RADIO TEST REPORT

Test Report No.: 10603536S-B

Applicant	:	**TKR CORPORATION**
Type of Equipment	:	**ID NODE**
Model No.	:	**MTD-04125N9**
FCC ID	:	**2ADVJMTD04125N9**
Test regulation	:	**FCC Part15 Subpart C: 2015**
Test result	:	**Complied**

1. This test report shall not be reproduced in full or partial, without the written approval of UL Japan, Inc.
2. The results in this report apply only to the sample tested.
3. This sample tested is in compliance with the limits of the above regulation.
4. The test results in this test report are traceable to the national or international standards.
5. This test report must not be used by the customer to claim product certification, approval, or endorsement by any agency of the Federal Government.
6. The opinions and the interpretations to the result of the description in this report are outside scopes where UL Japan has been accredited.

Date of test: December 16 to 18, 2014

Representative test engineer:

Makoto Hosaka
Engineer
Consumer Technology Division

Approved by :

Ichiro Isozaki
Manager
Consumer Technology Division

☐ The testing in which "Non-accreditation" is displayed is outside the accreditation scopes in UL Japan.
☒ There is no testing item of "Non-accreditation".

RTL02610

UL Japan, Inc.
Shonan EMC Lab.
1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa-ken, 259-1220 JAPAN
Telephone : +81 463 50 6400
Facsimile : +81 463 50 6401

REVISION HISTORY

Original Test Report No.: 10603536S-B

Revision	Test report No.	Date	Page revised	Contents
-(Original)	10603536S-B	January 22, 2015	-	-
1	10603536S-B	January 29, 2015	4 1,5 9	Addition of Rating description Updating and Addition of Test specification description Addition of remark
2	10603536S-B	February 4, 2015	4 8	Correction of Antenna gain Addition of remark
3	10603536S-B	June 2, 2016	5	Updating of Test specification Addition of remark
4	10603536S-B	June 6, 2016	9,13	Addition of remark

Contents

Page

SECTION 1: Customer information 4
SECTION 2: Equipment under test (E.U.T.) 4
SECTION 3: Test specification, procedures & results 5
SECTION 4: Operation of E.U.T. during testing 8
SECTION 5: Conducted emission 11
SECTION 6: 6dB bandwidth & Occupied bandwidth (99%) 12
SECTION 7: Maximum peak output power 12
SECTION 8: Out of band emissions (Antenna port conducted) 12
SECTION 9: Peak power density 12
SECTION 10: Radiated emission 13
Contents of APPENDIXES 15
APPENDIX 1: Data of Radio tests 16
APPENDIX 2: Test instruments 36
APPENDIX 3: Photographs of test setup 37

SECTION 1: Customer information

Company Name	:	TKR Corporation
Address	:	2-19-3 Tamagawa, Ota-ku, Tokyo 146-8091 Japan
Telephone Number	:	+81 3-3756-8091
Facsimile Number	:	+813-3756-8097
Contact Person	:	Masataka Aigo

SECTION 2: Equipment under test (E.U.T.)

2.1 Identification of E.U.T.

Type of equipment	:	ID NODE
Model No.	:	MTD-04125N9
Serial No.	:	Refer to 4.2
Rating	:	DC5.0V (USB Bus Power), DC3.7V(Battery)
Country of Mass-production	:	Japan
Condition of EUT	:	Engineering prototype (Not for Sale: This sample is equivalent to mass-produced items.)
Modification of EUT	:	No modification by the test lab.
Receipt Date of Sample	:	December 16, 2014

2.2 Product description

Model: MTD-04125N9 (referred to as the EUT in this report) is an ID NODE.

The clock frequencies used in the EUT:

SYSTEM: 10MHz
USB: 24MHz, 240MHz
Bluetooth Module: 32MHz, 32.768kHz

Equipment type	:	Transceiver
Frequency of operation	:	2402-2480MHz
Bandwidth / channel spacing	:	1MHz / 2MHz (Low Energy)
Type of modulation	:	GFSK
ITU code	:	F1D
Antenna type	:	HIGH DIELECTRIC CHIP ANTENNA
Antenna gain	:	2.726dBi
Antenna connector type	:	None (It exist the connector for only the tests of shipment.)
Operation temperature range	:	0 to +40 deg.C

FCC 15.31 (e) / 212
The transmitter is constantly provided voltage (DC3.3V) through the regulator regardless of input voltage. Therefore, this EUT complies with the requirement.

FCC 15.203 / 212
It is impossible for end users to replace the antenna, because it is soldered on the circuit board.
Therefore the equipment complies with the requirement of 15.203/212.

SECTION 3: Test specification, procedures & results

3.1 Test specification

Test specification : FCC Part 15 Subpart C: 2015, final revised on November 23, 2015
Title : FCC 47CFR Part15 Radio Frequency Device Subpart C Intentional Radiators
Section 15.207 Conducted limits
Section 15.247 Operation within the bands 902-928MHz, 2400-2483.5MHz, and 5725-5850MHz

*Some parts are effective on and after December 17, 2015 or December 23, 2015. The revision does not affect the test specification applied to the EUT.
The EUT has been tested for compliance with FCC Part 15 Subpart B. Refer to test report No. 10603536S-A.

3.2 Procedures & Results

Item	Test Procedure *1)	Specification	Remarks	Deviation	Worst Margin	Results
Conducted emission	ANSI C63.10:2009	FCC 15.207	-	N/A	**8.4dB** Freq.: 0.63810MHz Detection: Average Phase: N Mode: Bluetooth LE Tx 2480MHz with Cradle	Complied
6dB bandwidth	ANSI C63.10:2009	FCC 15.247 (a)(2)	Conducted	N/A	* See data	Complied
Maximum peak output power	ANSI C63.10:2009	FCC 15.247 (b)(3)	Conducted	N/A		Complied
Out of band emission & Restricted band edges	ANSI C63.10:2009	FCC 15.109, 15.247 (d) & 15.209	Conducted / Radiated	N/A	**2.3 dB** Freq.: 54.574 MHz Polarization: Vertical Detection: Quasi-Peak Mode: Bluetooth LE Tx 2402MHz Freq.: 54.573 MHz Polarization: Vertical Detection: Quasi-Peak Mode: Bluetooth LE Tx 2440 MHz Freq.: 54.569 MHz Polarization: Vertical Detection: Quasi-Peak Mode: Bluetooth LE Tx 2480 MHz	Complied
Power density	ANSI C63.10:2009	FCC 15.247 (e)	Conducted	N/A	* See data	Complied

Note: UL Japan's EMI Work Procedures No.13-EM-W0420 and 13-EM-W0422.
*1) These tests were also referred to KDB 558074 v03 r02 (FCC), "Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under §15.247".
*The test procedures and specifications in this report have not changed in FCC Part 15 Subpart C for Digital Transmission Systems. Therefore, the test data obtained are still adequate to demonstrate compliance with current applicable FCC regulation.

3.3 Addition to standard

Item	Test Procedure	Specification	Remarks	Worst Margin	Results
Occupied Bandwidth (99%)	ANSI C63.10:2009, RSS-Gen 6.6	-	Conducted	-	-

Note: UL Japan's Work Procedures No. 13-EM-W0420 and 13-EM-W0422

* Other than above, no addition, exclusion nor deviation has been made from the standard.

3.4 Uncertainty

The following uncertainties have been calculated to provide a confidence level of 95% using a coverage factor k=2.

Item	Frequency range	No.4/5/6/8 SR*1 (±)
Conducted emission (AC Mains) AMN/LISN	150kHz-30MHz	3.4 dB

Item	Frequency range	No.1 SAC*1/SR*2 (±)	No.2 SAC/SR (±)	No.3 SAC/SR (±)
Radiated emission (Measurement distance: 3m)	9kHz-30MHz	3.7 dB	3.5 dB	3.5 dB
	30MHz-300MHz	4.9 dB	4.9 dB	4.7 dB
	300MHz-1GHz	5.0 dB	5.0 dB	4.8 dB
	1GHz-15GHz	4.9 dB	4.9 dB	4.9 dB
Radiated emission (Measurement distance: 1m)	15GHz-18GHz	5.7 dB	5.7 dB	5.7 dB
	18GHz-40GHz	4.5 dB	4.3 dB	4.3 dB

*1: SAC=Semi-Anechoic Chamber
*2: SR= Shielded Room is applied besides radiated emission

Conducted emission test

The data listed in this test report has enough margin, more than the site margin.

Radiated emission test

The data listed in this report meets the limits unless the uncertainty is taken into consideration.

Antenna port conducted test

Power measurement uncertainty above 1GHz for this test was: (±) 0.68dB
Spurious emission (Conducted) measurement (below 1GHz) uncertainty for this test was: (±) 1.5dB
Spurious emission (Conducted), Power Density Measurement (1G-3GHz) uncertainty for this test was: (±) 1.7dB
Bandwidth Measurement uncertainty for this test was: (±) 0.66%

3.5 Test location

UL Japan, Inc. Shonan EMC Lab.
1-22-3, Megumigaoka, Hiratsuka-shi, Kanagawa-ken 259-1220 JAPAN
Telephone number : +81 463 50 6400
Facsimile number : +81 463 50 6401
JAB Accreditation No. : RTL02610

	IC Registration No.	Width x Depth x Height (m)	Size of reference ground plane (m) / horizontal conducting plane	Maximum measurement distance
☐ No.1 Semi-anechoic chamber	2973D-1	20.6 x 11.3 x 7.65	20.6 x 11.3	10m
☐ No.2 Semi-anechoic chamber	2973D-2	20.6 x 11.3 x 7.65	20.6 x 11.3	10m
☒ No.3 Semi-anechoic chamber	2973D-3	12.7 x 7.7 x 5.35	12.7 x 7.7	5m
☐ No.4 Semi-anechoic chamber	-	8.1 x 5.1 x 3.55	8.1 x 5.1	-
☐ No.1 Shielded room	-	6.8 x 4.1 x 2.7	6.8 x 4.1	-
☐ No.2 Shielded room	-	6.8 x 4.1 x 2.7	6.8 x 4.1	-
☒ No.3 Shielded room	-	6.3 x 4.7 x 2.7	6.3 x 4.7	-
☐ No.4 Shielded room	-	4.4 x 4.7 x 2.7	4.4 x 4.7	-
☐ No.5 Shielded room	-	7.8 x 6.4 x 2.7	7.8 x 6.4	-
☒ No.6 Shielded room	-	7.8 x 6.4 x 2.7	7.8 x 6.4	-
☐ No.7 Shielded room	-	2.76 x 3.76 x 2.4	2.76 x 3.76	-
☐ No.8 Shielded room	-	3.45 x 5.5 x 2.4	3.45 x 5.5	-
☐ No.1 Measurement room	-	2.55 x 4.1 x 2.5	2.55 x 4.1	-

3.6 Test setup, Test data & Test instruments

Refer to APPENDIX 1 to 3.

SECTION 4: Operation of E.U.T. during testing

4.1 Operating mode

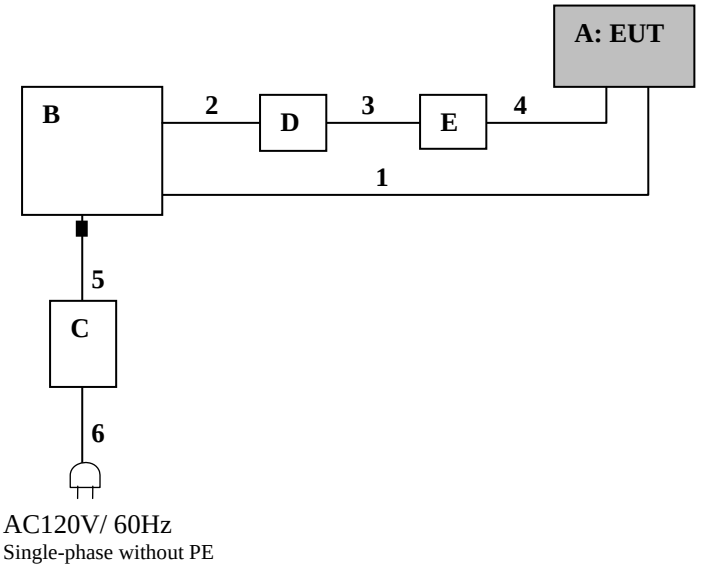
Test item	Mode	Tested frequency	Worst data mode *2)
All item	Bluetooth LE	2402MHz, 2440MHz, 2480MHz	PN9

*1) Transmitting duty was 100% on all tests.
*2) Software for testing : WiFi Control Application Ver.3.0,
EUT has the power settings by the software as follows;
Device driver: cebal2_x64.sys driver Ver.2.50.0.1
Test software : SmartRF Studio 7 Ver.1.16.1

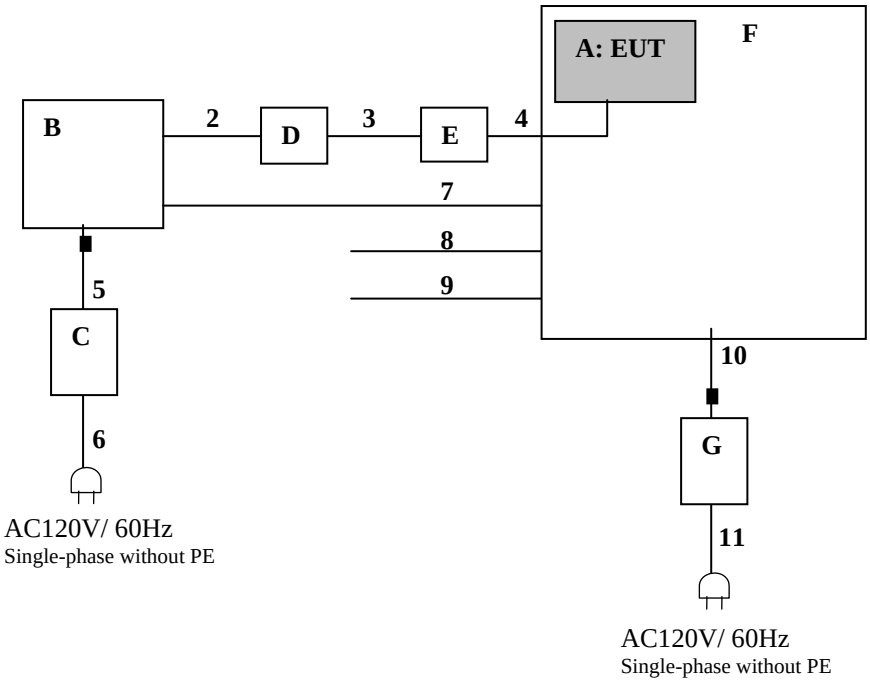
Power settings: 4dBm
*This setting of software is the worst case.
*This setting of software is different from power value of the specification.
It is the maximum power value of the specification when the software setting is 4dBm.
*Any conditions under the normal use do not exceed the condition of setting.
In addition, end users cannot change the settings of the output power of the product.

