

VMDSEMI

**VUSK002R52APA**

**Datasheet**

## General Description

$V_{(BR)DSS}$	$R_{DS(ON)_{max}}$	$I_D$
-20V	520mΩ@-4.5V	-0.66A
	780mΩ@-2.5V	
	1100mΩ@-1.8V	

## Symbol

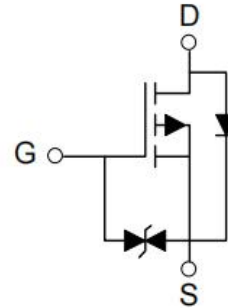
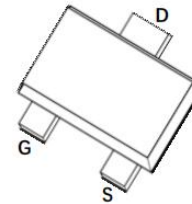


Figure 1 Symbol of VUSK002R52APA

## Features

- Trench Technology Power MOSFET
- Low  $R_{DS(on)}$
- Low Gate Charge
- ESD Protected

## Package Type



### SOT-523

Figure 2 Package Type of VUSK002R52APA

## Application

- Load/Power Switching
- Low Current Inverters
- Low Current DC/DC Converters

## Ordering Information

Product Name	Package
VUSK002R52APA	SOT-523

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

Parameter	Symbol	Rating	Unit
Drain-Source Voltage	$V_{DSS}$	-20	V
Gate-Source Voltage	$V_{GSS}$	$\pm 12$	V
Continuous Drain Current <sup>Note1,5</sup>	$I_D$	-0.66	A
Pulsed Drain Current <sup>Note2</sup>	$I_{DM}$	-2.0	A
Total Power Dissipation <sup>Note1</sup>	$P_D$	0.25	W
Junction Temperature	$T_J$	150	°C
Storage Temperature	$T_{STG}$	-55 to 150	°C

**Thermal Resistance**

Parameter	Symbol	Min	Typ	Max	Unit
Thermal Resistance, Junction-to-Ambient <sup>Note1</sup>	$R_{\theta JA}$		500		°C/W

