PAS

8790-04

GENERAL INFORMATION

1. SPECIFICATIONS FOR PAS

Item	Item	Specification
PAS unit	Rated voltage	DC 13.6 V (IGN power)
	Operating voltage	DC 9.0 V ~ 16.0 V
	Operating temperature	−30℃ ~ +80℃
	Maximum humidity	95%
	High internal pressure	24 V
	Insulation resistance	No heat & fire due to current leak
	Max. permissible current	Unit: 100 mA or less Sensor: 35 mA or less
PAS sensor	Operating frequency	58 KHz
	Detection range	30 cm~120 cm (based on lineal distance between sensor and obstacle)
	Tolerance	± 10 cm
	Operating voltage range	DC 8 V

2. CAUTIONS

- Note that the display does not show everything in the rear area. Always check nobody, especially animals and children, is behind the vehicle when parking or reversing.
- If you can not properly check the vehicle behind, get out of the vehicle and then visually check it.

1. The parking aid system is just a supplemental device to help your parking.
2. Always keep the safety precautions.
3. Do not press or shock the sensors by hitting or using a high-pressure water gun while washing, since it may damage the sensors.
4. If the system is in normal operating condition, a short beep sounds when the shift lever is moved into "R" position with the ignition key "ON".
5. If the system is defective, the warning buzzer sounds for 3 seconds when moving the gear shift lever to "R" position with the ignition ON. Be careful not to confuse this and the parking aid alarm (in 50 cm).

▶ The parking aid system will not work or improperly work under following cases:

1) Certain obstacles that sensors can not detect
- Thin and narrow objects, such as wires, ropes, chains
- Cotton, sponge, clothes, snow; that absorb ultrasonic waves
- Obstacles lower than the bumper (ex. drain ditch or mud puddle)

2) Not defective but improperly working
- When the sensing portion is frozen (operates normally after thawed)
- When the sensing portion is covered by rain, water drops, snow or mud (operates normally after cleaned)
- When receiving other ultrasonic signals (metal sound or air braking noises from heavy commercial vehicles)
- When a high-power radio is turned on

3) Narrowed sensing area
- When the sensing portion is partially covered by snow or mud (operates normally after cleaned)
- Surrounding temperature of sensor is too high (approx. over 80°C) or too low (approx. below −30°C)

4) Not defective but may cause malfunction
- When driving on the rough roads, gravel road, hill and grass
- When the bumper height is changed due to heavy load
- When the sensing portion is frozen
- When the sensing portion is covered by rain, water drops, snow or mud
- When receiving other ultrasonic signals (metal sound or air braking noises from heavy commercial vehicles)
- When a high-power radio is turned on
- When some accessories are attached in detecting ranges

Modification basis	
Application basis	
Affected VIN	

3. Major changes for PAS unit

PAS sensor	
Old 	New 
Operating frequency changed (40 KHz → 58 KHz) and sensor appearance and connector changed (insert type)	

PAS unit

Detection range changed from 25 cm~120 cm to 30 cm~120 cm

OVERVIEW AND OPERATING PROCESS

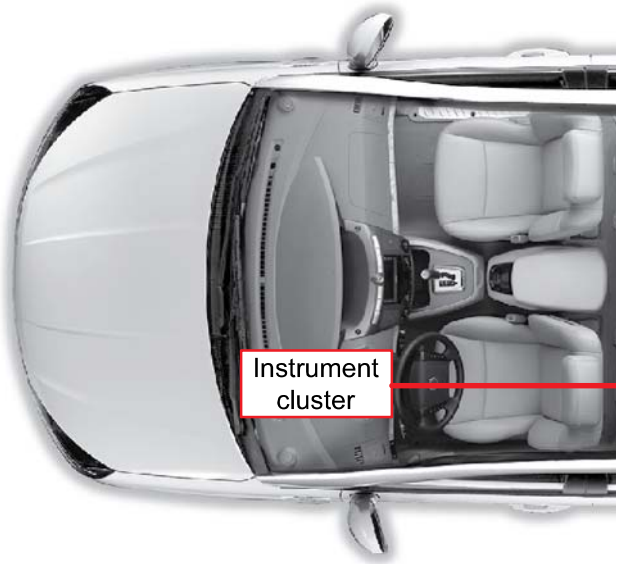
1. Overview

The parking aid system (PAS) is a supplementary device which detects the distance to any obstacle with the ultrasonic sensors equipped to the rear bumper and warns the driver with alarm sounds, when the vehicle is moving backward.
The system emits the ultrasonic wave signals from the sensors on the rear bumper with a specific interval and detects the reflected signals from obstacles.
The alarm interval becomes shorter as the obstacle approaches to assure the safety distance and to facilitate parking of the vehicle.

