On board Control Unit
SAM-OCU-14

System Manual Ver 1.2

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Rev. 1.2

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Revision History

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1 Overview

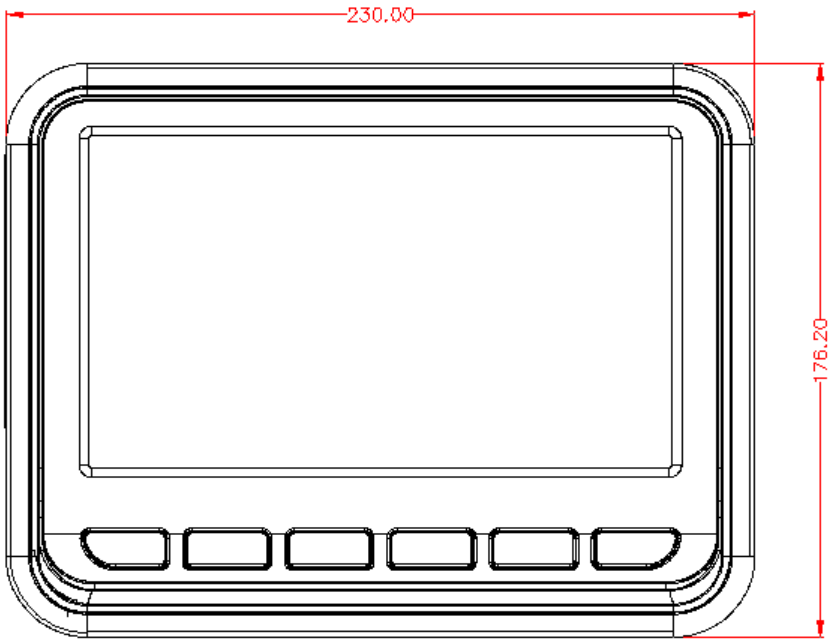
1.1 General Description

On-board Control Unit (OCU) is installed in a bus. That controls the bus system (such as door, passenger information display and etc.) and ticket validating system. In addition, it has a function of communication with the external center server.

This document informs and defines each module and specification of OCU.

Figure 1 Drawing of OCU

1.2 Outside Dimension



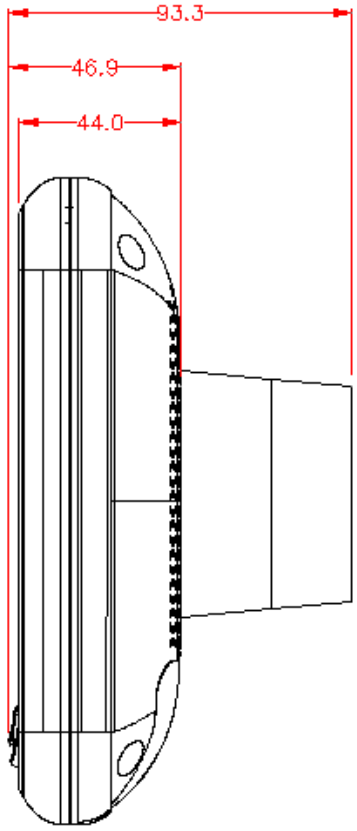


Figure 2 Outside dimension

1.3 System Configuration

1.3.1 Block Diagram

The following figure is the OCU block diagram.

