

## 600V N-Channel Super Junction MOSFET

|                |               |              |               |
|----------------|---------------|--------------|---------------|
| <b>Voltage</b> | <b>600 V</b>  | <b>Rdson</b> | <b>180 mΩ</b> |
| <b>Current</b> | <b>20.6 A</b> | <b>Qg</b>    | <b>40 nC</b>  |

### Feature:

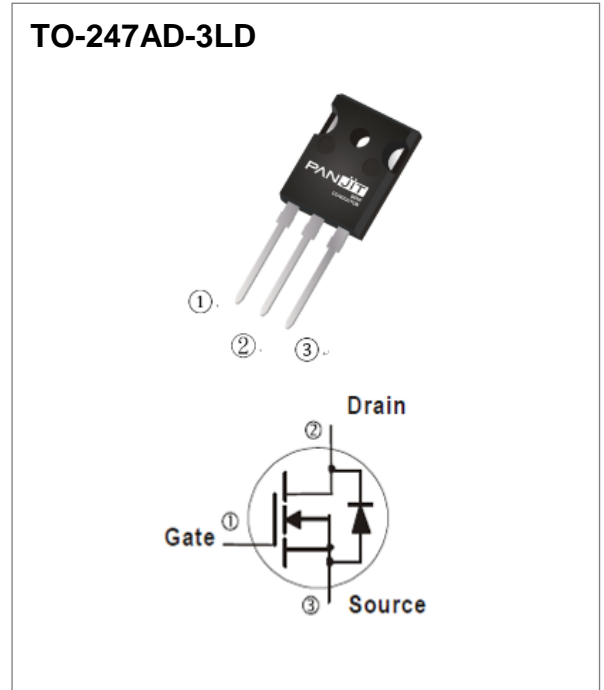
- $R_{DS(ON) Max}$ ,  $V_{GS}@10V$ : 180mΩ
- High Speed Switching and Low  $R_{DS(ON)}$
- 100% Avalanche Tested
- 100% Rg Tested
- Lead free in compliance with EU RoHS 2.0
- Green molding compound as per IEC 61249 standard

### Mechanical Data

- Case: TO-247AD-3LD package
- Terminals: Solderable per MIL-STD-750, Method 2026
- Approx. Weight: 6.231 grams

### Application

- TV Power / Industrial Power / PC ATX Power..



## Absolute Maximum Ratings ( $T_A = 25^\circ\text{C}$ unless otherwise specified)

| PARAMETER  |                         | SYMBOL         | LIMIT    | UNITS            |
|--|-------------------------|----------------|----------|------------------|
| Drain-Source Voltage @ $T_{jmax}$                |                         | $V_{DS}$       | 650      | V                |
| Drain-Source Voltage                             |                         | $V_{DS}$       | 600      |                  |
| Gate-Source Voltage                              |                         | $V_{GS}$       | $\pm 30$ |                  |
| Continuous Drain Current                         | $T_C=25^\circ\text{C}$  | $I_D$          | 20.6     | A                |
|  | $T_C=100^\circ\text{C}$ |                | 13       |                  |
| Pulsed Drain Current (Note 1)                    |                         | $I_{DM}$       | 62       | A                |
| Single Pulse Avalanche Energy                    |                         | $E_{AS}$       | 420      | mJ               |
| MOSFET dv/dt ruggedness                          |                         | dv/dt          | 50       | V/ns             |
| Power Dissipation                                | $T_C=25^\circ\text{C}$  | $P_D$          | 160      | W                |
|  | $T_C=100^\circ\text{C}$ |                | 64       |                  |
| Operating Junction and Storage Temperature Range |                         | $T_J, T_{STG}$ | -55~150  | $^\circ\text{C}$ |

