



VMDSEMI

**VUPB004R033NA**

**Datasheet**



VMDSEMI

## General Description

## Symbol

$V_{(BR)DSS}$	$R_{DS(ON)_{max}}$	$I_D$
40V	3.3mΩ@10V	120A
	5.3mΩ@4.5V	

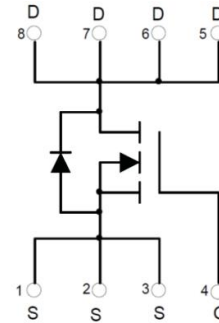


Figure 1 Symbol of VUPB004R033NA

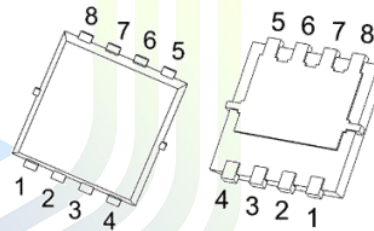
## Features

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

## Application

- Battery protection applications
- Power Switch Application

## Package Type



## PDFN5X6-8L

Figure 2 Package Type of VUPB004R033NA

## Ordering Information

Product Name	Package
VUPB004R033NA	PDFN5X6-8L

**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-Ambient <sup>Note6</sup>	$R_{\theta JA}$		53		°C/W
Thermal Resistance, Junction-to-Case	$R_{\theta JC}$		2.2		°C/W

