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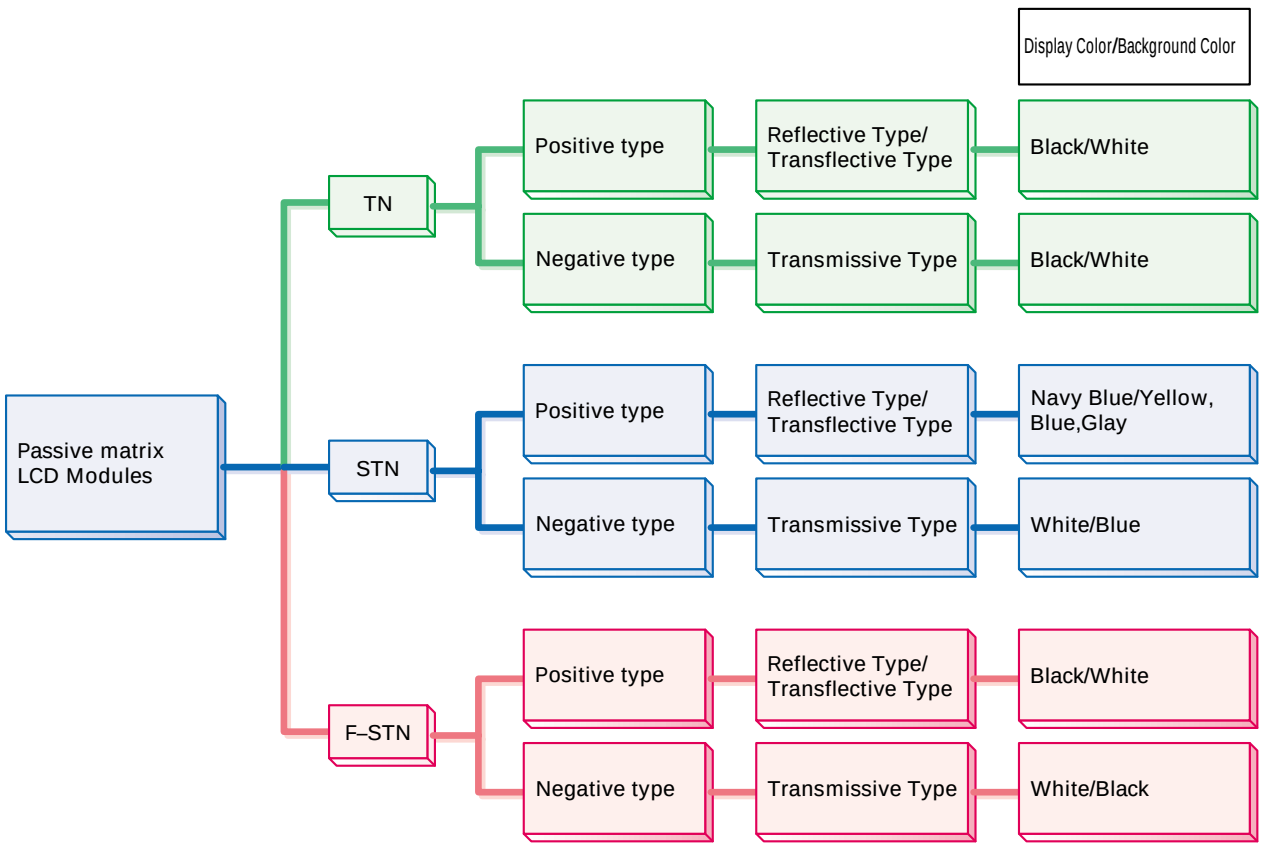
Introduction

- Hosiden offers from the panels only to module assemblies with drive IC and backlight.
- Hosiden quickly provide high-quality products complied with custom specifictation, such as custom design of display patterns and panel sizes.
- All products operate under a wide temperature range and offer high reliability.
- A wide variety of display types are available, such as TN, STN, Multi-Color STN, and printed types.
- Modules can be designed and produced incorporating drive circuits, backlighting, and key switches upon request.
- Electrode connection methods such as conductive rubber, clip terminals, heat seals, and FPC are available.

