HITACHI

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For Messrs;

Date; Apr. 22, '88

CUSTOMER'S ACCEPTANCE SPECIFICATIONS

LM213XB

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RECORD OF REVISION

Date	Sheet No.	Summary

Accepted by ; _____ Proposed by ;

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3. GENERAL SPECIFICATIONS.

3.1 STANDARD SPECIFICATIONS

3284PS 2501 - 234 - 1

3.2 GENERAL SPECIFICATION OF X-TYPE LCM

3284PS 2501 - 380 - 1

This Individual Specifications is prior to General Specification.

4. MECHANICAL DATA

(1)	Number of dots	256 W X 64 H dots
(2)	Module size	184.0W X 75.0H X 12.0 D (max.) mm
(3)	Effective display area	149.6W X 43.0Hmm
(4)	Dot size	0.51W X 0.51 Hmm
(5)	Dot pitch	0.56W X 0.56 Hmm
(6)	Viewing Direction	6 o'clock

5. ABSOLUTE MAXIMUM RATINGS

5.1 ELECTRICAL ABSOLUTE MAXIMUM RATINGS

ITEM	SYMBOL	MIN.	MAX.	UNIT	COMMENT
Power Supply for Logic	$V_{DD}-V_{SS}$	0	6.5	V	
Power Supply for LC Drive	$V_{DD}-V_0$	0	16.0	V	
Input Voltage	V_I	V_{SS}	V_{DD}	V	Note 1
Static Electricity			100	V	

5.2 ENVIRONMENTAL ABSOLUTE MAXIMUM RATINGS

ITEM	OPERATING		STORAGE		COMMENT
	MIN.	MAX.	MIN.	MAX.	
Ambient Temperature	0° C	40° C	-20° C	60° C	Note 1.2
Humidity	Note 3		Note 3		Without condensation
Vibration	——	0.5G	——	2G	XYZdirections
Shock	——	3G	——	50G	XYZdirections
Corrosive Gas	Not Acceptable		Not Acceptable		

Note1 (Backsround color of LCD → Ta=0° C Yellowish-oranse ⟷ 25° C Yellow ⟷ 40° C Bluish-orange)

Note2 Ta at 20° C ≺ 48Hr
Ta at 60° C ≺ 168Hr

Note3 Ta ≦ 10° C : 85%RH MAX.
Ta ≻ 40° C : Absolute humidity must be lower than the humidity of 85%RH at 40° C (50%RH at 50° C)

6. ELECTRICAL CHARACTERISTICS

ITEM		SYMBOL	CONDITION		MIN.	TYP	MAX.	UNIT
Logic circuit power supply voltage		$V_{DD}-V_{SS}$	———		4.75	5.0	5.25	V
LC driver circuit power supply voltage		$V_{EE}-V_{SS}$	———		-10.25	-10.5	-10.75	V
Input voltage Note 1	H	VIH			0.8×V_{DD}	—	V_{DD}	V
	L	VIL			0	—	0.2×V_{DD}	V
input leak current		Iin			-5.0		5.0	μA
Output leak current		IOUT			-10.0		10.0	μA
Clock frequency Note 2		fCL2			—		1.2	MHz
Power consumption		PW	V_{DD} = 5.0V Ta = 25° C		—		250	mW
Recommended LC driving voltage Note 3		$V_{DD}-V_0$	θ = 0° φ = 10°	Ta = 0° C	—	14.1	—	V
				Ta = 25° C	—	13.3	—	V
				Ta = 40° C	—	12.8	—	V

Note1 Applied to DB0~DB7, $\overline{CS}$, E, R/W, RS
Note2 internal clock
Note3 Recommended LC Driving Voltage may fluctuate about ±0.5V by each module.

