

## PRODUCT CHARACTERISTICS

|                             |       |
|-----------------------------|-------|
| VDSS                        | 650V  |
| $R_{DS(on)typ}(V_{GS}=10V)$ | 0.55Ω |
| Qg@type                     | 57nC  |
| ID                          | 16A   |

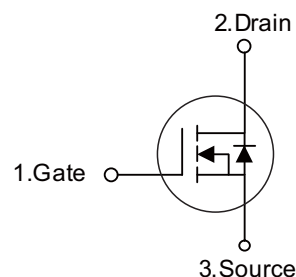
## APPLICATIONS

- High efficiency switch mode power supplies
- Electronic lamp ballasts based on half bridge
- LED power supply

## FEATURES

- \* High Switching Speed
- \* 100% Avalanche Tested

## Symbol



TO-220



TO-220F

## ORDER INFORMATION

| Order codes  |            | Package | Packing        |
|--------------|------------|---------|----------------|
| Halogen-Free | Halogen    |         |                |
| N/A          | MOT16N65HF | TO-220F | 50 pieces/Tube |
| N/A          | MOT16N65A  | TO-220  | 50 pieces/Tube |

## ABSOLUTE MAXIMUM RATINGS (T<sub>C</sub> = 25°C, unless otherwise specified)

| PARAMETER                          |                                    | SYMBOL           | RATINGS     | UNIT |
|------------------------------------|------------------------------------|------------------|-------------|------|
| Drain-Source Voltage               |                                    | V <sub>DSS</sub> | 650         | V    |
| Gate-Source Voltage                |                                    | V <sub>GSS</sub> | ±30         | V    |
| Drain Current                      | Continuous (T <sub>C</sub> = 25°C) | I <sub>D</sub>   | 16 (Note 2) | A    |
|                                    | Pulsed (Note 3)                    | I <sub>DM</sub>  | 64 (Note 2) | A    |
| Avalanche Current (Note 3)         |                                    | I <sub>AR</sub>  | 16          | A    |
| Avalanche Energy                   | Single Pulsed (Note 4)             | E <sub>AS</sub>  | 780         | mJ   |
|                                    | Repetitive (Note 5)                | E <sub>AR</sub>  | 20          | mJ   |
| Peak Diode Recovery dv/dt (Note 5) |                                    | dv/dt            | 4.5         | V/ns |
| Power Dissipation                  | TO-220                             | P <sub>D</sub>   | 270         | W    |
|                                    | TO-220F                            |                  | 60          | W    |
| Junction Temperature               |                                    | T <sub>J</sub>   | +150        | °C   |
| Storage Temperature                |                                    | T <sub>STG</sub> | -55~+150    | °C   |

Notes: 1. Absolute maximum ratings are those values beyond which the device could be permanently damaged.

Absolute maximum ratings are stress ratings only and functional device operation is not implied.

