

ELECTROMAGNETIC EMISSION COMPLIANCE REPORT FOR LOW-POWER, NON-LICENSED TRANSMITTER

Test Report No.	: OT-187-RWD-012
AGR No.	: A186A-133
Applicant	: Hironic Co., Ltd
Address	: 19F, 767, Sinsu-ro, Suji-gu, Yongin-si, Gyeonggi-do, Korea
Manufacturer	: Hironic Co., Ltd
Address	: 19F, 767, Sinsu-ro, Suji-gu, Yongin-si, Gyeonggi-do, Korea
Type of Equipment	: Mid-Frequency Obesity Care device
FCC ID.	: 2AQIV-THINBE
Model Name	: ThinBe
Multiple Model Name	e:N/A
Serial number	: N/A
Total page of Report	: 32 pages (including this page)
Date of Incoming	: June 05, 2018
Date of issue	: July 05, 2018

SUMMARY

The equipment complies with the regulation; *FCC PART 15 SUBPART C Section 15.247* This test report only contains the result of a single test of the sample supplied for the examination. It is not a generally valid assessment of the features of the respective products of the mass-production.

Reviewed by: Ki-Hong, Nam / Chief Engineer ONETECH Corp.

Approved by:

Keun-Young, Choi / Vice President ONETECH Corp.



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ONETECH Corp.: 43-14, Jinsaegol-gil, Chowol-eup, Gwangju-si, Gyeonggi-do, 12735, Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)

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Revision History

Rev. No.	Issue Report No.	Issued Date	Revisions	Section Affected
0	OT-187-RWD-012	2018.07.05	Initial Release	All



1. VERIFICATION OF COMPLIANCE

Applicant	: Hironic Co., Ltd
-----------	--------------------

Address : 19F, 767, Sinsu-ro, Suji-gu, Yongin-si, Gyeonggi-do, Korea

Contact Person : Jaehan Park / RA Manager

Telephone No. : +82-10-8514-0741

FCC ID : 2AQIV-THINBE

Model Name : ThinBe

Brand Name : -

Serial Number : N/A

Date : July 05, 2018

EQUIPMENT CLASS	DTS – DIGITAL TRNSMISSION SYSTEM
E.U.T. DESCRIPTION	Mid-Frequency Obesity Care device
THIS REPORT CONCERNS	Original Grant
MEASUREMENT PROCEDURES	ANSI C63.10: 2013
TYPE OF EQUIPMENT TESTED	Pre-Production
KIND OF EQUIPMENT	
AUTHORIZATION REQUESTED	Certification
EQUIPMENT WILL BE OPERATED	ECC DADT 15 SUDDADT C Service 15 247
UNDER FCC RULES PART(S)	FCC PART 15 SUBPART C Section 15.247
Modifications on the Equipment to Achieve	None
Compliance	None
Final Test was Conducted On	3 m, Semi Anechoic Chamber

-. The above equipment was tested by ONETECH Corp. for compliance with the requirement set forth in the FCC Rules and Regulations. This said equipment in the configuration described in this report, shows the maximum emission levels emanating from equipment are within the compliance requirements.



2. TEST SUMMARY

2.1 Test items and results

SECTION	TEST ITEMS	RESULTS
15.247 (a) (2)	Minimum 6 dB Bandwidth	Met the Limit / PASS
15.247 (b) (3)	Maximum Peak Conducted Output Power	Met the Limit / PASS
15.247 (d)	100 kHz Bandwidth Outside the Frequency Band	Met the Limit / PASS
15.247 (d)	Radiated Emission which fall in the Restricted Band	Met the Limit / PASS
15.247 (e)	Peak Power Spectral Density	Met the Limit / PASS
15.209	Radiated Emission Limits	Met the Limit / PASS
15.207	Conducted Limits	Met the Limit / PASS
15.203	Antenna Requirement	Met requirement / PASS

2.2 Additions, deviations, exclusions from standards

No additions, deviations or exclusions have been made from standard.

2.3 Related Submittal(s) / Grant(s)

Original submittal only

2.4 Purpose of the test

To determine whether the equipment under test fulfills the requirements of the regulation stated in FCC PART 15 SUBPART C Section 15.247.

2.5 Test Methodology

Both conducted and radiated testing was performed according to the procedures in ANSI C63.10: 2013. Radiated testing was performed at a distance of 3 m from EUT to the antenna.

2.6 Test Facility

The Onetech Corp. has been designated to perform equipment testing in compliance with ISO/IEC 17025.

The Electromagnetic compatibility measurement facilities are located at 43-14, Jinsaegol-gil, Chowol-eup, Gwangju-si,

Gyeonggi-do, 12735, Korea

-. Site Filing:

VCCI (Voluntary Control Council for Interference) - Registration No. R-4112/ C-14617/ G-10666 / T-1842

IC (Industry Canada) - Registration No. Site# 3736A-3

-. Site Accreditation:

KOLAS (Korea Laboratory Accreditation Scheme) - Accreditation NO. KT085

FCC (Federal Communications Commission) - Accreditation No. KR0013

RRA (Radio Research Agency) - Designation No. KR0013

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EMC-003 (Rev.2)



3. GENERAL INFORMATION

3.1 Product Description

The Hironic Co., Ltd, Model ThinBe (referred to as the EUT in this report) is a Mid-Frequency Obesity Care device. The product specification described herein was obtained from product data sheet or user's manual.

Device Type	Mid-Frequency Obesity Care device	
Temperature Range	$10 \ ^{\circ}C \sim + 40 \ ^{\circ}C$	
Operating Frequency	2 402 MHz ~ 2 480 MHz	
RF Output Power	-12.52 dBm	
Modulation Type	DSSS Modulation(GFSK)	
Antenna Type	Chip Antenna	
Antenna Gain	1.30 dBi	
Electrical Rating	DC 3.70 V	
List of each Osc. or crystal	20.769 http://20.MIL	
Freq.(Freq. >= 1 MHz)	32.768 kHz, 32 MHz	

3.2 Alternative type(s)/model(s); also covered by this test report.

-. None

4. EUT MODIFICATIONS

-. None



5. SYSTEM TEST CONFIGURATION

5.1 Justification

This device was configured for testing in a typical way as a normal customer is supposed to be used. During the test, the following components were installed inside of the EUT.

DEVICE TYPE	MANUFACTURER	MODEL/PART NUMBER	FCC ID
Main Board	Hironic Co., Ltd	MIDFREQME_REV0	N/A
Control board	Hironic Co., Ltd	N/A	N/A
Charge board	Hironic Co., Ltd	N/A	N/A
Module	Hironic Co., Ltd	N/A	N/A
Battery	Hironic Co., Ltd	N/A	N/A

5.2 Peripheral equipment

Defined as equipment needed for correct operation of the EUT, but not considered as tested:

Model	Manufacturer	Description	Connected to
ThinBe	Hironic Co., Ltd	Mid-Frequency Obesity Care device (EUT)	-
ЛG	N/A	TEST JIG	EUT
Pavilion g6	HP	Notebook PC	-

5.3 Mode of operation during the test

For the testing, software used to control the EUT for staying in continuous transmitting is programmed.

For final testing, the EUT was set at 2 402 MHz, 2 440 MHz, and 2 480 MHz to get a maximum emission levels from the EUT. The EUT was moved throughout the XY, XZ, and YZ planes and the worst case is "XZ" axis, but the worst data was recorded in this report.



5.4 Configuration of Test System

Line Conducted Test:	The EUT was connected to LISN. All supporting equipments were connected to another
	LISN. Preliminary Power line Conducted Emission test was performed by using the
	procedure in ANSI C63.10: 2013 to determine the worse operating conditions.
Radiated Emission Test:	Preliminary radiated emissions test were conducted using the procedure in ANSI C63.10:
	2013 to determine the worse operating conditions. Final radiated emission tests were
	conducted at 3 meter Semi Anechoic Chamber.
	The turntable was rotated through 360 degrees and the EUT was tested by positioned
	three orthogonal planes to obtain the highest reading on the field strength meter. Once
	maximum reading was determined, the search antenna was raised and lowered in both
	vertical and horizontal polarization.

5.5 Antenna Requirement

For intentional device, according to section 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device.

Antenna Construction:

The antenna of the EUT is a Chip Antenna on the main board in the EUT, so no consideration of replacement by the user.

