

4.5 Out-of-Band / Out-of-Block (Including Intermodulation) Emissions Limits

4.5.1 Test Requirements / Limits

FCC 24.238 Emission limitations for Broadband PCS equipment:

- (a) Out of band emissions. The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least $43 + 10 \log(P)$ dB.
- (b) Measurement procedure. Compliance with these rules is based on the use of measurement instrumentation employing a resolution bandwidth of 1 MHz or greater. However, in the 1 MHz 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 employed. A narrower resolution bandwidth is permitted in all cases to improve measurement accuracy provided the measured power is integrated over the full required measurement bandwidth (i.e. 1 MHz or 1 percent of emission bandwidth, as specified). 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 dB below the transmitter power.

FCC 27.53 Emission limits

- (h) AWS emission limits—(1) General protection levels. Except as otherwise specified below, for operations in the 1695-1710 MHz, 1710-1755 MHz, 1755-1780 MHz, 1915-1920 MHz, 1995-2000 MHz, 2000-2020 MHz, 2110-2155 MHz, 2155-2180 MHz, and 2180-2200 bands, the power of any emission outside a licensee's frequency block shall be attenuated below the transmitter power (P) in watts by at least $43 + 10 \log_{10}(P)$ dB

4.5.2 Test Procedure

Refer to ANSI C63.26, KDB 935210 D05 v01r02: 3.6.

4.5.3 Test Setup

Refer to clause 3.4.

4.5.4 Test Result

For Intermodulation

LTE Band 25_ Input Signal=2

Signal Type	AGC threshold level	Frequency (MHz)	Input Power (dBm)	Maximun Average Output Power (dBm)	Limit Average output Power (dBm)	Margin (dB)
Wideband	0.3 dB < AGC	1935	12.83	22.98	62.14	-39.16
Wideband	3 dB > AGC	1935	15.87	25.78	62.14	-36.36
Narrowband	0.3 dB < AGC	1930.3	14.41	22.47	62.14	-39.67
Narrowband	3 dB > AGC	1930.3	17.77	25.65	62.14	-36.49
Wideband	0.3 dB < AGC	1990	6.01	24.02	62.14	-38.12
Wideband	3 dB > AGC	1990	8.98	26.95	62.14	-35.19
Narrowband	0.3 dB < AGC	1994.7	11.6	30.06	62.14	-32.08
Narrowband	3 dB > AGC	1994.7	14.52	32.65	62.14	-29.49