2. Layout

ICM box

Buzzer integrated into ICM box (indicates distance as alarm interval)

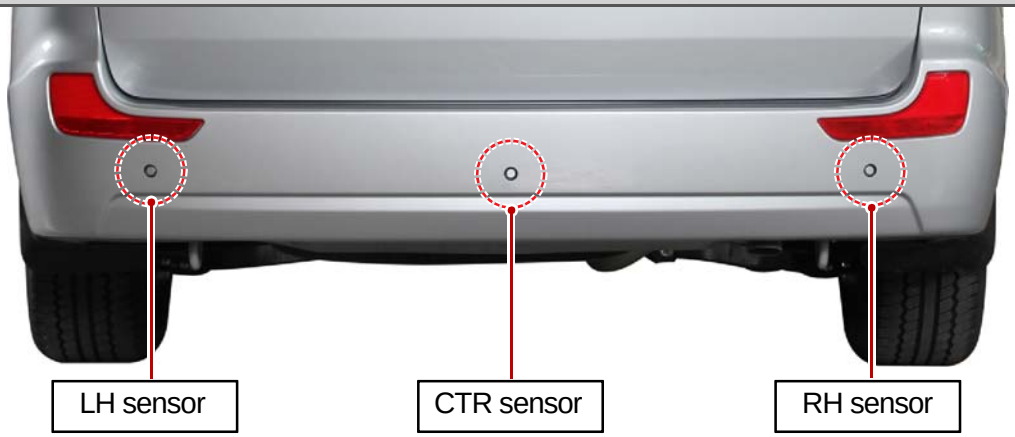


Shift lever (R position)

