



RADIO TEST REPORT

For

Descartes System Group Inc

Inventory control beacon tag

Test Model: BIN001-2

Prepared for : Descartes System Group Inc
Address : 105 Trafalgar Street, Floor 2 Floor 2, Nelson, New Zealand

Prepared by : Shenzhen LCS Compliance Testing Laboratory Ltd.
Address : Room 101, 201, Building A and Room 301, Building C, Juji Industrial Park, Yabianxueziwei, Shajing Street, Bao'an District, Shenzhen, Guangdong, China

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Date of receipt of test sample : March 31, 2025
Number of tested samples : 2
Sample No. : A03275110-1, A03275110-2
Serial number : Prototype
Date of Test : March 31, 2025 ~ April 10, 2025
Date of Report : April 11, 2025



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**RADIO TEST REPORT**
ETSI EN 300 330 V2.1.1 (2017-02)

Short Range Devices (SRD); Radio equipment in the frequency range 9 kHz to 25 MHz and inductive loop systems in the frequency range 9 kHz to 30 MHz; Harmonised Standard covering the essential requirements of article 3.2 of Directive 2014/53/EU

Report Reference No. : LCSA03275110EC

Date Of Issue..... : April 11, 2025

Testing Laboratory Name..... : Shenzhen LCS Compliance Testing Laboratory Ltd.

Address..... : Room 101, 201, Building A and Room 301, Building C, Juji Industrial Park, Yabianxueziwei, Shajing Street, Bao'an District, Shenzhen, Guangdong, China

Testing Location/Procedure..... : Full application of Harmonised standards ■
Partial application of Harmonised standards □
Other standard testing method □**Applicant's Name..... : Descartes System Group Inc**

Address..... : 105 Trafalgar Street, Floor 2 Floor 2, Nelson, New Zealand

Test Specification

Standard..... : ETSI EN 300 330 V2.1.1 (2017-02)

Test Report Form No. : TRF-4-E-167 A/0

TRF Originator..... : Shenzhen LCS Compliance Testing Laboratory Ltd.

Master TRF..... : Dated 2017-06

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Test Item Description..... : Inventory control beacon tag

Trade Mark..... : N/A

Test Model..... : BIN001-2

Ratings..... : DC 3V By CR2477 Button Battery

Result : PASS**Compiled by:**

Kevin Huang/Administrator

Supervised by:

Jack Liu/ Technique principal

Approved by:

Gavin Liang/ Manager



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RADIO -- TEST REPORT

Test Report No. : LCSA03275110ECApril 11, 2025

Date of issue

Test Model..... : BIN001-2

EUT..... : Inventory control beacon tag

Applicant..... : Descartes System Group Inc

Address..... : 105 Trafalgar Street, Floor 2 Floor 2, Nelson, New Zealand

Telephone..... : /

Fax..... : /

Manufacturer..... : Descartes System Group Inc

Address..... : 105 Trafalgar Street, Floor 2 Floor 2, Nelson, New Zealand

Telephone..... : /

Fax..... : /

Factory..... : Descartes System Group Inc

Address..... : 105 Trafalgar Street, Floor 2 Floor 2, Nelson, New Zealand

Telephone..... : /

Fax..... : /

Test Result**PASS**

The test report merely corresponds to the test sample.

It is not permitted to copy extracts of these test result without the written permission of the test laboratory.



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Revision History

Report Version	Issue Date	Revision Content	Revised By
000	April 11, 2025	Initial Issue	---





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1. GENERAL INFORMATION

1.1. Product Description for Equipment Under Test (EUT)

EUT : Inventory control beacon tag
Test Model : BIN001-2
Ratings : DC 3V By CR2477 Button Battery
Hardware Version : BIN001-2
Software Version : /

Bluetooth :

Frequency Range : 2402MHz~2480MHz
Channel Number : 40 channels for Bluetooth V5.0 (BT LE/BT 2LE)
Channel Spacing : 2MHz for Bluetooth V5.0 (BT LE/BT 2LE)
Modulation Type : GFSK for Bluetooth V5.0 (BT LE/BT 2LE)
Bluetooth Version : V5.0
Antenna Description : Internal Antenna , 3.0dBi(Max)

NFC :

Frequency Range : 13.56MHz
Modulation Type : ASK
Antenna Description : PCB Antenna, 0dBi(Max.)





