VUSB1P2R450PA

Datasheet

45mΩ, -12V, P-Channel Power MOSFET VUSB1P2R450PA

General Description

$V_{(BR)DSS}$	$R_{DS(ON)\_max}$	I_D
-12V	45mΩ@-4.5V	-4.1A
	60mΩ@-2.5V	
	90mΩ@-1.8V	

Symbol

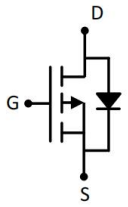


Figure 1 Symbol of VUSB1P2R450PA

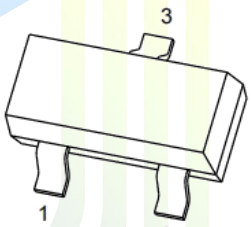
Features

- Trench FET Power MOSFET
- Excellent $R_{DS(on)}$ and Low Gate Charge

Application

- PWM application
- DC/DC Converter
- Load Switch for Portable Devices
- Battery Switch

Package Type



1. GATE
2. SOURCE
3. DRAIN

SOT-23

Figure 2 Package Type of VUSB1P2R450PA

Ordering Information

Product Name	Package
VUSB1P2R450PA	SOT-23

Absolute Maximum Ratings (T_A= 25 ºC, unless otherwise specified)

Parameter	Symbol	Rating	Unit
Drain-Source Voltage	V_{DSS}	-12	V
Gate-Source Voltage	V_{GSS}	±10	V
Continuous Drain Current[Note1]	I_D	-4.1	A
Pulsed Drain Current [Note2]	I_{DM}	-15	
Total Power Dissipation[Note4]	P_D	0.35	W
Junction Temperature	T_J	150	ºC
Storage Temperature	T_{STG}	-55 to 150	ºC

Thermal Resistance

Parameter	Symbol	Min	Typ	Max	Unit
Thermal Resistance, Junction-to-Ambient[Note5]	$R_{\theta JA}$		357		ºC/W

Electrical Characteristics (T_J= 25 ºC, unless otherwise specified)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Statistic Characteristics						
Drain-Source Breakdown Voltage	BV_{DSS}	V_{GS}=0V, I_D= 250uA	-12			V
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS}= -12V, V_{GS}=0V			-1	uA
Gate-Body Leakage Current	I_{GSS}	V_{GS} = ±10V, V_{DS}= 0V			±100	nA
Gate Threshold Voltage[Note3]	$V_{GS(th)}$	V_{DS}=V_{GS}, I_D=-250uA	-0.5	-0.65	-0.9	V
Static Drain-Source On-Resistance[Note3]	$R_{DS(ON)}$	V_{GS}=-4.5V, I_D= -3.5A		30	45	mΩ
		V_{GS}=-2.5V, I_D= -3.0A		40	60	
		V_{GS}=-1.8V, I_D= -2.0A		60	90	
Forward Transconductance[Note3]	g_{FS}	V_{DS}=-5V, I_D= -4.1A	6			S
Dynamic Characteristics						
Input Capacitance	C_{ISS}	V_{DS}=-4V		740		pF
Output Capacitance	C_{OSS}	V_{GS}=0V		290		pF
Reverse Transfer Capacitance	C_{RSS}	f=1MHz		190		pF
Total Gate Charge	Q_g	V_{DS}=-4V		4.5	9	nC
Gate-Source Charge	Q_{gs}	V_{GS}=-2.5V		1.2		
Gate-Drain Charge	Q_{gd}	I_D= -4.1A		1.6		
Gate Resistance	Rg	f = 1MHz, Open drain	1.4		14	Ω
Switching Parameters						
Turn-on Delay Time	$t_{d(on)}$	V_{DD}= -4V		13	20	ns
Turn-on Rise Time	t_r	V_{GS}= -4.5V		35	53	
Turn-off Delay Time	$t_{d(off)}$	R_L=1.2Ω		32	48	
Turn-off Fall Time	t_f	R_G=1Ω, I_D= -3.3A		10	20	
Turn-on Delay Time	$t_{d(on)}$	V_{DD}= -4V		5	10	
Turn-on Rise Time	t_r	V_{GS}= -8V		11	17	
Turn-off Delay Time	$t_{d(off)}$	R_L=6Ω		22	33	
Turn-off Fall Time	t_f	R_G=1Ω, I_D= -3.3A		16	24	
Diode Characteristics						
Diode Forward Voltage [Note3]	V_{SD}	V_{GS}=0V, I_S= -3.3A			-1.2	V
Continuous Source Current	I_S	T_C=25 ºC			-1.4	A
Pulsed Source Current	I_{SM}				-10	

Notes :

1.The maximum current rating is limited by package.And device mounted on a large heatsink.

