VUSB002R390PA

Datasheet

General Description

VUSB002R390PA MOSFET is based on unique device design to achieve low $R_{DS(ON)}$, low gate charge, fast switching and excellent avalanche characteristics.

Symbol

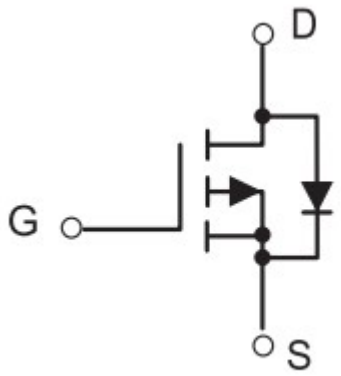


Figure 1 Symbol of VUSB002R390PA

Features

- Trench Technology LV Power MOSFET
- $R_{DS(ON)\_max}$ = 39.0mΩ@V_{GS} = -4.5V
- Low Gate Charge
- High Power and Current handing capability

Application

- Power switching application
- Load Switch
- Battery protection

Package Type

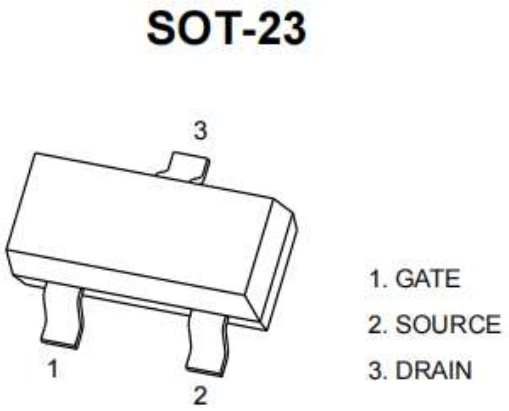


Figure 2 Package Type of VUSB002R390PA

Ordering Information

Product Name	Package
VUSB002R390PA	SOT-23

Absolute Maximum Ratings

Parameter	Symbol	Rating	Unit
Drain-Source Voltage	V_{DSS}	-20	V
Gate-Source Voltage	V_{GSS}	±10	V
Continuous Drain Current T_A = 25℃	I_D	-5.4	A
Continuous Drain Current T_A = 70℃		-4.4	A
Pulsed Drain Current[Note1]	I_{DM}	-22	A
Total Power Dissipation T_A = 25℃	P_D	1.2	W
Total Power Dissipation T_A = 70℃		0.8	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 [Note2]	$R_{\theta JA}$		104		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	-20			V
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS}= -20V, V_{GS}=0V			-1	uA
Gate-Body Leakage Current	I_{GSS}	V_{GS} = ±10V			±100	nA
Gate Threshold Voltage	$V_{GS(th)}$	V_{DS}=V_{GS}, I_D=-250uA	-0.4	-0.62	-1.0	V
Static 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= -3.0A		48	63	
Dynamic Characteristics						
Input Capacitance	C_{ISS}	V_{DS}= -10V		1010		pF
Output Capacitance	C_{OSS}	V_{GS}=0V		130		pF
Reverse Transfer Capacitance	C_{RSS}	f=1MHz		109		pF
Turn-on Delay Time	$t_{d(on)}$	V_{DS}= -10V		8.4		ns
Rise Time	t_r	V_{GS}= -4.5V		36.2		
Turn-off Delay Time	$t_{d(off)}$	R_L= 2.5Ω		76.8		
Fall Time	t_f	R_G=3.0Ω		56.2		
Gate Charge Characteristics						
Gate to Source Charge	Q_{gs}	V_{DS}= -10V		2.17		nC
Gate to Drain Charge	Q_{gd}	V_{GS}= -4.5V		2.54		
Gate Charge Total	Q_g	I_D= -4A		10.98		
Reverse Recovery Charge	Q_{rr}	I_F= -4A		4.38		nC
Reverse Recovery Time	t_{rr}	di/dt=100A/us		24.8		ns
Diode Characteristics						
Diode Forward Voltage	V_{SD}	V_{GS}=0V, I_S= -5.4A			-1.2	V

Notes :

