CT008-05

EPSON

Super Passive

Super Passive Matrix LCD Module

April/1999

SEIKO EPSON CORPORATION

Now, Passive LCD enhance to Super Passive

Brighter and more brilliant

New low power passive LCD module were born with “Brighter and more brilliant”, called “Super Passive LCD Module”.
Its features are 30% up brightness, higher contrast and makes more brilliant paper white mode display with HSR technology.
And LCD module makes power down to 1/8 of the conventional LCD module.
Lowest power consumption in the Mobile communication market is one of our corporate strategy “Energy Saving”.
Please hope for “Super Passive LCD Module”.

*HSR (High Sense Reflective): HSR is panel technology. It become brighter and higher display image quality.

H C L

ENERGY SAVING

High Quality, High Density

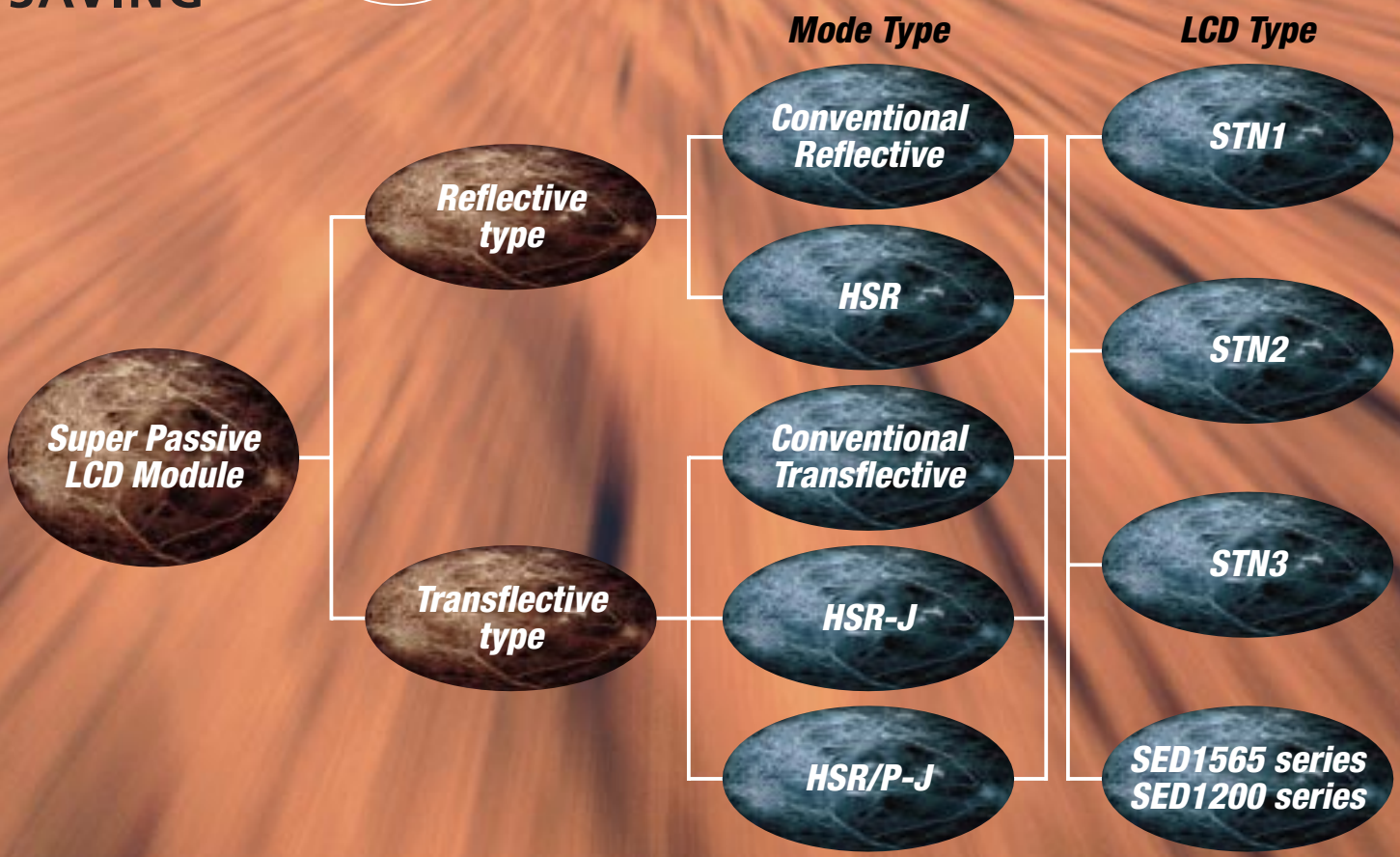
Since the HSR technology has been adopted, the Super Passive LCD has become 30% brighter than the usual passive LCD. The image quality has become closer to the ultimate paper white display.

