



TEST REPORT

<p>KCTL KCTL Inc. 65, Sinwon-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16677, Korea TEL: 82-31-285-0894 FAX: 82-505-299-8311 www.kctl.co.kr</p>	<p>Report No.: KR20-SRF0310-A Page (1) of (15)</p>	
---	---	--

1. Client

- Name : Samsung Electronics Co., Ltd.
- Address : 129, Samsung-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16677, Rep. of Korea
- Date of Receipt : 2020-10-08

2. Use of Report : Class II Permissive change

3. Name of Product / Model : Smart Wearable / SM-R835U

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

5. FCC ID : A3LSMR835

6. IC Certificate No. : 649E-SMR835

7. Date of Test : 2020-10-21 to 2020-11-23

8. Location of Test : ☒ Permanent Testing Lab ☐ On Site Testing (Address: Address of testing location)

9. Test method used : FCC Part 2 / RSS-Gen Issue 5
 FCC Part 22 Subpart H / RSS-132 Issue 3
 FCC Part 24 Subpart E / RSS-133 Issue 6
 FCC Part 27 Subpart L / RSS-139 Issue 3

10. Test Result : Refer to the test result in the test report

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

2020-12-07

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
2020-11-25	Originally issued	-
2020-12-07	Updated	6

This report shall not be reproduced except in full, without the written approval of KCTL Inc. This document may be altered or revised by KCTL Inc. personnel only, and shall be noted in the revision section of the document. Any alteration of this document not carried out by KCTL Inc. will constitute fraud and shall nullify the document. This test report is a general report that does not use the KOLAS accreditation mark and is not related to KS Q ISO/IEC 17025 and KOLAS accreditation.

Note. The report No. KR20-SRF0310 is superseded by the report No. KR20-SRF0310-A.

General remarks for test reports

Nothing significant to report.

CONTENTS

1.	General information	4
2.	Device information	4
2.1.	Accessory information	5
2.2.	Information about derivative model.....	5
2.3.	Frequency/channel operations.....	5
3.	Summary of tests	6
4.	Measurement uncertainty	7
5.	Test results	8
5.1.	Radiated Power (ERP/EIRP)	8
5.2.	Radiated Spurious Emissions	12
6.	Measurement equipment	15

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 Vietnam Co., Ltd.
 Address : Yenphong1-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-3327, G-198, C-3706, T-1849
 Industry Canada Registration No. : 8035A
 KOLAS No.: KT231

2. Device information

Equipment under test : Smart Wearable
 Model : SM-R835U
 Derivative model : SM-R835F
 Frequency range : Bluetooth(BDR/EDR/BLE)_2 402 MHz ~ 2 480 MHz
 WIFI(802.11b/g/n20)_2 412 MHz ~ 2 472 MHz
 LTE Band 12_699.7 MHz ~ 715.3 MHz
 LTE Band 13_779.5 MHz ~ 784.5 MHz
 LTE Band 5_824.7 MHz ~ 848.3 MHz
 LTE Band 26_824.7 MHz ~ 848.3 MHz, 814.7 MHz ~ 823.3 MHz
 LTE Band 4_1 710.7 MHz ~ 1 754.3 MHz
 LTE Band 66_1 710.7 MHz ~ 1 779.3 MHz
 LTE Band 2_1 850.7 MHz ~ 1 909.3 MHz
 LTE Band 25_1 850.7 MHz ~ 1 914.3 MHz
 WCDMA 850_826.4 MHz ~ 846.6 MHz
 WCDMA 1700_1 712.4 MHz ~ 1 752.6 MHz
 WCDMA 1900_1 852.4 MHz ~ 1 907.6 MHz
 Modulation technique : Bluetooth(BDR/EDR)_ GFSK, $\pi/4$ DQPSK, 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 : WIFI/Bluetooth(BDR/EDR/BLE)_LDS Antenna
 LTE/WCDMA_PIFA (Housing metal) Antenna
 Antenna gain : WIFI/Bluetooth(BDR/EDR/BLE) : -6.4 dBi
 Software version : R835U.001
 Hardware version : REV1.0
 Test device serial No. : Conducted(R3AM8001MVZ)
 Radiated(R3AM8002B0R)
 Operation temperature : -30 °C ~ 50 °C

2.1. Accessory information

Equipment	Manufacturer	Model	Serial No.	Power source	FCC ID & IC
Wireless charger	Samsung Electronics Co., Ltd.	EP-OR825	-	DC 5.0 V, 1.0 A	A3LEPOR825 / 649E-EPOR825

