

DUAL N-CHANNEL ENHANCEMENT MODE MOSFET

Product Summary

| | | |
|---------------|------------------------|-----------------------------|
| $V_{(BR)DSS}$ | $R_{DS(ON)}$ | I_D $T_A = 25^\circ C$ |
| 24V | 15mΩ @ $V_{GS} = 4.5V$ | 6.5A |
| | 20mΩ @ $V_{GS} = 2.5V$ | 5.6A |

Description and Applications

This new generation 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.

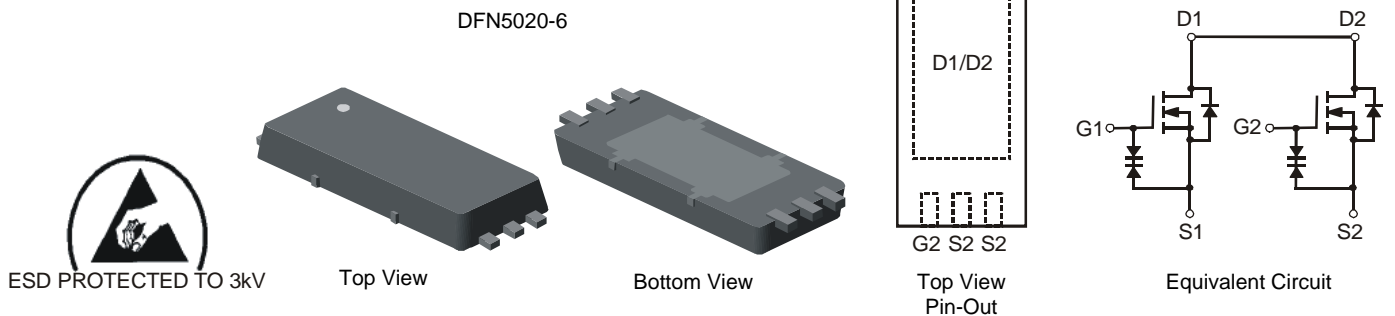
- DC-DC Converters
- Power management functions

Features and Benefits

- Low On-Resistance
- Low Input Capacitance
- Fast Switching Speed
- Low Input/Output Leakage
- **Lead Free By Design/RoHS Compliant (Note 1)**
- **"Green" Device (Note 2)**
- **ESD Protected up to 3kV**
- **Qualified to AEC-Q101 Standards for High Reliability**

Mechanical Data

- Case: DFN5020-6
- Case Material: Molded Plastic, "Green" Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminal Connections: See Diagram Below
- Weight: 0.03 grams (approximate)



Ordering Information (Note 3)

| Part Number | Case | Packaging |
|--------------|-----------|--------------------|
| DMG5802LFX-7 | DFN5020-6 | 3000 / Tape & Reel |

- Notes:
1. No purposefully added lead.
 2. Diodes Inc.'s "Green" policy can be found on our website at <http://www.diodes.com>.
 3. For packaging details, go to our website at <http://www.diodes.com>.

Marking Information



ME = Product Type Marking Code
 YM = Date Code Marking
 Y = Year (ex: X = 2010)
 M = Month (ex: 9 = September)

Date Code Key

| Year | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 |
|------|------|------|------|------|------|------|------|
| Code | X | Y | Z | A | B | C | D |

| Month | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec |
|-------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Code | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | O | N | D |

Maximum Ratings @ $T_A = 25^\circ\text{C}$ unless otherwise specified

| Characteristic | | | Symbol | Value | Unit |
|--|--------------|--------------------------|-----------|----------|------|
| Drain-Source Voltage | | | V_{DSS} | 24 | V |
| Gate-Source Voltage | | | V_{GSS} | ± 12 | V |
| Continuous Drain Current (Note 4) $V_{GS} = 4.5\text{V}$ | Steady State | $T_A = 25^\circ\text{C}$ | I_D | 6.5 | A |
| | | $T_A = 70^\circ\text{C}$ | | 5.2 | |
| Continuous Drain Current (Note 4) $V_{GS} = 2.5\text{V}$ | Steady State | $T_A = 25^\circ\text{C}$ | I_D | 5.6 | A |
| | | $T_A = 70^\circ\text{C}$ | | 4.5 | |
| Pulsed Drain Current (Note 5) | | | I_{DM} | 70 | A |