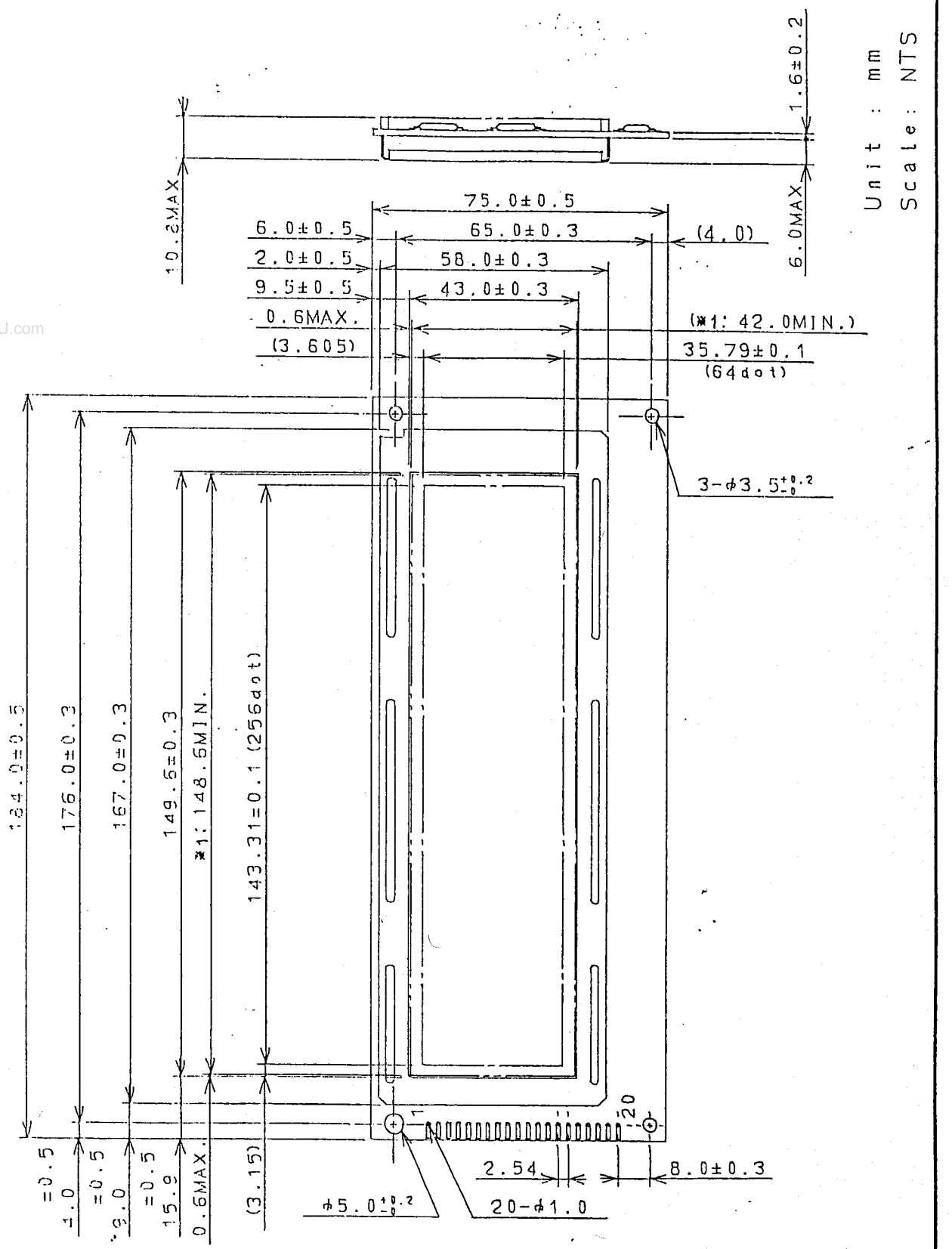
7. OPTICAL DATA

Ta = 25° C V_{DD} = 5.0V V_{EE} = -10.5V

ITEM	SYMBOL	CONDITION	MIN.	TYP	MAX.	UNIT	NOTE
Viewing area	φ2-φ1	K = 1.4	—	30	—	deg	1.2
Contrast ratio	K	φ = 10° θ = 0°	1.4	2.0	—	—	3
Response time (rise)	tr	φ = 10° θ = 0°	—	250	—	ms	4
Response time (fall)	tf	φ = 10° θ = 0°	—	400	—	ms	4

Note1 See General Specifications for definition of optical characteristics.

