



RF TEST REPORT

Report No.: 20240517G07667X-W3

Product Name: RCP-P1

Model No. : HSA-20NP-PB, HSA-20NP-PA

FCC ID: 2AHPN-HSA-20NP-PB

IC: 6434C-HSA20NPPB

Applicant: Harman International Industries Incorporated

Address: 30001, Cabot Drive, Novi, MI 48377, USA

Dates of Testing: 05/08/2024 - 05/16/2024

Issued by: CCIC Southern Testing Co., Ltd.

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Test Report

Product Name : RCP-P1

Brand Name..... : Ride Command Plus

Applicant : Harman International Industries Incorporated

Applicant Address : 30001, Cabot Drive, Novi, MI 48377, USA

Manufacturer : Harman International Industries Incorporated

Manufacturer Address..... : 30001, Cabot Drive, Novi, MI 48377, USA

Test Standards : 47 CFR Part 2/22/24/27
RSS-Gen, Issue 5: Feb 2021
RSS-132, Issue 4: Jan 2023
RSS-133, Issue 6: Jan 2018
RSS-139-Issue 4: Sep 2022

Test Result..... : Pass

Tested by : Kim Li 2024.05.17
Kim Li, Test Engineer

Reviewed by..... : Chris You 2024.05.17
Chris You, Senior Engineer

Approved by..... : Yang Fan 2024.05.17
Yang Fan, Manager



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Change History		
Issue	Date	Reason for change
1.0	2024.05.17	First edition



1. GENERAL INFORMATION

1.1 EUT Description

EUT Name	RCP-P1
EUT supports Radios application	WCDMA/HSPA
Hardware Version	V1.0
Software Version	N75NA_POPLS_R6.2.4
Frequency Range	WCDMA 850MHz Tx: 826.4 - 846.6MHz (at intervals of 200kHz); Rx: 871.4 - 891.6MHz (at intervals of 200kHz) WCDMA 1900MHz Tx: 1852.4 - 1907.6MHz (at intervals of 200kHz); Rx: 1932.4 - 1987.6MHz (at intervals of 200kHz) WCDMA 1700MHz Tx: 1712.4 - 1752.6MHz (at intervals of 200kHz); Rx: 2112.4 - 2152.6MHz (at intervals of 200kHz)
Maximum Output Power to Antenna	WCDMA 850: 21.87dBm WCDMA 1900: 22.31dBm WCDMA 1700: 21.95dBm
Type of Modulation	WCDMA: QPSK(Uplink) HSDPA/DC-HSDPA: QPSK HSUPA: QPSK HSPA+: 16QAM(uplink is not supported) DC-HSDPA: 64QAM
Antenna Gain	WCDMA 850: 1.0 dBi WCDMA 1900: 1.0 dBi WCDMA 1700: 1.0 dBi
Antenna Type	Internal Antenna
Power supply	DC 9V-16V

Note: This amend report refer to original SET2021-17306. Some PCB board materials have been replaced, and the parameters and functions of the replaced materials are the same as those of the original materials. Retest the Radiated Spurious Emissions items.

1.2 Maximum ERP/EIRP, Frequency Tolerance, and Emission Designator

FCC				
System	Type of Modulation	Emission Designator	Frequency Tolerance (ppm)	Maximum ERP/EIRP(W)
WCDMA 850 RMC 12.2Kbps	QPSK	4M17F9W	0.0075	0.118
WCDMA 1900 RMC 12.2Kbps	QPSK	4M13F9W	0.0069	0.214
WCDMA 1700 RMC 12.2Kbps	QPSK	4M13F9W	0.0072	0.197

IC				
System	Type of Modulation	Emission Designator	Frequency Tolerance (ppm)	Maximum EIRP(W)
WCDMA 850 RMC 12.2Kbps	QPSK	4M17F9W	0.0075	0.194
WCDMA 1900 RMC 12.2Kbps	QPSK	4M13F9W	0.0069	0.214
WCDMA 1700 RMC 12.2Kbps	QPSK	4M13F9W	0.0072	0.197



1.3 Test Standards and Results

The purpose of the report is to conduct testing according to the following FCC/IC certification standards:

1. 47 CFR Part 2, 22(H), 24(E), 27(L).
2. ANSI C63.26:2015.
3. FCC KDB 971168 D01 Power Meas License Digital Systems v03r01.
4. RSS-GEN Issue 5.
5. RSS-132 Issue 3, RSS-133 Issue 6, RSS-139 Issue 3.

