GENERAL

This document is specified for Remote Keyless Entry Hand Unit to be used as part of Smart Entry System.
This unit cammunicates with the vehicle side unit by pushing SW installed on a door steering wheel of the vehicle side and does lock/unlock movement of a door. And in the compartment, it removes the key cylinder lock and enable an engine start by communicating with the vehicle side unit. And this unit has two buttons on the case surface and when the button is pushed, it sends out a signal to the Smart Entry Receiver of the vehicle side that operates door lock/unlock.

## Performance Specification

### Erectrical Performance

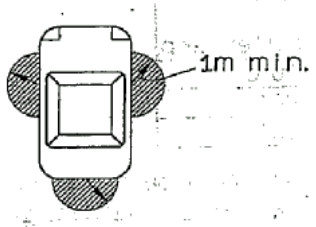
| Item | Conditions | Specification | | | Unit |
|---|---|---|---|---|---|
| | | min. | typ. | max. | |
| Carrier Freq. of transmit | Operating temp. range with battery | $f_{TX}$-0.1 | 312.125 $f_{TX}$ | $f_{TX}$+0.1 | MHZ |
| Moduration Type of transmit | FSK(frequency Shift Keying) | —— | —— | —— | —— |
| Rated voltage | Battery size CR2032 | —— | 3.0 | —— | V |
| Range of oprating voltage | | 2.5 | —— | 3.3 | V |
| Output power | FCC standard shall be satisfied Operating temp. range with battery | 50 | 60 | 70 | dBμV/m |
| Range of output power characteristics voltage | | 2.8 | —— | 3.3 | V |
| Carrier Freq. of receive | | 124 | 125 | 126 | KHZ |
| Moduration Type of receive | ASK(Amplitude Shift Keying) | —— | —— | | —— |
| Receive Sensitivity | | | 10 | | mV |

## Keyless Entrey Function

When user operates door lock/unlock SW. this device transmits data corressponding to each SW.

## Control Range

Controllable area shall occupy inside of each circles.
The centers of each circles locates at the knobs on the driver's door and passenger's door , and the tale of the car.
And those radii shall be more or 1 meter. Refer to below diagram.



## Hand Free Function Specifications

This part shall receive LF signal from the vehicle and transmit corresponding RF signal to the vehicle.

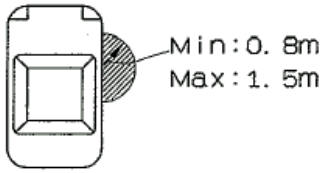
- ·Door lock, Door Unlock signal
- ·Engine start enable signals

## Communication Performance

(a):Communication range with respect to the door antenna.

Door antenna communication range shall be Min0.8m, Max1.5m from center of antenna that located at inside of Driver Door, Passenger Door, Back Door, and Outside Door Handles under actual mounted conditions and the following conditions.

Key ID shall not be transmitted or Battery life shall not be shortened by noises other than LF signal from the antenna.




Requirements

1)When measured the hand unit height shall be 0.5meter, 1meter, 1.5meter(above ground) with its orientation in all directions, both horizontally and vertically.

2)The system shall meet FCC standard.

3)Even under the worst combination taking into consideration the production of variation of remote controller(output, frequency, band width) nd the variation * including the temperature range characteristics specified following requirements shall be met.

| combination No. | Vehicle(receiver)temp. | Remote controller temp. | Door antenna temp. |
|---|---|---|---|
| ① | -30°C | -10 ~ 20°C | -30°C |
| ② | 0 ~40°C | 0 ~ 40°C | 0 ~ 40°C |
| ③ | 80°C | 30 ~ 60°C | 90°C |

4)With the emergency key stored and not stored.

(b):Communication range with respect to the inside antenna.

Inside antenna communication range covers the entire cabin, however, above the rear parcel shelf and instrument panel are excluded under actual mounted conditions and the following conditions.
Communication Range shall not exceed to outside of the vehicle.
Inside antenna to be mounted in center console.
Key ID shall not be transmitted or Battery life shall not be shortened by noises other than LF signal from the antenna.

Requirements

1)When measured the hand unit shall be held with its orientation in all directions, both horizontally and vertically.

2)The system shall meet FCC standard.

