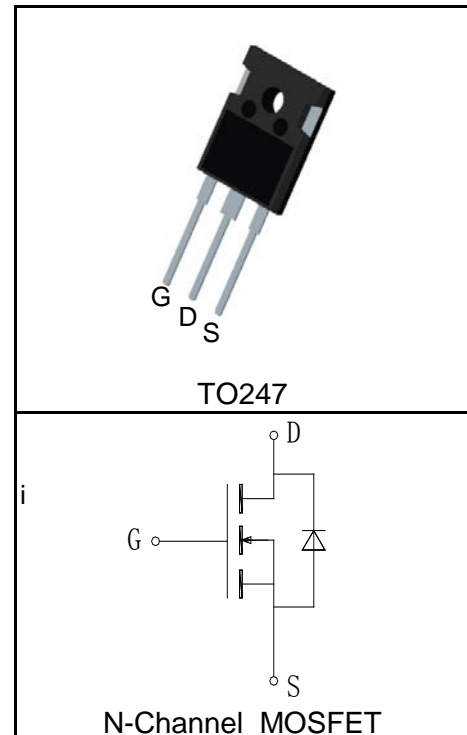


Features

- 60V/450A,
 $R_{DS(ON)} = 1.3m\Omega(Typ.)@V_{GS}=10V$
- Ultra Low On-Resistance
- Super High Dense Cell Design
- Fast Switching and Fully Avalanche Rated
- 100% avalanche tested
- 175°C Operating Temperature
- Lead Free and Green Devices Available (RoHS Compliant)

Applications

- Switching Application Systems
- Inverter Systems

Pin Description

Absolute Maximum Ratings

| Symbol | Parameter | Rating | Unit |
|--|--|--------------------------------|--------------------|
| Common Ratings ($T_C=25^\circ\text{C}$ Unless Otherwise Noted) | | | |
| V_{DSS} | Drain-Source Voltage | 60 | V |
| V_{GSS} | Gate-Source Voltage | ± 25 | |
| T_J | Maximum Junction Temperature | 175 | $^\circ\text{C}$ |
| T_{STG} | Storage Temperature Range | -55 to 175 | $^\circ\text{C}$ |
| I_S | Diode Continuous Forward Current | $T_C=25^\circ\text{C}$ 450 | A |
| Mounted on Large Heat Sink | | | |
| $I_{DP}^{①}$ | 300 μs Pulse Drain Current Tested | $T_C=25^\circ\text{C}$ 1800 | A |
| $I_D^{②}$ | Continuous Drain Current ($V_{GS}=10V$) | $T_C=25^\circ\text{C}$ 450 | A |
| | | $T_C=100^\circ\text{C}$ 318 | |
| P_D | Maximum Power Dissipation | $T_C=25^\circ\text{C}$ 600 | W |
| | | $T_C=100^\circ\text{C}$ 300 | |
| $R_{\theta JC}$ | Thermal Resistance-Junction to Case | 0.25 | $^\circ\text{C/W}$ |
| $R_{\theta JA}$ | Thermal Resistance-Junction to Ambient | 50 | $^\circ\text{C/W}$ |
| Drain-Source Avalanche Ratings | | | |
| $E_{AS}^{③}$ | Avalanche Energy, Single Pulsed | 1406 | mJ |

Electrical Characteristics ($T_C=25^\circ\text{C}$ Unless Otherwise Noted)

