The OPH-1005 is a portable terminal with a color display and a built-in laser scan engine.

Specifications Manual
All information subject to change without notice.

Document History

<table>
<thead>
<tr>
<th>Model Number</th>
<th>Specification Number</th>
</tr>
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<tbody>
<tr>
<td>OPH-1005</td>
<td></td>
</tr>
</tbody>
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<table>
<thead>
<tr>
<th>Edition</th>
<th>Original Spec Number</th>
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Date: 04-12-2013

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SUPPORT

<table>
<thead>
<tr>
<th>USA</th>
<th>Europe</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phone: 800-636-0090</td>
<td>Email: <a href="mailto:support@opticon.com">support@opticon.com</a></td>
</tr>
<tr>
<td>Email: <a href="mailto:support@opticonusa.com">support@opticonusa.com</a></td>
<td>Web: <a href="http://www.opticonusa.com">www.opticonusa.com</a></td>
</tr>
<tr>
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1. **Abstract**

This manual provides specifications for the OPH-1005 portable terminal (hereafter referred to as "scanner").

2. **Overview**

The OPH-1005 is a fully programmable portable terminal with a built-in laser scan engine. Applications can be developed in C-language and installed in the OPH’s internal flash memory. The OPH also features a RAM disk and a large flash disk on which e.g. a product database can be stored. The OPH’s also features an easy to use very rugged keyboard for data entry. For data communication, an IrDA interface is added (IrDA physical version 1.2).

The OPH-1005 can use a variety of cradles:

- CRD-1001 USB/RS232 cradle
- CRD-1002 analog modem cradle
- CRD-1003 GSM modem cradle
- CRD-1004 Ethernet cradle
- CRD-1005 USB/RS232 cradle

An application development kit, required to write, compile and install applications on the OPH-1005 is available as a free download. Development language: C language.

[Contents]

- Application Development Specification Manuals
- Development Library
- Sample code
- PC program to download applications to the OPH-1005

3. **Physical Features**

3.1. **Dimensions**

   W 55.4 x D 22.8 x H 136.1 mm

3.2. **Weight**

   140 g (including battery)
4. Environmental Specifications

4.1. Operating Temperature and Humidity
Temperature: -10 to 50°C
Humidity: 20% to 85% RH

4.2. Charging Temperature
Temperature: 0 to 40°C

4.3. Storage Temperature and Humidity
Temperature: -20 to 60°C
Humidity: 20% to 85% RH

4.4. Ambient Light Immunity
Decoding performance is guaranteed when the range of illumination on a barcode surface is between zero and the following values:

<table>
<thead>
<tr>
<th>Light Source</th>
<th>Luminance (lx)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Incandescent light</td>
<td>4,000</td>
</tr>
<tr>
<td>Fluorescent light</td>
<td>4,000</td>
</tr>
<tr>
<td>Sunlight</td>
<td>80,000</td>
</tr>
</tbody>
</table>

Conditions
Barcode Sample: OPTOELECTRONICS Test Sample

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>PCS</td>
<td>0.9</td>
</tr>
<tr>
<td>Resolution</td>
<td>0.25 mm</td>
</tr>
<tr>
<td>Quiet Zone</td>
<td>15 mm</td>
</tr>
<tr>
<td>Symbology</td>
<td>Code 39</td>
</tr>
<tr>
<td>N/W Ratio</td>
<td>1:2.5</td>
</tr>
<tr>
<td>Distance</td>
<td>96 mm</td>
</tr>
<tr>
<td>Angle</td>
<td>± 0° ² = 15° ³ = 0°</td>
</tr>
<tr>
<td>Curvature</td>
<td>R = ∞</td>
</tr>
</tbody>
</table>

Direct light or specular reflection from a light source should be prevented from entering the acceptance area.

Note: ±, ² and ³ respectively represent pitch, skew and tilt. Please see section 8 for how these values are defined.