Test detailed items/section required by FCC/IC rules and results are as below:

No.	Section	Section	Description	Limit	Result
	FCC	IC			
1	2.1053	RSS-GEN,6.13	Radiated Spurious Emissions	$< 43 + 10 \log_{10} (P[\text{Watts}])$	PASS
	22.917 (a)	RSS-132,5.5			
	24.238 (a)	RSS-133,6.5			
	27.53 (h)	RSS-139,6.6			

Remark:

1. All test items were verified and recorded according to the standards and without any deviation during the test.
2. This EUT has also been tested and complied with the requirements of FCC Part 15 Subpart B and ICES-003 Issue 7 October 2020, recorded in a separate test report.

1.4 Test Configuration of Equipment under Test

Antenna port conducted and radiated test items were performed according to KDB 971168 D01 Power Meas. License Digital Systems v03r01 with maximum output power.

Radiated measurements were performed with rotating EUT in different three orthogonal test planes to find the maximum emission.

Radiated emissions were investigated as following frequency range:

1. 30 MHz to 9000 MHz for WCDMA Band V.
2. 30 MHz to 20000 MHz for WCDMA Band II.
3. 30 MHz to 18000 MHz for WCDMA Band IV.

All modes and data rates and positions were investigated.

Test modes are chosen to be reported as the worst case configuration below:

Test Modes		
Band	Radiated TCs	Conducted TCs
WCDMA Band V	RMC 12.2Kbps Link	RMC 12.2Kbps Link
WCDMA Band II	RMC 12.2Kbps Link	RMC 12.2Kbps Link
WCDMA Band IV	RMC 12.2Kbps Link	RMC 12.2Kbps Link

Note: The maximum power levels are chosen to test as the worst case configuration as follows:

RMC 12.2Kbps mode for WCDMA band V,

RMC 12.2Kbps mode for WCDMA band II,

RMC 12.2Kbps mode for WCDMA band IV, only these modes were used for all tests.

1.5 Measurement Results Explanation Example

For all conducted test items:

The offset level is set in the spectrum analyzer to compensate the RF cable loss and attenuator factor between EUT conducted output port and spectrum analyzer. With the offset compensation, the spectrum analyzer reading level is exactly the EUT RF output level.

The spectrum analyzer offset is derived from RF cable loss and attenuator factor.

Offset = RF cable loss + Power Splitter + attenuator factor..

Following shows an offset computation example with cable loss 1dB, 3dB Power Splitter, 10dB attenuator.

Example:

$$\begin{aligned}\text{Offset (dB)} &= \text{RF cable loss(dB)} + \text{Power Splitter(dB)} + \text{attenuator factor(dB)} \\ &= 1 + 3 + 10 = 14 \text{ (dB)}\end{aligned}$$



1.6 Facilities and Accreditations

1.6.1 Test Facilities

FCC-Registration No.: 406086

CCIC Southern Testing Co., Ltd EMC Laboratory has been registered and fully described in a report filed with the FCC (Federal Communications Commission). The acceptance letter from the FCC is maintained in our files. Designation Number: CN1283, valid time is until June 30, 2025.

ISED Registration: 11185A-1

CCIC Southern Testing Co., Ltd. EMC Laboratory has been registered by Certification and Engineering Bureau of Industry Canada for the performance of radiated measurements with Registration No. 11185A-1 on Aug. 04, 2016, valid time is until June 30, 2025.

A2LA Code: 5721.01

CCIC-SET is a third party testing organization accredited by A2LA according to ISO/IEC 17025.

