



## Features

- Drain-Source Breakdown Voltage  $V_{DS} - 30\text{ V}$
- Drain-Source On-Resistance
  - $R_{DS(ON)} 53\text{m}\Omega$ , at  $V_{GS} = -10\text{V}$ ,  $I_{DS} = -4.1\text{A}$
  - $R_{DS(ON)} 64\text{m}\Omega$ , at  $V_{GS} = -4.5\text{V}$ ,  $I_{DS} = -4.0\text{A}$
  - $R_{DS(ON)} 86\text{m}\Omega$ , at  $V_{GS} = -2.5\text{V}$ ,  $I_{DS} = -1.0\text{A}$
- Continuous Drain Current at  $T_A=25^\circ\text{C}$   $I_D = -4.1\text{A}$
- Advanced high cell density Trench Technology
- RoHS Compliance & Halogen Free

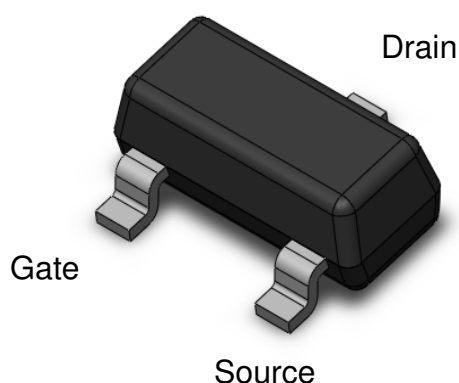
## Applications

- Power Management
- LCD Display inverter
- Load Switch

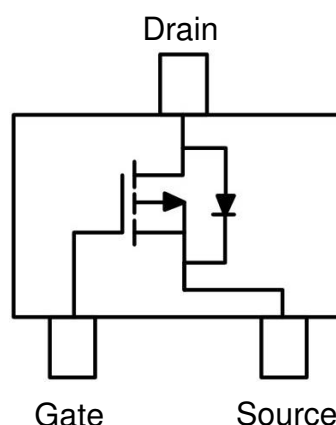
## Description

The CT3401-R3 uses high performance Trench Technology to provide excellent  $R_{DS(ON)}$  and low gate charge which is suitable for low voltage application.

## Package Outline



## Schematic



**Absolute Maximum Rating at 25°C**

| <b>Symbol</b> | <b>Parameters</b>                    | <b>Ratings</b> | <b>Units</b> | <b>Notes</b> |
|---------------|--------------------------------------|----------------|--------------|--------------|
| $V_{DS}$      | Drain-Source Voltage                 | -30            | V            |              |
| $V_{GS}$      | Gate-Source Voltage                  | $\pm 12$       | V            |              |
| $I_D$         | Continuous Drain Current             | -4.1           | A            | 1            |
| $I_{DM}$      | Pulsed Drain Current                 | -30            | A            | 1            |
| $P_D$         | Total Power Dissipation              | 1.4            | W            | 2            |
| $T_{STG}$     | Storage Temperature Range            | -55 to 150     | °C           |              |
| $T_J$         | Operating Junction Temperature Range | -55 to 150     | °C           |              |

**Thermal Characteristics**

| <b>Symbol</b>   | <b>Parameters</b>                              | <b>Test Conditions</b> | <b>Min</b> | <b>Typ</b> | <b>Max</b> | <b>Units</b> | <b>Notes</b> |
|-----------------|------------------------------------------------|------------------------|------------|------------|------------|--------------|--------------|
| $R_{\theta JA}$ | Thermal Resistance<br>Junction-Ambient (t=10s) |                        | -          | 140        | -          | °C /W        | 1,4          |

**Electrical Characteristics**  $T_A = 25^\circ\text{C}$  (unless otherwise specified)**Static Characteristics**

| Symbol       | Parameters                     | Test Conditions                 | Min | Typ | Max       | Units   | Notes |
|--------------|--------------------------------|---------------------------------|-----|-----|-----------|---------|-------|
| $B_{V_{DS}}$ | Drain-Source Breakdown Voltage | $V_{GS}=0V, I_D = -250\mu A$    | -30 | -   | -         | V       |       |
| $I_{DSS}$    | Drain-Source Leakage Current   | $V_{DS} = -30V, V_{GS} = 0V$    | -   | -   | -1        | $\mu A$ |       |
| $I_{GSS}$    | Gate-Source Leakage Current    | $V_{GS} = \pm 12V, V_{DS} = 0V$ | -   | -   | $\pm 100$ | nA      |       |

