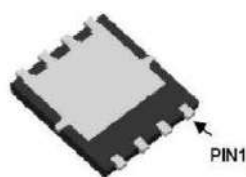


## General Features

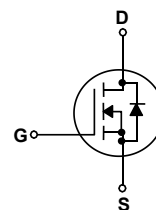
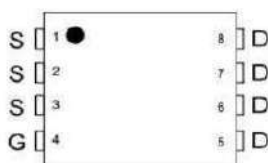
- Excellent gate charge  $\times R_{DS(on)}$  product(FOM)
- Very low on-resistance  $R_{DS(on)}$
- 150°C operating temperature
- Pb-free lead plating

## Application

- DC/DC Converter
- Ideal for high-frequency switching and synchronous rectification



DFN5\*6-8



N-Channel

## Product Summary



|                                |     |    |
|--------------------------------|-----|----|
| $V_{DS}$                       | 120 | V  |
| $R_{DS(on), Typ@ V_{GS}=10 V}$ | 4.3 | mΩ |
| $I_D$                          | 90  | A  |

## Absolute Maximum Ratings ( $T_C=25^\circ\text{C}$ unless otherwise noted)

| Parameter                                           | Symbol                    | Limit      | Unit |
|-----------------------------------------------------|---------------------------|------------|------|
| Drain-Source Voltage                                | $V_{DS}$                  | 120        | V    |
| Gate-Source Voltage                                 | $V_{GS}$                  | $\pm 20$   | V    |
| Drain Current-Continuous                            | $I_D$                     | 90         | A    |
| Drain Current-Continuous( $T_C=100^\circ\text{C}$ ) | $I_D (100^\circ\text{C})$ | 64         | A    |
| Pulsed Drain Current                                | $I_{DM}$                  | 360        | A    |
| Maximum Power Dissipation                           | $P_D$                     | 130        | W    |
| Derating factor                                     |                           | 1.04       | W/°C |
| Single pulse avalanche energy <sup>(Note 4)</sup>   | $E_{AS}$                  | 400        | mJ   |
| Operating Junction and Storage Temperature Range    | $T_J, T_{STG}$            | -55 To 150 | °C   |

## Thermal Characteristic

|                                         |                 |      |      |
|-----------------------------------------|-----------------|------|------|
| Thermal Resistance, Junction-to-Case    | $R_{\theta JC}$ | 0.92 | °C/W |
| Thermal Resistance, Junction-to-Ambient | $R_{\theta JA}$ | 62   | °C/W |

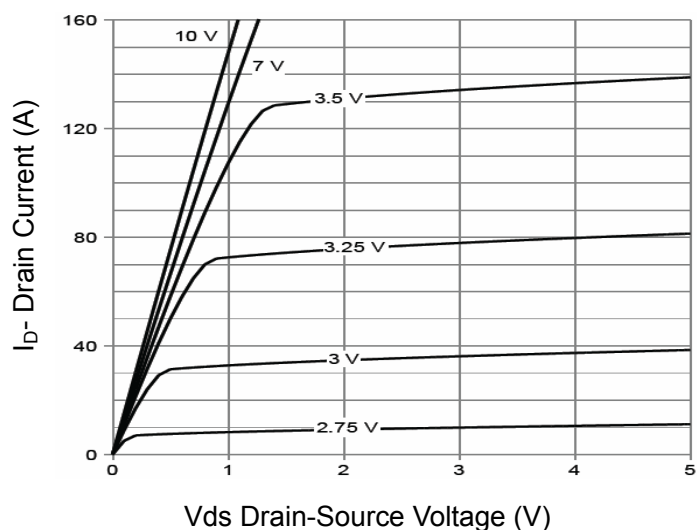
**Electrical Characteristics ( $T_C=25^{\circ}\text{C}$  unless otherwise noted)**

