

OVAL PRECISION OPTICAL PERFORMANCE LED LAMPs

Technical Data

12/25/2001

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 :
 - 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

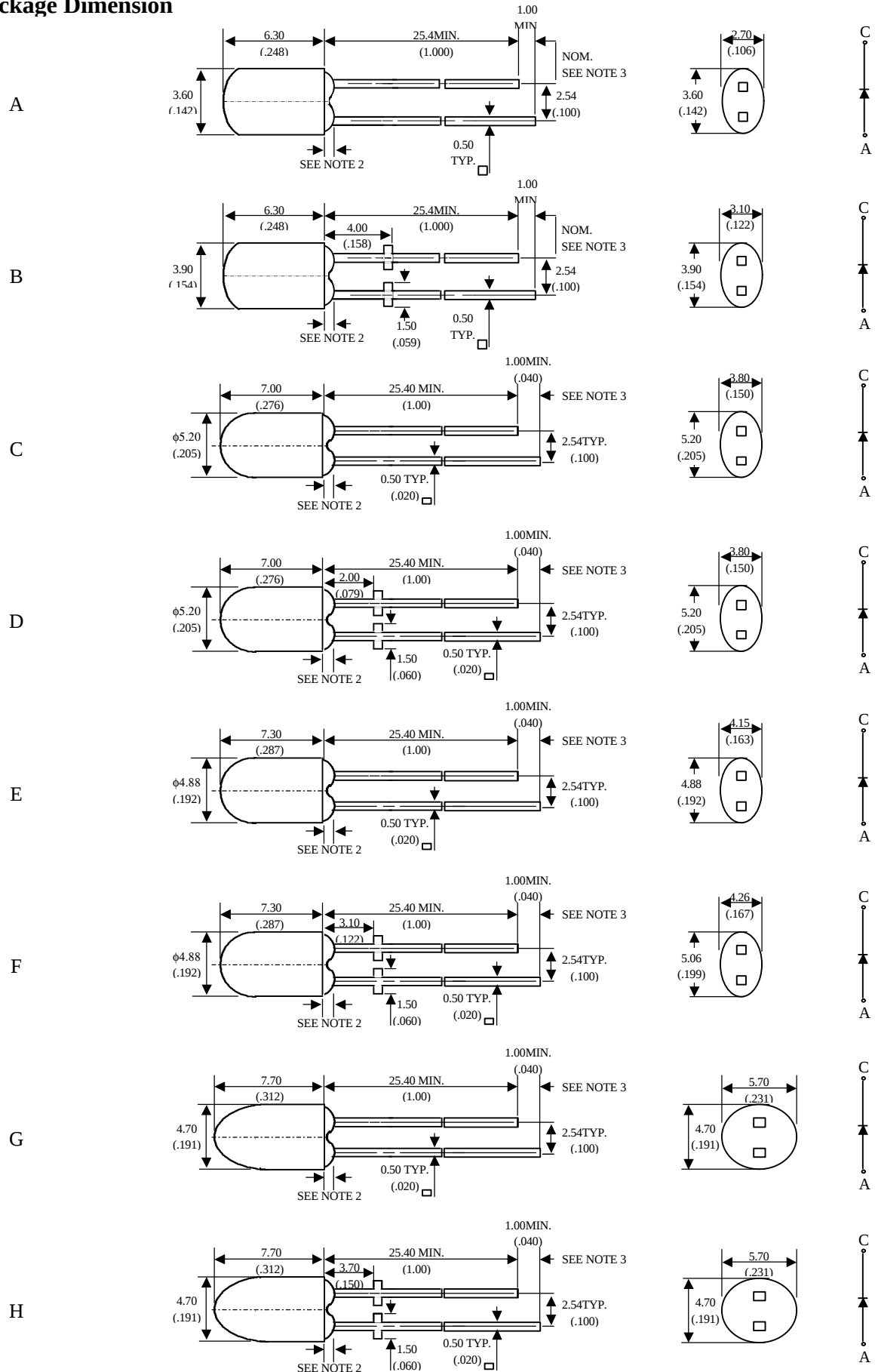
Benefits

- 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 ± 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 3.90 mm)

