6.6. Band Edge Compliance

Reference

Rule RSS-132: 5.5: (i) In the first 1.0 MHz band immediately outside and adjacent to each of the sub-bands specified in Section 5.1, the power of emissions per any 1% of the occupied bandwidth shall be attenuated (in dB) below the transmitter output power P (dBW) by at least 43 + 10 log10 p (watts).

(ii)After the first 1.0 MHz immediately outside and adjacent to each of the sub-bands, the power of emissions in any 100 kHz bandwidth shall be attenuated (in dB) below the transmitter output power P (dBW) by at least 43 + 10 log10 p (watts). If the measurement is performed using 1% of the occupied bandwidth, power integration over 100 kHz is required. Limit -13 dBm

Rule RSS-133 6.5 specifies that " In the 1.0 MHz bands immediately outside and adjacent to the equipment's operating frequency block, the emission power per any 1% of the emission bandwidth shall be attenuated (in dB) below the transmitter output power P (dBW) by at least 43 + 10 log10 p(watts).

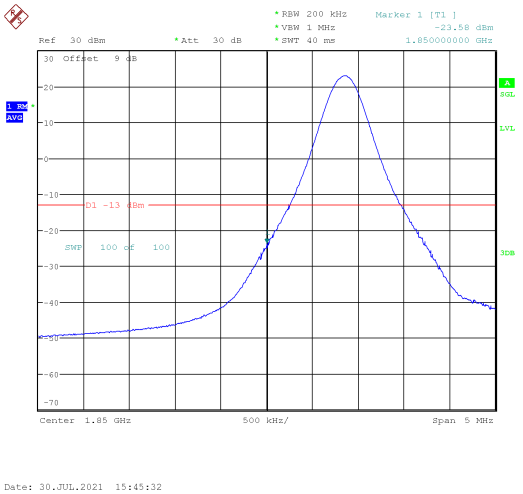
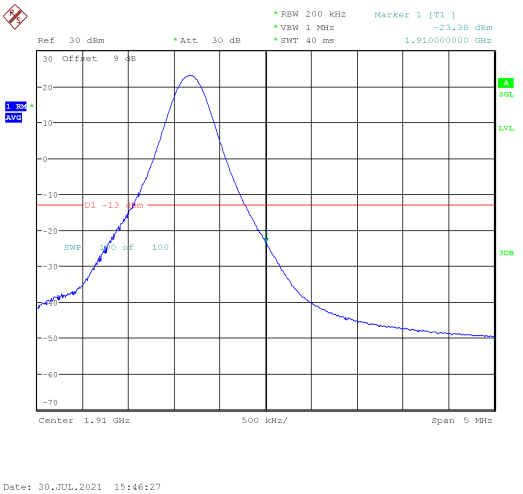
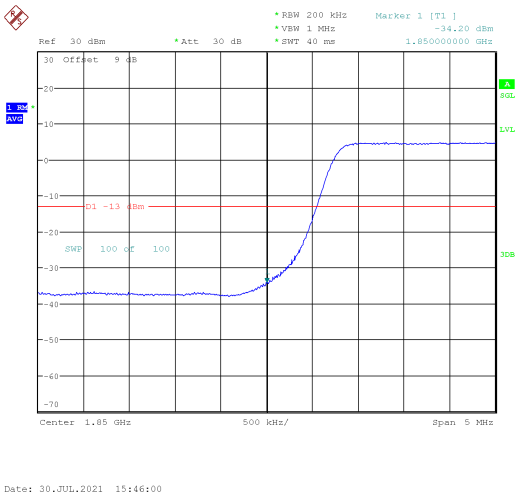
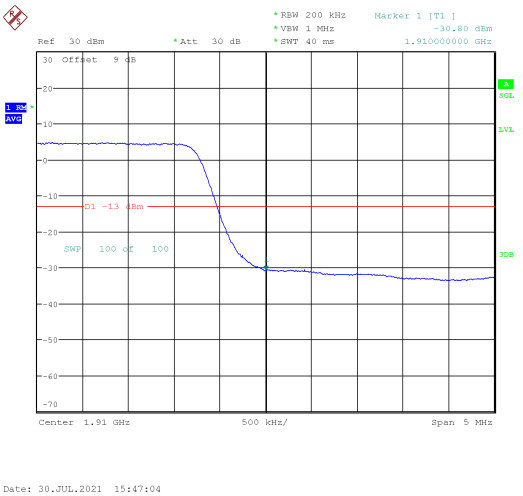
After the first 1.0 MHz, the emission power in any 1 MHz bandwidth shall be attenuated (in dB) below the transmitter output power P (dBW) by at least 43 + 10 log10 p(watts). If the measurement is performed using 1% of the emission bandwidth, power integration over 1.0 MHz is required." Limit -13 dBm

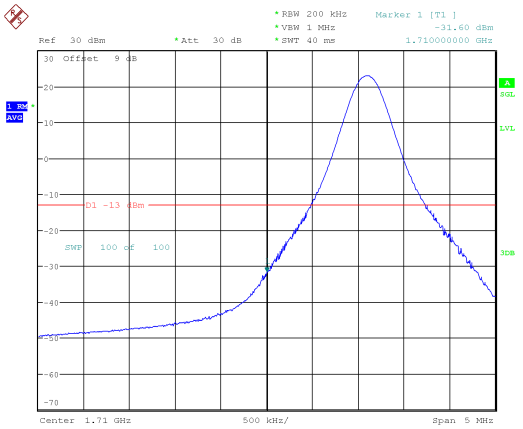
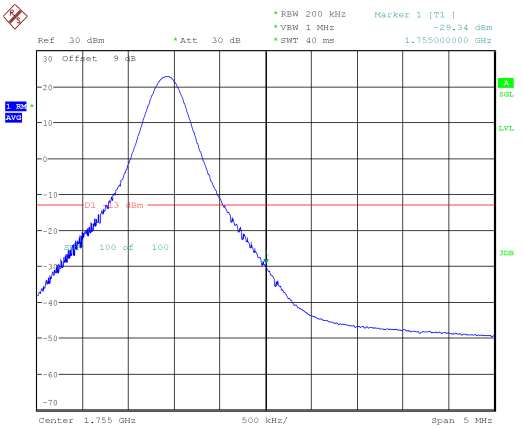
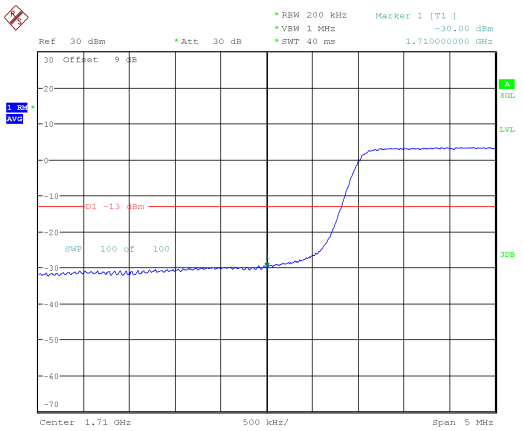
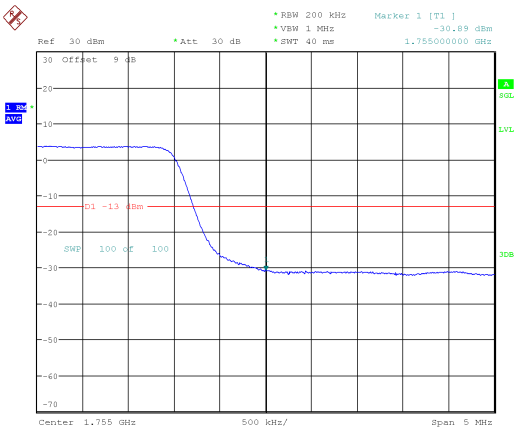
Rule RSS-139 6.6 specifies that " In the first 1.0 MHz bands immediately outside and adjacent to the equipment's smallest operating frequency block,2 which can contain the equipment's occupied bandwidth, the emission power per any 1% of the emission bandwidth shall be attenuated below the transmitter output power P (in dBW) by at least 43 + 10 log10 p (watts) dB. (ii) After the first 1.0 MHz outside the equipment's smallest operating frequency block, which can contain the equipment's occupied bandwidth, the emission power in any 1 MHz bandwidth shall be attenuated below the transmitter output power P (in dBW) by at least 43 + 10 log10 p (watts) dB.".

6.6.2 Measurement result

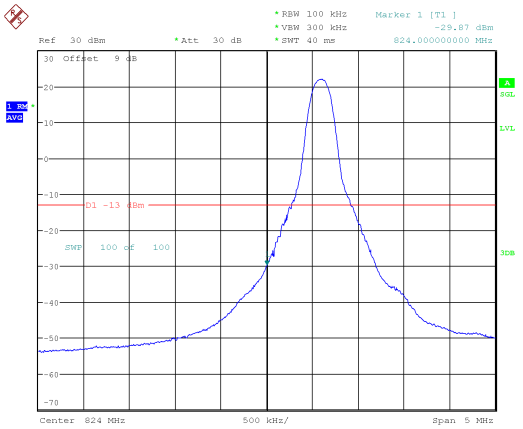
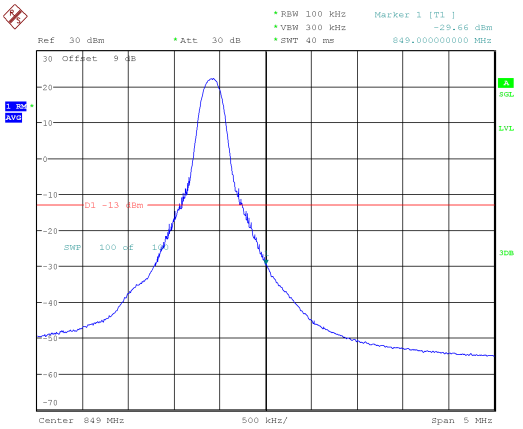
Only worst case result is given below

