verify No.527299393658

TEST REPORT

KCTL Inc.
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Suwon-si, Gyeonggi-do, 16677, Korea
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1. Client

- Name : Samsung Electronics Co., Ltd.
- Address : 129, Samsung-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16677, Rep. of Korea
- Date of Receipt : 2019-10-18

2. Use of Report : Class II Permissive change

3. Name of Product and Model : Smart Wearable / SM-R835F

4. Manufacturer and Country of Origin : Samsung Electronics Co., Ltd. / Korea

5. FCC ID : A3LSMR835

6. Date of Test : 2019-10-30 to 2019-11-05

7. Test Standards : FCC Part 2
FCC Part 22 Subpart H

8. Test Results : Refer to the test result in the test report

Affirmation	Tested by Name : Euijung Kim (Signature)	Technical Manager Name : Seungyong Kim (Signature)

2019-11-15

KCTL Inc.

As a test result of the sample which was submitted from the client, this report does not guarantee the whole product quality. This test report should not be used and copied without a written agreement by KCTL Inc.

Report revision history

Date	Revision	Page No
2019-11-15	Initial report	-

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1. General information

Client	:	Samsung Electronics Co., Ltd.
Address	:	129, Samsung-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16677, Rep. of Korea
Manufacturer	:	Samsung Electronics Co., Ltd.
Address	:	129, Samsung-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16677, Rep. of Korea
Factory	:	Samsung Electronics Co., Ltd.
Address	:	94-1, Imsu-dong, Gumi-si, Gyengsangbuk-do, 730-722, Rep. of Korea
Factory	:	Samsung Electronics VIETNAM Co., Ltd.
Address	:	Yenphong 1 - I.P Yentrung Commune, Yenphong Dist., Bac Ninh Province, Vietnam
Laboratory	:	KCTL Inc.
Address	:	65, Sinwon-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16677, Korea
Accreditations	:	FCC Site Designation No: KR0040, FCC Site Registration No: 687132 VCCI Registration No. : R-20080, G-20078, C-20059, T-20056 Industry Canada Registration No. : 8035A KOLAS No.: KT231

2. Device information

Equipment under test	:	Smart Wearable
Model	:	SM-R835F
Frequency range	:	Bluetooth(BDR/EDR/BLE)_2 402 ㎒ ~ 2 480 ㎒ WIFI(802.11b/g/n20)_2 412 ㎒ ~ 2 472 ㎒ LTE Band 5_824.7 ㎒ ~ 848.3 ㎒ WCDMA 850_826.4 ㎒ ~ 846.6 ㎒
Modulation technique	:	Bluetooth(BDR/EDR)_ GFSK, π/4DQPSK, 8DPSK Bluetooth(BLE)_GFSK WIFI(802.11b/g/n20)_DSSS, OFDM LTE_QPSK, 16QAM WCDMA_QPSK
Number of channels	:	Bluetooth(BDR/EDR)_79 ch Bluetooth(BLE)_40 ch WIFI(802.11b/g/n20)_13 ch
Power source	:	DC 3.85 V
Antenna specification	:	LTE/WCDMA_PIFA (Housing metal) Antenna WIFI/Bluetooth(BDR/EDR/BLE)_LDS Antenna
Antenna gain	:	WIFI/Bluetooth(BDR/EDR/BLE) : -6.4 ㏈i
Software version	:	R835F.001
Hardware version	:	REV1.0

Test device serial No. : Conducted(353343/11/000040/0)
Radiated(R3AM90016TK, R3AM90016QF, R3AM900174Y)

Operation temperature : -30 ℃ ~ 50 ℃

2.1. Accessory information

Equipment	Manufacturer	Model	Serial No.	Power source	FCC ID
Wireless charger	Samsung Electronics Co., Ltd.	EP-OR825	-	DC 5.0 V, 1.0 A	A3LEPOR825

2.2. Frequency/channel operations

This device contains the following capabilities:
Bluetooth(BDR/EDR/BLE), WIFI(802.11b/g/n20), LTE Band 5, WCDMA 850