Thermal Characteristics

| Characteristic | Symbol | Max | Unit |
|---|-----------------|-------------|--------------------|
| Power Dissipation (Note 4) | P_D | 0.98 | W |
| Thermal Resistance, Junction to Ambient @ $T_A = 25^\circ\text{C}$ (Note 4) | $R_{\theta JA}$ | 126.5 | $^\circ\text{C/W}$ |
| Operating and Storage Temperature Range | T_J, T_{STG} | -55 to +150 | $^\circ\text{C}$ |

Electrical Characteristics @ $T_A = 25^\circ\text{C}$ unless otherwise stated

| Characteristic | Symbol | Min | Typ | Max | Unit | Test Condition |
|--|--------------|-----|--------|----------|---------------|--|
| OFF CHARACTERISTICS (Note 6) | | | | | | |
| Drain-Source Breakdown Voltage | BV_{DSS} | 24 | - | - | V | $V_{GS} = 0\text{V}, I_D = 250\mu\text{A}$ |
| Zero Gate Voltage Drain Current $T_J = 25^\circ\text{C}$ | I_{DSS} | - | - | 1.0 | μA | $V_{DS} = 24\text{V}, V_{GS} = 0\text{V}$ |
| Gate-Source Leakage | I_{GSS} | - | - | ± 10 | μA | $V_{GS} = \pm 12\text{V}, V_{DS} = 0\text{V}$ |
| ON CHARACTERISTICS (Note 6) | | | | | | |
| Gate Threshold Voltage | $V_{GS(th)}$ | 0.6 | 0.9 | 1.5 | V | $V_{DS} = V_{GS}, I_D = 250\mu\text{A}$ |
| Static Drain-Source On-Resistance | $R_{DS(on)}$ | - | 11 | 15 | m Ω | $V_{GS} = 4.5\text{V}, I_D = 6.5\text{A}$ |
| | | - | 12 | 17 | | $V_{GS} = 4\text{V}, I_D = 5.6\text{A}$ |
| | | - | 13 | 18 | | $V_{GS} = 3.1\text{V}, I_D = 5.6\text{A}$ |
| | | - | 14 | 20 | | $V_{GS} = 2.5\text{V}, I_D = 5.6\text{A}$ |
| Forward Transfer Admittance | $ Y_{fs} $ | - | 17 | - | S | $V_{DS} = 5\text{V}, I_D = 6.5\text{A}$ |
| Diode Forward Voltage | V_{SD} | - | 0.6 | 0.9 | V | $V_{GS} = 0\text{V}, I_S = 1\text{A}$ |
| DYNAMIC CHARACTERISTICS (Note 7) | | | | | | |
| Input Capacitance | C_{iss} | - | 1066.4 | - | pF | $V_{DS} = 15\text{V}, V_{GS} = 0\text{V}, f = 1.0\text{MHz}$ |
| Output Capacitance | C_{oss} | - | 132.0 | - | | |
| Reverse Transfer Capacitance | C_{rss} | - | 127.1 | - | | |
| Gate Resistance | R_g | - | 1.47 | - | Ω | $V_{DS} = 0\text{V}, V_{GS} = 0\text{V}, f = 1\text{MHz}$ |
| Total Gate Charge $V_{GS} = 4.5\text{V}$ | Q_g | - | 14.5 | - | nC | $V_{GS} = 4.5\text{V}, V_{DS} = 15\text{V}, I_D = 5.8\text{A}$ |
| Total Gate Charge $V_{GS} = 10\text{V}$ | Q_{g1} | - | 31.3 | - | | |
| Gate-Source Charge | Q_{gs} | - | 2.0 | - | | |
| Gate-Drain Charge | Q_{gd} | - | 3.1 | - | | |
| Turn-On Delay Time | $t_{D(on)}$ | - | 3.69 | - | ns | $V_{GS} = 10\text{V}, V_{DS} = 15\text{V}, R_L = 2.1\Omega, R_G = 3\Omega$ |
| Turn-On Rise Time | t_r | - | 13.43 | - | ns | |
| Turn-Off Delay Time | $t_{D(off)}$ | - | 32.18 | - | ns | |
| Turn-Off Fall Time | t_f | - | 22.45 | - | ns | |

- Notes:
- Device mounted on FR-4 PCB with minimum recommended pad layout, single sided.
 - Repetitive rating, pulse width limited by junction temperature.
 - Short duration pulse test used to minimize self-heating effect.
 - Guaranteed by design. Not subject to production testing.

