



# PJA3420E

## 20V N-Channel Enhancement Mode MOSFET– ESD Protected

**Voltage** 20 V **Current** 5.1 A

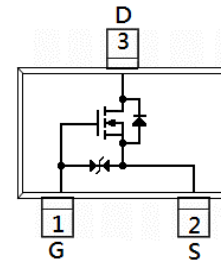
### Features

- $R_{DS(ON)}$ ,  $V_{GS}@4.5V$ ,  $I_D@5.1A < 27m\Omega$
- $R_{DS(ON)}$ ,  $V_{GS}@2.5V$ ,  $I_D@3.2A < 33m\Omega$
- $R_{DS(ON)}$ ,  $V_{GS}@1.8V$ ,  $I_D@2.0A < 46m\Omega$
- Advanced Trench Process Technology
- ESD Protected HBM Class 1C
- Specially Designed for Switch Load, PWM Application, etc.
- Lead free in compliance with EU RoHS 2.0
- Green molding compound as per IEC 61249 standard

### Mechanical Data

- Case : SOT-23 Package
- Terminals : Solderable per MIL-STD-750, Method 2026
- Approx. Weight : 0.0084 grams

SOT-23



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

| PARAMETER   |                           | SYMBOL          | LIMIT   | UNITS          |
|---|---------------------------|-----------------|---------|----------------|
| Drain-Source Voltage  |                           | $V_{DS}$        | 20      | V              |
| Gate-Source Voltage   |                           | $V_{GS}$        | $\pm 8$ |                |
| Continuous Drain Current <sup>(Note 4)</sup>                            | $T_A=25^\circ C$          | $I_D$           | 5.1     | A              |
|   | $T_A=70^\circ C$          |                 | 4.1     |                |
| Pulsed Drain Current <sup>(Note 1)</sup>                                | $T_A=25^\circ C$          | $I_{DM}$        | 20      |                |
| Power Dissipation   | $T_A=25^\circ C$          | $P_D$           | 1.3     | W              |
|   | Derate above $25^\circ C$ |                 | 10      | mW/ $^\circ C$ |
| Operating Junction and Storage Temperature Range                        |                           | $T_J, T_{STG}$  | -55~150 | $^\circ C$     |
| Typical Thermal Resistance<br>- Junction to Ambient <sup>(Note 5)</sup> |                           | $R_{\theta JA}$ | 100     | $^\circ C/W$   |



