

9.3. OUT OF BAND EMISSIONS

RULE PART(S)

FCC: §2.1051, and §96.41(e)

LIMITS

The conducted power of any emissions below 3530 MHz or above 3720 MHz shall not exceed -40 dBm/MHz.

TEST PROCEDURE

Per KDB 971168 D01 Power Meas License Digital Systems v03r01

The RF output of the transmitter was connected to a spectrum analyzer through a calibrated coaxial cable. Sufficient scans were taken to show the out-of-band Emissions, if any, up to 10th harmonic. Multiple sweeps were recorded in maximum hold mode using a peak detector to ensure that the worst-case emissions were caught.

- a) Set the RBW = 100kHz for emission below 1GHz and 1MHz for emissions above 1GHz (Tests were performed 1MHz [Worst case], to sweep 1 time for all frequency range)
- b) Set VBW $\geq 3 \times$ RBW
- c) Sweep time = auto couple;
- d) Detector = RMS;
- e) Ensure that the number of measurement points = Max (40001);
- f) Trace mode = Average(FDD), Max hold(TDD);

OUT OF BAND EMISSIONS RESULTS

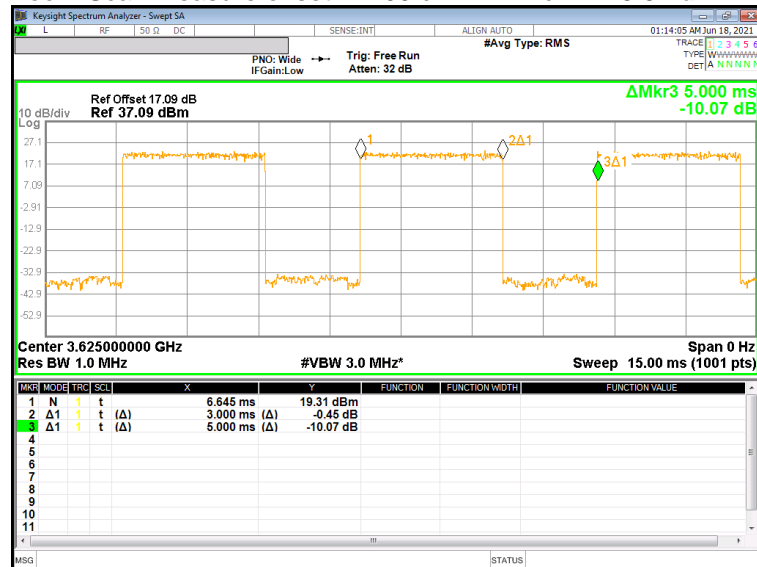
See the following pages.

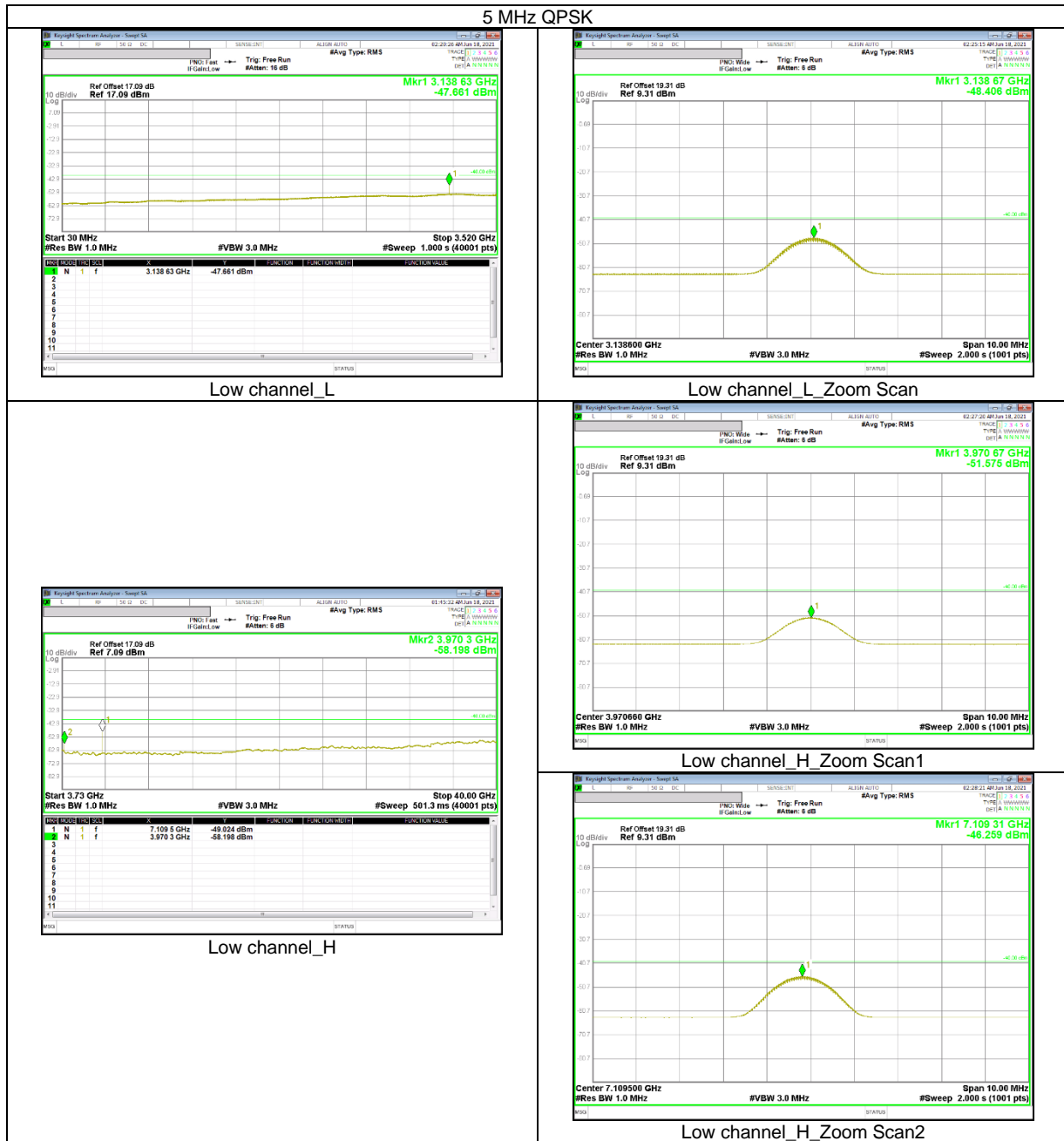
NOTE : Please refer to section 5.4 for bandwidth and RB setting about LTE bands.

