TEST REPORT

Eurofins KCTL Co.,Ltd. 65, Sinwon-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16677, Korea TEL: 82-70-5008-1021 FAX: 82-505-299-8311 www.kctl.co.kr	Report No.: KR23-SRF0264 Page (1) of (61)	eurofins | KCTL

1. Client

◦ Name : Samsung Electronics Co., Ltd.

◦ Address : 129, Samsung-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16677, Rep. of Korea

◦ Date of Receipt : 2023-09-05

2. Use of Report : Certification

3. Name of Product / Model : Tablet PC / SM-X308U

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

5. FCC ID : A3LSMX308U

6. Date of Test : 2023-09-20 to 2023-11-22

7. Location of Test : ■ Permanent Testing Lab ☐ On Site Testing

(Address:65, Sinwon-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16677, Korea)

8. Test method used : FCC Part 2

FCC Part 96

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

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

2023-11-24

Eurofins KCTL Co.,Ltd.

REPORT REVISION HISTORY

Date	Revision	Page No
2023-11-24	Originally issued	-

General remarks for test reports

Statement concerning the uncertainty of the measurement systems used for the tests

(may be required by the product standard or client)

☐ **Internal procedure used for type testing through which traceability of the measuring uncertainty has been established:**

Procedure number, issue date and title:

Calculations leading to the reported values are on file with the testing laboratory that conducted the testing.

☒ **Statement not required by the standard or client used for type testing**

CONTENTS

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 Thai Nguyen Co., Ltd
Address	:	Yen Binh Industrial Park, Dong Tien Ward, Pho Yen Town, Thai Nguyen Province, Vietnam
Laboratory	:	Eurofins KCTL Co.,Ltd.
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
		CAB Identifier: KR0040
		ISED Number: 8035A
		KOLAS No.: KT231

2. Device information

Equipment under test	:	Tablet PC		
Model	:	SM-X308U		
Modulation technique	:	QPSK, 16QAM, 64QAM, 256QAM		
Power source	:	DC 3.85 V		
Antenna specification	:	Main Antenna 2	:	LDS Antenna
Frequency range	:	LTE ULCA 48C	:	3 553.3 ㎒ ~ 3 690.0 ㎒ (BW: 5 ㎒ + 20 ㎒)
				3 560.0 ㎒ ~ 3 696.7 ㎒ (BW: 20 ㎒ + 5 ㎒)
				3 555.5 ㎒ ~ 3 690.0 ㎒ (BW: 10 ㎒ + 20 ㎒)
				3 560.0 ㎒ ~ 3 694.5 ㎒ (BW: 20 ㎒ + 10 ㎒)
				3 557.8 ㎒ ~ 3 690.0 ㎒ (BW: 15 ㎒ + 20 ㎒)
				3 560.0 ㎒ ~ 3 692.2 ㎒ (BW: 20 ㎒ + 15 ㎒)
				3 560.0 ㎒ ~ 3 690.0 ㎒ (BW: 20 ㎒ + 20 ㎒)
Max. aggregated bandwidth	:	25 ㎒, 30 ㎒, 35 ㎒, 40 ㎒		
Software version	:	X308U.001		
Hardware version	:	REV1.0		
Test device serial No.	:	Conducted	:	R32WA000P0L
		Radiated	:	R32W900200M
Operation temperature	:	0 ℃ ~ 35 ℃		

2.1. Frequency/channel operations

This device contains the following capabilities:
WLAN (11a/b/g/n/ac/ax), Bluetooth (BDR/EDR/BLE), NFC, Digitizer, WCDMA 850/1700/1900,
LTE B2/4/5/7/12/13/14/25/26/30/40/41(PC2/PC3)/48/66/71, ULCA 41C(PC2/PC3)/48C
NR n2/5/12/25/30/41(PC2/PC3)/48/66/71/77(PC2/PC3)/78(PC3), SRS n48/n77(PC2/PC3)/n78(PC3)

LTE ULCA 48C

PCC

Ch.	Frequency (㎒)
55273	3 553.3
55898	3 615.8
56523	3 678.3

Channel Bandwidth: 5 MHz

SCC

Ch.	Frequency (㎒)
55390	3 565.0
56015	3 627.5
56640	3 690.0

Channel Bandwidth: 20 MHz

Table 2.1-1.

PCC

Ch.	Frequency (㎒)
55340	3 560.0
55965	3 622.5
56590	3 685.0

Channel Bandwidth: 20 MHz

SCC

Ch.	Frequency (㎒)
55457	3 571.7
56082	3 634.2
56707	3 696.7

Channel Bandwidth: 5 MHz

Table 2.1-2.

PCC

Ch.	Frequency (㎒)
55295	3 555.5
55896	3 615.6
56496	3 675.6

Channel Bandwidth: 10 MHz

SCC

Ch.	Frequency (㎒)
55439	3 569.9
56040	3 630.0
56640	3 690.0

Channel Bandwidth: 20 MHz

Table 2.1-3.

PCC

Ch.	Frequency (㎒)
55340	3 560.0
55941	3 620.1
56541	3 680.1

Channel Bandwidth: 20 MHz

SCC

Ch.	Frequency (㎒)
55484	3 574.4
56085	3 634.5
56685	3 694.5

Channel Bandwidth: 10 MHz

Table 2.1-4.

PCC

Ch.	Frequency (㎒)
55318	3 557.8
55893	3 615.3
56469	3 672.9

Channel Bandwidth: 15 MHz

SCC

Ch.	Frequency (㎒)
55489	3 574.9
56064	3 632.4
56640	3 690.0

Channel Bandwidth: 20 MHz

Table 2.1-5.

PCC

Ch.	Frequency (㎒)
55340	3 560.0
55916	3 617.6
56491	3 675.1

Channel Bandwidth: 20 MHz

SCC

Ch.	Frequency (㎒)
55511	3 577.1
56087	3 634.7
56662	3 692.2

Channel Bandwidth: 15 MHz

Table 2.1-6.

PCC

Ch.	Frequency (㎒)
55340	3 560.0
55891	3 615.1
56442	3 670.2

Channel Bandwidth: 20 MHz

SCC

Ch.	Frequency (㎒)
55538	3 579.8
56089	3 634.9
56640	3 690.0

Channel Bandwidth: 20 MHz

Table 2.1-7.

3. Maximum ERP/EIRP power

LTE ULCA 48C

Mode	PCC+SCC (㎒)	Tx frequency (㎒)	Emission designator	EIRP	
				Max. power (dBm)	Max. power (W)
LTE ULCA 48C	5+20	3 553.3 ~ 3 690.0	23M0G7D	18.58	0.072
			23M0W7D	17.67	0.058
	20+5	3 560.0 ~ 3 696.7	23M0G7D	18.46	0.070
			23M1W7D	17.41	0.055
	10+20	3 555.5 ~ 3 690.0	28M3G7D	18.53	0.071
			28M2W7D	17.62	0.058
	20+10	3 560.0 ~ 3 694.5	28M3G7D	18.61	0.073
			28M2W7D	17.70	0.059
	15+20	3 557.8 ~ 3 690.0	33M1G7D	18.49	0.071
			33M0W7D	17.87	0.061
	20+15	3 560.0 ~ 3 692.2	33M0G7D	18.24	0.067
			33M0W7D	17.35	0.054
	20+20	3 560.0 ~ 3 690.0	38M0G7D	18.43	0.070
			38M0W7D	17.50	0.056

4. Summary of tests

FCC Part section(s)	Parameter	Test Limit	Test Condition	Test results
2.1046	Conducted Output Power	N/A	Conducted	Pass
2.1049	Occupied Bandwidth & 26 dB Bandwidth	N/A		Pass
2.1051 96.41(e)	Band Edge Emissions at Antenna Terminal	< -13 dBm/MHz at frequencies within 0-B MHz of channel edge < -25 dBm/MHz at frequencies greater than B MHz above and below channel edge < -25 dBm/MHz at frequencies below 3540 MHz and above 3710 MHz < -40 dBm/MHz at frequencies below 3530 MHz and above 3720 MHz		Pass
	Spurious Emissions at Antenna Terminal			Pass
96.41(e)	Adjacent Channel Leakage Ratio	At least 30 dB		Pass
96.41(g)	Peak to Average Power Ratio	< 13 dB		Pass
2.1055	Frequency stability	Emission must remain in band		Pass
2.1053 96.41(b)	Equivalent Isotropic Radiated Power	23 dBm/10 MHz	Radiated	Pass
2.1053 96.41(e)	Radiated Spurious Emissions	< -40 dBm/MHz at frequencies below 3530 MHz and above 3720 MHz		Pass

Notes:

1. 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
   - KDB 971168 D02 v02r02

4.1. Worst case orientation

1. All test were investigated for the two contiguous channels using various combinations of RB size, RB offset, modulation, and channel bandwidth in the test data.
2. All configurations have been performed (Stand-alone, Stand-alone with TA, with accessories).
   Worst case: Stand-alone
3. Output power measurements were measured on QPSK, 16QAM, 64QAM and 256QAM modulation. All tests except output power was performed with QPSK and 16QAM modulation.
4. In the case of radiated spurious emissions, only the worst-case bandwidth results were reported.
5. Additionally, output power and band edge measurement for A-MPR (NS_10) was reported.
6. EUT was investigated in three orthogonal orientations X, Y and Z. It was determined below as that **X** orientation was worst-case orientation. Therefore, all final radiated testing was performed with the EUT in **X** orientation.

7. Test Condition

- The measurement was performed with various configurations then worst results are reported.

1) Radiated measurement

Test Description	Modulation	RB size	Test Channel
Effective Isotropic Radiated Power	QPSK,16QAM	1	Low, Mid, High
Radiated Spurious Emissions	QPSK		

LTE ULCA Band	Bandwidth (㎒)	RB size	RB offset
CA 48C	5+20 20+5 10+20 20+10 15+20 20+15 20+20	1	Low, Mid, High

2) Conducted measurement

Test Description	Modulation	RB size	Test Channel
OBW & 26 ㏈ BW	QPSK, 16QAM	Full	Low, Mid, High
PAPR			Mid
Band Edge	QPSK	1	Low, High
		Full	
Spurious Emissions	QPSK	1	Low, Mid, High

LTE ULCA Band	Bandwidth (㎒)	RB size	RB offset
CA 5B	5+20 20+5 10+20 20+10 15+20 20+15 20+20	1	0, 24, 49, 74, 99
		Full	0

5. 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	0.9 dB	
Conducted spurious emissions	1.3 dB	
Radiated spurious emissions	Below 1 000 ㎒	2.4 dB
	1 000 ㎒ ~ 18 000 ㎒	2.4 dB
	Above 1 8000 ㎒	2.6 dB

6. Measurement results explanation example

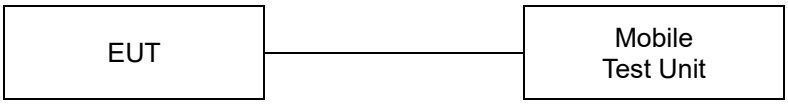
Frequency (㎒)	Factor(㏈)	Frequency (㎒)	Factor(㏈)
30	6.10	16 000	10.13
50	6.25	17 000	9.56
100	6.32	18 000	9.97
200	6.33	19 000	9.66
300	6.45	20 000	10.20
400	6.61	21 000	10.56
500	6.99	22 000	9.90
600	7.08	23 000	11.16
700	7.04	24 000	10.48
800	7.03	25 000	11.89
900	6.95	26 000	11.17
1 000	7.01	26 500	11.29
2 000	7.39	27 000	11.37
3 000	7.55	28 000	12.81
4 000	7.94	29 000	13.00
5 000	8.38	30 000	13.30
6 000	8.61	31 000	12.70
7 000	7.88	32 000	12.52
8 000	8.06	33 000	12.63
9 000	8.31	34 000	13.45
10 000	7.98	35 000	13.74
11 000	8.53	36 000	13.78
12 000	8.45	37 000	13.88
13 000	9.45	38 000	14.93
14 000	9.41	39 000	15.79
15 000	9.79	40 000	16.42

Note.
Offset(㏈) = RF cable loss(㏈) + Divider(㏈)

7. Test results

7.1. 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
Radio Standards Specifications – Section 192

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.

Test results

1. LTE ULCA 48C (Maximum Power)

Channel	PCC						SCC						Conducted Power (dBm)
	BW (MHz)	Ch	Freq. (MHz)	Mod.	RB	RB offset	BW (MHz)	Ch	Freq. (MHz)	Mod.	RB	RB offset	
Low	5	55273	3 553.3	QPSK	1	24	20	55390	3 565.0	QPSK	1	0	22.29
	20	55340	3 560.0	QPSK	1	99	5	55457	3 571.7	QPSK	1	0	22.67
	10	55295	3 555.5	QPSK	1	49	20	55439	3 569.9	QPSK	1	0	22.24
	20	55340	3 560.0	QPSK	1	99	10	55484	3 574.4	QPSK	1	0	22.39
	15	55318	3 557.8	QPSK	1	74	20	55489	3 574.9	QPSK	1	0	22.37
	20	55340	3 560.0	QPSK	1	99	15	55511	3 577.1	QPSK	1	0	22.34
	20	55340	3 560.0	QPSK	1	99	20	55538	3 579.8	QPSK	1	0	22.44
Mid	5	55898	3 615.8	QPSK	1	24	20	56015	3 627.5	QPSK	1	0	22.31
	20	55965	3 622.5	QPSK	1	99	5	56082	3 634.2	QPSK	1	0	22.47
	10	55896	3 615.6	QPSK	1	49	20	56040	3 630.0	QPSK	1	0	22.49
	20	55941	3 620.1	QPSK	1	99	10	56085	3 634.5	QPSK	1	0	22.56
	15	55893	3 615.3	QPSK	1	74	20	56064	3 632.4	QPSK	1	0	22.48
	20	55916	3 617.6	QPSK	1	99	15	56087	3 634.7	QPSK	1	0	22.68
	20	55891	3 615.1	QPSK	1	99	20	56089	3 634.9	QPSK	1	0	22.59
High	5	56523	3 678.3	QPSK	1	24	20	56640	3 690.0	QPSK	1	0	22.62
	20	56590	3 685.0	QPSK	1	99	5	56707	3 696.7	QPSK	1	0	23.20
	10	56496	3 675.6	QPSK	1	49	20	56640	3 690.0	QPSK	1	0	22.65
	20	56541	3 680.1	QPSK	1	99	10	56685	3 694.5	QPSK	1	0	22.10
	15	56469	3 672.9	QPSK	1	74	20	56640	3 690.0	QPSK	1	0	22.57
	20	56491	3 675.1	QPSK	1	99	15	56662	3 692.2	QPSK	1	0	22.85
	20	56442	3 670.2	QPSK	1	99	20	56640	3 690.0	QPSK	1	0	22.75

Note.

- Configuration: 1 RB

Channel	PCC						SCC						Conducted Power (dBm)
	BW (MHz)	Ch	Freq. (MHz)	Mod.	RB	RB offset	BW (MHz)	Ch	Freq. (MHz)	Mod.	RB	RB offset	
Low	5	55273	3 553.3	QPSK	25	0	20	55390	3 565.0	QPSK	100	0	22.30
	20	55340	3 560.0	QPSK	100	0	5	55457	3 571.7	QPSK	25	0	22.35
	10	55295	3 555.5	QPSK	50	0	20	55439	3 569.9	QPSK	100	0	22.47
	20	55340	3 560.0	QPSK	100	0	10	55484	3 574.4	QPSK	50	0	22.46
	15	55318	3 557.8	QPSK	75	0	20	55489	3 574.9	QPSK	100	0	22.41
	20	55340	3 560.0	QPSK	100	0	15	55511	3 577.1	QPSK	75	0	22.44
	20	55340	3 560.0	QPSK	100	0	20	55538	3 579.8	QPSK	100	0	22.48
Mid	5	55898	3 615.8	QPSK	25	0	20	56015	3 627.5	QPSK	100	0	22.60
	20	55965	3 622.5	QPSK	100	0	5	56082	3 634.2	QPSK	25	0	22.54
	10	55896	3 615.6	QPSK	50	0	20	56040	3 630.0	QPSK	100	0	22.47
	20	55941	3 620.1	QPSK	100	0	10	56085	3 634.5	QPSK	50	0	22.51
	15	55893	3 615.3	QPSK	75	0	20	56064	3 632.4	QPSK	100	0	22.58
	20	55916	3 617.6	QPSK	100	0	15	56087	3 634.7	QPSK	75	0	22.61
	20	55891	3 615.1	QPSK	100	0	20	56089	3 634.9	QPSK	100	0	22.58
High	5	56523	3 678.3	QPSK	25	0	20	56640	3 690.0	QPSK	100	0	22.62
	20	56590	3 685.0	QPSK	100	0	5	56707	3 696.7	QPSK	25	0	23.01
	10	56496	3 675.6	QPSK	50	0	20	56640	3 690.0	QPSK	100	0	22.55
	20	56541	3 680.1	QPSK	100	0	10	56685	3 694.5	QPSK	50	0	23.04
	15	56469	3 672.9	QPSK	75	0	20	56640	3 690.0	QPSK	100	0	22.62
	20	56491	3 675.1	QPSK	100	0	15	56662	3 692.2	QPSK	75	0	22.67
	20	56442	3 670.2	QPSK	100	0	20	56640	3 690.0	QPSK	100	0	22.57

Note.

- Configuration: Full RB

Channel	PCC						SCC						Conducted Power (dBm)
	BW (MHz)	Ch	Freq. (MHz)	Mod.	RB	RB offset	BW (MHz)	Ch	Freq. (MHz)	Mod.	RB	RB offset	
Low	20	55340	3 560.0	16QAM	1	99	5	55457	3 571.7	16QAM	1	0	22.53
Mid	20	55916	3 617.6	16QAM	1	99	15	56087	3 634.7	16QAM	1	0	22.61
High	20	56590	3 685.0	16QAM	1	99	5	56707	3 696.7	16QAM	1	0	23.10
Low	20	55340	3 560.0	16QAM	100	0	20	55538	3 579.8	16QAM	100	0	22.20
Mid	20	55916	3 617.6	16QAM	100	0	15	56087	3 634.7	16QAM	75	0	22.56
High	20	56541	3 680.1	16QAM	100	0	10	56685	3 694.5	16QAM	50	0	23.02

Note.
- Configuration: 1 RB & Full RB (Worst case for QPSK)

Channel	PCC						SCC						Conducted Power (dBm)
	BW (MHz)	Ch	Freq. (MHz)	Mod.	RB	RB offset	BW (MHz)	Ch	Freq. (MHz)	Mod.	RB	RB offset	
Low	20	55340	3 560.0	64QAM	1	99	5	55457	3 571.7	64QAM	1	0	21.55
Mid	20	55916	3 617.6	64QAM	1	99	15	56087	3 634.7	64QAM	1	0	21.53
High	20	56590	3 685.0	64QAM	1	99	5	56707	3 696.7	64QAM	1	0	21.88
Low	20	55340	3 560.0	64QAM	100	0	20	55538	3 579.8	64QAM	100	0	21.35
Mid	20	55916	3 617.6	64QAM	100	0	15	56087	3 634.7	64QAM	75	0	21.61
High	20	56541	3 680.1	64QAM	100	0	10	56685	3 694.5	64QAM	50	0	21.91

Note.
- Configuration: 1 RB & Full RB (Worst case for QPSK)

Channel	PCC						SCC						Conducted Power (dBm)
	BW (MHz)	Ch	Freq. (MHz)	Mod.	RB	RB offset	BW (MHz)	Ch	Freq. (MHz)	Mod.	RB	RB offset	
Low	20	55340	3 560.0	256QAM	1	99	5	55457	3 571.7	256QAM	1	0	18.66
Mid	20	55916	3 617.6	256QAM	1	99	15	56087	3 634.7	256QAM	1	0	18.54
High	20	56590	3 685.0	256QAM	1	99	5	56707	3 696.7	256QAM	1	0	18.91
Low	20	55340	3 560.0	256QAM	100	0	20	55538	3 579.8	256QAM	100	0	18.22
Mid	20	55916	3 617.6	256QAM	100	0	15	56087	3 634.7	256QAM	75	0	18.45
High	20	56541	3 680.1	256QAM	100	0	10	56685	3 694.5	256QAM	50	0	18.84

Note.
- Configuration: 1 RB & Full RB (Worst case for QPSK)

2. LTE ULCA 48C (A-MPR Power)

Channel	PCC						SCC						Conducted Power (dBm)
	BW (MHz)	Ch	Freq. (MHz)	Mod.	RB	RB offset	BW (MHz)	Ch	Freq. (MHz)	Mod.	RB	RB offset	
Low	5	55273	3 553.3	QPSK	1	24	20	55390	3 565.0	QPSK	1	0	13.91
	20	55340	3 560.0	QPSK	1	99	5	55457	3 571.7	QPSK	1	0	17.75
	10	55295	3 555.5	QPSK	1	49	20	55439	3 569.9	QPSK	1	0	16.97
	20	55340	3 560.0	QPSK	1	99	10	55484	3 574.4	QPSK	1	0	16.97
	15	55318	3 557.8	QPSK	1	74	20	55489	3 574.9	QPSK	1	0	16.91
	20	55340	3 560.0	QPSK	1	99	15	55511	3 577.1	QPSK	1	0	16.83
	20	55340	3 560.0	QPSK	1	99	20	55538	3 579.8	QPSK	1	0	16.81
Mid	5	55898	3 615.8	QPSK	1	24	20	56015	3 627.5	QPSK	1	0	15.99
	20	55965	3 622.5	QPSK	1	99	5	56082	3 634.2	QPSK	1	0	17.08
	10	55896	3 615.6	QPSK	1	49	20	56040	3 630.0	QPSK	1	0	16.02
	20	55941	3 620.1	QPSK	1	99	10	56085	3 634.5	QPSK	1	0	16.01
	15	55893	3 615.3	QPSK	1	74	20	56064	3 632.4	QPSK	1	0	16.11
	20	55916	3 617.6	QPSK	1	99	15	56087	3 634.7	QPSK	1	0	16.09
	20	55891	3 615.1	QPSK	1	99	20	56089	3 634.9	QPSK	1	0	16.15
High	5	56523	3 678.3	QPSK	1	24	20	56640	3 690.0	QPSK	1	0	16.97
	20	56590	3 685.0	QPSK	1	99	5	56707	3 696.7	QPSK	1	0	18.14
	10	56496	3 675.6	QPSK	1	49	20	56640	3 690.0	QPSK	1	0	17.05
	20	56541	3 680.1	QPSK	1	99	10	56685	3 694.5	QPSK	1	0	17.19
	15	56469	3 672.9	QPSK	1	74	20	56640	3 690.0	QPSK	1	0	17.11
	20	56491	3 675.1	QPSK	1	99	15	56662	3 692.2	QPSK	1	0	17.18
	20	56442	3 670.2	QPSK	1	99	20	56640	3 690.0	QPSK	1	0	17.08

Note.

