

# OVAL PRECISION OPTICAL PERFORMANCE LED LAMPs

## Technical Data

12/27/2002

### Description

These Precision Optical Performance oval LEDs are specifically designed for Full Color / Video and Passenger Information signs.

High efficiency LED materials are used in these lamps: Aluminum Indium Gallium Phosphide (AlInGaP) for red, amber and green, and Indium Gallium Nitride (InGaN) for true green and blue.

Designers can select parallel (where the axis of the leads is parallel to the wide axis of the oval radiation pattern) or perpendicular orientation. Designers can also choose between lamps with or without standoffs.

### Features

- Smooth, Consistent Spatial Radiation Patterns
- High Luminous Output
- Emitting Colors :
  - 632 nm Ultra Red
  - 625 nm Red
  - 605 nm Orange
  - 590 nm Amber
  - 573 nm Green
  - 525 nm True Green
  - 470 nm Blue
- Superior Resistance to Moisture
- Choice of Package Options

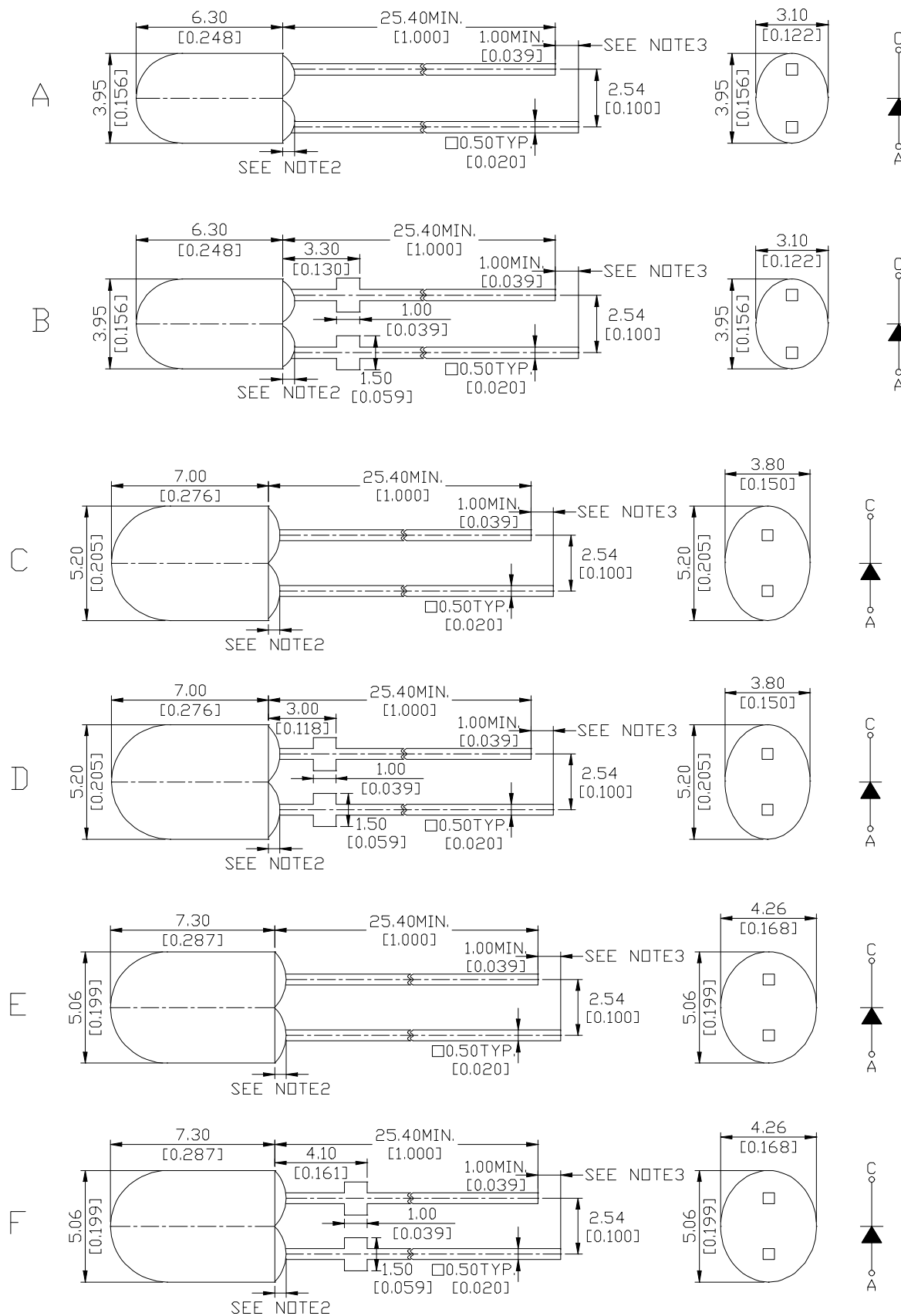
### Benefits

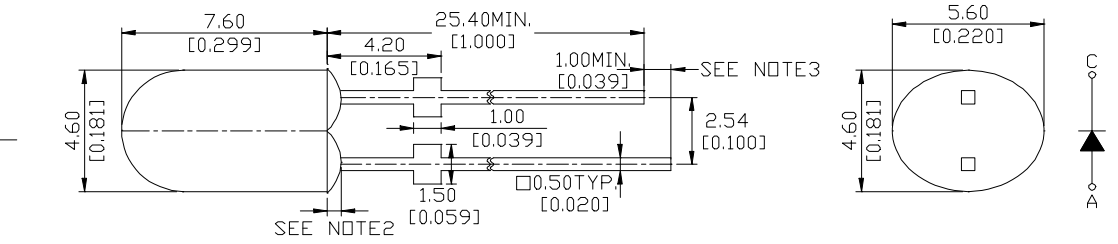
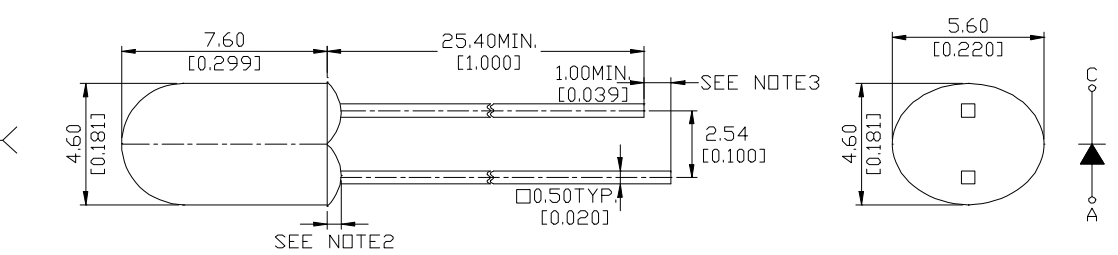
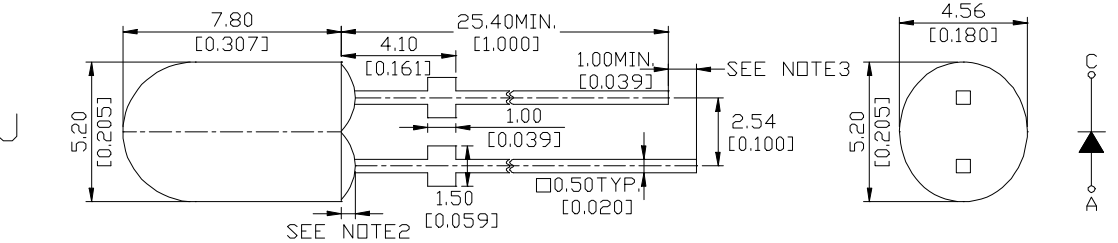
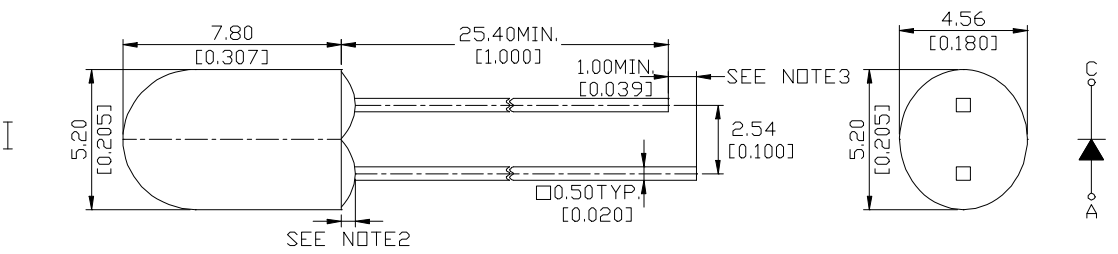
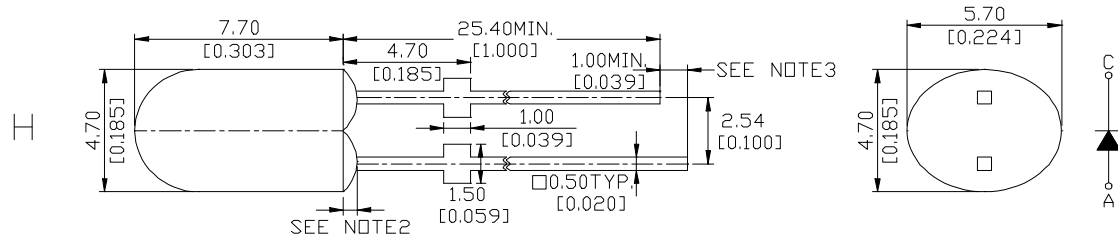
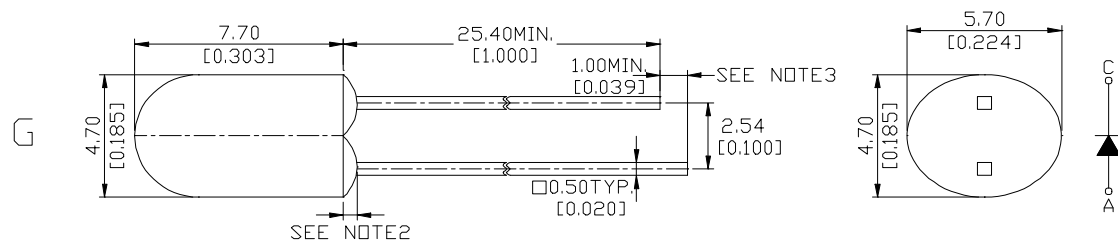
- Viewing Angle Designed for Wide Field of View Applications
- Red, True Green, and Blue Radiation Patterns Matched for Full Color Signs
- Superior Outdoor Environmental Performance

### Applications

- Full Color / Video Signs
- Variable Message Signs
  - Passenger Information
  - Advertising
  - Time / Temperature

## Package Dimension





- Notes :
1. Tolerance is  $\pm 0.25$  mm (.010") unless otherwise noted.
  2. Protruded resin under flange is 1.5 mm (.059") max.
  3. Lead spacing is measured where the leads emerge from the package.

## Part Numbering Scheme

MVL-6 A B C D

where A = Leadframe Orientation

and Package Dimension

- "3" = Parallel Leadframe (3.10 X 3.95 mm)
- "5" = Parallel Leadframe ( 4.26 X 5.06 mm )
- "6" = Perpendicular Leadframe (4.70 X 5.70 mm)
- "7" = Parallel Leadframe ( 3.80 X 5.20 mm )
- "8" = Parallel Leadframe ( 4.56 X 5.20 mm )
- "9" = Perpendicular Leadframe ( 4.60 X 5.60 mm )

where C = Color Option

- "UROK" = 632 nm Ultra Red
- "NUOL" = 625 nm Red
- "UOL" = 625 nm Red
- "TUOL" = 625 nm Red
- "SO" = 605 nm Orange
- "UYL" = 590 nm Amber
- "TUYL" = 590 nm Amber
- "UG" = 573 nm Green
- "HTG / UTG" = 525 nm True Green
- "HB / UB" = 470 nm Blue

where B = Package Color

- "1" = color diffuse
- "2" = diffuse
- "3" = Matching Color
- "4" = Water Clear

