VFPB004R009NA

Datasheet

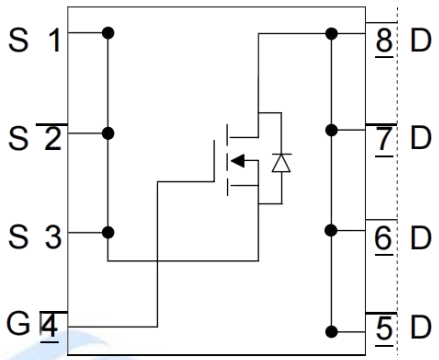
0.9mΩ, 40V, N-Channel MOSFET VFPB004R009NA

Description

- 40V N-channel SGT MOSFET
- It has been designed to very low on-state resistance and superior UIS performance, especial for BMS application
- Untral Low Rdson and Fast reverse recovery for synchronous rectification

$V_{(BR)DSS}$	$R_{DS(ON)\_max}$	I_D
40V	0.9mΩ@10V	370A

Symbol

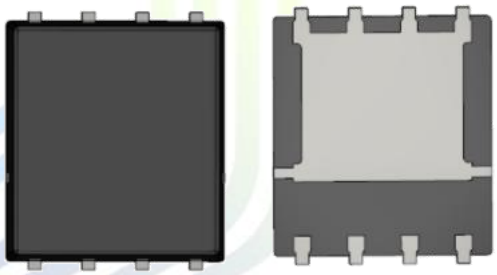


Symbol of VFPB004R009NA

Features

- Low $R_{DS(ON)}$
- Fast reverse recovery
- 100% UIS tested
- Fast switching

Package Type



Package Type of VFPB004R009NA

Application

- Battery management system
- DC-DC converter
- Synchronous rectification

Ordering Information

Product Name	Package
VFPB004R009NA	PDFN5×6

Absolute Maximum Ratings (T_J= 25 ºC, unless otherwise specified)

Parameter	Symbol	Value	Units
Drain-Source Voltage	V_{DS}	40	V
Drain Current - Continuous (T_C= 25°C VGS=10V) Note1	I_D	370	A
Drain Current - Continuous (T_C= 100°C VGS=10V)		220	A
Drain Current - Pulsed Note 2	I_{DM}	900	A
Gate-Source Voltage	V_{GS}	± 20	V
Single Pulsed Avalanche Energy Note 3	E_{AS}	550	mJ
Repetitive Avalanche Energy Note 3	E_{AR}	0.2	mJ
Power Dissipation (TC = 25°C)	P_D	125	W
Operating and Storage Temperature Range	T_J,T_{STG}	-55 to +150	°C

Thermal Resistance

Parameter	Symbol	Value	Units
Thermal Resistance, Junction-to-Case, Steady-State	$R_{\theta JC}$	1.0	°C/W
Thermal Resistance, Junction-to-Ambient, Steady State Note 4	$R_{\theta JA}$	54	°C/W

Notes:

1. The max drain current rating is package limited
2. Repetitive Rating: Pulse width limited by maximum junction temperature
3. L = 0.5 mH, V_{DD} = 30 V, Rg = 10 Ω, Starting T_J = 25 °C
4. Mount on minimum PCB layout

Electrical Characteristics(T_J= 25 ºC, unless otherwise specified)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Units
StaticCharacteristics						
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	V_{GS} = 0 V, I_D = 250 uA	40	-	-	V
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS} = 40 V, V_{GS}=0V	-	-	10	uA
Gate Leakage Current	I_{GSS}	V_{GS} = ± 20 V, V_{DS} = 0 V	-	-	±100	nA
Gate Threshold voltage	$V_{GS(th)}$	V_{DS} = V_{GS}, I_D = 250 uA	1.2	1.6	2	V
Drain-Source on-state resistance	$R_{DS(ON)}$	V_{GS} = 10 V, I_D = 30 A	-	0.6	0.9	mΩ
		V_{GS} = 5 V, I_D = 30 A	-	0.9	1.2	mΩ
Dynamic Characteristics						
Input Capacitance	C_{iss}	V_{DS} = 20 V, V_{GS} = 0 V f = 1 MHz	-	7020	-	pF
Output Capacitance	C_{oss}		-	2435	-	pF
Reverse Transfer Capacitance	C_{rss}		-	50	-	pF
Gate Resistance	R_g	f = 1 MHz	-	2	-	Ω
Switching Characteristics						
Turn On Delay Time	$T_{D(on)}$	V_{DD}= 32V , I_D=50A V_{GS} = 10V, R_G = 2.5 Ω	-	12	-	ns
Rise Time	Tr		-	41	-	ns
Turn Off Delay Time	$T_{D(off)}$		-	29	-	ns
Fall Time	T_f		-	65	-	ns
Total Gate Charge	Q_g	V_{DD} = 20 V , I_D = 50 A V_{GS} = 0 to10 V	-	92	-	nC
Gate-Source Charge	Q_{gs}		-	19	-	nC
Gate-Drain Charge	Q_{gd}		-	9	-	nC
Gate plateau voltage	Vplateau		-	3.2	-	V
Drain-Source Diode Characteristics and Maximum Ratings						
Diode Forward Voltage	V_{SD}	V_{GS} = 0 V,I_S= 50A	-	0.79	1.2	V
Reverse recovery time	T_{rr}	I_S=50A,di/dt=100A/us	-	80	-	ns
Reverse recovery charge	Q_{rr}		-	138	-	nC
Peak Reverse Recovery Current	I_{rrm}		-	4.5	-	A

