

100V N-Channel Enhancement Mode MOSFET

| | | | |
|----------------|--------------|------------------------------------|--------------------------------------|
| Voltage | 100 V | $R_{DS(ON),max}$ | < 5.0 mΩ |
| Current | 120 A | Q_G (TYP) | 40.5 nC |

Feature

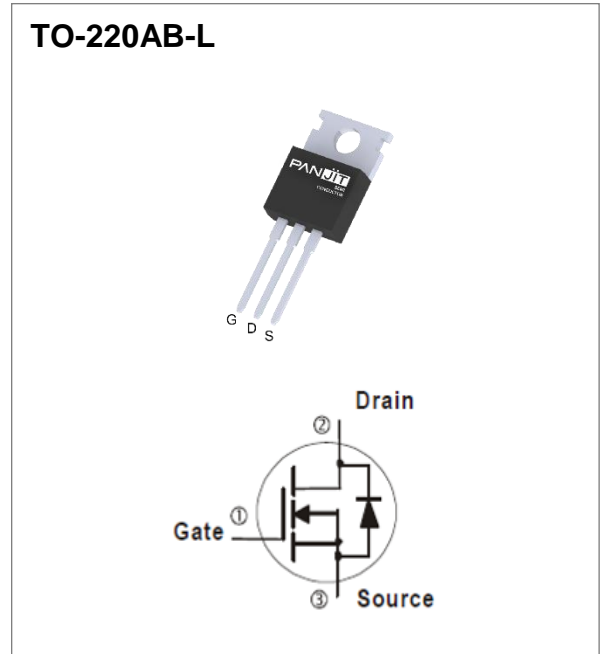
- $R_{DS(ON),max}$ < 5.0 m Ω at $V_{GS} = 10$ V, $I_D = 50$ A
- $R_{DS(ON),max}$ < 7.0 m Ω at $V_{GS} = 6$ V, $I_D = 25$ A
- High switching speed
- Low reverse transfer capacitance
- Lead free in compliance with EU RoHS 2.0
- Green molding compound as per IEC 61249 standard

Mechanical Data

- Case: TO-220AB-L package
- Terminals: Solderable per MIL-STD-750, Method 2026
- Approx. Weight: 2.0948 grams

Application

- SR solutions of Power supply, BMS, BLDC motor driver switch



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

| PARAMETER | | SYMBOL | LIMIT | UNITS |
|--|---------------------------|----------------|----------|------------------|
| Drain-Source Voltage | | V_{DS} | 100 | V |
| Gate-Source Voltage | | V_{GS} | ± 20 | |
| Continuous Drain Current (Note 3) | $T_C = 25^\circ\text{C}$ | I_D | 120 | A |
| | $T_C = 100^\circ\text{C}$ | | 76 | |
| Pulsed Drain Current (Note 6) | | I_{DM} | 480 | A |
| Single Pulse Avalanche Current (Note 5) | | I_{AS} | 50 | A |
| Single Pulse Avalanche Energy (Note 5) | | E_{AS} | 318 | mJ |
| Power Dissipation | $T_C = 25^\circ\text{C}$ | P_D | 138 | W |
| | $T_C = 100^\circ\text{C}$ | | 55 | |
| 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 (Bottom) | $R_{\theta JC}$ | 0.9 | $^\circ\text{C/W}$ |
| | Junction-to-Ambient (Note.4) | $R_{\theta JA}$ | 60 | $^\circ\text{C/W}$ |

