

Features

| | |
|---------|---|
| Package | 1608 Size with dome lens, Emitting color : Yellow Green Outer Dimension 1.64 x 0.84 x 1.26mm (L x W x H) |
|---------|---|

| | |
|------------------|---|
| Product features | <ul style="list-style-type: none">•Narrower distribution angle, High brightness•Moisture sensitive level : 3 (IPC/JEDEC J-STD-020D)•Lead-free soldering compatible•RoHS2 compliant |
|------------------|---|

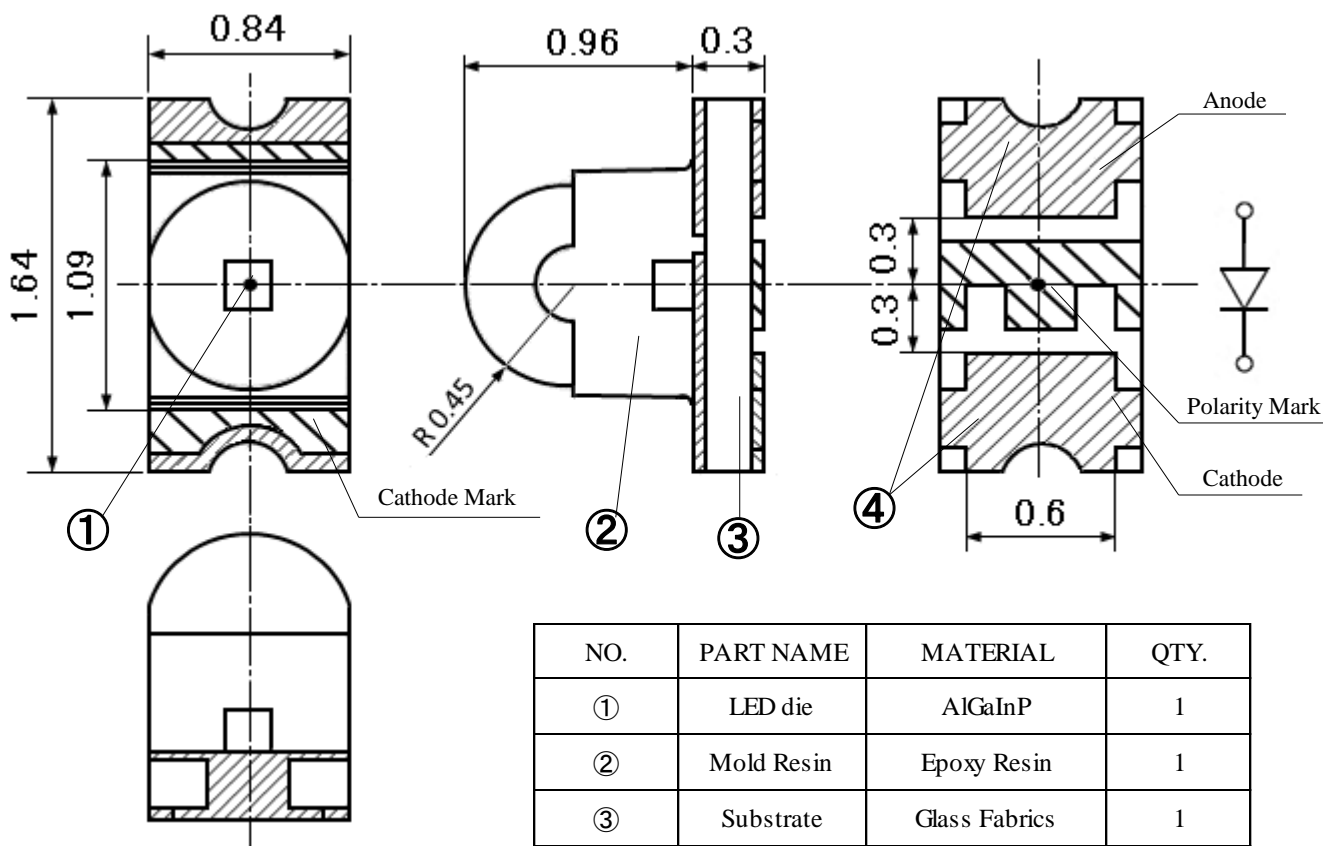
Recommended Applications

- Indicator lighting for Automotive use, Various indicators, etc.

Outline Dimensions

VFHD116P-4C32B-TR

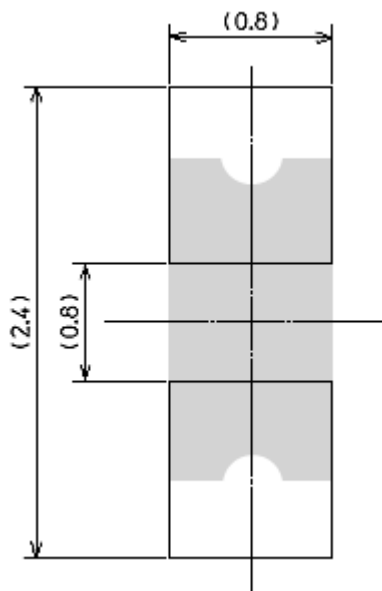
Unit :mm
 Weight :1.7mg
 Tolerance :±0.1



| NO. | PART NAME | MATERIAL | QTY. |
|-----|------------|---------------|------|
| ① | LED die | AlGaInP | 1 |
| ② | Mold Resin | Epoxy Resin | 1 |
| ③ | Substrate | Glass Fabrics | 1 |
| ④ | Electrode | Au/Ni/Cu | 2 |

Recommended Pad

Unit :mm



Specifications

VFHD1116P-4C32B-TR

【 Product Overview 】

| | |
|----------------------------|--------------|
| DIE MATERIAL | AlGaInP |
| EMITTING COLOR | Yellow Green |
| LENS COLOR (EMITTING AREA) | Milky White |

【 Absolute Maximum Ratings 】

(Ta=25°C)

| ITEM | SYMBOL | MAXIMUM RATINGS | UNITS |
|--|------------------|-----------------|-------|
| Power Dissipation | P_d | 78 | mW |
| Forward Current | I_F | 30 | mA |
| Repetitive Peak Forward Current "1ms, 1/20duty" | I_{FRM} | 100 | mA |
| I_F Derate Linearly from "75°C" | ΔI_F | 1.00 | mA/°C |
| I_{FRM} Derate Linearly from "75°C" | ΔI_{FRM} | 3.33 | mA/°C |
| Reverse Voltage | V_R | 5 | V |
| Operating Temperature | T_{opr} | -40 ~ +100 | °C |
| Storage Temperature | T_{stg} | -40 ~ +105 | °C |
| Electrostatic Discharge Threshold "HBM" | ESD | 1,000 | V |
| Soldering Temperature "Reflow Soldering" | T_{sld} | 260 | °C |

Notes 1

Notes 2

Notes 1 ESD testing method : EIAJ4701/300(304) Human body model(HBM) 1.5KΩ, 100pF

Notes 2 Please refer to page 8, "Soldering conditions".