Electrical Characteristics Diagrams

Figure 1: Typical Output Characteristics

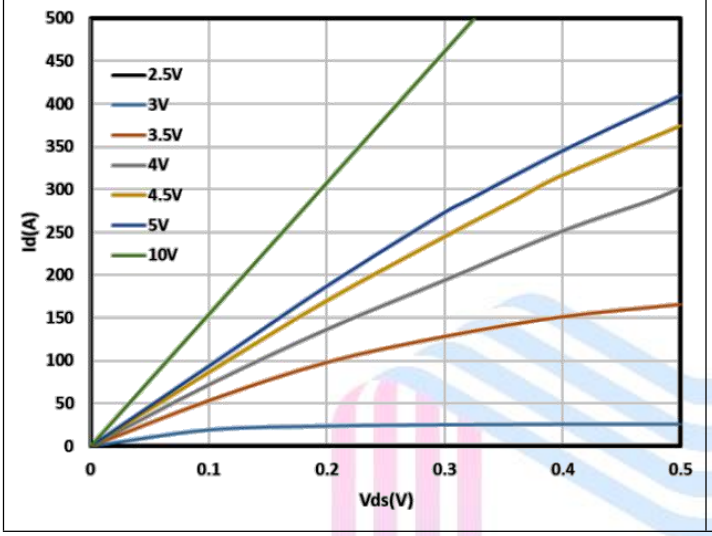


Figure 2: Transfer Characteristics

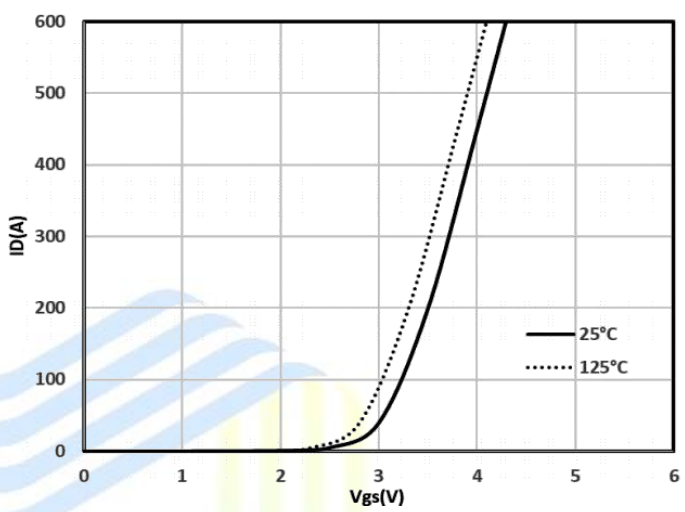


Figure 3: On-Resistance vs. Drain Current

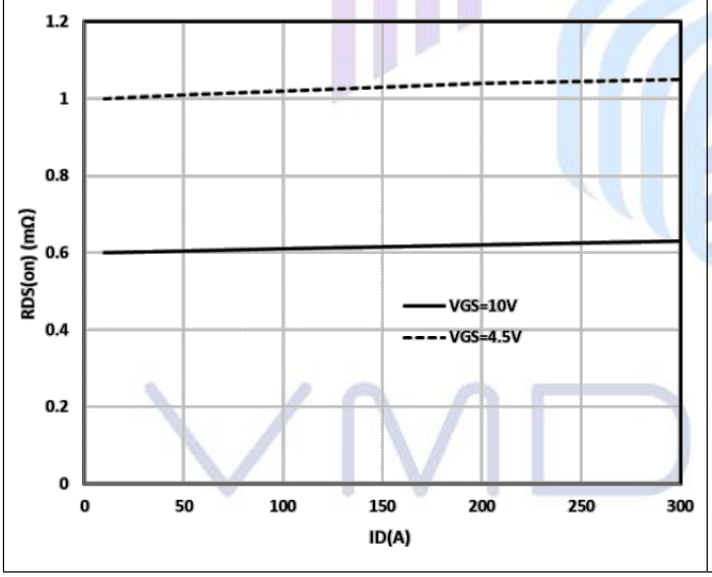


Figure 4:On-Resistance vs. Junction Temperature

