

# PJP6NA90 / PJF6NA90 / PJZ6NA90

## 900V N-Channel MOSFET

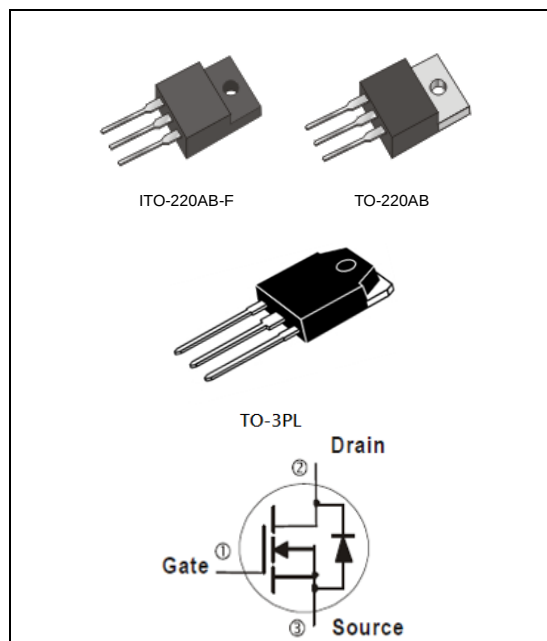
|                |              |                |            |
|----------------|--------------|----------------|------------|
| <b>Voltage</b> | <b>900 V</b> | <b>Current</b> | <b>6 A</b> |
|----------------|--------------|----------------|------------|

### Features

- $R_{DS(ON)}, V_{GS}@10V, I_D@3A < 2.3\Omega$
- High switching speed
- Improved dv/dt capability
- Low Gate Charge
- Low reverse transfer capacitance
- Lead free in compliance with EU RoHS 2011/65/EU directive.
- Green molding compound as per IEC61249 Std.  
(Halogen Free)

### Mechanical Data

- Case : TO-220AB, ITO-220AB-F, TO-3PL Package
- Terminals : Solderable per MIL-STD-750, Method 2026
- TO-220AB Approx. Weight : 0.067 ounces, 1.89 grams
- ITO-220AB-F Approx. Weight : 0.068 ounces, 2 grams
- TO-3PL Approx. Weight : 0.182 ounces, 5.174grams



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

| PARAMETER                                         |                                   | SYMBOL          | TO-220AB | ITO-220AB-F | TO-3PL | UNITS                 |
|---------------------------------------------------|-----------------------------------|-----------------|----------|-------------|--------|-----------------------|
| Drain-Source Voltage                              |                                   | $V_{DS}$        | 900      |             |        | V                     |
| Gate-Source Voltage                               |                                   | $V_{GS}$        | $\pm 30$ |             |        | V                     |
| Continuous Drain Current                          |                                   | $I_D$           | 6        |             |        | A                     |
| Pulsed Drain Current                              |                                   | $I_{DM}$        | 24       |             |        | A                     |
| Single Pulse Avalanche Energy <sup>(Note 1)</sup> |                                   | $E_{AS}$        | 600      |             |        | mJ                    |
| Power Dissipation                                 | $T_C=25^{\circ}\text{C}$          | $P_D$           | 167      | 56          | 192    | W                     |
|                                                   | Derate above $25^{\circ}\text{C}$ |                 | 1.34     | 0.45        | 1.54   | W/ $^{\circ}\text{C}$ |
| Operating Junction and Storage Temperature Range  |                                   | $T_J, T_{STG}$  | -55~150  |             |        | $^{\circ}\text{C}$    |
| Typical Thermal resistance                        |                                   |                 |          |             |        |                       |
| - Junction to Case                                |                                   | $R_{\theta JC}$ | 0.75     | 2.23        | 0.65   | $^{\circ}\text{C/W}$  |
| - Junction to Ambient                             |                                   | $R_{\theta JA}$ | 62.5     | 120         | 50     |                       |