2. Drain current limited by maximum junction temperature

3. Repetitive Rating: Pulse width limited by maximum junction temperature

4. L = 6.1mH, I<sub>AS</sub> = 16A, V<sub>DD</sub> = 50V, R<sub>G</sub> = 25Ω, Starting T<sub>J</sub> = 25°C

5. I<sub>SD</sub> ≤ 16A, di/dt ≤ 200A/μs, V<sub>DD</sub> ≤ BV<sub>DSS</sub>, Starting T<sub>J</sub> = 25°C

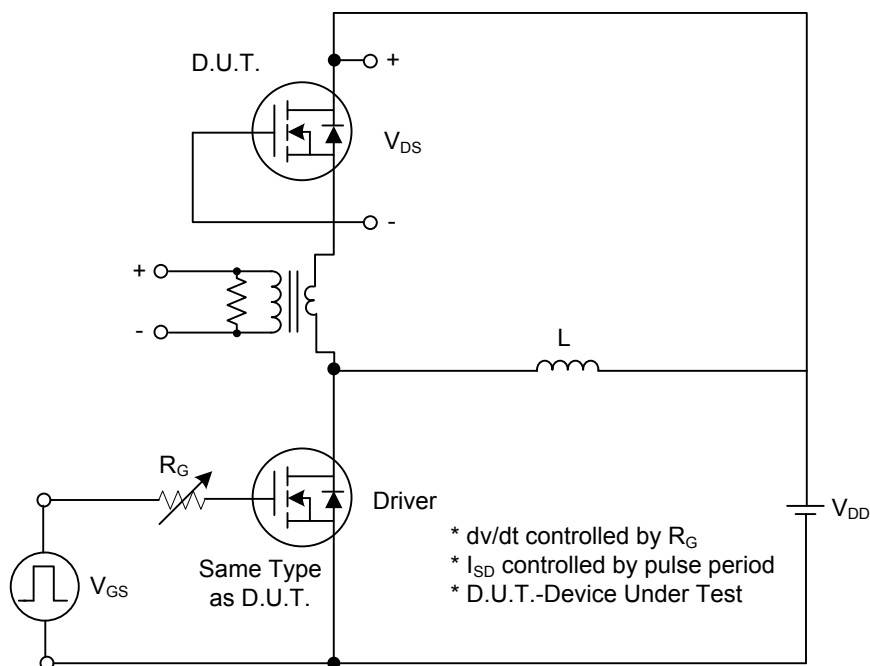
■ ELECTRICAL CHARACTERISTICS ( $T_C=25^{\circ}\text{C}$ , unless otherwise noted)

| PARAMETER                                      |         | SYMBOL              | TEST CONDITIONS                                                                 | MIN | TYP  | MAX  | UNIT |
|------------------------------------------------|---------|---------------------|---------------------------------------------------------------------------------|-----|------|------|------|
| Off characteristics                            |         |                     |                                                                                 |     |      |      |      |
| Drain-Source Breakdown Voltage                 |         | BV <sub>DSS</sub>   | I <sub>D</sub> =250μA, V <sub>GS</sub> =0V                                      | 650 | -    | -    | V    |
| Drain-Source Leakage Current                   |         | I <sub>DSS</sub>    | V <sub>DS</sub> =650V, V <sub>GS</sub> =0V                                      | -   | -    | 1    | μA   |
|                                                |         |                     | V <sub>DS</sub> =520V, V <sub>GS</sub> =0V, T <sub>C</sub> =125°C               | -   | -    | 10   | μA   |
| Gate- Source Leakage Current                   | Forward | I <sub>GSS</sub>    | V <sub>GS</sub> =+30V, V <sub>DS</sub> =0V                                      | -   | -    | +100 | nA   |
|                                                | Reverse |                     | V <sub>GS</sub> =-30V, V <sub>DS</sub> =0V                                      | -   | -    | -100 | nA   |
| On characteristics                             |         |                     |                                                                                 |     |      |      |      |
| Gate Threshold Voltage                         |         | V <sub>GS(TH)</sub> | V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =250μA                        | 2.0 | -    | 4.0  | V    |
| Static Drain-Source On-State Resistance        |         | R <sub>DS(ON)</sub> | V <sub>GS</sub> =10V, I <sub>D</sub> =8A                                        | -   | 0.55 | 0.6  | Ω    |
| Dynamic characteristics                        |         |                     |                                                                                 |     |      |      |      |
| Input Capacitance                              |         | C <sub>ISS</sub>    | V <sub>GS</sub> =0V, V <sub>DS</sub> =25V, f=1.0MHz                             | -   | 1078 | -    | pF   |
| Output Capacitance                             |         | C <sub>OSS</sub>    |                                                                                 | -   | 225  | -    | pF   |
| Reverse Transfer Capacitance                   |         | C <sub>RSS</sub>    |                                                                                 | -   | 10   | -    | pF   |
| Switching characteristics                      |         |                     |                                                                                 |     |      |      |      |
| Turn-ON Delay Time                             |         | t <sub>D(ON)</sub>  | V <sub>DS</sub> =30V, I <sub>D</sub> =0.5A, R <sub>G</sub> =25Ω<br>(Note 1, 2)  | -   | 112  | -    | ns   |
| Rise Time                                      |         | t <sub>R</sub>      |                                                                                 | -   | 186  | -    | ns   |
| Turn-OFF Delay Time                            |         | t <sub>D(OFF)</sub> |                                                                                 | -   | 335  | -    | ns   |
| Fall-Time                                      |         | t <sub>F</sub>      |                                                                                 | -   | 186  | -    | ns   |
| Total Gate Charge                              |         | Q <sub>G</sub>      | V <sub>GS</sub> =10V, V <sub>DS</sub> =50V, I <sub>D</sub> =1.3A<br>(Note 1, 2) | -   | 57   | -    | nC   |
| Gate to Source Charge                          |         | Q <sub>GS</sub>     |                                                                                 | -   | 15.4 | -    | nC   |
| Gate to Drain Charge                           |         | Q <sub>GD</sub>     |                                                                                 | -   | 15.8 | -    | nC   |
| Source-drain diode ratings and characteristics |         |                     |                                                                                 |     |      |      |      |
| Maximum Body-Diode Continuous Current          |         | I <sub>S</sub>      |                                                                                 | -   | -    | 16   | A    |
| Maximum Body-Diode Pulsed Current              |         | I <sub>SM</sub>     |                                                                                 | -   | -    | 64   | A    |
| Drain-Source Diode Forward Voltage             |         | V <sub>SD</sub>     | I <sub>S</sub> =16A, V <sub>GS</sub> =0V                                        | -   | -    | 1.4  | V    |

