VFPB010R050NB

Datasheet

General Description

$V_{(BR)DSS}$	$R_{DS(ON)\_max}$	I_D
100V	5.0mΩ@10V	135A
	7.5mΩ@4.5V	

Symbol

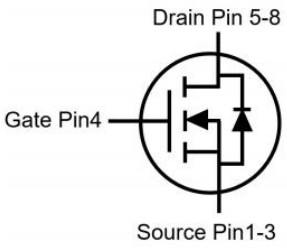
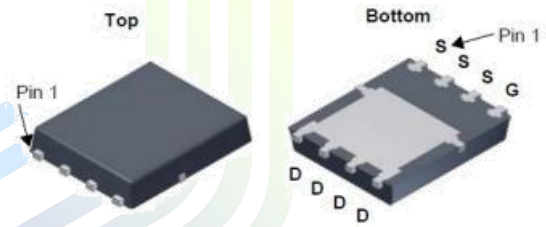


Figure 1 Symbol of VFPB010R050NB

Features

- Low $R_{DS(ON)}$
- Fast Switching and High efficiency
- 100% Avalanche Tested
- Pb-free lead plating;
- RoHS compliant

Package Type



PDFN5*6

Figure 2 Package Type of VFPB010R050NB

Application

- PD charger
- Motor driver
- Switching voltage regulator
- DC-DC converter
- Switched mode power supply

Ordering Information

Product Name	Package
VFPB010R050NB	PDFN5*6

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

Parameter		Symbol	Rating	Unit
Drain-Source Voltage		V_{DSS}	100	V
Gate-Source Voltage		V_{GSS}	±20	V
Continuous Drain Current	T_C=25ºC	I_D	135	A
Continuous Drain Current	T_C=100ºC		85	A
Pulsed Drain Current[Note 2]	T_C=25ºC	$I_{D.pulse}$	540	A
Continuous Diode Forward Current	T_C=25ºC	I_S	135	A
Continuous Drain Current	T_A=25ºC	I_{DSM}	25	A
Continuous Drain Current	T_A=70ºC		20	A
Max Power Dissipation	T_C=25ºC	P_D	125	W
Max Power Dissipation	T_C=100ºC		50	
Max Power Dissipation[Note 3]	T_A=25ºC	P_{DSM}	4	
Max Power Dissipation[Note 3]	T_A=70ºC		2.7	
Avalanche Energy, Single Pulse [Note 4]		E_{AS}	121	mJ
Operation and storage temperature		T_J,T_{STG}	-55 to 150	ºC

Thermal Resistance

Parameter	Symbol	Min	Typ	Max	Unit
Thermal Resistance, Junction-to-Case	$R_{θJC}$		1.0		ºC/W
Thermal Resistance, Junction-to-Ambient	$R_{θJA}$		30		

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

Parameter		Symbol	Test Conditions	Min	Typ	Max	Unit
Statistic Characteristics							
Drain-Source Breakdown Voltage		BV_{DSS}	V_{GS}=0V, I_D=250uA	100			V
Zero Gate Voltage Drain Current		I_{DSS}	V_{DS}=100V, V_{GS}=0V			1	uA
Zero Gate Voltage Drain Current T_J= 125 ºC			V_{DS}=100V, V_{GS}=0V			100	uA
Gate-Body Leakage Current	Forward	I_{GSSF}	V_{GS}=20V, V_{DS}=0V			100	nA
	Reverse	I_{GSSR}	V_{GS}=-20V, V_{DS}=0V			-100	
Gate Threshold Voltage		$V_{GS(TH)}$	V_{DS}=V_{GS}, I_D=250uA	1.4	1.9	2.4	V
Drain-Source On-Resistance[Note1]		$R_{DS(ON)}$	V_{GS}=10V, I_D=40A		3.8	5.0	mΩ
Drain-Source On-Resistance[Note1] T_J= 100 ºC					5		
Drain-Source On-Resistance[Note1]			V_{GS}=4.5V, I_D=30A		5.7	7.5	
Gate resistance		R_G	f=1 MHz, Open drain		1.3		Ω
Dynamic Characteristics							
Input Capacitance		C_{ISS}	V_{DS}=30V	3600	4240	4880	pF
Output Capacitance		C_{OSS}	V_{GS}=0V	1360	1600	1840	pF
Reverse Transfer Capacitance		C_{RSS}	f=1MHz	25	35	45	pF
Turn-on Delay Time		$t_{d(on)}$	V_{DS}=50V		13		ns
Rise Time		t_r	I_D=50A		45		
Turn-off Delay Time		$t_{d(off)}$	R_G=3Ω		39		
Fall Time		t_f	V_{GS}=10V		42		
Gate Charge Characteristics							
Gate to Source Charge		Q_{gs}	V_{GS}=10V		14		nC
Gate to Drain Charge		Q_{gd}	V_{DS}=50V		6.8		
Gate Charge Total@V_{GS}=10V		Q_g	I_D=50A		56		
Gate Charge Total@V_{GS}=4.5V					26		
Reverse Diode Characteristics							
Drain-Source Diode Forward Voltage		V_{SD}	V_{GS}=0V, I_{SD}=40A		0.8	1.2	V
Reverse Recovery Time		t_{rr}	I_{SD}=50A V_{GS}=0V		50		ns
Reverse Recovery Charge		Q_{rr}	di/dt=100A/us		53		nC

