

**Harvatek Surface Mount LED Data Sheet  
HT-110 Series**

|                                                                                                |                        |               |                |                |
|------------------------------------------------------------------------------------------------|------------------------|---------------|----------------|----------------|
| Official Product                                                                               | Product: HT-110 Series |               |                | Data Sheet No. |
| Tentative Product                                                                              | *****                  |               |                | HT-110 Series  |
| Specifications are subject to change without notice. Data and drawings herein are copyrighted. |                        | Mar. 03, 2005 | Version of 1.0 | Page 1/25      |

|                                                                       |           |
|-----------------------------------------------------------------------|-----------|
| <b>DISCLAIMER .....</b>                                               | <b>3</b>  |
| <b>PRODUCT SPECIFICATIONS .....</b>                                   | <b>4</b>  |
| <b>ATTENTION: ELECTROSTATIC DISCHARGE (ESD) PROTECTION .....</b>      | <b>5</b>  |
| <b>LABEL SPECIFICATIONS .....</b>                                     | <b>6</b>  |
| <b>PRODUCT CHARACTERISTICS .....</b>                                  | <b>11</b> |
| <b>ABSOLUTE MAXIMUM RATINGS .....</b>                                 | <b>11</b> |
| <b>ELECTRO-OPTICAL CHARACTERISTICS .....</b>                          | <b>12</b> |
| <b>PACKAGE OUTLINE DIMENSION .....</b>                                | <b>13</b> |
| <b>RECOMMENDED SOLDERING PATTERN FOR REFLOW SOLDERING .....</b>       | <b>13</b> |
| <b>CHARACTERISTIC CURVES FOR YG, Y, D, SD AND UR .....</b>            | <b>14</b> |
| <b>CHARACTERISTIC CURVES FOR UYG, UY, UD AND USD .....</b>            | <b>15</b> |
| <b>CHARACTERISTIC CURVES FOR NB, NG AND TW .....</b>                  | <b>16</b> |
| <b>CHARACTERISTIC CURVES FOR ALL COLORS (RADIATION PATTERN) .....</b> | <b>17</b> |
| <b>PACKAGING .....</b>                                                | <b>18</b> |
| <b>TAPE DIMENSION .....</b>                                           | <b>18</b> |
| <b>REEL DIMENSION .....</b>                                           | <b>19</b> |
| <b>PACKING .....</b>                                                  | <b>20</b> |
| <b>DRY PACK .....</b>                                                 | <b>21</b> |
| <b>REFLOW SOLDERING .....</b>                                         | <b>22</b> |
| <b>WAVE SOLDERING .....</b>                                           | <b>23</b> |
| <b>PRECAUTIONS .....</b>                                              | <b>23</b> |
| <b>REWORKING .....</b>                                                | <b>23</b> |
| <b>CLEANING .....</b>                                                 | <b>23</b> |
| <b>RELIABILITY .....</b>                                              | <b>24</b> |
| <b>REVISION HISTORY .....</b>                                         | <b>25</b> |

|                                                                                                |                        |               |                |                |
|------------------------------------------------------------------------------------------------|------------------------|---------------|----------------|----------------|
| Official Product                                                                               | Product: HT-110 Series |               |                | Data Sheet No. |
| Tentative Product                                                                              | *****                  |               |                | HT-110 Series  |
| Specifications are subject to change without notice. Data and drawings herein are copyrighted. |                        | Mar. 03, 2005 | Version of 1.0 | Page 2/25      |

**DISCLAIMER**

HARVATEK reserves the right to make changes without further notice to any products herein to improve reliability, function or design. HARVATEK 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.

**LIFE SUPPORT POLICY**

HARVATEK's products are not authorized for use as critical components in life support devices or systems without the express written approval of the President of HARVATEK or HARVATEK INTERNATIONAL. As used herein:

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, and (c) whose failure to perform when properly used in accordance with instructions for use provided in the labeling, can be reasonably expected to result in a significant injury of the user.
2. A critical component in 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.

|                                                                                                |                        |               |                |                |
|------------------------------------------------------------------------------------------------|------------------------|---------------|----------------|----------------|
| Official Product                                                                               | Product: HT-110 Series |               |                | Data Sheet No. |
| Tentative Product                                                                              | *****                  |               |                | HT-110 Series  |
| Specifications are subject to change without notice. Data and drawings herein are copyrighted. |                        | Mar. 03, 2005 | Version of 1.0 | Page 3/25      |

### Product Specifications

| Product   | Emission Color               | Technology | Test Current<br>$I_F$ (mA) | Luminous Intensity<br>$I_V$ (mcd) | Forward<br>Voltage<br>$V_F$ (V) | Orderable<br>Part Number |
|-----------|------------------------------|------------|----------------------------|-----------------------------------|---------------------------------|--------------------------|
| HT-110YG  | Yellow Green                 | GaP        | 20                         | 16 typ                            | 2.2 typ                         | HT-110YG-YYYY            |
| HT-110Y   | Yellow                       | GaAsP      | 20                         | 9 typ                             | 2.1 typ                         | HT-110Y-YYYY             |
| HT-110D   | Orange                       | GaAsP      | 20                         | 9 typ                             | 2.1 typ                         | HT-110D-YYYY             |
| HT-110SD  | Red                          | GaAsP      | 20                         | 9 typ                             | 2.1 typ                         | HT-110SD-YYYY            |
| HT-110UR  | Bright Red                   | AlGaAs     | 20                         | 20 typ                            | 1.8 typ                         | HT-110UR-YYYY            |
| HT-110UYG | Ultra Bright<br>Yellow Green | AlInGaP    | 20                         | 60 typ                            | 2.0 typ                         | HT-110UYG-YYYY           |
| HT-110UY  | Ultra Bright<br>Yellow       | AlInGaP    | 20                         | 120 typ                           | 1.9 typ                         | HT-110UY-YYYY            |
| HT-110UD  | Ultra Bright<br>Orange       | AlInGaP    | 20                         | 160 typ                           | 1.9 typ                         | HT-110UD-YYYY            |
| HT-110USD | Ultra Bright<br>Red          | AlInGaP    | 20                         | 120 typ                           | 1.9 typ                         | HT-110USD-YYYY           |
| HT-110NB  | Blue                         | InGaN      | 20                         | 60 typ                            | 3.3 typ                         | HT-110NB-YYYY            |
| HT-110NG  | True Green                   | InGaN      | 20                         | 200 typ                           | 3.3 typ                         | HT-110NG-YYYY            |
| HT-110TW  | White                        | InGaN      | 20                         | 180 typ                           | 3.3 typ                         | HT-110TW-YYYY            |

|                                                                                                |                        |               |                |                |
|------------------------------------------------------------------------------------------------|------------------------|---------------|----------------|----------------|
| Official Product                                                                               | Product: HT-110 Series |               |                | Data Sheet No. |
| Tentative Product                                                                              | *****                  |               |                | HT-110 Series  |
| Specifications are subject to change without notice. Data and drawings herein are copyrighted. |                        | Mar. 03, 2005 | Version of 1.0 | Page 4/25      |

|              | Specification        | Material                          | Quantity         |
|--------------|----------------------|-----------------------------------|------------------|
| Resin        | Water clear          | Epoxy resin                       |                  |
| Carrier tape | Per EIA 481-1A specs | Conductive black tape             | 3000pcs per reel |
| Reel         | Per EIA 481-1A specs | Conductive black                  |                  |
| Label        | HT standard          | Paper                             |                  |
| Packing bag  | 220x240mm            | Aluminum laminated bag/ no-zipper | One reel per bag |
| Carton       | HT standard          | Paper                             |                  |

Others:

Each immediate box consists of 5 reels. The 5 reels may not necessarily have the same lot number or the same bin combinations of  $I_V$ ,  $\lambda_D$  and  $V_f$ . Each reel has a label identifying its specification; the immediate box consists of a product label as well.

### ATTENTION: Electrostatic Discharge (ESD) protection



The symbol to the left denotes that ESD precaution is needed. ESD protection for GaP and AlGaAs based chips is necessary even though they are relatively safe in the presence of low static-electric discharge. Parts built with AlInGaP, GaN, or/and InGaN based chips are **STATIC SENSITIVE devices**. ESD precaution must be taken during design and assembly.

If manual work or processing is needed, please ensure the device is adequately protected from ESD during the process.