1.6.2 Test Environment Conditions

Temperature (°C):	15°C - 35°C
Relative Humidity (%):	30% -60%
Atmospheric Pressure (kPa):	86KPa-106KPa

During the measurement, the environmental conditions were within the listed ranges:

2. TEST REQUIREMENTS

2.1 Radiated Spurious Emissions

2.1.1 Requirement

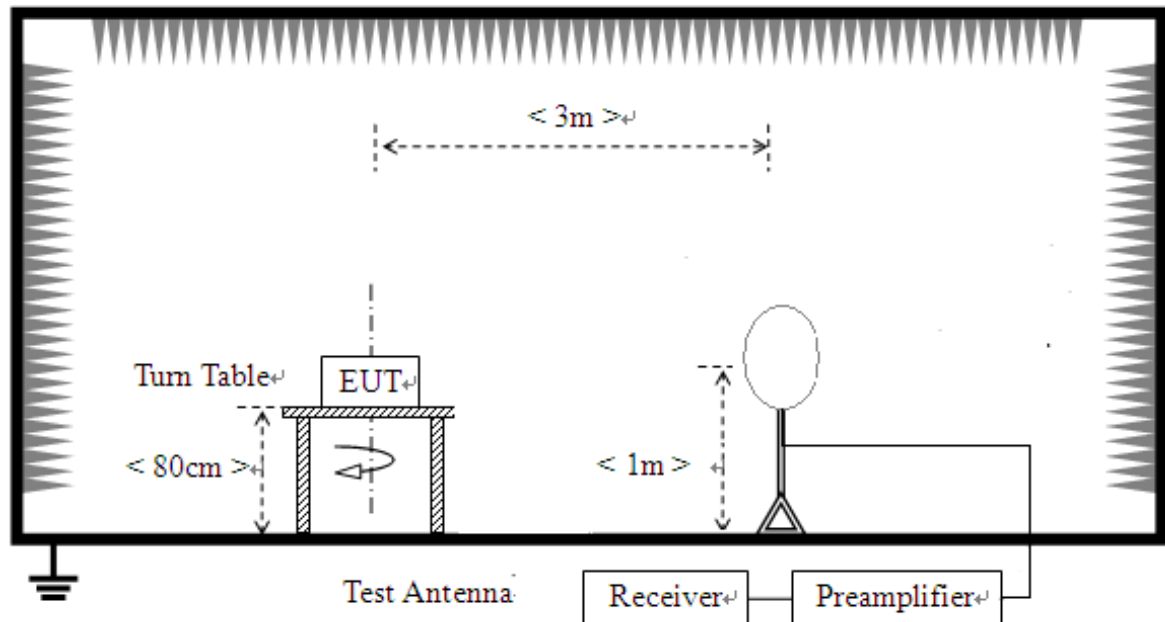
The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitter power (P) by a factor of at least $43 + 10 \log (P)$ dB. The spectrum is scanned from 30 MHz up to a frequency including its 10th harmonic.

2.1.2 Measuring Instruments

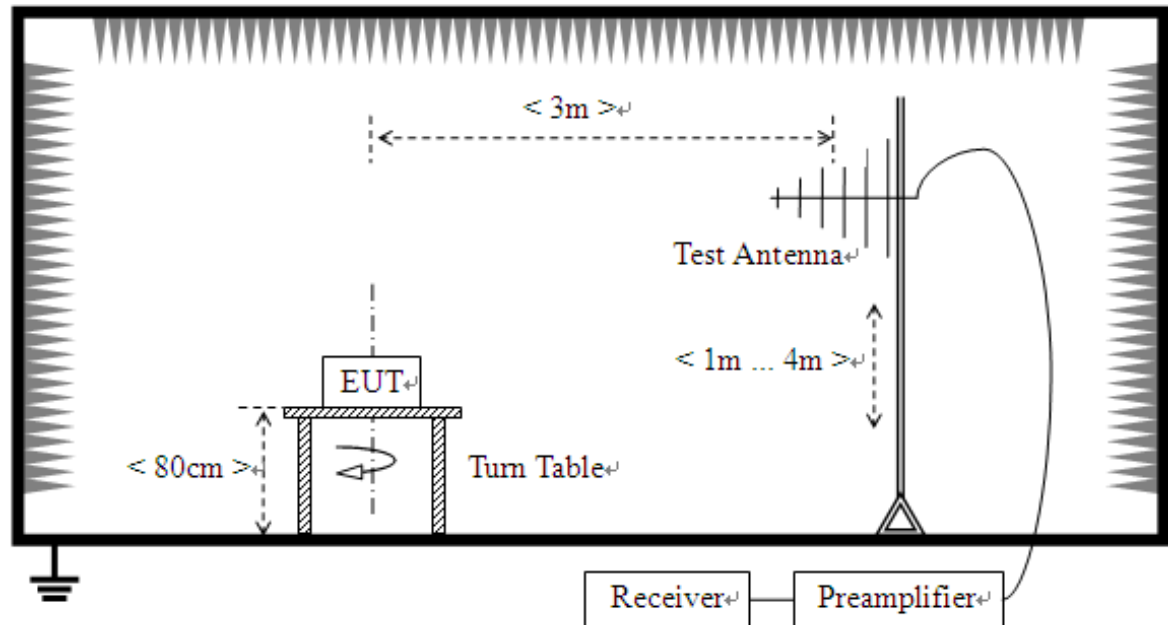
The measuring equipment is listed in the section 3 of this test report.

