VFPB010R077NA

Datasheet

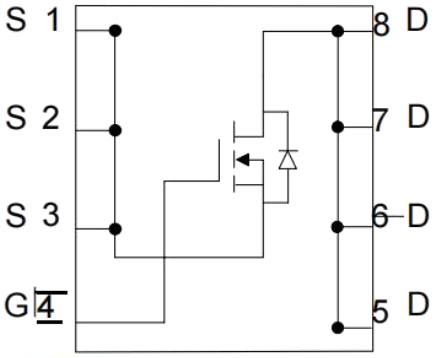
7.7mΩ, 100V, N-Channel Power MOSFET VFPB010R077NA

General Description

$V_{(BR)DSS}$	$R_{DS(ON)\_max}$	I_D
100V	7.7mΩ@10V	80A

- 100V N-channel SGT MOSFET
- It has been designed to very low on-state resistance (R_{DSON}) and yet maintain superior switching performance

Symbol

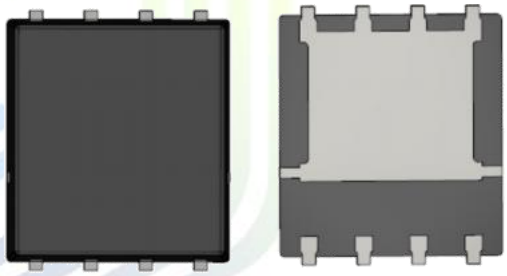


Symbol of VFPB010R077NA

Features

- N-channel, optimized for high-speed smooth switching
- Excellent Gate Charge×R_{DSON} (FOM)
- Very low on-resistance
- RoHS compliant Note 1
- Halogen-free Note 1

Package Type



Package Type of VFPB010R077NA

Application

- Motor Drivers
- DC-DC Converters
- Power Management
- Load Switching

Ordering Information

Product Name	Package
VFPB010R077NA	PDFN5×6

Absolute Maximum Ratings

Parameter	Symbol	Value	Units
Drain-Source Voltage	V_{DS}	100	V
Drain Current - Continuous (T_C = 25°C) Note1	-	80	A
Drain Current - Continuous (T_C = 100°C)	I_D	50	A
Drain Current - Continuous (package limited)	-	60	A
Drain Current - Pulsed Note 2	I_{DM}	240	A
Gate-Source Voltage	V_{GS}	± 20	V
Single Pulsed Avalanche Energy Note 3	E_{AS}	27.5	mJ
Power Dissipation (T_C = 25°C)	P_D	52	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	$R_{\theta JC}$	1.5	°C/W
Thermal Resistance, Junction-to-Ambient Steady State Note 4	$R_{\theta JA}$	48	°C/W

Notes:

1. The max drain current rating is package limited
2. Repetitive Rating: Pulse width limited by maximum junction temperature
3. L = 0.3 mH, V_{DD} =20 V, I_{AS}=10.5 A, R_G = 25 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
Static Characteristics						
Drain-Source Breakdown Voltage	BV_{DSS}	V_{GS} = 0 V,I_D = 250 μA	100	-	-	V
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS} = 80 V, V_{GS} = 0 V T_J = 25℃	-	-	1	μA
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 μA	1.3	2	2.5	V
Drain-Source on-state resistance	$R_{DS(ON)}$	V_{GS} = 10 V, I_D = 20 A	-	6	7.7	mΩ
		V_{GS} = 4.5 V, I_D = 15 A	-	8.5	10.5	
Dynamic Characteristics						
Input capacitance	C_{ISS}	V_{DS} = 50 V, V_{GS} = 0 V F = 1 MHz	-	2680	-	pF
Output capacitance	C_{OSS}		-	737	-	pF
Reverse transfer capacitance	C_{RSS}		-	2.05	-	pF
Gate resistance	R_G	F = 1 MHz	-	3.2	-	Ω
Switching Characteristics						
Turn On Delay Time	$T_{D(ON)}$	V_{DS} = 50 V, I_D =13 A V_{GS} = 10 V, R_{GEN} = 6 Ω	-	14	-	ns
Rise Time	T_R		-	28.5	-	ns
Turn Off Delay Time	$T_{D(OFF)}$		-	46.5	-	ns
Fall Time	T_F		-	42.5	-	ns
Total Gate Charge	Q_G	V_{DS} = 50 V, I_D = 13 A, V_{GS} = 10 V	-	39.5	-	nC
Gate-Source Charge	Q_{GS}		-	6.6	-	nC
Gate-Drain Charge	Q_{GD}		-	8.6	-	nC
Drain- Source Diode Characteristics and Maximum Ratings						
Maximum Continuous Body-Diode Forward Current	I_S		-	-	63	A
Maximum Pulsed Body-Diode Forward Current NOTE 1	I_{SM}		-	-	252	A
Diode Forward Voltage	V_{SD}	V_{GS} = 0 V, I_S = 1 A	-	0.7	1	V
Reverse recovery time	T_{RR}	I_F = 13 A, di/dt = 100 A/μS	-	177	-	ns
Reverse recovery charge	Q_{RR}		-	1291	-	nC

Notes:

1. Pulse Test: Pulse width ≤ 300 us, Duty cycle ≤ 2%
2. Essentially independent of operating temperature

Electrical Characteristics Diagrams

Figure 1: On-Region Characteristics

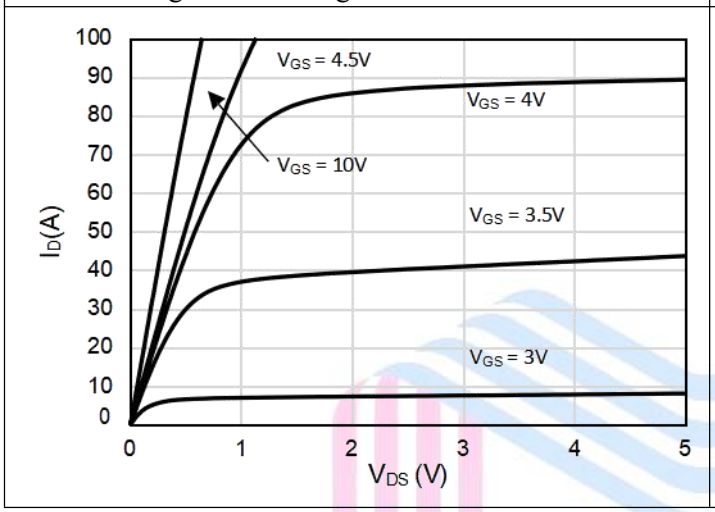


Figure 2: Transfer Characteristics

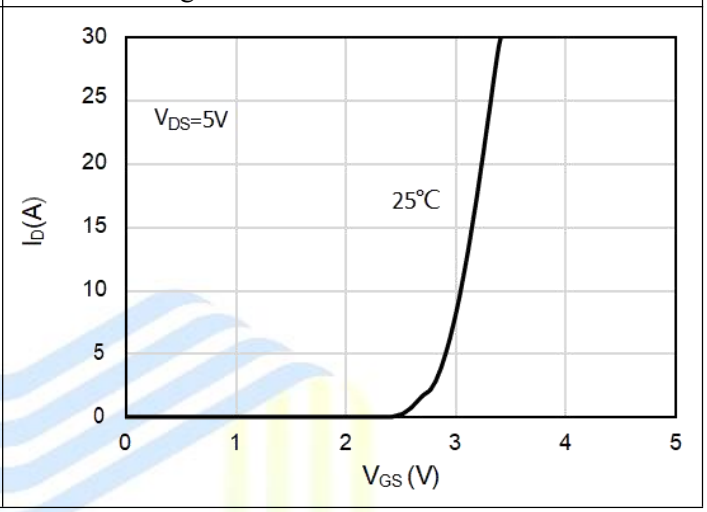


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

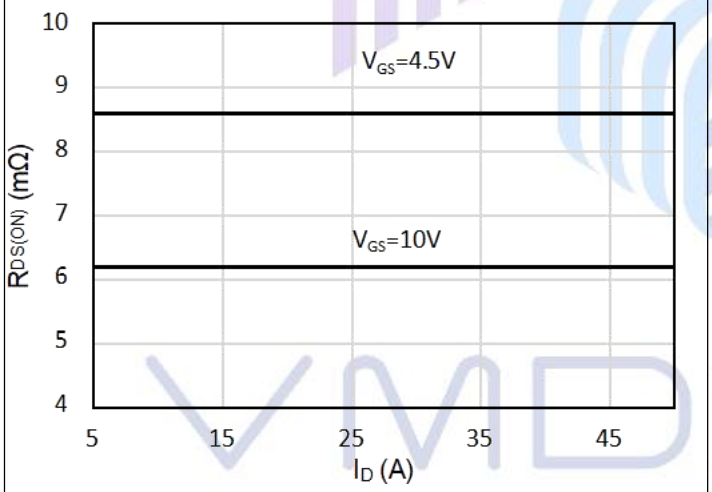