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

| PARAMETER | SYMBOL | TEST CONDITION | MIN. | TYP. | MAX. | UNITS |
|--|---------------|---|------|------|-----------|---------------|
| Static | | | | | | |
| Drain-Source Breakdown Voltage | BV_{DSS} | $V_{GS}=0\text{ V}, I_D=250\text{ }\mu\text{A}$ | 100 | - | - | V |
| Gate Threshold Voltage | $V_{GS(th)}$ | $V_{DS}=V_{GS}, I_D=270\text{ }\mu\text{A}$ | 1.8 | 2.8 | 3.8 | |
| Drain-Source On-State Resistance (Note 1) | $R_{DS(on)}$ | $V_{GS}=10\text{ V}, I_D=50\text{ A}$ | - | 4.3 | 5.0 | m Ω |
| | | $V_{GS}=6\text{ V}, I_D=25\text{ A}$ | - | 5.4 | 7.0 | |
| Zero Gate Voltage Drain Current | I_{DSS} | $V_{DS}=100\text{ V}, V_{GS}=0\text{ V}$ | - | - | 1 | μA |
| Gate-Source Leakage Current | I_{GSS} | $V_{GS}=\pm 20\text{ V}, V_{DS}=0\text{ V}$ | - | - | ± 100 | nA |
| Transfer characteristics (Note 1) | g_{fs} | $V_{DS}=10\text{ V}, I_D=50\text{ A}$ | - | 100 | - | S |
| Gate Resistance | R_g | $f = 1.0\text{ MHz}$ | - | 0.8 | 1.6 | Ω |
| Dynamic (Note 6) | | | | | | |
| Total Gate Charge | Q_g | $V_{DS}=50\text{ V}, I_D=50\text{ A},$ $V_{GS}=10\text{ V}$ | - | 40.5 | 53 | nC |
| Gate-Source Charge | Q_{gs} | | - | 15 | - | |
| Gate-Drain Charge | Q_{gd} | | - | 6 | - | |
| Gate Plateau Voltage | $V_{plateau}$ | | - | 5 | - | V |
| Input Capacitance | C_{iss} | $V_{DS}=50\text{ V}, V_{GS}=0\text{ V},$ $f=250\text{ kHz}$ | - | 3010 | 3910 | pF |
| Output Capacitance | C_{oss} | | - | 1080 | 1400 | |
| Reverse Transfer Capacitance | C_{riss} | | - | 14 | - | |
| Output Charge | Q_{oss} | $V_{DS}=50\text{ V}, V_{GS}=0\text{ V}$ | - | 85 | 110 | nC |
| Turn-On Delay Time | $t_{d(on)}$ | $V_{DD}=50\text{ V}, I_D=50\text{ A},$ $V_{GS}=10\text{ V}, R_G=3.0\text{ }\Omega$ (Note 2) | - | 16 | - | ns |
| Rise Time | t_r | | - | 6 | - | |
| Turn-Off Delay Time | $t_{d(off)}$ | | - | 26 | - | |
| Fall Time | t_f | | - | 6 | - | |
| Drain-Source Diode | | | | | | |
| Diode Forward Voltage | V_{SD} | $I_S=50\text{ A}, V_{GS}=0\text{ V}$ | - | 0.9 | 1.2 | V |
| Reverse Recovery Charge (Note 6) | Q_{rr} | $I_F=50\text{ A}, V_{DD}=50\text{ V}$ $di/dt=100\text{ A}/\mu\text{s}$ | - | 85 | 170 | nC |
| Reverse Recovery Time (Note 6) | T_{rr} | | - | 56 | 112 | ns |

NOTES :

1. Pulse width $\leq 300\text{ }\mu\text{s}$, Duty cycle $\leq 2\%$
2. Essentially independent of operating temperature typical characteristics.
3. The maximum drain current calculated by maximum junction temperature and thermal impedance. It can be varied by application and environment.
4. $R_{\theta JA}$ 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 inch² with 2oz.square pad of copper.
5. E_{AS} is calculated based on the condition of $L = 1.0\text{ mH}$, $I_{AS} = 25.2\text{ A}$, $V_{DD} = 50\text{ V}$, $V_{GS} = 10\text{ V}$. 100% test at $L = 0.1\text{ mH}$, $I_{AS} = 50\text{ A}$ in production.
6. Guaranteed by design, not subject to production testing.

