



# PJQ5446

## 40V N-Channel Enhancement Mode MOSFET

Voltage

40 V

Current

70A

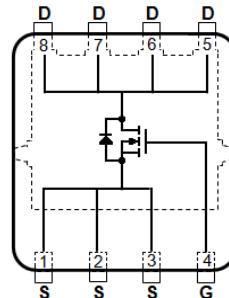
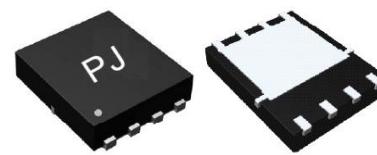
### Features

- $R_{DS(ON)}$ ,  $V_{GS}=10V$ ,  $I_D=12A < 9.5m\Omega$
- $R_{DS(ON)}$ ,  $V_{GS}=4.5V$ ,  $I_D=6A < 14m\Omega$
- High switching speed
- Improved dv/dt capability
- Low reverse transfer capacitance
- Lead free in compliance with EU RoHS 2.0
- Green molding compound as per IEC 61249 standard

### Mechanical Data

- Case : DFN5060-8L Package
- Terminals : Solderable per MIL-STD-750, Method 2026
- Approx. Weight : 0.0028 ounces, 0.08 grams

DFN5060-8L



### Maximum Ratings and Thermal Characteristics ( $T_A=25^\circ C$ unless otherwise noted)

| PARAMETER   | SYMBOL              | LIMIT    | UNITS |
|---|---------------------|----------|-------|
| Drain-Source Voltage                              | $V_{DS}$            | 40       | V     |
| Gate-Source Voltage                               | $V_{GS}$            | $\pm 20$ |       |
| Continuous Drain Current                          | $I_D$               | 70       | A     |
|   |                     | 45       |       |
| Pulsed Drain Current <sup>(Note 1)</sup>          | $I_{DM}$            | 280      |       |
| Power Dissipation                                 | $P_D$               | 70       | W     |
|   |                     | 28       |       |
| Continuous Drain Current                          | $I_D$               | 12       | A     |
|   |                     | 9.5      |       |
| Power Dissipation                                 | $P_D$               | 2.0      | W     |
| Power Dissipation                                 |                     | 1.3      |       |
| Single Pulse Avalanche Energy <sup>(Note 6)</sup> | $E_{AS}$            | 72       | mJ    |
| Operating Junction and Storage Temperature Range  | $T_J, T_{STG}$      | -55~150  | °C    |
| Typical Thermal Resistance <sup>(Note 4,5)</sup>  | Junction to Case    | 1.79     | °C/W  |
|   | Junction to Ambient | 62.5     |       |

- Limited only by Maximum Junction Temperature



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## Electrical Characteristics ( $T_A=25^\circ C$ unless otherwise noted)