【 Thermal Characteristics 】

(Ta=25°C)

| ITEM | SYMBOL | TYP. | MAX. | UNITS |
|---|---------------|------|------|-------|
| Thermal Resistance 【Junction - Ambient】 | $R_{th(j-a)}$ | 550 | - | °C/W |
| Thermal Resistance 【Junction - Solder point】 | $R_{th(j-s)}$ | 350 | - | °C/W |
| Junction Temperature | T_j | - | 105 | °C |

Notes 3

Notes 3 $R_{th(j-a)}$ Measurement condition
 •PCB : FR4 (t=1.6mm)
 •Pattern Size : 16mm²

【 Electro and Optical Characteristics 】

(Ta=25°C)

| ITEM | SYMBOL | CONDITIONS | MIN. | TYP. | MAX. | UNITS |
|--------------------------|-----------------|---------------------|------|------|------|---------------|
| Forward Voltage | V_F | $I_F = 20\text{mA}$ | 1.7 | 1.9 | 2.5 | V |
| Reverse Current | I_R | $V_R = 5\text{V}$ | - | - | 10 | μA |
| Luminous Intensity | I_V | $I_F = 20\text{mA}$ | 150 | 220 | 330 | mcd |
| Luminous Flux | ϕ_V | $I_F = 20\text{mA}$ | - | 200 | - | mlm |
| Peak Wavelength | λ_p | $I_F = 20\text{mA}$ | - | 575 | - | nm |
| Dominant Wavelength | λ_d | $I_F = 20\text{mA}$ | 570 | 573 | 576 | nm |
| Spectral Line Half Width | $\Delta\lambda$ | $I_F = 20\text{mA}$ | - | 15 | - | nm |
| Half Intensity Angle | $2\theta_{1/2}$ | $I_F = 20\text{mA}$ | - | 35 | - | nm |

Note:

Above Luminous Intensity (I_V) values and Dominant wavelength (λ_d) values are the setup value of the selection machine. 【Tolerance : $I_V \dots \pm 10\%$, $\lambda_d \dots \pm 1\text{nm}$ 】

【 Sorting Chart For Luminous Intensity and Dominant Wavelength 】

LEDs shall be sorted out into the following ranks of Luminous Intensity and Dominant Wavelength.

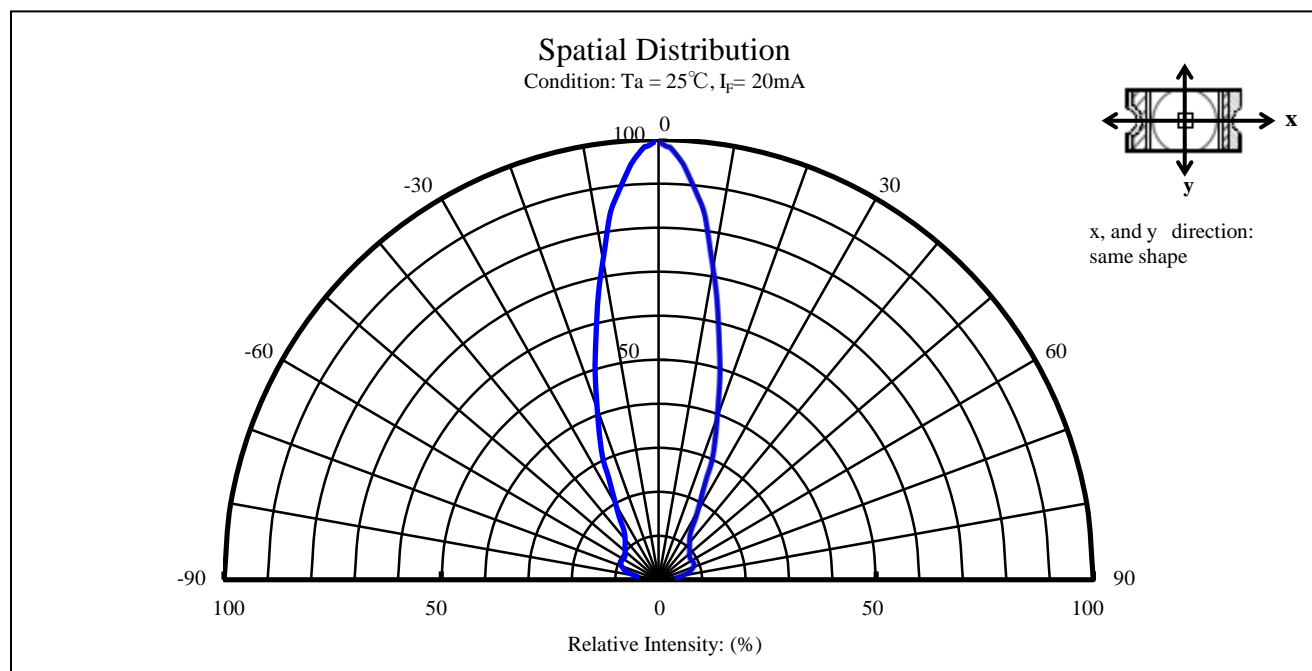
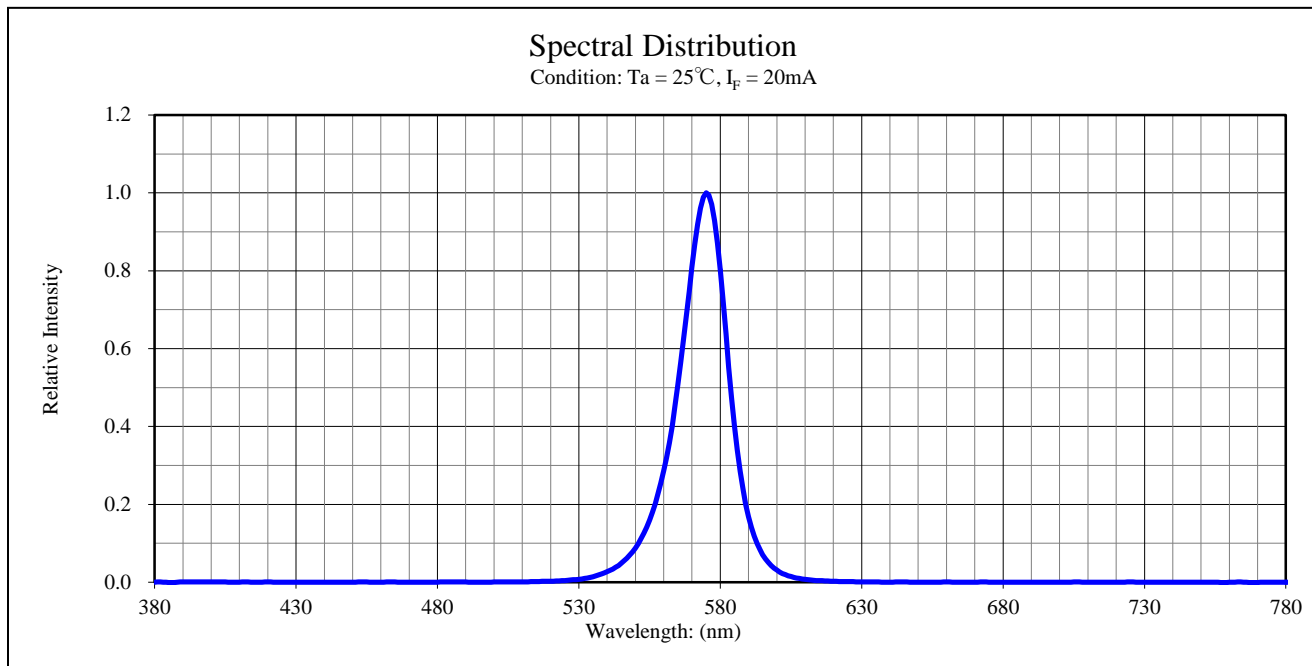
Luminous Intensity (I_V) Rank

