Specification for Batron BTHQ42003AV-FSTF-06LED White

CONTENTS

Specification
of
LCD Module Type
Item No.: BTHQ 42003AV-01

1. General Description

- 20 characters(5x8 dots) x 4 lines FSTN Positive Transflective Black & White Dot Matrix LCD module.
- Viewing Angle: 6 O' clock direction.
- Driving duty: 1/33 Duty, 1/5 bias.
- ' HITACHI' HCD66712UA02 (Die) LCD Controller & Driver or equivalent.
- ' SAMSUNG' KS0065B-PCC (Die) LCD Segment Driver or equivalent.
- Temperature compensation.
- White LED05 backlight.

2. Mechanical Specifications

The mechanical detail is shown in Fig. 1 and summarized in Table 1 below.

Table 1

Parameter	Specifications	Unit
Outline dimensions	65.0(W) x 28.4(H) x 8.5 Max.(D)	mm
Display format	20 characters x 4 lines	-
Character size	1.85(W) x 3.153(H) (5 x 8 dots)	mm
Character spacing	0.30(W) x 1.097(H)	mm
Character pitch	2.15(W) x 4.250(H)	mm
Dot size	0.358(W) x 0.381(H)	mm
Dot spacing	0.015(W) x 0.015(H)	mm
Dot pitch	0.373(W) x 0.396(H)	mm
Weight	Approx. 18	grams