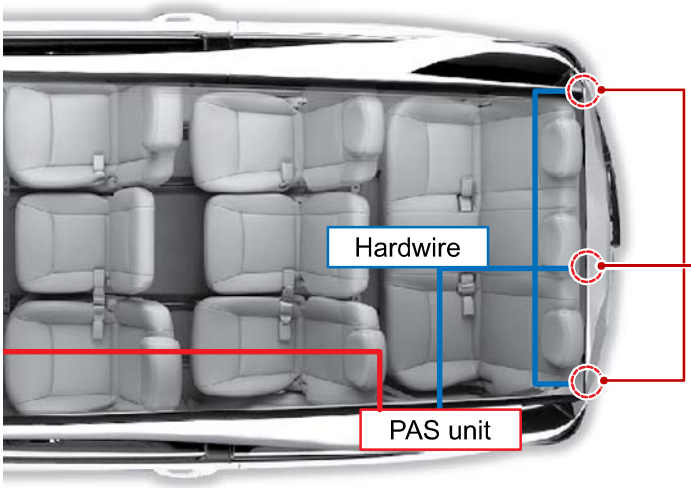
Sends reverse signal to PAS unit

Modification basis	
Application basis	
Affected VIN	

Installation of PAS sensor



- Rear obstacle detection sensor : 3 off
- Activated for reverse driving only



PAS sensor

PAS unit

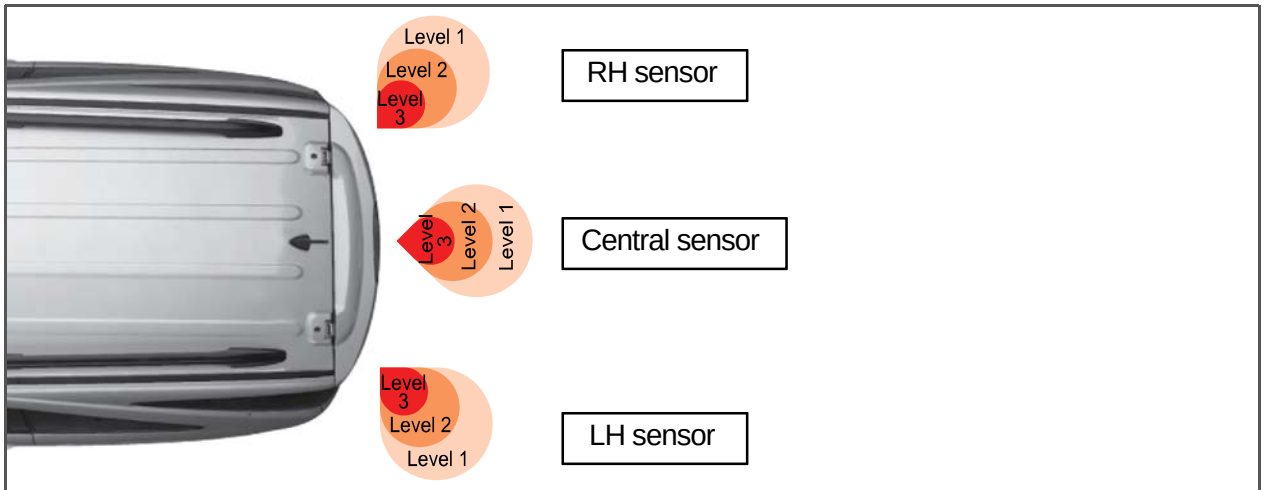
Control PAS sensor and send its status to ICM box (buzzer)

3. Operation process

1) How to operate

- The PAS sensors are activated when the transmission gear is in the "R" (reverse) position.

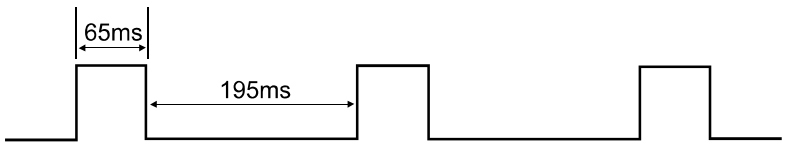
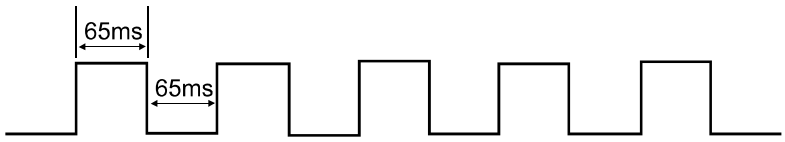
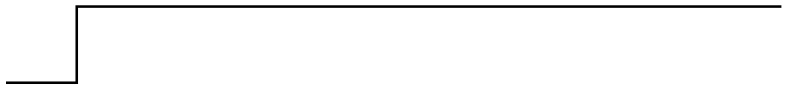
2) Sensing distance and range



* 0 ~ 30 cm (third sound produced within area to be ignored)

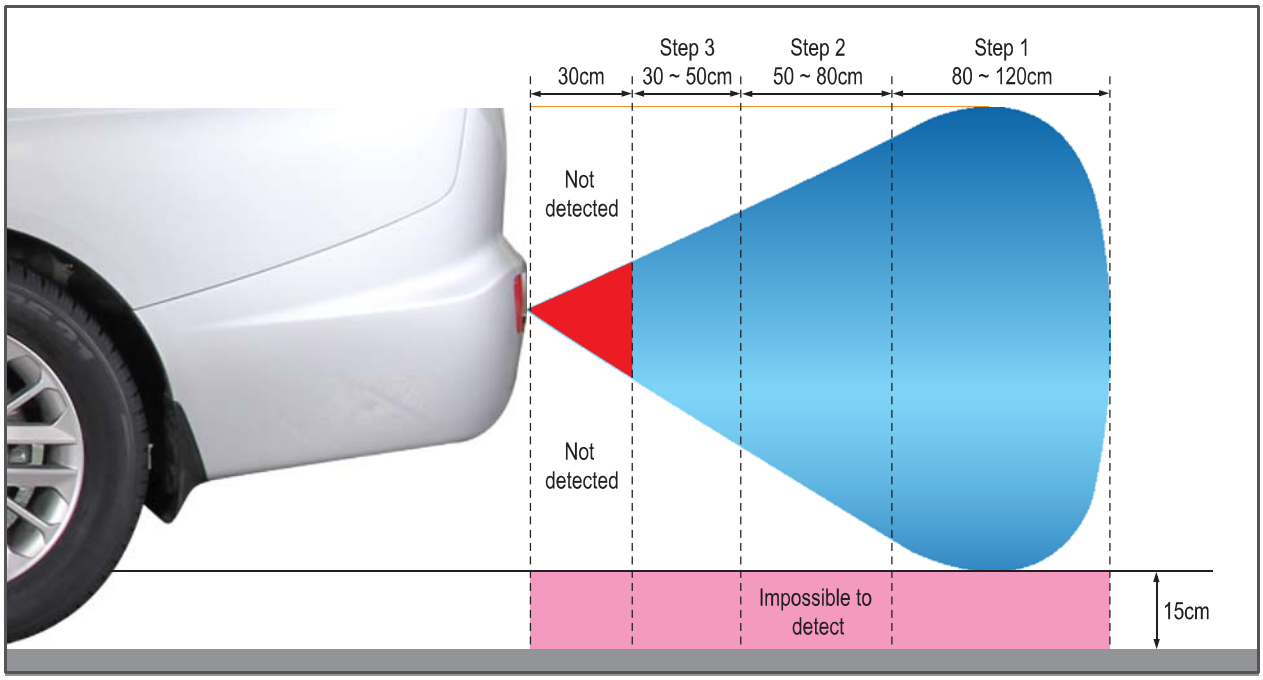
0cm	30cm	50cm	80cm	120cm	130cm
Center, LH/RH sensor	N/A	Alarm Level 3	Alarm Level 2	Alarm Level 1	N/A