Justification: The system was configured in typical fashion (as customer would normally use it) for testing.

4.2 Configuration and peripherals



with Cradle



*The EUT is operable in stand-alone (battery-power), but the test has been carried out with the above Configuration which is the worst case.
* Test data was taken under worse case conditions.
* In the case of test with cradle, Conducted emission tests were tested with Cable 11 since G supplied power.

Description of EUT and support equipment

No.	Item	Model number	Serial number	Manufacturer	Remarks
A	ID NODE	MTD-04125N9	*1)	TKR CORPORATION	-
B	Laptop PC	PC-VK27MBZNG	39002731A	NEC	-
C	AC Adaptor	PA-1650-37N	3707913LE	NEC	-
D	CC Debugger	CC2540DK-MINI	-	TEXAS INSTRUMENT	-
E	JIG	-	-	TKR CORPORATION	-
F	Multi Cradle	MTD-04238MC9	D-005	TKR CORPORATION	-
G	AC Adaptor	ATS050-A190	No.10	TECH	-

*1) No.03: used for Radiated emission and Conducted emission tests., No.02: used for Antenna terminal tests.

List of cables used

No.	Cable Name	Length (m)	Shield		Remark
			Cable	Connector	
1	USB	1.2	Shielded	Shielded	-
2	USB	1.5	Shielded	Shielded	-
3	Signal	0.1	Unshielded	Unshielded	-
4	Signal	0.25	Shielded	Shielded	-
5	DC	1.75	Unshielded	Unshielded	attached standard ferrite core.
6	AC	1.2	Unshielded	Unshielded	-
7	USB	0.5	Shielded	Shielded	-
8	USB	0.5	Shielded	Shielded	-
9	USB	0.5	Shielded	Shielded	-
10	DC	1.5	Unshielded	Unshielded	attached standard ferrite core.
11	AC	1.2	Unshielded	Unshielded	-

SECTION 5: Conducted emission

5.1 Operating environment

Test place : See test data (APPENDIX 1)
Temperature : See test data (APPENDIX 1)
Humidity : See test data (APPENDIX 1)

5.2 Test configuration

EUT was placed on a platform of nominal size, 1m by 1.5m, raised 0.8m above the conducting ground plane.
The table is made of Styrofoam and covered with polyvinyl chloride. That has very low permittivity.
The rear of tabletop was located 40cm to the vertical conducting plane. The rear of peripheral was aligned and was flushed with rear of tabletop. All other surfaces of tabletop were at least 80cm from any other grounded conducting surface. EUT was located 80cm from LISN.
Each EUT current-carrying power lead, except the ground (safety) lead, was individually connected through a LISN to the input power source. All unused 50ohm connectors of the LISN were resistively terminated in 50ohm when not connected to the measuring equipment.
Photographs of the set up are shown in APPENDIX 3.

5.3 Test conditions

Frequency range : 0.15 - 30MHz
EUT position : Table top

5.4 Test procedure

The AC Mains Terminal Continuous disturbance Voltage had been measured with the EUT via Host PC or Cradle within a Shielded room. The EUT via Host PC or Cradle were connected to a Line Impedance Stabilization Network (LISN).
An overview sweep with peak detection has been performed.
The measurements had been performed with a quasi-peak detector and if required, a CISPR average detector.
The conducted emission measurements were made with the following detection of the test receiver.

Detection Type : Quasi-Peak/ CISPR Average
IF Bandwidth : 9kHz

5.5 Results

Summary of the test results : Pass
Refer to APPENDIX 1

SECTION 6: 6dB bandwidth & Occupied bandwidth (99%)

Test procedure
The bandwidth was measured with a spectrum analyzer connected to the antenna port.
The test was measured based on Method 8.1 Option 1 and 8.2 Option 2 of KDB 558074 "Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under §15.247".

Summary of the test results: Pass
Refer to APPENDIX 1

SECTION 7: Maximum peak output power

Test procedure
The Maximum Output Power was measured with a power meter connected to the antenna port.
The test was measured based on Method 9.1.2 PKPM1 of KDB 558074 "Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under §15.247" .

Detection type: Peak / Average *1)

Summary of the test results: Pass
Refer to APPENDIX 1

*1) Average detector was used only for Reference data.

SECTION 8: Out of band emissions (Antenna port conducted)

Test procedure
The Out of Band Emissions was measured with a spectrum analyzer connected to the antenna port.
The radio frequency power that is produced by the intentional radiator confirmed 20dB below that in the 100kHz bandwidth within the band that contains the highest level of the desired power, based on a radiated measurement.
In the frequency range below 30MHz, RBW was narrowed to separate the noise contents.
Then, wide-band noise near the limit was checked separately, however the noise was not detected as shown in the chart.
(9kHz-150kHz:RBW=200Hz, 150kHz-30MHz:RBW=10kHz)

Summary of the test results: Pass
Refer to APPENDIX 1

SECTION 9: Peak power density

Test procedure
The peak power density was measured with a spectrum analyzer connected to the antenna port.

Instrument used	:	Spectrum Analyzer
RBW / VBW	:	3kHz / 9.1kHz

The test was measured based on Method 10.2 PKPSD of KDB 558074 "Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under §15.247".

Summary of the test results: Pass
Refer to APPENDIX 1

SECTION 10: Radiated emission

10.1 Operating environment

Test place : See test data (APPENDIX 1)
Temperature : See test data (APPENDIX 1)
Humidity : See test data (APPENDIX 1)

10.2 Test configuration

EUT was placed on a polystyrene platform of nominal size, 0.5m by 1.0m, raised 0.8m above the conducting ground plane. Photographs of the set up are shown in APPENDIX 3.

10.3 Test conditions

Frequency range : 30MHz to 25GHz
EUT position : Table top

10.4 Test procedure

The Radiated Electric Field Strength intensity has been measured on a semi-anechoic chamber with a ground plane and at a distance of 3m (below 15GHz) / 1m (above 15GHz) (Refer to Figure 1). Measurements were performed with quasi-peak, peak and average detector. The measuring antenna height was varied between 1 and 4m and EUT was rotated a full revolution in order to obtain the maximum value of the electric field intensity. The measurements were performed for both vertical and horizontal antenna polarization.
The radiated emission measurements were made with the following detection.

Frequency	30-1000MHz	1-25GHz		20dBc
Detection type	Quasi-Peak	Peak	Average *1)	Peak
IF Bandwidth	120kHz	RBW: 1MHz VBW: 3MHz	RBW: 1MHz VBW: 3MHz Detector: Linear Voltage Averaging	RBW: 100kHz VBW: 300kHz

*1) Average Power Measurement was measured based on 12.2.5 of KDB 558074 "Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under §15.247”.

The carrier level and spurious levels were confirmed at each position of X, Y, Z axes and with Cradle of EUT to see the position of maximum noise, and the test was made at the position that has the maximum noise.
Refer to APPENDIX 3
Combinations of the worst case

Frequency / Antenna polarization	Carrier *2)	Spurious			
		Below 1GHz	1-15GHz	15-18GHz	15-25GHz
Horizontal	X	X	Y	Y	Y
Vertical	Y	with Cradle	Z	Z	Z

*2) with spurious emissions near carrier frequency.

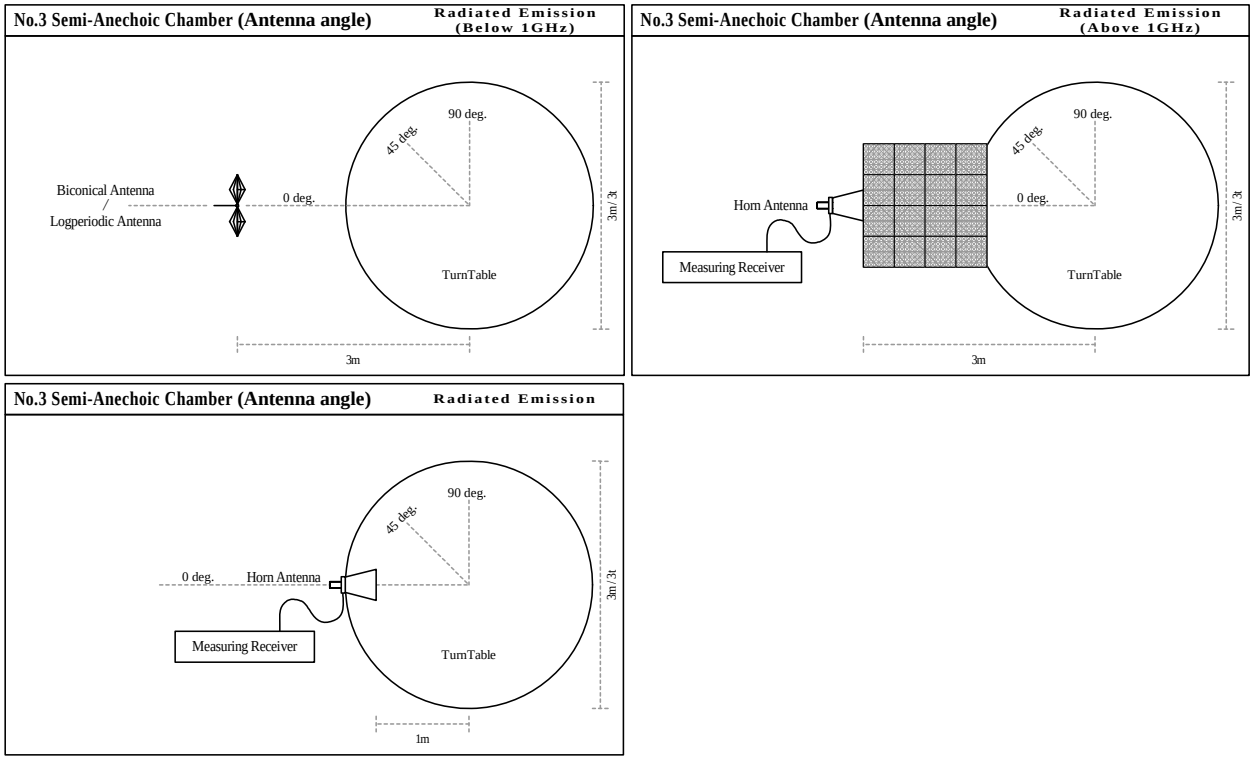


Figure 1. Antenna angle

10.5 Band edge

Band edge level at 2390MHz and 2483.5MHzis below the limits of FCC 15.209 and band edge level at 2400MHz is below the 20dBc. Refer to the data.

10.6 Results

Summary of the test results : Pass
* No noise was detected above the 5th order harmonics.

Refer to APPENDIX 1

Contents of APPENDIXES

APPENDIX 1: Data of Radio tests

Conducted emission
6dB bandwidth
Maximum peak output power
Radiated emission
Spurious emission (Antenna port conducted)
Peak power density
Occupied bandwidth

