

TEST REPORT

of

FCC Part 15 Subpart C

☒ New Application; ☐ Class I PC; ☐ Class II PC

Product : MK1Motion Sensor
Brand: Nido-Studio
Model: FSNMK1(X1)(X2) (X1=A0~Z9,X2=A00~Z99)
Model Difference: for Market Segment
FCC ID: 2AJG2-NIDOMK100A
FCC Rule Part: §15.247, Cat: DTS
Applicant: NIDO-USA LTD
Address: 3921 Wilderness Ridge Crystal Lake, Illinois
60012 USA

Test Performed by:
International Standards Laboratory

<Lung-Tan LAB>

*Site Registration No.

BSMI: SL2-IN-E-0013; MRA TW1036; TAF: 0997; IC: IC4067B-3;

*Address:

No. 120, Lane 180, Hsin Ho Rd.,
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Report No.: ISL-16LR166FCDS

Issue Date : 2016/08/22

Test results given in this report apply only to the specific sample(s) tested and are traceable to national or international standard through calibration of the equipment and evaluating measurement uncertainty herein.

This report MUST not be used to claim product endorsement by TAF, NVLAP or any agency of the Government.

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VERIFICATION OF COMPLIANCE

Applicant: NIDO-USA LTD
Product Description: MK1Motion Sensor
Brand Name: Nido-Studio
Model No.: FSNMK1(X1)(X2) (X1=A0~Z9,X2=A00~Z99)
Model Difference: for Market Segment
FCC ID: 2AJG2-NIDOMK100A
Date of Test: 2016/07/21 ~ 2016/08/19
Date of EUT Received: 2016/07/21

We hereby certify that:

All the tests in this report have been performed and recorded in accordance with the standards described above and performed by an independent electromagnetic compatibility consultant, International Standards Laboratory.

The test results contained in this report accurately represent the measurements of the characteristics and the energy generated by sample equipment under test at the time of the test. The sample equipment tested as described in this report is in compliance with the limits of above standards.

Test By:	<u>Lake Cheng</u> Lake Cheng / Engineer	Date:	<u>2016/08/22</u>
Prepared By:	<u>Gigi yeh</u> Gigi Yeh / Specialist	Date:	<u>2016/08/22</u>
Approved By:	<u>Vincent Su</u> Vincent Su / Technical Manager	Date:	<u>2016/08/22</u>

Version

Version No.	Date	Description
00	2016/08/22	Initial creation of document

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1 GENERAL INFORMATION

General:

Product Name	MK1Motion Sensor
Brand Name	Nido-Studio
Model Name	FSNMK1(X1)(X2) (X1=A0~Z9,X2=A00~Z99)
Model Difference	for Market Segment
Power Supply	12Vdc - 48Vdc

Bluetooth:

Frequency Range:	2402 – 2480MHz
Bluetooth Version:	V4.0
Channel number:	40 channels, 2MHz step
Modulation type:	GFSK
Tune-up power	-7.0 dBm
Power Tolerance:	+/- 1dBm
Dwell Time:	N/A
Antenna Designation:	Printed Antenna, -4.52dBi max

The EUT is compliance with Bluetooth 4.0 Standard.

Microwave Motion Sensor:

Frequency Range:	10.525GHz
FCC ID:	ZTYMRO8700
Channel number:	1
Modulation type:	GFSK
Antenna Type:	Integral PCB Antenna

Passive NFC:

FCC ID:	N/A
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The device is co-location with FCC certified modular, FCC ID: ZTYMRO8700

The Test report is applied for BT 4.0 (BLE).

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

1.1 Related Submittal(s) / Grant (s)

This submittal(s) (test report) is intended for **FCC ID: 2AJG2-NIDOMK100A** filing to comply with Section 15.247 of the FCC Part 15, Subpart C Rules.

1.2 Test Methodology

Both conducted and radiated testing were performed according to the procedures in ANSI C63.10: 2013 and RSS-Gen: 2010. Radiated testing was performed at an antenna to EUT distance 3 meters. Radiated testing was performed at an antenna to EUT distance 3 meters.

KDB Document: 558074 D01 DTS Meas Guidance v03r05

1.3 Test Facility

The measurement facilities used to collect the 3m Radiated Emission and AC power line conducted data are located on the address of **International Standards Laboratory** <Lung-Tan LAB> No. 120, Lane 180, Hsin Ho Rd., Lung-Tan Dist., Tao Yuan City 325, Taiwan which are constructed and calibrated to meet the FCC requirements in documents ANSI C63.10: 2013. FCC Registration Number is: TW1036, Canada Registration Number: 4067B-3.

1.4 Special Accessories

Not available for this EUT intended for grant.

1.5 Equipment Modifications

Not available for this EUT intended for grant.

2 SYSTEM TEST CONFIGURATION

2.1 EUT Configuration

The EUT configuration for testing is installed on RF field strength measurement to meet the Commissions requirement and operating in a manner which intends to maximize its emission characteristics in a continuous normal application.

2.2 EUT Exercise

The EUT (Transmitter) was operated in the engineering mode to fix the Tx frequency that was for the purpose of the measurements.

2.3 Test Procedure

2.3.1 Conducted Emissions

The EUT is placed on a turn table which is 0.8 m above ground plane. According to the requirements in Section 6 of C63.10: 2013, conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30 MHz using CISPR 16-1-1 Quasi-Peak and Average detector mode.