| PARAMETER   | SYMBOL       | TEST CONDITION  | MIN. | TYP. | MAX.      | UNITS     |
|---|--------------|---|------|------|-----------|-----------|
| <b>Static</b>   |              |   |      |      |           |           |
| Drain-Source Breakdown Voltage                        | $BV_{DSS}$   | $V_{GS}=0V, I_D=250\mu A$   | 40   | -    | -         | V         |
| Gate Threshold Voltage                                | $V_{GS(th)}$ | $V_{DS}=V_{GS}, I_D=250\mu A$   | 1    | 1.7  | 2.5       |           |
| Drain-Source On-State Resistance                      | $R_{DS(on)}$ | $V_{GS}=10V, I_D=12A$   | -    | 8    | 9.5       | $m\Omega$ |
|   |              | $V_{GS}=4.5V, I_D=6A$   | -    | 11   | 14        |           |
| Zero Gate Voltage Drain Current                       | $I_{DSS}$    | $V_{DS}=40V, V_{GS}=0V$   | -    | -    | 1         | $\mu A$   |
| Gate-Source Leakage Current                           | $I_{GSS}$    | $V_{GS}=\pm 20V, V_{DS}=0V$   | -    | -    | $\pm 100$ | $nA$      |
| <b>Dynamic</b> <small>(Note 7)</small>                |              |   |      |      |           |           |
| Total Gate Charge                                     | $Q_g$        | $V_{DS}=20V, I_D=8A,$<br>$V_{GS}=10V$ <small>(Note 2,3)</small>                   | -    | 22   | -         | nC        |
| Gate-Source Charge                                    | $Q_{gs}$     |   | -    | 4.2  | -         |           |
| Gate-Drain Charge                                     | $Q_{gd}$     |   | -    | 4.0  | -         |           |
| Input Capacitance                                     | $C_{iss}$    | $V_{DS}=25V, V_{GS}=0V,$<br>$f=1.0MHz$  | -    | 1258 | -         | pF        |
| Output Capacitance                                    | $C_{oss}$    |   | -    | 134  | -         |           |
| Reverse Transfer Capacitance                          | $C_{rss}$    |   | -    | 88   | -         |           |
| Turn-On Delay Time                                    | $t_{d(on)}$  | $V_{DS}=15V, I_D=1A,$<br>$V_{GS}=10V, R_G=3.3\Omega$<br><small>(Note 2,3)</small> | -    | 13   | -         | ns        |
| Turn-On Rise Time                                     | $t_r$        |   | -    | 14   | -         |           |
| Turn-Off Delay Time                                   | $t_{d(off)}$ |   | -    | 45   | -         |           |
| Turn-Off Fall Time                                    | $t_f$        |   | -    | 9    | -         |           |
| <b>Drain-Source Diode</b>                             |              |   |      |      |           |           |
| Maximum Continuous Drain-Source Diode Forward Current | $I_s$        | ---   | -    | -    | 70        | A         |
| Diode Forward Voltage                                 | $V_{SD}$     | $I_s=1A, V_{GS}=0V$   | -    | 0.7  | 1         | V         |

### NOTES :

1. Pulse width  $\leq 300\mu s$ , Duty cycle  $\leq 2\%$ .
2. Essentially independent of operating temperature typical characteristics.
3. Repetitive rating, pulse width limited by junction temperature  $T_{J(MAX)}=150^\circ C$ . Ratings are based on low frequency and duty cycles to keep initial  $T_J = 25^\circ C$ .
4. The maximum current rating is package limited.
5.  $R_{ThetaJA}$  is the sum of the junction-to-case and case-to-ambient thermal resistance where the case thermal reference is defined as the solder mounting surface of the drain pins. Mounted on a 1 inch<sup>2</sup> with 2oz.square pad of copper.
6. The test condition is  $L=0.1mH, I_{AS}=38A, V_{DD}=25V, V_{GS}=10V$ , Starting  $T_J=25^\circ C$ .
7. Guaranteed by design, not subject to production testing.