APPENDIX 2: Test instruments

Test instruments

APPENDIX 3: Photographs of test setup

Conducted emission
Radiated emission
Pre-check of the worst position

APPENDIX 1: Data of Radio tests

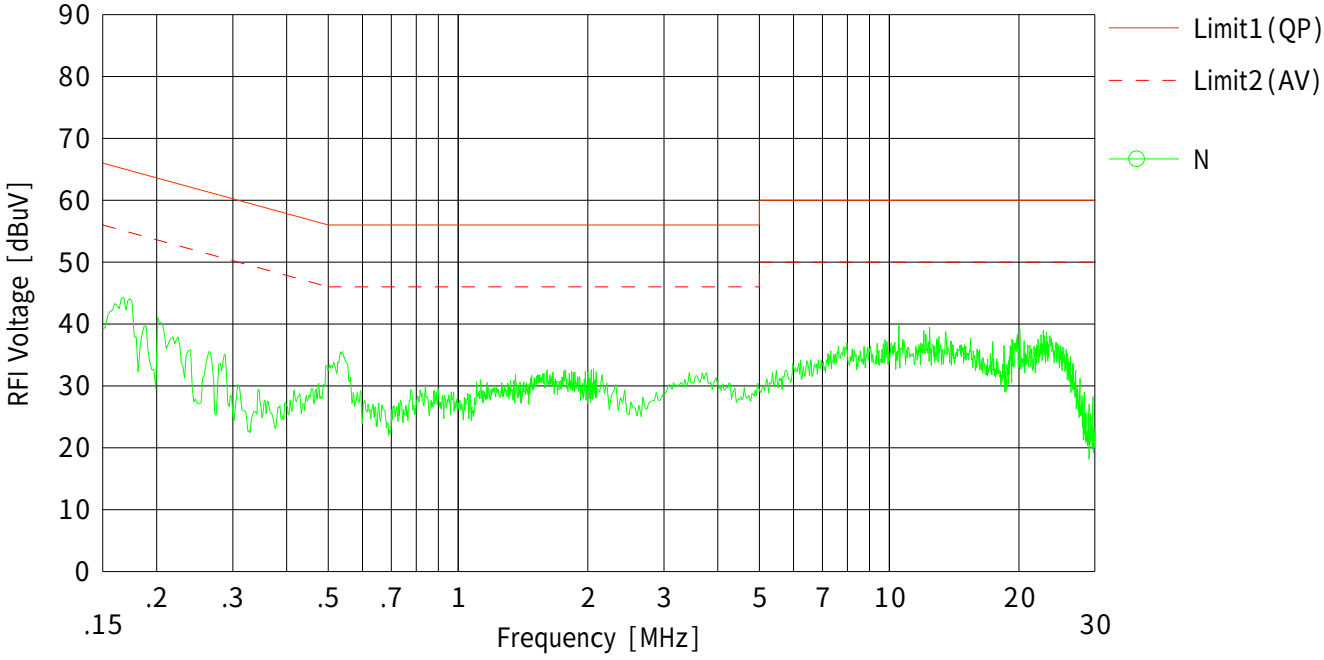
DATA OF CONDUCTED EMISSION TEST

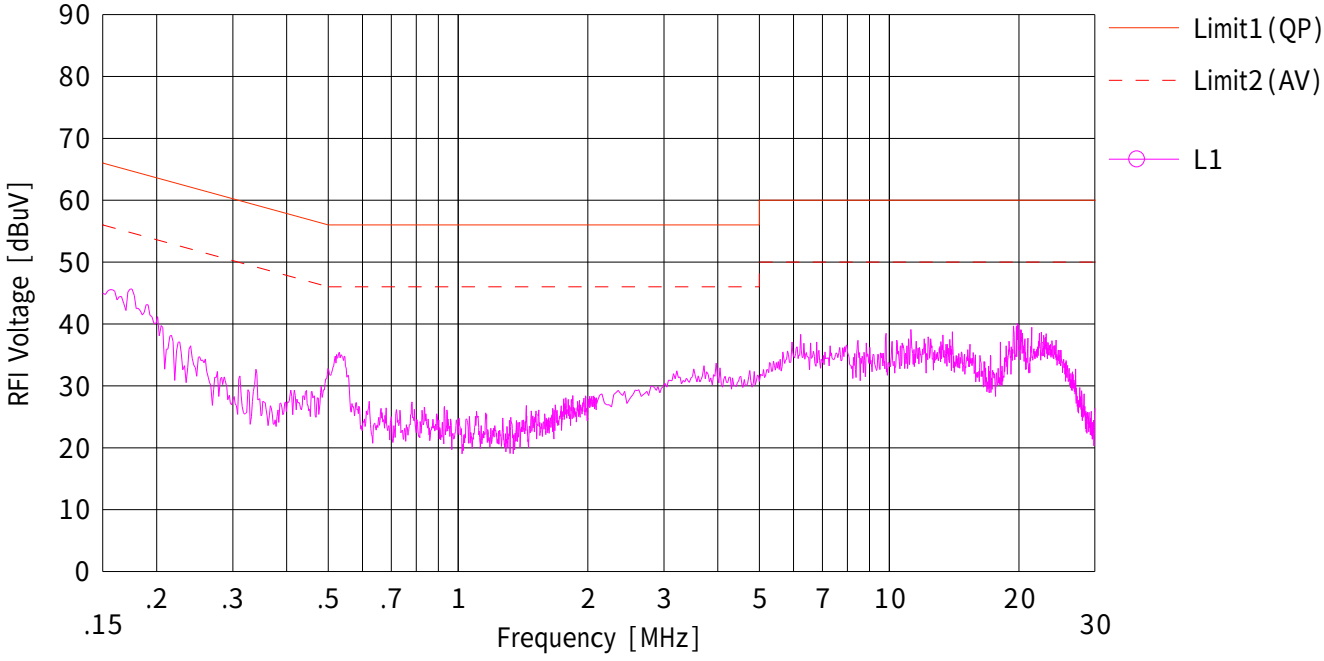
UL Japan, Inc. Shonan EMC Lab. No.6 Shielded Room
Date : 2014/12/19

Company	: TKR CORPORATION	Mode	: Bluetooth LE Tx 2402MHz
Kind of EUT	: ID NODE	Order No.	: 10603536S
Model No.	: MTD-04125N9	Power	: AC 120V / 60Hz
Serial No.	: No.03	Temp./Humi.	: 24deg.C. / 35%RH
Remarks	: **with PC**		

Limit1 : FCC 15C(15.207) QP
Limit2 : FCC 15C(15.207) AV

Engineer : Tomochika Sato





Calculation:Result[dBuV]=Reading[dBuV]+C.Fac(LISN+Cable+ATT)[dB]
LISN:SLS-02

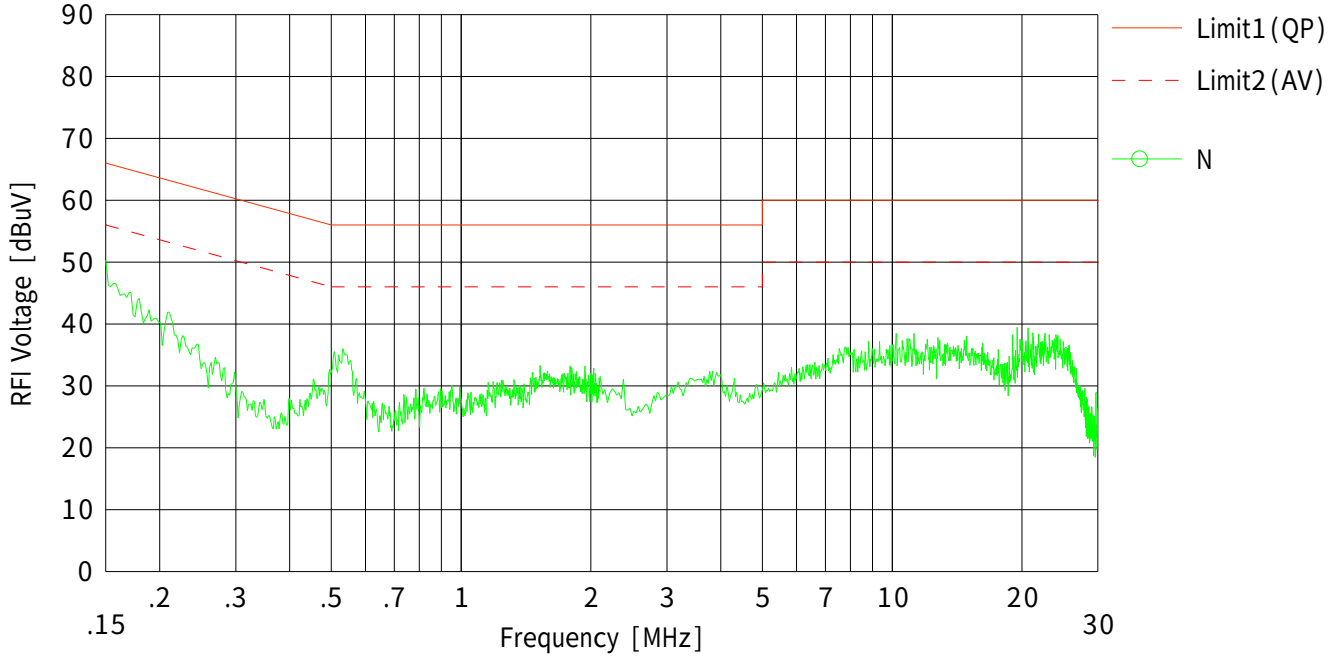
DATA OF CONDUCTED EMISSION TEST

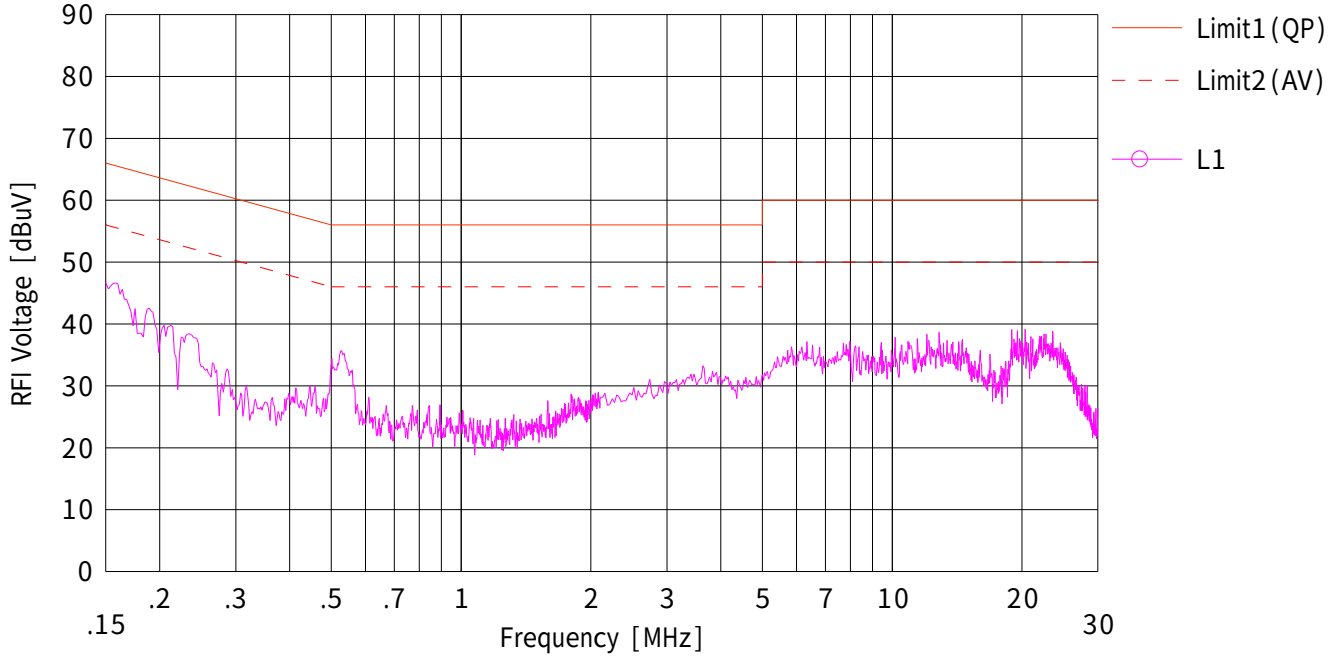
UL Japan, Inc. Shonan EMC Lab. No.6 Shielded Room
Date : 2014/12/19

Company	: TKR CORPORATION	Mode	: Bluetooth LE Tx 2440MHz
Kind of EUT	: ID NODE	Order No.	: 10603536S
Model No.	: MTD-04125N9	Power	: AC 120V / 60Hz
Serial No.	: No.03	Temp./Humi.	: 24deg.C. / 35%RH
Remarks	: **with PC**		