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

| PARAMETER                          | SYMBOL              | TEST CONDITION  | MIN. | TYP. | MAX. | UNITS |
|------------------------------------|---------------------|---|------|------|------|-------|
| <b>Static</b>                      |                     |   |      |      |      |       |
| Drain-Source Breakdown Voltage     | BV <sub>DSS</sub>   | V <sub>GS</sub> =0V, I <sub>D</sub> =250uA  | 20   | -    | -    | V     |
| Gate Threshold Voltage             | V <sub>GS(th)</sub> | V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =250uA  | 0.4  | 0.67 | 0.9  |       |
| Drain-Source On-State Resistance   | R <sub>DS(on)</sub> | V <sub>GS</sub> =4.5V, I <sub>D</sub> =5.1A   | -    | 22   | 27   | mΩ    |
|                                    |                     | V <sub>GS</sub> =2.5V, I <sub>D</sub> =3.2A   | -    | 26   | 33   |       |
|                                    |                     | V <sub>GS</sub> =1.8V, I <sub>D</sub> =2.0A   | -    | 34   | 46   |       |
| Zero Gate Voltage Drain Current    | I <sub>DSS</sub>    | V <sub>DS</sub> =20V, V <sub>GS</sub> =0V   | -    | -    | 1    | uA    |
| Gate-Source Leakage Current        | I <sub>GSS</sub>    | V <sub>GS</sub> =±8V, V <sub>DS</sub> =0V   | -    | -    | ±10  |       |
| <b>Dynamic</b> <sup>(Note 6)</sup> |                     |   |      |      |      |       |
| Total Gate Charge                  | Q <sub>g</sub>      | V <sub>DS</sub> =10V, I <sub>D</sub> =5.2A,<br>V <sub>GS</sub> =4.5V <sup>(Note 2,3)</sup>                        | -    | 6.3  | -    | nC    |
| Gate-Source Charge                 | Q <sub>gs</sub>     |   | -    | 1.2  | -    |       |
| Gate-Drain Charge                  | Q <sub>gd</sub>     |   | -    | 1.0  | -    |       |
| Input Capacitance                  | C <sub>iss</sub>    | V <sub>DS</sub> =10V, V <sub>GS</sub> =0V,<br>f=1MHZ  | -    | 515  | -    | pF    |
| Output Capacitance                 | C <sub>oss</sub>    |   | -    | 60   | -    |       |
| Reverse Transfer Capacitance       | C <sub>rss</sub>    |   | -    | 47   | -    |       |
| Turn-On Delay Time                 | t <sub>d(on)</sub>  | V <sub>DS</sub> =10V, I <sub>D</sub> =5.2A,<br>V <sub>GS</sub> =4.5V, R <sub>G</sub> =6Ω<br><sup>(Note 2,3)</sup> | -    | 7    | -    | ns    |
| Turn-On Rise Time                  | t <sub>r</sub>      |   | -    | 43   | -    |       |
| Turn-Off Delay Time                | t <sub>d(off)</sub> |   | -    | 170  | -    |       |
| Turn-Off Fall Time                 | t <sub>f</sub>      |   | -    | 13   | -    |       |
| <b>Drain-Source Diode</b>          |                     |   |      |      |      |       |
| Diode Forward Current              | I <sub>S</sub>      | T <sub>A</sub> =25°C  | -    | -    | 1.5  | A     |
| Diode Forward Voltage              | V <sub>SD</sub>     | I <sub>S</sub> =1A, V <sub>GS</sub> =0V   | -    | 0.76 | 1.2  | V     |

**Notes :**

- 1.Pulse width<300us, Duty cycle<2%.
- 2.Essentially independent of operating temperature typical characteristics.
- 3.Repetitive rating, pulse width limited by junction temperature T<sub>J</sub>(MAX)=150°C.Ratings are based on low frequency and duty cycles to keep initial T<sub>J</sub> =25°C.
- 4.The maximum current rating is package limited.
- 5.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.
- 6.Guaranteed by design, not subject to production testing.



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## TYPICAL CHARACTERISTIC CURVES

