



# TEST REPORT

<p style="text-align: center;"><b>KCTL KCTL Inc.</b>          65, Sinwon-ro, Yeongtong-gu,          Suwon-si, Gyeonggi-do, 16677, Korea          TEL: 82-31-285-0894 FAX: 82-505-299-8311  <a href="http://www.kctl.co.kr">www.kctl.co.kr</a></p>	<p>Report No.:  <b>KR20-SRF0200-A</b>          Page (1) of (17)</p>				
<p><b>1. Client</b></p> <p>◦ Name : Samsung Electronics Co., Ltd.</p> <p>◦ Address : 129, Samsung-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16677, Rep. of Korea</p> <p>◦ Date of Receipt : 2020-08-11</p> <p><b>2. Use of Report</b> : Class II Permissive change</p> <p><b>3. Name of Product / Model</b> : Mobile phone / SM-A013M</p> <p><b>4. Manufacturer / Country of Origin</b> : Samsung Electronics Co., Ltd. / Vietnam</p> <p><b>5. FCC ID</b> : A3LSMA013M</p> <p><b>6. Date of Test</b> : 2020-08-11</p> <p><b>7. Location of Test</b> : <input checked="" type="checkbox"/> Permanent Testing Lab <input type="checkbox"/> On Site Testing (Address: Address of testing location)</p> <p><b>8. Test method used</b> : FCC Part 2          FCC Part 22 subpart H          FCC Part 24 subpart E          FCC Part 27 subpart C</p> <p><b>9. Test Results</b> : Refer to the test result in the test report</p> <table border="1" style="width: 100%; border-collapse: collapse; margin-top: 10px;"> <tr> <td style="width: 15%; text-align: center; vertical-align: middle;">Affirmation</td> <td style="width: 40%; padding: 5px;">         Tested by            Name : Kwonse Kim (Signature)  </td> <td style="width: 45%; padding: 5px;">         Technical Manager            Name : Seungyong Kim (Signature)  </td> </tr> </table> <p style="text-align: right; margin-top: 20px;">2020-08-14</p> <p style="text-align: center; margin-top: 20px;"><b>KCTL Inc.</b></p> <p style="font-size: small; margin-top: 20px;">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.</p>			Affirmation	Tested by  Name : Kwonse Kim (Signature)	Technical Manager  Name : Seungyong Kim (Signature)
Affirmation	Tested by  Name : Kwonse Kim (Signature)	Technical Manager  Name : Seungyong Kim (Signature)			

## REPORT REVISION HISTORY

Date	Revision	Page No
2020-08-13	Originally issued	-
2020-08-14	Updated	8

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Note. The report No. KR20-SRF0200 is superseded by the report No. KR20-SRF0200-A.

## General remarks for test reports

Nothing significant to 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 Vietnam Co. Ltd.  
 Address : KCN Yen Binh I, Pho Yen, Thai Nguyen, VIETNAM  
 Laboratory : KCTL Inc.  
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 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 : Mobile phone  
 Model : SM-A013M  
 Modulation technique : Bluetooth(BDR/EDR)\_GFSK,  $\pi/4$ DQPSK, 8DPSK  
 Bluetooth(BLE)\_GFSK  
 WIFI(802.11b/g/n20)\_DSSS, OFDM  
 LTE\_QPSK, 16QAM, 64QAM  
 WCDMA\_QPSK  
 GSM\_GMSK, 8-PSK  
 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\_LDS Antenna  
 WIFI/Bluetooth(BDR/EDR/BLE)\_FPC Antenna  
 Antenna gain : WIFI/Bluetooth(BDR/EDR/BLE) : -5.46 dBi

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 2\_1 850.7 MHz ~ 1 909.3 MHz  
 LTE Band 4\_1 710.7 MHz ~ 1 754.3 MHz  
 LTE Band 5\_824.7 MHz ~ 848.3 MHz  
 LTE Band 66\_1 710.7 MHz ~ 1 779.3 MHz  
 GSM 850\_824.2 MHz ~ 848.8 MHz  
 GSM 1900\_1 850.2 MHz ~ 1 909.8 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

Software version : A013M.001

Hardware version : REV1.0

Test device serial No. : Radiated(R38N601729P)

Operation temperature : -30 °C ~ 50 °C

## 2.1. Accessory information

Equipment	Manufacturer	Model	Serial No.	Power source
Travel Adapter	HAEM	EP-TA60JBS	R37N4EP0012HM3	Input : 100-240V ~ 50-60 Hz, 0.15A(0,15A) Output : 5V, 700mA
Earphone	CRESYN	EHS61ASFWE	-	-