### Compliance and Certification

ISO9002, QS9000 and ISO14001 Certified

RoHS Compliant



|                                                                                                |                        |               |                |                |
|------------------------------------------------------------------------------------------------|------------------------|---------------|----------------|----------------|
| Official Product                                                                               | Product: HT-110 Series |               |                | Data Sheet No. |
| Tentative Product                                                                              | *****                  |               |                | HT-110 Series  |
| Specifications are subject to change without notice. Data and drawings herein are copyrighted. |                        | Mar. 03, 2005 | Version of 1.0 | Page 5/25      |

|                 |            |                                                                                   |                  |
|-----------------|------------|-----------------------------------------------------------------------------------|------------------|
| <b>HARVATEK</b> |            |  | Date: yyyy/mm/dd |
| CUSTOMER P/N:   |            |                                                                                   |                  |
| HARVATEK P/N:   |            | QTY:                                                                              | PCS              |
| LOT NO:         |            |                                                                                   | QC               |
| IV BIN:         | COLOR BIN: | VF:                                                                               |                  |

H T - 1 1 0    XXX -    YYYY

The diagram illustrates a 16-bit bus structure. The bus is divided into three color-coded segments: a blue segment for the first 8 bits (bits 0-7), a green segment for the next 4 bits (bits 8-11), and a red segment for the final 4 bits (bits 12-15). Arrows indicate the data flow from these segments to specific fields: the blue segment connects to the fields 'H T - 1 1 0', the green segment connects to 'XXX -', and the red segment connects to 'YYYY'.

| Series Name                           | Emitting Color                        | Customer Code                      |
|---------------------------------------|---------------------------------------|------------------------------------|
| <b>HT-121</b>                         | <b>XXX</b>                            | <b>YYYY</b>                        |
| <b>HT:</b> Harvatek                   | <b>YG:</b> Yellow Green               | <b>Customer Product Code (TBD)</b> |
| <b>110:</b> Side-emitting series      | <b>Y:</b> Yellow                      |                                    |
| <b>3.2 (L) x 1.5 (W) x 1.0 (H) mm</b> | <b>D:</b> Orange                      |                                    |
|                                       | <b>SD:</b> Red                        |                                    |
|                                       | <b>UR:</b> Bright Red                 |                                    |
|                                       | <b>UYG:</b> Ultra Bright Yellow Green |                                    |
|                                       | <b>UY:</b> Ultra Bright Yellow        |                                    |
|                                       | <b>UD:</b> Ultra Bright Orange        |                                    |
|                                       | <b>USD:</b> Ultra Bright Red          |                                    |
|                                       | <b>NB:</b> Blue                       |                                    |
|                                       | <b>NG:</b> True Green                 |                                    |
|                                       | <b>TW:</b> White                      |                                    |

|                                                                                                |                        |               |                |                |
|------------------------------------------------------------------------------------------------|------------------------|---------------|----------------|----------------|
| Official Product                                                                               | Product: HT-110 Series |               |                | Data Sheet No. |
| Tentative Product                                                                              | *****                  |               |                | HT-110 Series  |
| Specifications are subject to change without notice. Data and drawings herein are copyrighted. |                        | Mar. 03, 2005 | Version of 1.0 | Page 6/25      |

Lot No.:

1 2 3 4 5 6 7 8 9 10

**P 1 2 2 3 0 A - D T**

| Code 1                      | Code 2                                            | Code 3                                                                 | Code 4, 5  | Code 6, 7          | Code 9      | Code 10        |
|-----------------------------|---------------------------------------------------|------------------------------------------------------------------------|------------|--------------------|-------------|----------------|
|                             | Mfg. Year                                         | Mfg. Month                                                             | Mfg. Date  | Lots               | Resin Color | Packaging      |
| Internal<br>Tracing<br>Code | Z: 2000<br>1: 2001<br>2: 2002<br>3: 2003<br>..... | 1: Jan.<br>2: Feb.<br>....<br>9: Sep.<br>A: Oct.<br>B: Nov.<br>C: Dec. | 1~31/ (30) | 01~99,<br>A,B,C... | D: Diffused | T: Tape & Reel |

## Luminous Intensity (Iv) Bin:

| Bin | Luminous Intensity Range (mcd) |         | Bin | Luminous Intensity Range (mcd) |         |
|-----|--------------------------------|---------|-----|--------------------------------|---------|
|     | Minimum                        | Maximum |     | Minimum                        | Maximum |
| H1  | 2.8                            | 3.6     | H2  | 3.6                            | 4.5     |
| J1  | 4.5                            | 5.7     | J2  | 5.7                            | 7.2     |
| K1  | 7.2                            | 9.0     | K2  | 9.0                            | 11.2    |
| L1  | 11.2                           | 14.2    | L2  | 14.2                           | 18.0    |
| M1  | 18.0                           | 22.5    | M2  | 22.5                           | 28.5    |
| N1  | 28.5                           | 36.0    | N2  | 36.0                           | 45.0    |
| P1  | 45.0                           | 57.0    | P2  | 57.0                           | 71.5    |
| Q1  | 71.5                           | 90.0    | Q2  | 90.0                           | 112.5   |
| R1  | 112.5                          | 142.0   | R2  | 142.0                          | 180.0   |
| S1  | 180.0                          | 227.0   | S2  | 227.0                          | 285.0   |
| T1  | 285.0                          | 360.0   | T2  | 360.0                          | 450.0   |
| U1  | 450.0                          | 570.0   | U2  | 570.0                          | 715.0   |

@20mA / Ta=25° C, Tolerance: ± 10%

|                                                                                                |                        |               |                |
|------------------------------------------------------------------------------------------------|------------------------|---------------|----------------|
| Official Product                                                                               | Product: HT-110 Series |               | Data Sheet No. |
| Tentative Product                                                                              | *****                  |               | HT-110 Series  |
| Specifications are subject to change without notice. Data and drawings herein are copyrighted. |                        | Mar. 03, 2005 | Version of 1.0 |
|                                                                                                |                        | Page 7/25     |                |

## Wavelength ( $\lambda_D$ ) Bin:

| Bin | Wavelength Range (nm) |       |          |       |            |       |            |       |                   |       |
|-----|-----------------------|-------|----------|-------|------------|-------|------------|-------|-------------------|-------|
|     | Bright Red (UR)       |       | Red (SD) |       | Orange (D) |       | Yellow (Y) |       | Yellow Green (YG) |       |
|     | Min                   | Max   | Min      | Max   | Min        | Max   | Min        | Max   | Min               | Max   |
| -   | 620.0                 | 650.0 | 615.0    | 635.0 |            |       |            |       |                   |       |
| A   |                       |       |          |       | 597.0      | 600.0 | 582.0      | 584.5 | 561.5             | 564.5 |
| B   |                       |       |          |       | 600.0      | 603.0 | 584.6      | 587.0 | 564.5             | 567.5 |
| C   |                       |       |          |       | 603.0      | 606.0 | 587.0      | 589.5 | 567.5             | 570.5 |
| D   |                       |       |          |       | 606.0      | 609.0 | 589.5      | 592.0 | 570.5             | 573.5 |
| E   |                       |       |          |       | 609.0      | 612.0 |            |       | 573.5             | 576.5 |
| F   |                       |       |          |       | 612.0      | 615.0 |            |       |                   |       |
| H   |                       |       |          |       |            |       | 592.0      | 594.5 |                   |       |
| J   |                       |       |          |       |            |       | 594.5      | 597.0 |                   |       |

@20mA / Ta=25° C, Tolerance:  $\pm 0.5\text{nm}$

| Bin | Wavelength Range (nm) |       |             |       |             |       |                    |       |
|-----|-----------------------|-------|-------------|-------|-------------|-------|--------------------|-------|
|     | Red (USD)             |       | Orange (UD) |       | Yellow (UY) |       | Yellow Green (UYG) |       |
|     | Min                   | Max   | Min         | Max   | Min         | Max   | Min                | Max   |
| -   | 615.0                 | 630.0 |             |       |             |       |                    |       |
| A   |                       |       | 597.0       | 600.0 | 582.0       | 584.5 | 561.5              | 564.5 |
| B   |                       |       | 600.0       | 603.0 | 584.6       | 587.0 | 564.5              | 567.5 |
| C   |                       |       | 603.0       | 606.0 | 587.0       | 589.5 | 567.5              | 570.5 |
| D   |                       |       | 606.0       | 609.0 | 589.5       | 592.0 | 570.5              | 573.5 |
| E   |                       |       | 609.0       | 612.0 |             |       | 573.5              | 576.5 |
| F   |                       |       | 612.0       | 615.0 |             |       |                    |       |
| H   |                       |       |             |       | 592.0       | 594.5 |                    |       |
| J   |                       |       |             |       | 594.5       | 597.0 |                    |       |

@20mA / Ta=25° C, Tolerance:  $\pm 0.5\text{nm}$

|                                                                                                |                        |               |                |                |
|------------------------------------------------------------------------------------------------|------------------------|---------------|----------------|----------------|
| Official Product                                                                               | Product: HT-110 Series |               |                | Data Sheet No. |
| Tentative Product                                                                              | *****                  |               |                | HT-110 Series  |
| Specifications are subject to change without notice. Data and drawings herein are copyrighted. |                        | Mar. 03, 2005 | Version of 1.0 | Page 8/25      |

| Bin | Wavelength Range (nm) |       |           |       |
|-----|-----------------------|-------|-----------|-------|
|     | True Green (NG)       |       | Blue (NB) |       |
|     | Min                   | Max   | Min       | Max   |
| -   |                       |       |           |       |
| A   | 515.0                 | 520.0 | 460.0     | 464.0 |
| B   | 520.0                 | 525.0 | 464.0     | 468.0 |
| C   | 525.0                 | 530.0 | 468.0     | 472.0 |
| D   | 530.0                 | 535.0 | 472.0     | 476.0 |
| E   | 535.0                 | 540.0 | 476.0     | 480.0 |
| F   |                       |       | 480.0     | 485.0 |
| H   |                       |       |           |       |
| J   |                       |       |           |       |