Standard P-LCD Modules Modes



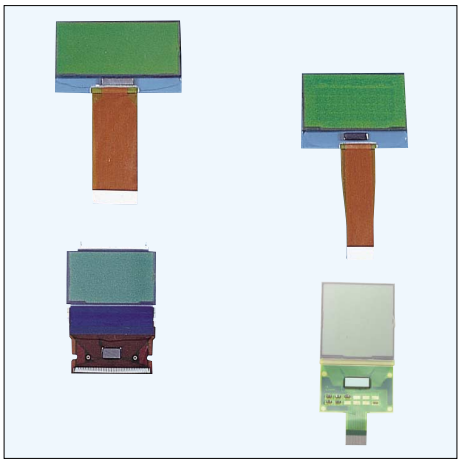
LCD Modules for Mobile Communication

Features

- Various IC mounting types are available (TAB, COB, COG, COF) per customer's requirement.
- Various interface types are available (FPC, Heat Seal, Pin) per customer's requirement.
- LCD controller and DC/DC voltage converter are included.

Applications

- Mobile phones/Pagers/PDA/Handy-Terminals



Specifications (Customer needs)

Display Type	Graphic type	Character type
Display Mode	TN, STN, F-STN	
Display Format	Max. 168×64 dots + Icon	Max. 4 rows by 12 columns
Duty Ratio	up to 1/64	up to 1/34
Supply Voltage	1.8 V to 5.5 V (Internal LCD drive supply)	
Interface	8 bit parallel or serial	4/8 bit parallel, IIC or serial

Color STN LCD Modules

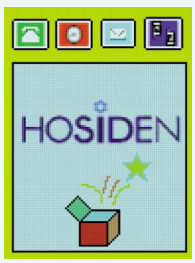
Features

- Clear transflective color display with optimizing a color filter and a single polarizer type STN.
- 256 or 4096 and 65000 colors
- Low power with built in DC/DC converter and RAM.

Applications

- Mobile Phones/Pagers/PDA

Color Display



Color Display

Specifications (Customer needs)

Display Format	128(RGB)×160 dots
Dot Pitch	0.08(RGB)×0.24mm
Supply Voltage	1.8V to 3.6V
Interface	8/16 bit parallel, SPI

High-brightness type and high-speed type are available. according to your requirement.

STN LCD Modules for Automobile

Features

- Wide operating temperature.
- High contrast ratio.
- Stability of temperature characteristic for black background is improved.

Applications

- Information display for Automobile/Industrial Equipment.

Specifications (Customer needs)

Contrast Ratio	30 (typ.)
Response Time	400 ms (typ.)
Operating Temperature	-30 to +80 ˚C
Storage Temperature	-40 to +85 ˚C
Back light	RED LED

STN LCD Modules (Reflective type) for PDA

Features

- High contrast display. (2-Lines Selection Addressing)
- Good visibility achromatic display. (4 gray scale display)
- Compact, thin, light weight.
- Built-in controller model is also available.
- Low power consumption. (with built-in RAM)

Applications

- PDA/Palm Top PC

Specifications (Customer needs)

Logic Supply Voltage	3.3 V
LCD Supply Voltage	20 V to 36 V
Power Consumption	10 mW (typ.)
Contrast Ratio	10 (typ.)
Response Time	500 ms (typ.)

✻Transflective and transmissive types.
(Back light: LED, EL, CCFL, etc.) are available per customer's requirement.

HOSIDEN

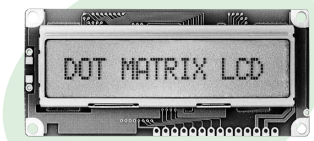
Standard design P-LCD Modules (Character type)

Features

- The built-in character generater ROM displays 160 kinds of texts such as alphanumeric texts and symbols.
- The built-in character generator RAM displays the text or pattern of your choice.
- HD44780 or the equivalent can be used for the controller.
- Direct interface capability available for 4 or 8 bit MPUs.
- The module is fully loaded with instructional functions.
- A full lineup, including TN or STN and reflective or transflective type, offers various choices to fit customers' requirements.