Limit1 : FCC 15C(15.207) QP
Limit2 : FCC 15C(15.207) AV

Engineer : Tomochika Sato





Calculation:Result[dBuV]=Reading[dBuV]+C.Fac(LISN+Cable+ATT)[dB]
LISN:SLS-02

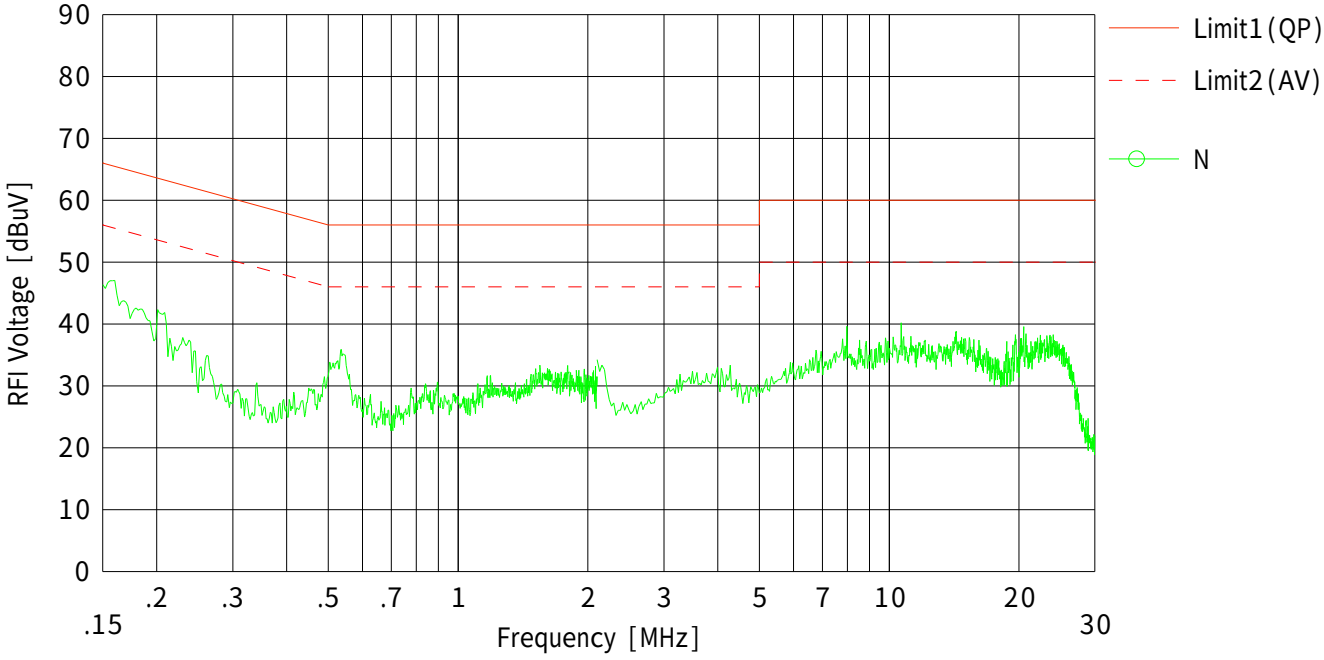
DATA OF CONDUCTED EMISSION TEST

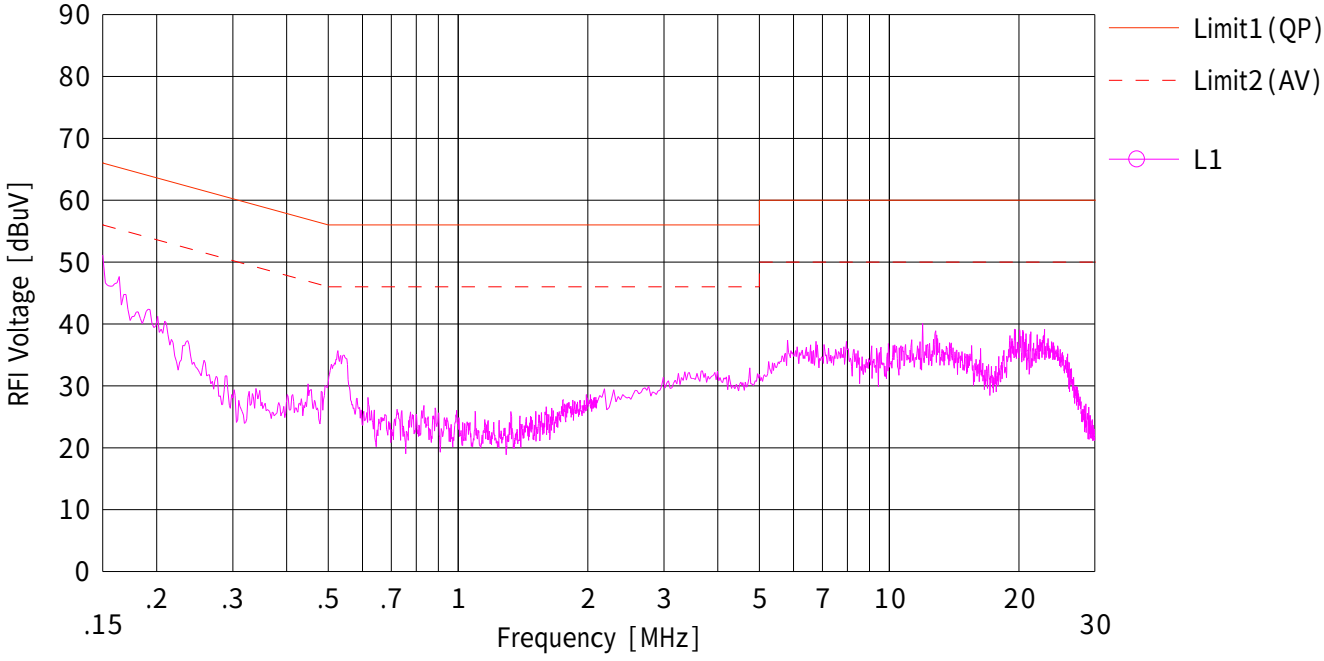
UL Japan, Inc. Shonan EMC Lab. No.6 Shielded Room
Date : 2014/12/19

Company	: TKR CORPORATION	Mode	: Bluetooth LE Tx 2480MHz
Kind of EUT	: ID NODE	Order No.	: 10603536S
Model No.	: MTD-04125N9	Power	: AC 120V / 60Hz
Serial No.	: No.03	Temp./Humi.	: 24deg.C. / 35%RH
Remarks	: **with PC**		

Limit1 : FCC 15C(15.207) QP
Limit2 : FCC 15C(15.207) AV

Engineer : Tomochika Sato





Calculation:Result[dBuV]=Reading[dBuV]+C.Fac(LISN+Cable+ATT)[dB]
LISN:SLS-02

DATA OF CONDUCTED EMISSION TEST

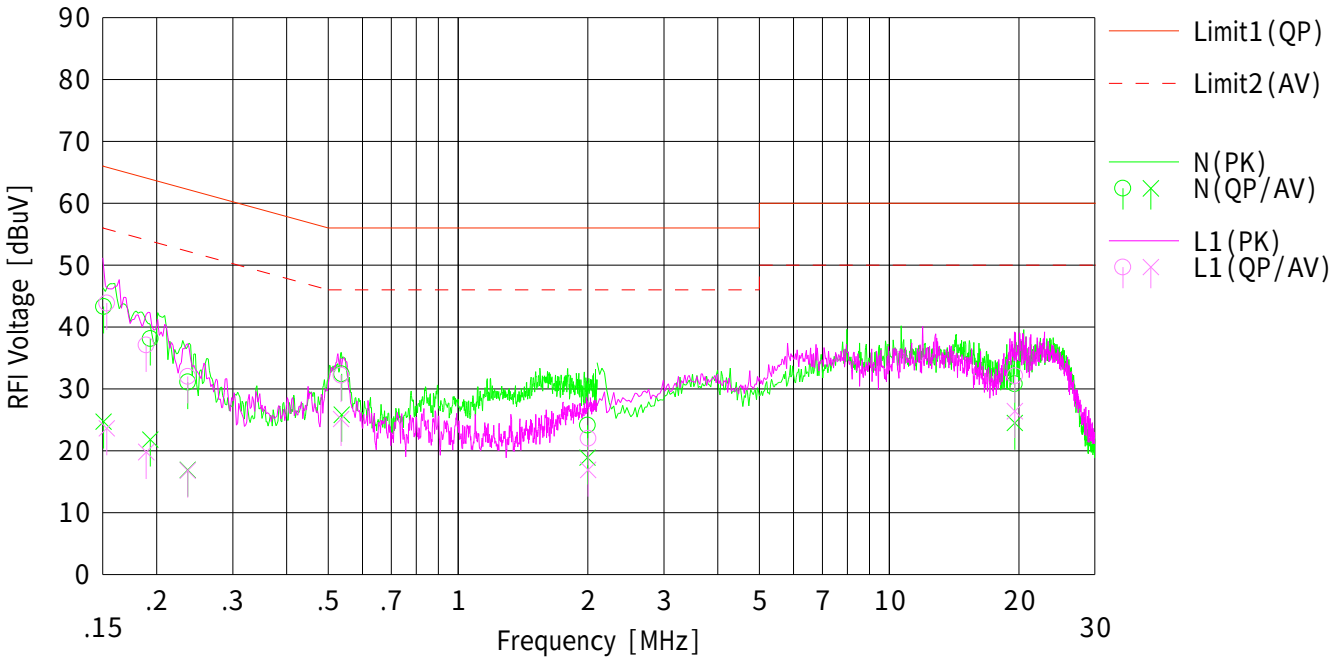
UL Japan, Inc. Shonan EMC Lab. No.6 Shielded Room
Date : 2014/12/19

Company : TKR CORPORATION
Kind of EUT : ID NODE
Model No. : MTD-04125N9
Serial No. : No.03
Remarks : **with PC**

Mode : Bluetooth LE Tx 2480MHz
Order No. : 10603536S
Power : AC 120V / 60Hz
Temp./Humi. : 24deg.C. / 35%RH

Limit1 : FCC 15C(15.207) QP
Limit2 : FCC 15C(15.207) AV

Engineer : Tomochika Sato



No.	Freq.	Reading		C.Fac	Results		Limit		Margin		Phase	Comment
		<QP>	<AV>		<QP>	<AV>	<QP>	<AV>	<QP>	<AV>		
	[MHz]	[dBuV]	[dBuV]	[dB]	[dBuV]	[dBuV]	[dBuV]	[dBuV]	[dB]	[dB]		
1	0.15060	30.7	12.1	12.6	43.3	24.7	65.9	55.9	22.6	31.2	N	
2	0.19320	25.5	9.2	12.6	38.1	21.8	63.8	53.8	25.7	32.0	N	
3	0.23600	18.5	4.3	12.6	31.1	16.9	62.2	52.2	31.1	35.3	N	
4	0.53650	19.8	13.2	12.6	32.4	25.8	56.0	46.0	23.6	20.2	N	
5	1.99700	11.4	6.2	12.7	24.1	18.9	56.0	46.0	31.9	27.1	N	
6	19.55660	17.2	10.9	13.6	30.8	24.5	60.0	50.0	29.2	25.5	N	
7	0.15310	31.3	11.0	12.6	43.9	23.6	65.8	55.8	21.9	32.2	L1	
8	0.18900	24.5	7.2	12.6	37.1	19.8	64.0	54.0	26.9	34.2	L1	
9	0.23590	19.4	4.2	12.6	32.0	16.8	62.2	52.2	30.2	35.4	L1	
10	0.53480	19.6	12.5	12.6	32.2	25.1	56.0	46.0	23.8	20.9	L1	
11	2.00320	9.3	4.2	12.7	22.0	16.9	56.0	46.0	34.0	29.1	L1	
12	19.57340	18.5	12.8	13.6	32.1	26.4	60.0	50.0	27.9	23.6	L1	

Calculation:Result[dBuV]=Reading[dBuV]+C.Fac(LISN+Cable+ATT)[dB]
LISN:SLS-02

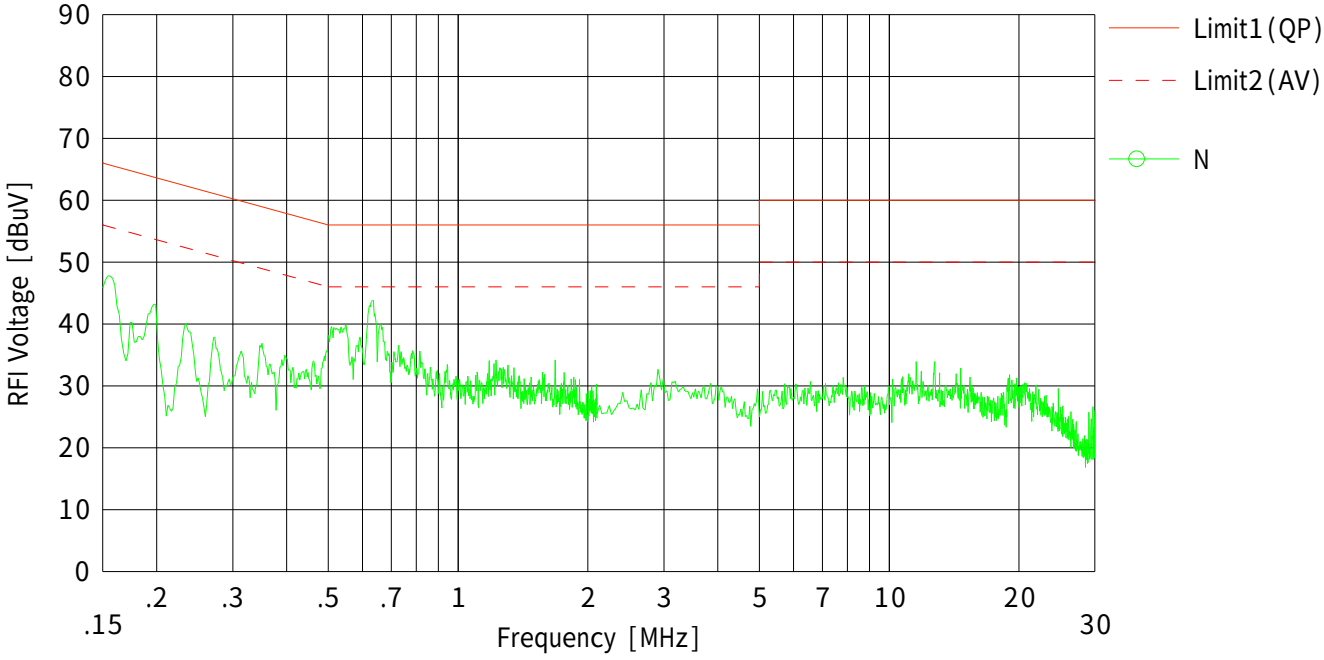
DATA OF CONDUCTED EMISSION TEST

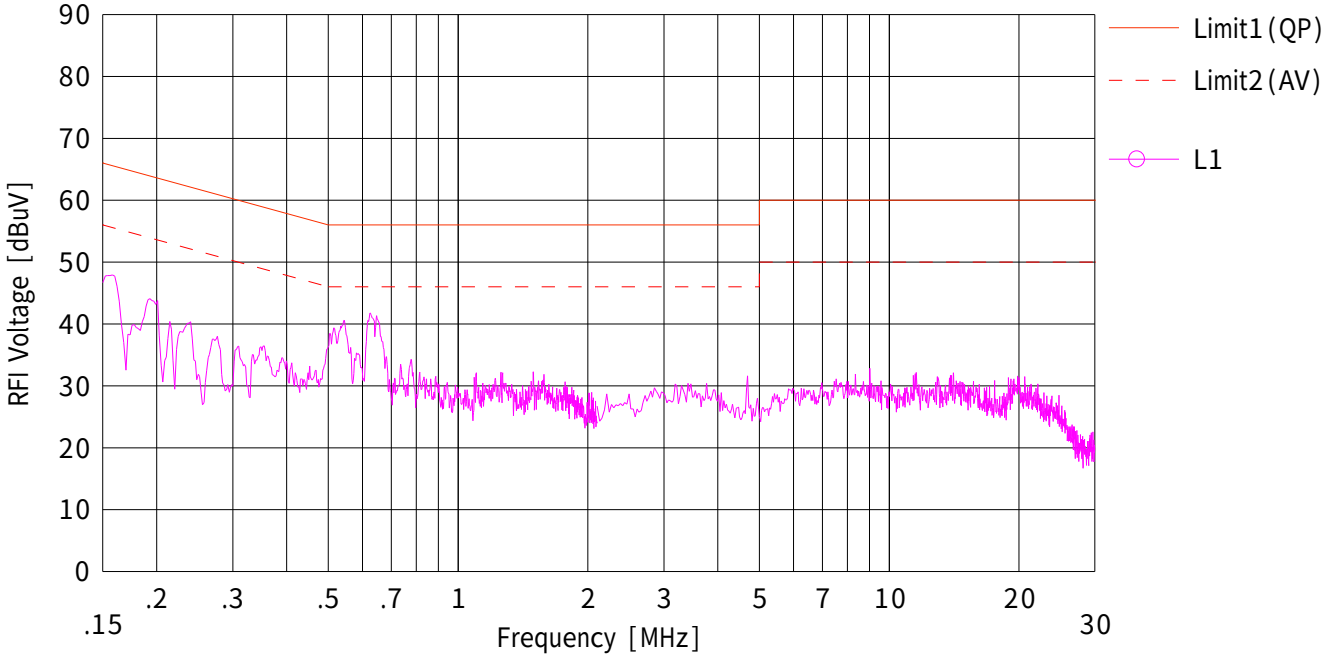
UL Japan, Inc. Shonan EMC Lab. No.6 Shielded Room
Date : 2014/12/19

