FCC TEST REPORT for Class II Permissive Change on UNII Device (5.8G Band)

No. 160500714SHA-001R2

Applicant	: Aruba Networks, Inc 1344 Crossman Ave. Sunnyvale, CA,94089
Manufacturer	: Aruba Networks, Inc 1344 Crossman Ave. Sunnyvale, CA,94089
Equipment	: Outdoor Wireless Mesh Access Router
Type/Model	: MST2H13N1-XX(where – XX can be any alphanumeric or blank), MST2H13N0-XX(where –XX can be any alphanumeric or blank)

SUMMARY

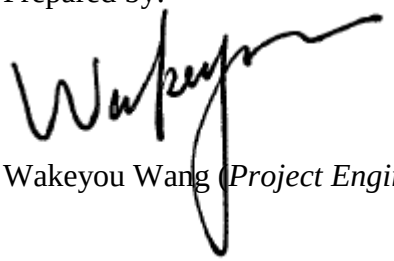
The equipment complies with the requirements according to the following standard(s):

47CFR Part 15 (2015): Radio Frequency Devices

ANSI C63.10 (2013): American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices

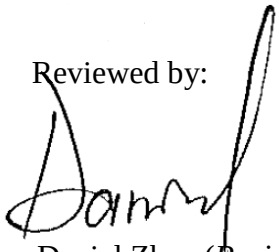
Date of issue: May 13, 2016

Prepared by:



Wakeyou Wang (*Project Engineer*)

Reviewed by:



Daniel Zhao (*Reviewer*)

Description of Test Facility

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Content

1. General Information

1.1 Applicant Information

Applicant	:	Aruba Networks, Inc
		1344 Crossman Ave. Sunnyvale, CA,94089
Name of contact	:	Robert Hastings
Tel	:	408-419-4093
Fax	:	/
Manufacturer	:	Aruba Networks, Inc
		1344 Crossman Ave. Sunnyvale, CA,94089
Sample received date	:	May 1, 2016
Date of test	:	May 1, 2016 ~ May 13, 2016

1.2 Identification of the EUT

Equipment	:	Outdoor Wireless Mesh Access Router
Type/model	:	MST2H13N1-XX(where – XX can be any alphanumeric or blank), MST2H13N0-XX(where –XX can be any alphanumeric or blank)
S/N	:	BP0000665
FCC ID	:	Q9DMST200
IC	:	/

1.3 Technical specification

Operation Frequency Band:	5725 – 5850MHz
Modulation:	BPSK QPSK 16-QAM 64-QAM
Gain of Antenna:	Internal, 13dBi
Rating:	MST2H13N1-XX: 100-240Va.c., 0.5A, 50/60Hz MST2H13N0-XX: 48V d.c. powered by POE: input 100-240Va.c., 0.5A, 50/60Hz; output 48V d.c., 0.35A
Declared Temperature range:	-30°C ~ 60°C
Description of EUT:	The EUT is a wireless access point. Here are two series of models. The two series are electrically identical except for the power board. Both series were tested and the worse data is listed in report. The EUT supports wireless network of a/n. The RF module used contains of two RF ports, namely port 0 and port 1.
Port identification:	Power × 1, Console USB × 1; RJ45 ports × 1
Category of EUT:	Class B
EUT type:	☒ Table top ☐ Floor standing
EUT Modes:	a/n20/n40
Channel Number:	5 Channel for 5745~5825MHz for 11a/n20; 2 Channel for 5755~5795MHz for 11n40;
Channel Description:	The channel spacing is 20MHz / 40MHz.

2. TEST SPECIFICATIONS

2.1 Test Standard

47CFR Part 15:2015
ANSI C63.10: 2013
KDB789033 D02 General UNII Test Procedures New Rules v01r02
FCC-16-24A1 (Released: March 2, 2016)

2.2 Mode of operation during the test

While testing transmitting mode of EUT, the internal modulation was applied.

The lowest, middle and highest channel were tested as representatives.

Freq. Band	Modulation	Lowest(MHz)	Middle(MHz)	Highest(MHz)
5725 - 5850MHz	a	5745	5785	5825
	n20	5745	5785	5825
	n40	5755	/	5795

MIMO Function Description

Modulation	Transmission / Idle		Beam forming	Beam forming gain
	Port 0	Port 1		
a	Transmission	Transmission	NO	0 dBi
n20	Transmission	Transmission	NO	0 dBi
n40	Transmission	Transmission	NO	0 dBi

Data rate VS Power

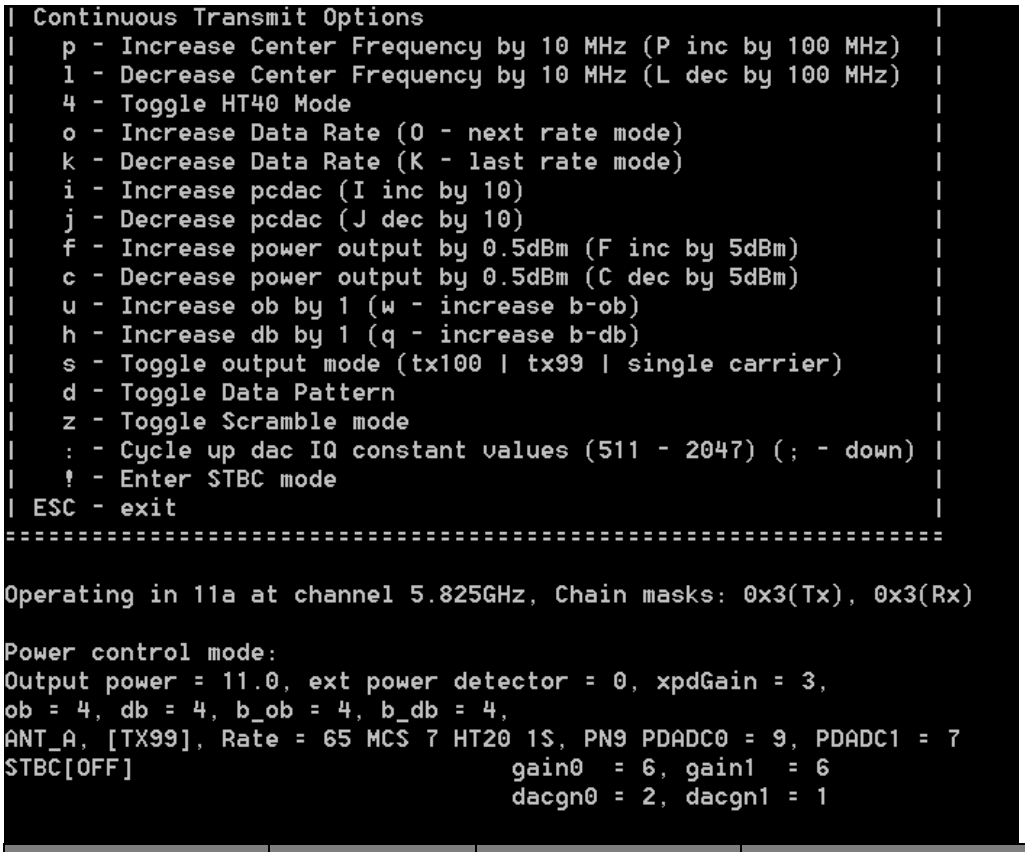
The pre-scan for the conducted power with all rates in each modulation and bands was used, and the worst case was found and used in all test cases.

