FCC Test Report

APPLICANT	:	**Tangerine Innovation Holding, Inc.**
EQUIPMENT	:	**Jido Sense**
BRAND NAME	:	**Tangerine**
MODEL NAME	:	**TNGJSV06**
FCC ID	:	**2AXZETNGJSV06**
STANDARD	:	**47 CFR Part 15 Subpart B**
CLASSIFICATION	:	**Certification**

The product was received on Sep. 12, 2020 and testing was completed on Oct. 26, 2020. We, Sporton International (Kunshan) Inc., would like to declare that the tested sample has been evaluated in accordance with the test procedures given in ANSI C63.4-2014 and has been in compliance with the applicable technical standards.

The test results in this report apply exclusively to the tested model / sample. Without written approval of Sporton International (Kunshan) Inc., the test report shall not be reproduced except in full.

Jason Jia

Reviewed by: Jason Jia / Supervisor

James Huang

Approved by: James Huang / Manager

ACCREDITED Cert #5145.02

Sporton International (Kunshan) Inc.
No. 1098, Pengxi North Road, Kunshan Economic Development Zone Jiangsu Province 215300
People's Republic of China

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REVISION HISTORY

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FC091201	Rev. 01	Initial issue of report	Nov. 24, 2020

SUMMARY OF TEST RESULT

Report Section	FCC Rule	Description	Limit	Result	Remark
3.1	15.109	Radiated Emission	< 15.109 limits	PASS	Under limit 4.98 dB at 692.51 MHz

Declaration of Conformity:
The test results with all measurement uncertainty excluded are presented in accordance with the regulation limits or requirements declared by manufacturers.
Comments and Explanations:
The declared of product specification for EUT presented in the report are provided by the manufacturer, and the manufacturer takes all the responsibilities for the accuracy of product specification.

1. General Description

1.1. Applicant

Tangerine Innovation Holding, Inc.
325 Sharon Park Dr 116, Menlo Park CA 94025, United States

1.2. Manufacturer

Tangerine Innovation Holding, Inc.
325 Sharon Park Dr 116, Menlo Park CA 94025, United States

1.3. Product Feature of Equipment Under Test

Product Feature	
Equipment	Jido Sense
Brand Name	Tangerine
Model Name	TNGJSV06
FCC ID	2AXZETNGJSV06
EUT supports Radios application	WCDMA/LTE/GNSS WLAN 2.4GHz 802.11b/g/n HT20/HT40 Bluetooth LE
IMEI Code	Radiation: Sample 1: 869091031285140 Sample 2: 869061031258105
HW Version	V6.2
SW Version	2.86
EUT Stage	Production Unit

Remark: The above EUT's information was declared by manufacturer. Please refer to the specifications or user's manual for more detailed description.

1.4. Product Specification of Equipment Under Test

Standards-related Product Specification	
Tx Frequency	WCDMA Band V: 826.4 MHz ~ 846.6 MHz WCDMA Band II: 1852.4 MHz ~ 1907.6 MHz LTE Band 2 : 1850.7 MHz ~ 1909.3 MHz LTE Band 4 : 1710.7 MHz ~ 1754.3 MHz LTE Band 5 : 824.7 MHz ~ 848.3 MHz 802.11b/g/n: 2412 MHz ~ 2462 MHz Bluetooth: 2402 MHz ~ 2480 MHz
Rx Frequency	WCDMA Band V: 871.4 MHz ~ 891.6 MHz WCDMA Band II: 1932.4 MHz ~ 1987.6 MHz LTE Band 2 : 1930.7 MHz ~ 1989.3 MHz LTE Band 4 : 2110.7 MHz ~ 2154.3 MHz LTE Band 5 : 869.7 MHz ~ 893.3 MHz 802.11b/g/n: 2412 MHz ~ 2462 MHz Bluetooth: 2402 MHz ~ 2480 MHz GNSS : 1559 MHz ~ 1610 MHz
Antenna Type	WWAN : Quad Band Flex Antenna WLAN : Dipole Antenna Bluetooth : Dipole Antenna GNSS: Patch Antenna
Type of Modulation	WCDMA : BPSK HSDPA/DC-HSDPA : QPSK HSUPA : QPSK HSPA+ : 16QAM(Uplink is not supported) DC-HSDPA : 64QAM LTE: QPSK / 16QAM / 64QAM 802.11b : DSSS (DBPSK / DQPSK / CCK) 802.11g/n : OFDM (BPSK / QPSK / 16QAM / 64QAM) Bluetooth LE : GFSK GNSS : BPSK

Note : GNSS = GLONASS + GPS

1.5. Modification of EUT

No modifications are made to the EUT during all test items.

