



VMDSEMI

**VUTL004R039NA**

**Datasheet**



VMDSEMI

## General Description

## Symbol

$V_{(BR)DSS}$	$R_{DS(ON)_{max}}$	$I_D$
40V	3.9mΩ@10V	120A
	6.0mΩ@4.5V	

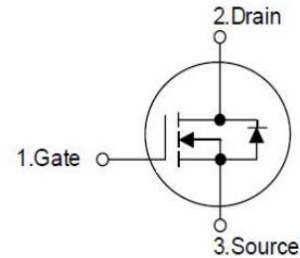
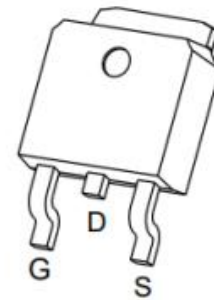


Figure 1 Symbol of VUTL004R039NA

## Features

- Trench Technology Power MOSFET
- Low  $R_{DS(ON)}$
- Low Gate Charge
- Low Gate Resistance
- 100% UIS Tested

## Package Type



## TO-252-2L

Figure 2 Package Type of VUTL004R039NA

## Application

- Battery protection applications
- Power Switch Application

## Ordering Information

Product Name	Package
VUTL004R039NA	TO-252-2L

**Absolute Maximum Ratings** ( $T_A = 25\text{ °C}$ , 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>	$I_D$	120	A
Pulsed Drain Current <sup>Note2</sup>	$I_{DM}$	340	
Avalanche Current <sup>Note3</sup>	$I_{AS}$	43	A
Single Pulsed Avalanche Energy <sup>Note3</sup>	$E_{AS}$	462	mJ
Total Power Dissipation <sup>Note5</sup>	$P_D$	56	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-Case	$R_{\theta JC}$		2.2		°C/W