- Configuration: 1 RB

Channel	PCC						SCC						Conducted Power (dBm)
	BW (Mhz)	Ch	Freq. (Mhz)	Mod.	RB	RB offset	BW (Mhz)	Ch	Freq. (Mhz)	Mod.	RB	RB offset	
Low	5	55273	3 553.3	QPSK	25	0	20	55390	3 565.0	QPSK	100	0	11.14
	20	55340	3 560.0	QPSK	100	0	5	55457	3 571.7	QPSK	25	0	10.71
	10	55295	3 555.5	QPSK	50	0	20	55439	3 569.9	QPSK	100	0	11.99
	20	55340	3 560.0	QPSK	100	0	10	55484	3 574.4	QPSK	50	0	11.64
	15	55318	3 557.8	QPSK	75	0	20	55489	3 574.9	QPSK	100	0	11.78
	20	55340	3 560.0	QPSK	100	0	15	55511	3 577.1	QPSK	75	0	11.63
	20	55340	3 560.0	QPSK	100	0	20	55538	3 579.8	QPSK	100	0	11.67
Mid	5	55898	3 615.8	QPSK	25	0	20	56015	3 627.5	QPSK	100	0	10.00
	20	55965	3 622.5	QPSK	100	0	5	56082	3 634.2	QPSK	25	0	10.01
	10	55896	3 615.6	QPSK	50	0	20	56040	3 630.0	QPSK	100	0	10.94
	20	55941	3 620.1	QPSK	100	0	10	56085	3 634.5	QPSK	50	0	10.90
	15	55893	3 615.3	QPSK	75	0	20	56064	3 632.4	QPSK	100	0	10.85
	20	55916	3 617.6	QPSK	100	0	15	56087	3 634.7	QPSK	75	0	10.88
	20	55891	3 615.1	QPSK	100	0	20	56089	3 634.9	QPSK	100	0	10.91
High	5	56523	3 678.3	QPSK	25	0	20	56640	3 690.0	QPSK	100	0	10.93
	20	56590	3 685.0	QPSK	100	0	5	56707	3 696.7	QPSK	25	0	11.15
	10	56496	3 675.6	QPSK	50	0	20	56640	3 690.0	QPSK	100	0	11.94
	20	56541	3 680.1	QPSK	100	0	10	56685	3 694.5	QPSK	50	0	11.99
	15	56469	3 672.9	QPSK	75	0	20	56640	3 690.0	QPSK	100	0	11.91
	20	56491	3 675.1	QPSK	100	0	15	56662	3 692.2	QPSK	75	0	11.95
	20	56442	3 670.2	QPSK	100	0	20	56640	3 690.0	QPSK	100	0	11.94

Note.
- Configuration: Full RB

Channel	PCC						SCC						Conducted Power (dBm)
	BW (MHz)	Ch	Freq. (MHz)	Mod.	RB	RB offset	BW (MHz)	Ch	Freq. (MHz)	Mod.	RB	RB offset	
Low	20	55340	3 560.0	16QAM	1	99	5	55457	3 571.7	16QAM	1	0	17.47
Mid	20	55965	3 622.5	16QAM	1	99	5	56082	3 634.2	16QAM	1	0	15.67
High	20	56590	3 685.0	16QAM	1	99	5	56707	3 696.7	16QAM	1	0	17.56
Low	10	55295	3 555.5	16QAM	50	0	20	55439	3 569.9	16QAM	100	0	11.45
Mid	10	55896	3 615.6	16QAM	50	0	20	56040	3 630.0	16QAM	100	0	10.78
High	20	56541	3 680.1	16QAM	100	0	10	56685	3 694.5	16QAM	50	0	11.96

Note.
- Configuration: 1 RB & Full RB (Worst case for QPSK)

Channel	PCC						SCC						Conducted Power (dBm)
	BW (MHz)	Ch	Freq. (MHz)	Mod.	RB	RB offset	BW (MHz)	Ch	Freq. (MHz)	Mod.	RB	RB offset	
Low	20	55340	3 560.0	64QAM	1	99	5	55457	3 571.7	64QAM	1	0	16.57
Mid	20	55965	3 622.5	64QAM	1	99	5	56082	3 634.2	64QAM	1	0	14.60
High	20	56590	3 685.0	64QAM	1	99	5	56707	3 696.7	64QAM	1	0	16.43
Low	10	55295	3 555.5	64QAM	50	0	20	55439	3 569.9	64QAM	100	0	10.60
Mid	10	55896	3 615.6	64QAM	50	0	20	56040	3 630.0	64QAM	100	0	9.92
High	20	56541	3 680.1	64QAM	100	0	10	56685	3 694.5	64QAM	50	0	10.89

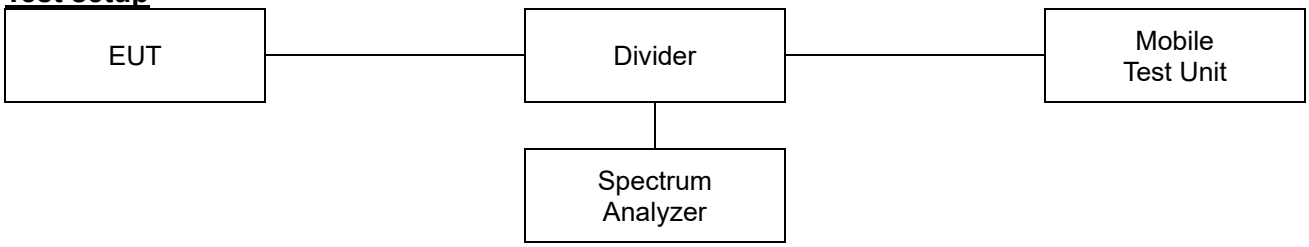
Note.
- Configuration: 1 RB & Full RB (Worst case for QPSK)

Channel	PCC						SCC						Conducted Power (dBm)
	BW (MHz)	Ch	Freq. (MHz)	Mod.	RB	RB offset	BW (MHz)	Ch	Freq. (MHz)	Mod.	RB	RB offset	
Low	20	55340	3 560.0	256QAM	1	99	5	55457	3 571.7	256QAM	1	0	13.60
Mid	20	55965	3 622.5	256QAM	1	99	5	56082	3 634.2	256QAM	1	0	11.61
High	20	56590	3 685.0	256QAM	1	99	5	56707	3 696.7	256QAM	1	0	13.38
Low	10	55295	3 555.5	256QAM	50	0	20	55439	3 569.9	256QAM	100	0	7.48
Mid	10	55896	3 615.6	256QAM	50	0	20	56040	3 630.0	256QAM	100	0	6.73
High	20	56541	3 680.1	256QAM	100	0	10	56685	3 694.5	256QAM	50	0	7.71

Note.
- Configuration: 1 RB & Full RB (Worst case for QPSK)

7.2. 99% Occupied Bandwidth & 26 dB Bandwidth

Test setup



Limit

The occupied bandwidth, that is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers radiated are each equal to 0.5 percent of the total mean power radiated by a given emission shall be measured.

Test procedure

971168 D01 v03r01 – Section 4.2 and 4.3
ANSI C63.26-2015 – Section 5.4.3 and 5.4.4

Test settings

◆ **26dB Bandwidth**

a) The spectrum analyzer center frequency is set to the nominal EUT channel center frequency. The span range for the spectrum analyzer shall be wide enough to see sufficient roll off of the signal to make the measurement.

b) The nominal RBW shall be in the range of 1% to 5% of the anticipated OBW, and the VBW shall be set ≥ 3 × RBW.

c) Set the reference level of the instrument as required to prevent the signal amplitude from exceeding the maximum spectrum analyzer input mixer level for linear operation.
See guidance provided in 4.2.3.

d) The dynamic range of the spectrum analyzer at the selected RBW shall be more than 10 dB below the target "−X dB" requirement, i.e., if the requirement calls for measuring the −26 dB OBW, the spectrum analyzer noise floor at the selected RBW shall be at least 36 dB below the reference level.

e) Set spectrum analyzer detection mode to peak, and the trace mode to max hold.

f) Determine the reference value by either of the following:
   1) Set the EUT to transmit a modulated signal. Allow the trace to stabilize.
   Set the spectrum analyzer marker to the highest level of the displayed trace (this is the reference value).
   2) Set the EUT to transmit an unmodulated carrier. Set the spectrum analyzer marker to the level of the carrier.

g) Determine the "−X dB amplitude" as equal to (Reference Value − X). Alternatively, this calculation can be performed on the spectrum analyzer using the delta-marker measurement function.

h) If the reference value was determined using an unmodulated carrier, turn the EUT modulation on, then either clear the existing trace or start a new trace on the spectrum analyzer and allow the new trace to stabilize. Otherwise the trace from step f) shall be used for step i).

i) Place two markers, one at the lowest and the other at the highest frequency of the envelope of the spectral display such that each marker is at or slightly below the "−X dB amplitude" determined in step f). If a marker is below this "−X dB amplitude" value it should be as close as possible to this value. The OBW is the positive frequency difference between the two markers.

j) The spectral envelope can cross the "−X dB amplitude" at multiple points. The lowest or highest frequency shall be selected as the frequencies that are the farthest away from the center frequency at which the spectral envelope crosses the "−X dB amplitude."

k) The OBW shall be reported by providing plot(s) of the measuring instrument display, to include markers depicting the relevant frequency and amplitude information (e.g., marker table). The frequency and amplitude axis and scale shall be clearly labeled. Tabular data may be reported in addition to the plot(s).

◆ 99% Occupied Bandwidth

a) The spectrum analyzer center frequency is set to the nominal EUT channel center frequency. The frequency span for the spectrum analyzer shall be set wide enough to capture all modulation products including the emission skirts (typically a span of 1.5 × OBW is sufficient).

b) The nominal IF filter 3 dB bandwidth (RBW) shall be in the range of 1% to 5% of the anticipated OBW, and the VBW shall be set ≥ 3 × RBW.

c) Set the reference level of the instrument as required to prevent the signal amplitude from exceeding the maximum spectrum analyzer input mixer level for linear operation. See guidance provided in 4.2.3.

d) Set the detection mode to peak, and the trace mode to max-hold.

e) If the instrument does not have a 99% OBW function, recover the trace data points and sum directly in linear power terms. Place the recovered amplitude data points, beginning at the lowest frequency, in a running sum until 0.5% of the total is reached. Record that frequency as the lower OBW frequency. Repeat the process until 99.5% of the total is reached and record that frequency as the upper OBW frequency. The 99% power OBW can be determined by computing the difference these two frequencies.

f) The OBW shall be reported and plot(s) of the measuring instrument display shall be provided with the test report. The frequency and amplitude axis and scale shall be clearly labeled. Tabular data can be reported in addition to the plot(s).

Notes:

1. The EUT was setup to maximum output power with all bandwidth and modulation.
2. All modes of operation were investigated and the worst-case configuration results are reported.

Test results

Operating Frequency : Low

PCC						SCC						26 dB Bandwidth (MHz)	99% Bandwidth (MHz)
BW (MHz)	Ch	Freq. (MHz)	Mod.	RB	RB offset	BW (MHz)	Ch	Freq. (MHz)	Mod.	RB	RB offset		
5	55273	3553.3	QPSK	25	0	20	55390	3565.0	QPSK	100	0	24.54	23.04
20	55340	3560.0	QPSK	100	0	5	55457	3571.7	QPSK	25	0	24.98	22.98
10	55295	3555.5	QPSK	50	0	20	55439	3569.9	QPSK	100	0	30.79	28.25
20	55340	3560.0	QPSK	100	0	10	55484	3574.4	QPSK	50	0	31.17	28.17
15	55318	3557.8	QPSK	75	0	20	55489	3574.9	QPSK	100	0	35.66	33.13
20	55340	3560.0	QPSK	100	0	15	55511	3577.1	QPSK	75	0	36.28	33.04
20	55340	3560.0	QPSK	100	0	20	55538	3579.8	QPSK	100	0	40.96	37.96

PCC						SCC						26 dB Bandwidth (MHz)	99% Bandwidth (MHz)
BW (MHz)	Ch	Freq. (MHz)	Mod.	RB	RB offset	BW (MHz)	Ch	Freq. (MHz)	Mod.	RB	RB offset		
5	55273	3553.3	16QAM	25	0	20	55390	3565.0	16QAM	100	0	24.54	22.98
20	55340	3560.0	16QAM	100	0	5	55457	3571.7	16QAM	25	0	24.66	22.98
10	55295	3555.5	16QAM	50	0	20	55439	3569.9	16QAM	100	0	30.72	28.17
20	55340	3560.0	16QAM	100	0	10	55484	3574.4	16QAM	50	0	30.72	28.17
15	55318	3557.8	16QAM	75	0	20	55489	3574.9	16QAM	100	0	35.84	33.04
20	55340	3560.0	16QAM	100	0	15	55511	3577.1	16QAM	75	0	36.01	33.04
20	55340	3560.0	16QAM	100	0	20	55538	3579.8	16QAM	100	0	40.46	37.96

Operating Frequency : Middle

PCC						SCC						26 dB Bandwidth (MHz)	99% Bandwidth (MHz)
BW (MHz)	Ch	Freq. (MHz)	Mod.	RB	RB offset	BW (MHz)	Ch	Freq. (MHz)	Mod.	RB	RB offset		
5	55898	3615.8	QPSK	25	0	20	56015	3627.5	QPSK	100	0	24.60	23.04
20	55965	3622.5	QPSK	100	0	5	56082	3634.2	QPSK	25	0	24.91	23.04
10	55896	3615.6	QPSK	50	0	20	56040	3630.0	QPSK	100	0	30.79	28.25
20	55941	3620.1	QPSK	100	0	10	56085	3634.5	QPSK	50	0	30.87	28.25
15	55893	3615.3	QPSK	75	0	20	56064	3632.4	QPSK	100	0	35.84	33.13
20	55916	3617.6	QPSK	100	0	15	56087	3634.7	QPSK	75	0	36.10	33.04
20	55891	3615.1	QPSK	100	0	20	56089	3634.9	QPSK	100	0	41.06	37.96

PCC						SCC						26 dB Bandwidth (MHz)	99% Bandwidth (MHz)
BW (MHz)	Ch	Freq. (MHz)	Mod.	RB	RB offset	BW (MHz)	Ch	Freq. (MHz)	Mod.	RB	RB offset		
5	55898	3615.8	16QAM	25	0	20	56015	3627.5	16QAM	100	0	24.73	23.04
20	55965	3622.5	16QAM	100	0	5	56082	3634.2	16QAM	25	0	24.66	23.10
10	55896	3615.6	16QAM	50	0	20	56040	3630.0	16QAM	100	0	30.57	28.17
20	55941	3620.1	16QAM	100	0	10	56085	3634.5	16QAM	50	0	30.87	28.17
15	55893	3615.3	16QAM	75	0	20	56064	3632.4	16QAM	100	0	36.01	32.95
20	55916	3617.6	16QAM	100	0	15	56087	3634.7	16QAM	75	0	36.10	33.04
20	55891	3615.1	16QAM	100	0	20	56089	3634.9	16QAM	100	0	40.76	37.86

Note.

- RB configuration: Full RB

Operating Frequency : High

PCC						SCC						26 dB Bandwidth (MHz)	99% Bandwidth (MHz)
BW (MHz)	Ch	Freq. (MHz)	Mod.	RB	RB offset	BW (MHz)	Ch	Freq. (MHz)	Mod.	RB	RB offset		
5	56523	3678.3	QPSK	25	0	20	56640	3690.0	QPSK	100	0	24.73	22.98
20	56590	3685.0	QPSK	100	0	5	56707	3696.7	QPSK	25	0	24.91	22.98
10	56496	3675.6	QPSK	50	0	20	56640	3690.0	QPSK	100	0	30.87	28.25
20	56541	3680.1	QPSK	100	0	10	56685	3694.5	QPSK	50	0	31.02	28.17
15	56469	3672.9	QPSK	75	0	20	56640	3690.0	QPSK	100	0	36.01	33.04
20	56491	3675.1	QPSK	100	0	15	56662	3692.2	QPSK	75	0	35.93	32.95
20	56442	3670.2	QPSK	100	0	20	56640	3690.0	QPSK	100	0	40.66	37.86

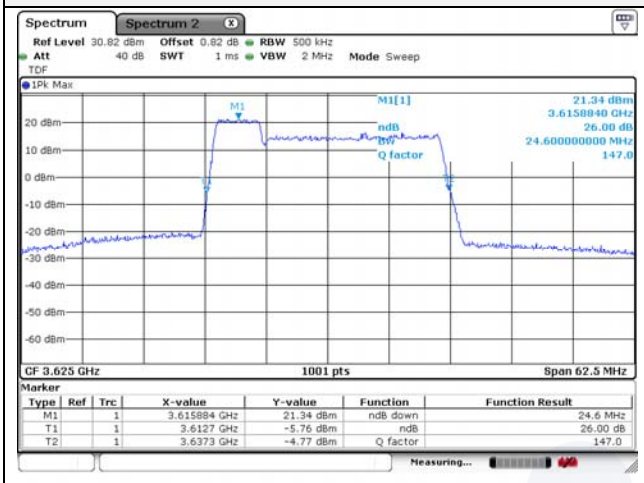
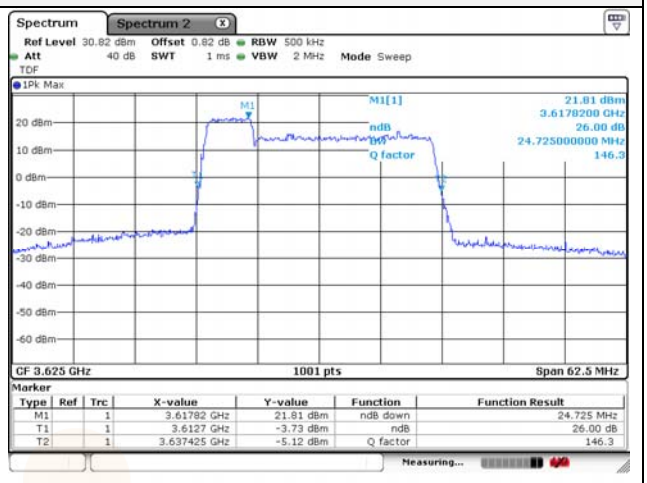
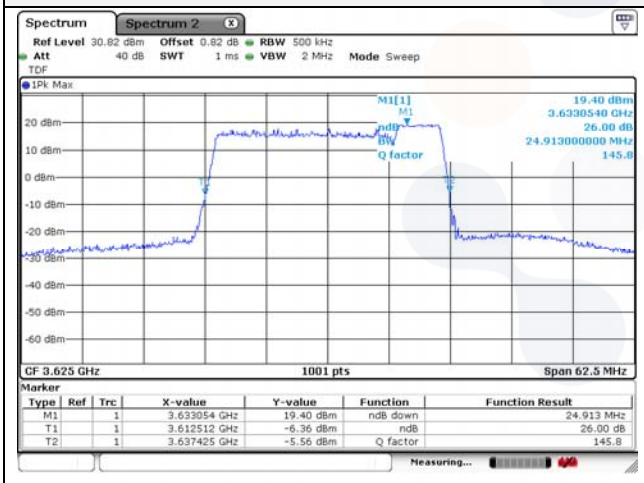
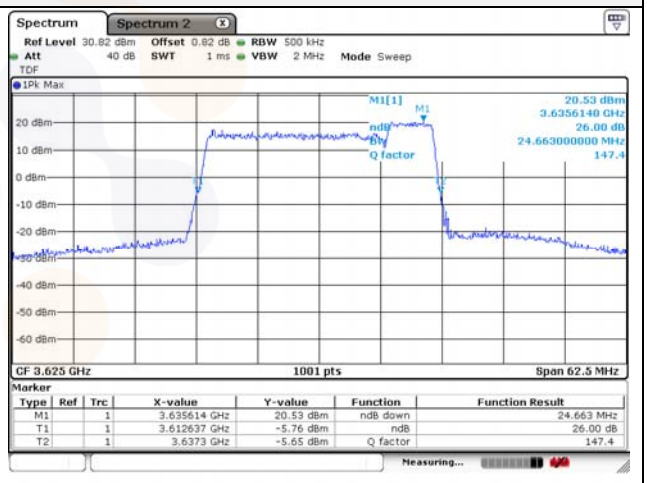
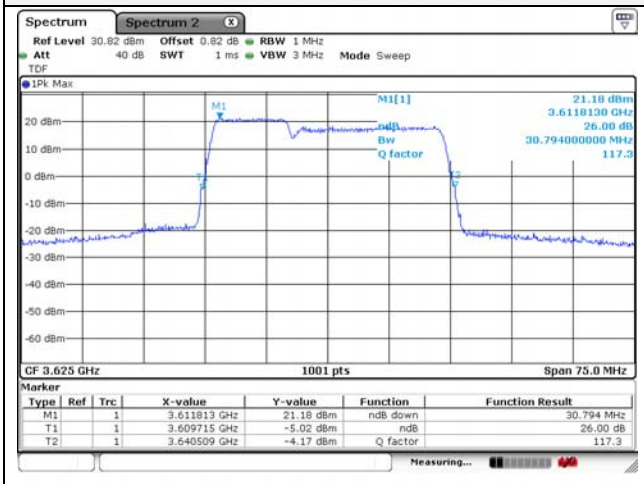
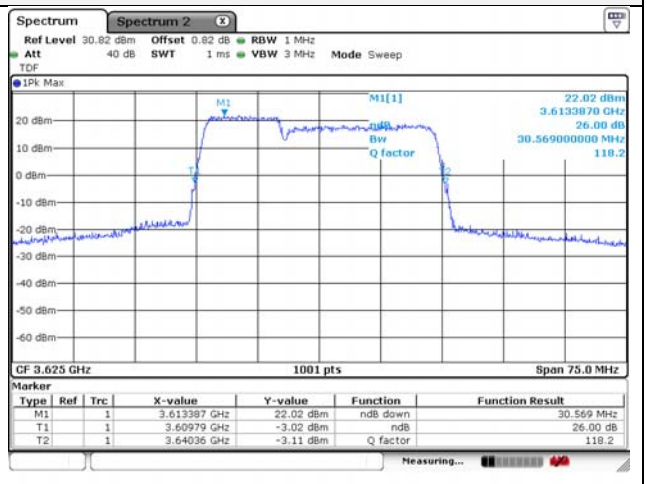
PCC						SCC						26 dB Bandwidth (MHz)	99% Bandwidth (MHz)
BW (MHz)	Ch	Freq. (MHz)	Mod.	RB	RB offset	BW (MHz)	Ch	Freq. (MHz)	Mod.	RB	RB offset		
5	56523	3678.3	16QAM	25	0	20	56640	3690.0	16QAM	100	0	24.35	22.98
20	56590	3685.0	16QAM	100	0	5	56707	3696.7	16QAM	25	0	24.79	22.98
10	56496	3675.6	16QAM	50	0	20	56640	3690.0	16QAM	100	0	30.50	28.17
20	56541	3680.1	16QAM	100	0	10	56685	3694.5	16QAM	50	0	30.87	28.17
15	56469	3672.9	16QAM	75	0	20	56640	3690.0	16QAM	100	0	35.84	33.04
20	56491	3675.1	16QAM	100	0	15	56662	3692.2	16QAM	75	0	36.01	33.04
20	56442	3670.2	16QAM	100	0	20	56640	3690.0	16QAM	100	0	40.76	37.86

Note.

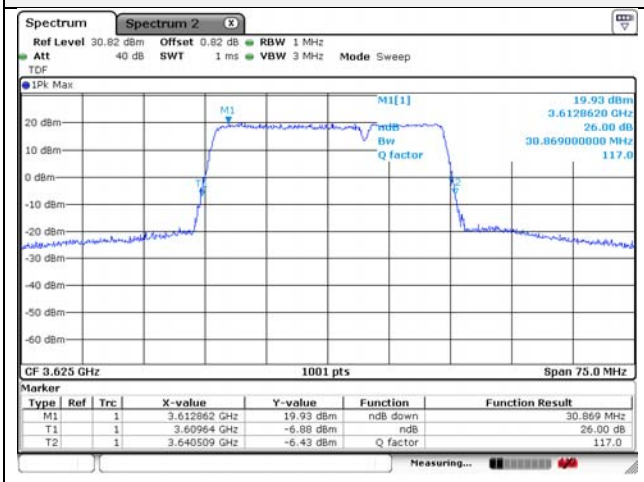
- RB configuration: Full RB

26 dB Bandwidth

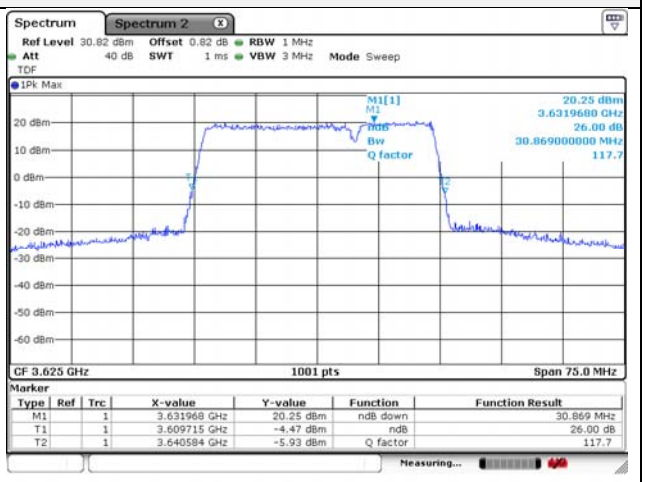
Test mode: LTE ULCA 48C

5M + 20M RB25/0 + RB100/0 QPSK Mid ch.	5M + 20M RB25/0 + RB100/0 16QAM Mid ch.
	
