KODENSHI AUK

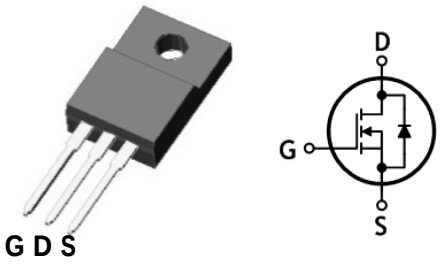
# SUN0765F

**New Generation N-Ch Power MOSFET**

## HIGH SPEED SWITCHING APPLICATION

### Features

- Low drain-source On resistance: $R_{DS(on)}$=1.1Ω (Typ.)
- Low gate charge: $Q_g$=18nC (Typ.)
- Low reverse transfer capacitance: $C_{rss}$=5.5pF (Typ.)
- RoHS compliant device
- 100% avalanche tested

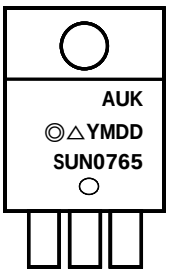



**TO-220F-3L**

### Ordering Information

| Part Number | Marking | Package |
|---|---|---|
| SUN0765F | SUN0765 | TO-220F-3L |

### Marking Information




**Column 1: Manufacturer**
**Column 2: Production Information**
**e.g.) ◎△YMDD**
**-. ◎: Option Code (H: Halogen Free)**
**-. △: Factory Management Code**
**-. YMDD: Date Code (Year, Month, Date)**
**Column 3: Device Code**

### Absolute maximum ratings ($T_C$=25°C unless otherwise noted)

| Characteristic | Symbol | | Rating | Unit |
|---|---|---|---|---|
| Drain-source voltage | $V_{DSS}$ | | 650 | V |
| Gate-source voltage | $V_{GSS}$ | | ±30 | V |
| Drain current (DC) * | $I_D$ | $T_c$=25°C | 7 | A |
| | | $T_c$=100°C | 4.43 | A |
| Drain current (Pulsed) * | $I_{DM}$ | | 28 | A |
| Single avalanche energy (Note 2) | $E_{AS}$ | | 92.9 | mJ |
| Repetitive avalanche current (Note 1) | $I_{AR}$ | | 7 | A |
| Repetitive avalanche energy (Note 1) | $E_{AR}$ | | 3.2 | mJ |
| Power dissipation | $P_D$ | | 32 | W |
| Junction temperature | $T_J$ | | 150 | °C |
| Storage temperature range | $T_{stg}$ | | -55~150 | °C |

* Limited only maximum junction temperature

## Thermal Characteristics

| Characteristic | Symbol | Rating | Unit |
|---|---|---|---|
| Thermal resistance, junction to case | $R_{th(j-c)}$ | Max. 3.9 | °C/W |
| Thermal resistance, junction to ambient | $R_{th(j-a)}$ | Max. 62.5 | |

## Electrical Characteristics ($T_C$=25°C unless otherwise noted)

| Characteristic | Symbol | Test Condition | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| Drain-source breakdown voltage | $BV_{DSS}$ | $I_D$=250uA, $V_{GS}$=0 | 650 | - | - | V |
| Gate threshold voltage | $V_{GS(th)}$ | $I_D$=250uA, $V_{DS}$=$V_{GS}$ | 3 | - | 5 | V |
| Drain-source cut-off current | $I_{DSS}$ | $V_{DS}$=650V, $V_{GS}$=0V | - | - | 1 | uA |
| | | $V_{DS}$=650V, $T_c$=150°C | - | - | 100 | uA |
| Gate leakage current | $I_{GSS}$ | $V_{DS}$=0V, $V_{GS}$=±30V | - | - | ±100 | nA |
| Drain-source on-resistance | $R_{DS(ON)}$ | $V_{GS}$=10V, $I_D$=3.5A | - | 1.1 | 1.4 | Ω |
| Forward transfer conductance (Note 3) | $g_{fs}$ | $V_{DS}$=10V, $I_D$=3.5A | - | 8.7 | - | S |
| Input capacitance | $C_{iss}$ | $V_{DS}$=25V, $V_{GS}$=0V, f=1.0MHz | - | 1385 | - | pF |
| Output capacitance | $C_{oss}$ | | - | 102 | - | |
| Reverse transfer capacitance | $C_{rss}$ | | - | 5.5 | - | |
| Turn-on delay time (Note 3,4) | $t_{d(on)}$ | $V_{DS}$=325V, $I_D$=7A, $R_G$=25Ω | - | 60 | - | ns |
| Rise time (Note 3,4) | $t_r$ | | - | 32 | - | |
| Turn-off delay time (Note 3,4) | $t_{d(off)}$ | | - | 113 | - | |
| Fall time (Note 3,4) | $t_f$ | | - | 22 | - | |
| Total gate charge (Note 3,4) | $Q_g$ | $V_{DS}$=520V, $V_{GS}$=10V, $I_D$=7A | - | 18 | 23 | nC |
| Gate-source charge (Note 3,4) | $Q_{gs}$ | | - | 7 | - | |
| Gate-drain charge (Note 3,4) | $Q_{gd}$ | | - | 3 | - | |