After this pre-scan, we choose the following table of the data rata as the worst case.

Mode	Worst case data rate
a	6Mbps
802.11 n20	MCS8
802.11 n40	MCS8

Test software setting:

The power level setting for a/n20/n40 is used with software offered by the manufactory as below.



Freq. Band	Mode	Frequency (MHz)	Software Setting
5725~5850	a	5745	17.5
		5785	17.5
		5825	17.5
	n20	5745	17.5
		5785	17.5
		5825	17.5
	n40	5755	18
		5795	18

Duty cycle:

Frequency Band (MHz)	Mode	Duty cycle factor (dB)
5725~5850	a	0.14
	n20	0.29
	n40	0.36

2.3 Test software list

Test Items	Software	Manufacturer	Version
Conducted emission	ESxS-K1	R&S	V2.1.0
Radiated emission	ES-K1	R&S	V1.71

2.4 Test peripherals list

Item No.	Name	Band and Model	Description
1	Laptop computer	HP ProBook 6470b	100-240V AC, 50/60Hz

2.5 Instrument list

Equipment	Type	Manu.	Internal no.	Cal. Date	Due date
Shielded room	-	Zhongyu	EC 2838	1/9/2016	1/8/2017
Test Receiver	ESCS 30	R&S	EC 2107	10/20/2015	10/19/2016
A.M.N.	ESH2-Z5	R&S	EC 3119	12/17/2015	12/16/2016
A.M.N.	ENV 216	R&S	EC 3394	8/2/2015	8/1/2016
A.M.N.	ENV4200	R&S	EC3558	8/2/2015	8/1/2016
Bilog Antenna	CBL 6112D	TESEQ	EC 4206	4/28/2016	4/27/2017
Horn antenna	HF 906	R&S	EC 3049	4/28/2016	4/27/2017
Horn antenna	3117	ETS	EC 4792-1	4/22/2016	4/21/2017
Horn antenna	HAP18-26W	TOYO	EC 4792-3	6/12/2015	6/11/2016
Pre-amplifier	Pre-amp 18	R&S	EC 5262	5/26/2015	5/25/2016
Pre-amplifier	Tpa0118-40	TOYO	EC 4792-2	4/12/2015	4/11/2016
Fully-anechoic chamber	-	Albatross project	EC 3047	5/12/2016	5/11/2017
Signal generator	SMR 20	R&S	EC 3044-1	8/18/2015	8/17/2016
Power amplifier	150W1000	AR	EC 3044-2	8/15/2015	8/14/2016
Power amplifier	25S1G4	AR	EC 3044-4	8/15/2015	8/14/2016
Power sensor / Power meter	N1911A/N1921A	Agilent	EC4318	4/9/2016	4/8/2017
PXA Signal Analyzer	N9030A	Agilent	EC5338	5/15/2015	5/14/2016
Power sensor	U2021XA	Agilent	EC5338-1	3/6/2016	3/5/2017
Vector Signal Generator	N5182B	Agilent	EC5175	1/9/2016	1/8/2017
MXG Analog Signal Generator	N5181A	Agilent	EC5338-2	3/6/2016	3/5/2017
Mobile Test System	Iqxel	Litepoint	EC 5176	1/9/2016	1/8/2017
Spectrum analyzer	E7402A	Agilent	EC2254	8/15/2015	8/14/2016

2.6 Test Summary

This report applies to tested sample only. The test results have been compared directly with the limits, and the measurement uncertainty is recorded. This report shall not be reproduced in part without written approval of Intertek Testing Service Shanghai Limited.

TEST ITEM	FCC REFERANCE	RESULT
Maximum Conducted Output Power	15.407(a)	Pass
Power spectral density	15.407(a)	Pass
Minimum 6dB Bandwidth	15.407(e)	Pass
Radiated emission	15.407 (b) 15.205, 15.209	Pass
Power line conducted emission	15.207	Pass
Emission Bandwidth (99%)	15.403(i)	Tested

Notes: 1: NA =Not Applicable

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3. Maximum Conducted Output Power & EIRP

Test result: Pass

3.1 Test limit

☐ For outdoor access point operating in 5150-5250MHz: 30dBm,
Maximum EIRP at any elevation angle above 30 degrees ≤21dBm;

☐ For indoor access point operating in 5150-5250MHz: 30dBm;

☐ For fixed point-to-point access point operating in 5150-5250MHz: 30dBm;

☐ For mobile and portable client devices operating in 5150-5250MHz: 24dBm;

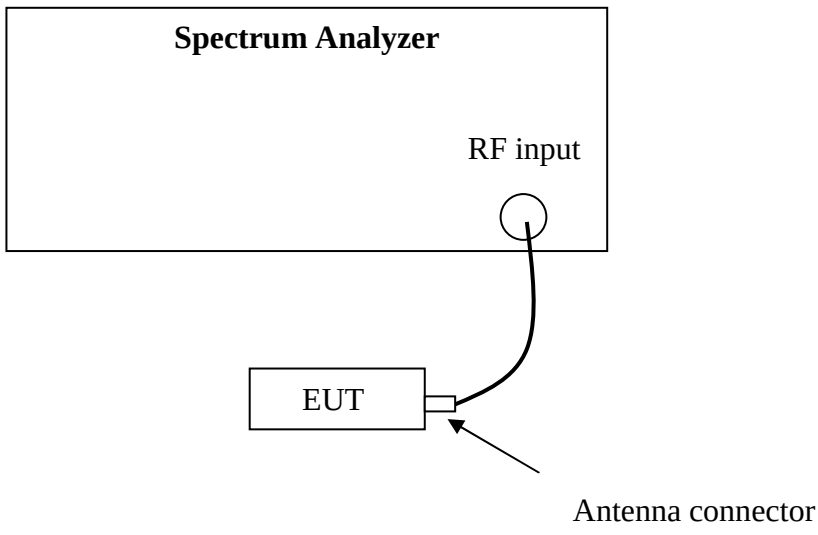
☐ For device operating in 5.25-5.35 GHz and 5.47-5.725 GHz: 24dBm or 11dBm + 10logB (B is 26dB bandwidth);