@20mA / Ta=25° C, Tolerance:  $\pm 0.5\text{nm}$

## Forward Voltage (V<sub>F</sub>) Bin:

| Color                                 | Bin Code | Spec. Range |
|---------------------------------------|----------|-------------|
| Blue (NB)<br>Green (NG)<br>White (TW) | G8       | 2.7-2.9 V   |
|                                       | H7       | 2.9-3.1 V   |
|                                       | H8       | 3.1-3.3 V   |
|                                       | J7       | 3.3-3.5 V   |
|                                       | J8       | 3.5-3.7 V   |
|                                       | K7       | 3.7-3.9 V   |
| Ultra Bright<br>(UYG, UY, UD, USD)    | -        | 2.4 V max   |
| Standard Bright<br>(YG, Y, D, SD)     | -        | 2.6 V max   |
| Bright Red (UR)                       | -        | 2.2 V max   |

@20mA / Ta=25°C, Tolerance:  $\pm 0.05\text{ V}$

|                                                                                                |                        |               |                |                |
|------------------------------------------------------------------------------------------------|------------------------|---------------|----------------|----------------|
| Official Product                                                                               | Product: HT-110 Series |               |                | Data Sheet No. |
| Tentative Product                                                                              | *****                  |               |                | HT-110 Series  |
| Specifications are subject to change without notice. Data and drawings herein are copyrighted. |                        | Mar. 03, 2005 | Version of 1.0 | Page 9/25      |

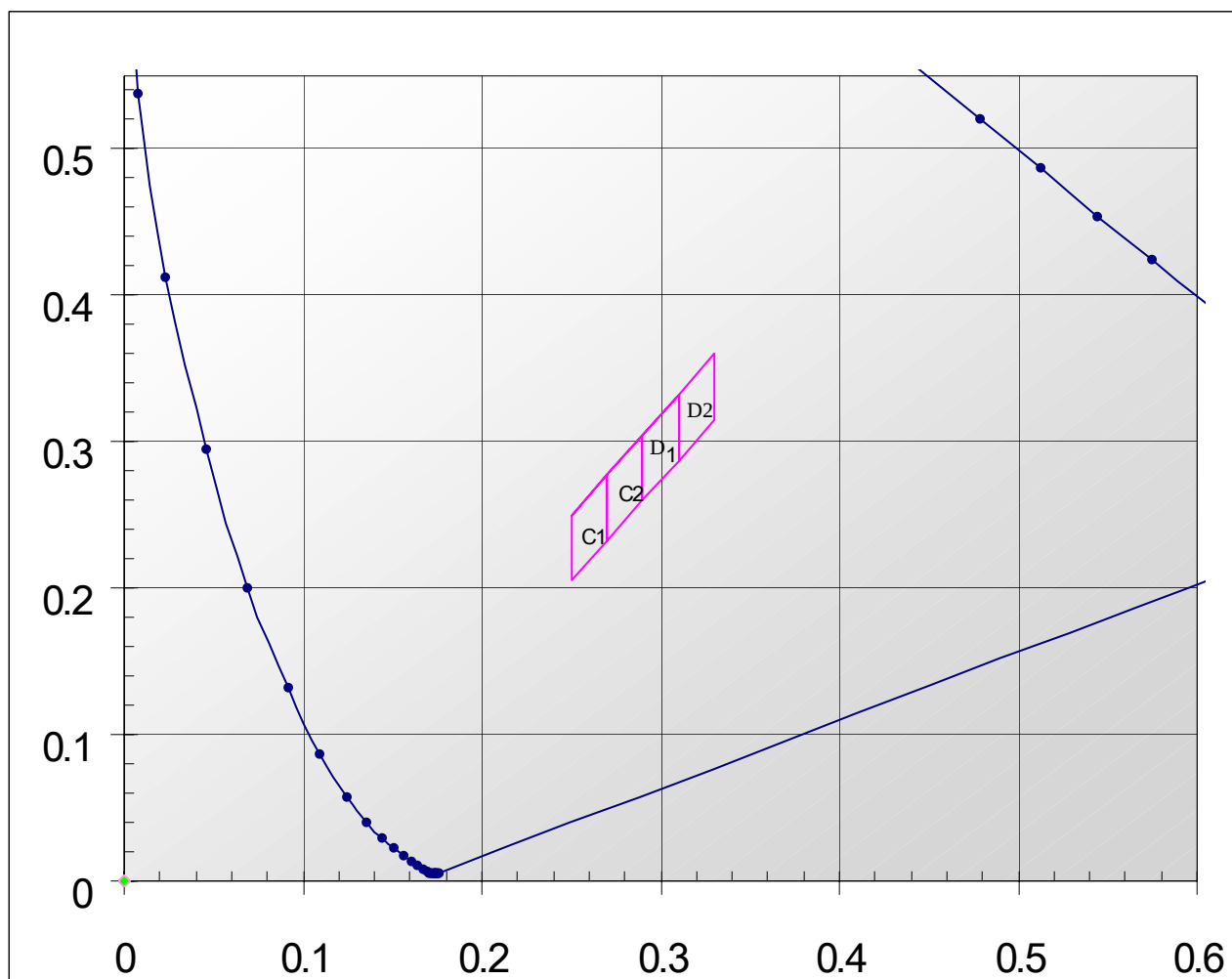
## Chromaticity Bin (for TW only):

|   | Rank C1 |        |        |        |
|---|---------|--------|--------|--------|
| x | 0.2500  | 0.2700 | 0.2700 | 0.2500 |
| y | 0.2500  | 0.2775 | 0.2325 | 0.2050 |

|   | Rank C2 |        |        |        |
|---|---------|--------|--------|--------|
| x | 0.2700  | 0.2900 | 0.2900 | 0.2700 |
| y | 0.2775  | 0.3050 | 0.2600 | 0.2325 |

|   | Rank D1 |        |        |        |
|---|---------|--------|--------|--------|
| x | 0.2900  | 0.3100 | 0.3100 | 0.2900 |
| y | 0.3050  | 0.3325 | 0.2875 | 0.2600 |

|   | Rank D2 |        |        |        |
|---|---------|--------|--------|--------|
| x | 0.3100  | 0.3300 | 0.3300 | 0.3100 |
| y | 0.3325  | 0.3600 | 0.3150 | 0.2875 |



@20mA / Ta=25°C, Tolerance:  $\pm 0.01$

|                                                                                                |                        |               |                |                |
|------------------------------------------------------------------------------------------------|------------------------|---------------|----------------|----------------|
| Official Product                                                                               | Product: HT-110 Series |               |                | Data Sheet No. |
| Tentative Product                                                                              | *****                  |               |                | HT-110 Series  |
| Specifications are subject to change without notice. Data and drawings herein are copyrighted. |                        | Mar. 03, 2005 | Version of 1.0 | Page 10/25     |

## Product Characteristics

### Absolute Maximum Ratings

| Product   | Emission Color            | P <sub>d</sub> (mW) | I <sub>F</sub> (mA) | I <sub>FP</sub> * (mA) | V <sub>R</sub> (V) | T <sub>OP</sub> (°C) | T <sub>ST</sub> (°C) |  |  |  |
|-----------|---------------------------|---------------------|---------------------|------------------------|--------------------|----------------------|----------------------|--|--|--|
| HT-110YG  | Yellow Green              | 65                  | 25                  | 100                    | 5                  | -30°C~+80°C          | -40°C~+85°C          |  |  |  |
| HT-110Y   | Yellow                    |                     |                     |                        |                    |                      |                      |  |  |  |
| HT-110D   | Orange                    |                     |                     |                        |                    |                      |                      |  |  |  |
| HT-110SD  | Red                       |                     |                     |                        |                    |                      |                      |  |  |  |
| HT-110UR  | Bright Red                | 66                  | 30                  | 100                    |                    |                      |                      |  |  |  |
| HT-110UYG | Ultra Bright Yellow Green | 72                  | 30                  | 100                    |                    |                      |                      |  |  |  |
| HT-110UY  | Ultra Bright Yellow       |                     |                     |                        |                    |                      |                      |  |  |  |
| HT-110UD  | Ultra Bright Orange       |                     |                     |                        |                    |                      |                      |  |  |  |
| HT-110USD | Ultra Bright Red          |                     |                     |                        |                    |                      |                      |  |  |  |
| HT-110NB  | Blue                      | 78                  | 20                  | 80                     |                    |                      |                      |  |  |  |
| HT-110NG  | True Green                |                     |                     |                        |                    |                      |                      |  |  |  |
| HT-110TW  | White                     |                     |                     |                        |                    |                      |                      |  |  |  |

\* Condition for I<sub>FP</sub> is pulse of 1/10 duty and 0.1msec width

|                                                                                                |                        |               |                |                |
|------------------------------------------------------------------------------------------------|------------------------|---------------|----------------|----------------|
| Official Product                                                                               | Product: HT-110 Series |               |                | Data Sheet No. |
| Tentative Product                                                                              | *****                  |               |                | HT-110 Series  |
| Specifications are subject to change without notice. Data and drawings herein are copyrighted. |                        | Mar. 03, 2005 | Version of 1.0 | Page 11/25     |

