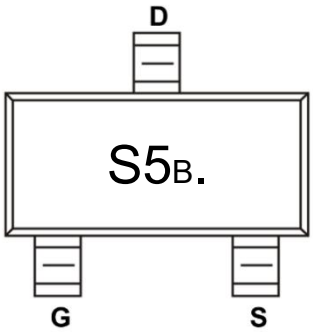


SOT-23

Circuit diagram



Marking



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P-Channel Enhancement Mode MOSFET

Absolute maximum ratings (T_A=25℃ unless otherwise noted)

Parameter	Symbol	Value	Unit
Drain-Source Voltage	V_{DS}	-20	V
Gate-Source Voltage	V_{GS}	±10	V
Continuous Drain Current	I_D	-5.4	A
Continuous Drain Current (T_A=70℃)	I_D (70℃)	-4.4	A
Pulsed Drain Current[1)]	I_{DM}	-22	A
Power Dissipation	P_D	1.2	W
Thermal Resistance Junction to Ambient[2)]	$R_{\theta JA}$	104	℃/W
Operating Junction Temperature	T_J	-55 ~ +150	℃
Storage Temperature	T_{STG}	-55 ~ +150	℃

Electrical characteristics (T_J=25 °C, unless otherwise noted)

Parameter	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Static Characteristics						
Drain-source breakdown voltage	$V_{(BR)DSS}$	V_{GS} =0V, I_D =-250μA	-20			V
Zero gate voltage drain current	I_{DSS}	V_{DS} =-20V, V_{GS} =0V			-1	μA
Gate-body leakage current	I_{GSS}	V_{DS} =0V, V_{GS} =±10V			±100	nA
Gate threshold voltage	$V_{GS(th)}$	V_{DS} =V_{GS}, I_D =-250μA	-0.4	-0.62	-1	V
Drain-source on-resistance	$R_{DS(on)}$	V_{GS} =-4.5V, I_D =-5.4A		27	39	mΩ
		V_{GS} =-2.5V, I_D =-4A		36	49	
		V_{GS} =-1.8V, I_D =-3A		48	63	
Dynamic characteristics[3)]						
Input Capacitance	C_{iss}	V_{DS} =-10V, V_{GS} =0V, f =1MHz		1010		pF
Output Capacitance	C_{oss}			130		
Reverse Transfer Capacitance	C_{rss}			109		
Total Gate Charge	Q_g	V_{DS} =-10V, V_{GS} =-4.5V I_D =-4A		10.98		nC
Gate-Source Charge	Q_{gs}			2.17		
Gate-Drain Charge	Q_{gd}			2.54		
Turn-on delay time	$t_{d(on)}$	V_{DS} =-10V, V_{GS} =-4.5V R_G =3Ω, R_L =2.5Ω		8		nS
Turn-on rise time	t_r			36		
Turn-off delay time	$t_{d(off)}$			77		
Turn-off fall time	t_f			56		
Source-Drain Diode characteristics						
Diode Forward Current	I_S				-5.4	A
Diode Forward voltage	V_{SD}	V_{GS} =0V, I_S =-5.4A			-1.2	V
Reverse Recovery Time	T_{rr}	I_F =-4A, di/dt =-100 A/μs		25		nS
Reverse Recovery Charge	Q_{rr}			4.38		nC

Notes:

1) Pulse Test: Pulse Width ≤300μs, Duty Cycle ≤2%.

2) $R_{\theta JA}$ is the sum of the junction-to-case and case-to-ambient thermal resistance, where the case thermal reference is defined as the solder mounting surface of the drain pins. $R_{\theta JC}$ is guaranteed by design, while $R_{\theta JA}$ is determined by the board design. The maximum rating presented here is based on mounting on a 1 in 2 pad of 2oz copper

3) Guaranteed by design, not subject to production testing.