1.2. Support Equipment List

Manufacturer	Description	Model	Serial Number	Certificate
---	---	---	---	---

1.3. External I/O

I/O Port Description	Quantity	Cable
---	---	---

1.3. Objective

The following report of is prepared on behalf of the **Descartes System Group Inc** in accordance with ETSI EN 300 330 V2.1.1 (2017-02): Short Range Devices (SRD); Radio equipment in the frequency range 9 kHz to 25 MHz and inductive loop systems in the frequency range 9 kHz to 30 MHz; Harmonised Standard covering the essential requirements of article 3.2 of Directive 2014/53/EU.

The objective is to determine compliance with ETSI EN 300 330 V2.1.1 (2017-02).

1.4. Test Methodology

All measurements contained in this report were conducted with ETSI EN 300 330 V2.1.1 (2017-02).





1.5. List Of Measuring Equipment

Item	Equipment	Manufacturer	Model No.	Serial No.	Cal Date	Due Date
1	Signal Analyzer	R&S	SL3	101507	2024-06-06	2025-06-05
2	MXA Signal Analyzer	Agilent	N9020A	MY49100060	2024-10-08	2025-10-07
3	DC Power Supply	Agilent	E3642A	N/A	2024-10-08	2025-10-07
4	Temperature & Humidity Chamber	Baro	/	/	2024-06-12	2025-06-11
5	MXG Vector Signal Generator	Agilent	E4438C	MY42081396(6G)	2024-10-08	2025-10-07
6	ESG Vector Signal Generator	Agilent	E4438C	MY49072627(3G)	2024-06-06	2025-06-05
7	EMI Test Software	Farad	EZ	/	N/A	N/A
8	3m Full Anechoic Chamber	MRDIANZI	FAC-3M	MR009	2022-08-17	2025-08-16
9	Positioning Controller	Max-Full	MF7802BS	MF780208586	N/A	N/A
10	Active Loop Antenna	SCHWARZBECK	FMZB 1519B	00005	2024-07-13	2027-07-12
11	By-log Antenna	SCHWARZBECK	VULB9163	9163-470	2024-08-03	2027-08-02
12	EMI Test Receiver	R&S	ESR 7	101181	2024-06-06	2025-06-05
13	Low-frequency amplifier	SchwarzZBECK	BBV9745	00253	2024-10-08	2025-10-07
14	High-frequency amplifier	JS Denki Pte	PA0118-43	JSPA21009	2024-10-08	2025-10-07



**1.6. Measurement Uncertainty (95% confidence levels, k=2)**

Test Item	Uncertainty
Radio Frequency	0.9×10^{-4}
Total RF Power, Conducted	1.0 dB
RF Power Density, Conducted	1.8 dB
Spurious Emissions, Conducted	1.8 dB
All Emissions, Radiated	3.1 dB
Temperature	0.5°C
Humidity	1 %
DC And Low Frequency Voltages	1 %

1.7. Description of Test Facility

NVLAP Accreditation Code is 600167-0.

FCC Designation Number is CN5024.

CAB identifier is CN0071.

CNAS Registration Number is L4595.

1.8. Description Of Test Mode

The EUT has been tested under typical operating condition.

***Note: Only recorded the worst case in this report.

1.9. Test Environment

Items	Required (IEC 68-1)	Actual
Temperature (°C)	15-35	23.6
Humidity (%RH)	25-75	52.8
Barometric pressure (mbar)	860-1060	950-1000

1.10 .Test Conditions

Conditions	Temperature	Voltage
Normal	21-25°C	DC 3.0V
Low extreme Temperature/Low extreme Voltage (TL/VL);	-20°C	DC 2.7V
Low extreme Temperature/High extreme Voltage (TL/VH);	-20°C	DC 3.3V
High extreme Temperature/Low extreme Voltage (TH/VL);	55°C	DC 2.7V
High extreme Temperature/High extreme Voltage (TH/VH).	55°C	DC 3.3V

Note1: The High Voltage DC 3.3V and Low Voltage DC 2.7V was declared by manufacturer



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2. SYSTEM TEST CONFIGURATION

2.1. Justification

The system was configured for testing in engineering mode.

