




DOCUMENT NUMBER AND REVISION
VL-FS-BTHQ 21603VSS-01 REV.B
(BTHQ 21603V-SRE-CONN.)

DOCUMENT TITLE:
SPECIFICATION
OF
LCD MODULE TYPE
ITEM NO.: BTHQ 21603VSS-01

APPROVALS:

EFFECTIVE DATE

DEPARTMENT	NAME	SIGNATURE	DATE
MARKETING (TECHNICAL SUPPORT)	PHILIP CHENG		2002.1.15
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Page No.	1	2	3	4	5	6	7	8	9	10	11	12
Rev. No.	B	B	A	B	B	A	A	A	A	A	A	A

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A	2002.01.04	First Release	PHILIP CHENG	TOM LEE
A B	2002.01.14	Items 1 to 3 were updated: 1.) (Page 4, point 1) “(CON-IL-402)” was added. 2.)(Page 4, point 2) “(Excluded connector)” was added. 3.)(Page 5, Fig. 1) Outline drawing was updated.	PHILIP CHENG	M.Y.LU

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**Specification
of
LCD Module Type
Item No.: BTHQ 21603VSS-01**

1. General Description

- 16 characters (5x8 dots) x 2 lines STN Positive Yellow Reflective Dot Matrix LCD module.
- Viewing Angle: 6 O'clock direction.
- Driving scheme: 1/16 Duty, 1/5 bias.
- 'NOVATEK' NT3881DH-01/AI (Die form) LCD Controller and Driver or equivalent
- 'SAMSUNG' KS0065B-PCC (Die form) or equivalent 40-Channel Segment/Common Driver for Dot Matrix LCD.
- Connector: 16 pins ZIF SMD connector (CON-IL-402).

2. Mechanical Specifications

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

Table 1

Parameter	Specifications	Unit
Outline dimensions	53.0(W) x 20.0(H) x 8.0 MAX.(D) (Excluded connector)	mm
Effective viewing area	36.0(W) x 10.0(H)	mm
Display format	16 characters x 2 lines	-
Character size	1.85(W) x 3.15(H) (5 x 8 dots)	mm
Character spacing	0.30(W) x 1.10(H)	mm
Character pitch	2.15(W) x 4.25(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:	TBD	grams

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ISSUE	AMENDMENT	DATE

TITLE: SPECIFICATION OF MODULE

PROJECT NO: BTHQ 21603VSS

REFERENCE UNLESS OTHERWISE SPECIFIED: X.X ±0.3
X.XX ±0.1

DIMENSIONS IN MM

MATERIAL: _____ FINISH: _____

SCALE: DO NOT ON SCALE THICKNESS: _____

THIRD ANGLE PROJECTION

DRAWN	NAME	SIGN	DATE
HE ZUOBING			01.11.27
CHECKED	WONG M.C		
APPROVED	ANDY LEUNG		

ITEM NO. BTHQ 21603VSS-01

DESCRIPTION: BT 21603VSS-SRE-HQ-CONN.

FILE NO: MODULE BT21603V-HQ | REV 0

SHEET 1 OF 1

16 PIN CONNECTION

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
VSS	VDD	V0	RS	R/W	E	DB0	DB1	DB2	DB3	DB4	DB5	DB6	DB7	LED(+)	LED(-)

*** NT3881 OR EQUIVALENT**

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3. Absolute Maximum Ratings

3.1 Electrical Maximum Ratings(Ta = 25 °C)

Table 2

Parameter	Symbol	Min.	Max.	Unit
Power Supply voltage (Logic)	VDD - VSS	-0.3	+7.0	V
Power Supply voltage (LCD drive)	VLCD=VDD – V0	-0.3	+13.5	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.