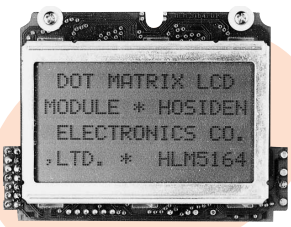
Specifications

Model		HLM3205	HLM3169	HLM3176	HLM3168	HLM3177	HLM3164	HLM3184	HLM3202
	STN	HLM5205	HLM5169	HLM5176	HLM5168	HLM5177	HLM5164	HLM5184	HLM5202
Display Format (Characters×lines)		16×1	16×1	16×1	16×2	16×2	16×4	16×4	20×2
Display Mode		Reflective	Reflective	Transflective	Reflective	Transflective	Reflective	Transflective	Reflective
	TN	Black & White							
	STN	Yellow / Silver							
Outline Dimensions W×H×T (mm)		83×36×10	80×36×8	80×36×18	80×36×8	84×44×17.6	82×60×10	82×60×10	116×35×10
Effective Display Area W×H(mm)		65.6×13.0	65.6×13.8	65.6×13.8	61.5×16.5	61.5×16.5	62.1×34	62.1×34	83×18.6
Character Size W×H(mm)		3.2×5.2	3.2×5.2	3.2×5.2	2.95×5.55	2.95×5.55	2.9×4.1	2.9×4.1	3.2×5.55
Dot Size W×H(mm)		0.6×0.7	0.6×0.7	0.6×0.7	0.55×0.65	0.55×0.65	0.5×0.5	0.5×0.5	0.6×0.65
Supply Voltage (V)		+5.0	+5.0	+5.0	+5.0	+5.0	+5.0	+5.0	+5.0
Driving Method (duty)		1/16	1/16	1/16	1/16	1/16	1/16	1/16	1/16
Backlight		—	—	LED	—	LED	—	EL	—
Operating Temperature (°C)		0~50							
Storage Temperature (°C)	TN	–20~70							
	STN	–20~60							



HLM5205

HLM3168



HLM5164

HLM3202

HOSIDEN

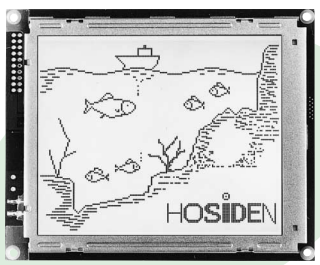
Standard design P-LCD Modules (Graphic type)

Features

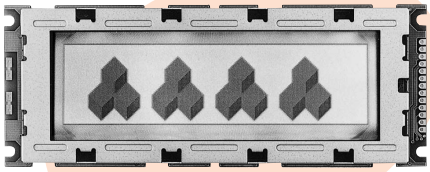
- Full-dot, large-capacity dot matrix module.
- STN type used in this LCD module provides high contrast and a wider viewing angle.
- This module is made in compact, thin, and light utilizing mounting technology.
- Driving circuit incorporates a C-MOS LSI for lower power consumption.
- An external mounted control LSI enables the interface with a various MPU.

