

# TPBSC146N10LS5

## N-Channel Enhancement MOSFET

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### Product Summary

- $V_{DS}$  100 V
- $I_{DS}$  (at  $V_{GS}=10V$ ) 60A
- $R_{DS(ON)}$  (at  $V_{GS}=10V$ )  $\leq 6.5m\Omega$  (TYP)

### Application

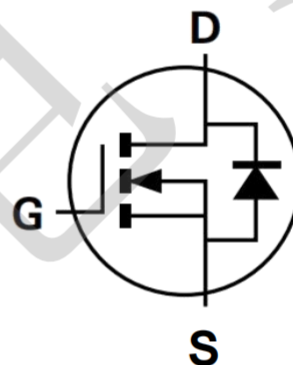
- Load switch
- High Frequency Switching and Synchronous Rectification
- Active Clamp in Intermediate
- DC/DC Power Supplies

### Package and Pin Configuration



PDFN5X6-8

### Circuit diagram



### Absolute Maximum Ratings

( $T_A=25^{\circ}C$  unless otherwise noted)

| PARAMETER                            | SYMBOL     | LIMIT              | UNIT        |
|--------------------------------------|------------|--------------------|-------------|
| Drain-Source Voltage                 | $V_{DS}$   | 100                | V           |
| Gate-Source Voltage                  | $V_{GS}$   | $\pm 20$           | V           |
| Continuous Drain Current             | $I_D$      | $T_C=25^{\circ}C$  | A           |
|                                      |            | $T_C=100^{\circ}C$ |             |
| Pulsed Drain Current                 | $I_{DM}$   | 105                | A           |
| Single Pulse Avalanche Energy        | EAS        | 56                 | mJ          |
| Total Power Dissipation              | $P_{DTOT}$ | $T_C=25^{\circ}C$  | 57          |
| Operating Junction Temperature Range | $T_J$      | -55 to +150        | $^{\circ}C$ |
| Storage Temperature Range            | $T_{stg}$  | -55 to +150        | $^{\circ}C$ |

### Thermal Characteristic

| PARAMETER                              | Symbol          | Value | Unit          |
|----------------------------------------|-----------------|-------|---------------|
| Junction-to-Ambient Thermal Resistance | $R_{\theta JA}$ | 62    | $^{\circ}C/W$ |
| Thermal Resistance Junction-Case       | $R_{\theta JC}$ | 2.2   | $^{\circ}C/W$ |

Note : The data tested by surface mounted on a 1 inch2 FR-4 board with 2OZ copper.

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

| PARAMETER                                               | CONDITIONS                                      | SYMBOL       | MIN | TYP  | MAX       | UNIT       |
|---------------------------------------------------------|-------------------------------------------------|--------------|-----|------|-----------|------------|
| Static                                                  |                                                 |              |     |      |           |            |
| Drain-Source Breakdown Voltage                          | $V_{GS}=0V, I_D=250\mu A$                       | $BV_{DSS}$   | 100 | --   | --        | V          |
| Gate-Source Threshold Voltage                           | $V_{DS}=V_{GS}, I_D=250\mu A$                   | $V_{GS(th)}$ | 1.2 | --   | 3.0       | V          |
| Gate-Source Leakage                                     | $V_{DS}=0V, V_{GS}=\pm 20V$                     | $I_{GSS}$    | --  | --   | $\pm 100$ | nA         |
| Zero Gate Voltage Drain Current                         | $V_{DS}=80V, V_{GS}=0V$                         | $I_{DSS}$    | --  | 0.1  | 1.0       | $\mu A$    |
|                                                         | $V_{DS}=80V, T_J=55^{\circ}C$                   |              | --  | 1.0  | 5.0       | $\mu A$    |
| Drain-Source On-State Resistance (Note 1)               | $V_{GS}=10V, I_D=15A$                           | $R_{DS(on)}$ | --  | 6.5  | 9.0       | m $\Omega$ |
|                                                         | $V_{GS}=4.5V, I_D=8A$                           |              | --  | 9.0  | 12        |            |
| Forward Transconductance (Note 2)                       | $V_{DS}=5V, I_D=20A$                            | $g_{fs}$     | --  | 75   | --        | S          |
| Dynamic (Note 2)                                        |                                                 |              |     |      |           |            |
| Total Gate Charge (Note 3)                              | $V_{DS}=50V, I_D=20A, V_{GS}=10V$               | $Q_g$        | --  | 40   | --        | nC         |
| Gate-Source Charge (Note 3)                             |                                                 | $Q_{gs}$     | --  | 7.2  | --        |            |
| Gate-Drain Charge (Note 3)                              |                                                 | $Q_{gd}$     | --  | 6.5  | --        |            |
| Input Capacitance                                       | $V_{DS}=50V, V_{GS}=0V, F=1.0MHz$               | $C_{iss}$    | --  | 2860 | --        | pF         |
| Output Capacitance                                      |                                                 | $C_{oss}$    | --  | 410  | --        |            |
| Reverse Transfer Capacitance                            |                                                 | $C_{rss}$    | --  | 38   | --        |            |
| Switching                                               |                                                 |              |     |      |           |            |
| Turn-On Delay Time (Note 3)                             | $V_{DD}=30V, I_D=1A, V_{GS}=10V, R_G=3.3\Omega$ | $t_{d(on)}$  | --  | 8.3  | --        | nS         |
| Rise Time (Note 3)                                      |                                                 | $t_r$        | --  | 4.2  | --        |            |
| Turn-Off Delay Time (Note 3)                            |                                                 | $t_{d(off)}$ | --  | 36   | --        |            |
| Fall Time (Note 3)                                      |                                                 | $t_f$        | --  | 6.9  | --        |            |
| Source-Drain Diode Ratings and Characteristics (Note 2) |                                                 |              |     |      |           |            |
| Forward Voltage                                         | $V_{GS}=0V, I_F=10A$                            | $V_{SD}$     | --  | 0.7  | 1.2       | V          |
| Continuous Source Current                               | Integral reverse diode in the MOSFET            | $I_S$        | --  | --   | 60        | A          |
| Pulsed Current (Note 1)                                 |                                                 | $I_{SM}$     | --  | --   | 105       | A          |

