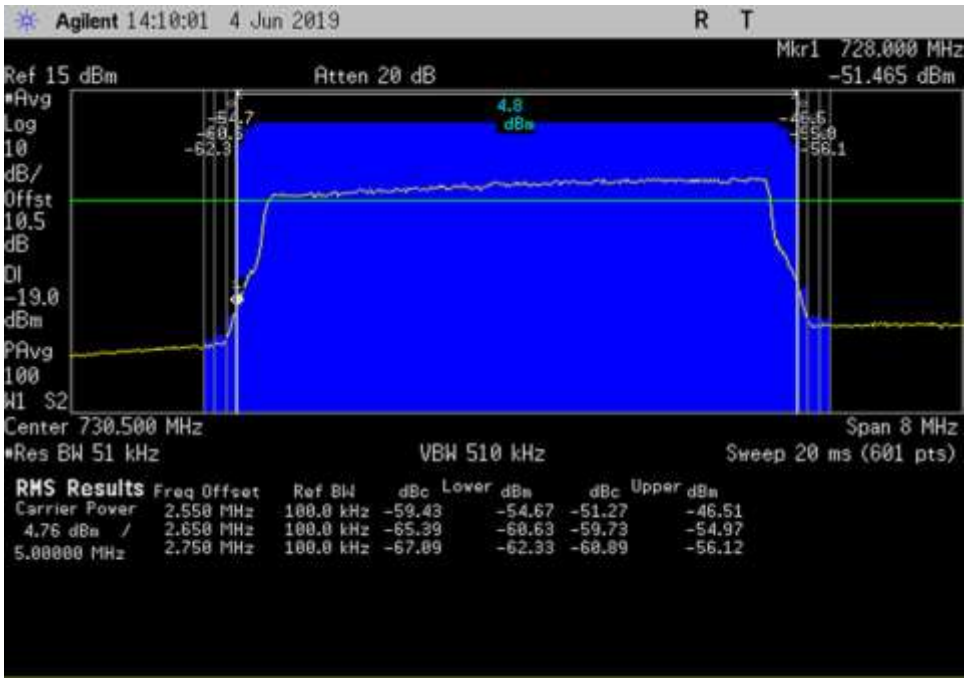
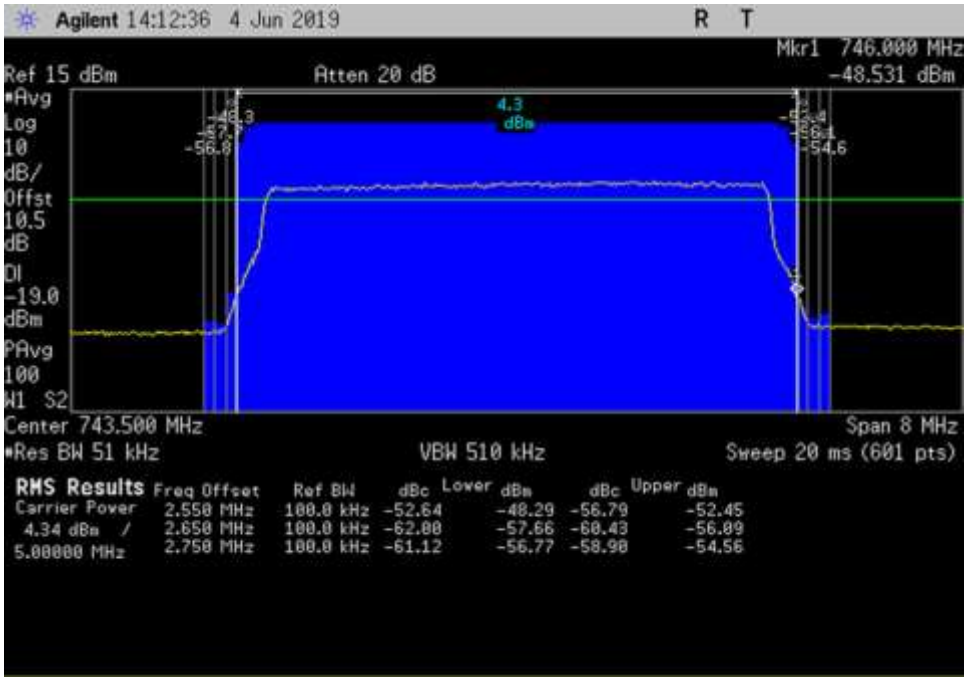
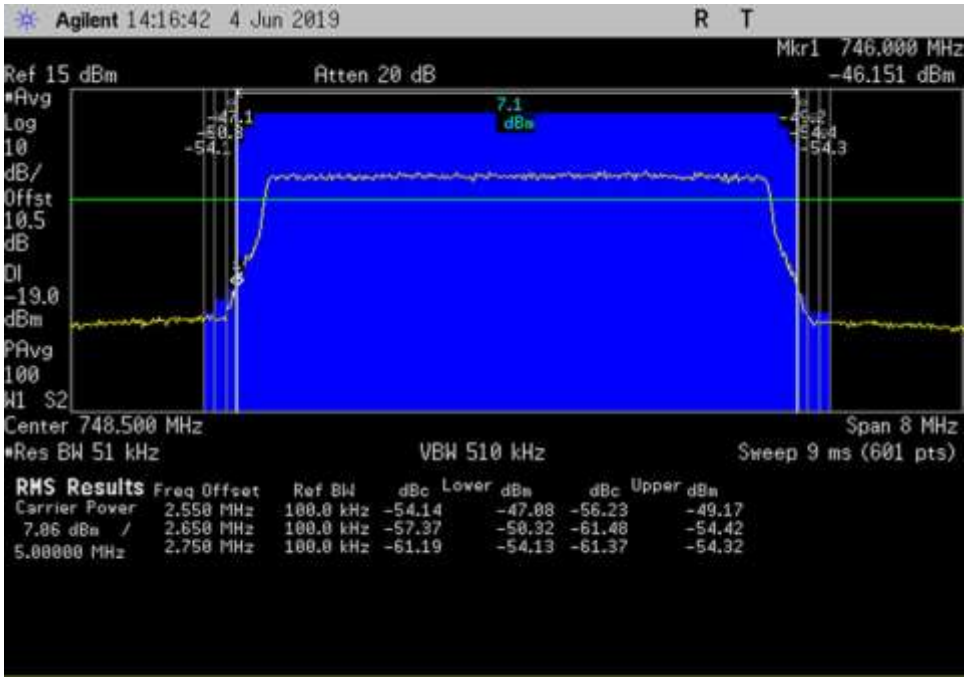


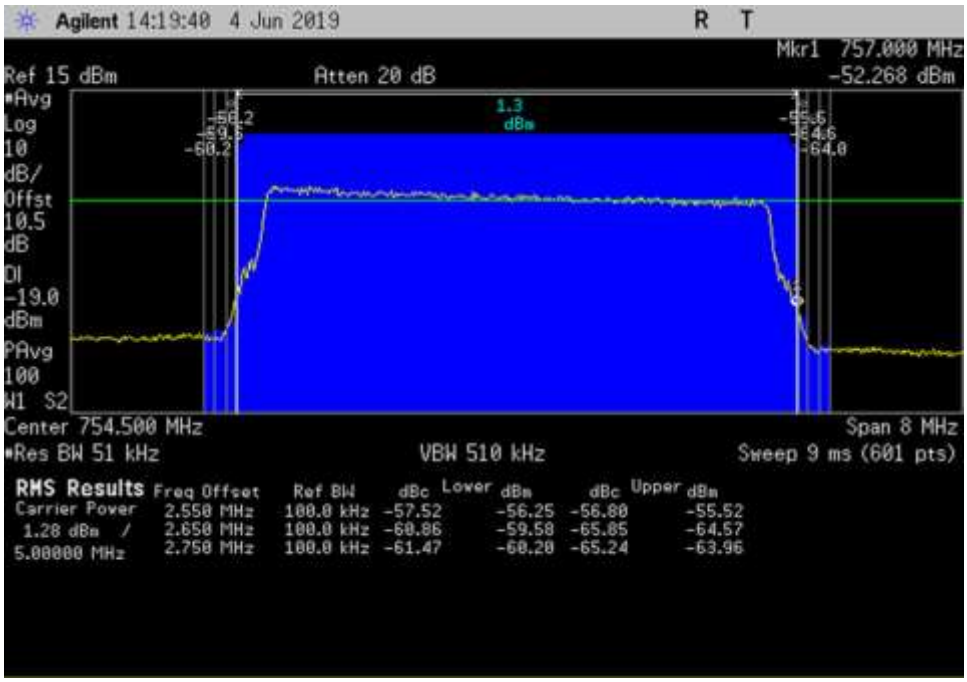
DL_728-746_LTE_ 726.5- 734.5MHz_50ft Cable



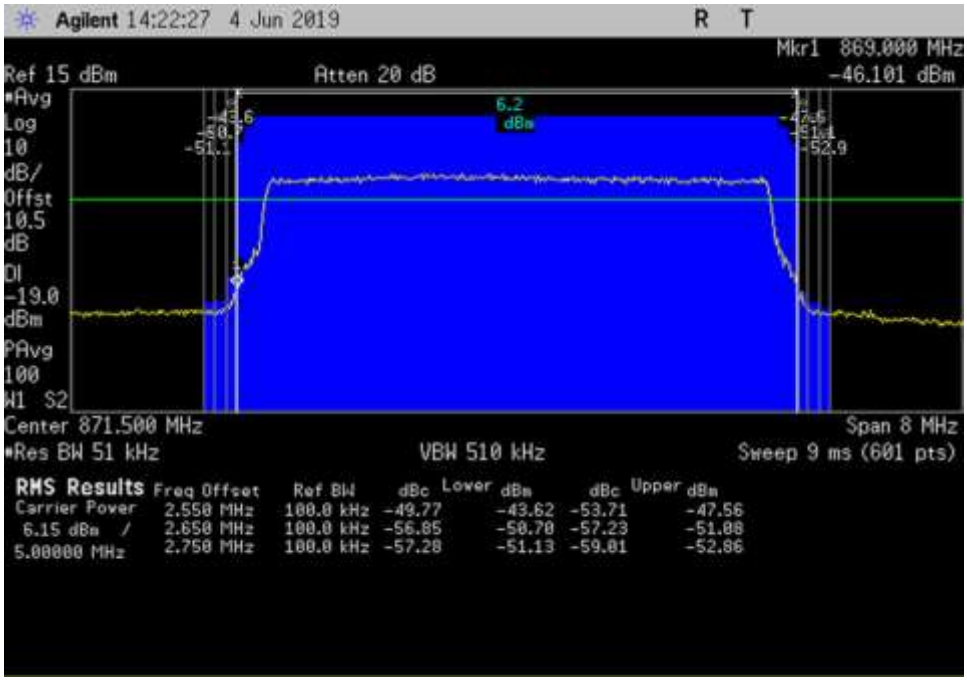
DL_728-746_LTE_ 739.5- 747.5MHz_50ft Cable



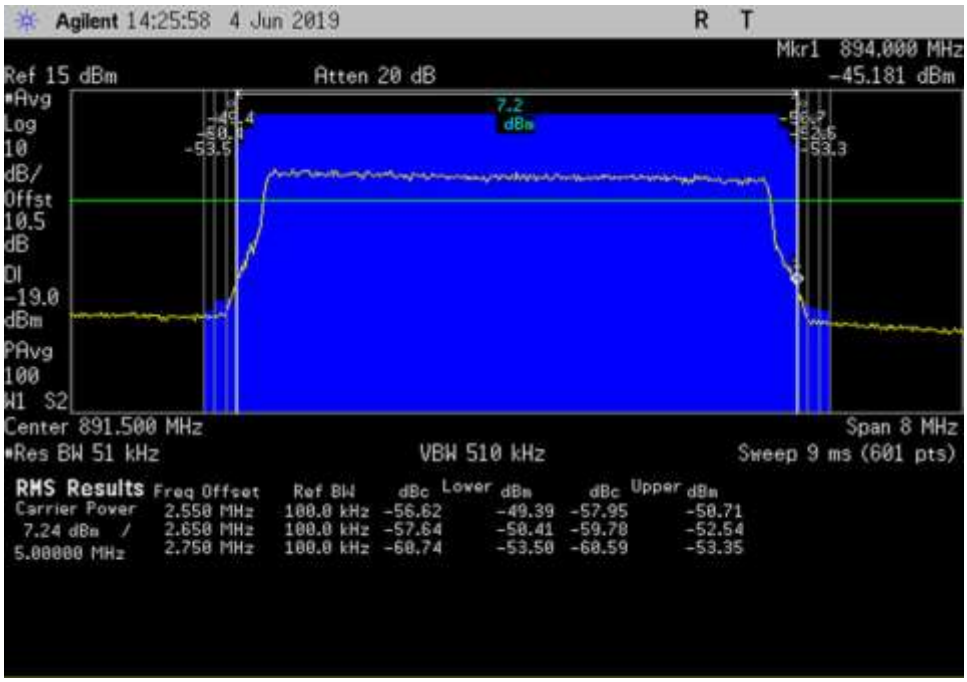
DL_746-757_LTE_ 744.5- 752.5MHz_50ft Cable



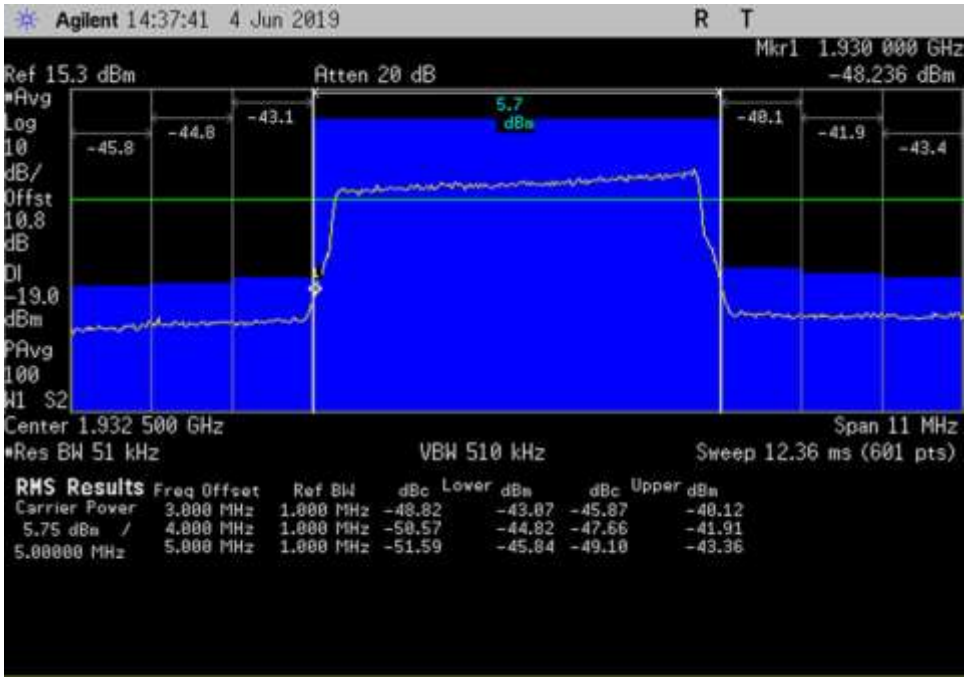
DL_746-757_LTE_ 750.5- 758.5MHz_50ft Cable



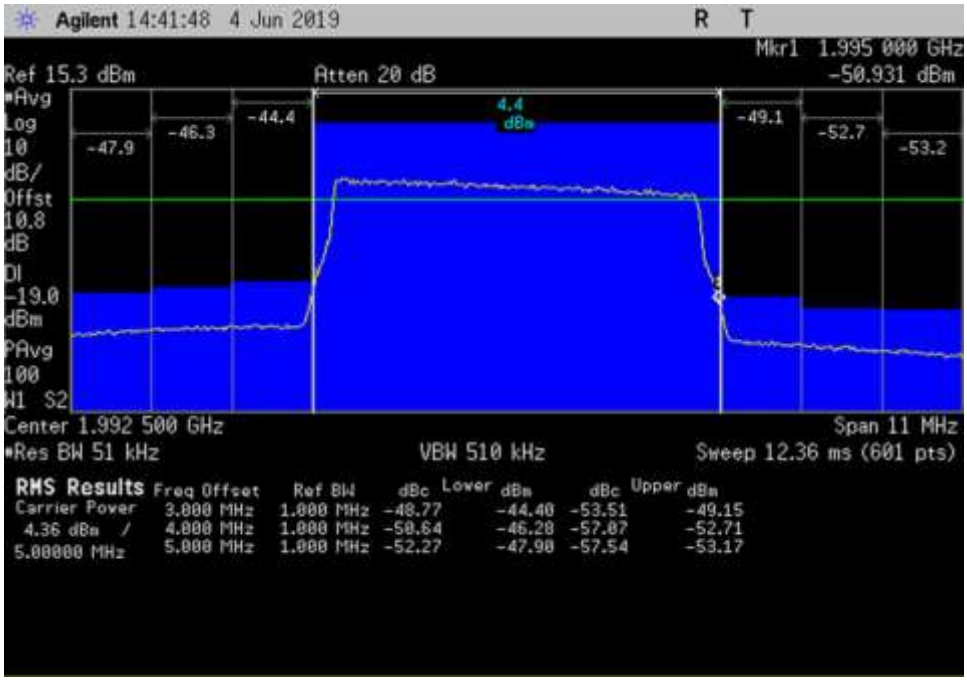
DL_869-894_LTE_ 867.5- 875.5MHz_50ft Cable



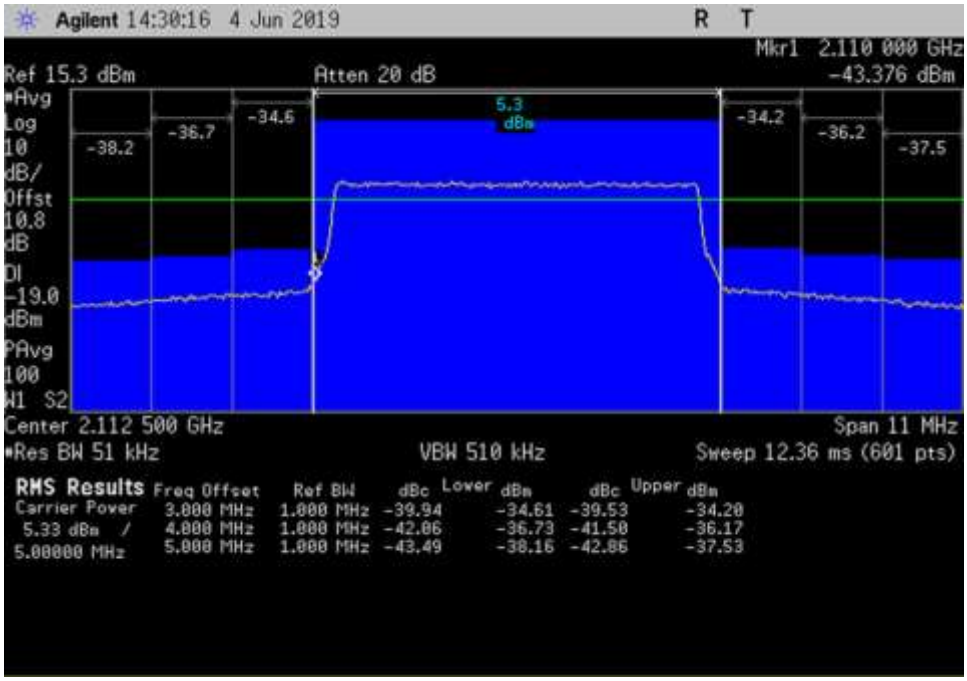
DL_869-894_LTE_ 887.5- 895.5MHz_50ft Cable



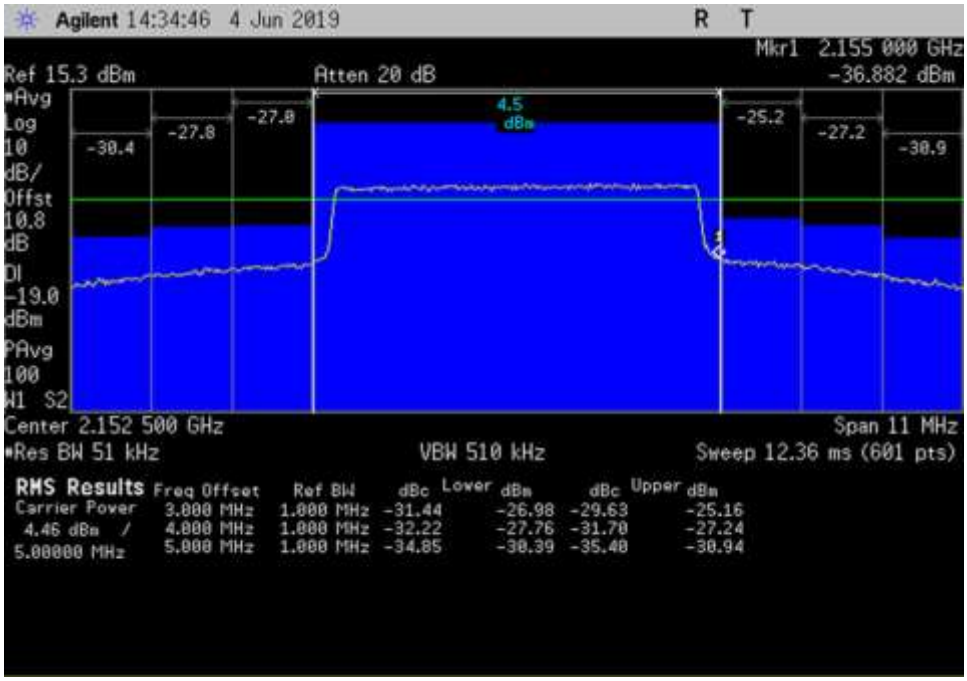
DL_1930-1995_LTE_ 1927- 1938MHz_50ft Cable



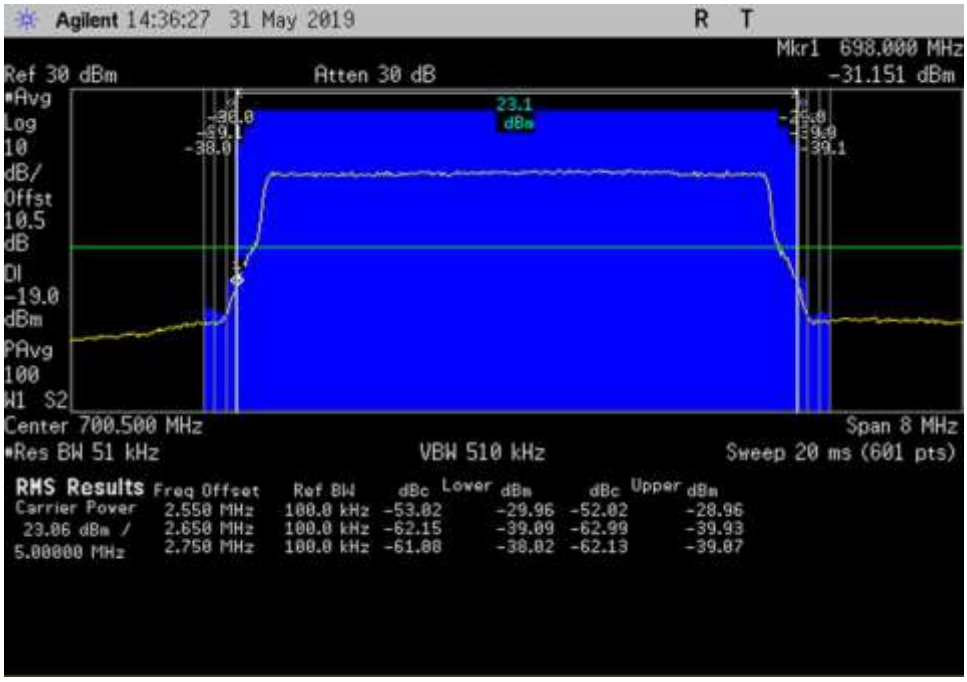
DL_1930-1995_LTE_ 1987- 1998MHz_50ft Cable



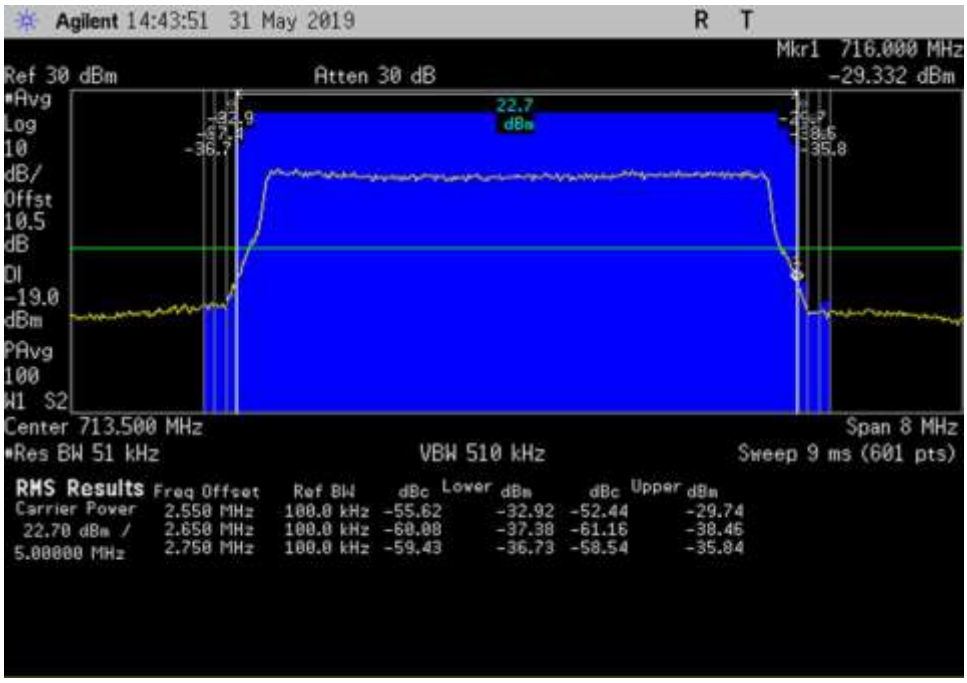
DL_2110-2155_LTE_ 2107- 2118MHz_50ft Cable



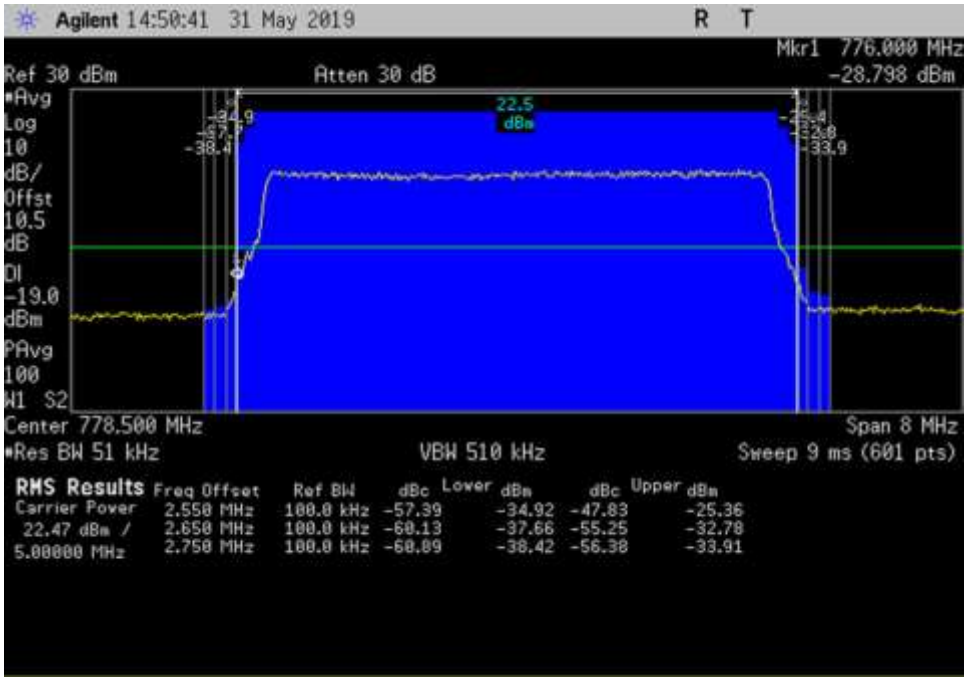
DL_2110-2155_LTE_ 2147- 2158MHz_50ft Cable



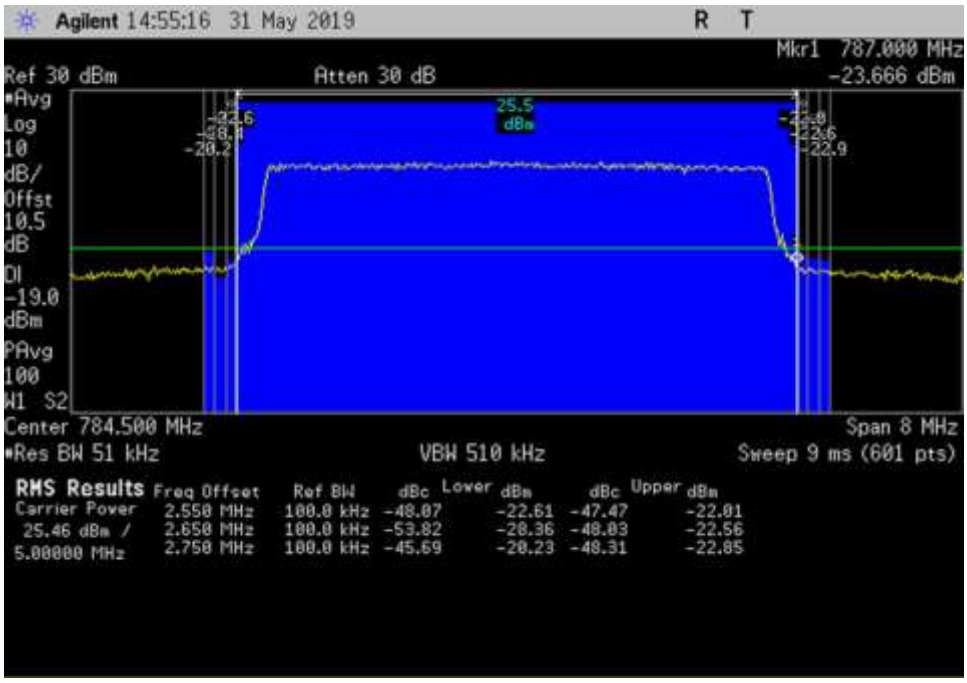
UL_698-716_LTE_ 696.5- 704.5MHz_100ft Cable



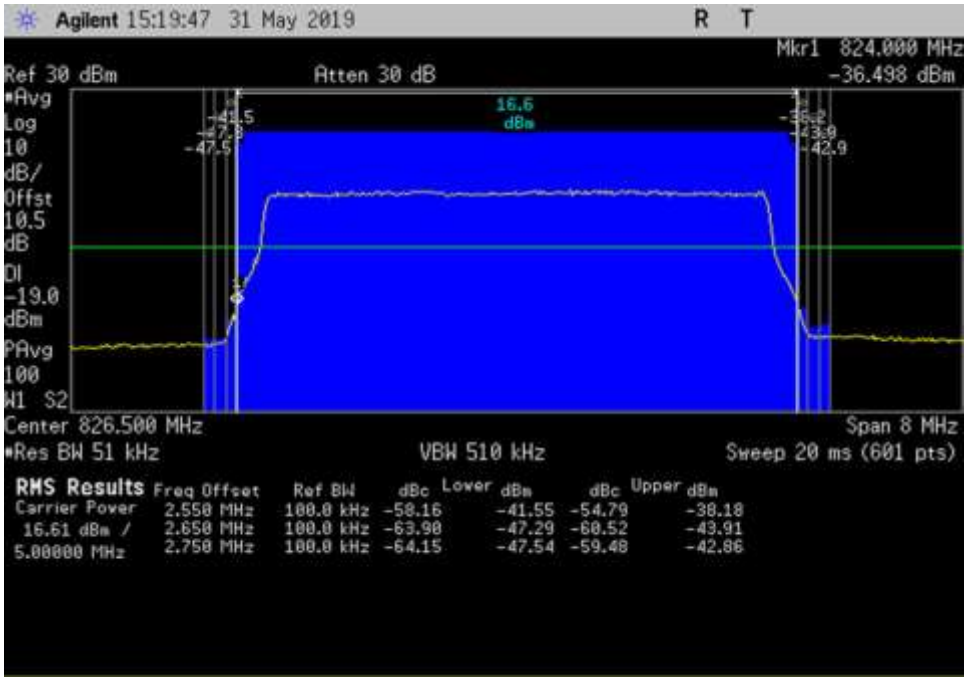
UL_698-716_LTE_ 709.5- 717.5MHz_100ft Cable



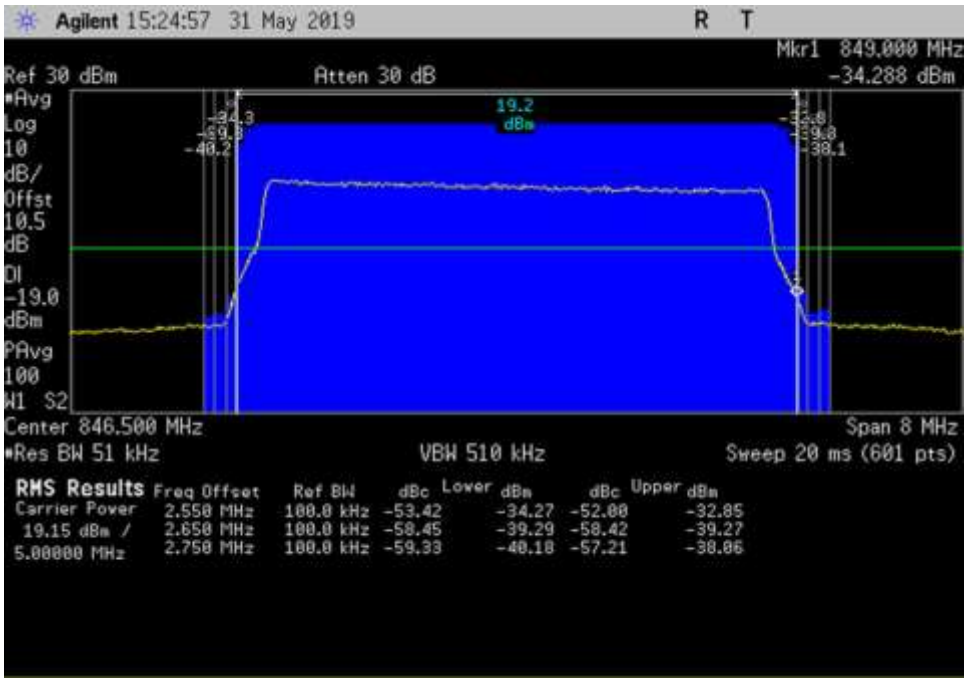
UL_776-787_LTE_ 774.5- 782.5MHz_100ft Cable



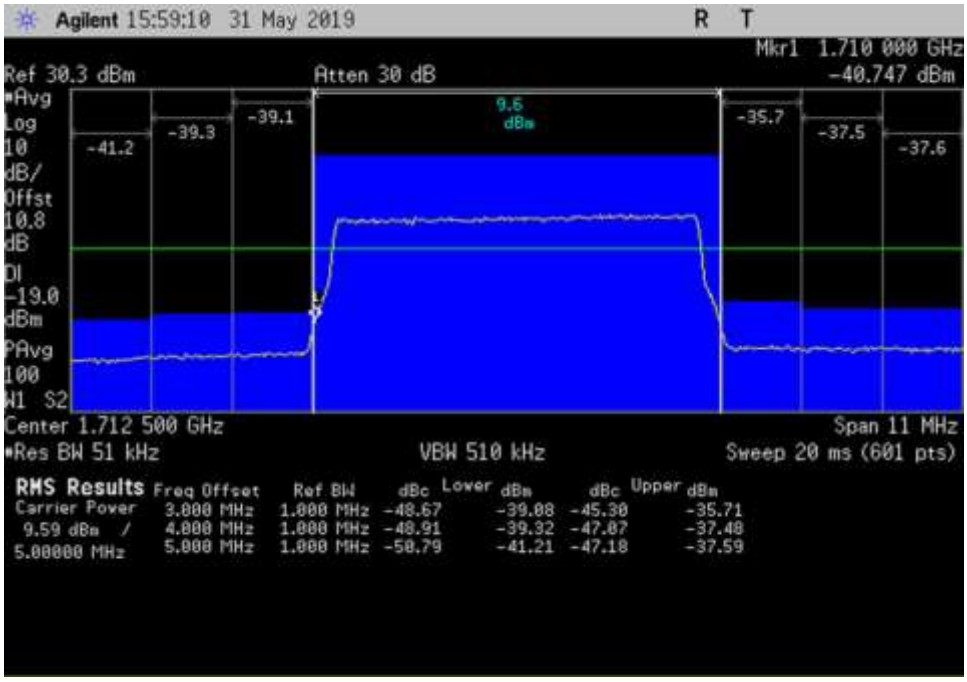
UL_776-787_LTE_ 780.5- 788.5MHz_100ft Cable



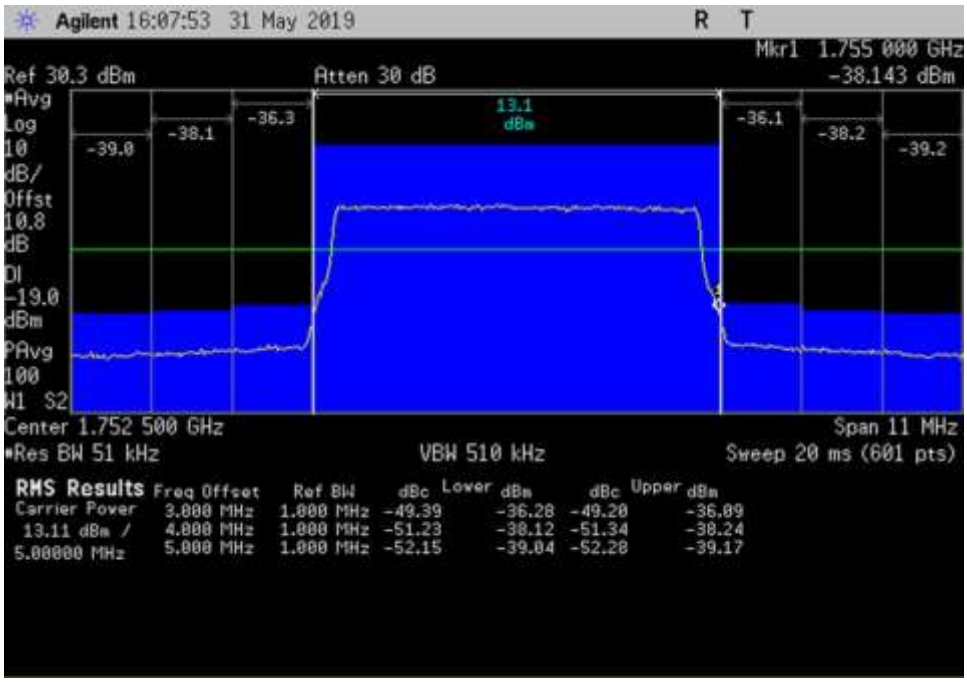
UL_824-849_LTE_ 822.5- 830.5MHz_100ft Cable



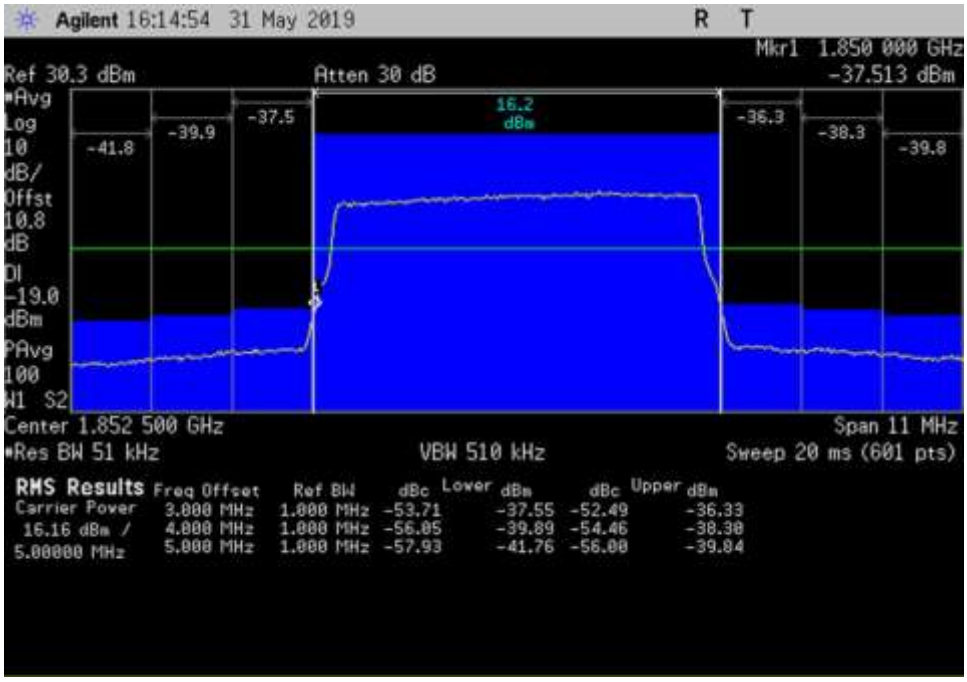
UL_824-849_LTE_ 842.5- 850.5MHz_100ft Cable



UL_1710-1755_LTE_ 1707- 1718MHz_100ft Cable

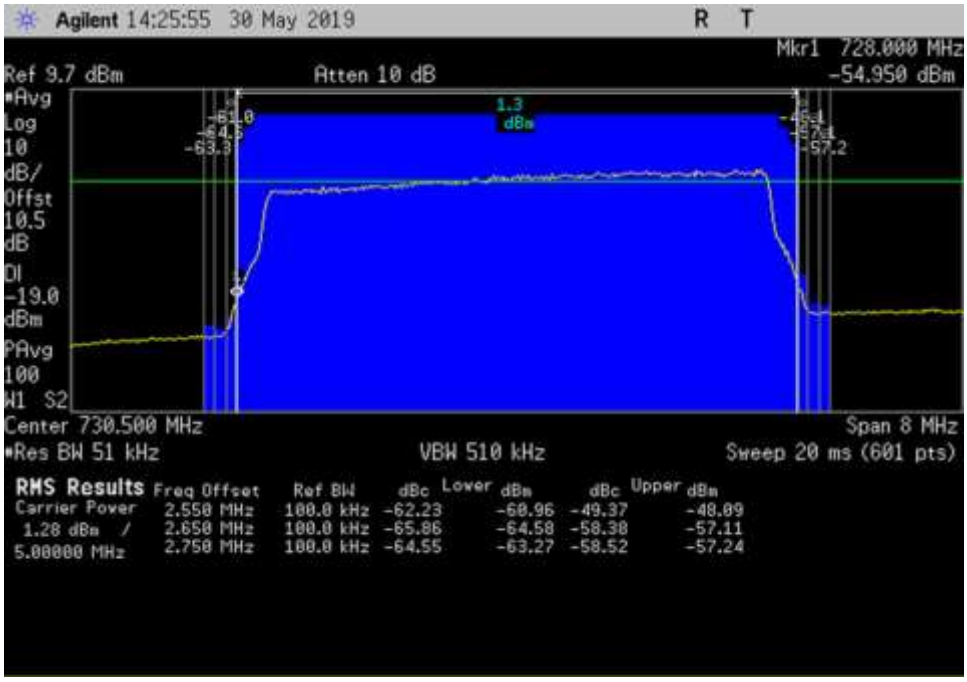


UL_1710-1755_LTE_ 1747- 1758MHz_100ft Cable

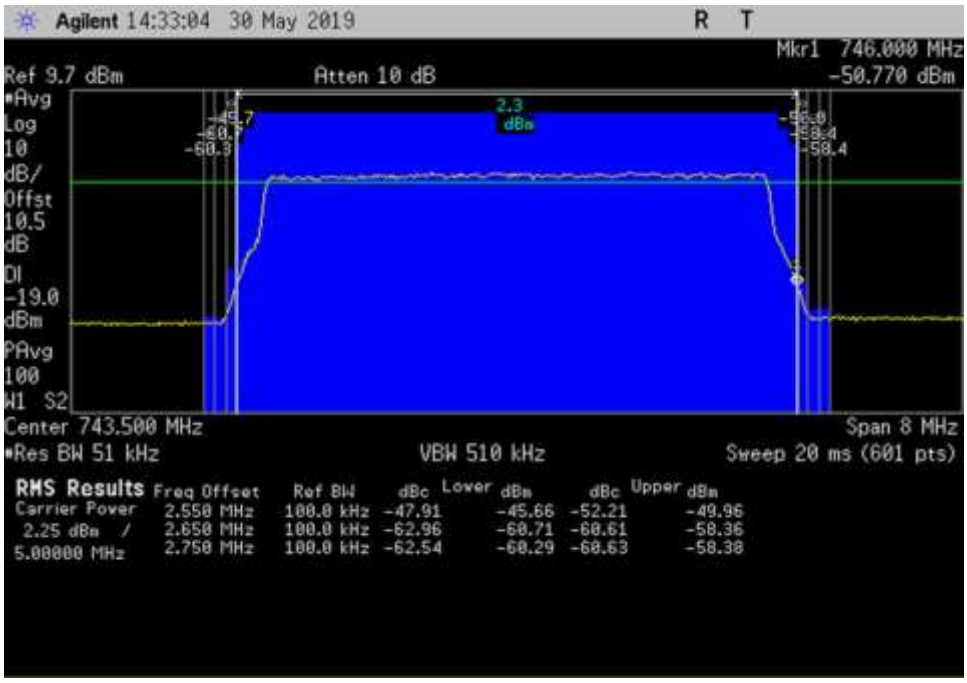


UL_1850-1915_LTE_ 1847- 1858MHz_100ft Cable

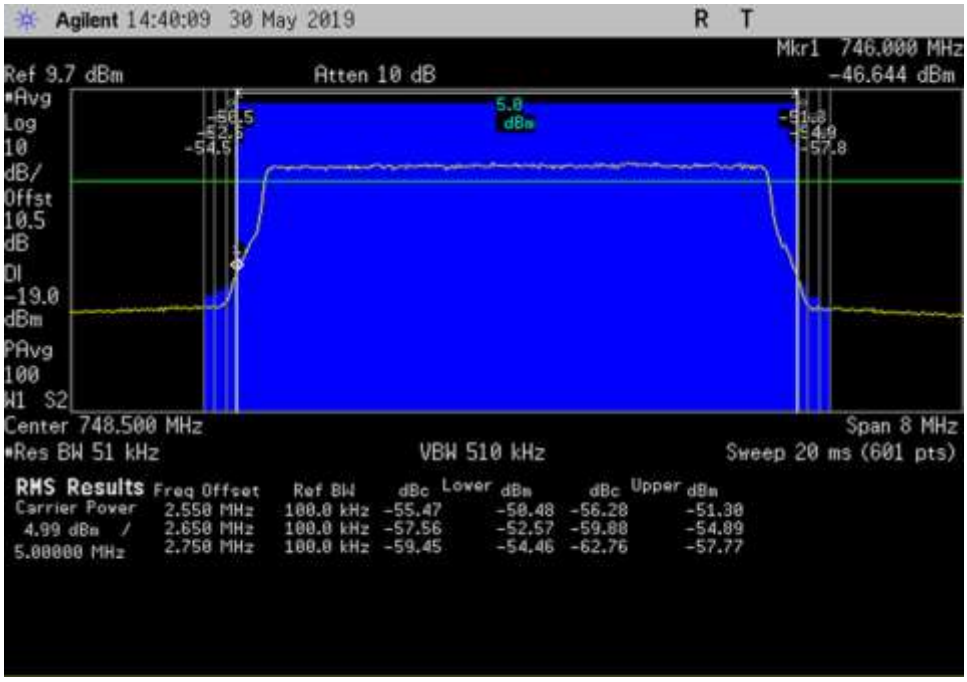
UL_1850-1915_LTE_ 1907- 1918MHz_100ft Cable



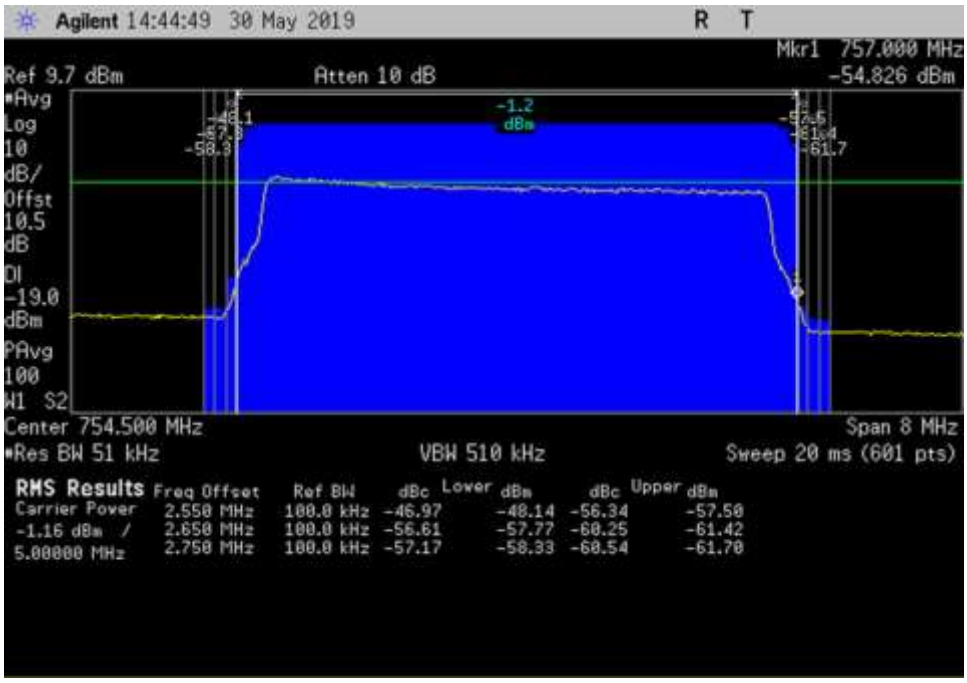
DL_728-746_LTE_ 726.5- 734.5MHz_100ft Cable



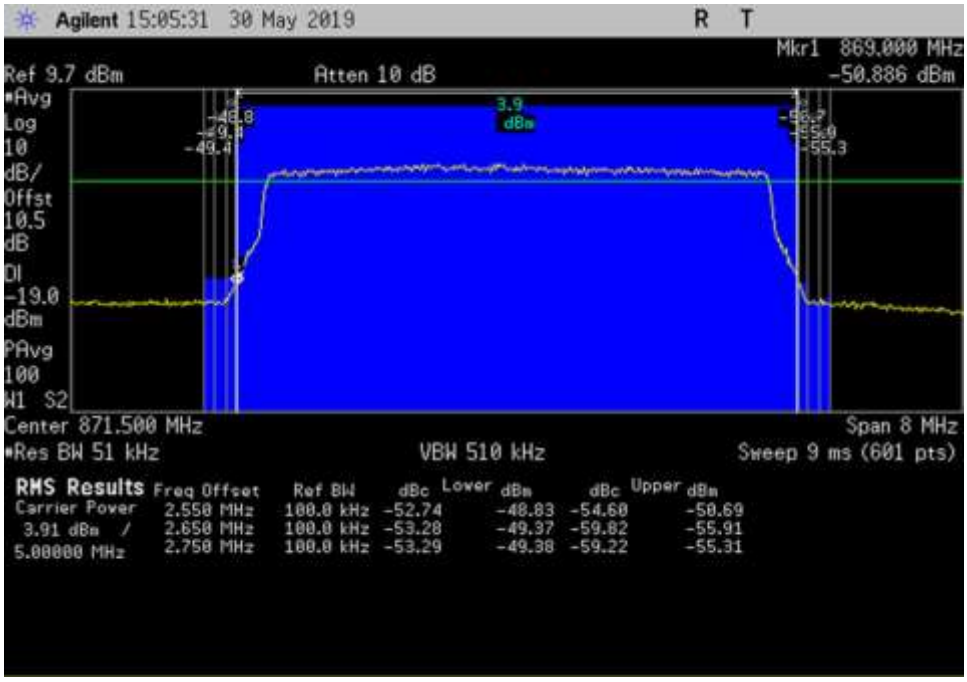
DL_728-746_LTE_ 739.5- 747.5MHz_100ft Cable



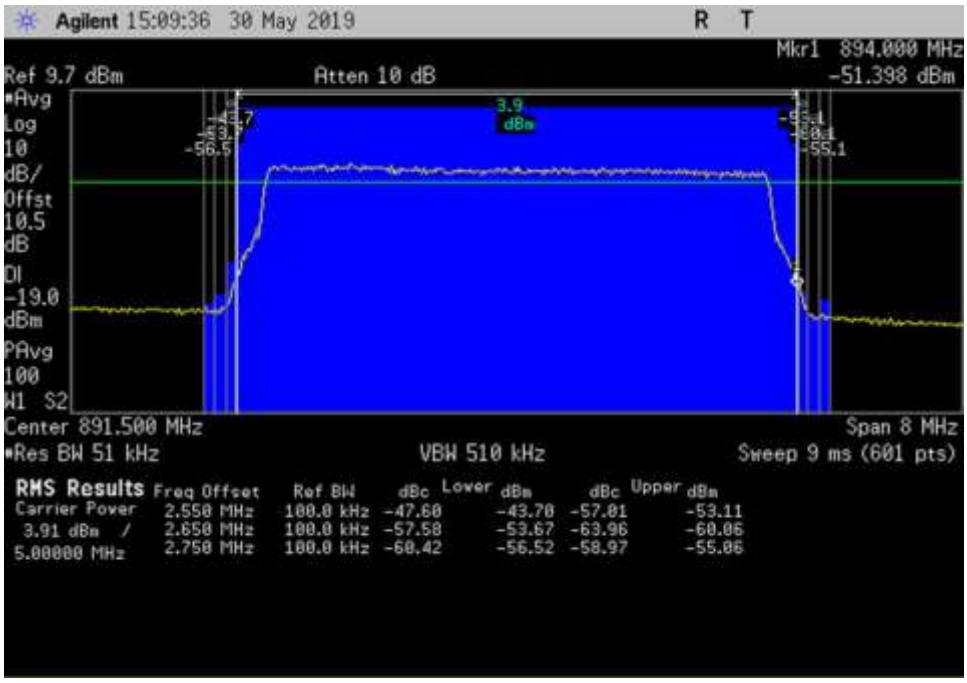
DL_746-757_LTE_ 744.5- 752.5MHz_100ft Cable



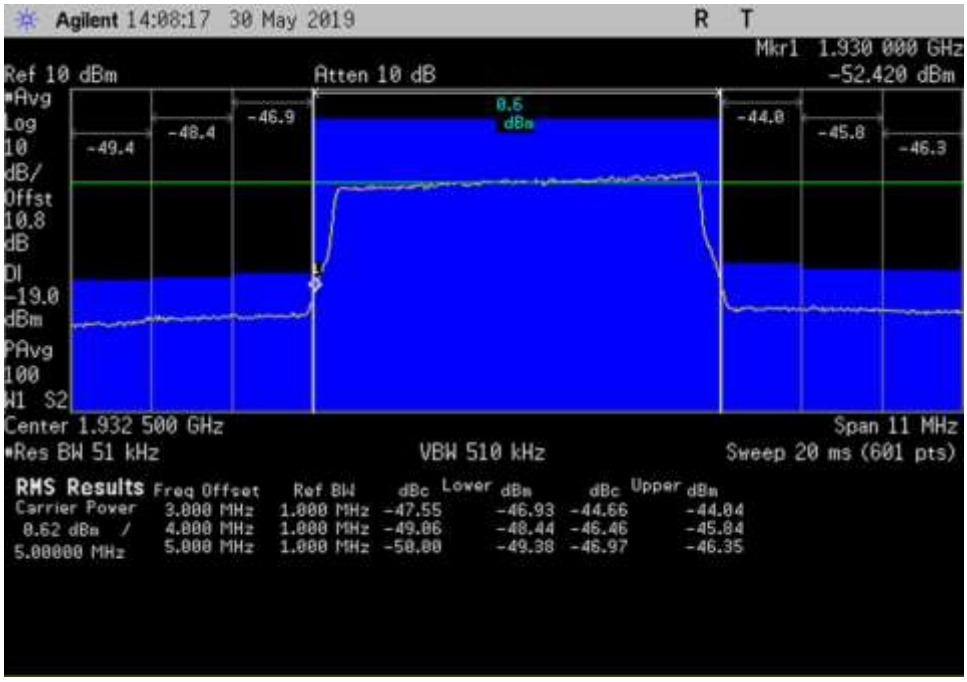
DL_746-757_LTE_ 750.5- 758.5MHz_100ft Cable



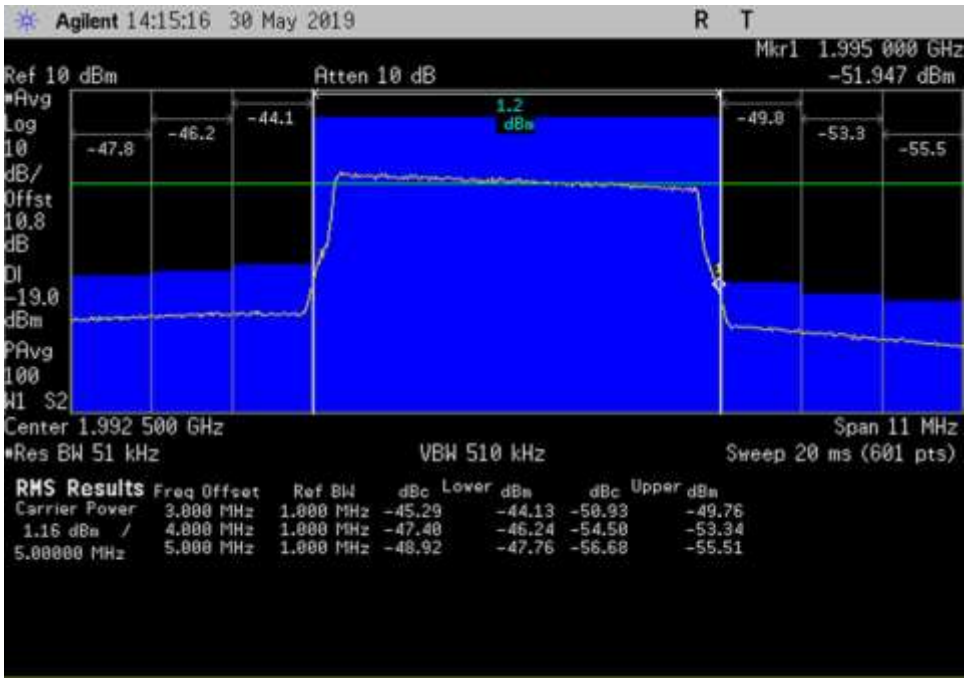
DL_869-894_LTE_ 867.5- 875.5MHz_100ft Cable



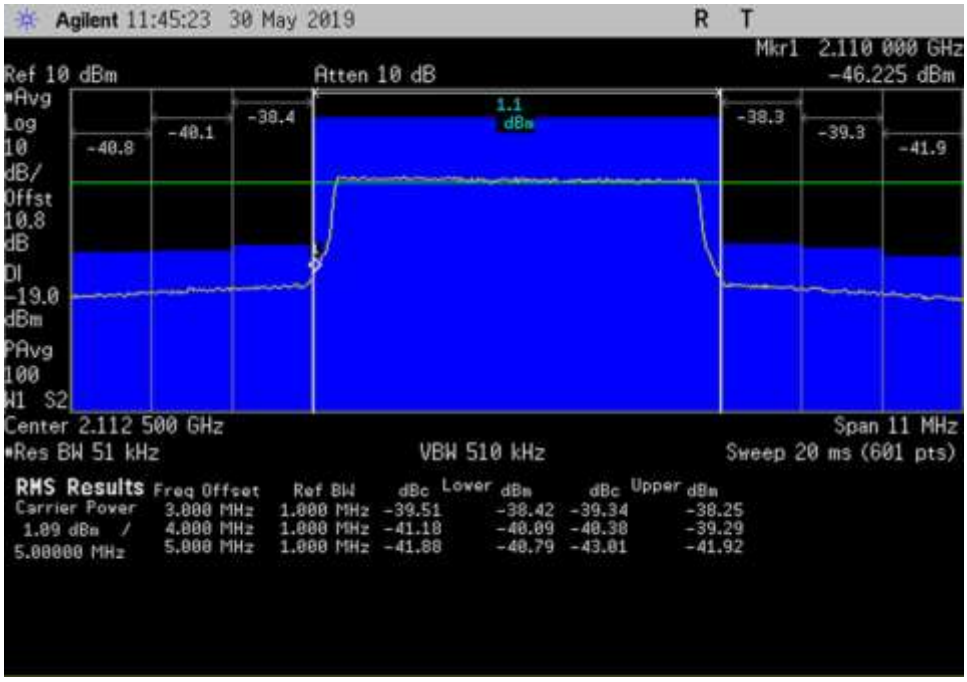
DL_869-894_LTE_ 887.5- 895.5MHz_100ft Cable



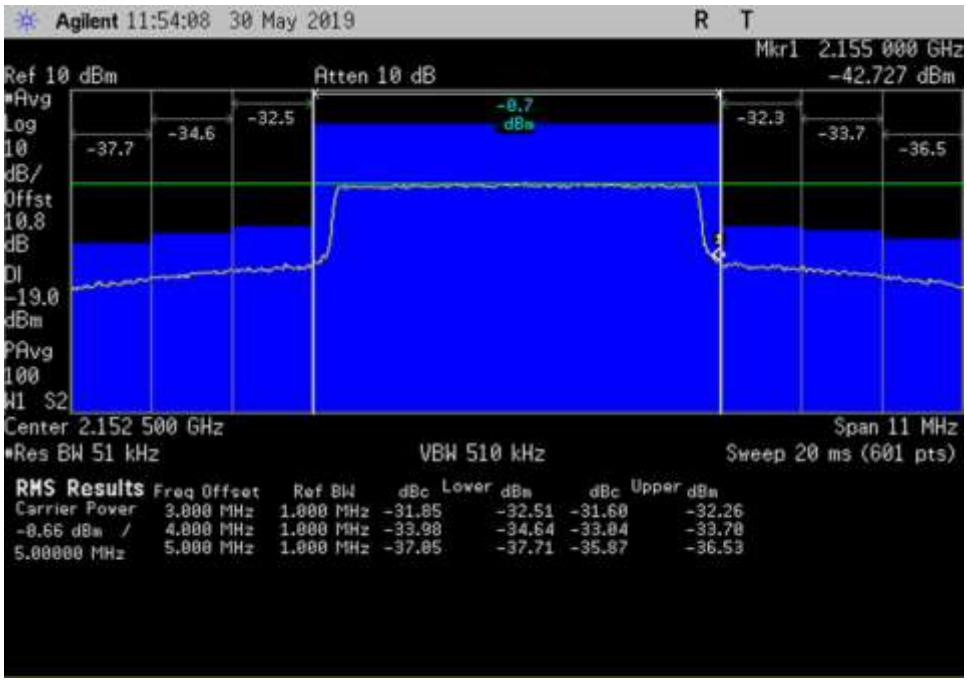
DL_1930-1995_LTE_ 1927- 1938MHz_100ft Cable



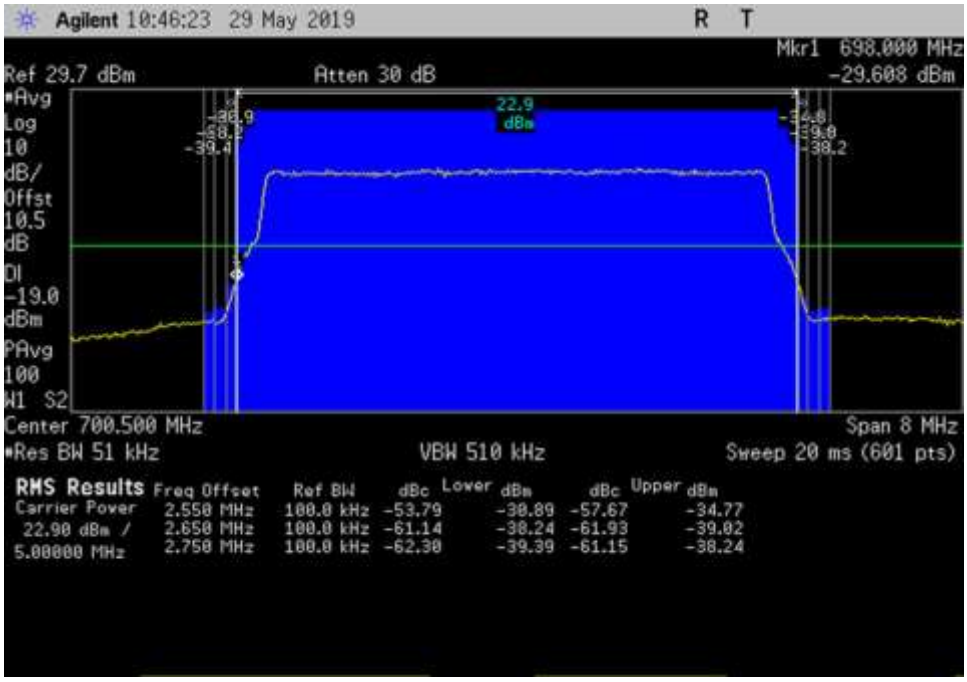
DL_1930-1995_LTE_ 1987- 1998MHz_100ft Cable



