



VMDSEMI

**VUSB003R600PA**

**Datasheet**



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## General Description

## Symbol

$V_{(BR)DSS}$	$R_{DS(ON)_{max}}$	$I_D$
-30V	60mΩ@-10V	-4.2A
	87mΩ@-4.5V	

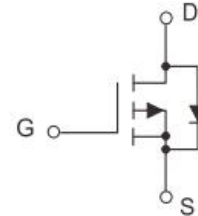
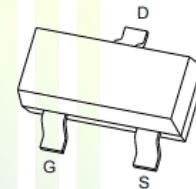


Figure 1 Symbol of VUSB003R600PA

## Features

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

## Package Type



**SOT-23**

## Application

- DC/DC Converter
- Load Switch

Figure 2 Package Type of VUSB003R600PA

## Ordering Information

Product Name	Package
VUSB003R600PA	SOT-23

**Absolute Maximum Ratings** ( $T_A = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified)

Parameter	Symbol	Rating	Unit
Drain-Source Voltage	$V_{DS}$	-30	V
Gate-Source Voltage	$V_{GS}$	$\pm 20$	V
Continuous Drain Current <sup>Note1</sup>	$I_D$	-4.2	A
Pulsed Drain Current <sup>Note2</sup>	$I_{DM}$	-16	
Total Power Dissipation <sup>Note4</sup>	$P_D$	1.4	W
Junction Temperature	$T_J$	150	$^{\circ}\text{C}$
Storage Temperature	$T_{STG}$	-55 to 150	$^{\circ}\text{C}$

**Thermal Resistance**

Parameter	Symbol	Min	Typ	Max	Unit
Thermal Resistance, Junction-to-Ambient <sup>Note5</sup>	$R_{\theta JA}$		89		$^{\circ}\text{C/W}$

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**60mΩ, -30V, P-Channel Power MOSFET**
**VUSB003R600PA**
**Electrical Characteristics** ( $T_A = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Statistic Characteristics						
Drain-Source Breakdown Voltage	BV <sub>DSS</sub>	V <sub>GS</sub> =0V, I <sub>D</sub> = 250uA	-30			V
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	V <sub>DS</sub> = -24V, V <sub>GS</sub> =0V			-1	uA
Gate-Body Leakage Current	I <sub>GSS</sub>	V <sub>GS</sub> = ±20V, V <sub>DS</sub> = 0V			±100	nA
Gate Threshold Voltage <sup>Note3</sup>	V <sub>GS(th)</sub>	V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =-250uA	-1	-1.6	-3	V
Static Drain-Source On-Resistance <sup>Note3</sup>	R <sub>DS(ON)</sub>	V <sub>GS</sub> =-10V, I <sub>D</sub> = -4.1A		45	60	mΩ
		V <sub>GS</sub> =-4.5V, I <sub>D</sub> = -3A		57	87	
Forward Transconductance <sup>Note3</sup>	g <sub>FS</sub>	V <sub>DS</sub> =-5V, I <sub>D</sub> = -4A	5			S
Dynamic Characteristics						
Input Capacitance	C <sub>ISS</sub>	V <sub>DS</sub> =-15V		572		pF
Output Capacitance	C <sub>OSS</sub>	V <sub>GS</sub> =0V		65		pF
Reverse Transfer Capacitance	C <sub>RSS</sub>	f=1MHz		57		pF
Total Gate Charge	Q <sub>g</sub>	V <sub>DS</sub> =-15V		10		nC
Gate-Source Charge	Q <sub>gs</sub>	V <sub>GS</sub> =-10V		2		
Gate-Drain Charge	Q <sub>gd</sub>	I <sub>D</sub> = -4.1A		3.4		
Switching Parameters						
Turn-on Delay Time	t <sub>d(on)</sub>	V <sub>DD</sub> = -15V		8		ns
Turn-on Rise Time	t <sub>r</sub>	V <sub>GS</sub> = -10V		6.2		
Turn-off Delay Time	t <sub>d(off)</sub>	R <sub>L</sub> =3.65Ω		25		
Turn-off Fall Time	t <sub>f</sub>	R <sub>G</sub> =3Ω		10		
Diode Characteristics						
Diode Forward Voltage <sup>Note3</sup>	V <sub>SD</sub>	V <sub>GS</sub> =0V, I <sub>S</sub> = -2A			-1.2	V

Notes :

- 1.The maximum current rating is limited by package.And device mounted on a large heatsink.
- 2.Pulse Test : Pulse Width  $\leq 10\mu s$ , duty cycle  $\leq 1\%$ .
- 3.Pulse Test : Pulse Width  $\leq 300\mu s$ , duty cycle  $\leq 2\%$ .
- 4.The power dissipation  $P_D$  is limited by  $T_{J(MAX)} = 150^{\circ}\text{C}$ .And device mounted on a large heatsink
- 5.Device mounted on 1in<sup>2</sup> FR-4 board with 2oz. Copper, in a still air environment with  $T_A = 25^{\circ}\text{C}$ .