**On Characteristics**

| Symbol       | Parameters                    | Test Conditions                    | Min   | Typ | Max  | Units      | Notes |
|--------------|-------------------------------|------------------------------------|-------|-----|------|------------|-------|
| $R_{DS(ON)}$ | Drain-Source On-Resistance    | $V_{GS} = -10V, I_D = -4.1A$       | -     | 53  | 68   | m          | 3     |
|              |                               | $V_{GS} = -4.5V, I_D = -4.0A$      | -     | 64  | 80   | m $\Omega$ |       |
|              |                               | $V_{GS} = -2.5V, I_D = -1.0A$      | -     | 86  | 100  | m $\Omega$ |       |
| $V_{GS(TH)}$ | Gate-Source Threshold Voltage | $V_{GS} = V_{DS}, I_D = -250\mu A$ | -0.47 | -   | -1.3 | V          | 3     |

**Dynamic Characteristics**

| Symbol    | Parameters                   | Test Conditions                                | Min | Typ  | Max | Units | Notes |
|-----------|------------------------------|------------------------------------------------|-----|------|-----|-------|-------|
| $C_{ISS}$ | Input Capacitance            | $V_{DS} = -10V,$<br>$V_{GS} = 0V,$<br>$f=1MHz$ | -   | 1320 | -   | pF    |       |
| $C_{OSS}$ | Output Capacitance           |                                                | -   | 88   | -   |       |       |
| $C_{RSS}$ | Reverse Transfer Capacitance |                                                | -   | 72   | -   |       |       |

**Switching Characteristics**

| Symbol       | Parameters                 | Test Conditions                                                 | Min | Typ  | Max | Units | Notes |
|--------------|----------------------------|-----------------------------------------------------------------|-----|------|-----|-------|-------|
| $T_{D(ON)}$  | Turn-On Delay Time         | $V_{DS} = -15V, V_{GS} = -10V,$<br>$R_G = 3\Omega, I_D = -4.1A$ | -   | 10.7 | -   | ns    |       |
| $T_R$        | Rise Time                  |                                                                 | -   | 11.2 | -   |       |       |
| $T_{D(OFF)}$ | Turn-Off Delay Time        |                                                                 | -   | 47.1 | -   |       |       |
| $T_F$        | Fall Time                  |                                                                 | -   | 6.7  | -   |       |       |
| $Q_G$        | Total Gate Charge          | $V_{DS} = -4.5V, V_{GS} = -10V,$<br>$I_D = -4.1A$               | -   | 12.4 | -   | nC    |       |
| $Q_{GS}$     | Gate-Source Charge         |                                                                 | -   | 2.9  | -   |       |       |
| $Q_{GD}$     | Gate-Drain (Miller) Charge |                                                                 | -   | 3.5  | -   |       |       |

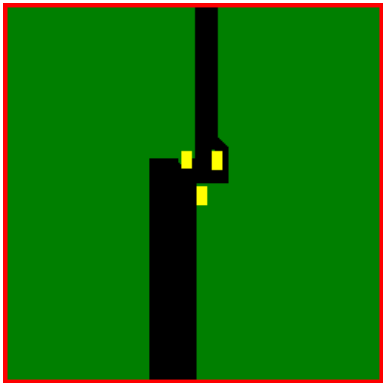


Drain-Source Diode Characteristics

| Symbol          | Parameters                    | Test Conditions                               | Min | Typ | Max  | Units | Notes |
|-----------------|-------------------------------|-----------------------------------------------|-----|-----|------|-------|-------|
| V <sub>SD</sub> | Body Diode Forward Voltage    | V <sub>GS</sub> = 0V, I <sub>SD</sub> = -1.0A |     |     | 1.2  | V     |       |
| I <sub>SD</sub> | Body Diode Continuous Current |                                               |     |     | -4.2 | A     | 1     |

Note:

