

# Kingbright

## Optoelectronic Components



**Technical Data** **121**

**Bin Code Systems** **133**

Absolute maximum ratings (T <sub>A</sub> =25°C)		E,I Hi.Eff.Red Orange	H Bright Red	SR Super Bright Red	SURK Hyper Red	SUR-E Hyper Red	SUR-G Hyper Red	N Pure Orange	SEK Super Bright Orange	Unit
		(GaAsP/GaP)	(GaP)	(GaAlAs)	(AlGaInP)	(AlGaInP)	(AlGaInP)	(AlGaInP)	(GaAsP/GaP)	(AlGaInP)
Reverse voltage	V <sub>R</sub>	●	●	●	●	●	●	●	●	V
Forward current	I <sub>F</sub>	5	5	5	5	5	5	5	5	mA
Forward current (Peak) 1/10 Duty Cycle, 0.1ms Pulse Width	I <sub>FS</sub>	30	25	30	30	30	30	25	30	mA
Power dissipation	P <sub>D</sub>	160	130	155	185	200	150	145	195	mW
<b>LED LAMPS:</b>										
Operating temperature	T <sub>A</sub>	75	62.5	75	75	75	75	62.5	75	°C
Storage temperature	T <sub>STG</sub>	-40~+85	-40~+85	-40~+85	-40~+85	-40~+85	-40~+85	-40~+85	-40~+85	°C
<b>LED DISPLAYS:</b>										
Operating temperature	T <sub>A</sub>	-40~+85	-40~+85	-40~+85	-40~+85	-40~+85	-40~+85	-40~+85	-40~+85	°C
Storage temperature	T <sub>STG</sub>	-40~+85	-40~+85	-40~+85	-40~+85	-40~+85	-40~+85	-40~+85	-40~+85	°C

Operating Characteristics		E,I Hi.Eff.Red Orange	H Bright Red	SR Super Bright Red	SURK Hyper Red	SUR-E Hyper Red	SUR-G Hyper Red	N Pure Orange	SEK Super Bright Orange	Unit
		(GaAsP/GaP)	(GaP)	(GaAlAs)	(AlGaInP)	(AlGaInP)	(AlGaInP)	(AlGaInP)	(GaAsP/GaP)	(AlGaInP)
Forward voltage (typ.) I <sub>F</sub> =20mA	V <sub>F</sub>	●	●	●	●	●	●	●	●	V
I <sub>F</sub> =10mA		2.0	2.25	1.85	1.95	1.9	1.9	2.05	2.1	
I <sub>F</sub> =2mA		1.9	2.05	1.8	1.85	1.8	1.85	1.95	2.0	
Forward voltage (max.) I <sub>F</sub> =20mA, 10mA, 2mA	V <sub>F</sub>	1.7	1.85	1.65	1.75	1.7	1.75	1.85	1.85	V
Reverse current V <sub>R</sub> =5V	I <sub>R</sub>	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	uA
Peak Emission Wavelength I <sub>F</sub> =20mA, 10mA, 2mA	λ <sub>p</sub>	10	10	10	10	10	10	10	10	nm
Dominant Wavelength I <sub>F</sub> =20mA, 10mA, 2mA	λ <sub>D</sub>	627	700	660	650	640	640	607	610	nm
Spectral line half-width I <sub>F</sub> =20mA, 10mA, 2mA	Δλ <sub>1/2</sub>	625	660	640	630	630	630	610	601	nm
Capacitance V <sub>F</sub> =0V, f=1MHZ	C	45	45	20	28	25	22	35	29	pF

Absolute maximum ratings (T <sub>A</sub> =25°C)		SE-E Hyper Red	SE-H Hyper Red	G,SG Green, Super Bright Green	PG Pure Green	CGK Green	MGK Mega Green	MG Mega Green	ZG Green	Unit
		(AlGaInP)	(AlGaInP)	(GaP)	(GaP)	(AlGaInP)	(AlGaInP)	(AlGaInP)	(InGaN)	
Reverse voltage	V <sub>R</sub>	5	5	5	5	5	5	5	5	V
Forward current	I <sub>F</sub>	30	30	25	25	30	30	30	25	mA
Forward current (Peak) 1/10 Duty Cycle, 0.1ms Pulse Width	I <sub>FS</sub>	195	150	140	135	150	150	150	150	mA
Power dissipation	P <sub>D</sub>	75	84	62.5	62.5	75	75	75	102.5	mW
<b>LED LAMPS:</b>										
Operating temperature	T <sub>A</sub>	-40~+85	-40~+85	-40~+85	-40~+85	-40~+85	-40~+85	-40~+85	-40~+85	°C
Storage temperature	T <sub>STG</sub>	-40~+85	-40~+85	-40~+85	-40~+85	-40~+85	-40~+85	-40~+85	-40~+85	°C
<b>LED DISPLAYS:</b>										
Operating temperature	T <sub>A</sub>	-40~+85	-40~+85	-40~+85	-40~+85	-40~+85	-40~+85	-40~+85	-40~+85	°C
Storage temperature	T <sub>STG</sub>	-40~+85	-40~+85	-40~+85	-40~+85	-40~+85	-40~+85	-40~+85	-40~+85	°C

Operating Characteristics		SE-E Hyper Red	SE-H Hyper Red	G,SG Green, Super Bright Green	PG Pure Green	CGK Green	MGK Mega Green	MG Mega Green	ZG Green	Unit
		(AlGaInP)	(AlGaInP)	(GaP)	(GaP)	(AlGaInP)	(AlGaInP)	(AlGaInP)	(InGaN)	
Forward voltage (typ.) I <sub>F</sub> =20mA	V <sub>F</sub>	2.0	2.2	2.2	2.25	2.1	2.1	2.1	3.3	V
I <sub>F</sub> =10mA		1.9	2.05	2.0	2.1	2.0	2.0	2.0	3.0	
I <sub>F</sub> =2mA		1.8	1.85	1.9	1.9	1.9	1.9	1.9	2.65	
Forward voltage (max.) I <sub>F</sub> =20mA, 10mA, 2mA	V <sub>F</sub>	2.5	2.8	2.5	2.5	2.5	2.5	2.5	4.1	V
Reverse current V <sub>R</sub> =5V	I <sub>R</sub>	10	10	10	10	10	10	10	50	µA
Peak Emission Wavelength I <sub>F</sub> =20mA, 10mA, 2mA	λ <sub>p</sub>	630	640	565	555	574	574	574	515	nm
Dominant Wavelength I <sub>F</sub> =20mA, 10mA, 2mA	λ <sub>D</sub>	621	630	568	555	570	570	570	525	nm
Spectral line half-width I <sub>F</sub> =20mA, 10mA, 2mA	Δλ <sub>1/2</sub>	20	25	30	30	20	20	26	30	nm
Capacitance V <sub>F</sub> =0V, f=1MHZ	C	25	27	15	45	15	15	20	45	pF