1.6. Test Location

Sporton International (Kunshan) Inc. is accredited to ISO/IEC 17025:2017 by American Association for Laboratory Accreditation with Certificate Number 5145.02.

Test Firm	Sporton International (Kunshan) Inc.		
Test Site Location	No. 1098, Pengxi North Road, Kunshan Economic Development Zone Jiangsu Province 215300 People's Republic of China TEL : +86-512-57900158 FAX : +86-512-57900958		
Test Site No.	**Sporton Site No.**	**FCC Designation No.**	**FCC Test Firm Registration No.**
	03CH02-KS	CN1257	314309

1.7. Test Software

Item	Site	Manufacture	Name	Version
1.	03CH02-KS	AUDIX	E3	6.2009-8-24a

1.8. Applicable Standards

According to the specifications of the manufacturer, the EUT must comply with the requirements of the following standards:

- 47 CFR Part 15 Subpart B
- ANSI C63.4-2014

Remark: All test items were verified and recorded according to the standards and without any deviation during the test.

2. Test Configuration of Equipment Under Test

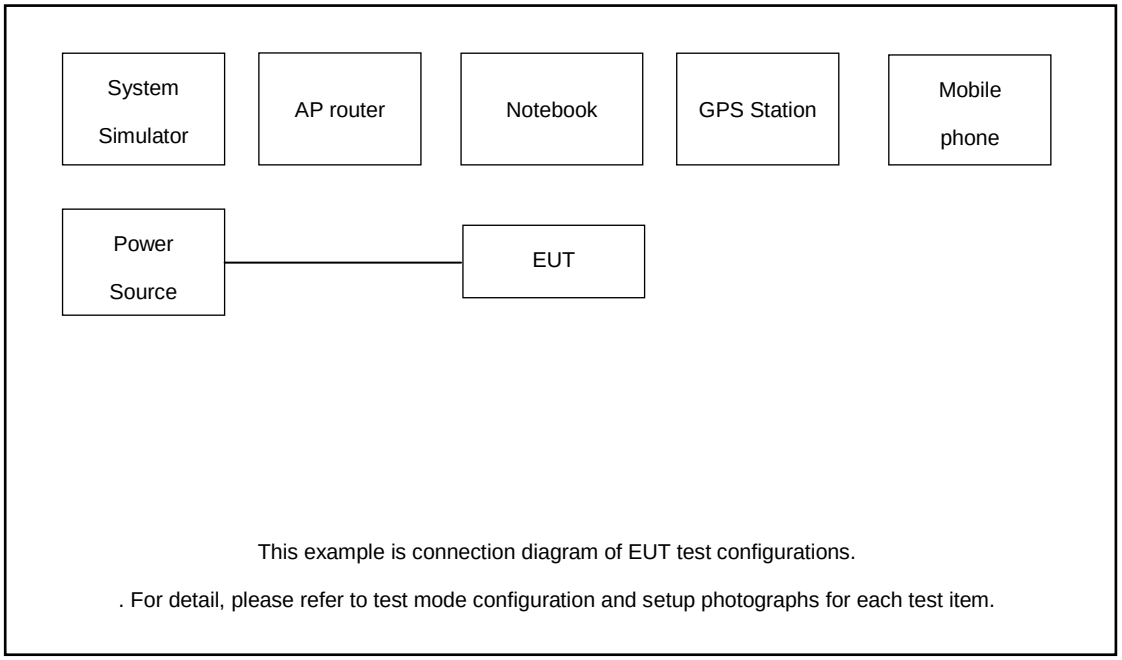
2.1. Test Mode

The EUT has been associated with peripherals pursuant to ANSI C63.4-2014 and configuration operated in a manner tended to maximize its emission characteristics in a typical application.

Frequency range investigated: radiation emission (30MHz to the 5th harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower).

Test Items	Function Type
Radiated Emissions	Mode 1: WCDMA Band 5 Rx(Low) + Bluetooth Idle + WLAN Idle(2.4G) + DC 12V + GNSS Rx for Sample 1 Mode 2: LTE Band 5 Rx(Low) + Bluetooth Idle + WLAN Idle(2.4G) + DC 12V + GNSS Rx for Sample 1 Mode 3: WCDMA Band 5 Rx(Low) + Bluetooth Idle + WLAN Idle(2.4G) + DC 12V + GNSS Rx for Sample 2
Remark: **1.** The worst case of RE is mode 3; only the test data of this mode is reported. **2.** Pre-scanned Low channel for WCDMA Band V/LTE Band 5, the worst channel was recorded in this report. **3.** Sample 1 without e-SIM; Sample 2 with e-SIM.	