3.2 Environmental Condition

Table 3

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

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4. Electrical Specifications

4.1 Interface signals

Table 4

Pin No.	Symbol	Description
1	VSS	Ground(0V).
2	VDD	Power supply for logic (+5V)
3	V0	Power supply for LCD driver
4	RS	Register Select Input: "High" for Data register (for read and write) "Low" for Instruction register (for write), Busy flag, address counter (for read)
5	R/W	Read/Write signal: " High" for Read mode. "Low" for Write mode.
6	E	Enable. Start signal for data read /write.
7	DB0	Data input/output (LSB)
8	DB1	Data input/output
9	DB2	Data input/output
10	DB3	Data input/output
11	DB4	Data input/output
12	DB5	Data input/output
13	DB6	Data input/output
14	DB7	Data input/output (MSB)
15	LED(+)	Anode of LED backlight
16	LED(-)	Cathode of LED backlight

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4.2 Typical Electrical Characteristics

At Ta = 25 °C, VDD = 5V±5%, VSS=0V.

Table 5

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Supply voltage (Logic)	VDD-VSS		4.75	5.00	5.25	V
Supply voltage (LCD)	VLCD =VDD-V0	VDD =5.0V, Note1.	4.0	4.5	5.0	V
Input signal voltage 1 for E,DB0-DB7,R/W,RS.	V _{IH1}	"H" level	2.2	-	VDD	V
	V _{IL1}	"L" level	-0.3	-	0.8	V
Input signal voltage 2 for OSC1.	V _{IH2}	"H" level	VDD -1.0	-	VDD	V
	V _{IL2}	"L" level	VSS	-	1.0	V
Supply Current (Logic & LCD)	IDD	Character mode, Note 1	-	1.3	2.0	mA
Supply Current (LCD)	I0	Character mode, Note 1	-	0.2	0.3	mA

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

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4.3 Timing Specifications

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

Refer to Fig. 2, the bus timing diagram for write mode.

Table 6

Parameter	Symbol	Min.	Max.	Unit	Remarks
Enable cycle time	t _{CYCE}	500	-	ns	
Enable "High" level pulse width	t _{WHE}	300	-	ns	
Enable rise time	t _{RE}	-	25	ns	
Enable fall time	t _{FE}	-	25	ns	
RS, R/W set-up time	t _{AS}	60	-	ns	8-bit operation mode
		100			4-bit operation mode
RS, R/W address hold time	t _{AH}	10	-	ns	
Data output delay	t _{DS}	100	-	ns	
Data hold time	t _{DHR}	10	-	ns	

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

Table 7

Parameter	Symbol	Min.	Max.	Unit	Remarks
Enable cycle time	t _{CYCE}	500	-	ns	
Enable "High" level pulse width	t _{WHE}	300	-	ns	
Enable rise time	t _{RE}	-	25	ns	
Enable fall time	t _{FE}	-	25	ns	
RS, R/W set-up time	t _{AS}	60	-	ns	8-bit operation mode
		100			4-bit operation mode
RS, R/W address hold time	t _{AH}	10	-	ns	
Read data output delay	t _{RD}	-	190	ns	
Read data hold time	t _{DHR}	20	-	ns	

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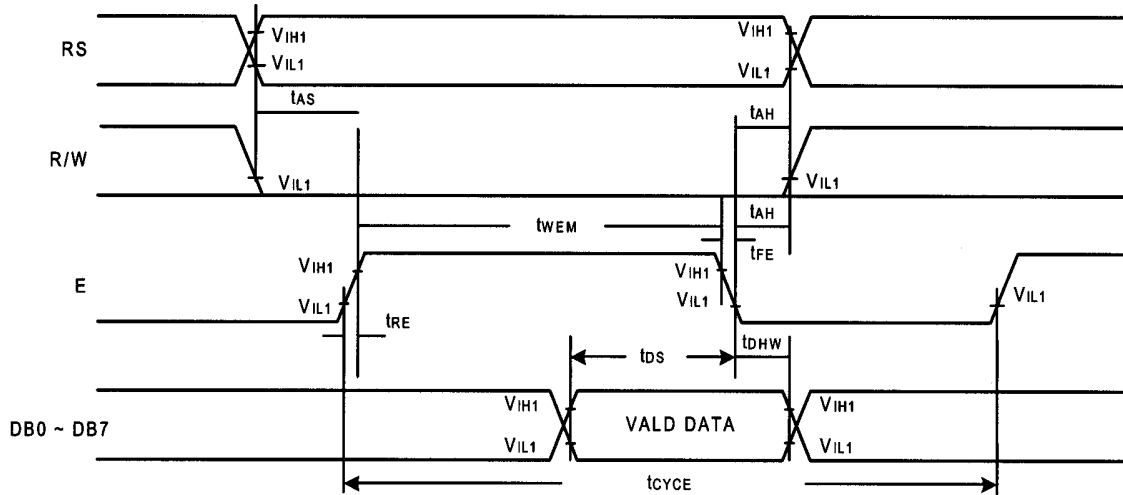