Notes:

1. Pulse width≤380μs; duty cycle≤ 2%.
2. Repetitive rating;pulse width limited by max junction temperature.
3. The power dissipation P_{DSM} is based on $R_{\theta JA}$ and the maximum allowed junction temperature of 150°C.
4. Limited by T_{Jmax}, starting T_J = 25°C, L = 0.5mH, R_G = 25Ω, I_{AS} = 22A, V_{GS} =10V.

Typical Performance Characteristics

Figure 3: Typ. Output Characteristics

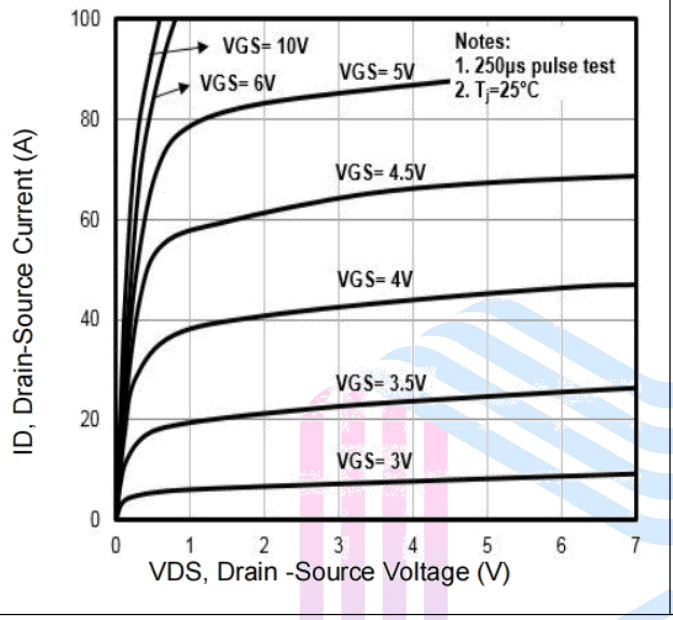


Figure 4: Typ. Gate Charge

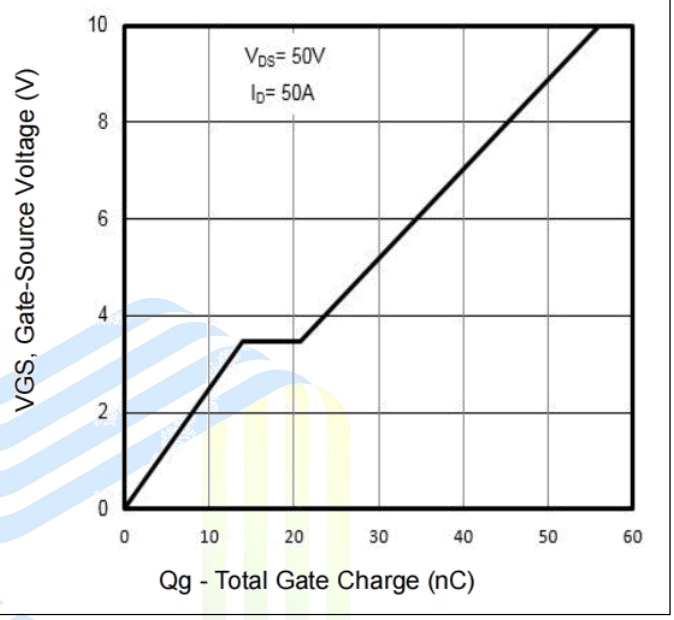


Figure 5: Normalized On-State Resistance

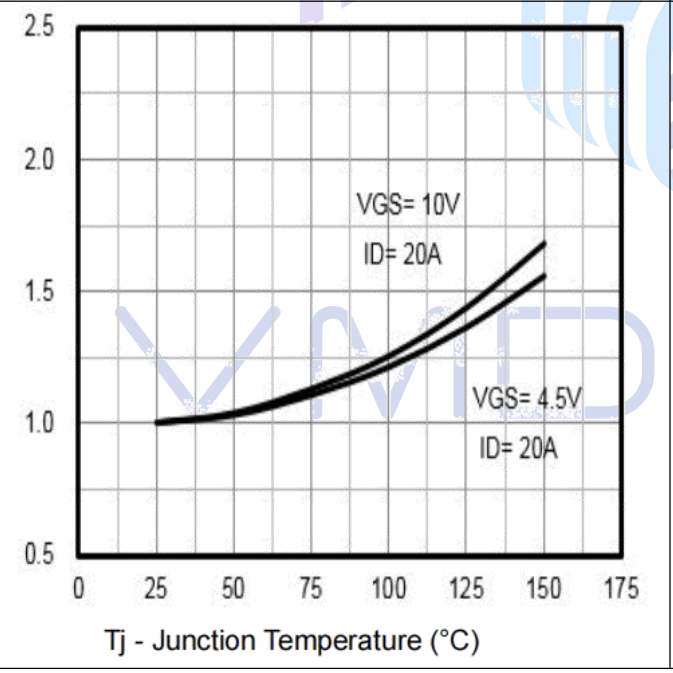


Figure 6: Typ. Transfer Characteristics

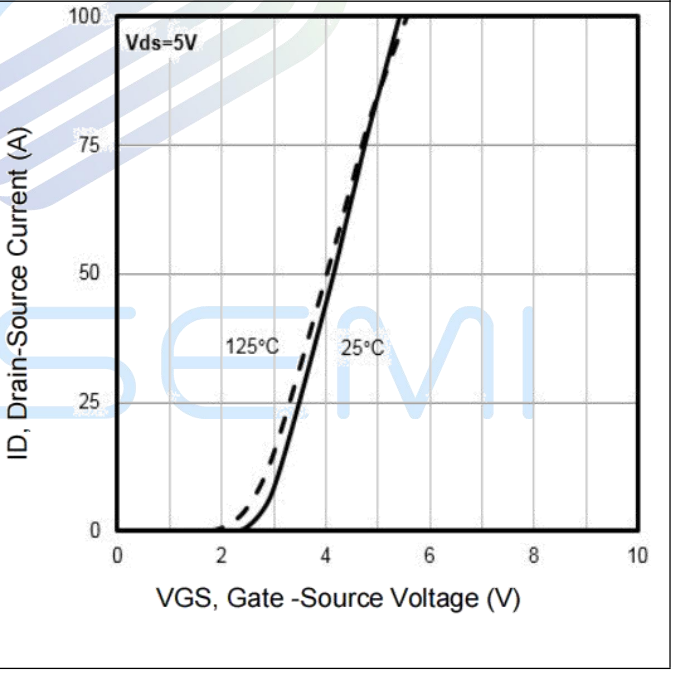


Figure 7: Typ. Capacitances

