# Description
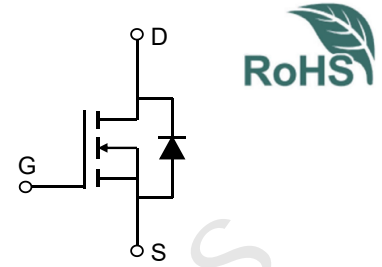
## Features
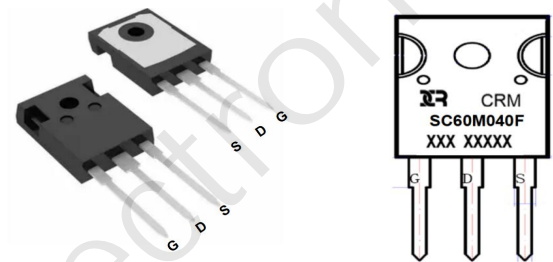
- 600V, 76A

  $R_{DS(ON)}$ Typ = 30mΩ@ $V_{GS}$ = 10V

- Ultra-fast body diode

- Extremely low losses due to very low Eon and Eoff

- Qualified for industrial grade applications according to JEDEC

- 100% avalanche tested

**Schematic Diagram**

## Application

- Uninterruptible Power Supply   (UPS)

- Switch Mode Power Supply (SMPS)

- Power Factor Correction (PFC)

**Marking and Pin Assignment**

## Package Marking and Ordering Information

| Device | Marking | Package | Outline | TUBE(pcs) | InnerBox(pcs) | Per Carton (pcs) |
|--------|---------|---------|---------|-----------|---------------|------------------|
| CRMSC60M040F | CRMSC60M040F | TO-247-3L | TUBE | 25 | 1000 | 2000 |

## Absolute Maximum Ratings (@ $T_J$ = 25°C unless otherwise specified)

| Symbol | Parameter | | Value | Units |
|--------|-----------|--|-------|-------|
| $V_{DS}$ | Drain-to-Source Voltage | | 600 | V |
| $V_{GS}$ | Gate-to-Source Voltage(static) | | ±20 | V |
| $V_{GS}$ | Gate-to-Source Voltage(dynamic) | AC(f>1 Hz) | ±30 | V |
| $I_D$ | Continuous Drain Current[1] | $T_C$ = 25°C | 76 | A |
| | | $T_C$ = 100°C | 48 | A |
| $I_{DM}$ | Pulsed Drain Current [2] | $T_C$ = 25°C | 280 | A |
| $E_{AS}$ | Single Pulsed Avalanche Energy | $V_{DD}$=50V;L=10mH | 480 | mJ |
| $I_S$ | Continuous diode forward current | $T_C$ = 25°C | 76 | A |
| $I_{S,pluse}$ | Diode pluse current[2] | $T_C$ = 25°C | 280 | A |
| diF/dt | Maximum diode commutation speed | $V_{DS}$=0...400V,$I_{SD}$<= 62A | 900 | A/μs |
| $P_D$ | Power Dissipation | $T_C$ = 25°C | - | W |
| $T_J$, $T_{STG}$ | Junction & Storage Temperature Range | | -55 to 150 | °C |

## Thermal Characteristics

| Symbol | Parameter | Value | Units |
|---|---|---|---|
| $R_{\theta JA}$ | Thermal Resistance, Junction-to- Ambient Device on PCB with Minimal footprint | - | °C/W |
| $R_{\theta JC}$ | Thermal Resistance, Junction to Case | - | °C/W |