20M + 5M RB100/0 + RB25/0 QPSK Mid ch.	**20M + 5M RB100/0 + RB25/0 16QAM Mid ch.**
	
10M + 20M RB50/0 + RB100/0 QPSK Mid ch.	**10M + 20M RB50/0 + RB100/0 16QAM Mid ch.**
	

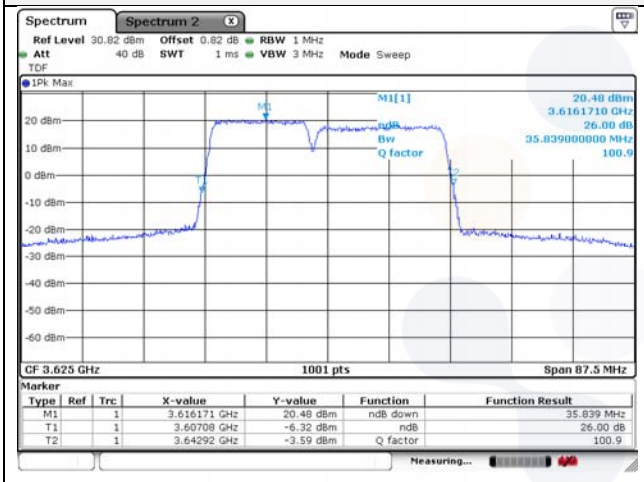
20M + 10M RB100/0 + RB50/0 QPSK Mid ch.



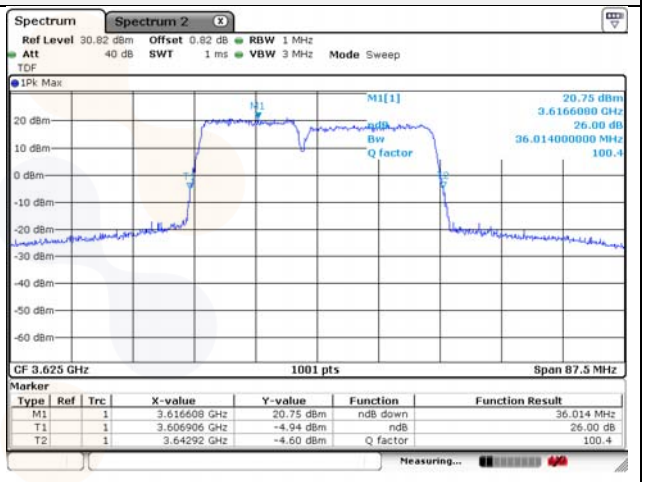
20M + 10M RB100/0 + RB50/0 16QAM Mid ch.



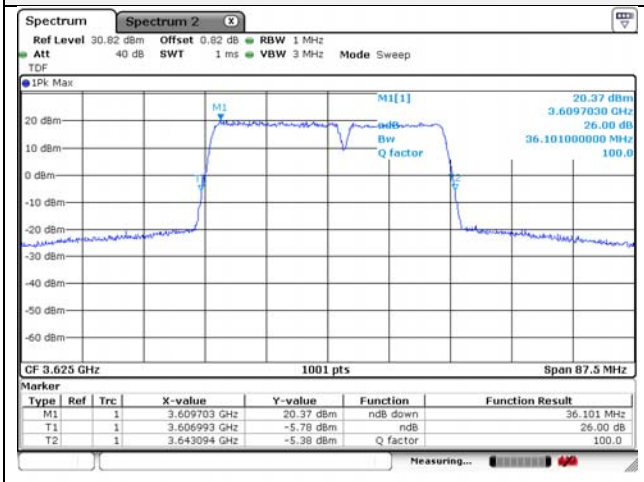
15M + 20M RB75/0 + RB100/0 QPSK Mid ch.



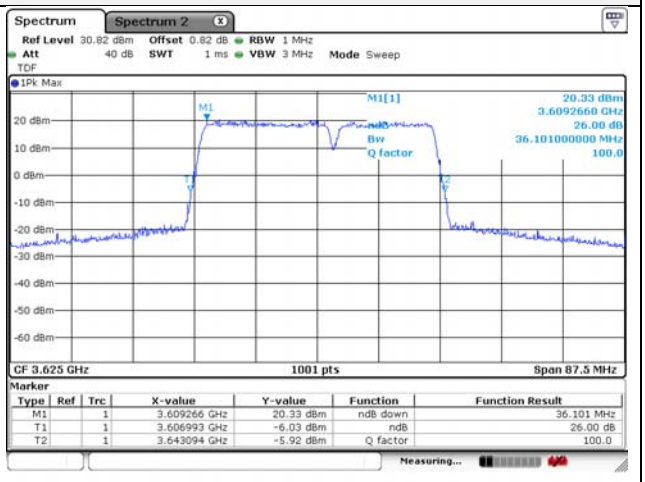
15M + 20M RB75/0 + RB100/0 16QAM Mid ch.

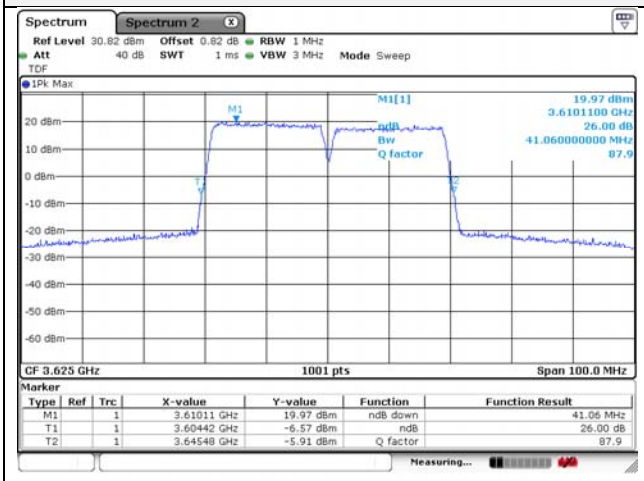
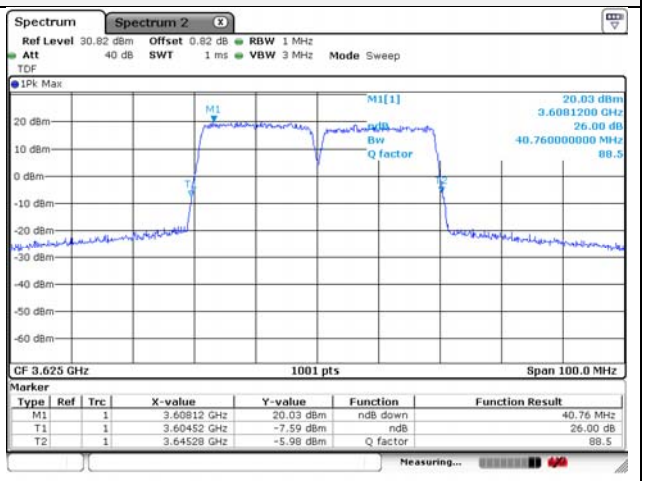


20M + 15M RB100/0 + RB75/0 QPSK Mid ch.



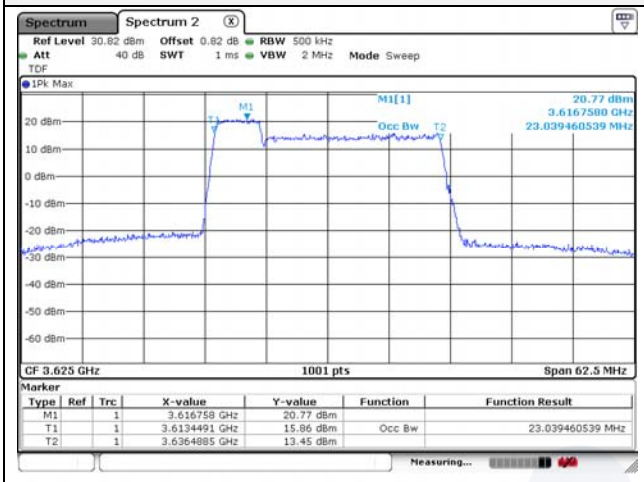
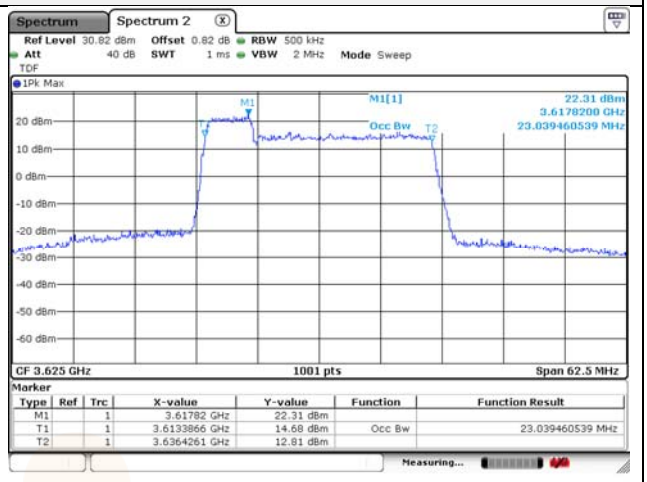
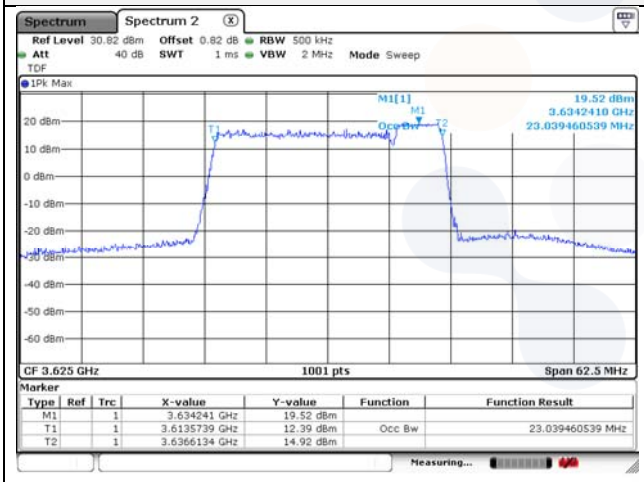
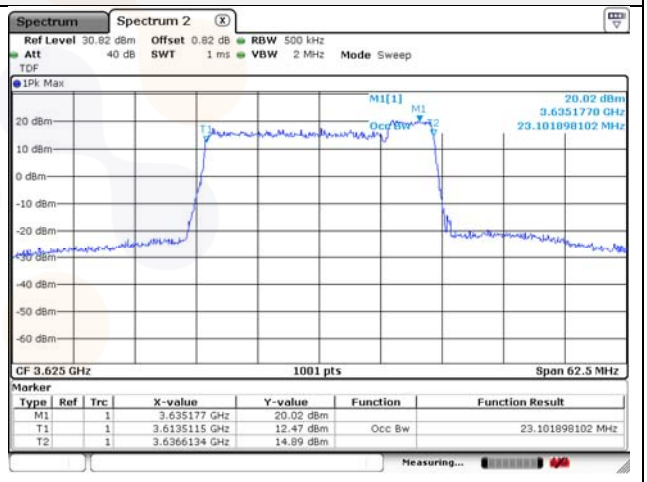
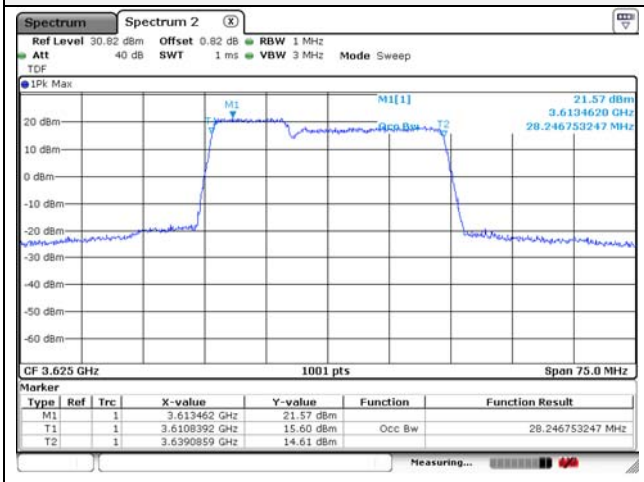
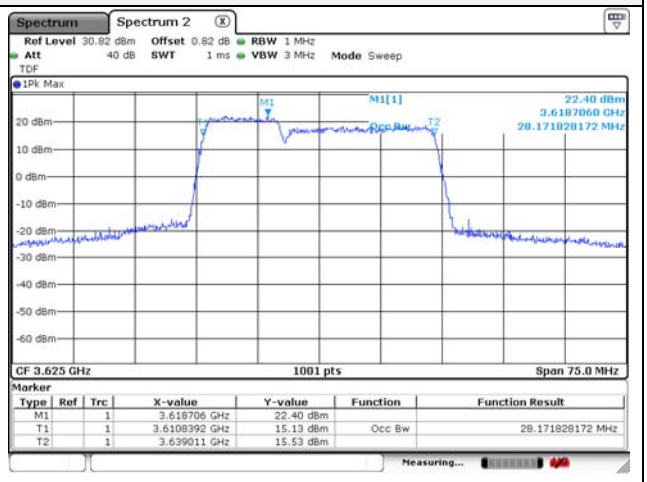
20M + 15M RB100/0 + RB75/0 16QAM Mid ch.



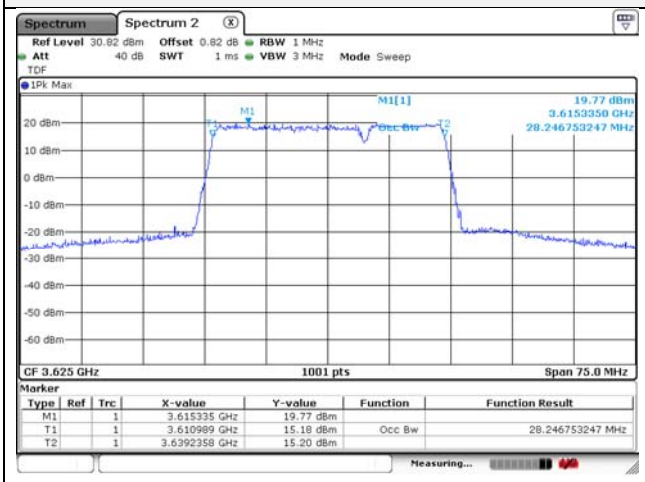
20M + 20M RB100/0 + RB100/0 QPSK Mid ch.	20M + 20M RB100/0 + RB100/0 16QAM Mid ch.
	

99% Occupied Bandwidth

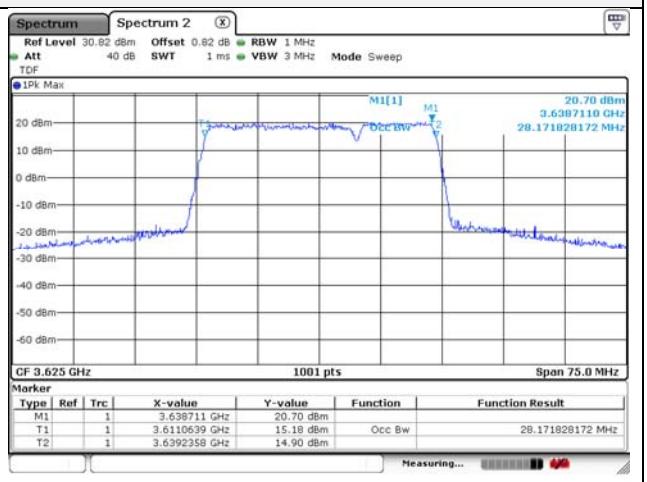
Test mode: LTE ULCA 48C

5M + 20M RB25/0 + RB100/0 QPSK Mid ch.	5M + 20M RB25/0 + RB100/0 16QAM Mid ch.
	
20M + 5M RB100/0 + RB25/0 QPSK Mid ch.	**20M + 5M RB100/0 + RB25/0 16QAM Mid ch.**
	
10M + 20M RB50/0 + RB100/0 QPSK Mid ch.	**10M + 20M RB50/0 + RB100/0 16QAM Mid ch.**
	

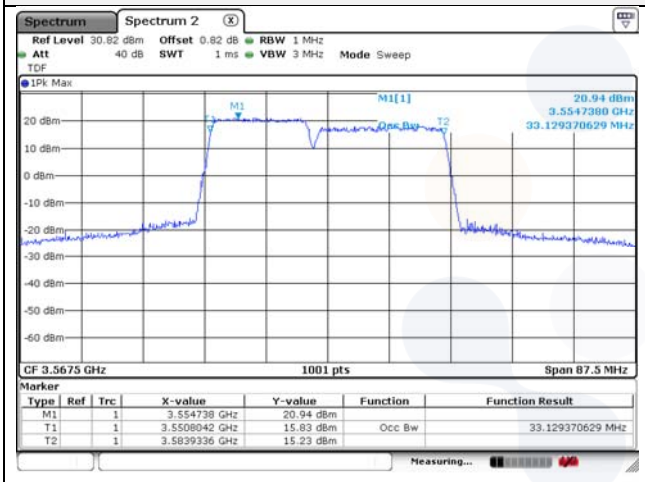
20M + 10M RB100/0 + RB50/0 QPSK Mid ch.



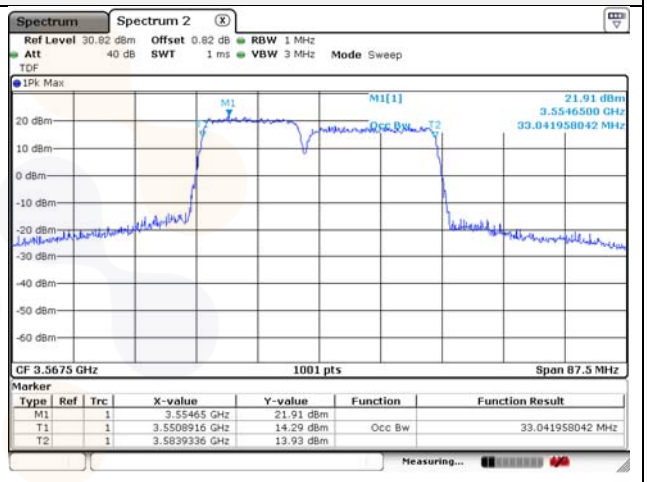
20M + 10M RB100/0 + RB50/0 16QAM Mid ch.



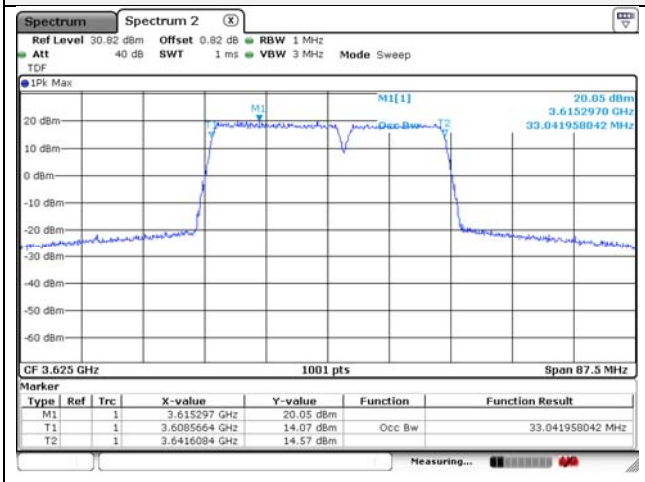
15M + 20M RB75/0 + RB100/0 QPSK Mid ch.



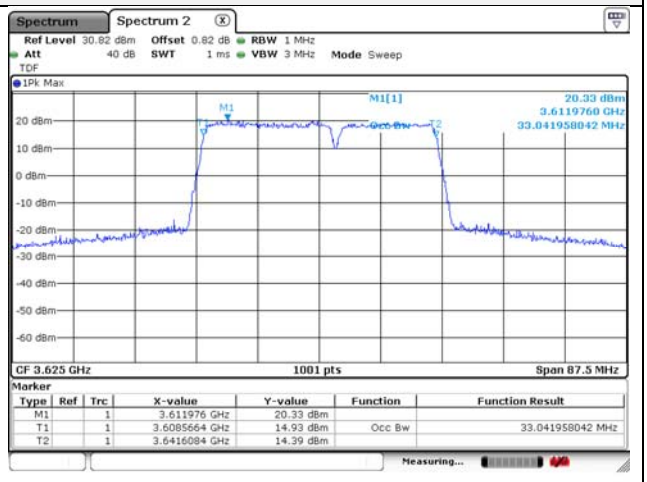
15M + 20M RB75/0 + RB100/0 16QAM Mid ch.

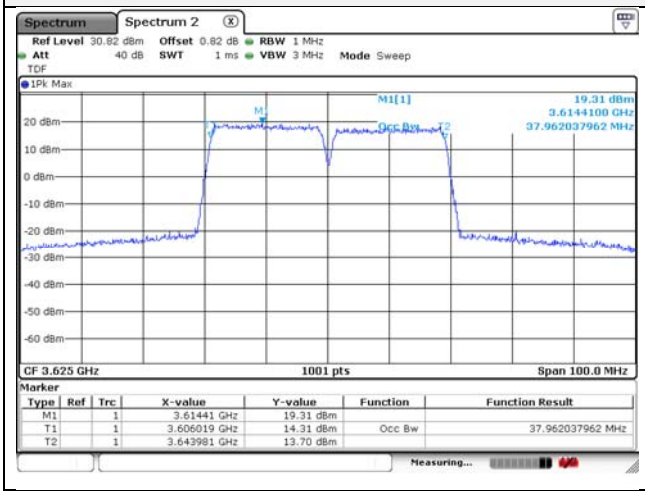
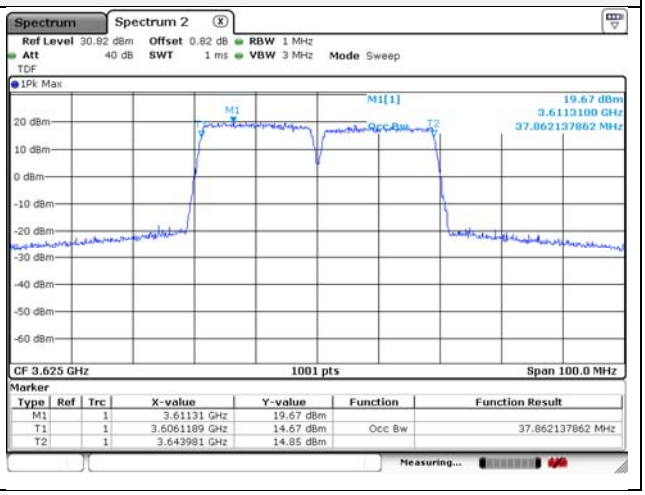


20M + 15M RB100/0 + RB75/0 QPSK Mid ch.



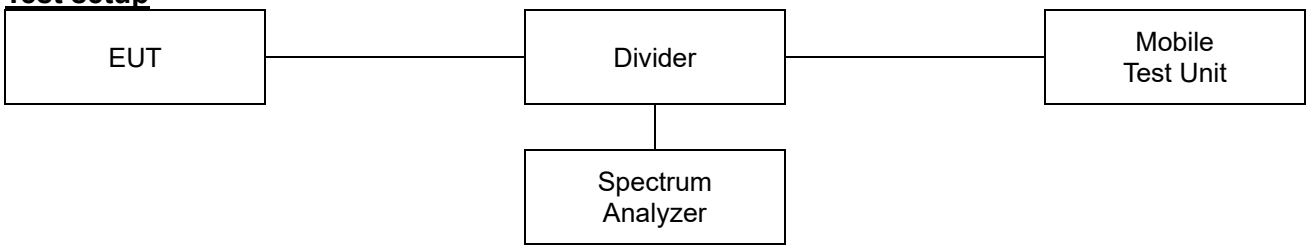
20M + 15M RB100/0 + RB75/0 16QAM Mid ch.



20M + 20M RB100/0 + RB100/0 QPSK Mid ch.	20M + 20M RB100/0 + RB100/0 16QAM Mid ch.
	

