The results are summarized in the following table. The highest (worst case) emissions from the measurement data are provided.

Test Cases	QPSK		16QAM		64QAM	
	LBE	UBE	LBE	UBE	LBE	UBE
AWS Single Carrier at Band Edge Frequency	-22.392	-22.496	-23.583	-22.956	-23.025	-22.588
AWS Multicarrier at 2112.4, 2117.4 & 2167.6MHz	-23.933	-22.845	-24.283	-22.782	-24.071	-23.139
Multiband Multicarrier at 1932.4, 1937.4 & 2167.6MHz	Test Results documented in Appendix C.					

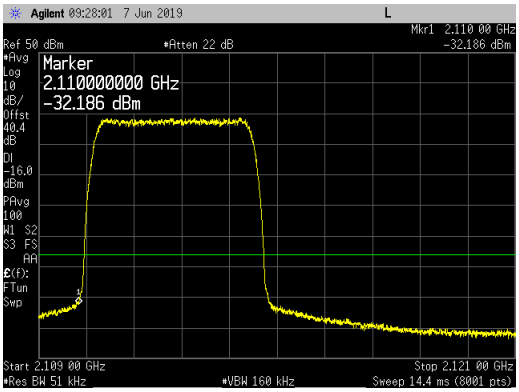
The total measurement RF path loss of the test setup (attenuator and test cables) was 40.4 dB and is accounted for by the spectrum analyzer reference level offset. The display line on the plots reflects the required limit.

Conducted band edge measurements are provided in the following pages.

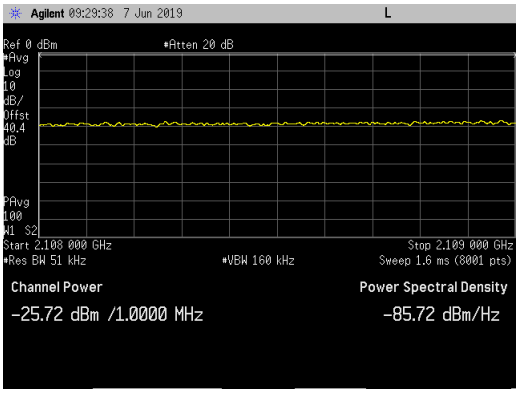
Single Carrier with QPSK Modulation at Maximum Power -Lower and Upper Band Edge Plots:

WCDMA Carrier at BC (2112.4MHz)

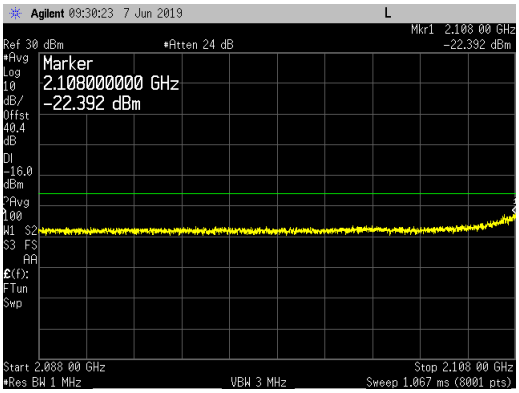
Port 3_LBE_2109 to 2121MHz



Port 3_LBE_2108 to 2109MHz

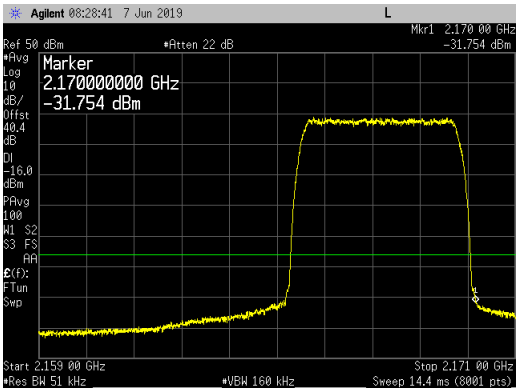


Port 3_LBE_2088 to 2108MHz

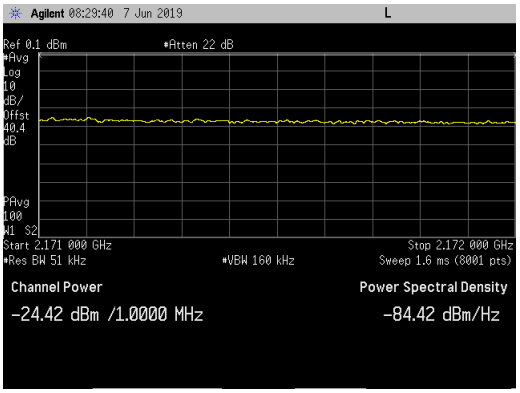


WCDMA Carrier at TC (2167.6MHz)

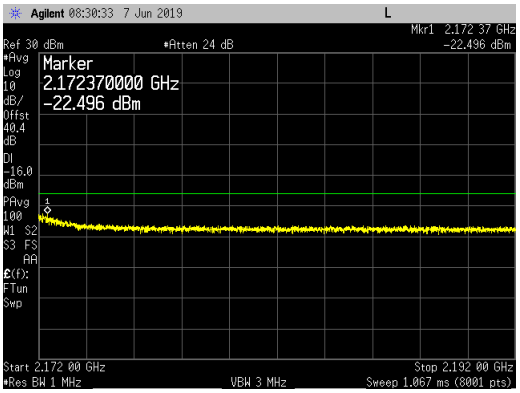
Port 3_UBE_2159 to 2171MHz



Port 3_UBE_2171 to 2172MHz



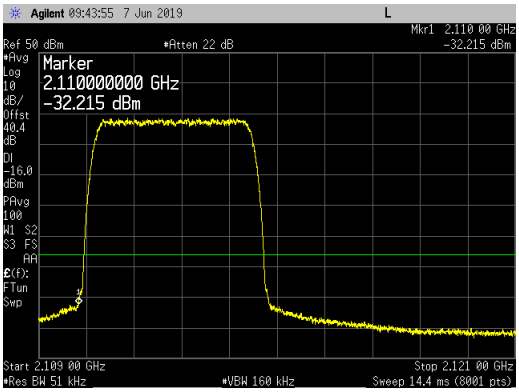
Port 3_UBE_2172 to 2192MHz



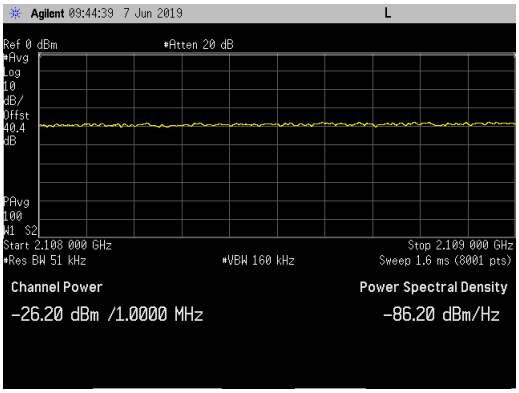
Single Carrier with 16QAM Modulation at Maximum Power -Lower and Upper Band Edge Plots:

WCDMA Carrier at BC (2112.4MHz)

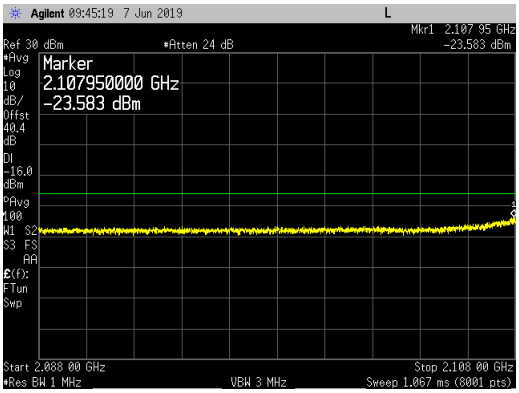
Port 3_LBE_2109 to 2121MHz



Port 3_LBE_2108 to 2109MHz

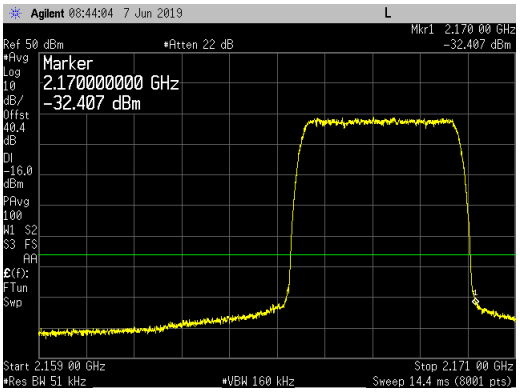


Port 3_LBE_2088 to 2108MHz

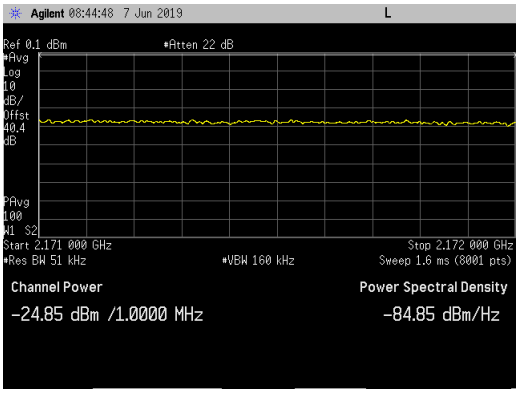


WCDMA Carrier at TC (2167.6MHz)

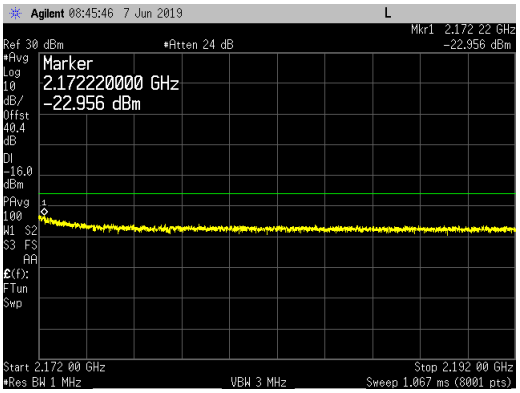
Port 3_UBE_2159 to 2171MHz



Port 3_UBE_2171 to 2172MHz



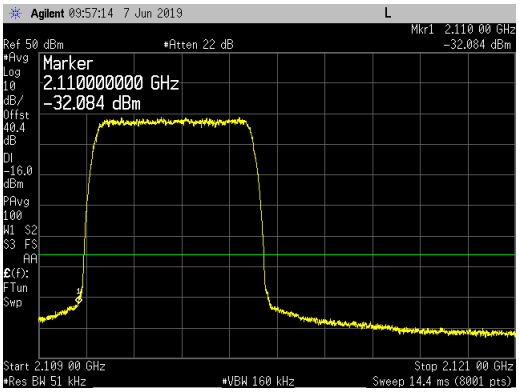
Port 3_UBE_2172 to 2192MHz



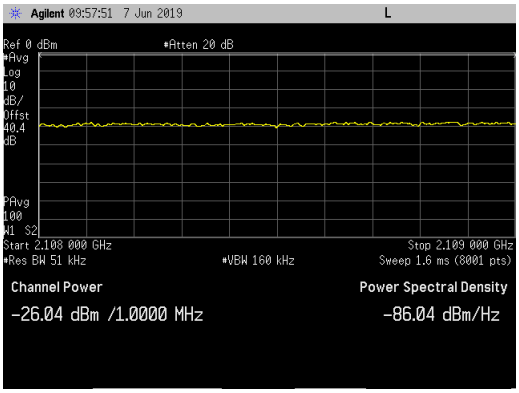
Single Carrier with 64QAM Modulation at Maximum Power -Lower and Upper Band Edge Plots:

WCDMA Carrier at BC (2112.4MHz)

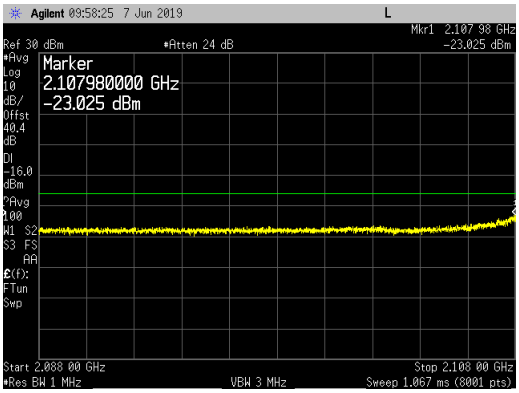
Port 3_LBE_2109 to 2121MHz



Port 3_LBE_2108 to 2109MHz

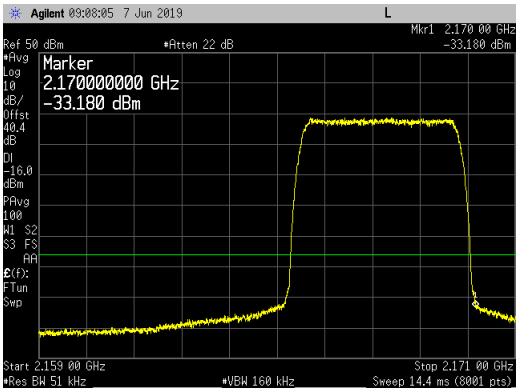


Port 3_LBE_2088 to 2108MHz

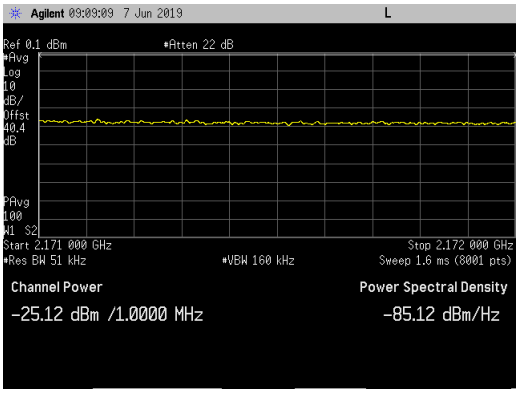


WCDMA Carrier at TC (2167.6MHz)

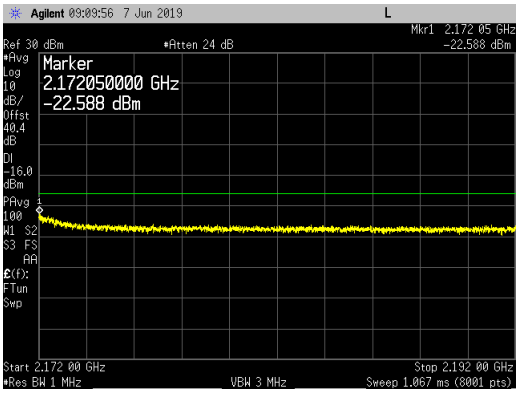
Port 3_UBE_2159 to 2171MHz



Port 3_UBE_2171 to 2172MHz



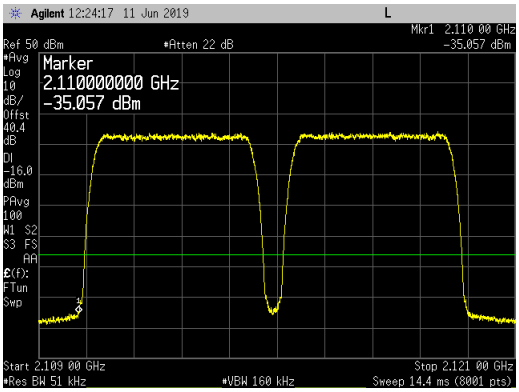
Port 3_UBE_2172 to 2192MHz



AWS Band Multicarrier with QPSK Modulation at Max Power at Bottom Chs and at Top Ch -LBE & UBE Plots:

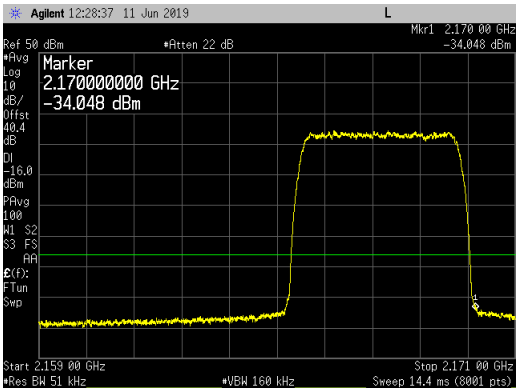
WCDMA Carriers at 2112.4, 2117.4 & 2167.6MHz

Port 3_LBE_2109 to 2121MHz

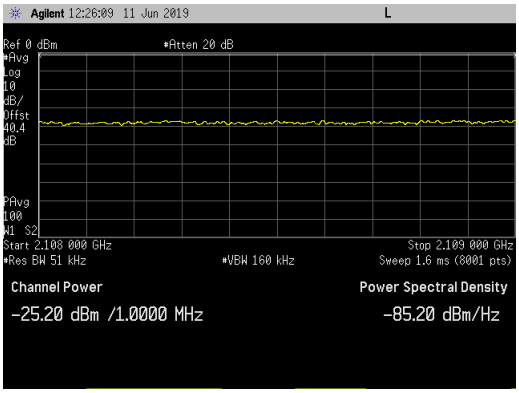


WCDMA Carriers at 2112.4, 2117.4 & 2167.6MHz

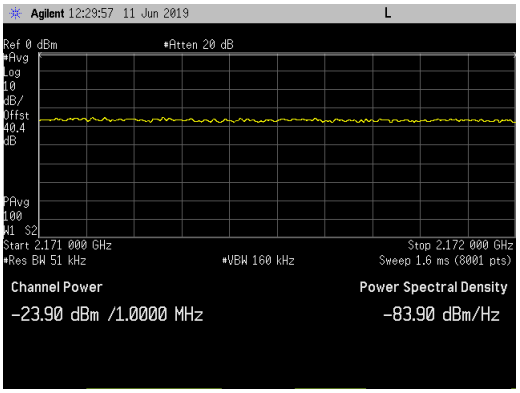
Port 3_UBE_2159 to 2171MHz



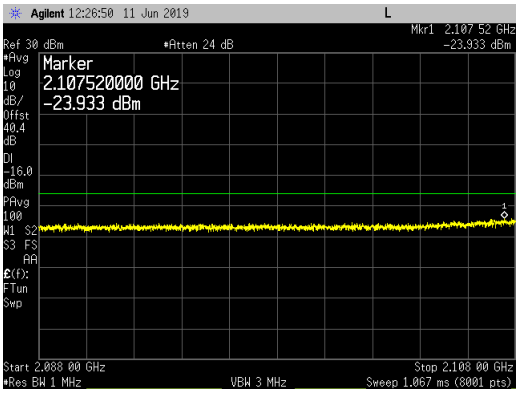
Port 3_LBE_2108 to 2109MHz



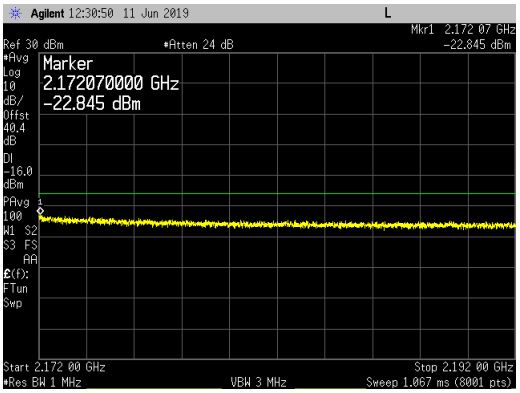
Port 3_UBE_2171 to 2172MHz



Port 3_LBE_2088 to 2108MHz



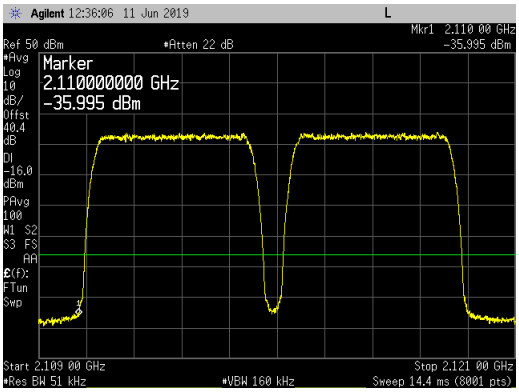
Port 3_UBE_2172 to 2192MHz



AWS Band Multicarrier with 16QAM Modulation at Max Power at Bottom Chs and at Top Ch -LBE & UBE Plots:

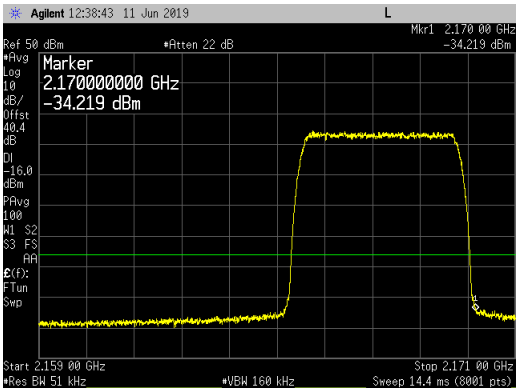
WCDMA Carriers at 2112.4, 2117.4 & 2167.6MHz

Port 3_LBE_2109 to 2121MHz

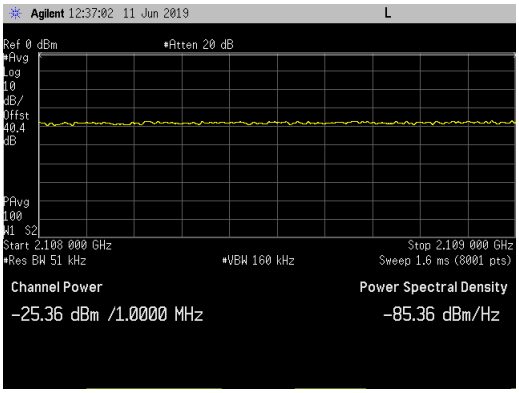


WCDMA Carriers at 2112.4, 2117.4 & 2167.6MHz

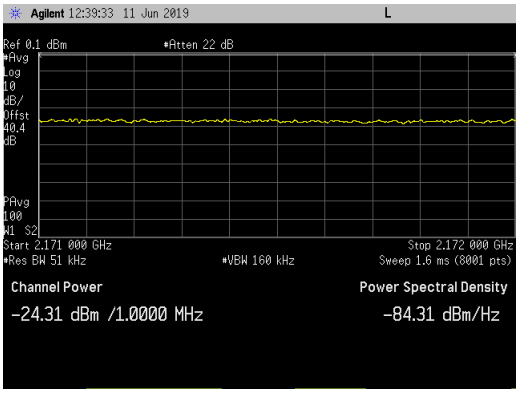
Port 3_UBE_2159 to 2171MHz



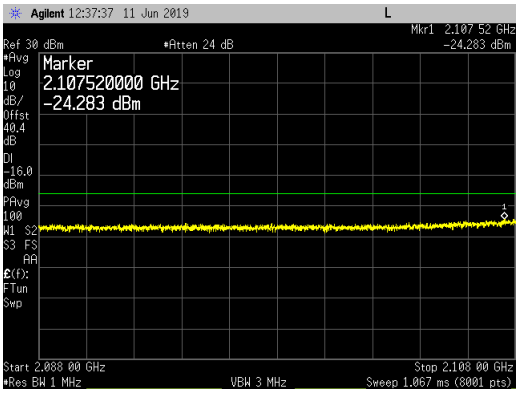
Port 3_LBE_2108 to 2109MHz



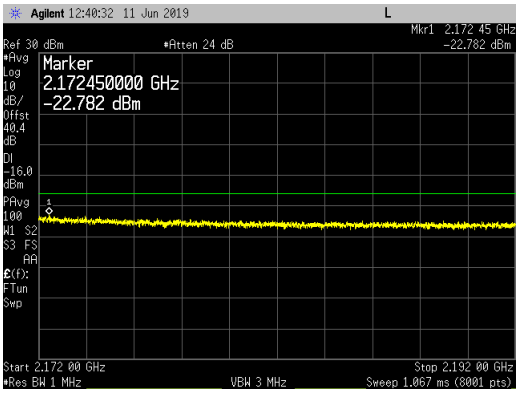
Port 3_UBE_2171 to 2172MHz



Port 3_LBE_2088 to 2108MHz



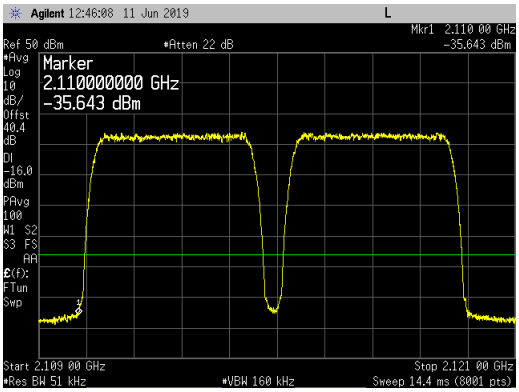
Port 3_UBE_2172 to 2192MHz



AWS Band Multicarrier with 64QAM Modulation at Max Power at Bottom Chs and at Top Ch -LBE & UBE Plots:

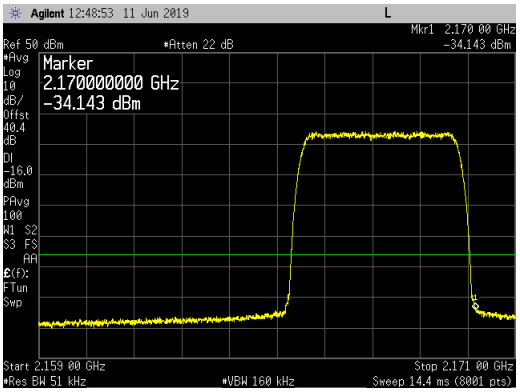
WCDMA Carriers at 2112.4, 2117.4 & 2167.6MHz

Port 3_LBE_2109 to 2121MHz

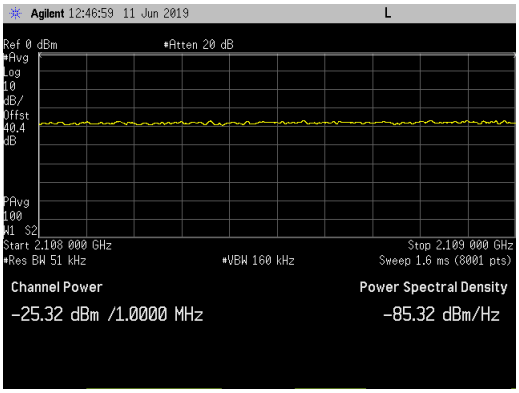


WCDMA Carriers at 2112.4, 2117.4 & 2167.6MHz

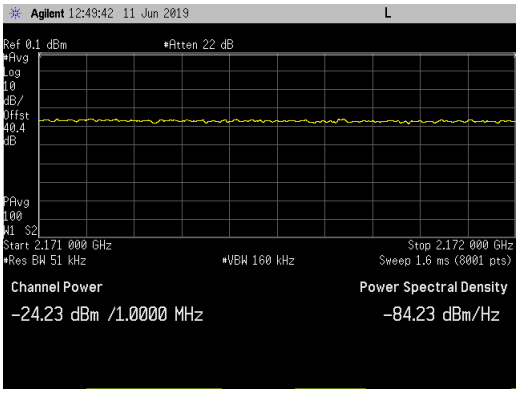
Port 3_UBE_2159 to 2171MHz



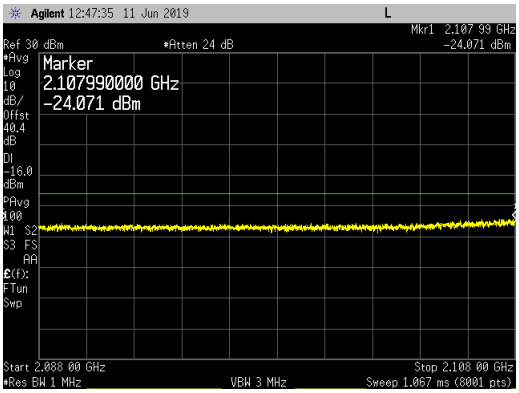
Port 3_LBE_2108 to 2109MHz



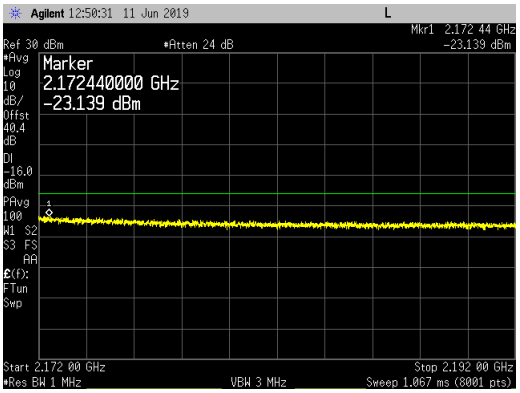
Port 3_UBE_2171 to 2172MHz



Port 3_LBE_2088 to 2108MHz



Port 3_UBE_2172 to 2192MHz



Transmitter Antenna Port Conducted Emissions

Transmitter conducted emission measurements were made at RRH antenna port 3. Measurements were performed over the 9kHz to 22GHz frequency range.

Single Carrier Test Cases

The single carrier test case was performed with the RRH operating on the PCS middle channel (1960.0MHz) and AWS middle channel (2140.0MHz) simultaneously with all WCDMA modulation types (QPSK, 16QAM and 64QAM) at maximum power. The same modulation type was used for both PCS and AWS carriers.

PCS Multicarrier Multiband Test Case

In the PCS band: Three carriers (based upon KDB 971168 D03v01) using two carriers (with minimum spacing between carrier frequencies) at the lower band edge (UARFCN 9662: 1932.4 & UARFCN 9687: 1937.4MHz) and a third carrier with maximum spacing between the other two carrier frequencies (UARFCN 9938: 1987.6MHz) at the upper band edge. In the AWS band: Single WCDMA carrier at the middle channel (UARFCN 3250: 2140MHz). The carriers were operated at maximum power (~26W/PCS carrier and 40W/AWS carrier) with at total port power of 120 watts (80W for PCS band carriers + 40W for AWS band carrier). The same modulation type was used for both PCS and AWS carriers.

AWS Multicarrier Multiband Test Case

In the AWS band: Three carriers (based upon KDB 971168 D03v01) using two carriers (with minimum spacing between carrier frequencies) at the lower band edge (UARFCN 3112: 2112.4 & UARFCN 3137: 2117.4MHz) and a third carrier with maximum spacing between the other two carrier frequencies (UARFCN 3388: 2167.6MHz) at the upper band edge. In the PCS band: Single WCDMA carrier at the middle channel (UARFCN 9800: 1960.0MHz). The carriers were operated at maximum power (80W/PCS carrier and ~13W/AWS carrier) with at total port power of 120 watts (80W for PCS band carrier + 40W for AWS band carriers). The same modulation type was used for both PCS and AWS carriers.

Multicarrier Multiband Test Case

Three carriers (based upon KDB 971168 D03v01) using two carriers (with minimum spacing between carrier frequencies) at the PCS band lower band edge (UARFCN 9662: 1932.4 & UARFCN 9687: 1937.4MHz) and a third carrier with maximum spacing between the other two carrier frequencies (UARFCN 3388: 2167.6MHz) at the AWS band upper band edge. The carriers were operated at maximum power (40W/PCS carrier and 40W/AWS carrier) with at total port power of 120 watts (80W for PCS band carriers + 40W for AWS band carrier). The same modulation type was used for both PCS and AWS carriers.

The test configuration parameters are provided below:

PCS Band Transmission Parameters			AWS Band Transmission Parameters		
Carrier Frequency	**Channel Bandwidth**	**Carrier Power**	**Carrier Frequency**	**Channel Bandwidth**	**Carrier Power**
1960.0MHz (Mid Ch)	WCDMA 5M	80 Watts	2140.0MHz (Mid Ch)	WCDMA 5M	40 Watts
1932.4, 1937.4 & 1987.6MHz (BC, BC+1, and TC)	WCDMA 5M	26+26+26 Watts	2140.0MHz (Mid Ch)	WCDMA 5M	40 Watts
1932.4 & 1937.4MHz (BC and BC+1)	WCDMA 5M	40 + 40 Watts	2167.6MHz (Top Ch)	WCDMA 5M	40 Watts
1960.0MHz (Mid Ch)	WCDMA 5M	80 Watts	2112.4, 2117.4 & 2167.6MHz (BC, BC+1, and TC)	WCDMA 5M	13+13+13 Watts

The power of any emission outside of the authorized operating frequency range cannot exceed -13 dBm as specified in section 24.238(a), 27.53(h)(1), RSS 133 6.5(i) and RSS 139 6.6. The limit of -16dBm was used in the certification testing. The limit is adjusted to -16dBm [-13dBm -10 log (2)] per FCC KDB 662911D01 v02r01 because the BTS may operate as a 2 port MIMO transmitter. The required measurement parameters include a 1MHz bandwidth with power measured in average value (since transmitter power was measured in average value).

Measurements were performed with a spectrum analyzer using a peak detector with max hold over 50 sweeps (except for the 20MHz to 3GHz frequency range). Measurements for the 20MHz to 3GHz frequency range was performed with the spectrum analyzer in the RMS average mode over 100 traces.

The limit for the 9kHz to 150kHz frequency range was adjusted to –46dBm to correct for a spectrum analyzer RBW of 1kHz versus required RBW of 1MHz [i.e.: -46dBm = -16dBm -10log(1000kHz/1kHz)]. The limit for the 150kHz to 20MHz frequency range was adjusted to –36dBm to correct for a spectrum analyzer RBW of 10kHz versus required RBW of 1MHz [i.e.: -36dBm = -16dBm -10log(1000kHz/10kHz)]. The required limit of -16dBm with a RBW of $\geq$1MHz was used for all other frequency ranges. The spectrum analyzer settings that were used for this test are summarized in the following table.

Frequency Range	RBW	VBW	Number of Data Points	Detector	Sweep Time	Max Hold over	Offset Note (1)
9kHz to 150kHz	1kHz	3kHz	8001	Peak	Auto	50 Sweeps	8.7dB
150kHz to 20MHz	10kHz	30kHz	8001	Peak	Auto	50 Sweeps	8.7dB
20MHz to 3GHz	1MHz	3MHz	8001	Average	Auto	Note (2)	40.4dB
3GHz to 6GHz	1MHz	3MHz	8001	Peak	Auto	50 Sweeps	40.2dB
6GHz to 18GHz	2MHz	6MHz	8192	Peak	Auto	50 Sweeps	33.1dB
18GHz to 22GHz	1MHz	3MHz	8001	Peak	Auto	50 Sweeps	41.3dB
1900 to 2200MHz	1MHz	3MHz	8001	Average	Auto	Note (2)	40.4dB

Note 1: The total measurement RF path loss of the test setup (attenuators, test cables and filters) is accounted for by the spectrum analyzer reference level offset.
Note 2: Max Hold not used and instead measurements were performed with the spectrum analyzer in the RMS average mode over 100 traces.

A low pass filter was used to reduce the measurement instrumentation noise floor for the frequency ranges below 20MHz. A high pass filter was used to reduce the measurement instrumentation noise floor for the frequency range above 6GHz. The total measurement RF path loss of the test setup (attenuators, low pass filter, high pass filter and test cables) as shown in the table is accounted for by the spectrum analyzer reference level offset. The display line on the plots reflects the required limit. Conducted spurious emission plots/measurements are provided in Appendix C of this report.

Transmitter Radiated Spurious Emissions

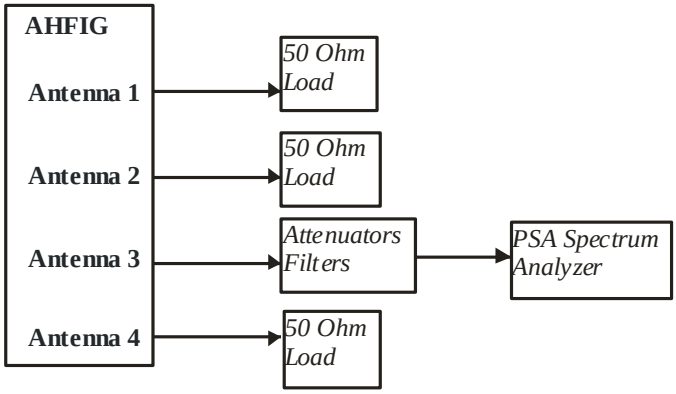
Radiated emission measurement results are in Appendix A.

Frequency Stability/Accuracy

Frequency Stability/Accuracy measurement results are in Appendix A.

APPENDIX E: ANTENNA PORT GSM/EDGE TEST DATA FOR THE PCS BAND

All conducted RF measurements in this section were made at AHFIG antenna port 3. Based on the RF power measurement results shown in Appendix A & B, Port 3 had the highest LTE RMS average power for the PCS and AWS bands (represents the worst case) and therefore it was selected for all the remaining antenna port tests. All testing in this section was performed with GSM/EDGE modulation types. The test setup used is provided below.