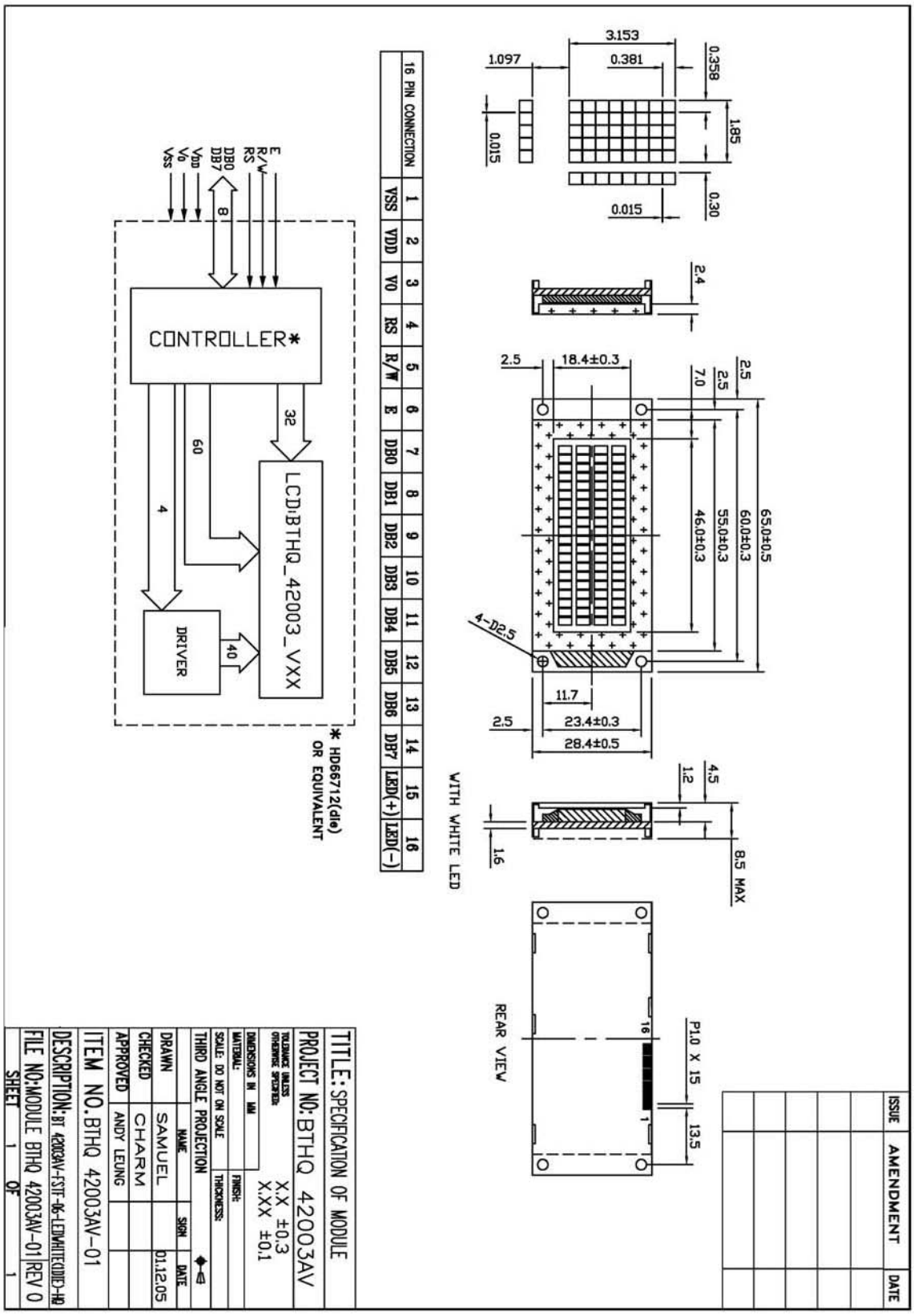


Figure 1: Outline Drawing

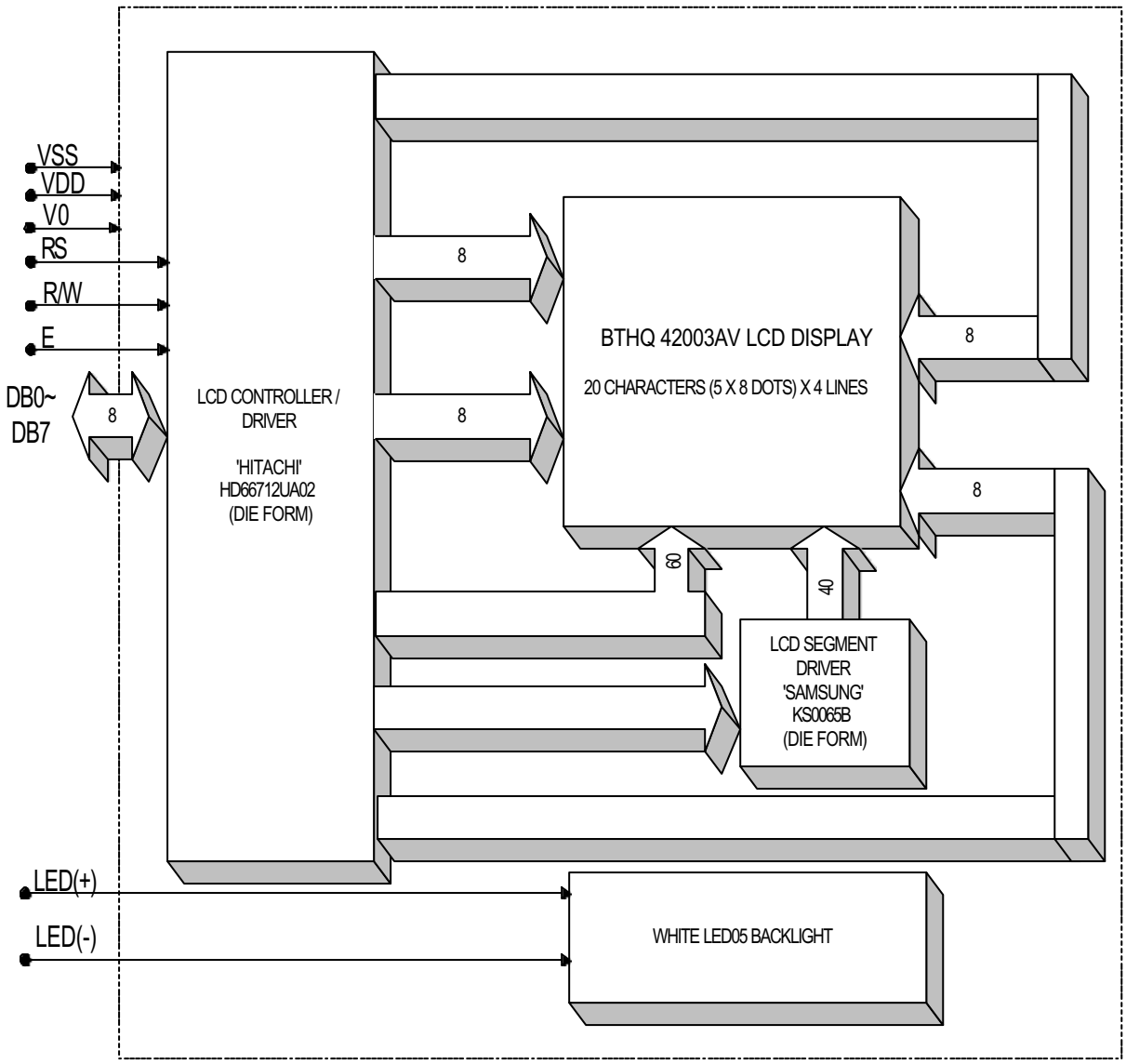


Figure 2: Block Diagram

3. Interface signals

Table 2

Pin No.	Symbol	Description
1	VSS	Ground (0V).
2	VDD	Power supply for logic (+5V).
3	V0	Power supply to the booster to generate LCD drive voltage.
4	RS	Select registers during bus mode: Low: Instruction register (write); Busy flag, address counter (read) High: Data register (write/read)
5	R/W	Read/write during bus mode; High: Read Low: Write
6	E	Starts data read/write.
7	DB0	Data input/output bit 0 (LSB).
8	DB1	Data input/output bit 1.
9	DB2	Data input/output bit 2.
10	DB3	Data input/output bit 3.
11	DB4	Data input/output bit 4.
12	DB5	Data input/output bit 5.
13	DB6	Data input/output bit 6.
14	DB7	Data input/output bit 7(MSB).
15	LED(+)	Anode of LED backlight.
16	LED(-)	Cathode of LED backlight.

4. Absolute Maximum Ratings

4.1 Electrical Maximum Ratings(Ta = 25 ° C)

Table 3

Parameter	Symbol	Min.	Max.	Unit
Power Supply voltage (Logic)	VDD - VSS	-0.3	+7.0	V
Power Supply voltage (LCD drive)	VLCD	-0.3	+13.0	V
Input voltage	Vin	-0.3	VDD+0.3	V

Note:

The modules may be destroyed if they are used beyond the absolute maximum ratings.

All voltage values are referenced to VSS = 0V.

4.2 Environmental Condition

Table 4