# PJQ5446

## TYPICAL CHARACTERISTIC CURVES

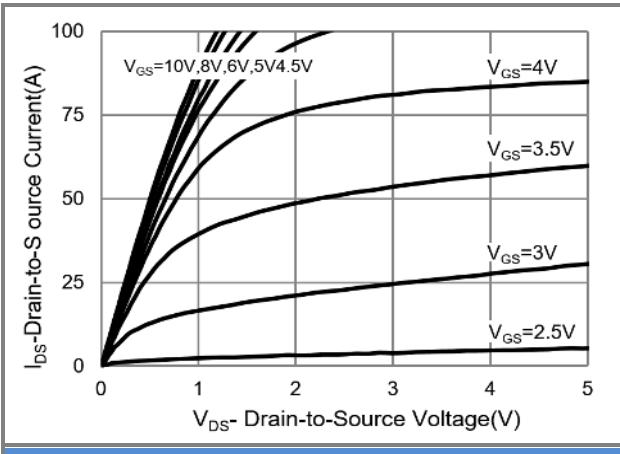


Fig.1 On-Region Characteristics

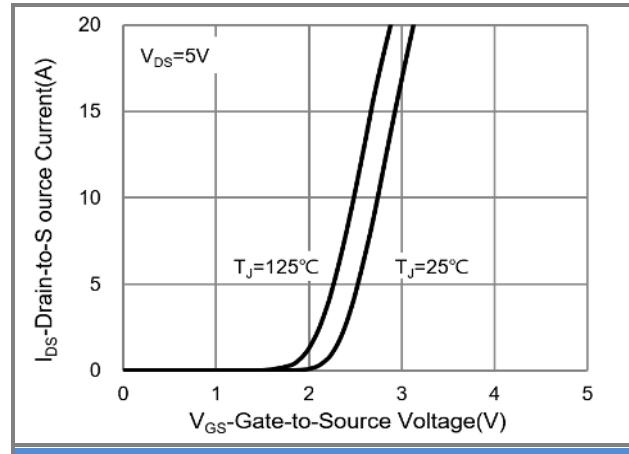


Fig.2 Transfer Characteristics

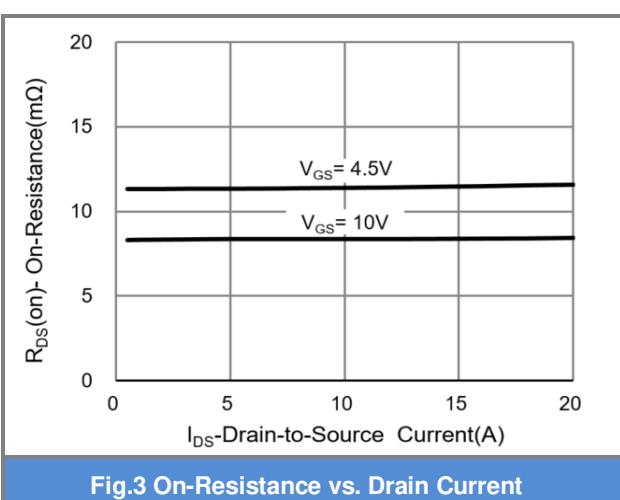


Fig.3 On-Resistance vs. Drain Current

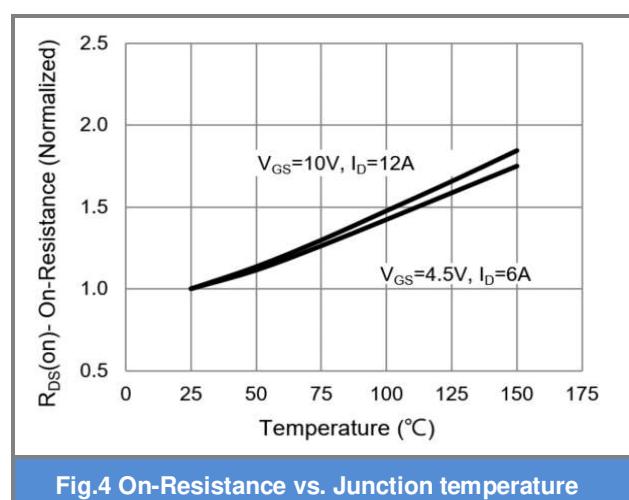


Fig.4 On-Resistance vs. Junction temperature

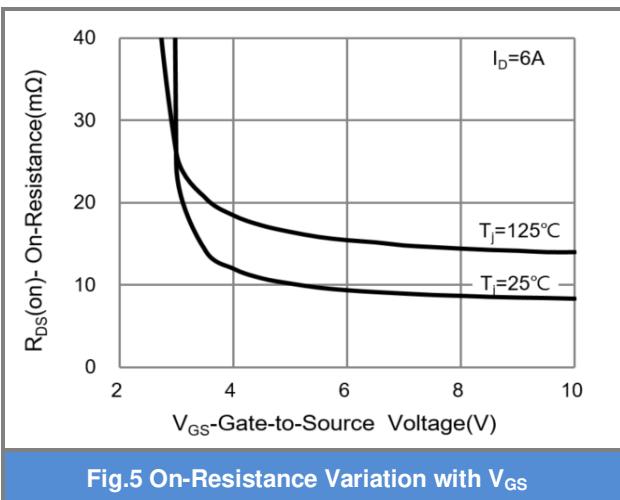


Fig.5 On-Resistance Variation with V\_Gs

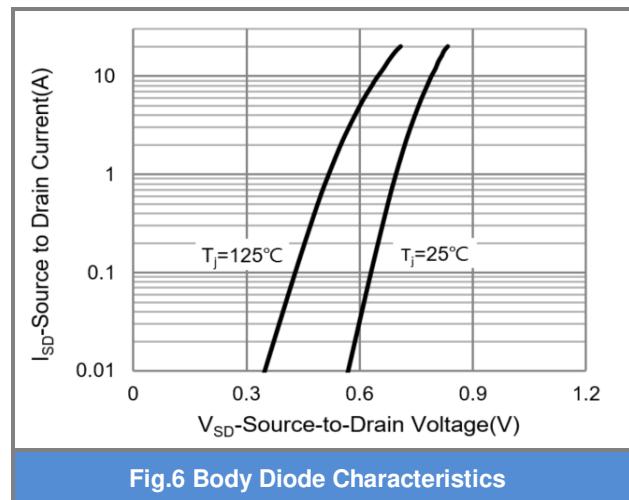


Fig.6 Body Diode Characteristics



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## TYPICAL CHARACTERISTIC CURVES