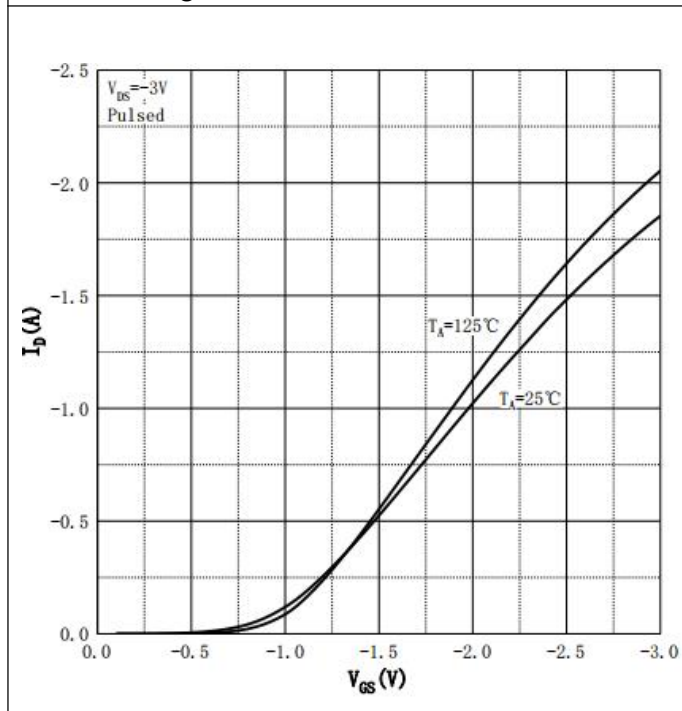
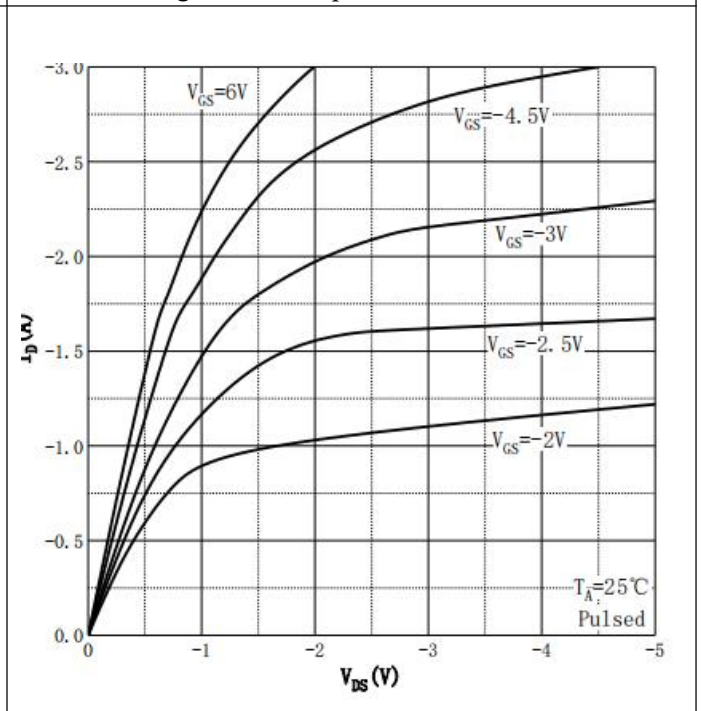
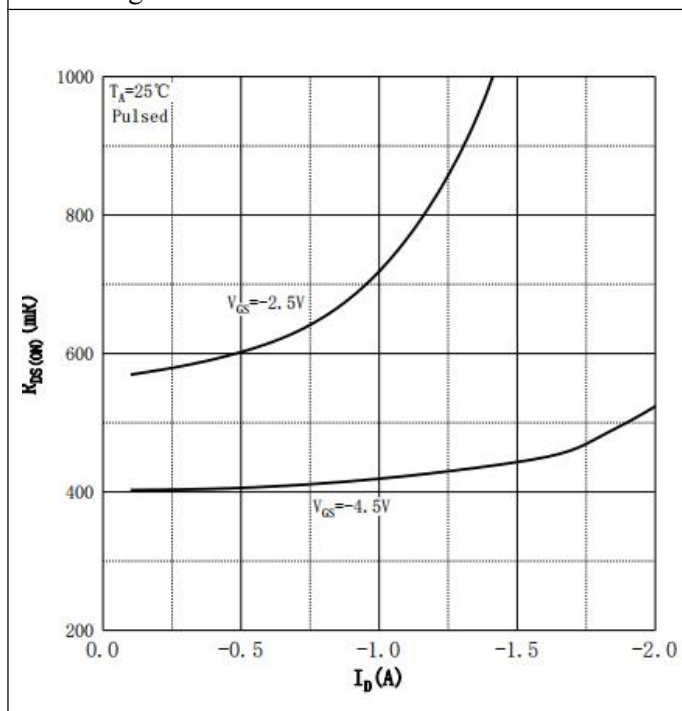
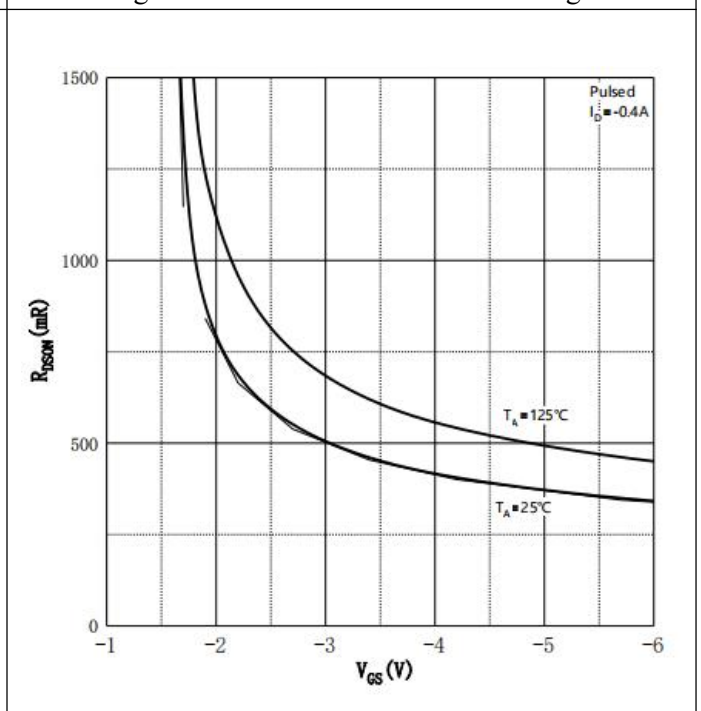
**Electrical Characteristics** ( $T_A = 25^\circ\text{C}$ , unless otherwise specified)