4.5. Static Electricity
Air discharge: ± 8 kV MAX (No malfunction)
               ± 15 kV MAX (No destruction)
Contact discharge: ± 4 kV MAX (No malfunction)
                   ± 8 kV MAX (No destruction)

4.6. Drop resistance.
There will be no sign of decreased performance after the following drop test:
Drop the scanner from 1.5 M above the concrete floor (6 sides, 3 times each).
Scratches or discoloration of the casing do not decrease product performance.
## Controls

<table>
<thead>
<tr>
<th>Items</th>
<th>Specifications</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>CPU</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Type</td>
<td>RX62N 32-bit MCU</td>
<td></td>
</tr>
<tr>
<td>Internal ROM</td>
<td>512KB + 32 KB</td>
<td>For OS and configuration</td>
</tr>
<tr>
<td>Internal RAM</td>
<td>96 KB</td>
<td></td>
</tr>
<tr>
<td>Clock frequency</td>
<td>96 MHz</td>
<td></td>
</tr>
<tr>
<td><strong>Memory</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FLASH ROM</td>
<td>4 MB</td>
<td>For user applications</td>
</tr>
<tr>
<td>SRAM</td>
<td>4 MB</td>
<td>Battery backed up</td>
</tr>
<tr>
<td>NAND Flash</td>
<td>128 MB</td>
<td>For flash disk</td>
</tr>
<tr>
<td><strong>LCD</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Active area</td>
<td>W 31.68 x H 39.6 mm</td>
<td></td>
</tr>
<tr>
<td>Number of dots</td>
<td>W 240 x H 320</td>
<td>Dot pitch 0.13 mm</td>
</tr>
<tr>
<td>Color depth</td>
<td>262144</td>
<td></td>
</tr>
<tr>
<td>Backlight</td>
<td>White LED</td>
<td></td>
</tr>
<tr>
<td>Character fonts</td>
<td>With True Type fonts an unlimited choice of characters fonts is available.</td>
<td>For True Type fonts, the user has to install the FreeType library.</td>
</tr>
<tr>
<td>Build-in character fonts</td>
<td>Tiny font: 6 dots x 6 dots Small font: 8 dots x 8 dots Medium font: 6 dots x 12 dots Large font: 8 dots x 16 dots Huge font: 12 dots x 24 dots</td>
<td>These are build into the OS.</td>
</tr>
<tr>
<td><strong>Indicators</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LED</td>
<td>Two-color LED (red/green)</td>
<td>When lit at the same time, red and green appear as orange</td>
</tr>
<tr>
<td>Buzzer</td>
<td>Adjustable volume, tone</td>
<td></td>
</tr>
<tr>
<td><strong>Operations</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Keys</td>
<td>UP, DOWN, SCAN, SHIFT, BS, CLEAR, POWER, 10Keys, Dot, ENTER, #, END, CLR, RET</td>
<td></td>
</tr>
<tr>
<td><strong>Clock</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Built-in RTC</td>
<td>YY/MM/DD/HH/MM/SS</td>
<td>Battery backed up</td>
</tr>
<tr>
<td></td>
<td>(Leap-year supported)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Accurate within 90 seconds per month</td>
<td></td>
</tr>
</tbody>
</table>
6. Electrical Specifications

6.1. Electrical Characteristics

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Typ</th>
<th>Unit</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating voltage</td>
<td>3.6–4.2</td>
<td>V</td>
<td>Lithium-ion battery</td>
</tr>
<tr>
<td>Operating current</td>
<td>150</td>
<td>mA</td>
<td>When laser emitting</td>
</tr>
<tr>
<td>Stand-by current</td>
<td>&lt;50</td>
<td>mA</td>
<td></td>
</tr>
<tr>
<td>Sleep current</td>
<td>&lt;2</td>
<td>mA</td>
<td>When the power is OFF</td>
</tr>
</tbody>
</table>

6.2. Main Battery

The main battery is a lithium-ion battery:

- Nominal capacity: 1100 mAh
- Nominal voltage: 3.7 V.
- Low voltage: Less than 3.4 V
- Usable time: Ca. 40 hours (backlight off, 1 scan / 10 sec)
- Data hold time (clock and SRAM): 24 hours