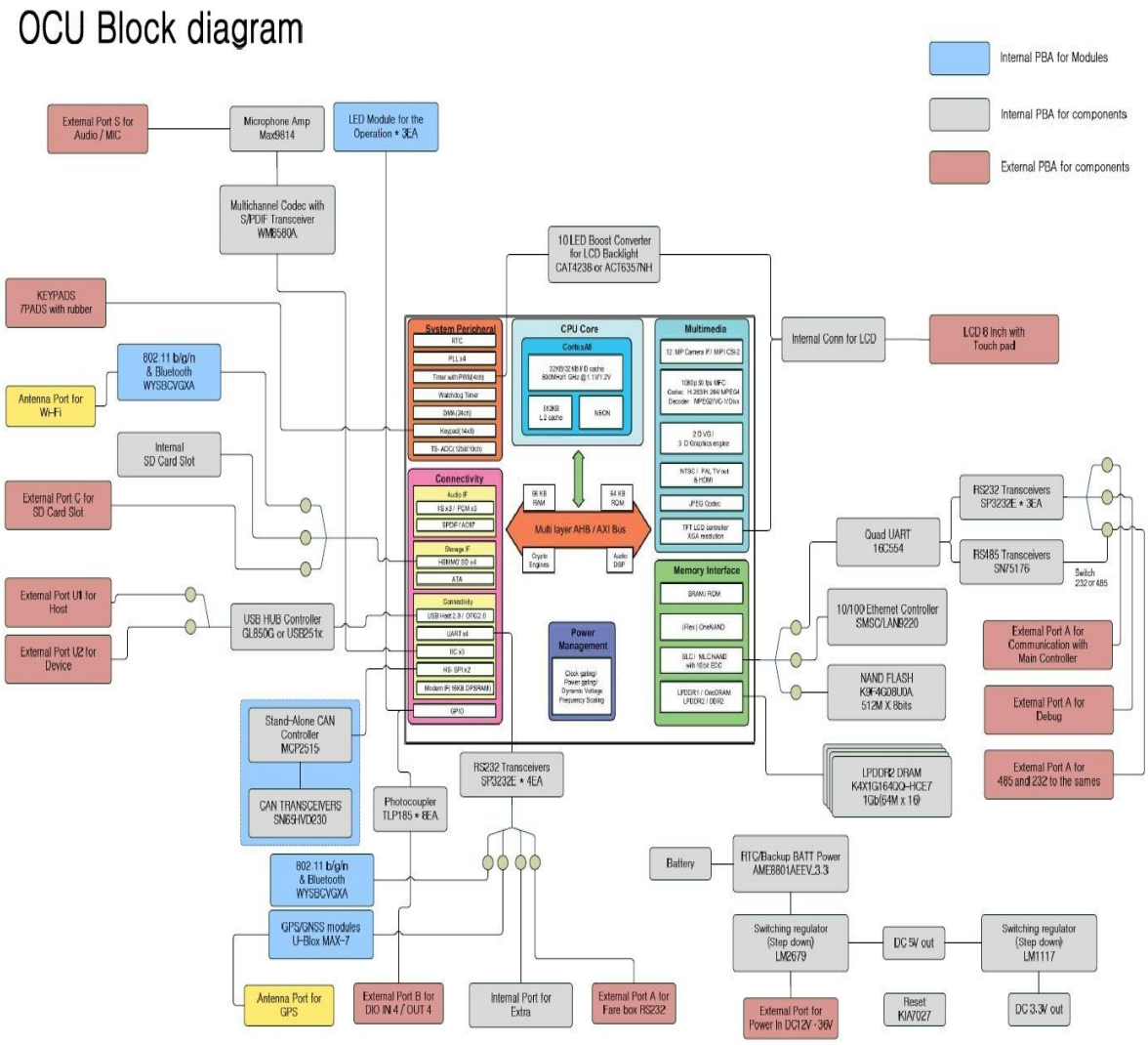


Figure 3 OCU Block Diagram

1.4 General Specification

The table below shows the general specifications of the OCU.

System	Item	Specification
Enclosure	Dimension(mm)	230.0(W) * 176.2(H) * 46.9(D)
	Material	Outside steel of enclosure : Material: PC-ABS
CPU Module	Processor	Samsung S5PV210, Cortex-A8 1GHz
	Memory	RAM: 512MB, NAND Flash: 512MB
	OS	ANDROID 4.0
Base Board Module	Wi-Fi/Bluetooth Module	IEEE802.11b/g/n, Bluetooth 3.0+HS
	GPS module	GPS RX Sensitivity: -164dBm GPS Accuracy: 3m
Touch screen display	8 inch Resolution: 1024 * 3(RGB) * 600 Touch method: 4-wire resistive touch	
External Interface	USB 2.0 Host * 1 USB 2.0 OTG * 1 SD Card Slot * 1 LAN * 1 RS232 * 1, RS232/485 * 1 CAN interface * 1 Antenna port *3	
Speaker	Rated Input Power	1W, 8ohm
Power	Input voltage (V)	24 VDC

Table 1 General specification

2 Module Configuration

The configuration of OCU is as follows:

- CPU Module
- Base Board Module
- Touch Screen Display
- Speaker

2.1 CPU Module

2.1.1 General Description

The CPU Module controls all the sub-modules and processes all the data in the OCU. They have sufficient space for Operating System (OS) and the OCU application data.