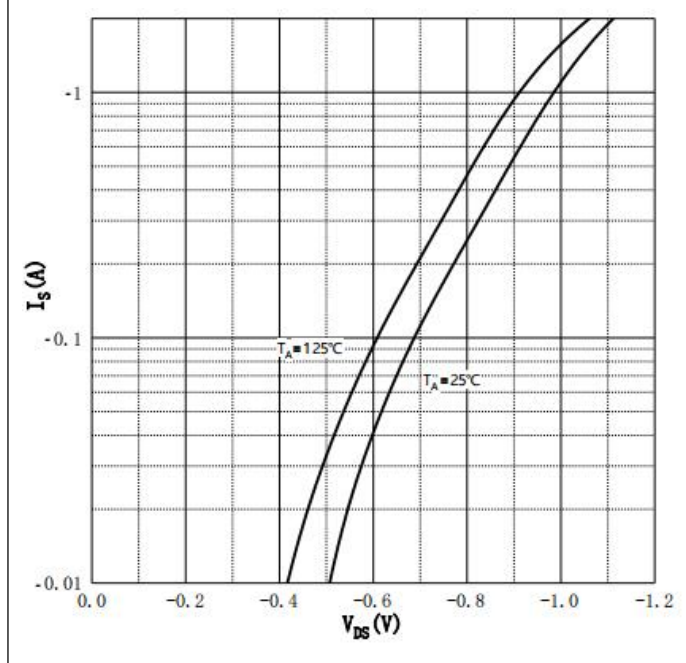
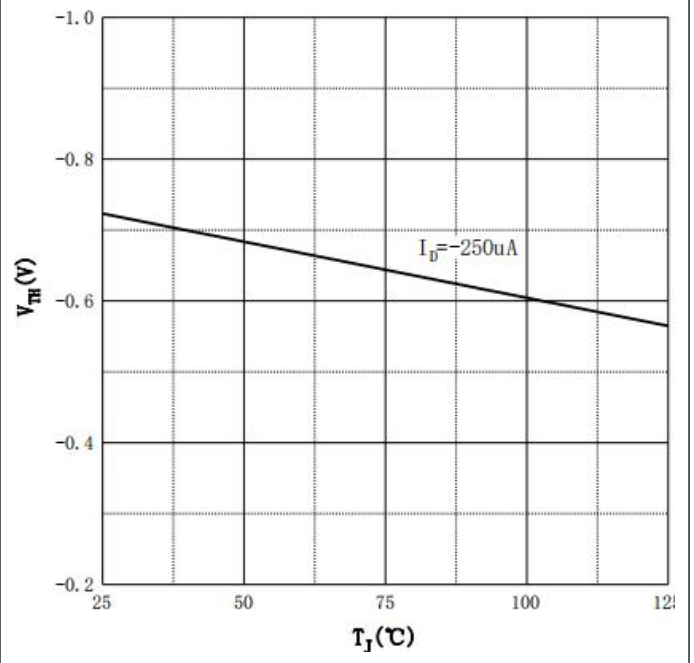
Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
<b>Statistic Characteristics</b>						
Drain-Source Breakdown Voltage	$BV_{DSS}$	$V_{GS}=0V, I_D = -250\mu A$	-20			V
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS} = -16V, V_{GS}=0V$			-1	$\mu A$
Gate-Body Leakage Current	$I_{GSS}$	$V_{GS} = \pm 10V, V_{DS} = 0V$			$\pm 10$	$\mu A$
Gate Threshold Voltage <sup>Note3</sup>	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=-250\mu A$	-0.4	-0.7	-1.0	V
Static Drain-Source On-Resistance <sup>Note3</sup>	$R_{DS(on)}$	$V_{GS} = -4.5V, I_D = -0.5A$		400	520	mΩ
		$V_{GS} = -2.5V, I_D = -0.3A$		570	780	
		$V_{GS} = -1.8V, I_D = -0.12A$		810	1100	
Forward tranconductance	$g_{FS}$	$V_{DS} = -5V, I_D = -0.4A$		1.0		S
<b>Dynamic Characteristics</b>						
Input Capacitance	$C_{ISS}$	$V_{DS} = -10V$		79		pF
Output Capacitance	$C_{OSS}$	$V_{GS}=0V$		15		pF
Reverse Transfer Capacitance	$C_{RSS}$	$f=1MHz$		13		pF
<b>Switching Parameters</b>						
Total Gate Charge	$Q_g$	$V_{DS} = -10V$		2.26		nC
Gate-source Charge	$Q_{gs}$	$V_{GS} = -4.5V$		0.45		
Gate-drain Charge	$Q_{gd}$	$I_D = -0.2A$		0.24		
Turn-on Delay Time	$t_{d(on)}$	$V_{DD} = -10V$		8		ns
Turn-on Rise Time	$t_r$	$V_{GS} = -4.5V$		5.5		
Turn-off Delay Time	$t_{d(off)}$	$R_L = 50\Omega$		30		
Turn-off Fall Time	$t_f$	$R_G = 3\Omega$		17		
<b>Diode Characteristics</b>						
Diode Forward Voltage <sup>Note3</sup>	$V_{SD}$	$V_{GS}=0V, I_S = -0.5A$			1.2	V

