



# PJA45N02

## 20V N-CHANNEL ENHANCEMENT MODE MOSFET

**VOLTAGE** 20 Volts **CURRENT** 3.6 Amperes

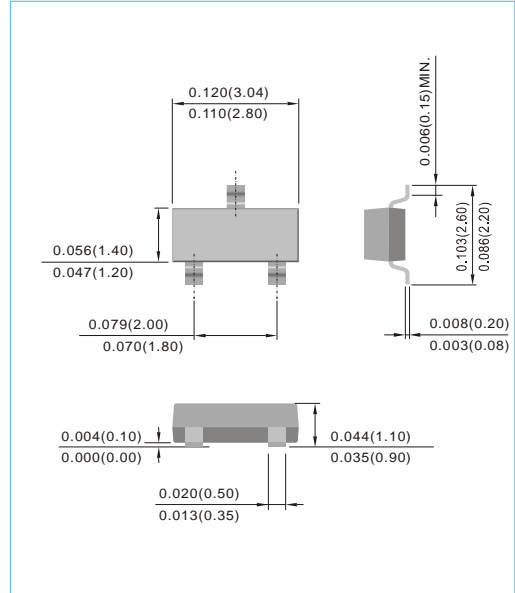
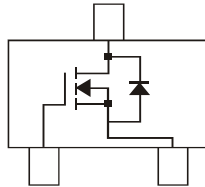
**SOT-23** Unit : inch(mm)

### FEATURES

- $R_{DS(ON)}, V_{GS}@1.8V, I_D@1.5A < 87m\Omega$
- $R_{DS(ON)}, V_{GS}@4.5V, I_D@3.6A < 40m\Omega$
- Advanced Trench Process Technology
- High Density Cell Design For Ultra Low On-Resistance
- Specially Designed for DC/DC Converters
- Low Gate Charge
- ILead free in comply with EU RoHS 2002/95/EC directives.
- Green molding compound as per IEC61249 Std. . (Halogen Free)

### MECHANICAL DATA

- Case: SOT-23 Package
- Terminals : Solderable per MIL-STD-750, Method 2026
- Apporx. Weight : 0.0003 ounces, 0.0084grams
- Marking : 45



### MAXIMUM RATINGS AND THERMAL CHARACTERISTICS ( $T_A=25^\circ\text{C}$ unless otherwise noted )

| PARAMETER  |              |                        | SYMBOL          | LIMIT        | UNITS              |
|--|--------------|------------------------|-----------------|--------------|--------------------|
| Drain-Source Voltage                             |              |                        | $V_{DS}$        | 20           | V                  |
| Gate-Source Voltage                              |              |                        | $V_{GS}$        | $\pm 8$      | V                  |
| Continuous Drain Current (Notes 1)               | Steady-State | $T_A=25^\circ\text{C}$ | $I_D$           | 2.9          | A                  |
|  | Steady-State | $T_A=70^\circ\text{C}$ |                 | 2.3          |                    |
| Pulsed Drain Current (Notes 1)                   |              |                        | $I_{DM}$        | 10           | A                  |
| Power Dissipation (Notes 1)                      | Steady-State | $T_A=25^\circ\text{C}$ | $P_D$           | 700          | mW                 |
|  |              | $T_A=70^\circ\text{C}$ |                 | 400          |                    |
| Typical Thermal Resistance (Notes 1)             |              |                        | $R_{\theta JA}$ | 178          | $^\circ\text{C/W}$ |
| Operating Junction and Storage Temperature Range |              |                        | $T_J, T_{STG}$  | -55 to + 150 | $^\circ\text{C}$   |