## Source-Drain Diode Ratings and Characteristics ($T_C$=25°C unless otherwise noted)

| Characteristic | Symbol | Test Condition | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| Source current (DC) | $I_S$ | Integral reverse diode in the MOSFET | - | - | 7 | A |
| Source current (Pulsed) | $I_{SM}$ | | - | - | 28 | A |
| Forward voltage | $V_{SD}$ | $V_{GS}$=0V, $I_{SD}$=7A | - | - | 1.4 | V |
| Reverse recovery time (Note 3,4) | $t_{rr}$ | $I_{SD}$=7A, $V_{GS}$=0V $dI_F/dt$=100A/us | - | 410 | - | ns |
| Reverse recovery charge (Note 3,4) | $Q_{rr}$ | | - | 1.7 | - | uC |

Note:
1. Repeated rating: Pulse width limited by safe operating area
2. L=3.5mH, $I_{AS}$=7A, $V_{DD}$=50V, $R_G$=25Ω, Starting $T_J$=25°C
3. Pulse test: Pulse width≤300us, Duty cycle≤2%
4. Essentially independent of operating temperature typical characteristics

## Typical Electrical Characteristics Curves

**Fig. 1 Typical Output Characteristics**

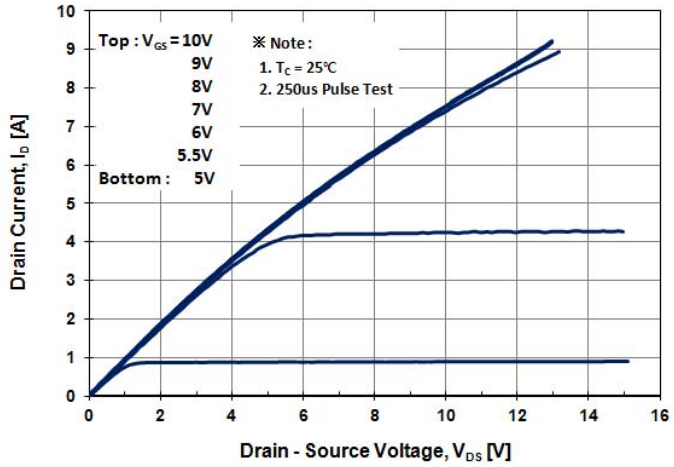



**Fig. 2 Typical Output Characteristics**

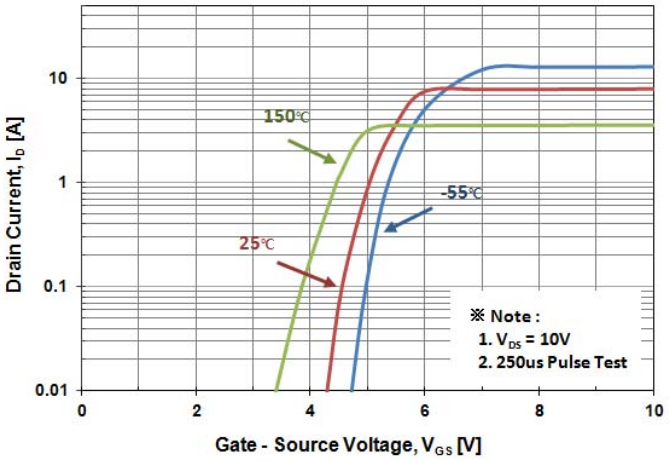