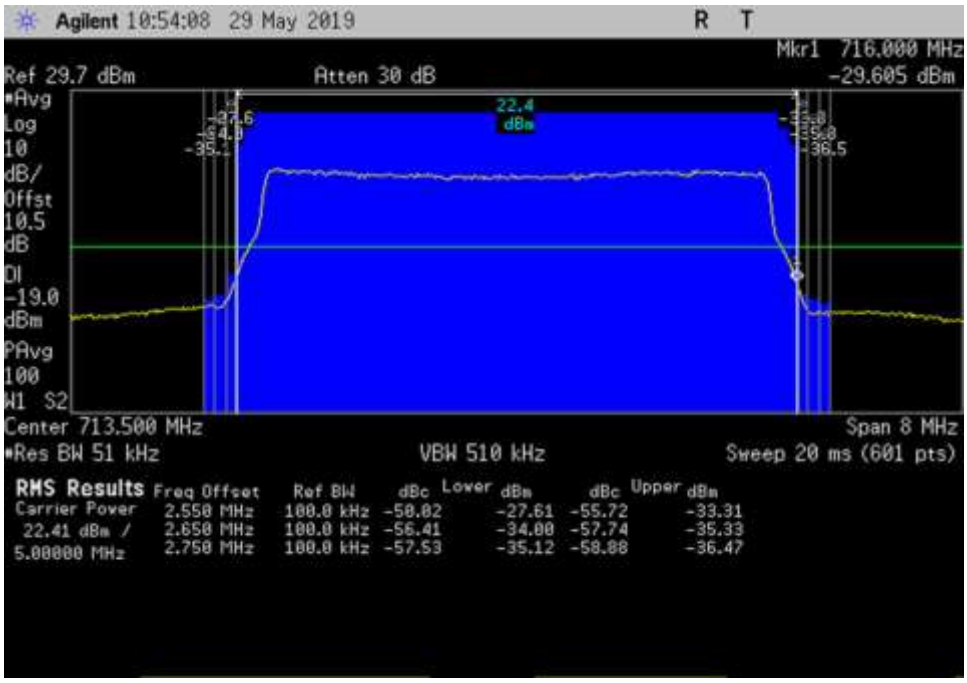
DL_2110-2155_LTE_ 2107- 2118MHz_100ft Cable



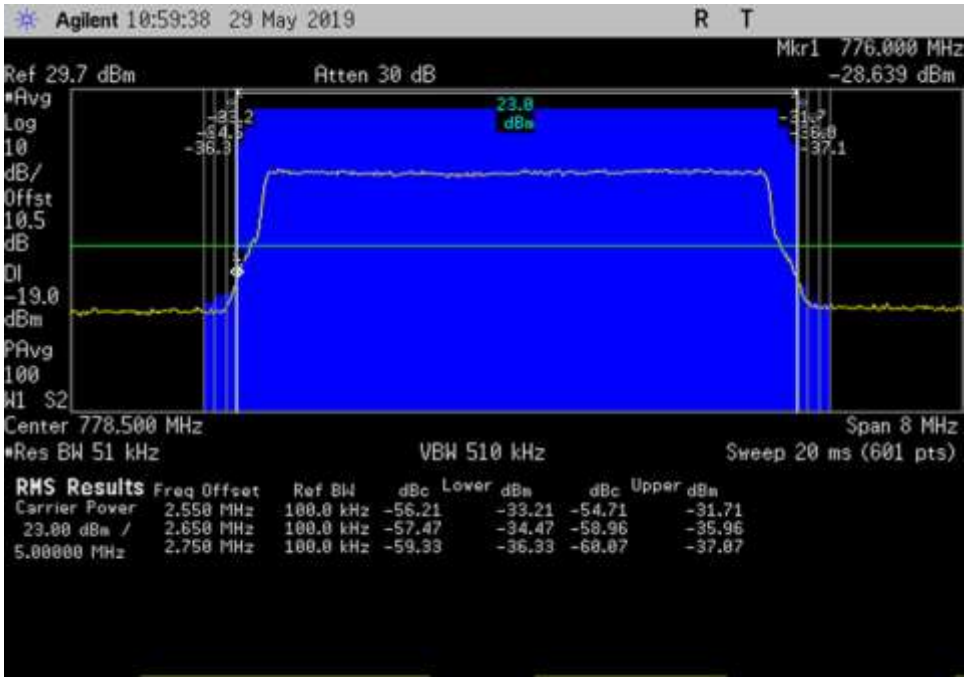
DL_2110-2155_LTE_ 2147- 2158MHz_100ft Cable



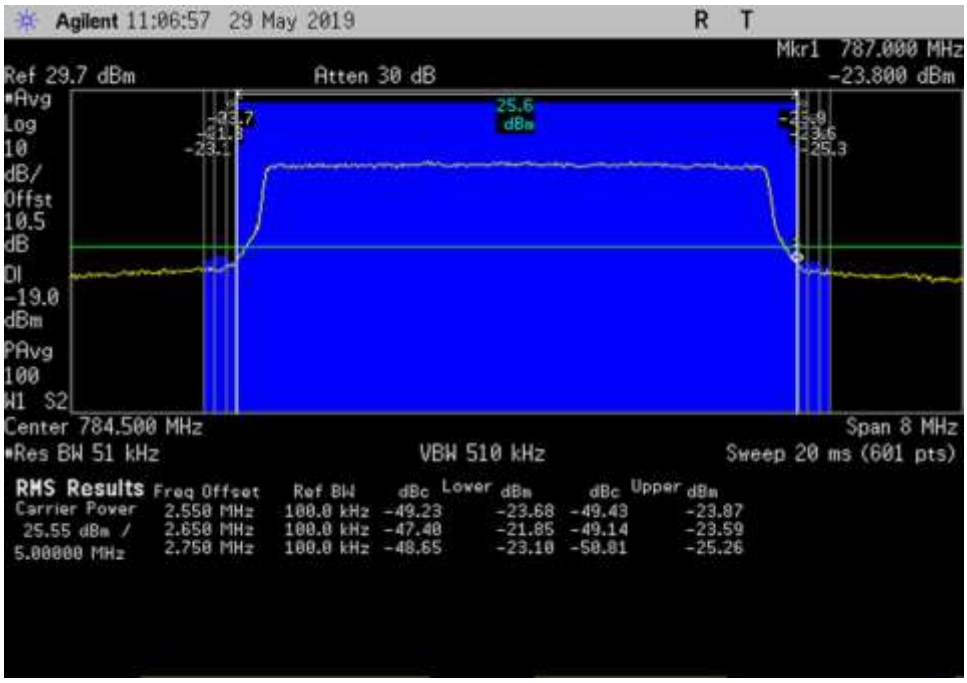
UL_698-716_LTE_ 696.5- 704.5MHz_150ft Cable



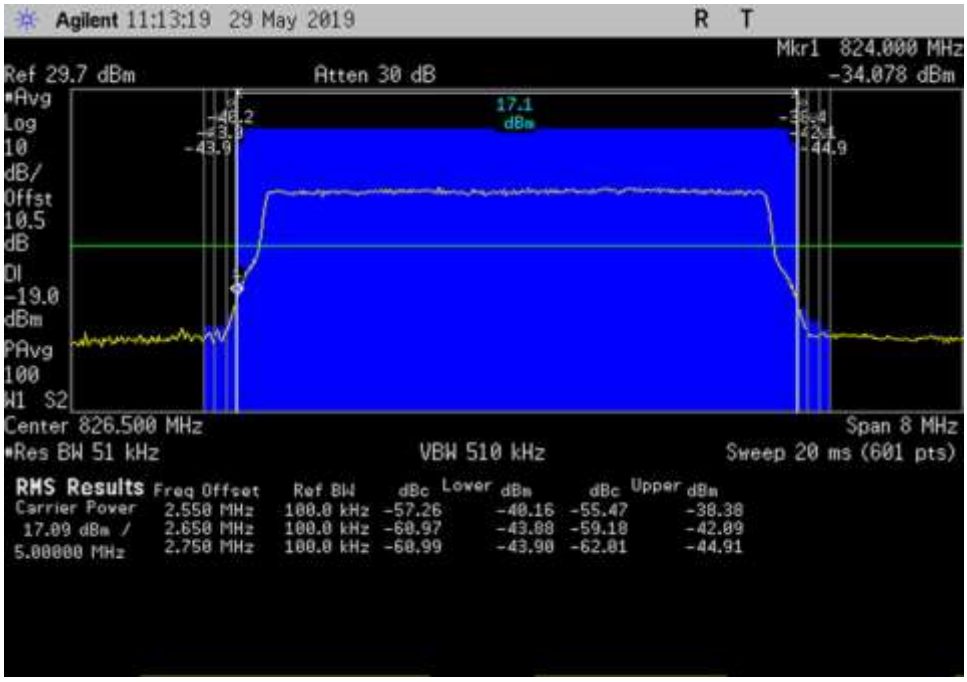
UL_698-716_LTE_ 709.5- 717.5MHz_150ft Cable



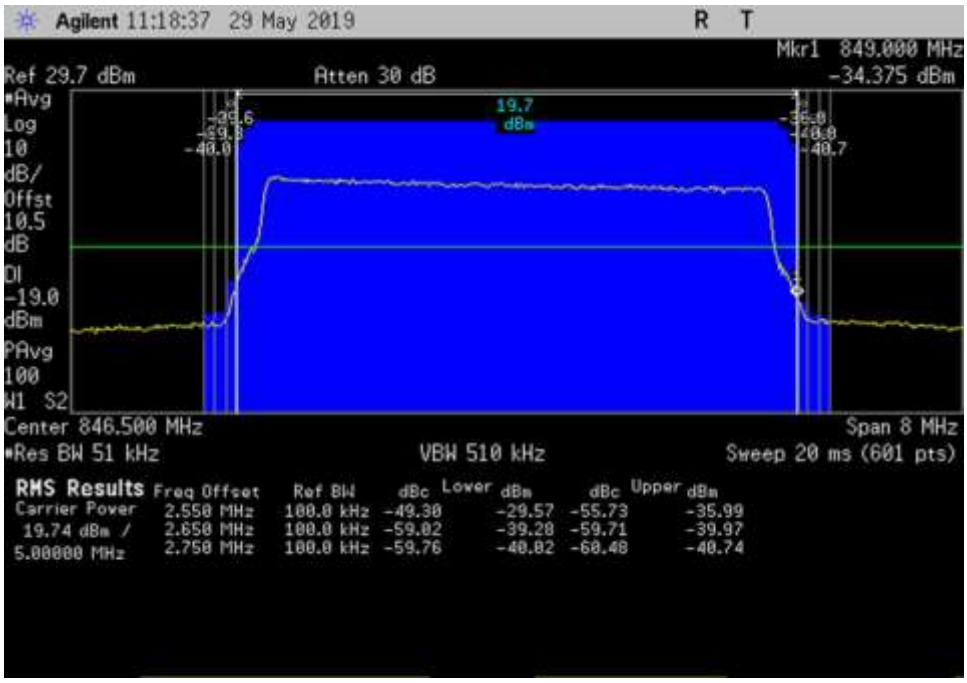
UL_776-787_LTE_ 774.5- 782.5MHz_150ft Cable



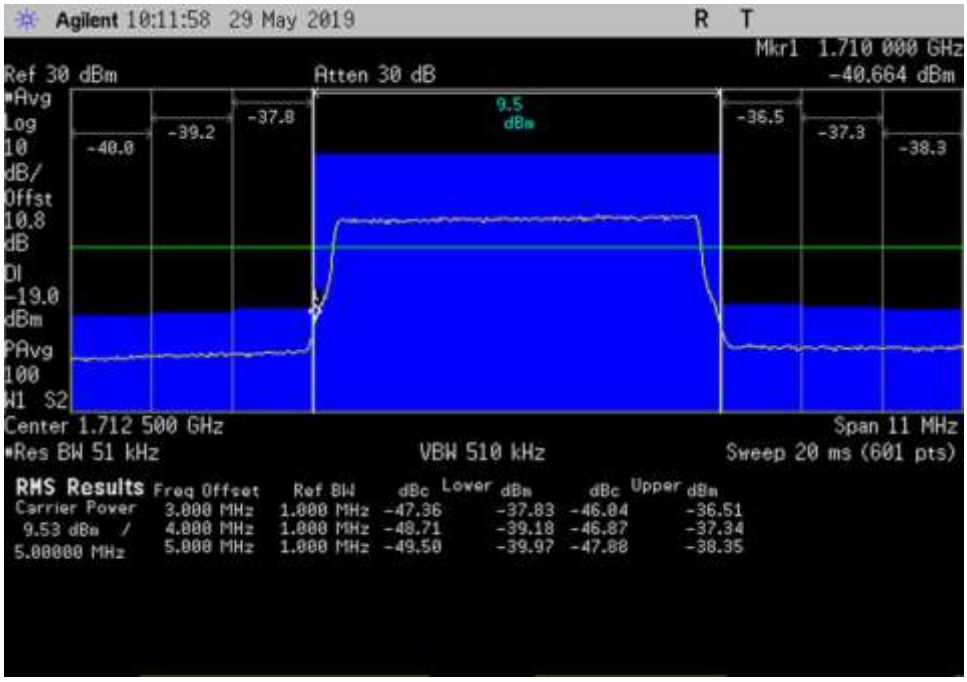
UL_776-787_LTE_ 780.5- 788.5MHz_150ft Cable



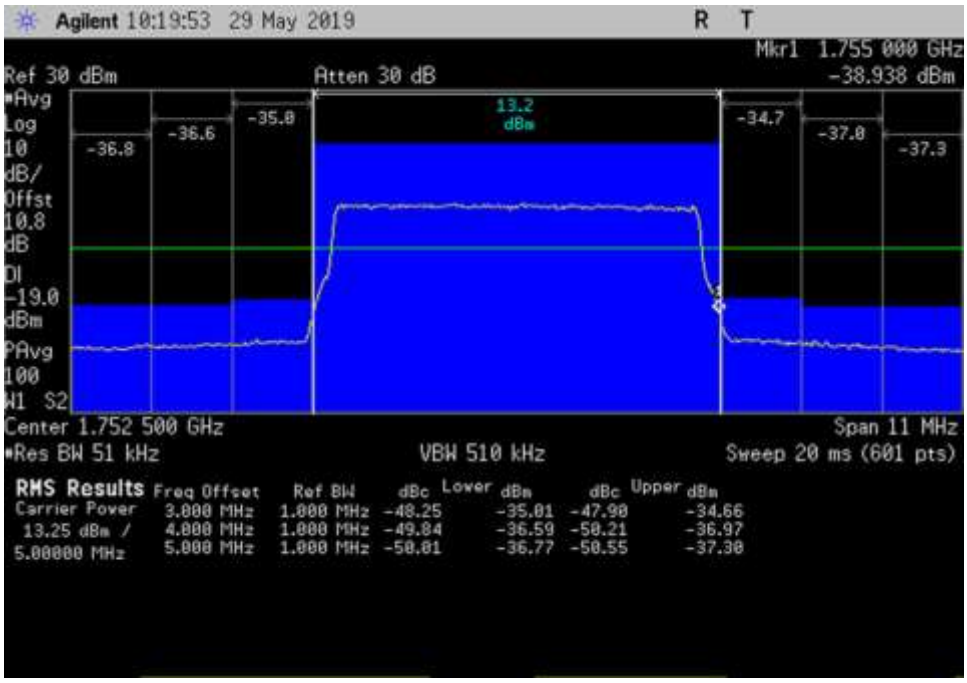
UL_824-849_LTE_ 822.5- 830.5MHz_150ft Cable



UL_824-849_LTE_ 842.5- 850.5MHz_150ft Cable

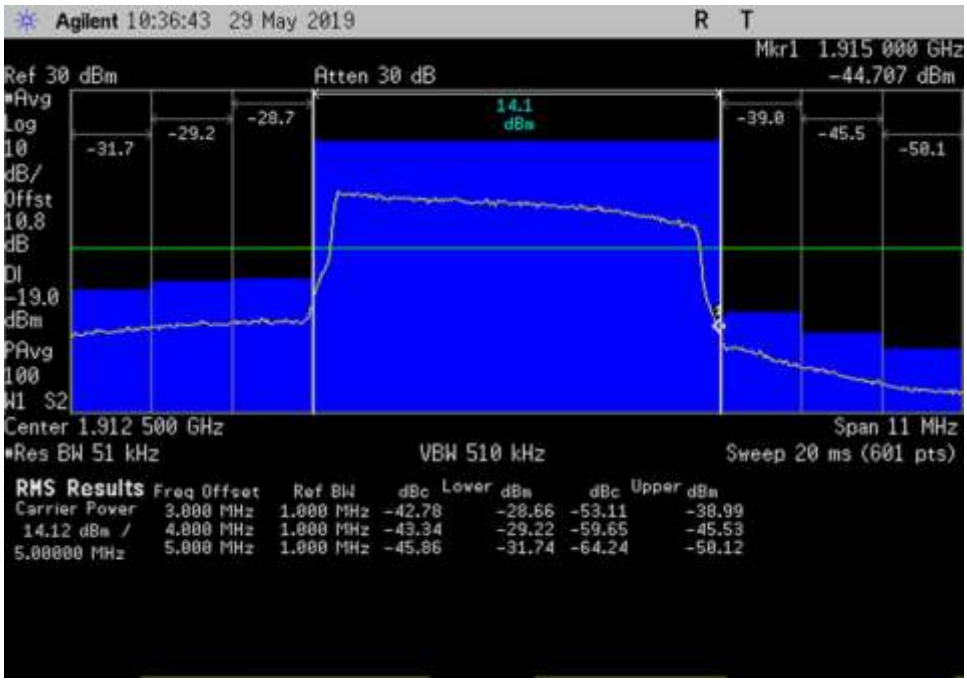


UL_1710-1755_LTE_ 1707- 1718MHz_150ft Cable

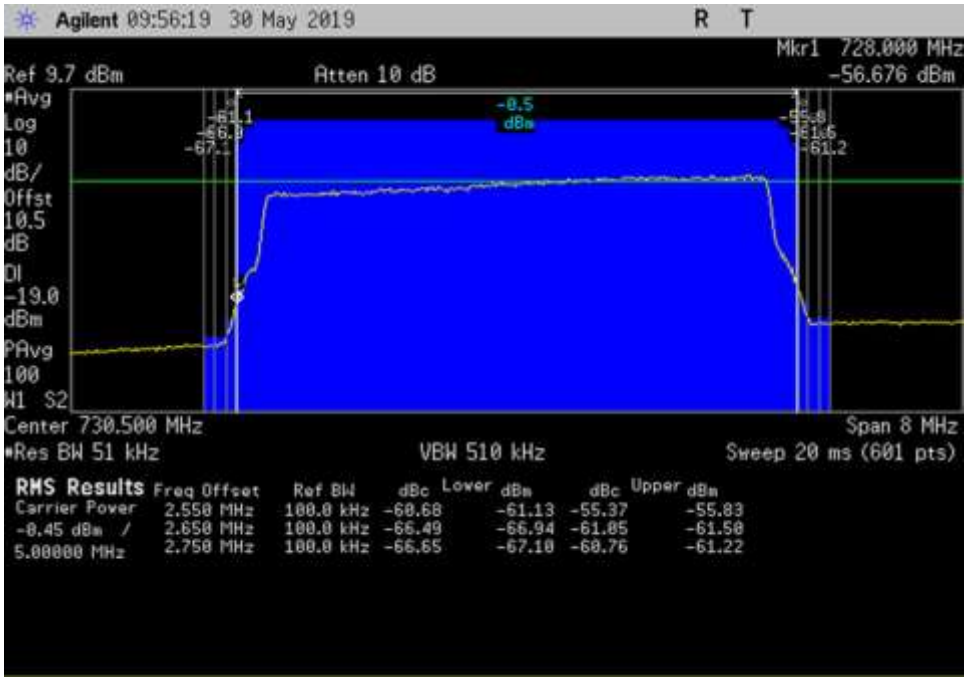


UL_1710-1755_LTE_ 1747- 1758MHz_150ft Cable

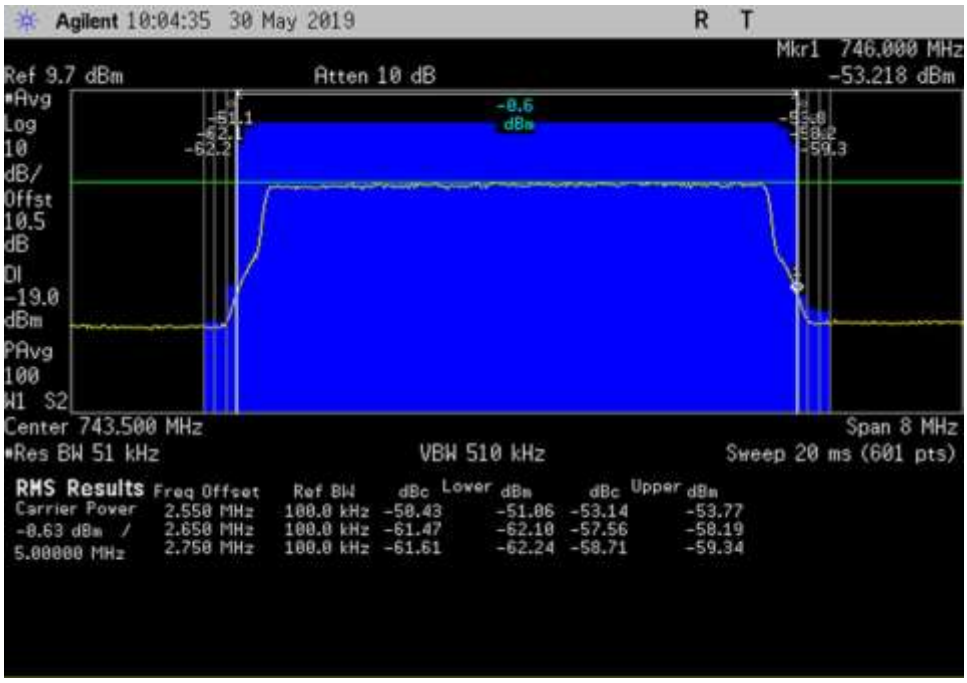
UL_1850-1915_LTE_ 1847- 1858MHz_150ft Cable



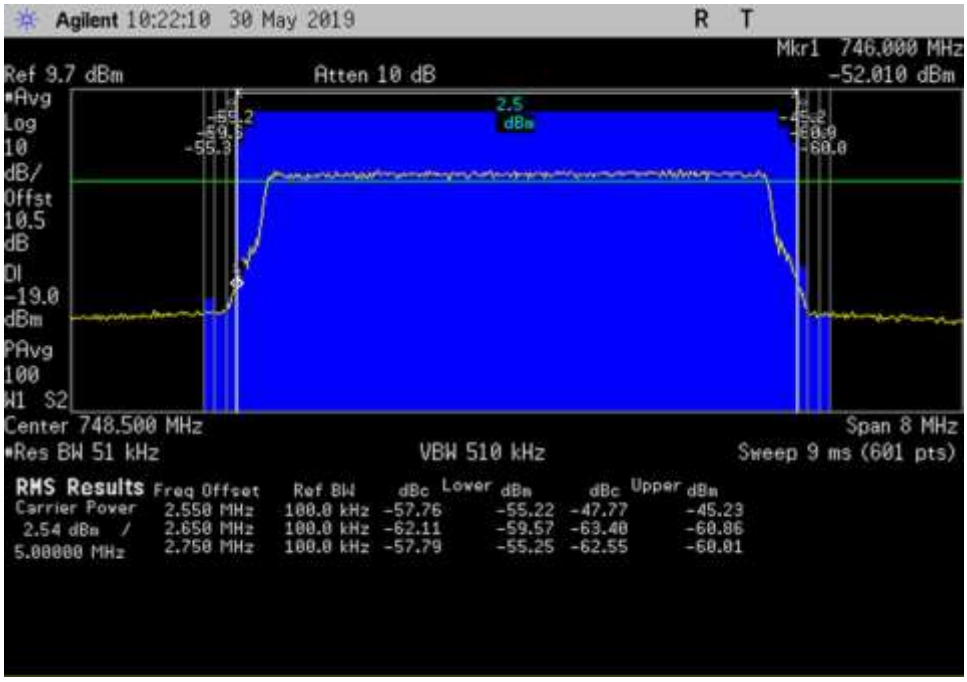
UL_1850-1915_LTE_ 1907- 1918MHz_150ft Cable



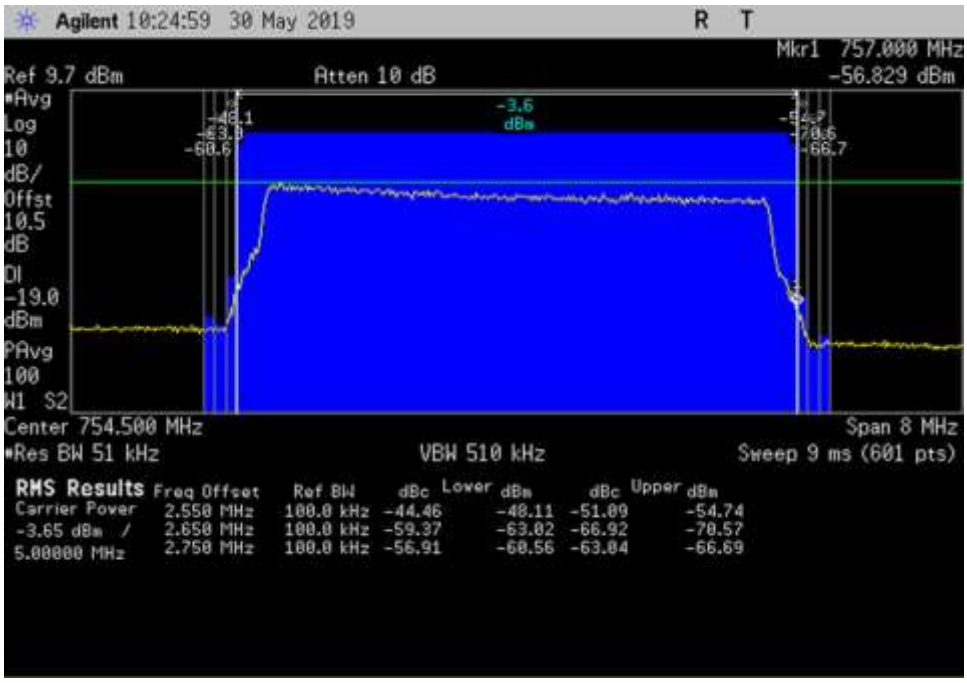
DL_728-746_LTE_ 726.5- 734.5MHz_150ft Cable



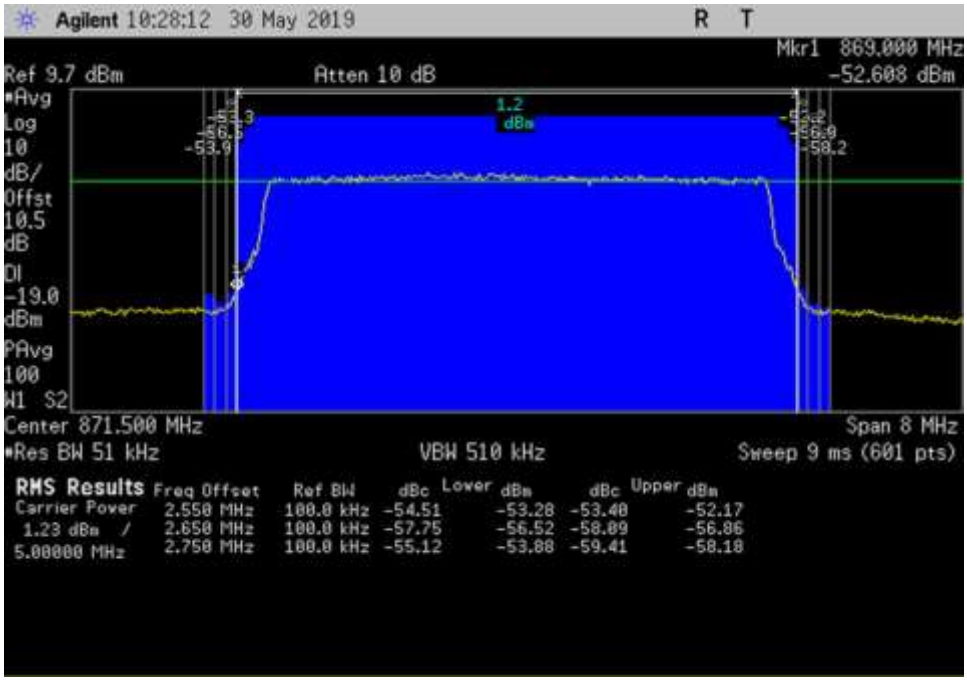
DL_728-746_LTE_ 739.5- 747.5MHz_150ft Cable



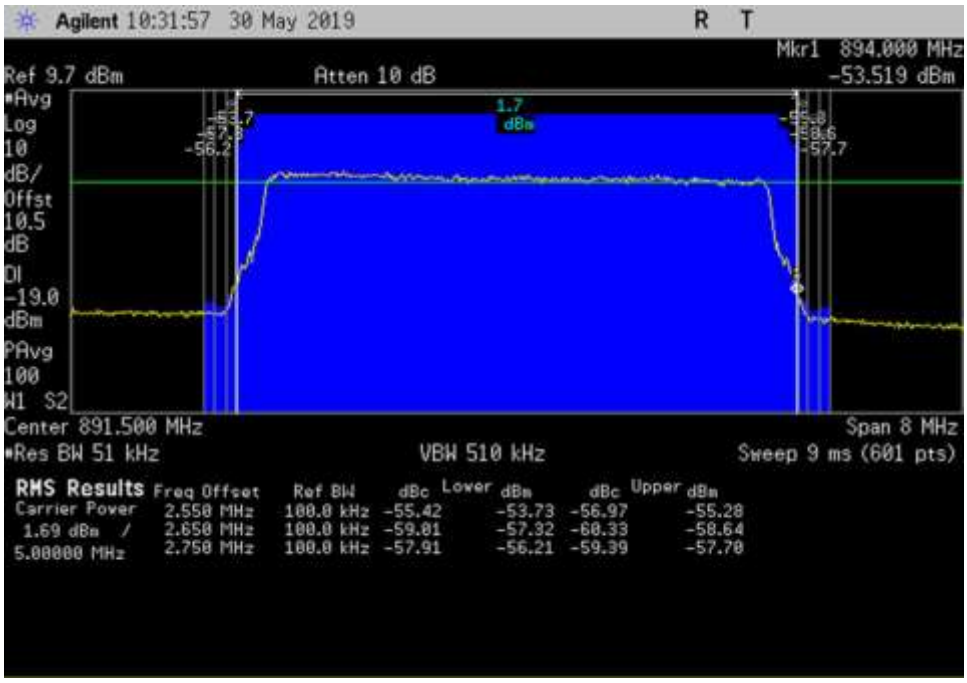
DL_746-757_LTE_ 744.5- 752.5MHz_150ft Cable



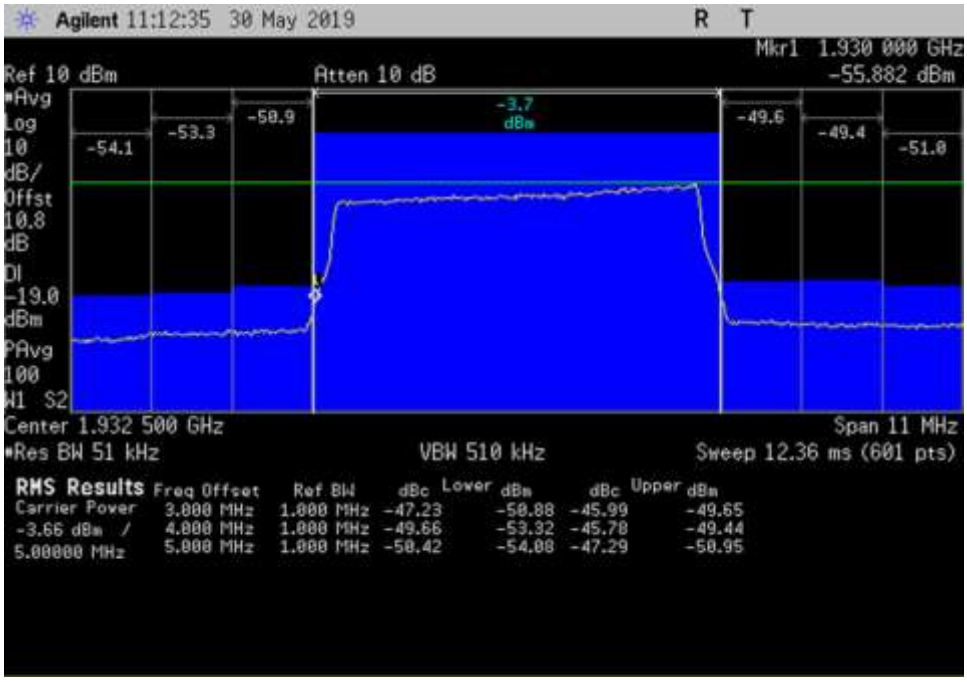
DL_746-757_LTE_ 750.5- 758.5MHz_150ft Cable



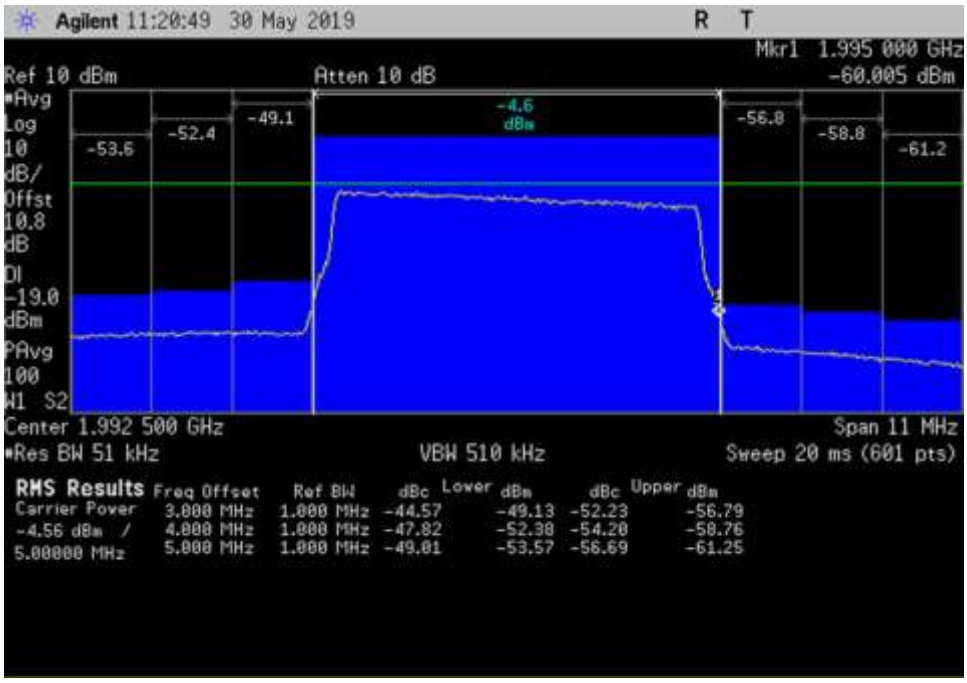
DL_869-894_LTE_ 867.5- 875.5MHz_150ft Cable



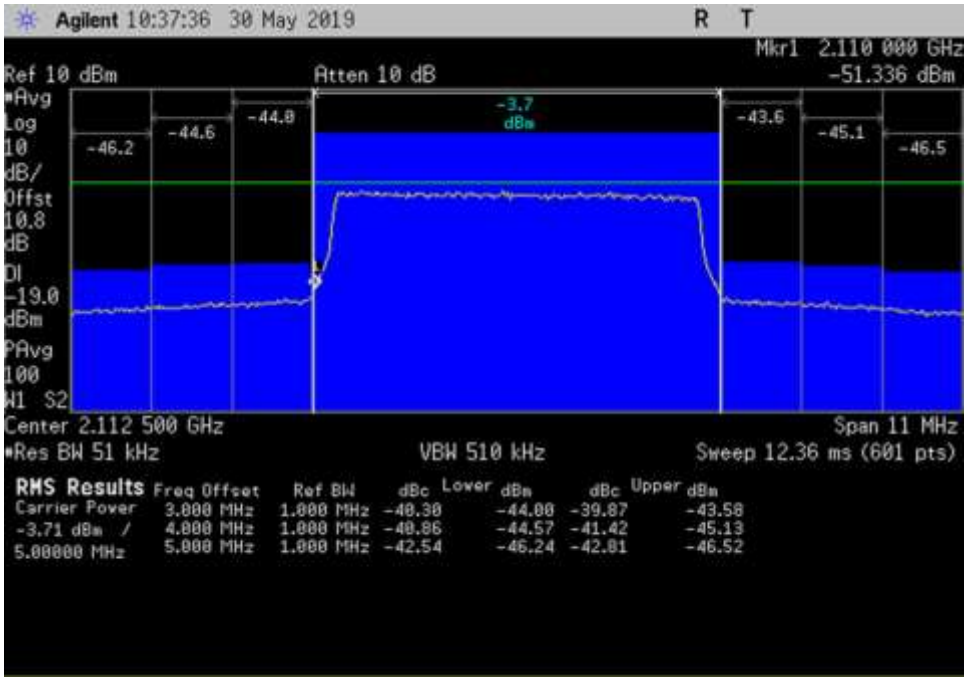
DL_869-894_LTE_ 887.5- 895.5MHz_150ft Cable



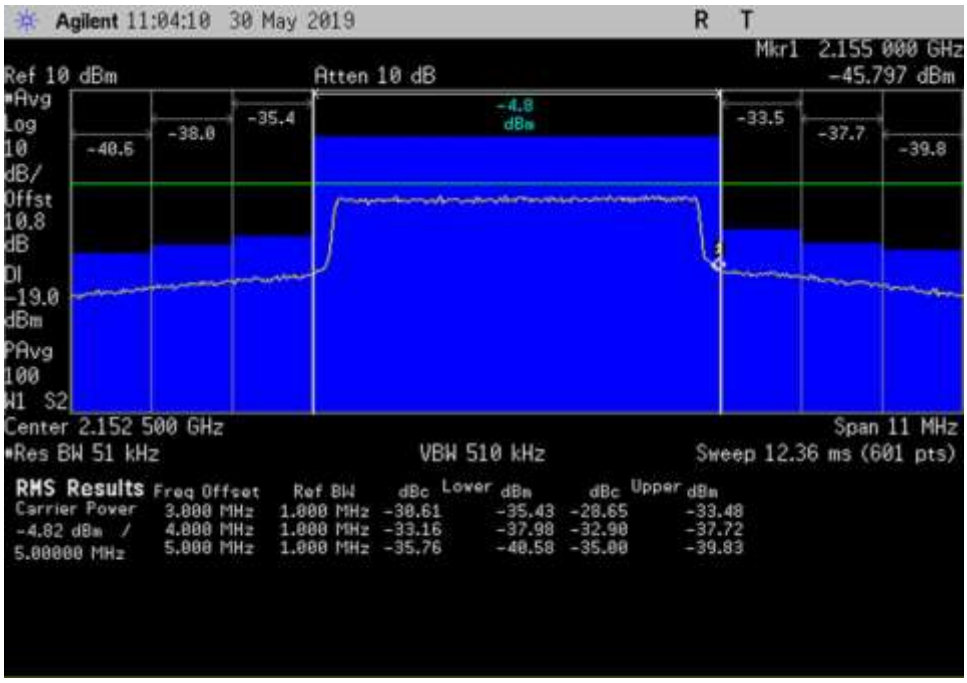
DL_1930-1995_LTE_ 1927- 1938MHz_150ft Cable



DL_1930-1995_LTE_ 1987- 1998MHz_150ft Cable



DL_2110-2155_LTE_ 2107- 2118MHz_150ft Cable



DL_2110-2155_LTE_ 2147- 2158MHz_150ft Cable

7.6 Conducted Spurious Emissions

Test Conditions / Setup

Test Location:	CKC Laboratories, Inc. • 1120 Fulton Place • Fremont, CA 94539 • (510) 249-1170
Customer:	Cellphone-Mate, Inc.
Specification:	**7.6 Conducted Spurious Emissions / 47 CFR §2.1051 Spurious Emissions at Antenna Terminals**
Work Order #:	**102129** Date 06/04/2019
Test Type:	**Conducted Emissions**
Tested By:	**Hieu S Nguyenpham**
Software:	EMITest 5.03.11

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 1			

Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 1			

Test Conditions / Notes:

Test environment conditions: Temperature: 23.1°C, Relative Humidity: 42%, Atmospheric Pressure: 101.8kPa

Frequency range of measurement = 30MHz- 22GHz.
30 MHz - 1000MHz -> RBW*= 1MHz VBW= 3MHz
1000 MHz - 22000MHz ->RBW= 1MHz VBW= 3MHz

*Note: As specified on 7.6 Conducted spurious emissions test procedure of 935210 D03 Signal Booster Measurements v04r02, for frequencies below 1 GHz, an RBW of 1 MHz may be used in a preliminary measurement. If non-compliant emissions are detected, a final measurement shall be made with a 100 kHz RBW. Additionally, a peak detector may also be used for the preliminary measurement. If non-compliant emissions are detected, then a final measurement of these emissions shall be made with the power averaging (RMS) detector.

27.53 (f) For operations in the 746-758 MHz, 775-788 MHz, and 805-806 MHz bands, emissions in the band 1559-1610 MHz shall be limited to −70 dBW/MHz equivalent isotropically radiated power (EIRP) for wideband signals, and −80 dBW EIRP for discrete emissions of less than 700 Hz bandwidth. For the purpose of equipment authorization, a transmitter shall be tested with an antenna that is representative of the type that will be used with the equipment in normal operation.
Modification 1 was in place during testing.

Test Equipment:

Asset #	Description	Manufacturer	Model	Calibration Date	Cal Due Date
P05411	Attenuator	Weinschel	54A-10	1/19/2018	1/19/2020
P07192	Cable	Astro	32022-29094K-29094K-48TC	10/9/2017	10/9/2019
P07191	Cable	Astro	32022-29094K-29094K-48TC	10/30/2017	10/30/2019
03418	Signal Generator	Agilent	E4438C	05/13/2019	05/13/2021
03471	Spectrum Analyzer	Agilent	E4440A	1/18/2018	1/18/2020

Test Location:	CKC Laboratories, Inc. • 1120 Fulton Place • Fremont, CA 94539 • (510) 249-1170
Customer:	Cellphone-Mate, Inc.
Specification:	**7.6 Conducted Spurious Emissions / 47 CFR §2.1051 Spurious Emissions at Antenna Terminals**
Work Order #:	**102129** Date 06/18/2019
Test Type:	**Conducted Emissions**
Tested By:	**Hieu S Nguyenpham**
Software:	EMITest 5.03.11

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 2			

Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 2			

Test Conditions / Notes:

Test environment conditions: Temperature: 20.9°C, Relative Humidity: 48%, Atmospheric Pressure: 101.4kPa

Frequency range of measurement = 30MHz- 22GHz.
30 MHz - 1000MHz -> RBW*= 1MHz VBW= 3MHz
1000 MHz - 22000MHz ->RBW= 1MHz VBW= 3MHz

*Note: As specified on 7.6 Conducted spurious emissions test procedure of 935210 D03 Signal Booster Measurements v04r02, for frequencies below 1 GHz, an RBW of 1 MHz may be used in a preliminary measurement. If non-compliant emissions are detected, a final measurement shall be made with a 100 kHz RBW. Additionally, a peak detector may also be used for the preliminary measurement. If non-compliant emissions are detected, then a final measurement of these emissions shall be made with the power averaging (RMS) detector.

27.53 (f) For operations in the 746-758 MHz, 775-788 MHz, and 805-806 MHz bands, emissions in the band 1559-1610 MHz shall be limited to −70 dBW/MHz equivalent isotropically radiated power (EIRP) for wideband signals, and −80 dBW EIRP for discrete emissions of less than 700 Hz bandwidth. For the purpose of equipment authorization, a transmitter shall be tested with an antenna that is representative of the type that will be used with the equipment in normal operation.

Test Equipment:

Asset #	Description	Manufacturer	Model	Calibration Date	Cal Due Date
P05411	Attenuator	Weinschel	54A-10	1/19/2018	1/19/2020
P07192	Cable	Astro	32022-29094K-29094K-48TC	10/9/2017	10/9/2019
P07191	Cable	Astro	32022-29094K-29094K-48TC	10/30/2017	10/30/2019
03418	Signal Generator	Agilent	E4438C	05/13/2019	05/13/2021
03471	Spectrum Analyzer	Agilent	E4440A	1/18/2018	1/18/2020

Test Location:	CKC Laboratories, Inc. • 1120 Fulton Place • Fremont, CA 94539 • (510) 249-1170
Customer:	Cellphone-Mate, Inc.
Specification:	**7.6 Conducted Spurious Emissions / 47 CFR §2.1051 Spurious Emissions at Antenna Terminals**
Work Order #:	**102129** Date 06/18/2019
Test Type:	**Conducted Emissions**
Tested By:	**Hieu S Nguyenpham**
Software:	EMITest 5.03.11

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 3			

Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 3			

Test Conditions / Notes:

Test environment conditions: Temperature: 20.9°C, Relative Humidity: 48%, Atmospheric Pressure: 101.4kPa

Frequency range of measurement = 30MHz- 22GHz.
30 MHz - 1000MHz -> RBW*= 1MHz VBW= 3MHz
1000 MHz - 22000MHz ->RBW= 1MHz VBW= 3MHz

*Note: As specified on 7.6 Conducted spurious emissions test procedure of 935210 D03 Signal Booster Measurements v04r02, for frequencies below 1 GHz, an RBW of 1 MHz may be used in a preliminary measurement. If non-compliant emissions are detected, a final measurement shall be made with a 100 kHz RBW. Additionally, a peak detector may also be used for the preliminary measurement. If non-compliant emissions are detected, then a final measurement of these emissions shall be made with the power averaging (RMS) detector.

27.53 (f) For operations in the 746-758 MHz, 775-788 MHz, and 805-806 MHz bands, emissions in the band 1559-1610 MHz shall be limited to −70 dBW/MHz equivalent isotropically radiated power (EIRP) for wideband signals, and −80 dBW EIRP for discrete emissions of less than 700 Hz bandwidth. For the purpose of equipment authorization, a transmitter shall be tested with an antenna that is representative of the type that will be used with the equipment in normal operation.

Test Equipment:

Asset #	Description	Manufacturer	Model	Calibration Date	Cal Due Date
P05411	Attenuator	Weinschel	54A-10	1/19/2018	1/19/2020
P07192	Cable	Astro	32022-29094K-29094K-48TC	10/9/2017	10/9/2019
P07191	Cable	Astro	32022-29094K-29094K-48TC	10/30/2017	10/30/2019
03418	Signal Generator	Agilent	E4438C	05/13/2019	05/13/2021
03471	Spectrum Analyzer	Agilent	E4440A	1/18/2018	1/18/2020

Summary of Results

Configuration 1

Pass: As summarized in plots below, the conducted spurious emissions are within limits. Only performed on a 50ft cable

9 kHz-30 MHz
No Conducted Spurious Emissions were found within 20dB of the limit.

Per section 27.53 (f), the 1559-1610 band was also investigated and found emission within limits using applied correction (see calculation below).

Limit Line Calculation*					
Frequency (MHz)	Antenna Gain- cable loss (dBi)		Limit line EIRP (dBW/MHz)	Limit line EIRP (dBm)	Limit line EIRP corrected (dBm)
UL 776-787	-5.5		-70.0	-40	-45.5

Configuration 2

Pass: As summarized in plots below, the conducted spurious emissions are within limits. Only performed on a 50ft cable

9 kHz-30 MHz
No Conducted Spurious Emissions were found within 20dB of the limit.

Per section 27.53 (f), the 1559-1610 band was also investigated and found emission within limits using applied correction (see calculation below).

Limit Line Calculation*					
Frequency (MHz)	Antenna Gain- cable loss (dBi)		Limit line EIRP (dBW/MHz)	Limit line EIRP (dBm)	Limit line EIRP corrected (dBm)
UL 776-787	-5.5		-70.0	-40	-45.5

Configuration 3

Pass: As summarized in plots below, the conducted spurious emissions are within limits. Only performed on a 50ft cable

9 kHz-30 MHz

No Conducted Spurious Emissions were found within 20dB of the limit.

Per section 27.53 (f), the 1559-1610 band was also investigated and found emission within limits using applied correction (see calculation below).

Limit Line Calculation*					
Frequency (MHz)	**Antenna Gain- cable loss (dBi)**		**Limit line EIRP (dBW/MHz)**	**Limit line EIRP (dBm)**	**Limit line EIRP corrected (dBm)**
UL 776-787	-5.5		-70.0	-40	-45.5

LIMIT LINE FOR SPURIOUS CONDUCTED EMISSION

REQUIRED ATTENUATION = 43+10 LOG P DB

Limit line (dBuV) = V_{dBuv} - Attenuation

$$V_{dBuV} = 20\,\mathrm{Log}\,\frac{V}{1\,x\,10^{-6}}$$

$$= 20\left(\mathrm{Log}\,V - \mathrm{Log}\,1\,x\,10^{-6}\right)$$

$$= 20\,\mathrm{Log}\,V - 20\,\mathrm{Log}1\,x\,10^{-6}$$

$$= 20\,\mathrm{Log}\,V - 20\,(-6)$$

$$= 20\,\mathrm{Log}\,V + 120$$

$$\mathrm{Attenuation} = 43 + 10\,\mathrm{Log}\,P$$

$$= 43 + 10\,\mathrm{Log}\,\frac{V^2}{R}$$

$$= 43 + 10\left(\mathrm{Log}\,V^2 - \mathrm{Log}\,R\right)$$

$$= 43 + 10\left(2\,\mathrm{Log}\,V - \mathrm{Log}\,R\right)$$

$$= 43 + 20\,\mathrm{Log}\,V - 10\,\mathrm{Log}\,R$$

Limit line = V_{dBuv} - Attenuation

= 20 Log V + 120 – (43 + 20 Log V – 10Log R)

