

**•General Description**

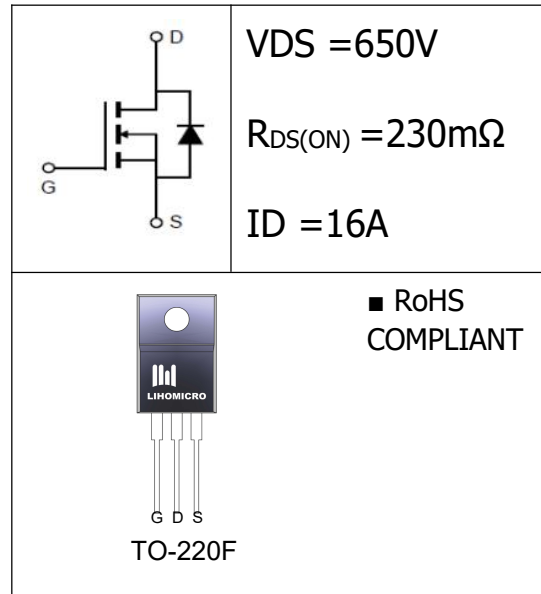
The SJ MOSFET LH65R230 has the low  $R_{DS(on)}$ , low gate charge, fast switching and excellent avalanche characteristics. This device offers extremely fast and robust body diode, and is suitable for telecom and power supplies.

**•Features**

- Extremely Low Switching loss
- Build-in ESD Diode

**•Application**

- LED/LCD/PDP TV and monitor Lighting
- Solar/Renewable/UPS-Micro Inverter System
- Power Supplies


**•Ordering Information:**

|                                       |                        |
|---------------------------------------|------------------------|
| Part number                           | LH65R230               |
| Package                               | TO-220F                |
| Basic ordering unit (pcs)             | 1000                   |
| Normal Package Material Ordering Code | LH65R230F-TO220F-TU    |
| Halogen Free Ordering Code            | LH65R230F-TO220F-TU-HF |

**•Absolute Maximum Ratings (TC = 25°C)**

| PARAMETER                                                                      |            | SYMBOL        | Value    | UNIT |
|--------------------------------------------------------------------------------|------------|---------------|----------|------|
| Drain-Source Breakdown Voltage                                                 |            | $BV_{DSS}$    | 650      | V    |
| Gate-Source Voltage                                                            |            | $V_{GS}$      | ±30      | V    |
| Continuous Drain Current                                                       | TC = 25°C  | $I_D$         | 16       | A    |
|                                                                                | TC = 100°C |               | 10       |      |
| Pulsed drain current<br>(TC = 25°C, $t_p$ limited by $T_{jmax}$ ) <sup>1</sup> |            | $I_D$ pulse   | 48       | A    |
| Single Pulse Avalanche Energy <sup>1</sup>                                     |            | $I_{AR}$      | 2.3      | A    |
| Single Pulse Avalanche Energy <sup>2</sup>                                     |            | $E_{AS}$      | 250      | mJ   |
| Power Dissipation (TC=25°C)                                                    |            | $P_D$         | 120      | W    |
| Operating Temperature and Storage Temperature Range                            |            | $T_J/T_{STG}$ | -55~+150 | °C   |
| MOSFET dv/dt ruggedness, $V_{DS}=0\ldots400V$                                  |            | dv/dt         | 50       | V/ns |
| Reverse diode dv/dt, $V_{DS}=0\ldots480V, I_{SD}\leq I_D$                      |            | dv/dt         | 15       | V/ns |

