Certificate of Test

NCT CO., LTD.
211-71, Geumgok-ro, Hwaseong-si, Gyeonggi-do, 18511, Republic of Korea
(Tel: +82-31-323-6070 / Fax: +82-31-323-6071)

Report No.: NW2303-F002-1

1. **Client**
   - ○ Name : INFAC ELECS CO., LTD.
   - ○ Address : 16648, 53, Saneop-ro 155beon-gil, Gwonseon-gu, Suwon-si, Gyeonggi-do, Korea
   - ○ Date of Receipt : 2023-01-10

2. **Use of Report :** FCC Certification

3. **Test Sample**
   - ○ Description / Model : MV Vehicle project Door Handle Sensor module / MV DHS NFC
   - ○ FCC ID : 2A93T-DHS-NFC

4. **Place of Test :** ■ Fixed test □ Field test
   (Address:211-71, Geumgok-ro, Hwaseong-si, Gyeonggi-do, 18511, Republic of Korea)

5. **Date of Test :** 2023-01-16 ~ 2023-03-02

6. **Test method used :** FCC Part 1.1310

7. **Testing Environment :**
   - ○ Temperature: (25 ± 5) °C, Humidity: Less than 75 % R.H.

   * Unless specified otherwise in the individual methods, the tests were conducted on ambient conditions.

8. **Test Results :** Refer to the test results

The results shown in this test report refer only to the sample(s) tested unless otherwise stated.
This Test Report cannot be reproduced, except in full
This test report is not related to KOLAS recognition and RRA designation.

Affirmation	**Tested by** (signature)	**Technical Manager** (signature)
	Ji-won Hong 홍지원	Changmin, Kim

Mar 23, 2023

NCT CO., LTD. (seal)

Contact us at report@nct.re.kr to confirm the authenticity of this report

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1. General Information's

1.1 Test Performed

Laboratory	:	NCT Co., Ltd.
Address	:	211-71, Geumgok-ro, Hwaseong-si, Gyeonggi-do, 18511, Korea
Telephone	:	+82-31-323-6070
Facsimile	:	+82-31-323-6071
FCC Designation No.	:	KR0166
FCC Registration Number	:	409631

2. Information's about Test Item

2.1 Applicant Information

Company name	:	INFAC ELECS CO., LTD.
Address	:	16648, 53, Saneop-ro 155beon-gil, Gwonseon-gu, Suwon-si, Gyeonggi-do, Korea
Telephone / Facsimile	:	+82-10-8928-5713 / +82-31-298-9500

2.2 Equipment Under Test (EUT) description

Test item particulars	:	MV Vehicle project Door Handle Sensor module
Model and/or type reference	:	MV DHS NFC
Additional model name	:	MV DHS NFC-R
Serial number	:	Prototype
Antenna type and gain	:	PCB Loop Antenna
Date (s) of performance of tests:	:	2023-01-16 ~ 2023-03-02
Date of receipt of test item	:	2023-01-10
EUT condition	:	Pre-production, not damaged
Number of channel	:	1
EUT Power Source	:	DC 12.0 V
Type of Modulation	:	ASK
Firmware version	:	1.0
Hardware version	:	1.0
Test software name(version)	:	-

2.3 Tested Frequency

Test Mode	Test frequency (MHz)		
	Low frequency	Middle frequency	High frequency
RFID	-	13.56	-

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3. Test Report

3.1 Test Report Version

Test Report No.	Date	Description
NW2303-F002	2023-03-21	Initial issue
NW2303-F002-1	2023-03-23	Reissue due to addition of MPE Calculation.

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3.2 Evalution result

Following FCC KDB 447498 D01 “General SAR test exclusion guidance”
The corresponding SAR Exclusion Threshold condition, listed below:

1) The 1-g and 10-g SAR test exclusion thresholds for 100 MHz to 6 GHz at test separation distances ≤ 50 mm are determined by:

   [(max. power of channel, including tune-up tolerance, mW)/(min. test separation distance, mm)] ·[√ f(GHz)] ≤ 3.0 for 1-g SAR and ≤ 7.5 for 10-g extremity SAR, where

   - f(GHz) is the RF channel transmit frequency in GHz.
   - Power and distance are rounded to the nearest mW and mm before calculation.
   - The result is rounded to one decimal place for comparison The test exclusions are applicable only when the minimum test separation distance is ≤ 50 mm and for transmission frequencies between 100 MHz and 6 GHz. When the minimum test separation distance is < 5 mm, a distance of 5 mm is applied to determine SAR test exclusion.

