Minilogic Device Corporation

MLC Series LCD Module Specification

Part No.	First Edition	Final Edition	Original Date	Customer No.
-	A	A	17/02/03	-

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Revisions

Date	Rev.	Modified Area				Description	Engineer Approved
		Elect.	Mech.	Pin Config.	Others.		
17/02/03	A					First Edition	Anthony Tsang

1.0 Application

- Instrument Display
- Telephone Display
- Automotive Display
- Small and Compact Handheld Device Display
- Tough Working Condition Display
- Unstable Voltage Supply Display
- Board Viewing Angle Display
- Stable Contrast Ratio Display

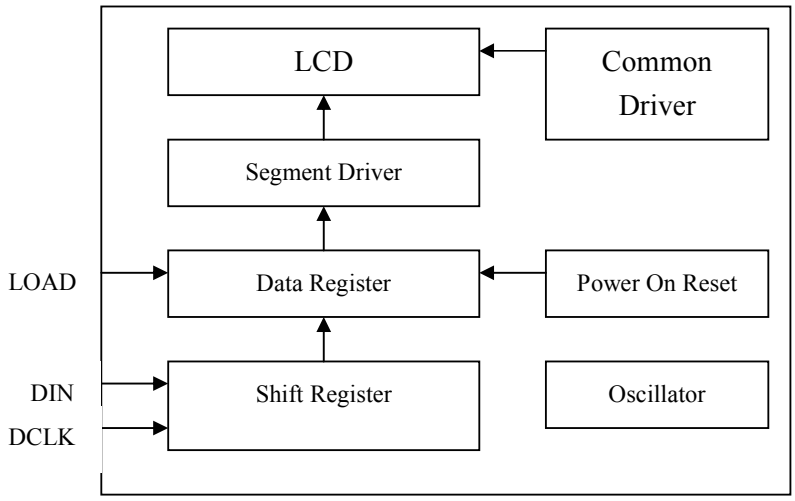
2.0 Features

- Simple 3 pin interference with microcontroller through DCLK, DIN, and LOAD.
- Typical Current Consumption: 25uA at VDD = 3V.
- Logic & LCD Power Supply: 3.0V to 6.0V
- Offer the best contrast ratio and widest viewing angle of TN LCD technology.
- NO temperature compensation is needed when Topt = -40℃ to 80℃

3.0 MLC Series General Description

The MLC is driven by our ML1001 COG LCD Driver. ML1001 static LCD COG (chip on glass) driver is a gold bump chip which targets at custom TN LCD COG module product which requires the best quality of TN LCD technology.
With the use of ML1001 series driver, it offers the best contrast, the widest viewing angle, a board range of operating voltage and operating temperature when compared to the multiplex method.

4.0 Block Diagram



5.0 Electrical Specification

5.1 Absolute Maximum Ratings

Parameter	Symbol	Condition	MIN	MAX	Unit
Supply voltage	V_{DD}		-0.5	+7.0	V
Supply Current	I_{DD}	V_{DD} = 3V, no Load	-50	+50	mA
Input Voltage	V_{IN}		GND-0.3	V_{DD} +0.3	V
Output Voltage	V_{OUT}		GND-0.3	V_{DD} +0.3	V
DC input Current	I_{IN}		-10	+10	mA
DC output Current	I_{OUT}		-10	+10	mA
Storage temperature	T_{stg}		-65	+150	^{o}C
Total power dissipation	P_{tot}		-	400	mW