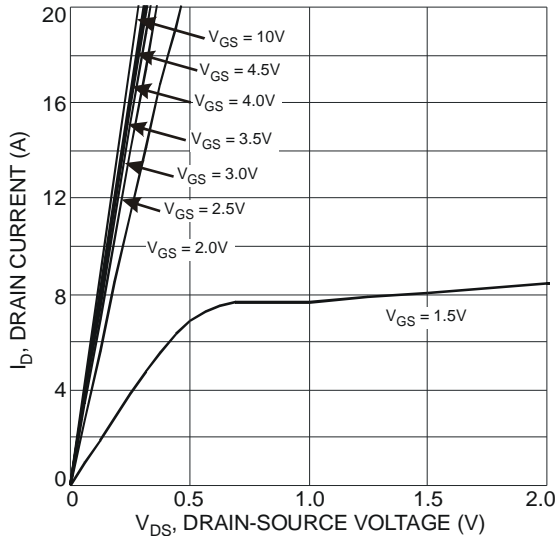


Fig. 1 Typical Output Characteristic

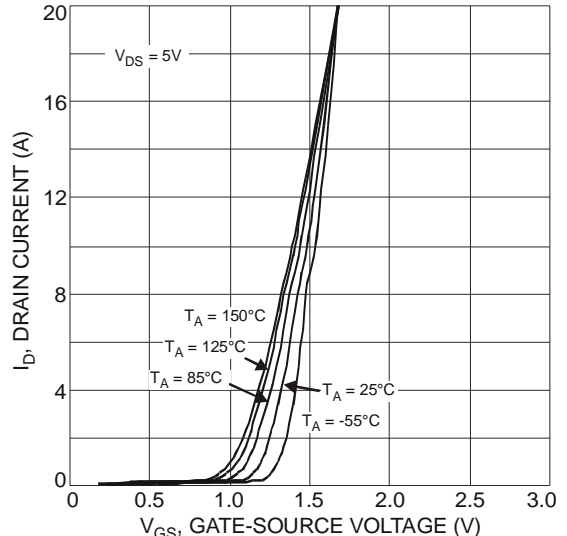


Fig. 2 Typical Transfer Characteristic

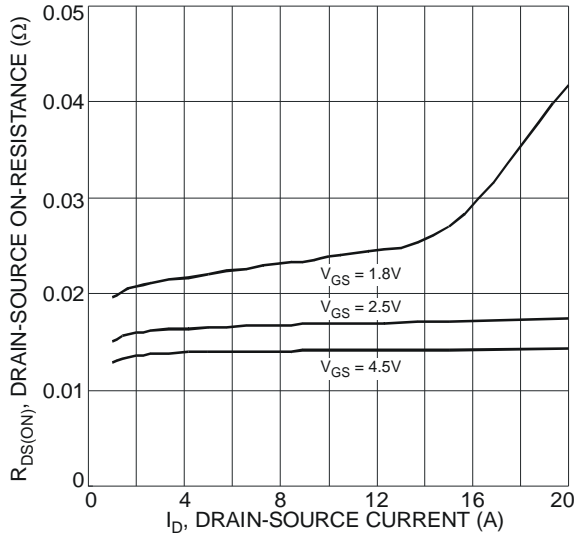


Fig. 3 Typical On-Resistance vs. Drain Current and Gate Voltage

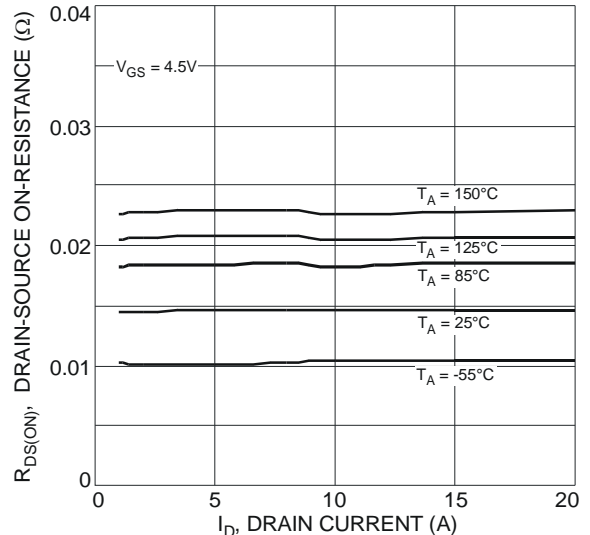


Fig. 4 Typical On-Resistance vs. Drain Current and Temperature

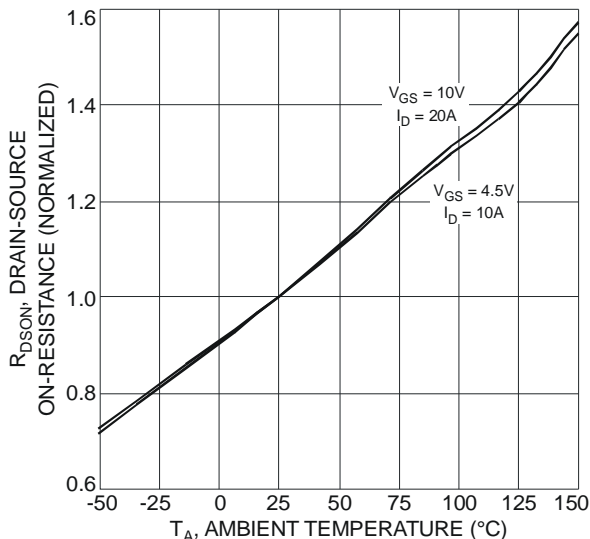


Fig. 5 On-Resistance Variation with Temperature