## 2.2. Frequency/channel operations

This device contains the following capabilities:

2.4GHz WIFI(802.11b/g/n(HT20)), Bluetooth(BDR/EDR/BLE), LTE Band 2, LTE Band 4, LTE Band 5,  
LTE Band 66, WCDMA 850, WCDMA 1700, WCDMA 1900, GSM 850, GSM 1900

### LTE Band 2

Ch.	Frequency (MHz)
18607	1 850.7
18900	1 880.0
19193	1 909.3

Table 2.2.1. 1.4M BW

Ch.	Frequency (MHz)
18615	1 851.5
18900	1 880.0
19185	1 908.5

Table 2.2.2. 3M BW

Ch.	Frequency (MHz)
18625	1 852.5
18900	1 880.0
19175	1 907.5

Table 2.2.3. 5M BW

Ch.	Frequency (MHz)
18650	1 855.0
18900	1 880.0
19150	1 905.0

Table 2.2.4. 10M BW

Ch.	Frequency (MHz)
18675	1 857.5
18900	1 880.0
19125	1 902.5

Table 2.2.5. 15M BW

Ch.	Frequency (MHz)
18700	1 860.0
18900	1 880.0
19100	1 900.0

Table 2.2.6. 20M BW

### LTE Band 4

Ch.	Frequency (MHz)
19957	1 710.7
20175	1 732.5
20393	1 754.3

Table 2.2.7. 1.4M BW

Ch.	Frequency (MHz)
19965	1 711.5
20175	1 732.5
20385	1 753.5

Table 2.2.8. 3M BW

Ch.	Frequency (MHz)
19975	1 712.5
20175	1 732.5
20375	1 752.5

Table 2.2.9. 5M BW

Ch.	Frequency (MHz)
20000	1 715.0
20175	1 732.5
20350	1 750.0

Table 2.2.10. 10M BW

Ch.	Frequency (MHz)
20025	1 717.5
20175	1 732.5
20325	1 747.5

Table 2.2.11. 15M BW

Ch.	Frequency (MHz)
20050	1 720.0
20175	1 732.5
20300	1 745.0

Table 2.2.12. 20M BW

### LTE Band 5

Ch.	Frequency (MHz)
20407	824.7
20525	836.5
20643	848.3

Table 2.2.13. 1.4M BW

Ch.	Frequency (MHz)
20415	825.5
20525	836.5
20635	847.5

Table 2.2.14. 3M BW

Ch.	Frequency (MHz)
20425	826.5
20525	836.5
20625	846.5

Table 2.2.15. 5M BW

Ch.	Frequency (MHz)
20450	829.0
20525	836.5
20600	844.0

Table 2.2.16. 10M BW

**LTE Band 66**

Ch.	Frequency (MHz)
131979	1 710.7
132322	1 745.0
132665	1 779.3

Table 2.2.17. 1.4M BW

Ch.	Frequency (MHz)
131987	1 711.5
132322	1 745.0
132657	1 778.5

Table 2.2.18. 3M BW

Ch.	Frequency (MHz)
131997	1 712.5
132322	1 745.0
132647	1 777.5

Table 2.2.19. 5M BW

Ch.	Frequency (MHz)
132022	1 715.0
132322	1 745.0
132622	1 775.0

Table 2.2.20. 10M BW

Ch.	Frequency (MHz)
132047	1 717.5
132322	1 745.0
132597	1 772.5

Table 2.2.21. 15M BW

Ch.	Frequency (MHz)
132072	1 720.0
132322	1 745.0
132572	1 770.0

Table 2.2.22. 20M BW

**Notes:**

1. LTE Band 66(1 710 - 1 780 MHz) overlaps the entire frequency range of LTE Band 4(1 710 - 1 755 MHz) and they have same maximum tune-up power. Therefore, test data provided in this report covers Band 4 as well as Band 66 subpart to Part27.

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### 3. Summary of tests

FCC Part section(s)	Parameter	Test Limit	Test Condition	Test results
22.913(a)(5)	Effective Radiated Power	< 7 Watts max. ERP	Radiated	Pass
24.232(c)	Equivalent Isotropic Radiated Power	< 2 Watts max. EIRP		Pass
27.50(d)(4)		< 1 Watts max. EIRP		Pass
2.1053 22.917(a) 24.238(a) 27.53(h)	Radiated Spurious Emissions	<43 + 10Log <sub>10</sub> (P) dB for all out of band emissions		Pass

#### Notes:

- 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
- This is the C2PC test report to add a variant model, SM-A013M as documented in the C2PC letter. Because the change does not affect RF characteristics, therefore, only radiated spurious emission test was done against the worst case from the main model, SM-A013M/DS, documented in the original filing and approved in 07/10/2020. All rest tests documented in original filing under model SM-A013M/DS remains representative of the variant model, SM-A013M.