5.2 DC Characteristics

V_{DD} = 3.0V; T_{amb} = 25^{o}C ; unless otherwise specified

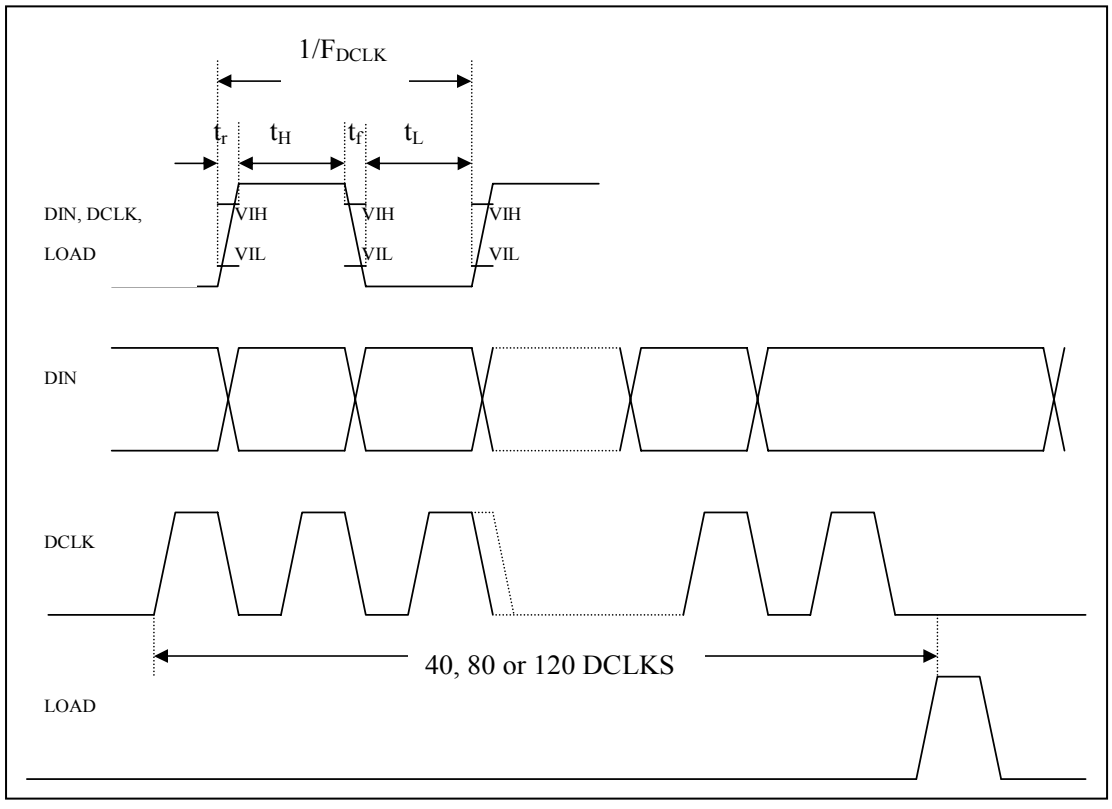
Parameter	Symbol	Condition	MIN	TYP	MAX	Unit
Supplies						
Supply voltage	V_{DD}		2.0	-	6.0	V
Supply Current	I_{DD}	Disable Oscillator	-	0.1	0.5	uA
Supply Current	I_{DD}	Enable Oscillator	-	25	60	uA
Logic						
LOW-level input voltage	V_{IL}		GND	-	0.3*V_{DD}	V
HIGH-level input voltage	V_{IH}		0.7*V_{DD}	-	V_{DD}	V
LOW-level output current	I_{OL}	V_{OL} = 1.0V	1	-	-	mA
HIGH-level output current	I_{OH}	V_{OH} = 2.0V	-1	-	-	mA
LCD outputs						
Output resistance at pads S1 to S40	R_{SEG}		-	85	150	ohm
Output resistance at pads COM1A and COM1B	R_{COM}		-	45	100	ohm

5.3 AC Characteristics

V_{DD} =3.0V; T_{amb} = 25°C; unless otherwise specified

Parameter	Symbol	Conditions	MIN	TYP	MAX	Unit
Oscillator frequency at pad OOUT	f_{oout}		21	32	48	kHz
FIN, LOAD, DIN, DCLK High time	t_H		0.4	-	-	us
FIN, LOAD, DIN, DCLK Low time	t_L		0.4	-	-	us
FIN, LOAD, DIN, DCLK Rise time	t_r		-	-	10	us
FIN, LOAD, DIN, DCLK Fall time	t_f		-	-	10	us
DCLK Frequency	F_{DCLK}		1	-	1,000	kHz