Company	: TKR CORPORATION	Mode	: Bluetooth LE Tx 2402MHz
Kind of EUT	: ID NODE	Order No.	: 10603536S
Model No.	: MTD-04125N9	Power	: AC 120V / 60Hz
Serial No.	: No.03	Temp./Humi.	: 24deg.C. / 35%RH
Remarks	: with Cradle		

Limit1 : FCC 15C(15.207) QP
Limit2 : FCC 15C(15.207) AV

Engineer : Tomochika Sato





Calculation:Result[dBuV]=Reading[dBuV]+C.Fac(LISN+Cable+ATT)[dB]
LISN:SLS-01

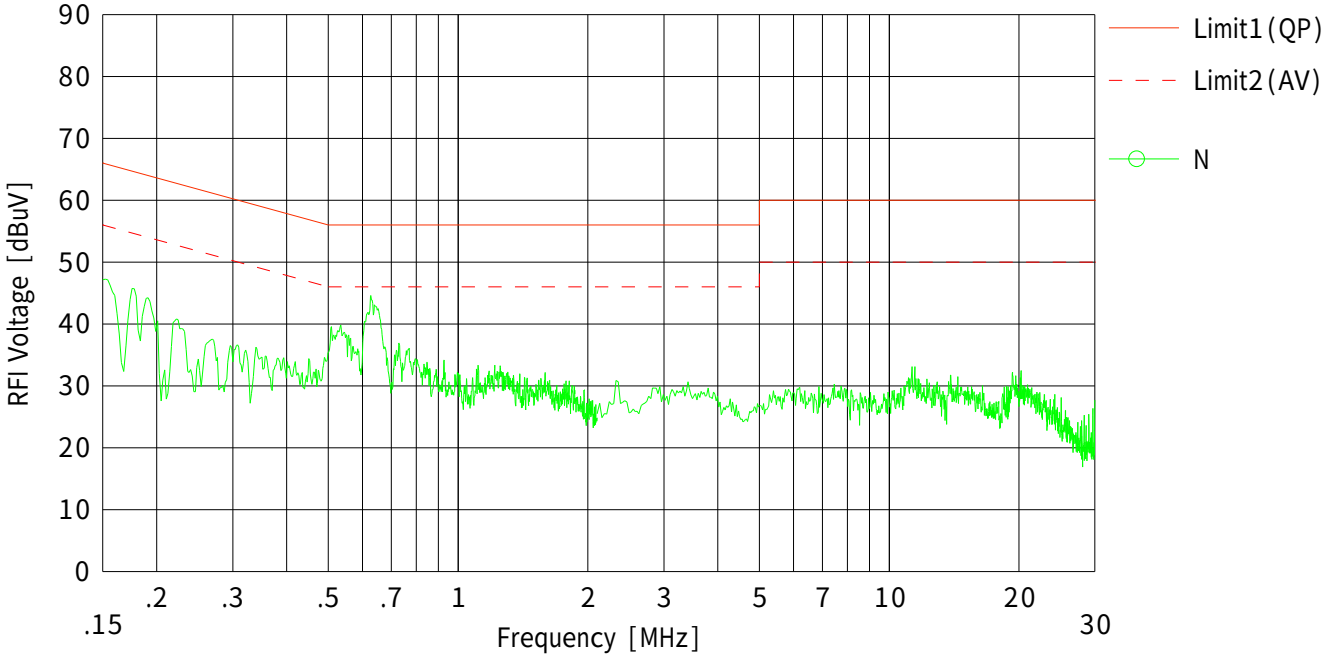
DATA OF CONDUCTED EMISSION TEST

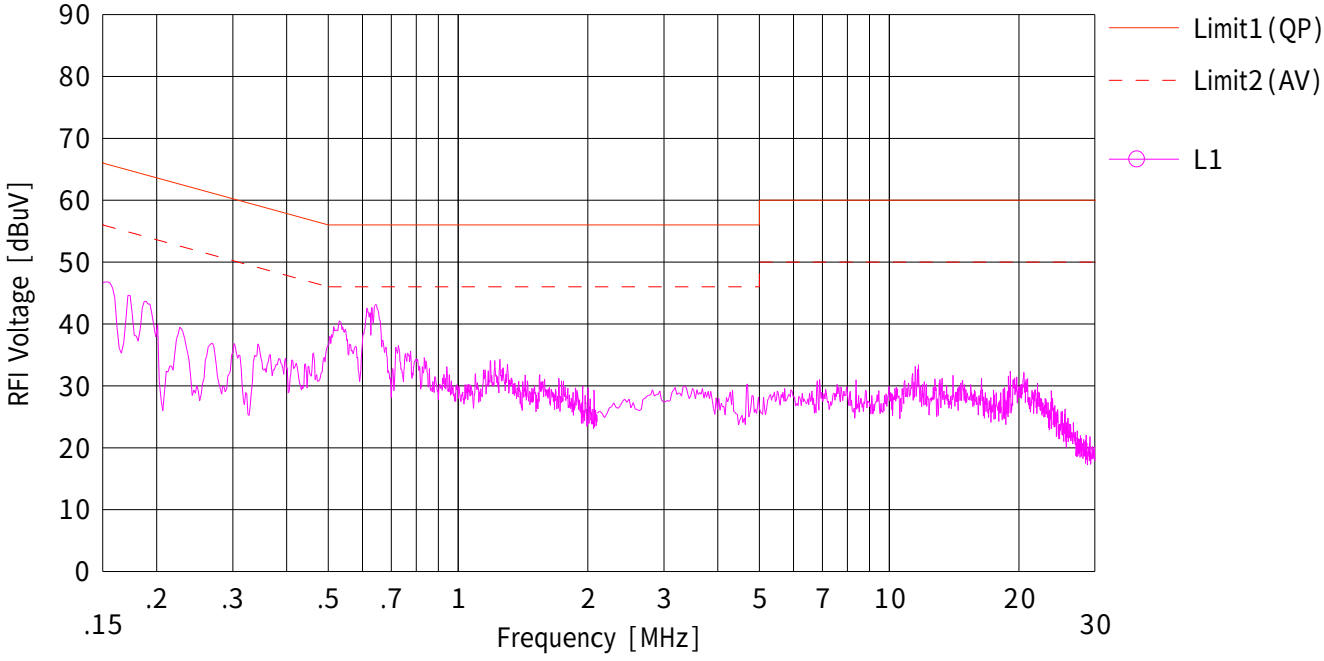
UL Japan, Inc. Shonan EMC Lab. No.6 Shielded Room
Date : 2014/12/19

Company	: TKR CORPORATION	Mode	: Bluetooth LE Tx 2440MHz
Kind of EUT	: ID NODE	Order No.	: 10603536S
Model No.	: MTD-04125N9	Power	: AC 120V / 60Hz
Serial No.	: No.03	Temp./Humi.	: 24deg.C. / 35%RH
Remarks	: with Cradle		

Limit1 : FCC 15C(15.207) QP
Limit2 : FCC 15C(15.207) AV

Engineer : Tomochika Sato





Calculation:Result[dBuV]=Reading[dBuV]+C.Fac(LISN+Cable+ATT)[dB]
LISN:SLS-01

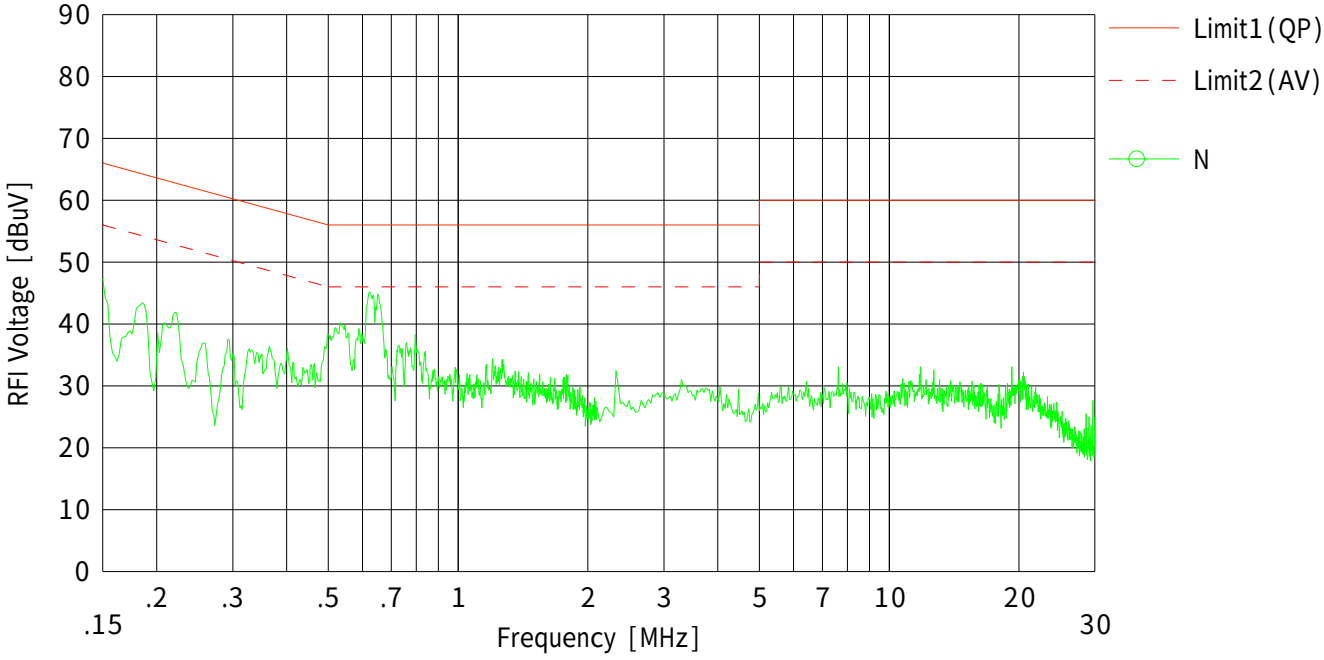
DATA OF CONDUCTED EMISSION TEST

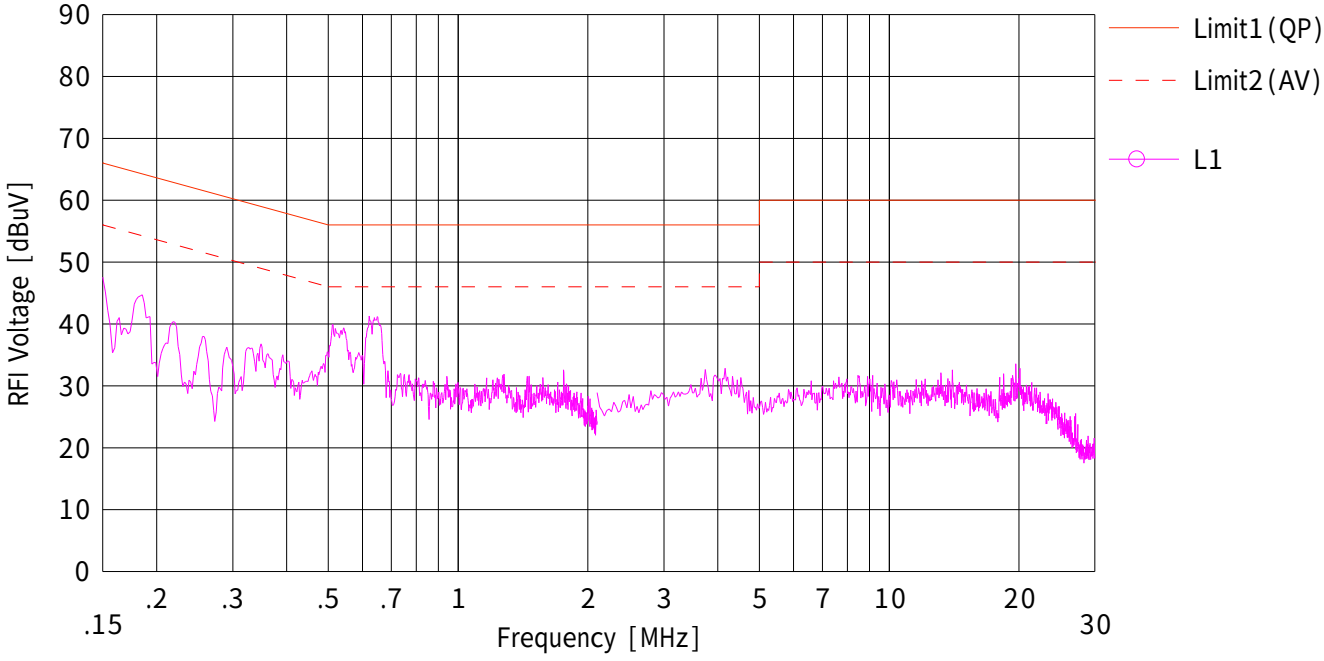
UL Japan, Inc. Shonan EMC Lab. No.6 Shielded Room
Date : 2014/12/19

Company	: TKR CORPORATION	Mode	: Bluetooth LE Tx 2480MHz
Kind of EUT	: ID NODE	Order No.	: 10603536S
Model No.	: MTD-04125N9	Power	: AC 120V / 60Hz
Serial No.	: No.03	Temp./Humi.	: 24deg.C. / 35%RH
Remarks	: with Cradle		