TYPICAL CHARACTERISTIC CURVES

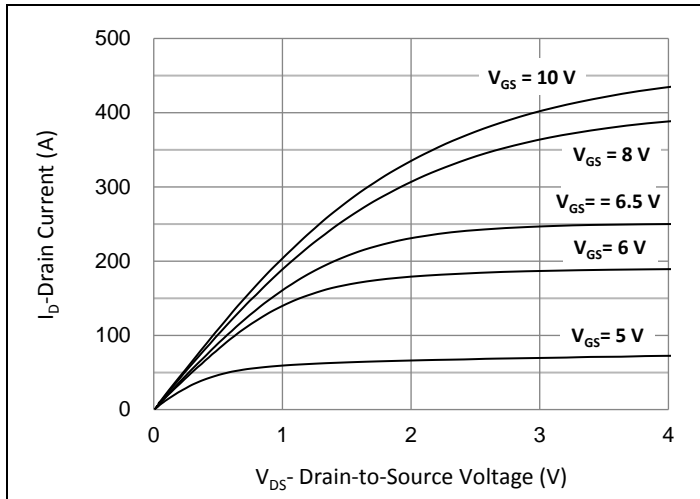


Fig.1 Output Characteristics

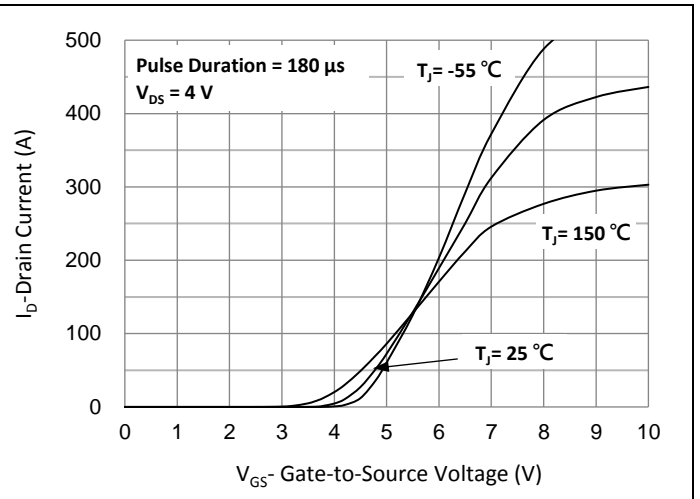


Fig.2 Transfer Characteristics

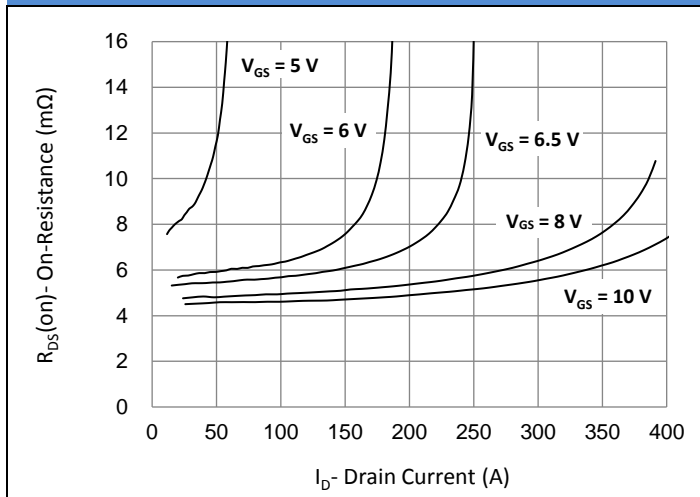


Fig.3 On-Resistance vs. Drain Current

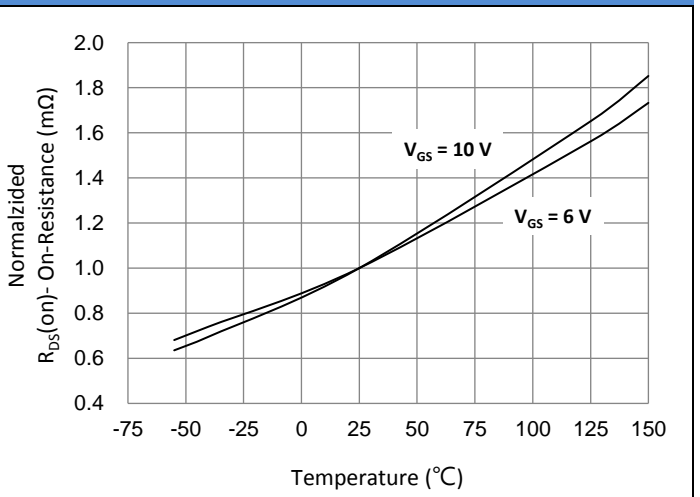


Fig.4 On-Resistance vs. Junction temperature