where D = Standoff Option

- "N/A" = Without
- "-S" = With Stopper

## Absolute Maximum Ratings at T<sub>A</sub>=25°C

| Parameter                                                | AlInGaP<br>"UROK"<br>"UOL"<br>"SO"<br>"UYL"<br>"TUOL"<br>"TUYL"<br>"UG" | AlInGaP<br>"NUOL" | InGaN<br>"HTG"<br>"HB" | InGaN<br>"UTG"<br>"UB" | Units |
|----------------------------------------------------------|-------------------------------------------------------------------------|-------------------|------------------------|------------------------|-------|
| DC Forward Current                                       | 50                                                                      | 30                | 30                     | 30                     | mA    |
| Power Dissipation                                        | 105                                                                     | 70                | 125                    | 125                    | mW    |
| Peak Forward Current(1/10 Duty Cycle 100 μs pulse width) | 100                                                                     | 100               | 100                    | 100                    | mA    |
| Reverse Voltage (I <sub>R</sub> =100μA)                  | 5                                                                       | 5                 | 5                      | 5                      | V     |
| Operating Temp Range                                     | -20 to + 85                                                             | -20 to + 85       | -20 to + 80            | -20 to + 80            | °C    |
| Storage Temp                                             | -40 to + 100                                                            | -40 to + 100      | -30 to + 100           | -30 to + 100           | °C    |
| Electrostatic Discharge Threshold                        | N/A                                                                     | N/A               | 300 <sup>NOTE1</sup>   | 1000                   | V     |
| Solder Temperature                                       | 260°C for 5 seconds<br>[ 1.5mm ( 0.06 in. ) below seating plane ]       |                   |                        |                        |       |

Notes: 1. Product resistance to electrostatic discharge (ESD) is measured by simulating ESD using a rapid avalanche energy test (RAET). The RAET procedures are designed to approximate the maximum ESD ratings shown. Seller gives no other assurances regarding the ability of Products to withstand ESD.

