TEST REPORT

FCC/ISED BT LE Test for ETGBBTBP01 Certification

APPLICANT LG Innotek Co., Ltd.

REPORT NO. HCT-RF-2012-FI001

DATE OF ISSUE December 7, 2020

> **Tested by** Jeong Ho Kim

Con

Technical Manager Kwon Jeong

HCT CO., LTD. Soo Chan Lee Soo Chan Lee

HCT CO., LTD.

74, Seoicheon-ro 578beon-gil, Majang-myeon, Icheon-si, Gyeonggi-do, 17383 KOREA Tel. +82 31 634 6300 F ax. +82 31 645 6401





HCT Co., Ltd.

74, Seoicheon-ro 578beon-gil, Majang-myeon, Icheon-si, Gyeonggi-do, 17383 KOREA Tel. +82 31 634 6300 Fax. +82 31 645 6401

TEST REPORT FCC/ISED BT LE Test for ETGBBTBP01	REPORT NO. HCT-RF-2012-F1001 DATE OF ISSUE December 07, 2020 Additional Model
Applicant	LG Innotek Co., Ltd. E1/E3, 30, Magokjungang 10-ro, Gangseo-gu, Seoul, 07796, Korea
Eut Type Model Name	Blue Adapter ETGBBTBP01
FCC ID IC	YZP-ETGBBTBP01 7414C-ETGBBTBP01
Max. RF Output Power	-0.926 dBm (0.81 mW)
Modulation type	GFSK
FCC Classification	Digital Transmission System(DTS)
FCC Rule Part(s)	Part 15.247
ISED Rule Part(s)	RSS-247 Issue 2 (February 2017) RSS-Gen Issue 5_Amendment 1 (March 2019)
	The result shown in this test report refer only to the sample(s) tested unless otherwise stated. This test results were applied only to the test methods required by the standard.



REVISION HISTORY

The revision history for this test report is shown in table.

Revision No.	Date of Issue	Description
0	December 07, 2020	Initial Release

Engineering Statement:

The measurements shown in this report were made in accordance with the procedures indicated, and the emissions from this equipment were found to be within the limits applicable. I assume full responsibility for the accuracy and completeness of these measurements, and for the qualifications of all persons taking them. It is further stated that upon the basis of the measurements made, the equipment tested is capable of operation in accordance with the requirements of the FCC / ISED Rules under normal use and maintenance.

* The report shall not be reproduced except in full(only partly) without approval of the laboratory.





CONTENTS

1. EUT DESCRIPTION	5
2. TEST METHODOLOGY	6
EUT CONFIGURATION	6
EUT EXERCISE	6
GENERAL TEST PROCEDURES	6
DESCRIPTION OF TEST MODES	7
3. INSTRUMENT CALIBRATION	7
4. FACILITIES AND ACCREDITATIONS	7
FACILITIES	7
EQUIPMENT	7
5. ANTENNA REQUIREMENTS	8
6. MEASUREMENT UNCERTAINTY	8
7. DESCRIPTION OF TESTS	9
8. SUMMARY TEST OF RESULTS	28
9. TEST RESULT	30
9.1 DUTY CYCLE	30
9.2 6dB BANDWIDTH & 99 % BANDWIDTH	32
9.3 OUTPUT POWER	42
9.4 POWER SPECTRAL DENSITY	43
9.5 BAND EDGE/ CONDUCTED SPURIOUS EMISSIONS	48
9.6 RADIATED SPURIOUS EMISSIONS	65
9.7 RADIATED RESTRICTED BAND EDGES	71
9.8 RECEIVER SPURIOUS EMISSIONS	76
9.9 POWERLINE CONDUCTED EMISSIONS	77
10. LIST OF TEST EQUIPMENT	81
11. ANNEX A_ TEST SETUP PHOTO	83



1. EUT DESCRIPTION

Model	ETGBBTBP01	ETGBBTBP01		
Additional Model	-			
EUT Type	Blue Adapter			
Power Supply	DC 5V			
Frequency Range	2402 MHz - 2480 MHz			
	Duala	1M 37Bit/s : -1.090 dBm (0.78 mW)		
	Peak	1M 255Bit/s : -0.926 dBm (0.81 mW)		
Max. RF Output Power		1M 37Bit/s : -1.25 dBm (0.75 mW)		
	Average	1M 255Bit/s : -1.16 dBm (0.77 mW)		
Modulation Type	GFSK			
Bluetooth Version	4.2			
Number of Channels	40 Channels			
Antenna type	PCB Antenna			
Antenna Peak Gain	1.5 dBi			
Date(s) of Tests	November 19, 2020 ~ December 02, 2020			
PMN (Product Marketing Number)	Blue Adapter			
HVIN (Hardware Version Identification Number)	ETGBBTBP01			
FVIN (Firmware Version Identification Number)	31A			
HMN (Host Marketing Name)	N/A			



2. TEST METHODOLOGY

FCC KDB 558074 D01 15.247 Meas Guidance v05r02 dated April 02, 2019 entitled "guidance for compliance measurements on digital transmission system, frequency hopping spread spectrum system, and hybrid system devices and the measurement procedure described in ANSI C63.10(Version : 2013) 'the American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices'.

EUT CONFIGURATION

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

EUT EXERCISE

The EUT was operated in the engineering mode to fix the Tx frequency that was for the purpse of the measurements. According to its specifications, the EUT must comply with the requirements of the Section 15.207, 15.209 and 15.247 under the FCC Rules Part 15 Subpart C. / RSS-Gen issue 5, RSS-247 issue 2.

GENERAL TEST PROCEDURES

Conducted Emissions

The EUT is placed on the turntable, which is 0.8 m above ground plane. According to the requirements in Section 6.2 of ANSI C63.10. (Version :2013) Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30MHz using CISPR Quasi-peak and average detector modes.

Radiated Emissions

The EUT is placed on a turn table, which is 0.8 m above ground plane below 1GHz. Above 1GHz with 1.5m using absorbers between the EUT and receive antenna. The turntable shall rotate 360 degrees to determine the position of maximum emission level. EUT is set 3 m away from the receiving antenna, which varied from 1 m to 4 m to find out the highest emission. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical. In order to find out the max. emission, the relative positions of this hand-held transmitter (EUT) was rotated through three orthogonal axes according to the requirements in Section 6.6.5 of ANSI C63.10. (Version: 2013)



DESCRIPTION OF TEST MODES

The EUT has been tested under operating condition. Test program used to control the EUT for staying in continuous transmitting and receiving mode is programmed.

3. INSTRUMENT CALIBRATION

The measuring equipment, which was utilized in performing the tests documented herein, has been calibrated in accordance with the manufacturer's recommendations for utilizing calibration equipment's, which is traceable to recognized national standards.

Especially, all antenna for measurement is calibrated in accordance with the requirements of C63.5 (Version : 2017).

4. FACILITIES AND ACCREDITATIONS

FACILITIES

The SAC(Semi-Anechoic Chamber) and conducted measurement facility used to collect the radiated data are located at the 74, Seoicheon-ro 578beon-gil,

Majang-myeon, Icheon-si, Gyeonggi-do, 17383, Rep. of KOREA.

The site is constructed in conformance with the requirements of ANSI C63.4. (Version :2014) and CISPR Publication 22.

Detailed description of test facility was submitted to the Commission and accepted dated April 02, 2018 (Registration Number: KR0032).

For ISED, test facility was accepted dated February 14, 2019 (CAB identifier: KR0032).

EQUIPMENT

Radiated emissions are measured with one or more of the following types of Linearly polarized antennas: tuned dipole, bi-conical, log periodic, bi-log, and/or ridged waveguide, horn. Spectrum analyzers with pre-selectors and quasi-peak detectors are used to perform radiated measurements. Conducted emissions are measured with Line Impedance Stabilization Networks and EMI Test Receivers. Calibrated wideband preamplifiers, coaxial cables, and coaxial attenuators are also used for making measurements.

All receiving equipment conforms to CISPR Publication 16-1, "Radio Interference Measuring Apparatus and Measurement Methods."



5. ANTENNA REQUIREMENTS

According to FCC 47 CFR § 15.203 / RSS-Gen(Issue 5) Section 8:

"An intentional radiator antenna shall be designed to ensure that no antenna other than that furnished by the responsible party can be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section."

(1) The antennas of this E.U.T are permanently attached.

(2) The E.U.T Complies with the requirement of § 15.203

6. MEASUREMENT UNCERTAINTY

The measurement uncertainties shown below were calculated in accordance with the requirements of ANSI C63.10-2013.

All measurement uncertainty values are shown with a coverage factor of k = 2 to indicate a 95 % level of confidence.

The measurement data shown herein meets or exceeds the U_{CISPR} measurement uncertainty values specified in CISPR 16-4-2 and, thus, can be compared directly to specified limits to determine compliance.

Parameter	Expanded Uncertainty (\pm dB)
Conducted Disturbance (150 kHz ~ 30 MHz)	1.82
Radiated Disturbance (9 kHz ~ 30 MHz)	3.40
Radiated Disturbance (30 MHz ~ 1 GHz)	4.80
Radiated Disturbance (1 GHz ~ 18 GHz)	5.70
Radiated Disturbance (18 GHz ~ 40 GHz)	5.05



7. DESCRIPTION OF TESTS

7.1. Duty Cycle

Test Configuration

EUT .	Coax cable	Spectrum Analyzer

Test Procedure

The transmitter output is connected to the Spectrum Analyzer.

We tested according to the zero-span measurement method, 6.0)b) in KDB 558074 v05r02.

The largest availble value of RBW is 8 MHz and VBW is 50 MHz.

The zero-span method of measuring duty cycle shall not be used if T \leq 6.25 microseconds. (50/6.25 = 8)

The zero-span method was used because all measured T data are > 6.25 microseconds and both RBW and VBW are > 50/T.

- 1. RBW = 8 MHz (the largest available value)
- 2. VBW = 8 MHz (\geq RBW)
- 3. SPAN = 0 Hz
- 4. Detector = Peak
- 5. Number of points in sweep > 100
- 6. Trace mode = Clear write
- 7. Measure $T_{total} \,and \, T_{on}$
- 8. Calculate Duty Cycle = T_{on}/T_{total} and Duty Cycle Factor = 10log(1/Duty Cycle)



7.2. 6dB Bandwidth & 99 % Bandwidth

Limit

The minimum permissible 6 dB bandwidth is 500 kHz.

Test Configuration



Test Procedure

The transmitter output is connected to the Spectrum Analyzer.

The Spectrum Analyzer is set to (Procedure 8.2 in KDB 558074 v05r02,

Procedure 11.8.1 in ANSI 63.10-2013)

- 1) RBW = 100 kHz
- 2) VBW \geq 3 x RBW
- 3) Detector = Peak
- 4) Trace mode = max hold
- 5) Sweep = auto couple
- 6) Allow the trace to stabilize
- 7) We tested 6 dB bandwidth using the automatic bandwidth measurement capability of a spectrum analyzer. X dB is set 6 dB.

Test Procedure (99 % Bandwidth for ISED)

The transmitter output is connected to the spectrum analyzer.

RBW = $1\% \sim 5\%$ of the occupied bandwidth VBW $\Rightarrow 3 \times$ RBW Detector = Peak Trace mode = max hold Sweep = auto couple Allow the trace to stabilize

Note : We tested OBW using the automatic bandwidth measurement capability of a spectrum analyzer.



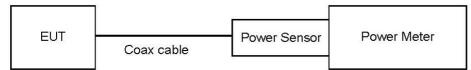


7.3. Output Power

Limit

The maximum permissible conducted output power is 1 Watt.

Test Configuration



Test Procedure

The transmitter output is connected to the Power Meter.

- Peak Power (Procedure 11.9.1.3 in ANSI 63.10-2013)
- : Measure the peak power of the transmitter.
- Average Power (Procedure 8.3.2.3 in KDB 558074 v05r02, Procedure 11.9.2.3 in ANSI 63.10-2013)
 - 1) Measure the duty cycle.
 - 2) Measure the average power of the transmitter. This measurement is an average over both the on and off periods of the transmitter.
 - 3) Add 10 $\log(1/x)$, where x is the duty cycle, to the measured power in order to compute the average power during the actual transmission times.