2.2. Information about derivative model

The difference between basic model and derivative models is:

Hardware is identical with the basic model and software is as follows.

a. For the model SM-R835U:

- 3G(B2,B4,B5), 4G(B2,B4,B5,B12,B13,B25,B26,B66) are enabled by software.

b. For the model SM-R835F:

- 3G(B2,B4), 4G(B2,B4,B12,B13,B25,B26,B66) are disabled by software.
- 3G(B1,B8), 4G(B1,B3,B7,B8,B20) are enabled by software.

c. In USA, 4G(B7) disabled by MCC code. Because device doesn't support B7 roaming in USA.

d. All other protocol part is same and all other features of Volte, SUPL is same.

2.3. Frequency/channel operations

This device contains the following capabilities:

Bluetooth(BDR/EDR/BLE), WIFI(802.11b/g/n20),

LTE Band 12, LTE Band 13, LTE Band 5, LTE Band 26, LTE Band 4, LTE Band 66, LTE Band 2
 LTE Band 25, WCDMA 850, WCDMA 1700, WCDMA 1900

WCDMA 850	
Ch.	Frequency (MHz)
4132	826.4
4183	836.6
4233	846.6

Table 2.3.1.
RMC/HSDPA/HSUPA/HSPA+

WCDMA 1700	
Ch.	Frequency (MHz)
1312	1 712.4
1412	1 732.4
1513	1 752.6

Table 2.3.2.
RMC/HSDPA/HSUPA/HSPA+

WCDMA 1900	
Ch.	Frequency (MHz)
9262	1 852.4
9400	1 880.0
9538	1 907.6

Table 2.3.3.
RMC/HSDPA/HSUPA/HSPA+

3. Summary of tests

FCC Part Section(s)	RSS Section(s)	Parameter	Test results
22.913(a)(5) 24.232(c) 27.50(d)(4)	RSS-132(5.4) RSS-133(6.4) RSS-139(6.5)	Effective Radiated Power & Equivalent Isotropic Radiated Power	Pass
2.1053 22.917(a) 24.238(a) 27.53(h)	RSS-132(5.5) RSS-133(6.5) RSS-139(6.6)	Radiated Spurious Emissions	Pass

Notes:

1. All modes of operation were investigated and the worst case emissions are reported with the EUT positioning, modulations and paging service configurations in the test data.
2. All the radiated tests have been performed two modes (with charger and without charger).
3. For WCDMA Band 5, the fundamental of the EUT was investigated in three orthogonal orientations X, Y and Z. It was determined that **X** orientation was worst-case orientation. Therefore, all final radiated testing was performed with the EUT in **X** orientation.
For ERP/EIRP tests, this band was performed with charger for evaluation of worst case mode.
4. For WCDMA Band 4, Band 2, the fundamental of the EUT was investigated in three orthogonal orientations X, Y and Z. It was determined that **Z** orientation was worst-case orientation. Therefore, all final radiated testing was performed with the EUT in **Z** orientation.
For ERP/EIRP tests, these bands were performed without charger for evaluation of worst case mode.
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 mode and channel set for this C2PC filing test was based on the worst case condition raised in original report, KR19-SRF0096-A.
7. The maximum production power and tolerance are not impacted by the change stated in the C2PC letter.

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 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.

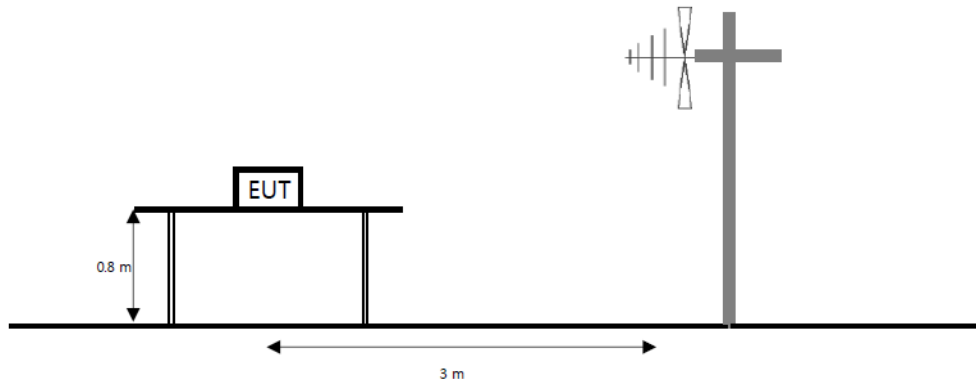
Parameter	Expanded uncertainty (\pm)	
Radiated spurious emissions	9 kHz ~ 30 MHz	2.28 dB
	30 MHz ~ 1 GHz	3.68 dB
	Above 1 GHz	5.72 dB

