

FCC Test Report

FCC ID:2ACVK-1003

Product: Retail Pixel kit
Trade Mark: KANO
Model Number: 1003
Serial Model: N/A
Report No.: SER171120004003E

Prepared for

Kano Computing Limited
69-89 Mile End Road, London E1 4TT, UK

Prepared by

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TEST RESULT CERTIFICATION

Applicant's name : Kano Computing Limited

Address..... : 69-89 Mile End Road, London E1 4TT, UK

Manufacturer's Name : Kano Computing Limited

Address..... : 69-89 Mile End Road, London E1 4TT, UK

Product description

Product name : Retail Pixel kit

Model and/or type reference : 1003

FCC Part15B

Standards : ANSI C63.4:2014

This device described above has been tested by NTEK, and the test results show that the equipment under test (EUT) is in compliance with Part 15 of FCC Rules. And it is applicable only to the tested sample identified in the report.

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Date of Test :

Date (s) of performance of tests..... : 11 Nov. 2017 ~ 11 Dec. 2017

Date of Issue : 11 Dec. 2017

Test Result..... : **Pass**

Testing Engineer :

Eileen Liu

(Eileen Liu)

Technical Manager :

Jason Chen

(Jason Chen)

Authorized Signatory :

Sam. Chen

(Sam Chen)

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1. TEST SUMMARY

Test procedures according to the technical standards:

EMC Emission				
Standard	Test Item	Limit	Judgment	Remark
FCC Part15B ANSI C63.4: 2014	Conducted Emission	Class B	PASS	
	Radiated Emission	Class B	PASS	

NOTE:

- (1) 'N/A' denotes test is not applicable in this Test Report
- (2) For client's request and manual description, the test will not be executed.

1.1 TEST FACILITY

Shenzhen NTEK Testing Technology Co., Ltd

Add. : 1/F, Building E, Fenda Science Park, Sanwei Community, Xixiang Street, Bao'an District, Shenzhen 518126 P.R. China.

FCC Registration Number:463705; IC Registration Number:9270A-1

CNAS Registration Number:L5516

1.2 MEASUREMENT UNCERTAINTY

The reported uncertainty of measurement $y \pm U$, where expanded uncertainty U is based on a standard uncertainty multiplied by a coverage factor of $k=2$, providing a level of confidence of approximately **95 %**.

A. Conducted Measurement :

Test Site	Method	Measurement Frequency Range	U, (dB)	NOTE
NTEKC01	ANSI	150 KHz ~ 30MHz	3.2	

B. Radiated Measurement :

Test Site	Method	Measurement Frequency Range	U, (dB)	NOTE
NTEKA01	ANSI	30MHz ~ 1000MHz	4.7	
		1GHz ~12.4GHz	5.0	

2. GENERAL INFORMATION

2.1 GENERAL DESCRIPTION OF EUT

Equipment	Retail Pixel kit	
Trade Mark	KANO	
Model Name	1003	
Serial Model	N/A	
Model Difference	N/A	
Product Description	The EUT is a Retail Pixel kit.	
	Connecting I/O port:	USB
	Operation Frequency:	BT:2402~2480 MHz WIFI:802.11b/g/n20:2412~2462MHz 802.11n40MHz: 2422-2452MHz
	Modulation Type:	BT(1Mbps)/BLE: GFSK BT EDR(2Mbps): $\pi/4$ -DQPSK BT EDR(3Mbps): 8-DPSK IEEE 802.11b : DSSS (CCK, DQPSK, DBPSK) IEEE 802.11g/n (HT20/HT40) : OFDM (64QAM, 16QAM, QPSK, BPSK)
Power Source	USB 5V	
Adapter	N/A	
Battery	Model:16G5002A DC 3.7V,1500mAh	
HW Version	N/A	
SW Version	N/A	

2.1.2 DESCRIPTION OF TEST MODES

To investigate the maximum EMI emission characteristics generates from EUT, the test system was pre-scanning tested base on the consideration of following EUT operation mode or test configuration mode which possible have effect on EMI emission level. Each of these EUT operation mode(s) or test configuration mode(s) mentioned above was evaluated respectively.