The backup battery is an 11 mAh secondary battery.
7. Optical Specifications

7.1. Laser Scan Specifications

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Light-emitting element</td>
<td>Red laser diode</td>
<td>—</td>
</tr>
<tr>
<td>Emission wavelength</td>
<td>650 ±10 (25°C) nm</td>
<td></td>
</tr>
<tr>
<td>Light output</td>
<td>1.0 or less mW</td>
<td></td>
</tr>
<tr>
<td>Scanning method</td>
<td>Bi-directional scanning</td>
<td>—</td>
</tr>
<tr>
<td>Scanning speed</td>
<td>100 ±20 scans/s</td>
<td></td>
</tr>
<tr>
<td>Scan angle</td>
<td>Scan angle: 54 ±5°</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Read angle: 44 (Min)</td>
<td>°</td>
</tr>
</tbody>
</table>

Notes:
Refer to chapter 8, “Technical Specifications,” to read about scanning performance.

7.1.1. Tilt of Laser Scan Line
Maximum tilt between both ends of laser scan line.
Less than 1.2° upward tilt from the scan origin.
Maximum of 3.1 mm when measured at a point 150 mm away from the scan origin. (The skew angle of this measurement was 0°.)
Measurement was done from the center of the scan line.

7.1.2. Curvature of Scan
Maximum gap between the straight line connecting both ends of laser scan line and the actual laser scan line.
Less than 1.27° curvature from the scan origin.
Maximum of 3.3 mm curvature when measured at a point 150 mm away from the scan origin.
Measurement was done from the center of the scan line.

Figure 1: Scan tilt and curvature
8. Technical Specifications Barcode Scanner

The conditions are as follows, unless otherwise specified.

**Conditions**

<table>
<thead>
<tr>
<th>Condition</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ambient temperature and humidity:</td>
<td>Room temperature (5 to 35°C) Room humidity (45% to 85% RH)</td>
</tr>
<tr>
<td>Ambient light</td>
<td>500 to 900 lx</td>
</tr>
<tr>
<td>Background</td>
<td>Barcode = black, Space = white, Margin = white, Background of label = black</td>
</tr>
<tr>
<td>Decoding test</td>
<td>Approve the performance when decoding is successful in all ten tests. (Decoding is deemed successful when completed in 0.5 seconds or less.)</td>
</tr>
</tbody>
</table>

8.1. Print Contrast Signal (PCS)

PCS = 0.45 or higher (over 70% of reflectivity of space and quiet zone).

Scanning performance may decline if dirt or scratches mark the optical window. Keep the optical window clean.

8.2. Minimum Resolution

0.15 mm

8.3. Supported symbologies:

**Linear (1D)**

- JAN/UPC/EAN, incl. add-on
- Codabar/NW-7
- Code 11
- Code 39
- Code 93
- Code 128
- GS1-128 (EAN-128)
- GS1 Dabar (RSS)
- IATA
- Industrial 2of5
- Interleaved 2of5
- ISBN-ISMN-ISSN
- Matrix 2of5
- MSI/Plessey

**S-Code**

**Telepen**

**Tri-Optic**

**UK/Plessey**

**Postal codes (1D)**

- Chinese Post
- Korean Postal Authority Code

**2D codes**

- GS1 Composite Codes
- MicroPDF417
- PDF417
8.4. Scan Area and Resolution

8.4.1. Depth of Field

The depth of field is measured from the edge of the scanner. The scanning range is within the circular arc centered on the scan origin.

![Figure 2: Depth of field](image)

<table>
<thead>
<tr>
<th>Symbology</th>
<th>Resolution (mm)</th>
<th>Decode Depth (mm)</th>
<th>PCS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Code 39</td>
<td>1.0</td>
<td>70 - 450</td>
<td>0.9</td>
</tr>
<tr>
<td>Code 39</td>
<td>0.5</td>
<td>50 - 320</td>
<td>0.9</td>
</tr>
<tr>
<td>Code 39</td>
<td>0.25</td>
<td>50 - 200</td>
<td>0.9</td>
</tr>
<tr>
<td>Code 39</td>
<td>0.15</td>
<td>55 - 120</td>
<td>0.9</td>
</tr>
</tbody>
</table>