Sample Calculation

- Conducted Output Power(Peak) = Reading Value + ATT loss + Cable loss
- Conducted Output Power(Average) = Reading Value + ATT loss + Cable loss + Duty Cycle Factor



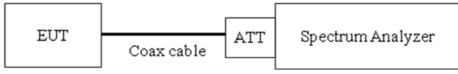


7.4. Power Spectral Density

Limit

The transmitter power density average over 1-second interval shall not be greater than 8dBm in any 3 kHz BW.

Test Configuration



Test Procedure

The transmitter output is connected to the Spectrum Analyzer.

We tested according to Procedure 8.4 in KDB 558074 v05r02, Procedure 11.10 in ANSI 63.10-2013.

The spectrum analyzer is set to :

- 1) Set analyzer center frequency to DTS channel center frequency.
- 2) Set span to at least 1.5 times the OBW.
- 3) RBW = 3 kHz \leq RBW \leq 100 kHz.
- 4) VBW \geq 3 x RBW.
- 5) Sweep = auto couple
- 6) Detector = Peak
- 7) Trace mode = max hold
- 8) Allow trace to fully stablize.
- 9) Use the peak marker function to determine the maximum amplitude level.
- Use the peak marker function to determine the maximum amplitude level within the RBW.
 If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.

Sample Calculation

Power Spectral Density = Reading Value + ATT loss + Cable loss



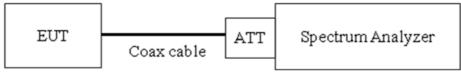


7.5. Conducted Band Edge(Out of Band Emissions) & Conducted Spurious Emissions

Limit

The maximum conducted (average) output power was used to demonstrate compliance, then the peak power in any 100 kHz bandwidth outside of the authorized frequency band shall be attenuated by at least 20 dB relative to the maximum in-band peak PSD level in 100 kHz. [Conducted > 20 dBc]

Test Configuration



Test Procedure

The transmitter output is connected to the spectrum analyzer.

(Procedure 8.5 in KDB 558074 v05r02, Procedure 11.11 in ANSI 63.10-2013)

- 1) RBW = 100 kHz
- 2) VBW \geq 3 x RBW
- 3) Set span to encompass the spectrum to be examined
- 4) Detector = Peak
- 5) Trace Mode = max hold
- 6) Sweep time = auto couple
- 7) Ensure that the number of measurement points \geq 2 x Span/VBW
- 8) Allow trace to fully stabilize.
- 9) Use peak marker function to determine the maximum amplitude level.

Measurements are made over the 30 MHz to 25 GHz range with the transmitter set to the lowest, middle, and highest channels.







Factors for frequency

Freq(MHz)	Factor(dB)
30	10.09
100	10.12
200	10.17
300	10.22
400	10.25
500	10.26
600	10.26
700	10.28
800	10.29
900	10.31
1000	10.32
2000	10.46
2400	10.50
2480	10.52
2500	10.52
3000	10.57
4000	10.65
5000	10.76
6000	10.76
7000	10.78
8000	10.78
9000	10.85
10000	10.90
11000	10.96
12000	11.02
13000	11.07
14000	11.15
15000	11.24
16000	11.21
17000	11.26
18000	11.27
19000	11.30
20000	11.35
21000	11.37
22000	11.41
23000	11.53
24000	11.60
25000	11.60
26000	11.64

Note : 1. 2400 ~ 2500 MHz is fundamental frequency range.

2. Factor = Attenuator loss(10dB) + Cable loss

7.6. Radiated Test

FCC

HCT

Frequency (MHz)	Field Strength (uV/m)	Measurement Distance (m)
0.009 – 0.490	2400/F(kHz)	300
0.490 – 1.705	24000/F(kHz)	30
1.705 – 30	30	30

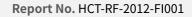
ISED

Frequency (MHz)	Field Strength (uA/m)	Measurement Distance (m)
0.009 - 0.490	6.37/F(kHz)	300
0.490 – 1.705	63.7/F(kHz)	30
1.705 – 30	0.08	30

FCC&ISED

Frequency (MHz)	Field Strength (uV/m)	Measurement Distance (m)
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

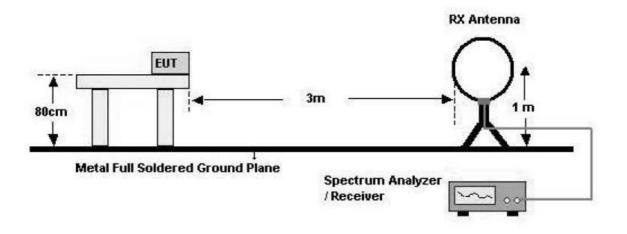
ъ 객 비 밀 CUSTOMER SECRET



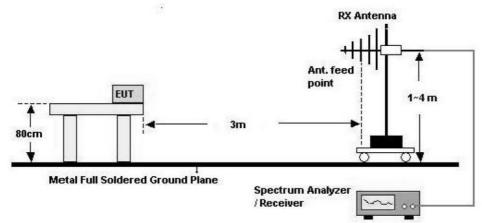
HCT

Test Configuration

Below 30 MHz



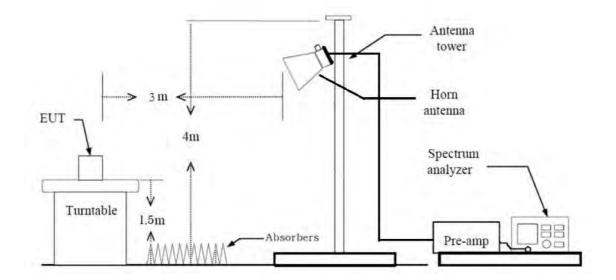




ъ 갠 비 밀 CUSTOMER SECRET



Above 1 GHz



Test Procedure of Radiated spurious emissions(Below 30 MHz)

- 1. The EUT was placed on a non-conductive table located on semi-anechoic chamber.
- 2. The loop antenna was placed at a location 3m from the EUT
- 3. The EUT is placed on a turntable, which is 0.8m above ground plane.
- 4. We have done x, y, z planes in EUT and horizontal and vertical polarization and Parallel to the ground plane in detecting antenna.

5. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.

6. Distance Correction Factor(0.009 MHz - 0.490 MHz) = 40log(3 m/300 m) = - 80 dB

Measurement Distance : 3 m

7. Distance Correction Factor(0.490 MHz – 30 MHz) = 40log(3 m/30 m) = - 40 dB

Measurement Distance : 3 m

- 8. Spectrum Setting
 - Frequency Range = 9 kHz ~ 30 MHz
 - Detector = Peak
 - Trace = Maxhold
 - RBW = 9 kHz
 - VBW \geq 3 x RBW
- 9. Total = Reading Value + Antenna Factor(A.F) + Cable Loss(C.L) + Distance Factor(D.F)

10. Measurement value only up to 6 maximum emissions noted, or would be lesser if no specific emissions from the EUT are recorded (ie: margin > 20 dB from the applicable limit) and considered



that's already beyond the background noise floor.

KDB 414788 OFS and Chamber Correlation Justification

Base on FCC 15.31 (f) (2): measurements may be performed at a distance closer than that specified in the regulations; however, an attempt should be made to avoid making measurements in the near field.

OFS and chamber correlation testing had been performed and chamber measured test result is the worst case test result.

Test Procedure of Radiated spurious emissions(Below 1GHz)

- 1. The EUT was placed on a non-conductive table located on semi-anechoic chamber.
- 2. The EUT is placed on a turntable, which is 0.8m above ground plane.
- 3. The Hybrid antenna was placed at a location 3m from the EUT, which is varied from 1m to 4m to find out the highest emissions.
- 4. We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.

5. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.

- 6. Spectrum Setting
 - (1) Measurement Type(Peak):
 - Measured Frequency Range : 30 MHz 1 GHz
 - Detector = Peak
 - Trace = Maxhold
 - RBW = 100 kHz
 - VBW \geq 3 x RBW
 - (2) Measurement Type(Quasi-peak):
 - Measured Frequency Range : 30 MHz 1 GHz
 - Detector = Quasi-Peak
 - RBW = 120 kHz
 - In general, (1) is used mainly
- 7. Total = Reading Value + Antenna Factor(A.F) + Cable Loss(C.L)

8. Measurement value only up to 6 maximum emissions noted, or would be lesser if no specific emissions from the EUT are recorded (ie: margin > 20 dB from the applicable limit) and considered that's already beyond the background noise floor.





Test Procedure of Radiated spurious emissions (Above 1 GHz)

- 1. The EUT is placed on a turntable, which is 1.5 m above ground plane.
- 2. We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.

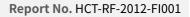
3. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.

- 4. EUT is set 3 m away from the receiving antenna, which is varied from 1m to 4m to find out the highest emissions.
- 5. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
- 6. Each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
- 7. The unit was tested with DC Power supply.
- 8. Spectrum Setting (Method 8.6 in KDB 558074 v05r02, Procedure 11.12 in ANSI 63.10-2013)
 - (1) Measurement Type(Peak):
 - Measured Frequency Range : 1 GHz 25 GHz
 - Detector = Peak
 - Trace = Max hold
 - RBW = 1 MHz
 - VBW \geq 3 x RBW
 - (2) Measurement Type(Average):
 - Duty cycle < 98%, duty cycle variations are less than $\pm 2\%$
 - Measured Frequency Range : 1 GHz 25 GHz
 - Detector = RMS
 - Averaging type = power (*i.e.*, RMS)
 - RBW = 1 MHz
 - VBW \geq 3 x RBW
 - Sweep time = auto.
 - Trace mode = average (at least 100 traces).
 - Correction factor shall be added to the measurement results prior to comparing to the emission limit in order to compute the emission level that would have been measured had the test been performed at 100 percent duty cycle.
 - Duty Cycle Factor (dB) : Please refer to the please refer to section 9.1

9. Measurement value only up to 6 maximum emissions noted, or would be lesser if no specific emissions from the EUT are recorded (ie: margin > 20 dB from the applicable limit) and considered that's already beyond the background noise floor.

10. Distance extrapolation factor = 20log (test distance / specific distance) (dB)







11. Total (Measurement Type : Peak)

= Peak Reading Value + Antenna Factor(A.F) + Cable Loss(C.L) - Amp Gain(G) + Distance

Factor(D.F)

Total (Measurement Type : Average)

- = Average Reading Value + Antenna Factor(A.F) + Cable Loss(C.L) Amp Gain(G)
 - + Distance Factor(D.F) + Duty Cycle Factor

Test Procedure of Radiated Restricted Band Edge

1. The EUT is placed on a turntable, which is 1.5 m above ground plane.

2. We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.

3. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.

- 4. EUT is set 3 m away from the receiving antenna, which is varied from 1m to 4m to find out the highest emissions.
- 5. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
- 6. Each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
- 7. The unit was tested with DC Power supply.
- 8. Spectrum Setting
 - (1) Measurement Type(Peak):
 - Measured Frequency Range : 2310 MHz \sim 2390 MHz/ 2483.5 MHz \sim 2500 MHz
 - Detector = Peak
 - Trace = Max hold
 - RBW = 1 MHz
 - VBW \geq 3 x RBW
 - (2) Measurement Type(Average):
 - Duty cycle < 98%, duty cycle variations are less than $\pm 2\%$
 - Measured Frequency Range : 2310 MHz \sim 2390 MHz/ 2483.5 MHz \sim 2500 MHz
 - Detector = RMS
 - Averaging type = power (*i.e.*, RMS)
 - RBW = 1 MHz
 - VBW \geq 3 x RBW
 - Sweep time = auto.
 - Trace mode = average (at least 100 traces).
 - Correction factor shall be added to the measurement results prior to comparing to the emission limit in order to compute the emission level that would have been measured had



the test been performed at 100 percent duty cycle.

- Duty Cycle Factor (dB) : Please refer to the please refer to section 9.1.

- 9. Measurement value only up to 6 maximum emissions noted, or would be lesser if no specific emissions from the EUT are recorded (ie: margin > 20 dB from the applicable limit) and considered that's already beyond the background noise floor.
- 10. Distance extrapolation factor = 20log (test distance / specific distance) (dB)
- 11. Total(Measurement Type : Peak)

= Peak Reading Value + Antenna Factor(A.F) + Cable Loss(C.L) + Distance Factor(D.F)

Total(Measurement Type : Average) = Average Reading Value + Antenna Factor(A.F) + Cable Loss(C.L) + Distance Factor(D.F) + Duty Cycle Factor



7.7. AC Power line Conducted Emissions

Limit

For an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies, within the band 150 kHz to 30 MHz, shall not exceed the limits in the following table, as measured using a $50 \,\mu$ H/50 ohms line impedance stabilization network (LISN).