Test Setup Used for AHFIG Conducted RF Measurements

RF Output Power

RF output power has been measured in both Peak and RMS Average terms at AHFIG Antenna Port 3 at the bottom, middle and top frequency channels for GSM/EDGE modulations. RMS Average power was measured as described in section 5.2 of KDB 971168 D01v03r01 and ANSI C63.26-2015 sections 5.2.4.3. Peak power was measured as described in section 5.1 of KDB 971168 D01v03r01 and ANSI C63.26-2015 section 5.2.3.3. The peak to average power ratio (PAPR) has been calculated as described in section 5.7 of KDB971168 D01v03r01 and ANSI C63.26-2015 section 5.2.6. All results are presented in tabular form below. The highest values are highlighted.

Single Carrier Test Configurations at Antenna Port 3				
Modulation	**Frequency _ Channel**	**Peak (dBm)**	**Average (dBm)**	**PAPR (dB)**
GMSK	**1930.2MHz _ Bottom Channel***	34.640	34.387	0.253
	1930.4MHz _ BC+1	48.777	48.503	0.274
	1960.0MHz _ Middle Channel	48.847	**48.701**	0.146
	1989.6MHz _ TC-1	**48.888**	48.595	0.293
	1989.8MHz _ Top Channel*	34.962	34.647	**0.315**
8PSK	**1930.2MHz _ Bottom Channel***	37.764	34.947	2.817
	1930.4MHz _ BC+1	51.784	48.884	2.900
	1960.0MHz _ Middle Channel	51.910	48.803	**3.107**
	1989.6MHz _ TC-1	**52.065**	**49.062**	3.003
	1989.8MHz _ Top Channel*	37.937	34.922	3.015

*Reduced Power Channels

The power levels at the bottom and top channels had to be reduced by 14 dB to meet the band edge emission requirements. The next channel from the band edge (i.e.: BC+1 and TC-1) met the band edge emission requirements with the RRH operating at maximum output power.

RF output power has been measured for the multicarrier test configurations to verify/document the power levels. The minimum spacing between adjacent GSM/EDGE carriers is 400kHz. The maximum RF bandwidth is 37.5MHz (for rated power) for GSM carriers on the same antenna port. All results are presented in tabular form below.

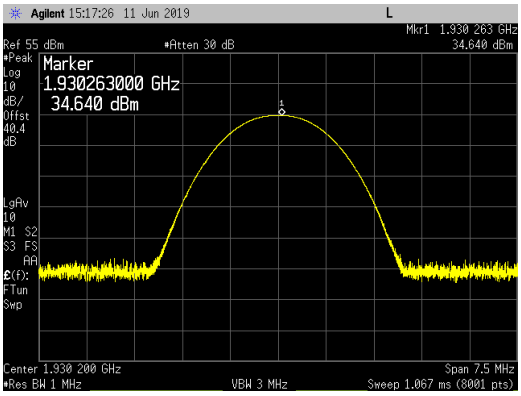
Multicarrier Test Configurations at Antenna Port 3				
Test Configuration	**Modulation Type**	**Frequency _ Channel**	**Ave Pwr**	**Total PCS Band Ave Pwr**
Three Carriers at Bottom Channels and at Maximum Spacing at Reduced Power	**GMSK**	**1930.2MHz _ Bottom Channel**	38.342dBm (6.83 Watts)	(10.92 Watts)
		1930.6MHz _ BC Min Spacing		
		1967.4MHz _ Max Spacing	36.113dBm (4.09 Watts)	40.4dBm
	8PSK	**1930.2MHz _ Bottom Channel**	38.375dBm (6.88 Watts)	(11.21 Watts)
		1930.6MHz _ BC Min Spacing		
		1967.4MHz _ Max Spacing	36.365dBm (4.33 Watts)	40.5dBm
Three Carriers at Bot Channels + 1 and at Maximum Spacing at Maximum Power	**GMSK**	**1930.4MHz _ Bot Ch+1**	46.413dBm (43.8 Watts)	(68.8 Watts)
		1930.8MHz _ BC Min Spacing		
		1967.6MHz _ Max Spacing	43.982dBm (25.0 Watts)	48.4dBm
	8PSK	**1930.4MHz _ Bot Ch+1**	46.545dBm (45.1 Watts)	(71.7 Watts)
		1930.8MHz _ BC Min Spacing		
		1967.6MHz _ Max Spacing	44.254dBm (26.6 Watts)	48.6dBm
Three Carriers at Top Channels and at Maximum Spacing at Reduced Power	**GMSK**	**1989.8MHz _ Top Channel**	38.821dBm (7.62 Watts)	(11.33 Watts)
		1989.4MHz _ TC Min Spacing		
		1952.6MHz _ Max Spacing	35.693dBm (3.71 Watts)	40.5dBm
	8PSK	**1989.8MHz _ Top Channel**	38.939dBm (7.83 Watts)	(11.88 Watts)
		1989.4MHz _ TC Min Spacing		
		1952.6MHz _ Max Spacing	36.071dBm (4.05 Watts)	40.8dBm
Three Carriers at Top Channels - 1 and at Maximum Spacing at Maximum Power	**GMSK**	**1989.6MHz _ Top Ch-1**	46.903dBm (49.0 Watts)	(71.7 Watts)
		1989.2MHz _ TC Min Spacing		
		1952.4MHz _ Max Spacing	43.560dBm (22.7 Watts)	48.6dBm
	8PSK	**1989.6MHz _ Top Ch-1**	47.172dBm (52.1 Watts)	(77.6 Watts)
		1989.2MHz _ TC Min Spacing		
		1952.4MHz _ Max Spacing	44.060dBm (25.5 Watts)	48.9dBm

The power levels at the bottom and top channels had to be reduced by 8 dB to meet the band edge emission requirements. The next channel from the band edge (i.e.: BC+1 and TC-1) met the band edge emission requirements with the RRH operating at maximum output power.

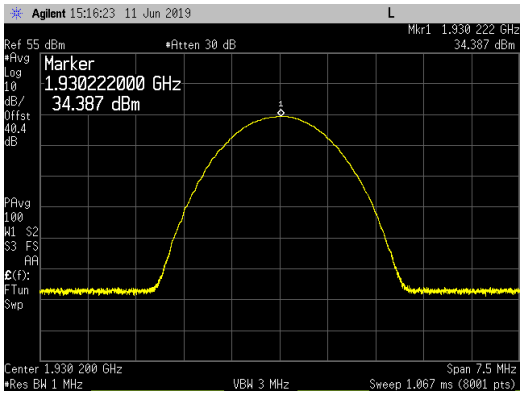
All measurement results are provided in the following pages. The total measurement RF path loss of the test setup (attenuator and test cables) was 40.4 dB and is accounted for by the spectrum analyzer reference level offset.