Absolute maximum ratings (T <sub>A</sub> =25°C)		ZG-E Green (InGaN)	ZG-G Green (InGaN)	Y Yellow (GaAsP/GaP)	SYK Super Bright Yellow (AlGaInP)	SY-H Super Bright Yellow (AlGaInP)	QB-D Blue (InGaN)	QB-F Blue (InGaN)	QB-G Blue (InGaN)	Unit
Reverse voltage	V <sub>R</sub>	5	5	5	5	5	5	5	5	V
Forward current	I <sub>F</sub>	30	30	30	30	30	30	30	30	mA
Forward current (Peak) 1/10 Duty Cycle, 0.1ms Pulse Width	I <sub>FS</sub>	100	100	140	175	140	150	150	150	mA
Power dissipation	P <sub>D</sub>	120	120	75	75	84	120	120	120	mW
<b>LED LAMPS:</b>										
Operating temperature	T <sub>A</sub>	-40~+85	-40~+85	-40~+85	-40~+85	-40~+85	-40~+85	-40~+85	-40~+85	°C
Storage temperature	T <sub>STG</sub>	-40~+85	-40~+85	-40~+85	-40~+85	-40~+85	-40~+85	-40~+85	-40~+85	°C
<b>LED DISPLAYS:</b>										
Operating temperature	T <sub>A</sub>	-40~+85	-40~+85	-40~+85	-40~+85	-40~+85	-40~+85	-40~+85	-40~+85	°C
Storage temperature	T <sub>STG</sub>	-40~+85	-40~+85	-40~+85	-40~+85	-40~+85	-40~+85	-40~+85	-40~+85	°C

Operating Characteristics		ZG-E Green (InGaN)	ZG-G Green (InGaN)	Y Yellow (GaAsP/GaP)	SYK Super Bright Yellow (AlGaInP)	SY-H Super Bright Yellow (AlGaInP)	QB-D Blue (InGaN)	QB-F Blue (InGaN)	QB-G Blue (InGaN)	Unit
Forward voltage (typ.) I <sub>F</sub> =20mA	V <sub>F</sub>	3.2	3.2	2.1	2.0	2.3	3.3	3.3	3.3	V
I <sub>F</sub> =10mA		3.05	3.05	1.95	1.95	2.2	3.0	3.0	3.0	
I <sub>F</sub> =2mA		2.8	2.8	1.85	1.85	2.0	2.65	2.65	2.65	
Forward voltage (max.) I <sub>F</sub> =20mA, 10mA, 2mA	V <sub>F</sub>	4.0	4.0	2.5	2.5	2.8	4.0	4.0	4.0	V
Reverse current V <sub>R</sub> =5V	I <sub>R</sub>	50	50	10	10	10	50	50	50	uA
Peak Emission Wavelength I <sub>F</sub> =20mA, 10mA, 2mA	λ <sub>p</sub>	520	520	590	590	590	468	461	461	nm
Dominant Wavelength I <sub>F</sub> =20mA, 10mA, 2mA	λ <sub>D</sub>	525	525	588	590	589	470	465	465	nm
Spectral line half-width I <sub>F</sub> =20mA, 10mA, 2mA	Δλ <sub>1/2</sub>	35	35	35	20	20	25	25	25	nm
Capacitance V <sub>F</sub> =0V, f=1MHZ	C	100	100	20	20	45	100	100	100	pF

# Kingbright TECHNICAL DATA 5V/12V/14V WITH INTERNAL RESISTANCE

Absolute maximum ratings ( $T_A=25^{\circ}\text{C}$ )		E,I Hi.Eff.Red (GaAsP/GaP)	SR Super Bright Red (GaAlAs)	G,SG Green, Super Bright Green (GaP)	Y Yellow (GaAsP/GaP)	Unit
Reverse voltage	$V_R$	5	5	5	5	V
Forward voltage (Max.) for 5V	$V_F$	6	6	6	6	V
Forward voltage (Max.) for 12V	$V_F$	14	14	14	14	V
Forward voltage (Max.) for 14V	$V_F$	16	16	16	16	V
Power dissipation for 5V	$P_D$	85	85	85	85	mW
Power dissipation for 12V	$P_D$	120	120	120	120	mW
Power dissipation for 14V	$P_D$	160	160	160	160	mW
<b>LED LAMPS:</b>						
Operating temperature	$T_A$	-40~+70	-40~+70	-40~+70	-40~+70	$^{\circ}\text{C}$
Storage temperature	$T_{STG}$	-40~+85	-40~+85	-40~+85	-40~+85	$^{\circ}\text{C}$
<b>LED DISPLAYS:</b>						
Operating temperature	$T_A$	-40~+70	-40~+70	-40~+70	-40~+70	$^{\circ}\text{C}$
Storage temperature	$T_{STG}$	-40~+85	-40~+85	-40~+85	-40~+85	$^{\circ}\text{C}$

Operating Characteristics		E,I Hi.Eff.Red (GaAsP/GaP)	SR Super Bright Red (GaAlAs)	G,SG Green, Super Bright Green (GaP)	Y Yellow (GaAsP/GaP)	Unit
Forward current (typ.) $V_F=5V$	$I_F$	13	13	11.5	13	mA
Forward current (typ.) $V_F=12V$	$I_F$	8.5	8.5	8.5	8.5	mA
Forward current (typ.) $V_F=14V$	$I_F$	10.5	10.5	10.5	10.5	mA
Forward current (max.) $V_F=5V$	$I_F$	17.5	17.5	17.5	17.5	mA
Forward current (max.) $V_F=12V$	$I_F$	11.5	11.5	11.5	11.5	mA
Forward current (max.) $V_F=14V$	$I_F$	13.5	13.5	13.5	13.5	mA
Reverse current $V_R=5V$	$I_R$	10	10	10	10	$\mu\text{A}$
Peak Emission Wavelength $V_F=5V,12V,14V$	$\lambda_p$	627	660	565	590	nm
Dominant Wavelength $V_F=5V,12V,14V$	$\lambda_D$	625	640	568	588	nm
Spectral line half-width $V_F=5V,12V,14V$	$\Delta\lambda_{1/2}$	45	20	30	35	nm

Absolute maximum ratings (T <sub>A</sub> =25°C)		E,I Hi.Eff.Red (GaAsP/GaP)	H Bright Red (GaP)	SR Super Bright Red (GaAlAs)	G,SG Green, Super Bright Green (GaP)	Y Yellow (GaAsP/GaP)	Unit
Reverse voltage	V <sub>R</sub>	0.5	0.5	0.5	0.5	0.5	V
Forward voltage (max.)	V <sub>F</sub>	14	14	14	14	14	V
Total Power dissipation	P <sub>D</sub>	310	310	310	310	310	mW
Operating temperature	T <sub>A</sub>	-40~+70	-40~+70	-40~+70	-40~+70	-40~+70	°C
Storage temperature	T <sub>STG</sub>	-40~+85	-40~+85	-40~+85	-40~+85	-40~+85	°C