## Typical Performance Characteristics

Figure 3: Transfer Characteristics

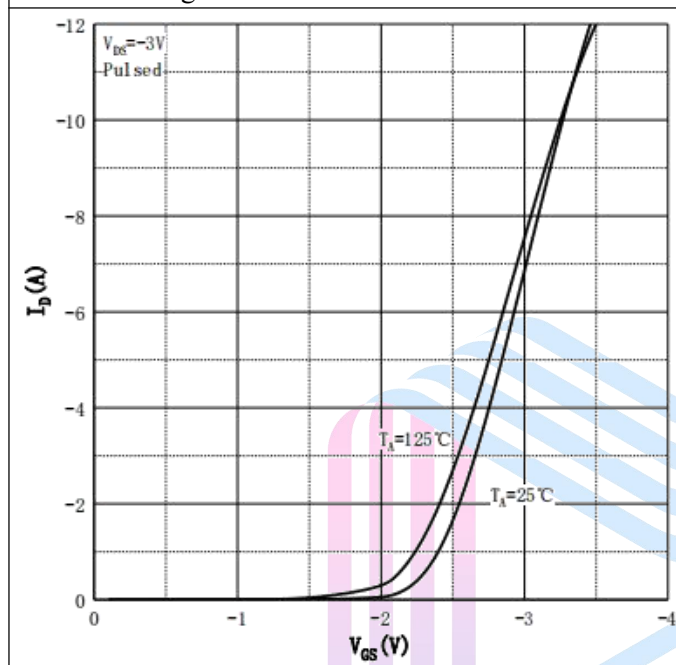


Figure 4: Output Characteristics

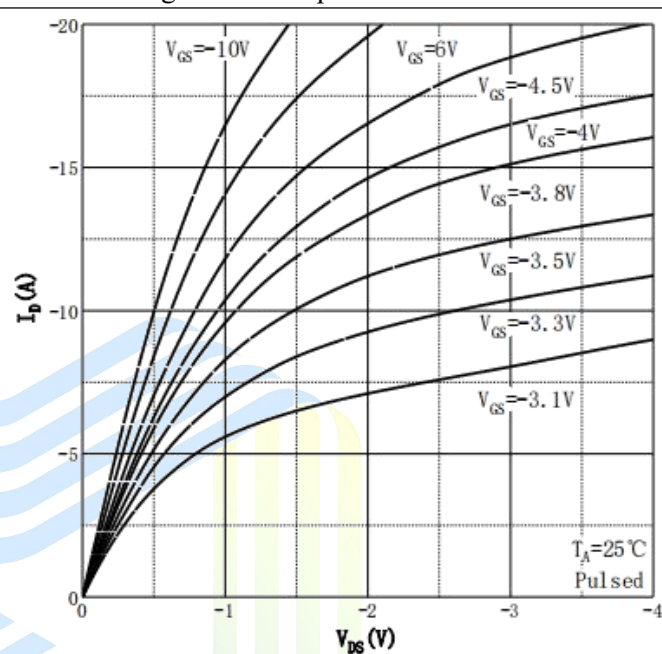