### Thermal Characteristics

| PARAMETER          |                     | SYMBOL          | MAXIMUM | UNITS                     |
|--------------------|---------------------|-----------------|---------|---------------------------|
| Thermal Resistance | Junction-to-Case    | $R_{\theta JC}$ | 0.71    | $^\circ\text{C}/\text{W}$ |
|                    | Junction-to-Ambient | $R_{\theta JA}$ | 50      | $^\circ\text{C}/\text{W}$ |

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

| 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  | 600  | -    | -    | V     |
| Gate Threshold Voltage  | V <sub>GS(th)</sub> | V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =250uA  | 2.8  | -    | 3.8  |       |
| Drain-Source On-State Resistance                                | R <sub>DS(on)</sub> | V <sub>GS</sub> =10V, I <sub>D</sub> =9.5A <sup>(Note 1)</sup>  | -    | 155  | 180  | mΩ    |
| Zero Gate Voltage Drain Current                                 | I <sub>DSS</sub>    | V <sub>DS</sub> =600V, V <sub>GS</sub> =0V  | -    | -    | 1    | uA    |
| Gate-Source Leakage Current                                     | I <sub>GSS</sub>    | V <sub>GS</sub> =±30V, V <sub>DS</sub> =0V  | -    | -    | ±100 | nA    |
| Transfer characteristics  | gfs                 | V <sub>DS</sub> =20V, I <sub>D</sub> =20A   | -    | 18   | -    | S     |
| <b>Dynamic</b> <sup>(Note 3)</sup>                              |                     |   |      |      |      |       |
| Total Gate Charge   | Q <sub>g</sub>      | V <sub>DS</sub> =480V, I <sub>D</sub> =20A,<br>V <sub>GS</sub> =10V   | -    | 40   | -    | nC    |
| Gate-Source Charge  | Q <sub>gs</sub>     |   | -    | 9    | -    |       |
| Gate-Drain Charge   | Q <sub>gd</sub>     |   | -    | 17   | -    |       |
| Input Capacitance   | C <sub>iss</sub>    | V <sub>DS</sub> =400V, V <sub>GS</sub> =0V,<br>f=250kHz   | -    | 1410 | -    | pF    |
| Output Capacitance  | C <sub>oss</sub>    |   | -    | 50   | -    |       |
| Reverse Transfer Capacitance                                    | C <sub>rss</sub>    |   | -    | 13   | -    |       |
| Effective Output Capacitance Energy Related <sup>(Note 3)</sup> | C <sub>o(er)</sub>  | V <sub>DS</sub> =0V to 480V,<br>V <sub>GS</sub> =0V, f=250kHz<br><sup>(Note 3)</sup>                            | -    | 68   | -    |       |
| Turn-On Delay Time  | t <sub>d(on)</sub>  | V <sub>DD</sub> =300V, I <sub>D</sub> =20A,<br>V <sub>GS</sub> =10V, R <sub>G</sub> =25Ω<br><sup>(Note 3)</sup> | -    | 51   | -    | ns    |
| Turn-On Rise Time   | t <sub>r</sub>      |   | -    | 81   | -    |       |
| Turn-Off Delay Time   | t <sub>d(off)</sub> |   | -    | 174  | -    |       |
| Turn-Off Fall Time  | t <sub>f</sub>      |   | -    | 78   | -    |       |
| Gate Resistance   | R <sub>g</sub>      | f=1.0MHz  | -    | 8    | -    | Ω     |
| <b>Drain-Source Diode</b>                                       |                     |   |      |      |      |       |
| Maximum Continuous Drain-Source Diode Forward Current           | I <sub>S</sub>      |   | -    | -    | 20.6 | A     |
| Diode Forward Voltage   | V <sub>SD</sub>     | I <sub>S</sub> =20A, V <sub>GS</sub> =0V  | -    | -    | 1.4  | V     |
| Reverse Recovery Charge   | Q <sub>rr</sub>     | I <sub>S</sub> =20A   | -    | 6.5  | -    | μC    |
| Reverse Recovery Time   | T <sub>rr</sub>     | di/dt=100A/μs   | -    | 380  | -    | ns    |