| Parameter                          | Symbol              | Condition                                                                             | Min | Typ  | Max  | Unit |
|------------------------------------|---------------------|---------------------------------------------------------------------------------------|-----|------|------|------|
| Off Characteristics                |                     |                                                                                       |     |      |      |      |
| Drain-Source Breakdown Voltage     | BV <sub>DSS</sub>   | V <sub>GS</sub> =0V I <sub>D</sub> =250μA                                             | 120 |      | -    | V    |
| Zero Gate Voltage Drain Current    | I <sub>DSS</sub>    | V <sub>DS</sub> =96V,V <sub>GS</sub> =0V                                              | -   | -    | 1    | μA   |
| Gate-Body Leakage Current          | I <sub>GSS</sub>    | V <sub>GS</sub> =±20V,V <sub>DS</sub> =0V                                             | -   | -    | ±100 | nA   |
| On Characteristics (Note 3)        |                     |                                                                                       |     |      |      |      |
| Gate Threshold Voltage             | V <sub>GS(th)</sub> | V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =250μA                              | 1.2 | 1.8  | 2.5  | V    |
| Drain-Source On-State Resistance   | R <sub>DS(ON)</sub> | V <sub>GS</sub> =10V, I <sub>D</sub> =45A                                             | -   | 4.3  | 6.5  | mΩ   |
|                                    |                     | V <sub>GS</sub> =4.5V, I <sub>D</sub> =45A                                            |     | 5.7  | 7.8  |      |
| Forward Transconductance           | g <sub>FS</sub>     | V <sub>DS</sub> =5V,I <sub>D</sub> =50A                                               |     | 60   | -    | S    |
| Dynamic Characteristics (Note3)    |                     |                                                                                       |     |      |      |      |
| Input Capacitance                  | C <sub>iss</sub>    | V <sub>DS</sub> =60V,V <sub>GS</sub> =0V,<br>F=1.0MHz                                 | -   | 3722 | -    | pF   |
| Output Capacitance                 | C <sub>oss</sub>    |                                                                                       | -   | 228  | -    | pF   |
| Reverse Transfer Capacitance       | C <sub>rss</sub>    |                                                                                       | -   | 25   | -    | pF   |
| Switching Characteristics (Note 3) |                     |                                                                                       |     |      |      |      |
| Turn-on Delay Time                 | t <sub>d(on)</sub>  | V <sub>DD</sub> =60V,I <sub>D</sub> =45A<br>V <sub>GS</sub> =10V,R <sub>G</sub> =1.6Ω | -   | 20   | -    | nS   |
| Turn-on Rise Time                  | t <sub>r</sub>      |                                                                                       | -   | 15   | -    | nS   |
| Turn-Off Delay Time                | t <sub>d(off)</sub> |                                                                                       | -   | 40   | -    | nS   |
| Turn-Off Fall Time                 | t <sub>f</sub>      |                                                                                       | -   | 10   | -    | nS   |
| Total Gate Charge                  | Q <sub>g</sub>      | V <sub>DS</sub> =60V,I <sub>D</sub> =45A,<br>V <sub>GS</sub> =10V                     | -   | 90   | -    | nC   |
| Gate-Source Charge                 | Q <sub>gs</sub>     |                                                                                       | -   | 21   | -    | nC   |
| Gate-Drain Charge                  | Q <sub>gd</sub>     |                                                                                       | -   | 23.5 | -    | nC   |
| Drain-Source Diode Characteristics |                     |                                                                                       |     |      |      |      |
| Diode Forward Voltage (Note 2)     | V <sub>SD</sub>     | V <sub>GS</sub> =0V,I <sub>S</sub> =45A                                               | -   | -    | 1.2  | V    |
| Diode Forward Current              | I <sub>S</sub>      |                                                                                       | -   | -    | 90   | A    |
| Reverse Recovery Time              | t <sub>rr</sub>     | T <sub>J</sub> = 25°C, I <sub>F</sub> = 45A<br>di/dt = 100A/μs (Note3)                | -   | 70   | -    | nS   |
| Reverse Recovery Charge            | Q <sub>rr</sub>     |                                                                                       | -   | 137  | -    | nC   |

