




Network
Components
Business Unit

Liquid Crystal Display Product Catalogue



2006–2007

Liquid Crystal Display

General Research of Electronics, Inc.

Dot Matrix Liquid Crystal Display Modules

CHARACTER TYPE

FEATURES

- Slim, light weight and low power consumption
- High contrast and wide viewing angle
- Built-in controller for easy interfacing
- LCD modules with built-in LED backlight



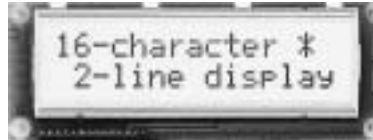
L1671



L1672



L1682



L1692



L1634

SPECIFICATIONS

Character format (character x line)		16 x 1	16 x 2	16 x 2	16 x 2	16 x 4
Model		L1671	L1672	L1682	L1692	L1634
STN type (gray)	Reflective	L167100J000	L167200J000	L168200J000	L169200J200	L163400J000
	Transflective With LED backlight (yellow-green)	L1671B1J000	L1672B1J000	L1682B1J000	L1692B1J200	L1634B1J000
Character font		5 x 7 dots + cursor	5 x 7 dots + cursor	5 x 7 dots + cursor	5 x 7 dots + cursor	5 x 7 dots + cursor
Module size (H x V x T) mm	Reflective	80.0 x 36.0 x 11.3	85.0 x 30.0 x 10.1	80.0 x 36.0 x 11.3	122.0 x 44.0 x 11.3	87.0 x 60.0 x 11.6
	With LED backlight	80.0 x 36.0 x 15.8	85.0 x 30.0 x 15.8	80.0 x 36.0 x 15.8	122.0 x 44.0 x 15.8	87.0 x 60.0 x 15.8
Viewing area (H x V) mm		64.5 x 13.8	62.0 x 16.0	64.5 x 13.8	99.0 x 24.0	61.8 x 25.2
Character size*1 (H x V) mm		3.07 x 5.73	2.78 x 4.27	2.95 x 3.80	4.84 x 8.06	2.95 x 4.15
Dot size (H x V) mm		0.55 x 0.75	0.50 x 0.55	0.55 x 0.50	0.92 x 1.10	0.55 x 0.55
Power supply voltage (V _{DD} -V _{SS})V		+ 5.0	+ 5.0	+ 5.0	+ 5.0	+ 5.0
Current consumption (mA, typ.)	I _{DD}	1.5	2.0	1.6	2.0	2.7
	I _{LC}	0.2	0.2	0.3	0.4	1.1
Driving method (duty)		1/16	1/16	1/16	1/16	1/16
Built-in LSI		KS0066U/SPLC780 or equivalent	KS0066U/SPLC780 KS0065B/SPLC063 or equivalent	KS0066U/SPLC780 KS0065B/SPLC063 or equivalent	KS0066U/SPLC780 KS0065B/SPLC063 or equivalent	KS0066U/SPLC780 MSM5839CGS or equivalent
Operating temperature*2 (°C)		0 to +50	0 to +50	0 to +50	0 to +50	0 to +50
Storage temperature (°C)		-20 to +60	-20 to +60	-20 to +60	-20 to +60	-20 to +60
Weight (g, typ.)	Reflective	25	25	25	50	50
	With LED backlight	35	40	35	65	65
LED backlight	Forward current consumption (mA)	100	112	100	240	200
	Forward input voltage (V, typ.)	+ 4.1	+ 4.1	+ 4.1	+ 4.1	+ 4.1

H : Horizontal, V : Vertical, T : Thickness (max.)

