Zacta

TEST REPORT

Report number : Z101C-15084
Issue date : August 26, 2015

The device, as described herewith, was tested pursuant to applicable test procedure and complies with the requirements of;

FCC Part 22 Subpart H
IC RSS-132

The test results are traceable to the international or national standards.

Applicant	:	KYOCERA Corporation
Equipment under test (EUT)	:	Module
Model number	:	KA36
FCC ID	:	JOYKA36
IC Certification Number	:	574B-KA36

Date of test	:	August 21, 22, 2015
Test place	:	TÜV SÜD Zacta Ltd. Yonezawa Testing Center 4149-7 Hachimanpara 5-chome Yonezawa-shi Yamagata 992-1128 Japan Phone: +81-238-28-2880 Fax: +81-238-28-2888
Test results	:	Complied

The results in this report are applicable only to the equipment tested.
This report shall not be re-produced except in full without the written approval of TÜV SÜD Zacta Ltd.
This test report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the federal government.

Tested by : Taiki Watanabe

Taiki Watanabe

Hikaru Shibata

Hikaru Shibata

Authorized by : Hiro Suzuki

Hiroaki Suzuki
Manager of EMC Technical Department

Zacta

Table of contents

Page

1. Summary of Test *3*
1.1 Purpose of test 3
1.2 Standards 3
1.3 List of applied test to the EUT 3
1.4 Modification to the EUT by laboratory 3
2. Equipment Under Test *4*
2.1 General Description of equipment 4
2.2 EUT information 4
2.3 Variation of the family model(s) 5
2.4 Description of Test mode 5
3. Configuration of equipment *6*
3.1 Equipment(s) used 6
3.2 Cable(s) used 6
3.3 System configuration 6
4. Effective Radiated Power *7*
4.1 Measurement procedure 7
4.2 Calculation method 7
4.3 Limit 7
4.4 Test data 8
5. Radiated Emissions and Harmonic Emissions *11*
5.1 Measurement procedure 11
5.2 Calculation method 11
5.3 Limit 11
5.4 Test data 12
6. Uncertainty of measurement *18*
7. Laboratory description *19*
Appendix A. Test equipment *20*

Zacta

1. Summary of Test

1.1 Purpose of test

It is the original test in order to verify conformance to FCC Part 22 Subpart H, IC RSS-132.

1.2 Standards

CFR47 FCC Part 22 Subpart H
IC RSS-132

1.2.1 Test Methods

KDB 971168 D01 Power Meas License Digital Systems v02r02
ANSI/TIA/EIA-603-D-2010

1.2.2 Deviation from standards

None

1.3 List of applied test to the EUT

FCC Section	IC Section	Test items	Condition	Result
2.1046	N/A	Conducted Output Power	Conducted	N/A *
22.913(a)(2)	RSS-132 4.3	Effective Radiated Power	Radiated	PASS
22.917(a) 2.1049	N/A	Occupied Bandwidth	Conducted	N/A *
22.917(a) 2.1051	RSS-132 4.5.1	Band Edge Spurious and Harmonic at Antenna Terminal	Conducted	N/A *
22.917(a) 2.1053	RSS-132 4.5.1	Radiated emissions and Harmonic Emissions	Radiated	PASS
22.355 2.1055	RSS-132 4.3	Frequency Stability	Conducted	N/A *

*: For KA36, this model is a model that changed the LTE band of J79 (FCC ID: JOYJ79). Other than the LTE band 12 and 13, the module is electrically identical. Therefore, only the Radiated test items were performed.
Refer to the following test report about other test items; J79 Test report number: Z071C-15077.

1.3.1 Test set up

Table-Top

1.4 Modification to the EUT by laboratory

None

Zacta

2. Equipment Under Test

2.1 General Description of equipment

EUT is the Module.

2.2 EUT information

Applicant	:	KYOCERA Corporation Yokohama Office 2-1-1 Kagahara, Tsuzuki-ku Yokohama-shi, Kanagawa, Japan Phone: +81-45-943-6253 Fax: +81-45-943-6314
Equipment under test	:	Module
Trade name	:	Kyocera
Model number	:	KA36
Serial number	:	N/A
EUT condition	:	Pre-Production
Power ratings	:	DC 3.9V
Size	:	(W) 40.0 × (D) 40.0 × (H) 4.3 mm
Environment	:	Indoor and Outdoor use
Terminal limitation	:	-20˚C to 60˚C
RF Specification		
Frequency of Operation	:	Up Link WCDMA Band V: 826.4-846.6MHz LTE Band V: 824-849MHz Down Link WCDMA Band V: 871.4-891.6MHz LTE Band V: 869-894MHz
Modulation type	:	WCDMA Band V: QPSK, 16QAM LTE Band V: QPSK, 16QAM
Emission designator	:	WCDMA Band V: 4M17F9W LTE Band V: QPSK: 9M00G7D, 16QAM: 8M99W7D
Conducted Output power	:	WCDMA Band V: 0.221W (23.45dBm) LTE Band V: QPSK 0.167W (22.23dBm), 16QAM 0.134W (21.27dBm)
Antenna type	:	External antenna
Antenna gain	:	WCDMA Band V: 3.8Bi LTE Band V: 3.8dBi