2.2. Connection Diagram of Test System



The EUT has been associated with peripherals pursuant to ANSI C63.4-2014 and configuration operated in a manner tended to maximize its emission characteristics in a typical application

2.3. Support Unit used in test configuration and system

Item	Equipment	Trade Name	Model Name	FCC ID	Data Cable	Power Cord
1.	WLAN AP	TP-Link	TL-WDR5600	N/A	N/A	Unshielded,1.8m
2.	DC Power Supply	GW	GPC-60300	N/A	N/A	Unshielded,1.8m
3.	Mobile phone	Huawei	N/A	N/A	N/A	N/A
4.	Signal Generator	R&S	SMBV100A	N/A	N/A	Unshielded,1.8m
5.	LTE Base Station	Anritsu	MT8820C	N/A	N/A	Unshielded,1.8m

2.4. EUT Operation Test Setup

The EUT was in WCDMA/LTE idle mode during the testing. The EUT was synchronized to the BCCH, and is in continuous receiving mode by setting system simulator's paging reorganization.

At the same time, the EUT was attached to the Mobile phone or WLAN AP, and the following programs installed in the EUT were programmed during the test.

1. Data application is transferred between notebook and EUT via USB cable.
2. Turn on GNSS function to make the EUT receive continuous signals from GNSS station.

3. Test Result

3.1. Test of Radiated Emission Measurement

3.1.1. Limit of Radiated Emission

The emissions from an unintentional radiator shall not exceed the field strength levels specified in the following table:

<Class B Limit>

Frequency (MHz)	Field Strength (microvolts/meter)	Measurement Distance (meters)
30 – 88	100	3
88 – 216	150	3
216 - 960	200	3
Above 960	500	3

3.1.2. Measuring Instruments

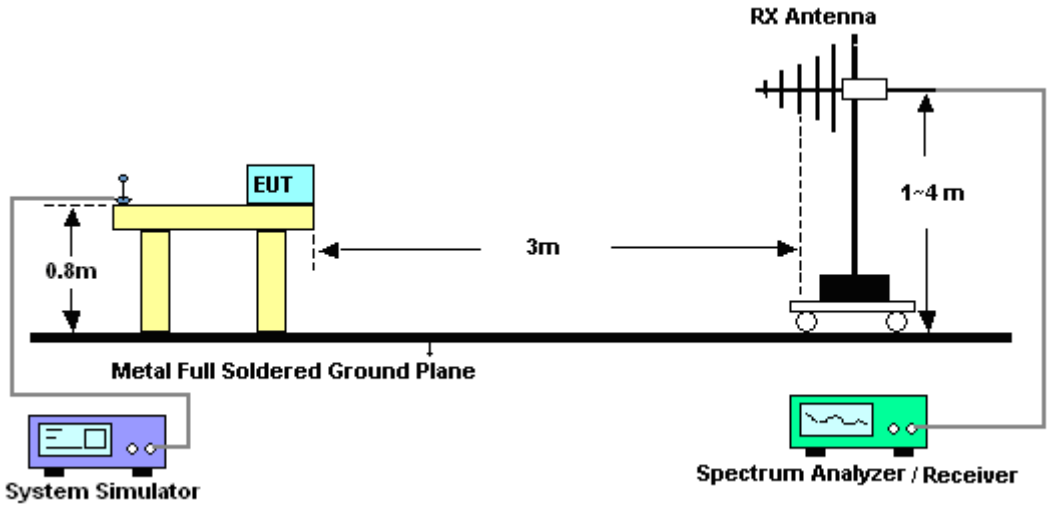
The measuring equipment is listed in the section 4 of this test report.