## Electrical Characteristics ($T_J$ = 25°C unless otherwise specified)

| Symbol | Parameter | Conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| **Off Characteristics** | | | | | | |
| $V_{(BR)DSS}$ | Drain-Source Breakdown Voltage | $I_D$ = 1mA, $V_{GS}$ = 0V | 600 | - | - | V |
| $I_{DSS}$ | Zero Gate Voltage Drain Current | $V_{DS}$ = 600V, $V_{GS}$ = 0V | - | - | 1.0 | µA |
| $I_{GSS}$ | Gate-Body Leakage Current | $V_{DS}$ = 0V, $V_{GS}$ = ±20V | - | - | ±100 | nA |
| **On Characteristics** | | | | | | |
| $V_{GS(th)}$ | Gate Threshold Voltage | $V_{DS}$ = $V_{GS}$, $I_D$ = 800µA | 2.7 | 3.5 | 4.3 | V |
| $R_{DS(ON)}$ | Static Drain-Source ON-Resistance | $V_{GS}$ = 10V, $I_D$ = 29.5A | | 30 | 37 | mΩ |
| Rg | Gate resistance | f=1MHz,opendrain | - | 1 | - | Ω |
| **Dynamic Characteristics** | | | | | | |
| $C_{iss}$ | Input Capacitance | $V_{GS}$ = 0V, $V_{DS}$ = 400V, f = 250kHz | - | 5200 | - | pF |
| $C_{oss}$ | Output Capacitance | | - | 105 | - | pF |
| $C_{rss}$ | Reverse Transfer Capacitance | | - | 10.0 | - | pF |
| $Q_g$ | Total Gate Charge | | - | 135 | - | nC |
| $Q_{gs}$ | Gate Source Charge | $V_{GS}$ = 0 to 10V $V_{DS}$ = 400V, $I_D$ = 29.5A | - | 32 | - | nC |
| $Q_{gd}$ | Gate Drain("Miller") Charge | | - | 42 | - | nC |
| $V_{plateau}$ | Gate plateau voltage | | - | 5.2 | - | V |
| **Switching Characteristics** | | | | | | |
| $t_{d(on)}$ | Turn-On DelayTime | $V_{GS}$ = 13V, $V_{DD}$ = 400V $I_D$= 29.5A, $R_G$ = 3.3Ω | - | 25 | - | ns |
| $t_r$ | Turn-On Rise Time | | - | 21 | - | ns |
| $t_{d(off)}$ | Turn-Off DelayTime | | - | 110 | - | ns |
| $t_f$ | Turn-Off Fall Time | | - | 4 | - | ns |
| **Diode Recovery Characteristics** | | | | | | |
| $V_{SD}$ | Drain to Source Diode Forward Voltage | $V_R$=400V,$I_F$ = 8A, di/dt = 100A/us | - | 0.9 | - | V |
| trr | Body Diode Reverse Recovery Time | | - | 330 | - | ns |
| Qrr | Body Diode Reverse Recovery Charge | | - | 4.8 | - | µC |
| Irrm | PeaK reverse recovery current | | - | 30 | - | A |

Notes:

1. Limited by Tj,max. Maximum Duty Cycle D = 0.50

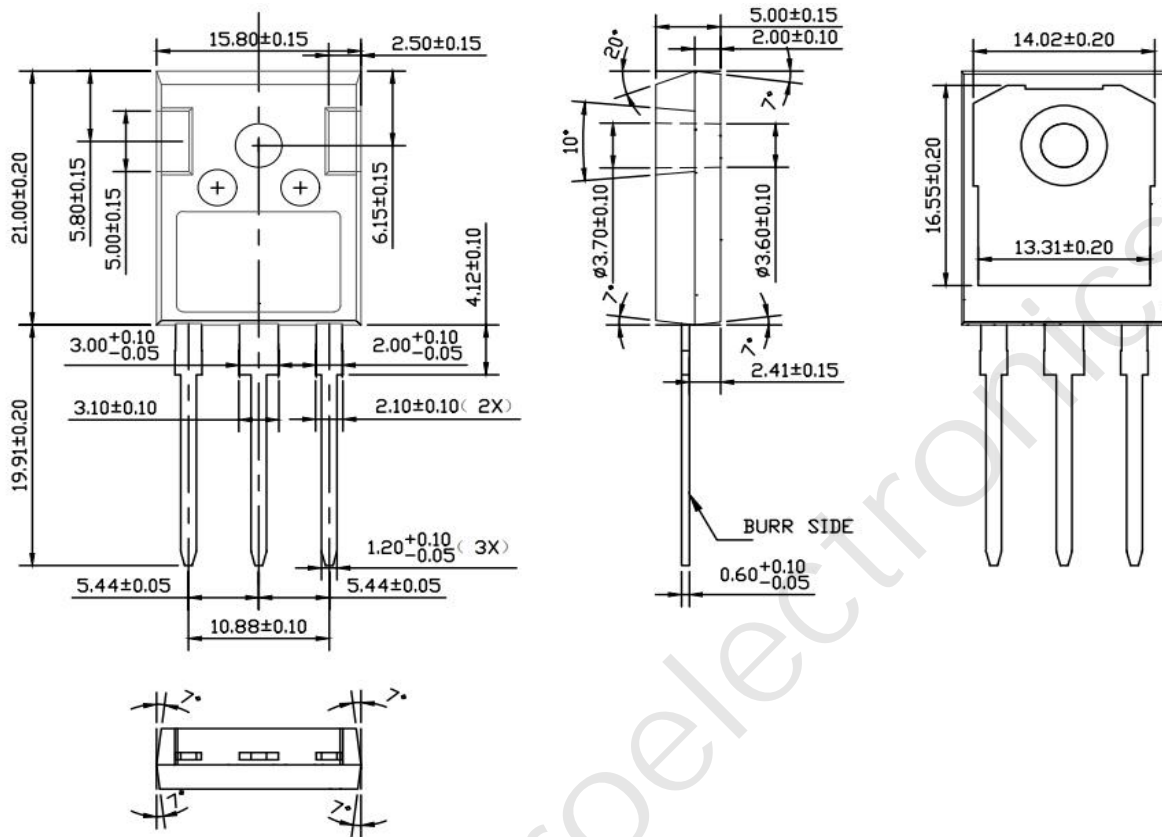2. Repetitive Rating: Pulse width limited by maximum junction temperature