Zacta

2.3 Variation of the family model(s)

Not applicable

2.4 Description of Test mode

The EUT had been tested under operating condition.
There are three channels have been tested as following:

Band	Channel	Frequency
WCDMA Band V	4132	826.4MHz
	4183	836.6MHz
	4233	846.6MHz

Band	Modulation	Bandwidth	Channel	Frequency [MHz]
LTE Band V	QPSK	1.4MHz	20407 20525 20643	824.7 836.5 848.3
		3MHz	20415 20525 20635	825.5 836.5 847.5
		5MHz	20425 20525 20625	826.5 836.5 846.5
		10MHz	20450 20525 20600	829.0 836.5 844.0
	16QAM	1.4MHz	20407 20525 20643	824.7 836.5 848.3
		3MHz	20415 20525 20635	825.5 836.5 847.5
		5MHz	20425 20525 20625	826.5 836.5 846.5
		10MHz	20450 20525 20600	829.0 836.5 844.0

The field strength of spurious emissions was measured at each position of all three axis X, Y and Z to compare the level, and the maximum noise.
The worst emission was found in Y axis and the worst case recorded.

3. Configuration of equipment

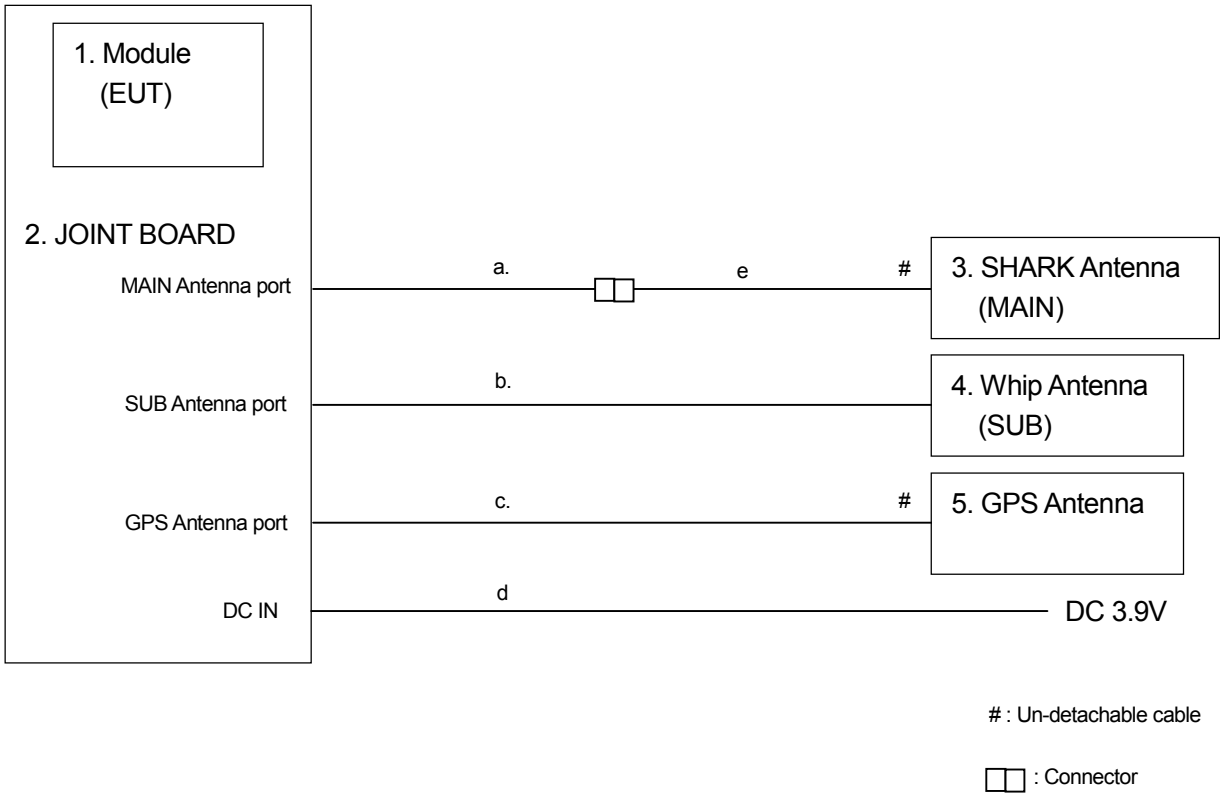
3.1 Equipment(s) used

No.	Equipment	Company	Model No.	Serial No.	FCC ID / DoC	Comment
1	Module	KYOCERA	KA36	N/A	JOYKA36	EUT
2	JOINT BOARD	KYOCERA	N/A	N/A	N/A	-
3	SHARK Antenna	YOKOWO	N/A	N/A	N/A	-
4	Whip Antenna	EAD	PTR7210	N/A	N/A	-
5	GPS Antenna	PASTERNACK	PE51066	N/A	N/A	-

3.2 Cable(s) used

No.	Cable	Length[m]	Shield	Connector	Comment
a	RF cable (MAIN)	0.3	YES	Metal	-
b	RF cable (SUB)	0.3	YES	Metal	-
c	GPS Antenna cable	5.0	YES	Metal	-
d	DC cable	1.3	NO	Plastic	-
e	RF cable	0.9	YES	Metal	-

3.3 System configuration



Note1: Numbers assigned to equipment or cables on this diagram correspond to the list in “3.1 Equipment(s) used” and “3.2 Cable(s) used”.

