

# NB-IoT / LoRa Smart Parking Timer Sensor

- ☑ **100% Accuracy tested by SGS Lab**  
Geo-magnet+Radar Detection
- ☑ **5 seconds identifying Tailing-parking**  
to Self-ticketing automation
- ☑ **SGS tested IP68 grade**  
Water-proof rolled over under water by vehicle
- ☑ **38AH ultra large battery capacity**  
3 years battery life
- ☑ **No calibration required**  
5 minutes installing one sensor
- ☑ **Patent-designed for 4G LTE**  
88% antenna performance max
- ☑ **NB-IoT/CAT-M1/LoRa WAN protocol**  
Supports 700/900/1800MHz wide bands
- ☑ **Remotely Upgrade (FOTA/COTA)**  
Supports Firmware and Configuration



# Smart Parking Timer Sensor

## Smart Parking Sensor

### P01

- Detection Technology : Earth Magnet + Micro Radar
- Installation : Surface mount
- Application Platform : GoGoParker Parking Platform
- Power Supply : 27000 mAh
- Certification : CE, FCC, NCC(PLMN11)
- Detection Object : Parking Occupancy Algorithm
- Dimension : (D)15X (H)3.9 cm / (D)5.9X (H)1.5 inches
- Weight : 551 g /19 oz
- Wireless Coverage : 500 meter-5 km(Line-of-sky)
- Enclosure : IP68 degree
- Pressure Test: 5000 kg
- IoT Protocol : NB-IoT(Support E-SIM) / CAT-M1/ LoRa/ ZigBee
- IoT Frequency : 700~900 MHz / 2.4 GHz
- Battery Life: 1 - 3 years(depending on usage model)
- Operating Temperature: -20 to 70°C(80°C for 3 hours)
- Report Latency: < 95%, status change within 2 mins.

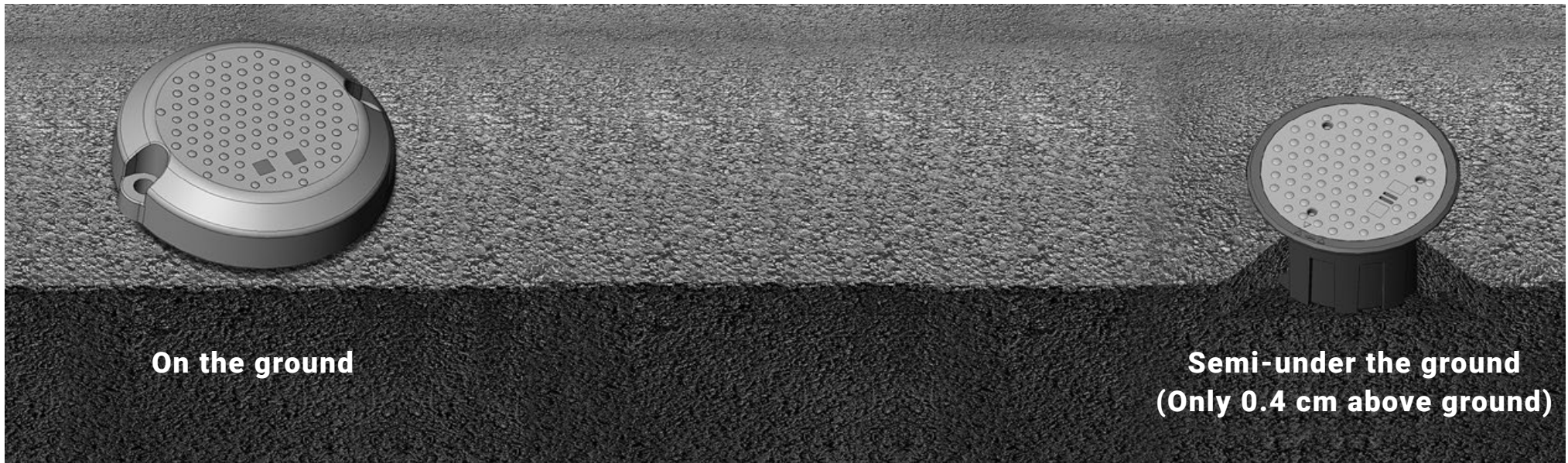


## Smart Parking Sensor

### P02

- Detection Technology : Earth Magnet + Micro Radar
- Installation : Flush mount
- Application Platform : GoGoParker Parking Platform
- Power Supply : Industrial battery 19000/38000 mAh
- Certification : CE, FCC, NCC(PLMN11)
- Detection Object : Parking Occupancy Algorithm
- Dimension : (D)12 X (H)6.8 cm / (D)4.7 X (H)2.7 inches
- Weight : 488g / 17.2oz
- Wireless Coverage : 500 meter-5 km(Line-of-sky)
- Enclosure : IP68 degree(SGS certified)
- Pressure Test: 5000 kg(SGS certified)
- IoT Protocol : NB-IoT(Support E-SIM) / CAT-M1/ LoRa/ ZigBee
- IoT Frequency : 700~900 MHz / 2.4 GHz
- Battery Life: 1 - 5 years(depending on usage model)
- Operating Temperature: -20 to 70°C(80°C for 3 hours)
- Report Latency: < 95%, status change within 2 mins.

SGS



On the ground

Semi-under the ground  
(Only 0.4 cm above ground)

# Antenna Position and Performance



**NR P01**

**NR P02**

**Other brands**

Only 0.4 cm above ground  
No tripping risk



On the ground

Semi-under the ground

under the ground

Antenna over the ground  
**Better radio performance**

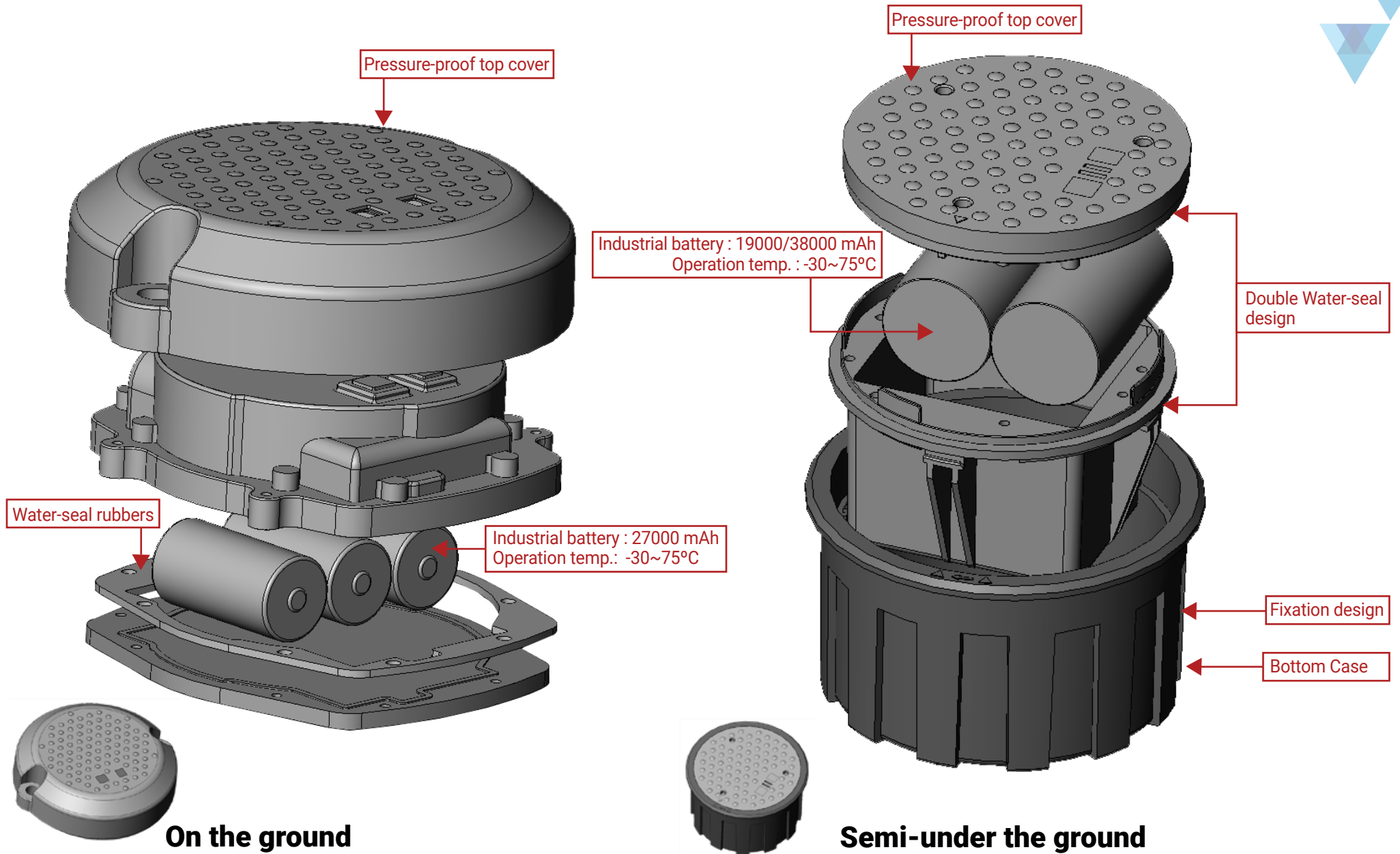
Antenna over the ground  
**Better radio performance**