**Fig.3 On-Resistance Variation with Drain Current and Gate Voltage**

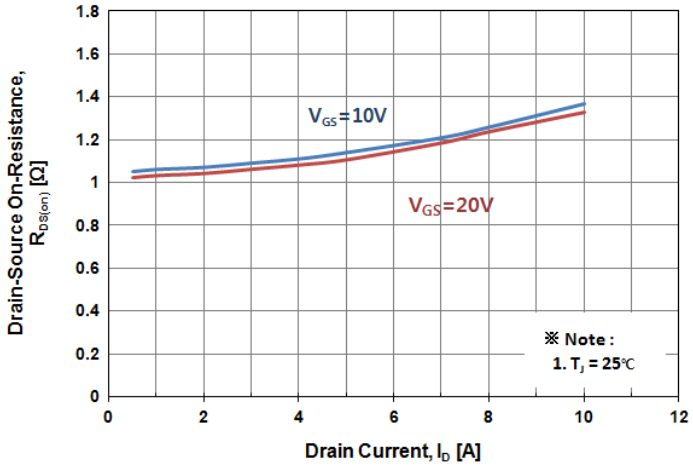



**Fig. 4 Body Diode Forward Voltage Variation with Source Current**

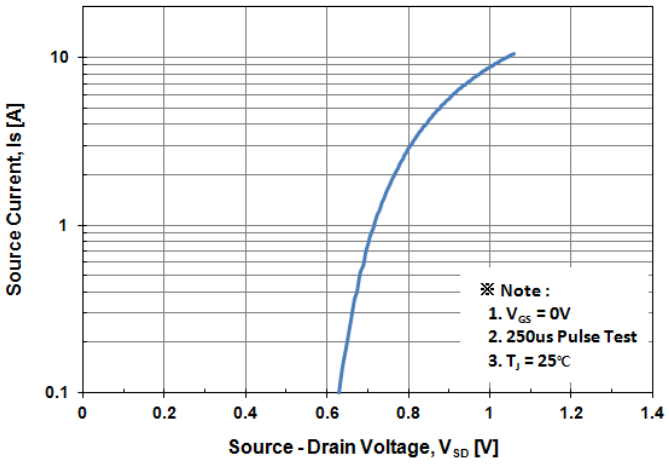



**Fig. 5 Typical Capacitance Characteristics**

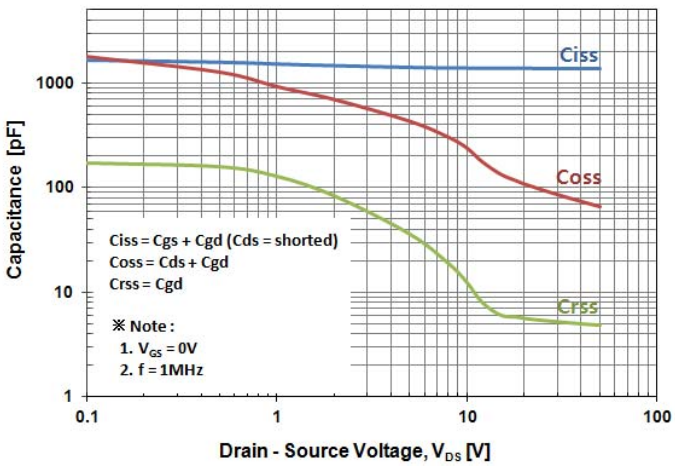



**Fig. 6 Typical Total Gate Charge Characteristics**

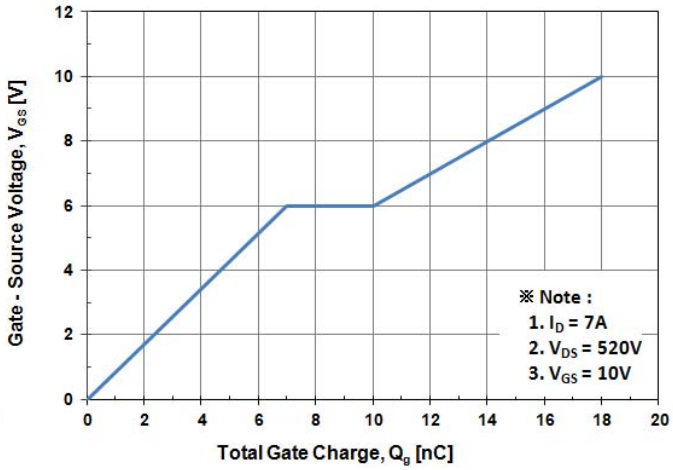


**Fig. 7 Breakdown Voltage Variation vs. Temperature**

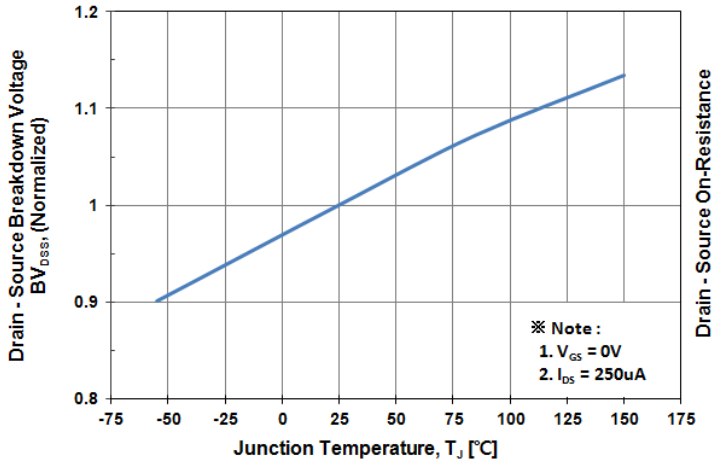



