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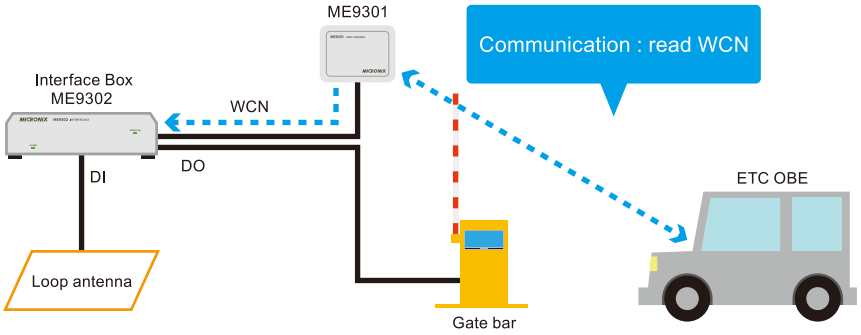
# Enriched life using privately ETC

## DSRC roadside system ME9300


# About ME9300 system

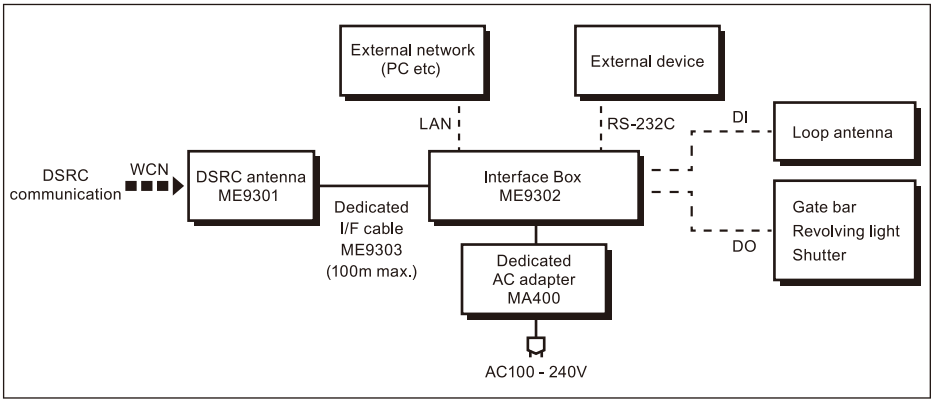
DSRC roadside system ME9300 is a system utilizing ETC used on highway.
ME9300 was born as a private service of ETC.
Each ETC on-board equipment (hereafter referred to as OBE.) installed in a vehicle has a unique ID called WCN.
ME9300 communicates with OBE and reads WCN of OBE. A lot of applications will be generated based on this read WCN. Parking lot management can be cited as an example. If the read WCN coincides with the registered WCN, a signal for opening the bar (digital output DO) is sent to the gate bar. Next, if the loop antenna detects a vehicle (digital input DI), it sends a signal to close the bar (digital output DO) to the gate bar. In this way, only registered vehicles can enter.




Notes

- WCN (Wireless Call Number)
  WCN is a 12-digit unique number attached to each OBE. In other words, the vehicle can be identified by WCN.
- DSRC (Dedicated Short Range Communication)
  DSRC is the name of wireless communication technology. One application of DSRC technology is ETC used on highway.
- ETC1.0 and ETC2.0
  ETC 1.0 is the specifications that the frequency channel is 2 channels and the modulation method is ASK modulation. On the other hand, ETC 2.0 has 7 channels for frequency channel and ASK and QPSK modulation for modulation method. With QPSK modulation, the transmission rate will be four times as fast as ASK modulation.