= 20 Log V + 120 – 43 – 20 Log V + 10Log R

= 20 Log V + 120 – 43 – 20 Log V + 10Log R

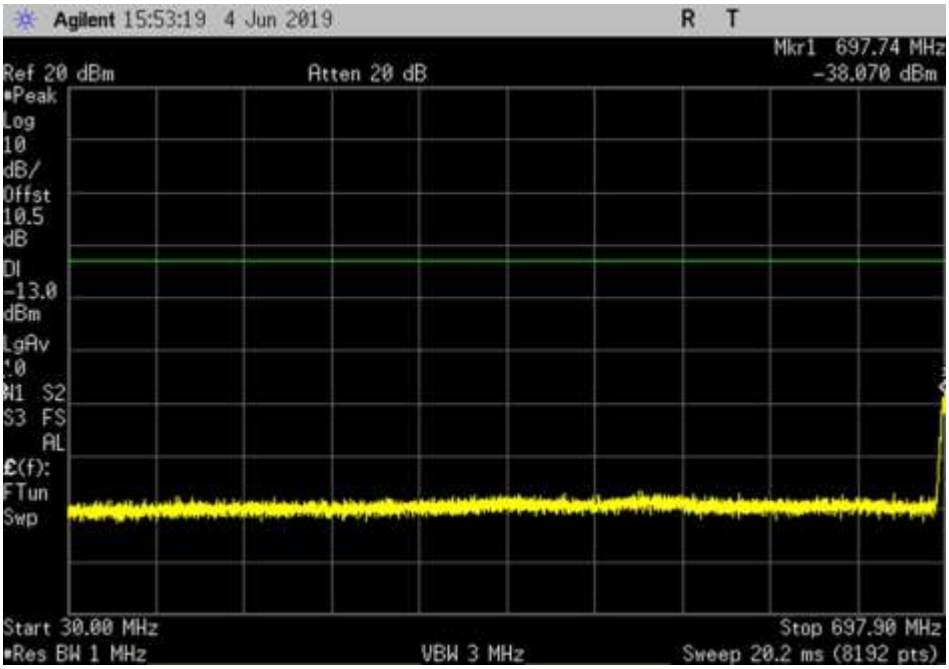
= 120 – 43 + 10 Log 50 Note : R = 50 Ω

= 120 –43 + 16.897

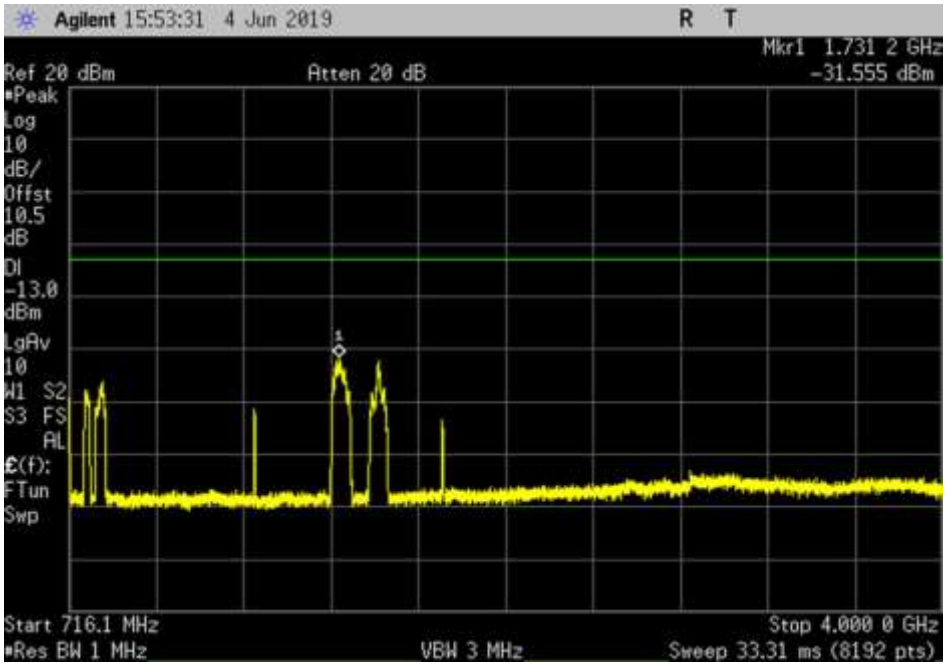
= 94 dBuV at any power level

Plots

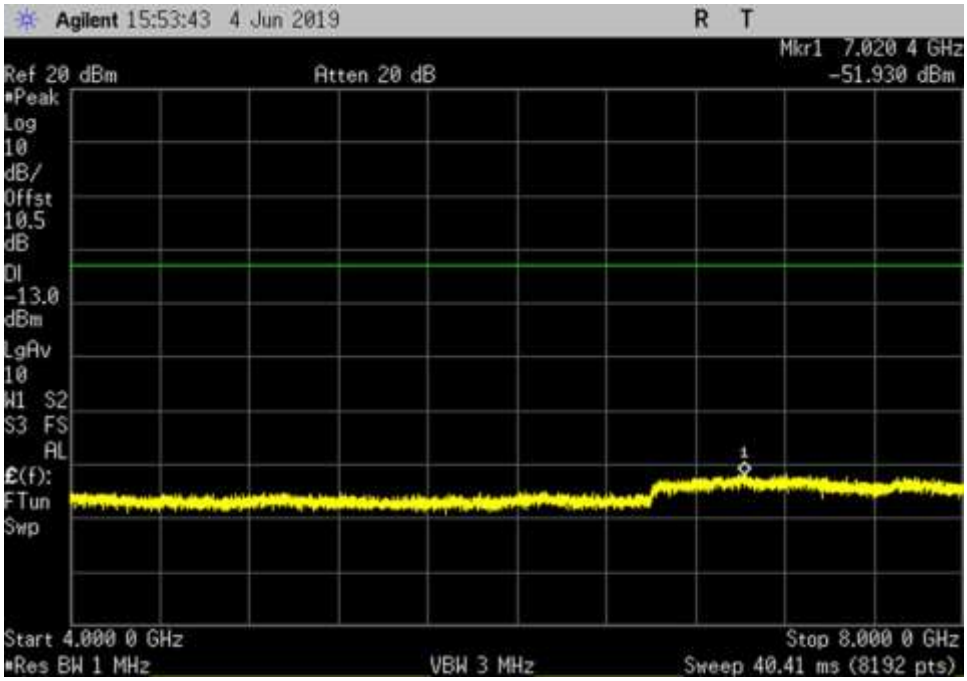
Configuration 1



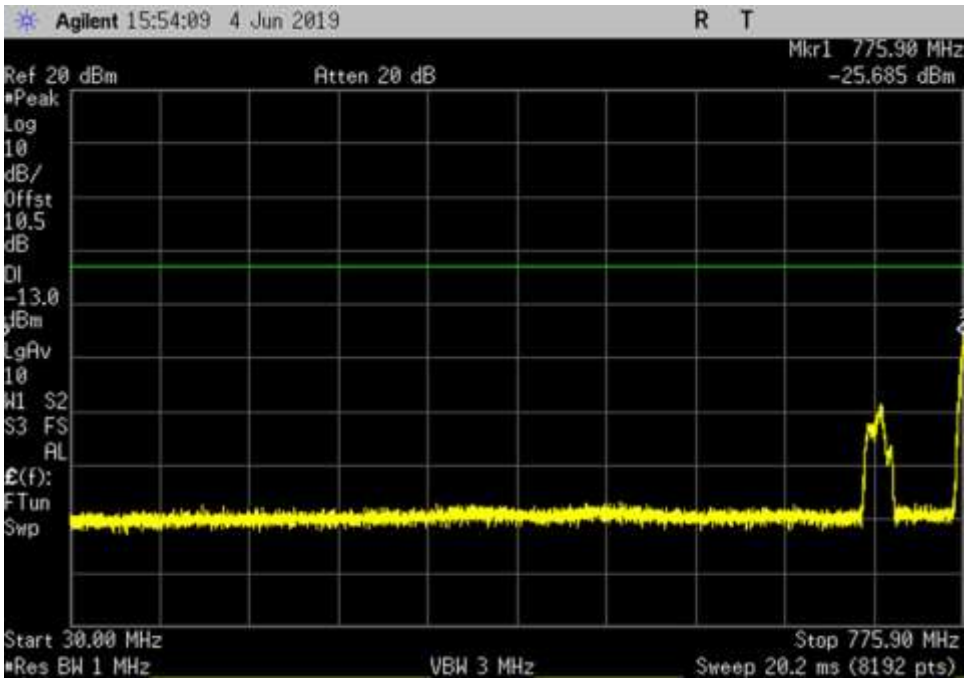
UL_698-716_ 30- 697.9MHz_50ft Cable



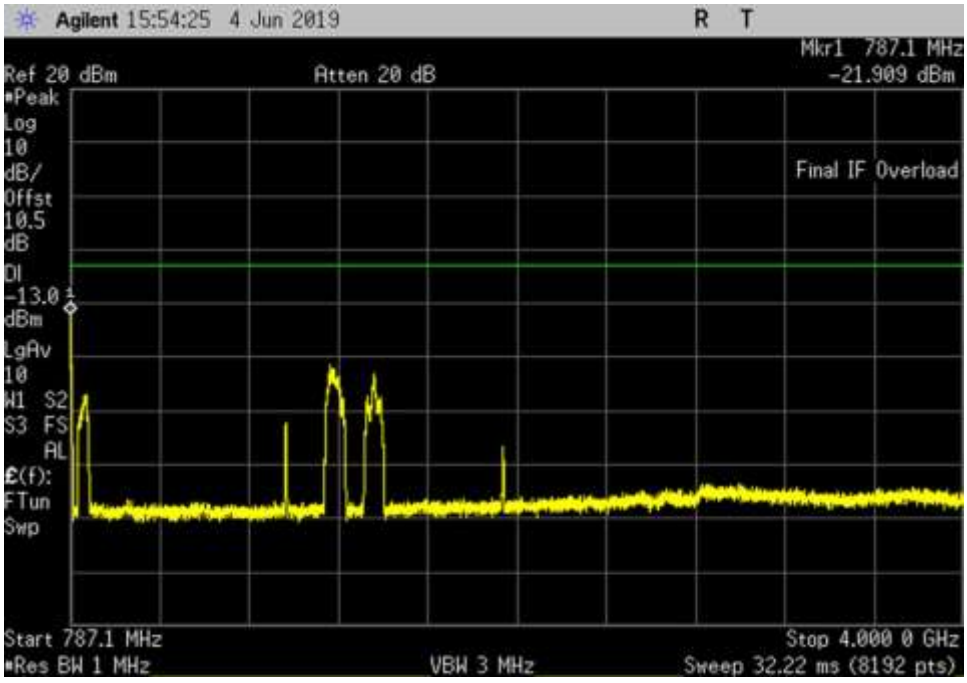
UL_698-716_ 716.1- 4000MHz_50ft Cable



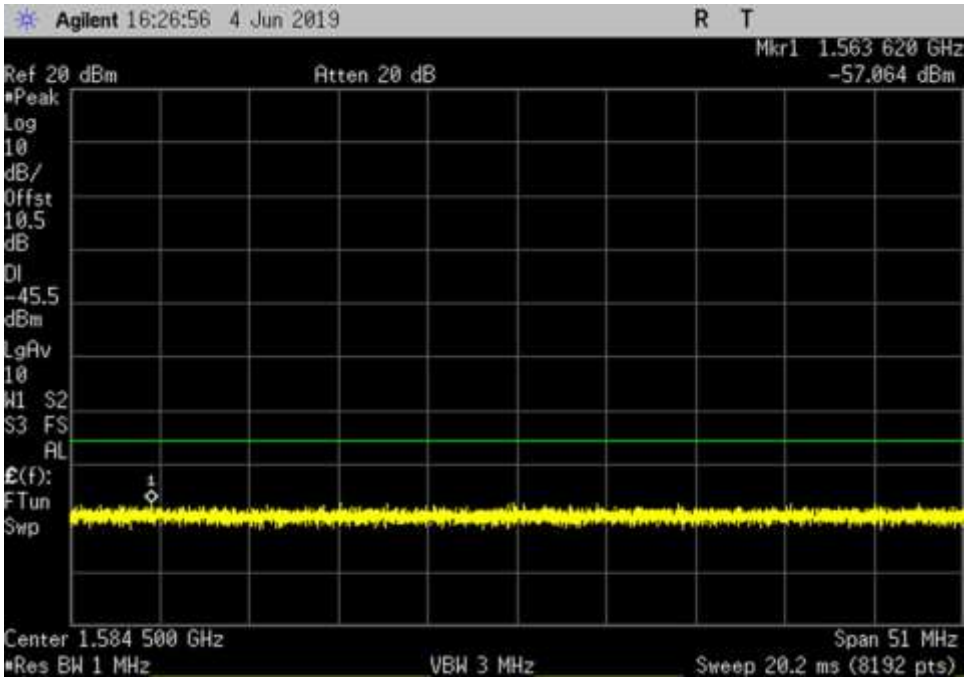
UL_698-716_ 4000- 8000MHz_50ft Cable



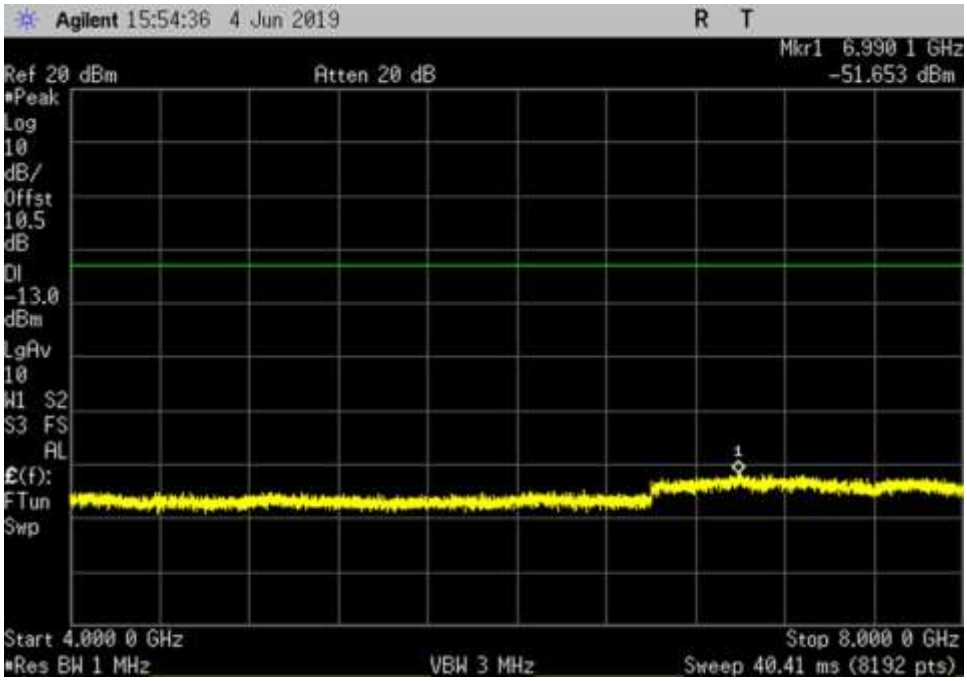
UL_776-787_ 30- 775.9MHz_50ft Cable



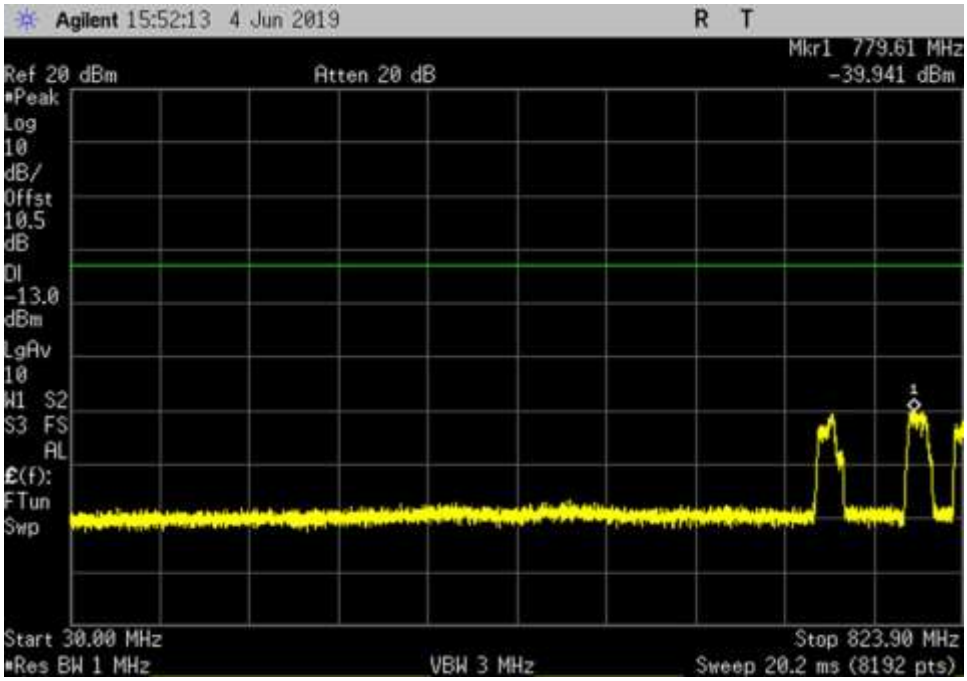
UL_776-787_ 787.1- 4000MHz_50ft Cable



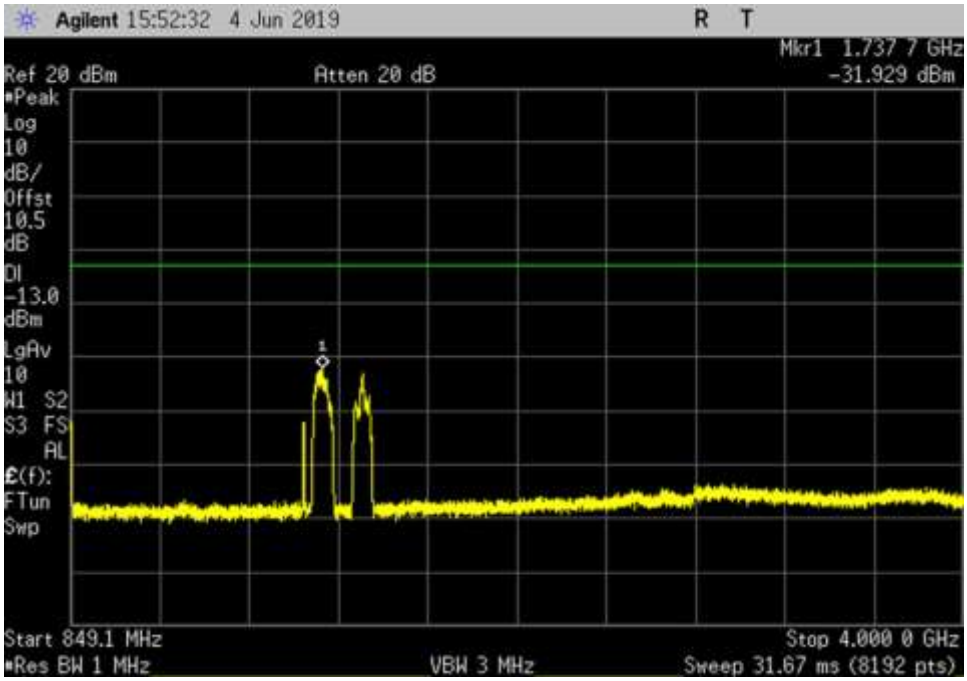
UL_776-787_ 1559- 1610MHz_50ft Cable



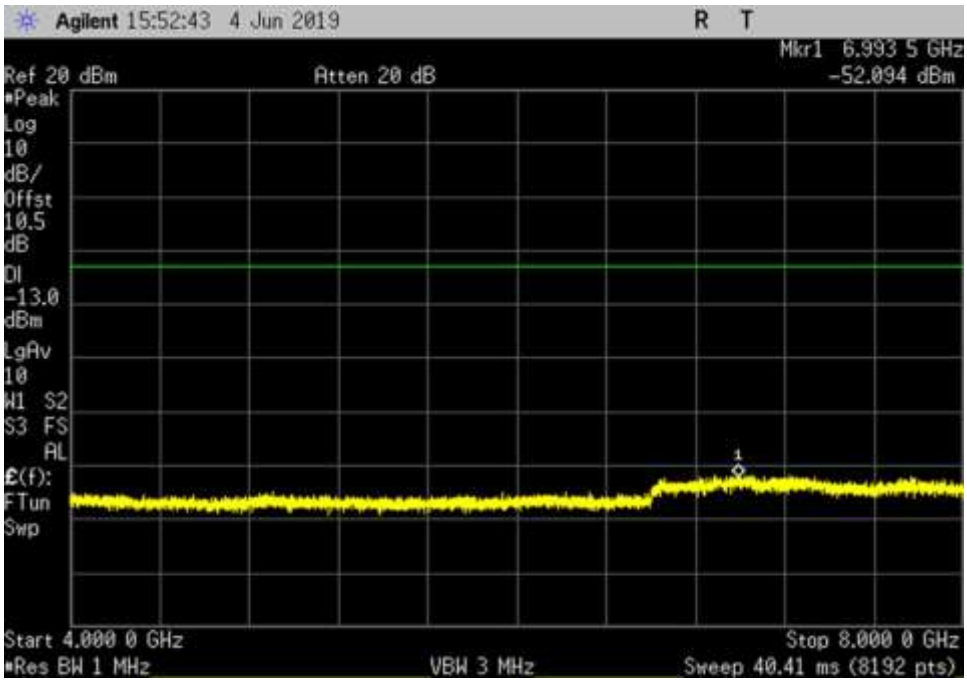
UL_776-787_ 4000- 8000MHz_50ft Cable



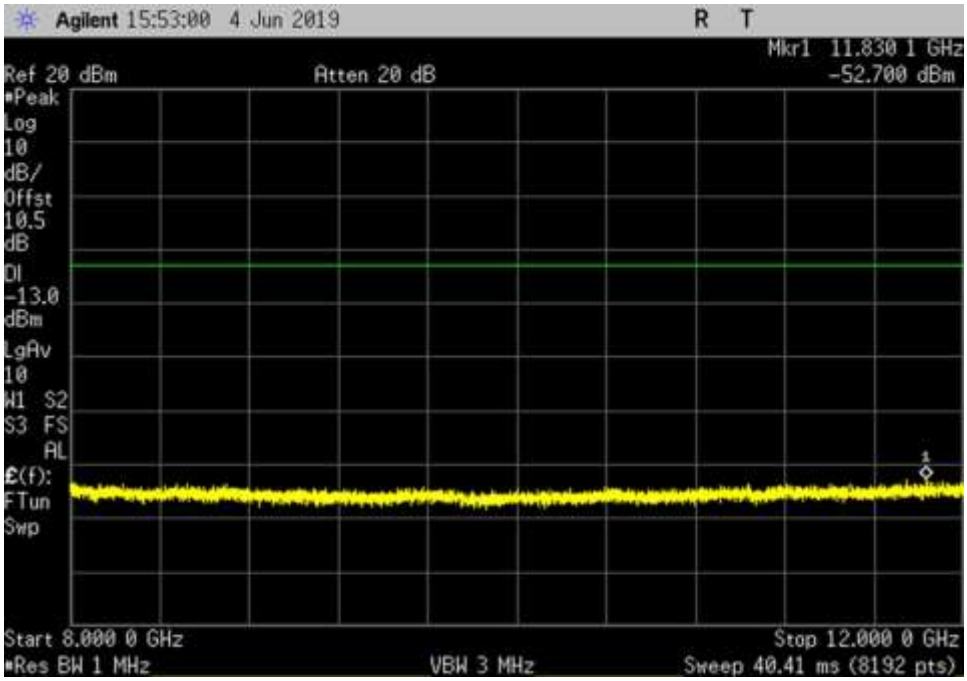
UL_824-849_ 30- 823.9MHz_50ft Cable



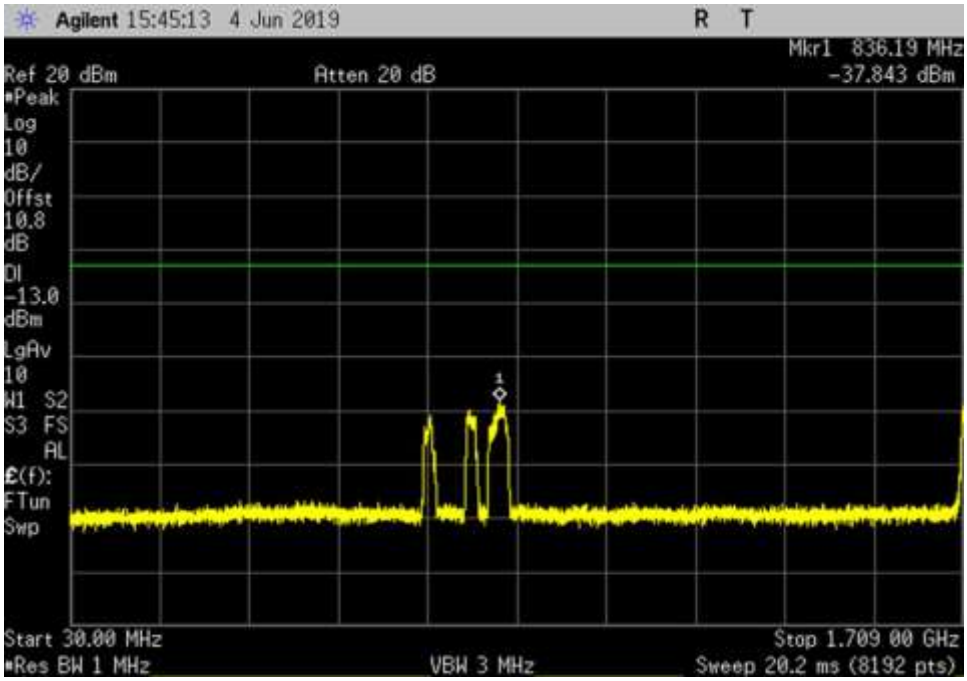
UL_824-849_ 849.1- 4000MHz_50ft Cable



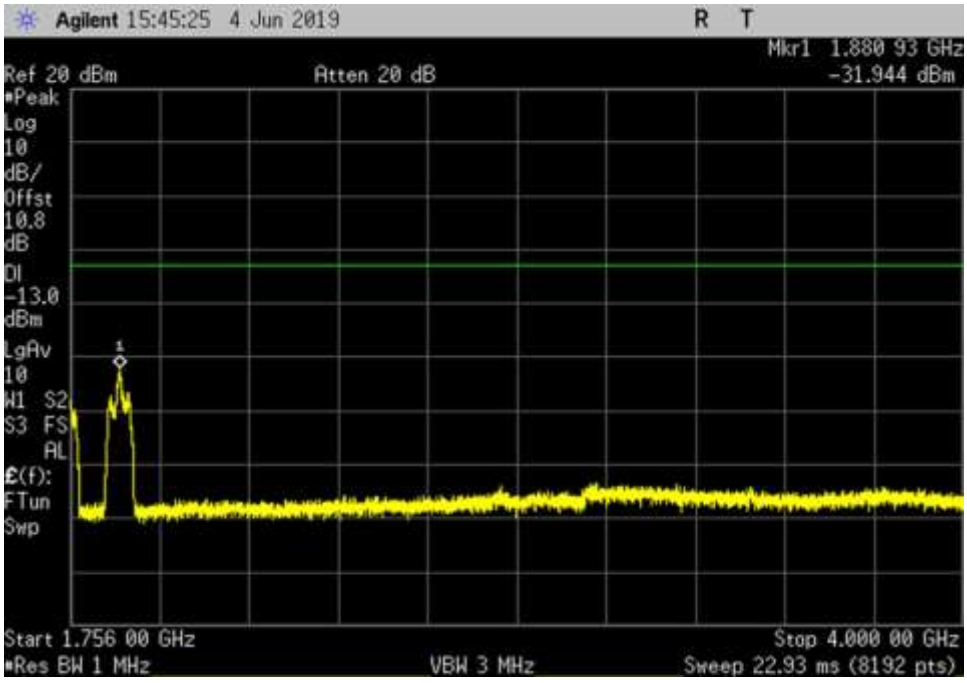
UL_824-849_ 4000- 8000MHz_50ft Cable



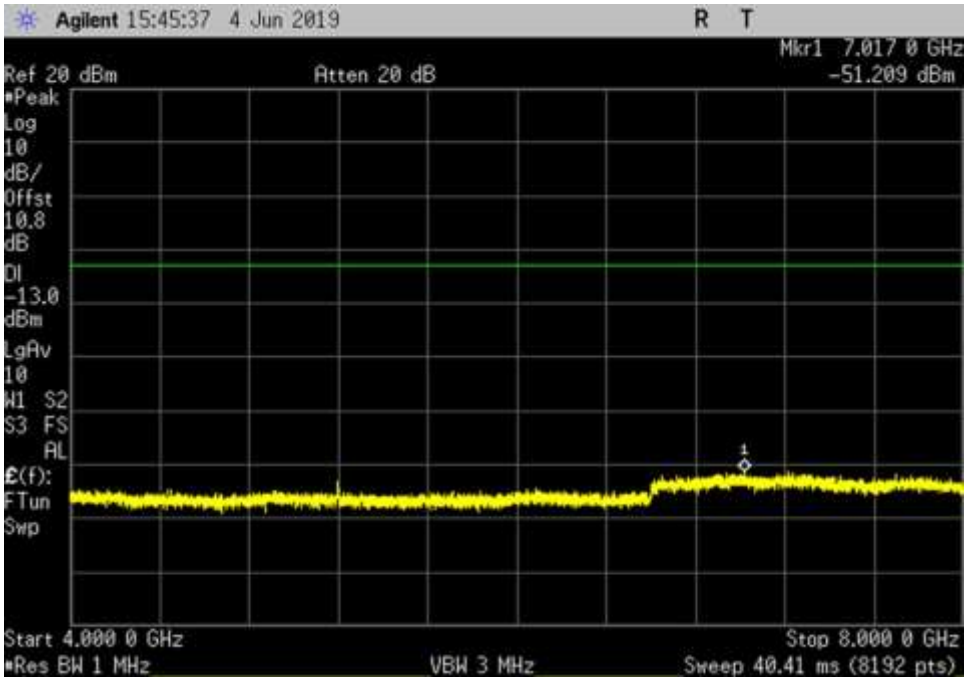
UL_824-849_ 8000- 12000MHz_50ft Cable



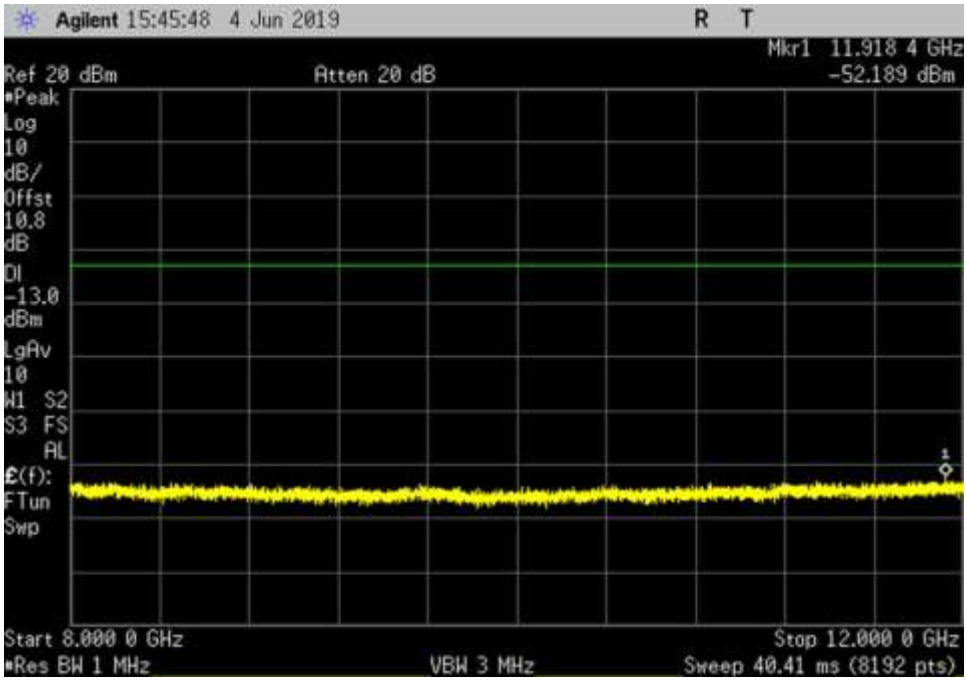
UL_1710-1755_ 30- 1709MHz_50ft Cable



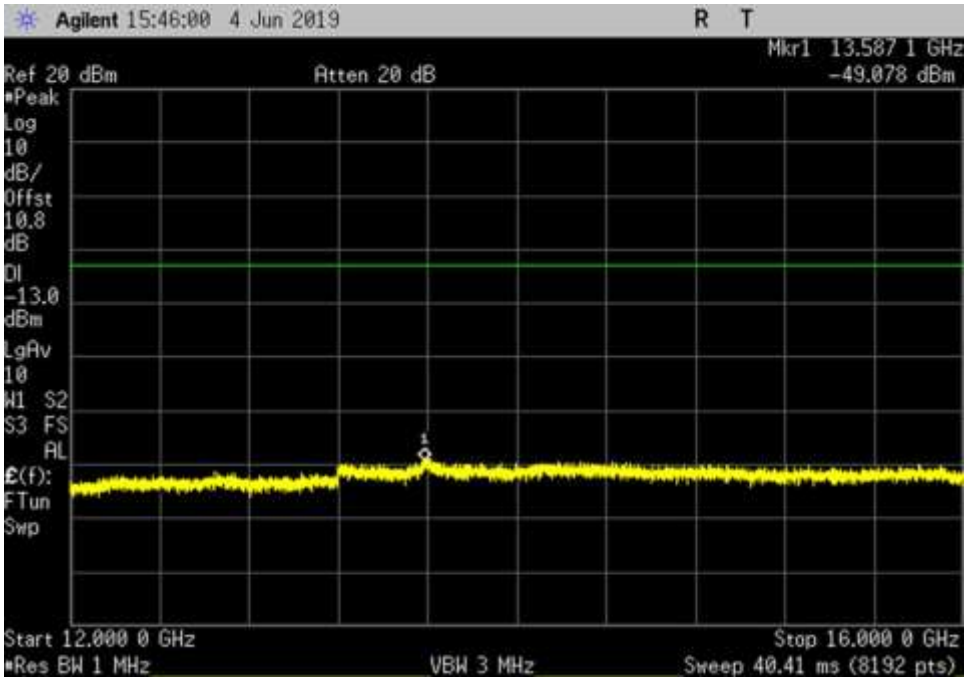
UL_1710-1755_ 1756- 4000MHz_50ft Cable



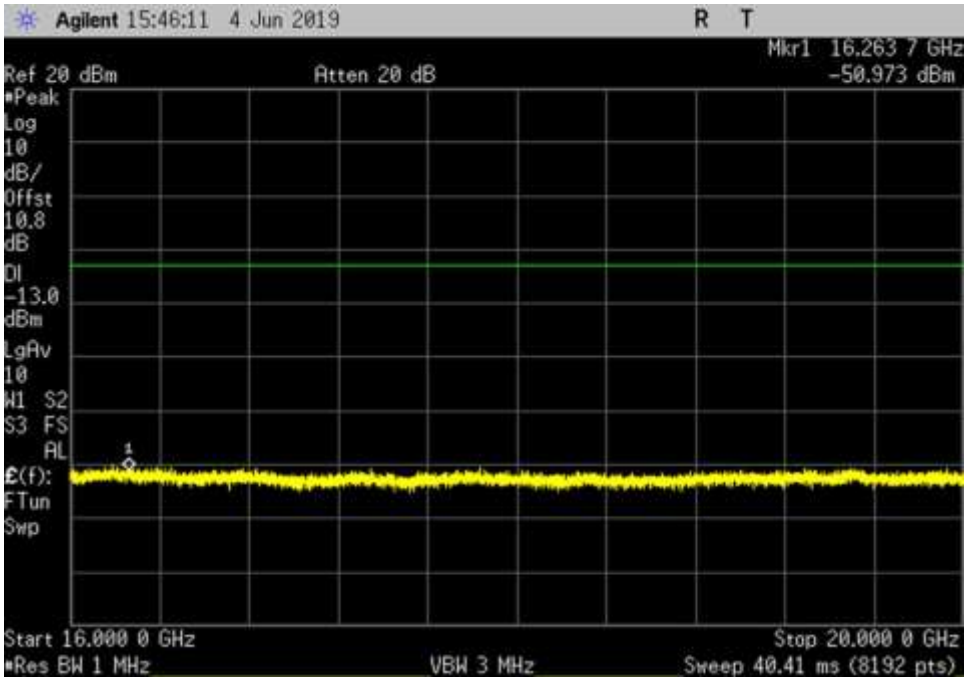
UL_1710-1755_ 4000- 8000MHz_50ft Cable



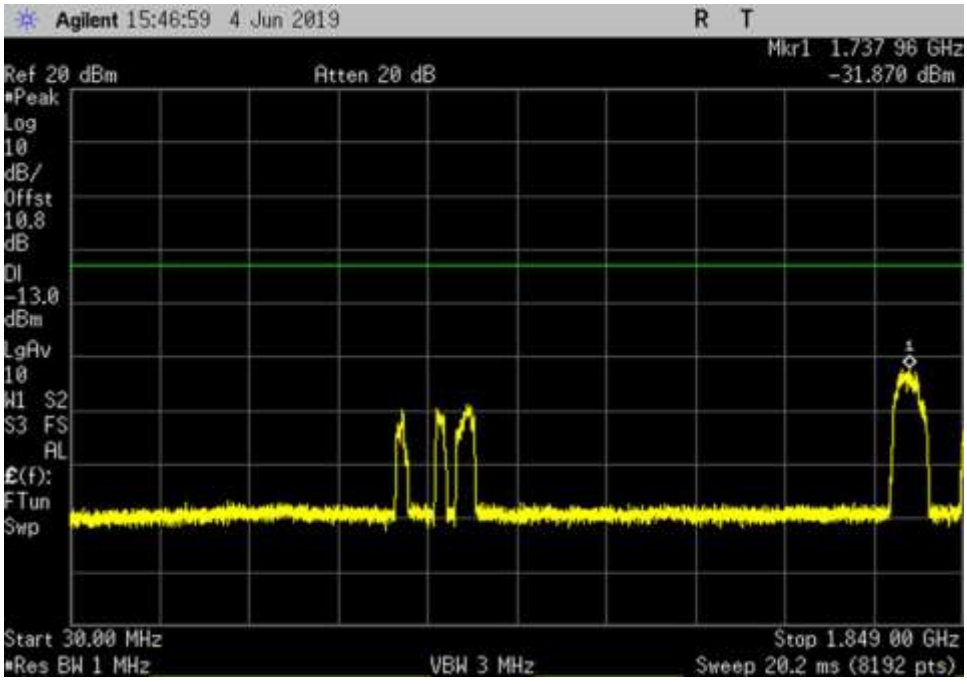
UL_1710-1755_ 8000- 12000MHz_50ft Cable



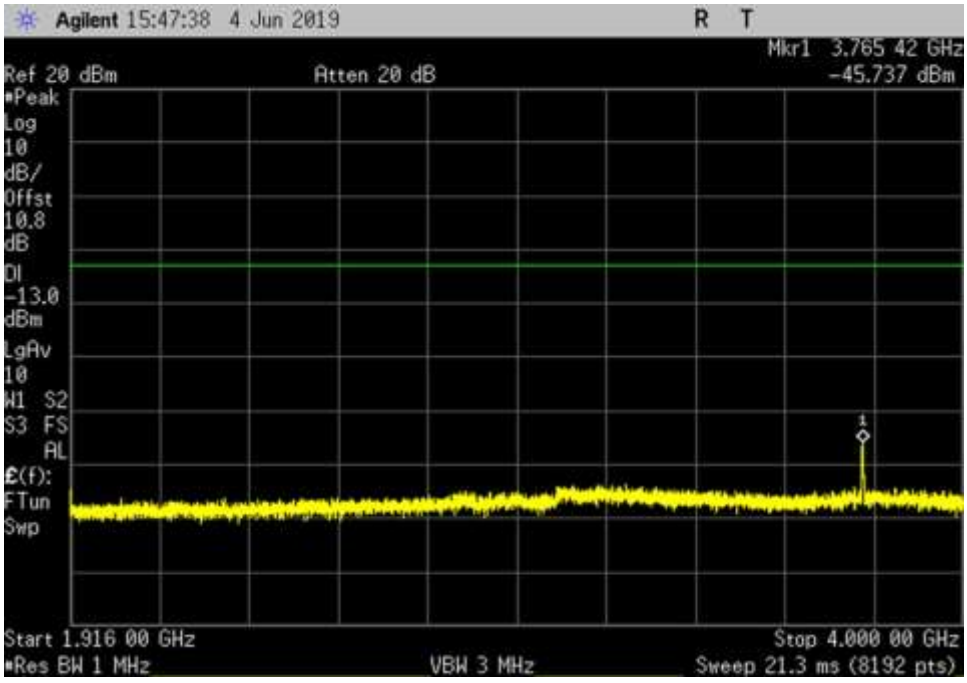
UL_1710-1755_ 12000- 16000MHz_50ft Cable



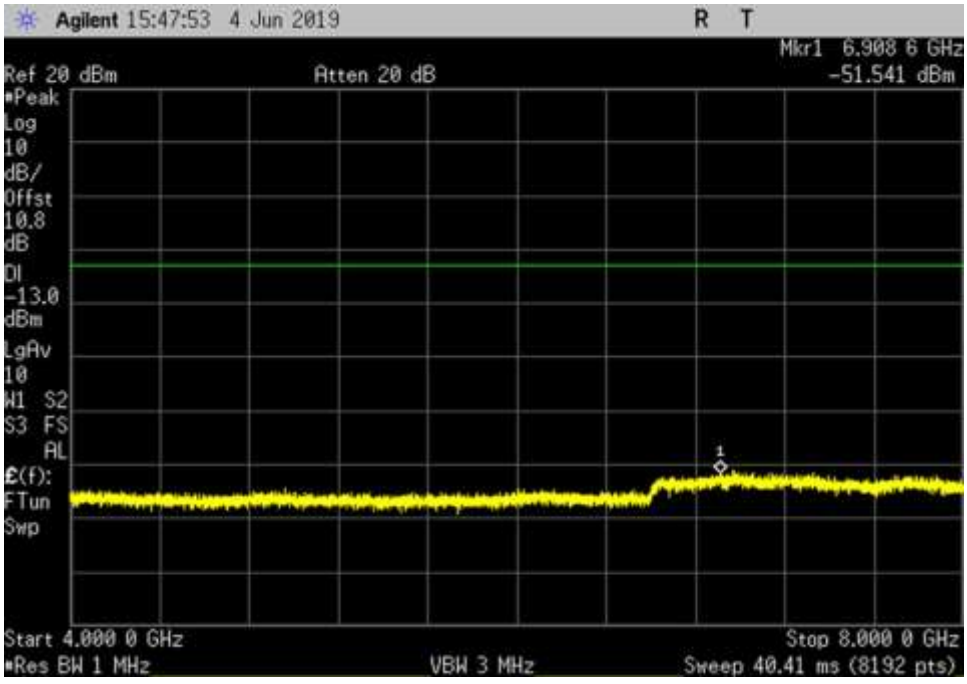
UL_1710-1755_ 16000- 20000MHz_50ft Cable



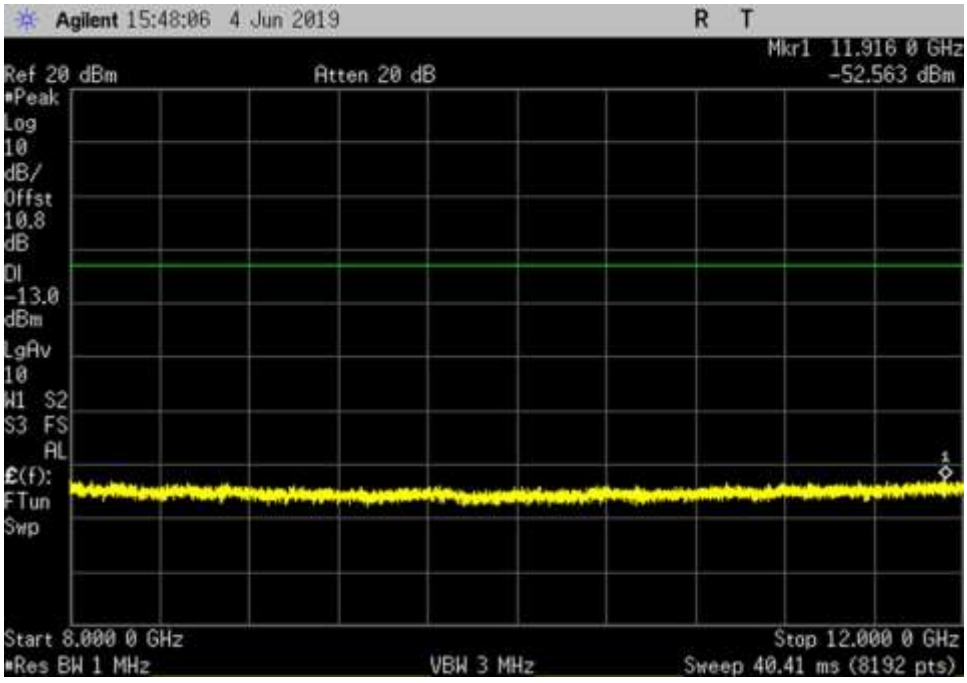
UL_1850-1915_ 30- 1849MHz_50ft Cable



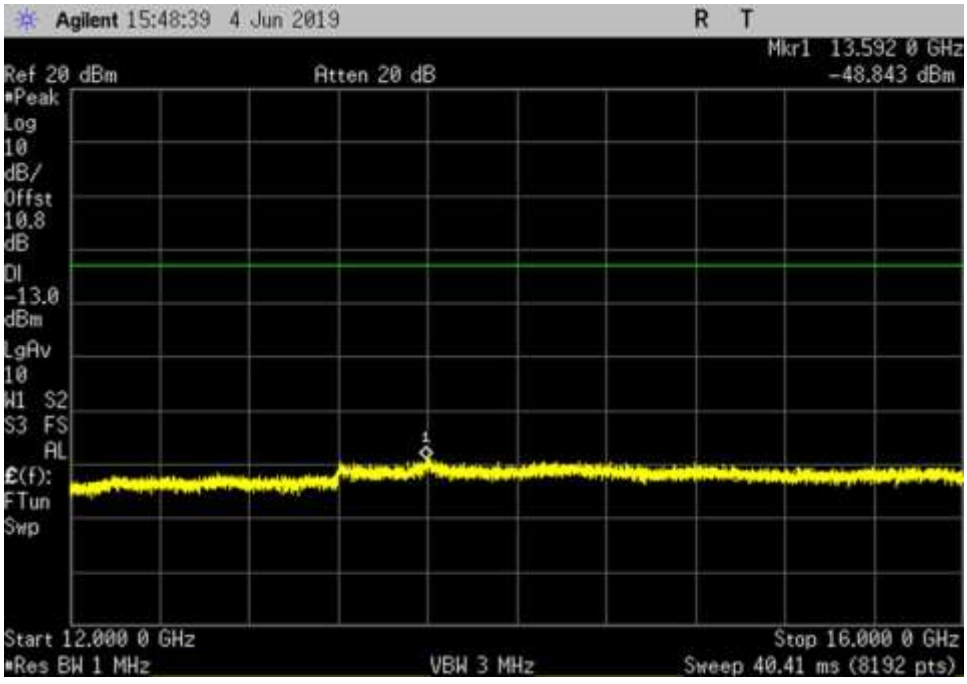
UL_1850-1915_ 1916- 4000MHz_50ft Cable



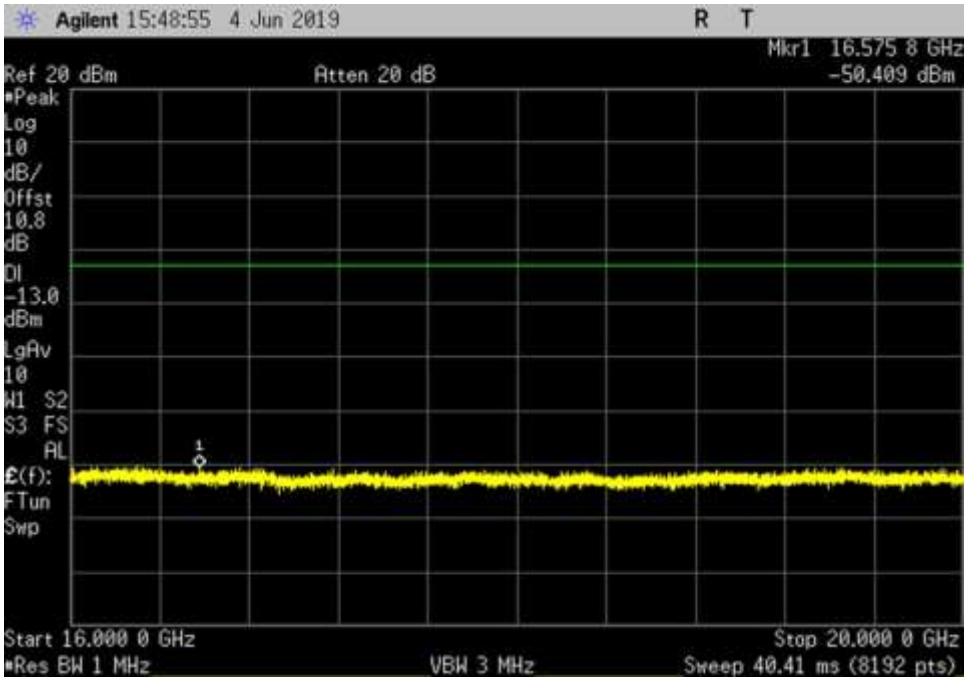
UL_1850-1915_ 4000- 8000MHz_50ft Cable



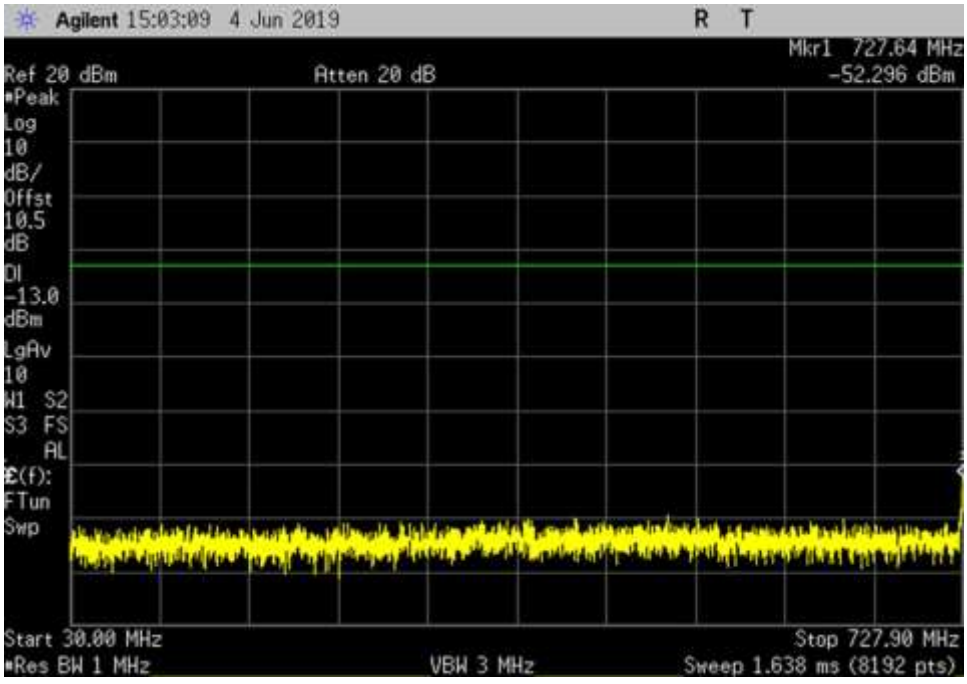
UL_1850-1915_ 8000- 12000MHz_50ft Cable



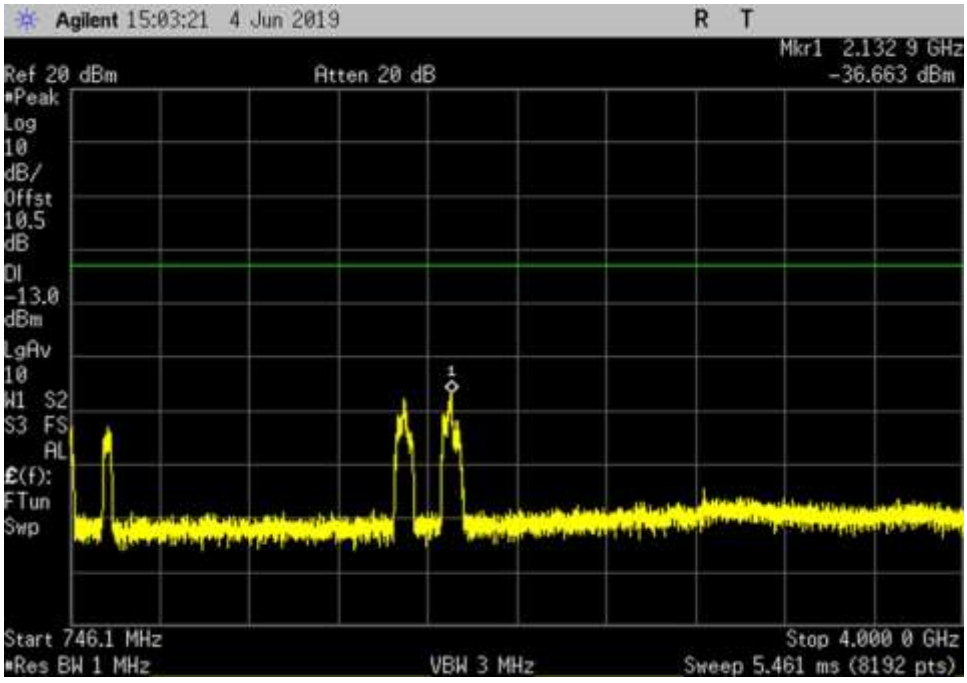
UL_1850-1915_ 12000- 16000MHz_50ft Cable



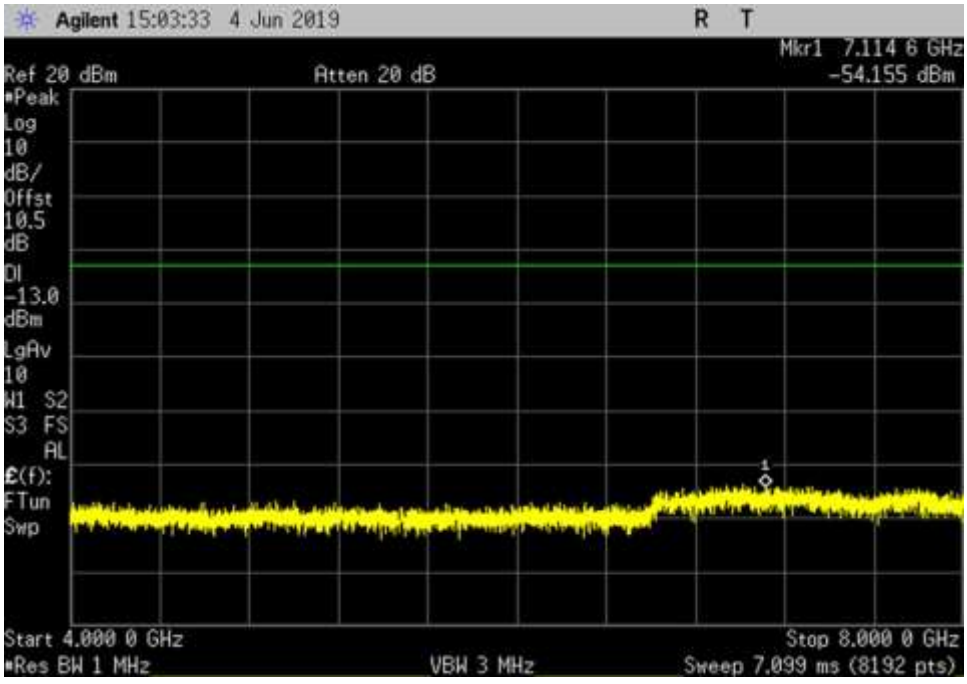
UL_1850-1915_ 16000- 20000MHz_50ft Cable



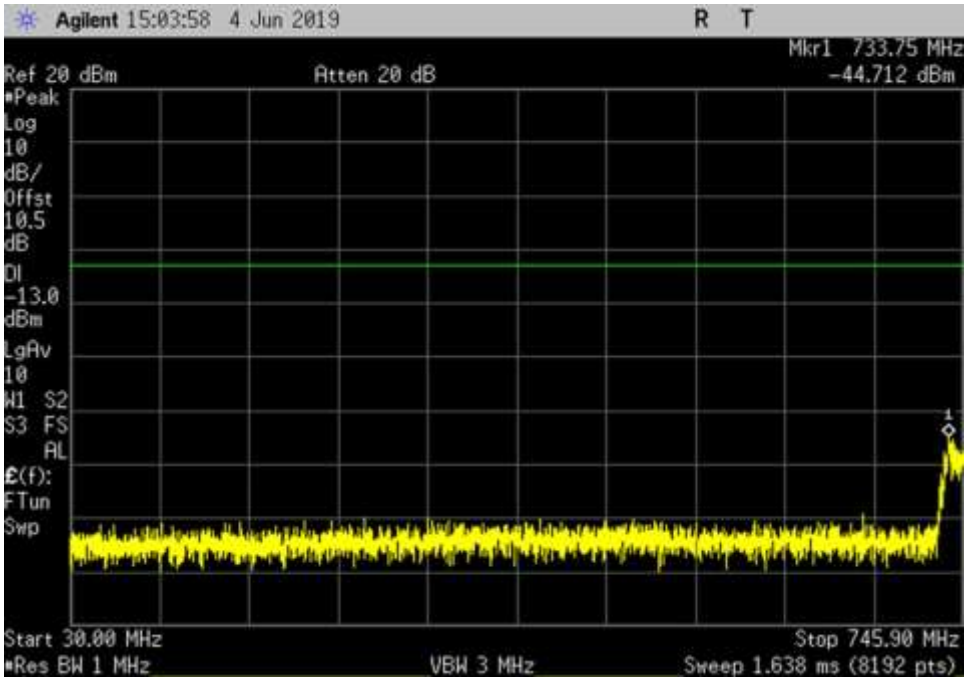
DL_728-746_ 30- 727.9MHz_50ft Cable



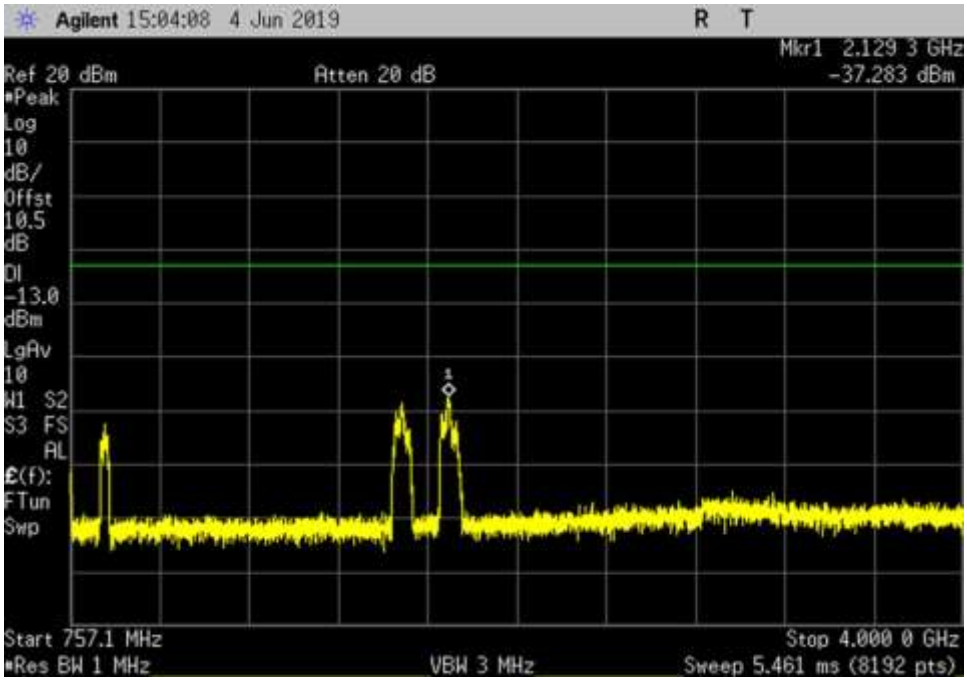
DL_728-746_ 746.1- 4000MHz_50ft Cable



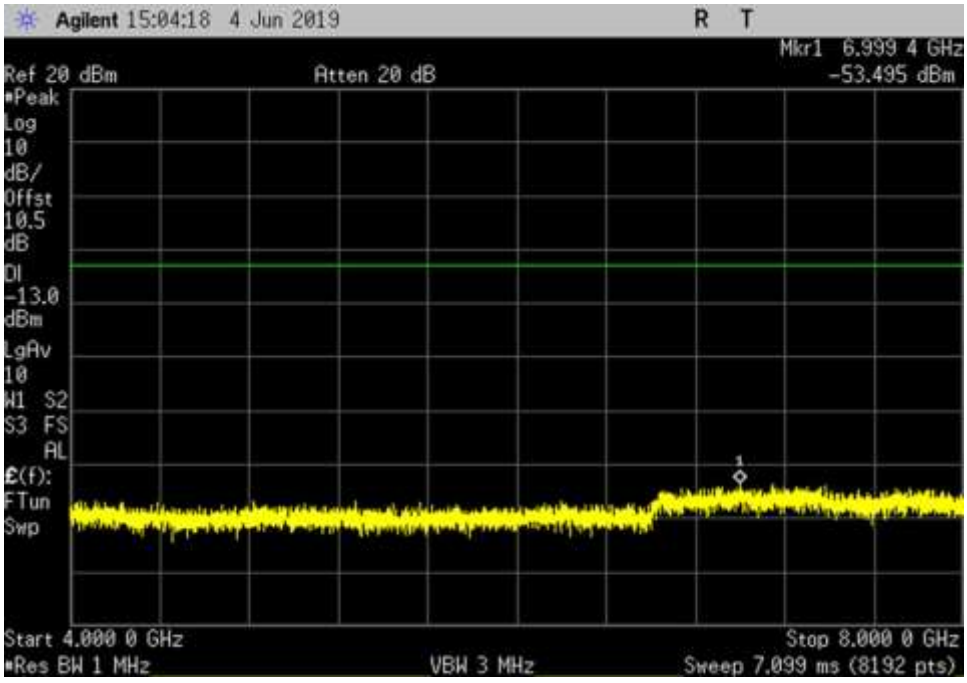
DL_728-746_ 4000- 8000MHz_50ft Cable



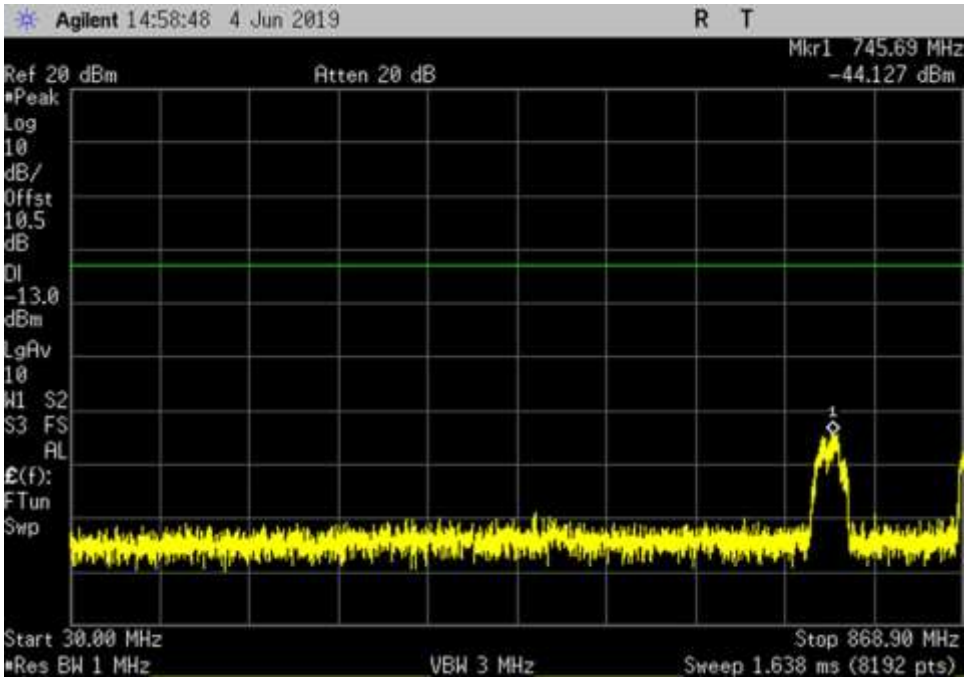
DL_746-757_ 30- 745.9MHz_50ft Cable



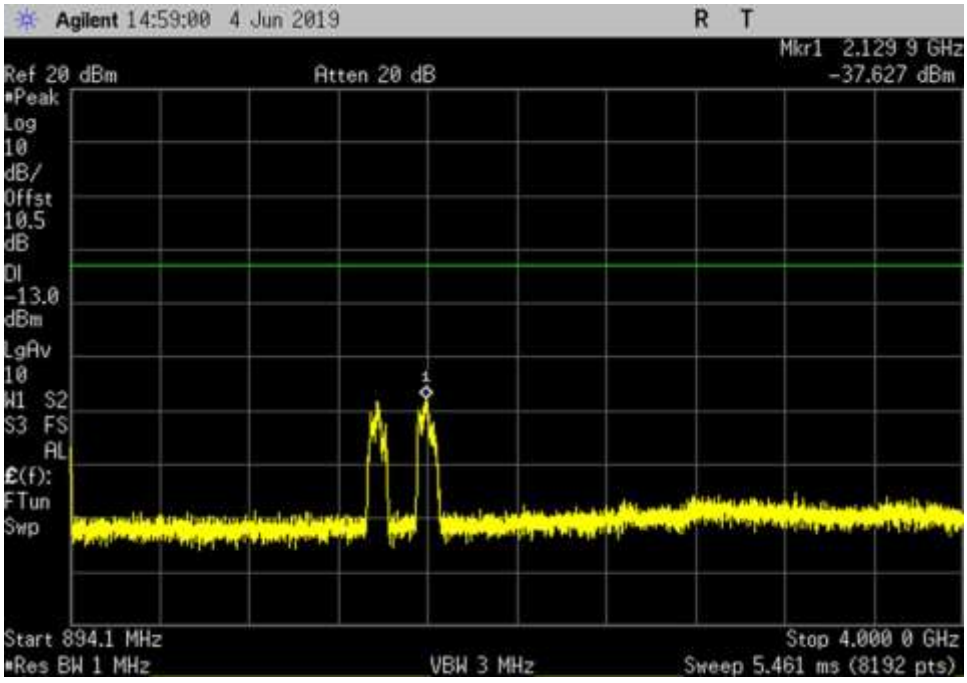
DL_746-757_ 757.1- 4000MHz_50ft Cable



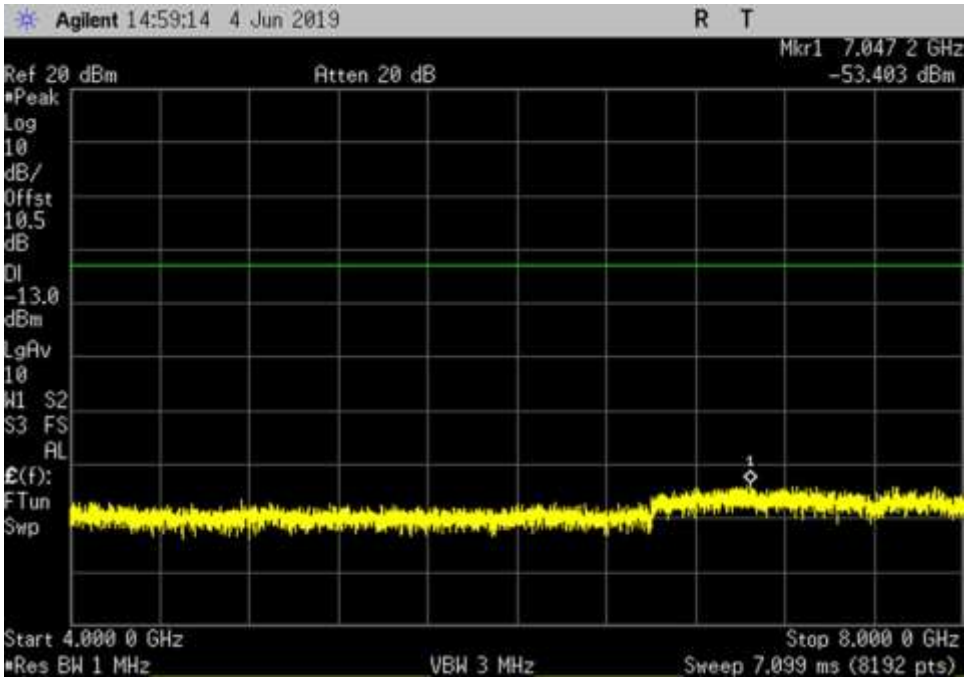
DL_746-757_ 4000- 8000MHz_50ft Cable



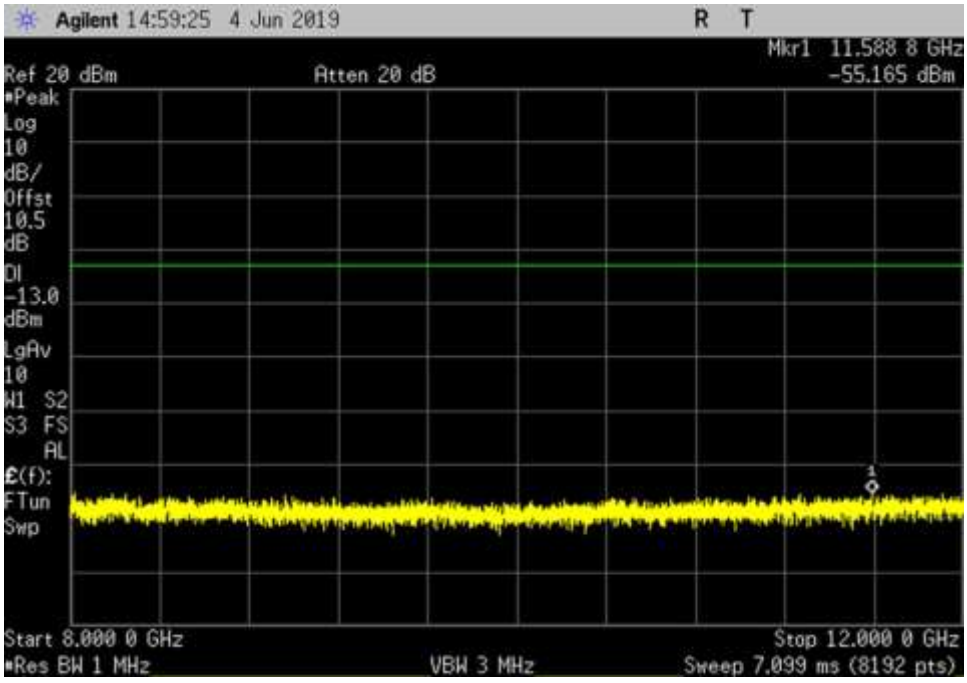
DL_869-894_ 30- 868.9MHz_50ft Cable



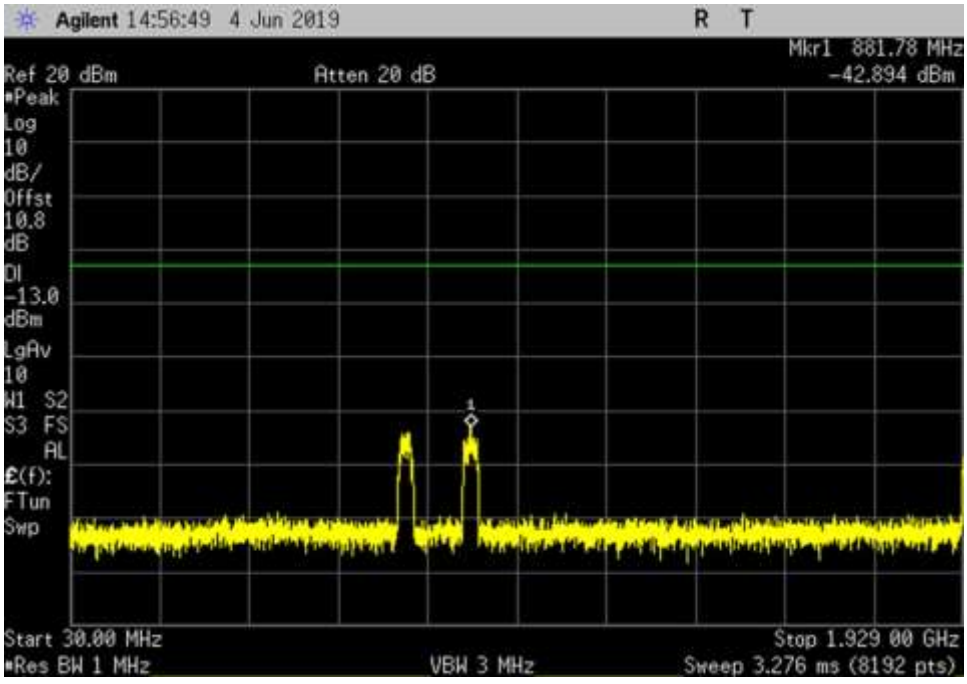
DL_869-894_ 894.1- 4000MHz_50ft Cable



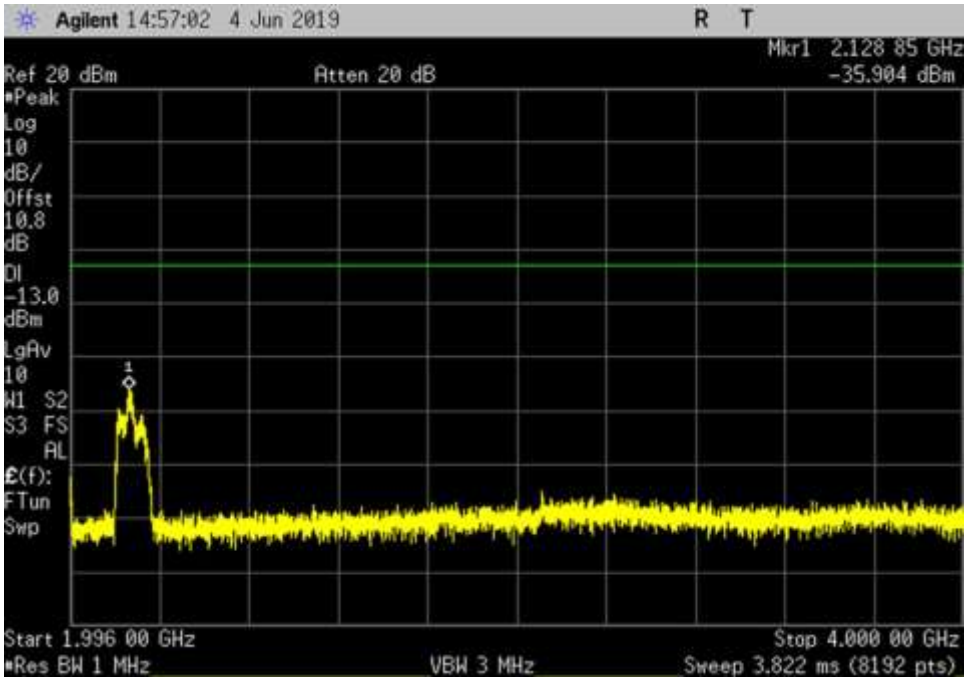
DL_869-894_ 4000- 8000MHz_50ft Cable



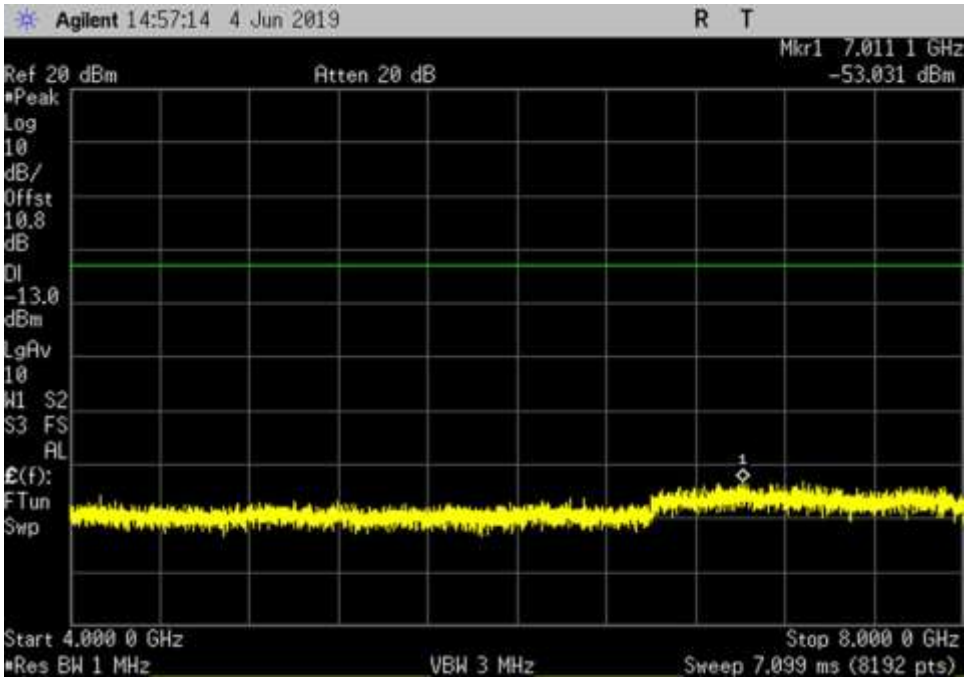
DL_869-894_ 8000- 12000MHz_50ft Cable



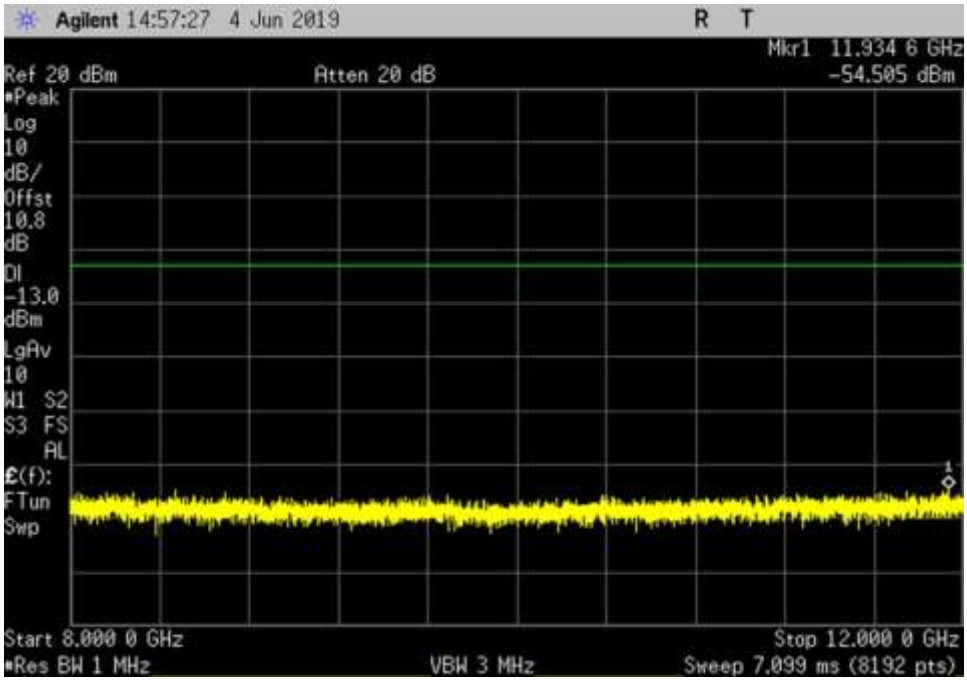
DL_1930-1995_ 30- 1929MHz_50ft Cable



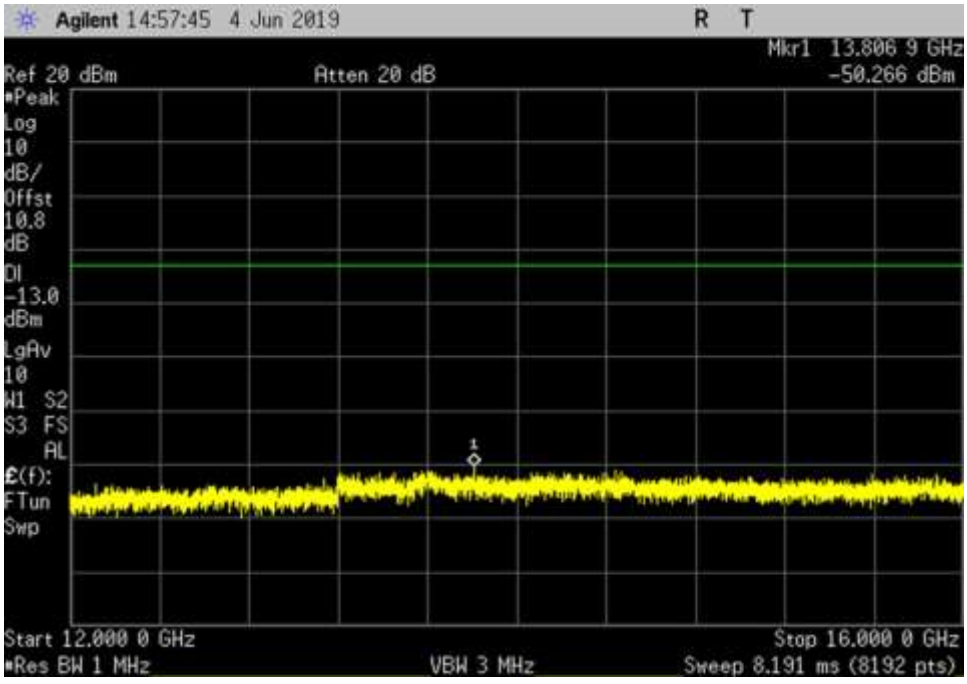
DL_1930-1995_ 1996- 4000MHz_50ft Cable



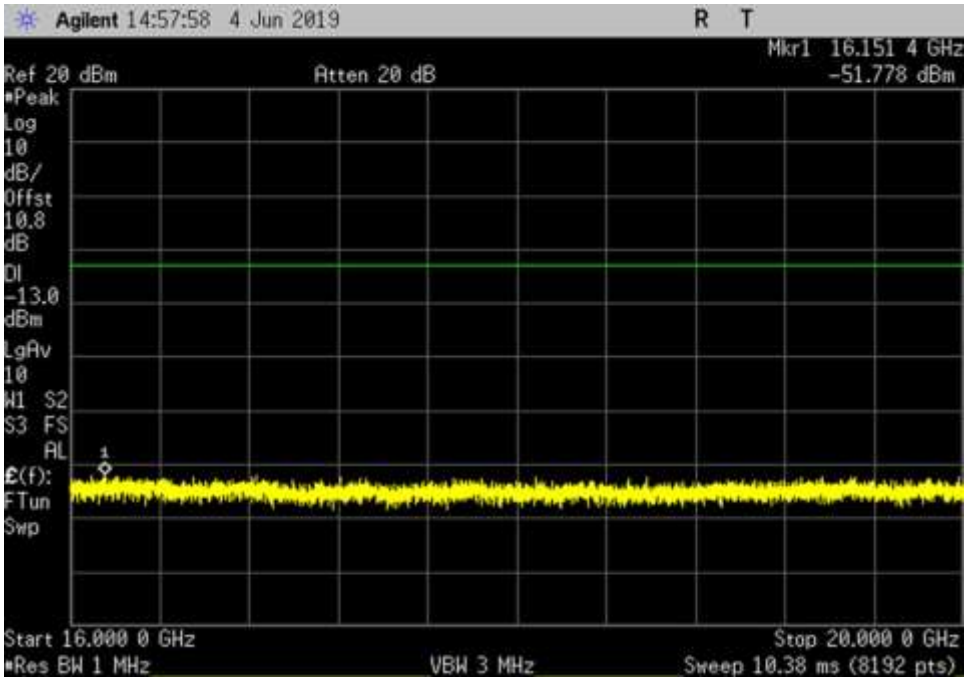
DL_1930-1995_ 4000- 8000MHz_50ft Cable



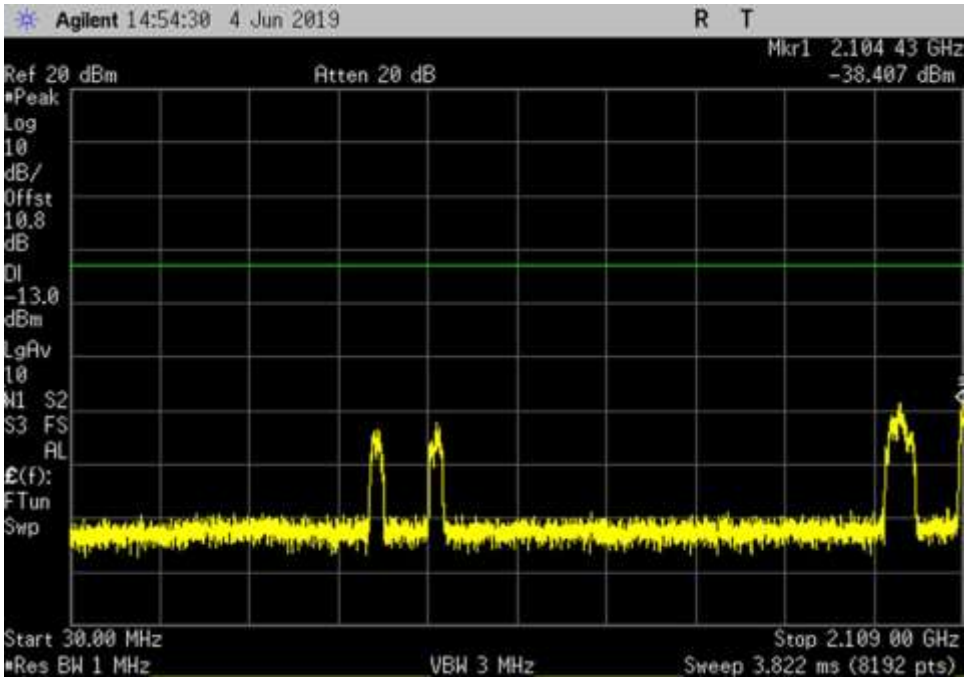
DL_1930-1995_ 8000- 12000MHz_50ft Cable



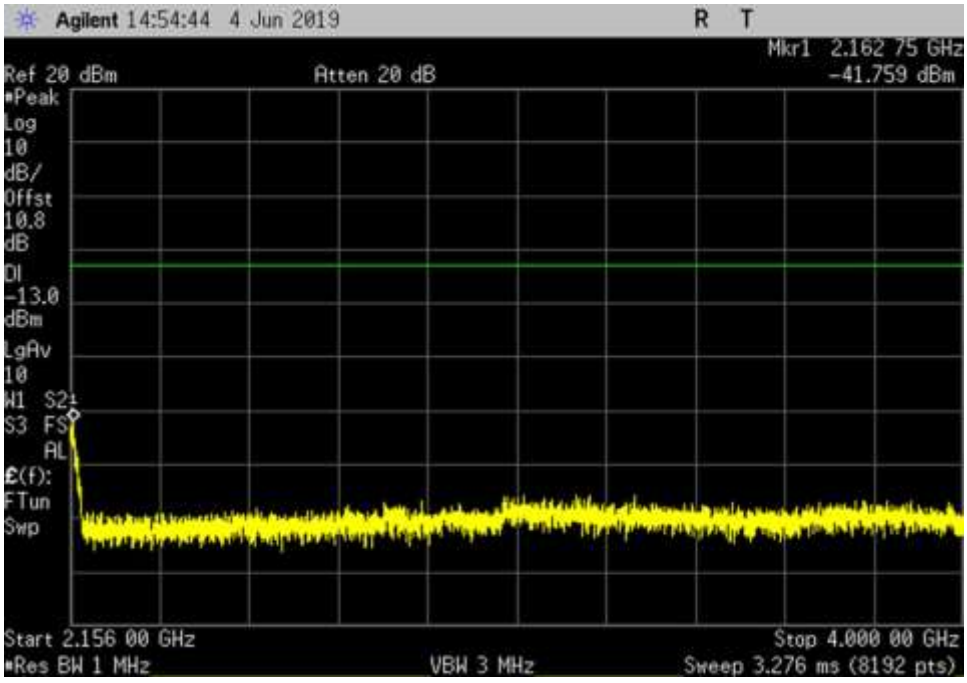
DL_1930-1995_ 12000- 16000MHz_50ft Cable