## MVL-63XXX

### AllInGaP

#### Device Selection Guide (Red, Orange, Amber, Green)

| Part Number   | Color and<br>Typical<br>Dominant<br>Wavelength<br>$\lambda_d$ (nm) | Luminous<br>Intensity<br>Iv(mcd) at<br>I <sub>F</sub> =20mA |      | Package<br>Color | Leads<br>with<br>Stand-Offs | Lead<br>Frame<br>Orientation | Package<br>Drawing | Viewing<br>Angle<br>2 $\theta$ 1/2 (Degrees)<br>Typ |       |
|---------------|--------------------------------------------------------------------|-------------------------------------------------------------|------|------------------|-----------------------------|------------------------------|--------------------|-----------------------------------------------------|-------|
|               |                                                                    | Min.                                                        | Typ. |                  |                             |                              |                    | Major                                               | Minor |
| MVL-632UOL    | Red 625                                                            | 150                                                         | 300  | diffuse          | No                          | Parallel                     | A                  | 110                                                 | 60    |
| MVL-632UOL-S  |                                                                    |                                                             |      |                  | Yes                         |                              | B                  |                                                     |       |
| MVL-633UOL    |                                                                    | 150                                                         | 300  | Red              | No                          |                              | A                  |                                                     |       |
| MVL-633UOL-S  |                                                                    |                                                             |      |                  | Yes                         |                              | B                  |                                                     |       |
| MVL-634NUOL   |                                                                    | 150                                                         | 300  | Water Clear      | No                          |                              | A                  |                                                     |       |
| MVL-634NUOL-S |                                                                    |                                                             |      |                  | Yes                         |                              | B                  |                                                     |       |
| MVL-634UOL    |                                                                    | 150                                                         | 300  | Water Clear      | No                          |                              | A                  |                                                     |       |
| MVL-634UOL-S  |                                                                    |                                                             |      |                  | Yes                         |                              | B                  |                                                     |       |
| MVL-633SO     | Orange 605                                                         | 150                                                         | 300  | Orange           | No                          |                              | A                  |                                                     |       |
| MVL-633SO-S   |                                                                    |                                                             |      |                  | Yes                         |                              | B                  |                                                     |       |
| MVL-634SO     |                                                                    | 150                                                         | 300  | Water Clear      | No                          |                              | A                  |                                                     |       |
| MVL-634SO-S   |                                                                    |                                                             |      |                  | Yes                         |                              | B                  |                                                     |       |
| MVL-633UYL    | Amber 590                                                          | 170                                                         | 350  | Amber            | No                          |                              | A                  |                                                     |       |
| MVL-633UYL-S  |                                                                    |                                                             |      |                  | Yes                         |                              | B                  |                                                     |       |
| MVL-634UYL    |                                                                    | 170                                                         | 350  | Water Clear      | No                          |                              | A                  |                                                     |       |
| MVL-634UYL-S  |                                                                    |                                                             |      |                  | Yes                         |                              | B                  |                                                     |       |
| MVL-631TUYL   |                                                                    | 400                                                         | 450  | Amber diffuse    | No                          |                              | A                  |                                                     |       |
| MVL-631TUYL-S |                                                                    |                                                             |      |                  | Yes                         |                              | B                  |                                                     |       |
| MVL-632TUYL   |                                                                    | 400                                                         | 450  | diffuse          | No                          |                              | A                  |                                                     |       |
| MVL-632TUYL-S |                                                                    |                                                             |      |                  | Yes                         |                              | B                  |                                                     |       |
| MVL-634UG     | Green 573                                                          | 100                                                         | 150  | Water Clear      | No                          |                              | A                  |                                                     |       |
| MVL-634UG-S   |                                                                    |                                                             |      |                  | Yes                         |                              | B                  |                                                     |       |

### InGaN

#### Device Selection Guide (True Green,Blue)

|              |                |     |     |             |     |          |   |     |    |
|--------------|----------------|-----|-----|-------------|-----|----------|---|-----|----|
| MVL-633HTG   | True Green 525 | 350 | 650 | Green       | No  | Parallel | A | 110 | 60 |
| MVL-633HTG-S |                |     |     |             | Yes |          | B |     |    |
| MVL-634HTG   |                | 350 | 650 | Water Clear | No  |          | A |     |    |
| MVL-634HTG-S |                |     |     |             | Yes |          | B |     |    |
| MVL-633HB    | Blue 470       | 100 | 200 | Blue        | No  |          | A |     |    |
| MVL-633HB-S  |                |     |     |             | Yes |          | B |     |    |
| MVL-634HB    |                | 100 | 200 | Water Clear | No  |          | A |     |    |
| MVL-634HB-S  |                |     |     |             | Yes |          | B |     |    |
| MVL-633UTG   | True Green 525 | 250 | 450 | Green       | No  |          | A |     |    |
| MVL-633UTG-S |                |     |     |             | Yes |          | B |     |    |
| MVL-634UTG   |                | 250 | 450 | Water Clear | No  |          | A |     |    |
| MVL-634UTG-S |                |     |     |             | Yes |          | B |     |    |
| MVL-633UB    | Blue 470       | 70  | 140 | Blue        | No  |          | A |     |    |
| MVL-633UB-S  |                |     |     |             | Yes |          | B |     |    |
| MVL-634UB    |                | 70  | 140 | Water Clear | No  |          | A |     |    |
| MVL-634UB-S  |                |     |     |             | Yes |          | B |     |    |

**MVL-65XXX****AllInGaP****Device Selection Guide (Red, Orange, Amber, Green)**

| Part Number  | Color and<br>Typical<br>Dominant<br>Wavelength<br>$\lambda_d$ (nm) | Luminous<br>Intensity<br>Iv(mcd) at<br>I <sub>F</sub> =20mA |      | Package<br>Color | Leads<br>with<br>Stand-Offs | Lead<br>Frame<br>Orientation | Package<br>Drawing | Viewing<br>Angle<br>2 $\theta$ 1/2 (Degrees) |    |
|--------------|--------------------------------------------------------------------|-------------------------------------------------------------|------|------------------|-----------------------------|------------------------------|--------------------|----------------------------------------------|----|
|              |                                                                    | Min.                                                        | Typ. |                  |                             |                              |                    | Typ                                          |    |
| MVL-653UOL   | Red 625                                                            | 400                                                         | 600  | Red              | No                          | Parallel                     | E                  | 50                                           | 30 |
| MVL-653UOL-S |                                                                    |                                                             |      |                  | Yes                         |                              | F                  |                                              |    |
| MVL-654UOL   |                                                                    | 400                                                         | 600  | Water Clear      | No                          |                              | E                  |                                              |    |
| MVL-654UOL-S |                                                                    |                                                             |      |                  | Yes                         |                              | F                  |                                              |    |
| MVL-653SO    | Orange 605                                                         | 400                                                         | 700  | Orange           | No                          |                              | E                  |                                              |    |
| MVL-653SO-S  |                                                                    |                                                             |      |                  | Yes                         |                              | F                  |                                              |    |
| MVL-654SO    |                                                                    | 400                                                         | 700  | Water Clear      | No                          |                              | E                  |                                              |    |
| MVL-654SO-S  |                                                                    |                                                             |      |                  | Yes                         |                              | F                  |                                              |    |
| MVL-653UYL   | Amber 590                                                          | 500                                                         | 800  | Amber            | No                          |                              | E                  |                                              |    |
| MVL-653UYL-S |                                                                    |                                                             |      |                  | Yes                         |                              | F                  |                                              |    |
| MVL-654UYL   |                                                                    | 500                                                         | 800  | Water Clear      | No                          |                              | E                  |                                              |    |
| MVL-654UYL-S |                                                                    |                                                             |      |                  | Yes                         |                              | F                  |                                              |    |
| MVL-653UG    | Green 573                                                          | 80                                                          | 150  | Green            | No                          |                              | E                  |                                              |    |
| MVL-653UG-S  |                                                                    |                                                             |      |                  | Yes                         |                              | F                  |                                              |    |
| MVL-654UG    |                                                                    | 80                                                          | 150  | Water Clear      | No                          |                              | E                  |                                              |    |
| MVL-654UG-S  |                                                                    |                                                             |      |                  | Yes                         |                              | F                  |                                              |    |