Antenna under the ground  
**Limited radio performance**



Antenna

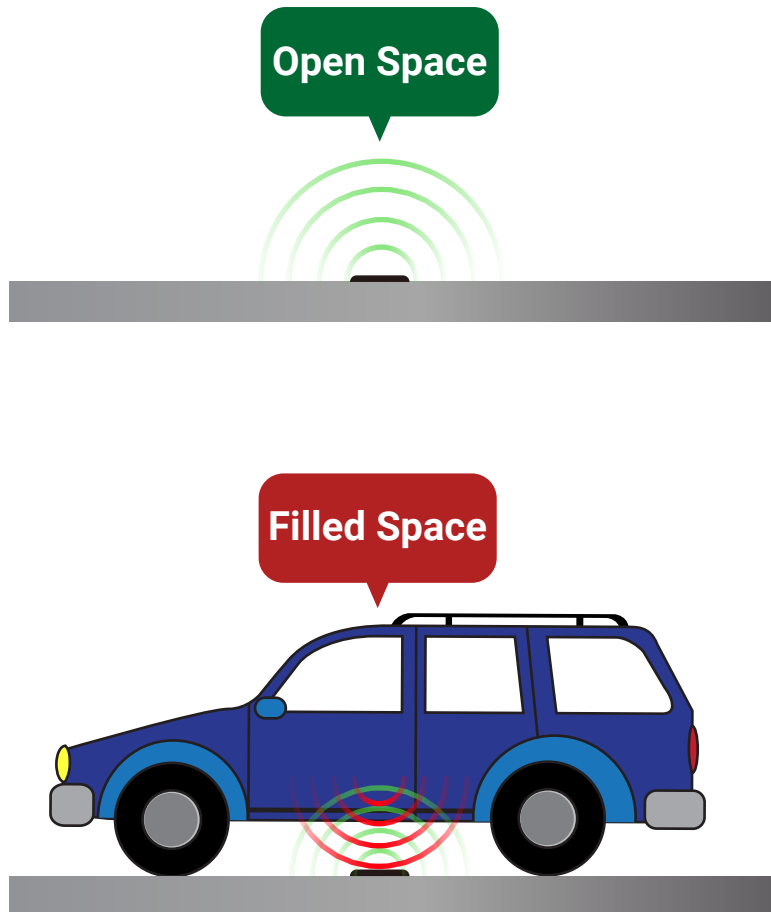
# Exploded View



# Best Accuracy

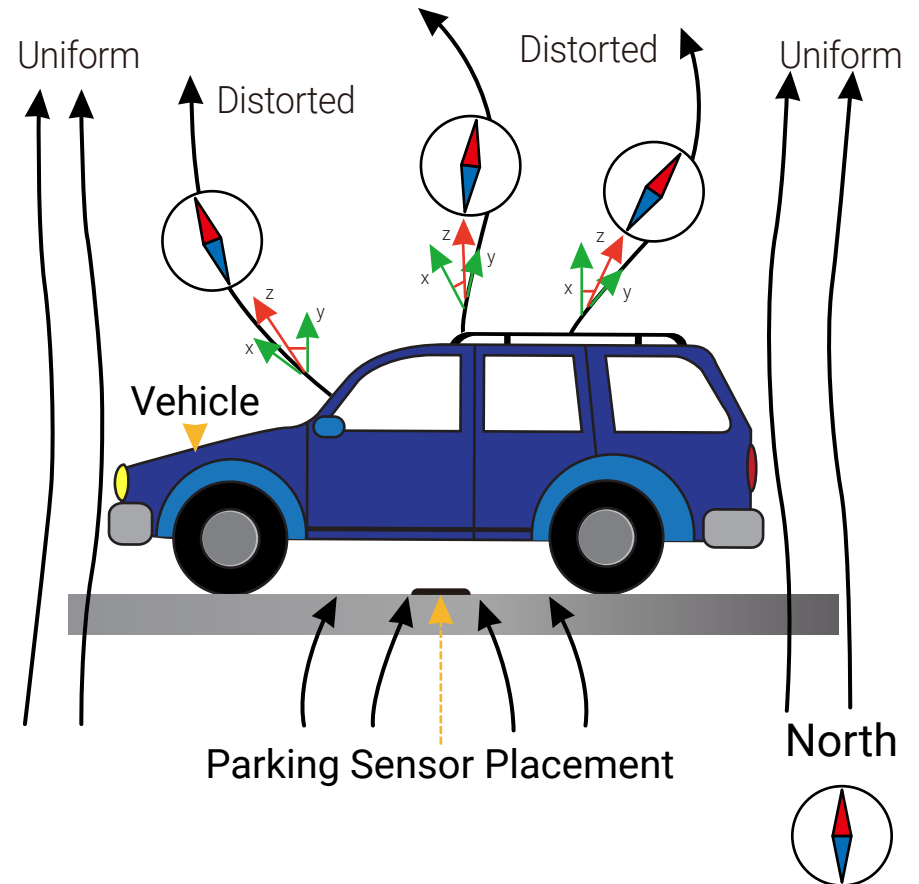
## Micro Radar

Micro Radar module transmits wireless modulation wave and receives reflective signals which is detected as parking occupancy.



## Earth Magnetic

Earth magnetic field lines distorted by ferrous metal of the vehicle, magnetic field strength obtained as the vehicle presence and movement with the magnetic sensor.