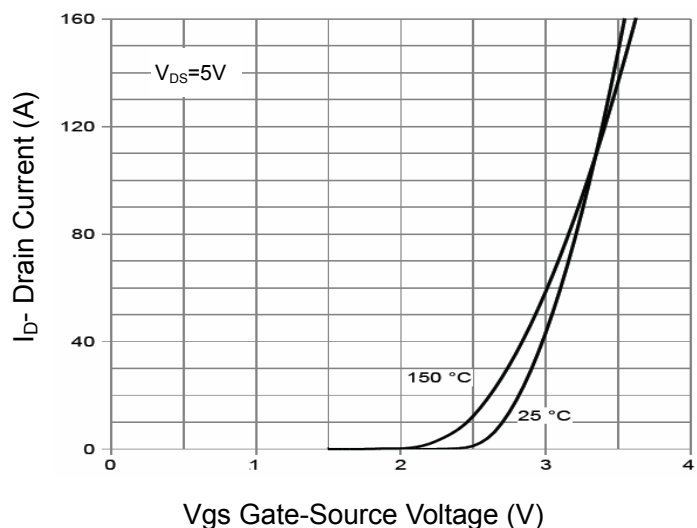
**Notes:**

1. Repetitive Rating: Pulse width limited by maximum junction temperature.
2. Pulse Test: Pulse Width  $\leq 300\mu s$ , Duty Cycle  $\leq 2\%$ .
3. Guaranteed by design, not subject to production
4. EAS condition :  $T_J=25^{\circ}\text{C}, V_{DD}=50V, V_G=10V, L=0.5mH, R_g=25\Omega$

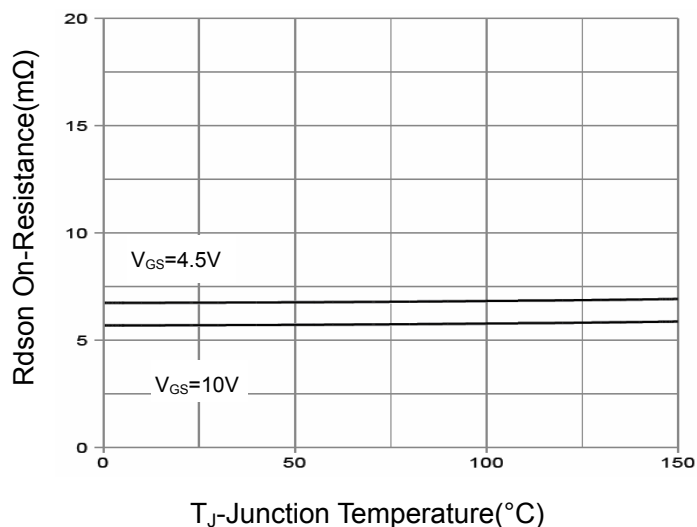
## Typical Electrical and Thermal Characteristics