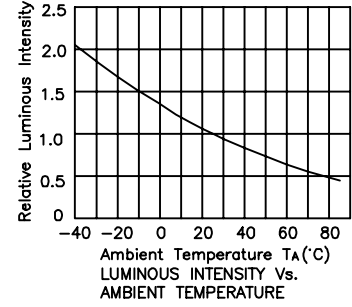
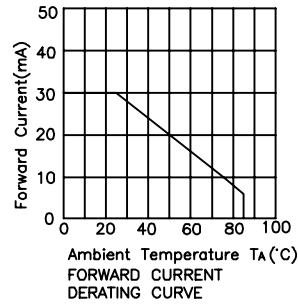
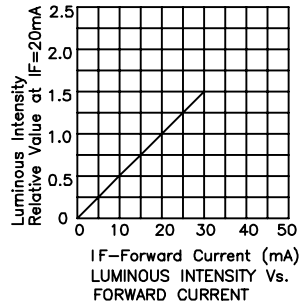
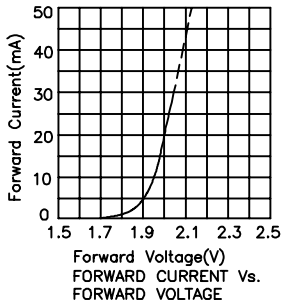
Operating Characteristics		E,I Hi.Eff.Red (GaAsP/GaP)	H Bright Red (GaP)	SR Super Bright Red (GaAlAs)	G,SG Green, Super Bright Green (GaP)	Y Yellow (GaAsP/GaP)	Unit
Forward current (min.) V <sub>F</sub> =3.5V	I <sub>F</sub>	8	8	8	8	8	mA
Forward current (typ.) V <sub>F</sub> =5V	I <sub>F</sub>	22	22	22	22	22	mA
Supply current V <sub>F</sub> =3.5V ~ 14V	I <sub>SON</sub>	8 ~ 44	8 ~ 44	8 ~ 44	8 ~ 44	8 ~ 44	mA
Blink frequency V <sub>F</sub> =3.5V ~ 14V	f	3 ~ 1.5	3 ~ 1.5	3 ~ 1.5	3 ~ 1.5	3 ~ 1.5	Hz
Peak Emission Wavelength	λ <sub>p</sub>	627	700	660	565	590	nm
Dominant Wavelength	λ <sub>D</sub>	625	660	640	568	588	nm
Spectral line half-width	Δλ <sub>1/2</sub>	45	45	20	30	35	nm

Absolute maximum ratings ( $T_A=25^{\circ}\text{C}$ )		F3 (GaAs)	SF4 (GaAlAs)	SF6 (GaAlAs)	SF7 (GaAlAs)	Unit
Reverse voltage	$V_R$	5	5	5	5	V
Forward current	$I_F$	50	50	50	50	mA
Forward current (Peak) 1/100 Duty Cycle, 10 $\mu\text{s}$ Pulse Width	$i_{FS}$	1.2	1.2	1	1	A
Power dissipation	$P_D$	80	80	80	80	mW
<b>LED LAMPS:</b>						
Operating temperature	$T_A$	-40~+85	-40~+85	-40~+85	-40~+85	$^{\circ}\text{C}$
Storage temperature	$T_{STG}$	-40~+85	-40~+85	-40~+85	-40~+85	$^{\circ}\text{C}$
<b>LED DISPLAYS:</b>						
Operating temperature	$T_A$	-40~+85	-40~+85	-40~+85	-40~+85	$^{\circ}\text{C}$
Storage temperature	$T_{STG}$	-40~+85	-40~+85	-40~+85	-40~+85	$^{\circ}\text{C}$

Operating Characteristics		F3 (GaAs)	SF4 (GaAlAs)	SF6 (GaAlAs)	SF7 (GaAlAs)	Unit
Forward voltage (typ.) $I_F=20\text{mA}$	$V_F$	1.2	1.3	1.35	1.4	V
Forward voltage (max.) $I_F=20\text{mA}$	$V_F$	1.6	1.6	1.6	1.6	V
Reverse current $V_R=5\text{V}$	$I_R$	10	10	10	10	$\mu\text{A}$
Peak Emission Wavelength $I_F=20\text{mA}$	$\lambda_p$	940	880	860	850	nm
Spectral line half-width $I_F=20\text{mA}$	$\Delta\lambda_{1/2}$	50	50	50	50	nm
Capacitance $V_F=0\text{V}, f=1\text{MHZ}$	$C$	90	90	30	30	pF

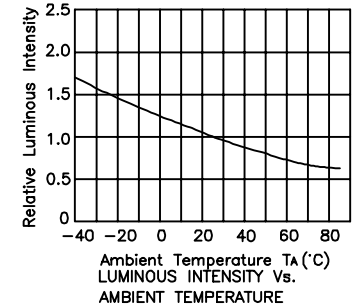
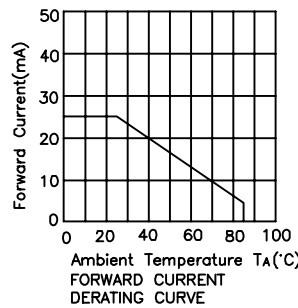
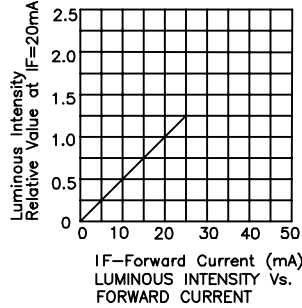
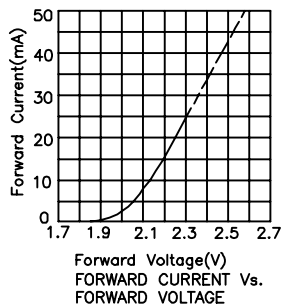
High Efficiency Red, Orange

E,I : GaAsP/GaP



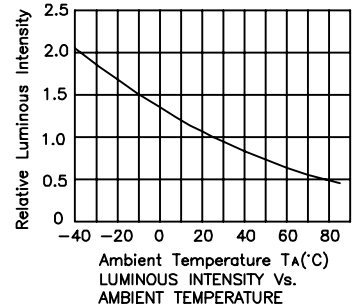
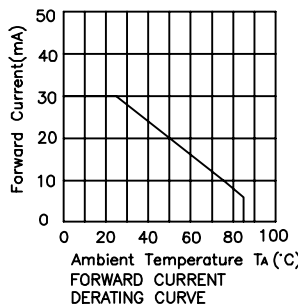
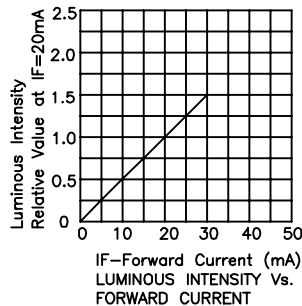
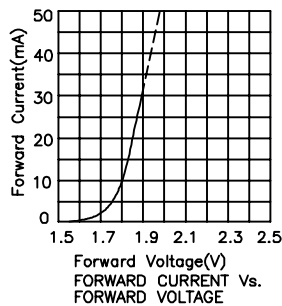
Bright Red

H : GaP



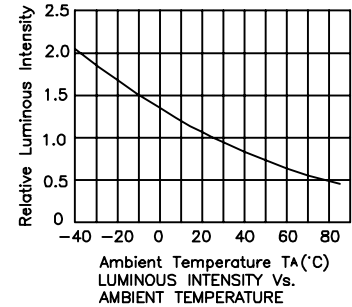
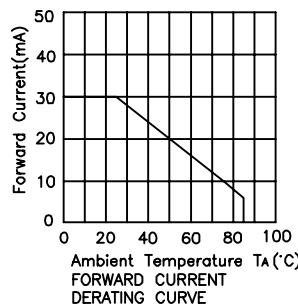
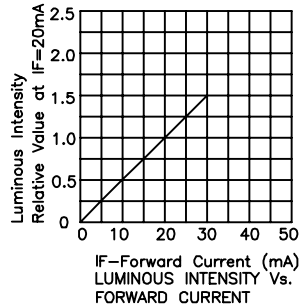
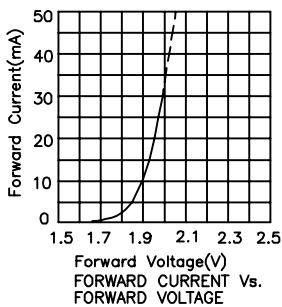
Super Bright Red

