

3.2.4 Conducted Spurious Emissions

- Procedure:

The level of the carrier and the various conducted spurious and harmonic frequencies is measured by means of a calibrated spectrum analyzer. The spectrum is scanned from the lowest frequency generated in the equipment up to a frequency including its 10th harmonic.

- Measurement Data: Comply

Note 1: According to power measurements, this test item was performed at worst ca mode of each modulation type.

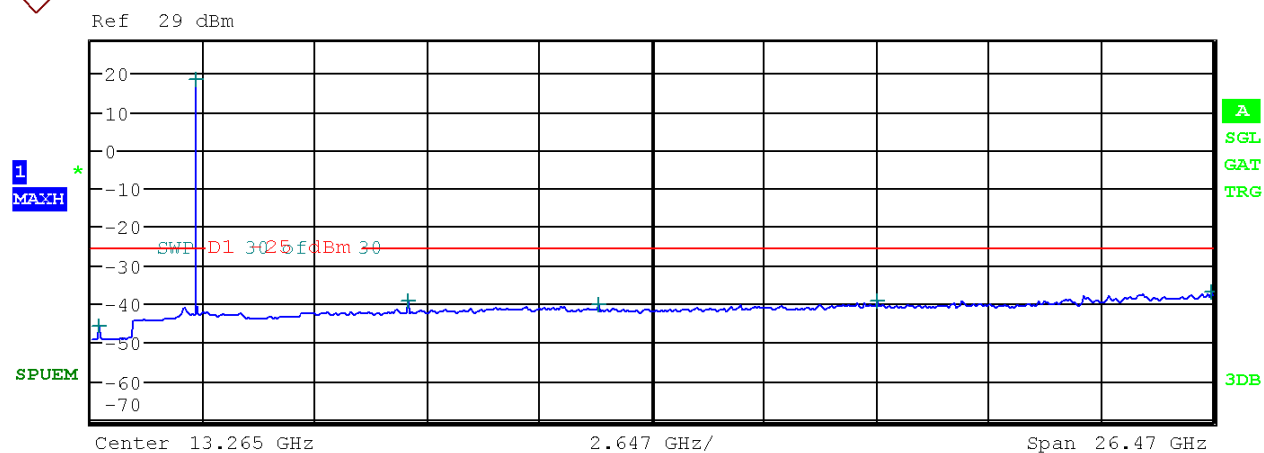
Note 2: See next pages for actual measured spectrum plots.

- Minimum Standard:

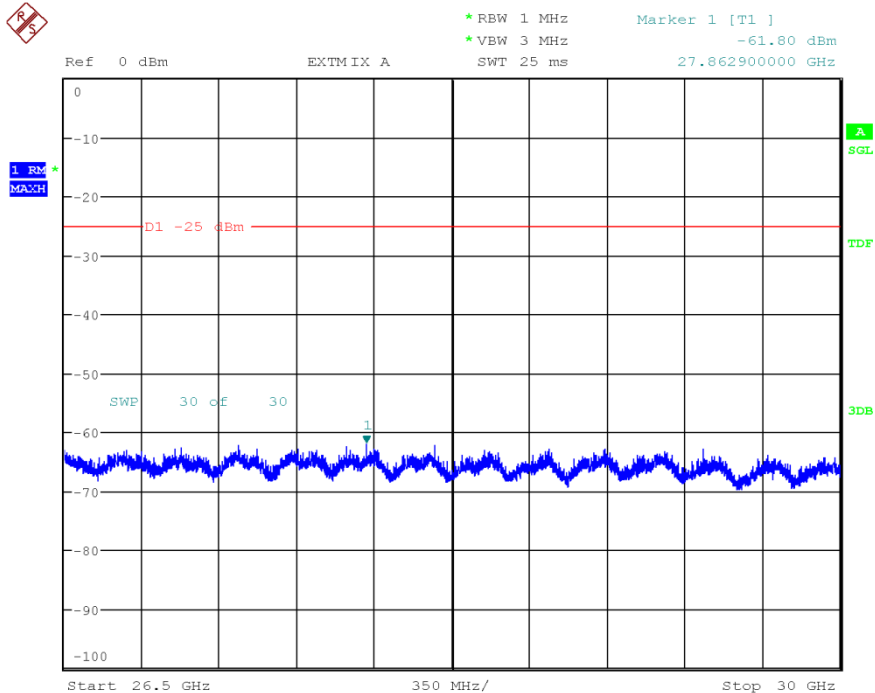
On any frequency outside a licensee's frequency block, the power of any emission shall be attenuated below the transmitter power (P) by at least $55 + 10\log(P)$ dB. The limit of emission equal to -25 dBm

Conducted Spurious Emissions

OBW: 5MHz & Lowest Frequency & PUSC Zone & QPSK1/2 & Main Antenna



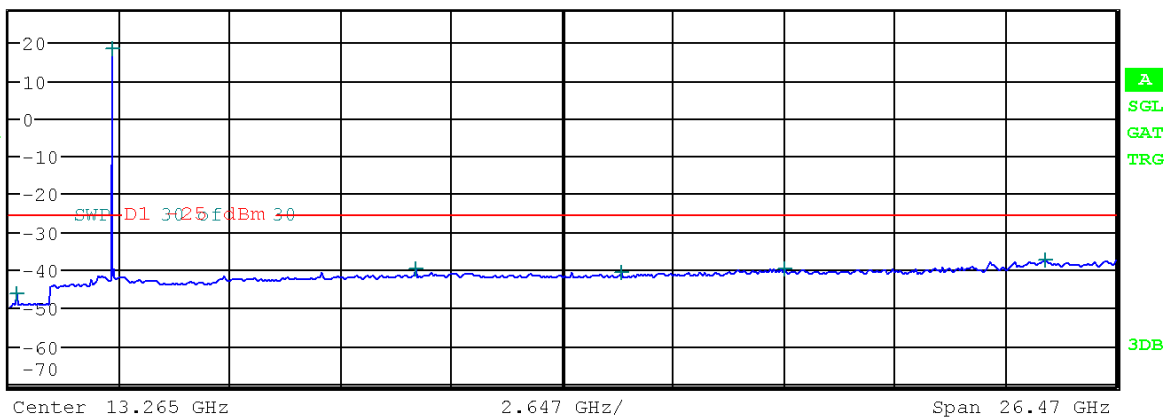
Start [Hz]	Stop [Hz]	RBW [Hz]	Freq [Hz]	PwrAbs [dBm]	Δ Limit [dB]
30.000 M	1.000 G	100.00 k	184.230000 M	-45.72	-200.00
1.000 G	5.000 G	1.00 M	2.498667 G	18.57	-200.00
5.000 G	10.000 G	1.00 M	7.498000 G	-39.20	-200.00
10.000 G	15.000 G	1.00 M	11.999500 G	-40.48	-200.00
15.000 G	20.000 G	1.00 M	18.582500 G	-39.22	-200.00
20.000 G	26.500 G	1.00 M	26.472050 G	-37.12	-200.00



OBW: 5MHz & Lowest Frequency & PUSC Zone & 16QAM1/2 & Main Antenna



1
MAXH



2.647 GHz/

Span 26.47 GHz

Start [Hz]	Stop [Hz]	RBW [Hz]	Freq [Hz]	PwrAbs [dBm]	Δ Limit [dB]
30.000 M	1.000 G	100.00 k	184.230000 M	-46.41	-200.00
1.000 G	5.000 G	1.00 M	2.498667 G	18.47	-200.00
5.000 G	10.000 G	1.00 M	9.756500 G	-39.71	-200.00
10.000 G	15.000 G	1.00 M	14.666500 G	-40.67	-200.00
15.000 G	20.000 G	1.00 M	18.551000 G	-39.77	-200.00
20.000 G	26.500 G	1.00 M	24.802200 G	-37.35	-200.00



EXTM IX A

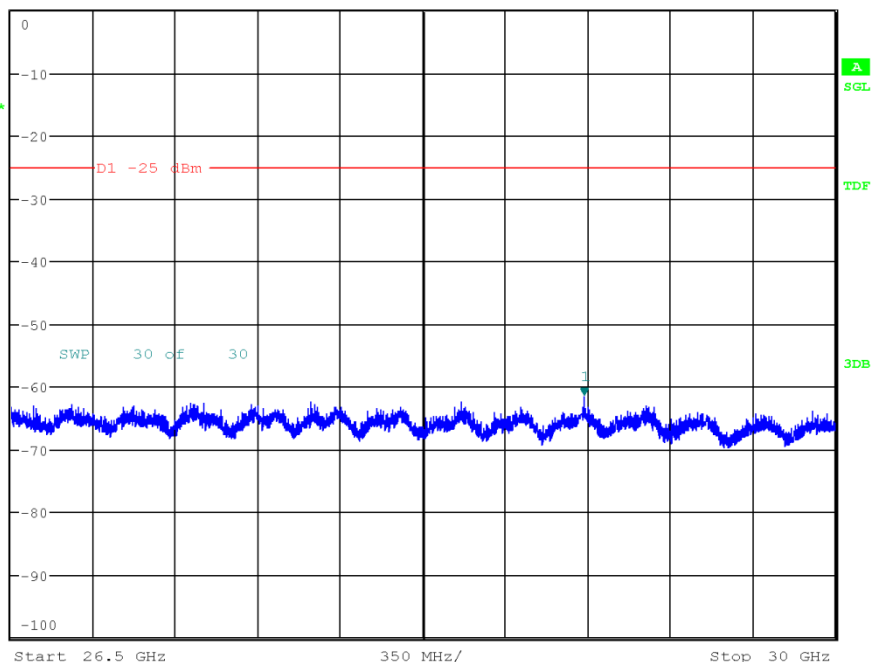
* VBW 3 MHz

SWT 25 ms

Marker 1 [T1]