Figure 5: On-Resistance vs. Drain Current

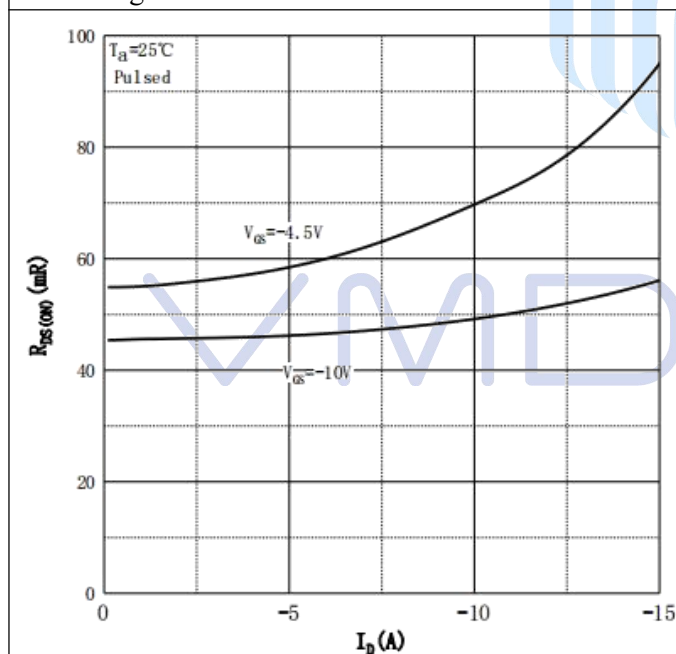
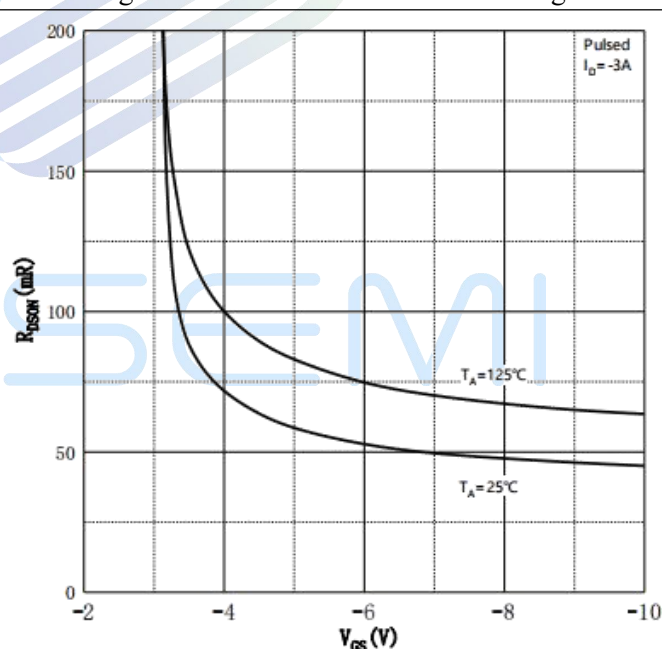
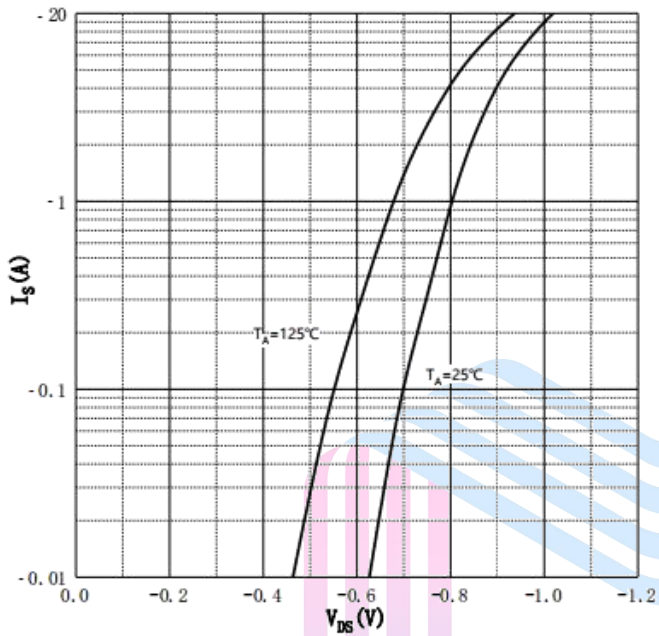
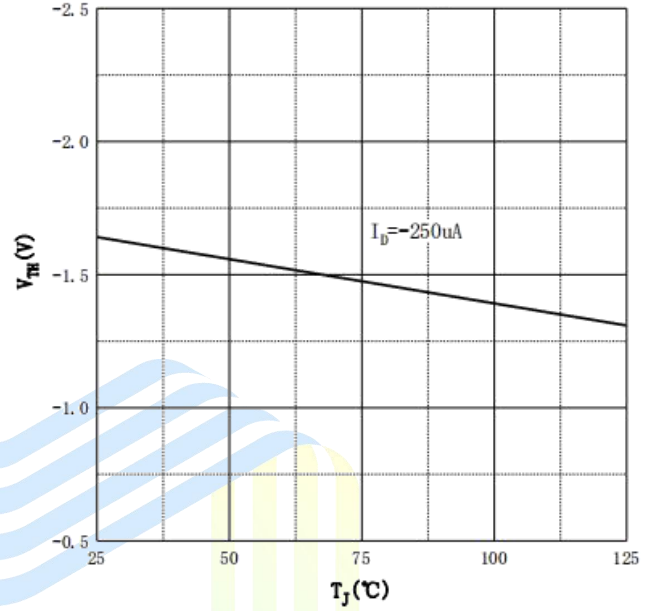