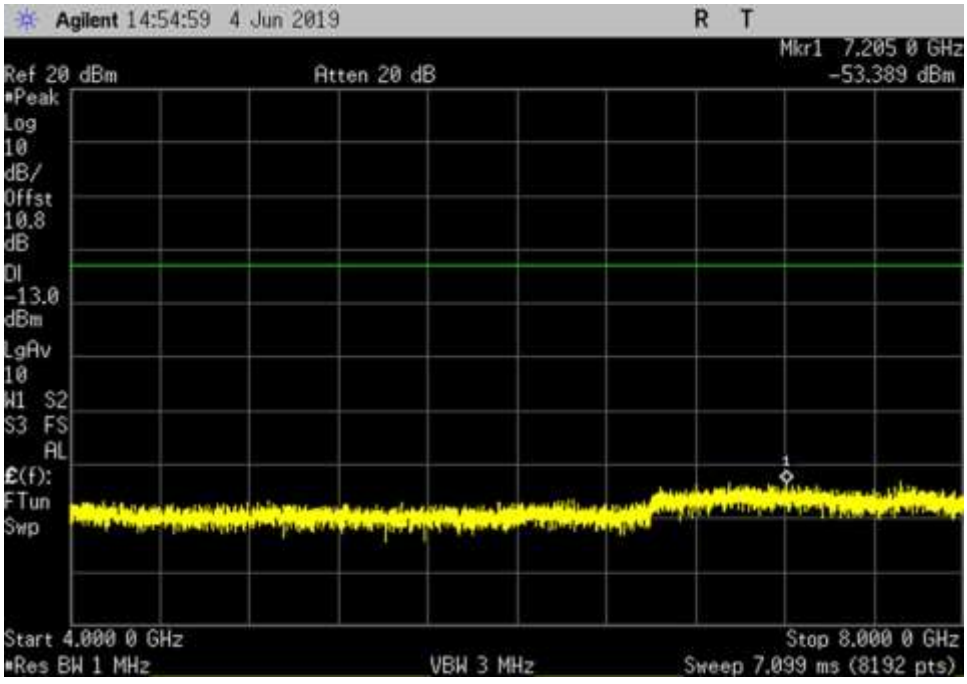
DL_1930-1995_ 16000- 20000MHz_50ft Cable