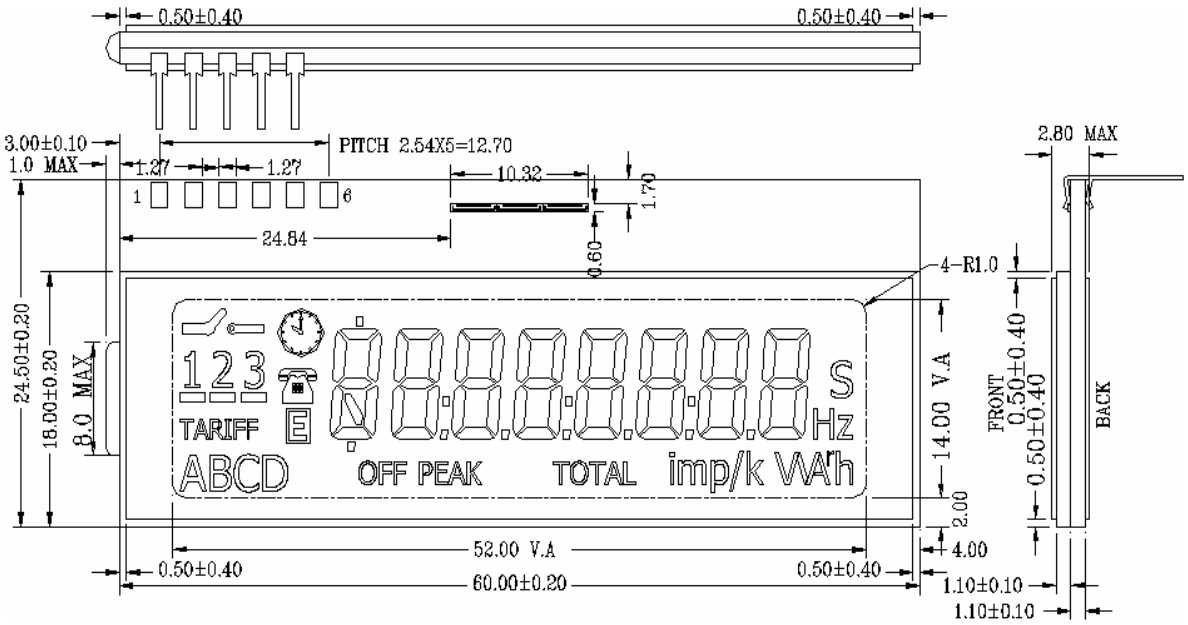
5.4 Timing Diagram



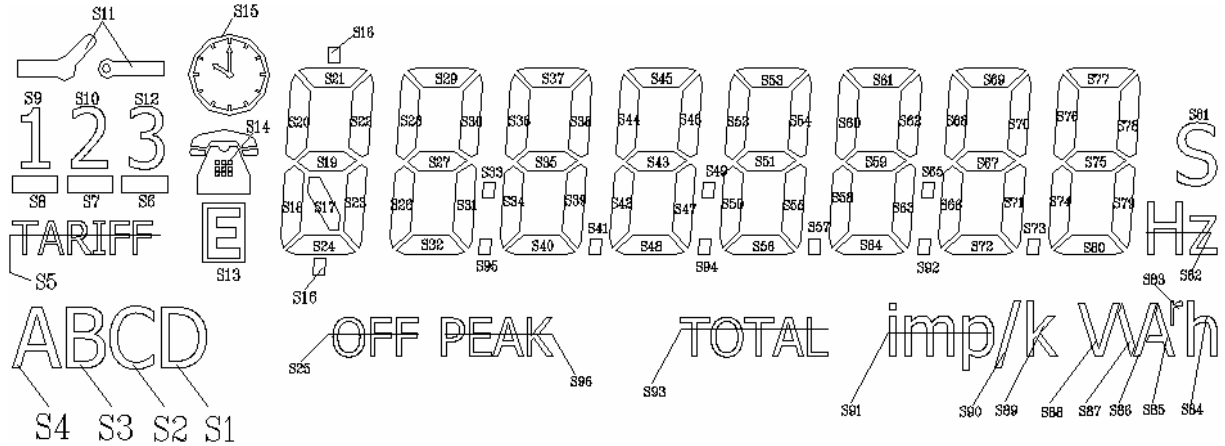
6.0 MLC8200 Pin Assignment

PIN NO.	SYMBOL	LEVEL	FUNCTION
1	VDD	-	Power Supply, 2V to 6V
2	GND	-	Logic Ground
3	LOAD	L→H	Load data to data register
4	DIN	H/L	Display Data DIN=H Segment ON DIN=L Segment OFF
5	DCLK	L→H	Load data to shift register

