POWERVIEW DISPLAY CORP.
鋭視光電股份有限公司

Embedded Display System

With

CAN Bus

Product Information

MODEL NO. : E070W1D1-4 V.3x

Date : *2023/07/11* ***Revision. 0.1***

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Note :

This product specification is subject to change without any notice. Please contact PowerView customer technical service department, **faeservice@powerview.com.tw**, or your local service agents for the latest product information and updates of product specification.

Records of Revision

Date	Rev. No.	Summary	Page
2023/7/11	0.1	Tentative Version	-

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1.0 Handling Precaution

1.) Handle with care. Pay attention not to press or scratch the surface of the system screen, especially the polarizer. Do not twist or bend the whole module or any part of the system kit. It may cause un-recoverable damages to the system.

2.) Do not drop or bump the system kit since the LCD display of the system contains fragile glass components. Breakage of this portion might cause leakage of the liquid crystal sealed inside the displays. Do not touch the liquid crystal liquid in case of leakage. Flush with massive water immediately in case of contact with your skin with liquid crystal fluid and call for doctor for immediate medical treatment.

3.) Be sure to turn off power supply while plug or un-plug the power input connector.

4.) Clean up the polarizer only with soft solvent if necessary. The desirable cleaners are water, IPA (Isopropyl Alcohol) or Hexane. Do not use Ketone type materials (ex. Acetone), Ethyl alcohol, toluene, Ethyl acid or Methyl chloride. It will permanently damage the polarizer due to chemical reaction.

5.) Wipe off fluid drop immediately to prevent from possible discoloration or spots on the polarizer.

6.) Do not twist nor bend the system structure, even momentarily. Bending or twisting torque may likely damage the internal components of the system.

7.) Protect the system from static environment to prevent from damage to the CMOS gate array IC.

2.0 General Description

E070W1D1-4 V.3x is a very compact, highly integrated ARM9 embedded system that is consist of the following components.

1. 7" TFT-LCD Panel (800x480 WVGA)
2. Projective Capacitive (PCAP) Touch Screen
3. Embedded Solution with ARM9 based CPU
4. Built-in 64MB SDRAM and 128MB Flash Memory
5. Linux Kernel Version 3.10.102
6. Wireless Solution Embedded – 2G/3G/4G/Bluetooth/WIFI/RFID/GPS for data transfer
7. Communication: CAN bus*2, RS232*1, USB*1 (RS485 as optional)
8. Auto DIM, ACC
9. IP-65 Plastic Housing
10. Wide power range: 6V~55V
11. Support 5W heater function for

E070W1D1-4 V.3x is a complete all-in-one embedded system that provides a ready-to-use environment for customers with a variety of applications. Its compact, power-saving computing circuitry and slim LCD modules make the whole system very suitable for portable, diagnostic and HMI (Human Machine Interface) applications. Its housing design also meets IP-65 standard that enables users to operate this monitor in various environment. With its industrial standard function-ready and built-in PowerView owned OS software, E070W1D1-4 V.3x provides an easy-to-use, robust, installation-ready and risk-less environment for all users. Customers can concentrate their major engineering resources on the application software development for specific application.

In addition, another special merit of E070W1D1-4 V.3x is its true digital TFT LCD display. With 7” in diagonal size, 800x480 resolution, and 800nits (typ.) sunlight readable brightness, it’s very vivid, eye-catching and crystal clear screen can perfectly present excellent pictures, icons, user interface on its 15:9 wide screen. Everything needed for a computing display is already built into a compact and complete module and ready for immediate installation upon arrival.

The platform of E070W1D1-4 V.3x also reserves high flexibilities to adopt future expansions of several different industrial interfaces without changing its original form factor. This merit can minimize the reinvestments of capital and engineering efforts in remaking mechanical tooling for specification changes.

Its Linux based operating system enable customers to develop their own application software on an open platform to minimize the heavy investments, in terms of time and engineering resources, into the system.

There is a graphic drawing utility available, which is developed by PowerView to let customer control this embedded system by using the ASCII command code via RS232 interface. With the help of this graphic utility, customer can easily develop their own application software without the complex programming skill which usually is needed by the other embedded systems on the market.

2.1 General Applications

- Portable Devices, Compact Diagnostic Tools, Surveillance and Monitoring Equipment, Control and HMI Terminals.

* This product needs to be installed by professional person and the place will be different by the type of the car. End user is not allowed to install the product.