2.3.2 Radiated Emissions

The EUT is placed on a turn table which is 0.8/1.5 m above ground plane. The turn table shall rotate 360 degrees to determine the position of maximum emission level. EUT is set 3m away from the receiving antenna which varied from 1m to 4m to find out the highest emission. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical. In order to find out the max. emission, the relative positions of this hand-held transmitter (EUT) was rotated through three orthogonal axes and measurement procedures for electric field radiated emissions above 1 GHz the EUT measurement is to be made “while keeping the antenna in the ‘cone of radiation’ from that area and pointed at the area both in azimuth and elevation, with polarization oriented for maximum response.” Is still within the 3dB illumination BW of the measurement antenna. According to the requirements in Section 8 and 13 and Subclause 8.3.1.2 of ANSI C63.10: 2013.

2.4 Configuration of Tested System

Fig. 2-1 Configuration of Tested System (Fixed channel)

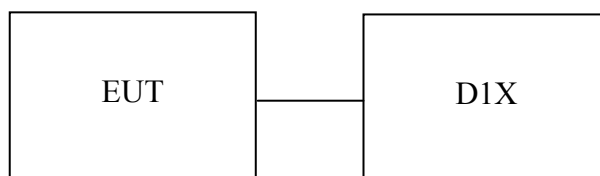


Table 1 Equipment Used in Tested System

Item	Equipment	Mfr/Brand	Model/ Type No.	Series No.	Data Cable	Power Cord
1	D1X	--	D1X	N/A	Non-shielding	Non-shielding

3 SUMMARY OF TEST RESULTS

FCC Rules	Description Of Test	Result
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5 AC POWER LINE CONDUCTED EMISSION TEST

5.1 Standard Applicable:

According to §15.207, frequency range within 150KHz to 30MHz shall not exceed the Limit table as below.

Frequency range MHz	Limits dB(uV)	
	Quasi-peak	Average
0.15 to 0.50	66 to 56	56 to 46
0.50 to 5	56	46
5 to 30	60	50
Note 1.The lower limit shall apply at the transition frequencies 2.The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50 MHz.		

5.2 Measurement Equipment Used:

AC Power Line Test Site					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Conduction 04-3 Cable	WOKEN	CFD 300-NL	Conduction 04 -3	07/28/2015	07/27/2016
EMI Receiver 17	Rohde & Schwarz	ESCI 7	100887	09/08/2015	09/07/2016
LISN 18	ROHDE & SCHWARZ	ENV216	101424	02/11/2016	02/10/2017
LISN 19	ROHDE & SCHWARZ	ENV216	101425	03/12/2016	03/11/2017
Test Software	Farad	EZEMC Ver:ISL-03A2	N/A	N/A	N/A

5.3 EUT Setup:

1. The conducted emission tests were performed in the test site, using the setup in accordance with the ANSI C63.4-2014.
2. The AC/DC Power adaptor of EUT was plug-in LISN. The EUT was placed flushed with the rear of the table.
3. The LISN was connected with 120Vac/60Hz power source.

5.4 Measurement Procedure:

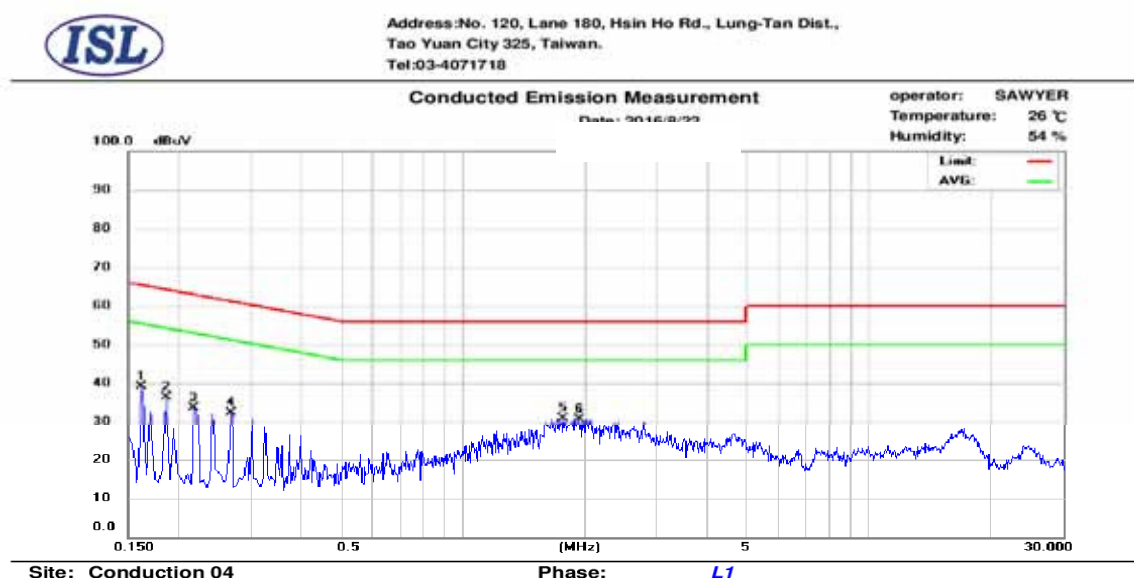
1. The EUT was placed on a table which is 0.8m above ground plane.
2. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
3. Repeat above procedures until all frequency measured were complete.