Figure 4: On-Resistance vs. Junction Temperature

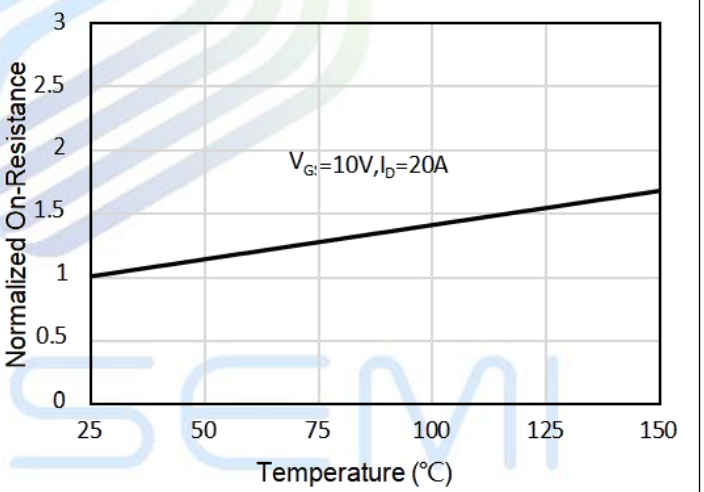


Figure 5: Body-Diode Characteristics

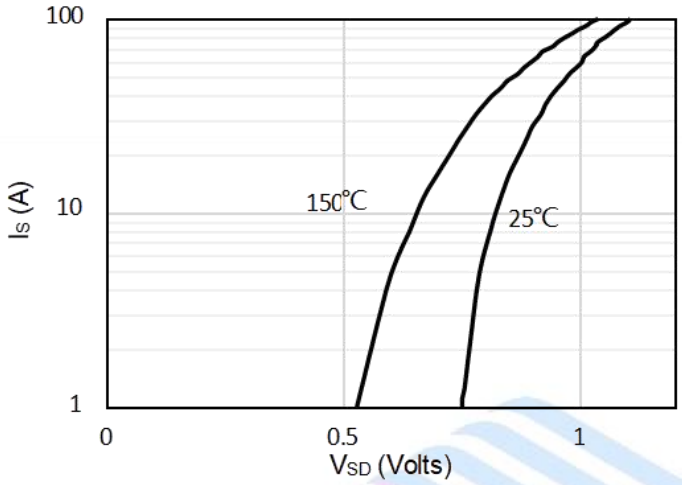


Figure 6: Capacitance Characteristics

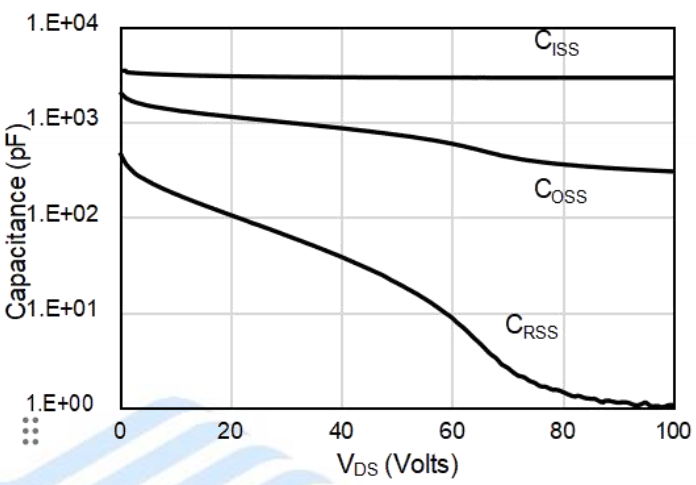


Figure7:Gate-ChargeCharacteristics

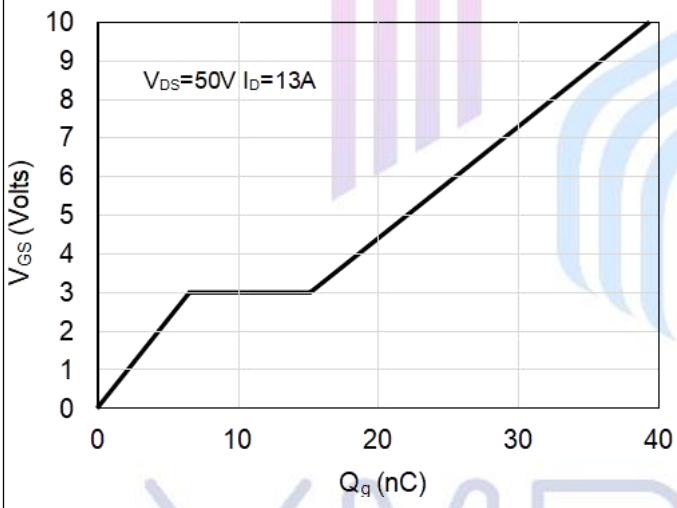


Figure 8: Power De-rating

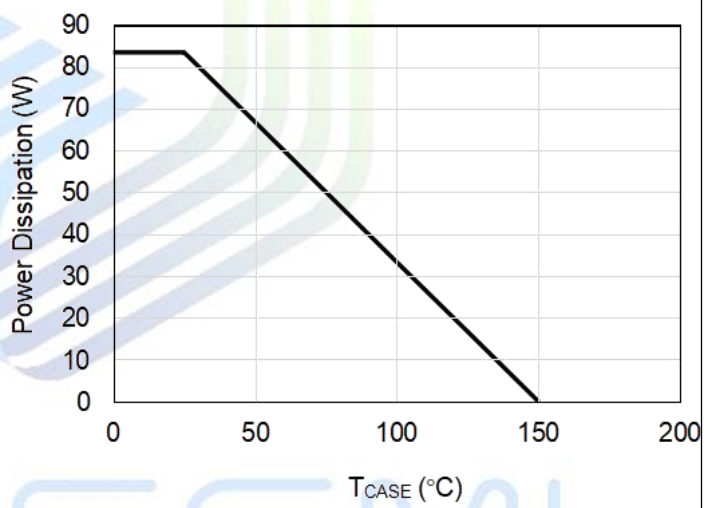


Figure 9: Current De-rating