2.2 Main Features

- Built-in Sunlight Readable Brightness Digital 7” WVGA LCD
- Projective Capacitive (PCAP) Touch Screen
- Embedded ARM9 MCU Engine
- Built-in 64MB SDRAM and 128MB Flash Memory
- Linux Kernel Version 3.10.102
- Versatile I/O functions
- All-IN-ONE unit with Single DC power Supply Input
- Ultra Wide Input Voltage Range +6VDC ~ +55VDC
- LTE module, supporting multi-bands LTE-FDD, W-CDMA, CDMA–
- Bluetooth 4.1, supporting Dual-Mode(Bluetooth and Bluetooth LE)
- WIFI IEEE 802.11b/g/n
- RFID module (125KHz)
- GPS module, supporting GPS
- IP-65 module connectors, adopted with Deutsch DT04-12PA 12 way Connector
- Build-in battery, support sleep mode
- Build-in RTC function
- Build-in Defrost heater & Battery heater
- Support external Wiegand26 card read

2.3 General Information

2.3.1 System & Display Characteristics

Item	Specification	Note
CPU Processor	ARM9 MCU	-
OS	Linux 3.10.102	
Flash Memory	128 MB	
SDRAM	64 MB	
Communication I/F *Note(1)	RS232 x 1	support QSerialPort
	CAN Bus 2.0B x 2 with termination	support Socket CAN and QSerialBus
	USB1.1 Client x 1(for f/w upload)	support F/W program and RamDisk
	LTE Cat.1	
	GPS	support NMEA command
	Bluetooth4.1	
	RFID (125KHz)	support QSerialPort
	WIFI IEEE 802.11b/g/n	
Peripherals	RTC	
	Light Sensor	support sysfs, QAmbientLightSensor
	3D Accelerometer	support sysfs, QAccelerometer
User interface	Keypad (5 keys) + PCAP Touch	support QKeyEvent/QTouchEvent
DC power input	+6V~+55V	
Protection	IP65	
IO Connector	Deutsch DT04-12PA 12 way Compatible	
Audio Alarm	Internal buzzer	
Defrost heater input	+12V±10%(5W), Auto shutdown at 35℃	

Note (1): Customer's program code could be updated via the USB client port. .

2.3.2 Display Unit:

Item	Specification	Unit	Note
Display Type	a-Si TFT LCD 7" Active Matrix	inch	Wide 15:9
Active Area	152.4(H) x 91.44(V)	mm	-
Number of Pixels	800(H) x 480RGB(V)	pixel	WVGA
Pixel Arrangement	RGB Vertical Stripe	-	-
Brightness	720	nits	After Touch
Viewing Angle	140/120	degree	6 o'clock
Display Mode	Normally White	-	-
Color Depth	16.7M Colors	-	

Note (1): Customer's program code could be updated via the USB client port. .

2.3.3 Mechanical Dimensions

Item		Typ.	Unit	Note
Dimension	Horizontal	186.5	mm	±0.5
	Vertical	126.5		±0.5
	Depth	(33.3)		Main Body, (1)
	Depth	(56.3)		Incl. CN Receptacle Housing
Weight		(650)	g	±10g(temp)

Note (1): This depth exists excluding the compatible connector housing of the Deutsch Connector DT04-12xx series. Please refer the drawing of "Outline Dimensions" section.

3.0 Absolute Maximum Ratings

3.1 Absolute Ratings of Environment Requirement

Item	Symbol	Min.	Max.	Unit	Note
Storage Temperature	Tstg	-30	+80	ºC	(1)
Operation Temperature (Ambient Temperature)	Topr	-20	+70	ºC	(1)

Note (1): Temperature and relative humidity range are shown in the figure below.

95% RH Max. (40º C >Ta)

Maximum wet – bulb temperature at 39ºC or less. No condensation.

3.2 Electrical Absolute Ratings (Entire Embedded Module)

Item	SYMBOL	MIN	MAX	UNIT	NOTE
Power Supply Voltage	V_{DD}	-60	60	V	(1),(2)

Note (1): Within operating temperature

Note (2): Permanent damage to the device may occur if maximum values are exceeded.

Functional operation should be restricted to the conditions described under normal operating conditions.

4.0 Optical Characteristics of Display

The following items are measured under stable conditions in a dark room or equivalent state.

* Measuring Equipment: BM-5A, CA-110.

(V_{DD}=.12V, Ta=25±2ºC)

Item		Symbol	Condition	Min.	Typ.	Max.	Unit	Note
Contrast Ratio		CR	Φ=0 θ=0 Viewing Normal Angle		500	-		(1), (2),(4)
Response Time at 25ºC	Rising	Tr		-	10	20	ms	(3)
	Falling	Tf		-	15	30		
Luminance		Y_L		630	720	-	cd/m^2	(1), (2),(6)
Viewing Angle	Hor.	θ_L	CR≥10 (at center point)	60	70	-	Degree	(2),(5)
		θ_R		60	70	-		
	Ver.	ϕ_H		40	50	-		
		ϕ_L		60	70	-		

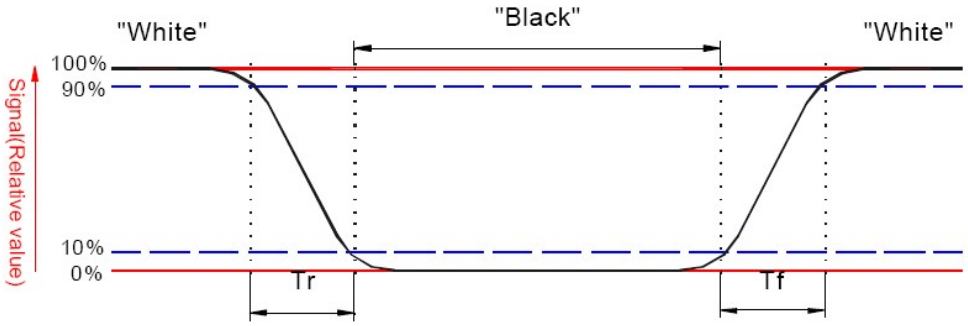
Note (1): Test Condition

- Ambient Temperature =25℃and test in the dark room.

