30V N-CHANNEL ENHANCEMENT MODE MOSFET

Product Summary

$V_{(BR)DSS}$	$R_{DS(on)}$	I_D T_A = +25°C
30V	760mΩ @ V_{GS} = 4.5V	0.65A
	930mΩ @ V_{GS} = 2.5V	0.58A
	1500mΩ @ V_{GS} = 1.8V	0.45A

Description

This MOSFET has been designed to minimize the on-state resistance ($R_{DS(on)}$) and yet maintain superior switching performance, making it ideal for high efficiency power management applications.

Applications

- Load switch
- Portable applications
- Power Management Functions

Features

- 0.4mm ultra low profile package for thin application
- 0.48mm^2 package footprint, 16 times smaller than SOT23
- Low $V_{GS(th)}$, can be driven directly from a battery
- Low $R_{DS(on)}$
- **ESD Protected**
- **Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- **Qualified to AEC-Q101 Standards for High Reliability**

Mechanical Data

- Case: X2-DFN0806-3
- Case Material: Molded Plastic, "Green" Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Finish – NiPdAu over Copper leadframe. Solderable per MIL-STD-202, Method 208 e4
- Weight: 0.00043 grams (approximate)

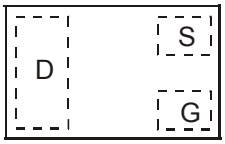


ESD PROTECTED

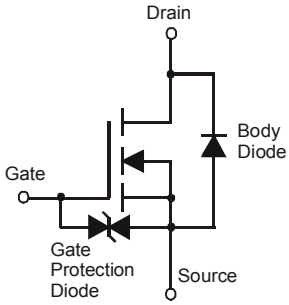
X2-DFN0806-3



Bottom View



Top View
Package Pin Configuration



Equivalent Circuit

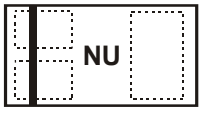
Ordering Information (Note 4)

Part Number	Marking	Reel size (inches)	Tape width (mm)	Quantity per reel
DMN3900UFA-7B	NU	7	8	10,000

Notes:
1. No purposely added lead. Fully EU Directive 2002/95/EC (RoHS) & 2011/65/EU (RoHS 2) compliant.
2. See http://www.diodes.com/quality/lead_free.html for more information about Diodes Incorporated's definitions of Halogen- and Antimony-free, "Green" and Lead-free.
3. Halogen- and Antimony-free "Green" products are defined as those which contain <900ppm bromine, <900ppm chlorine (<1500ppm total Br + Cl) and <1000ppm antimony compounds.
4. For packaging details, go to our website at http://www.diodes.com/products/packages.html.

Marking Information

DMN3900UFA-7B



Top View
Bar Denotes Gate and Source Side

NU = Product Type Marking Code

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Maximum Ratings (@T_A = +25°C, unless otherwise specified.)

Characteristic			Symbol	Value	Unit
Drain-Source Voltage			V_{DSS}	30	V
Gate-Source Voltage			V_{GSS}	±8	
Continuous Drain Current	V_{GS} = 4.5V	(Note 6)	I_D	0.65	A
		T_A = +70°C (Note 6)		0.52	
		(Note 5)	I_D	0.55	
Pulsed Drain Current		(Note 7)	I_{DM}	2.5	

Thermal Characteristics (@T_A = +25°C, unless otherwise specified.)

Characteristic		Symbol	Value	Unit
Power Dissipation	(Note 6)	P_D	490	mW
	(Note 5)		390	
Thermal Resistance, Junction to Ambient	(Note 6)	$R_{\theta JA}$	255	°C/W
	(Note 5)		327	
Operating and Storage Temperature Range		T_J, T_{STG}	-55 to +150	°C

Electrical Characteristics (@T_A = +25°C, unless otherwise specified.)