"5" = Parallel Leadframe (4.88 X 5.06 mm)

"6" = Perpendicular Leadframe (4.70 X 5.70 mm)

"7" = Parallel Leadframe (3.80 X 5.20 mm)

where C = Color Option

"UOL" = 625 nm Red

"SO" = 605 nm Orange

"UYL" = 590 nm Amber

"UG" = 573 nm Green

"HTG / UTG" = 525 nm True Green

"HB / UB" = 470 nm Blue

where B = Package Color

"3" = Matching Color

"4" = Water Clear

where D = Standoff Option

"N/A" = Without

"-S" = With Stopper

Absolute Maximum Ratings at $T_A=25^{\circ}\text{C}$

Parameter	AlInGaP	InGaN "HTG" "HB"	InGaN "UTG" "UB"	Units
DC Forward Current	50	30	30	mA
Power Dissipation	105	125	125	mW
Peak Forward Current(1/10 Duty Cycle 100 μs pulse width)	100	100	100	mA
Reverse Voltage ($I_R=100\mu\text{A}$)	5	5	5	V
Operating Temp Range	-20 to + 85	-20 to + 80	-20 to + 80	$^{\circ}\text{C}$
Storage Temp	-40 to + 100	-30 to + 100	-30 to + 100	$^{\circ}\text{C}$
Electrostatic Discharge Threshold	N/A	300 ^{NOTE1}	1000	V
Solder Temperature	260 $^{\circ}\text{C}$ for 5 seconds [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)**

Part Number	Color and Typical Dominant Wavelength λ_d (nm)	Luminous Intensity Iv(mcd) at I _F =20mA		Package Color	Leads with Stand-Offs	Lead Frame Orientation	Package Drawing	Viewing Angle 2 θ 1/2 (Degrees)	
		Min.	Typ.					Typ Major	Minor
MVL-633UOL	Red 625	150	300	Red	No	Parallel	A	110	60
MVL-633UOL-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		

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

AlInGaP

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

Part Number	Color and Typical Dominant Wavelength $\lambda_d(\text{nm})$	Luminous Intensity Iv(mcd) at I _F =20mA		Package Color	Leads with Stand-Offs	Lead Frame Orientation	Package Drawing	Viewing Angle 2 θ 1/2 (Degrees)	
		Min.	Typ.					Typ Major	Minor
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 Typical Dominant Wavelength λ_d (nm)	Luminous Intensity Iv(mcd) at I _F =20mA		Package Color	Leads with Stand-Offs	Lead Frame Orientation	Package Drawing	Viewing Angle 2 θ 1/2 (Degrees)	
		Min.	Typ.					Typ Major	Minor
MVL-663UOL	Red 625	200	400	Red	No	Perpendicular	G	80	40
MVL-663UOL-S					Yes		H		
MVL-664UOL		200	400	Water Clear	No		G		
MVL-664UOL-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		

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

Part Number	Color and Typical Dominant Wavelength λ_d (nm)	Luminous Intensity I _v (mcd) at I _F =20mA		Package Color	Leads with Stand-Offs	Lead Frame Orientation	Package Drawing	Viewing Angle 2 θ 1/2 (Degrees)	
		Min.	Typ.					Typ Major	Minor
MVL-671UOL	Red 625	250	500	Reddiffuse	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		

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

MVL-671HTG	True Green 525	600	1100	Greendiffuse	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	Bluediffuse	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		