CPU Module is assembled with some parts as follows;

- CPU (Samsung S5PV210, Cortex-A8 1GHz)
- RAM (LDDR2 1Gbit *4)
- NAND Flash 512MB

2.1.2 Block diagram

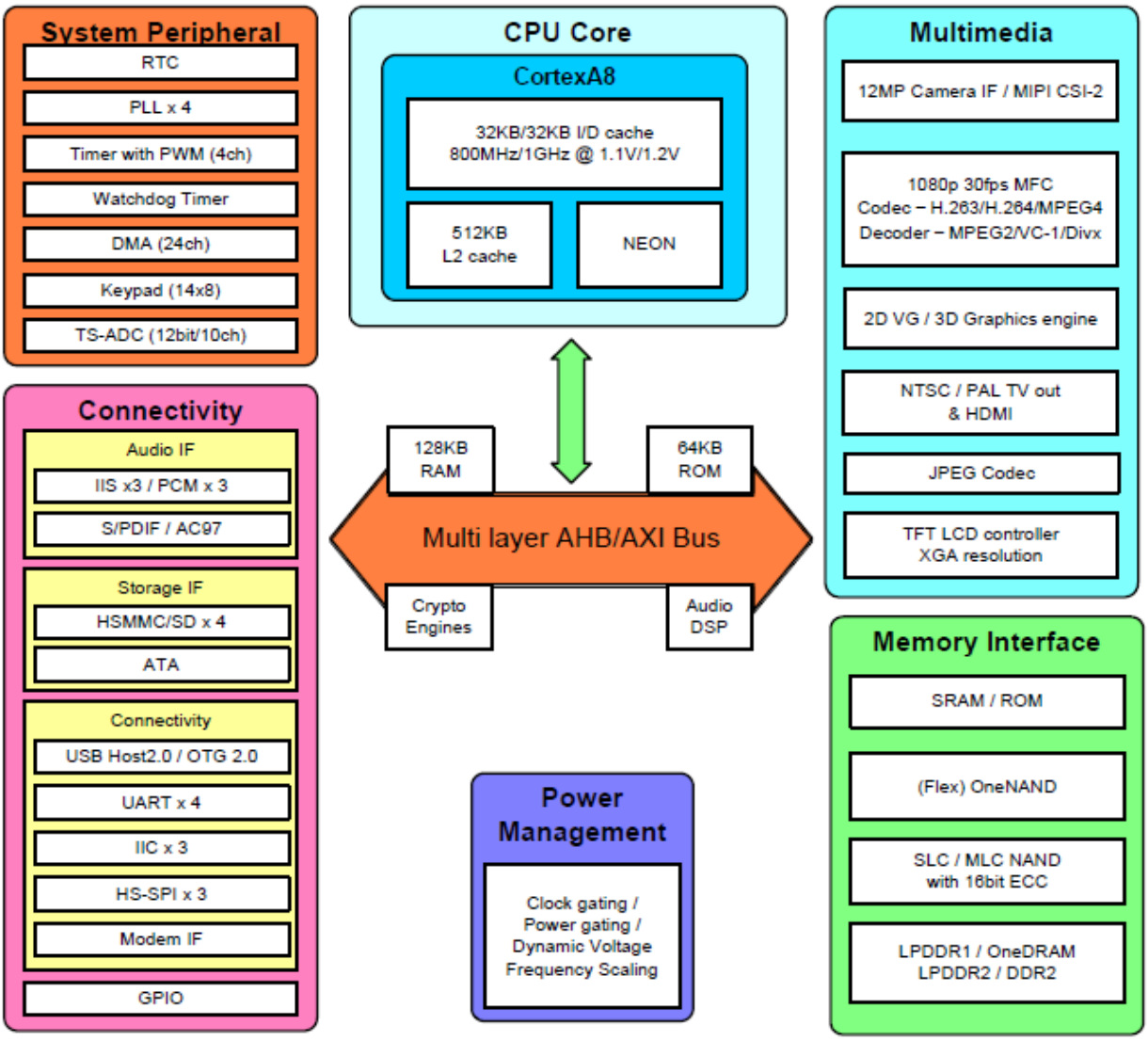


Figure 4 Block diagram of CPU Module

2.2 Base board module

2.2.1 General Description

Base board module performs major functions of OCU device controlling. The Wi-Fi/BT module, CAN module and etc. are installed on the base board.