Note (2): To be measured on the center area of panel with a viewing cone of 1° by Topcon Luminance Meter BM-5A, after 10 minutes operation.

Note (3): Definition of response time:

The output signals of photo detector are measured when the input signals are changed from “black” to “white”(falling time) and from “white” to “black”(rising time), respectively. The response time is defined as the time interval between the 10% and 90% of amplitudes. Refer to figure as below.

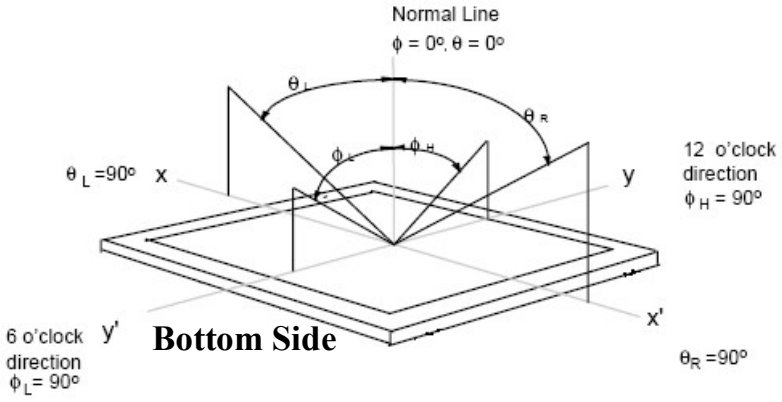


Note (4): Definition of contrast ratio:

Contrast ratio is calculated with the following formula.

$$\textbf{Contrast ratio (CR)} = \frac{\textbf{Photo detector output when LCD is at “White” state}}{\textbf{Photo detector output when LCD is at “Black” state}}$$

Note (5): Definition of viewing angle, Refer to figure as below.



Note (6): Measured at the center area of the panel when all the input terminals of LCD panel are electrically opened.

5.0 Electrical Characteristics

5.1 DC Characteristics (Entire Embedded System)

Item	Symbol	Min.	Typ.	Max.	Unit	Note
Supply Voltage	V_{DD}	6	12	55	V	
	I_{DD}	-	400		mA	(1)
	I_{DD}		1.5	2	A	(2)
Permissive Input Ripple Voltage	V_{RF}	-	-	100	mV_{P-P}	V_{DD}=+12V
Wiegand power output	$V_{wiegand}$	10.8	12	13.2	V	
USB power input	V_{USB}	4.5	5.0	5.5	V	
Heater Power	V_{Heater}	10.8	12	13.2	V	(3),(4)
	I_{Heater}	-	5	-	W	
	$T_{Shutdown}$	30	35	40	℃	

Note (1): V_{DD}=12V Without RS232 or CAN2.0B device connected. (LCD is attached, with the maximum brightness). Battery is full charged.

Note (2): VDD=12V, Battery Fast-Charge, RF(LTE) Function on

Note (3): The power 5W is defined under 12V input voltage.

Note (4): Heater will force to shut down by internal temperature sensor.

5.2 AC Characteristics (Entire Embedded System)

Item	Symbol	Min.	Typ.	Max.	Unit	Note
RFID	F_{RFID}	120	125	135	KHz	ASK modulation
Power off	T_{Off}	3.5	4	4.5	H	(1)
RS232 Speed	F_{RS232}	-	-	115.2	Kbps	
CAN1 Speed	F_{CAN1}	-	-	500	Kbps	
CAN2 Speed	F_{CAN2}	-	-	1000	Kbps	

Note (1): System turn off internal power from sleep mode.

5.3 RF Support(UMST/LTE)

Module	Band
E070W1D1-4 V.1A	LTE:B1/B3/B8/B28
	3G:2100MHz/900MHz
E070W1D1-4 V.1E	LTE Cat1: B7/B20
	UMTS: 2100MHz/900MHz
E070W1D1-4 V.1U	LTE Cat1: B2/B4/B12
	UMTS: 850MHz/1700MHz/1900MHz