WCDMA 850

Ch.	Frequency (㎒)
4132	826.4
4183	836.6
4233	846.6

Table 2.2.1.
RMC/HSDPA/HSUPA/HSPA+

3. Summary of tests

FCC Part Section(s)	Parameter	Test results
2.1046 22.913(a)(5)	Conducted Output Power	Pass
2.1049	Occupied Bandwidth & 26 dB Bandwidth	N/T(Note1)
2.1051 22.917(a)	Band Edge Emissions at Antenna Terminal	N/T(Note1)
	Spurious Emissions at Antenna Terminal	N/T(Note1)
2.1055 22.355	Frequency stability	N/T(Note1)
22.913(a)(5)	Effective Radiated Power & Equivalent Isotropic Radiated Power	Pass
2.1053 22.917(a)	Radiated Spurious Emissions	Pass

Notes: (N/T: Not Tested, N/A: Not Applicable)

1. These test item was performed. (FCC ID: A3LSMR835)
   Test Report No. KR19-SRF0096-A issued on 8, August, 2019 by KCTL Inc.)
2. C2PC model is electrically identical to the Original model.
   The Product Equality Declaration includes detailed information about the changes between the devices.
3. The data from that application has been verified through appropriate spot checks to demonstrate compliance for this device as shown in the test result of section 6.
4. Output power was verified to be within the expected tune up tolerances prior to performing the spot checks for radiated spurious emissions and band edge to confirm that the proposed changes to the digital circuitry had not adversely affected the previously reported values in the original filing.
5. The test procedure(s) in this report were performed in accordance as following.
   ANSI C63.26-2015
   ANSI/TIA-603-E-2016
   KDB 971168 D01 v03r01
6. The test scenario for spot check is based on the worst-case of original report results.

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4. Measurement uncertainty

The measurement uncertainties shown below were calculated in accordance with the requirements of ANSI C63.4-2014.

All measurement uncertainty values are shown with a coverage factor of *k*=2 to indicated a 95 % level of confidence. The measurement data shown herein meets of 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 (±)	
Conducted RF power	1.76 dB	
Conducted spurious emissions	4.03 dB	
Radiated spurious emissions	9 kHz ~ 30 MHz	2.28 dB
	30 MHz ~ 1 GHz	3.68 dB
	Above 1 GHz	5.72 dB

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5. Measurement results explanation example

The offset level is set in the spectrum analyzer to compensate the RF cable loss factor between EUT conducted output port and spectrum analyzer.
With the offset compensation, the spectrum analyzer reading level is exactly the EUT RF output level.

Frequency (㎒)	Factor(㏈)	Frequency (㎒)	Factor(㏈)
30	0.03	11 000	1.83
50	0.09	12 000	1.89
100	0.20	13 000	1.75
200	0.20	14 000	1.95
300	0.26	15 000	1.98
400	0.25	16 000	1.95
500	0.28	17 000	1.99
600	0.31	18 000	2.07
700	0.34	19 000	2.37
800	0.32	20 000	2.22
900	0.35	21 000	2.23
1 000	0.36	22 000	2.03
2 000	0.67	23 000	2.32
3 000	0.83	24 000	2.45
4 000	0.94	25 000	2.42
5 000	0.95	26 000	2.65
6 000	1.00	26 500	2.78
7 000	1.04	27 000	2.75
8 000	1.77	28 000	3.06
9 000	1.85	29 000	2.46
10 000	1.66	30 000	2.80

Note.
Offset(㏈) = RF cable loss(㏈)

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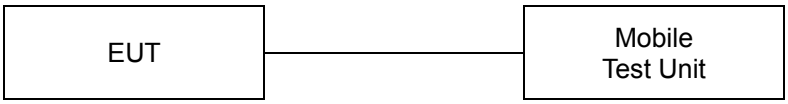
6. Test results

6.1. Conducted output power

Test setup



Test procedure

971168 D01 v03r01 – Section 5.2
ANSI C63.26-2015 – Section 5.2.4.2
CFR 47, - Section §2.1046

Test settings

When an average power meter is used to perform RF output power measurements, the fundamental condition that measurement be performed only over durations of active transmissions at maximum output power level applies. Thus, an average power meter can always be used to perform the measurement when the EUT can be configured to transmit continuously.

