**Toshiba Matsushita Display Technology Co., Ltd.**

PRODUCT INFORMATION

4.98cm Transflective COLOUR TFT-LCD MODULE
(2.0 TYPE)

# LTM020A784
# (a-Si TFT)

**TENTATIVE**

## FEATURES

(1) a-Si TFT-LCD for Cellular Phone
(2) 120(H) x 160(V) pixels
(3) Transflective Mode
(4) 65K colors
(5) CPU memory bus I/F [16 bit]

## MECHANICAL SPECIFICATIONS

| Item | Specifications |
|---|---|
| Dimensional Outline (TYP.) | 39.15(*W*) x 49.7(*H*) x 4.74(TYP.) (*D*) mm |
| Number of Pixels | 120( x RGB)(W) x 160 (*H*) pixels |
| Active Area | 29.88(*W*) x 39.84 (*H*) mm |
| Pixel Pitch | 0.249(*W*) x 0.249(*H*) |
| Weight (approximately) | 10.5 g |

## ABSOLUTE MAXIMUM RATINGS

| Item | Min. | Max. | Unit |
|---|---|---|---|
| Supply Voltage | 2.5 | 3.3 | V |
| Operating Temperature | -20 | 70 | °C |
| Storage Temperature | -25 | 70 | °C |
| Storage Humidity (Max. wet bulb temp. = 39°C) | 10 | 90 | %RH |

## ELECTRICAL SPECIFICATION

| Item | | Min. | Typ. | Max. | Unit | Remarks |
|---|---|---|---|---|---|---|
| Supply Voltage | | 2.94 | 3.0 | 3.06 | V | |
| Power Consumption | 8 colors / partial display | --- | 2.5 | --- | mW | |
| | 8 colors / full display | --- | 3 | --- | mW | |
| | 65 colors / full display | --- | 6 | --- | mW | |
| | 65 colors / full display | --- | 162 | --- | mW | Light on |

*1 : Final number will be specified with actual LCD samples.

## OPTICAL SPECIFICATION (*Ta*=25°C)

| Item | Min. | Typ. | Max. | Unit | Remarks |
|---|---|---|---|---|---|
| Contrast Ratio (Transmissive) | --- | 100 | --- | --- | Transmissive mode |
| Contrast Ratio (Reflective) | --- | 40 | --- | --- | Reflective mode |
| Response Time ($t_{ON}$ + $t_{OFF}$) | --- | --- | 50 | ms | |
| Brightness | --- | 30 | --- | cd/㎡ | Transmissive mode |
| Reflectance | --- | 7 | --- | % | Reflective mode |
| Optimum view angle | --- | 6'oclock *1 | --- | --- | |

*1 : Lower side of the panel has better viewing angle.

