



## CTL0203PS-R3

### P-Channel Enhancement MOSFET

#### Features

- Drain-Source Breakdown Voltage  $V_{DS} -30\text{ V}$
- Drain-Source On-Resistance  
 $R_{DS(ON)} 160\text{m}\Omega$ , at  $V_{GS} = -4.5\text{V}$ ,  $I_D = -1.6\text{A}$   
 $R_{DS(ON)} 110\text{m}\Omega$ , at  $V_{GS} = -10\text{V}$ ,  $I_D = -2.0\text{A}$
- Continuous Drain Current at  $T_A=25^\circ\text{C}$   $I_D = -2.0\text{A}$
- Advanced high cell density Trench Technology
- RoHS Compliance & Halogen Free

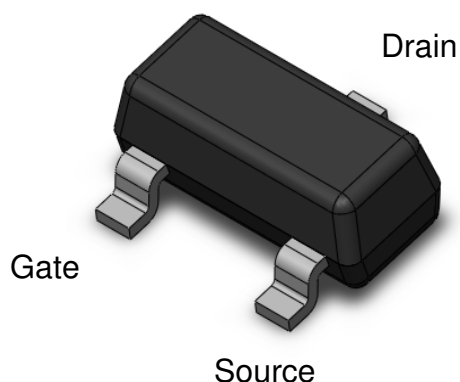
#### Description

The CTL0203PS-R3 is the P-Channel logic enhancement mode power field effect transistors are produced using high cell density, DMOS trench technology. This high density process is especially tailored to minimize on-state resistance. These devices are particularly suited for low voltage application such as cellular phone and notebook computer power management.

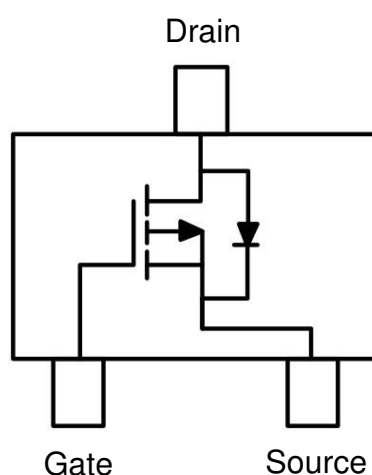
#### Applications

- Power Management
- Portable Equipment
- Battery Powered System
- Load Switch

#### Package Outline



#### Schematic





**CTL0203PS-R3**

## **P-Channel Enhancement MOSFET**

### **Absolute Maximum Rating at 25°C**

| Symbol           | Parameters                           | Test Conditions | Min | Notes |
|------------------|--------------------------------------|-----------------|-----|-------|
| V <sub>DS</sub>  | Drain-Source Voltage                 | -30             | V   |       |
| V <sub>GS</sub>  | Gate-Source Voltage                  | ±20             | V   |       |
| I <sub>D</sub>   | Continuous Drain Current             | -2.0            | A   | 1     |
| I <sub>DM</sub>  | Pulsed Drain Current                 | -8              | A   | 1     |
| P <sub>D</sub>   | Total Power Dissipation              | 0.78            | W   | 2     |
| T <sub>STG</sub> | Storage Temperature Range            | -55 to 150      | °C  |       |
| T <sub>J</sub>   | Operating Junction Temperature Range | -55 to 150      | °C  |       |

### **Thermal Characteristics**

| Symbol            | Parameters                                     | Test Conditions | Min | Typ | Max | Units | Notes |
|-------------------|------------------------------------------------|-----------------|-----|-----|-----|-------|-------|
| R <sub>ΘJA4</sub> | Thermal Resistance<br>Junction-Ambient (t=10s) |                 | --  | 110 | 160 | °C /W | 1,4   |