**InGaN****Device Selection Guide (True Green,Blue)**

|              |                |     |      |             |     |          |   |    |    |
|--------------|----------------|-----|------|-------------|-----|----------|---|----|----|
| MVL-653HTG   | True Green 525 | 750 | 1500 | Green       | No  | Parallel | E | 50 | 30 |
| MVL-653HTG-S |                |     |      |             | Yes |          | F |    |    |
| MVL-654HTG   |                | 750 | 1500 | Water Clear | No  |          | E |    |    |
| MVL-654HTG-S |                |     |      |             | Yes |          | F |    |    |
| MVL-653HB    | Blue 470       | 200 | 400  | Blue        | No  |          | E |    |    |
| MVL-653HB-S  |                |     |      |             | Yes |          | F |    |    |
| MVL-654HB    |                | 200 | 400  | Water Clear | No  |          | E |    |    |
| MVL-654HB-S  |                |     |      |             | Yes |          | F |    |    |

**MVL-66XXX****AllInGaP****Device Selection Guide (Red, Orange, Amber)**

| Part Number   | Color and<br>Typical<br>Dominant<br>Wavelength<br>$\lambda_d(\text{nm})$ | Luminous<br>Intensity<br>Iv(mcd) at<br>I <sub>F</sub> =20mA |      | Package<br>Color | Leads<br>with<br>Stand-Offs | Lead<br>Frame<br>Orientation | Package<br>Drawing | Viewing<br>Angle<br>201/2 (Degrees)<br>Typ |       |
|---------------|--------------------------------------------------------------------------|-------------------------------------------------------------|------|------------------|-----------------------------|------------------------------|--------------------|--------------------------------------------|-------|
|               |                                                                          | Min.                                                        | Typ. |                  |                             |                              |                    | Major                                      | Minor |
| MVL-663UOL    | Red 625                                                                  | 200                                                         | 400  | Red              | No                          | Perpendicular                | G                  | 80                                         | 40    |
| MVL-663UOL-S  |                                                                          |                                                             |      |                  | Yes                         |                              | H                  |                                            |       |
| MVL-664UOK    |                                                                          | 150                                                         | 300  | Ultra Red        | No                          |                              | G                  |                                            |       |
| MVL-664UOK-S  |                                                                          |                                                             |      |                  | Yes                         |                              | H                  |                                            |       |
| MVL-664UOL    |                                                                          | 200                                                         | 400  | Water Clear      | No                          |                              | G                  |                                            |       |
| MVL-664UOL-S  |                                                                          |                                                             |      |                  | Yes                         |                              | H                  |                                            |       |
| MVL-663TUOL   |                                                                          | 400                                                         | 800  | Red              | No                          |                              | G                  |                                            |       |
| MVL-663TUOL-S |                                                                          |                                                             |      |                  | Yes                         |                              | H                  |                                            |       |
| MVL-664TUOL   |                                                                          | 400                                                         | 800  | Water Clear      | No                          |                              | G                  |                                            |       |
| MVL-664TUOL-S |                                                                          |                                                             |      |                  | Yes                         |                              | H                  |                                            |       |
| MVL-663SO     | Orange 605                                                               | 250                                                         | 500  | Orange           | No                          |                              | G                  |                                            |       |
| MVL-663SO-S   |                                                                          |                                                             |      |                  | Yes                         |                              | H                  |                                            |       |
| MVL-664SO     |                                                                          | 250                                                         | 500  | Water Clear      | No                          |                              | G                  |                                            |       |
| MVL-664SO-S   |                                                                          |                                                             |      |                  | Yes                         |                              | H                  |                                            |       |
| MVL-663UYL    | Amber 590                                                                | 300                                                         | 600  | Amber            | No                          |                              | G                  |                                            |       |
| MVL-663UYL-S  |                                                                          |                                                             |      |                  | Yes                         |                              | H                  |                                            |       |
| MVL-664UYL    |                                                                          | 300                                                         | 600  | Water Clear      | No                          |                              | G                  |                                            |       |
| MVL-664UYL-S  |                                                                          |                                                             |      |                  | Yes                         |                              | H                  |                                            |       |
| MVL-663TUYL   |                                                                          | 400                                                         | 800  | Amber            | No                          |                              | G                  |                                            |       |
| MVL-663TUYL-S |                                                                          |                                                             |      |                  | Yes                         |                              | H                  |                                            |       |
| MVL-664TUYL   |                                                                          | 400                                                         | 800  | Water Clear      | No                          |                              | G                  |                                            |       |
| MVL-664TUYL-S |                                                                          |                                                             |      |                  | Yes                         |                              | H                  |                                            |       |

**InGaN****Device Selection Guide (True Green,Blue)**

|              |                |     |      |             |     |               |   |    |    |
|--------------|----------------|-----|------|-------------|-----|---------------|---|----|----|
| MVL-663HTG   | True Green 525 | 600 | 1200 | Green       | No  | Perpendicular | G | 80 | 40 |
| MVL-663HTG-S |                |     |      |             | Yes |               | H |    |    |
| MVL-664HTG   |                | 600 | 1200 | Water Clear | No  |               | G |    |    |
| MVL-664HTG-S |                |     |      |             | Yes |               | H |    |    |
| MVL-663MTG   | True Green 525 | 700 | 1300 | Green       | No  |               | G |    |    |
| MVL-663MTG-S |                |     |      |             | Yes |               | H |    |    |
| MVL-664MTG   |                | 700 | 1300 | Water Clear | No  |               | G |    |    |
| MVL-664MTG-S |                |     |      |             | Yes |               | H |    |    |
| MVL-663HB    | Blue 470       | 100 | 250  | Blue        | No  |               | G |    |    |
| MVL-663HB-S  |                |     |      |             | Yes |               | H |    |    |
| MVL-664HB    |                | 100 | 250  | Water Clear | No  |               | G |    |    |
| MVL-664HB-S  |                |     |      |             | Yes |               | H |    |    |
| MVL-663MB    | Blue 470       | 200 | 380  | Blue        | No  |               | G |    |    |
| MVL-663MB-S  |                |     |      |             | Yes |               | H |    |    |
| MVL-664MB    |                | 200 | 380  | Water Clear | No  |               | G |    |    |
| MVL-664MB-S  |                |     |      |             | Yes |               | H |    |    |

