



**Pb-free
HEAT**



1104LS Series

Single Color PLCC-2 Type
(High Reliability type, V-Series)

Features

| | | |
|-----------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|
| Package | PLCC-2 Bathtub Type. Water clear resin | |
| Product features | <ul style="list-style-type: none"> • Outer Dimension 3.5 x 2.8 x 1.9mm(L x W x H) • Wide operation temperature range. Storage Temperature : -40°C~120°C Operating Temperature : -40°C~100°C Operation Guarantee • Spatial distribution characteristics. (201/2 : 120deg) • Corresponding to a use requiring high reliability in cars etc... • Ramification of luminosity group sorting. It is possible to have a uniform transmission with little irregularities even when several are lined up. • Lead-free soldering compatible • RoHS compliant | |
| Dominant wavelength | Blue : 470nm (VCPB,VCLB) Green : 525nm (VCPG,VCMG) 561nm (VFHG,VFJG,VFGG) Yellow Green : 570nm (VFHP,VFJP,VFGP) Yellow : 589nm (VFHY,VFJY,VFGY) Orange : 606nm (VFHA,VFJA,VFGA) Red : 616nm (VFHV,VFJV,VFGV) 626nm (VFHR,VFJR,VFGR) | |
| Spatial distribution | 120 deg. | |
| Die materials | VC□□:InGaN、 VF□□ :AlGaInP | |
| Rank grouping parameter | Sorted by luminous intensity and wavelength and taped according to rank. | |
| Assembly methods (customer) | Corresponding to surface mounter. | |
| Soldering methods | Corresponding to reflow soldering / Manual Soldering | |
| Taping dimensions | 2,000pcs(standard)per reel in a 8mm width tape. Reel diameter : φ180mm | |
| ESD-withstand voltage | AlGaInP:Up to 2kV (HBM), InGaN:Up to 1kV(HBM) | ※ Reference |

Recommended Applications

SW lighting for car indicators, meter panel, car audio and heater control, etc...



1104LS Series

Single Color PLCC-2 Type
(High Reliability type, V-Series)

Color and Luminous Intensity

(Ta=25°C)

| Part No. | Material | Emitted Color | Lens Color | Dominant Wavelength | | Luminous Intensity | | | Luminous Flux | | Optical Efficiency (lm/W) (Reference) |
|------------|----------|---------------|-------------|---------------------|------------|--------------------|------|------------|---------------|------------|---------------------------------------------|
| | | | | λ_d (nm) | | I_v (mcd) | | | ϕ_v (lm) | | |
| | | | | TYP. | I_F (mA) | MIN. | TYP. | I_F (mA) | TYP. | I_F (mA) | |
| VCPB1104LS | InGaN | Blue | Water Clear | 470 | 10 | 33 | 60 | 10 | 0.19 | 10 | 6.1 |
| VCLB1104LS | | | | | 30 | 150 | 260 | 30 | 0.85 | 30 | 8.9 |
| VCPG1104LS | | Green | | 525 | 10 | 120 | 260 | 10 | 0.83 | 10 | 26.8 |
| VCMG1104LS | | | | | 30 | 330 | 700 | 30 | 2.20 | 30 | 22.9 |
| VFHG1104LS | AlGaInP | Green | | 561 | 20 | 18 | 25 | 20 | 0.10 | 20 | 2.5 |
| VFJG1104LS | | | | | 20 | 27 | 36 | 20 | 0.11 | 20 | 2.8 |
| VFGG1104LS | | | | | 50 | 68 | 90 | 50 | 0.28 | 50 | 2.5 |
| VFHP1104LS | AlGaInP | Yellw Green | | 570 | 20 | 56 | 78 | 20 | 0.30 | 20 | 7.5 |
| VFJP1104LS | | | | | 20 | 82 | 110 | 20 | 0.35 | 20 | 8.8 |
| VFGP1104LS | | | | | 50 | 120 | 180 | 50 | 0.57 | 50 | 5.2 |
| VFHY1104LS | AlGaInP | Yellw | | 589 | 20 | 120 | 170 | 20 | 0.54 | 20 | 13.5 |
| VFJY1104LS | | | | | 20 | 180 | 255 | 20 | 0.81 | 20 | 20.3 |
| VFGY1104LS | | | 50 | | 470 | 645 | 50 | 2.03 | 50 | 18.5 | |
| VFHA1104LS | AlGaInP | Orange | 606 | 20 | 120 | 170 | 20 | 0.54 | 20 | 13.5 | |
| VFJA1104LS | | | | 20 | 180 | 255 | 20 | 0.81 | 20 | 20.3 | |
| VFGA1104LS | | | | 50 | 560 | 910 | 50 | 2.46 | 50 | 22.4 | |
| VFHV1104LS | AlGaInP | Red | 616 | 20 | 120 | 170 | 20 | 0.54 | 20 | 13.5 | |
| VFJV1104LS | | | | 20 | 180 | 230 | 20 | 0.73 | 20 | 18.3 | |
| VFGV1104LS | | | | 50 | 680 | 940 | 50 | 2.46 | 50 | 22.4 | |
| VFHR1104LS | AlGaInP | Red | 632 | 20 | 100 | 140 | 20 | 0.44 | 20 | 11.0 | |
| VFJR1104LS | | | | 20 | 150 | 210 | 20 | 0.66 | 20 | 16.5 | |
| VFGR1104LS | | | | 50 | 330 | 500 | 50 | 1.57 | 50 | 14.3 | |