Pretest Mode	Description
Mode 1	Downloading

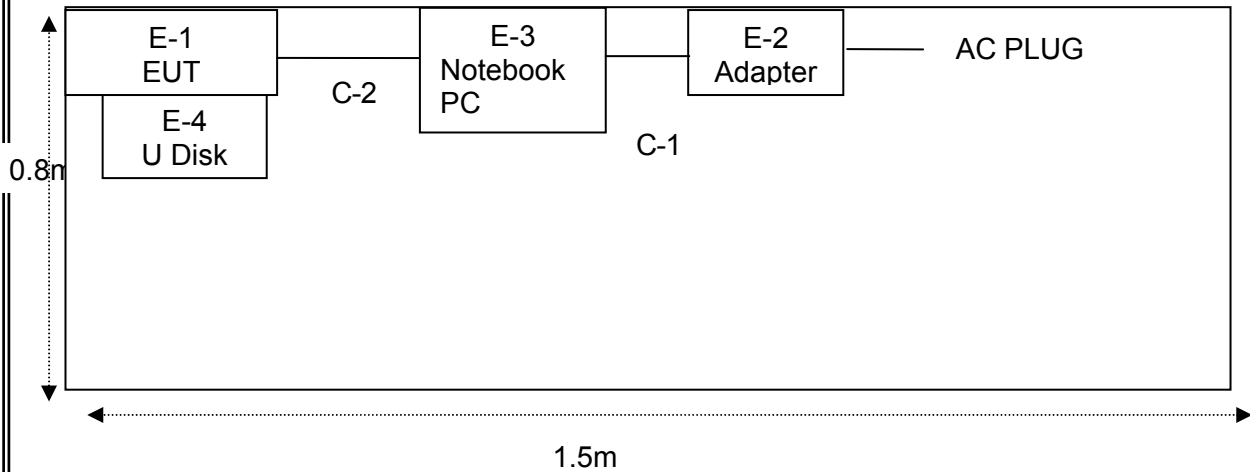
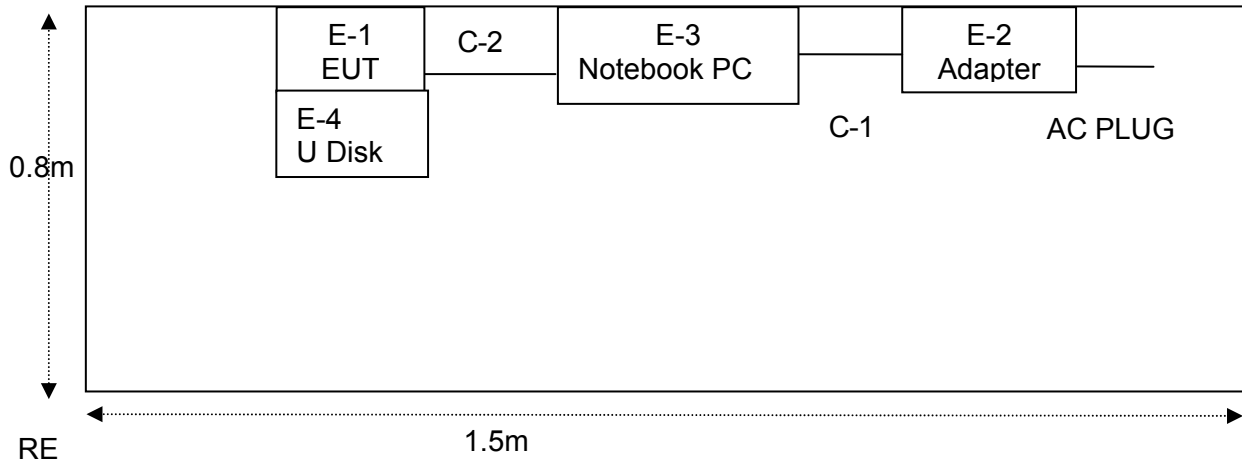
For Conducted Test	
Final Test Mode	Description
Mode 1	Downloading

For Radiated Test	
Final Test Mode	Description
Mode 1	Downloading

Note: Final Test Mode: Through Pre-scan, find the mode 1 is the worst case.
Only the worst case mode is recorded in the report.

2.2 DESCRIPTION OF TEST SETUP

CE



2.3 DESCRIPTION TEST PERIPHERAL AND EUT PERIPHERAL

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

Item	Equipment	Brand	Model/Type No.	Series No.	Note
E-1	Retail Pixel kit	KANO	1003	N/A	EUT
E-2	Adapter	/	N/A	N/A	
E-3	Notebook PC	Lenovo	E450	N/A	
E-4	U-Disk	Lenovo	SK-8185	N/A	

Item	Cable Type	Shielded Type	Ferrite Core	Length	Note
C-2	USB Cable	NO	NO	1.5m	

Note:

- (1) The support equipment was authorized by Declaration of Confirmation.
- (2) For detachable type I/O cable should be specified the length in cm in 『Length』 column.
- (3) “YES” means “shielded” “with core”; “NO” means “unshielded” “without core”.

2.4 MEASUREMENT INSTRUMENTS LIST

Radiation Test equipment

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until	Calibration period
1	Spectrum Analyzer	Agilent	E4407B	MY45108040	2017.06.06	2018.06.05	1 year
2	Test Receiver	R&S	ESPI	101318	2017.06.06	2018.06.05	1 year
3	Bilog Antenna	TESEQ	CBL6111D	31216	2017.04.09	2018.04.08	1 year
4	50Ω Coaxial Switch	Anritsu	MP59B	6200264416	2017.06.06	2018.06.05	1 year
5	Spectrum Analyzer	ADVANTEST	R3132	150900201	2017.06.06	2018.06.05	1 year
6	Horn Antenna	EM	EM-AH-10180	2011071402	2017.04.09	2018.04.08	1 year
7	Horn Ant	Schwarzbeck	BBHA 9170	9170-181	2016.07.06	2017.07.05	1 year
8	Amplifier	EMC	EMC051835SE	980246	2016.08.09	2017.08.08	1 year
9	Loop Antenna	ARA	PLA-1030/B	1029	2017.06.06	2018.06.05	1 year
10	Power Meter	DARE	RPR3006W	15I00041SNO84	2016.08.09	2017.08.08	1 year
11	Power Sensor	R&S	URV5-Z4	0395.1619.05	2016.07.06	2017.07.05	1 year
12	Test Cable (30MHz-1GHz)	N/A	R-02	N/A	2017.04.21	2020.04.20	3 year
13	High Test Cable(1G-40GHz)	N/A	R-03	N/A	2017.04.21	2020.04.20	3 year
14	High Test Cable(1G-40GHz)	N/A	R-04	N/A	2017.04.21	2020.04.20	3 year

AC Conduction Test equipment

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until	Calibration period
1	Test Receiver	R&S	ESCI	101160	2017.06.06	2018.06.05	1 year
2	LISN	R&S	ENV216	101313	2017.04.19	2018.04.18	1 year
3	LISN	SCHWARZBECK	NNLK 8129	8129245	2017.06.06	2018.06.05	1 year
4	50Ω Coaxial Switch	ANRITSU CORP	MP59B	6200983704	2017.06.06	2018.06.05	1 year
5	Test Cable (9KHz-30MHz)	N/A	C01	N/A	2017.04.21	2020.04.20	3 year
6	Test Cable (9KHz-30MHz)	N/A	C02	N/A	2017.04.21	2020.04.20	3 year
7	Test Cable (9KHz-30MHz)	N/A	C03	N/A	2017.04.21	2020.04.20	3 year

Note: Each piece of equipment is scheduled for calibration once a year except the Test Cable which is scheduled for calibration every 3 years.