SR : GaAlAs



Hyper Red

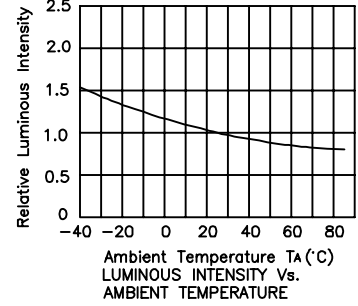
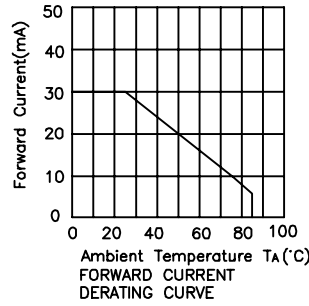
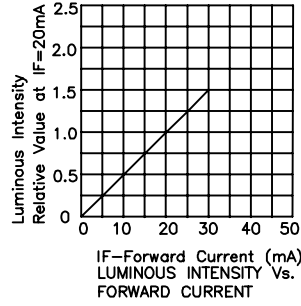
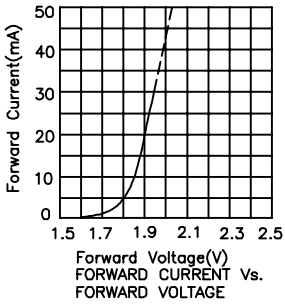
SURK : AlGaInP





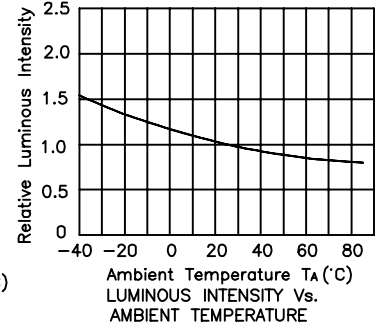
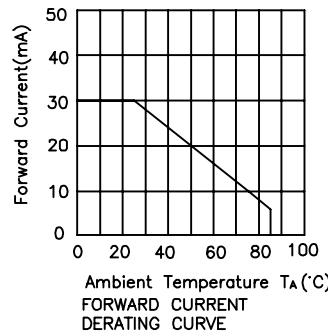
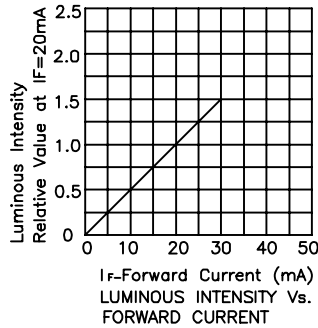
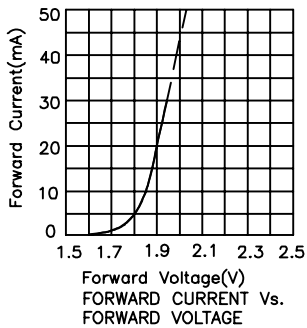
Hyper Red

SUR-E : AlGaInP



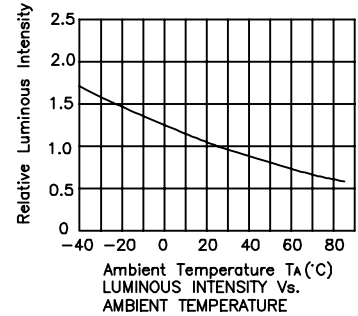
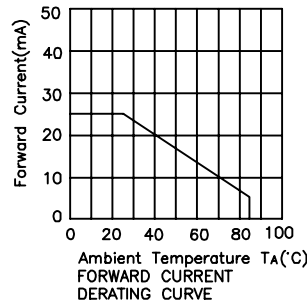
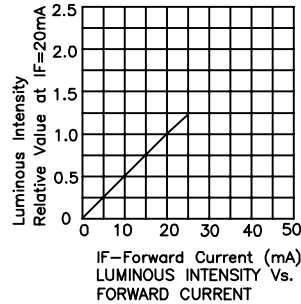
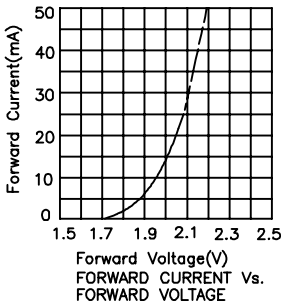
Hyper Red

SUR-G : AlGaInP



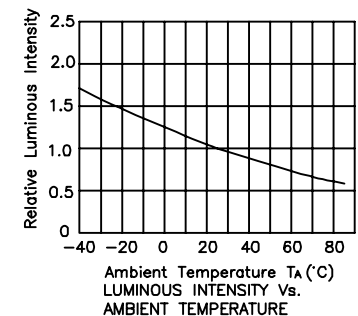
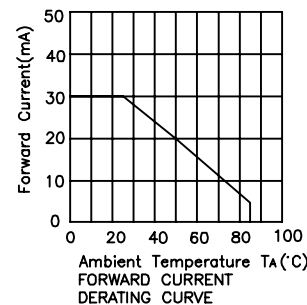
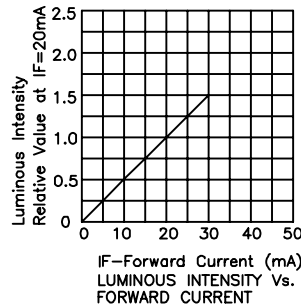
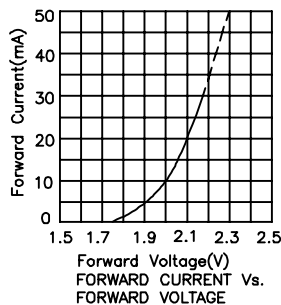
Pure Orange

N : GaAsP/GaP



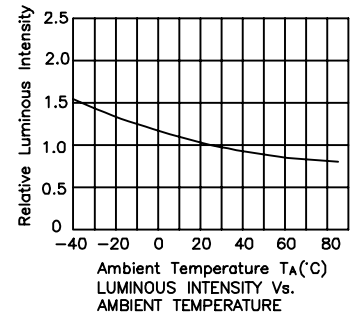
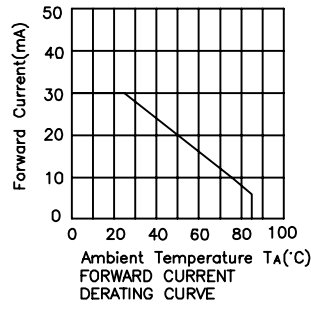
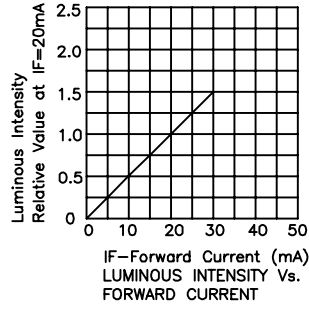
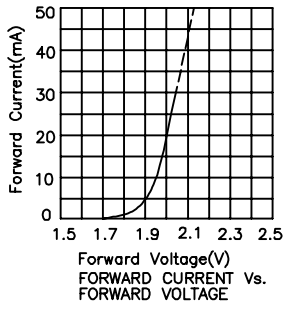
Super Bright Orange