※Note : The luminous intensity(I_v) and dominant wavelength (λ_d) above are the setup values of the sorting machine.
(Tolerance : I_v ... $\pm 10\%$, λ_d ... ± 1 nm)

Absolute Maximum Ratings

(Ta=25°C)

| Item | Symbol | VCPB | VCLB | VCPG | VCMG | VFHG | VFJG | VFGG | Unit |
|-----------------------------------------------|------------------|----------|------|------|------|------|------|------|-------|
| Power Dissipation | P_d | 76 | 117 | 76 | 120 | 78 | 78 | 130 | mW |
| Continuous Forward Current | I_F | 20 | 30 | 20 | 30 | 30 | 30 | 50 | mA |
| Repetitive Peak Forward Current ^{※1} | I_{FRM} | 100 | 100 | 100 | 100 | 100 | 100 | 100 | mA |
| Derating ^{※2} | ΔI_F | 0.57 | 0.86 | 0.57 | 0.86 | 0.86 | 0.86 | 1.43 | mA/°C |
| | ΔI_{FRM} | 2.86 | 2.86 | 2.86 | 2.86 | 2.86 | 2.86 | 2.04 | mA/°C |
| Reverse Voltage | V_R | 5 | 5 | 5 | 5 | 5 | 5 | 5 | V |
| Operating Temperature | T_{opr} | -40~+100 | | | | | | | °C |
| Storage Temperature | T_{stg} | -40~+120 | | | | | | | °C |

| Item | Symbol | VFHP | VFJP | VFGP | VFHY | VFJY | VFGY | Unit |
|-----------------------------------------------|------------------|----------|------|------|------|------|------|-------|
| Power Dissipation | P_d | 78 | 78 | 189 | 78 | 78 | 189 | mW |
| Continuous Forward Current | I_F | 30 | 30 | 50 | 30 | 30 | 70 | mA |
| Repetitive Peak Forward Current ^{※1} | I_{FRM} | 100 | 100 | 100 | 100 | 100 | 100 | mA |
| Derating ^{※2} | ΔI_F | 0.86 | 0.86 | 1.43 | 0.86 | 0.86 | 1.43 | mA/°C |
| | ΔI_{FRM} | 2.86 | 2.86 | 2.04 | 2.86 | 2.86 | 2.04 | mA/°C |
| Reverse Voltage | V_R | 5 | 5 | 5 | 5 | 5 | 5 | V |
| Operating Temperature | T_{opr} | -40~+100 | | | | | | °C |
| Storage Temperature | T_{stg} | -40~+120 | | | | | | °C |

※1 I_{FRM} Measurement condition / VC□□ : Pulse Width \leq 0.1ms, Duty \leq 1/10

VF□□ : Pulse Width \leq 1.0ms, Duty \leq 1/20

※2 VFGY : Ta=71°C or higher

Other : Ta=85°C or higher

Absolute Maximum Ratings

| Item | Symbol | VFHA | VFJA | VFGA | Unit |
|------------------------------------|------------------|----------|------|------|-------|
| Power Dissipation | P_d | 78 | 78 | 189 | mW |
| Continuous Forward Current | I_F | 30 | 30 | 70 | mA |
| Repetitive Peak Forward Current ※1 | I_{FRM} | 100 | 100 | 100 | mA |
| Derating ※2 | ΔI_F | 0.86 | 0.86 | 1.43 | mA/°C |
| | ΔI_{FRM} | 2.86 | 2.86 | 2.04 | mA/°C |
| Reverse Voltage | V_R | 5 | 5 | 5 | V |
| Operating Temperature | T_{opr} | -40~+100 | | | °C |
| Storage Temperature | T_{stg} | -40~+120 | | | °C |

| Item | Symbol | VFHV | VFJV | VFGV | VFHR | VFJR | VFGR | Unit |
|------------------------------------|------------------|----------|------|------|------|------|------|-------|
| Power Dissipation | P_d | 78 | 78 | 189 | 78 | 78 | 189 | mW |
| Continuous Forward Current | I_F | 30 | 30 | 70 | 30 | 30 | 70 | mA |
| Repetitive Peak Forward Current ※1 | I_{FRM} | 100 | 100 | 100 | 100 | 100 | 100 | mA |
| Derating ※2 | ΔI_F | 0.86 | 0.86 | 1.43 | 0.86 | 0.86 | 1.43 | mA/°C |
| | ΔI_{FRM} | 2.86 | 2.86 | 2.04 | 2.86 | 2.86 | 2.04 | mA/°C |
| Reverse Voltage | V_R | 5 | 5 | 5 | 5 | 5 | 5 | V |
| Operating Temperature | T_{opr} | -40~+100 | | | | | | °C |
| Storage Temperature | T_{stg} | -40~+120 | | | | | | °C |

※1 I_{FRM} Measurement condition / $VC\Box\Box$: Pulse Width ≤ 0.1 ms, Duty $\leq 1/10$