	Limits (dBµV)		
Frequency Range (MHz)	Quasi-peak	Average	
0.15 to 0.50	66 to 56 ^(a) 56 to 46 ^(a)		
0.50 to 5	56	46	
5 to 30	60	50	

^(a)Decreases with the logarithm of the frequency.

Compliance with this provision shall be based on the measurement of the radio frequency voltage between each power line (LINE and NEUTRAL) and ground at the power terminals.

Test Configuration

See test photographs attached in Annex A for the actual connections between EUT and support equipment.

Test Procedure

- 1. The EUT is placed on a wooden table 80 cm above the reference ground plane.
- 2. The EUT is connected via LISN to a test power supply.
- 3. The measurement results are obtained as described below:
- 4. Detectors : Quasi Peak and Average Detector.

Sample Calculation

Quasi-peak(Final Result) = Reading Value + Correction Factor



7.8. Receiver Spurious Emissions

I.	:.	~	•	:	٠
L			I	I	ι

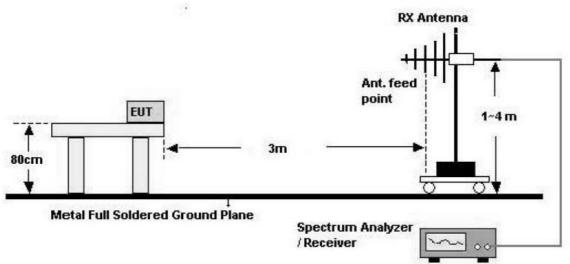
Frequency (MHz)	Field Strength (uV/m)	Measurement Distance (m)
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

Note:

Measurements for compliance with the limits in table may be performed at distances other than 3 metres.

Test Configuration







Test Procedure of Receiver Spurious Emissions (Below 1GHz)

- 1. The EUT was placed on a non-conductive table located on semi-anechoic chamber.
- 2. The EUT is placed on a turntable, which is 0.8m above ground plane.
- 3. The Hybrid antenna was placed at a location 3m from the EUT, which is varied from 1m to 4m to find out the highest emissions.
- 4. We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.

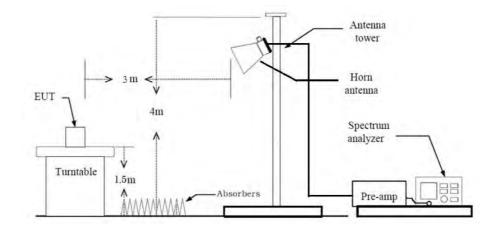
5. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.

- 6. Spectrum Setting
 - (1) Measurement Type(Peak):
 - Measured Frequency Range : 30 MHz 1 GHz
 - Detector = Peak
 - Trace = Maxhold
 - RBW = 100 kHz
 - VBW \geq 3 x RBW
 - (2) Measurement Type(Quasi-peak):
 - Measured Frequency Range : 30 MHz 1 GHz
 - Detector = Quasi-Peak
 - RBW = 120 kHz
- 7. Total = Reading Value + Antenna Factor(A.F) + Cable Loss(C.L)

객 ъ 비 밀 CUSTOMER SECRET



Above 1 GHz



Test Procedure of Radiated spurious emissions (Above 1 GHz)

1. The EUT is placed on a turntable, which is 1.5 m above ground plane.

2. We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.

3. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.

- 4. EUT is set 3 m away from the receiving antenna, which is varied from 1m to 4m to find out the highest emissions.
- 5. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
- 6. Each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
- 7. The unit was tested with DC Power supply.
- 8. Spectrum Setting
 - (1) Measurement Type(Peak):
 - Measured Frequency Range : 1 GHz 25 GHz
 - Detector = Peak
 - Trace = Maxhold
 - RBW = 1 MHz
 - VBW \geq 3 x RBW
 - (2) Measurement Type(Average):
 - We performed using a reduced video BW method was done with the analyzer in linear mode
 - Measured Frequency Range : 1 GHz 25 GHz
 - Detector = Average





- Trace = RMS
- RBW = 1 MHz
- VBW \geq 3 x RBW
- 9. Measurement value only up to 6 maximum emissions noted, or would be lesser if no specific emissions from the EUT are recorded (ie: margin > 20 dB from the applicable limit) and considered that's already beyond the background noise floor.
- 10. Distance extrapolation factor = 20log (test distance / specific distance) (dB)
- 11. Total = Reading Value + Antenna Factor(A.F) + Cable Loss(C.L) Amp Gain(G) + Distance Factor(D.F)





7.9. Worst case configuration and mode

Radiated & Conducted Worst case Voltage 5[V]

Radiated Test

1. All modes of operation were investigated and the worst case configuration results are reported.

- Mode : Stand alone, Stand alone
- Worstcase : Stand alone
- 2. EUT Axis:
 - Radiated Spurious Emissions : X
 - Radiated Restricted Band Edge : Y
- 3. All packet length of operation were investigated and the test results are worst case in lowest

packet length.

(Worst case : 1M 37Bytes)

4. All position of loop antenna were investigated and the test result is a no critical peak found at all positions.

- Position : Horizontal, Vertical, Parallel to the ground plane

AC Power line Conducted Emissions

1. All modes of operation were investigated and the worst case configuration results are reported.

- Mode : Stand alone + Notebook
- Worstcase : Stand alone + Notebook

Conducted test

1. The EUT was configured with packet length of highest power.

(Worst case : 1M 255Bytes)



8. SUMMARY TEST OF RESULTS

FCC Part

Test Description	FCC Part Section(s)	Test Limit	Test Condition	Test Result
6 dB Bandwidth	§ 15.247(a)(2)	> 500 kHz		PASS
Conducted Maximum Output Power	§ 15.247(b)(3)	< 1 Watt		PASS
Power Spectral Density	§ 15.247(e)	< 8 dBm / 3 kHz Band	Conducted	PASS
Band Edge (Out of Band Emissions)	§ 15.247(d)	Conducted > 20 dBc		PASS
AC Power line Conducted Emissions	§ 15.207	cf. Section 7.7		PASS
Radiated Spurious Emissions	§ 15.247(d), 15.205, 15.209	cf. Section 7.6	Dediated	PASS
Radiated Restricted Band Edge	§ 15.247(d), 15.205, 15.209	cf. Section 7.6	Radiated	PASS



Report No. HCT-RF-2012-FI001



ISED Part

Test Description	ISED Part	Test Limit	Test Condition	Test
	Section(s)			Result
6 dB Bandwidth	RSS-247, 5.2	> 500 kHz		PASS
99% Bandwidth	RSS-GEN, 6.7	NA		PASS
Conducted Maximum Peak Output Power And e.i.r.p.	RSS-247, 5.4.4	< 1 Watt <4 Watt(e.i.r.p.)	Conducted	PASS
Power Spectral Density	RSS-247, 5.2	< 8 dBm / 3 kHz Band		PASS
Band Edge(Out of Band Emissions)	RSS-247, 5.5	Conducted > 20 dBc		PASS
AC Power line Conducted Emissions	RSS-GEN, 8.8	RSS-GEN section 8.8 table 4		PASS
Radiated Spurious Emissions	RSS-GEN, 8.9	RSS-GEN section 8.9 table 5, 6		PASS
Receiver Spurious Emissions	RSS-GEN, 5 RSS-GEN, 7.3	RSS-GEN section 7.3 table 3	Radiated	PASS
Radiated Restricted Band Edge	RSS-GEN, 8.10	RSS-GEN section 8.10 table 7		PASS

고 객 비 밀 CUSTOMER SECRET

9. TEST RESULT

9.1 DUTY CYCLE

Data rate (Bit/s)	Packet length (Byte)	T₀n (ms)	T _{total} (ms)	Duty Cycle	Duty Cycle Factor (dB)
1M	37	0.4079	0.6245	0.6532	1.85
1M	255	2.1500	2.5000	0.8600	0.66





IM Bit/s (37 Byte) Test Plots

BL Center Fre	q 2.402000000	PNO: Fast	Trig: Free Ru Atten: 16 dB	in	#Avg Type:	RMS	09:24:28 AMIN TRACE TYPE DET		Frequency
0 dB/div	Ref Offset 10.52 dB Ref 15.00 dBm					Δ	Mkr3 62	4.5 µs 37 dB	Auto Tune
5.00 5.00 5.00	X					3Δ4			Center Fred 2.402000000 GH:
25 0									Start Free 2.402000000 GH
55.0	4. vyMarodisyyn			hypey	hill the first state of the second state of th				Stop Fre 2.402000000 GH
enter 2.40 es BW 8 N	2000000 GHz 1Hz	#VBW	8.0 MHz		St	weep 1.3	Spa 267 ms (10		CF Step 8.000000 MH
IL A2 1		407.9 μs (Δ)	י -0.26 dB	FUNC	TION FUNC	TION WIDTH	FUNCTION	ALUE 🛧	Auto Ma
	t t (Δ) t	290.1 μs 624.5 μs (Δ) 290.1 μs	-1.00 dBm -0.37 dB -1.00 dBm						Freq Offse 0 H
7 2 2 8 9 2 2 10 2 2 2									
90						STATUS		E.	

IM Bit/s (225 Byte) Test Plots

Duty Cycle (Low-CH 0)

enter	Fre	RF q 2			Hz PNO: Fast FGain:Lov		Trig: Free Ru Atten: 16 dB	#Av:	align actro g Type: RMS	09:53:21 AMNov 28, 202 TRACE 2 2 4 TVPE WYWWWW DET 2 11 01 M 17	Frequency
0 dB/di			Offset 10 15.00						۵	Mkr3 2.500 ms -0.20 dE	
5 (0) 5 (0) 5 100					Xa					304	Center Fre 2.402000000 GH
25 0											Start Fre 2.402000000 GF
55 0 85 0 75 0				Linas	Ŵ				Labourt		Stop Fre 2.402000000 GH
Center Res BW			00000	GHz	⊥ #V	/BW	8.0 MHz		Sweep 5	Span 0 Ha .000 ms (1001 pts	CF Ste 8.000000 MH Auto Mi
MKR MODE		SCL	745	×	150 ms	100	Y 0.03 dB	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE	Auto
2 F 3 Δ4 4 F 5	1	t		1	555 ms 500 ms 555 ms		-0.84 dBm -0.20 dB -0.84 dBm				Freq Offse
6 7 8 9 10											
11		-			_					2	
SG									STATU:	5	

객 비 고 밀 CUSTOMER SECRET



Report No. HCT-RF-2012-FI001

9.2 6dB BANDWIDTH & 99 % BANDWIDTH

FCC(6dB BANDWIDTH)

Mode (Bit/s)	Channel	6 dB Bandwidth (kHz)	Limit (kHz)
	0	699.6	
1M 37byte	19	699.9	> 500
	39	695.7	

Mode	Channel	6 dB Bandwidth	Limit
(Bit/s)		(kHz)	(kHz)
	0	682.7	
1M 225byte	19	704.6	> 500
	39	704.0	

Report No. HCT-RF-2012-FI001



IM Bit/s (37 Byte) Test Plots

Center Freq 2.402000000	GHz Cente	BENSE INT ir Freq: 2.402000000 GHz Free Run Avg Hold: 1: 10 dB	1/134-2010 [09:24:42 AMNov 29, 20 Radio Std: None 1/1 Radio Device: BTS	Frequency
10 dEl/div Ref 15.00 dBm				1000 B
500 500 500 500 500 500 500 500				Center Free 2.402000000 GH;
Sto 720 Center 2.402 GHz #Res BW 100 kHz	#	VBW 300 kHz	Span 5 Mł Sweep 2.533 n	
Occupied Bandwidth	ո 1144 MHz	Total Power	5.56 dBm	1
Transmit Freq Error x dB Bandwidth	5.338 kHz 699.6 kHz	OBW Power x dB	99.00 % -6.00 dB	Freq Offset 0 Hz
45G			Lostatus	

6 dB Bandwidth plot (Low-CH 0)

6 dB Bandwidth plot (Mid-CH 19)