2.1.3 Test Setup

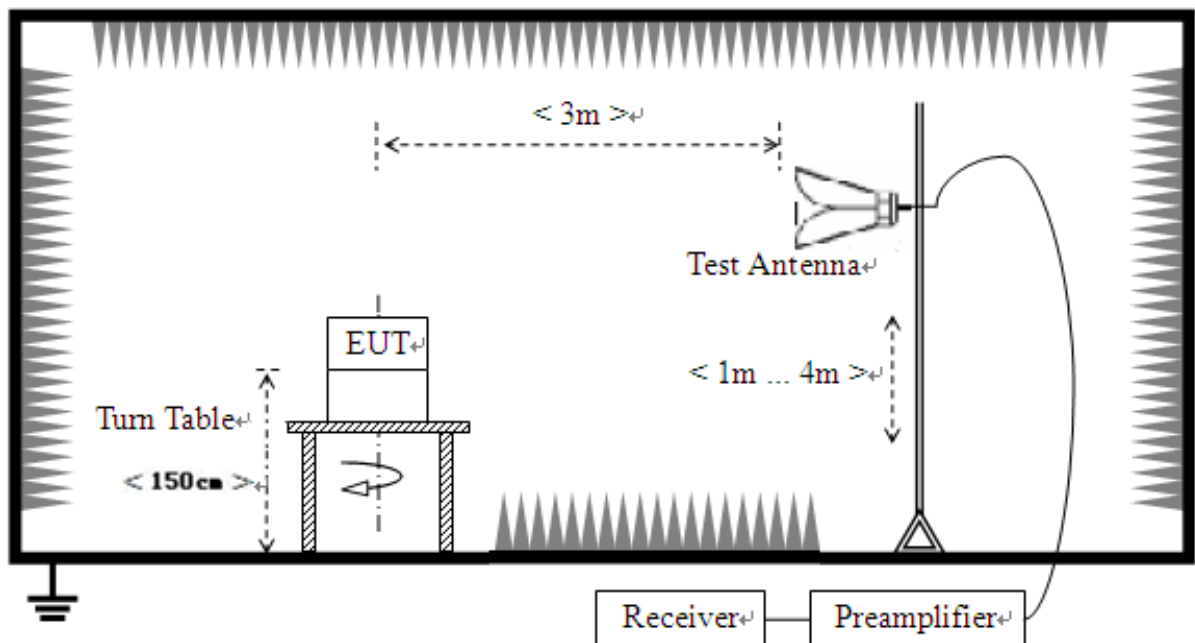
For radiated emissions from 9 kHz to 30MHz