Electrical/Optical Characteristics at T_A=25°C

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

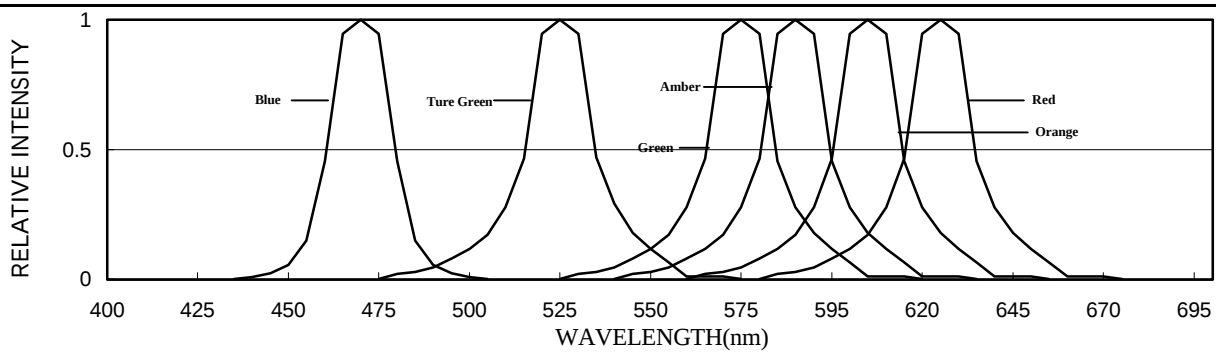


Figure 1. RELATIVE INTENSITY

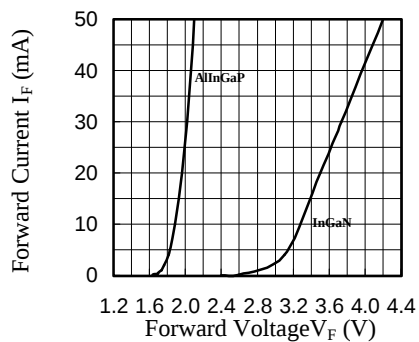


FIG.2 FORWARD CURRENT VS. FORWARD VOLTAGE

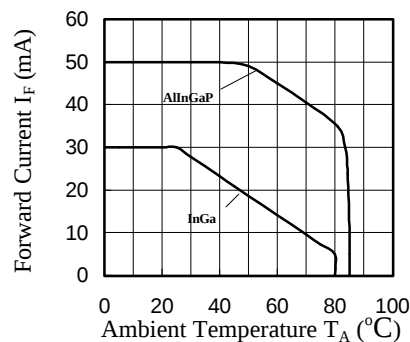


FIG.3 FORWARD CURRENT VS. AMBIENT TEMPERATURE

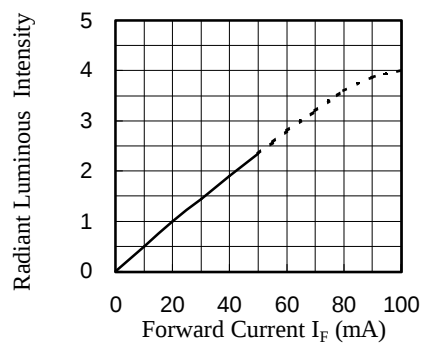


FIG.4 RELATIVE LUMINOUS INTENSITY VS. FORWARD CURRENT

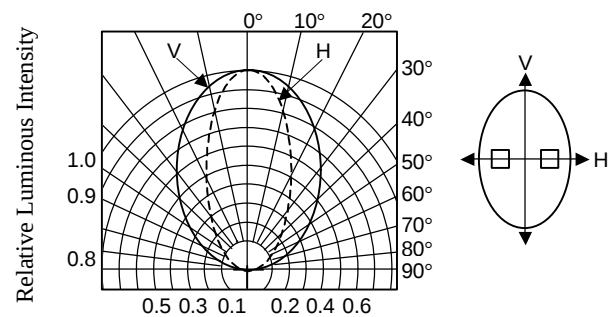


FIG.7 SPATIAL RADIATION PATTERN 80 X 40 DEGREE LAMPS

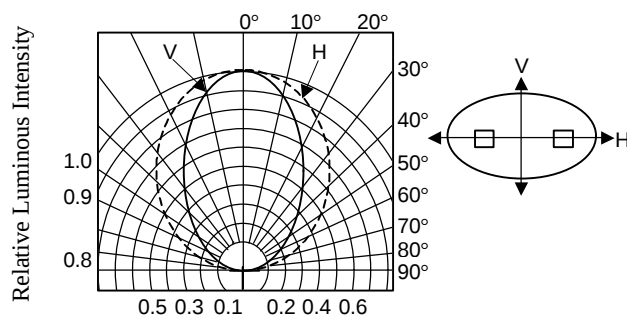


FIG.6 SPATIAL RADIATION PATTERN 100 X 60 DEGREE LAMPS

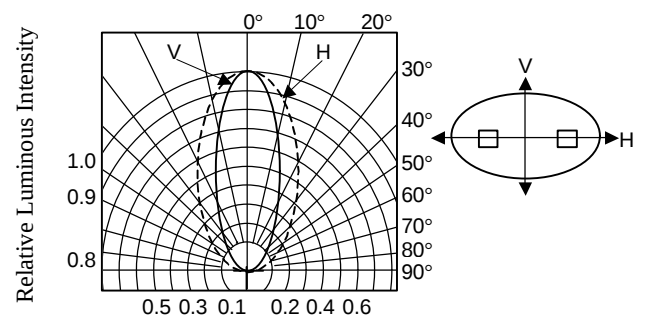


FIG.5 SPATIAL RADIATION PATTERN 50 X 30 DEGREE LAMPS

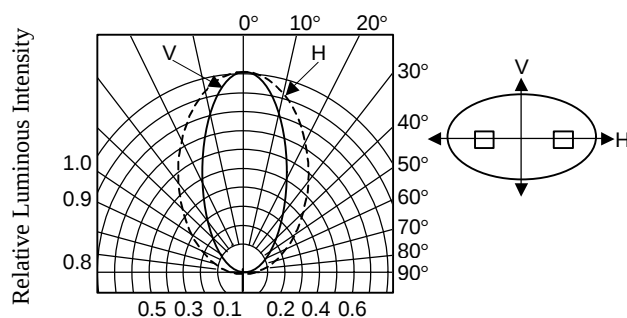


FIG.5 SPATIAL RADIATION PATTERN 70 X 40 DEGREE LAMPS

Unity Oval LEDs Bin Table

Luminous Intensity		
BIN RANGE	I _V (mcd) @ I _F =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		
R	2	2

Luminous Intensity @I _F =20mA UNIT:mcd								
code	MIN	MAX	code	MIN	MAX	code	MIN	MAX
A	0	0	0	0	0	0	0	0