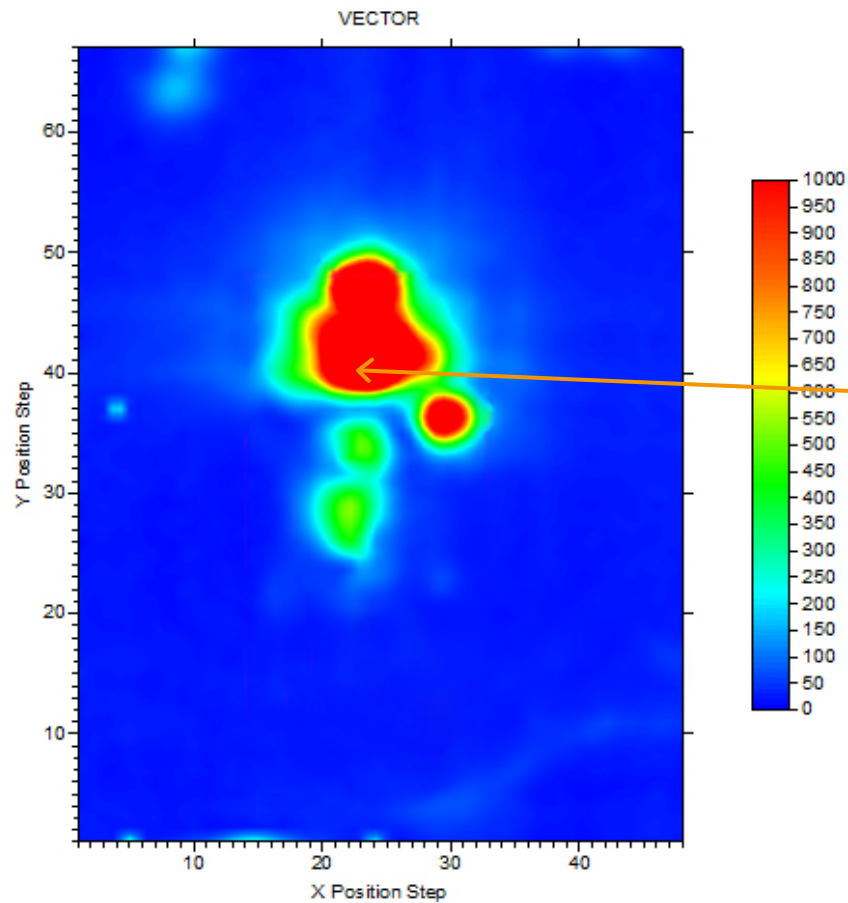




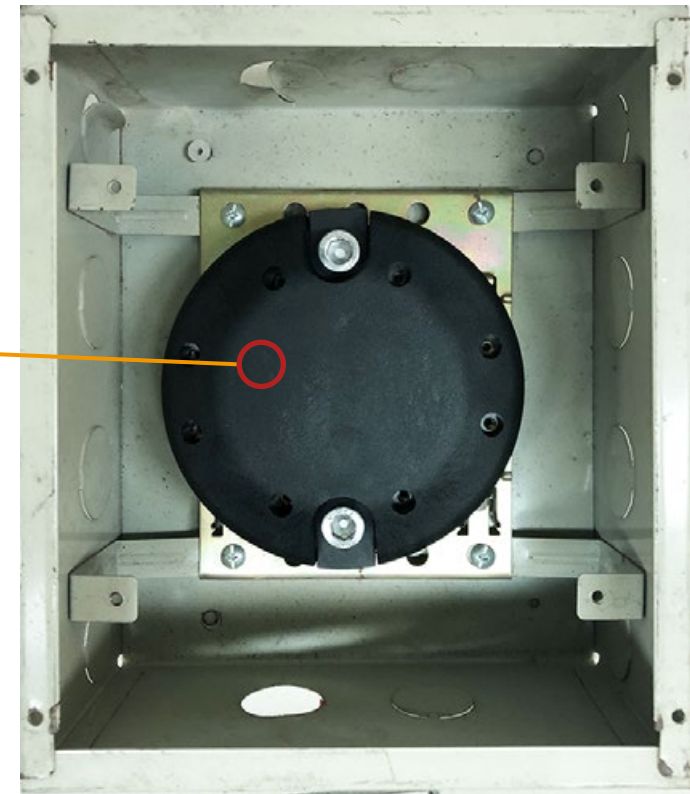
# Best Accuracy

High precision magnetic field calibration to avoid Hard Iron effect with offset & soft iron effect with Ellipsoid shape.

False alarm avoidance: ① Random vehicle passing by ② Double-parking ③ Magnetic damage



Magnetic Field Heat-map



Parking Sensor Test Unit

# System Components



## LoRa Base Station

- LoRa transmission over 10 KM (Line of sky)
- IP66 water-proof and dust tight enclosure
- Setting up to 16 channel
- Ease of installation
- Ethernet connection
- NB-IoT / 3G output (Optional)
- 700~928 Radio Frequency Band adaption  
(NB-IoT solution is not applicable)



## Outdoor CMS (Changeable Message Sign)

- LED Display Dimension: 160(W) X 120(H) cm
- Digits Dimension: 15(W) X 25(H) cm
- Communication Protocol: ASCII/ModBus RTU
- Weather standard: IP65 for outdoor
- Assumption: See clearly from 30 meters
- Design by demand



Example

# Installation Strategy

## On the ground



### Features:

#### Recommend for parking lot parking

- Good line-of-sight with receiver.
- Ease of installation.
- Ease of maintenance.
- Need only two screws for installation, fast and easy.