2.2. EUT Exercise Software

N/A.

2.3. Special Accessories

N/A.

2.4. Block Diagram/Schematics

Please refer to the related document.

2.5. Equipment Modifications

Shenzhen LCS Compliance Testing Laboratory Ltd. has not done any modification on the EUT.

2.6. Configuration of Test Setup

Please refer to the test setup photo.





3. SUMMARY OF TEST RESULTS

ETSI EN 300 330 V2.1.1 (2017-02)

Reference Clause No.	Description Of Test Item	Result
§4.3.1&§4.3.2	Permitted range of operating frequencies	Compliant
§4.3.3	Modulation bandwidth	Compliant
§4.3.4	Transmitter H-field requirements	Compliant
§4.3.5	Transmitter RF carrier current	N/A
§4.3.6	Transmitter radiated E-field	N/A
§4.3.7	Transmitter conducted spurious emissions	N/A
§4.3.8	Transmitter radiated spurious domain emission limits < 30 MHz	Compliant
§4.3.9	Transmitter radiated spurious domain emission limits > 30 MHz	Compliant
§4.3.10	Transmitter Frequency stability	N/A
§4.4.2	Receiver spurious emissions	Compliant
§4.4.3	Adjacent channel selectivity	N/A
§4.4.4	Receiver blocking or desensitization	N/A
Note: 1. N/A means not applicable; 2. Product Class: Class 1.		





4. H-FIELD (RADIATED)

4.1. Definition

In the case of a transmitter with an integral or dedicated antenna, the radiated H-field is defined in the direction of maximum field strength under specified conditions of measurement.

4.2. Limit

Table 2 H-field limits at 10 m

Frequency range (MHz)	H-field strength limit (H_f) dB μ A/m at 10 m or specified in mW e.r.p.
$0,009 \leq f < 0,090$	72 descending 3 dB/oct above 0,03 MHz or according to note 1 (see note 5)
$0,09 \leq f < 0,119$	42
$0,119 \leq f < 0,135$	66 descending 3 dB/oct above 0,119 MHz or according to note 1 (see notes 3 and 5)
$0,135 \leq f < 0,140$	42
$0,140 \leq f < 0,1485$	37.7
$0,1485 \leq f < 30$	-5 (see note 4)
$0,315 \leq f < 0,600$	-5
$3,155 \leq f < 3,400$	13.5
4,234	9 (see note 9)
4,516	7
$7,400 \leq f < 8,800$	9
$10,2 \leq f < 11,00$	9
$12,5 \leq f \leq 20$	-7
$6,765 \leq f \leq 6,795$	42 (see notes 3 and 7)
$26,957 \leq f \leq 27,283$	42 (see notes 3)
$13,410 \leq f \leq 13,553, 13,567 \leq f \leq 13,710$	9 (see note 6)
$13,110 \leq f \leq 13,410, 13,710 \leq f \leq 14,010$	-3,5 (see note 6)
$12,660 \leq f \leq 13,110, 14,010 \leq f \leq 14,460$	-10 (see note 6)
$11,810 \leq f \leq 12,660, 14,460 \leq f \leq 15,310$	-16 (see note 6)
$13,460 \leq f \leq 13,553, 13,567 \leq f \leq 13,660$	27 (see note 6)
$13,360 \leq f \leq 13,460, 13,660 \leq f \leq 13,760$	Linear transition from 27 to -3,5 (see note 6)
$13,110 \leq f \leq 13,360, 13,760 \leq f \leq 14,010$	-3,5 (see note 6)
$12,660 \leq f \leq 13,110, 14,010 \leq f \leq 14,460$	-5 (see note 6)
$13,553 \leq f \leq 13,567$	42 (see note 3) or 60 (see notes 2 and 3)
27,095	42
26,995, 27,045, 27,095, 27,145, 27,195 (see note 8)	100mw