Note. For LTE B48 Spurious Emission (Gate trigger off)

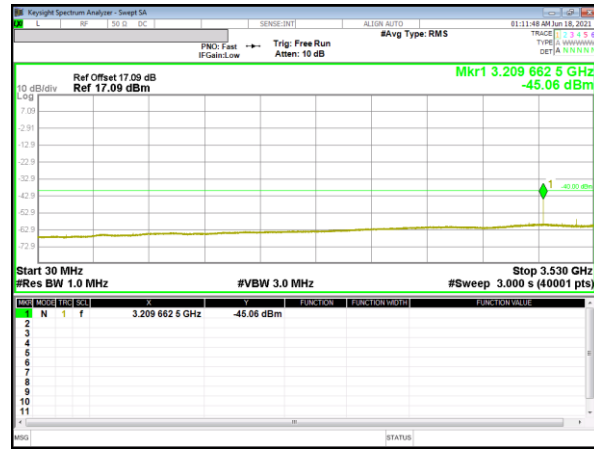
RF Path Loss: 17.09 dB & DCF 2.22 dB: $10\log(3/5)$

Zoom Scan Measure offset: 17.09 dB + 2.22 dB = **19.31 dB**

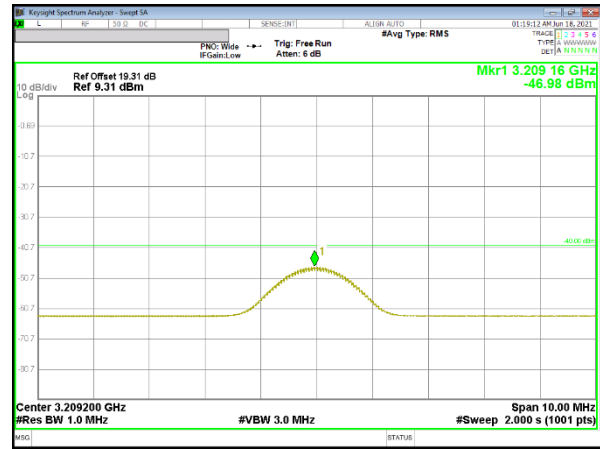




5 MHz QPSK



Mid channel_L



Mid channel_L_Zoom Scan



Mid channel_H



Mid channel_H_Zoom Scan1

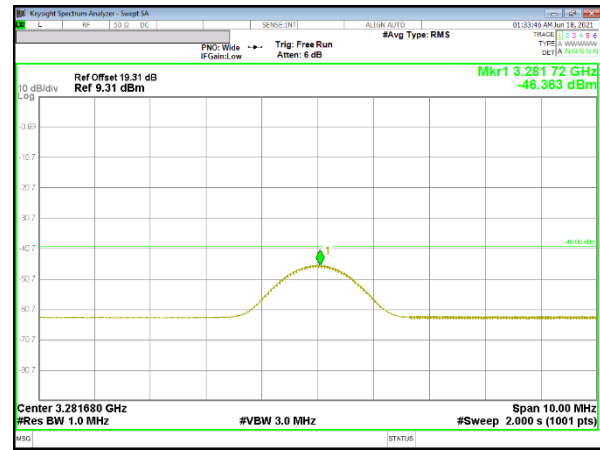


Mid channel_H_Zoom Scan2

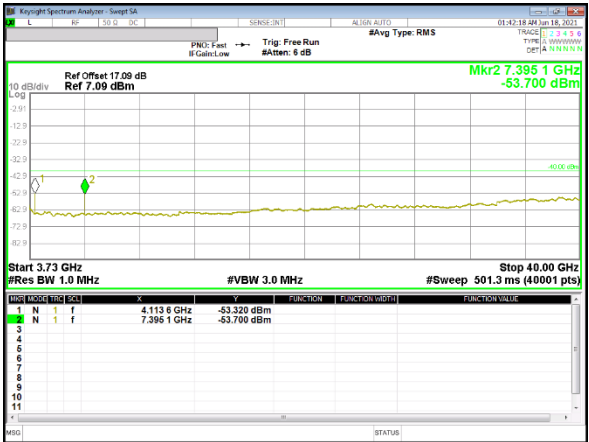
5 MHz QPSK



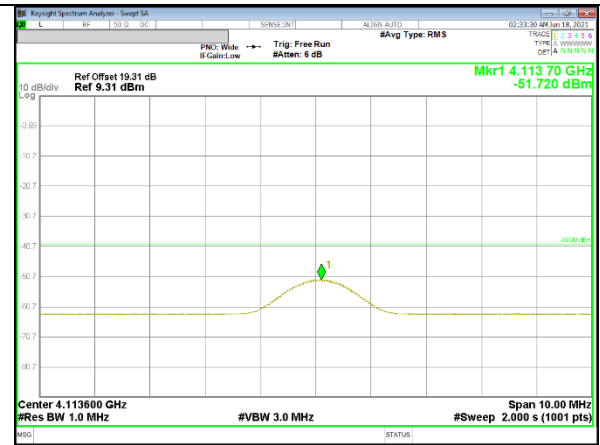
High channel_L



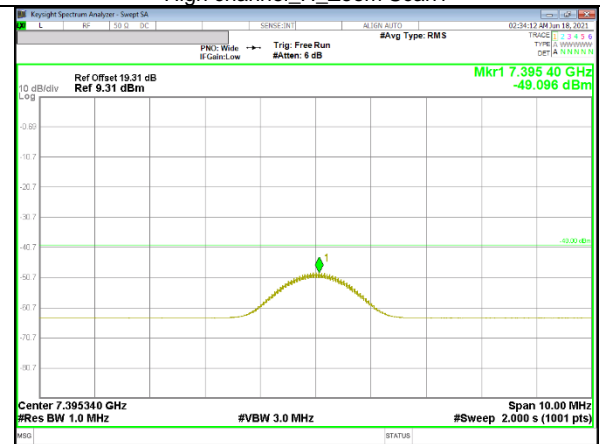
High channel_L_Zoom Scan



High channel_H



High channel_H_Zoom Scan1



High channel_H_Zoom Scan2

9.4. FREQUENCY STABILITY

RULE PART(S)

FCC: §2.1055

LIMITS

For Part 96, the frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block.

TEST PROCEDURE

Per KDB 971168 D01 Power Meas License Digital Systems v03r01

RESULTS

LTE Band 48(Lowest Frequency: QPSK / Highest Frequency: QPSK)

Limit		3550	3700	Delta (Hz)	Frequency Stability (ppm)
Condition		F low @ End of OBW	F high @ End of OBW		
Temperature	Voltage	(MHz)	(MHz)		
Normal (20C)	Normal	3550.2630	3699.7405		
Extreme (50C)		3550.2630	3699.7405	32.6	0.009
Extreme (40C)		3550.2630	3699.7405	-27.0	-0.007
Extreme (30C)		3550.2630	3699.7405	31.1	0.009
Extreme (10C)		3550.2631	3699.7406	56.8	0.016
Extreme (0C)		3550.2630	3699.7405	44.3	0.012
20C		3.4 V	3550.2630	3699.7405	24.8
	3.2 V	3550.2630	3699.7406	54.2	0.015

9.5. END USER DEVICE(CBSD PROTOCOL)

RULE PART(S)

FCC: §96.47

LIMITS

End user devices may operate only if they can positively receive and decode an authorization signal transmitted by a CBSD, including the frequencies and power limits for their operation.

An end user device must discontinue operations, change frequencies, or change its operational power level within 10 seconds of receiving instructions from its associated CBSD.

TEST PROCEDURE

Per KDB 940660 D01 Part 96 CBRS Eqpt v03

RESULTS

Not performed.