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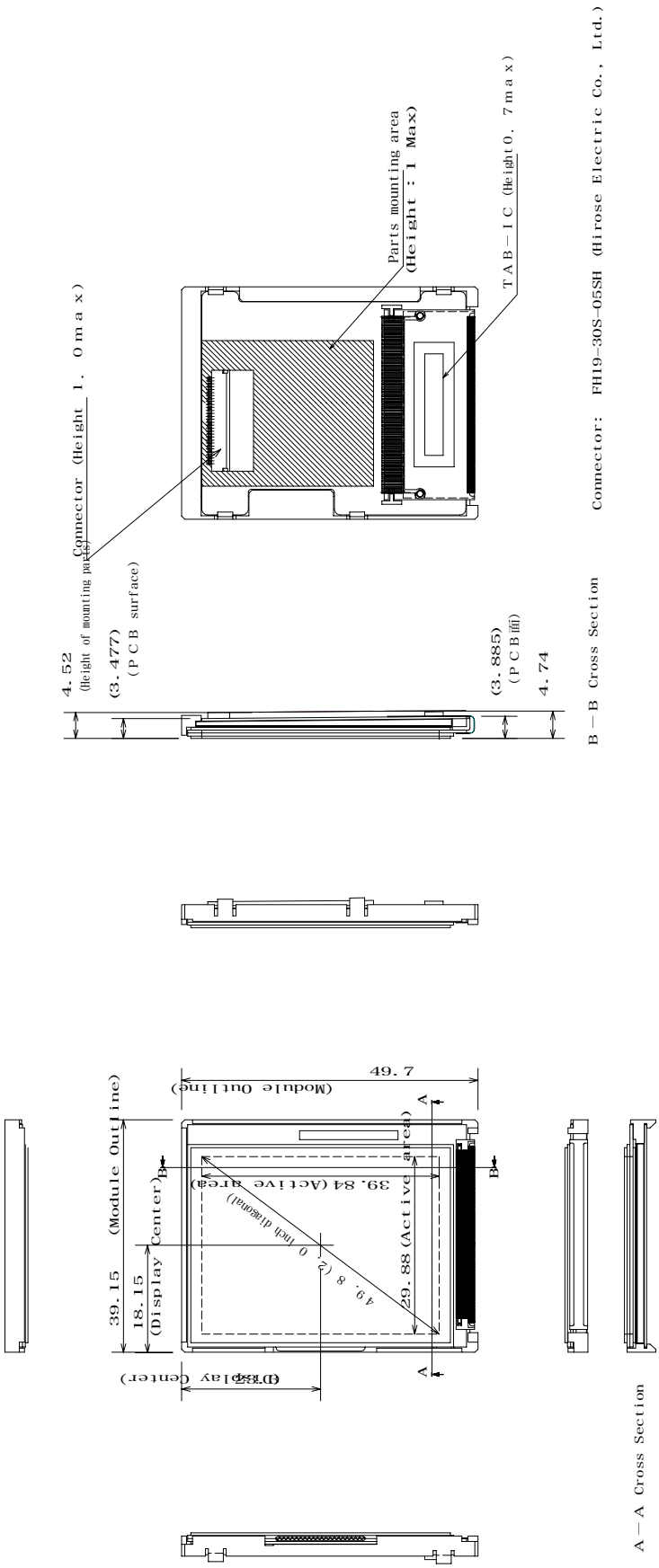
*The information contained herein may be changed without prior notice. It is therefore advisable to contact Toshiba Matsushita Display Technology Co.,Ltd. before proceeding with the design of equipment incorporating this product.

