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For Messrs;

Date; Apr. 22, '88

CUSTOMER'S ACCEPTANCE SPECIFICATIONS

LM213XB

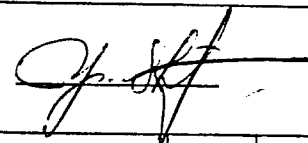
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RECORD OF REVISION

Date	Sheet No.	Summary

Accepted by ; _____

Proposed by ; 

Mobara Works Hitachi, Ltd.

Sh.
No.

3284PS 2501-LM213XB-2

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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 43.0H mm
- (4) Dot size 0.51W X 0.51 H mm
- (5) Dot pitch 0.56W X 0.56 H mm
- (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	XYZ directions
Shock	—	3G	—	50G	XYZ directions
Corrosive Gas	Not Acceptable		Not Acceptable		

Note 1 (Background color of LCD) $\xrightarrow{\text{Ta}=0^{\circ}\text{C}}$ Yellowish-orange \longleftrightarrow 25° C Yellow \longleftrightarrow 40° C Bluish-orange

Note 2 Ta at 20° C < 48Hr
Ta at 60° C < 168Hr

Note 3 Ta ≤ 40° 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

I T E M		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	V_{IH}		$0.8 \times V_{DD}$	—	V_{DD}	V	
	L	V_{IL}		0	—	$0.2 \times V_{DD}$	V	
input leak current		I_{in}		-5.0		5.0	μA	
Output leak current		I_{OUT}		-10.0		10.0	μA	
Clock frequency Note 2		fCL2		—		1.2	MHz	
Power consumption		PW	$V_{DD} = 5.0V$ $T_a = 25^\circ C$	—		250	mW	
Recommended LC driving voltage Note 3		$V_{DD}-V_0$	$\theta = 0^\circ$	$T_a = 0^\circ C$	—	14.1	—	V
			$\phi = 10^\circ$	$T_a = 25^\circ C$	—	13.3	—	V
				$T_a = 40^\circ C$	—	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 $\pm 0.5V$ by each module.

7. OPTICAL DATA

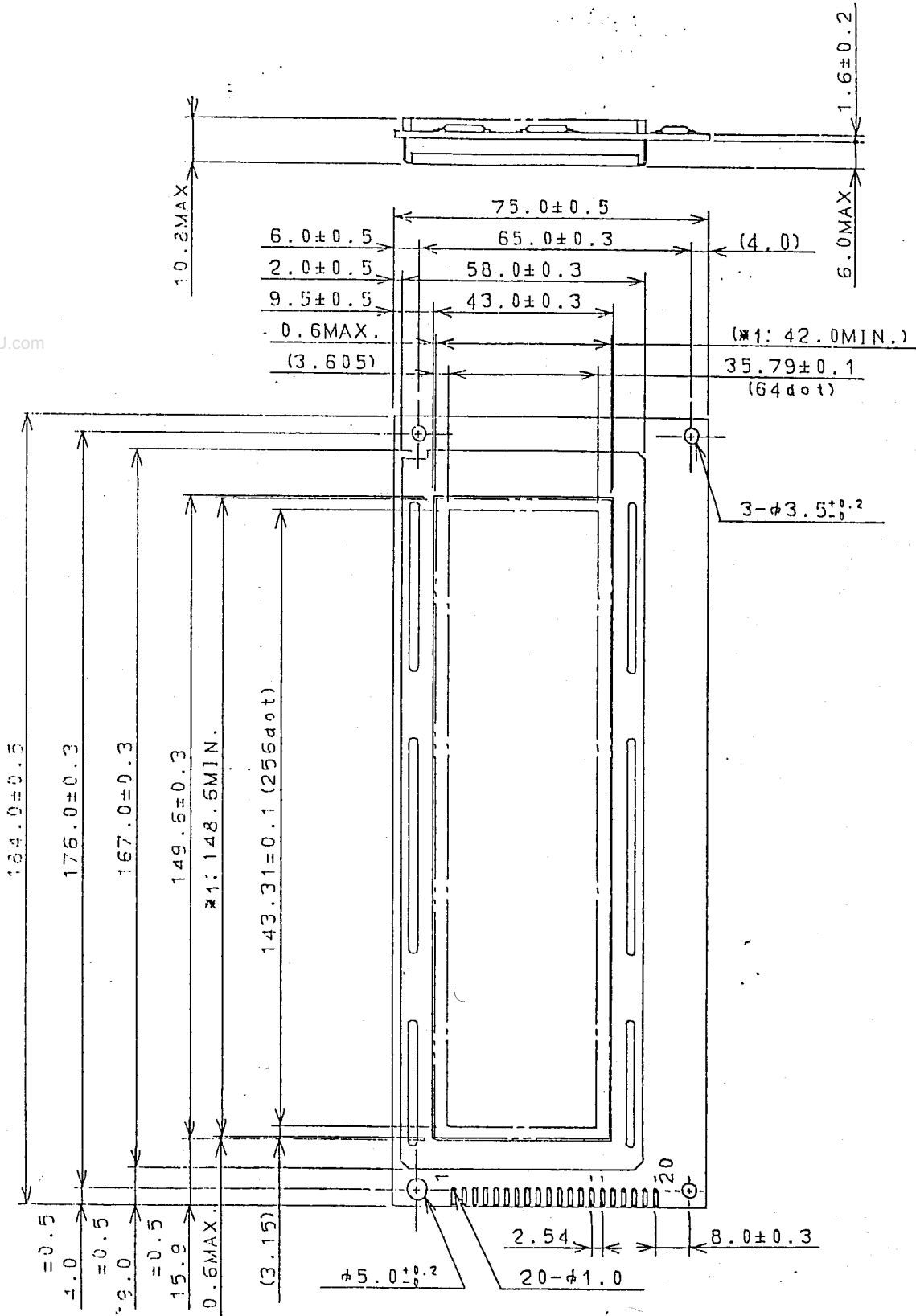
$T_a = 25^\circ C$ $V_{DD} = 5.0V$ $V_{EE} = -10.5V$