$VF\Box\Box$: Pulse Width ≤ 1.0 ms, Duty $\leq 1/20$

※2 VFGA,VFGV,VFGR : Ta=71°C or higher

Other : Ta=85°C or higher

Thermal Characteristics

| Item | Symbol | Ratings | | | | | | Unit |
|----------------------------------------------------------|-----------------|---------|------|------|------|------|------|------|
| | | VCP□ | VCLB | VCMG | VFH□ | VFJ□ | VFG□ | |
| Junction Temperature (MAX.) | T_j | 120 | 120 | 120 | 120 | 120 | 120 | °C |
| Thermal Resistance (TYP.) (Junction/ambient) | $R_{(th\ j-a)}$ | 300 | 250 | 270 | 350 | 350 | 260 | °C/W |
| Thermal Resistance (TYP.) (Junction/Solder Point) | $R_{(th\ j-s)}$ | 150 | 100 | 100 | 200 | 200 | 110 | °C/W |

※ $R_{th(j-a)}$ Measurement Condition / Substrate: FR4(t=1.6mm) Pattern Size: 16mm².



1104LS Series

Single Color PLCC-2 Type
(High Reliability type, V-Series)

Electro-Optical Characteristics

(Ta=25°C)

| Item | Forward Voltage | | | Reverse Current | | Wavelength | | | | Half Intensity Angle | |
|------------|--------------------|------|---------------------|---------------------|---------------------|---------------------|---------------------|--------------------------|------------|----------------------|---------------------|
| | V _F (V) | | | I _R (μA) | | Peak | Dominant | Spectral Line Half Width | Conditions | 2θ1/2(deg.) | |
| | TYP. | MAX. | I _F (mA) | TYP. | I _F (mA) | λ _p (nm) | λ _d (nm) | Δλ (nm) | | TYP. | I _F (mA) |
| VCPB1104LS | 3.1 | 3.7 | 10 | 10 | | 462 | 470 | 22 | 10 | | 10 |
| VCLB1104LS | 3.2 | 3.9 | 30 | | | | | | | | 30 |
| VCPG1104LS | 3.1 | 3.7 | 10 | | | | | | | | 10 |
| VCMG1104LS | 3.2 | 3.9 | 30 | | | | | | | | 30 |
| VFHG1104LS | 2.0 | 2.5 | 20 | 100 | 5 | | | 20 | 20 | 120 | 20 |
| VFJG1104LS | 2.0 | 2.5 | 20 | | | | | | | | 20 |
| VFGG1104LS | 2.2 | 2.6 | 50 | | | | | | | | 50 |
| VFHP1104LS | 2.0 | 2.5 | 20 | | | | | | | | 20 |
| VFJP1104LS | 2.0 | 2.5 | 20 | | | | | | | | 20 |
| VFGP1104LS | 2.2 | 2.6 | 50 | | | | | | | | 50 |
| VFHY1104LS | 2.0 | 2.5 | 20 | | | | | | | | 20 |
| VFJY1104LS | 2.0 | 2.5 | 20 | | | | | | | | 20 |
| VFGY1104LS | 2.2 | 2.6 | 50 | | | | | | | | 50 |
| VFHA1104LS | 2.0 | 2.5 | 20 | | | | | | | | 20 |
| VFJA1104LS | 2.0 | 2.5 | 20 | | | | | | | | 20 |
| VFGA1104LS | 2.2 | 2.6 | 50 | | | | | | | | 50 |
| VFHV1104LS | 2.0 | 2.5 | 20 | | | | | | | | 20 |
| VFJV1104LS | 2.0 | 2.5 | 20 | | | | | | | | 20 |
| VFGV1104LS | 2.2 | 2.6 | 50 | | | | | | | | 50 |
| VFHR1104LS | 2.0 | 2.5 | 20 | | | | | | | | 20 |
| VFJR1104LS | 2.0 | 2.5 | 20 | 20 | | | | | | | |
| VFGR1104LS | 2.2 | 2.6 | 50 | 50 | | | | | | | |

※Note: The dominant wave length (λ_d) above is the setup value of the sorting machine.
(Tolerance : λ_d...±1nm)

Luminous Intensity Rank

(Ta=25°C)

Intensity Tolerance each Rank : +/-10%

| Rank | I _v (mcd) | | VCPB | VCLB | VCPG | VCMG | VFHG | VFJG | VFGG |
|------|----------------------|-------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|
| | MIN. | MAX. | I _F =10mA | I _F =30mA | I _F =10mA | I _F =30mA | I _F =20mA | I _F =20mA | I _F =50mA |
| B1 | 10 | 12 | | | | | | | |
| B2 | 12 | 15 | | | | | | | |
| B3 | 15 | 18 | | | | | | | |
| B4 | 18 | 22 | | | | | B4 | | |
| B5 | 22 | 27 | | | | | B6 | | |
| B6 | 27 | 33 | | | | | B6 | B6 | |
| B7 | 33 | 39 | B7 | | | | | | |
| B8 | 39 | 47 | | | | | | B8 | |
| B9 | 47 | 56 | | | | | | | |
| BX | 56 | 68 | | | | | | | |
| BY | 68 | 82 | | | | | | | BY |
| BZ | 82 | 100 | BZ | | | | | | |
| C1 | 100 | 120 | | | | | | | C1 |
| C2 | 120 | 150 | | | C2 | | | | |
| C3 | 150 | 180 | | C3 | | | | | |
| C4 | 180 | 220 | | | | | | | |
| C5 | 220 | 270 | | | | | | | |
| C6 | 270 | 330 | | | | | | | |
| C7 | 330 | 390 | | C7 | C7 | C7 | | | |
| C8 | 390 | 470 | | | | | | | |
| C9 | 470 | 560 | | | | | | | |
| CX | 560 | 680 | | | | | | | |
| CY | 680 | 820 | | | | | | | |
| CZ | 820 | 1,000 | | | | CZ | | | |
| D1 | 1,000 | 1,200 | | | | | | | |
| D2 | 1,200 | 1,500 | | | | | | | |
| D3 | 1,500 | 1,800 | | | | | | | |
| D4 | 1,800 | 2,200 | | | | | | | |