**MVL-67XXX****AlInGaP****Device Selection Guide (Red)**

| Part Number   | Color and<br>Typical<br>Dominant<br>Wavelength<br>$\lambda_d(\text{nm})$ | Luminous<br>Intensity<br>Iv(mcd) at<br>I <sub>F</sub> =20mA |      | Package<br>Color | Leads<br>with<br>Stand-Offs | Lead<br>Frame<br>Orientation | Package<br>Drawing | Viewing<br>Angle<br>2 $\theta$ 1/2 (Degrees)<br>Typ |       |
|---------------|--------------------------------------------------------------------------|-------------------------------------------------------------|------|------------------|-----------------------------|------------------------------|--------------------|-----------------------------------------------------|-------|
|               |                                                                          | Min.                                                        | Typ. |                  |                             |                              |                    | Major                                               | Minor |
| MVL-671UOL    | Red 625                                                                  | 250                                                         | 500  | Red diffuse      | No                          | Parallel                     | C                  | 70                                                  | 30    |
| MVL-671UOL-S  |                                                                          |                                                             |      |                  | Yes                         |                              | D                  |                                                     |       |
| MVL-673UOL    |                                                                          | 250                                                         | 500  | Red              | No                          |                              | C                  |                                                     |       |
| MVL-673UOL-S  |                                                                          |                                                             |      |                  | Yes                         |                              | D                  |                                                     |       |
| MVL-674UOL    |                                                                          | 250                                                         | 500  | Water Clear      | No                          |                              | C                  |                                                     |       |
| MVL-674UOL-S  |                                                                          |                                                             |      |                  | Yes                         |                              | D                  |                                                     |       |
| MVL-671TUOL   |                                                                          | 500                                                         | 900  | Red diffuse      | No                          |                              | C                  | 80                                                  | 30    |
| MVL-671TUOL-S |                                                                          |                                                             |      |                  | Yes                         |                              | D                  |                                                     |       |
| MVL-672TUOL   |                                                                          | 500                                                         | 900  | diffuse          | No                          |                              | C                  |                                                     |       |
| MVL-672TUOL-S |                                                                          |                                                             |      |                  | Yes                         |                              | D                  |                                                     |       |
| MVL-673TUOL   |                                                                          | 800                                                         | 1300 | Red              | No                          |                              | C                  |                                                     |       |
| MVL-673TUOL-S |                                                                          |                                                             |      |                  | Yes                         |                              | D                  |                                                     |       |
| MVL-674TUOL   |                                                                          | 800                                                         | 1300 | Water Clear      | No                          |                              | C                  |                                                     |       |
| MVL-674TUOL-S |                                                                          |                                                             |      |                  | Yes                         |                              | D                  |                                                     |       |
| MVL-673UG     | Green 573                                                                | 70                                                          | 150  | Green            | No                          |                              | C                  | 70                                                  | 30    |
| MVL-673UG-S   |                                                                          |                                                             |      |                  | Yes                         |                              | D                  |                                                     |       |
| MVL-674UG     |                                                                          | 70                                                          | 150  | Water Clear      | No                          |                              | C                  |                                                     |       |
| MVL-674UG-S   |                                                                          |                                                             |      |                  | Yes                         |                              | D                  |                                                     |       |

**InGaN****Device Selection Guide (True Green,Blue)**

|              |                |     |      |               |     |          |   |    |    |
|--------------|----------------|-----|------|---------------|-----|----------|---|----|----|
| MVL-671HTG   | True Green 525 | 600 | 1100 | Green diffuse | No  | Parallel | C | 70 | 30 |
| MVL-671HTG-S |                |     |      |               | Yes |          | D |    |    |
| MVL-673HTG   |                | 700 | 1200 | Green         | No  |          | C |    |    |
| MVL-673HTG-S |                |     |      |               | Yes |          | D |    |    |
| MVL-674HTG   |                | 700 | 1200 | Water Clear   | No  |          | C |    |    |
| MVL-674HTG-S |                |     |      |               | Yes |          | D |    |    |
| MVL-671HB    | Blue 470       | 100 | 200  | Blue diffuse  | No  |          | C |    |    |
| MVL-671HB-S  |                |     |      |               | Yes |          | D |    |    |
| MVL-673HB    |                | 100 | 250  | Blue          | No  |          | C |    |    |
| MVL-673HB-S  |                |     |      |               | Yes |          | D |    |    |
| MVL-674HB    |                | 100 | 250  | Water Clear   | No  |          | C |    |    |
| MVL-674HB-S  |                |     |      |               | Yes |          | D |    |    |



**MVL-68XXX****AlInGaP****Device Selection Guide (Red)**

| Part Number  | Color and<br>Typical<br>Dominant<br>Wavelength<br>$\lambda_d$ (nm) | Luminous<br>Intensity<br>Iv(mcd) at<br>I <sub>F</sub> =20mA |      | Package<br>Color | Leads<br>with<br>Stand-Offs | Lead<br>Frame<br>Orientation | Package<br>Drawing | Viewing<br>Angle<br>2 $\theta$ 1/2 (Degrees)<br>Typ |       |
|--------------|--------------------------------------------------------------------|-------------------------------------------------------------|------|------------------|-----------------------------|------------------------------|--------------------|-----------------------------------------------------|-------|
|              |                                                                    | Min.                                                        | Typ. |                  |                             |                              |                    | Major                                               | Minor |
| MVL-681UOL   | Red 625                                                            | 300                                                         | 600  | Red diffuse      | No                          | Parallel                     | I                  | 60                                                  | 30    |
| MVL-681UOL-S |                                                                    |                                                             |      |                  | Yes                         |                              | J                  |                                                     |       |
| MVL-682UOL   |                                                                    | 300                                                         | 600  | diffuse          | No                          |                              | I                  |                                                     |       |
| MVL-682UOL-S |                                                                    |                                                             |      |                  | Yes                         |                              | J                  |                                                     |       |
| MVL-683UOL   |                                                                    | 400                                                         | 800  | Red              | No                          |                              | I                  |                                                     |       |
| MVL-683UOL-S |                                                                    |                                                             |      |                  | Yes                         |                              | J                  |                                                     |       |
| MVL-684UOL   |                                                                    | 400                                                         | 800  | Water Clear      | No                          |                              | I                  |                                                     |       |
| MVL-684UOL-S |                                                                    |                                                             |      |                  | Yes                         |                              | J                  |                                                     |       |

**InGaN****Device Selection Guide (True Green,Blue)**

|              |                |     |      |               |     |          |   |    |    |
|--------------|----------------|-----|------|---------------|-----|----------|---|----|----|
| MVL-681HTG   | True Green 525 | 600 | 1200 | Green diffuse | No  | Parallel | I | 60 | 30 |
| MVL-681HTG-S |                |     |      |               | Yes |          | J |    |    |
| MVL-682HTG   |                | 600 | 1200 | diffuse       | No  |          | I |    |    |
| MVL-682HTG-S |                |     |      |               | Yes |          | J |    |    |
| MVL-683HTG   |                | 650 | 1300 | Green         | No  |          | I |    |    |
| MVL-683HTG-S |                |     |      |               | Yes |          | J |    |    |
| MVL-684HTG   |                | 650 | 1300 | Water Clear   | No  |          | I |    |    |
| MVL-684HTG-S |                |     |      |               | Yes |          | J |    |    |
| MVL-681HB    | Blue 470       | 100 | 200  | Blue diffuse  | No  |          | I |    |    |
| MVL-681HB-S  |                |     |      |               | Yes |          | J |    |    |
| MVL-682HB    |                | 100 | 200  | diffuse       | No  |          | I |    |    |
| MVL-682HB-S  |                |     |      |               | Yes |          | J |    |    |
| MVL-683HB    |                | 150 | 300  | Blue          | No  |          | I |    |    |
| MVL-683HB-S  |                |     |      |               | Yes |          | J |    |    |
| MVL-684HB    |                | 150 | 300  | Water Clear   | No  |          | I |    |    |
| MVL-684HB-S  |                |     |      |               | Yes |          | J |    |    |

**MVL-69XXX****AlInGaP****Device Selection Guide (Red)**

| Part Number   | Color and<br>Typical<br>Dominant<br>Wavelength<br>$\lambda_d$ (nm) | Luminous<br>Intensity<br>I <sub>v</sub> (mcd) at<br>I <sub>F</sub> =20mA |      | Package<br>Color | Leads<br>with<br>Stand-Offs | Lead<br>Frame<br>Orientation | Package<br>Drawing | Viewing<br>Angle<br>2 $\theta$ 1/2 (Degrees) |       |
|---------------|--------------------------------------------------------------------|--------------------------------------------------------------------------|------|------------------|-----------------------------|------------------------------|--------------------|----------------------------------------------|-------|
|               |                                                                    | Min.                                                                     | Typ. |                  |                             |                              |                    | Major                                        | Minor |
| MVL-693TUOL   | Red 625                                                            | 1000                                                                     | 2000 | Red              | No                          | Perpendicular                | K                  | 50                                           | 25    |
| MVL-693TUOL-S |                                                                    |                                                                          |      |                  | Yes                         |                              | L                  |                                              |       |
| MVL-694TUOL   |                                                                    | 1000                                                                     | 2000 | Water Clear      | No                          |                              | K                  |                                              |       |
| MVL-694TUOL-S |                                                                    |                                                                          |      |                  | Yes                         |                              | L                  |                                              |       |
| MVL-693TUYL   | Amber 590                                                          | 1000                                                                     | 2000 | Amber            | No                          |                              | K                  | 50                                           | 25    |
| MVL-693TUYL-S |                                                                    |                                                                          |      |                  | Yes                         |                              | L                  |                                              |       |
| MVL-694TUYL   |                                                                    | 1000                                                                     | 2000 | Water Clear      | No                          |                              | K                  |                                              |       |
| MVL-694TUYL-S |                                                                    |                                                                          |      |                  | Yes                         |                              | L                  |                                              |       |

