

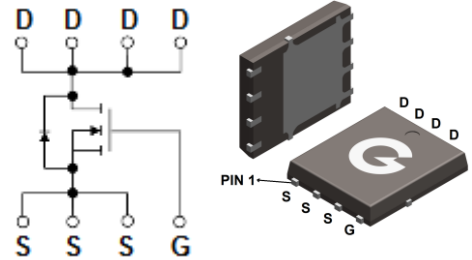
### Features

- Extremely low losses due to very low FOM  $R_{DS(on)} \times Q_G$
- High-speed switching
- Halogen free
- Qualified to AEC-Q101 standards for high reliability

HF

### Mechanical Data

- Case: PDFN5×6-8L
- Molding Compound: UL Flammability Classification Rating 94V-0
- Terminals: Matte tin-plated leads; solderability-per MIL-STD-202, Method 208



PDFN5×6-8L

### Ordering Information

| Part Number     | Package    | Shipping Quantity      | Marking Code |
|-----------------|------------|------------------------|--------------|
| TBL170N06T-5DL8 | PDFN5×6-8L | 5000 pcs / Tape & Reel | 170N06T      |

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

| Parameter                                              | Symbol   | Value    | Unit |
|--------------------------------------------------------|----------|----------|------|
| Drain-to-Source Voltage                                | $V_{DS}$ | 60       | V    |
| Gate-to-Source Voltage                                 | $V_{GS}$ | $\pm 20$ | V    |
| Continuous Drain Current ( $T_C = 25^\circ\text{C}$ )  | $I_D$    | 39       | A    |
| Continuous Drain Current ( $T_C = 100^\circ\text{C}$ ) |          | 27       | A    |
| Pulsed Drain Current ( $T_C = 25^\circ\text{C}$ )      | $I_{DM}$ | 160      | A    |
| Single Pulse Avalanche Energy <sup>*1</sup>            | $E_{AS}$ | 15       | mJ   |

### Thermal Characteristics

| Parameter                                      | Symbol          | Value           | Unit               |
|------------------------------------------------|-----------------|-----------------|--------------------|
| Power Dissipation ( $T_C = 25^\circ\text{C}$ ) | $P_D$           | 50              | W                  |
| Thermal Resistance Junction-to-Case            | $R_{\theta JC}$ | 3               | $^\circ\text{C/W}$ |
| Thermal Resistance Junction-to-Air             | $R_{\theta JA}$ | 44              | $^\circ\text{C/W}$ |
| Operating Junction Temperature Range           | $T_J$           | $-55 \sim +175$ | $^\circ\text{C}$   |
| Storage Temperature Range                      | $T_{STG}$       | $-55 \sim +175$ | $^\circ\text{C}$   |