8. DIMENSIONAL OUTLINE



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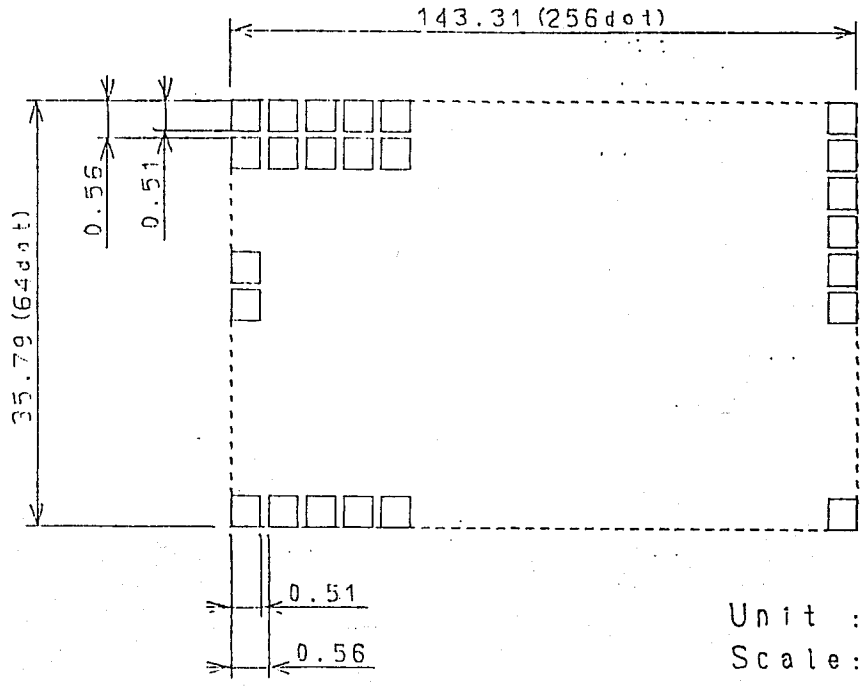
Note 1 DETAIL DRAWING OF MATRIX PATTERN