Limit1 : FCC 15C(15.207) QP
Limit2 : FCC 15C(15.207) AV

Engineer : Tomochika Sato





Calculation:Result[dBuV]=Reading[dBuV]+C.Fac(LISN+Cable+ATT)[dB]
LISN:SLS-01

DATA OF CONDUCTED EMISSION TEST

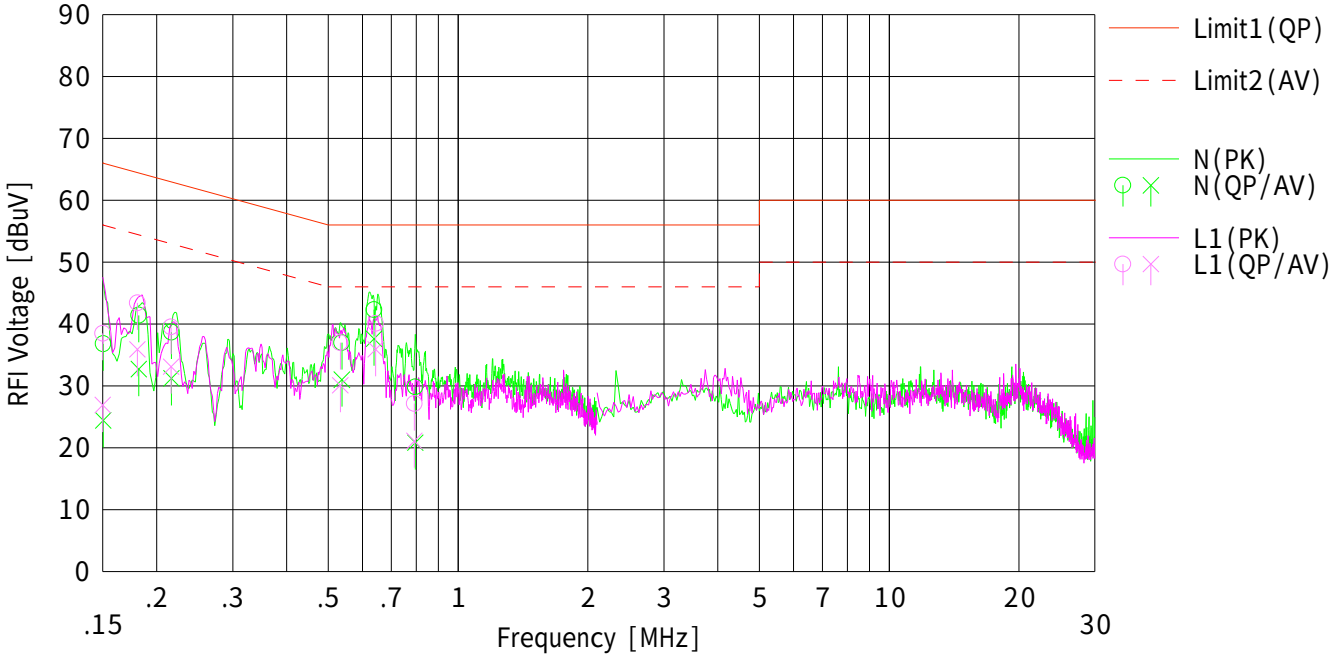
UL Japan, Inc. Shonan EMC Lab. No.6 Shielded Room
Date : 2014/12/19

Company : TKR CORPORATION
Kind of EUT : ID NODE
Model No. : MTD-04125N9
Serial No. : No.03
Remarks : with Cradle

Mode : Bluetooth LE Tx 2480MHz
Order No. : 10603536S
Power : AC 120V / 60Hz
Temp./Humi. : 24deg.C. / 35%RH

Limit1 : FCC 15C(15.207) QP
Limit2 : FCC 15C(15.207) AV

Engineer : Tomochika Sato



No.	Freq.	Reading		C.Fac	Results		Limit		Margin		Phase	Comment
		<QP>	<AV>		<QP>	<AV>	<QP>	<AV>	<QP>	<AV>		
	[MHz]	[dBuV]	[dBuV]	[dB]	[dBuV]	[dBuV]	[dBuV]	[dBuV]	[dB]	[dB]		
1	0.15030	24.2	11.8	12.6	36.8	24.4	65.9	55.9	29.1	31.5	N	
2	0.18160	28.9	20.2	12.5	41.4	32.7	64.4	54.4	23.0	21.7	N	
3	0.21620	26.1	18.6	12.6	38.7	31.2	62.9	52.9	24.2	21.7	N	
4	0.53720	24.5	18.5	12.5	37.0	31.0	56.0	46.0	19.0	15.0	N	
5	0.63810	29.7	25.0	12.6	42.3	37.6	56.0	46.0	13.7	8.4	N	
6	0.79590	17.2	8.2	12.6	29.8	20.8	56.0	46.0	26.2	25.2	N	
7	0.15010	25.9	14.3	12.6	38.5	26.9	65.9	55.9	27.4	29.0	L1	
8	0.18040	30.9	23.4	12.5	43.4	35.9	64.4	54.4	21.0	18.5	L1	
9	0.21570	26.9	20.5	12.6	39.5	33.1	62.9	52.9	23.4	19.8	L1	
10	0.53280	24.5	17.6	12.5	37.0	30.1	56.0	46.0	19.0	15.9	L1	
11	0.64360	27.5	23.3	12.6	40.1	35.9	56.0	46.0	15.9	10.1	L1	
12	0.79180	14.5	8.5	12.6	27.1	21.1	56.0	46.0	28.9	24.9	L1	

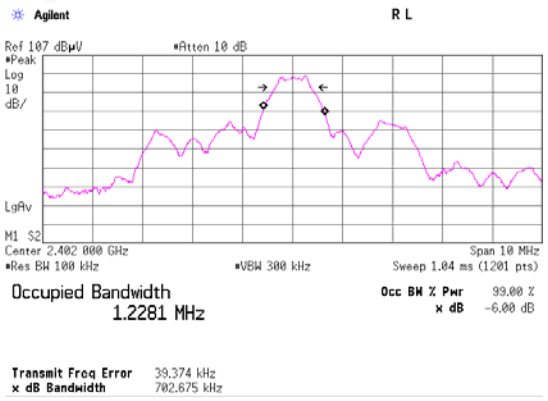
Calculation:Result[dBuV]=Reading[dBuV]+C.Fac(LISN+Cable+ATT)[dB]
LISN:SLS-01

-6dB Bandwidth

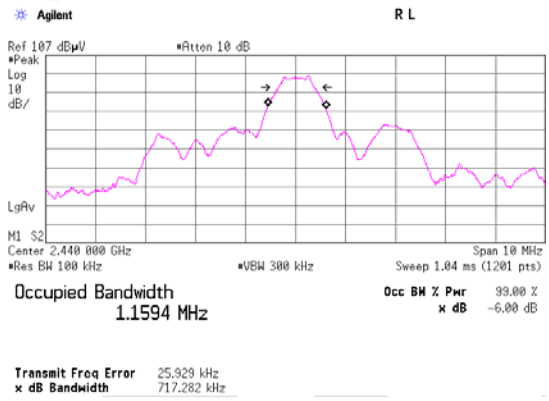
Test place	UL Japan, Inc. Shonan EMC Lab.	No.3 Shielded Room
Date	December 18, 2014	
Temperature / Humidity	23deg.C , 38%RH	
Engineer	Makoto Hosaka	
Mode	Tx, Bluetooth LE, PN9	

Freq. [MHz]	-6dB Bandwidth [MHz]	Limit [MHz]
2402.0000	0.703	> 0.500
2440.0000	0.717	> 0.500
2480.0000	0.711	> 0.500

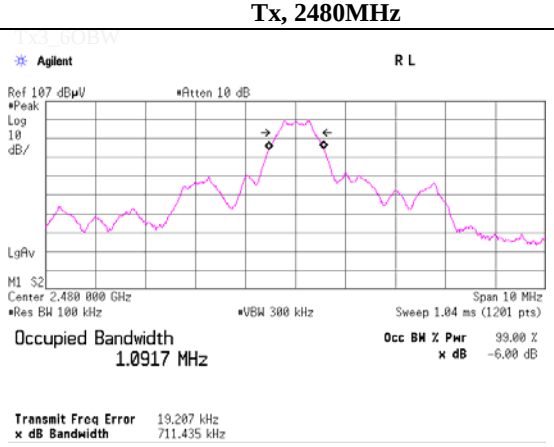
Tx, 2402MHz



Tx, 2440MHz



Tx, 2480MHz



UL Japan, Inc.
Shonan EMC Lab.
1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa 259-1220 JAPAN
Telephone : +81 463 50 6400
Facsimile : +81 463 50 6401

Maximum Peak Conducted Output Power

(PKPM1)

Test place	UL Japan, Inc. Shonan EMC Lab.	No.3 Shielded Room
Date	December 18, 2014	
Temperature / Humidity	23deg.C , 38%RH	
Engineer	Makoto Hosaka	
Mode	Tx, Bluetooth LE, PN9,	

(* P/M: Power Meter with power sensor)

Ch	Freq.	P/M (Peak) Reading	Cable Loss	Atten. Loss	Result		Limit		Margin
	[MHz]	[dBm]	[dB]	[dB]	[dBm]	[mW]	[dBm]	[mW]	[dB]
Low	2402.0	-10.67	0.77	9.90	0.00	1.00	30.00	1000	30.00
Mid	2440.0	-10.63	0.78	9.90	0.05	1.01	30.00	1000	29.95
High	2480.0	-10.43	0.79	9.90	0.26	1.06	30.00	1000	29.74

Sample Calculation:

Result = Reading + Cable Loss (including the cable(s) customer supplied) + Atten. Loss

UL Japan, Inc.
Shonan EMC Lab.

1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa 259-1220 JAPAN
Telephone : +81 463 50 6400
Facsimile : +81 463 50 6401

(Reference) Maximum Conducted Output Power

(AVGPM)

Test place	UL Japan, Inc. Shonan EMC Lab. No.3 Shielded Room
Date	January 23, 2011
Temperature / Humidity	23deg.C , 45%RH
Engineer	Makoto Hosaka
Mode	Tx, Bluetooth LE, PN9,

(* P/M: Power Meter with power sensor, AV: Average)

Ch	Freq.	P/M (AV) Reading	Cable Loss	Atten. Loss	Duty Factor	Result		Limit		Margin
	[MHz]	[dBm]	[dB]	[dB]	[dB]	[dBm]	[mW]	[dBm]	[mW]	[dB]
Low	2402.0	-11.03	0.77	9.90	0.00	-0.36	0.92	30.00	1000	30.36
Mid	2440.0	-11.00	0.78	9.90	0.00	-0.32	0.93	30.00	1000	30.32
High	2480.0	-10.76	0.79	9.90	0.00	-0.07	0.98	30.00	1000	30.07

Sample Calculation:

Result = Reading + Cable Loss (including the cable(s) customer supplied) + Atten. Loss + Duty Factor

E.I.R.P = Result + Antenna Gain

UL Japan, Inc.
Shonan EMC Lab.

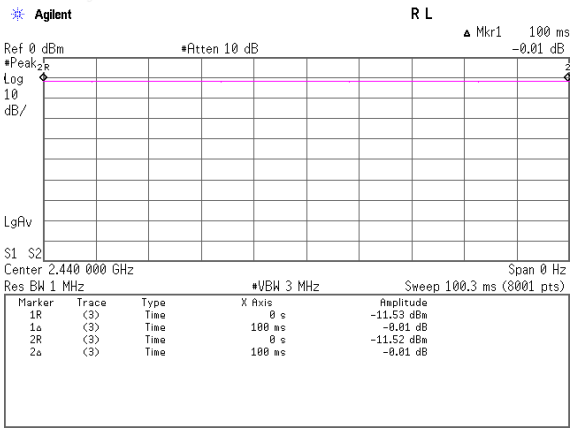
1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa 259-1220 JAPAN
Telephone : +81 463 50 6400
Facsimile : +81 463 50 6401

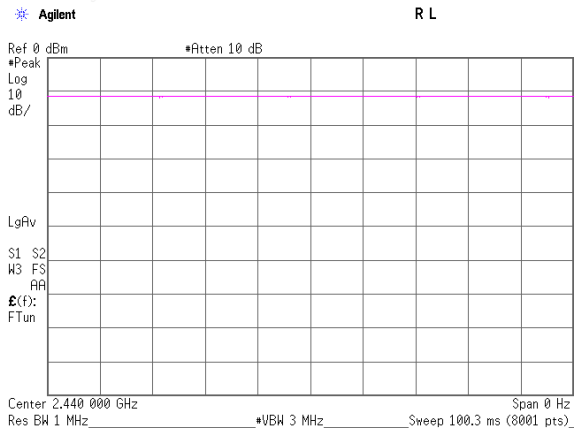
Test place	UL Japan, Inc. Shonan EMC Lab.	No.3 Shielded Room
Date	December 18, 2014	
Temperature / Humidity	23deg.C , 38%RH	
Engineer	Makoto Hosaka	

Burst rate confirmation

Tx, Bluetooth LE, PN9

Tx2_duty1	Tx2_duty2





UL Japan, Inc.
Shonan EMC Lab.
1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa 259-1220 JAPAN
Telephone : +81 463 50 6400
Facsimile : +81 463 50 6401

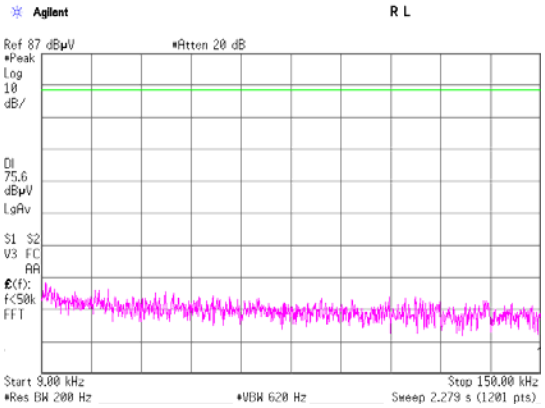
Test place	UL Japan, Inc. Shonan EMC Lab.	No.3 Shielded Room
Date	December 18, 2014	
Temperature / Humidity	23deg.C , 38%RH	
Engineer	Makoto Hosaka	

Spurious emission (Conducted)

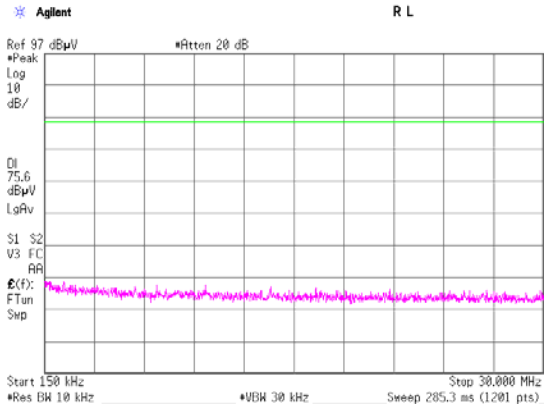
Tx, Bluetooth LE, PN9

Tx, 2402MHz (below 30MHz)