5.5 Measurement Result:

The initial step in collecting conducted data is a spectrum analyzer peak scan of the measurement range. Significant peaks are then marked as shown on the following data page, and these signals are then quasi-peaked.

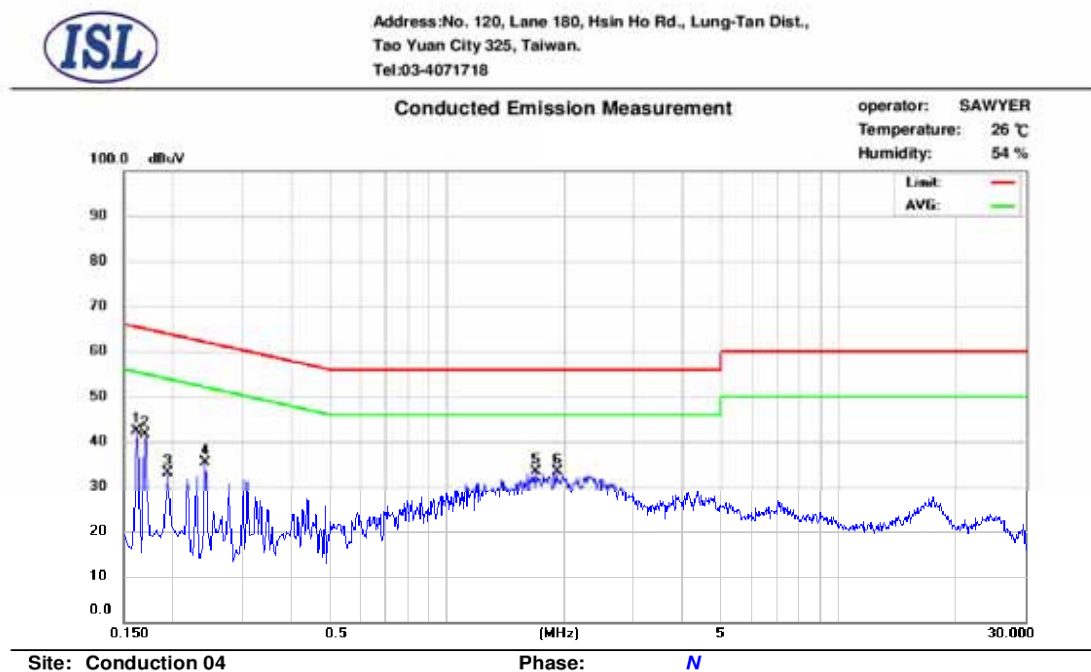
AC POWER LINE CONDUCTED EMISSION TEST DATA

Operation Mode:	Operation Mode	Test Date:	2016/08/17
Test By:	Lake		



No.	Frequency (MHz)	QP_R (dBuV)	AVG_R (dBuV)	Correct Factor (dB)	QP Emission (dBuV)	QP Limit (dBuV)	QP Margin (dB)	AVG Emission (dBuV)	AVG Limit (dBuV)	AVG Margin (dB)
1	0.162	26.50	1.88	9.69	36.19	65.36	-29.17	11.57	55.36	-43.79
2	0.186	23.49	1.22	9.69	33.18	64.21	-31.03	10.91	54.21	-43.30
3	0.218	20.87	-0.39	9.69	30.56	62.89	-32.33	9.30	52.89	-43.59
4	0.270	16.37	-0.38	9.69	26.06	61.12	-35.06	9.31	51.12	-41.81
5	1.754	15.48	9.26	9.74	25.22	56.00	-30.78	19.00	46.00	-27.00
6	1.934	16.99	11.44	9.75	26.74	56.00	-29.26	21.19	46.00	-24.81

Operation Mode:	Operation Mode	Test Date:	2016/08/17
Test By:	Lake		



No.	Frequency (MHz)	QP_R (dBuV)	AVG_R (dBuV)	Correct Factor (dB)	QP Emission (dBuV)	QP Limit (dBuV)	QP Margin (dB)	AVG Emission (dBuV)	AVG Limit (dBuV)	AVG Margin (dB)
1	0.162	25.95	1.88	9.68	35.63	65.36	-29.73	11.56	55.36	-43.80
2	0.170	25.61	2.83	9.68	35.29	64.96	-29.67	12.51	54.96	-42.45
3	0.194	23.05	6.50	9.68	32.73	63.86	-31.13	16.18	53.86	-37.68
4	0.242	18.69	3.40	9.68	28.37	62.03	-33.66	13.08	52.03	-38.95
5	1.682	18.54	12.26	9.73	28.27	56.00	-27.73	21.99	46.00	-24.01
6	1.918	19.48	13.86	9.74	29.22	56.00	-26.78	23.60	46.00	-22.40

6 PEAK OUTPUT POWER MEASUREMENT

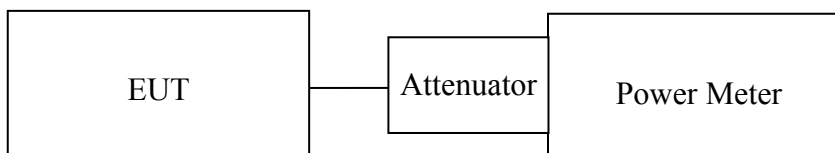
6.1 Standard Applicable:

According to

6.2 Measurement Equipment Used:

Conducted Emission Test Site					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Power Meter 05	Anritsu	ML2495A	1116010	07/28/2016	07/27/2017
Power Sensor 05	Anritsu	MA2411B	34NKF50	07/28/2016	07/27/2017
Power Sensor 06	DARE	RPR3006W	13I00030SNO3 3	11/03/2015	11/02/2016
Power Sensor 07	DARE	RPR3006W	13I00030SNO3 4	11/03/2015	11/02/2016
DC Power supply	ABM	8185D	N/A	09/05/2015	09/04/2016
AC Power supply	EXTECH	CFC105W	NA	12/26/2015	12/25/2016
Attenuator	Woken	Watt-65m3502	11051601	NA	NA
Splitter	MCLI	PS4-199	12465	12/26/2015	12/25/2017
Spectrum analyzer	Agilent	N9030A	MY51360021	10/02/2015	10/01/2016
Test Software	DARE	Radimation Ver:2013.1.23	NA	N/A	N/A

6.3 Test Set-up:



6.4 Measurement Procedure:

Refer to section 9.1.3 and 9.2.3 Peak and Average Conducted Output Power Measurement Procedure of KDB Document: 558074 D01 DTS Meas Guidance v03r05

6.5 Measurement Result:

LE Mode

Frequency (MHz)	Peak Reading Power (dBm)	Cable Loss	Output Power (dBm)	Output Power (W)	Limit (W)
Low	-8.40	0.00	-8.40	0.00014	1
Mid	-6.92	0.00	-6.92	0.00020	1
High	-8.39	0.00	-8.39	0.00014	1

