



ExPD (Excellent Power Device)  
**TN4Q06** — Quasi-Resonant Switching  
Power Supply ExPD

### Features

- Original control IC for Quasi-resonant type.
- High voltage Power MOSFET with current sense.
- Low input voltage protection (Automatic reset)
- Over voltage protection (Latch).
- Over current protection (Pulse-by-pulse).

### Specifications

**Absolute Maximum Ratings** at Ta=25°C

| Parameter   | Symbol            | Conditions                 | Ratings                      | unit |
|---|-------------------|----------------------------|------------------------------|------|
| [The voltage parameters indicate the GND pin voltage] |                   |                            |                              |      |
| Drain-to-Source Voltage                               | V <sub>DSS</sub>  | 3-5                        | 450                          | V    |
| Drain Current (DC)                                    | I <sub>D</sub>    | 3-5                        | 9                            | A    |
| Drain Current (Pulse)                                 | I <sub>DP</sub>   | 3-5 PW≤10μs, duty cycle≤1% | 36                           | A    |
| V <sub>DD</sub> Pin Apply Voltage                     | V <sub>DD</sub>   | 4-5                        | -0.3 to 16.7                 | V    |
| FB Pin Apply Voltage                                  | V <sub>FB</sub>   | 1-5                        | -0.3 to V <sub>DD</sub> +0.3 | V    |
| EDGE Pin Apply Voltage                                | V <sub>EDGE</sub> | 2-5                        | -0.3 to V <sub>DD</sub> +0.3 | V    |
| Allowable Power Dissipation                           | P <sub>D</sub>    | T <sub>c</sub> =25°C       | 2                            | W    |
|   |                   |                            | 40                           | W    |
| Operating Temperature                                 | T <sub>opr</sub>  |                            | -25 to +125                  | °C   |
| Junction Temperature                                  | T <sub>j</sub>    |                            | 150                          | °C   |
| Storage Temperature                                   | T <sub>stg</sub>  |                            | -55 to +150                  | °C   |
| Avalanche Energy (Single Pulse) *1                    | E <sub>AS</sub>   | 3-5                        | 430                          | mJ   |
| Avalanche Current *2                                  | I <sub>AV</sub>   | 3-5                        | 9                            | A    |

\*1 V<sub>DD</sub>=50V, L=10mH, I<sub>AV</sub>=9A

\*2 L≤10mH, single pulse

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# TN4Q06

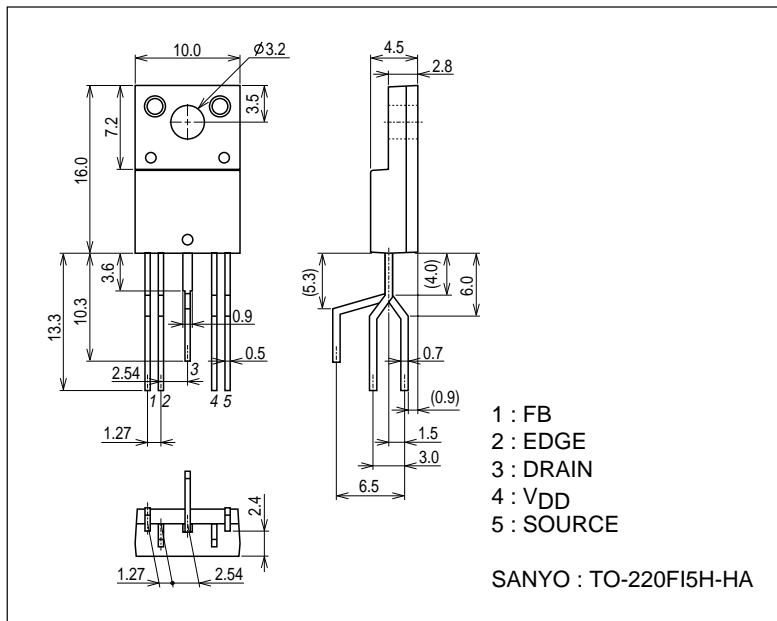
## Electrical Characteristics at Ta=25°C

