

# PJQ5540S6C-AU

## 40V N-Channel Enhancement Mode MOSFET

**Voltage**

**40 V**

**Current**

**168 A**

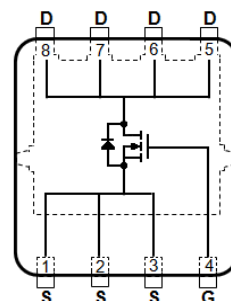
### Features

- $R_{DS(ON)}$ ,  $V_{GS}@10V$ ,  $I_D@20A < 1.9m\Omega$
- $R_{DS(ON)}$ ,  $V_{GS}@4.5V$ ,  $I_D@20A < 3.1m\Omega$
- Excellent FOM
- Logic Level Drive
- AEC-Q101 qualified
- Lead free in compliance with EU RoHS 2.0
- Green molding compound as per IEC 61249 standard

### Mechanical Data

- Case : DFN5060XC-8L Package
- Terminals : Solderable per MIL-STD-750, Method 2026
- Approx. Weight : 0.098 grams

DFN5060XC-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 <sup>(Note 3)</sup>       | $T_C=25^{\circ}C$   | $I_D$                               | 168       | A             |
|                                                    | $T_C=100^{\circ}C$  |                                     | 119       |               |
| Pulsed Drain Current <sup>(Note 1)</sup>           | $T_C=25^{\circ}C$   | $I_{DM}$                            | 672       |               |
| Power Dissipation                                  | $T_C=25^{\circ}C$   | $P_D$                               | 97        | W             |
|                                                    | $T_C=100^{\circ}C$  |                                     | 48        |               |
| Continuous Drain Current <sup>(Note 4)</sup>       | $T_A=25^{\circ}C$   | $I_D$                               | 33        | A             |
|                                                    | $T_A=70^{\circ}C$   |                                     | 28        |               |
| Power Dissipation                                  | $T_A=25^{\circ}C$   | $P_D$                               | 3.8       | W             |
|                                                    | $T_A=70^{\circ}C$   |                                     | 2.6       |               |
| Single Pulse Avalanche Current <sup>(Note 6)</sup> |                     | $I_{AS}$                            | 22        | A             |
| Single Pulse Avalanche Energy <sup>(Note 6)</sup>  |                     | $E_{AS}$                            | 200       | mJ            |
| Operating Junction and Storage Temperature Range   |                     | $T_J, T_{STG}$                      | -55~175   | $^{\circ}C$   |
| Thermal Resistance <sup>(Note 4)</sup>             | Junction to Case    | $R_{\theta JC}$                     | 1.55      | $^{\circ}C/W$ |
|                                                    | Junction to Ambient | $R_{\theta JA}$ <sup>(Note 4)</sup> | 40        |               |
|                                                    |                     | $R_{\theta JA}$ <sup>(Note 5)</sup> | 26 (Typ.) |               |