*1: Excluding the cursor

*2: Used with external temperature compensation circuit

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L2032



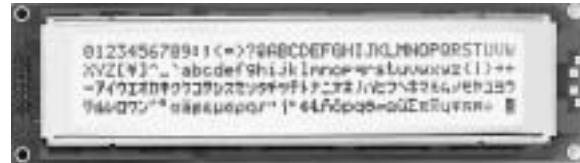
L2034



L2462



L4052



L4044

■ SPECIFICATIONS

Character format (character x line)		20 x 2	20 x 4	24 x 2	40 x 2	40 x 4
Model		L2032	L2034	L2462	L4052	L4044
STN type (gray)	Reflective	L203200J000	L203400J000	L246200J000	L405200J000	L404400J000
	Transflective With LED backlight (yellow-green)	L2032B1J000	L2034B1J000	L2462B1J000	L4052B1J000	L4044B1J000
Character font		5 x 7 dots + cursor	5 x 7 dots + cursor	5 x 7 dots + cursor	5 x 7 dots + cursor	5 x 7 dots + cursor
Module size (H x V x T) mm	Reflective	116.0 x 37.0 x 11.3	98.0 x 60.0 x 11.6	118.0 x 36.0 x 11.3	182.0 x 33.5 x 11.3	190.0 x 54.0 x 10.1
	With LED backlight	116.0 x 37.0 x 15.8	98.0 x 60.0 x 15.8	118.0 x 36.0 x 15.8	182.0 x 33.5 x 16.3	190.0 x 54.0 x 16.3
Viewing area (H x V) mm		83.0 x 18.6	76.0 x 25.2	94.5 x 17.8	154.4 x 15.8	147.0 x 29.5
Character size*1 (H x V) mm		3.20 x 4.85	2.95 x 4.15	3.20 x 4.85	3.20 x 4.85	2.78 x 4.27
Dot size (H x V) mm		0.60 x 0.65	0.55 x 0.55	0.60 x 0.65	0.60 x 0.65	0.50 x 0.55
Power supply voltage (V _{DD} -V _{SS})V		+ 5.0	+ 5.0	+ 5.0	+ 5.0	+ 5.0
Current consumption (mA, typ.)	I _{DD}	2.0	2.9	2.5	3.0	8.0
	I _{LD}	0.4	1.2	0.5	1.0	3.0
Driving method (duty)		1/16	1/16	1/16	1/16	1/16
Built-in LSI		KS0066U/SPLC780 KS0063/SPLC063 or equivalent	KS0066U/SPLC780 MSM5839CGS or equivalent	KS0066U/SPLC780 KS0063/SPLC063 or equivalent	KS0066U/SPLC780 KS0063/SPLC063 or equivalent	KS0066U/SPLC780 MSM5839CGS or equivalent
Operating temperature*2 (°C)		0 to +50	0 to +50	0 to +50	0 to +50	0 to +50
Storage temperature (°C)		-20 to +60	-20 to +60	-20 to +60	-20 to +60	-20 to +60
Weight (g, typ.)	Reflective	40	55	40	70	90
	With LED backlight	60	70	60	95	140
LED backlight	Forward current consumption (mA)	154	240	150	260	480
	Forward input voltage (V, typ.)	+ 4.1	+ 4.1	+ 4.1	+ 4.1	+ 4.1

H : Horizontal, V : Vertical, T : Thickness (max.)

*1: Excluding the cursor

*2: Used with external temperature compensation circuit

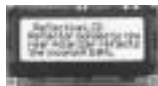
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Dot Matrix Liquid Crystal Display Modules

GRAPHIC TYPE

■ FEATURES

- Wide viewing angle and high contrast
- Slim, light weight and low power consumption
- Full dot configuration fits any application
- Available in STN and FSTN