**CTL0203PS-R3****P-Channel Enhancement MOSFET****Electrical Characteristics**  $T_A = 25^\circ\text{C}$  (unless otherwise specified)**Static Characteristics**

| Symbol           | Parameters                     | Test Conditions                               | Min | Typ | Max  | Units | Notes |
|------------------|--------------------------------|-----------------------------------------------|-----|-----|------|-------|-------|
| B <sub>VDS</sub> | Drain-Source Breakdown Voltage | V <sub>GS</sub> = 0V, I <sub>D</sub> = -250μA | -30 | -   | -    | V     |       |
| I <sub>DSS</sub> | Drain-Source Leakage Current   | V <sub>DS</sub> = -30V, V <sub>GS</sub> = 0V  | -   | -   | -1   | μA    |       |
| I <sub>GSS</sub> | Gate-Source Leakage Current    | V <sub>GS</sub> = ±20V, V <sub>DS</sub> = 0V  | -   | -   | ±100 | nA    |       |

**On Characteristics**

| Symbol              | Parameters                    | Test Conditions                                             | Min | Typ | Max | Units | Notes |
|---------------------|-------------------------------|-------------------------------------------------------------|-----|-----|-----|-------|-------|
| R <sub>DS(ON)</sub> | Drain-Source On-Resistance    | V <sub>GS</sub> = -4.5V, I <sub>D</sub> = -1.6A             | -   | 160 | 200 | mΩ    | 3     |
|                     |                               | V <sub>GS</sub> = -10V, I <sub>D</sub> = -2.0A              | -   | 110 | 130 | mΩ    |       |
| V <sub>GS(th)</sub> | Gate-Source Threshold Voltage | V <sub>GS</sub> = V <sub>DS</sub> , I <sub>D</sub> = -250μA | -1  | --- | -3  | V     | 3     |

**Dynamic Characteristics**

| Symbol           | Parameters                   | Test Conditions                                             | Min | Typ | Max | Units | Notes |
|------------------|------------------------------|-------------------------------------------------------------|-----|-----|-----|-------|-------|
| C <sub>ISS</sub> | Input Capacitance            | V <sub>GS</sub> = 0V,<br>V <sub>DS</sub> = -15V<br>f = 1MHz | -   | 205 | -   | pF    |       |
| C <sub>OSS</sub> | Output Capacitance           |                                                             | -   | 42  | -   |       |       |
| C <sub>RSS</sub> | Reverse Transfer Capacitance |                                                             | -   | 13  | -   |       |       |

**Switching Characteristics**

| Symbol              | Parameters          | Test Conditions                                                                                       | Min | Typ | Max | Units | Notes |
|---------------------|---------------------|-------------------------------------------------------------------------------------------------------|-----|-----|-----|-------|-------|
| T <sub>D(ON)</sub>  | Turn-On Delay Time  | V <sub>DS</sub> = -15V ,<br>V <sub>GS</sub> = -4.5V,<br>R <sub>G</sub> = 6Ω,<br>R <sub>L</sub> = 15Ω, | -   | 18  | -   | ns    |       |
| T <sub>R</sub>      | Rise Time           |                                                                                                       | -   | 16  | -   |       |       |
| T <sub>D(OFF)</sub> | Turn-Off Delay Time |                                                                                                       | -   | 32  | -   |       |       |
| T <sub>F</sub>      | Fall Time           |                                                                                                       | -   | 8   | -   |       |       |
| Q <sub>G</sub>      | Total Gate Charge   | V <sub>DS</sub> = -15V ,<br>V <sub>GS</sub> = -4.5V,<br>I <sub>D</sub> = -2A                          | -   | 3.7 | -   | nC    |       |
| Q <sub>GS</sub>     | Gate-Source Charge  |                                                                                                       | -   | 2   | -   |       |       |
| Q <sub>GD</sub>     | Gate-Drain Charge   |                                                                                                       | -   | 1   | -   |       |       |