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
OFF CHARACTERISTICS (Note 8)						
Drain-Source Breakdown Voltage	BV_{DSS}	30	—	—	V	V_{GS} = 0V, I_D = 250μA
Zero Gate Voltage Drain Current	I_{DSS}	—	—	1	μA	V_{DS} = 30V, V_{GS} = 0V
Gate-Source Leakage	I_{GSS}	—	—	3	μA	V_{GS} = ±8V, V_{DS} = 0V
ON CHARACTERISTICS (Note 8)						
Gate Threshold Voltage	$V_{GS(th)}$	0.45	—	0.95	V	V_{DS} = V_{GS}, I_D = 250μA
Static Drain-Source On-Resistance	$R_{DS(on)}$	—	400	760	mΩ	V_{GS} = 4.5V, I_D = 200mA
			480	930		V_{GS} = 2.5V, I_D = 100mA
			617	1500		V_{GS} = 1.8V, I_D = 75mA
Forward Transfer Admittance	$\|Y_{fs}\|$	40	—	—	mS	V_{DS} = 3V, I_D = 10mA
Diode Forward Voltage (Note 8)	V_{SD}	—	0.7	1.2	V	V_{GS} = 0V, I_S = 300mA
DYNAMIC CHARACTERISTICS (Note 9)						
Input Capacitance	C_{iss}	—	42.2	—	pF	V_{DS} = 25V, V_{GS} = 0V, f = 1.0MHz
Output Capacitance	C_{oss}	—	4.5	—	pF	
Reverse Transfer Capacitance	C_{rss}	—	3,4	—	pF	
Gate Resistance	R_g	—	468	—	Ω	V_{DS} = 0V, V_{GS} = 0V, f = 1MHz
Total Gate Charge	Q_g	—	0.7	—	nC	V_{GS} = 4.5V, V_{DS} = 15V, I_D = 200mA
Gate-Source Charge	Q_{gs}	—	0.11	—	nC	
Gate-Drain Charge	Q_{gd}	—	0.15	—	nC	
Turn-On Delay Time	$t_{D(on)}$	—	10.5	—	ns	V_{DS} = 10V, I_D = 200mA, V_{GS} = 4.5V, R_G = 6Ω
Turn-On Rise Time	t_r	—	7.8	—	ns	
Turn-Off Delay Time	$t_{D(off)}$	—	80.6	—	ns	
Turn-Off Fall Time	t_f	—	23.4	—	ns	

Notes:
5. Device mounted on FR-4 PCB, with minimum recommended pad layout.
6. Device mounted on FR-4 PCB, with minimum recommended pad layout, except the device measured at t ≤ 10 sec.
7. Device mounted on minimum recommended pad layout test board, 10μs pulse duty cycle = 1%.
8. Short duration pulse test used to minimize self-heating effect.
9. Guaranteed by design. Not subject to production testing

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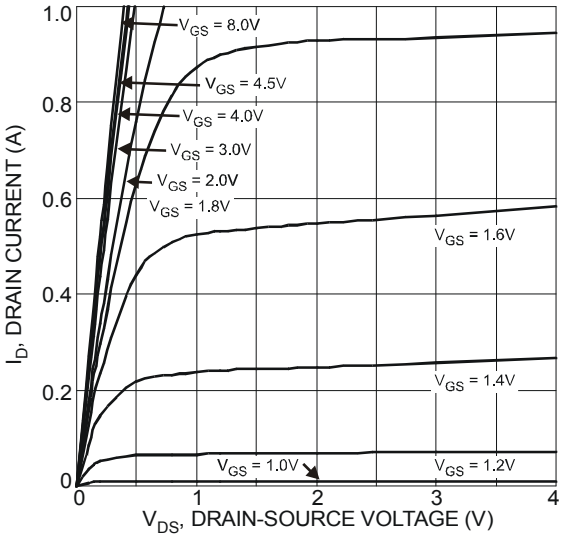


