CSM Series
Capacitive Touch Sensor Display
15.0 x 15.0 x 3.2 mm

CSMS15CIC01 - Super Red Capacitive Touch LED Sensor with a Display Size of 0.59 x 0.59 inches (15 x 15 mm) square

Application

- Mobile communication devices
- Electronic devices
- Point of sale terminals
- Industrial control displays
- Touch screen monitors
- Media players
- Food service appliances
- Appliances and consumer equipments

Key features

- Integrated touch sensing and LED display technology
- Enables the device interface to be more user friendly and intuitive
- Allow Top Mount and Reverse Mount design
- Available in one standard size: 15.0mm x 15.00mm x 3.2mm
- Available in 5 colors: super red, white, pure green, blue or yellow
- Touch sensor: integrated circuit (IC)
- Uniform illumination and high optical clarity due to LED technology
- Robust design due to no mechanical moving parts
- Simplifies devices design and manufacturability
- Optional overlay (icons): on/off, arrow, alarm (sold separately)
- Capacitive Touch Display can also be mounted behind clear glass or plastic layer such as polycarbonate or acrylic
- Capacitive sensor still functional when hands are wet
- Capacitive sensor still functional when hands are covered with certain types of gloves
Ordering Data

The CSM Series (Capacitive Touch Sensor LED Display) is available in a range of standard features and options. To specify simply choose one option from each column.

<table>
<thead>
<tr>
<th>Series</th>
<th>Mounting Type</th>
<th>Shape</th>
<th>Dimension</th>
<th>Polarity</th>
<th>IC</th>
<th>Color</th>
</tr>
</thead>
<tbody>
<tr>
<td>C</td>
<td>SM</td>
<td>S</td>
<td>15</td>
<td>C</td>
<td>IC</td>
<td></td>
</tr>
</tbody>
</table>

Cap Touch
Surface Mount
Through-Hole

15 mm x 15 mm
Common Cathode

Integrated Circuit

Super Red  01
White      04
Pure Green 05
Blue       06
Yellow     07

¹For Through-Hole version, please refer to CTH Series Datasheets

Application Circuit

![Application Circuit Diagram]

VDD
INPUT
OUTPUT 1
OUTPUT 2
VSS
CONTROLLER

R1
R2
R3
R4
R5
R6

CAP TOUCH SENSOR DISPLAY

INTERNAL IC
VDD
VSS
PIN 1
PIN 2
PIN 3
PIN 4

M
Package Dimensions

Notes
1. Dimensions are in millimeter [inch]
   Tolerance is ±0.25 [.010] and angle is ±1° unless otherwise noted

Features
- Touch Display with Drive IC
- SMD Type
- RoHS Compliant
- Low Power Consumption
- Easy Mounting on P.C. Board or Socket

Typical Internal Equivalent Circuit
Internal Circuit Diagram

Truth Table

<table>
<thead>
<tr>
<th>SENSOR</th>
<th>PIN#2</th>
</tr>
</thead>
<tbody>
<tr>
<td>NOT TOUCHED</td>
<td>LOW</td>
</tr>
<tr>
<td>TOUCHED</td>
<td>HIGH</td>
</tr>
</tbody>
</table>

Internal IC Electrical Characteristics

(TA = 25°C, unless otherwise specified)

<table>
<thead>
<tr>
<th></th>
<th>Symbol</th>
<th>Min.</th>
<th>Typ.</th>
<th>Max.</th>
<th>Unit</th>
<th>Condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supply Voltage</td>
<td>V_{DD}</td>
<td>2.0</td>
<td>--</td>
<td>5.5</td>
<td>V</td>
<td>--</td>
</tr>
<tr>
<td>High Level Input Voltage</td>
<td>V_{IH}</td>
<td>3.5</td>
<td>--</td>
<td>5</td>
<td>V</td>
<td>V_{DD} = 5V</td>
</tr>
<tr>
<td>Low Level Input Voltage</td>
<td>V_{IL}</td>
<td>0</td>
<td>--</td>
<td>1.5</td>
<td>V</td>
<td>V_{DD} = 5V</td>
</tr>
<tr>
<td>Operating Current</td>
<td>I_{DD1}</td>
<td>--</td>
<td>16</td>
<td>--</td>
<td>μA</td>
<td>V_{DD} = 5V No load</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>--</td>
<td>3.5</td>
<td>μA</td>
<td>V_{DD} = 3V No load</td>
</tr>
<tr>
<td>Operating Current (SLRT = V_{DD})</td>
<td>I_{DD2}</td>
<td>--</td>
<td>10.5</td>
<td>--</td>
<td>μA</td>
<td>V_{DD} = 5V No load</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>2.5</td>
<td>μA</td>
<td>V_{DD} = 3V No load</td>
</tr>
<tr>
<td>Low Level Output Current</td>
<td>I_{OL}</td>
<td>--</td>
<td>30</td>
<td>--</td>
<td>mA</td>
<td>V_{DD} = 3V</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>V_{OL} = 1V</td>
</tr>
<tr>
<td>High Level Output Current</td>
<td>I_{OH}</td>
<td>--</td>
<td>8</td>
<td>--</td>
<td>mA</td>
<td>V_{DD} = 3V</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>V_{OH} = 2V</td>
</tr>
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</table>
### ABSOLUTE MAXIMUM RATING FOR LED (Ta=25°C)