6. PRELIMINARY TEST

6.1 AC Power line Conducted Emissions Tests

During Preliminary Tests, the following operating mode was investigated

Operation Mode	The Worse operating condition (Please check one only)
Charging Mode	Х

6.2 General Radiated Emissions Tests

During Preliminary Tests, the following operating modes were investigated

Operation Mode	The Worse operating condition (Please check one only)
Transmitting Mode	Х



7. MINIMUM 6 dB BANDWIDTH

7.1 Operating environment

Temperature	:	24.3 °C
Relative humidity	:	43.9 % R.H.

7.2 Test set-up

The antenna output of the EUT was connected to the spectrum analyzer. The resolution bandwidth is set to 100 kHz, and peak detection was used. The 6 dB bandwidth is defined as the total spectrum over which the power is higher than the peak power minus 6 dB.



7.3 Test equipment used

	Model Number	Manufacturer	Description	Serial Number	Last Cal.
-	FSV40	Rohde & Schwarz	Signal Analyzer	101009	Mar. 14, 2018 (1Y)



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7.4 Test data

-. Test Date

: June 11, 2018 ~ June 14, 2018

: Pass

-. Test Result

CHANNEL FREQUENCY(MHz) MEASURED VALUE (kHz) MARGIN (kHz) LIMIT (kHz) 500.00 Low $2\ 402.00$ 714.30 214.30 Middle 2 440.00 704.30 500.00 204.30 High 2 480.00 729.30 500.00 229.30

Remark. Margin = Measured Value - Limit

Tested by: Hyung-Kwon, Oh / Assistant Manager

Ref Level 20.00 dBm Offset 0.50 dB RBW 100 kHz Mode Auto FFT • 1Pk View D1[1] -0.37 dB 714.30 kHz 10 dBm M1[1] -18.94 dBm 2.40164040 GHz 0 dBm M1[1] -18.94 dBm -10 dBm 01 -20 dBm 01 -30 dBm -40 dBm
1Pk View 10 dBm 10
10 dBm M1[1] -18.94 dBm 0 dBm 2.40164040 GHz 0 dBm 0 -10 dBm 0 01 -13.110 dBm M1 -20 dBm 0 -30 dBm 0 -50 dBm
-10 dBm D1 -13.110 dBm M1 B1
D1 -13.110 dBm M1 D1 -20 dBm D2 -19.110 dBm30 dBm50 dBm -
-2U dBm D2 -19.110 dBm V U1 -30 dBm -40 dBm -50 dBm -5
-40 dBm -50 dBm
-50 dBm
-60 dBm
-70 dBm
CF 2.402 GHz 1001 pts Span 5.0 MHz



Spectrum	-	ectrum 2			rum 3		Spectrum 4	4 🗙		
RefLevel 20. Att		Offset SWT	0.50 dB 🖷		/ 100 k⊢ / 300 k⊢		Auto FFT			
●1Pk View	50 GD	- oni	1 110	TON	000 Ki	12 moue	Autonn			
						D	1[1]			-0.40 dB
										704.30 kHz
10 dBm				-		M	1[1]			-18.75 dBm 964040 GHz
								1	2.439	
0 dBm				+						+
-10 dBm			ļ							
	-13.180	dBm		MJ	\sim	\sim				+
-20 dBm	ا D2 -19_	.180 dBm=		₽						+
							Į			
-30 dBm				Д			<u>\</u>			
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40 dBm										
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to dBm	w	\sim		\top				\sim		h_{-}
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-60 dBm				+						
-70 dBm				+						
CF 2.44 GHz		i	L		1001	pts	I	L	Spa	in 5.0 MHz
									· · ·	
Spectrum	Spe	ectrum 2	×	Spect	rum 3	×s	Spectrum 4	4 🗶		
RefLevel 20 Att).00 dBm		0.50 dB 🧉	RBW		Ηz	Auto FFT	4 🛞		[₩
Ref Level 20).00 dBm	Offset	0.50 dB 🧉	RBW	/ 100 kH	Hz Hz Mode	Auto FFT	4 🗶		
RefLevel 20 Att).00 dBm	Offset	0.50 dB 🧉	RBW	/ 100 kH	Hz Hz Mode		4 8		-0.16 dB 729.30 kHz
RefLevel 20 Att).00 dBm	Offset	0.50 dB 🧉	RBW	/ 100 kH	Hz Hz Mode Di	Auto FFT	4 8	-	-0.16 dB 729.30 kHz -18.56 dBm
Ref Level 20 Att 1Pk View).00 dBm	Offset	0.50 dB 🧉	RBW	/ 100 kH	Hz Hz Mode Di	Auto FFT		-	-0.16 dB 729.30 kHz
Ref Level 20 Att 1Pk View).00 dBm	Offset	0.50 dB 🧉	RBW	/ 100 kH	Hz Hz Mode Di	Auto FFT	4 8	-	-0.16 dB 729.30 kHz -18.56 dBm
Ref Level 20 Att 1Pk View).00 dBm	Offset	0.50 dB 🧉	RBW	/ 100 kH	Hz Hz Mode Di	Auto FFT		-	-0.16 dB 729.30 kHz -18.56 dBm
Ref Level 20 Att 1Pk View 10 dBm 0 dBm -10 dBm	0.00 dBm 30 dB	Offset	0.50 dB 🧉	RBW	/ 100 kH	Hz Hz Mode Di	Auto FFT		-	-0.16 dB 729.30 kHz -18.56 dBm
Ref Level 20 Att 1Pk View 10 dBm 0 dBm -10 dBm).00 dBm	Offset	0.50 dB 🧉	RBW	/ 100 kH / 300 kH	Hz Hz Mode D: M	Auto FFT		-	-0.16 dB 729.30 kHz -18.56 dBm
Ref Level 20 Att 1Pk View 10 dBm 0 dBm -10 dBm D1).00 dBm 30 dB -12.440	Offset	0.50 dB 🧉	RBW	/ 100 kH / 300 kH	Hz Hz Mode Di	Auto FFT		-	-0.16 dB 729.30 kHz -18.56 dBm
Ref Level 20 Att 1Pk View 10 dBm 0 dBm -10 dBm D1).00 dBm 30 dB -12.440	dBm-	0.50 dB 🧉	RBW	/ 100 kH / 300 kH	Hz Hz Mode D: M	Auto FFT		-	-0.16 dB 729.30 kHz -18.56 dBm
Ref Level 20 Att 1Pk View 1D dBm 0 0 dBm 0 -10 dBm D1 -20 dBm 0).00 dBm 30 dB -12.440	dBm-	0.50 dB 🧉	RBW	/ 100 kH / 300 kH	Hz Hz Mode D: M	Auto FFT		-	-0.16 dB 729.30 kHz -18.56 dBm
Ref Level 20 Att 1Pk View 10 dBm 0 dBm -10 dBm D1).00 dBm 30 dB -12.440	dBm-	0.50 dB 🧉	RBW	/ 100 kH / 300 kH	Hz Hz Mode D: M	Auto FFT		-	-0.16 dB 729.30 kHz -18.56 dBm
Ref Level 20 Att 1Pk View 10 dBm 0 dBm -10 dBm -20 dBm -30 dBm).00 dBm 30 dB -12.440	dBm-	0.50 dB 🧉	RBW	/ 100 kH / 300 kH	Hz Hz Mode D: M	Auto FFT		-	-0.16 dB 729.30 kHz -18.56 dBm
Ref Level 20 Att 1Pk View 1D dBm 0 -10 dBm D1 -20 dBm D1).00 dBm 30 dB -12.440	dBm-	0.50 dB 🧉	RBW	/ 100 kH / 300 kH	Hz Hz Mode D: M	Auto FFT		-	-0.16 dB 729.30 kHz -18.56 dBm
Ref Level 20 Att 1Pk View 10 dBm 0 dBm -10 dBm -20 dBm -30 dBm -40 dBm).00 dBm 30 dB -12.440	dBm-	0.50 dB 🧉	RBW	/ 100 kH / 300 kH	Hz Hz Mode D: M	Auto FFT		-	-0.16 dB 729.30 kHz -18.56 dBm
Ref Level 20 Att 1Pk View 10 dBm 0 dBm -10 dBm -20 dBm -30 dBm).00 dBm 30 dB -12.440	dBm-	0.50 dB 🧉	RBW	/ 100 kH / 300 kH	Hz Hz Mode D: M	Auto FFT		-	-0.16 dB 729.30 kHz -18.56 dBm
Ref Level 20 Att 1Pk View 10 dBm 0 dBm -10 dBm -20 dBm -30 dBm -40 dBm).00 dBm 30 dB -12.440	dBm-	0.50 dB 🧉	RBW	/ 100 kH / 300 kH	Hz Hz Mode D: M	Auto FFT		-	-0.16 dB 729.30 kHz -18.56 dBm
Ref Level 20 Att 1Pk View 10 dBm 0 dBm -10 dBm -20 dBm -30 dBm -40 dBm).00 dBm 30 dB -12.440	dBm-	0.50 dB 🧉	RBW	/ 100 kH / 300 kH	Hz Hz Mode D: M	Auto FFT		-	-0.16 dB 729.30 kHz -18.56 dBm
Ref Level 20 Att 1Pk View 10 dBm 0 dBm -10 dBm -20 dBm -30 dBm -40 dBm).00 dBm 30 dB -12.440	dBm-	0.50 dB 🧉	RBW	/ 100 kH / 300 kH	Hz Hz Mode D: M	Auto FFT		-	-0.16 dB 729.30 kHz -18.56 dBm
Ref Level 20 Att 1Pk View 10 dBm 0 dBm -10 dBm -20 dBm -30 dBm -40 dBm).00 dBm 30 dB -12.440	dBm-	0.50 dB 🧉	RBW	/ 100 kH / 300 kH	Hz Hz Mode D: M	Auto FFT		-	-0.16 dB 729.30 kHz -18.56 dBm
Ref Level 20 Att 1Pk View 10 dBm 0 dBm -10 dBm -20 dBm -30 dBm -40 dBm -50 dBm -60 dBm).00 dBm 30 dB -12.440	dBm-	0.50 dB 🧉	RBW	/ 100 kH / 300 kH	Hz Hz Mode D: M	Auto FFT		-	-0.16 dB 729.30 kHz -18.56 dBm
Ref Level 20 Att 1Pk View 10 dBm 0 dBm -10 dBm -20 dBm -30 dBm -50 dBm -60 dBm).00 dBm 30 dB -12.440	dBm-	0.50 dB 🧉	RBW	/ 100 kH	Hz Hz Mode D: M	Auto FFT		2.479	-0.16 dB 729.30 kHz 18.56 dBm 663040 GHz
Ref Level 20 Att 1Pk View 10 dBm 0 dBm -10 dBm -20 dBm -30 dBm -40 dBm -50 dBm -60 dBm).00 dBm 30 dB -12.440	dBm-	0.50 dB 🧉	RBW	/ 100 kH / 300 kH	Hz Hz Mode D: M	Auto FFT		2.479	-0.16 dB 729.30 kHz -18.56 dBm