3. EMC EMISSION TEST

3.1 CONDUCTED EMISSION MEASUREMENT

3.1.1 POWER LINE CONDUCTED EMISSION (Frequency Range 150KHz-30MHz)

FREQUENCY (MHz)	Class A (dBuV)		Class B (dBuV)	
	Quasi-peak	Average	Quasi-peak	Average
0.15 -0.5	79.00	66.00	66 - 56 *	56 - 46 *
0.50 -5.0	73.00	60.00	56.00	46.00
5.0 -30.0	73.00	60.00	60.00	50.00

Note:

- (1) The tighter limit applies at the band edges.
- (2) The limit of " * " marked band means the limitation decreases linearly with the logarithm of the frequency in the range.

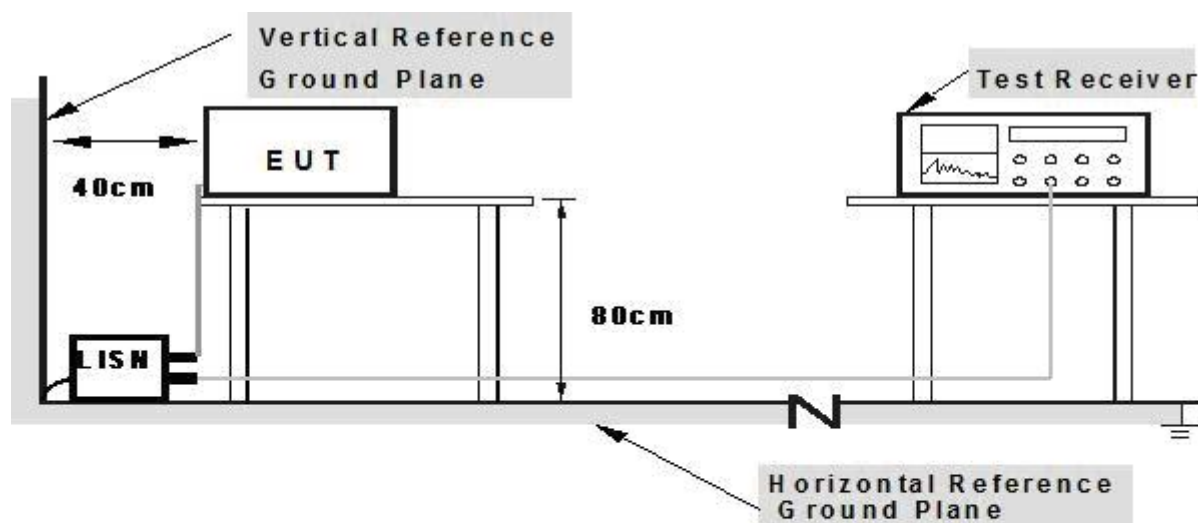
The following table is the setting of the receiver

Receiver Parameters	Setting
Attenuation	10 dB
Start Frequency	0.15 MHz
Stop Frequency	30 MHz
IF Bandwidth	9 kHz

3.1.2 TEST PROCEDURE

- The EUT was placed 0.8 meters from the horizontal ground plane with EUT being connected to the power mains through a line impedance stabilization network (LISN). All other support equipments powered from additional LISN(s). The LISN provide 50 Ohm/ 50uH of coupling impedance for the measuring instrument.
- Interconnecting cables that hang closer than 40 cm to the ground plane shall be folded back and forth in the center forming a bundle 30 to 40 cm long.
- I/O cables that are not connected to a peripheral shall be bundled in the center. The end of the cable may be terminated, if required, using the correct terminating impedance. The overall length shall not exceed 1 m.
- LISN at least 80 cm from nearest part of EUT chassis.
- For the actual test configuration, please refer to the related Item –EUT Test Photos.

3.1.3 TEST SETUP



Note: 1. Support units were connected to second LISN.

2. Both of LISNs (AMN) are 80 cm from EUT and at least 80 from other units and other metal planes

3.1.4 EUT OPERATING CONDITIONS

The EUT tested system was configured as the statements of 2.3 Unless otherwise a special operating condition is specified in the follows during the testing.