4. Effective Radiated Power

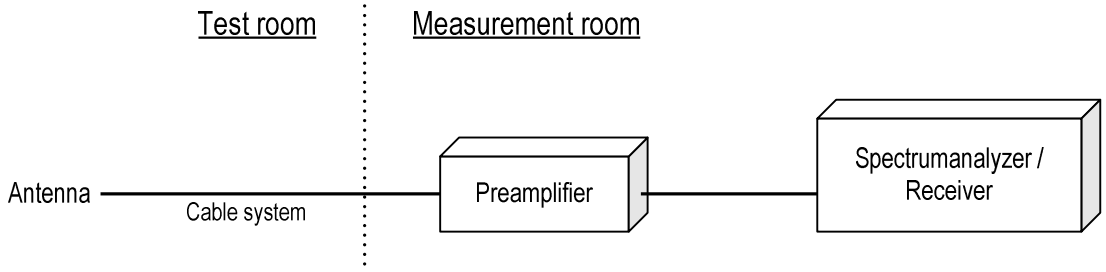
4.1 Measurement procedure
[FCC 22.913(a), IC RSS-132 4.4]

<Step 1>
The EUT and support equipment are placed on a 1 meter x 1.5 meter surface, 0.8 meter height FRP table. Radiated emission measurements are performed at 3 meter distance with the broadband antenna (double ridged guide antenna). The antenna is positioned both the horizontal and vertical planes of polarization and height is varied 1 to 4 meters and stopped at height producing the maximum emission.
The bandwidth of the spectrum analyzer is set to 1MHz. The turntable is rotated by 360 degrees and stopped at azimuth of producing the maximum emission.

<Step 2>
The substitution antenna is replaced by the transmitter antenna (EUT).
The frequency of the signal generator is adjusted to the measurement frequency.
Level of the signal generator is adjusted to the level that is obtained from step 1, and record the emission level of signal generator.

Spectrum analyzer setting
- Detector: Peak, RBW: 5MHz, VBW: 8MHz

- Test configuration



4.2 Calculation method

Result (ERP) = S.G Reading – Cable loss + Antenna Gain
Margin = Limit – Result (ERP)

Example:
Limit @ 836.6MHz : 38.4dBm
S.G Reading = 28.6dBm Cable loss = 0.7dB Ant. Gain = -10.7dBd
Result = 28.6 - 0.7 + (-10.7) = 17.2dBm
Margin = 38.4 - 17.2 = 21.2dB

4.3 Limit

7 W (38.4dBm)

4.4 Test data

Date : August 21, 2015
Temperature : 25.0 [˚C]
Humidity : 66.2 [%]
Test place : 3m Semi-anechoic chamber
Test engineer : Taiki Watanabe

[WCDMA Band V]

H/V	Frequency [MHz]	S.A Reading [dBm]	S.G Reading [dBm]	Cable loss [dB]	Ant.Gain [dBd]	Result [dBm]	Limit [dBm]	Margin [dB]
H	826.4	-9.7	30.3	0.7	-10.7	18.9	38.4	19.5
H	836.6	-11.7	28.3	0.7	-10.7	16.9	38.4	21.5
H	846.6	-11.0	29.0	0.8	-10.7	17.6	38.4	20.8

Date : August 21, 2015
Temperature : 25.0 [˚C]
Humidity : 66.2 [%]
Test place : 3m Semi-anechoic chamber
Test engineer : Taiki Watanabe

[LTE Band V]
QPSK, BW 1.4MHz

H/V	Frequency [MHz]	S.A Reading [dBm]	S.G Reading [dBm]	Cable loss [dB]	Ant.Gain [dBd]	Result [dBm]	Limit [dBm]	Margin [dB]
V	824.7	-13.7	31.7	0.7	-10.7	20.3	38.4	18.1
V	836.5	-13.0	32.5	0.7	-10.7	21.1	38.4	17.3
V	848.3	-12.8	30.9	0.8	-10.7	19.5	38.4	18.9

QPSK, BW 3MHz

H/V	Frequency [MHz]	S.A Reading [dBm]	S.G Reading [dBm]	Cable loss [dB]	Ant.Gain [dBd]	Result [dBm]	Limit [dBm]	Margin [dB]
V	825.5	-15.0	30.4	0.7	-10.7	19.0	38.4	19.4
V	836.5	-14.0	31.5	0.7	-10.7	20.1	38.4	18.3
V	847.5	-13.9	29.8	0.8	-10.7	18.4	38.4	20.0

QPSK, BW 5MHz

H/V	Frequency [MHz]	S.A Reading [dBm]	S.G Reading [dBm]	Cable loss [dB]	Ant.Gain [dBd]	Result [dBm]	Limit [dBm]	Margin [dB]
V	826.5	-14.0	31.4	0.7	-10.7	20.0	38.4	18.4
V	836.5	-13.0	32.5	0.7	-10.7	21.1	38.4	17.3
V	846.5	-14.7	29.0	0.8	-10.7	17.6	38.4	20.8