* Margin = Output Power – Limit

Frequency: 1935MHz

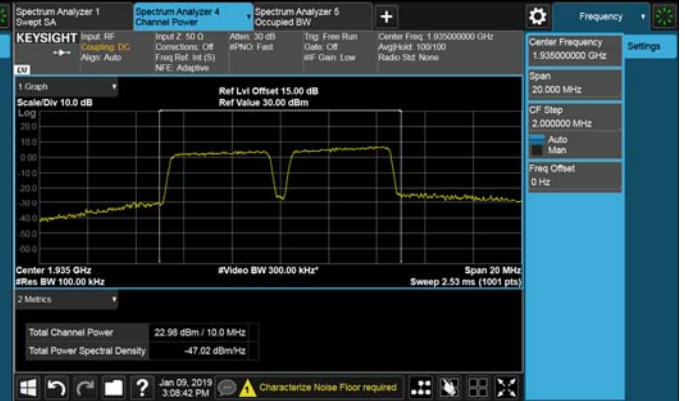
Wideband

AGC threshold level: 0.3 dB < AGC

Input power



Maximum Average Output Power

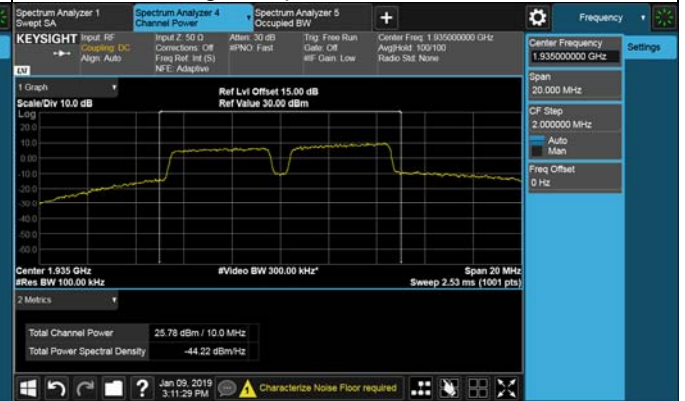


AGC threshold level: 3 dB > AGC

Input power



Maximum Average Output Power



Narrowband

AGC threshold level: 0.3 dB < AGC

Input power



Maximum Average Output Power



AGC threshold level: 3 dB > AGC

Input power



Maximum Average Output Power



Frequency: 1990MHz

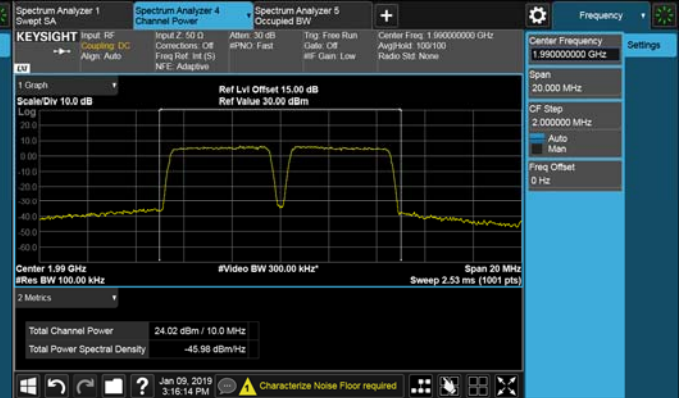
Wideband

AGC threshold level: 0.3 dB < AGC

Input power

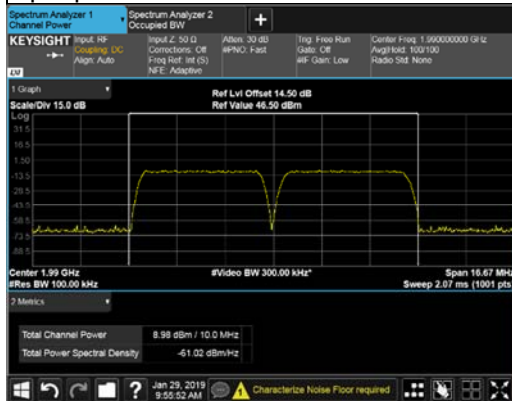


Maximum Average Output Power

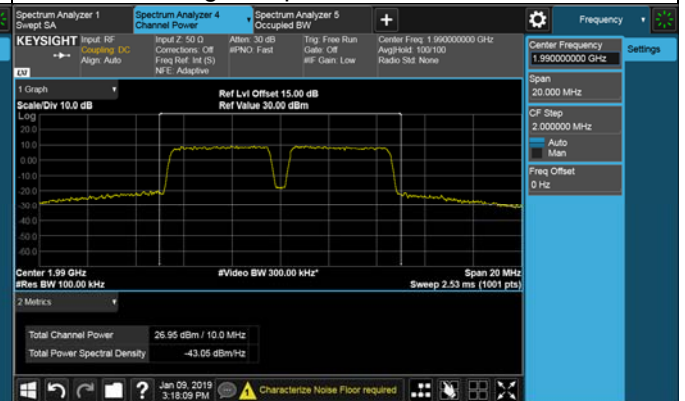


AGC threshold level: 3 dB > AGC

Input power



Maximum Average Output Power



Narrowband

AGC threshold level: 0.3 dB < AGC

Input power

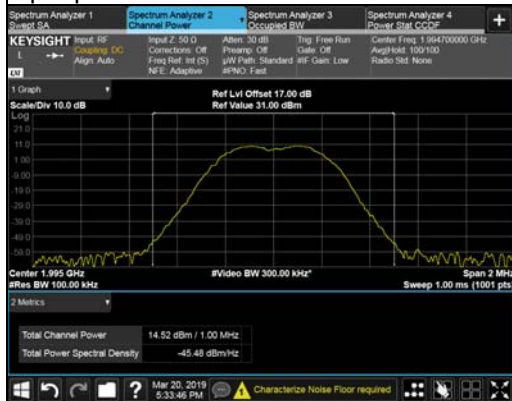


Maximum Average Output Power



AGC threshold level: 3 dB > AGC

Input power



Maximum Average Output Power



LTE Band 66 Input Signal=2

Signal Type	AGC threshold level	Frequency (MHz)	Input Power (dBm)	Maximun Average Output Power (dBm)	LimitAverage output Power (dBm)	Margin (dB)
Wideband	0.3 dB < AGC	2115	8.85	22.14	62.14	-40.00
Wideband	3 dB > AGC	2115	11.86	25.09	62.14	-37.05
Narrowband	0.3 dB < AGC	2110.3	3.58	20.61	62.14	-41.53
Narrowband	3 dB > AGC	2110.3	6.66	23.56	62.14	-38.58
Wideband	0.3 dB < AGC	2195	6.75	14.63	62.14	-47.51
Wideband	3 dB > AGC	2195	9.67	17.69	62.14	-44.45
Narrowband	0.3 dB < AGC	2199.7	2.57	12.61	62.14	-49.53
Narrowband	3 dB > AGC	2199.7	5.52	15.61	62.14	-46.53