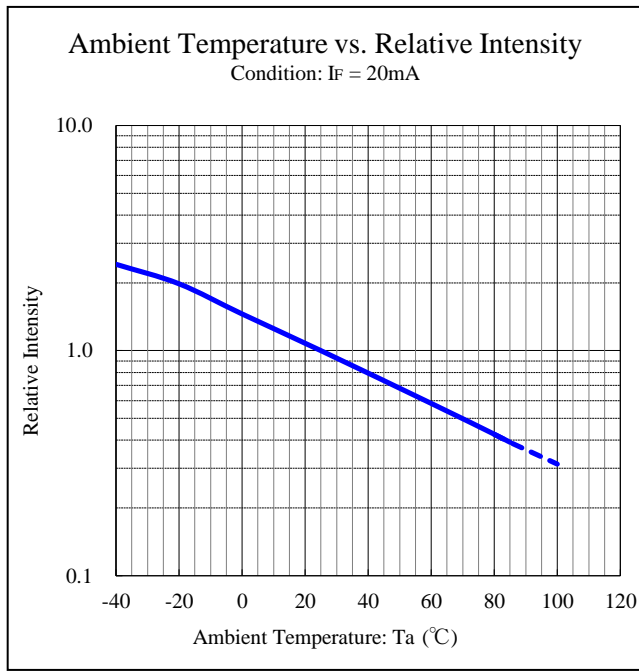
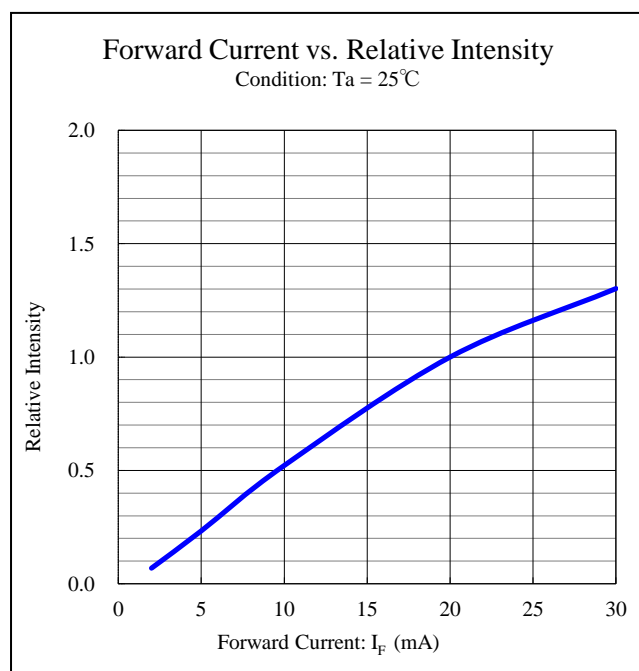
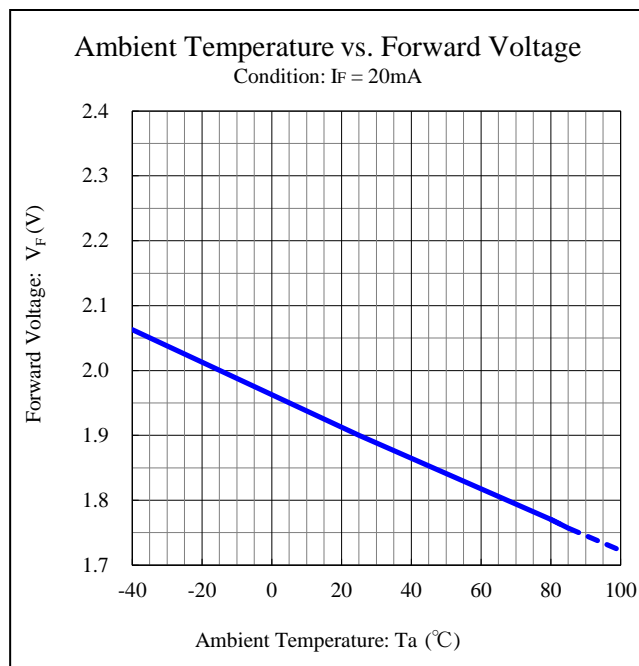
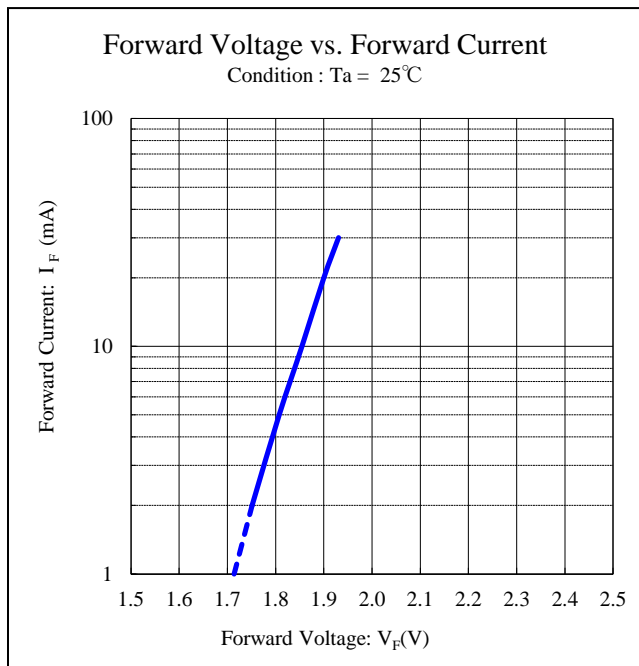
| Rank | I_V (mcd) | | Conditions |
|------|-------------|------|---|
| | MIN. | MAX. | |
| C3 | 150 | 180 | $I_F = 20\text{mA}$ $T_a = 25^\circ\text{C}$ |
| C4 | 180 | 220 | |
| C5 | 220 | 270 | |
| C6 | 270 | 330 | |