QPSK, BW 10MHz

H/V	Frequency [MHz]	S.A Reading [dBm]	S.G Reading [dBm]	Cable loss [dB]	Ant.Gain [dBd]	Result [dBm]	Limit [dBm]	Margin [dB]
V	829.0	-13.0	32.4	0.7	-10.7	21.0	38.4	17.4
V	836.5	-13.1	32.4	0.7	-10.7	21.0	38.4	17.4
V	844.0	-14.0	29.7	0.7	-10.7	18.3	38.4	20.1

16QAM, BW 1.4MHz

H/V	Frequency [MHz]	S.A Reading [dBm]	S.G Reading [dBm]	Cable loss [dB]	Ant.Gain [dBd]	Result [dBm]	Limit [dBm]	Margin [dB]
V	824.7	-14.0	31.4	0.7	-10.7	20.0	38.4	18.4
V	836.5	-14.0	31.5	0.7	-10.7	20.1	38.4	18.3
V	848.3	-12.6	31.1	0.8	-10.7	19.7	38.4	18.7

16QAM, BW 3MHz

H/V	Frequency [MHz]	S.A Reading [dBm]	S.G Reading [dBm]	Cable loss [dB]	Ant.Gain [dBd]	Result [dBm]	Limit [dBm]	Margin [dB]
V	825.5	-13.2	32.2	0.7	-10.7	20.8	38.4	17.6
V	836.5	-13.5	32.0	0.7	-10.7	20.6	38.4	17.8
V	847.5	-13.0	30.7	0.8	-10.7	19.3	38.4	19.1

16QAM, BW 5MHz

H/V	Frequency [MHz]	S.A Reading [dBm]	S.G Reading [dBm]	Cable loss [dB]	Ant.Gain [dBd]	Result [dBm]	Limit [dBm]	Margin [dB]
V	826.5	-13.0	32.4	0.7	-10.7	21.0	38.4	17.4
V	836.5	-13.0	32.5	0.7	-10.7	21.1	38.4	17.3
V	846.5	-14.0	29.7	0.8	-10.7	18.3	38.4	20.1

16QAM, BW 10MHz

H/V	Frequency [MHz]	S.A Reading [dBm]	S.G Reading [dBm]	Cable loss [dB]	Ant.Gain [dBd]	Result [dBm]	Limit [dBm]	Margin [dB]
V	829.0	-13.7	31.7	0.7	-10.7	20.3	38.4	18.1
V	836.5	-15.1	30.4	0.7	-10.7	19.0	38.4	19.4
V	844.0	-13.8	29.9	0.7	-10.7	18.5	38.4	19.9

5. Radiated Emissions and Harmonic Emissions

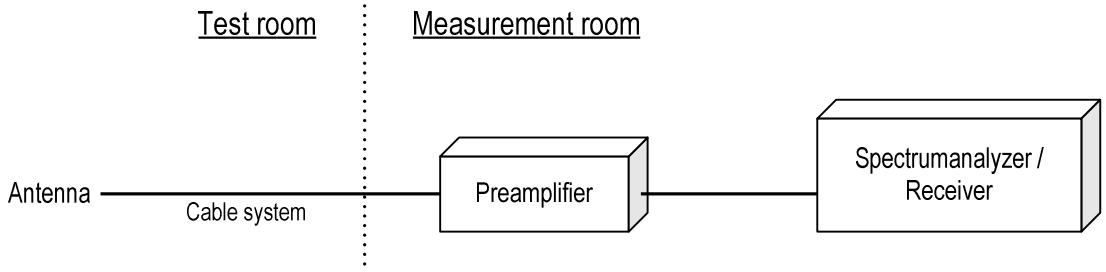
5.1 Measurement procedure
[FCC 22.917(a), 2.1053, IC RSS-132 4.5.1]

<Step 1>
The EUT and support equipment are placed on a 1 meter x 1.5 meter surface, 0.8 meter height FRP table.
Radiated emission measurements are performed at 3 meter distance with the broadband antenna (Biconical antenna, Log periodic antenna and double ridged guide antenna). The antenna is positioned both the horizontal and vertical planes of polarization and height is varied 1 to 4 meters and stopped at height producing the maximum emission.
The bandwidth of the spectrum analyzer is set to 1MHz. The turntable is rotated by 360 degrees and stopped at azimuth of producing the maximum emission. The frequency is investigated up to 20GHz.

<Step 2>
The substitution antenna is replaced by the transmitter antenna (EUT).
The frequency of the signal generator is adjusted to the measurement frequency.
Level of the signal generator is adjusted to the level that is obtained from step 1, and record the emission level of signal generator.

Spectrum analyzer setting
- Detector: Peak (RBW: 1MHz, VBW: 3MHz)

- Test configuration



5.2 Calculation method

Result = S.G Reading – Cable loss + Antenna Gain
Margin = Limit – Result (ERP)

Example:
Limit @ 3346.6MHz : -13.0dBm
S.G Reading = -64.6dBm Cable loss = 1.5dB Ant. Gain = 7.5dBd
Result = -64.6 – 1.5 + 7.5 = -58.6dBm
Margin = -13.0-(-58.6) = 45.6dB

5.3 Limit

-13dBm or less

5.4 Test data

Date : August 21, 2015
Temperature : 23.2 [˚C]
Humidity : 60.4 [%]
Test place : 3m Semi-anechoic chamber
Test engineer : Hikaru Shibata