1. Pulse Test: Pulse Width≤300us,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.

Typical Performance Characteristics

Figure 3: Transfer Characteristics

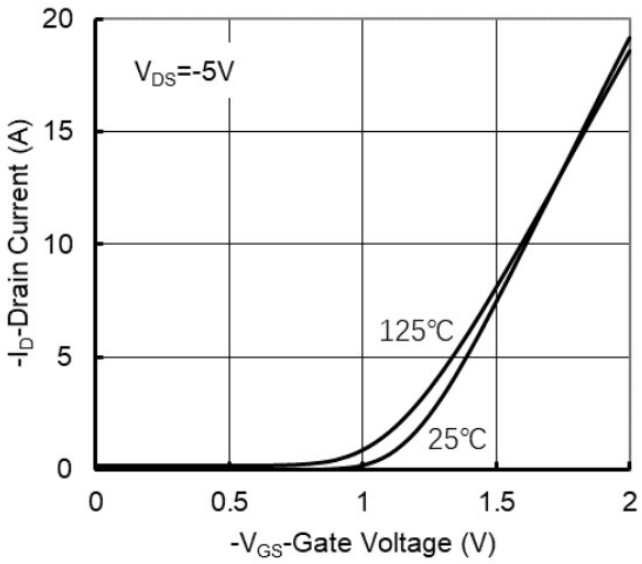


Figure 4: Output Characteristics

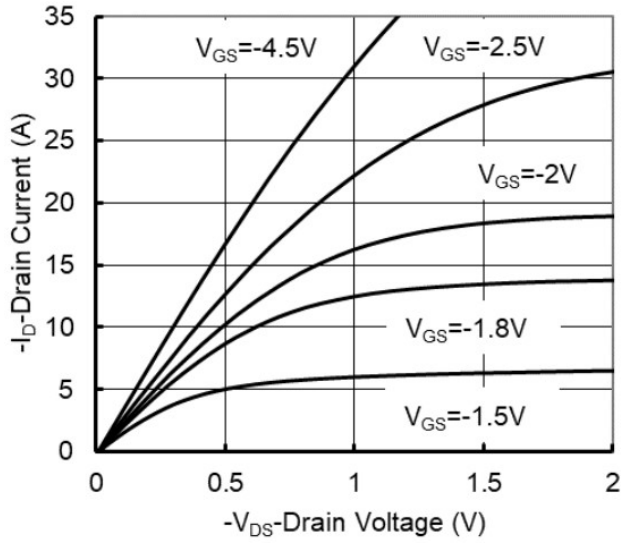


Figure 5: On-Resistance vs. Drain Current and Gate Voltage

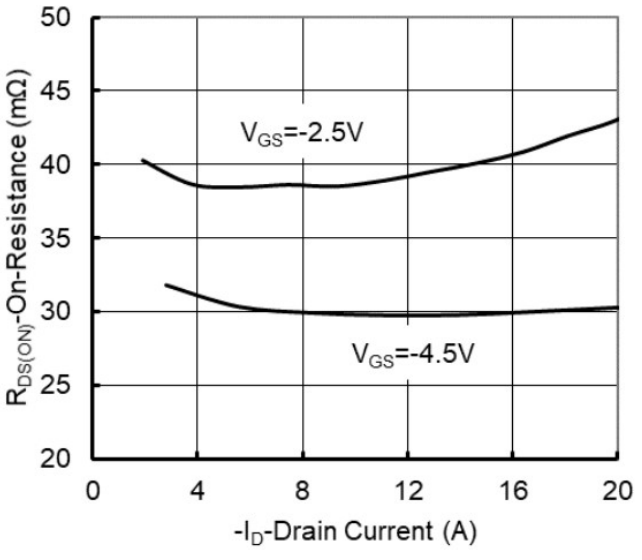


Figure 6: On-Resistance vs. Junction Temperature

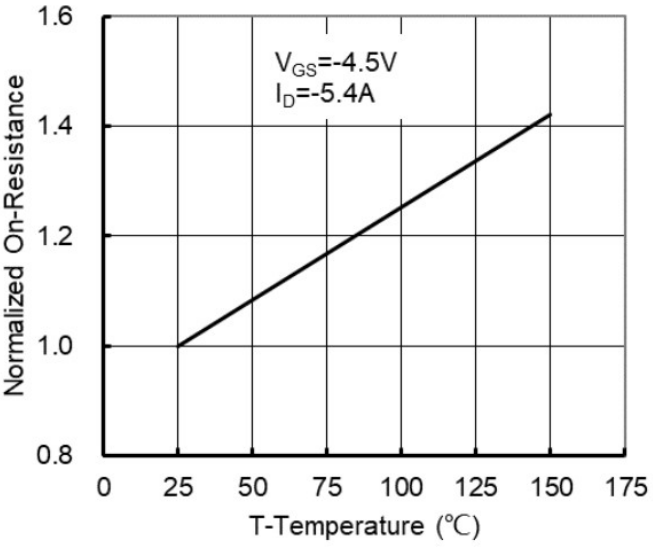


