SUBJECT SPECIFICATIONS FOR APPROVAL
LIQUID CRYSTAL DISPLAY EDM-DG64AA43D/EDM-LG64AA44D

1. APPLICATION
This specification defines quality requirements for the liquid crystal display of following Part No., manufactured by Matsushita Electronic Components Co.Ltd., to be delivered to LINUS TECHNOLOGY .

2. PRODUCTION CODE

Matsushita Code	EDM DG64AA43D
	EDM LG64AA44D

3. MECHANICAL CHARACTERISTICS
3.1 Outline Dimensions
See attached drawing DM-630113-01

3.2 Display Characteristics

· Resolution	640 x 400 dots	·	mm
· Pixel Pitch	0.32 x 0.32 mm	· Pixel Gap	0.04 x 0.04 mm
· Effective Area	204.76 x 127.96 mm	· Inspection Area	210.8 x 132 mm

· Display Type	POSITIVE YELLOW TRANSFLECTIVE
· Options	GREEN EL BACKLIGHT , CONNECTOR (BURNDY HBLB20R-1J)

3.3 Weight MAX 410 grams

4. ABSOLUTE MAXIMUM RATINGS

CHARACTERISTICS	SYMBOL	MIN.		MAX.	UNIT	REMARKS
1. Power Supply for Logic	$V_{DD} - V_{SS}$	0		6.0	V	
2. Power Supply for LCD Driver	$V_{DD} - V_{EE}$	0		28	V	
3. Input Logic Level	Vi	-0.3		V_{DD}+0.3	V	
4. Operating Temperature	Topr	0		40	℃	10 ~90%RH (NOTE 1)
5. Storage Temperature	Tstg	-20		+60	℃	10 ~90%RH (NOTE 2)

NOTE : 1) Max.wet bulb temp.=28 deg.℃ (non-condensing)
2) -41~60℃... within 1 hour, non-condensing.
When the display is moved from storage temperature into operating temperature, it must recover normal display characteristics within 4 hours.

5. OPERATIONAL CHARACTERISTICS

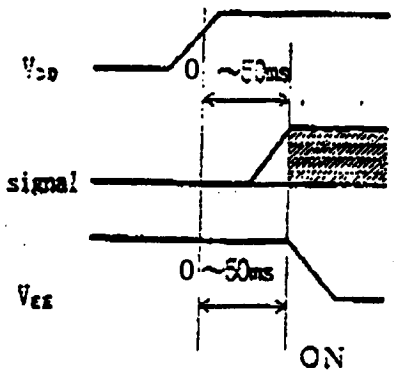
5.1 Electrical Circuits see attached drawing DM-630113-02

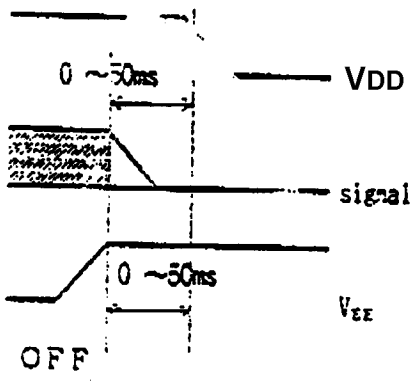
5.2 Electrical Characteristics

Ta = 0~40℃, VDD = 5V±5%, VEE = -22V, GND = 0V

CHARACTERISTICS	SYMBOL	MIN.	TYP.	MAX.	UNIT	REMARKS
1. Input Voltage	ViH	0.8VDD		VDD	V	
	ViL	0		0.2VDD	V	
2. Power Supply Current VDD = 5.0V VEE = -22V VLCD = -17V Checkered pattern f cpx = 2.40MHz	IDD		10	20	mA	Ta = 25 ℃
	IEE		13	20	mA	
3. Shift Clock Frequency	fcpx			3.0	MHZ	