[WCDMA Band V]
(Channel: 4132)

H/V	Frequency [MHz]	S.A Reading [dBm]	S.G Reading [dBm]	Cable loss [dB]	Ant.Gain [dBd]	Result [dBm]	Limit [dBm]	Margin [dB]
V	3301.3	-63.0	-64.5	1.5	7.4	-58.6	-13.0	45.6

(Channel: 4183)

H/V	Frequency [MHz]	S.A Reading [dBm]	S.G Reading [dBm]	Cable loss [dB]	Ant.Gain [dBd]	Result [dBm]	Limit [dBm]	Margin [dB]
V	3346.6	-64.0	-64.5	1.5	7.5	-58.5	-13.0	45.5

(Channel: 4233)

H/V	Frequency [MHz]	S.A Reading [dBm]	S.G Reading [dBm]	Cable loss [dB]	Ant.Gain [dBd]	Result [dBm]	Limit [dBm]	Margin [dB]
V	3386.7	-64.0	-64.4	1.5	7.6	-58.4	-13.0	45.4

Date : August 21, 2015
Temperature : 23.2 [˚C]
Humidity : 60.4 [%]
Test place : 3m Semi-anechoic chamber
Test engineer : Hikaru Shibata

Date : August 22, 2015
Temperature : 25.8 [˚C]
Humidity : 65.6 [%]
Test place : 3m Semi-anechoic chamber
Test engineer : Taiki Watanabe

[LTE Band V]
QPSK, BW 1.4MHz
Channel: 20407

H/V	Frequency [MHz]	S.A Reading [dBm]	S.G Reading [dBm]	Cable loss [dB]	Ant.Gain [dBd]	Result [dBm]	Limit [dBm]	Margin [dB]
H	1648.2	-61.3	-68.9	1.0	6.9	-63.1	-13.0	50.1
H	2472.8	-52.2	-54.7	1.3	7.4	-48.6	-13.0	35.6
H	3297.0	-51.3	-52.9	1.5	7.4	-47.0	-13.0	34.0
V	3297.0	-49.7	-50.4	1.5	7.4	-44.5	-13.0	31.5

Channel: 20525

H/V	Frequency [MHz]	S.A Reading [dBm]	S.G Reading [dBm]	Cable loss [dB]	Ant.Gain [dBd]	Result [dBm]	Limit [dBm]	Margin [dB]
H	2508.2	-49.2	-51.5	1.3	7.4	-45.4	-13.0	32.4
H	3344.3	-53.7	-55.1	1.5	7.5	-49.1	-13.0	36.1
V	3344.2	-54.4	-54.9	1.5	7.5	-48.9	-13.0	35.9

Channel: 20643

H/V	Frequency [MHz]	S.A Reading [dBm]	S.G Reading [dBm]	Cable loss [dB]	Ant.Gain [dBd]	Result [dBm]	Limit [dBm]	Margin [dB]
H	2543.6	-47.5	-39.9	1.3	7.6	-33.6	-13.0	20.6
H	3391.4	-49.4	-51.1	1.5	7.6	-45.1	-13.0	32.1
V	3391.4	-49.6	-50.0	1.5	7.6	-44.0	-13.0	31.0
V	5087.0	-55.9	-51.4	1.9	8.7	-44.6	-13.0	31.6

Zacta

16QAM, BW 1.4MHz
Channel: 20407

H/V	Frequency [MHz]	S.A Reading [dBm]	S.G Reading [dBm]	Cable loss [dB]	Ant.Gain [dBd]	Result [dBm]	Limit [dBm]	Margin [dB]
H	2474.4	-52.0	-54.5	1.3	7.4	-48.4	-13.0	35.4
H	3329.2	-49.5	-51.1	1.5	7.5	-45.1	-13.0	32.1
V	3329.2	-51.0	-51.7	1.5	7.5	-45.7	-13.0	32.7

Channel: 20525

H/V	Frequency [MHz]	S.A Reading [dBm]	S.G Reading [dBm]	Cable loss [dB]	Ant.Gain [dBd]	Result [dBm]	Limit [dBm]	Margin [dB]
H	2509.7	-48.0	-50.3	1.3	7.4	-44.2	-13.0	31.2
H	3346.2	-55.0	-56.4	1.5	7.5	-50.4	-13.0	37.4
V	3346.3	-54.0	-54.5	1.5	7.5	-48.5	-13.0	35.5

Channel: 20643

H/V	Frequency [MHz]	S.A Reading [dBm]	S.G Reading [dBm]	Cable loss [dB]	Ant.Gain [dBd]	Result [dBm]	Limit [dBm]	Margin [dB]
H	2545.2	-47.0	-39.4	1.3	7.6	-33.1	-13.0	20.1
H	3393.6	-50.0	-51.7	1.5	7.6	-45.7	-13.0	32.7
V	3393.6	-52.0	-52.4	1.5	7.6	-46.4	-13.0	33.4
V	5090.0	-56.2	-51.7	1.9	8.7	-44.9	-13.0	31.9