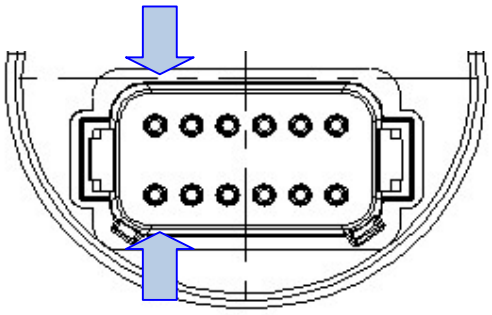
5.4 Input Terminal Pin Assignment

5.4.1 Main Interface:

Rear Connector : Deutsch 12-pin DT04-12PA or equivalent

Pin #	Function	Specification
1	GND	System Ground/programming
2	+PWR	Positive V in = +6~55V DC
3	USB +5v	Programming
4	USB_CN	Programming
5	USB_CP	Programming
6	+12V	Heater power input
7	CAN1_Low	Capable of 500kbps
8	CAN1_High	Capable of 500kbps
9	CAN2_Low	Capable of 1Mbps(With Termination)
10	CAN2_High	Capable of 1Mbps(With Termination)
11	RS232 Tx	Debugging + Programming
12	RS232 Rx	Debugging + Programming

Pin 1



Pin 12

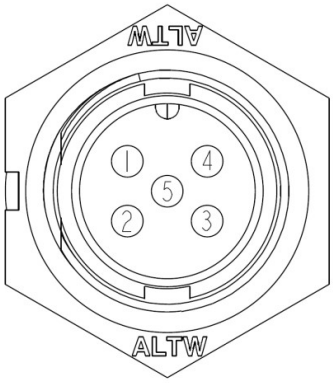
Real view

5.4.2 Wiegand Card Reader:

Rear Connector : ABD-05PMMS-LC7001

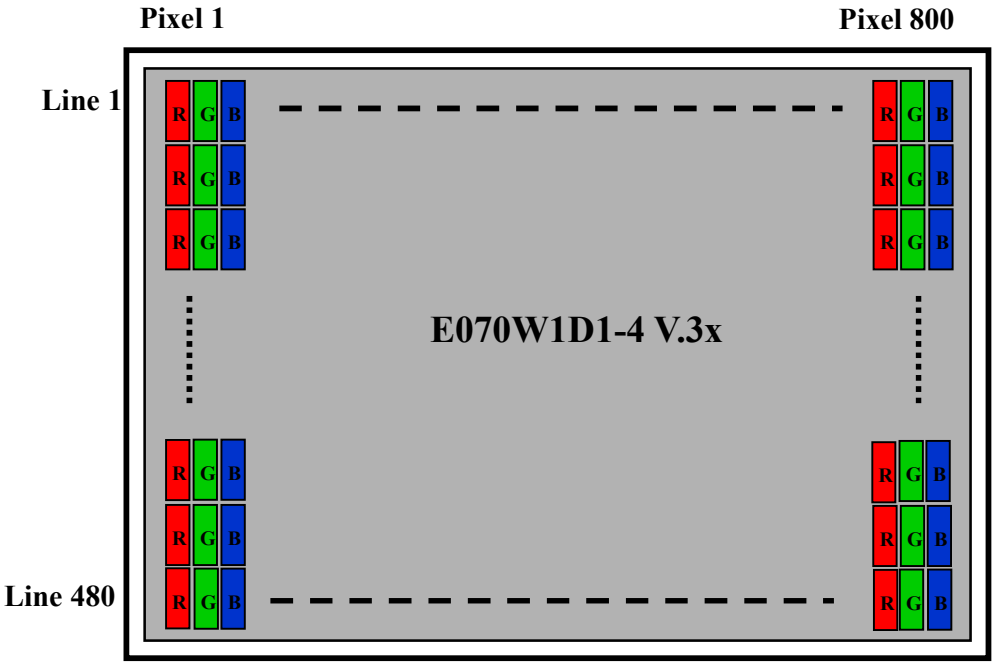
Match Connector : BD-05BFFM-LL7AXX

Pin #	**Function**	**Specification**
1	12V	Internal 12V power output
2	Wiegand D1	D1 of card reader
3	GND	Power ground
4	LED Ctrl	LED control
5	Wiegand D0	D0 of card reader