- Limited only By Maximum Junction Temperature



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

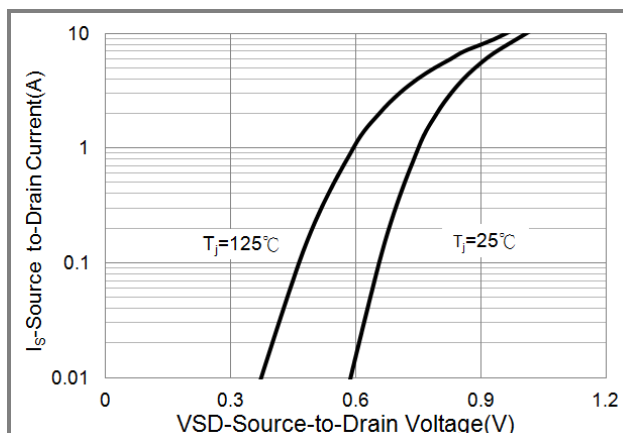
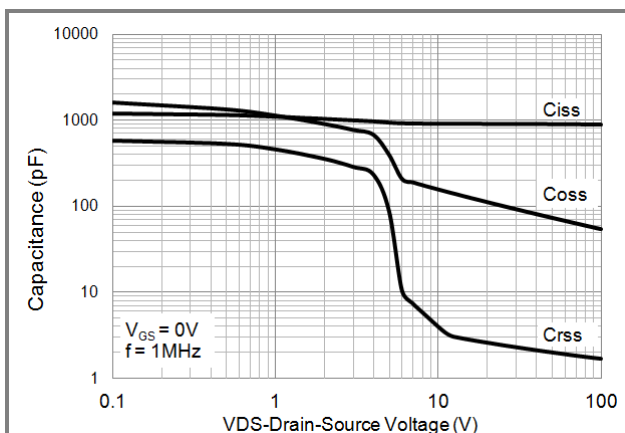
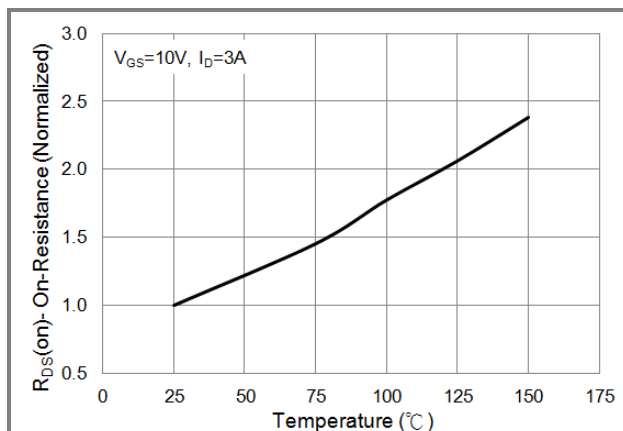
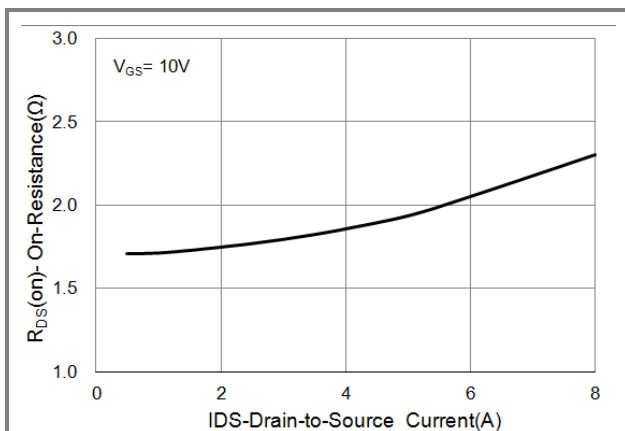
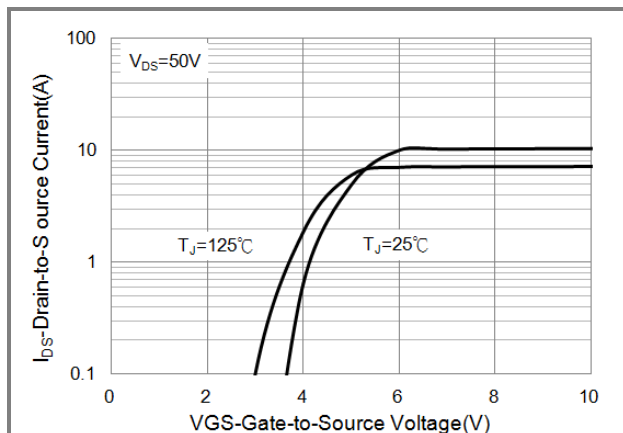
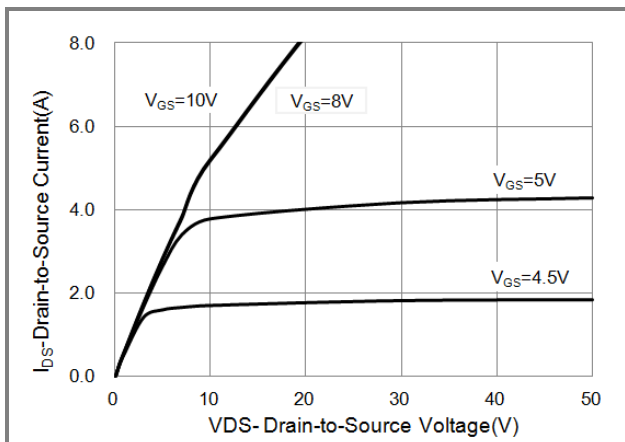
| PARAMETER                                             | SYMBOL              | TEST CONDITION                                                                  | MIN. | TYP. | MAX. | UNITS |
|-------------------------------------------------------|---------------------|---------------------------------------------------------------------------------|------|------|------|-------|
| Static                                                |                     |                                                                                 |      |      |      |       |
| Drain-Source Breakdown Voltage                        | BV <sub>DSS</sub>   | V <sub>GS</sub> =0V, I <sub>D</sub> =250uA                                      | 900  | -    | -    | V     |
| Gate Threshold Voltage                                | V <sub>GS(th)</sub> | V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =250uA                        | 2    | 2.88 | 4    | V     |
| Drain-Source On-State Resistance                      | R <sub>DS(on)</sub> | V <sub>GS</sub> =10V, I <sub>D</sub> =3A                                        | -    | 1.85 | 2.3  | Ω     |
| Zero Gate Voltage Drain Current                       | I <sub>DSS</sub>    | V <sub>DS</sub> =900V, V <sub>GS</sub> =0V                                      | -    | 0.02 | 1    | uA    |
| Gate-Source Leakage Current                           | I <sub>GSS</sub>    | V <sub>GS</sub> =±30V, V <sub>DS</sub> =0V                                      | -    | ±10  | ±100 | nA    |
| Diode Forward Voltage                                 | V <sub>SD</sub>     | I <sub>S</sub> =6A, V <sub>GS</sub> =0V                                         | -    | 0.86 | 1.4  | V     |
| Dynamic (Note 4)                                      |                     |                                                                                 |      |      |      |       |
| Total Gate Charge                                     | Q <sub>g</sub>      | V <sub>DS</sub> =720V, I <sub>D</sub> =6A,<br>V <sub>GS</sub> =10V (Note 2,3)   | -    | 23.6 | -    | nC    |
| Gate-Source Charge                                    | Q <sub>gs</sub>     |                                                                                 | -    | 5.4  | -    |       |