If the EUT cannot be configured to transmit continuously (i.e., burst duty cycle < 98%), then the following options can be implemented to facilitate measurement of the average power with an average power meter:

a) A gated average power meter can be used to perform the measurement if the gating parameters can be adjusted such that the power is measured only during active transmission bursts at maximum output power levels.
b) A conventional average power meter with no signal gating capability can also be used if the measured burst duty cycle is constant (i.e., duty cycle variations are less than or equal to ± 2%) by performing the measurement over the on/off burst cycles and then correcting (increasing) the measured level by a factor equal to [10log (1/duty cycle)]. See 5.2.4.3.4 for guidance with respect to measuring the transmitter duty cycle.

See item r) of 4.1 for more information regarding power meter functional requirements and limitations, and consult the instrumentation-specific application literature for proper set-up and use.

Notes:

1. Offset(dB) = RF cable loss(dB)
2. HSPA+
   Since 16QAM is not used for uplink, the uplink category and release is same as HSUPA.
   Therefore, the RF conducted power is not measured.

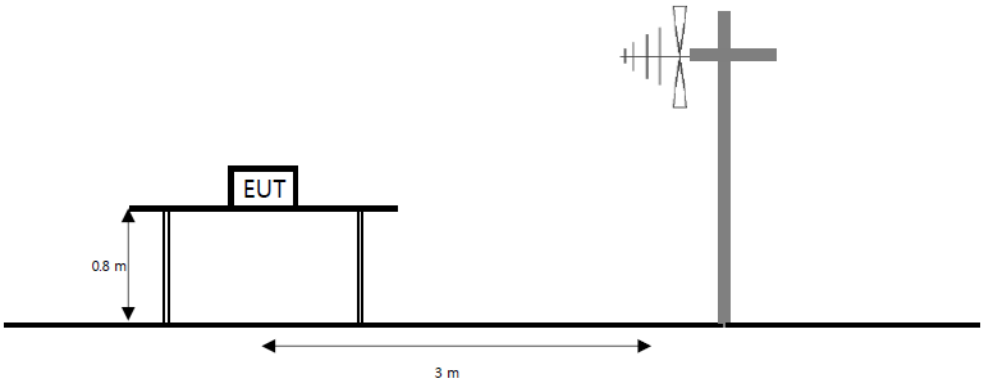
Test results

Test Band	Test mode	Average Conducted Power (dBm)		
		Low	Middle	High
WCDMA 850	RMC	22.30	22.29	22.11

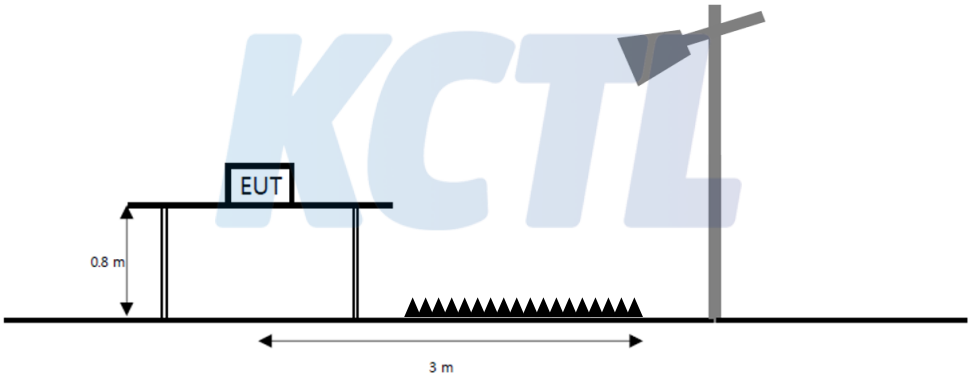
6.2. Radiated Power (ERP/EIRP)

Test setup

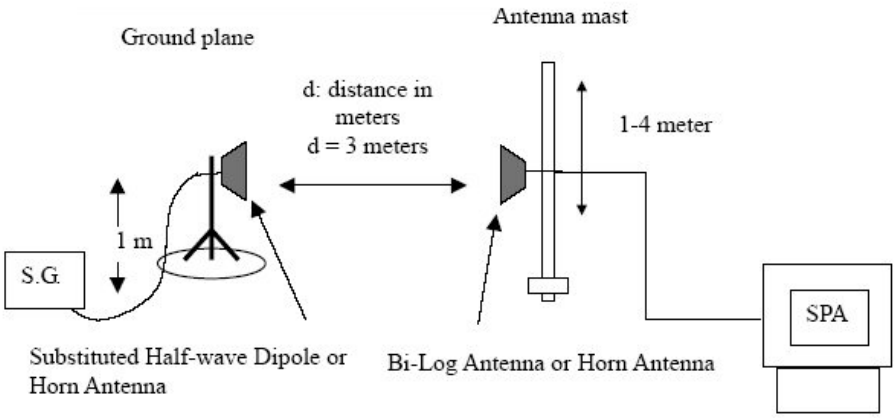
The diagram below shows the test setup that is utilized to make the measurements for emission from 30 ㎒ to 1 ㎓ emissions.