LTE band 2

LOW BAND EDGE BLOCK-1RB-low_offset	HIGH BAND EDGE BLOCK-1RB-high_offset
	
LOW BAND EDGE BLOCK-20MHz-100%RB	HIGH BAND EDGE BLOCK-20MHz-100%RB
	

LOW BAND EDGE BLOCK-1RB-low_offset	HIGH BAND EDGE BLOCK-1RB-high_offset
	
LOW BAND EDGE BLOCK-20MHz-100%RB	HIGH BAND EDGE BLOCK-20MHz-100%RB
	

LTE band 5

LOW BAND EDGE BLOCK-1RB-low_offset	HIGH BAND EDGE BLOCK-1RB-high_offset
	
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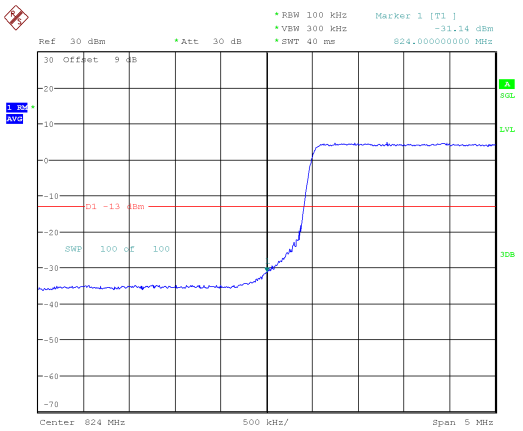
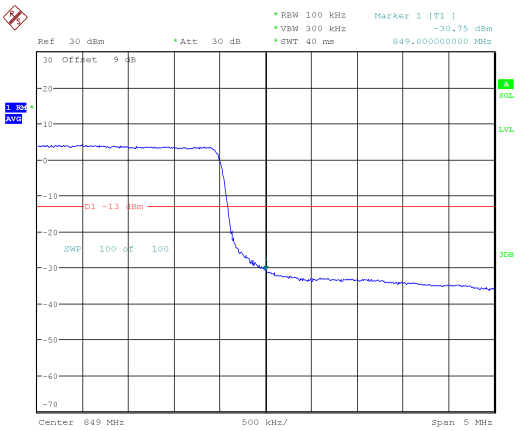
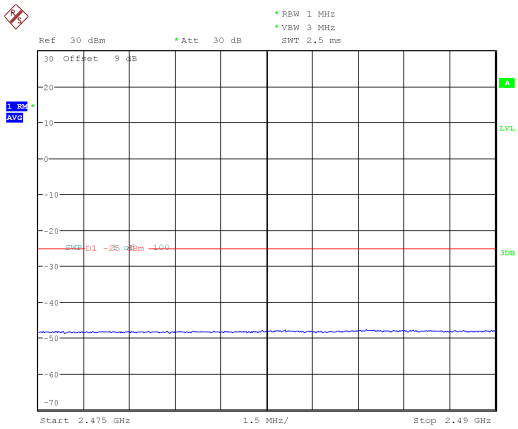
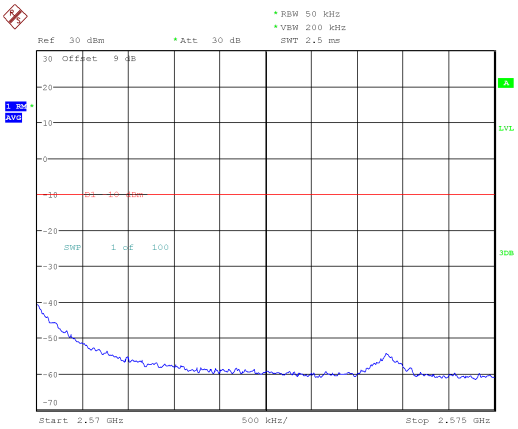
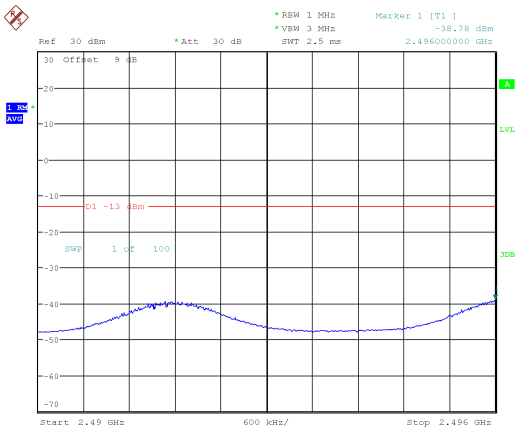
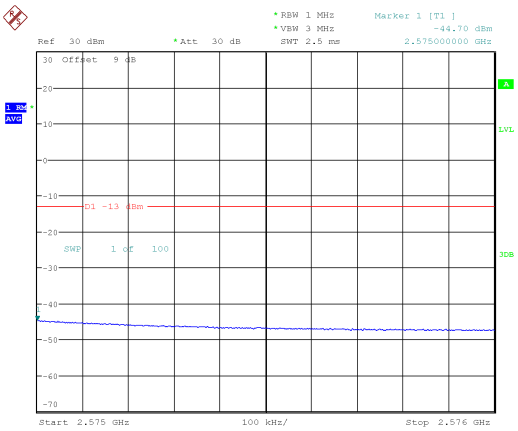
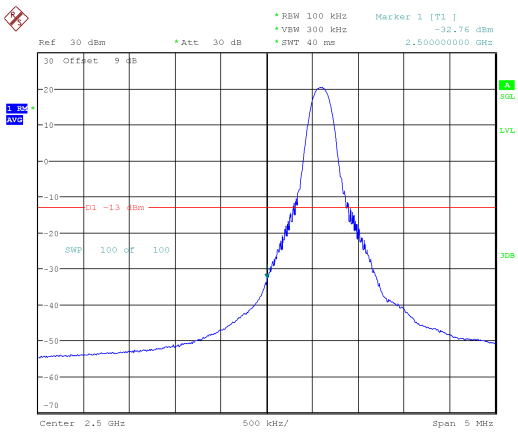
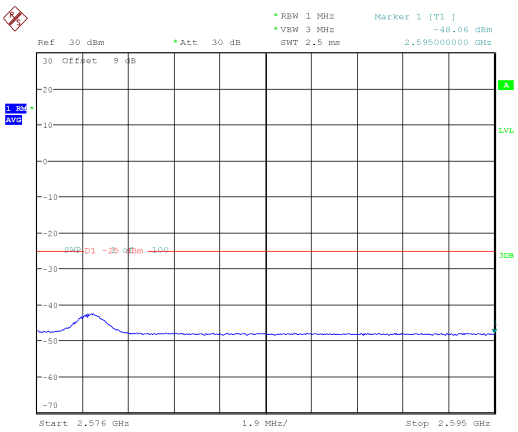
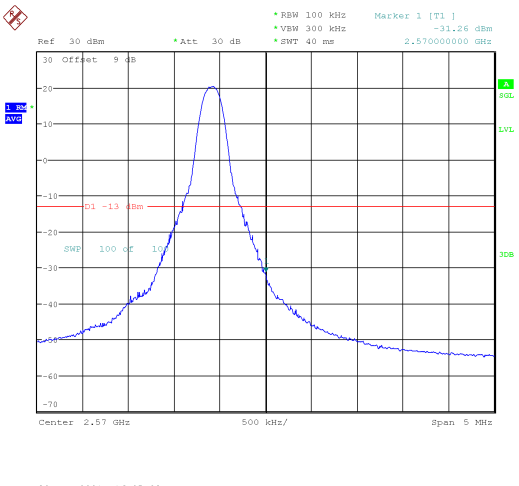
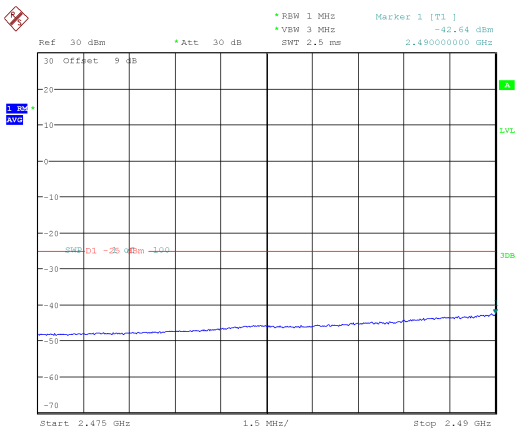
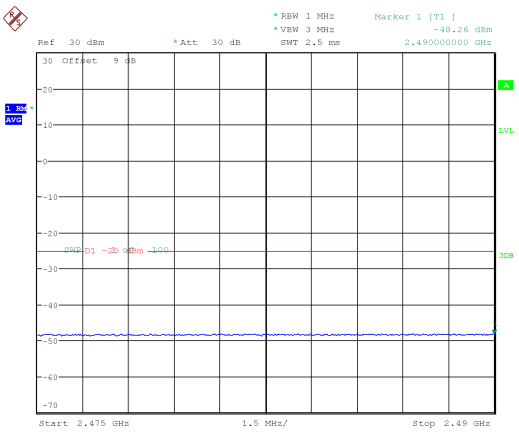
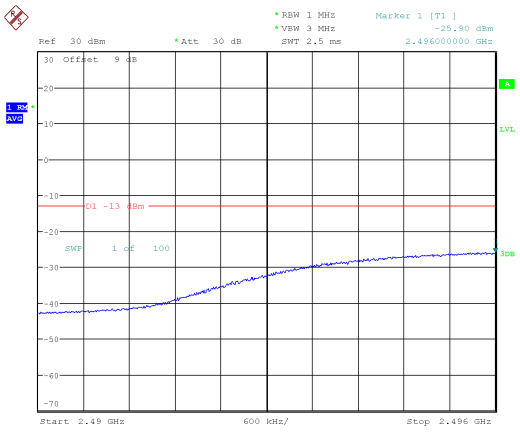
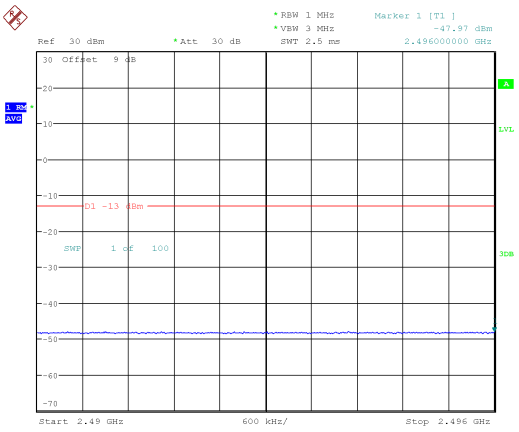
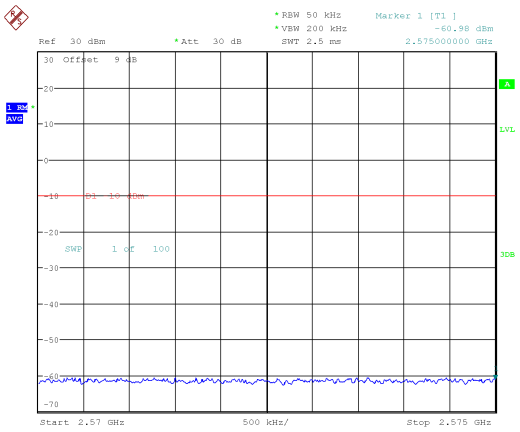
	

LOW BAND EDGE BLOCK-1RB-low_offset	HIGH BAND EDGE BLOCK-1RB-high_offset
 Date: 30.JUL.2021 16:02:30	 Date: 30.JUL.2021 16:05:25
 Date: 30.JUL.2021 16:02:47	 Date: 30.JUL.2021 16:05:42
 Date: 30.JUL.2021 16:02:13	 Date: 30.JUL.2021 16:05:58

/	
LOW BAND EDGE BLOCK-20MHz-100%RB	HIGH BAND EDGE BLOCK-20MHz-100%RB
	
	



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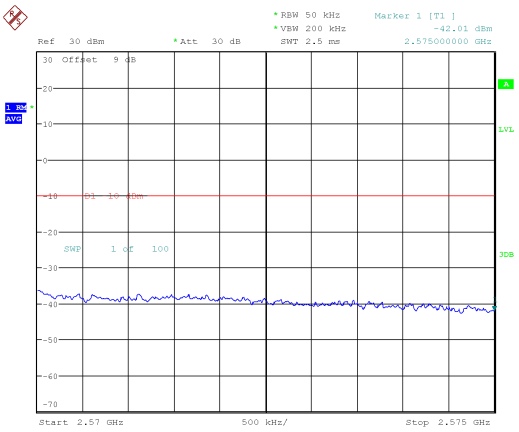

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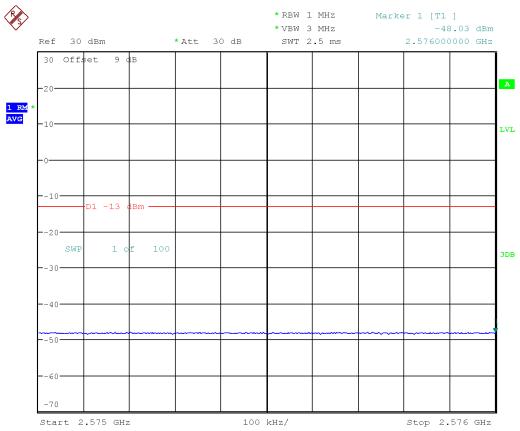

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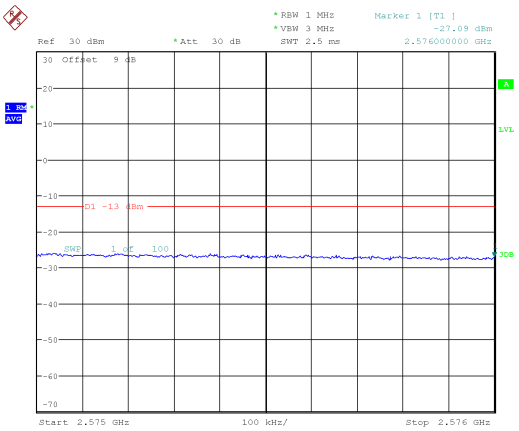

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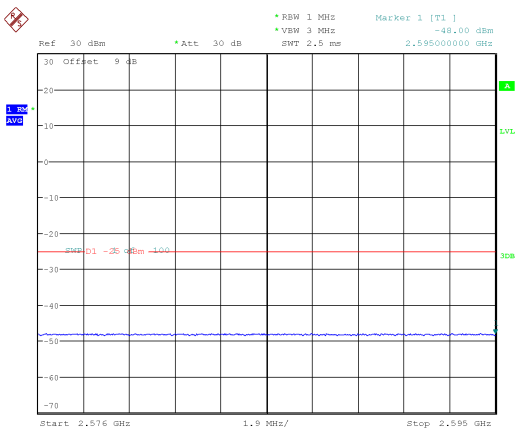

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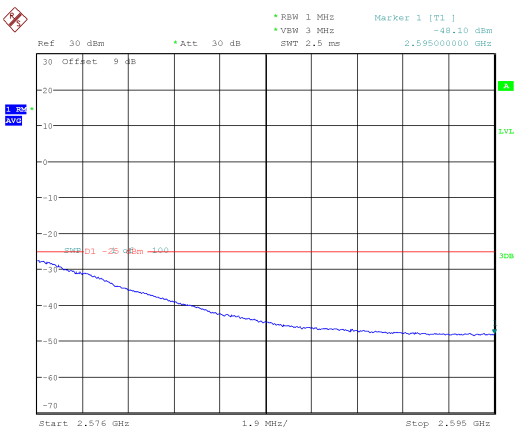