5. Test results

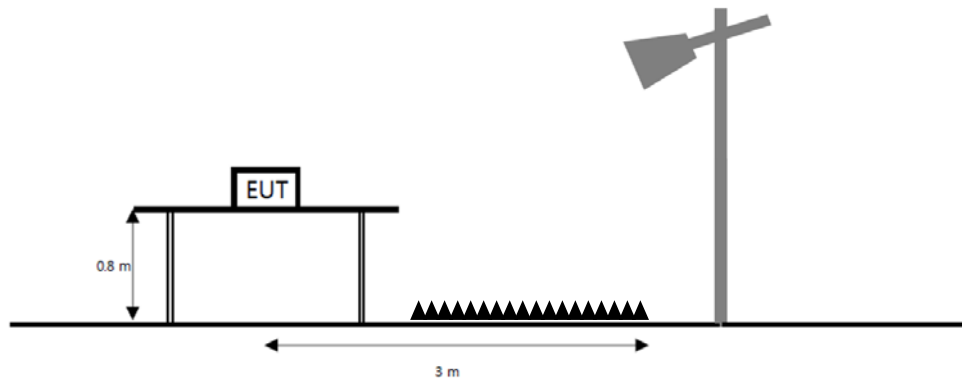
5.1. Radiated Power (ERP/EIRP)

Test setup

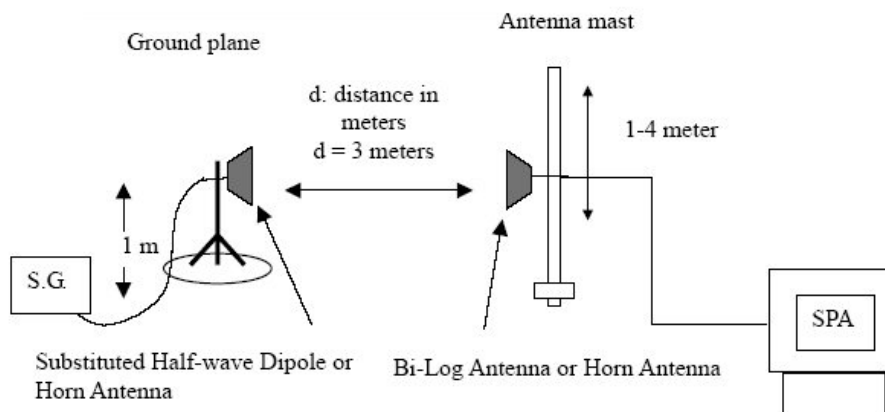
The diagram below shows the test setup that is utilized to make the measurements for emission from 30 MHz to 1 GHz emissions.



The diagram below shows the test setup that is utilized to make the measurements for emission from 1 GHz to the tenth harmonic of the highest fundamental frequency or to 40 GHz 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. And according to RSS-132(5.4), the equivalent isotropically radiated power (e.i.r.p) for mobile equipment shall not exceed 11.5 watts. Refer to SRSP-503 for base stations e.i.r.p limits.

According to §24.232(c) and RSS-133(6.4), mobile and portable stations are limited to 2 watts EIRP and the equipment must employ a means for limiting power to the minimum necessary for successful communications.

According to §27.50(d)(4) and RSS-139(6.5), fixed, mobile, and portable (hand-held) stations operating in the 1710~1755 MHz band and mobile and portable stations operating in the 1695~1710 MHz and 1755~1780 MHz bands are 1 watt EIRP.

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 $\geq 3 \times$ RBW.
- 3) SPAN = 2 \times to 3 \times the OBW.
- 4) Number of measurement points in sweep $\geq 2 \times$ span / RBW.
- 5) Sweep time :
 - 1) Auto couple, or
 - 2) $\geq [10 \times (\text{number of points in sweep}) \times (\text{transmission period})]$ 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.