## Test Circuit

### Switching Test Circuit & Waveforms
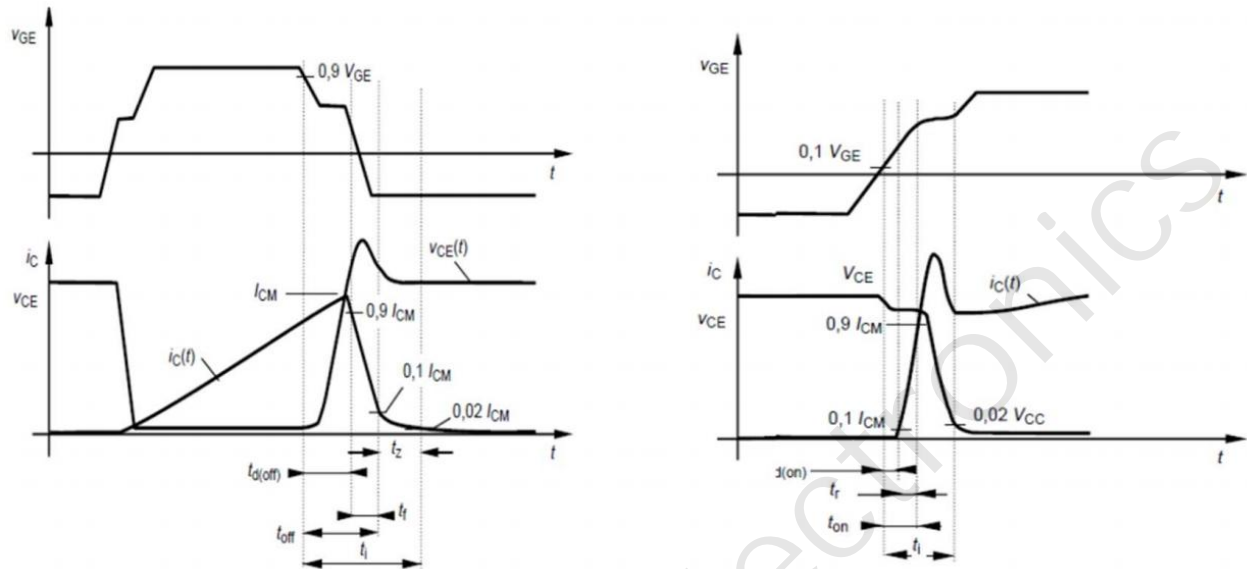
### Diode Recovery Test Circuit & Waveforms
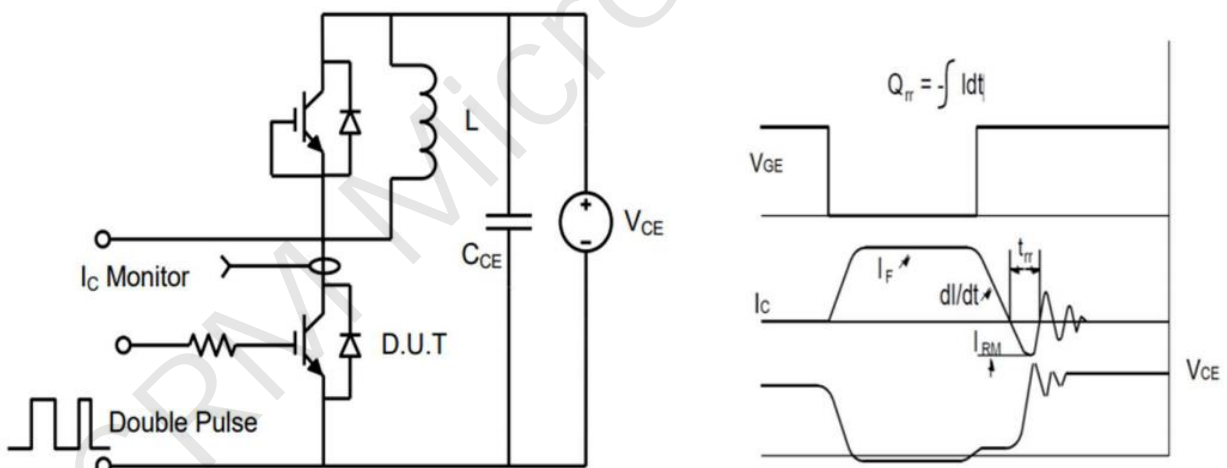
## Package Mechanical Data(TO-247-3L)



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## Contact information

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