



VMDSEMI

**VUSE004R220NA**

**Datasheet**



VMDSEMI

## General Description

## Symbol

$V_{(BR)DSS}$	$R_{DS(ON)_{max}}$	$I_D$
40V	22mΩ@10V	8A
	28mΩ@4.5V	

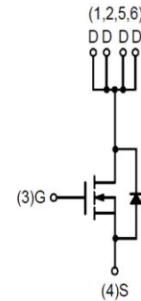


Figure 1 Symbol of VUSE004R220NA

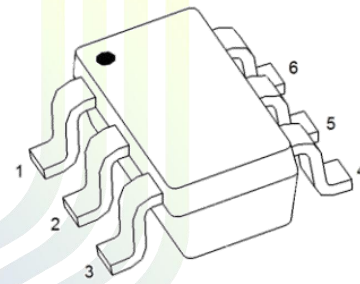
## Features

- Trench Technology Power MOSFET
- Low  $R_{DS(ON)}$
- Low Gate Charge

## Application

- DC-DC Converter
- Power Switch Application
- Hard Switched and High Frequency Circuits

## Package Type



## SOT-23-6L

Figure 2 Package Type of VUSE004R220NA

## Ordering Information

Product Name	Package
VUSE004R220NA	SOT-23-6L

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

Parameter	Symbol	Rating	Unit
Drain-Source Voltage	$V_{DS}$	40	V
Gate-Source Voltage	$V_{GS}$	$\pm 20$	V
Continuous Drain Current <sup>Note1</sup>	$I_D$	8	A
Pulsed Drain Current <sup>Note2</sup>	$I_{DM}$	32	
Avalanche Current <sup>Note3</sup>	$I_{AS}$	25	A
Single Pulsed Avalanche Energy <sup>Note3</sup>	$E_{AS}$	31	mJ
Total Power Dissipation <sup>Note5</sup>	$P_D$	0.45	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	$R_{\theta JA}$		277		$^\circ\text{C/W}$