Item	Operating Temperature (Topr)		Storage Temperature (Tstg)		Remark
	Min.	Max.	Min.	Max.	
Ambient Temperature	0°C	+50°C	-10°C	+60°C	Dry
Humidity	95% max. RH for Ta ≤ 40°C < 95% RH for Ta > 40°C				no condensation
Vibration (IEC 68-2-6) cells must be mounted on a suitable connector	Frequency: 10 ~ 55 Hz Amplitude: 0.75 mm Duration: 20 cycles in each direction.				3 directions
Shock (IEC 68-2-27) Half-sine pulse shape	Pulse duration : 11 ms Peak acceleration: 981 m/s^2 = 100g Number of shocks : 3 shocks in 3 mutually perpendicular axes.				3 directions

5. Electrical Specifications

5.1 Typical Electrical Characteristics

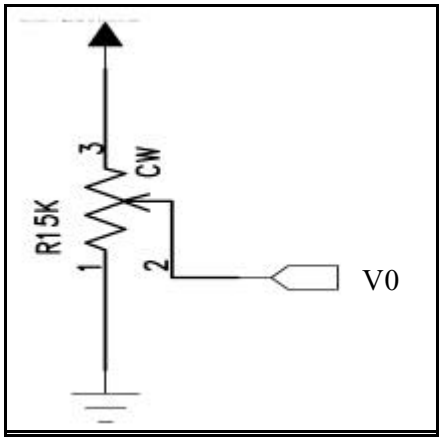
At Ta = 25 °C, VDD = 5V±0.1V, VSS=0V.

Table 5

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Supply voltage (Logic)	VDD -VSS		4.9	5.0	5.1	V
Supply voltage (LCD)	VLCD	VDD = 5V, Note (1)	4.85	5.35	5.85	V
Input signal voltage (except OSC1)	V_{IH}	"High" level	0.7VDD	-	VDD	V
	V_{IL}	"Low" level, VDD=3V to 4.5V	-0.3	-	0.6	V
Supply Current (Logic & LCD)	IDD	Character mode, VDD = 5V	-	2.6	3.9	mA
Supply voltage of white LED05 backlight	VLED	Forward current =20mA Number of LED chips =1	3.2	3.4	3.6	V

Note (1) : There is tolerance in optimum LCD driving voltage during production and it will be within the specified range.