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

| Symbol                             | Parameter                         | Test Condition                                                                                 | Min. | Typ. | Max. | Unit |
|------------------------------------|-----------------------------------|------------------------------------------------------------------------------------------------|------|------|------|------|
| Static Characteristics             |                                   |                                                                                                |      |      |      |      |
| V <sub>DSS</sub>                   | Drain-Source Breakdown Voltage    | V <sub>GS</sub> = 0V, I <sub>D</sub> = 250μA                                                   | 60   | -    | -    | V    |
| I <sub>DSS</sub>                   | Zero Gate Voltage Drain Current   | V <sub>DS</sub> = 60V, V <sub>GS</sub> = 0V                                                    | -    | -    | 1    | μA   |
| I <sub>GSS</sub>                   | Gate-Body Leakage Current         | V <sub>GS</sub> = ±20V, V <sub>DS</sub> = 0V                                                   | -    | -    | ±100 | nA   |
| On Characteristics                 |                                   |                                                                                                |      |      |      |      |
| R <sub>DS(ON)</sub>                | Static Drain-Source On-resistance | V <sub>GS</sub> = 10V, I <sub>D</sub> = 20A                                                    | -    | 13.5 | 17   | mΩ   |
|                                    |                                   | V <sub>GS</sub> = 4.5V, I <sub>D</sub> = 10A                                                   | -    | 17.5 | 22   | mΩ   |
| V <sub>GS(th)</sub>                | Gate Threshold Voltage            | V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 250μA                                     | 1    | -    | 2.5  | V    |
| Dynamic Characteristics            |                                   |                                                                                                |      |      |      |      |
| C <sub>ISS</sub>                   | Input Capacitance                 | V <sub>GS</sub> = 0V<br>V <sub>DS</sub> = 30V<br>f = 1MHZ                                      | -    | 820  | -    | pF   |
| C <sub>OSS</sub>                   | Output Capacitance                |                                                                                                | -    | 240  | -    |      |
| C <sub>RSS</sub>                   | Reverse Transfer Capacitance      |                                                                                                | -    | 17   | -    |      |
| Q <sub>G</sub>                     | Total Gate-Charge                 | V <sub>DD</sub> = 30V<br>V <sub>GS</sub> = 10V<br>I <sub>D</sub> = 10A                         | -    | 16.2 | -    | nC   |
| Q <sub>GS</sub>                    | Gate to Source Charge             |                                                                                                | -    | 3.8  | -    |      |
| Q <sub>GD</sub>                    | Gate to Drain (Miller) Charge     |                                                                                                | -    | 2.2  | -    |      |
| Switching Characteristics          |                                   |                                                                                                |      |      |      |      |
| t <sub>d(ON)</sub>                 | Turn-on Delay Time                | V <sub>DD</sub> = 30V<br>V <sub>GS</sub> = 10V<br>R <sub>G</sub> = 10Ω<br>I <sub>D</sub> = 20A | -    | 13   | -    | ns   |
| t <sub>r</sub>                     | Turn-on Rise Time                 |                                                                                                | -    | 25   | -    |      |
| t <sub>d(OFF)</sub>                | Turn-Off Delay Time               |                                                                                                | -    | 26   | -    |      |
| t <sub>f</sub>                     | Turn-Off Fall Time                |                                                                                                | -    | 10   | -    |      |
| Source-Drain Diode Characteristics |                                   |                                                                                                |      |      |      |      |
| V <sub>SD</sub>                    | Diode Forward Voltage             | I <sub>SD</sub> = 20A, V <sub>GS</sub> = 0V, T <sub>J</sub> = 25°C                             | -    | 0.9  | 1.2  | V    |
| t <sub>rr</sub>                    | Reverse Recovery Time             | V <sub>R</sub> = 30V, I <sub>F</sub> = 10A                                                     | -    | 27   | -    | ns   |
| Q <sub>rr</sub>                    | Reverse Recovery Charge           | di/dt = 100A/μs                                                                                | -    | 20   | -    | nC   |

Note 1: The  $E_{AS}$  test condition is  $V_{DD} = 25V, L = 0.1mH, V_{GS} = 10V$ , Starting  $T_J = 25^\circ\text{C}$

Ratings and Characteristics Curves (@  $T_A = 25^\circ\text{C}$  unless otherwise specified)