The diagram below shows the test setup that is utilized to make the measurements for emission from 1 ㎓ to the tenth harmonic of the highest fundamental frequency or to 40 ㎓ emissions, whichever is lower.



The diagram below shows the test setup for substituted method.



Limit

According to §22.913(a)(5), the ERP of transmitters in the cellular radiotelephone service must not exceed the limits in this section. The ERP of mobile transmitters and auxiliary test transmitters must not exceed 7 watts.

Test procedure

971168 D01 v03r01 - Section 5.2.2
ANSI 63.26-2015 – Section 5.2.4.4.1
ANSI/TIA-603-E-2016 - Section 2.2.17

Test settings

1) RBW = 1 % to 5 % of the OBW.
2) VBW ≥ 3 × RBW.
3) SPAN = 2 × to 3 × the OBW.
4) Number of measurement points in sweep ≥ 2 × span / RBW.
5) Sweep time :
   1) Auto couple, or
   2) ≥ [10 × (number of points in sweep) × (transmission period)] for single sweep (automation-compatible) measurement. Transmission period is the on and off time of the transmitter.
6) Detector = RMS
7) If the EUT can be configured to transmit continuously, then set the trigger to free run.
8) If the EUT cannot be configured to transmit continuously, then use a sweep trigger with the level set to enable triggering only on full power bursts and configure the EUT to transmit at full power for the entire duration of each sweep. Verify that the sweep time is less than or equal to the transmission burst duration. Time gating can also be used under similar constraints (i.e., configured such that measurement data is collected only during active full -power transmissions).
9) Trace mode = trace averaging (RMS) over 100 sweeps.
10) Compute the power by integrating the spectrum across the OBW of the signal using the instrument's band or channel power measurement function, with the band/channel limits set equal to the OBW band edges. If the instrument does not have a band or channel power function, then sum the spectrum levels (in linear power units) at intervals equal to the RBW extending across the entire OBW of the spectrum.
11) Allow trace to fully stabilize.

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Notes:

1. On a test site, the EUT shall be placed at 80 cm height on a turn table, and in the position close To normal use as declared by the applicant.
2. The test antenna shall be oriented initially for vertical polarization located 3 m from EUT to Correspond to the fundamental frequency of the transmitter.
3. The turntable is rotated through 360°, and the receiving antenna scans in order to determine the Level of the maximized emission.
4. The test antenna shall be raised and lowered again through the specified range of height until the maximum signal level is detected by the measuring receiver.
5. The maximum signal level detected by the measuring receiver shall be noted.
6. The EUT was replaced by half-wave dipole (1 GHz below) or horn antenna (1 GHz above) connected to a signal generator.
   The power is calculated by the following formula;
   Pd(dBm) = Pg(dBm) – Cable loss (dB) + Antenna gain (dB)
   Note. Pd is the dipole equivalent power and Pg is the generator output power into the substitution antenna.
7. The test antenna shall be raised and lowered through the specified range of height to ensure that The maximum signal is received.
8. The input signal to the substitution antenna shall be adjusted to the level that produces a level Detected by the measuring corrected for the change of input attenuator setting of the measuring Receiver.
9. The input level to the substitution antenna shall be recorded as power level in dBm, corrected for Any change of input attenuator setting of the measuring receiver.
10. The measurement shall be repeated with the test antenna and the substitution antenna Orientated for horizontal polarization.