☒ For device operating in 5.725-5.85 GHz: 30dBm

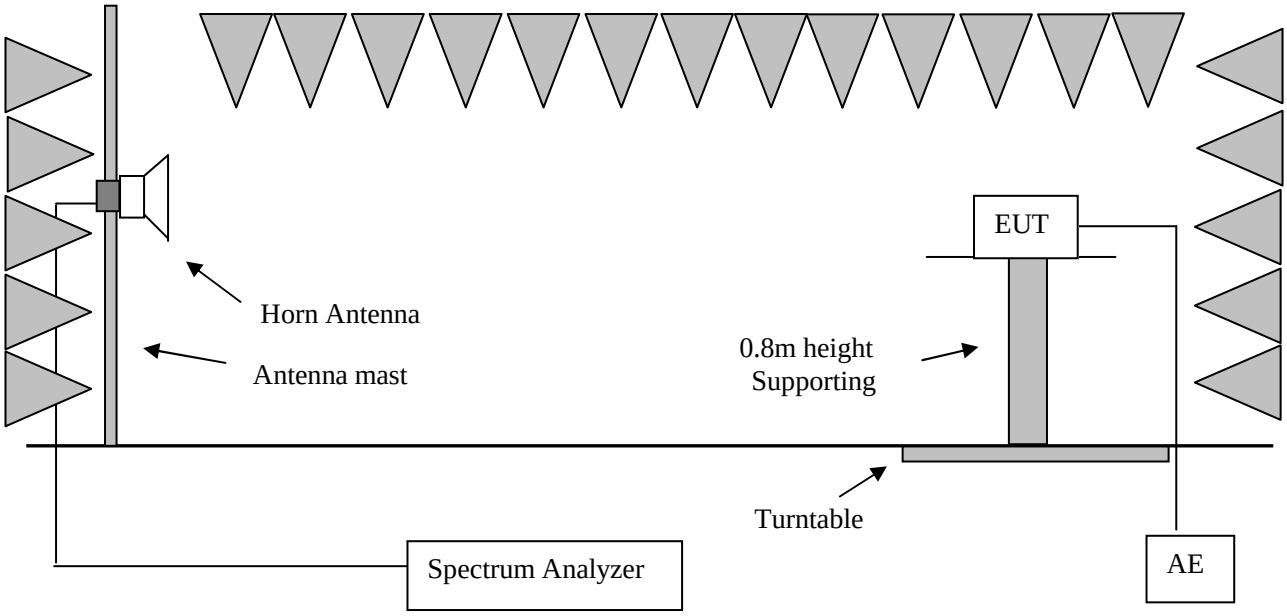
If the transmitting antenna of directional gain greater than 6dBi is used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi. If there have a beamforming type, the limit should be the less of original and original + 6 –antenna gain-beamforming gain.

3.2 Test Configuration

☒ Maximum Conducted Output Power test



☐ Maximum EIRP test



3.3 Test procedure and test setup

☒ The power output per FCC §15.407(a) was measured on the EUT using a 50 ohm RF cable connected to spectrum analyzer and the measurement method refer to KDB 789033D02:
Method SA-1.

(i) Set span to encompass the entire emission bandwidth (EBW).

(ii) Set RBW = 1 MHz.

(iii) Set VBW ≥ 3 MHz.

(iv) Number of points in sweep ≥ 2 Span / RBW.

(v) Sweep time = auto.

(vi) Detector = RMS (i.e., power averaging).

(vii) If transmit duty cycle < 98 percent, use a video trigger with the trigger level set to enable triggering only on full power pulses. Transmitter must operate at maximum power control level for the entire duration of every sweep. If the EUT transmits continuously (i.e., with no off intervals) or at duty cycle ≥ 98 percent, and if each transmission is entirely at the maximum power control level, then the trigger shall be set to “free run”.

(viii) Trace average at least 100 traces in power averaging (i.e., RMS) mode.

(ix) Compute power by integrating the spectrum across the EBW of the signal using the instrument’s band power measurement function with band limits set equal to the EBW band edges.

☐ Measurement of emission at elevation angle higher than 30 degrees from horizon (for 5150-5250MHz outdoor access point)

For fixed infrastructure, not electrically or mechanically steerable beam antenna

a) If elevation plane radiation pattern is available: i) Determine the device intended mounting elevation angle and define 0° reference angle on the elevation plane radiation pattern.

ii) Indicate any radiation pattern between 30° and 90° which has highest gain.

iii) Calculate the EIRP based on this highest gain and conducted output power.

iv) Compare to the limit of 125 mW to find compliance.

v) Include the elevation pattern data in the application filing with the test report to show how the calculations are made.

b) If elevation plane radiation pattern is not available, but the antenna type (such as dipole omnidirectional, Yagi, parabolic, or sector antenna) has symmetrical elevation plane pattern referenced at main beam and all lobes on the main beam elevation plane have highest gains, then the following measurement method is acceptable to determine compliance:

(i) Determine the device's intended mounting elevation angle referenced to the horizon. (ii) Rotate EUT antenna by 90° around the main beam axis in horizontal position to transform measurement in elevation angle into azimuth angle and define 0° reference angle based on device's intended mounting elevation angle.

(iii) Move test antenna along the horizontal arc, or rotate the turn table with EUT antenna placed at the center, between 30° and 90° relative to the 0° reference angle, and then continuing down from 90° to 30° on the other side of the pattern, while maintaining the test antenna pointing with constant distance to the EUT antenna and search for the spot which has the highest measured emission. Both horizontal and vertical polarization shall be investigated to find out the maximum radiated emission level.

For All Other Types of Antenna

a) Describe what type of antenna is used.

b) Determine by calculation, measurement or simulation, all radiation lobes/beams, which have EIRP higher than 125 mW within 3-dB elevation beamwidth.

c) Provide an explanation of how those antenna beams are controlled to be kept below 30° elevation angle. The explanation should include installation instruction of the device, mechanical control, electro-mechanical control or software algorithm, if the beams are electrically controlled by software.