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NOTE 1: For the frequency ranges 9 kHz to 135 kHz, the following additional restrictions apply to limits above 42 dB μ A/m:

- for loop coil antennas with an area $\geq 0,16$ m² this table and table B.1 with the antenna limitations apply;
- for loop coil antennas with an area between 0,05 m² and 0,16 m² table B.1 applies with a correction factor. The limit is: table value + $10 \times \log(\text{area}/0,16 \text{ m}^2)$;
- for loop coil antennas with an area $< 0,05$ m² the limit is 10 dB below table B.1.

NOTE 2: For RFID (incl. NFC) and EAS applications only.

NOTE 3: Spectrum mask limit, see annex I.

NOTE 4: For further information see annex G.

NOTE 5: Limit is 42 dB μ A/m for the following spot frequencies:

60 kHz $\pm$ 250 Hz, 66,6 kHz $\pm$ 750 Hz, 75 kHz $\pm$ 250 Hz, 77,5 kHz $\pm$ 250 Hz, and 129,1 kHz $\pm$ 500 Hz.

NOTE 6: Only in conjunction with spectrum mask, see annex I.

NOTE 7: The frequency range 6,765 MHz - 6,795 MHz is not a harmonised ISM frequency band

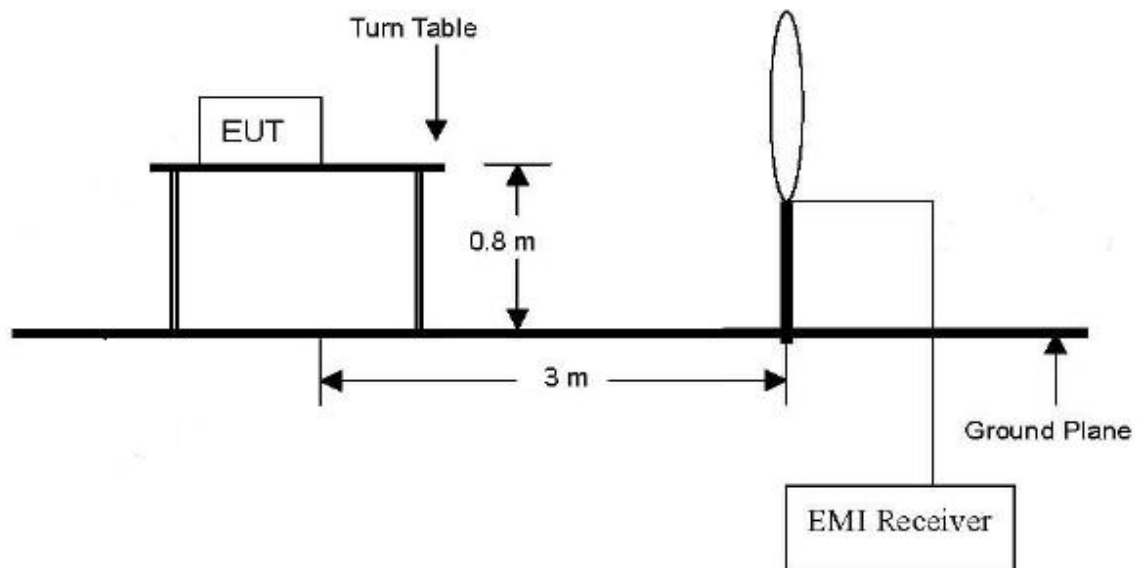
according article 5.138 of the ITU Radio Regulations [i.13].

NOTE 8: Center frequencies for channelized systems by using ≤ 10 kHz bandwidth.

NOTE 9: The limit is valid in the range 984 kHz - 7 484 kHz for Transmitting only on receipt of a

Balise/Eurobalise tele-powering signal from a train.

4.3. Test Setup



4.4. Test Procedure

Please refer to ETSI EN 300 330 V2.1.1 (2017-02) clause 6.2.4 for the measurement method.