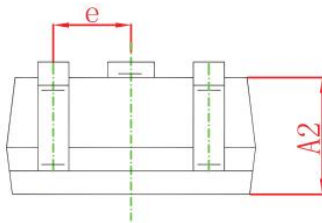
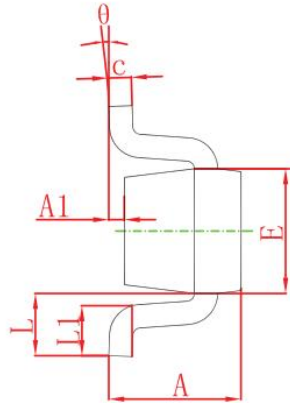
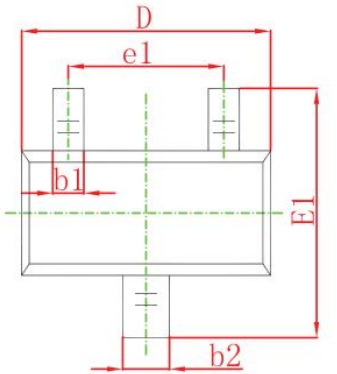
**Notes :**

- 1.The maximum current rating is limited by package.
- 2.Repetitive rating;pulse width limited by  $T_{J(MAX)} = 150^\circ\text{C}$ .
- 3.Pulse Test : Pulse Width  $\leq 300\mu s$ , duty cycle  $\leq 2\%$ .
- 4.The power dissipation  $P_D$  is limited by  $T_{J(MAX)} = 150^\circ\text{C}$ .
- 5.Device mounted on  $1in^2$  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**


**Mechanical Dimensions:**
**SOT-523 Package Information**


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
θ	0°	8°	0°	8°

## NOTICE

Hangzhou VMD Semiconductor Co., Ltd (VMD) reserves the right to make changes without notice in order to improve reliability, function or design and to discontinue any product or service without notice. Customers should obtain the latest relevant information before orders and should verify that such information is current and complete. All products are sold subject to VMD's terms and conditions supplied at the time of order acknowledgement.

VMD, its affiliates, agents, and employees, and all persons acting on its or their behalf, disclaim any and all liability for any errors, inaccuracies or incompleteness contained herein or in any other disclosure relating to any product.

VMD disclaims any and all liability arising out of the use or application of any product described herein or of any information provided herein to the maximum extent permitted by law. The product specifications do not expand or otherwise modify VMD's terms and conditions of purchase, including but not limited to the warranty expressed therein, which apply to these products.

VMD warrants performance of its hardware products to the specifications at the time of sale, testing, reliability and quality control are used to the extent VMD deems necessary to support this warrantee. Except where agreed upon by contractual agreement, testing of all parameters of each product is not necessarily performed.

VMD does not assume any liability arising from the use of any product or circuit designs described herein. Customers are responsible for their products and applications using VMD's components. To minimize risk, customers must provide adequate design and operating safeguards.

VMD does not warrant or convey any license to any intellectual property rights either expressed or implied under its patent rights, nor the rights of others. Reproduction of information in VMD's data sheets or data books is permissible only if reproduction is without modification or alteration. Reproduction of this information with any alteration is an unfair and deceptive business practice.

VMD is not responsible or liable for such altered documentation. Resale of VMD's products with statements different from or beyond the parameters stated by VMD for that product or service voids all express or implied warranties for the associated VMD product or service and is an unfair and deceptive business practice.

All Rights Reserved.





## Via-Media Semiconductor Limited Company

<http://www.vmdsemi.com>

### Main Sites:

#### - Headquarters

Hangzhou Via-Media Semiconductor Co., LTD.  
1305-1306, Building 71, No. 90, Wensan Road, Xihu  
District, Hangzhou, Zhejiang Province, P.R. China  
Tel: +86-0571-8515 0563

#### - Shanghai

Shanghai R&D Center.  
1506~1508, Xinyin Building, 888 Yishan Road,  
Shanghai, P.R of China  
Tel: +86- 021-54201999

#### - Xi'an

Xi'an R&D Center  
1703B, Building A, Greenland Center, Jinye Road,  
High-Tech Zone, Xi'an, Shaanxi, P.R of China

#### - Chengdu Office

Chengdu Winhi Semiconductor Co., LTD.  
Floor 15, Building 5, No. 171, Hele 2<sup>nd</sup> Street,  
Chengdu, Sichuan Province, P.R. China  
Tel: +86-028-8505 0771

#### - Shenzhen

Shenzhen Sales office  
Room 4A15, Block AB, Tianxiang Building,  
Chegongmiao , Futian District, Shenzhen, P.R of China  
Tel: +86-0755- 82570682