Single Carrier Power Plots at AHFIG Antenna Port 3 for GMSK Modulation

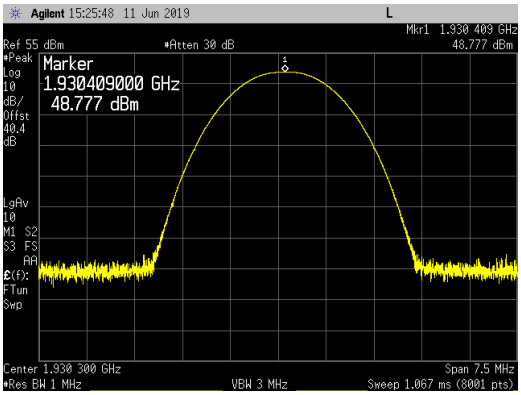
Bottom Channel_1930.2MHz_Peak



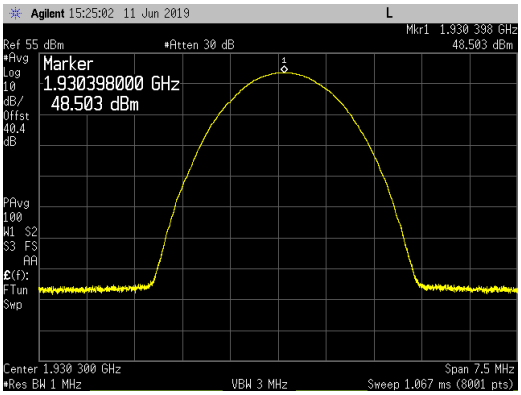
Bottom Channel_1930.2MHz_Average



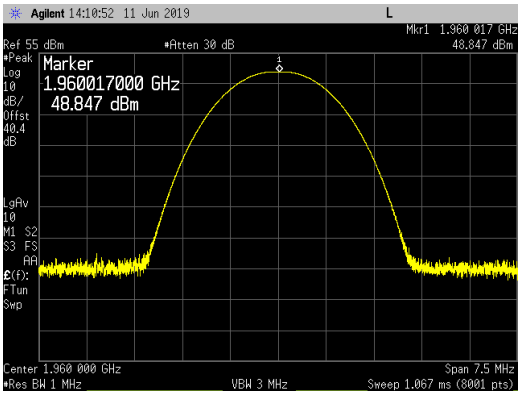
Bottom Channel +1_1930.4MHz__Peak



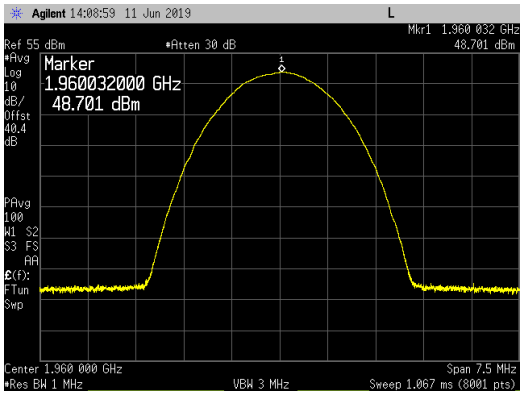
Bottom Channel +1_1930.4MHz_Average



Middle Channel_1960.0MHz_Peak

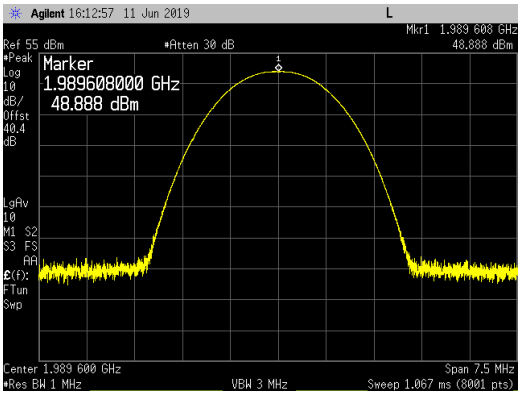


Middle Channel_1960.0MHz_Ave

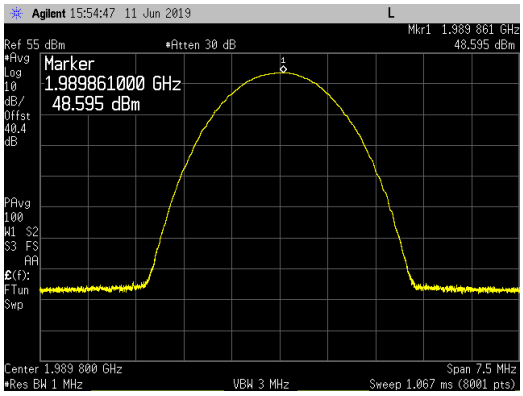


Single Carrier Power Plots at AHFIG Antenna Port 3 for GMSK Modulation continued

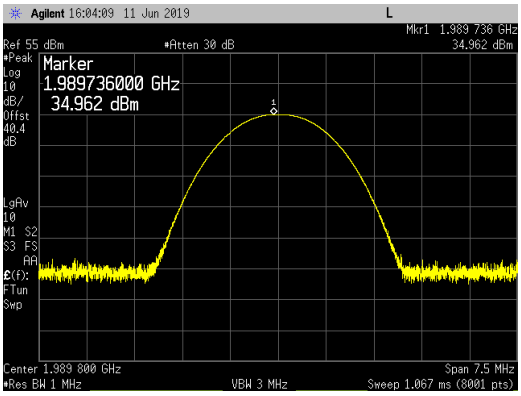
Top Channel -1_1989.6MHz_Peak



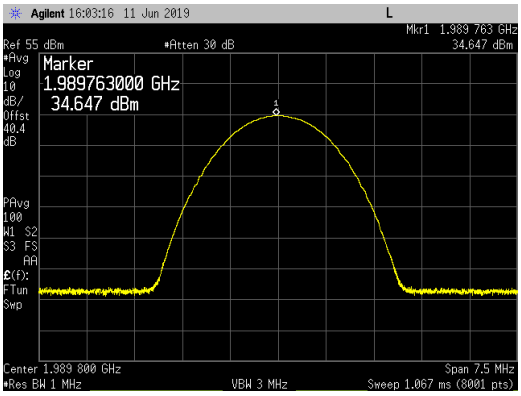
Top Channel -1_1989.6MHz_Average



Top Channel_1989.8MHz_Peak

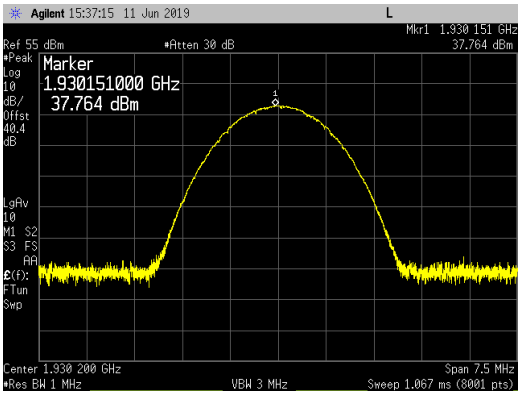


Top Channel_1989.8MHz_Average

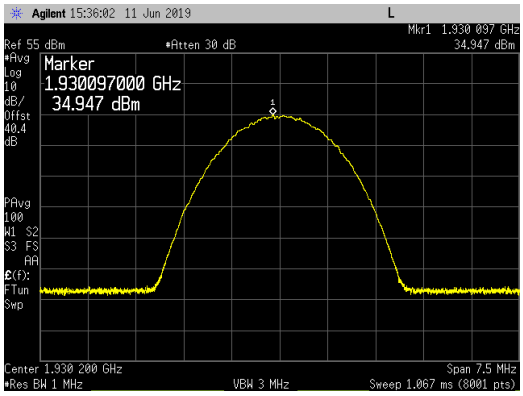


Single Carrier Power Plots at AHFIG Antenna Port 3 for 8PSK Modulation

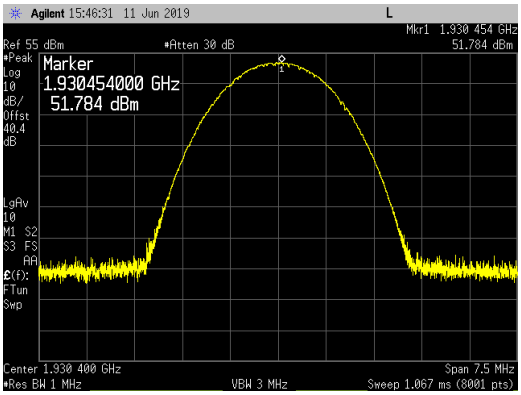
Bottom Channel_1930.2MHz_Peak



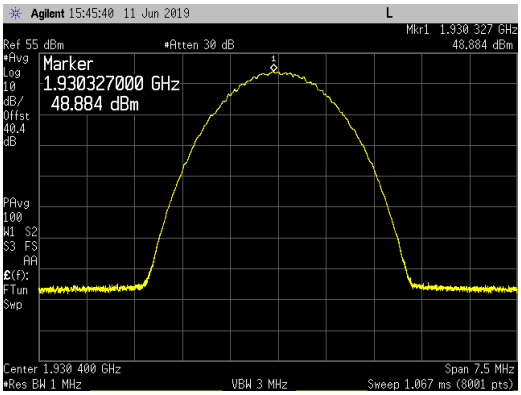
Bottom Channel_1930.2MHz_Average



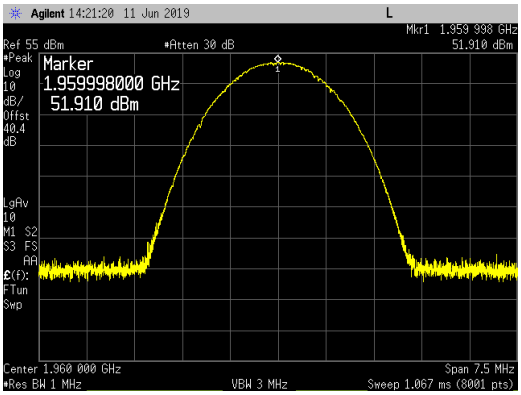
Bottom Channel +1_1930.4MHz__Peak



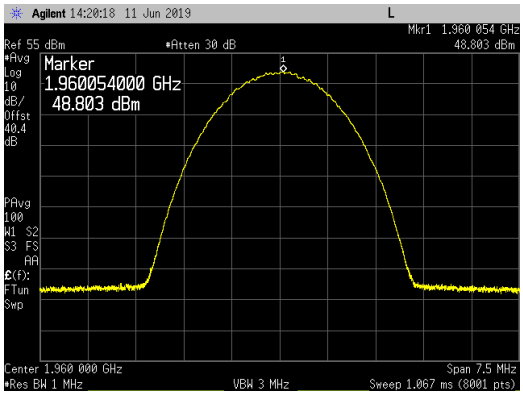
Bottom Channel +1_1930.4MHz_Average



Middle Channel_1960.0MHz_Peak

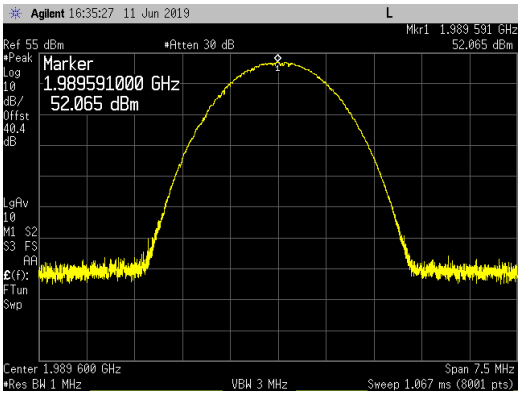


Middle Channel_1960.0MHz_Ave

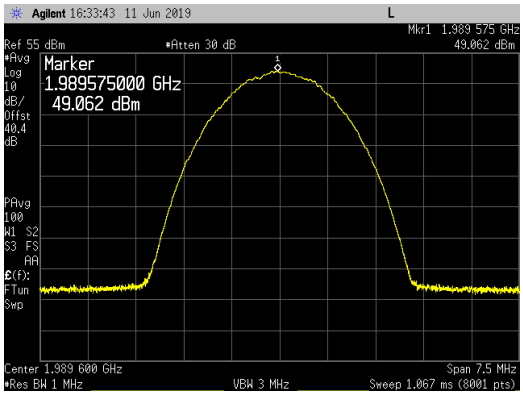


Single Carrier Power Plots at AHFIG Antenna Port 3 for 8PSK Modulation continued

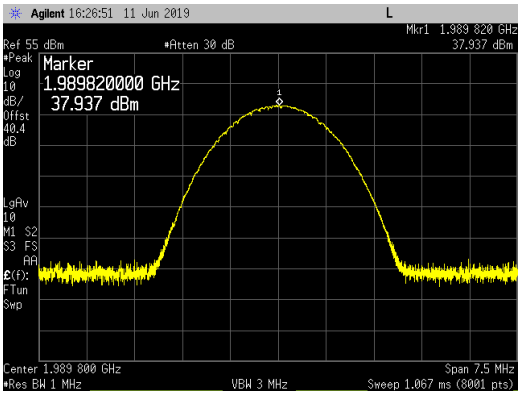
Top Channel -1_ 1989.6MHz_ Peak



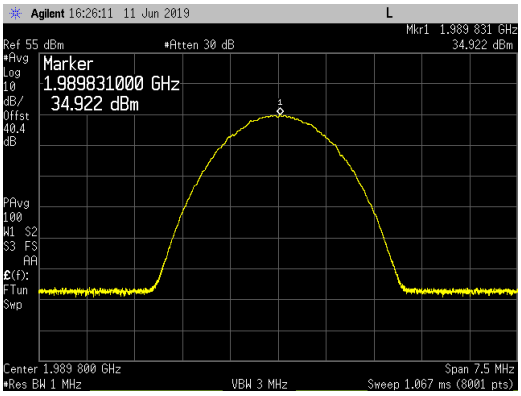
Top Channel -1_1989.6MHz_Average



Top Channel_ 1989.8MHz_ Peak

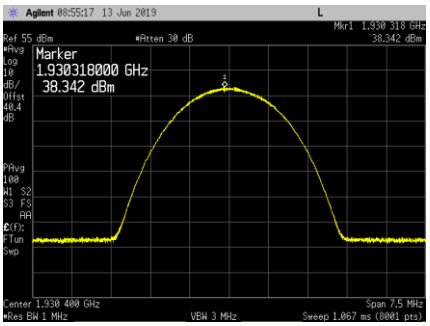


Top Channel_1989.8MHz_Average

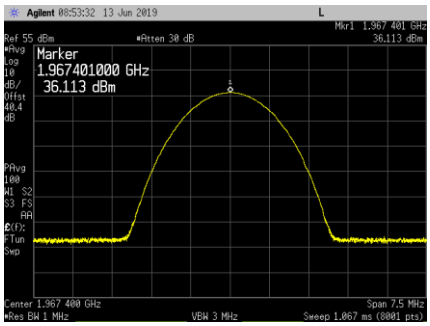


Multicarrier Average Power Plots for GSM Carrier Bottom Channels at Antenna Port 3:

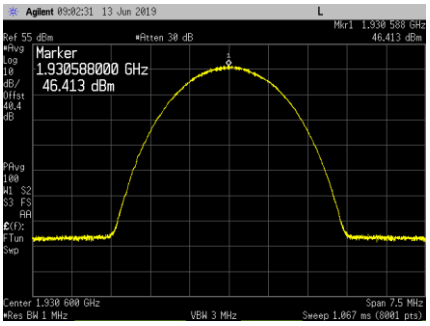
BC_GMSK_ 1930.2 & 1930.6MHz



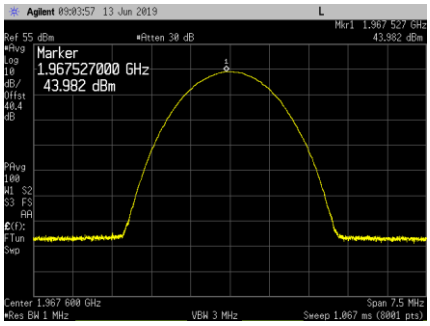
BC_GMSK_ 1967.4MHz



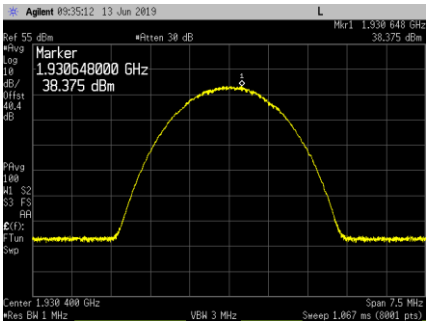
BC+1_GMSK_ 1930.4 & 1930.8MHz



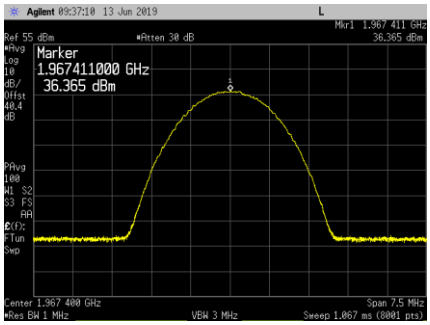
BC+1_GMSK_ 1967.6MHz



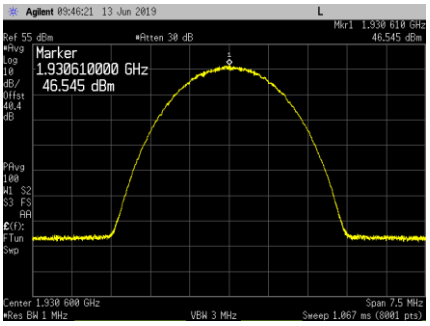
BC_8PSK_ 1930.2 & 1930.6MHz



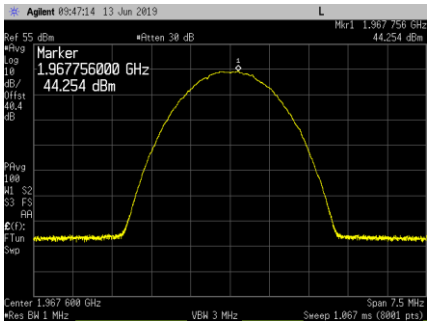
BC_8PSK_ 1967.4MHz



BC+1_8PSK_ 1930.4 & 1930.8MHz

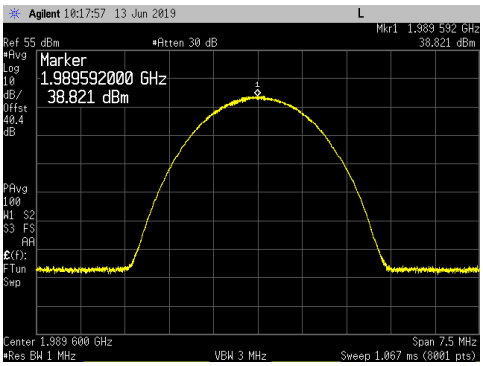


BC+1_8PSK_ 1967.6MHz

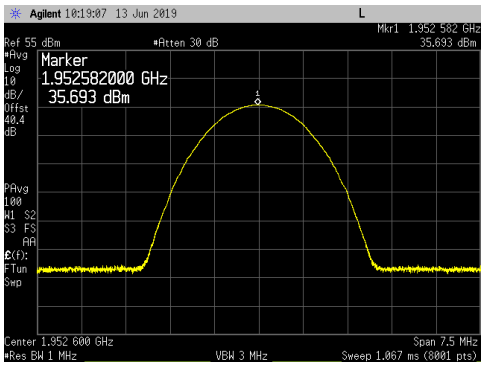


Multicarrier Average Power Plots for GSM Carrier Top Channels at Antenna Port 3:

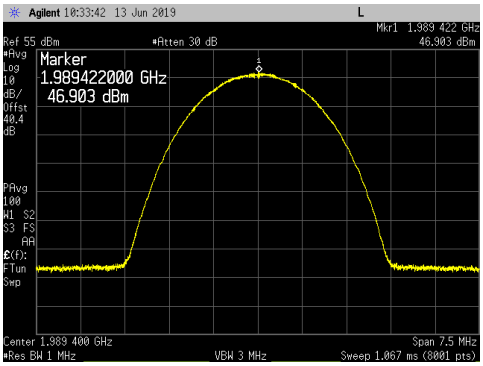
TC_GMSK_ 1989.8 & 1989.4MHz



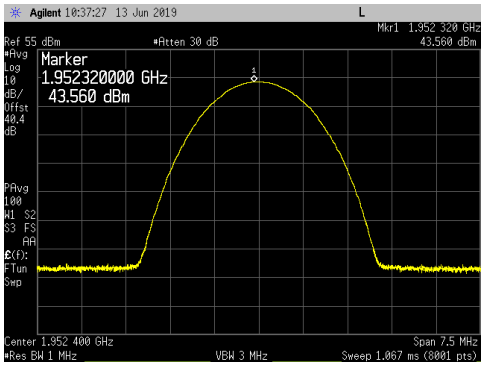
TC_GMSK_ 1952.6MHz



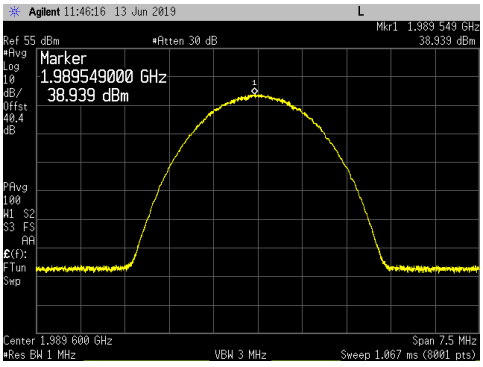
TC-1_GMSK_ 1989.6 & 1989.2MHz



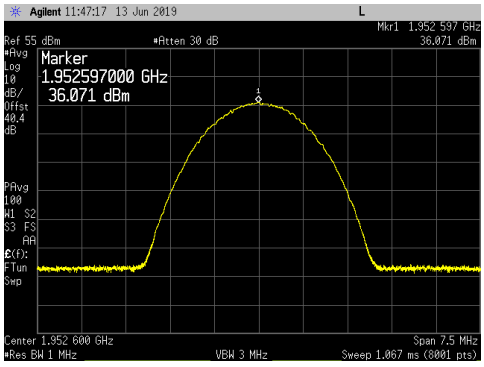
TC-1_GMSK_ 1952.4MHz



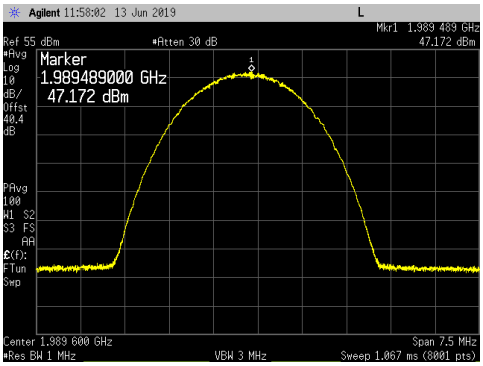
TC_8PSK_ 1989.8 & 1989.4MHz



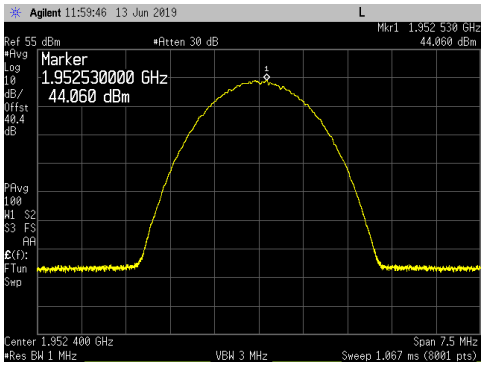
TC_8PSK_ 1952.6MHz



TC-1_8PSK_ 1989.6 & 1989.2MHz



TC-1_8PSK_ 1952.4MHz



Emission Bandwidth (26 dB down and 99%)

Emission bandwidth measurements were made at antenna port 3 on the bottom, middle and top channels. The AHFIG was operated at maximum RF output power for GSM/EDGE modulations.

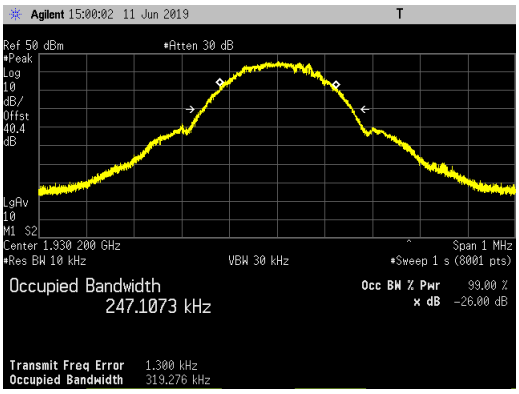
The 26dB emission bandwidth was measured in accordance with section 4 of FCC KDB 971168 D01v03r01 and ANSI C63.26 section 5.4. The 99% occupied bandwidth was measured in accordance with section 6.7 of RSS-Gen Issue 5. For both measurements, an occupied bandwidth built-in function in the spectrum analyzer was used. The results are provided in the following table. The largest emission bandwidth is highlighted.

Modulation	Frequency _ Channel	Emission Bandwidth (kHz)	
		26dB	99%
GMSK	**1930.2MHz_Bottom Channel**	319	**247**
	1960.0MHz_Middle Channel	**320**	**247**
	1989.8MHz_Top Channel	**320**	**247**
8PSK	**1930.2MHz_Bottom Channel**	310	**244**
	1960.0MHz_Middle Channel	309	**244**
	1989.8MHz_Top Channel	**312**	**244**

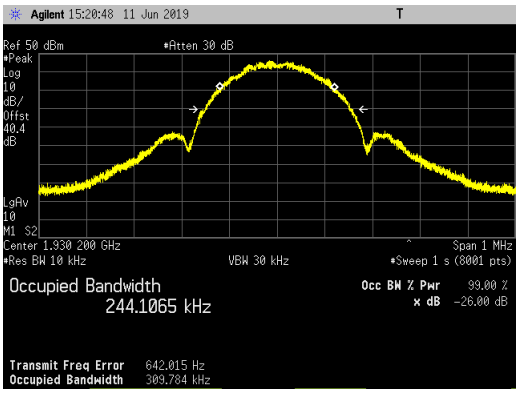
Emission bandwidth measurement data are provided in the following pages.

GSM/EDGE Emission Bandwidth Plots at AHFIG Antenna Port 3

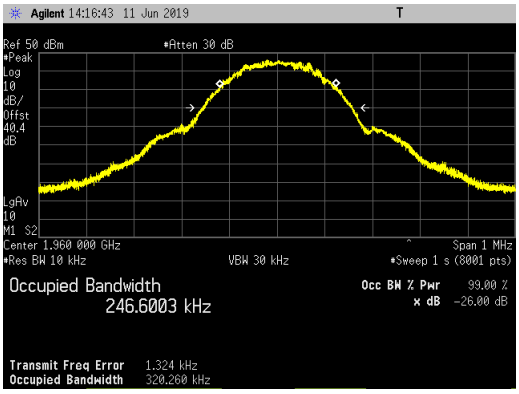
Bottom Channel_1930.2MHz_GMSK Modulation



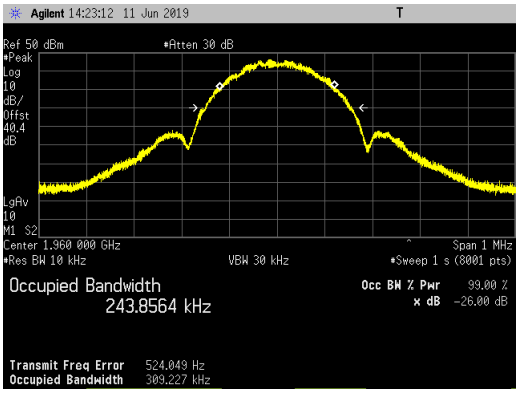
Bottom Channel_1930.2MHz_8PSK Modulation



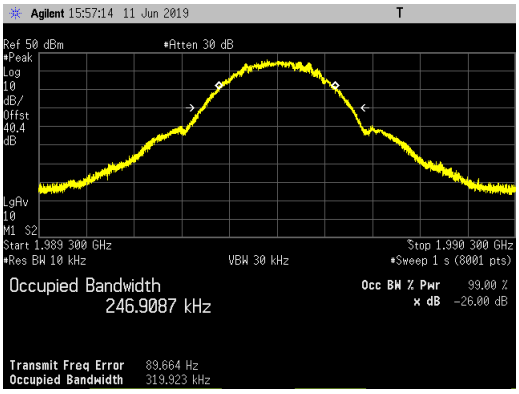
Middle Channel_1960.0MHz_GMSK Modulation



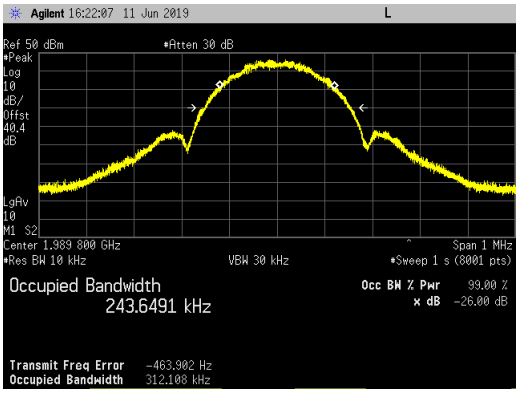
Middle Channel_1960.0MHz_8PSK Modulation



Top Channel_1989.8MHz_GMSK Modulation



Top Channel_1989.8MHz_8PSK Modulation



Antenna Port Conducted Band Edge

Conducted band edge measurements were made at AHFIG antenna port 3 at the upper and lower band edges. The AHFIG was operated at the band edge frequencies with GSM/EDGE modulation types.

The AHFIG single carrier output power was reduced by 14 dB at the bottom (1930.2MHz) and top (1989.8MHz) RF channels to pass the band edge emission requirements. The AHFIG single carrier at maximum output power passed band edge emissions requirements at one RF channel inside the bottom and top RF channels (i.e.: BC+1_1930.4MHz and TC-1_1989.6MHz).