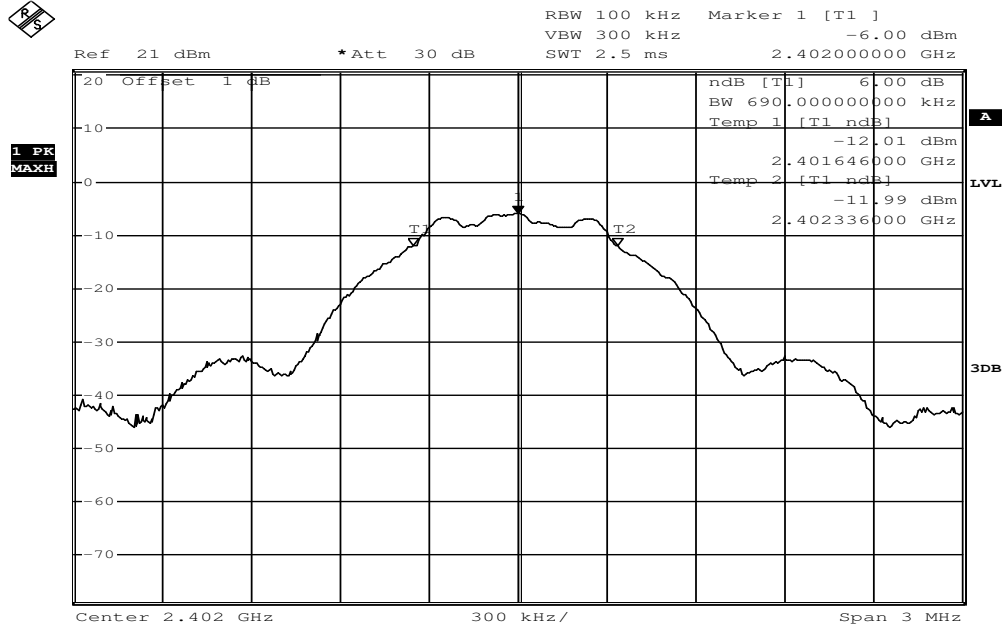
Offset: 1dB

7 6dB Bandwidth

7.1 Standard Applicable:

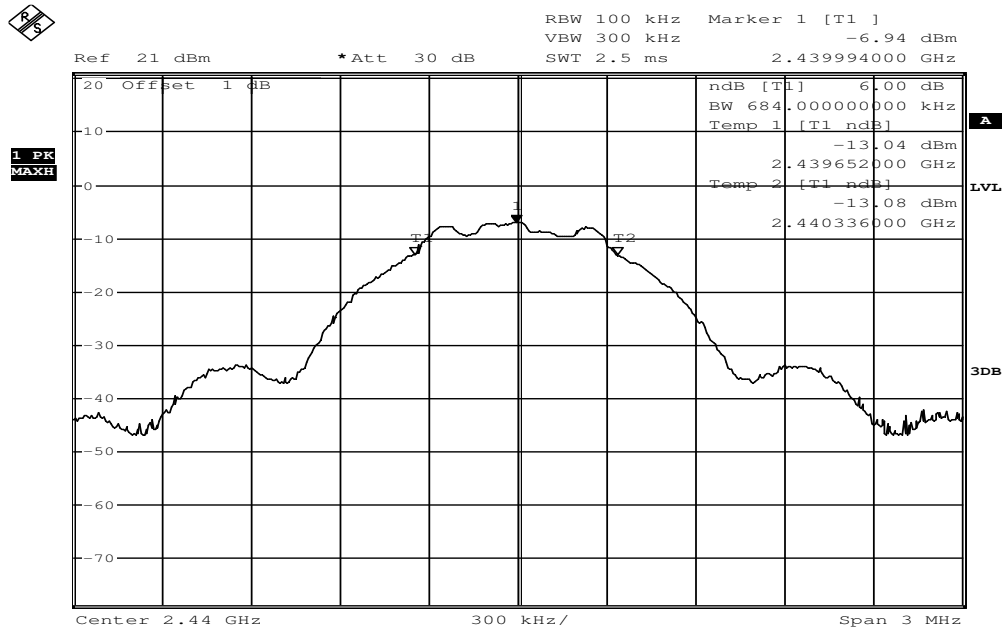
According to

6dB Bandwidth Test Data CH-Low



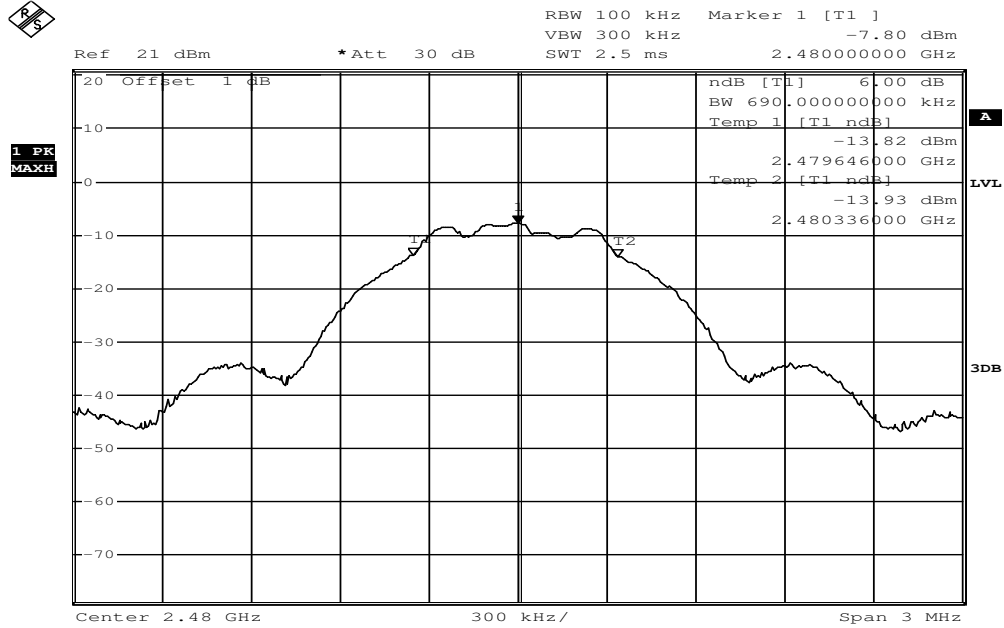
Date: 13.JUN.2016 14:57:06

6dB Bandwidth Test Data CH-Mid



Date: 13.JUN.2016 14:59:23

6dB Bandwidth Test Data CH-High



Date: 13.JUN.2016 15:01:36

8 100KHz BANDWIDTH OF BAND EDGES MEASUREMENT

8.1 Standard Applicable:

According to

8.2.2 Radiated emission:

Chamber 14(966)					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Spectrum Analyzer 21(26.5GHz)	Agilent	N9010A	MY49060537	07/29/2016	07/28/2017
Spectrum Analyzer 20(6.5GHz)	Agilent	E4443A	MY48250315	05/20/2016	05/19/2017
Spectrum Analyzer 22(43GHz)	R&S	FSU43	100143	05/22/2016	05/21/2017
Dipole antenna	SCHWARZBECK	VHAP,30-300	919	12/28/2015	12/27/2017
Dipole antenna	SCHWARZBECK	UHAP,300-1000	1195	12/28/2015	12/27/2017
Loop Antenna9K-30M	A.H.SYSTEM	SAS-564	294	06/17/2015	06/16/2017
Bilog Antenna30-1G	SCHWARZBECK	VULB9168	644	03/02/2016	03/01/2017
Horn antenna1-18G	ETS	3117	00066665	11/30/2015	11/29/2016
Horn antenna26-40G(05)	Com-power	AH-640	100A	01/21/2015	01/20/2017
Horn antenna18-26G(04)	Com-power	AH-826	081001	07/24/2015	07/23/2017
Preamplifier9-1000M	HP	8447D	NA	03/11/2016	03/10/2017
Preamplifier1-18G	MITEQ	AFS44-00101800-25-10P-44	1329256	07/27/2016	07/26/2017
Preamplifier1-26G	EM	EM01M26G	NA	03/10/2016	03/09/2017
Preamplifier26-40G	MITEQ	JS-26004000-27-5A	818471	07/23/2015	07/22/2017
Cable1-18G	HUBER SUHNER	Sucoflex 106	NA	11/25/2015	11/24/2016
Cable UP to 1G	HUBER SUHNER	RG 214/U	NA	10/02/2015	10/01/2016
SUCOFLEX 1GHz~40GHz cable	HUBER SUHNER	Sucoflex 102	27963/2&37421/2	11/03/2015	11/02/2017
Signal Generator	R&S	SMU200A	102330	03/28/2016	03/27/2017
Signal Generator	Anritsu	MG3692A	20311	11/04/2015	11/03/2016
2.4G Filter	Micro-Tronics	Brm50702	76	12/26/2015	12/25/2016
Test Software	Audix	E3 Ver:6.12023	N/A	N/A	N/A

