



# PJD60N04-AU

## 40V N-Channel Enhancement Mode MOSFET

**Voltage**

**40 V**

**Current**

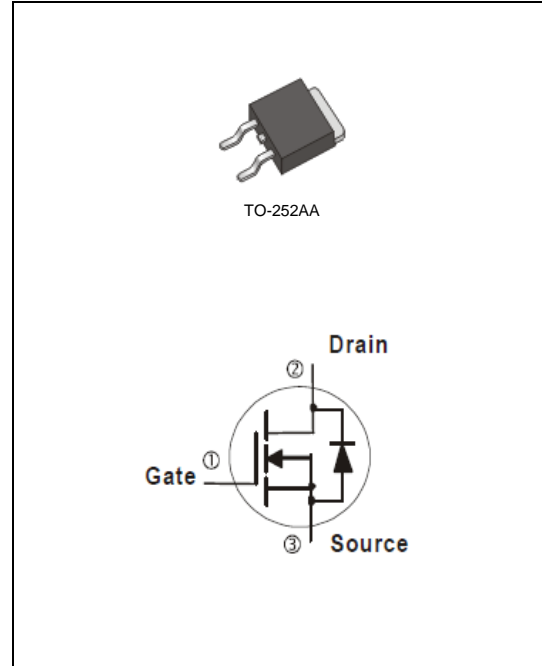
**60 A**

### Features

- $R_{DS(ON)}$ ,  $V_{GS}@10V$ ,  $I_D@20A < 6.5m\Omega$
- $R_{DS(ON)}$ ,  $V_{GS}@4.5V$ ,  $I_D@10A < 9m\Omega$
- High switching speed
- Improved dv/dt capability
- Low Gate Charge
- Low reverse transfer capacitance
- AEC-Q101 qualified
- Lead free in compliance with EU RoHS 2.0
- Green molding compound as per IEC 61249 standard

### Mechanical Data

- Case : TO-252AA Package
- Terminals : Solderable per MIL-STD-750, Method 2026
- Approx. Weight : 0.0104 ounces, 0.297grams



### 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 (Note 4)                | $T_C=25^\circ C$    | $I_D$           | 60       | A            |
|  | $T_C=100^\circ C$   |                 | 38       |              |
| Pulsed Drain Current (Note 1)                    | $T_C=25^\circ C$    | $I_{DM}$        | 240      |              |
| Power Dissipation                                | $T_C=25^\circ C$    | $P_D$           | 75       | W            |
|  | $T_C=100^\circ C$   |                 | 37.5     |              |
| Continuous Drain Current (Note 4)                | $T_A=25^\circ C$    | $I_D$           | 12.7     | A            |
|  | $T_A=70^\circ C$    |                 | 10       |              |
| Power Dissipation                                | $T_A=25^\circ C$    | $P_D$           | 2.4      | W            |
|  | $T_A=70^\circ C$    |                 | 1.6      |              |
| Operating Junction and Storage Temperature Range |                     | $T_J, T_{STG}$  | -55~175  | $^\circ C$   |
| Typical Thermal Resistance (Note 4,5)            | Junction to Case    | $R_{\theta JC}$ | 2        | $^\circ C/W$ |
|  | Junction to Ambient | $R_{\theta JA}$ | 62.5     |              |