2.2.2 Layout of Base board module

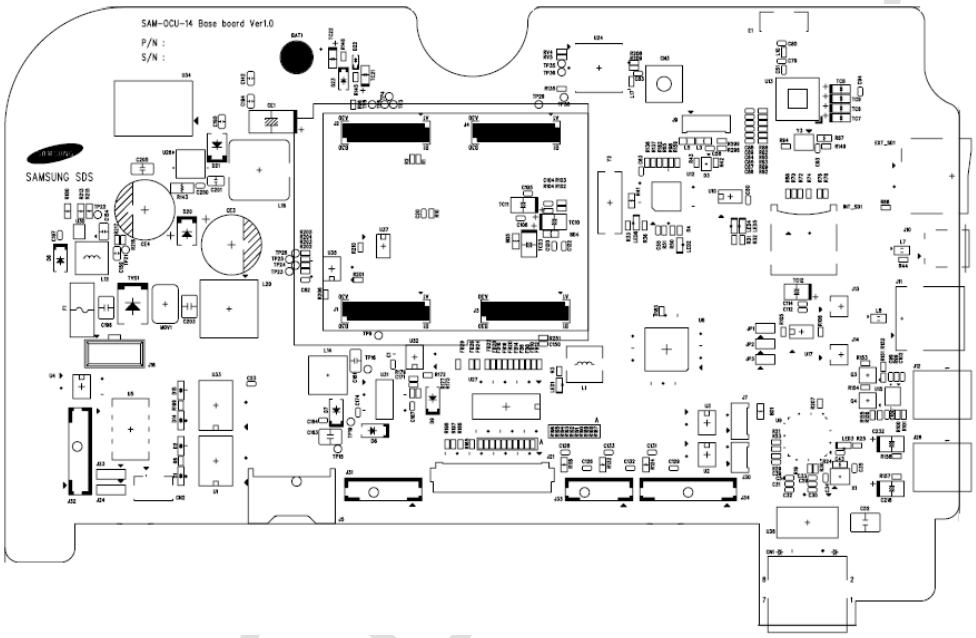


Figure 5 Top Layout of Base board module (Example)

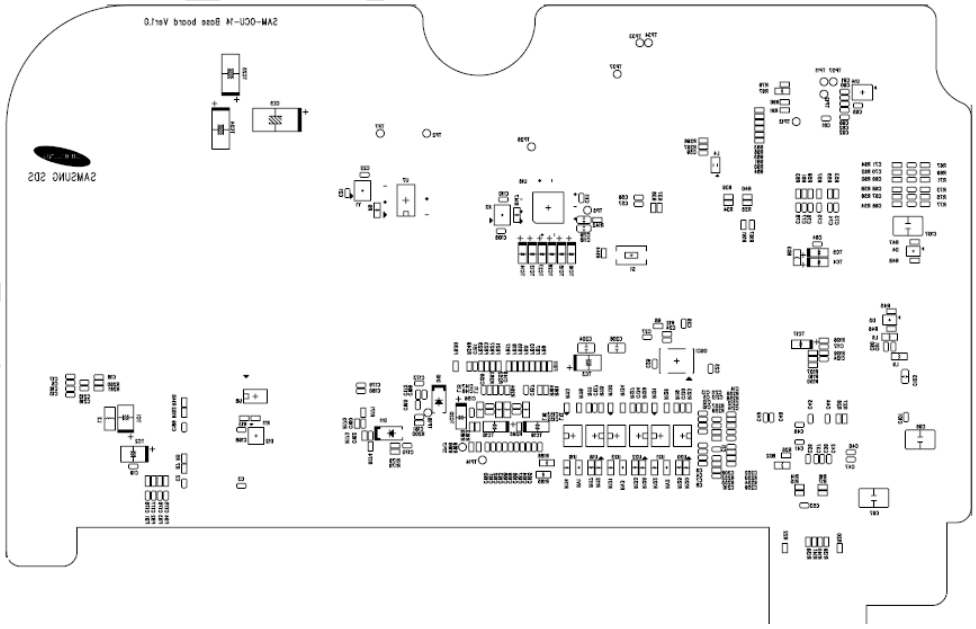


Figure 6 Bottom Layout of Base board module (Example)