3) Alarm section and interval (from PAS buzzer in ICM box)

Level	Center, LH/RH sensor	Alarm interval(msec)
1	80 ~120 (cm)	
2	50 ~80 (cm)	
3	30 ~50 (cm)	
Tolerance	±10cm	

Modification basis	
Application basis	
Affected VIN	

4) Detection range by sensors



Height	Ground ~ 15 cm	15 cm ~ lower side of bumper	Lower side of bumper ~
Possible to detect	Impossible to detect	Not detected	Detected
Tolerance	± 5 cm	± 5 cm	± 5 cm

5) Distance calibration by temperature from temperature sensor

The ultrasonic wave sensor directs the distance value by receiving the sensor operating temperature from the sensor and compensating for the detecting deviation since it varies depending on the ambient temperature.

Temperature	Thermistor output value	Temperature	Thermistor output value
+80℃	6.93 V	+20℃	2.16 V
+70℃	6.24 V	+10℃	1.45 V
+60℃	6.04 V	0℃	1.15 V
+50℃	5.34 V	−10℃	0.98 V
+40℃	4.62 V	−20℃	0.88 V
+30℃	4.15 V	−30℃	0.75 V

4. Self-diagnosis

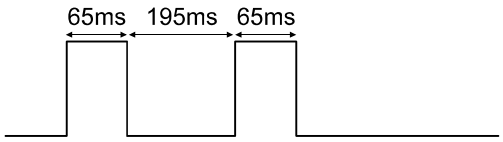
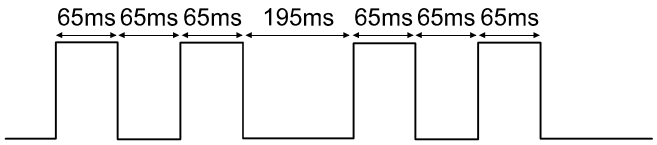
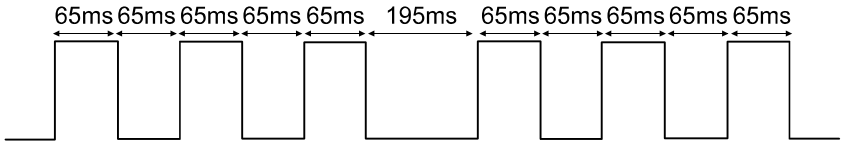
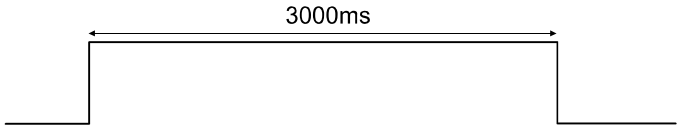
▶ **PAS self-diagnosis mode (outputs warning beep via exterior buzzer)**