3.1.3. Test Procedures

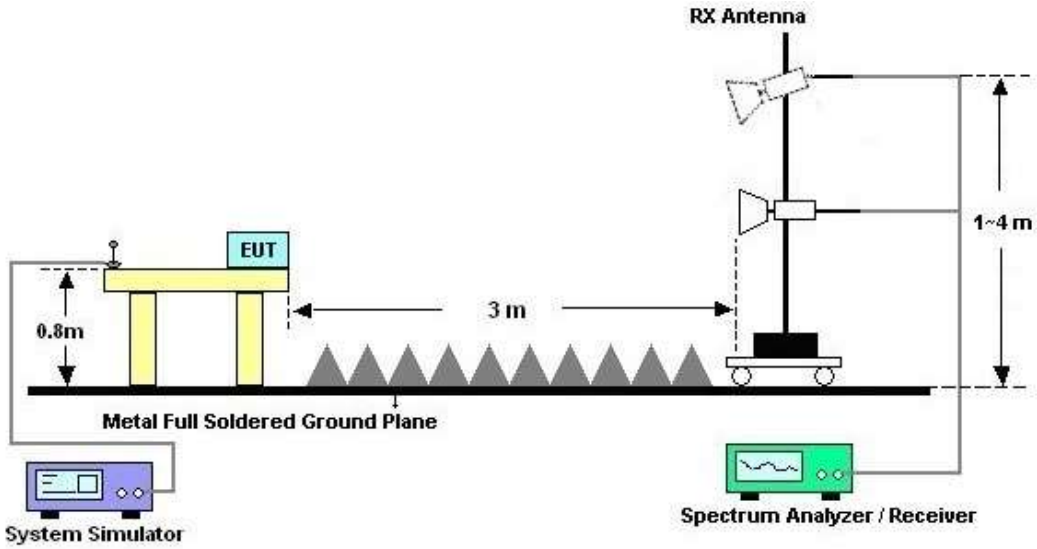
1. The EUT was placed on a turntable with 0.8 meter above ground.
2. The EUT was set 3 meters from the interference receiving antenna, which was mounted on the top of a variable height antenna tower.
3. The EUT was set 3 meters from the interference receiving antenna, which was mounted on the top of a variable height antenna tower.
4. The table was rotated 360 degrees to determine the position of the highest radiation.
5. The antenna is a Bi-Log antenna and its height is adjusted between one to four meters above ground to find the maximum value of the field strength for both horizontal polarization and vertical polarization of the antenna.
6. For each suspected emission, the EUT was arranged to its worst case and then tune the antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading.
7. Set the test-receiver system to Peak Detect Function and specified bandwidth with Maximum Hold Mode (RBW=120kHz/VBW=300kHz for frequency below 1GHz; RBW=1MHz VBW=3MHz (Peak), RBW=1MHz/VBW=10Hz (Average) for frequency above 1GHz).
8. If the emission level of the EUT in peak mode was 3 dB lower than the limit specified, peak values of EUT will be reported. Otherwise, the emission will be repeated by using the quasi-peak method and reported.
9. Emission level (dBμV/m) = 20 log Emission level (μV/m)
10. Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level