**Fig. 8 On-Resistance Variation vs. Temperature**

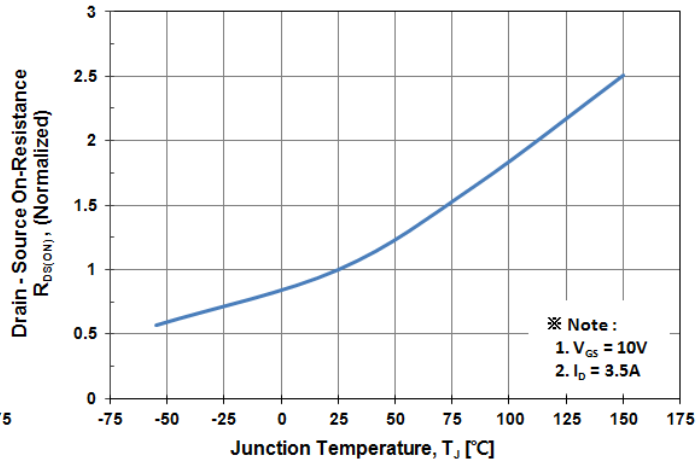



**Fig. 9 Maximum Drain Current vs. Case Temperature**

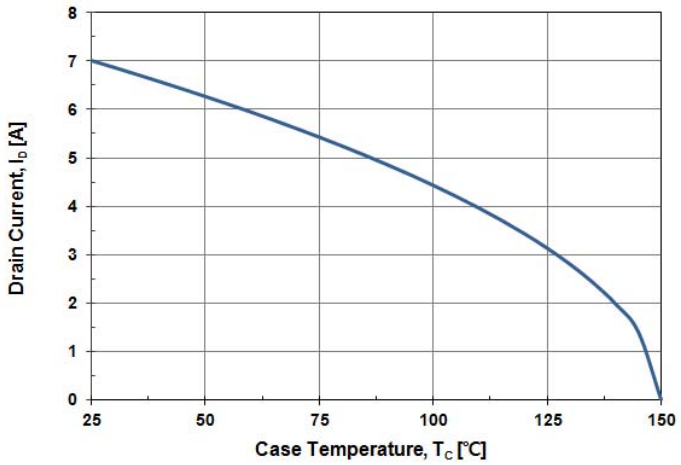



**Fig. 10 Maximum Safe Operating Area**

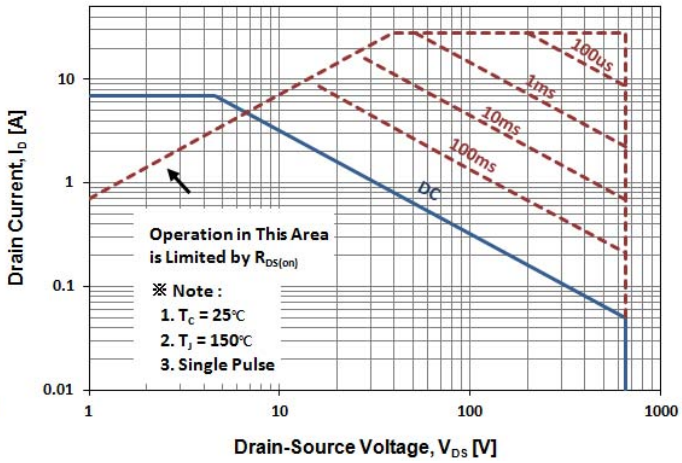



**Fig. 11 Transient Thermal Impedance**

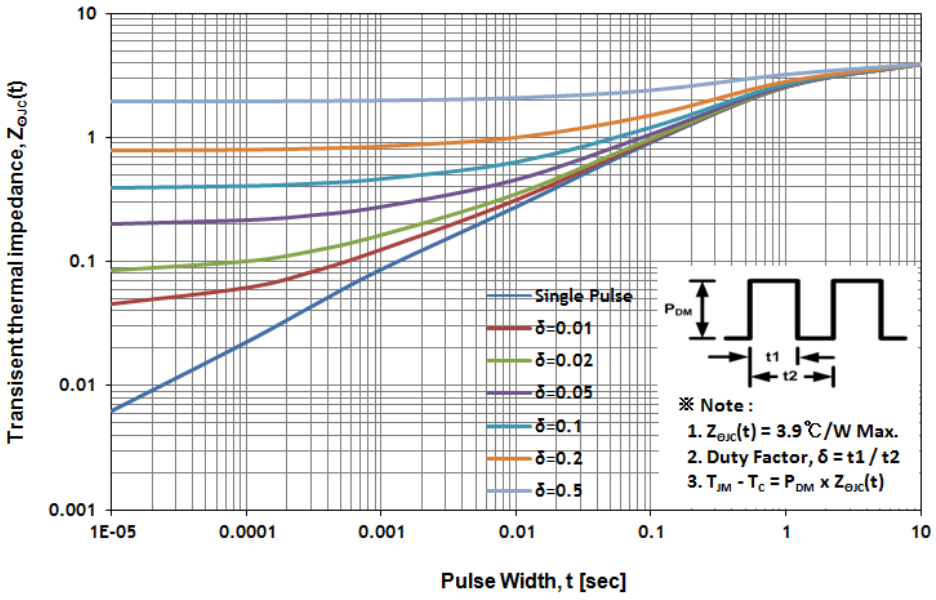
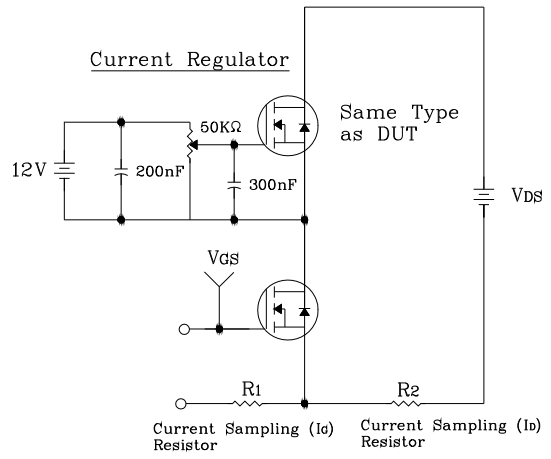


**Fig. 12 Gate Charge Test Circuit & Waveform**



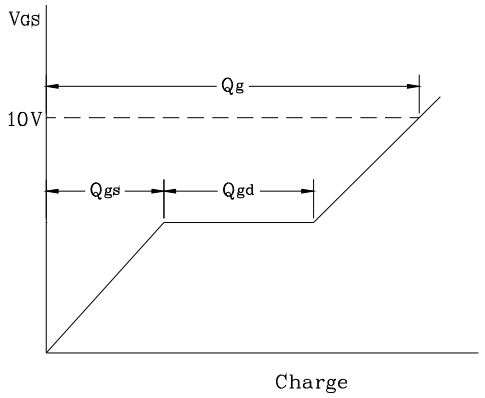
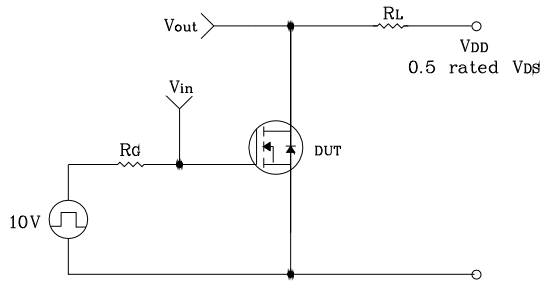