## Electro-Optical Characteristics

(T<sub>a</sub> 25 °C)

| Product   | Emission Color            | I <sub>F</sub> (mA) | V <sub>F</sub> (V) |     | λ(nm)            |                |    | I <sub>V</sub> (mcd) |     |
|-----------|---------------------------|---------------------|--------------------|-----|------------------|----------------|----|----------------------|-----|
|           |                           |                     | typ                | max | λ <sub>D</sub>   | λ <sub>P</sub> | Δλ | min                  | typ |
| HT-110YG  | Yellow Green              | 20                  | 2.2                | 2.6 | 573              | 568            | 30 | 9                    | 16  |
| HT-110Y   | Yellow                    | 20                  | 2.1                | 2.6 | 590              | 589            | 35 | 5.6                  | 9   |
| HT-110D   | Orange                    | 20                  | 2.1                | 2.6 | 608              | 610            | 35 | 5.6                  | 9   |
| HT-110SD  | Red                       | 20                  | 2.1                | 2.6 | 629              | 642            | 35 | 3.6                  | 9   |
| HT-110UR  | Bright Red                | 20                  | 1.8                | 2.2 | 643              | 660            | 20 | 9                    | 20  |
| HT-110UYG | Ultra Bright Yellow Green | 20                  | 2.0                | 2.4 | 573              | 574            | 20 | 36                   | 60  |
| HT-110UY  | Ultra Bright Yellow       | 20                  | 1.9                | 2.4 | 589              | 593            | 15 | 36                   | 120 |
| HT-110UD  | Ultra Bright Orange       | 20                  | 1.9                | 2.4 | 605              | 609            | 17 | 56                   | 160 |
| HT-110USD | Ultra Bright Red          | 20                  | 1.9                | 2.4 | 622              | 636            | 17 | 56                   | 120 |
| HT-110NB  | Blue                      | 20                  | 3.3                | 3.9 | 470              | 468            | 40 | 36                   | 60  |
| HT-110NG  | True Green                | 20                  | 3.3                | 3.9 | 527              | 520            | 40 | 140                  | 200 |
| HT-110TW  | White                     | 20                  | 3.3                | 3.9 | X=0.29<br>Y=0.31 | -              | -  | 90                   | 180 |

\* Per NIST standards

|                                                                                                |                        |               |                |                |
|------------------------------------------------------------------------------------------------|------------------------|---------------|----------------|----------------|
| Official Product                                                                               | Product: HT-110 Series |               |                | Data Sheet No. |
| Tentative Product                                                                              | *****                  |               |                | HT-110 Series  |
| Specifications are subject to change without notice. Data and drawings herein are copyrighted. |                        | Mar. 03, 2005 | Version of 1.0 | Page 12/25     |

## Package Outline Dimension

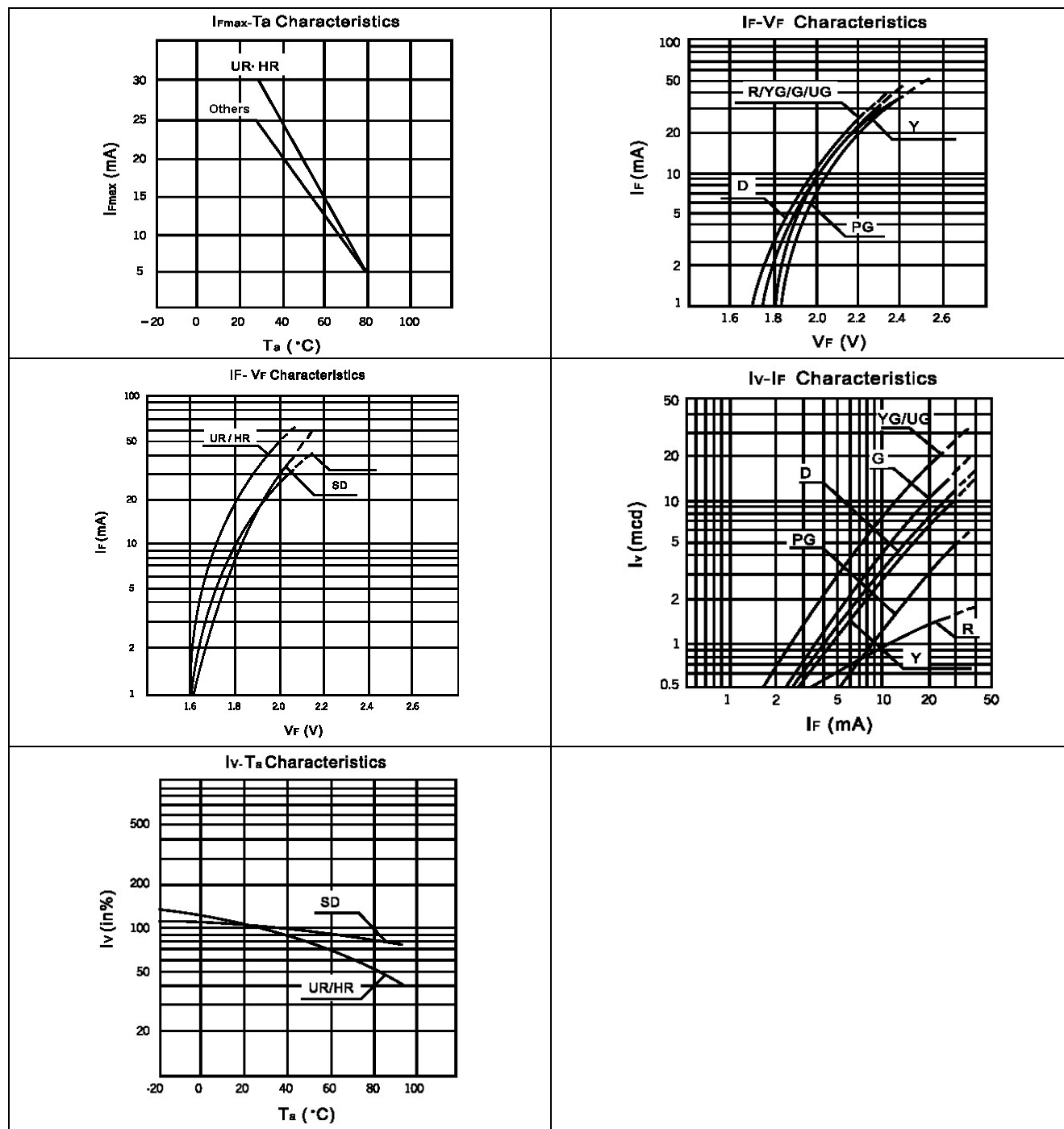
## Recommended Soldering Pattern for Reflow Soldering

Unit: mm Tolerance: +/-0.1

| Outline Dimension                                                                                                                | Solder Pattern |
|----------------------------------------------------------------------------------------------------------------------------------|----------------|
| <p>1. Soldering terminal may shift in x, y direction.<br/>2. Polarity referring onto the cathode line is reversed on the UR.</p> |                |
| Soldering terminals may shift in the x, y direction.                                                                             | Unit: mm       |

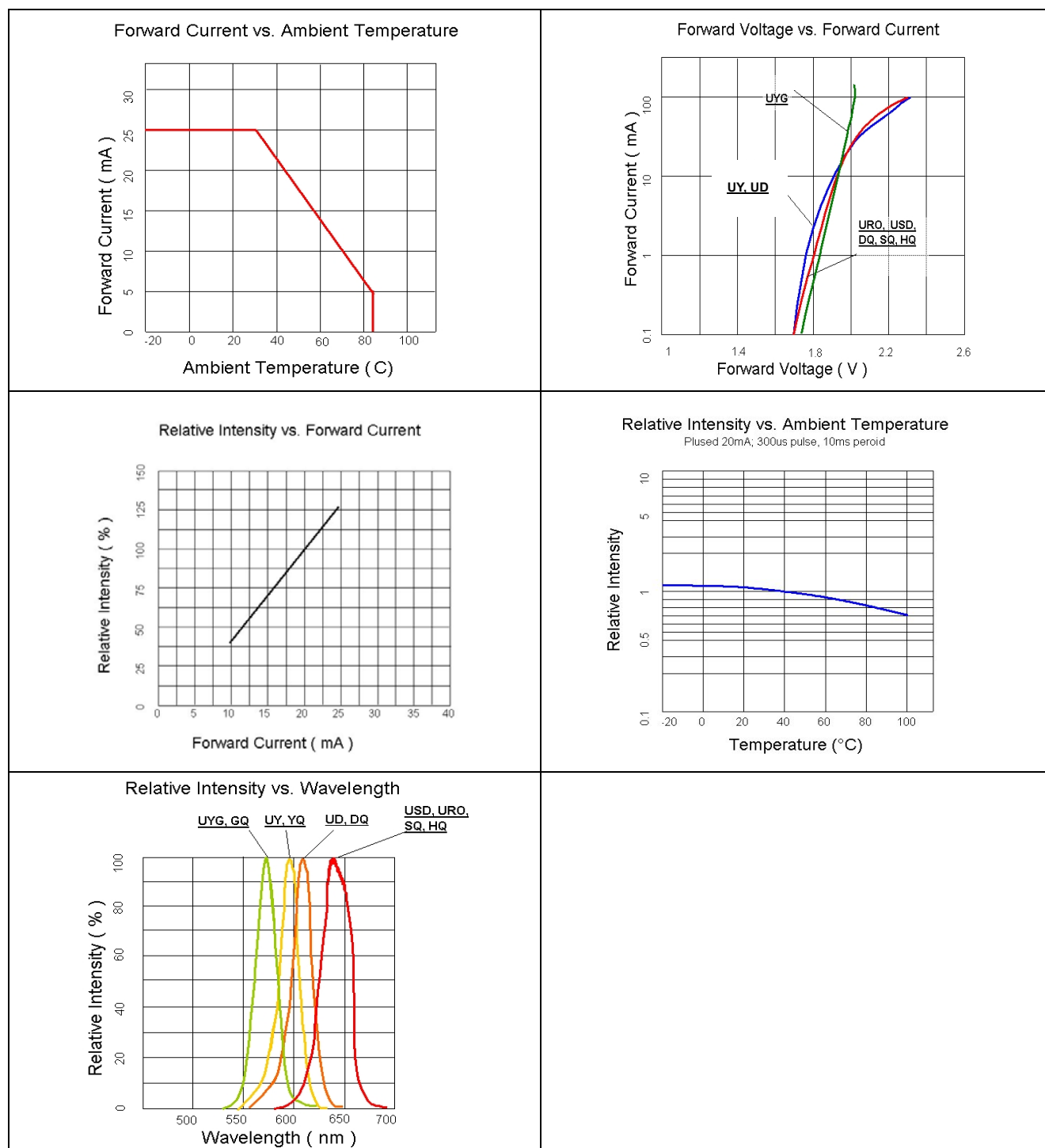
|                                                                                                |                        |                |
|------------------------------------------------------------------------------------------------|------------------------|----------------|
| Official Product                                                                               | Product: HT-110 Series | Data Sheet No. |
| Tentative Product                                                                              | *****                  | HT-110 Series  |
| Specifications are subject to change without notice. Data and drawings herein are copyrighted. | Mar. 03, 2005          | Version of 1.0 |
|                                                                                                |                        | Page 13/25     |