8. MAXIMUM PEAK OUTPUT POWER

8.1 Operating environment

Temperature	:	24.3 °C
Relative humidity	:	43.9 % R.H.

8.2 Test set-up

The antenna output of the EUT was connected to the spectrum analyzer.

The resolution bandwidth is set to \geq DTS Bandwidth, the video bandwidth is set to 3 times the resolution bandwidth.



8.3 Test equipment used

	Model Number	Manufacturer	Description	Serial Number	Last Cal.
■ -	FSV40	Rohde & Schwarz	Signal Analyzer	101009	Mar. 14, 2018 (1Y)



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8.4 Test data

-. Test Date

: June 11, 2018 ~ June 14, 2018

-. Test Result

: Pass

CHANNEL	FREQUENCY	MEASURED VALUE	LIMIT	MARGIN
CHAINLE	(MHz)	(dBm)	(dBm)	(dB)
LOW	2 402.00	-12.92	30.00	42.92
MIDDLE	2 440.00	-12.92	30.00	42.92
HIGH	2 480.00	-12.52	30.00	42.52

Remark. Margin = Limit – Measured Value (=Receiver Reading + Cable Loss)

Tested by: Hyung-Kwon, Oh / Assistant Manager

Ref Level 20.			RBW 3 MH			
● Att ●1Pk View	30 dB 🔵 SWT	1 ms 🖷	VBW 10 MH	2 Mode /	Auto Sweep	
				Mi	[1]	 -12.92 dBn 2.40216980 GH
10 dBm						
0 dBm						
-10 dBm				M1		
-20 dBm						
-30 dBm						
-40 dBm						
-50 dBm						
-60 dBm						
-70 dBm						
CF 2.402 GHz			1001	pts		Span 5.0 MHz



Spectrum	Spectrum 2		pectrum 3		Spectrum 4	× ×		
Ref Level 20			RBW 3 MH					
● Att ●1Pk View	30 dB 😑 SWT	ıms 🖷	VBW 10 MH	IZ Mode	e Auto Sweep			
					M1[1]		-	12.92 dBm
							2.440	20980 GHz
10 dBm								
0 dBm								
-10 dBm				M1				
				F in				
-20 dBm								
-30 dBm								
-40 dBm								
-50 dBm					_			
-60 dBm								
-70 dBm								
CF 2.44 GHz			1001	pts			Spa	n 5.0 MHz
			Middle					_
Spectrum Ref Level 20		0.50 dB 🔵	pectrum 3 RBW 3 MH	X Iz	Spectrum 4	8		
RefLevel 20 Att		0.50 dB 🔵	pectrum 3	X Iz		8		
Ref Level 20).00 dBm Offset	0.50 dB 🔵	pectrum 3 RBW 3 MH	Iz Iz Mode	Spectrum 4	* *		
RefLevel 20 Att).00 dBm Offset	0.50 dB 🔵	pectrum 3 RBW 3 MH	Iz Iz Mode	Spectrum 4	8		12.52 dBm 56540 GHz
RefLevel 20 Att).00 dBm Offset	0.50 dB 🔵	pectrum 3 RBW 3 MH	Iz Iz Mode	Spectrum 4	8		12.52 dBm
Ref Level 20 Att 1Pk View).00 dBm Offset	0.50 dB 🔵	pectrum 3 RBW 3 MH	Iz Iz Mode	Spectrum 4	8		12.52 dBm
Ref Level 20 Att 1Pk View).00 dBm Offset	0.50 dB 🔵	pectrum 3 RBW 3 MH	Iz Iz Mode	Spectrum 4	8		12.52 dBm
Ref Level 20 Att 1Pk View 10 dBm).00 dBm Offset	0.50 dB 🔵	pectrum 3 RBW 3 MH	Iz Iz Mode	Spectrum 4			12.52 dBm
Ref Level 20 Att 1Pk View 10 dBm).00 dBm Offset	0.50 dB 🔵	pectrum 3 RBW 3 MH	Iz Iz Mode	Spectrum 4			12.52 dBm
Ref Level 20 Att 1Pk View 10 dBm- 0 dBm-).00 dBm Offset	0.50 dB 🔵	Pectrum 3 RBW 3 MH VBW 10 MH	Iz Iz Mode	Spectrum 4	8		12.52 dBm
Ref Level 20 Att 1Pk View 10 dBm- 0 dBm-).00 dBm Offset	0.50 dB 🔵	Pectrum 3 RBW 3 MH VBW 10 MH	Iz Iz Mode	Spectrum 4			12.52 dBm
Ref Level 20 Att 1Pk View 10 dBm 0 dBm -10 dBm -10 dBm).00 dBm Offset	0.50 dB 🔵	Pectrum 3 RBW 3 MH VBW 10 MH	Iz Iz Mode	Spectrum 4			12.52 dBm
Ref Level 20 Att 1Pk View 10 dBm 0 dBm -10 dBm -10 dBm).00 dBm Offset	0.50 dB 🔵	Pectrum 3 RBW 3 MH VBW 10 MH	Iz Iz Mode	Spectrum 4			12.52 dBm
Ref Level 20 Att 1Pk View 10 dBm 0 0 dBm -10 dBm -20 dBm -20 dBm).00 dBm Offset	0.50 dB 🔵	Pectrum 3 RBW 3 MH VBW 10 MH	Iz Iz Mode	Spectrum 4			12.52 dBm
Ref Level 20 Att 1Pk View 10 dBm 0 0 dBm -10 dBm -20 dBm -20 dBm).00 dBm Offset	0.50 dB 🔵	Pectrum 3 RBW 3 MH VBW 10 MH	Iz Iz Mode	Spectrum 4			12.52 dBm
Ref Level 20 Att 1Pk View 10 dBm 0 dBm -10 dBm -20 dBm).00 dBm Offset	0.50 dB 🔵	Pectrum 3 RBW 3 MH VBW 10 MH	Iz Iz Mode	Spectrum 4			12.52 dBm
Ref Level 20 Att 1Pk View 10 dBm 0 dBm -10 dBm -20 dBm -30 dBm -40 dBm).00 dBm Offset	0.50 dB 🔵	Pectrum 3 RBW 3 MH VBW 10 MH	Iz Iz Mode	Spectrum 4			12.52 dBm
Ref Level 20 Att 1Pk View 10 dBm 0 dBm -10 dBm -20 dBm).00 dBm Offset	0.50 dB 🔵	Pectrum 3 RBW 3 MH VBW 10 MH	Iz Iz Mode	Spectrum 4			12.52 dBm
Ref Level 20 Att 1Pk View 10 dBm 0 dBm -10 dBm -20 dBm -30 dBm -40 dBm).00 dBm Offset	0.50 dB 🔵	Pectrum 3 RBW 3 MH VBW 10 MH	Iz Iz Mode	Spectrum 4			12.52 dBm
Ref Level 20 Att 1Pk View 10 dBm 0 dBm -10 dBm -20 dBm -30 dBm -40 dBm).00 dBm Offset	0.50 dB 🔵	Pectrum 3 RBW 3 MH VBW 10 MH	Iz Iz Mode	Spectrum 4			12.52 dBm
Ref Level 20 Att 1Pk View 10 dBm 0 dBm -10 dBm -20 dBm -30 dBm -40 dBm -50 dBm -60 dBm).00 dBm Offset	0.50 dB 🔵	Pectrum 3 RBW 3 MH VBW 10 MH	Iz Iz Mode	Spectrum 4			12.52 dBm
Ref Level 20 Att 1Pk View 10 dBm 0 dBm -10 dBm -20 dBm -30 dBm -40 dBm).00 dBm Offset	0.50 dB 🔵	Pectrum 3 RBW 3 MH VBW 10 MH	Iz Iz Mode	Spectrum 4			12.52 dBm
Ref Level 20 Att 1Pk View 10 dBm 0 dBm -10 dBm -20 dBm -30 dBm -40 dBm -50 dBm -60 dBm).00 dBm Offset	0.50 dB 🔵	Pectrum 3 RBW 3 MH VBW 10 MH	Iz Iz Mode	Spectrum 4			12.52 dBm
Ref Level 20 Att 1Pk View 10 dBm 0 dBm -10 dBm -20 dBm -30 dBm -40 dBm -50 dBm -60 dBm).00 dBm Offset	0.50 dB 🔵	Pectrum 3 RBW 3 MH VBW 10 MH		Spectrum 4		2.479	12.52 dBm