7.3. Band Edge Emissions at Antenna Terminal

Test setup



Limit

According to §96.41(e) 3.5 GHz Emissions and Interference Limits
(1) General protection levels
(ii) Except as otherwise specified in paragraph (e)(2) of this section, for channel and frequency assignments made by a CBSD to End User Devices, the conducted power of any End User Device emission outside the fundamental emission (whether in or outside of the authorized band) shall not exceed −13 dBm/MHz within 0 to B megahertz (where B is the bandwidth in megahertz of the assigned channel or multiple contiguous channels of the End User Device) above the upper CBSD-assigned channel edge and within 0 to B megahertz below the lower CBSD-assigned channel edge. At all frequencies greater than B megahertz above the upper CBSD assigned channel edge and less than B megahertz below the lower CBSD-assigned channel edge, the conducted power of any End User Device emission shall not exceed −25 dBm/MHz. Notwithstanding the emission limits in this paragraph, the Adjacent Channel Leakage Ratio for End User Devices shall be at least 30 dB.

(2) Additional protection levels. Notwithstanding paragraph (e)(1) of this section, for CBSDs and End User Devices, the conducted power of emissions below 3540 MHz or above 3710 MHz shall not exceed −25 dBm/MHz, and the conducted power of emissions below 3530 MHz or above 3720 MHz shall not exceed −40dBm/MHz.

Test procedure

971168 D01 v03r01 - Section 6
ANSI C63.26-2015 – Section 5.7

Test settings

1) Start frequency was set to 30 ㎒ and stop frequency was set to at least 10th the fundamental frequency.
2) Span was set large enough so as to capture all out of band emissions near the band edge.
3) Set the RBW > 1% of the emission bandwidth.
4) Set the VBW ≥ 3 x RBW.
5) Set the number of sweep points ≥ 2 x Span/RBW
6) Detector = RMS
7) Trace mode = trace average
8) Sweep time should be auto for peak detection. For RMS detection the sweep time should be set as follows:
    a) If the device can be configured to transmit continuously (duty cycle ≥ 98%), set the (sweep time) > (number of points in sweep) x (symbol period) (e.g., by a factor of 10 x symbol period x number of points) Increasing the sweep time (i.e., slowing the sweep speed) will allow for averaging over multiple symbols.
    b) If the device cannot transmit continuously (duty cycle < 98%), a gated sweep shall be used when possible (i.e., gate triggered such that the analyzer only sweeps when the device is transmitting at full power), set the sweep time > (number of points in sweep) x (symbol period) but the sweep time shall always be maintained at a value that is less than or equal to the minimum transmission time
    c) If the device cannot be configured to transmit continuously (duty cycle > 98%), and a free-running sweep must be used, set the sweep time so that the averaging is performed over multiple on/off cycles by setting the sweep time > (number of points in sweep) × (transmitter period) (i.e., the transmit on-time + the off-time). The spectrum analyzer readings shall subsequently be corrected by [10 log (1/duty cycle)]. This assumes that the transmission period and duty cycle is relatively constant (duty cycle variation ≤ ±2%).
    d) If the device cannot be configured to transmit continuously and a free-running sweep must be used, and if the transmissions exhibit a non-constant duty cycle (duty cycle variations > ±2%), set the sweep time so that the averaging is performed over the on-period by setting the sweep time > (symbol period) × (number of points), while also maintaining the sweep time < (transmitter on-time). The trace mode shall be set to max hold, since not every display point will be averaged only over just the on-time. Thus, multiple sweeps (e.g., 100) in maximum hold art necessary to ensure that the maximum power is measured.
9) Allow trace to fully stabilize.

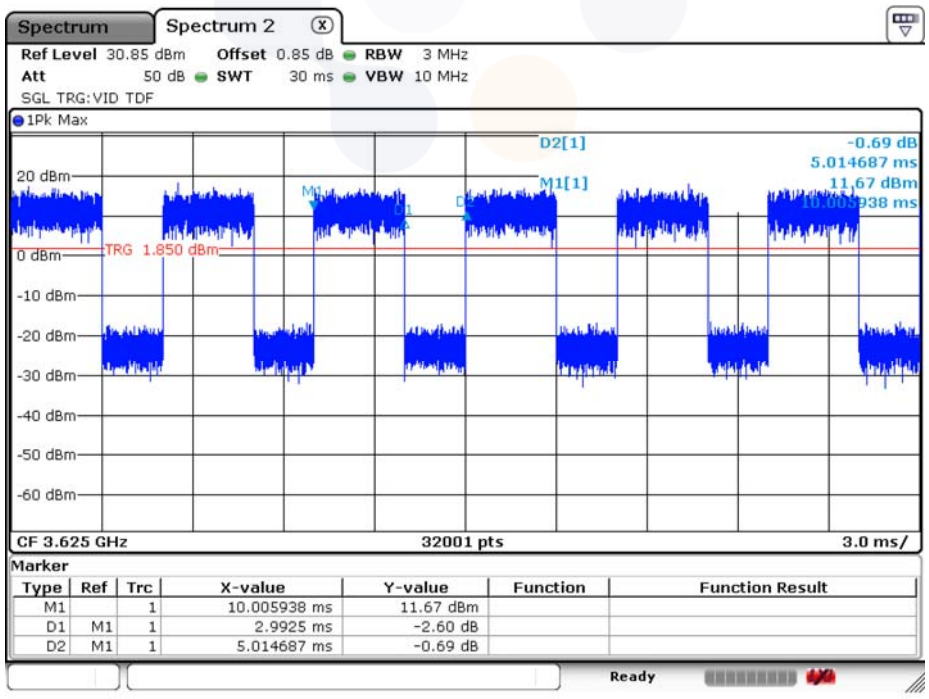
Notes:

1. compliance with these rules is based on the use of measurement instrumentation employing a resolution bandwidth of 1 ㎒ or greater. however in the 1 ㎒ bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be may be employed. The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 ㏈ below the transmitter power.
2. The EUT was setup to maximum output power as its lowest and highest channel with all bandwidth, modulation and RB configurations.
3. When the ULCA 48C is activated, A-MPR for CA_NS_10 is implemented in this EUT per the A-MPR specification in 3GPP TS 36.101 (Table 6.2.4A, 10-1). Conducted output power verification data are shown in this test report. For emission mask, this section was only investigated under A-MPR condition.
4. Duty cycle factor

Period (㎳)	On time (㎳)	Duty cycle		Duty Cycle Factor (㏈)
		(Linear)	(%)	
5.014 687	2.992 500	0.596 747	59.67	2.24

1) Duty cycle (Linear) = Ton time / Period
2) DCF(Duty cycle factor) = 10log(1/duty cycle)
3) Offset(㏈) = RF cable loss(㏈) + Divider(㏈) + Duty Cycle Factor(㏈)

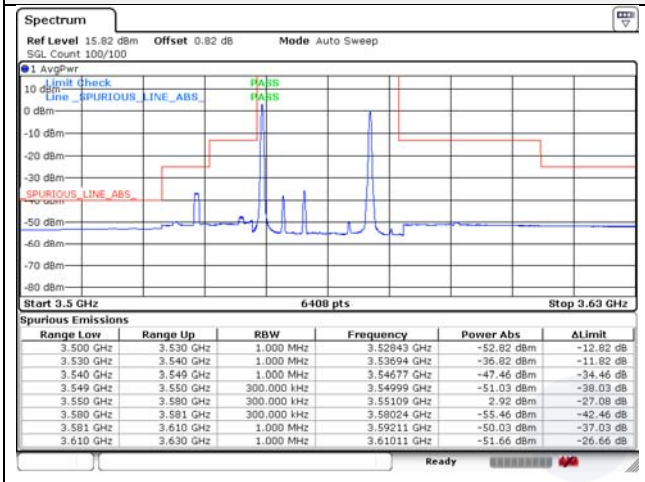
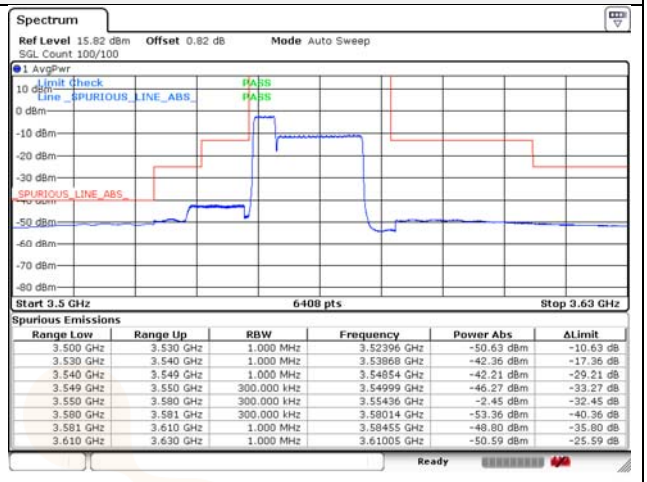
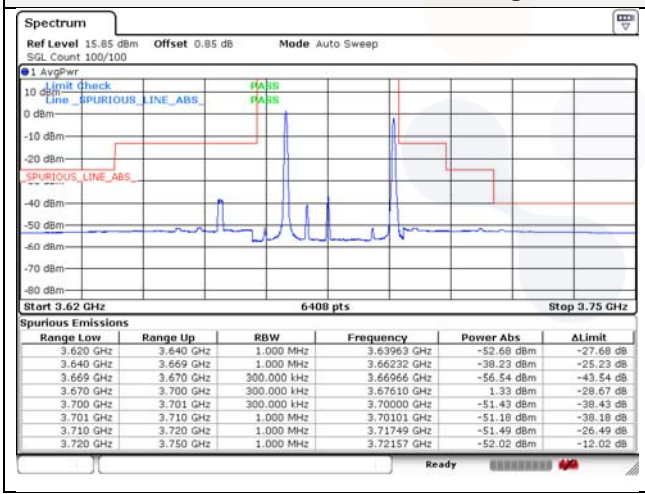
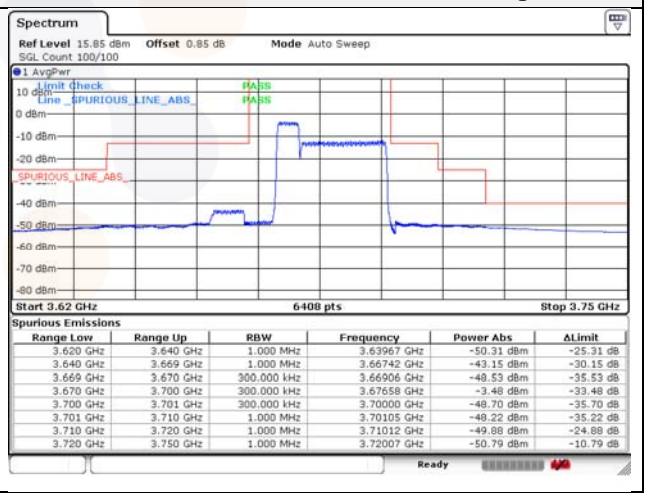
ULCA 48C



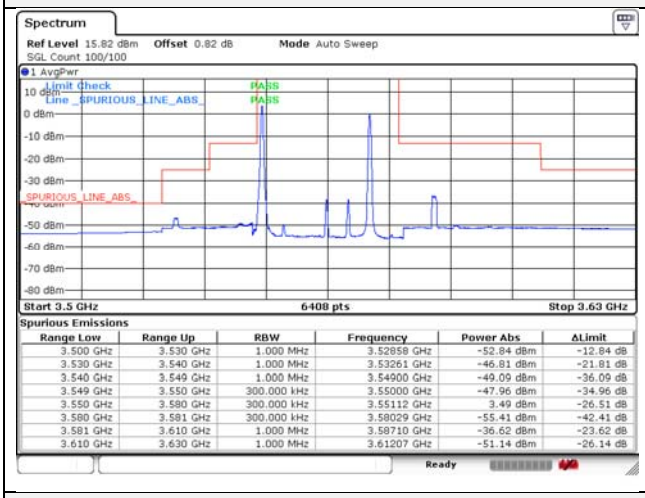
Test results

EMISSION MASK

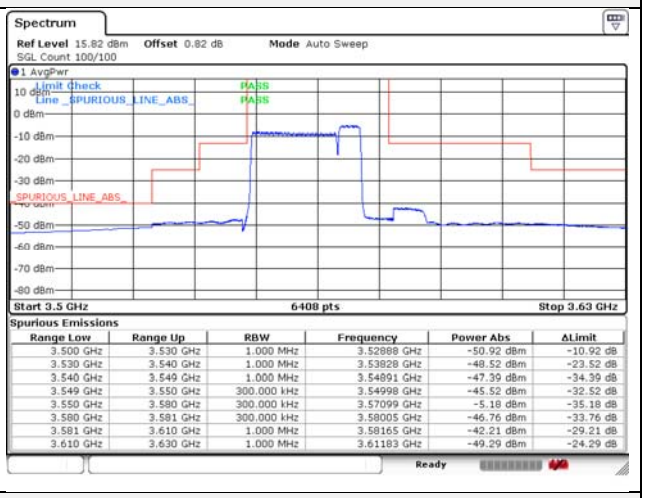
Test mode: LTE ULCA 48C

5M + 20M RB1/0 + RB1/99 QPSK Low ch.	5M + 20M RB25/0 + RB100/0 QPSK Low ch.
	
5M + 20M RB1/0 + RB1/99 QPSK High ch.	**5M + 20M RB25/0 + RB100/0 QPSK High ch.**
	

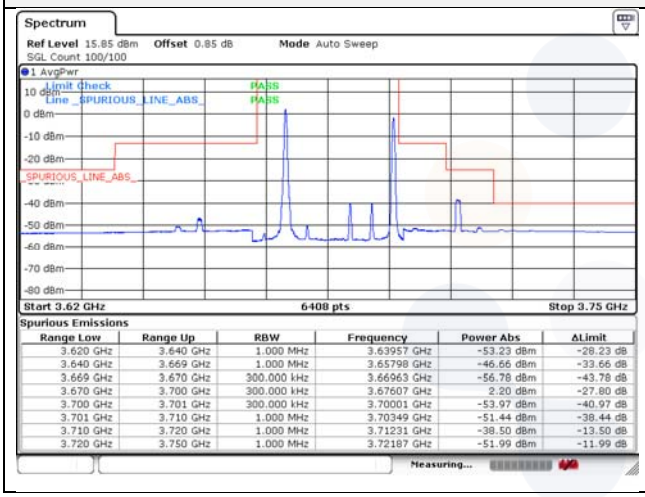
20M + 5M RB1/0 + RB1/24 QPSK Low ch.



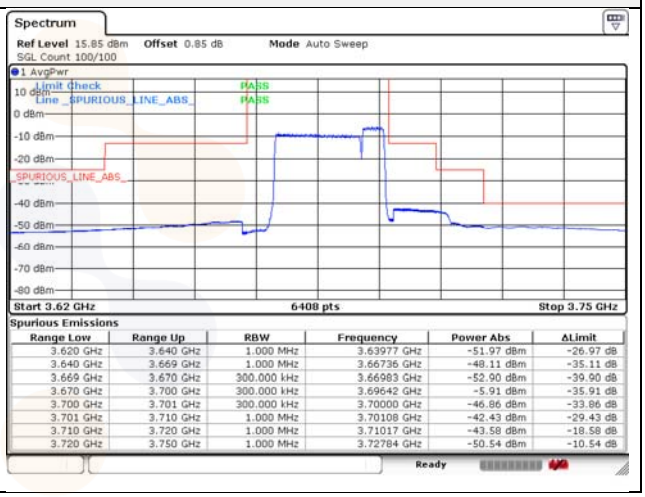
20M + 5M RB100/0 + RB25/0 QPSK Low ch.

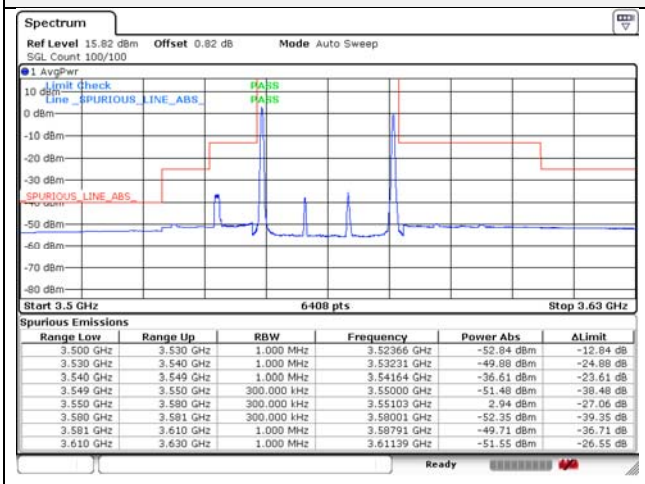
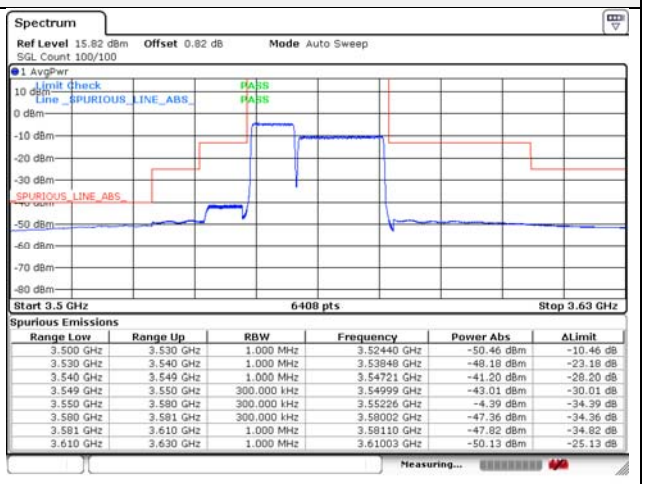
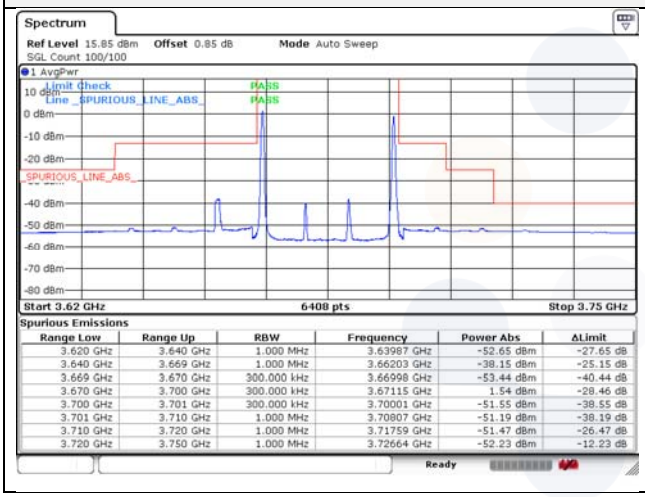
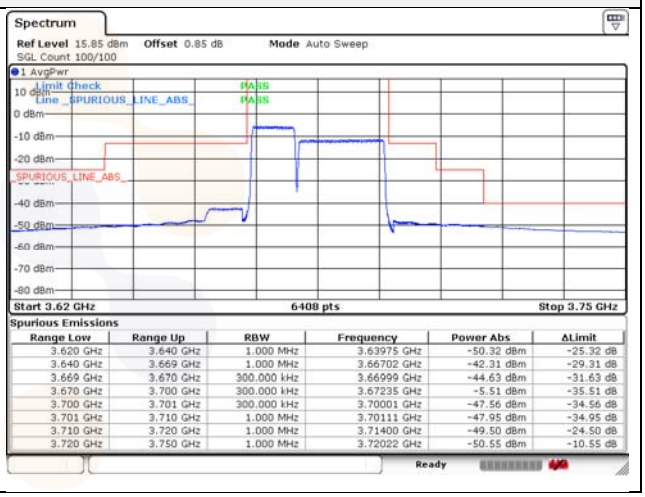


20M + 5M RB1/0 + RB1/24 QPSK High ch.

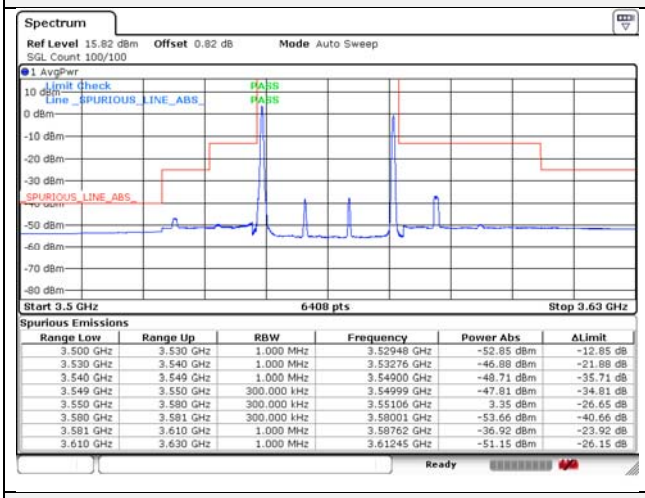


20M + 5M RB100/0 + RB25/0 QPSK High ch.

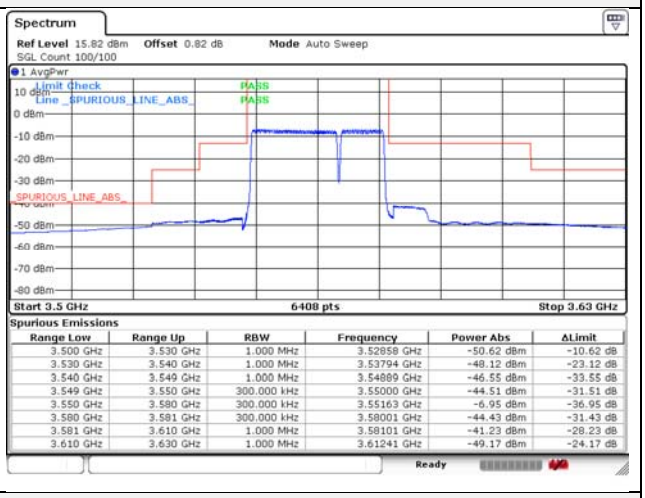


10M + 20M RB1/0 + RB1/99 QPSK Low ch.	10M + 20M RB50/0 + RB100/0 QPSK Low ch.
	
10M + 20M RB1/0 + RB1/99 QPSK High ch.	**10M + 20M RB50/0 + RB100/0 QPSK High ch.**
	

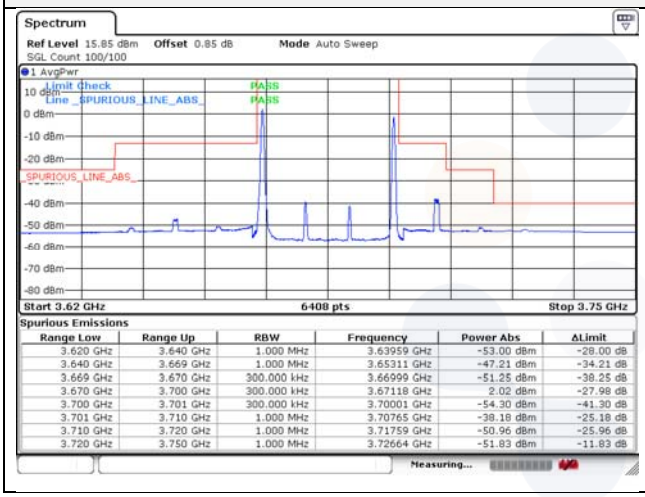
20M + 10M RB1/0 + RB1/49 QPSK Low ch.



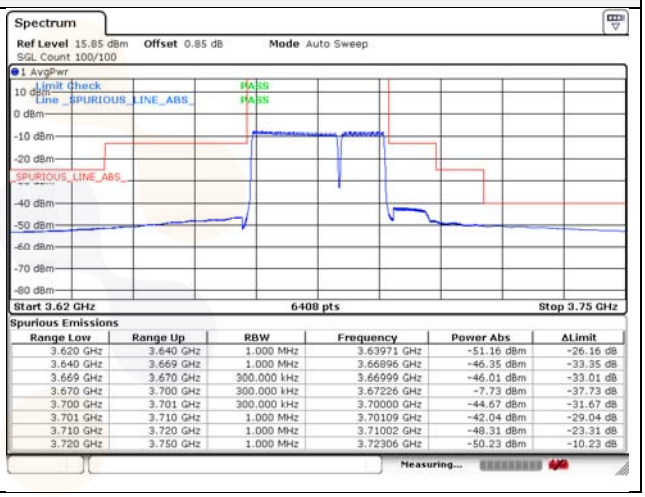
20M + 10M RB100/0 + RB50/0 QPSK Low ch.



