KODENSHI AUK

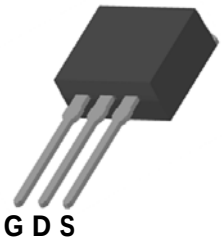
# SUN1060I2

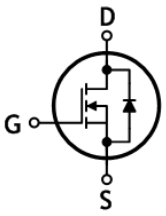
**New Generation N-Ch Power MOSFET**

## HIGH SPEED SWITCHING APPLICATION

### Features

- Low drain-source On resistance: $R_{DS(on)}$=0.6Ω (Typ.)
- Low gate charge: $Q_g$=27nC (Typ.)
- Low reverse transfer capacitance: $C_{rss}$=4.9pF (Typ.)
- RoHS compliant device
- 100% avalanche tested



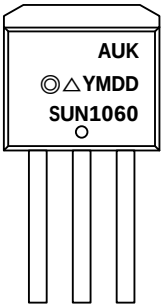




**I2-PAK**

### Ordering Information

| Part Number | Marking | Package |
|---|---|---|
| SUN1060I2 | SUN1060 | I2-PAK |

### 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 | $V_{DSS}$ | | 600 | V |
| Gate-source voltage | $V_{GSS}$ | | ±30 | V |
| Drain current (DC) * | $I_D$ | $T_c$=25°C | 10 | A |
| | | $T_c$=100°C | 6.32 | A |
| Drain current (Pulsed) * | $I_{DM}$ | | 40 | A |
| Single avalanche energy (Note 2) | $E_{AS}$ | | 545 | mJ |
| Repetitive avalanche current (Note 1) | $I_{AR}$ | | 10 | A |
| Repetitive avalanche energy (Note 1) | $E_{AR}$ | | 11 | mJ |
| Power dissipation | $P_D$ | | 110 | 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. 1.13 | °C/W |
| Thermal resistance, junction to ambient | $R_{th(j-a)}$ | Max. 50 | |

## 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 | 600 | - | - | V |
| Gate threshold voltage | $V_{GS(th)}$ | $I_D$=250uA, $V_{DS}$=$V_{GS}$ | 3 | - | 5 | V |
| Drain-source cut-off current | $I_{DSS}$ | $V_{DS}$=600V, $V_{GS}$=0V | - | - | 1 | uA |
| | | $V_{DS}$=600V, $T_c$=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, $I_D$=5A | - | 0.6 | 0.75 | Ω |
| Forward transfer conductance (Note 3) | $g_{fs}$ | $V_{DS}$=10V, $I_D$=5A | - | 11 | - | S |
| Input capacitance | $C_{iss}$ | $V_{DS}$=25V, $V_{GS}$=0V, f=1.0MHz | - | 2178 | - | pF |
| Output capacitance | $C_{oss}$ | | - | 154 | - | |
| Reverse transfer capacitance | $C_{rss}$ | | - | 4.9 | - | |
| Turn-on delay time (Note 3,4) | $t_{d(on)}$ | $V_{DS}$ =300V, $I_D$=10A, $R_G$=25Ω | - | 92 | - | ns |
| Rise time (Note 3,4) | $t_r$ | | - | 40 | - | |
| Turn-off delay time (Note 3,4) | $t_{d(off)}$ | | - | 175 | - | |
| Fall time (Note 3,4) | $t_f$ | | - | 40 | - | |
| Total gate charge (Note 3,4) | $Q_g$ | $V_{DS}$=480V, $V_{GS}$=10V, $I_D$=10A | - | 27 | 35 | nC |
| Gate-source charge (Note 3,4) | $Q_{gs}$ | | - | 11 | - | |
| Gate-drain charge (Note 3,4) | $Q_{gd}$ | | - | 5 | - | |