2.2.3 Wi-Fi/Bluetooth module

The OCU has the Wi-Fi/Bluetooth module to communicate with the server (in the garage) and peripheral devices. The key features are as below;

- IEEE802.11b/g/n standard conformity, BT3.0,2.1+EDR
- Low standby current (with advanced power save and sleep mode)
- Transmit speed : 11/5.5/2/1 Mbps(11b), 54/48/36/24/18/12/9/6 Mbps(11g), 150~6.5 Mbps (11n)
- Channel Number : 1 to 13 channel (11bg), 79 channel (BT)
- Interface : SDIO
- Built-in EEPROM, 2G-PA, Crystal, BPF
- Security: WEP (64/128), TKIP, AES, WPA/WPA2, WAPI
- Small Outline: 9.0 x 8.8 x 1.35(Max) mm
- Package: Metal case package
- Utilizes 88W8787 IC
- RoHS Conformity

2.2.4 GPS module

The specification of GPS module is as below.

Item	Specification
RX Sensitivity	-164dBm
Cold start autonomous	-147dBm
Hot start autonomous	-161dBm
Tracking mode	-166dBm
Accuracy	3m
TTFF from cold start	42 sec
TTFF from warm start	30 sec
TTFF from hot start	1.8 sec

Table 2 Specification of GPS module

2.3 Touch Screen Display

2.3.1 General Description

The Touch screen display is a color graphic touch screen (8” inch TFT LCD) that allows driver to input their operation. The Touch screen display is positioned ergonomically for driver to operate easily.