I T E M	SYMBOL	CONDITION	MIN.	TYP	MAX.	UNIT	NOTE
Viewing area	$\phi 2-\phi 1$	$K=1.4$	—	30	—	deg	1.2
Contrast ratio	K	$\phi = 10^\circ$ $\theta = 0^\circ$	1.4	2.0	—	—	3
Response time (rise)	t_r	$\phi = 10^\circ$ $\theta = 0^\circ$	—	250	—	ms	4
Response time (fall)	t_f	$\phi = 10^\circ$ $\theta = 0^\circ$	—	400	—	ms	4

Note1 See General Specifications for definition of optical characteristics.

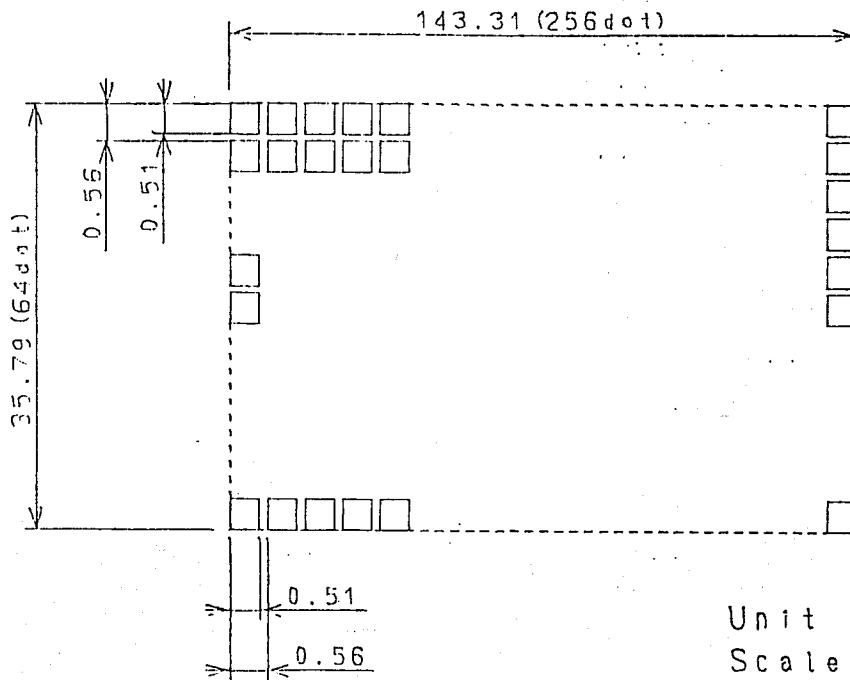