- Limited only By Maximum Junction Temperature



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## Electrical Characteristics ( $T_A=25^\circ\text{C}$ 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                      | $R_{DS(on)}$ | $V_{GS}=10V, I_D=20A$  | -    | 5.5  | 6.5       | m $\Omega$ |
|   |              | $V_{GS}=4.5V, I_D=10A$   | -    | 7    | 9         |            |
| 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> (Note 6)                               |              |  |      |      |           |            |
| Total Gate Charge                                     | $Q_g$        | $V_{DS}=20V, I_D=10A,$<br>$V_{GS}=4.5V$ (Note 1,2)               | -    | 17   | -         | nC         |
| Gate-Source Charge                                    | $Q_{gs}$     |  | -    | 4.9  | -         |            |
| Gate-Drain Charge                                     | $Q_{gd}$     |  | -    | 6.4  | -         |            |
| Input Capacitance                                     | $C_{iss}$    | $V_{DS}=25V, V_{GS}=0V,$<br>$f=1\text{MHz}$                      | -    | 1759 | -         | pF         |
| Output Capacitance                                    | $C_{oss}$    |  | -    | 176  | -         |            |
| Reverse Transfer Capacitance                          | $C_{rss}$    |  | -    | 126  | -         |            |
| Turn-On Delay Time                                    | $t_{d(on)}$  | $V_{DD}=15V, I_D=1A,$<br>$V_{GS}=10V, R_G=6\Omega$<br>(Note 1,2) | -    | 11   | -         | ns         |
| Turn-On Rise Time                                     | $t_r$        |  | -    | 21   | -         |            |
| Turn-Off Delay Time                                   | $t_{d(off)}$ |  | -    | 40   | -         |            |
| Turn-Off Fall Time                                    | $t_f$        |  | -    | 25   | -         |            |
| <b>Drain-Source Diode</b>                             |              |  |      |      |           |            |
| Maximum Continuous Drain-Source Diode Forward Current | $I_S$        | ---  | -    | -    | 60        | 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  $T_{J(MAX)}=175^\circ\text{C}$ . Ratings are based on low frequency and duty cycles to keep initial  $T_J=25^\circ\text{C}$ .
4. The maximum current rating is package limited.
5.  $R_{\theta JA}$  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. Guaranteed by design, not subject to production testing.