<p>KCTL KCTL Inc. 65, Sinwon-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16677, Korea TEL: 82-31-285-0894 FAX: 82-505-299-8311 www.kctl.co.kr</p>	<p>Report No.: KR20-SRF0310-A Page (10) of (15)</p>	
---	---	---

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;

$$Pd(\text{dBm}) = Pg(\text{dBm}) - \text{Cable loss (dB)} + \text{Antenna gain (dB)}$$
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		EIRP <small>Note.1</small>	
		[MHz]	[V/H]	[dBi]	[dB]	[dB m]	[dB m]	[W]	[dB m]	[W]
RMC	4132	826.40	V	0.70	3.76	9.74	6.68	0.005	8.83	0.008

Test mode: WCDMA 1700

Mode	Channel	Frequency	Pol.	Antenna Gain	C.L	Substitute Level	EIRP	
		[MHz]	[V/H]	[dBi]	[dB]	[dB m]	[dB m]	[W]
RMC	1312	1 712.4	V	5.79	5.36	13.90	14.33	0.027

Test mode: WCDMA 1900

Mode	Channel	Frequency	Pol.	Antenna Gain	C.L	Substitute Level	EIRP	
		[MHz]	[V/H]	[dBi]	[dB]	[dB m]	[dB m]	[W]
RMC	9262	1 852.4	V	5.45	5.62	15.16	14.99	0.032

Note.

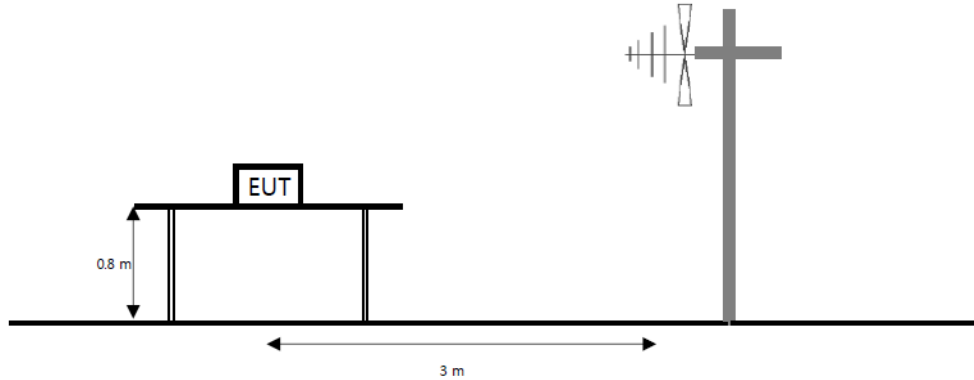
- The E.I.R.P conversion formula for IC :

$$\text{E.I.R.P result(dBm)} = \text{E.R.P result (dBm)} + 2.15 \text{ (dB)}$$
- $$\text{E.R.P \& E.I.R.P(dBm)} = \text{Substitute Level(dB)} + \text{Antenna gain(dBi)} - \text{C.L(Cable loss) (dB)}$$