QPSK, BW 3MHz
Channel: 20415

H/V	Frequency [MHz]	S.A Reading [dBm]	S.G Reading [dBm]	Cable loss [dB]	Ant.Gain [dBd]	Result [dBm]	Limit [dBm]	Margin [dB]
H	2472.7	-53.0	-55.5	1.3	7.4	-49.4	-13.0	36.4
H	3297.0	-52.0	-53.6	1.5	7.4	-47.7	-13.0	34.7
V	3297.0	-53.3	-54.0	1.5	7.4	-48.1	-13.0	35.1

Channel: 20525

H/V	Frequency [MHz]	S.A Reading [dBm]	S.G Reading [dBm]	Cable loss [dB]	Ant.Gain [dBd]	Result [dBm]	Limit [dBm]	Margin [dB]
H	2505.7	-51.0	-53.3	1.3	7.4	-47.2	-13.0	34.2
H	3341.0	-55.0	-56.4	1.5	7.5	-50.4	-13.0	37.4
V	3341.0	-55.0	-55.5	1.5	7.5	-49.5	-13.0	36.5

Channel: 20635

H/V	Frequency [MHz]	S.A Reading [dBm]	S.G Reading [dBm]	Cable loss [dB]	Ant.Gain [dBd]	Result [dBm]	Limit [dBm]	Margin [dB]
H	2538.8	-48.0	-40.4	1.3	7.6	-34.1	-13.0	21.1
H	3385.0	-51.0	-52.7	1.5	7.6	-46.7	-13.0	33.7
V	3385.0	-52.0	-52.4	1.5	7.6	-46.4	-13.0	33.4
V	5078.0	-55.9	-51.4	1.9	8.7	-44.6	-13.0	31.6

Zacta

16QAM, BW 3MHz
Channel: 20415

H/V	Frequency [MHz]	S.A Reading [dBm]	S.G Reading [dBm]	Cable loss [dB]	Ant.Gain [dBd]	Result [dBm]	Limit [dBm]	Margin [dB]
H	2472.7	-54.0	-56.5	1.3	7.4	-50.4	-13.0	37.4
H	3297.0	-49.0	-50.6	1.5	7.4	-44.7	-13.0	31.7
V	3297.0	-51.9	-52.6	1.5	7.4	-46.7	-13.0	33.7

Channel: 20525

H/V	Frequency [MHz]	S.A Reading [dBm]	S.G Reading [dBm]	Cable loss [dB]	Ant.Gain [dBd]	Result [dBm]	Limit [dBm]	Margin [dB]
H	2505.8	-50.0	-52.3	1.3	7.4	-46.2	-13.0	33.2
H	3341.0	-55.0	-56.4	1.5	7.5	-50.4	-13.0	37.4
V	3341.0	-57.6	-58.1	1.5	7.5	-52.1	-13.0	39.1

Channel: 20635

H/V	Frequency [MHz]	S.A Reading [dBm]	S.G Reading [dBm]	Cable loss [dB]	Ant.Gain [dBd]	Result [dBm]	Limit [dBm]	Margin [dB]
H	2538.7	-47.8	-40.2	1.3	7.6	-33.9	-13.0	20.9
H	3384.9	-52.0	-53.7	1.5	7.6	-47.7	-13.0	34.7
V	3384.9	-55.0	-55.4	1.5	7.6	-49.4	-13.0	36.4

QPSK, BW 5MHz
Channel: 20425

H/V	Frequency [MHz]	S.A Reading [dBm]	S.G Reading [dBm]	Cable loss [dB]	Ant.Gain [dBd]	Result [dBm]	Limit [dBm]	Margin [dB]
H	2479.5	-52.0	-54.5	1.3	7.4	-48.4	-13.0	35.4
H	3306.1	-51.5	-53.1	1.5	7.4	-47.2	-13.0	34.2
V	3306.1	-52.2	-53.7	1.5	7.4	-47.8	-13.0	34.8

Channel: 20525

H/V	Frequency [MHz]	S.A Reading [dBm]	S.G Reading [dBm]	Cable loss [dB]	Ant.Gain [dBd]	Result [dBm]	Limit [dBm]	Margin [dB]
H	2509.5	-53.0	-55.3	1.3	7.4	-49.2	-13.0	36.2
H	3346.0	-55.2	-56.6	1.5	7.5	-50.6	-13.0	37.6
V	3346.0	-55.2	-55.7	1.5	7.5	-49.7	-13.0	36.7

Channel: 20625

H/V	Frequency [MHz]	S.A Reading [dBm]	S.G Reading [dBm]	Cable loss [dB]	Ant.Gain [dBd]	Result [dBm]	Limit [dBm]	Margin [dB]
H	2539.6	-52.0	-44.4	1.3	7.6	-38.1	-13.0	25.1
H	3386.0	-52.0	-53.7	1.5	7.6	-47.7	-13.0	34.7
V	3386.0	-51.0	-51.4	1.5	7.6	-45.4	-13.0	32.4
V	5079.0	-57.0	-52.5	1.9	8.7	-45.7	-13.0	32.7

Zacta

16QAM, BW 5MHz
Channel: 20425

H/V	Frequency [MHz]	S.A Reading [dBm]	S.G Reading [dBm]	Cable loss [dB]	Ant.Gain [dBd]	Result [dBm]	Limit [dBm]	Margin [dB]
H	2479.5	-53.0	-55.5	1.3	7.4	-49.4	-13.0	36.4
H	3306.0	-55.9	-57.5	1.5	7.4	-51.6	-13.0	38.6
V	3306.0	-53.2	-54.7	1.5	7.4	-48.8	-13.0	35.8