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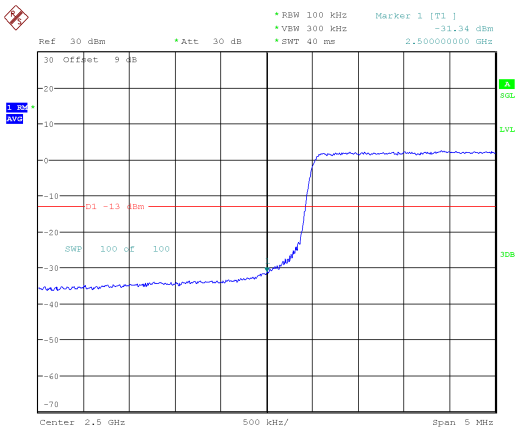
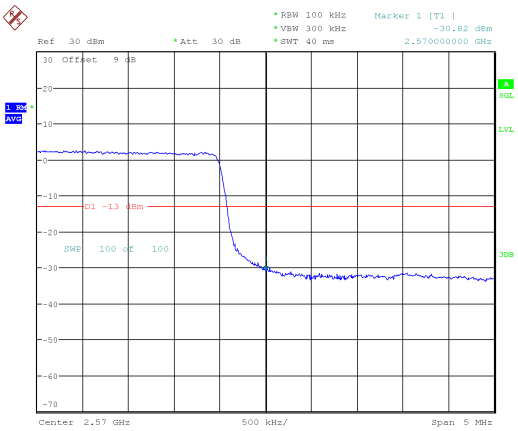
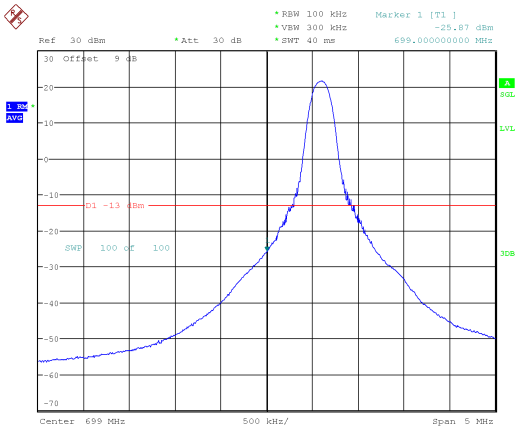
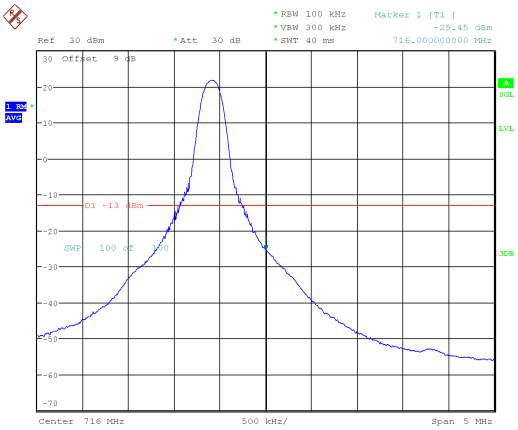
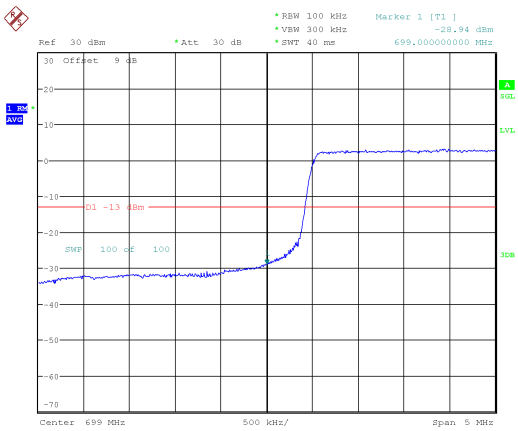
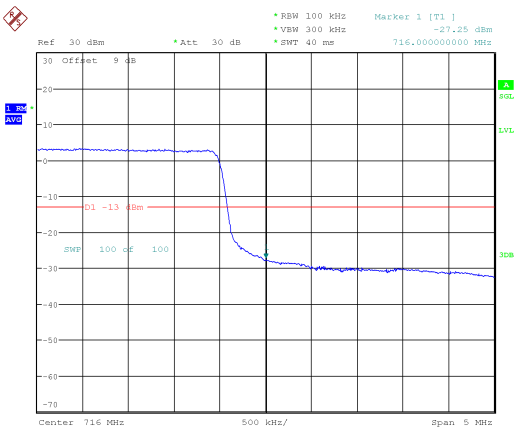
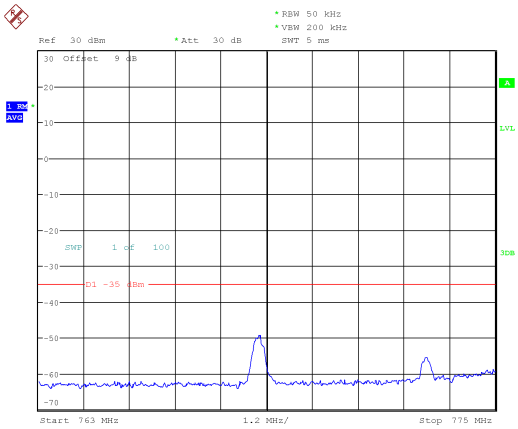
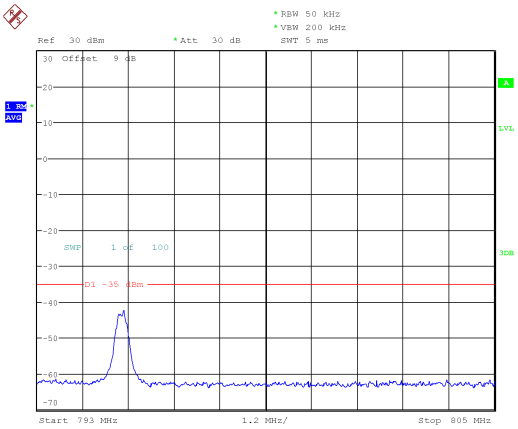
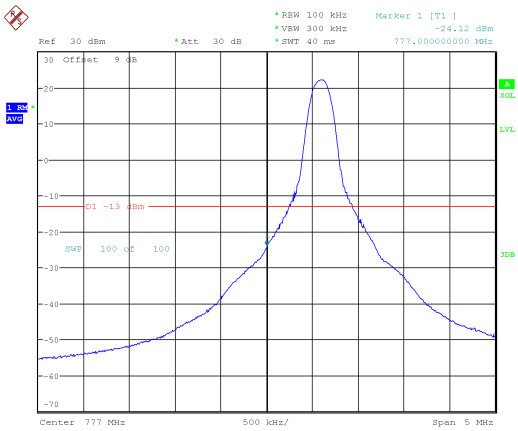
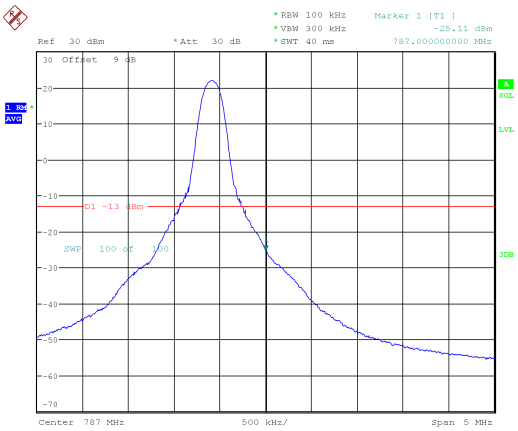
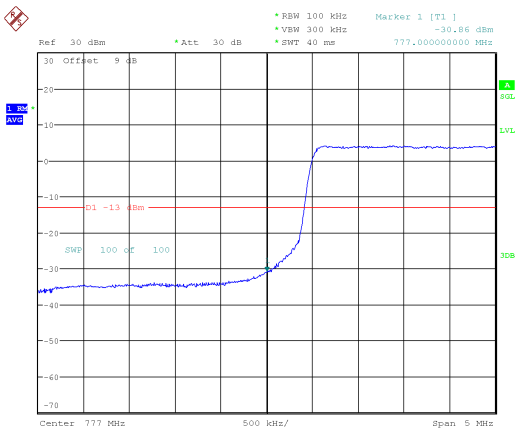
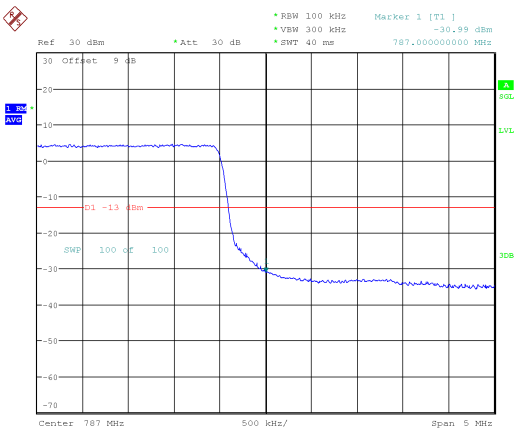
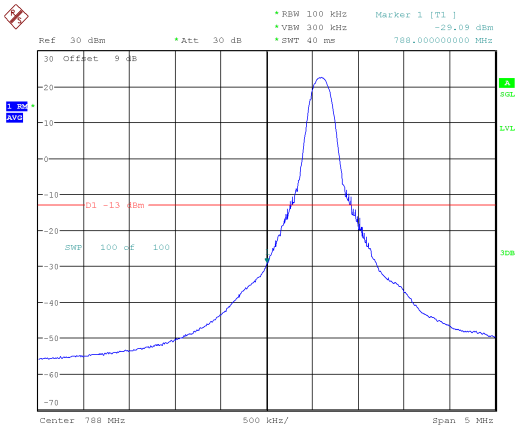
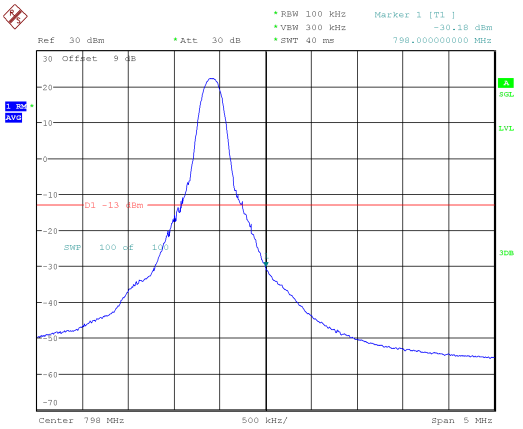
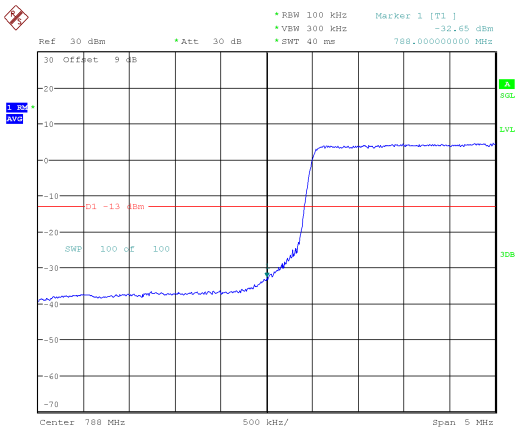
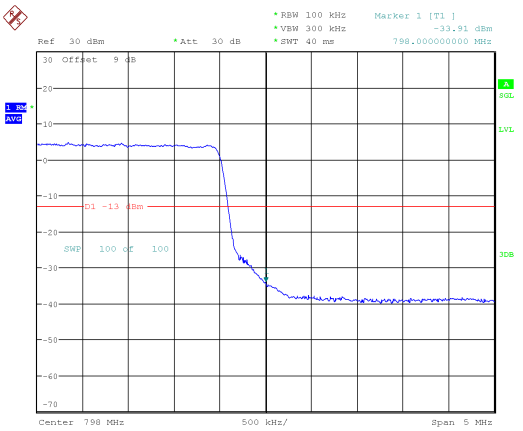


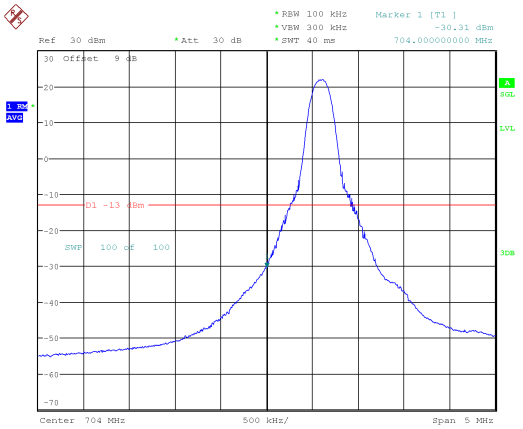
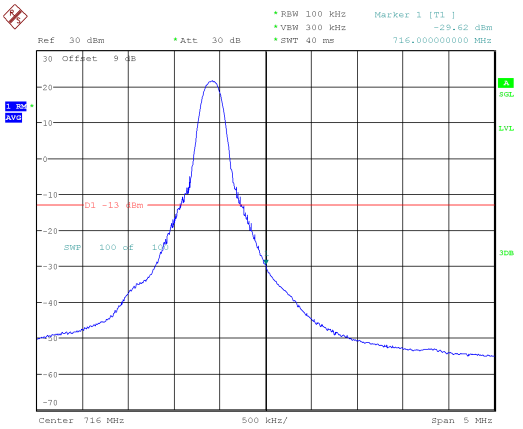
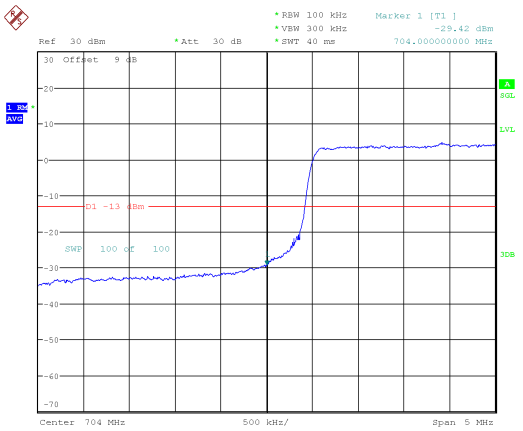
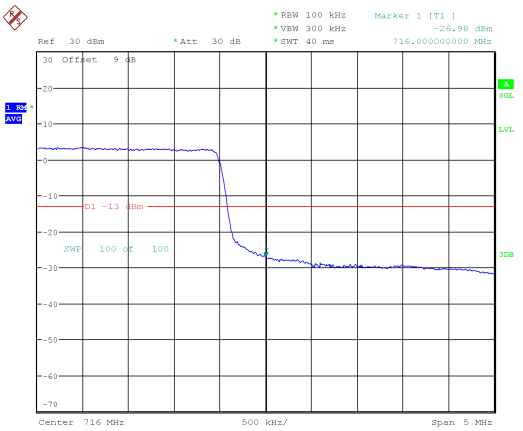


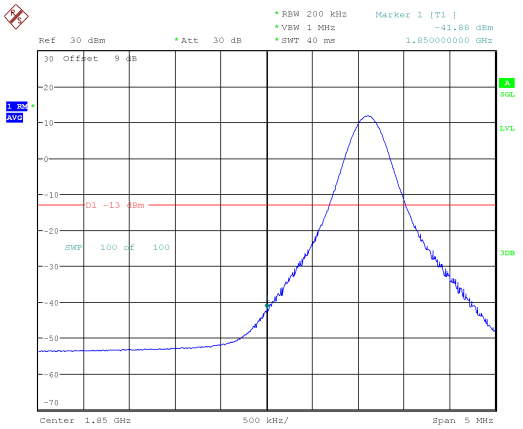
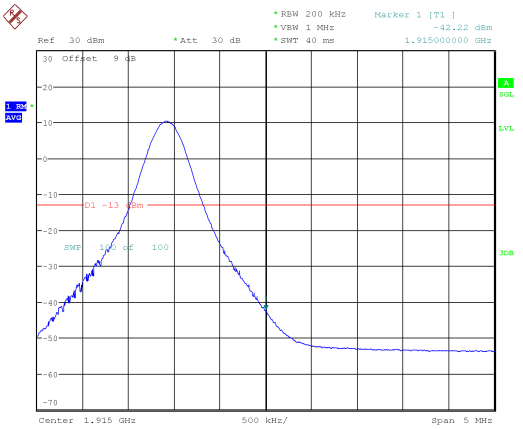
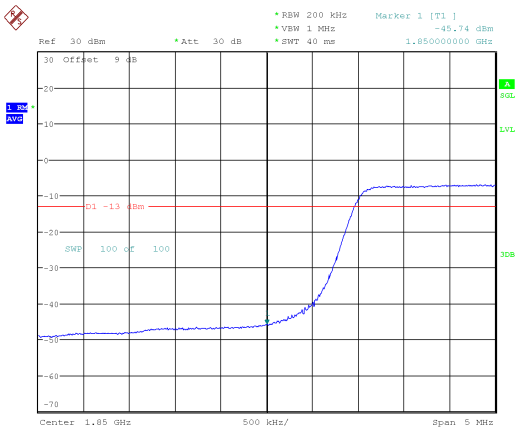
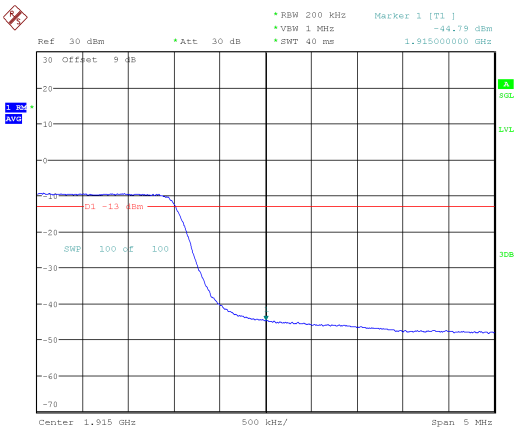
LTE band 12