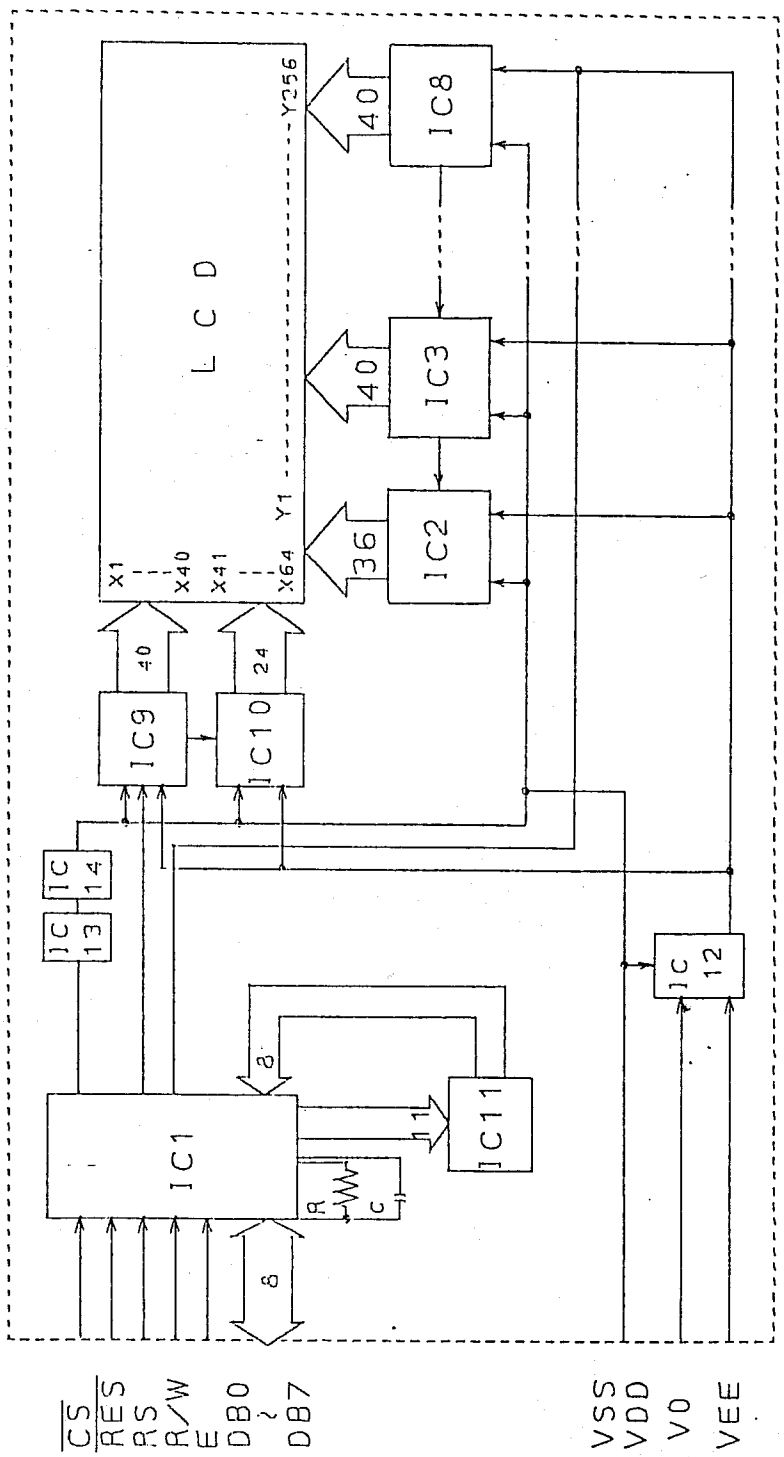


Unit : mm
Scale: NTS
No specified tolerance ±0.1

Note 2 INTERNAL PIN CONNECTION

Pin No.	Symbol	Function
1	VSS	Ground
2	VDD	Power supply for logic
3	V0	Power supply for LCD drive
4	RS	Register select
5	R/W	Read/write
6	E	Enable
7~14	DB0~DB7	Data bus
15	$\overline{CS}$	Chip select
16	$\overline{RES}$	Reset
17	VEE	Power supply for LCD
18~20	N.C	No connection