5.2 Test Condition



5.3 Timing Specifications

At Ta = 0 °C To +50 °C , VDD = +5V±0.1V, VSS = 0V.

Refer to Fig. 3, the bus timing diagram for write mode.

Table 6

Item	Symbol	Min	Typ	Max	Unit
Enable cycle time	t_{cycE}	500	—	—	ns
Enable pulse width (high level)	PW_{EH}	230	—	—	
Enable rise/fall time	t_{Er}, t_{Ef}	—	—	20	
Address set-up time (RS, R/W to E)	t_{AS}	40	—	—	
Address hold time	t_{AH}	10	—	—	
Data set-up time	t_{DSW}	80	—	—	
Data hold time	t_{H}	10	—	—	

Refer to Fig. 4, the bus timing diagram for read mode.

Table 7

Item	Symbol	Min	Typ	Max	Unit
Enable cycle time	t_{cycE}	500	—	—	ns
Enable pulse width (high level)	PW_{EH}	230	—	—	
Enable rise/fall time	t_{Er}, t_{Ef}	—	—	20	
Address set-up time (RS, R/W to E)	t_{AS}	40	—	—	
Address hold time	t_{AH}	10	—	—	
Data delay time	t_{DDR}	—	—	160	
Data hold time	t_{DHR}	5	—	—	