※ Please contact our sales staff concerning rank designation.

Luminous Intensity Rank

Intensity Tolerance each Rank : +/-10%

| Rank | I _v (mcd) | | VFHP | VFJP | VFGP | VFHY | VFJY | VFGY |
|------|----------------------|-------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|
| | MIN. | MAX. | I _F =20mA | I _F =20mA | I _F =50mA | I _F =20mA | I _F =20mA | I _F =50mA |
| B1 | 10 | 12 | | | | | | |
| B2 | 12 | 15 | | | | | | |
| B3 | 15 | 18 | | | | | | |
| B4 | 18 | 22 | | | | | | |
| B5 | 22 | 27 | | | | | | |
| B6 | 27 | 33 | | | | | | |
| B7 | 33 | 39 | | | | | | |
| B8 | 39 | 47 | | | | | | |
| B9 | 47 | 56 | | | | | | |
| BX | 56 | 68 | BX | | | | | |
| BY | 68 | 82 | | | | | | |
| BZ | 82 | 100 | | BZ | | | | |
| C1 | 100 | 120 | C1 | | | | | |
| C2 | 120 | 150 | | | C2 | C2 | | |
| C3 | 150 | 180 | | C3 | | | | |
| C4 | 180 | 220 | | | | C4 | C4 | |
| C5 | 220 | 270 | | | C5 | | | |
| C6 | 270 | 330 | | | | | C6 | |
| C7 | 330 | 390 | | | | | | |
| C8 | 390 | 470 | | | | | | |
| C9 | 470 | 560 | | | | | | C9 |
| CX | 560 | 680 | | | | | | |
| CY | 680 | 820 | | | | | | CY |
| CZ | 820 | 1,000 | | | | | | |
| D1 | 1,000 | 1,200 | | | | | | |
| D2 | 1,200 | 1,500 | | | | | | |
| D3 | 1,500 | 1,800 | | | | | | |
| D4 | 1,800 | 2,200 | | | | | | |

※ランク指定については、担当営業へお問い合わせください。

Luminous Intensity Rank

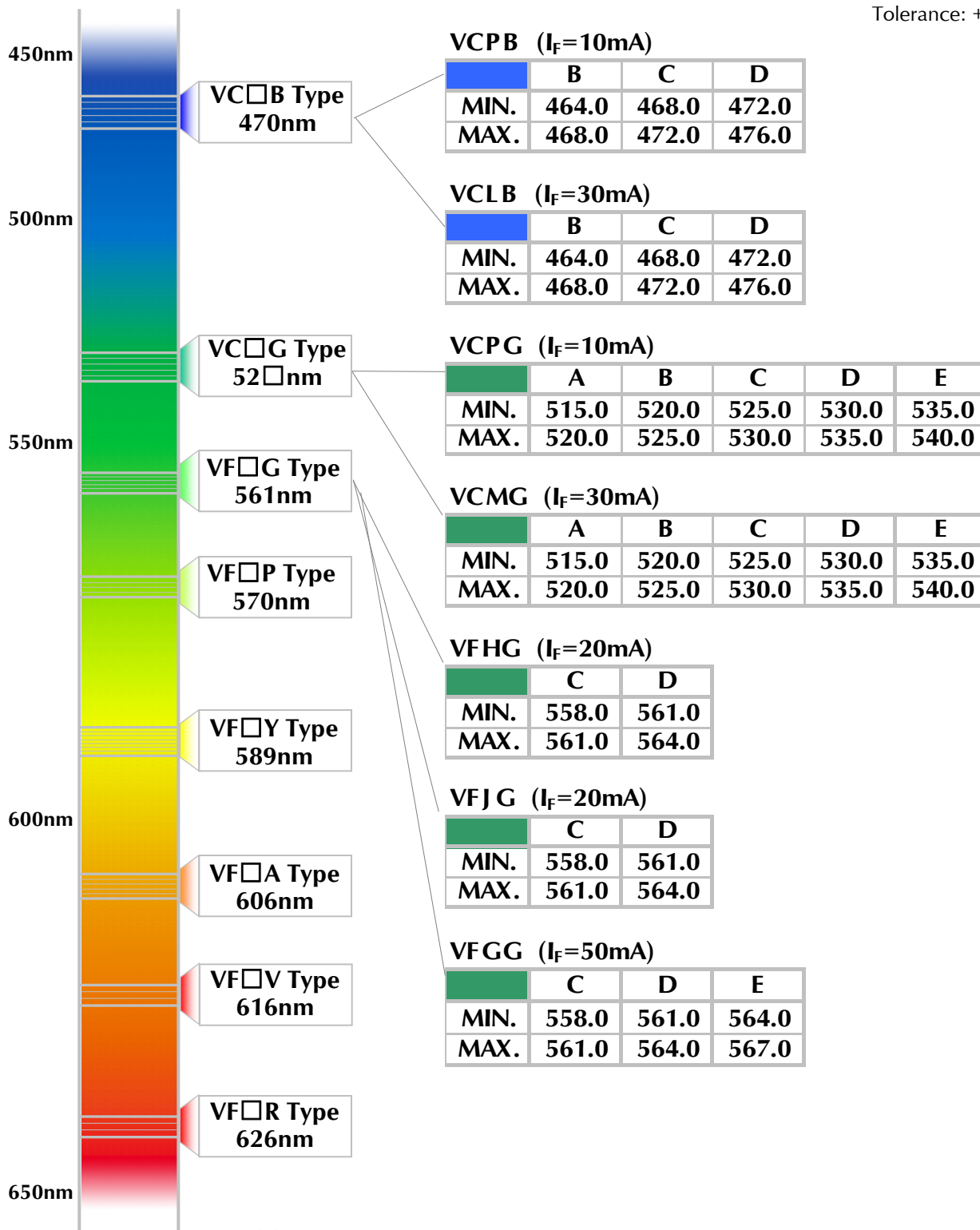
(Ta=25°C)