**Conditions**

Barcode Sample: OPTOELECTRONICS Test Sample

- N/W Ratio: 1:2.5
- Angle: ± = 0°, ± = 15°, ± = 0°
- Curvature: R = •

<table>
<thead>
<tr>
<th>Resolution (mm)</th>
<th>Symbology</th>
<th>PCS</th>
<th>Quiet Zone</th>
<th>Digits</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.0</td>
<td>Code 39</td>
<td>0.9</td>
<td>25 mm</td>
<td>1</td>
</tr>
<tr>
<td>0.5</td>
<td>Code 39</td>
<td>0.9</td>
<td>18 mm</td>
<td>3</td>
</tr>
<tr>
<td>0.25</td>
<td>Code 39</td>
<td>0.9</td>
<td>10 mm</td>
<td>8</td>
</tr>
<tr>
<td>0.15</td>
<td>Code 39</td>
<td>0.9</td>
<td>7 mm</td>
<td>10</td>
</tr>
</tbody>
</table>
8.5. Pitch, Skew, and Tilt

8.5.1. Pitch Angle

$\pm = \pm 35^\circ$

Figure 3: Pitch angle

Conditions

Barcode Sample: OPTOELECTRONICS Test Sample $\pm = 35^\circ$

<table>
<thead>
<tr>
<th>Distance</th>
<th>96 mm from the edge of the scanner</th>
</tr>
</thead>
<tbody>
<tr>
<td>Label</td>
<td>Pitch Angle, Skew Angle, Dead Zone</td>
</tr>
<tr>
<td></td>
<td>PCS = 0.9, Resolution = 0.25mm, Symbology = 9-digit Code 39, Quiet Zone = 10 mm, N/W Ratio = 1:2.5</td>
</tr>
<tr>
<td>Tilt Angle</td>
<td>PCS = 0.9, Resolution = 0.26mm, Symbology = 13-digit JAN, Quiet Zone = 10mm</td>
</tr>
<tr>
<td>Angle</td>
<td>Pitch: Skew $\beta = 15^\circ$; Tilt $\gamma = 0^\circ$</td>
</tr>
<tr>
<td></td>
<td>Tilt: Pitch $\pm = 0^\circ$; Skew $\beta = 15^\circ$</td>
</tr>
<tr>
<td></td>
<td>Skew Dead Zone: Pitch $\pm = 0^\circ$; Tilt $\gamma = 0^\circ$</td>
</tr>
<tr>
<td>Curvature</td>
<td>R = *</td>
</tr>
</tbody>
</table>
8.5.2. Skew Angle and Dead Zone
Skew: ±50° (Excluding dead zone)
Dead zone: DZ = ±8° (There are some areas in which decoding fails due to specular reflection)

Conditions
Barcode Sample: OPTOELECTRONICS Test Sample
Distance 96 mm from the edge of the scanner
Label

- **Pitch Angle, Skew Angle, Dead Zone**
  - PCS = 0.9, Resolution = 0.25mm, Symbology = 9-digit Code 39,
  - Quiet Zone = 10 mm, N/W Ratio = 1:2.5

- **Tilt Angle**
  - PCS = 0.9, Resolution = 0.26mm, Symbology = 13-digit JAN,
  - Quiet Zone = 10mm

Angle
- **Pitch**: Skew $\beta = +15^\circ$; Tilt $\gamma = 0^\circ$
- **Tilt**: Pitch $\pm = 0^\circ$; Skew $\beta = +15^\circ$
- **Skew Dead Zone**: Pitch $\pm = 0^\circ$; Tilt $\gamma = 0^\circ$

Curvature $R = \ast$
8.5.3. Tilt Angle

\[ \theta = \pm 20^\circ \]

Figure 5: Tilt angle

Conditions

Barcode Sample: OPTOELECTRONICS Test Sample ³

- Distance: 96 mm from the edge of the scanner
- Label:
  - Pitch Angle, Skew Angle, Dead Zone
    - PCS = 0.9, Resolution = 0.25mm, Symbology = 9-digit Code 39, Quiet Zone = 10 mm, N/W Ratio = 1:2.5
  - Tilt Angle
    - PCS = 0.9, Resolution = 0.26mm, Symbology = 13-digit JAN, Quiet Zone = 10mm
- Angle
  - Pitch: Skew \( \beta = +15^\circ \); Tilt \( \theta = 0^\circ \)
  - Tilt: Pitch \( \pm = 0^\circ \); Skew \( \beta = +15^\circ \)
  - Skew Dead Zone: Pitch \( \pm = 0^\circ \); Tilt \( \theta = 0^\circ \)
- Curvature: \( R = \ast \)
8.6. **Curvature**

With 8-digit JAN/UPC/EAN barcodes, decoding performance is guaranteed when Re15 mm.