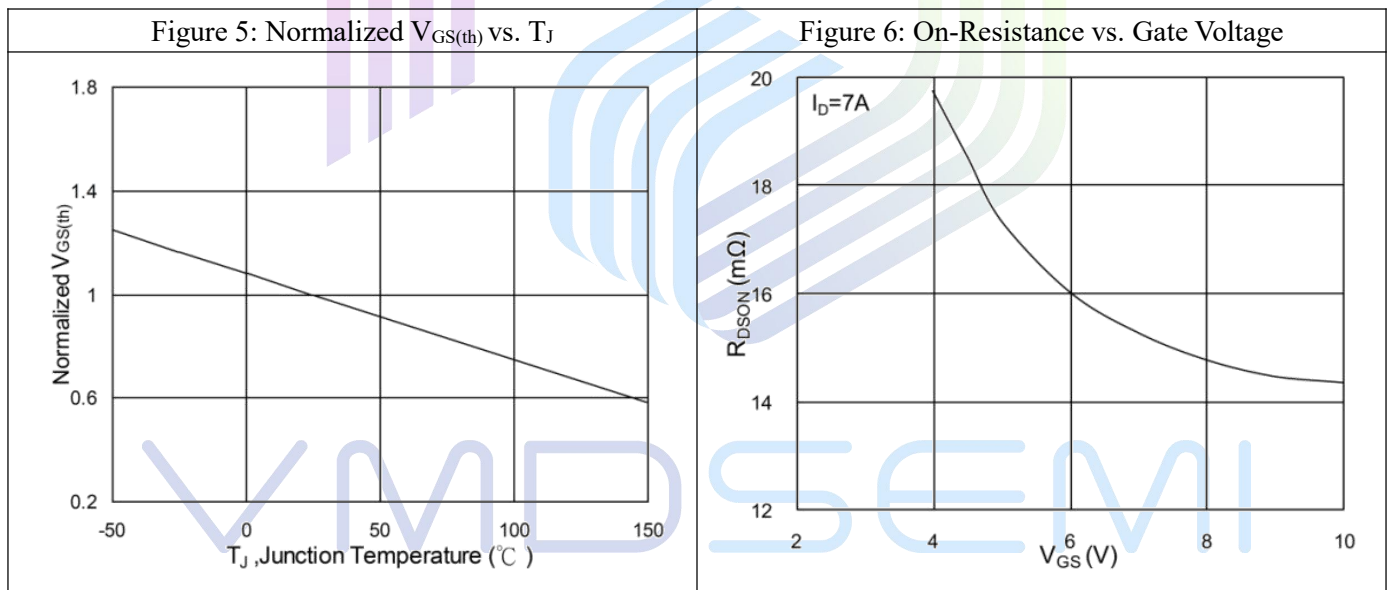
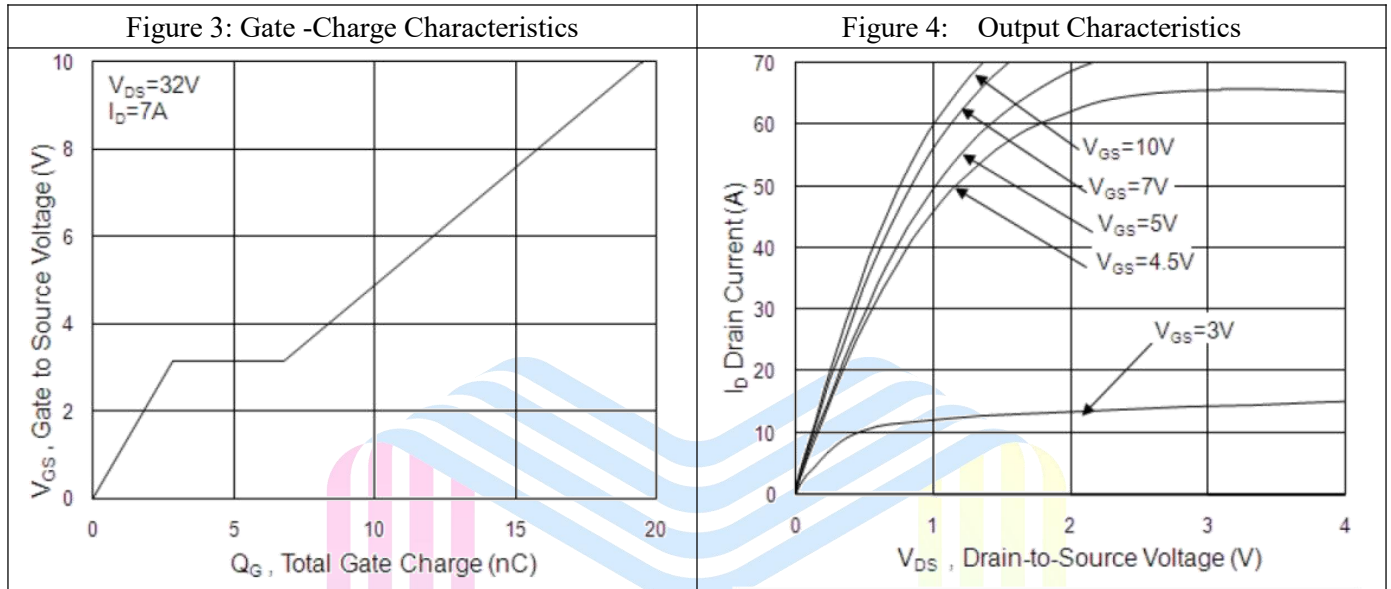
**Electrical Characteristics** ( $T_J = 25^\circ\text{C}$ , unless otherwise specified)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
<b>Statistic Characteristics</b>						
Drain-Source Breakdown Voltage	$BV_{DSS}$	$V_{GS}=0V, I_D=250\mu A$	40			V
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS}=32V, V_{GS}=0V$			1	$\mu A$
Gate-Body Leakage Current	$I_{GSS}$	$V_{GS} = \pm 20V, V_{DS}=0V$			$\pm 100$	nA
Gate Threshold Voltage <sup>Note4</sup>	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=250\mu A$	1.0	1.6	2.5	V
Static Drain-Source On-Resistance <sup>Note4</sup>	$R_{DS(on)}$	$V_{GS}=10V, I_D=7A$		17	22	mΩ
		$V_{GS}=4.5V, I_D=6A$		22	28	
Forward Transconductance <sup>Note4</sup>	$g_{FS}$	$V_{DS}=5V, I_D=7A$		10		S
<b>Dynamic Characteristics</b>						
Input Capacitance	$C_{ISS}$	$V_{DS}=15V$		1013		pF
Output Capacitance	$C_{OSS}$	$V_{GS}=0V$		107		pF
Reverse Transfer Capacitance	$C_{RSS}$	$f=1MHz$		76		pF
Total Gate Charge	$Q_g$	$V_{DS}=32V$		9.8		nC
Gate-Source Charge	$Q_{gs}$	$V_{GS}=4.5V$		2.8		
Gate-Drain Charge	$Q_{gd}$	$I_D=7A$		3.9		
<b>Switching Parameters</b>						
Turn-on Delay Time	$t_{d(on)}$	$V_{DD}=20V$		2.8		ns
Turn-on Rise Time	$t_r$	$V_{GS}=10V$		40.4		
Turn-off Delay Time	$t_{d(off)}$	$I_D=7A$		22.8		
Turn-off Fall Time	$t_f$	$R_G=3.3\Omega$		6.4		
<b>Diode Characteristics</b>						
Diode Forward Voltage <sup>Note4</sup>	$V_{SD}$	$V_{GS}=0V, I_S=1A$			1.0	V
Continuous Source Current	$I_S$	$V_G = V_D = 0V$ Force Current			8	A