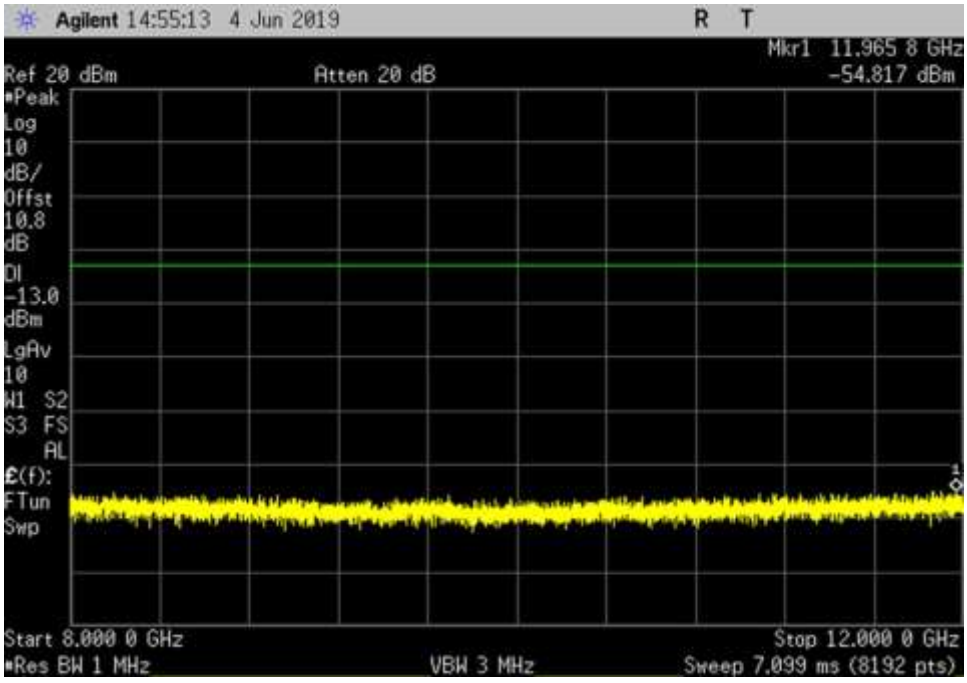
DL_2110-2155_ 30- 2109MHz_50ft Cable



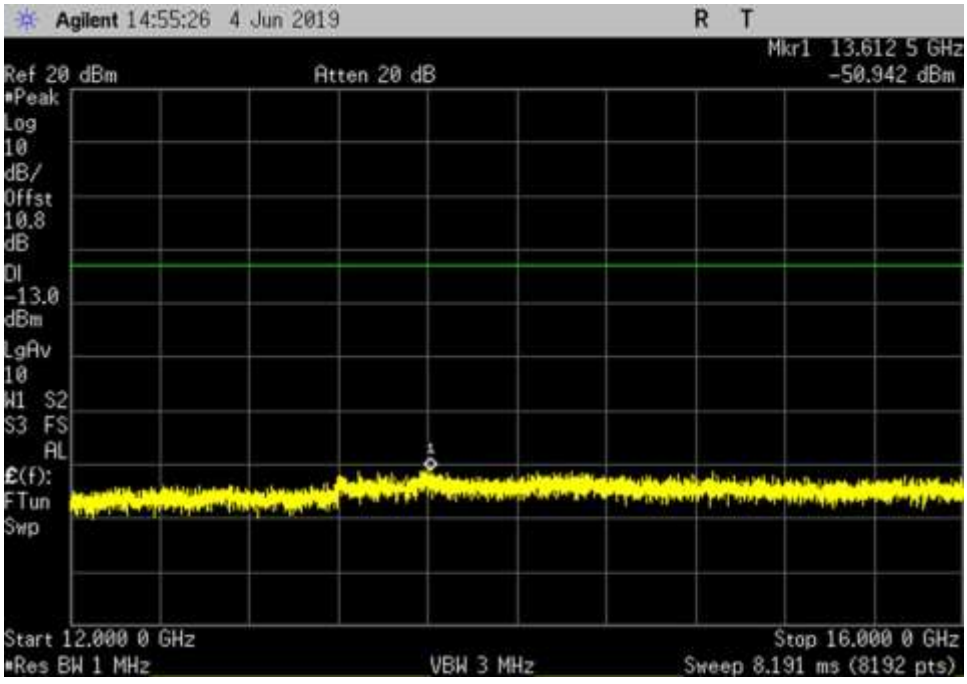
DL_2110-2155_ 2156- 4000MHz_50ft Cable



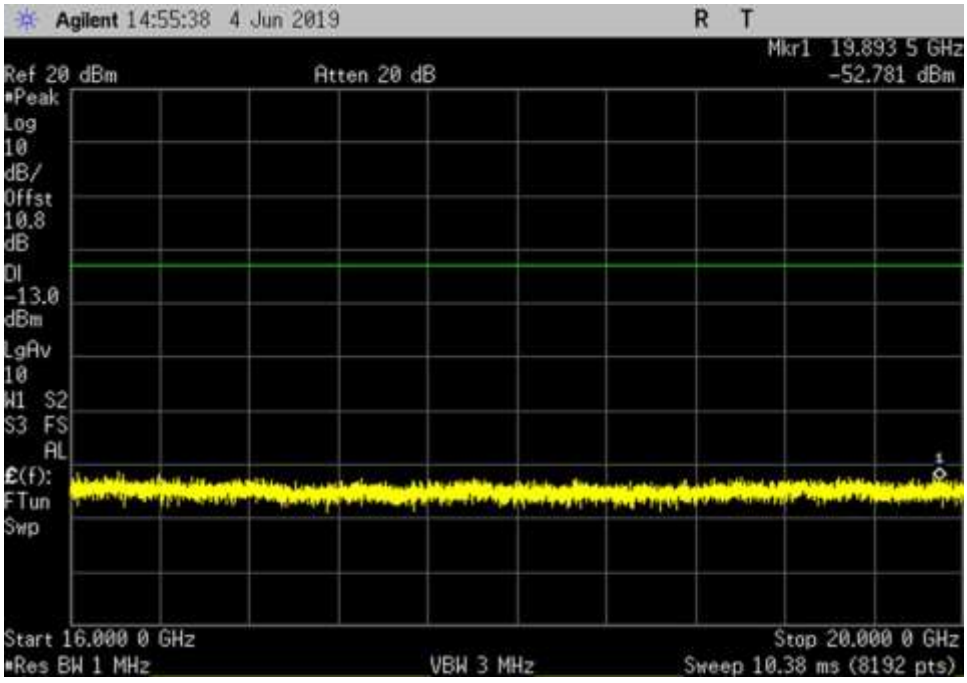
DL_2110-2155_ 4000- 8000MHz_50ft Cable



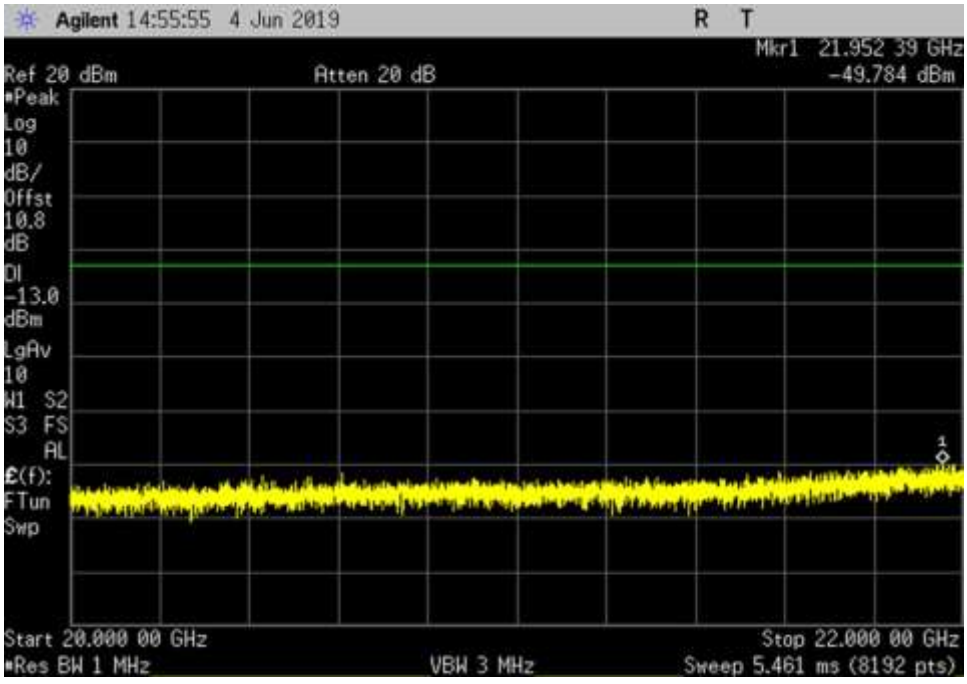
DL_2110-2155_ 8000- 12000MHz_50ft Cable



DL_2110-2155_ 12000- 16000MHz_50ft Cable

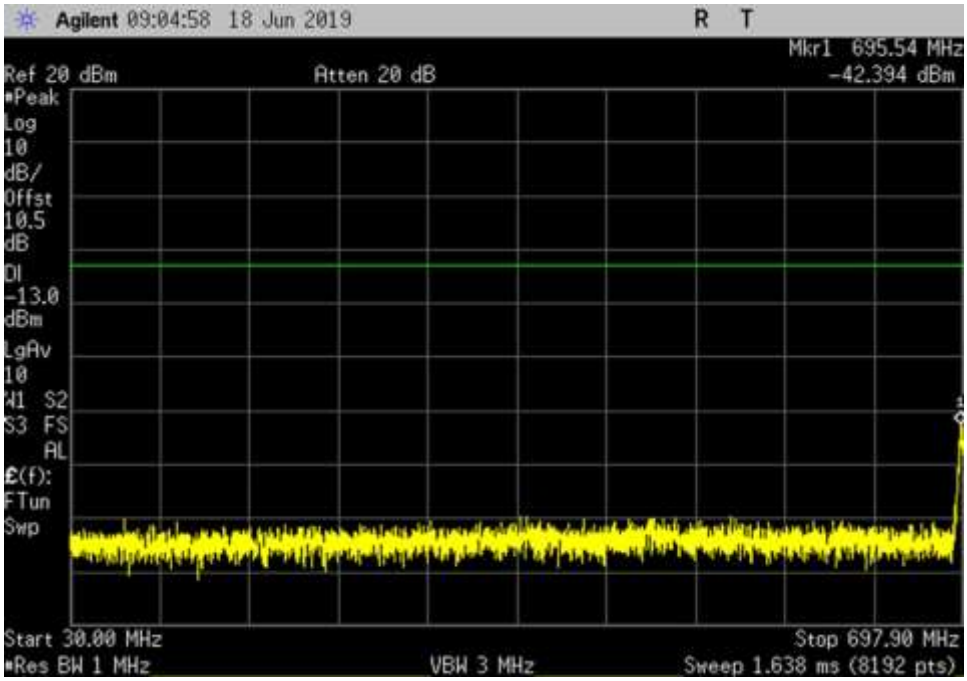


DL_2110-2155_ 16000- 20000MHz_50ft Cable

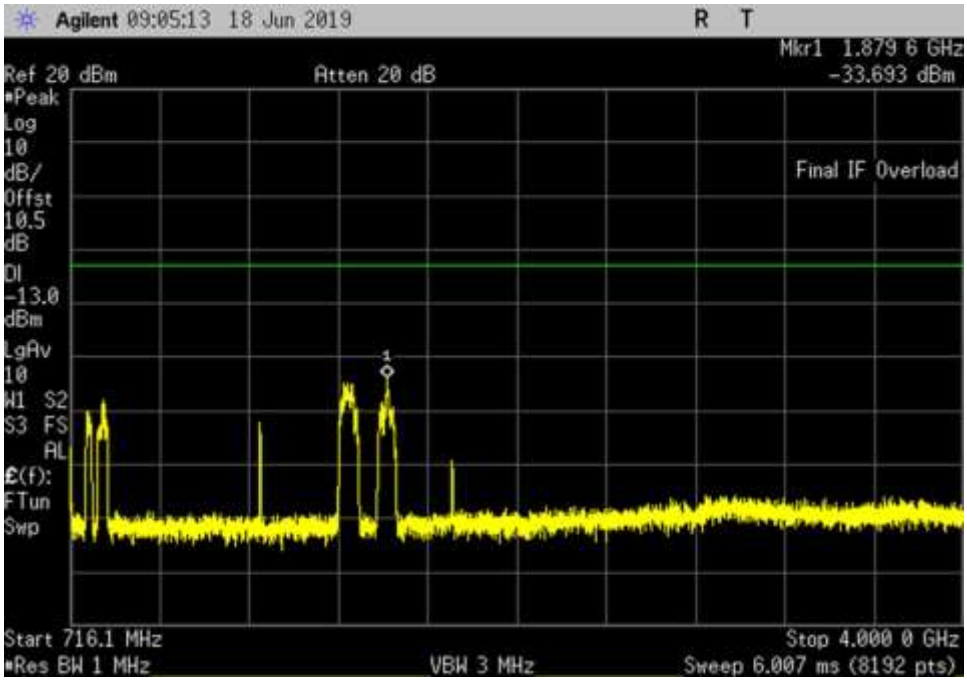


DL_2110-2155_ 20000- 22000MHz_50ft Cable

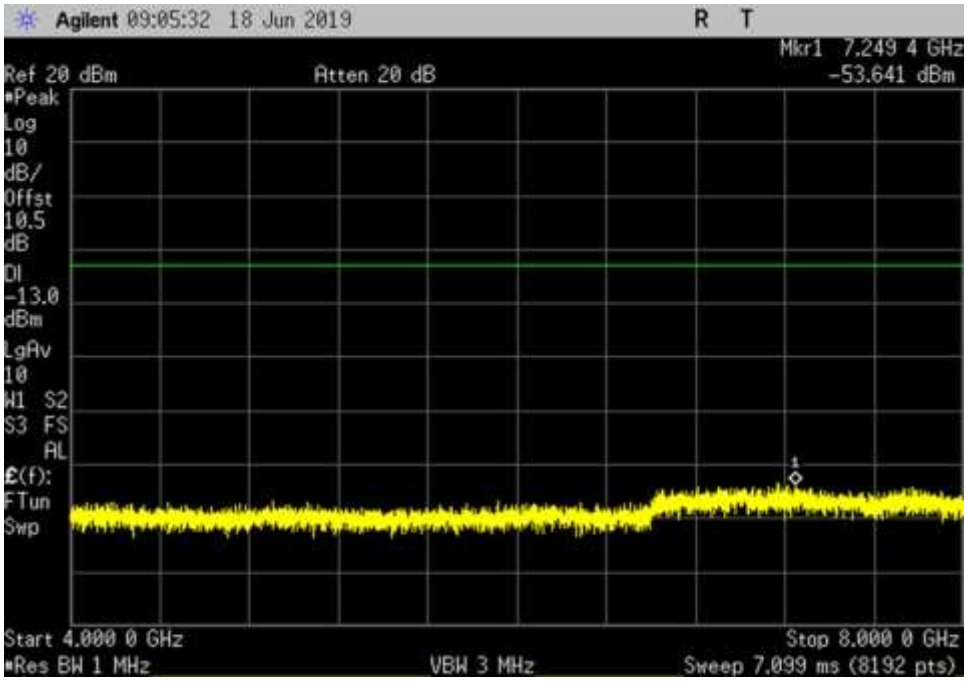
Configuration 2



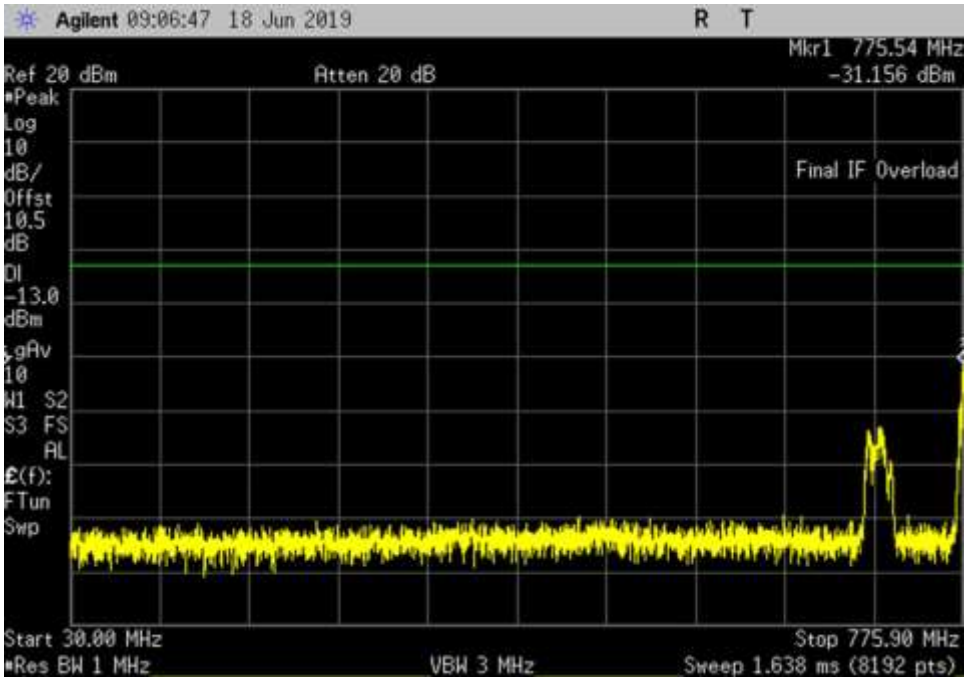
UL_698-716_ 30- 697.9MHz



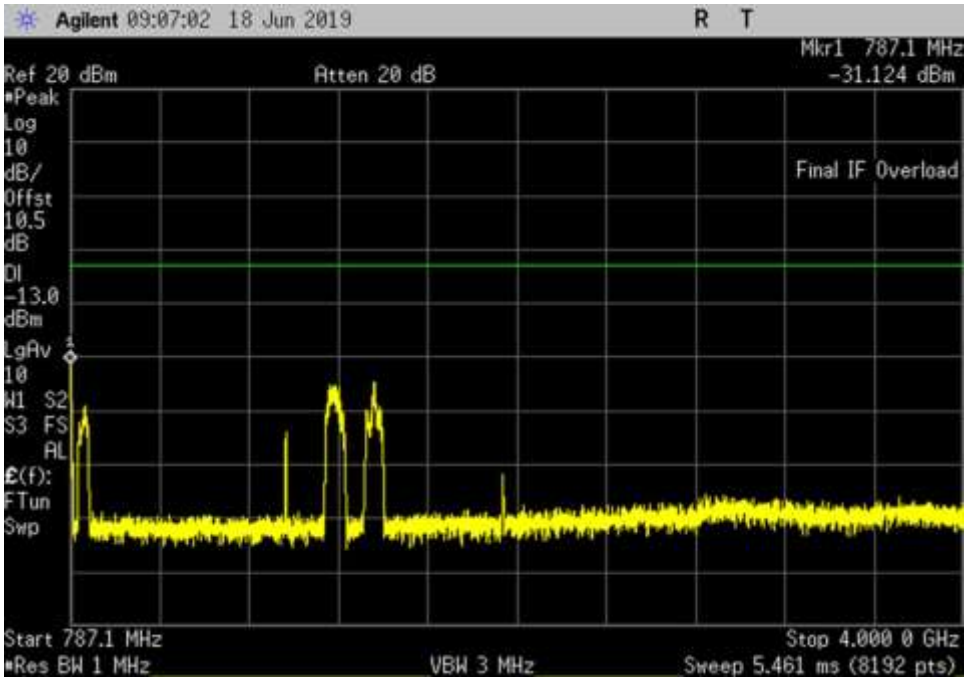
UL_698-716_ 716.1- 4000MHz



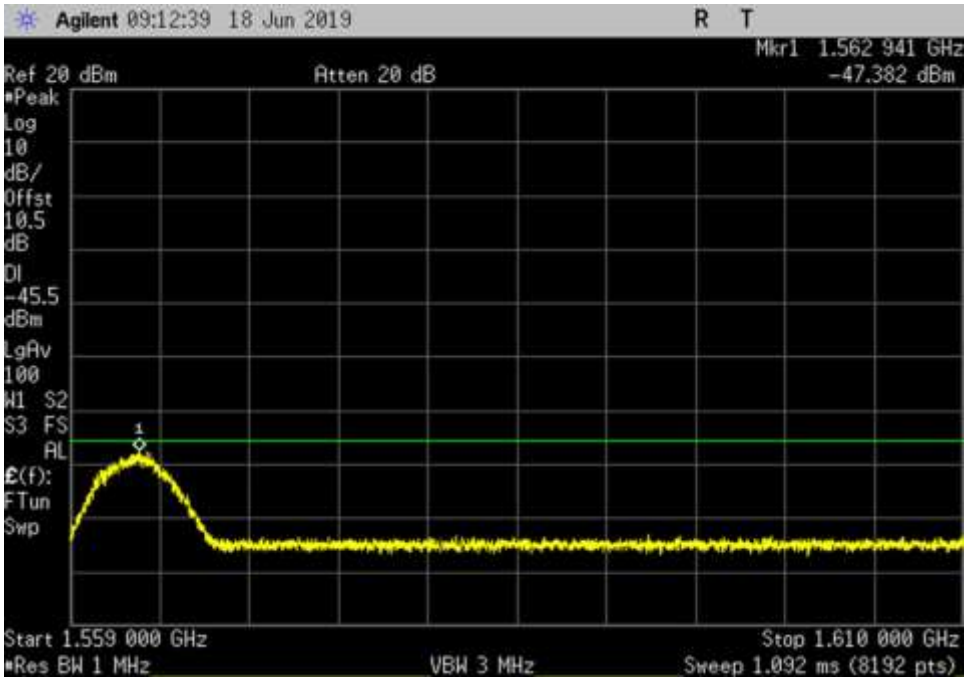
UL_698-716_ 4000- 8000MHz



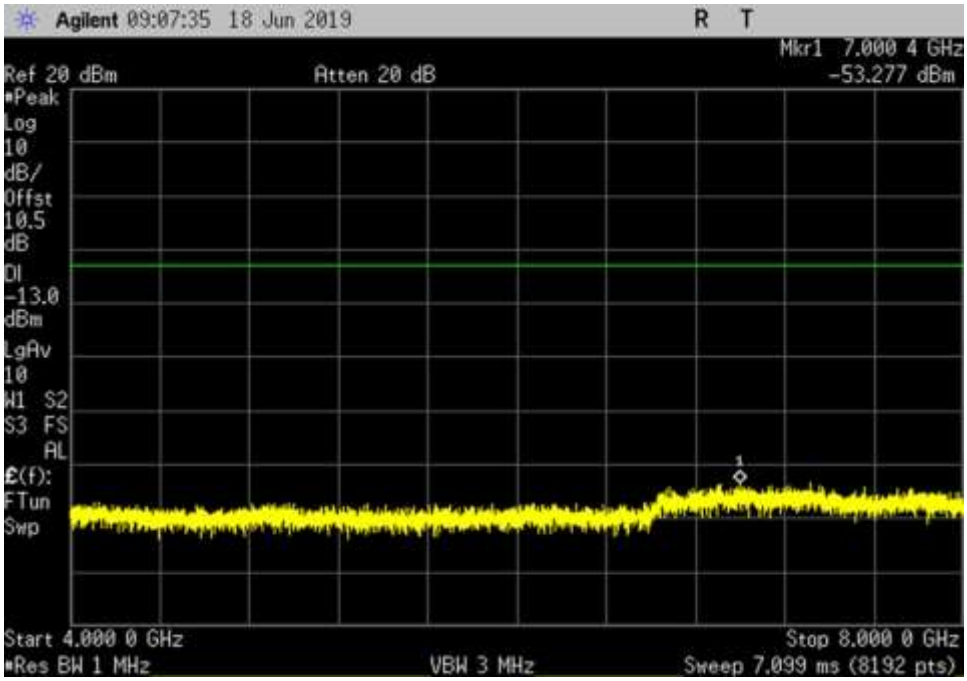
UL_776-787_ 30- 775.9MHz



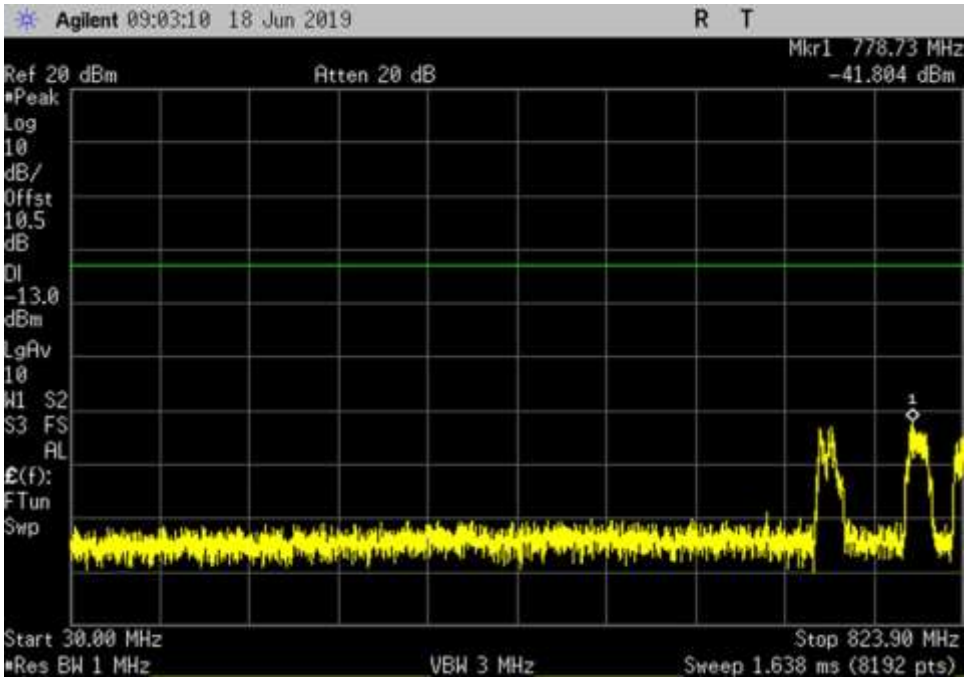
UL_776-787_ 787.1- 4000MHz



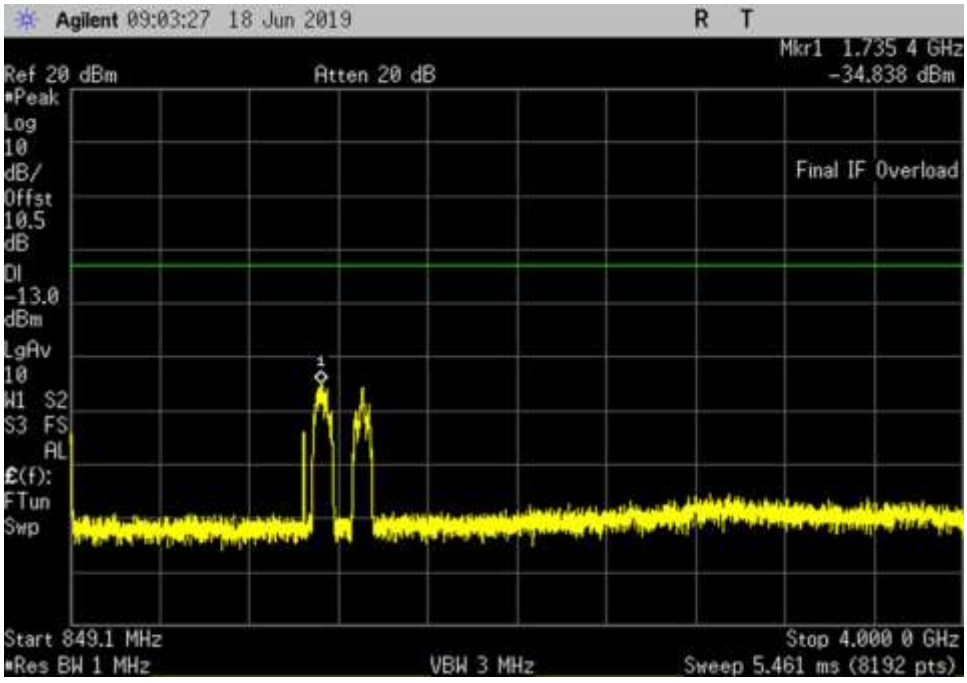
UL_776-787_ 1559- 1610MHz



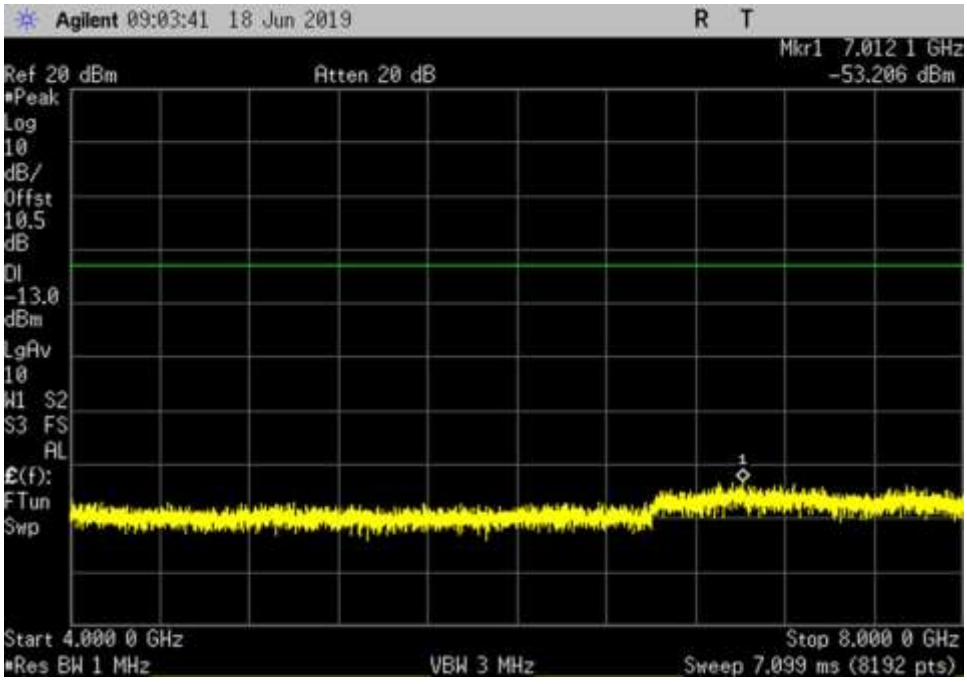
UL_776-787_ 4000- 8000MHz



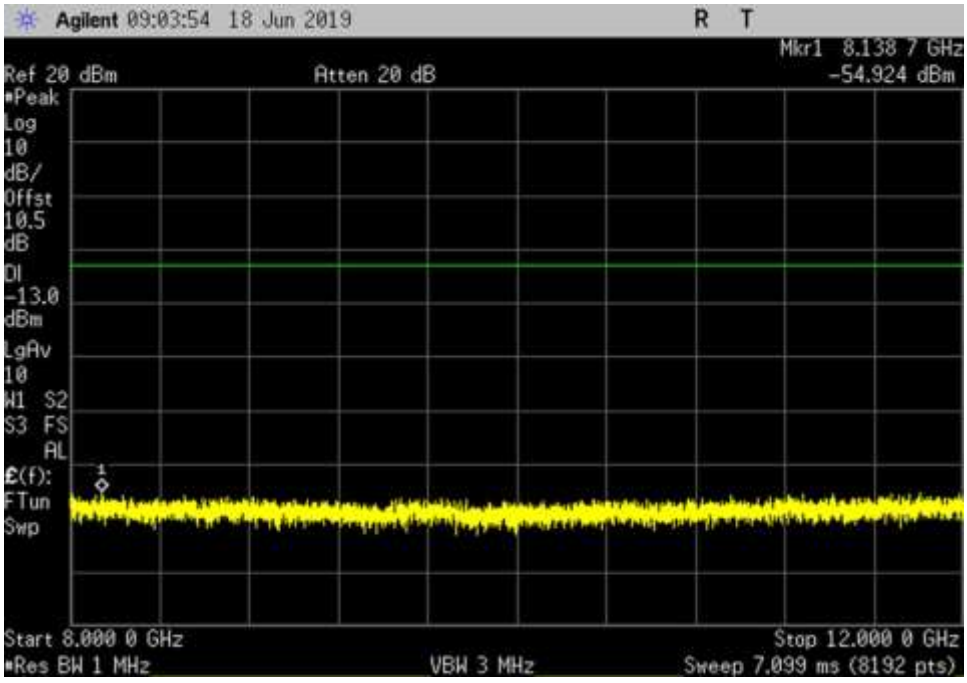
UL_824-849_30- 823.9MHz



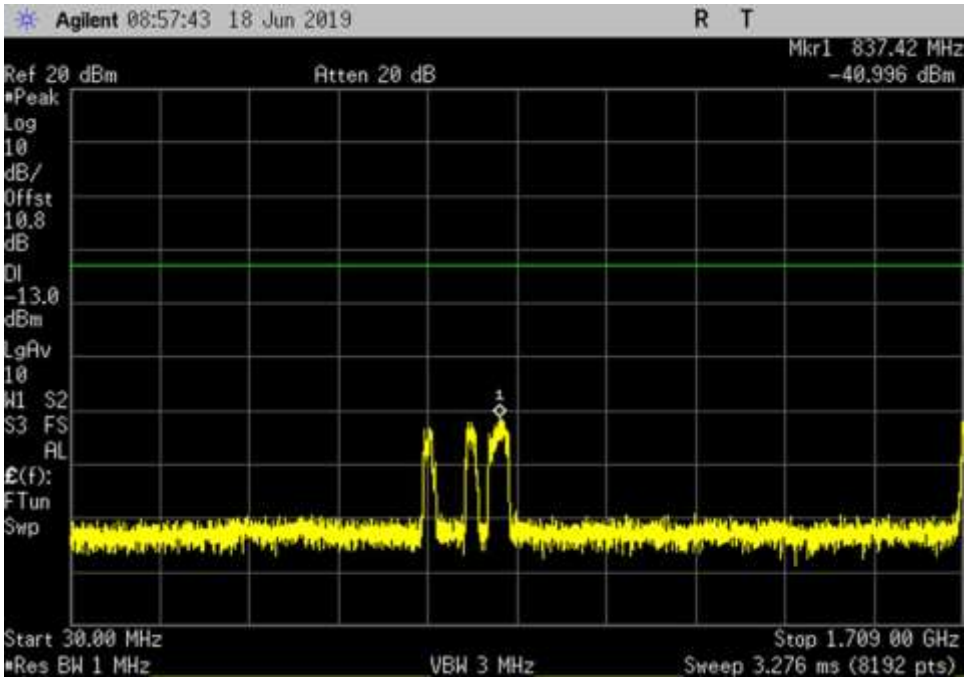
UL_824-849_849.1- 4000MHz



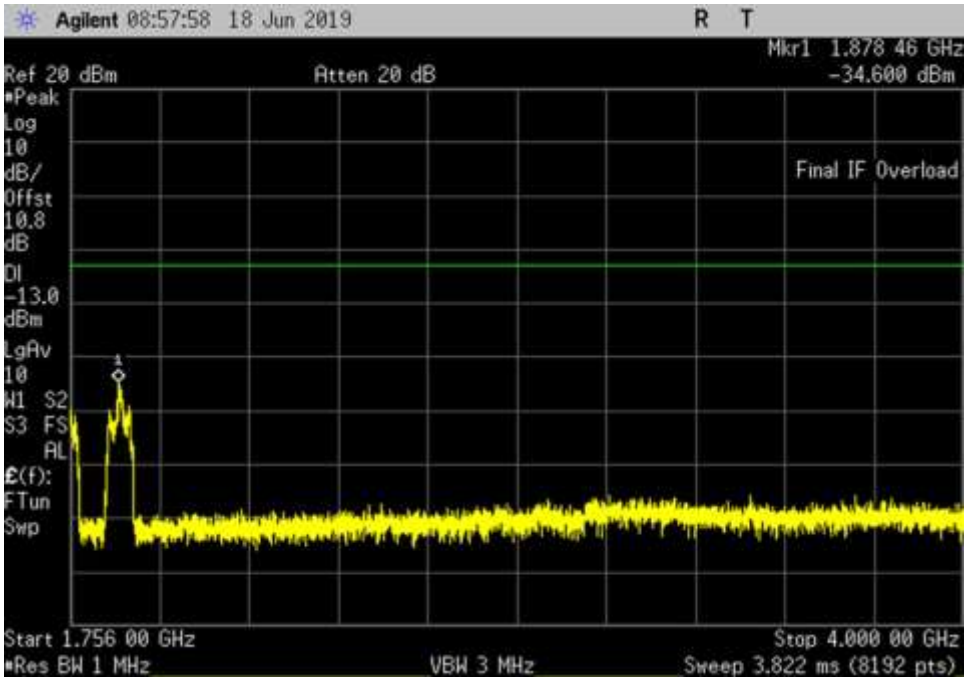
UL_824-849_4000- 8000MHz



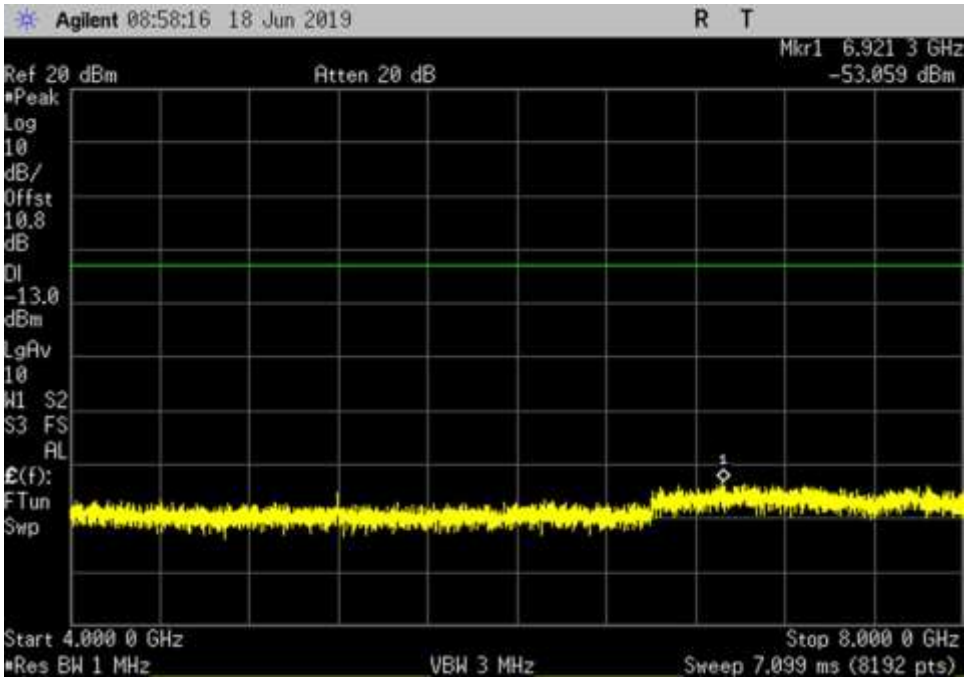
UL_824-849_8000- 12000MHz



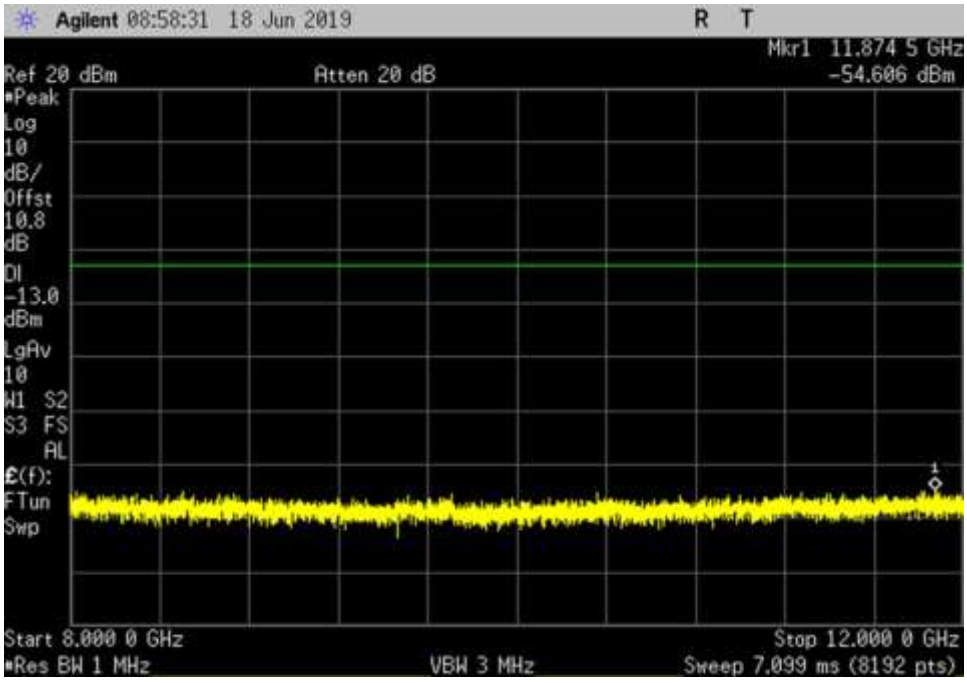
UL_1710-1755_30- 1709MHz



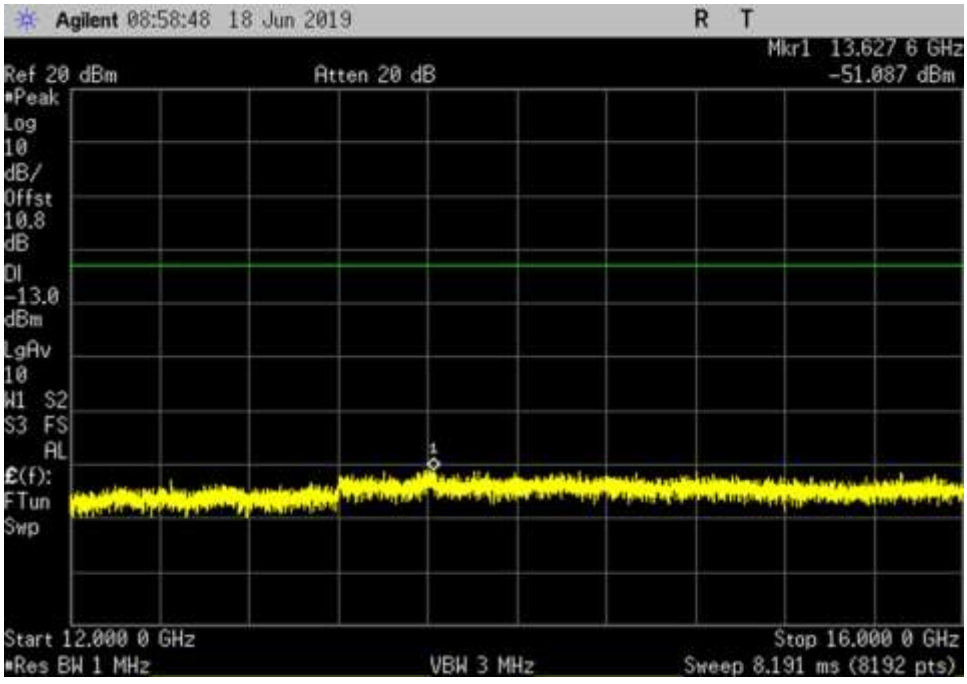
UL_1710-1755_ 1756- 4000MHz



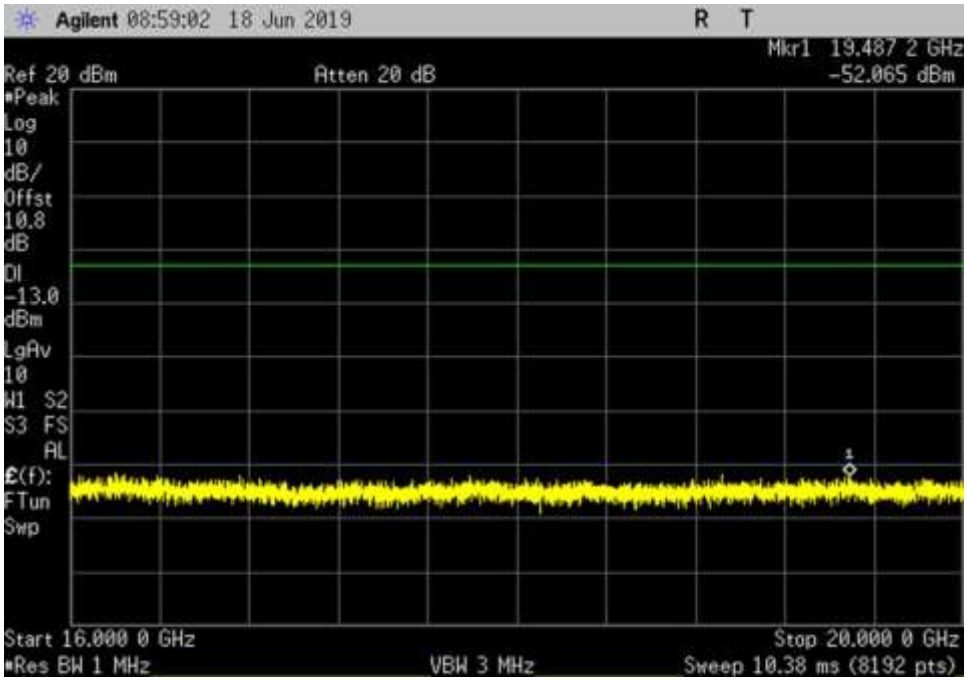
UL_1710-1755_ 4000- 8000MHz



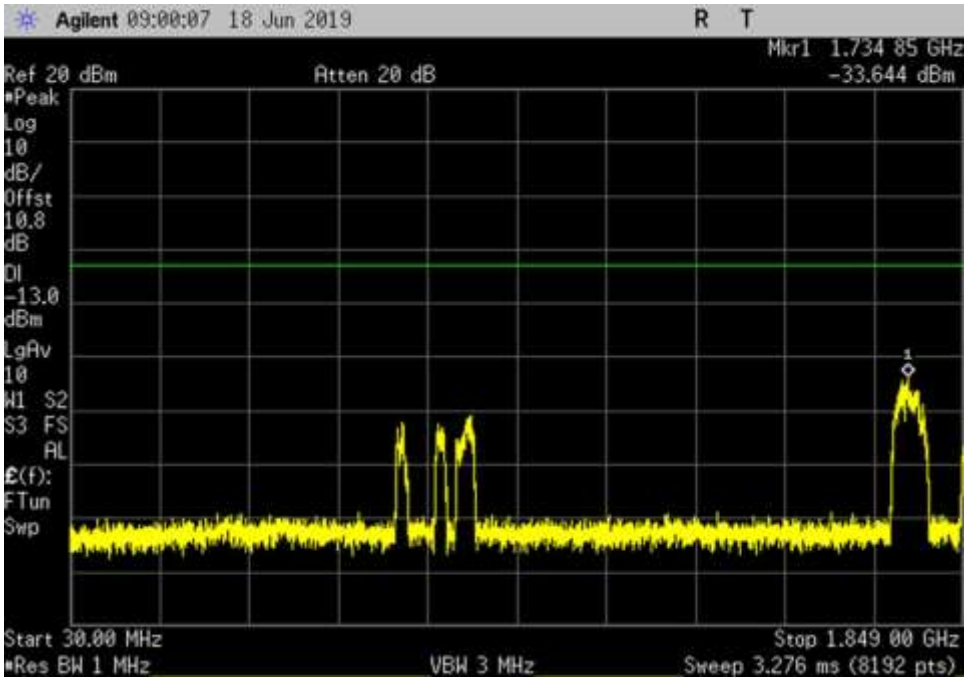
UL_1710-1755_8000- 12000MHz



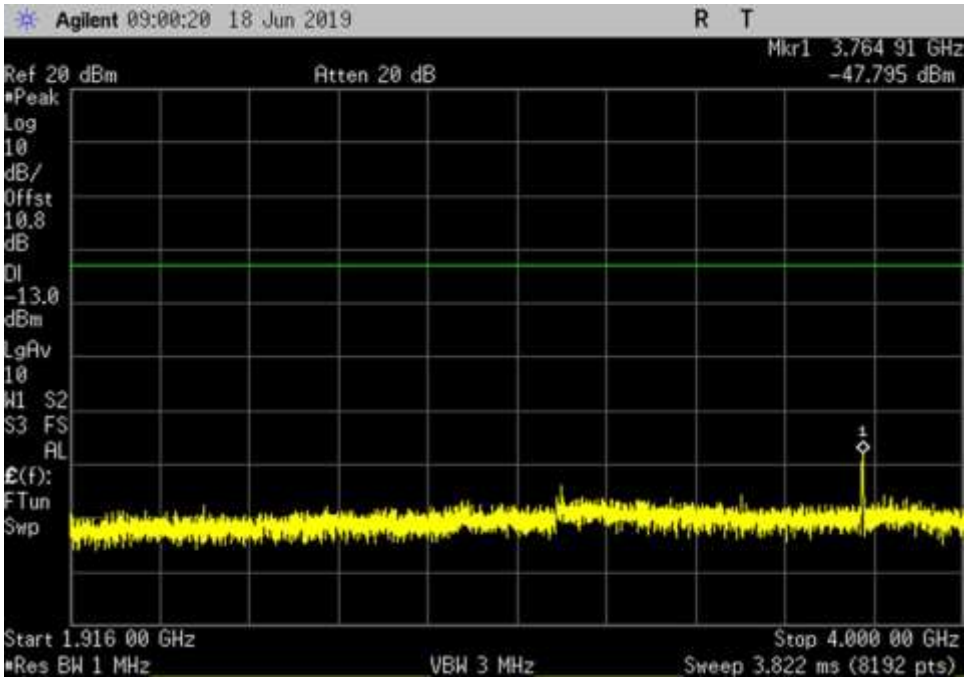
UL_1710-1755_12000- 16000MHz



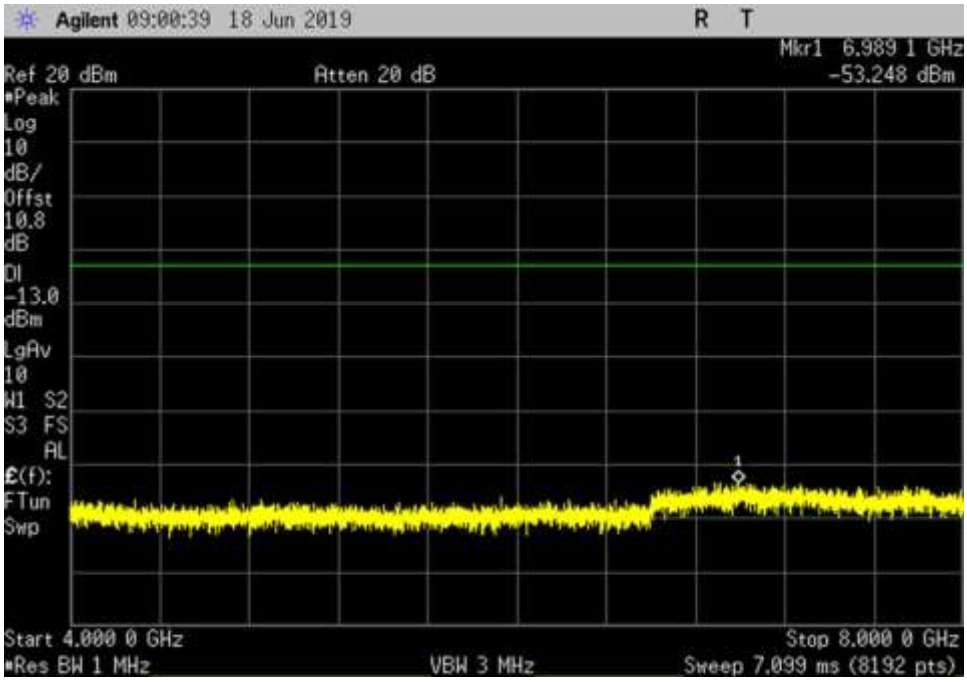
UL_1710-1755_ 16000- 20000MHz



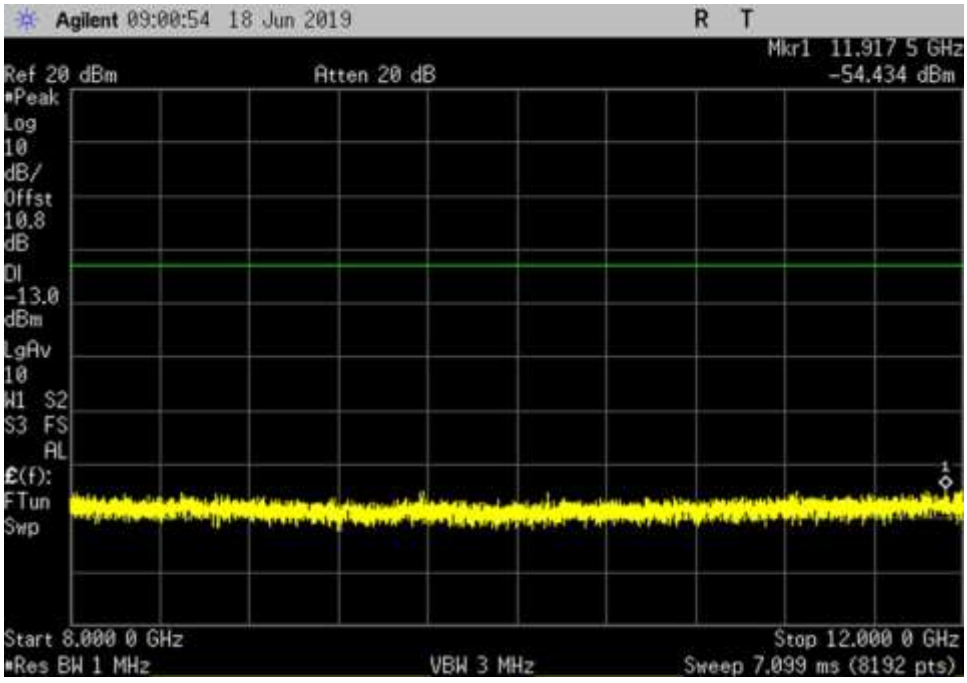
UL_1850-1915_30- 1849MHz



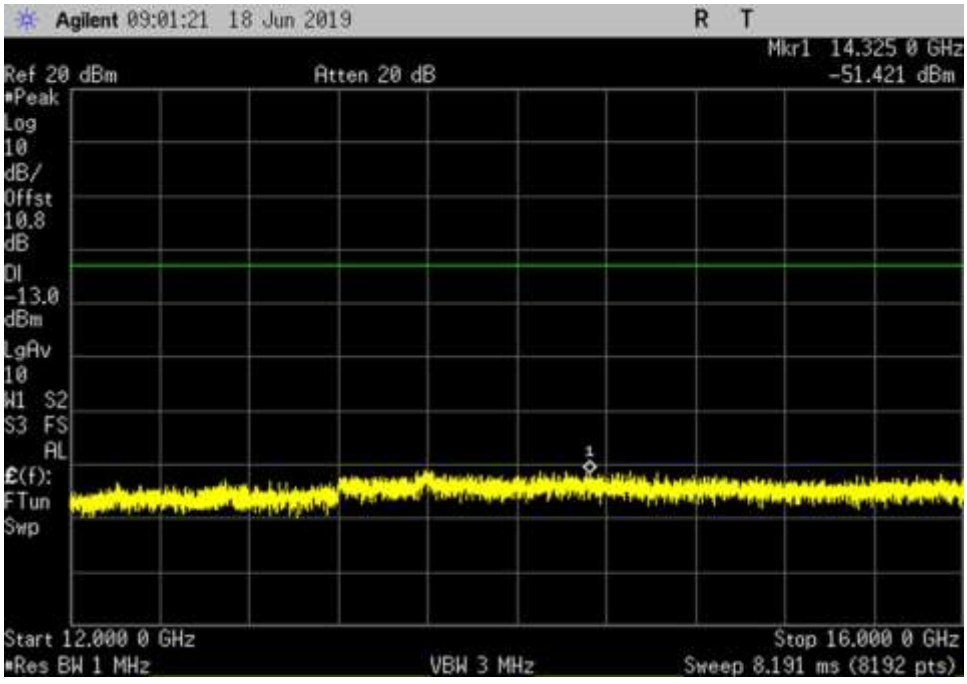
UL_1850-1915_1916- 4000MHz



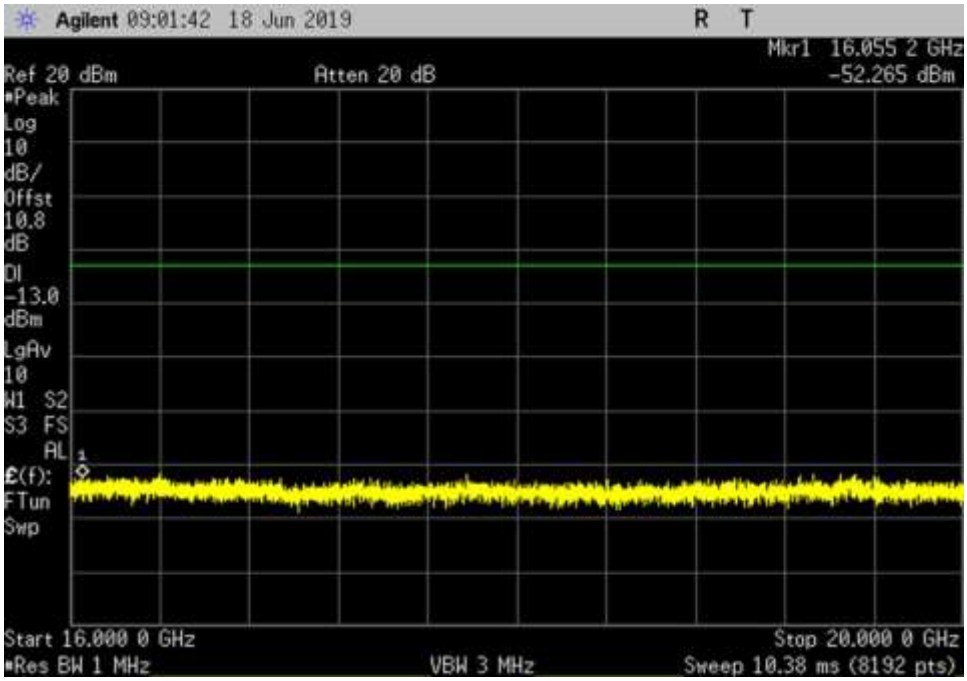
UL_1850-1915_4000- 8000MHz



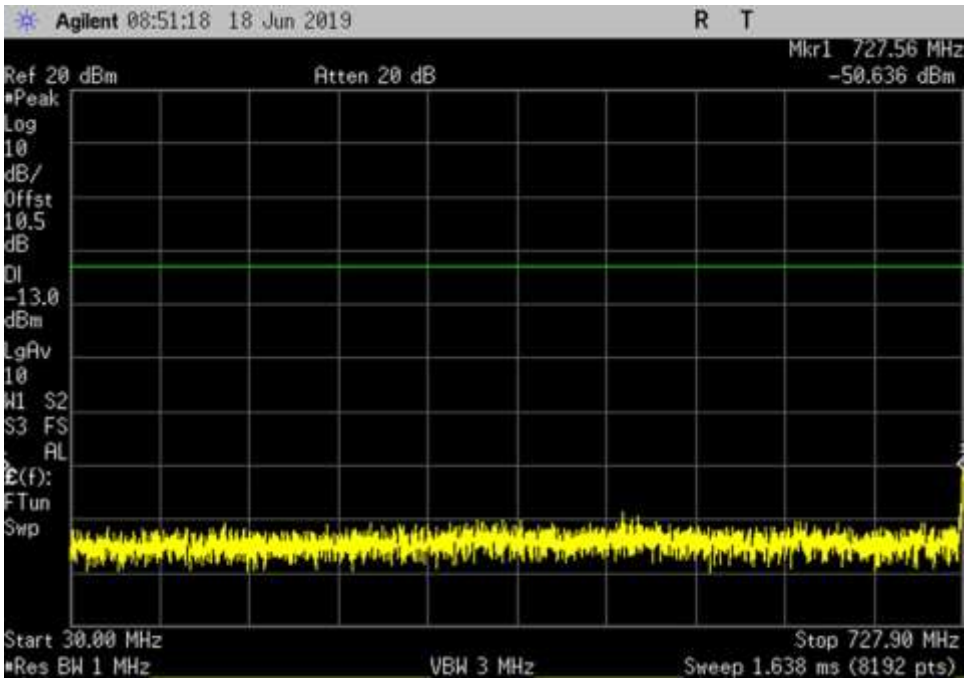
UL_1850-1915_ 8000- 12000MHz



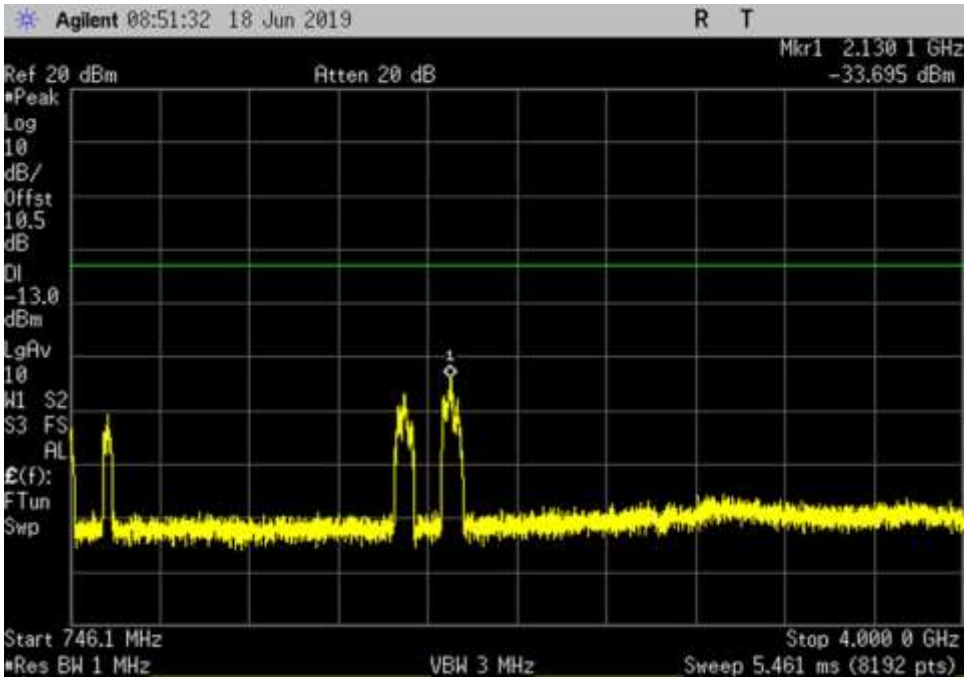
UL_1850-1915_ 12000- 16000MHz



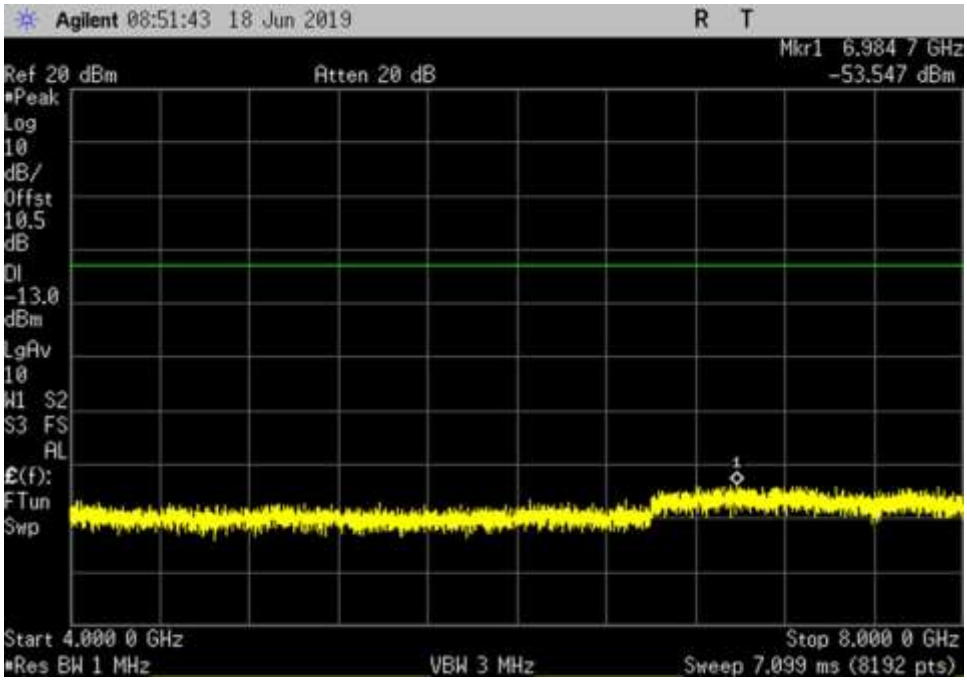
UL_1850-1915_ 16000- 20000MHz



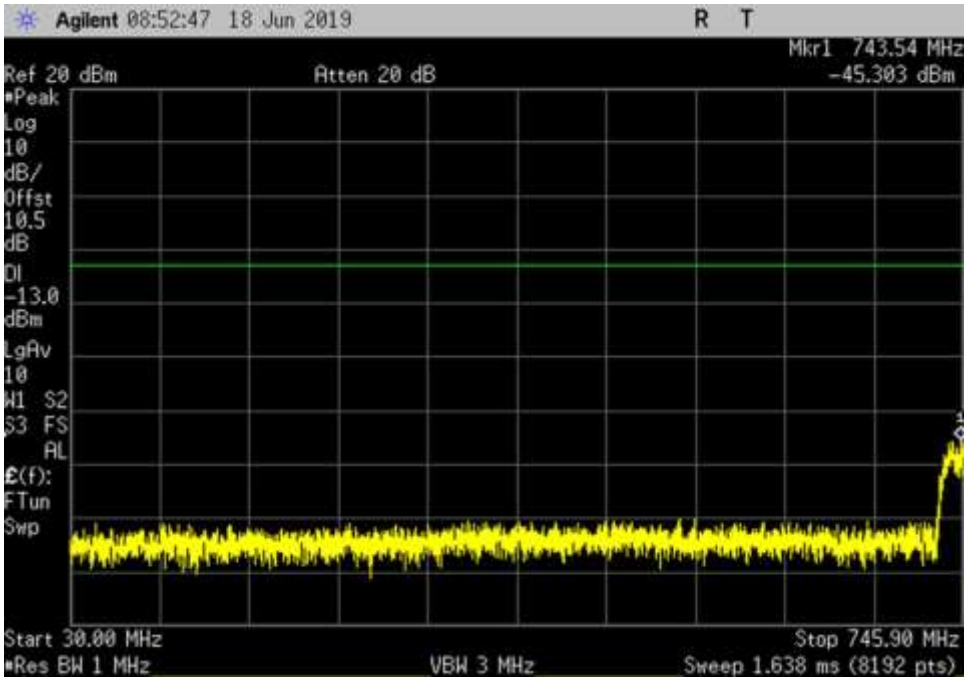
DL_728-746_30- 727.9MHz



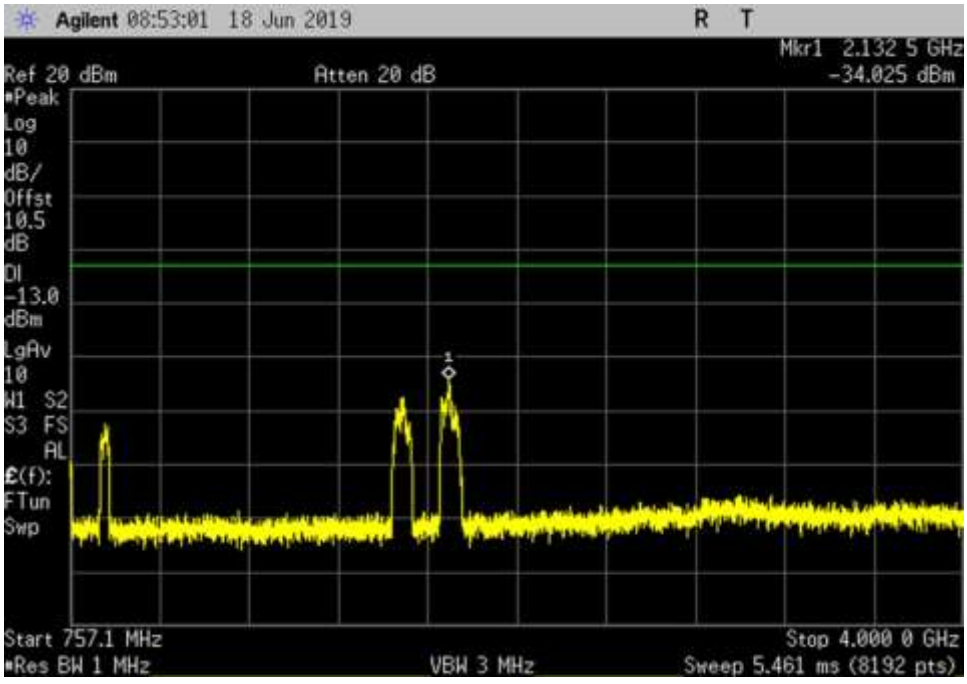
DL_728-746_746.1- 4000MHz



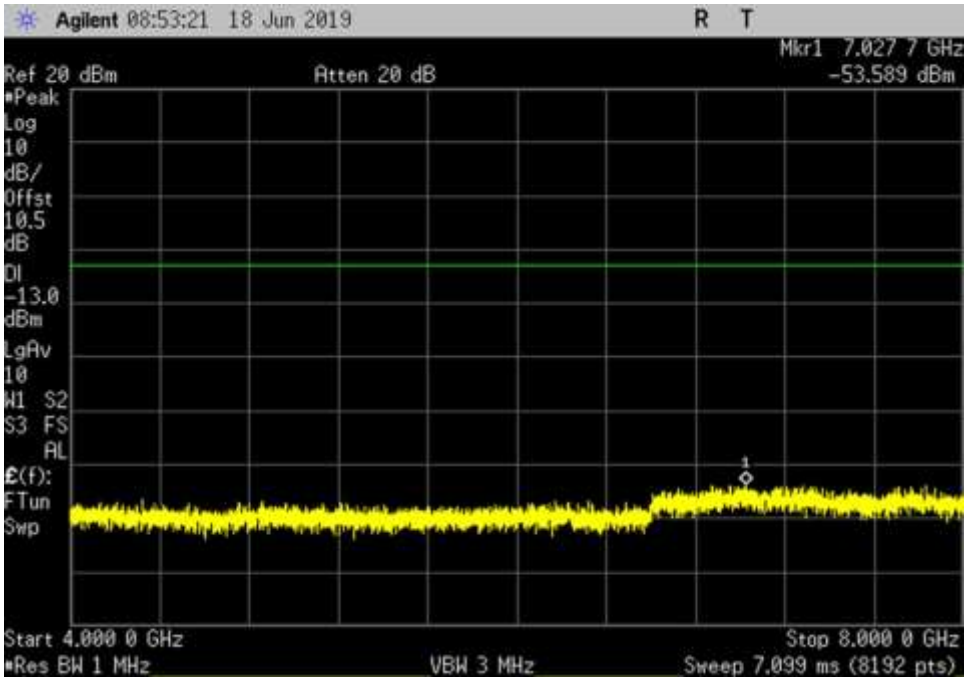
DL_728-746_ 4000- 8000MHz



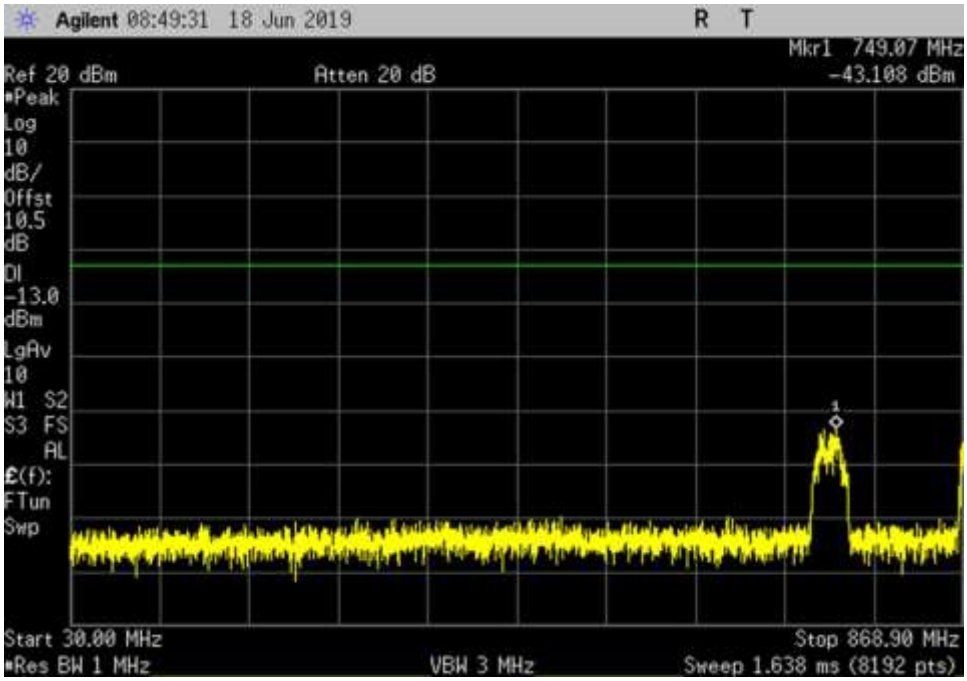
DL_746-757_30- 745.9MHz



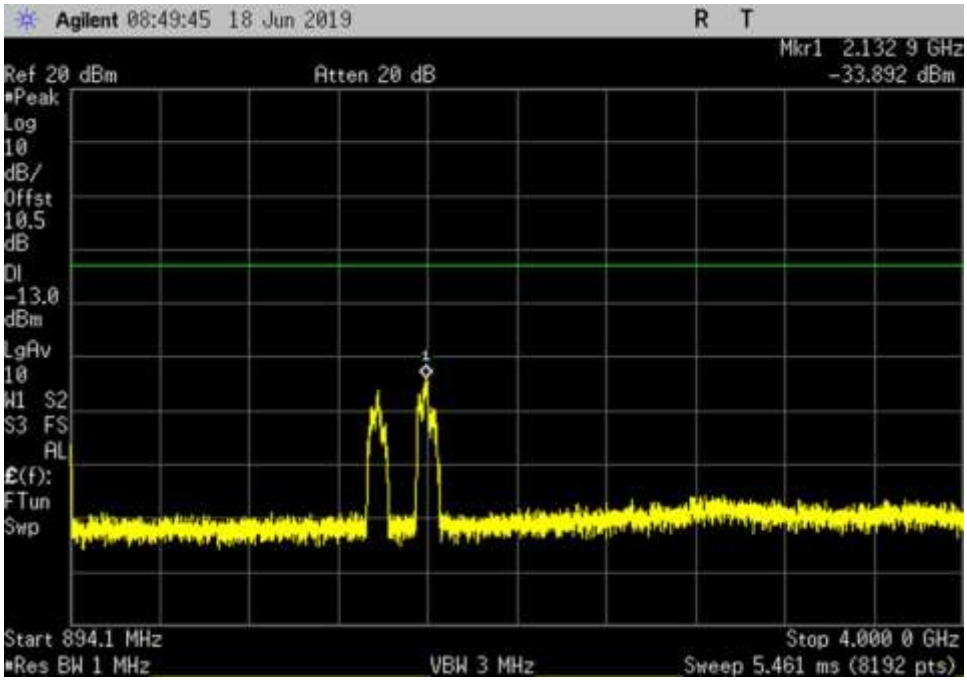
DL_746-757_757.1- 4000MHz



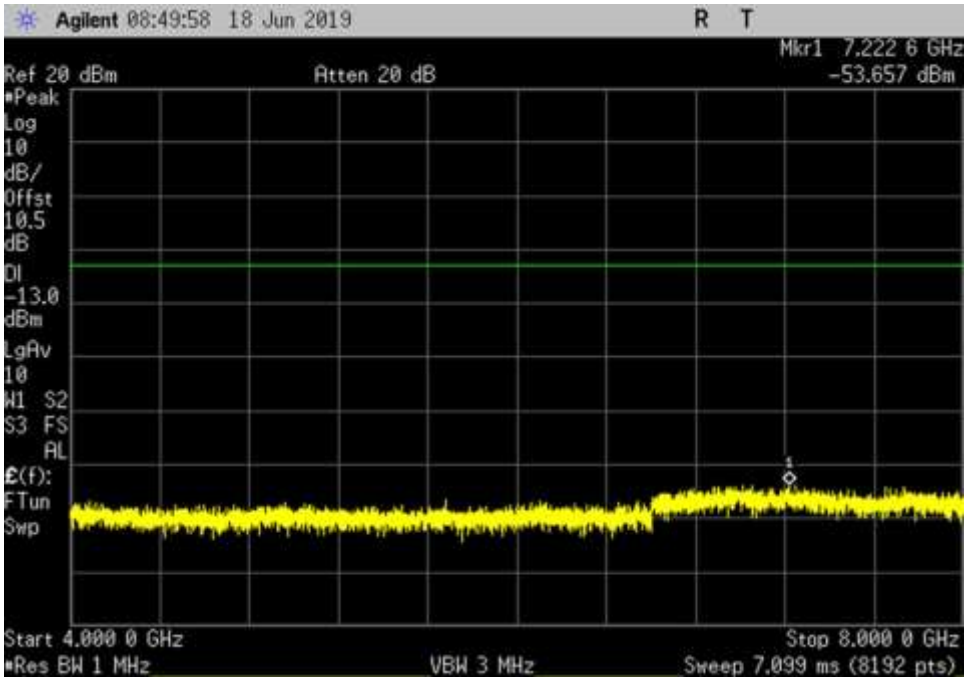
DL_746-757_ 4000- 8000MHz



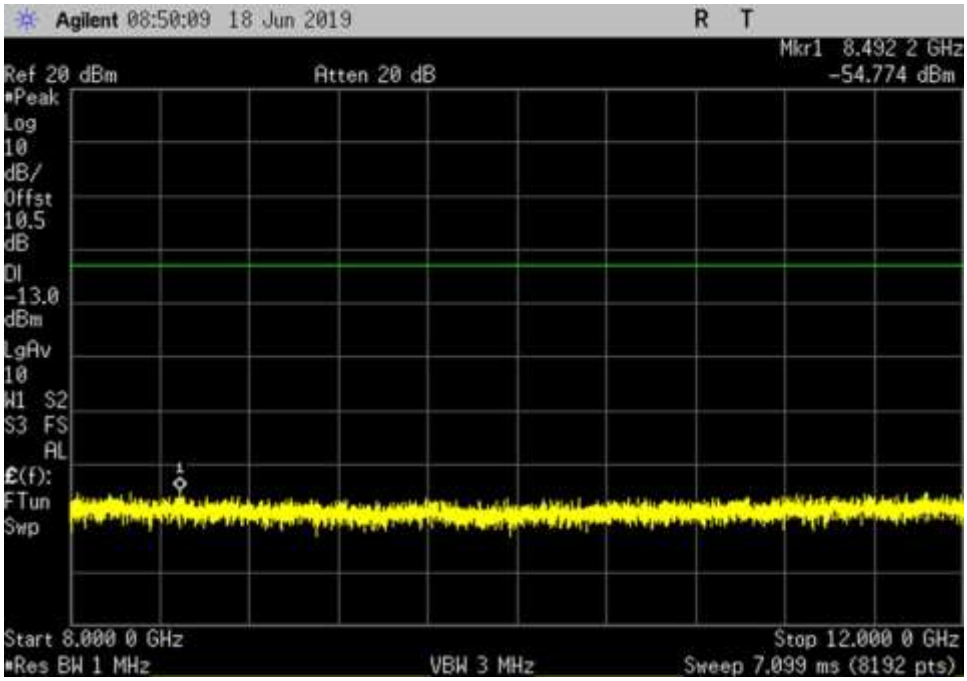
DL_869-894_ 30- 868.9MHz



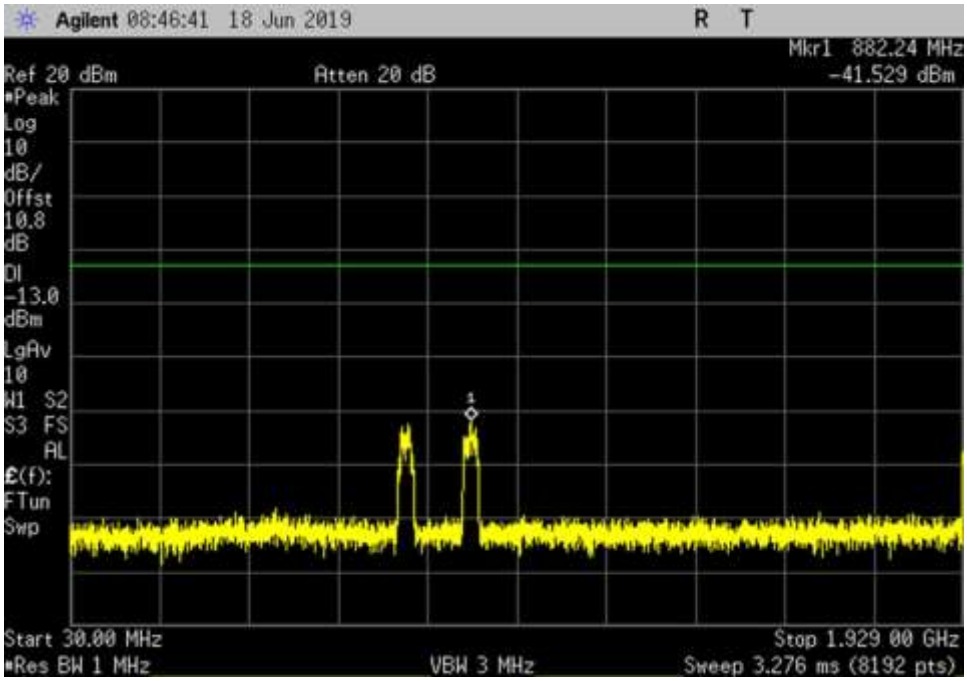
DL_869-894_ 894.1- 4000MHz



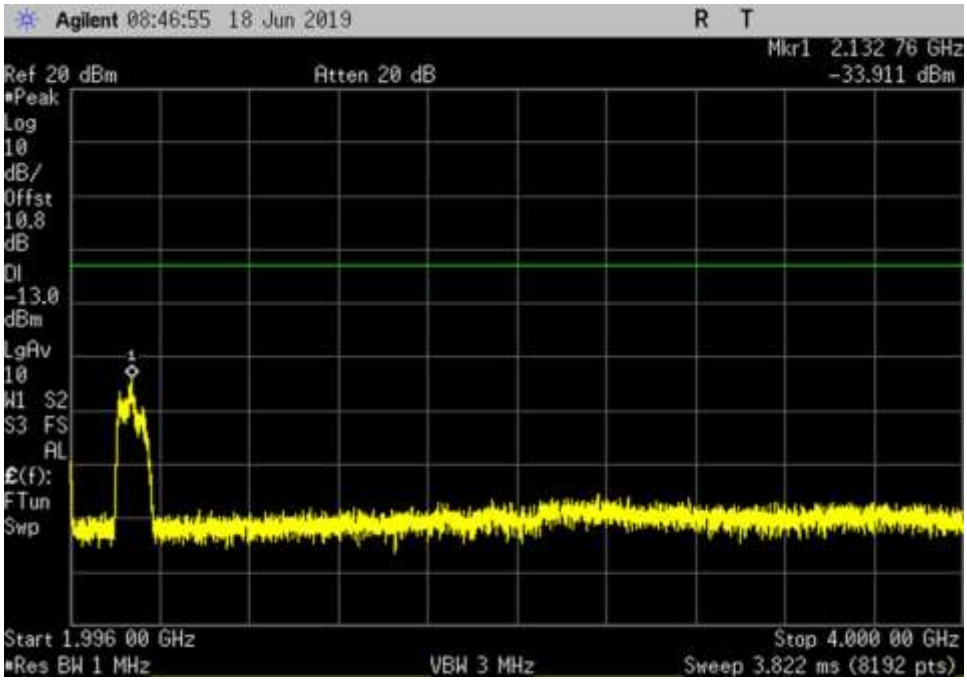
DL_869-894_ 4000- 8000MHz



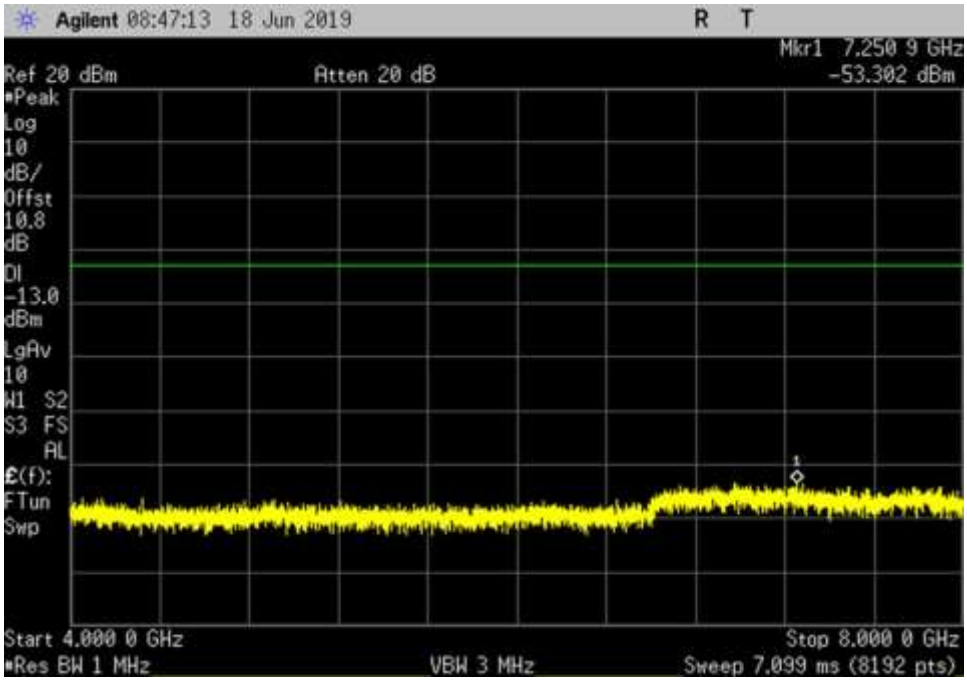
DL_869-894_ 8000- 12000MHz



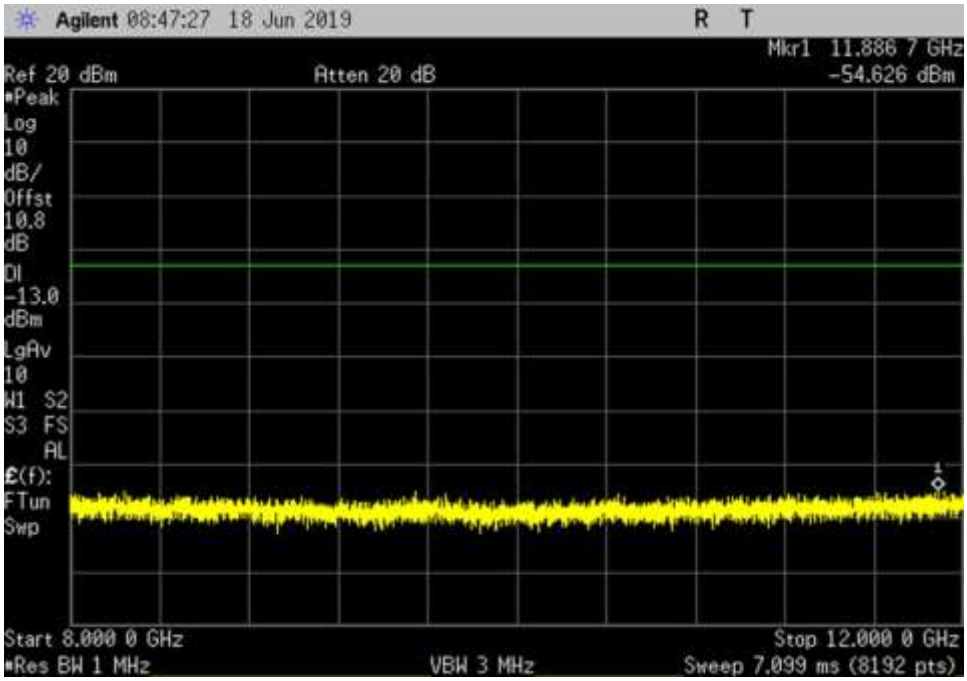
DL_1930-1995_ 30- 1929MHz



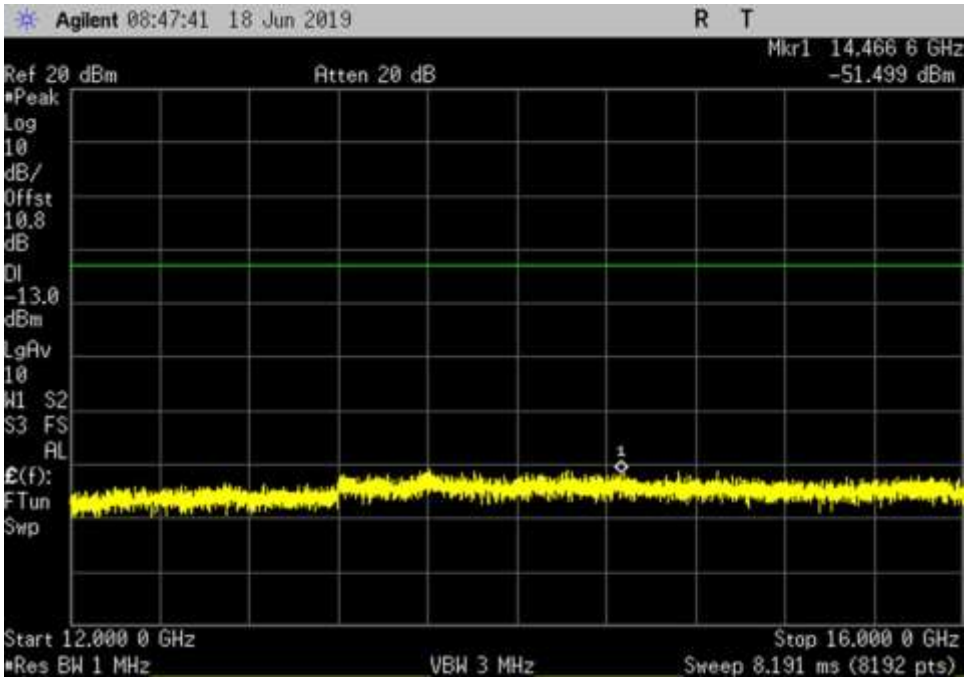
DL_1930-1995_ 1996- 4000MHz



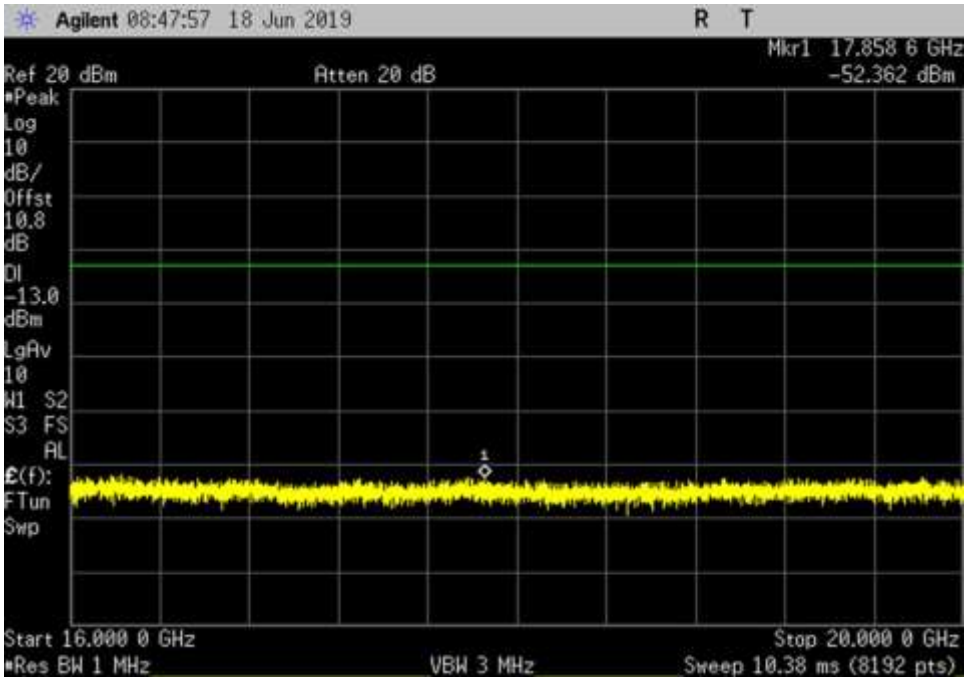
DL_1930-1995_ 4000- 8000MHz



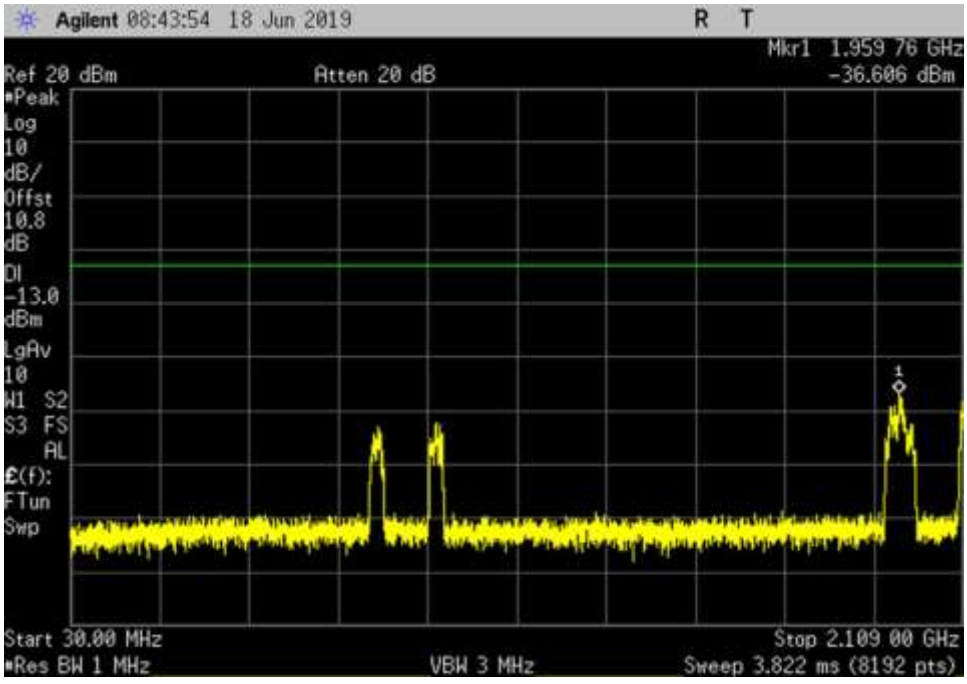
DL_1930-1995_ 8000- 12000MHz



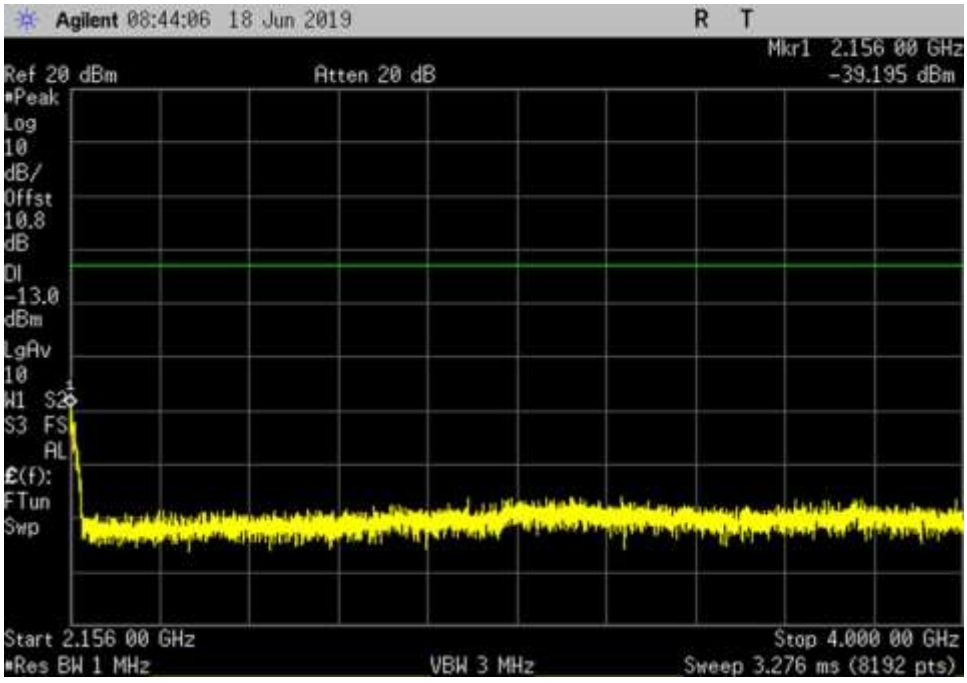
DL_1930-1995_ 12000- 16000MHz



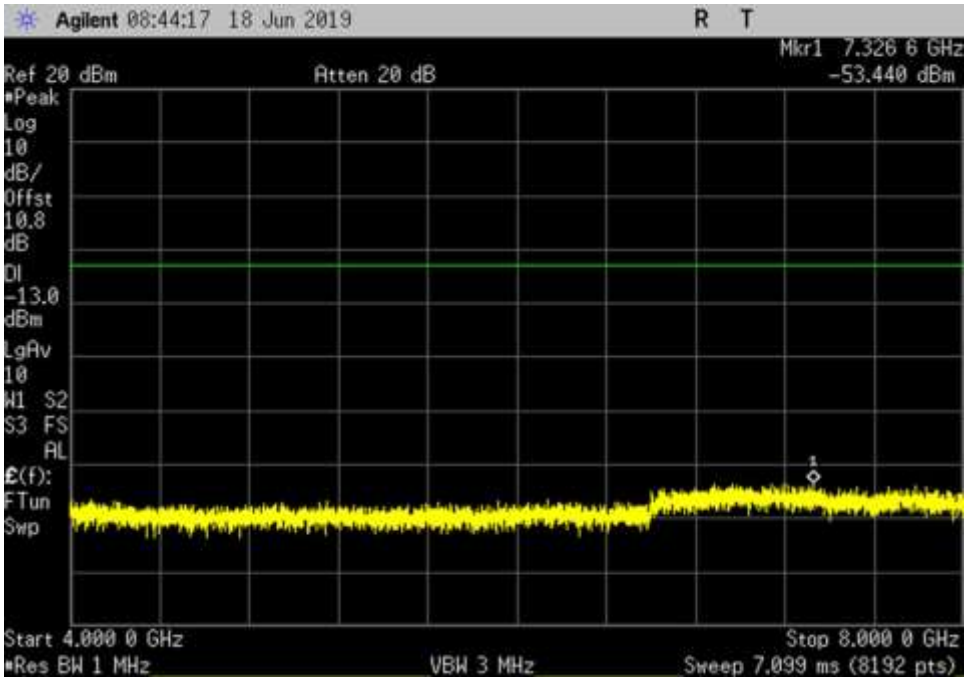
DL_1930-1995_ 16000- 20000MHz



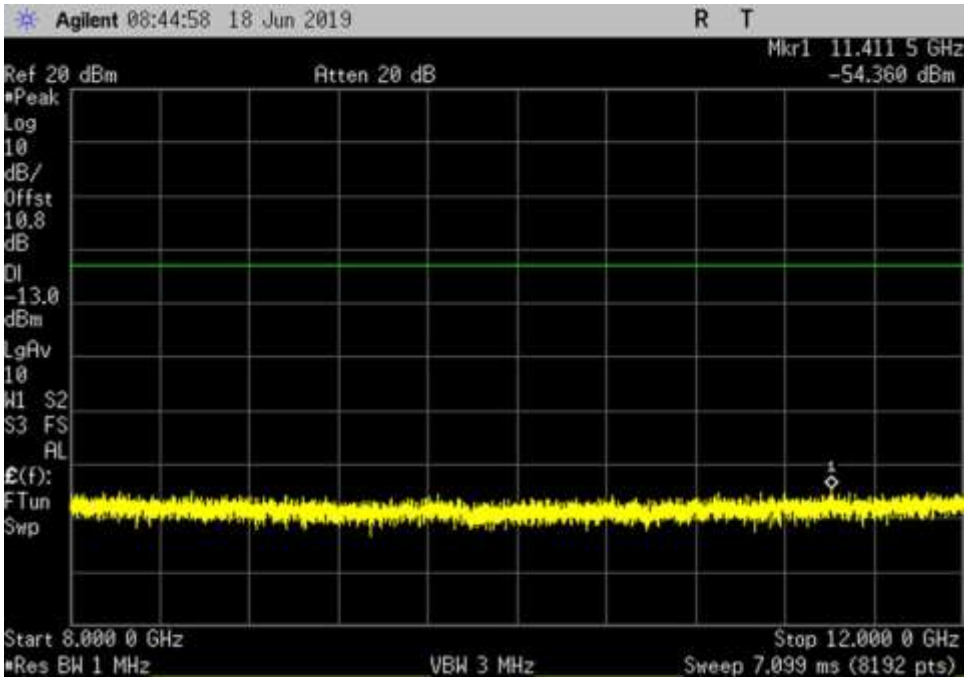
DL_2110-2155_30- 2109MHz



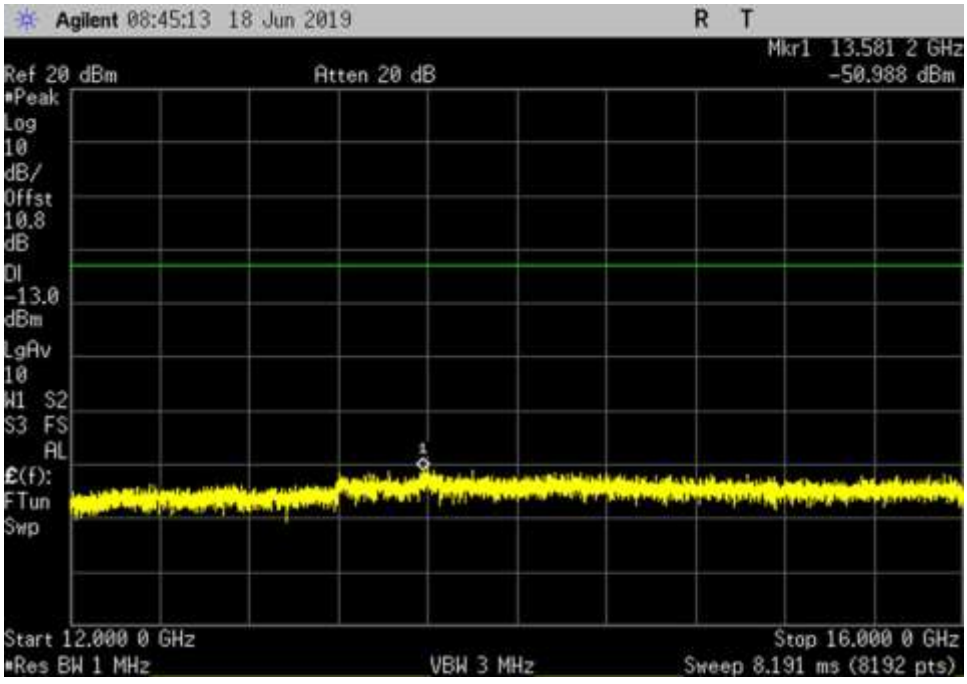
DL_2110-2155_ 2156- 4000MHz



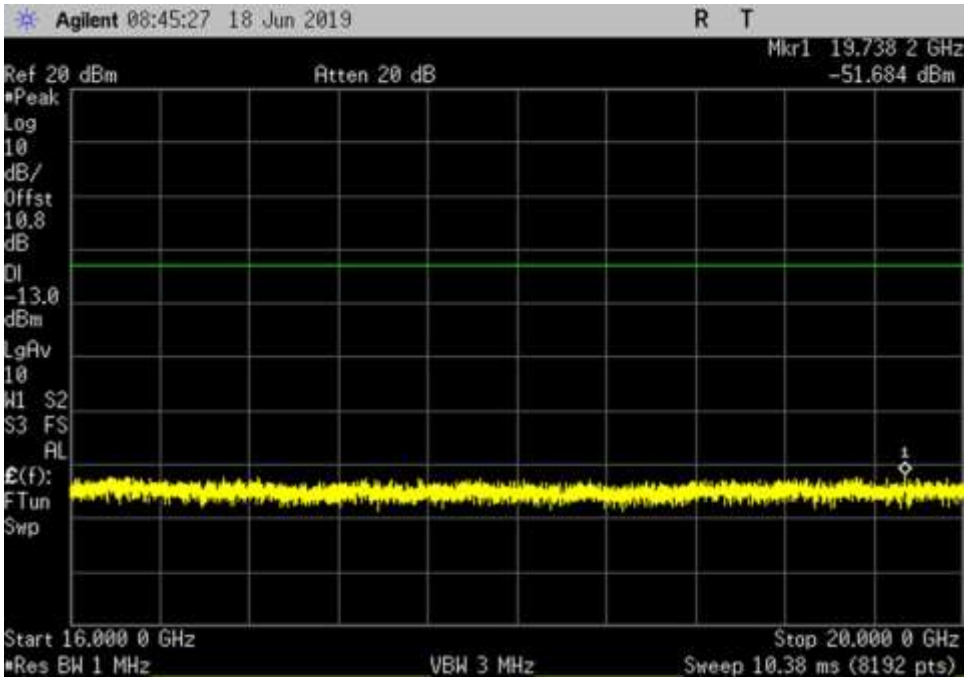
DL_2110-2155_ 4000- 8000MHz



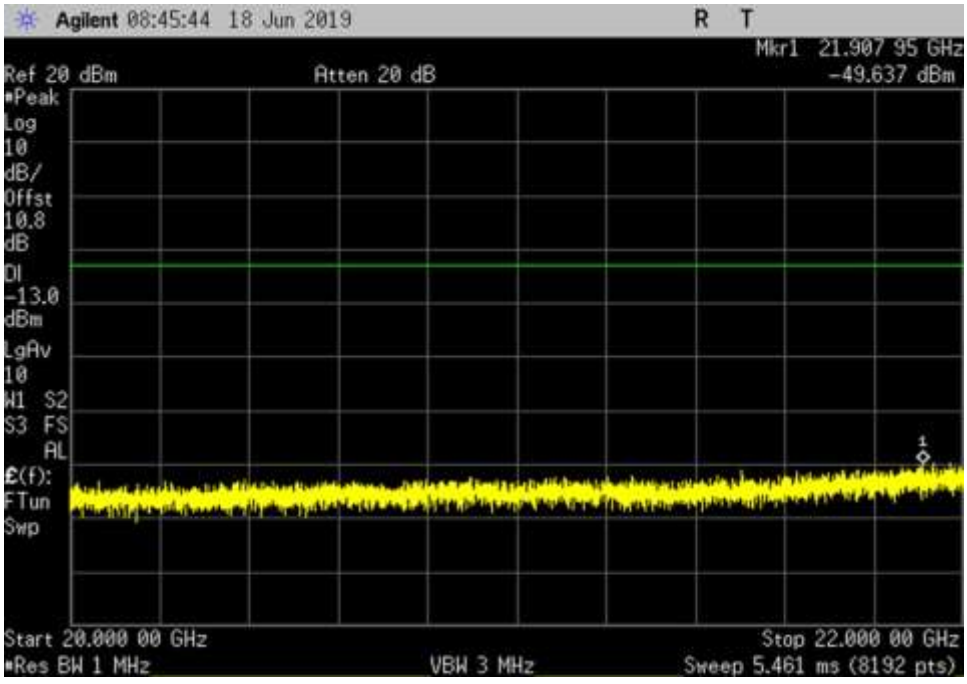
DL_2110-2155_ 8000- 12000MHz



DL_2110-2155_ 12000- 16000MHz

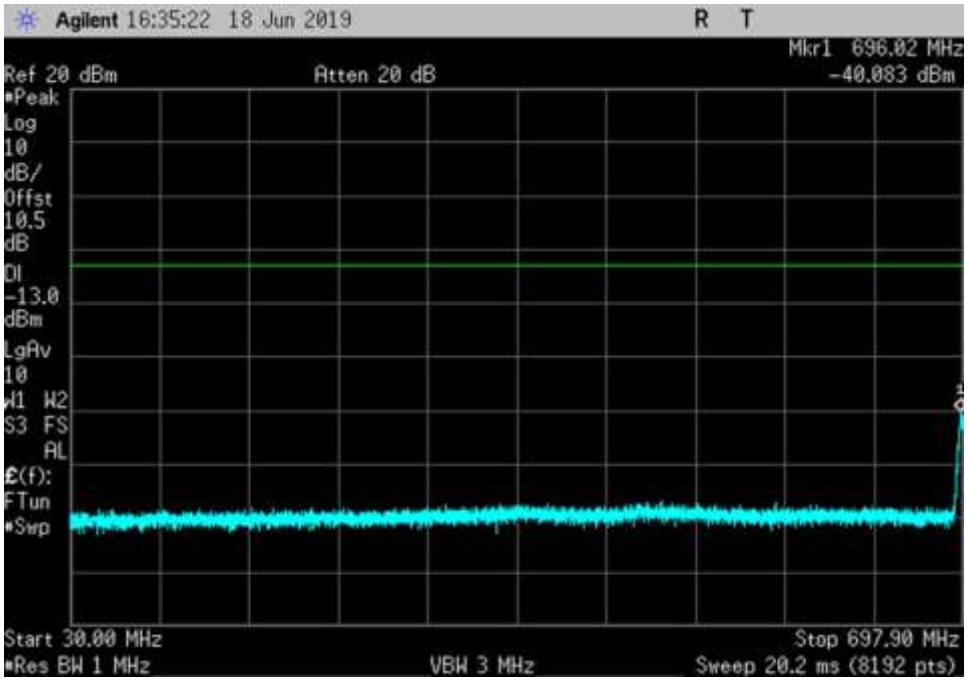


DL_2110-2155_ 16000- 20000MHz

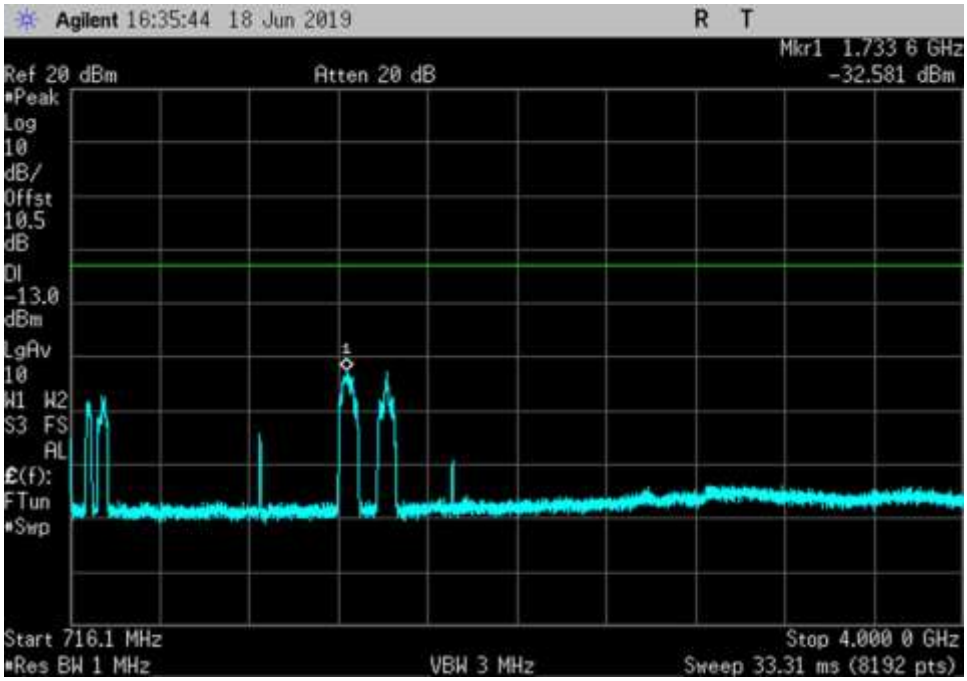


DL_2110-2155_ 20000- 22000MHz

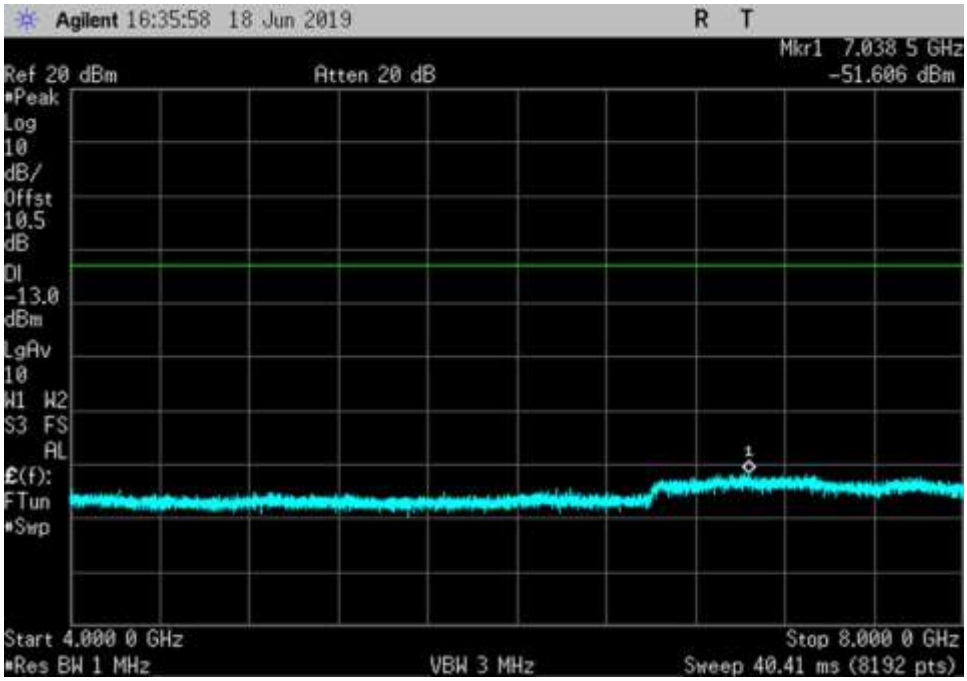
Configuration 3



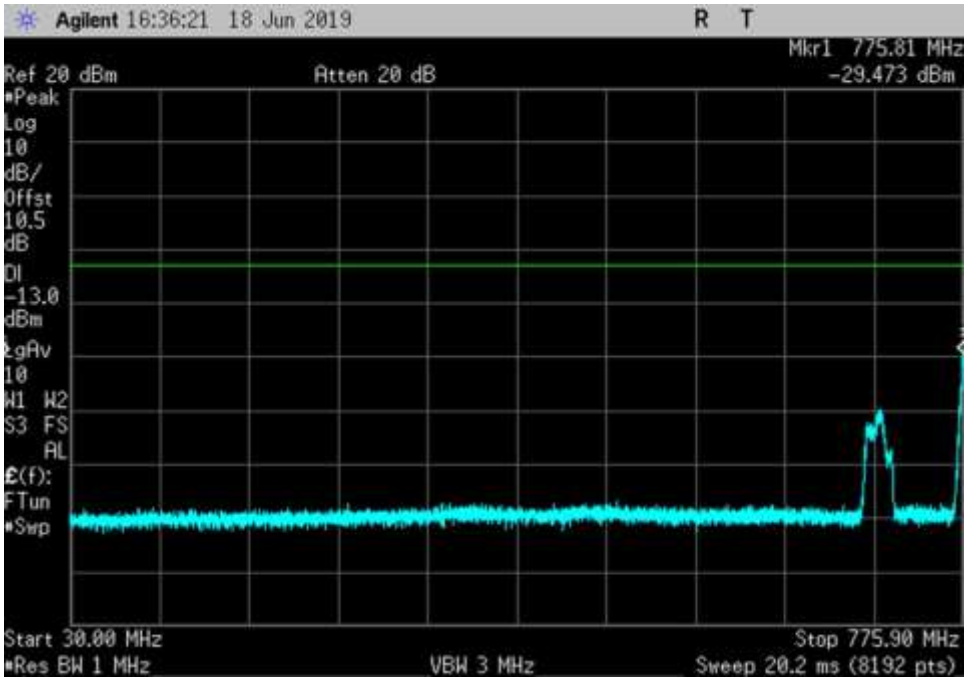
UL_698-716_ 30- 697.9MHz



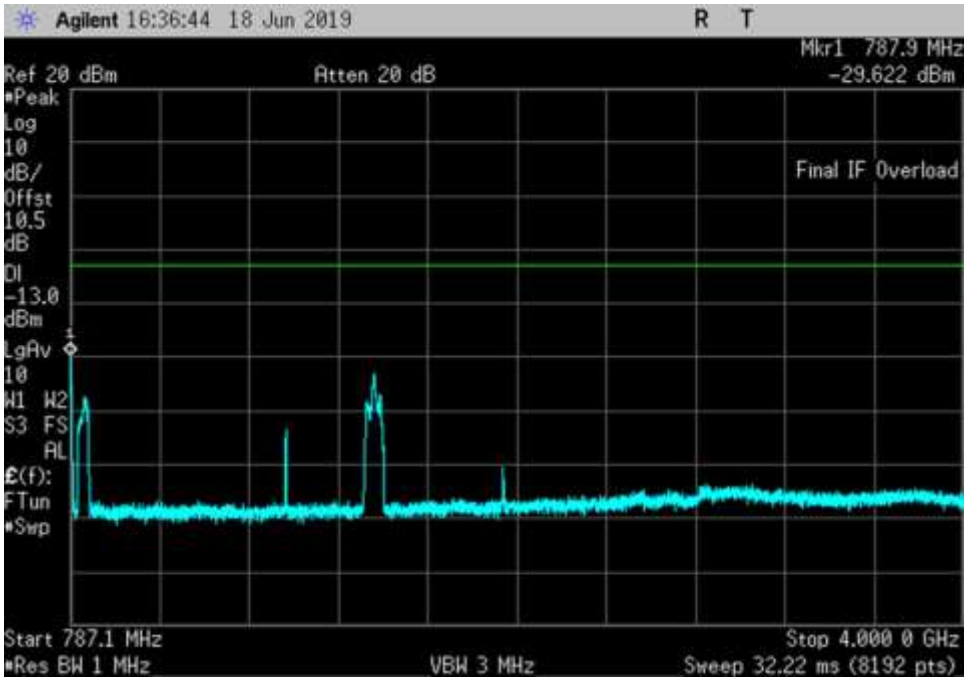
UL_698-716_ 716.1- 4000MHz



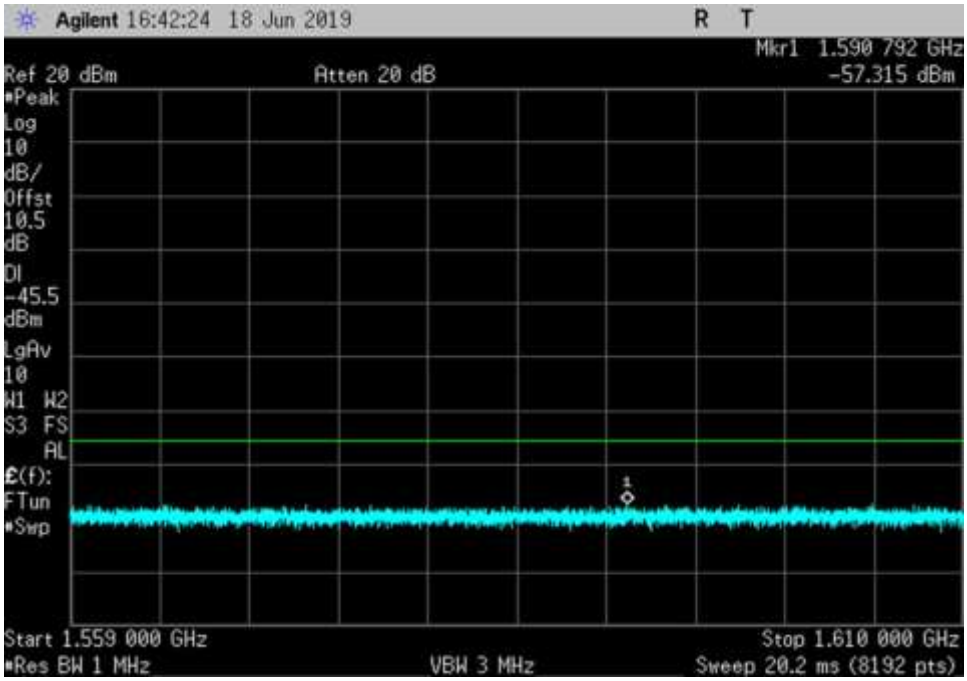
UL_698-716_ 4000- 8000MHz



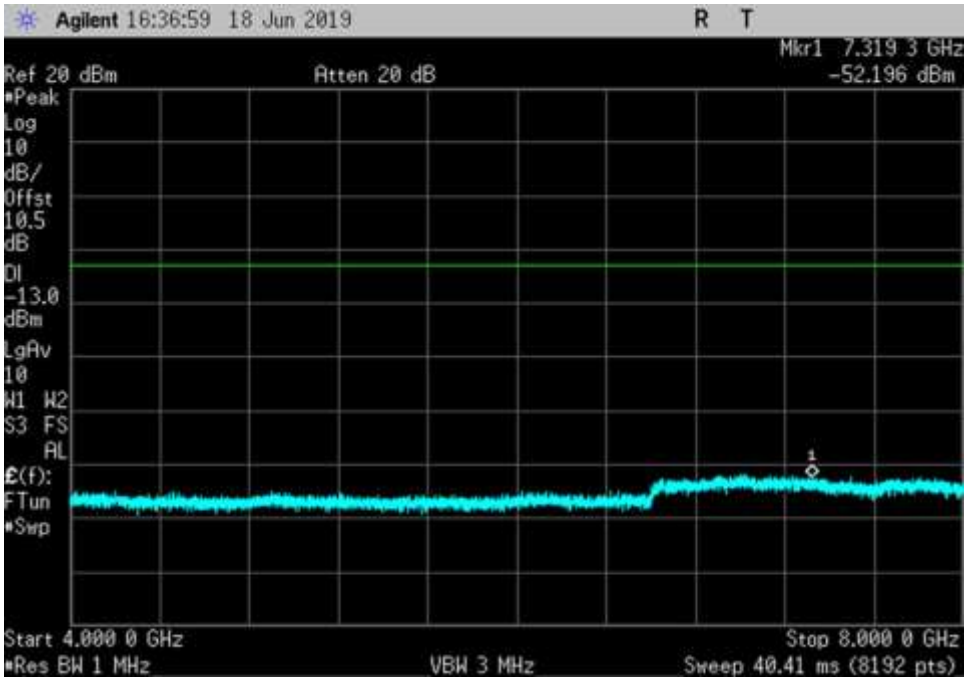
UL_776-787_ 30- 775.9MHz



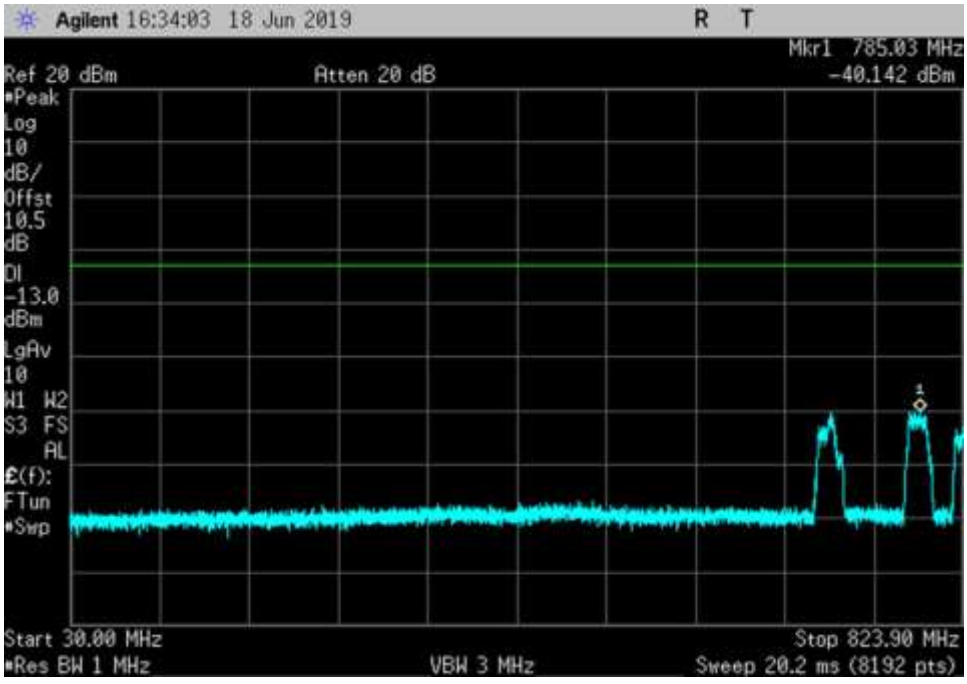
UL_776-787_ 787.1- 4000MHz



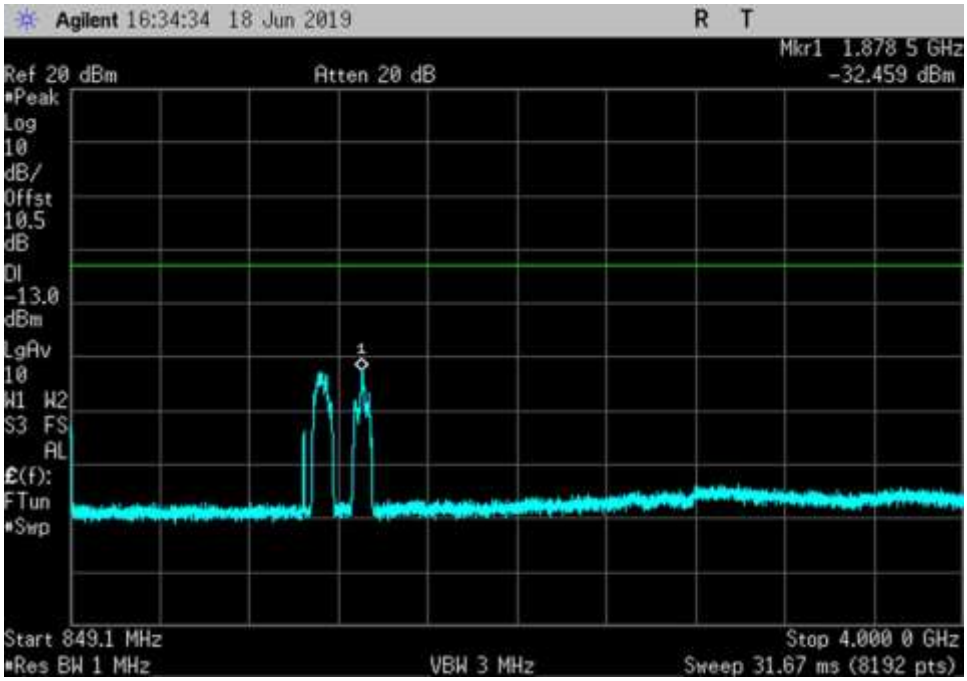
UL_776-787_ 1559- 1610MHz



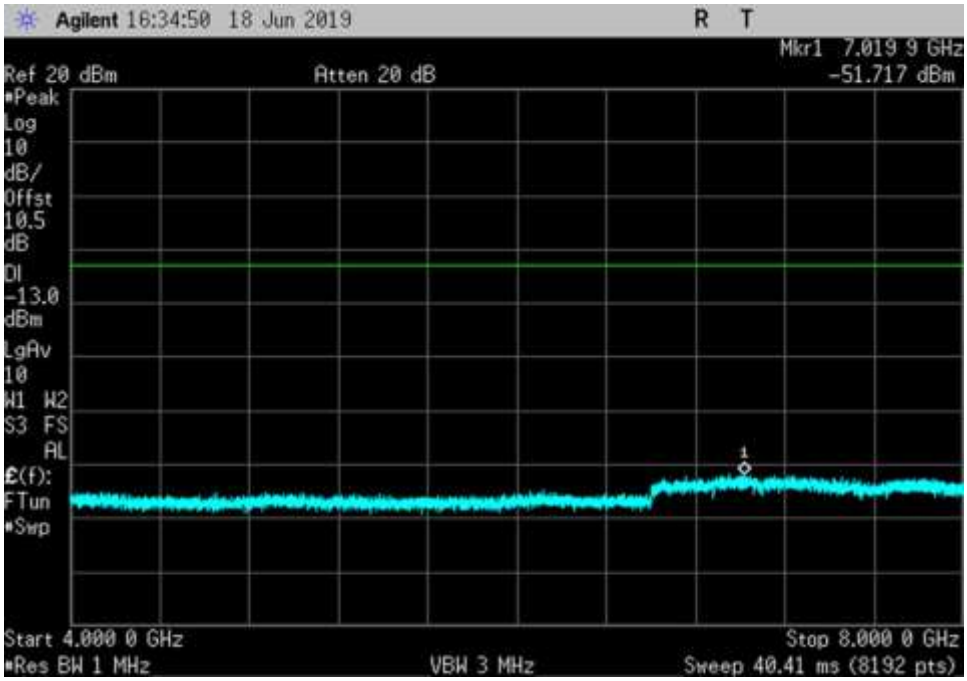
UL_776-787_4000- 8000MHz



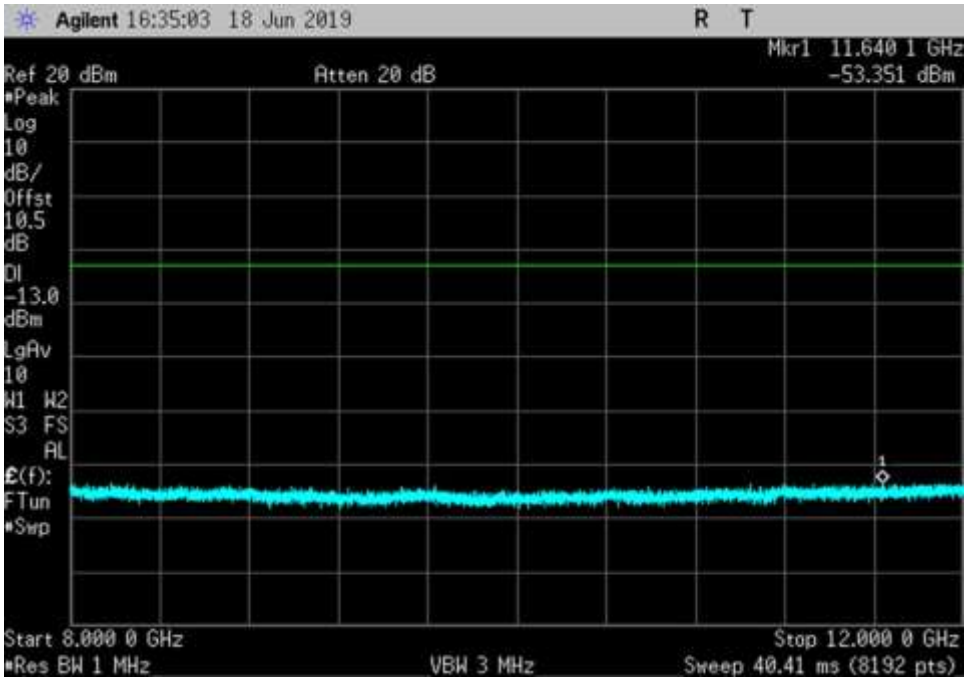
UL_824-849_30- 823.9MHz



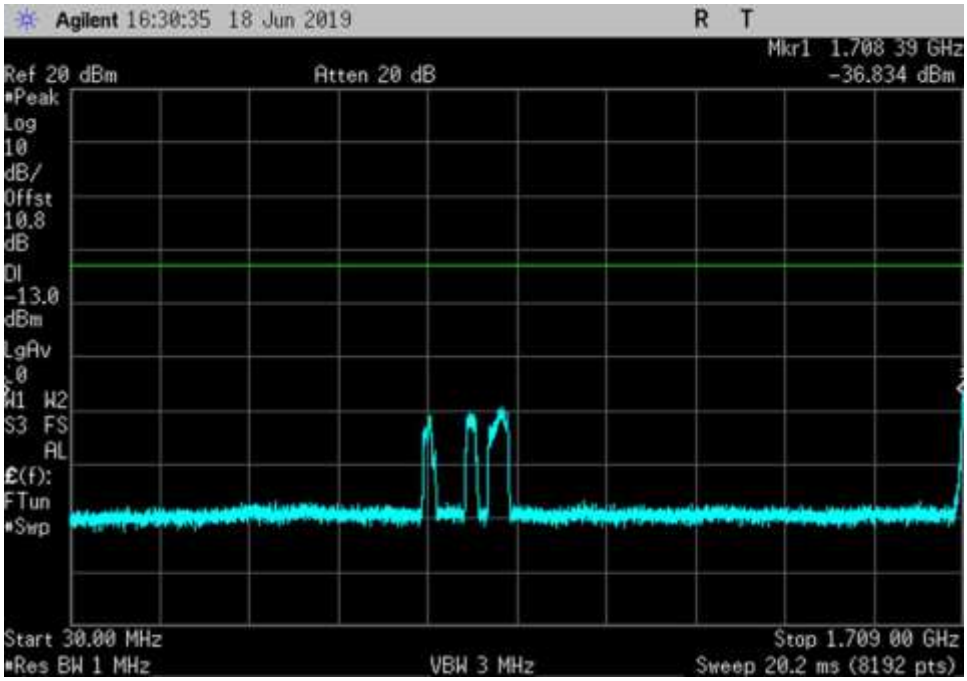
UL_824-849_ 849.1- 4000MHz



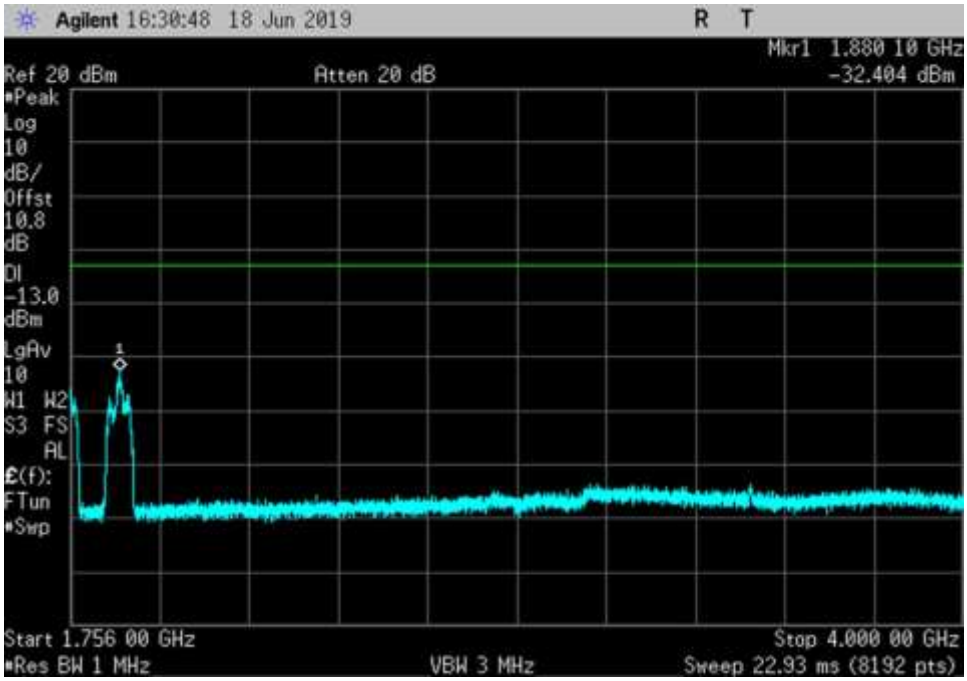
UL_824-849_ 4000- 8000MHz



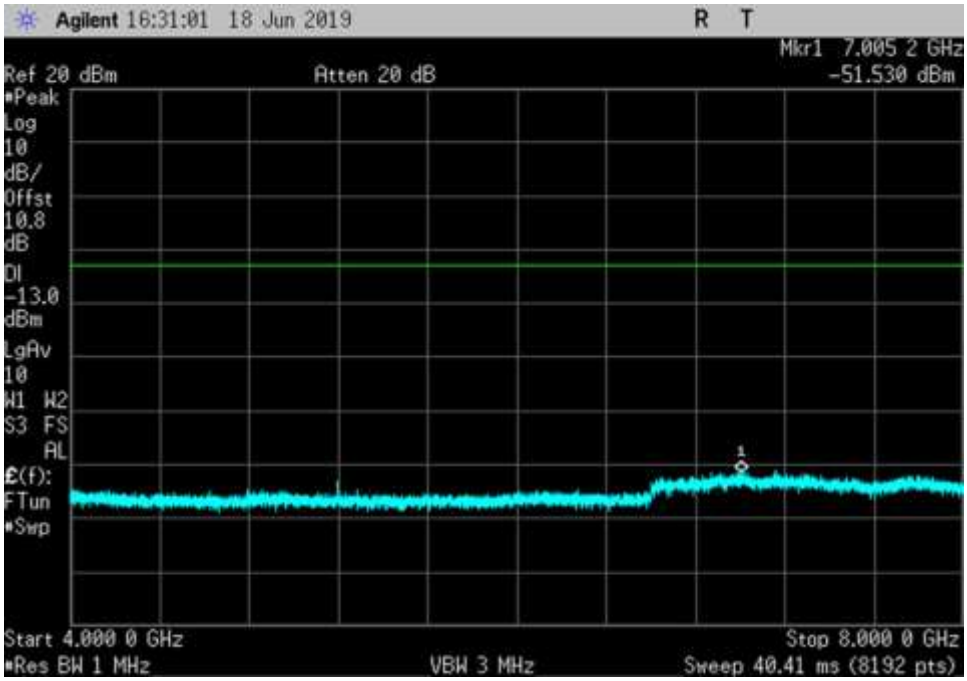
UL_824-849_ 8000- 12000MHz



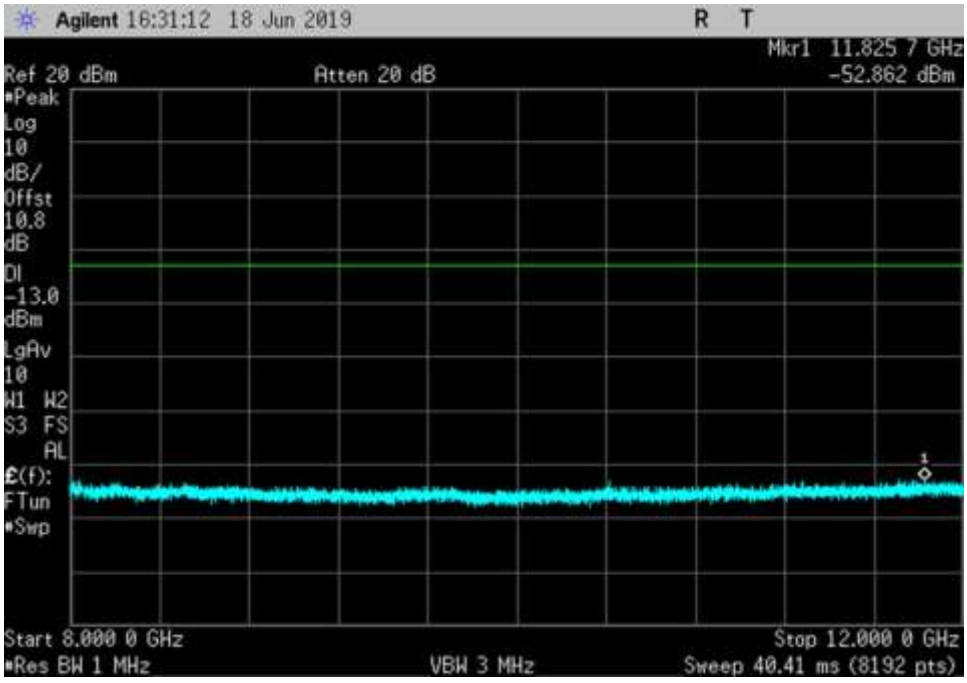
UL_1710-1755_ 30- 1709MHz



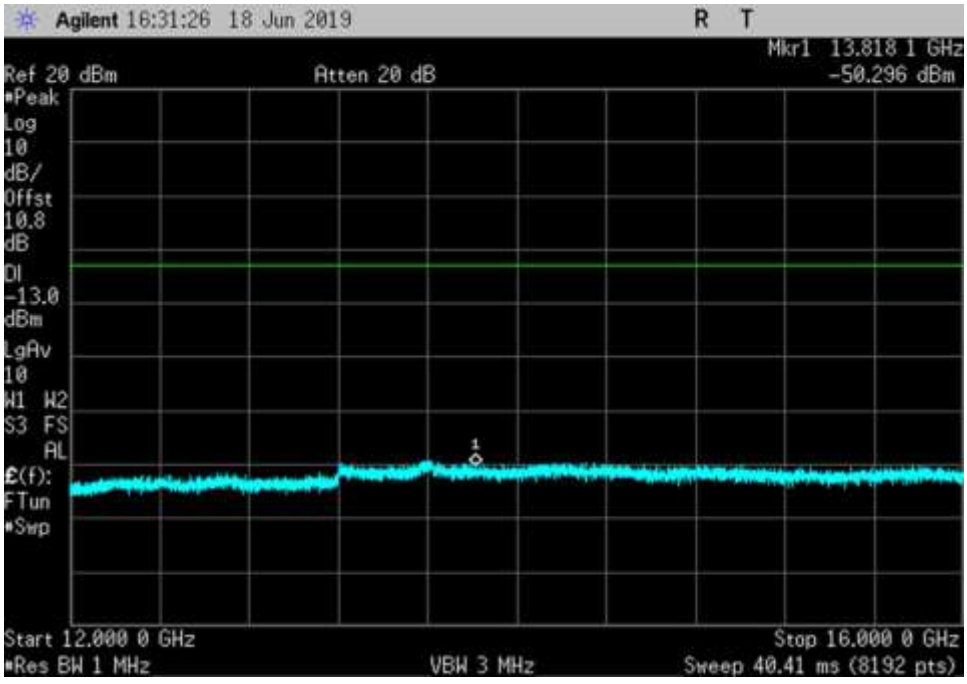
UL_1710-1755_ 1756- 4000MHz



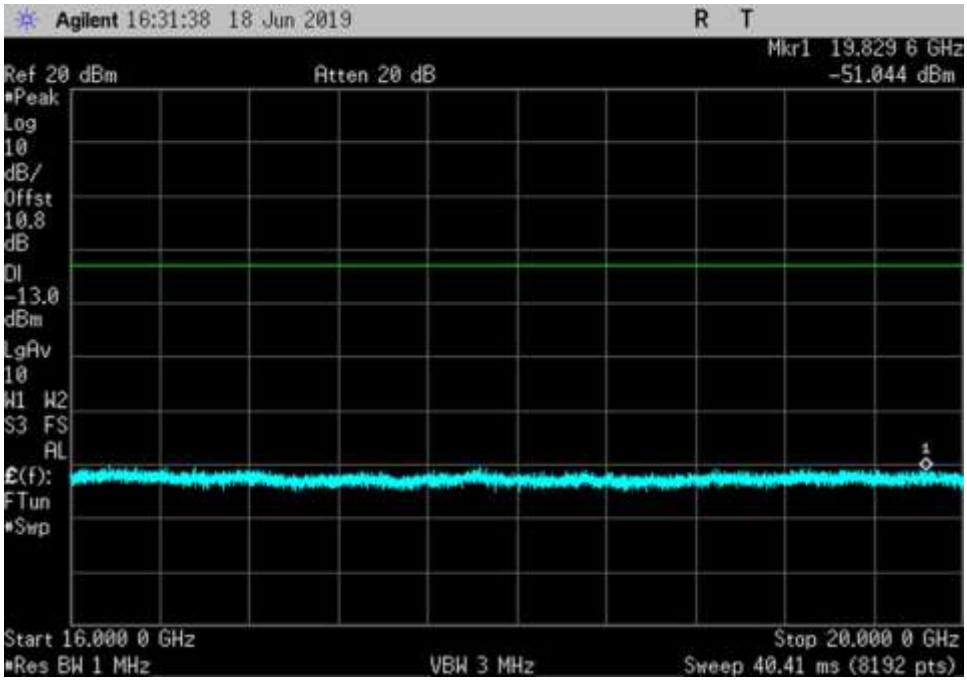
UL_1710-1755_ 4000- 8000MHz



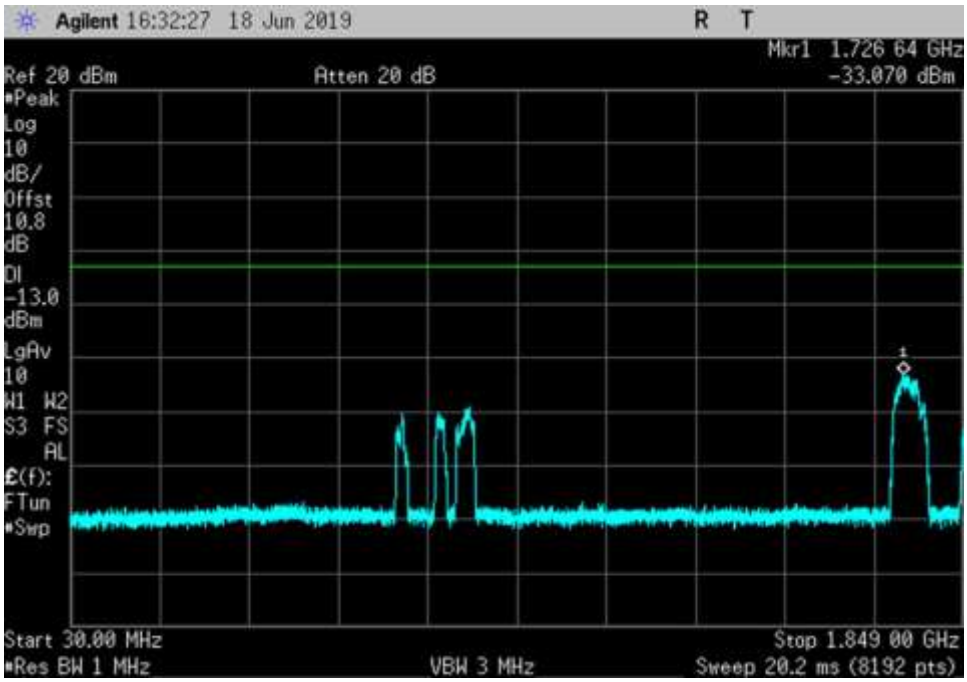
UL_1710-1755_8000- 12000MHz



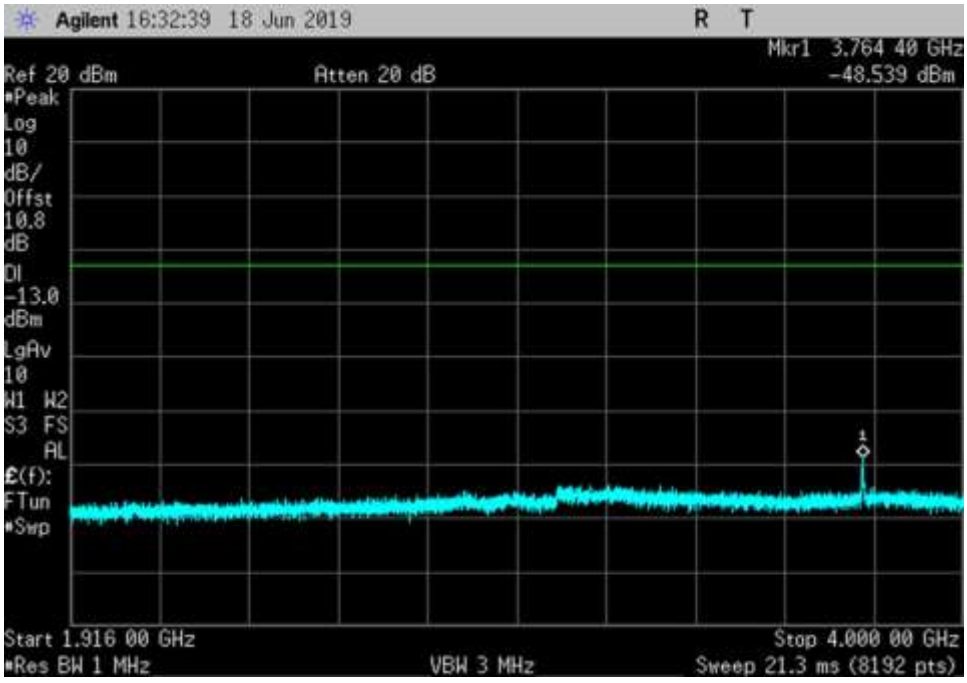
UL_1710-1755_ 12000- 16000MHz



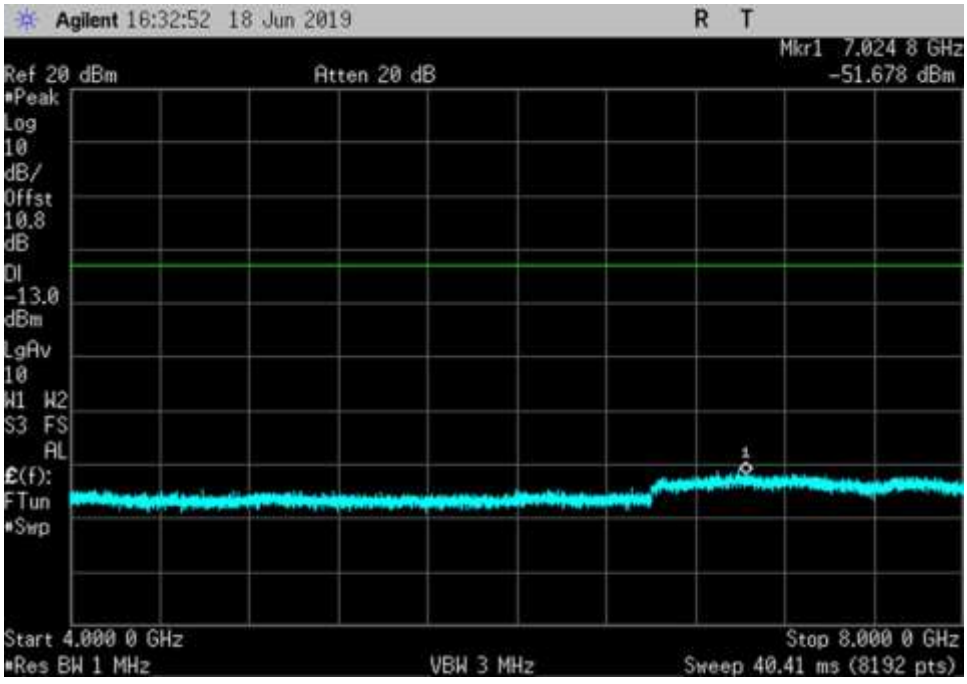
UL_1710-1755_ 16000- 20000MHz



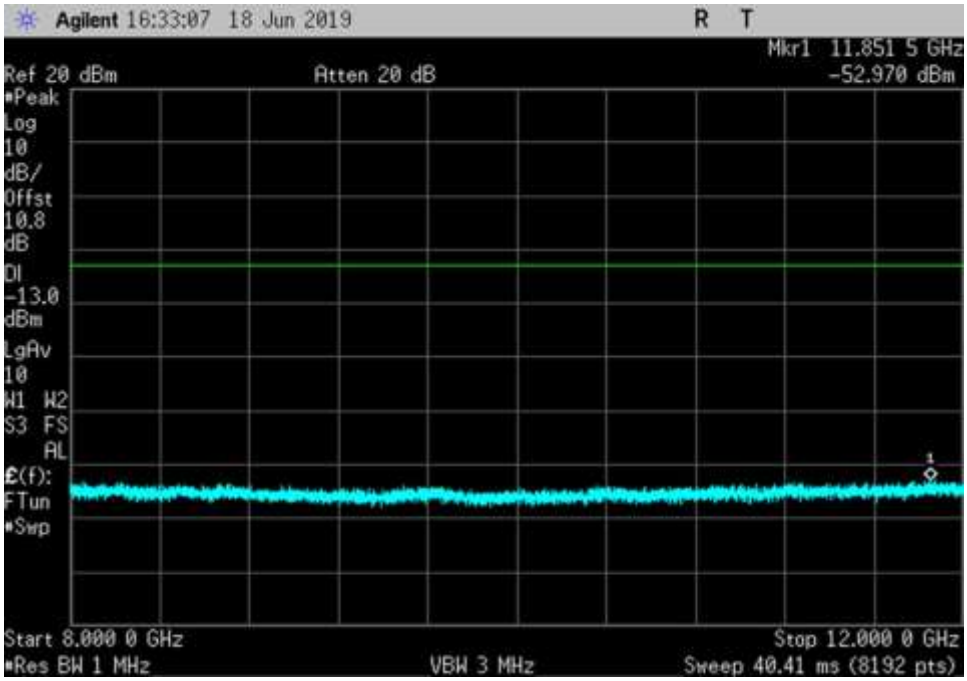
UL_1850-1915_30- 1849MHz



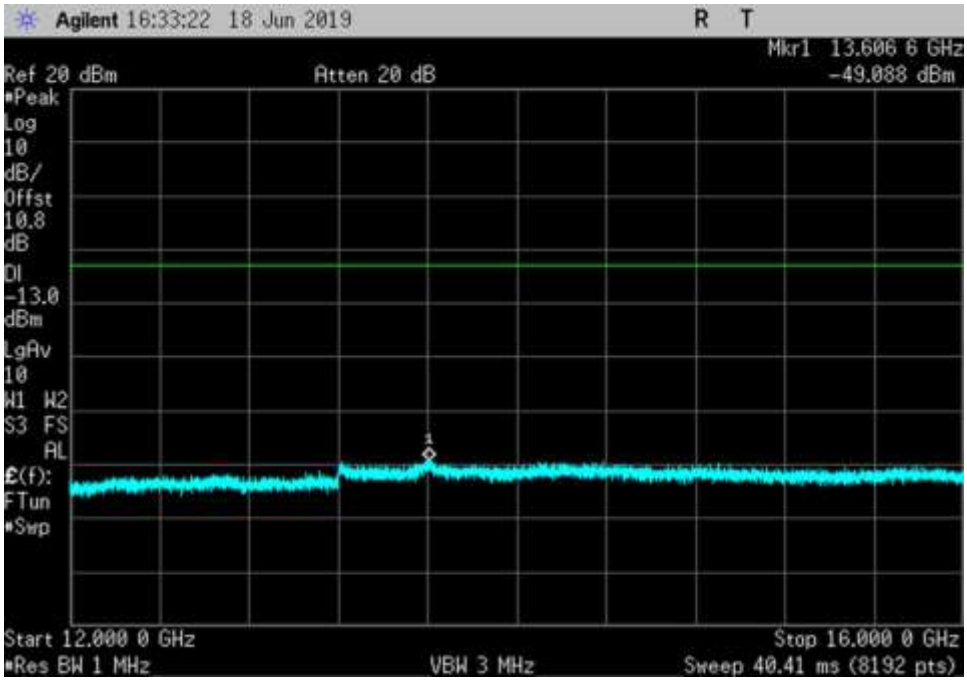
UL_1850-1915_1916- 4000MHz



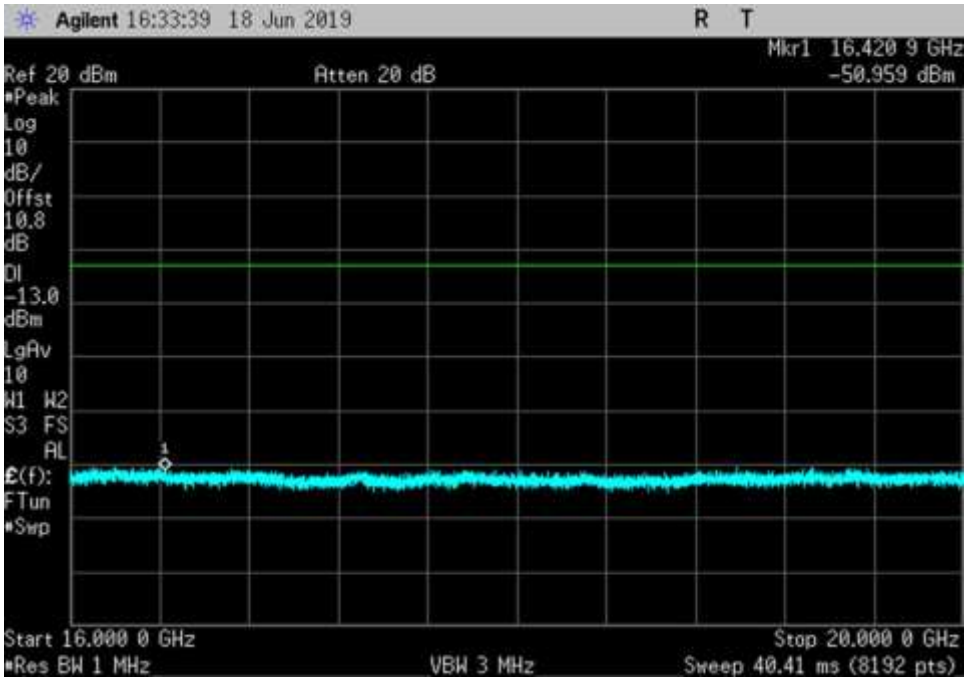
UL_1850-1915_ 4000- 8000MHz



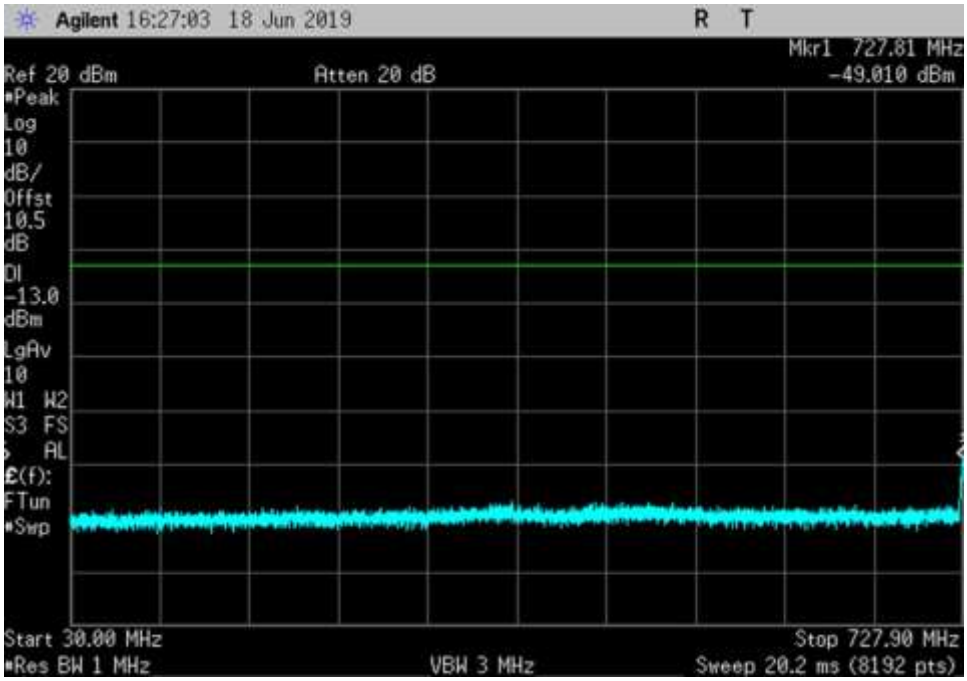
UL_1850-1915_ 8000- 12000MHz



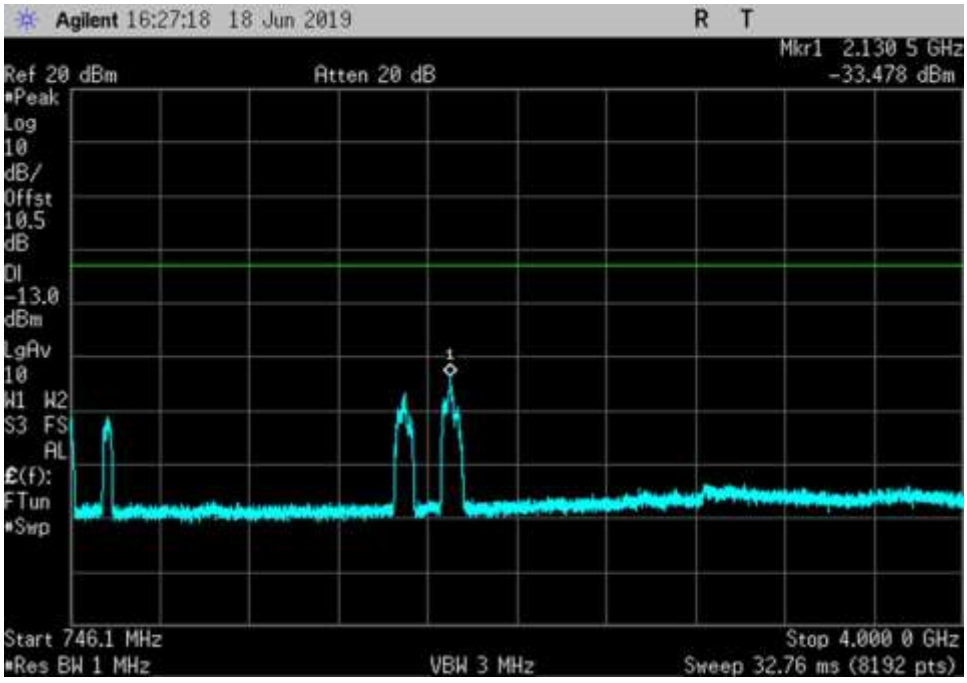
UL_1850-1915_ 12000- 16000MHz



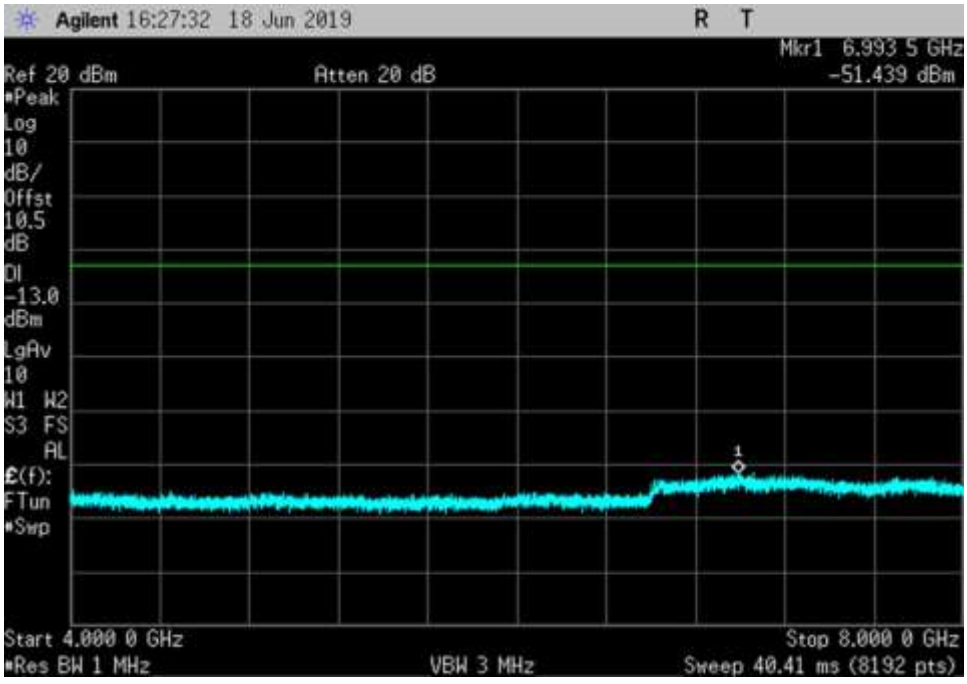
UL_1850-1915_ 16000- 20000MHz



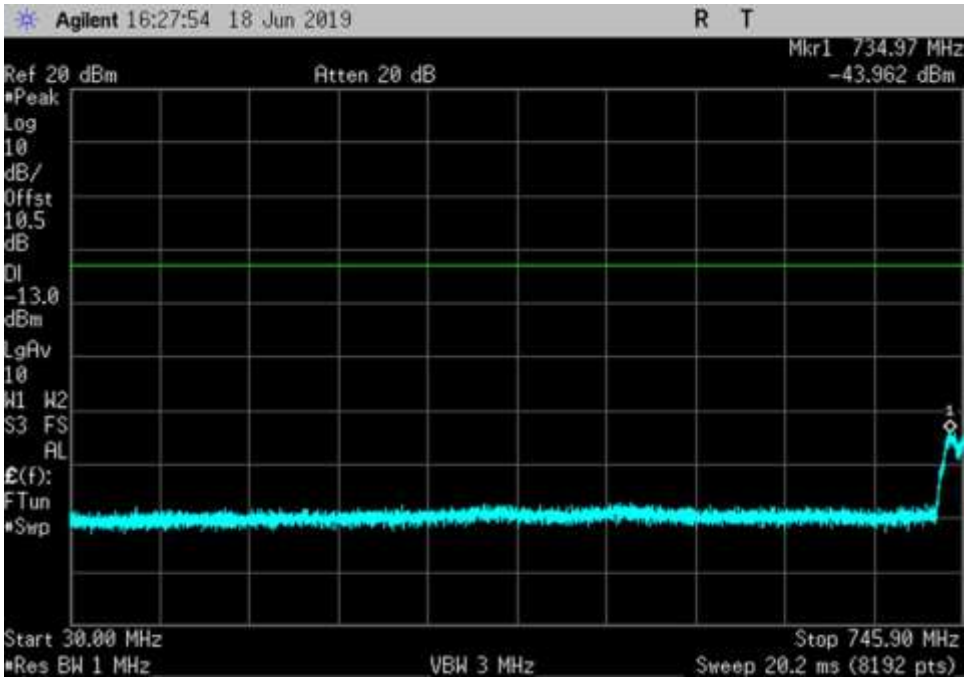
DL_728-746_ 30- 727.9MHz



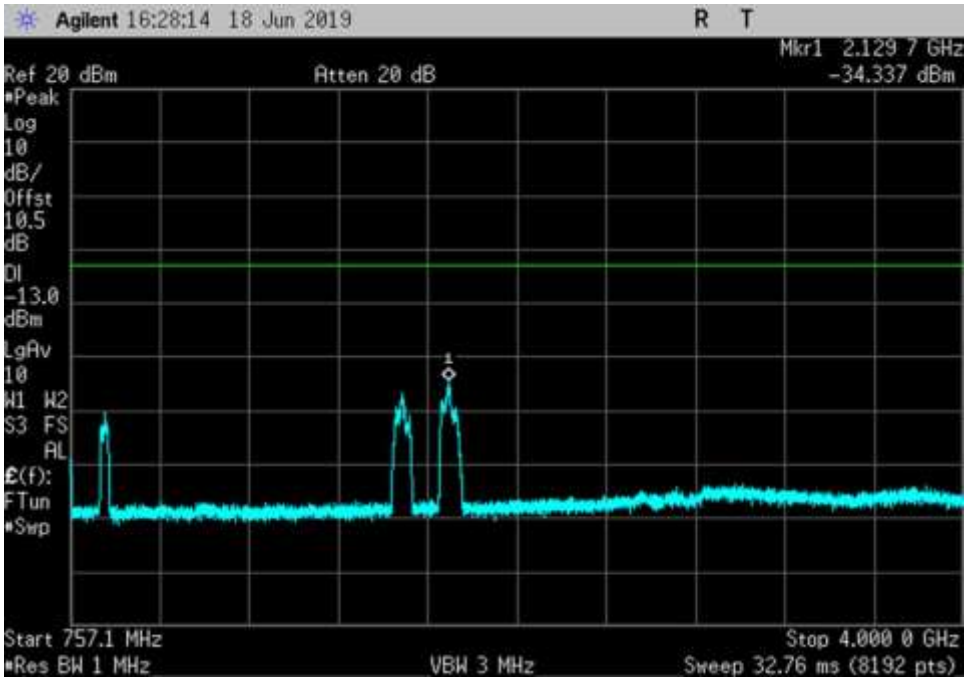
DL_728-746_ 746.1- 4000MHz



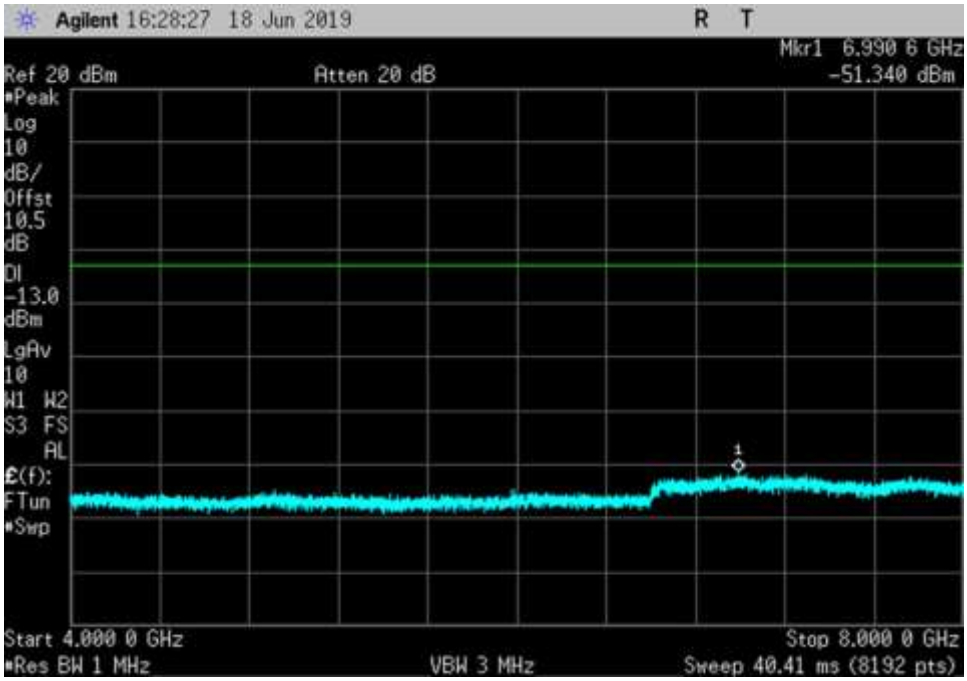
DL_728-746_ 4000- 8000MHz



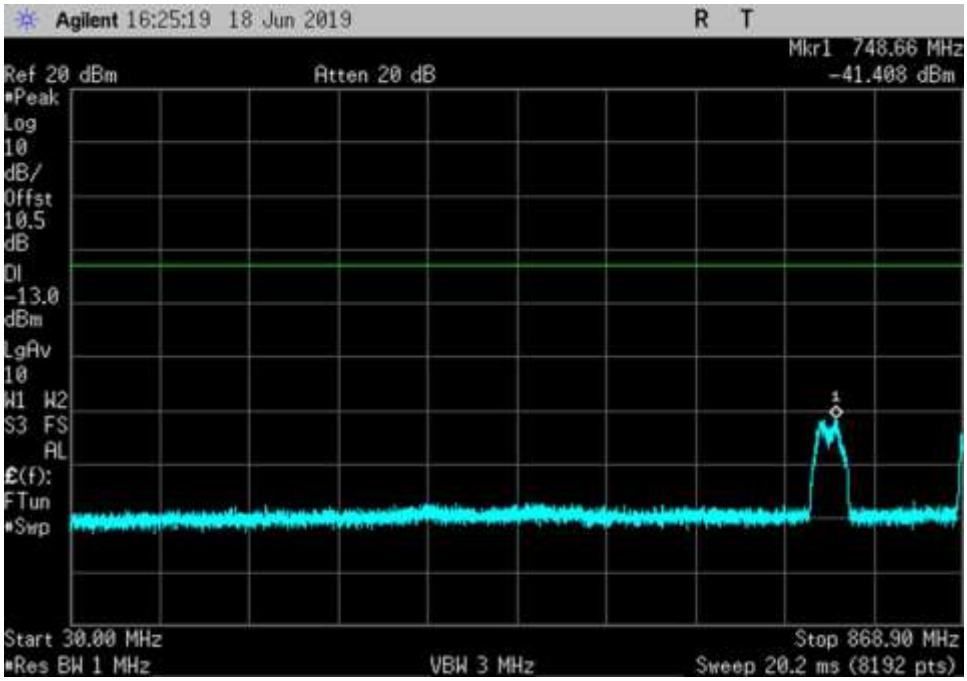
DL_746-757_ 30- 745.9MHz



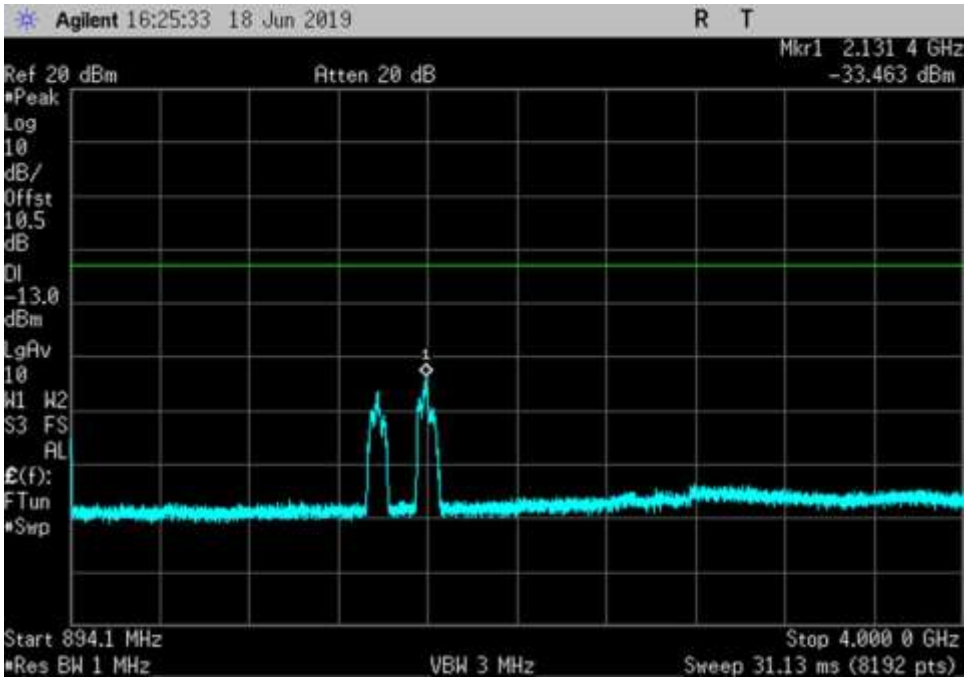
DL_746-757_ 757.1- 4000MHz



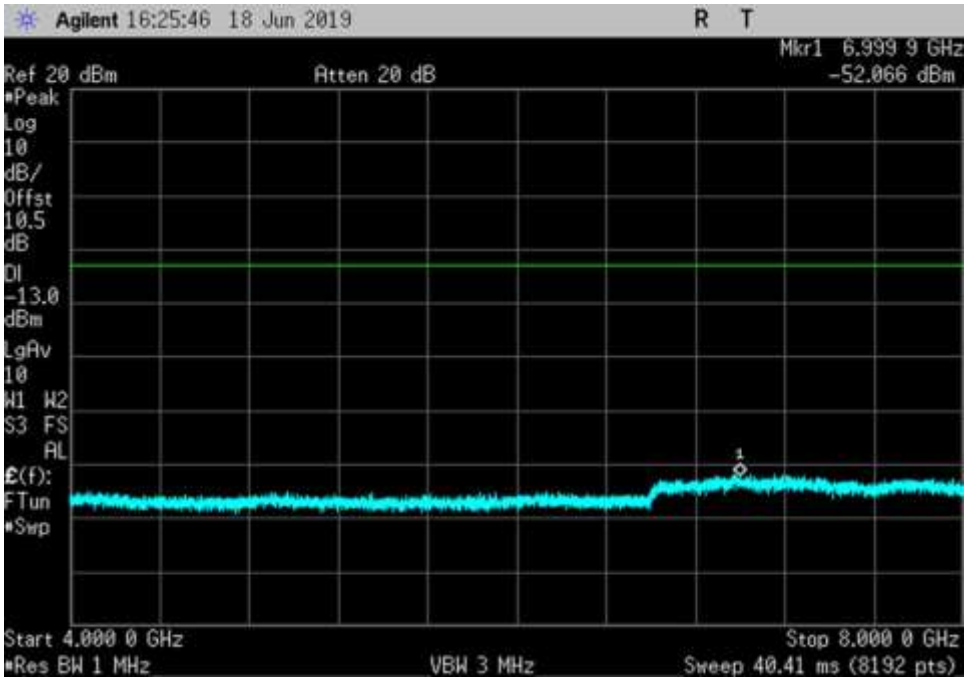
DL_746-757_ 4000- 8000MHz



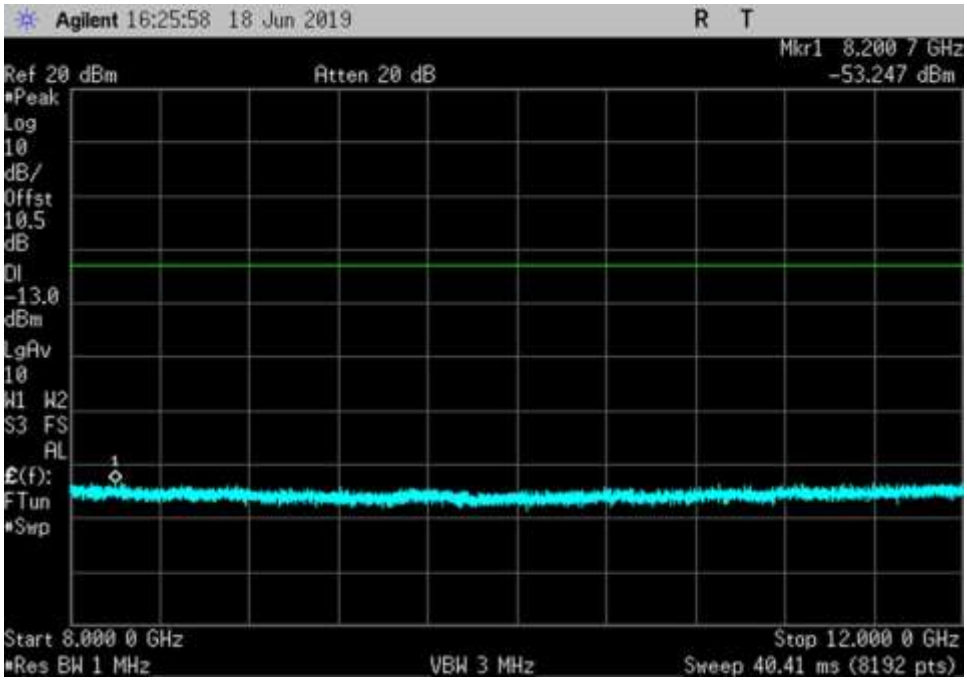
DL_869-894_ 30- 868.9MHz



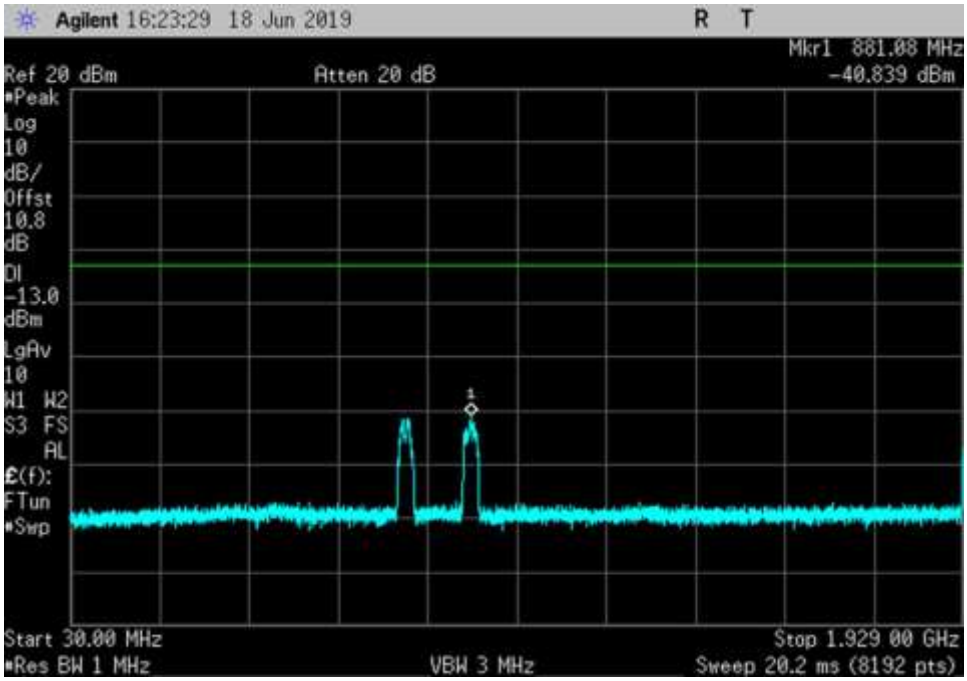
DL_869-894_ 894.1- 4000MHz



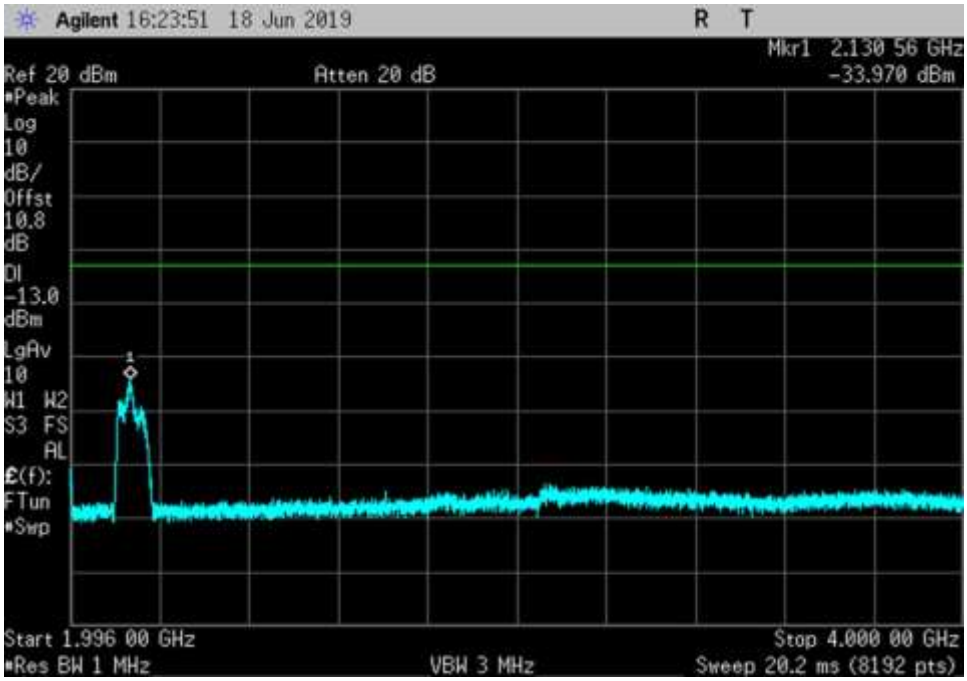
DL_869-894_ 4000- 8000MHz



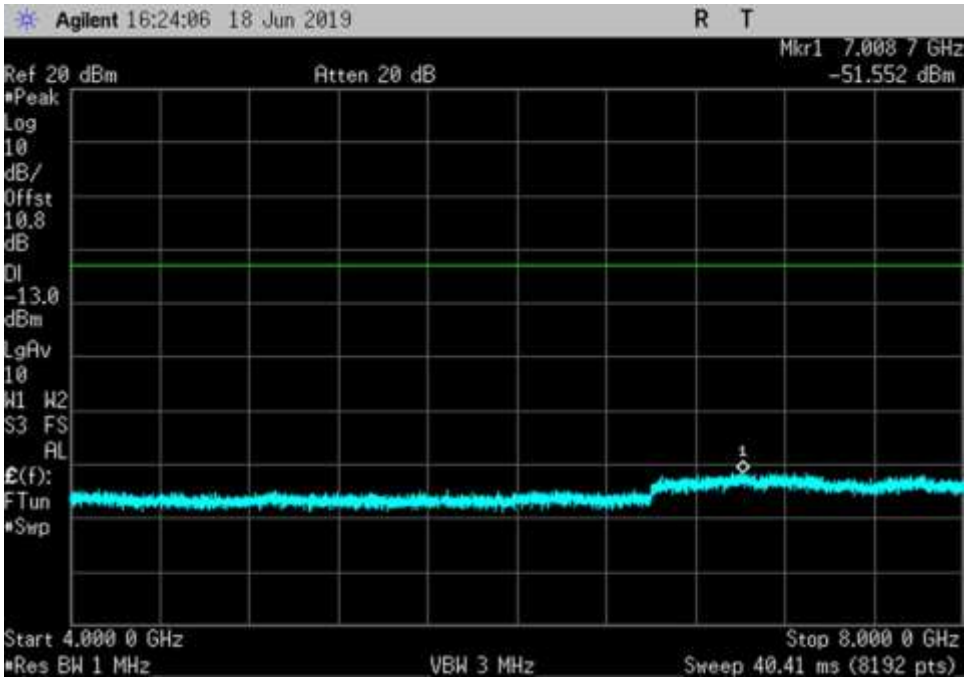
DL_869-894_ 8000- 12000MHz



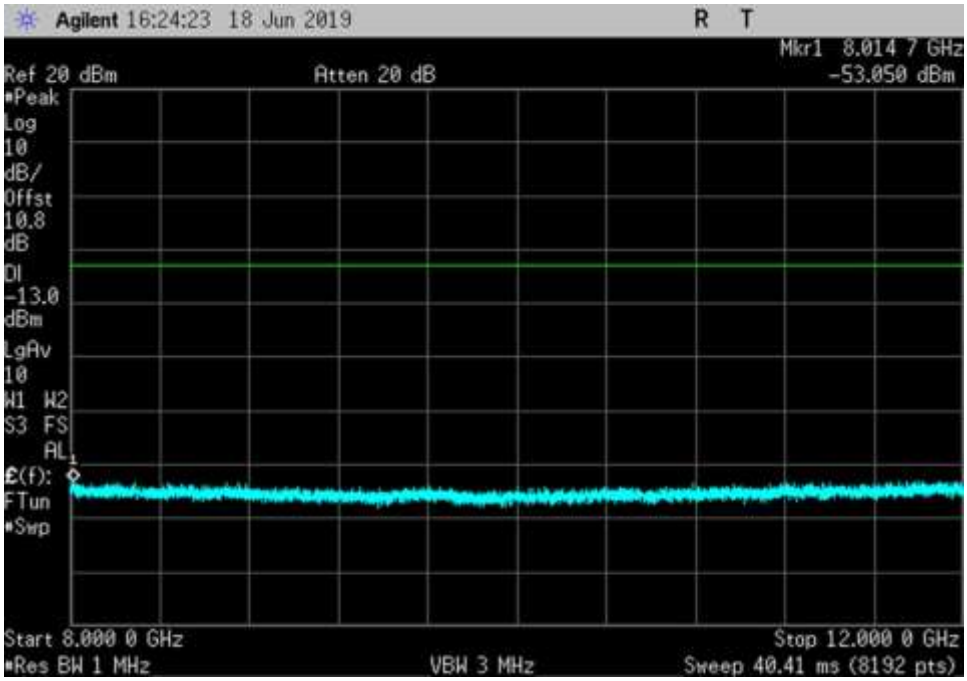