Test results

Test mode: WCDMA 850

Mode	Channel	Frequency	Pol.	Antenna Gain	C.L	Substitute Level	ERP	
		[㎒]	[V/H]	[dBi]	[dB]	[dBm]	[dBm]	[W]
RMC	4132	826.40	V	-0.50	3.70	12.41	8.21	0.007
	4183	836.60	V	-0.50	3.71	13.70	9.49	0.009
	4233	846.60	V	-0.60	3.73	13.92	9.59	0.009

Note.
1. E.R.P (dBm) = Substitute Level(dB) + Antenna gain(dBi) - C.L(Cable loss) (dB)

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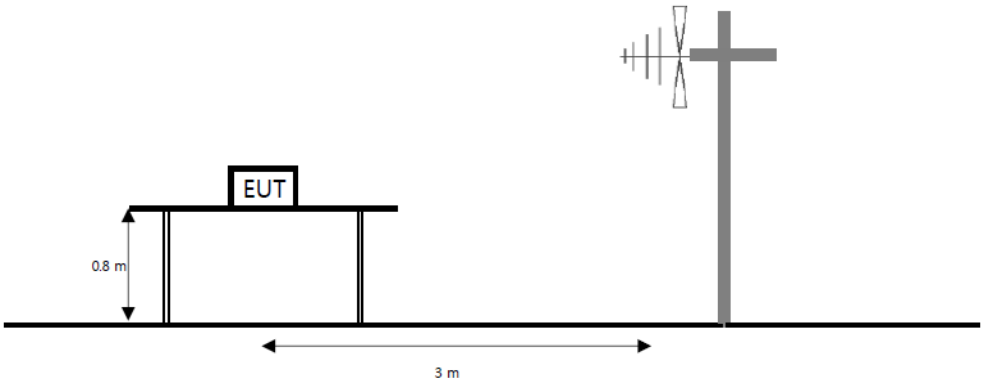
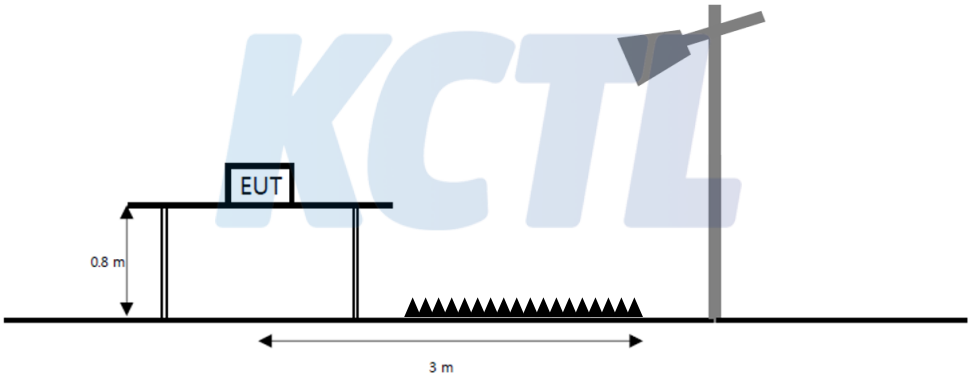
6.3. Radiated Spurious Emissions

Test setup

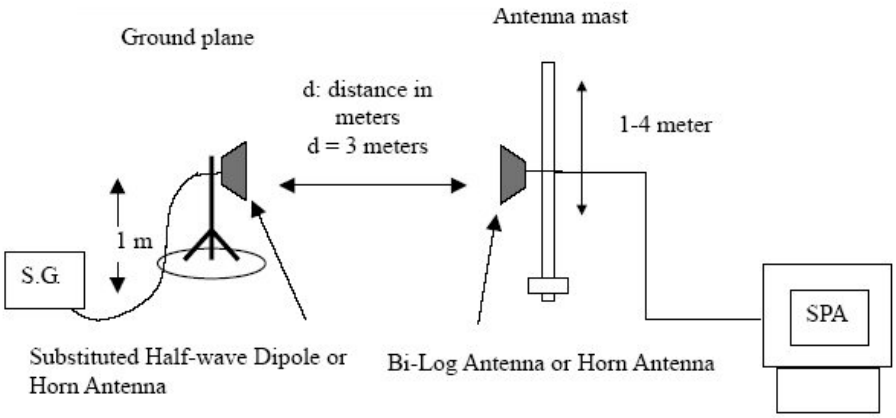
The diagram below shows the test setup that is utilized to make the measurements for emission from 30 ㎒ to 1 ㎓ emissions.