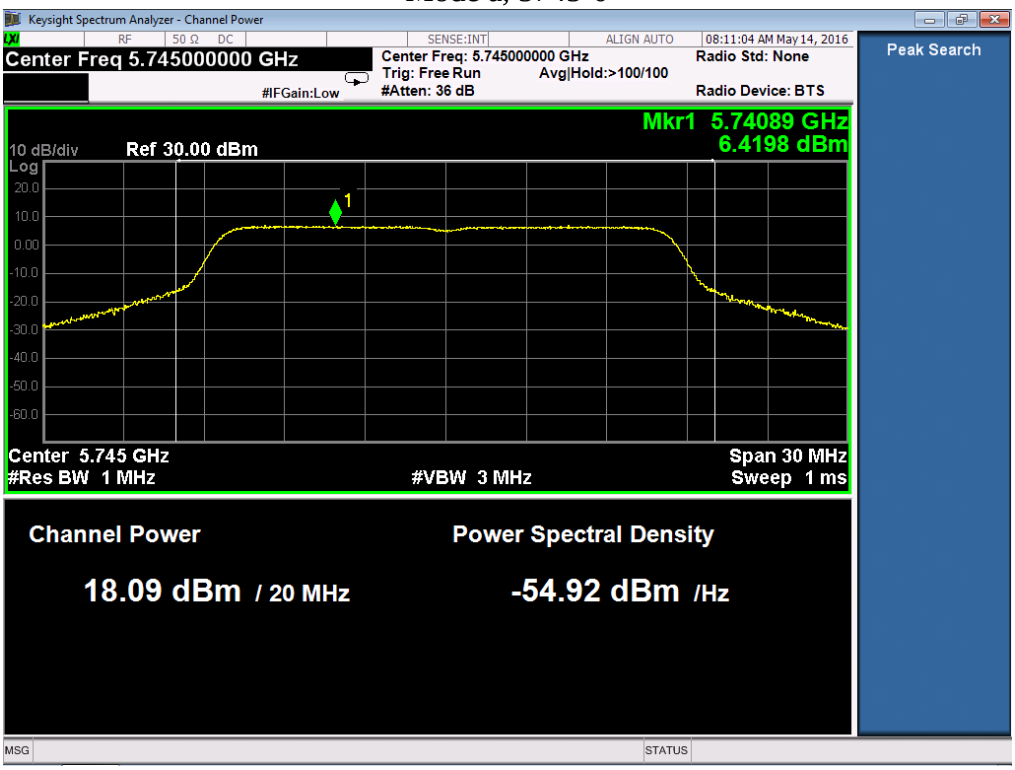
3.4 Test protocol

Temperature : 25 °C
Relative Humidity : 55 %

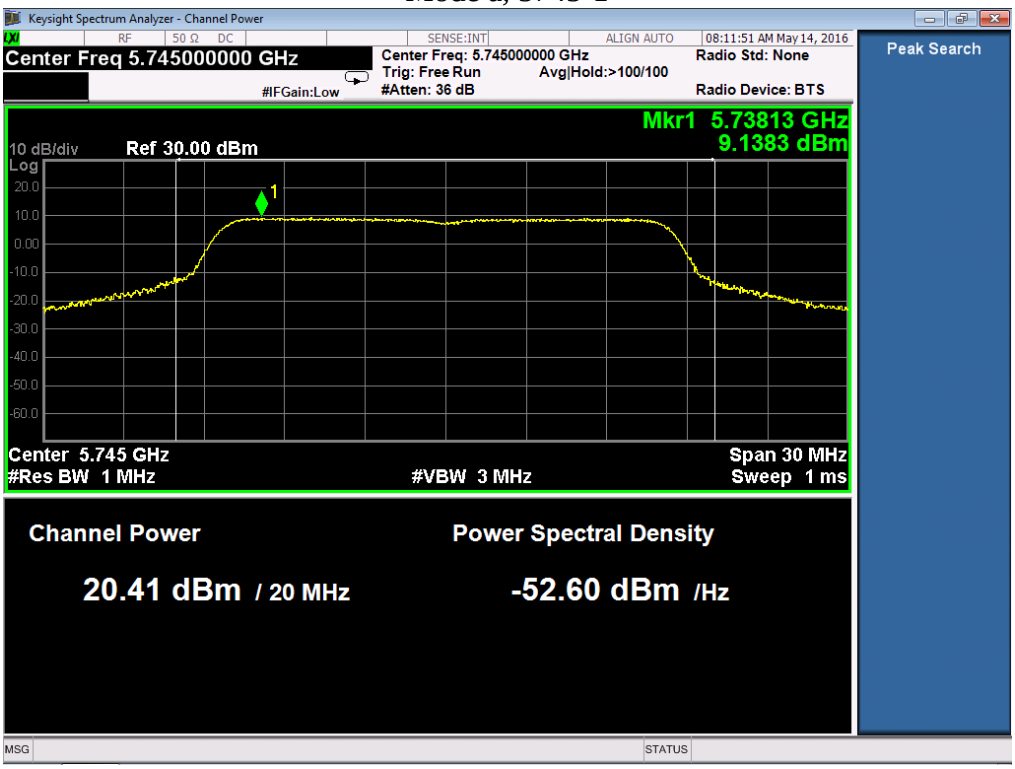
Maximum Conducted Output Power test							
Mode	**Freq (MHz)**	**Factor (dB)**	**Reading (dBm)**		**Total power (dBm)**	**Limit (dBm)**	**Margin (dB)**
			Port 0	**Port 1**			
a	5745	4.14	18.09	20.41	22.41	23.00	0.59
	5785	4.14	18.28	20.80	22.73	23.00	0.27
	5825	4.14	18.65	20.40	22.62	23.00	0.38
n20	5745	4.29	18.06	20.46	22.43	23.00	0.57
	5785	4.29	18.19	20.74	22.66	23.00	0.34
	5825	4.29	18.67	20.40	22.63	23.00	0.37
n40	5755	4.36	18.18	20.58	22.55	23.00	0.45
	5795	4.36	18.70	20.10	22.47	23.00	0.53

Note: 1. Factor = Cable loss + duty cycle.
2. For antenna gain = 13dBi, the limit should be corrected as 30 - (13 - 6) = 23dBm while no beam-forming is applied.
3. Total power = $10 * \lg(10^{\text{port 0 / 10}} + 10^{\text{port 1 / 10}})$.
4. The graph below is named as 'Mode <*a/n20/n40*>, <*channel frequency*>-<*port*>'.