DL_1930-1995_ 30- 1929MHz



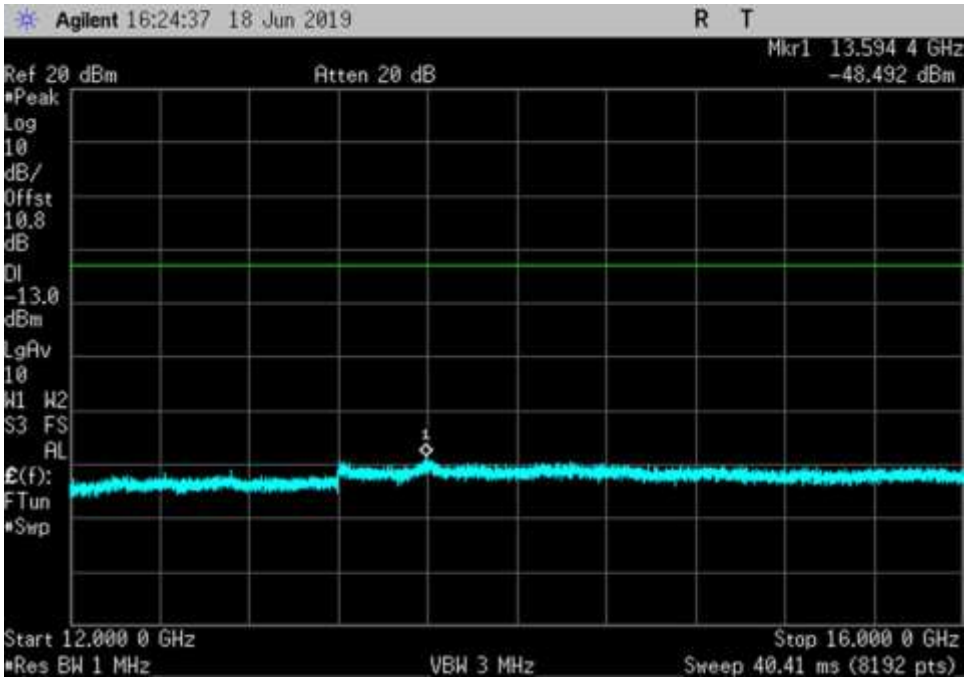
DL_1930-1995_ 1996- 4000MHz



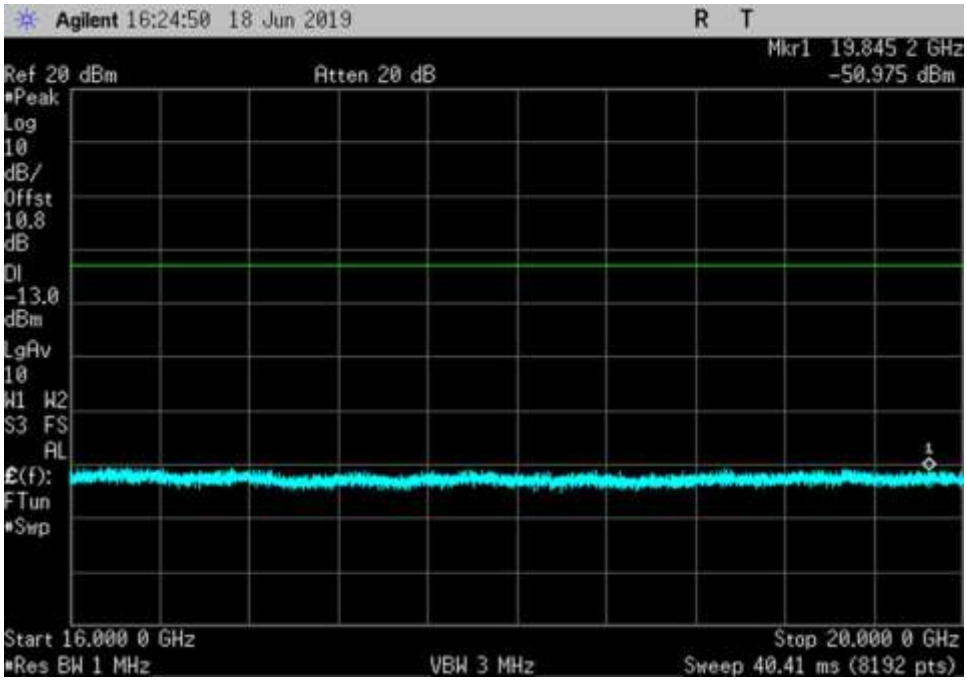
DL_1930-1995_ 4000- 8000MHz



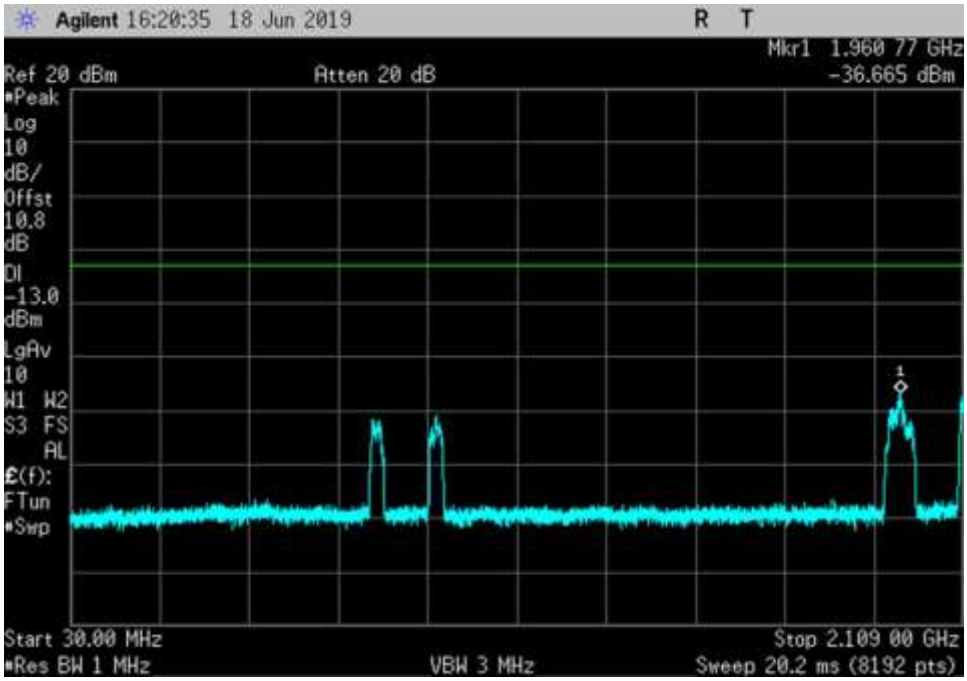
DL_1930-1995_ 8000- 12000MHz



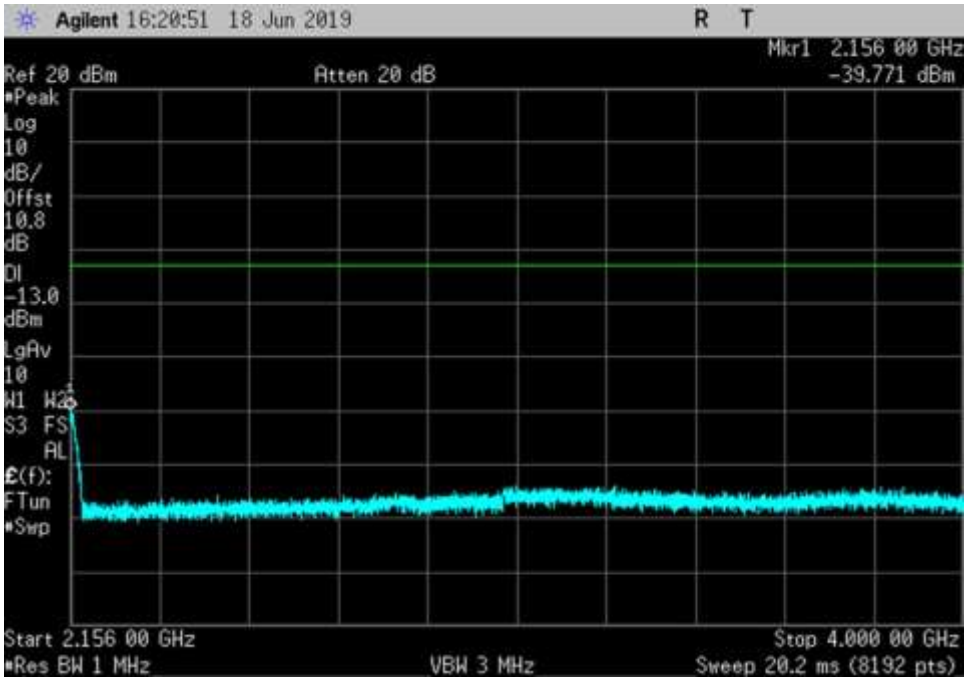
DL_1930-1995_ 12000- 16000MHz



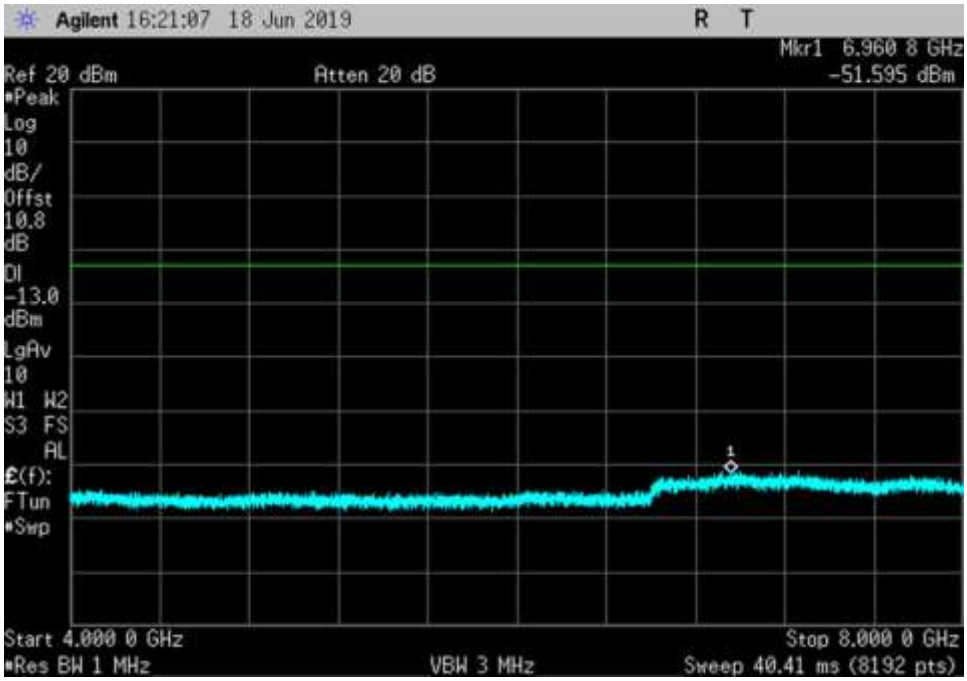
DL_1930-1995_ 16000- 20000MHz



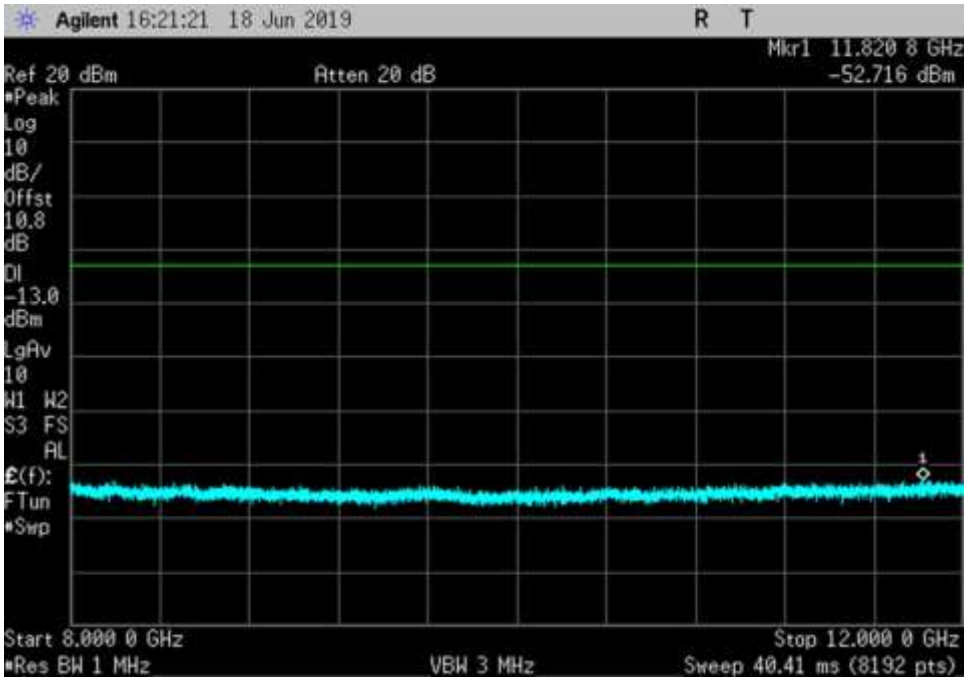
DL_2110-2155_ 30- 2109MHz



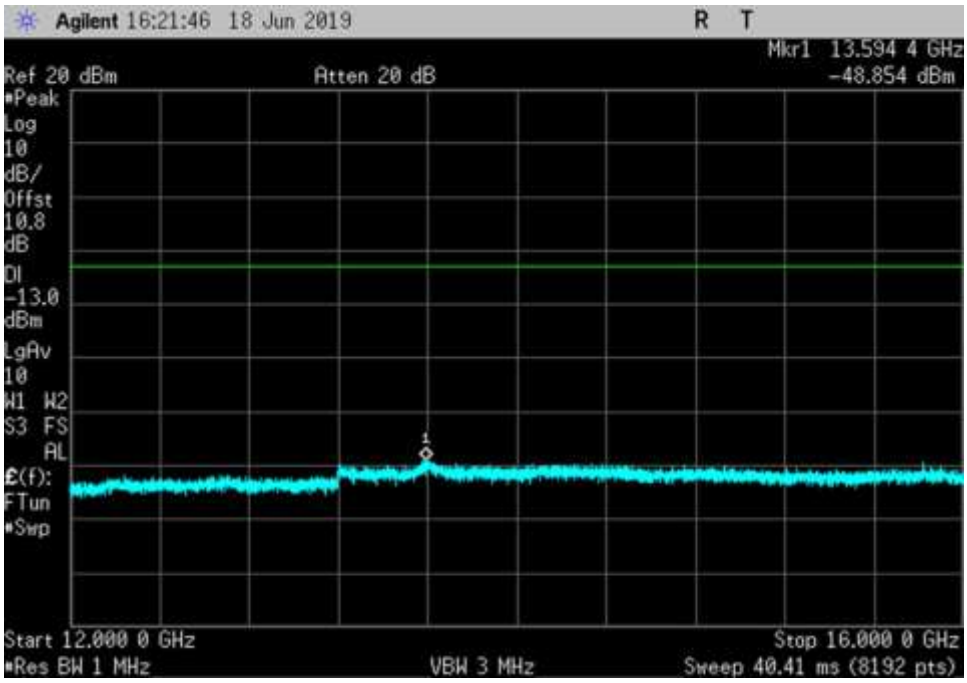
DL_2110-2155_ 2156- 4000MHz



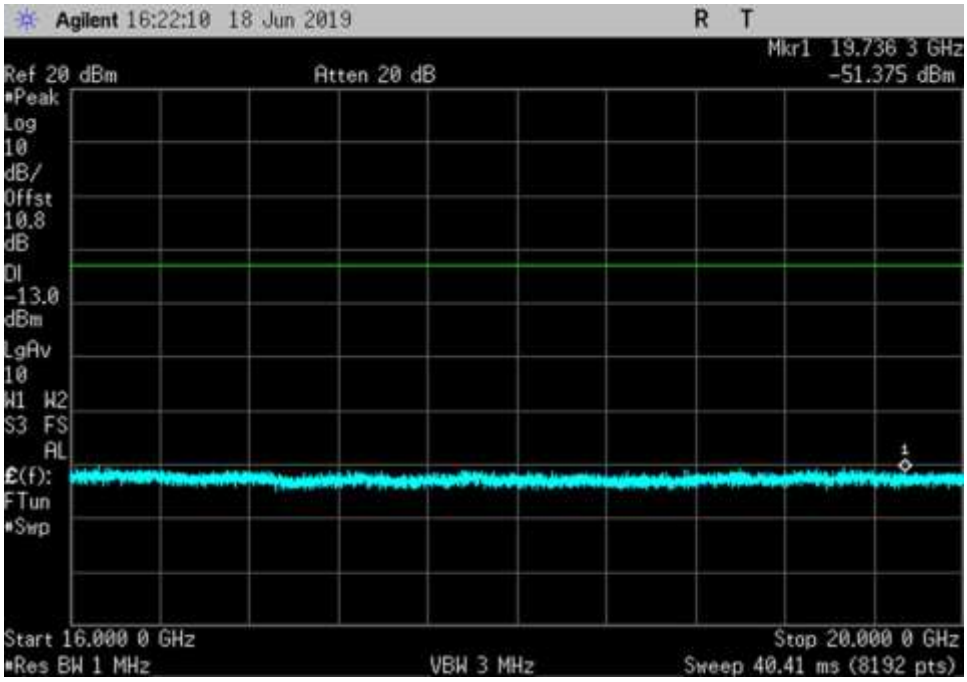
DL_2110-2155_ 4000- 8000MHz



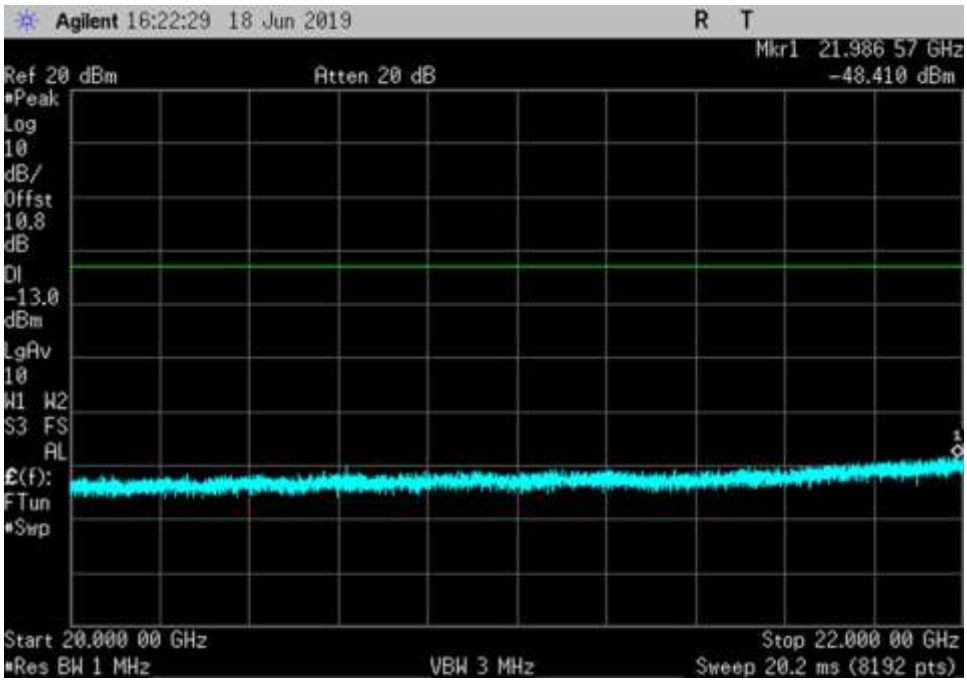
DL_2110-2155_ 8000- 12000MHz



DL_2110-2155_ 12000- 16000MHz



DL_2110-2155_ 16000- 20000MHz



DL_2110-2155_ 20000- 22000MHz

7.7 Noise limit

Test Conditions / Setup

Test Location:	CKC Laboratories, Inc. • 1120 Fulton Place • Fremont, CA 94539 • (510) 249-1170
Customer:	Cellphone-Mate, Inc.
Specification:	**7.7 Noise Limit (Maximum Transmitter Noise Power Level / Variable UL Noise Timing)**
Work Order #:	**102129** Date: 05/24/2019 and 05/28/2019
Test Type:	**Conducted Emissions**
Tested By:	**Hieu Song Nguyenpham**
Software:	EMITest 5.03.11

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 1			

Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 1			

Test Conditions / Notes:

05/24/2019
Test environment conditions: Temperature: 23.1°C, Relative Humidity: 46%, Atmospheric Pressure: 101.2kPa

05/28/2019
Test environment conditions: Temperature: 22.2°C, Relative Humidity: 44%, Atmospheric Pressure: 101.7kPa
Modification 1 was in place during testing.

Test Equipment:

Asset #	Description	Manufacturer	Model	Calibration Date	Cal Due Date
P07192	Cable	Astro	32022-29094K-29094K-48TC	10/9/2017	10/9/2019
P07191	Cable	Astro	32022-29094K-29094K-48TC	10/30/2017	10/30/2019
03418	Signal Generator	Agilent	E4438C	05/13/2019	05/13/2021
03471	Spectrum Analyzer	Agilent	E4440A	1/18/2018	1/18/2020
C00082	Directional Coupler	MECA Electronics, Inc.	722-10-1.500V	9/18/2017	9/18/2019

Test Location: CKC Laboratories, Inc. • 1120 Fulton Place • Fremont, CA 94539 • (510) 249-1170
Customer: Cellphone-Mate, Inc.
Specification: **7.7 Noise Limit (Maximum Transmitter Noise Power Level / Variable UL Noise Timing)**
Work Order #: **102129** Date: 06/17/2019
Test Type: **Conducted Emissions**
Tested By: **Hieu Song Nguyenpham**
Software: EMITest 5.03.11

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 2			

Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 2			

Test Conditions / Notes:

Test environment conditions:
Temperature: 20.9°C
Relative Humidity: 48%
Atmospheric Pressure: 101.4kPa

Test Equipment:

Asset #	Description	Manufacturer	Model	Calibration Date	Cal Due Date
P07192	Cable	Astro	32022-29094K-29094K-48TC	10/9/2017	10/9/2019
P07191	Cable	Astro	32022-29094K-29094K-48TC	10/30/2017	10/30/2019
03418	Signal Generator	Agilent	E4438C	05/13/2019	05/13/2021
03471	Spectrum Analyzer	Agilent	E4440A	1/18/2018	1/18/2020
C00082	Directional Coupler	MECA Electronics, Inc.	722-10-1.500V	9/18/2017	9/18/2019

Test Location: CKC Laboratories, Inc. • 1120 Fulton Place • Fremont, CA 94539 • (510) 249-1170
Customer: Cellphone-Mate, Inc.
Specification: **7.7 Noise Limit (Maximum Transmitter Noise Power Level / Variable UL Noise Timing)**
Work Order #: **102129** Date: 06/18/2019
Test Type: **Conducted Emissions**
Tested By: **Hieu Song Nguyenpham**
Software: EMITest 5.03.11

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 3			

Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 3			

Test Conditions / Notes:

Test environment conditions:
Temperature: 20.9°C
Relative Humidity: 48%
Atmospheric Pressure: 101.4kPa

Test Equipment:

Asset #	Description	Manufacturer	Model	Calibration Date	Cal Due Date
P07192	Cable	Astro	32022-29094K-29094K-48TC	10/9/2017	10/9/2019
P07191	Cable	Astro	32022-29094K-29094K-48TC	10/30/2017	10/30/2019
03418	Signal Generator	Agilent	E4438C	05/13/2019	05/13/2021
03471	Spectrum Analyzer	Agilent	E4440A	1/18/2018	1/18/2020
C00082	Directional Coupler	MECA Electronics, Inc.	722-10-1.500V	9/18/2017	9/18/2019

Summary of Results

Configuration 1

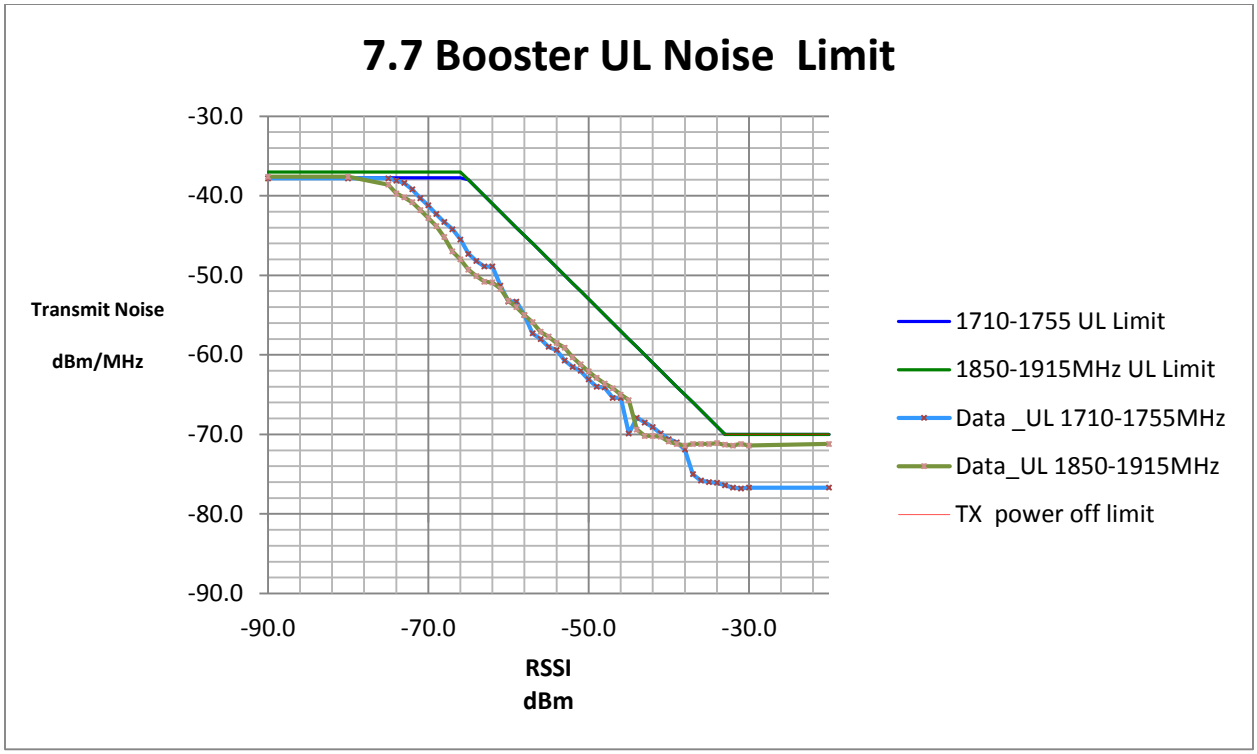
7.7 Summary of Results on a 50ft Cable

7.7.1 Maximum transmitter noise power level

- 7.7.1 a-g: Maximum transmitter noise with 50-ohm shielded load

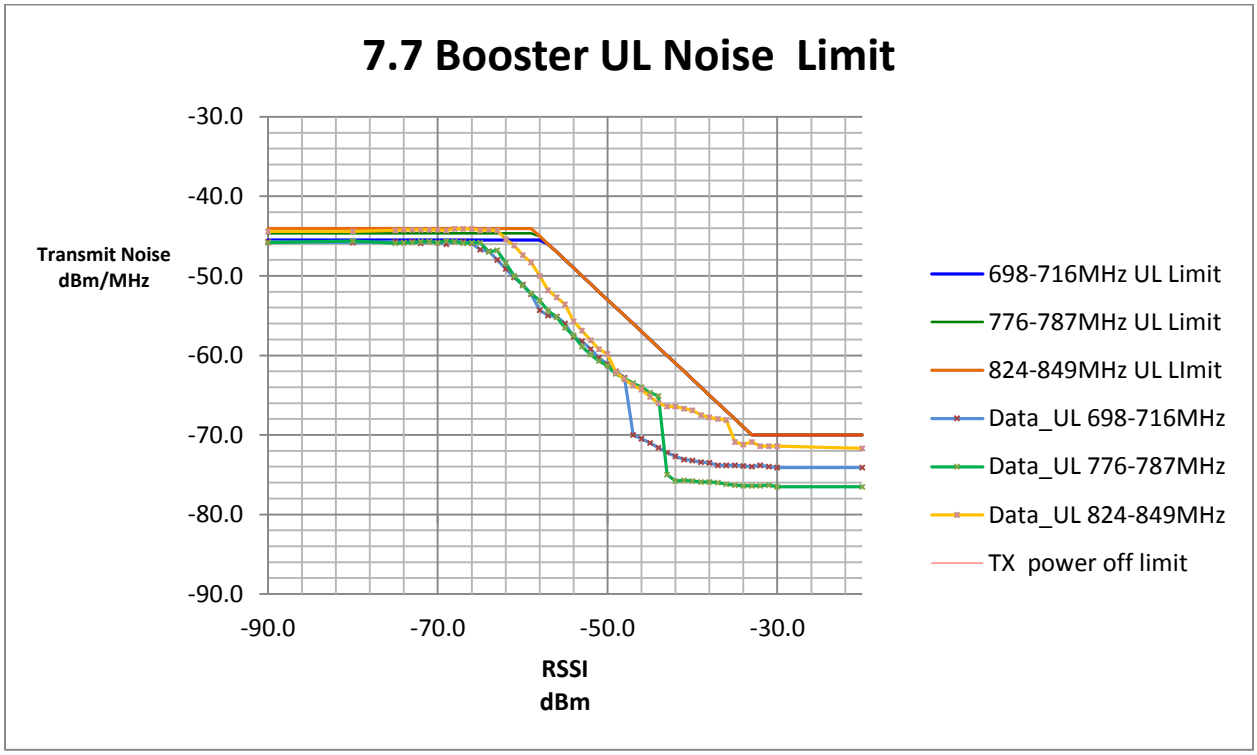
Maximum Noise Power			
Frequency MHz	**Measured dBm./MHz**	**Limit dBm/MHz**	**Margin**
UL 1710-1755	-37.7	-37.7	0.0
UL 1850-1915	-37.6	-37.0	-0.6
UL 824-849	-44.4	-44.1	-0.3
UL 698-716	-45.7	-45.5	-0.2
UL 776-787	-45.6	-44.6	-1.0
DL 2110-2155	-38.83	-37.70	-1.13
DL 1930-1995	-39.75	-37.00	-2.75
DL 869-894	-44.83	-44.10	-0.73
DL 728-746	**-45.83**	-45.50	**-0.33**
DL 746-757	-45.59	-44.60	-0.99

- 7.7.1 h-n: Maximum transmitter noise when varying the DL signal generator output level with a 4.1MHz AWGN signal



1710.0	1755.0	MHz			
			Limit		Margin
RSSI (dBm)	Measured Noise (dBm/MHz)	RSSI Dependent	Fixed Booster Limit	TX off	
-90.0	-37.8	-	-37.7	-	-0.1
-80.0	-37.8	-	-37.7	-	-0.1
-34.0	-76.1	-69.0	-	-	-7.1
-33.0	-76.4	-70.0	-	-	-6.4
-32.0	-76.7	-	-	-70	-6.7
-31.0	-76.8	-	-	-70	-6.8

1850.0	1915.0	MHz			
			Limit		Margin
RSSI (dBm)	Measured Noise (dBm/MHz)	RSSI Dependent	Fixed Booster Limit	TX off	
-90.0	-37.6	-	-37.0	-	-0.6
-80.0	-37.6	-	-37.0	-	-0.6
-34.0	-71.1	-69.0	-	-	-2.1
-33.0	-71.3	-70.0	-	-	-1.3
-32.0	-71.4	-	-	-70	-1.4
-31.0	-71.2	-	-	-70	-1.2



824.0	849.0	MHz			
			Limit		Margin
RSSI (dBm)	Measured Noise (dBm/MHz)	RSSI Dependent	Fixed Booster Limit	TX off	
-68.0	-44.1	-	-44.1	-	0.0
-67.0	-44.1	-	-44.1	-	0.0
-34.0	-71.2	-69.0	-	-	-2.2
-33.0	-70.9	-70.0	-	-	-0.9
-32.0	-71.4	-	-	-70	-1.4
-31.0	-71.4	-	-	-70	-1.4

698.0	716.0	MHz			
		Limit			Margin
RSSI (dBm)	Measured Noise (dBm/MHz)	RSSI Dependent	Fixed Booster Limit	TX off	
-90.0	-45.7	-	-45.5	-	-0.2
-80.0	-45.8	-	-45.5	-	-0.3
-34.0	-73.9	-69.0	-	-	-4.9
-33.0	-74.0	-70.0	-	-	-4.0
-32.0	-73.8	-	-	-70	-3.8
-31.0	-74.0	-	-	-70	-4.0

776.0	787.0	MHz			
		Limit			Margin
RSSI (dBm)	Measured Noise (dBm/MHz)	RSSI Dependent	Fixed Booster Limit	TX off	
-69.0	-45.6	-	-44.6	-	-1.0
-68.0	-45.7	-	-44.6	-	-1.1
-34.0	-76.4	-69.0	-	-	-7.4
-33.0	-76.4	-70.0	-	-	-6.4