Please refer to test report(Report number: 4789899747-E10)

9.6. RADIATED POWER (ERP & EIRP)

RULE PART(S)

FCC: §96.41(b)

LIMITS

Device	Maximum EIRP (dBm/10 megahertz)	Maximum PSD (dBm/MHz)
End User Device	23	n/a
Category A CBSD	30	20
Category B CBSD ¹	47	37

TEST PROCEDURE

ANSI / TIA / EIA 603 E Clause 2.2.17; ESU40 setting reference to 971168 D01 v03r01

For radiated output power measurement with a ESU40:

- a) Set the RBW \geq OBW;
- b) Set VBW \geq 3 \times RBW;
- c) Set span \geq 2 \times RBW;
- d) Sweep time = auto couple;
- e) Detector = rms;
- f) Ensure that the number of measurement points \geq 2 \times span/RBW;
- g) Trace mode = Average(LTE);

TEST RESULTS

RF Output Power(total power) EIRP results meets Maximum EIRP limit (23 dBm/10MHz) of End User Device.

9.6.1. ERP/EIRP Results

LTE Band 48

ERP / EIRP	Band	Frequency Range [MHz]		Max. Conducted Power [dBm]	Allowed Max. Antenna Gain [dBi]	Max. ERP/EIRP		Limit [W]
						[dBm]	[mW]	
EIRP	LTE 48	3552.50	3697.50	22.26	0.00	22.26	168.267	0.20

9.7. FIELD STRENGTH OF SPURIOUS RADIATION

RULE PART(S)

FCC: §2.1053 and §96.41(e)

LIMIT

The conducted power of any emissions below 3530 MHz or above 3720 MHz shall not exceed -40 dBm/MHz.

TEST PROCEDURE

ANSI / TIA / EIA 603 E Clause 2.2.12; ESU40 setting reference to 971168 D01 v03r01
For peak power measurement with a ESU40:

- a) Set the RBW = 100 kHz for emission below 1GHz and 1MHz for emissions above 1GHz
- b) Set VBW $\geq 3 \times$ RBW;
- c) Sweep time = auto couple;
- d) Detector = rms;
- e) Ensure that the number of measurement points \geq span/RBW;
- f) Trace mode = Average(FDD), Max hold(TDD);

RESULTS

See the following pages.

NOTE : Please refer to section 5.4 for bandwidth and RB setting about LTE.

9.7.1. SPURIOUS RADIATION PLOTS

LTE Band 48

		UL Verification Services, Inc. Above 1GHz High Frequency Substitution Measurement							
		Company:	Samsung						
		Project #:	4789899747						
		Date:	2021-06-07						
		Test Engineer:	19227						
		Configuration:	EUT, Y-Position						
		Location:	Chamber 1						
		Mode:	LTE_QPSK Band 48 Harmonics, 5MHz Bandwidth						
		Test Voltage:	AC 120 V, 60 Hz						
f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch, 3552.5MHz									
7105.00	-16.5	V	3.0	44.4	1.0	-59.8	-40.0	-19.8	
10657.50	-24.4	V	3.0	42.4	1.0	-65.8	-40.0	-25.8	
14210.00	-16.9	V	3.0	44.7	1.0	-60.6	-40.0	-20.6	
7105.00	-17.3	H	3.0	44.4	1.0	-60.7	-40.0	-20.7	
10657.50	-24.1	H	3.0	42.4	1.0	-65.5	-40.0	-25.5	
14210.00	-17.1	H	3.0	44.7	1.0	-60.8	-40.0	-20.8	
Mid Ch, 3625MHz									
7250.00	-20.0	V	3.0	44.3	1.0	-63.3	-40.0	-23.3	
10875.00	-22.0	V	3.0	42.5	1.0	-63.5	-40.0	-23.5	
14500.00	-16.4	V	3.0	45.0	1.0	-60.4	-40.0	-20.4	
7250.00	-13.0	H	3.0	44.3	1.0	-56.3	-40.0	-16.3	
10875.00	-22.1	H	3.0	42.5	1.0	-63.6	-40.0	-23.6	
14500.00	-16.5	H	3.0	45.0	1.0	-60.5	-40.0	-20.5	
High Ch, 3697.5MHz									
7395.00	-15.6	V	3.0	44.2	1.0	-58.8	-40.0	-18.8	
11092.50	-20.8	V	3.0	42.6	1.0	-62.3	-40.0	-22.3	
14790.00	-15.7	V	3.0	45.2	1.0	-59.9	-40.0	-19.9	
7395.00	-14.3	H	3.0	44.2	1.0	-57.5	-40.0	-17.5	
11092.50	-21.0	H	3.0	42.6	1.0	-62.6	-40.0	-22.6	
14790.00	-15.6	H	3.0	45.2	1.0	-59.8	-40.0	-19.8	

5MHz
QPSK

END OF TEST REPORT