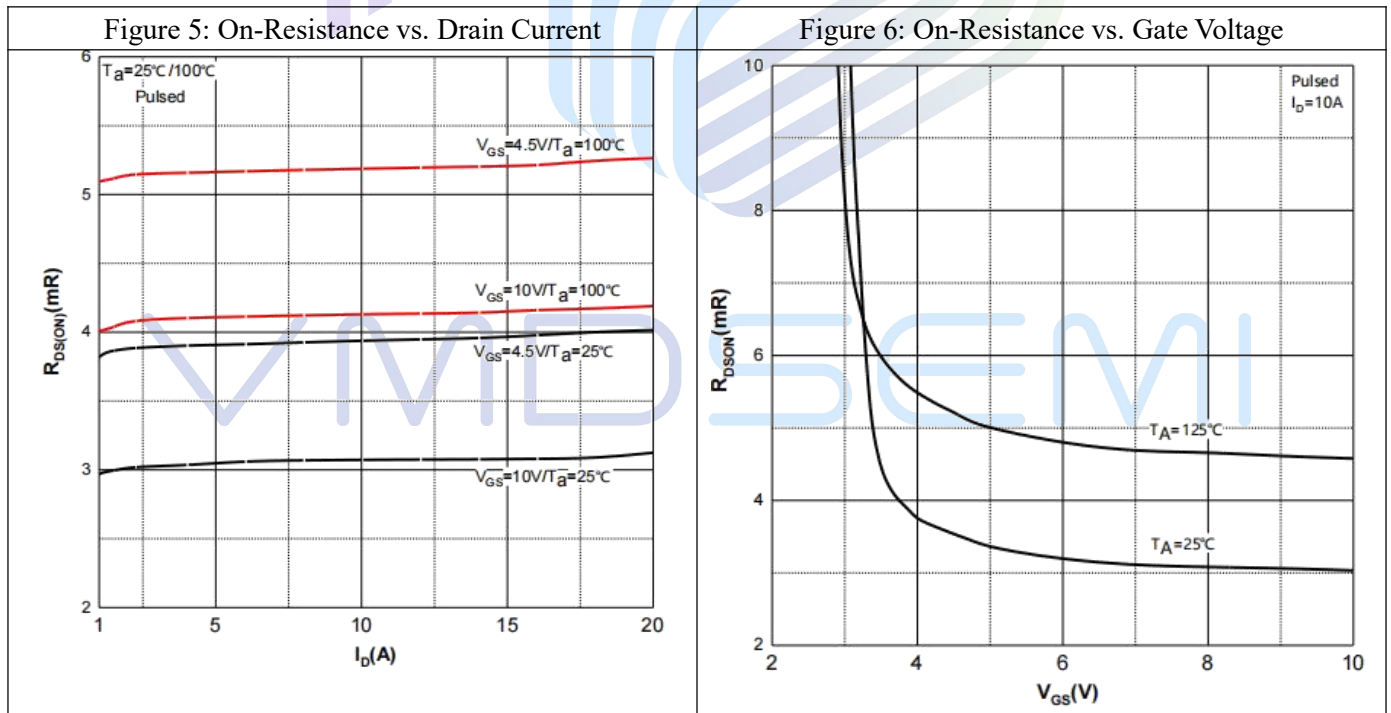
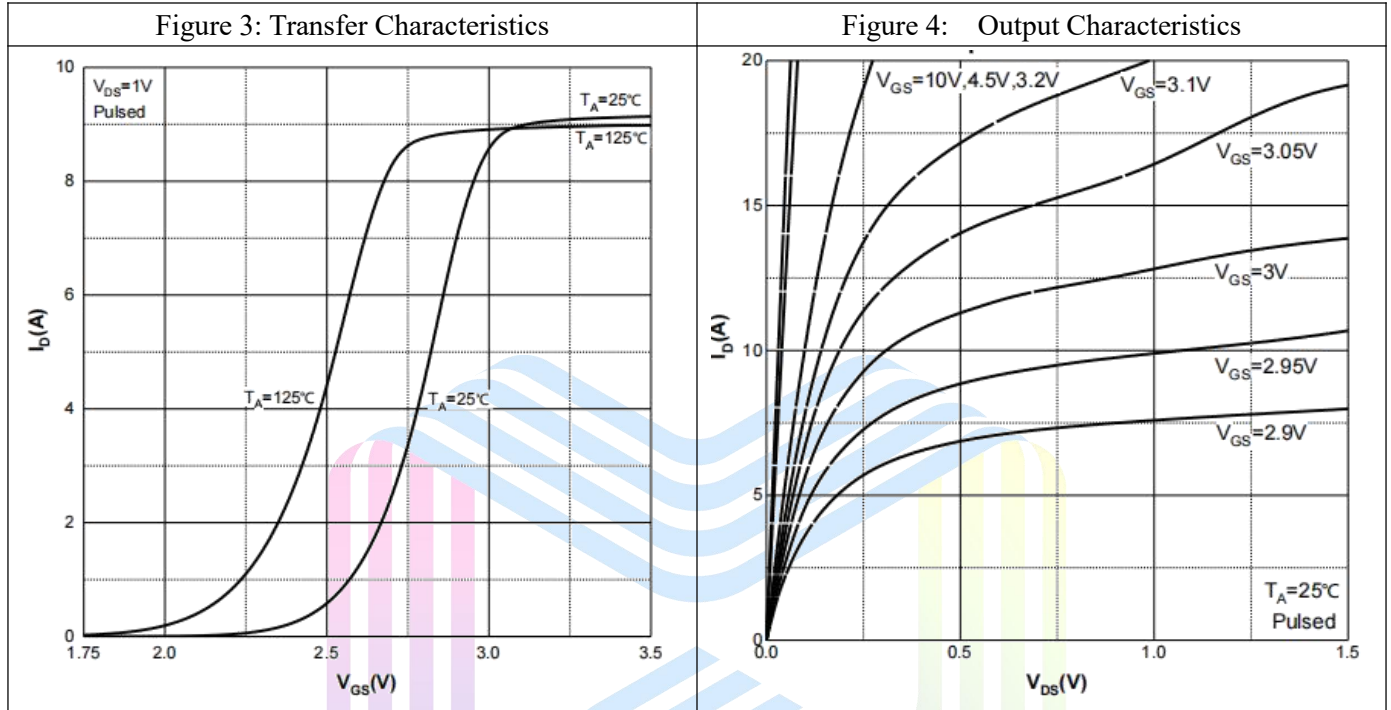
**Electrical Characteristics** ( $T_J = 25^\circ\text{C}$ , unless otherwise specified)

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	1.7	3.0	V
Static Drain-Source On-Resistance <sup>Note4</sup>	$R_{DS(on)}$	$V_{GS}=10V, I_D=30A$		2.5	3.3	mΩ
		$V_{GS}=4.5V, I_D=10A$		3.5	5.3	
<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 :

- 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  $\leq 1\%$ .
- EAS condition:  $V_{DD} = 25V, V_{GS} = 10V, L = 0.5mH, R_G=25\Omega$  Starting  $T_J = 25^\circ\text{C}$ .
- 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