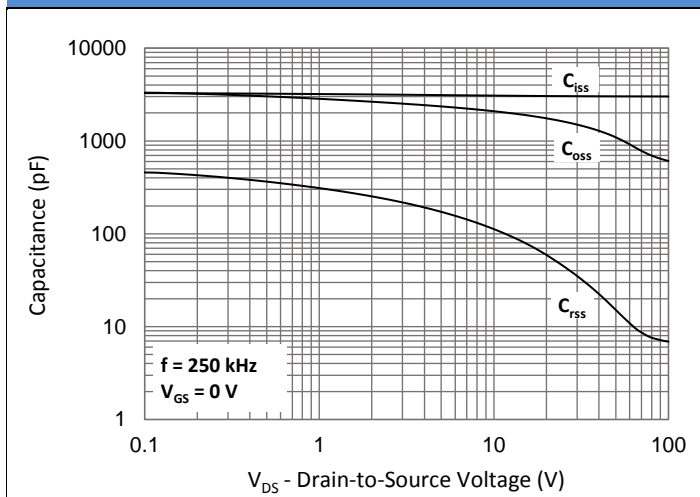


Fig.5 Capacitance vs. Drain-Source Voltage

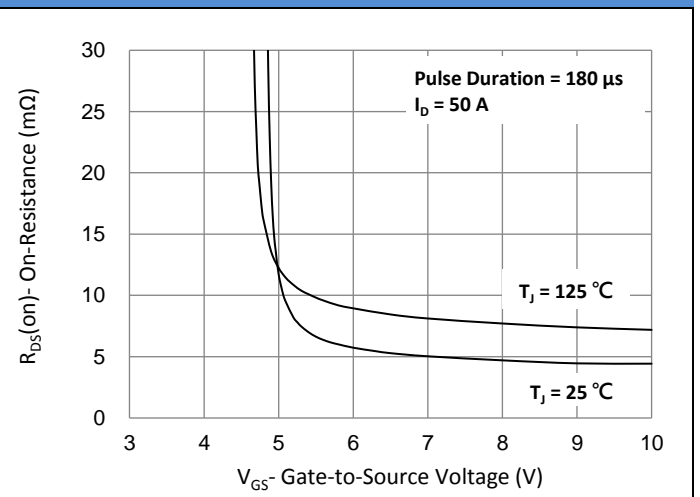


Fig.6 On-Resistance vs. Gate-Source Voltage

TYPICAL CHARACTERISTIC CURVES

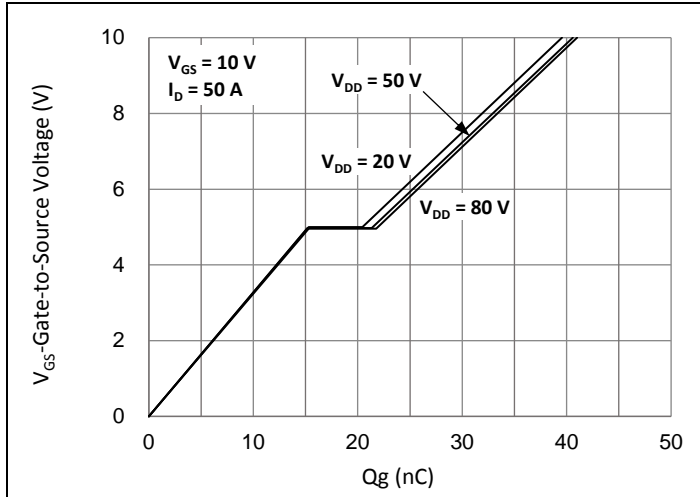


Fig.7 Gate-Charge Characteristics

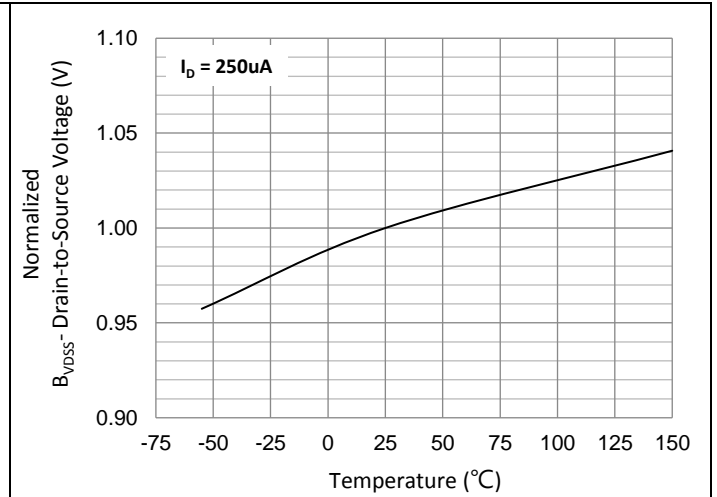