3.1.4. Test Setup of Radiated Emission

For radiated emissions from 30MHz to 1GHz

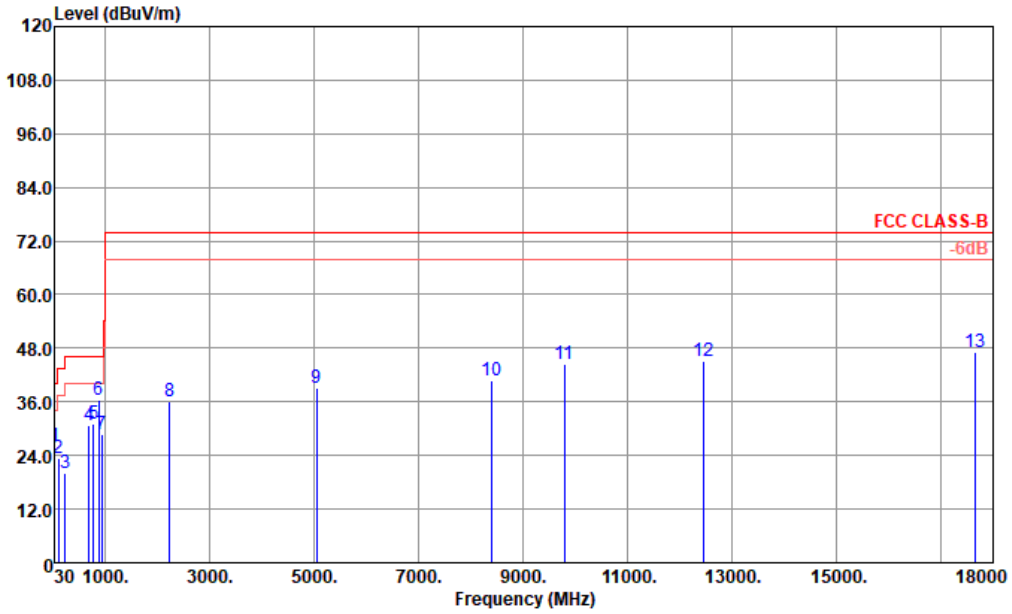


For radiated emissions above 1GHz



3.1.5. Test Result of Radiated Emission

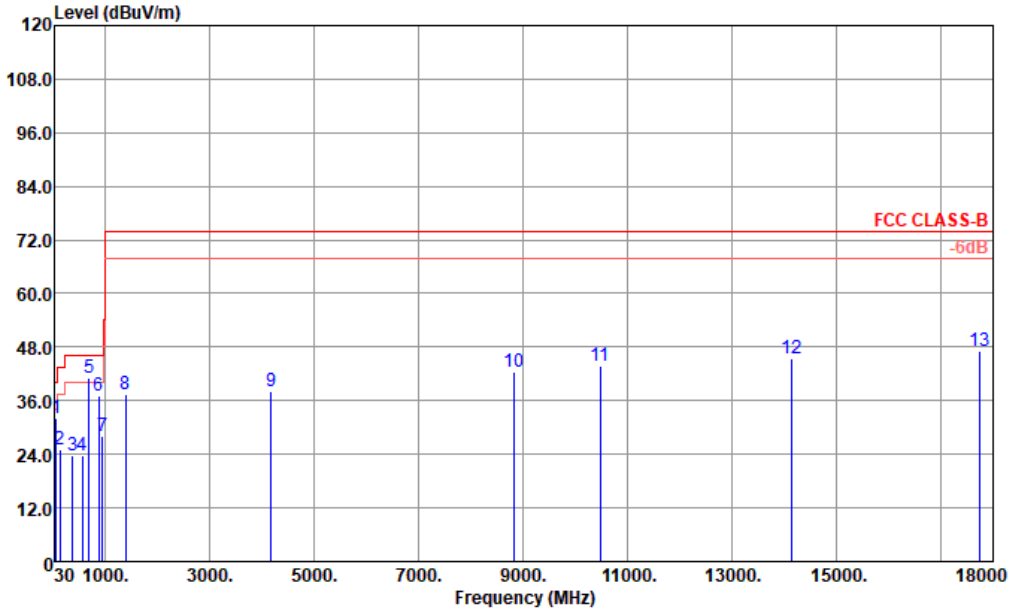
Test Engineer :	Fang	**Temperature :**	21~22°C
		Relative Humidity :	41~42%
Test Distance :	3m	**Polarization :**	Horizontal
Remark :	#6 is system simulator signal which can be ignored.		



Site : 03CH02-KS
Condition : FCC CLASS-B 3m LF 6111D SN44483 HORIZONTAL

	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	A/Pos	T/Pos	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	cm	deg	
1	34.85	26.06	-13.94	40.00	34.47	22.45	1.34	32.20	100	0	Peak
2	107.60	23.28	-20.22	43.50	36.31	16.82	2.34	32.19	---	---	Peak
3	234.67	20.02	-25.98	46.00	31.78	16.95	3.46	32.17	---	---	Peak
4	690.57	30.60	-15.40	46.00	30.23	26.66	5.91	32.20	---	---	Peak
5	786.60	31.21	-14.79	46.00	29.00	28.20	6.31	32.30	---	---	Peak
6	875.84	36.49			32.94	29.20	6.65	32.30	---	---	Peak
7	943.74	28.90	-17.10	46.00	23.42	30.78	6.90	32.20	---	---	Peak
8	2232.00	36.00	-38.00	74.00	30.88	31.03	8.95	34.86	---	---	Peak
9	5056.00	39.10	-34.90	74.00	22.40	35.46	13.45	32.21	---	---	Peak
10	8408.00	40.66	-33.34	74.00	22.04	35.09	17.91	34.38	---	---	Peak
11	9792.00	44.43	-29.57	74.00	22.32	37.70	19.37	34.96	---	---	Peak
12	12456.00	45.15	-28.85	74.00	18.30	39.71	22.65	35.51	---	---	Peak
13	17667.00	47.11	-26.89	74.00	14.00	41.33	27.07	35.29	---	---	Peak

Test Engineer :	Fang	**Temperature :**	21~22°C
		Relative Humidity :	41~42%
Test Distance :	3m	**Polarization :**	Vertical
Remark :	#6 is system simulator signal which can be ignored.		