### NOTES :

1. Pulse width ≤ 300us, Duty cycle ≤ 2%
2. C<sub>o(er)</sub> is a capacitance that gives the same stored energy as C<sub>oss</sub> while V<sub>DS</sub> is rising from 0V to 80% V<sub>(BR)DSS</sub>
3. Guaranteed by design, not subject to production testing

TYPICAL CHARACTERISTIC CURVES

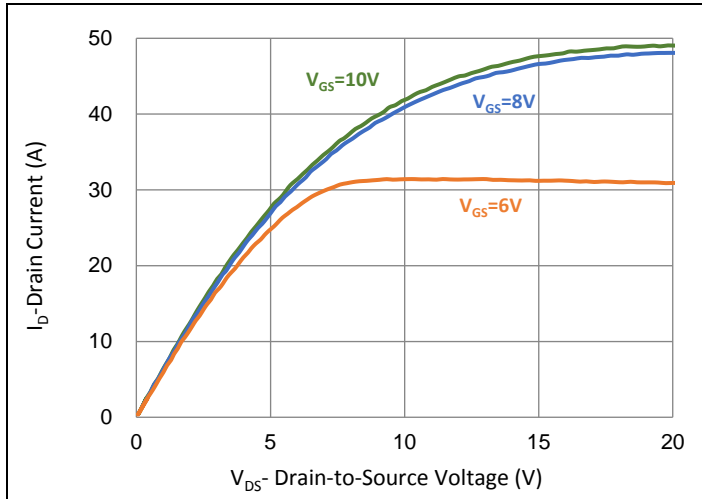