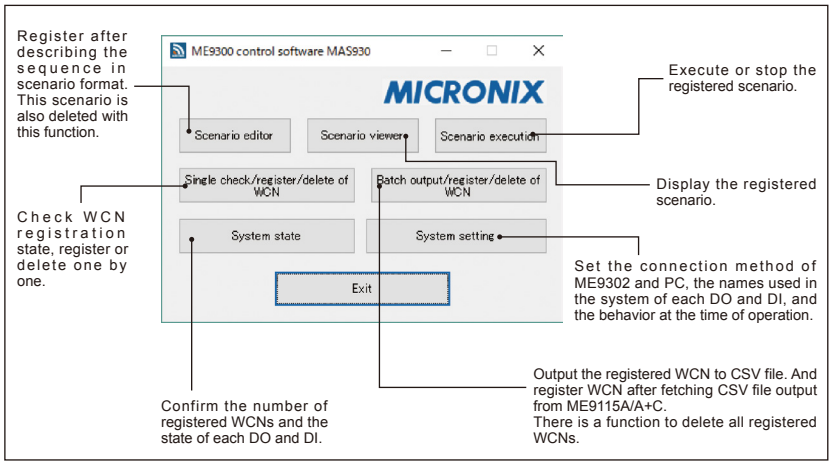
# ME9300 system block diagram




ME9300 system consists of DSRC antenna ME9301, Interface Box ME9302 and Dedicated I/F cable ME9303.
ME9301 communicates with OBE installed in the vehicle and reads the WCN of OBE. This read WCN is transmitted to ME9302 via the cable ME9303 with a maximum length of 100 m.
ME9302 compares the read WCN with the WCN registered in ME9302 in advance. Meanwhile, since ME9302 has the digital input DI (maximum 6 inputs), the digital output DO (maximum 6 outputs) will be decided from these DI information and coincidence/difference of WCNs (the read WCN is coincident with/different from the read WCN registered).
In addition, ME9302 has LAN and RS-232C as interfaces for communication with external networks and external devices. Either LAN or RS-232C should be preselected at the factory shipment. However, it can be changed at a later date.

# Preparation to operate ME9300 system

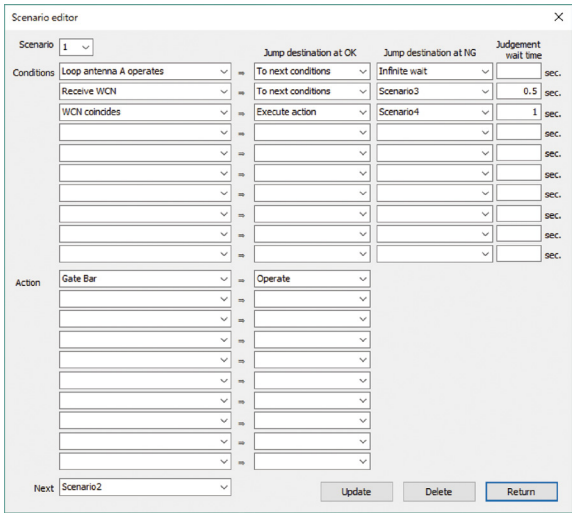
Before operating ME9300 system, "Setting of sequence" and "WCN registration of user vehicle" should be performed using "ME9300 control software MAS930 " installed in PC.
The PC is connected to LAN or RS-232C of Interface Box ME9302.



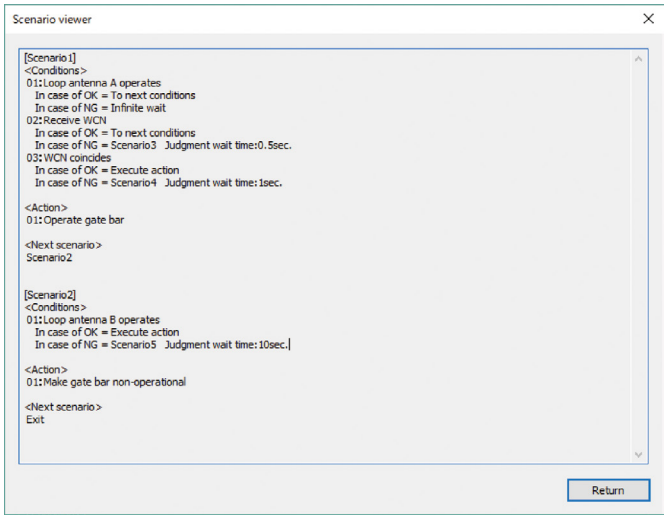
Main menu

## Setting of sequence

The conditions for outputting DO are determined from WCN and DI. For example, sense the loop antenna A (DI), and then open the gate bar (DO) when the WCN is coincident with the registered number. Furthermore, when sensing the loop antenna B (DI), close the gate bar (DO). This sequence is described in the scenario format using "Scenario editor". The contents of the sequence can be checked in "Scenario viewer".
In addition, the sequence just to transfer the WCN acquired with ME9301 to external devices can be set up. At this time, DI and DO are not used.