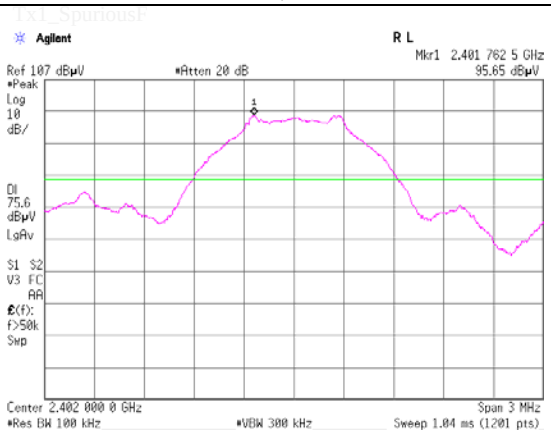
9kHz - 150kHz



150kHz - 30MHz



Carrier, 20dBc Limit



UL Japan, Inc.
Shonan EMC Lab.
1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa 259-1220 JAPAN
Telephone : +81 463 50 6400
Facsimile : +81 463 50 6401

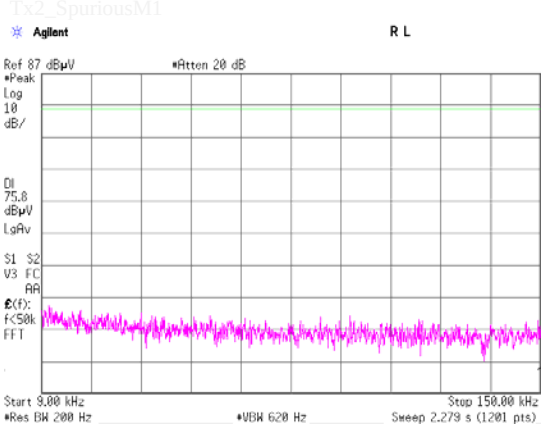
Test place	UL Japan, Inc. Shonan EMC Lab.	No.3 Shielded Room
Date	December 18, 2014	
Temperature / Humidity	23deg.C , 38%RH	
Engineer	Makoto Hosaka	

Spurious emission (Conducted)

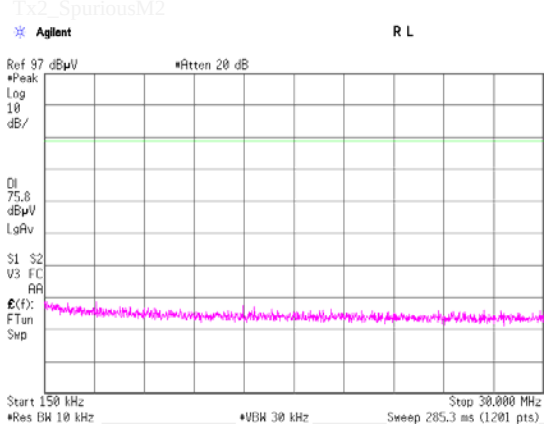
Tx, Bluetooth LE, PN9

Tx, 2440MHz (below 30MHz)

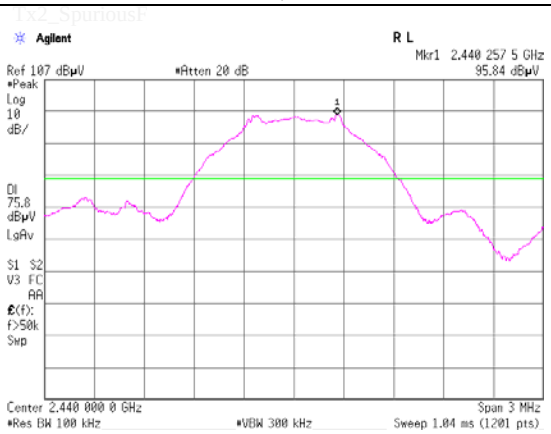
9kHz - 150kHz



150kHz - 30MHz



Carrier, 20dBc Limit



UL Japan, Inc.
Shonan EMC Lab.
1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa 259-1220 JAPAN
Telephone : +81 463 50 6400
Facsimile : +81 463 50 6401

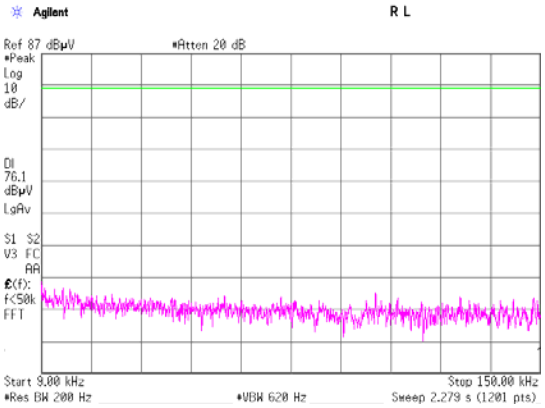
Test place	UL Japan, Inc. Shonan EMC Lab.	No.3 Shielded Room
Date	December 18, 2014	
Temperature / Humidity	23deg.C , 38%RH	
Engineer	Makoto Hosaka	

Spurious emission (Conducted)

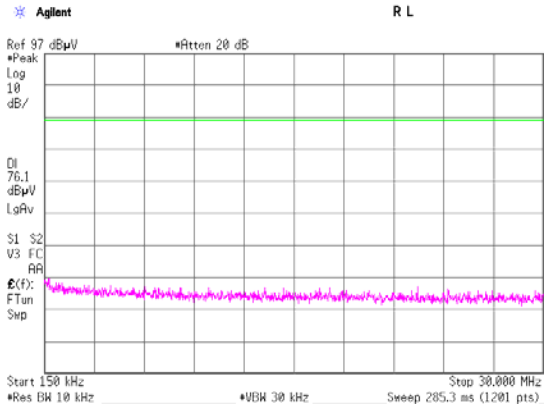
Tx, Bluetooth LE, PN9

Tx, 2480MHz (below 30MHz)

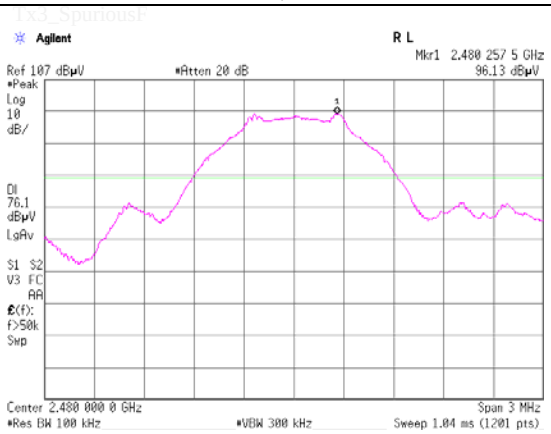
9kHz - 150kHz



150kHz - 30MHz



Carrier, 20dBc Limit



UL Japan, Inc.
Shonan EMC Lab.
1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa 259-1220 JAPAN
Telephone : +81 463 50 6400
Facsimile : +81 463 50 6401

Maximum Power Spectral Density

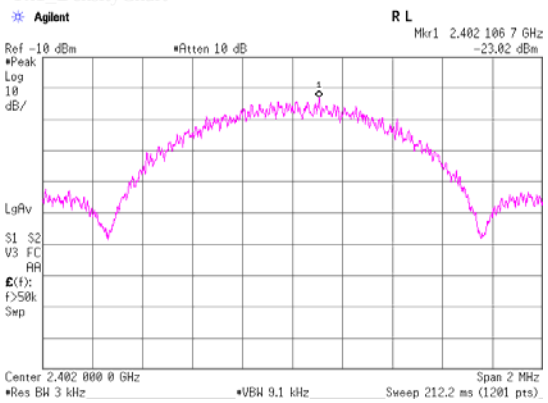
(PKPSD)

Test place	UL Japan, Inc. Shonan EMC Lab.	No.3 Shielded Room
Date	December 18, 2014	
Temperature / Humidity	23deg.C , 38%RH	
Engineer	Makoto Hosaka	
Mode	Tx, Bluetooth LE, PN9	

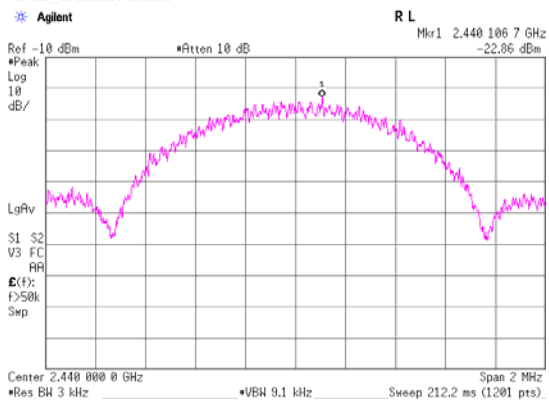
Ch. Freq. [MHz]	Freq. Reading [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. [dB]	Result [dBm]	Limit [dBm]	Margin [dB]
2402.0000	2402.11	-23.02	0.77	9.90	-12.35	8.00	20.35
2440.0000	2440.11	-22.86	0.78	9.90	-12.18	8.00	20.18
2480.0000	2480.11	-22.61	0.79	9.90	-11.92	8.00	19.92

Sample Calculation:
Result = Reading + Cable Loss (including the cable(s) customer supplied) + Atten. Loss

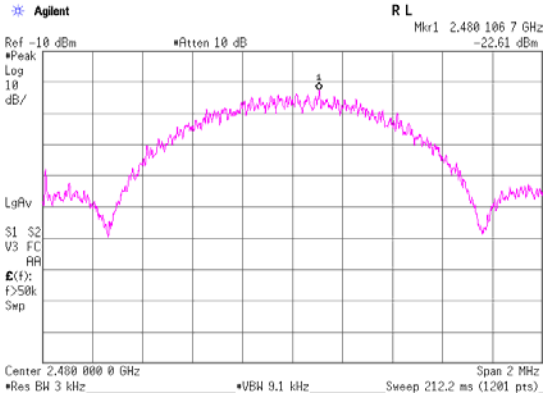
Tx, 2402MHz



Tx, 2440MHz



Tx, 2480MHz



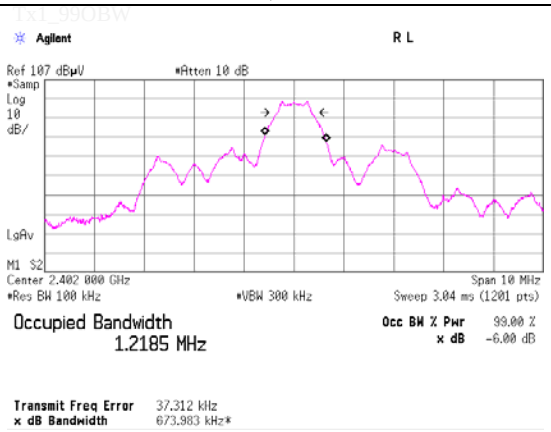
UL Japan, Inc.
Shonan EMC Lab.
1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa 259-1220 JAPAN
Telephone : +81 463 50 6400
Facsimile : +81 463 50 6401

Test place	UL Japan, Inc. Shonan EMC Lab.	No.3 Shielded Room
Date	December 18, 2014	
Temperature / Humidity	23deg.C , 38%RH	
Engineer	Makoto Hosaka	

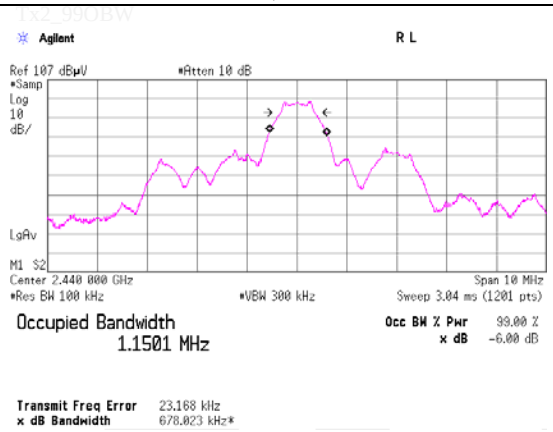
99% Occupied Bandwidth

Tx, Bluetooth LE, PN9

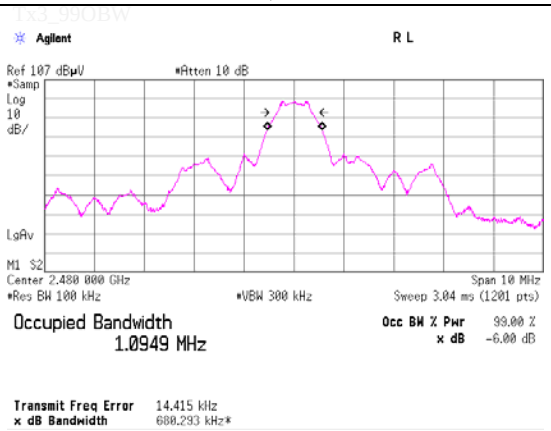
Tx, 2402MHz



Tx, 2440MHz



Tx, 2480MHz



UL Japan, Inc.
Shonan EMC Lab.
1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa 259-1220 JAPAN
Telephone : +81 463 50 6400
Facsimile : +81 463 50 6401

Radiated Emission

UL Japan, Inc. Shonan EMC Lab.