# PJD60N04-AU

## TYPICAL CHARACTERISTIC CURVES

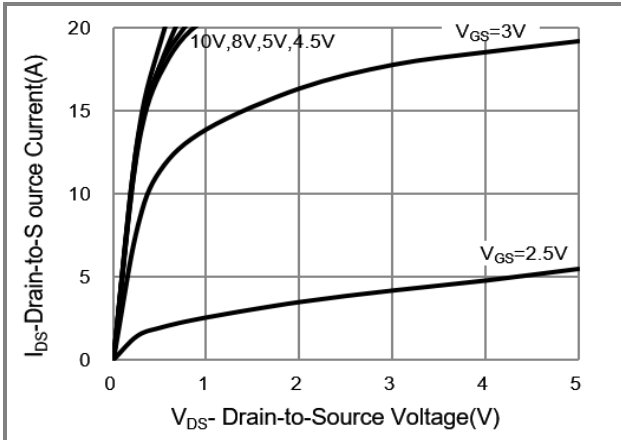


Fig.1 Output Characteristics

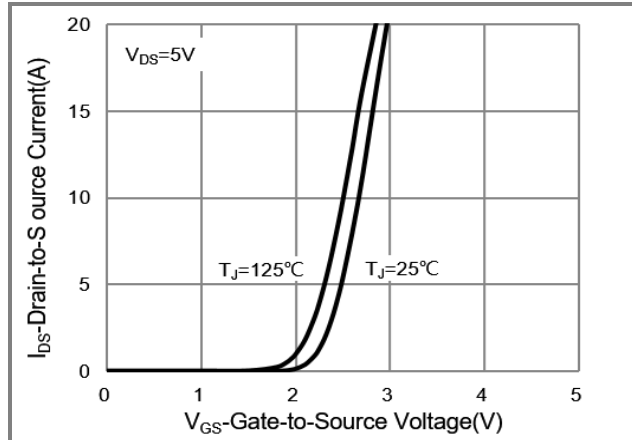


Fig.2 Transfer Characteristics

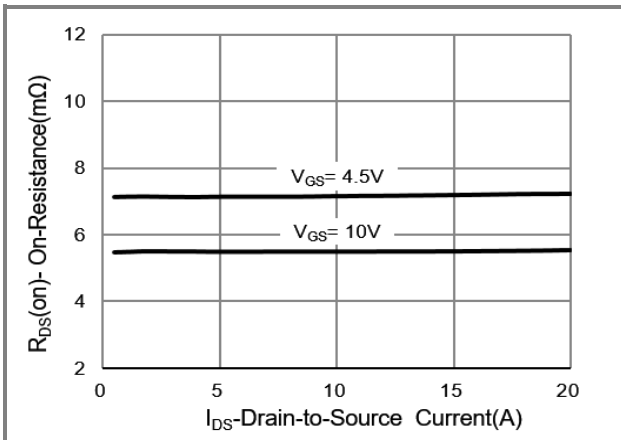


Fig.3 On-Resistance vs. Drain Current

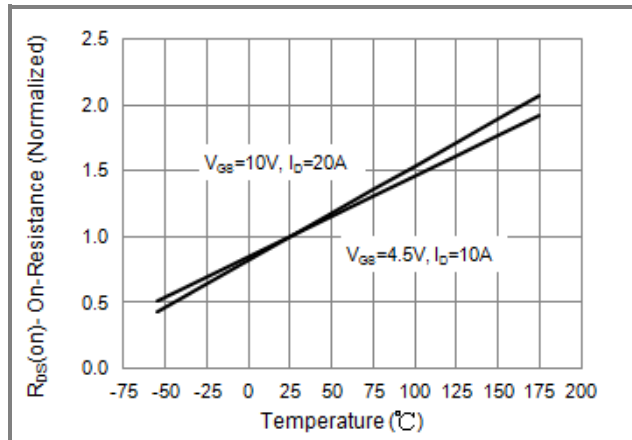


Fig.4 On-Resistance vs. Junction temperature

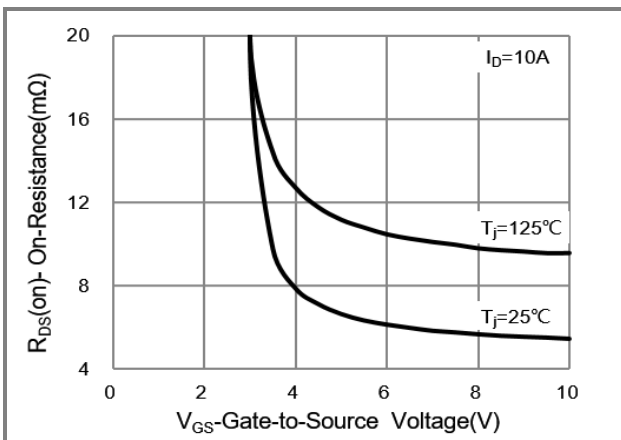


Fig.5 On-Resistance Variation with  $V_{GS}$

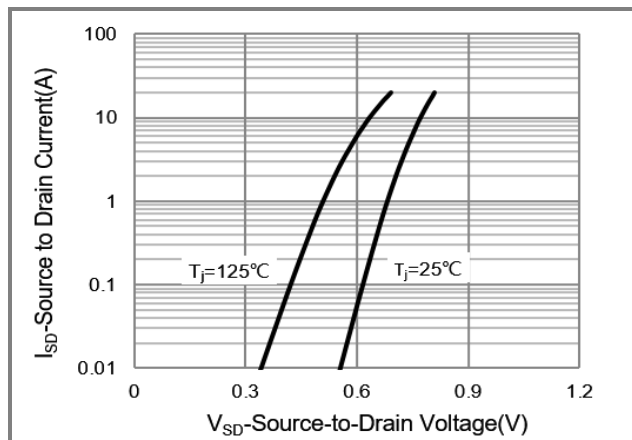


Fig.6 Source-Drain Diode Forward Voltage



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## TYPICAL CHARACTERISTIC CURVES