8. DIMENSIONAL OUTLINE

*1 : Effective display area of LCD



Unit : mm
Scale : NTS

Note 1 DETAIL DRAWING OF MATRIX PATTERN



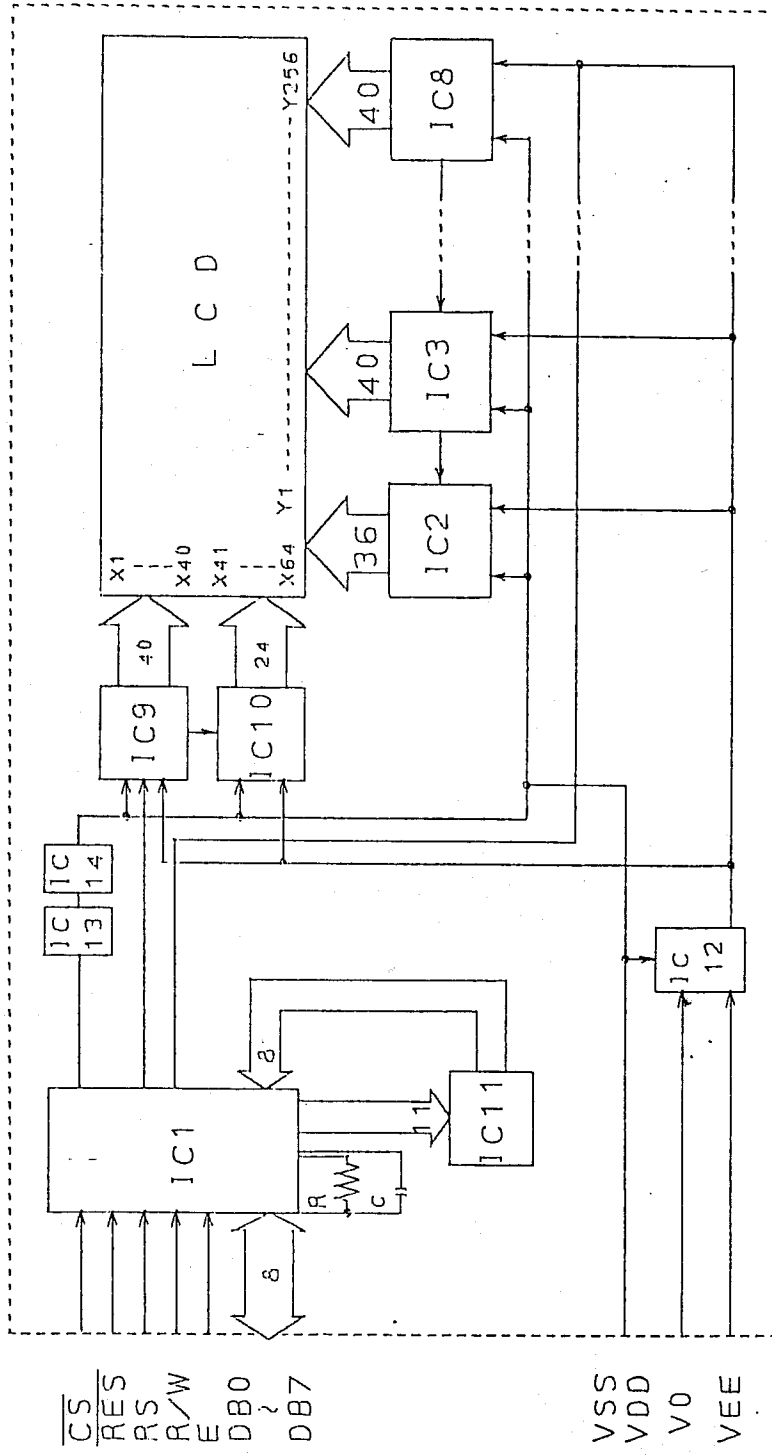
Unit : mm
Scale: NTS

No specified tolerance ± 0.1

Note 2 INTERNAL PIN CONNECTION

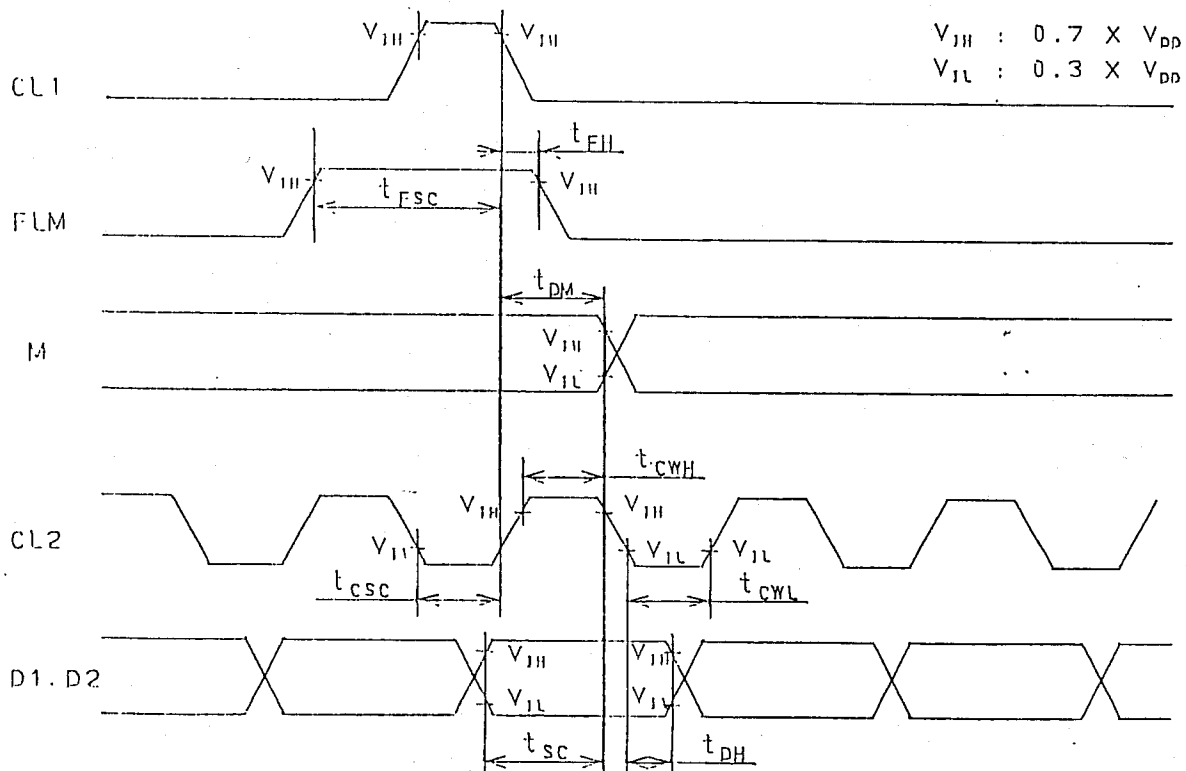
Pin No.	Symbol	Function
1	VSS	Ground
2	VDD	Power supply for logic
3	V0	Power supply for LCD drive
4	RS	Register select