## Characteristic Curves for YG, Y, D, SD and UR



|                                                                                                |                        |                |
|------------------------------------------------------------------------------------------------|------------------------|----------------|
| Official Product                                                                               | Product: HT-110 Series | Data Sheet No. |
| Tentative Product                                                                              | *****                  | HT-110 Series  |
| Specifications are subject to change without notice. Data and drawings herein are copyrighted. | Mar. 03, 2005          | Version of 1.0 |
|                                                                                                |                        | Page 14/25     |

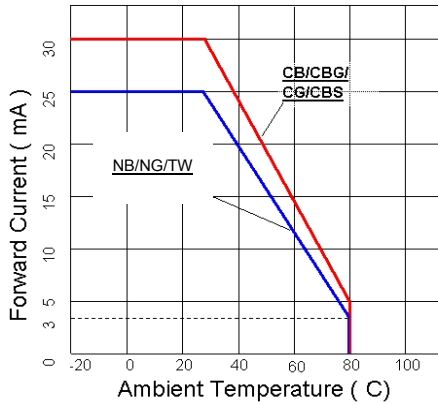
## Characteristic Curves for UYG, UY, UD and USD



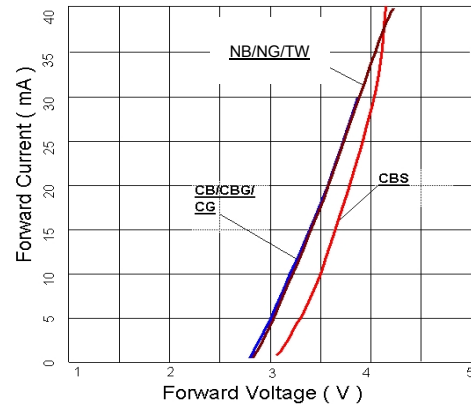
|                                                                                                |                        |                |
|------------------------------------------------------------------------------------------------|------------------------|----------------|
| Official Product                                                                               | Product: HT-110 Series | Data Sheet No. |
| Tentative Product                                                                              | *****                  | HT-110 Series  |
| Specifications are subject to change without notice. Data and drawings herein are copyrighted. | Mar. 03, 2005          | Version of 1.0 |
|                                                                                                |                        | Page 15/25     |

## Characteristic Curves for NB, NG and TW

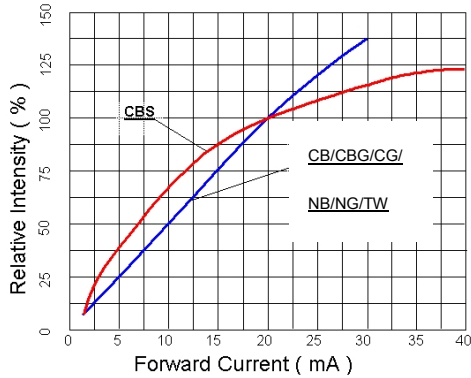
Forward Current vs. Ambient Temperature



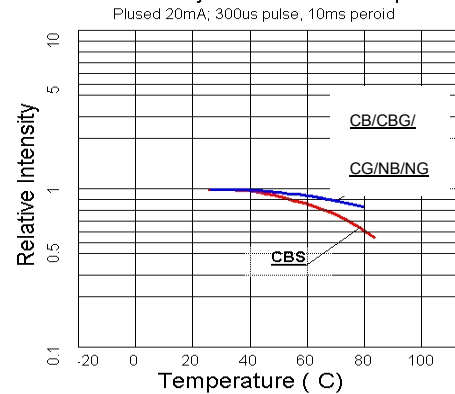
Forward Voltage vs. Forward Current



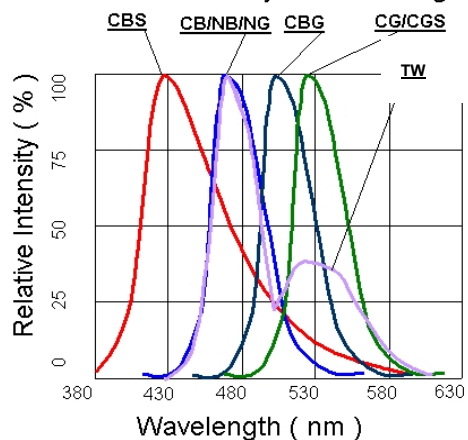
Relative Intensity vs. Forward Current



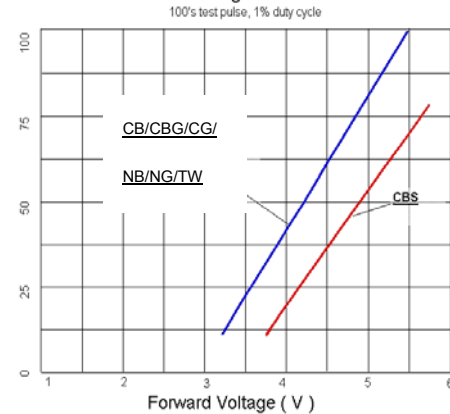
Relative Intensity vs. Ambient Temperature



Relative Intensity vs. Wavelength

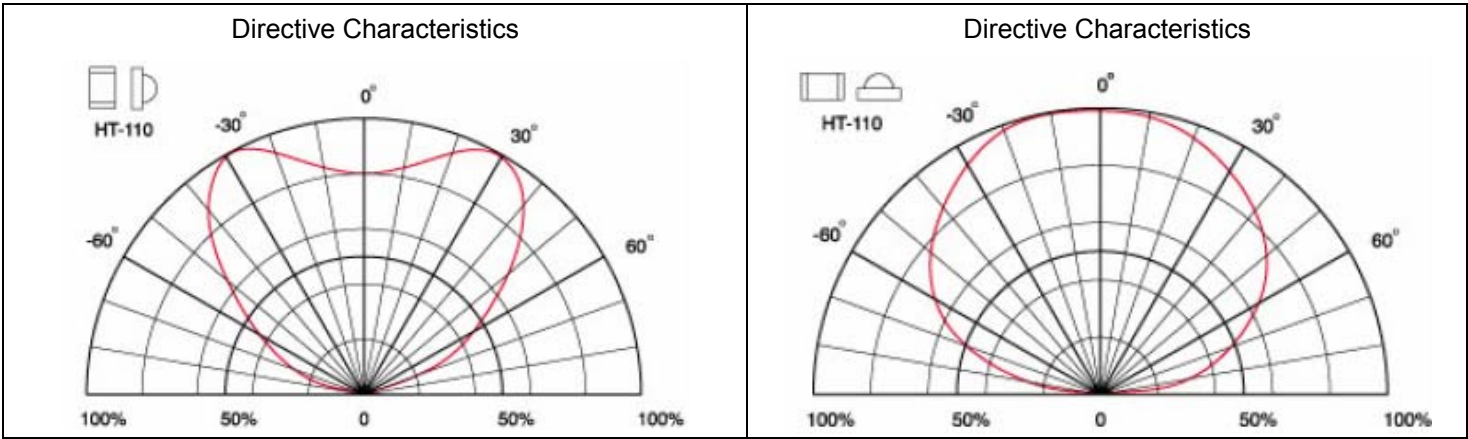


Peak Forward Voltage vs. Forward Current



|                                                                                                |                        |                |
|------------------------------------------------------------------------------------------------|------------------------|----------------|
| Official Product                                                                               | Product: HT-110 Series | Data Sheet No. |
| Tentative Product                                                                              | *****                  | HT-110 Series  |
| Specifications are subject to change without notice. Data and drawings herein are copyrighted. | Mar. 03, 2005          | Version of 1.0 |
|                                                                                                |                        | Page 16/25     |