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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 or exceeds the  $U_{\text{CISPR}}$  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	30 MHz ~ 1 GHz	3.7 dB
	Above 1 GHz	5.7 dB

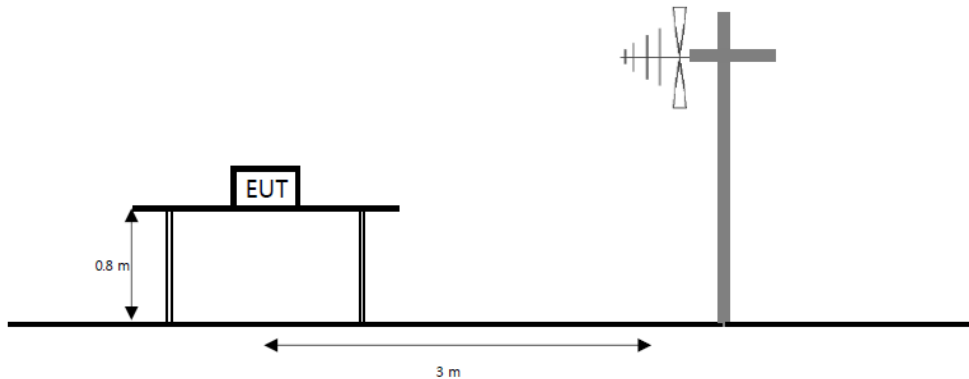
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## 5. Test results

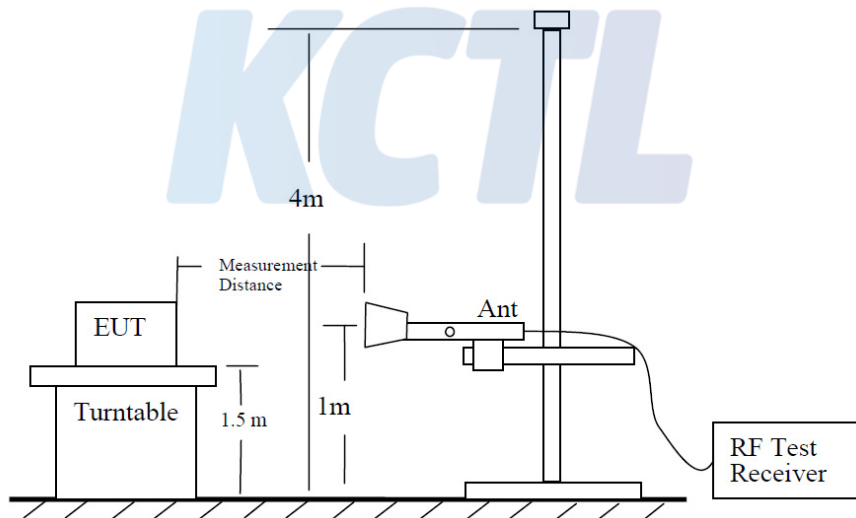
### 5.1. Radiated Power (ERP/EIRP)

#### Test setup

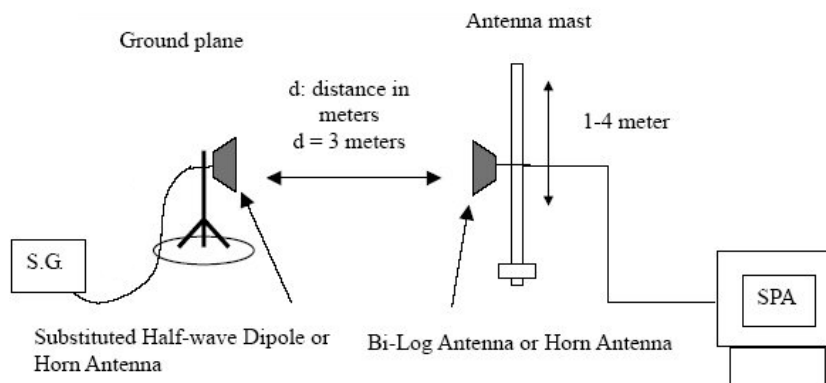
The diagram below shows the test setup that is utilized to make the measurements for emission from 30 MHz to 1 GHz emissions.



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.