**●Electronic Characteristics**

| PARAMETER                               | SYMBOL       | TEST CONDITION                             | MIN | TYP  | MAX     | UNIT |
|-----------------------------------------|--------------|--------------------------------------------|-----|------|---------|------|
| Drain-Source Breakdown Voltage          | $BV_{DSS}$   | $V_{GS}=0V, I_D=250\mu A$                  | 650 | --   | --      | V    |
| Gate Threshold Voltage                  | $V_{GS(TH)}$ | $V_{DS}=V_{GS}, I_D=250\mu A$              | 2.5 | --   | 4.5     | V    |
| Drain-source On Resistance <sup>3</sup> | $R_{DS(ON)}$ | $V_{GS}=10V, I_D=8A$                       | --  | 210  | 230     | mΩ   |
| Drain-Source Leakage Current            | $I_{DSS}$    | $V_{DS}=650V, V_{GS}=0V, T_J=25^\circ C$   | --  | --   | 1       | uA   |
|                                         |              | $V_{DS}=650V, V_{GS}=0V, T_J=125^\circ C$  | --  | --   | 100     |      |
| Gate-Source Leakage Current             | $I_{GSS}$    | $V_{GS}=\pm 30V$                           | --  | --   | $\pm 1$ | uA   |
| Forward Transconductance <sup>3</sup>   | $R_G$        | $f=1.0MHz$ open drain                      | --  | --   | 6.2     | Ω    |
| Input Capacitance                       | $C_{iss}$    | $V_{GS}=0V, V_{DS}=400V, f=1.0MHz$         | --  | 1206 | --      | pF   |
| Output Capacitance                      | $C_{oss}$    |                                            | --  | 29.7 | --      |      |
| Reverse transfer Capacitance            | $C_{rss}$    |                                            | --  | 1.5  | --      |      |
| Turn-on delay time                      | $T_d(on)$    | $I_D=8.0A, V_{DS}=325V, R_G=25\Omega$      | --  | 16.5 | --      | nS   |
| Rise time                               | $T_r$        |                                            | --  | 16.2 | --      |      |
| Turn -Off Delay Time                    | $T_d(off)$   |                                            | --  | 67   | --      |      |
| Fall time                               | $T_f$        |                                            | --  | 19.5 | --      |      |
| Total Gate Charge                       | $Q_g$        | $I_D=8.0A, V_{DS}=400V, V_{GS}=10V$        | --  | 31.3 | ---     | nC   |
| Gate-to-Source Charge                   | $Q_{gs}$     |                                            | --  | 7.8  | --      |      |
| Gate-to-Drain Charge                    | $Q_{gd}$     |                                            | --  | 12.4 | ---     |      |
| Continuous Diode Forward Current        | $I_S$        |                                            | --  | --   | 16      | A    |
| Pulsed Diode Forward Current            | $I_{SM}$     |                                            | --  | --   | 50      | A    |
| Diode Forward Voltage                   | $V_{SD}$     | $T_J=25^\circ C, I_S=8.0A, V_{GS}=0V$      | --  | --   | 1.3     | V    |
| Reverse Recovery Time                   | $t_{rr}$     | $V_{RR}=400V, I_f=I_S, di_f/dt=100A/\mu s$ | --  | 285  | --      | ns   |
| Reverse Recovery Charge                 | $Q_{rr}$     |                                            | --  | 2.6  | --      | uC   |

**●Thermal Characteristics**

| PARAMETER                           | SYMBOL     | MAX  | UNIT |
|-------------------------------------|------------|------|------|
| Thermal Resistance Junction-case    | $R_{thJC}$ | 0.83 | °C/W |
| Thermal Resistance Junction-ambient | $R_{thJA}$ | 62   | °C/W |

Notes:

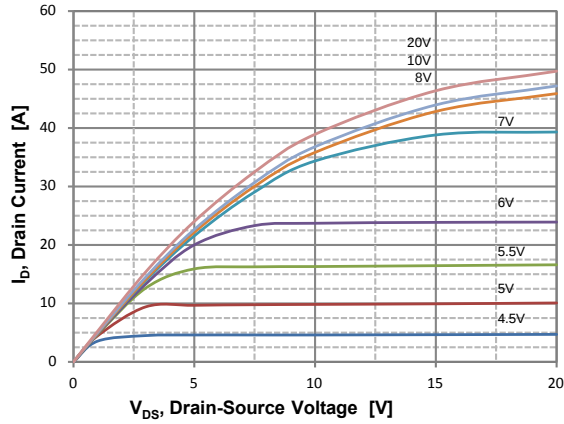
1.Repetitive Rating: Pulse width limited by maximum junction temperature.

