ALPS ELECTRIC Co., LTD

GENERAL

This document is specified for Remote Keyless Entry Hand Unit to be used as part of Smart Entry System.
This unit communicates 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

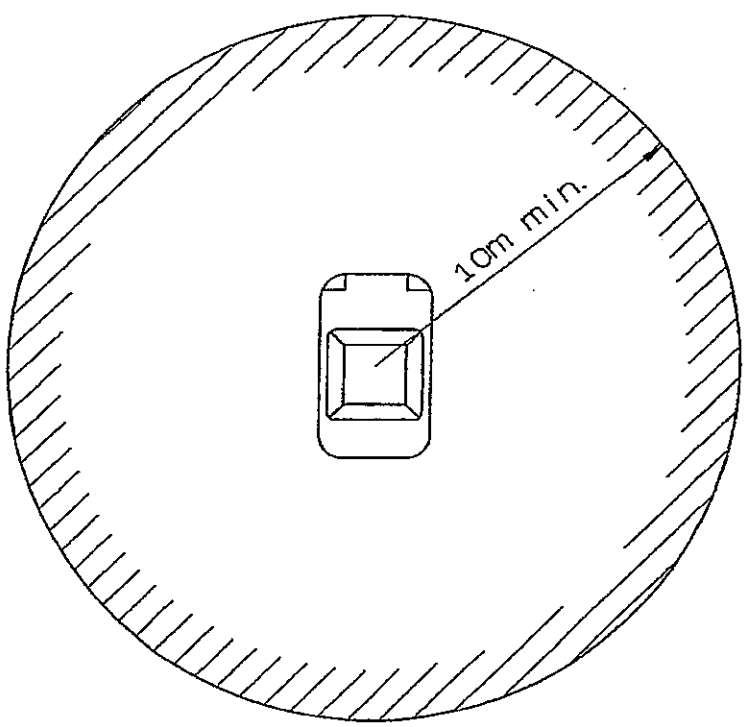
Item	Conditions	Specification			Unit
		min.	typ.	max.	
Carrier Freq. of transmit	Operating temp. range with battery	f_{Tx}-0.1	433.92 f_{Tx}	f_{Tx}+0.1	MHZ
Moduration Type of transmit	FSK(frequency Shift Keying)	——	——	——	——
Rated voltage	Battery size CR2032	——	3.0	——	V
Range of oprating voltage		2.5	——	3.3	V
Output power	FCC standard shall be satisfied Operating temp. range with battery	60	70	80	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

This part shall transmit RF signals of DATA according to the SWs when LOCK, UNLOCK, PANIC SW pressed.

Control Range

Controllable area shall occupy inside of circle.
The center of its circle located at the middle of the body of a car.
And its radius shall be more or 10 meter. Refer to below diagram.



Requirements

1)When measured the hand unit height shall be 1meter(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 bariation * including the temperature range characteristics specified following requirements shall be met.

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

Hand Free Function Specifications

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

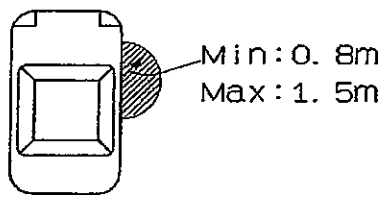
- ·Door lock, Door Unlock, PANIC signal
- ·Engine start enable signals

Communication Performance

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

Door antenna communication range shall be Min0.8m. Max1.5m from center of antenn 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 variatic 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, and PANIC.
Code shall be the same as 3-2-2. item(b), (c)