5	R/W	Read/write
6	E	Enable
7~14	DB0~DB7	Data bus
15	\overline{CS}	Chip select
16	\overline{RES}	Reset
17	VEE	Power supply for LCD
18~20	N.C	No connection

9. BLOCK DIAGRAM

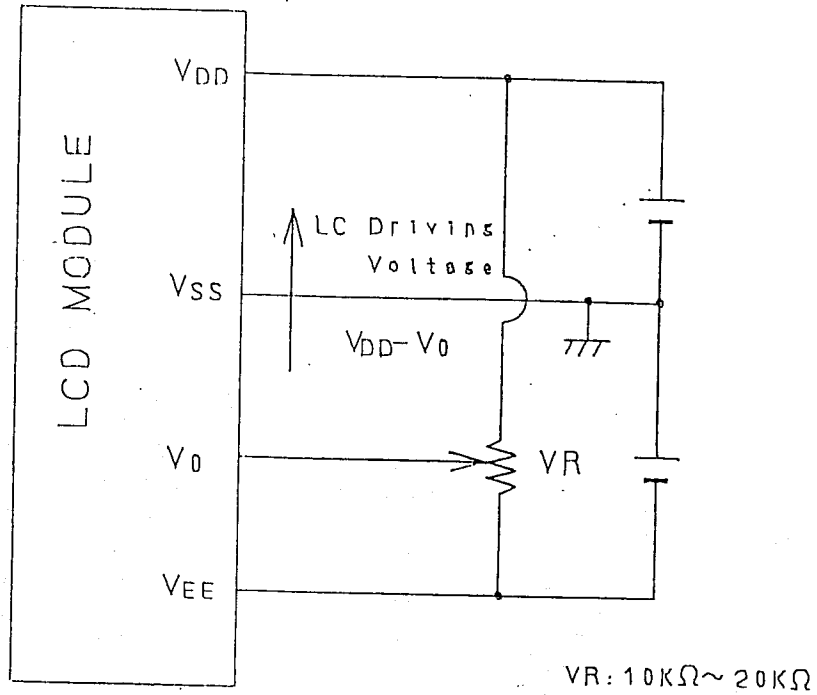


10. TIMING CHARACTERISTICS

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 time	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



11. POWER SUPPLY for LCD MODULE



12. POWER AND INTERFACE TIMING SEQUENCE