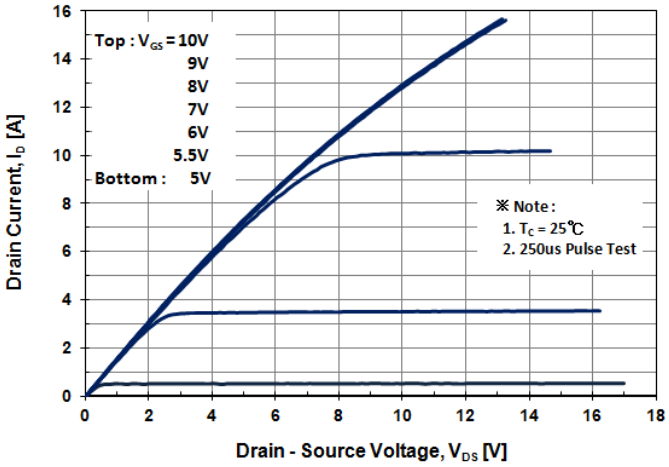
## Source-Drain Diode Ratings and Characteristics ($T_C$=25°C unless otherwise noted)

| Characteristic | Symbol | Test Condition | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| Source current (DC) | $I_S$ | Integral reverse diode in the MOSFET | - | - | 10 | A |
| Source current (Pulsed) | $I_{SM}$ | | - | - | 40 | A |
| Forward voltage | $V_{SD}$ | $V_{GS}$=0V, $I_{SD}$=10A | - | - | 1.4 | V |
| Reverse recovery time (Note 3,4) | $t_{rr}$ | $I_{SD}$=10A, $V_{GS}$=0V $dI_F/dt$=100A/us | - | 467 | - | ns |
| Reverse recovery charge (Note 3,4) | $Q_{rr}$ | | - | 2.85 | - | uC |

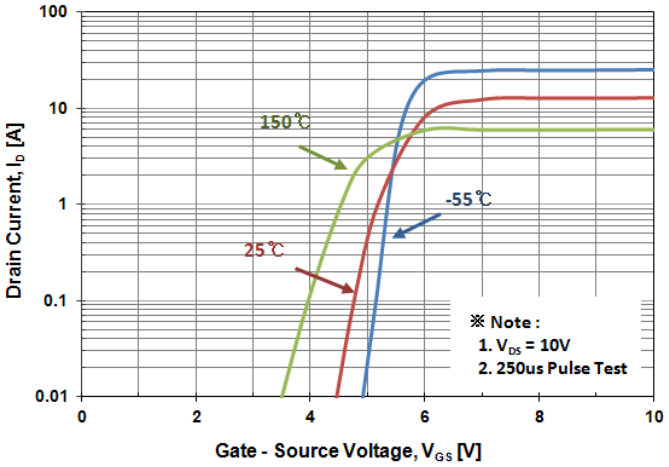
Note:
1. Repeated rating: Pulse width limited by safe operating area
2. L=10mH, $I_{AS}$=10A, $V_{DD}$=50V, $R_G$=25Ω, Starting $T_J$=25°C
3. Pulse test: Pulse width≤300us, Duty cycle≤2%
4. Essentially independent of operating temperature typical characteristics

## Typical Electrical Characteristics Curves

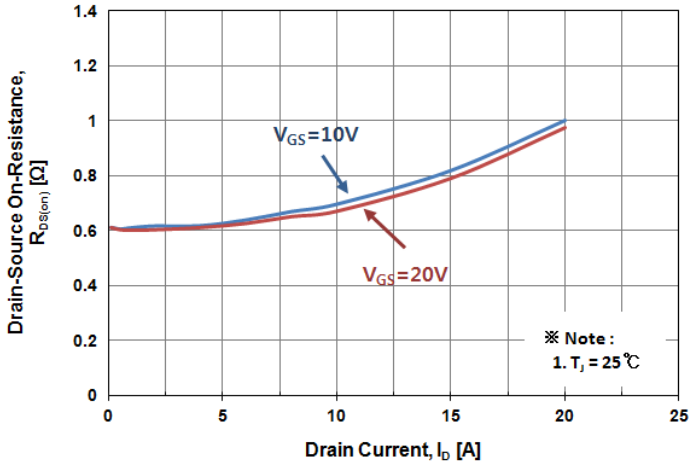
### Fig. 1 Typical Output Characteristics



