PREPARED BY: DATE	SHARP	SPEC No. LC95408
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APPROVED BY: DATE	LIQUID CRYSTAL DISPLAY GROUP SHARP CORPORATION	ISSUED Apr. 26. 1995
		PAGE 16 Pages
		APPLICABLE DIVISION
	SPECIFICATION	■DUTY PANEL DEVELOPMENT CENTER □TFT DEVELOPMENT CENTER □LCD PRODUCTS DEVELOPMENT CENTER □EL PRODUCTION DEPT.

SPECIFICATION FOR

Passive Matrix COLOR LCD Module

Model No.

LM16X212

□CUSTOMER'S APPROVAL

DATE

BY

PRESENTED BY Y. Inoue

Y. Inoue
Department General Manager
Engineering Department 2
DUTY Panel Development Center
NARA LCD Group
SHARP Corporation

2. Construction and Outline

Construction : 5 X 7 dot + cursor, 16-character 2-line dot-matrix display module (Built-in Yellow-green backlight LED, positive type)

Outline : See Fig.7.

Interface signals : See Table 5.

Character pattern details : See Fig.7.

Character codes : See Table 9.

There shall be no scratches, stains, chips, distortions and other external drawbacks that may affect the display function. Rejection criteria shall be noted in Inspection Standard (S-U-009).

3. Mechanical Specifications

Table 1

Parameter	Specification	Unit
Outline dimensions	84(W) X 44(H) X 16 MAX(D)	mm
Effective display area	61(W) X 15.8(H)	mm
Display format	16 characters X 2 lines	-
Character format	5 X 7 dots with cursor	-
Character size	2.96(W) X 4.86(H)(5 X 7 dots)	mm
Dot size	0.56(W) X 0.66(H)	mm
Dot spacing	0.04	mm
Character color *	Dark blue	-
Backlight color	Yellow green	-
Weight	Approx. 40	g

* Due to characteristics of the LC Material, the color vary with environmental temperature.

4. Electrical Specifications

4.1 Absolute maximum ratings

Table 2

Parameter	Symbol	Min.	Max.	Unit	Remark
Supply voltage(Logic)	VDD-VSS	-0.3	6.5	V	
Supply voltage(LCD drive)	V0-VSS	0	6.5	V	VDD>V0
Supply current(Backlight LED)	ILED	-	240	mA	Ta=25℃
Input voltage	VIN	-0.3	VDD+0.3	V	
Storage temperature	Tstg	-25	70	℃	
Operating temperature	Topr	0	50	℃	
Reverse voltage(Backlight LED)	VLED-VLSS	-5	-	V	

4.2 Electrical characteristics

Table 3 (Ta=25℃)

Parameter		Symbol	Min.	Typ.	Max.	Unit	Condition
Supply voltage(Logic)		VDD-VSS	4.75	5	5.25	V	
Supply voltage (LCD drive)		V0-VSS		0.65*		V	VDD=5V
Input voltage	"L"	VIL	-0.3	-	0.6	V	
	"H"	VIH	2.2	-	VDD	V	
Output voltage	"L"	VOL	-	-	0.4	V	IOL=1.2mA
	"H"	VOH	2.4	-	-	V	-IOH=0.205mA
Input leakage current		IIL	-	-	1	uA	
Internal oscillating frequency		fosc		250		KHz	
Supply current		IDD		1.6	2.2	mA	VDD=5v, V0=0V
		ILED		120	180	mA	VLED-VLSS=5V
Power dissipation		Pd		608	911	mW	VDD=5V, V0=0V VLED-VLSS=5V
Supply voltage (Backlight LED)		VLED-VLSS	4.75	5	5.25	V	

* Note. After over 30 minutes since backlight begin lighting.

4.3 Timing characteristics

Table 4

VDD=5.0V±5%
Ta=0~50℃

Parameter	Symbol	Min.	Typ.	Max.	Unit
Enable cycle time	tcycE	1000	-	-	ns
Enable pulse width	PWEH	450	-	-	ns
Enable rise/fall time	tEr,tEf	-	-	25	ns
RS,R/W setup time	tAS	140	-	-	ns
Address hold time	tAH	10	-	-	ns
Data setup time	tDSW	195	-	-	ns
Data delay time	tDDR	-	-	320	ns
Data hold time(write)	tH	10	-	-	ns
Data hold time(read)	tDHR	20	-	-	ns

Timing chart: See Fig.1.

4.4 Interface signals

Table 5

Pin No.	Symbol	Description	Connection
1	VSS	Ground potential	GND:0V
2	VDD	Power supply	+5V
3	V0	Contrast adjustment voltage	Adjust the contrast by changing the supply voltage from 0V to 5V.
4	RS	Register select signal	Control signal inputs (For details, see section 6 and 7.)
5	R/W	Read/write select signal	
6	E	Operation(data read/write enable signal)	
7	DB0	Code I/O data LSB	Data bus line :DB7 may also be used to check the busy flag. :Lines DB0~DB3 are not used when interfacing with a 4-bit microprocessor. (For details, see section 6 and 7.)
8	DB1	Code I/O data 2nd bit	
9	DB2	Code I/O data 3rd bit	
10	DB3	Code I/O data 4th bit	
11	DB4	Code I/O data 5th bit	
12	DB5	Code I/O data 6th bit	
13	DB6	Code I/O data 7th bit	
14	DB7	Code I/O data MSB	
15	VLED	Power supply (+)	5V power supply between VLED and VLSS.
16	VLSS	Power supply (-)	