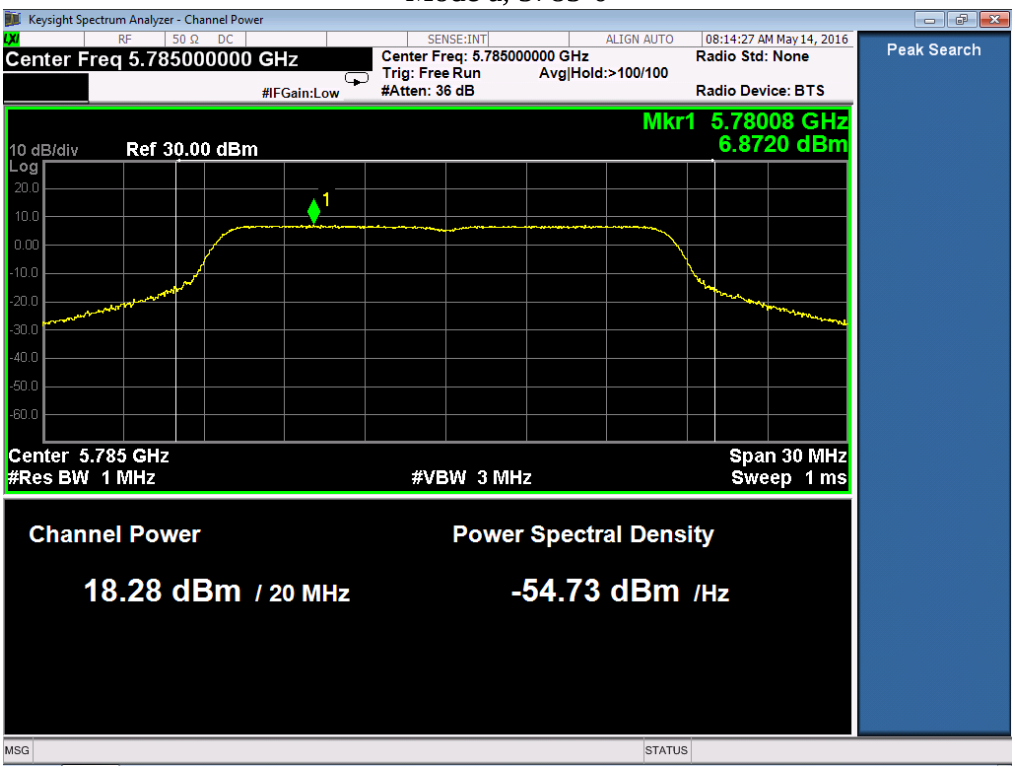
Mode a, 5745-0



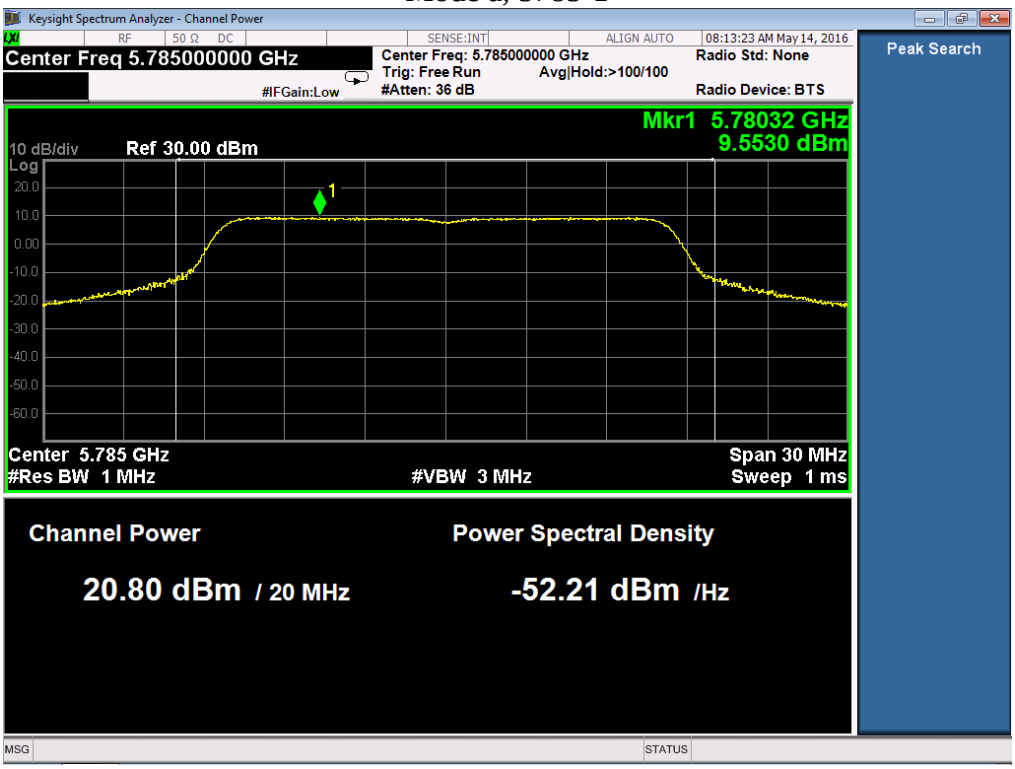
Mode a, 5745-1



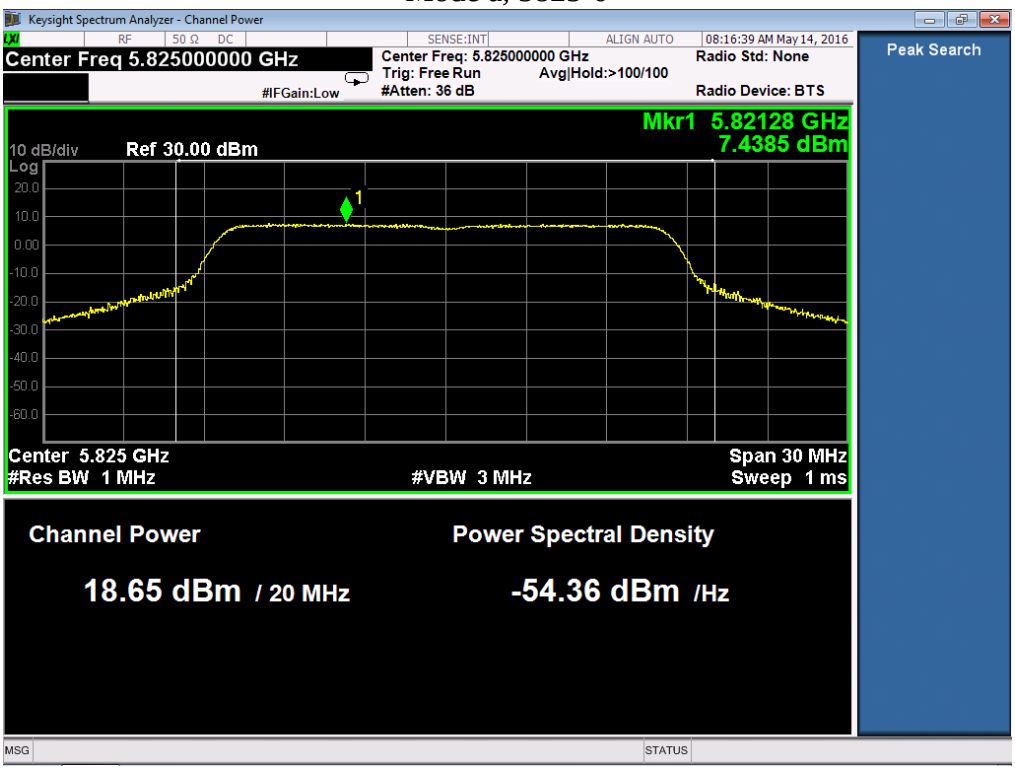