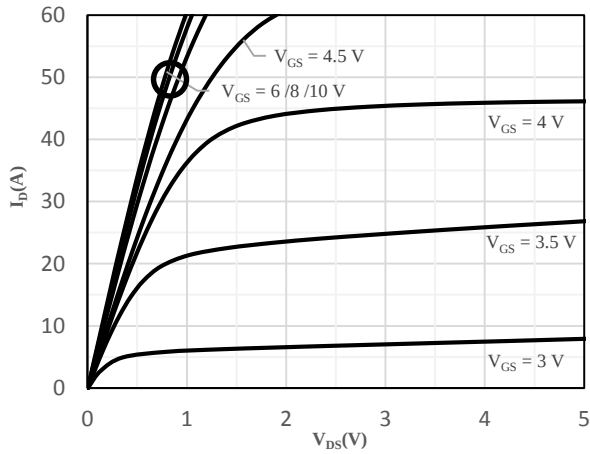


Fig 1 Typical Output Characteristics

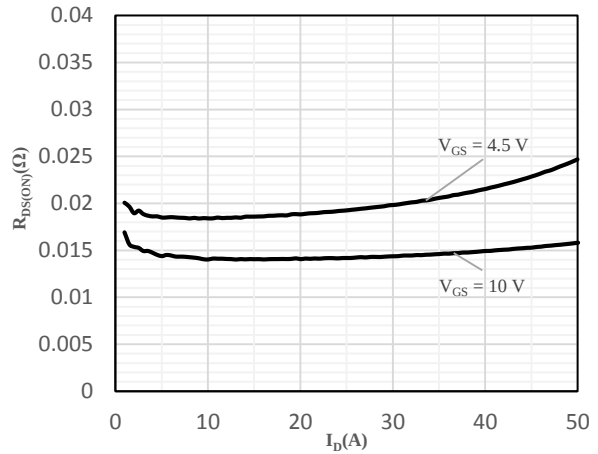


Fig 2 On-Resistance vs. Drain Current and Gate Voltage

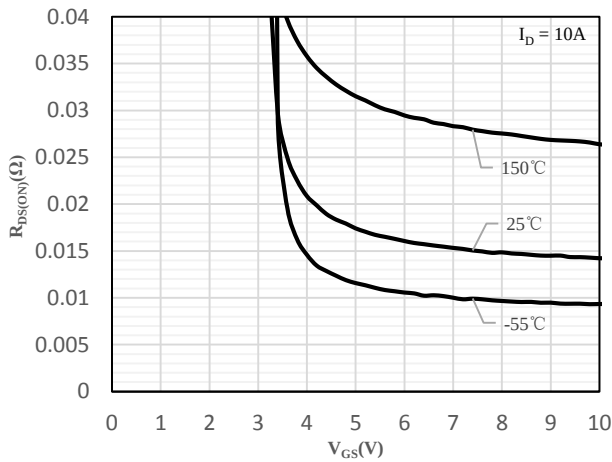


Fig 3 On-Resistance vs. Gate-Source Voltage

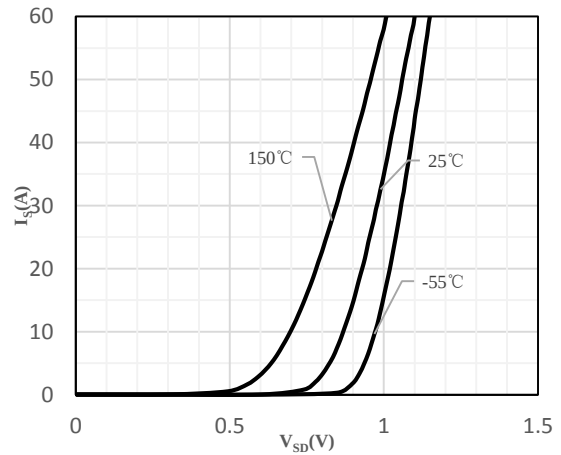


Fig 4 Body-Diode Characteristics

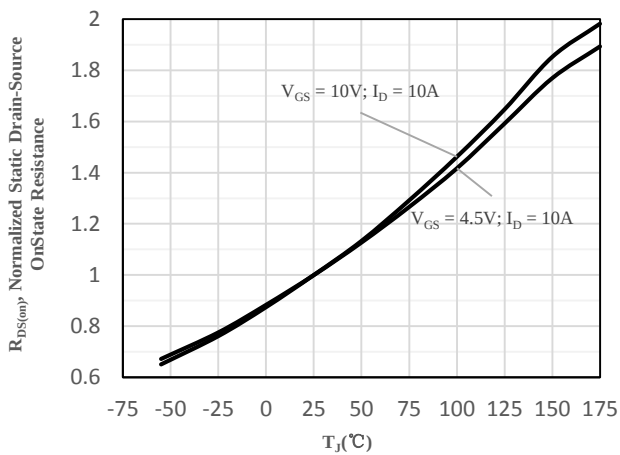


Fig 5 Normalized On-Resistance vs. Junction Temperature

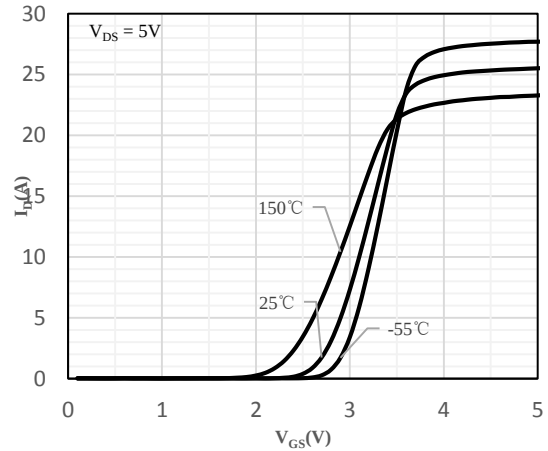


Fig 6 Transfer Characteristics

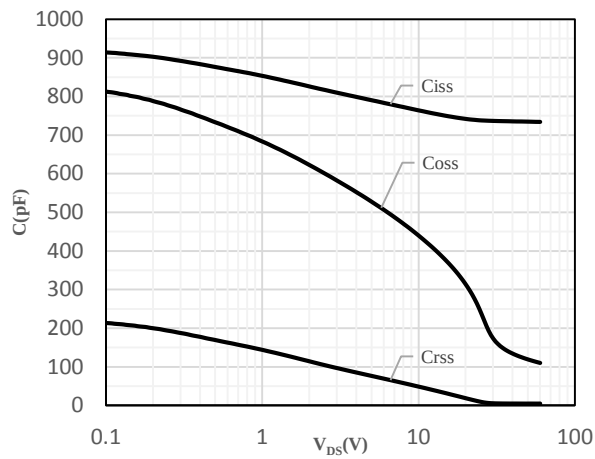