The diagram below shows the test setup that is utilized to make the measurements for emission from 1 ㎓ to the tenth harmonic of the highest fundamental frequency or to 40 ㎓ emissions, whichever is lower.



The diagram below shows the test setup for substituted method.



Limit

According to §22.917(a), the power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10log(P)dB.

Test procedure

971168 D01 v03r01 - Section 5.8
ANSI 63.26-2015 – Section 5.5
ANSI/TIA-603-E-2016 - Section 2.2.12

Test settings

1) RBW = 1 kHz for below 1 GHz and 1 MHz for above 1 GHz.
2) VBW ≥ 3 × RBW.
3) Detector = RMS
4) Trace mode = Max hold
5) Sweep time = Auto couple
6) Number of sweep points ≥ 2 × span / RBW
7) Allow trace to fully stabilize.

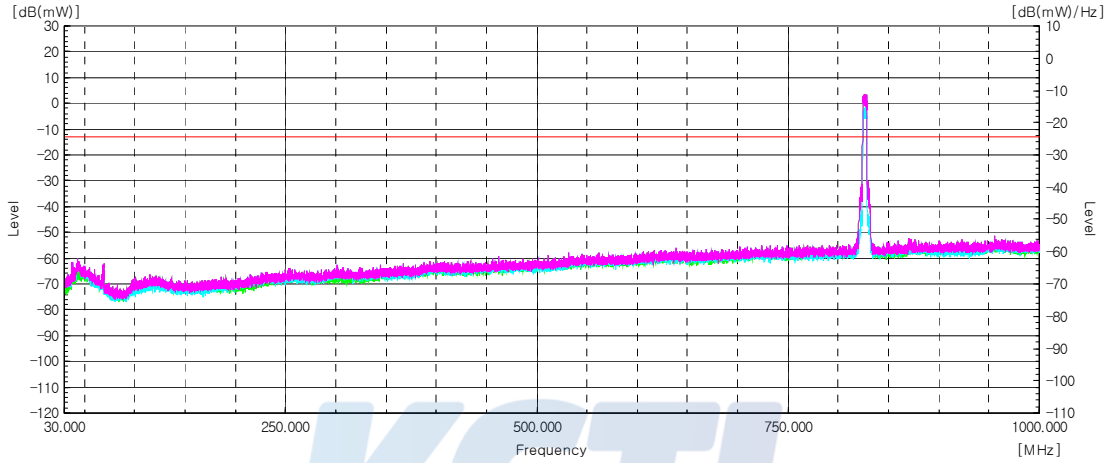
Notes:

1. On a test site, the EUT shall be placed at 80 cm height on a turn table, and in the position close To normal use as declared by the applicant.
2. The test antenna shall be oriented initially for vertical polarization located 3 m from EUT to Correspond to the fundamental frequency of the transmitter.
3. The turntable is rotated through 360°, and the receiving antenna scans in order to determine the Level of the maximized emission.
4. The test antenna shall be raised and lowered again through the specified range of height until the maximum signal level is detected by the measuring receiver.
5. The maximum signal level detected by the measuring receiver shall be noted.
6. The EUT was replaced by half-wave dipole (1 GHz below) or horn antenna (1 GHz above) connected to a signal generator.
7. The test antenna shall be raised and lowered through the specified range of height to ensure that The maximum signal is received.
8. The input signal to the substitution antenna shall be adjusted to the level that produces a level Detected by the measuring corrected for the change of input attenuator setting of the measuring Receiver.
9. The input level to the substitution antenna shall be recorded as power level in dBm, corrected for Any change of input attenuator setting of the measuring receiver.
10. The measurement shall be repeated with the test antenna and the substitution antenna Orientated for horizontal polarization.
11. This EUT was tested under all configurations and the highest power is reported in RMC mode

Test results (Below 1 000 ㎒)