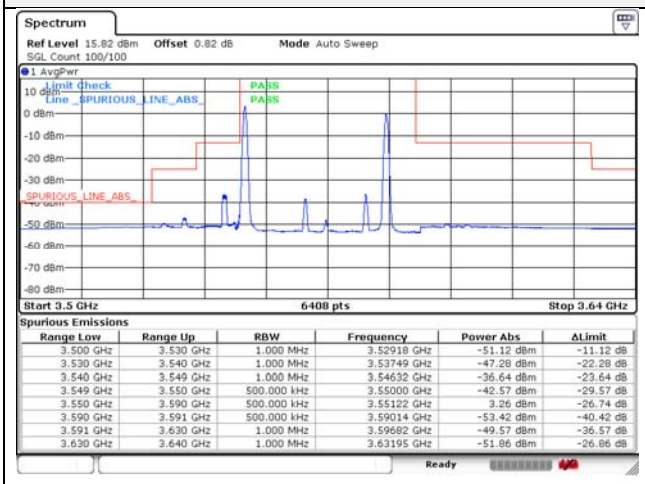
20M + 10M RB1/0 + RB1/49 QPSK High ch.



20M + 10M RB100/0 + RB50/0 QPSK High ch.



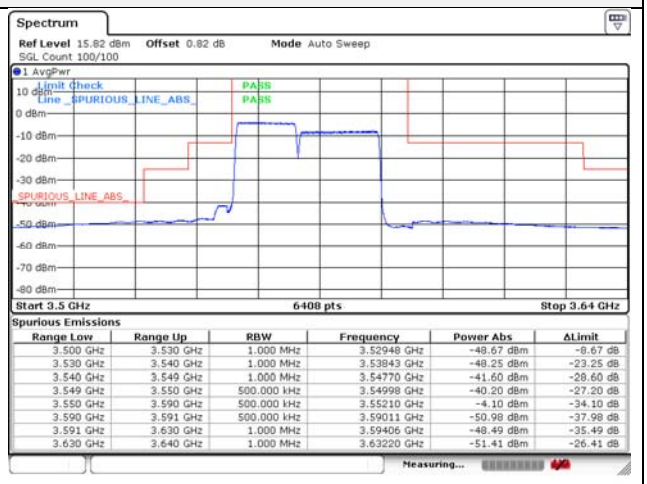
15M + 20M RB1/0 + RB1/99 QPSK Low ch.



Spurious Emissions

Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
3.500 GHz	3.530 GHz	1.000 MHz	3.52918 GHz	-51.12 dBm	-11.12 dB
3.530 GHz	3.540 GHz	1.000 MHz	3.53749 GHz	-47.28 dBm	-22.28 dB
3.540 GHz	3.549 GHz	1.000 MHz	3.54632 GHz	-36.64 dBm	-23.64 dB
3.549 GHz	3.550 GHz	500.000 kHz	3.55000 GHz	-42.57 dBm	-29.57 dB
3.550 GHz	3.590 GHz	500.000 kHz	3.55122 GHz	3.26 dBm	-26.74 dB
3.590 GHz	3.591 GHz	500.000 kHz	3.59014 GHz	-53.42 dBm	-40.42 dB
3.591 GHz	3.630 GHz	1.000 MHz	3.59682 GHz	-49.57 dBm	-36.57 dB
3.630 GHz	3.640 GHz	1.000 MHz	3.63195 GHz	-51.86 dBm	-26.86 dB

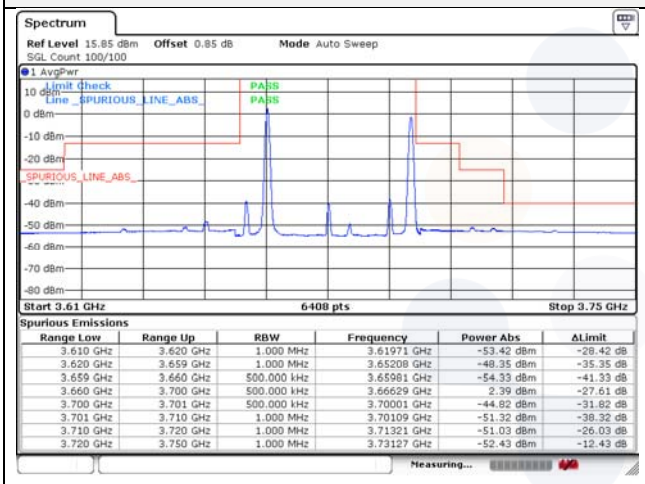
15M + 20M RB75/0 + RB100/0 QPSK Low ch.



Spurious Emissions

Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
3.500 GHz	3.530 GHz	1.000 MHz	3.52948 GHz	-48.67 dBm	-8.67 dB
3.530 GHz	3.540 GHz	1.000 MHz	3.53843 GHz	-48.25 dBm	-23.25 dB
3.540 GHz	3.549 GHz	1.000 MHz	3.54770 GHz	-41.60 dBm	-28.60 dB
3.549 GHz	3.550 GHz	500.000 kHz	3.54998 GHz	-40.20 dBm	-27.20 dB
3.550 GHz	3.590 GHz	500.000 kHz	3.55210 GHz	-4.10 dBm	-34.10 dB
3.590 GHz	3.591 GHz	500.000 kHz	3.59011 GHz	-50.98 dBm	-37.98 dB
3.591 GHz	3.630 GHz	1.000 MHz	3.59406 GHz	-48.49 dBm	-35.49 dB
3.630 GHz	3.640 GHz	1.000 MHz	3.63220 GHz	-51.41 dBm	-26.41 dB

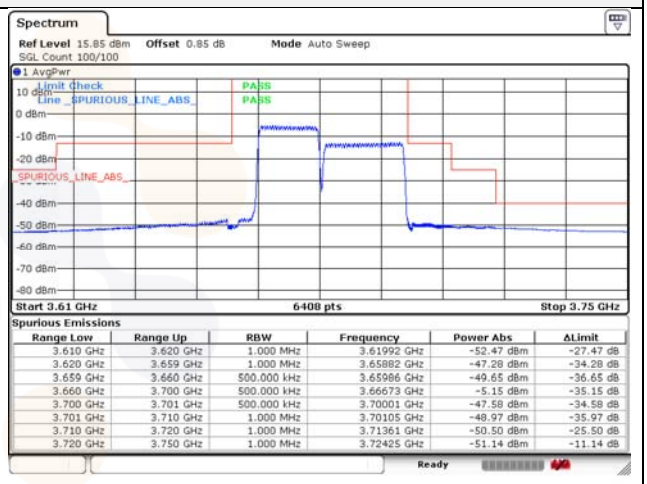
15M + 20M RB1/0 + RB1/99 QPSK High ch.



Spurious Emissions

Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
3.610 GHz	3.620 GHz	1.000 MHz	3.61971 GHz	-53.42 dBm	-28.42 dB
3.620 GHz	3.659 GHz	1.000 MHz	3.65208 GHz	-48.35 dBm	-35.35 dB
3.659 GHz	3.660 GHz	500.000 kHz	3.65981 GHz	-54.33 dBm	-41.33 dB
3.660 GHz	3.700 GHz	500.000 kHz	3.66629 GHz	2.39 dBm	-27.61 dB
3.700 GHz	3.701 GHz	500.000 kHz	3.70001 GHz	-44.82 dBm	-31.82 dB
3.701 GHz	3.710 GHz	1.000 MHz	3.70109 GHz	-51.32 dBm	-38.32 dB
3.710 GHz	3.720 GHz	1.000 MHz	3.71321 GHz	-51.03 dBm	-26.03 dB
3.720 GHz	3.750 GHz	1.000 MHz	3.73127 GHz	-52.43 dBm	-12.43 dB

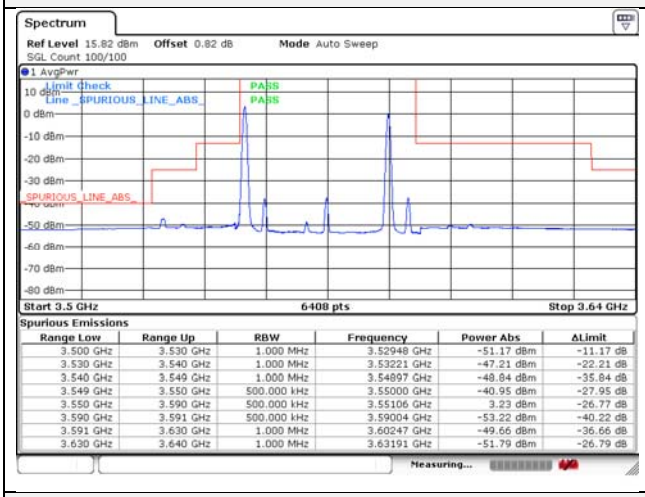
15M + 20M RB75/0 + RB100/0 QPSK High ch.



Spurious Emissions

Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
3.610 GHz	3.620 GHz	1.000 MHz	3.61992 GHz	-52.47 dBm	-27.47 dB
3.620 GHz	3.659 GHz	1.000 MHz	3.65882 GHz	-47.28 dBm	-34.28 dB
3.659 GHz	3.660 GHz	500.000 kHz	3.65986 GHz	-49.65 dBm	-36.65 dB
3.660 GHz	3.700 GHz	500.000 kHz	3.66673 GHz	-5.15 dBm	-35.15 dB
3.700 GHz	3.701 GHz	500.000 kHz	3.70001 GHz	-47.58 dBm	-34.58 dB
3.701 GHz	3.710 GHz	1.000 MHz	3.70105 GHz	-48.97 dBm	-35.97 dB
3.710 GHz	3.720 GHz	1.000 MHz	3.71361 GHz	-50.50 dBm	-25.50 dB
3.720 GHz	3.750 GHz	1.000 MHz	3.72425 GHz	-51.14 dBm	-11.14 dB

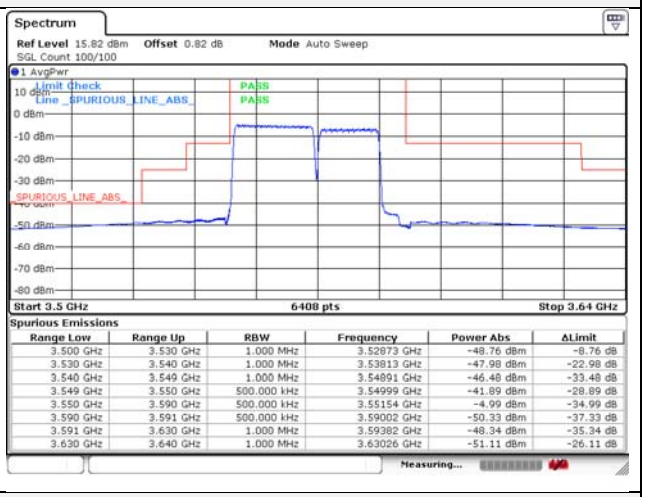
20M + 15M RB1/0 + RB1/74 QPSK Low ch.



Spurious Emissions

Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
3.500 GHz	3.530 GHz	1.000 MHz	3.52948 GHz	-51.17 dBm	-11.17 dB
3.530 GHz	3.540 GHz	1.000 MHz	3.53221 GHz	-47.21 dBm	-22.21 dB
3.540 GHz	3.549 GHz	1.000 MHz	3.54897 GHz	-48.84 dBm	-35.84 dB
3.549 GHz	3.550 GHz	500.000 kHz	3.55000 GHz	-40.95 dBm	-27.95 dB
3.550 GHz	3.590 GHz	500.000 kHz	3.55106 GHz	3.23 dBm	-26.77 dB
3.590 GHz	3.591 GHz	500.000 kHz	3.59004 GHz	-53.22 dBm	-40.22 dB
3.591 GHz	3.630 GHz	1.000 MHz	3.60247 GHz	-49.66 dBm	-36.66 dB
3.630 GHz	3.640 GHz	1.000 MHz	3.63191 GHz	-51.79 dBm	-26.79 dB

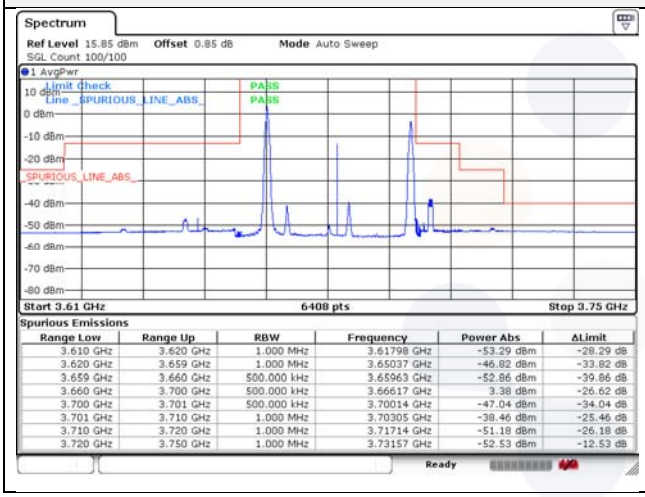
20M + 15M RB100/0 + RB75/0 QPSK Low ch.



Spurious Emissions

Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
3.500 GHz	3.530 GHz	1.000 MHz	3.52873 GHz	-48.76 dBm	-8.76 dB
3.530 GHz	3.540 GHz	1.000 MHz	3.53813 GHz	-47.98 dBm	-22.98 dB
3.540 GHz	3.549 GHz	1.000 MHz	3.54891 GHz	-46.48 dBm	-33.48 dB
3.549 GHz	3.550 GHz	500.000 kHz	3.54999 GHz	-41.89 dBm	-28.89 dB
3.550 GHz	3.590 GHz	500.000 kHz	3.55154 GHz	-4.99 dBm	-34.99 dB
3.590 GHz	3.591 GHz	500.000 kHz	3.59002 GHz	-50.33 dBm	-37.33 dB
3.591 GHz	3.630 GHz	1.000 MHz	3.59382 GHz	-48.34 dBm	-35.34 dB
3.630 GHz	3.640 GHz	1.000 MHz	3.63026 GHz	-51.11 dBm	-26.11 dB

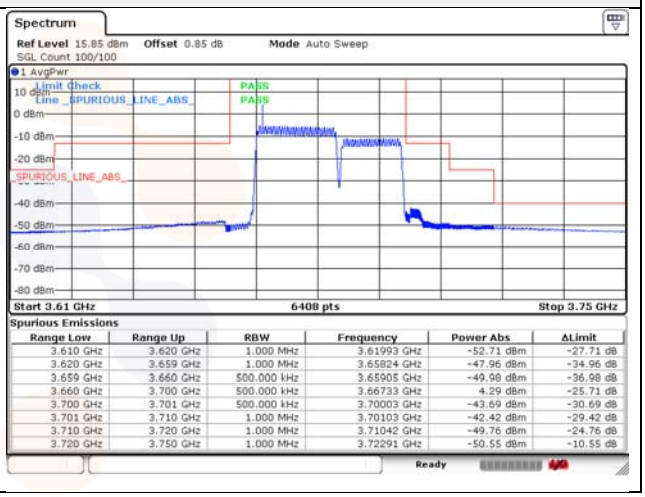
20M + 15M RB1/0 + RB1/74 QPSK High ch.



Spurious Emissions

Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
3.610 GHz	3.620 GHz	1.000 MHz	3.61798 GHz	-53.29 dBm	-28.29 dB
3.620 GHz	3.659 GHz	1.000 MHz	3.65037 GHz	-46.82 dBm	-33.82 dB
3.659 GHz	3.660 GHz	500.000 kHz	3.65963 GHz	-52.86 dBm	-39.86 dB
3.660 GHz	3.700 GHz	500.000 kHz	3.66617 GHz	3.38 dBm	-26.62 dB
3.700 GHz	3.701 GHz	500.000 kHz	3.70014 GHz	-47.04 dBm	-34.04 dB
3.701 GHz	3.710 GHz	1.000 MHz	3.70305 GHz	-38.46 dBm	-25.46 dB
3.710 GHz	3.720 GHz	1.000 MHz	3.71714 GHz	-51.18 dBm	-26.18 dB
3.720 GHz	3.750 GHz	1.000 MHz	3.73157 GHz	-52.53 dBm	-12.53 dB

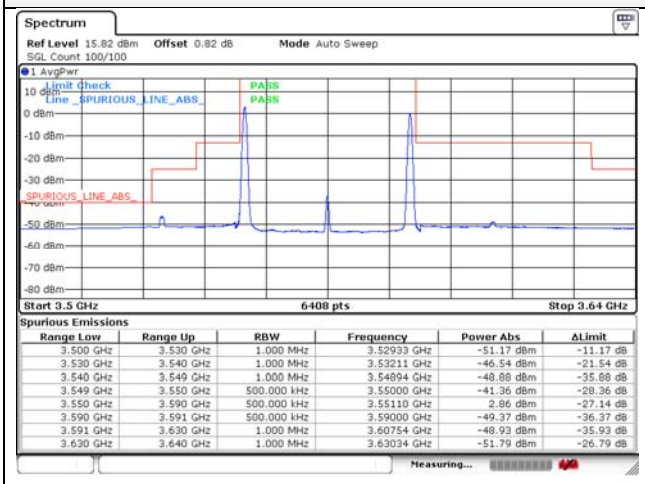
20M + 15M RB100/0 + RB75/0 QPSK High ch.



Spurious Emissions

Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
3.610 GHz	3.620 GHz	1.000 MHz	3.61993 GHz	-52.71 dBm	-27.71 dB
3.620 GHz	3.659 GHz	1.000 MHz	3.65824 GHz	-47.96 dBm	-34.96 dB
3.659 GHz	3.660 GHz	500.000 kHz	3.65905 GHz	-49.98 dBm	-36.98 dB
3.660 GHz	3.700 GHz	500.000 kHz	3.66733 GHz	4.29 dBm	-25.71 dB
3.700 GHz	3.701 GHz	500.000 kHz	3.70003 GHz	-43.69 dBm	-30.69 dB
3.701 GHz	3.710 GHz	1.000 MHz	3.70103 GHz	-42.42 dBm	-29.42 dB
3.710 GHz	3.720 GHz	1.000 MHz	3.71042 GHz	-49.76 dBm	-24.76 dB
3.720 GHz	3.750 GHz	1.000 MHz	3.72291 GHz	-50.55 dBm	-10.55 dB

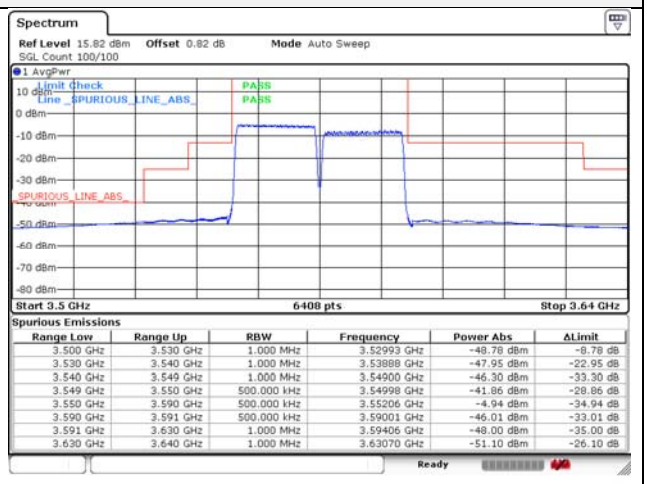
20M + 20M RB1/0 + RB1/99 QPSK Low ch.



Spurious Emissions

Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
3.500 GHz	3.530 GHz	1.000 MHz	3.52933 GHz	-51.17 dBm	-11.17 dB
3.530 GHz	3.540 GHz	1.000 MHz	3.53211 GHz	-46.54 dBm	-21.54 dB
3.540 GHz	3.549 GHz	1.000 MHz	3.54894 GHz	-48.88 dBm	-35.88 dB
3.549 GHz	3.550 GHz	500.000 kHz	3.55000 GHz	-41.36 dBm	-28.36 dB
3.550 GHz	3.590 GHz	500.000 kHz	3.55110 GHz	2.86 dBm	-27.14 dB
3.590 GHz	3.591 GHz	500.000 kHz	3.59000 GHz	-49.37 dBm	-36.37 dB
3.591 GHz	3.630 GHz	1.000 MHz	3.60754 GHz	-48.93 dBm	-35.93 dB
3.630 GHz	3.640 GHz	1.000 MHz	3.63034 GHz	-51.79 dBm	-26.79 dB

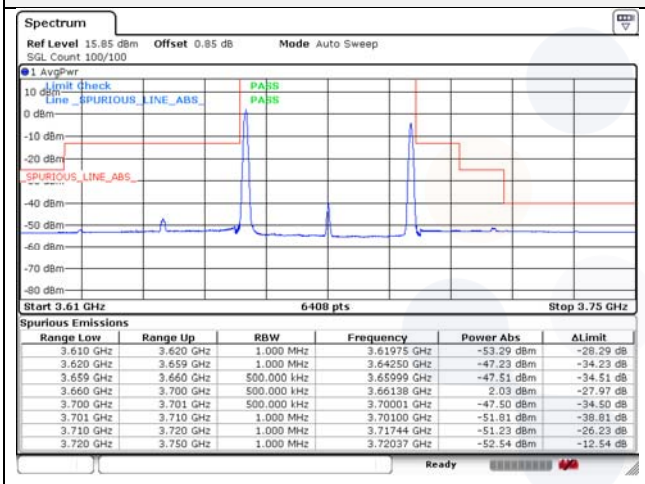
20M + 20M RB100/0 + RB100/0 QPSK Low ch.



Spurious Emissions

Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
3.500 GHz	3.530 GHz	1.000 MHz	3.52993 GHz	-48.78 dBm	-8.78 dB
3.530 GHz	3.540 GHz	1.000 MHz	3.53888 GHz	-47.95 dBm	-22.95 dB
3.540 GHz	3.549 GHz	1.000 MHz	3.54900 GHz	-46.30 dBm	-33.30 dB
3.549 GHz	3.550 GHz	500.000 kHz	3.54998 GHz	-41.86 dBm	-28.86 dB
3.550 GHz	3.590 GHz	500.000 kHz	3.55206 GHz	-4.94 dBm	-34.94 dB
3.590 GHz	3.591 GHz	500.000 kHz	3.59001 GHz	-46.01 dBm	-33.01 dB
3.591 GHz	3.630 GHz	1.000 MHz	3.59406 GHz	-48.00 dBm	-35.00 dB
3.630 GHz	3.640 GHz	1.000 MHz	3.63070 GHz	-51.10 dBm	-26.10 dB

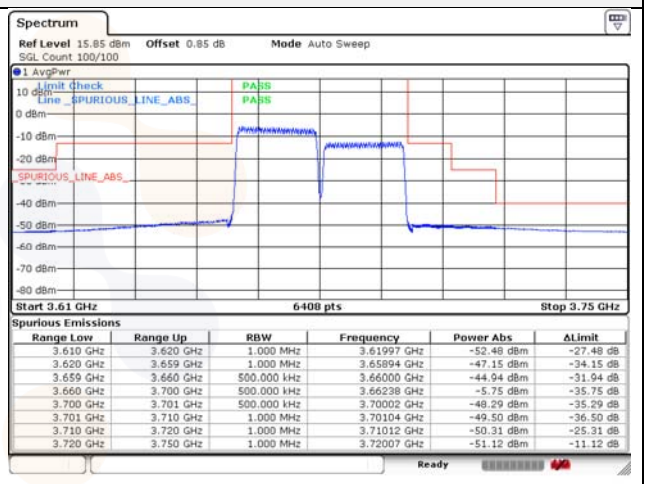
20M + 20M RB1/0 + RB1/99 QPSK High ch.



Spurious Emissions

Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
3.610 GHz	3.620 GHz	1.000 MHz	3.61975 GHz	-53.29 dBm	-28.29 dB
3.620 GHz	3.659 GHz	1.000 MHz	3.64250 GHz	-47.23 dBm	-34.23 dB
3.659 GHz	3.660 GHz	500.000 kHz	3.65999 GHz	-47.51 dBm	-34.51 dB
3.660 GHz	3.700 GHz	500.000 kHz	3.66138 GHz	2.03 dBm	-27.97 dB
3.700 GHz	3.701 GHz	500.000 kHz	3.70001 GHz	-47.50 dBm	-34.50 dB
3.701 GHz	3.710 GHz	1.000 MHz	3.70100 GHz	-51.81 dBm	-38.81 dB
3.710 GHz	3.720 GHz	1.000 MHz	3.71744 GHz	-51.23 dBm	-26.23 dB
3.720 GHz	3.750 GHz	1.000 MHz	3.72037 GHz	-52.54 dBm	-12.54 dB

20M + 20M RB100/0 + RB100/0 QPSK High ch.