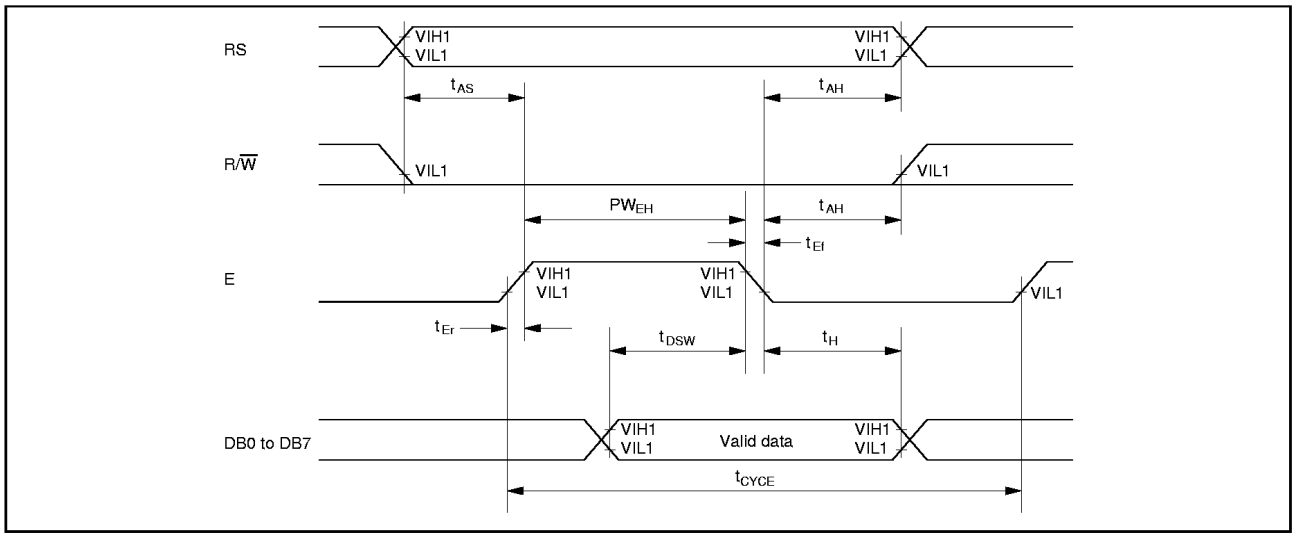


Figure 3 : Write Mode Timing Diagram

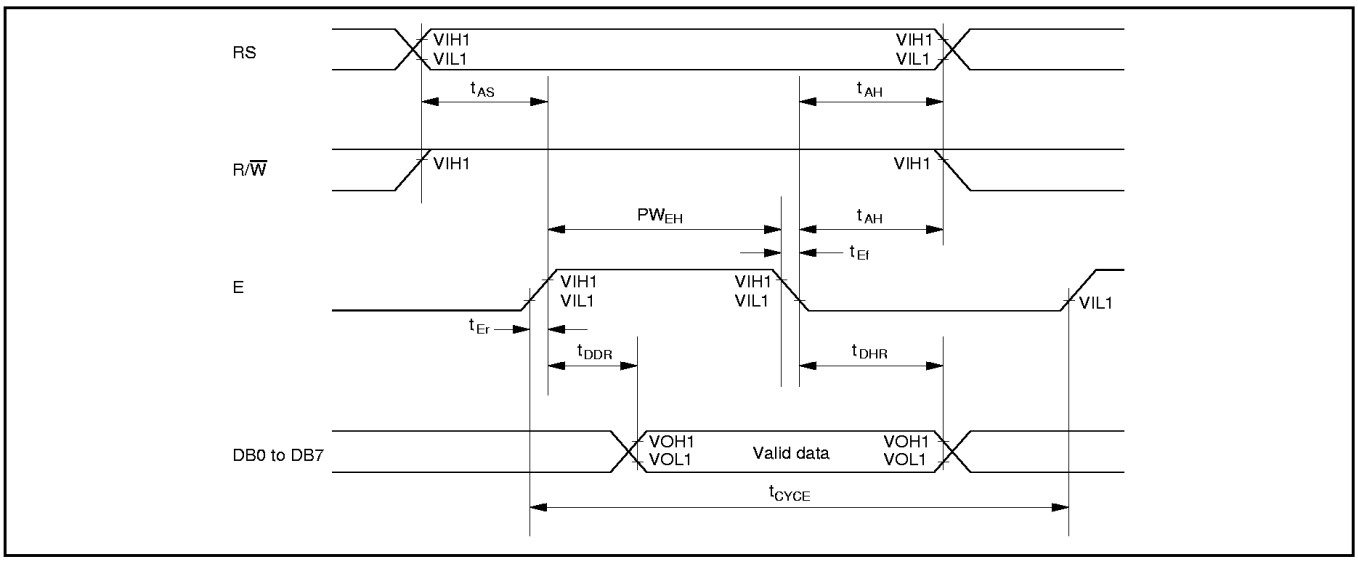
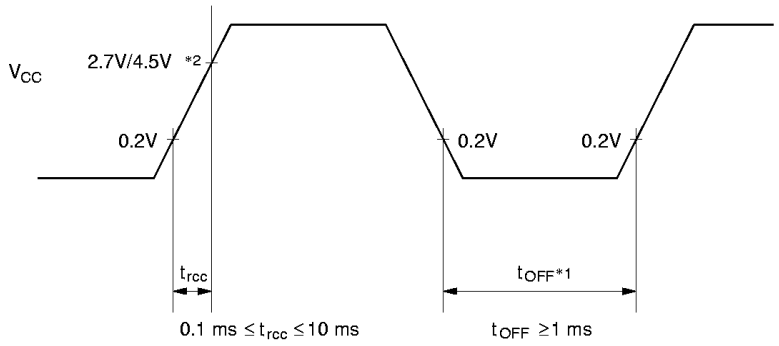


Figure 4 : Read Mode Timing Diagram

5.4 Power Supply Sequence



Notes:
1. t_{OFF} compensates for the power oscillation period caused by momentary power supply oscillations.
2. Specified at 4.5V for 5-volt operation, and at 2.7V for 3-volt operation.
3. If the above electrical conditions are not satisfied, the internal reset circuit will not operate normally. In this case, initialized by instruction. (Refer to the Initializing by Instruction section.)

Figure 5: Power Supply Sequence

6. APPENDIX

These specifications shall be applied to the White LED-Lamp (LED or LEDs), NSPWF50BS, which is supplied by Nichia Corporation (Nichia).