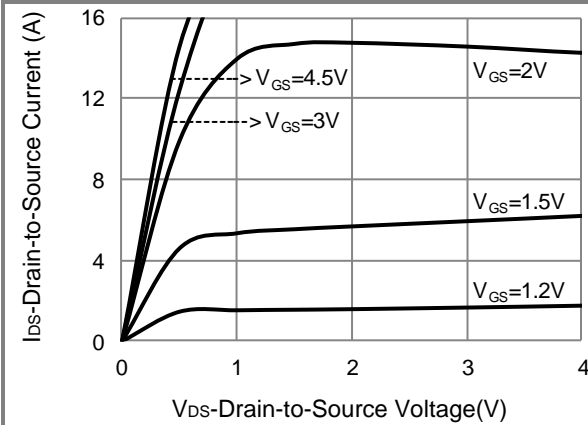


Fig.1 Output Characteristics

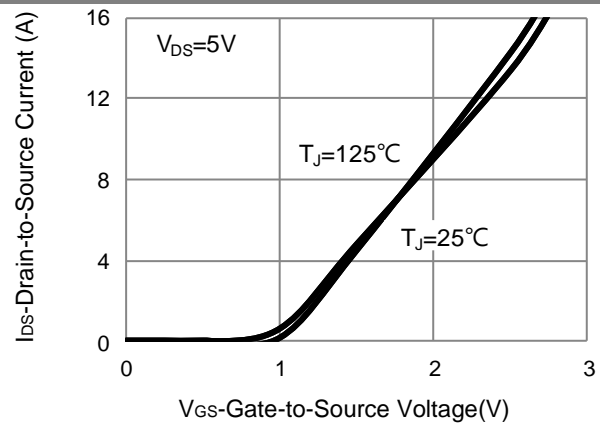


Fig.2 Transfer Characteristics

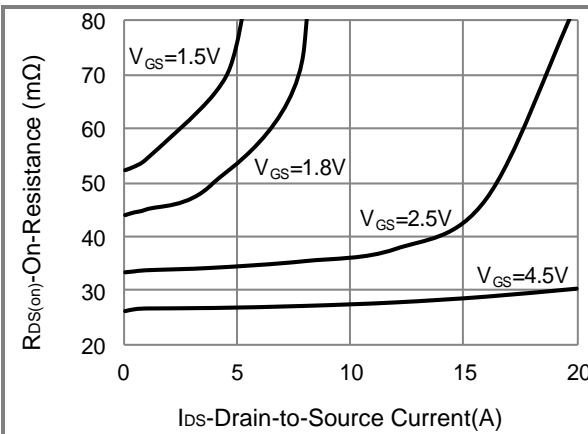


Fig.3 On-Resistance vs. Drain Current

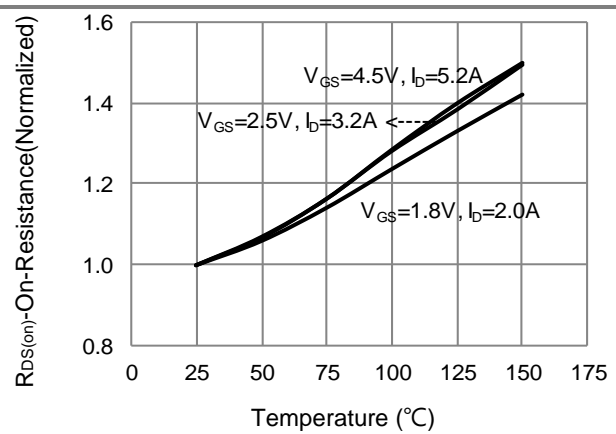


Fig.4 On-Resistance vs. Junction temperature

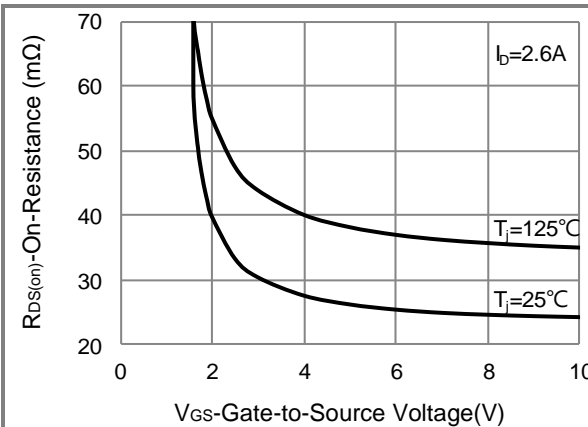


Fig.5 On-Resistance Variation with  $V_{GS}$