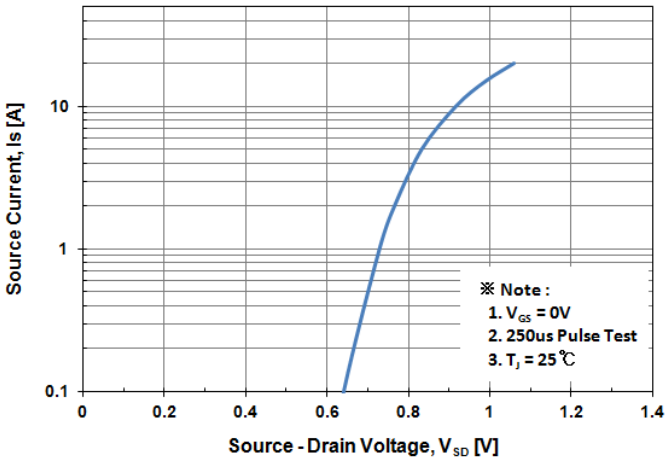

### Fig. 2 Typical Output Characteristics



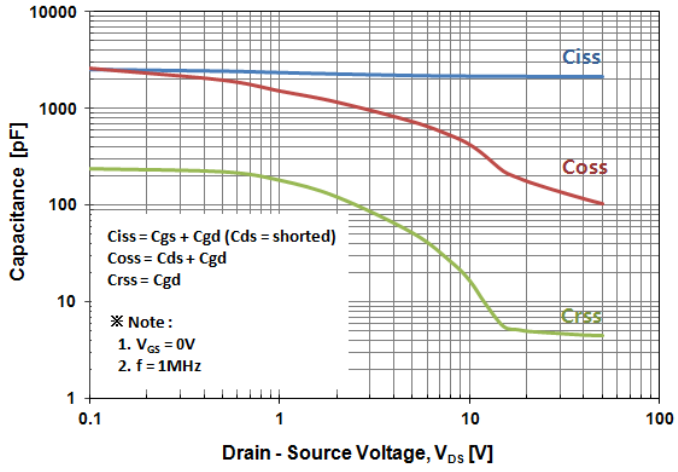

### Fig.3 On-Resistance Variation with Drain Current and Gate Voltage




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




### Fig. 5 Typical Capacitance Characteristics




### Fig. 6 Typical Total Gate Charge