SEK : AlGaInP



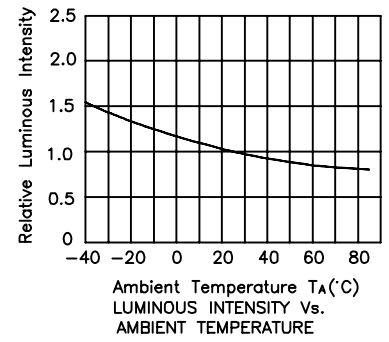
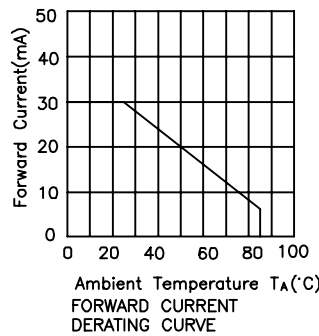
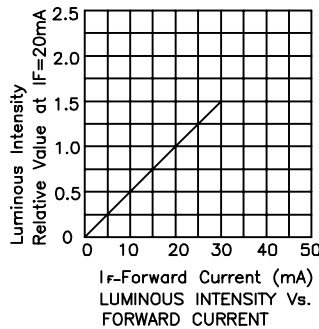
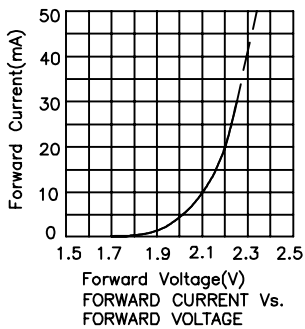
Hyper Red

SE-E : AlGaInP



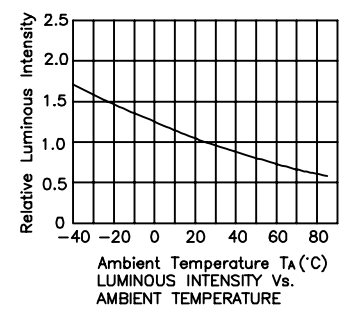
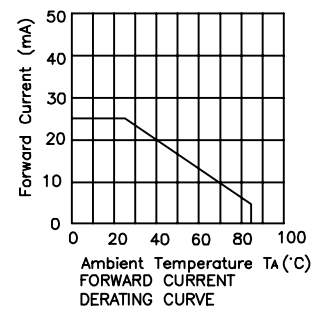
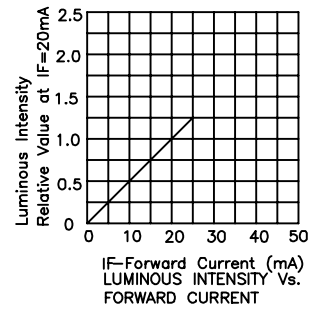
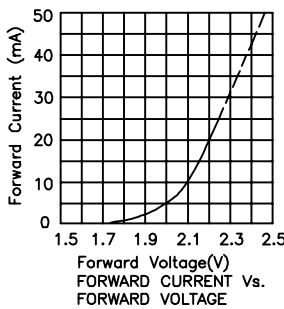
Hyper Red

SE-H : AlGaInP



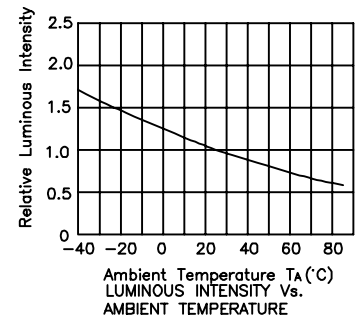
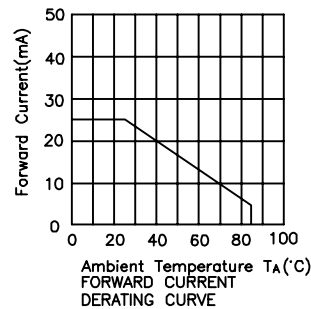
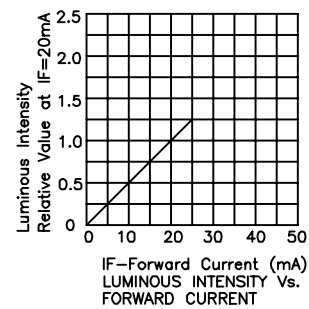
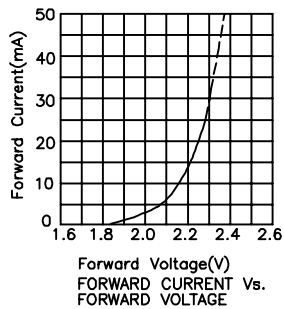
Green, Super Bright Green

G,SG : GaP



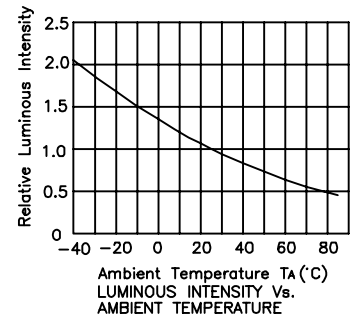
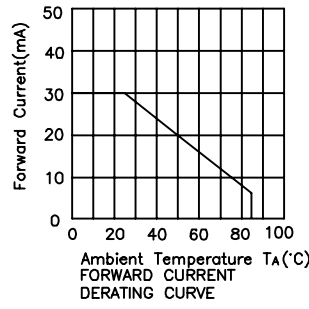
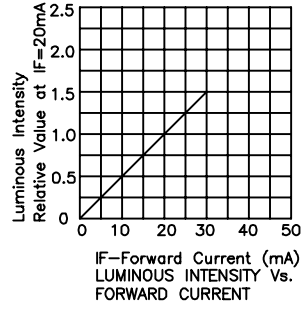
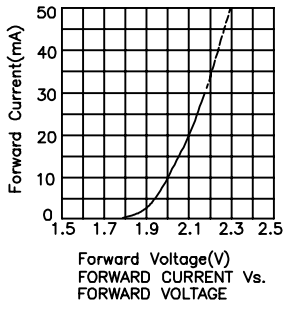
Pure Green

PG : GaP



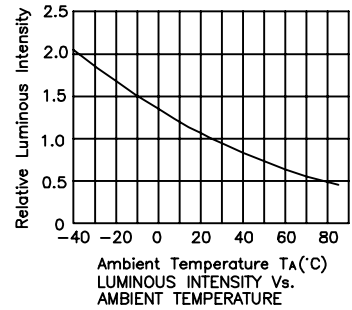
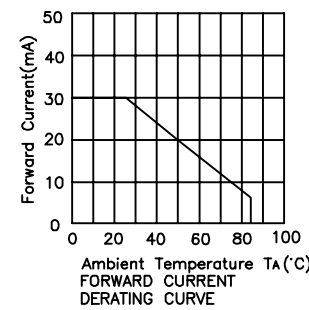
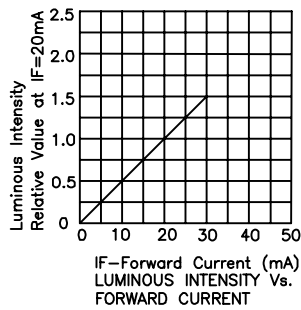
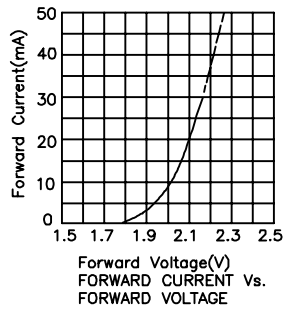
Green