2.Pulse Test : Pulse Width ≤ 10μs, duty cycle ≤ 1%.

3.Pulse Test : Pulse Width ≤ 300μs, duty cycle ≤ 2%.

4.The power dissipation P_D is limited by $T_{J(MAX)}$ = 150°C.And device mounted on a large heatsink

5.Device mounted on 1in^2 FR-4 board with 2oz. Copper, in a still air environment with T_A =25°C.

Typical Performance Characteristics

Figure 3: Transfer Characteristics

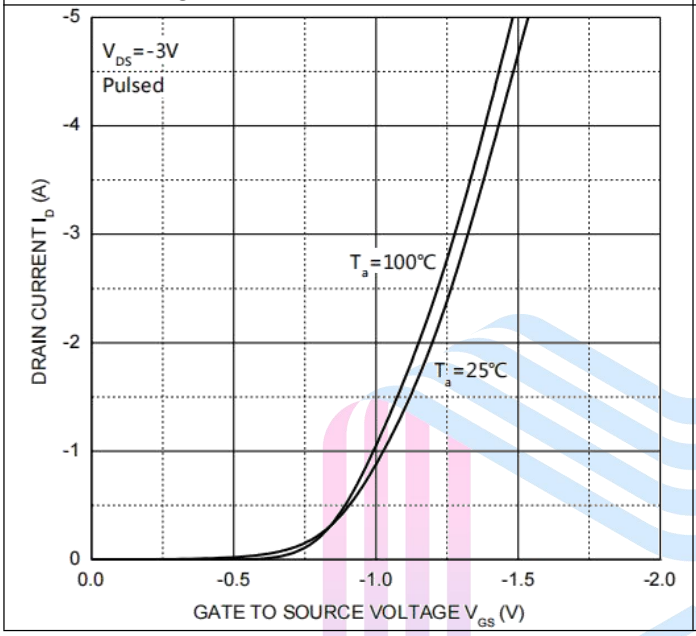