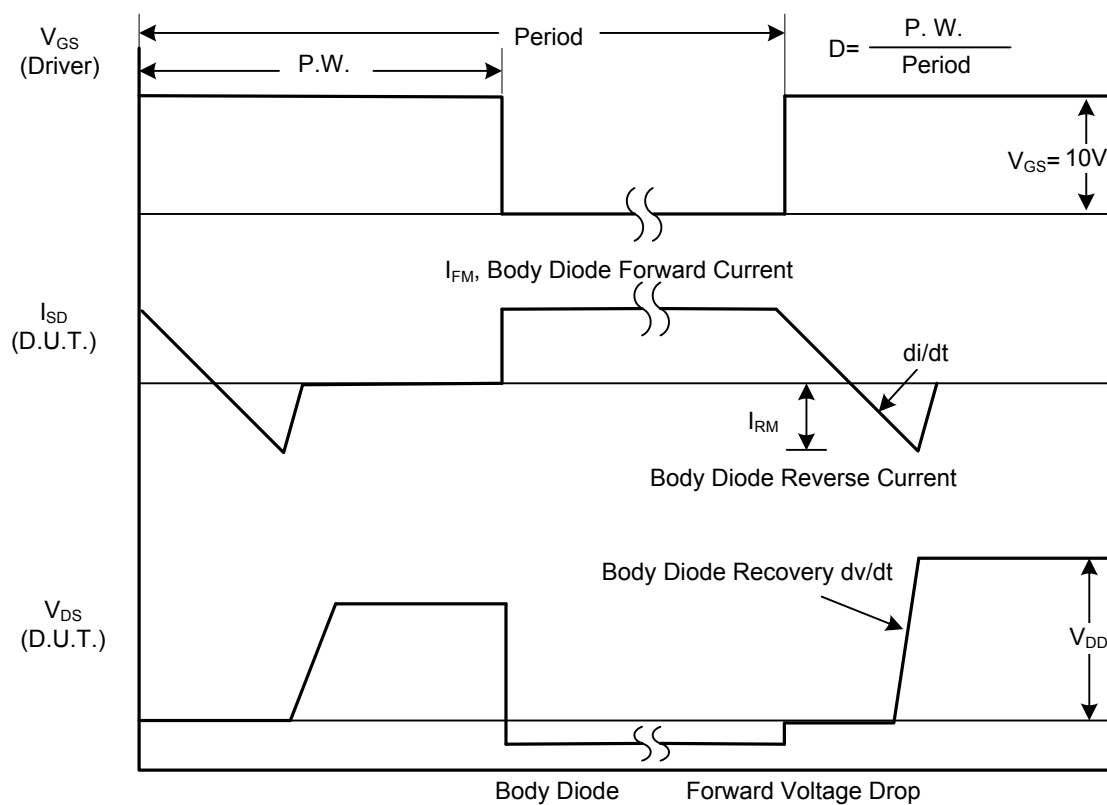
Notes: 1. Pulse Test: Pulse width  $\leq 300\mu\text{s}$ , Duty cycle  $\leq 2\%$