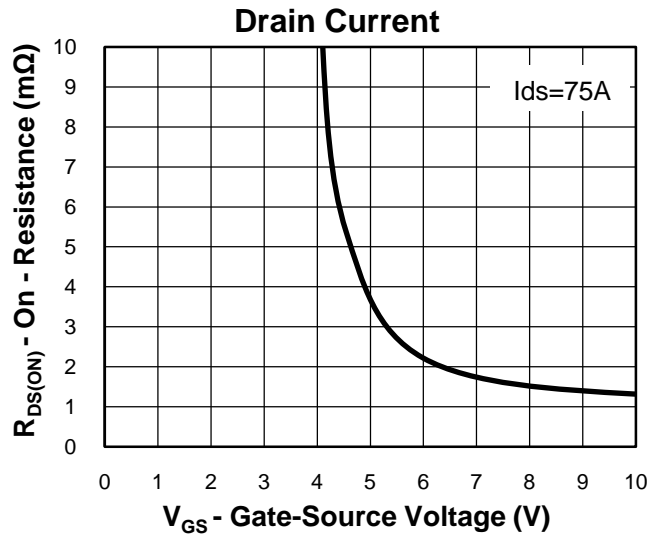
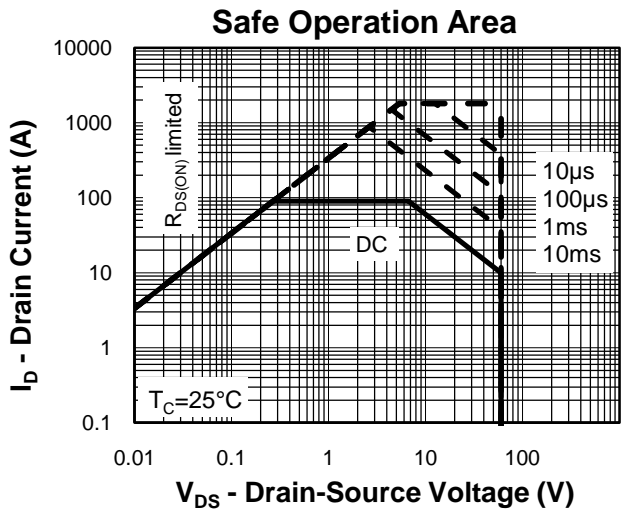
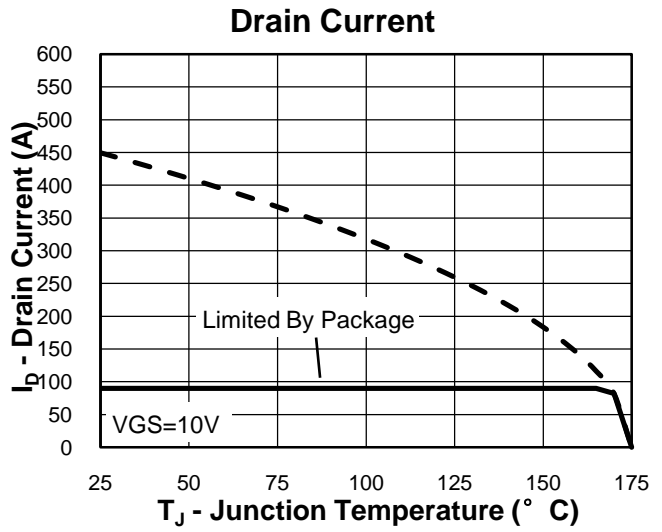
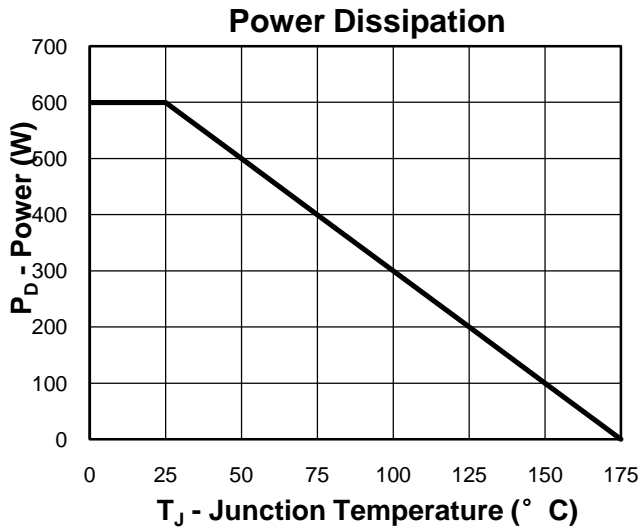
| Symbol | Parameter | Test Condition | RU60450Q | | | Unit |
|--|----------------------------------|---|----------|-------|-----------|------------|
| | | | Min. | Typ. | Max. | |
| Static Characteristics | | | | | | |
| BV_{DSS} | Drain-Source Breakdown Voltage | $V_{GS}=0V, I_{DS}=250\mu A$ | 60 | | | V |
| I_{DSS} | Zero Gate Voltage Drain Current | $V_{DS}=60V, V_{GS}=0V$ | | | 1 | μA |
| | | $T_J=125^\circ C$ | | | 30 | |
| $V_{GS(th)}$ | Gate Threshold Voltage | $V_{DS}=V_{GS}, I_{DS}=250\mu A$ | 2 | 3 | 4 | V |
| I_{GSS} | Gate Leakage Current | $V_{GS}=\pm 25V, V_{DS}=0V$ | | | ± 100 | nA |
| $R_{DS(ON)}^{(4)}$ | Drain-Source On-state Resistance | $V_{GS}=10V, I_{DS}=75A$ | | 1.3 | 1.8 | m Ω |
| Diode Characteristics | | | | | | |
| $V_{SD}^{(4)}$ | Diode Forward Voltage | $I_{SD}=75A, V_{GS}=0V$ | | | 1.2 | V |