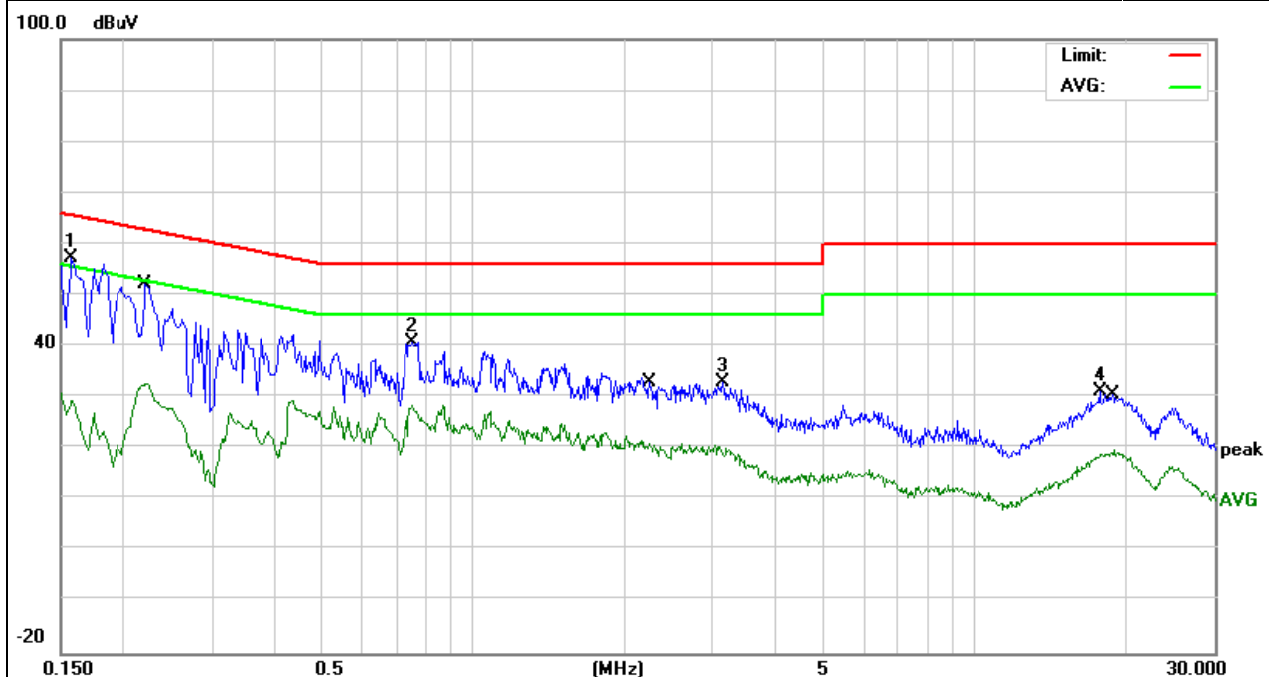
3.1.5 TEST RESULTS

EUT:	Retail Pixel kit	Model Name. :	1003
Temperature:	26 °C	Relative Humidity:	54%
Pressure:	1010hPa	Test Date:	2017-11-23
Test Mode:	Mode 1	Phase :	L
Test Voltage:	DC 5V from PC AC120V/60Hz		

Frequency (MHz)	Reading Level (dBμV)	Correct Factor (dB)	Measure-ment (dBμV)	Limits (dBμV)	Margin (dB)	Remark
0.1580	47.52	9.82	57.34	65.56	-8.22	QP
0.7580	30.96	9.85	40.81	56.00	-15.19	QP
3.1420	22.95	10.05	33.00	56.00	-23.00	QP
17.6620	20.97	10.24	31.21	60.00	-28.79	QP
0.2220	22.90	9.82	32.72	52.74	-20.02	AVG
0.7580	18.74	9.85	28.59	46.00	-17.41	AVG
2.2460	11.16	9.89	21.05	46.00	-24.95	AVG
18.8460	9.36	10.25	19.61	50.00	-30.39	AVG

Remark:

1. All readings are Quasi-Peak and Average values.
2. Factor = Insertion Loss + Cable Loss.

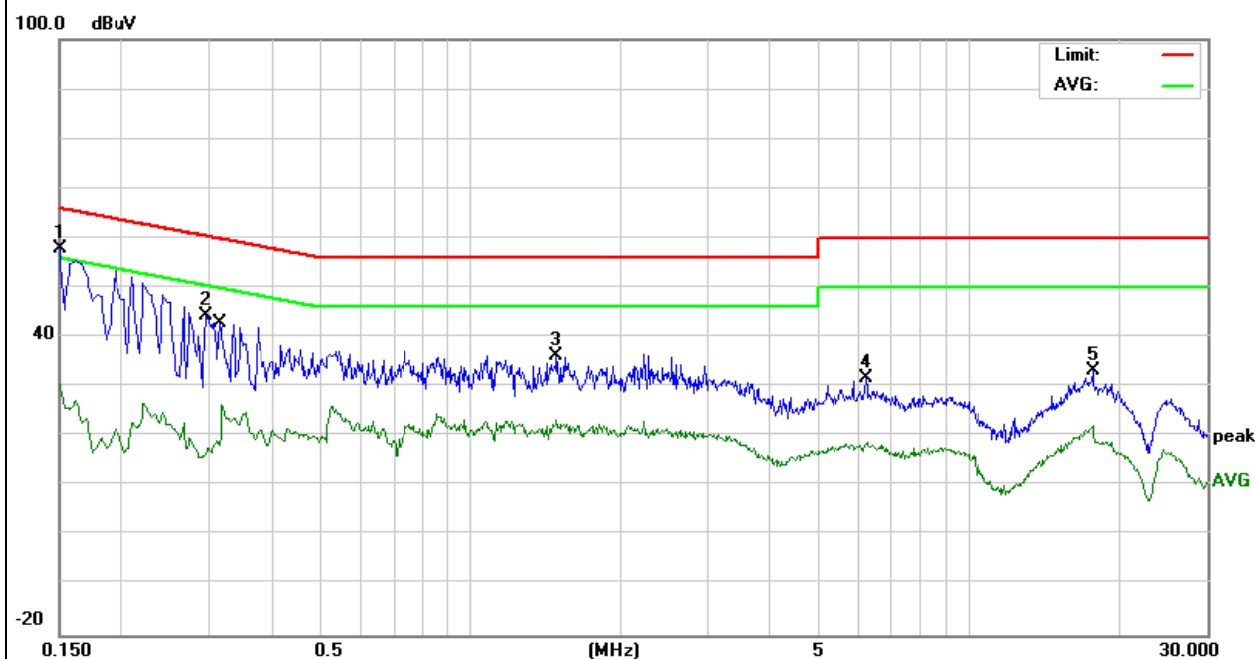


EUT:	Retail Pixel kit	Model Name. :	1003
Temperature:	26 °C	Relative Humidity:	54%
Pressure:	1010hPa	Test Date:	2017-11-23
Test Mode:	Mode 1	Phase :	N
Test Voltage:	DC 5V from PC AC120V/60Hz		

Frequency	Reading Level	Correct Factor	Measure-ment	Limits	Margin	Remark
(MHz)	(dBμV)	(dB)	(dBμV)	(dBμV)	(dB)	
0.1500	47.83	9.92	57.75	65.99	-8.24	QP
0.2940	34.37	9.92	44.29	60.41	-16.12	QP
1.4900	26.33	9.93	36.26	56.00	-19.74	QP
6.2340	21.85	10.02	31.87	60.00	-28.13	QP
17.6660	22.86	10.25	33.11	60.00	-26.89	QP
0.1500	20.77	9.92	30.69	55.99	-25.30	AVG
0.3180	16.35	9.92	26.27	49.76	-23.49	AVG
1.4900	13.49	9.93	23.42	46.00	-22.58	AVG
6.2540	8.89	10.02	18.91	50.00	-31.09	AVG
17.6660	11.97	10.25	22.22	50.00	-27.78	AVG