CGK : AlGaInP



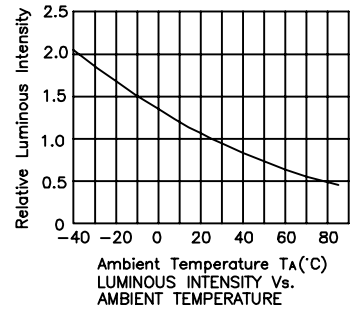
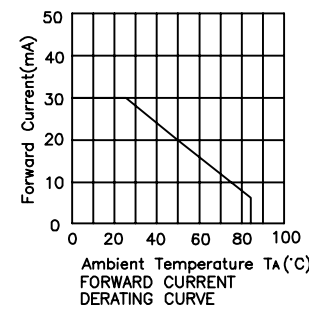
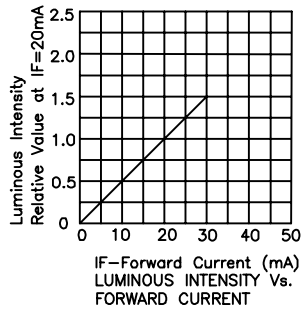
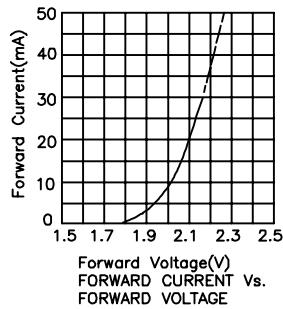
Mega Green

MGK : AlGaInP



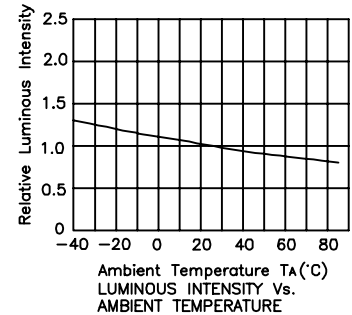
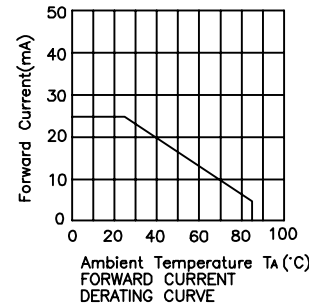
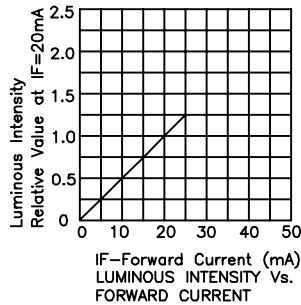
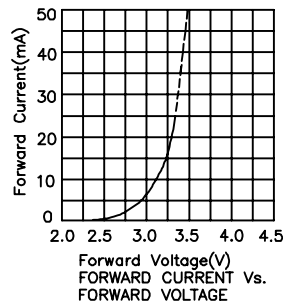
Mega Green

MG : AlGaInP



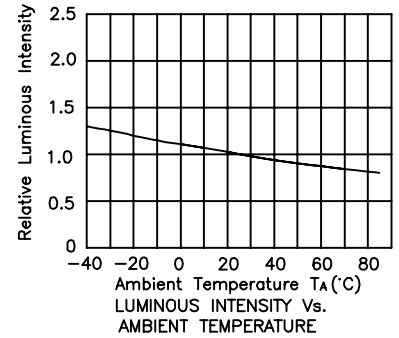
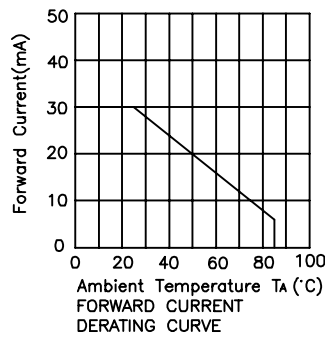
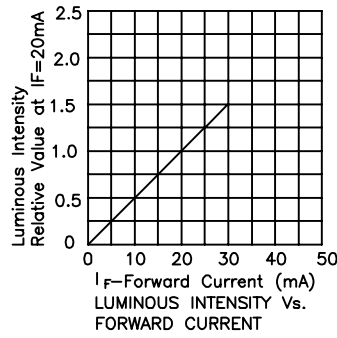
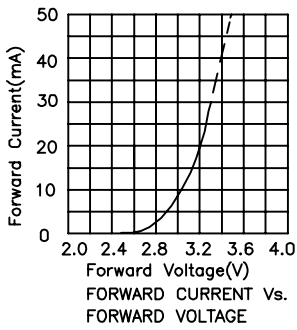
Green

ZG : InGaN



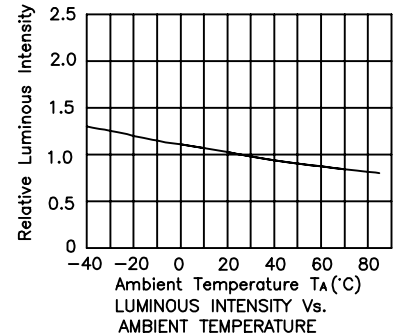
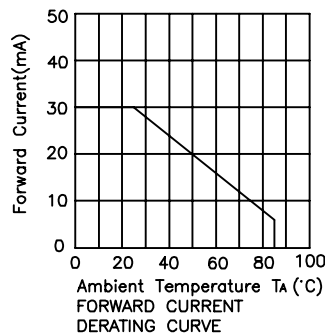
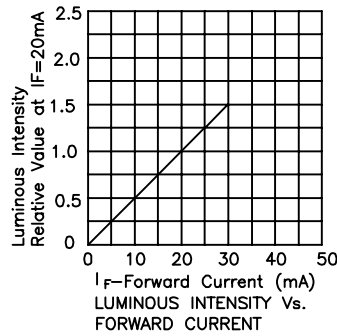
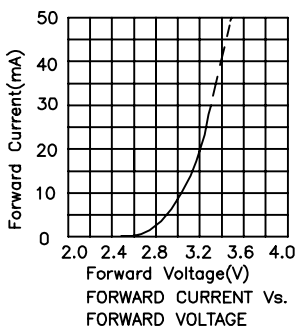
Green

ZG-E : InGaN



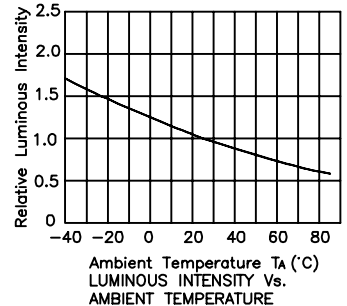
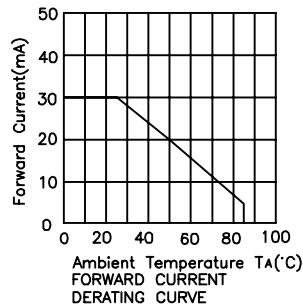
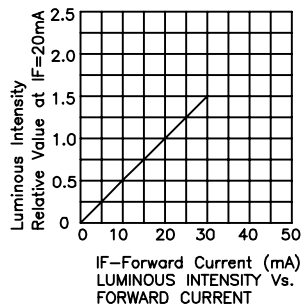
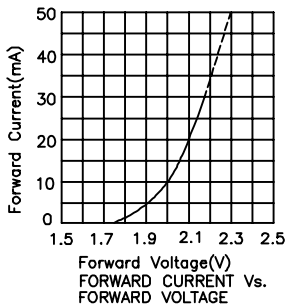
Green