CTL0203PS-R3

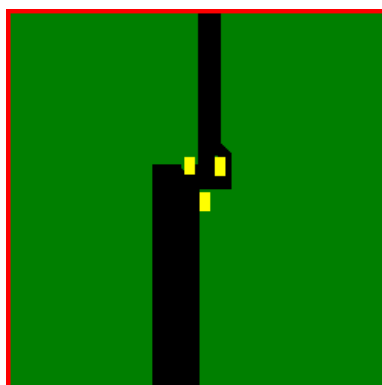
## P-Channel Enhancement MOSFET

### 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>D</sub> = -1A | -   | -0.85 | -1.2 | V     |       |
| I <sub>SD</sub> | Body Diode Continuous Current |                                            | -   | -     | -1   | A     | 1     |

Note:

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



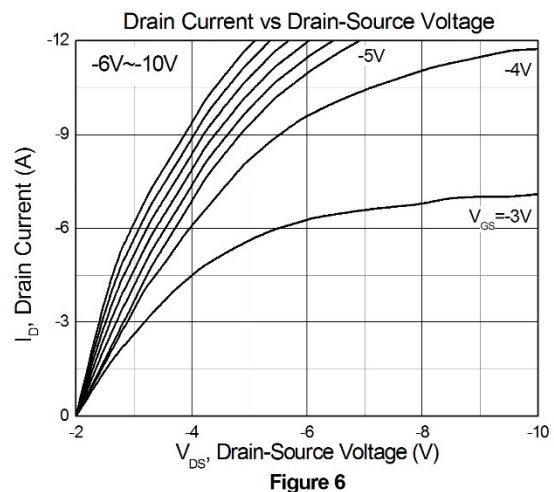
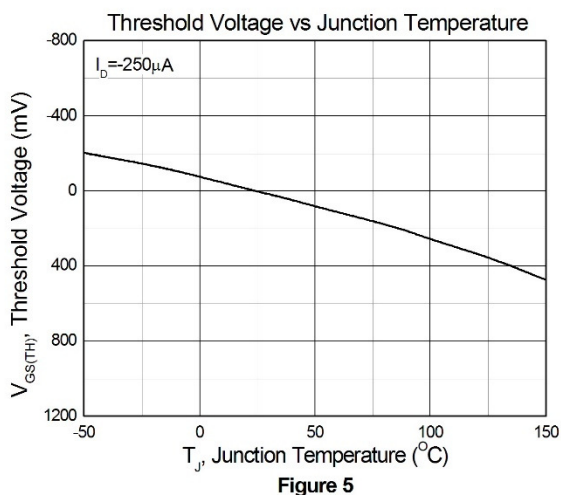
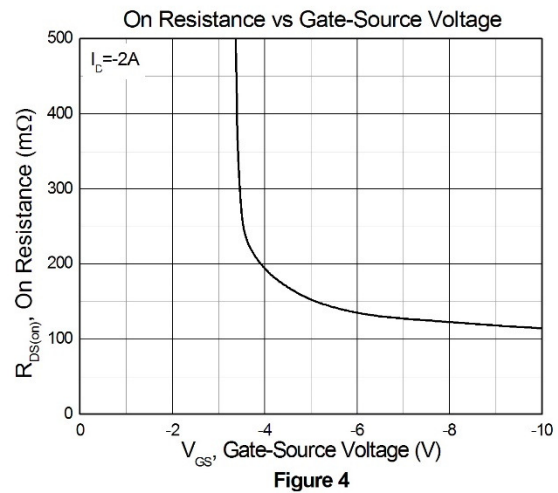
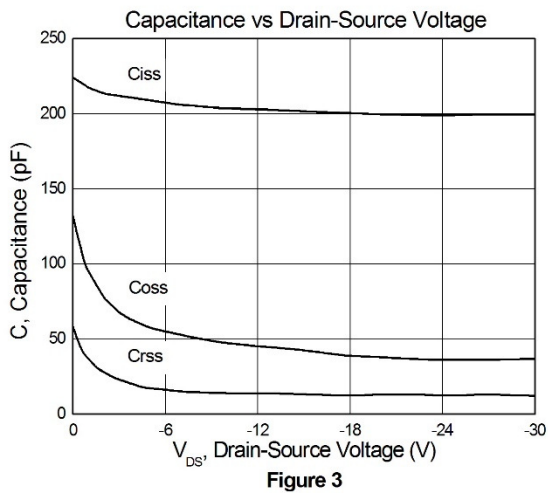
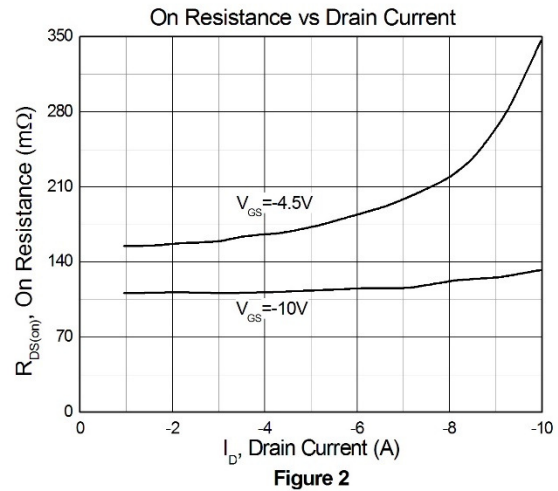
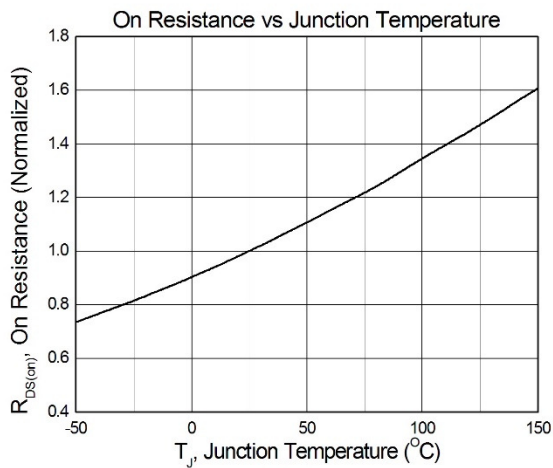
FR-4  
25.4 × 25.4 mm .  
2 Oz Copper