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4.5. Test Result

Product	:	Inventory control beacon tag
Test Engineer	:	Jay Luo
Environmental Conditions	:	24.8°C / 53.8%
Conclusion	:	Pass

Test Mode: Tx-13.56MHz

Test Temperature (°C)	Test Voltage (Vdc)	Antenna Polarity	Measure Level At 3m (dBuA/m)	Calculated Factor (dB, C ₃)	Result At 10m (dBuA/m)	Limit At 10m (dBuA/m)
TL	VL	--	39.98	23.5	16.48	60
	VH	--	40.17	23.5	16.67	60
TN	VN	--	39.99	23.5	16.49	60
TH	VL	--	40.06	23.5	16.56	60
	VH	--	40.01	23.5	16.51	60

***Note:

$$H_{10m} = H_{3m} - C_3$$

The correct factor C₃ is equal to or approximately equal to 23.5dB



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5. PERMITTED RANGE OF OPERATING FREQUENCIES

5.1. Definition

The permitted range of operating frequencies is the frequency range over which the equipment is authorized to operate.

5.2. Limit

The permitted range of operating frequencies for intentional emissions shall be entirely within the frequency bands in ETSI EN 300 330 V2.1.1 (2017-02) table 1.

5.3. Test Procedure

Please refer to ETSI EN 300 330 V2.1.1 (2017-02) clause 6.2.2 for the measurement method.

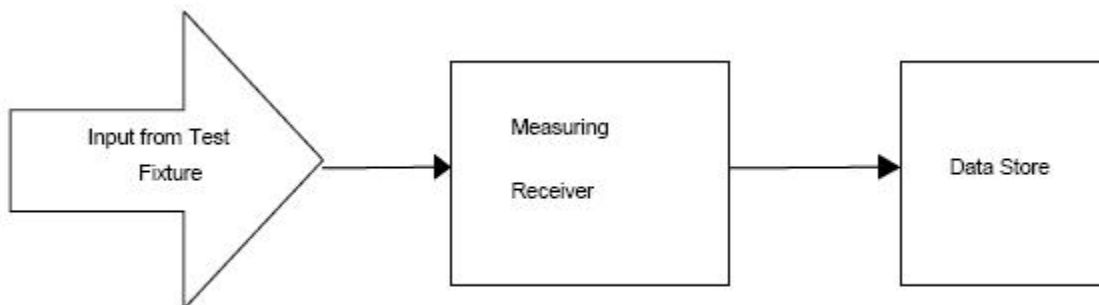


Figure 1: Test set-up for measuring the operating frequency range

5.4. Test Result

Product	:	Inventory control beacon tag
Test Engineer	:	Jay Luo
Environmental Conditions	:	24.8℃/ 53.8%
Conclusion	:	Pass

Test Result (Tx-13.56MHz)				
Test Temperature (℃)	Test Voltage (Vdc)	Lower Frequency (MHz)	Upper Frequency (MHz)	Limit
TL	VL	13.564	13.563	13.553MHz<f<13.567MHz
	VH	13.553	13.566	13.553MHz<f<13.567MHz
TN	VN	13.565	13.567	13.553MHz<f<13.567MHz
TH	VL	13.553	13.567	13.553MHz<f<13.567MHz
	VH	13.555	13.564	13.553MHz<f<13.567MHz



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6. MODULATION BANDWIDTH

6.1. Definition

The modulation bandwidth contains all associated side bands above the following level:

- a) For carrier frequencies below 135 kHz:
 - 23 dB below the carrier, for RFID within the transmitter emission boundary of figure I.1, and for RFID and EAS systems within the transmitter mask of figures I.2, I.3 and I.4, see CISPR 16-1-4 [2] or the appropriate spurious limit as defined in clauses 4.3.7, 4.3.8, 4.3.9.
- b) For carrier frequencies in the range 135 kHz to 30 MHz:
 - 15 dB below the carrier or the appropriate spurious limit as defined in clauses 4.3.7, 4.3.8, 4.3.9.