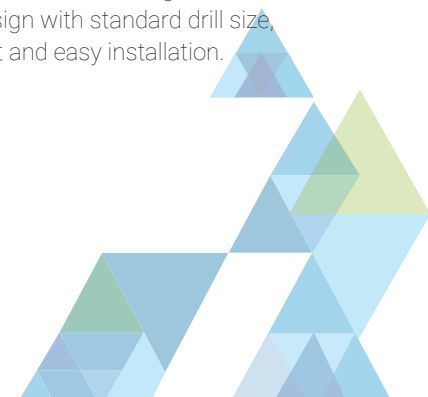
## Semi-under the ground



### Features:

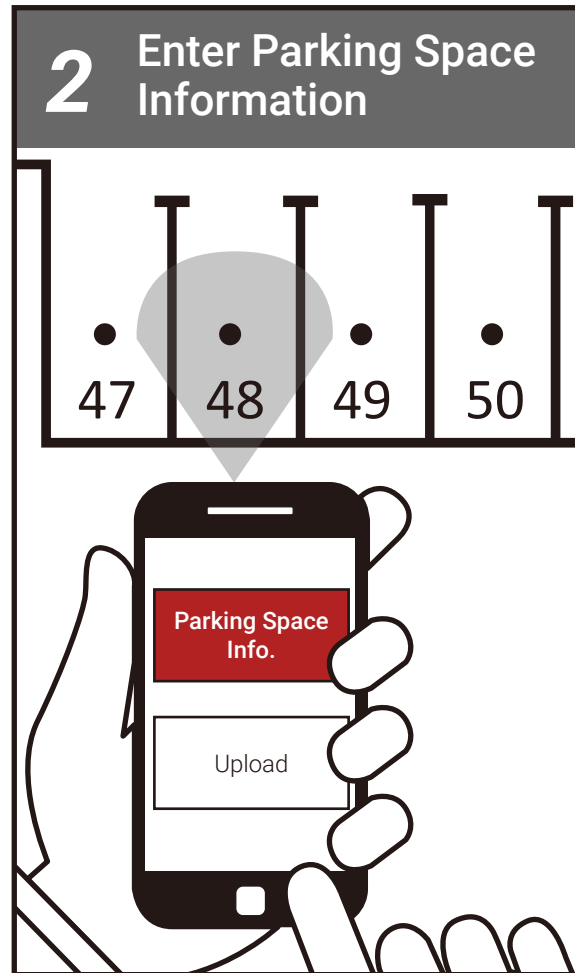
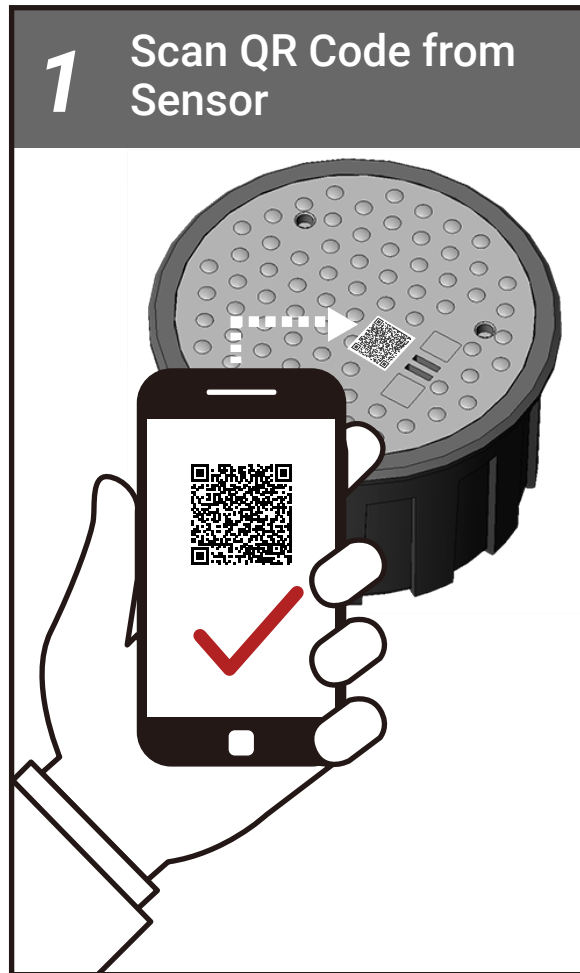
#### Recommend for street parking

- Good line-of-sight with receiver.
- Less tripping hazard risk.
- Less stolen risk.
- Lower risk of damage.
- Design with standard drill size, fast and easy installation.



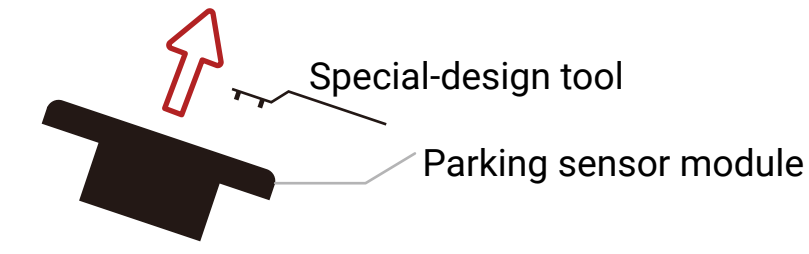
# App for Installer

## 3 Easy Steps Integrating Sensor IMEI and Parking Space GPS

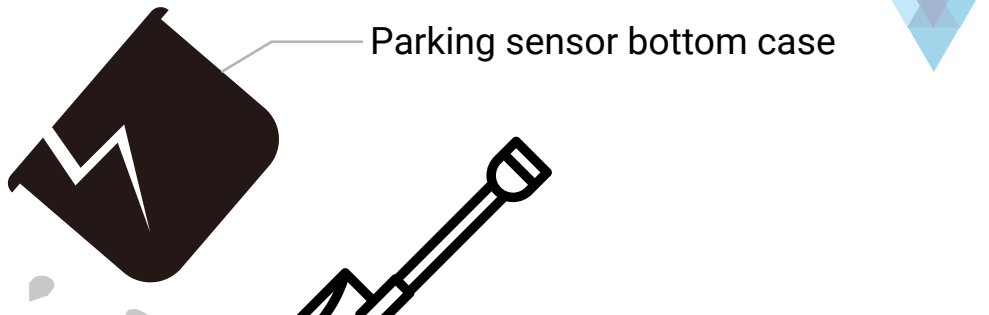




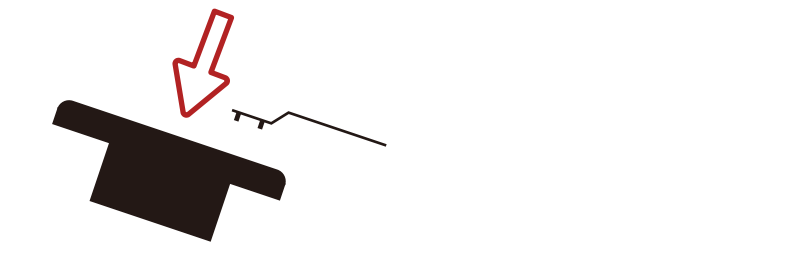
# 4-easy-steps During Pacing New Road



**Step1**  
Withdraw the parking sensor module by special-design tool.



**Step2**  
Scrap the parking sensor bottom case during pacing the new road.



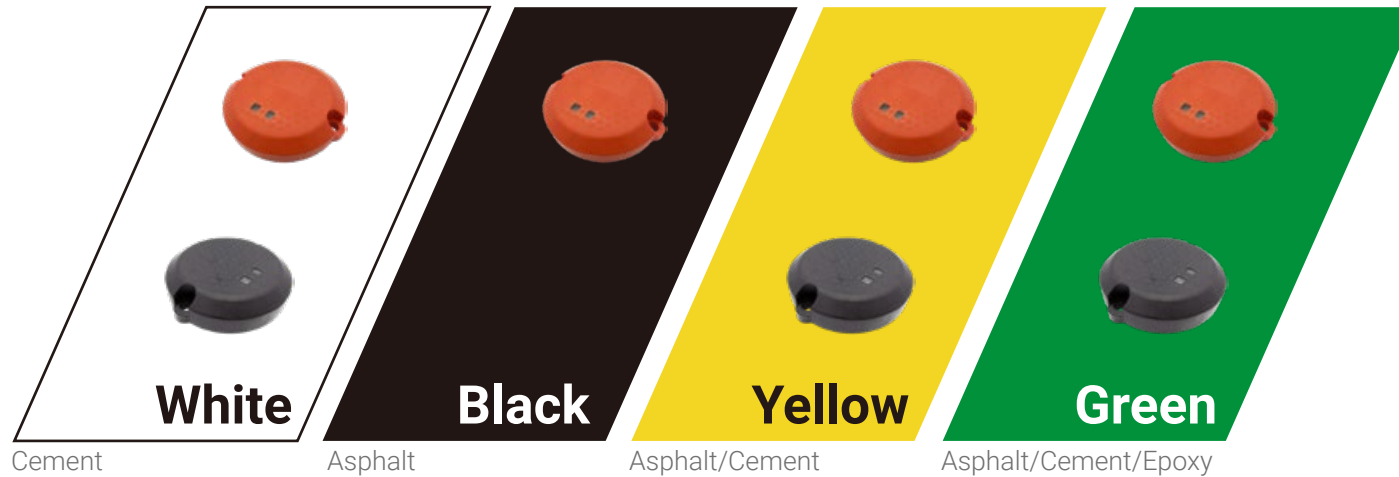
**Step3**  
Re-drill a hole for replaced bottom case when the road is steady, then put sensor back.