9. BLOCK DIAGRAM



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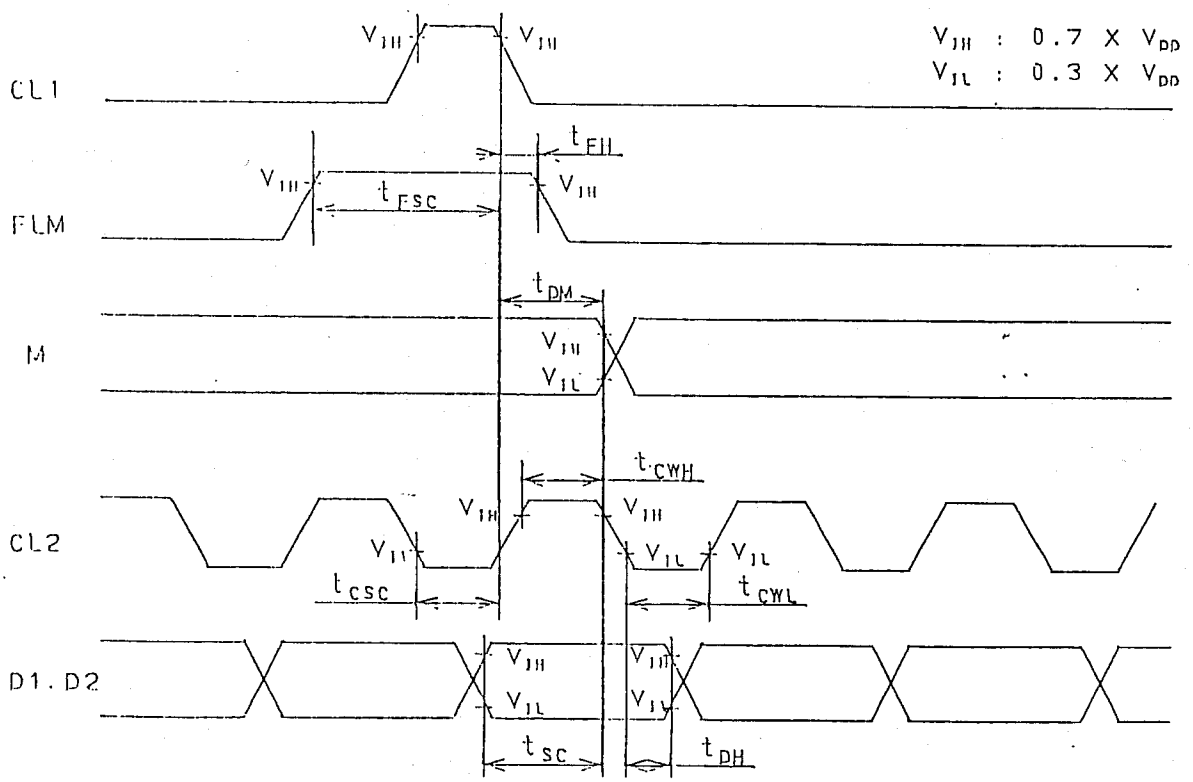
10. TIMING CHARACTERISTICS

ITEM	SYMBOL	MIN.	TYP.	MAX.	UNIT
clock frequency	f_{CL2}	—	—	1200	MHz
clock pulse width (High level)	t_{CWH}	300	—	—	ns
clock pulse width (Low level)	t_{CWL}	300	—	—	ns
clock set up time	t_{CSU}	300	—	—	ns
data set up sime	t_{SU}	200	—	—	ns
"FLM" set up time	t_{FSU}	200	—	—	ns
"M" delay time	t_{DM}	-1000	—	+1000	ns
"FLM" hold time	t_{FH}	0	—	—	ns
data hold time	t_{DH}	200	—	—	ns



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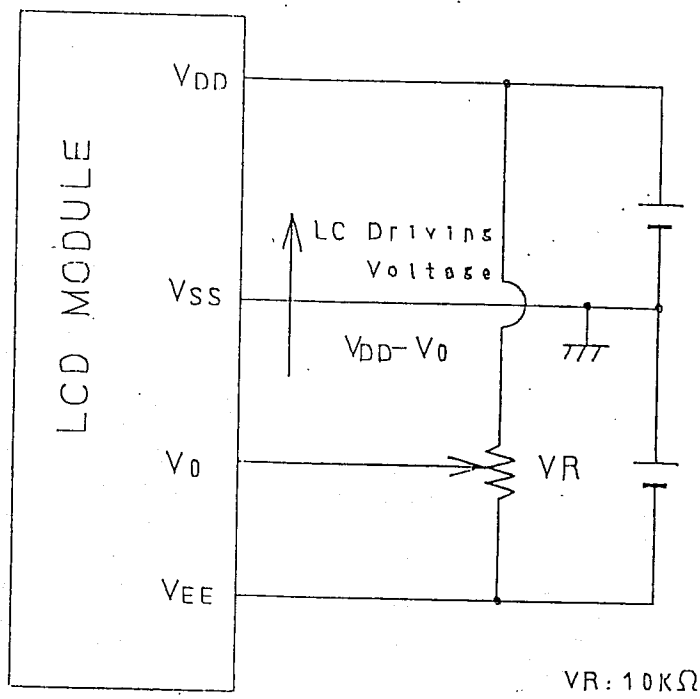
11. POWER SUPPLY for LCD MODULE



VR: 10KΩ~20KΩ

12. POWER AND INTERFACE TIMING SEQUENCE