| Gate-Drain Charge                                     | Q <sub>gd</sub>     |                                                                                 | -    | 9.2  | -    |       |
| Input Capacitance                                     | C <sub>iss</sub>    | V <sub>DS</sub> =25V, V <sub>GS</sub> =0V,<br>f=1.0MHZ                          | -    | 915  | -    | pF    |
| Output Capacitance                                    | C <sub>oss</sub>    |                                                                                 | -    | 101  | -    |       |
| Reverse Transfer Capacitance                          | C <sub>rss</sub>    |                                                                                 | -    | 2.5  | -    |       |
| Turn-On Delay Time                                    | td <sub>(on)</sub>  | V <sub>DD</sub> =450V, I <sub>D</sub> =6A,<br>R <sub>G</sub> =25Ω<br>(Note 2,3) | -    | 17   | -    | ns    |
| Turn-On Rise Time                                     | t <sub>r</sub>      |                                                                                 | -    | 28   | -    |       |
| Turn-Off Delay Time                                   | td <sub>(off)</sub> |                                                                                 | -    | 66   | -    |       |
| Turn-Off Fall Time                                    | t <sub>f</sub>      |                                                                                 | -    | 33   | -    |       |
| Drain-Source Diode                                    |                     |                                                                                 |      |      |      |       |
| Maximum Continuous Drain-Source Diode Forward Current | I <sub>S</sub>      | ---                                                                             | -    | -    | 6    | A     |
| Maximum Pulsed Drain-Source Diode Forward Current     | I <sub>SM</sub>     | ---                                                                             | -    | -    | 24   | A     |
| Reverse Recovery Time                                 | trr                 | V <sub>GS</sub> =0V, I <sub>S</sub> =6A                                         | -    | 403  | -    | ns    |
| Reverse Recovery Charge                               | Qrr                 | di <sub>F</sub> / dt=100A/us (Note 2)                                           | -    | 6.1  | -    | uC    |