Compact Design

Contributing to down-sizing of various applications using different modules such as COG's, CDF's and YCP's

Low Power Consumption

Since the STN1 and 2 technologies or the OSO technology have been adopted,the power consumption of less than one eighth of the one of usual passive LCD has been realized.



Super Passive LCD Product Lineup

■Character display type

Working sample code	Display format	Power consumption (μA)	Module Construction	page
TCM-A1035	16 characters × 4 lines + Icons (FTN)	100	LCD + TCP	4
TCM-A1047	12 characters × 3 lines + Icons (FTN)	38	LCD + TCP	4
TCM-A1055	132 × 65 pixels (FTN)	140	LCD + TCP	4

■Character display type

	MP code	Working sample code	Display format	Power consumption (mW)	Module Construction	page
■STN1	EG8504x-xx	TCM-A0813-x	320 × 200 pixels	9	LCD + TCP + PCB + plastic case	5
■STN2	EG7502x-xx	TCM-A0822-x	320 × 200 pixels	3	LCD + TCP + PCB + plastic case	5
	EG7502x-xx	TCM-A1013-x	320 × 200 pixels	3	LCD + TCP + PCB + plastic case + EL (BG*)	5
	EG7014x-xx	TCM-A0824-x	640 × 200 pixels	5	LCD + TCP + PCB + plastic case	5

BG* : Blue Black

HSR Lineup

■Reflective type

Conventional reflective type

The brightness can be increased by more than 30% as compared with conventional passive LCD's by using HSR.

HSR

■Back-light type

Conventional transflective type

Under Reflective mode (when the back-light is not being lit)

Under back-light mode (when the back-light is being lit)

* When using a blue colored high brightness back-light

HSR-J (Permeation stressing type)

When the back-light becomes on, the display turns negative mode. It is possible to distinguish the panel designs.
Also, the visibility will be enhanced while the back-light is being light.

Under Reflective mode (when the back-light is not being lit)

Under back-light mode (when the back-light is being lit)

* When using a blue colored high brightness back-light

HSR/P-J (Reflection stressing type)

When the back-light becomes on, the display turns negative mode. It is possible to distinguish the panel designs.
Also, the contact will be enhanced under the back-light mode.

Under Reflective mode (when the back-light is not being lit)

Under back-light mode (when the back-light is being lit)

* When using a blue colored high brightness back-light

	Contrast	Transmittance (Back-light)	Remarks
Ordinary semi-permeable type	△	△	
HSR-J	○	○	Permeation stressing type
HSR/P-J	◎	◎	Reflection stressing type

Character Display Type

These LCD modules are designed for cellular. They can display 5 × 7 or 8 font characters (max. 16 characters × 4 lines + Icons). By using TCPs of the SED 1240 or SED 1220/1230 series, current and voltage requirements are kept extremely low, and dimensions and thickness are minimized.
Since the power supply for driving the LCD (voltage booster doubler or tripler) is included, external drive circuitry is not required. This contributes to simplicity of circuit design and helps to reduce costs.