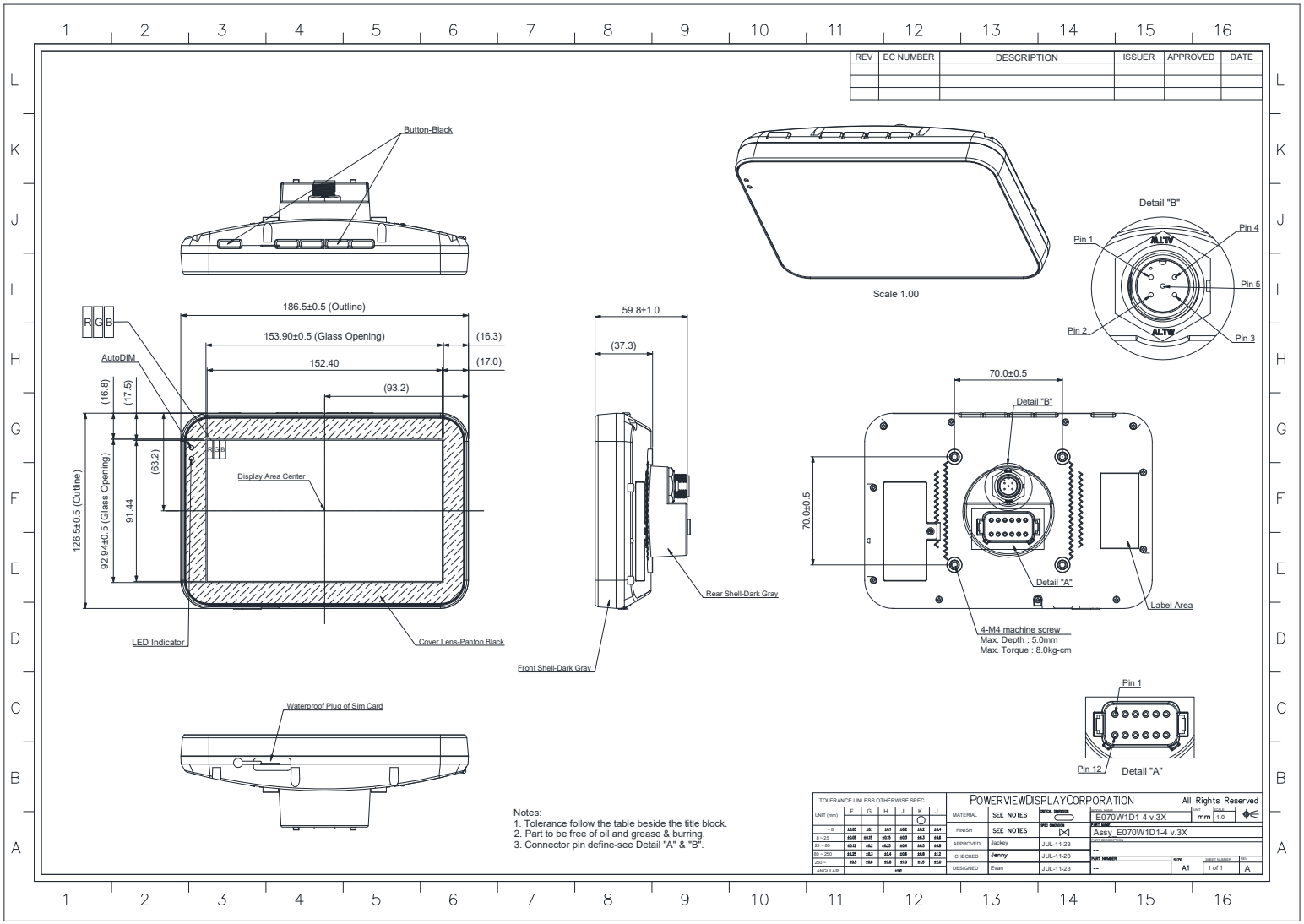


Real view

5.5 Display Pixel Format



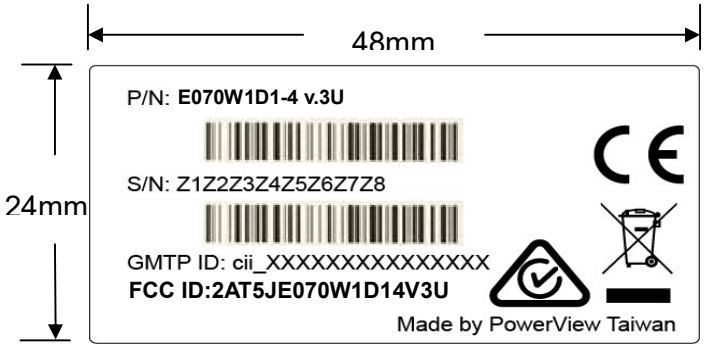
6.0 Outline Dimensions



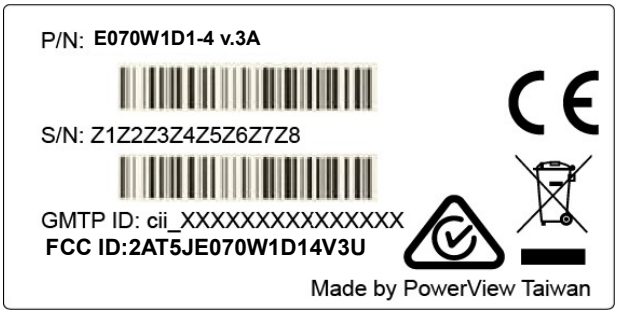
7.0 Labeling, Packaging & Others

7.1 Labeling

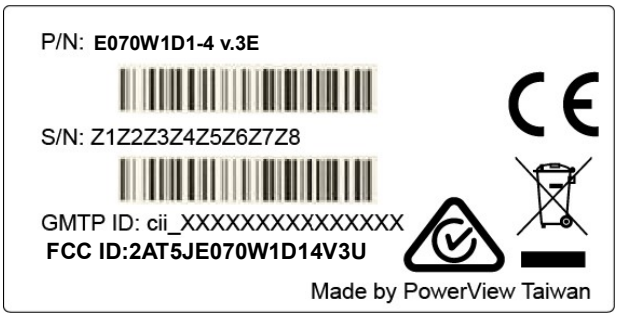
FCC certification:



RCM certification:



CE certification:



Z1	Assembly Plant
Z2	Manufacturing Year. last digit
Z3	Manufacturing Month
Z4	Manufacturing Date
Z5	Product Category
Z6Z7Z8	Production Sequence No.
xxxxxxxxx	GMTP ID

7.2 Packaging

TBD

8.0 General Notice

8.1 Reliability Test Items

No.	Test Items	Conditions	Remark
1	High Temperature Storage	Ta= + 80℃ 240 Hrs	
2	Low Temperature Storage	Ta= - 30℃ 240 Hrs	
3	High Temperature Operation	Ta= + 70℃ 240 Hrs	
4	Low Temperature Operation	Ta= - 30℃ 240 Hrs	
5	High Temperature and High Humidity	Ta= 50℃, 80%RH 240 Hrs	Operation
6	Heat Shock	-30~80℃/100 cycles 1Hr/cycle	Non-operation
7	Electrostatic discharge	Contact = ± 4 kV, Class B Air = ± 8 kV, Class B	Non-operation
8	Vibration	Frequency range : 8~33.3 Hz Stroke : 1.3mm Sweep : 2.9G, 33.3~400Hz Cycle : 15 minutes 2 hours for each direction of X,Z 4 hours for Y direction	Non-Operation
9	Mechanical Shock	100G, 6ms, ±X±Y±Z 3 times for each direction	JIS C7021, A-7 Condition C Non-Operation
10	Vibration (with carton)	Random vibration : 0.015G2/Hz from 5~200Hz -6dB/octave from 200~500Hz	IEC 68- 2-34
11	Drop (with carton)	Height : 60 cm 1 corner, 3 edges, 6 surfaces	JIS Z0202

Note (1): Ta: Ambient temperature.

Note (2): In the standard conditions, there is not display function NG issue occurred. All the cosmetic specification is judged before the reliability stress.

9.0 Storage, Operation & Others

a) Do not leave the panel in high temperature, and high humidity for a long time. It is highly recommended to store the module with temperature from 0 to 35°C and relative humidity of less than 70%.

b) Do not store the TFT-LCD module in direct sunlight.

c) The module shall be stored in a dark place. It is prohibited to apply sunlight or fluorescent light during the store.

d) Do not connect or disconnect the module in the "Power On" condition.

e) Power supply should always be turned on/off by the item 3.2 "Electrical Absolute Ratings"

f) The liquid-crystal is deteriorated by ultraviolet rays. Do not leave it in direct sunlight and strong ultraviolet rays for many hours.

g) Avoid condensation of water. It may result in improper operation or disconnection of electrode.

h) Do not exceed the absolute maximum rating value. (The supply voltage, input signal voltage, environment, and so on). Otherwise the panel may be damaged.

i) If the panel displays the same pattern continuously for a long period of time, it can be the situation when the image "Sticks" to the screen.

j) If the module has its circuitry FPC with it, please handle it carefully and prevent the FPC to be stressed.

10.0 Certification:

10.1 E070W1D1-4 V.3A: RCM Certification

Item	Band	Standard
LTE + WCDMA	B1,B3,B8,B28	AS/CA S042
UMTS	2100MHz,900MHz	
BT	BT4.0 V2.1.1	AS/NZS 4268
RFID	125KHz	AS/NZS 4268
WIFI	IEEE 802.11b/g/n	AS/NZS 4268
EMI		AS/NZS CISPR32
Safety/ MPE SAR		AS/NZS 62368-1, AS/NZS 2772.2

10.2 E070W1D1-4 V.3E: CE Certification

Item	Band	Standard
LTE	B7,B20	EN301908-1,EN301489-1-52
UMTS	2100MHz,900MHz	
BT	BT4.0 V2.1.1	EN300328,EN301489-1-17
RFID	125KHz	EN300330,EN301489-1-3
GNSS	GPS	EN303413,EN301489-1-19
Safety/ MPE SAR		EN62368-1, EN50385/ EN62311
WIFI	IEEE 802.11b/g/n	EN300328,EN301489-1-17

10.3 E070W1D1-4 V.3U: FCC Certification

Item	Band	Standard
LTE	B2,B4,B12	Part 22, 24, 27
UMTS	850MHz,1700MHz,1900MHz	
BT	BT4.0 V2.1.1	Part 15C
RFID	125KHz	Part 15C
EMI		Part 15B
MPE SAR		Part 2.1091 &Part 2.1093
WIFI	IEEE 802.11b/g/n	Part 15C

- **Federal Communication Commission Interference Statement**

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation.

This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one of the following measures:
. Reorient or relocate the receiving antenna.
. Increase the separation between the equipment and receiver.
. Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
. Consult the dealer or an experienced radio/TV technician for help.