**NOTES :**

1.  $L=30\text{mH}, I_{AS}=6.2A, V_{DD}=50V, R_G=25\text{ohm}$ , Starting  $T_J=25^{\circ}\text{C}$
2. Pulse width  $\leq 300\mu s$ , Duty cycle  $\leq 2\%$
3. Essentially independent of operating temperature typical characteristics.
4. Guaranteed by design, not subject to production testing

# PJP6NA90 / PJF6NA90 / PJZ6NA90

## TYPICAL CHARACTERISTIC CURVES



# PJP6NA90 / PJF6NA90 / PJZ6NA90

## TYPICAL CHARACTERISTIC CURVES

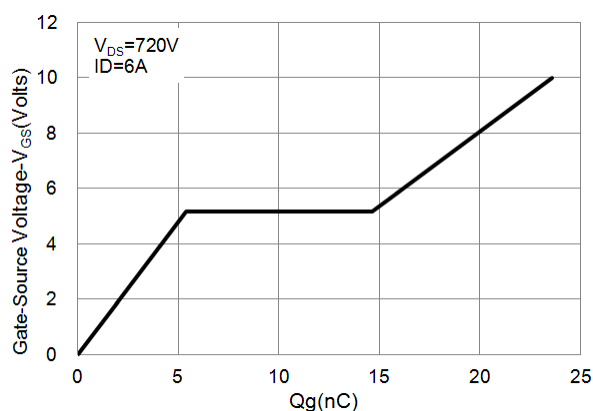


Fig.7 Gate Charge