Remark:

1. All readings are Quasi-Peak and Average values.
2. Factor = Insertion Loss + Cable Loss.

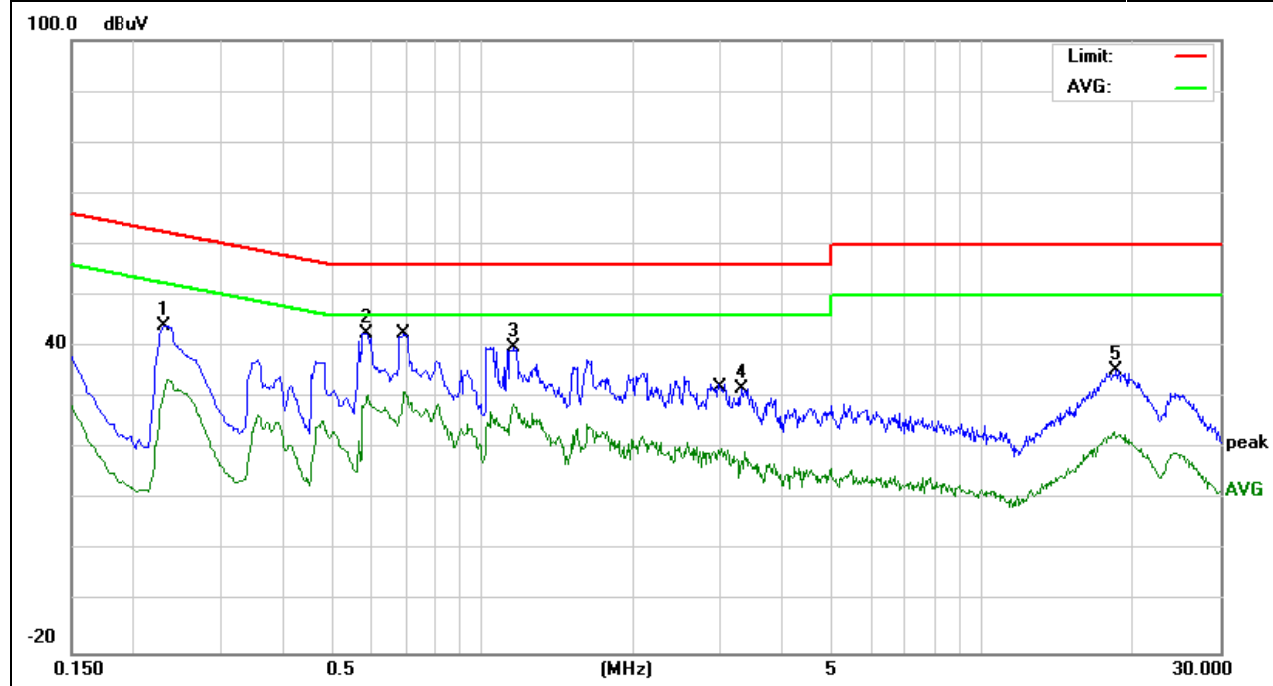


EUT:	Retail Pixel kit	Model Name. :	1003
Temperature:	26 °C	Relative Humidity:	54%
Pressure:	1010hPa	Test Date:	2017-11-23
Test Mode:	Mode 1	Phase :	L
Test Voltage:	DC 5V from PC AC240V/60Hz		

Frequency	Reading Level	Correct Factor	Measure-ment	Limits	Margin	Remark
(MHz)	(dBμV)	(dB)	(dBμV)	(dBμV)	(dB)	
0.2300	34.26	9.82	44.08	62.45	-18.37	QP
0.5860	32.70	9.83	42.53	56.00	-13.47	QP
1.1539	29.99	9.91	39.90	56.00	-16.10	QP
3.3100	21.61	10.05	31.66	56.00	-24.34	QP
18.5260	25.12	10.24	35.36	60.00	-24.64	QP
0.2340	23.84	9.82	33.66	52.30	-18.64	AVG
0.6980	21.37	9.83	31.20	46.00	-14.80	AVG
1.1539	18.94	9.91	28.85	46.00	-17.15	AVG
3.0140	9.92	10.05	19.97	46.00	-26.03	AVG
18.3900	13.05	10.24	23.29	50.00	-26.71	AVG

Remark:

1. All readings are Quasi-Peak and Average values.
2. Factor = Insertion Loss + Cable Loss.

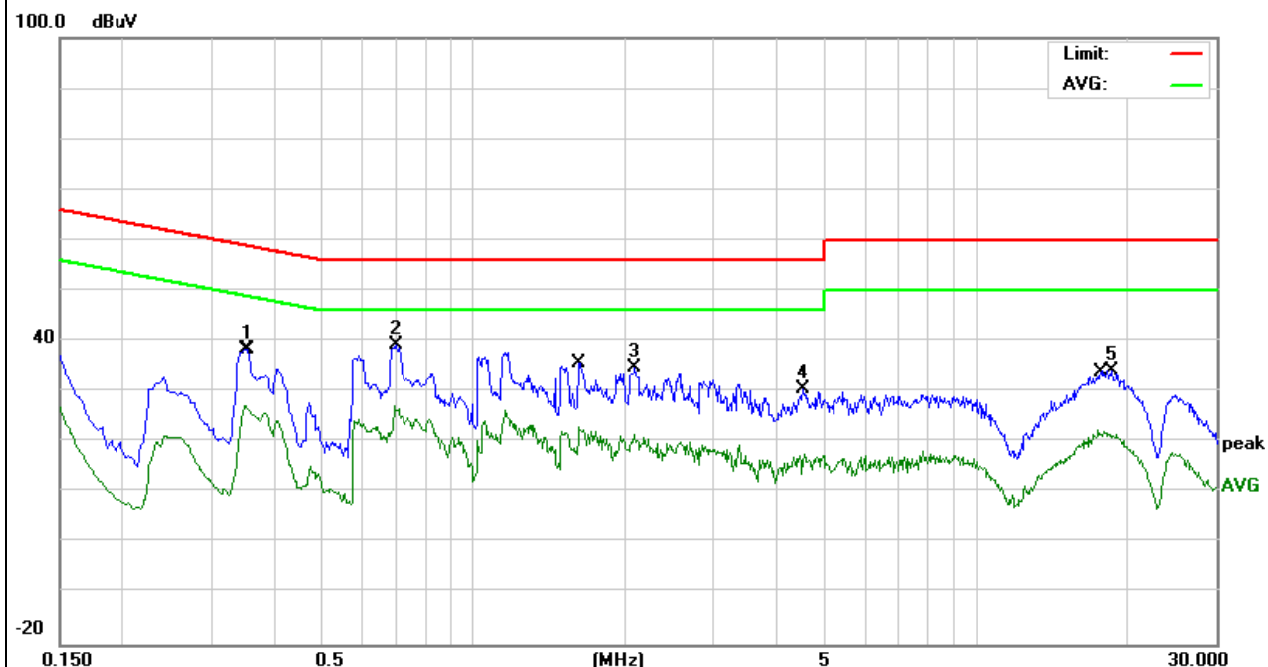


EUT:	Retail Pixel kit	Model Name. :	1003
Temperature:	26 °C	Relative Humidity:	54%
Pressure:	1010hPa	Test Date:	2017-11-23
Test Mode:	Mode 1	Phase :	N
Test Voltage:	DC 5V from PC AC240V/60Hz		

Frequency	Reading Level	Correct Factor	Measure-ment	Limits	Margin	Remark
(MHz)	(dBμV)	(dB)	(dBμV)	(dBμV)	(dB)	
0.3540	28.39	9.93	38.32	58.87	-20.55	QP
0.6980	29.23	9.93	39.16	56.00	-16.84	QP
2.0900	24.93	9.94	34.87	56.00	-21.13	QP
4.5100	20.45	9.96	30.41	56.00	-25.59	QP
18.5500	24.02	10.25	34.27	60.00	-25.73	QP
0.3500	17.31	9.92	27.23	48.96	-21.73	AVG
0.6900	17.21	9.93	27.14	46.00	-18.86	AVG
1.6220	13.15	9.94	23.09	46.00	-22.91	AVG
4.5260	7.56	9.96	17.52	46.00	-28.48	AVG
17.4740	12.17	10.25	22.42	50.00	-27.58	AVG

Remark:

1. All readings are Quasi-Peak and Average values.
2. Factor = Insertion Loss + Cable Loss.



3.2 RADIATED EMISSION MEASUREMENT

3.2.1 LIMITS OF RADIATED EMISSION MEASUREMENT

FREQUENCY (MHz)	Class A (at 10m)	Class B (at 3m)
	dBuV/m	dBuV/m
30 ~ 88	39.0	40.0
88 ~ 216	43.5	43.5
216 ~ 960	46.5	46.0
Above 960	49.5	54.0

Notes:

- (1) The limit for radiated test was performed according to as following:
FCC PART 15B /ICES-003.
- (2) The tighter limit applies at the band edges.
- (3) Emission level (dBuV/m)=20log Emission level (uV/m).

3.2.2 TEST PROCEDURE

Test Arrangement for Radiated Emissions up to 1 GHz

- a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at an accredited test facility. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c. The antenna is a broadband antenna, and its height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.

Note: The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for quasi-peak detection (QP) at frequency below 1GHz.

Test Arrangement for Radiated Emissions above 1 GHz.

- a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at an accredited chamber room. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c. The height of antenna can be varied from one meter to four meters, the height of adjustment depends on the EUT height and the antenna 3dB beamwidth both, to detect the maximum value of the field strength.Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.

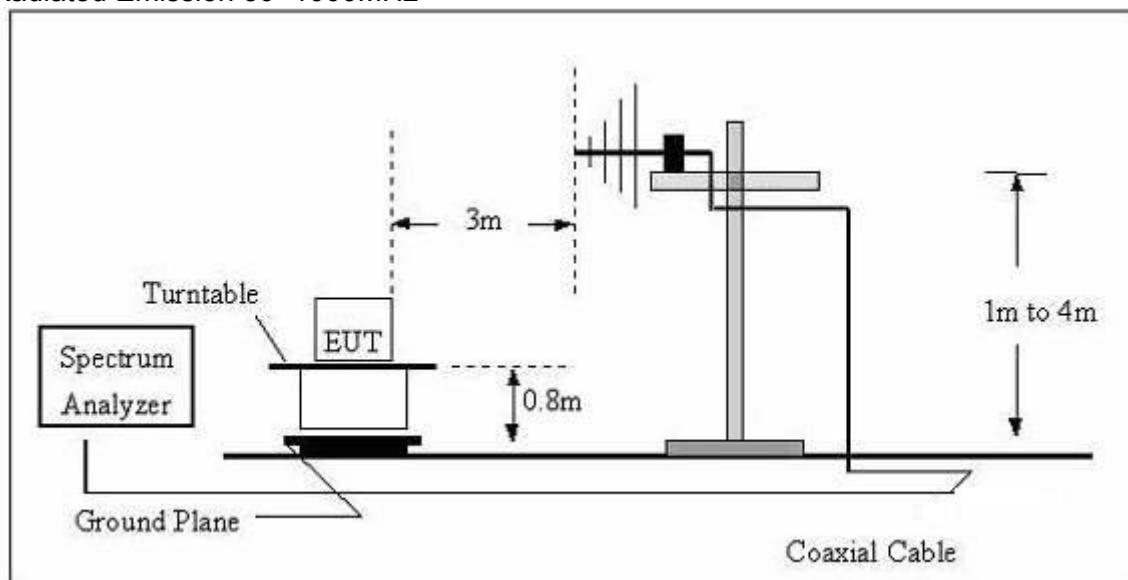
Note: For the hand-held device, the EUT should be measured for all 3 axes and only the worst case is recorded in the report