Mode a, 5785-0



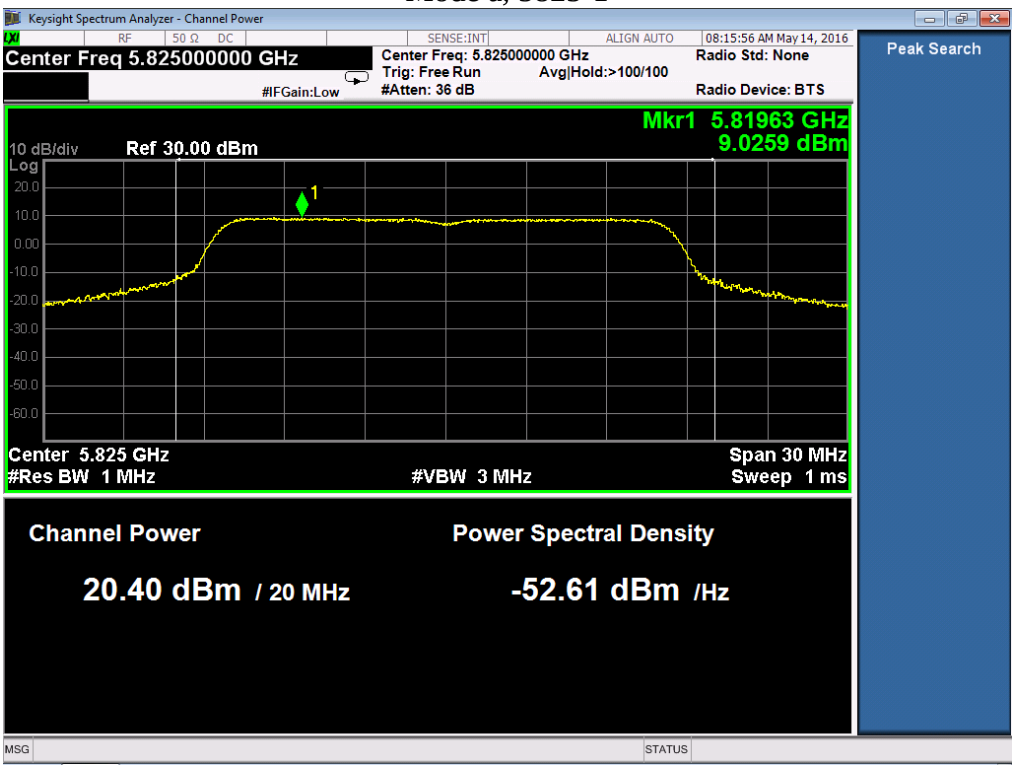
Mode a, 5785-1



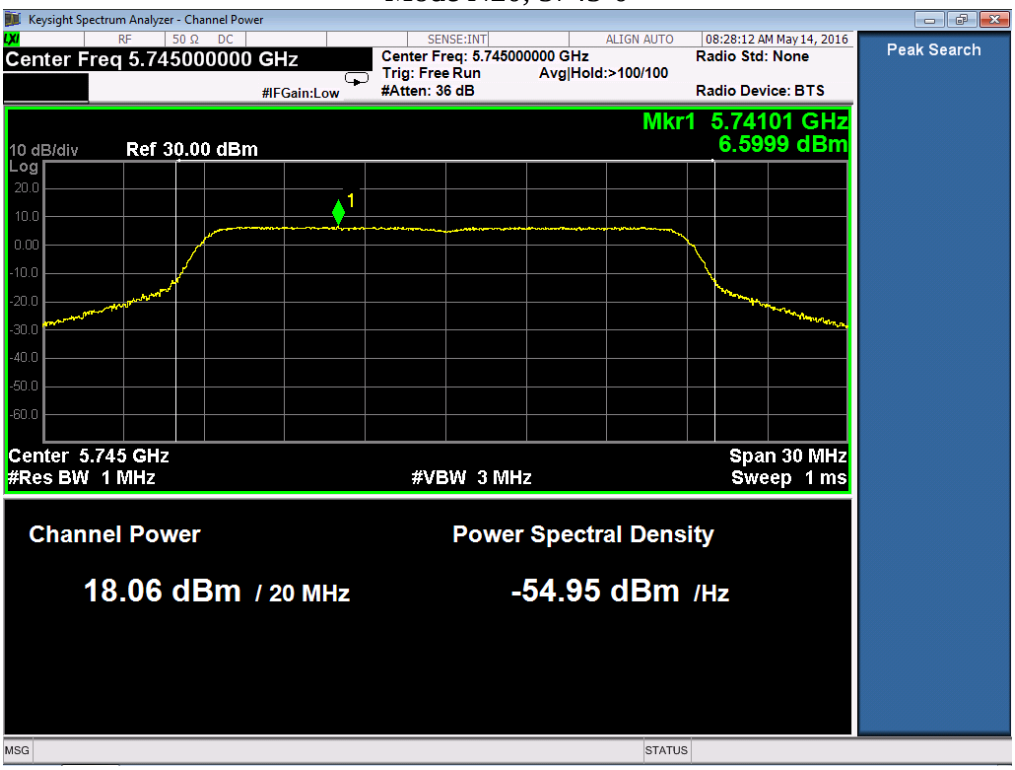
Mode a, 5825-0



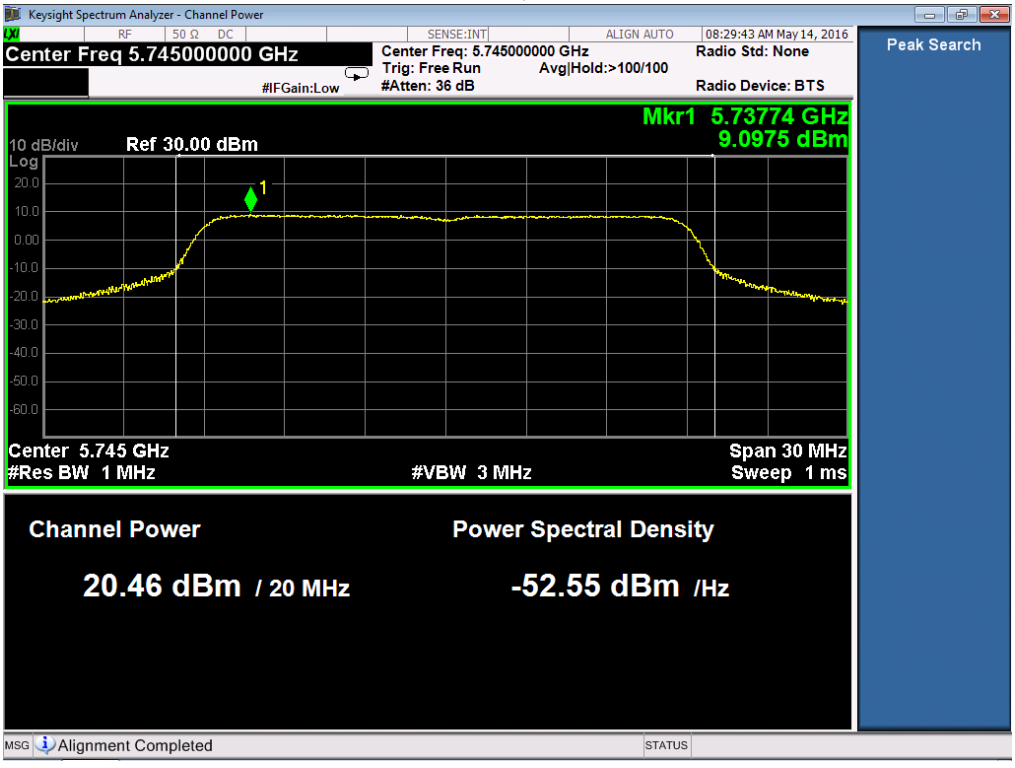