Figure 4: Output Characteristics

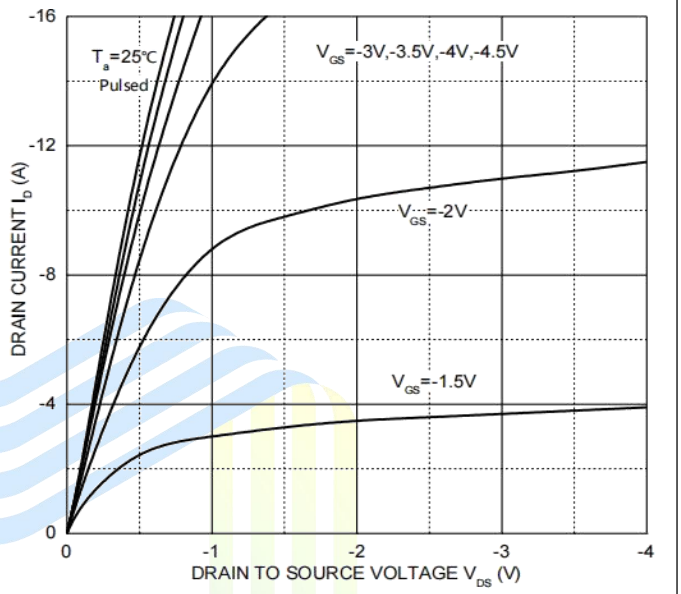


Figure 5: On-Resistance vs. Drain Current

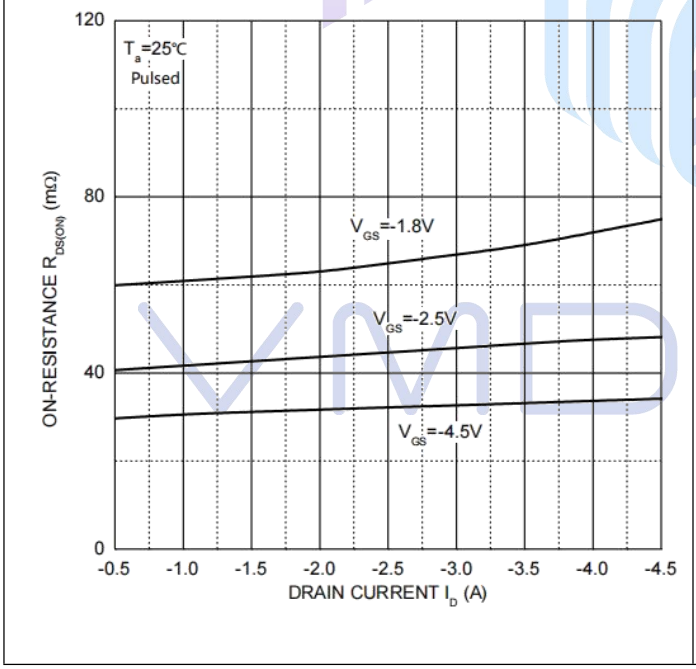


Figure 6: On-Resistance vs. Gate Voltage

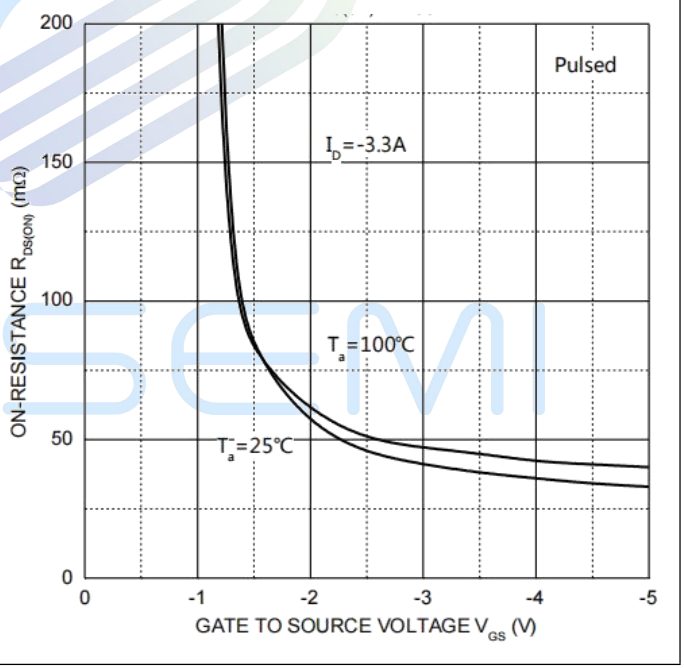


Figure 7: Body Diode Characteristics

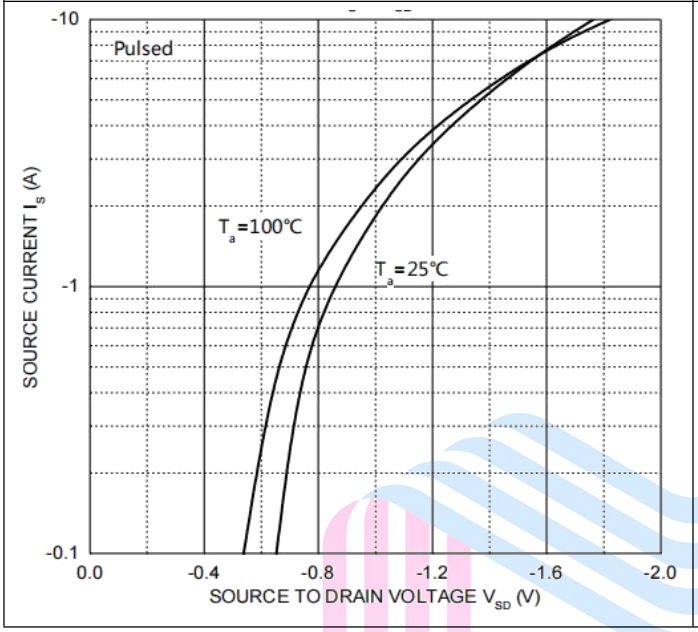
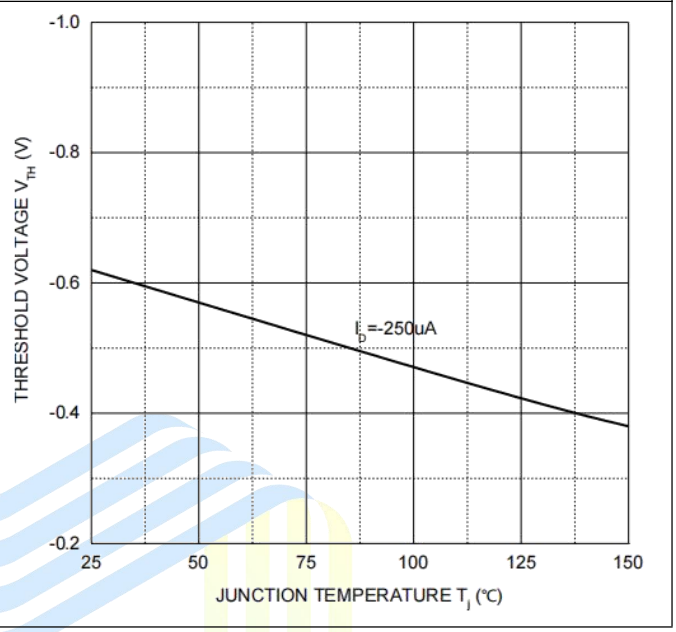
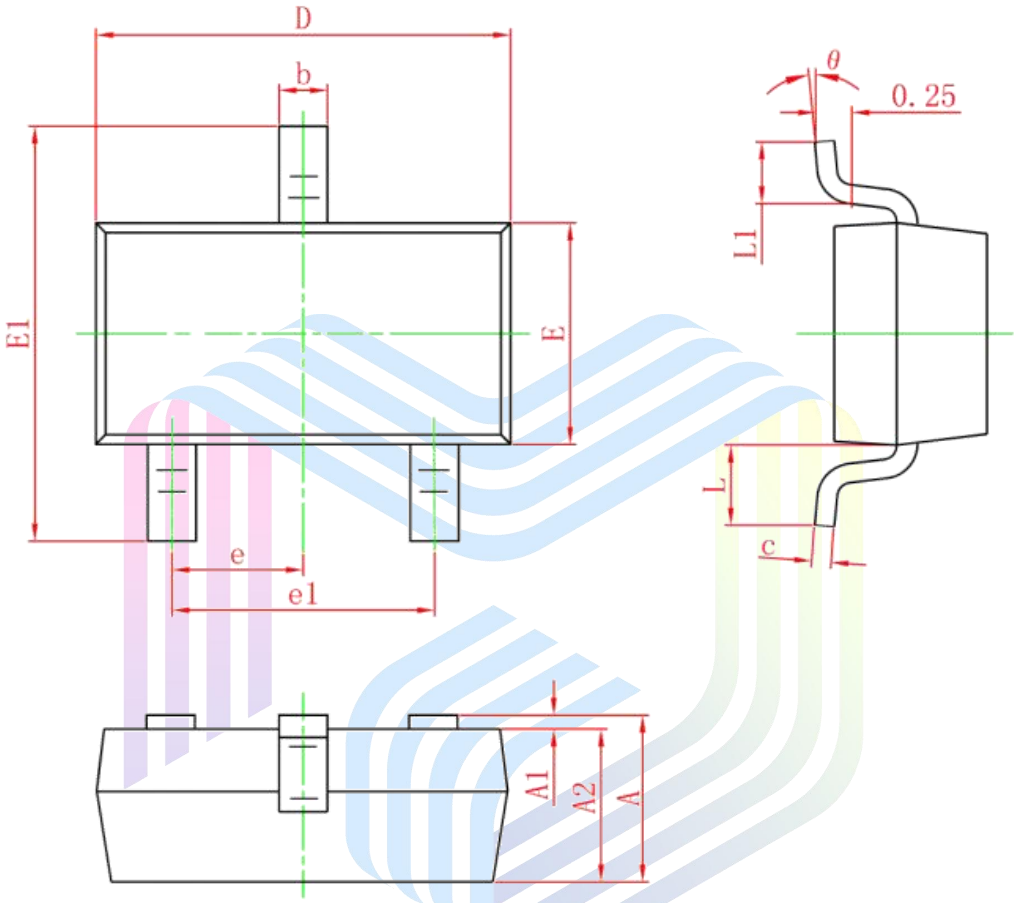


Figure 8: Threshold Voltage



Mechanical Dimensions:

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	0.100	0	0.004
A2	0.900	1.050	0.035	0.041
b	0.300	0.500	0.012	0.020
c	0.080	0.150	0.003	0.006
D	2.800	3.000	0.110	0.118
E	1.150	1.500	0.045	0.059
E1	2.250	2.650	0.089	0.104
e	0.950TYP		0.037TYP	
e1	1.800	2.000	0.071	0.079
L	0.550REF		0.022REF	
L1	0.300	0.500	0.012	0.020
θ	0°	8°	0°	8°

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