# PJQ5540S6C-AU

## Electrical Characteristics (T<sub>A</sub>=25°C unless otherwise noted)

| PARAMETER                        | SYMBOL              | TEST CONDITION                                                                                     | MIN. | TYP. | MAX. | UNITS |
|----------------------------------|---------------------|----------------------------------------------------------------------------------------------------|------|------|------|-------|
| Static                           |                     |                                                                                                    |      |      |      |       |
| Drain-Source Breakdown Voltage   | BV <sub>DSS</sub>   | V <sub>GS</sub> =0V, I <sub>D</sub> =250uA                                                         | 40   | -    | -    | V     |
| Gate Threshold Voltage           | V <sub>GS(th)</sub> | V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =250uA                                           | 1.2  | 1.6  | 2.2  |       |
| Drain-Source On-State Resistance | R <sub>DS(on)</sub> | V <sub>GS</sub> =10V, I <sub>D</sub> =20A                                                          | -    | 1.55 | 1.9  | mΩ    |
|                                  |                     | V <sub>GS</sub> =4.5V, I <sub>D</sub> =20A                                                         | -    | 2.4  | 3.1  |       |
| Zero Gate Voltage Drain Current  | I <sub>DSS</sub>    | V <sub>DS</sub> =40V, V <sub>GS</sub> =0V                                                          | -    | -    | 1    | uA    |
| Gate-Source Leakage Current      | I <sub>GSS</sub>    | V <sub>GS</sub> =±20V, V <sub>DS</sub> =0V                                                         | -    | -    | ±100 | nA    |
| Dynamic <sup>(Note 6)</sup>      |                     |                                                                                                    |      |      |      |       |
| Total Gate Charge                | Q <sub>g</sub>      | V <sub>DS</sub> =32V, I <sub>D</sub> =20A,<br>V <sub>GS</sub> =10V                                 | -    | 55   | 72   | nC    |
| Gate-Source Charge               | Q <sub>gs</sub>     |                                                                                                    | -    | 5.6  | -    |       |
| Gate-Drain Charge                | Q <sub>gd</sub>     |                                                                                                    | -    | 10.8 | -    |       |
| Input Capacitance                | C <sub>iss</sub>    | V <sub>DS</sub> =25V, V <sub>GS</sub> =0V,<br>f=1MHz                                               | -    | 2283 | 3000 | pF    |
| Output Capacitance               | C <sub>oss</sub>    |                                                                                                    | -    | 722  | 1100 |       |
| Reverse Transfer Capacitance     | C <sub>rss</sub>    |                                                                                                    | -    | 68   | 120  |       |
| Gate resistance                  | R <sub>g</sub>      | f=1MHz                                                                                             | -    | 2    | -    | Ω     |
| Turn-On Delay Time               | t <sub>d(on)</sub>  | V <sub>DS</sub> =32V, I <sub>D</sub> =20A,<br>V <sub>GS</sub> =10V, R <sub>G</sub> =3Ω<br>(Note 2) | -    | 8.2  | -    | ns    |
| Turn-On Rise Time                | t <sub>r</sub>      |                                                                                                    | -    | 14   | -    |       |
| Turn-Off Delay Time              | t <sub>d(off)</sub> |                                                                                                    | -    | 56   | -    |       |
| Turn-Off Fall Time               | t <sub>f</sub>      |                                                                                                    | -    | 23   | -    |       |
| Drain-Source Diode               |                     |                                                                                                    |      |      |      |       |
| Diode Forward Current            | I <sub>S</sub>      | T <sub>C</sub> =25°C<br>(Package Limit)                                                            | -    | -    | 113  | A     |
| Pulsed Diode Forward Current     | I <sub>SM</sub>     |                                                                                                    | -    | -    | 672  |       |
| Diode Forward Voltage            | V <sub>SD</sub>     | I <sub>S</sub> =20A, V <sub>GS</sub> =0V                                                           | -    | 0.75 | 1.3  | V     |
| Reverse Recovery Time            | T <sub>rr</sub>     | V <sub>DD</sub> =32V, V <sub>GS</sub> =0V,                                                         | -    | 40   | -    | ns    |
| Reverse Recovery Charge          | Q <sub>rr</sub>     | I <sub>S</sub> =20A, dI <sub>S</sub> /dt=100A/us                                                   | -    | 23   | -    | nC    |

### NOTES :

- Pulse width≤100us, Duty cycle≤2%.
- Essentially independent of operating temperature typical characteristics.
- Chip capability with an R<sub>θJC</sub>=1.55°C/W, Package limited 120A.
- R<sub>θJA</sub> 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.
- Device on 2s2p FR4 PCB defined in accordance with JEDEC standards (JESD51-5,-7) PCB is vertical in still air.
- E<sub>AS</sub> is calculated based on the condition of L=1mH, I<sub>AS</sub>=20A, V<sub>DD</sub>=30V, V<sub>GS</sub>=10V. 100% test at L=0.5mH, I<sub>AS</sub>=22A in production.
- Guaranteed by design, not subject to production testing.