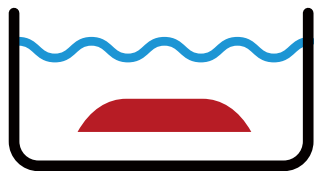
**Step4**  
Done.  
That was easy!

# Color Selection

According to ground color of parking lot for better pedestrian awareness



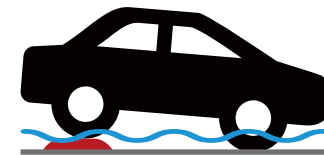
# Durability Test



**Water Immersion**  
IP68 degree



**Pressure**  
5000 kg sustainability

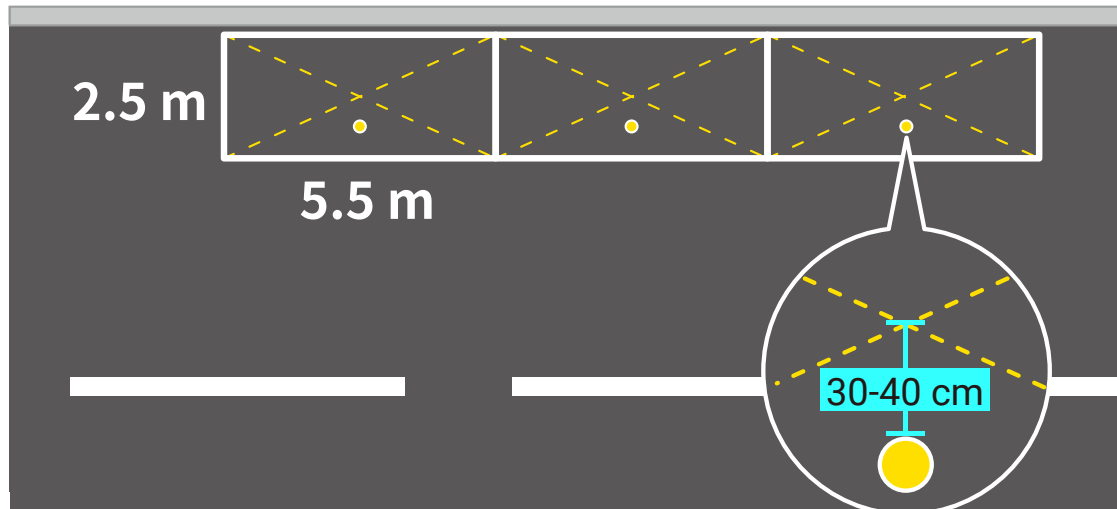


**Pressure under water**  
Real World Simulation

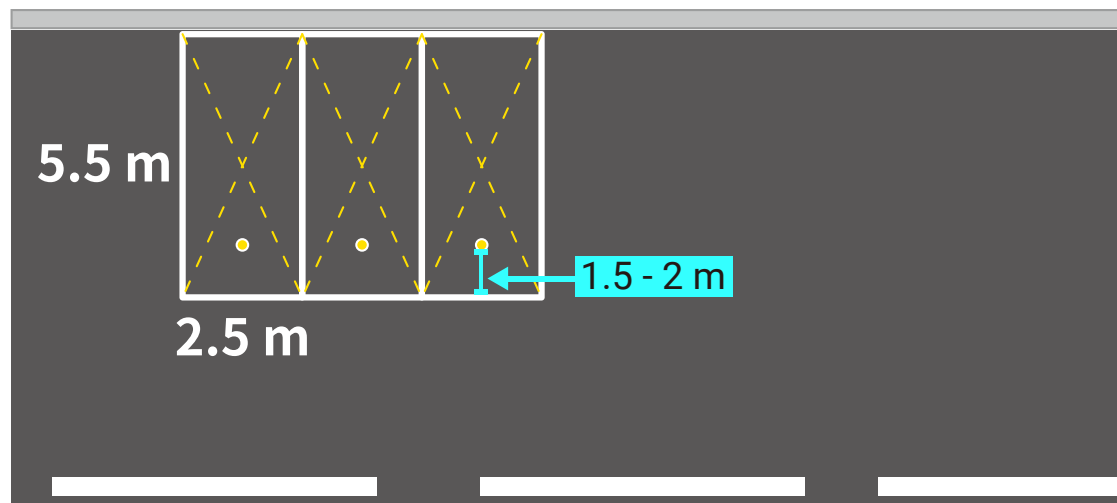
# Effective Installation Position

## Street Parking

Please install sensor between central point and road side, 30-40 cm away from central point.