**Fig. 13 Resistive Switching Test Circuit & Waveform**



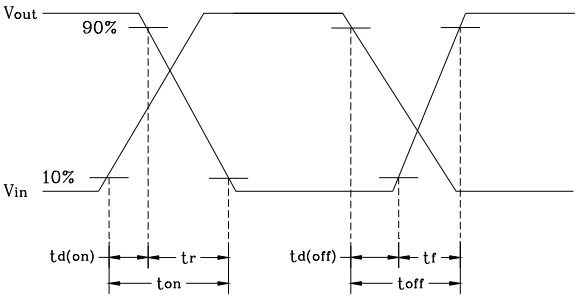
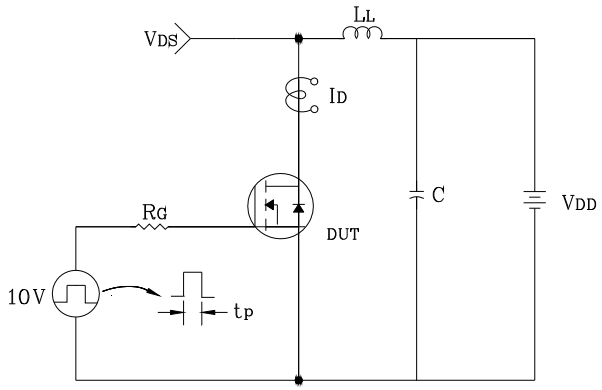




**Fig. 14 $E_{AS}$ Test Circuit & Waveform**



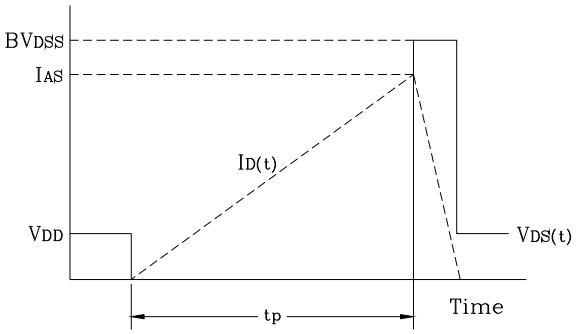
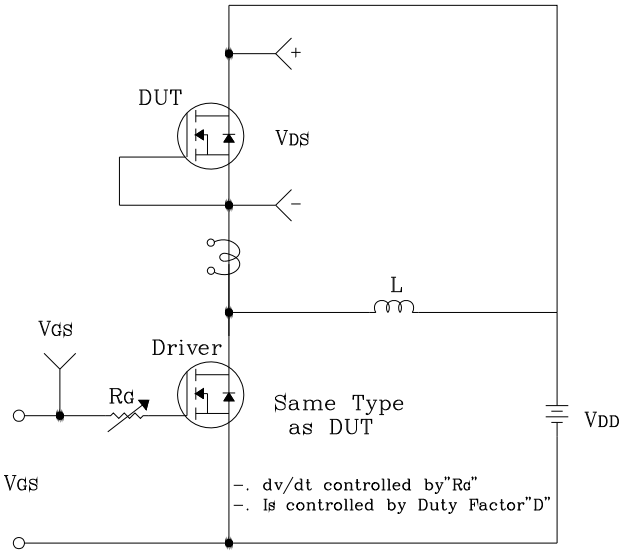
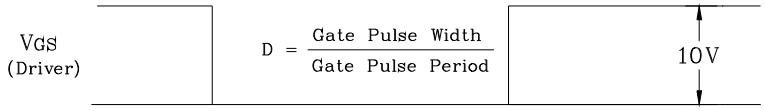
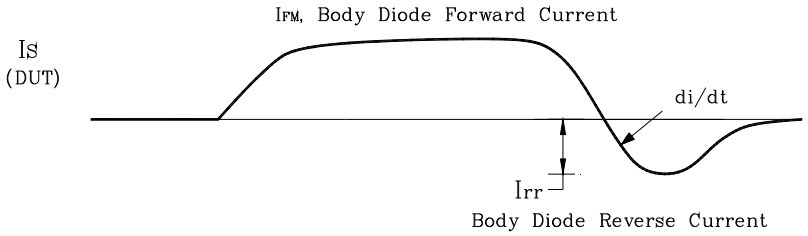
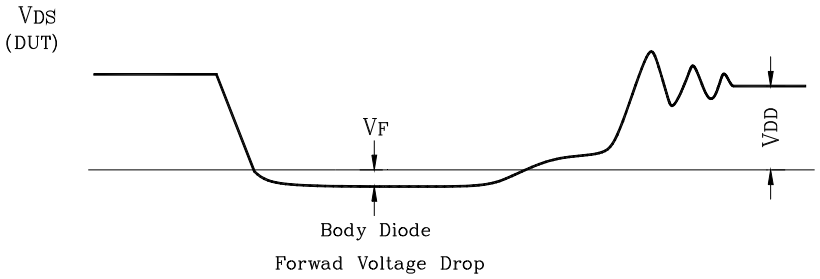