2.  $I_{AS} = 2.3A, V_{DD} = 50V, R_G = 25\Omega$ , Starting  $T_J = 25^\circ C$

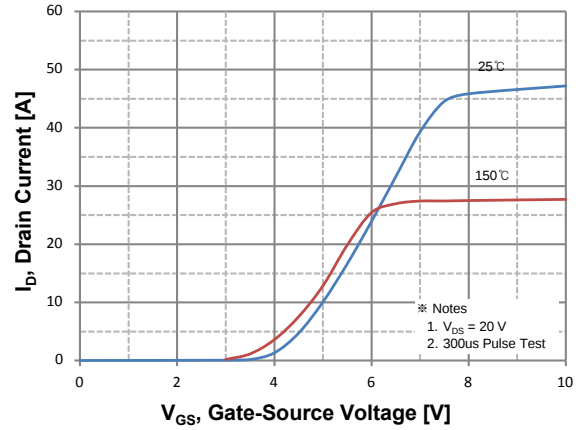
3. Pulse Test : Pulse width  $\leq 300\mu s$ , Duty cycle  $\leq 2\%$

● **Typical Characteristics**  $T_J=25^{\circ}\text{C}$ , unless otherwise noted

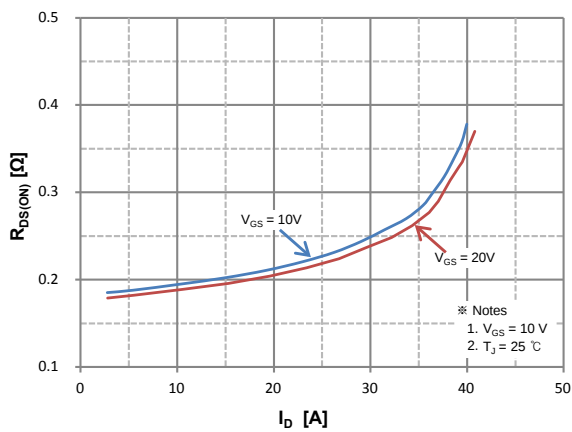
**Figure 1. On Region Characteristics**



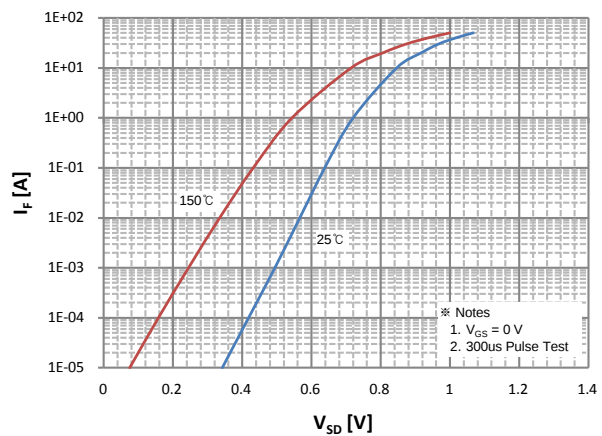
**Figure 2. Transfer Characteristics**



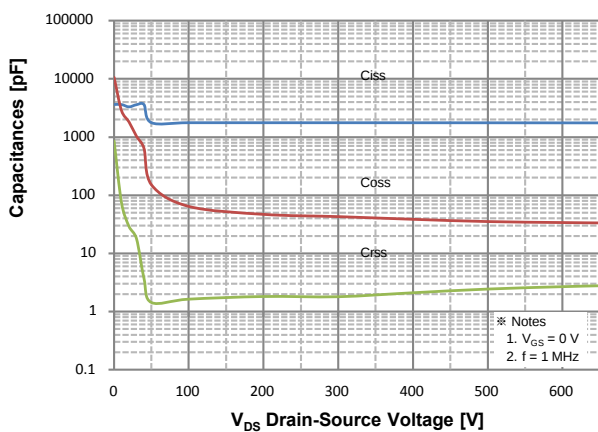
**Figure 3. On Resistance Variation vs Drain Current and Gate Voltage**