Test place	No.3 Semi Anechoic Chamber	
Date	December 16, 2014	December 18, 2014
Temperature / Humidity	22 deg.C, 31 %RH	22 deg.C, 31 %RH
Engineer	Makoto Hosaka	
Mode	Tx, 2402 MHz	
	Bluetooth LE	

(* PK: Peak, AV: Average, QP: Quasi-Peak)

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle [deg]	Remark
Hori.	64.611	QP	50.7	7.1	6.4	32.2	32.0	40.0	8.0	304	183	
Hori.	2390.000	PK	46.5	26.4	13.6	41.1	45.4	73.9	28.5	100	283	
Hori.	4804.000	PK	51.9	30.6	5.5	39.8	48.2	73.9	25.7	100	216	
Hori.	7206.000	PK	46.6	36.6	6.9	40.2	49.9	73.9	24.0	100	0	
Hori.	9608.000	PK	45.8	38.5	7.9	40.1	52.1	73.9	21.8	100	0	
Hori.	12010.000	PK	46.1	39.5	8.9	39.6	54.9	73.9	19.0	100	0	
Hori.	2390.000	AV	37.0	26.4	13.6	41.1	35.9	53.9	18.0	100	283	
Hori.	4804.000	AV	48.4	30.6	5.5	39.8	44.7	53.9	9.2	100	216	
Hori.	7206.000	AV	36.9	36.6	6.9	40.2	40.2	53.9	13.7	100	0	
Hori.	9608.000	AV	36.7	38.5	7.9	40.1	43.0	53.9	10.9	100	0	
Hori.	12010.000	AV	37.2	39.5	8.9	39.6	46.0	53.9	7.9	100	0	
Vert.	52.595	QP	51.1	9.8	6.7	32.2	35.4	40.0	4.6	100	143	
Vert.	54.574	QP	53.9	9.3	6.7	32.2	37.7	40.0	**2.3**	100	139	
Vert.	64.813	QP	53.9	7.0	6.4	32.2	35.1	40.0	4.9	100	107	
Vert.	2390.000	PK	45.8	26.4	13.6	41.1	44.7	73.9	29.2	100	260	
Vert.	4804.000	PK	51.9	30.6	5.5	39.8	48.2	73.9	25.7	100	195	
Vert.	7206.000	PK	45.6	36.6	6.9	40.2	48.9	73.9	25.0	100	0	
Vert.	9608.000	PK	46.1	38.5	7.9	40.1	52.4	73.9	21.5	100	0	
Vert.	12010.000	PK	46.1	39.5	8.9	39.6	54.9	73.9	19.0	100	0	
Vert.	2390.000	AV	36.5	26.4	13.6	41.1	35.4	53.9	18.5	100	260	
Vert.	4804.000	AV	47.6	30.6	5.5	39.8	43.9	53.9	10.0	100	195	
Vert.	7206.000	AV	36.6	36.6	6.9	40.2	39.9	53.9	14.0	100	0	
Vert.	9608.000	AV	36.5	38.5	7.9	40.1	42.8	53.9	11.1	100	0	
Vert.	12010.000	AV	37.4	39.5	8.9	39.6	46.2	53.9	7.7	100	0	

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18GHz)-Distance factor(above 15GHz)) - Gain(Amprifier)
Distance factor : 15GHz -40GHz : 20log(3.0m/1.0m)= 9.5dB

20dBc Data Sheet **(RBW 100kHz, VBW 300kHz)**

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	2402.000	PK	91.3	26.4	13.6	41.1	90.2	-	-	
Hori.	2399.274	PK	61.6	26.4	13.6	41.1	60.5	70.2	9.7	
Hori.	2400.000	PK	57.4	26.4	13.6	41.1	56.3	70.2	13.9	
Vert.	2402.000	PK	90.6	26.4	13.6	41.1	89.5	-	-	
Vert.	2399.274	PK	60.8	26.4	13.6	41.1	59.7	69.5	9.8	
Vert.	2400.000	PK	57.0	26.4	13.6	41.1	55.9	69.5	13.6	

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18GHz)-Distance factor(above 15GHz)) - Gain(Amprifier)
Distance factor : 15GHz -40GHz : 20log(3.0m/1.0m)= 9.5dB

Radiated Emission

UL Japan, Inc. Shonan EMC Lab.

Test place	No.3 Semi Anechoic Chamber	
Date	December 16, 2014	December 18, 2014
Temperature / Humidity	22 deg.C, 31 %RH	22 deg.C, 31 %RH
Engineer	Makoto Hosaka	
Mode	Tx, 2440 MHz	
	Bluetooth LE	

(* PK: Peak, AV: Average, QP: Quasi-Peak)

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle [deg]	Remark
Hori.	63.540	QP	50.3	7.2	6.4	32.2	31.7	40.0	8.3	314	182	
Hori.	4880.000	PK	52.0	30.9	5.5	39.7	48.7	73.9	25.2	100	216	
Hori.	7320.000	PK	45.3	36.8	6.8	40.3	48.6	73.9	25.3	100	0	
Hori.	9760.000	PK	46.0	38.6	8.0	40.0	52.6	73.9	21.3	100	0	
Hori.	12200.000	PK	45.7	39.4	9.0	39.8	54.3	73.9	19.6	100	0	
Hori.	4880.000	AV	49.0	30.9	5.5	39.7	45.7	53.9	8.2	100	216	
Hori.	7320.000	AV	36.5	36.8	6.8	40.3	39.8	53.9	14.1	100	0	
Hori.	9760.000	AV	36.4	38.6	8.0	40.0	43.0	53.9	10.9	100	0	
Hori.	12200.000	AV	36.2	39.4	9.0	39.8	44.8	53.9	9.1	100	0	
Vert.	52.605	QP	51.5	9.8	6.7	32.2	35.8	40.0	4.2	100	150	
Vert.	54.573	QP	53.9	9.3	6.7	32.2	37.7	40.0	**2.3**	100	129	
Vert.	64.509	QP	53.9	7.1	6.4	32.2	35.2	40.0	4.8	100	133	
Vert.	4880.000	PK	51.8	30.9	5.5	39.7	48.5	73.9	25.4	100	110	
Vert.	7320.000	PK	45.2	36.8	6.8	40.3	48.5	73.9	25.4	100	0	
Vert.	9760.000	PK	44.9	38.6	8.0	40.0	51.5	73.9	22.4	100	0	
Vert.	12200.000	PK	45.1	39.4	9.0	39.8	53.7	73.9	20.2	100	0	
Vert.	4880.000	AV	48.7	30.9	5.5	39.7	45.4	53.9	8.5	100	110	
Vert.	7320.000	AV	36.6	36.8	6.8	40.3	39.9	53.9	14.0	100	0	
Vert.	9760.000	AV	36.0	38.6	8.0	40.0	42.6	53.9	11.3	100	0	
Vert.	12200.000	AV	36.3	39.4	9.0	39.8	44.9	53.9	9.0	100	0	

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18GHz)-Distance factor(above 15GHz)) - Gain(Amprifier)
Distance factor : 15GHz -40GHz : 20log(3.0m/1.0m)= 9.5dB

UL Japan, Inc.
Shonan EMC Lab.
1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa 259-1220 JAPAN
Telephone : +81 463 50 6400
Facsimile : +81 463 50 6401

Radiated Emission

UL Japan, Inc. Shonan EMC Lab.

Test place	No.3 Semi Anechoic Chamber	
Date	December 16, 2014	December 18, 2014
Temperature / Humidity	22 deg.C, 31 %RH	22 deg.C, 31 %RH
Engineer	Makoto Hosaka	
Mode	Tx, 2480 MHz	
	Bluetooth LE	

(* PK: Peak, AV: Average, QP: Quasi-Peak)

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle [deg]	Remark
Hori.	64.627	QP	50.3	7.1	6.4	32.2	31.6	40.0	8.4	326	182	
Hori.	2483.500	PK	49.2	26.6	13.6	41.1	48.3	73.9	25.6	100	45	
Hori.	4960.000	PK	52.5	31.2	5.6	39.6	49.7	73.9	24.2	100	197	
Hori.	7440.000	PK	45.7	37.0	6.8	40.4	49.1	73.9	24.8	100	0	
Hori.	9920.000	PK	44.7	38.6	8.1	39.9	51.5	73.9	22.4	100	0	
Hori.	12400.000	PK	44.3	39.3	9.0	40.0	52.6	73.9	21.3	100	0	
Hori.	2483.500	AV	44.2	26.6	13.6	41.1	43.3	53.9	10.6	100	45	
Hori.	4960.000	AV	49.3	31.2	5.6	39.6	46.5	53.9	7.4	100	197	
Hori.	7440.000	AV	36.7	37.0	6.8	40.4	40.1	53.9	13.8	100	0	
Hori.	9920.000	AV	35.6	38.6	8.1	39.9	42.4	53.9	11.5	100	0	
Hori.	12400.000	AV	35.3	39.3	9.0	40.0	43.6	53.9	10.3	100	0	
Vert.	52.604	QP	51.4	9.8	6.7	32.2	35.7	40.0	4.3	100	150	
Vert.	54.569	QP	53.9	9.3	6.7	32.2	37.7	40.0	**2.3**	100	130	
Vert.	64.814	QP	53.9	7.0	6.4	32.2	35.1	40.0	4.9	100	110	
Vert.	2483.500	PK	49.1	26.6	13.6	41.1	48.2	73.9	25.7	100	264	
Vert.	4960.000	PK	51.9	31.2	5.6	39.6	49.1	73.9	24.8	100	60	
Vert.	7440.000	PK	45.9	37.0	6.8	40.4	49.3	73.9	24.6	100	0	
Vert.	9920.000	PK	45.8	38.6	8.1	39.9	52.6	73.9	21.3	100	0	
Vert.	12400.000	PK	45.5	39.3	9.0	40.0	53.8	73.9	20.1	100	0	
Vert.	2483.500	AV	44.0	26.6	13.6	41.1	43.1	53.9	10.8	100	264	
Vert.	4960.000	AV	48.6	31.2	5.6	39.6	45.8	53.9	8.1	100	60	
Vert.	7440.000	AV	36.8	37.0	6.8	40.4	40.2	53.9	13.7	100	0	
Vert.	9920.000	AV	35.7	38.6	8.1	39.9	42.5	53.9	11.4	100	0	
Vert.	12400.000	AV	35.7	39.3	9.0	40.0	44.0	53.9	9.9	100	0	

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18GHz)-Distance factor(above 15GHz)) - Gain(Amprifier)
Distance factor : 15GHz -40GHz : 20log(3.0m/1.0m)= 9.5dB

APPENDIX 2
Test Instruments

EMI test equipment

Control No.	Instrument	Manufacturer	Model No	Serial No	Test Item	Calibration Date * Interval(month)
SAF-03	Pre Amplifier	SONOMA	310N	290213	RE	2014/02/14 * 12
SAT6-06	Attenuator	JFW	50HF-006N	-	RE	2014/02/17 * 12
SBA-03	Biconical Antenna	Schwarzbeck	BBA9106	91032666	RE	2014/10/18 * 12
SCC-C1/C2/C3/C4/C5/C10/SRSE-03	Coaxial Cable&RF Selector	Fujikura/Fujikura/Suhner/Suhner/Suhner/TOYO	8D2W/12DSFA/141PE/141PE/141PE/141PE/NS4906	-/0901-271(RF Selector)	RE	2014/04/25 * 12
SLA-03	Logperiodic Antenna	Schwarzbeck	UHALP9108A	UHALP 9108-A 0901	RE	2014/10/18 * 12
SOS-05	Humidity Indicator	A&D	AD-5681	4062518	RE	2014/10/30 * 12
STR-06	Test Receiver	Rohde & Schwarz	ESCI	101259	RE	2014/03/04 * 12
SJM-15	Measure	ASKUL	-	-	RE	-
SAEC-03(NSA)	Semi-Anechoic Chamber	TDK	SAEC-03(NSA)	3	RE	2014/07/14 * 12
COTS-SEMI-1	EMI Software	TSJ	TEPTO-DV(RE,CE,RFI,MF)	-	RE/ CE	-
SAF-06	Pre Amplifier	TOYO Corporation	TPA0118-36	1440491	RE	2014/05/23 * 12
SCC-G04	Coaxial Cable	Junkosha	J12J102207-00	JUN-12-14-018	RE	2014/06/24 * 12
SCC-G23	Coaxial Cable	Suhner	SUCOFLEX 104	297342/4	RE	2014/05/15 * 12
SHA-03	Horn Antenna	Schwarzbeck	BBHA9120D	9120D-739	RE	2014/08/12 * 12
SAT10-05	Attenuator(above1GHz)	Agilent	8493C-010	74864	RE	2014/11/21 * 12
SFL-18	Highpass Filter	MICRO-TRONICS	HPM50111	119	RE	2014/04/22 * 12
SSA-02	Spectrum Analyzer	Agilent	E4448A	MY48250106	RE/AT	2014/03/17 * 12
SHA-05	Horn Antenna	ETS LINDGREN	3160-09	LM4210	RE	2014/03/15 * 12
SAF-09	Pre Amplifier	TOYO Corporation	HAP18-26W	00000018	RE	2014/05/15 * 12
SCC-G18	Coaxial Cable	Suhner	SUCOFLEX 104A	46292/4A	RE	2014/03/14 * 12
SPM-06	Power Meter	Anritsu	ML2495A	0850009	AT	2014/04/08 * 12
SPSS-03	Power sensor	Anritsu	MA2411B	0917063	AT	2014/04/08 * 12
SAT10-10	Attenuator	Weinschel Corp.	54A-10	37584	AT	2014/04/22 * 12
SCC-G12	Coaxial Cable	Suhner	SUCOFLEX 102	30790/2	AT	2014/03/13 * 12
SOS-06	Humidity Indicator	A&D	AD-5681	4062118	AT	2014/03/07 * 12
TR-09	Test Receiver	Rohde & Schwarz	ESCI	100769	CE	2014/09/24 * 12
SCC-05	Coaxial Cable	Fujikura	5D2W	-	CE	2014/04/17 * 12
SAT3-06	Attenuator	JFW	50HF-003N	-	CE	2014/02/17 * 12
SLS-01	LISN	Rohde & Schwarz	ENV216	100511	CE(EUT)	2014/02/14 * 12
SLS-02	LISN	Rohde & Schwarz	ENV216	100512	CE	2014/03/05 * 12
STM-24	Terminator	TME	CT-01 BP	-	CE	2014/01/07 * 12
SOS-10	Humidity Indicator	A&D	AD-5681	4064561	CE	2014/10/30 * 12
SJM-18	Measure	ASKUL	-	-	CE	-

The expiration date of the calibration is the end of the expired month .
As for some calibrations performed after the tested dates , those test equipment have been controlled by means of an unbroken chains of calibrations .

All equipment is calibrated with valid calibrations . Each measurement data is traceable to the national or international standards.
Test Item :
CE: Conducted emission,
RE: Radiated emission,
AT: Antenna terminal conducted test