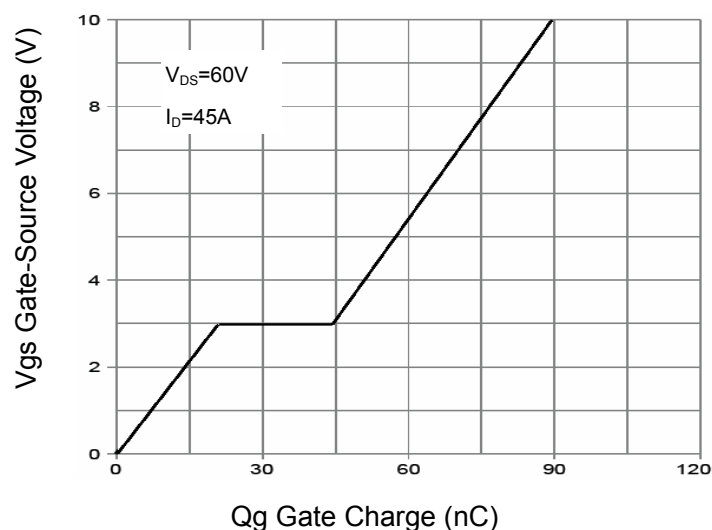
**Figure 1 Output Characteristics**



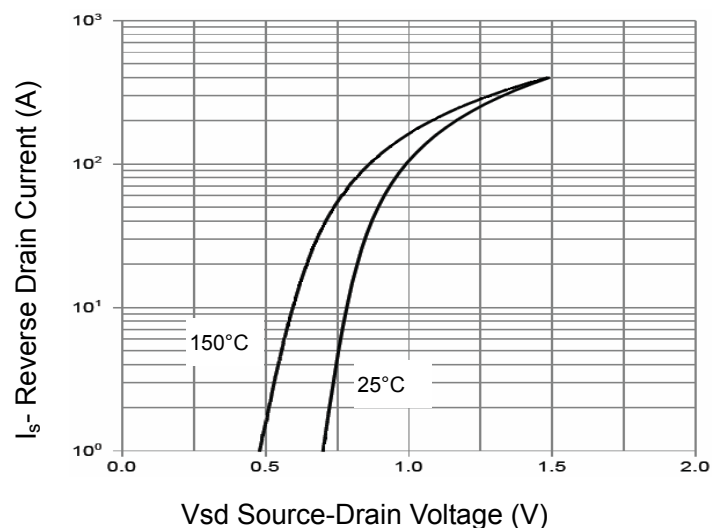
**Figure 2 Transfer Characteristics**



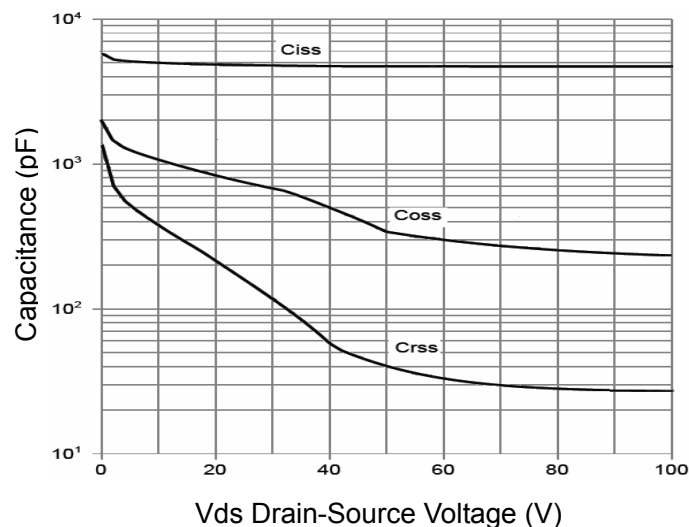
**Figure 3  $R_{DS(on)}$ -Junction Temperature**



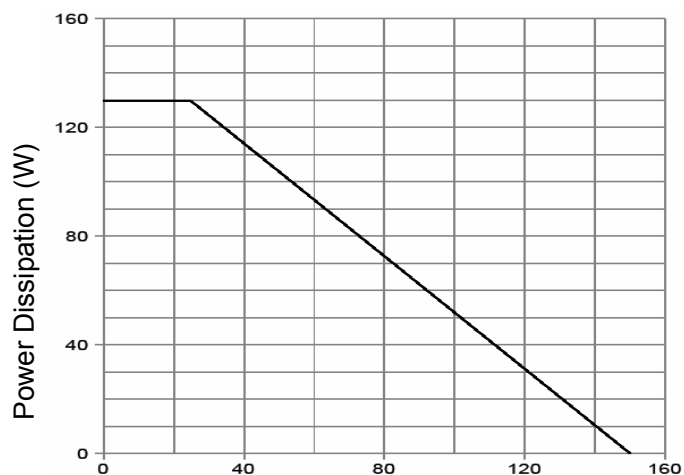
**Figure 4 Gate Charge**



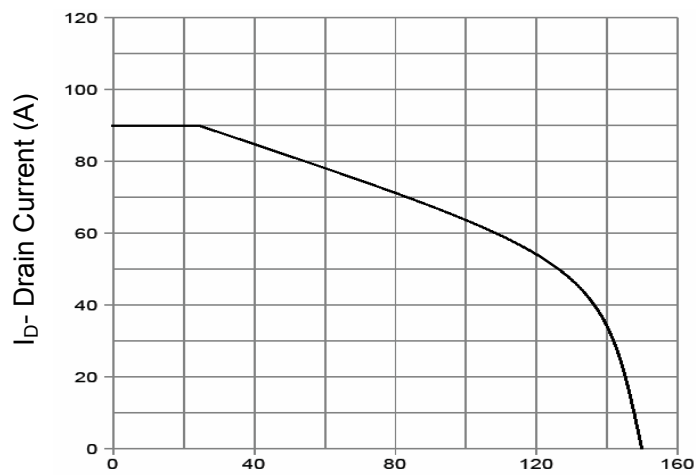
**Figure 5 Source- Drain Diode Forward**