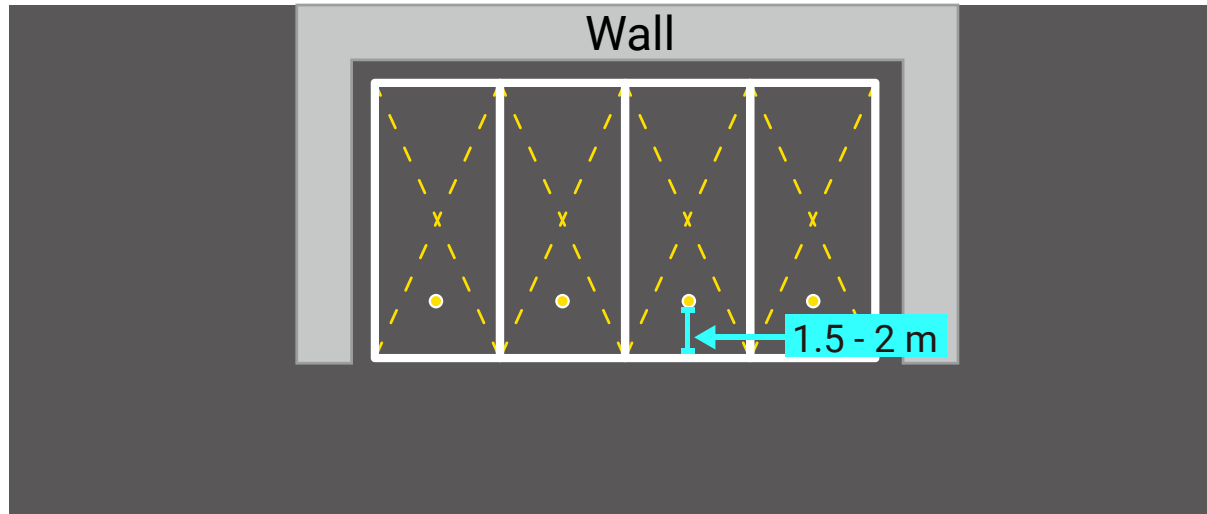


## Parking Lot Type A

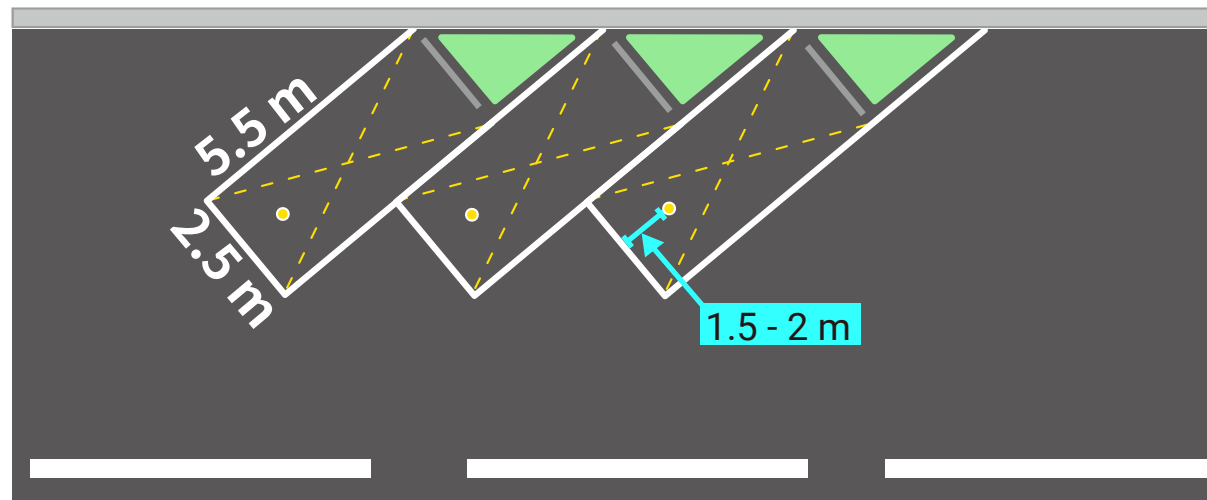


# Effective Installation Position

Parking Lot with Walls



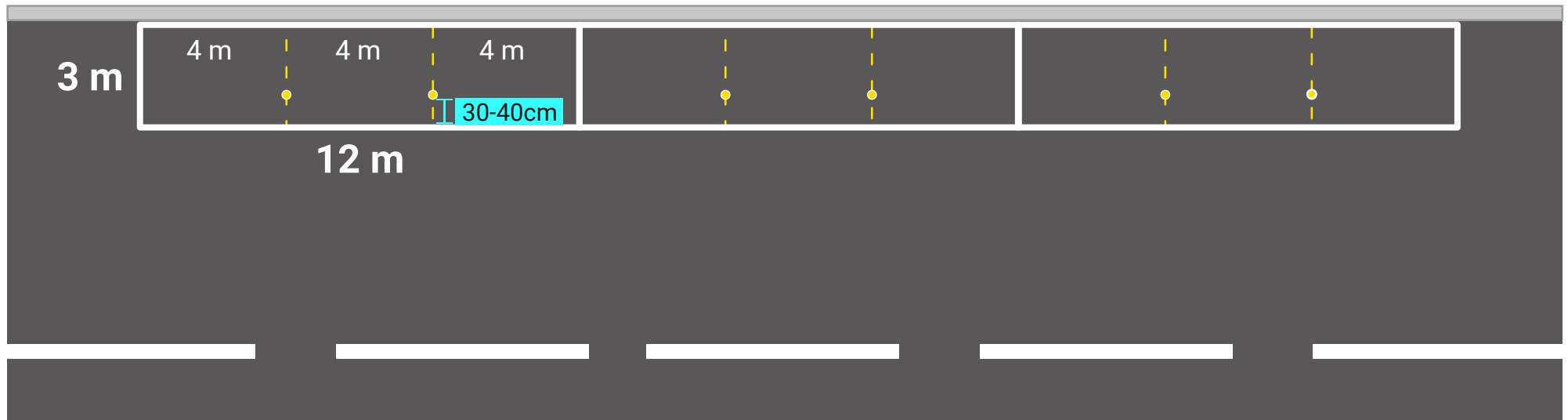
Parking Lot Type B





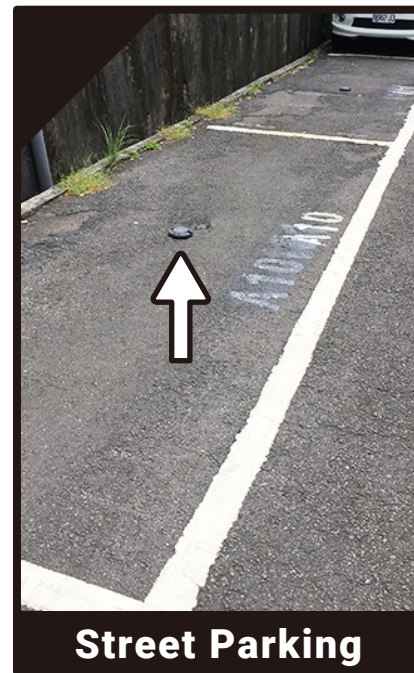
# Effective Installation Position

## Bus Parking



Note: 2 sensors installed are for compact car and bus detection interchangeable in special occasion.

# Test Cases



# NHR's Advantages among the market competitions in parking occupancy sensor

Benchmarking Items	NHR	Competitor-A	Competitor-B
Sensing Theory	Radar + Earth Magnet	MW + Earth Magnet	Optic + Earth Magnet
Weather-proof grade	IP68	IP67	IP68
Above ground height	0.4 cm	0.6 cm	5 cm
Operating temp.	-20~80°C	-20~60°C	-20~80°C
Back-to-back parking	Yes, detectable	No	No
Wireless Protocol	NB-IoT + LoRa WAN	NB-IoT	Proprietary only
Battery Life	3 years	1 years	5 years
Installation Time	5 minutes per sensor	30 minutes per sensor	15 minutes per sensor
Re-deployment design	Double water-seal design	No	No
Antenna Efficiency	88% Max (Patent design)	Regular	Regular
Wireless Band	Full bands 700 ~ 900 MHz	700 or 900 MHz	2.4 GHz
OTA Configuration	Yes	No	No
Battery Low Alarm	Yes	Yes	Yes
Burglar Alarm	Yes (Built-in Vibration Sensor)	No	No
Platform	Intelligent platform + APP	No platform	No platform

# Accuracy Test - Third party laboratory

**SGS**

Reliability Laboratory

## TEST REPORT

Report No.: HHN0011A/2018  
Page: 2 of 4

### 1. Parking Occupancy Detection Accuracy Test:

#### Test Equipment:

Name	Brand	Model	Serial No.
Stop Watch	CASIO	HS-3	702Q02R
Test Vehicle	Honda	FIT	N/A
Test Vehicle	Lexus	RX350	N/A

#### Test Environmental Conditions:

Ambient temperature:  $(25 \pm 3) ^\circ\text{C}$   
Ambient humidity:  $(55 \pm 20) \% \text{RH}$

#### Test Method/ Specification:

##### 1. Test Conditions--I:

Test environmental: Rain (outdoor)  
Test method: Place the sample on the ground. Move the vehicle over the sensor then move the vehicle out of the sensor, examine the monitor platform to receive sensor signal and average time.  
Test cycle: 220 cycles (110 times move in, 110 times move out)

##### 2. Test Conditions--II:

Test environmental: Rain (outdoor)  
Test method: Place the sample on the ground. After the first vehicle moves out of the sensor, then another vehicle quickly moves to sensor, examine whether the sensor can distinguish different vehicle signal.  
Test cycle: 3 cycles

##### 3. Test Conditions--III:

Test environmental: Rain (outdoor)  
Test method: Place the sample on the ground. Move the vehicle nearby the sensor, then examine whether the sensor to receive wrong signal.  
Test cycle: 3 cycles

**SGS**

Reliability Laboratory

## TEST REPORT

Report No.: HHN0011A/2018  
Page: 3 of 4

#### Specimen:

Style/ Item No.: P01(P02)/ No.1  
Quantity: Total 1 piece

#### Test Result:

##### 1. Test conditions--I:

Style/ Item No.	Test cycle	Check Item	Correct identification times	Accuracy	Average recognition return time (s)
P01(P02)/ No.1	220	110 (Move in)	110	100%	13
		110 (Move out)	110	100%	14

##### 2. Test conditions--II:

Style/ Item No.	Test cycle	Check Item	Examine whether the sample can distinguish different vehicle signal?	Accuracy
P01(P02)/ No.1	3 cycles (Move out)		Yes	100%
	3 cycles (Move in)		Yes	100%

##### 3. Test conditions--III:

Style/ Item No.	Test cycle	Check Item	Examine whether the sensor to receive wrong signal?	Misjudgment Ratio
P01(P02)/ No.1	3 cycles		No	100%
			No	100%



# Accuracy Test - Third party organization

There are three(3) key test items in the report:

## 1. Accuracy verifications for vehicle moves in and out

Test result: 100% accurate from 220 times / 110 cycles

## 2. Quick switch-over parking behavior identification

This test simulates a parking behavior In down-town, which is one vehicle moves out from the parking space, then another vehicle rapidly moves in. The parking sensor should be able to identify there are two vehicles in switch-over. In self-ticketing business model, this feature is a must.