Fig.1 Typical Output Characteristic

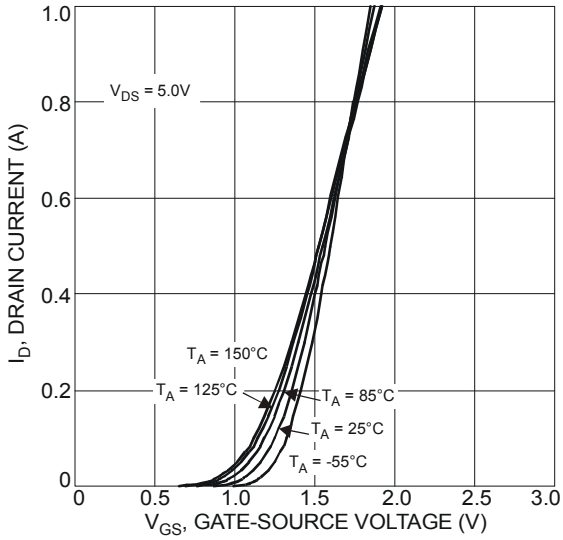


Fig. 2 Typical Transfer Characteristics

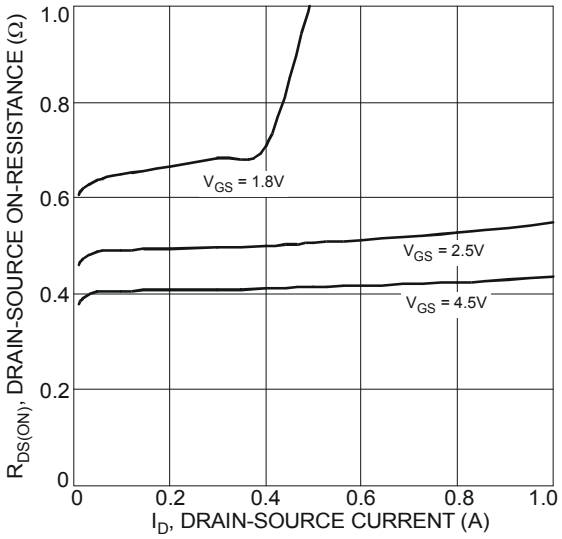


Fig. 3 Typical On-Resistance vs. Drain Current and Gate Voltage

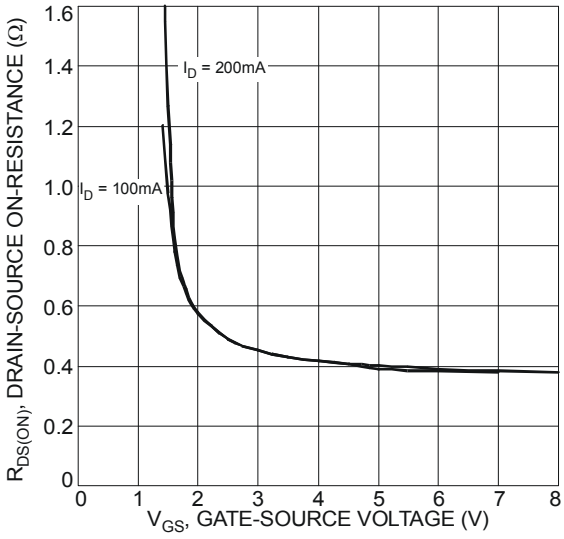


Fig. 4 Typical Drain-Source On-Resistance vs. Gate-Source Voltage