- 1. The power dissipation is limited by 150°C junction temperature.
- 2. Device mounted on a glass-epoxy board



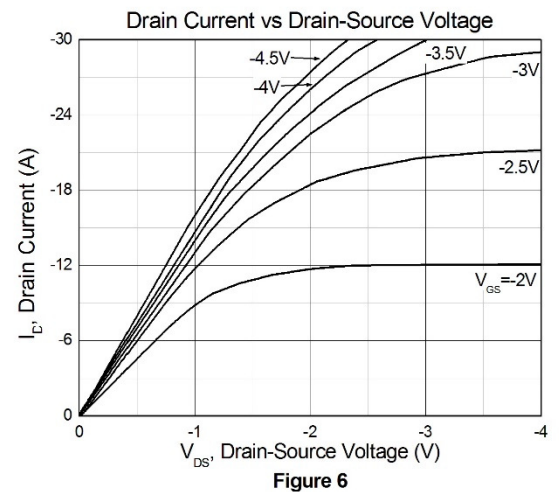
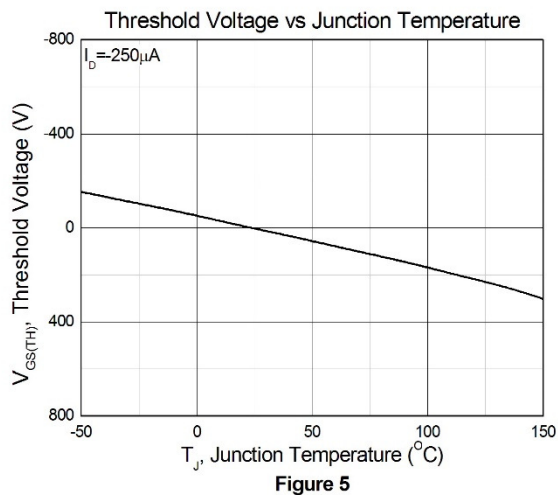
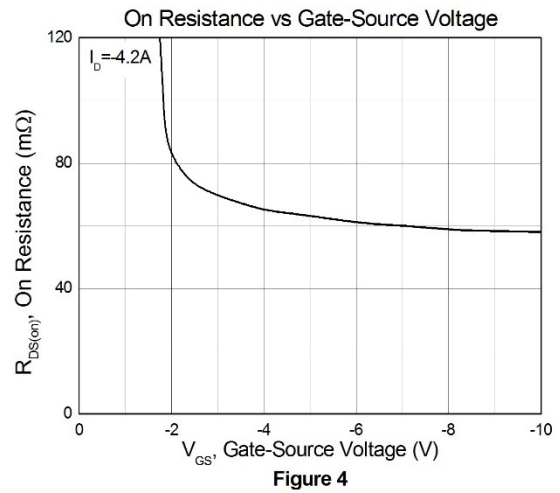
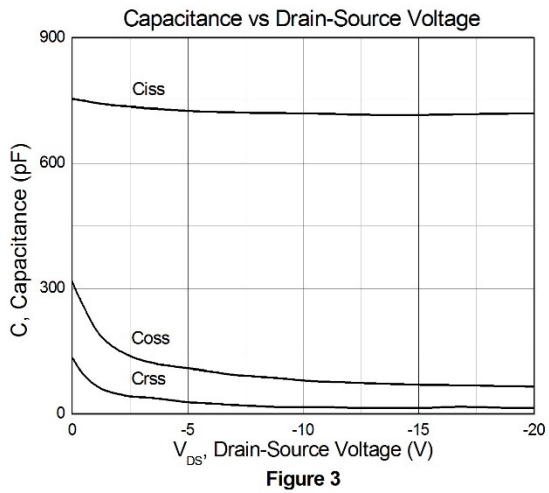
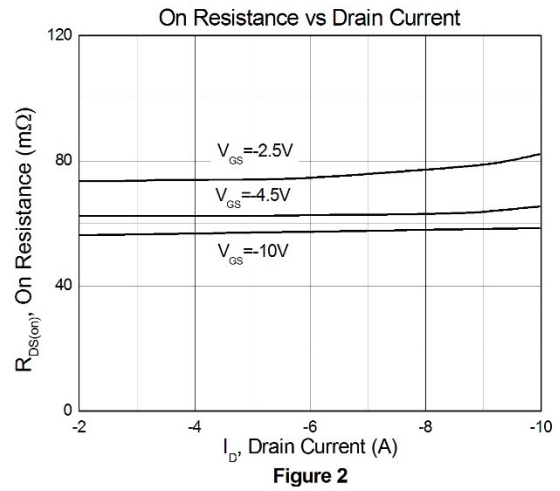
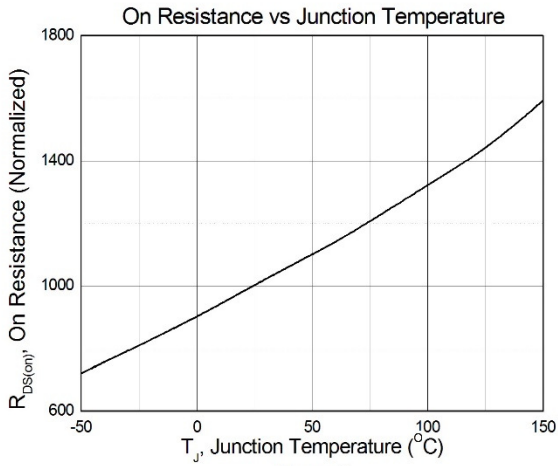
FR-4  
25.4 × 25.4 mm .  
2 Oz Copper