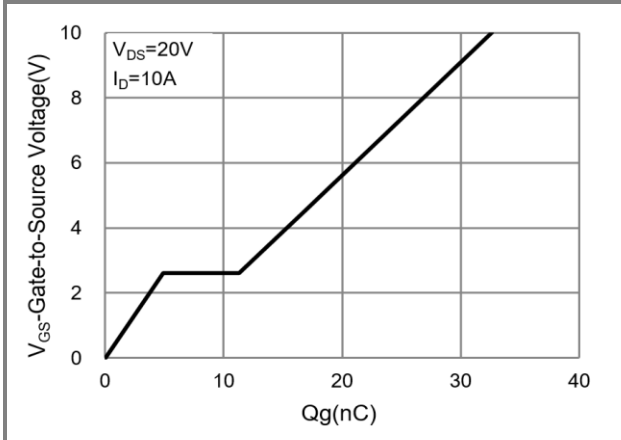


Fig.7 Gate-Charge Characteristics

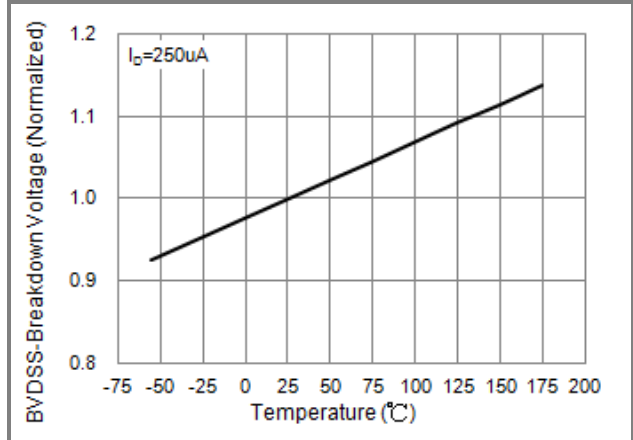


Fig.8 Breakdown Voltage Variation vs. Temperature

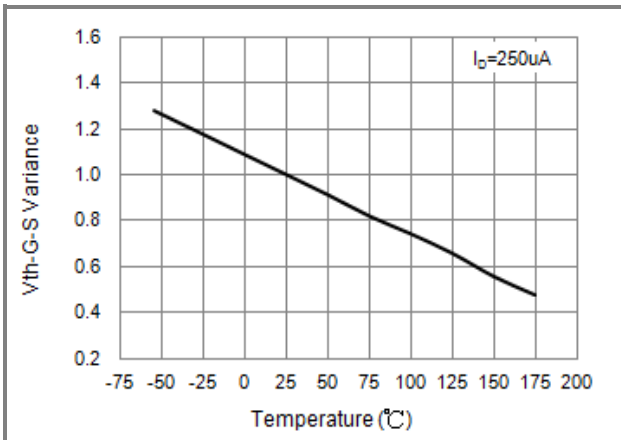


Fig.9 Threshold Voltage Variation with Temperature

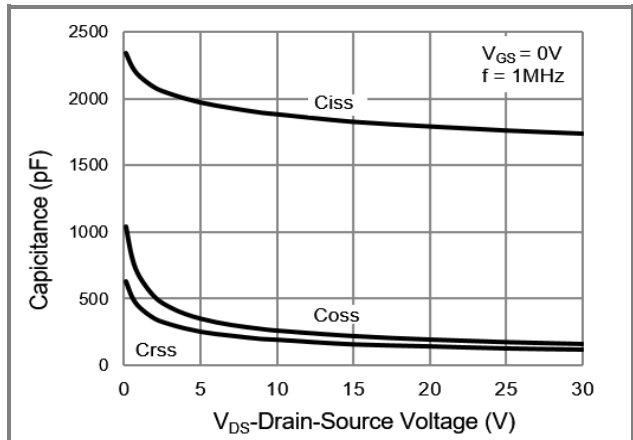


Fig.10 Capacitance vs. Drain-Source Voltage

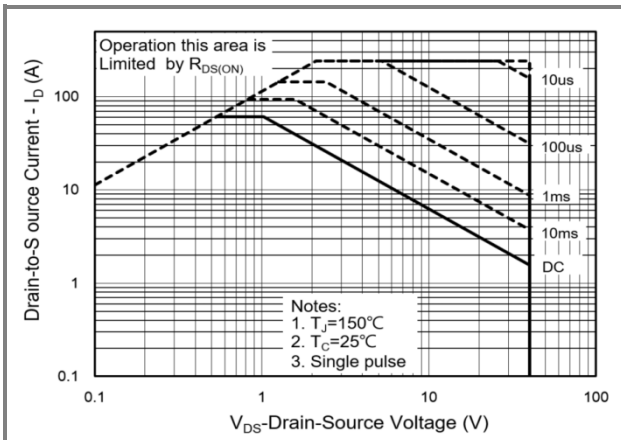


Fig.11 Maximum Safe Operating Area

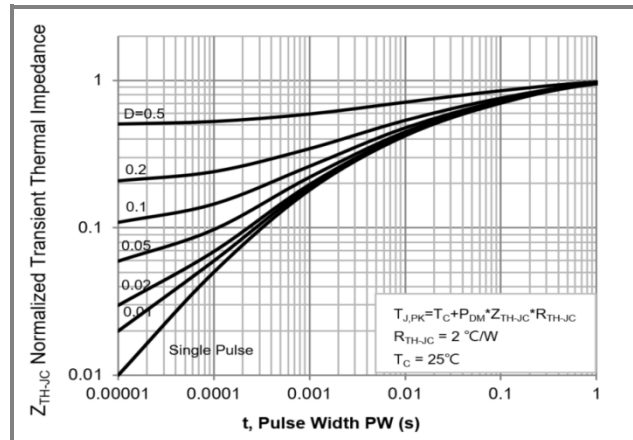


Fig.12 Normalized Transient Thermal Impedance