Intensity Tolerance each Rank : +/-10%

| Rank | I _v (mcd) | | VFHA | VFJA | VFGA | VFHV | VFJV | VFGV | VFHR | VFJR | VFGR |
|------|----------------------|-------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|
| | MIN. | MAX. | I _f =20mA | I _f =20mA | I _f =50mA | I _f =20mA | I _f =20mA | I _f =50mA | I _f =20mA | I _f =20mA | I _f =50mA |
| B1 | 10 | 12 | | | | | | | | | |
| B2 | 12 | 15 | | | | | | | | | |
| B3 | 15 | 18 | | | | | | | | | |
| B4 | 18 | 22 | | | | | | | | | |
| B5 | 22 | 27 | | | | | | | | | |
| B6 | 27 | 33 | | | | | | | | | |
| B7 | 33 | 39 | | | | | | | | | |
| B8 | 39 | 47 | | | | | | | | | |
| B9 | 47 | 56 | | | | | | | | | |
| BX | 56 | 68 | | | | | | | | | |
| BY | 68 | 82 | | | | | | | | | |
| BZ | 82 | 100 | | | | | | | | | |
| C1 | 100 | 120 | | | | | | | C1 | | |
| C2 | 120 | 150 | C2 | | | C2 | | | C3 | | |
| C3 | 150 | 180 | | | | C4 | C4 | | | C3 | |
| C4 | 180 | 220 | C4 | C4 | | | C4 | | | | |
| C5 | 220 | 270 | | | | | | | | C5 | |
| C6 | 270 | 330 | | C6 | | | C6 | | | | |
| C7 | 330 | 390 | | | | | | | | | C7 |
| C8 | 390 | 470 | | | | | | | | | |
| C9 | 470 | 560 | | | | | | | | | |
| CX | 560 | 680 | | | | | | | | | |
| CY | 680 | 820 | | | CY | | | CY | | | CY |
| CZ | 820 | 1,000 | | | | | | | | | |
| D1 | 1,000 | 1,200 | | | D1 | | | D1 | | | |
| D2 | 1,200 | 1,500 | | | | | | | | | |
| D3 | 1,500 | 1,800 | | | | | | | | | |
| D4 | 1,800 | 2,200 | | | | | | | | | |

※ Please contact our sales staff concerning rank designation.

Color Tone Groups (λ_d)