| t_{rr} | Reverse Recovery Time | $I_{SD}=75A, di_{SD}/dt=100A/\mu s$ | | 165 | | ns |
| Q_{rr} | Reverse Recovery Charge | | | 430 | | nC |
| Dynamic Characteristics⁽⁵⁾ | | | | | | |
| R_G | Gate Resistance | $V_{GS}=0V, V_{DS}=0V, F=1MHz$ | | 1.2 | | Ω |
| C_{iss} | Input Capacitance | $V_{GS}=0V,$ $V_{DS}=30V,$ Frequency=1.0MHz | | 12100 | | pF |
| C_{oss} | Output Capacitance | | | 1450 | | |
| C_{riss} | Reverse Transfer Capacitance | | | 620 | | |
| $t_{d(ON)}$ | Turn-on Delay Time | $V_{DD}=30V, R_L=0.3\Omega,$ $I_{DS}=75A, V_{GEN}=10V,$ $R_G=2.5\Omega$ | | 45 | | ns |
| t_r | Turn-on Rise Time | | | 230 | | |
| $t_{d(OFF)}$ | Turn-off Delay Time | | | 160 | | |
| t_f | Turn-off Fall Time | | | 230 | | |
| Gate Charge Characteristics⁽⁵⁾ | | | | | | |
| Q_g | Total Gate Charge | $V_{DS}=48V, V_{GS}=10V,$ $I_{DS}=75A$ | | 415 | | nC |
| Q_{gs} | Gate-Source Charge | | | 81 | | |
| Q_{gd} | Gate-Drain Charge | | | 113 | | |