Typical Characteristics

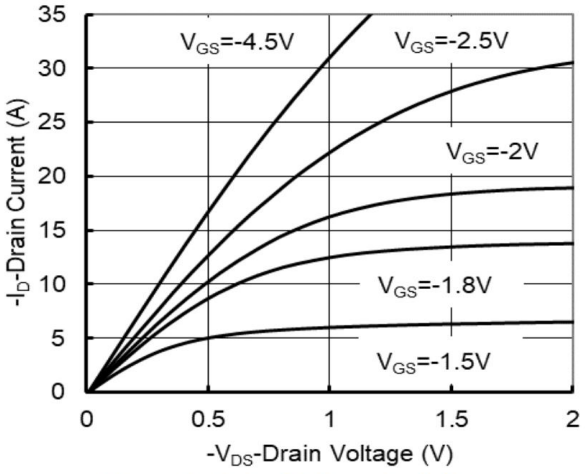


Figure1. Output Characteristics

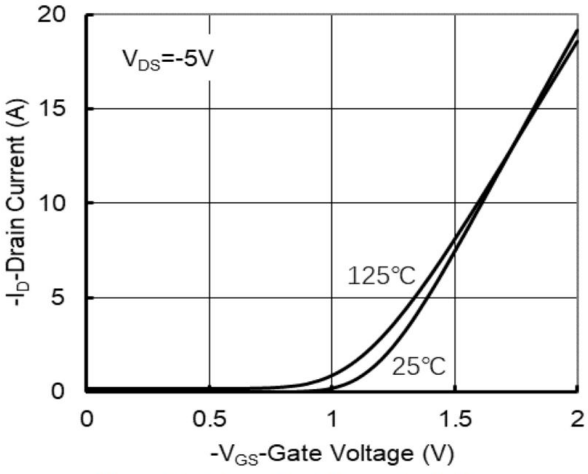


Figure2. Transfer Characteristics

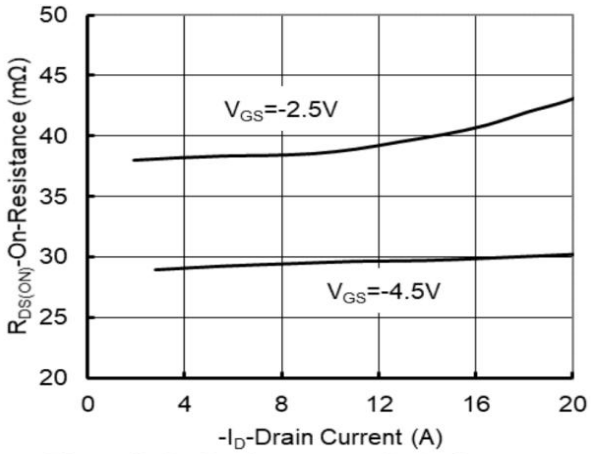


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

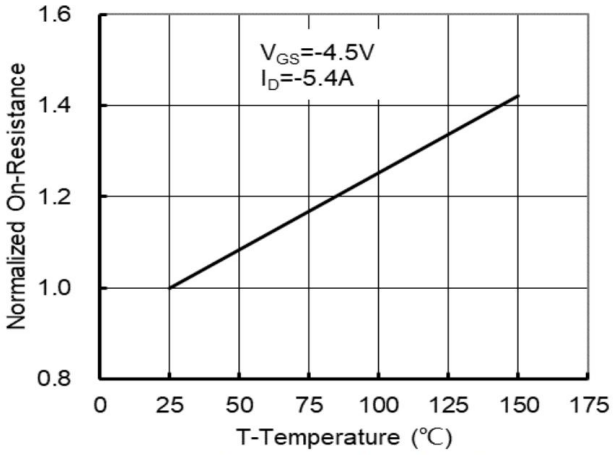


Figure 4: On-Resistance vs. Junction Temperature

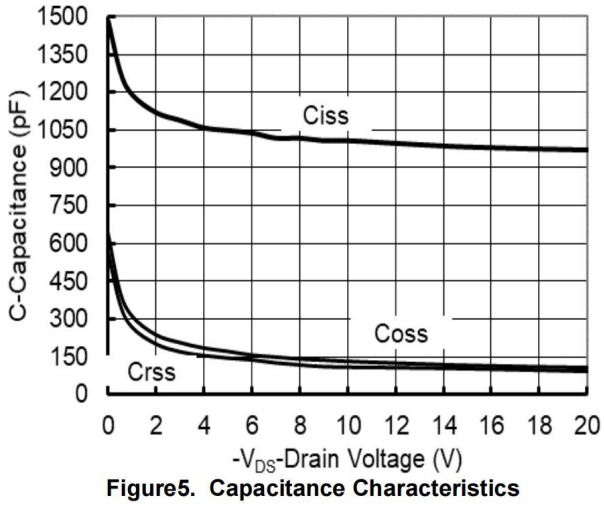