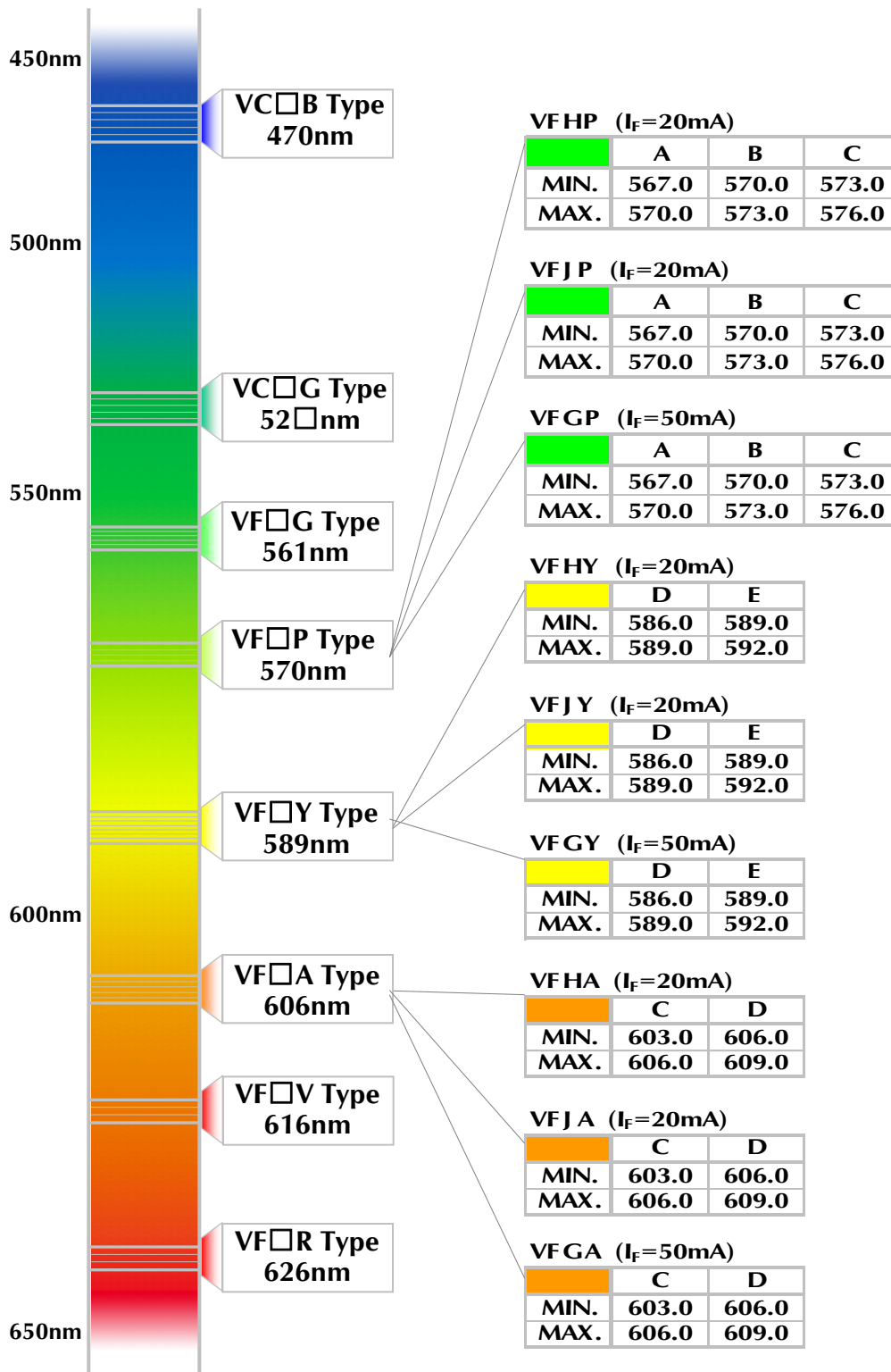
※ Please contact our sales staff concerning rank designation.

Color Tone Groups (λd)

($T_a=25^\circ\text{C}$)

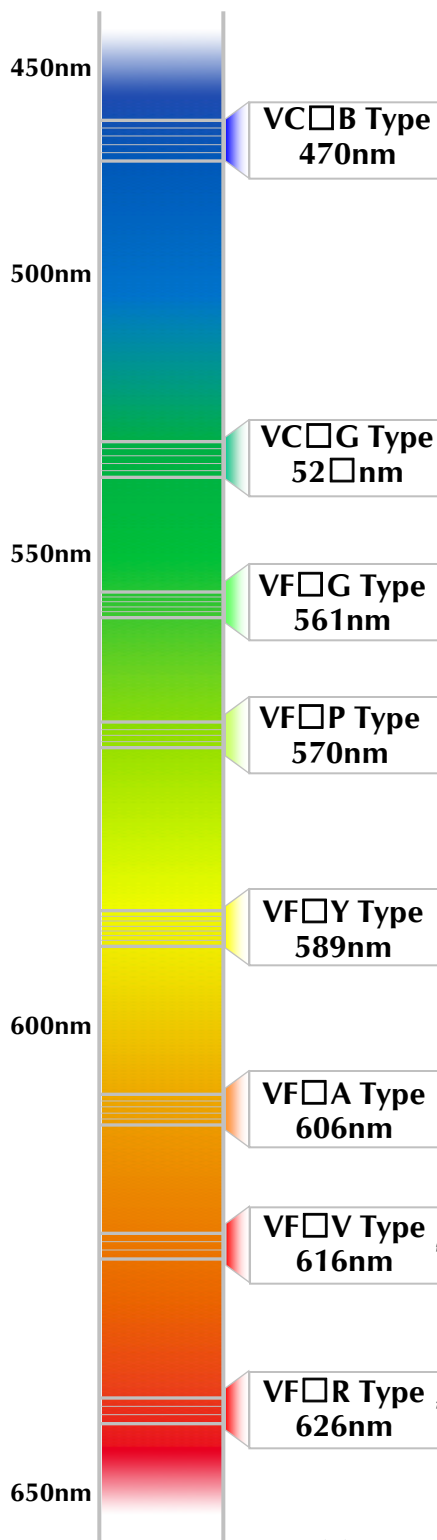
(unit: nm)

Tolerance: +/-1nm



※ Please contact our sales staff concerning rank designation.