9. 100 kHz BANDWIDTH OUTSIDE THE FREQUENCY BAND

9.1 Operating environment

Temperature	:	24.3 °C
Relative humidity	:	43.9 % R.H.

9.2 Test set-up for conducted measurement

The antenna output of the EUT was connected to the spectrum analyzer. The resolution bandwidth is set to 100 kHz, the video bandwidth is set to 3 times the resolution bandwidth and peak detection was used.



9.3 Test set-up for radiated measurement

The radiated emissions measurements were performed on the 3 m semi anechoic chamber. The EUT was placed on turntable approximately 1.5 m above the ground plane.

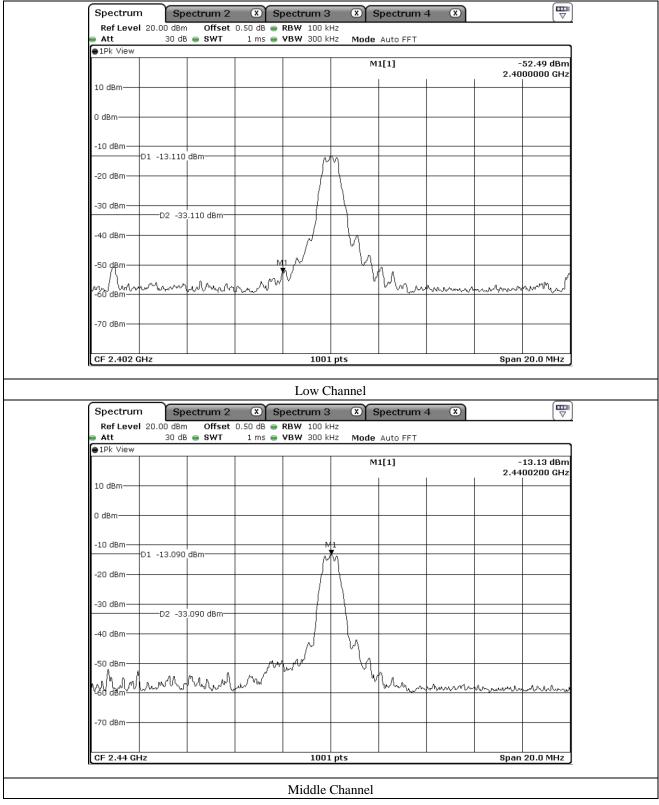
The frequency spectrum from 30 MHz to 26.5 GHz was scanned and maximum emission levels at each frequency recorded. The system was rotated 360°, and the antenna was varied in the height between 1.0 m and 4.0 m in order to determine the maximum emission levels. This procedure was performed for horizontal and vertical polarization of the receiving antenna.

9.4 Test equipment used

	Model Number	Manufacturer	Description	Serial Number	Last Cal.
-	FSV40	Rohde & Schwarz	Signal Analyzer	101009	Mar. 14, 2018 (1Y)
■ -	ESU	Rohde & Schwarz	EMI Test Receiver	100261	Mar. 29, 2018 (1Y)
-	310N	Sonoma Instrument	Pre-Amplifier	312544	Mar. 28, 2018 (1Y)
-	BBV9718	Schwarzbeck	Amplifier	310	Mar. 30, 2018 (1Y)
	SCU40A	Rohde & Schwarz	Signal Conditioning unit	100436	Mar. 15, 2018 (1Y)
■ -	DT3000-3t	Innco System	Turn Table	DT3000/093	N/A
■ -	MA-4000XPET	Innco System	Antenna Master	MA4000/509	N/A
-	VULB9163	Schwarzbeck	TRILOG Broadband Antenna	9163-419	Aug. 05, 2016 (2Y)
■ -	BBHA9120D	Schwarzbeck	Horn Antenna	BBHA9120D295	Aug. 16, 2017 (2Y)
-	BBHA9170	Schwarzbeck	Horn Antenna	BBHA9170179	Jul. 28, 2017 (2Y)



9.5 Test data for conducted emission





Spectrum	Spectrum 2	× SI	bectrum 3	×s	pectrum 4	4 🗴		
RefLevel 20.00 Att 3	dBm Offset 30 dB 🖷 SWT		RBW 100 kH VBW 300 kH		Auto FFT			
● 1Pk View	0 ub 🥌 3 Wi	1 1115	YDYY 300 KF	12 Moue	AULO FFI			
				M	1[1]	1		57.31 dBm 35000 GHz
10 dBm								
0 dBm								
-10 dBm	.490 dBm		N					
-20 dBm			M	1				
-30 dBm	2 -32.490 dBm							
-40 dBm			-					
-50 dBm				\neg	A			
-50 dBm \	when	www.	~~ v	ι. ·	hv. #l	Luch-Car	mound	www.www.
-70 dBm								
CF 2.48 GHz			1001	pts			Span	20.0 MHz
CF 2.48 GHz			1001 High C				Span	20.0 MHz