Characteristics

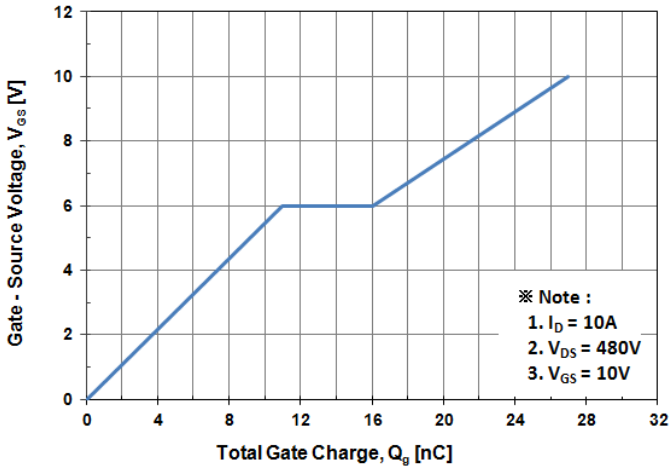


**Fig. 7 Breakdown Voltage Variation vs. Temperature**

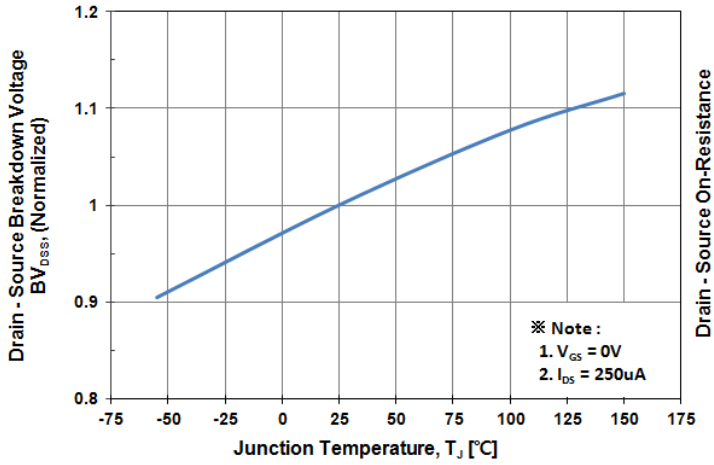



**Fig. 8 On-Resistance Variation vs. Temperature**

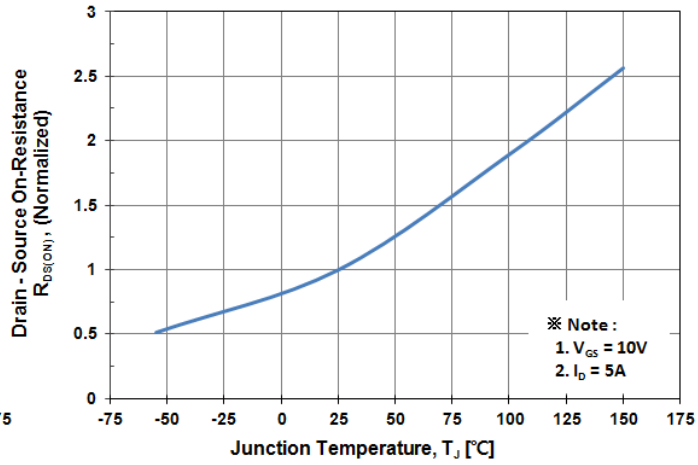



**Fig. 9 Maximum Drain Current vs. Case Temperature**

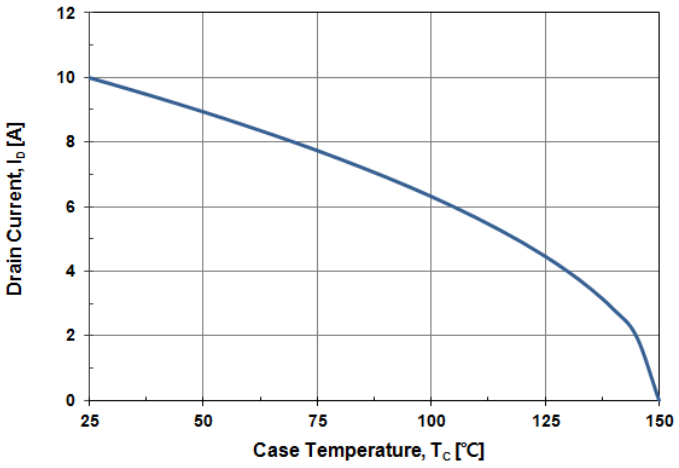