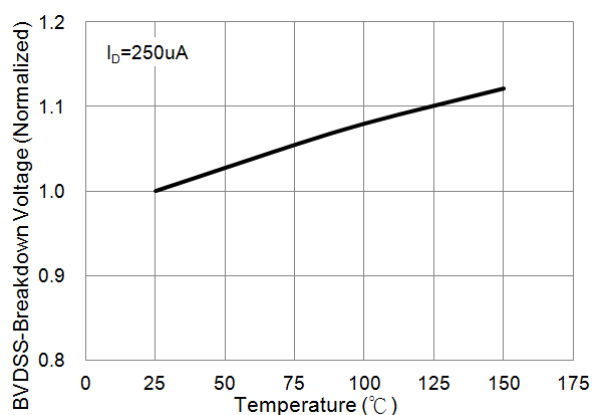


Fig.8  $BV_{DS}$  vs. Junction Temperature

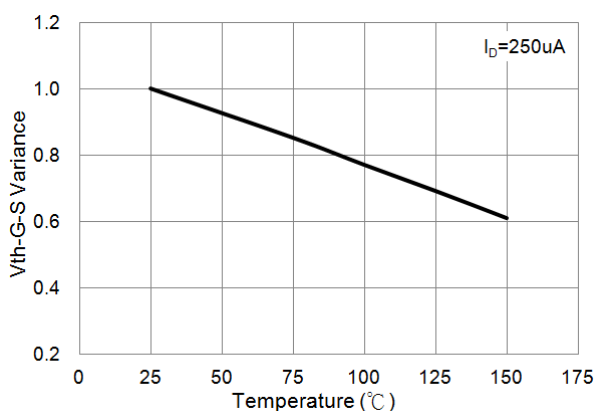


Fig.9 Threshold Voltage Variation with Temperature

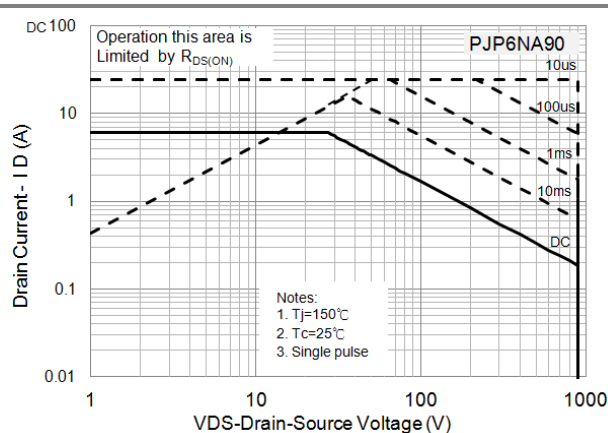


Fig.10 Maximum Safe Operating Area

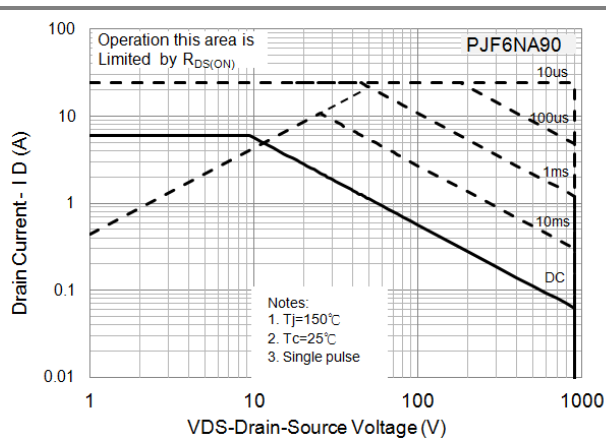


Fig.11 Maximum Safe Operating Area

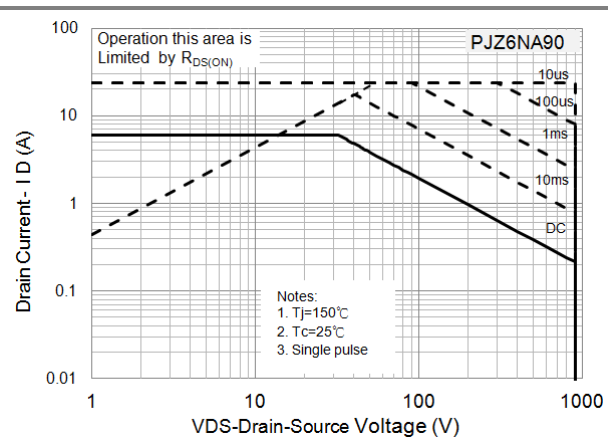


Fig.12 Maximum Safe Operating Area

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## TYPICAL CHARACTERISTIC CURVES