Site : 03CH02-KS
Condition : FCC CLASS-B 3m LF 6111D SN44483 VERTICAL

	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	A/Pos	T/Pos	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	cm	deg	
1	69.77	32.16	-7.84	40.00	49.95	12.50	1.89	32.18	---	---	Peak
2	139.61	25.21	-18.29	43.50	37.16	17.50	2.67	32.12	---	---	Peak
3	375.32	23.87	-22.13	46.00	30.66	21.10	4.36	32.25	---	---	Peak
4	561.56	23.63	-22.37	46.00	25.10	25.49	5.34	32.30	---	---	Peak
5	692.51	41.02	-4.98	46.00	40.63	26.67	5.92	32.20	100	0	Peak
6	874.87	37.21			33.67	29.20	6.64	32.30	---	---	Peak
7	952.47	28.18	-17.82	46.00	22.47	30.98	6.93	32.20	---	---	Peak
8	1400.00	37.32	-36.68	74.00	36.89	28.70	7.05	35.32	---	---	Peak
9	4176.00	38.06	-35.94	74.00	23.34	35.40	12.39	33.07	---	---	Peak
10	8832.00	42.40	-31.60	74.00	22.92	35.33	18.26	34.11	---	---	Peak
11	10485.00	43.91	-30.09	74.00	20.33	38.56	20.13	35.11	---	---	Peak
12	14130.00	45.35	-28.65	74.00	15.95	40.51	24.02	35.13	---	---	Peak
13	17730.00	47.23	-26.77	74.00	14.08	41.35	27.14	35.34	---	---	Peak

Note:

1. Level(dBμV/m) = Read Level(dBμV) + Antenna Factor(dB/m) + Cable Loss(dB) - Preamp Factor(dB)
2. Over Limit(dB) = Level(dBμV/m) – Limit Line(dBμV/m)

4. List of Measuring Equipment

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
EMI Test Receiver	R&S	ESR7	101403	9kHz~7GHz;Max 30dBm	Oct. 17, 2020	Oct. 26, 2020	Oct. 16, 2021	Radiation (03CH02-KS)
EXA Spectrum Analyzer	Keysight	N9010A	MY55370528	10Hz-44G,MAX 30dB	Oct. 17, 2020	Oct. 26, 2020	Oct. 16, 2021	Radiation (03CH02-KS)
Bilog Antenna	TeseQ	CBL6111D	44483	30MHz-1GHz	Dec. 30, 2019	Oct. 26, 2020	Dec. 29, 2020	Radiation (03CH02-KS)
Double Ridge Horn Antenna	ETS-Lindgren	3117	75957	1GHz~18GHz	Nov. 10, 2019	Oct. 26, 2020	Nov. 09, 2020	Radiation (03CH02-KS)
SHF-EHF Horn	Com-power	AH-840	101115	18GHz~40GHz	Nov. 10, 2019	Oct. 26, 2020	Nov. 09, 2020	Radiation (03CH02-KS)
Amplifier	MITEQ	EM18G40GGA	060728	18~40GHz	Jan. 08, 2020	Oct. 26, 2020	Jan. 07, 2021	Radiation (03CH02-KS)
Amplifier	SONOMA	310N	187289	9KHz-1GHz	Jan. 02, 2020	Oct. 26, 2020	Jan. 01, 2021	Radiation (03CH02-KS)
Amplifier	Keysight	83017A	MY53270316	500MHz~26.5GHz	Oct. 17, 2020	Oct. 26, 2020	Oct. 16, 2021	Radiation (03CH02-KS)
AC Power Source	Chroma	61601	616010002473	N/A	NCR	Oct. 26, 2020	NCR	Radiation (03CH02-KS)
Turn Table	MF	MF7802	N/A	0~360 degree	NCR	Oct. 26, 2020	NCR	Radiation (03CH02-KS)
Antenna Mast	MF	MF7802	N/A	1 m~4 m	NCR	Oct. 26, 2020	NCR	Radiation (03CH02-KS)

NCR: No Calibration Required

5. Uncertainty of Evaluation

Uncertainty of Radiated Emission Measurement (30 MHz ~ 1000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	**4.9dB**

Uncertainty of Radiated Emission Measurement (1000 MHz ~ 18000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	**5.0dB**

Uncertainty of Radiated Emission Measurement (18000 MHz ~ 40000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	**5.1dB**