1.SPECIFICATIONS

(1) Absolute Maximum Rating (Ta=25℃)

Item	Symbol	Absolute Maximum Rating	Unit
Forward Current	I_F	30	mA
Pulse Forward Current	I_{FP}	100	mA
Reverse Voltage	V_R	5	V
Power Dissipation	P_D	120	mW
Operating Temperature	Topr	−30 ～ +85	℃
Storage Temperature	Tstg	−40 ～ +100	℃
Lead Soldering Temperature	Tsol	260±5℃ for 5sec. (3.0mm from the base of the epoxy bulb)	

I_{FP} Conditions : Pulse Width ≦ 10msec. and Duty ≦ 1/10

(2) Initial Electrical/Optical Characteristics (Ta=25℃)

Item		Symbol	Condition	Min.	Typ.	Max.	Unit
Forward Voltage		V_F	I_F=20[mA]	−	3.6	4.0	V
Reverse Current		I_R	V_R= 5[V]	−	−	50	μA
Luminous Intensity	Rank S	Iv	I_F=20[mA]	300	360	420	mcd
	Rank R	Iv	I_F=20[mA]	210	260	300	mcd
	Rank Q	Iv	I_F=20[mA]	150	180	210	mcd

※ One delivery will include three different ranks of products. The quantity-ratio of the three ranks is decided by Nichia.
Measurement Uncertainty of the Luminous Intensity : ±10%

Color Ranks (I_F=20mA,Ta=25℃)

	Rank a			
x	0.250	0.250	0.290	0.290
y	0.205	0.250	0.305	0.260

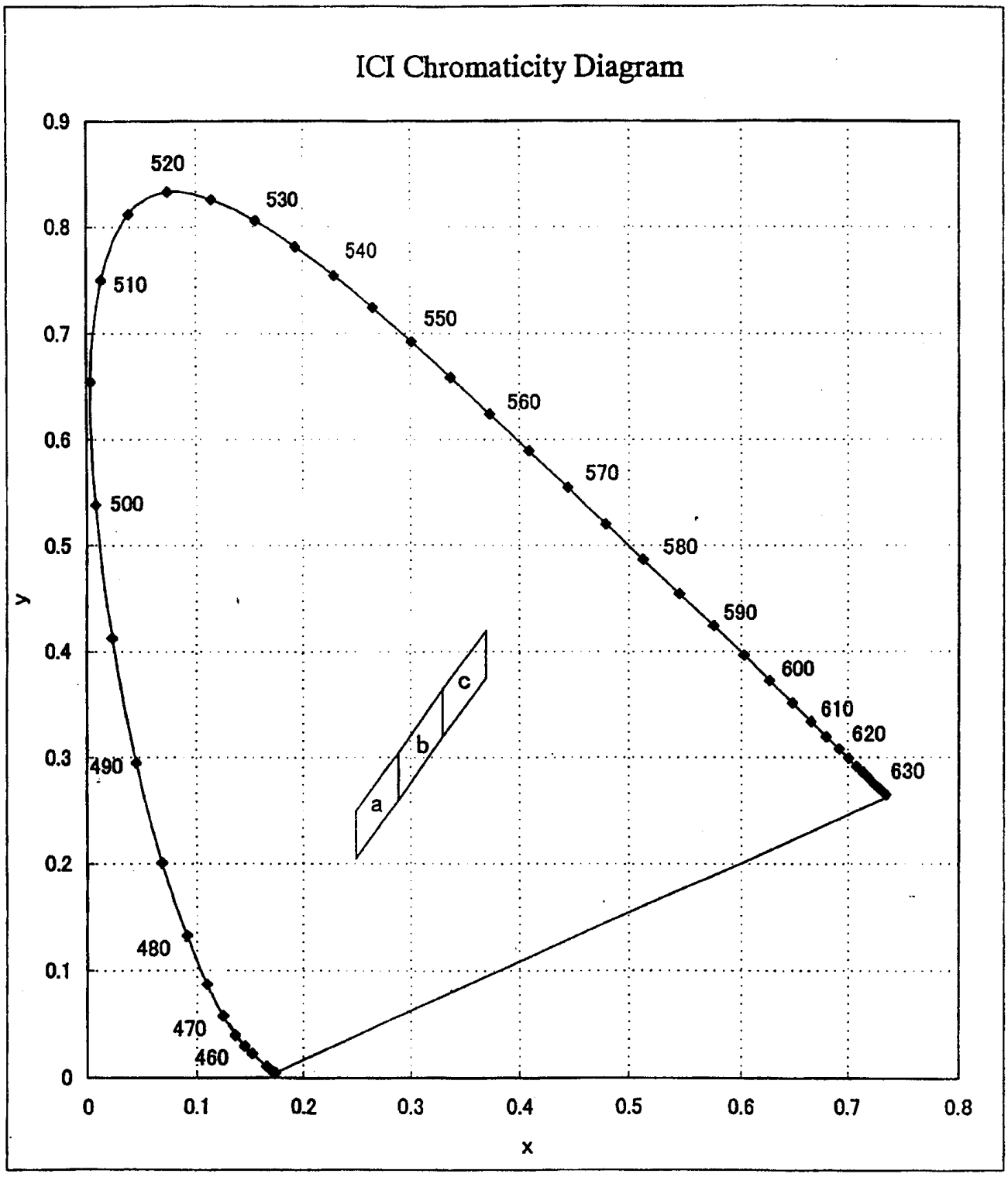
	Rank b			
x	0.290	0.290	0.330	0.330
y	0.260	0.305	0.365	0.320