# PJQ5540S6C-AU

## TYPICAL CHARACTERISTIC CURVES

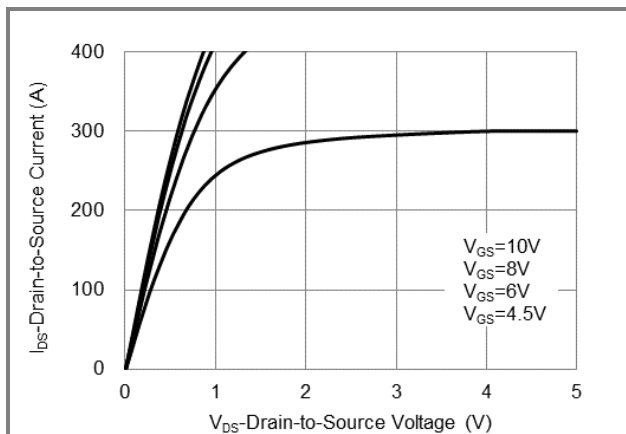


Fig.1 On-Region Characteristics

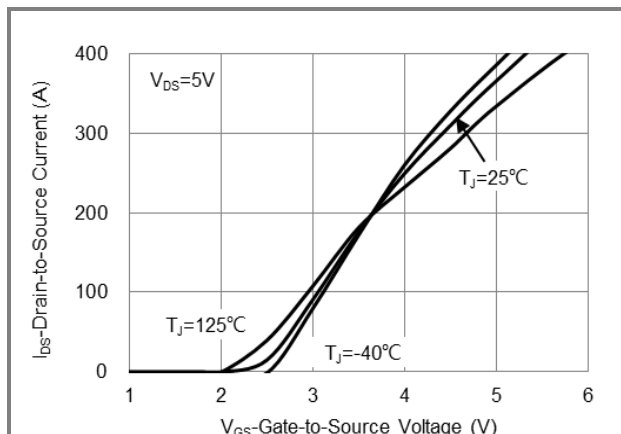


Fig.2 Transfer Characteristics

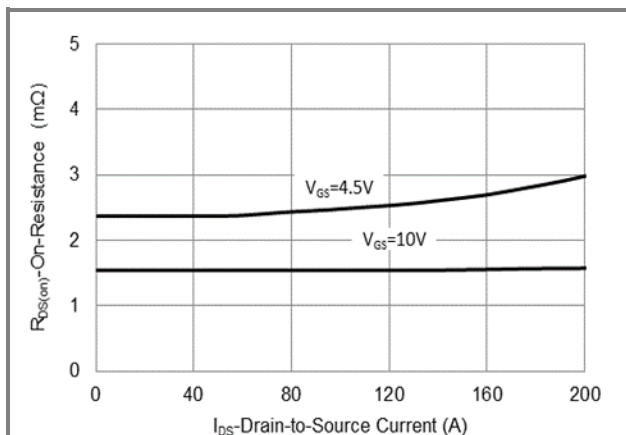


Fig.3 On-Resistance vs. Drain Current

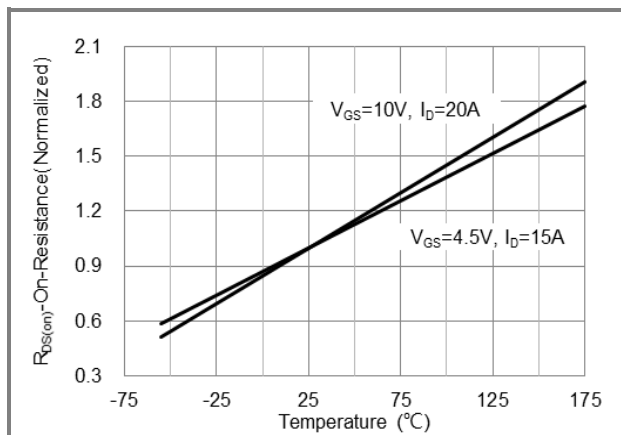


Fig.4 On-Resistance vs. Junction temperature