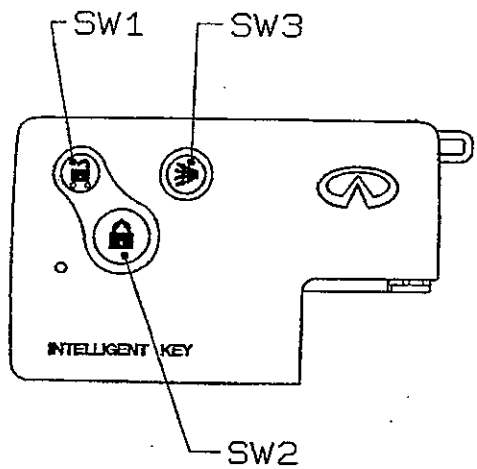
(c)Code Communicating Method

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



Time Tolerance:±20%

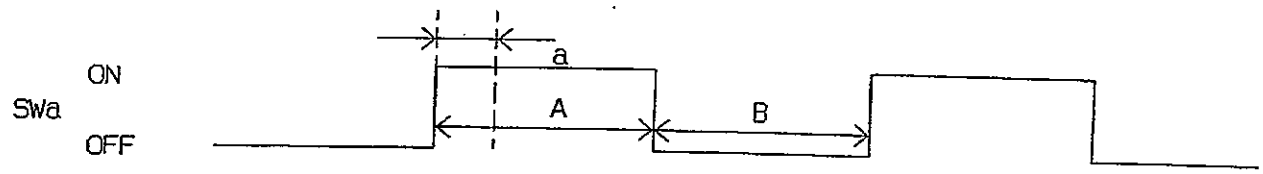
	SW Name	Operate Time	Request Name	Function (Description)
SW1	Lock	30msec min	Lock request	Key ID + Rolling code + Door Lock Command
SW2	Unlock	30msec min	Unlock request	Key ID + Rolling code + Door Unlock Command
SW3	PANIC	30msec min	PANIC request	Key ID + Rolling code + PANIC Command

SW Input Specification

Definition of terms

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

(a) Switch Acceptance Requirements



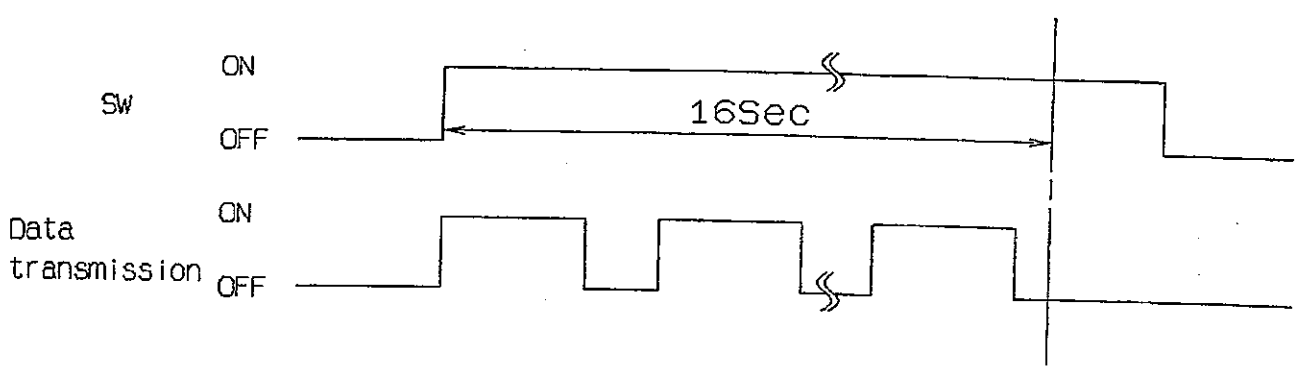
1)Minimum operation time to accept a SW input(A):SW1, SW2, SW3=30msec
The time to neglect the bouncing of switch contact(=a)should be 5msec or less.

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.