* Margin = Output Power – Limit

Frequency: 2115MHz

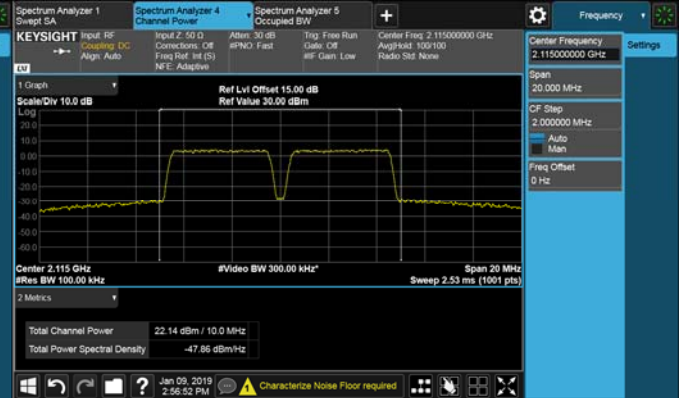
Wideband

AGC threshold level: 0.3 dB < AGC

Input power

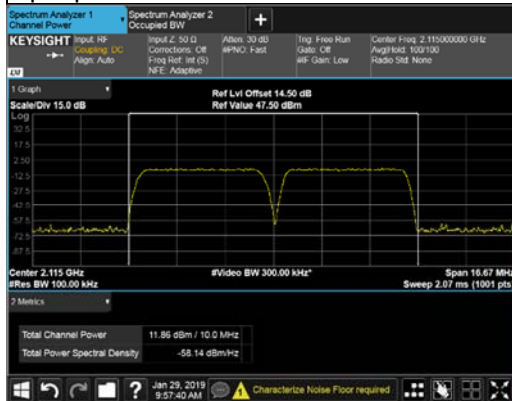


Maximum Average Output Power

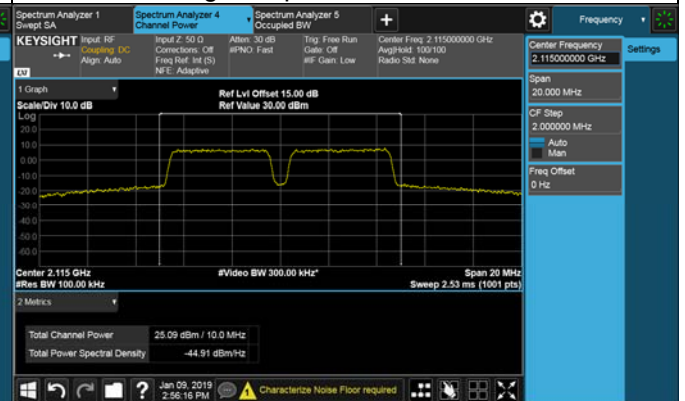


AGC threshold level: 3 dB > AGC

Input power



Maximum Average Output Power



Narrowband

AGC threshold level: 0.3 dB < AGC

Input power

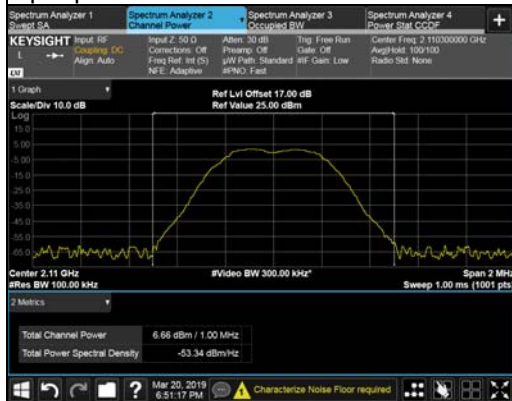


Maximum Average Output Power



AGC threshold level: 3 dB > AGC

Input power



Maximum Average Output Power

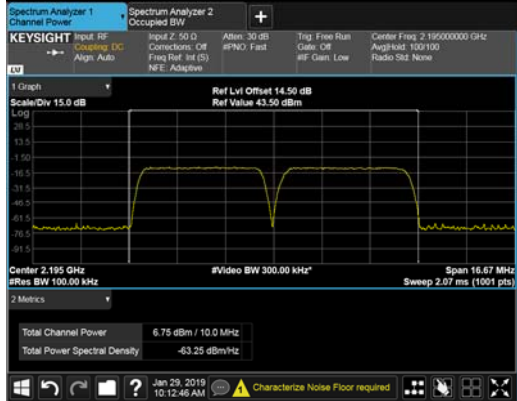


Frequency: 2195MHz

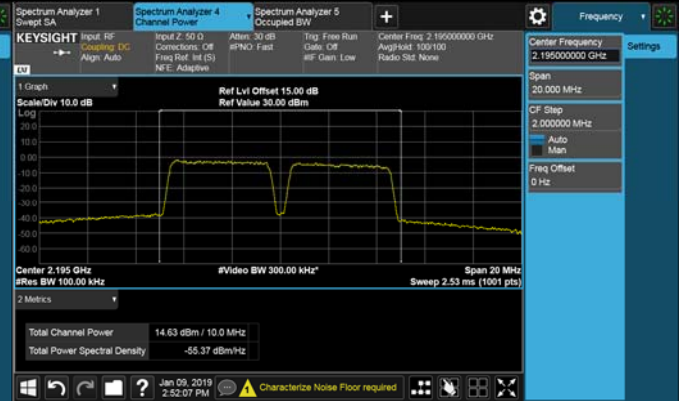
Wideband

AGC threshold level: 0.3 dB < AGC

Input power



Maximum Average Output Power



AGC threshold level: 3 dB > AGC

Input power



Maximum Average Output Power



Narrowband

AGC threshold level: 0.3 dB < AGC

Input power

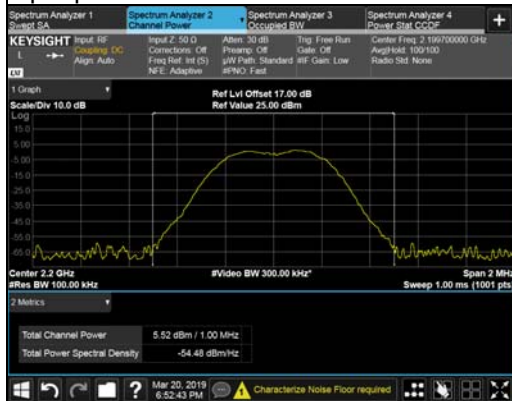


Maximum Average Output Power



AGC threshold level: 3 dB > AGC

Input power



Maximum Average Output Power



For Intermodulation:

LTE Band 25 Input Signal=2

Signal Type	Input Power	Frequency (MHz)	OBW SG (kHz)	OBW Booster (kHz)	Delta OBW (kHz)	Limit (5% OBW) (kHz)	Margin to Limit (kHz)
Wideband	0.3 dB < AGC	1935	9107.2	9083.6	23.6	205	-181.4
Wideband	3 dB > AGC	1935	9133.9	9321.2	187.3	205	-17.7
Narrowband	0.3 dB < AGC	1930.3	491.48	499.29	7.81	17.5	-9.69
Narrowband	3 dB > AGC	1930.3	493.75	497.57	3.82	17.5	-13.68
Wideband	0.3 dB < AGC	1990	9072.2	9065.7	6.5	205	-198.5
Wideband	3 dB > AGC	1990	9098.4	9068.9	29.5	205	-175.5
Narrowband	0.3 dB < AGC	1994.7	496.06	488.59	7.47	17.5	-13.03
Narrowband	3 dB > AGC	1994.7	493.89	496.44	2.55	17.5	-14.95

* Margin = Limit - Delta

Frequency: 1935MHz

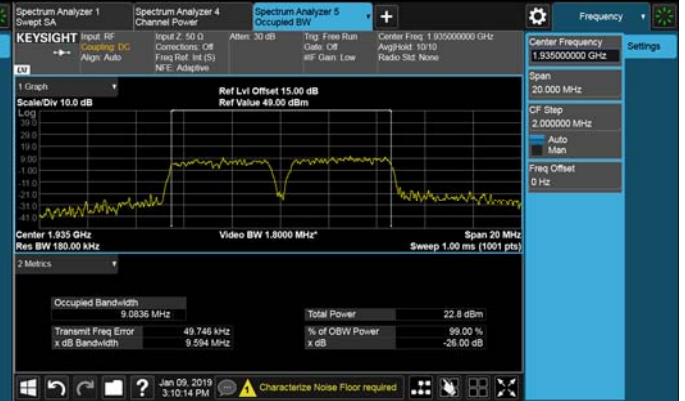
Wideband

AGC threshold level: 0.3 dB < AGC

OBW SG



OBW Booster

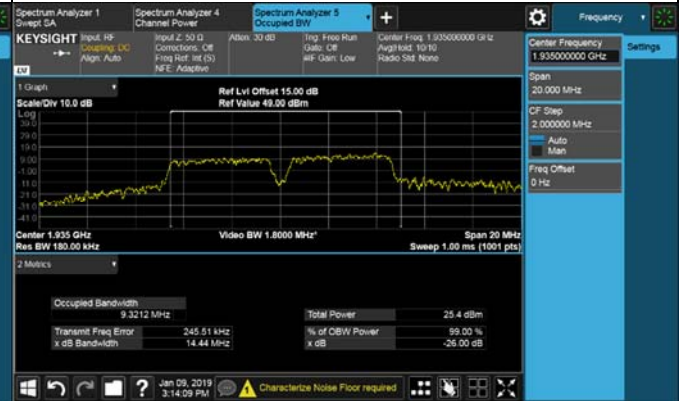


AGC threshold level: 3 dB > AGC

OBW SG



OBW Booster



Narrowband

AGC threshold level: 0.3 dB < AGC

OBW SG



OBW Booster



AGC threshold level: 3 dB > AGC

OBW SG



OBW Booster



Frequency: 1990MHz

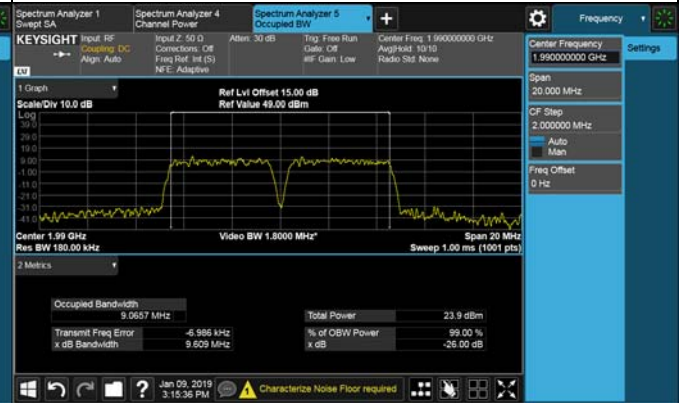
Wideband

AGC threshold level: 0.3 dB < AGC

OBW SG



OBW Booster

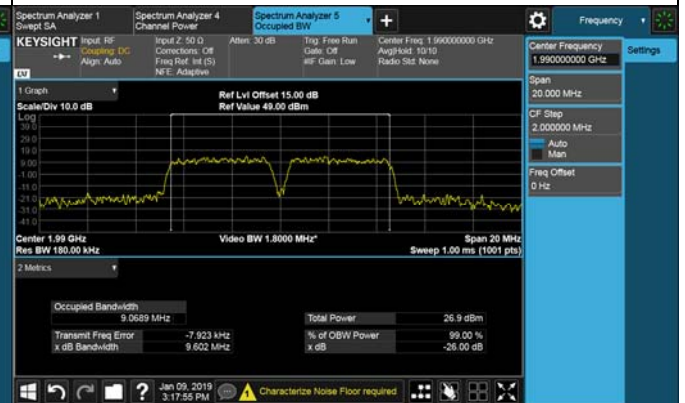


AGC threshold level: 3 dB > AGC

OBW SG



OBW Booster



Narrowband

AGC threshold level: 0.3 dB < AGC

OBW SG



OBW Booster



AGC threshold level: 3 dB > AGC

OBW SG



OBW Booster



LTE Band 66 Input Signal=2

Signal Type	Input Power	Frequency (MHz)	OBW SG (kHz)	OBW Booster (kHz)	Delta OBW (kHz)	Limit (5% OBW) (kHz)	Margin to Limit (kHz)
Wideband	0.3 dB < AGC	2115	9052.2	9083.2	31	205	-174
Wideband	3 dB > AGC	2115	9074	9173.7	99.7	205	-105.3
Narrowband	0.3 dB < AGC	2110.3	494.18	497.88	3.7	17.5	-13.8
Narrowband	3 dB > AGC	2110.3	499.42	500.1	0.68	17.5	-16.82
Wideband	0.3 dB < AGC	2195	9080.6	9033.4	47.2	205	-157.8
Wideband	3 dB > AGC	2195	9091.7	9061.4	30.3	205	-174.7
Narrowband	0.3 dB < AGC	2199.7	497.06	500.09	3.03	17.5	-14.47
Narrowband	3 dB > AGC	2199.7	490.43	492.85	2.42	17.5	-15.08