2.3.2 Layout

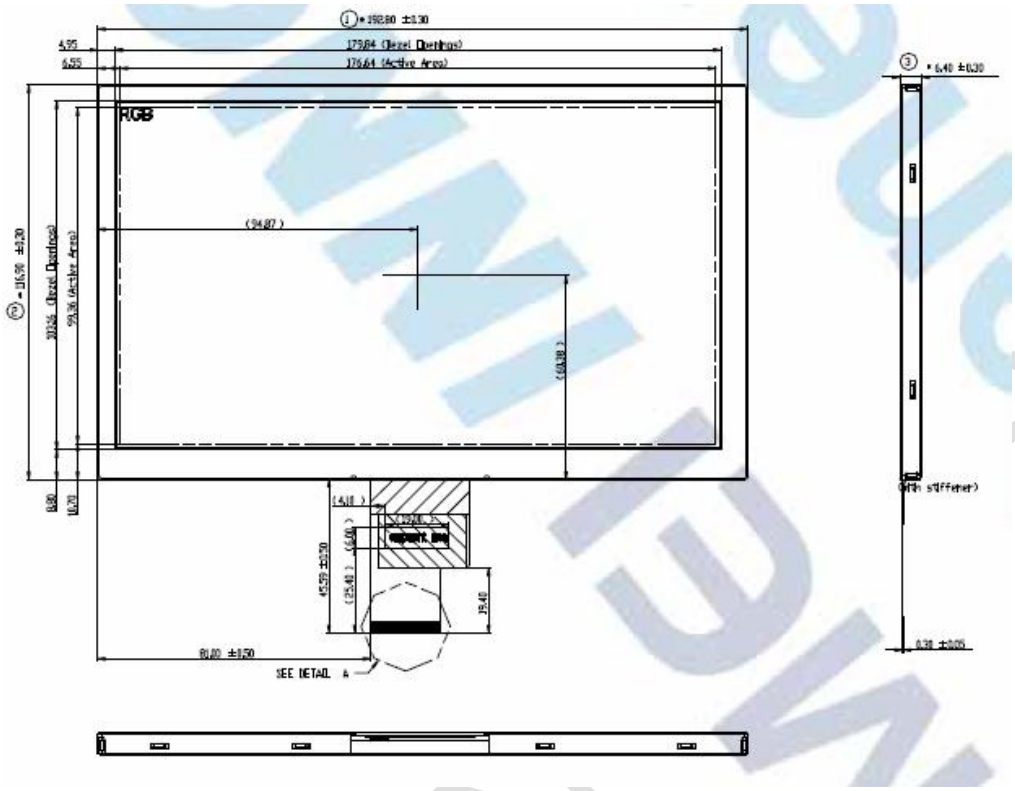


Figure 7 Layout of LCD display

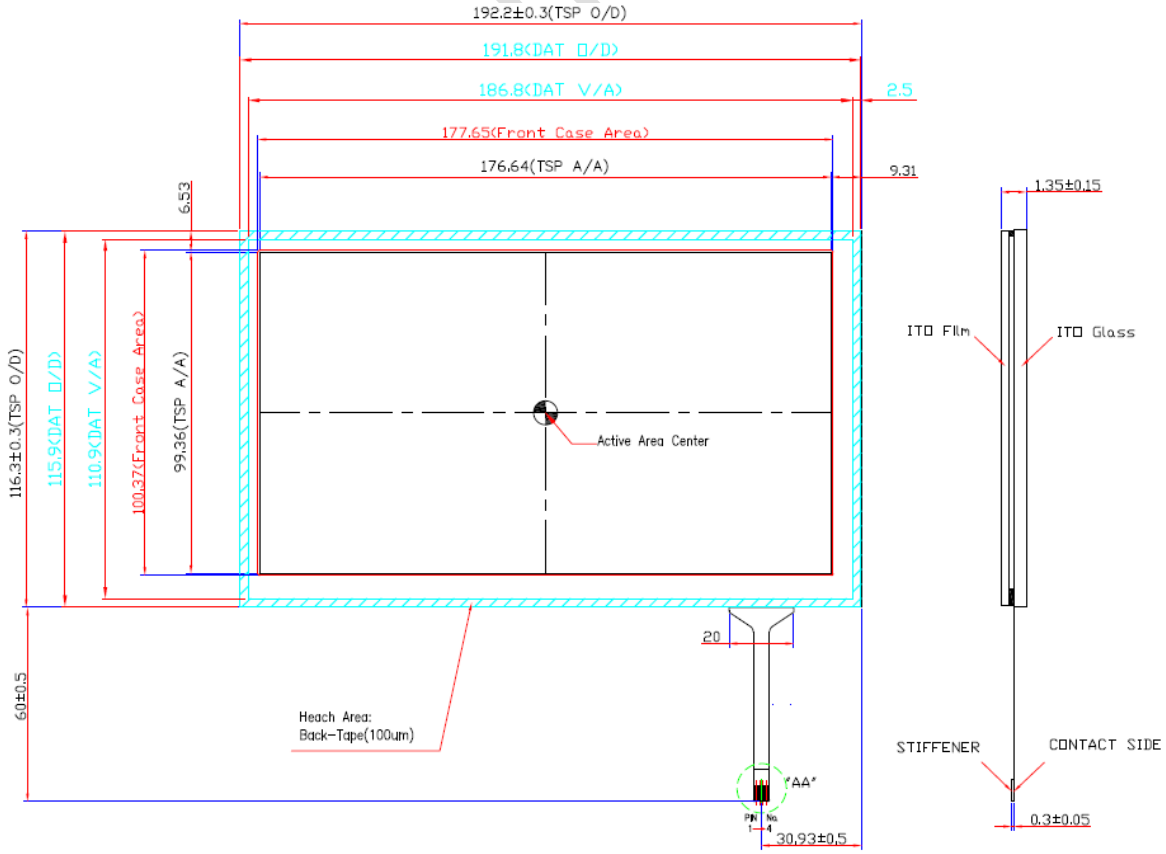


Figure 8 Layout of Touch panel

2.3.3 LCD display specification

Item	Specification
LCD size	8.0 inch(Diagonal)
Driver element	a-Si TFT active matrix
Resolution	1024 x 3(RGB) x 600
Display mode	Normally White
Dot pitch	0.1725(W) x 0.1656(H)
Active area	176.64(W) x 99.36(H)mm
Module size	192.8(W) x 116.9(H) x 6.4(D)mm
Surface treatment	Plain
Color arrangement	RGB-stripe
View Direction(Gray Inversion)	6:00 O’ Clock
Interface	Digital
Backlight power consumption	3.56W (Typ.)
Panel power consumption	0.39 W(Typ)
Weight	0.226kg(Typ)

Table 3 Specification of LCD display

2.3.4 Touch panel Specification

Item	Specification
Glass THK	1.1mm
Film type	Non-glare
Total THK	1.35±0.15mm
Linearity	±1.5% or less
Transmittance	80% or more
Resistance	100 < X axis <1200ohm, 100 < Y axis < 1200ohm
Tail	FPC (Ni+Au)
Method	4-wire resistive touch

Table 4 Specification of Touch panel

2.4 Speaker

2.4.1 General Description

The Speaker is installed in the OCU. The speaker makes a sound for driver's recognition.