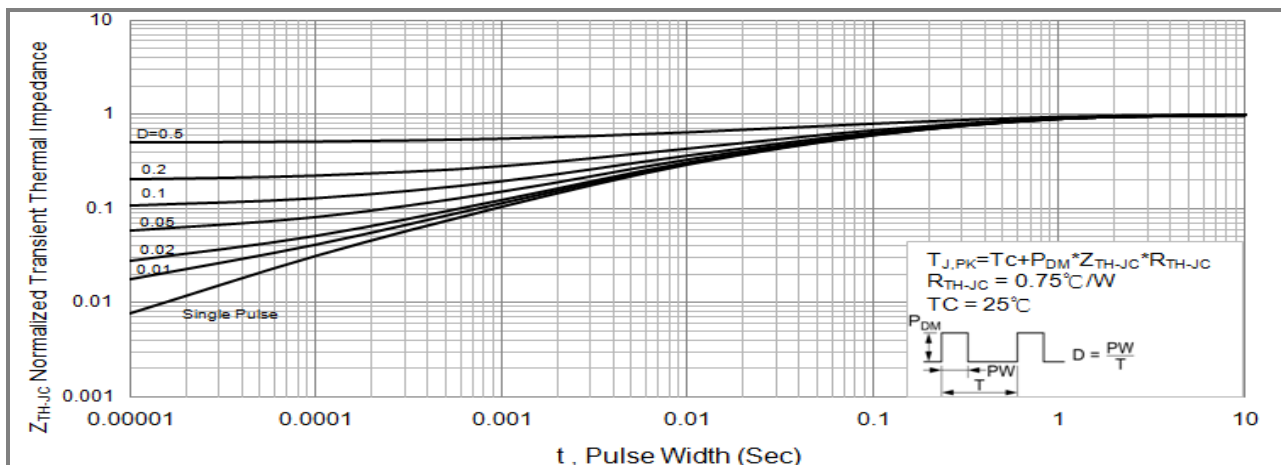


Fig.13 PJP6NA90 Normalized Transient Thermal Impedance vs. Pulse Width

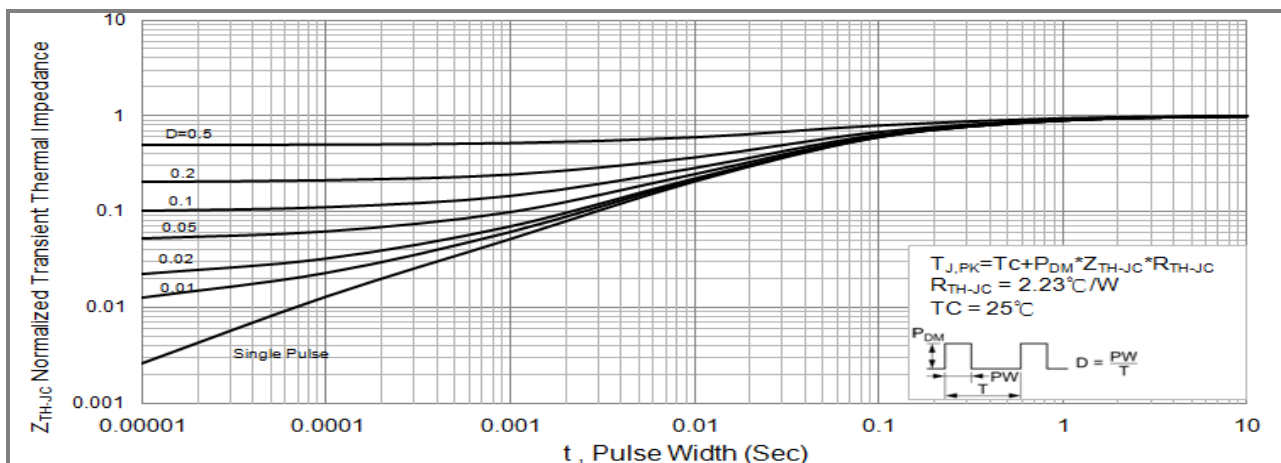


Fig.14 PJF6NA90 Normalized Transient Thermal Impedance vs. Pulse Width

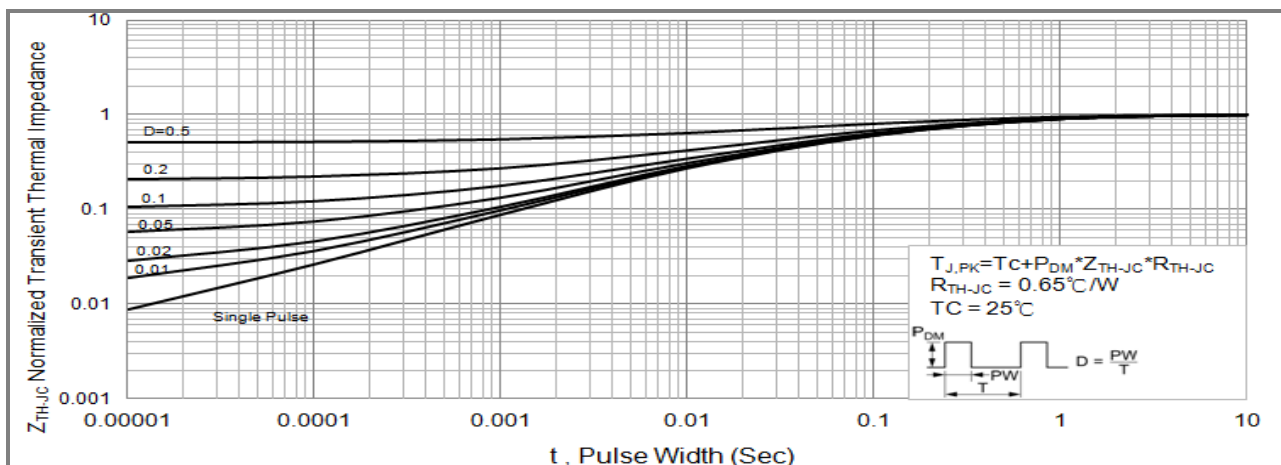
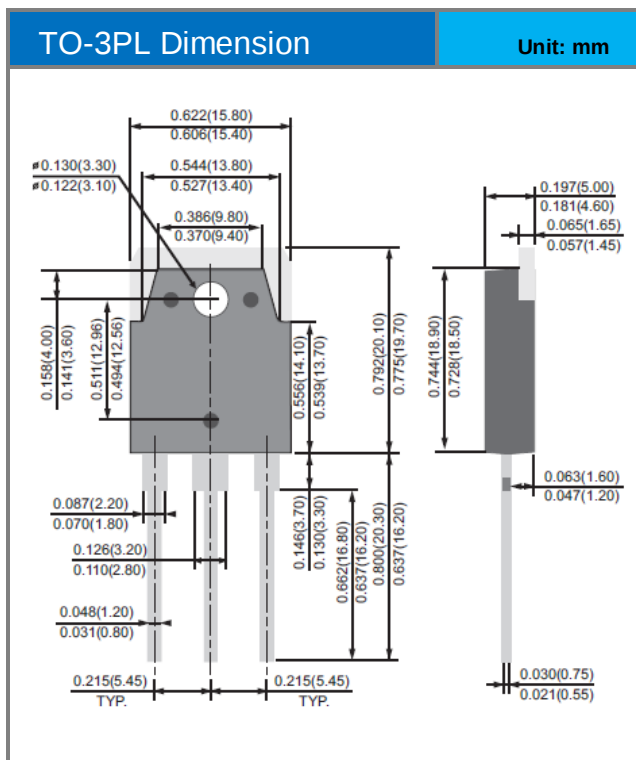
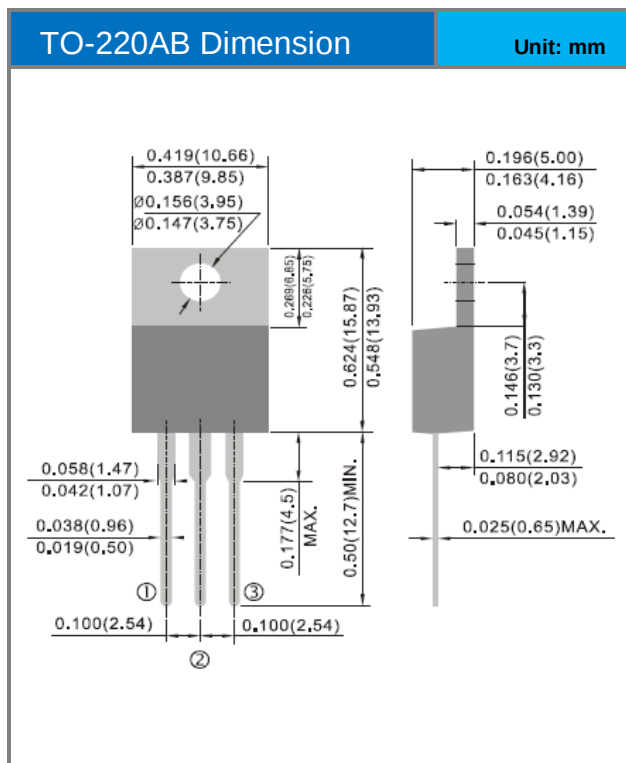