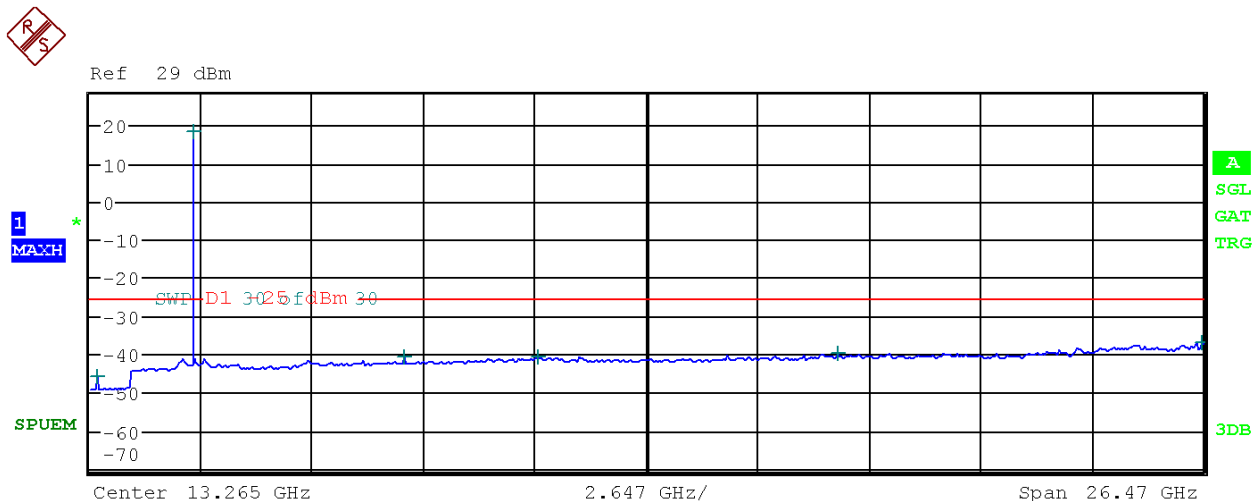
-61.47 dBm

28.933900000 GHz

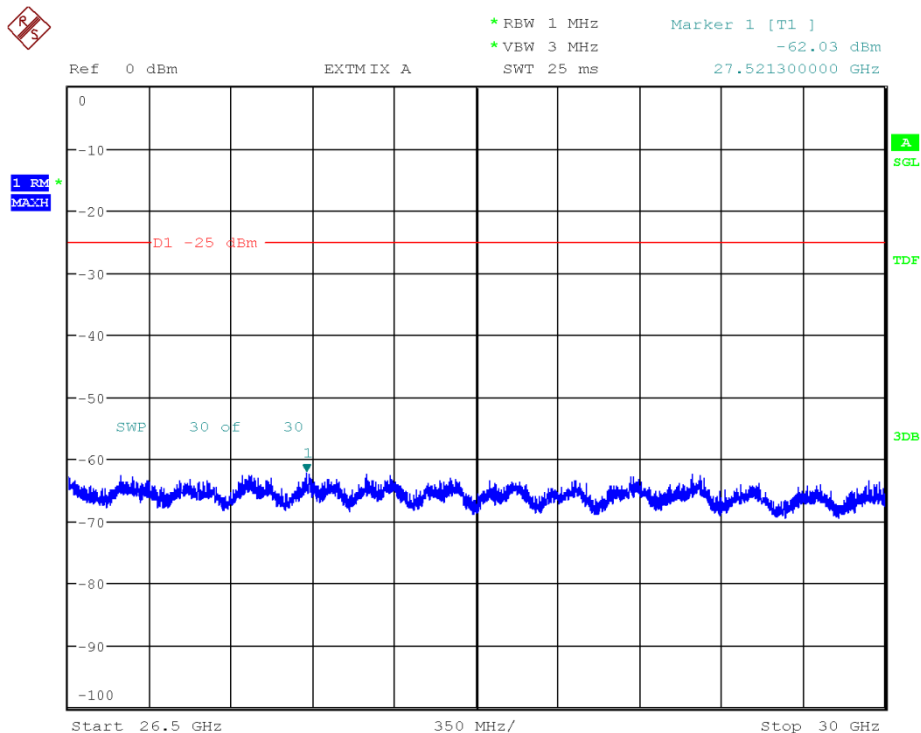


Conducted Spurious Emissions

OBW: 5MHz & Lowest Frequency & PUSC Zone & 64QAM5/6 & Main Antenna

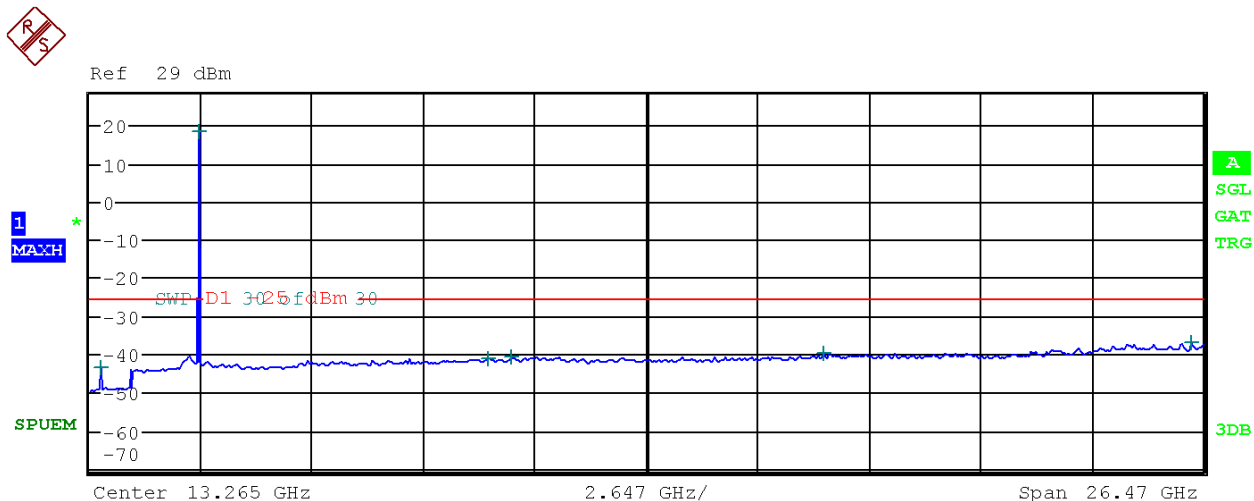


Start [Hz]	Stop [Hz]	RBW [Hz]	Freq [Hz]	PwrAbs [dBm]	Δ Limit [dB]
30.000 M	1.000 G	100.00 k	185.200000 M	-46.00	-200.00
1.000 G	5.000 G	1.00 M	2.498667 G	18.43	-200.00
5.000 G	10.000 G	1.00 M	7.498000 G	-40.48	-200.00
10.000 G	15.000 G	1.00 M	10.657000 G	-40.76	-200.00
15.000 G	20.000 G	1.00 M	17.807000 G	-39.60	-200.00
20.000 G	26.500 G	1.00 M	26.440850 G	-37.12	-200.00

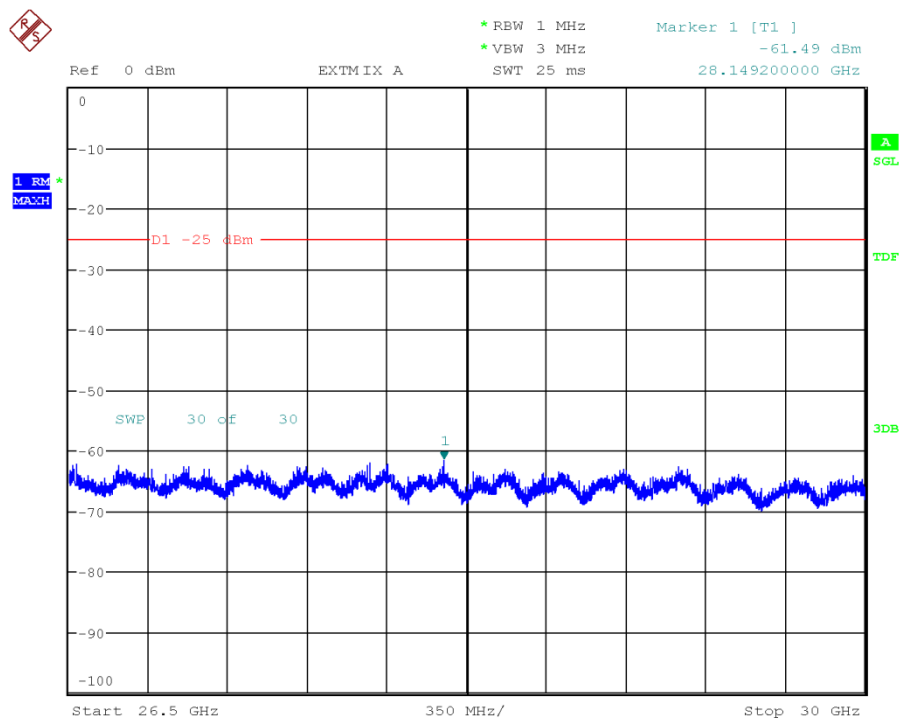


Conducted Spurious Emissions

OBW: 5MHz & Middle Frequency & PUSC Zone & QPSK1/2 & Main Antenna

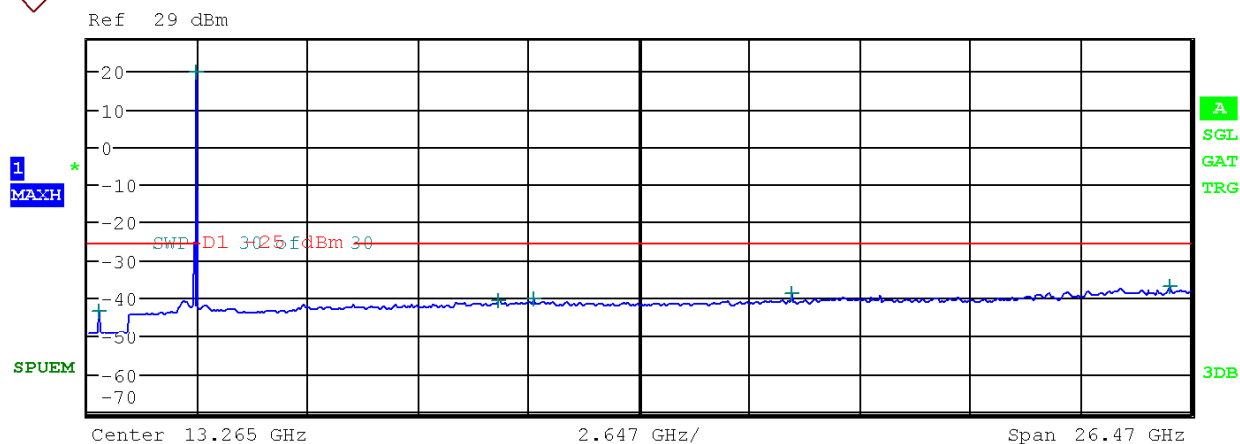


Start [Hz]	Stop [Hz]	RBW [Hz]	Freq [Hz]	PwrAbs [dBm]	Δ Limit [dB]
30.000 M	1.000 G	100.00 k	285.110000 M	-43.70	-200.00
1.000 G	5.000 G	1.00 M	2.601333 G	18.61	-200.00
5.000 G	10.000 G	1.00 M	9.507000 G	-41.19	-200.00
10.000 G	15.000 G	1.00 M	10.053000 G	-40.58	-200.00
15.000 G	20.000 G	1.00 M	17.460000 G	-39.58	-200.00
20.000 G	26.500 G	1.00 M	26.215300 G	-36.87	-200.00