		ectrum 2		Spectrum 3		Spectrum	4 🛛		
Ref Leve Att	20.00 dBm 30 dB			RBW 100 ki VBW 300 ki		Auto Culoor			
●1Pk View	30 UB	311	24.7 115	YDYY SUUKI	12 Moue	Auto Sweep	J		
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						1	1	1.	.20080 GHz
10 dBm									
0 dBm									
-10 dBm									
-20 dBm									
-30 dBm—									
	D1 -33.110	dBm							
-40 dBm									
-50 dBm				<u>M1</u>					
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Spectrun	n Sp	ectrum 2	×	Low C		Spectrum	4 X		
Ref Leve	20.00 dBm	Offset	2.40 dB 😑	Spectrum 3 RBW 100 kH					
Ref Leve Att		Offset	2.40 dB 😑	Spectrum 3		Spectrum Auto Sweep			
Ref Leve	20.00 dBm	Offset	2.40 dB 😑	Spectrum 3 RBW 100 kH	3 X 3	Auto Sweep			
Ref Leve Att	20.00 dBm	Offset	2.40 dB 😑	Spectrum 3 RBW 100 kH	3 X 3				,
Ref Leve Att	20.00 dBm	Offset	2.40 dB 😑	Spectrum 3 RBW 100 kH	3 X 3	Auto Sweep			-46.45 dBm
Ref Leve Att 1Pk View	20.00 dBm	Offset	2.40 dB 😑	Spectrum 3 RBW 100 kH	3 X 3	Auto Sweep			-46.45 dBm
Ref Leve Att 1Pk View	20.00 dBm	Offset	2.40 dB 😑	Spectrum 3 RBW 100 kH	3 X 3	Auto Sweep			-46.45 dBm
Ref Leve Att 1Pk View	20.00 dBm	Offset	2.40 dB 😑	Spectrum 3 RBW 100 kH	3 X 3	Auto Sweep			-46.45 dBm
Ref Leve Att 1Pk View	20.00 dBm	Offset	2.40 dB 😑	Spectrum 3 RBW 100 kH	3 X 3	Auto Sweep			-46.45 dBm
Ref Leve Att 1Pk View 10 dBm	20.00 dBm	Offset	2.40 dB 😑	Spectrum 3 RBW 100 kH	3 X 3	Auto Sweep			-46.45 dBm
Ref Leve Att 1Pk View 10 dBm	20.00 dBm	Offset	2.40 dB 😑	Spectrum 3 RBW 100 kH	3 X 3	Auto Sweep			-46.45 dBm
Ref Leve Att 1Pk View 10 dBm 0 dBm -10 dBm	20.00 dBm	Offset	2.40 dB 😑	Spectrum 3 RBW 100 kH	3 X 3	Auto Sweep			-46.45 dBm
Ref Leve Att 1Pk View 10 dBm 0 dBm -10 dBm -20 dBm -30 dBm	1 20.00 dBm 30 dB	Offset SWT	2.40 dB 😑	Spectrum 3 RBW 100 kH	3 X 3	Auto Sweep			-46.45 dBm
Ref Leve Att 1Pk View 10 dBm 0 dBm -10 dBm -20 dBm -30 dBm	20.00 dBm	Offset SWT	2.40 dB 😑	Spectrum 3 RBW 100 kH	3 X 3	Auto Sweep			-46.45 dBm
Ref Leve Att 1Pk View 10 dBm 0 dBm -10 dBm -20 dBm -30 dBm	0 20.00 dBm 30 dB	dBm-	2.40 dB 240 ms 2	Spectrum 3 RBW 100 kH VBW 300 kH	X E	Auto Sweep			-46.45 dBm 8.0720 GHz
Ref Leve Att 1Pk View 10 dBm 0 dBm -10 dBm -20 dBm -30 dBm	D1 -33.110	dBm-	2.40 dB 240 ms 2	Spectrum 3 RBW 100 kH VBW 300 kH	X E	Auto Sweep			-46.45 dBm 8.0720 GHz
Ref Leve Att 1Pk View 10 dBm 0 dBm -10 dBm -20 dBm -30 dBm	D1 -33.110	dBm-	2.40 dB 240 ms 2	Spectrum 3 RBW 100 kH VBW 300 kH	X E	Auto Sweep			-46.45 dBm 8.0720 GHz
Ref Leve Att 1Pk View 10 dBm 0 dBm -10 dBm -20 dBm -30 dBm	D1 -33.110	dBm-	2.40 dB 240 ms 2	Spectrum 3 RBW 100 kH VBW 300 kH	X E	Auto Sweep			-46.45 dBm 8.0720 GHz
Ref Leve Att 1Pk View 10 dBm 0 dBm -10 dBm -20 dBm -30 dBm -40 dBm	D1 -33.110	dBm-	2.40 dB 240 ms 2	Spectrum 3 RBW 100 kH	X E	Auto Sweep			-46.45 dBm 8.0720 GHz
Ref Leve Att 1Pk View 10 dBm 0 dBm -10 dBm -20 dBm -30 dBm	D1 -33.110	dBm-	2.40 dB 240 ms 2	Spectrum 3 RBW 100 kH VBW 300 kH	X E	Auto Sweep			-46.45 dBm 8.0720 GHz
Ref Leve Att 1Pk View 10 dBm 0 dBm -10 dBm -20 dBm -30 dBm -40 dBm -50 dBm -60 dBm	D1 -33.110	dBm-	2.40 dB 240 ms 2	Spectrum 3 RBW 100 kH VBW 300 kH	X E	Auto Sweep			-46.45 dBm 8.0720 GHz
Ref Leve Att 1Pk View 10 dBm 0 dBm -10 dBm -20 dBm -30 dBm -40 dBm	D1 -33.110	dBm-	2.40 dB 240 ms 2	Spectrum 3 RBW 100 kH VBW 300 kH	X E	Auto Sweep			-46.45 dBm 8.0720 GHz
Ref Leve Att 1Pk View 10 dBm 0 dBm -10 dBm -20 dBm -30 dBm -40 dBm -50 dBm -60 dBm	D1 -33.110	dBm-	2.40 dB 240 ms 2	Spectrum 3 RBW 100 kH VBW 300 kH	X E	Auto Sweep			-46.45 dBm 8.0720 GHz
Ref Leve Att 1Pk View 10 dBm 0 dBm -10 dBm -20 dBm -30 dBm -40 dBm -50 dBm -60 dBm	D1 -33.110	dBm-	2.40 dB 240 ms 2	Spectrum 3 RBW 100 kH VBW 300 kH	X E	Auto Sweep		11	-46.45 dBm 8.0720 GHz