* Margin = Limit - Delta

Frequency: 2115MHz

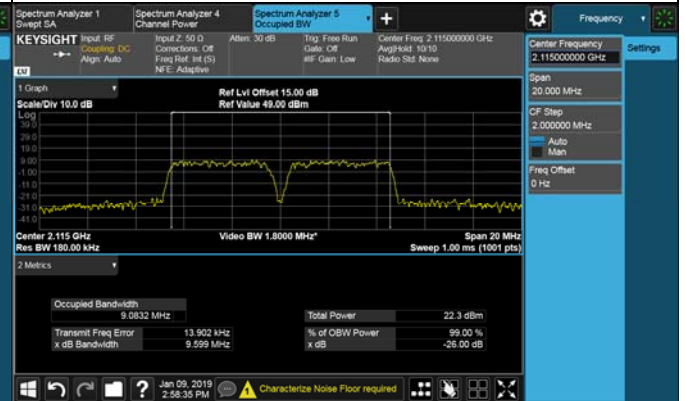
Wideband

AGC threshold level: 0.3 dB < AGC

OBW SG

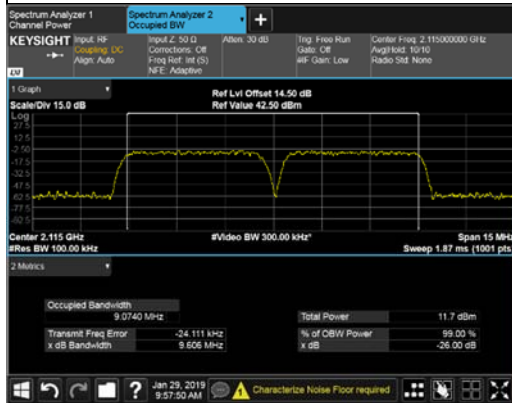


OBW Booster

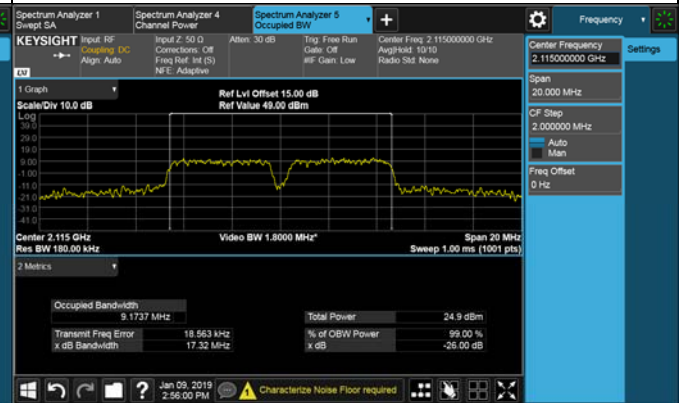


AGC threshold level: 3 dB > AGC

OBW SG



OBW Booster



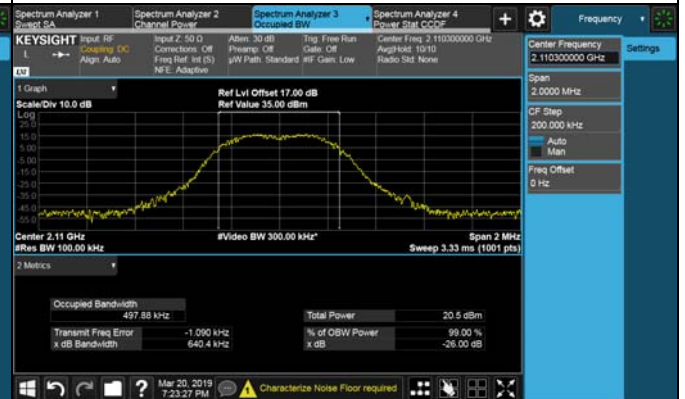
Narrowband

AGC threshold level: 0.3 dB < AGC

OBW SG



OBW Booster

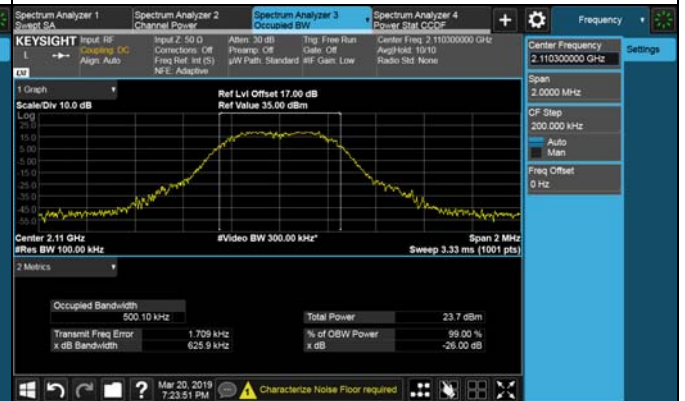


AGC threshold level: 3 dB > AGC

OBW SG



OBW Booster

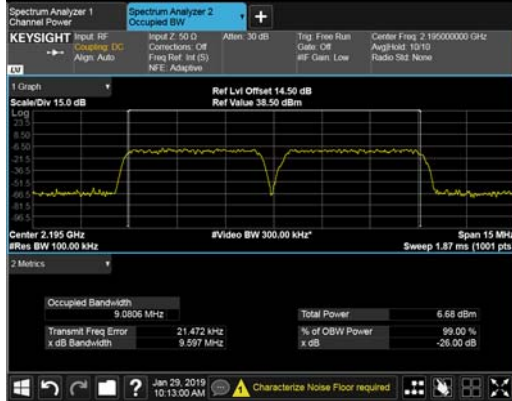


Frequency: 2195MHz

