

**100V N-Channel Enhancement Mode MOSFET**

|                |              |                               |               |
|----------------|--------------|-------------------------------|---------------|
| <b>Voltage</b> | <b>100 V</b> | <b>R<sub>DS(on),max</sub></b> | <b>3.9 mΩ</b> |
| <b>Current</b> | <b>126 A</b> | <b>Q<sub>G</sub> (TYP)</b>    | <b>46 nC</b>  |

**Feature**

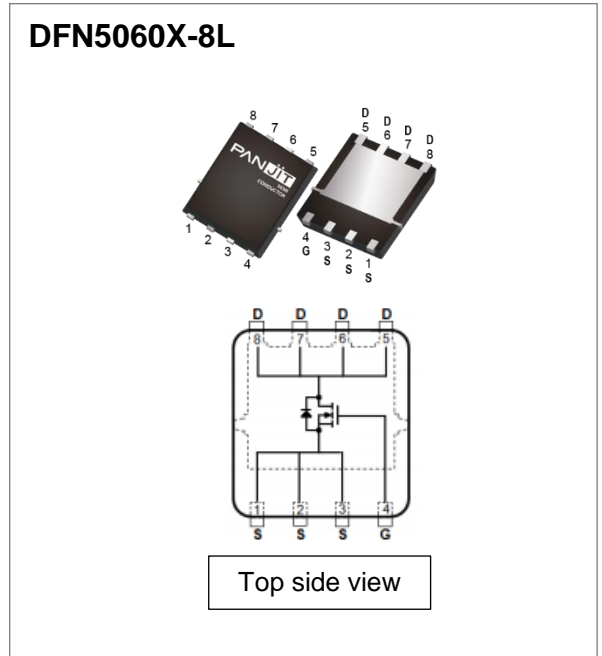
- R<sub>DS(ON),max</sub> < 3.9 mΩ at V<sub>GS</sub> = 10 V, I<sub>D</sub> = 60 A
- R<sub>DS(ON),max</sub> < 5.9 mΩ at V<sub>GS</sub> = 6 V, I<sub>D</sub> = 30 A
- High switching speed
- Low reverse transfer capacitance
- Lead free in compliance with EU RoHS 2.0
- Green molding compound as per IEC 61249 standard

**Mechanical Data**

- Case: DFN5060X-8L Package
- Terminals: Solderable per MIL-STD-750, Method 2026
- Approx. Weight: 0.087 grams

**Application**

- SR solutions of PD Charger, Brick Power, 48V DC/DC converter



**Absolute Maximum Ratings** (T<sub>A</sub> = 25 °C unless otherwise specified)

| PARAMETER  |                        | SYMBOL                           | LIMIT   | UNITS |
|--|------------------------|----------------------------------|---------|-------|
| Drain-Source Voltage                             |                        | V <sub>DS</sub>                  | 100     | V     |
| Gate-Source Voltage                              |                        | V <sub>GS</sub>                  | ±20     |       |
| Continuous Drain Current (Note 3)                | T <sub>C</sub> =25 °C  | I <sub>D</sub>                   | 126     | A     |
|  | T <sub>C</sub> =100 °C |                                  | 89      |       |
| Pulsed Drain Current (Note 6)                    | T <sub>C</sub> =25 °C  | I <sub>DM</sub>                  | 504     | A     |
| Single Pulse Avalanche Current (Note 5)          |                        | I <sub>AS</sub>                  | 54      | A     |
| Single Pulse Avalanche Energy (Note 5)           |                        | E <sub>AS</sub>                  | 145     | mJ    |
| Power Dissipation                                | T <sub>C</sub> =25 °C  | P <sub>D</sub>                   | 125     | W     |
|  | T <sub>C</sub> =100 °C |                                  | 62.5    |       |
| Operating Junction and Storage Temperature Range |                        | T <sub>J</sub> ,T <sub>STG</sub> | -55~175 | °C    |