2. Essentially independent of operating temperature

■ TEST CIRCUITS AND WAVEFORMS

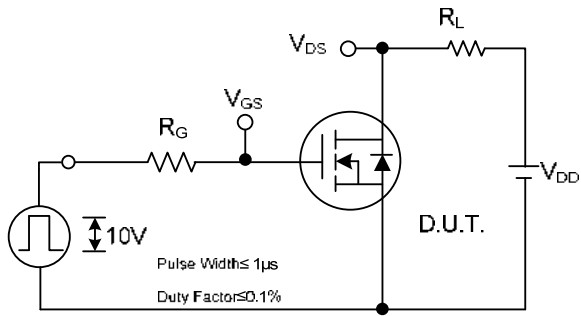


Peak Diode Recovery dv/dt Test Circuit

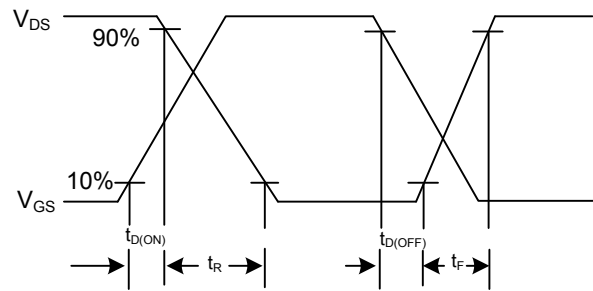


Peak Diode Recovery dv/dt Waveforms

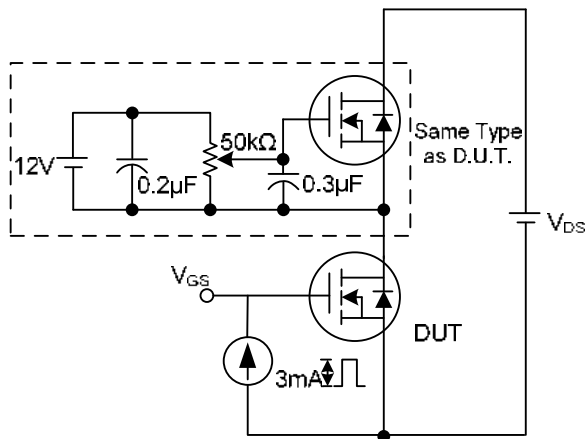
■ TEST CIRCUITS AND WAVEFORMS(Cont.)