| Parameter  | Symbol   | Conditions           | Ratings |         |      | Unit |
|--|----------|----------------------|---------|---------|------|------|
|  |          |                      | min     | typ     | max  |      |
| [MOSFET]   |          |                      |         |         |      |      |
| Drain-to-Source Breakdown Voltage  | V(BR)DSS | 3-5 ID=1mA, VDD=0V   | 450     |         |      | V    |
| Zero-Gate Voltage Drain Current  | IDSS     | 3-5 VDS=450V, VDD=0V |         |         | 1    | mA   |
| Static Drain-to-Source On-State Resistance   | RDS(on)  | 3-5 ID=4.5A, VDD=15V |         | 0.48    | 0.6  | Ω    |
| Input Capacitance  | Ciss     | VDS=20V, f=1MHz      |         | 1700    |      | pF   |
| Output Capacitance   | Coss     | VDS=20V, f=1MHz      |         | 450     |      | pF   |
| [IC]   |          |                      |         |         |      |      |
| Power Supply Line Breakdown Voltage  | V(BR)DD  | 4-5 IDD=1mA, VFB=0V  | 16.7    |         |      | V    |
| Over Voltage Input Latch Shutdown Threshold Voltage                                | OVP      | 4-5                  | 15.7    | 16.5    | 17.3 | V    |
| Burst Mode Start Threshold Voltage   | VBon     | 4-5 VEDGE=VDD        | 15.2    | 16.0    | 16.8 | V    |
| Burst Mode Stop Threshold Voltage  | VBoff    | 4-5 VEDGE=VDD        | 14.6    | 15.4    | 16.2 | V    |
| Burst Mode Hysteresis Voltage  | ΔVB      | 4-5 VEDGE=VDD        |         | 0.6     |      | V    |
| Low Voltage Protection Release Threshold Voltage                                   | UVH      | 4-5                  | 9.1     | 9.9     | 10.7 | V    |
| Low Voltage Protection Operation Threshold Voltage (Latch Reset Threshold Voltage) | UVL      | 4-5                  | 8.0     | 8.8     | 9.6  | V    |
| Low Voltage Protection Hysteresis Voltage  | ΔUV      | 4-5                  |         | 1.1     |      | V    |
| Feedback Detection Threshold Voltage   | VFB      | 1-5                  | 0.58    | 0.70    | 0.82 | V    |
| Edge Signal Release Threshold Voltage  | VEDGE-H  | 2-5                  | 2.3     | 2.6     | 2.9  | V    |
| Edge Signal Detection Threshold Voltage  | VEDGE-L  | 2-5                  | 1.6     | 1.9     | 2.2  | V    |
| Edge Signal Hysteresis Voltage   | ΔVEDGE   | 2-5                  |         | 0.7     |      | V    |
| Initial Oscillation Frequency  | fosc     | 3-5 VEDGE=0V         | 30      | 35      | 40   | kHz  |
| Maximum Oscillation Frequency  | fmax     | 3-5                  | 150     | 180     | 210  | kHz  |
| Power Supply Current (at start-up)   | IDD(on)  | 4-5                  |         | 200     |      | μA   |
| Minimum ON Time  | ton(min) | 3-5                  |         | 300     |      | ns   |
| Step Drive Voltage   | tstep    | 3-5                  |         | 200     |      | ns   |
| Step Drive Gate Voltage  | VGstep   | 3-5                  |         | VDD-5.7 |      | V    |