Figure 7: Capacitance Characteristics

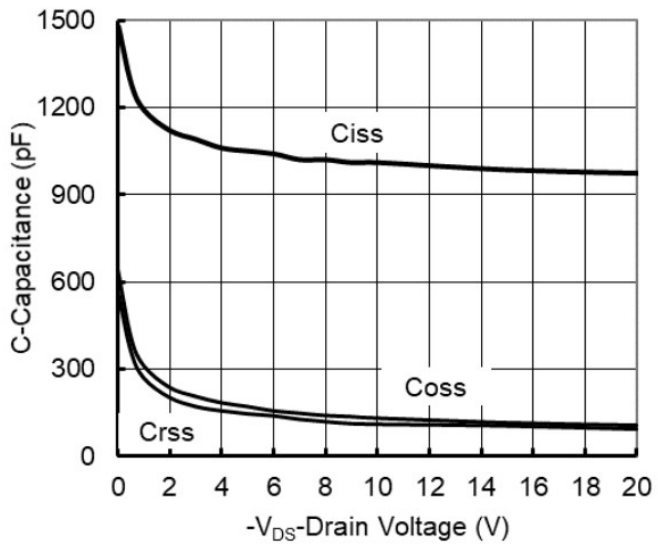


Figure 8: Gate Charge

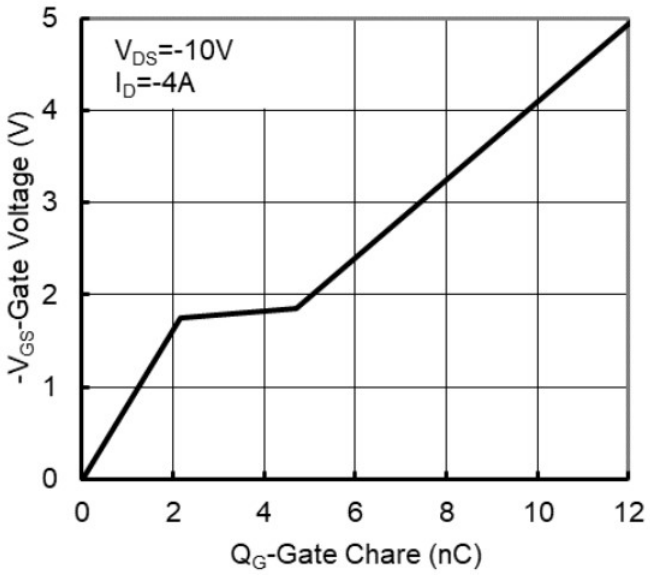


Figure 9: Safe Operation Area

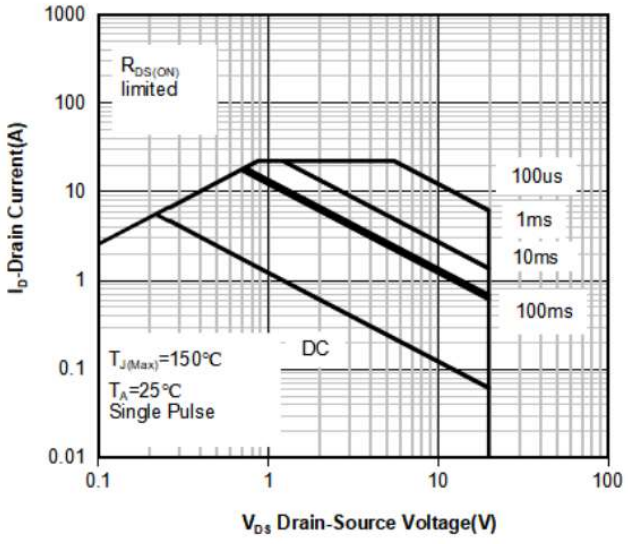


Figure 10: Maximum Continuous Drain Current vs Ambient Temperature

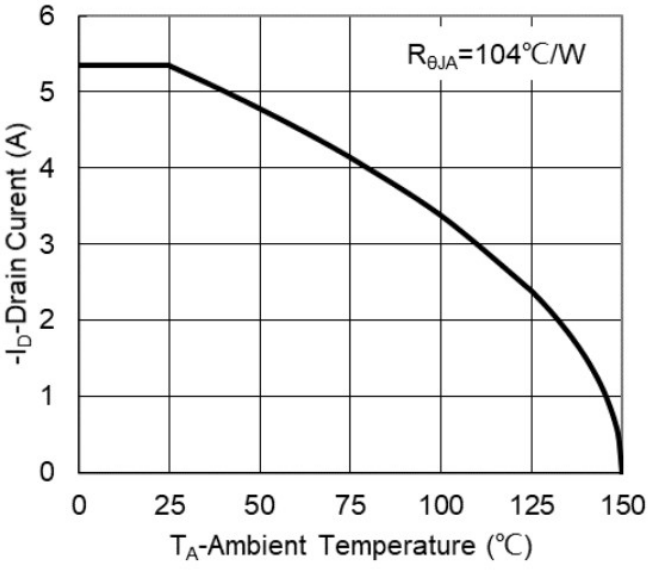
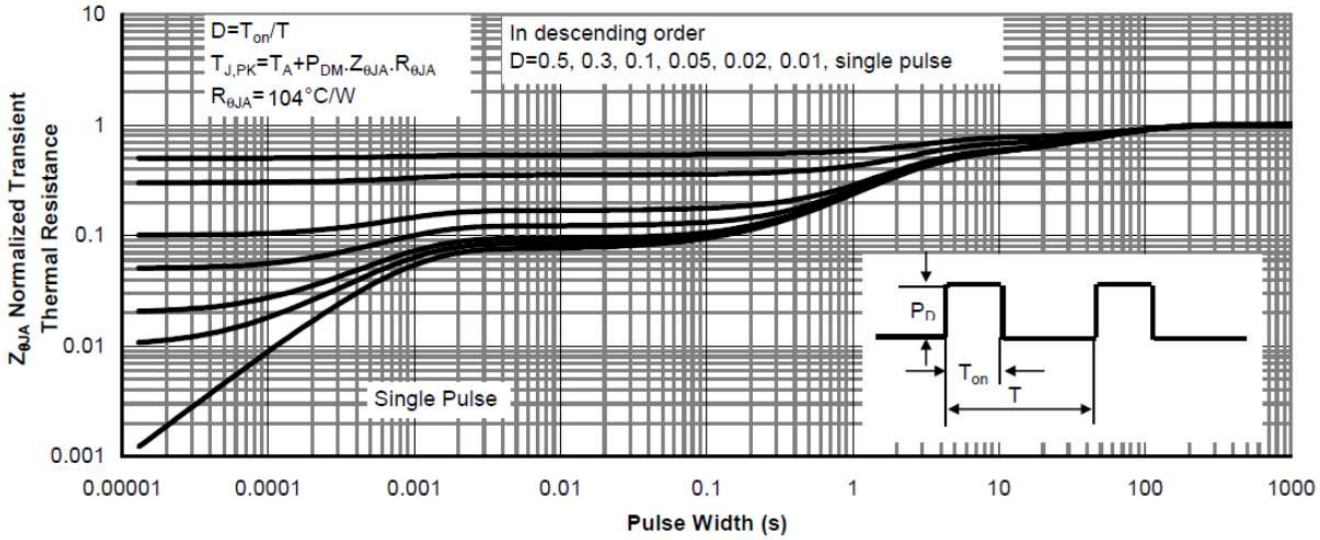
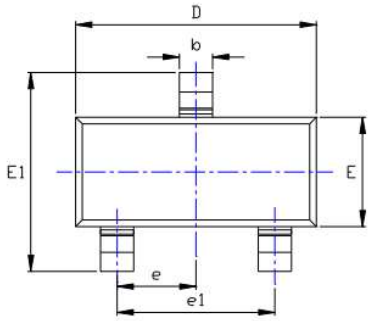


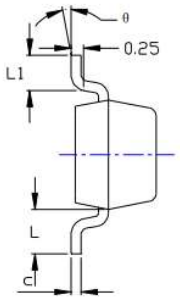
Figure 10: Normalized Maximum Transient Thermal Impedance



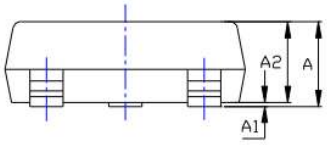
Mechanical Dimensions:



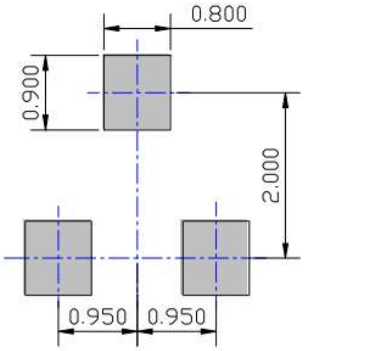
TOP VIEW



SIDE VIEW



SIDE VIEW



UNIT：mm

SUGGESTED SOLDER PAD LAYOUT

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	0.150		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	0.950REF			0.037REF	
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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