Fig.1 Output Characteristics

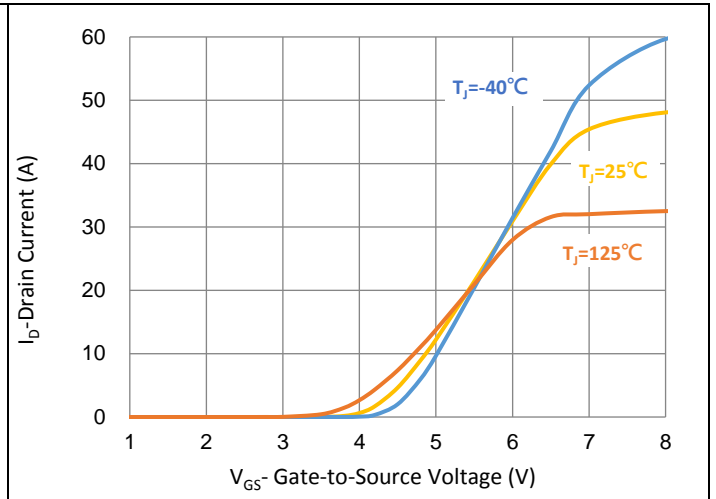


Fig.2 Transfer Characteristics

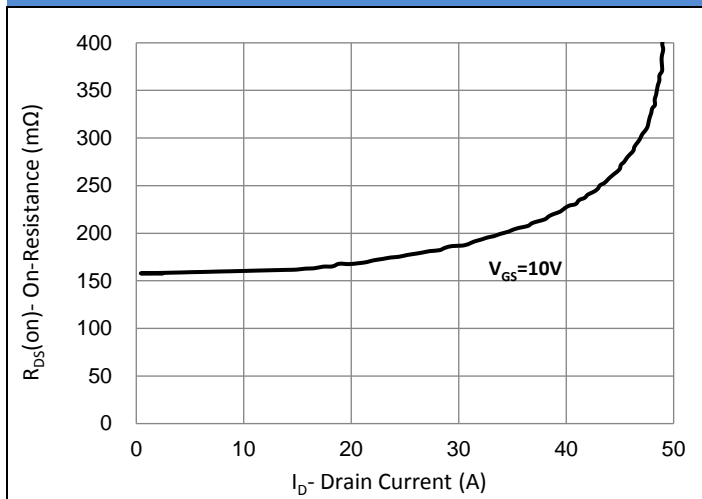


Fig.3 On-Resistance vs. Drain Current

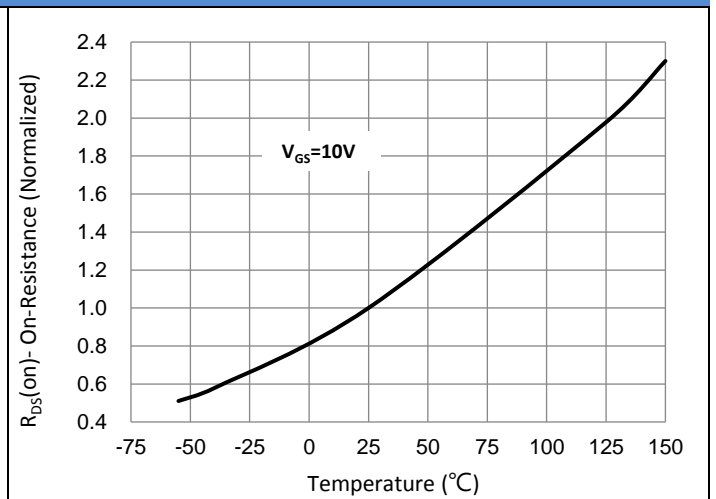


Fig.4 On-Resistance vs. Junction Temperature

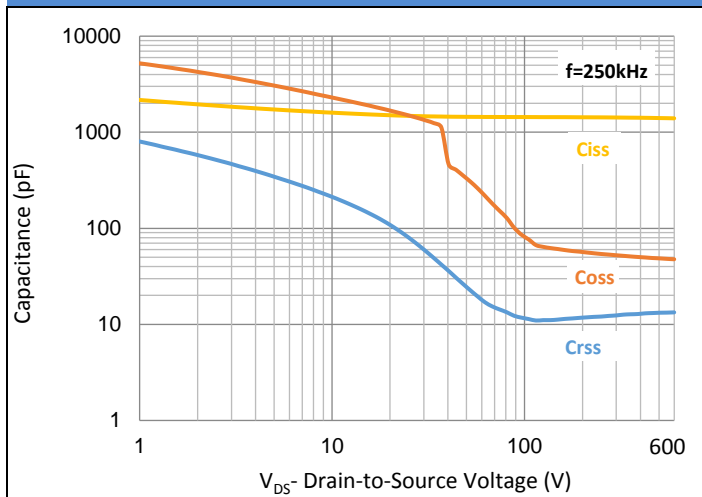