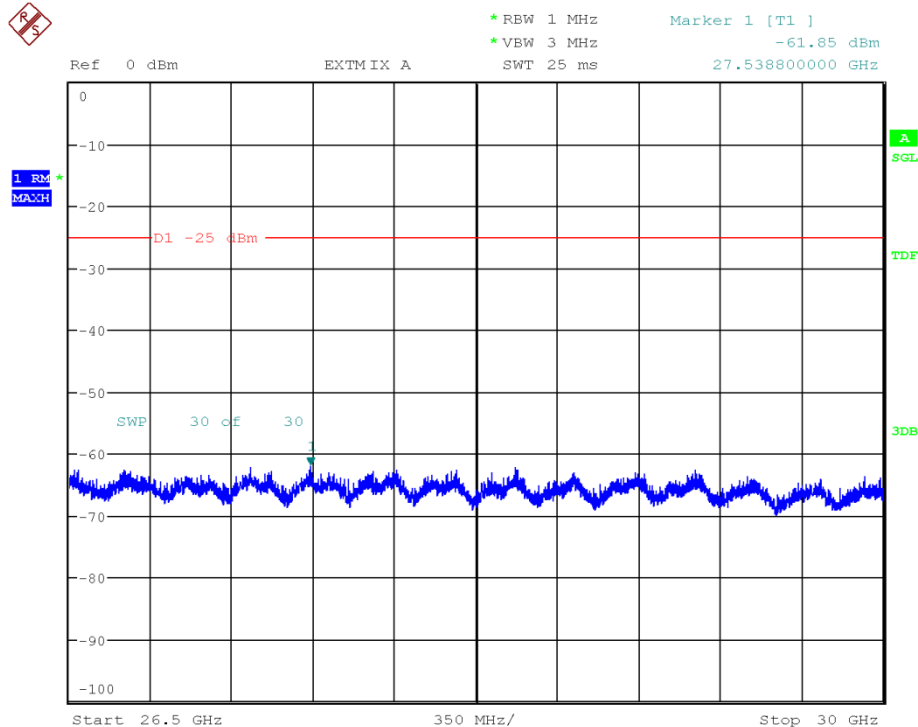


Conducted Spurious Emissions

OBW: 5MHz & Middle Frequency & PUSC Zone & 16QAM1/2 & Main Antenna

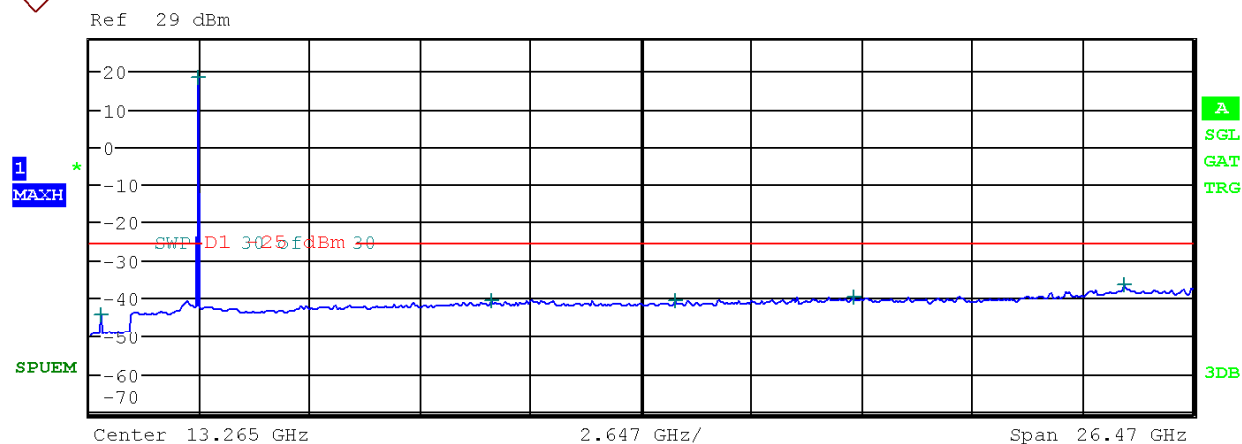


Start [Hz]	Stop [Hz]	RBW [Hz]	Freq [Hz]	PwrAbs [dBm]	Δ Limit [dB]
30.000 M	1.000 G	100.00 k	286.080000 M	-43.73	-200.00
1.000 G	5.000 G	1.00 M	2.600000 G	19.91	-200.00
5.000 G	10.000 G	1.00 M	9.859500 G	-40.50	-200.00
10.000 G	15.000 G	1.00 M	10.724500 G	-40.46	-200.00
15.000 G	20.000 G	1.00 M	16.921500 G	-38.98	-200.00
20.000 G	26.500 G	1.00 M	25.981300 G	-37.05	-200.00

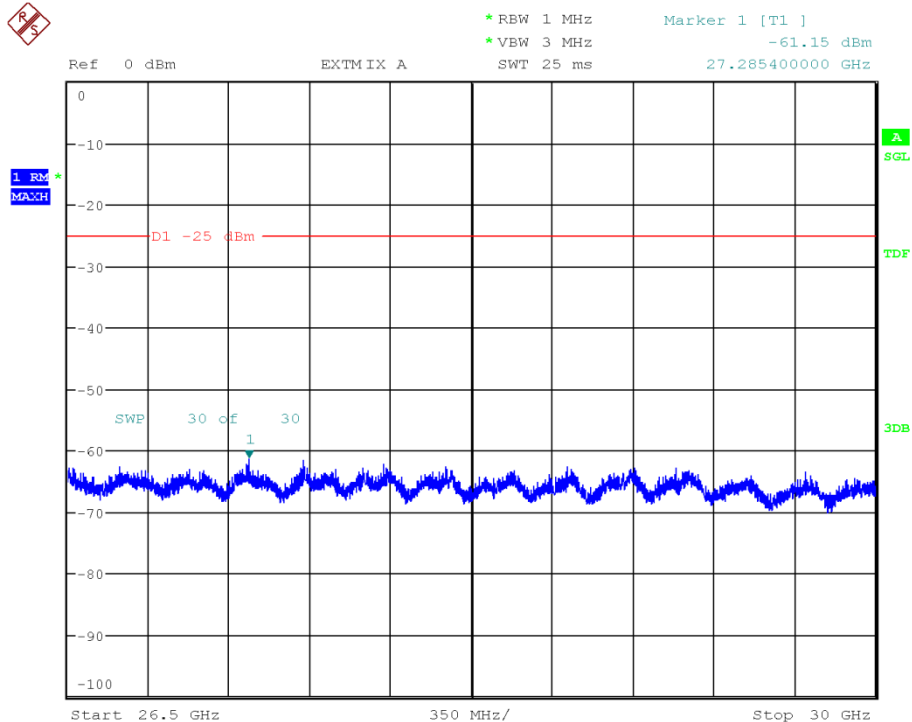


Conducted Spurious Emissions

OBW: 5MHz & Middle Frequency & PUSC Zone & 64QAM5/6 & Main Antenna



Start [Hz]	Stop [Hz]	RBW [Hz]	Freq [Hz]	PwrAbs [dBm]	Δ Limit [dB]
30.000 M	1.000 G	100.00 k	286.080000 M	-44.29	-200.00
1.000 G	5.000 G	1.00 M	2.600000 G	18.63	-200.00
5.000 G	10.000 G	1.00 M	9.679000 G	-40.93	-200.00
10.000 G	15.000 G	1.00 M	14.056500 G	-40.49	-200.00
15.000 G	20.000 G	1.00 M	18.348500 G	-39.76	-200.00
20.000 G	26.500 G	1.00 M	24.843150 G	-36.33	-200.00



Conducted Spurious Emissions

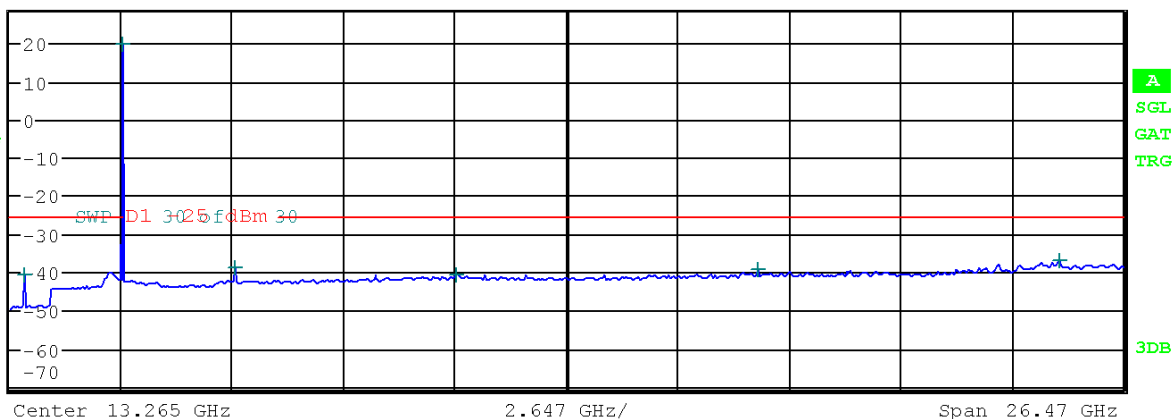
OBW: 5MHz & Highest Frequency & PUSC Zone & QPSK1/2 & Main Antenna



Ref 29 dBm

1
MAXH

SPUEM



Center 13.265 GHz

2.647 GHz/

Span 26.47 GHz

Start [Hz]	Stop [Hz]	RBW [Hz]	Freq [Hz]	PwrAbs [dBm]	Δ Limit [dB]
30.000 M	1.000 G	100.00 k	372.410000 M	-40.55	-200.00
1.000 G	5.000 G	1.00 M	2.686667 G	20.01	-200.00
5.000 G	10.000 G	1.00 M	5.374000 G	-39.02	-200.00
10.000 G	15.000 G	1.00 M	10.621000 G	-40.52	-200.00
15.000 G	20.000 G	1.00 M	17.808000 G	-39.29	-200.00
20.000 G	26.500 G	1.00 M	24.973800 G	-37.07	-200.00



Ref 0 dBm

EXTMIX A

* RBW 1 MHz

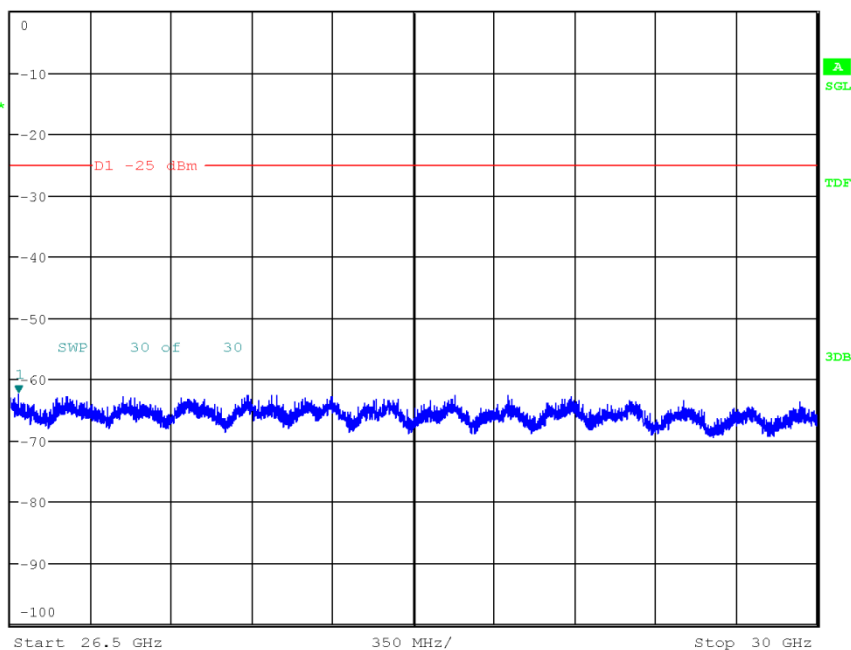
Marker 1 [T1]

* VBW 3 MHz

-62.37 dBm

SWT 25 ms

26.535000000 GHz

1 RM
MAXH

Start 26.5 GHz

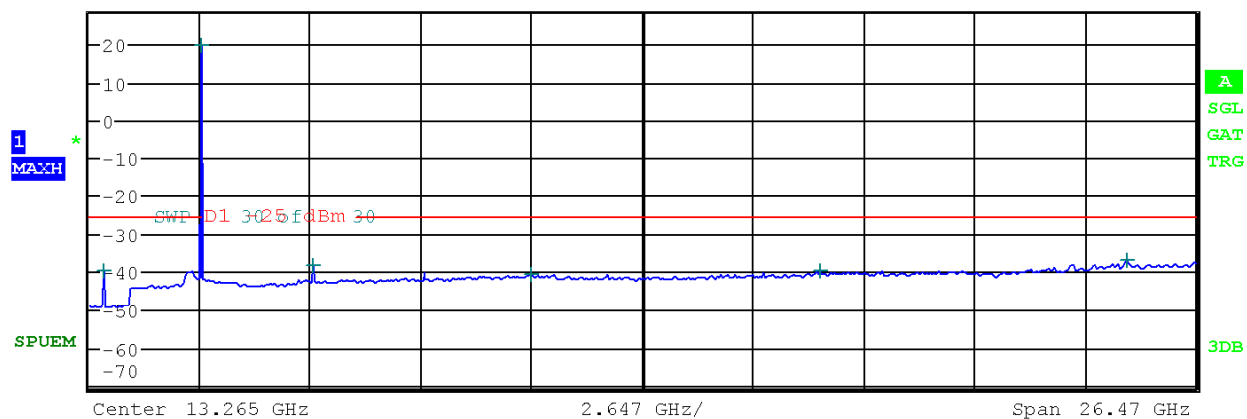
350 MHz/

Stop 30 GHz

OBW: 5MHz & Highest Frequency & PUSC Zone & 16QAM1/2 & Main Antenna



1
MAXH



2.647 GHz/

Span 26.47 GHz

Start [Hz]	Stop [Hz]	RBW [Hz]	Freq [Hz]	PwrAbs [dBm]	Δ Limit [dB]
30.000 M	1.000 G	100.00 k	372.410000 M	-39.86	-200.00
1.000 G	5.000 G	1.00 M	2.688000 G	19.98	-200.00
5.000 G	10.000 G	1.00 M	5.374000 G	-38.20	-200.00
10.000 G	15.000 G	1.00 M	10.597500 G	-40.53	-200.00
15.000 G	20.000 G	1.00 M	17.507000 G	-39.65	-200.00
20.000 G	26.500 G	1.00 M	24.865900 G	-36.90	-200.00