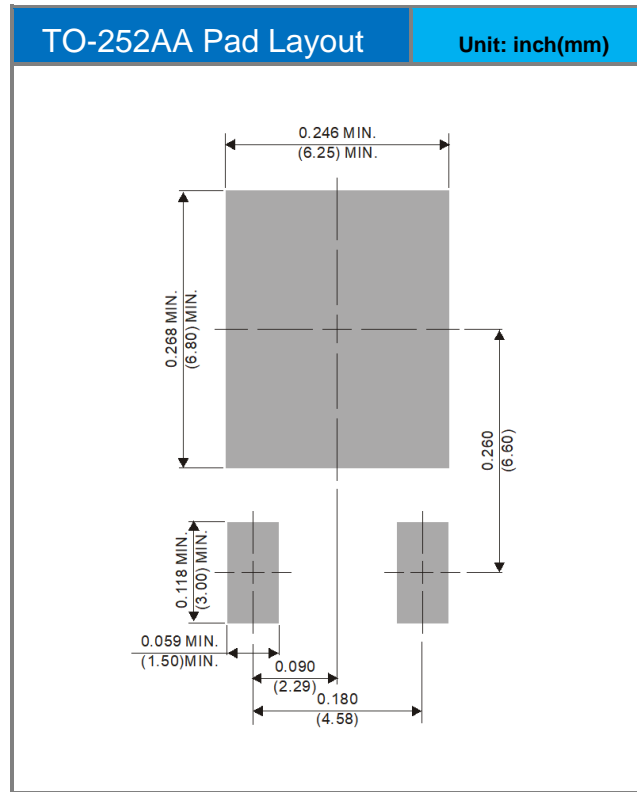
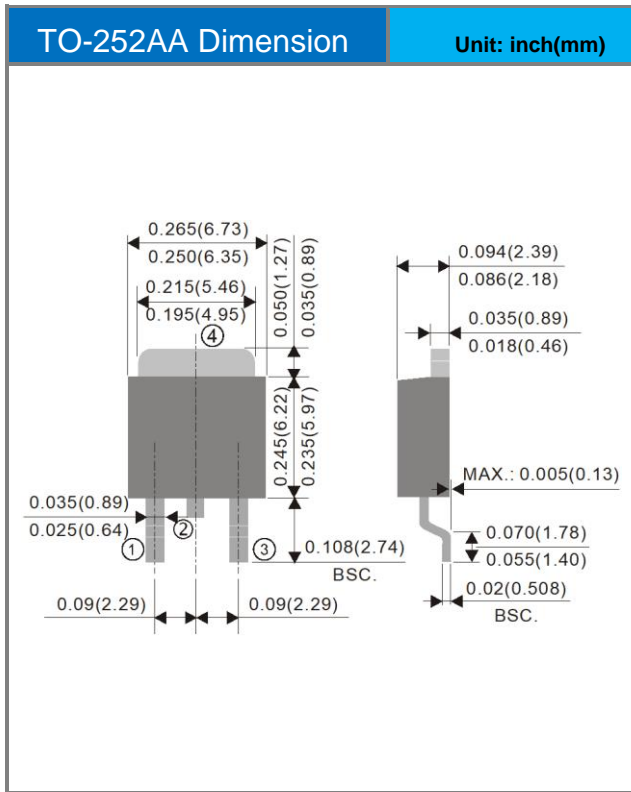


# PJD60N04-AU

## Part No Packing Code Version

| Part No Packing Code | Package Type | Packing Type        | Marking | Version      |
|----------------------|--------------|---------------------|---------|--------------|
| PJD60N04-AU_L2_000A1 | TO-252AA     | 3,000pcs / 13" reel | D60N04  | Halogen free |

## Packaging Information & Mounting Pad Layout





## PJD60N04-AU

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