Figure 9 Layout of Speaker

Items	Description
Rated Input Power	1.0W (Max. 1.5W)
Impedance	8±15%(Ohm)
Output SPL @ 0.1W/0.1M	87±2dB
Resonant frequency	800±20% Hz
Magnet size (mm)	11.5 * 1.5
Weight	10g
Dimension (mm)	40(W) * 20(H) * 8.2(D)

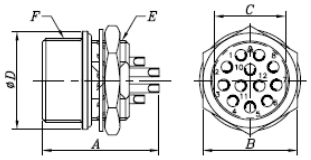
Table 5 Specification of Speaker

2.5 Connector and Power switch

2.5.1 Signal & Power connector

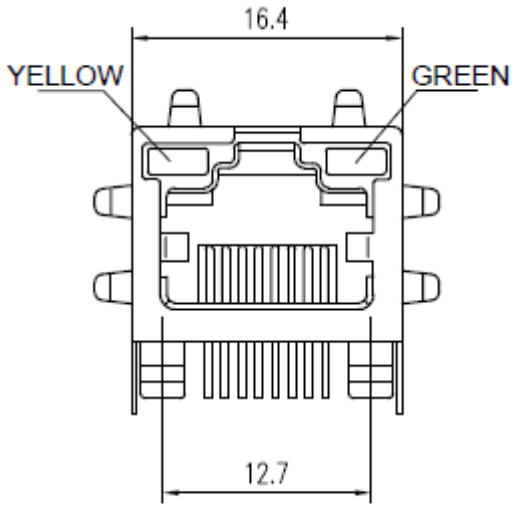
SW Solder Type Receptacle

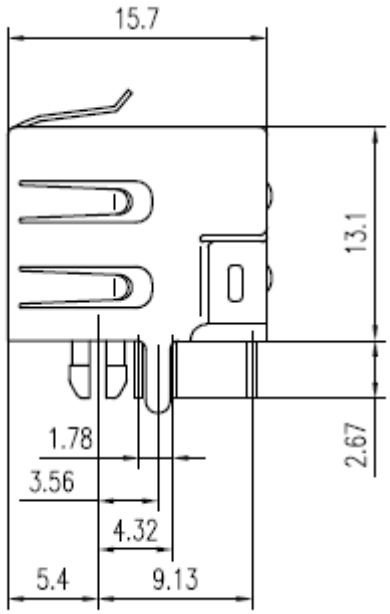
SW-10W-12 (R)



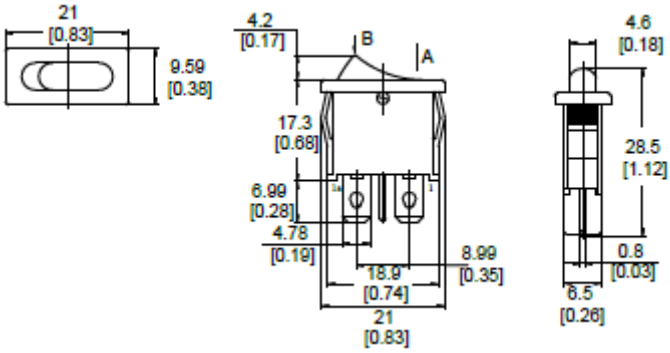
Part Number	A	B	C	ØD	E	F
SW- 8W-4 (R)	14.2	10	7.5	11	M8×0.5P	M10×0.5P
SW- 8W-5 (R)						
SW- 8W-6 (R)						
SW-10W-2 (R)	15.8	13	9.8	14.5	M11×0.75P	M12.5×0.5P
SW-10W-3 (R)						
SW-10W-4 (R)						
SW-10W-9 (R)	16.2					
SW-10W-10 (R)						
SW-10W-12 (R)						

2.5.2 LAN connector



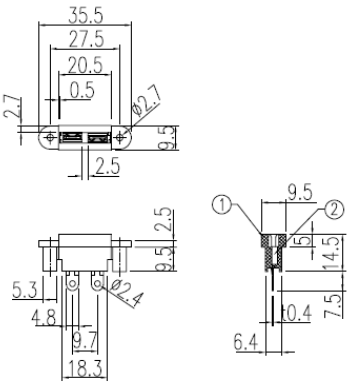


2.5.3 Power switch & Fuse holder



BR-FHAM

(발주Lot : 100ea)