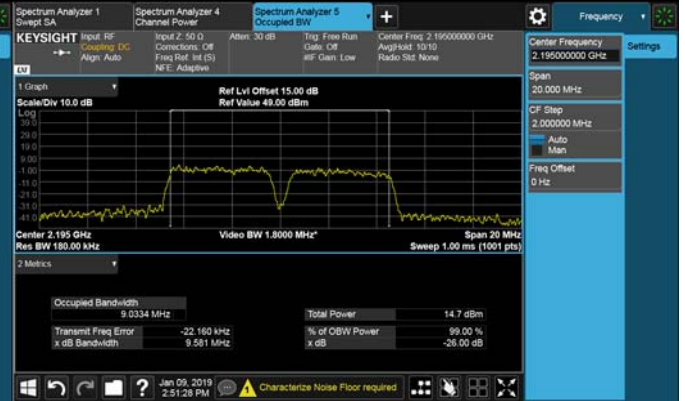
Wideband

AGC threshold level: 0.3 dB < AGC

OBW SG

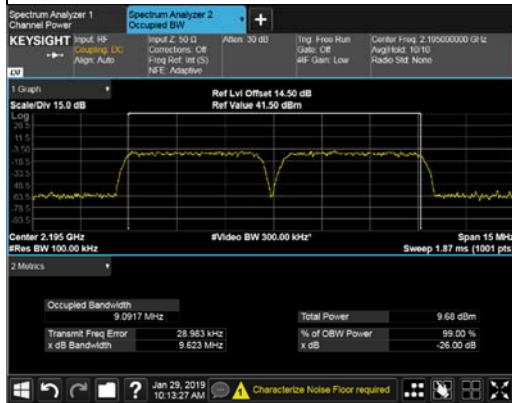


OBW Booster

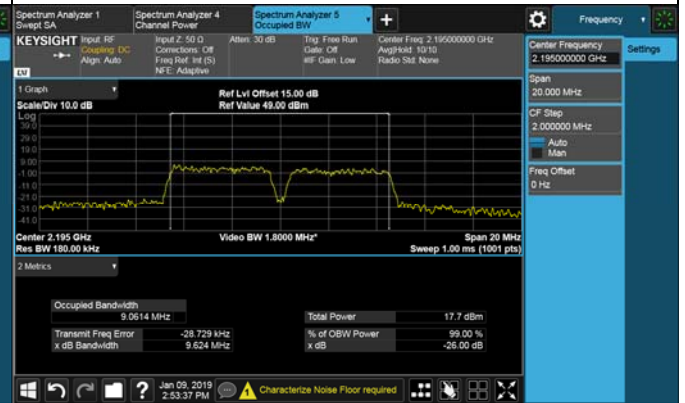


AGC threshold level: 3 dB > AGC

OBW SG



OBW Booster



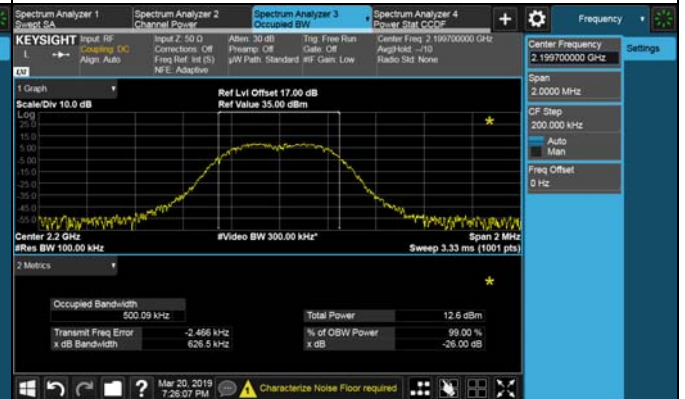
Narrowband

AGC threshold level: 0.3 dB < AGC

OBW SG

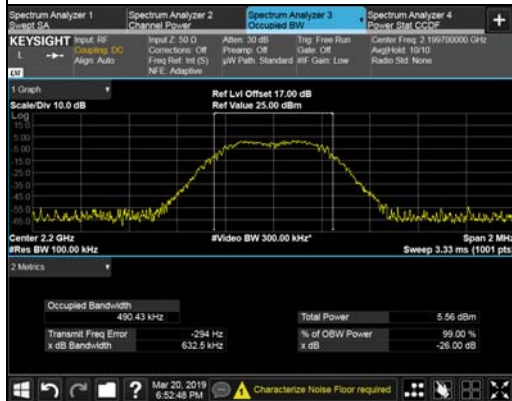


OBW Booster

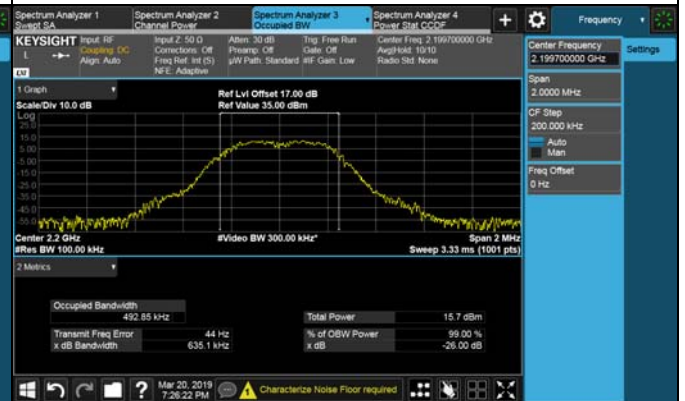


AGC threshold level: 3 dB > AGC

OBW SG



OBW Booster



For Intermodulation:

LTE Band 25 Input Signal=2

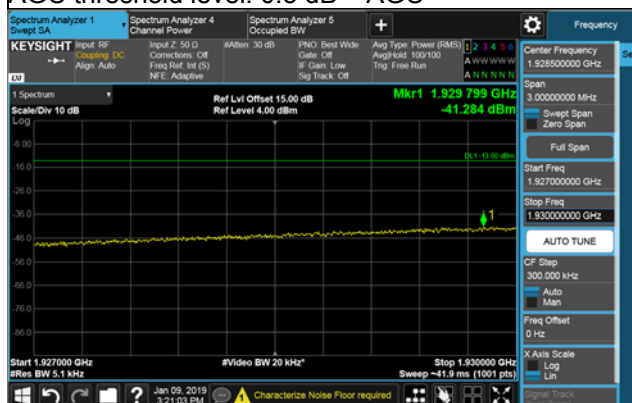
Signal Type	AGC threshold level	Band Edge	Frequency (MHz)	Input Power (dBm)	Max. OOB (dBm)	Limit(OOB) (dBm)	Margin (dB)
Wideband	0.3 dB < AGC	Lower	1935	12.83	-41.284	-13	-28.284
Wideband	3 dB > AGC	Lower	1935	15.87	-23.122	-13	-10.122
Narrowband	0.3 dB < AGC	Lower	1930.3	14.41	-31.475	-13	-18.475
Narrowband	3 dB > AGC	Lower	1930.3	17.77	-26.724	-13	-13.724
Wideband	0.3 dB < AGC	Upper	1990	6.01	-50.531	-13	-37.531
Wideband	3 dB > AGC	Upper	1990	8.98	-34.005	-13	-21.005
Narrowband	0.3 dB < AGC	Upper	1994.7	11.6	-23.252	-13	-10.252
Narrowband	3 dB > AGC	Upper	1994.7	14.52	-16.809	-13	-3.809