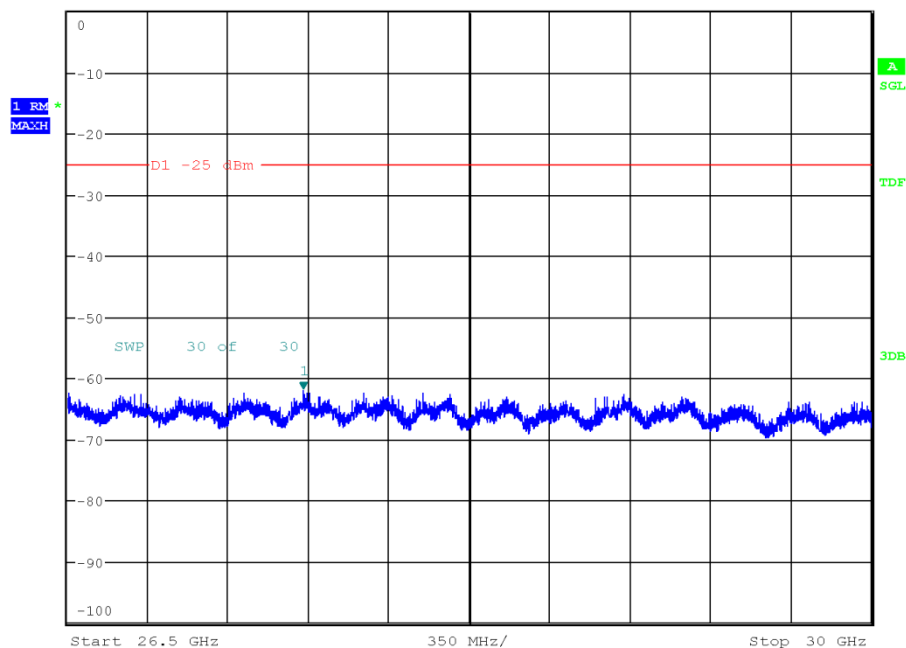


Marker 1 [T1]

-61.90 dBm

27.528300000 GHz

EXTMIX A



Start 26.5 GHz

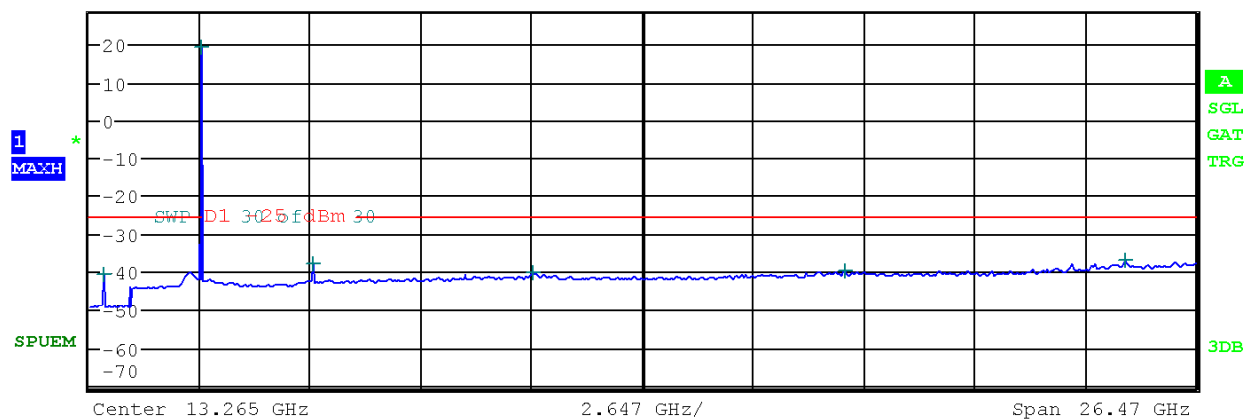
350 MHz/

Stop 30 GHz

OBW: 5MHz & Highest Frequency & PUSC Zone & 64QAM6/5 & Main Antenna



1
MAXH



2.647 GHz/

Span 26.47 GHz

Start [Hz]	Stop [Hz]	RBW [Hz]	Freq [Hz]	PwrAbs [dBm]	Δ Limit [dB]
30.000 M	1.000 G	100.00 k	372.410000 M	-40.76	-200.00
1.000 G	5.000 G	1.00 M	2.686667 G	19.60	-200.00
5.000 G	10.000 G	1.00 M	5.372500 G	-37.74	-200.00
10.000 G	15.000 G	1.00 M	10.653500 G	-40.46	-200.00
15.000 G	20.000 G	1.00 M	18.120000 G	-39.70	-200.00
20.000 G	26.500 G	1.00 M	24.807400 G	-37.08	-200.00

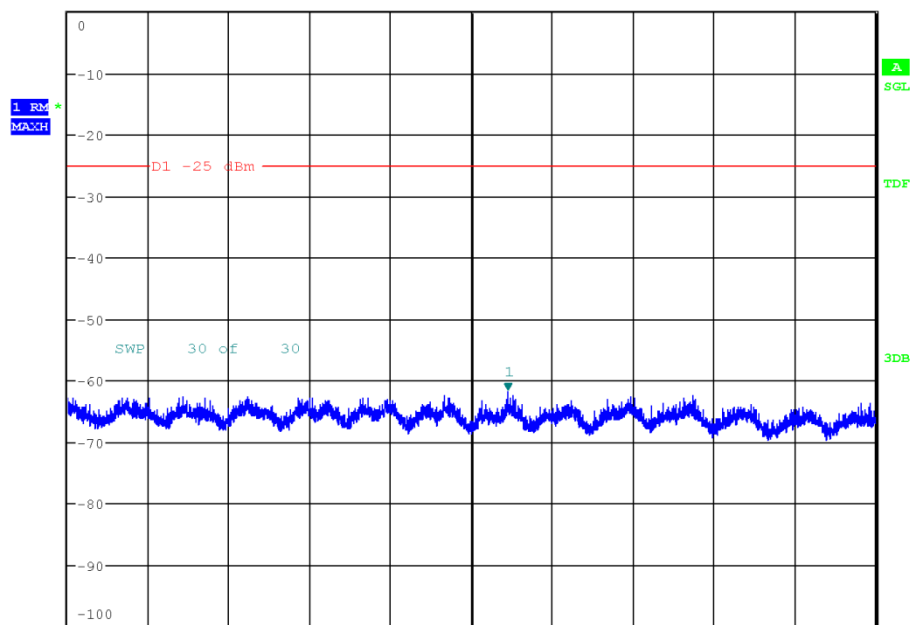


EXTM IX A

Marker 1 [T1]