Fig.5 Capacitance vs. Drain-Source Voltage

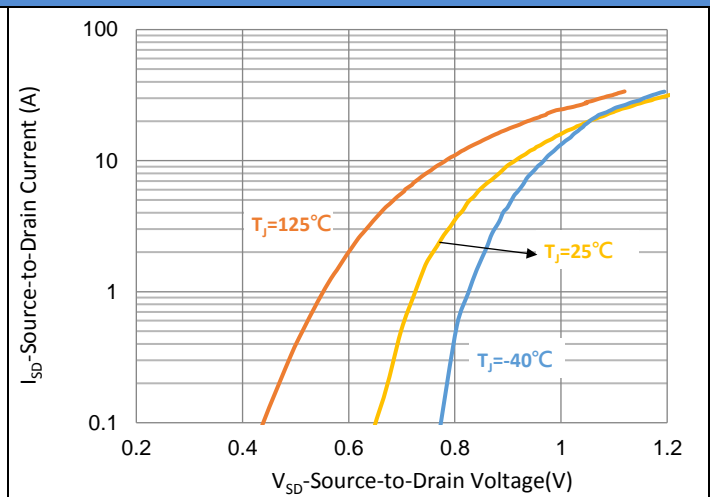


Fig.6 Source-Drain Diode Forward Voltage

TYPICAL CHARACTERISTIC CURVES

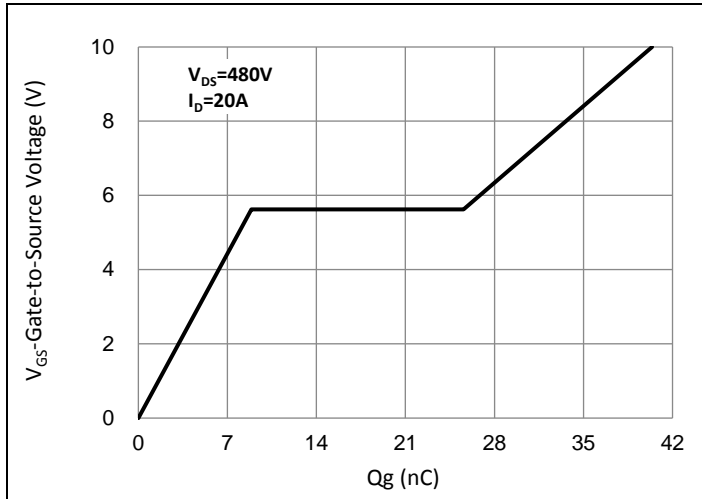


Fig.7 Gate-Charge Characteristics

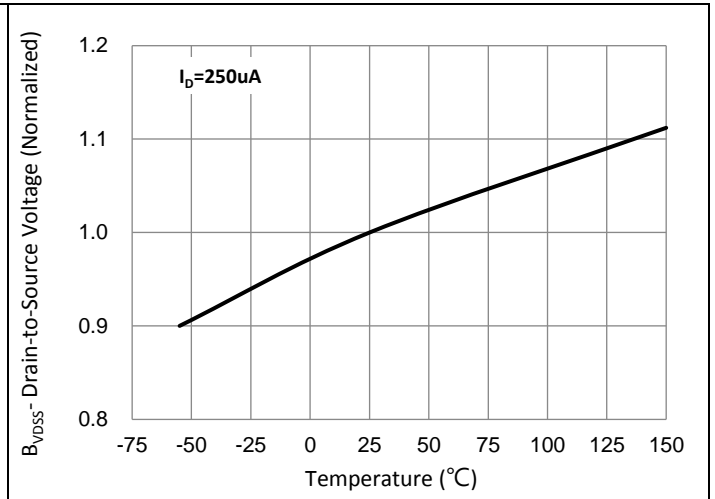


Fig.8 Breakdown Voltage Variation vs. Temperature