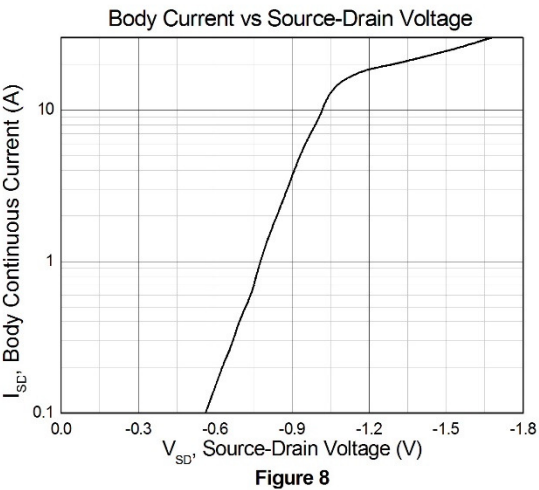
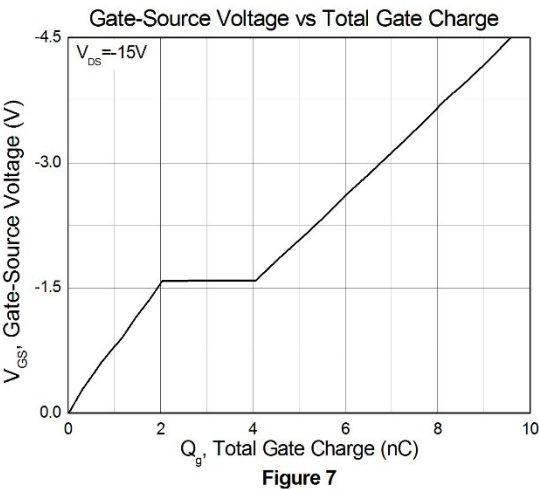
Test Board

- 3. The data tested by pulsed , pulse width ≤ 300μs , duty cycle ≤ 2%
- 4. Thermal Resistance follow JESD51-3.



