Zacta

TEST REPORT

Report number : Z101C-14063
Issue date : October 2, 2014

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

FCC Part22 Subpart H
IC RSS-132

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

Applicant	:	Japan Radio Co., Ltd.
Equipment under test (EUT)	:	3G/GSM IT Controller
Model number	:	JRN-130K
FCC ID	:	CKEJRN-130K
IC Certification Number	:	768B-JRN130K

Date of test : September 9, 2014
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.

Tested by : Taiki Watanabe

Authorized by : Eiji Akiba
Deputy General Manager of EMC Technical Department

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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

ANSI/TIA/EIA-603-C-2004

1.2.2 Deviation from standards

None

1.3 List of applied test to the EUT

Test items Section	Test items	Condition	Result
2.1046 RSS-132(4.4)	Conducted Output Power	Conducted	N/A *
22.913(a) RSS-132(4.4)	Effective Radiated Power	Radiated	PASS
22.917(a) 2.1049 RSS-Gen(4.6.1)	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 *

*: This product has a certified module inside it. (FCC ID: QIPPHS8-P, IC: 7830A-PHS8P)
Therefore, it was only measured radiated test.

1.3.1 Test set up

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1.4 Modification to the EUT by laboratory

None

2. Equipment Under Test

2.1 General Description of equipment

The EUT is 3G/GSM IT Controller.

2.2 EUT information

Applicant	:	Japan Radio Co., Ltd. 1011 SW Klickitat Way Bldg. B Suite 201B Seatle Washington 98134 United Phone: +1-206-654-5644 Fax: +1-206-654-7030
Equipment under test	:	3G/GSM IT Controller
Trade name	:	JRC
Model number	:	JRN-130K
Serial number	:	No.1
EUT condition	:	Pre-Production
Power ratings	:	DC 24 V
Size	:	(W) 136.4 × (D) 43.6 × (H) 220.0 mm
Environment	:	Indoor and Outdoor use
Terminal limitation	:	-30˚C to 70˚C
RF Specification		
Frequency of Operation	:	Up Link GSM850: 824.2-848.8MHz EDGE850: 824.2-848.8MHz WCDMA Band V: 826.4-846.6MHz Down Link GSM850: 869.20-893.8MHz EDGE850: 869.20-893.8MHz WCDMA Band V: 871.4-891.6MHz
Modulation type	:	GSM850: GMSK EDGE850: 8-PSK WCDMA Band V: QPSK, 16QAM
Output power	:	GSM850: 0.676W ERP (28.3dBm) EDGE850: 0.562W ERP (27.5dBm) WCDMA Band V: 0.145W ERP (21.6dBm)
Antenna type	:	λ/2 Shortened type Dipole antenna
Antenna gain	:	-0.58dBi

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
GSM850 EDGE850	128	824.2MHz
	190	836.6MHz
	251	848.8MHz
WCDMA Band V	4132	826.4MHz
	4183	836.6MHz
	4233	846.6MHz

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 X axis and the worst case recorded.

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3. Configuration of equipment