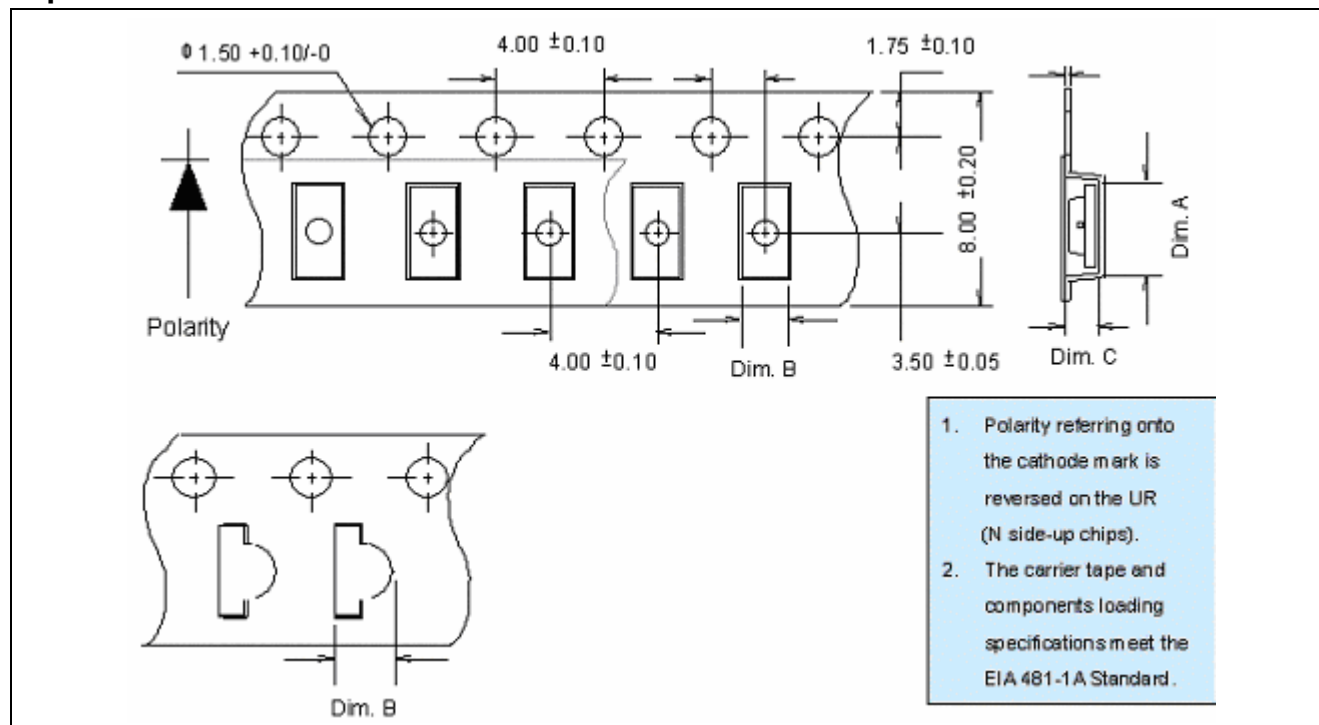
**Characteristic Curves for All Colors (Radiation Pattern)**



|                                                                                                |                        |               |                |                |
|------------------------------------------------------------------------------------------------|------------------------|---------------|----------------|----------------|
| Official Product                                                                               | Product: HT-110 Series |               |                | Data Sheet No. |
| Tentative Product                                                                              | *****                  |               |                | HT-110 Series  |
| Specifications are subject to change without notice. Data and drawings herein are copyrighted. |                        | Mar. 03, 2005 | Version of 1.0 | Page 17/25     |

## Packaging

## Tape Dimension

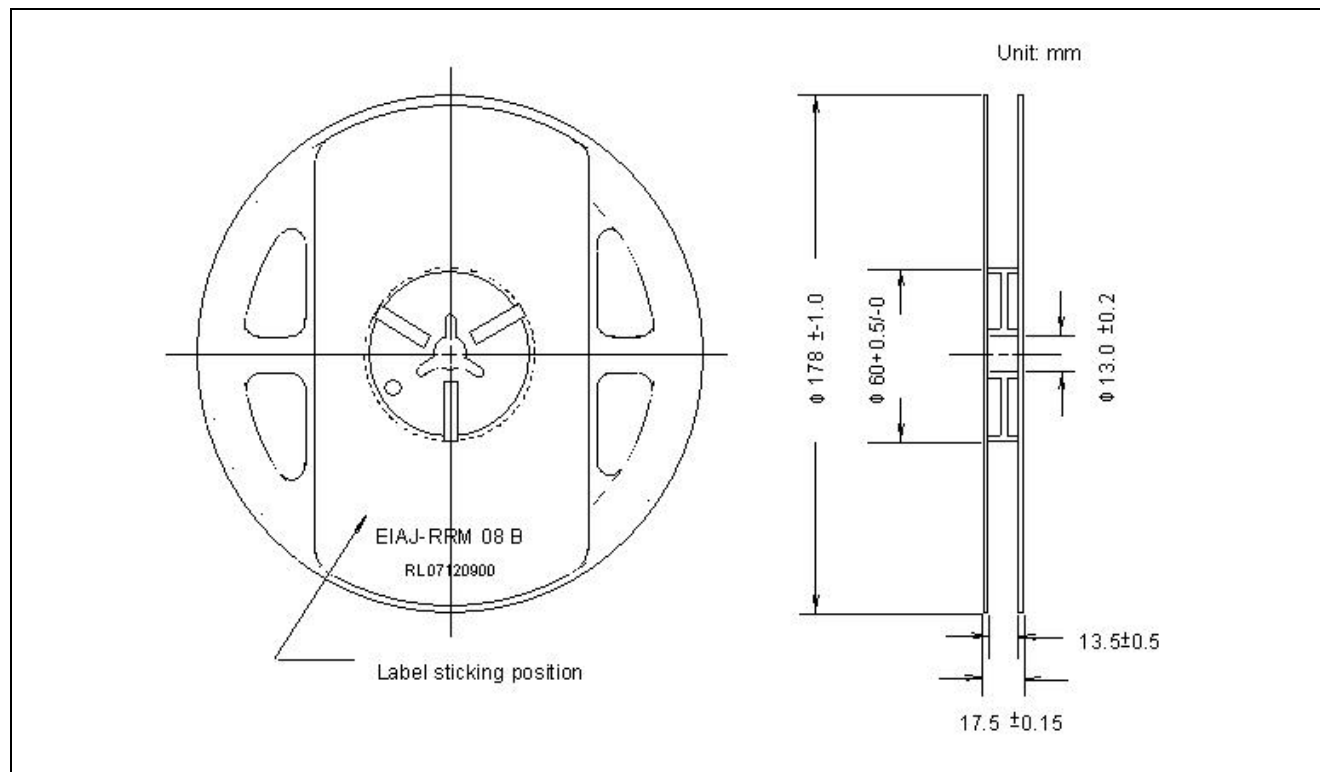


| Part No. | Dim. A          | Dim. B          | Dim. C          | Q'ty/Reel |
|----------|-----------------|-----------------|-----------------|-----------|
| HT-110   | 3.40 $\pm$ 0.10 | 1.70 $\pm$ 0.10 | 1.20 $\pm$ 0.10 | 3K        |

Unit: mm

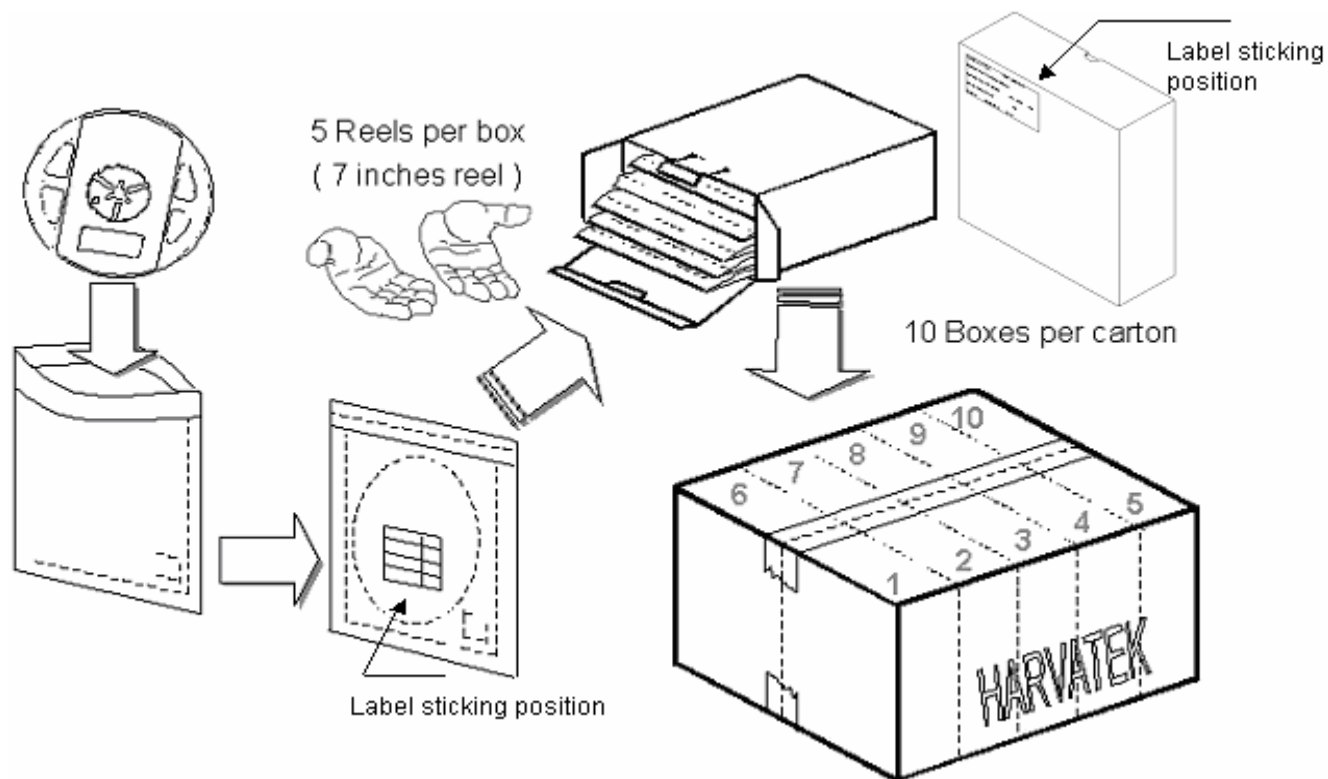
|                                                                                                |                        |               |                |                |
|------------------------------------------------------------------------------------------------|------------------------|---------------|----------------|----------------|
| Official Product                                                                               | Product: HT-110 Series |               |                | Data Sheet No. |
| Tentative Product                                                                              | *****                  |               |                | HT-110 Series  |
| Specifications are subject to change without notice. Data and drawings herein are copyrighted. |                        | Mar. 03, 2005 | Version of 1.0 | Page 18/25     |