**Thermal Characteristics**

| PARAMETER          | SYMBOL                       | VALUES           |      |      | UNITS |      |
|--------------------|------------------------------|------------------|------|------|-------|------|
|                    |                              | MIN.             | TYP. | MAX. |       |      |
| Thermal Resistance | Junction-to-Case (Bottom)    | R <sub>θJC</sub> | -    | 0.8  | 1.2   | °C/W |
|                    | Junction-to-Ambient (Note 4) | R <sub>θJA</sub> | -    | -    | 50    | °C/W |

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

| PARAMETER                                 | SYMBOL        | TEST CONDITION   | MIN. | TYP. | MAX.      | UNITS         |
|---|---------------|--|------|------|-----------|---------------|
| <b>Static Characteristics</b>             |               |  |      |      |           |               |
| Drain-Source Breakdown Voltage            | $BV_{DSS}$    | $V_{GS}=0\text{ V}, I_D=250\text{ }\mu\text{A}$  | 100  | -    | -         | V             |
| Gate Threshold Voltage                    | $V_{GS(th)}$  | $V_{DS}=V_{GS}, I_D=300\text{ }\mu\text{A}$  | 1.8  | 2.8  | 3.8       |               |
| Drain-Source On-State Resistance (Note 1) | $R_{DS(on)}$  | $V_{GS}=10\text{ V}, I_D=60\text{ A}$  | -    | 3.5  | 3.9       | m $\Omega$    |
|   |               | $V_{GS}=6\text{ V}, I_D=30\text{ A}$   | -    | 4.5  | 5.9       |               |
| Zero Gate Voltage Drain Current           | $I_{DSS}$     | $V_{DS}=100\text{ V}, V_{GS}=0\text{ V}$   | -    | -    | 2         | $\mu\text{A}$ |
| Gate-Source Leakage Current               | $I_{GSS}$     | $V_{GS}=\pm 20\text{ V}, V_{DS}=0\text{ V}$  | -    | -    | $\pm 100$ | nA            |
| Transfer characteristics (Note 1)         | $g_{fs}$      | $V_{DS}=10\text{ V}, I_D=60\text{ A}$  | -    | 110  | -         | S             |
| <b>Dynamic Characteristics</b> (Note 6)   |               |  |      |      |           |               |
| Total Gate Charge                         | $Q_g$         | $V_{DS}=50\text{ V}, I_D=60\text{ A}, V_{GS}=10\text{ V}$                                    | -    | 46   | 60        | nC            |
| Gate-Source Charge                        | $Q_{gs}$      |  | -    | 16   | -         |               |
| Gate-Drain Charge                         | $Q_{gd}$      |  | -    | 7.0  | -         |               |
| Gate Plateau Voltage                      | $V_{plateau}$ |  | -    | 4.5  | -         | V             |
| Input Capacitance                         | $C_{iss}$     | $V_{DS}=50\text{ V}, V_{GS}=0\text{ V}, f=250\text{ kHz}$                                    | -    | 3110 | 4040      | pF            |
| Output Capacitance                        | $C_{oss}$     |  | -    | 1220 | 1590      |               |
| Reverse Transfer Capacitance              | $C_{rss}$     |  | -    | 19   | -         |               |
| Output Charge                             | $Q_{oss}$     | $V_{DS}=50\text{ V}, V_{GS}=0\text{ V}$  | -    | 93   | 121       | nC            |
| Turn-On Delay Time                        | $t_{d(on)}$   | $V_{DD}=50\text{ V}, I_D=60\text{ A}, V_{GS}=10\text{ V}, R_G=1.8\text{ }\Omega$<br>(Note 2) | -    | 15.3 | -         | ns            |
| Rise Time                                 | $t_r$         |  | -    | 8.7  | -         |               |
| Turn-Off Delay Time                       | $t_{d(off)}$  |  | -    | 24   | -         |               |
| Fall Time                                 | $t_f$         |  | -    | 5.4  | -         |               |
| Gate Resistance                           | $R_g$         | $f=1.0\text{ MHz}$   | -    | 0.4  | 0.8       | $\Omega$      |
| <b>Drain-Source Diode</b>                 |               |  |      |      |           |               |
| Diode Forward Voltage                     | $V_{SD}$      | $I_S=60\text{ A}, V_{GS}=0\text{ V}$   | -    | 0.9  | 1.2       | V             |
| Reverse Recovery Charge                   | $Q_{rr}$      | $I_F=60\text{ A}, V_{DD}=50\text{ V}, di/dt=100\text{ A}/\mu\text{s}$                        | -    | 180  | -         | nC            |
| Reverse Recovery Time                     | $T_{rr}$      |  | -    | 89   | -         | 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 inch<sup>2</sup> with 2oz.square pad of copper.
5.  $E_{AS}$  is calculated based on the condition of  $L = 0.1\text{ mH}$ ,  $I_{AS} = 54\text{ A}$ ,  $V_{DD} = 50\text{ V}$ ,  $V_{GS} = 10\text{ V}$  and 100% test in production.
6. Guaranteed by design, not subject to production testing.