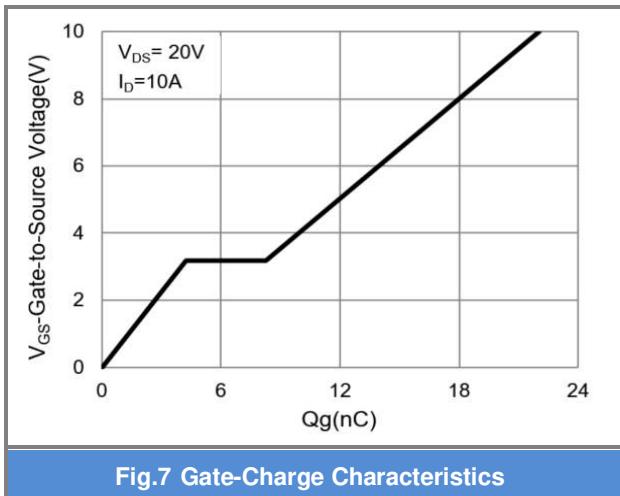


Fig.7 Gate-Charge Characteristics

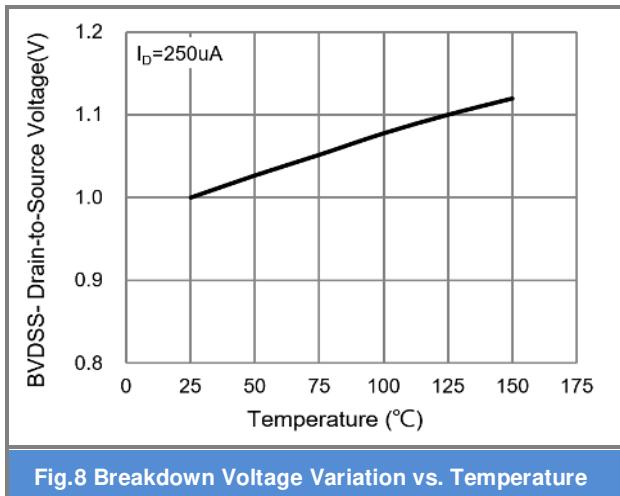


Fig.8 Breakdown Voltage Variation vs. Temperature

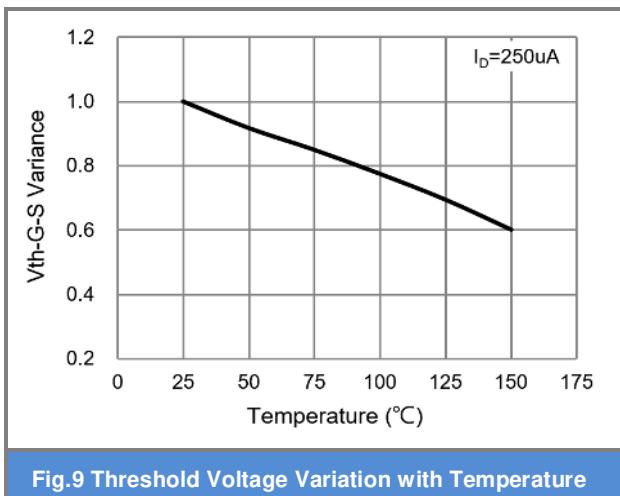


Fig.9 Threshold Voltage Variation with Temperature

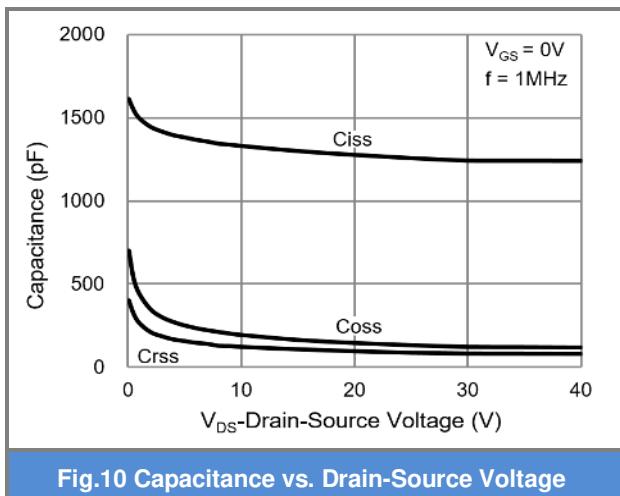