## Typical Characteristic Curves







## Test Circuits & Waveforms

Figure 9: Gate Charge Test Circuit

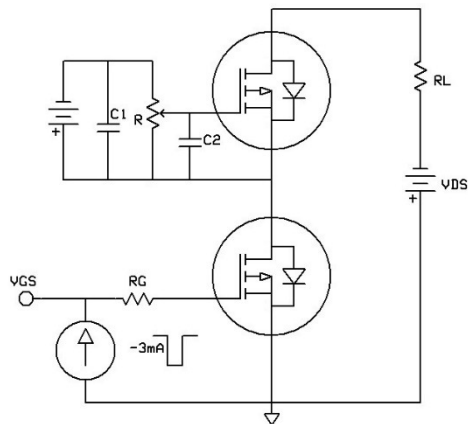


Figure 10: Gate Charge Waveform

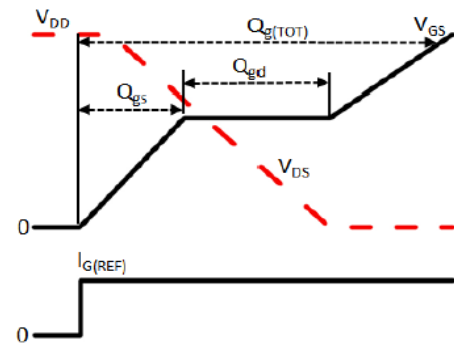


Figure 11: Switching Time Test Circuit

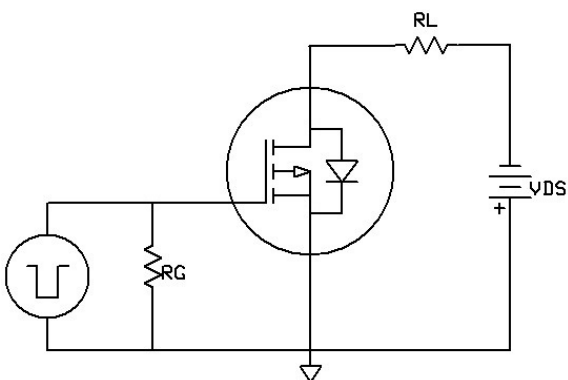
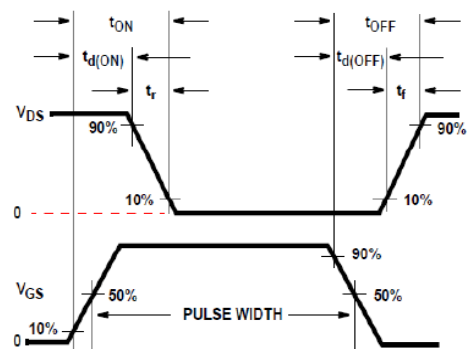
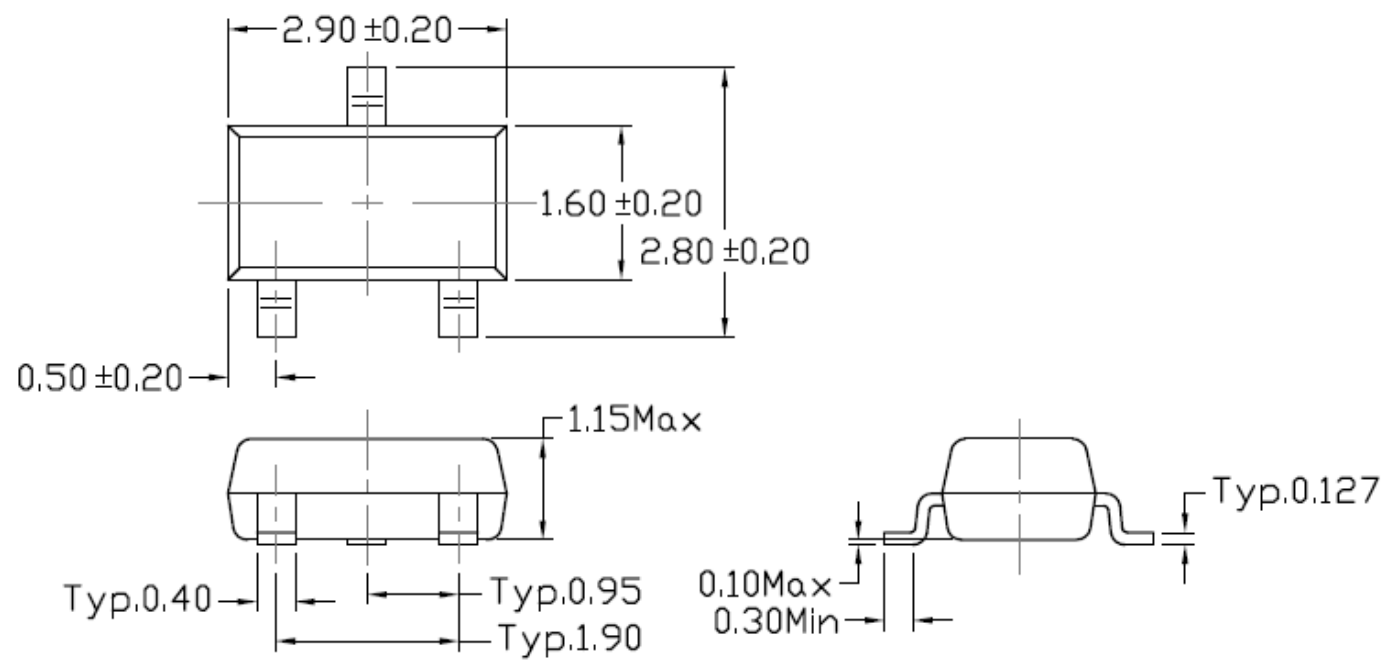