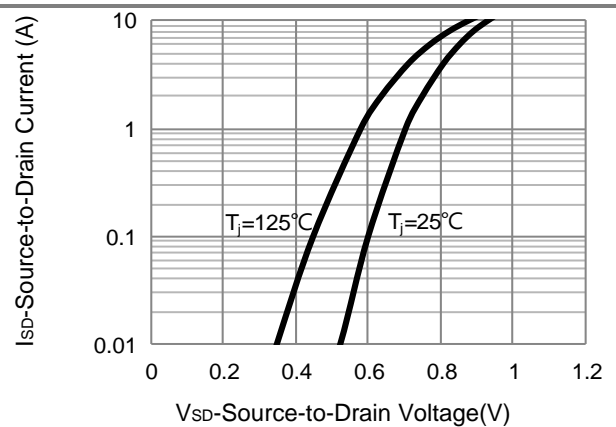
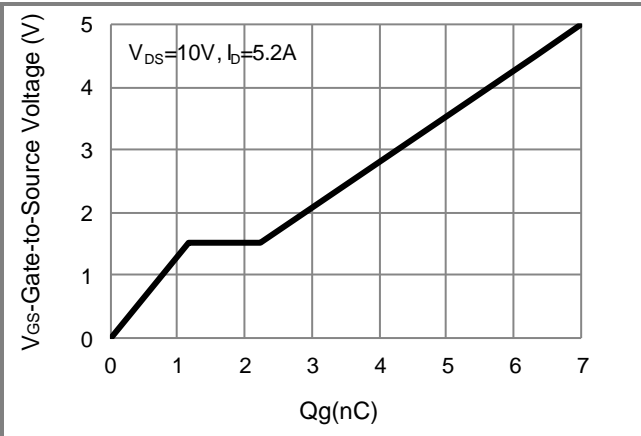


Fig.6 Body Diode Characteristic

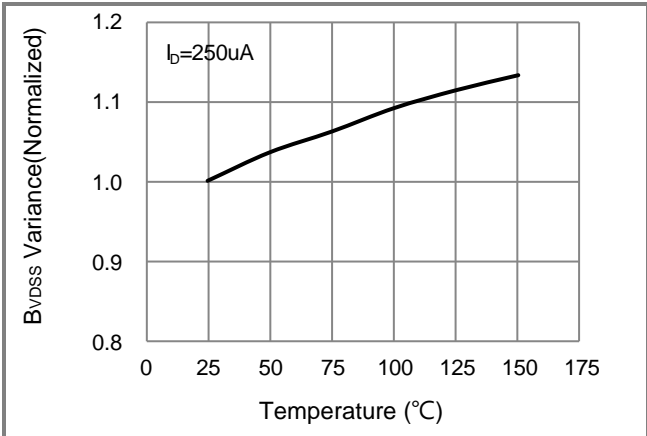


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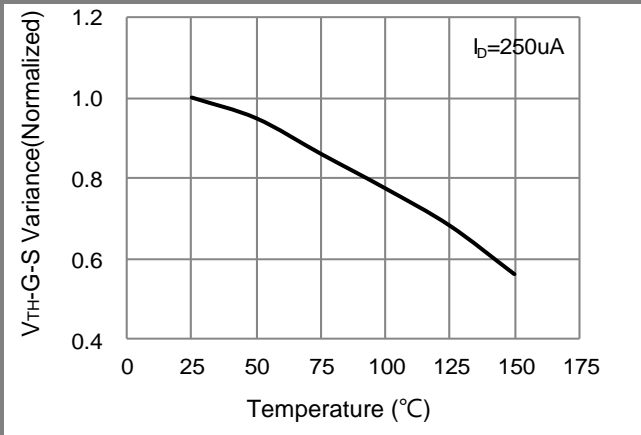
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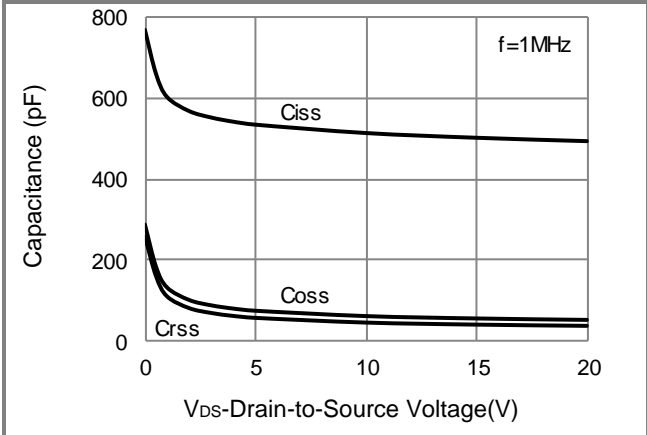
**Fig.7 Gate-Charge Characteristics**