Notes:

1. Pulse test; pulse width ≤ 300 μS, duty cycle ≤ 2%.
2. Guaranteed by design, not subject to production testing.
3. Independent of operating temperature

### Typical Electrical and Thermal Characteristics

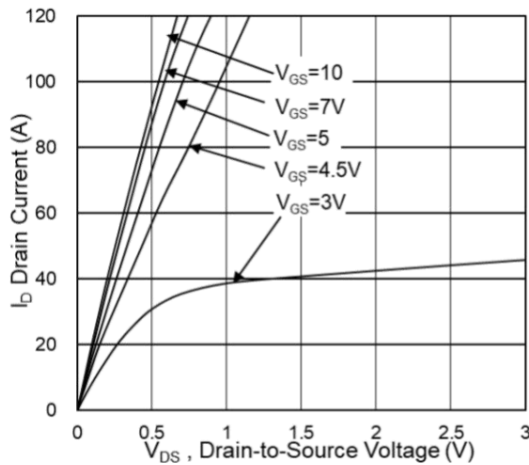


Fig.1 Typical Output Characteristics

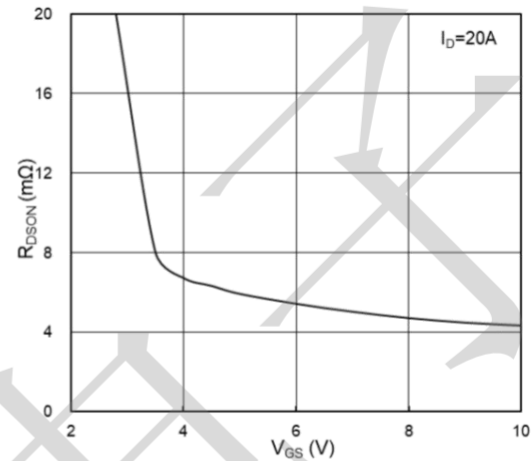


Fig.2 On-Resistance vs G-S Voltage

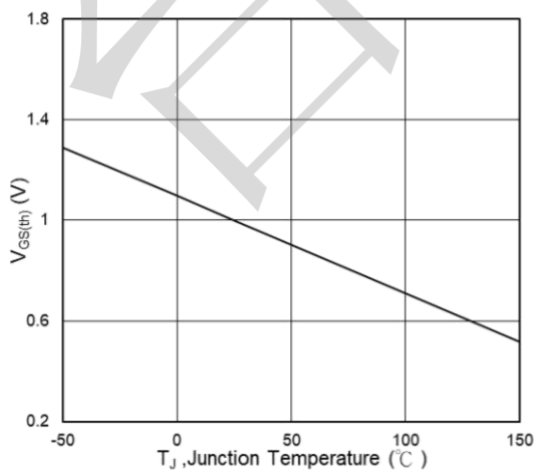
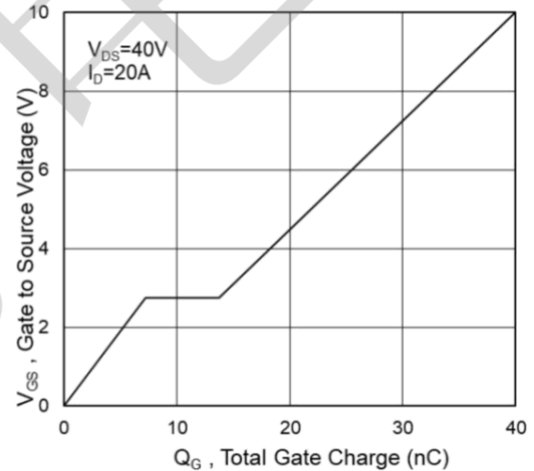
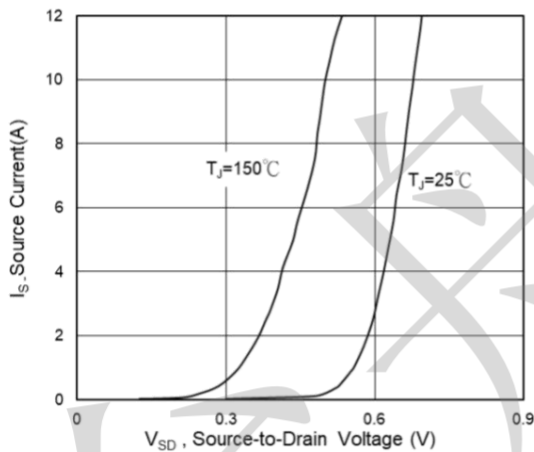