ZG-G : InGaN



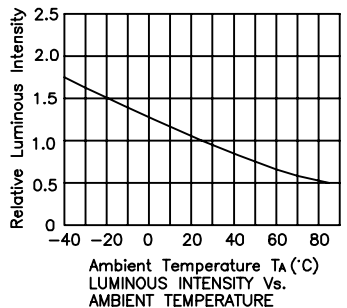
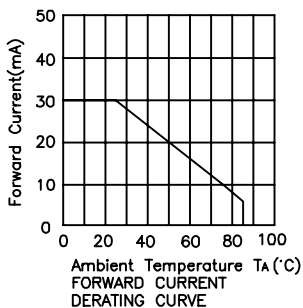
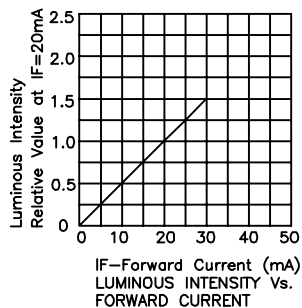
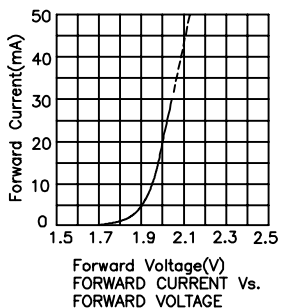
Yellow

Y : GaAsP/GaP



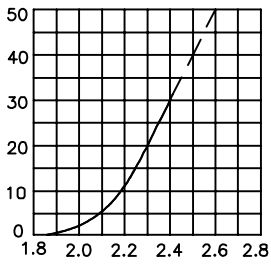
Super Bright Yellow

SYK : AlGaInP

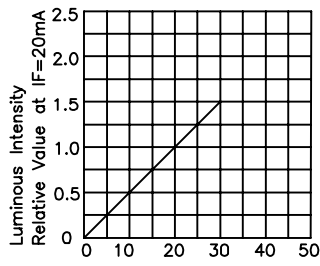


Super Bright Yellow

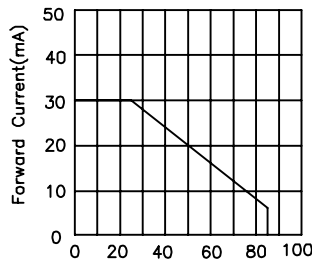
SY-H : AlGaInP



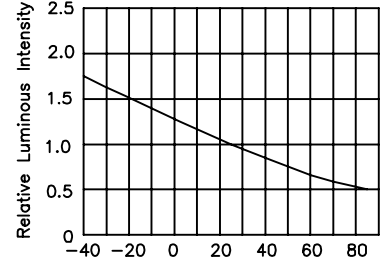
Forward Voltage(V)  
FORWARD CURRENT Vs.  
FORWARD VOLTAGE



If-Forward Current (mA)  
LUMINOUS INTENSITY Vs.  
FORWARD CURRENT



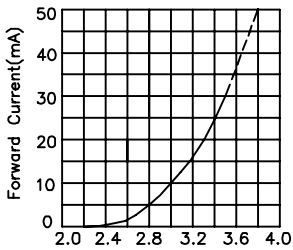
Ambient Temperature  $T_A$ (°C)  
FORWARD CURRENT  
DERATING CURVE



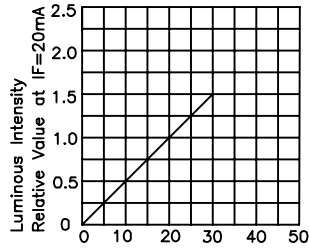
Ambient Temperature  $T_A$ (°C)  
LUMINOUS INTENSITY Vs.  
AMBIENT TEMPERATURE

Blue

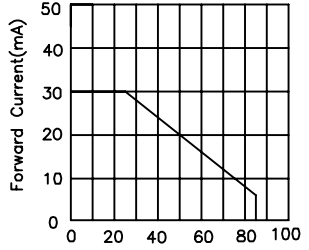
QB-D: InGaN



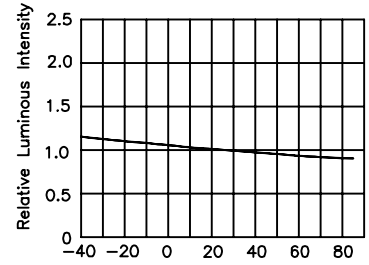
Forward Voltage(V)  
FORWARD CURRENT Vs.  
FORWARD VOLTAGE



If-Forward Current (mA)  
LUMINOUS INTENSITY Vs.  
FORWARD CURRENT



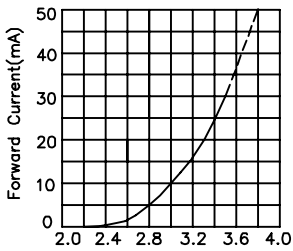
Ambient Temperature  $T_A$ (°C)  
FORWARD CURRENT  
DERATING CURVE



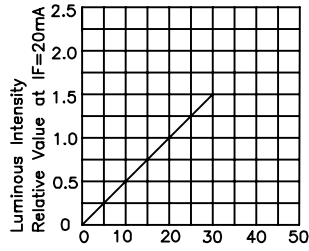
Ambient Temperature  $T_A$ (°C)  
LUMINOUS INTENSITY Vs.  
AMBIENT TEMPERATURE

Blue

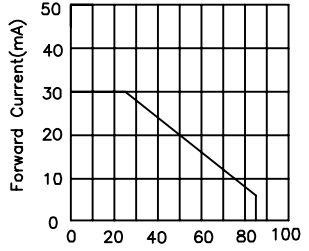
QB-F: InGaN



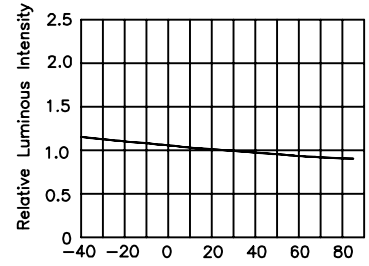
Forward Voltage(V)  
FORWARD CURRENT Vs.  
FORWARD VOLTAGE



If-Forward Current (mA)  
LUMINOUS INTENSITY Vs.  
FORWARD CURRENT



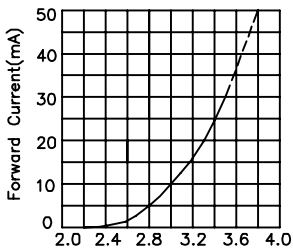
Ambient Temperature  $T_A$ (°C)  
FORWARD CURRENT  
DERATING CURVE



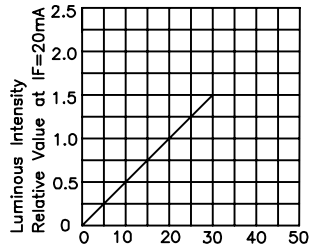
Ambient Temperature  $T_A$ (°C)  
LUMINOUS INTENSITY Vs.  
AMBIENT TEMPERATURE

Blue

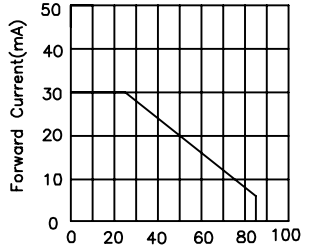
QB-G: InGaN



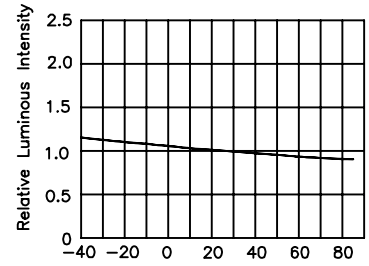
Forward Voltage(V)  
FORWARD CURRENT Vs.  
FORWARD VOLTAGE