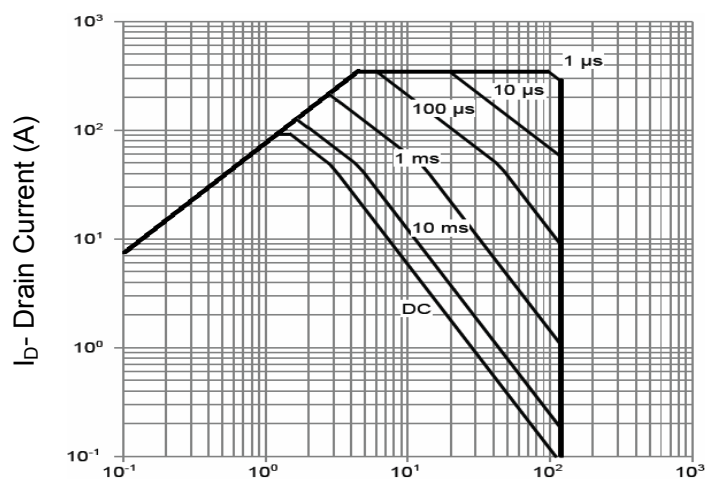
**Figure 6 Capacitance vs  $V_{DS}$**



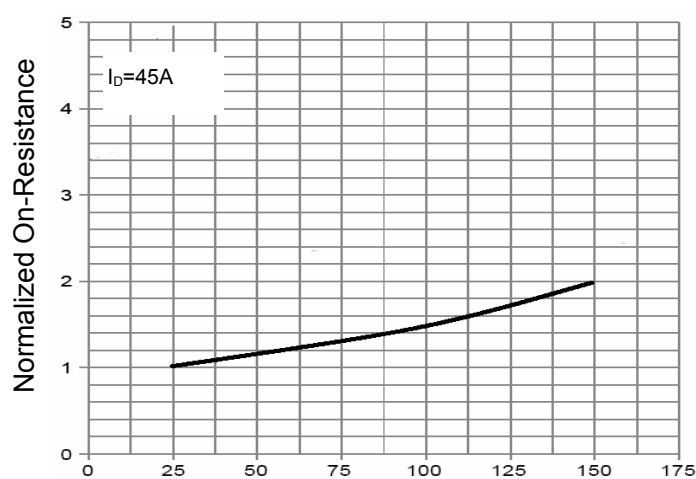
T<sub>J</sub>-Junction Temperature(°C)  
**Figure 7 Power De-rating**



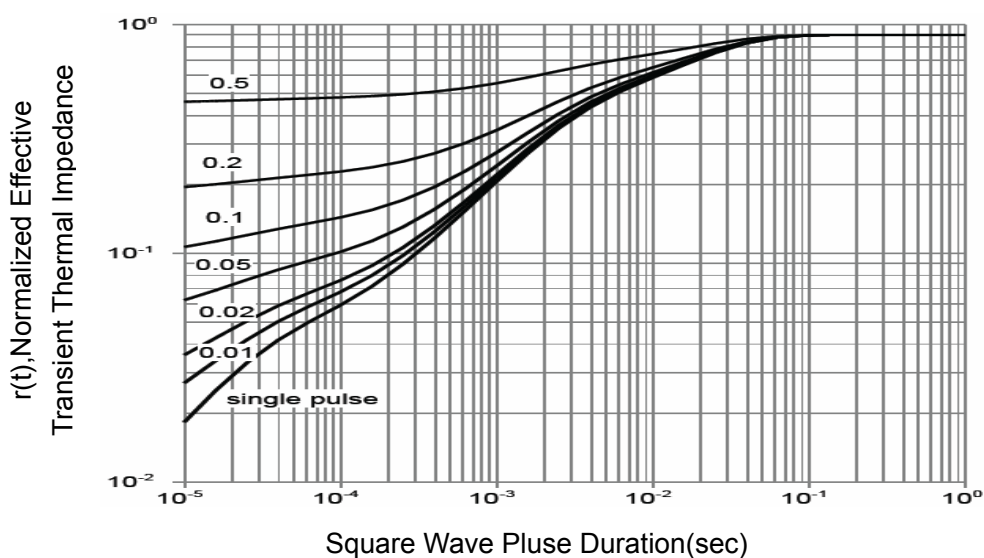
T<sub>J</sub>-Junction Temperature (°C)  
**Figure 9 Current De-rating**