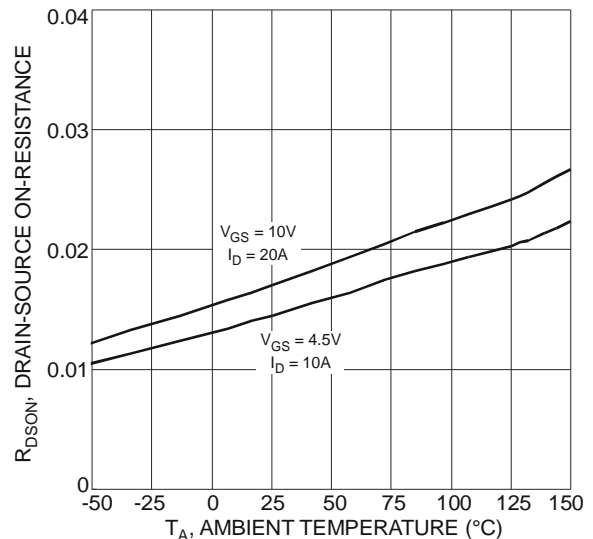


Fig. 6 On-Resistance Variation with Temperature

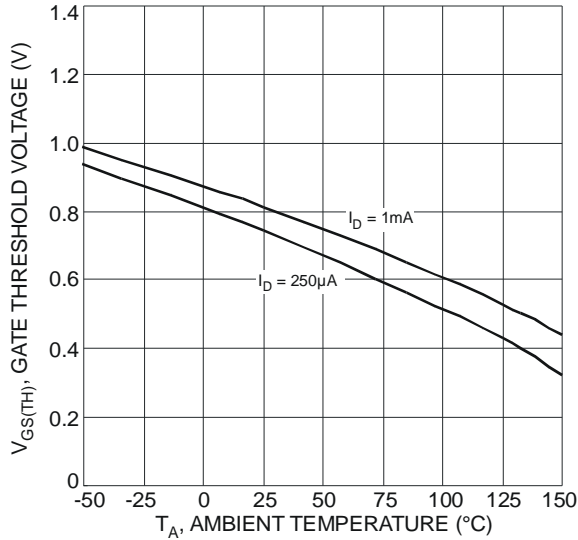


Fig. 7 Gate Threshold Variation vs. Ambient Temperature

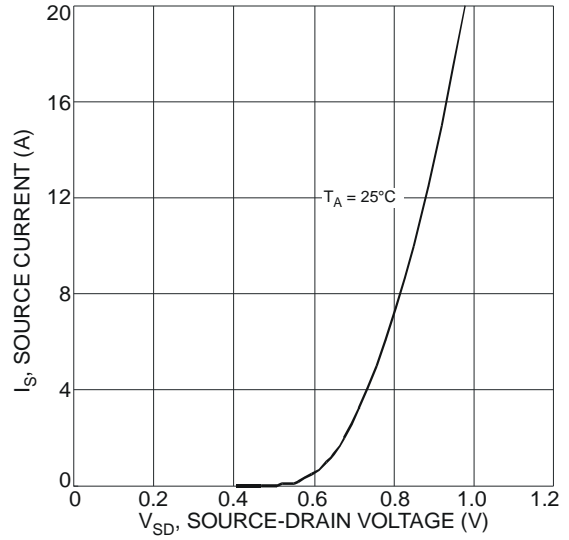


Fig. 8 Diode Forward Voltage vs. Current

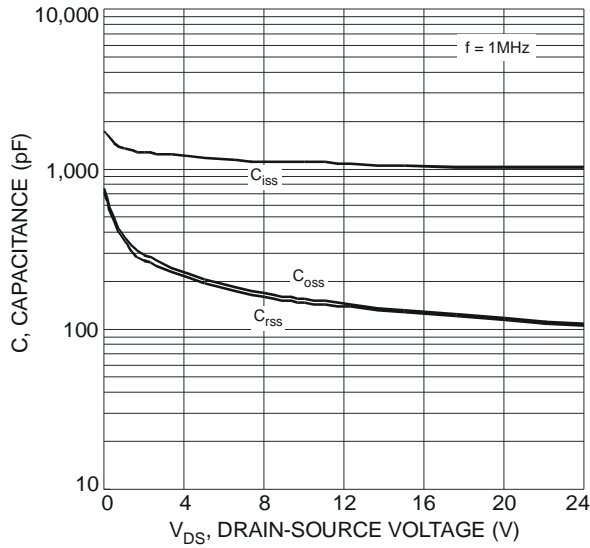


Fig. 9 Typical Total Capacitance

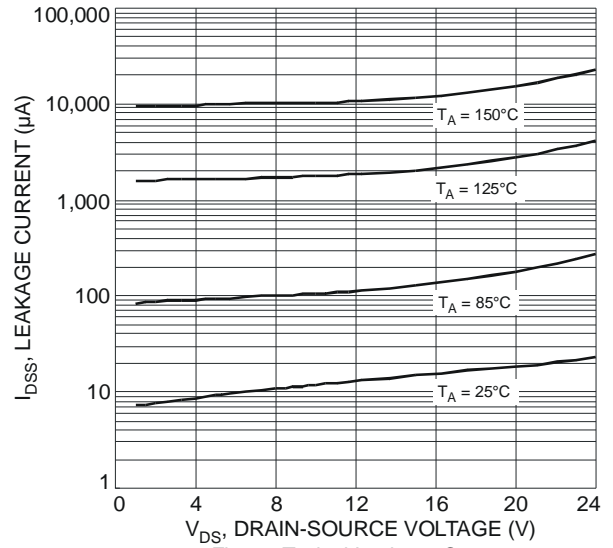


Fig. 10 Typical Leakage Current vs. Drain-Source Voltage