* Margin = Max. OOB – Limit

Frequency: 1935MHz

Wideband

AGC threshold level: 0.3 dB < AGC



AGC threshold level: 3 dB > AGC



Narrowband

AGC threshold level: 0.3 dB < AGC



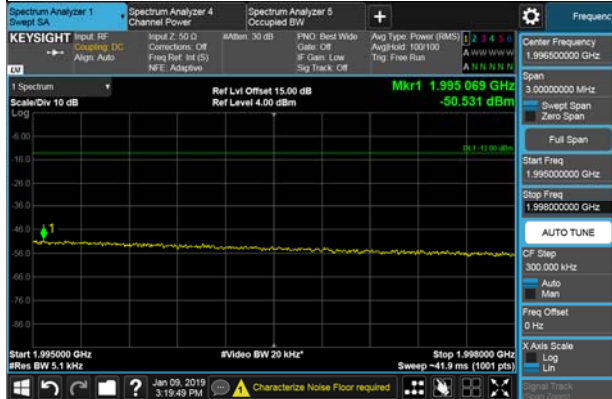
AGC threshold level: 3 dB > AGC



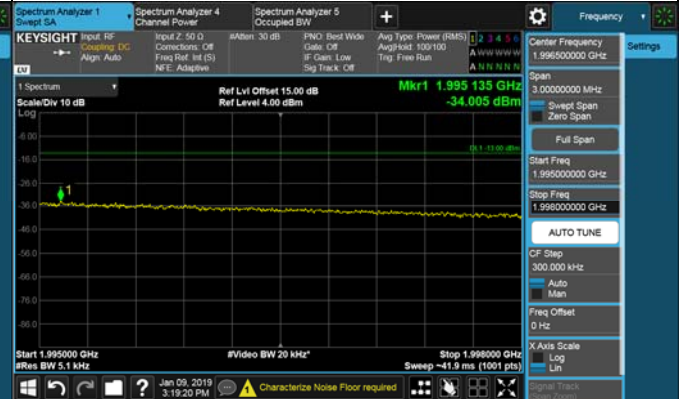
Frequency: 1990MHz

Wideband

AGC threshold level: 0.3 dB < AGC



AGC threshold level: 3 dB > AGC



Narrowband

AGC threshold level: 0.3 dB < AGC



AGC threshold level: 3 dB > AGC



LTE Band 66 Input Signal=2

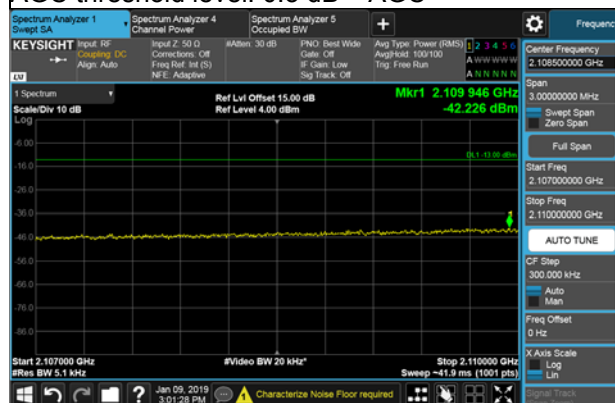
Signal Type	AGC threshold level	Band Edge	Frequency (MHz)	Input Power (dBm)	Max. OOB (dBm)	Limit(OOB) (dBm)	Margin (dB)
Wideband	0.3 dB < AGC	Lower	2115	8.85	-42.226	-13	-29.226
Wideband	3 dB > AGC	Lower	2115	11.86	-23.262	-13	-10.262
Narrowband	0.3 dB < AGC	Lower	2110.3	3.58	-32.905	-13	-19.905
Narrowband	3 dB > AGC	Lower	2110.3	6.66	-29.244	-13	-16.244
Wideband	0.3 dB < AGC	Upper	2195	6.75	-53.756	-13	-40.756
Wideband	3 dB > AGC	Upper	2195	9.67	-44.152	-13	-31.152
Narrowband	0.3 dB < AGC	Upper	2199.7	2.57	-41.159	-13	-28.159
Narrowband	3 dB > AGC	Upper	2199.7	5.52	-38.137	-13	-25.137

* Margin = Max. OOB – Limit

Frequency: 2115MHz

Wideband

AGC threshold level: 0.3 dB < AGC



AGC threshold level: 3 dB > AGC



Narrowband

AGC threshold level: 0.3 dB < AGC



AGC threshold level: 3 dB > AGC



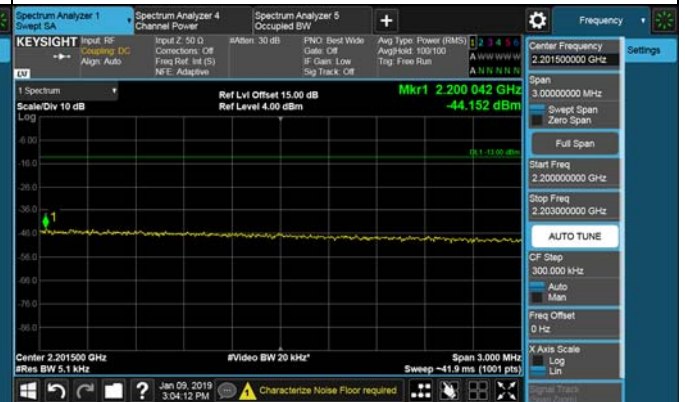
Frequency: 2197.5MHz

Wideband

AGC threshold level: 0.3 dB < AGC



AGC threshold level: 3 dB > AGC



Narrowband

AGC threshold level: 0.3 dB < AGC



AGC threshold level: 3 dB > AGC