FCC Caution: To assure continued compliance, any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate this equipment. (Example - use only shielded interface cables when connecting to computer or peripheral devices).

FCC Radiation Exposure Statement

This equipment complies with FCC RF radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with a minimum distance of 20 centimeters between the radiator and your body.

This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

The antennas used for this transmitter must be installed to provide a separation distance of at least 20 cm from all persons and must not be co-located or operating in conjunction with any other antenna or transmitter.

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:
(1) This device may not cause harmful interference, and (2) This device must accept any interference received, including interference that may cause undesired operation.

11.0 Inspection Specifications

11.1 Purpose

This Inspection Specifications are to define the TFT-LCD Modules (hereinafter called "Modules") inspection standard for customer applying in the incoming receiving process.

11.2 Scope:

Specifications contain

- Display Quality Evaluation
- Mechanics Specification

11.3 Liability

Inspection Deadline

The buyer (Customer) should inspect the modules within fifteen (15) calendar days after delivery.

Notification of Rejection

The customer may propose to reject one or more lots as the modules fail to meet the AQL (Acceptable Quality Level). In that case, the customer should notify PowerView in either documents or mail.

Notification Deadline

The customer should inform PowerView within 3 working days upon finishing inspection. If the Customer fails to inform PowerView, the right to reject will be lifted.

11.4 Sampling Plan

Unless there is other agreement, sampling plan for incoming inspection should follow MIL-STD-105E.

Lot size:

Quantity per shipment as one lot (different model as different lot .)

Sampling type:

Normal inspection, single sampling.

Sampling level:

Level II.

AQL:

Acceptable Quality Level

Major defect: AQL=1.0

Minor defect: AQL=2.5

11.5 Panel Inspection Condition

Environment

Room Temperature: 25±5℃.

Humidity : 65±5% RH.

Illumination : 300 ~ 700 Lux.

Inspection instruments

Pattern generator

VG-828 or equivalent model.

Video board: PowerView video board or equivalent. The output of the signal should comply with the specification provided by PowerView.

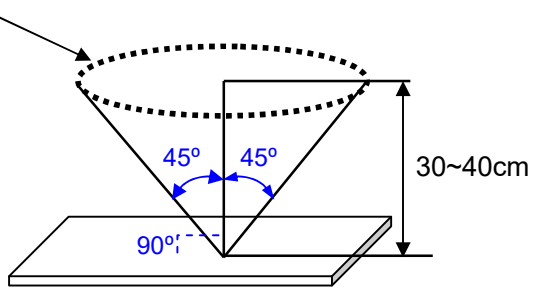
Luminance colorimeter: Topcon BM-7 or equivalent model

Inspection Distance

35±5 cm

Inspection Angle:

Eye position



11.6 Classification of Defects

Defects are classified as major defects and minor defects according to the degree of defectiveness defined herein.

Major defects:

A major defect is a defect that is likely to result in failure, or to reduce materially the usability of the product for its intended purpose.

Minor defects:

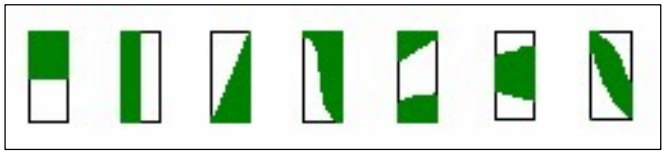
A minor defect is either a defect that is not likely to reduce materially the usability of the product for its intended application, or a departure from an intended purpose with little bearing on the effective use or operation of the product.

11.6.1 Electrical inspection specification

Inspection tem	Specification	Judge Criterion	
		Major	Minor
Line defect	Can't be seen.	●	
Bright dots	≦1 dots (Note1,2,3)		●
Dark dots	≦5 dots (Note1,2,3)		●
Total dots defect	≦5 dots (Note1,2,3)		●
Display non-uniformity or Mura (Note 4,5)	Use of ND filter or judged by equivalent limit sample		●

Note (1): For bright dot defect, bright area should be larger than 1/2 area of a sub-pixel to be count as 1 dot defect. A dot defect that is smaller than the defined dot defect will be treated as small bright dot.

*The drawing of 1/2 area sub-pixel definition: The 1/2 area sub-pixel can be defined as below one or more of specific shapes.



All bright dot defects should not be noticeable by observer under specified inspection environment , Please refer to Section 10.5.

Note (2): Adjacent-dot defect (refer to picture, dot 1,2,..,8 around A are all A's adjacent dots) should be inspected under the same display pattern in any one of White/Black/Green/Blue/Red/Monotone Gray pattern.

1	2	3
4	A	5
6	7	8

Note (3): Adjacent-dot defect should be observed under any one of white/Black/Green/Blue/Red pattern. 1 pair of bright dots equals 2 dots.

*Inspection patterns:

Standard inspection patterns of dot defect are listed below. PowerView uses these patterns as standard criteria for judging dot defect. Please inform PowerView if any other pattern is to be used to examine dot defect.