Fig.10 Capacitance vs. Drain-Source Voltage

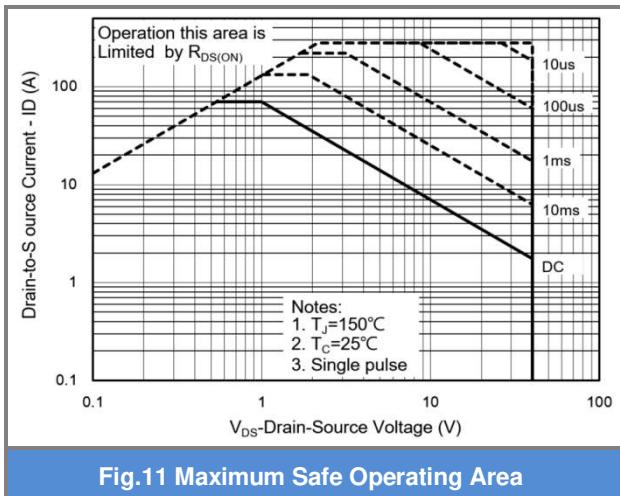


Fig.11 Maximum Safe Operating Area

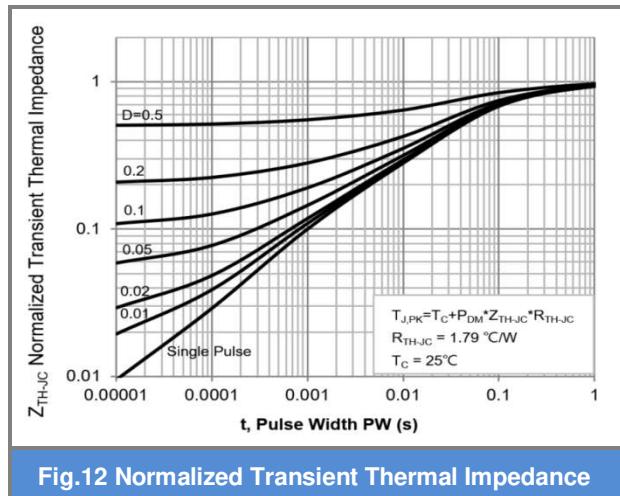


Fig.12 Normalized Transient Thermal Impedance

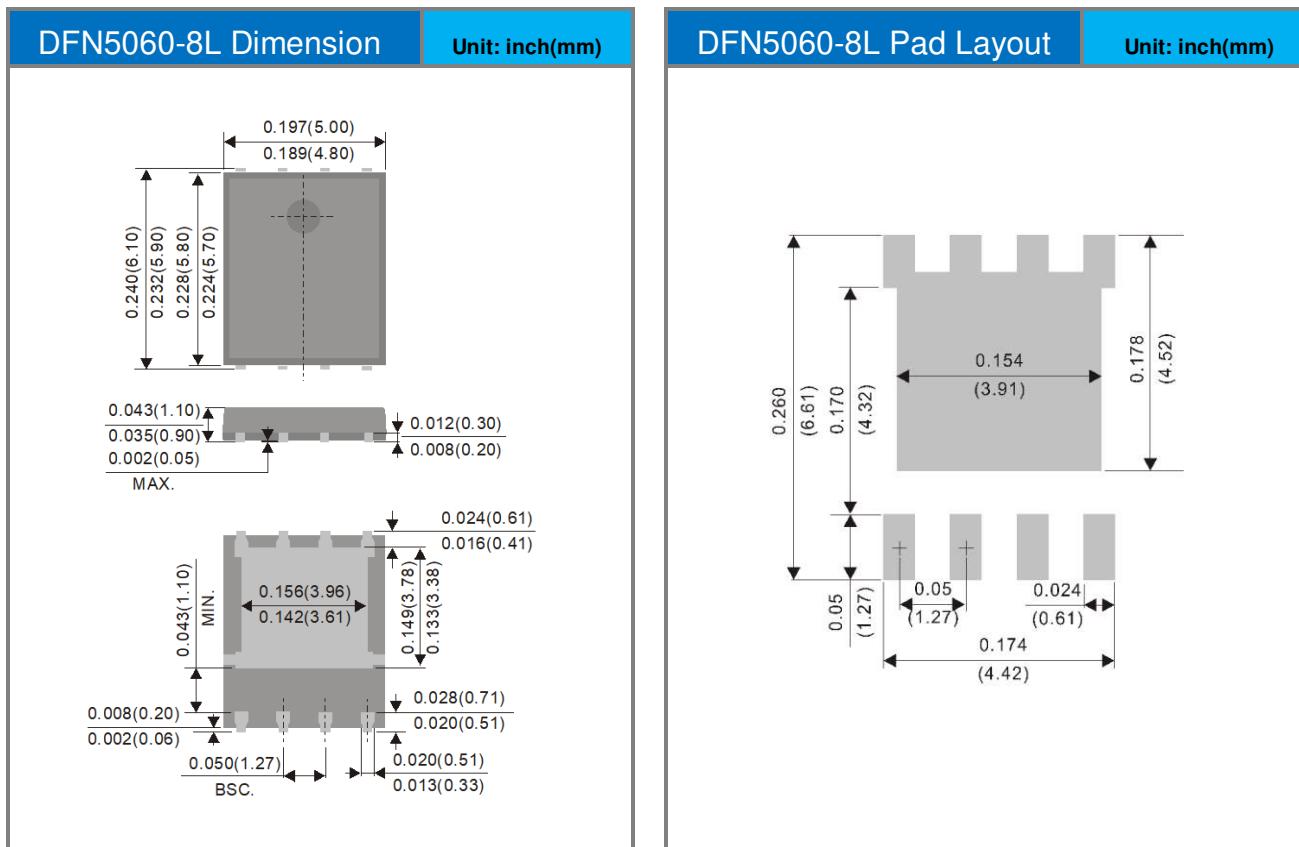


# PJQ5446

## Part No Packing Code Version

| Part No Packing Code | Package Type | Packing Type       | Marking | Version      |
|----------------------|--------------|--------------------|---------|--------------|
| PJQ5446_R2_00001     | DFN5060-8L   | 3000pcs / 13" reel | Q5446   | Halogen free |

## Packaging Information & Mounting Pad Layout





## PJQ5446

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