TYPICAL CHARACTERISTIC CURVES

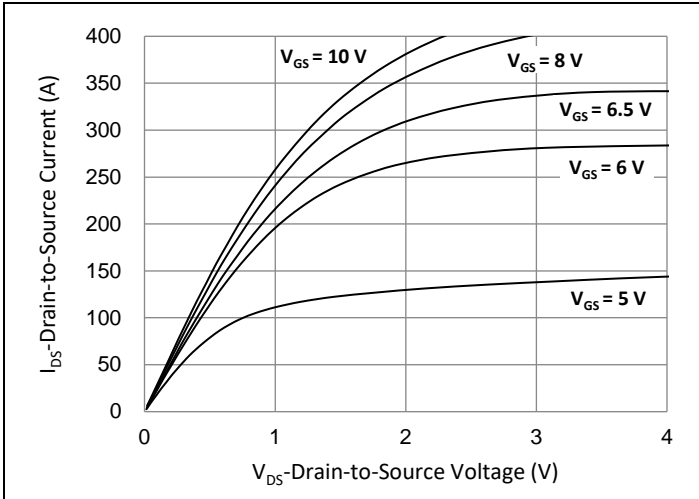


Fig.1 Output Characteristics

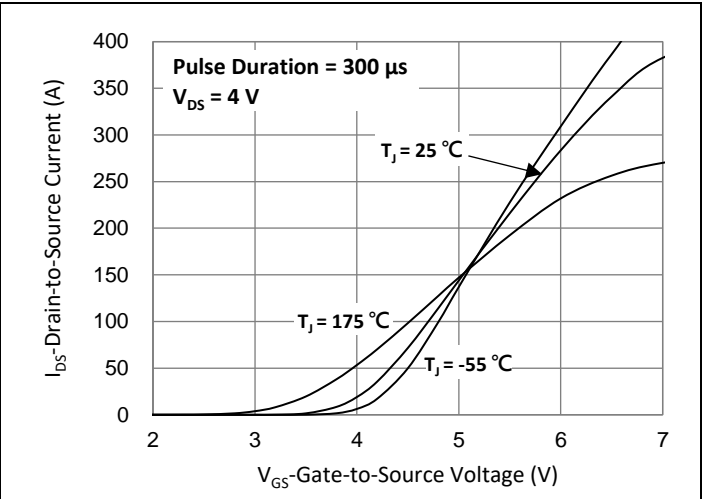


Fig.2 Transfer Characteristics

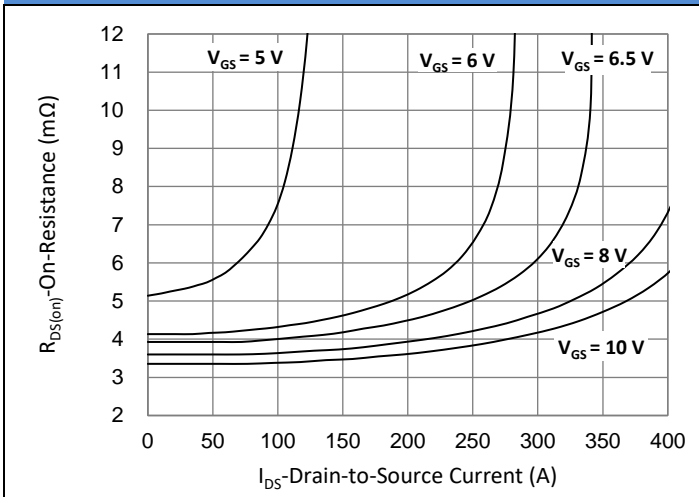


Fig.3 On-Resistance vs. Drain Current

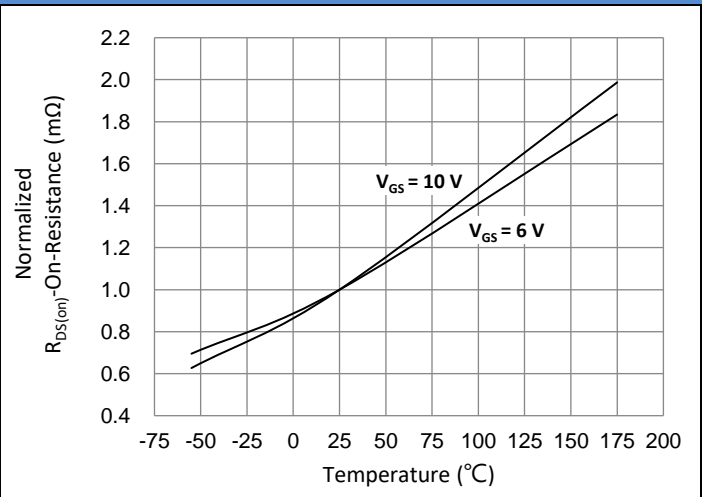