## Package Dimensions

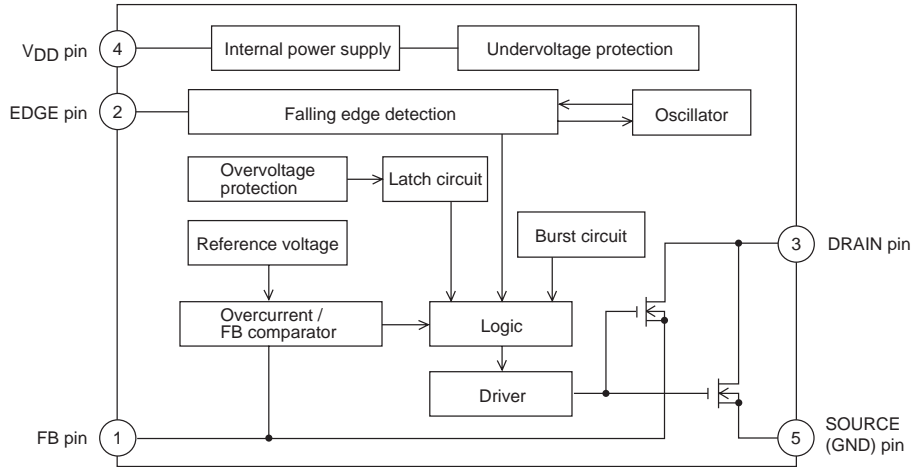
unit : mm

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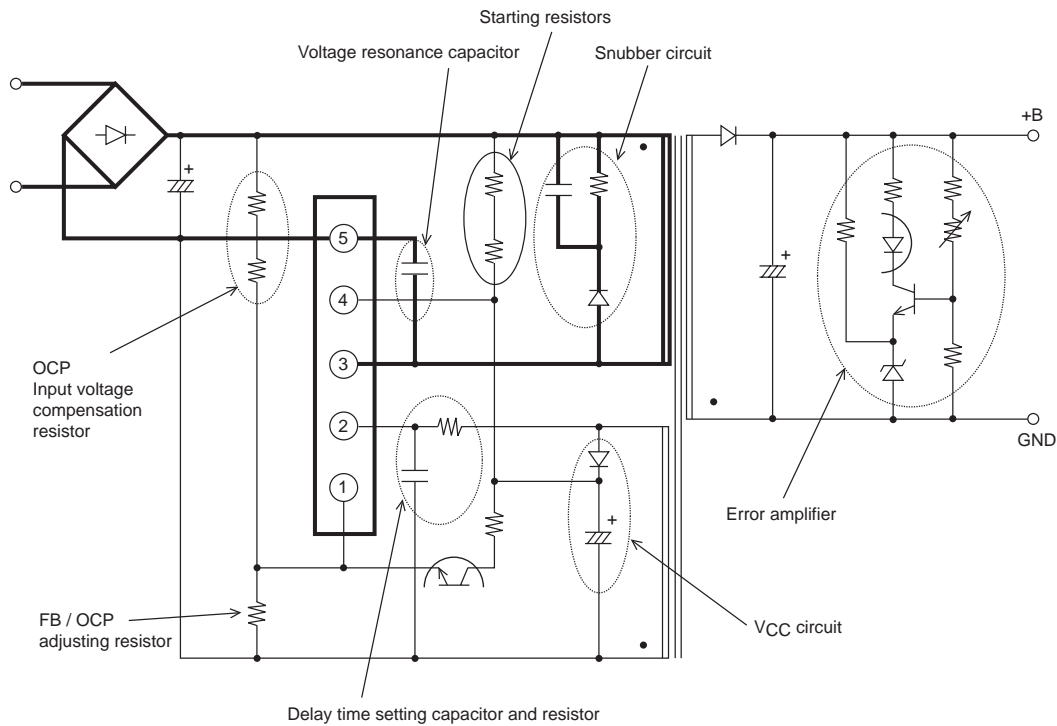
## Block Diagram



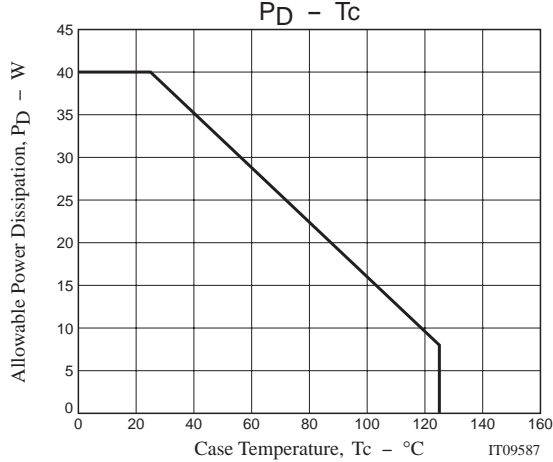
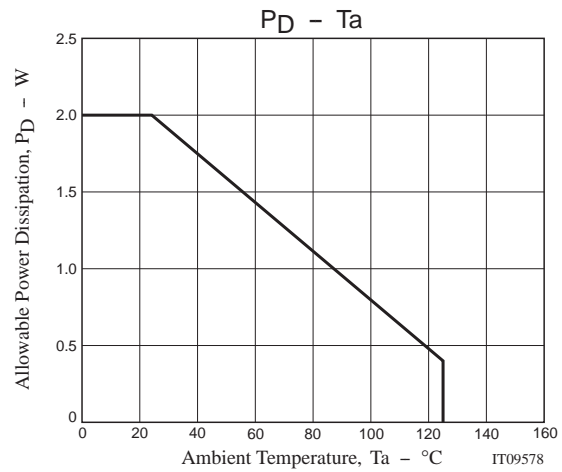
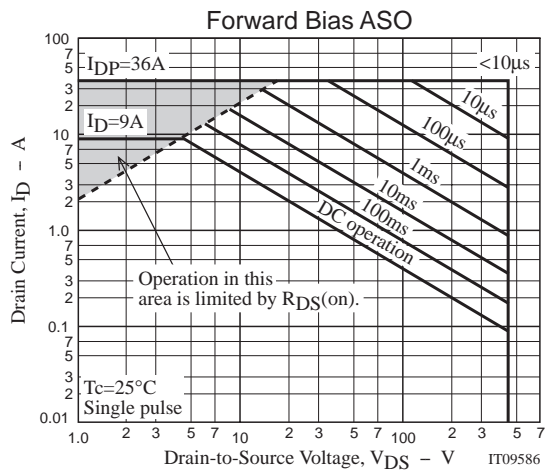
## Pin Definitions and Functions

| Pin No. | Symbol       | Name                             | Function                                     |
|---------|--------------|----------------------------------|--|
| 1       | FB           | Over current / feedback terminal | Input for feedback voltage and current sense |
| 2       | EDGE         | EDGE detection terminal          | Delay EDGE Input voltage                     |
| 3       | DRAIN        | DRAIN terminal                   | Power MOSFET Drain                           |
| 4       | VDD          | Power supply terminal            | Input for Start-up voltage and drive voltage |
| 5       | SOURCE (GND) | Source (Ground) terminal         | Power MOSFET Source (Ground)                 |

## Circuit Function Diagram



# TN4Q06



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