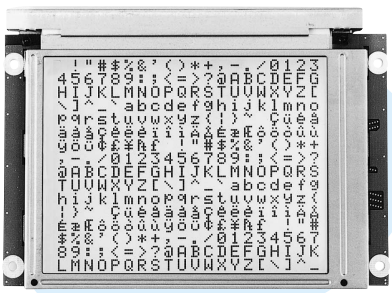
Specifications

Model	HLM6160	HLM6242	HLM6241	HLM6243	HLM6321	HLM6323	HLM6325
Display Format (Characters×lines)	160×128	240×48	240×64	240×64	320×240	320×240	320×240
Display Mode	Transflective	Reflective	Reflective	Transmissive	Transflective/ Transmissive	Transflective/ Transmissive	Transmissive
	Silver	Silver	Yellow / Silver	Blue	Silver / F-STN	Blue / F-STN	Blue
Outline Dimensions W×H×T (mm)	129×104.5×14	161×52×10.1	149×57×13	157×57×14	153×110×12.5	157.8×121.6×11.5	167×110×15
Effective Display Area W×H(mm)	101×82	116×36	114×35	114×35	112×85	121×91.6	122×92
Dot Size W×H(mm)	0.56×0.56	0.42×0.42	0.42×0.42	0.42×0.42	0.30×0.30	0.33×0.33	0.33×0.33
Dot Pitch W×H(mm)	0.6×0.6	0.45×0.45	0.45×0.45	0.45×0.45	0.33×0.33	0.36×0.36	0.36×0.36
Supply Voltage (V)	+5.0/-15.0	+5.0/-20.0	+5.0/-15.0	+5.0/-15.0	+5.0/-23.0	+5.0/-23.0	+5.0/-23.0
Driving Method (duty)	1/64	1/48	1/64	1/64	1/240	1/240	1/240
Backlight	EL	–	(EL)	CCFL	CCFL	CCFL	CCFL
Operating Temperature (°C)	0~40	0~40	0~40	0~40	0~40	0~40	0~40
Storage Temperature (°C)	±20~60	±20~60	±20~60	±20~60	±20~60	±20~60	±20~60
Remarks	Built-in Controller		Versions with EL backlight are available		Thin version	Thin version	



HLM6160


HLM6241


HLM6321

Optical Characteristics (Character Type)

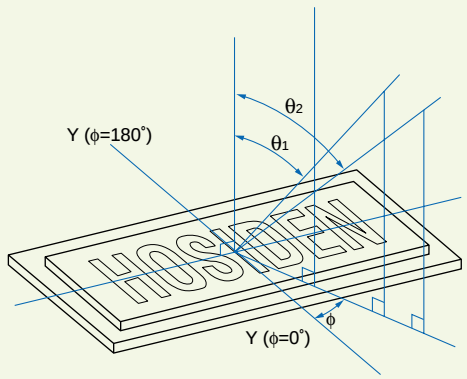
TN (1/16 Duty Reflective Type) Ta=25°C

Item	Symbol	Conditions	Min.	Typ.	Max.	Unit	Remarks
Viewing Angle	$\theta_2-\theta_1$	C_R>1.4	20	—	—	deg.	(Note 1) (Note 2)
Contrast Ratio	C_R	θ=25° ϕ=0°	6	—	—	—	(Note 3)
Rise Time	tr	θ=25° ϕ=0°	—	80	150	ms	(Note 4)
Decay Time	td	θ=25° ϕ=0°	—	175	350	ms	

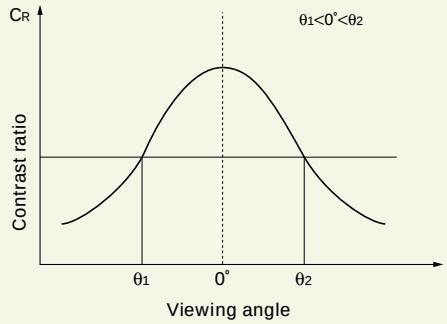
STN (1/16 Duty Yellow Mode) Ta=25°C

Item	Symbol	Conditions	Min.	Typ.	Max.	Unit	Remarks
Viewing Angle	$\theta_2-\theta_1$	C_R>1.4	45	—	—	deg.	(Note 1) (Note 2)
Contrast Ratio	C_R	θ=25° ϕ=0°	10	—	—	—	(Note 3)
Rise Time	tr	θ=25° ϕ=0°	—	200	300	ms	(Note 4)
Decay Time	td	θ=25° ϕ=0°	—	250	350	ms	