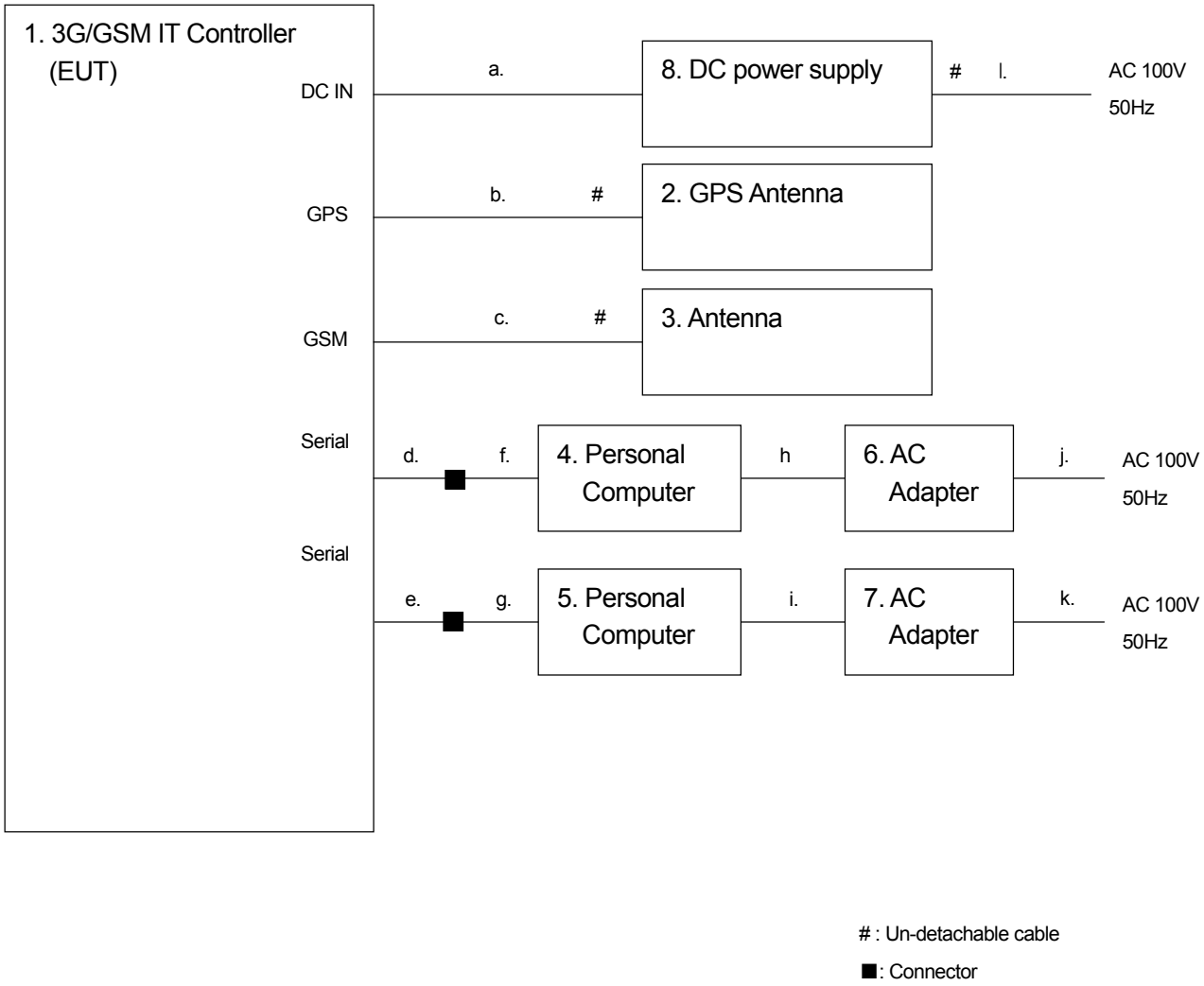
3.1 Equipment(s) used

No.	Equipment	Company	Model No.	Serial No.	FCC ID / DoC	Comment
1	3G/GSM IT Controller	JRC	JRN-130K	No.1	CKEJRN-130K	EUT
2	GPS Antenna	YOKOWO	NAY-3930G	12740036	N/A	Accessory
3	Antenna	NIPPON ANTENNA	DP-BRO-DCS (BNC)	W000058	N/A	Accessory
4	Personal Computer	FUJITSU	FMVNC4DC3	R7101676	DoC	-
5	Personal Computer	FUJITSU	FMVNC4DC3	R7106610	DoC	-
6	AC Adapter	FUJITSU	ADP-60ZH A	06837981A	N/A	-
7	AC Adapter	FUJITSU	ADP-60ZH A	07108697A	N/A	-
8	DC power supply	KIKUSUI	PAB	47306490	N/A	-

3.2 Cable(s) used

No.	Cable	Length[m]	Shield	Connector	Comment
a	DC cable	2.0	No	Plastic	-
b	GPS Antenna cable	5.0	Yes	Metal	-
c	Antenna cable	2.5	Yes	Metal	-
d	Serial cable	2.0	No	Plastic	-
e	Serial cable	2.0	No	Plastic	-
f	USB-Serial cable	1.0	Yes	Metal	-
g	USB-Serial cable	0.5	No	Metal	-
h	DC cable for PC AC Adapter	1.9	Yes	Metal	-
i	DC cable for PC AC Adapter	1.9	Yes	Metal	-
j	AC power cord	2.0	No	Plastic	-
k	AC power cord	1.0	No	Plastic	-
l	AC power cord for DC power supply	2.0	No	Plastic	-

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

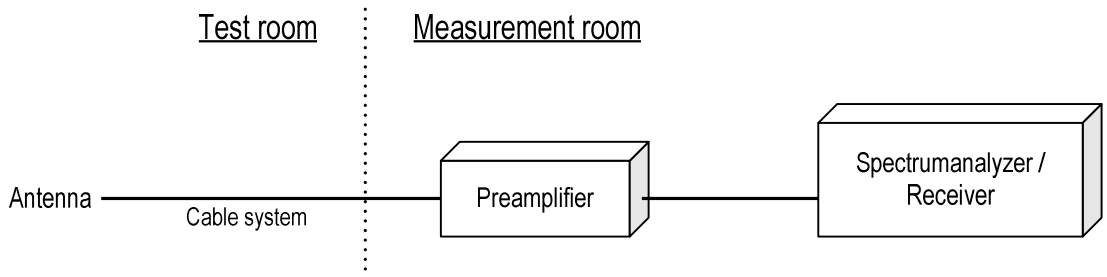
4.1 Measurement procedure
[FCC 22.913(a), RSS-132(4.4)]