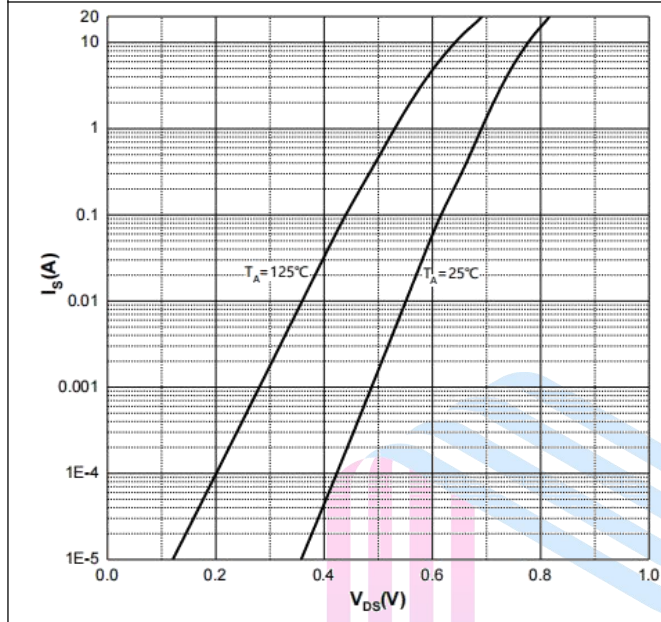
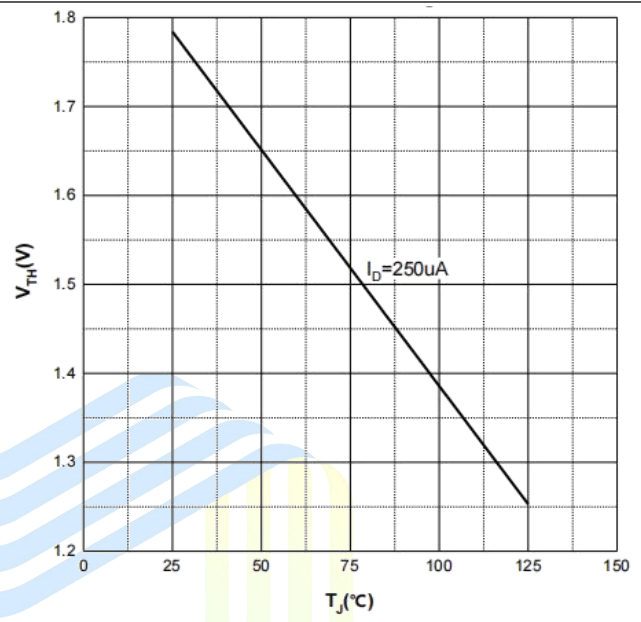
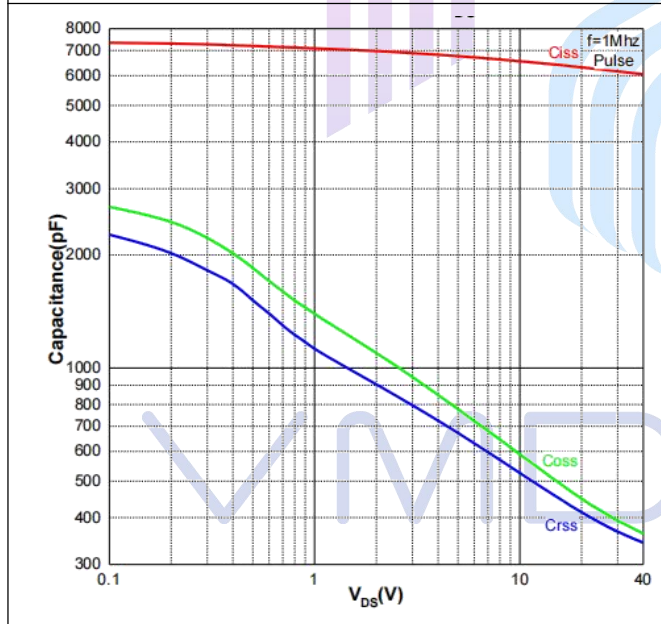
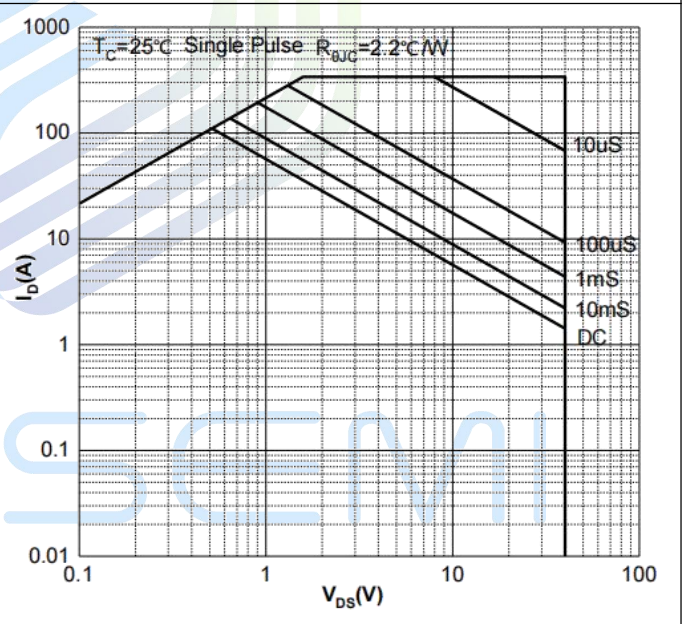
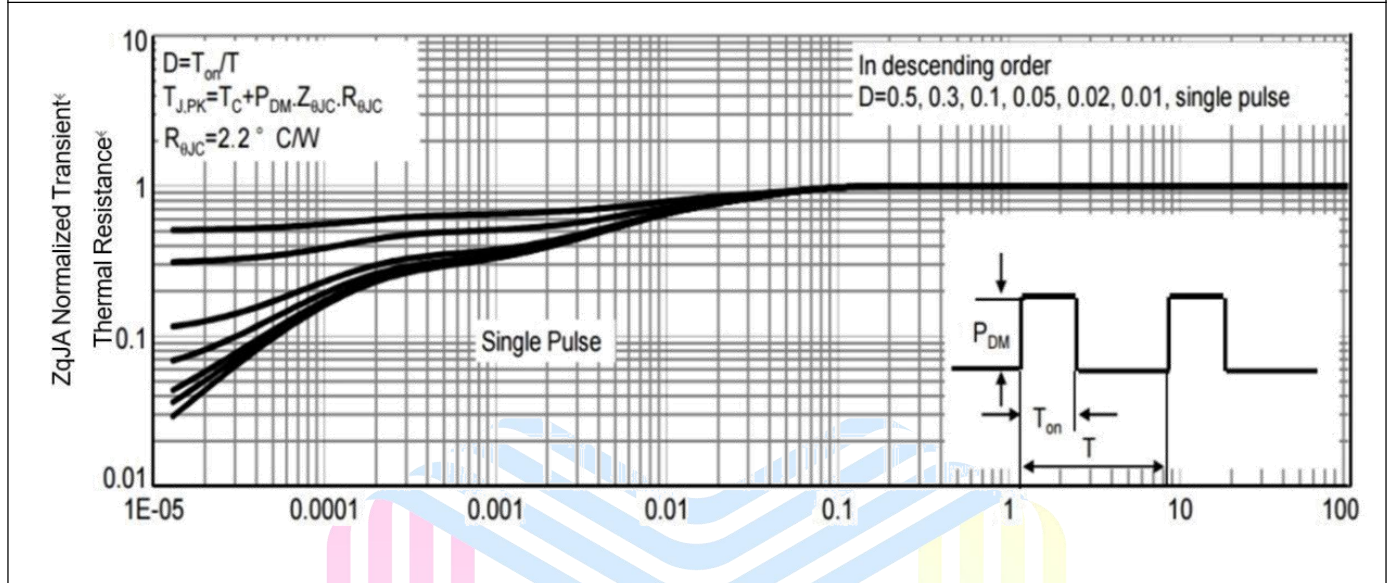
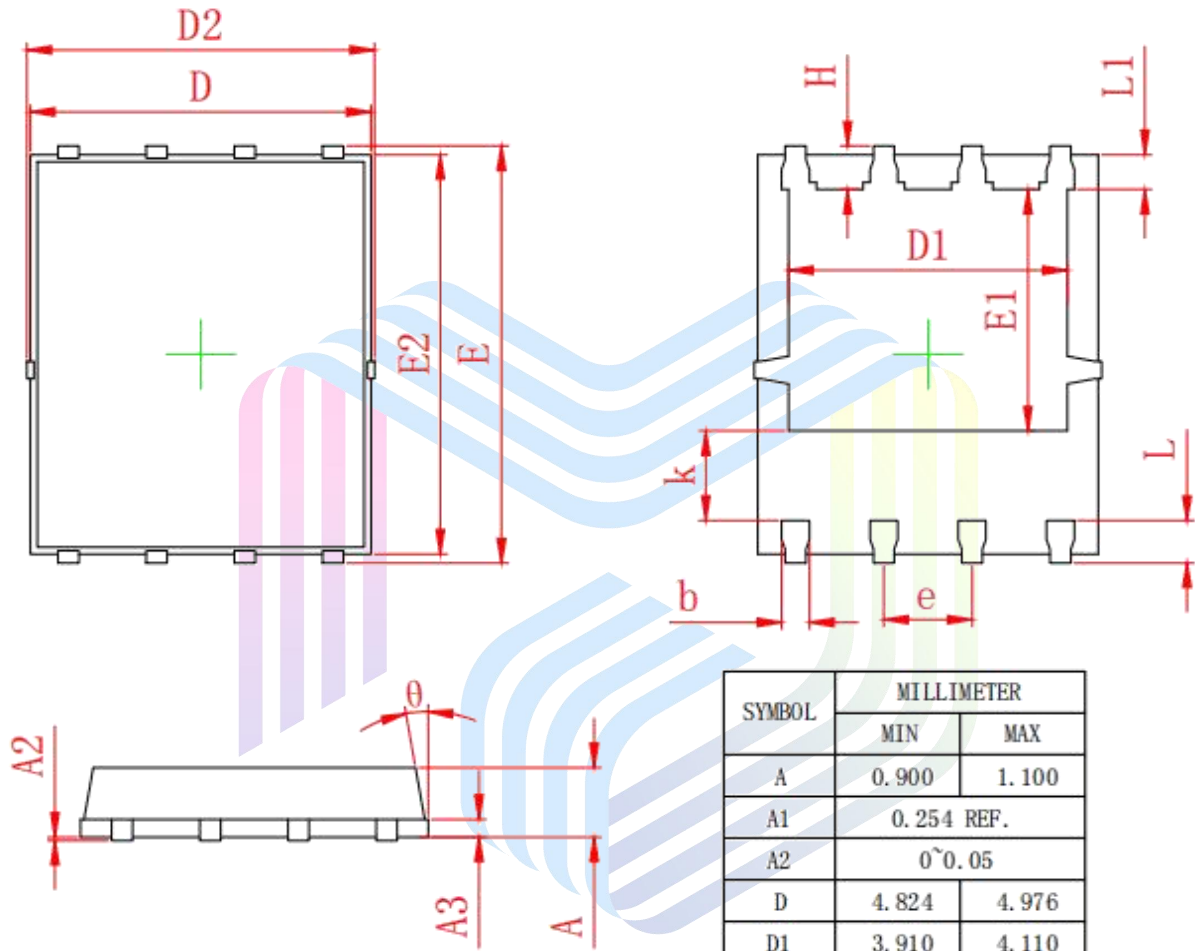
**Figure 7: Body Diode Characteristics**

**Figure 8: Threshold Voltage**

**Figure 9: Typical Capacitance**

**Figure 10: Safe Operation Area**


Figure 11: Normalized Maximum Transient Thermal Impedance



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**Mechanical Dimensions:**
**PDFN5X6-8L Package Information**


SYMBOL	MILLIMETER	
	MIN	MAX
A	0.900	1.100
A1	0.254 REF.	
A2	0 <sup>~</sup> 0.05	
D	4.824	4.976
D1	3.910	4.110
D2	4.944	5.076
E	5.924	6.076
E1	3.375	3.575
E2	5.674	5.826
b	0.350	0.450
e	1.270 TYP.	
L	0.534	0.686
L1	0.424	0.576
k	1.190	1.390
H	0.549	0.701
θ	8°	12°



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