-32.0	-76.4	-	-	-70	-6.4
-31.0	-76.3	-	-	-70	-6.3

7.7.2 Variable uplink noise timing

Uplink Noise timing		
Frequency	**Measured**	**Limit**
MHz	Sec	sec
UL1710-1755	0.72	3.00
UL1850-1915	0.48	3.00
UL824-849	0.83	3.00
UL 698-716	0.91	3.00
UL776-787	0.92	3.00

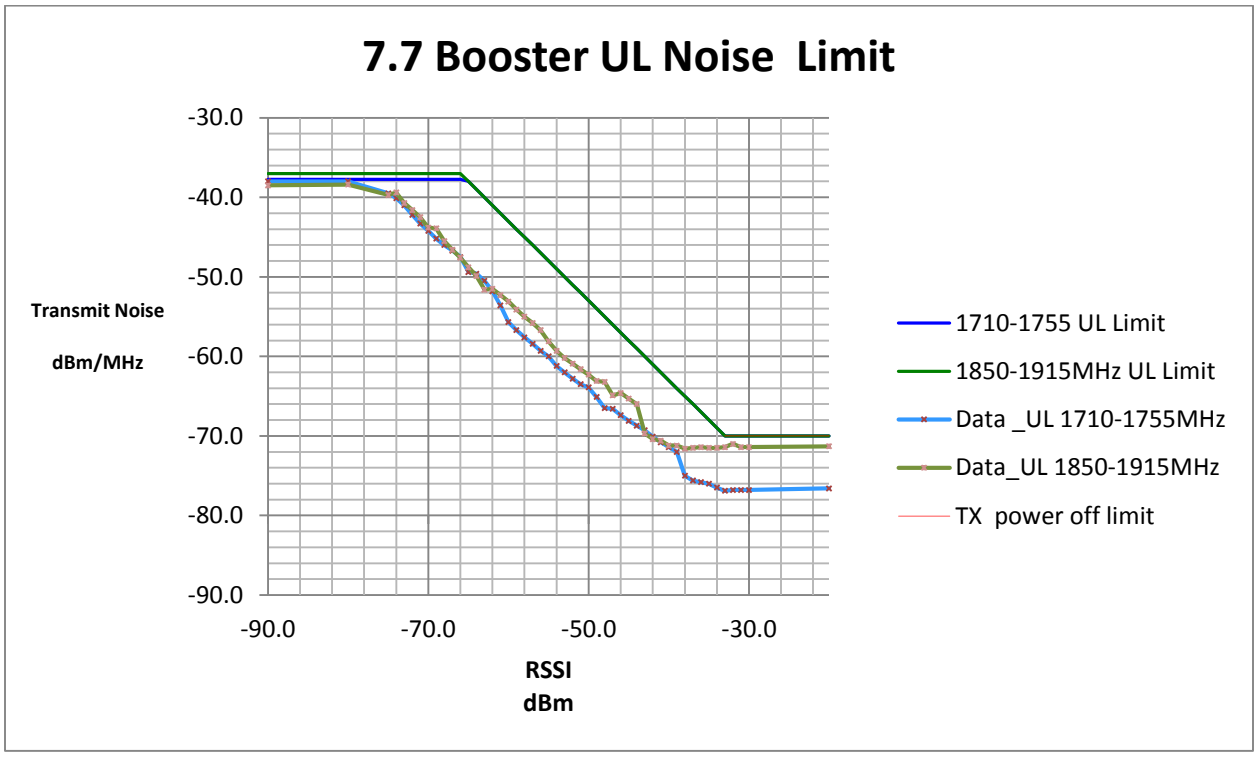
7.7 Summary of Results on a 100ft Cable

7.7.1 Maximum transmitter noise power level

- 7.7.1 a-g: Maximum transmitter noise with 50-ohm shielded load

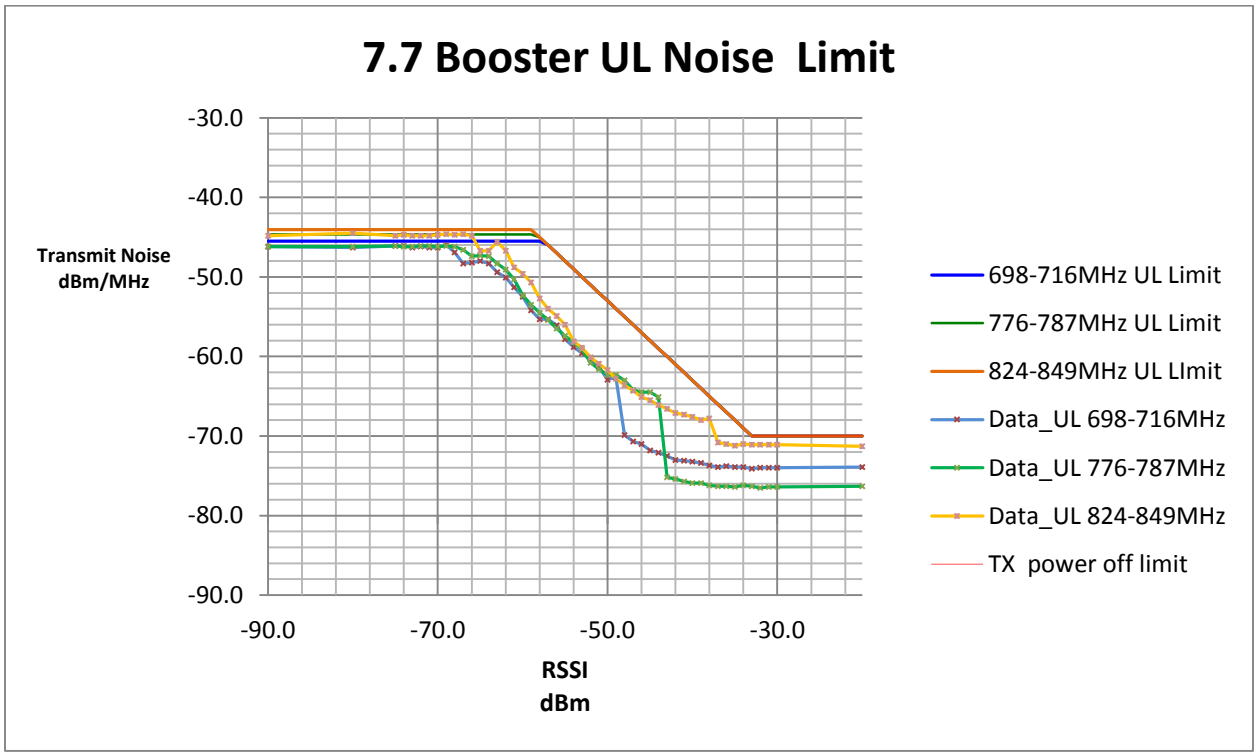
Maximum Noise Power			
Frequency	**Measured**	**Limit**	**Margin**
MHz	dBm/MHz	dBm/MHz	
UL 1710-1755	-37.8	-37.7	-0.1
UL 1850-1915	-38.3	-37.0	-1.3
UL 824-849	-44.4	-44.1	-0.3
UL 698-716	-45.7	-45.5	-0.2
UL 776-787	-45.8	-44.6	-1.2
DL 2110-2155	-40.87	-37.70	-3.17
DL 1930-1995	-44.66	-37.00	-7.66
DL 869-894	-45.74	-44.10	-1.64
DL 728-746	**-47.25**	-45.50	-1.75
DL 746-757	-46.82	-44.60	-2.22

- 7.7.1 h-n: Maximum transmitter noise when varying the DL signal generator output level with a 4.1MHz AWGN signal



1710.0	1755.0	MHz			
		Limit			Margin
RSSI (dBm)	Measured Noise (dBm/MHz)	RSSI Dependent	Fixed Booster Limit	TX off	
-90.0	-38.0	-	-37.7	-	-0.3
-80.0	-38.0	-	-37.7	-	-0.3
-34.0	-76.5	-69.0	-	-	-7.5
-33.0	-76.9	-70.0	-	-	-6.9
-32.0	-76.8	-	-	-70	-6.8
-31.0	-76.8	-	-	-70	-6.8

1850.0	1915.0	MHz			
		Limit			Margin
RSSI (dBm)	Measured Noise (dBm/MHz)	RSSI Dependent	Fixed Booster Limit	TX off	
-90.0	-38.5	-	-37.0	-	-1.5
-80.0	-38.4	-	-37.0	-	-1.4
-34.0	-71.5	-69.0	-	-	-2.5
-33.0	-71.4	-70.0	-	-	-1.4
-32.0	-71.0	-	-	-70	-1.0
-31.0	-71.4	-	-	-70	-1.4



824.0	849.0	MHz			
		Limit			Margin
RSSI (dBm)	Measured Noise (dBm/MHz)	RSSI Dependent	Fixed Booster Limit	TX off	
-70.0	-44.7	-	-44.1	-	-0.6
-69.0	-44.6	-	-44.1	-	-0.5
-34.0	-71.0	-69.0	-	-	-2.0
-33.0	-71.1	-70.0	-	-	-1.1
-32.0	-71.1	-	-	-70	-1.1
-31.0	-71.1	-	-	-70	-1.1

698.0	716.0	MHz			
		Limit			Margin
RSSI (dBm)	Measured Noise (dBm/MHz)	RSSI Dependent	Fixed Booster Limit	TX off	
-75.0	-46.1	-	-45.5	-	-0.6
-74.0	-46.1	-	-45.5	-	-0.6
-34.0	-73.9	-69.0	-	-	-4.9
-33.0	-74.1	-70.0	-	-	-4.1
-32.0	-74.0	-	-	-70	-4.0
-31.0	-74.0	-	-	-70	-4.0

776.0	787.0	MHz			
		Limit			Margin
RSSI (dBm)	Measured Noise (dBm/MHz)	RSSI Dependent	Fixed Booster Limit	TX off	
-75.0	-46.1	-	-44.6	-	-1.5
-74.0	-46.2	-	-44.6	-	-1.6
-34.0	-76.2	-69.0	-	-	-7.2
-33.0	-76.3	-70.0	-	-	-6.3
-32.0	-76.5	-	-	-70	-6.5
-31.0	-76.4	-	-	-70	-6.4

7.7.2 Variable uplink noise timing

Uplink Noise Timing		
Frequency	**Measured**	**Limit**
MHz	Sec	sec
UL1710-1755	0.32	3.00
UL1850-1915	0.27	3.00
UL824-849	0.83	3.00
UL 698-716	0.71	3.00
UL776-787	0.94	3.00

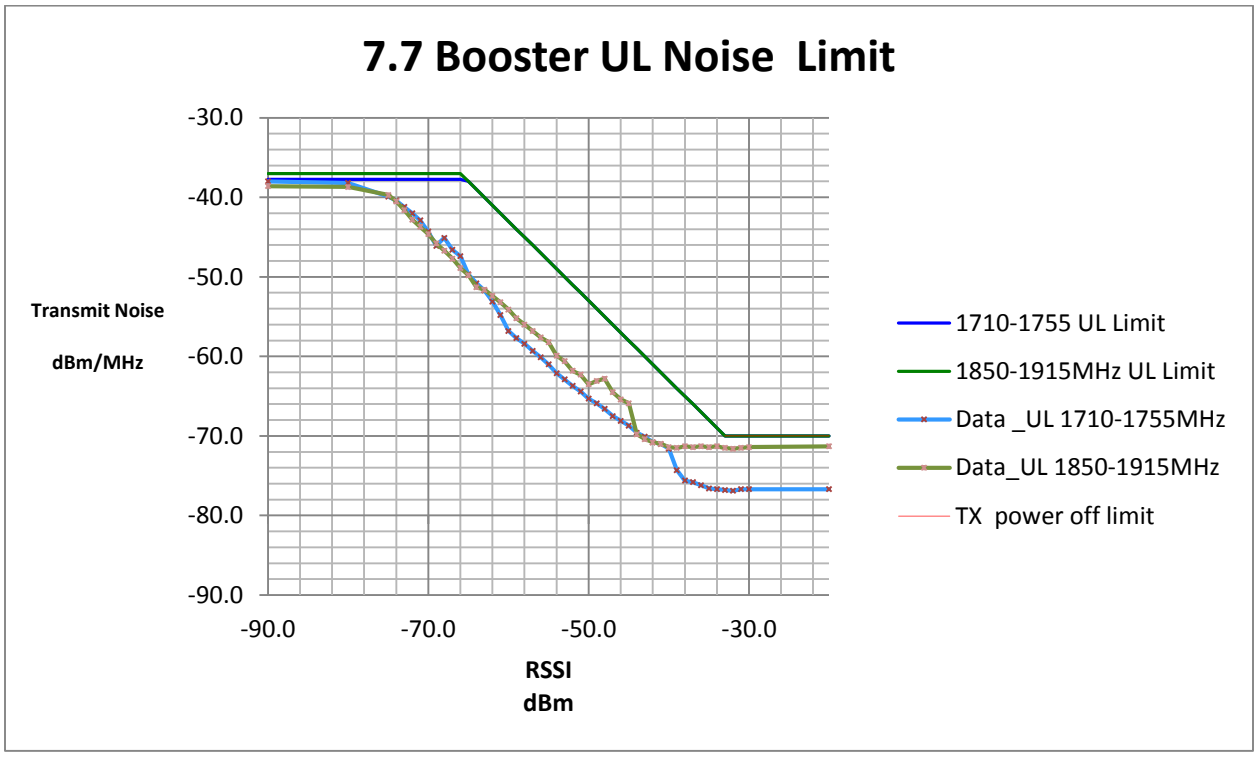
7.7 Summary of Results on a 150ft Cable

7.7.1 Maximum transmitter noise power level

- 7.7.1 a-g: Maximum transmitter noise with 50-ohm shielded load

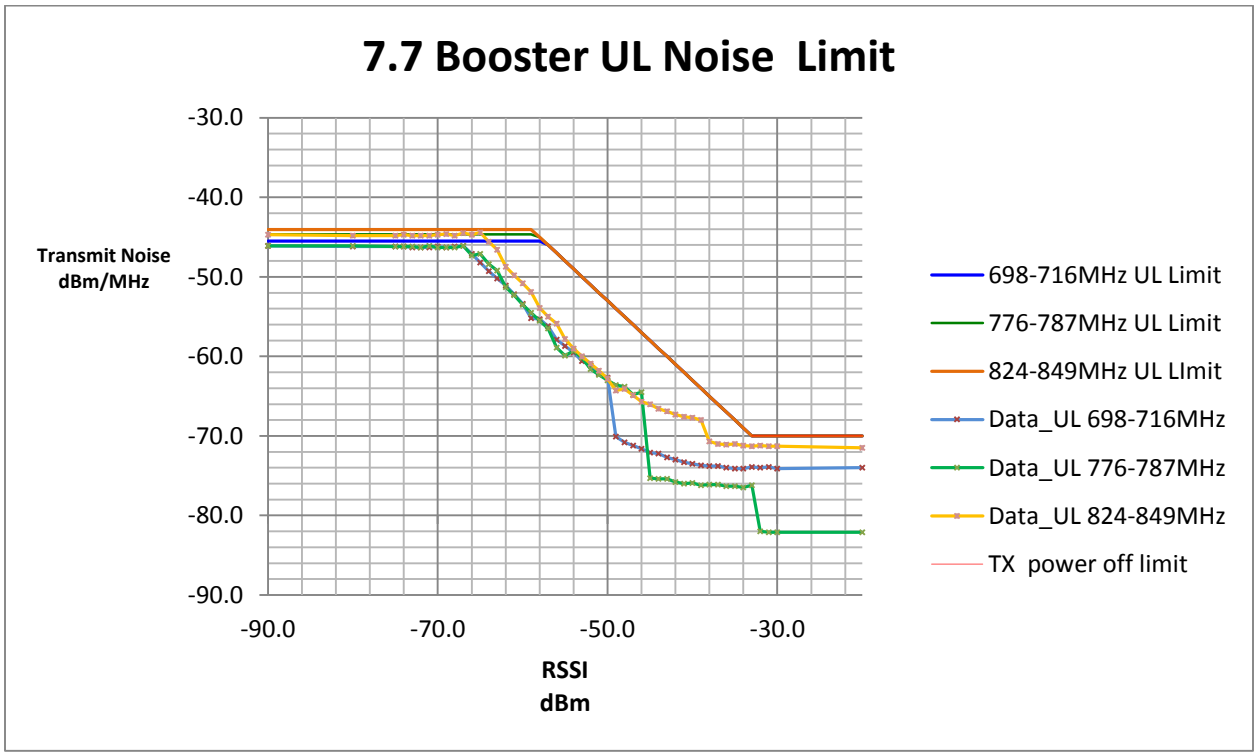
Maximum Noise Power			
Frequency	**Measured**	**Limit**	**Margin**
MHz	dBm/MHz	dBm/MHz	
UL 1710-1755	-37.7	-37.7	0.0
UL 1850-1915	-38.2	-37.0	-1.2
UL 824-849	-44.8	-44.1	-0.7
UL 698-716	-45.6	-45.5	-0.1
UL 776-787	-45.7	-44.6	-1.1
DL 2110-2155	-45.54	-37.70	-7.84
DL 1930-1995	-47.93	-37.00	-10.93
DL 869-894	-47.20	-44.10	-3.10
DL 728-746	**-48.29**	-45.50	**-2.79**
DL 746-757	-48.36	-44.60	-3.76

- 7.7.1 h-n: Maximum transmitter noise when varying the DL signal generator output level with a 4.1MHz AWGN signal.



1710.0	1755.0	MHz			
		Limit			Margin
RSSI (dBm)	Measured Noise (dBm/MHz)	RSSI Dependent	Fixed Booster Limit	TX off	
-90.0	-38.0	-	-37.7	-	-0.3
-80.0	-38.2	-	-37.7	-	-0.5
-34.0	-76.7	-69.0	-	-	-7.7
-33.0	-76.8	-70.0	-	-	-6.8
-32.0	-76.9	-	-	-70	-6.9
-31.0	-76.7	-	-	-70	-6.7

1850.0	1915.0	MHz			
		Limit			Margin
RSSI (dBm)	Measured Noise (dBm/MHz)	RSSI Dependent	Fixed Booster Limit	TX off	
-90.0	-38.6	-	-37.0	-	-1.6
-80.0	-38.7	-	-37.0	-	-1.7
-34.0	-71.3	-69.0	-	-	-2.3
-33.0	-71.5	-70.0	-	-	-1.5
-30.0	-71.4	-	-	-70	-1.4
-20.0	-71.3	-	-	-70	-1.3



824.0	849.0	MHz			
		Limit			Margin
RSSI (dBm)	Measured Noise (dBm/MHz)	RSSI Dependent	Fixed Booster Limit	TX off	
-90.0	-44.7	-	-44.1	-	-0.6
-80.0	-44.8	-	-44.1	-	-0.7
-34.0	-71.2	-69.0	-	-	-2.2
-33.0	-71.3	-70.0	-	-	-1.3
-32.0	-71.2	-	-	-70	-1.2
-31.0	-71.3	-	-	-70	-1.3

698.0	716.0	MHz			
		Limit			Margin
RSSI (dBm)	Measured Noise (dBm/MHz)	RSSI Dependent	Fixed Booster Limit	TX off	
-90.0	-46.1	-	-45.5	-	-0.6
-80.0	-46.2	-	-45.5	-	-0.7
-34.0	-74.1	-69.0	-	-	-5.1
-33.0	-73.9	-70.0	-	-	-3.9
-32.0	-74.0	-	-	-70	-4.0
-31.0	-73.9	-	-	-70	-3.9

776.0	787.0	MHz			
		Limit			Margin
RSSI (dBm)	Measured Noise (dBm/MHz)	RSSI Dependent	Fixed Booster Limit	TX off	
-90.0	-46.1	-	-44.6	-	-1.5
-80.0	-46.1	-	-44.6	-	-1.5
-34.0	-76.5	-69.0	-	-	-7.5
-33.0	-76.2	-70.0	-	-	-6.2
-32.0	-82.0	-	-	-70	-12.0
-31.0	-82.1	-	-	-70	-12.1

7.7.2 Variable uplink noise timing

Uplink Noise Timing		
Frequency	**Measured**	**Limit**
MHz	Sec	sec
UL1710-1755	0.61	3.00
UL1850-1915	0.13	3.00
UL824-849	0.92	3.00
UL 698-716	0.85	3.00
UL776-787	0.92	3.00

Configuration 2

Note: Only Contract to perform Max Noise on a 50ft Cable

7.7.1 Maximum transmitter noise power level

- 7.7.1 a-g: Maximum transmitter noise with 50-ohm shielded load

Maximum Noise Power			
Frequency	**Measured**	**Limit**	**Margin**
MHz	dBm/MHz	dBm/MHz	
UL 1710-1755	-37.9	-37.7	-0.2
UL 1850-1915	-37.7	-37.0	-0.7
UL 824-849	-44.3	-44.1	-0.2
UL 698-716	-46.1	-45.5	-0.6
UL 776-787	-45.5	-44.6	-0.9
DL 2110-2155	-37.83	-37.70	-0.13
DL 1930-1995	-39.94	-37.00	-2.94
DL 869-894	-44.95	-44.10	-0.85
DL 728-746	-45.81	-45.50	-0.31
DL 746-757	-45.67	-44.60	-1.07

Configuration 3

7.7 Summary of Results

CKC Laboratories was only contracted to perform Max Noise on a 50ft Cable

7.7.1 Maximum transmitter noise power level

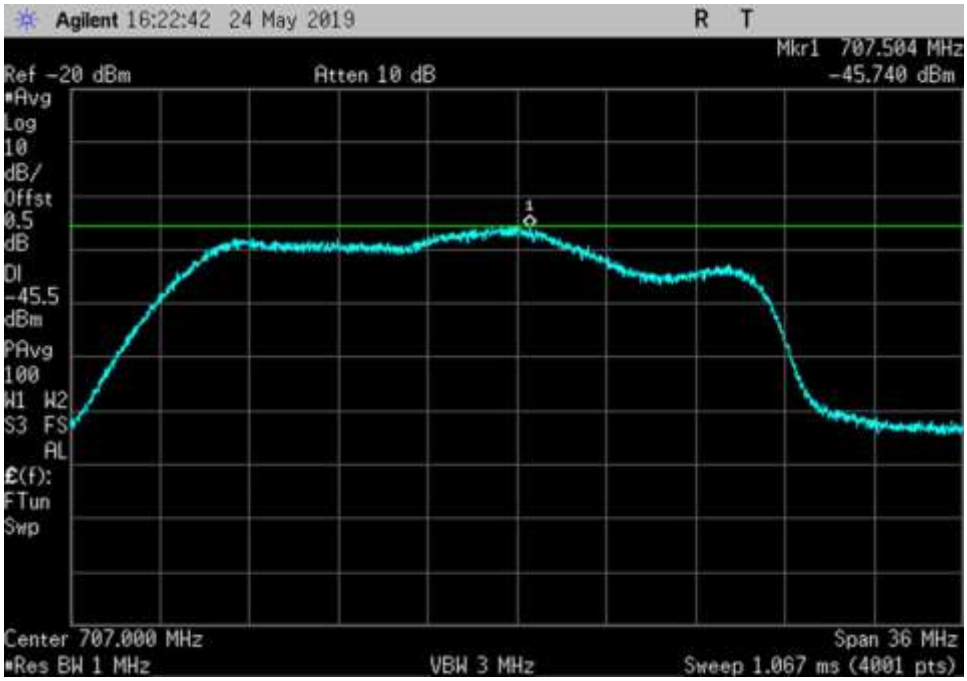
- 7.7.1 a-g: Maximum transmitter noise with 50-ohm shielded load.

Maximum Noise Power			
Frequency	**Measured**	**Limit**	**Margin**
MHz	dBm./MHz	dBm/MHz	
UL 1710-1755	-38.1	-37.7	-0.4
UL 1850-1915	-37.7	-37.0	-0.7
UL 824-849	-44.6	-44.1	-0.5
UL 698-716	-46.0	-45.5	-0.5
UL 776-787	-45.5	-44.6	-0.9
DL 2110-2155	-39.90	-37.70	-2.20
DL 1930-1995	-42.04	-37.00	-5.04
DL 869-894	-47.86	-44.10	-3.76
DL 728-746	**-48.89**	-45.50	**-3.39**
DL 746-757	-48.68	-44.60	-4.08

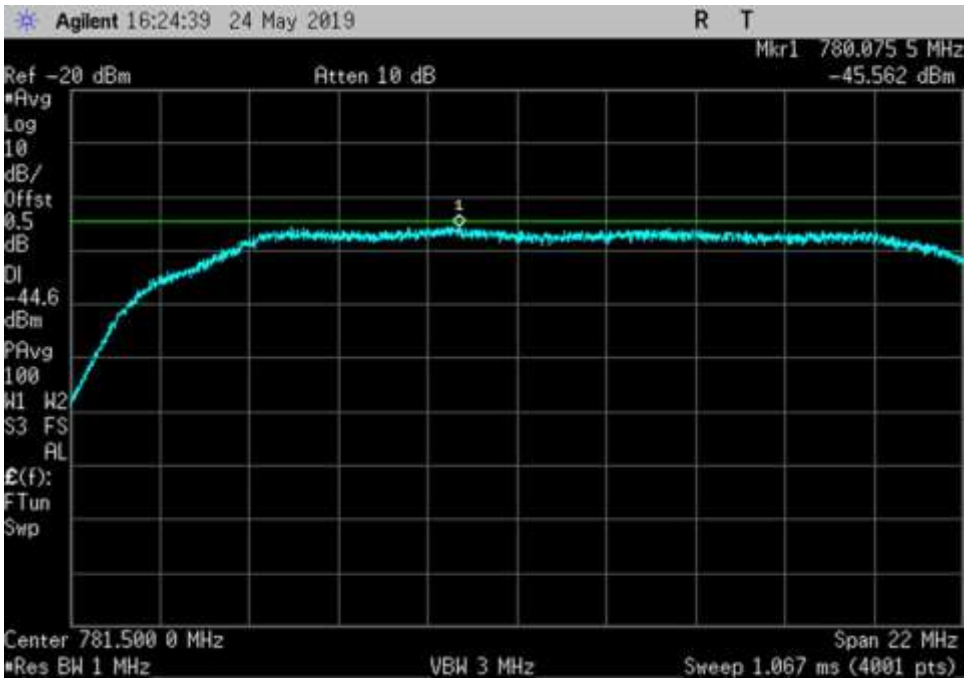
7.7.1 Maximum Transmitter Noise Power Level