Figure 12: Switching Time Waveform



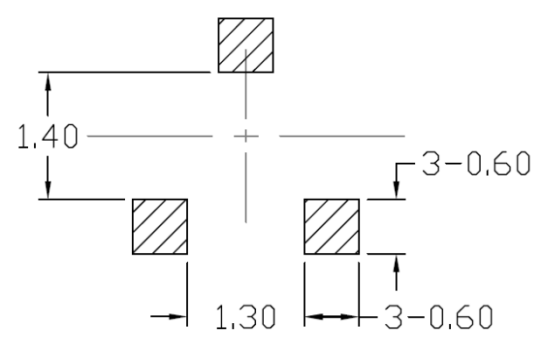


Package Dimension (SC-59)



Note: Dimensions in mm

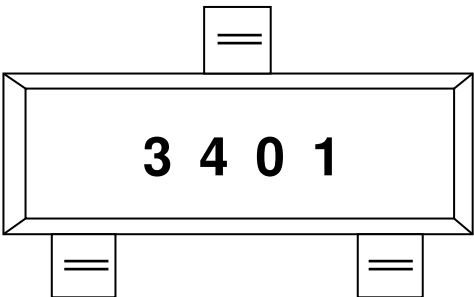
Recommended pad layout for surface mount leadform



Note: Dimensions in mm



Marking Information



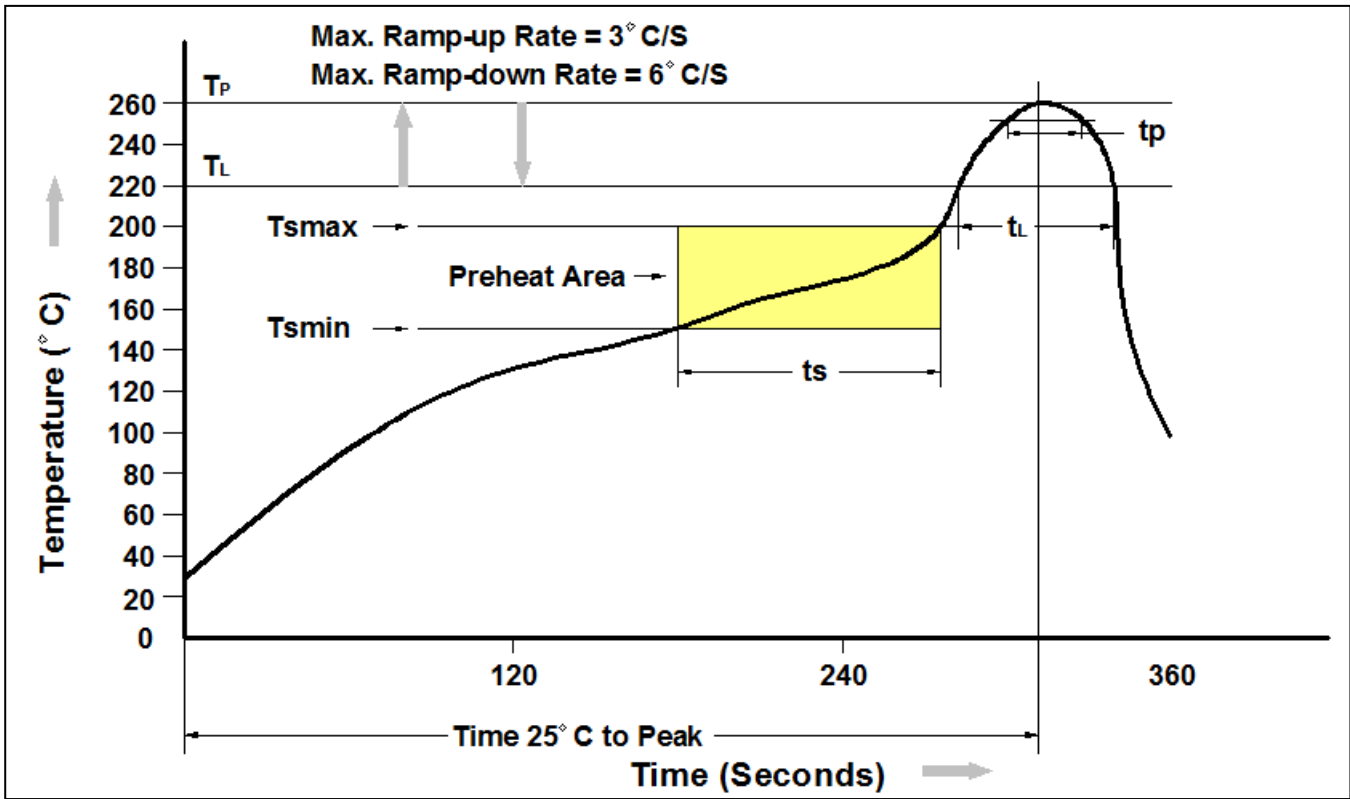
3401 : Device Number

Ordering Information

| Part Number | Description | Quantity |
|-------------|-------------|----------|
| CT3401-R3   | SC-59 Reel  | 3000 pcs |



Reflow Profile



| Profile Feature                                                     | Pb-Free Assembly Profile |
|---------------------------------------------------------------------|--------------------------|
| Temperature Min. (T <sub>min</sub> )                                | 150 °C                   |
| Temperature Max. (T <sub>max</sub> )                                | 200 °C                   |
| Time (t <sub>s</sub> ) from (T <sub>min</sub> to T <sub>max</sub> ) | 60-120 seconds           |
| Ramp-up Rate (t <sub>L</sub> to t <sub>P</sub> )                    | 3 °C/second max.         |
| Liquidous Temperature (T <sub>L</sub> )                             | 217 °C                   |
| Time (t <sub>L</sub> ) Maintained Above (T <sub>L</sub> )           | 60 – 150 seconds         |
| Peak Body Package Temperature                                       | 260 °C +0 °C / -5 °C     |