G1213



G1216

■ SPECIFICATIONS

Dot format (H x V, dot)			128 x 32	128 x 64
Model			G1213	G1216
STN type (gray)	Reflective Wide temperature range	Built-in RAM	G121300N000	G121600N000
	Transflective With LED backlight (yellow-green) Wide temperature range	—		
		Built-in RAM	G1213B1N000	G1216B1N000
		Built-in controller		
FSTN type (black and white)	Transflective With EL backlight*(white)	—		
Module (H x V x T) mm	Reflective		75.0 x 41.5 x 6.8	75.0 x 52.7 x 6.8
	With EL backlight			
	With LED backlight		75.0 x 41.5 x 8.9	75.0 x 52.7 x 8.9
Viewing area (H x V) mm			60.0 x 21.3	60.0 x 32.5
Dot size (H x V) mm			0.40 x 0.48	0.40 x 0.40
Dot pitch (H x V) mm			0.43 x 0.51	0.43 x 0.43
Power supply voltage (V)	(V _{DD} -V _{SS})		+ 5.0	+ 5.0
	(V _{LC} -V _{SS})		-8.0* ⁴	-8.2* ⁴ (G121600N) -8.0* ⁴ (G1216B1N)
Current consumption (mA, typ.)	I _{DD}		2.0	2.0
	I _{LC}		1.7 (G121300N) 1.8 (G1213B1N)	1.8
Driving method (duty)			1/64	1/64
Built-in LSI	Driver		HD61202U HD61203U or equivalent	HD61202U HD61203U or equivalent
		Controller		
Operating temperature range(°C)			-20 to + 70*	-20 to + 70*
Storage temperature range(°C)			-30 to + 80	-30 to + 80
Weight (g, typ.)	Reflective		23	35
	With EL backlight			
	With LED backlight		35	45
Inverters for EL	Model			
	Power supply voltage (V)			
	Current consumption* (mA, typ.)			
LED backlight	Forward current consumption (mA)		40	90
	Forward input voltage (V, typ.)		3.8	4.1

*1: We produce the module after we get the order to prevent the EL from absorbing moisture.

H : Horizontal, V : Vertical, T : Thickness (max.)

*2: Anti-glare polarizer

*3: T_a=25°C

*4: Used with external temperature compensation circuit.

*5: Including the EL backlight

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G191D



G321E

SPECIFICATIONS

Dot format (H x V, dot)		192 x 192	320 x 240
Model		G191D	G321E
STN type (gray)	Reflective	G191DB1P000	
	Transflective, With LED backlight (yellow-green) Wide temperature range		
STN type (blue)	Transmissive		G321EV5B000
	With CFL backlight With touch panel		G321EV5B00X
FSTN type (black and white)	Transmissive		G321EV5R000
	With CFL backlight With touch panel		G321EV5R00X
Module size (H x V x T) mm	Reflective		
	With LED backlight	86.0 x 95.0 x 9.0	
	With CFL backlight		150.0 x 96.0 x 14.0
	With touch panel		150.0 x 96.0 x 16.0
Viewing area (H x V) mm		67.4 x 67.4	103.0 x 80.0
Dot size (H x V) mm		0.30 x 0.30	0.27 x 0.27
Dot pitch (H x V) mm		0.33 x 0.33	0.30 x 0.30
Power supply voltage (V)	V _{DD} -V _{SS}	+ 5.0	+ 5.0
	V _{LC} -V _{SS}	-24.0	-24.0
Current consumption (mA, typ.)	I _{DD}	5.0	6.4
	I _{LC}	4.5	5.7
Driving method (duty)		1/192	1/240
Built-in LSI		HD66204 HD66205 or equivalent	MSM6599B MSM6698 or equivalent
Operating temperature (°C)		-20 to + 70*	0 to + 50*
Storage temperature (°C)		-30 to + 80	-20 to + 60
Weight (g, typ.)	Reflective		
	With LED backlight	80	
	With CFL backlight		195
	With touch panel		240
LED backlight	Forward current consumption (mA)	100	
	Forward input voltage (V, typ.)	4.1	
Inverters for CFL	Model		INVC303
	Power supply voltage (V)		+ 24.0
	Current consumption (mA, typ.)		60

H : Horizontal, V : Vertical, T : Thickness (max.)

*1: G2436 operates with a single power source.

*2: Used with external temperature compensation circuit.

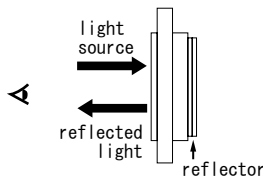
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Liquid Crystal Display Modules

REFLECTIVE/TRANSFLECTIVE/TRANSMISSIVE LCD

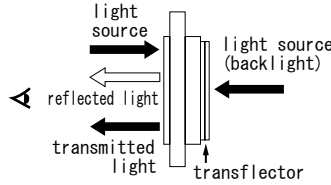
1 Reflective LCD

Reflector bonded to the rear polarizer reflects the incoming ambient light. Low power consumption because no backlight is required.