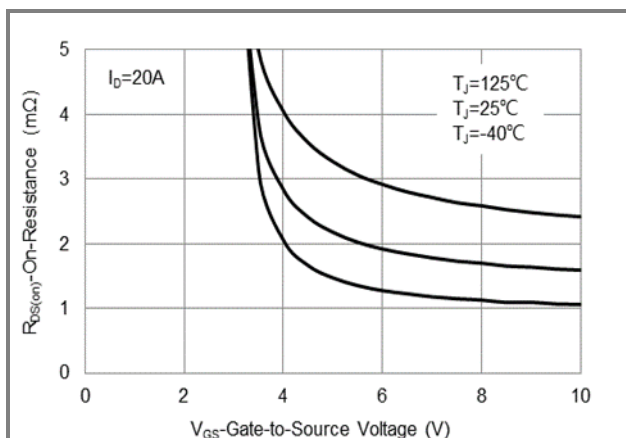


Fig.5 On-Resistance Variation with  $V_{GS}$

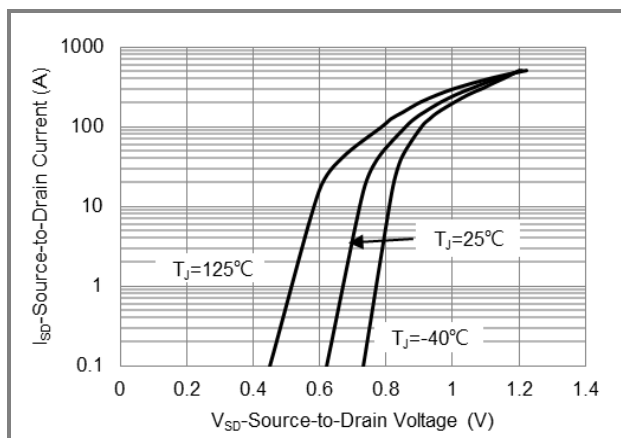
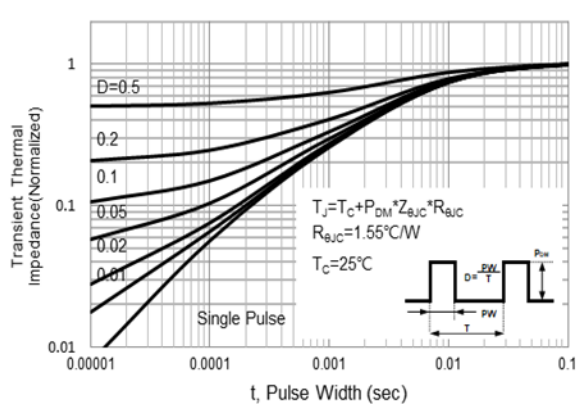
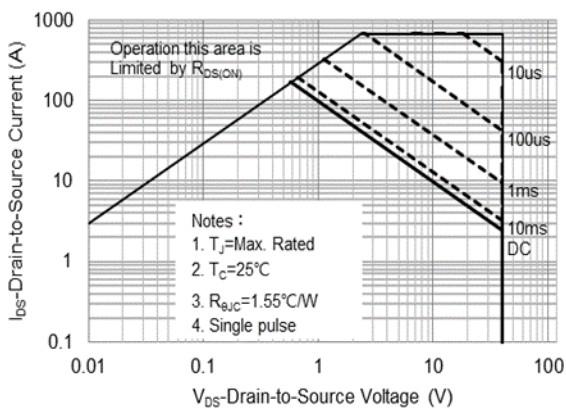
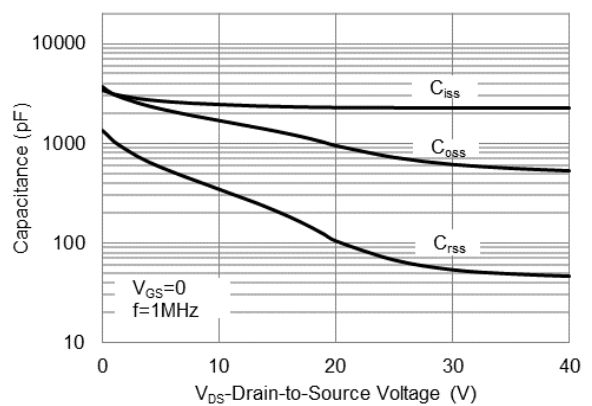
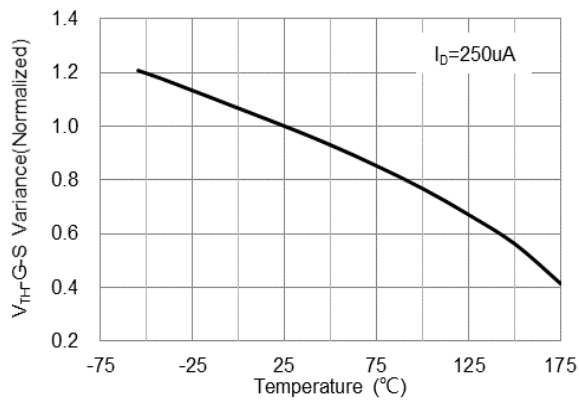
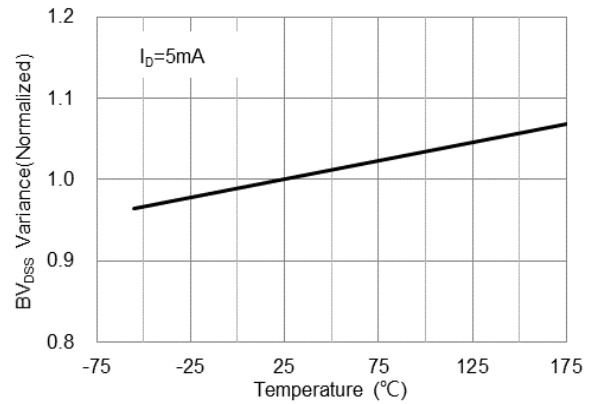
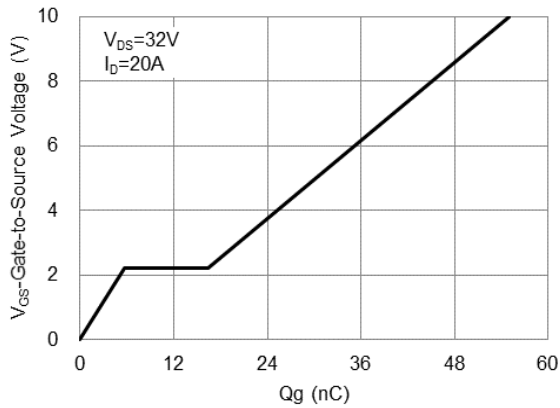