	Rank c			
x	0.330	0.330	0.370	0.370
y	0.320	0.365	0.420	0.375

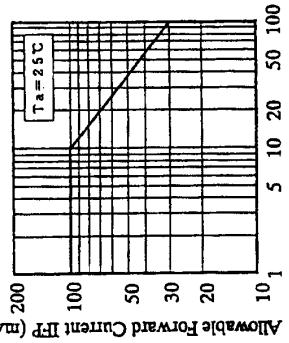
※ One delivery will include the consecutive two ranks of products.
The quantity-ratio of the two ranks is decided by Nichia.
Measurement Uncertainty of the Color Coordinates : ±0.02

2.TYPICAL INITIAL OPTICAL/ELECTRICAL CHARACTERISTICS

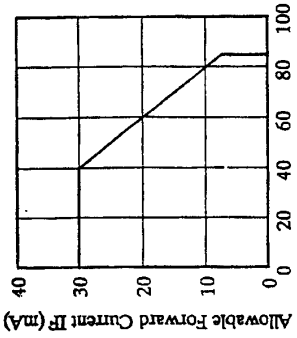
Please refer to figures No.STLZ-A906042, No.STLZ-A801473.


ICI Chromaticity Diagram
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
y
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
x
520
530
540
550
560
570
580
590
600
610
620
630
510
500
490
480
470
460
a
b
c

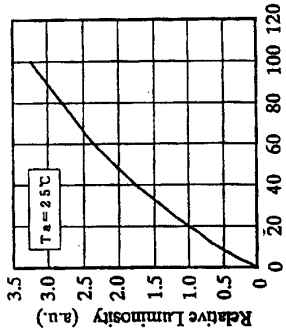
■ Duty Ratio vs. Allowable Forward Current



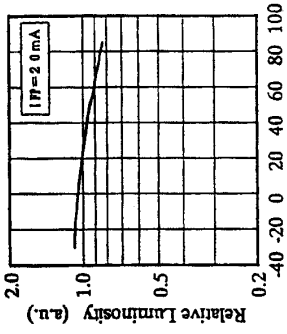
■ Ambient Temperature vs. Allowable Forward Current



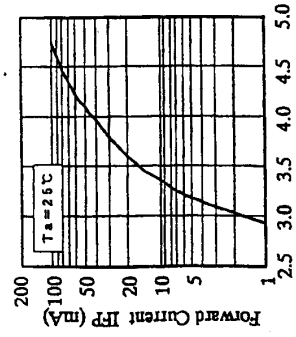
■ Forward Current vs. Relative Luminosity



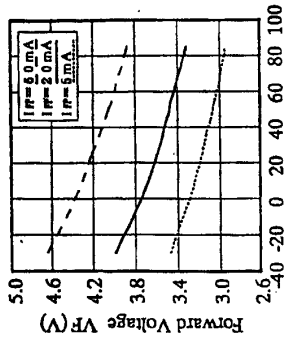
■ Ambient Temperature vs. Relative Luminosity



■ Forward Voltage vs. Forward Current



■ Ambient Temperature vs. Forward Voltage



Rev.1	Section	Approve	Check	Draw	
Rev.2	ST	Bando	Yamada	Tamura	
Rev.3	Date	Jun.1,1999			
Rev.4	Model	NSPWxxxx			
NICHIA CORPORATION	Title	TYP.CHARACTERISTICS			
	No.	STLZ-A906042			