TCM-A1047 series

■ Features

- 12 characters × 3 lines + icons (5 × 8 font characters) ideal for cellular
- This module is constructed with LCD and TCP, and is thus a simple standard module.
- Built-in LCD drive power circuit and oscillator circuit gives low power consumption
- Thanks to its abundant command functions, many different kinds of indications are available. (Vertical double-size letters, normal and reversed indications, etc.)

■ Specifications

Module construction	LCD + TCP
Display format	12 characters × 3 lines + Icons
Liquid crystal panel	FTN transflective
LCD driver	SED1225
Duty	1/26
Interface	4bit, 8bit parallel (68/80 series) or serial
Power Supply Voltage	1.7 to 3.6 V
Liquid crystal drive power supply	Voltage booster (tripler)
Current consumption	38μA *1
Glass External Dimensions	32.1 × 23.8 × 1.7 mm *2
Operating Temperature	-20 to 70°C
Storage Temperature	-30 to 80°C

*1 Typical value, with V_{DD} = 1.8 V, voltage tripler, internal power ON. Normal mode. Text display.
*2 The overall thickness can be varied according to the glass used.

TCM-A1035 series

■ Features

- 16 characters × 4 lines + icons (5 × 8 font characters) ideal for cellular and pagers
- This module is constructed with LCD and TCP, and is thus a simple standard module.
- Built-in LCD drive power circuit and oscillator circuit gives low power consumption
- Thanks to its abundant command functions, many different kinds of indications are available. (Vertical double-size letters, whole line scrolling, normal and reversed indications, etc.)

■ Specifications

Module construction	LCD + TCP
Display format	16 characters × 4 lines + Icons
Liquid crystal panel	FTN transflective
LCD driver	SED1240
Duty	1/34
Interface	4bit, 8bit parallel (68/80 series) or serial
Power Supply Voltage	2.4 to 3.6 V (recommended)
Liquid crystal drive power supply	Voltage booster (doubler, tripler)
Current consumption	100μA *1
Glass External Dimensions	35.6 × 26.8 × 1.7 mm *2
Operating Temperature	-20 to 70°C
Storage Temperature	-30 to 80°C

*1 Typical value, with V_{DD} = 3.0 V, voltage tripler, internal power ON. Normal mode. Text display.
*2 The overall thickness can be varied according to the glass used.

Graphic Display type

This is an LCD module which is capable of making 16x16 font "Kanji (Chinese characters) indications" (maximum 8-figures x 4-lines + icons) most suitable for use with pagers and cellular phones. Adopting the SED1526 Series, SED1530 Series and SED1565 Series devices as the LCD driver and by employment of a low voltage drive liquid crystal display, it will help realize ultra low current consumption and low voltage applications. Moreover, by employment of 0.4t glass, down-sizing and thin-shaping has become possible.

TCM-A1055 series

■ Features

- Display employs 132 x 65 pixels making it most suitable for the cellular and pager.
- This module is constructed with LCD and TCP, and is thus a simple standard module.
- Built-in LCD drive power circuit and oscillator circuit gives low power consumption

■ Specifications

Module construction	LCD + TCP
Display format	132 × 65 pixels
Liquid crystal panel	FTN transflective
LCD driver	SED1565D
Duty	1/65
Interface	8bit parallel (68/80 series) or serial
Power Supply Voltage	2.7 to 3.3 V
Liquid crystal drive power supply	Voltage booster (doubler, tripler, quadrupler)
Current consumption	140μA *1
Glass External Dimensions	34.0 × 30.3 × 1.4 mm
Operating Temperature	-20 to 70°C
Storage Temperature	-30 to 80°C

*1 Typical value, with VDD = 3.0 V, voltage quadrupler, internal power ON.