**Fig. 15 Diode Reverse Recovery Time Test Circuit & Waveform**

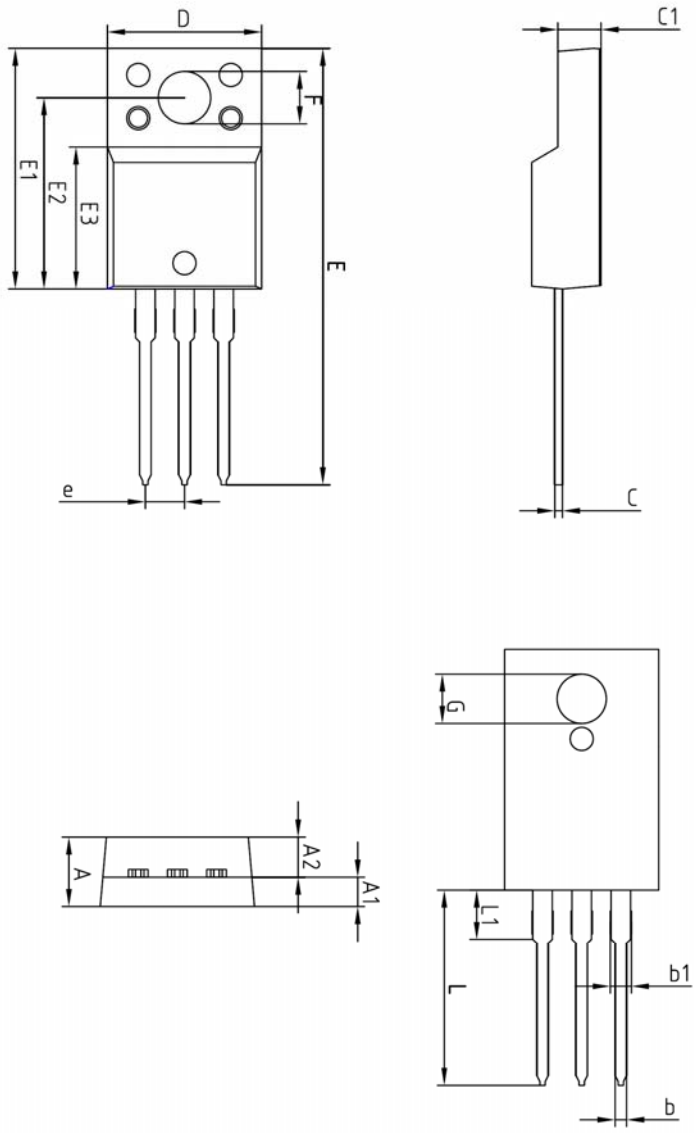


## Package Outline Dimensions




| SYMBOL | MILLIMETERS | | | NOTE |
|---|---|---|---|---|
| | MINIMUM | NOMINAL | MAXIMUM | |
| A | – | – | 4.60 | |
| A1 | 2.45 | 2.50 | 2.55 | |
| A2 | 1.95 | 2.00 | 2.05 | |
| b | 0.65 | 0.75 | 0.85 | |
| b1 | 1.07 | 1.27 | 1.47 | |
| C | 0.40 | 0.50 | 0.60 | |
| C1 | 2.70 | 2.80 | 2.90 | |
| D | 9.90 | 10.00 | 10.10 | |
| E | 28.00 | – | 28.60 | |
| E1 | 15.50 | 15.60 | 15.70 | |
| E2 | 12.30 | 12.40 | 12.50 | |
| E3 | 9.15 | 9.20 | 9.25 | |
| F | 3.30 | 3.40 | 3.50 | |
| G | 3.10 | 3.20 | 3.30 | |
| e | 2.54 BSC | | | |
| L | 12.40 | – | 13.00 | |
| L1 | 3.46 BSC | | | |

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