Figure 6: On-Resistance vs. Gate Voltage

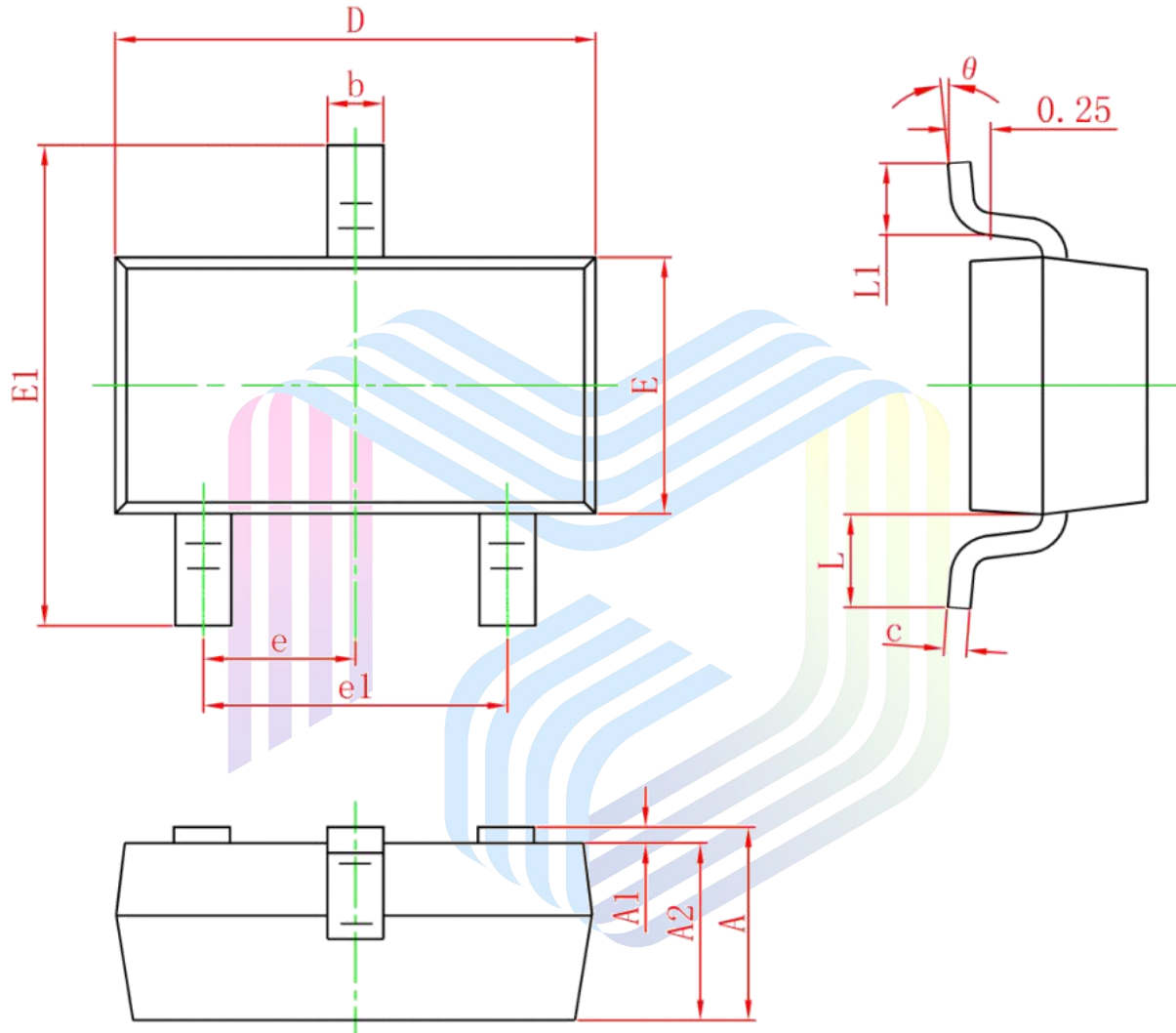


**Figure 7: Body Diode Characteristics**

**Figure 8: Threshold Voltage**


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## 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
$\theta$	0°	8°	0°	8°



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