**DIMENSIONAL OUTLINE**

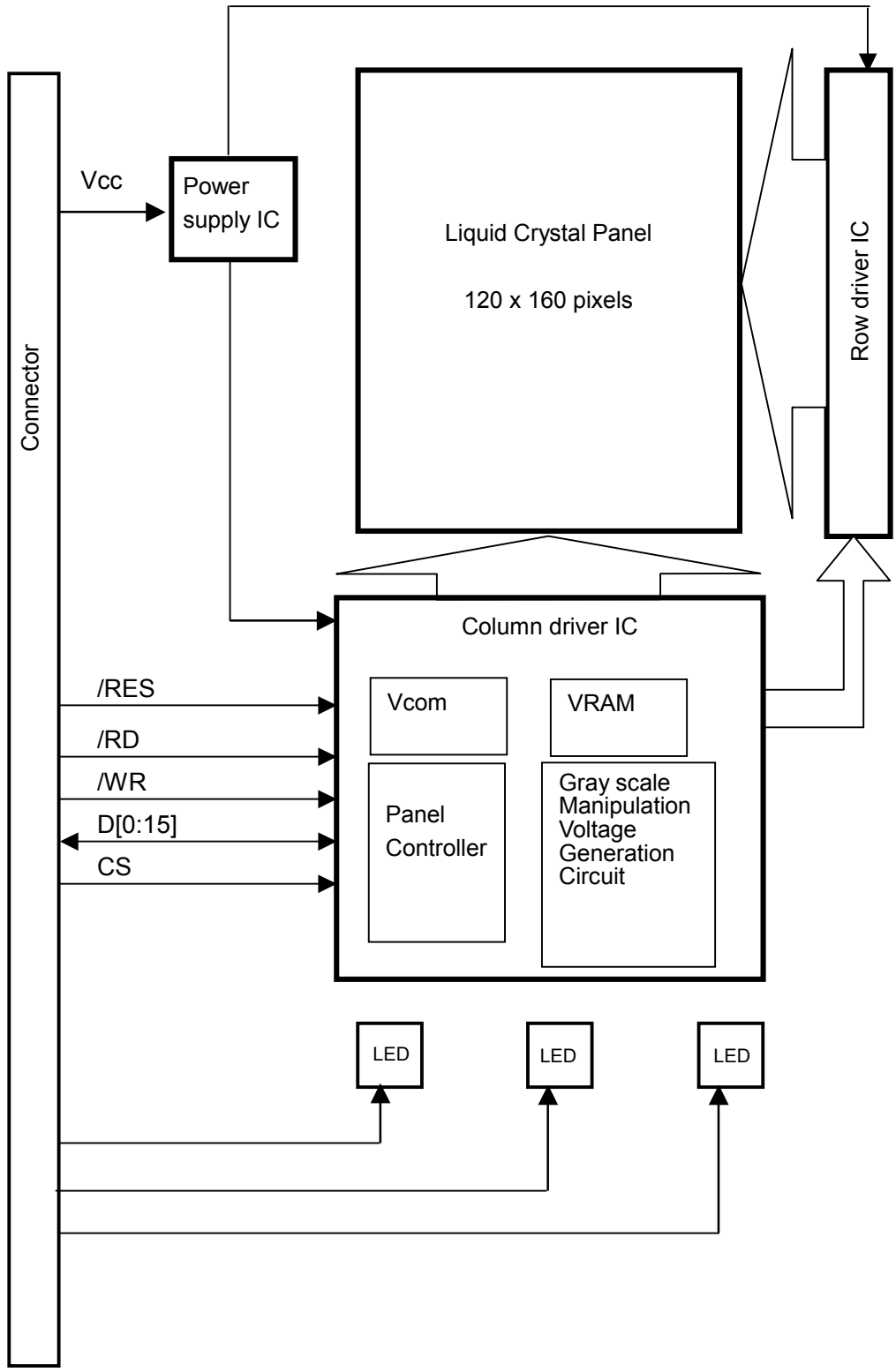
Unit : mm



**PIN ASSIGNMENT FOR INTERFACE**

| PIN | SYMBOL | I/O | SIGNAL |
|---|---|---|---|
| 1 | Vcc | - | POSITIVE SUPPLY VOLTAGE |
| 2 | Vcc | | POSITIVE SUPPLY VOLTAGE |
| 3 | Vss | - | GROUND, FOR LCD SIGNALS and Vcc |
| 4 | Vss | - | GROUND, FOR LCD SIGNALS and Vcc |
| 5 | NC | - | No Connection |
| 6 | NC | - | No Connection |
| 7 | RES | I | RESET SIGNAL TO LCD DRIVER |
| 8 | CS | I | CHIP SELECT |
| 9 | D[15], Parallel bus MSB | I/O | DATA |
| 10 | D[14], Parallel bus | I/O | DATA |
| 11 | D[13], Parallel bus | I/O | DATA |
| 12 | D[12], Parallel bus | I/O | DATA |
| 13 | D[11], Parallel bus | I/O | DATA |
| 14 | D[10], Parallel bus | I/O | DATA |
| 15 | D[9], Parallel bus | I/O | DATA |
| 16 | D[8], Parallel bus | I/O | DATA |
| 17 | D[7], Parallel bus | I/O | DATA |
| 18 | D[6], Parallel bus | I/O | DATA |
| 19 | D[5], Parallel bus | I/O | DATA |
| 20 | D[4], Parallel bus | I/O | DATA |
| 21 | D[3], Parallel bus | I/O | DATA |
| 22 | D[2], Parallel bus | I/O | DATA |
| 23 | D[1], Parallel bus | I/O | DATA |
| 24 | D[0], Parallel bus LSB | I/O | DATA |
| 25 | RS | I | DATA OR COMMAND |
| 26 | WR | I | WRITE |
| 27 | RD | I | READ |
| 28 | LED1 | - | LED 1 POWER SUPPLY |
| 29 | LED2 | - | LED 2 POWER SUPPLY |
| 30 | LED3 | - | LED 3 POWER SUPPLY |