Figure 2: Bus write operation sequence (Writing data from MPU to NT3881).

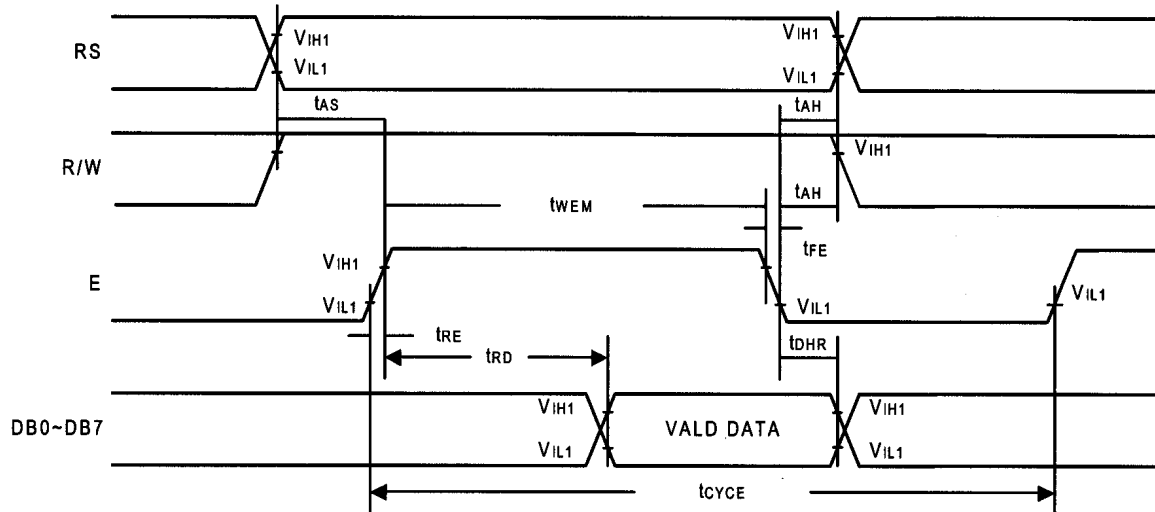


Figure 3: Bus read operation sequence (Reading out data from NT3881 to MPU).

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4.4 Timing Diagram of VDD against V0.

Power on sequence shall meet the requirement of Figure 4, the timing diagram of VDD against V0.