- Notes:
- ① Pulse width limited by safe operating area.
 - ② Calculated continuous current based on maximum allowable junction temperature. The package limitation current is 90A.
 - ③ Limited by T_{Jmax} , $I_{AS}=75A$, $V_{DD}=48V$, $R_G=50\Omega$, Starting $T_J=25^\circ C$.
 - ④ Pulse test; Pulse width $\leq 300\mu s$, duty cycle $\leq 2\%$.
 - ⑤ Guaranteed by design, not subject to production testing.

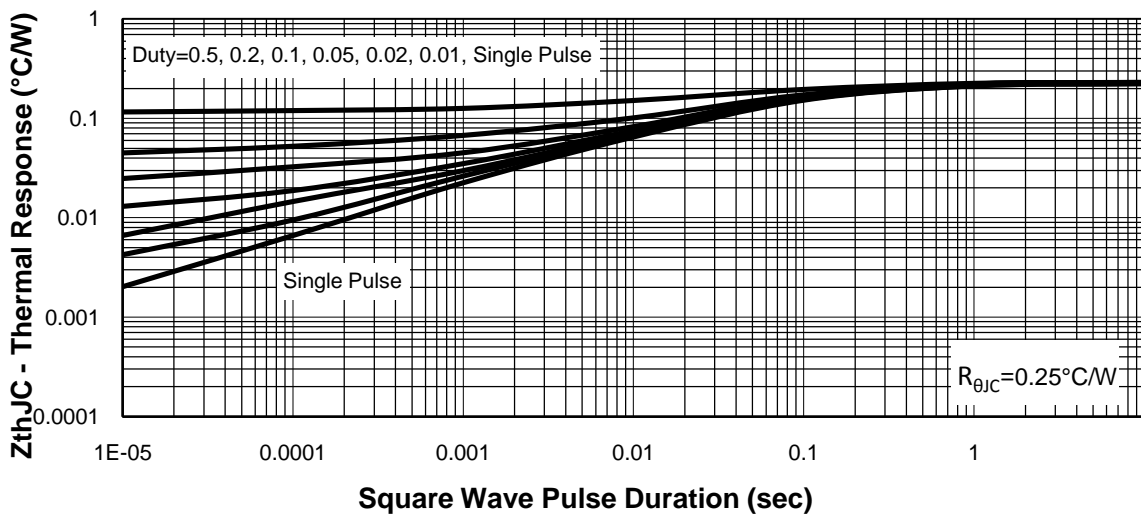
Ordering and Marking Information

| Device | Marking | Package | Packaging | Quantity | Reel Size | Tape width |
|---------------|----------------|----------------|------------------|-----------------|------------------|-------------------|
| RU60450Q | RU60450Q | TO247 | Tube | 30 | - | - |