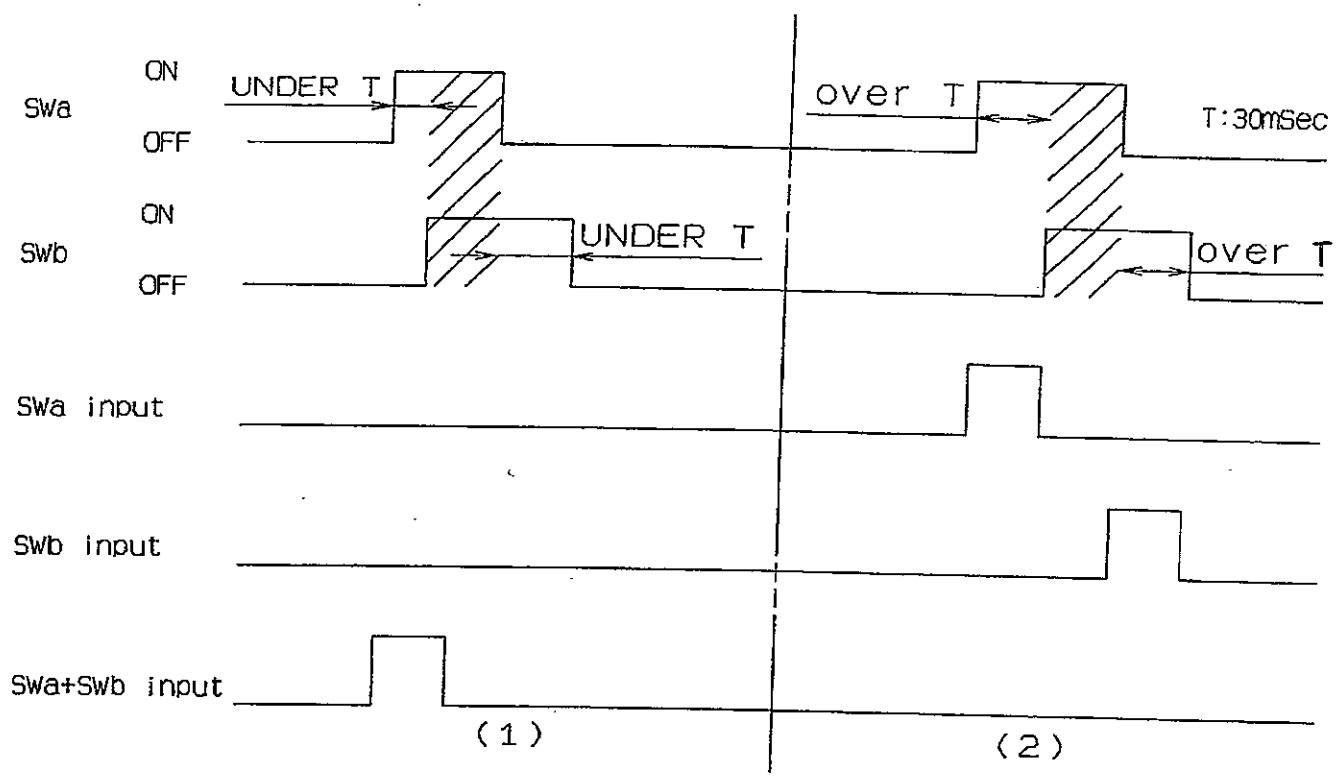
3)Acceptable interval(process time)in continuous operation of the same SW(B):32msec m
If it accepts a second(subsequent)SW operation, it shall transmit the data being sent to the end, and then it shall transmit the second data.

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.

Transmit Data

(a)Key ID Specification

(1)Key ID shall be unique for every single Transmitter.
(2)Shall be transmitted only when porper data code generated.

(b) Rolling code

Rolling code window : 256 press
Re synchronization : Recoverd by two serial input.
Re synchronization after battery replacement : Sall not require initializalization.
Transmitter operation for ID program : Shall not require initialization.
Kind of rolling code : 104 x 10^4 kinds.

(c)Transmit Data Format

HEADER	ROLLING CODE	NOT USED	ID CODE	FUNCTION CODE	PARITY CODE
16bit	20bit	12bit	28bit	4bit	4bit

① HEADER
Code to change Receiver status to receive mode from standby.

Date :OOOO 16bit

② ROLLING CODE
Code to be incremented every Key press. 20bit

③ NOT USED 12bit

④ ID CODE (Key ID)
Code to identify of each Transmitter.
Data :Data to be stored in EEPROM. 28bit

⑤ FUNCTION CODE
Code to each Function Key. 4bit

⑥ PARITY CODE
CRC data that generated from all data. 4bit

Data protocol
Transmission data is MANCHESTER coded.

Speed : 2.5kbps
Protocol : Manchester code

Difinition of data bit"0"and"1".

Data"0" ··· Rising edge

Data"1" ··· Falling edge