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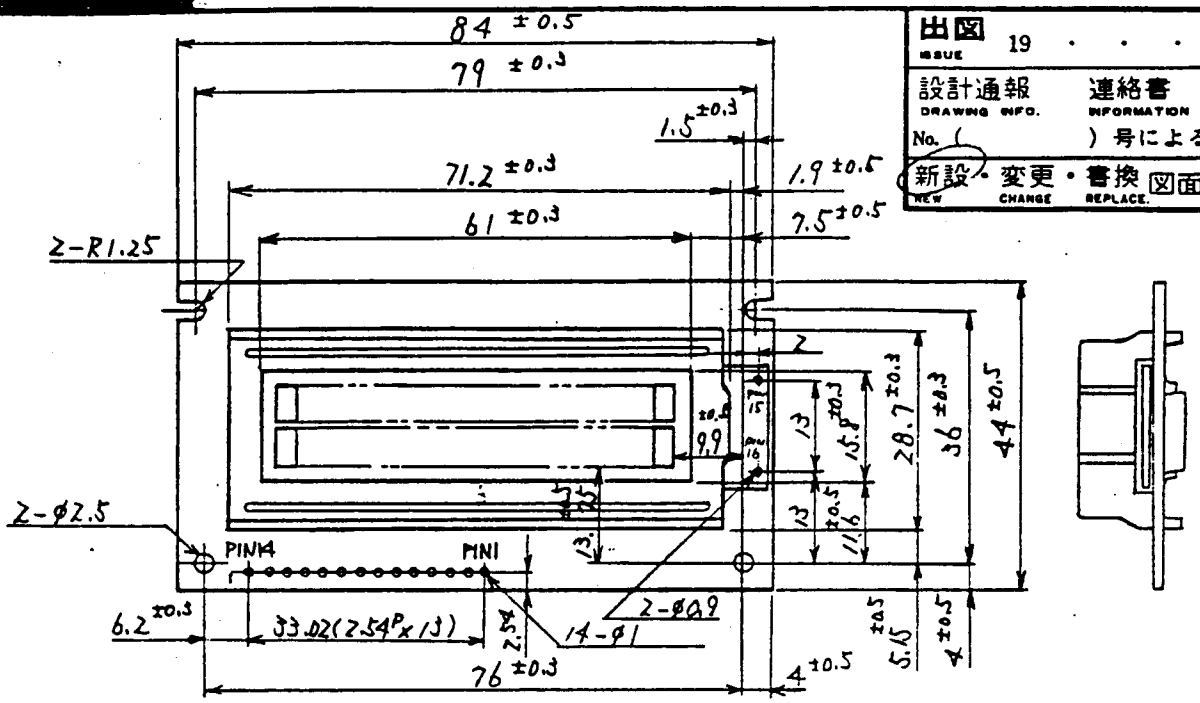
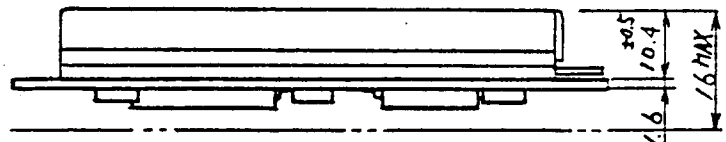
設計通報 DRAWING INFO. 連絡書 INFORMATION

No. ( ) 号による

新設・変更・書換 図面 NEW CHANGE REPLACE.



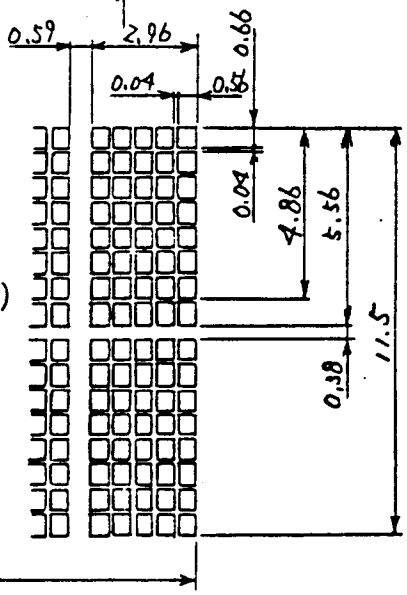


*	**
1	V_{SS}
2	V_{DD}
3	V_0
4	RS
5	R/W
6	E
7	DB_0
8	DB_1
9	DB_2
10	DB_3
11	DB_4
12	DB_5
13	DB_6
14	DB_7

* Pin No.
** Display Signal

*	**
15	V_{LED}
16	V_{LSS}

Dot Size
(5=5/1)



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⚠	19 ・ ・				LM16X21A
	年月日 DATE	訂正記事 REVISE	設通No.	担当 PREPA	適用機種 MODEL LM162A01

材質 MATERIAL	板厚 THICKNESS	仕上 FINISH	尺度 SCALE 1/1	名称 NAME	Fig. 7 Unit Outline Dimensions
				記号 SYMBOL	
				部品コード PARTS CODE	

設計 DESIGN	本図 TRACE	検図 CHECK	検図 CHECK	承認 APPROVE	シャープ株式会社 SHARP CORPORATION 発行部門 LCD Division	作成日付 DATE 1986・9・4・	図番 DRAWING No. ODI62A01101
	岡田	打田	野村	打田			