3)Even under the worst combination taking into consideration the production of variation of remote controller(output, frequency, band width) nd the variation * including the temperature range characteristics specified following requirements shall be met.

| combination No. | Vehicle(receiver)temp. | Remote controller temp. | Inside antenna temp. |
|---|---|---|---|
| ① | -30°C | -10 ~ 20°C | -30°C |
| ② | 0 ~ 40°C | 0 ~ 40°C | 0 ~ 40°C |
| ③ | 80°C | 30 ~ 60°C | 90°C |

4)With the emergency key stored and not stored.

## Transmittion and Reception Data

### (a)Key ID Specifications

1)Key ID shall be the same as 3-2-2. item(a)

### (b)Rolling Code

1)Communication data shall use Rolling code for receiving and transmitting DATA of Door Lock, Door Unlock
Code shall be the same as 3-2-2. item(b),(c)

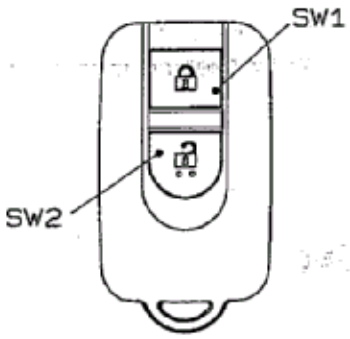
### (c)Code Communicating Method

Communication between Smart Keyless Unit-Hand Unit for engine start use shall be code communicating method.

1)When Battery replacing, initialization or Registration shall not be required.

2)When new hand unit registrating, Initialization or Re-Registration for Hand unit shall not be required.

## SW Functions

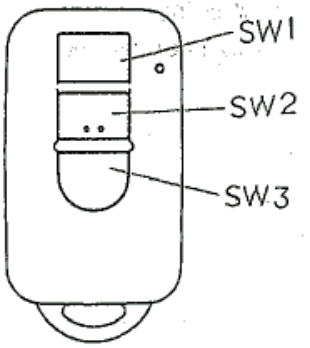



441, 443

Time Tolerance:±20%

| | SW Name | Operate Time | Request Name | Function (Description) |
|---|---|---|---|---|
| SW1 | Lock | 30msec min | Lock request | Key ID + rolling code + door lock command are transmitted. |
| SW2 | Unlock | 30msec min | Unlock request | Key ID + rolling code + door unlock command are transmitted. |

## SW Functions




442

Time Tolerance: ±20%

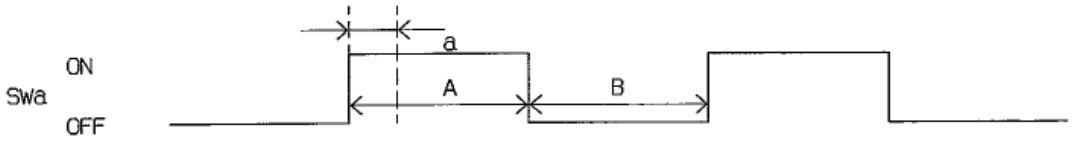
| | SW Name | Operate Time | Request Name | Function (Description) |
|---|---|---|---|---|
| SW1 | Lock | 30msec min | Lock request | Key ID + rolling code + door lock command are transmitted. |
| SW2 | Unlock | 30msec min | Unlock request | Key ID + rolling code + door unlock command are transmitted. |
| SW3 | S. door | 30msec min | S. door request | Key ID + rolling code + S. door open / close command are transmitted |

# SW Input Specification

Definition of terms

Acknowledges a SW operation:The control unit acknowledged a SW being or having been operated.
Accepts a SW operation:The system acknowledged SW turned on by meeting specified condition.
Time tolerance:±20%