Test result: 100% accurate

## 3. Nearby vehicles interference

The sensor should not be affected by the nearby vehicle stop by or passing through.

Test result: 0% Wrong signal reported

**Two(2) relevant observations about the report:**

- a. It is test over "raining day" that shows much more effective than test under sunny day in that most sensors and wireless transmission will be affected by rain.
- b. The response time for both move-in and move-out is 13.5 seconds in average that meets most requirements of smart city projects in terms of response time.  
Having said that the local NB-IoT/Lora signal quality will be having significant impact on response time.



# Reliability Test Report

## Compression Verification: 5000 KG

SGS

Reliability Laboratory

### TEST REPORT

Report No.: HC40026A/2018  
Page: 1 of 4  
Date: April 13, 2018

NIETZSCHE ENTERPRISE CO., LTD.  
4F, NO.560, 2ND SEC., CHUNG SHAN RD.,  
CHUNG HO DIST., NEW TAIPEI CITY, TAIWAN

The following merchandise was submitted and identified by the vendor as:

**Product Description:** NB-Iot Smart Parking Sensor  
**Style/Item No.:** P02/No.1  
**Manufacturer/Vendor:** Nietzsche Enterprise Co., Ltd.  
**Country of Origin:** Taiwan  
**Quantity:** Total 1 piece  
**Testing Period:** Apr. 10, 2018

We have tested the submitted sample(s) as requested and the following results were obtained:

**Test Required:** (According to client's test specification, please see following sheets in detail.)  
1. Compression Test

**Test Results:** - PLEASE SEE ATTACHED SHEETS -

Signed for and on behalf of  
SGS TAIWAN Ltd.

*Hank Chiu*

Hank Chiu  
Supervisor

Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 90 days only. This test report cannot be reproduced, except in full, without prior written permission of the Company. 除非另有說明，此測試報告僅針對所測試之樣品負責，所測試之樣品僅保留 90 天。本報告不得全數或局部翻印、不得部分複製。  
This document is issued by the Company subject to its General Conditions of Service printed overleaf, available on request or accessible at [www.sgs.com/terms\\_and\\_conditions.html](http://www.sgs.com/terms_and_conditions.html) and, for electronic format documents, subject to Terms and Conditions for Electronic Documents at [www.sgs.com/terms\\_and\\_conditions.html](http://www.sgs.com/terms_and_conditions.html). Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein. Any holder of this document is advised that information contained herein reflects the Company's findings at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility is to its Client and this document does not constitute parties to a transaction from exercising all their rights and obligations under the transaction documents. This document cannot be reproduced except in full, without prior written approval of the Company. Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law.

SGS Taiwan Ltd. No.13, Wu Kung Road, New Taipei Industrial Park, Wuku District, New Taipei City, Taiwan/新北市五股區吳興路13號, 33號, 35號  
台灣檢驗科技股份有限公司 (886-2) 2299-3279 (886-2) 2299-9558 www.taiwan.sgs.com Member of SGS Group

SGS

Reliability Laboratory

### TEST REPORT

Report No.: HC40026A/2018  
Page: 2 of 4

#### 1. Compression Test:

##### Test Equipment:

Name	Brand	Model	Serial No.
Materials Testing System	CHUN YEN	CY-6040A4	10112007

##### Lab Environmental Conditions:

Ambient temperature:  $(25 \pm 3) ^\circ\text{C}$   
Ambient humidity:  $(55 \pm 20) \% \text{RH}$

##### Test Method/ Specification:

**Test Method:** Increase the load until it reaches the test load. Maintain the load for a designated duration, then release the load.  
**Sample Condition:** Mated with fixture  
**Applied load:** 5,000 kgf  
**Test speed:** 1 mm/minute  
**Test duration:** 5 seconds  
**Testing device:** As shown in photo 3

- Examine the appearance of specimen(s) by visual check after this test.

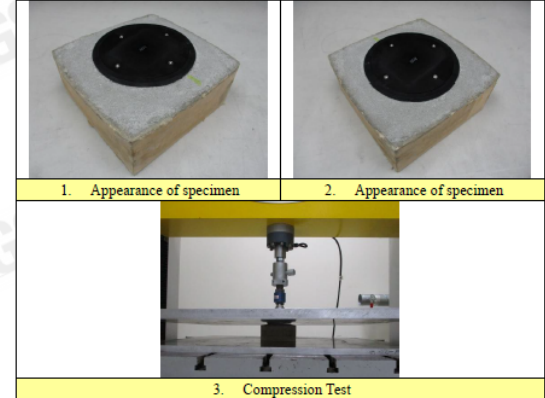
SGS

Reliability Laboratory

### TEST REPORT

Report No.: HC40026A/2018  
Page: 4 of 4

#### Test Photos:



--- The End of Test Report ---

Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 90 days only. This test report cannot be reproduced, except in full, without prior written permission of the Company. 除非另有說明，此測試報告僅針對所測試之樣品負責，所測試之樣品僅保留 90 天。本報告不得全數或局部翻印、不得部分複製。  
This document is issued by the Company subject to its General Conditions of Service printed overleaf, available on request or accessible at [www.sgs.com/terms\\_and\\_conditions.html](http://www.sgs.com/terms_and_conditions.html) and, for electronic format documents, subject to Terms and Conditions for Electronic Documents at [www.sgs.com/terms\\_and\\_conditions.html](http://www.sgs.com/terms_and_conditions.html). Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein. Any holder of this document is advised that information contained herein reflects the Company's findings at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility is to its Client and this document does not constitute parties to a transaction from exercising all their rights and obligations under the transaction documents. This document cannot be reproduced except in full, without prior written approval of the Company. Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law.

SGS Taiwan Ltd. No.13, No.33, Wu Chyuan Road, Wuku Industrial Zone, New Taipei City, Taiwan / 新北市五股區吳園路33號, 33號, 35號  
台灣檢驗科技股份有限公司 (886-2) 2299-3279 (886-2) 2299-9558 www.tw.sgs.com Member of SGS Group

Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 90 days only. This test report cannot be reproduced, except in full, without prior written permission of the Company. 除非另有說明，此測試報告僅針對所測試之樣品負責，所測試之樣品僅保留 90 天。本報告不得全數或局部翻印、不得部分複製。  
This document is issued by the Company subject to its General Conditions of Service printed overleaf, available on request or accessible at [www.sgs.com/terms\\_and\\_conditions.html](http://www.sgs.com/terms_and_conditions.html) and, for electronic format documents, subject to Terms and Conditions for Electronic Documents at [www.sgs.com/terms\\_and\\_conditions.html](http://www.sgs.com/terms_and_conditions.html). Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein. Any holder of this document is advised that information contained herein reflects the Company's findings at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility is to its Client and this document does not constitute parties to a transaction from exercising all their rights and obligations under the transaction documents. This document cannot be reproduced except in full, without prior written approval of the Company. Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law.