2) At 100 MHz to 6 GHz and for test separation distances > 50 mm, the SAR test exclusion threshold is determined according to the following:

   a) [Threshold at 50 mm in step 1) + (test separation distance - 50mm)·(f(MHz)/150)] mW, at 100MHz to 1500 MHz

   b) [Threshold at 50 mm in step 1) + (test separation distance - 50 mm)·10] mW at > 1500 MHz and ≤ 6 GHz

3) At frequencies below 100 MHz, the following may be considered for SAR test exclusion.

   a) The threshold at the corresponding test separation distance at 100 MHz in step 2) is multiplied by [1 + log(100/f(MHz))] for test separation distances > 50 mm and < 200 mm.

   b) The threshold determined by the equation in a) for 50 mm and 100 MHz is multiplied by ½ for test separation distances ≤ 50 mm.

   c) SAR measurement procedures are not established below 100 MHz. When SAR test exclusion cannot be applied, a KDB inquiry is required to determine SAR evaluation requirements for any test results to be acceptable.

3.3 SAR Test Exclusion Thresholds

Maximum measured transmitter power:

Frequency (MHz)	Field Strength (dBuV/m@3m)	Max. Power (mW)	Min. test separation distance(mm)	SAR test exclusion calculation value(note)	SAR test exclusion thresholds	Result
13.56	61.72	0.000446	50	0.000446	885.31	Pass

Note:

1. Determining compliance based on the results of the compliance measurement, not taking into account measurement instrumentation uncertainty.
2. Calculate SAR test exclusion thresholds from condition “3” formulas.
3. Field Strength (dBuV/m@3m) = Field Strength (dBuV/m@30m) + 40*log(30/3)
4. MAX POWER(dBm) = Field Strength of Fundamental (dBuV/m@3m) – 95.23,
   MAX POWER(mW) = 10^(Max power (dBm)/10)

Conslusion:

Source-base time average power is below Exemption Criteria and/or MPE thresholds, therefore the device is Compliant FCC RF esposure requirement.

SAR Test Exclusion Thresholds for < 100 MHz and < 200 mm (KDB 447498 Appendix C)

MHz	< 50	50	60	70	80	90	100	110	120	130	140	150	160	170	180	190	mm
100	237	474	481	487	494	501	507	514	521	527	534	541	547	554	561	567	
50	308	617	625	634	643	651	660	669	677	686	695	703	712	721	729	738	
10	474	948	961	975	988	1001	1015	1028	1041	1055	1068	1081	1095	1108	1121	1135	
1	711	1422	1442	1462	1482	1502	1522	1542	1562	1582	1602	1622	1642	1662	1682	1702	mW
0.1	948	1896	1923	1949	1976	2003	2029	2056	2083	2109	2136	2163	2189	2216	2243	2269	
0.05	1019	2039	2067	2096	2125	2153	2182	2211	2239	2268	2297	2325	2354	2383	2411	2440	
0.01	1185	2370	2403	2437	2470	2503	2537	2570	2603	2637	2670	2703	2737	2770	2803	2837	

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3.4 MPE Calculation

1) Limits for Maximum Permissible Exposure (MPE)

$S = EIRP/(4R^2\pi)$

S = Maximum power density (mW/cm2)
P = Power input to the antenna (mW)
G = Numeric power gain of the antenna
R = Distance to the center of the radiation of the antenna
EIRP = Equivalent Isotropic Radiated Power(mW) (=P*G)

Frequency range (MHz)	Electric Field strength (V/m)	Magnetic field strength (A/m)	Power Density (mW/cm2)	Averageing time (minutes)
0.3 ~ 1.34	614	1.63	*100	30
1.34 ~ 30	824 / f	2.19 / f	*180 / f^2	30
30 ~ 300	27.5	0.073	0.2	30
300 ~ 1,500			f / 1500	30
1,500 ~ 100,000			1	30

2) MPE Calculation

Modulation	Frequency (MHz)	Measured Maximum Radiated power	Measured Maximum Radiated power	Tune-up tolerance	Max. Power with tune-up tolerance (P)		Power Density (S)	Limit of Power Density (S)	Result
		(dBuV/m)	(dBm)	(dB)	(dBm)	(mW)	(mW/cm2)	(mW/cm2)	
ASK	13.56	61.72	-33.51	± 1.00	-32.51	0.0005610	0.00000011	0.98	PASS

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