Plots

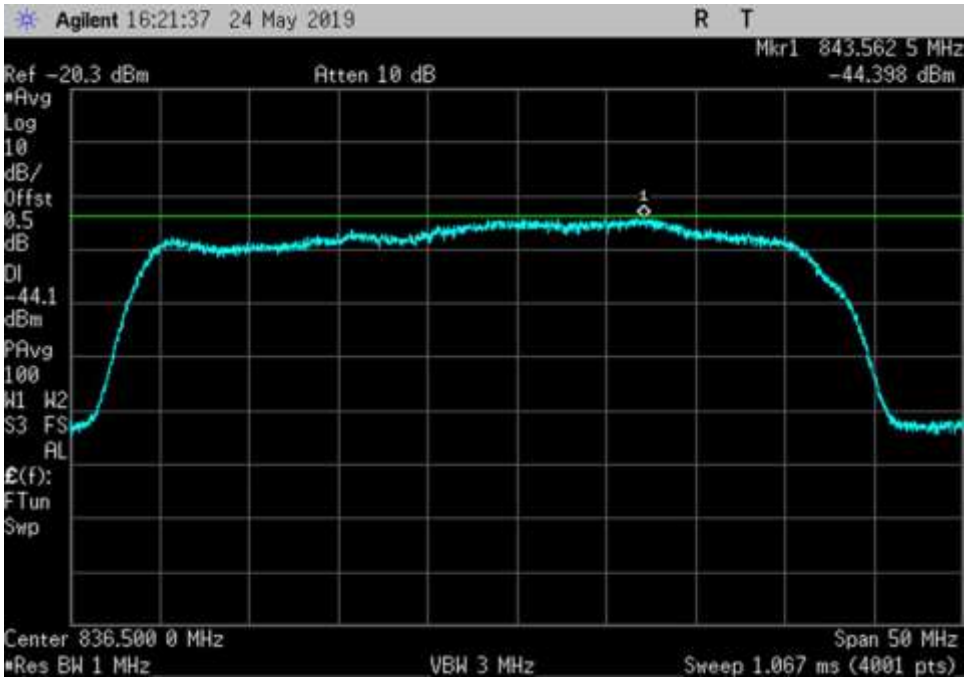
Configuration 1



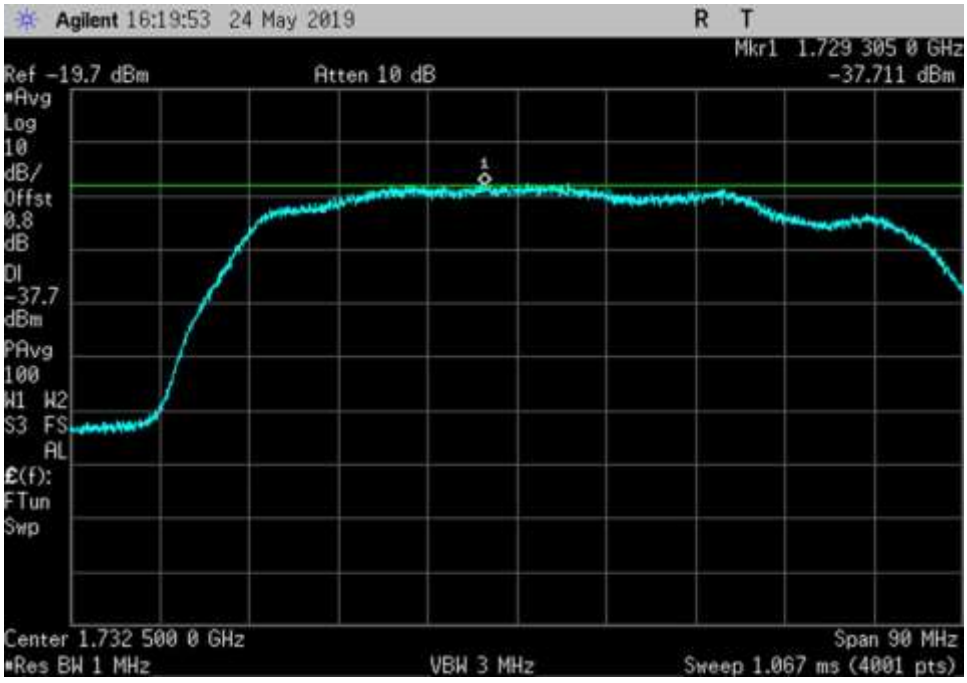
UL_698-716_ 707MHz_50ft Cable



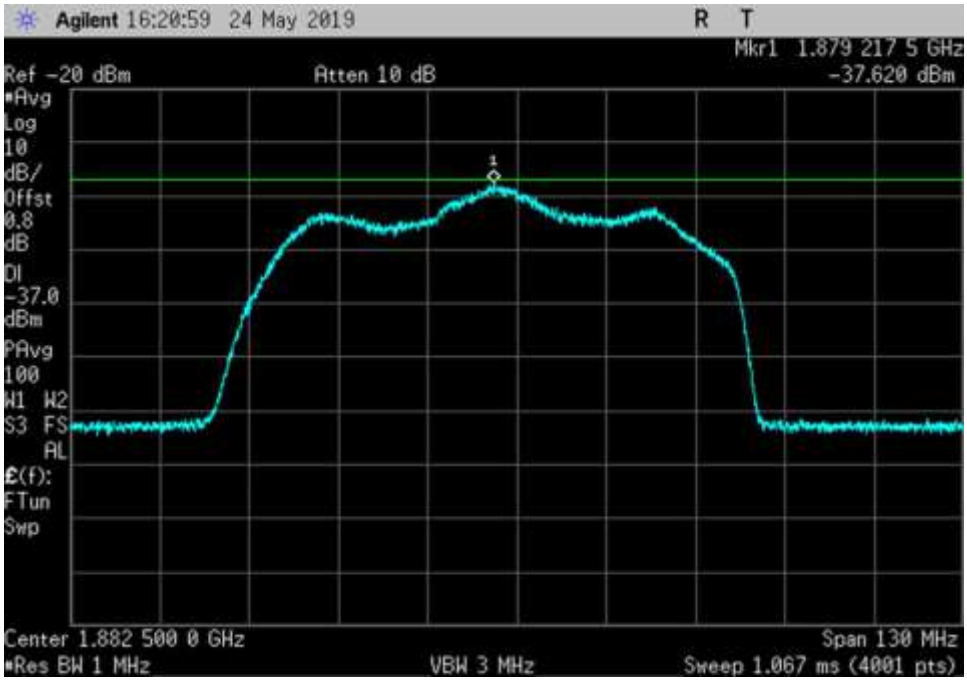
UL_776-787_ 781.5MHz_50ft Cable



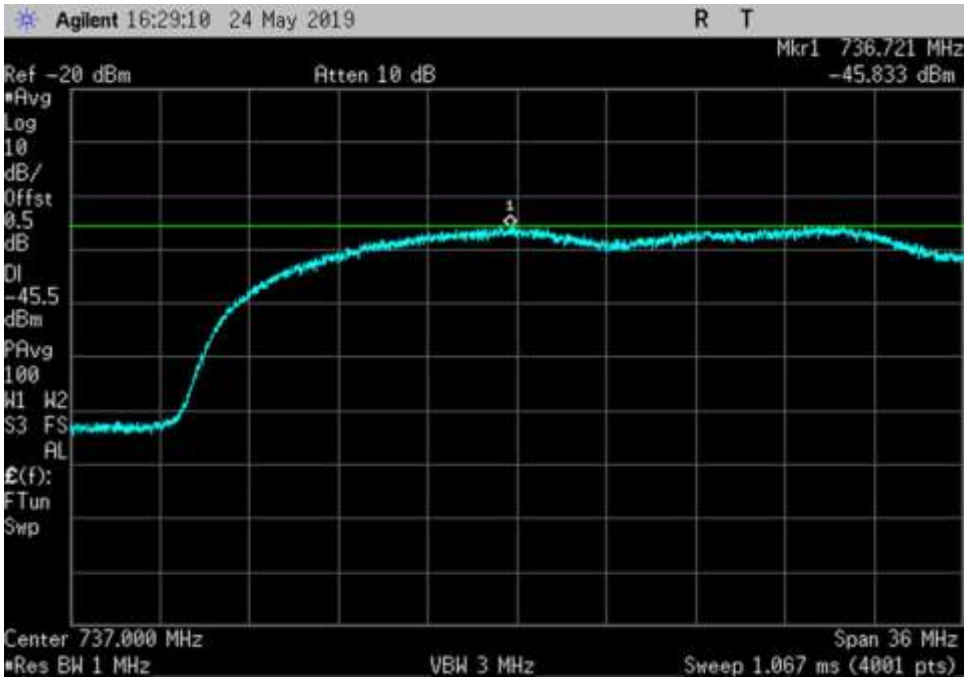
UL_824-849_ 836.5MHz_50ft Cable



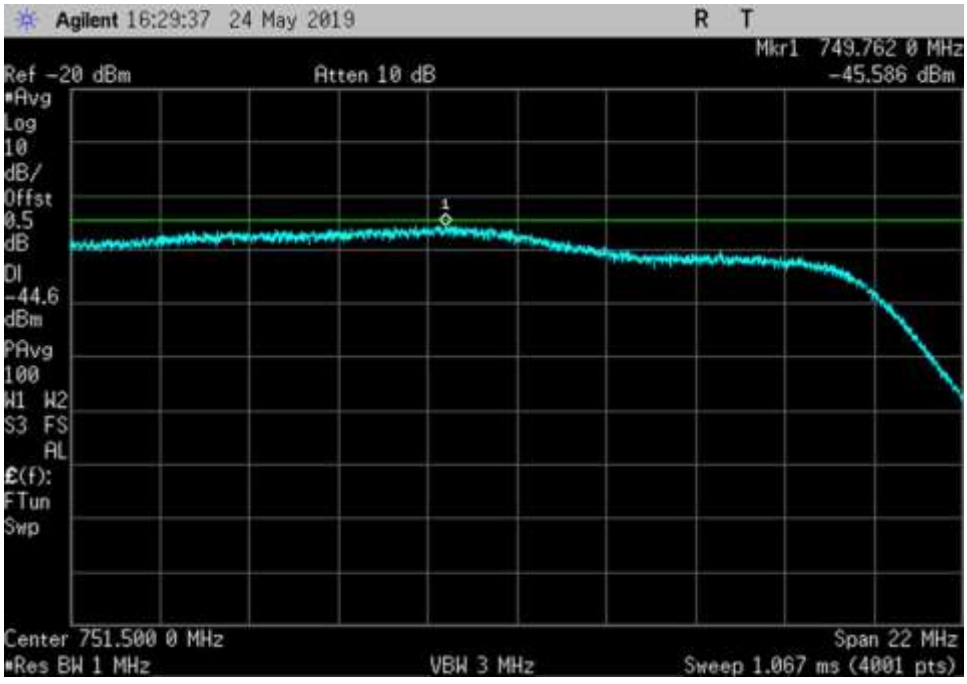
UL_1710-1755_ 1732.5MHz_50ft Cable



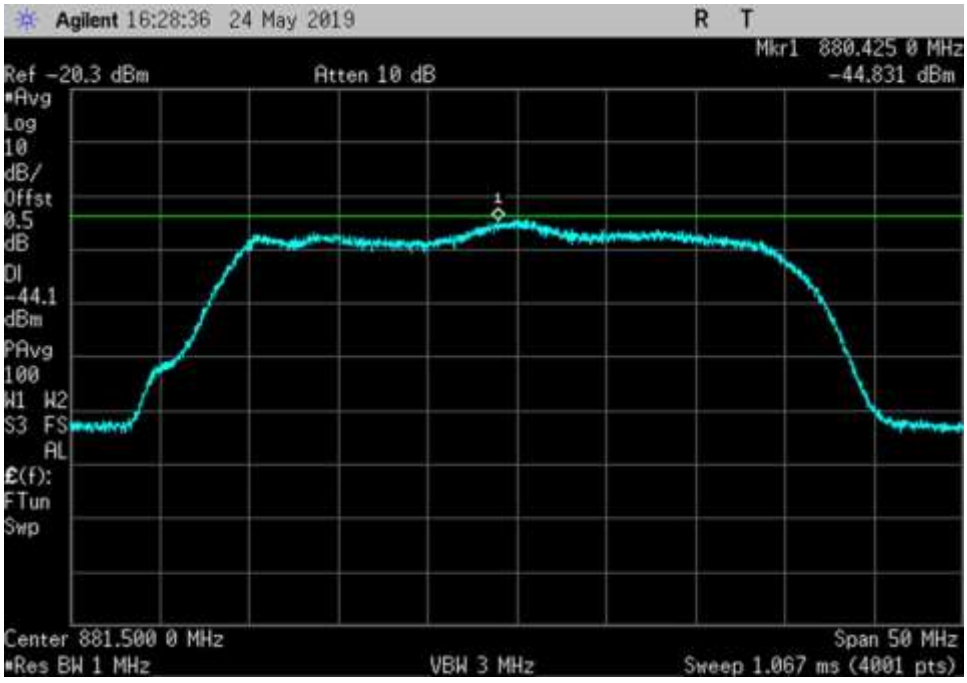
UL_1850-1915_ 1882.5MHz_50ft Cable



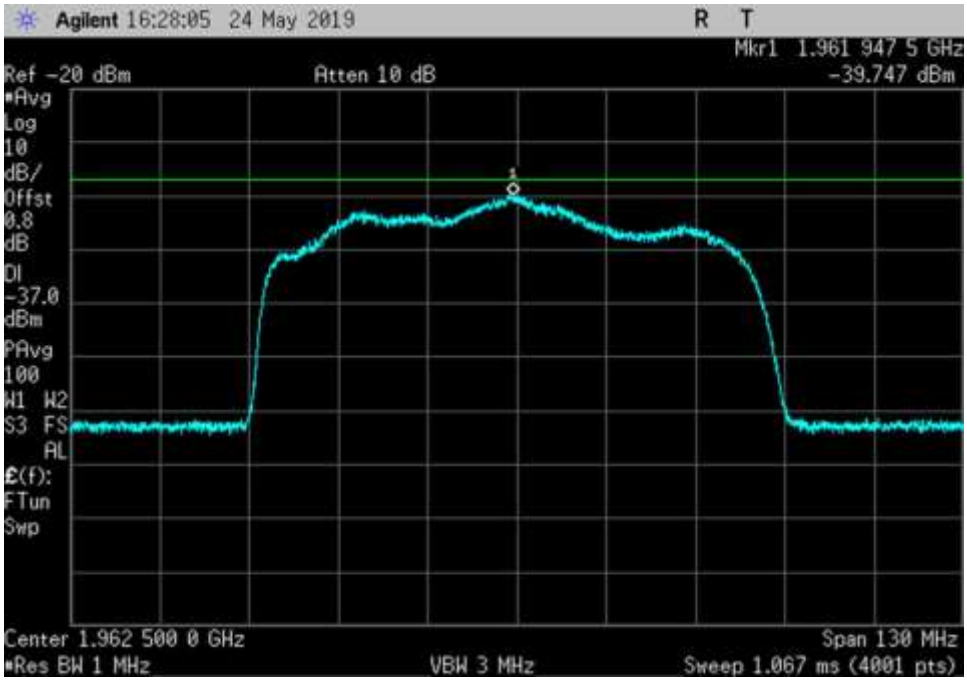
DL_728-746_ 737MHz_50ft Cable



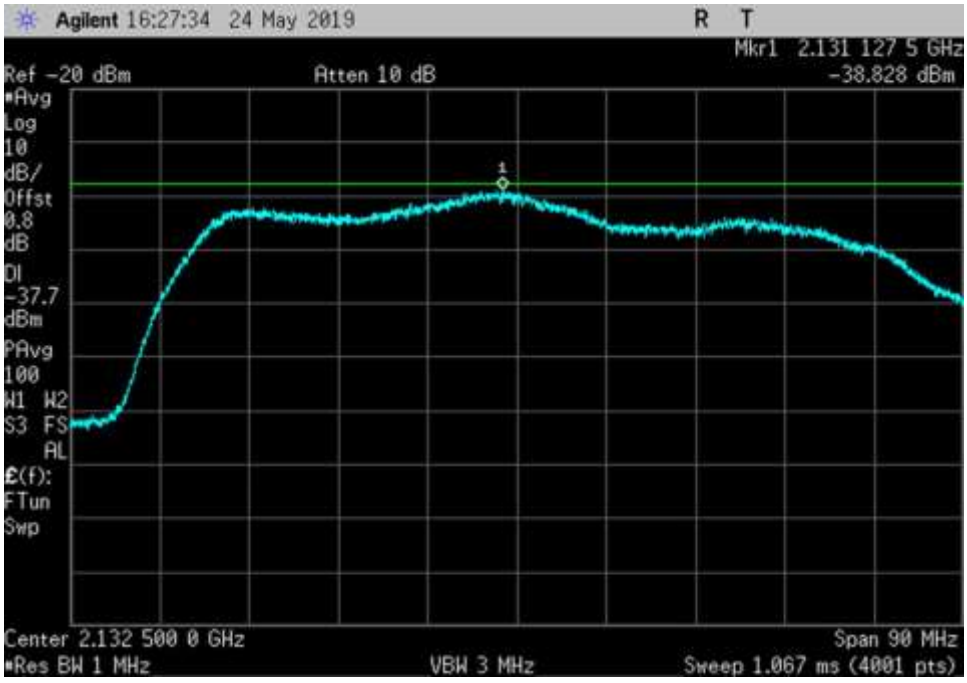
DL_746-757_ 751.5MHz_50ft Cable



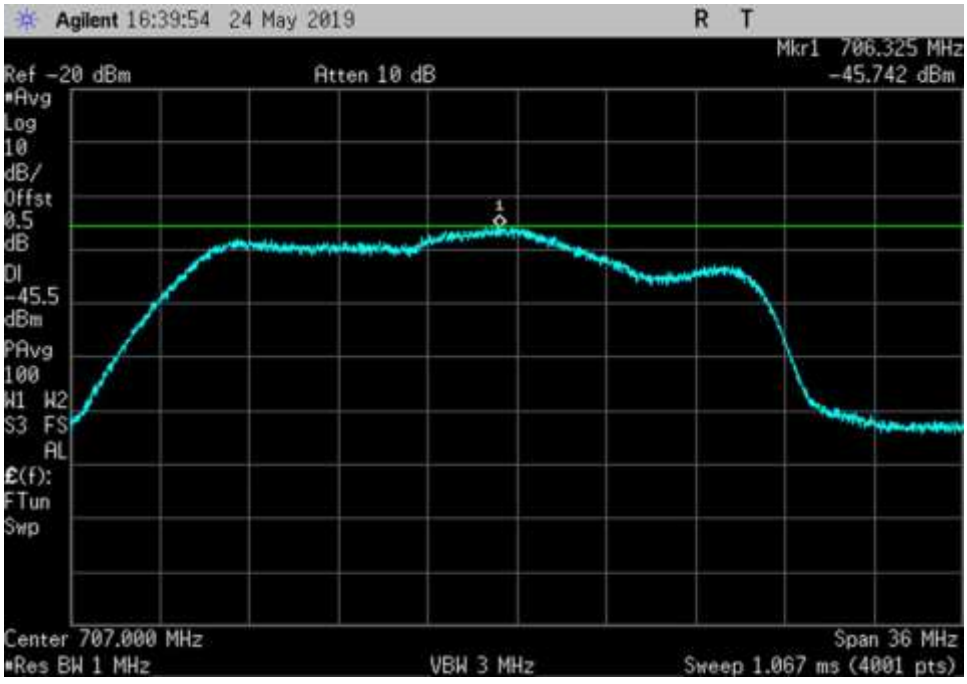
DL_869-894_ 881.5MHz_50ft Cable



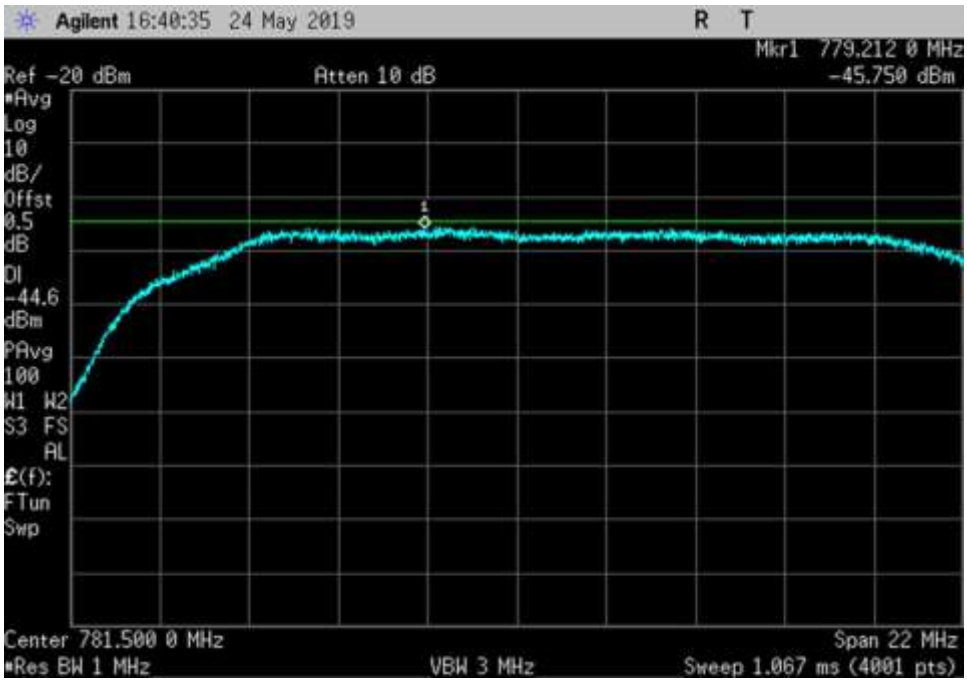
DL_1930-1995_ 1962.5MHz_50ft Cable



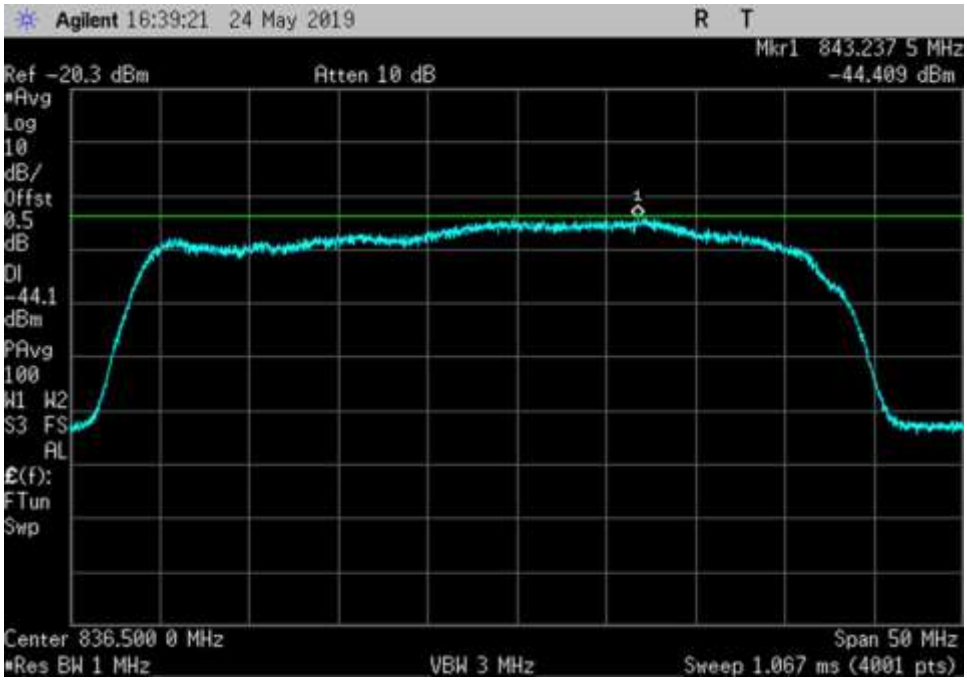
DL_2110-2155_ 2132.5MHz_50ft Cable



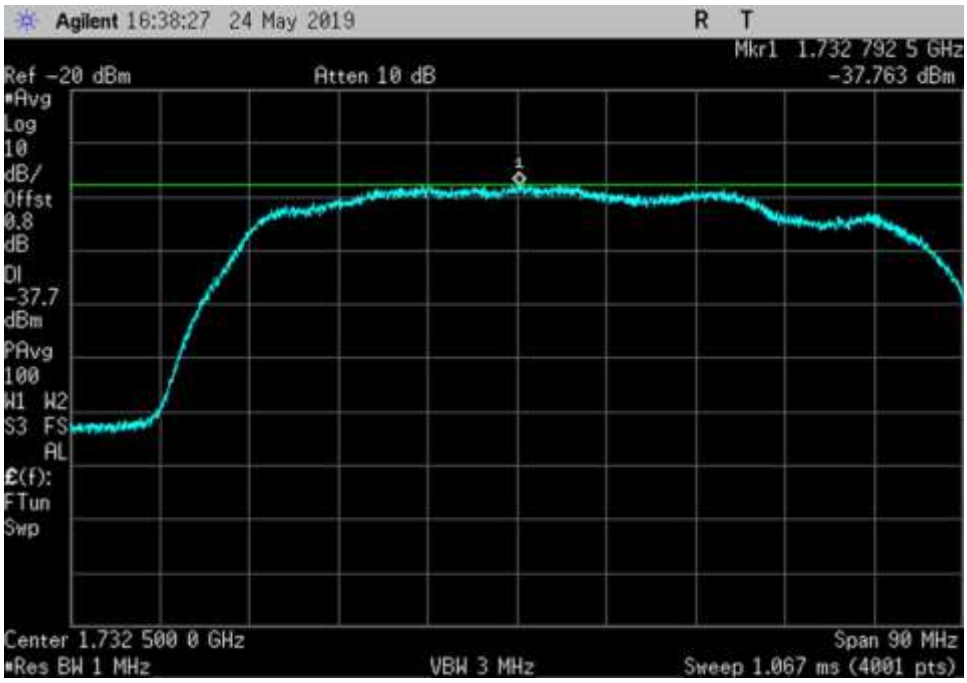
UL_698-716_ 707MHz_100ft Cable



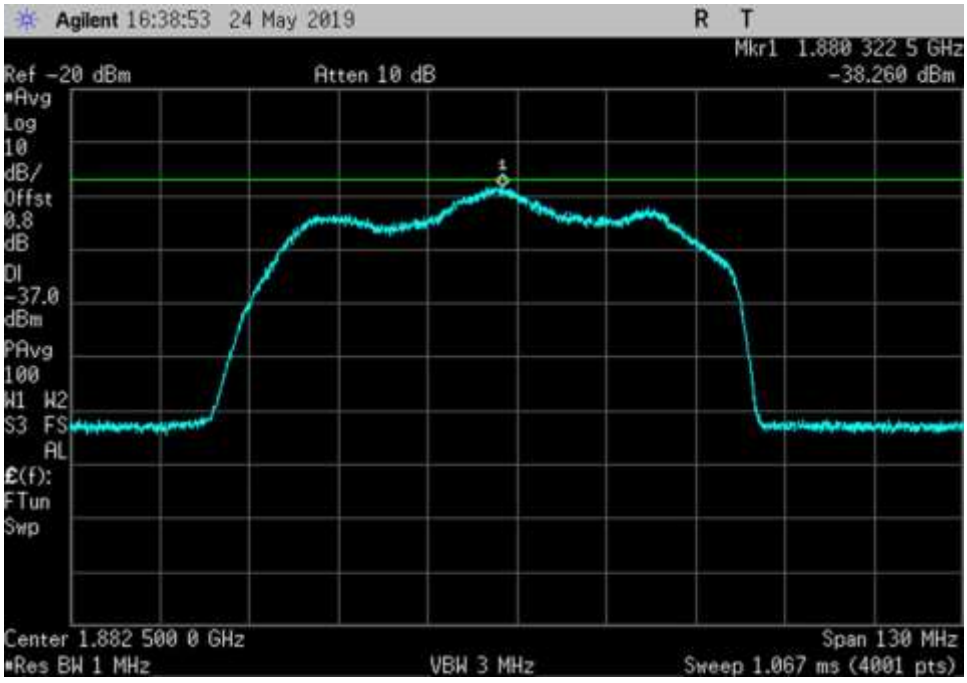
UL_776-787_ 781.5MHz_100ft Cable



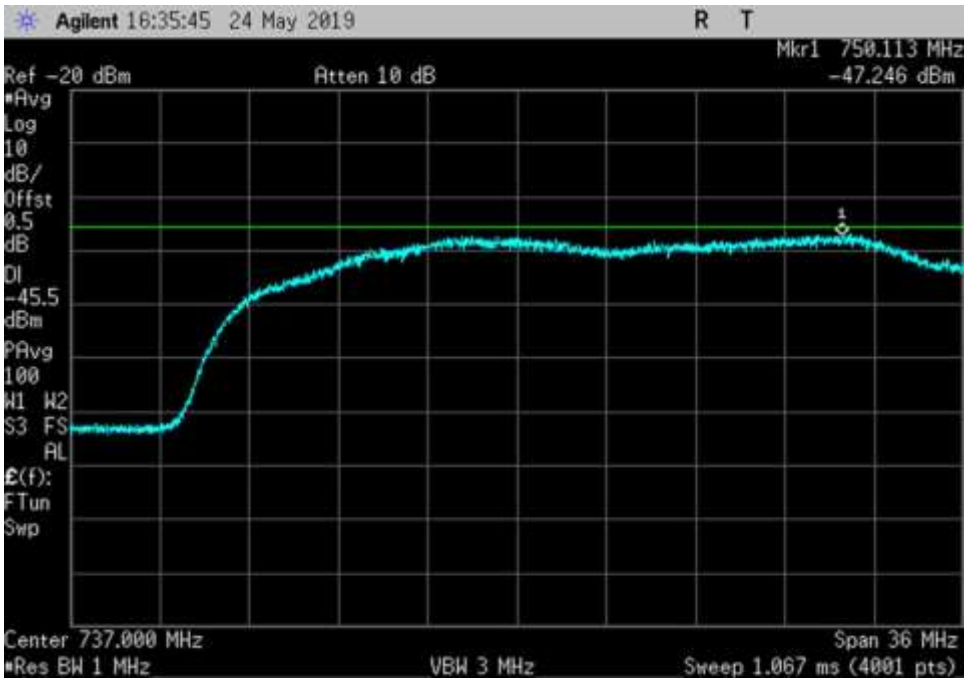
UL_824-849_ 836.5MHz_100ft Cable



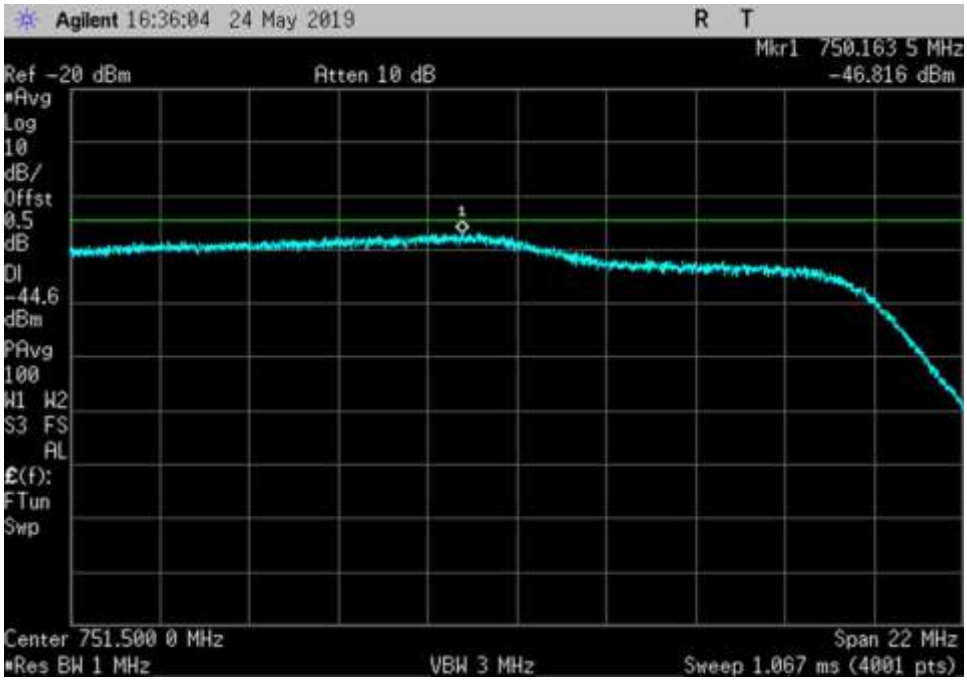
UL_1710-1755_ 1732.5MHz_100ft Cable



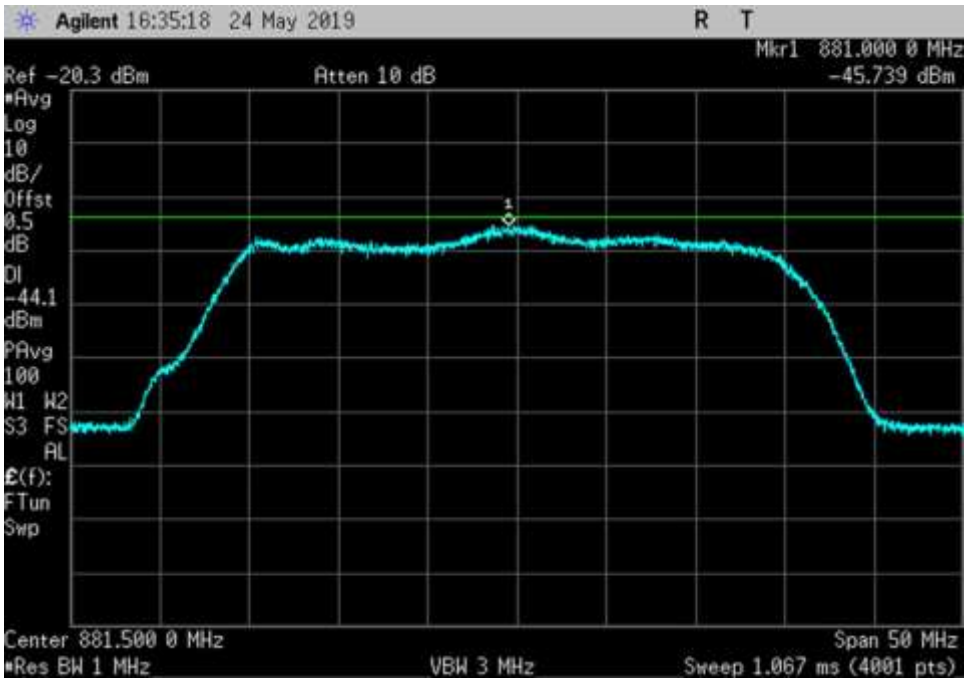
UL_1850-1915_ 1882.5MHz_100ft Cable



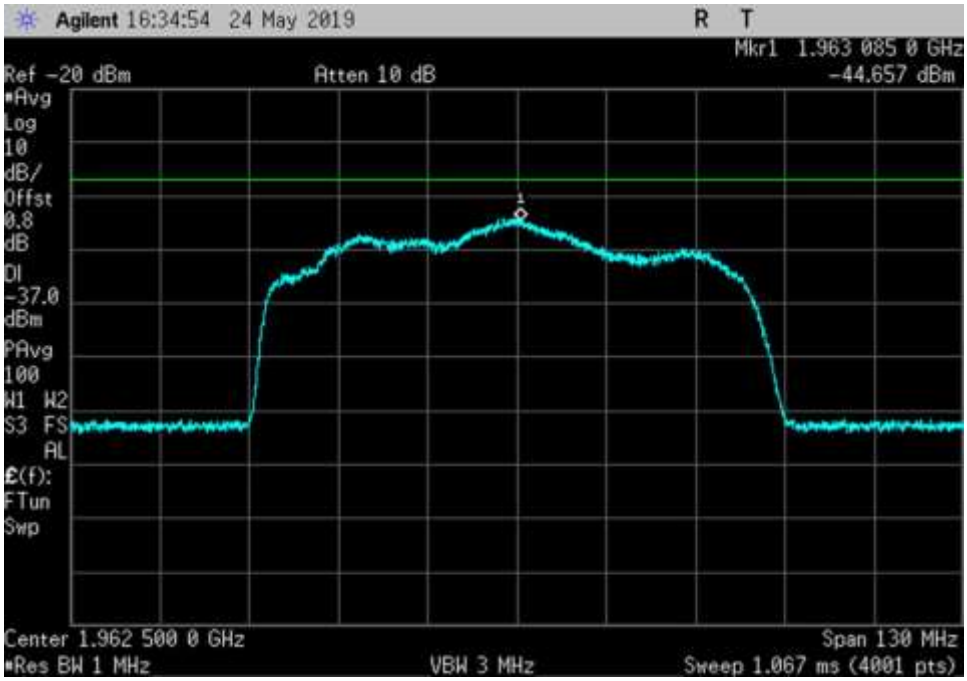
DL_728-746_ 737MHz_100ft Cable



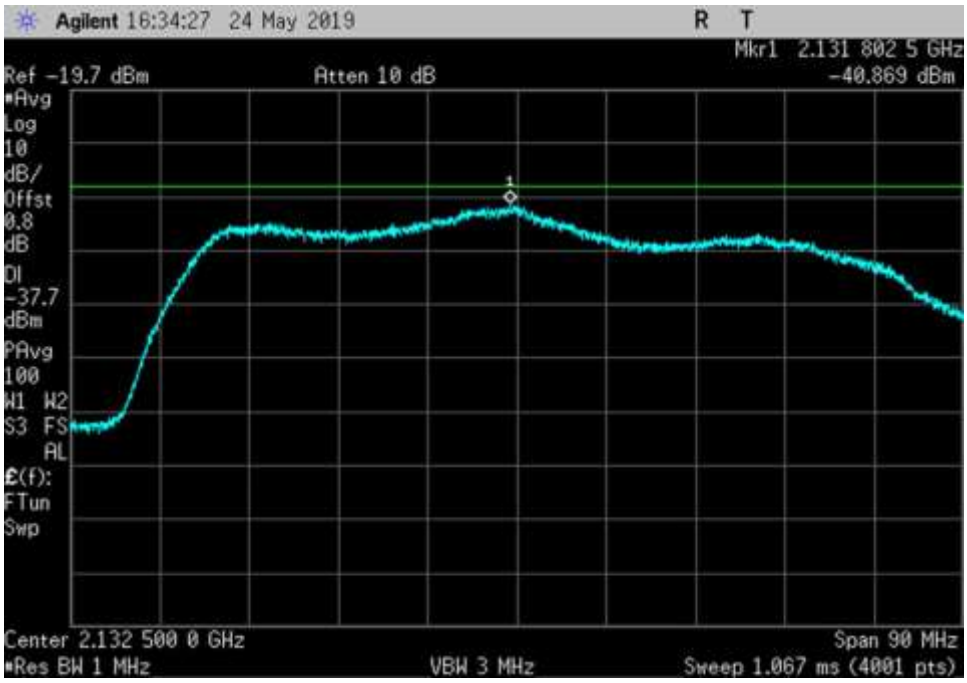
DL_746-757_ 751.5MHz_100ft Cable



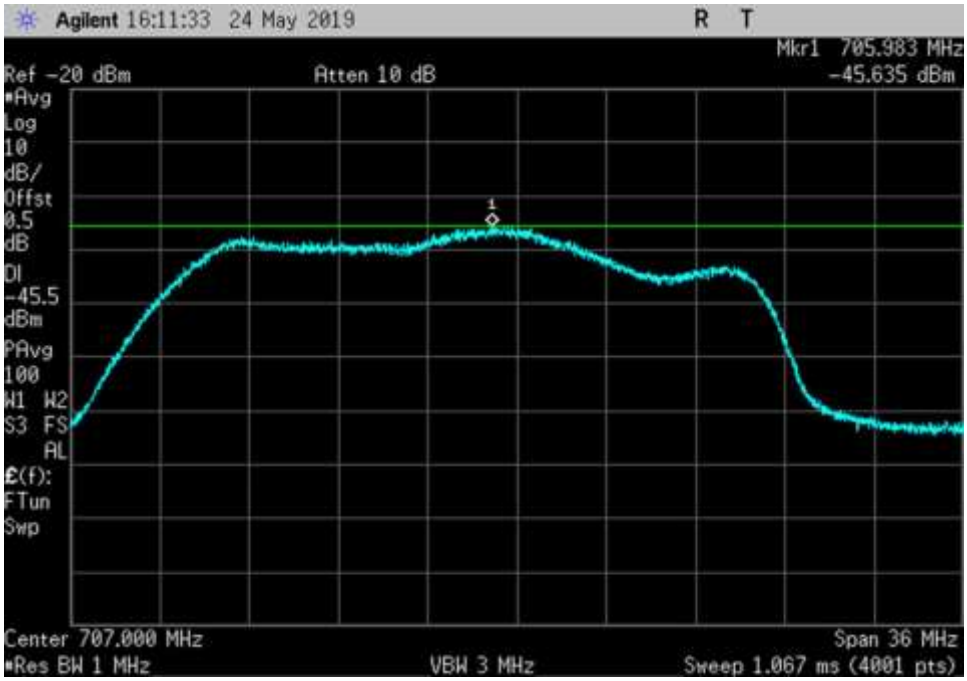
DL_869-894_ 881.5MHz_100ft Cable



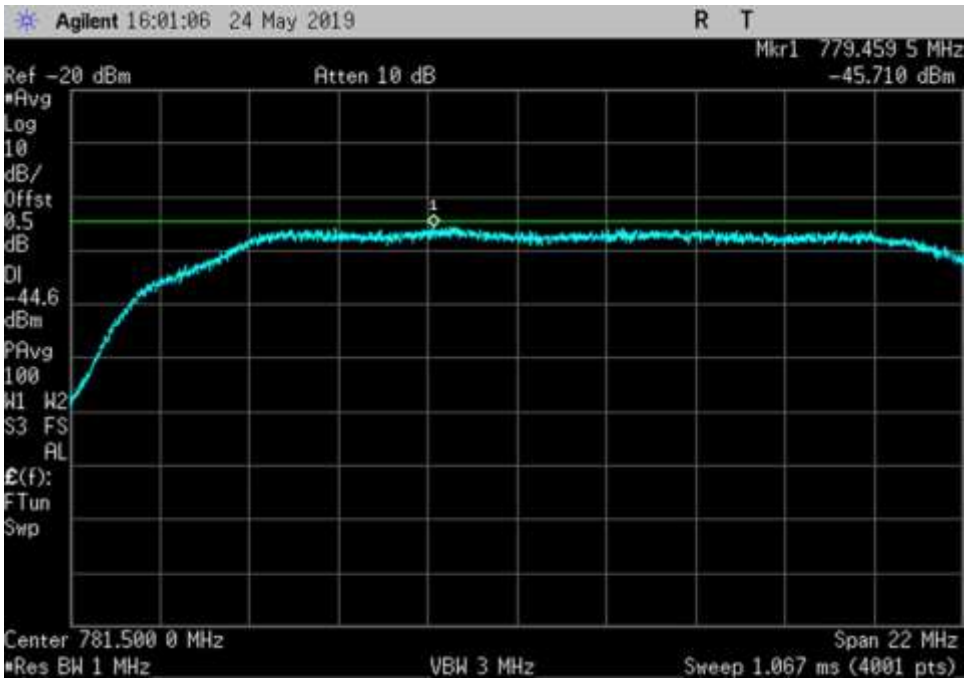
DL_1930-1995_ 1962.5MHz_100ft Cable



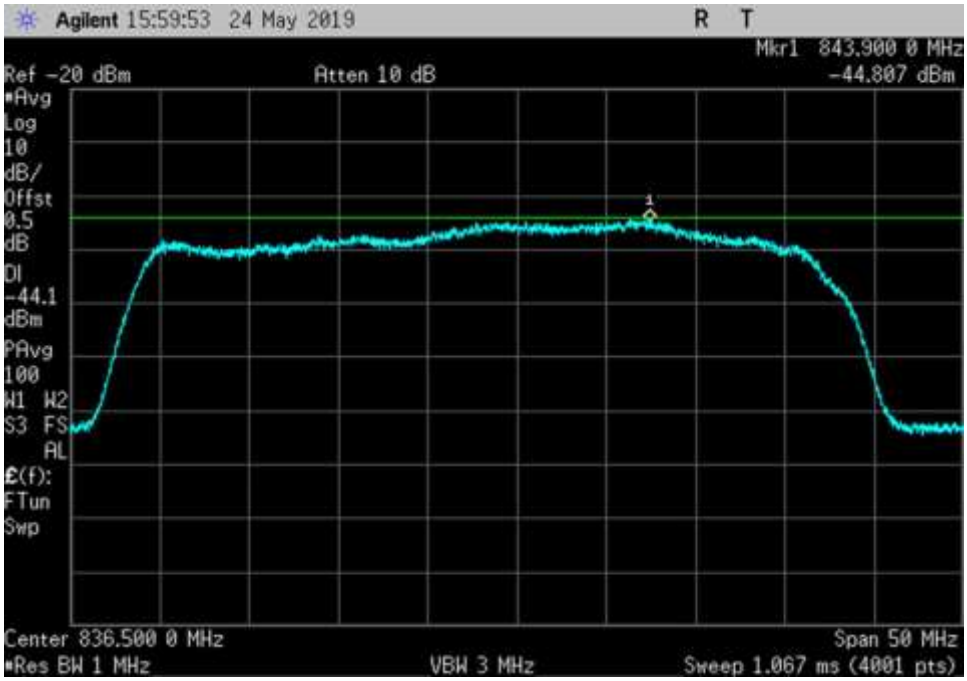
DL_2110-2155_ 2132.5MHz_100ft Cable



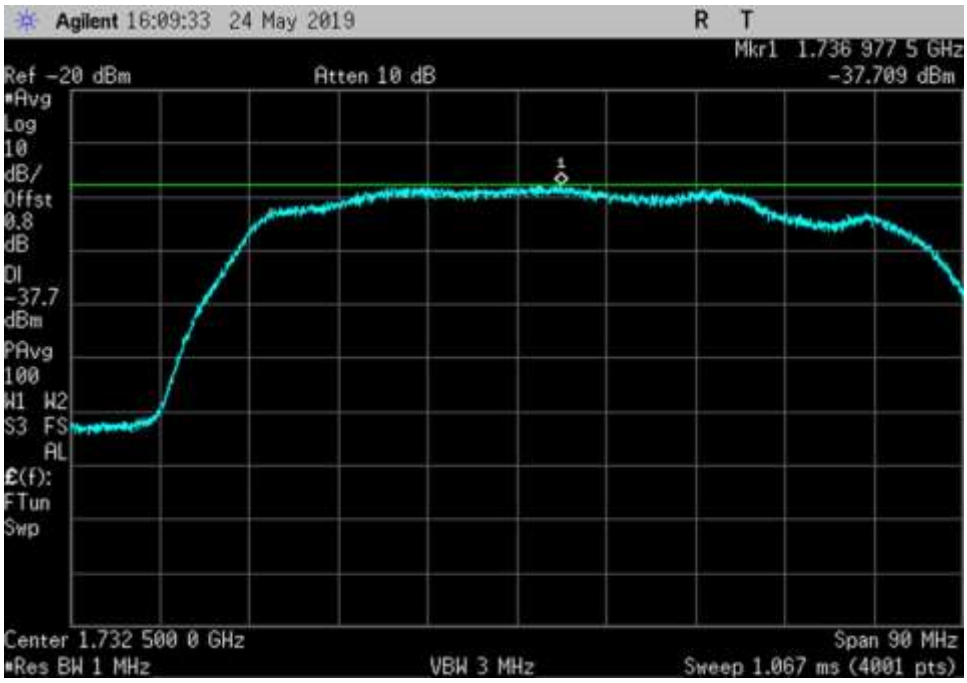
UL_698-716_ 707MHz_150ft Cable



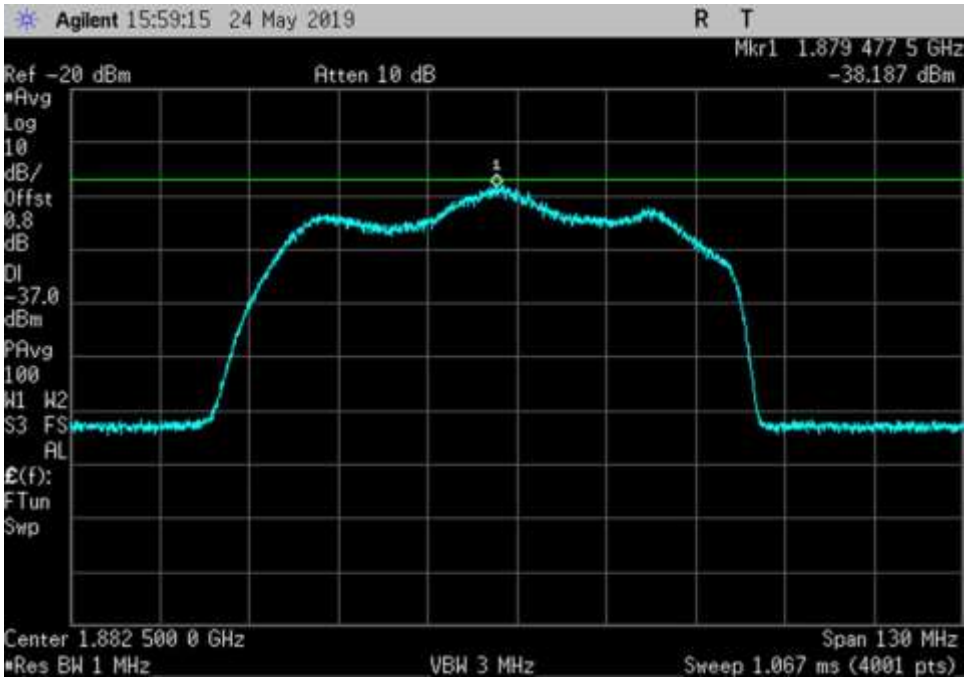
UL_776-787_ 781.5MHz_150ft Cable



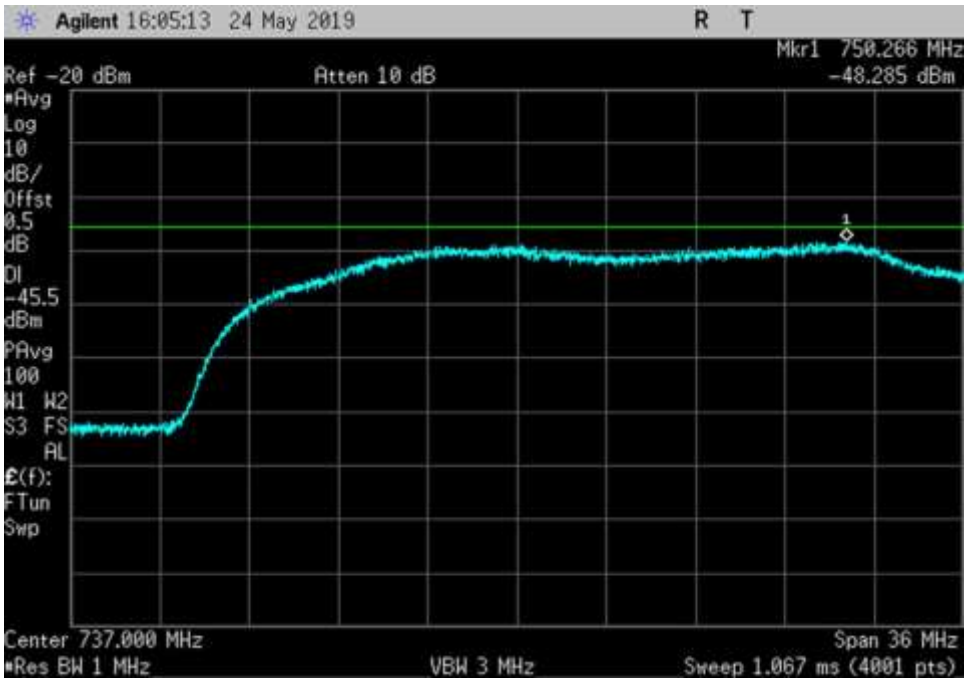
UL_824-849_ 836.5MHz_150ft Cable



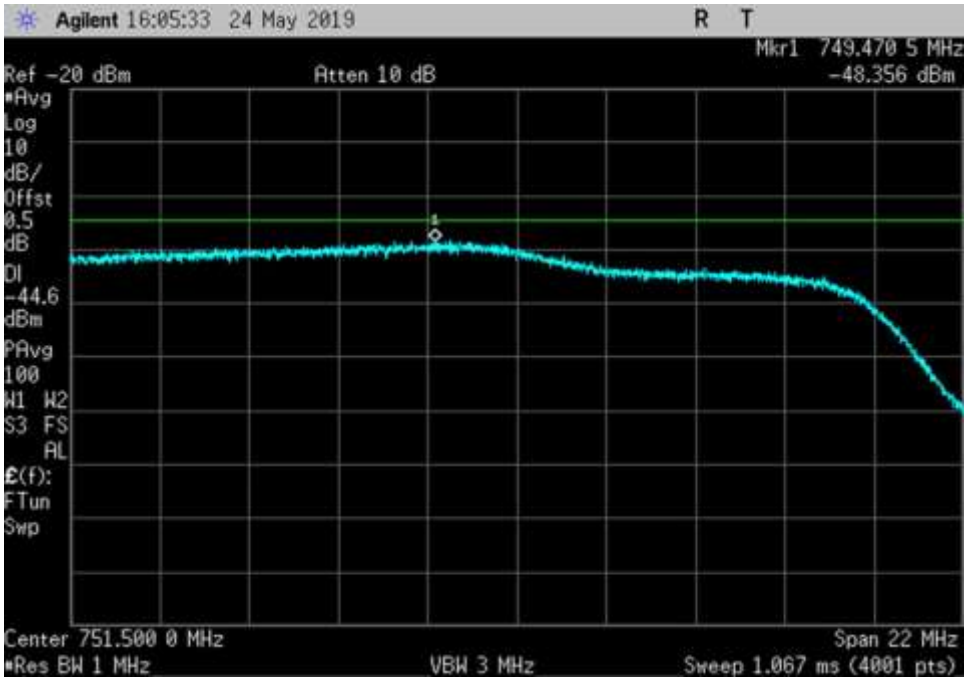
UL_1710-1755_ 1732.5MHz_150ft Cable



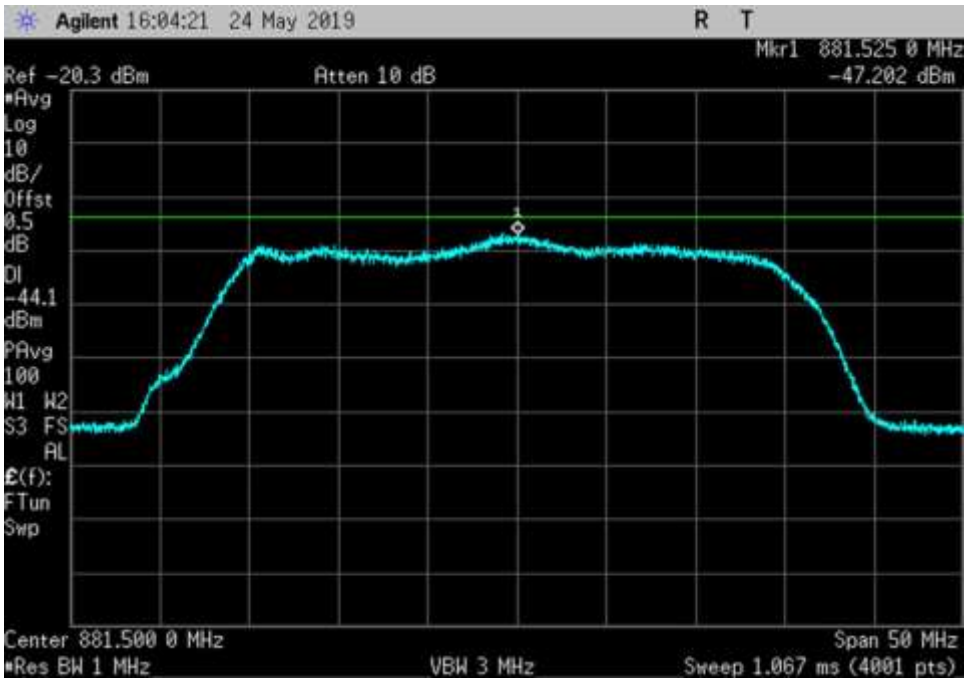
UL_1850-1915_ 1882.5MHz_150ft Cable



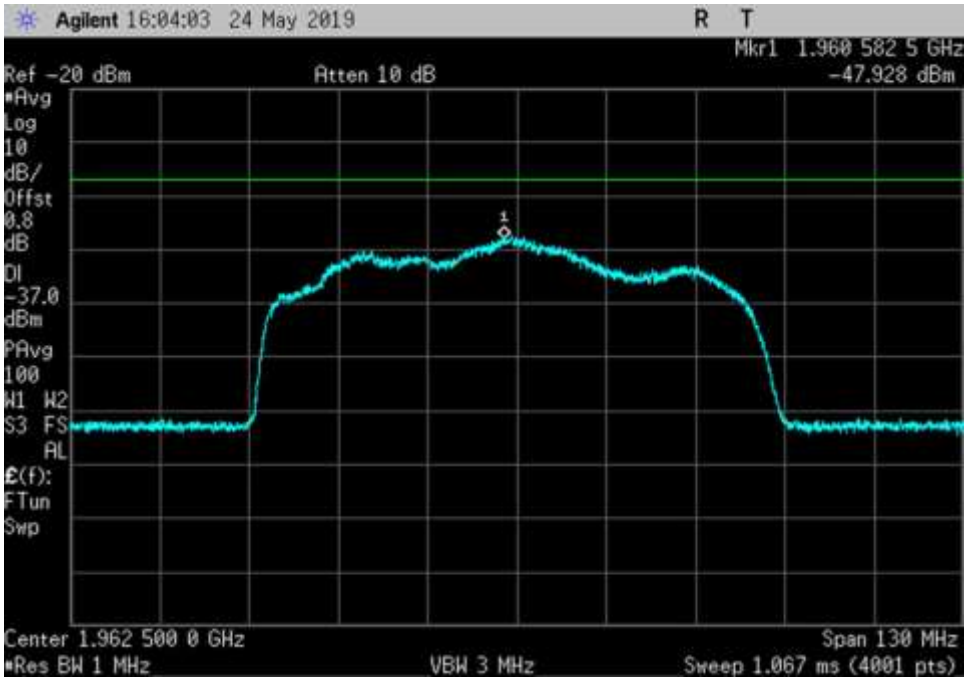
DL_728-746_ 737MHz_150ft Cable



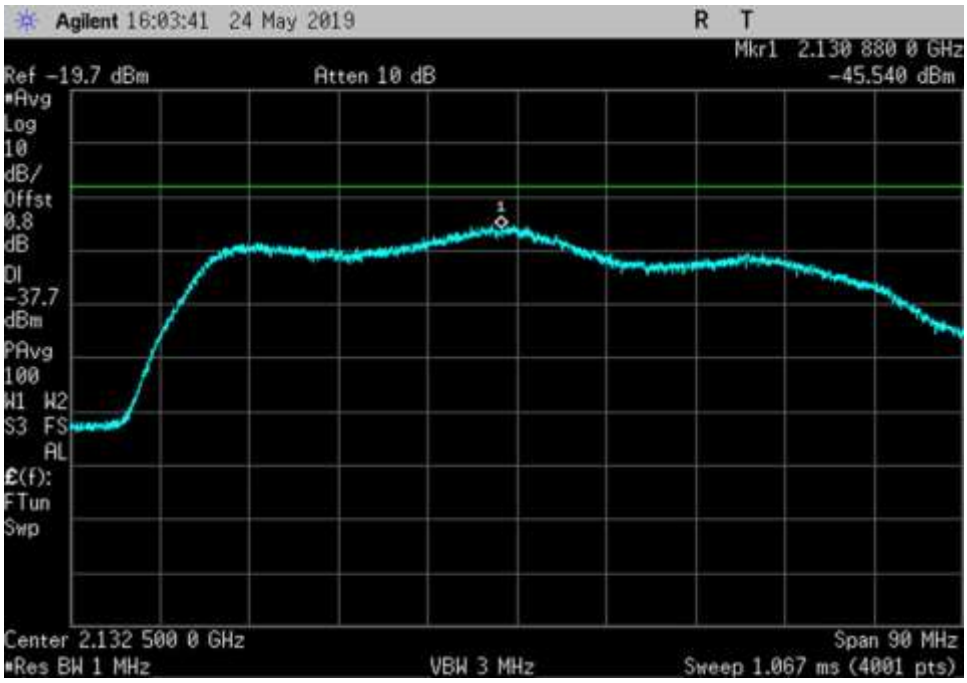
DL_746-757_ 751.5MHz_150ft Cable



DL_869-894_ 881.5MHz_150ft Cable

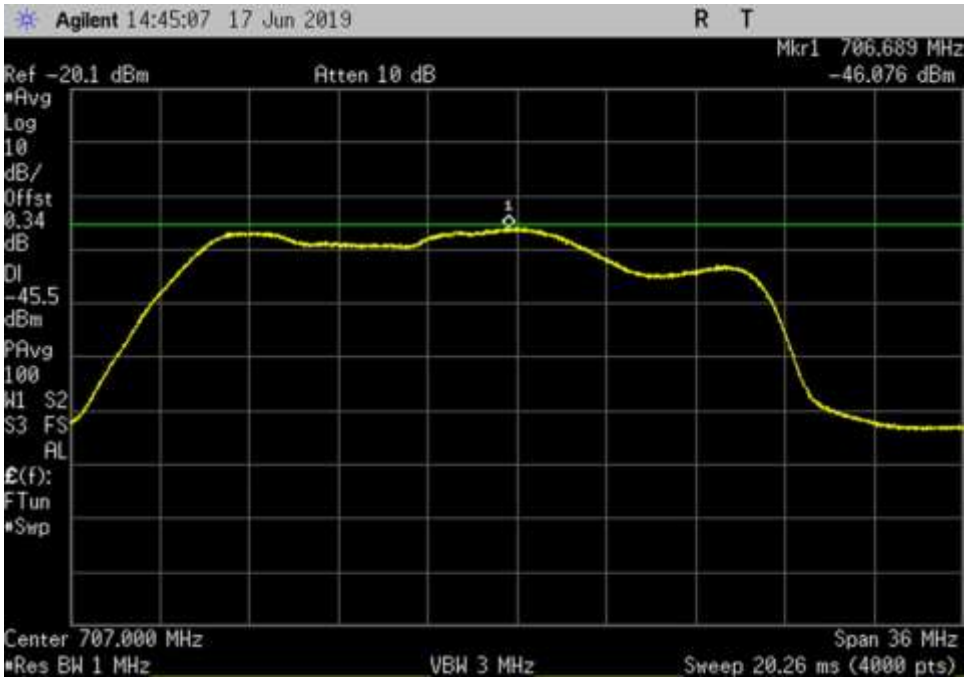


DL_1930-1995_ 1962.5MHz_150ft Cable

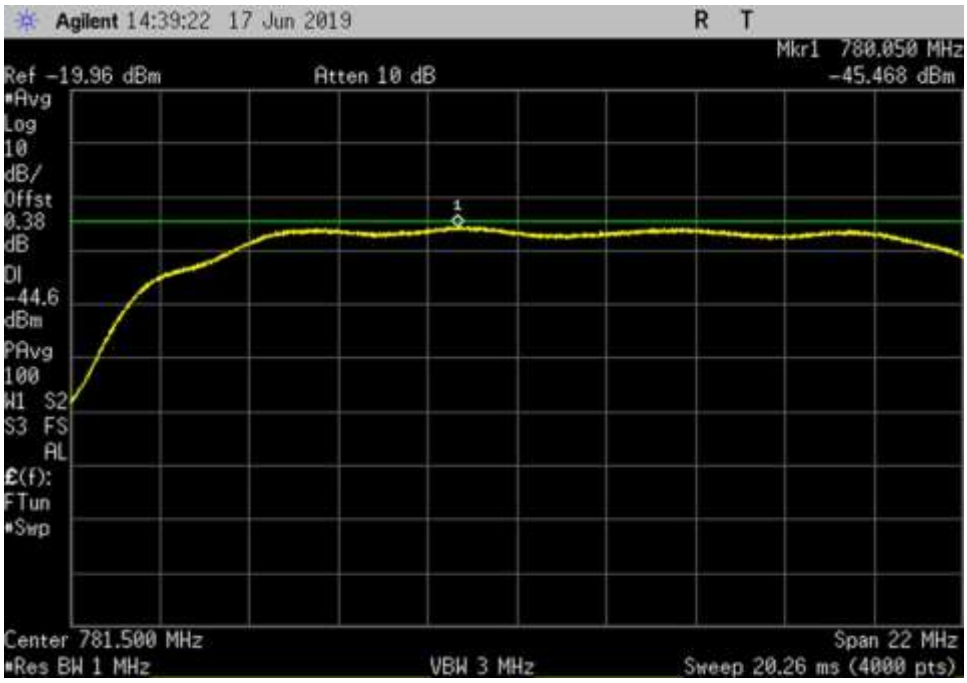


DL_2110-2155_ 2132.5MHz_150ft Cable

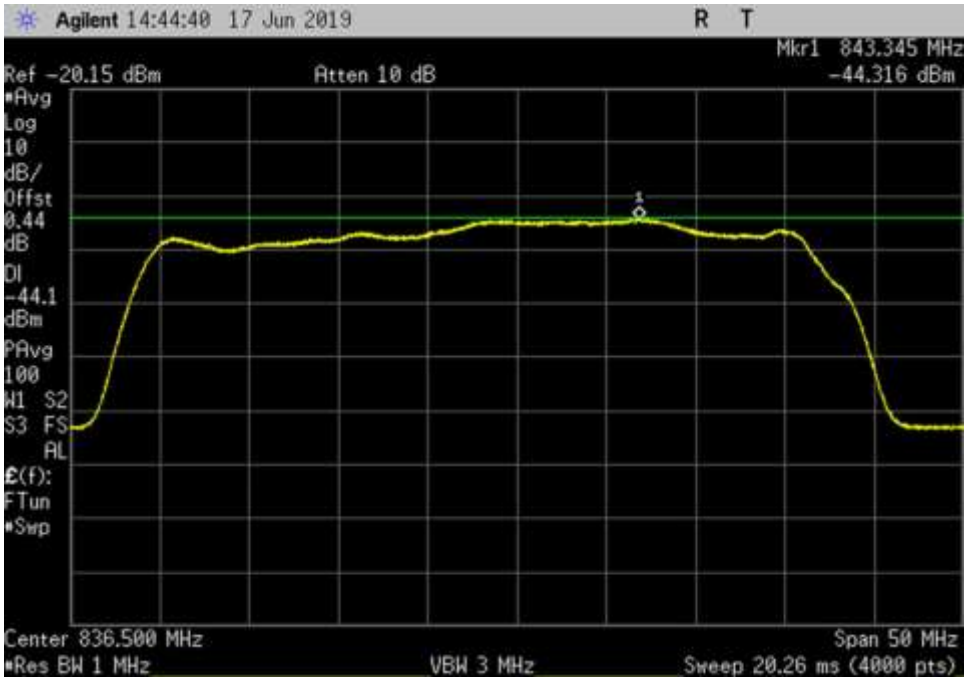
Configuration 2



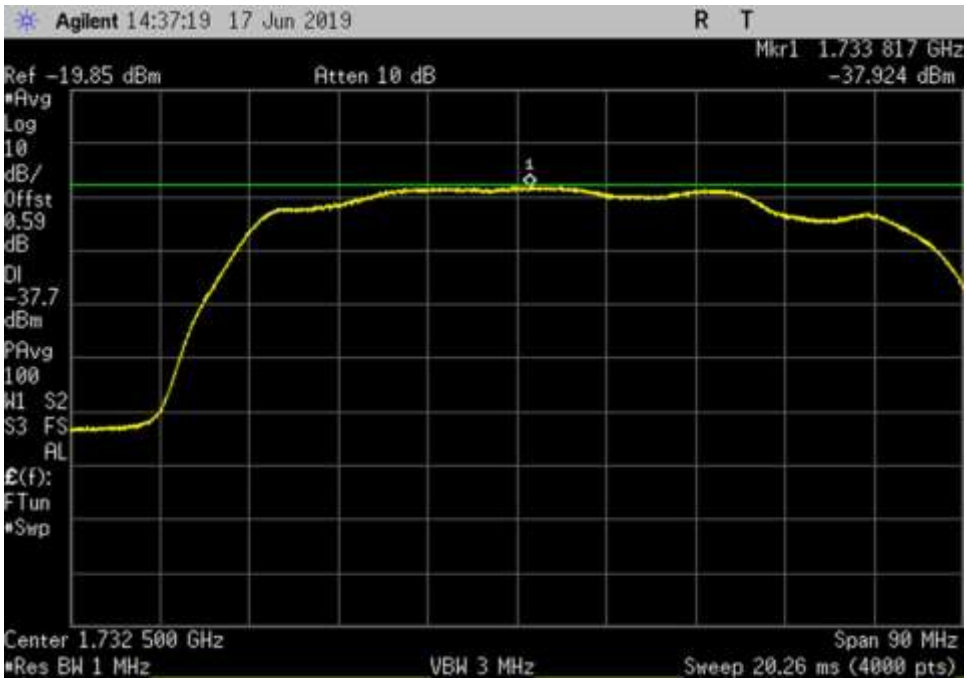
UL_698-716_ 707MHz



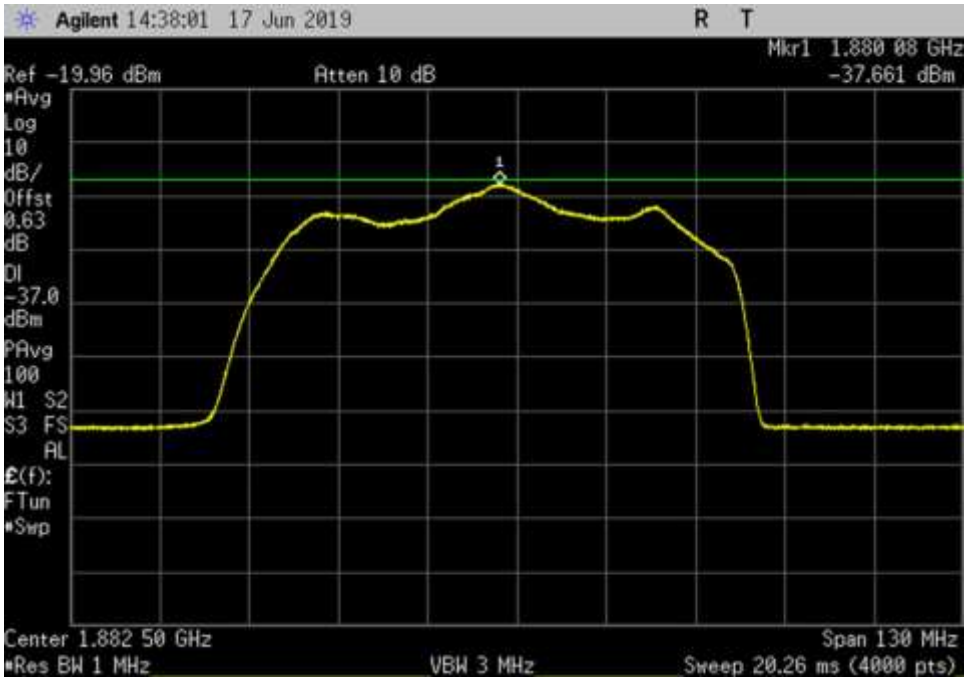
UL_776-787_ 781.5MHz



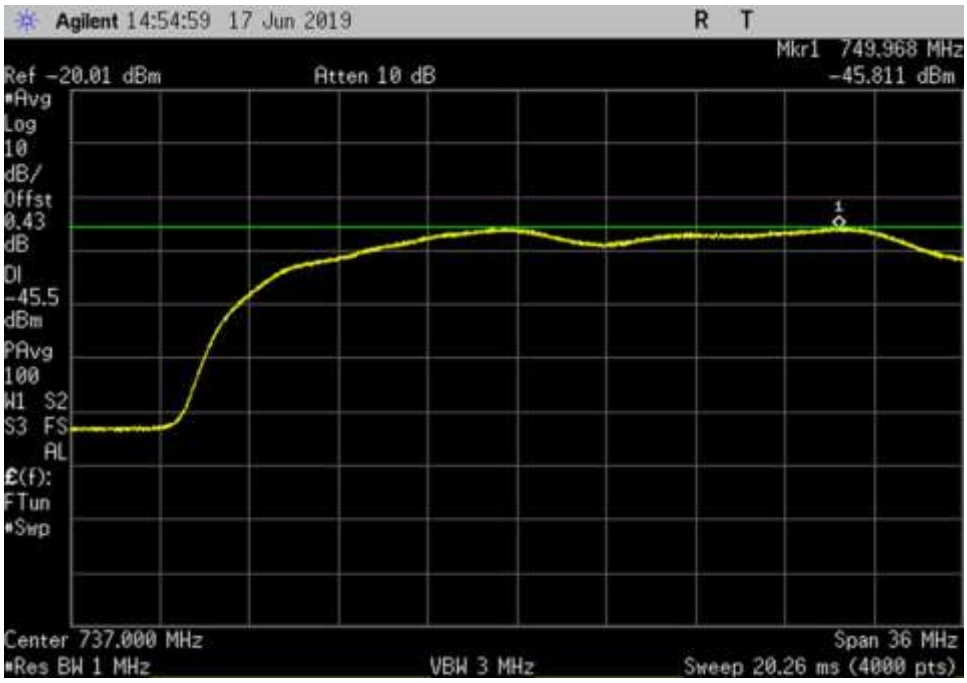
UL_824-849_ 836.5MHz



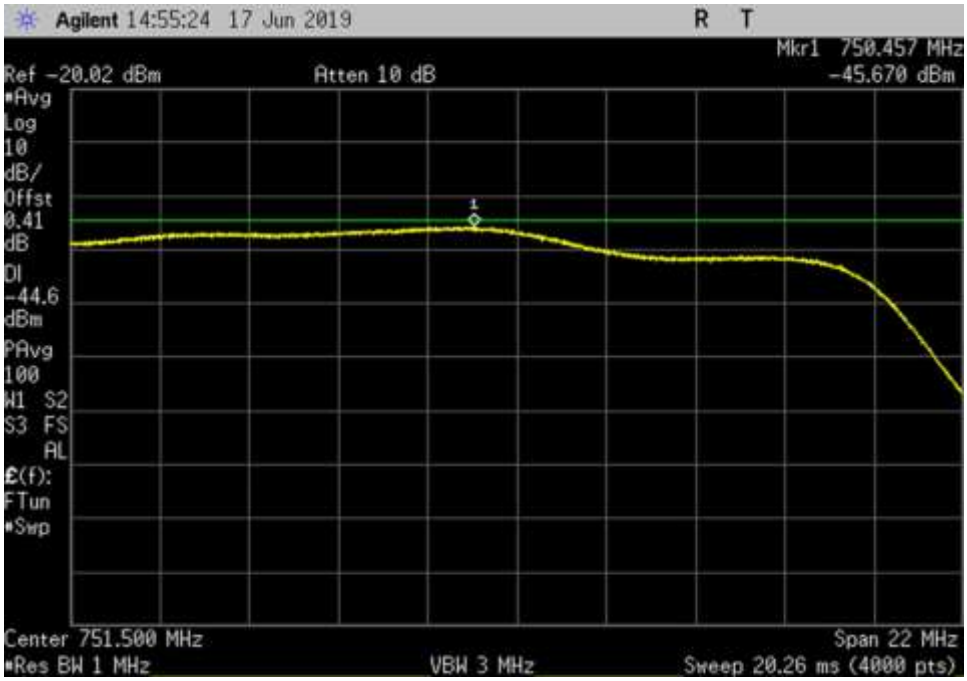
UL_1710-1755_ 1732.5MHz



UL_1850-1915_ 1882.5MHz



DL_728-746_ 737MHz



DL_746-757_ 751.5MHz