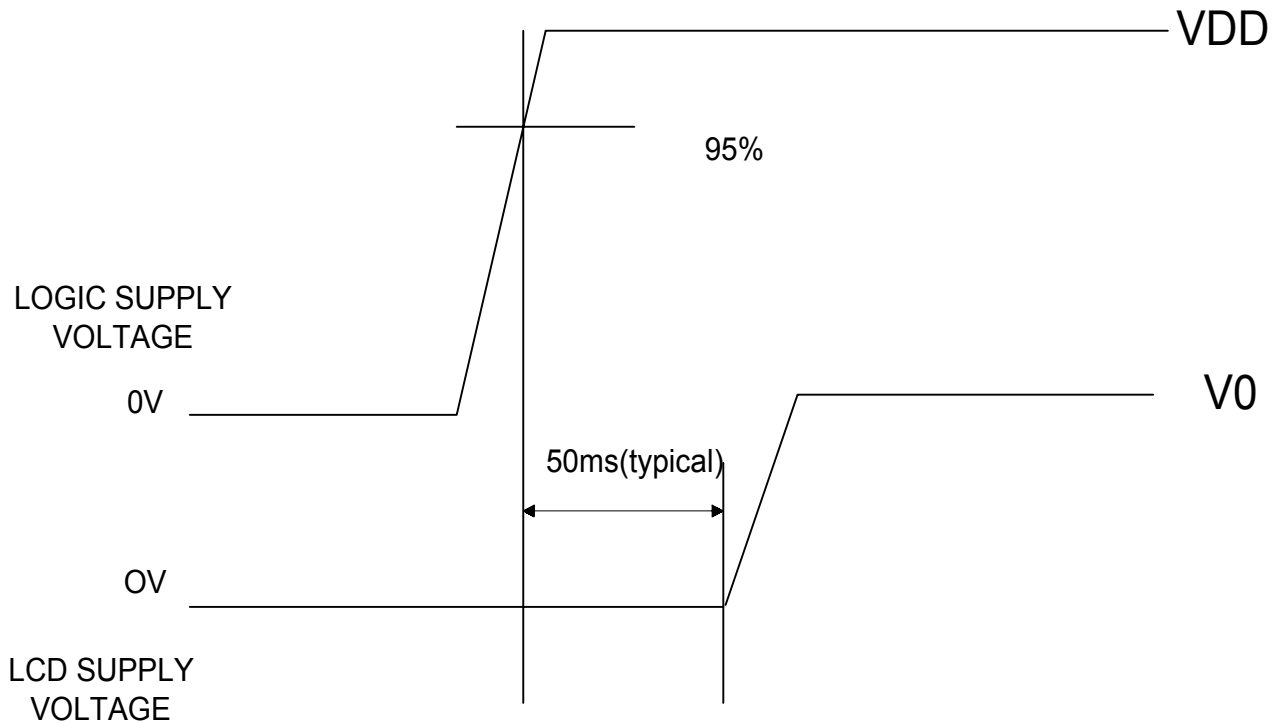


Figure 4: Timing diagram of VDD against V0.

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**4.5 Correspondence between Character Codes and Character Patterns
(NOVATEK Standard NT3881D-01)**

		Higher 4-bit (D4 to D7) of Character Code (Hexadecimal)																
		0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F	
Lower 4-bit (D0 to D3) of Character Code (Hexadecimal)	0	CG RAM (1)			0	a	P	`	P					一	夕	三	α	P
	1	CG RAM (2)		!	1	À	Q	a	9			□	ア	チ	△	ä	9	
	2	CG RAM (3)		"	2	B	R	b	r			Γ	イ	ツ	×	β	θ	
	3	CG RAM (4)		#	3	C	S	c	s			┘	ウ	テ	τ	ε	ω	
	4	CG RAM (5)		\$	4	D	T	d	t			、	イ	ト	ト	μ	Ω	
	5	CG RAM (6)		%	5	E	U	e	u			、	オ	ナ	1	ε	Ü	
	6	CG RAM (7)		&	6	F	V	f	v			ヲ	カ	ニ	ヨ	ρ	Σ	
	7	CG RAM (8)		'	7	G	W	g	w			ア	キ	ヌ	ウ	g	π	
	8	CG RAM (1)		(8	H	X	h	x			イ	ク	ネ	リ	μ	Σ	
	9	CG RAM (2))	9	I	Y	i	y			ウ	ケ	ル	ル	、	γ	
	A	CG RAM (3)		*	:	J	Z	j	z			エ	コ	ン	レ	j	〒	
	B	CG RAM (4)		+	;	K	Ĭ	k	Ĭ			オ	サ	ヒ	ロ	*	〒	
	C	CG RAM (5)		,	<	L	≠	l	l			カ	シ	フ	フ	φ	〒	
	D	CG RAM (6)		-	=	M	l	m	3			ユ	ズ	、	ン	ト	÷	
	E	CG RAM (7)		.	>	N	^	n	→			ヨ	セ	ホ	、	ñ		
	F	CG RAM (8)		/	?	O	_	o	+			ウ	ソ	マ	、	ö		

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