Figure5. Capacitance Characteristics

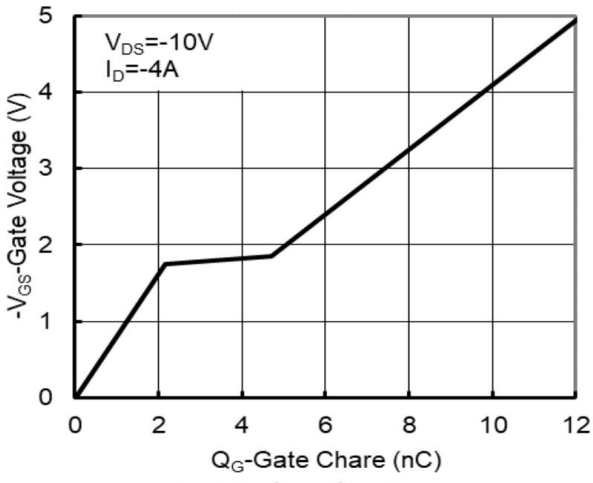


Figure6. Gate Charge

Typical Characteristics

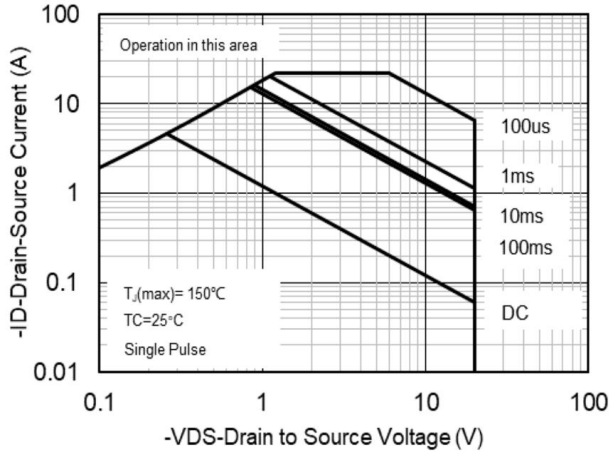


Figure7. Safe Operation Area

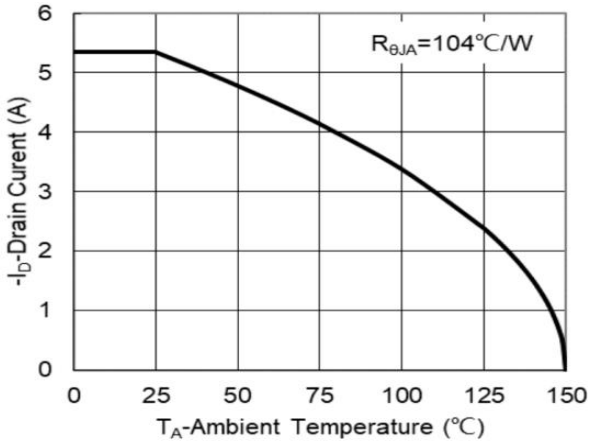


Figure8. Maximum Continuous Drain Current vs Ambient Temperature

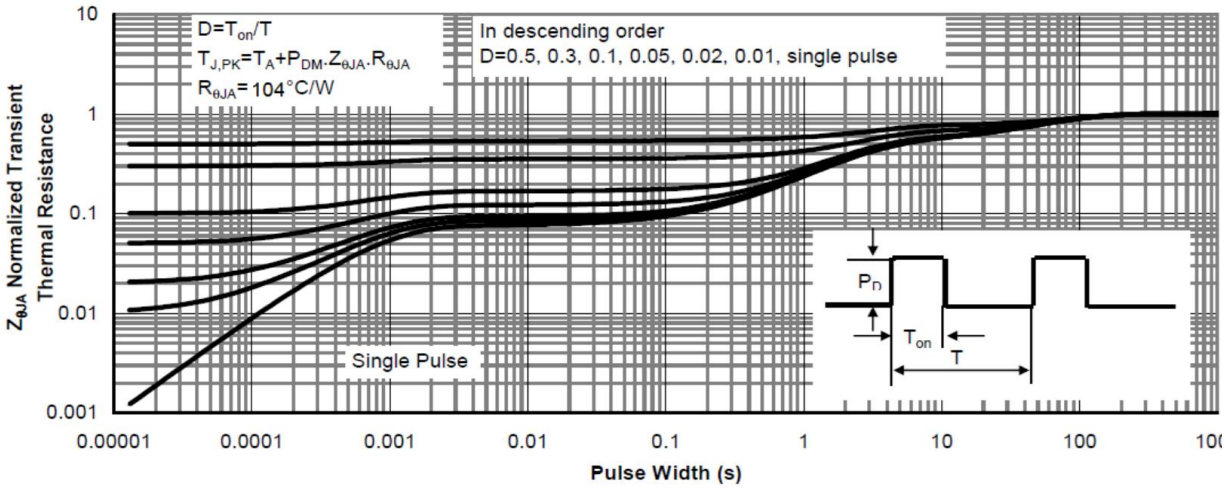
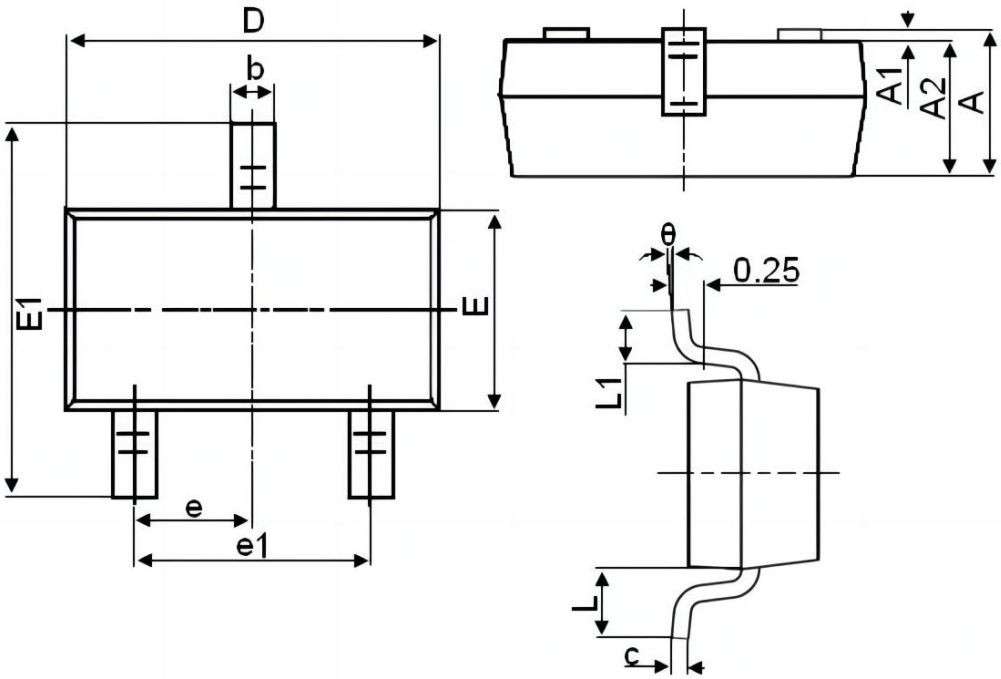


Figure9. Normalized Maximum Transient Thermal Impedance

SOT-23 Package Information



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	0.900	1.150	0.035	0.045
A1	0.000	0.100	0.000	0.004
A2	0.900	1.050	0.035	0.041
b	0.300	0.500	0.012	0.020
c	0.080	0.200	0.003	0.008
D	2.800	3.000	0.110	0.118
E	1.200	1.400	0.047	0.055
E1	2.250	2.550	0.089	0.100
e	0.950 TYP.		0.037 TYP.	
e1	1.800	2.000	0.071	0.079
L	0.550 REF.		0.022 REF.	
L1	0.300	0.500	0.012	0.020
θ	0°	8°	0°	8°