LOW BAND EDGE BLOCK-1RB-low_offset	HIGH BAND EDGE BLOCK-1RB-high_offset
	
LOW BAND EDGE BLOCK-20MHz-100%RB	HIGH BAND EDGE BLOCK-20MHz-100%RB
	

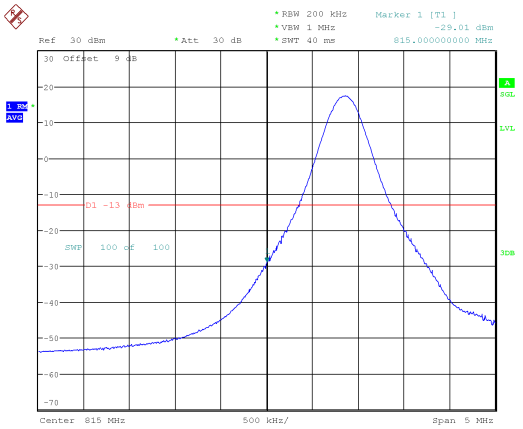
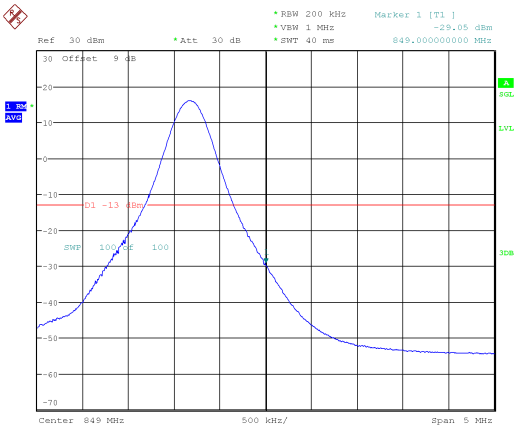
LOW BAND EDGE BLOCK-1RB-low_offset	HIGH BAND EDGE BLOCK-1RB-high_offset
 Date: 30.JUL.2021 16:28:25	 Date: 30.JUL.2021 16:27:58
 Date: 30.JUL.2021 16:26:30	 Date: 30.JUL.2021 16:27:42
LOW BAND EDGE BLOCK-20MHz-100%RB	HIGH BAND EDGE BLOCK-20MHz-100%RB
 Date: 30.JUL.2021 16:27:14	 Date: 30.JUL.2021 16:28:52

LOW BAND EDGE BLOCK-1RB-low_offset	HIGH BAND EDGE BLOCK-1RB-high_offset
	
LOW BAND EDGE BLOCK-20MHz-100%RB	**HIGH BAND EDGE BLOCK-20MHz-100%RB**
	

LOW BAND EDGE BLOCK-1RB-low_offset	HIGH BAND EDGE BLOCK-1RB-high_offset
	
LOW BAND EDGE BLOCK-20MHz-100%RB	**HIGH BAND EDGE BLOCK-20MHz-100%RB**
	

LOW BAND EDGE BLOCK-1RB-low_offset	HIGH BAND EDGE BLOCK-1RB-high_offset
	
LOW BAND EDGE BLOCK-20MHz-100%RB	HIGH BAND EDGE BLOCK-20MHz-100%RB
	

LTE band 26(part22)

LOW BAND EDGE BLOCK-1RB-low_offset	HIGH BAND EDGE BLOCK-1RB-high_offset
	
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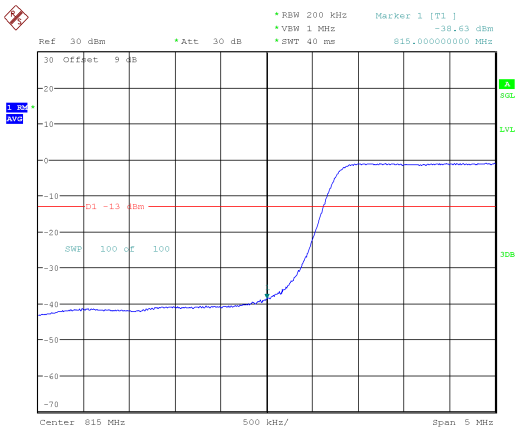
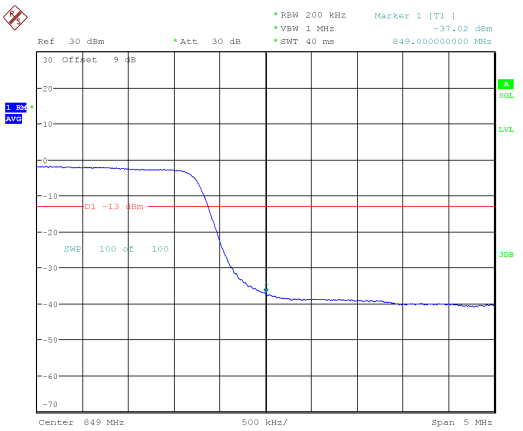
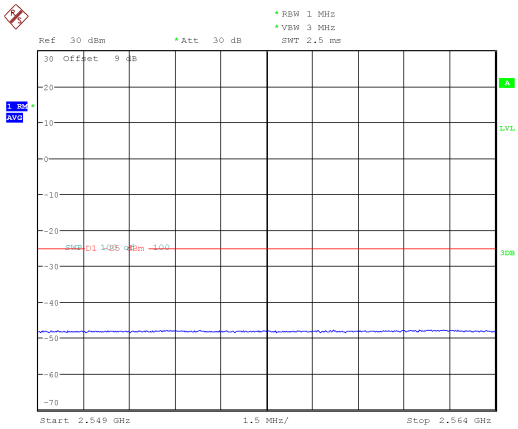
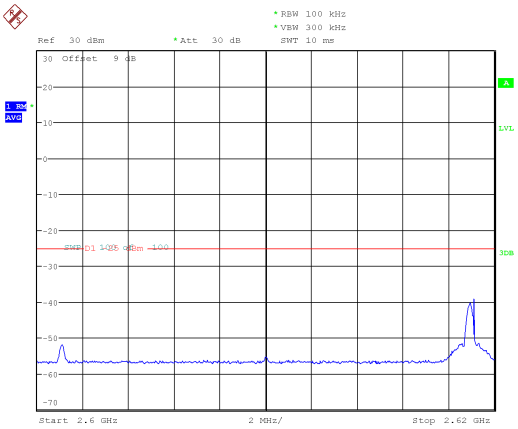
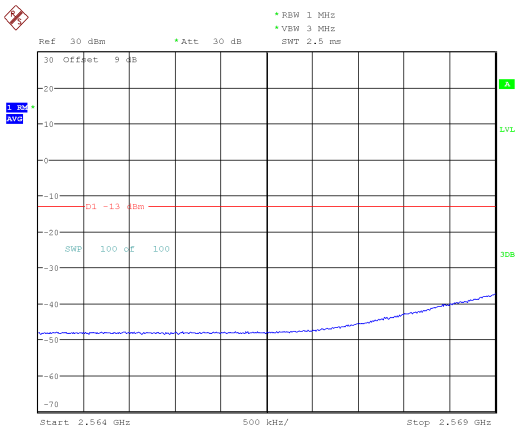
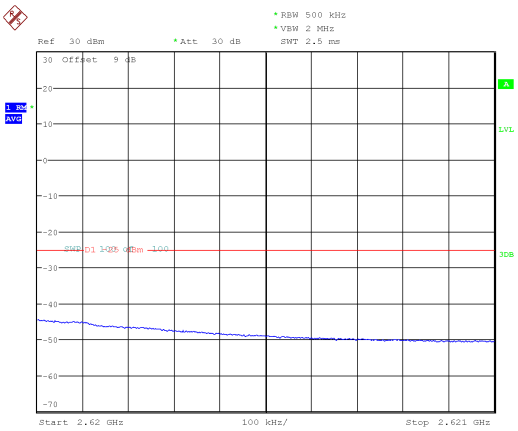
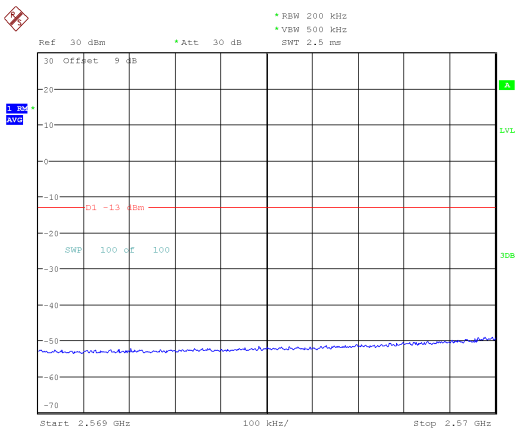
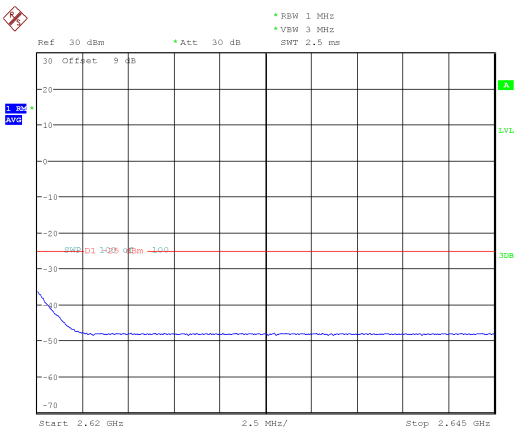
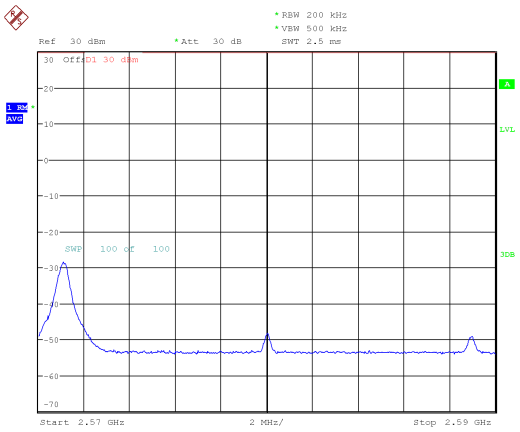
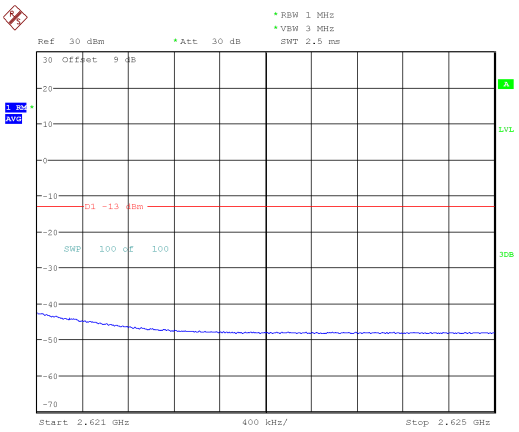
	

LOW BAND EDGE BLOCK-1RB-low_offset	HIGH BAND EDGE BLOCK-1RB-high_offset
 Date: 4.AUG.2021 14:27:56	 Date: 4.AUG.2021 14:31:25
 Date: 4.AUG.2021 14:28:22	 Date: 4.AUG.2021 14:31:51
 Date: 4.AUG.2021 14:28:48	 Date: 4.AUG.2021 14:33:10





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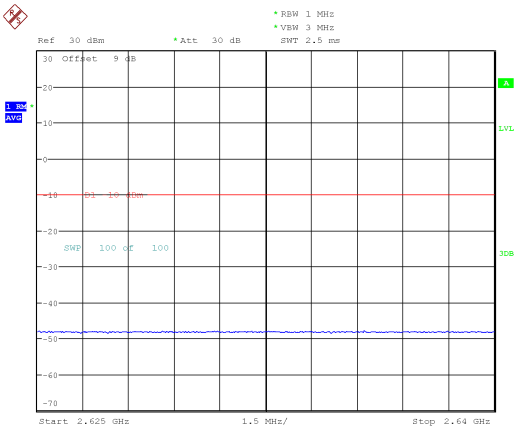
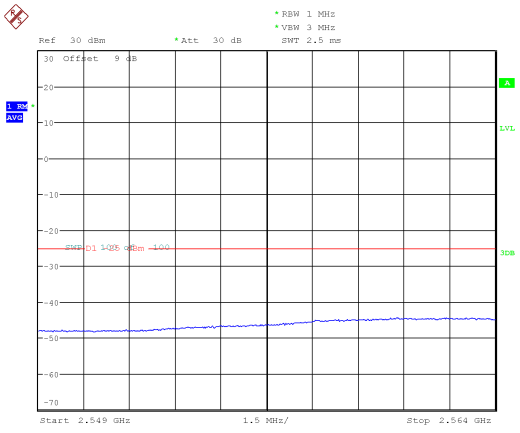
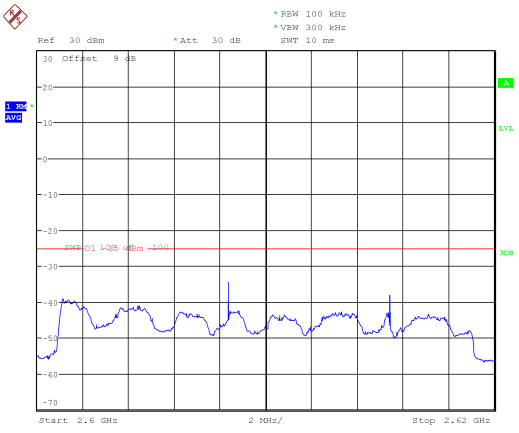
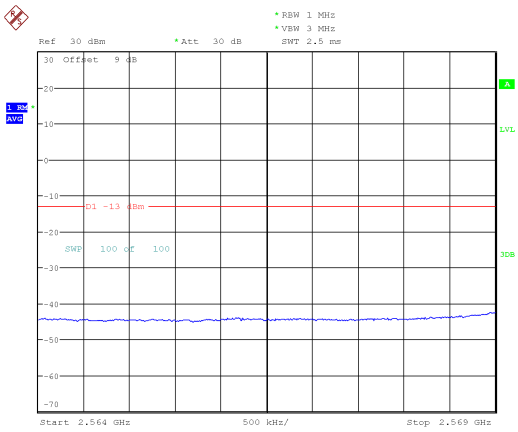