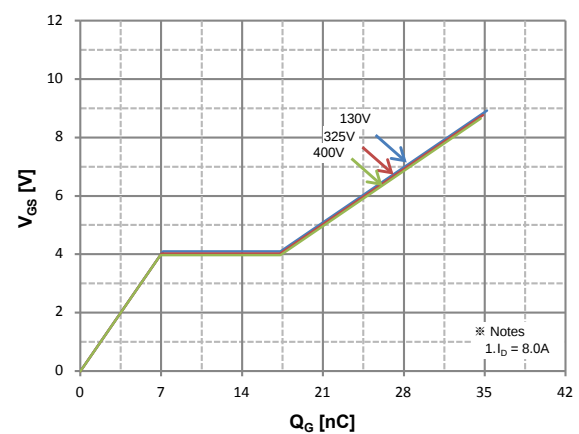
**Figure 4. Body Diode Forward Voltage Variation with Source Current and Temperature**



**Figure 5. Capacitance Characteristics**

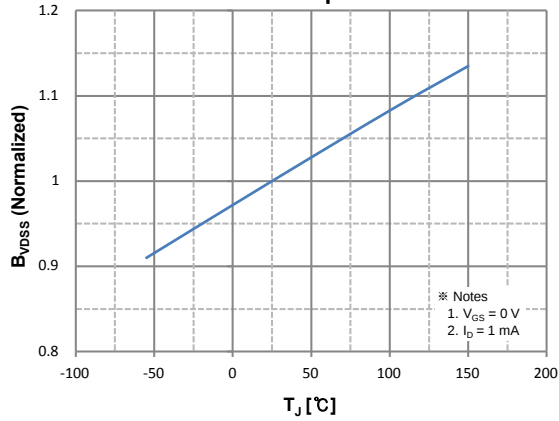


**Figure 6. Gate Charge Characteristics**

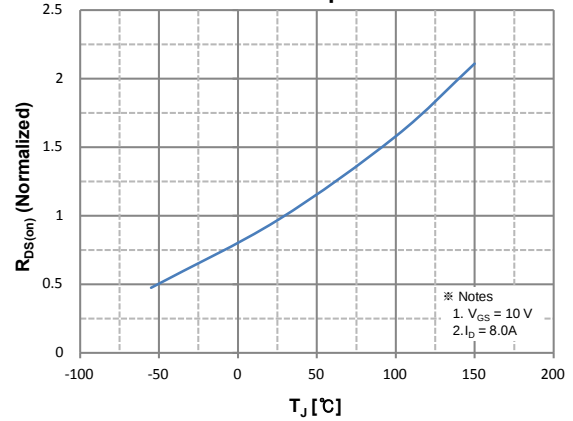


● **Typical Characteristics(Cont.)**

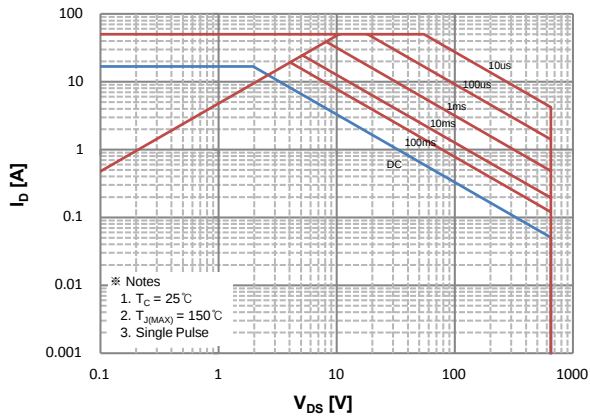
**Figure 7. Breakdown Voltage Variation vs. Temperature**