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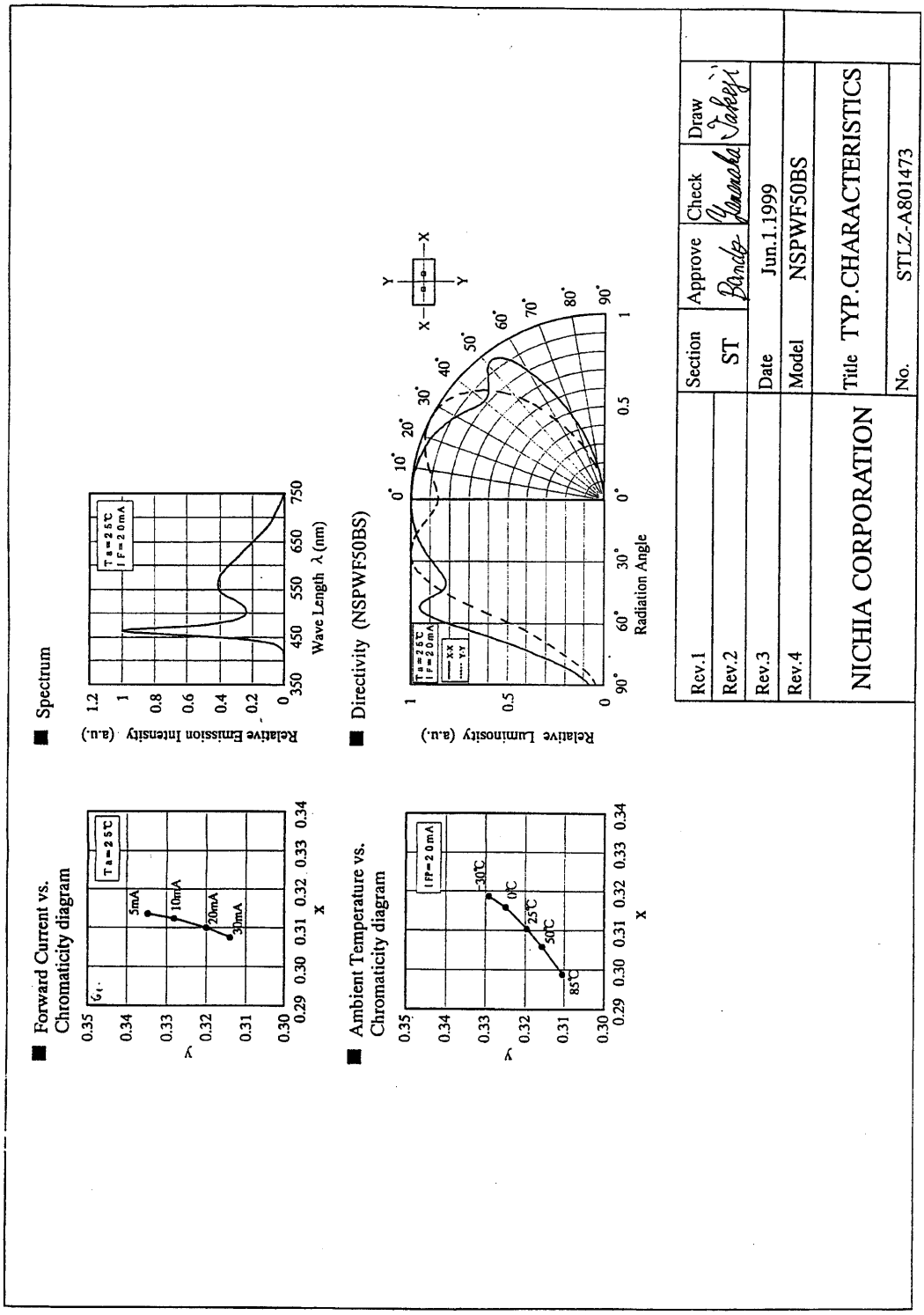
■ Spectrum
Relative Emission Intensity (a.u.)
Wave Length λ (nm)
Ta=25℃
IF=20mA
■ Directivity (NSPWF50BS)
Relative Luminosity (a.u.)
Radiation Angle
■ Forward Current vs. Chromaticity diagram
■ Ambient Temperature vs. Chromaticity diagram
5mA
10mA
20mA
30mA
-30℃
0℃
25℃
50℃
85℃
NICHIA CORPORATION
Rev.1
Rev.2
Rev.3
Rev.4
Section ST
Approve
Check
Draw
Date Jun.1.1999
Model NSPWF50BS
Title TYP.CHARACTERISTICS
No. STLZ-A801473