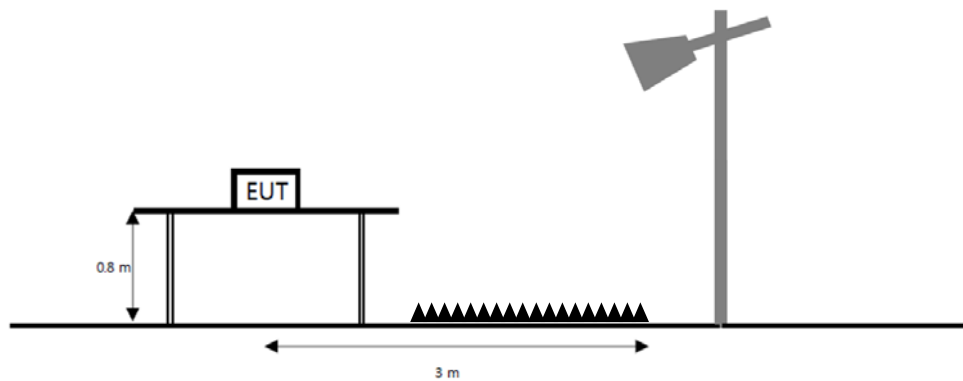
5.2. Radiated Spurious Emissions

Test setup

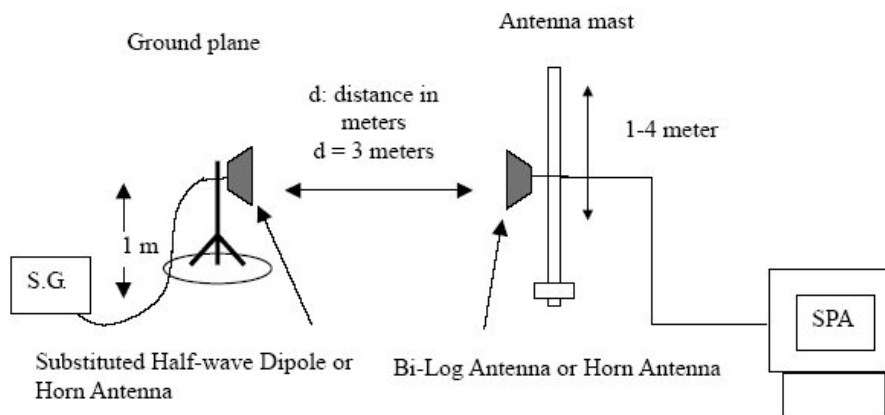
The diagram below shows the test setup that is utilized to make the measurements for emission from 30 MHz to 1 GHz emissions.



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



The diagram below shows the test setup for substituted method.



Limit

According to §22.917(a), §24.238(a) and RSS-132(5.5), RSS-133(6.5), 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 $43 + 10\log(P)$ dB.

According to §27.53(h) and RSS-139(6.6), the power of any emission outside a licensee's frequency block shall be attenuated below the transmitter power (P) in watts by at least $43 + 10\log(P_{\text{[Watts]}})$ 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 $\geq 3 \times$ RBW.
- 3) Detector = RMS
- 4) Trace mode = Max hold
- 5) Sweep time = Auto couple
- 6) Number of sweep points $\geq 2 \times$ 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 (Above 1 000 MHz)

Test mode : WCDMA 850

Frequency(MHz) : 826.4

Channel : 4132

Mode	Frequency	Pol.	Antenna Gain	Cable loss	Substitute Level	Level	Limit	Margin
	[MHz]	[V/H]	[dBi]	[dB]	[dBm]	[dBm]	[dBm]	[dB]
RMC	2 476.00	H	6.15	6.50	-56.35	-56.70	-13.00	43.70

Test mode : WCDMA 1700

Frequency(MHz) : 1 752.6

Channel : 1513

Mode	Frequency	Pol.	Antenna Gain	Cable loss	Substitute Level	Level	Limit	Margin
	[MHz]	[V/H]	[dBi]	[dB]	[dBm]	[dBm]	[dBm]	[dB]
RMC	5 258.49	H	10.31	11.18	-50.33	-51.20	-13.00	38.20

Test mode : WCDMA 1900

Frequency(MHz) : 1 907.6

Channel : 9538

Mode	Frequency	Pol.	Antenna Gain	Cable loss	Substitute Level	Level	Limit	Margin
	[MHz]	[V/H]	[dBi]	[dB]	[dBm]	[dBm]	[dBm]	[dB]
RMC	5 725.91	V	10.55	12.23	-41.32	-43.00	-13.00	30.00

Note.

1. ERP & E.I.R.P(dB m)= Substitute Level(dB) + Antenna gain(dBi) – Cable Loss(dB)

6. Measurement equipment

Equipment Name	Manufacturer	Model No.	Serial No.	Next Cal. Date
Biconical VHF-UHF Broadband Antenna	SCHWARZBECK	VUBA9117	275	22.04.09
Bilog Antenna	Teseq GmbH	CBL 6143A	35039	21.05.21
Horn Antenna	ETS.lindgren	3117	00227509	21.09.23
Horn Antenna	ETS.lindgren	3117	161225	21.05.12
Horn Antenna	ETS.lindgren	3116	00086632	21.02.17
Horn Antenna	ETS.lindgren	3116	00086635	21.05.12
High pass Filter	Wainwright Instruments GmbH	WHKX3.0/18G-12SS	44	21.01.21
High pass Filter	Wainwright Instruments GmbH	WHKX10-900-1000-15000-40SS	11	21.08.20
Attenuator	Weinschel ENGINEERING	10	AJ1239	21.05.15
Broadband Amplifier	SONOMA INSTRUMENT	310N	185799	21.01.21
Amplifier	L-3 Narda-MITEQ	AFS5-00101800-25-S-5	2054570	21.05.22
Amplifier	L-3 Narda-MITEQ	JS44-18004000-33-8P	2000996	21.01.22
Spectrum Analyzer	AGILENT	N9040B	MY57010132	21.07.29
Signal Generator	R&S	SMB100A	176206	21.01.21
Wideband Radio Communication Tester	R&S	CMW500	141780	21.04.16
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
Cable Assembly	Radiall	R286303620	1649.241	N/A
Cable Assembly	Radiall	TESTPRO 3	N/A	N/A

End of test report