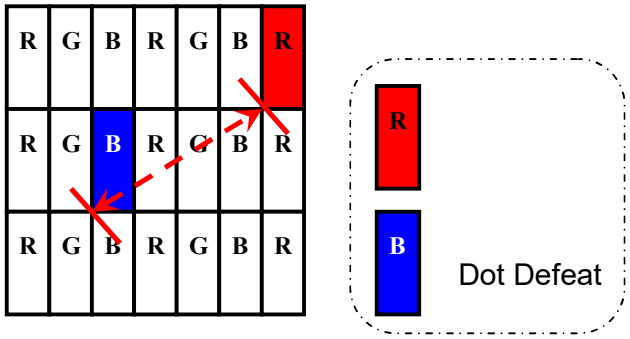
Test Pattern	Defect
Black	For white dot(s)
White	For black dot(s)
Monotone Red/Green/Blue	For black and white dot(s)

Note (4): The general mura symptoms has to be judged using 2% ND Filter.

Note (5): The inspection method of ND Filter - holding ND filter in front of the panel around 1 cm and examine the panel from 35±5 cm in the front view for 3 seconds.

Note (6): Definition of distance between dots as following illustrations.

Distance between defect dots:



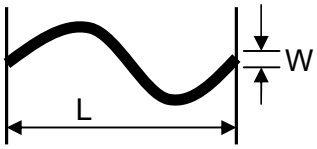
11.6.2 Appearance inspection specification

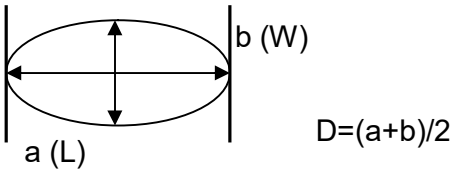
Judged area	Judged item		Inspection specification		Judge Criterion	
					Major	Minor
Active area	Particles, Scratch and Bubbles in display	Circular	**Average diameter: D(mm)**	**Numbers**		●
			D≦0.3	Disregarded		
			0.3 < D≦ 0.5	N≦5		
			0.5 < D	Not allowed		
		Linear	**Width: W(mm); Length: L(mm)**	**Numbers**		●
			W≦0.1	Disregarded		
			0.5<L≦5.0 0.1<W≦0.2	N≦5		
			5.0 < L 0.2 < W	Not allowed		
Bezel	Scratch		No harm			●
	Dirt					●
	Wrap		No dangerous			●
	Sunken		No harm			●
Label (S/N, B/L, WEEK)	No label		Not Allowed		●	
	Overlap Label (triple)					●
	Invert label					●
	Broken					●
	Dirt		Word can be read.			●
	Not clear					●
	Word out of shape					●
	Mistake		Not Allowed			●
	Position		Be attached on right position as defined in drawing			●
Screw	Not enough (Q'ty)		Not Allowed		●	
	float		Not Allowed			●
	Limp		Grounding OK			●
Solder	Appearance		Can't see the abnormal color, shape, hurt, dirt. Limited sample would be prepared, if necessary.		●	
Connector	Connection status		No correct connection		●	
FPC/FFC	Broken		Not Allowed		●	

Note (1): Extraneous substances which can be wiped out, such as fingerprint and particles are not considered as a defect.

Note (2): Defects on the Black Matrix are not considered as a defect. When L >=2W, defect count as liner defect.

Note (3): To verify whether the responsibility of following defects are caused by PowerView, the IQC checks as requested on above items before mass production such as the polarizer scratch, mura, glass broken, …etc.





11.7 Limited Warranty

PowerView represents and warrants that all Modules shall (i) conform to the specifications set forth in Article 10.5, 10.6 hereof and (ii) be free from any defects in material and workmanship for 12 month(s) after Customer's acceptance or deemed acceptance. PowerView will replace, rework or refund the defective or non-conforming Modules; Provided that Customer (i) promptly informs Supplier of the defects or non-conformities within the warranty period, (ii) comply with the specifications and conditions hereunder and (iii) comply with PowerView's procedure for Modules replace, rework and return. The warranty period for the Modules replaced or reworked shall be the remaining term for such Modules.

THE WARRANTIES AND REMEDIES SET FORTH ABOVE ARE EXCLUSIVE AND IN LIEU OF ALL OTHER WARRANTIES, TERMS OR CONDITIONS, EXPRESS OR IMPLIED, EITHER IN FACT OR BY OPERATION OF LAW, STATUTORY OR OTHERWISE, INCLUDING WARRANTIES OR CONDITIONS OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE, ALL OF WHICH ARE EXPRESSLY DISCLAIMED. PowerView'S WARRANTIES HEREIN APPLY ONLY TO CUSTOMER AND ARE NOT TO BE EXTENDED TO ANY THIRD PARTY.

11.8 Governing Law

This Agreement shall be governed and construed in accordance with the laws of TAIWAN, the Republic of China. Both parties agree to submit any dispute, which cannot be amicably resolved, to Hsinchu District Court for the first instance.