- System enters into this mode when gear shifted "R" position after initial ignition ON
- The self-diagnosis fails and the buzzer sounds under any of the following conditions:

  a. Open circuit in sensor (TX)
  b. Open circuit in power wires (+ and -)
  c. In the event of sensor failure itself

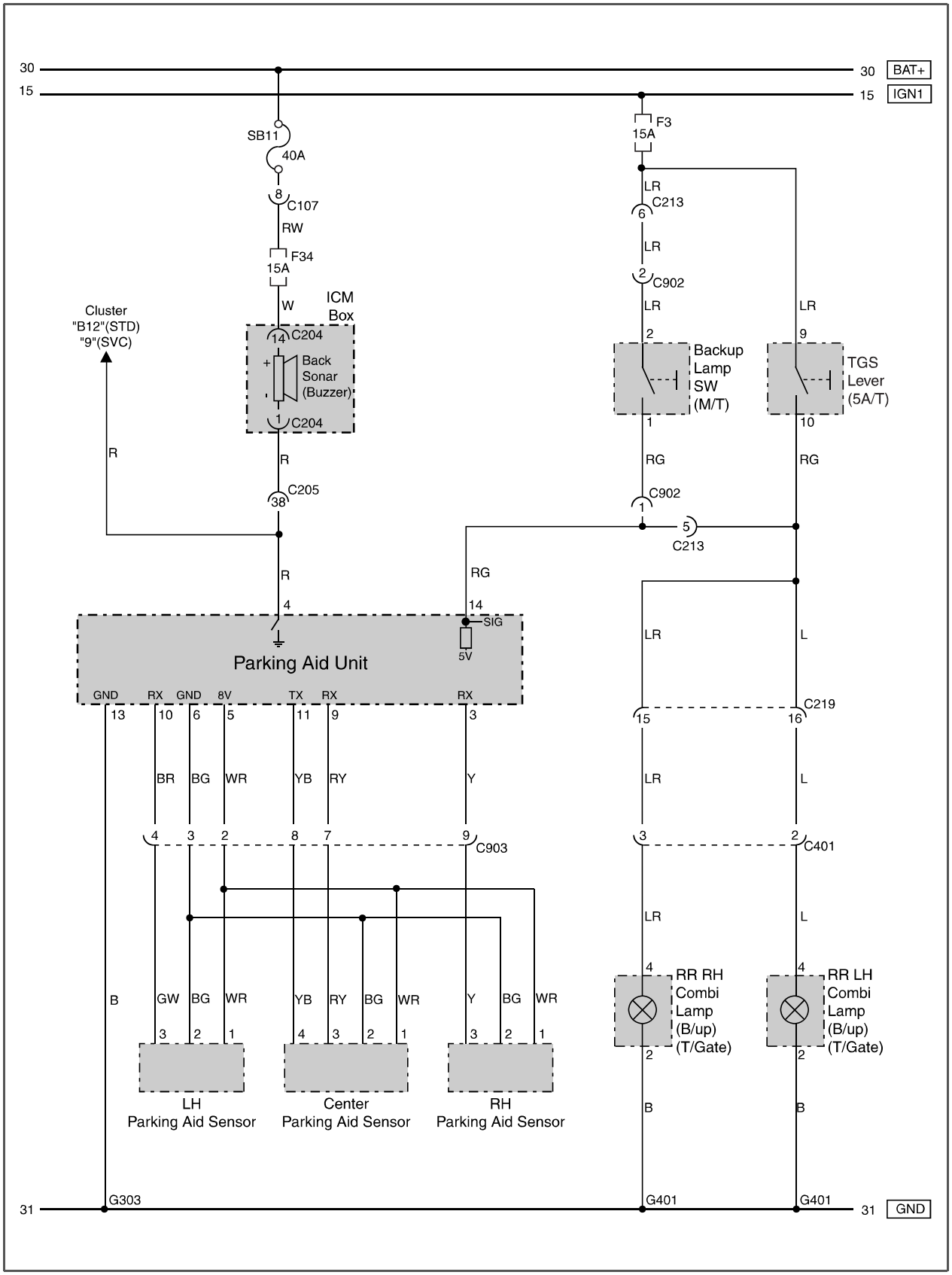
- If normal, warning buzzer sounds for 0.065 seconds.