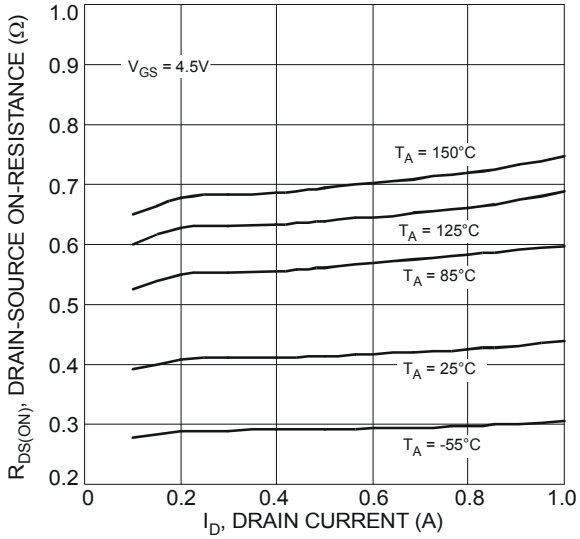


Fig. 5 Typical On-Resistance vs. Drain Current and Temperature

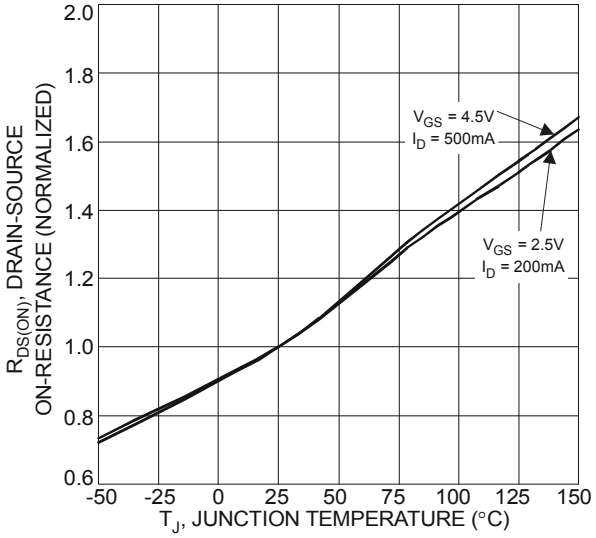


Fig. 6 On-Resistance Variation with Temperature

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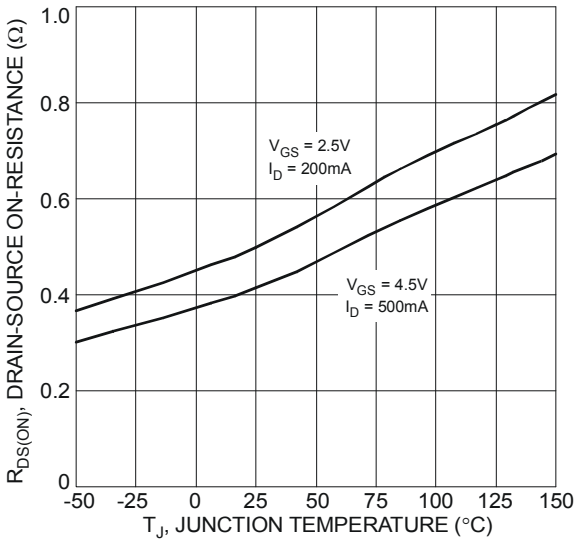