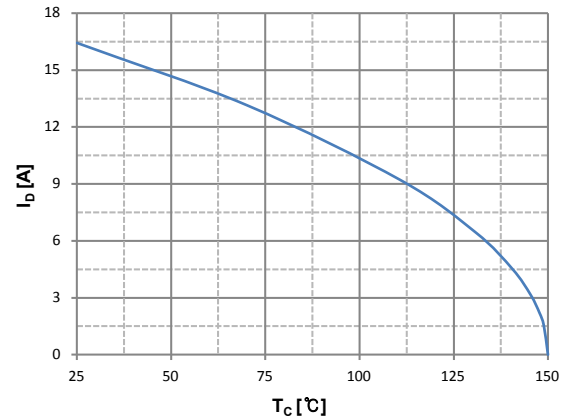
**Figure 8. On-Resistance Variation vs. Temperature**



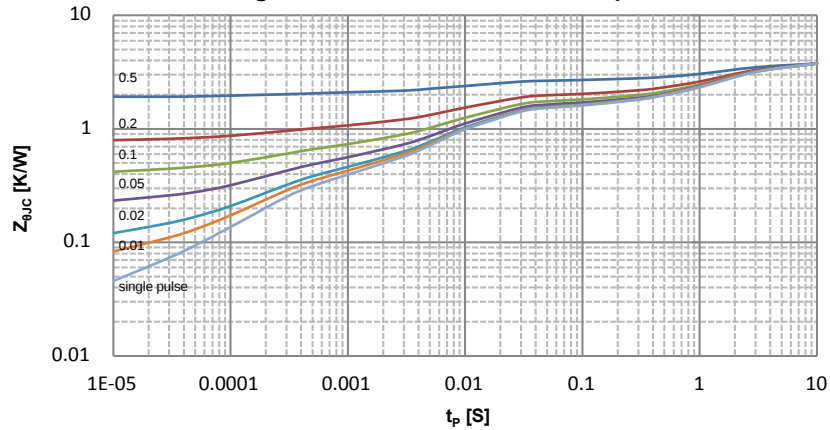
**Figure 9. Maximum Safe Operating Area**