Aglient Spectrum Analyzer - Decupied BV 20 RL RE SD2 AC Center Freq 2.440000000	GHz Cente	erFreq: 2.44000000 GHz Free Run Avg Hold n: 10 dB	ALIGNALITO 09:32:29 AM Radio Std: N Radio Devic	lone Frequency
10 dB/div Ref 15.00 dBm			1	
- 50 -50 -5,0 -				Center Freq 2.440000000 GHz
75:0				
Center 2.44 GHz #Res BW 100 kHz	#	VBW 300 kHz	Spa Sweep 2	n 5 MHz .533 ms 500,000 kHz
Occupied Bandwidth	, 1139 MHz	Total Power	5.16 dBm	<u>Auto</u> Man
Transmit Freq Error x dB Bandwidth	4.903 kHz 699.9 kHz	OBW Power x dB	99.00 % -6.00 dB	Freq Offset 0 Hz
MSG			To STATUS	





RL RF 500 AC Center Freq 2.480000000	GHZ Cente	r Freq: 2.48000000 GHz	Radio Sto		Frequency
10 dB/div Ref 15.00 dBm					-
500 500 500 500 500 500 500 500					Center Free 2.480000000 GH
55.0 (55.0 (75.0) (75.0) Center 2.48 GHz				an 5 MHz	CF Step
#Res BW 100 kHz		#VBW 300 kHz		2.533 ms	S00.000 kH
Occupied Bandwidth 1.1	088 MHz	Total Fower	4.69 dBm		FreqOffset
Transmit Freq Error x dB Bandwidth	4.301 kHz 695.7 kHz	OBW Power x dB	99.00 % -6.00 dB		0H:
66			LA STATUS		

6 dB Bandwidth plot (High-CH 39)



IM Bit/s (255 Byte) Test Plots

EL RE 502 40 Center Freq 2.402000000	Trig: F	SENSE INT r Freq: 2.402000000 GHz Free Run Avg Hold: h: 10 dB	1/12/14/2017 00:53:42 AMNov 29, 21 Radio Std: None 1/1 Radio Device: BTS	Frequency
10 dB/div Ref 15.00 dBm				
5 00 5 00 				Center Fred 2.402000000 GH;
第 0 45:0 55.0 36:0				
ZEN Center 2.402 GHz #Res BW 100 kHz	#	VBW 300 kHz	Span 5 MI Sweep 2.533 n	
Occupied Bandwidth) 899 MHz	Total Power	5.95 dBm	Auto Mar
Transmit Freq Error x dB Bandwidth	9,475 kHz 682.7 kHz	OBW Power x dB	99.00 % -6.00 dB	Freq Offse 0 H:
56			In status	

6 dB Bandwidth plot (Low-CH 0)

6 dB Bandwidth plot (Mid-CH 19)

Agilent Spectrum Analyzer - Occupied BV 30 RL RESSOR AC Center Freq 2.440000000	GHz Cente	GENSE (MT) Ir Freq: 2.440000000 GHz Free Run Avg Hol II: 10 dB	Radio Std	INOID	uèncy
10 dB/div Ref 15.00 dBm				Ce	nter Freq
500 	\sim		~	2.4400	00000 GH;
55.0 45.0 					
Center 2.44 GHz #Res BW 100 kHz		VBW 300 kHz	Sp Sweep		CF Stej 500.000 kH
Occupied Bandwidth 1.0		Auto Mar Freq Offse			
Transmit Freq Error x dB Bandwidth	8.650 kHz 704.6 kHz				0 Hz
ASG			10 STATUS		





RL 45 500 40 Center Freq 2.480000000	Frequency					
10 dB/div Ref 15.00 dBm					-	
5.00 		~			Center Free 2.480000000 GH	
-25.0 						
45,0 ,35,0 ,45,0						
Center 2.48 GHz #Res BW 100 kHz Occupied Bandwidth 1.0929 MHz Transmit Freq Error 7.865 kH;		VBW 300 kHz		an 5 MHz 2.533 ms	CF Ste 500.000 kH	
		Total Power	5.02 dBm 99.00 %		Auto Ma Freq Offse 0 H	
		OBW Power				
x dB Bandwidth	704.0 kHz	x dB	-6.00 dB			
66	Lataus.					

6 dB Bandwidth plot (High-CH 39)





ISED (99 % BANDWIDTH)

Mode (Bit/s)	Packet length (Byte)	Channel	99 % Bandwidth (kHz)
		0	1058.5
1M 37byte	37	19	1060.0
		39	1058.6

Mode (Bit/s)	Packet length (Byte)	Channel	99 % Bandwidth (kHz)
		0	1043.1
1M 225byte	37	19	1054.4
		39	1050.4



IM Bit/s (37 Byte) Test Plots

Agilent Spectrum Analyzer - Occupied B W RL RF 50.0 AC		server that	AADTO 109:25:04 AMNov 28, 2020	
Center Freq 2.402000000	GHz Cente	r Freq: 2.402000000 GHz Free Run Avg Hold>1/ 1: 10 dB	Radio Std: None	Frequency
o dE/div Ref 15.00 dBm		_		Center Freq 2.402000000 GHz
-og 5 00 	-	-		
50				
5.0				
55) (51) (51)				
Center 2.402 GHz Res BW 51 kHz	#	VBW 160 kHz	Span 5 MHz Sweep 2.533 ms	
Occupied Bandwidt		Total Power	6.34 dBm	<u>Auto</u> Ma
	0585 MHz 13.011 kHz	OBW Power	99.00 %	Freq Offse 0 H
x dB Bandwidth	599.7 kHz	x dB	-6.00 dB	
5G		I	STATUS	

99 % Bandwidth plot (Low-CH 0)

99 % Bandwidth plot (Mid-CH 19)

Agilent Spectrum Analyzer - Decupied B Of RL RESOLAC Center Freq 2.440000000	GHz Cente	Freq: 2.440000000 GHz ree Run Avg Ho ;: 10 dB		09:32:50 AMNov 26, 2020 Radio Std: None Radio Device: BTS	Frequency
10 dB/div Ref 15.00 dBn	n				Center Freq
5.00 (15.0 (0.1) (6.0 (5.0) (5.0			×		2.440000000 GHz
750 Center 2,44 GHz #Res BW 51 kHz	#	VBW 160 kHz		Span 5 MHz Sweep 2.533 ms	CF Step 500.000 kHz
Occupied Bandwidt	^h 0600 MHz	Total Power	5,88	dBm	<u>Auto</u> Man
Transmit Freq Error x dB Bandwidth	12.836 kHz 604.2 kHz	OBW Power x dB		.00 % 00 dB	Freq Offset 0 Hz
MSG			To STATUS		





	2.480000000	Trig:F	SENSE INT Freq: 2.480000000 GHz Free Run Avg Hold h: 10 dB			Frequency Center Freq 2.48000000 GHz
10 dB/div	Ref 15.00 dBm					
500 500 150 250 360 						
55.0 55.0 75.0 Center 2.48 #Res BW 51		#	VBW 160 kHz		oan 5 MHz 2.533 ms	CF Step 500.000 kH:
Occupie	d Bandwidth		Total Power	5.41 dBm		Auto Mar
Transmit x dB Bane	Freq Error	0586 MHZ 11.691 kHz 613.9 kHz	OBW Power x dB	99.00 % -6.00 dB		Freq Offse 0 H:
				IN STATUS		

99 % Bandwidth plot (High-CH 39)



IM Bit/s (225 Byte) Test Plots

enter Freq 2.402000000	Hz Cente	r Freq: 2.402000000 GHz ree Run Avg Hold:	134-5070 [09:54:07 AMNov 29, 20 Radio Std: None 1/1	20 Frequency
#	IFGain:Low #Atten	: 10 dB	Radio Device: BTS	
0 dE/dly Ref 15.00 dBm				
5 00 5 00 	-	m		Center Free 2.402000000 GH
250	\sim			
5.0				
55 D				
Center 2.402 GHz Res BW 51 kHz	#	VBW 160 kHz	Span 5 MH Sweep 2.533 m	S 500.000 kH
Occupied Bandwidth	431 MHz	Total Power	6.98 dBm	Auto Ma
Transmit Freq Error		OBW Power	99.00 %	Freq Offse 0 H
x dB Bandwidth	592.8 kHz	x dB	-6.00 dB	

99 % Bandwidth plot (Low-CH 0)

99 % Bandwidth plot (Mid-CH 19)

Aglient Spectrum Analyzer - Docupied B N RL RE SOQ AC Center Freq 2.440000000	GHz Cente	ar Freq: 2.44000000 GH Freq Run Avg H 1: 10 dB	4116444670 Iz old: 1/1	09:58:07 AMNov 26, 2020 Radio Std: None Radio Device: BTS	Frequency
10 dB/div Ref 15.00 dBm					Survey and
6 m 5 m 16 0 20 0 3 m 46 0 55		h	~~~~		Center Freq 2.440000000 GHz
Center 2.44 GHz				Span 5 MHz	
#Res BW 51 kHz		VBW 160 kHz	1.0	Sweep 2.533 ms	CF Step 500.000 kHz Auto Man
Occupied Bandwidt	n 0544 MHz	Total Power	6.47	dBm	FreqOffset
Transmit Freq Error x dB Bandwidth	9.515 kHz 604.7 kHz	OBW Power x dB		00 % 00 dB	DHz
MSG			Lo STATUS		



Report No. HCT-RF-2012-FI001



EL 35 500 AC	GHz Cente	SENSE INT r Freq: 2.480000000 GHz Free Run Avg Hold a; 10 dB	Radio St >1/1	AMNov 28, 2020 d: None evice: BTS	Frequency
o dE/div Ref 15.00 dBn	ń				
500 500 500 500 500 500 500 500		ma la			Center Free 2.480000000 GH:
25 0 75 0 75 0 75 0 75 0 75 0 75 0 75 0 7	#	VBW 160 kHz		pan 5 MHz 2.533 ms	CF Step 500.000 kHz
Occupied Bandwidt		Total Power	6.06 dBm		Auto Man
1.	0504 MHz				Freq Offset
Transmit Freq Error x dB Bandwidth	10.478 kHz 611.2 kHz	OBW Power x dB	99.00 % -6.00 dB		0 Hz
86			TATUS		

99 % Bandwidth plot (High-CH 39)

9.3 OUTPUT POWER

Peak Power

Data rate	Packet length	LE M	lode	Measured	Limit
(Bit/s)	(Byte)	Frequency [MHz]	Channel	Power(dBm)	(dBm)
		2402	0	-1.090	
	37	2440	19	-1.551	
114		2480	39	-1.884	20
1M		2402	0	-0.926	30
	255	2440	19	-1.389	
		2480	39	-1.856	

Average Power

Data rate	Packet length	LE Mode		Measured Power	Duty Cycle Factor	Result	Limit
(Bit/s)	(Byte)	Frequency [MHz]	Channel	(dBm)	(dB)	(dBm)	(dBm)
		2402	0	-3.10	1.85	-1.25	
	37	2440	19	-3.61	1.85	-1.76	
1M		2480	39	-4.07	1.85	-2.22	20
TIM		2402	0	-1.81	0.66	-1.16	30
	255	2440	19	-2.30	0.66	-1.64	
		2480	39	-2.88	0.66	-2.22	

Note :

1. Power meter offset = Attenuator loss + Cable loss

2. We apply to the offset in the 2.4 GHz range that was rounded off to the closest tenth dB.

So, 10.52 dB is offset for 2.4 GHz Band.

ъ 객 비 밀 CUSTOMER SECRET



9.4 POWER SPECTRAL DENSITY

			Test Resu	lt
Frequency (MHz)	Channel No.	Mode (Bit/s)	Measured Power(dBm)	Limit (dBm)
2402	0		-15.733	
2440	19	1M 37 Byte	-16.080	
2480	39	or byte	-16.622	8
2402	0		-15.168	0
2440	19	1M 225 Byte	-15.818	
2480	39		-16.510	

Note :

1. Spectrum reading values are not plot data.

The PSD results in plot is already including the actual values of loss for the attenuator and cable combination.

- 2. Spectrum offset = Attenuator loss + Cable loss
- 3. We apply to the offset in the 2.4 GHz range that was rounded off to the closest tenth dB. So, 10.52 dB is offset for 2.4 GHz Band.
- 4. The plot included is the worst mode(125k Bit/s (37 Byte)) of peak output power.