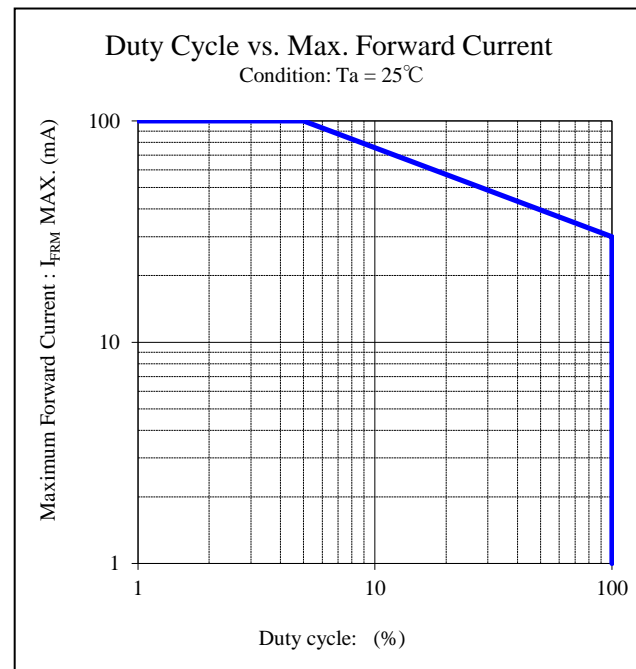
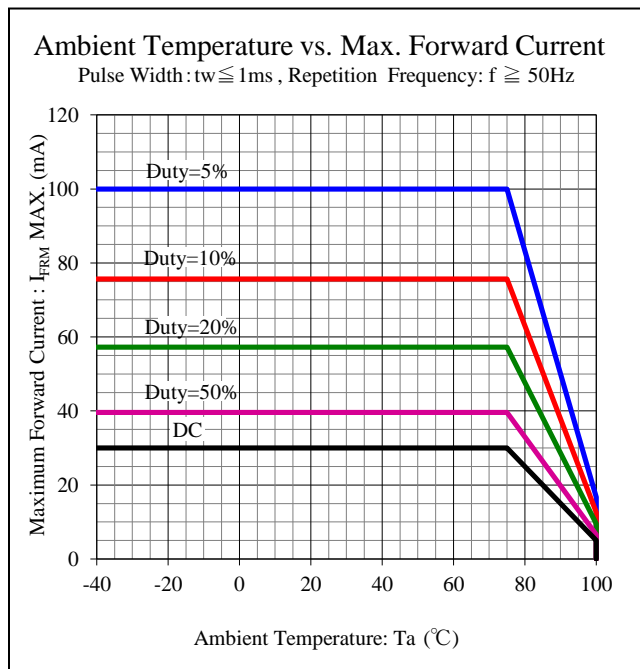
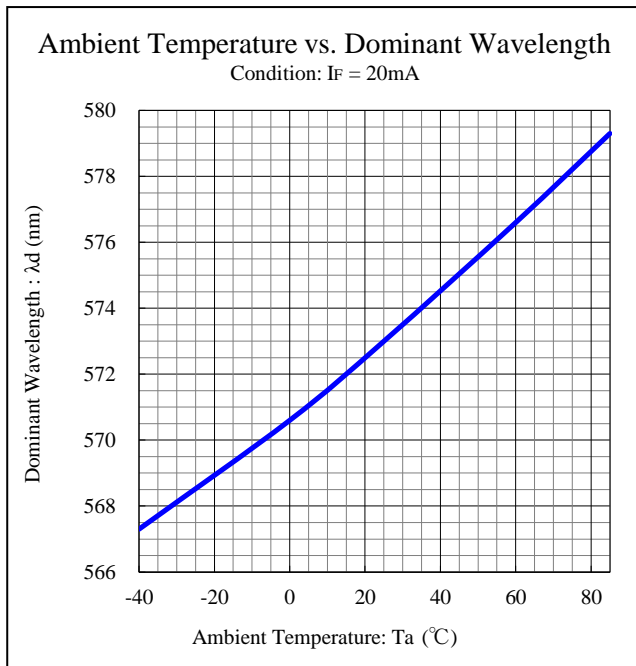
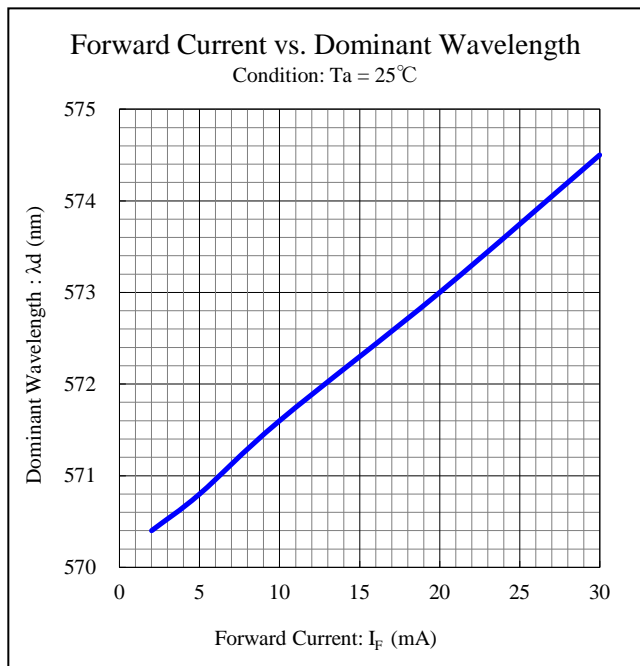
Dominant Wavelength (λ_d) Rank

| Rank | λ_d (nm) | | Conditions |
|------|------------------|------|---|
| | MIN. | MAX. | |
| B | 570 | 573 | $I_F = 20\text{mA}$ $T_a = 25^\circ\text{C}$ |
| C | 573 | 576 | |

Above Luminous Intensity (I_V) values and Dominant Wavelength (λ_d) values are the setup value of the selection machine. 【Tolerance : $I_V \dots \pm 10\%$, $\lambda_d \dots \pm 1\text{nm}$ 】







Soldering condition

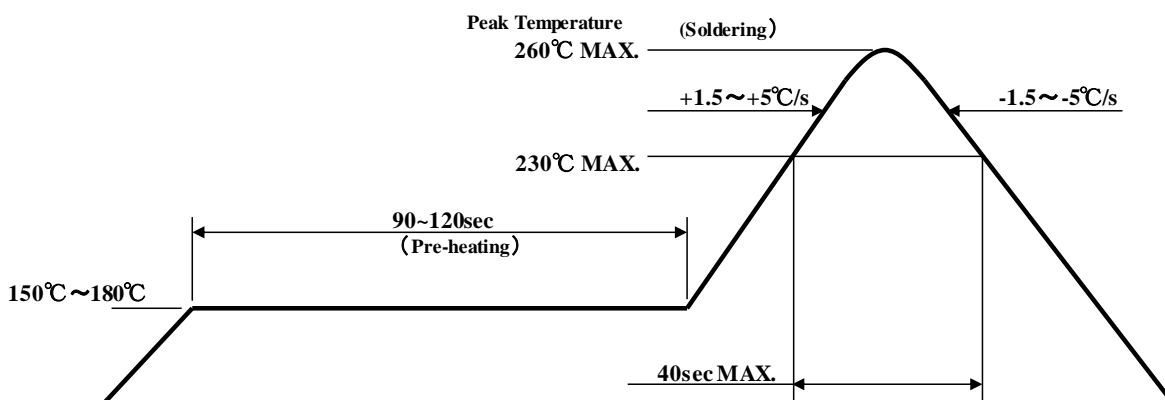
VFHD1116P-4C32B-TR

【Soldering Precaution】

(acc.to:EIAJ-4701/300)

1. Heat stress during soldering will influence the reliability of LEDs, however that effect will vary on heating method. Also, if components of varying shape are soldered together, it is recommended to set the soldering pad temperature according to the component most vulnerable to heat (e.g., surface mount LED).
2. LED parts including the resin are not stable immediately after soldering (when they are not at room temperature), any mechanical stress may cause damage to the product. Please avoid such stress after soldering, especially stacking of the boards which may cause the boards to warp and any other types of friction with hard materials.
3. Recommended temperature profile for the Reflow soldering is listed as the temperature of the resin surface. Temperature distribution varies on heating method, PCB material, other components in the assembly, and mounting density.
Please do not repeat the heating process in Reflow process more than twice.

【Recommended Reflow Soldering Condition】



Notes 1 Temperature Profile for the reflow should be set to the surface temperature of resin which is on the top of LED. This should be the maximum temperature for soldering. Lowering the heating temperature and decreasing heating time is very effective in achieving higher reliability.

Notes 2 The reflow soldering process should be done up to twice(2 times Max). When second process is performed, interval between first and second process should be as short as possible to prevent absorption of moisture to resin of LED. The second soldering process should not be done until LEDs have returned to room temperature (by nature-cooling) after first soldering process.

Soldering condition

VFHD1116P-4C32B-TR

4. If soldering manually, Stanley recommends using a soldering iron equipped with temperature control. During the actual soldering process, make sure that the soldering iron never touches the LED itself, and avoid the LED's electrode heating temperature reaching above the heating temperature of the solder pad. All repairs must be performed only once in the same spot, and please avoid reusing components.
5. In soldering process, immediately after iron tip is cleaned, please make sure that the soldering iron reaches the appropriate temperature before using. Also, please avoid applying any types of pressure to the soldered components before the solder has been cooled and hardened, as it may deteriorate solder performance and solder quality.