V<sub>ds</sub> Drain-Source Voltage (V)  
**Figure 8 Safe Operation Area**



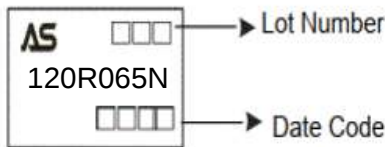
T<sub>J</sub>-Junction Temperature(°C)  
**Figure 10 Rdson-Junction Temperature**

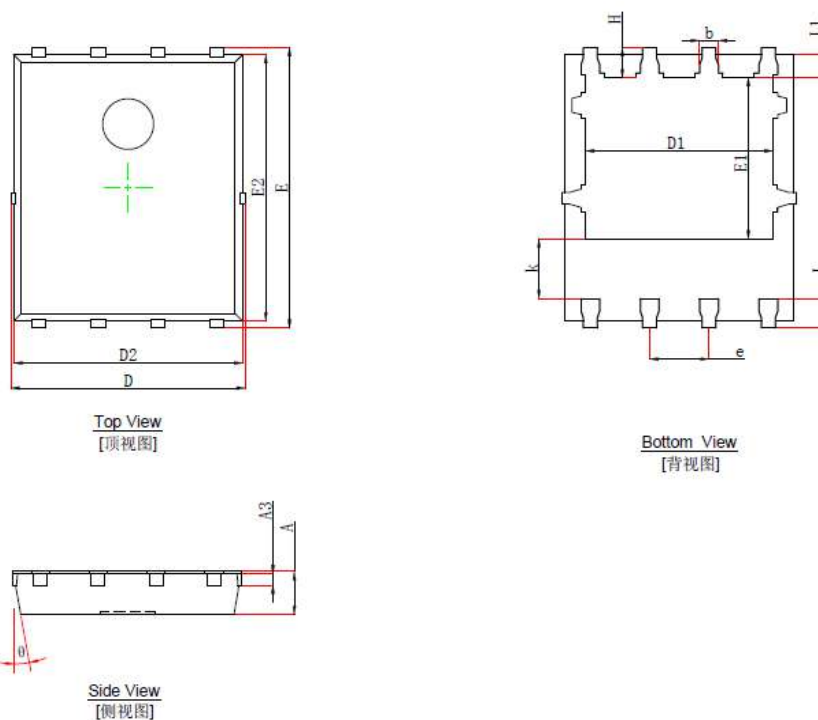


**Figure 11 Normalized Maximum Transient Thermal Impedance**

## Ordering and Marking Information

| Ordering Device No. | Marking  | Package   | Packing   | Quantity  |
|---------------------|----------|-----------|-----------|-----------|
| ASDM120R065NQ-R     | 120R065N | PDFN5*6-8 | Tape&Reel | 4000/Reel |

| PACKAGE   | MARKING                                                                             |
|-----------|-------------------------------------------------------------------------------------|
| PDFN5*6-8 |  |

**PDFN5x6\_P, 8 Leads**


| Symbol | Dimensions In Millimeters |       | Dimensions In Inches |       |
|--------|---------------------------|-------|----------------------|-------|
|        | Min.                      | Max.  | Min.                 | Max.  |
| A      | 0.900                     | 1.000 | 0.035                | 0.039 |
| A3     | 0.254REF.                 |       | 0.010REF.            |       |
| D      | 4.944                     | 5.096 | 0.195                | 0.201 |
| E      | 5.974                     | 6.126 | 0.235                | 0.241 |
| D1     | 3.910                     | 4.110 | 0.154                | 0.162 |
| E1     | 3.375                     | 3.575 | 0.133                | 0.141 |
| D2     | 4.824                     | 4.976 | 0.190                | 0.196 |
| E2     | 5.674                     | 5.826 | 0.223                | 0.229 |
| k      | 1.190                     | 1.390 | 0.047                | 0.055 |
| b      | 0.350                     | 0.450 | 0.014                | 0.018 |
| e      | 1.270TYP.                 |       | 0.050TYP.            |       |
| L      | 0.559                     | 0.711 | 0.022                | 0.028 |
| L1     | 0.424                     | 0.576 | 0.017                | 0.023 |
| H      | 0.574                     | 0.726 | 0.023                | 0.029 |
| θ      | 10°                       | 12°   | 10°                  | 12°   |

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