(Note 1) Definition of viewing direction θ and ϕ

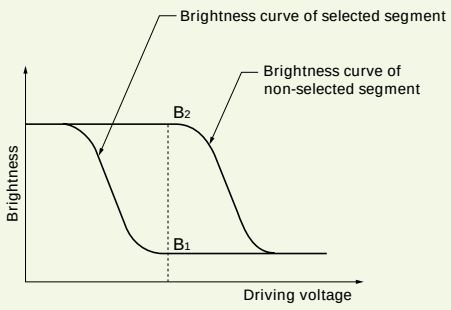


(Note 2) Definition of viewing angle θ1 and θ2

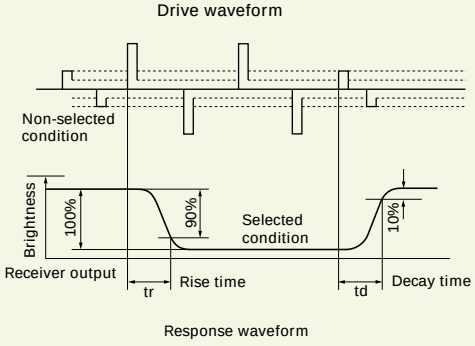


(Note 3) Definition of contrast ratio C_R

$$C_R = \frac{\text{Brightness in non-selected segment}(B_2)}{\text{Brightness in selected segment}(B_1)}$$



(Note 4) Definition of optical response time



Optical Characteristics (Graphic Type)

Ta=25°C

Item	Conditions	Duty 1/N	Yellow, Silver mode Reflective type			Blue mode Transmissive type			Black and white mode Transmissive type			Unit	Remarks
			Min.	Typ.	Max.	Min.	Typ.	Max.	Min.	Typ.	Max.		
Viewing Angle θ (ϕ, 0°–180°)	C_R>1.4	64	–20		30	–20		30	–20		30	deg.	(Note 1) (Note 2)
		100	–20		30	–20		30	–20		30		
		200	–20		20	–20		20	–20		20		
		240	–20		20	–20		20	–20		20		
Viewing Angle θ (ϕ, 90°–270°)	C_R>1.4	64	–30		30	–30		30	–30		30	deg.	
		100	–30		30	–30		30	–30		30		
		200	–30		30	–30		30	–30		30		
		240	–30		30	–30		30	–30		30		
Contrast Ratio C_R	Ta=25C° θ=0° ϕ=0°	64		6			7			30			(Note 3)
		100		5			6			25			
		200		4			5			20			
		240		3			4			18			
Rise Time tr	Ta=25C° θ=0° ϕ=0°	64		200	250		200	250		200	250	msec	(Note 4)
		100		200	250		200	250		200	250		
		200		250	300		250	300		250	300		
		240		250	350		250	350		250	350		
Decay Time td	Ta=25C° θ=0° ϕ=0°	64		200	250		200	250		200	250	msec	
		100		200	250		200	250		200	250		
		200		250	300		250	300		250	300		
		240		250	350		250	300		250	350		

✻Specifications are subject to change without prior notice due to technical improvements.

See Page7

Custom LCD Specification Check List (English)

◆ Please specify the following items when making an inqulry.

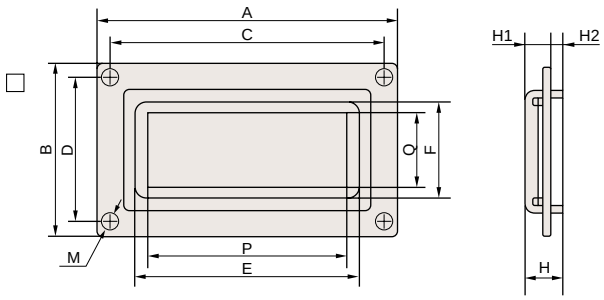
〈1. Company〉 _____ 〈2. Div/Dept〉 _____ 〈3. Application〉 _____