## Reel Dimension



|                                                                                                |                        |                |
|------------------------------------------------------------------------------------------------|------------------------|----------------|
| Official Product                                                                               | Product: HT-110 Series | Data Sheet No. |
| Tentative Product                                                                              | *****                  | HT-110 Series  |
| Specifications are subject to change without notice. Data and drawings herein are copyrighted. | Mar. 03, 2005          | Version of 1.0 |
|                                                                                                |                        | Page 19/25     |

## Packing



5 boxes per carton is available depending on shipment quantity.

|                                                                                                                                                                                                                                                                      | Specification        | Material                          | Quantity         |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------|-----------------------------------|------------------|
| Carrier tape                                                                                                                                                                                                                                                         | Per EIA 481-1A specs | Conductive black tape             | 4000pcs per reel |
| Reel                                                                                                                                                                                                                                                                 | Per EIA 481-1A specs | Conductive black                  |                  |
| Label                                                                                                                                                                                                                                                                | HT standard          | Paper                             |                  |
| Packing bag                                                                                                                                                                                                                                                          | 220x240mm            | Aluminum laminated bag/ no-zipper | One reel per bag |
| Carton                                                                                                                                                                                                                                                               | HT standard          | Paper                             | Non-specified    |
| Others:                                                                                                                                                                                                                                                              |                      |                                   |                  |
| Each immediate box consists of 5 reels. The 5 reels may not necessarily have the same lot number or the same bin combinations of Iv, $\lambda_D$ and Vf. Each reel has a label identifying its specification; the immediate box consists of a product label as well. |                      |                                   |                  |

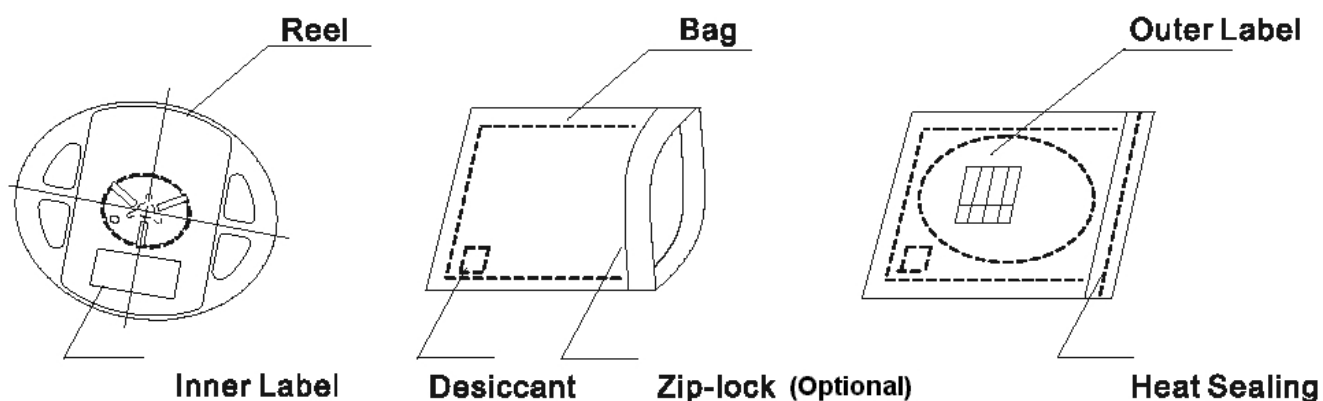
|                                                                                                |                        |               |                |                |
|------------------------------------------------------------------------------------------------|------------------------|---------------|----------------|----------------|
| Official Product                                                                               | Product: HT-110 Series |               |                | Data Sheet No. |
| Tentative Product                                                                              | *****                  |               |                | HT-110 Series  |
| Specifications are subject to change without notice. Data and drawings herein are copyrighted. |                        | Mar. 03, 2005 | Version of 1.0 | Page 20/25     |

## Dry Pack

All SMD optical devices are **MOISTURE SENSITIVE**. Avoid exposure to moisture at all times during transportation or storage. Every reel is packaged in a moisture protected anti-static bag. Each bag is properly sealed prior to shipment.

Upon request, a humidity indicator will be included in the moisture protected anti-static bag prior to shipment.

The packaging sequence is as follows:

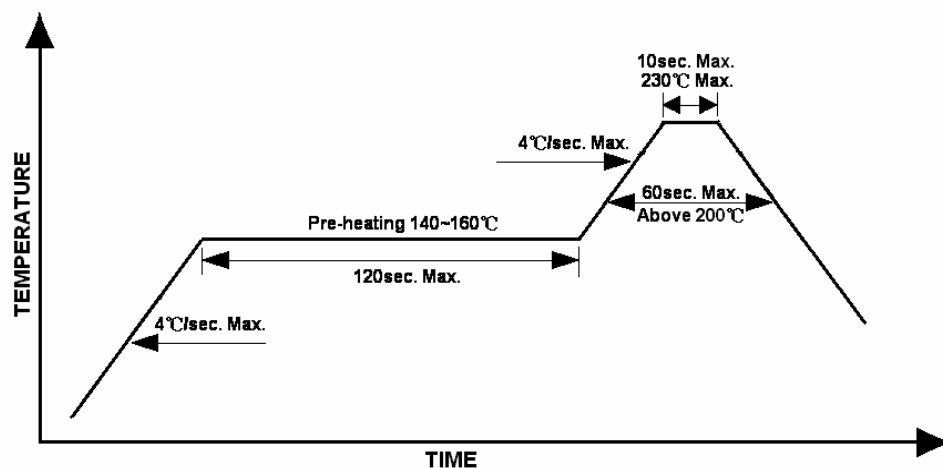


|                                                                                                |                        |               |                |                |
|------------------------------------------------------------------------------------------------|------------------------|---------------|----------------|----------------|
| Official Product                                                                               | Product: HT-110 Series |               |                | Data Sheet No. |
| Tentative Product                                                                              | *****                  |               |                | HT-110 Series  |
| Specifications are subject to change without notice. Data and drawings herein are copyrighted. |                        | Mar. 03, 2005 | Version of 1.0 | Page 21/25     |

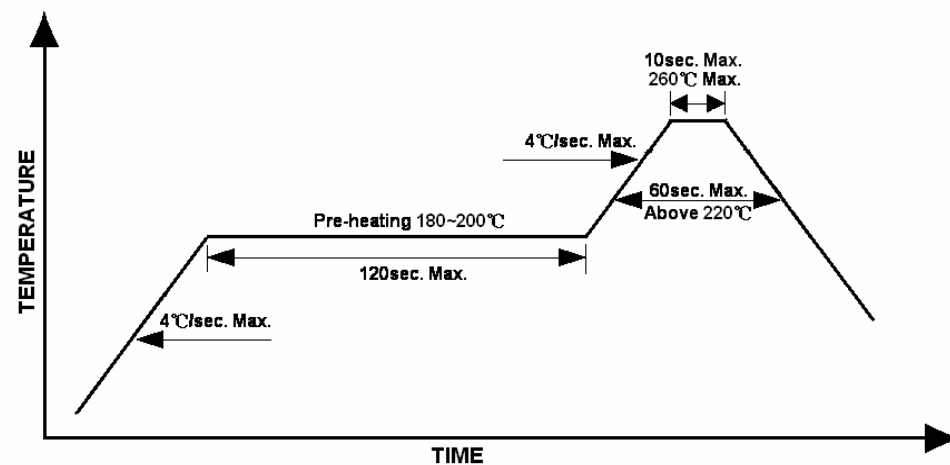
## Reflow Soldering

- Recommended tin glue specifications: melting temperature in the range of 178~192 °C
- The recommended reflow soldering profile is as follows (temperatures indicated are as measured on the surface of the LED resin):

### Lead Solder Profile



### Lead-free Solder Profile



|                                                                                                |                        |               |                |                |
|------------------------------------------------------------------------------------------------|------------------------|---------------|----------------|----------------|
| Official Product                                                                               | Product: HT-110 Series |               |                | Data Sheet No. |
| Tentative Product                                                                              | *****                  |               |                | HT-110 Series  |
| Specifications are subject to change without notice. Data and drawings herein are copyrighted. |                        | Mar. 03, 2005 | Version of 1.0 | Page 22/25     |

**Wave Soldering**

- Maximum soldering temperature is 260°C for 5 seconds.