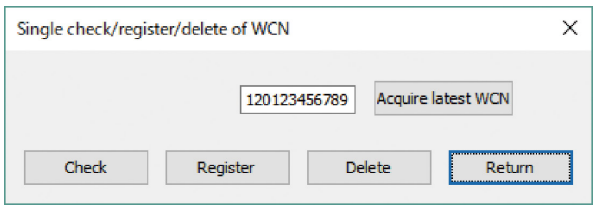
Scenario editor



Scenario viewer

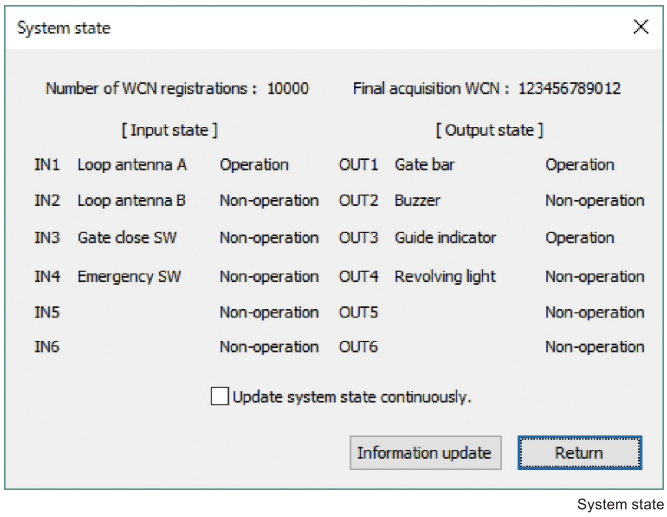
## WCN registration of user vehicle

It is necessary to register WCN in Interface Box ME9302 in advance. Read WCN of each user's vehicle with ME9115A or ME9115A+C, and then register this number in ME9302 using "Single check/register/delete of WCN".
Moreover, the latest WCN acquired with this system can also be registered.



Single check /register/delete of WCN

In addition, ME9300 control software MAS930 makes possible to read the current parameters.



System state

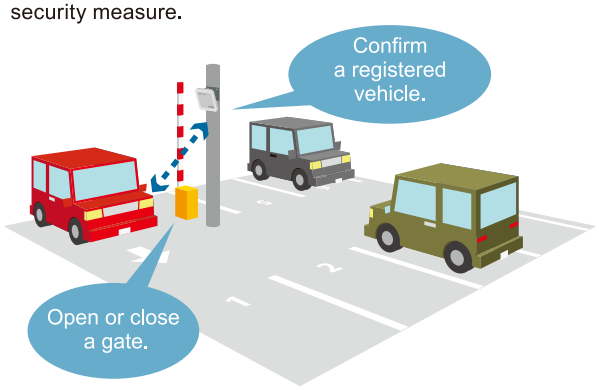
# System application example of ME9300

There are applications processed by comparing WCN pre-registered with WCN read from ETC OBE, and applications simply transferring to external devices without prior registration of WCN.

## Applications comparing with pre-registered WCN

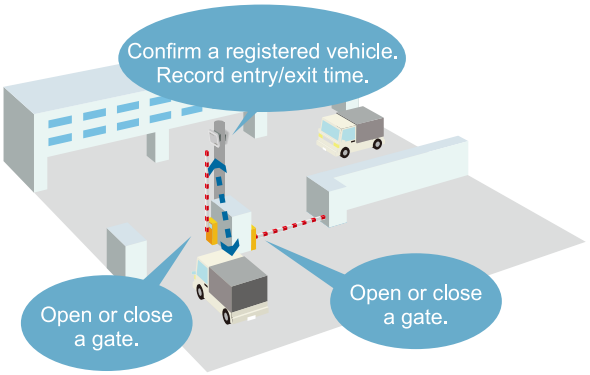
### Parking lot management

If it's installed at the entrance/exit point of the parking lot, the gate opens automatically when a registered vehicle comes close. Passing only permitted vehicles will be a security measure.