■ Lineup

Working sample name	Display mode
TCM-A1055-4	FTN Transflective
TCM-A1055-5	FTN HSR/P-J
TCM-A1055-6	FTN HSR-J

Full dot display type

These LCD modules feat are the industry's lowest power consumption thanks to the power supply circuit developed by us, which is ideal for smart phones, PDAs and HPCs requiring low power consumption.
High contrast is also achived thanks to the adoption of a newly developed panel process.

■ STN1

EG8504 series

(Working sample name: TCM-A0813 series)

■ Features

- Newly developed power supply circuit and low-voltage liquid crystal for low power consumption
- Ideal for products requiring low power consumption such as portable information display devices
- Provision of a standard module contributes to shorter development lead times and lower development cost

■ Specifications

Display format	320 × 240 pixels
Dot pitch	0.24 × 0.24 mm
Dot size	0.225 × 0.225 mm
Duty	1/240
Interface	4 bit parallel *1
Power Supply Voltage	2.75 to 5.25 V
Liquid crystal drive power supply	35 V (max.)
Current consumption	9 mW
External Dimensions	94.0 × 73.6 × 7.1 mm
Operating Temperature	0 to 50˚C
Storage Temperature	-20 to 60˚C

*1: With driver support, 8-bit support possible

■ Lineup

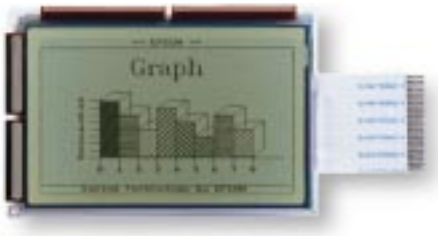
Mass production name	Working sample name	Display mode
EG8504C-AZ	—	FTN Reflective
EG8504C-AZ-1	—	FTN HSR
EG8504C-FZ-1	—	FTN Transflective EL (White)
—	TCM-A0813-23	FTN HSR-J EL (BG)

*An optional setting allows to support the backlight.

■ STN2

EG7502 series
EG7503 series

(Working sample name: TCM-A0822/TCM-A1013 series)



Winner of the "Commendation from the Chair-man of the Energy Conservation Center"
at 7th "Energy Conservation Vanguard 21" in 1996

■ Features

- Newly developed power supply circuit for industry leading ultra low power consumption
- Built-in DC/DC converter allows operation from single 3.3 V power supply
- Adoption of new panel process provides high contrast
- Provision of a standard module contributes to shorter development lead times and lower development cost

■ Specifications

Display format	320 × 200 pixels
Pixel pitch	0.18 × 0.18 mm
Pixel size	0.165 × 0.165 mm
Duty	1/200
Contrast ratio	8:1
Interface	8 bit parallel
Power Supply Voltage	3.3 V single supply voltage
Liquid crystal drive power supply	Built-in DC/DC converter
Power consumption (Typ.)	3 mW
External Dimensions	71.1 × 49.0 × 5.5 mm *1
Operating Temperature	0 to 50˚C
Storage Temperature	-20 to 70˚C

*1: With backlight fitted as an option, the height dimension is different.

■ Lineup

Mass production name	Working sample name	Display mode
EG7502C-AS	—	FTN Reflective
—	TCM-A0822-22	FTN HSR
EG7502C-RS	—	FTN Transflective LED
—	TCM-A1013-1	FTN Transflective EL (BG)
EG7503C-ES	—	FTN HSR-J EL (EL)

*An optional setting allows to support the backlight.

EG7014 series

(Working sample name: TCM-A0822/TCM-A1013 series)
(Working sample name: TCM-A0824 series)

Winner of the "Commendation from the Chair-man of the Energy Conservation Center"
at 7th "Energy Conservation Vanguard 21" in 1996

■ Features

- Newly developed power supply circuit for industry leading ultra low power consumption
- Built-in DC/DC converter allows operation from single 3.3 V power supply
- Adoption of new panel process provides high contrast
- Provision of a standard module contributes to shorter development lead times and lower development cost

■ Specifications

Display format	640 × 200 pixels
Pixel pitch	0.18 × 0.18 mm
Pixel size	0.165 × 0.165 mm
Duty	1/200
Contrast ratio	8:1
Interface	8 bit parallel
Power Supply Voltage	3.3 V single supply voltage
Liquid crystal drive power supply	Built-in DC/DC converter
Power consumption (Typ.)	5 mW
External Dimensions	128.7 × 49.0 × 5.5 mm
Operating Temperature	0 to 50˚C
Storage Temperature	-20 to 70˚C

*1: With backlight fitted as an option, the height dimension is different.