【Recommended Manual Soldering Condition】

| | |
|--------------------------|--------------------|
| Temperature of Iron Tip | 350°C MAX. |
| Soldering Duration, Time | 3sec. Max., 1 time |

6. When using adhesive material for tentative fixatives, thermosetting resin or Ultraviolet radiation (UV) setting resin with heat shall be recommended.
《The curing condition, Temperature: 150°C Max./Time: 120sec. Max.》
7. Isopropyl alcohol is recommended for cleaning. Some chemicals, including Freon substitute detergent could corrode or affect the optical characteristics of the lens or the casing surface. Please review the reference chart below for cleaning. Cleaning with ultrasonic shall not be recommended.

| Cleaning agents | Recommended / Not recommended |
|-------------------|-------------------------------|
| Isopropyl alcohol | ✓ Recommended |
| Ethyl alcohol | ✓ Recommended |
| Pure water | ✓ Recommended |
| Trichloroethylene | x Not recommended |
| Chloroethene | x Not recommended |
| Acetone | x Not recommended |
| Thinner | x Not recommended |

8. Flow soldering (dip soldering) is not recommended for this product.

【 Other Precautions 】

1. The products are designed to achieve the highest performance reliability, however they can be influenced by usage conditions.
2. Absolute Maximum Ratings are set to prevent LED lamps from failing due to excess stress(temperature, current, voltage, etc.). Usage conditions must not exceed the ratings for a moment, nor do reach one item of absolute maximum ratings simultaneously.
3. To achieve the highest performance reliability, it is necessary to take into account, factors such as forward voltage adjusted to the usage temperature condition, derating of the power consumption, and other variable factors.
4. Please insert Straight Protective Resistors into the circuit in order to stabilize LED operation and to prevent the device from igniting due to excess current.
5. Please check the actual performance in the assembly because the Specification Sheets are described for LED device only.
6. Please refrain from looking directly at the light source of LED at high output, as it may harm your vision.
7. The products are designed to operate without failure in recommended usage conditions. However, please take the necessary precautions to prevent fire, injury, and other damages should any malfunction or failure arise
8. The products are manufactured to be used for ordinary electronic equipment. Please contact our sales staff beforehand when exceptional quality and reliability are required, and the failure or malfunction of the products might directly jeopardize life or health (such as for airplanes, aerospace, transport equipment, medical applications, nuclear reactor control systems and so on).
9. The formal specification sheets shall be valid only by exchange of documents signed by both parties.



Packaging Specifications

VFHD1116P-4C32B-TR

This product is baked (moisture removal) before packaging, and is shipped in moisture-proof packaging (as shown below) to minimize moisture absorption during transportation and storage. However, with regard to storing the products, Stanley recommends the use of dry-box under the following conditions is recommended. Moisture-proof bag as the packaging is made of anti-static material but packaging box is not.

【Recommended Storage Condition / Products Warranty Period】

| | |
|-------------|-----------|
| Temperature | +5~30°C |
| Humidity | Under 70% |

In the case of the package unopened, **6 months under【 Recommended Storage Condition】**. Please avoid rapid transition from low temp. condition to high temp. condition and storage in corroding and dusty environment.

【Time elapsed after Package Opening.】

The package should not be opened until immediately prior to its use, and please keep the time frame between package opening and soldering which is **【maximum 168h.】** If the device needs to be soldered twice, both soldering must be completed within the 168h.

If any components should remain after their use, please seal the package and store them under the conditions described in the **【 Recommended Storage Condition】**.

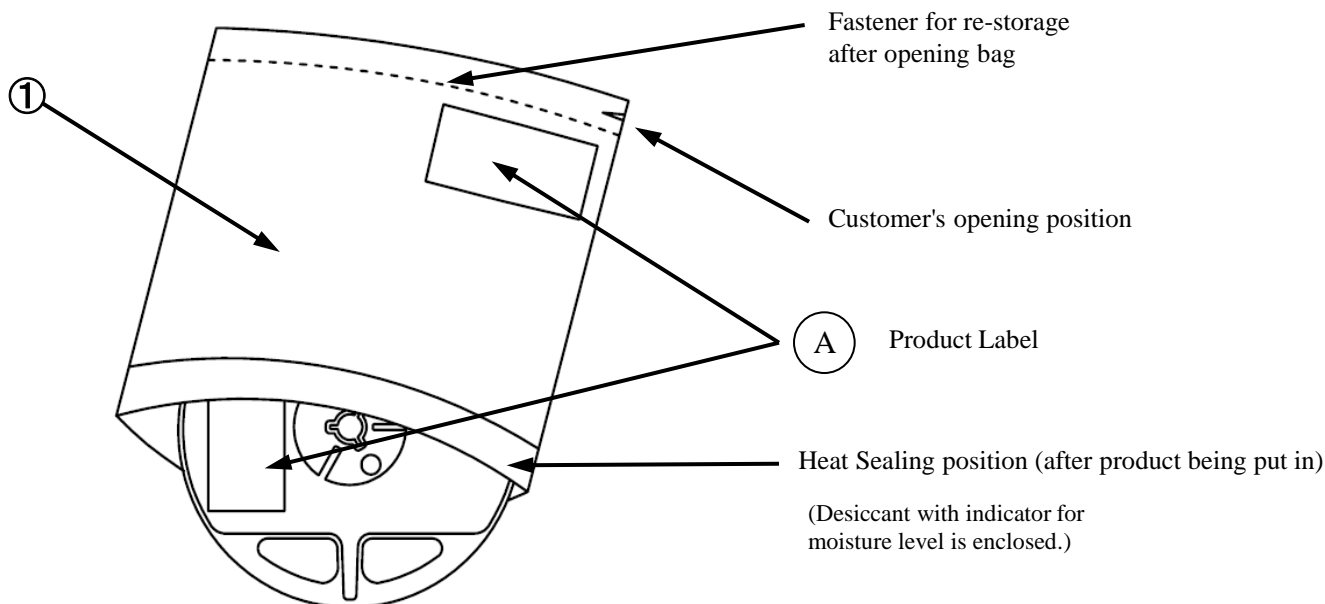
This product must be required to perform baking process (moisture removal) for **at least 48h,not exceed for 72h, at 60+±5 degrees Celsius** if following conditions apply.

1. In the case of silica gel (blue) which indicates the moisture level within the package, changes or loses its blue color.
2. In the case of time is passed for 168h after the package is opened once.

Baking process should be performed after LED having been taken out of the package.

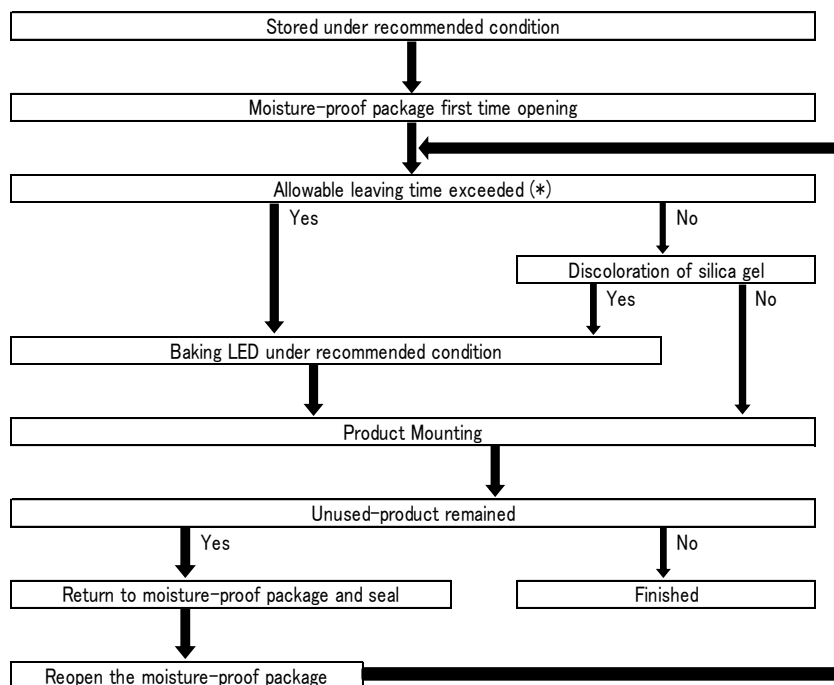
Baking may be performed in the tape-reel form, however if it is performed with the reel stacked over one another, it may cause deformation of the reels and taping materials and later obstruct mounting. Please handle only once it has returned to room temperature. Provided that, baking process shall be 2 times MAX.