### Factory entrance/exit management

When the registered vehicle approaches, the gate opens automatically. At the same time, since it records entry/exit time automatically, it's useful for management of vehicle.




### Area entrance vehicle management

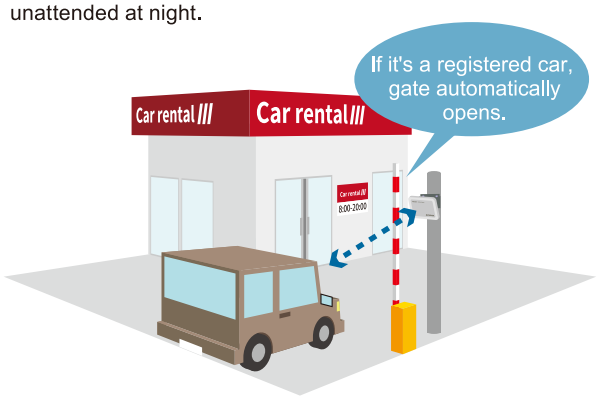
The admission of vehicles non-registered will be restricted at disaster areas and construction sites. Prevent entry of unnecessary vehicles so that prevent traffic jams or confusion at the site.


### Vehicle standby area management

The waiting area for cars is prepared in plaza nearby and only the registered vehicles can wait there. If the vehicles in taxi stand and construction site are parked there temporarily, the congestion on the road will be eliminated.

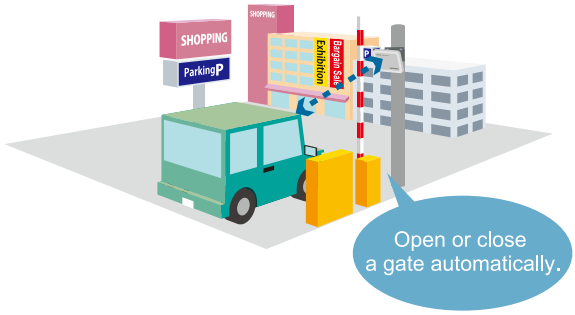

### Rental car return management

When returning a rental car, the parking gate opens automatically. For this reason, it is possible for the store to be unattended at night.



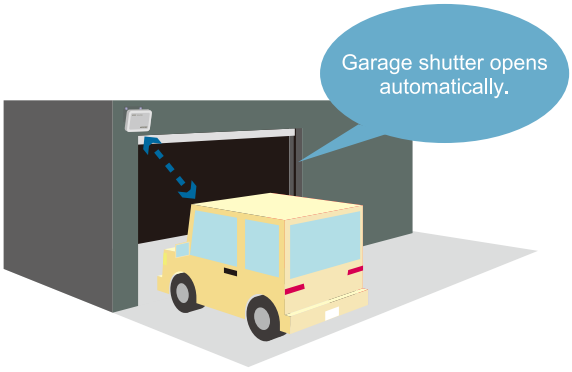

### Visitor management for commercial facilities

In case of registered vehicle, the entry/exit gate of a shopping center will automatically open. The customers are convenient, and a shopping center can do customers' management and enclose them.



## Home garage management

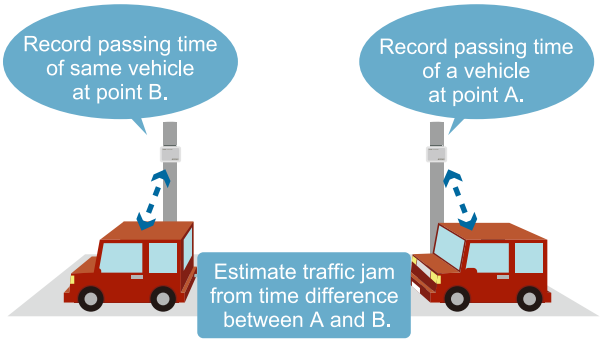
When returning home by car, the garage shutter will automatically open. The stress of remote control operation will be eliminated because of hands-free.