#### NOTES:

1. Mounted on minimum pad layout.
2. Mounted on 48cm<sup>2</sup> FR-4PCB.



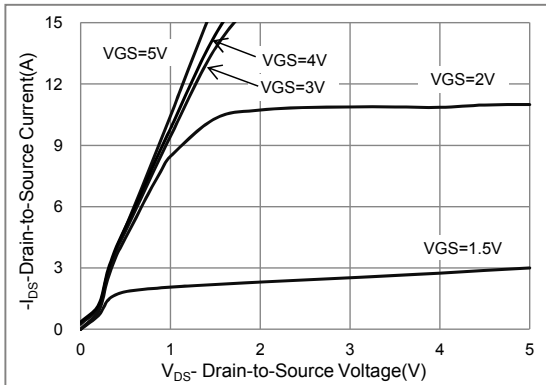
# PJA45N02

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

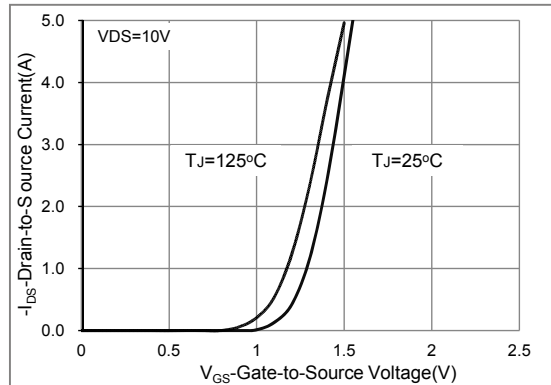
| PARAMETER                        | SYMBOL              | TEST CONDITION   | MIN. | TYP. | MAX. | UNITS |
|----------------------------------|---------------------|--|------|------|------|-------|
| Static                           |                     |  |      |      |      |       |
| Drain-Source Breakdown Voltage   | BV <sub>DSS</sub>   | V <sub>GS</sub> =0V, I <sub>D</sub> =250μA   | 20   | -    | -    | V     |
| Gate Threshold Voltage           | V <sub>GS(th)</sub> | V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =250μA                               | 0.5  | 0.6  | 1    | V     |
| Drain-Source On-State Resistance | R <sub>DS(on)</sub> | V <sub>GS</sub> =4.5V, I <sub>D</sub> =3.6A  | -    | 40   | -    | mΩ    |
|                                  |                     | V <sub>GS</sub> =2.5V, I <sub>D</sub> =3.1A  | -    | 47   | 53   |       |
|                                  |                     | V <sub>GS</sub> =1.8V, I <sub>D</sub> =1.5A  | -    | 55   | 87   |       |
|                                  |                     | V <sub>GS</sub> =1.5V, I <sub>D</sub> =1.0A  | -    | 65   | -    |       |
| Zero Gate Voltage Drain Current  | I <sub>DSS</sub>    | V <sub>DS</sub> =16V, V <sub>GS</sub> =0V  | -    | -    | 0.5  | μA    |
| Gate -Source Leakage Current     | I <sub>GSS</sub>    | V <sub>GS</sub> =±8V, V <sub>DS</sub> =0V  | -    | -    | ±100 | nA    |
| Dynamic                          |                     |  |      |      |      |       |
| Forward Transconductance         | g <sub>FS</sub>     | V <sub>DS</sub> =5V, I <sub>D</sub> =3.1A  | -    | 11   | -    | S     |
| Total Gate Charge                | Q <sub>g(tot)</sub> | V <sub>DS</sub> =10V, I <sub>D</sub> =2.7A<br>V <sub>GS</sub> =4.5V                    | -    | 6.5  | -    | nC    |
| Threshold Gate Charge            | Q <sub>g(th)</sub>  |  | -    | 0.6  | -    |       |
| Gate-Source Charge               | Q <sub>gs</sub>     |  | -    | 0.8  | -    |       |
| Gate-Drain Charge                | Q <sub>gd</sub>     |  | -    | 1.5  | -    |       |
| Turn-On Delay Time               | td <sub>on</sub>    | V <sub>DD</sub> =10V, V <sub>GS</sub> =4.5V,<br>R <sub>G</sub> =6Ω, R <sub>L</sub> =3Ω | -    | 5    | -    | ns    |
| Turn-Off Delay Time              | td <sub>off</sub>   |  | -    | 30   | -    |       |
| Turn-On Rise Time                | t <sub>r</sub>      |  | -    | 6    | -    |       |
| Turn-Off Fall Time               | t <sub>f</sub>      |  | -    | 8    | -    |       |
| Input Capacitance                | C <sub>iss</sub>    | V <sub>DS</sub> =10V, V <sub>GS</sub> =0V<br>f=1.0MHz                                  | -    | 500  | -    | pF    |
| Output Capacitance               | C <sub>oss</sub>    |  | -    | 68   | -    |       |
| Reverse Transfer Capacitance     | C <sub>rss</sub>    |  | -    | 60   | -    |       |
| Source-Drain Diode               |                     |  |      |      |      |       |
| Diode Forward Voltage            | V <sub>SD</sub>     | I <sub>S</sub> =1A, V <sub>GS</sub> =0V  | -    | 0.62 | 1.2  | V     |