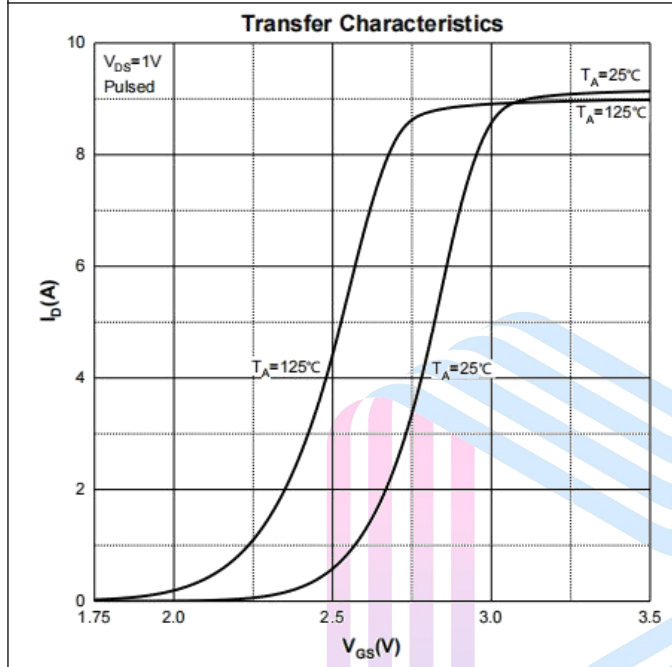
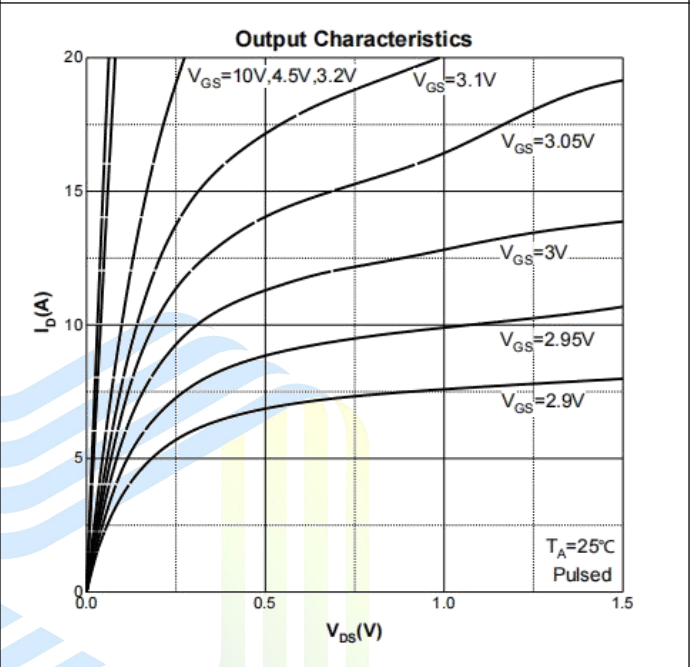
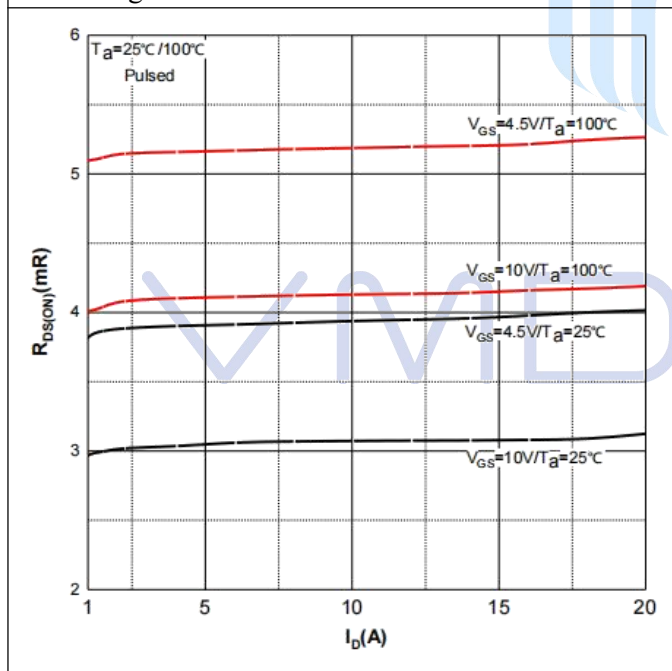
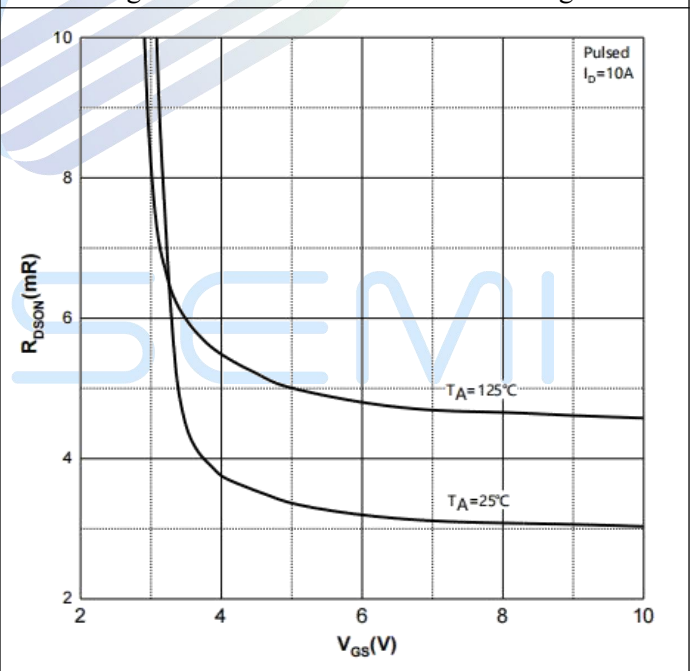
**Electrical Characteristics** ( $T_J = 25\text{ }^\circ\text{C}$ , unless otherwise specified)

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	1.7	3.0	V
Static Drain-Source On-Resistance <sup>Note4</sup>	$R_{DS(on)}$	$V_{GS}=10V, I_D=30A$		3.0	3.9	mΩ
		$V_{GS}=4.5V, I_D=10A$		4.0	6.0	
<b>Dynamic Characteristics</b>						
Input Capacitance	$C_{ISS}$	$V_{DS}=20V$		6573		pF
Output Capacitance	$C_{OSS}$	$V_{GS}=0V$		451		pF
Reverse Transfer Capacitance	$C_{RSS}$	$f=1MHz$		411		pF
Total Gate Charge	$Q_g$	$V_{DS}=20V$		26.1		nC
Gate-Source Charge	$Q_{gs}$	$V_{GS}=10V$		4.4		
Gate-Drain Charge	$Q_{gd}$	$I_D=30A$		8.8		
Gate Resistance	$R_g$	$f=1MHz, \text{Open drain}$		0.94		Ω
<b>Switching Parameters</b>						
Turn-on Delay Time	$t_{d(on)}$	$V_{DD}=15V$		10.3		ns
Turn-on Rise Time	$t_r$	$V_{GS}=10V$		5.3		
Turn-off Delay Time	$t_{d(off)}$	$I_D=15A$		44		
Turn-off Fall Time	$t_f$	$R_G=3.3\Omega$		9.2		
<b>Diode Characteristics</b>						
Diode Forward Voltage <sup>Note4</sup>	$V_{SD}$	$V_{GS}=0V, I_S=10A$			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. EAS condition:  $V_{DD} = 25V, V_{GS} = 10V, L = 0.5mH, R_G=25\Omega$  Starting  $T_J = 25^\circ\text{C}$ .
4. Pulse Test : Pulse Width  $\leq 300\mu s$ , duty cycle  $\leq 2\%$ .
5. The power dissipation  $P_D$  is limited by  $T_{J(MAX)} = 150^\circ\text{C}$ . And device mounted on a large heatsink