객 비 밀 ъ CUSTOMER SECRET



IM Bit/s (37 Byte) Test Plots



Power Spectral Density (Low-CH 0)

Power Spectral Density (Mid-CH 19)







Frequency Auto Tune	09:37:19 AMNov 28, 2020 TRACE 2 3 4 5 TYPE MULLIONALD DET P P P P P P	#Avg Type: RMS Avg Hold: 1/1	Trig: Free Run Atten: 6 dB	GHZ PNO: Wide		enter Fi
	.480 000 5 GHz -16.622 dBm	Mkr1 2		a ounican	Ref Offset 10.52 dB Ref 5.00 dBm	dB/div
Center Fre 2.480000000 GH						0)
Start Fre 2.479478244 GH	AMA A	many	www.ven	MW DANN M	- Marta Maran May	5,0
Stop Fre 2.480521756 GH	h. In Mr. Hul WAY	r v ¥'			Manyana	se AMM
CF Ste 104.351 kH Auto Ma						5.0
Freq Offse 0 H						5.0
	Span 1.044 MHz				800000 GHz	enter 2.4
	10.8 ms (1000 pts)	Sweep 1	9.1 kHz	#VBW		Res BW

Power Spectral Density (High-CH 39)



IM Bit/s (255 Byte) Test Plots



Power Spectral Density (Low-CH 0)

Power Spectral Density (Mid-CH 19)







Frequency	04:06 AMNov 28, 2020 TRACE 2 3 4 5 TYPE MUSICINAL DET P P P P P P		#Avg Type Avg Hold:	Free Run		CHZ PNO: Wide -	150 0 AC	er Freq	ent
Auto Tur	9 998 4 GHz 16.510 dBm	Mkr1 2.				a cunter	Dffset 10.52 dB 5.00 dBm		0 dB
Center Fre 2.480000000 GH									6 00
Start Fre 2.479471988 GF	Mm Winner .	Makym	manparty	where where	Wym	Munn	manyan	and when	(5,0) 25,0 (
Stop Fre 2.480528012 GF								Yn 10.	3510
CF Ste 105.602 ki Auto Mi									15:0 m
Freq Offs 0 F									75:0
	pan 1.056 MHz						000 GHz	er 2.480	ent
	ms (1000 pts)	Sweep 1		kHz	BW 9.1	#VBI	Hz	BW 3.0	Res

Power Spectral Density (High-CH 39)



고 객 비 밀 CUSTOMER SECRET

9.5 BAND EDGE/ CONDUCTED SPURIOUS EMISSIONS

Test Result : please refer to the plot below. In order to simplify the report, attached plots were only the worst case channel and data rate.



IM Bit/s (37 Byte) Test Plots -BandEdge

Low-CH 0 81 Frequency Center Freq 2.400000000 GHz #Avg Type: RMS Avg|Hold: 1/1 CHZ PNO: Wide ---- Trig: Free Run IFGain:Low Atten: 16 dB DET P.P.P.P.P.P.P Auto Tune 2.040 MHz 36.808 dB ∆Mkr1 Ref Offset 10.52 dB Ref 15.00 dBm Center Freq 2142 2.40000000 GHz Start Freq 2.396000000 GHz Stop Freq 2.404000000 GHz Χ2 CF Step 800.000 kHz Man Auto Freq Offset 0 Hz Center 2.400000 GHz #Res BW 100 kHz Span 8.000 MHz Sweep 4.000 ms (1001 pts) #VBW 300 kHz

High-CH 39







IM Bit/s (255 Byte) Test Plots -BandEdge



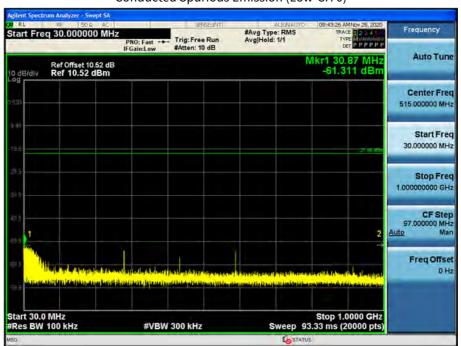
High-CH 39





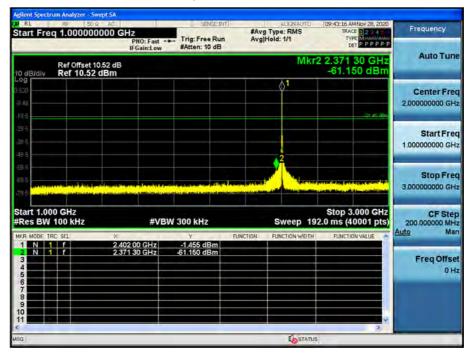
IM Bit/s (37 Byte) Test Plots -Conducted Spurious Emission

30 MHz ~ 1 GHz



Conducted Spurious Emission (Low-CH 0)

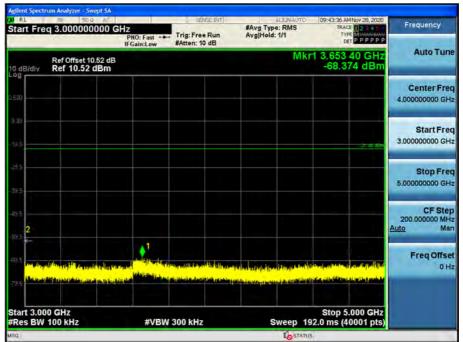
1 GHz ~ 3 GHz



객 비 밀 고 CUSTOMER SECRET

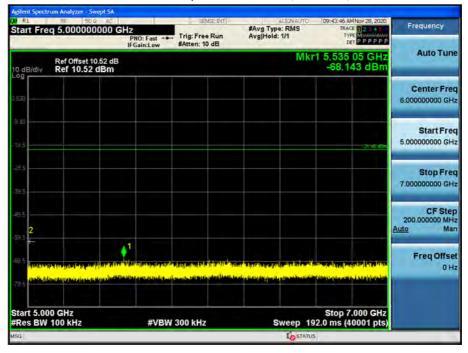


3 GHz ~ 5 GHz



Conducted Spurious Emission (Low-CH 0)

5 GHz ~ 7 GHz



객 비 밀 고 CUSTOMER SECRET

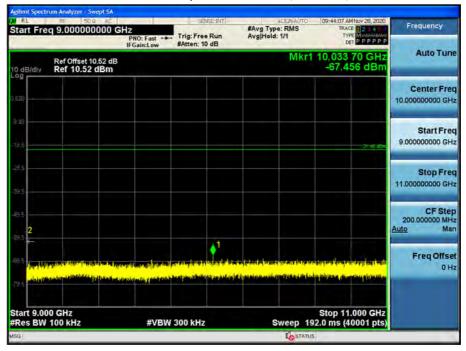


7 GHz ~ 9 GHz



Conducted Spurious Emission (Low-CH 0)

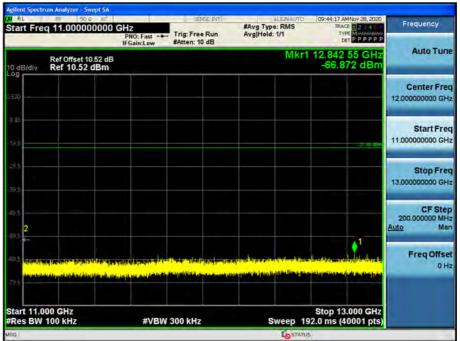
9 GHz ~ 11 GHz



٦ 객 비 밀 CUSTOMER SECRET



11 GHz ~ 13 GHz



Conducted Spurious Emission (Low-CH 0)

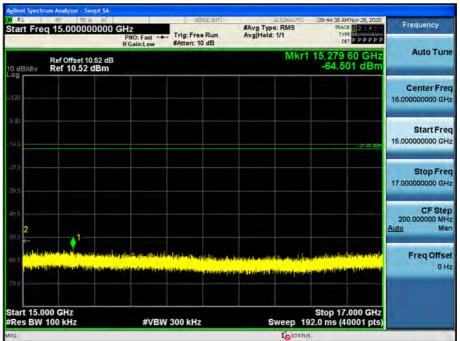
13 GHz ~ 15 GHz

Start Fre	aq 13.000000000	GHz PNO: Fast	SENSE INT Trig: Free Run #Atten: 10 dB	#Avg Type: RMS Avg[Hold: 1/1	09:44:27 AMNov 28, 2020 TRACE 2 3 4 5 TYPE MUMANANY DET P P P P P	Frequency
10 dB/div	Ref Offset 10.52 dB Ref 10.52 dBm			Mkr1	14.964 45 GHz -64.430 dBm	Auto Tune
)570						Center Free 14.000000000. GH:
9.48					<u>े न</u> हा	Start Free 13.000000000 GH
29.5 39.5						Stop Free 15.000000000 GH
-9.5 2.						CF Step 200.000000 MH Auto Mar
60.5 <mark>17.07.97.1</mark>	a possibilitati da se da bada da se		h han da karan da ka Karan da karan da kar	the second of heats when the second second	itentarieten bisieren unt	Freq Offse 0 H
Start 13.0			300 kHz		Stop 15.000 GHz 2.0 ms (40001 pts)	
SG				Sweep 13		

객 비 밀 고 CUSTOMER SECRET



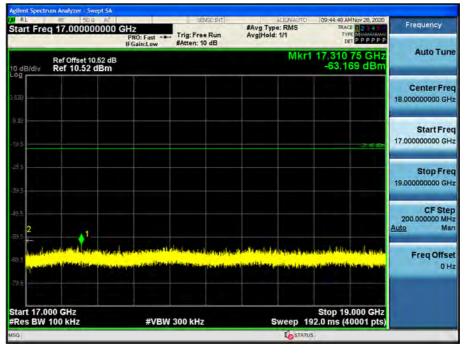
15 GHz ~ 17 GHz



Conducted Spurious Emission (Low-CH 0)

17 GHz ~ 19 GHz

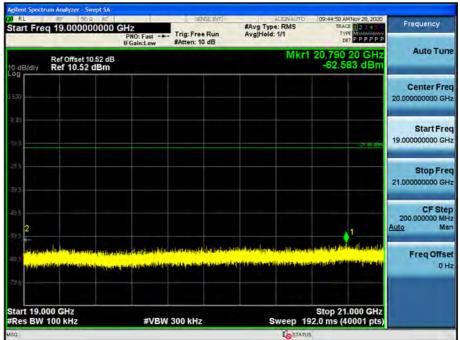




객 비 밀 고 CUSTOMER SECRET



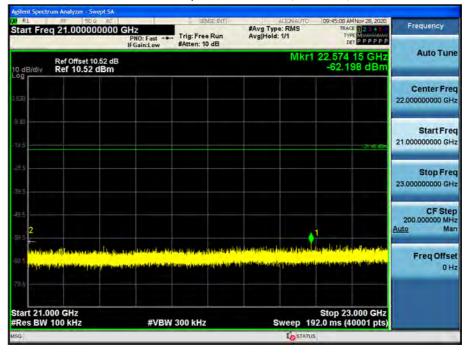
19 GHz ~ 21 GHz



Conducted Spurious Emission (Low-CH 0)

21 GHz ~ 23 GHz





고 객 비 밀 CUSTOMER SECRET



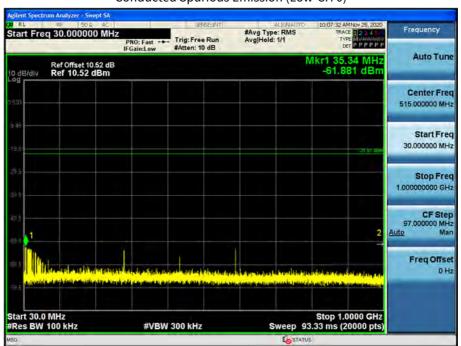
23 GHz ~ 25 GHz

RL RF 500 AC Start Freq 23.000000000 G	PNO: Fast Trig: Free Run	#Avg Type: RMS Avg Hold: 1/1	09:45:19 AMNov 28, 2020 TRACE 1 2 3 4 5 TYPE MUNICIPAL OF P P P P P	Frequency
Ref Offset 10.52 dB g dB/div Ref 10.52 dBm	IFGain:Low #Atten: 10 dB	Mkr1	24.963 05 GHz -57.658 dBm	Auto Tune
50				Center Fred 24.000000000 GH:
9.49			-3 6 Br	Start Free 23.000000000 GH:
25				Stop Free 25.000000000 GH
49.5 2 59.5 5		ng an an ang ang ang ang ang ang ang ang		CF Step 200.000000 MH Auto Mar
Terris of a service by the contract of the service	na da Cargang Ali da Antonio da A Antonio da Antonio da A			Freq Offse 0 H
Start 23.000 GHz #Res BW 100 kHz	#VBW 300 kHz	Sweep 19	Stop 25.000 GHz 2.0 ms (40001 pts)	