<table>
<thead>
<tr>
<th></th>
<th>Symbol</th>
<th>Rating</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power Dissipation (Per Dice)</td>
<td>$P_D$</td>
<td>70</td>
<td>mW</td>
</tr>
<tr>
<td>Continuous Forward Current (Per Dice)</td>
<td>$I_F$</td>
<td>25</td>
<td>mA</td>
</tr>
<tr>
<td>Peak Current (Per Dice, duty cycle 1/10,1KHz)</td>
<td>$I_{FP}$</td>
<td>90</td>
<td>mA</td>
</tr>
<tr>
<td>Derating Liner from 25°C (Per Dice)</td>
<td>$\Delta I_F / \Delta T$</td>
<td>0.33</td>
<td>mA / °C</td>
</tr>
<tr>
<td>Reverse Voltage (Per Dice)</td>
<td>$V_R$</td>
<td>5</td>
<td>V</td>
</tr>
<tr>
<td>Operating Temp.</td>
<td>$T_{OPR}$</td>
<td>-35 ~ +85</td>
<td>°C</td>
</tr>
<tr>
<td>Storage Temp.</td>
<td>$T_{STG}$</td>
<td>-35 ~ +85</td>
<td>°C</td>
</tr>
<tr>
<td>Hand Soldering Temperature</td>
<td>$T_{SOL}$</td>
<td>350</td>
<td>°C</td>
</tr>
</tbody>
</table>

### ELECTRO-OPTICAL CHARACTERISTICS (Ta=25°C)

<table>
<thead>
<tr>
<th></th>
<th>Symbol</th>
<th>Min.</th>
<th>Typ.</th>
<th>Max.</th>
<th>Unit</th>
<th>Condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Luminous Intensity</td>
<td>$I_V$</td>
<td>6.7</td>
<td>13</td>
<td>--</td>
<td>mcd</td>
<td>$I_F = 20$ mA</td>
</tr>
<tr>
<td>Forward Voltage</td>
<td>$V_F$</td>
<td>--</td>
<td>2</td>
<td>2.8</td>
<td>V</td>
<td>$I_F = 20$ mA</td>
</tr>
<tr>
<td>Peak Wavelength</td>
<td>$\lambda_P$</td>
<td>--</td>
<td>660</td>
<td>--</td>
<td>nm</td>
<td>$I_F = 20$ mA</td>
</tr>
<tr>
<td>Dominant Wavelength</td>
<td>$\lambda_D$</td>
<td>--</td>
<td>645</td>
<td>--</td>
<td>nm</td>
<td>$I_F = 20$ mA</td>
</tr>
<tr>
<td>Spectrum Radiation Bandwidth</td>
<td>$\Delta \lambda$</td>
<td>--</td>
<td>20</td>
<td>--</td>
<td>nm</td>
<td>$I_F = 20$ mA</td>
</tr>
<tr>
<td>Reverse Current</td>
<td>$I_R$</td>
<td>-</td>
<td>100</td>
<td>--</td>
<td>µA</td>
<td>$V_R = 5$ V</td>
</tr>
</tbody>
</table>
ELECTRICAL/OPTICAL CHARACTERISTICS CURVES