According to §24.232(c), 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), Fixed, mobile and portable (hand-held) stations operating in the 1710-1755 MHz and 1755-1780 MHz bands are limited to 1 watt EIRP.

### **Test procedure**

971168 D01 v03r01 - Section 5.2 and 5.8, 412172 D01 v01r01

ANSI 63.26-2015 – Section 5.2

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.

**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: LTE Band 2

Bandwidth	Modulation	Frequency	Pol.	Antenna Gain	C.L	Substitute Level	EIRP	
		[MHz]	[V/H]	[dBi]	[dB]	[dBm]	[dBm]	[W]
5 M	QPSK	1907.5	H	5.38	5.76	20.25	19.87	0.097

### Test mode: LTE Band 5

Bandwidth	Modulation	Frequency	Pol.	Antenna Gain	C.L	Substitute Level	ERP	
		[MHz]	[V/H]	[dBi]	[dB]	[dBm]	[dBm]	[W]
3 M	QPSK	825.5	H	-0.20	3.70	24.38	20.48	0.112

### Test mode: LTE Band 66/4

Bandwidth	Modulation	Frequency	Pol.	Antenna Gain	C.L	Substitute Level	EIRP	
		[MHz]	[V/H]	[dBi]	[dB]	[dBm]	[dBm]	[W]
3 M	QPSK	1745.0	H	5.87	5.39	21.55	22.02	0.159

Note.

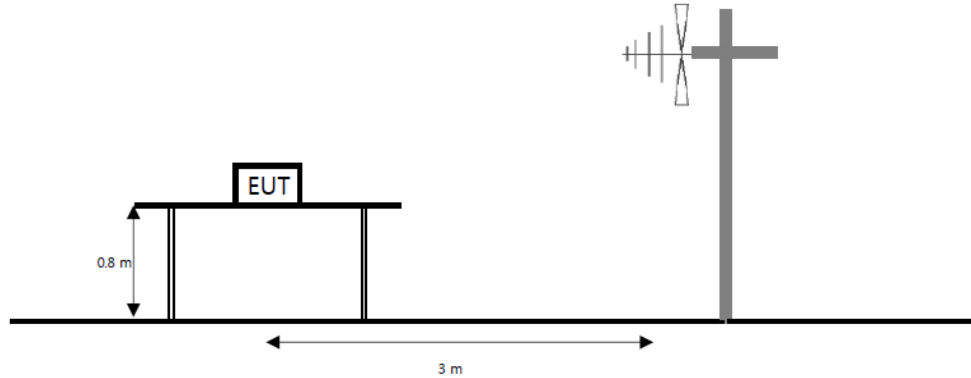
1. E.R.P & E.I.R.P(dBm) = Substitute Level(dB) + Antenna gain(dBi) - C.L(Cable loss) (dB)

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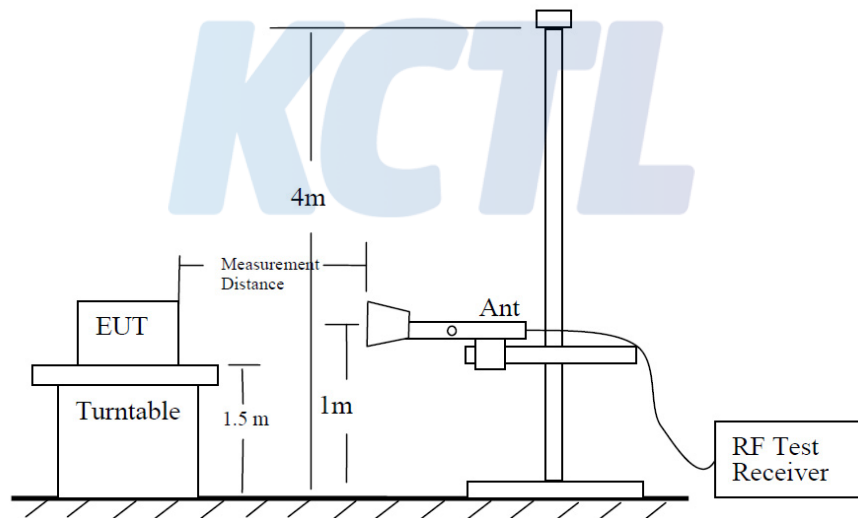
## 5.2. Radiated Spurious Emissions