Test Board

3. The data tested by pulsed , pulse width  $\leq 300\mu\text{s}$  , duty cycle  $\leq 2\%$
4. Thermal Resistance follow JESD51-3.

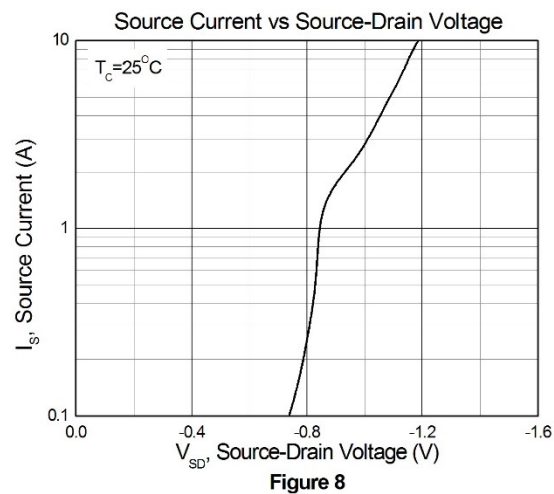
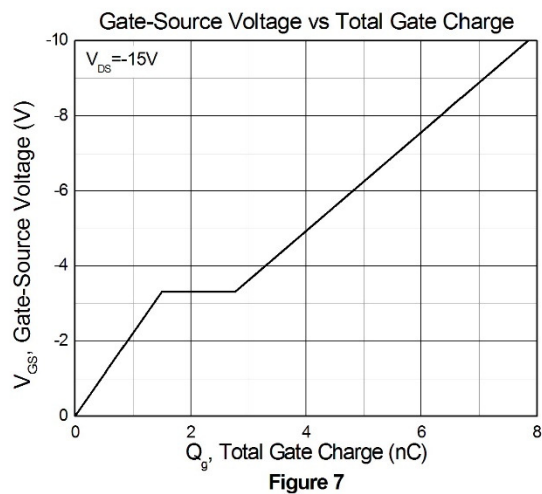