Fig. 7 On-Resistance Variation with Temperature

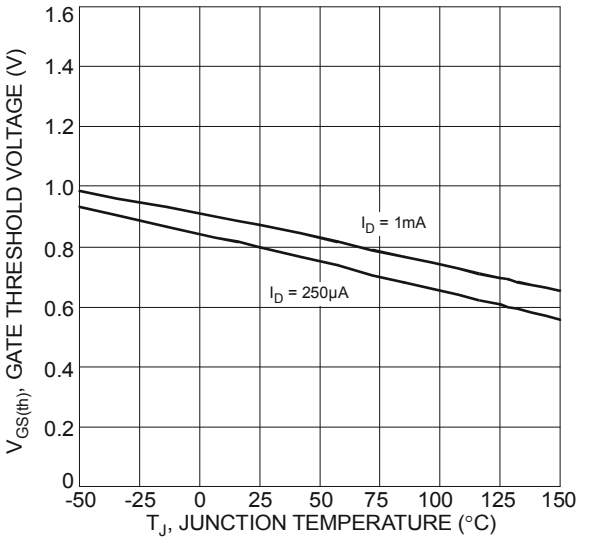


Fig. 8 Gate Threshold Variation vs. Ambient Temperature

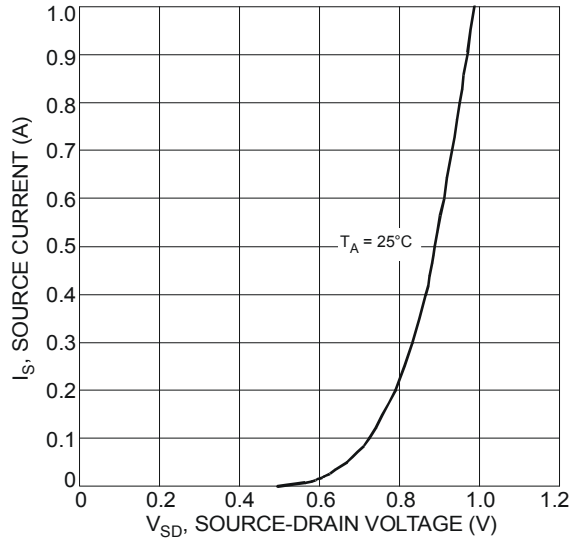


Fig. 9 Diode Forward Voltage vs. Current

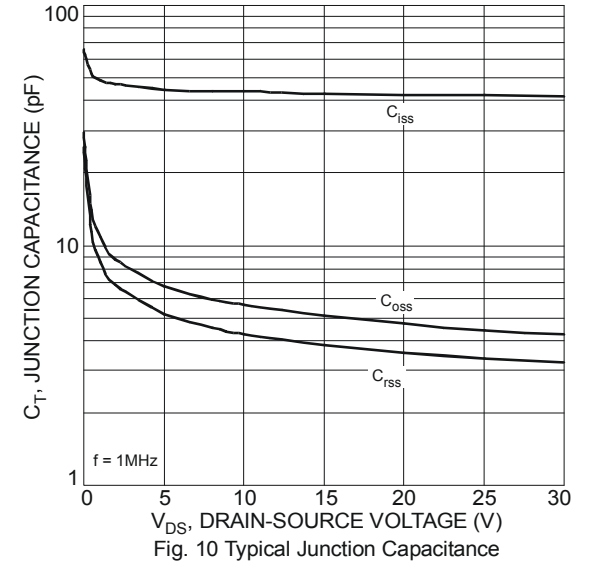


Fig. 10 Typical Junction Capacitance

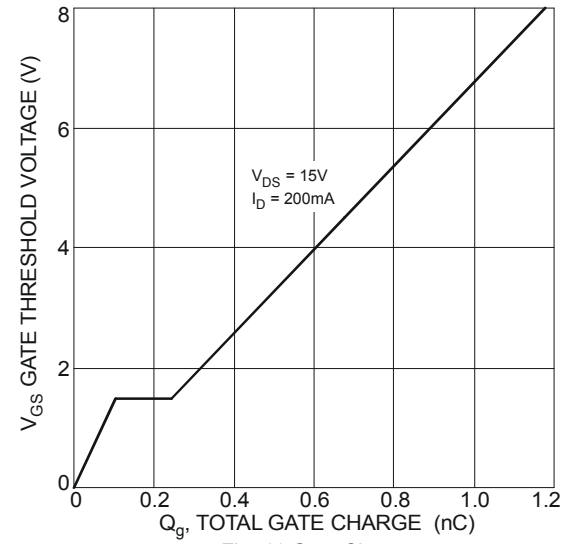


Fig. 11 Gate Charge

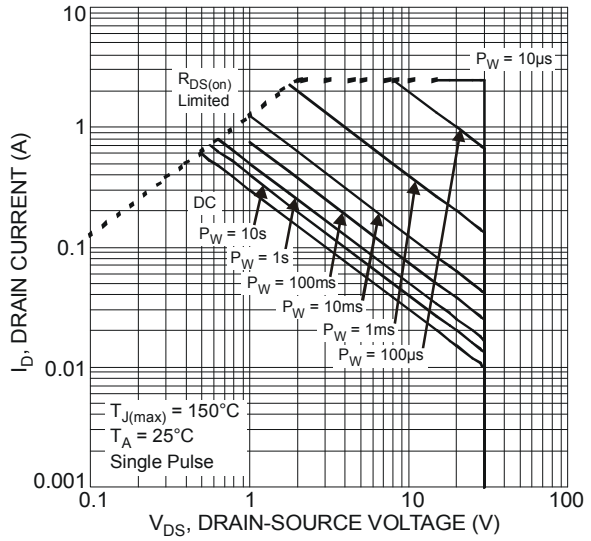


Fig. 12 SOA, Safe Operation Area

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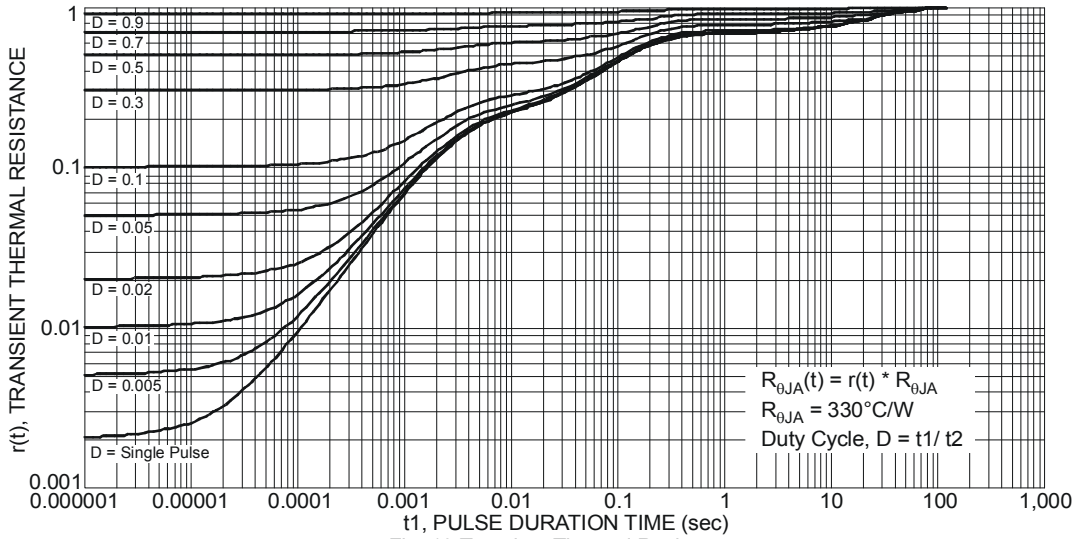
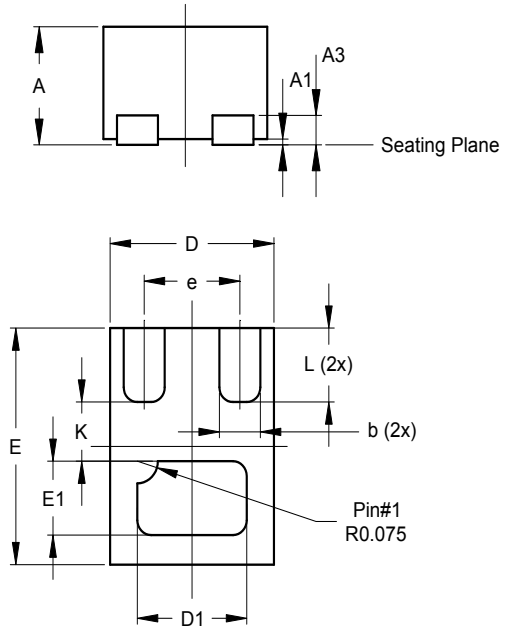


Fig. 13 Transient Thermal Resistance

Package Outline Dimensions