6.2. Limit

The modulation bandwidth shall be within the assigned frequency band see table 1 or $\pm 7,5\%$ of the carrier frequency whichever is the smallest. For RFID and EAS Systems, the modulation bandwidth shall be within the transmitter emission boundary of figures I.1, I.2, I.3 and I.4. For further information, see CEPT/ERC/REC 70-03 [i.1] or ERC/ECC/CEPT Decisions as implemented through National Radio Interfaces (NRI) and additional NRI as relevant.

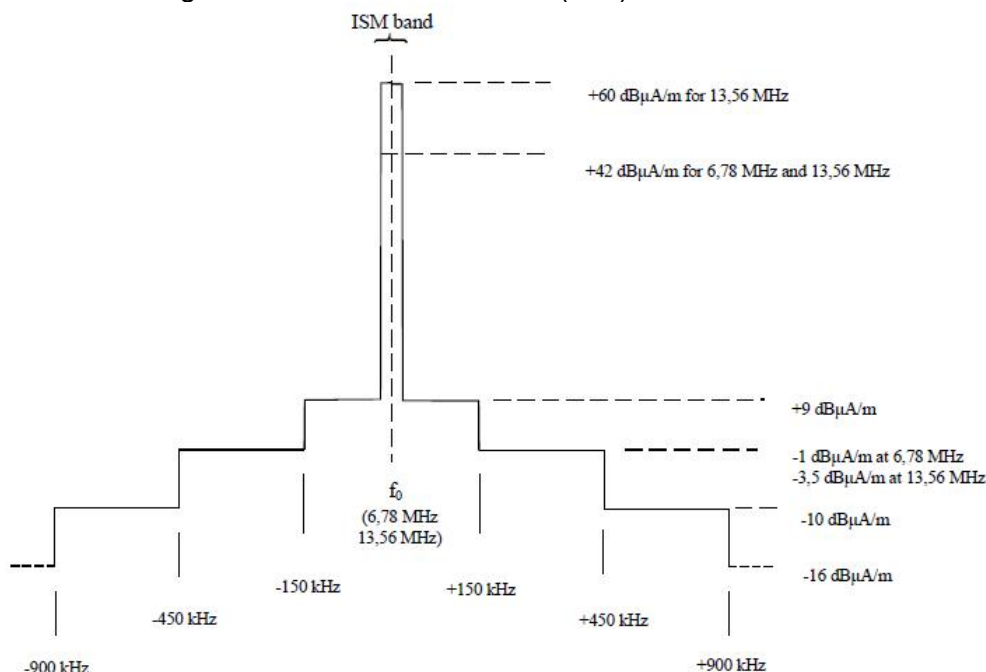


Figure I.2: Spectrum mask limit for RFIDs and EAS in the 6,78 MHz and 13,56 MHz range

6.3. Test Setup

The same as section 4.3

6.4. Test Procedure

Please refer to ETSI EN 300 330 V2.1.1 (2017-02) clause 6.2.3 for the measurement method.