## Applications transferring the read WCN to external device

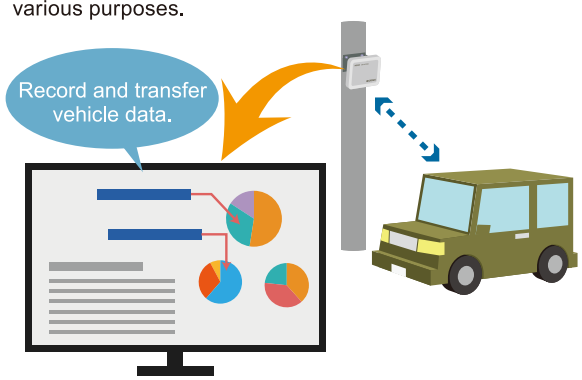
### Traffic congestion survey

The WCN of vehicles traveling on highways and national roads are detected at two points and the time between two points and traffic jam will be estimated from the passing time of the same vehicle.



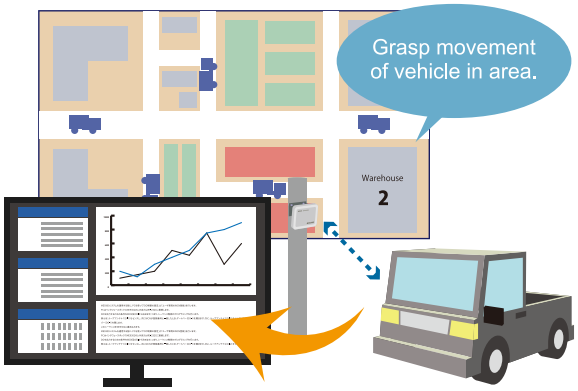

### Traffic volume survey

After acquiring WCN of vehicles passing through the measuring point on expressway or ordinary road, it's automatically transferred to the center. This big data can be used for various purposes.




### Vehicle movement management

It's installed in major places in vast factory and automatically records passing vehicles. This allows to grasp the movement of the vehicle in the factory.

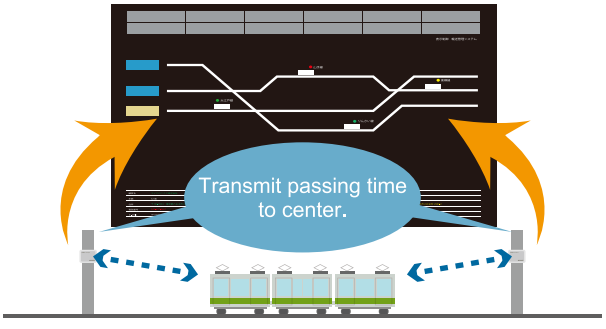



### Improving customer satisfaction

Customer's vehicle and personal information visited are registered, and the information is displayed on the screen at the next visit. With a quick hospitality, customer satisfaction will increase.


### Bus/train operation management

The passing time of registered bus or train will be transmitted to the center at entrance/exit of highway, bus stop and garage in case of bus, or at each station and rolling stock base in case of train. The data will be used for operation and entering/leaving management.



# Specifications

## DSRC antenna ME9301


ME9301 is a device for communicating with ETC OBE installed in the vehicle and reading WCN.
The read WCN is transmitted to Interface Box ME9302 via serial communication RS-422A.In addition, the power is supplied from ME9302.

| Item | Specifications |
|---|---|
| Wireless section | |
| Transmission frequency | 5.795GHz, 5.805GHz |
| Transmission power | 5mW +20/-50% |
| Modulation method | ASK modulation |
| Wireless standard | ARIB STD-T75 compliant |
| RSSI control function (*option) | Measures the RSSI (Received Signal Strength Indicator) of OBE and communicates with OBE of RSSI value larger than the preset threshold. And acquires only WCN of OBE with the largest RSSI value among RSSI values larger than the threshold. |
| Power supply | |
| Input voltage | approx.6.6VDC (depends on I / F cable length.)<br>*Supplied from ME9302 through dedicated I / F cable. |
| Power consumption | approx.1.5W |
| Interface | RS-422A compliant |
| Other | |
| Operating temperature | -20 to 50°C |
| Dimensions | 175(W)x130(H)x45(D) mm(excluding mounting bracket) |
| Weight | approx.1kg(including mounting bracket) |
| Waterproof | IP67 |
| Standard accessories | Operation manual |