Fig.4 On-Resistance vs. Junction temperature

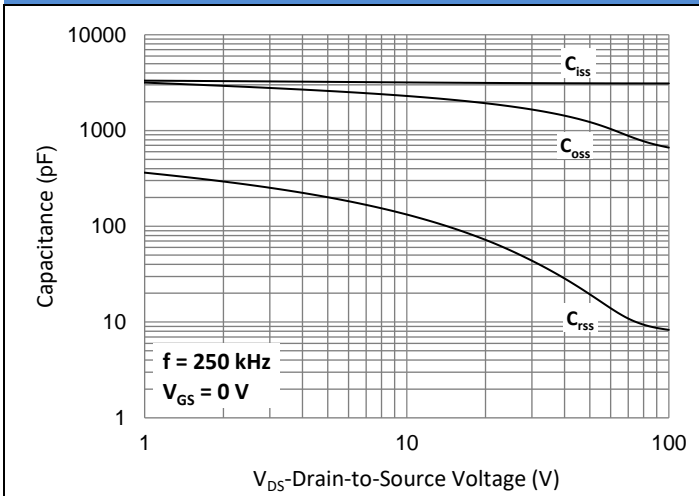


Fig.5 Capacitance vs. Drain-Source Voltage

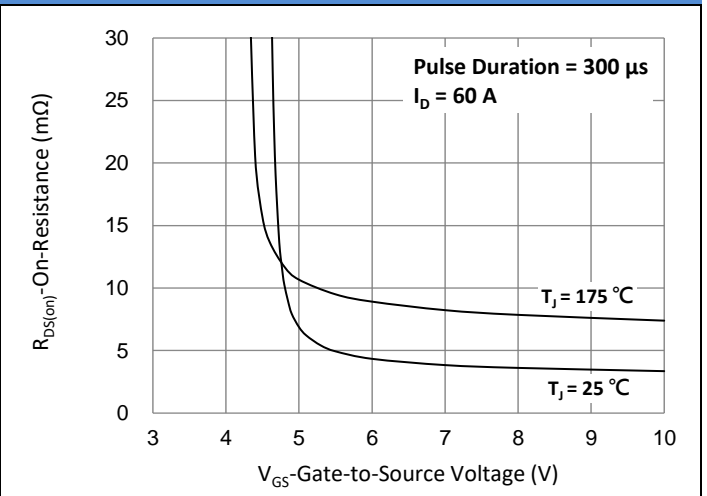


Fig.6 On-Resistance vs. Gate-Source Voltage

TYPICAL CHARACTERISTIC CURVES

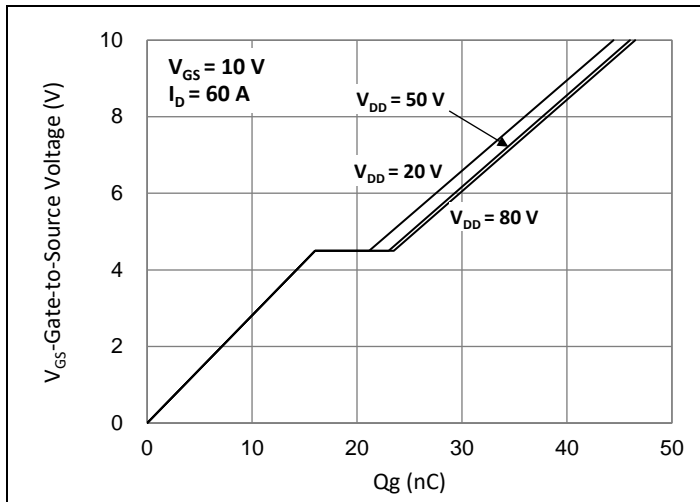


Fig.7 Gate-Charge Characteristics