For radiated emissions from 30MHz to 1GHz



For radiated emissions above 1GHz



2.1.4 Test Procedures

1. The testing follows FCC KDB 971168 D01 v03r01 Section 5.8.
2. The EUT was placed on a rotatable wooden table 0.8/1.5 meters above the ground.
3. The EUT was set 3 meters from the receiving antenna, which was mounted on the antenna tower.
4. The table was rotated 360 degrees to determine the position of the highest spurious emission.
5. The height of the receiving antenna is varied between one meter and four meters to search for the maximum spurious emission for both horizontal and vertical polarizations.
6. Make the measurement with the spectrum analyzer's RBW = 1MHz, VBW = 3MHz, taking record of maximum spurious emission.
7. A horn antenna was substituted in place of the EUT and was driven by a signal generator.
8. Tune the output power of signal generator to the same emission level with EUT maximum spurious emission.
9. Taking the record of output power at antenna port.
10. Repeat step 7 to step 8 for another polarization.
11. The RF fundamental frequency should be excluded against the limit line in the operating frequency band.
12. The limit line is derived from $43 + 10\log(P)$ dB below the transmitter power P(Watts)
 $= P(W) - [43 + 10\log(P)]$ (dB)
 $= [30 + 10\log(P)]$ (dBm) - $[43 + 10\log(P)]$ (dB)
 $= -13\text{dBm}$.
13. This device employs GMSK technology with GSM and GSM capabilities. All configurations were investigated and the worst case emissions were found in GSM mode.
14. This device employs UMTS technology with WCDMA (AMR/RMC), HSDPA, HSUPA capabilities. All configurations were investigated and the worst case UMTS emissions were found in RMC WCDMA mode at 12.2Kbps.
15. This unit was tested with its standard battery.
16. All Spurious Emission tests were performed in X, Y, Z axis direction and low, middle, high channel. And only the worst axis test condition was recorded in this test report.
17. The spectrum is measured from 9 KHz to the 10th harmonic of the fundamental frequency of the transmitter using CISPR quasi peak detector below 1GHz. The worst case emissions



are reported however emissions whose levels were not within 20dB of the respective limits were not reported.

18. For 9KHz to 30MHz: the amplitude of spurious emissions are attenuated by more than 20dB below the permissible value has no need to be reported.

2.1.5 Test Results of Radiated Spurious Emissions

Note: 1. (Absolute)Level=Reading Level + Factor

Worst-Case test data provide as below:

WCDMA 850 Middle Channel: 30MHz~10GHz							
NO.	Freq. [MHz]	Reading [dBm]	Level [dBm]	Limit [dBm]	Margin [dB]	Factor [dB]	Polarity
1	31.94	-96.36	-72.83	-13.00	59.83	23.53	Horizontal
2	67.36	-98.01	-78.66	-13.00	65.66	19.35	Horizontal
3	501.17	-105.02	-72.38	-13.00	59.38	32.64	Horizontal
4	2908.70	-57.89	-51.86	-13.00	38.86	6.03	Horizontal
5	4873.26	-60.56	-45.82	-13.00	32.82	14.75	Horizontal
6	7639.71	-60.17	-40.67	-13.00	27.67	19.50	Horizontal
NO.	Freq. [MHz]	Reading [dBm]	Level [dBm]	Limit [dBm]	Margin [dB]	Factor [dB]	Polarity
1	41.65	-98.31	-78.38	-13.00	65.38	19.93	Vertical
2	94.54	-103.64	-79.82	-13.00	66.82	23.82	Vertical
3	529.80	-104.15	-72.99	-13.00	59.99	31.16	Vertical
4	3134.41	-57.57	-50.37	-13.00	37.37	7.20	Vertical
5	5069.19	-59.56	-44.94	-13.00	31.94	14.62	Vertical
6	7522.98	-59.73	-40.07	-13.00	27.07	19.66	Vertical



WCDMA 1900 Middle Channel: 30MHz~20GHz							
NO.	Freq. [MHz]	Reading [dBm]	Level [dBm]	Limit [dBm]	Margin [dB]	Factor [dB]	Polarity
1	31.94	-95.57	-72.04	-13.00	59.04	23.53	Horizontal
2	67.85	-94.66	-75.30	-13.00	62.30	19.36	Horizontal
3	508.45	-104.27	-71.67	-13.00	58.67	32.60	Horizontal
4	4809.24	-59.23	-44.49	-13.00	31.49	14.74	Horizontal
5	11039.8	-61.16	-38.39	-13.00	25.39	22.77	Horizontal
6	17407.1	-65.78	-36.52	-13.00	23.52	29.26	Horizontal
NO.	Freq. [MHz]	Reading [dBm]	Level [dBm]	Limit [dBm]	Margin [dB]	Factor [dB]	Polarity
1	41.65	-95.48	-75.55	-13.00	62.55	19.93	Vertical
2	66.39	-96.71	-75.92	-13.00	62.92	20.79	Vertical
3	663.73	-104.19	-70.95	-13.00	57.95	33.24	Vertical
4	3176.58	-57.37	-50.13	-13.00	37.13	7.24	Vertical
5	4801.72	-58.98	-44.25	-13.00	31.25	14.73	Vertical
6	10779.9	-60.97	-38.36	-13.00	25.36	22.61	Vertical