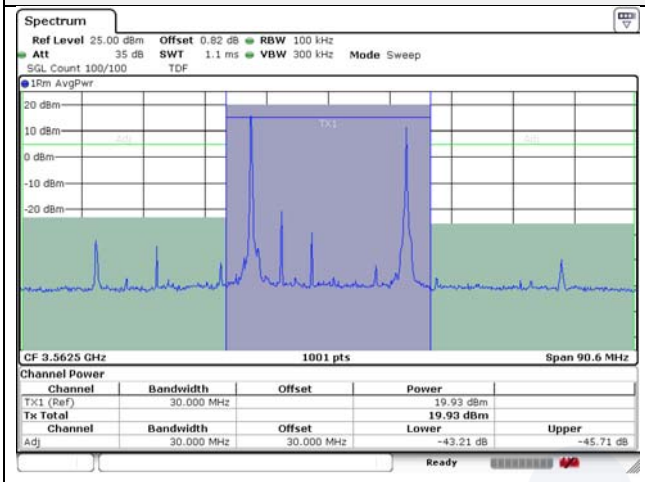
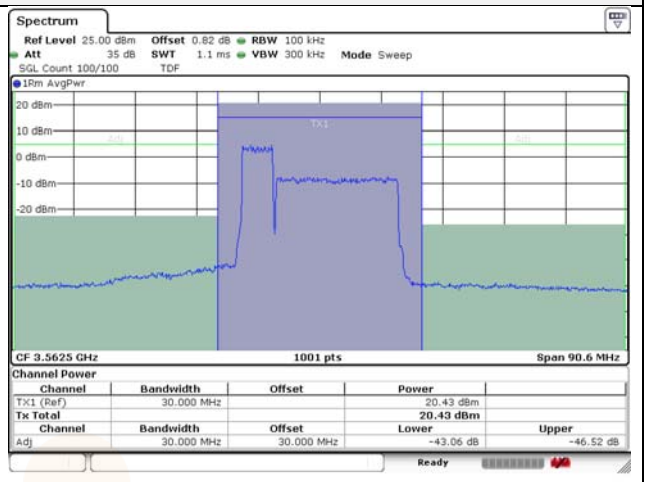
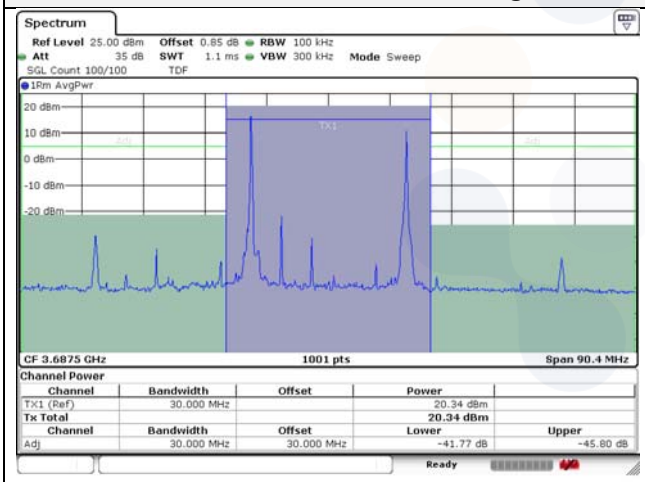
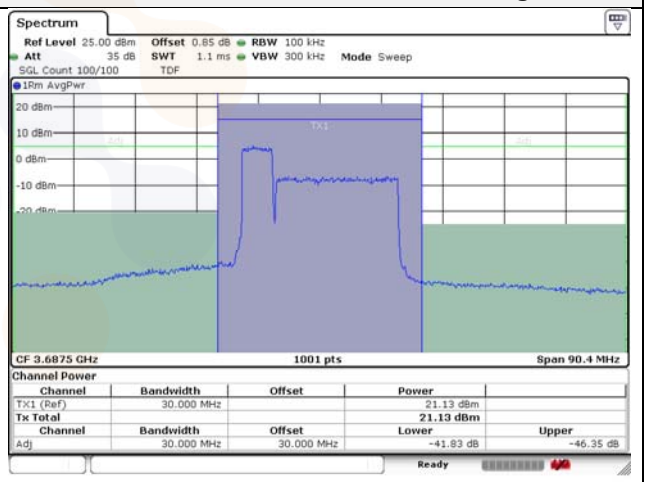


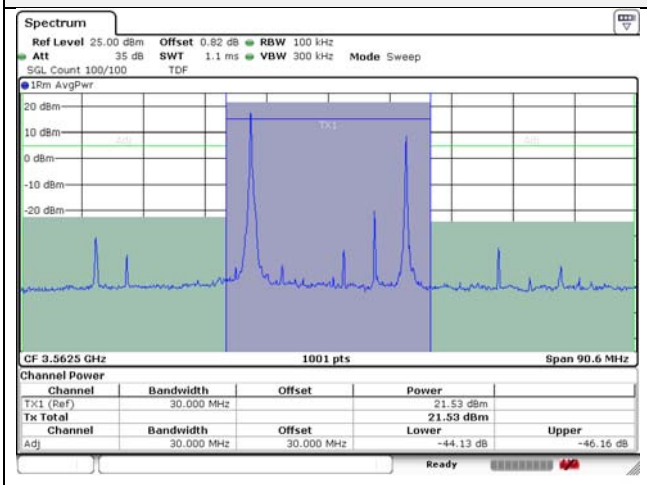
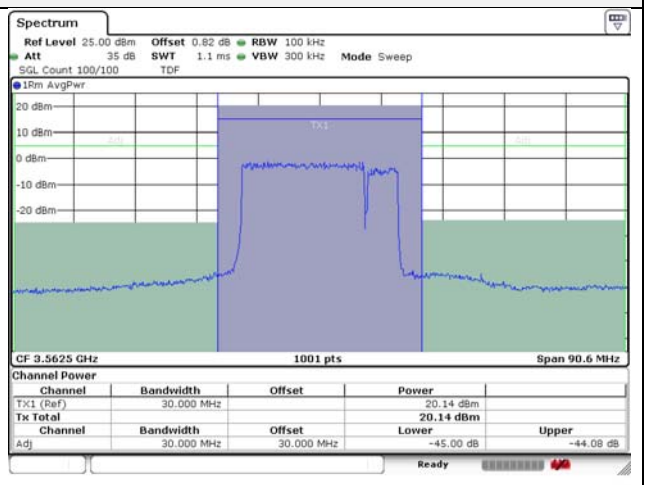
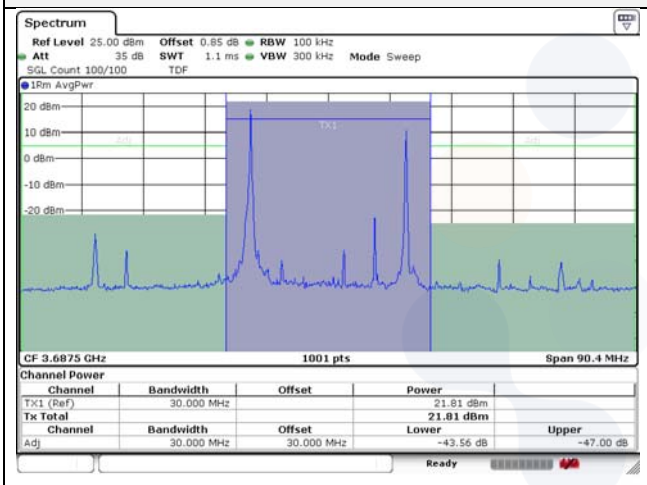
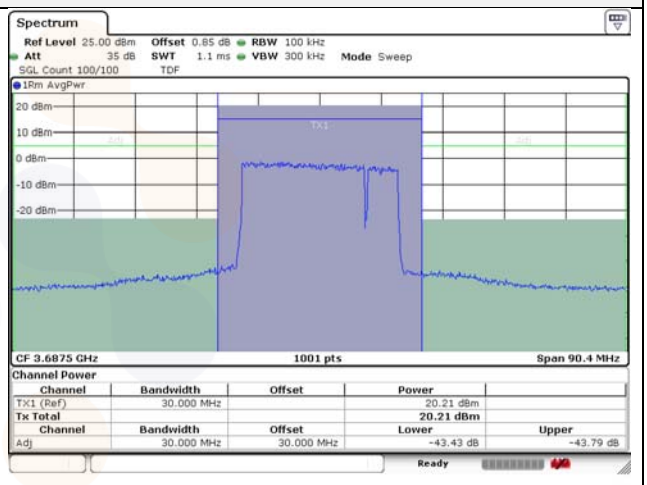
Spurious Emissions

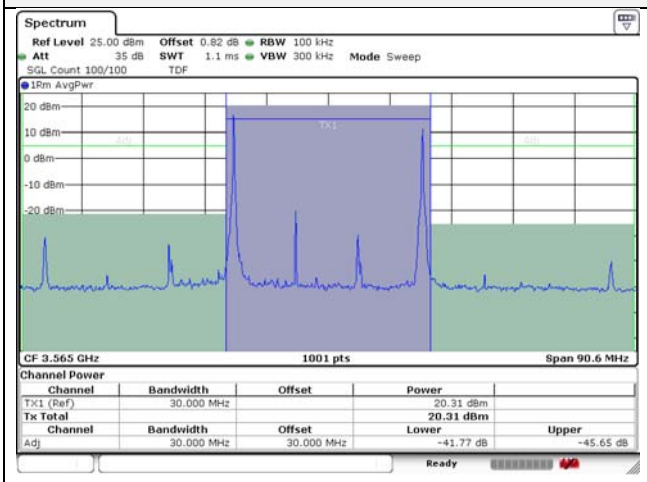
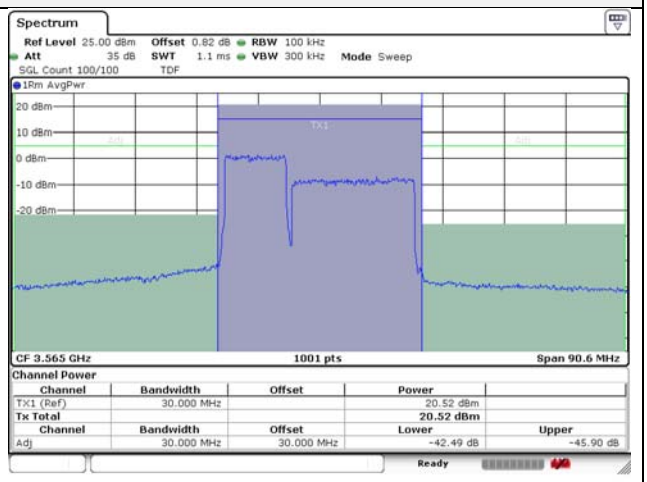
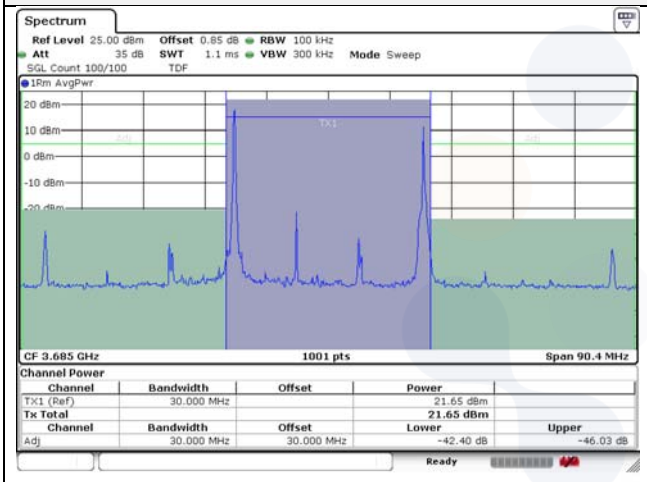
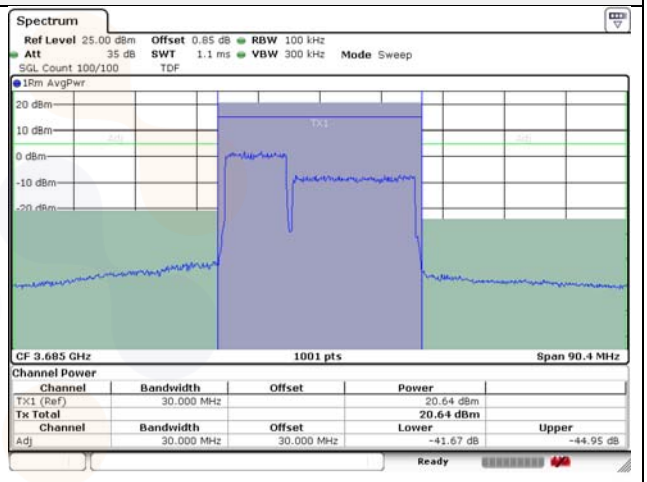
Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
3.610 GHz	3.620 GHz	1.000 MHz	3.61997 GHz	-52.48 dBm	-27.48 dB
3.620 GHz	3.659 GHz	1.000 MHz	3.65894 GHz	-47.15 dBm	-34.15 dB
3.659 GHz	3.660 GHz	500.000 kHz	3.66000 GHz	-44.94 dBm	-31.94 dB
3.660 GHz	3.700 GHz	500.000 kHz	3.66238 GHz	-5.75 dBm	-35.75 dB
3.700 GHz	3.701 GHz	500.000 kHz	3.70002 GHz	-48.29 dBm	-35.29 dB
3.701 GHz	3.710 GHz	1.000 MHz	3.70104 GHz	-49.50 dBm	-36.50 dB
3.710 GHz	3.720 GHz	1.000 MHz	3.71012 GHz	-50.31 dBm	-25.31 dB
3.720 GHz	3.750 GHz	1.000 MHz	3.72007 GHz	-51.12 dBm	-11.12 dB

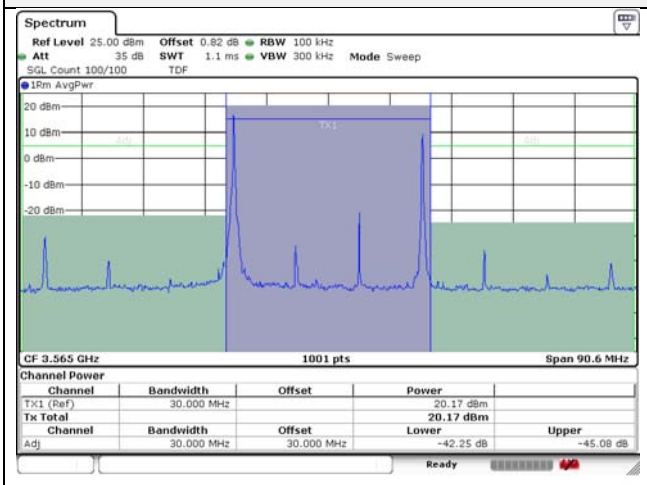
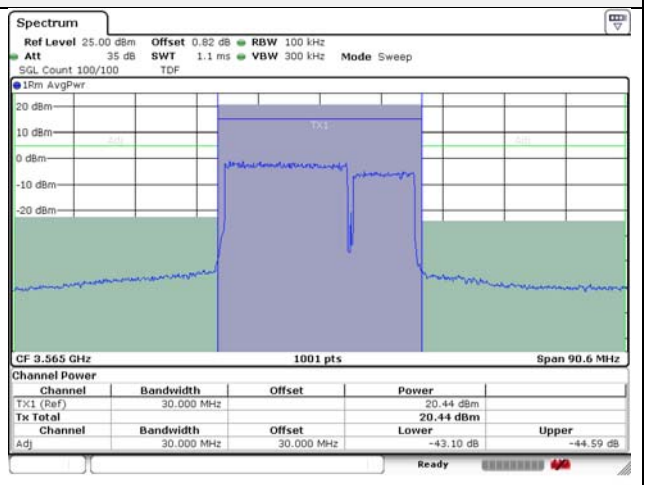
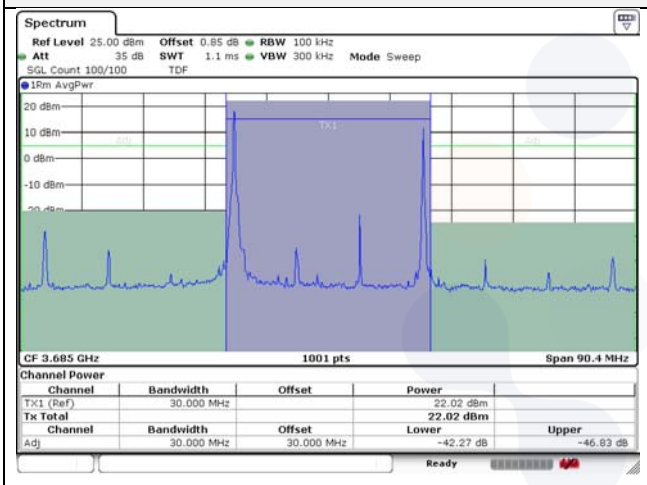
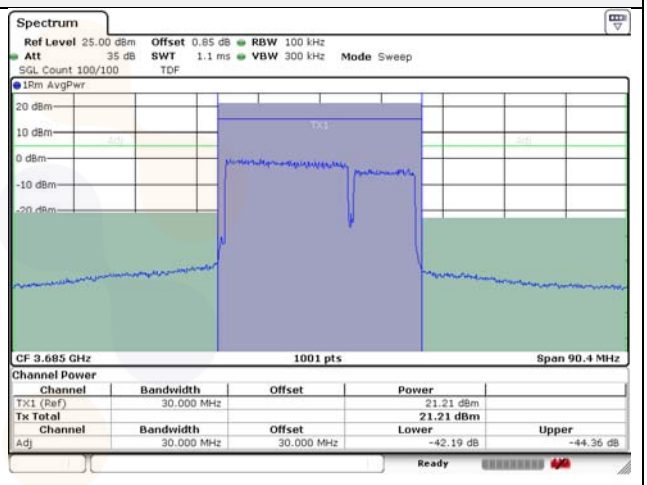
ADJACENT CHANNEL POWER

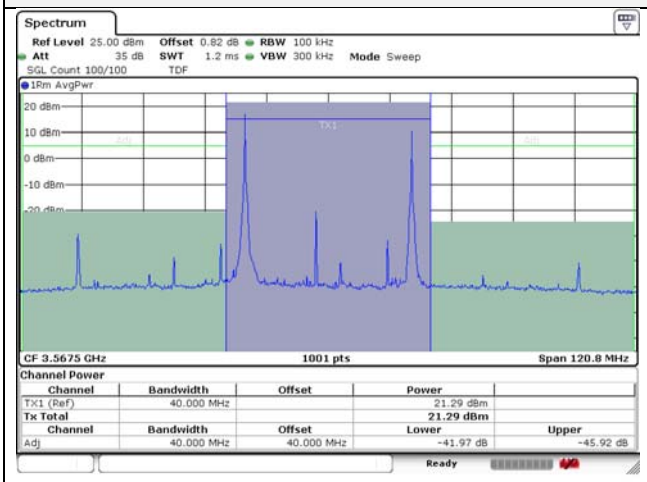
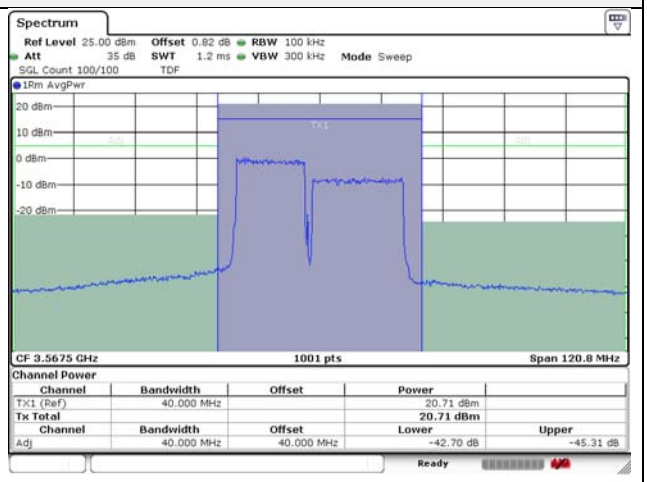
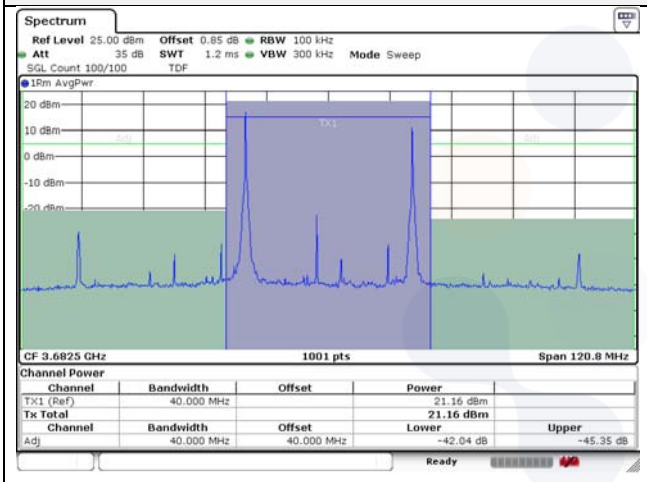
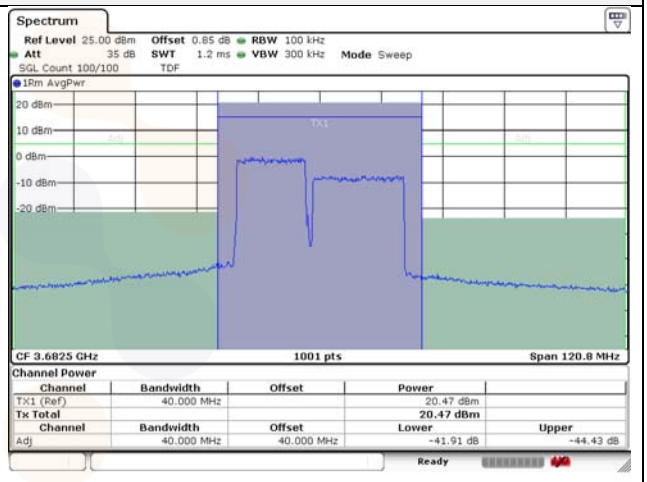
Test mode: LTE ULCA 48C

5M + 20M RB1/0 + RB1/99 QPSK Low ch.	5M + 20M RB25/0 + RB100/0 QPSK Low ch.
	
5M + 20M RB1/0 + RB1/99 QPSK High ch.	**5M + 20M RB25/0 + RB100/0 QPSK High ch.**
	

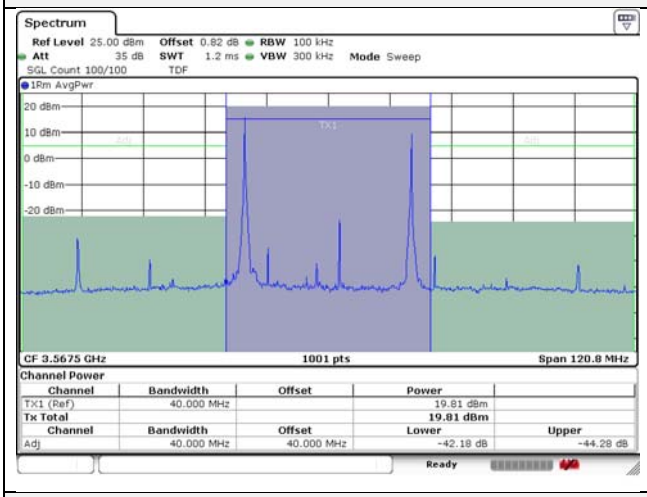
20M + 5M RB1/0 + RB1/24 QPSK Low ch.	20M + 5M RB100/0 + RB25/0 QPSK Low ch.
	
20M + 5M RB1/0 + RB1/24 QPSK High ch.	**20M + 5M RB100/0 + RB25/0 QPSK High ch.**
	

10M + 20M RB1/0 + RB1/99 QPSK Low ch.	10M + 20M RB50/0 + RB100/0 QPSK Low ch.
	