LOW BAND EDGE BLOCK-20MHz-100%RB



HIGH BAND EDGE BLOCK-20MHz-100%RB





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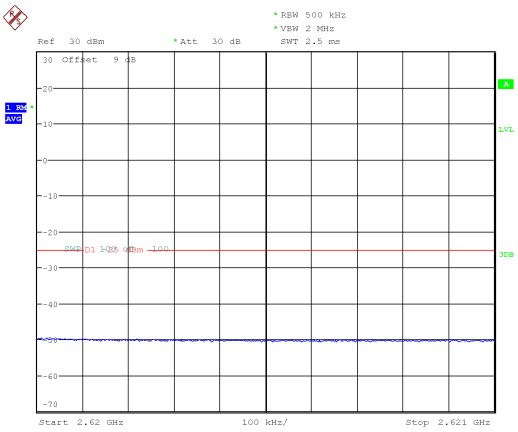

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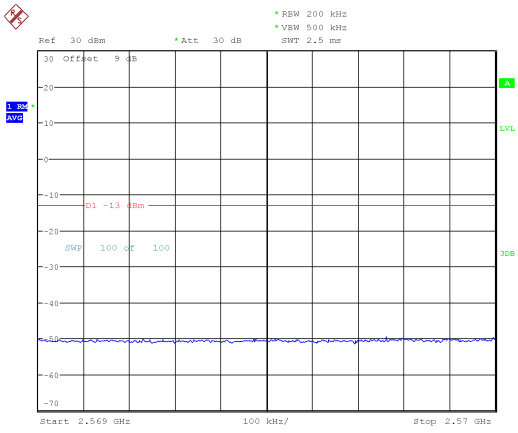

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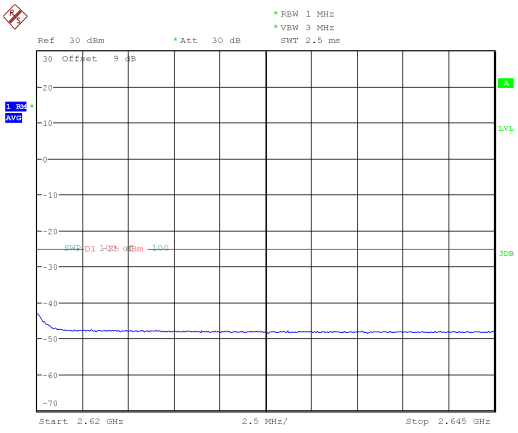

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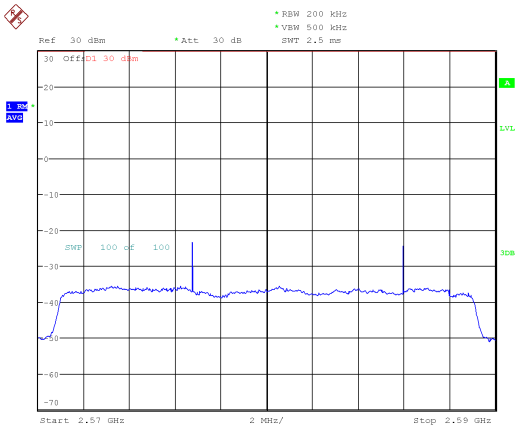

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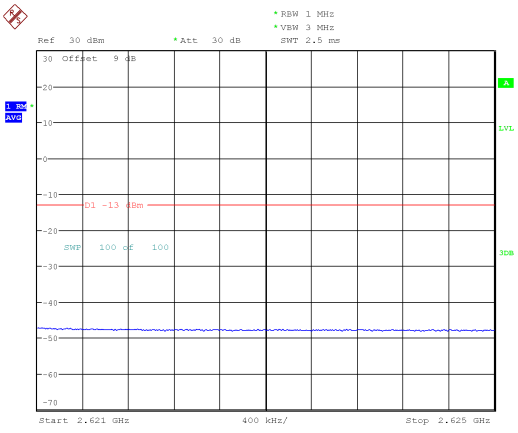

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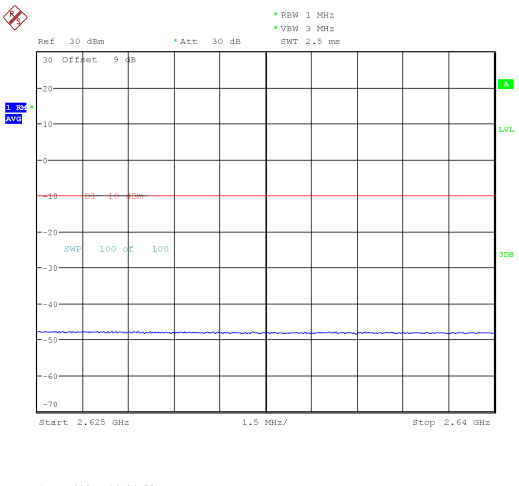
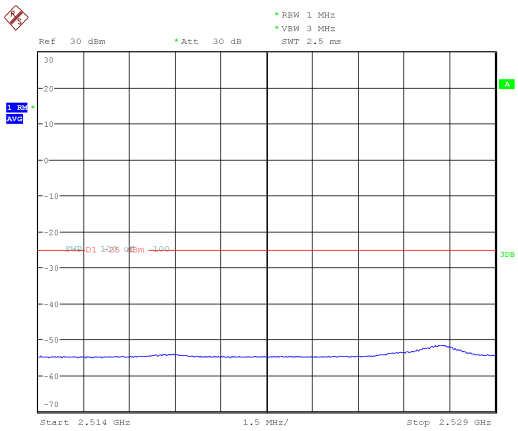
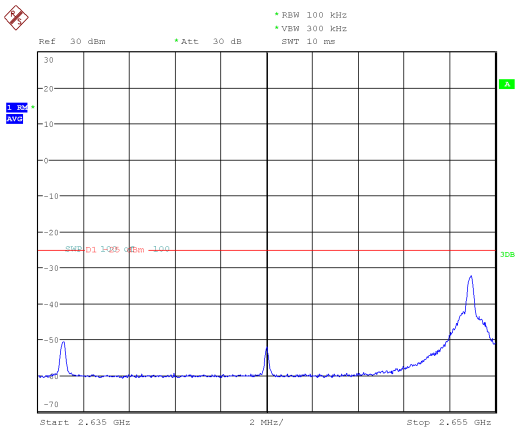
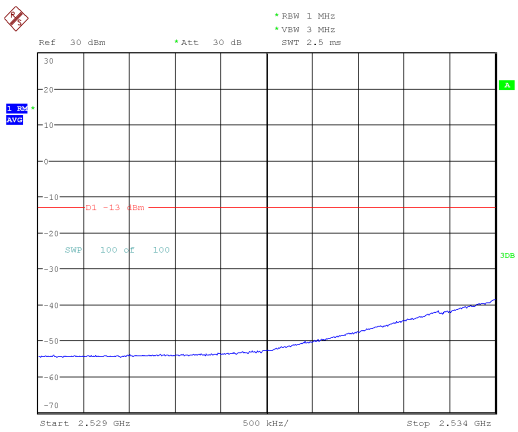
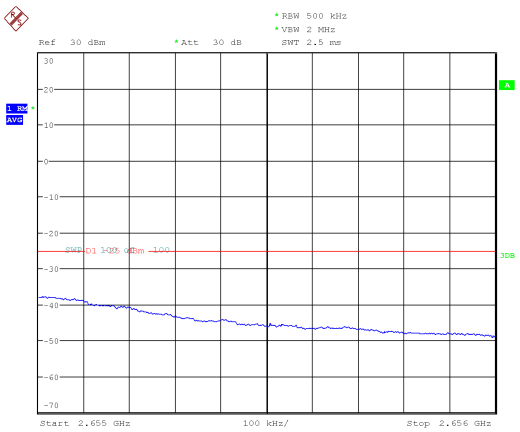
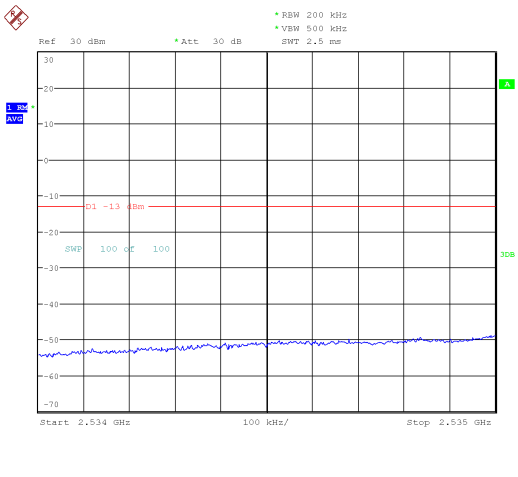
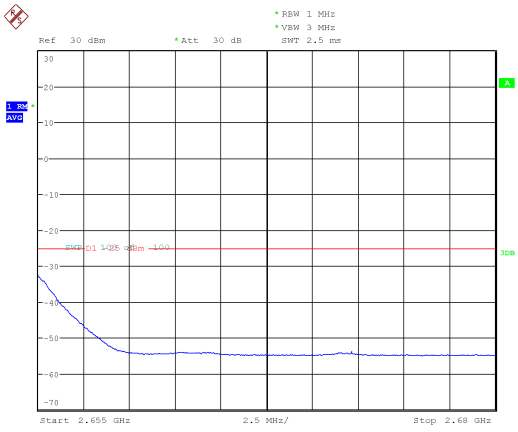
/	

LTE band 41

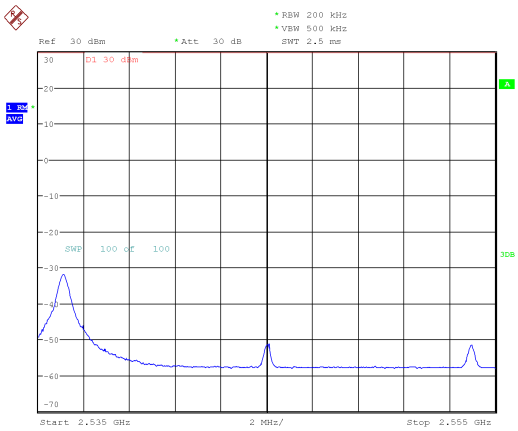
LOW BAND EDGE BLOCK-1RB-low_offset	HIGH BAND EDGE BLOCK-1RB-high_offset
	
	