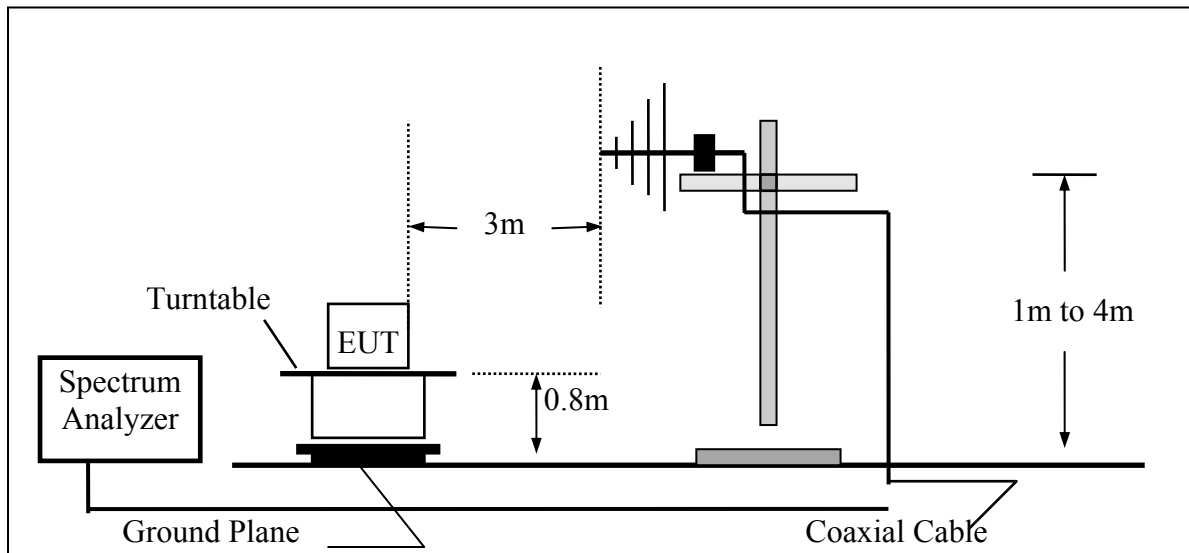
8.3 Test SET-UP:

8.3.1 Conducted Emission at antenna port:

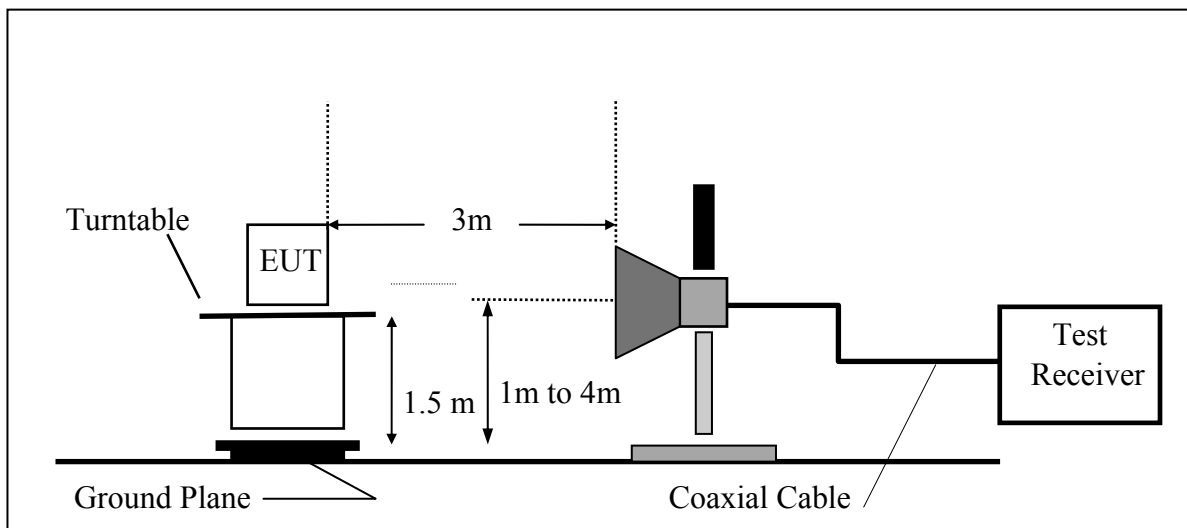
Refer to section 6.3 for details.

8.3.2 Radiated emission:

(A) Radiated Emission Test Set-Up, Frequency Below 1000MHz



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



8.4 Measurement Procedure:

1. Place the EUT on the table and set it in transmitting mode.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
3. Set center frequency of spectrum analyzer = operating frequency.
4. Set the spectrum analyzer as RBW, VBW=100KHz, Span=25MHz, Sweep = auto
5. Mark Peak, 2.390GHz and 2.4835GHz and record the max. level.
6. Repeat above procedures until all frequency measured were complete.

Refer to section 11 and 12 emissions in restricted and non-restricted frequency bands Measurement Procedure of KDB Document: 558074 D01 DTS Meas Guidance v03r05

The measurement of unwanted emissions at the edge of the authorized frequency bands can be complicated by the leakage of RF energy from the fundamental emission into the RBW pass band. Thus, for measurements at the band edges, a narrower resolution bandwidth (no less than 10 kHz) can be used within the first 1 MHz beyond the fundamental emission, provided that that measured energy is subsequently integrated over the appropriate reference bandwidth (i.e., 100 kHz or 1 MHz). This integration can be performed using the band power function of the spectrum analyzer or by summing the spectral levels (in linear power units) over the appropriate reference bandwidth.