**Notes :**

- The maximum current rating is limited by package. And device mounted on a large heatsink.
- Pulse Test : Pulse Width  $\leq 10\mu s$ , duty cycle  $\leq 1\%$ .
- $E_{AS}$  condition:  $V_{DD} = 25V, V_{GS} = 10V, L = 0.1mH, I_{AS}=25A$
- Pulse Test : Pulse Width  $\leq 300\mu s$ , duty cycle  $\leq 2\%$ .
- The power dissipation  $P_D$  is limited by  $T_{J(MAX)} = 150^\circ\text{C}$ . And device mounted on a large heatsink
- Device mounted on 1in2 FR-4 board with 2oz. Copper, in a still air environment with  $T_A = 25^\circ\text{C}$ .

## Typical Performance Characteristics



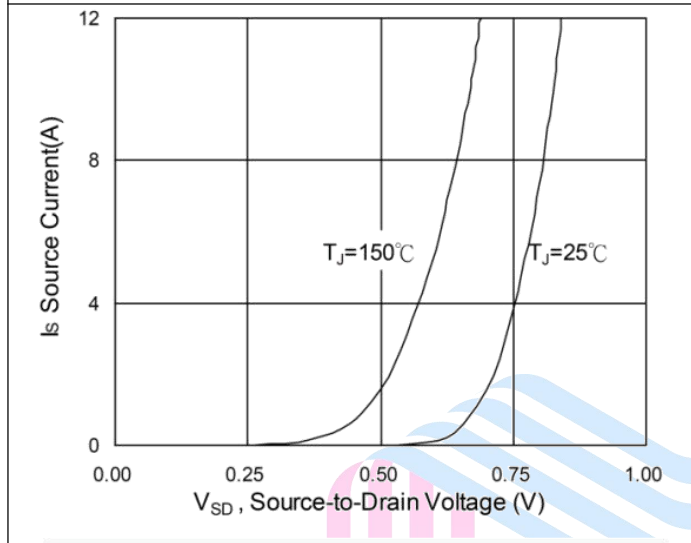