## Typical Characteristic Curves





P-Channel Enhancement MOSFET





## Test Circuits & Waveforms

Figure 9: Gate Charge Test Circuit

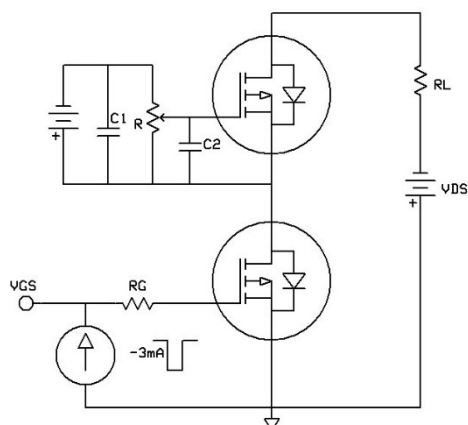


Figure 10: Gate Charge Waveform

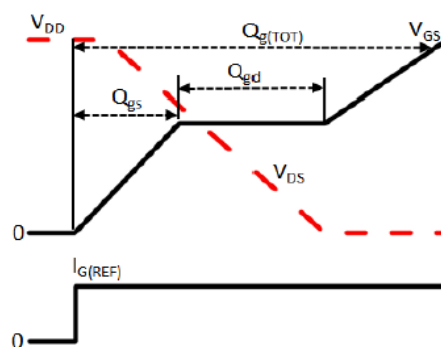


Figure 11: Switching Time Test Circuit

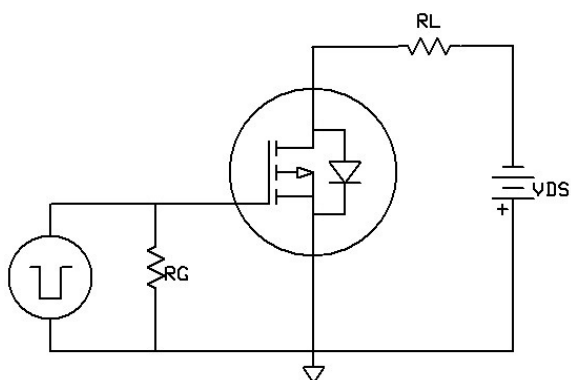
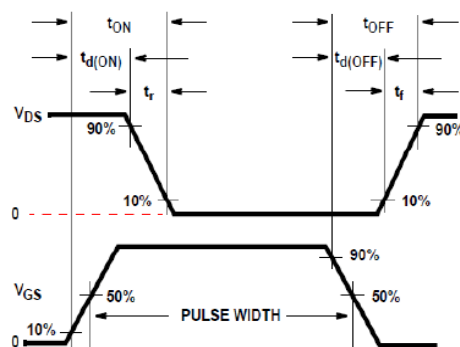
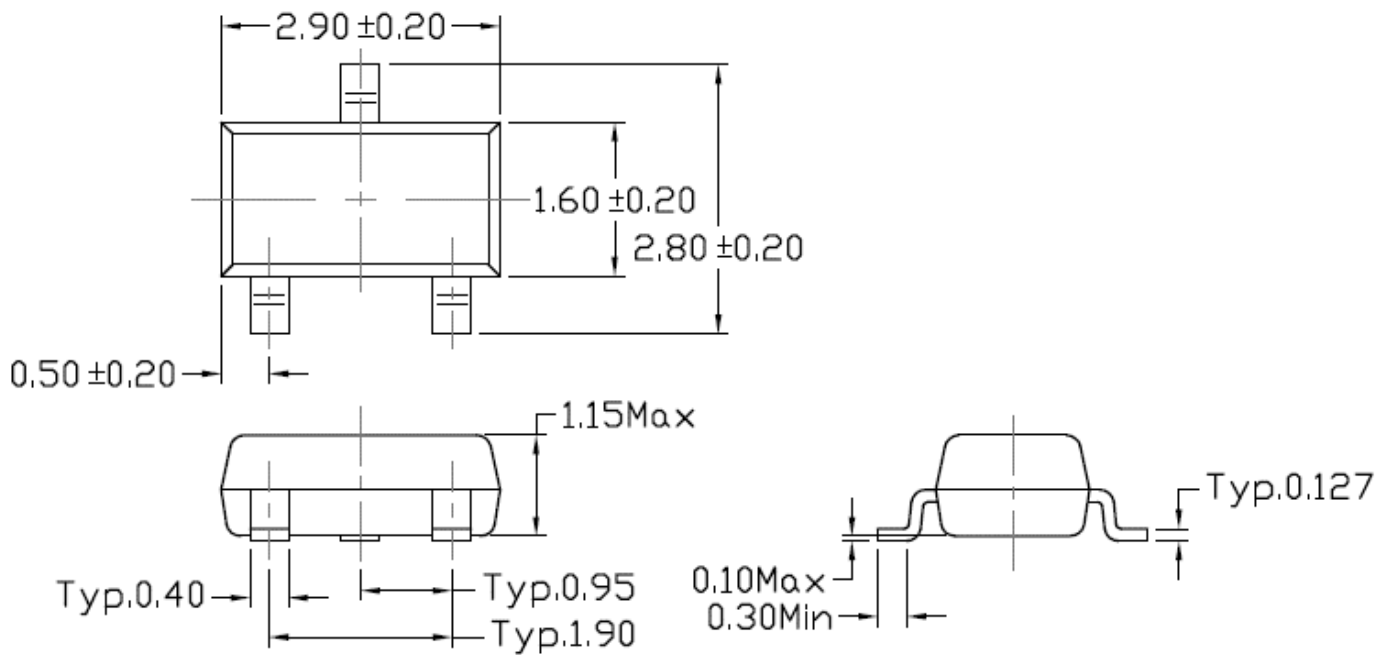