Please see AP02002 at http://www.diodes.com/datasheets/ap02002.pdf for latest version.

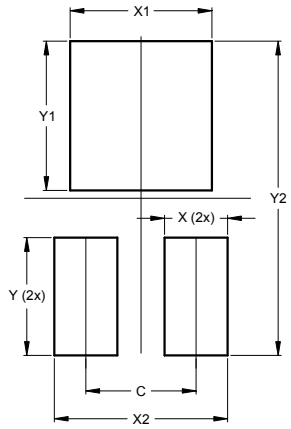


X2-DFN0806-3			
Dim	**Min**	**Max**	**Typ**
A	0.375	0.40	0.39
A1	0	0.05	0.02
A3	-	-	0.10
b	0.10	0.20	0.15
D	0.55	0.65	0.60
D1	0.35	0.45	0.40
E	0.75	0.85	0.80
E1	0.20	0.30	0.25
e	-	-	0.35
K	-	-	0.20
L	0.20	0.30	0.25
All Dimensions in mm			

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Suggested Pad Layout

Please see AP02001 at http://www.diodes.com/datasheets/ap02001.pdf for the latest version.



Dimensions	Value (in mm)
C	0.350
X	0.200
X1	0.450
X2	0.550
Y	0.375
Y1	0.475
Y2	1.000

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