<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: 3MHz, VBW: 8MHz): GSM
- Detector: Peak (RBW: 5MHz, VBW: 8MHz): WCDMA

- Test configuration



4.2 Calculation method

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

4.3 Limit

7 W (38.45dBm)

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4.4 Test data

Date : Sep. 9, 2014
Temperature : 23.0 [˚C]
Humidity : 47.0 [%] Test engineer :
Test place : 3m Semi-anechoic chamber Taiki Watanabe

[GSM850]

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	824.2	24.1	39.5	0.7	-10.7	28.2	38.4	10.2
H	836.7	22.2	39.7	0.7	-10.7	28.3	38.4	10.1
H	848.8	21.5	39.1	0.7	-10.7	27.7	38.4	10.7

[EDGE850]

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	824.2	22.0	37.4	0.7	-10.7	26.1	38.4	12.3
H	836.7	17.7	35.2	0.7	-10.7	23.8	38.4	14.6
H	848.8	21.3	38.9	0.7	-10.7	27.5	38.4	10.9

[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	825.5	17.6	30.5	0.7	-10.7	19.1	38.4	19.3
H	835.8	16.5	30.0	0.7	-10.7	18.6	38.4	19.8
H	847.5	18.5	33.0	0.7	-10.7	21.6	38.4	16.8

5. Radiated Emissions and Harmonic Emissions

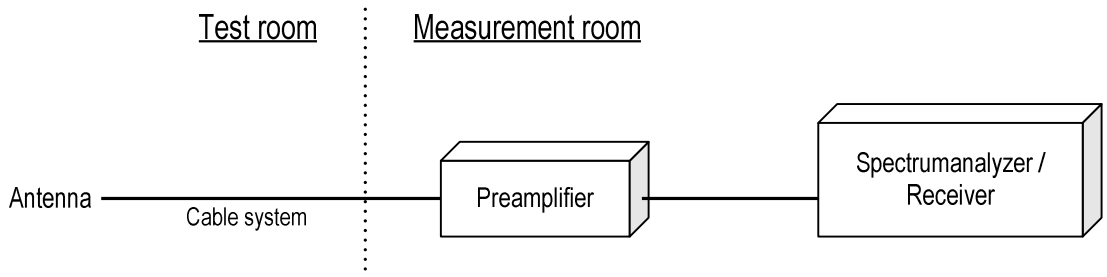
5.1 Measurement procedure
[FCC 22.917(a), 2.1053, RSS-132(4.5.1)]

<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)

5.3 Limit

-13dBm or less

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5.4 Test data

Date : Sep. 9, 2014
Temperature : 23.0 [˚C]
Humidity : 47.0 [%] Test engineer :
Test place : 3m Semi-anechoic chamber Taiki Watanabe

[GSM850]
(Channel: 128)

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	1648.4	-53.9	-54.5	1.0	6.8	-48.7	-13.0	35.7
V	1648.4	-57.9	-57.8	1.0	6.8	-52.0	-13.0	39.0
H	2472.6	-58.2	-53.8	1.3	7.5	-47.6	-13.0	34.6
V	2472.6	-62.6	-57.6	1.3	7.5	-51.4	-13.0	38.4

(Channel: 190)

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	1673.2	-57.0	-56.8	1.0	6.6	-51.2	-13.0	38.2
V	1673.2	-59.3	-58.9	1.0	6.6	-53.3	-13.0	40.3
H	2509.9	-58.5	-54.3	1.3	7.5	-48.1	-13.0	35.1
V	2510.2	-62.1	-52.5	1.3	7.5	-46.3	-13.0	33.3

(Channel: 251)

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	1697.6	-51.4	-51.0	1.0	6.4	-45.6	-13.0	32.6
V	1697.8	-56.5	-55.5	1.0	6.4	-50.1	-13.0	37.1
H	2546.4	-57.7	-53.5	1.3	7.6	-47.2	-13.0	34.2
V	2546.4	-61.4	-56.9	1.3	7.6	-50.6	-13.0	37.6

[EDGE850]
(Channel: 128)

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	1648.4	-54.8	-55.0	1.0	6.8	-49.2	-13.0	36.2
V	1648.4	-58.5	-58.2	1.0	6.8	-52.4	-13.0	39.4
H	2472.6	-59.0	-54.1	1.3	7.5	-47.9	-13.0	34.9
V	2472.6	-62.9	-57.9	1.3	7.5	-51.7	-13.0	38.7