■ Lineup

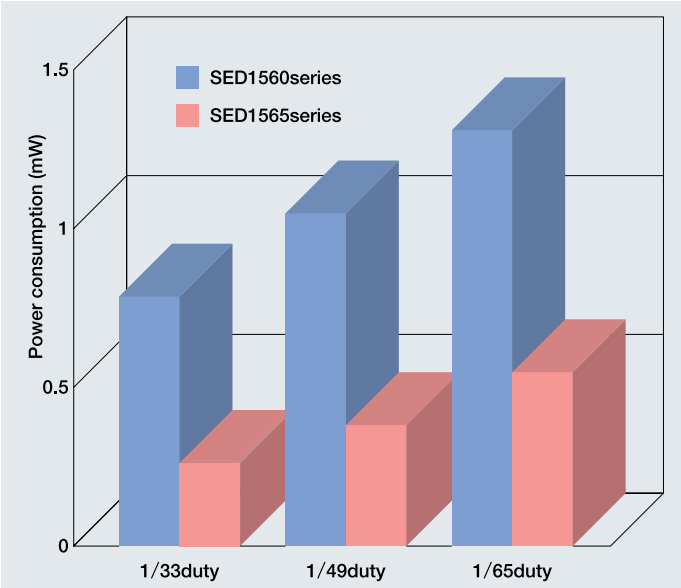
Mass production name	Working sample name	Display mode
EG7014C-AS	—	FTN Reflective
—	TCM-A0824-22	FTN HSR

*An optional setting allows to support the backlight.

Super Passive LCD Module

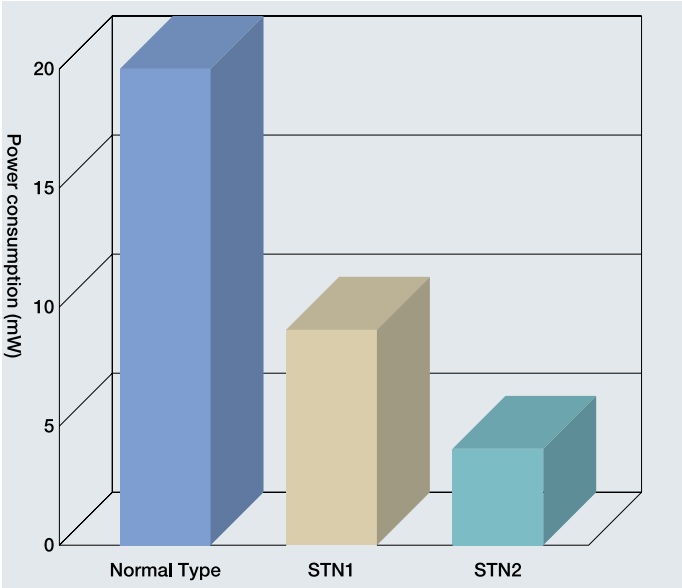
Power consumption

Small size module series



* Above characteristics is not same condition.