-61.73 dBm

28.404700000 GHz



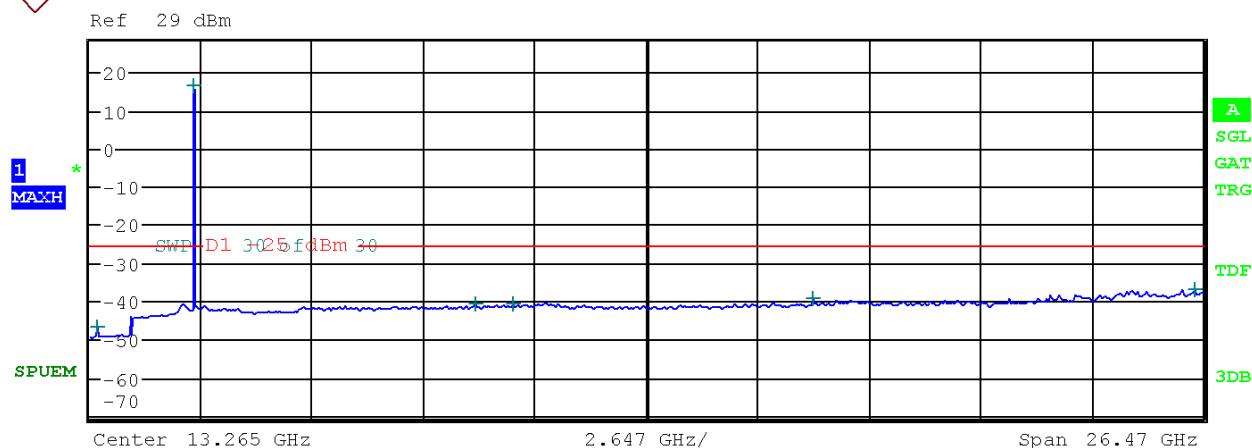
Start 26.5 GHz

350 MHz/

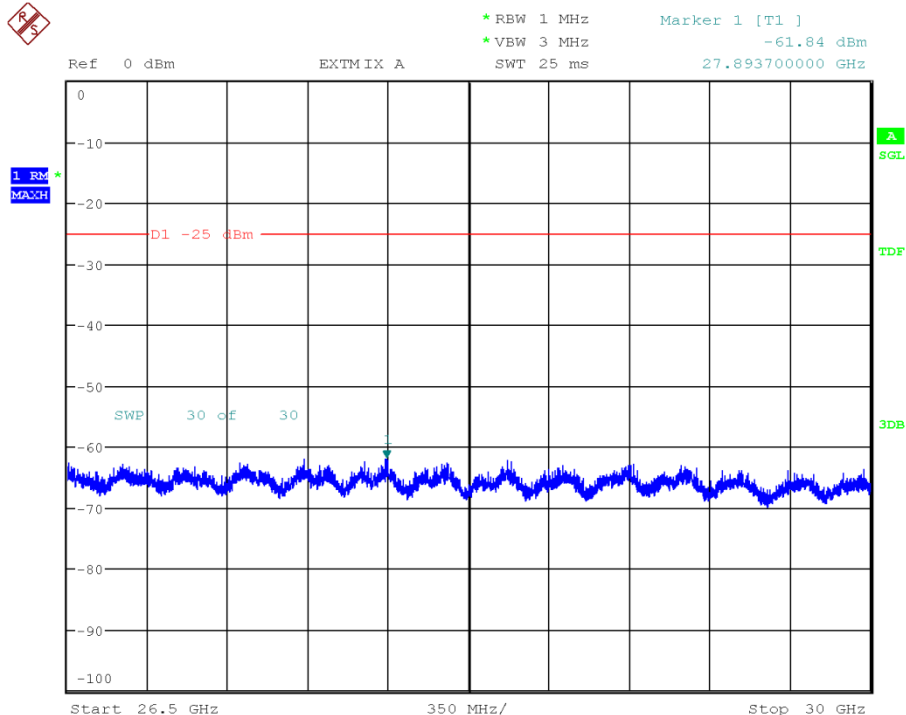
Stop 30 GHz

Conducted Spurious Emissions

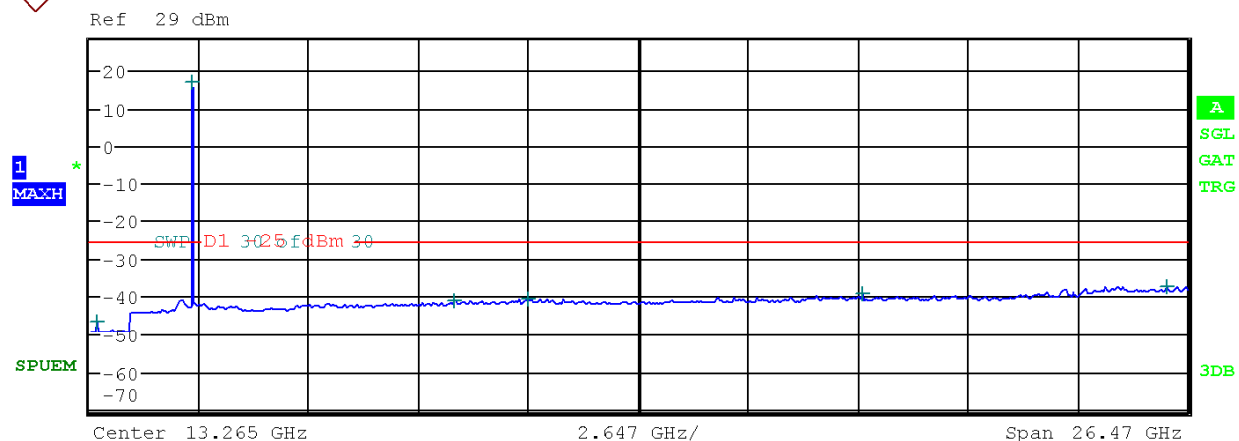
OBW: 10MHz & Lowest Frequency & PUSC Zone & QPSK1/2 & Main Antenna



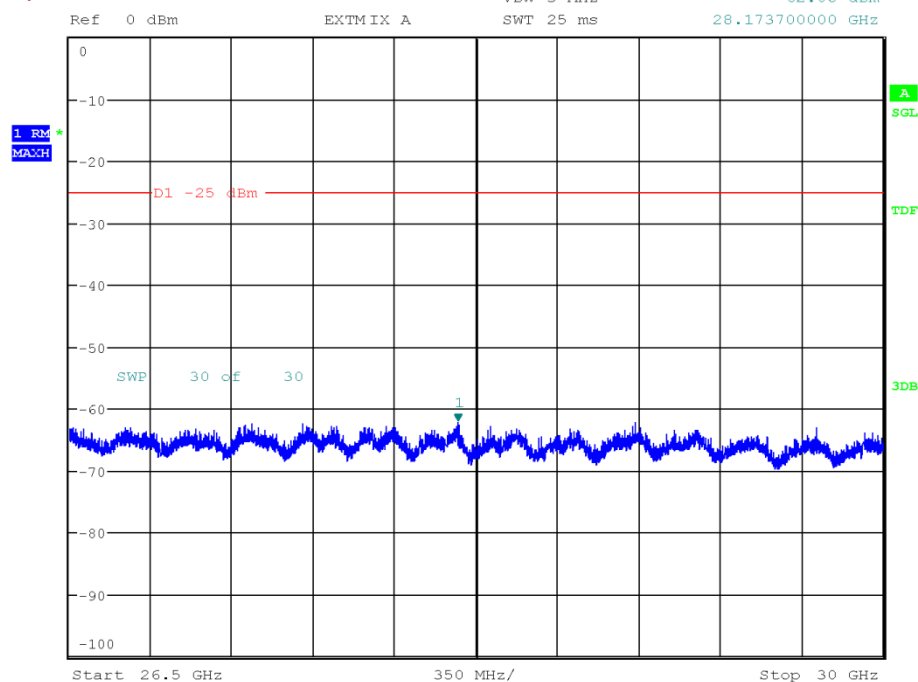
Start [Hz]	Stop [Hz]	RBW [Hz]	Freq [Hz]	PwrAbs [dBm]	Δ Limit [dB]
30.000 M	1.000 G	100.00 k	193.930000 M	-46.95	-200.00
1.000 G	5.000 G	1.00 M	2.506667 G	16.66	-200.00
5.000 G	10.000 G	1.00 M	9.184500 G	-40.89	-200.00
10.000 G	15.000 G	1.00 M	10.064500 G	-40.55	-200.00
15.000 G	20.000 G	1.00 M	17.208000 G	-39.48	-200.00
20.000 G	26.500 G	1.00 M	26.300450 G	-37.00	-200.00



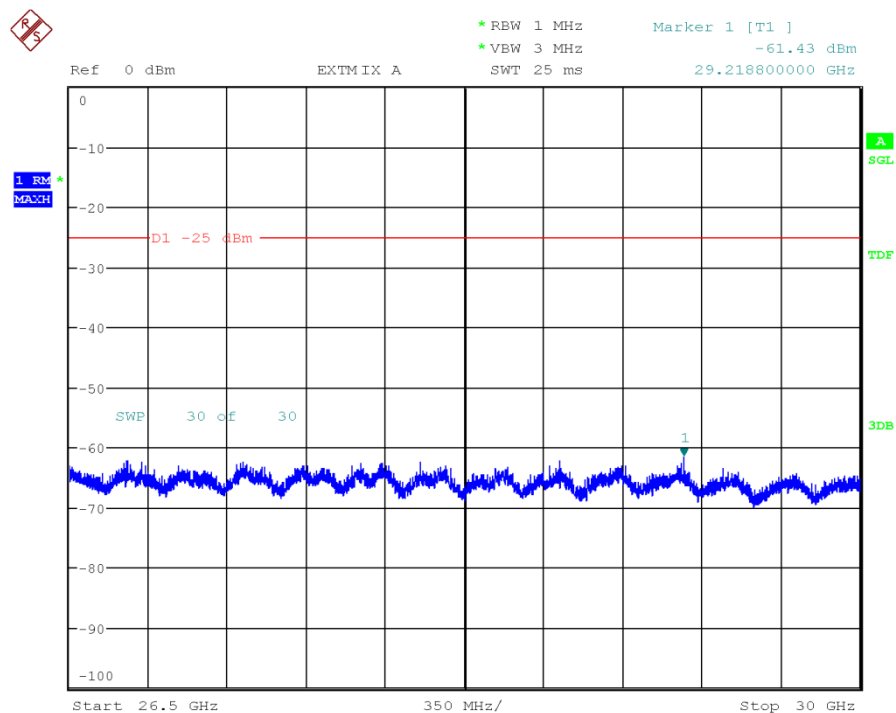
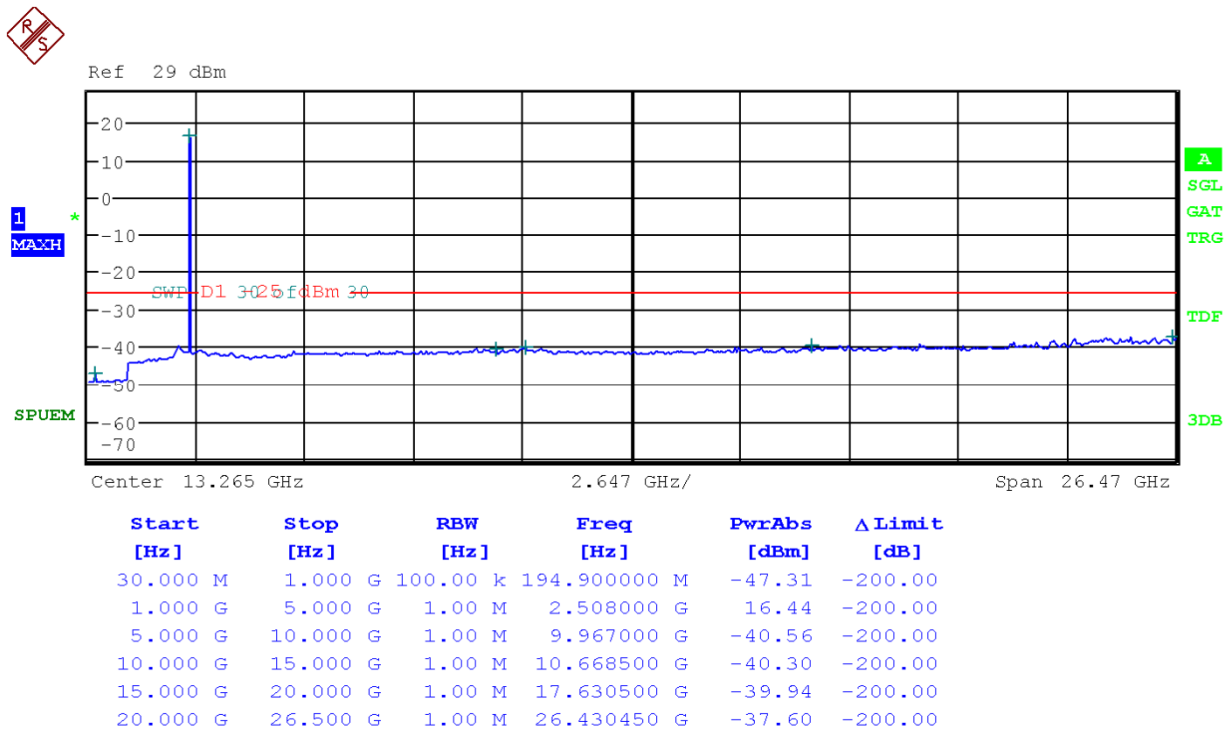
OBW: 10MHz & Lowest Frequency & PUSC Zone & 16QAM1/2 & Main Antenna