### Test setup

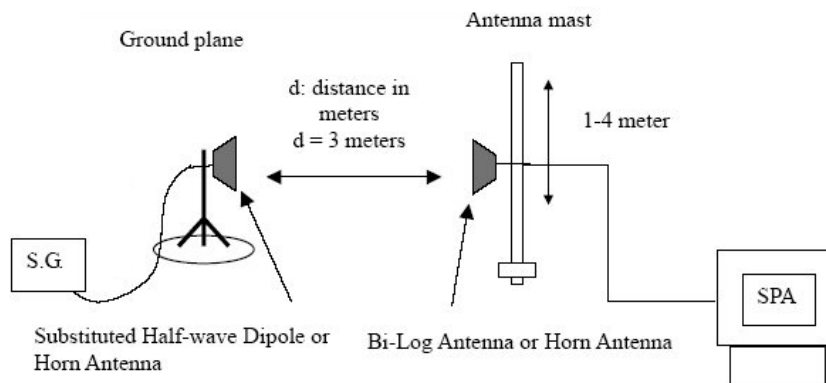
The diagram below shows the test setup that is utilized to make the measurements for emission from 30 MHz to 1 GHz emissions.



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), 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  $43 + 10\log(P_{\text{[Watts]}})$  dB.

According to §27.53(h), 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 6.2

ANSI 63.26-2015 – Section 5.5

ANSI/TIA-603-E-2016 - Section 2.2.12

### **Test settings**

- 1) RBW = 100 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.

### Test results (Above 1 000 MHz)

Test mode : LTE Band 2

Frequency(MHz) : 1 907.5

Channel : 19175

Bandwidth(MHz) : 5

Mode	Frequency	Pol.	Antenna Gain	Cable loss	Substitute Level	Level	Limit	Margin
	[MHz]	[V/H]	[dBi]	[dB]	[dBm]	[dBm]	[dBm]	[dB]
QPSK	3 815.43	H	8.53	8.38	-50.75	-50.60	-13.00	37.60
	5 722.91	H	10.54	10.36	-43.88	-43.70	-13.00	30.70
	7 630.39	H	12.23	11.88	-56.25	-55.90	-13.00	42.90
	9 537.26	H	13.19	13.08	-54.11	-54.00	-13.00	41.00

Test mode : LTE Band 5

Frequency(MHz) : 825.5

Channel : 20415

Bandwidth(MHz) : 3

Mode	Frequency	Pol.	Antenna Gain	Cable loss	Substitute Level	Level	Limit	Margin
	[MHz]	[V/H]	[dBi]	[dB]	[dBm]	[dBm]	[dBm]	[dB]
QPSK	1 648.67	V	6.15	5.36	-60.39	-59.60	-13.00	46.60
	2 472.70	H	5.38	6.50	-56.28	-57.40	-13.00	44.40
	3 296.41	V	8.16	7.62	-58.64	-58.10	-13.00	45.10
	4 120.13	H	8.50	8.68	-58.12	-58.30	-13.00	45.30

Test mode : LTE Band 66/4

Frequency(MHz) : 1 745.0

Channel : 132322

Bandwidth(MHz) : 3

Mode	Frequency	Pol.	Antenna Gain	Cable loss	Substitute Level	Level	Limit	Margin
	[MHz]	[V/H]	[dBi]	[dB]	[dBm]	[dBm]	[dBm]	[dB]
QPSK	3 493.82	H	8.39	7.90	-59.89	-59.40	-13.00	46.40
	5 239.29	H	10.34	9.97	-59.37	-59.00	-13.00	46.00
	6 986.56	H	11.29	11.50	-55.89	-56.10	-13.00	43.10
	8 732.63	H	13.15	12.63	-54.52	-54.00	-13.00	41.00



## 6. Measurement equipment

Equipment Name	Manufacturer	Model No.	Serial No.	Next Cal. Date
Spectrum Analyzer	R&S	FSV30	100807	21.07.29
Spectrum Analyzer	AGILENT	N9040B	MY57010132	21.07.29
Vector Signal Generator	R&S	SMBV100A	257566	21.07.13
Signal Generator	R&S	SMR40	100007	21.04.08
Signal Generator	R&S	SMB100A	176206	21.01.21
Wideband Radio Communication Tester	R&S	CMW500	141780	21.04.16
Wideband Radio Communication Tester	R&S	CMW500	132423	21.03.12
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	20.09.25
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	WHKX1.0/1.5S-10SS	14	21.01.21
Attenuator	Weinschel ENGINEERING	10	AJ1239	21.05.15
Amplifier	SONOMA INSTRUMENT	310N	186280	21.01.21
Amplifier	L-3 Narda-MITEQ	AMF-7D-01001800-22-10P	2031196	21.02.12
Amplifier	L-3 Narda-MITEQ	JS44-18004000-33-8P	2000997	21.07.29
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**