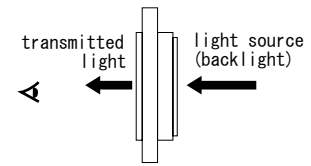
2 Transflective LCD

Transflector bonded to the rear polarizer reflects light from the front as well as enabling lights to pass through the back. Used with backlight off in bright light and with it on in low light to reduce power consumption.

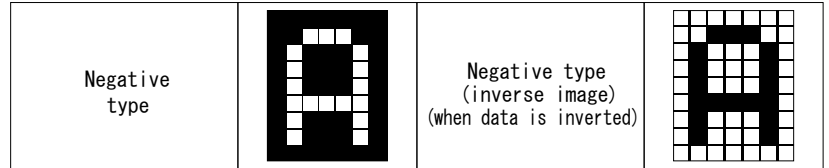
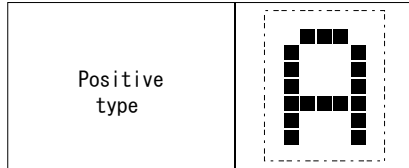


3 Transmissive LCD

Without reflector or transflector bonded to the rear polarizer. Backlight required. Most common is transmissive negative image.



POSITIVE/NEGATIVE MODE



Negative type (inverse image) (when data is inverted)

TN TYPE/STN TYPE/FSTN TYPE

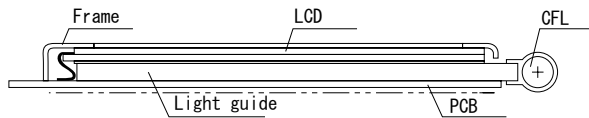
TN	(Background/dot color) Gray/Black	TN (Twisted Nematic) type is most conventional and economical. It is used for static drive LCD and low-duty drive LCD (watch, calculator, etc.)
STN	Yellowgreen/Dark blue Gray/Dark blue White/Blue	STN (Super Twisted Nematic) type has a higher twist angle, and thus provides clear visibility and wider viewing angle. This is suitable especially for high-duty drive LCD.
FSTN	White/Black	FSTN (Film Super Twisted Nematic) type utilizes RCF (Retardation Control Film) to remove the coloring of STN LCD. Thus FSTN type provides easy-to-read black-and-white display.

STRUCTURE AND FEATURE OF LCD MODULE WITH BACKLIGHT

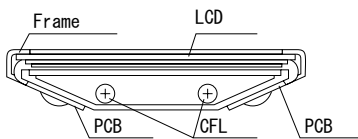
CFL (Cold Cathode Fluorescent Lamp) backlight

Features: high brightness, long service life, inverter required

- Edge backlight type (G321E)



- Backlight type

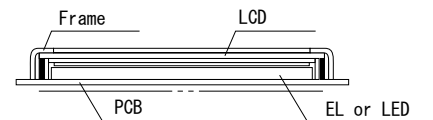


EL (Electroluminescent Lamp) backlight

LED (Light Emitting Diode) backlight

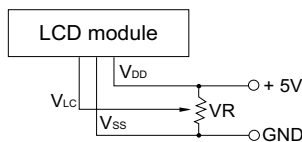
- Features: EL: thin, inverter required

- LED: long service life, low voltage driving, no inverter required

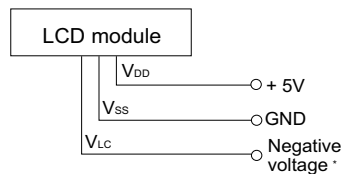


POWER SUPPLY

- Character modules (single power supply)

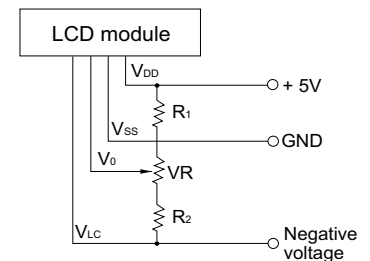


- G1213 and G1216



• Negative voltage should be variable for contrast adjustment.