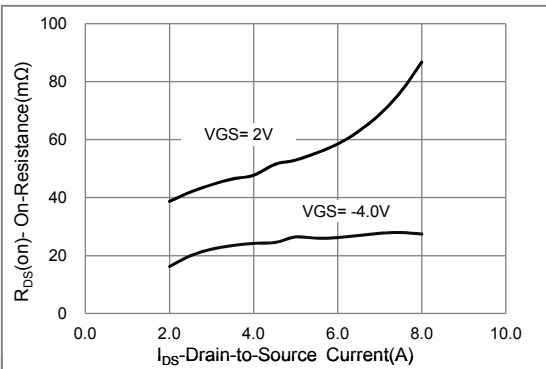
# PJA45N02



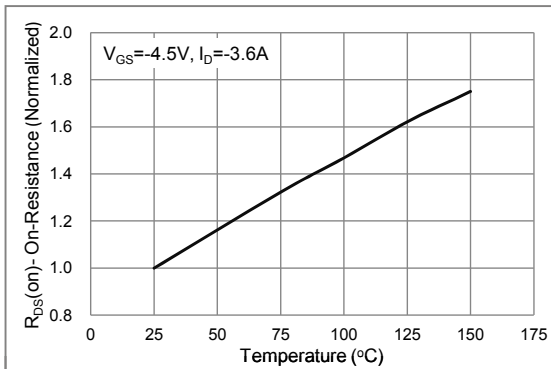
**Fig.1 Output Characteristics**



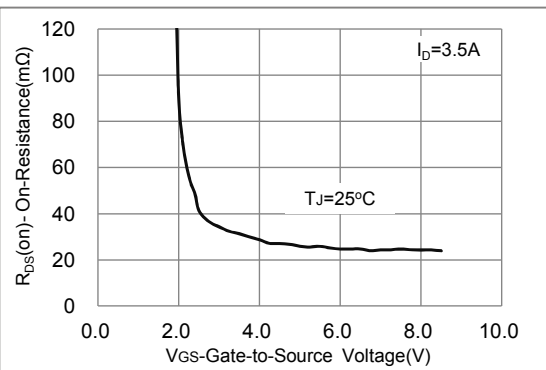
**Fig.2 Transfer Characteristics**



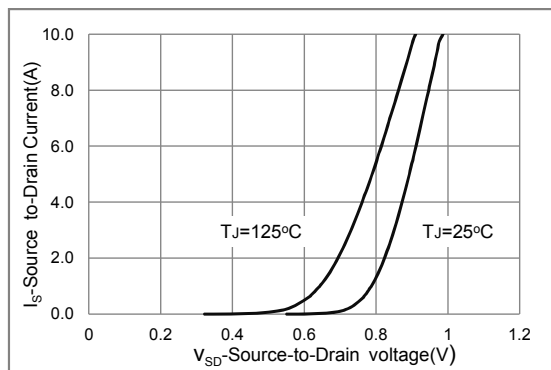
**Fig.3 On-Resistance vs. Drain current**



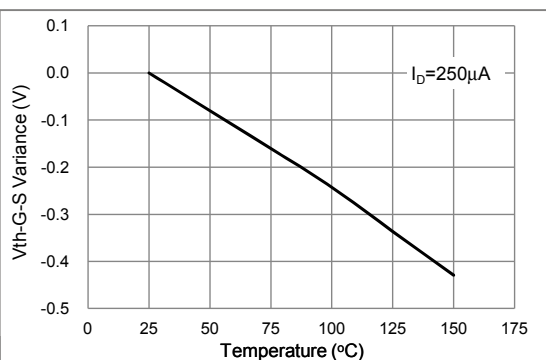
**Fig.4 On-Resistance vs. Junction temperature**