【Moisture-proof Packaging Specification】



| NO. | PART NAME | MATELRIAL | REMARKS |
|-----|--|-----------|---------------------|
| ① | Moisture-proof bag with Aluminum layer | PET+Al+PE | with ESD protection |

【Flow Chart-package Opening to Mounting】



Allowable leaving time means the maximum allowable leaving time after opening package, which depends on each LED type.

The allowable leaving time should be calculated from the first opening of package to the time when soldering process is finished.

When judging if the allowable leaving time has exceeded or not, please subtract the soldering time after reopening. The allowable leaving time after reopening should be calculated from the first opening of package, or from the time when baking process is finished.

Packaging Specifications

VFHD1116P-4C32B-TR

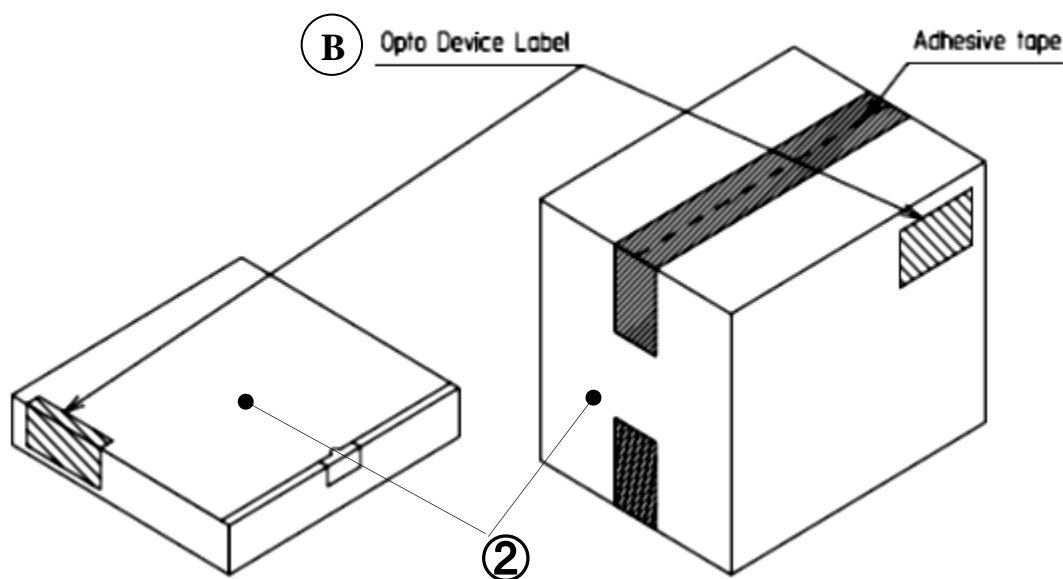
【 Packing box 】

(RoHS2 / ELV Compliant)

| Box TYPE | Outline dimension L × W × H (mm) | Capacity of the box |
|----------|-------------------------------------|---------------------|
| Type A | 280 × 265 × 45 | 3 reels |
| Type B | 310 × 235 × 265 | 15 reels |
| Type C | 440 × 310 × 265 | 30 reels |

The above measure is all the reference value.

Box for shipment is selected out of the above table, according to the shipping quantity.



Type A

Material / box : Cardboard C5BF

Type B,C

Material / box : Cardboard K5AF

Partition : Cardboard K5AF

| No. | PART NAME | MATERIAL | REMARKS |
|-----|-------------|----------------------|------------------------|
| ② | Packing Box | Corrugated Cardboard | without ESD protection |

【Label Specification】

(acc.to JIS-X0503(Code-39))

A Product label

The image shows a product label for Stanley Electric Co., Ltd. The label is rectangular and contains the following information:

- Header: **STANLEY -STANLEY ELECTRIC CO.,LTD.-**
- Field A: A box for the parts number.
- Field B: A barcode for the parts number.
- Field C: A box for the parts code, enclosed in parentheses.
- Field D: A box for the packed parts quantity, followed by "PCS".
- Field E: A barcode for the packed parts quantity.
- Field F: A box for the lot number and rank, preceded by "Lot No.".
- Field G: A barcode for the lot number and rank.

- A. Parts number
 - B. Bar-code for parts number
 - C. Parts code (In-house identification code for each parts number)
 - D. Packed parts quantity
 - E. Bar-Code for packed parts quantity
 - F. Lot number & Rank
- (refer to Lot Number Notational System for details)
- G. Bar-Code for Lot number & Rank

B Opto device label

The image shows an opto device label for Stanley Electric Co., Ltd. The label is rectangular and contains the following information:

- Header: **STANLEY OPTO DEVICES**
- Field A: A box for the customer name, followed by the Japanese characters "御中".
- Field B: A box for the parts type.
- Field C: A box for the parts code, enclosed in parentheses.
- Field D: A box for the parts number.
- Field E: A box for the packed parts quantity, followed by "PCS".
- Field F: A box for the carton number, preceded by "C/NO".
- Field G: A box for the shipping date.
- Field H: A barcode for the in-house identification number.
- Footer: **STANLEY ELECTRIC CO.,LTD.**

- A. Customer Name
- B. Parts Type
- C. Parts Code
- D. Parts Number
- E. Packed Parts Quantity
- F. Carton Number
- G. Shipping Date
- H. Bar-Code for In-house identification Number