During the radiated emission test, the Spectrum Analyzer was set with the following configurations:

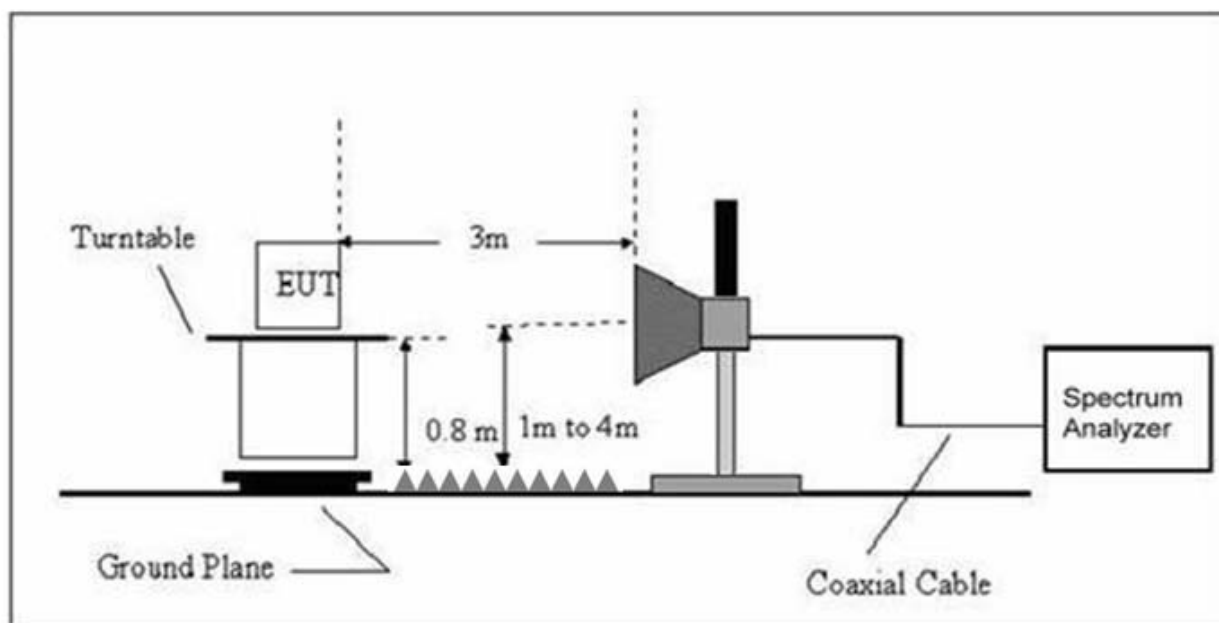
Frequency Band (MHz)	Function	Resolution bandwidth	Video Bandwidth
30 to 1000	QP	120 kHz	300 kHz
Above 1000	Peak	1 MHz	1 MHz
	Avg	1 MHz	10 Hz

3.2.3 TEST SETUP

For Radiated Emission 30~1000MHz



(B) Radiated Emission Test Set-Up Frequency Above 1GHz



3.2.4 TEST RESULTS

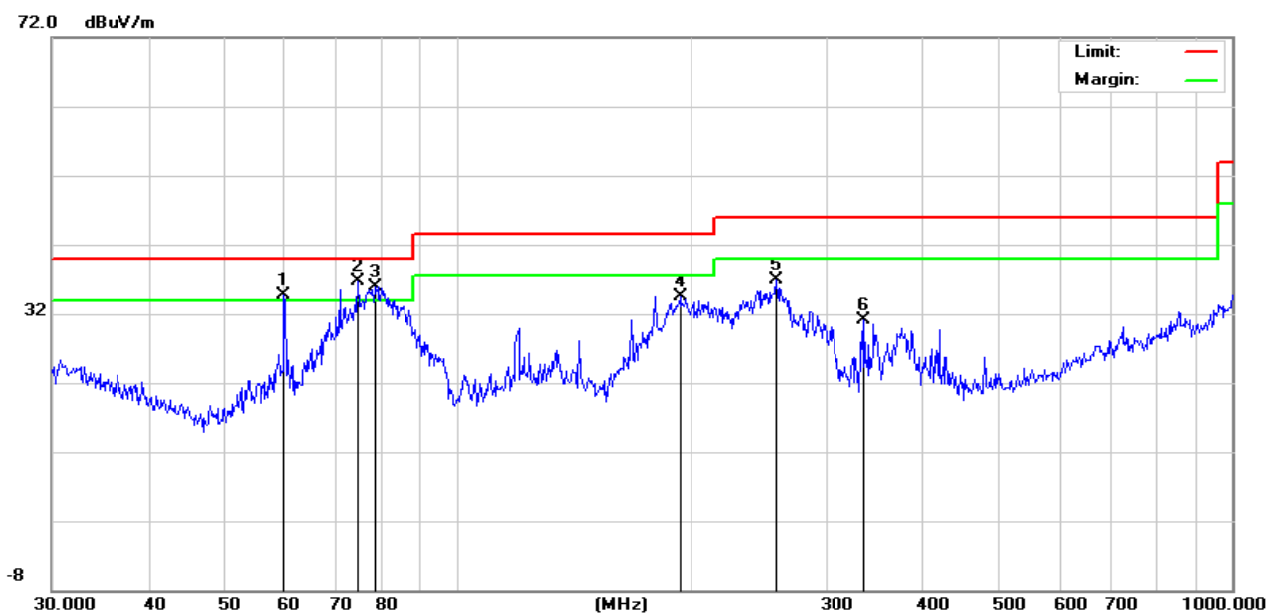
TEST RESULTS (30~1000 MHz)

EUT:	Retail Pixel kit	Model Name:	1003
Temperature:	24 °C	Relative Humidity:	54%
Pressure:	1010 hPa	Test Date :	2017-11-24
Test Mode :	Mode 1	Polarization :	Horizontal
Test Power :	DC 5V from PC AC120V/60Hz		

Polar (H/V)	Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Remark
	(MHz)	(dBuV)	(dB)	(dBuV/m)	(dBuV/m)	(dB)	
H	59.8588	23.12	11.51	34.63	40.00	-5.37	QP
H	74.3953	25.89	10.91	36.80	40.00	-3.20	QP
H	78.4133	24.34	11.56	35.90	40.00	-4.10	QP
H	193.7726	21.01	13.49	34.50	43.50	-9.00	QP
H	258.3263	24.12	12.88	37.00	46.00	-9.00	QP
H	336.0350	17.10	14.10	31.20	46.00	-14.80	QP

Remark:

Factor = Antenna Factor + Cable Loss - Amplifier.