Test mode	:	WCDMA 850
Frequency (㎒)	:	826.4
Channel	:	4132

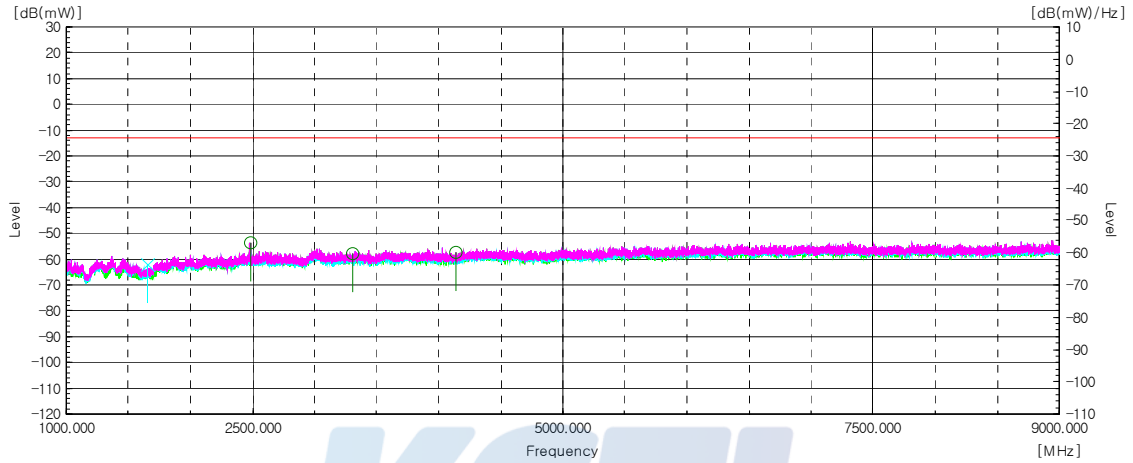
Horizontal/Vertical



Test results (Above 1 000 ㎒)

Test mode : WCDMA 850
Frequency (㎒) : 826.4
Channel : 4132

Horizontal/Vertical

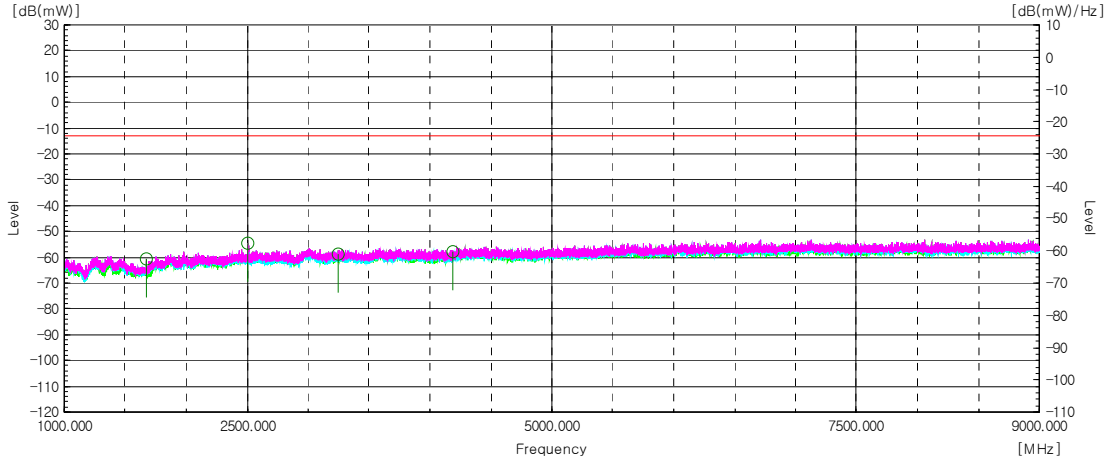


Mode	Frequency	Pol.	Antenna Gain	Cable loss	Substitute Level	Level	Limit	Margin
	[㎒]	[V/H]	[dBi]	[dB]	[dBm]	[dBm]	[dBm]	[dB]
RMC	1 655.04	V	6.41	5.36	-63.05	-62.00	-13.00	49.00
	2 481.59	H	6.00	6.64	-52.86	-53.50	-13.00	40.50
	3 308.14	H	7.38	7.67	-57.51	-57.80	-13.00	44.80
	4 135.70	H	8.74	8.60	-57.64	-57.50	-13.00	44.50

Note.
1. Limit Calculation(dBm)= 43 + 10log($P_{[Watts]}$)