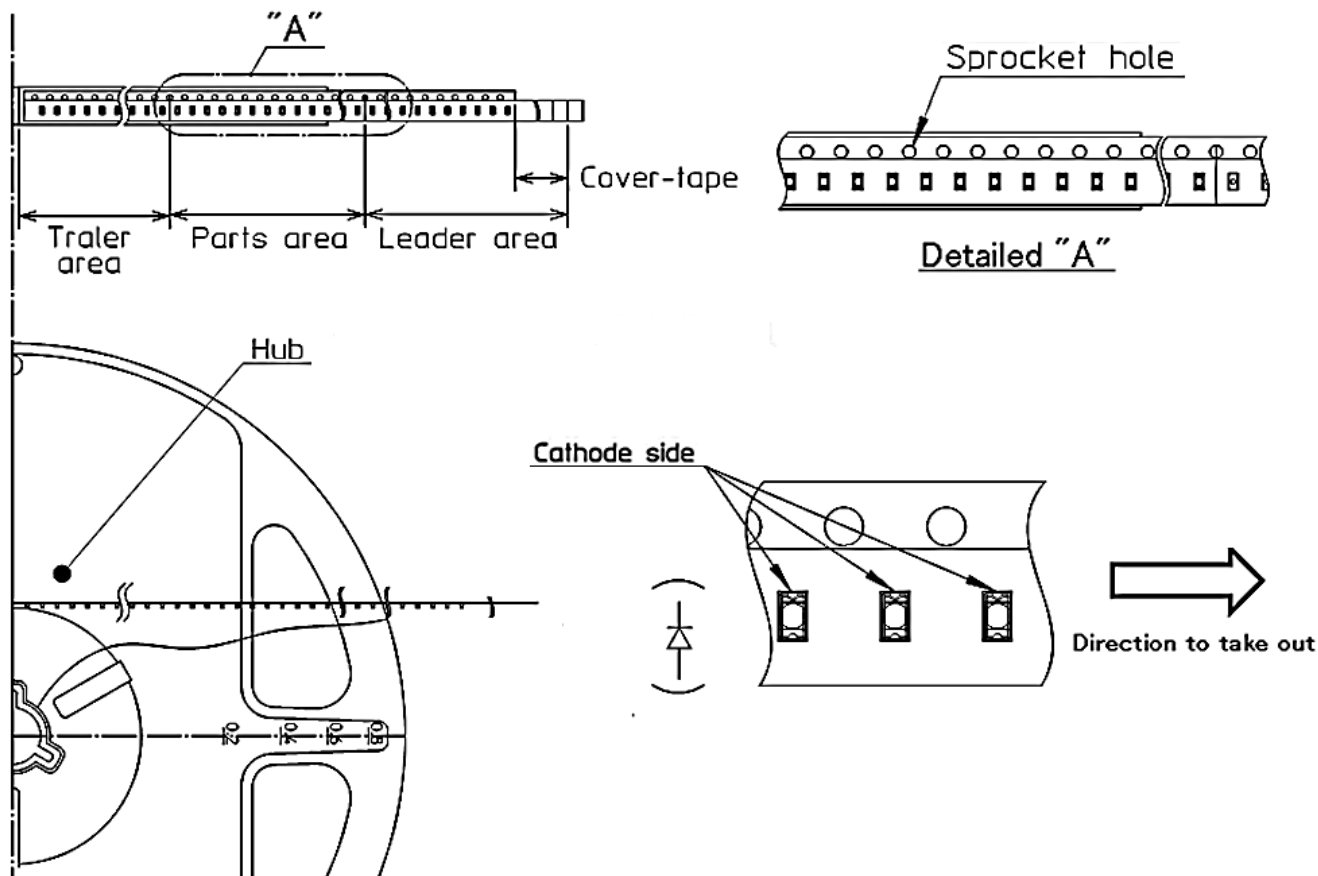
<Remarks> Bar-code font : acc.to Code-39(JIS-X0503)

Taping and Reel Specifications

VFHD1116P-4C32B-TR

(acc.to JIS-C0806-03)

【Appearance】



Note "-TR" means cathode side of LEDs should be placed on the sprocket-hole side.

| Items | | Specifications | Remarks |
|--------------|--------------|--|--|
| Leader area | Cover-tape | Cover-tape shall be longer than 320mm without carrier-tape | The end of cover-tape shall be held with adhesive tape. |
| | Carrier-tape | Empty pocket shall be more than 25 pieces. | Please refer to the above figure for Taping & reel orientation . |
| Trailer area | | Empty pocket shall be more than 40 pieces. | The end of taping shall be inserted into a slit of the hub. |

Taping and Reel Specifications

VFHD1116P-4C32B-TR

(acc.to JIS-C0806-03)

【Qty. per Reel】

3,000parts/reel

Minimum Qty. per reel might be 500 parts when getting less than 3,000 parts. In such case, parts of 500-unit-qty. shall be packed in a reel and the qty. shall be identified on the label

【Mechanical strength】

Cover-tape adhesive strength shall be 0.1~1.0N (An angle between carrier-tape and cover-tape shall be 170 deg.) Both tapes shall be so sealed that the contained parts will not come out from the tape when it is bent at a radius of 15mm.

【Others】

Reversed-orientation, Up-side down placing, side placing and out of spec. parts mix shall not be held.
Max qty. of empty pocket per reel shall be defined as follows.

| Qty./reel | Max. qty. of empty pocket | Remarks |
|-----------|---------------------------|----------------|
| 500 | 1 | - |
| 1,000 | 1 | - |
| 1,500 | 1 | - |
| 2,000 | 2 | No continuance |
| 2,500 | 2 | No continuance |
| 3,000 | 3 | No continuance |

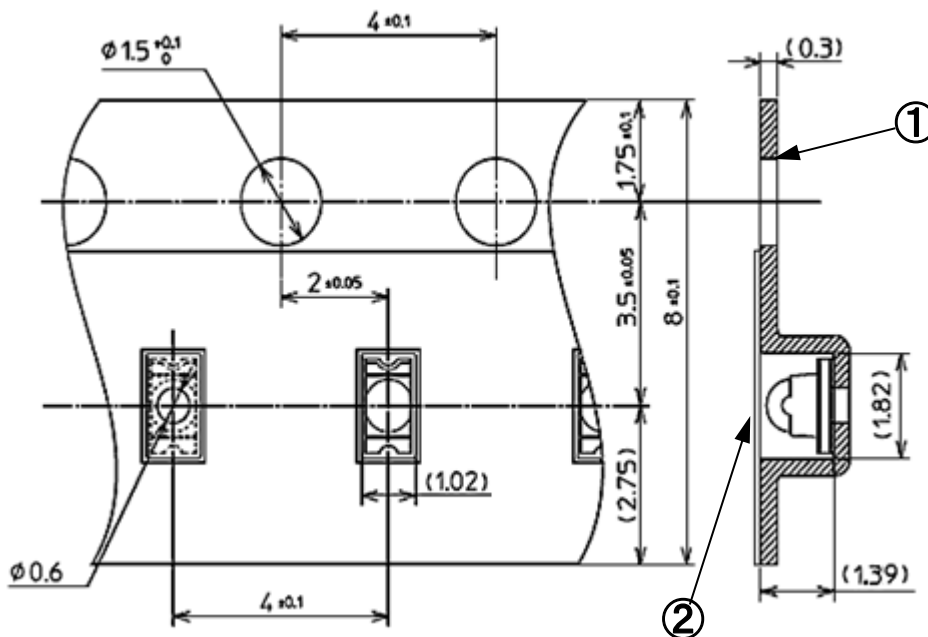
Taping and Reel Specifications

VFHD1116P-4C32B-TR

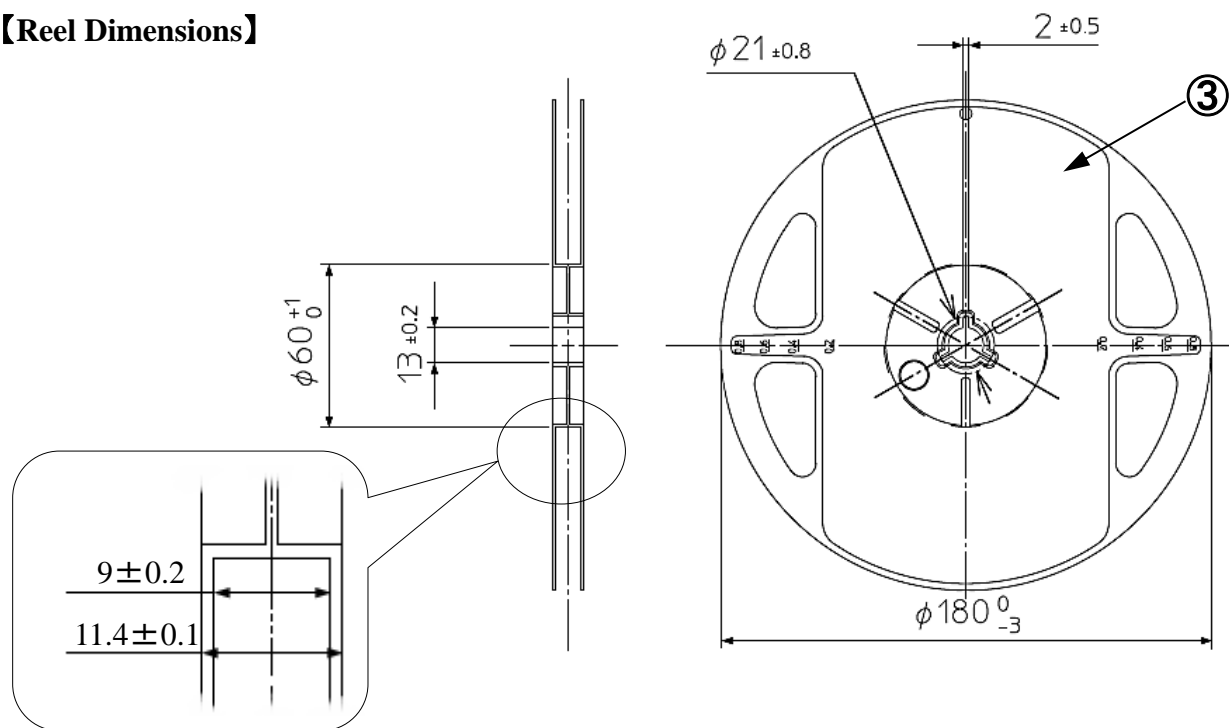
(acc.to JIS-C0806-03)