Two multicarrier test cases based upon KDB 971168 D03v01 using three carriers (at maximum power) per antenna port was performed. The first multicarrier test case is with two carriers (with minimum spacing between carrier frequencies) at the lower band edge (i.e.: 1930.2 & 1930.6MHz) and a third carrier with maximum spacing between the other two carrier frequencies (1967.4MHz). The second multicarrier test case is with two carriers (with minimum spacing between carrier frequencies) at upper band edge (i.e.: 1989.4 & 1989.8MHz) and a third carrier with maximum spacing between the other two carrier frequencies (1952.6MHz). The multicarrier cases at maximum output port power passed band edge emissions requirements at one RF channel inside the bottom and top RF channels (i.e.: BC+1_1930.4MHz and TC-1_1989.6MHz). The power was reduced by 8dB to pass the band edge requirements at the bottom and top channels.

The power of any emission outside of the authorized operating frequency range cannot exceed -13 dBm as specified in section 24.238(a) and RSS 133 6.5(i). The GSM/EDGE carriers are not MIMO.

Measurements were performed with the spectrum analyzer in the RMS average mode over 100 traces. In the 1MHz bands outside and adjacent to the frequency block, a resolution bandwidth of 1% of the measured emission bandwidth (3.3kHz) per 24.238(b) and RSS 133 6.5(i) was used. In the 1 to 2MHz frequency range outside the band edge (i.e.: 1928 to 1929MHz and 1991 to 1992MHz bands) the RBW was set to 1% of the measured emission bandwidth (3.3kHz) and the power integrated over 1MHz. In the 2MHz to 22MHz frequency range outside the band edge (i.e.: 1908 to 1928MHz and 1992 to 2012MHz bands) a 1MHz RBW and 3MHz VBW was used. The results are summarized in the following table. The highest (worst case) emissions from the measurement data are provided.

Band 2 Carrier Frequency Modulation Type and Carrier Power Level	Port 3 (dBm)	
	Lower	Upper
Single Carrier at Bottom Channel (1930.2MHz)/Top Channel (1989.8MHz) GMSK and Reduced Power (Maximum Power -14dB or ~3 Watts)	-15.311	-14.929
Single Carrier at Bottom Channel (1930.2MHz)/Top Channel (1989.8MHz) 8PSK and Reduced Power (Maximum Power -14dB or ~3 Watts)	-19.186	-18.990
Single Carrier at BC+1 (1930.4MHz)/TC-1 (1989.6MHz) GMSK and Maximum Power (49dBm or 80 Watts)	-21.190	-22.624
Single Carrier at BC+1 (1930.4MHz)/TC-1 (1989.6MHz) 8PSK and Maximum Power (49dBm or 80 Watts)	-22.852	-23.478
Three Carriers at BCs (1930.2 and 1930.6MHz) and at Max Spacing (1967.4MHz)/ Three Carriers at TCs (1989.4 and 1989.8MHz) and at Max Spacing (1952.6MHz) GMSK and Reduced Power (Maximum Power – 8dB or ~11 Watts)	-15.645	-14.999
Three Carriers at BCs (1930.2 and 1930.6MHz) and at Max Spacing (1967.4MHz)/ Three Carriers at TCs (1989.4 and 1989.8MHz) and at Max Spacing (1952.6MHz) 8PSK and Reduced Power (Maximum Power – 8dB or ~11 Watts)	-18.473	-17.739
Three Carriers at BCs (1930.4 and 1930.8MHz) and at Max Spacing (1967.6MHz)/ Three Carriers at TCs (1989.2 and 1989.6MHz) and at Max Spacing (1952.4MHz) GMSK and Maximum Power (49dBm or 80 Watts)	-21.203	-22.702
Three Carriers at BCs (1930.4 and 1930.8MHz) and at Max Spacing (1967.6MHz)/ Three Carriers at TCs (1989.2 and 1989.6MHz) and at Max Spacing (1952.4MHz) 8PSK and Maximum Power (49dBm or 80 Watts)	-21.213	-23.067

The reduced power level was 14dB down from maximum power level (~35dBm) for the single carrier as shown in the RF output power section of this report. The reduced power level was 8dB down from maximum power level (~41dBm) for the multicarrier test case as shown in the RF output power section of this report.

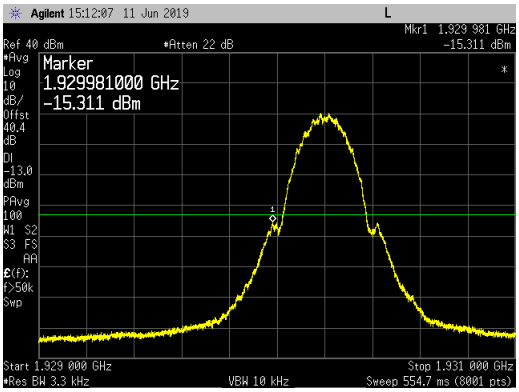
The total measurement RF path loss of the test setup (attenuator and test cables) was 40.4 dB and is accounted for by the spectrum analyzer reference level offset. The display line on the plots reflects the required limit.

Conducted band edge measurements are provided in the following pages.

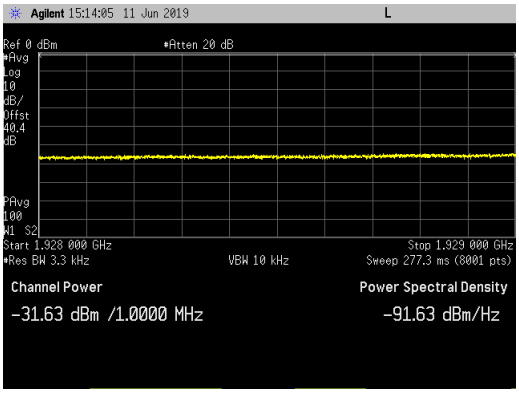
Single Carrier at Reduced Power on Port 3 -Lower and Upper Band Edge Plots:

GSMK Carrier at Bottom Channel (1930.2MHz)

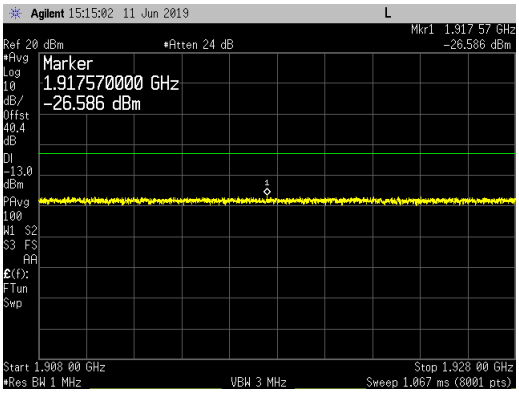
LBE_ 1929 to 1931MHz



LBE_1928 to 1929MHz

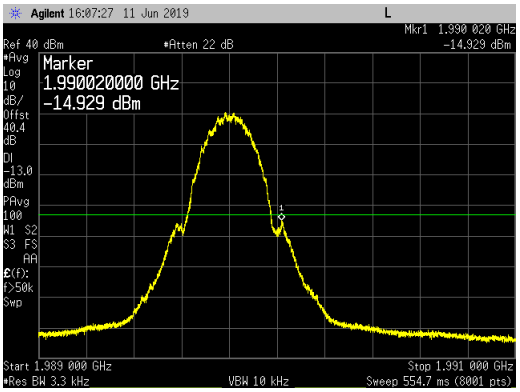


LBE_1908 to 1928MHz

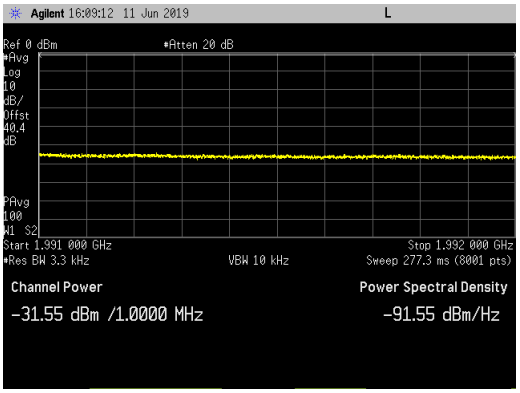


GMSK Carrier at Top Channel (1989.8MHz)

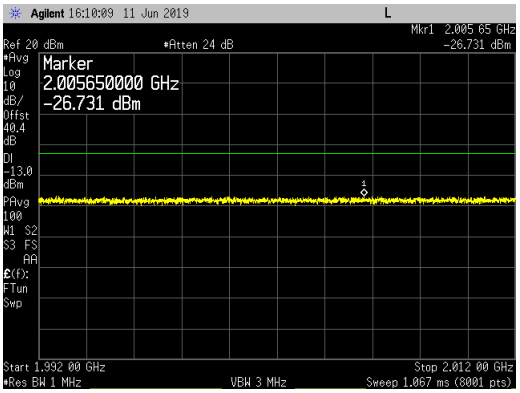
UBE_1989 to 1991MHz



UBE_1991 to 1992MHz



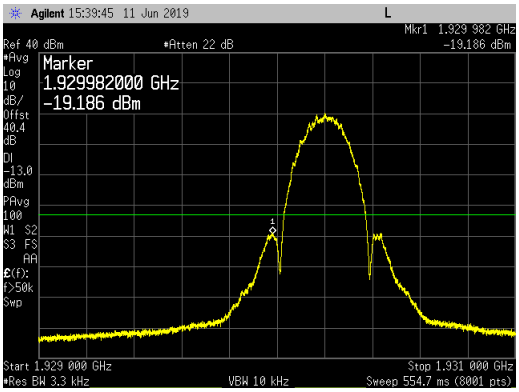
UBE_1992 to 2012MHz



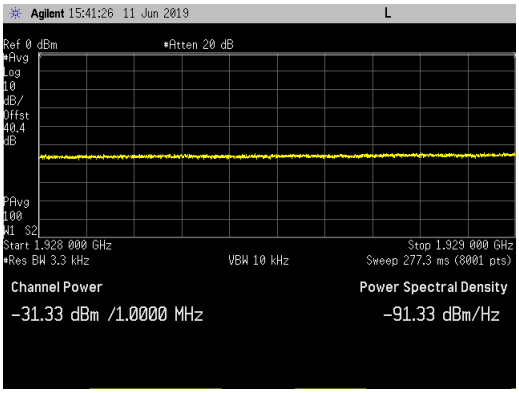
Single Carrier at Reduced Power on Port 3 -Lower and Upper Band Edge Plots:

8PSK Carrier at Bottom Channel (1930.2MHz)

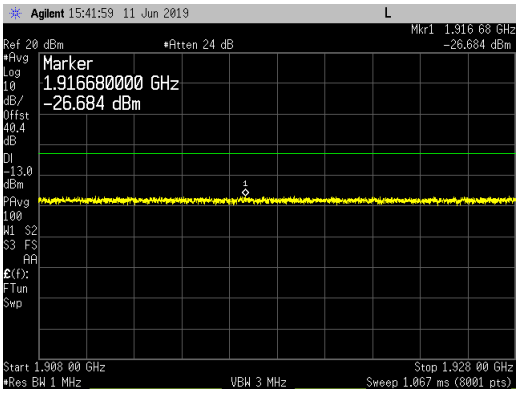
LBE_1929 to 1931MHz



LBE_1928 to 1929MHz

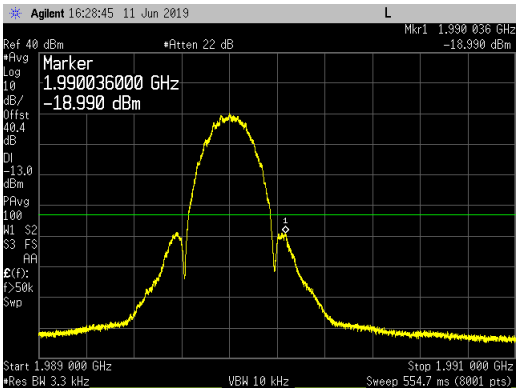


LBE_1908 to 1928MHz

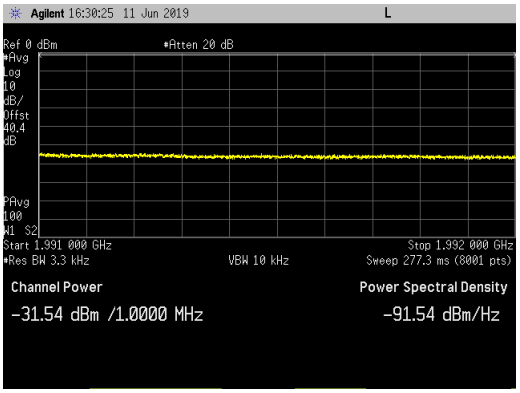


8PSK Carrier at Top Channel (1989.8MHz)

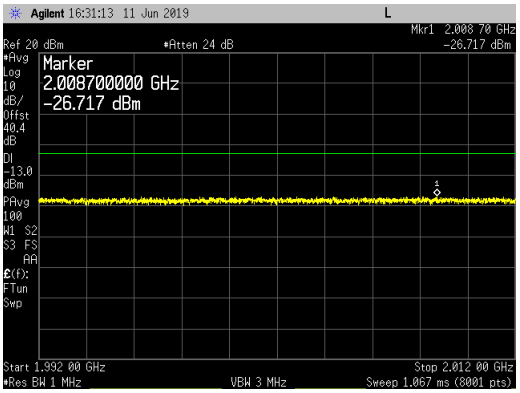
UBE_1989 to 1991MHz



UBE_1991 to 1992MHz



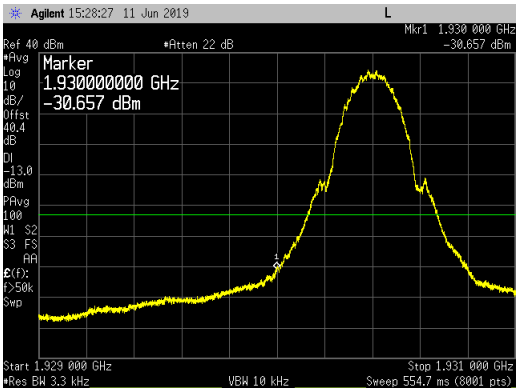
UBE_1992 to 2012MHz



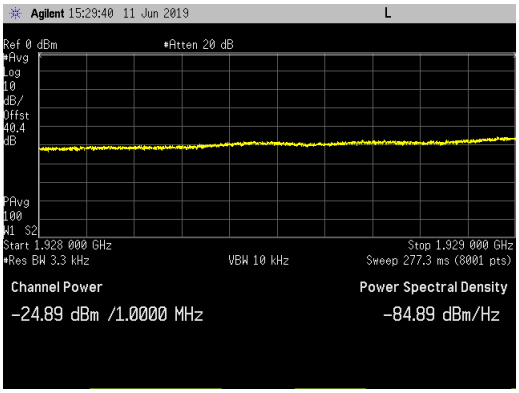
Single Carrier at Maximum Power on Port 3 -Lower and Upper Band Edge Plots:

GMSK Carrier at BC+1 (1930.4MHz)

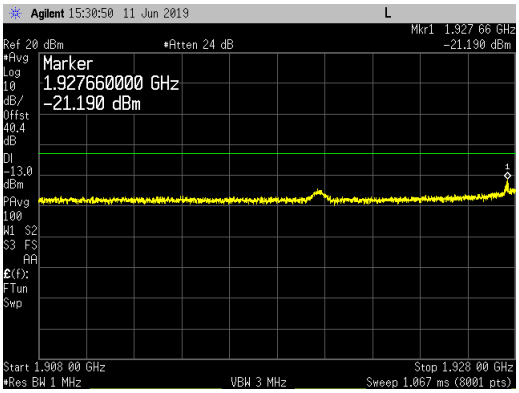
LBE_1929 to 1931MHz



LBE_1928 to 1929MHz

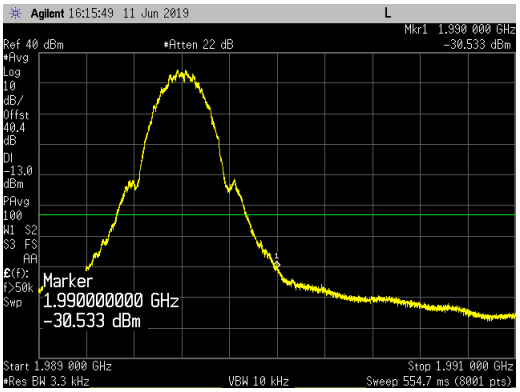


LBE_1908 to 1928MHz

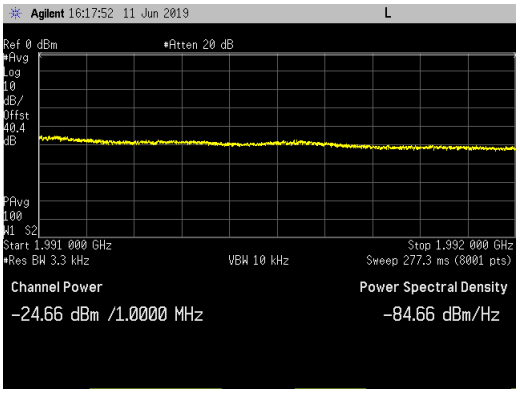


GMSK Carrier at TC-1 (1989.6MHz)

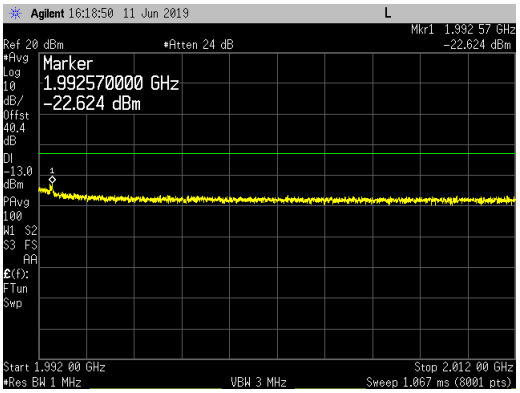
UBE_1989 to 1991MHz



UBE_1991 to 1992MHz



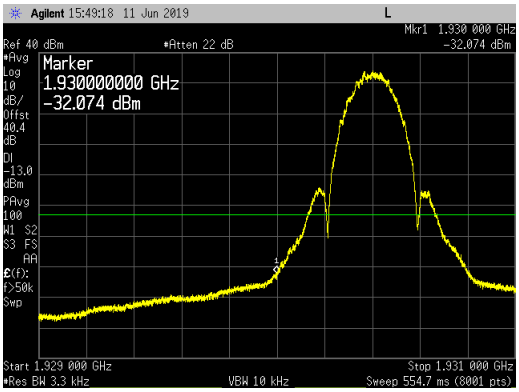
UBE_1992 to 2012MHz



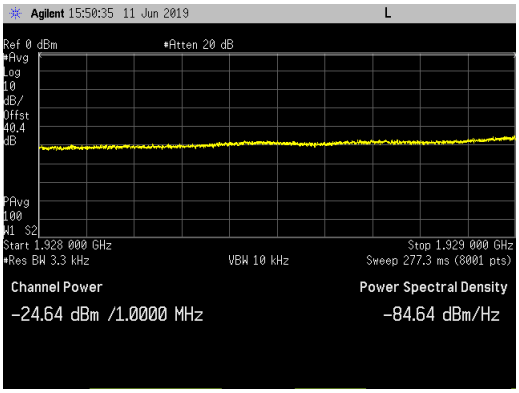
Single Carrier at Maximum Power on Port 3 -Lower and Upper Band Edge Plots:

8PSK Carrier at BC+1 (1930.4MHz)

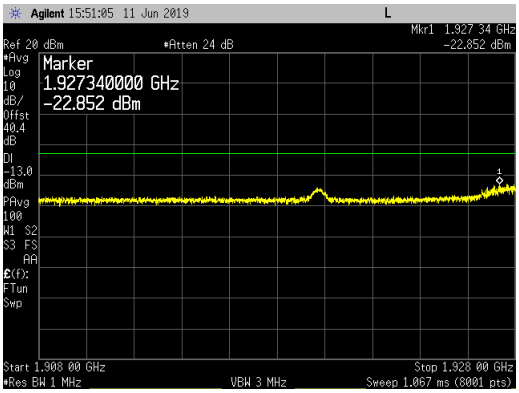
LBE_1929 to 1931MHz



LBE_1928 to 1929MHz

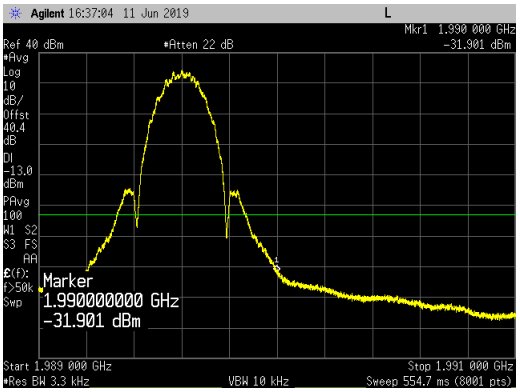


LBE_1908 to 1928MHz

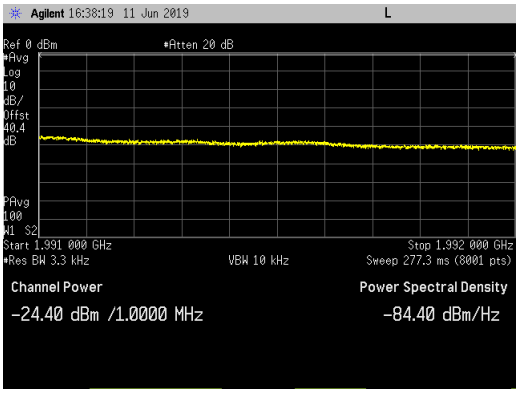


8PSK Carrier at TC-1 (1989.6MHz)

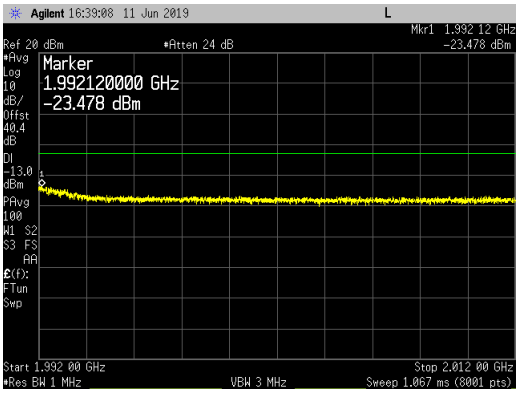
UBE_1989 to 1991MHz



UBE_1991 to 1992MHz



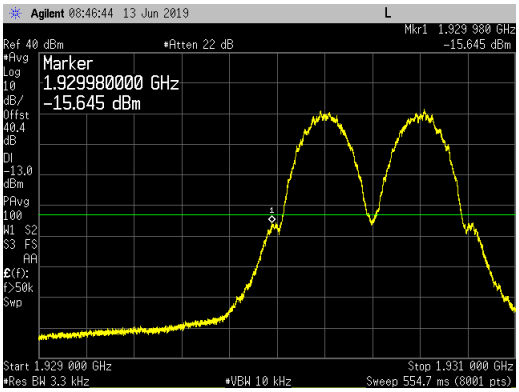
UBE_1992 to 2012MHz



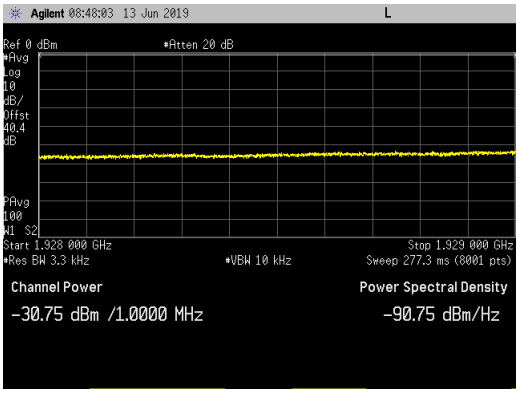
Three Carriers at Reduced Power on Port 3 -Lower and Upper Band Edge Plots:

GMSK Carriers at 1930.2, 1930.6 & 1967.4MHz

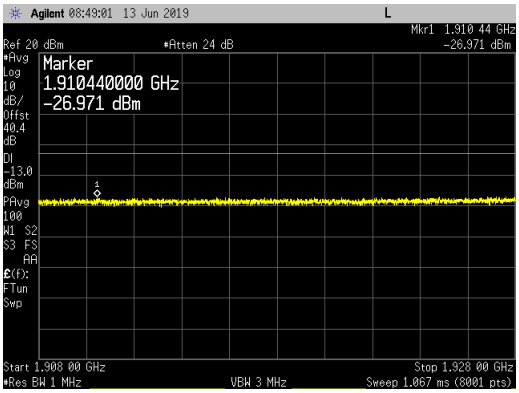
LBE_1929 to 1931MHz



LBE_1928 to 1929MHz

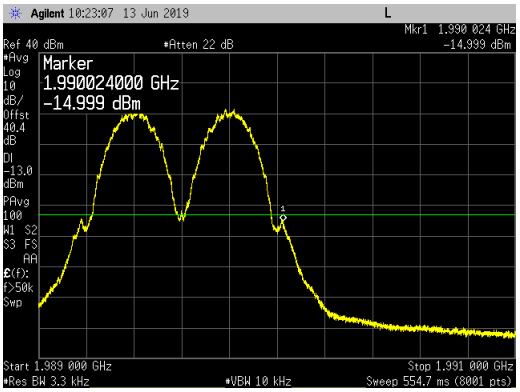


LBE_1908 to 1928MHz

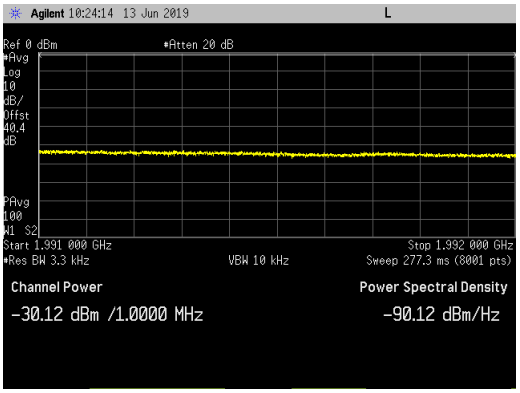


GMSK Carriers at 1989.4, 1989.8 & 1952.6MHz

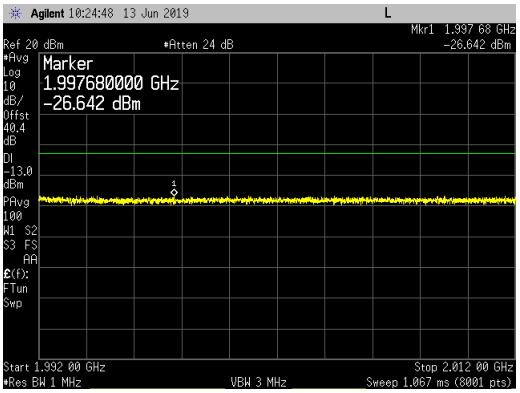
UBE_1989 to 1991MHz



UBE_1991 to 1992MHz



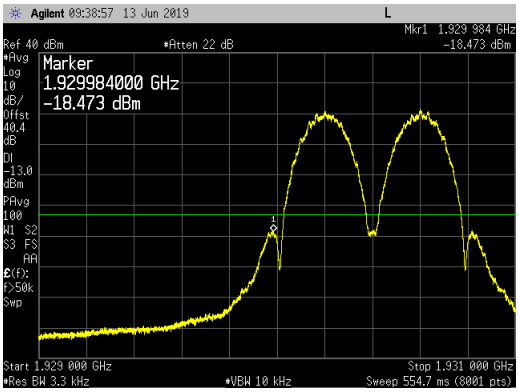
UBE_1992 to 2012MHz



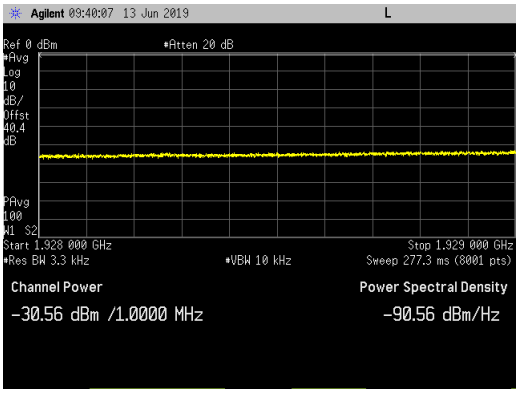
Three Carriers at Reduced Power on port 3 -Lower and Upper Band Edge Plots:

8PSK Carriers at 1930.2, 1930.6 & 1967.4MHz

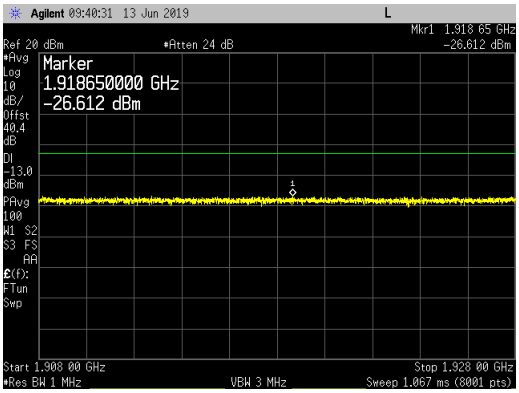
LBE_1929 to 1931MHz



LBE_1928 to 1929MHz

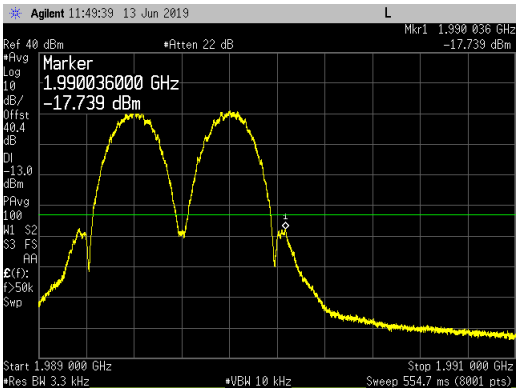


LBE_1908 to 1928MHz

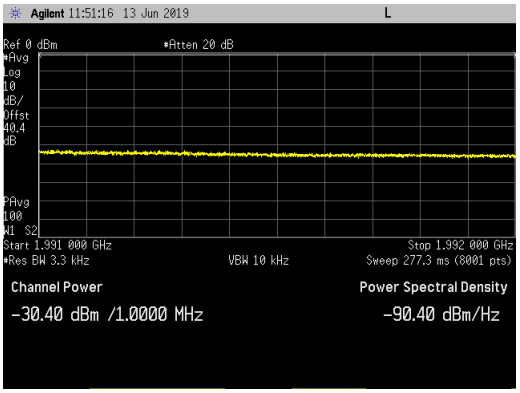


8PSK Carriers at 1989.4, 1989.8 & 1952.6MHz

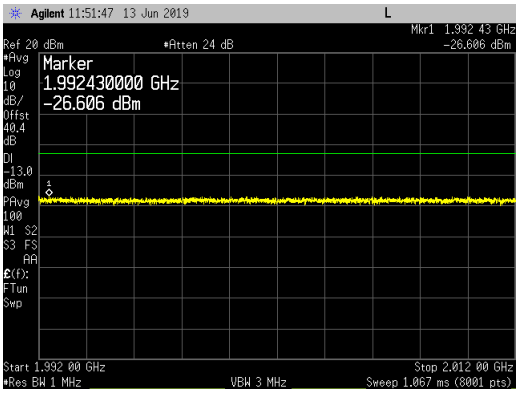
Port 2_UBE_1989 to 1991MHz



Port 2_UBE_1991 to 1992MHz



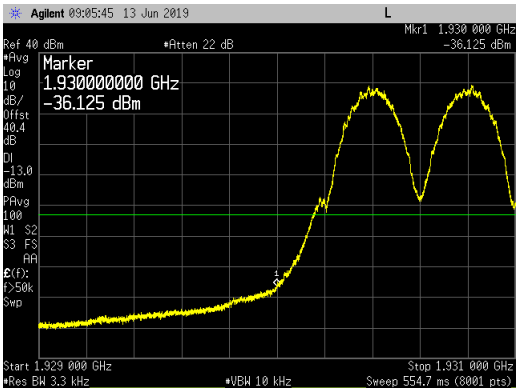
Port 2_UBE_1992 to 2012MHz



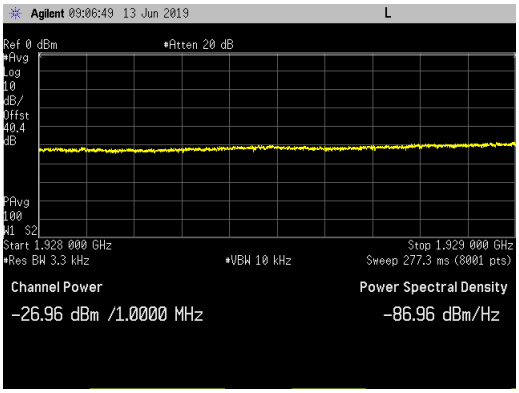
Three Carriers at Maximum Power on Port 3 -Lower and Upper Band Edge Plots:

GMSK Carriers at 1930.4, 1930.8 & 1967.6MHz

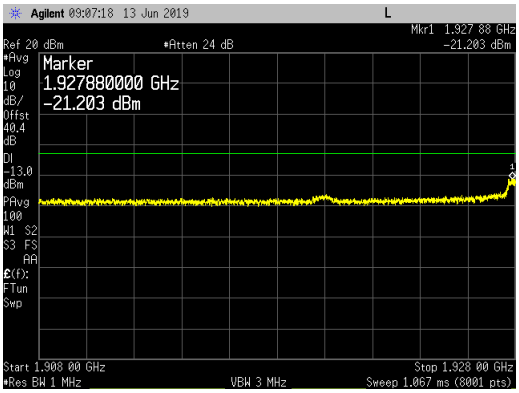
LBE_1929 to 1931MHz



LBE_1928 to 1929MHz

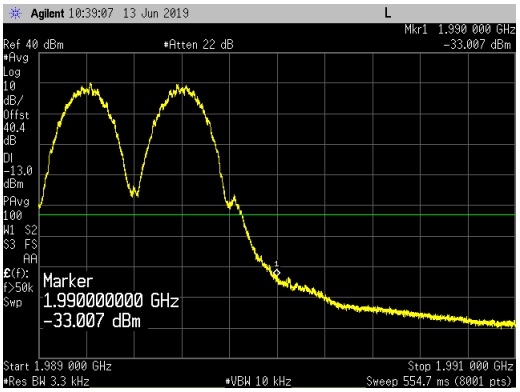


LBE_1908 to 1928MHz

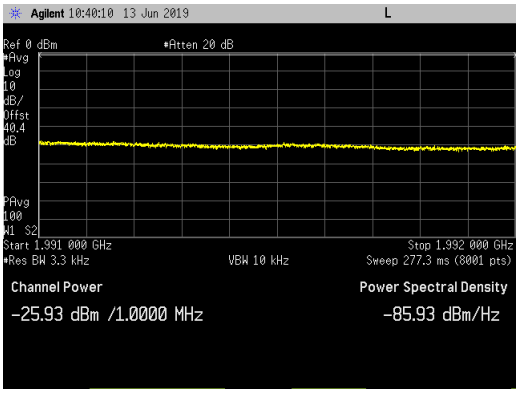


GMSK Carriers at 1989.2, 1989.6 & 1952.4MHz

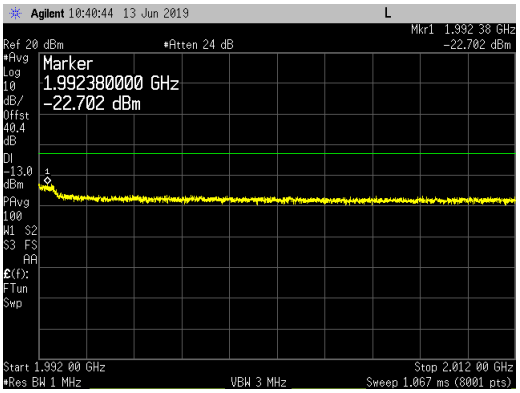
UBE_1989 to 1991MHz



UBE_1991 to 1992MHz



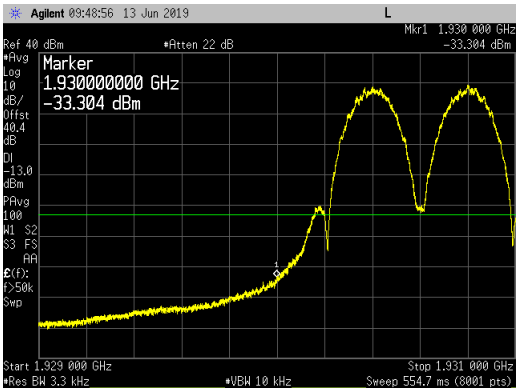
UBE_1992 to 2012MHz



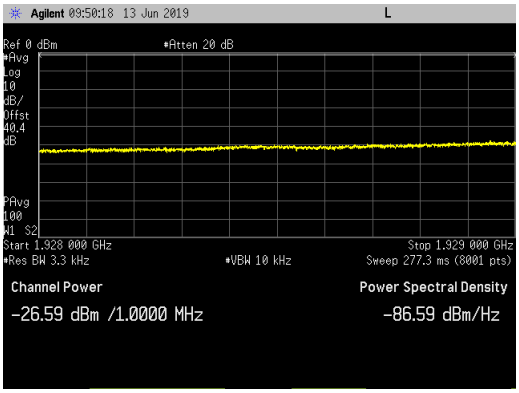
Three Carriers at Maximum Power on Port 3 -Lower and Upper Band Edge Plots:

8PSK Carriers at 1930.4, 1930.8 & 1967.6MHz

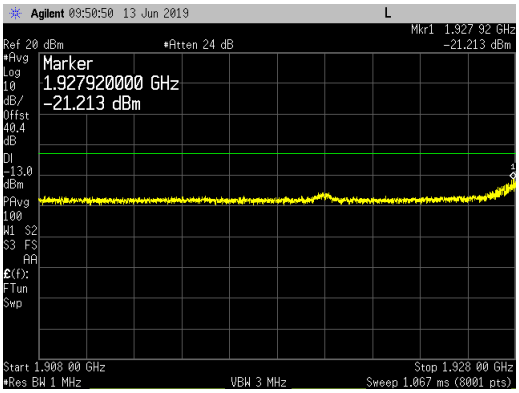
LBE_1929 to 1931MHz



LBE_1928 to 1929MHz

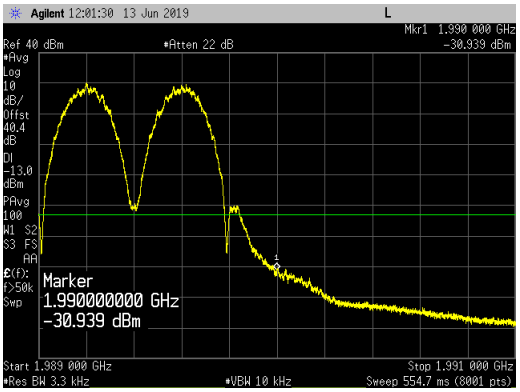


LBE_1908 to 1928MHz

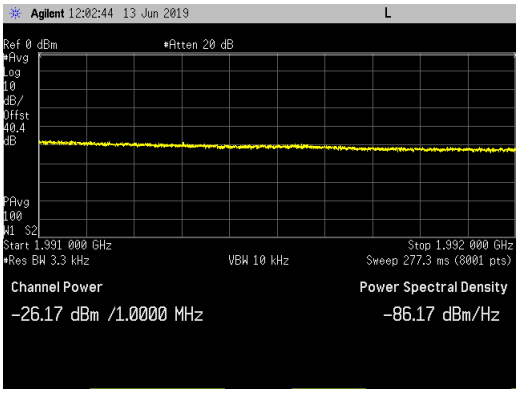


8PSK Carriers at 1989.2, 1989.6 & 1952.4MHz

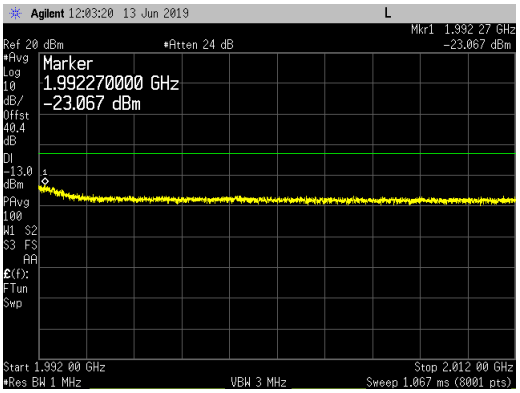
UBE_1989 to 1991MHz



UBE_1991 to 1992MHz



UBE_1992 to 2012MHz



Transmitter Antenna Port Conducted Emissions

Transmitter conducted emission measurements were made at RRH antenna port 3 with GSM/EDGE modulation types. Measurements were performed over the 9kHz to 22GHz frequency range.

Single Carrier Test Case

The single carrier test case was performed with the RRH operating on the PCS Band 2 middle channel (1960.0MHz) using GSM/EDGE at maximum power. A single LTE1.4 carrier operating at AWS band middle frequency (2155.0MHz) with 256QAM modulation at maximum power was enabled for all testing.

Multicarrier Multiband Multi-RAT Test Cases

Two multicarrier test cases based upon KDB 971168 D03v01 using three carriers (at maximum power) per antenna port was performed. The first multicarrier test case is with two carriers (with minimum spacing between carrier frequencies) at the lower band edge (i.e.: 1930.4 & 1930.8MHz) and a third carrier with maximum spacing between the other two carrier frequencies (1967.6MHz). The second multicarrier test case is with two carriers (with minimum spacing between carrier frequencies) at upper band edge (i.e.: 1989.2 & 1989.6MHz) and a third carrier with maximum spacing between the other two carrier frequencies (1952.4MHz). A single LTE1.4 carrier operating at AWS band middle frequency (2155.0MHz) with 256QAM modulation at maximum power was enabled for all testing.

The test configuration parameters are provided below:

PCS Band Transmission Parameters			AWS Band Transmission Parameters		
Carrier Frequency	**Channel Type**	**Carrier Power**	**Carrier Frequency**	**Channel Type**	**Carrier Power**
1960.0MHz (Mid Ch)	GSM/EDGE	80 Watts	2155.0MHz (Mid Ch)	LTE 1.4	40 Watts
1930.4, 1930.8 & 1967.6MHz (BC, BC+1, and Max Spacing)	GSM/EDGE	26+26+26 Watts	2155.0MHz (Mid Ch)	LTE 1.4	40 Watts
1989.2, 1989.6 & 1952.4MHz (BC, BC+1, and Max Spacing)	GSM/EDGE	26+26+26 Watts	2155.0MHz (Mid Ch)	LTE 1.4	40 Watts

The power of any emission outside of the authorized operating frequency range cannot exceed -13 dBm as specified in section 24.238(a) and RSS 133 6.5(i). The GSM/EDGE carriers are not MIMO. The required measurement parameters include a 1MHz bandwidth with power measured in average value (since transmitter power was measured in average value).

Measurements were performed with a spectrum analyzer using a peak detector with max hold over 50 sweeps (except for the 20MHz to 3GHz frequency range). Measurements for the 20MHz to 3GHz frequency range was performed with the spectrum analyzer in the RMS average mode over 100 traces.

The limit for the 9kHz to 150kHz frequency range was adjusted to –43dBm to correct for a spectrum analyzer RBW of 1kHz versus required RBW of 1MHz [i.e.: -43dBm = -13dBm -10log(1000kHz/1kHz)]. The limit for the 150kHz to 20MHz frequency range was adjusted to –33dBm to correct for a spectrum analyzer RBW of 10kHz versus required RBW of 1MHz [i.e.: -33dBm = -13dBm -10log(1000kHz/10kHz)]. The required limit of -13dBm with a RBW of ≥1MHz was used for all other frequency ranges. The spectrum analyzer settings that were used for this test are summarized in the following table.

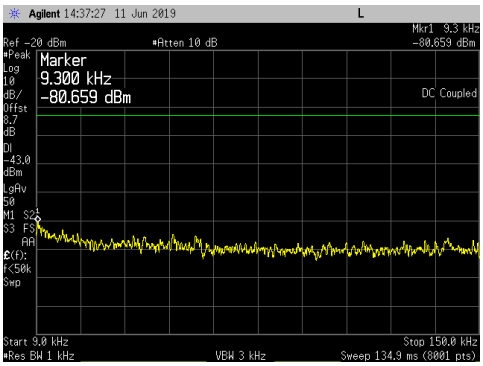
Frequency Range	RBW	VBW	Number of Data Points	Detector	Sweep Time	Max Hold over	Offset Note (1)
9kHz to 150kHz	1kHz	3kHz	8001	Peak	Auto	50 Sweeps	8.7dB
150kHz to 20MHz	10kHz	30kHz	8001	Peak	Auto	50 Sweeps	8.7dB
20MHz to 3GHz	1MHz	3MHz	8001	Average	Auto	Note (2)	40.4dB
3GHz to 6GHz	1MHz	3MHz	8001	Peak	Auto	50 Sweeps	40.2dB
6GHz to 18GHz	2MHz	6MHz	8192	Peak	Auto	50 Sweeps	33.1dB
18GHz to 22GHz	1MHz	3MHz	8001	Peak	Auto	50 Sweeps	41.3dB
1900 to 2200MHz	1MHz	3MHz	8001	Average	Auto	Note (2)	40.4dB

Note 1: The total measurement RF path loss of the test setup (attenuators, test cables and filters) is accounted for by the spectrum analyzer reference level offset.
Note 2: Max Hold not used and instead measurements were performed with the spectrum analyzer in the RMS average mode over 100 traces.

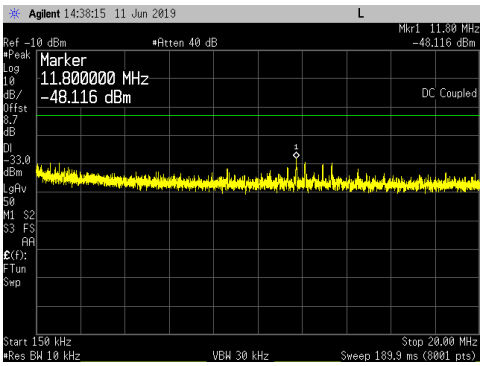
A low pass filter was used to reduce the measurement instrumentation noise floor for the frequency ranges below 20MHz. A high pass filter was used to reduce the measurement instrumentation noise floor for the frequency ranges above 6GHz. The total measurement RF path loss of the test setup (attenuators, low pass filter, high pass filter and test cables) as shown in the table is accounted for by the spectrum analyzer reference level offset. The display line on the plots reflects the required limit. Conducted spurious emission plots/measurements are provided in the following pages.

Single GMSK Carrier at PCS Mid Ch (1960MHz) with Single LTE1.4 Carrier at AWS Mid Ch (2155MHz):

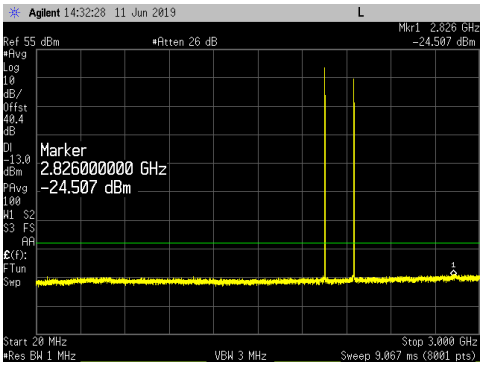
9kHz to 150kHz



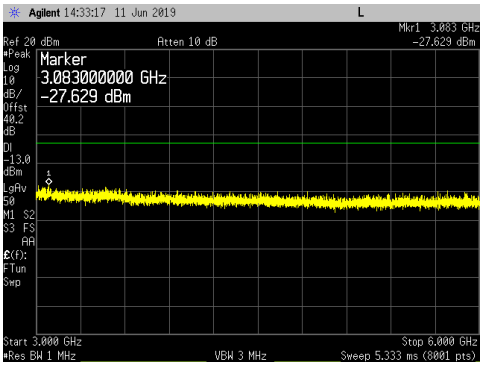
150kHz to 20MHz



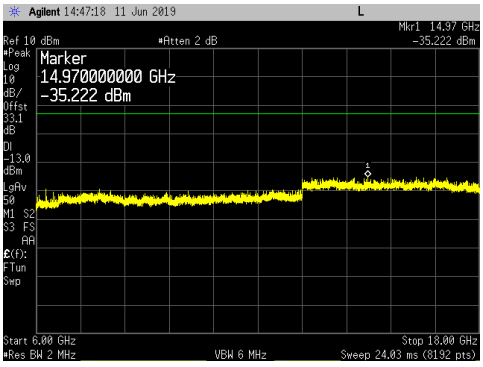
20MHz to 3GHz



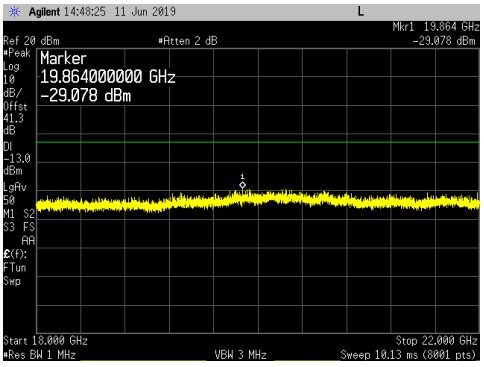
3GHz to 6GHz



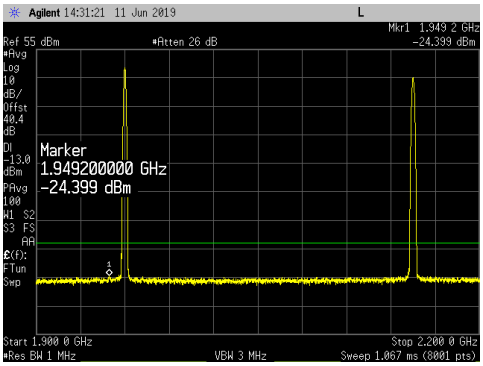
6GHz to 18GHz



18GHz to 22GHz

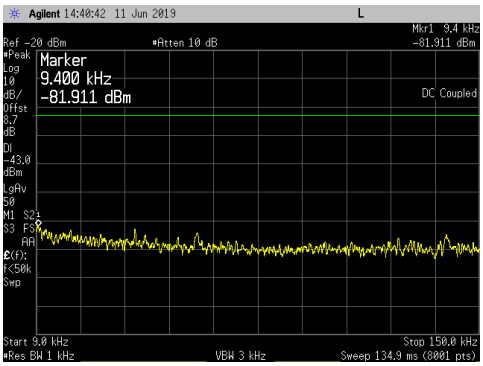


1900MHz to 2200MHz

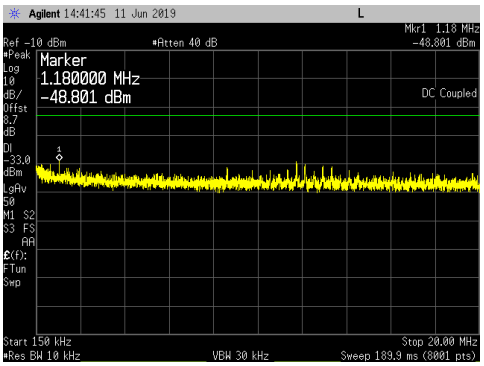


Single 8PSK Carrier at PCS Mid Ch (1960MHz) with Single LTE1.4 Carrier at AWS Mid Ch (2155MHz):

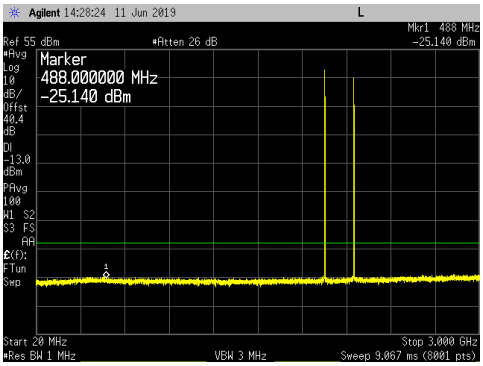
9kHz to 150kHz



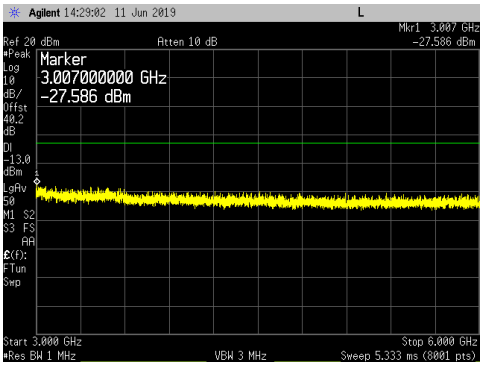
150kHz to 20MHz



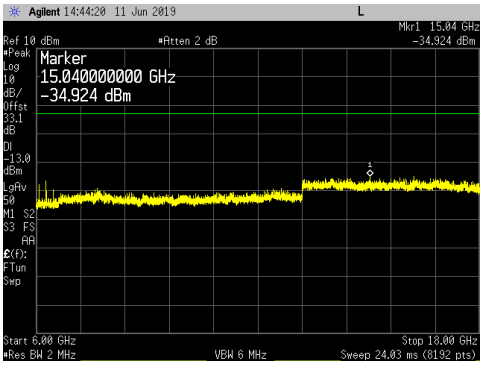
20MHz to 3GHz



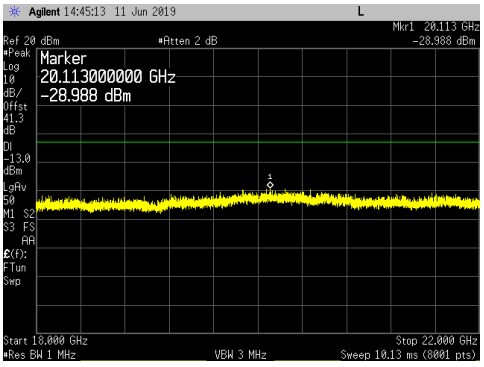
3GHz to 6GHz



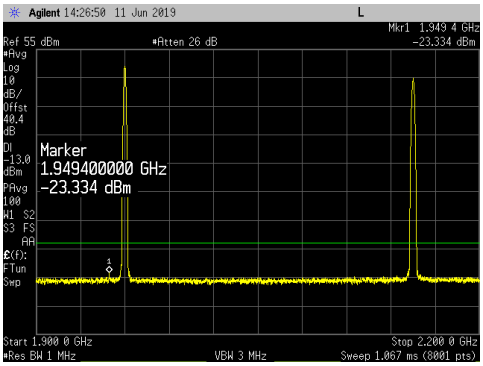
6GHz to 18GHz



18GHz to 22GHz

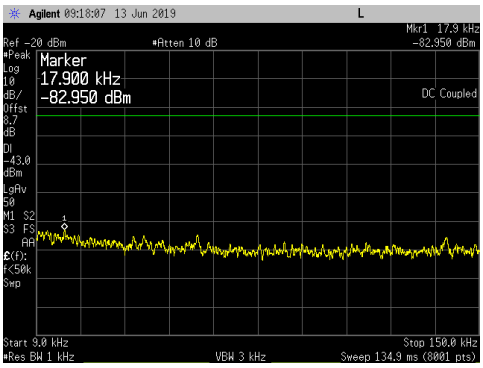


1900MHz to 2200MHz

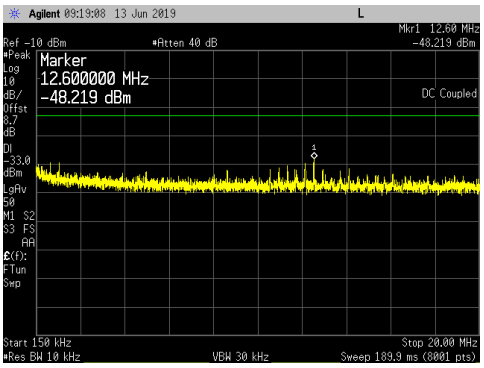


Three GMSK Carriers at BCs (1930.4 and 1930.8MHz) and at Max Spacing (1967.4MHz) with Single LTE1.4 Carrier at AWS Mid Ch (2155MHz):