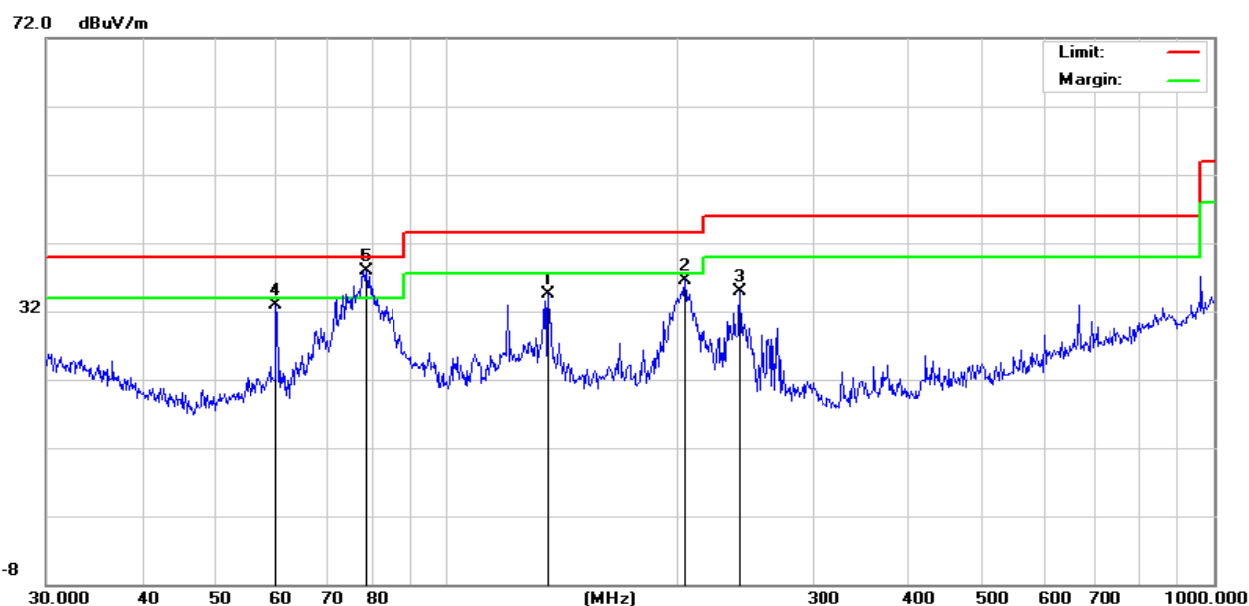


EUT:	Retail Pixel kit	Model Name :	1003
Temperature:	24 °C	Relative Humidity:	54%
Pressure:	1010 hPa	Test Date :	2017-11-24
Test Mode :	Mode 1	Polarization :	Vertical
Test Power :	DC 5V from PC AC120V/60Hz		

Polar (H/V)	Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Remark
	(MHz)	(dBuV)	(dB)	(dBuV/m)	(dBuV/m)	(dB)	
V	135.5062	22.85	11.66	34.51	43.50	-8.99	QP
V	204.2377	22.74	13.86	36.60	43.50	-6.90	QP
V	240.8304	23.01	11.97	34.98	46.00	-11.02	QP
V	59.8588	21.41	11.51	32.92	40.00	-7.08	QP
V	78.4133	26.37	11.56	37.93	40.00	-2.07	QP

Remark:

Factor = Antenna Factor + Cable Loss - Amplifier.



3.2.5 TEST RESULTS(1000~6000MHz)

EUT:	Retail Pixel kit	Model Name :	1003
Temperature:	24 °C	Relative Humidity:	54%
Pressure:	1010 hPa	Test Date :	2017-11-24
Test Mode :	Mode 1		
Test Power :	DC 5V from PC AC120V/60Hz		

All the modulation modes have been tested, and the worst result was report as below:

Polar (H/V)	Frequency (MHz)	Reading (dBuV/m)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Remark
V	1187.69	65.78	-13.27	52.51	74.00	-21.49	Pk
V	1187.69	50.70	-13.27	37.43	54.00	-16.57	AV
V	1485.84	62.98	-11.62	51.36	74.00	-22.64	Pk
V	1485.84	49.50	-11.62	37.88	54.00	-16.12	AV
V	2077.24	60.92	-11.08	49.84	74.00	-24.16	Pk
V	2077.24	48.10	-11.08	37.02	54.00	-16.98	AV
V	5051.83	47.79	2.80	50.59	74.00	-23.41	Pk
V	5051.83	32.60	2.80	35.40	54.00	-18.60	AV
H	1187.69	64.70	-13.27	51.43	74.00	-22.57	Pk
H	1187.69	49.80	-13.27	36.53	54.00	-17.47	AV
H	1559.49	64.08	-11.48	52.60	74.00	-21.40	Pk
H	1559.49	49.60	-11.48	38.12	54.00	-15.88	AV
H	2080.96	61.96	-11.09	50.87	74.00	-23.13	Pk
H	2080.96	48.20	-11.09	37.11	54.00	-16.89	AV
H	5051.83	44.72	2.80	47.52	74.00	-26.48	Pk
H	5051.83	29.60	2.80	32.40	54.00	-21.60	AV

Remark:

Absolute Level= ReadingLevel+ Factor, Margin= Absolute Level - Limit

Note: Only the worst results data points are reported in the report.