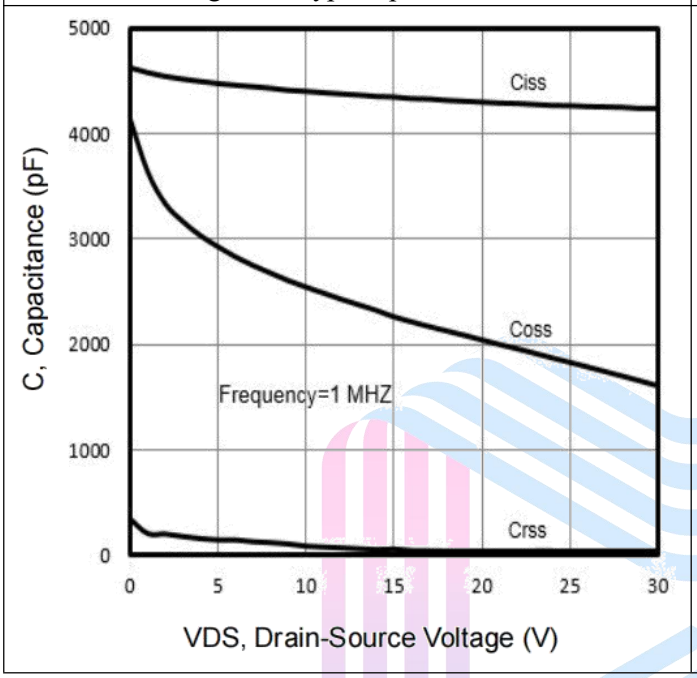


Figure 8: Forward Characteristics of Body Diode

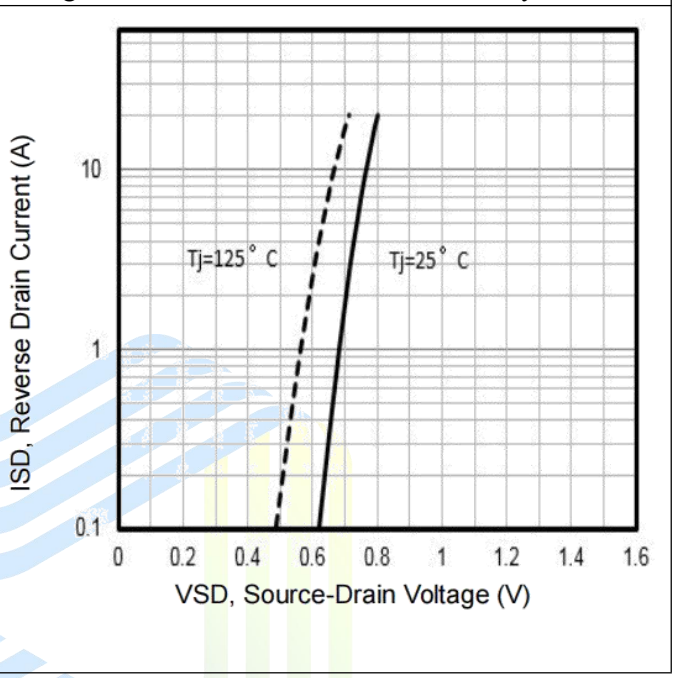


Figure 9: Gate-Source Threshold Voltage

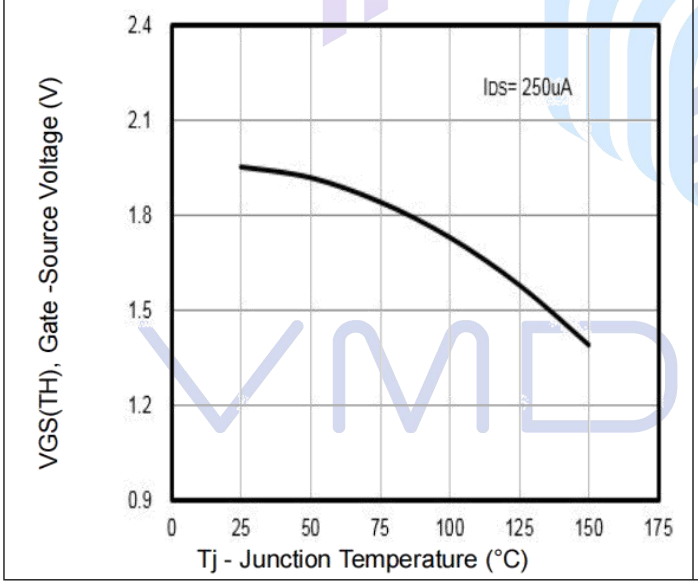


Figure 10: Safe Operating Area

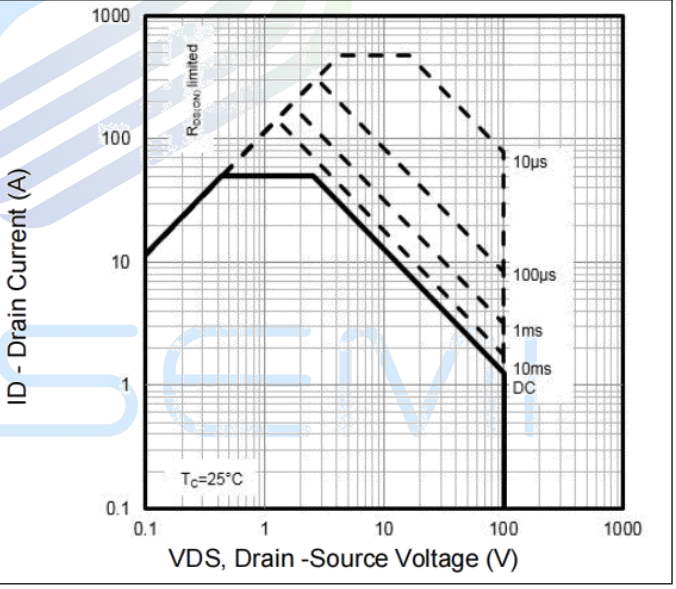
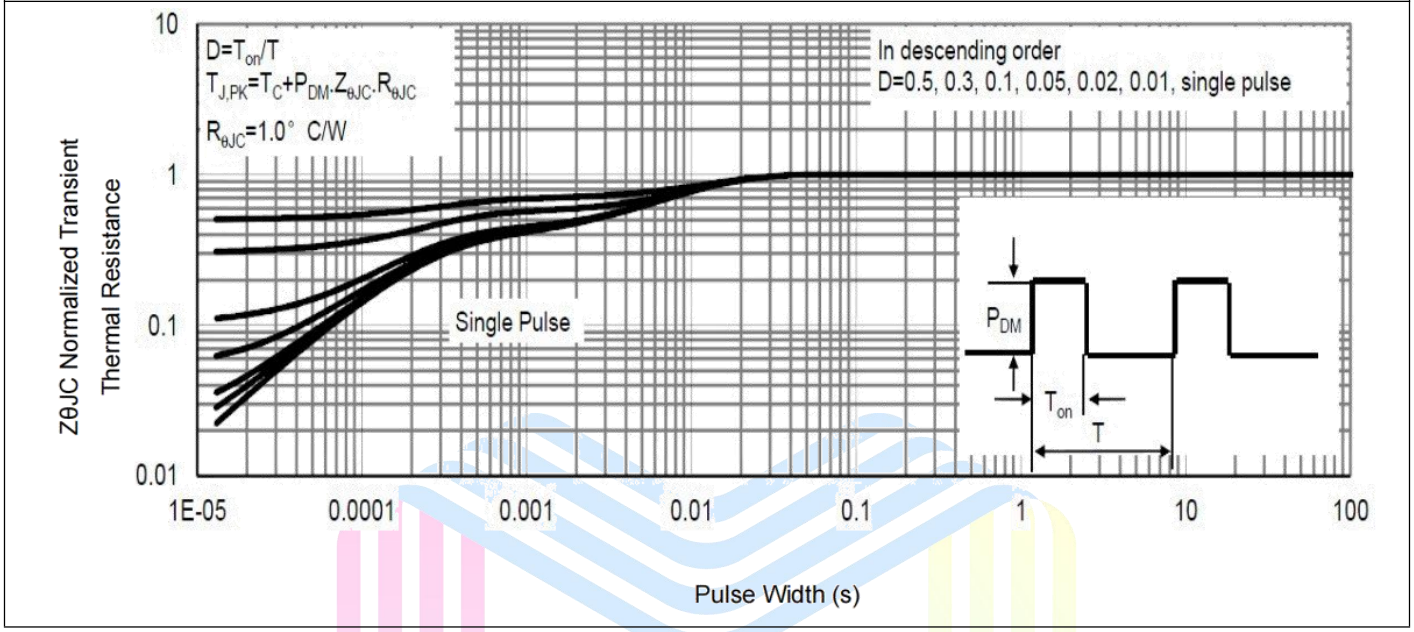
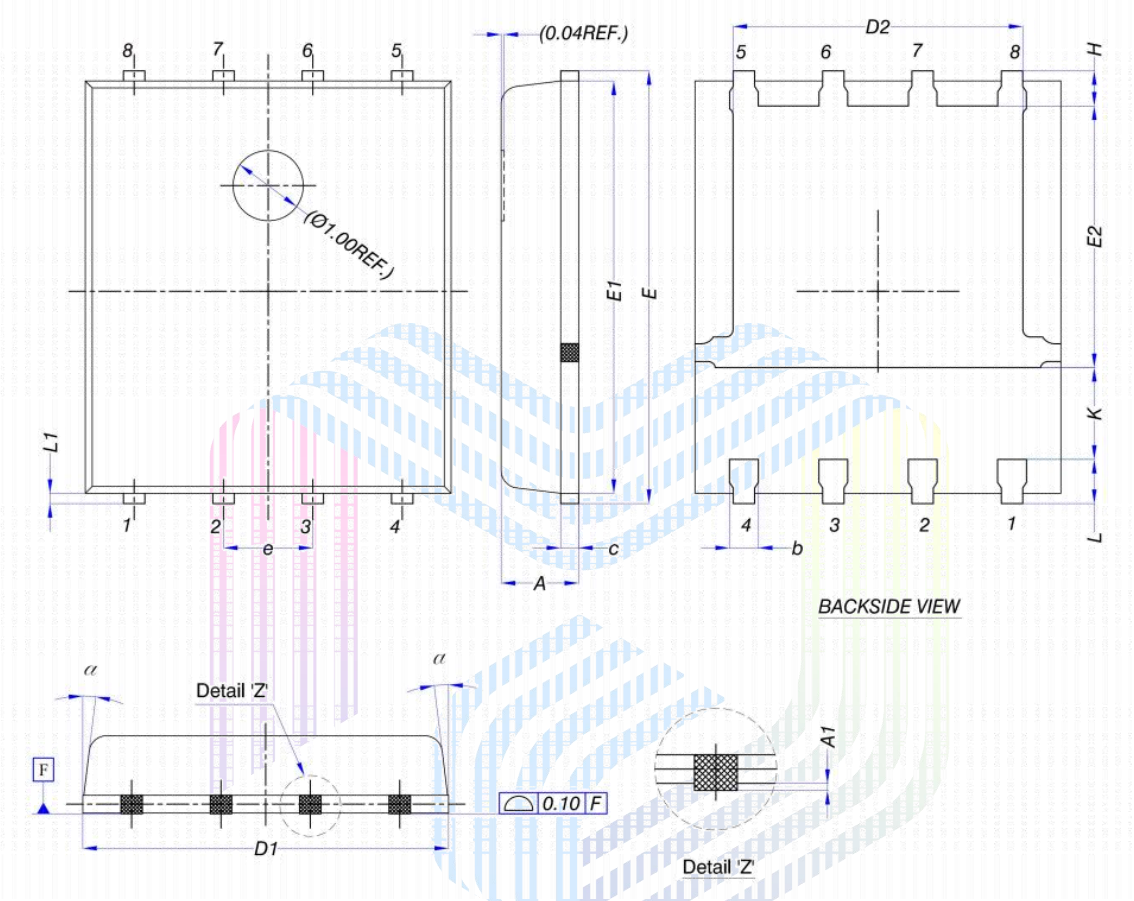


Figure 11: Normalized Maximum Transient Thermal Impedance



Mechanical Dimensions

Package Information PDFN5*6



Symbol	DIMENSIONS (unit : mm)		
	Min	Typ	Max
A	1.00	1.10	1.20
A1	0.00	--	0.05
b	0.30	0.40	0.50
c	0.20	0.25	0.30
D1	5.00	5.20	5.40
D2	3.80	4.10	4.25
E	5.95	6.15	6.35
E1	5.66	5.86	6.06
E2	3.52	3.72	3.92
e	1.27 BSC		
H	0.40	0.50	0.60
K	1.10	--	--
L	0.50	0.60	0.70
L1	0.08	0.15	0.22
α	0°	--	12°

Notes:

1. Refer to JEDEC MO-240 variation AA.
2. Dimensions "D1" and "E1" do NOT include mold flash protrusions or gate burrs.
3. Dimensions "D1" and "E1" include interterminal flash or protrusion. Interterminal flash or protrusion shall not exceed 0.25mm per side.

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