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Att	20.00 dBm 30 dB			RBW 100 kH		Auto Sweep)		
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Ref Level	20.00 dBm	Offset	2.40 dB 😑	Spectrum 3 RBW 100 kH	Z Z Z Mode	Auto Sweep			
Ref Level Att	20.00 dBm	Offset	2.40 dB 😑	Spectrum 3 RBW 100 kH	Z Z Z Mode				-46.67 dBm
Ref Level Att	20.00 dBm	Offset	2.40 dB 😑	Spectrum 3 RBW 100 kH	Z Z Z Mode	Auto Sweep			
Ref Level Att 1Pk View	20.00 dBm	Offset	2.40 dB 😑	Spectrum 3 RBW 100 kH	Z Z Z Mode	Auto Sweep			-46.67 dBm
Ref Level Att 1Pk View	20.00 dBm	Offset	2.40 dB 😑	Spectrum 3 RBW 100 kH	Z Z Z Mode	Auto Sweep			-46.67 dBm
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Ref Level Att 1Pk View 10 dBm 0 dBm	20.00 dBm	Offset	2.40 dB 😑	Spectrum 3 RBW 100 kH	Z Z Z Mode	Auto Sweep			-46.67 dBm
Ref Level Att 1Pk View 10 dBm 0 dBm	20.00 dBm	Offset	2.40 dB 😑	Spectrum 3 RBW 100 kH	Z Z Z Mode	Auto Sweep			-46.67 dBm
Ref Level Att 1Pk View 10 dBm- 0 dBm- -10 dBm-	20.00 dBm	Offset	2.40 dB 😑	Spectrum 3 RBW 100 kH	Z Z Z Mode	Auto Sweep			-46.67 dBm
Ref Level Att 1Pk View 10 dBm 0 dBm -10 dBm -20 dBm -30 dBm	20.00 dBm 30 dB	Offset SWT	2.40 dB 😑	Spectrum 3 RBW 100 kH	Z Z Z Mode	Auto Sweep			-46.67 dBm
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Ref Level Att 1Pk View 10 dBm 0 dBm -10 dBm -20 dBm -30 dBm	20.00 dBm 30 dB	Offset SWT	2.40 dB • 240 ms •	Spectrum 3 RBW 100 kH VBW 300 kH	X E	• Auto Sweep 1[1]			-46.67 dBm 6.2980 GHz
Ref Level Att 1Pk View 10 dBm 0 dBm -10 dBm -20 dBm -30 dBm	20.00 dBm 30 dB	Offset SWT	2.40 dB • 240 ms •	Spectrum 3 RBW 100 kH VBW 300 kH	X E	• Auto Sweep 1[1]			-46.67 dBm 6.2980 GHz
Ref Level Att 1Pk View 10 dBm 0 dBm -10 dBm -20 dBm -30 dBm	20.00 dBm 30 dB	Offset SWT	2.40 dB • 240 ms •	Spectrum 3 RBW 100 kH VBW 300 kH	X E	• Auto Sweep 1[1]			-46.67 dBm 6.2980 GHz
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Ref Level Att 1Pk View 10 dBm 0 dBm -10 dBm -20 dBm -30 dBm -40 dBm -50 dBm -60 dBm	20.00 dBm 30 dB	Offset SWT	2.40 dB • 240 ms •	Spectrum 3 RBW 100 kH VBW 300 kH	X E	• Auto Sweep 1[1]			-46.67 dBm 6.2980 GHz
Ref Level Att 1Pk View 10 dBm 0 dBm -10 dBm -20 dBm -30 dBm -50 dBm -50 dBm -50 dBm -70 dBm	20.00 dBm 30 dB	Offset SWT	2.40 dB • 240 ms •	Spectrum 3 RBW 100 kH VBW 300 kH	X E	• Auto Sweep 1[1]		Line and the second sec	46.67 dBm 6.2980 GHz
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		ectrum 2		Spectrum 3		Spectrum	4 🛛		
	20.00 dBm			RBW 100 kH					
● Att ●1Pk View	30 dB	SWT	24.7 ms 🖮	VBW 300 kH	12 Mode	Auto Sweep			
					м	1[1]		-	46.36 dBm
									75360 GHz
10 dBm									
0 dBm									
-10 dBm									
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Ref Level Att	1 Spo 20.00 dBm 30 dB	Offset	2.40 dB 😑			Spectrum (4 🛛		
Ref Level	20.00 dBm	Offset	2.40 dB 😑	Spectrum 3 RBW 100 kH	iz Mode	Auto Sweep	4 🛛		
Ref Level Att	20.00 dBm	Offset	2.40 dB 😑	Spectrum 3 RBW 100 kH	iz Mode	-	4 🛛		•46.45 dBrr
Ref Level Att 1Pk View	20.00 dBm	Offset	2.40 dB 😑	Spectrum 3 RBW 100 kH	iz Mode	Auto Sweep	4 8		
Ref Level Att	20.00 dBm	Offset	2.40 dB 😑	Spectrum 3 RBW 100 kH	iz Mode	Auto Sweep	4 🗷		•46.45 dBrr
Ref Level Att 1Pk View	20.00 dBm	Offset	2.40 dB 😑	Spectrum 3 RBW 100 kH	iz Mode	Auto Sweep	4 8		•46.45 dBrr
Ref Level Att 1Pk View	20.00 dBm	Offset	2.40 dB 😑	Spectrum 3 RBW 100 kH	iz Mode	Auto Sweep	4 8		•46.45 dBrr
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Ref Level Att 1Pk View	20.00 dBm	Offset	2.40 dB 😑	Spectrum 3 RBW 100 kH	iz Mode	Auto Sweep	4 8		•46.45 dBrr
Ref Level Att 1Pk View 10 dBm 0 dBm -10 dBm	20.00 dBm	Offset	2.40 dB 😑	Spectrum 3 RBW 100 kH	iz Mode	Auto Sweep	4 8		•46.45 dBrr
Ref Level Att 1Pk View 10 dBm	20.00 dBm	Offset	2.40 dB 😑	Spectrum 3 RBW 100 kH	iz Mode	Auto Sweep	4 8		•46.45 dBrr
Ref Level Att 1Pk View 10 dBm 0 dBm -10 dBm -20 dBm	20.00 dBm	Offset	2.40 dB 😑	Spectrum 3 RBW 100 kH	iz Mode	Auto Sweep	4 8		•46.45 dBrr
Ref Level Att 1Pk View 10 dBm 0 dBm -10 dBm -20 dBm	20.00 dBm	Offset : SWT	2.40 dB 😑	Spectrum 3 RBW 100 kH	iz Mode	Auto Sweep	4 8		•46.45 dBrr
Ref Level Att 1Pk View 10 dBm 0 dBm -10 dBm -20 dBm -30 dBm	20.00 dBm 30 dB	Offset : SWT	2.40 dB 😑	Spectrum 3 RBW 100 kH	iz Mode	Auto Sweep	4 8		•46.45 dBrr
Ref Level Att 1Pk View 10 dBm 0 dBm -10 dBm -20 dBm	20.00 dBm 30 dB	Offset : SWT	2.40 dB 240 ms 3	Spectrum 3 RBW 100 kH VBW 300 kH	IZ Mode	Auto Sweep			46.45 dBm 7.7130 GHz
Ref Level Att 1Pk View 10 dBm 0 dBm -10 dBm -20 dBm -30 dBm -40 dBm	20.00 dBm 30 dB 01 -32.490	Offset : SWT	2.40 dB 240 ms 3	Spectrum 3 RBW 100 kH VBW 300 kH	IZ Mode	Auto Sweep			46.45 dBm 7.7130 GHz
Ref Level Att 1Pk View 10 dBm 0 dBm -10 dBm -20 dBm -30 dBm -40 dBm	20.00 dBm 30 dB 01 -32.490	Offset : SWT	2.40 dB 240 ms 3	Spectrum 3 RBW 100 kH VBW 300 kH	IZ Mode	Auto Sweep			46.45 dBm 7.7130 GHz
Ref Level Att 1Pk View 10 dBm 0 dBm -10 dBm -20 dBm -30 dBm -40 dBm	20.00 dBm 30 dB	Offset : SWT	2.40 dB 240 ms 3	Spectrum 3 RBW 100 kH	IZ Mode	Auto Sweep			46.45 dBm 7.7130 GHz
Ref Level Att 1Pk View 10 dBm 0 dBm -10 dBm -20 dBm -30 dBm -40 dBm	20.00 dBm 30 dB 01 -32.490	Offset : SWT	2.40 dB 240 ms 3	Spectrum 3 RBW 100 kH VBW 300 kH	IZ Mode	Auto Sweep			46.45 dBm 7.7130 GHz
Ref Level Att 1Pk View 10 dBm 0 dBm -10 dBm -20 dBm -30 dBm -40 dBm -50 dBm	20.00 dBm 30 dB 01 -32.490	Offset : SWT	2.40 dB 240 ms 3	Spectrum 3 RBW 100 kH VBW 300 kH	IZ Mode	Auto Sweep			46.45 dBm 7.7130 GHz
Ref Level Att 1Pk View 10 dBm 0 dBm -10 dBm -20 dBm -30 dBm -40 dBm -50 dBm	20.00 dBm 30 dB 01 -32.490	Offset : SWT	2.40 dB 240 ms 3	Spectrum 3 RBW 100 kH VBW 300 kH	IZ Mode	Auto Sweep			46.45 dBm 7.7130 GHz
Ref Level Att 1Pk View 10 dBm 0 dBm -10 dBm -20 dBm -30 dBm -40 dBm -50 dBm -60 dBm	20.00 dBm 30 dB 01 -32.490	Offset : SWT	2.40 dB 240 ms 3	Spectrum 3 RBW 100 kH VBW 300 kH	IZ Mode	Auto Sweep			46.45 dBm 7.7130 GHz
Ref Level Att 1Pk View 10 dBm 0 dBm -10 dBm -20 dBm -30 dBm -40 dBm -50 dBm -50 dBm -70 dBm	20.00 dBm 30 dB D1 -32.490	Offset : SWT	2.40 dB 240 ms 3	Spectrum 3 RBW 100 kH VBW 300 kH	Kuntuk	Auto Sweep		1	46.45 dBm 7.7130 GHz
Ref Level Att 1Pk View 10 dBm 0 dBm -10 dBm -20 dBm -30 dBm -40 dBm -50 dBm -60 dBm	20.00 dBm 30 dB D1 -32.490	Offset : SWT	2.40 dB 240 ms 3	Spectrum 3 RBW 100 kH VBW 300 kH	Kuntuk	Auto Sweep		1	46.45 dBm 7.7130 GHz



9.6 Test data for radiated emission

9.6.1 Radiated Emission which fall in the Restricted Band

- -. Test Date : June 11, 2018 ~ June 14, 2018
- -. Resolution bandwidth : 1 MHz for Peak and Average Mode
- -. Video bandwidth : 1 MHz for Peak Mode, 10 Hz for Average Mode
- -. Measurement distance : 3 m
- -. Result : <u>PASSED</u>

Frequency	Reading	Detector	Ant. Pol.	Ant.	Cable	Amp	Total	Limits	Margin		
(MHz)	(dBµV)	Mode	(H / V)	Factor	Loss	Gain	(dBµV/m)	(dBµV/m)	(dB)		
Test Data for Low Channel											
2 315.79	45.57	Peak	Н				46.95	74.00	27.05		
2 342.73	34.59	Average	Н				35.97	54.00	18.03		
2 335.22	45.63	Peak	V	26.94	9.20	34.76	47.01	74.00	26.99		
2 345.84	34.34	Average	V				35.72	54.00	18.28		
			Test I	Data for Hi	igh Channe	el					
2 495.87	46.10	Peak	Н				47.55	74.00	26.45		
2 499.48	34.27	Average	Н				35.72	54.00	18.28		
2 493.87	45.91	Peak	V	27.47	9.49	35.51	47.36	74.00	26.64		
2 489.90	34.11	Average	V				35.56	54.00	18.44		