**Fig. 10 Maximum Safe Operating Area**

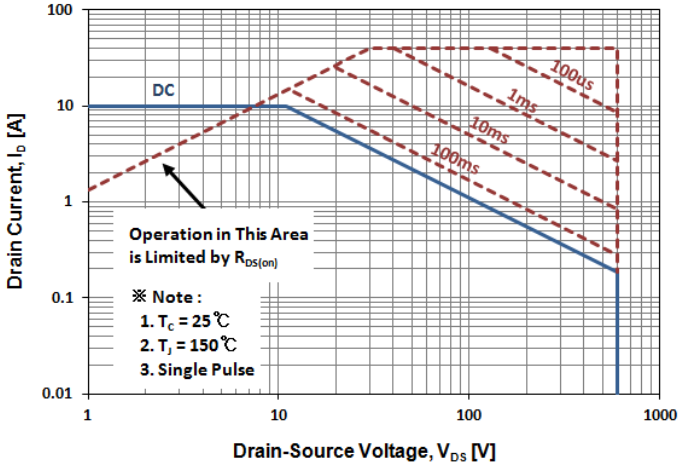



**Fig. 11 Transient Thermal Impedance**

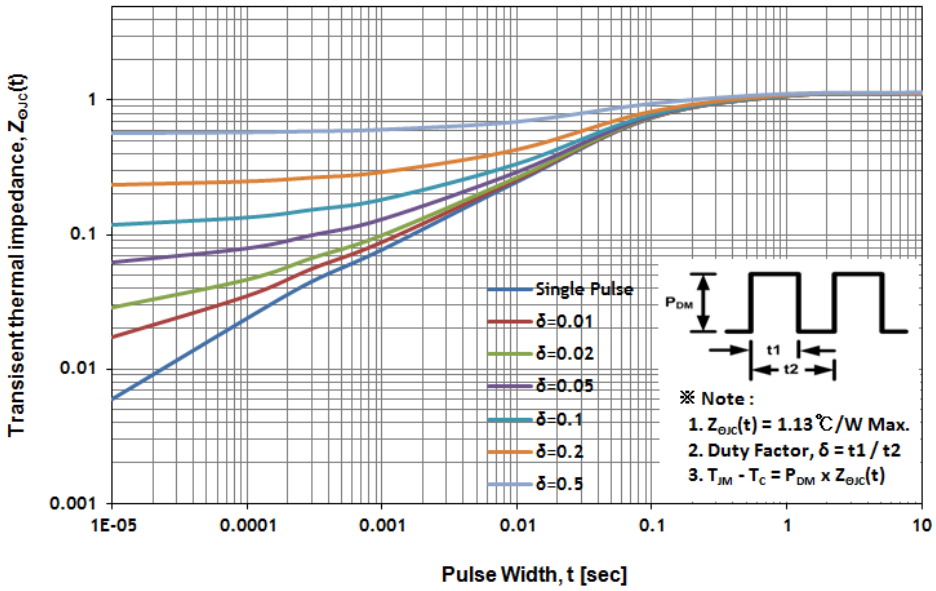
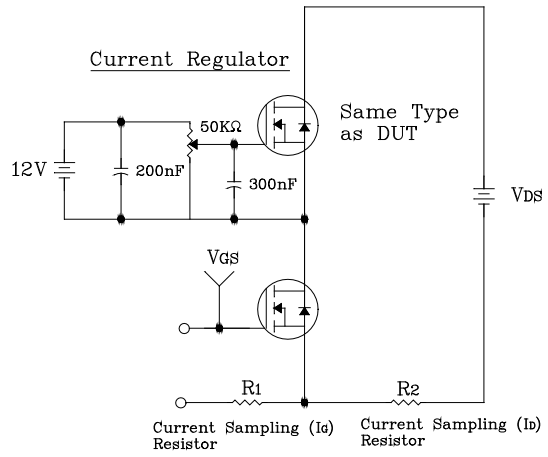


**Fig. 12 Gate Charge Test Circuit & Waveform**



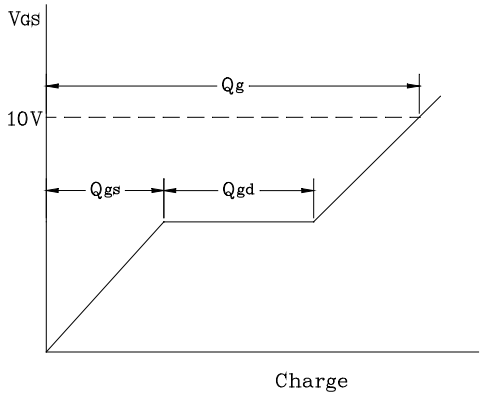
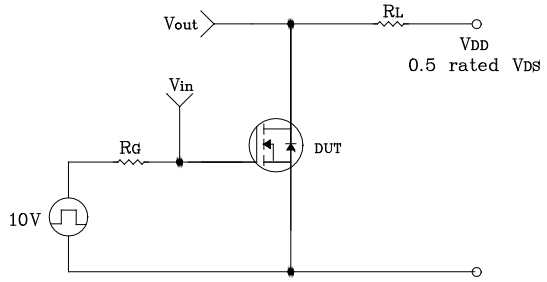