Mode a, 5825-1



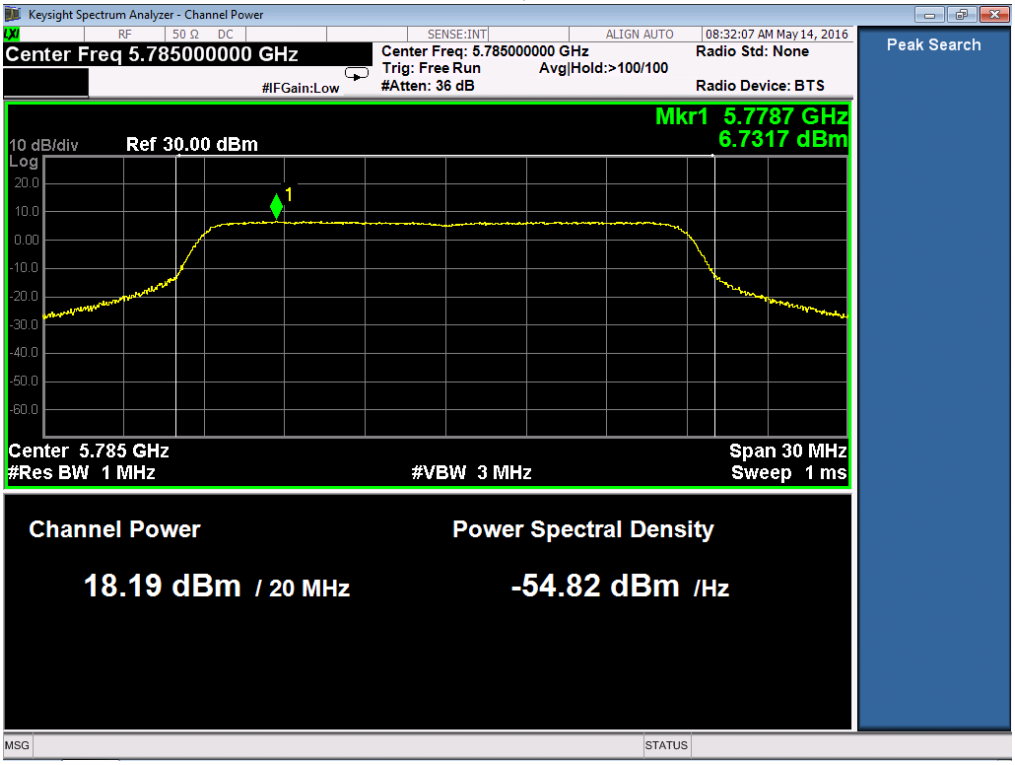
Mode N20, 5745-0



Mode N20, 5745-1



Mode N20, 5785-0