8.5 Field Strength Calculation:

The field strength is calculated by adding the Antenna Factor and Cable Factor and subtracting the Amplifier Gain and EUTy Cycle Correction Factor(if any) from the measured reading. The basic equation with a sample calculation is as follows:

$$FS = RA + AF + CL - AG$$

Where	FS = Field Strength	CL = Cable Attenuation Factor (Cable Loss)
	RA = Reading Amplitude	AG = Amplifier Gain
	AF = Antenna Factor	

8.6 Measurement Result:

Note: Refer to next page spectrum analyzer data chart and tabular data sheets.

Band Edges Test Data

Radiated Emission:

Operation Mode TX CH Low
Fundamental Frequency 2402 MHz
Temperature 25

Test Date 2016/08/17
Test By Lake

Operation Mode	TX CH High
Fundamental Frequency	2480 MHz
Temperature	25

Test Date	2016/08/17
Test By	Lake

9 SPURIOUS RADIATED EMISSION TEST

9.1 Standard Applicable

According to

9.4 Measurement Procedure:

1. The EUT was placed on a turn table which is 0.8m above ground plane.
2. The turn table shall rotate 360 degrees to determine the position of maximum emission level.
3. EUT is set 3m away from the receiving antenna which varied from 1m to 4m to find out the highest emissions.
4. When measurement procedures for electric field radiated emissions above 1 GHz the EUT measurement is to be made “while keeping the antenna in the ‘cone of radiation’ from that area and pointed at the area both in azimuth and elevation, with polarization oriented for maximum response.” is still within the 3dB illumination BW of the measurement antenna.
5. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
6. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
7. Repeat above procedures until all frequency measured were complete.

Refer to section 11 and 12 emissions in restricted and non-restricted frequency bands Measurement Procedure of KDB Document: 558074 D01 DTS Meas Guidance v03r05

9.5 Field Strength Calculation

The field strength is calculated by adding the Antenna Factor and Cable Factor and subtracting the Amplifier Gain and EUTy Cycle Correction Factor(if any) from the measured reading. The basic equation with a sample calculation is as follows:

$$FS = RA + AF + CL - AG$$

Where	FS = Field Strength	CL = Cable Attenuation Factor (Cable Loss)
	RA = Reading Amplitude	AG = Amplifier Gain
	AF = Antenna Factor	

9.6 Measurement Result:

Note: Refer to next page spectrum analyzer data chart and tabular data sheets.

Radiated Spurious Emission Measurement Result: (below 1GHz)

Operation Mode TX CH Low
Fundamental Frequency 2402MHz
Temperature 25

Test Date 2016/08/17
Test By Lake

Radiated Spurious Emission Measurement Result (below 1GHz)

Operation Mode	TX CH Mid	Test Date	2016/08/17
Fundamental Frequency	2442MHz	Test By	Lake
Temperature	25		

Radiated Spurious Emission Measurement Result (below 1GHz)

Operation Mode	TX CH High	Test Date	2016/08/17
Fundamental Frequency	2480MHz	Test By	Lake
Temperature	25		

Radiated Spurious Emission Measurement Result (above 1GHz)

Operation Mode	TX CH Low	Test Date	2016/08/17
Fundamental Frequency	2402 MHz	Test By	Lake
Temperature	25		

Radiated Spurious Emission Measurement Result (above 1GHz)

Operation Mode	TX CH Mid	Test Date	2016/08/17
Fundamental Frequency	2442 MHz	Test By	Lake
Temperature	25		

Radiated Spurious Emission Measurement Result (above 1GHz)

Operation Mode	TX CH High	Test Date	2016/08/17
Fundamental Frequency	2480 MHz	Test By	Lake
Temperature	25		

10 Peak Power Spectral Density

10.1 Standard Applicable:

According to

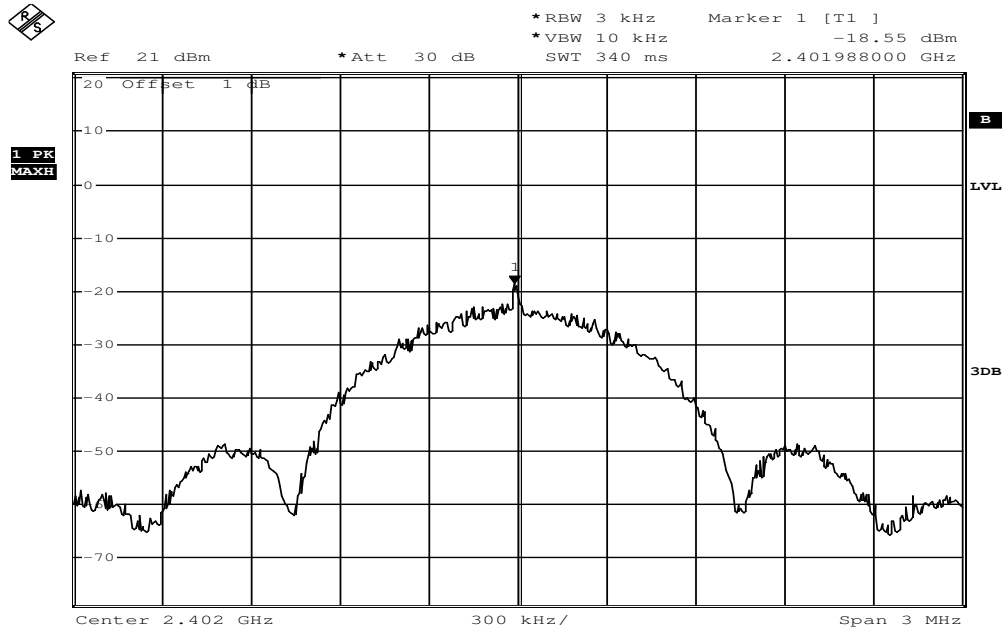
10.5 Measurement Result:

LE mode

Frequency MHz	Power Density Level (dBm)/3KHz	Maximum Limit (dBm)
Low	-18.55	8
Mid	-19.46	8
High	-20.33	8

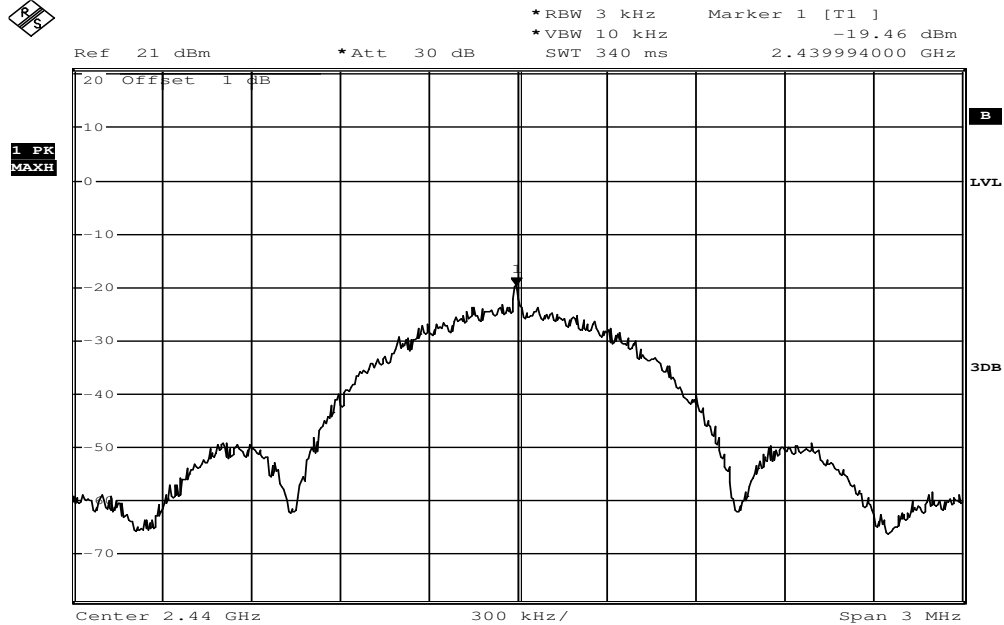
LT mode

Power Spectral Density Test Plot (CH-Low)



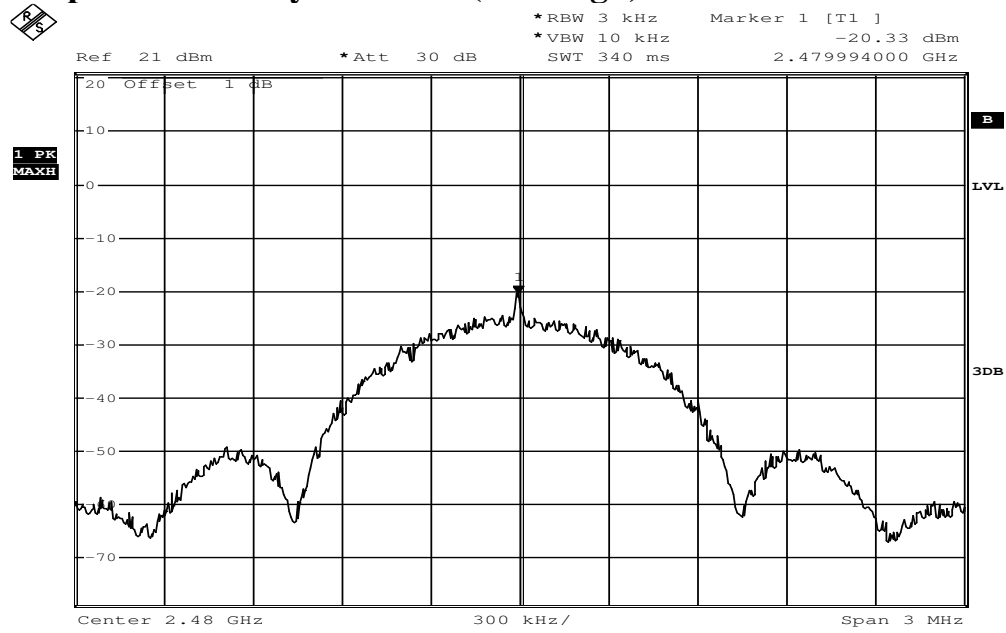
Date: 13.JUN.2016 14:58:00

Power Spectral Density Test Plot (CH-Mid)



Date: 13.JUN.2016 15:00:17

Power Spectral Density Test Plot (CH-High)



Date: 13.JUN.2016 15:02:25

11 ANTENNA REQUIREMENT

11.1 Standard Applicable:

According to