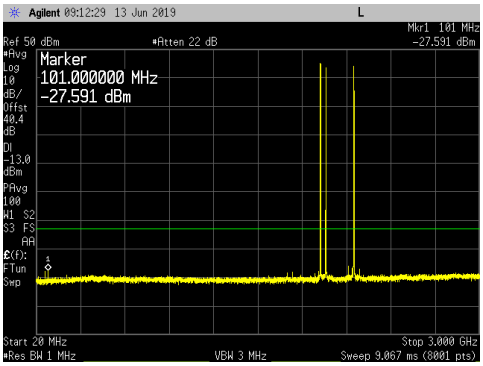
9kHz to 150kHz



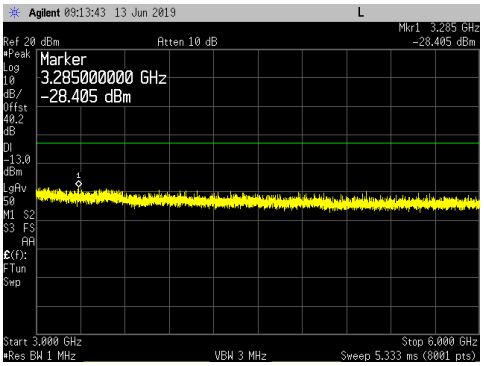
150kHz to 20MHz



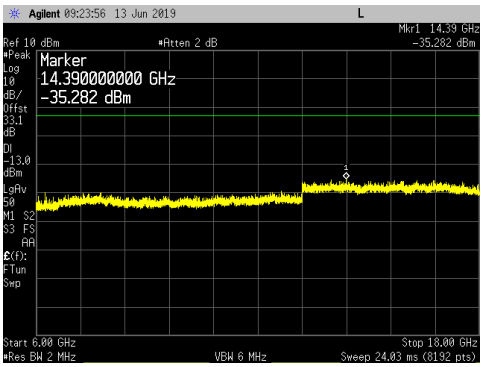
20MHz to 3GHz



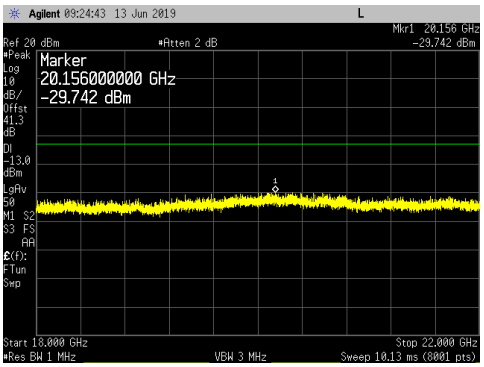
3GHz to 6GHz



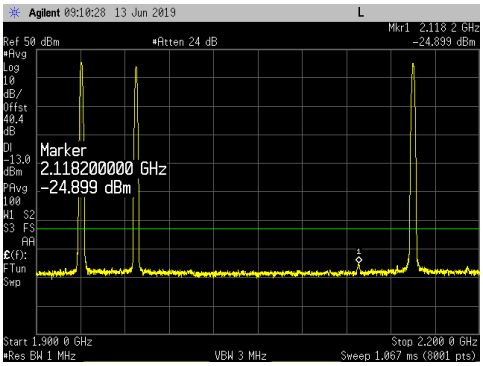
6GHz to 18GHz



18GHz to 22GHz

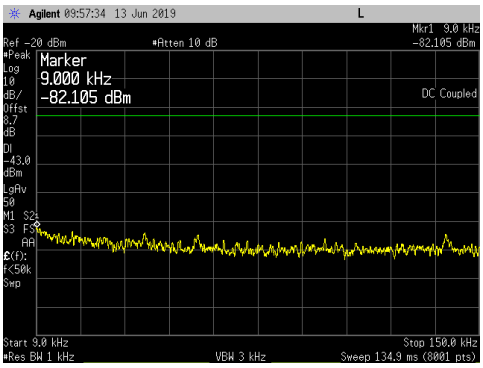


1900MHz to 2200MHz

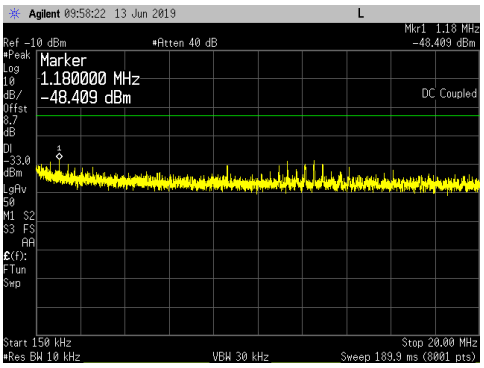


Three 8PSK Carriers at BCs (1930.4 and 1930.8MHz) and at Max Spacing (1967.4MHz) with Single LTE1.4 Carrier at AWS Mid Ch (2155MHz):

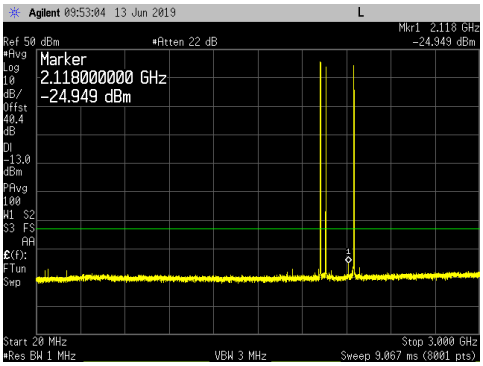
9kHz to 150kHz



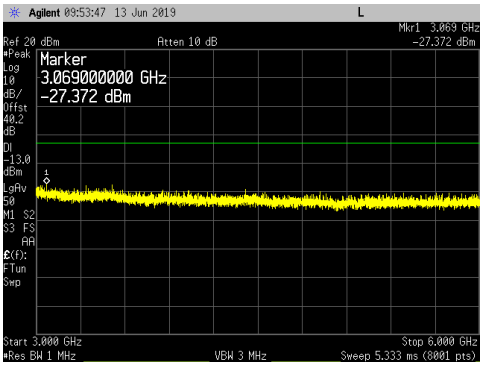
150kHz to 20MHz



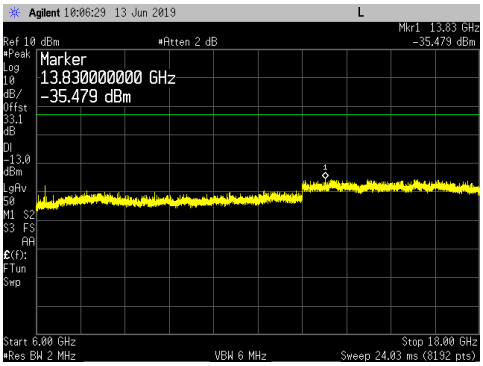
20MHz to 3GHz



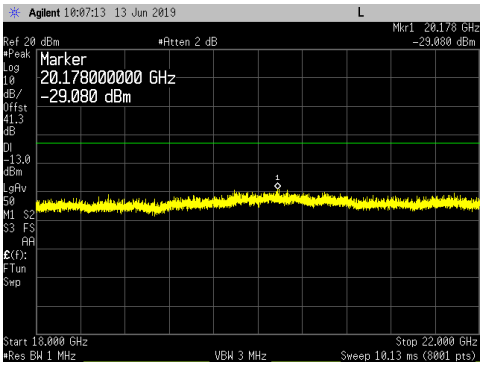
3GHz to 6GHz



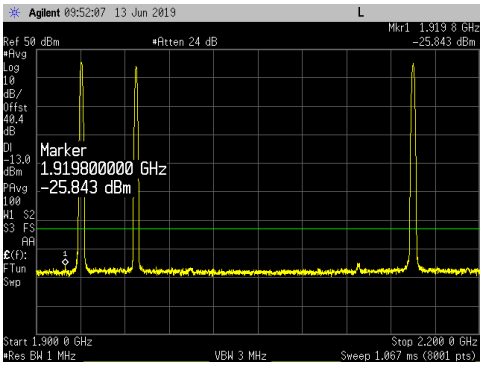
6GHz to 18GHz



18GHz to 22GHz

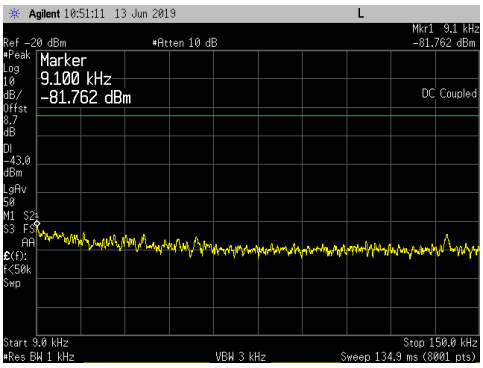


1900MHz to 2200MHz

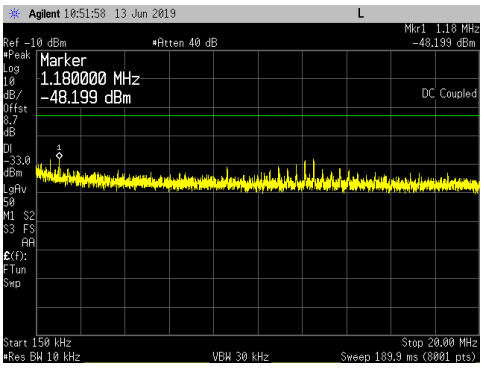


Three GMSK Carriers at TCs (1989.2 and 1989.6MHz) and at Max Spacing (1952.6MHz) with Single LTE1.4 Carrier at AWS Mid Ch (2155MHz):

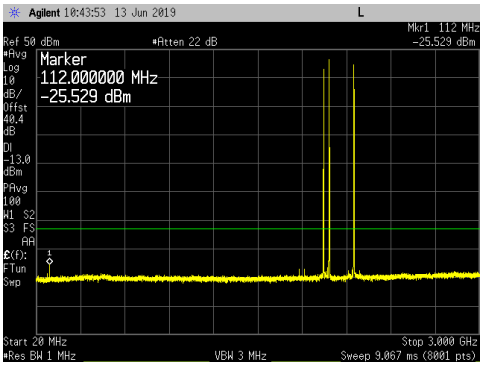
9kHz to 150kHz



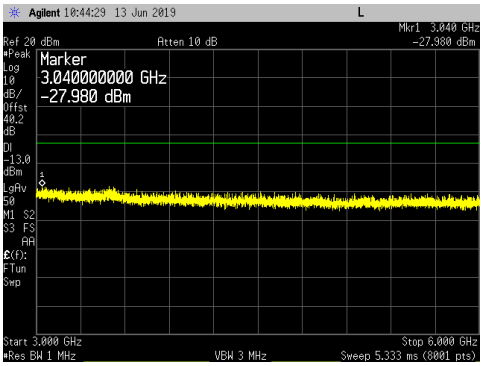
150kHz to 20MHz



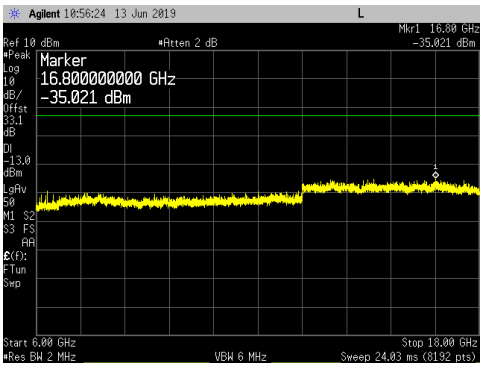
20MHz to 3GHz



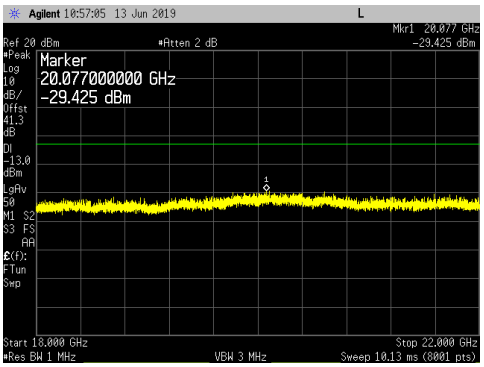
3GHz to 6GHz



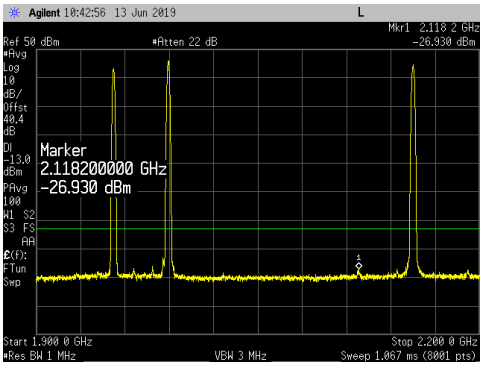
6GHz to 18GHz



18GHz to 22GHz

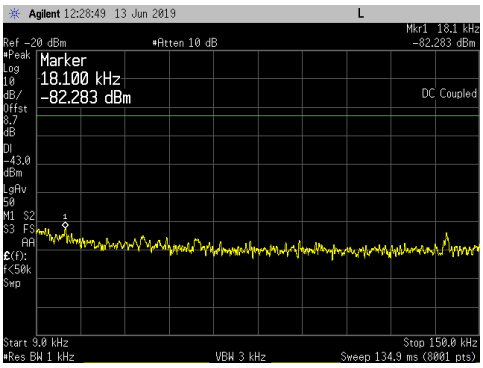


1900MHz to 2200MHz

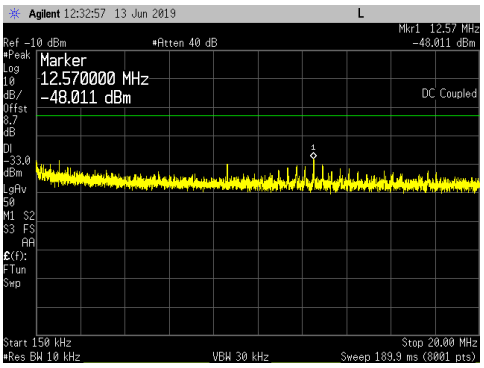


Three 8PSK Carriers at TCs (1989.2 and 1989.6MHz) and at Max Spacing (1952.6MHz) with Single LTE1.4 Carrier at AWS Mid Ch (2155MHz):

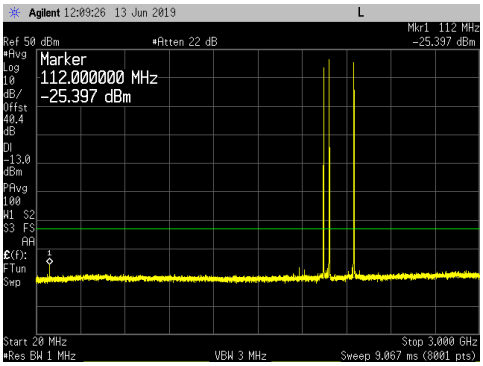
9kHz to 150kHz



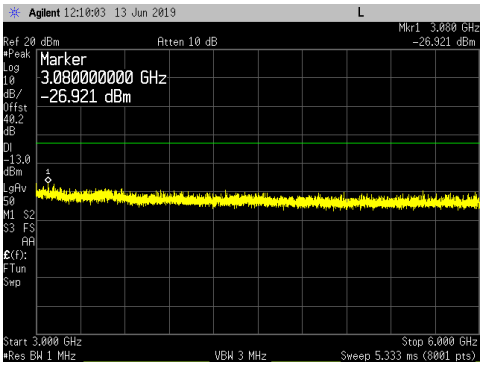
150kHz to 20MHz



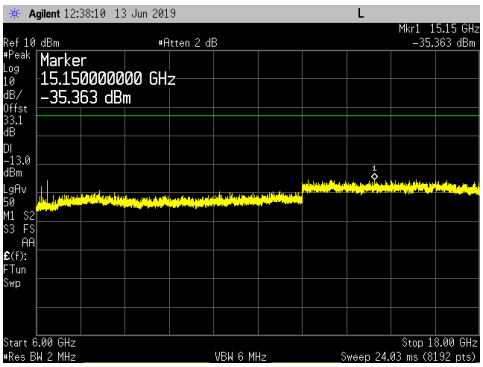
20MHz to 3GHz



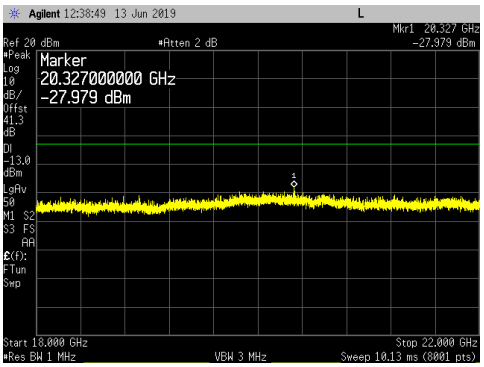
3GHz to 6GHz



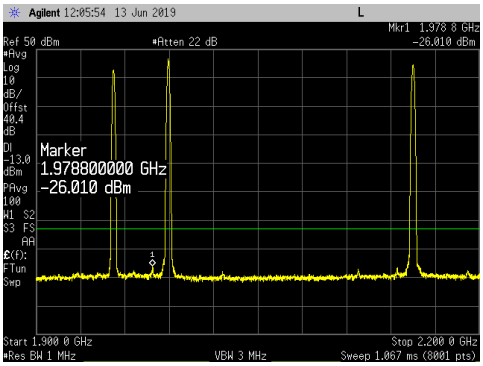
6GHz to 18GHz



18GHz to 22GHz



1900MHz to 2200MHz



Transmitter Radiated Spurious Emissions

Radiated emission measurement results are in Appendix A.

Frequency Stability/Accuracy

Frequency Stability/Accuracy measurement results are in Appendix A.

END OF REPORT