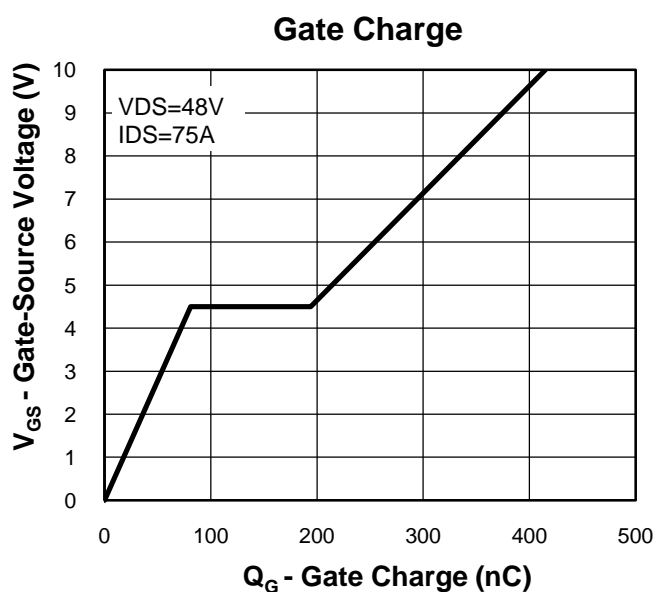
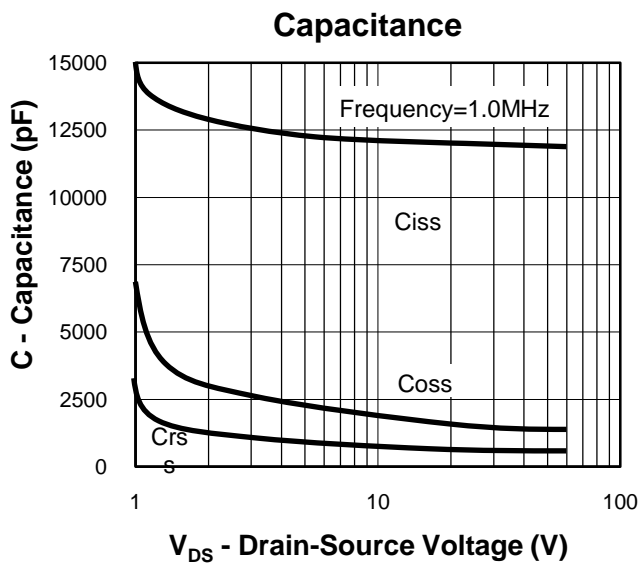
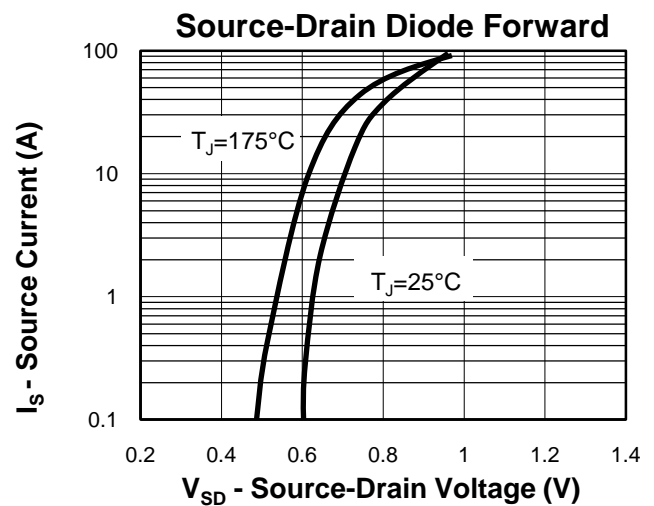
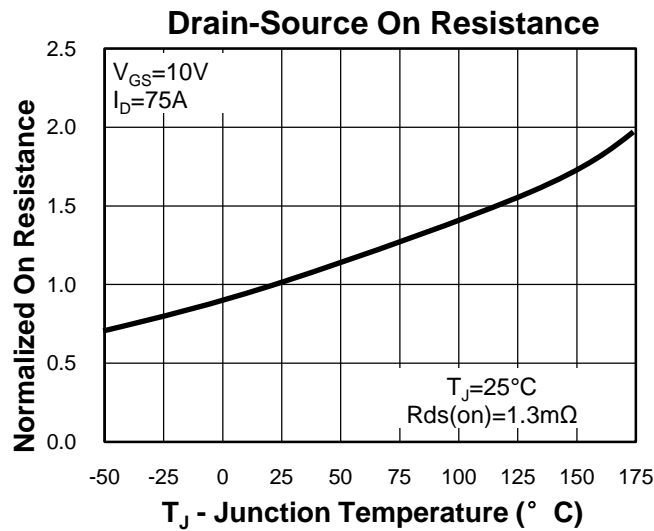
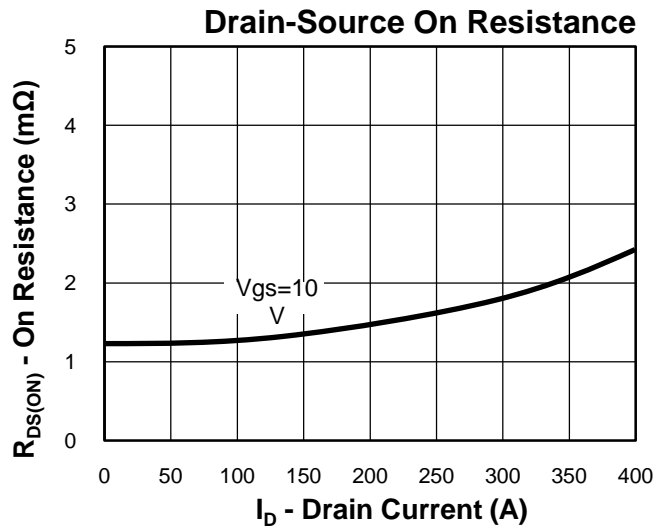
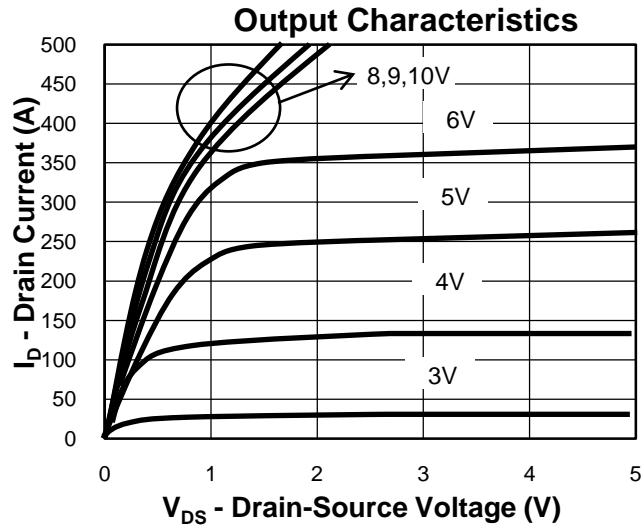
Typical Characteristics