SGS Taiwan Ltd. No.13, No.33, Wu Chyuan Road, Wuku Industrial Zone, New Taipei City, Taiwan / 新北市五股區吳園路33號, 33號, 35號  
台灣檢驗科技股份有限公司 (886-2) 2299-3279 (886-2) 2299-9558 www.tw.sgs.com Member of SGS Group

# Reliability Test Report

## Water-proof verification: IP68



Reliability Laboratory

### TEST REPORT

Report No.: HC40026/2018  
Page: 1 of 4  
Date: April 12, 2018

NIETZSCHE ENTERPRISE CO., LTD.  
4F, NO. 560, 2ND SEC., CHUNG SHAN RD.,  
CHUNG HO DIST., NEW TAIPEI CITY, TAIWAN

The following merchandise was submitted and identified by the vendor as:

**Product Description:** NB-LoT Smart Parking Sensor  
**Style/ Item No.:** P02/No.1  
**Manufacturer/ Vendor:** Nietzsche Enterprise Co., Ltd.  
**Country of Origin:** Taiwan  
**Quantity:** Total 1 piece  
**Testing Period:** Apr. 10, 2018

We have tested the submitted sample(s) as requested and the following results were obtained:

#### Test Required:

Test for Degrees of Protection Provided by Enclosures (IEC 60529 Edition 2.2: 2013)

IP Code	IPX8
First characteristic numeral	Omitted
Second characteristic numeral	Degrees of protection against ingress of water

#### Test Results:

Conclusion	
Submittals sample(s) comply with the requirement and acceptance conditions of IEC 60529 Edition 2.2: 2013 Degrees of Protection Provided by Enclosures -- IPX8	
The detailed description of test result, please see attached sheet(s).	

Signed for and on behalf of  
SGS TAIWAN Ltd.

Ivan Wang

Ivan Wang  
Team Leader

Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 90 days only. This test report cannot be reproduced, except in full, without prior written permission of the Company. 除非另有說明，此測試報告僅針對送檢之樣品負責，所有數據均僅適用於該樣品。本報告之樣品僅保留90天。本報告不得重印或轉載，除非事先獲得本公司之書面許可。  
This document is issued by the Company subject to its General Conditions of Service printed overleaf, available on request or accessible at [www.tw.sgs.com/terms\\_and\\_conditions.htm](http://www.tw.sgs.com/terms_and_conditions.htm) and, for electronic format documents, subject to Terms and Conditions for Electronic Documents at [www.tw.sgs.com/terms\\_electronic.htm](http://www.tw.sgs.com/terms_electronic.htm). Attention is drawn to the limitation of liability, indemnification and jurisdiction issues outlined therein. Any holder of this document is advised that information contained herein reflects the Company's findings at the time of the intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility is to its Client and this document does not constitute part of a transaction from exercising all their rights and obligations under the transaction documents. This document cannot be reproduced except in full, without prior written approval of the Company. Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law.

SGS Taiwan Ltd. No. 34, Wu Kang Road, New Taipei Industrial Park, Wu Kang District, New Taipei City, Taiwan 416; 中興區中興路34號, 35樓, 35號  
台灣檢驗科技股份有限公司 (886-2) 2299-3279 f: (886-2) 2299-9558 www.tw.sgs.com Member of SGS Group



Reliability Laboratory

### TEST REPORT

Report No.: HC40026/2018  
Page: 2 of 4

#### Test for Degrees of Protection Provided by Enclosures:

##### Test Equipment:

Name	Brand	Model	Serial No.
IPX7/IPX8 Immersion Tank	Self-made	SGS-ETR-030201	ETR000001

##### Lab Environmental Conditions:

Ambient temperature: (15 ~ 35)°C  
Ambient humidity: (25 ~ 75) % RH

##### Test Method/ Specification:

Test method: IEC 60529 Edition 2.2: 2013 --IPX8

##### Test for protection against water:

Sample condition: Non-Operating

Test means: Completely immerse the specimen in water in its service position as specified by client.

Test condition: The lowest point of enclosures with a height is located 1000 mm below the surface of the water

Test duration: 60 minutes

Test Device: As shown in photo 3, 4

- Examine the protection against ingress water of specimen(s) after this test.

Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 90 days only. This test report cannot be reproduced, except in full, without prior written permission of the Company. 除非另有說明，此測試報告僅針對送檢之樣品負責，所有數據均僅適用於該樣品。本報告之樣品僅保留90天。本報告不得重印或轉載，除非事先獲得本公司之書面許可。  
This document is issued by the Company subject to its General Conditions of Service printed overleaf, available on request or accessible at [www.tw.sgs.com/terms\\_and\\_conditions.htm](http://www.tw.sgs.com/terms_and_conditions.htm) and, for electronic format documents, subject to Terms and Conditions for Electronic Documents at [www.tw.sgs.com/terms\\_electronic.htm](http://www.tw.sgs.com/terms_electronic.htm). Attention is drawn to the limitation of liability, indemnification and jurisdiction issues outlined therein. Any holder of this document is advised that information contained herein reflects the Company's findings at the time of the intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility is to its Client and this document does not constitute part of a transaction from exercising all their rights and obligations under the transaction documents. This document cannot be reproduced except in full, without prior written approval of the Company. Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law.

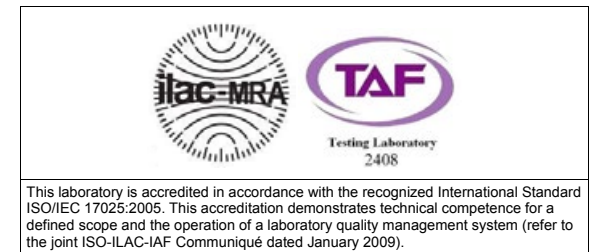
SGS Taiwan Ltd. No. 31, No. 33, No. 35, Wu Chyuan Road, Wu Kuang Industrial Zone, New Taipei City, Taiwan / 新北市五股區五權路31號, 33號, 35號  
台灣檢驗科技股份有限公司 (886-2) 2299-3279 f: (886-2) 2299-9558 www.tw.sgs.com Member of SGS Group



Great One Global Certification Co., Ltd.

9F-2, No. 120, Quaohe Rd., Zhonghe Dist., New Taipei City 235, Taiwan (R.O.C.)  
Website: [www.go-safety.com.tw](http://www.go-safety.com.tw) TEL: +886-2-2248-0810  
Email: [sales@go-safety.com.tw](mailto:sales@go-safety.com.tw) FAX: +886-2-2248-0811

## Degrees of Protection Provided by Enclosures (IP code)



Standard Used :	IEC 60529:1989+AMD1:1999+AMD2:2013CSV
Date of Test :	August 24, 2018
Date of Issue :	August 24, 2018
Result :	Passed (IP6X)
Report Number :	GO18082305
Reviewer :	

- The test results of this report relate only to the tested sample identified in this report.
- This report shall not be reproduced, in full or in portion, except for having written approval from Great One Global Certification Co. Ltd.
- The data in report cannot be used for advertisement, publication and promotion.

[www.GO-SAFETY.com.tw](http://www.GO-SAFETY.com.tw)

# Thank You