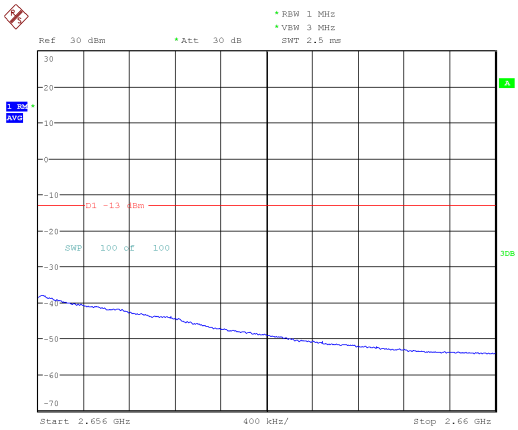
Date: 16.JUL.2021 16:57:03



Date: 16.JUL.2021 17:01:49



Date: 16.JUL.2021 16:57:31



Date: 16.JUL.2021 17:00:52

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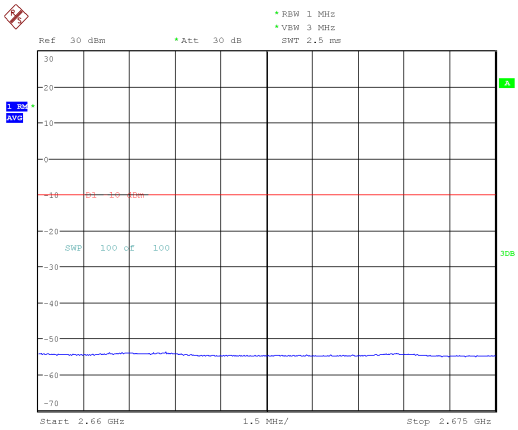
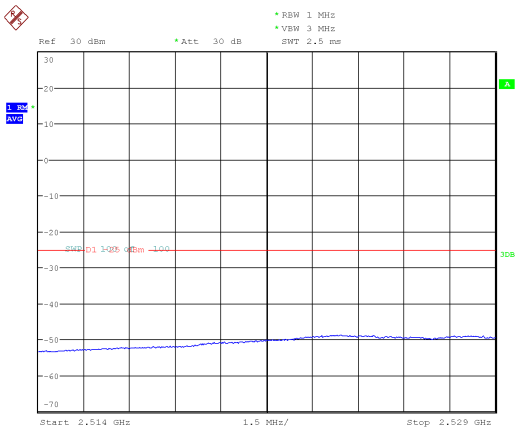
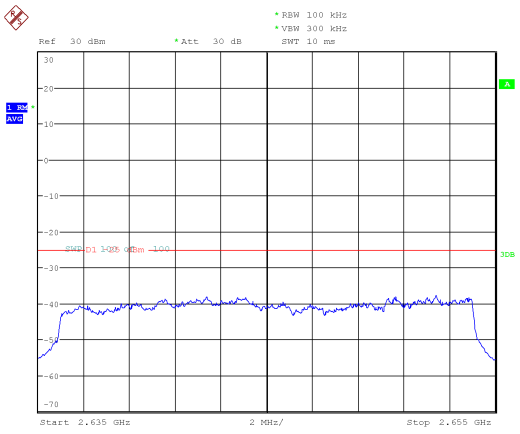
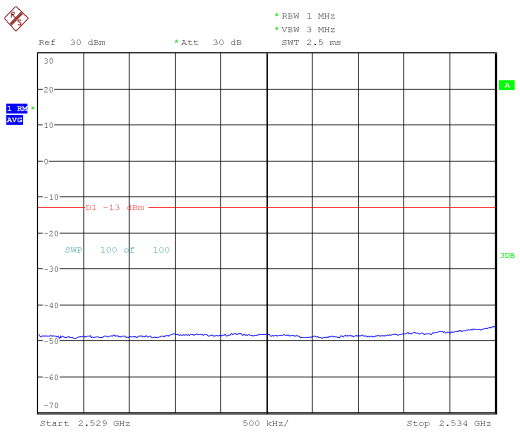
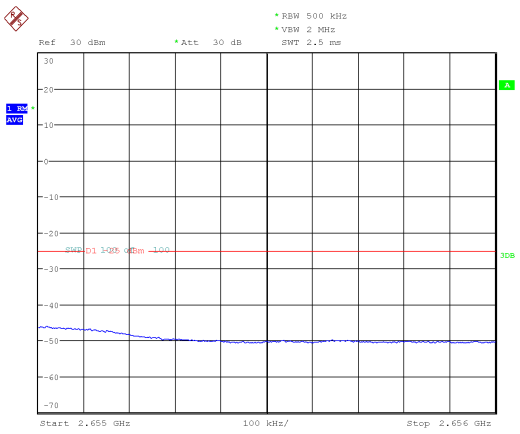
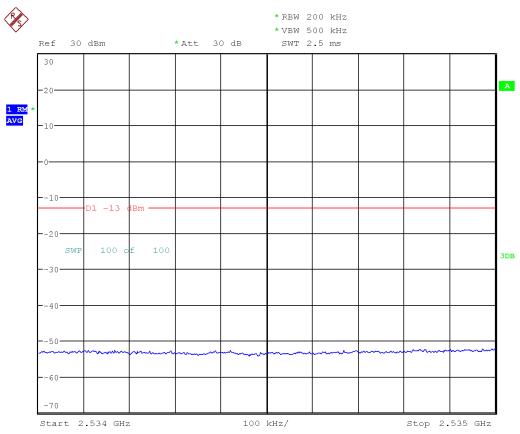
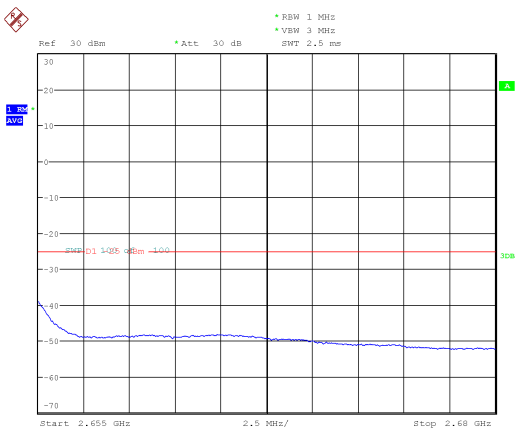
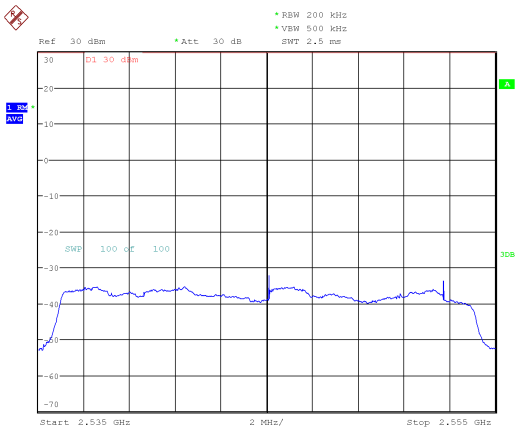


Date: 16.JUL.2021 17:01:21

LOW BAND EDGE BLOCK-20MHz-100%RB	HIGH BAND EDGE BLOCK-20MHz-100%RB
 Date: 16.JUL.2021 16:58:00	 Date: 16.JUL.2021 17:02:17
 Date: 16.JUL.2021 16:58:29	 Date: 16.JUL.2021 17:02:45
 Date: 16.JUL.2021 16:58:57	 Date: 16.JUL.2021 17:04:09



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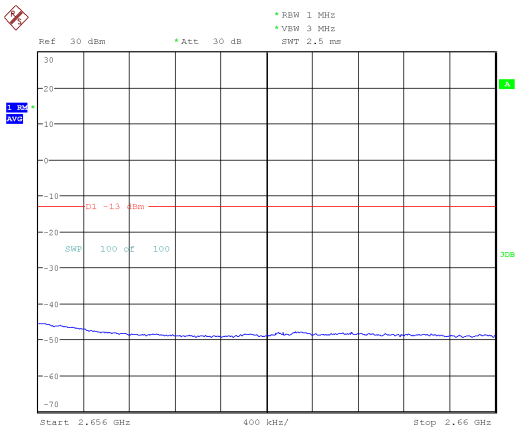

Date: 16.JUL.2021 17:03:13

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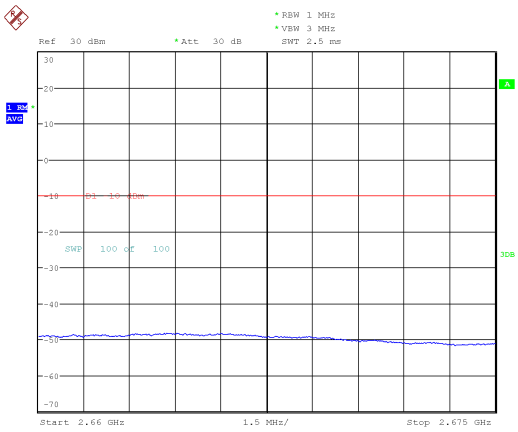
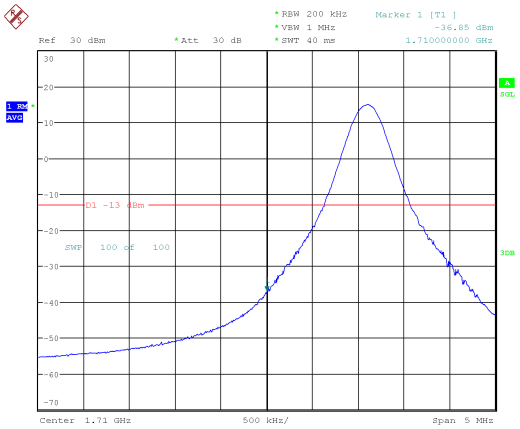
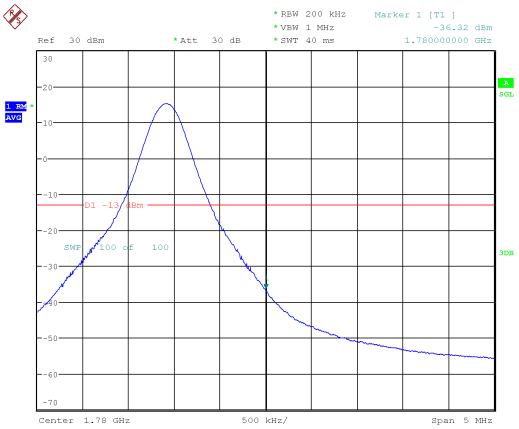
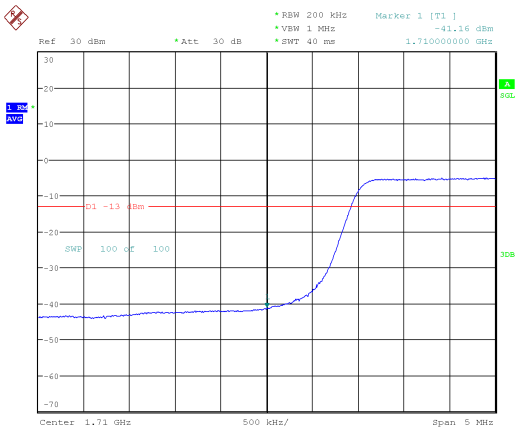
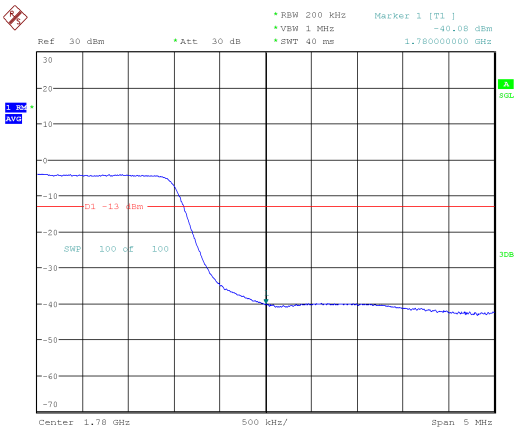
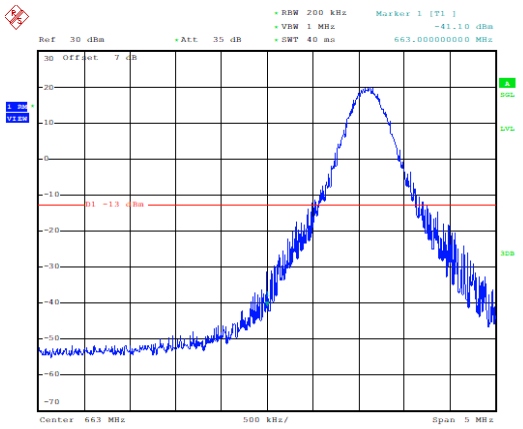
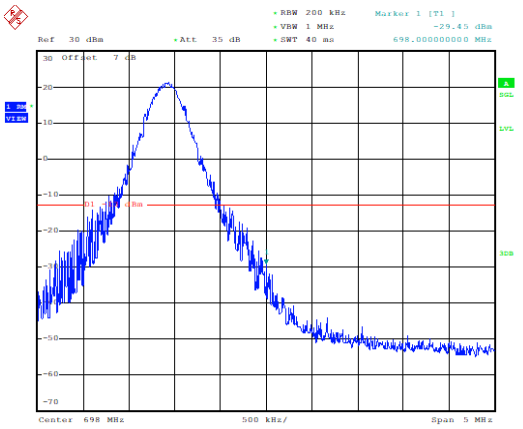
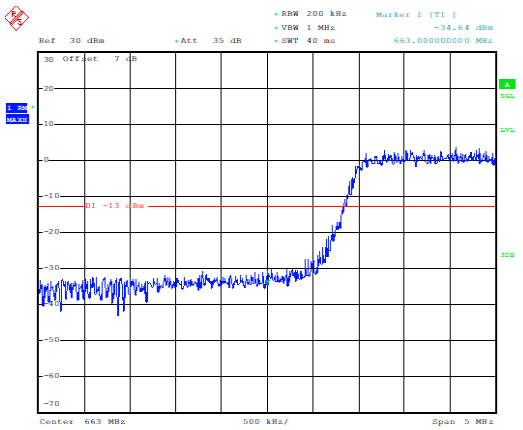
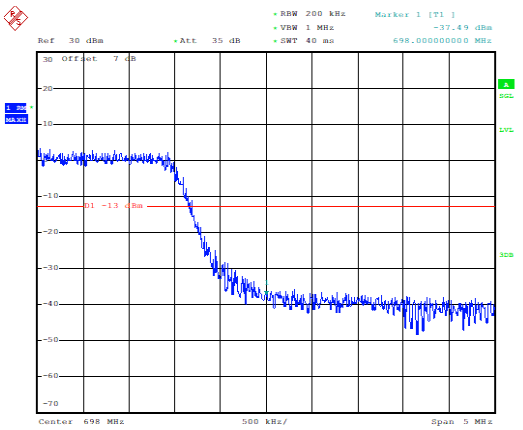


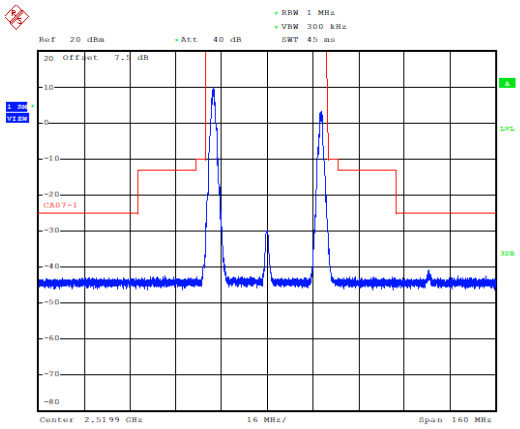
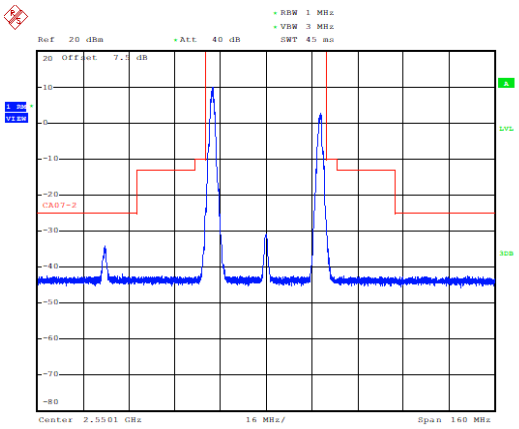
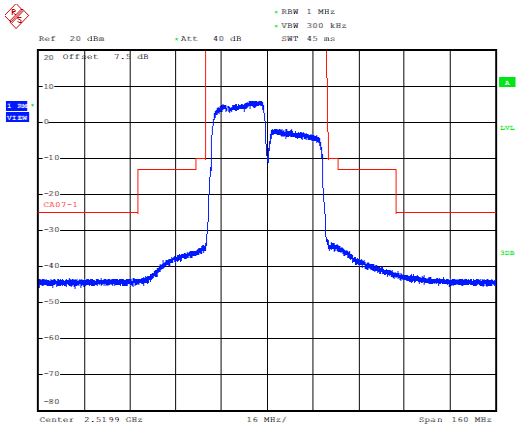
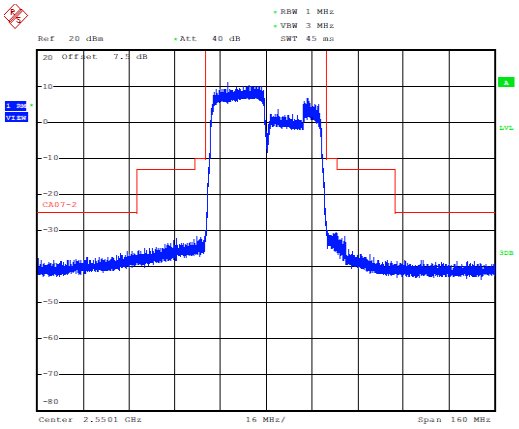
Date: 16.JUL.2021 17:03:41