Unit :mm

【Taping Dimensions】



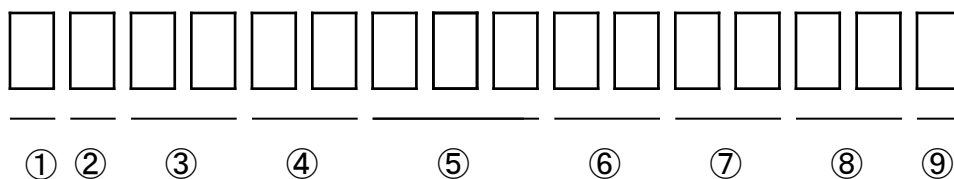
【Reel Dimensions】



| NO. | PART NAME | REMARKS |
|-----|--------------|-------------------|
| ① | Carrier-tape | Conductive Grade |
| ② | Cover-tape | Anti-Static Grade |
| ③ | Carrier-reel | Conductive Grade |

Lot Number Notational System

VFHD1116P-4C32B-TR



① - 1digit : Production Location (Mark identify alphabet)

② - 1digit : Production Year (Last Digit of Production Year shall be indicate as 2020→0, 2021→1, 2022→2,····)

③ - 2digits : Production Month (Jan. to Sep. ,shall be indicated as 01,02,03,····)

④ - 2digits : Production Date

⑤ - 3digits : Serial Number

⑥ - 2digits : Tape and Reel following Number

⑦ - 2digits : Luminous Intensity Rank.

(If luminous intensity rank is 1 digit, "-" shall be dashed on the place for the second digit.

If there is no identified rank, "- -" shall be used to indicate.)

⑧ - 2digits : Color Rank

(If chromaticity rank is 1 digit, "-" shall be dashed on the place for the second digit.

If there is no identified rank, "- -" shall be used to indicate.)

⑨ - 1digit : Option Rank (Stanley normally print "-" to indicate.)

This product is in compliance with RoHS2/ ELV.

Prohibition substance and it's criteria value of RoHS2/ ELV are as follows.

- RoHS2 instruction ... Refer to following 1 to 10.
- ELV instruction ... Refer to following 1 to 4.

| No. | Substances | Threshold |
|-----|---------------------------------------|-----------------|
| 1 | Lead and its compounds | 0.1% (1,000ppm) |
| 2 | Mercury and its compounds | 0.1% (1,000ppm) |
| 3 | Cadmium and its compounds | 0.01% (100ppm) |
| 4 | Hexavalent chromium compounds | 0.1% (1,000ppm) |
| 5 | PBB : Polybrominated Biphenyls | 0.1% (1,000ppm) |
| 6 | PBDE : Polybrominated Biphenyl Ethers | 0.1% (1,000ppm) |
| 7 | DEHP : Bis (2-ethylhexyl) phthalate | 0.1% (1,000ppm) |
| 8 | BBP : Butyl benzyl phthalate | 0.1% (1,000ppm) |
| 9 | DBP : Dibutyl phthalate | 0.1% (1,000ppm) |
| 10 | DIBP : Diisobutyl phthalate | 0.1% (1,000ppm) |

Reliability Testing Result

VFHD1116P-4C32B-TR

1. Reliability Testing Result

| Test Item | Standard | Test Condition | Duration | Failure |
|-------------------------------------|---------------------------|---|-------------------------|---------|
| Operating Life | EIAJ ED-4701 /100(101) | Ta=25°C Maximum Rated Current | 1,000h | 0 / 20 |
| High Temperature Operating Life | EIAJ ED-4701 /100(101) | Ta=85°C Maximum Rated Current ※1 | 1,000h | 0 / 20 |
| Low Temperature Operating Life | EIAJ ED-4701 /100(101) | Ta=-40°C Maximum Rated Current | 1,000h | 0 / 20 |
| Wet High Temperature Operating Life | EIAJ ED-4701 /100(102) | Ta=60°C Maximum Rated Current Rh=90% | 1,000h | 0 / 20 |
| High Temperature Storage Life | EIAJ ED-4701 /200(201) | Ta = Tstg max. Maximum Storage Temperature | 1,000h | 0 / 20 |
| Low Temperature Storage Life | EIAJ ED-4701 /200(202) | Ta = Tstg min. Minimum Storage Temperature | 1,000h | 0 / 20 |
| Wet High Temperature Storage Life | EIAJ ED-4701 /100(101) | Ta=60°C Rh=90% | 1,000h | 0 / 20 |
| Thermal Shock | EIAJ ED-4701 /100(105) | Ta= Tstg max. ~ Tstg min. (each 15min) | 1,000 cycles | 0 / 20 |
| Resistance to Reflow Soldering | EIAJ ED-4701 /300(301) | Moisture Soak : 30°C 70% 168h Preheating : 150~180°C 120sec MAX. Soldering : 260°C 5sec | 2times | 0 / 20 |
| Electric Static Discharge(ESD) ※2 | EIAJ ED-4701 /300(304) | C=100pF R2=1.5KΩ ±2,000V | once each polarity | 0 / 10 |
| Electric Static Discharge(ESD) ※2 | EIAJ ED-4701 /300(304) | C=200pF R2=0Ω±200V | once each polarity | 0 / 10 |
| Vibration, Variable Frequency | EIAJ ED-4701 /400(403) | 98.1m/s ² (10G) 100~2,000Hz 20min sweep XYZ direction | 2h of each direction | 0 / 10 |

※1 Maximum Rated Current at Maximum Rated Operating Temperature

※2 Reference test

2. Failure Criteria

| Item | Symbol | Condition | Failure Criteria |
|---------------------|----------------|--|---|
| Luminous Intensity | I _V | I _F Value of each product Luminous Intensity | Testing Min. Value < Standard Min. Value × 0.5 |
| Forward Voltage | V _F | I _F Value of each product Forward Voltage | Testing Max. Value ≥ Standard Max. Value × 1.2 |
| Reverse Current | I _R | V _R =5V | Testing Max. Value ≥ Standard Max. Value × 2.5 |
| Cosmetic appearance | - | - | No notable, decollation, deformation and cracking |

Special Notice to Customers Using the Products and Technical Information Shown in This Data Sheet

- 1) The technical information shown in the data sheets are limited to the typical characteristics and circuit examples of the referenced products. It does not constitute the warranting of industrial property nor the granting of any license.
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