Fig 7 Capacitance Characteristics

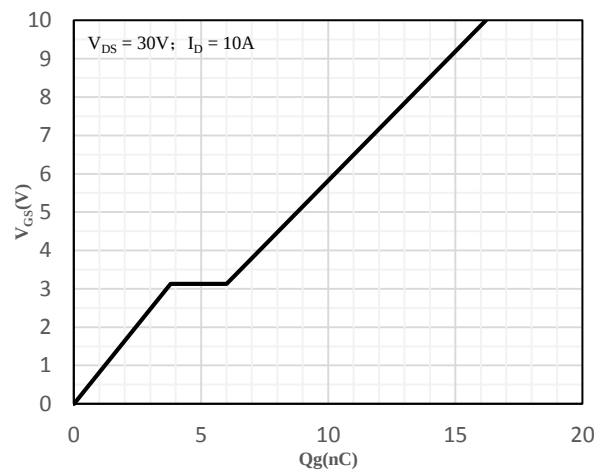


Fig 8 Gate-Charge Characteristics

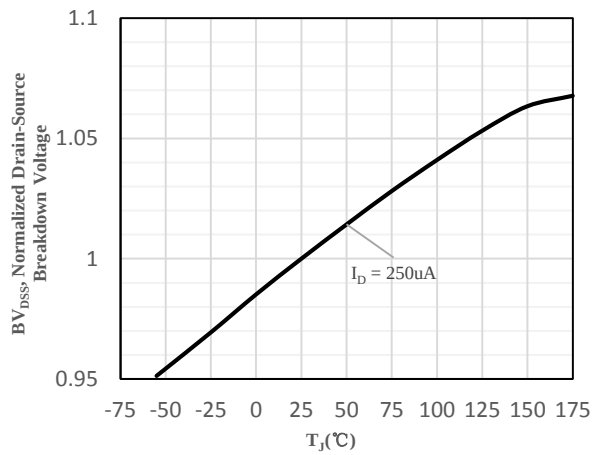


Fig 9 Normalized Breakdown Voltage  
vs. Junction Temperature

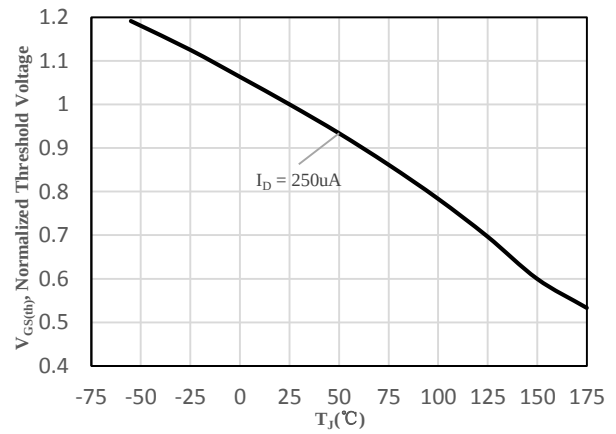
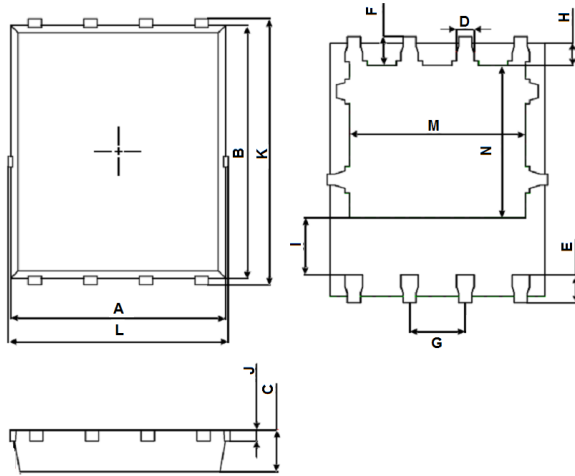


Fig 10 Normalized  $V_{GS(th)}$  vs. Junction Temperature

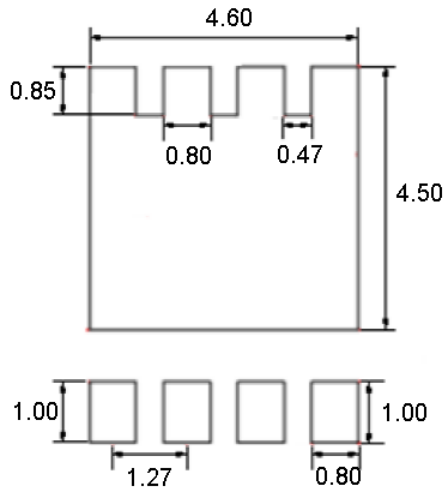
Package Outline Dimensions (Unit: mm)



| PDFN5x6-8L |       |       |
|------------|-------|-------|
| Dimension  | Min.  | Max.  |
| A          | 4.824 | 4.976 |
| B          | 5.674 | 5.826 |
| C          | 0.900 | 1.000 |
| D          | 0.350 | 0.450 |
| E          | 0.559 | 0.711 |
| F          | 0.574 | 0.726 |
| G          | 1.250 | 1.290 |
| H          | 0.424 | 0.576 |
| I          | 1.190 | 1.390 |
| J          | 0.154 | 0.354 |
| K          | 5.974 | 6.126 |
| L          | 4.944 | 5.096 |
| M          | 3.910 | 4.110 |
| N          | 3.375 | 3.575 |

Mounting Pad Layout (Unit: mm)

PDFN5x6-8L



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