- G191D, and G321E



Note 1: Contrast can be adjusted by VR.
Note 2: For module with backlight, power supply for backlight is necessary.

CAUTION

- If the LCD panel is damaged, be careful not to get the liquid crystal in your mouth and not to be injured by crushed glasses.
- If you should swallow the liquid crystal, first, wash your mouth thoroughly with water, then, drink a lot of water and induce vomiting, and then, consult a physician.
- If the liquid crystal should get in your eye, flush your eye with running water for at least fifteen minutes.
- If the liquid crystal touches your skin or clothes, remove it and wash the affected part of your skin or clothes with soap and running water.
- EL or CFL backlight is driven by a high voltage with an inverter. Do not touch the connection part or the wiring pattern of the inverter.
- Do not use inverters without a load or in the short-circuit mode.
- Use the LCD module within the rated voltage to prevent overheating and/or damage. Also, take steps to ensure that the connector does not come off.

Handling Precautions

- Since the LCD panel has glass substrate, avoid applying mechanical shock or pressure on the module. Do not drop, bend, twist or press the module.
- Do not soil or damage LCD panel terminals.
- Since the polarizer is made of easily-scratched material, be careful not to touch or place objects on the display surface.
- Keep the display surface clean. Do not touch it with your skin.
- CMOS LSI is used in the LCD module. Be careful of static electricity.
- Do not disassemble the module or remove the liquid crystal panel or the panel frame.
- Do not damage the film surface of the EL lamp; otherwise the lamp will be damaged by humidity.
- To set an EL lamp in an LCD module, push the EL lamp with its emitting side up, without pushing the rubber connectors too hard. If you damage them, the LCD module may not work properly.

Mounting and Designing

- To protect the polarizer and the LCD panel, cover the display surface with a transparent plate (e.g., acrylic or glass) with a small gap between the transparent plate and the display surface.
- Keep the module dry. Avoid condensation to prevent the transparent electrodes from being damaged.
- Drive LCD panel with AC waveform in which DC element is not included to prevent deterioration in the LCD panel.
- Contrast of LCD varies depending on the ambient temperature. To offer the optimum contrast, LC drive voltage should be adjusted. LCD driven in a high duty ratio must be provided with drive voltage adjustment method.
- Mount a LCD module with the specified mounting part/holes.

- Design the equipment so that input signal is not applied to the LCD module while power supply voltage is not applied to it.
- Do not locate the CFL tube and the lamp lead wire close to a metal plate or a plated part inside the equipment. Otherwise stray capacity causes a drop in voltage, decreasing the brightness and the ability to start-up.

Cleaning

- Do not wipe the polarizer with a dry cloth, as it may scratch the surface.
- Wipe the LCD panel gently with a soft cloth soaked with a petroleum benzine.
- Do not use ketonic solvents (ketone and acetone) or aromatic solvents (toluene and xylene), as they may damage the polarizer.

Storing

- Store the LCD panel in a dark place, where the temperature is $25^{\circ}\text{C}\pm 10^{\circ}\text{C}$ and the relative humidity below 65%. If possible, store the LCD panel in the packaging situation when it was delivered.
- Do not store the module near organic solvents or corrosive gases.
- Keep the module (including accessories) safe from vibration, shock and pressure.
- Use an LCD module with built-in EL backlight within six months of delivery.
- EL backlight is easily affected by environmental conditions such as temperature and humidity; the quality may deteriorate if stored for an extended period of time. Contact Seiko Instruments Inc. for details.
- Some parts of the backlight and the inverter generate heat. Take care so that the heat does not affect the liquid crystal or any other parts.
- Dust particles attached to the surface of the LCD or the surface of the backlight degrade the display quality. Be careful to keep dust out in designing the structure as well as in handling the module.
- Black or white air-bubbles may be produced if the LCD panel is stored for long time in the lower temperature or mechanical shocks are applied onto the LCD panel.

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