10M + 20M RB1/0 + RB1/99 QPSK High ch.	**10M + 20M RB50/0 + RB100/0 QPSK High ch.**
	

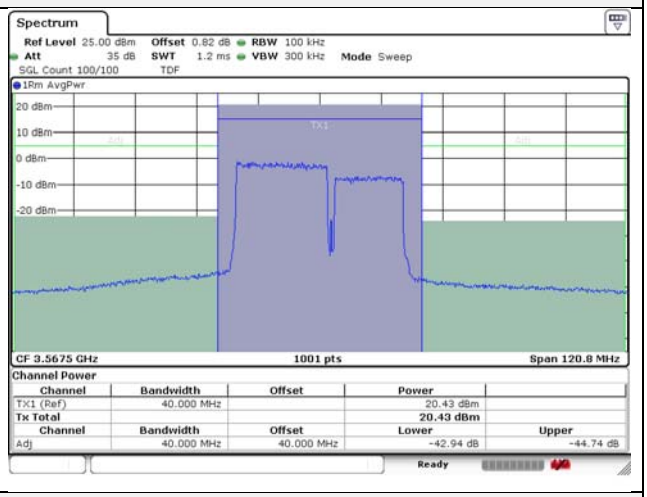
20M + 10M RB1/0 + RB1/49 QPSK Low ch.	20M + 10M RB100/0 + RB50/0 QPSK Low ch.
	
20M + 10M RB1/0 + RB1/49 QPSK High ch.	**20M + 10M RB100/0 + RB50/0 QPSK High ch.**
	

15M + 20M RB1/0 + RB1/99 QPSK Low ch.	15M + 20M RB75/0 + RB100/0 QPSK Low ch.
	
15M + 20M RB1/0 + RB1/99 QPSK High ch.	**15M + 20M RB75/0 + RB100/0 QPSK High ch.**
	

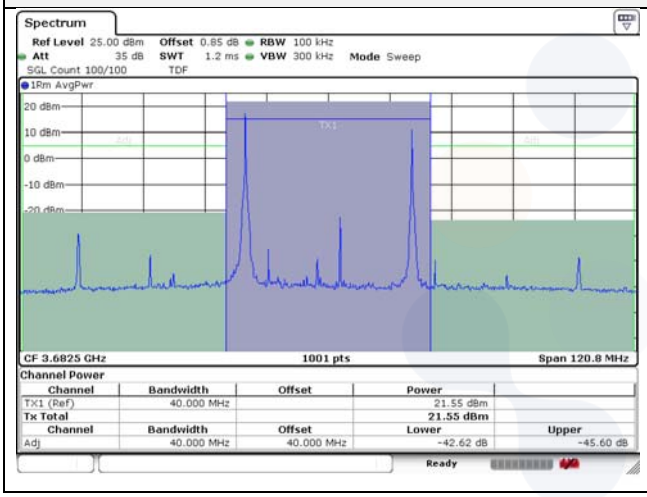
20M + 15M RB1/0 + RB1/74 QPSK Low ch.



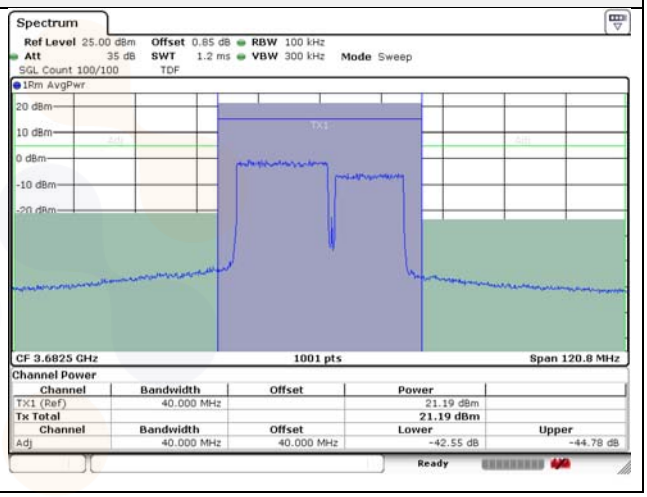
20M + 15M RB100/0 + RB75/0 QPSK Low ch.



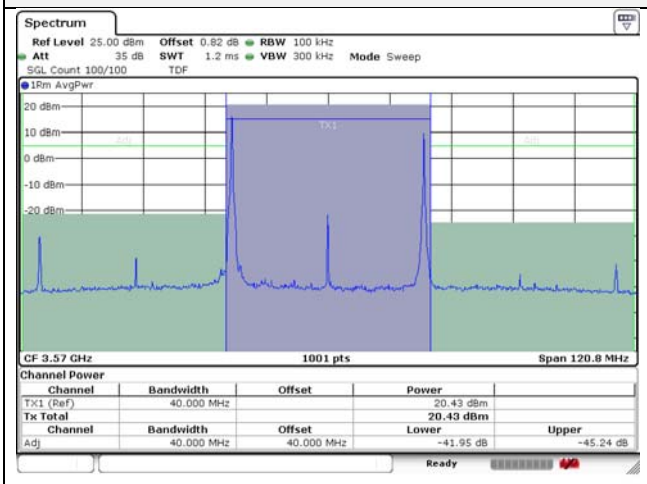
20M + 15M RB1/0 + RB1/74 QPSK High ch.



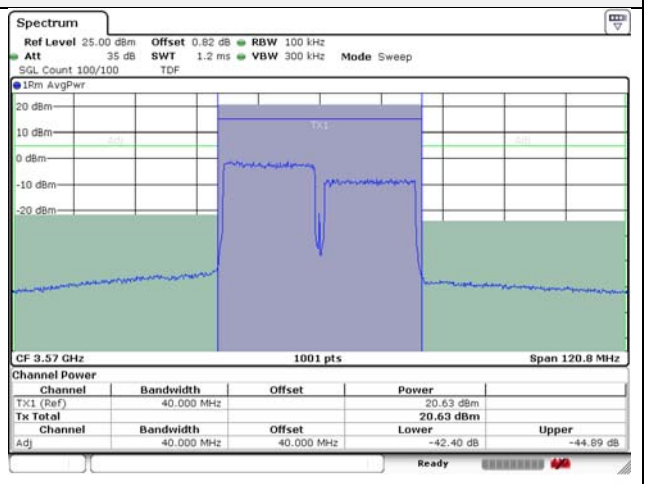
20M + 15M RB100/0 + RB75/0 QPSK High ch.



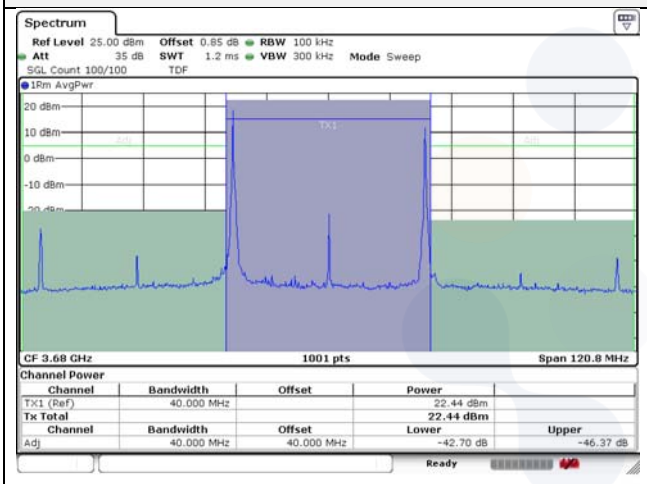
20M + 20M RB1/0 + RB1/99 QPSK Low ch.



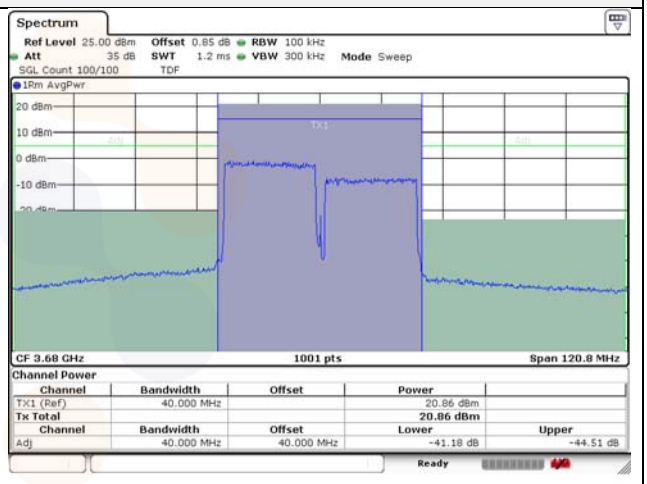
20M + 20M RB100/0 + RB100/0 QPSK Low ch.



20M + 20M RB1/0 + RB1/99 QPSK High ch.

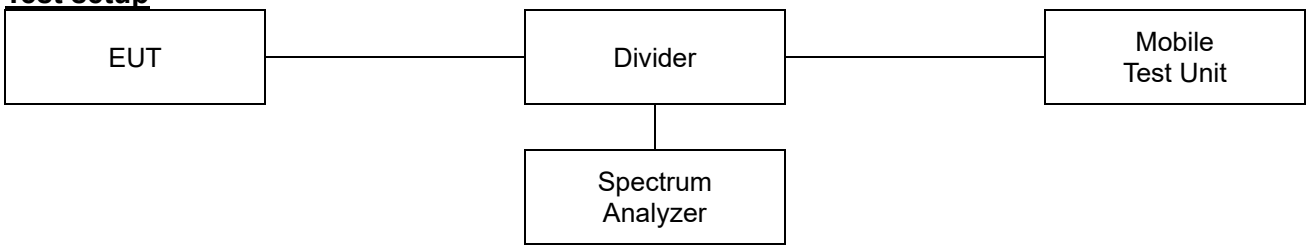


20M + 20M RB100/0 + RB100/0 QPSK High ch.



7.4. Spurious Emissions at Antenna Terminal

Test setup



Limit

According to §96.41(e) The conducted power of emissions below 3530 ㎒ or above 3720 ㎒ shall not exceed −40㏈m/㎒.

Test procedure

971168 D01 v03r01 - Section 6
ANSI 63.26-2015 – Section 5.7

Test settings

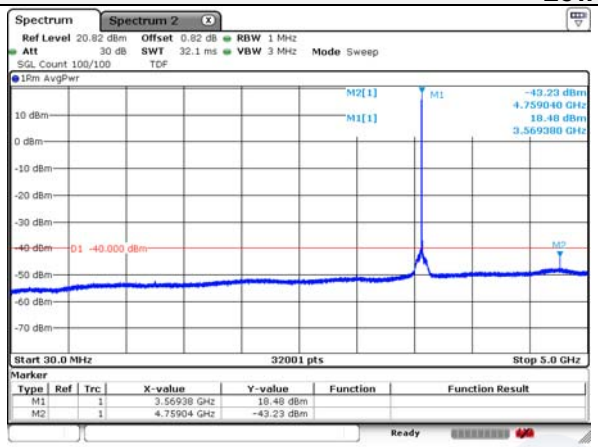
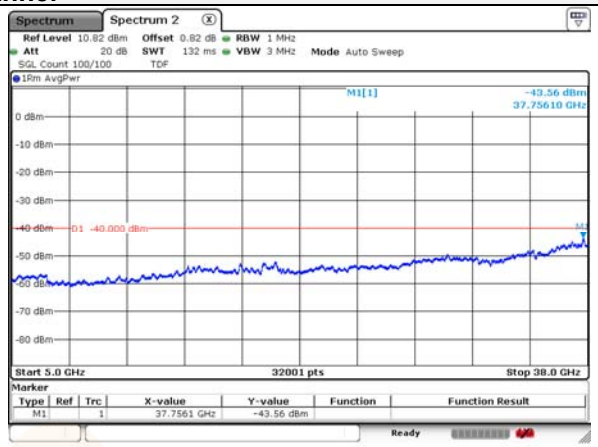
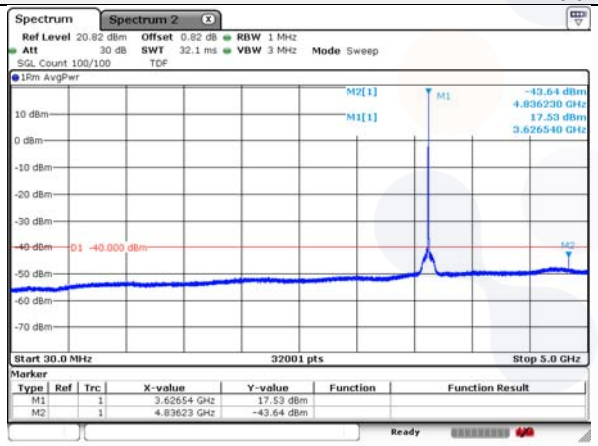
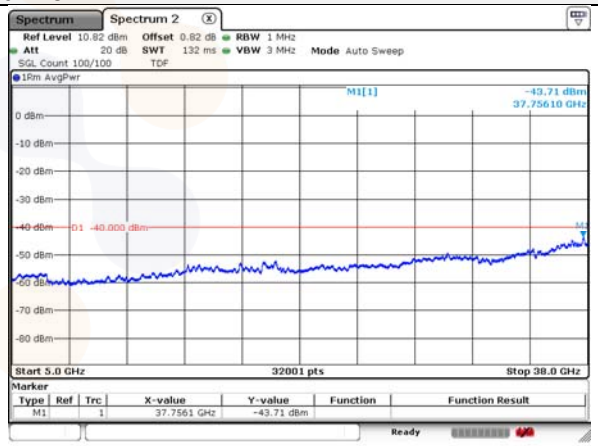
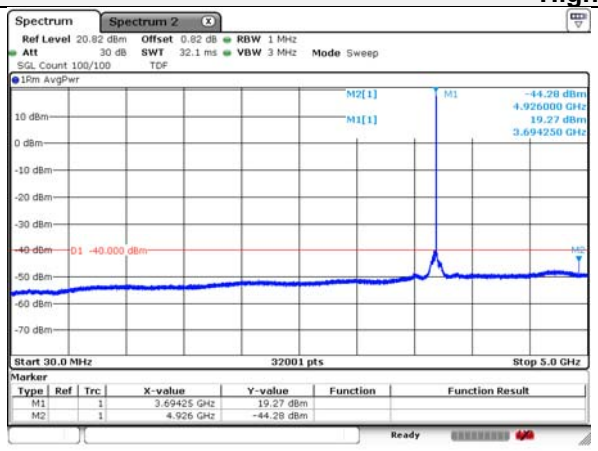
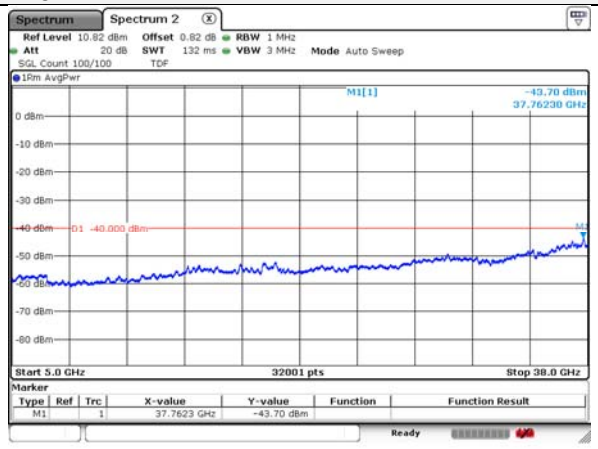
1) Start frequency was set to 30 ㎒ and stop frequency was set to at least 10th the fundamental frequency.
2) Detector = RMS
3) Sweep time = auto couple.
4) Trace mode = trace average
5) Allow trace to fully stabilize.
6) Please see test notes below RBW and VBW settings.

Notes:

1. Per 22.917(b) and RSS-132(5.5), compliance with these provisions is based on the use of measurement instrumentation employing a resolution bandwidth of 100 ㎑ or greater for frequencies less than 1 ㎓ and 1 ㎒ or greater for frequencies greater than 1 ㎓.
   The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 ㏈ below the transmitter power.
2. All modes of operation were investigated and the worst-case configuration results are reported.

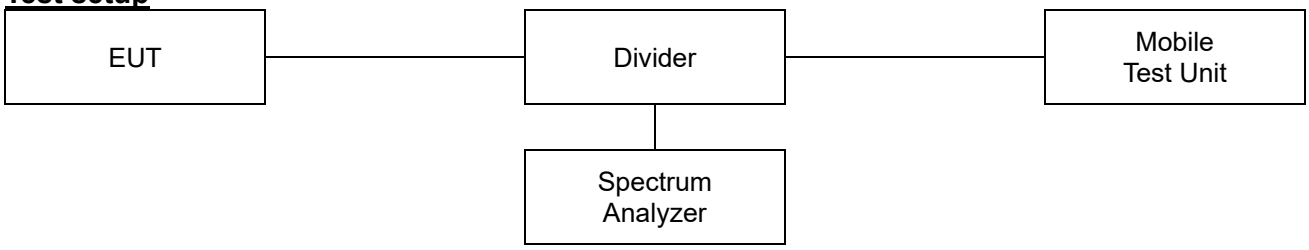
Test results

Test mode: LTE ULCA 48C

20M + 5M RB1/99 + RB1/0 QPSK	
Low channel	
	
20M + 15M RB1/99 + RB1/0 QPSK	
Middle channel	
	
20M + 5M RB1/99 + RB1/0 QPSK	
High channel	
	

7.5. Peak to Average Power Ratio (PAPR)

Test setup



Limit

According to RSS-192(5.5), the peak-to-average ratio(PAR) of the transmission must not exceed 13 dB.

Test procedure

971168 D01 v03r01 - Section 5.7.2
971168 D02 v02r02 – Section VII
ANSI 63.26-2015 – Section 5.2.3.4

Test settings

5.2.3.4 Measurement of peak power in a broadband noise-like signal using CCDF

1) Set resolution/measurement bandwidth ≥ OBW or specified reference bandwidth
2) Set the number of counts to a value that stabilizes the measured CCDF curve.
3) Set the measurement interval as follows:
   a) For continuous transmissions, set to the greater of [10 x (number of points in sweep) x (transmission symbol period)] or 1 ms.
   b) For burst transmissions, employ an external trigger that is synchronized with the EUT burst timing sequence, or use the internal burst trigger with a trigger level that allows the burst to stabilize. Set the measurement internal to a time that is less than or equal to the burst duration.
   c) If there are several carriers in a single antenna port, the peak power shall be determined for each individual carrier (by disabling the other carriers while measuring the required carrier) and the total peak power calculated from the sum of the individual carrier peak powers.
4) Record the maximum PAPR level associated with a probability of 0.1%

5.2.6 Peak-to-average power ratio

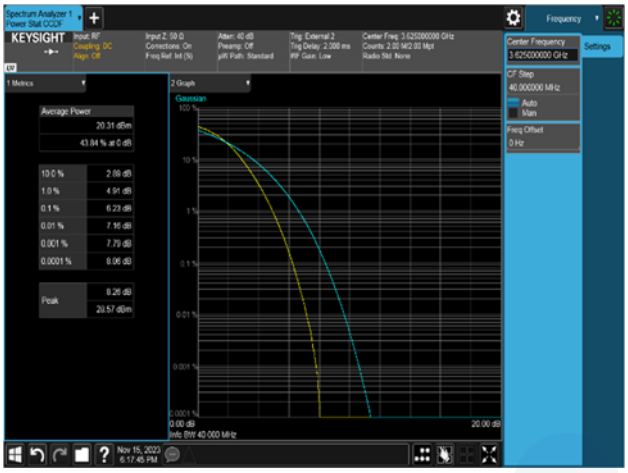
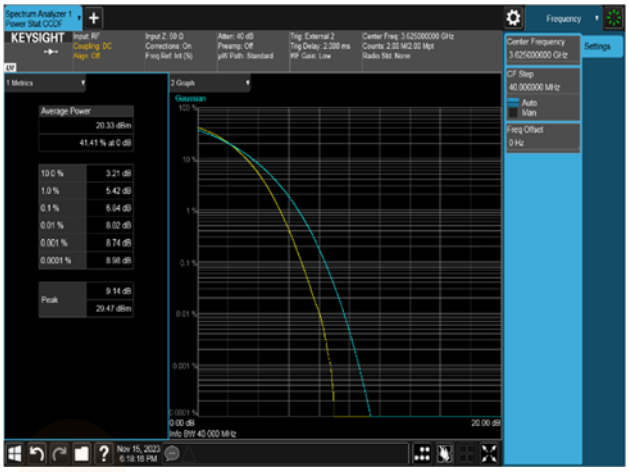
1) Use one of the procedures presented in 5.2(ANSI C63.26-2015) to measure the total peak power and record as P_{PK}.
2) Use one of the applicable procedure presented 5.2(ANSI C63.26-2015) to measure the total average power and record as PAG. Determine the P.A.P.R from:
3) PAPR(dB) = PPK (dBm or dBW) - PAG(dBm or dBW)

Notes:

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

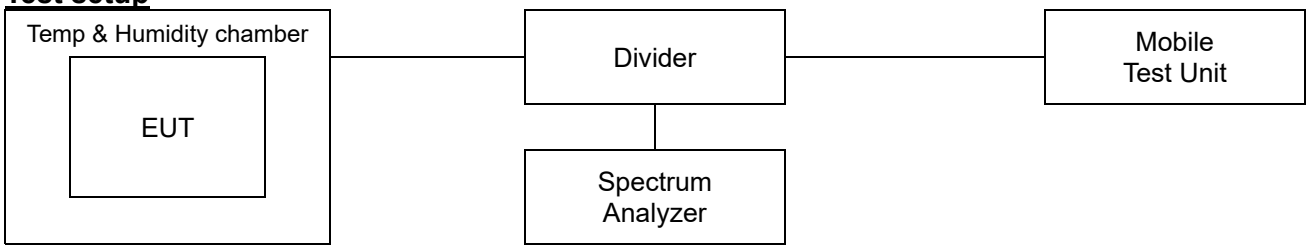
Test results

Test mode: LTE ULCA 48C

20M + 20M RB100/0 + RB100/0 QPSK Mid ch.	20M + 20M RB100/0 + RB100/0 16QAM Mid ch.
	

7.6. Frequency stability

Test setup



Limit

According to §2.1055(a),

The frequency stability shall be measured with variation of ambient temperature as follows:

1) From -30° to + 50° centigrade for all equipment except that specified in paragraphs (a) (2) and (3) of this section.
2) From -20° to + 50° centigrade for equipment to be licensed for use in the maritime services under part 80 of this chapter, except for class A, B, and S emergency position indicating radio beacons (EPIRBS), and equipment to be licensed for use above 952 ㎒ at operational fixed stations in all services, stations in the local television transmission service and point-to-point microwave radio service under part 21 of this chapter, equipment licensed for use aboard aircraft in the aviation services under part 87 of this chapter, and equipment authorized for use in the family radio service under part 95 of this chapter.
3) From 0° to + 50° centigrade for equipment to be licensed for use in the radio broadcast Services under part 73 of this chapter.

According to §2.1055(d),

The frequency stability shall be measured with variation of primary supply Voltage as follows:

1) Vary primary supply voltage from 85 to 115 percent of the nominal value for other than hand carried battery equipment.
2) For hand carried, battery powered equipment, reduce primary supply voltage to the battery operating and point which shall be specified by the manufacturer.
3) The supply voltage shall be measured at the input to the cable normally provided with the equipment, or at the power supply terminals if cables are not normally provided. Effects on frequency of transmitter keying (except for broadcast transmitters) and any heating element cycling at the nominal supply voltage and at each extreme also shall be shown.