## Electrical/Optical Characteristics at T<sub>A</sub>=25°C

| Parameter                              | Symbol                          | Min. | Typ.    | Max. | Units   | Test Conditions                                                                    |
|----------------------------------------|---------------------------------|------|---------|------|---------|------------------------------------------------------------------------------------|
| <b>Typical Viewing Angle</b>           |                                 |      |         |      |         |                                                                                    |
| Major/Minor                            |                                 |      |         |      |         |                                                                                    |
| MVL-63XXX                              | 2θ <sub>1/2</sub>               |      | 110/60  |      | Degrees | I <sub>F</sub> = 20mA                                                              |
| MVL-65XXX                              |                                 |      | 50/30   |      |         |                                                                                    |
| MVL-66XXX                              |                                 |      | 80/40   |      |         |                                                                                    |
| MVL-67XXX                              |                                 |      | 70/30   |      |         |                                                                                    |
| MVL-68XXX                              |                                 |      | 60/30   |      |         |                                                                                    |
| MVL-69XXX                              |                                 |      | 50/25   |      |         |                                                                                    |
| <b>Peak/Dominant Wavelength</b>        |                                 |      |         |      |         |                                                                                    |
| MVL-6XXUOK(-S)                         | λ <sub>p</sub> / λ <sub>d</sub> |      | 637/632 |      | nm      | Peak and Dominant of Wavelength of Spectral Distribution at I <sub>F</sub> = 20 mA |
| MVL-6XXNUOL(-S)                        |                                 |      | 630/625 |      |         |                                                                                    |
| MVL-6XXUOL(-S)                         |                                 |      | 630/625 |      |         |                                                                                    |
| MVL-6XXTUOL(-S)                        |                                 |      | 630/625 |      |         |                                                                                    |
| MVL-6XXSO(-S)                          |                                 |      | 610/605 |      |         |                                                                                    |
| MVL-6XXUYL(-S)                         |                                 |      | 592/590 |      |         |                                                                                    |
| MVL-6XXTUYL(-S)                        |                                 |      | 592/590 |      |         |                                                                                    |
| MVL-6XXUG(-S)                          |                                 |      | 575/573 |      |         |                                                                                    |
| MVL-6XXUTG(-S)                         |                                 |      | 523/525 |      |         |                                                                                    |
| MVL-6XXHTG(-S)                         |                                 |      | 523/525 |      |         |                                                                                    |
| MVL-6XXUB(-S)                          |                                 |      | 468/470 |      |         |                                                                                    |
| MVL-6XXHB(-S)                          |                                 |      | 468/470 |      |         |                                                                                    |
| <b>Spectral Halfwidth</b>              |                                 |      |         |      |         |                                                                                    |
| Ultra Red (λ <sub>d</sub> = 632 nm)    | Δλ <sub>1/2</sub>               |      | 22      |      | nm      | Wavelength Width at Spectral Distribution 1/2 Power Point at I <sub>F</sub> = 20mA |
| Red (λ <sub>d</sub> = 625 nm)          |                                 |      | 17      |      |         |                                                                                    |
| Orange (λ <sub>d</sub> = 605 nm)       |                                 |      | 13      |      |         |                                                                                    |
| Amber (λ <sub>d</sub> = 590 nm)        |                                 |      | 17      |      |         |                                                                                    |
| Yellow Green (λ <sub>d</sub> = 573 nm) |                                 |      | 20      |      |         |                                                                                    |
| Ture Green (λ <sub>d</sub> = 525 nm)   |                                 |      | 40      |      |         |                                                                                    |
| Blue (λ <sub>d</sub> = 470 nm)         |                                 |      | 26      |      |         |                                                                                    |
| <b>Forward Voltage</b>                 |                                 |      |         |      |         |                                                                                    |
| AlInGaP                                | V <sub>F</sub>                  | 1.6  | 2.1     | 2.6  | V       | I <sub>F</sub> = 20mA                                                              |
| InGaN                                  |                                 | 2.8  | 3.5     | 4.2  |         |                                                                                    |
| <b>Reverse Current</b>                 |                                 |      |         |      |         |                                                                                    |
| AlInGaP                                | I <sub>R</sub>                  |      |         | 100  | μA      | V <sub>R</sub> = 5V                                                                |
| InGaN "HTG" "HB"                       |                                 |      |         | 100  |         |                                                                                    |
| "UTG" "UB"                             |                                 |      |         | 10   |         |                                                                                    |