With 13-digit JAN/UPC/EAN barcodes, decoding performance is guaranteed when Re20 mm.

![Curvature Condition](image)

**Conditions**

- Barcode Sample: OPTOELECTRONICS Test Sample
- PCS = 0.9, Resolution = 0.26 mm, Quiet Zone = 10 mm
- Distance = 96 mm from the edge of the scanner
- Angle = Skew Angle $\theta = +15^\circ$

9. **Interface Specifications**

9.1. **Infrared Transmission (IrDA)**

9.1.1. **Specifications**

- IrDA version 1.2 standard (physical layer only).

9.1.2. **Transmission speed**

Transmission speeds: 1200bps ~ 115.2 kbps.
10. Labeling

10.1. Product label

The product label with the serial number as shown below is affixed to the scanner.

![Figure 7: Product label]

The serial number consists of 6 numeric digits. It starts with 000001 and is incremented with 1 for each scanner. The serial number is also stored in the scanner's non-volatile memory and API functions are available to retrieve the serial number for use in user applications.

The field “Manufactured: “ describes the production date, specified as month, followed by the year. So e.g. January 2014.

Material: Base + laminate protection against wear.
Base: PP film, thickness 80µm, backing with glue.
Laminate: PET film, clear, thickness 50µm.

10.2. White box label

Size is 70mm x 25mm with a tolerance of ± 2 mm
Label material: Paper, white, with permanent adhesive backing.

Article number: Standard code 39 + human readable text, data = 12964
Serial number: Standard code 39 + human readable text, data should match that of the product inside the box.
11. Packaging Specifications

11.1. Individual Packaging Specification

After putting a scanner in a foam bag, pack it in a separate box with the accessories. Put a label on the side of the individual packing box.

Figure 8: Individual packaging
11.2. Collective Packaging Specification
Put 50 individual boxes with scanners inside a box.

Figure 9: Collective packaging

Note: The “RO” mark labeled on the package tray or package box guarantees that the applicable product has passed our test of RoHS restrictions compliance (the restriction of the use of certain hazardous substances in electrical and electronic equipment, 2002/95 EC). However, this document does not have any legal weight in the European Union.
12. Regulatory Compliance

12.1. Laser Safety
IEC 60825-1:2007 Laser Class 2
CDRH Laser Class 2
FDA CDRH Laser class II. Complies with 21 CFR 1040.10 and 1040.11 except for deviations pursuant to laser notice No. 50 dated June 24, 2007.
Class II laser devices are not considered to be hazardous when used for their intended purpose. Avoid staring into the laser beam.

12.2. EMC
EN55022
EN55024
FCC Part 15 Subpart B Class B: This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

12.3. RoHS
RoHS: The restriction of the use of certain hazardous substances in electrical and electronic equipment, 2002/95 EC.
13. Safety

Handle this product carefully. Do not deliberately subject it to any of the following.

13.1. Shock

Do not throw or drop the scanner.
Do not place heavy objects on the scanner.

13.2. Temperature Conditions

Do not use the scanner at temperatures outside the specified range.
Do not pour boiling water on the scanner.
Do not throw the scanner into the fire.
Do not leave the scanner on the dashboard of a car.

13.3. Foreign Materials

Do not immerse the scanner in liquids.
Do not subject the scanner to chemicals.

13.4. Battery

Do not overcharge nor over discharge the battery.
Do not charge the battery at freezing temperatures.
Do not charge the battery at very high temperatures.
When the scanner is not used for a very long time, remove the battery from the battery compartment.
Replace the battery when its lifetime has expired. This is after two years of operation or 500 charge/discharge cycles. (When a half discharged battery is recharged, this counts as only half a cycle.)

13.5. Other

Do not disassemble this product.
The scanner may be damaged by high voltage discharges.
14. Mechanical Drawing

Figure 10: Mechanical drawing