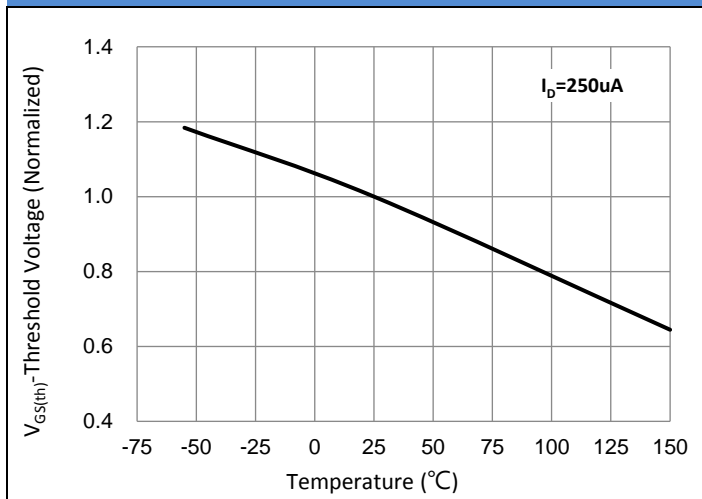


Fig.9 Threshold Voltage Variation with Temperature

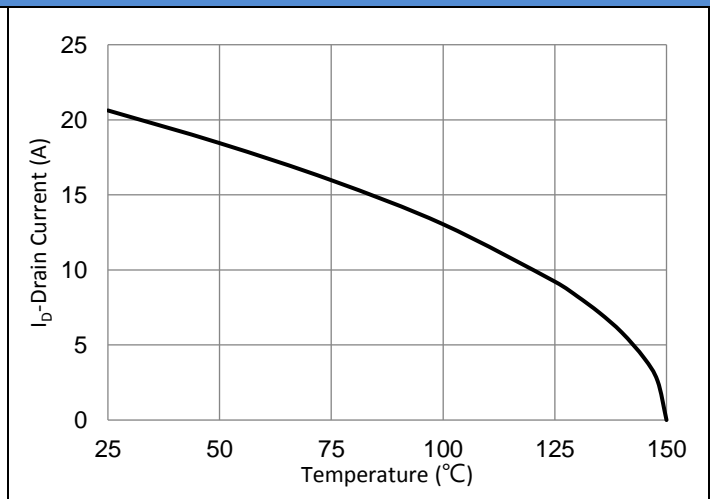


Fig.10 Drain Current vs. Case Temperature

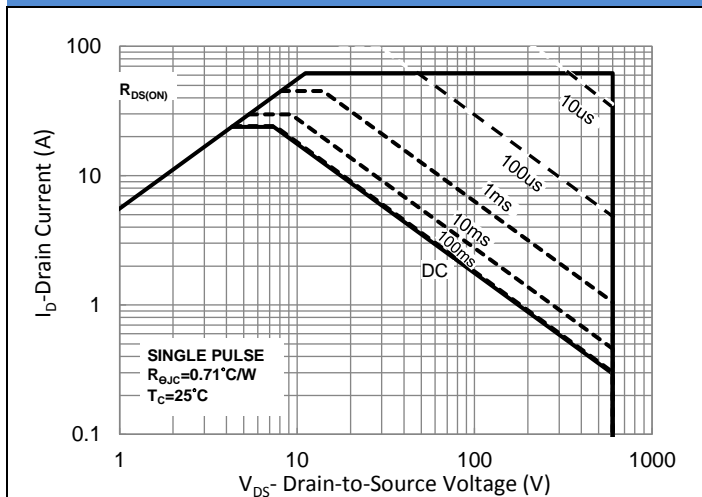


Fig.11 Maximum Safe Operating Area

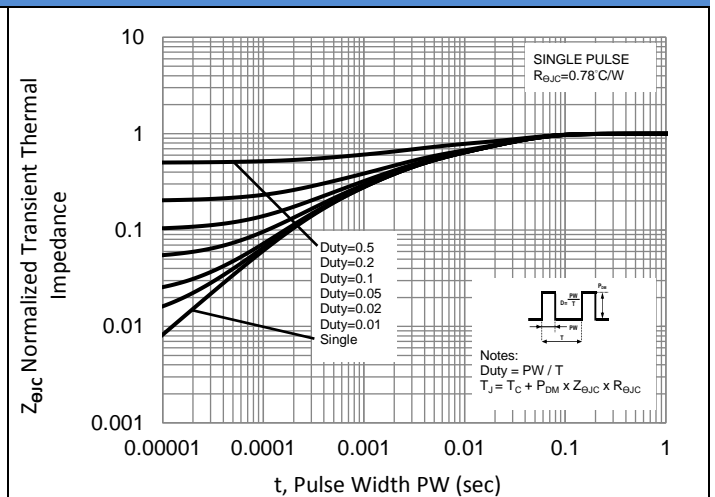
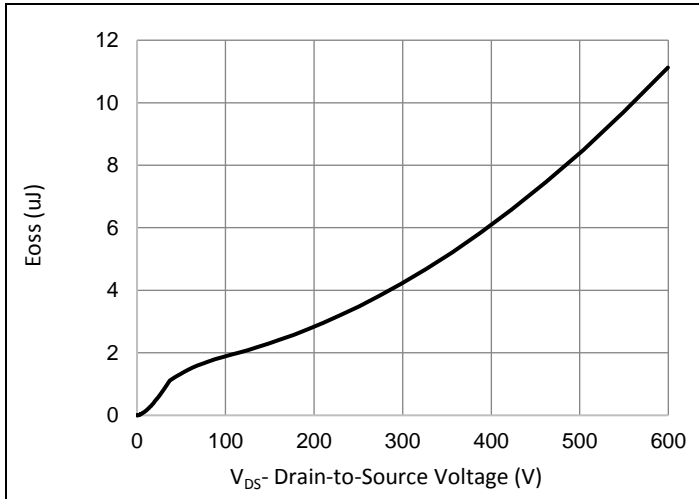