(Channel: 190)

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	1673.2	-57.9	-57.8	1.0	6.6	-52.2	-13.0	39.2
V	1673.2	-60.8	-60.0	1.0	6.6	-54.4	-13.0	41.4
H	2509.9	-59.5	-55.5	1.3	7.5	-49.3	-13.0	36.3
V	2510.2	-64.0	-54.0	1.3	7.5	-47.8	-13.0	34.8

(Channel: 251)

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	1697.6	-52.8	-52.2	1.0	6.4	-46.8	-13.0	33.8
V	1697.6	-57.2	-56.8	1.0	6.4	-51.4	-13.0	38.4
H	2546.4	-58.0	-54.3	1.3	7.6	-48.0	-13.0	35.0
V	2546.4	-62.7	-58.1	1.3	7.6	-51.8	-13.0	38.8

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[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]
H	1650.3	-60.5	-60.9	1.0	6.8	-55.1	-13.0	42.1
V	1652.8	-62.4	-62.6	1.0	6.8	-56.8	-13.0	43.8
H	2479.2	-64.4	-60.2	1.3	7.5	-54.0	-13.0	41.0
V	2479.2	-64.5	-59.8	1.3	7.5	-53.6	-13.0	40.6

(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]
H	1673.2	-56.1	-55.8	1.0	6.6	-50.2	-13.0	37.2
V	1673.2	-60.2	-60.0	1.0	6.6	-54.4	-13.0	41.4
H	2509.9	-64.6	-60.7	1.3	7.5	-54.5	-13.0	41.5
V	2510.2	-64.5	-60.4	1.3	7.5	-54.2	-13.0	41.2

(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]
H	1690.6	-55.8	-55.4	1.0	6.5	-50.0	-13.0	37.0
V	1690.9	-59.1	-59.1	1.0	6.5	-53.7	-13.0	40.7
H	2539.8	-63.2	-59.5	1.3	7.5	-53.3	-13.0	40.3
V	2539.8	-63.2	-59.0	1.3	7.5	-52.8	-13.0	39.8

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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

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, 2015
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.31, 2014
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	Jan. 23, 2015
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, 2014 Nov. 28, 2014* (*:Telecom port)
3m Semi-anechoic chamber	A-0166			Jul. 3, 2015
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	ECSI	100451	Nov. 30, 2014	Nov. 16, 2013
Preamplifier	ANRITSU	MH648A	M96057	Jun. 30, 2015	Jun. 12, 2014
Biconical antenna	Schwarzbeck	VHA9103/BBA9106	2125	May 31, 2015	May 7, 2014
Log periodic antenna	Schwarzbeck	UHALP9108A	0560	May 31, 2015	May 7, 2014
Attenuator	TME	CFA-01NPJ-6	N/A (S275)	Jun. 30, 2015	Jun. 9, 2014
Attenuator	TME	CFA-01NPJ-3	N/A (S272)	Jun. 30, 2015	Jun. 9, 2014
Spectrum analyzer	Agilent Technologies	E4440A	US44302655	May 31, 2015	May 30, 2014
Preamplifier	Agilent Technologies	8449B	3008A1008	Dec. 31, 2014	Dec. 9, 2013
Dipole antenna	Schwarzbeck	VHAP	1021	Sep. 30, 2014	Sep. 19, 2013
Dipole antenna	Schwarzbeck	UHAP	993	Sep. 30, 2014	Sep. 19, 2013
Double ridged guide antenna	EMCO	3115	5205	Dec. 31, 2014	Dec. 10, 2013
Attenuator	Agilent Technologies	8491B	MY39268633	Jan. 31, 2015	Jan. 15, 2013
Double ridged guide antenna	EMCO	3115	00058532	Sep. 30, 2014	Sep. 6, 2013
Signal generator	ROHDE&SCHWARZ	SMB100A	177525	Feb. 28, 2015	Feb. 18, 2014
Microwave cable	SUHNER	SUCOFELX102/2m	31648/2	Feb. 28, 2015	Feb. 13, 2014
High pass filter	Micro-Tronics	HPM50115	004	Jul. 31, 2015	Jul. 12, 2014
High pass filter	Wainwright	WHKX2.8/18G-6SS	1	Jul. 31, 2015	Jul. 17, 2014
Wideband radio frequency tester	ROHDE&SCHWARZ	CMW500	116338	Mar. 31, 2015	Mar. 7, 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)	May 31, 2015	May 6, 2014
3m Semi-anechoic chamber	TOKIN	N/A	N/A (9002-SVSWR)	May 31, 2015	May 6, 2014

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