Color Tone Groups (λ_d)

 (unit: nm)
 Tolerance: +/-1nm

VFHV (I_F=20mA)

| | B | C |
|------|-------|-------|
| MIN. | 613.0 | 616.0 |
| MAX. | 616.0 | 619.0 |

VFJV (I_F=20mA)

| | B | C |
|------|-------|-------|
| MIN. | 613.0 | 616.0 |
| MAX. | 616.0 | 619.0 |

VFGV (I_F=50mA)

| | B | C |
|------|-------|-------|
| MIN. | 613.0 | 616.0 |
| MAX. | 616.0 | 619.0 |

VFHR (I_F=20mA)

| | A | B |
|------|-------|-------|
| MIN. | 620.0 | 626.0 |
| MAX. | 626.0 | 632.0 |

VFJR (I_F=20mA)

| | A | B |
|------|-------|-------|
| MIN. | 620.0 | 626.0 |
| MAX. | 626.0 | 632.0 |

VFGR (I_F=50mA)

| | A | B | C |
|------|-------|-------|-------|
| MIN. | 620.0 | 626.0 | 632.0 |
| MAX. | 626.0 | 632.0 | 638.0 |

※ Please contact our sales staff concerning rank designation.

**Pb-free
HEAT**

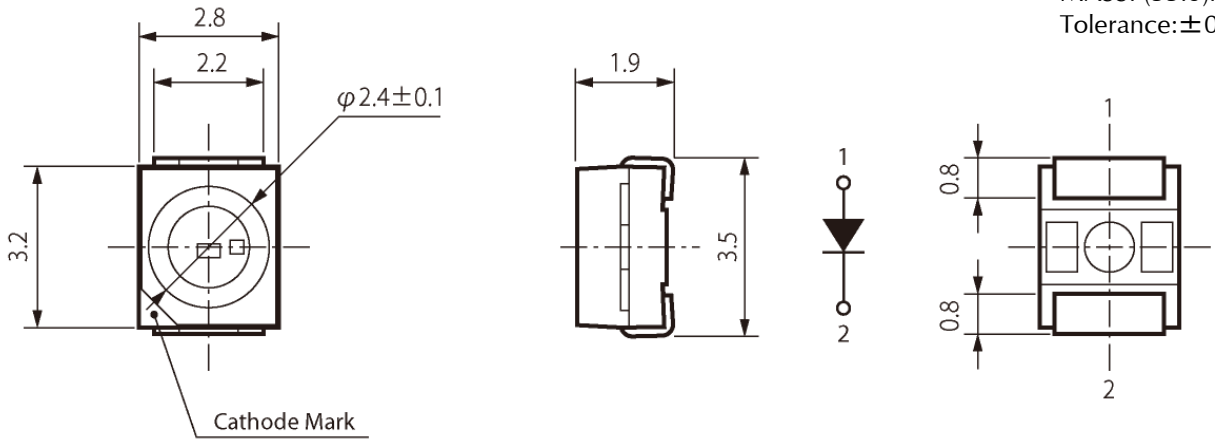
1104LS Series

Single Color PLCC-2 Type
(High Reliability type, V-Series)

Package Dimensions

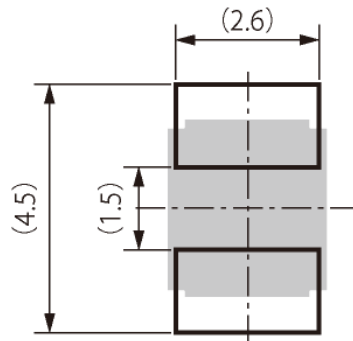
(Unit: mm)

MASS: (33.0)mg
Tolerance: ± 0.2



Recommended Soldering Pattern

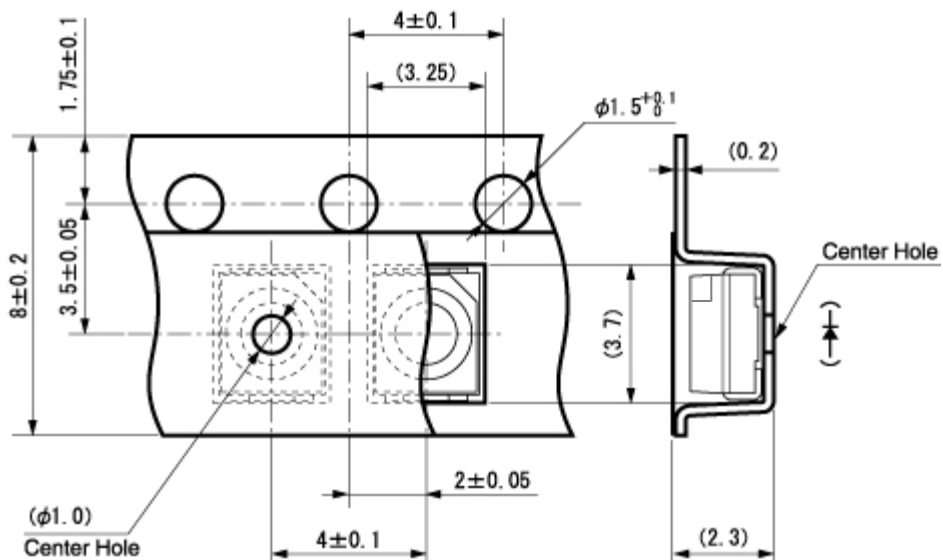
(Unit: mm)