Middle size module series



* In case of 320×240 pixels, 1/240 duty, pixel pitch=0.24mm

Driver IC's lineup for small size module

Character display type

Part number	Display format	Current consumption (μA)	Supply voltage (V)	LCD driving voltage (V)	Duty	MPU interface
SED1220	12 characters×3 lines+Icons	80*1	2.4 - 3.6	4.0 - 7.0	1/26	4/8 bit serial
SED1221	12 characters×2 lines+Icons				1/18	
SED1225	12 characters×2/3 lines+Icons	50*2	1.8 - 3.6	4.0 - 6.0	1/18, 1/26	
SED1230	12 characters×4 lines+Icons	100*3	2.4 - 3.6	4.0 - 12.0	1/30	
SED1231	12 characters×3 lines+Icons				1/23	
SED1232	12 characters×2 lines+Icons				1/16	
SED1233	16 characters×2 lines+Icons					
SED1240*4	12 characters×4 lines+Icons	80	1.8 - 3.6	4.0 - 10.0	1/18, 1/34	

*1 : V_{DD}=3.0V, V_5=6.0V, internal power supply circuit active (maximum value)
*2 : V_{DD}=3.0V, V_5=6.0V, internal power supply circuit active (maximum target value)
*3 : V_{DD}=3.0V, V_5=6.0V, internal power supply circuit active (maximum target value)
*4 : with double-height characters display format, blink in lines format, scroll vertically in lines format

Graphic display type

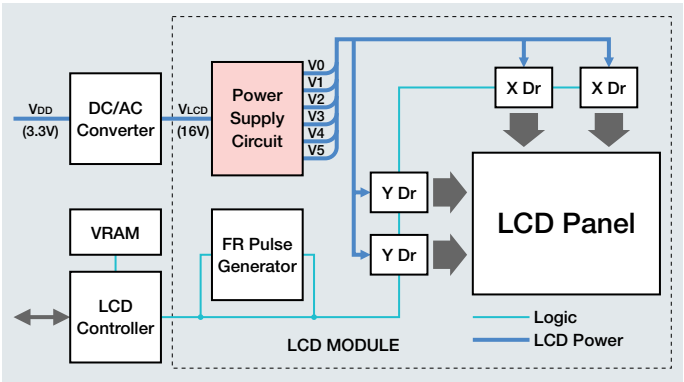
Part number	Current consumption (μA)	Supply voltage (V)	LCD driving voltage (V)	Duty	Segment outputs	Common outputs	Display RAM	MPU interface
SED1565	81*1	1.8 - 5.5	4.5 - 16.0	1/65	132	65	132×65 bit	8 bit serial
SED1566	43*2			1/49		49		
SED1567	29*2			1/33		33		
SED1569	46*2			1/53		53		

*1 : V_{DD}=3.0V, V_5=11.0V, voltage quadrupler, internal power supply circuit active, normal mode (typical value)
*2 : V_{DD}=3.0V, V_5=8.0V, voltage tripler, internal power supply circuit active, normal mode (typical value)

Features of Super Passive LCD

STN1

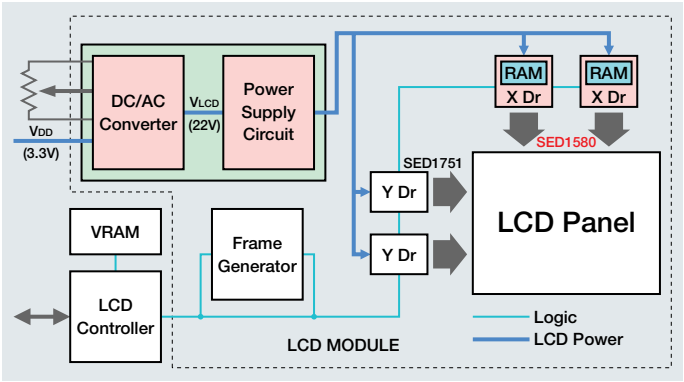
•STN1 realizes low power consumption of the industry by integrating the new power circuit.
This module applies over 1/240 duty modules.
•Current consumption ——— 5.5mW (320×240pixels)
•Contrast ratio ——— 6.5:1 (Reflective)
5.5:1 (Transflective, backlight off)