## (a) Switch Acceptance Requirements



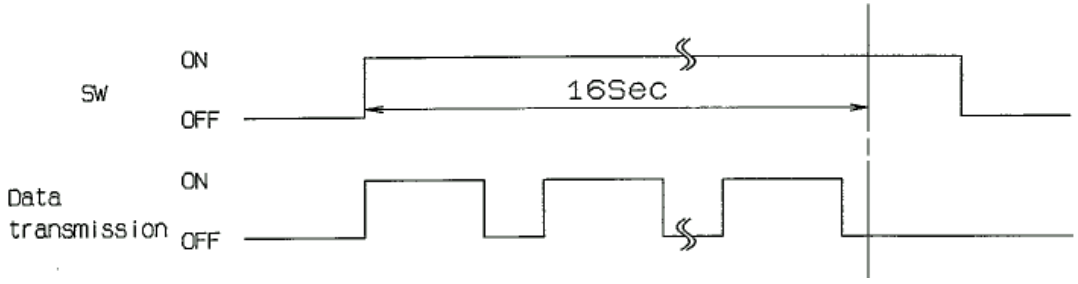

1)Minimum operation time to accept a SW input(A):SW1, SW2, SW3=30msec
The time to neglect the bouncing of switch contact(=a)should be 5msec or less.

2)If the controller acknowledges a SW operation longer than the min. operate time(A) to accept a SW input(accepts a SW operation), it shall send a data corresponding to individual SWs.
Even if it happens that it no longer acknowledges a SW operation in the process of transmission, it shall transmit the data being sent to the end.

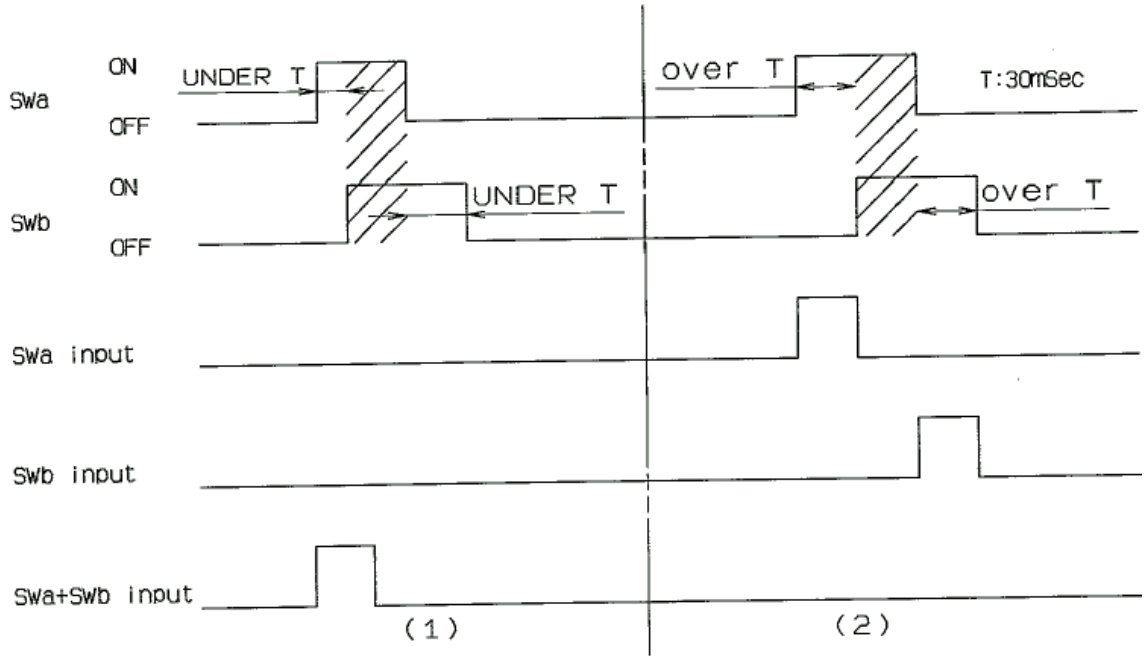
3)Acceptable interval(process time)in continuous operation of the same SW(B):32msec min.
If it accepts a second(subsequent)SW operation, it shall transmit the data being sent to the end, and then it shall transmit the second data.

4)Data shall cotinuously transmitted while SW input acknowledged.

5)SW acknowlwgement shall be cancelled and data transmission suspended when 16 seconds passed after SW input captured.



## (b) (Rules for)Multiple SW Input Requirements




1)When SWa and SWb are turned ON within 30mS at the same time.
and the time which both SWa and SWb are turned ON is T sec min.,
SWa + SWb are accepted. fig (1) above

2)SWa shall be cancelled when SWb input acknowledged under SWa being acknowledged
(Cancell by Smart Controlle).
After cancellation executed, SWa being OFF, and SWb kept on,
SWb input shall be effective. Fig(2) above.