Fig.8 Breakdown Voltage Variation vs. Temperature

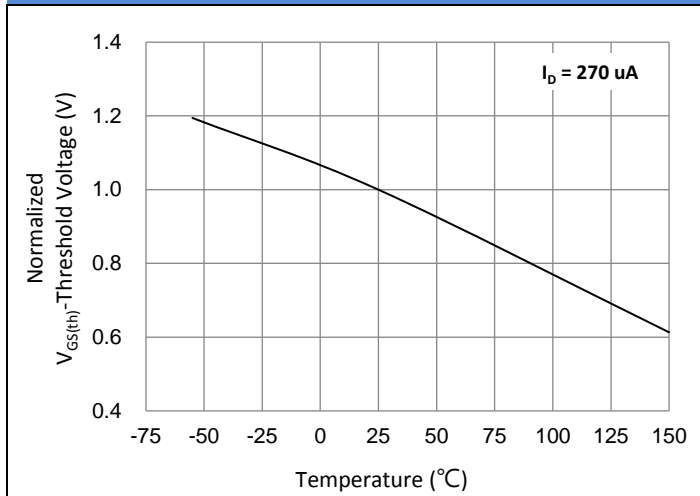


Fig.9 Threshold Voltage Variation with Temperature

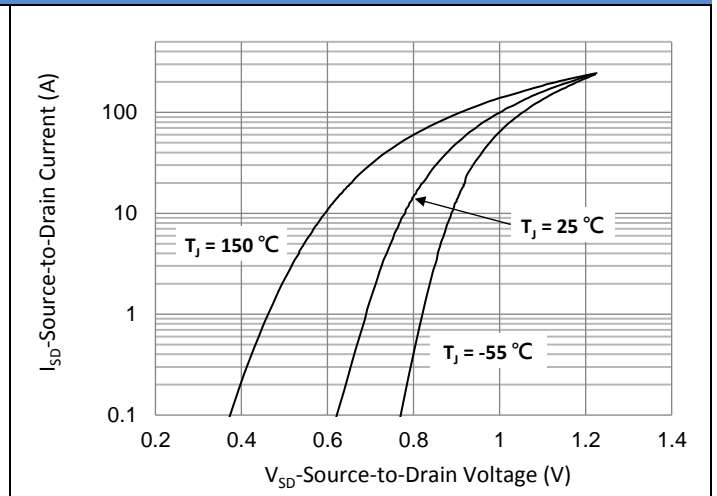


Fig.10 Source-Drain Diode Forward Voltage

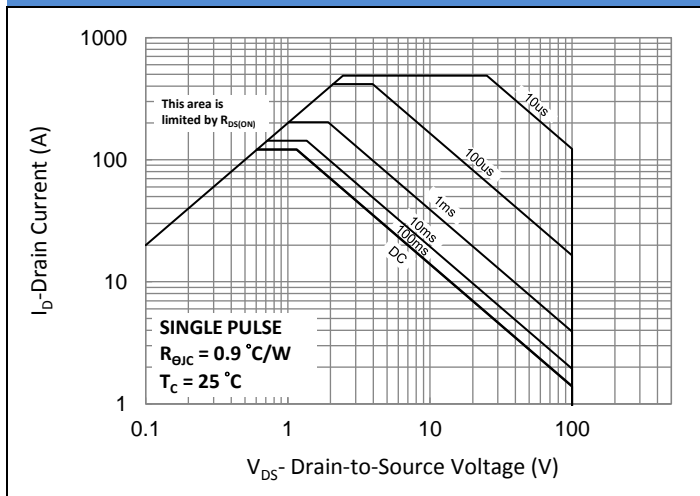


Fig.11 Maximum Safe Operating Area

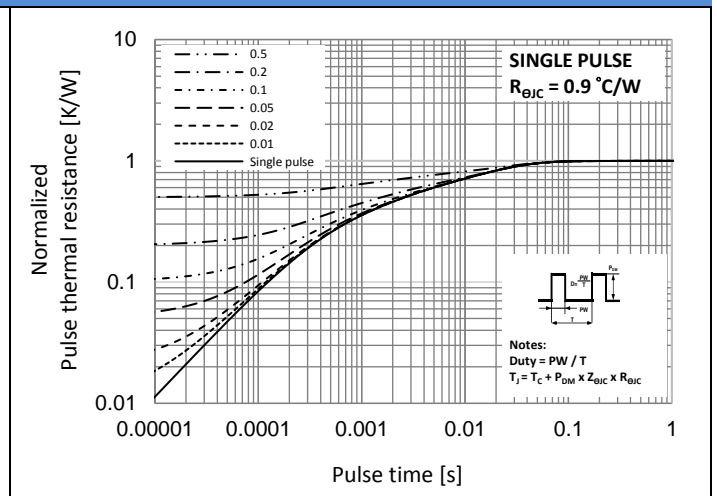