## Interface Box ME9302


ME9302 receives WCN from DSRC antenna ME9301, the MPU in this unit processes based on WCN and DI, and then the result is output to DO.
WCN and DI & DO information can be also transmitted to the networks or external devices via LAN or RS-232C.
The power supply of ME9301 is supplied from this unit.
*Although this unit is for indoor use, "Outdoor storage case" is prepared as an option when installing it outdoors.

| Item | Specifications |
|---|---|
| Interface | |
| RS-422A | Connected to ME9301 |
| LAN(*) | 10BASE-T/100BASE-TX |
| RS-232C(*) | Baud rate 2,400-38,400bps |
| DIO(digital input/output) | 6 inputs(DI) and 6 outputs(DO)<br>< Input ><br>・Input form：Photo coupler<br>・Maximum on-state voltage：+27V<br>・Minimum on-state voltage：+6V<br>・Off-state voltage：-30 to +1.3V<br>・Input current at on-state：(Input voltage−1.25V)/2.2kΩ<br>< Output ><br>・Output form : Photo MOS relay<br>・Maximum load voltage : 60V(AC/DC)<br>・Max. continuous load current : 210mA(150mA@50℃)<br>・On resistance : 2.3Ωtyp, 4Ωmax<br>・Off leakage current : 1μA max<br>・Operating time : 0.6ms typ, 2ms max @ only Photo MOS relay<br>・Recovery time : 0.06ms typ, 0.2ms max @ only Photo MOS relay |
| Number of WCN registrations | 160,000 max<br>(However, processing time per vehicle depends on number of registrations) |
| Power supply | |
| Input voltage | approx.9VDC<br>*Using dedicated AC adapter MA400. Input voltage from 100 to 240VAC. |
| Power consumption | approx.3.5W(including power consumption of ME9301) |
| Other | |
| Operating temperature | 0 to 50°C |
| Dimensions | 240(W)x60(H)x210(D) mm |
| Weight | approx.1.6kg |
| Standard accessories | Dedicated AC adapter MA400, ME9300 control software MAS930, Operation manual |

*Either LAN or RS - 232C should be preselected at the factory shipment. However, it can be changed at a later date.

## Dedicated I/F cable ME9303

ME9303 is a cable for connecting the DSRC antenna ME9301 to the Interface Box ME9302.
Since the cable is covered with a shield, it will be protected from extraneous noise.
The cable length can be specified, but the maximum length is 100 m.

# Other equipment to operate ME9300 system

## (1)DSRC communication unit ME9115A/A+C


When registering WCN in Interface Box ME9302, WCN of each user's vehicle is read with ME9115A or ME9115A+C.
ME9115A has only the function to read WCN. Meanwhile, ME9115A+C has the function of measuring the electric field strength (strength of radio wave) of the surroundings in addition to the function of reading WCN.

## (2) ETC/ITS spot electric field strength measurement system ME9200

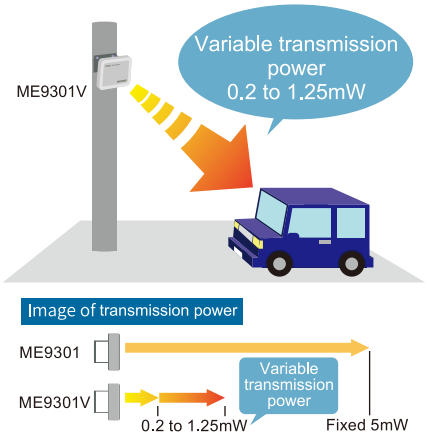
This is a system for measuring the strength of radio wave emitted from DSRC antenna ME9301 (electric field strength).
Since the strength and spread of radio wave can be measured, ME9301 can be installed to the optimum position and angle.
The strength of radio wave is displayed in graph and map.