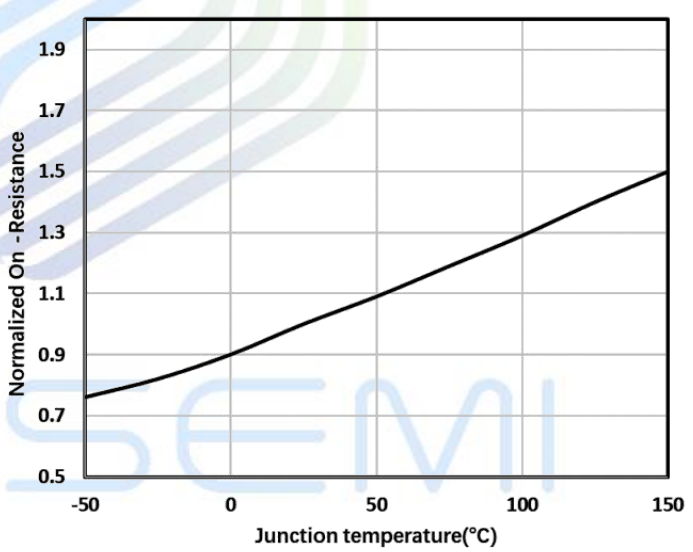


Figure 5: Forward characteristics of reverse diode

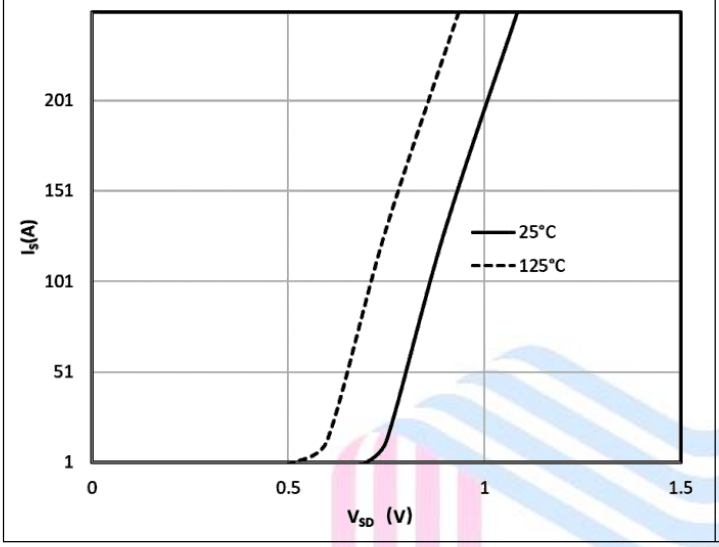


Figure 6: Gate Charge Characteristics

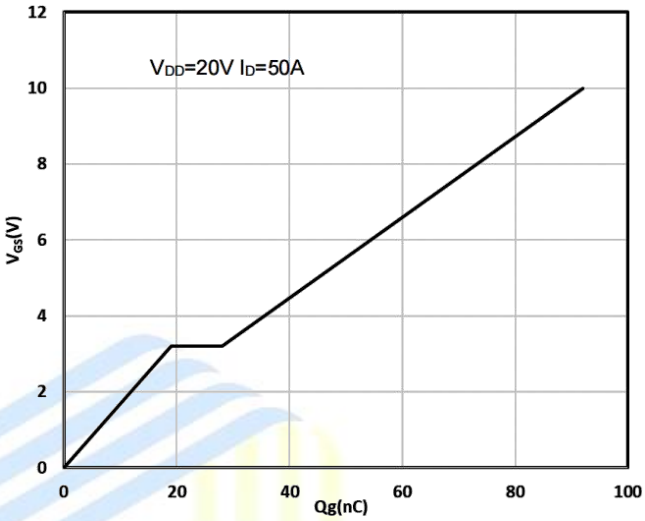


Figure 7: Capacitance Characteristics

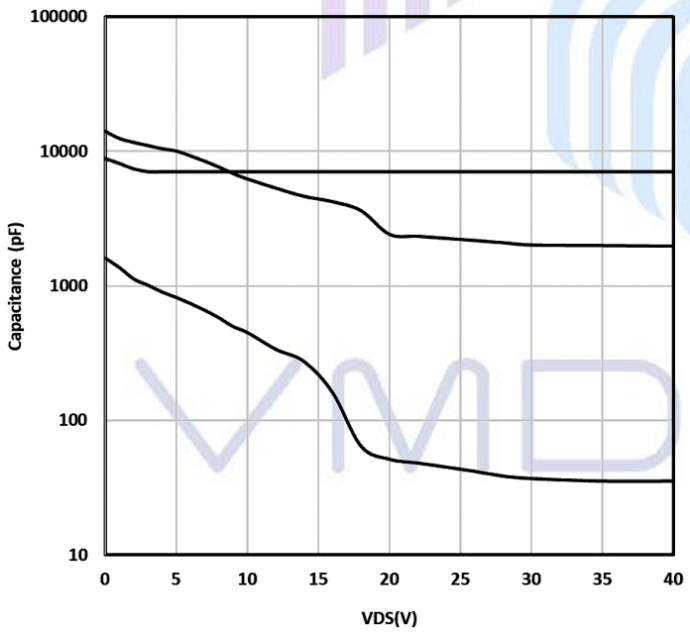


Figure 8: Maximum Forward Biased Safe Operating Area