LOW BAND EDGE BLOCK-1RB-low_offset	HIGH BAND EDGE BLOCK-1RB-high_offset
	
LOW BAND EDGE BLOCK-20MHz-100%RB	HIGH BAND EDGE BLOCK-20MHz-100%RB
	

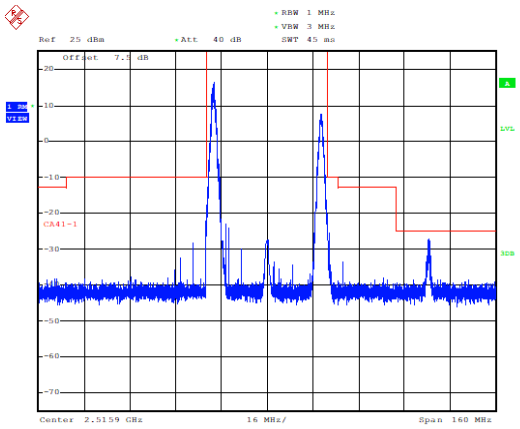
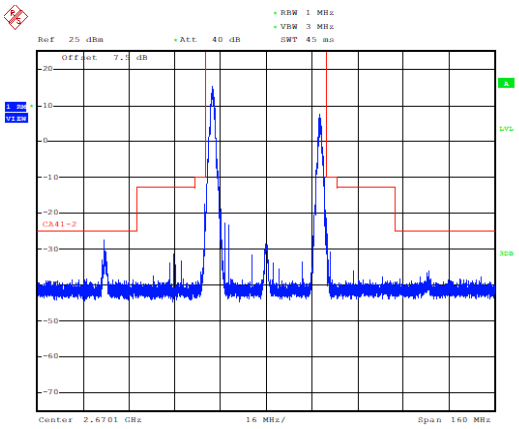
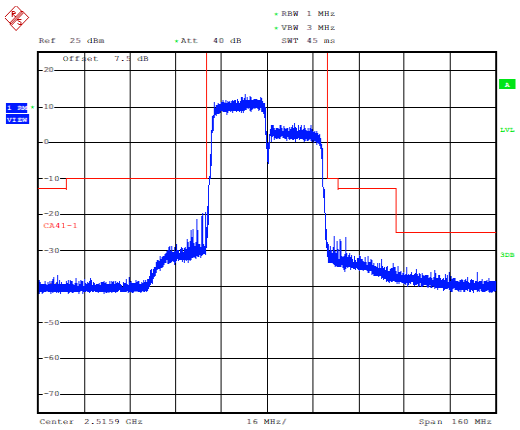
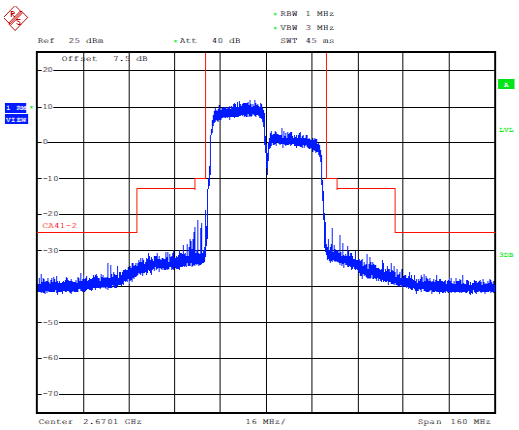
LTE band 71

LOW BAND EDGE BLOCK-1RB-low_offset	HIGH BAND EDGE BLOCK-1RB-high_offset
	
LOW BAND EDGE BLOCK-20MHz-100%RB	HIGH BAND EDGE BLOCK-20MHz-100%RB
	

LTE CA-7C 20MHz+20MHz

LOW BAND EDGE BLOCK-1RB-low_offset	HIGH BAND EDGE BLOCK-1RB-high_offset
 Date: 26.JAN.2003 07:30:49	 Date: 26.JAN.2003 07:45:35
LOW BAND EDGE BLOCK-20MHz-100%RB	**HIGH BAND EDGE BLOCK-20MHz-100%RB**
 Date: 26.JAN.2003 07:33:23	 Date: 26.JAN.2003 07:44:47

LTE CA-41C 20MHz+20MHz

LOW BAND EDGE BLOCK-1RB-low_offset	HIGH BAND EDGE BLOCK-1RB-high_offset
 Date: 26.JAN.2003 08:21:39	 Date: 26.JAN.2003 08:35:40
LOW BAND EDGE BLOCK-20MHz-100%RB	**HIGH BAND EDGE BLOCK-20MHz-100%RB**
 Date: 26.JAN.2003 08:23:48	 Date: 26.JAN.2003 08:34:33

6.7. Conducted Spurious Emission

6.7.1 Measurement Method

The following steps outline the procedure used to measure the conducted emissions from the EUT.

1. Determine frequency range for measurements: From CFR 2.1057 the spectrum should be investigated from the lowest radio frequency generated in the equipment up to at least the 10th harmonic of the carrier frequency. For the mobile station equipment tested, this equates to a frequency range of 13 MHz to 9 GHz, data taken from 10 MHz to 25 GHz.
2. Determine EUT transmit frequencies: below outlines the band edge frequencies pertinent to conducted emissions testing.
3. The number of sweep points of spectrum analyzer is set to 30001 which is greater than span/RBW.

6. 7.2 Measurement Limit

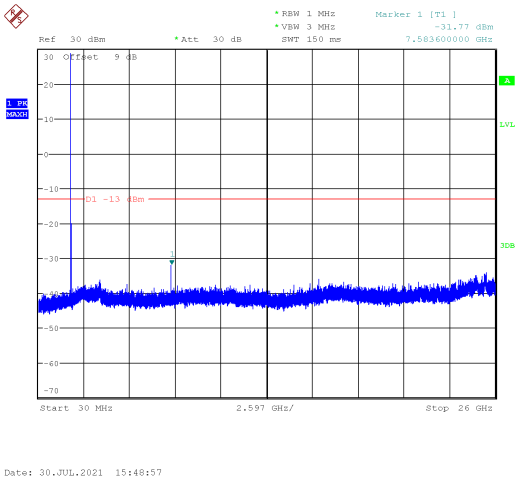
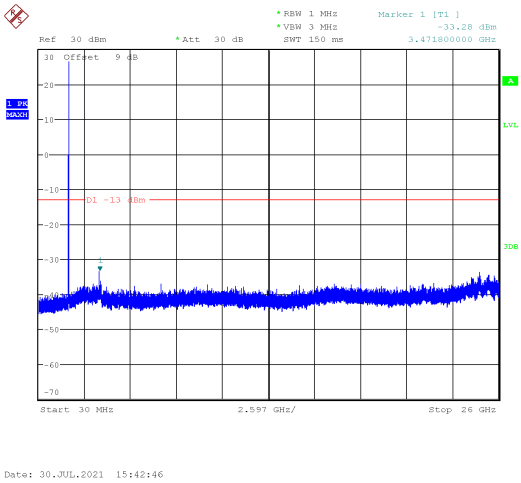
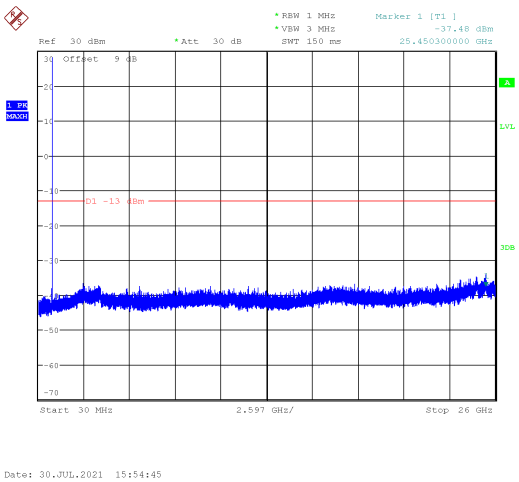
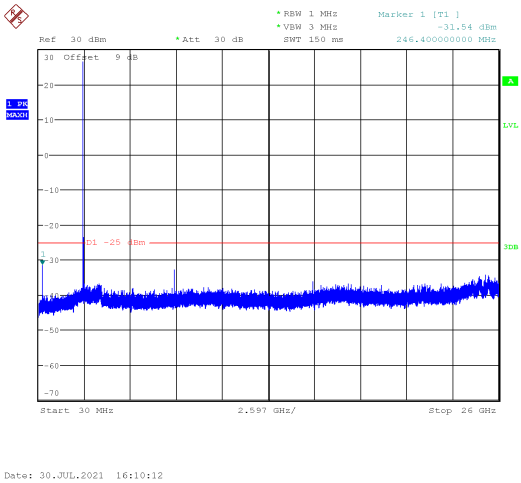
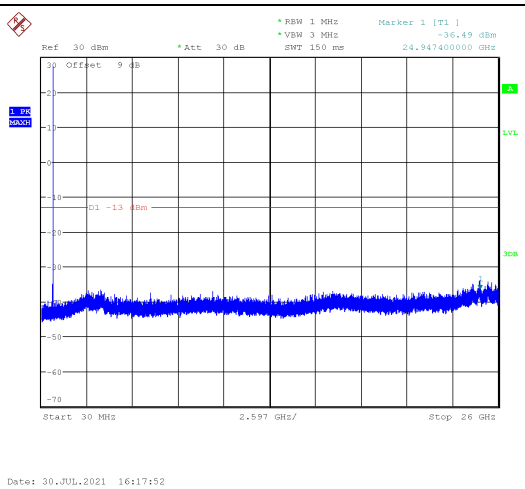
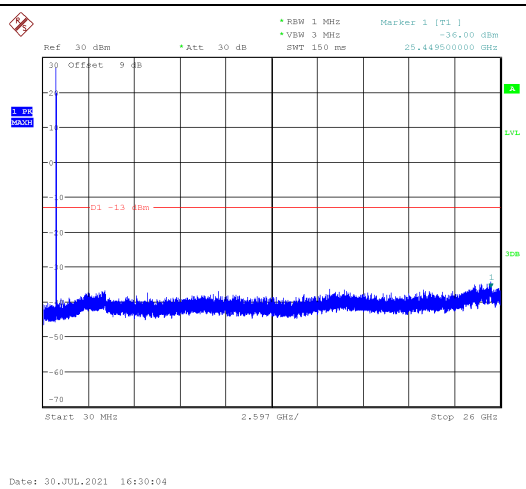
Rule RSS-132 5.5 specifies that " In the first 1.0 MHz band immediately outside and adjacent to each of the sub-bands specified in Section 5.1, the power of emissions per any 1% of the occupied bandwidth shall be attenuated (in dB) below the transmitter output power P (dBW) by at least 43 + 10 log10 p (watts). (ii) After the first 1.0 MHz immediately outside and adjacent to each of the sub-bands, the power of emissions in any 100 kHz bandwidth shall be attenuated (in dB) below the transmitter output power P (dBW) by at least 43 + 10 log10 p (watts). If the measurement is performed using 1% of the occupied bandwidth, power integration over 100 kHz is required.” Limit -13 dBm