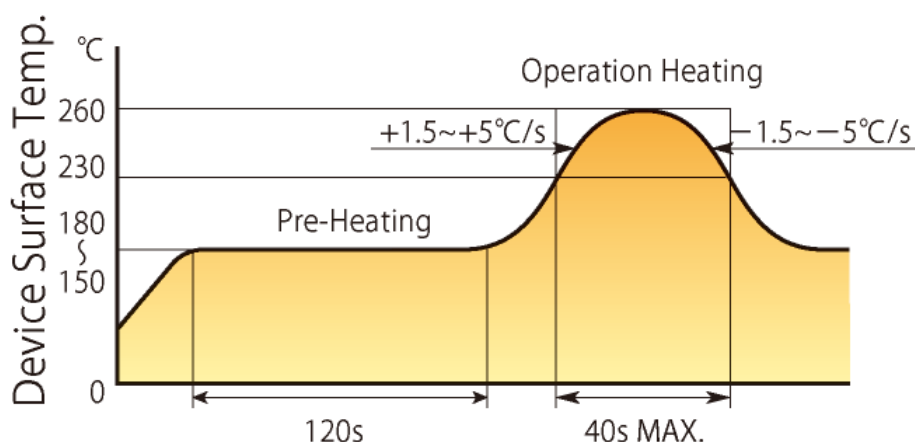
Taping Specification

(Unit: mm)

•Quantity: 2,000pcs/ reel (standard)



Reflow Soldering Conditions



- 1) The above profile temperature gives the maximum temperature of the LED resin surface. Please set the temperature so as to avoid exceeding this range.
- 2) Total times of reflow soldering process shall be no more than 2 times. When the second reflow soldering process is performed, intervals between the first and second reflow should be short as possible (while allowing some time for the component to return to room temperature after the first reflow) in order to prevent the LED resin from absorbing moisture.
- 3) Temperature fluctuation to the LED during the pre-heating process shall be minimized.

Manual Soldering Conditions

| | |
|------------------------------|-----------------------------|
| Iron tip temp. | 350 °C (MAX.) |
| Soldering time and frequency | 3 s (MAX.) 1 time (MAX.) |

Reliability Testing Result

| Reliability Testing Result | Applicable Standard | Testing Conditions | Duration | Failure |
|-----------------------------------------------|-----------------------|------------------------------------------------------------------------------------------------------|--------------------|---------|
| Room Temp. Operating Life | EIAJ ED-4701/100(101) | Ta = 25°C, I _F = Maximum Rated Current | 1,000 h | 0/20 |
| High Temp. Operating Life | EIAJ ED-4701/100(101) | Ta = 85°C I _F = Derating Value | 1,000 h | 0/20 |
| Low Temp. Operating Life | EIAJ ED-4701/100(101) | Ta = -40°C, I _F = Maximum Rated Current | 1,000 h | 0/20 |
| Wet High Temp. Operating Life | EIAJ ED-4701/100(102) | Ta = 60°C, 90%, I _F = Maximum Rated Current | 1,000 h | 0/20 |
| Wet High Temp. Storage Life | EIAJ ED-4701/100(103) | Ta = 60°C, 90% | 1,000 h | 0/20 |
| Thermal Shock | EIAJ ED-4701/100(105) | Ta = -40°C ~ 120°C (each 15min.) | 1,000 cycles | 0/20 |
| Thermal Shock Operating | EIAJ ED-4701/100(105) | Ta = -40°C(OFF) ~ 85°C(ON) each 15min. I _F = Derating Value | 1,000 cycles | 0/20 |
| High Temp. Storage Life | EIAJ ED-4701/200(201) | Ta = 120°C | 1,000 h | 0/20 |
| Low Temp. Storage Life | EIAJ ED-4701/200(202) | Ta = -40°C | 1,000 h | 0/20 |
| Cycled Temp. Humidity Operating Life | EIAJ ED-4701/200(203) | Ta = -30°C(2h) ~ 80°C, 95%(2h), 8h/cycle I _F = Derating Value 5min on-off | 30 cycles | 0/20 |
| Resistance to Reflow Soldering | EIAJ ED-4701/300(301) | Moisture Soak : 30°C, 70%, 672h Preheat : 150°C~180°C (120s Max.) Soldering Temp. : 260°C (5s) | Twice | 0/20 |
| Electric Static Discharge (ESD) ^{※1} | EIAJ ED-4701/300(304) | C = 100pF, R2 = 1.5KΩ, ±2,000V | once each polarity | 0/10 |
| Vibration, Variable Frequency | EIAJ ED-4701/400(403) | 98.1m/s ² (10G), 100 ~ 2KHz, 20min. XYZ each direction | 2 h | 0/10 |

※1 Reference test

Failure Criteria

| Items | Symbols | Conditions | Failure criteria |
|---------------------|----------------|------------------------------------------------------------|-----------------------------------------------------------------|
| Luminous Intensity | I _v | I _F Value of each product Luminous Intensity | Testing Min. Value < Spec. Min. Value x 0.5 |
| Forward Voltage | V _F | I _F Value of each product Forward Voltage | Testing Max. Value ≥ Spec. Max. Value x 1.2 |
| Reverse Current | I _R | V _R = Maximum Rated Reverse Voltage V | Testing Max. Value ≥ Spec. Max. Value x 2.5 |
| Cosmetic Appearance | - | - | Occurrence of notable decoloration, deformation and cracking |

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