## (3) DSRC OBE Tester ME9100


This is a tester that tests at the wireless level whether or not OBE installed in the vehicle normally communicates.
When trouble occurs at the gate, it is possible to judge whether OBE of the user malfunctions. The function of this tester is also equipped with DSRC communication unit ME9115A/A+C.

# With variable transmission power function DSRC antenna ME9301V


For traffic congestion surveys on highways and national roads, ME9301 is suitable because it can communicate even further, but for applications at narrow spaces such as parking lot management and factory entrance/exit management, ME9301V is suitable.




## Transmission power adjustment function

The ME9301 has a fixed transmission power of 5mW. However, ME9301V can change the transmission power in the range of 0.2 to 1.25mW(8dB variable width). By adjusting the transmission power, it's possible to limit the communication area. Therefore, it enables to prevent the malfunction of communicating with OBE driving the adjacent lane in a narrow area.

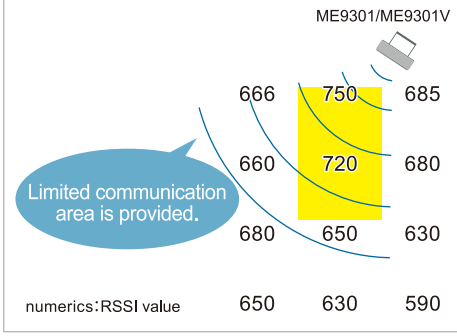
| Item | Specifications |
|---|---|
| Transmission power | |
| Power range | 0.2mW+20/-50% to 1.25mW+20/-50% (8 dB variable width) |
| Setting resolution | 0.1dB |
| Wireless section | |
| Transmission frequency | 5.795GHz、5.805GHz |
| Modulation method | ASK modulation |
| Wireless standard | ARIB STD-T75 compliant |
| RSSI control function (*Installed as standard) | Measures the RSSI (Received Signal Strength Indicator) of OBE and communicates with OBE of RSSI value larger than the preset threshold. And acquires only WCN of OBE with the largest RSSI value among RSSI values larger than the threshold. |
| Power supply | |
| Input voltage | approx.6.6VDC (depends on I / F cable length.)<br>*Supplied from ME9302 through dedicated I / F cable. |
| Power consumption | approx.1.5W |
| Interface | RS-422A compliant |
| Other | |
| Operating temperature | -20 to 50°C |
| Dimensions | 175(W)x130(H)x45(D) mm(excluding mounting bracket) |
| Weight | approx.1kg(including mounting bracket) |
| Waterproof | IP67 |
| Standard accessories | Operation manual |

The communication area can be specified more reliably by using it together with the RSSI control function (which is an option in ME9301) shown below.

## RSSI control function

ME9301V measures the RSSI (Received Signal Strength Indicator) of OBE and communicates with OBE of RSSI value larger than the preset threshold (the received signal is stronger) <Receiving sensitivity adjustment>.
And also, it is a function to acquire only WCN of OBE with the largest RSSI value among RSSI values larger than the threshold.
Therefore, the communication area can be limited.

Set the RSSI threshold to approximately 700 if the yellow part should be used as the communication area.




## Summary of methods for limiting communication area

There are two ways to limit the communication area as described above.

1. How to adjust the transmission power
   It is a method to adjust the transmission power, that is, the communication distance of the downlink. ME9301V corresponds
2. Method by RSSI control
   It is a method to adjust the receiving sensitivity, that is, the communication distance of the uplink. ME9301/ME9301V correspond

These two ways can be used alone or in combination.

*MICRONIX Corporation reserves the right to make change in design, specification and other information without prior notice.

AGENCY

MICRONIX

**MICRONIX CORPORATION**

**2987-2, KOBIKI-CHO, HACHIOJI-SHI, TOKYO 193-0934 JAPAN**

**TEL：+81-42-637-3667　FAX：+81-42-637-0227**

**URL : http://www.micronix-jp.com  E-mail : micronix_e@micronix-jp.com**

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