Fig.6 Source-Drain Diode Forward Voltage

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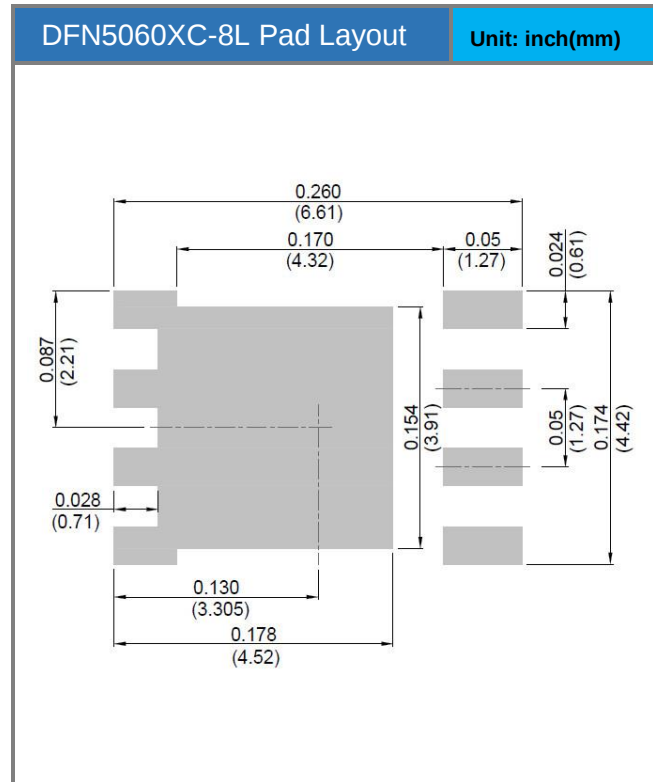
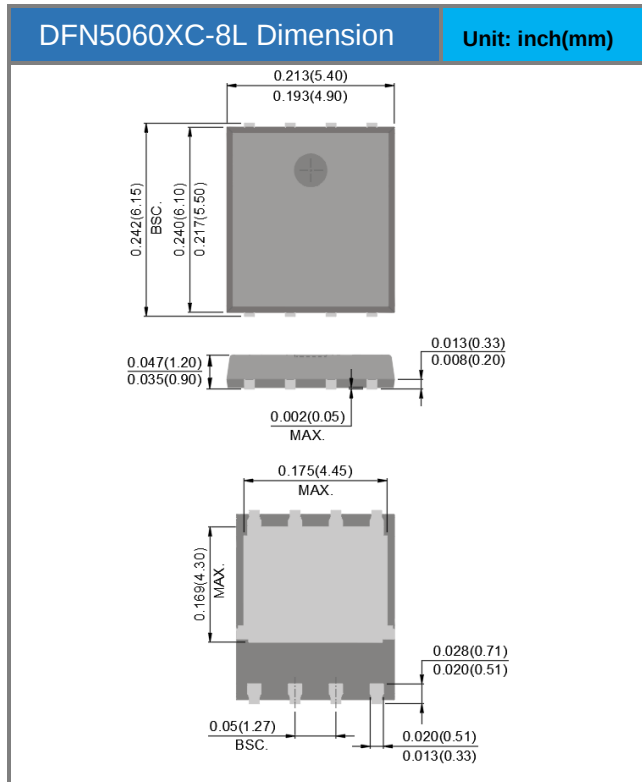


# PJQ5540S6C-AU

## Product and Packing Information

| Part No.      | Package Type | Packing Type      | Marking |
|---------------|--------------|-------------------|---------|
| PJQ5540S6C-AU | DFN5060XC-8L | 3K pcs / 13" reel | 5540S6C |

## Packaging Information & Mounting Pad Layout



## PJQ5540S6C-AU

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