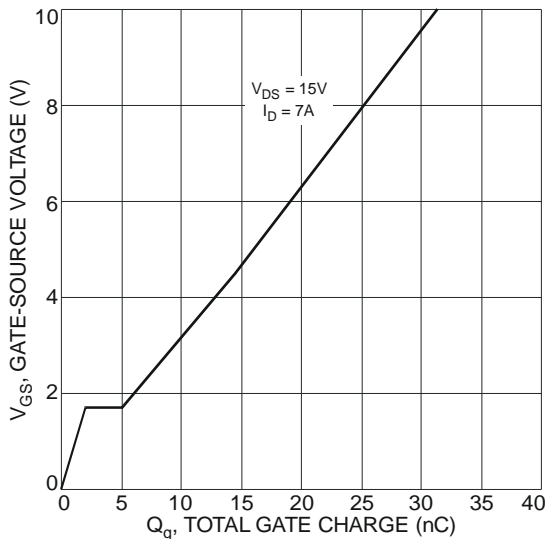


Fig. 11 Gate-Charge Characteristics

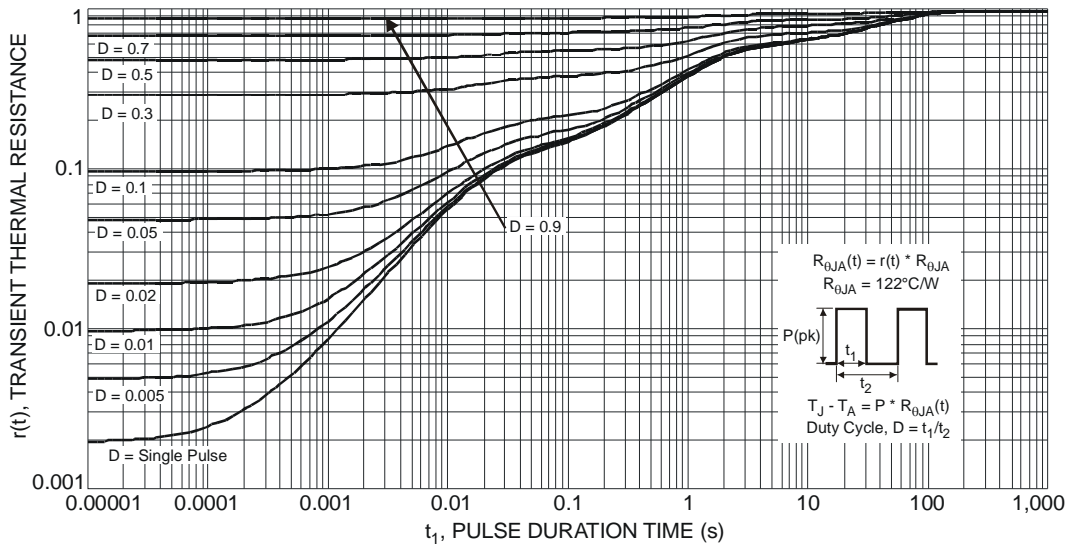
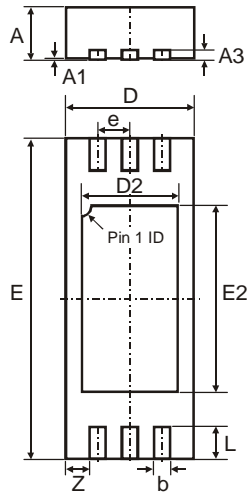


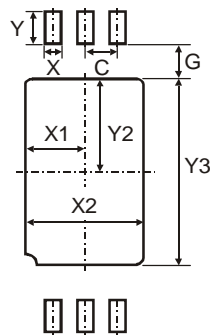
Fig. 12 Transient Thermal Response

Package Outline Dimensions



| DFN5020-6 | | | |
|----------------------|------|------|-------|
| Dim | Min | Max | Typ |
| A | 0.75 | 0.85 | 0.80 |
| A1 | 0 | 0.05 | 0.02 |
| A3 | - | - | 0.15 |
| b | 0.20 | 0.30 | 0.25 |
| D | 1.90 | 2.10 | 2.00 |
| D2 | 1.40 | 1.60 | 1.50 |
| e | - | - | 0.50 |
| E | 4.90 | 5.10 | 5.00 |
| E2 | 2.80 | 3.00 | 2.90 |
| L | 0.35 | 0.65 | 0.50 |
| Z | - | - | 0.375 |
| All Dimensions in mm | | | |

Suggested Pad Layout



| Dimensions | Value (in mm) |
|------------|---------------|
| C | 0.50 |
| G | 0.35 |
| X | 0.35 |
| X1 | 0.90 |
| X2 | 1.80 |
| Y | 0.70 |
| Y2 | 1.60 |
| Y3 | 3.20 |

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