6.5. Test Result

Pass

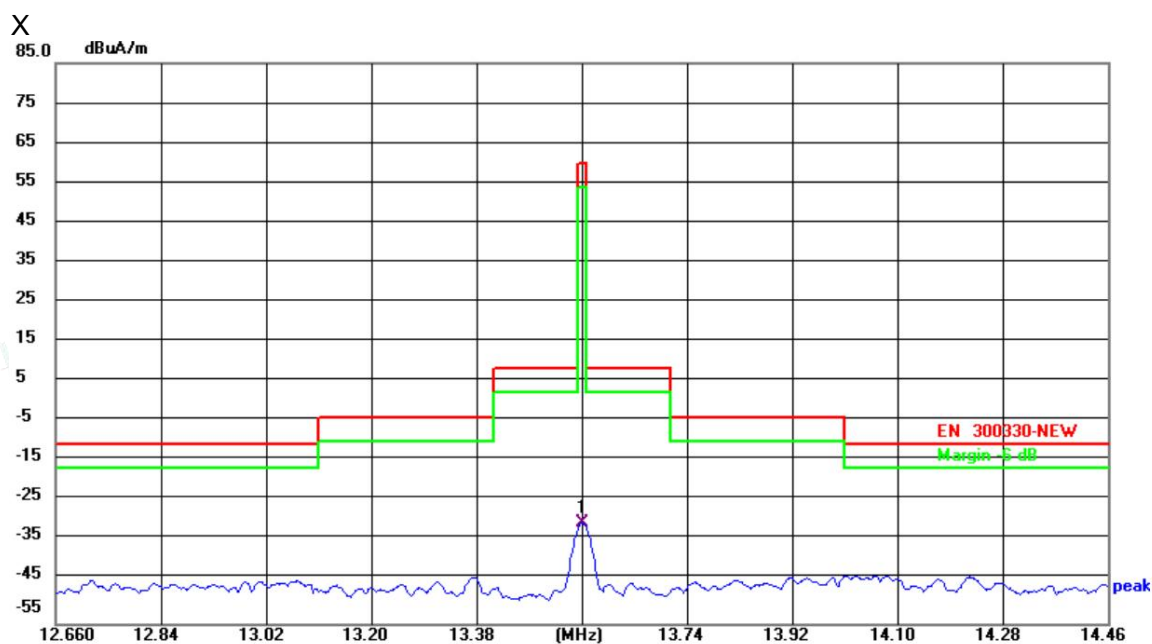
The test data please refer to following page.





Product	Inventory control beacon tag	Test Engineer	Jay Luo
Environmental Conditions	NTNV (Worst mode)		

Note: X, Y, Z direction Both normal and extreme test conditions passed the test and only the worst mode data was represente.



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Level (dBuA/m)	Limit (dBuA/m)	Margin (dB)	Detector
1	13.5600	31.89	-61.57	-29.68	60.00	-89.68	QP



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7. TRANSMITTER SPURIOUS EMISSIONS

7.1. Definition

Spurious domain emission limits are limits on emissions at frequencies other than those of the carrier and sidebands associated (clauses 4.3.2 and 4.3.3) with normal test modulation (clause 5.8).

7.2. Limit

Below 30MHz:

The radiated field strength of the spurious domain emissions below 30 MHz shall not exceed the generated H-field dB μ A/m at 10 m given in table 5.

Table 5

State	Frequency $9 \text{ kHz} \leq f < 10 \text{ MHz}$	Frequency $10 \text{ MHz} \leq f < 30 \text{ MHz}$
Operating	27 dB μ A/m at 9 kHz descending 3 dB/oct	-3,5 dB μ A/m
Standby	5,5 dB μ A/m at 9 kHz descending 3 dB/oct	-25 dB μ A/m

Above 30MHz:

The power of any radiated emission shall not exceed the values given in table 6.

Table 6

State	47 MHz to 74 MHz 87,5 MHz to 118 MHz 174 MHz to 230 MHz 470 MHz to 790 MHz	Other frequencies between 30 MHz to 1 000 MHz
Operating	4 nW	250 nW
Standby	2 nW	2 nW

7.3. Test Procedure

Please refer to ETSI EN 300 330 V2.1.1 (2017-02) clause 6.2.8 & clause 6.2.9 for the measurement method.





7.4. Test Result

Product	:	Inventory control beacon tag
Test Engineer	:	Jay Luo
Environmental Conditions	:	24.8°C / 53.8%
Conclusion	:	Pass

Test Result for Operating Mode (9KHz~30MHz)			
Frequency (MHz)	Measure Level (dBuA/m)	Limit (dBuA/m)	Margin (dB)
--	--	27 dBμA/m at 9 kHz descending 3 dB/oct (9KHz – 10MHz)	--
--	--		--
--	--	-3,5 dBuA/m (10MHz – 30MHz)	--
--	--		--
Test Result for Standby Mode (9KHz~30MHz)			
Frequency (MHz)	Measure Level (dBuA/m)	Limit (dBuA/m)	Margin (dB)
--	--	5.5 dBμA/m at 9 kHz descending 3 dB/oct (9KHz – 10MHz)	--
--	--		--
--	--	-25 dBμA/m (10MHz – 30MHz)	--
--	--		--

Remark:

Data of measurement within this frequency range shown “--” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.