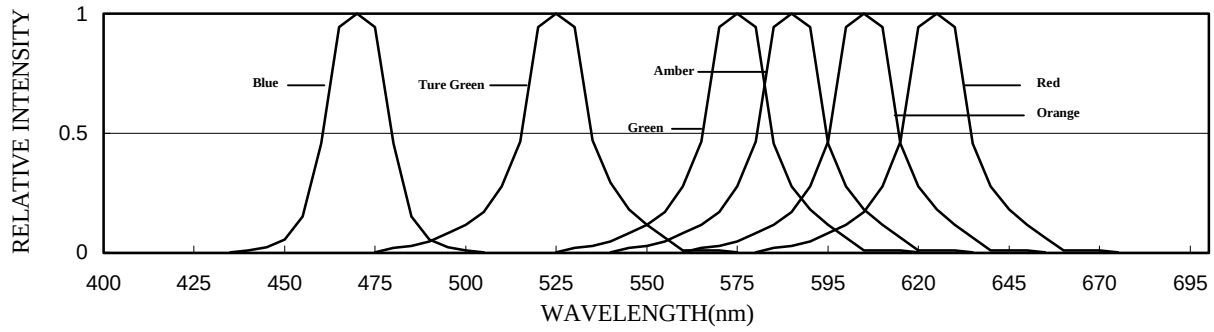


Figure 1.RELATIVE INTENSITY

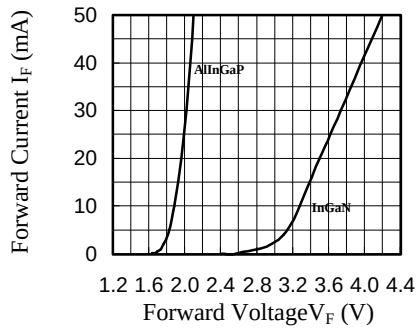


FIG.2 FORWARD CURRENT VS. FORWARD VOLTAGE

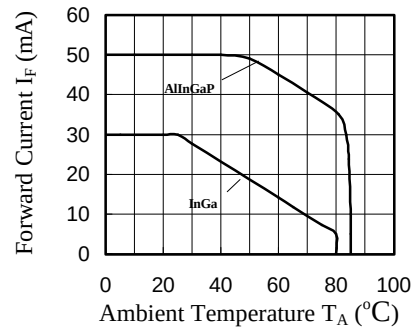


FIG.3 FORWARD CURRENT VS. AMBIENT TEMPERATURE

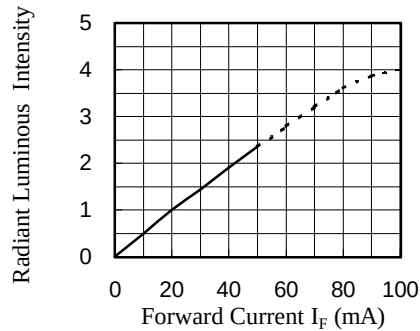


FIG.4 RELATIVE LUMINOUS INTENSITY VS. FORWARD CURRENT

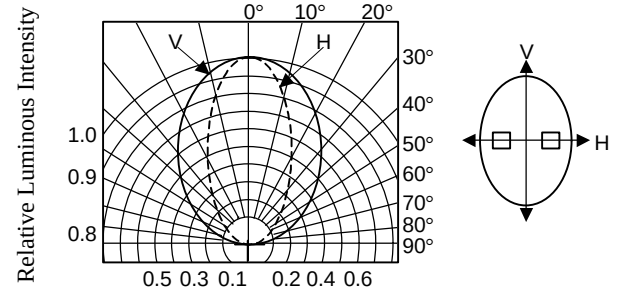


FIG.5 SPATIAL RADIATION PATTERN 80 X 40 DEGREE LAMPS

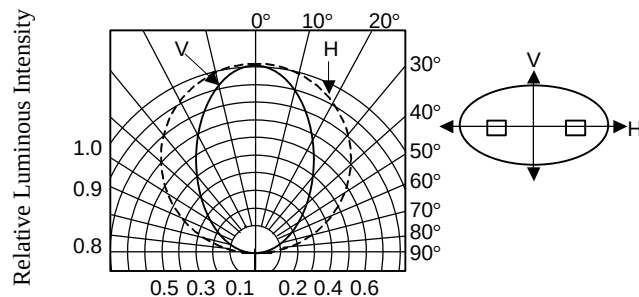


FIG.6 SPATIAL RADIATION PATTERN 110 X 60 DEGREE LAMPS

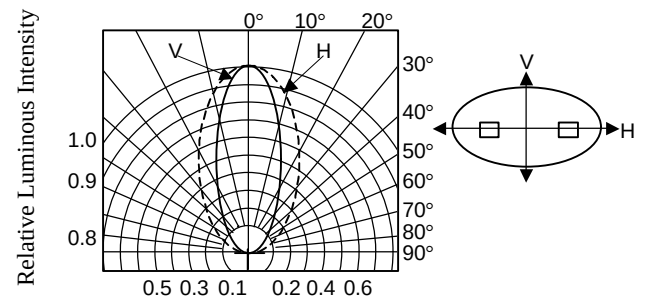


FIG.7 SPATIAL RADIATION PATTERN 50 X 30 DEGREE LAMPS

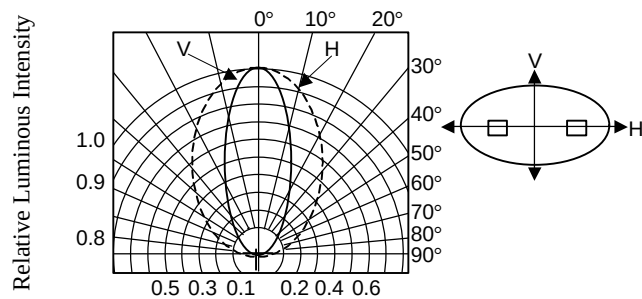


FIG.8 SPATIAL RADIATION PATTERN  
70 X 30 DEGREE LAMPS

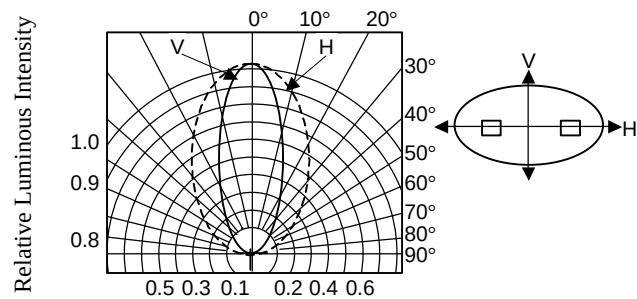


FIG.9 SPATIAL RADIATION PATTERN  
60 X 30 DEGREE LAMPS

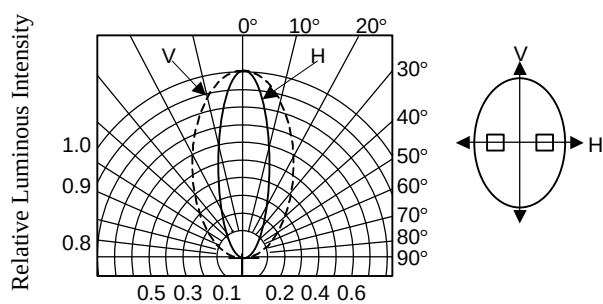


FIG.10 SPATIAL RADIATION PATTERN  
50 X 25 DEGREE LAMPS

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## Unity Oval LEDs Bin Table

| Luminous Intensity |                                             |      |
|--------------------|---------------------------------------------|------|
| BIN RANGE          | I <sub>V</sub> (mcd) @ I <sub>F</sub> =20mA |      |
|                    | MIN                                         | MAX  |
| J                  | 41                                          | 70   |
| K                  | 58                                          | 100  |
| L                  | 81                                          | 141  |
| M                  | 115                                         | 199  |
| N                  | 163                                         | 282  |
| O                  | 230                                         | 398  |
| P                  | 326                                         | 563  |
| Q                  | 461                                         | 796  |
| R                  | 652                                         | 1126 |
| S                  | 922                                         | 1593 |
| T                  | 1303                                        | 2253 |
| U                  | 1843                                        | 3185 |

## Unity OVAL LED Bin Codes

| Category code |          |          |
|---------------|----------|----------|
| <b>R</b>      | <b>2</b> | <b>2</b> |

| Luminous Intensity @I <sub>F</sub> =20mA UNIT:mcd |     |     |          |     |      |          |       |       |
|---------------------------------------------------|-----|-----|----------|-----|------|----------|-------|-------|
| code                                              | MIN | MAX | code     | MIN | MAX  | code     | MIN   | MAX   |
| <b>A</b>                                          | 2   | 3   | <b>J</b> | 41  | 70   | <b>S</b> | 922   | 1593  |
| <b>B</b>                                          | 3   | 4   | <b>K</b> | 58  | 100  | <b>T</b> | 1303  | 2253  |
| <b>C</b>                                          | 4   | 6   | <b>L</b> | 81  | 141  | <b>U</b> | 1843  | 3185  |
| <b>D</b>                                          | 5   | 9   | <b>M</b> | 115 | 199  | <b>V</b> | 2606  | 4506  |
| <b>E</b>                                          | 7   | 12  | <b>N</b> | 163 | 282  | <b>W</b> | 3686  | 6371  |
| <b>F</b>                                          | 10  | 18  | <b>O</b> | 230 | 398  | <b>X</b> | 5213  | 9011  |
| <b>G</b>                                          | 14  | 25  | <b>P</b> | 326 | 563  | <b>Y</b> | 7373  | 12742 |
| <b>H</b>                                          | 20  | 35  | <b>Q</b> | 461 | 796  | <b>Z</b> | 10425 | 18002 |
| <b>I</b>                                          | 29  | 50  | <b>R</b> | 652 | 1126 |          |       |       |