**Fig.5 On-Resistance vs. V\_GS vs Temperature**



**Fig.6 Body Diode Characteristics**

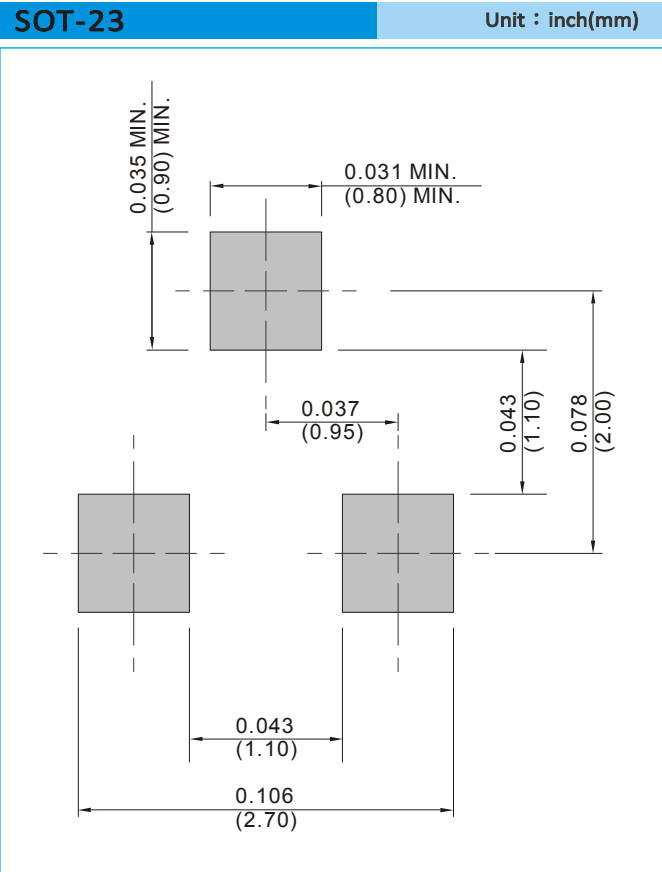


**Fig.7 Threshold Voltage Variation with Temperature**



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## MOUNTING PAD LAYOUT



## ORDER INFORMATION

- Packing information
  - T/R - 12K per 13" plastic Reel
  - T/R - 3K per 7" plastic Reel



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## Part No\_packing code\_Version

PJA45N02\_R1\_00001

PJA45N02\_R2\_00001

For example :

**RB500V-40\_R2\_00001**



| Packing Code <b>XX</b>               |                      |                                  |                      | Version Code <b>XXXXX</b> |                      |                                       |
|--------------------------------------|----------------------|----------------------------------|----------------------|---------------------------|----------------------|---------------------------------------|
| Packing type                         | 1 <sup>st</sup> Code | Packing size code                | 2 <sup>nd</sup> Code | HF or RoHS                | 1 <sup>st</sup> Code | 2 <sup>nd</sup> ~5 <sup>th</sup> Code |
| Tape and Ammunition Box (T/B)        | A                    | N/A                              | 0                    | HF                        | 0                    | serial number                         |
| Tape and Reel (T/R)                  | R                    | 7"                               | 1                    | RoHS                      | 1                    | serial number                         |
| Bulk Packing (B/P)                   | B                    | 13"                              | 2                    |                           |                      |                                       |
| Tube Packing (T/P)                   | T                    | 26mm                             | X                    |                           |                      |                                       |
| Tape and Reel (Right Oriented) (TRR) | S                    | 52mm                             | Y                    |                           |                      |                                       |
| Tape and Reel (Left Oriented) (TRL)  | L                    | PANASERT T/B CATHODE UP (PBCU)   | U                    |                           |                      |                                       |
| FORMING                              | F                    | PANASERT T/B CATHODE DOWN (PBCD) | D                    |                           |                      |                                       |



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