Fig.5 Normalized  $V_{GS(th)}$  vs.  $T_J$

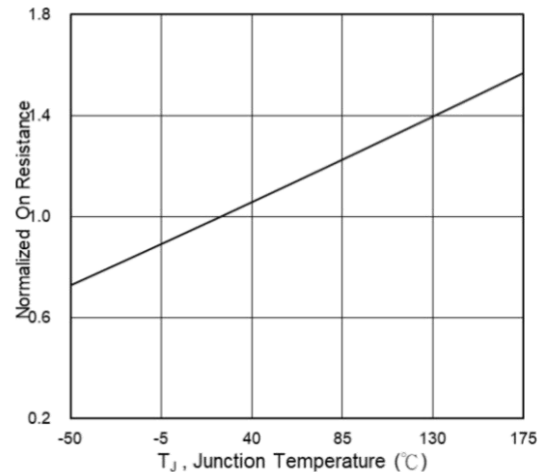
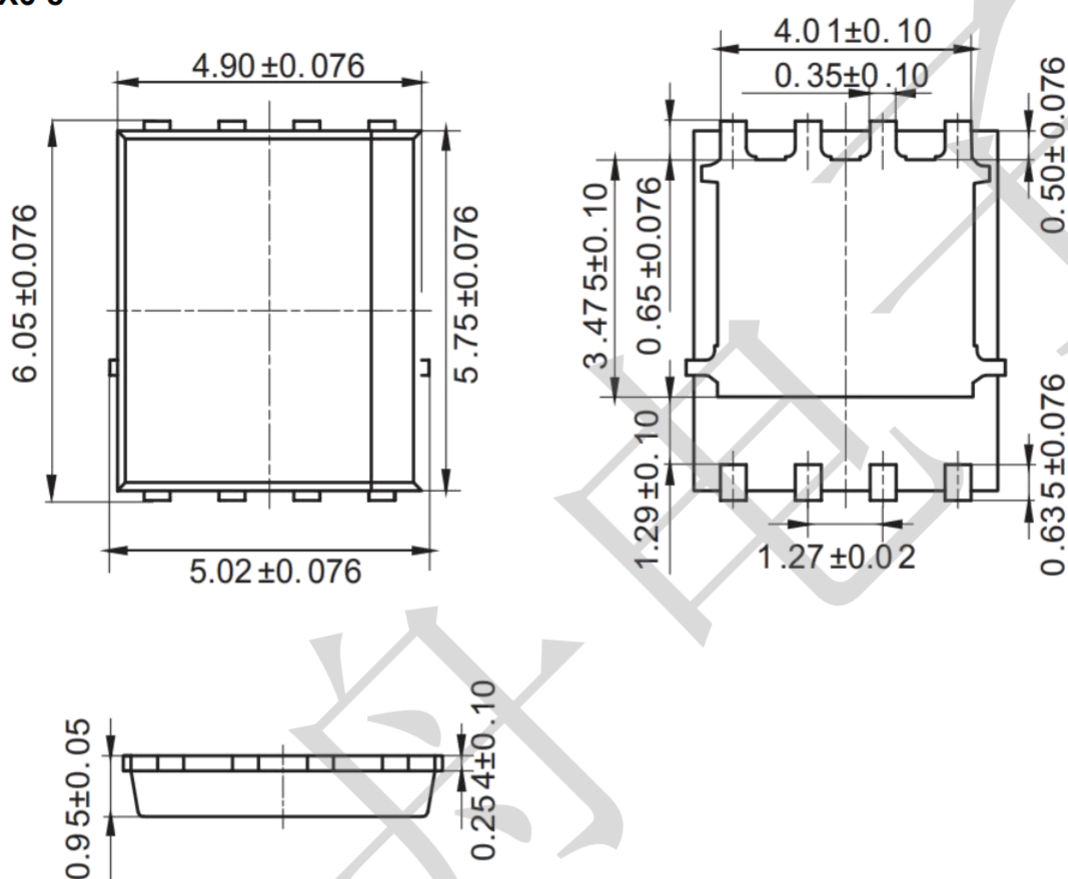


Fig.6 Normalized  $R_{DS(on)}$  vs.  $T_J$

## Package Information

PDFN5X6-8



## Mounting Pad Layout (unit: mm)