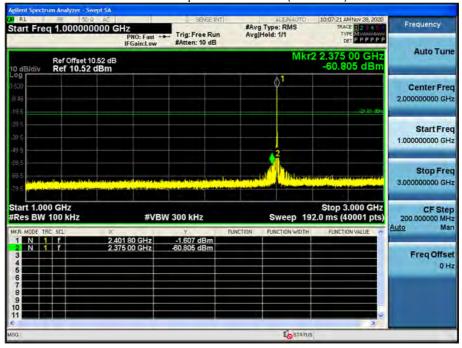
IM Bit/s (255 Byte) Test Plots -Conducted Spurious Emission

 $30 \text{ MHz} \sim 1 \text{ GHz}$



Conducted Spurious Emission (Low-CH 0)

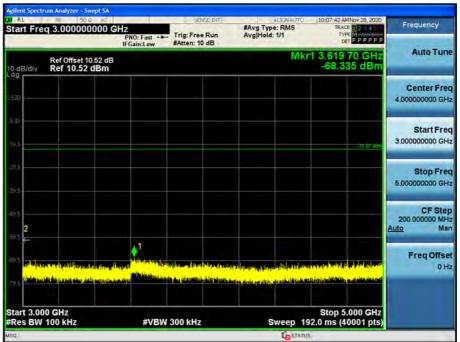
1 GHz ~ 3 GHz



객 비 밀 고 CUSTOMER SECRET

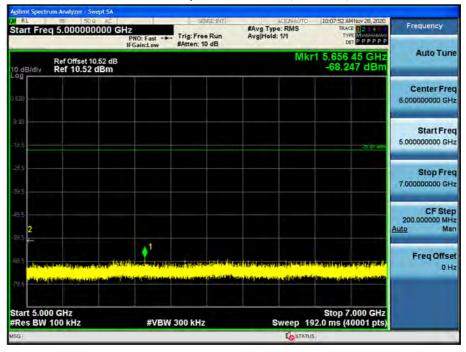


3 GHz ~ 5 GHz



Conducted Spurious Emission (Low-CH 0)

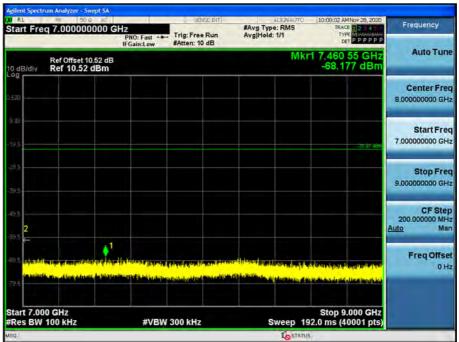
5 GHz ~ 7 GHz



٦ 객 비 밀 CUSTOMER SECRET



7 GHz ~ 9 GHz



Conducted Spurious Emission (Low-CH 0)

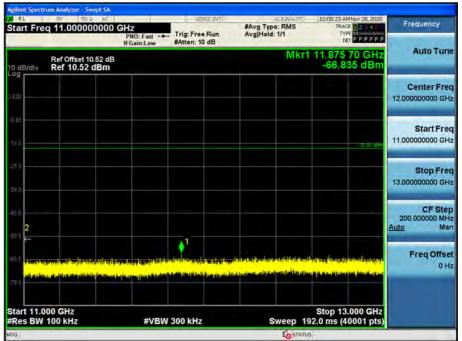
9 GHz ~ 11 GHz

Frequency	10:08:13 AMNov 28, 2020 TRACE 2 3 4 5 TYPE MUMANANA DET P P P P P	#Avg Type: RMS Avg Hold: 1/1	SENSE INT Trig: Free Run #Atten: 10 dB	PNO: Fast	50 0 AC	Freq	stant
Auto Tu	10,980 55 GHz -67.951 dBm	Mkr1			offset 10.52 dB 10.52 dBm		0 dB
Center Fre 10.000000000 G							.530) -
Start Fre 9.000000000 G	্য হা এক						9.49 - 19,5 -
Stop Fro 11.000000000 Gi							95 - 95 -
CF Ste 200.000000 Mi Auto Mi							9.5
Freq Offs 01		anı a façor (yazıla dana kayı façır) Yaşa façiri dana kayı takır (yaşır)	ana na seunal panagan si ma	The Press			95-
	Stop 11.000 GHz 2.0 ms (40001 pts)		300 kHz	#VBW :	:	.000 3W 1	
		Sweep 19	300 KHZ	#VBW	Hz	3W 1	Res sig

٦ 객 비 밀 CUSTOMER SECRET



11 GHz ~ 13 GHz



Conducted Spurious Emission (Low-CH 0)

13 GHz ~ 15 GHz



Frequency	10:08:34 AM Nov 28, 2020 TRACE 2 3 4 5 TYPE MUMANANA DET P P P P P	#Avg Type: RMS Avg[Hold: 1/1	SENSE INT Trig: Free Run #Atten: 10 dB	GHz PNO: Fast	q 13.000000000 (RL Start Fre
Auto Tun	14.994 85 GHz -65.798 dBm	Mkr1			Ref Offset 10.52 dB Ref 10.52 dBm	0 dB/div
Center Fre 14.00000000 GH						570
Start Fre 13.000000000 GH	ಶಾಹ					9.43
Stop Fre 15.00000000 GH						29.5
CF Ste 200.000000 MH Auto Ma						2 59.5
Freq Offse 0 H	Martin and a constant from the	allociticate a policicatilita <mark>menyamat Policicate provinsion</mark>		and the second to	narde hinoreal administration	and the second
	Stop 15.000 GHz 2.0 ms (40001 pts)			#VBW :	00 GHz	Start 13.0
		Lo STATUS				SĠ

객 비 밀 고 CUSTOMER SECRET



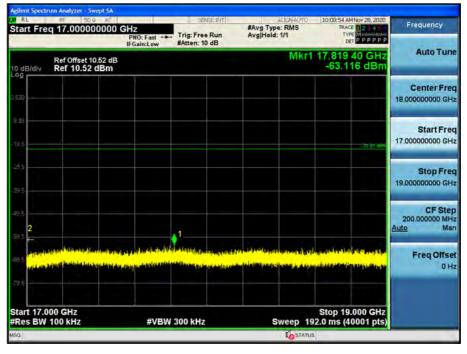
15 GHz ~ 17 GHz



Conducted Spurious Emission (Low-CH 0)

17 GHz ~ 19 GHz

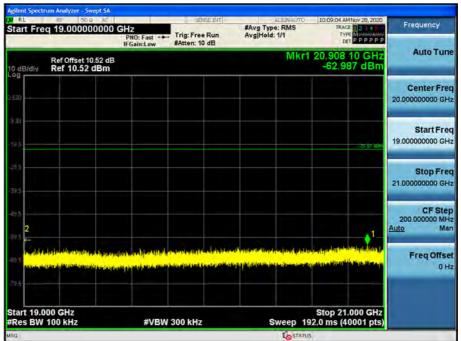




객 비 밀 고 CUSTOMER SECRET



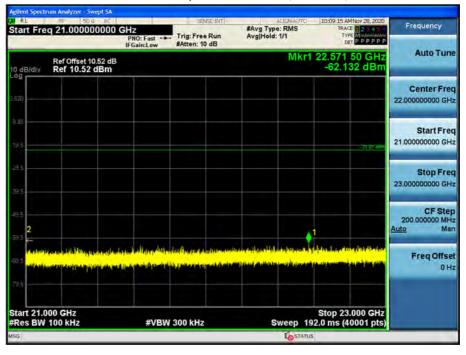
19 GHz ~ 21 GHz



Conducted Spurious Emission (Low-CH 0)

21 GHz ~ 23 GHz





객 비 고 밀 CUSTOMER SECRET



23 GHz ~ 25 GHz

RL RE 50 Q AC		SENSE: INT	ALIGNAUTO	10:09:25 AMNov 28, 2020	and a state of the
Start Freq 23.000000000	PNO: Fast	Trig: Free Run #Atten: 10 dB	#Avg Type: RMS Avg[Hold: 1/1	TYPE MUMANANA DET P P P P P	Frequency
Ref Offset 10.52 dB			Mkr	1 24.692 20 GHz -58.234 dBm	Auto Tune
) 530)					Center Freq 24.00000000 GHz
9.13				-रा डॉ स्टर्भ	Start Freq 23.000000000 GHz
315					Stop Freq 25.000000000 GHz
43.5 2 59.5	Melline a bitter	antificient	ang dang teruppen bij kena kana kana filang ter	1 Special states and the second of the second	CF Step 200.000000 MHz Auto Man
Louise en and best fields the series of the		the state of the state of the state of the			Freq Offset 0 Hz
Start 23.000 GHz #Res BW 100 kHz	#VBM	300 kHz	Sween 1	Stop 25.000 GHz 92.0 ms (40001 pts)	





9.6 RADIATED SPURIOUS EMISSIONS

Frequency Range : 9 kHz – 30MHz

Frequency	Reading	Ant. factor	Cable loss	Ant. POL	Total	Limit	Margin		
MHz	dBuV/m	dBm/m	dBm	(H/V)	dBuV/m	dBuV/m	dB		
No Critical peaks found									

Note:

1. The reading of emissions are attenuated more than 20 dB below the permissible limits or the field strength is too small to be measured.

- 2. Distance extrapolation factor = 40log (specific distance / test distance) (dB)
- 3. Limit line = specific Limits (dBuV) + Distance extrapolation factor
- 4. Radiated test is performed with hopping off.

Frequency Range : Below 1 GHz

Frequency	Reading	Ant. factor	Cable loss	Ant. POL	Total	Limit	Margin		
MHz	MHz dBuV/m		dBm	(H/V)	dBuV/m	dBuV/m	dB		
No Critical peaks found									

Note:

1. Radiated emissions measured in frequency range from 30 MHz to 1000 MHz were made

with an instrument using Quasi peak detector mode.

객 비 ъ 밀 CUSTOMER SECRET



Report No. HCT-RF-2012-FI001

Frequency Range : Above 1 GHz

Mode: 1M Bit/s (37 Byte)

Operation Mode: CH Low

Frequency	Reading	Duty Cycle Factor	A.F+C.L- A.G+D.F	ANT. POL	Total	Limit	Margin	Measurement Type
[MHz]	dBuV	[dB]	[dB]	[H/V]	[dBuV/m]	[dBuV/m]	[dB]	Type
4804	40.51	0.00	4.21	V	44.72	73.98	29.26	PK
4804	28.52	1.85	4.21	V	34.58	53.98	19.40	AV
7206	39.33	0.00	12.24	V	51.57	73.98	22.41	PK
7206	26.55	1.85	12.24	V	40.64	53.98	13.34	AV
4804	41.90	0.00	4.21	н	46.11	73.98	27.87	PK
4804	29.62	1.85	4.21	Н	35.68	53.98	18.30	AV
7206	39.56	0.00	12.24	Н	51.80	73.98	22.18	PK
7206	27.46	1.85	12.24	Н	41.55	53.98	12.43	AV

Operation Mode: CH Mid

Frequency	Reading	Duty Cycle Factor	A.F+C.L- A.G+D.F	ANT. POL	Total	Limit	Margin	in cubur ciricine
[MHz]	dBuV	[dB]	[dB]	[H/V]	[dBuV/m]	[dBuV/m]	[dB]	Туре
4880	40.96	0.00	4.43	V	45.39	73.98	28.59	PK
4880	29.15	1.85	4.43	V	35.43	53.98	18.55	AV
7320	38.06	0.00	12.46	V	50.52	73.98	23.46	PK
7320	26.88	1.85	12.46	V	41.19	53.98	12.79	AV
4880	41.67	0.00	4.43	н	46.10	73.98	27.88	PK
4880	29.71	1.85	4.43	Н	35.99	53.98	17.99	AV
7320	39.52	0.00	12.46	Н	51.98	73.98	22.00	PK
7320	26.92	1.85	12.46	Н	41.23	53.98	12.75	AV