Fig.12 Normalized Transient Thermal Impedance

## TYPICAL CHARACTERISTIC CURVES

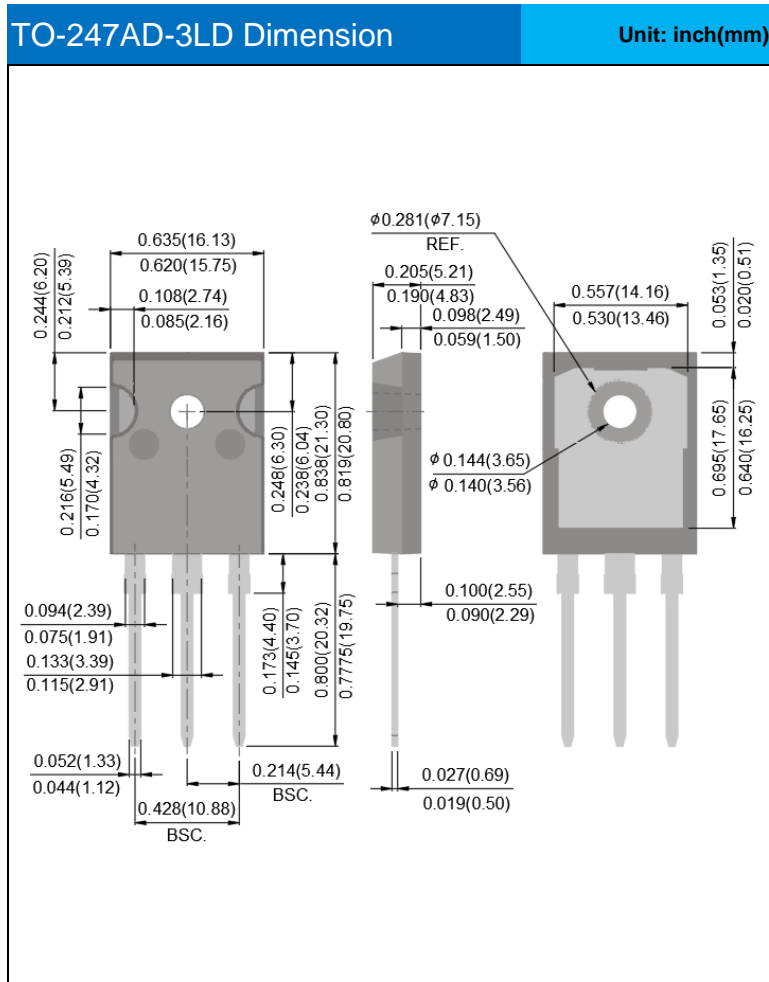


**Fig.13 Typ. Coss Stored Energy**

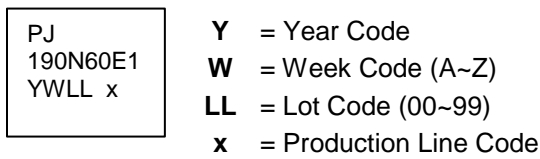
**Product and Packing Information:**

| Part No.     | Package Type | Packing Type | Marking  |
|--------------|--------------|--------------|----------|
| PJMH190N60E1 | TO-247AD-3LD | 30pcs / Tube | 190N60E1 |

**Packaging Information**



**Marking Diagram**



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