If-Forward Current (mA)  
LUMINOUS INTENSITY Vs.  
FORWARD CURRENT



Ambient Temperature  $T_A$ (°C)  
FORWARD CURRENT  
DERATING CURVE



Ambient Temperature  $T_A$ (°C)  
LUMINOUS INTENSITY Vs.  
AMBIENT TEMPERATURE

SELECTION CODE FOR STANDARD LEDS (T <sub>A</sub> =25°C)					
Group	Light intensity in mcd(10mA)		Group	Light intensity in mcd(10mA)	
	min.	max.		min.	max.
F	0.1	0.25	W	110	200
G	0.2	0.4	X	170	280
H	0.3	0.6	Y	230	350
I	0.4	1	Z	300	500
K	0.7	1.5	ZA	400	620
L	1	3	ZB	520	750
M	1.8	5	ZC	650	1200
N	3	7	ZD	900	1800
P	5	12	ZE	1400	2400
Q	8	17	ZF	1900	3000
R	12	23	ZG	2500	3600
S	18	35	ZH	3100	4500
T	28	55	ZM	4000	5400
U	40	90	ZN	4800	6500
V	70	130	ZP	5900	7600

SELECTION CODE FOR SUPER BRIGHT LEDS (T <sub>A</sub> =25°C)					
Group	Light intensity in mcd(20mA)		Group	Light intensity in mcd(20mA)	
	min.	max.		min.	max.
A	1.6	3.5	ZA	2800	3800
B	2.6	5.5	ZB	3300	4500
C	4	10	ZC	3800	5500
D	7	15	ZD	4700	6500
E	10	24	ZE	5700	7500
F	18	44	ZF	6700	8500
G	36	60	ZG	7500	10000
H	50	90	ZH	8000	12000
M	70	130	ZM	10000	16000
N	110	220	ZN	12000	20000
P	180	320	ZP	16000	24000
Q	280	420	ZQ	20000	32000
R	380	550	ZR	24000	40000
S	480	750	ZS	32000	50000
T	650	1100	ZT	40000	60000
U	900	1500	ZU	50000	80000
V	1200	1800	ZV	70000	150000
W	1500	2100	ZW	110000	220000
X	1800	2500	ZX	180000	360000
Y	2200	3000	ZY	280000	560000
Z	2500	3300	ZZ	420000	900000

SELECTION CODE FOR DISPLAYS (T <sub>A</sub> =25°C)					
Group	Light intensity in ucd(10mA)		Group	Light intensity in ucd(10mA)	
	min.	max.		min.	max.
C	60	160	P	12000	24000
D	120	280	Q	18000	36000
E	200	410	R	26000	60000
F	300	640	S	44000	101000
G	480	1040	T	75000	173000
H	800	1600	U	128000	293000
I	1200	2500	V	217000	498000
K	1900	4100	W	368000	846000
L	3000	6400	X	626000	1438000
M	4700	10500	Y	1063000	2445000
N	8000	16000	Z	1807000	4156000

SELECTION CODE FOR NPN PHOTOTRANSISTORS (T <sub>A</sub> =25°C)					
Group	Photocurrent(mA)		Group	Photocurrent(mA)	
	min.	max.		min.	max.
F	0.1	0.25	L	1	3
G	0.2	0.4	M	1.8	5
H	0.3	0.6	N	3	7
I	0.4	1	P	5	12
K	0.7	1.5			

SELECTION CODE FOR INFRARED EMITTING DIODES (T <sub>A</sub> =25°C)					
Group	Radiant intensity in mW/sr(20mA)		Group	Radiant intensity in mW/sr(20mA)	
	min.	max.		min.	max.
AK	0.5	2	D	7	15
AL	0.8	3.2	E	10	24
A	1.6	3.5	F	18	44
B	2.6	5.5	G	36	60
C	4	10	H	50	90

SELECTION CODE FOR LUMINOUS FLUX								
(T <sub>A</sub> =25°C; Tolerance: +/-15%)								
Group	Luminous Flux in lm		Group	Luminous Flux in lm		Group	Luminous Flux in lm	
	min.	max.		min.	max.		min.	max.
A1	0.5	0.6	B2	12	14	C6	210	240
A2	0.6	0.7	B3	14	17	C7	240	280
A3	0.7	0.8	B4	17	20	C8	280	320
A4	0.8	1	B5	20	24	C9	320	370
A5	1	1.2	B6	24	29	C10	370	430
A6	1.2	1.4	B7	29	35	C11	430	490
A7	1.4	1.7	B8	35	42	C12	490	560
A8	1.7	2	B9	42	50	C13	560	640
A9	2	2.4	B10	50	60	C14	640	740
A10	2.4	2.9	B11	60	70	C15	740	850
A11	2.9	3.5	B12	70	80	C16	850	1000
A12	3.5	4.2	B13	80	90	D1	1000	1200
A13	4.2	5	B14	90	100	D2	1200	1400
A14	5	6	C1	100	120	D3	1400	1600
A15	6	7.2	C2	120	140	D4	1600	1800
A16	7.2	8.6	C3	140	160	D5	1800	2100
A17	8.6	10	C4	160	180	-	-	-
B1	10	12	C5	180	210	-	-	-

COLOR CODE FOR GREEN LEDS + DISPLAYS		
(T <sub>A</sub> =25°C)		
Group	Dom. Wavelength (nm)	
	ZG	
	min.	max.
1	513	522
2	518	527
3	523	532
4	528	537

COLOR CODE FOR BLUE LEDS + DISPLAYS					
(T <sub>A</sub> =25°C)					
Group	Dom. Wavelength (nm)		Group	Dom. Wavelength (nm)	
	min.	max.		min.	max.
1	443	452	3A	469	475
2	448	457	3B	471	477
3	453	462	4A	473	479
1A	458	465	4B	475	481
1B	461	468	5A	477	483
2A	464	471	5B	479	485
2B	467	473	5C	481	488

COLOR CODE FOR LEDS + DISPLAYS				
(T <sub>A</sub> =25°C, Tolerance: +/-1nm)				
Group	Dom. Wavelength (nm)			
	Green		Yellow	
	min.	max.	min.	max.
0	556	559		
1	559	561	581	584
2	561	563	584	586
3	563	565	586	588
4	565	567	588	590
5	567	569	590	592
6	569	571	592	594
7	571	573	594	597
8	573	575	597	600

SOLDERING INSTRUCTIONS						
Types	Dip soldering / * wave soldering			Iron soldering (with 1.5mm iron tip)		
	Temperature of the soldering bath	Maximum soldering time	Distance from solder joint to package	Temperature of soldering iron	Maximum soldering time	Distance from solder joint to package
LEDS	<=260°C	3s	>=2mm	<=350°C	3s	>2mm
	<=260°C	5s	>=5mm	<=350°C	5s	>5mm
SMDS [1]	/	/	/	<=350°C	3s	/
DISPLAYS	* <=260°C	* 3s	* >2mm	<=350°C	3s	>2mm
PHOTOCOUPLER	<=260°C	3s	>2mm	<=310°C	3s	/
	/	/	/	<=260°C	10s	/

NOTE: 1. one time only