Report No. HCT-RF-2012-FI001

Frequency	Reading	Duty Cycle Factor	A.F+C.L- A.G+D.F	ANT. POL	Total	Limit	Margin	Measurement
[MHz]	dBuV	[dB]	[dB]	[H/V]	[dBuV/m]	[dBuV/m]	[dB]	Туре
4960	41.49	0.00	4.83	V	46.32	73.98	27.66	PK
4960	29.74	1.85	4.83	V	36.42	53.98	17.56	AV
7440	38.72	0.00	12.63	V	51.35	73.98	22.63	PK
7440	26.15	1.85	12.63	V	40.63	53.98	13.35	AV
4960	42.40	0.00	4.83	Н	47.23	73.98	26.75	PK
4960	30.21	1.85	4.83	Н	36.89	53.98	17.09	AV
7440	39.98	0.00	12.63	Н	52.61	73.98	21.37	PK
7440	27.51	1.85	12.63	Н	41.99	53.98	11.99	AV

Mode : 1M Bit/s (255 Byte)

HCT

Frequency [MHz]	Reading dBuV	Duty Cycle Factor [dB]	A.F+C.L- A.G+D.F [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
4804	40.99	0.00	4.21	V	45.20	73.98	28.78	PK
4804	29.65	0.66	4.21	V	34.52	53.98	19.46	AV
7206	38.53	0.00	12.24	V	50.77	73.98	23.21	PK
7206	26.62	0.66	12.24	V	39.52	53.98	14.46	AV
4804	41.94	0.00	4.21	Н	46.15	73.98	27.83	PK
4804	29.81	0.66	4.21	Н	34.68	53.98	19.30	AV
7206	38.96	0.00	12.24	Н	51.20	73.98	22.78	PK
7206	27.44	0.66	12.24	Н	40.34	53.98	13.64	AV

Operation Mode: CH Low

Operation Mode: CH Mid

Frequency	Reading	Duty Cycle Factor	A.F+C.L- A.G+D.F	ANT. POL	Total	Limit	Margin	in cubur ciricine
[MHz]	dBuV	[dB]	[dB]	[H/V]	[dBuV/m]	[dBuV/m]	[dB]	Туре
4880	41.52	0.00	4.43	V	45.95	73.98	28.03	PK
4880	29.15	0.66	4.43	V	34.24	53.98	19.74	AV
7320	37.57	0.00	12.46	V	50.03	73.98	23.95	PK
7320	26.99	0.66	12.46	V	40.11	53.98	13.87	AV
4880	42.14	0.00	4.43	н	46.57	73.98	27.41	PK
4880	29.68	0.66	4.43	н	34.77	53.98	19.21	AV
7320	38.75	0.00	12.46	Н	51.21	73.98	22.77	PK
7320	27.06	0.66	12.46	Н	40.18	53.98	13.80	AV



Report No. HCT-RF-2012-FI001

Frequency	Reading	Duty Cycle Factor	A.F+C.L- A.G+D.F	ANT. POL	Total	Limit	Margin	
[MHz]	dBuV	[dB]	[dB]	[H/V]	[dBuV/m]	[dBuV/m]	[dB]	Туре
4960	41.61	0.00	4.83	V	46.44	73.98	27.54	PK
4960	30.06	0.66	4.83	V	35.55	53.98	18.43	AV
7440	39.48	0.00	12.63	V	52.11	73.98	21.87	PK
7440	27.02	0.66	12.63	V	40.31	53.98	13.67	AV
4960	41.90	0.00	4.83	Н	46.73	73.98	27.25	PK
4960	30.30	0.66	4.83	Н	35.79	53.98	18.19	AV
7440	39.69	0.00	12.63	Н	52.32	73.98	21.66	PK
7440	27.08	0.66	12.63	Н	40.37	53.98	13.61	AV

Operation Mode: CH High



IM Bit/s (37 Byte) Test Plots (Worst case : Z-H)

Ref Level 97.00 dBµV Att 0 dB Count 100/100	SWT 68 ms WBW 3 MHz			
1Rm AvgPwr@2Pk Cirw	7			
90 dBµV-		MILI	1	27.51 dBµV 7,4393922 CH/
80 dBµV				
70 d8µV			1	117 Jan 1
50 dBµV-				
50 dBµV				
	and the second and the second s	universitestand	environnalistatio	marteelarteenmeestrak
30 dBµV-	T			
20 dBµV				
10 dBµV-				

Radiated Spurious Emissions plot - Average Reading (Ch.39 3rd Harmonic)

Radiated Spurious Emissions plot – Peak Reading (Ch.39 3rd Harmonic)

1Pk Maxe2Pk Clr	W.	7						
1. S. A. I. C.		1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		MI	111			19.98 dBH
90 dBµV		1					644	0021/ 01
BU dBUV						12 F.1.		
10 OBLY		1.1.1				1000		
O dBuV								
				1		1.00.01	11.0	
i0 dBµV-		-						
								1.0
50 dBµV	-	-						
Acade and a second			M	1 I			1.1.1.1	
10 dBUV	minum	annon	nample	- Alexander	- الم محمد الموالية	mininte	-	monald
30 dBUV	are have an	and when the second sec	mouthrowth	Alvan Alarand	Mullikananalaan	nurennalere	Whaterman	ater half a strate
						1 - 1	1000	
20 dBuV					_			
LO dBµV-	-	-			_			-
	-					1		
D dBuV-								

Note:

Plot of worst case are only reported.

ъ 객 비 밀 CUSTOMER SECRET



Channel No.

9.7 RADIATED RESTRICTED BAND EDGES

Mode : 1M Bit/s (37 Byte)

Operating Frequency 2402 MHz 0

Frequency	Reading	Duty Cycle Factor	※ A.F+C.L+ Att-A.G+D.F	Ant. Pol.	Total	Limit	Margin	Measurement Type
[MHz]	[dBuV/m]	[dB]	[dB]	[H/V]	[dBuV/m]	[dBuV/m]	[dB]	
2390.0	62.87	0.00	2.61	Н	65.48	73.98	8.50	PK
2390.0	37.19	1.85	2.61	н	41.65	53.98	12.33	AV
2390.0	61.22	0.00	2.61	V	63.83	73.98	10.15	PK
2390.0	36.17	1.85	2.61	V	40.63	53.98	13.35	AV

Mode : 1M Bit/s (37 Byte)

Operating Frequency

Channel No.

2480 MHz

39

Frequency [MHz]	Reading [dBuV/m]	Duty Cycle Factor [dB]	※ A.F+C.L+ Att-A.G+D.F [dB]	Ant. Pol. [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Ū	Measurement Type
2483.5#(2484)	59.98	0.00	3.13	Н	63.11	73.98	10.87	PK
2483.5#(2484)	41.66	1.85	3.13	Н	46.64	53.98	7.34	AV
2483.5#(2485)	58.25	0.00	3.13	Н	61.38	73.98	12.60	PK
2483.5#(2485)	39.97	1.85	3.13	Н	44.95	53.98	9.03	AV
2485.5~2500	68.67	0.00	3.13	Н	71.80	73.98	2.18	PK
2485.5~2500	41.06	1.85	3.13	Н	46.04	53.98	7.94	AV

Note : # integration method Used (ANSI C63.10 Section11.13.3)



Mode : 1M Bit/s (255 Byte)

Operating Frequency Channel No. 2402 MHz

0

Frequency	Reading	Duty Cycle Factor	※ A.F+C.L+ Att-A.G+D.F	Ant. Pol.	Total		Ũ	Measurement Type
[MHz]	[dBuV/m]	[dB]	[dB]	[H/V]	[dBuV/m]	[dBuV/m]	[dB]	
2390.0	62.76	0.00	2.61	Н	65.37	73.98	8.61	PK
2390.0	36.42	0.66	2.61	Н	39.69	53.98	14.29	AV
2390.0	60.96	0.00	2.61	V	63.57	73.98	10.41	PK
2390.0	35.78	0.66	2.61	V	39.05	53.98	14.93	AV

Mode : 1M Bit/s (255 Byte)

Operating Frequency	2480 MHz
Channel No.	39

Frequency [MHz]	Reading [dBuV/m]	Duty Cycle Factor [dB]	※ A.F+C.L+ Att-A.G+D.F [dB]	Ant. Pol. [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
2483.5#(2484)	61.72	0.00	3.13	H	64.85	73.98	9.13	РК
2483.5#(2484)	39.49	0.66	3.13	Н	43.28	53.98	10.70	AV
2483.5#(2485)	59.71	0.00	3.13	Н	62.84	73.98	11.14	PK
2483.5#(2485)	38.44	0.66	3.13	Н	42.23	53.98	11.75	AV
2485.5~2500	69.02	0.00	3.13	Н	72.15	73.98	1.83	PK
2485.5~2500	38.73	0.66	3.13	Н	42.52	53.98	11.46	AV

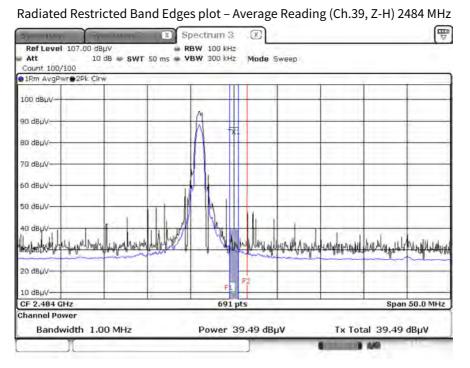
Note : # integration method Used (ANSI C63.10 Section11.13.3)

Note: All data Worst case Duty Cycle Correction Factor applied.

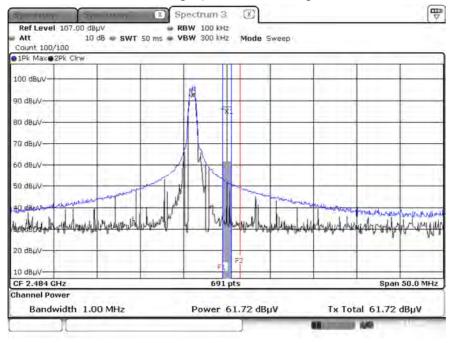




Mode : 1M Bit/s (255 Byte) Test Plots

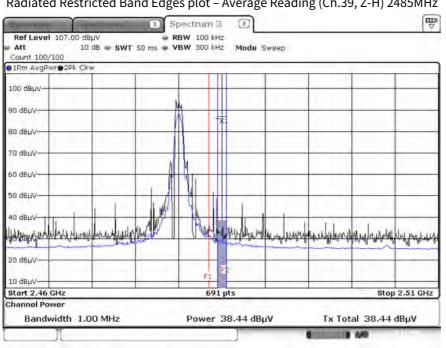


Radiated Restricted Band Edges plot - Peak Reading (Ch.39, Z-H) 2484MHz

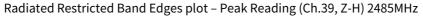


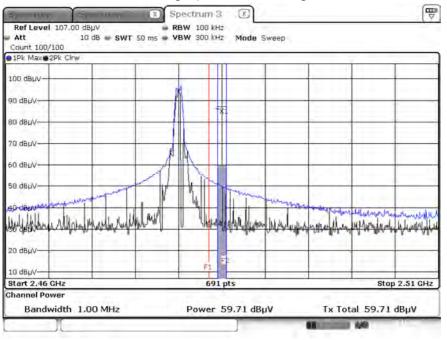




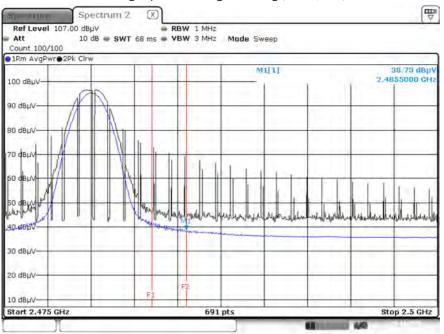


Radiated Restricted Band Edges plot - Average Reading (Ch.39, Z-H) 2485MHz



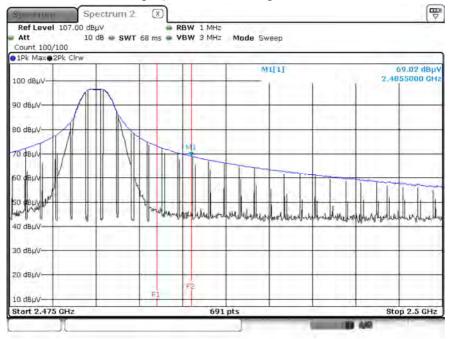






Radiated Restricted Band Edges plot - Average Reading (Ch.39, Z-H)2485.5 MHz ~ 2500MHz

Radiated Restricted Band Edges plot - Peak Reading (Ch.39, Z-H) 2485.5 MHz ~ 2500MHz



Note:

Plot of worst case are only reported.