**Figure 10. Maximum Drain Current vs. Case Temperature**



**Figure 11. Transient Thermal Response Curve**



● Test Circuits and Waveforms

Fig 1. Gate Charge Test Circuit & Waveform

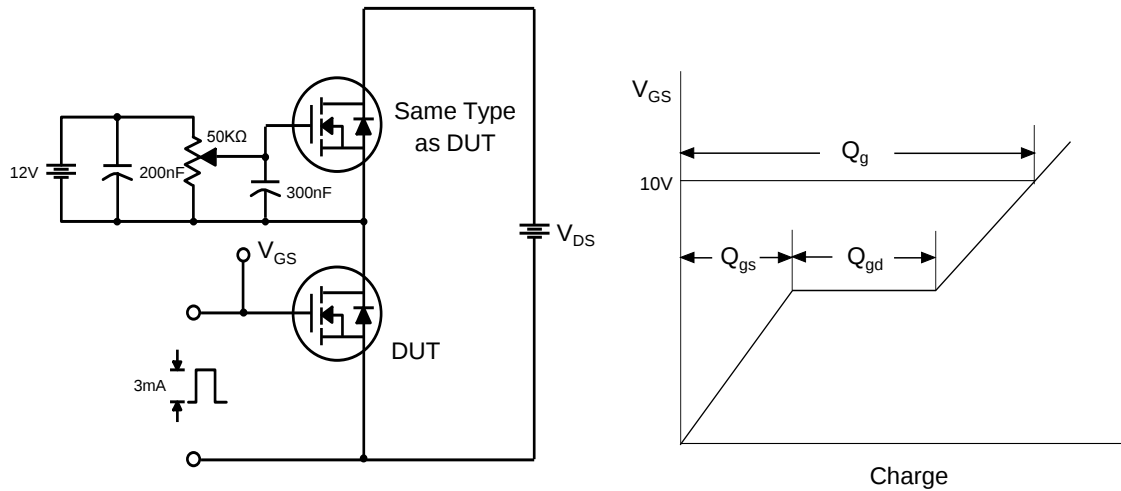


Fig 2. Resistive Switching Test Circuit & Waveforms

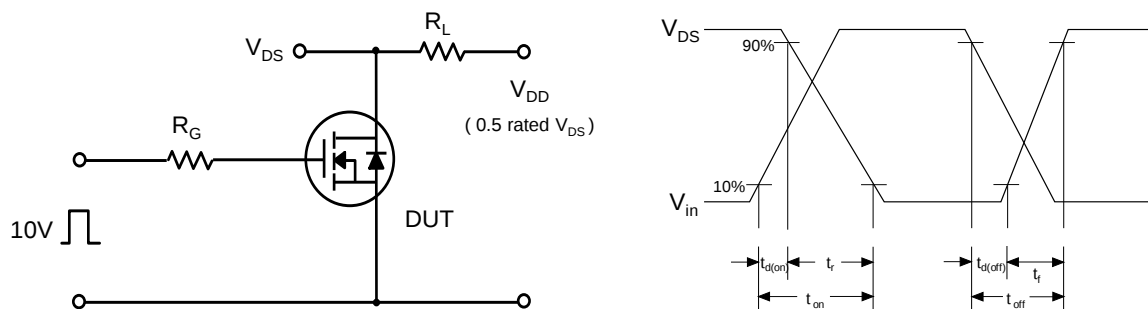
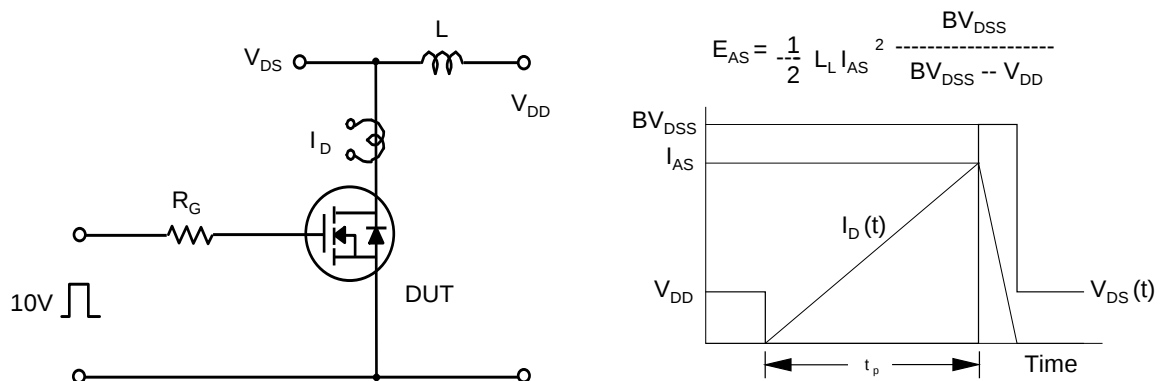
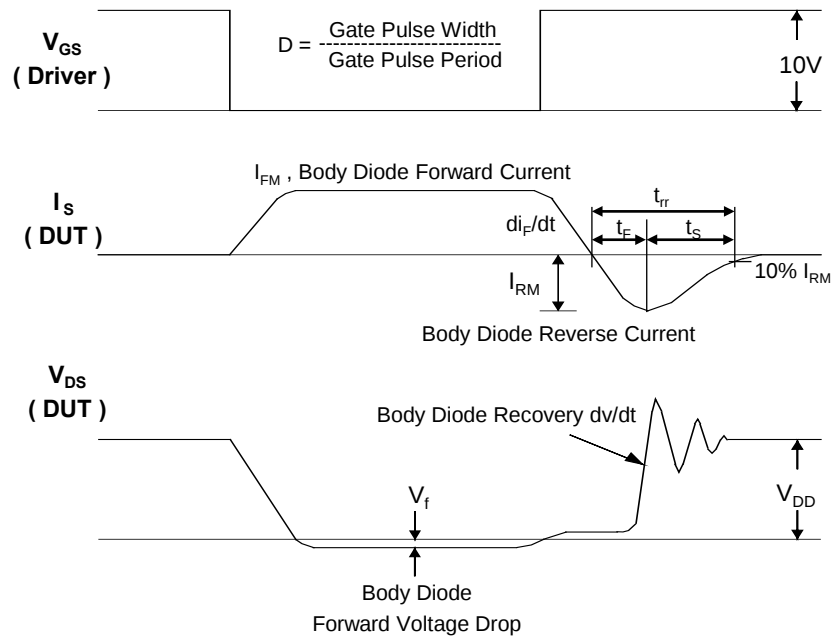
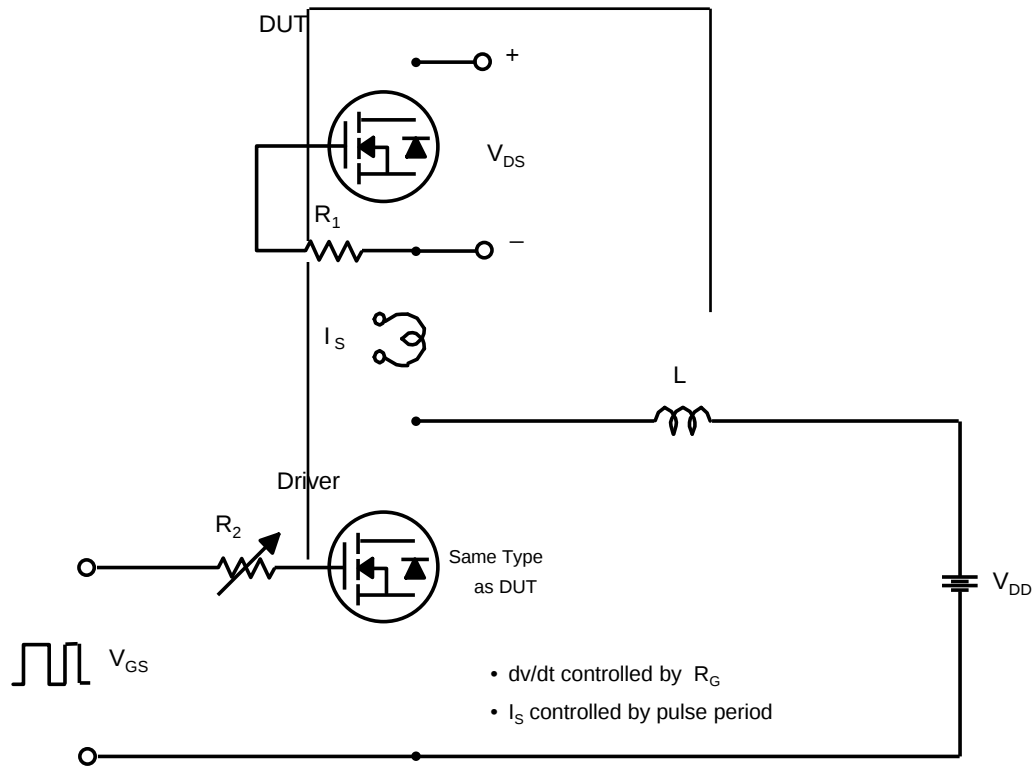


Fig 3. Unclamped Inductive Switching Test Circuit & Waveforms



•Test Circuits and Waveforms(cont.)

Fig 4. Peak Diode Recovery dv/dt Test Circuit & Waveforms



**•Dimensions (TO-220F)**

UNIT:mm

| SYMBOL | min   | max   | SYMBOL | min   | max   |
|--------|-------|-------|--------|-------|-------|
| A      | 4.40  | 4.90  | B1     | 2.90  | 3.70  |
| A1     | 2.40  | 3.00  | e      | 2.40  | 2.70  |
| A2     | 2.30  | 3.00  | e1     | 4.95  | 5.25  |
| b      | 0.60  | 0.90  | L      | 12.40 | 14.20 |
| b1     | 1.10  | 1.70  | L1     | 2.40  | 3.40  |
| c      | 0.40  | 0.70  | ∅P     | 2.90  | 3.50  |
| D      | 9.80  | 10.60 |        |       |       |
| B      | 15.40 | 16.40 |        |       |       |