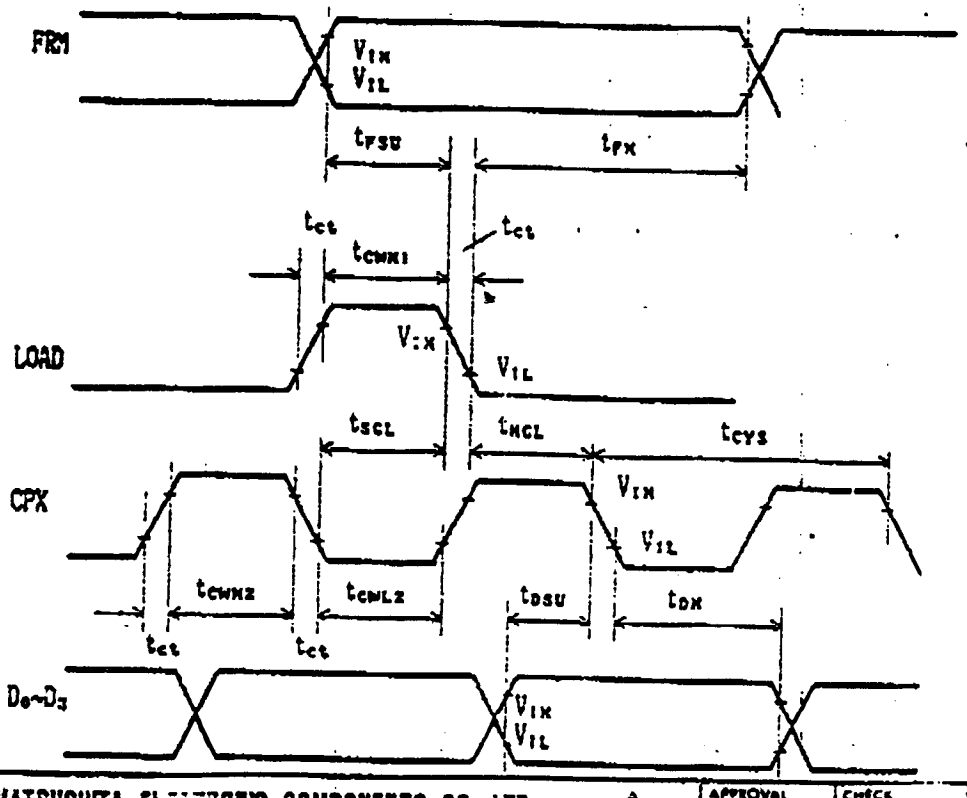
NOTE :Power Turn ON-OFF Sequence





5.3 Switching Characteristics (V_{DD}= 5.0 V ±0.25, V_{SS}= 0 V, Ta= 0~40℃)

item	symb.	min.	typ.	max.	単位
clock (cpx) cycle time	t_{CYS}	330	—	—	ns
clock (cpx) pulse width (H)	t_{CWHZ}	150	—	—	ns
clock (cpx) pulse width (L)	t_{CWLZ}	150	—	—	ns
clock (cpx) set up time	t_{SCL}	150	—	—	ns
clock (cpx) hold time	t_{HCL}	150	—	—	ns
rise / fall time (CPX, LOAD)	t_{ct}	—	—	50	ns
LOAD pulse width (H)	t_{CWH1}	150	—	—	ns
DATA set up time	t_{DSU}	130	—	—	ns
DATA hold time	t_{DH}	130	—	—	ns
FRAME set up time	t_{FSU}	200	—	—	ns
FRAME hold time	t_{FH}	200	—	—	ns