STN2

SED1580

•Winner of '96 The 7th Energy Conservation Vanguard21 "Commendation from the Chairman of the Energy Conservation Center".
•STN2-CI adapt external LCD controller IC.
This method applies large size modules.
•The lowest power consumption of the industry
Current consumption ——— 3mW (320×200pixels)
5mW (640×200pixels)
•Contrast ratio ——— 8:1 (Reflective)
•Possible to display a gray-scale image



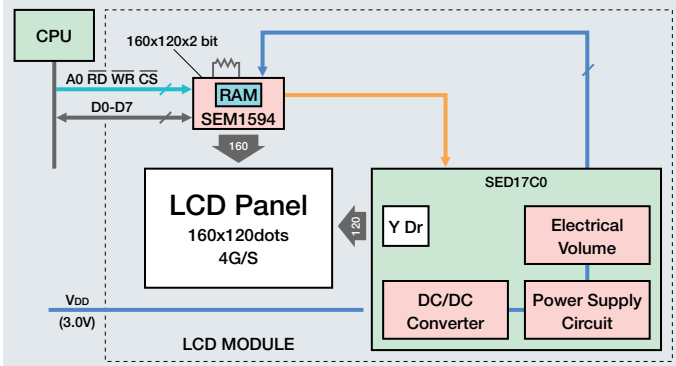
STN3

under development

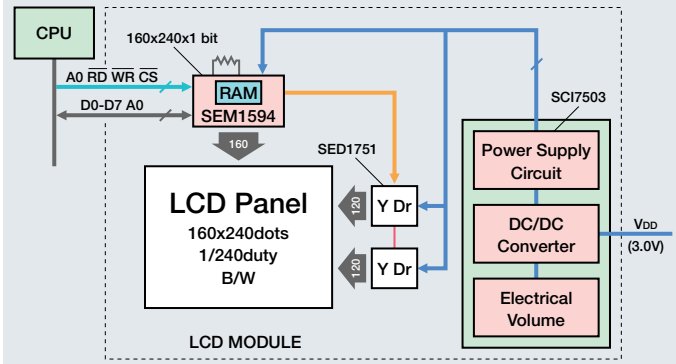
SED1590

•STN2-BI adapt a method of bus-interface.
This method is possible to be directly connected to CPU. (Built in Controller IC)
•The lowest power consumption of industry
Current consumption ——— 3mW (320 × 200pixels)
•Contrast ratio ——— 8:1 (Reflective)

STN3-TypeB (~1/120 duty) under development



STN3-TypeC (~1/240 duty) under development



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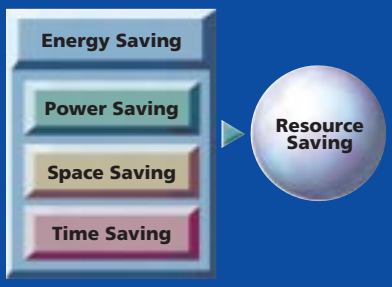

EPSON offers effective savings to its customers through a wide range of electronic devices, such as semiconductors, liquid crystal display (LCD) modules, and crystal devices. These savings are achieved through a sophisticated melding of three different efficiency technologies.

Power saving technology provides low power consumption at low voltages.

Space saving technology provides further reductions in product size and weight through super-precise processing and high-density assembly technology.

Time saving technology shortens the time required for design and development on the customer side and shortens delivery times.

Our concept of Energy Saving technology conserves resources by blending the essence of these three efficiency technologies. The essence of these technologies is represented in each of the products that we provide to our customers.

In the industrial sector, leading priorities include measures to counter the greenhouse effect by reducing CO_2, measures to preserve the global environment, and the development of energy-efficient products. Environmental problems are of global concern, and although the contribution of energy-saving technology developed by EPSON may appear insignificant, we seek to contribute to the development of energy-saving products by our customers through the utilization of our electronic devices. EPSON is committed to the conservation of energy, both for the sake of people and of the planet on which we live.

NOTICE

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