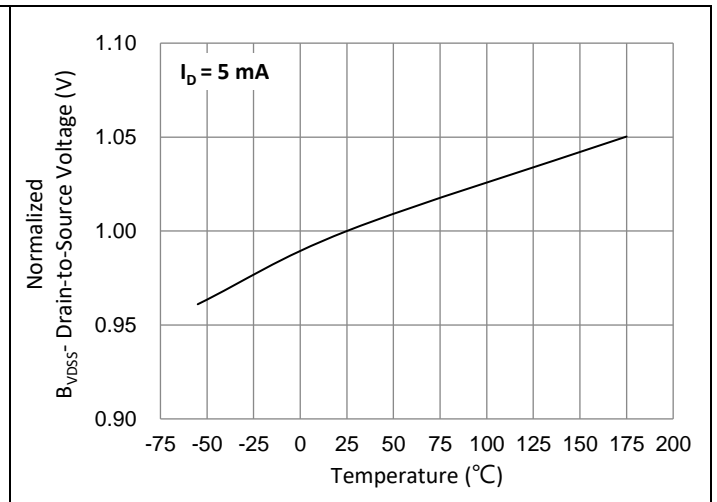


Fig.8 Breakdown Voltage Variation vs. Temperature

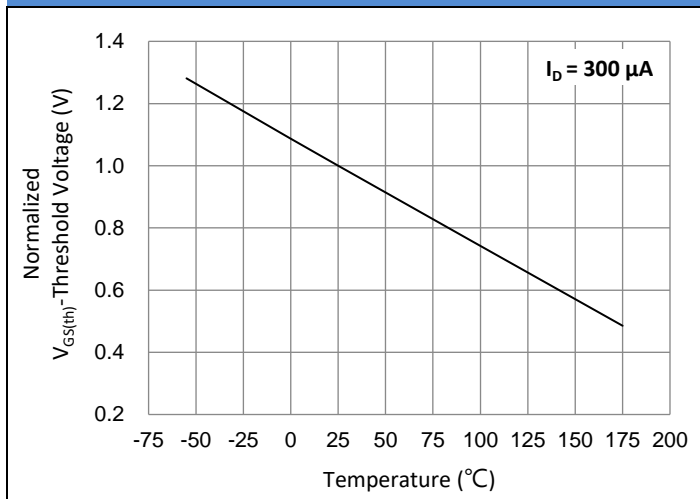


Fig.9 Threshold Voltage Variation with Temperature

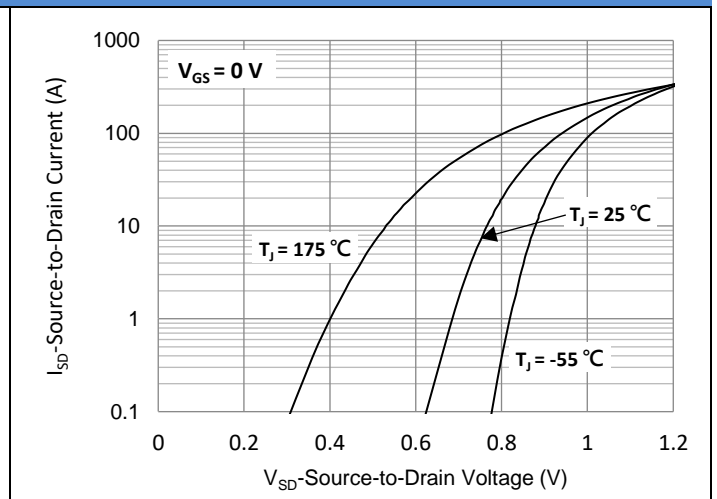


Fig.10 Source-Drain Diode Forward Voltage

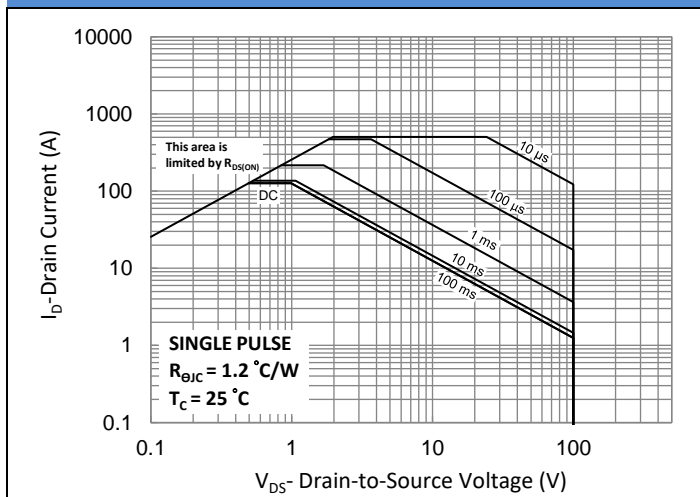