B	0	0	0	0	0	0	0	0
C	0	0	0	0	0	0	0	0
D	0	0	0	0	0	0	0	0
E	0	0	0	0	0	0	0	0
F	0	0	0	0	0	0	0	0
G	0	0	0	0	0	0	0	0
H	0	0	0	0	0	0	0	0
I	0	0	0	0	0			

Dominant wavelength (Second code) @I _F =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 _F =20mA UNIT:Voltage				
	AlInGaP		InGaN	
VF	MIN	MAX	MIN	MAX
1	-0.05	0.05	-0.05	0.05
2	-0.05	0.05	-0.05	0.05
3	-0.05	0.05	-0.05	0.05
4	-0.05	0.05	-0.05	0.05
5	-0.05	0.05	-0.05	0.05
6	-0.05	0.05	-0.05	0.05
7	-0.05	0.05	-0.05	0.05
8			-0.05	0.05

Unity OVAL LED Bin Codes

Category code		
R	D	2

Luminous Intensity @I _F =20mA UNIT:mcd								
code	MIN	MAX	code	MIN	MAX	code	MIN	MAX
A	0	0	0	0	0	0	0	0
B	0	0	0	0	0	0	0	0
C	0	0	0	0	0	0	0	0
D	0	0	0	0	0	0	0	0
E	0	0	0	0	0	0	0	0
F	0	0	0	0	0	0	0	0
G	0	0	0	0	0	0	0	0
H	0	0	0	0	0	0	0	0
I	0	0	0	0	0			

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 _F =20mA UNIT:Voltage				
	AlInGaP		InGaN	
VF	MIN	MAX	MIN	MAX
1	-0.05	0.05	-0.05	0.05
2	-0.05	0.05	-0.05	0.05
3	-0.05	0.05	-0.05	0.05
4	-0.05	0.05	-0.05	0.05
5	-0.05	0.05	-0.05	0.05
6	-0.05	0.05	-0.05	0.05
7	-0.05	0.05	-0.05	0.05
8			-0.05	0.05