Test mode : WCDMA 850
Frequency (㎒) : 836.6
Channel : 4183

Horizontal/Vertical

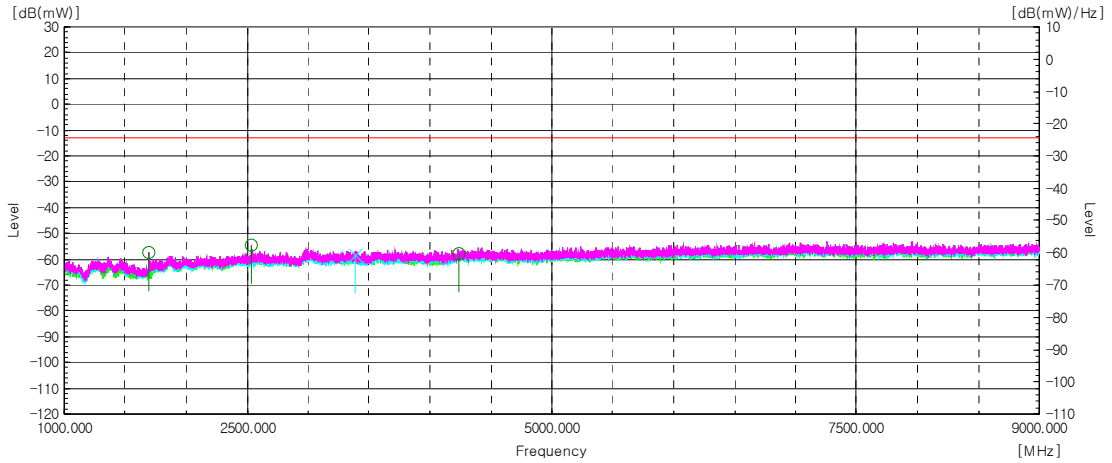


Mode	Frequency	Pol.	Antenna Gain	Cable loss	Substitute Level	Level	Limit	Margin
	[㎒]	[V/H]	[dBi]	[dB]	[dBm]	[dBm]	[dBm]	[dB]
RMC	1 671.04	H	6.39	5.39	-61.50	-60.50	-13.00	47.50
	2 506.59	H	6.01	6.63	-53.98	-54.60	-13.00	41.60
	3 247.14	H	7.24	7.60	-58.24	-58.60	-13.00	45.60
	4 183.70	H	8.78	8.65	-57.83	-57.70	-13.00	44.70

Note.
1. Limit Calculation(dBm)= 43 + 10log($P_{[Watts]}$)

Test mode : WCDMA 850
Frequency (㎒) : 846.6
Channel : 4233

Horizontal/Vertical



Mode	Frequency	Pol.	Antenna Gain	Cable loss	Substitute Level	Level	Limit	Margin
	[㎒]	[V/H]	[dBi]	[dB]	[dBm]	[dBm]	[dBm]	[dB]
RMC	1 691.04	H	6.37	5.43	-58.34	-57.40	-13.00	44.40
	2 536.10	H	6.05	6.72	-53.83	-54.50	-13.00	41.50
	3 386.65	V	7.55	7.77	-57.88	-58.10	-13.00	45.10
	4 234.20	H	8.83	8.69	-58.04	-57.90	-13.00	44.90

Note.
1. Limit Calculation(dBm)= 43 + 10log($P_{[Watts]}$)

7. Measurement equipment

Equipment Name	Manufacturer	Model No.	Serial No.	Next Cal. Date
Biconical VHF-UHF Broadband Antenna	SCHWARZBECK	VUBA9117	275	20.04.13
Bilog Antenna	Teseq GmbH	CBL 6143A	35039	21.05.21
Horn Antenna	ETS.lindgren	3117	161225	20.05.22
High pass Filter	Wainwright Instruments GmbH	WHKX1.0/1.5S-10SS	14	20.01.25
Attenuator	Weinschel ENGINEERING	10	AJ1239	20.05.14
Amplifier	SONOMA INSTRUMENT	310N	186402	20.01.04
Amplifier	L-3 Narda-MITEQ	AMF-7D-01001800-22-10P	2031196	20.02.21
Spectrum Analyzer	AGILENT	N9040B	MY57010132	20.07.31
Signal Generator	R&S	SMB100A	176206	20.01.25
Widebnad Radio Communication Tester	R & S	CMW500	141780	20.04.18
Antenna Mast	MATURO	EAS 1.5	042/8941211	N/A
Antenna Mast	MATURO	EAS 1.5	043/8941211	N/A
Turn Table	MATURO	TT 0.8 PF	041/8941211	N/A

End of test report

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