| Dominant wavelength (Second code) @I <sub>F</sub> =20mA UNIT:nm |                  |     |     |     |     |     |     |     |     |     |
|-----------------------------------------------------------------|------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Material                                                        | BIN CODE         |     | 1   |     | 2   |     | 3   |     | 4   |     |
|                                                                 | Wavelength(typ.) |     | MIN | MAX | MIN | MAX | MIN | MAX | MIN | MAX |
| AlInGaP                                                         | UOL              | 625 | 619 | 624 | 622 | 628 | 626 | 631 |     |     |
|                                                                 | SOL              | 615 | 609 | 614 | 612 | 618 | 616 | 621 |     |     |
|                                                                 | SO               | 605 | 599 | 604 | 602 | 608 | 606 | 611 |     |     |
|                                                                 | UYL              | 590 | 584 | 589 | 587 | 591 | 589 | 593 | 591 | 596 |
|                                                                 | UG               | 572 | 568 | 573 | 571 | 576 | 574 | 579 |     |     |
| InGaN                                                           | TG               | 525 | 519 | 524 | 522 | 528 | 526 | 532 | 530 | 536 |
|                                                                 | SG               | 505 | 499 | 504 | 502 | 508 | 506 | 511 |     |     |
|                                                                 | BG               | 490 | 484 | 489 | 487 | 493 | 491 | 496 |     |     |
|                                                                 | B                | 470 | 464 | 469 | 467 | 473 | 471 | 476 |     |     |

| Forward Voltage @I <sub>F</sub> =20mA UNIT:Voltage |         |      |       |      |
|----------------------------------------------------|---------|------|-------|------|
|                                                    | AlInGaP |      | InGaN |      |
| VF                                                 | MIN     | MAX  | MIN   | MAX  |
| <b>1</b>                                           | 1.35    | 1.65 | 2.55  | 2.85 |
| <b>2</b>                                           | 1.55    | 1.85 | 2.75  | 3.05 |
| <b>3</b>                                           | 1.75    | 2.05 | 2.95  | 3.25 |
| <b>4</b>                                           | 1.95    | 2.25 | 3.15  | 3.45 |
| <b>5</b>                                           | 2.15    | 2.45 | 3.34  | 3.65 |
| <b>6</b>                                           | 2.35    | 2.65 | 3.55  | 3.85 |
| <b>7</b>                                           | 2.55    | 2.85 | 3.75  | 4.05 |
| <b>8</b>                                           |         |      | 3.95  | 4.25 |

## Unity OVAL LED Bin Codes

| Category code |          |          |
|---------------|----------|----------|
| <b>R</b>      | <b>D</b> | <b>2</b> |

| Luminous Intensity @I <sub>F</sub> =20mA UNIT:mcd |     |     |          |     |      |          |       |       |
|---------------------------------------------------|-----|-----|----------|-----|------|----------|-------|-------|
| code                                              | MIN | MAX | code     | MIN | MAX  | code     | MIN   | MAX   |
| <b>A</b>                                          | 2   | 3   | <b>J</b> | 41  | 70   | <b>S</b> | 922   | 1593  |
| <b>B</b>                                          | 3   | 4   | <b>K</b> | 58  | 100  | <b>T</b> | 1303  | 2253  |
| <b>C</b>                                          | 4   | 6   | <b>L</b> | 81  | 141  | <b>U</b> | 1843  | 3185  |
| <b>D</b>                                          | 5   | 9   | <b>M</b> | 115 | 199  | <b>V</b> | 2606  | 4506  |
| <b>E</b>                                          | 7   | 12  | <b>N</b> | 163 | 282  | <b>W</b> | 3686  | 6371  |
| <b>F</b>                                          | 10  | 18  | <b>O</b> | 230 | 398  | <b>X</b> | 5213  | 9011  |
| <b>G</b>                                          | 14  | 25  | <b>P</b> | 326 | 563  | <b>Y</b> | 7373  | 12742 |
| <b>H</b>                                          | 20  | 35  | <b>Q</b> | 461 | 796  | <b>Z</b> | 10425 | 18002 |
| <b>I</b>                                          | 29  | 50  | <b>R</b> | 652 | 1126 |          |       |       |

### Color Ranks

Blue

|   | Rank A |       |       |       |  |
|---|--------|-------|-------|-------|--|
| x | 0.151  | 0.127 | 0.151 | 0.171 |  |
| y | 0.013  | 0.037 | 0.068 | 0.040 |  |

|   | Rank B |       |       |       |  |
|---|--------|-------|-------|-------|--|
| x | 0.137  | 0.114 | 0.142 | 0.161 |  |
| y | 0.027  | 0.058 | 0.091 | 0.058 |  |

|   | Rank C |       |       |       |  |
|---|--------|-------|-------|-------|--|
| x | 0.122  | 0.100 | 0.135 | 0.152 |  |
| y | 0.048  | 0.087 | 0.122 | 0.081 |  |

|   | Rank D |       |       |       |  |
|---|--------|-------|-------|-------|--|
| x | 0.105  | 0.081 | 0.130 | 0.137 |  |
| y | 0.077  | 0.133 | 0.171 | 0.112 |  |

Green

|   | Rank E |       |       |       |  |
|---|--------|-------|-------|-------|--|
| x | 0.144  | 0.059 | 0.131 | 0.203 |  |
| y | 0.560  | 0.665 | 0.745 | 0.625 |  |

|   | Rank F |       |       |       |  |
|---|--------|-------|-------|-------|--|
| x | 0.178  | 0.111 | 0.168 | 0.227 |  |
| y | 0.610  | 0.730 | 0.755 | 0.630 |  |

|   | Rank G |       |       |       |  |
|---|--------|-------|-------|-------|--|
| x | 0.202  | 0.143 | 0.216 | 0.252 |  |
| y | 0.620  | 0.750 | 0.755 | 0.630 |  |

|   | Rank H |       |       |       |  |
|---|--------|-------|-------|-------|--|
| x | 0.230  | 0.186 | 0.279 | 0.296 |  |
| y | 0.628  | 0.760 | 0.734 | 0.619 |  |

Red

|   | Rank I |       |       |       |  |
|---|--------|-------|-------|-------|--|
| x | 0.663  | 0.630 | 0.685 | 0.721 |  |
| y | 0.292  | 0.331 | 0.328 | 0.287 |  |

|   | Rank J |       |       |       |  |
|---|--------|-------|-------|-------|--|
| x | 0.675  | 0.648 | 0.706 | 0.734 |  |
| y | 0.280  | 0.312 | 0.307 | 0.274 |  |

| Forward Voltage @I <sub>F</sub> =20mA UNIT:Voltage |         |      |       |      |
|----------------------------------------------------|---------|------|-------|------|
|                                                    | AlInGaP |      | InGaN |      |
| VF                                                 | MIN     | MAX  | MIN   | MAX  |
| <b>1</b>                                           | 1.35    | 1.65 | 2.55  | 2.85 |
| <b>2</b>                                           | 1.55    | 1.85 | 2.75  | 3.05 |
| <b>3</b>                                           | 1.75    | 2.05 | 2.95  | 3.25 |
| <b>4</b>                                           | 1.95    | 2.25 | 3.15  | 3.45 |
| <b>5</b>                                           | 2.15    | 2.45 | 3.35  | 3.65 |
| <b>6</b>                                           | 2.35    | 2.65 | 3.55  | 3.85 |
| <b>7</b>                                           | 2.55    | 2.85 | 3.75  | 4.05 |
| <b>8</b>                                           |         |      | 3.95  | 4.25 |