**Fig.8 Breakdown Voltage Variation vs. Temperature**



**Fig.9 Threshold Voltage Variation with Temperature**



**Fig.10 Capacitance vs. Drain-Source Voltage**

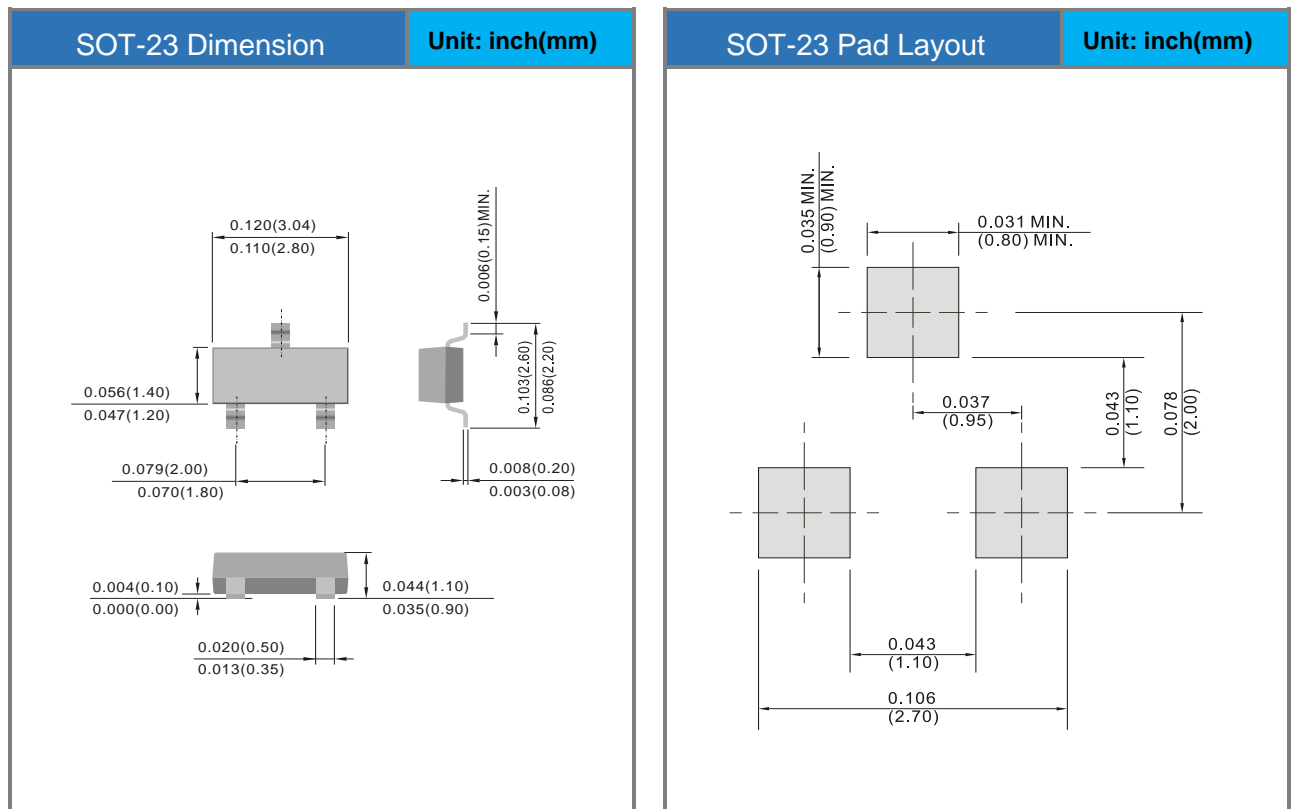


# PJA3420E

## Part No. Packing Code Version

| Part No. Packing Code | Package Type | Packing Type     | Marking | Version                        |
|-----------------------|--------------|------------------|---------|--------------------------------|
| PJA3420E_R1_00701     | SOT-23       | 3K pcs / 7" reel | 20E     | Halogen free<br>RoHS compliant |

## Packaging Information & Mounting Pad Layout





## PJA3420E

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