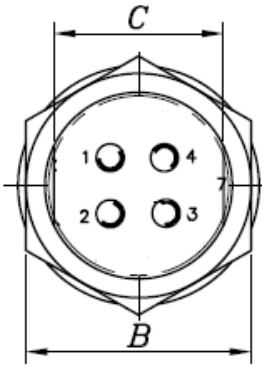


No	Component Part	Material	Remark	Plated
1	Frame	P.B.T.	UL94V-0	-
2	Terminal	BRASS	t0.4	Sn
4	Rating	-	32V 40A	-

2.6 Connection Diagram

Figure 10 Connector Layout of Rear Cover

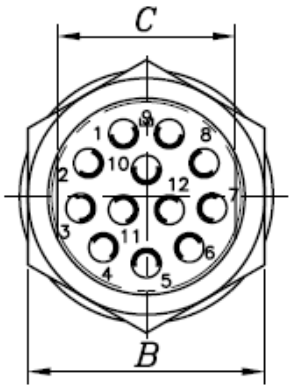
2.6.1 Rear Cover connector – PWR



Pin No	Name	Description	Connector Option
1	PWR	DC_IN	DC POWER IN 24V
2	PWR	DC_IN	
3	GND	GND	
4	GND	GND	

Table 7 Specification of PWR Connector

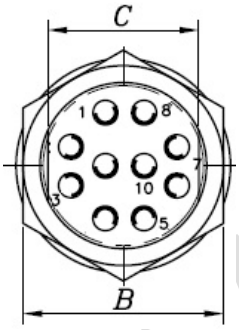
2.6.2 Rear Cover connector –SIGNAL



Pin No	Name	Description	Connector Option
1	VDD	DC_OUT 3.3V	RS232 Comm
2	RXD	Comm	
3	TXD	Comm	
4	GND	GND	
5	RXD	Comm	
6	TXD	Comm	
7	RXD	RS232 & 485	RS232 or 485 (Optional)
8	TXD	RS232 & 485	
9	485_A	Comm	RS485 Comm
10	485_B	Comm	
11	CAN_H	Comm	CAN Comm
12	CAN_L	Comm	

Table 8 Specification of SIGNAL Connector

2.6.3 Rear Cover connector –DIO



Pin No	Name	Description	Connector Option
1	VDD_EXT_DIO1	DC_OUT 3.3V	For GPIO 1
2	GPIO_IN1	GPIO INPUT	
3	GPIO_OUT1	GPIO OUTPUT	
4	VDD_EXT_DIO2		For GPIO 2
5	GPIO_IN2	GPIO INPUT	
6	GPIO_OUT2	GPIO OUTPUT	
7	VDD_EXT_DIO0	DC_OUT 3.3V	For GPIO 0
8	GPIO_IN0	GPIO INPUT	
9	GPIO_OUT0	GPIO OUTPUT	
10	GND	GND	

Table 9 Specification of DIO Connector

2.7 Operation & Usage

1. Turn on the OCU, check the android OS booting by the LCD display. After boot-up, the operator can use the OCU.
2. There are six (6) keys on front of OCU. The function for each key is as below;
    - ROUTE: The selection of in-service route.
    - START: The operator pushes this button when start the service.
    - Payzone 1: The selection of fare payment type
    - Payzone 2 : The selection of fare payment type
    - Payzone 3 : The selection of fare payment type
    - CANCEL: Cancelation of event.
3. The LCD display has a resistive touch panel for operator to operate the OCU by using his finger.
4. There are USB port, Audio port and External Micro SD card slot on the right side of OCU.
5. There are Digital In/Output port, Serial communication port and LAN (Ethernet) port on the rear cover of OCU. So, it supports variable interface.
6. The OCU has audio interface to support the announcement for operator.

This euipment complies with FCC radiation exposure limits set forth for an uncontrolled environment.

This euipment should be installed and operated with minimum distance 20cm between the radiator & your body.

FCC STATEMENT

CAUTION: Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

Note: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

Modifications not expressly approved by the manufacturer could void the user's authority to operated the equipment under FCC rules.

Thank You.

Tel : +82-2-3429-2114
E-mail : sdspr@samsung.com
http : //www.sds.samsung.co.kr