Fig 1. Forward Current vs. Forward Voltage

Fig 2. Relative Intensity vs. Forward Current

Fig 3. Forward Voltage vs. Temperature

Fig 4. Relative Intensity vs. Temperature

Fig 5. Spectral Power Distribution vs. Wavelength

Fig 6. Forward current vs. Temperature
SOLDERING PAD SIZE

Top Mount

Reverse Mount

Dimensions are in millimeter [inch]
# Soldering Characteristics

1. IR-Reflow Condition (Pb free)

<table>
<thead>
<tr>
<th>Area</th>
<th>Title</th>
<th>Symbol</th>
<th>Min.</th>
<th>Max.</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) Preheat</td>
<td>Ramp-up rate</td>
<td>$V_P$</td>
<td>1</td>
<td>5</td>
<td>°C/sec</td>
</tr>
<tr>
<td></td>
<td>Temperature</td>
<td>$T_P$</td>
<td>150</td>
<td>--</td>
<td>°C</td>
</tr>
<tr>
<td></td>
<td>Time</td>
<td>$t_P$</td>
<td>--</td>
<td>--</td>
<td>sec</td>
</tr>
<tr>
<td>(2) Equilibrium</td>
<td>Ramp-up rate</td>
<td>$V_E$</td>
<td>--</td>
<td>--</td>
<td>°C/sec</td>
</tr>
<tr>
<td></td>
<td>Temperature</td>
<td>$T_E$</td>
<td>150</td>
<td>200</td>
<td>°C</td>
</tr>
<tr>
<td></td>
<td>Time</td>
<td>$t_E$</td>
<td>60</td>
<td>120</td>
<td>sec</td>
</tr>
<tr>
<td>(3) Reflow</td>
<td>Ramp-up rate</td>
<td>$V_R$</td>
<td>1</td>
<td>5</td>
<td>°C/sec</td>
</tr>
<tr>
<td></td>
<td>Temperature</td>
<td>$T_R$</td>
<td>220</td>
<td>--</td>
<td>°C</td>
</tr>
<tr>
<td></td>
<td>Time</td>
<td>$t_R$</td>
<td>--</td>
<td>60</td>
<td>sec</td>
</tr>
<tr>
<td>(4) Cooling</td>
<td>Ramp-up rate</td>
<td>$V_{RP}$</td>
<td>--</td>
<td>260</td>
<td>°C</td>
</tr>
<tr>
<td></td>
<td>Temperature</td>
<td>$t_{rp}$</td>
<td>--</td>
<td>10</td>
<td>sec</td>
</tr>
<tr>
<td></td>
<td>Time</td>
<td>$V_C$</td>
<td>3</td>
<td>6</td>
<td>°C/sec</td>
</tr>
</tbody>
</table>

![Diagram of soldering process](attachment:image.png)

2. Hand Soldering (Iron Condition)

- Soldering Iron: 30W Max
- Temperature 350°C Max
- Soldering Time: 3 Seconds Max (One Time)
- Distance: 1.6mm min (From Seating Plane)

* If you choose to add the overlay (optional) it should be applied after reflow
Overlay (Sold Separately)

- Standard Icons: Arrow, On/OFF, Alarm
- Icons combines interactive control with color identification to ease and accelerate user interactions for any device
- Reverse printed translucent clear icons for capacitive touch sensor LED backlighting
- Overlay lamination with optically clear adhesive
- Optically clear adhesive for easy installation, high cohesive, and long term durability
- When the CTH or CSM are turned off you can still see the standard icon overlay
- Offers high-temperature capability, high hardness, use resistance, and chemical inertness
- Custom icons are also available upon request [contact a VCC representative]
- Suggested overlay size: 0.590" x 0.590"

Maximum thickness of acrylic/glass, 0.118" [3mm]

For more information, please refer to the most recent overlay datasheet available on our website
Overlay Installation Instructions

Before you begin set up your mat and antistatic wrist strap. Professional service technicians use grounding straps to minimize the chances of electrostatic discharge (ESD) during normal maintenance involving electronic devices. These antistatic devices may be placed around the wrists or ankles to ground the technician to the system being worked on. These straps release any static present on the technician’s body and pass it harmlessly to ground potential.

Use the appropriate equipment.

An antistatic bag is a bag used to store electronic components, which are prone to damage caused electrostatic discharge (ESD).

Steps:
Note: if using reflow soldering the overlay must be installed afterwards as a second operation
1) Peel the overlay (adhesive) off its white sheet without removing the transparent film (Figure 1)
2) Apply the overlay over the capacitive touch sensor component (Figure 2) without removing the protective face line. Be sure to align or orientate the overlay properly.
3) Be sure check for no contamination in the ignition zone this can be done with electrical test (Figure 4,5,6)
4) The protective film can either be removed in the assembly line or by the end user
Storage Method

• **Storage Conditions**

A. Before opening the package:
The LEDs should be kept at -40°C ~ 105°C and RH: 45% ~ 85%. The LEDs should be used within a year. When storing the LEDs, moisture proof packaging with absorbent material (silica gel) is recommended.

B. After opening the package:
The LEDs should be kept at ≤30°C and ≤70%RH. The LEDs should be soldered within 168 hours (7) after opening the package. If unused LEDs remain, they should be stored in moisture proof packages, such as sealed containers with packages of moisture absorbent material (silica gel).

It is also recommended to return the LEDs to the original moisture proof bag and to reseal the moisture proof bag again.

• If the moisture absorbent material (silica gel) has faded away or the LEDs have exceeded the storage time, baking treatment should be performed using the following conditions.

Baking treatment: more than 24 hours at 65 ± 5°C

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Reel Dimension

Dimensions are in millimeter [inch]

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Compliances and Approvals

[Icons for compliance and approval marks]