9.8 RECEIVER SPURIOUS EMISSIONS

Frequency Range : Below 1 GHz

Frequency	Reading	Ant. factor	Cable loss	Ant. POL	Total	Limit	Margin	
MHz	dBuV/m	dBm/m	dBm	(H/V)	dBuV/m	dBuV/m	dB	
No Critical peaks found								

Note:

1. Radiated emissions measured in frequency range from 30 MHz to 1000 MHz were made with an instrument using Quasi peak detector mode.

Frequency Range : Above 1 GHz

Frequency	Reading	Ant. factor	Cable loss	Ant. POL	Total	Limit	Margin
MHz	dBuV/m	dBm/m	dBm	(H/V)	dBuV/m	dBuV/m	dB
No Critical peaks found							



9.9 POWERLINE CONDUCTED EMISSIONS

Conducted Emissions (Line 1)

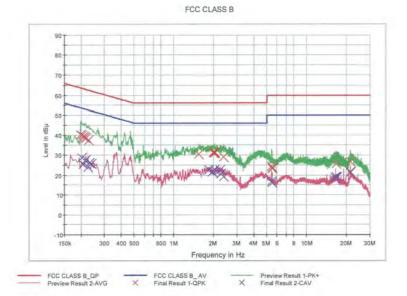
Test

1/2

HCT TEST Report



EUT: Manufacturer: Test Site: Operating Conditions: LGIT_ETGBBTBP01 LG INNOTEK SHIELD ROOM BTLE MODE_N



Final Result 1

Frequency (MHz)	QuasiPeak (dBuV)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBuV)
0.198000	40.3	9.000	On	N	9.7	23.4	63.7
0.204000	39.8	9.000	On	N	9.7	23.6	63.4
0.208000	39.1	9.000	On	N	9.7	24.2	63.3
0.212000	38.8	9,000	On	N	9.7	24.3	63.1
0.218000	38.5	9,000	On	N	9.7	24.4	62.9
0.228000	37.5	9,000	On	N	9.7	25.0	62.5
1.532000	30.2	9.000	On	N	9.8	25.8	56.0
1.980000	31.5	9,000	On	N	9.8	24.5	56.0
1.984000	31.0	9.000	On	N	9.8	25.0	56.0
2.030000	31.4	9,000	On	N	9.8	24.6	56.0
2.034000	31.1	9,000	On	N	9.8	24.9	56.0
2.372000	28.9	9.000	On	N	9.8	27.1	56.0
5.466000	24.1	9.000	On	N	9.8	35.9	60.0
5.484000	23.6	9.000	On	N	9.8	36.4	60.0
5.492000	23.2	9,000	On	N	9.8	36.8	60.0
16.746000	25.5	9.000	On	N	10.0	34.5	60.0
21.314000	21.6	9.000	On	N	10.1	38.4	60.0
21.322000	26.5	9.000	On	N	10,1	33.5	60.0

2020-11-19

오후 4:41:53

고 객 비 밀 CUSTOMER SECRET

2/2



Test

Final Result 2

Frequency (MHz)	CAverage (dBuV)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBuV)
0.204000	28,8	9,000	On	N	9.7	24.6	53.4
0.208000	25.2	9.000	On	N	9.7	28,1	53.3
0.218000	27.7	9,000	On	N	9.7	25.2	52.9
0.226000	23.9	9.000	On	N	9.7	28.7	52.6
0.230000	26.0	9,000	On	N	9.7	26.5	52.4
0.240000	25.5	9.000	On	N	9.7	26.6	52.1
1.826000	22.6	9.000	On	N	9.8	23.4	46.0
1,938000	21.5	9,000	On	N	9.8	24.5	46.0
2.034000	22.6	9.000	On	N	9.8	23.4	46.0
2.240000	22,5	9,000	On	N	9.8	23.5	46.0
2.268000	20.7	9,000	On	N	9.8	25.3	46.0
2.372000	19.2	9.000	On	N	9.8	26.8	46.0
5,466000	16,7	9,000	On	N	9.8	33.3	50.0
5,490000	16.0	9,000	On	N	9.8	34.0	50.0
16,310000	18.9	9.000	On	N	10.0	31.1	50.0
16,762000	19.0	9,000	On	N	10.0	31.0	50.0
16.840000	18.9	9.000	On	N	10.0	31.1	50.0
21.322000	21.2	9.000	On	N	10.1	28.8	50.0

2020-11-19

오후 4:41:53



Conducted Emissions (Line 2)

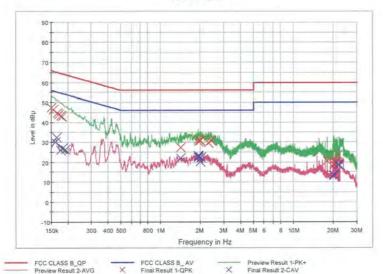
HCT

Test

1/2

HCT TEST Report





AVG	×	Final Result 1-QPK	×	Final Re

Final Result 1

Frequency (MHz)	QuasiPeak (dBuV)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBuV)
0.150000	47.2	9.000	On	L1	9.8	18.8	66.0
0.156000	46.3	9,000	On	L1	9.8	19.4	65.7
0.166000	44.6	9.000	On	L1	9.8	20.6	65.2
0.170000	43.9	9.000	On	L1	9.8	21.1	65.0
0.176000	43.3	9.000	On	L1	9.8	21.3	64.7
0.180000	42.8	9.000	On	L1	9.8	21.7	64.5
1.418000	27.4	9.000	On	L1	9.8	28.6	56.0
1.912000	30.4	9,000	On	L1	9.8	25.6	56.0
1.926000	31.3	9,000	On	L1	9.8	24.7	56.0
1.998000	30.7	9,000	On	L1	9.8	25.3	56.0
2.298000	29.8	9.000	On	L1	9.8	26.2	56.0
2.392000	30.6	9,000	On	L1	9.8	25.4	56.0
17.846000	20.5	9,000	On	L1	10.0	39.5	60.0
20.072000	18.7	9.000	On	L1	10.1	41.3	60.0
20.076000	18.7	9.000	On	L1	10.1	41.3	60,0
20.130000	18.8	9.000	On	L1	10.1	41.2	60,0
20.272000	18.3	9,000	On	L1	10.1	41.7	60.0
21,698000	23.7	9,000	On	L1	10.1	36.3	60.0

2020-11-19

오후 4:52:48

고 객 비 밀 CUSTOMER SECRET

2/2



Test

Final Result 2

Frequency (MHz)	CAverage (dBuV)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBuV)
0.160000	29.9	9.000	On	L1	9,8	25,5	55.5
0.164000	32.2	9,000	On	L1	9.8	23.0	55.3
0.176000	26.0	9.000	On	L1	9.8	28.7	54.7
0.180000	26.5	9,000	On	L1	9.8	28.0	54.5
0.184000	27.1	9,000	On	L1	9.8	27.2	54.3
0.192000	26.2	9.000	On	L1	9.8	27.7	53.9
1,418000	21.8	9.000	On	L1	9.8	24.2	46.0
1,912000	22.2	9.000	On	L1	9.8	23.8	46.0
1.926000	23.1	9.000	On	L1	9.8	22.9	46.0
1.930000	23.0	9.000	On	L1	9.8	23.0	46.0
1.998000	20.1	9.000	On	L1	9.8	25.9	46.0
2.022000	22.2	9,000	On	L1	9.8	23.8	46.0
20.028000	13.5	9,000	On	L1	10.1	36.5	50.0
20.072000	13.3	9,000	On	L1	10.1	36.7	50.0
20.076000	13.2	9.000	On	L1	10.1	36.8	50.0
20.130000	13.1	9,000	On	L1	10.1	36.9	50.0
21,698000	18,4	9.000	On	L1	10.1	31.6	50.0
22.224000	18,4	9.000	On	L1	10.1	31.6	50.0

2020-11-19

오후 4.52,48



10. LIST OF TEST EQUIPMENT

Conducted Test

Manufacture r	Model / Equipment	Calibratio n Date	Calibratio n Interval	Serial No.
Rohde & Schwarz	ENV216 / LISN	09/04/2020	Annual	102245
Rohde & Schwarz	ESCI / Test Receiver	06/10/2020	Annual	100584
ESPEC	SU-642 /Temperature Chamber	07/30/2020	Annual	0093000718
Agilent	N9030A / Signal Analyzer	03/23/2020	Annual	MY49432108
Agilent	N1911A / Power Meter	04/07/2020	Annual	MY45100523
Agilent	N1921A / Power Sensor	06/08/2020	Annual	MY57820067
HP	E3632A / DC Power Supply	09/16/2020	Annual	MY40004427
HP	8493C / Attenuator(10 dB)(DC-26.5 GHz)	07/03/2020	Annual	08285
Rohde & Schwarz	EMC32 / Software	N/A	N/A	N/A
HCT CO., LTD.	FCC WLAN&BT&BLE Conducted Test Software v3.0	N/A	N/A	N/A

Note:

1. Equipment listed above that calibrated during the testing period was set for test after the calibration.

2. Equipment listed above that has a calibration due date during the testing period, the testing is completed before equipment expiration date.



Radiated Test		Calibration	Calibration	
Manufacturer	Model / Equipment	Date	Interval	Serial No.
Innco system	CO3000 / Controller(Antenna mast)	N/A	N/A	CO3000-4p
Innco system	MA4640/800-XP-EP / Antenna Position Tower	N/A	N/A	N/A
Audix	EM1000 / Controller	N/A	N/A	060520
Audix	Turn Table	N/A	N/A	N/A
TNM system	FBSM-01B / Amp & Filter Bank Switch Controller	N/A	N/A	N/A
Schwarzbeck	Loop Antenna	05/18/2020	Biennial	1513-175
Schwarzbeck	VULB 9168 / Hybrid Antenna	08/02/2019	Biennial	01039
Schwarzbeck	BBHA 9120D / Horn Antenna	06/28/2019	Biennial	1300
Schwarzbeck	BBHA9170 / Horn Antenna(15 GHz ~ 40 GHz)	04/29/2019	Biennial	BBHA9170342
Rohde & Schwarz	FSP(10 Hz ~ 40 GHz) / Spectrum Analyzer	05/13/2020	Annual	101055
Wainwright Instruments	WRCJV2400/2483.5-2370/2520- 60/12SS / Band Reject Filter	01/21/2020	Annual	2
Wainwright Instruments	WRCJV5100/5850-40/50-8EEK / Band Reject Filter	02/10/2020	Annual	1
CERNEX	CBL18265035 / Power Amplifier	12/26/2019	Annual	22966
CERNEX	CBL26405040 / Power Amplifier	03/23/2020	Annual	25956
TNM system	FBSM-05B / HPF(3~18GHz) + LNA1(1~18GHz)	01/21/2020	Annual	F6
TNM system	FBSM-05B / ATT(10dB) + LNA1(1~18GHz)	01/21/2020	Annual	None
TNM system	FBSM-05B / ATT(3dB) + LNA1(1~18GHz)	01/21/2020	Annual	None
TNM system	FBSM-05B / LNA1(1~18GHz)	01/21/2020	Annual	25540
TNM system	FBSM-05B / HPF(7~18GHz) + LNA2(6~18GHz)	01/21/2020	Annual	28550
TNM system	FBSM-05B / Thru(30MHz ~ 18GHz)	01/21/2020	Annual	None

Note:

1. Equipment listed above that calibrated during the testing period was set for test after the calibration.

2. Equipment listed above that has a calibration due date during the testing period, the testing is completed before equipment expiration date.

3. Espectially, all antenna for measurement is calibrated in accordance with the requirements of

C63.5(Version : 2017)..



11. ANNEX A_ TEST SETUP PHOTO

Please refer to test setup photo file no. as follows;

No.	Description
1	HCT-RF-2012-FI001-P