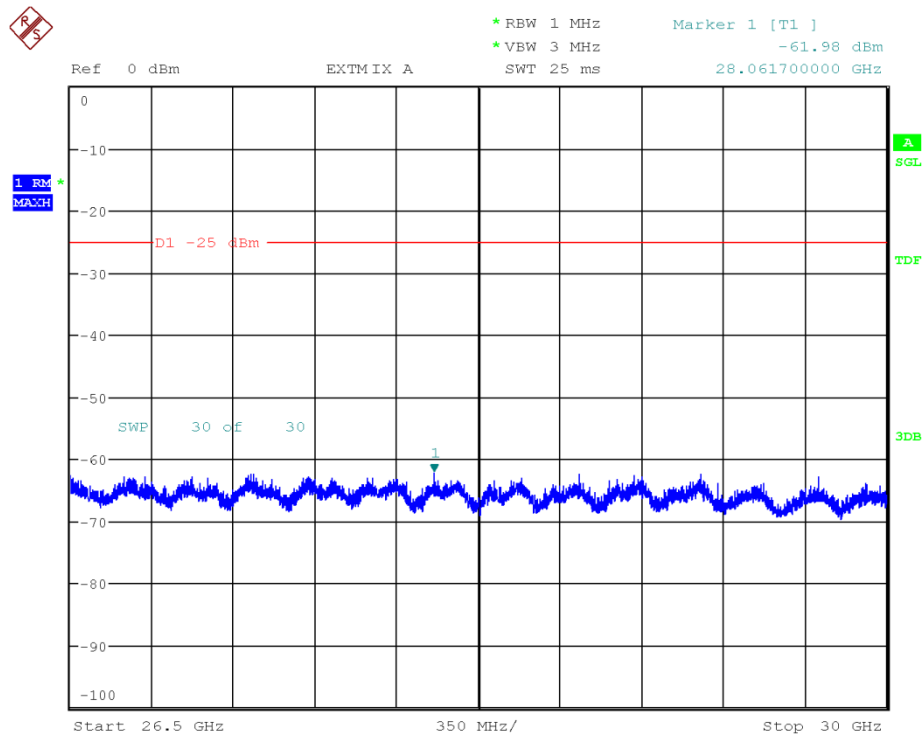
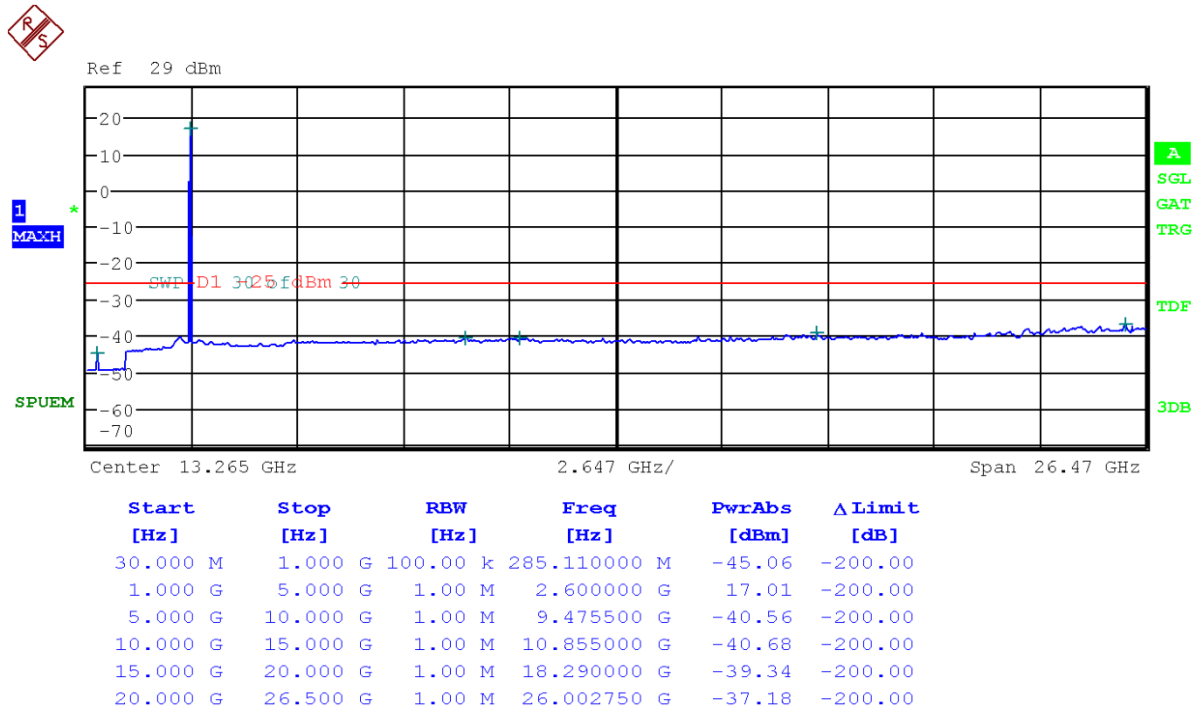
Start	Stop	RBW	Freq	PwrAbs	Δ Limit
[Hz]	[Hz]	[Hz]	[Hz]	[dBm]	[dB]
30.000 M	1.000 G	100.00 k	192.960000 M	-47.00	-200.00
1.000 G	5.000 G	1.00 M	2.506667 G	16.84	-200.00
5.000 G	10.000 G	1.00 M	8.799000 G	-41.02	-200.00
10.000 G	15.000 G	1.00 M	10.575000 G	-40.73	-200.00
15.000 G	20.000 G	1.00 M	18.633000 G	-39.54	-200.00
20.000 G	26.500 G	1.00 M	25.990400 G	-37.35	-200.00



OBW: 10MHz & Lowest Frequency & PUSC Zone & 64QAM5/6 & Main Antenna

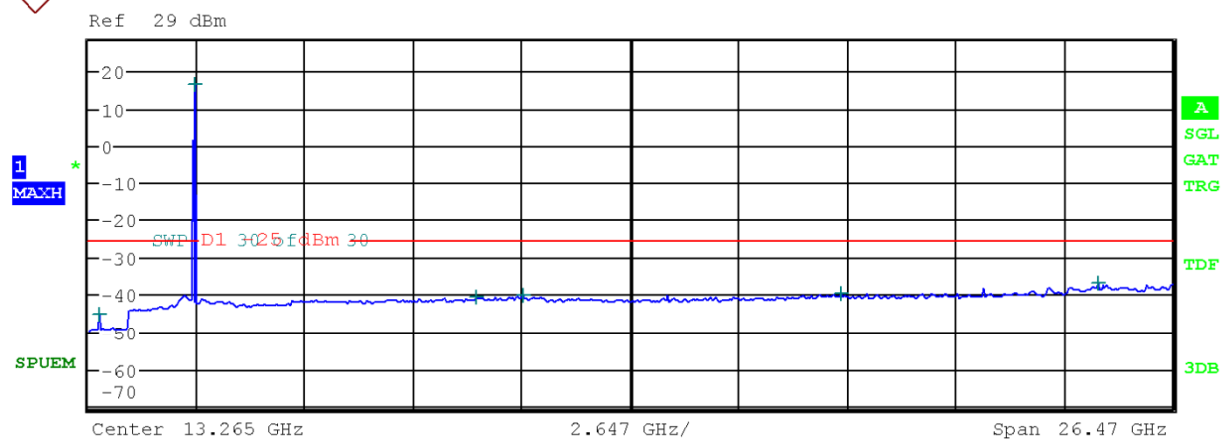


OBW: 10MHz & Middle Frequency & PUSC Zone & QPSK1/2 & Main Antenna

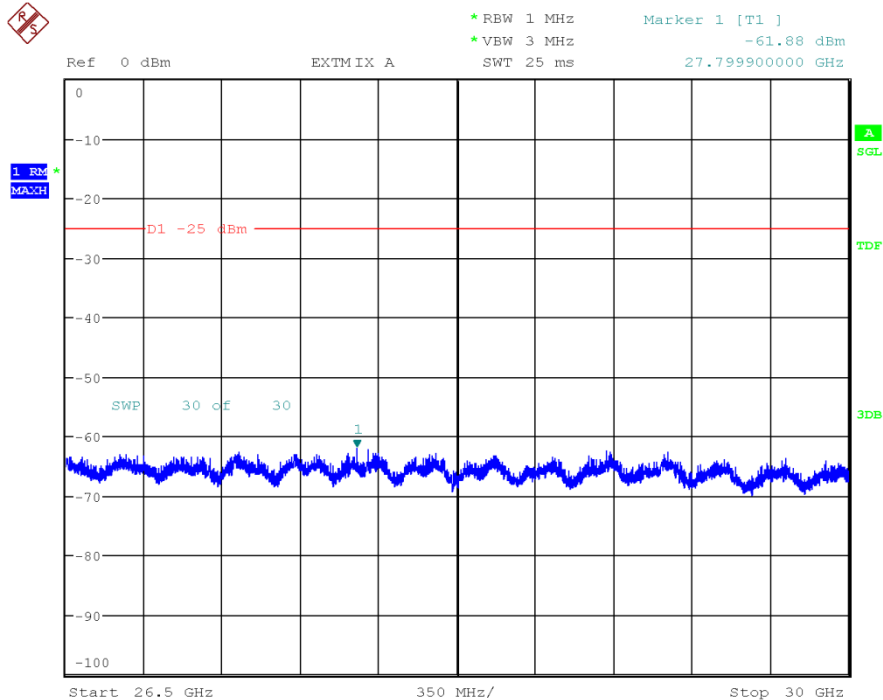


Conducted Spurious Emissions

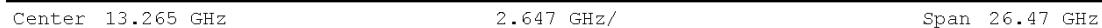
OBW: 10MHz & Middle Frequency & PUSC Zone & 16QAM1/2 & Main Antenna



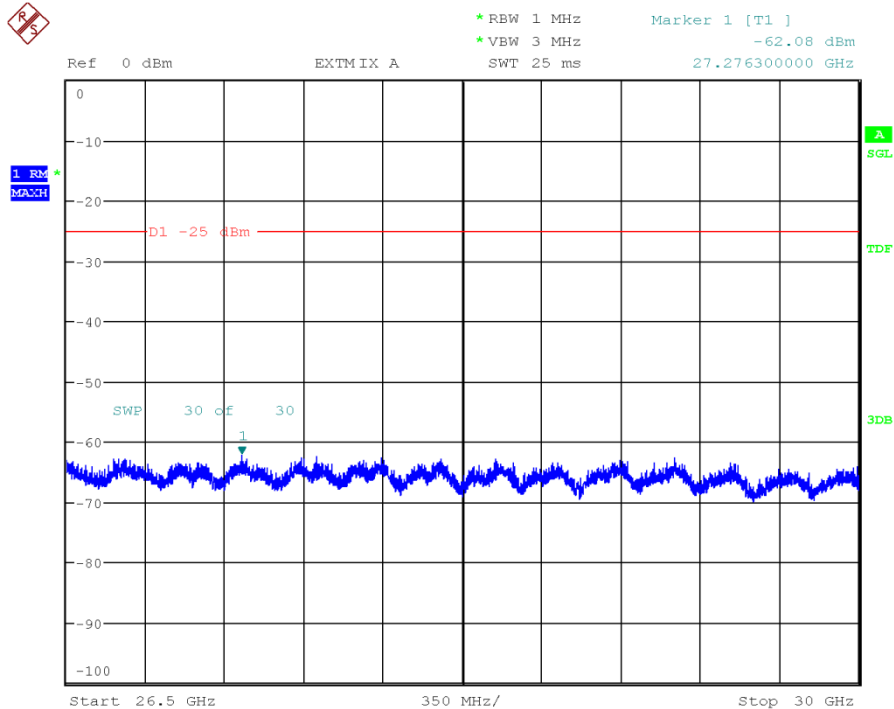
Start [Hz]	Stop [Hz]	RBW [Hz]	Freq [Hz]	PwrAbs [dBm]	ΔLimit [dB]
30.000 M	1.000 G	100.00 k	285.110000 M	-45.55	-200.00
1.000 G	5.000 G	1.00 M	2.604000 G	16.47	-200.00
5.000 G	10.000 G	1.00 M	9.507000 G	-40.75	-200.00
10.000 G	15.000 G	1.00 M	10.647500 G	-40.32	-200.00
15.000 G	20.000 G	1.00 M	18.380500 G	-39.82	-200.00
20.000 G	26.500 G	1.00 M	24.694300 G	-37.15	-200.00