Tabulated test data for Restricted Band

Remark: "H": Horizontal, "V": Vertical

Margin (dB) = Limits (dB μ V/m) - Total Level (dB μ V/m)

Total Level = Reading + Antenna Factor + Cable Loss - Pre-Amplifier Gain

Tested by: Hyung-Kwon, Oh / Assistant Manager



9.6.2 Spurious & Harmonic Radiated Emission

Test Date	: June 11, 2018 ~ June 14, 2018
Resolution bandwidth	: 1 MHz for Peak and Average Mode for the emissions fall in restricted band,
	100 kHz for Peak Mode for the emissions outside restricted band
Video bandwidth	: 1 MHz for Peak Mode, 10 Hz for Average Mode
Frequency range	: 1 GHz ~ 26.5 GHz

- -. Measurement distance : 3 m
- -. Result : <u>PASSED</u>

Frequency (GHz)	Reading (dBµV)	Detector Mode	Ant. Pol. (H/V)	Ant. Factor	Cable Loss	Amp Gain	Total (dBµV/m)	Limits (dBµV/m)	Margin (dB)		
Test Data for Low Channel											
	34.81	Peak	Н				42.22	74.00	31.78		
	23.70	Average	Н				31.11	54.00	22.89		
4 804.00	33.61	Peak	V	30.84	12.31	35.74	41.02	74.00	32.98		
	23.24	Average	V				30.65	54.00	23.35		
Test Data for Middle Channel											
	33.56	Peak	Н		12.43	35.80	40.20	74.00	33.80		
	23.80	Average	Н				30.44	54.00	23.56		
4 880.00	34.60	Peak	v	30.01			41.24	74.00	32.76		
	23.17	Average	v				29.81	54.00	24.19		
		<u> </u>	Tes	st Data fo	r High Cl	nannel					
	34.50	Peak	Н			35.96	42.50	74.00	31.50		
	23.62	Average	Н				31.62	54.00	22.38		
4 960.00	34.28	Peak	v	31.15	12.81		42.28	74.00	31.72		
	23.60	Average	V				31.60	54.00	22.40		

Tabulated test data for Restricted Band

Remark: "H": Horizontal, "V": Vertical

Margin (dB) = Limits (dB μ V/m) - Total Level (dB μ V/m)

Total Level = Reading + Antenna Factor + Cable Loss - Pre-Amplifier Gain

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EMC-003 (Rev.2)

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10. PEAK POWER SPECTRAL DENSITY

10.1 Operating environment

Temperature	:	24.3 °C
Relative humidity	:	43.9 % R.H.

10.2 Test set-up

The antenna output of the EUT was connected to the spectrum analyzer.

The resolution bandwidth is set to 3 kHz \leq RBW \leq 100 kHz, the video bandwidth is set to 3 times the resolution bandwidth.



10.3 Test equipment used

	Model Number	Manufacturer	Description	Serial Number	Last Cal.
■ -	FSV40	Rohde & Schwarz	Signal Analyzer	101009	Mar. 14, 2018 (1Y)



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10.4 Test data

-. Test Date : June 11, 2018 ~ June 14, 2018 : Pass

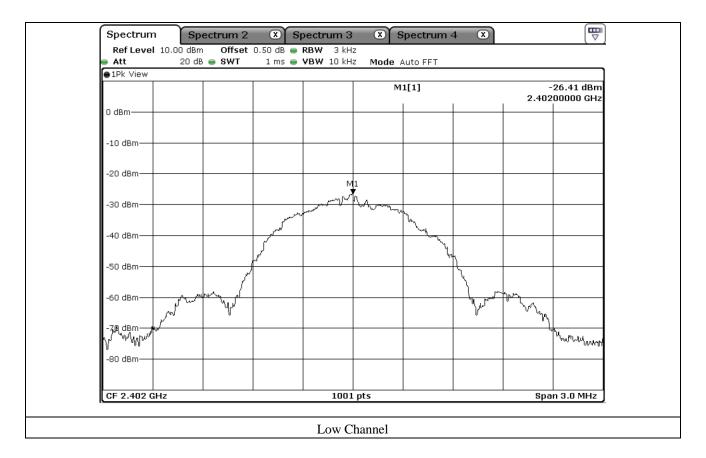
-. Test Result

-. Operating Condition : Continuous transmitting mode

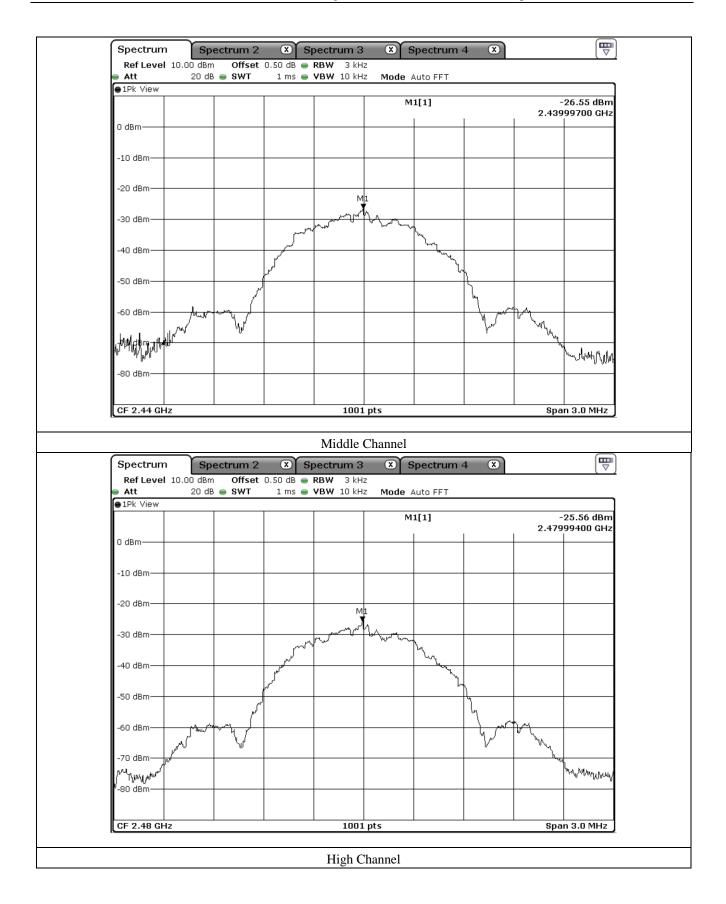
CHANNEL	FREQUENCY(MHz)	MEASURED VALUE (dBm)	LIMIT (dBm)	MARGIN (dB)
Low	2 402.00	-26.41	8.00	34.41
Middle	2 440.00	-26.55	8.00	34.55
High	2 480.00	-25.56	8.00	33.56

Remark. Margin = Limit – Measured value

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11. RADIATED EMISSION TEST

11.1 Operating environment

Temperature	:	24.3 °C
Relative humidity	:	43.9 % R.H.

11.2 Test set-up

The radiated emissions measurements were on the 3 m semi anechoic chamber. The EUT and other support equipment were placed on a non-conductive turntable above the ground plane. The interconnecting cables from outside test site were inserted into ferrite clamps at the point where the cables reach the turntable.

The frequency spectrum from 30 MHz to 26.5 GHz was scanned and emission levels maximized at each frequency recorded. The system was rotated 360°, and the antenna was varied in height between 1.0 m and 4.0 m in order to determine the maximum emission levels. This procedure was performed for both horizontal and vertical polarization of the receiving antenna.