Channel: 20525

H/V	Frequency [MHz]	S.A Reading [dBm]	S.G Reading [dBm]	Cable loss [dB]	Ant.Gain [dBd]	Result [dBm]	Limit [dBm]	Margin [dB]
H	2509.6	-49.0	-51.3	1.3	7.4	-45.2	-13.0	32.2
H	3346.0	-56.0	-57.4	1.5	7.5	-51.4	-13.0	38.4
V	3346.0	-57.0	-57.5	1.5	7.5	-51.5	-13.0	38.5

Channel: 20625

H/V	Frequency [MHz]	S.A Reading [dBm]	S.G Reading [dBm]	Cable loss [dB]	Ant.Gain [dBd]	Result [dBm]	Limit [dBm]	Margin [dB]
H	2539.6	-47.6	-40.0	1.3	7.6	-33.7	-13.0	20.7
H	3386.0	-51.6	-53.3	1.5	7.6	-47.3	-13.0	34.3
V	3386.0	-51.6	-52.0	1.5	7.6	-46.0	-13.0	33.0

QPSK, BW 10MHz
Channel: 20450

H/V	Frequency [MHz]	S.A Reading [dBm]	S.G Reading [dBm]	Cable loss [dB]	Ant.Gain [dBd]	Result [dBm]	Limit [dBm]	Margin [dB]
H	2473.5	-51.9	-54.4	1.3	7.4	-48.3	-13.0	35.3
H	3298.3	-53.0	-54.6	1.5	7.4	-48.7	-13.0	35.7
V	3298.3	-50.4	-54.6	1.5	7.4	-48.7	-13.0	35.7

Channel: 20525

H/V	Frequency [MHz]	S.A Reading [dBm]	S.G Reading [dBm]	Cable loss [dB]	Ant.Gain [dBd]	Result [dBm]	Limit [dBm]	Margin [dB]
H	2496.4	-51.0	-53.3	1.3	7.4	-47.2	-13.0	34.2
H	3328.3	-57.0	-58.4	1.5	7.5	-52.4	-13.0	39.4
V	3328.3	-58.0	-58.5	1.5	7.5	-52.5	-13.0	39.5

Channel: 20600

H/V	Frequency [MHz]	S.A Reading [dBm]	S.G Reading [dBm]	Cable loss [dB]	Ant.Gain [dBd]	Result [dBm]	Limit [dBm]	Margin [dB]
H	2518.8	-48.5	-40.9	1.3	7.5	-34.7	-13.0	21.7
H	3358.3	-52.9	-54.6	1.5	7.5	-48.6	-13.0	35.6
V	3358.3	-54.8	-55.2	1.5	7.5	-49.2	-13.0	36.2

Zacta

16QAM, BW 10MHz
Channel: 20450

H/V	Frequency [MHz]	S.A Reading [dBm]	S.G Reading [dBm]	Cable loss [dB]	Ant.Gain [dBd]	Result [dBm]	Limit [dBm]	Margin [dB]
H	2473.9	-52.0	-54.5	1.3	7.4	-48.4	-13.0	35.4
H	3298.4	-55.1	-56.7	1.5	7.4	-50.8	-13.0	37.8
V	3298.5	-53.0	-54.5	1.5	7.4	-48.6	-13.0	35.6

Channel: 20525

H/V	Frequency [MHz]	S.A Reading [dBm]	S.G Reading [dBm]	Cable loss [dB]	Ant.Gain [dBd]	Result [dBm]	Limit [dBm]	Margin [dB]
H	2496.3	-52.0	-54.3	1.3	7.4	-48.2	-13.0	35.2
H	3328.3	-56.8	-58.2	1.5	7.5	-52.2	-13.0	39.2
V	3328.3	-57.0	-57.5	1.5	7.5	-51.5	-13.0	38.5

Channel: 20600

H/V	Frequency [MHz]	S.A Reading [dBm]	S.G Reading [dBm]	Cable loss [dB]	Ant.Gain [dBd]	Result [dBm]	Limit [dBm]	Margin [dB]
H	2518.8	-48.0	-40.4	1.3	7.5	-34.2	-13.0	21.2
H	3358.4	-55.2	-56.9	1.5	7.5	-50.9	-13.0	37.9
V	3358.4	-57.4	-57.8	1.5	7.5	-51.8	-13.0	38.8

6. Uncertainty of measurement

Expanded uncertainties stated are calculated with a coverage Factor k=2.
Please note that these results are not taken into account when determining compliance or non-compliance with test result.