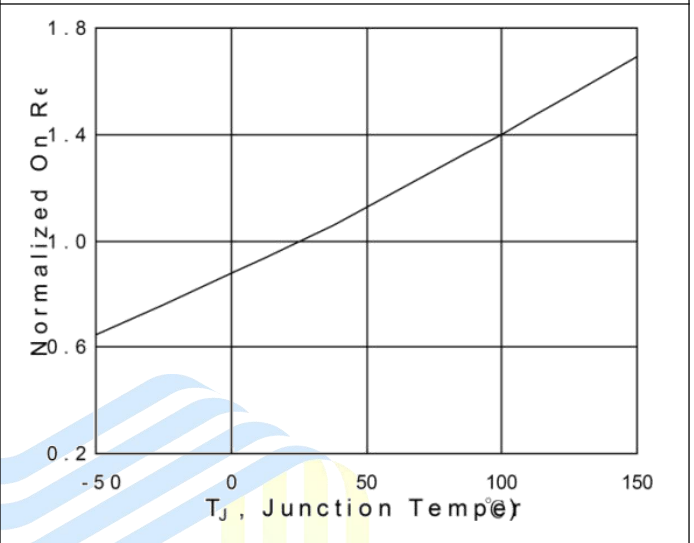
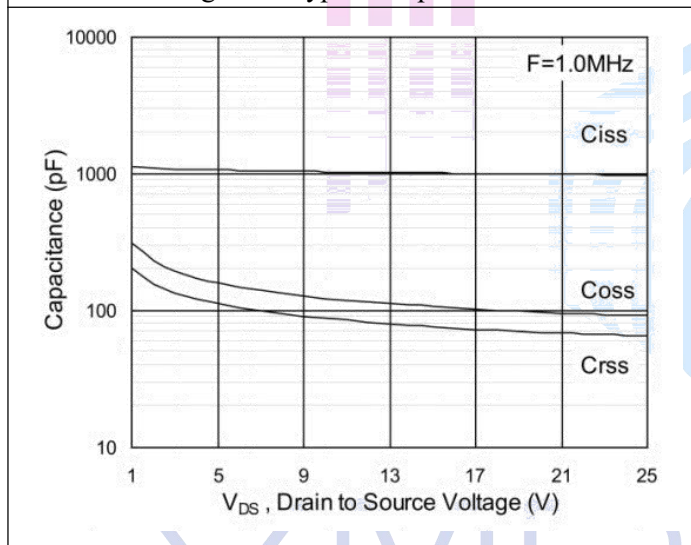
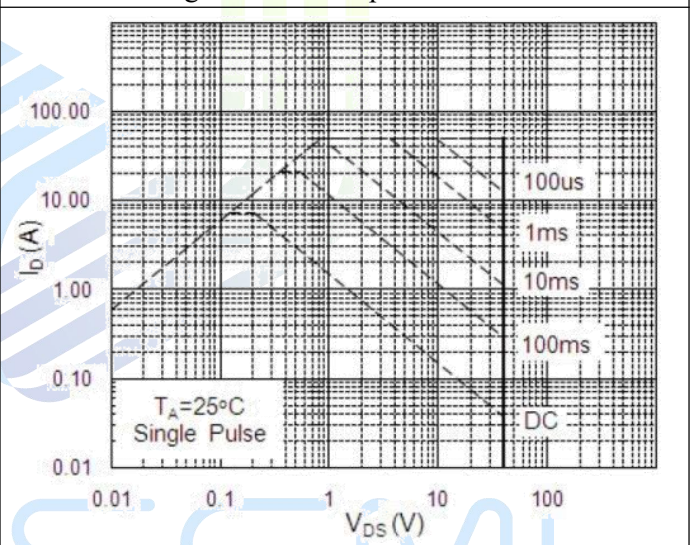
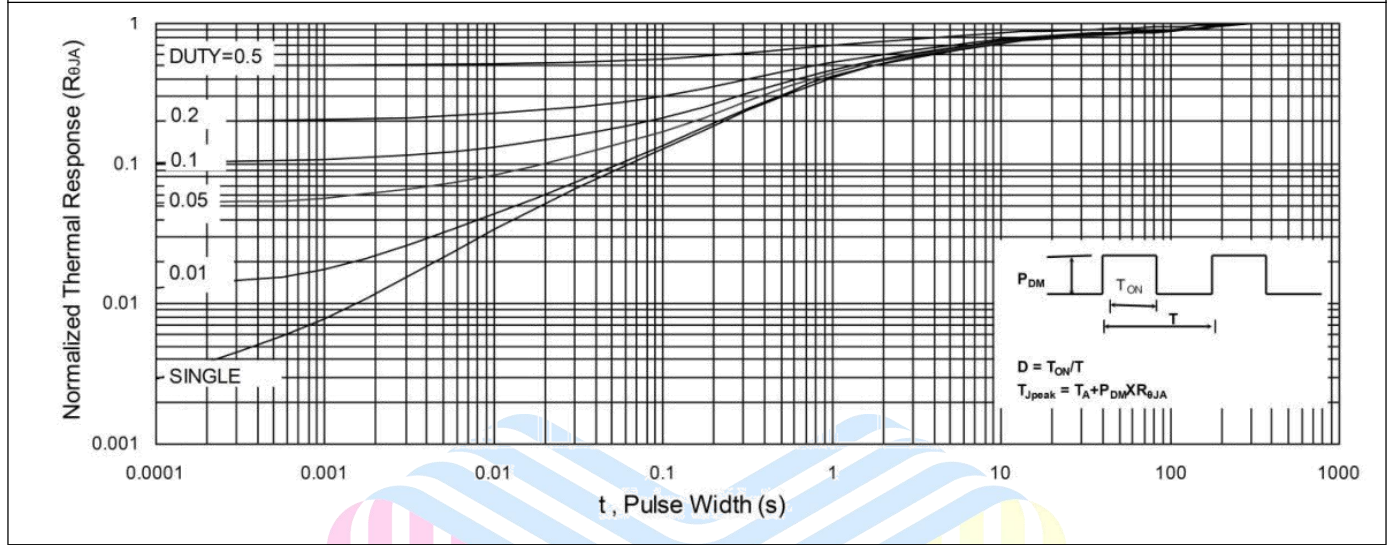
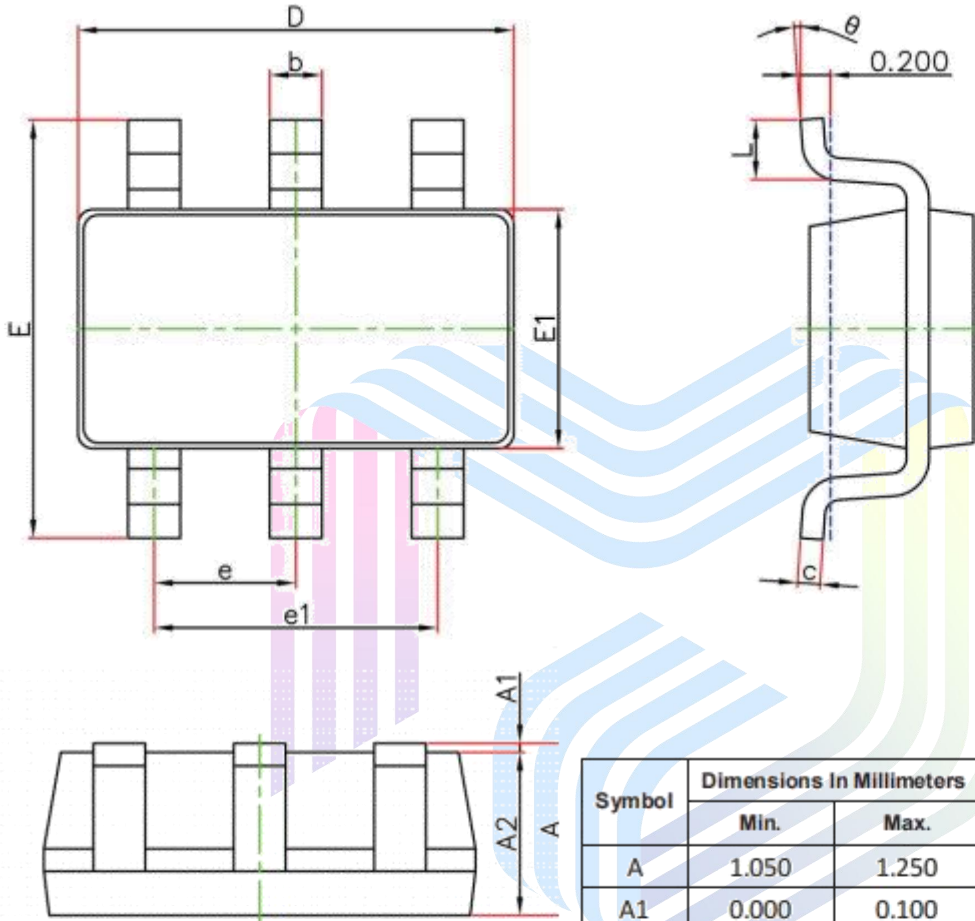
**Figure 7: Body Diode Characteristics**

**Figure 8: Normalized R<sub>DS(on)</sub> vs. T<sub>J</sub>**

**Figure 9: Typical Capacitance**

**Figure 10: Safe Operation Area**


Figure 11: Normalized Maximum Transient Thermal Impedance




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**Mechanical Dimensions:**
**SOT-23-6L Package Information**


Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	1.050	1.250	0.041	0.049
A1	0.000	0.100	0.000	0.004
A2	1.050	1.150	0.041	0.045
b	0.300	0.500	0.012	0.020
c	0.100	0.200	0.004	0.008
D	2.820	3.020	0.111	0.119
E1	1.500	1.700	0.059	0.067
E	2.650	2.950	0.104	0.116
e	0.950(BSC)		0.037(BSC)	
e1	1.800	2.000	0.071	0.079
L	0.300	0.600	0.012	0.024
θ	0°	8°	0°	8°



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## 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

#### - 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

#### - Shanghai

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

#### - Shenzhen

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

#### - Xi'an

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