▶ **Alarm interval during self-diagnosis**

Defective	Alarm interval	Remark
Defective LH sensor		
Defective center sensor		
Defective RH sensor		
Defective two or more sensors		

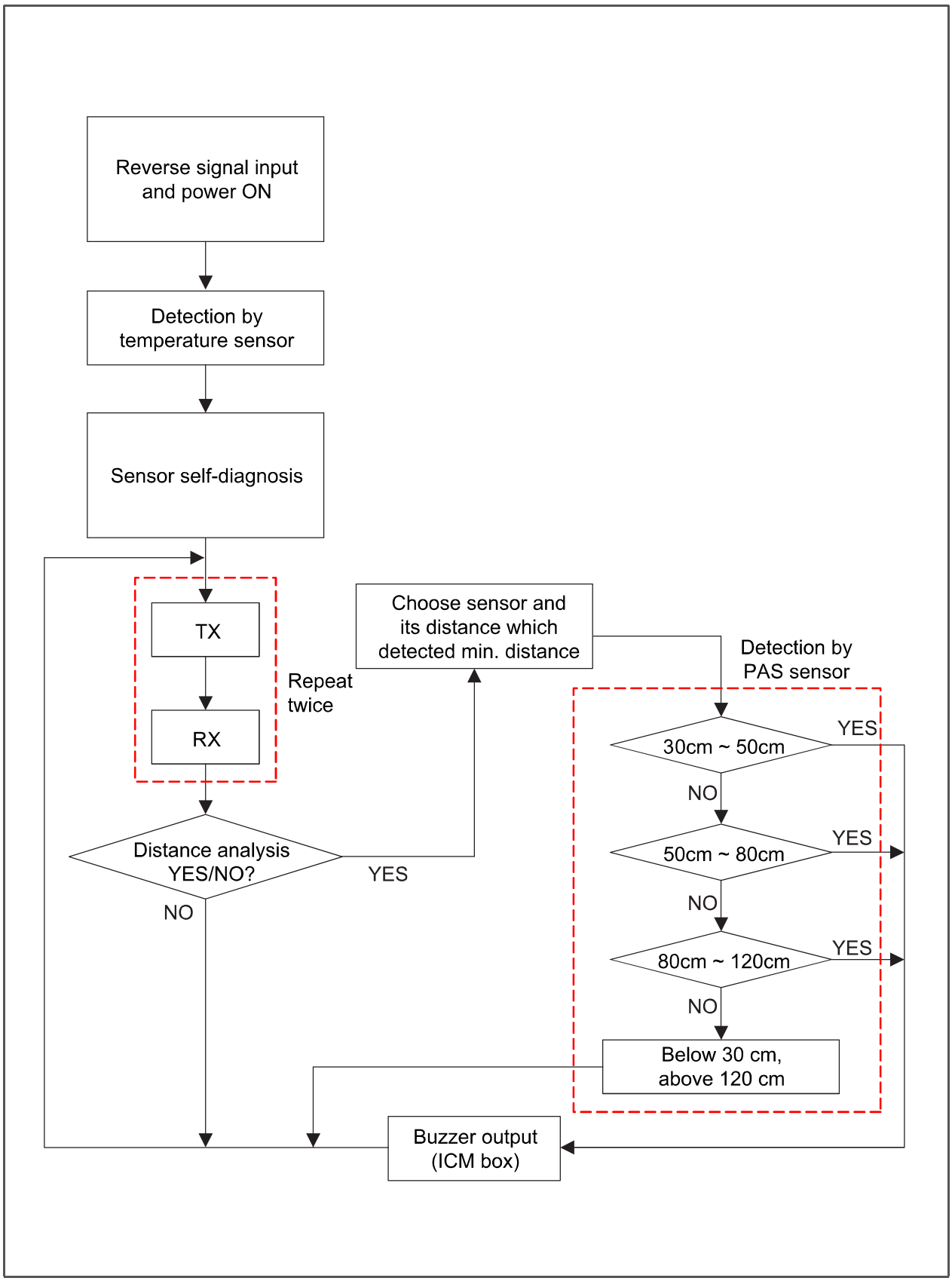
Modification basis	
Application basis	
Affected VIN	

5. Wiring diagram



Modification basis	
Application basis	
Affected VIN	

6. FLOW CHART



Modification basis	
Application basis	
Affected VIN	