OBW: 10MHz & Middle Frequency & PUSC Zone & 64QAM5/6 & Main Antenna

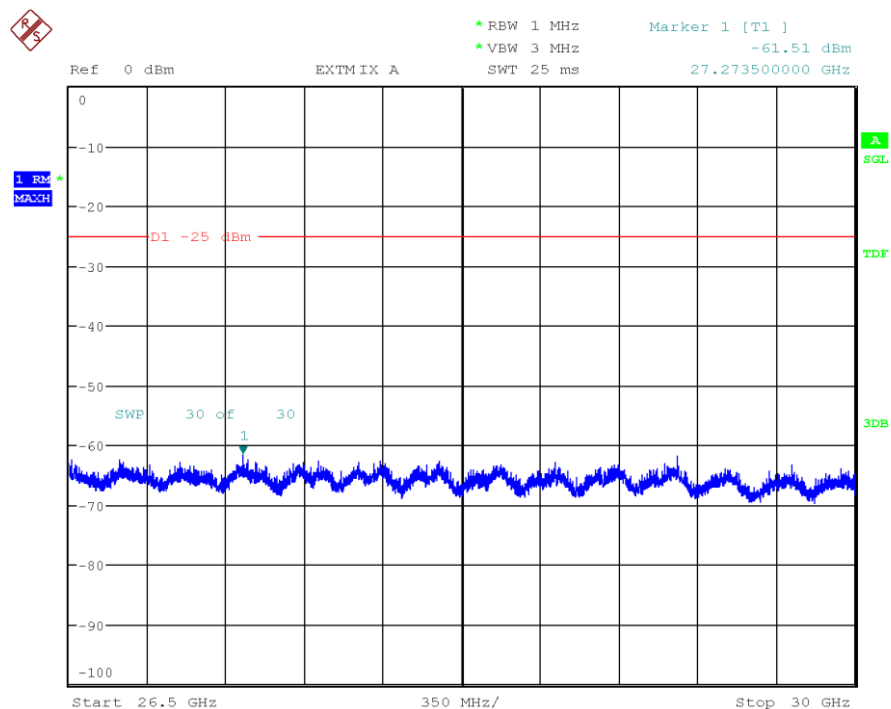
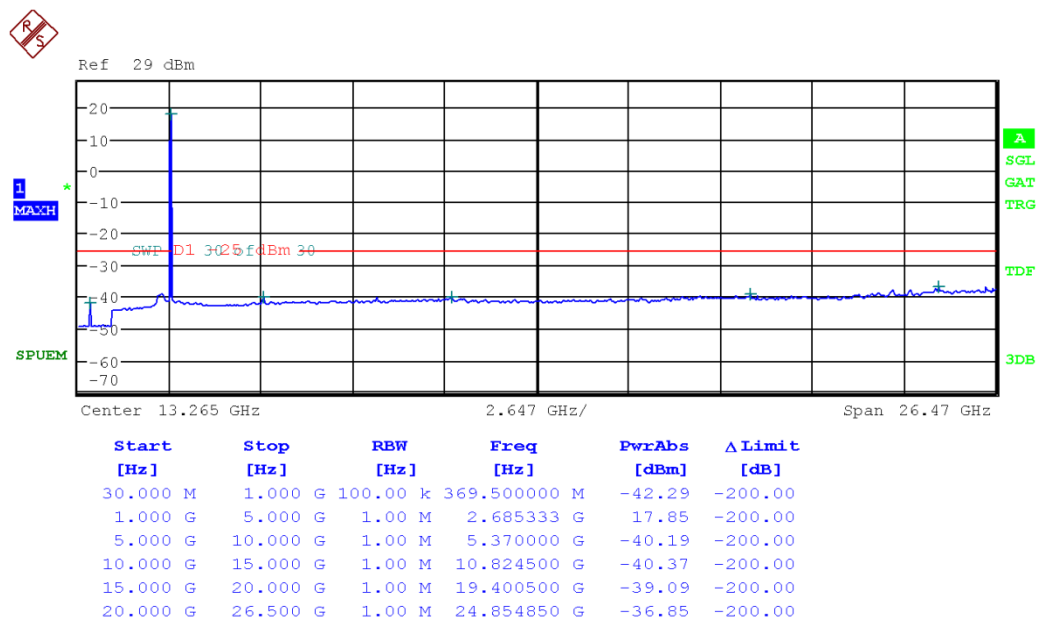


Start	Stop	RBW	Freq	PwrAbs	Δ Limit
[Hz]	[Hz]	[Hz]	[Hz]	[dBm]	[dB]
30.000 M	1.000 G	100.00 k	285.110000 M	-45.26	-200.00
1.000 G	5.000 G	1.00 M	2.602667 G	16.64	-200.00
5.000 G	10.000 G	1.00 M	9.360500 G	-40.71	-200.00
10.000 G	15.000 G	1.00 M	14.899500 G	-40.41	-200.00
15.000 G	20.000 G	1.00 M	18.099000 G	-39.58	-200.00
20.000 G	26.500 G	1.00 M	25.348850 G	-37.35	-200.00



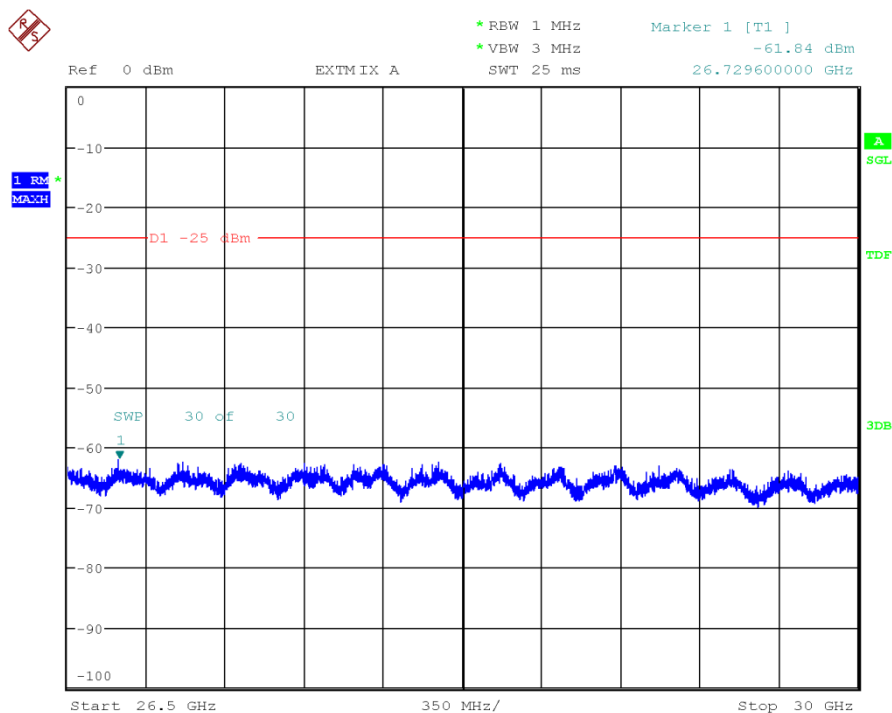
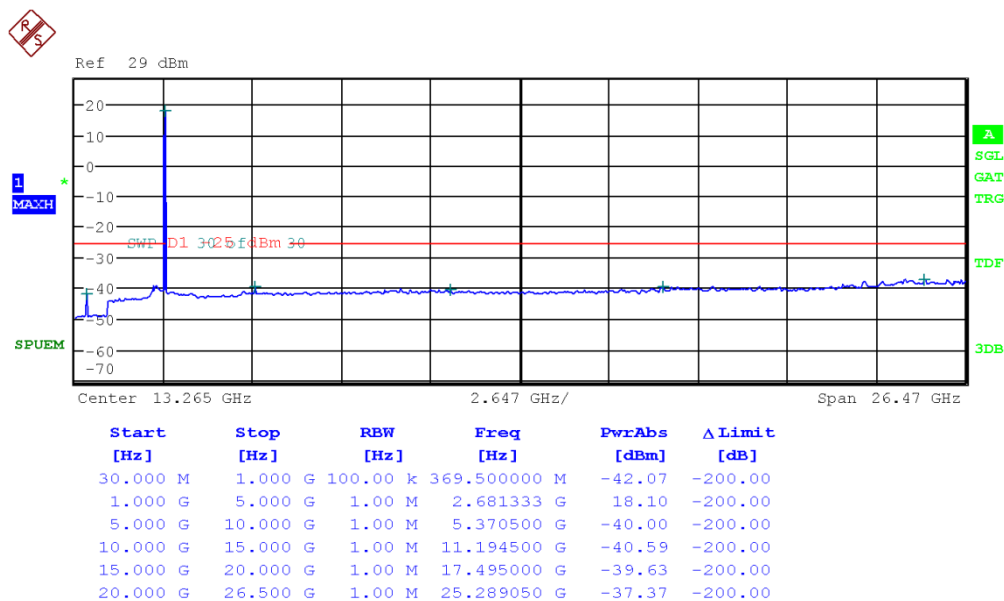
Conducted Spurious Emissions

OBW: 10MHz & Highest Frequency & PUSC Zone & QPSK1/2 & Main Antenna



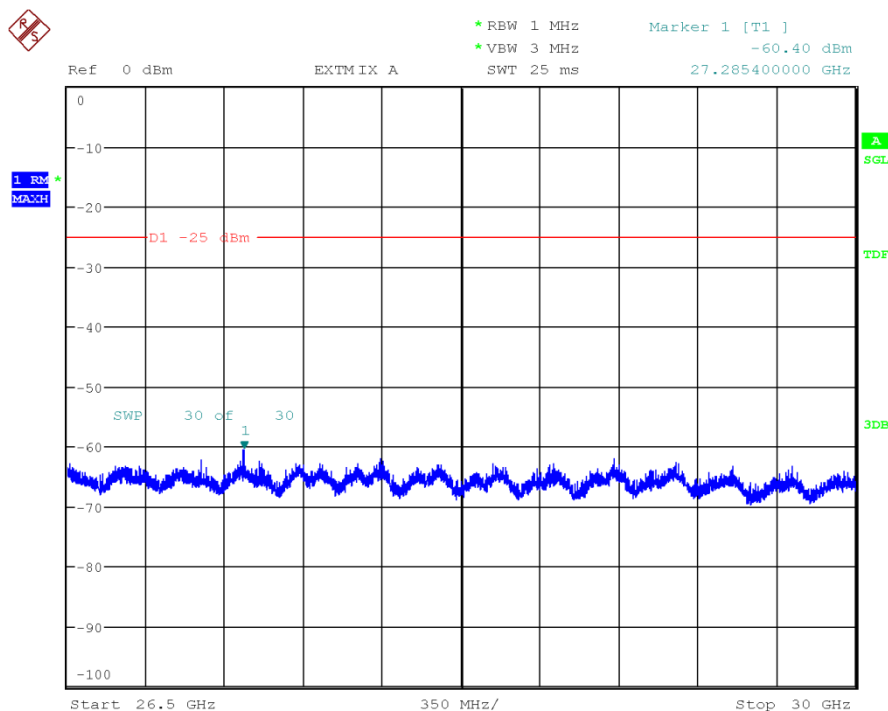
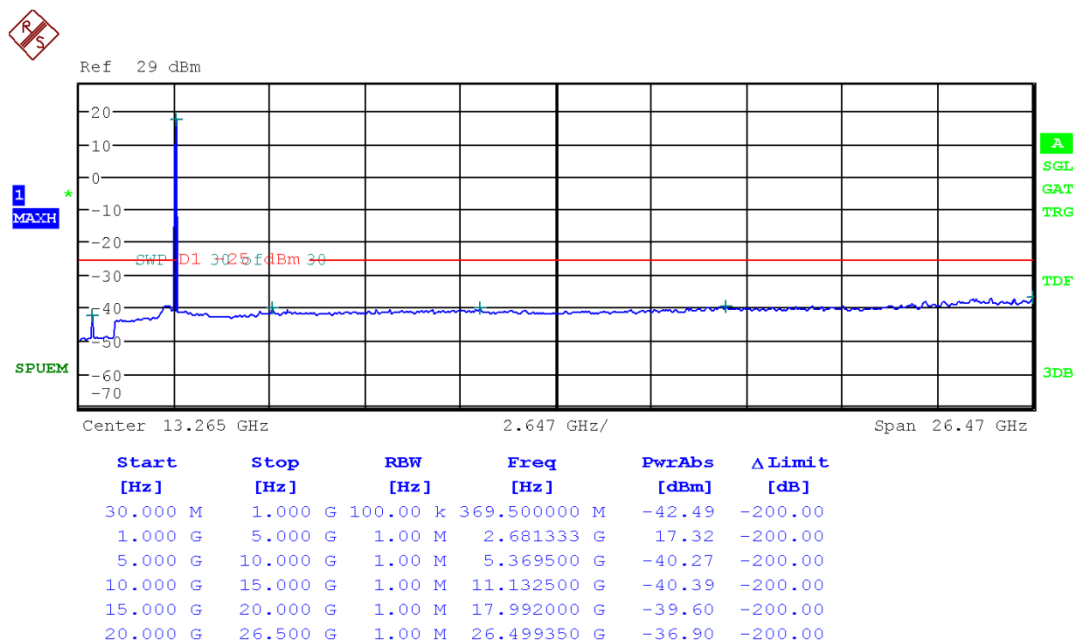
Conducted Spurious Emissions

OBW: 10MHz & Highest Frequency & PUSC Zone & 16QAM1/2 & Main Antenna



Conducted Spurious Emissions

OBW: 10MHz & Highest Frequency & PUSC Zone & 64QAM6/5 & Main Antenna



3.2.5 Frequency Stability

- Procedure:

The frequency stability of the transmitter is measured by:

- a) **Temperature** : The temperature is varied from -30°C to + 50°C using an environmental chamber with 10°C increments.
- b) **Primary Supply Voltage** : The primary supply voltage is varied from 85% to 115% of the nominal voltage at the input to the device or at the power supply terminals if cables are not normally supplied.