Fig.12 Normalized Transient Thermal Impedance

TYPICAL CHARACTERISTIC CURVES

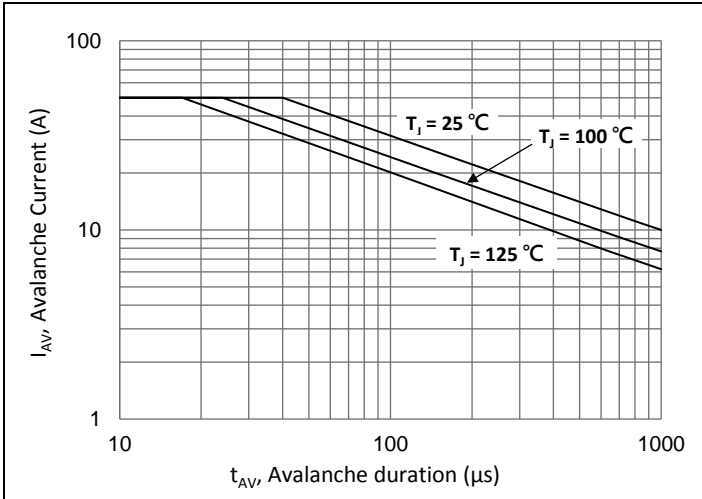


Fig.13 Avalanche Characteristics

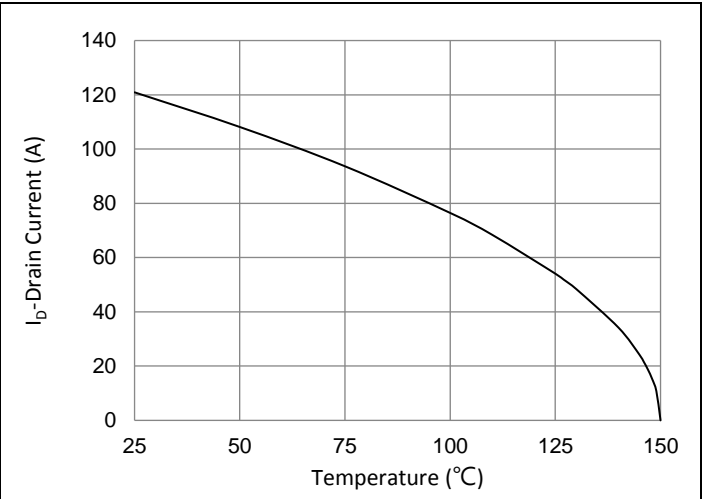
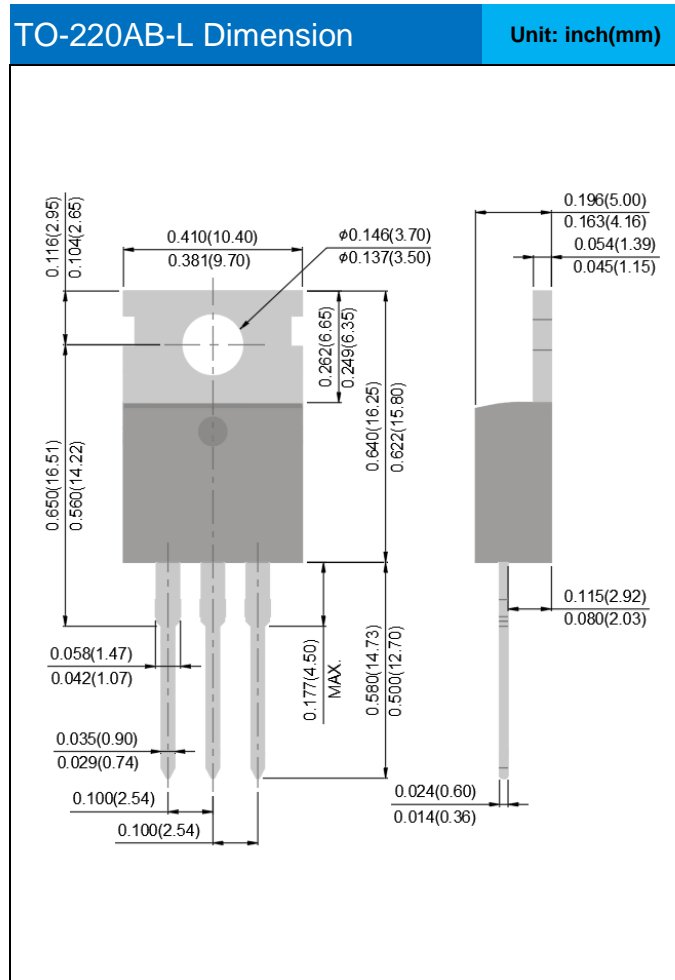


Fig.14 Drain Current vs. Case Temperature

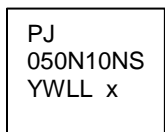
Product and Packing Information

| Part No. | Package Type | Packing Type | Marking |
|---------------|--------------|--------------|----------|
| PSMP050N10NS2 | TO-220AB-L | 50pcs / Tube | 050N10NS |

Packaging Information



Marking Diagram



- Y** = Year Code
- W** = Week Code (A~Z)
- LL** = Lot Code (00~99)
- x** = Production Line Code

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