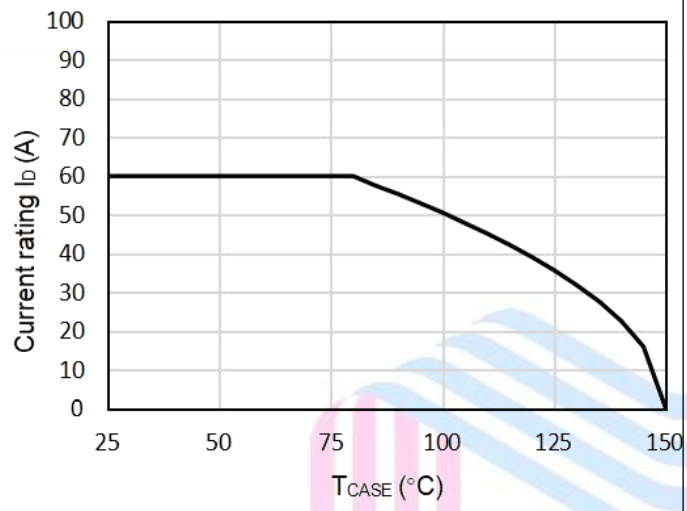


Figure 10: Single Pulse Power Rating Junction-to-Case

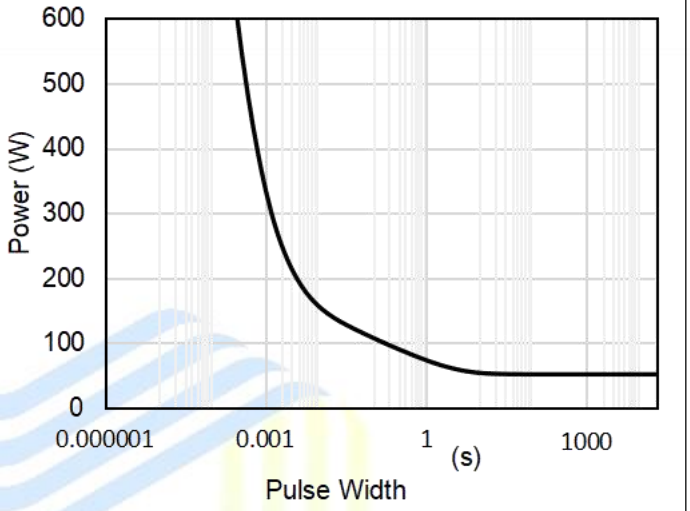


Figure 11: Normalized Maximum Transient Thermal Impedance

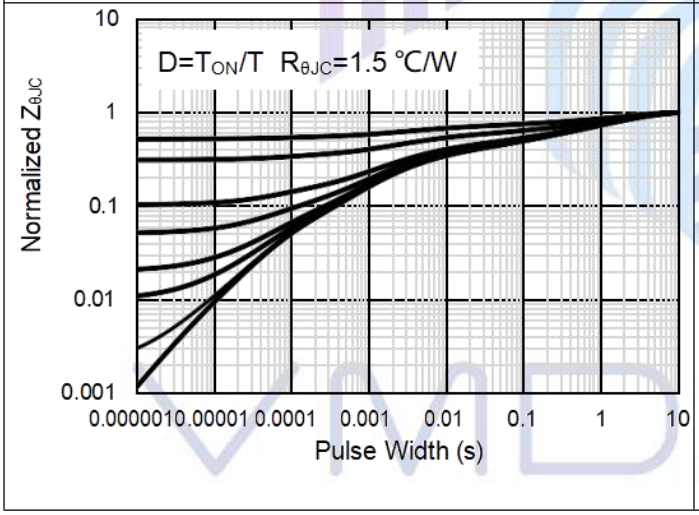
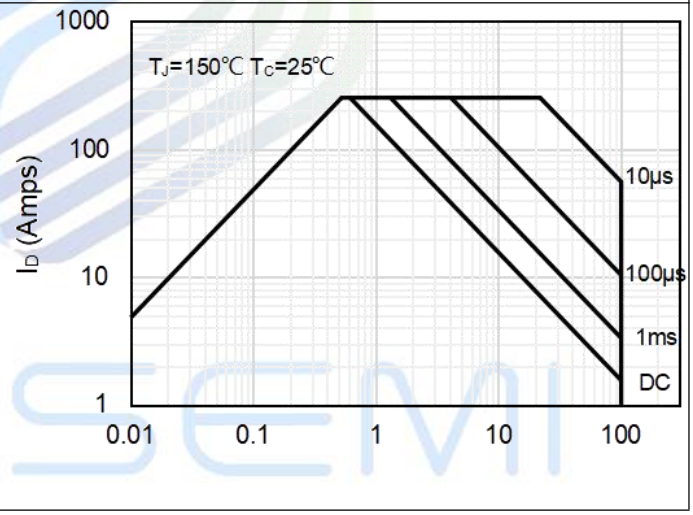
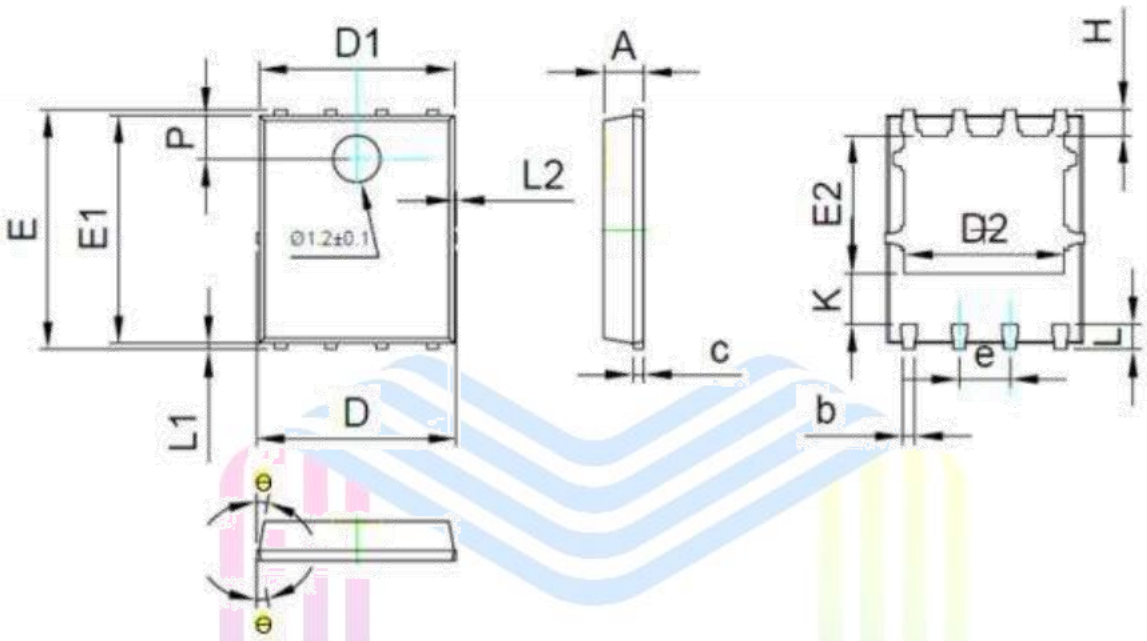


Figure 12: Maximum Forward Biased Safe Operating Area



Mechanical Dimensions (PDFN5×6 Unit: mm)



COMMON DIMENSIONS
(UNITS OF MEASURE = MILLIMETER)

SYMBOL	MIN	NOM	MAX
A	0.90	1.00	1.10
b	0.35	0.40	0.45
c	0.21	0.25	0.34
D	-	-	5.1
D1	4.85	4.90	4.95
D2	3.96	4.01	4.06
e	1.27 BSC		
E	5.95	6.00	6.05
E1	5.70	5.75	5.80
E2	3.425	3.475	3.525
H	0.60	0.65	0.70
K	1.29	-	-
L	0.60	0.65	0.70
L1	0.05	0.15	0.25
L2	-	-	0.12
θ	8°	10°	12°
P	1.05	1.10	1.15

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