Time Period and Procedure:

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.

- Measurement Data: **Comply**

Note 1: See next pages for measurement data.

- Minimum Standard:

The frequency stability shall be sufficient to ensure that the fundamental emissions stay within the authorized bands of operation.

Measurement Data:

BANDWIDTH	:	5	MHZ
ZONE MODE	:	PUSC	
MODULATION TYPE	:	QPSK 1/2	
OPERATING FREQUENCY	:	2,600,000,013	Hz
REFERENCE VOLTAGE	:	3.7	V _{DC}

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQ (Hz)	Deviation (ppm)
100%	3.7	+20(Ref)	2,600,000,013	0.000
100%		-30	2,599,999,991	-0.008
100%		-20	2,600,000,007	-0.002
100%		-10	2,599,999,985	-0.011
100%		0	2,600,000,008	-0.002
100%		+10	2,599,999,988	-0.010
100%		+20	2,599,999,984	-0.011
100%		+30	2,600,000,013	0.000
100%		+40	2,600,000,017	0.002
100%		+50	2,599,999,991	-0.008
85%	3.145	+20	N/A	N/A
115%	4.255	+20	2,600,000,006	-0.003
BATT.ENDPOINT	3.400	+20	2,599,999,989	-0.009

Measurement Data:

BANDWIDTH	:	10	MHZ
ZONE MODE	:	PUSC	
MODULATION TYPE	:	QPSK 1/2	
OPERATING FREQUENCY	:	2,599,999,994	Hz
REFERENCE VOLTAGE	:	3.7	V _{DC}

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQ (Hz)	Deviation (ppm)
100%	3.7	+20(Ref)	2,599,999,994	0.000
100%		-30	2,599,999,982	-0.005
100%		-20	2,600,000,010	0.006
100%		-10	2,599,999,992	-0.001
100%		0	2,599,999,980	-0.005
100%		+10	2,599,999,985	-0.003
100%		+20	2,600,000,012	0.007
100%		+30	2,599,999,994	0.000
100%		+40	2,600,000,017	0.009
100%		+50	2,599,999,990	-0.002
85%	3.145	+20	N/A	N/A
115%	4.255	+20	2,600,000,014	0.008
BATT.ENDPOINT	3.400	+20	2,599,999,989	-0.002

3.2.6 Radiated Spurious Emissions

- Procedure:

Spurious and harmonic emissions between the lowest frequency generated in this device and up to 10th harmonic of the highest generated in this device are measured at semi-anechoic chamber. The equipment under test is placed on a wooden turntable located at 3-meters from the receive antenna.

This test is based on the use of spectrum analyzer employing a RBW/VBW = 5MHz(OBW: 5MHz) and 10MHz(OBW: 10MHz) and peak detector mode.

The receive antenna height and turntable rotations are adjusted for the highest reading on the receive spectrum analyzer. A antenna is substituted in place of the EUT. This antenna is driven by a vector signal generator for spurious emissions. The level of the signal generator is adjusted to obtain the same spectrum analyzer's reading level when EUT existed. After that conducted power at the input terminal of the transmit antenna is measured and this conducted power is corrected with antenna gain in dBi. This spurious level was recorded.

Note: Radiated Spurious Emission Measurements by Substitution Method according to ANSI/TIA/EIA-603-C-2004, Aug. 17, 2004

- Measurement Data: Comply

Note 1: According to power measurements, this test item was performed at worst ca mode of each modulation type.

Note 2: See next pages for worst case measurement data.

- Minimum Standard:

On any frequency outside a licensee's frequency block, the power of any emission shall be attenuated below the transmitter power (P) by at least $55 + 10\log(P)$ dB. The limit of emission equal to -25 dBm

Measurement Data:

- OBW: 5MHz & Main Antenna

Tested Freq.	Mod. Type	Frequency (MHz)	EUT Position	TEST CONDITIONS				
				level (dBm)	Pol. (H/V)	Ant Gain (dBi)	Result (dBm)	Limit (dBm)
Lowest	QPSK1/2	4997.38	Z	-47.16	H	10.61	-33.61	-25.00
		7496.62	Z	-45.71	H	11.36	-27.84	-25.00
	16QAM1/2	4998.44	Z	-46.95	H	10.61	-33.40	-25.00
		7498.60	Z	-46.01	H	11.36	-28.14	-25.00
	64QAM1/2	4997.60	Z	-46.96	H	10.61	-33.41	-25.00
		7497.54	Z	-45.92	H	11.36	-28.05	-25.00
Middle	QPSK1/2	5199.74	Z	-46.21	H	10.80	-32.89	-25.00
		7799.42	Z	-45.74	H	11.32	-28.67	-25.00
	16QAM1/2	5200.04	Z	-46.22	H	10.80	-32.90	-25.00
		7800.66	Z	-45.77	H	11.32	-28.70	-25.00
	64QAM1/2	5200.28	Z	-46.20	H	10.80	-32.88	-25.00
		7799.26	Z	-45.89	H	11.32	-28.82	-25.00
Highest	QPSK1/2	5373.78	Z	-44.12	H	10.96	-30.44	-25.00
		8060.11	Z	-45.78	H	11.29	-28.29	-25.00
	16QAM1/2	5373.94	Z	-44.23	H	10.96	-30.55	-25.00
		8059.99	Z	-45.50	H	11.29	-28.01	-25.00
	64QAM1/2	5373.90	Z	-44.19	H	10.96	-30.51	-25.00
		8060.51	Z	-45.22	H	11.29	-27.73	-25.00

- OBW: 10MHz & Main Antenna

Tested Freq.	Mod. Type	Frequency (MHz)	EUT Position	TEST CONDITIONS				
				level (dBm)	Pol. (H/V)	Ant Gain (dBi)	Result (dBm)	Limit (dBm)
Lowest	QPSK1/2	5016.82	Z	-49.27	H	10.63	-36.09	-25.00
		7527.04	Z	-47.94	H	11.35	-30.08	-25.00
	16QAM1/2	5017.38	Z	-49.13	H	10.63	-35.95	-25.00
		7525.50	Z	-48.24	H	11.35	-30.38	-25.00
	64QAM1/2	5016.84	Z	-49.36	H	10.63	-36.18	-25.00
		7524.42	Z	-48.10	H	11.35	-30.24	-25.00
Middle	QPSK1/2	5200.06	Z	-47.67	H	10.80	-34.35	-25.00
		7800.26	Z	-46.74	H	11.32	-29.67	-25.00
	16QAM1/2	5199.10	Z	-47.66	H	10.80	-34.34	-25.00
		7799.54	Z	-46.67	H	11.32	-29.60	-25.00
	64QAM1/2	5199.96	Z	-47.49	H	10.80	-34.17	-25.00
		7800.12	Z	-46.86	H	11.32	-29.79	-25.00
Highest	QPSK1/2	5366.38	Z	-46.03	H	10.95	-32.36	-25.00
		8050.76	Z	-46.48	H	11.29	-28.99	-25.00
	16QAM1/2	5366.90	Z	-45.99	H	10.95	-32.32	-25.00
		8050.94	Z	-46.57	H	11.29	-29.08	-25.00
	64QAM1/2	5367.02	Z	-45.95	H	10.95	-32.28	-25.00
		8051.18	Z	-46.64	H	11.29	-29.15	-25.00

APPENDIX

TEST EQUIPMENT FOR TESTS

Type	Manufacturer	Model	Cal.Date (yy/mm/dd)	Next.Cal.Date (yy/mm/dd)	S/N
Spectrum Analyzer	Agilent	E4440A	12/09/18	13/09/18	MY45304199
Spectrum Analyzer	Agilent	E4440A	12/01/03	13/01/03	MY44033778
Spectrum Analyzer	Rohde Schwarz	FSQ26	12/01/09	13/01/09	200445
Harmonic Mixer	OML	M28HWD	12/02/06	13/02/06	Ka100224-1
Power Splitter	Anritsu	K241B	12/09/17	13/09/17	020611
TEMP & HUMIDITY Chamber	JISCO	KR-100/J-RHC2	12/09/17	13/09/17	30604493/021031
Digital Multimeter	H.P	34401A	12/03/05	13/03/05	3146A13475, US36122178
Signal Generator	Rohde Schwarz	SMR20	12/03/05	13/03/05	101251
Vector Signal Generator	Rohde Schwarz	SMJ100A	12/01/09	13/01/09	100148
Vector Signal Generator	Rohde Schwarz	SMBV100A	12/01/09	13/01/11	255571
Thermo hygrometer	BODYCOM	BJ5478	12/01/13	13/01/13	090205-2
DC Power Supply	HP	6633A	12/03/05	13/03/05	3524A06634
High-pass filter	Wainwright	WHNX3.0	12/09/17	13/09/17	9
HORN ANT	ETS	3115	11/09/06	13/09/06	21097
HORN ANT	ETS	3115	12/02/20	14/02/20	6419
HORN ANT	A.H.Systems	SAS-574	11/03/25	13/03/25	154
HORN ANT	A.H.Systems	SAS-574	11/03/25	13/03/25	155
Dipole Antenna	Schwarzbeck	VHA9103	12/03/12	14/03/12	2116
Dipole Antenna	Schwarzbeck	VHA9103	11/11/22	13/11/22	2117
Dipole Antenna	Schwarzbeck	UHA9105	12/03/12	14/03/12	2261
Dipole Antenna	Schwarzbeck	UHA9105	11/11/22	13/11/22	2262
Attenuator (3dB)	WEINSCHL	56-3	12/09/17	13/09/17	Y2342
Attenuator (3dB)	WEINSCHL	56-3	12/09/17	13/09/17	Y2370
Amplifier (30dB)	H.P	8449B	12/03/05	13/03/05	3008A00370
Amplifier	EMPOWER	BBS3Q7ELU	12/09/18	13/09/18	1020
BILOG ANTENNA	SCHAFFNER	CBL 6112D	10/12/21	12/12/21	22609
Amplifier (22dB)	H.P	8447E	12/01/09	13/01/09	2945A02865