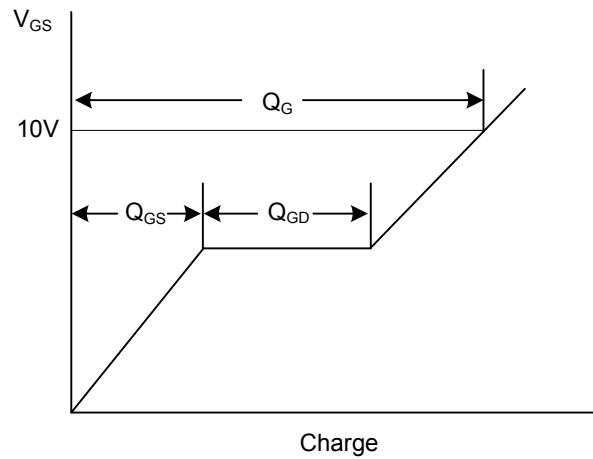
Switching Test Circuit



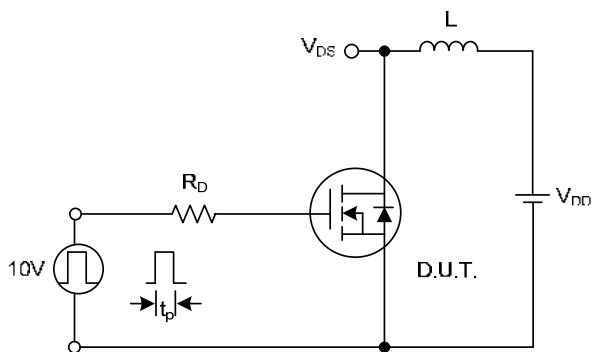
Switching Waveforms



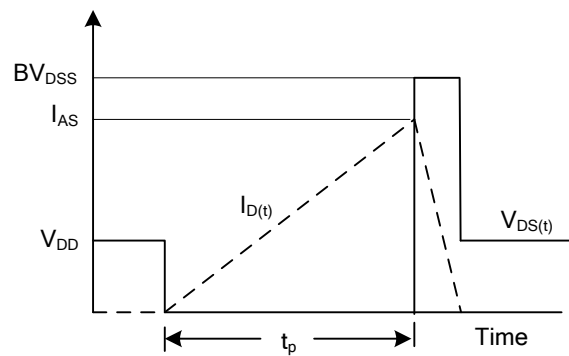
Gate Charge Test Circuit



Gate Charge Waveform

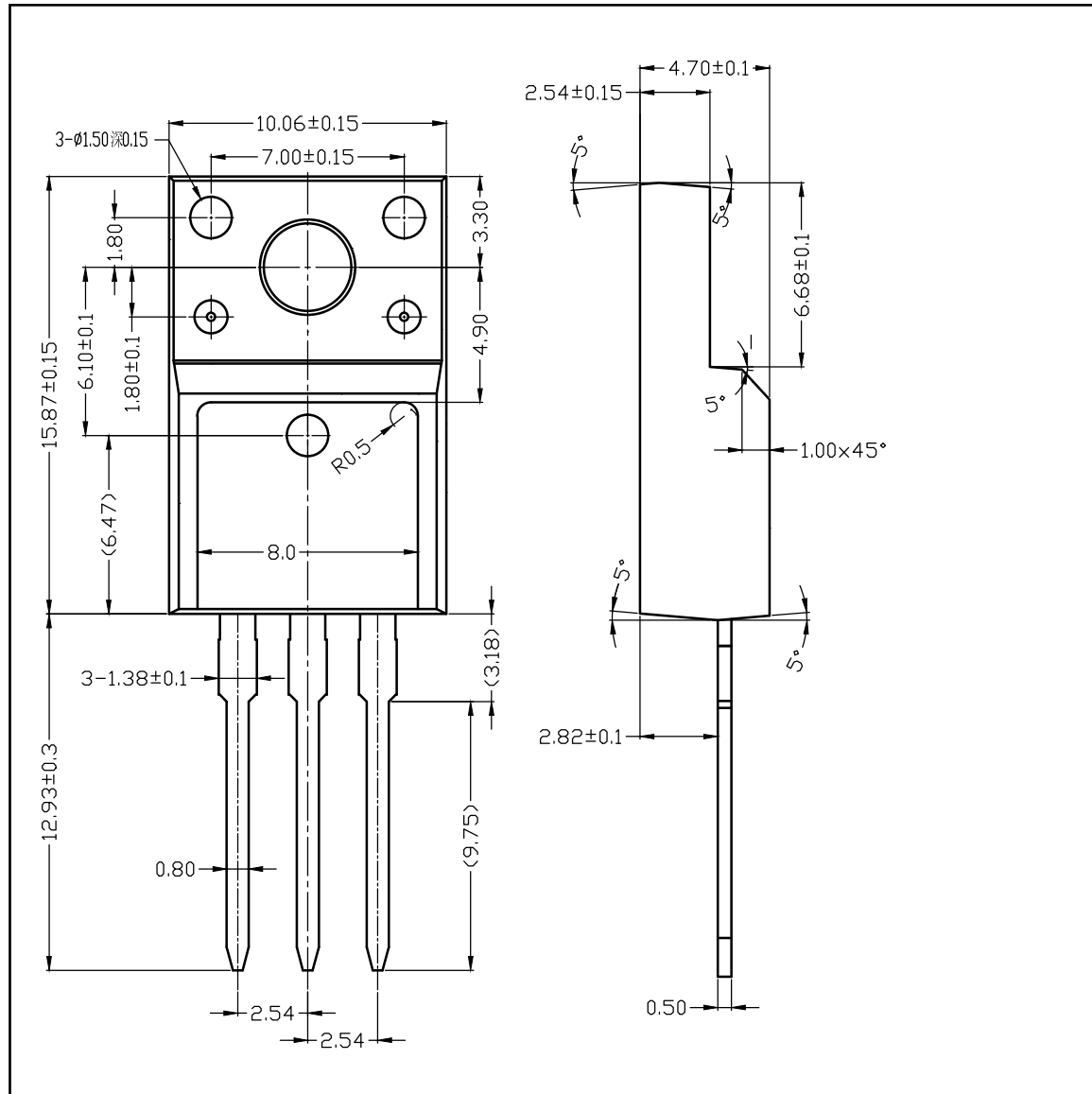


Unclamped Inductive Switching Test Circuit



Unclamped Inductive Switching Waveforms

## ■ TO-220F-3L PACKAGE OUTLINE DIMENSIONS



■ TO-220-3L PACKAGE OUTLINE DIMENSIONS