**Precautions**

1. Avoid exposure to moisture at all times during transportation or storage.
2. Anti-Static precaution must be taken when handling GaN, InGaN, and AlInGaP products.
3. It is suggested to connect the unit with a current limiting resistor of the proper size. Avoid applying a reverse voltage beyond the specified limit.
4. Avoid operation beyond the limits as specified by the absolute maximum ratings.
5. Avoid direct contact with the surface through which the LED emits light.
6. If possible, assemble the unit in a clean room or dust-free environment.

**Reworking**

- Rework should be completed within 5 seconds under 260 °C.
- The iron tip must not come in contact with the copper foil.
- Twin-head type is preferred.

**Cleaning**

Following are cleaning procedures after soldering:

- An alcohol-based solvent such as isopropyl alcohol (IPA) is recommended.
- Temperature x Time should be 50°C x 30sec. or <30°C x 3min
- Ultra sonic cleaning: < 15W/ bath; bath volume ≤ 1liter
- Curing: 100 °C max, <3min

**Cautions of Pick and Place**

- Avoid stress on the resin at elevated temperature.
- Avoid rubbing or scraping the resin by any object.
- Electro-static may cause damage to the component. Please ensure that the equipment is properly grounded. Use of an ionizer fan is recommended.

|                                                                                                |                        |               |                |                |
|------------------------------------------------------------------------------------------------|------------------------|---------------|----------------|----------------|
| Official Product                                                                               | Product: HT-110 Series |               |                | Data Sheet No. |
| Tentative Product                                                                              | *****                  |               |                | HT-110 Series  |
| Specifications are subject to change without notice. Data and drawings herein are copyrighted. |                        | Mar. 03, 2005 | Version of 1.0 | Page 23/25     |

## Reliability

| Item                                 | Frequency/ lots/ samples/ failures                              | Standards Reference            | Conditions                                                                                                                   |
|--------------------------------------|-----------------------------------------------------------------|--------------------------------|------------------------------------------------------------------------------------------------------------------------------|
| Precondition                         | For all reliability monitoring tests according to JEDEC Level 2 | J-STD-020                      | 1.) Baking at 85°C for 24hrs<br>2.) Moisture storage at 85°C/ 60% R.H. for 168hrs                                            |
| Solderability                        | 1Q/ 1/ 22/ 0                                                    | JESD22-B102-B<br>And CNS-5068  | Accelerated aging 155°C/ 24hrs<br>Tinning speed: 2.5+0.5cm/s<br>Tinning: A: 215°C/ 3+1s or B: 260°C/ 10+1s                   |
| Resistance to soldering heat         |                                                                 | CNS-5067                       | Dipping soldering terminal only<br>Soldering bath temperature<br>A: 260+/-5°C; 10+/-1s<br>B: 350+/-10°C; 3+/-0.5s            |
| Operating life test                  | 1Q/ 1/ 40/ 0                                                    | CNS-11829                      | 1.) Precondition: 85°C baking for 24hrs<br>85°C/ 60%R.H. for 168hrs<br>2.) Tamb25°C; IF=20mA; duration 1000hrs               |
| High humidity, high temperature bias | 1Q/ 1/ 45/ 0                                                    | JESD-A101-B                    | Tamb: 85°C<br>Humidity: 85% R.H., IF=5mA<br>Duration: 1000hrs                                                                |
| High temperature bias                | 1Q/ 1/ 20                                                       | HT specs.                      | Tamb: 55°C<br>IF=20mA<br>Duration: 1000hrs                                                                                   |
| Pulse life test                      | 1Q/ 1/ 40/ 0                                                    |                                | Tamb25°C, If=20mA,, Ip=100mA, Duty cycle=0.125 (tp=125μs,T=1sec)<br>Duration 500hrs)                                         |
| Temperature cycle                    | 1Q/ 1/ 76/ 0                                                    | JESD-A104-A<br>IEC 68-2-14, Nb | A cycle: -40 degree C 15min; +85 degree C 15min<br>Thermal steady within 5 min..<br>300 cycles<br>2 chamber/ Air-to-air type |
| High humidity storage test           | 1Q/ 1/ 40/ 0                                                    | CNS-6117                       | 60+3°C<br>90+5/-10% R.H. for 500hrs                                                                                          |
| High temperature storage test        | 1Q/ 1/ 40/ 0                                                    | CNS-554                        | 100+10°C for 500hrs                                                                                                          |
| Low temperature storage test         | 1Q/ 1/ 40/ 0                                                    | CNS-6118                       | -40+5°C for 500hrs                                                                                                           |

|                                                                                                |                        |               |                |                |
|------------------------------------------------------------------------------------------------|------------------------|---------------|----------------|----------------|
| Official Product                                                                               | Product: HT-110 Series |               |                | Data Sheet No. |
| Tentative Product                                                                              | *****                  |               |                | HT-110 Series  |
| Specifications are subject to change without notice. Data and drawings herein are copyrighted. |                        | Mar. 03, 2005 | Version of 1.0 | Page 24/25     |

**Revision History**

| Changes since last revision | Page | Version No. | Revision Date |
|-----------------------------|------|-------------|---------------|
| New format                  |      | 1.0         | 03-03-2006    |
|                             |      |             |               |
|                             |      |             |               |
|                             |      |             |               |
|                             |      |             |               |
|                             |      |             |               |
|                             |      |             |               |
|                             |      |             |               |
|                             |      |             |               |

|                                                                                                |                        |                |                |
|------------------------------------------------------------------------------------------------|------------------------|----------------|----------------|
| Official Product                                                                               | Product: HT-110 Series |                | Data Sheet No. |
| Tentative Product                                                                              | *****                  |                | HT-110 Series  |
| Specifications are subject to change without notice. Data and drawings herein are copyrighted. | Mar. 03, 2005          | Version of 1.0 | Page 25/25     |

Компания «Океан Электроники» предлагает заключение долгосрочных отношений при поставках импортных электронных компонентов на взаимовыгодных условиях!

Наши преимущества:

- Поставка оригинальных импортных электронных компонентов напрямую с производств Америки, Европы и Азии, а так же с крупнейших складов мира;
- Широкая линейка поставок активных и пассивных импортных электронных компонентов (более 30 млн. наименований);
- Поставка сложных, дефицитных, либо снятых с производства позиций;
- Оперативные сроки поставки под заказ (от 5 рабочих дней);
- Экспресс доставка в любую точку России;
- Помощь Конструкторского Отдела и консультации квалифицированных инженеров;
- Техническая поддержка проекта, помощь в подборе аналогов, поставка прототипов;
- Поставка электронных компонентов под контролем ВП;
- Система менеджмента качества сертифицирована по Международному стандарту ISO 9001;
- При необходимости вся продукция военного и аэрокосмического назначения проходит испытания и сертификацию в лаборатории (по согласованию с заказчиком);
- Поставка специализированных компонентов военного и аэрокосмического уровня качества (Xilinx, Altera, Analog Devices, Intersil, Interpoint, Microsemi, Actel, Aeroflex, Peregrine, VPT, Syfer, Eurofarad, Texas Instruments, MS Kennedy, Miteq, Cobham, E2V, MA-COM, Hittite, Mini-Circuits, General Dynamics и др.);

Компания «Океан Электроники» является официальным дистрибьютором и эксклюзивным представителем в России одного из крупнейших производителей разъемов военного и аэрокосмического назначения «JONHON», а так же официальным дистрибьютором и эксклюзивным представителем в России производителя высокотехнологичных и надежных решений для передачи СВЧ сигналов «FORSTAR».



## JONHON

«JONHON» (основан в 1970 г.)

Разъемы специального, военного и аэрокосмического назначения:

(Применяются в военной, авиационной, аэрокосмической, морской, железнодорожной, горно- и нефтедобывающей отраслях промышленности)

«FORSTAR» (основан в 1998 г.)

ВЧ соединители, коаксиальные кабели,  
кабельные сборки и микроволновые компоненты:

(Применяются в телекоммуникациях гражданского и специального назначения, в средствах связи, РЛС, а так же военной, авиационной и аэрокосмической отраслях промышленности).



Телефон: 8 (812) 309-75-97 (многоканальный)

Факс: 8 (812) 320-03-32

Электронная почта: [ocean@oceanchips.ru](mailto:ocean@oceanchips.ru)

Web: <http://oceanchips.ru/>

Адрес: 198099, г. Санкт-Петербург, ул. Калинина, д. 2, корп. 4, лит. А