WCDMA 1700 Middle Channel: 30MHz~18GHz							
NO.	Freq. [MHz]	Reading [dBm]	Level [dBm]	Limit [dBm]	Margin [dB]	Factor [dB]	Polarity
1	31.94	-96.84	-73.31	-13.00	60.31	23.53	Horizontal
2	46.50	-95.24	-75.19	-13.00	62.19	20.05	Horizontal
3	683.62	-104.59	-70.00	-13.00	57.00	34.59	Horizontal
4	2392.67	-56.57	-53.38	-13.00	40.38	3.19	Horizontal
5	4864.37	-58.99	-44.25	-13.00	31.25	14.74	Horizontal
6	17394.4	-67.05	-37.71	-13.00	24.71	29.34	Horizontal
NO.	Freq. [MHz]	Reading [dBm]	Level [dBm]	Limit [dBm]	Margin [dB]	Factor [dB]	Polarity
1	31.94	-94.43	-73.16	-13.00	60.16	21.27	Vertical
2	99.87	-102.72	-78.29	-13.00	65.29	24.43	Vertical
3	762.72	-104.51	-68.63	-13.00	55.63	35.88	Vertical
4	3518.55	-56.77	-49.77	-13.00	36.77	7.00	Vertical
5	7576.45	-60.22	-40.59	-13.00	27.59	19.63	Vertical
6	17384.1	-66.43	-37.15	-13.00	24.15	29.28	Vertical



3. LIST OF MEASURING EQUIPMENT

Item	Test Equipment	Manufacturer	Model No.	Serial No.	Cal Date	Due Date
1	EMI Test Receiver	ROHDE&SCHWARZ	ESW26	A180502935	2023.06.08	2024.06.07
2	5M Anechoic Chamber	Albatross	SAC-5MAC 12.8x6.8x6.4m	A0304210	2022.06.09	2026.06.08
3	Loop Antenna	Schwarz beck	HFH2-Z2	A0304220	2022.05.02	2025.05.01
4	Broadband antenna (30MHz~1GHz)	R&S	HL562	A0304224	2023.06.08	2026.06.07
5	EMI Horn Ant. (1-18G)	ETC	MCTD-1209	A150402241	2023.05.16	2026.05.15
6	Horn antenna (18GHz~26.5GHz)	AR	AT4510	A0804450	2023.06.01	2026.05.31
7	Amplifier 30M~1GHz	MILMEGA	80RF1000-1000	A140101634	2023.10.20	2024.10.19
8	Amplifier 1G~18GHz	MILMEGA	AS0104R-800/400	A160302517	2023.10.20	2024.10.19
9	Wideband Radio Communication tester	R&S	CMW500	A130101034	2023.07.13	2024.07.12



4. UNCERTAINTY OF EVALUATION

The measurement uncertainties shown below were calculated in accordance with the requirements of ANSI C63.10-2013. All the measurement uncertainty value were shown with a coverage $K=2$ to indicate 95% level of confidence . The measurement data show herein meets or exceeds the CISPR measurement uncertainty values specified in CISPR 16-4-2 and can be compared directly to specified limit to determine compliance.

Uncertainty of Conducted Emission Measurement (150kHz~30MHz)

Measuring Uncertainty for a level of confidence of 95%($U=2U_c(y)$)	2.8dB
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Uncertainty of Radiated Emission Measurement (9kHz~30MHz)

Measuring Uncertainty for a level of confidence of 95%($U=2U_c(y)$)	3.5dB
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Uncertainty of Radiated Emission Measurement (30MHz~1GHz)

Measuring Uncertainty for a level of confidence of 95%($U=2U_c(y)$)	3.91dB
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Uncertainty of Radiated Emission Measurement (1GHz~18GHz)

Measuring Uncertainty for a level of confidence of 95%($U=2U_c(y)$)	4.5dB
--	-------

Uncertainty of Radiated Emission Measurement (18GHz~40GHz)

Measuring Uncertainty for a level of confidence of 95%($U=2U_c(y)$)	4.9dB
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Uncertainty of RF Conducted Measurement (9kHz~40GHz)

Measuring Uncertainty for a level of confidence of 95%($U=2U_c(y)$)	1.2dB
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**** END OF REPORT ****