Test procedure

ANSI 63.26-2015 – Section 5.6

Test settings

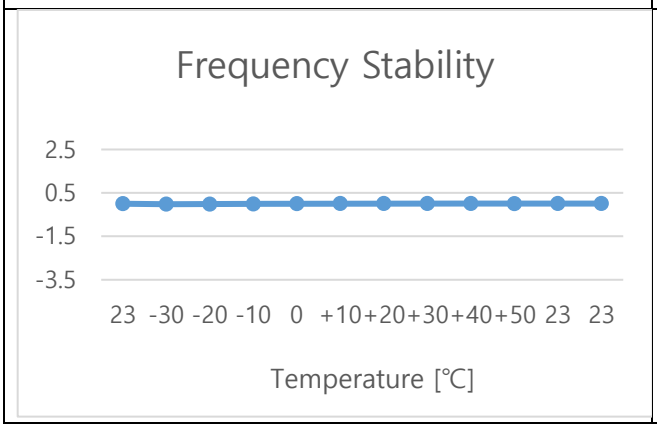
1) The carrier frequency of the transmitter is measured at room temperature. (20°C to provide a reference)
2) The equipment is turned on in a “standby” condition for one minute before applying power to the transmitter. Measurement of the carrier frequency of the transmitter is made within one minute after applying power to the transmitter.
3) Frequency measurements are made at 10°C intervals ranging from -30°C to +50°C. A period of at least one half-hour is provided to allow stabilization of the equipment at each Temperature level.

Test results

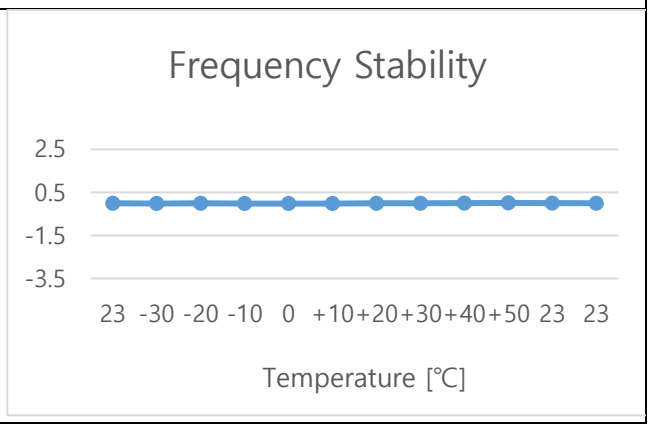
Test mode	:	LTE ULCA 48C	
Component Carrier	:	PCC	SCC
Frequency (㎐)	:	3 615 100 000	3 634 900 000
Channel	:	55891	56089
Bandwidth(㎒)	:	20	20
RB Size/Offset		100/0	100/0
Deviation limit	:	Emissions must remain in band	

Power (V)	Temp. (°C)	PCC				SCC			
		Frequency	Tolerance	Deviation		Frequency	Tolerance	Deviation	
		(㎐)	(㎐)	(ppm)	(%)	(㎐)	(㎐)	(ppm)	(%)
3.85*	+23(Ref)	3,615,100,001	1.23	0.0	0.000 000	3,634,899,996	-4.45	0.0	0.000 000
	-30	3,615,099,992	-8.06	0.0	0.000 000	3,634,899,994	-5.53	0.0	0.000 000
	-20	3,615,099,995	-5.50	0.0	0.000 000	3,634,899,996	-4.03	0.0	0.000 000
	-10	3,615,099,996	-4.19	0.0	0.000 000	3,634,899,993	-7.44	0.0	0.000 000
	0	3,615,100,001	1.04	0.0	0.000 000	3,634,899,991	-9.04	0.0	0.000 000
	+10	3,615,100,004	3.58	0.0	0.000 000	3,634,899,994	-5.69	0.0	0.000 000
	+20	3,615,100,003	2.55	0.0	0.000 000	3,634,899,997	-3.33	0.0	0.000 000
	+30	3,615,100,005	5.09	0.0	0.000 000	3,634,899,997	-2.58	0.0	0.000 000
	+40	3,615,100,004	4.10	0.0	0.000 000	3,634,899,999	-1.08	0.0	0.000 000
	+50	3,615,100,002	1.69	0.0	0.000 000	3,634,900,002	2.44	0.0	0.000 000
4.43*	+23(Ref)	3,615,100,003	3.20	0.0	0.000 000	3,634,900,001	1.09	0.0	0.000 000
3.40*	+23(Ref)	3,615,100,004	4.28	0.0	0.000 000	3,634,899,995	-5.02	0.0	0.000 000

PCC



SCC

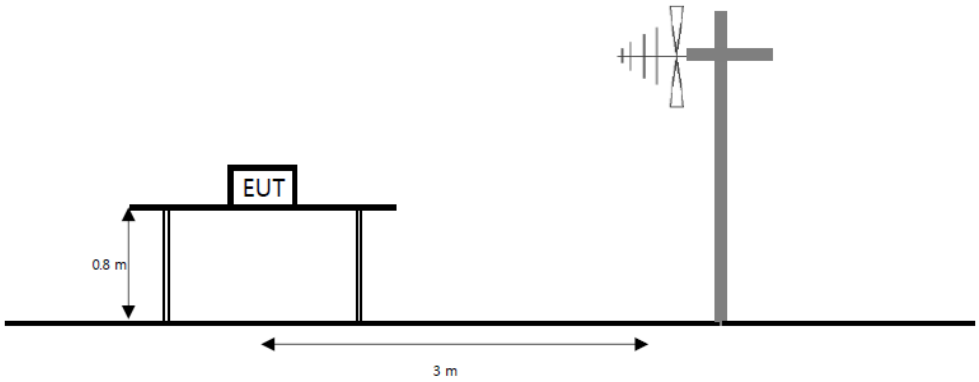


*Battery condition:
- Rated battery status: DC 3.85 V
- 115 % of rated battery status: DC 4.43 V
- End point: DC 3.40 V

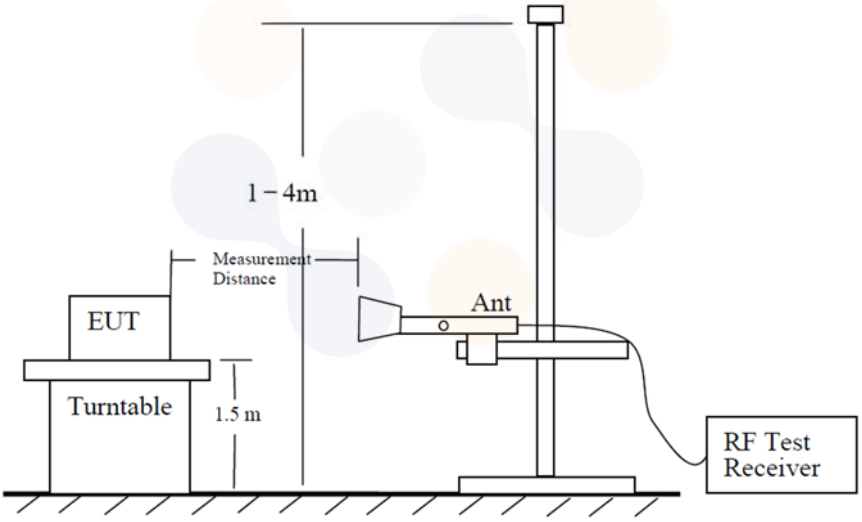
7.7. Radiated Power (ERP/EIRP)

Test setup

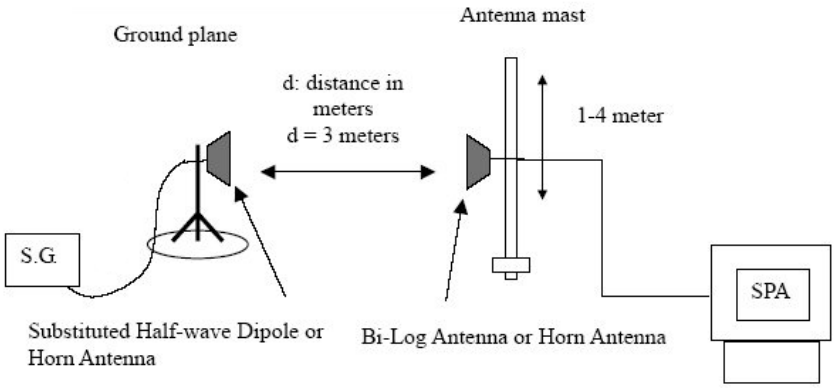
The diagram below shows the test setup that is utilized to make the measurements for emission from 30 ㎒ to 1 ㎓ emissions.



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 §96.41(b), The maximum effective isotropic radiated power (EIRP) of any CBSD and End User Device shall not exceed 23dBm/MHz.

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 ≥ 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.

Notes:

1. On a test site, the EUT shall be placed at 80 cm or 1.5 m 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 ㎓ below) or horn antenna (1 ㎓ 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: LTE ULCA 48C

Modulation: QPSK

Ch.	PCC				SCC				Pol. [V/H]	Antenna Gain [dBi]	C.L [dB]	Substitute Level [dBm]	EIRP	
	BW (MHz)	Freq. (MHz)	RB	RB offset	BW (MHz)	Freq. (MHz)	RB	RB offset					[dBm]	[W]
Low	5	3 553.3	1	24	20	3 565.0	1	0	H	8.40	12.92	23.10	18.58	0.072
	20	3 560.0	1	99	5	3 571.7	1	0	H	8.41	12.92	22.97	18.46	0.070
	10	3 555.5	1	49	20	3 569.9	1	0	H	8.40	12.93	23.06	18.53	0.071
	20	3 560.0	1	99	10	3 574.4	1	0	H	8.41	12.92	23.12	18.61	0.073
	15	3 557.8	1	74	20	3 574.9	1	0	H	8.40	12.93	23.02	18.49	0.071
	20	3 560.0	1	99	15	3 577.1	1	0	H	8.41	12.92	22.75	18.24	0.067
	20	3 560.0	1	99	20	3 579.8	1	0	H	8.41	12.92	22.94	18.43	0.070
Mid	5	3 615.8	1	24	20	3 627.5	1	0	H	8.51	12.88	22.88	18.51	0.071
	20	3 622.5	1	99	5	3 634.2	1	0	H	8.52	12.87	22.80	18.45	0.070
	10	3 615.6	1	49	20	3 630.0	1	0	H	8.51	12.88	22.75	18.38	0.069
	20	3 620.1	1	99	10	3 634.5	1	0	H	8.52	12.87	22.67	18.32	0.068
	15	3 615.3	1	74	20	3 632.4	1	0	H	8.51	12.88	22.47	18.10	0.065
	20	3 617.6	1	99	15	3 634.7	1	0	H	8.51	12.87	22.57	18.21	0.066
	20	3 615.1	1	99	20	3 634.9	1	0	H	8.51	12.88	22.32	17.95	0.062
High	5	3 678.3	1	24	20	3 690.0	1	0	H	8.62	12.30	22.13	18.45	0.070
	20	3 685.0	1	99	5	3 696.7	1	0	H	8.63	12.31	21.88	18.20	0.066
	10	3 675.6	1	49	20	3 690.0	1	0	H	8.62	12.30	21.68	18.00	0.063
	20	3 680.1	1	99	10	3 694.5	1	0	H	8.62	12.30	22.02	18.34	0.068
	15	3 672.9	1	74	20	3 690.0	1	0	H	8.61	12.29	21.27	17.59	0.057
	20	3 675.1	1	99	15	3 692.2	1	0	H	8.62	12.30	21.83	18.15	0.065
	20	3 670.2	1	99	20	3 690.0	1	0	H	8.61	12.29	21.71	18.03	0.064

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

Modulation: 16QAM

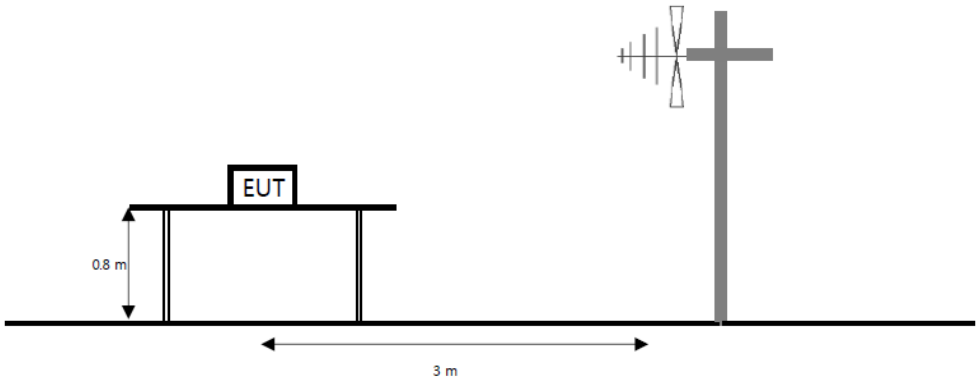
Ch.	PCC				SCC				Pol. [V/H]	Antenna Gain [dBi]	C.L [dB]	Substitute Level [dBm]	EIRP	
	BW (㎒)	Freq. (㎒)	RB	RB offset	BW (㎒)	Freq. (㎒)	RB	RB offset					[dBm]	[W]
Low	5	3 553.3	1	24	20	3 565.0	1	0	H	8.40	12.92	22.19	17.67	0.058
	20	3 560.0	1	99	5	3 571.7	1	0	H	8.41	12.92	21.80	17.29	0.054
	10	3 555.5	1	49	20	3 569.9	1	0	H	8.40	12.93	22.15	17.62	0.058
	20	3 560.0	1	99	10	3 574.4	1	0	H	8.41	12.92	22.21	17.70	0.059
	15	3 557.8	1	74	20	3 574.9	1	0	H	8.40	12.93	22.40	17.87	0.061
	20	3 560.0	1	99	15	3 577.1	1	0	H	8.41	12.92	21.86	17.35	0.054
	20	3 560.0	1	99	20	3 579.8	1	0	H	8.41	12.92	22.01	17.50	0.056
Mid	5	3 615.8	1	24	20	3 627.5	1	0	H	8.51	12.88	21.60	17.23	0.053
	20	3 622.5	1	99	5	3 634.2	1	0	H	8.52	12.87	21.76	17.41	0.055
	10	3 615.6	1	49	20	3 630.0	1	0	H	8.51	12.88	21.64	17.27	0.053
	20	3 620.1	1	99	10	3 634.5	1	0	H	8.52	12.87	21.72	17.37	0.055
	15	3 615.3	1	74	20	3 632.4	1	0	H	8.51	12.88	21.59	17.22	0.053
	20	3 617.6	1	99	15	3 634.7	1	0	H	8.51	12.87	21.39	17.03	0.050
	20	3 615.1	1	99	20	3 634.9	1	0	H	8.51	12.88	21.45	17.08	0.051
High	5	3 678.3	1	24	20	3 690.0	1	0	H	8.62	12.30	21.22	17.54	0.057
	20	3 685.0	1	99	5	3 696.7	1	0	H	8.63	12.31	21.02	17.34	0.054
	10	3 675.6	1	49	20	3 690.0	1	0	H	8.62	12.30	20.85	17.17	0.052
	20	3 680.1	1	99	10	3 694.5	1	0	H	8.62	12.30	20.94	17.26	0.053
	15	3 672.9	1	74	20	3 690.0	1	0	H	8.61	12.29	20.56	16.88	0.049
	20	3 675.1	1	99	15	3 692.2	1	0	H	8.62	12.30	20.89	17.21	0.053
	20	3 670.2	1	99	20	3 690.0	1	0	H	8.61	12.29	20.72	17.04	0.051

Note.
1. E.R.P & E.I.R.P(㏈m) = Substitute Level(㏈) + Antenna gain(㏈d&㏈i) - C.L(Cable loss) (㏈)

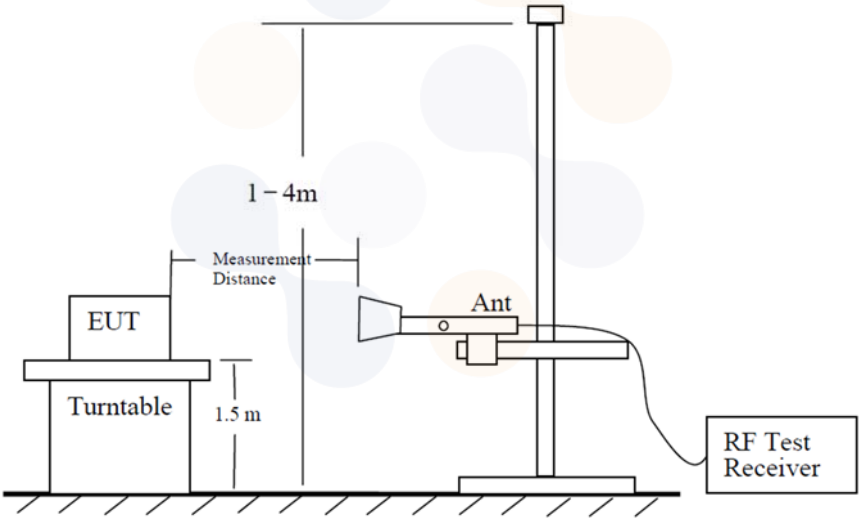
7.8. Radiated Spurious Emissions

Test setup

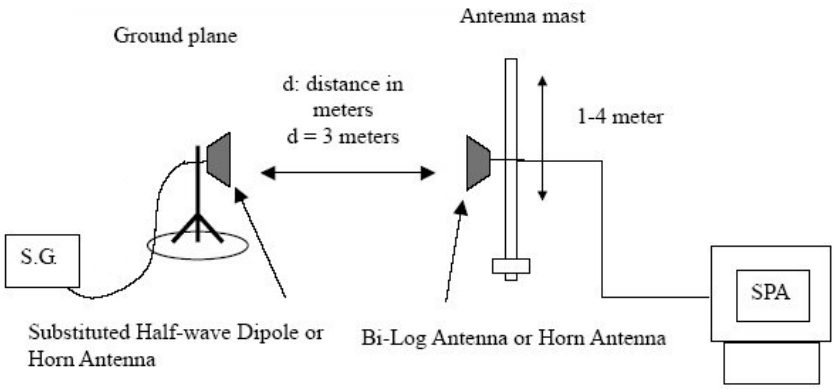
The diagram below shows the test setup that is utilized to make the measurements for emission from 30 ㎒ to 1 ㎓ emissions.



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 §96.41(e) 3.5 GHz Emissions and Interference Limits
(1) General protection levels
(ii) Except as otherwise specified in paragraph (e)(2) of this section, for channel and frequency assignments made by a CBSD to End User Devices, the conducted power of any End User Device emission outside the fundamental emission (whether in or outside of the authorized band) shall not exceed −13 dBm/MHz within 0 to B megahertz (where B is the bandwidth in megahertz of the assigned channel or multiple contiguous channels of the End User Device) above the upper CBSD-assigned channel edge and within 0 to B megahertz below the lower CBSD-assigned channel edge. At all frequencies greater than B megahertz above the upper CBSD assigned channel edge and less than B megahertz below the lower CBSD-assigned channel edge, the conducted power of any End User Device emission shall not exceed −25 dBm/MHz. Notwithstanding the emission limits in this paragraph, the Adjacent Channel Leakage Ratio for End User Devices shall be at least 30 dB.

(2) Additional protection levels. Notwithstanding paragraph (e)(1) of this section, for CBSDs and End User Devices, the conducted power of emissions below 3540 MHz or above 3710 MHz shall not exceed −25 dBm/MHz, and the conducted power of emissions below 3530 MHz or above 3720 MHz shall not exceed −40dBm/MHz.

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 ㎑ for below 1 ㎓ and 1 ㎒ for above 1 ㎓.
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 or 1.5 m 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 ㎓ below) or horn antenna (1 ㎓ 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

Operating Frequency : Low

Test Mode	PCC				SCC			
	BW (㎒)	Freq. (㎒)	RB	RB offset	BW (㎒)	Freq. (㎒)	RB	RB offset
LTE ULCA 48C	20	3 560.0	1	99	10	3 574.4	1	0

Mode	Frequency	Pol.	Antenna Gain	Cable loss	Substitute Level	Level	Limit	Margin
	[㎒]	[V/H]	[dBi]	[dB]	[dBm]	[dBm]	[dBm]	[dB]
QPSK	4 758.91	V	9.96	14.09	-43.27	-47.40	-40.00	7.40
	7 136.88	V	11.59	19.13	-45.66	-53.20	-40.00	13.20
	10 706.70	V	13.20	24.30	-39.30	-50.40	-40.00	10.40
	14 283.71	H	14.23	30.10	-33.43	-49.30	-40.00	9.30
	17 849.22	H	14.10	34.24	-34.36	-54.50	-40.00	14.50

Operating Frequency : Middle

Test Mode	PCC				SCC			
	BW (㎒)	Freq. (㎒)	RB	RB offset	BW (㎒)	Freq. (㎒)	RB	RB offset
LTE ULCA 48C	20	3 620.1	1	99	10	3 634.5	1	0

Mode	Frequency	Pol.	Antenna Gain	Cable loss	Substitute Level	Level	Limit	Margin
	[㎒]	[V/H]	[dBi]	[dB]	[dBm]	[dBm]	[dBm]	[dB]
QPSK	4 839.33	H	10.08	14.64	-45.04	-49.60	-40.00	9.60
	7 260.37	V	11.76	18.90	-44.86	-52.00	-40.00	12.00
	10 886.92	V	13.20	24.70	-38.00	-49.50	-40.00	9.50
	14 522.80	H	14.10	29.77	-34.23	-49.90	-40.00	9.90
	18 151.19	H	11.30	31.26	-31.04	-51.00	-40.00	11.00

Note.

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

Operating Frequency : High

Test Mode	PCC				SCC			
	BW (㎒)	Freq. (㎒)	RB	RB offset	BW (㎒)	Freq. (㎒)	RB	RB offset
LTE ULCA 48C	20	3 680.1	1	99	10	3 694.5	1	0

Mode	Frequency	Pol.	Antenna Gain	Cable loss	Substitute Level	Level	Limit	Margin
	[㎒]	[V/H]	[dBi]	[dB]	[dBm]	[dBm]	[dBm]	[dB]
QPSK	4 919.02	H	10.19	15.31	-44.48	-49.60	-40.00	9.60
	7 380.28	V	11.93	19.42	-44.81	-52.30	-40.00	12.30
	11 071.44	V	13.21	24.56	-37.95	-49.30	-40.00	9.30
	14 763.32	V	14.05	30.85	-33.70	-50.50	-40.00	10.50
	18 447.92	V	11.30	31.66	-30.94	-51.30	-40.00	11.30

Note.

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

8. Measurement equipment

Equipment Name	Manufacturer	Model No.	Serial No.	Next Cal. Date
Spectrum Analyzer	R&S	FSV40-N	101462	24.10.12*
PXA Signal Analyzer	KEYSIGHT	N9040B	US56050101	24.07.03
Spectrum Analyzer	AGILENT	N9040B	US55230151	24.07.03
Vector Signal Generator	R&S	SMBV100A	257566	24.07.04
Signal Generator	R&S	SMB100A	176206	24.01.19
Divider	Marki Microwave, Inc.	PD-0040	D0002	24.07.04
Wideband Radio Communication Tester	R&S	CMW500	141780	24.01.19
Wideband Radio Communication Tester	R&S	CMW500	132120	24.04.25
Temp & Humid Chamber	ESPEC CORP.	SH-642	93016978	24.01.19
High Pass Filter	Wainwright Instruments GmbH	WHKX10-900-1000-15000-40SS	11	24.07.04
High Pass Filter	Wainwright Instruments GmbH	WHKX12-2805-3000-18000-40SS	32	24.07.04
High Pass Filter	Wainwright Instruments GmbH	WHNX10-4050-4500-26500-40CC	SN3	24.10.16*
High Pass Filter	QOTANA TECHNOLOGIES	DBHF0508004000A	20070100016	24.07.04
Bilog Antenna	Teseq GmbH	CBL 6112D	62027	24.11.17**
Bilog Antenna	ETS.LINDGREN	3143B	228420	25.07.20
Horn Antenna	ETS-LINDGREN	3117	251528	24.02.02
Horn Antenna	ETS.LINDGREN	3117	227509	24.07.12
Horn Antenna	ETS-Lindgren	3116	00086635	24.03.20
Horn Antenna	ETS-LINDGREN	3116C	251516	24.02.02
Amplifier	SONOMA INSTRUMENT	310N	421822	24.10.12*
Amplifier	C&K Technologies, Inc.	BZR-00504000-551028-252525	27736	24.07.04
Amplifier	C&K Technologies, Inc.	BZRT-00504000-481055-382525	26299-27735	24.07.04
Antenna Mast	innco systems GmbH	MA4640-XP-ET	N/A	-
Controller	innco systems GmbH	CO3000	1175/4585031 9/P	-

*This equipment was calibrated during the test period, and was used after calibration.
**This equipment was calibrated during the test period, and was used before calibration.

End of test report