5.4 Interface Specification

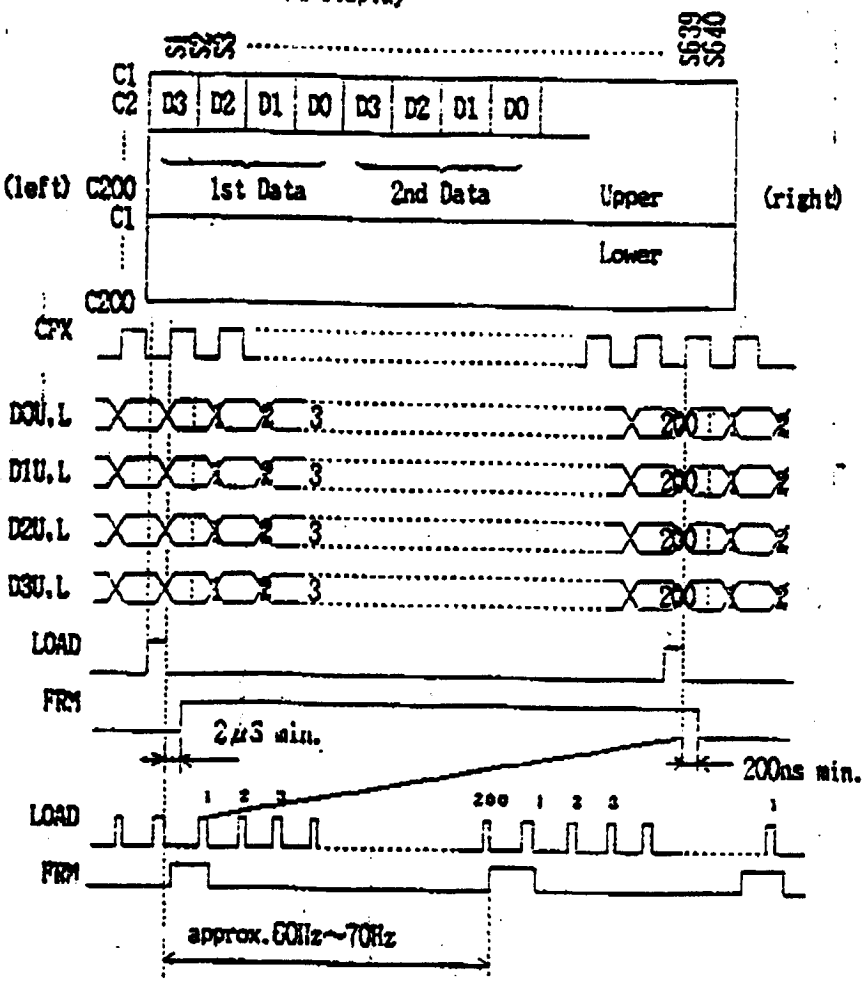
Interface is done by the 4 bit parallel data input to the 2 divided display (upper side and lower side).

Pin assignment is as follows:

Pin No	SYMBOL	CONTENTS	FUNCTIONS
1	V_{DD}	+5V	Power Supply for Logic
2	F.GND	GND	Metal Frame ground
3	CPX	Shift clock	Clock for shifting display data to column driver LSI
4	N.C.	——	open (DISPLAY OFF in case of EDM LG64AA44D) *1
5	FRM	Frame start	Initial signal for frame
6	LOAD	Latch pulse	Latch signal for display data and shift clock for frame data
7	V_{EE}	GND	Ground
8	N.C.	-----	open
9	D0U	Data	Data for upper screen
10	D1U	Data	Data for upper screen
11	D2U	Data	Data for upper screen
12	D3U	Data	Data for upper screen
13	V_{EE}	-22V	Minus Power Supply
14	V_{LCD}	-12 ~-21 V	LCD Drive Voltage
15	V_{SS}	GND	Ground
16	D0L	Data	Data for lower screen
17	D1L	Data	Data for lower screen
18	D2L	Data	Data for lower screen
19	D3L	Data	Data for lower screen
20	V_{SS}	GND	Ground

*1. In order to display, this pin has to be logically [illegible] (0V) in case of EDM LG64AA44D.

5.5 Relation between DATA and Display



6. OPTICAL CHARACTERISTICS (Ta=25°C, Frame Frequency=70Hz)

The measurement method is defined in Article 10 of this specification.

No.	Characteristic	Sym.	Condition	Min.	Typ.	Max.	Unit	Remarks
6.1	Response Time	t_{ON} / t_{OFF}	$\theta=0°$ $\Phi=0°$ V_{OPR}=22 V	- / -	250 / 500	350 / 650	ms	
6.2	Vertical Viewing Angle	θ_1 / θ_2	CR≧1.5 $\Phi=0°$	15 / 15			deg.	
6.3	Horizontal Viewing Angle	Φ_1 / Φ_2	CR≧1.5 $\theta=0°$	50 / 50			deg.	
6.4	Contrast Ratio	CR	$\theta=0°$ $\Phi=0°$ V_{OPR}=22 V	2.0	2.5		—	
6.5	Brightness of EL *1	B	$\theta=0°$ $\Phi=0°$ V_{OPR}=0 V	3.5	4.5		nit	100v AC 500 Hz

*1. Brightness is through th LCD panel, and parts No of EL device is EDP ELHG111.