| Time (t <sub>P</sub> ) within 5 °C of 260 °C                        | 30 seconds               |
| Ramp-down Rate (T <sub>P</sub> to T <sub>L</sub> )                  | 6 °C/second max          |
| Time 25 °C to Peak Temperature                                      | 8 minutes max.           |



## DISCLAIMER

CT MICRO RESERVES THE RIGHT TO MAKE CHANGES WITHOUT FURTHER NOTICE TO ANY PRODUCTS HEREIN TO IMPROVE RELIABILITY, FUNCTION OR DESIGN. CT MICRO DOES NOT ASSUME ANY LIABILITY ARISING OUT OF THE APPLICATION OR USE OF ANY PRODUCT OR CIRCUIT DESCRIBED HEREIN; NEITHER DOES IT CONVEY ANY LICENSE UNDER ITS PATENT RIGHTS, NOR THE RIGHTS OF OTHERS.

---

CT MICRO ARE NOT AUTHORIZED FOR USE AS CRITICAL COMPONENTS IN LIFE SUPPORT DEVICES OR SYSTEMS WITHOUT EXPRESS WRITTEN APPROVAL OF CT MICRO INTERNATIONAL CORPORATION.

- 1. Life support devices or systems are devices or systems which, (a) are intended for surgical implant into the body, or (b) support or sustain life, or (c) whose failure to perform when properly used in accordance with instruction for use provided in the labeling, can be reasonably expected to result in significant injury to the user.*
- 2. A critical component is any component of a life support device or system whose failure to perform can be reasonably expected to cause the failure of the life support device or system, or to affect its safety or effectiveness.*