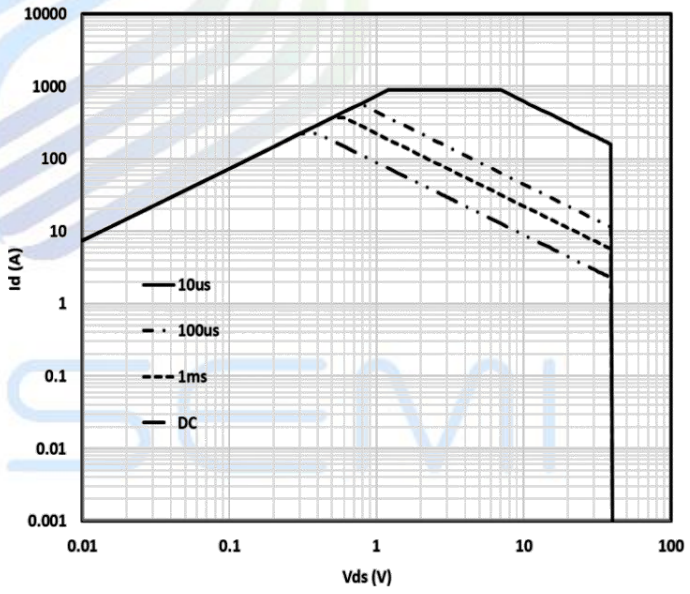


Figure 9: Power Dissipation

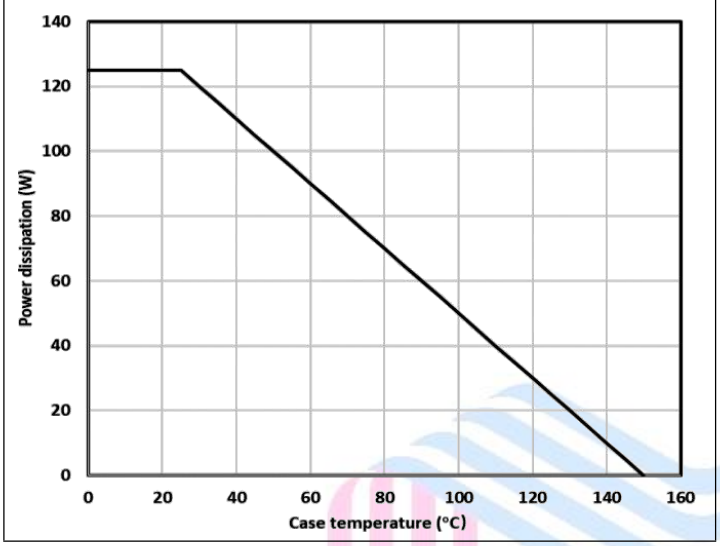
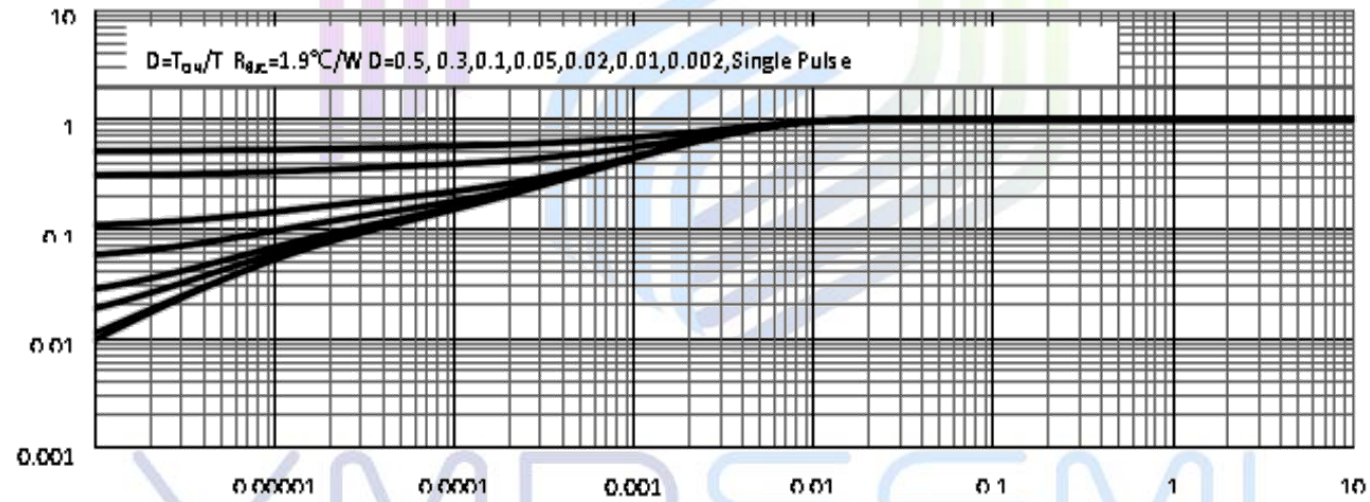
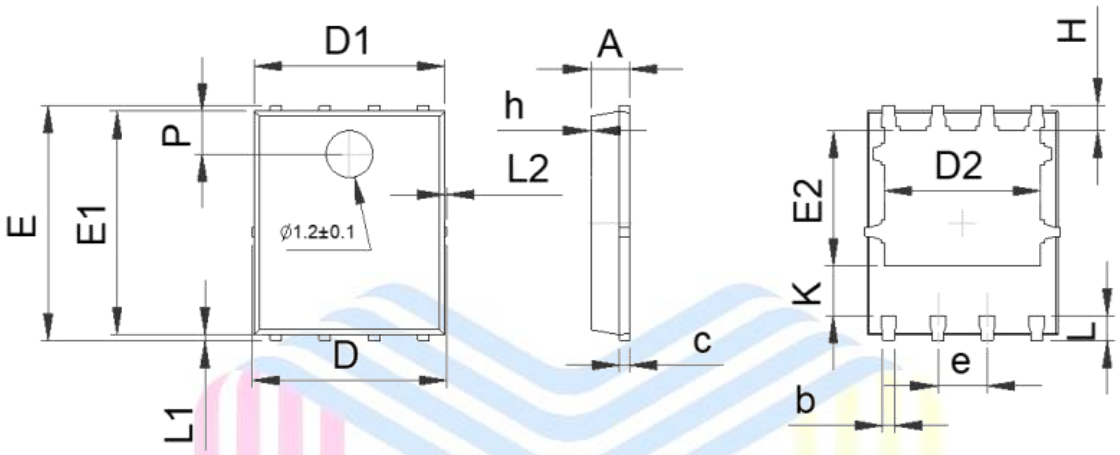


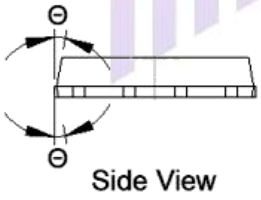
Figure 10: Normalized Transient thermal Impedance



Mechanical Dimensions

PDFN5x6 Package Information





SYMBOL	MIN	NOM	MAX
A	0.90	1.00	1.10
b	0.20	0.30	0.40
c	0.21	0.25	0.34
D	–	–	5.10
D1	4.80	4.90	5.00
D2	3.91	4.01	4.11
e	1.27 BSC		
E	5.90	6.00	6.10
E1	5.65	5.75	5.85
E2	3.375	3.475	3.575
H	0.55	0.65	0.75
h	–	–	0.10
K	1.20	–	–
L	0.55	0.65	0.75
L1	0.05	0.15	0.25
L2	–	–	0.12
Θ	8°	10°	12°
P	1.00	1.10	1.20

Unit in mm

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