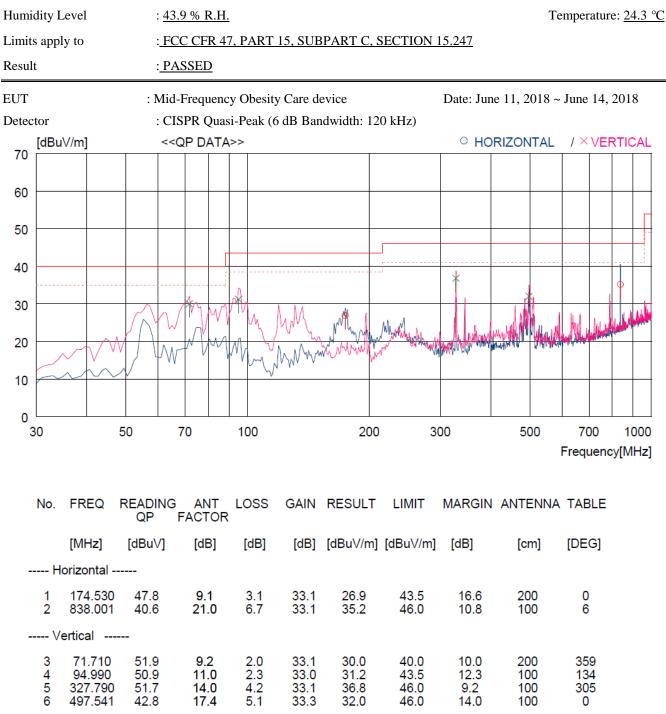
11.3 Test equipment used

	Model Number	Manufacturer	Description	Serial Number	Last Cal.
■ -	FSV40	Rohde & Schwarz	Signal Analyzer	101009	Mar. 14, 2018 (1Y)
-	ESU	Rohde & Schwarz	EMI Test Receiver	100261	Mar. 29, 2018 (1Y)
■ -	310N	Sonoma Instrument	Pre-Amplifier	312544	Mar. 28, 2018 (1Y)
■ -	BBV9718	Schwarzbeck	Amplifier	310	Mar. 30, 2018 (1Y)
	DT3000-3t	Innco System	Turn Table	DT3000/093	N/A
■ -	MA-4000XPET	Innco System	Antenna Master	MA4000/509	N/A
-	VULB9163	Schwarzbeck	TRILOG Broadband Antenna	9163-419	Aug. 05, 2016 (2Y)
-	BBHA9120D	Schwarzbeck	Horn Antenna	BBHA9120D295	Aug. 16, 2017 (2Y)
-	BBHA9170	Schwarzbeck	Horn Antenna	BBHA9170179	Jul. 28, 2017 (2Y)



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11.4 Test data for 30 MHz ~ 1 GHz





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11.5 Test data for Below 30 MHz

- -. Test Date : June 11, 2018 ~ June 14, 2018
- -. Resolution bandwidth : 200 Hz (from 9 kHz to 0.15 MHz), 9 kHz (from 0.15 MHz to 30 MHz)
- -. Frequency range : 9 kHz ~ 30 MHz
- -. Measurement distance : 3 m
- -.Operating mode : Transmitting mode

Frequency	Reading		Ant.	Angle	Ant. Factor	Cable	Emission	Limits	Margin		
(MHz)	(dBµV)		Height (m)	(°)	(dB/m)	Loss	Level(dBµV/m)	(dBµV/m)	(dB)		
	It was not observed any emissions from the EUT.										

11.6 Test data for above 1 GHz

- -. Test Date : June 11, 2018 ~ June 14, 2018
- -. Resolution bandwidth 21 MHz for Peak and Average Mode
- -. Video bandwidth : 1 MHz for Peak Mode, 10 Hz for Average Mode
- -. Frequency range : 1 GHz ~ 26.5 GHz
- -. Measurement distance : 3 m
- -.Operating mode : Transmitting mode

It was not observed any emissions from the EUT.

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12. CONDUCTED EMISSION TEST

12.1 Operating environment

Temperature	:	24.3 °C
Relative humidity	:	43.9 % R.H.

12.2 Test set-up

The EUT was placed on a wooden table, 0.8 m height above the floor. Power was fed to the EUT through a 50 Ω / 50 μ H + 5 Ω Artificial Mains Network (AMN). The ground plane was electrically bonded to the reference ground system and all power lines were filtered from ambient.

12.3 Test equipment used

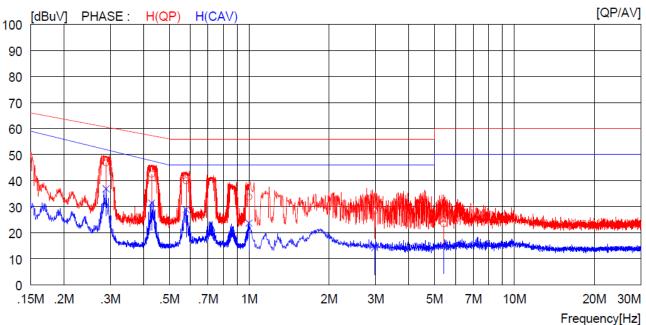
	Model Number	Manufacturer	Description	Serial Number	Last Cal. (Interval)
■ -	ESPI	Rohde & Schwarz	EMI Test Receiver	101278	Oct. 27, 2017 (1Y)
□ -	ESHS10	Rohde & Schwarz	EMI Test Receiver	834467/007	Mar. 29, 2018 (1Y)
□ -	NSLK8128	Schwarzbeck	AMN	8128-216	Mar. 29, 2018 (1Y)
-	NSLK8126	Schwarzbeck	AMN	8126-404	Apr. 04, 2018 (1Y)
□ -	3825/2	EMCO	AMN	9109-1869	Apr. 11, 2018 (1Y)
■ -	3825/2	EMCO	AMN	9109-1867	Mar. 28, 2018 (1Y)



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12.4 Test data

- -. Test Date : June 11, 2018 ~ June 14, 2018
- -. Resolution bandwidth : 9 kHz
- -. Frequency range : 0.15 MHz ~ 30 MHz
- -. Tested Line : HOT LINE



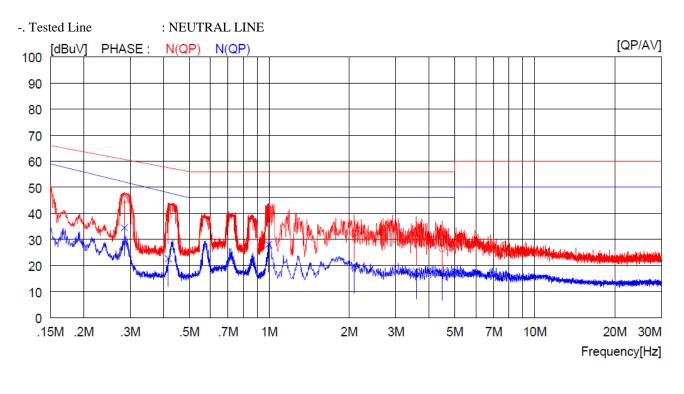
	NO	FREQ [MHz]	READING QP AV [dBuV] [dBuV	C.FACTOR] [dB]	RES QP [dBuV]	AV	LIM QP [dBuV]	AV	MAR QP [dBuV]	GIN AV [dBuV]	PHASE]
_	1 2 3 4 5 6 7 8 9 10	0.28900 0.42900 0.57900 0.99800 2.97600 5.41500 0.28900 0.42900 0.57900 0.99800	36.5 32.2 29.6 23.4 18.0 13.0 26.6 21.1 18.6 13.4	10.3 10.3 10.3 10.3 10.4 10.4 10.4 10.3 10.3 10.3 10.3	46.8 42.5 39.9 33.7 28.4 23.4	 	60.6 57.3 56.0 56.0 56.0 60.0	 51.9 47.7 46.0 46.0		 15.0 16.3 17.1 22.3	H (QP) H (QP) H (QP) H (QP) H (QP) H (QP) H (CAV) H (CAV) H (CAV) H (CAV) H (CAV)
	11 12	2.97600 5.41500	3.9 4.5	10.4 10.4		14.3 14.9		46.0 50.0		31.7 35.1	H (CAV) H (CAV)

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NO	FREQ	READ		C.FACTOR	RESU		LIM		MAR		PHASE
	[MHz]	QP [dBuV]	AV [dBuV]	[dB]	QP [dBuV]	AV [dBuV]	QP [dBuV]	AV [dBuV]	QP [dBuV]	AV [dBuV]	
1	0.28500	34.9		10.3	45.2		60.7		15.5		N(QP)
2	0.41700	28.5		10.3	38.8		57.5		18.7		N(QP)
3	0.99600	28.7		10.3	39.0		56.0		17.0		N(QP)
4	2.08400	21.9		10.3	32.2		56.0		23.8		N(QP)
5	3.57600	20.0		10.4	30.4		56.0		25.6		N(QP)
6	4.47600	16.1		10.4	26.5		56.0		29.5		N(QP)
7	0.28500		24.2	10.3		34.5		52.1		17.6	N (CAV)
8	0.41700		12.3	10.3		22.6		48.0		25.4	N (CAV)
9	0.99600		17.8	10.3		28.1		46.0		17.9	N(CAV)
10	2.08400		9.7	10.3		20.0		46.0		26.0	N (CAV)
11	3.57600		7.4	10.4		17.8		46.0		28.2	N (CAV)
12	4.47600		6.8	10.4		17.2		46.0		28.8	N (CAV)

Remark: Margin (dB) = Limit – Level (Result)

The emission level in above table is included the transducer factor that means insertion loss (LISN), cable loss and attenuator.

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