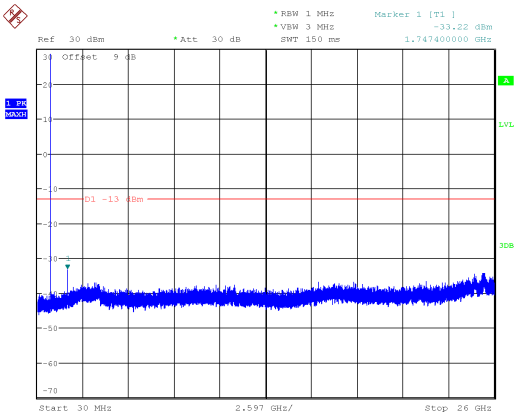
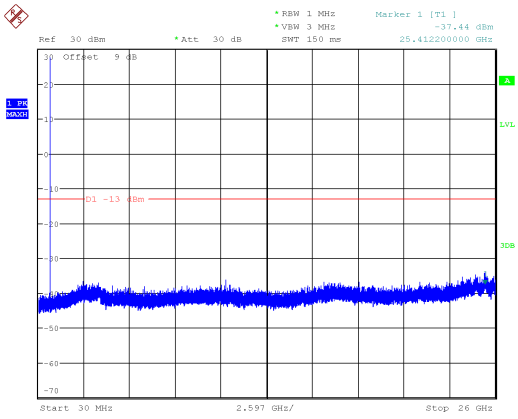
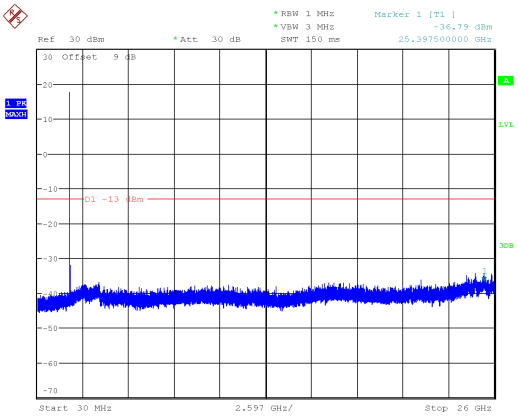
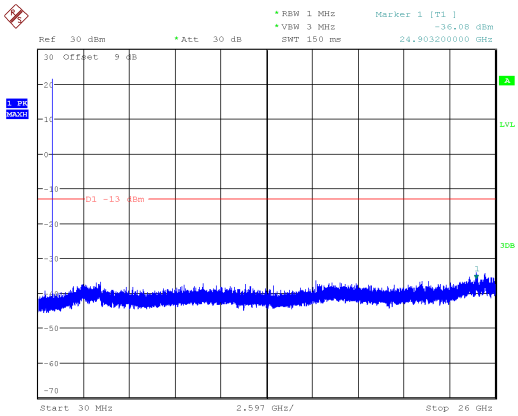
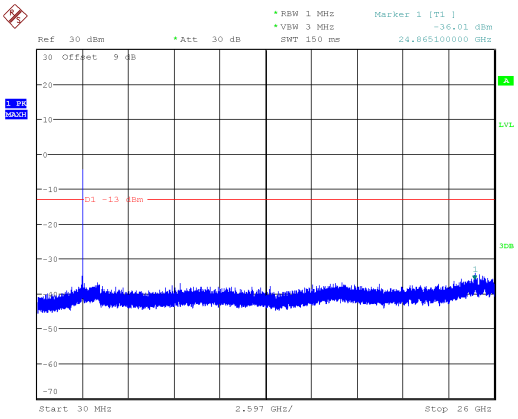
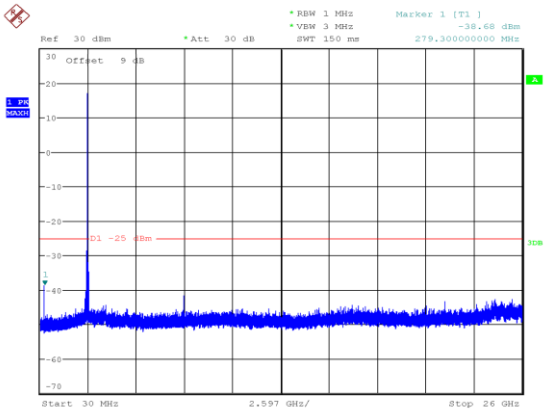
Rule RSS-133 6.5 specifies that " In the 1.0 MHz bands immediately outside and adjacent to the equipment’s operating frequency block, the emission power per any 1% of the emission bandwidth shall be attenuated (in dB) below the transmitter output power P (dBW) by at least 43 + 10 log10 p(watts). After the first 1.0 MHz, the emission power in any 1 MHz bandwidth shall be attenuated (in dB) below the transmitter output power P (dBW) by at least 43 + 10 log10 p(watts). If the measurement is performed using 1% of the emission bandwidth, power integration over 1.0 MHz is required.” Limit -13 dBm

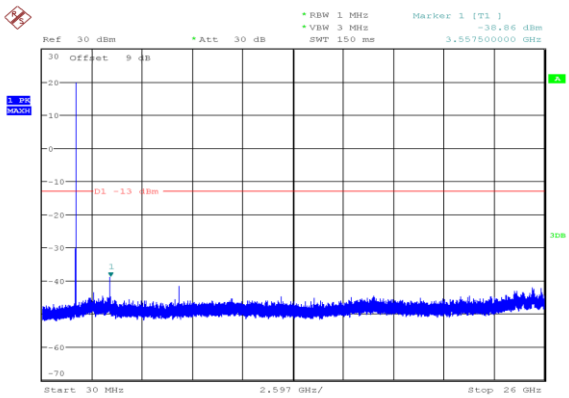
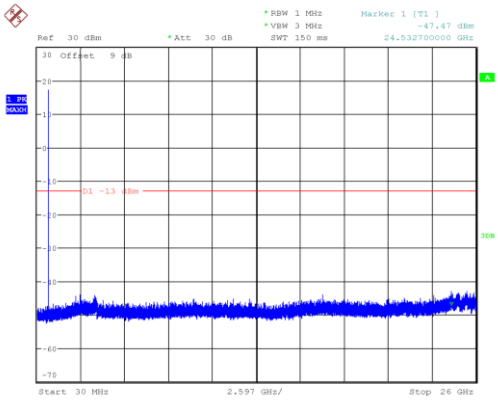
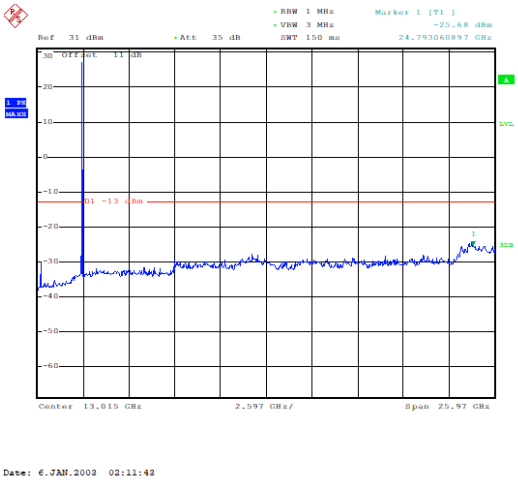
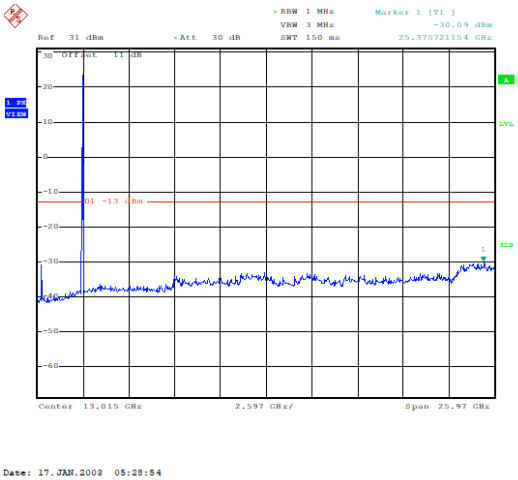
Rule RSS-139 6.6 specifies that “ In the first 1.0 MHz bands immediately outside and adjacent to the equipment’s smallest operating frequency block,2 which can contain the equipment’s occupied bandwidth, the emission power per any 1% of the emission bandwidth shall be attenuated below the transmitter output power P (in dBW) by at least 43 + 10 log10 p (watts) dB. (ii) After the first 1.0 MHz outside the equipment’s smallest operating frequency block, which can contain the equipment’s occupied bandwidth, the emission power in any 1 MHz bandwidth shall be attenuated below the transmitter output power P (in dBW) by at least 43 + 10 log10 p (watts) dB.

6. 7.3 Measurement result

Only worst case result is given below

Spurious emission limit –13dBm.(30MHz – 26GHz)	
LTE band 2	**LTE band 4**
	
LTE band 5	**LTE band 7**
	
LTE band 12	**LTE band 13**
	

LTE band 14	LTE band 17
	
Date: 30.JUL.2021 16:35:49	Date: 30.JUL.2021 16:49:40
LTE band 25	**LTE band 26(part22)**
	
Date: 4.AUG.2021 13:57:05	Date: 4.AUG.2021 14:04:26
LTE band 38	**LTE band 41**
	
Date: 4.AUG.2021 14:36:04	

LTE band 66	LTE band 71
	
LTE CA_7C	**LTE CA_41C**
	

6.8. Peak-To-Average Power Ratio

Reference

Rule RSS-132: 5.4: the peak-to-average power ratio (PAPR) of the transmitter shall not exceed 13 dB for more than 0.1% of the time using a signal corresponding to the highest PAPR during periods of continuous transmission. Limit ≤ 13dB

Rule RSS-133 6.4 specifies that " the transmitter's peak-to-average power ratio (PAPR) shall not exceed 13 dB for more than 0.1% of the time using a signal corresponding to the highest PAPR during periods of continuous transmission." Limit ≤ 13dB

Rule RSS-139 6.5 specifies that "In addition, the peak to average power ratio (PAPR) of the equipment shall not exceed 13 dB for more than 0.1% of the time, using a signal that corresponds to the highest PAPR during periods of continuous transmission."

6.8.1 Measurement results

LTE band 2, 20MHz

Frequency(MHz)	PAPR(dB)		
1880.0	QPSK	16QAM	64QAM
	4.81	6.22	5.61

LTE band 4, 20MHz

Frequency(MHz)	PAPR(dB)		
1732.5	QPSK	16QAM	64QAM
	4.94	6.28	4.94

LTE band 5, 10MHz

Frequency(MHz)	PAPR(dB)		
844.0	QPSK	16QAM	64QAM
	5.64	6.35	5.67

LTE band 7, 20MHz

Frequency(MHz)	PAPR(dB)		
2535.0	QPSK	16QAM	64QAM
	4.94	6.09	5.00

LTE band 12,10MHz

Frequency(MHz)	PAPR(dB)		
707.5	QPSK	16QAM	64QAM
	5.32	6.15	8.40

LTE band 13,10MHz

Frequency(MHz)	PAPR(dB)		
782.0	QPSK	16QAM	64QAM
	5.90	6.97	6.70

LTE band 14,10MHz

Frequency(MHz)	PAPR(dB)		
793.0	QPSK	16QAM	64QAM
	5.42	6.25	8.49

LTE band 17,10MHz

Frequency(MHz)	PAPR(dB)		
710.0	QPSK	16QAM	64QAM
	5.26	5.99	8.43

LTE band 25, 20MHz

Frequency(MHz)	PAPR(dB)		
1905.0	QPSK	16QAM	64QAM
	4.94	6.35	4.97

LTE band 26(part22), 15MHz

Frequency(MHz)	PAPR(dB)		
841.5	QPSK	16QAM	64QAM
	4.74	5.93	7.66

LTE band 38, 20MHz

Frequency(MHz)	PAPR(dB)		
2610.0	QPSK	16QAM	64QAM
	9.62	9.68	9.68

LTE band 41, 20MHz

Frequency(MHz)	PAPR(dB)		
2593.0	QPSK	16QAM	64QAM
	9.62	9.07	8.78

LTE band 66, 20MHz

Frequency(MHz)	PAPR(dB)		
1770.0	QPSK	16QAM	64QAM
	5.00	6.41	5.06

LTE band 71, 20MHz

Frequency(MHz)	PAPR(dB)		
688.0	QPSK	16QAM	64QAM
	8.46	8.40	5.03

LTE CA-7C,15MHz+20MHz

Bandwidth(MHz)	PAPR(dB)		
15MHz/20MHz	QPSK	16QAM	64QAM
	5.99	5.99	8.40

LTE CA-41C,5MHz+20MHz

Bandwidth(MHz)	PAPR(dB)		
5MHz/20MHz	QPSK	16QAM	64QAM
	8.78	10.26	8.43

7. Test Equipment List

Conducted Test System

Item	Equipment Name	Type	Serial Number	Manufacturer	Cal. Date	Cal. interval
1	Universal Radio Communication Tester	CMW500	148874	R&S	2021-05-10	1 year
2	Vector Signal Analyzer	FSQ26	101091	R&S	2021-05-10	1 year
3	DC Power Supply	ZUP60-14	LOC-220Z006-0007	TDL-Lambda	2021-05-09	1 year
4	Eagle Test Software	Eagle V3.1 FCC BT/WIFI	N/A	ECIT	N/A	N/A

Radiated Emission Test System

Item	Equipment Name	Type	Serial Number	Manufacturer	Cal. Date	Cal. Interval
1	Universal Radio Communication Tester	CMW500	104178	R&S	2021-05-10	1 year
2	Test Receiver	ESU40	100307	R&S	2021-05-10	1 year
3	TRILOG Antenna	VULB9163	VULB9163-515	Schwarzbeck	2020-02-28	2 years
4	Double Ridged Guide Antenna	ETS-3117	135890	ETS	2020-02-28	2 years
5	2-Line V-Network	ENV216	101380	R&S	2021-05-10	1 year
6	RF Signal Generator	SMF100A	102314	R&S	2021-05-10	1 year
7	Amplifier	SCU08	10146	R&S	2021-05-10	1 year
8	EMI Test Software	EMC32 V9.15.00	N/A	R&S	N/A	N/A

Anechoic chamber

Fully anechoic chamber by ETS.

Annex A: Measurement Uncertainty

Measurement uncertainty for all the testing in this report are within the limit specified in 3IN documents. The detailed measurement uncertainty to see the column, k=2

Measurement Items	Range	Confidence Level	Calculated Uncertainty
Peak Output Power-Conducted	2412MHz-2462MHz	95%	0.544dB
Peak Power Spectral Density	2412MHz-2462MHz	95%	0.502dB
Occupied 6dB Bandwidth	2412MHz-2462MHz	95%	69.26kHz
Band Edges-Conducted	2412MHz-2462MHz	95%	0.544dB
Conducted Emission	30MHz-2GHz	95%	0.90dB
Conducted Emission	2GHz-3.6GHz	95%	0.88dB
Conducted Emission	3.6GHz-8GHz	95%	0.96dB
Conducted Emission	8GHz-20GHz	95%	0.94dB
Conducted Emission	20GHz-22GHz	95%	0.88dB
Conducted Emission	22GHz-26GHz	95%	0.86dB
Transmitter Spurious Emission-Radiated	9KHz-30MHz	95%	5.66dB
Transmitter Spurious Emission-Radiated	30MHz-1000MHz	95%	4.98dB
Transmitter Spurious Emission-Radiated	1000MHz -18000MHz	95%	5.06dB
Transmitter Spurious Emission-Radiated	18000MHz -40000MHz	95%	5.20dB
AC Power line Conducted Emission	0.15MHz-30MHz	95%	3.66 dB

Annex B: Accreditation Certificate

Accredited Laboratory

A2LA has accredited

INDUSTRIAL INTERNET INNOVATION CENTER (SHANGHAI) CO., LTD.

Shanghai, People's Republic of China

for technical competence in the field of

Electrical Testing

This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2017 *General requirements for the competence of testing and calibration laboratories*. This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality management system (*refer to joint ISO-ILAC-IAF Communiqué dated April 2017*).

Presented this 12th day of April 2021.

Vice President, Accreditation Services
For the Accreditation Council
Certificate Number 3682.01
Valid to February 28, 2023

For the tests to which this accreditation applies, please refer to the laboratory's Electrical Scope of Accreditation.

************END OF REPORT************