〈4. Design〉

☐New ☐Modify: Manufacturer _____ Part No. _____ Remarks _____

☐Equivalent: Manufacturer _____ Part No. _____ Remarks _____

〈5. LCD Dimensions〉



A×B : Module size _____ × _____ mm

E×F : Viewing area _____ × _____ mm

P×Q : Active display area _____ × _____ mm

C : Distance between mounting holes _____ mm

D : Distance between mounting holes _____ mm

M : Diameter of mounting hole _____ mm

H : Total thickness _____ mm

H1 : Upper thickness _____ mm

H2 : Lower thickness _____ mm

〈6. Display Contents〉

☐Character type: _____ Characters _____ lines

Character dots _____ × _____ dots + cursor

Character pitch _____ × _____ mm

Dot pitch _____ × _____ mm

Dot size _____ × _____ mm

☐Graphics (Full dot) type: _____ × _____ dots

Dot pitch _____ × _____ mm

Dot size _____ × _____ mm

☐Segment type: _____ digits _____ lines

☐Others _____

〈7. LCD Panel〉

Viewing angle: ☐6 o'clock ☐12 o'clock ☐____ o'clock

Type: ☐TN

☐STN(☐Yellow green ☐Silver ☐Blue)

☐F-STN (Black and White)

☐Positive type ☐Negative type

☐Reflective ☐Transflective ☐Transmissive

☐Others _____

Gray scale: ☐Yes____ gray scale ☐No

Preferential specifications:

☐Response time tr____ms (____˚C) td____ms(____˚C)

☐Viewing angle____deg. (____˚C) ☐Contrast____(____˚C)

☐Others _____

LCD surface finishing:

☐Glossy ☐Anti-glare ☐ _____

〈8. Driving Method〉

Multiplexing: 1/_____ duty, 1/_____ bias

Frame frequency: _____ Hz

〈9. IC〉

LCD driver: ☐Specified ☐Unspecified

driver_____ Manufacturer_____

Drive Method: ☐QFP ☐TCP ☐COB ☐COG ☐COF

☐Other _____

〈10. Power Supply〉

☐Single power supply: ☐3V ☐5V ☐____V

☐2 power supplies

For logic: (V_{DD}-V_{SS}): ☐3.3V ☐5V ☐____V

For LC drive (V_{LC}-V_{SS}): ☐____V

〈11. Temperature Compensation Circuit〉

☐Internal: ☐External ☐Unnecessary

Compensation range: ☐0˚C to 50˚C ☐ ____˚C to ____˚C

〈12. Current Consumption〉

For logic: typ. _____ mA, max._____ mA

For LC drive: typ._____ mA, max._____ mA

Others ( ): typ._____ mA, max._____ mA

〈13. Contrast Adjustment〉

☐Internal ☐External ☐Unnecessary

Method: ☐Temp. compensation curcuit ☐Volume ☐_____

〈14. Temperature Range〉

Operating temperature: ☐0˚C to 50˚C ☐____˚C to ____˚C

Storage temperature: ☐-20˚C to 60˚C ☐____˚C to ____˚C

〈15. Input/Output Terminal〉

Specifying allocation: ☐Yes ☐No

Specifying Position: ☐Yes ☐No

〈16. Mass〉

typ._____ g, max._____ g

〈17. Connector〉

☐Internal ☐External ☐Unnecessary

Type No. _____ (Manufacturer _____)

〈18. Backlight〉

☐Internal ☐External ☐Unnecessary

☐EL: ☐Green ☐White ☐ _____

☐LED: ☐Yellow green ☐Amber ☐ _____

☐CFL: ☐White ☐ _____

☐Incandescent lamp ☐Others _____

☐Backlight type ☐Edge backlight type

Brightness: _____ cd/m²

Inverter: ☐Internal ☐External ☐Unnecessary

Power supply voltage_____ V

Current consumption (backlight included)_____ mA

Brightness control: ☐Yes ☐No

〈19. Others〉

_____

_____

_____

〈20. Schedule〉

Estimate: _____

Sample: Delivery _____ Quantity: _____ pcs

Mass production: Target price: _____

Delivery _____ Total quantity: _____ pcs

Quantity per month _____ pcs