**BLOCK DIAGRAM**



**Pixels Location**

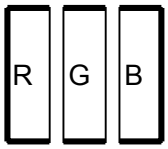
120 pixels

| | | | | | | |
|---|---|---|---|---|---|---|
| 1, 1 | 2, 1 | | x, 1 | | | 120, 1 |
| 1, 2 | | | | | | |
| | | | | | | |
| 1, y | | | x, y | | | |
| | | | | | | |
| 1, 160 | | | | | | 120,160 |

160 lines

**Pixels Arrangement**

: Pixel




: Dot

(Sub-pixel)

**CONNECTOR**

FPC:30 pin / 0.5mm pitch,

Connector: FH19-30S-0.5SH (Hirose Electric Co., LTD.)

**Command/AC Timing**

Detail technical information of “command/data”, or “AC timing” can be available with following documents:

-IC specification of column driver : HD66770

-IC specification of row driver : HD66771

-IC specification of power supply : HD667P00

## FOR SAFETY

LCD module is generally designed with precise parts to achieve light weighted thin mechanical dimensions.
In using our Modules, make certain that you fully understand and put into practice the warnings and safety precautions detailed in Engineering Information No.EE-N001,"CAUTIONS AND INSTRUCTIONS FOR TOSHIBA MATSUSHITA DISPLAY TECHNOLOGY CO.,LTD. LCD MODULES".
Refer to individual specifications and TECHNICAL DATA sheets (hereinafter called "TD") for more detailed technical information.

### 1) SPECIAL PURPOSES

A) Toshiba Matsushita Display Technology Co.,Ltd.'s Standard LCD Modules have not been customized for operation in extreme environments or for use in applications where performance failures could be life-threatening or otherwise catastrophic.

B) Since Toshiba Matsushita Display Technology Co.,Ltd.'s Standard LCD Modules have not been designed for operation in extreme environments, they must never be used in devices that will be exposed to abnormally high levels of vibration or shock which exceed Toshiba Matsushita Display Technology Co.,Ltd.'s published specification limits.

C) In addition, since Toshiba Matsushita Display Technology Co.,Ltd. Standard LCD Modules have not been designed for use in applications where performance failures could be life-threatening or catastrophic, they must never be installed in aircraft navigation control systems (such as, but not limited to Traffic Collision Avoidance System and Air Traffic Indicator), in military defense or weapons systems, in critical industrial process-control systems (e.g., those involved in the production of nuclear energy), or in critical medical device or patient life-support systems.

### 2) DISASSEMBLING OR MODIFICATION

DO NOT DISASSEMBLE OR MODIFY the module. It may damage sensitive parts inside LCD module, and may cause scratches or dust on the display.
Toshiba Matsushita Display Technology Co.,Ltd. doses not warrant the module, if customer disassembled or modified it.

### 3) BREAKAGE OF LCD PANEL

DO NOT INGEST liquid crystal material, DO NOT INHALE this material, and DO NOT CONTACT the material with skin, if LCD panel is broken and liquid crystal material spills out.
If liquid crystal material comes into mouth or eyes, rinse mouth or eyes out with water immediately.
If this material contact with skin or cloths, wash it off immediately with alcohol and rinse thoroughly with water.

### 4) GLASS OF LCD PANEL

BE CAREFUL WITH CHIPS OF GLASS that may cause injuring fingers or skin, when the glass is broken.

### 5) ELECTRIC SHOCK

DISCONNECT POWER SUPPLY before handling LCD module.

### 6) ABSOLUTE MAXIMUM RATINGS AND POWER PROTECTION CIRCUIT

DO NOT EXCEED the absolute maximum rating values under the worst probable conditions caused by the supply voltage variation, input voltage variation, variation in parts' constants, environmental temperature, etc., otherwise LCD module may be damaged.
Employ protection circuit for power supply, whenever the specification or TD specifies it.
Suitable protection circuit should be applied for each system design.

### 7) DISPOSAL

When dispose LCD module, obey to the applicable environmental regulations.

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