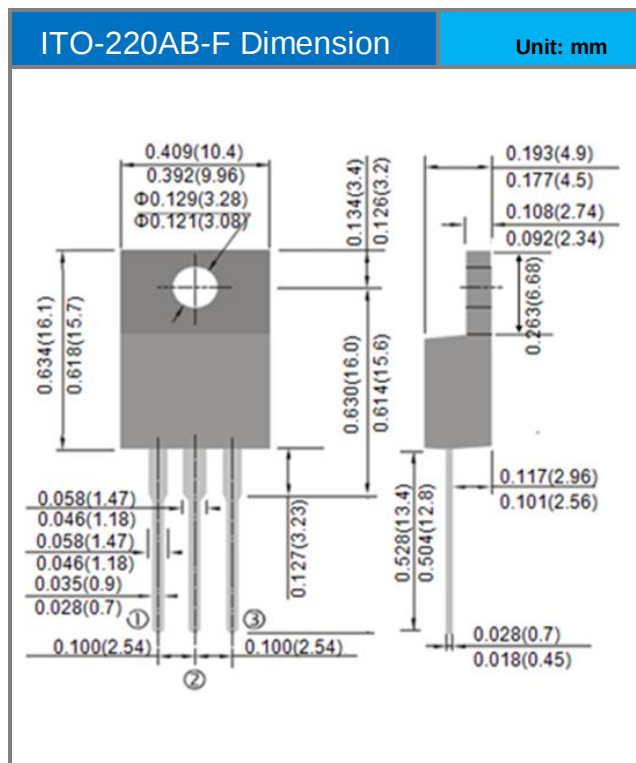


Fig.15 PJZ6NA90 Normalized Transient Thermal Impedance vs. Pulse Width

# PJP6NA90 / PJF6NA90 / PJZ6NA90

## Packaging Information





## PJP6NA90 / PJF6NA90 / PJZ6NA90

### PART NO PACKING CODE VERSION

| Part No Packing Code | Package Type | Packing type | Marking | Version      |
|----------------------|--------------|--------------|---------|--------------|
| PJP6NA90_TO_00001    | TO-220AB     | 50pcs / Tube | P6NA90  | Halogen free |
| PJF6NA90_TO_00001    | ITO-220AB-F  | 50pcs / Tube | F6NA90  | Halogen free |
| PJZ6NA90_TO_10001    | TO-3PL       | 30pcs / Tube | Z6NA90  | Rohs         |



## **PJP6NA90 / PJF6NA90 / PJZ6NA90**

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