## 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**


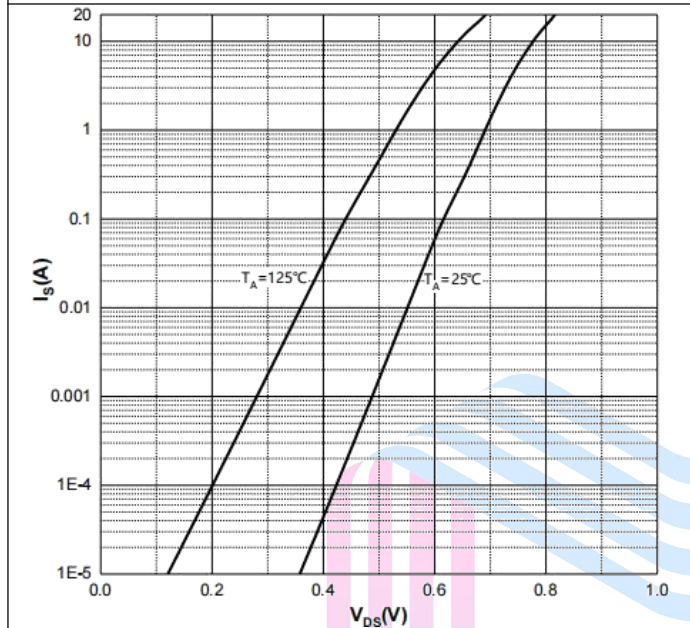
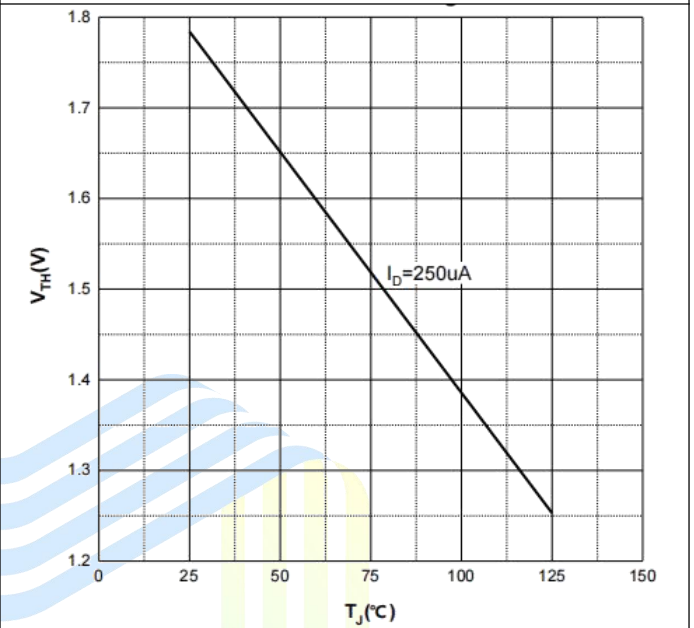
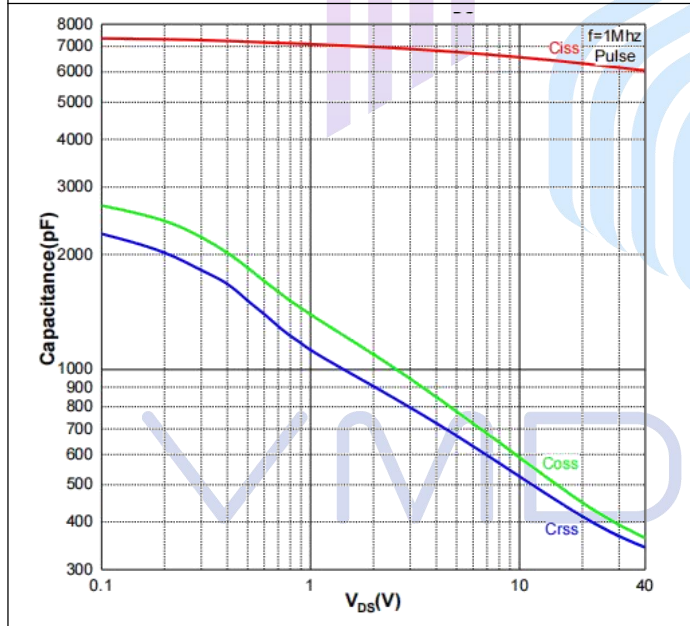
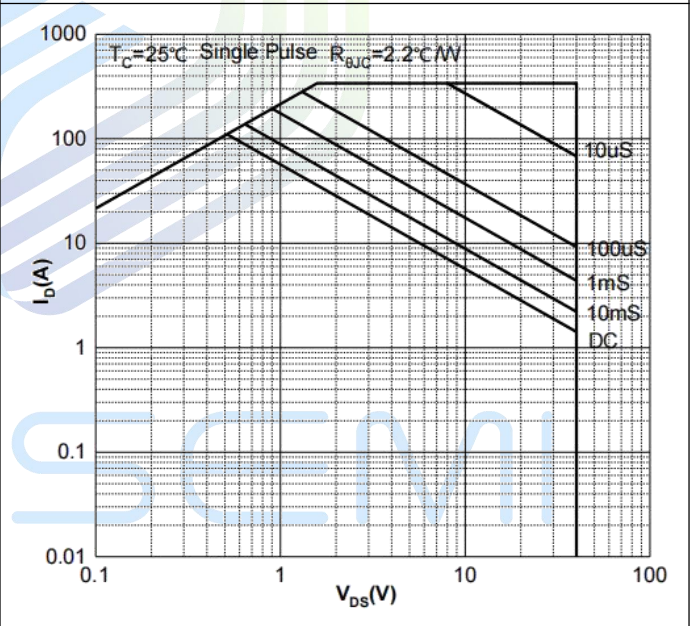
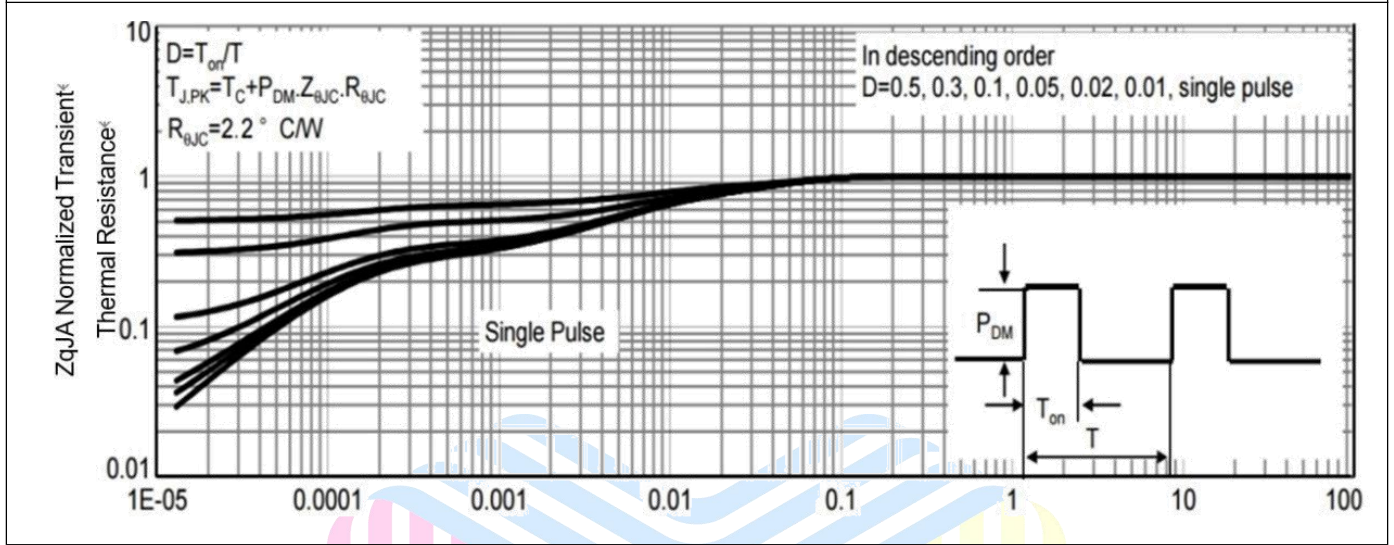
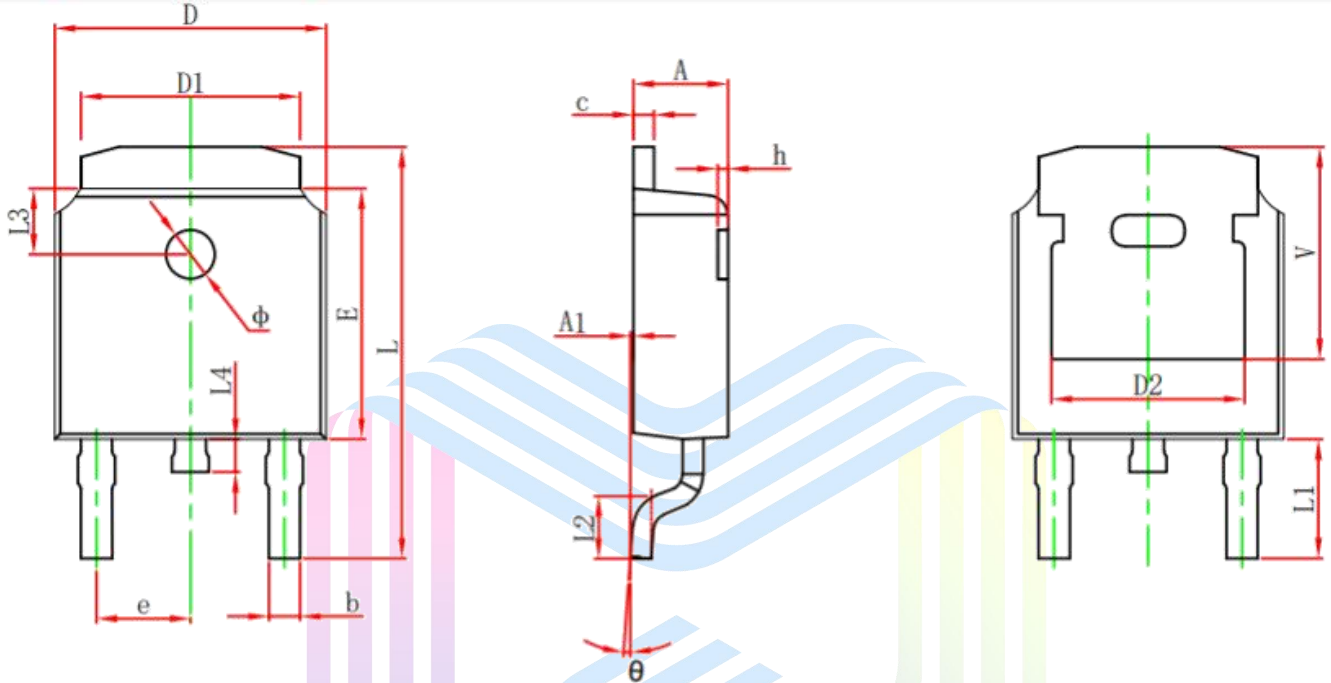
**Figure 7: Body Diode Characteristics**

**Figure 8: Threshold Voltage**

**Figure 9: Typical Capacitance**

**Figure 10: Safe Operation Area**


Figure 11: Normalized Maximum Transient Thermal Impedance




**Mechanical Dimensions:**
**TO-252-2L Package Information**


Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	2.200	2.400	0.087	0.094
A1	0.000	0.127	0.000	0.005
b	0.635	0.770	0.025	0.030
c	0.460	0.580	0.018	0.023
D	6.500	6.700	0.256	0.264
D1	5.100	5.460	0.201	0.215
D2	4.830 REF.		0.190 REF.	
E	6.000	6.200	0.236	0.244
e	2.186	2.386	0.086	0.094
L	9.712	10.312	0.382	0.406
L1	2.900 REF.		0.114 REF.	
L2	1.400	1.700	0.055	0.067
L3	1.600 REF.		0.063 REF.	
L4	0.600	1.000	0.024	0.039
Φ	1.100	1.300	0.043	0.051
θ	0°	8°	0°	8°
h	0.000	0.300	0.000	0.012
V	5.250 REF.		0.207 REF.	



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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