The Test Result for Operating Mode, Tx-13.56MHz (Above 30MHz)					
Frequency (MHz)	Measure Level (dBm)	Limit (dBm)	Margin (dB)	Pol./Phase	Remark
57.33	-68.32	-54.00	-14.32	Horizontal	Peak
335.41	-61.43	-36.00	-25.43	Horizontal	Peak
464.56	-60.77	-36.00	-24.77	Horizontal	Peak
68.07	-70.98	-54.00	-16.98	Vertical	Peak
420.31	-59.20	-36.00	-23.20	Vertical	Peak
916.36	-64.55	-36.00	-28.55	Vertical	Peak

The Test Result for Standby Mode (Above 30MHz)					
Frequency (MHz)	Measure Level (dBm)	Limit (dBm)	Margin (dB)	Pol./Phase	Remark
60.03	-69.32	-57.00	-12.32	Horizontal	Peak
340.57	-62.58	-57.00	-5.58	Horizontal	Peak
459.32	-62.17	-57.00	-5.17	Horizontal	Peak
69.84	-71.95	-57.00	-14.95	Vertical	Peak
420.17	-64.30	-57.00	-7.30	Vertical	Peak
913.65	-64.38	-57.00	-7.38	Vertical	Peak



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8. RECEIVER SPURIOUS EMISSIONS

8.1. Definition

Spurious radiation from receivers are emissions radiated from the antenna, the chassis and case of the receiver. It is specified as the radiated power of a discrete signal.

8.2. Limit

Below 30MHz:

The spurious components below 30 MHz shall not exceed the generated H-field dB μ A/m values at 10 m according to table 8.

Table 8: Receiver spurious radiation limits

Frequency 9 kHz $\leq$ f < 10 MHz	Frequency 10 MHz $\leq$ f < 30 MHz
5,5 dB μ A/m at 9 kHz descending 3 dB/oct	-25 dB μ A/m

Above 30MHz:

The spurious components above 30 MHz measured values shall not exceed 2 nW.

8.4. Test Procedure

Please refer to ETSI EN 300 330 V2.1.1 (2017-02) clause 6.3.1 for the measurement method.

8.5. Test Result

Product	:	Inventory control beacon tag
Test Engineer	:	Jay Luo
Environmental Conditions	:	24.8°C / 53.8%
Conclusion	:	Pass

Test Result for Receiving Mode (9KHz~30MHz)			
Frequency (MHz)	Measure Level (dB μ A/m)	Limit (dB μ A/m)	Margin (dB)
--	--	5,5 dB μ A/m at 9 kHz descending 3 dB/oct (9KHz~10MHz)	--
--	--		--
--	--	-25 dB μ A/m (10MHz – 30MHz)	--
--	--		--
--	--		--

Remark:

Data of measurement within this frequency range shown "--" in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured. Measured in frequency range from 9k~10th harmonic or 1GHz (which is greater).

The Test Result for Receiving Mode, RX-13.56MHz (Above 30MHz)					
Frequency (MHz)	Measure Level (dBm)	Limit (dBm)	Margin (dB)	Pol./Phase	Remark
59.23	-67.09	-57.00	-10.09	Horizontal	Peak
339.85	-65.38	-57.00	-8.38	Horizontal	Peak
464.52	-65.51	-57.00	-8.51	Horizontal	Peak
69.31	-66.16	-57.00	-9.16	Vertical	Peak
423.50	-62.21	-57.00	-5.21	Vertical	Peak
914.49	-61.35	-57.00	-4.35	Vertical	Peak



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9. PHOTOGRAPHS OF TEST SETUP

Please refer to separated files Appendix D for Photographs of Test Setup_NFC.

10. PHOTOGRAPHS OF THE EUT

Please refer to separated files Appendix C for Photographs of The EUT.

-----THE END OF REPORT-----



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