**Fig. 13 Resistive Switching Test Circuit & Waveform**



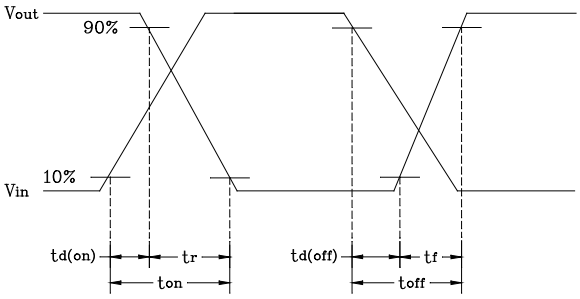
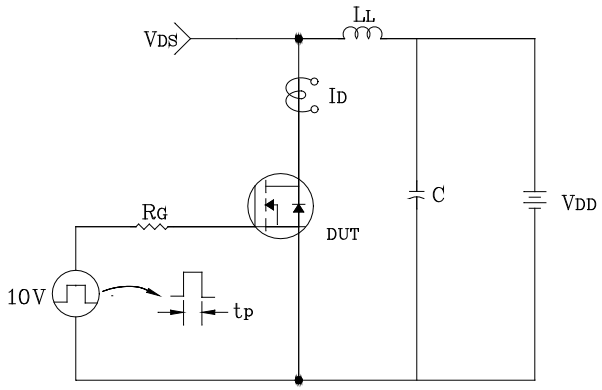




**Fig. 14 $E_{AS}$ Test Circuit & Waveform**



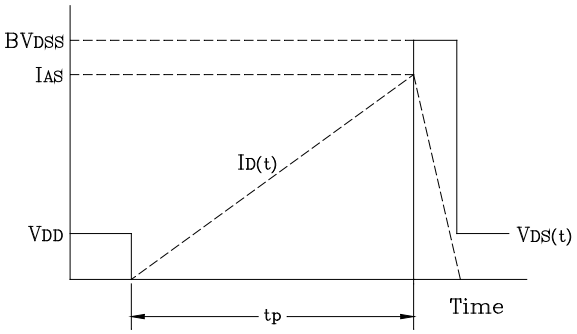
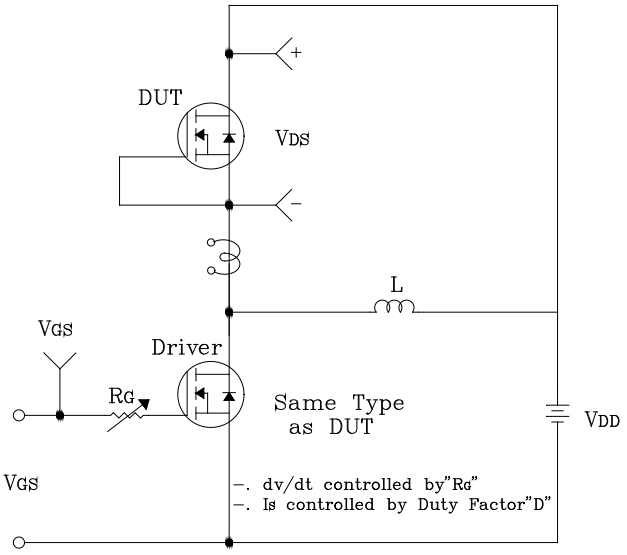
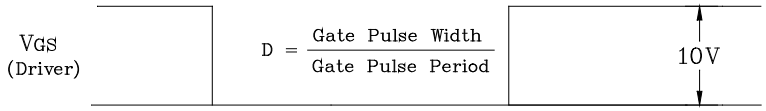
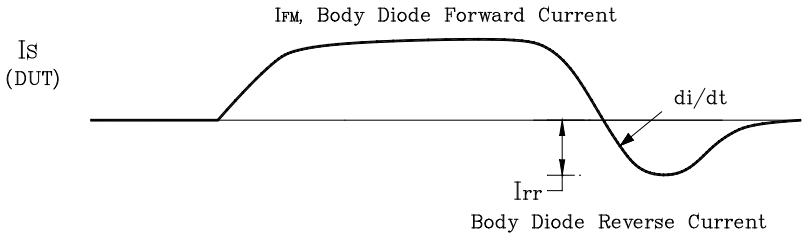
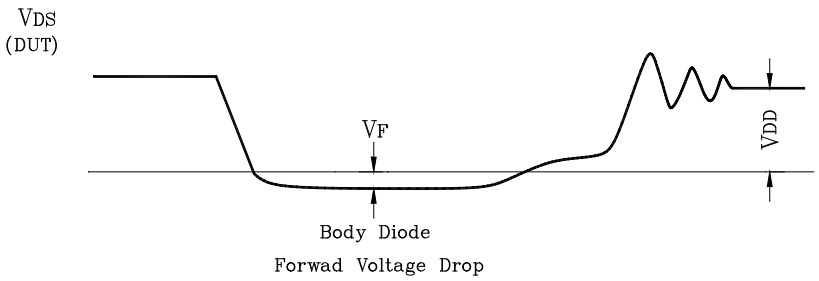