Figure 12: Switching Time Waveform

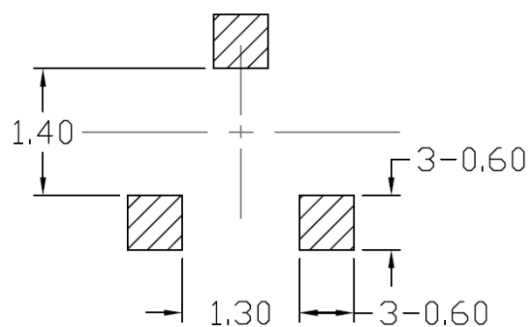




### Package Dimension (SC-59)



### Recommended pad layout for surface mount leadform

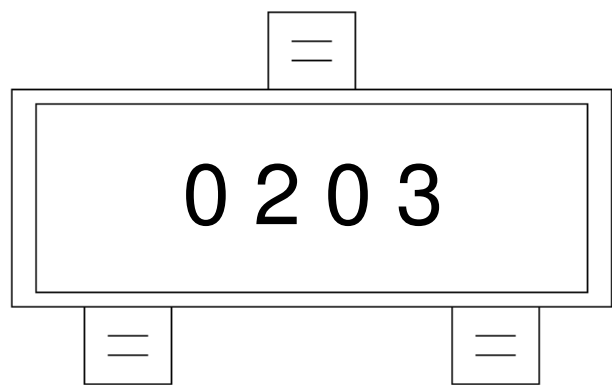




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**P-Channel Enhancement MOSFET**