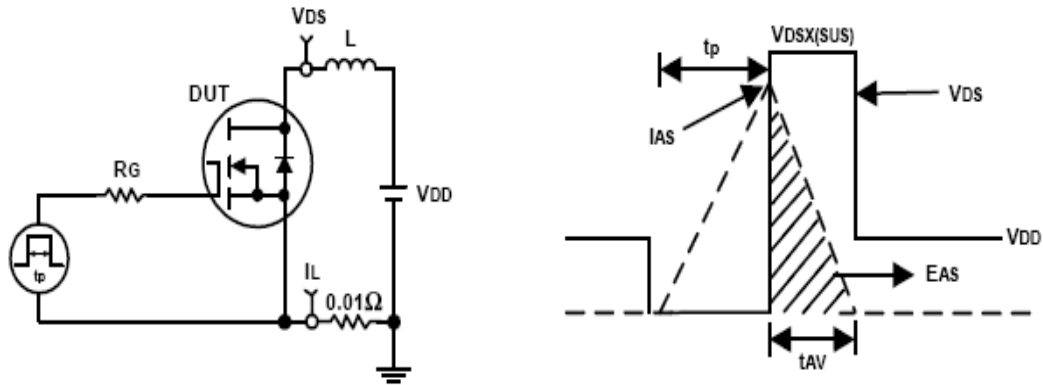
Thermal Transient Impedance



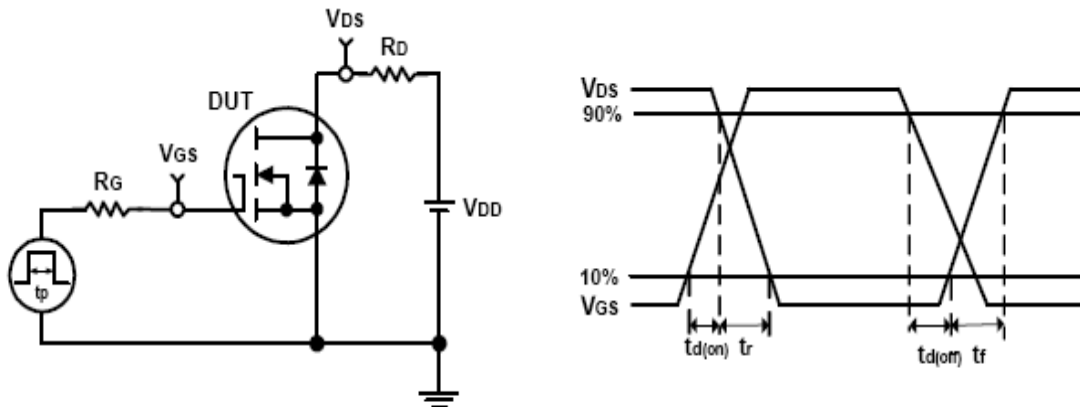
Typical Characteristics



Avalanche Test Circuit and Waveforms

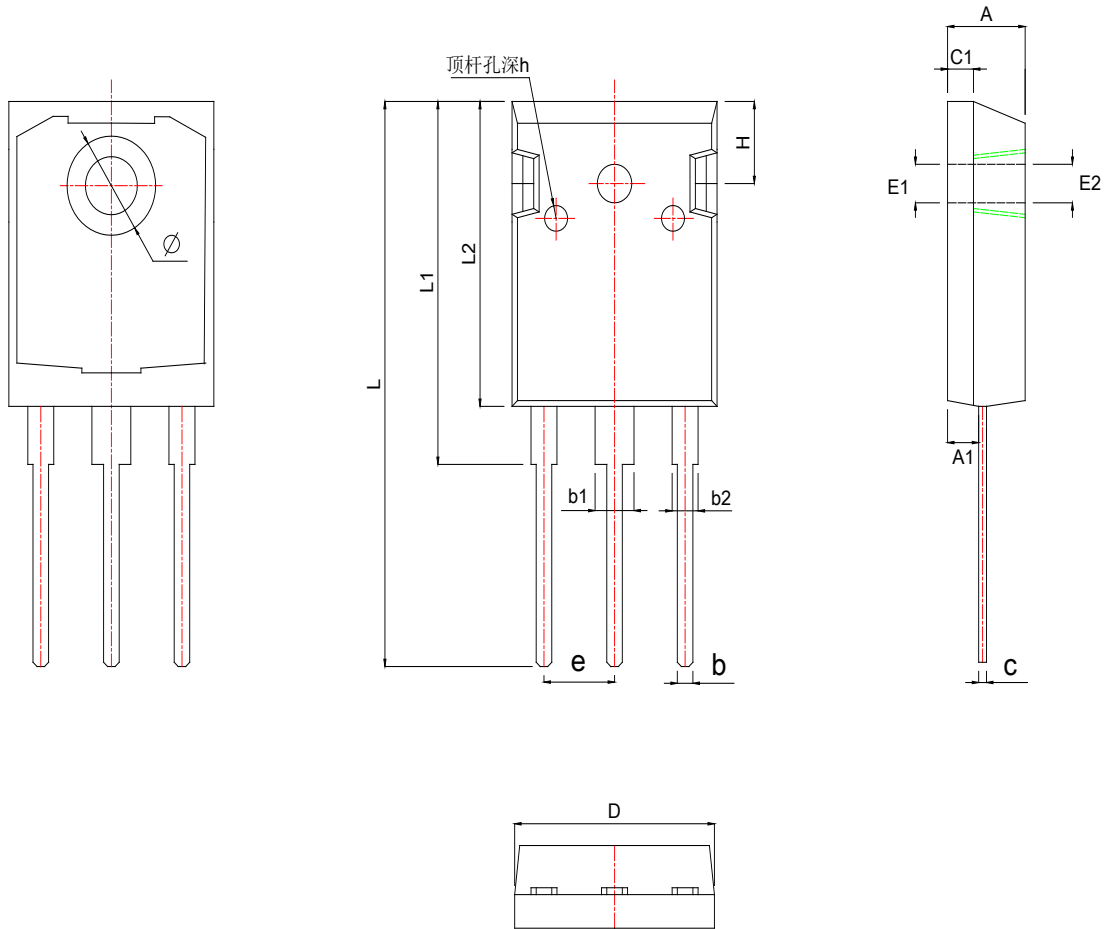


Switching Time Test Circuit and Waveforms



Package Information

TO247



| SYMBOL | MM | | | INCH | | |
|--------|----------|--------|--------|----------|-------|-------|
| | MIN | NOM | MAX | MIN | NOM | MAX |
| A | 4.850 | 5.000 | 5.150 | 0.191 | 0.197 | 0.203 |
| A1 | 2.200 | 2.400 | 2.600 | 0.087 | 0.094 | 0.102 |
| b | 1.000 | 1.200 | 1.400 | 0.039 | 0.047 | 0.055 |
| b1 | 2.800 | 3.000 | 3.200 | 0.110 | 0.118 | 0.126 |
| b2 | 1.800 | 2.000 | 2.200 | 0.071 | 0.079 | 0.087 |
| c | 0.500 | 0.600 | 0.700 | 0.020 | 0.024 | 0.028 |
| c1 | 1.900 | 2.000 | 2.100 | 0.075 | 0.079 | 0.083 |
| D | 15.450 | 15.600 | 15.750 | 0.608 | 0.614 | 0.620 |
| E1 | 3.500REF | | | 0.138REF | | |
| E2 | 3.600REF | | | 0.142REF | | |
| L | 40.900 | 41.100 | 41.300 | 1.610 | 1.618 | 1.626 |
| L1 | 24.800 | 24.950 | 25.100 | 0.976 | 0.982 | 0.988 |
| L2 | 20.300 | 20.450 | 20.600 | 0.799 | 0.805 | 0.811 |
| Φ | 7.10 | 7.20 | 7.30 | 0.280 | 0.283 | 0.287 |
| e | 5.450TYP | | | 0.215TYP | | |
| H | 5.980REF | | | 0.235REF | | |
| h | 0.000 | 0.150 | 0.300 | 0.000 | 0.006 | 0.012 |

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