**Fig. 15 Diode Reverse Recovery Time Test Circuit & Waveform**

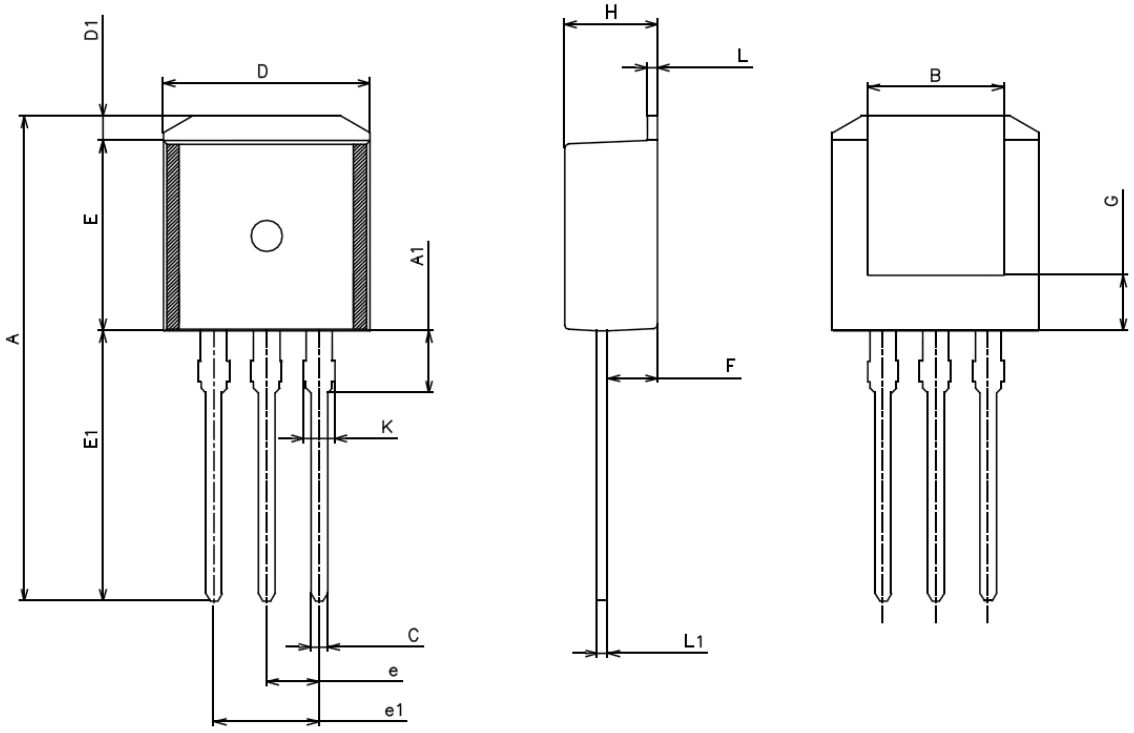


## Package Outline Dimensions




| SYMBOL | MILLIMETERS | | | NOTE |
|---|---|---|---|---|
| | MINIMUM | NOMINAL | MAXIMUM | |
| A | 22.98 | 23.48 | 23.98 | |
| A1 | 2.80 | 3.00 | 3.20 | |
| B | 6.40 | 6.60 | 6.80 | |
| C | 0.60 | 0.80 | 1.00 | |
| D | 9.80 | 10.00 | 10.20 | |
| D1 | 1.00 | 1.20 | 1.40 | |
| E | 9.05 | 9.20 | 9.35 | |
| E1 | 12.68 | 13.08 | 13.48 | |
| e | 2.34 | 2.54 | 2.74 | |
| e1 | 4.88 | 5.08 | 5.28 | |
| F | 2.20 | 2.40 | 2.60 | |
| G | 2.50 | 2.70 | 2.90 | |
| H | 4.35 | 4.50 | 4.65 | |
| K | 1.42 | 1.52 | 1.62 | |
| L | 0.40 | 0.50 | 0.60 | |
| L1 | 0.40 | 0.50 | 0.60 | |

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