**Marking Information**



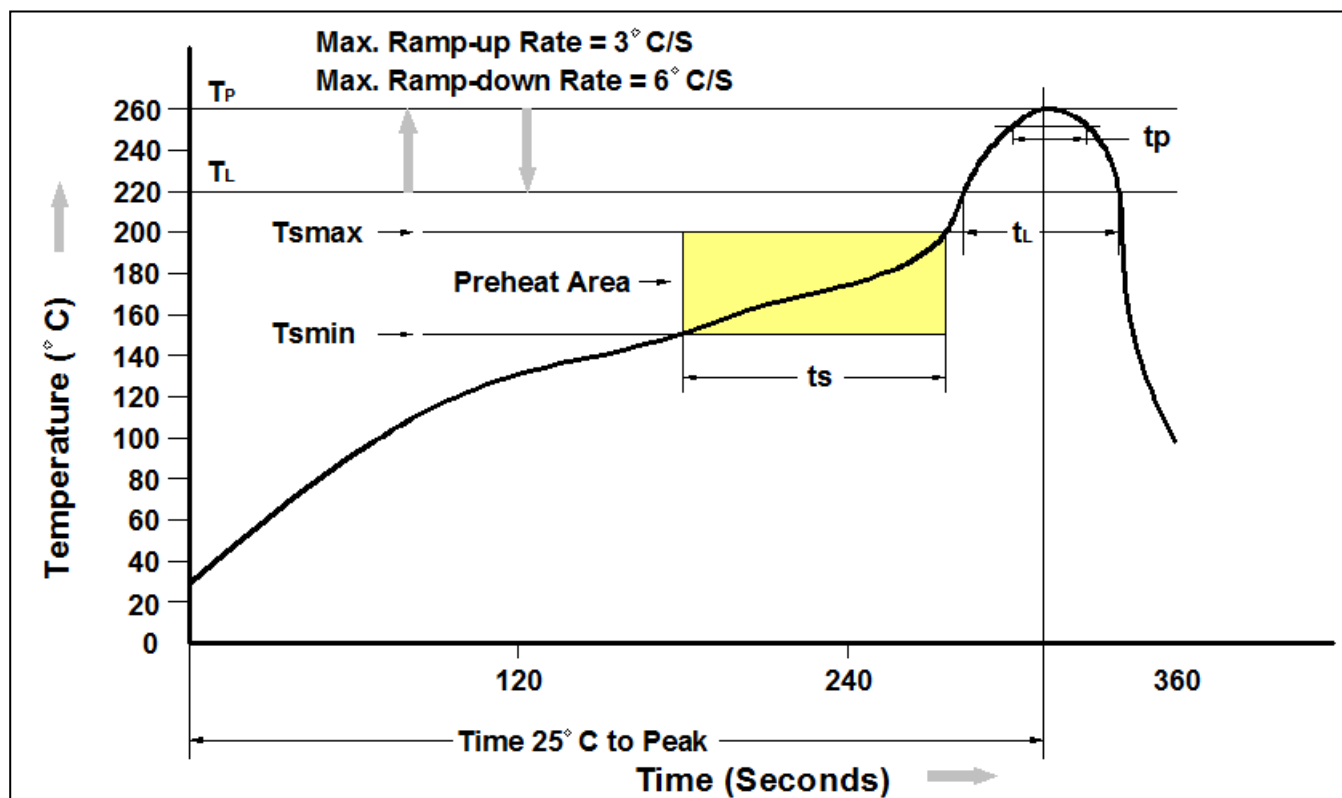
0203: Device Number

**Ordering Information**

| Part Number  | Description | Quantity |
|--------------|-------------|----------|
| CTL0203PS-R3 | SOT-23 Reel | 3000 pcs |



## Reflow Profile



| Profile Feature                                                       | Pb-Free Assembly Profile |
|-----------------------------------------------------------------------|--------------------------|
| Temperature Min. (T <sub>smin</sub> )                                 | 150°C                    |
| Temperature Max. (T <sub>smax</sub> )                                 | 200°C                    |
| Time (t <sub>s</sub> ) from (T <sub>smin</sub> to T <sub>smax</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.           |



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