Test item	Measurement uncertainty
Conducted emission at mains port	±3.0dB
Radiated emission (9kHz – 30MHz)	±4.4dB
Radiated emission (30MHz – 1000MHz)	±4.5dB
Radiated emission (1000MHz – 26GHz)	±3.9dB

Zacta

7. Laboratory description

1. Location:

TÜV SÜD Zacta Ltd. Yonezawa Testing Center
4149-7 Hachimanpara 5-chome Yonezawa-shi Yamagata 992-1128 Japan
Phone: +81-238-28-2880 Fax: +81-238-28-2888

2. Facility filing information:

1) NVLAP accreditation: NVLAP Lab. code: 200306-0

2) VLAC accreditation: Lab. code: VLAC-013

Site name	Radiated emission	Conducted emission for mains port	Conducted emission for telecom port	Radiated emission (CMAD)	Expiry Date
3m Semi-anechoic chamber	VLAC-013			-	Jul. 3, 2017
10m Semi-anechoic chamber No.1				VLAC-013	
10m Semi-anechoic chamber No.2					
Shielded room No.1	-	VLAC-013		-	

3) FCC filing:

Site name	Registration Number	Expiry Date
Site 3	91065	Oct. 1, 2017
3m Semi-anechoic chamber	540072	Feb. 20, 2017
10m Semi-anechoic chamber No.1		
10m Semi-anechoic chamber No.2		
Shielded room No.1		

4) Industry Canada Oats site filing:

Site name	Sites on file: Oats 3m/10m	Expiry Date
Site 3	4224A-3	Dec. 3, 2017
3m Semi-anechoic chamber	4224A-4	
10m Semi-anechoic chamber No.1	4224A-5	
10m Semi-anechoic chamber No.2	4224A-6	Jan. 15, 2017

5) VCCI site filing:

Site name	Radiated emission	Conducted emission for mains port	Conducted emission for telecom port	Expiry Date
Site 3	R-138	C-134	T-1222	Nov. 16, 2017
3m Semi-anechoic chamber	A-0166			Jul. 3, 2017
10m Semi-anechoic chamber No.1				
10m Semi-anechoic chamber No.2				
Shielded room No.1	-	A-0166		

6) TÜV SÜD PS authorization:
Authorized as an EMC test laboratory

7) TÜV Rheinland authorization:
Authorized as an EMC test laboratory

Appendix A. Test equipment

Radiated emission

Equipment	Company	Model No.	Serial No.	Cal. Due	Cal. Date
EMI Receiver	ROHDE&SCHWARZ	ESCI	100451	Dec. 31, 2015	Dec. 25, 2014
Preamplifier	ANRITSU	MH648A	M96057	Jun. 30, 2016	Jun. 12, 2015
Biconical antenna	Schwarzbeck	VHA9103/BBA9106	2125	Jun. 30, 2016	Jun. 4, 2015
Log periodic antenna	Schwarzbeck	UHALP9108A	0560	Jun. 30, 2016	Jun. 4, 2015
Attenuator	TME	CFA-01NPJ-6	N/A (S275)	Jun. 30, 2016	Jun. 23, 2015
Attenuator	TME	CFA-01NPJ-3	N/A (S272)	Jun. 30, 2016	Jun. 23, 2015
Spectrum analyzer	Agilent Technologies	E4440A	US44302655	Jun. 30, 2016	Jun. 11, 2015
Preamplifier	TSJ	MLA-100M18-B02-40	1929118	May 31, 2016	May 1, 2015
Attenuator	AEROFLEX	26A-10	081217-08	Mar. 31, 2016	Mar. 12, 2015
Dipole antenna	Schwarzbeck	VHAP	1020	Sep. 30, 2015	Sep. 5, 2014
Dipole antenna	Schwarzbeck	UHAP	994	Sep. 30, 2015	Sep. 5, 2014
Double ridged guide antenna	EMCO	3115	5205	Feb. 29, 2016	Feb. 16, 2015
Attenuator	Agilent Technologies	8491B	MY39268633	Feb. 29, 2016	Feb. 1, 2015
Double ridged guide antenna	EMCO	3115	000058532	Oct. 31, 2015	Oct. 14, 2014
Signal generator	ROHDE&SCHWARZ	SMB100A	177525	Jun. 30, 2016	Jun. 19, 2015
Power amplifier	R&K	CGA020M602-2633R	B40240	Mar.31, 2016	Mar. 23, 2015
Microwave cable	SUHNER	SUCOFELX102/2m	31648/2	Mar. 28, 2016	Mar. 10, 2015
High pass filter	Micro-Tronics	HPM50115	004	Jul. 31, 2016	Jul. 12, 2015
High pass filter	Wainwright	WHKX2.8/18G-6SS	1	Jul. 31, 2016	Jul. 17, 2015
Wideband radio frequency tester	ROHDE&SCHWARZ	CMW500	126079	Aug. 31, 2015	Aug. 28, 2014
Microwave cable	SUHNER	SUCOFLEX104/9m	346316/4	Oct. 31, 2015	Oct. 31, 2014
		SUCOFLEX104/1m	322084/4	Oct. 31, 2015	Oct. 31, 2014
		SUCOFLEX104/1.5m	317226/4	Oct. 31, 2015	Oct. 31, 2014
		SUCOFLEX104/7m	41625/6	Oct. 31, 2015	Oct. 31, 2014
PC	DELL	DIMENSION E521	75465BX	N/A	N/A
Software	TOYO Corporation	EP5/RE-AJ	0611193/V5.3.61	N/A	N/A
3m Semi-anechoic chamber	TOKIN	N/A	N/A (9002-NSA)	Apr. 30, 2016	Apr. 27, 2015
3m Semi-anechoic chamber	TOKIN	N/A	N/A (9002-SVSWR)	Apr. 30, 2016	Apr. 27, 2015

*: The calibrations of the above equipment are traceable to NIST or equivalent standards of the reference organizations.