Fig.11 Maximum Safe Operating Area

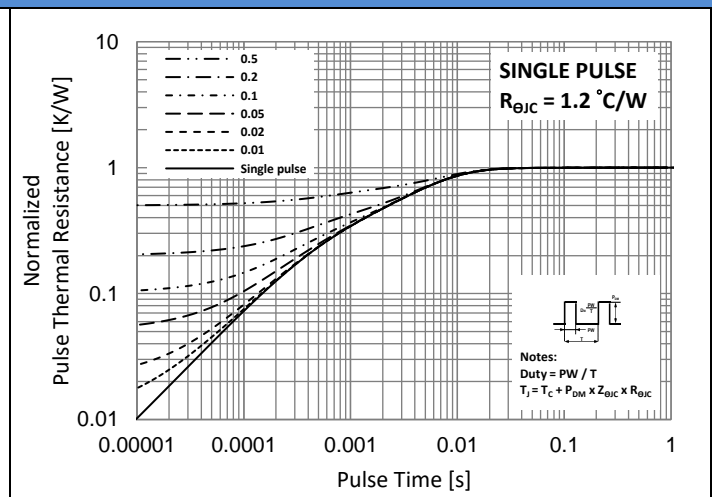
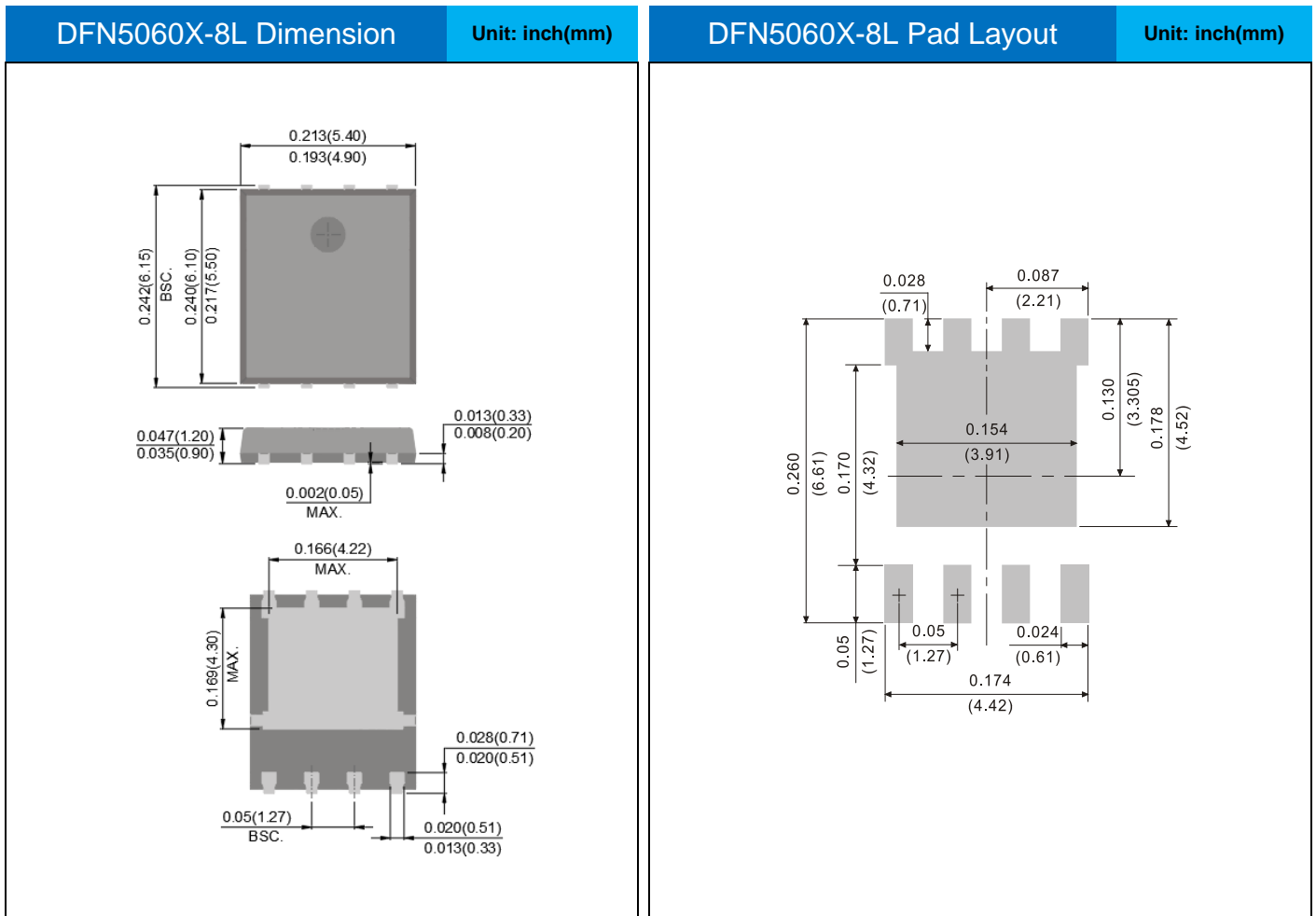


Fig.12 Normalized Transient Thermal Impedance

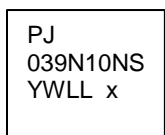
**Product and Packing Information**

| Part No.       | Package Type | Packing Type       | Marking  |
|----------------|--------------|--------------------|----------|
| PSMQC039N10NS2 | DFN5060X-8L  | 3000pcs / 13" reel | 039N10NS |

**Packaging Information & Mounting Pad Layout**



**Marking Diagram**



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

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