8.0 MLC8200 Mechanical Dimension



9.0 MLC8200 Segment Orientation



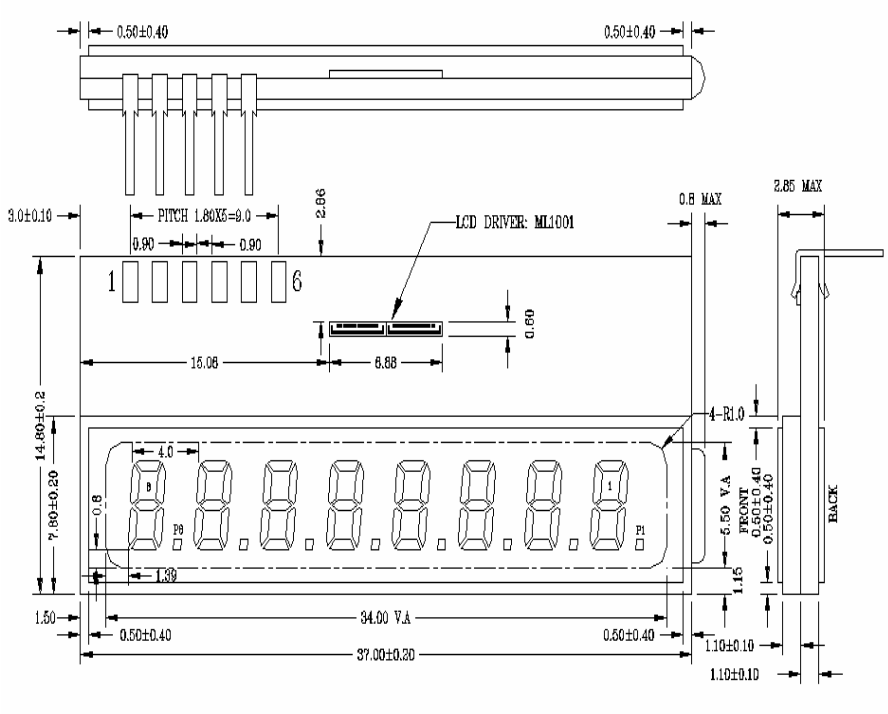
10.0 General Specification of MLC8200

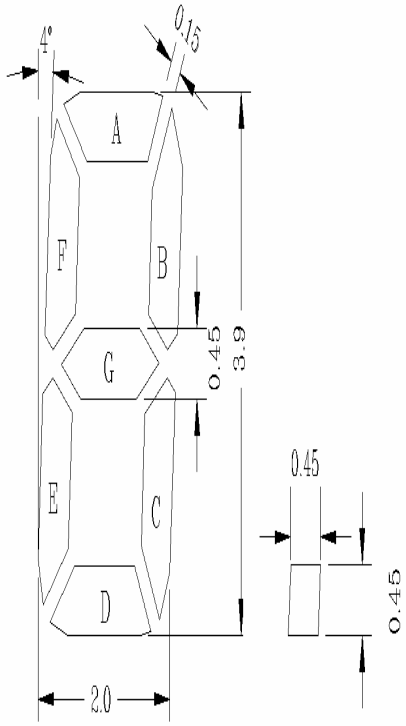
Top glass dimension	: 60.00±0.2 (H) X 18.00±0.2 (W) mm
Bottom glass dimension	: 60.00±0.2 (H) X 24.50±0.2 (W) mm
Thickness of LCD (max)	: 2.85 mm
Thickness of top glass	: 1.10 mm
Thickness of bottom glass	: 1.10 mm
Viewing area	: 52.00±0.2 (H) X 14.00±0.2 (W) mm
Duty Ratio	: 1
Operating Voltage	: 2.5 V to 5.0 V
Storage temperature	: -25 to +85℃
Operating temperature	: -20 to +80℃
Top Polarizer	: Transmissive
Bottom Polarizer	: Reflective
End Seal	: Left
Length of pin	: 10 mm
Pitch of pin	: 2.54 mm

12.0 MLC8213 Pin Assignment

PIN NO.	SYMBOL	LEVEL	FUNCTION
1	VDD	-	Power Supply, 2V to 6V
2	GND	-	Logic Ground
3	LOAD	L→H	Load data to data register
4	DIN	H/L	Display Data DIN=H Segment ON DIN=L Segment OFF
5	DCLK	L→H	Load data to shift register

13.0 MLC8213 Mechanical Dimension





14.0 MLC8213 Segment Orientation

SEG	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10
NAME	8D	8E	8F	8A	8B	8G	8C	P8	7D	7E
SEG	S11	S12	S13	S14	S15	S16	S17	S18	S19	S20
NAME	7F	7A	7B	7G	7C	P7	6D	6E	6F	6A
SEG	S21	S22	S23	S24	S25	S26	S27	S28	S29	S30
NAME	6B	6G	6C	P6	5D	5E	5F	5A	5B	5G
SEG	S31	S32	S33	S34	S35	S36	S37	S38	S39	S40
NAME	5C	P5	4D	4E	4F	4A	4B	4G	4C	P4
SEG	S41	S42	S43	S44	S45	S46	S47	S48	S49	S50
NAME	3D	3E	3F	3A	3B	3G	3C	P3	2D	2E
SEG	S51	S52	S53	S54	S55	S56	S57	S58	S59	S60
NAME	2F	2A	2B	2G	2C	P2	1D	1E	1F	1A
SEG	S61	S62	S63	S64						
NAME	1B	1G	1C	P1						

15.0 General Description of MLC8213

Top glass dimension	: 37.00±0.2 (H) X 7.80±0.2 (W) mm
Bottom glass dimension	: 37.00±0.2 (H) X 14.80±0.2 (W) mm
Thickness of LCD (max)	: 2.85 mm
Thickness of top glass	: 1.10 mm
Thickness of bottom glass	: 1.10 mm
Viewing area	: 34.00±0.2 (H) X 5.50±0.2 (W) mm
Duty Ratio	: 1
Operating Voltage	: 3.0 V to 5.0 V
Storage temperature	: -30 to +80℃
Operating temperature	: -20 to +70℃
Top Polarizer	: Transmissive
Bottom Polarizer	: Reflective
End Seal	: Right
Length of pin	: 6.25 mm
Pitch of pin	: 1.80 mm