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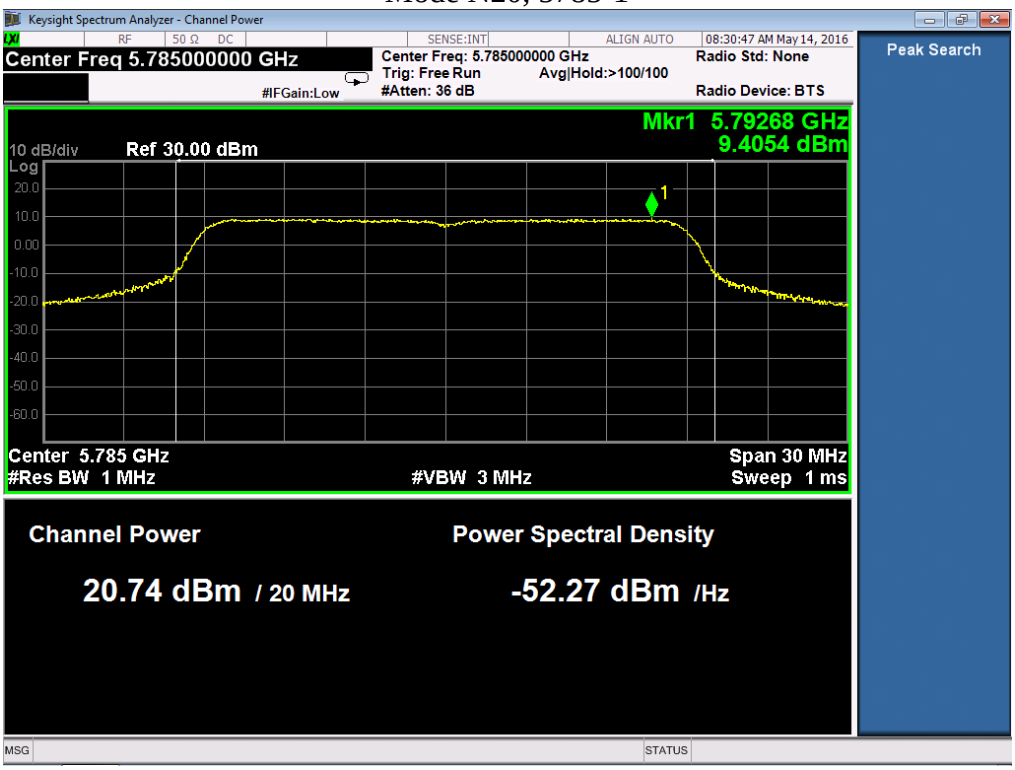
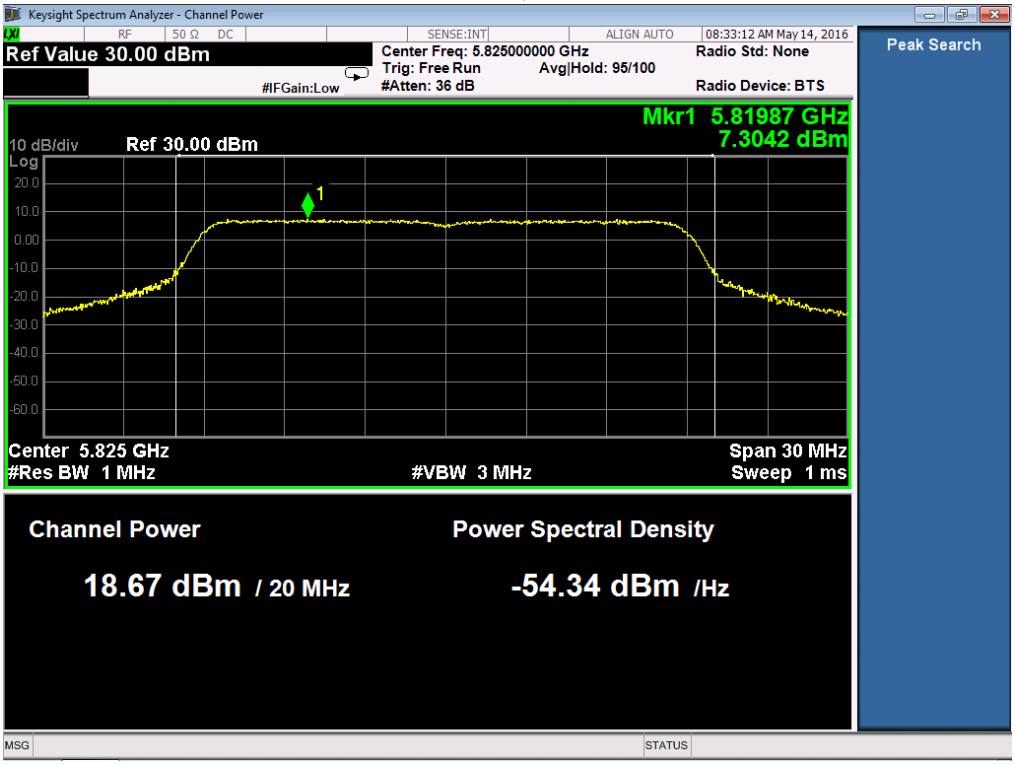
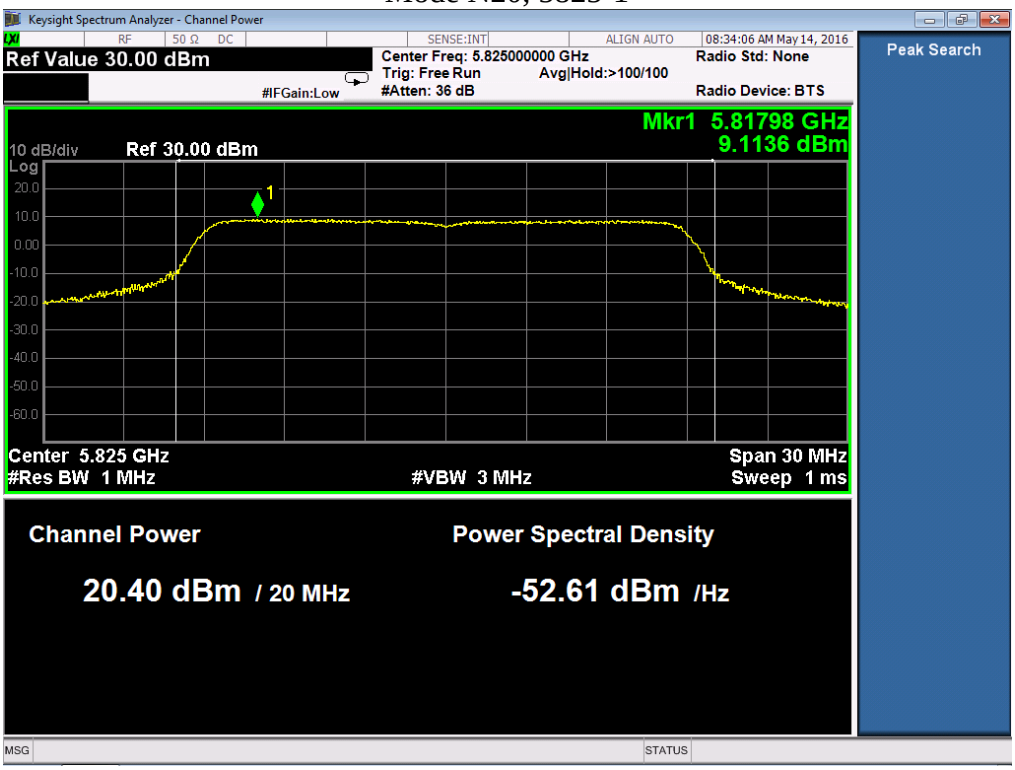


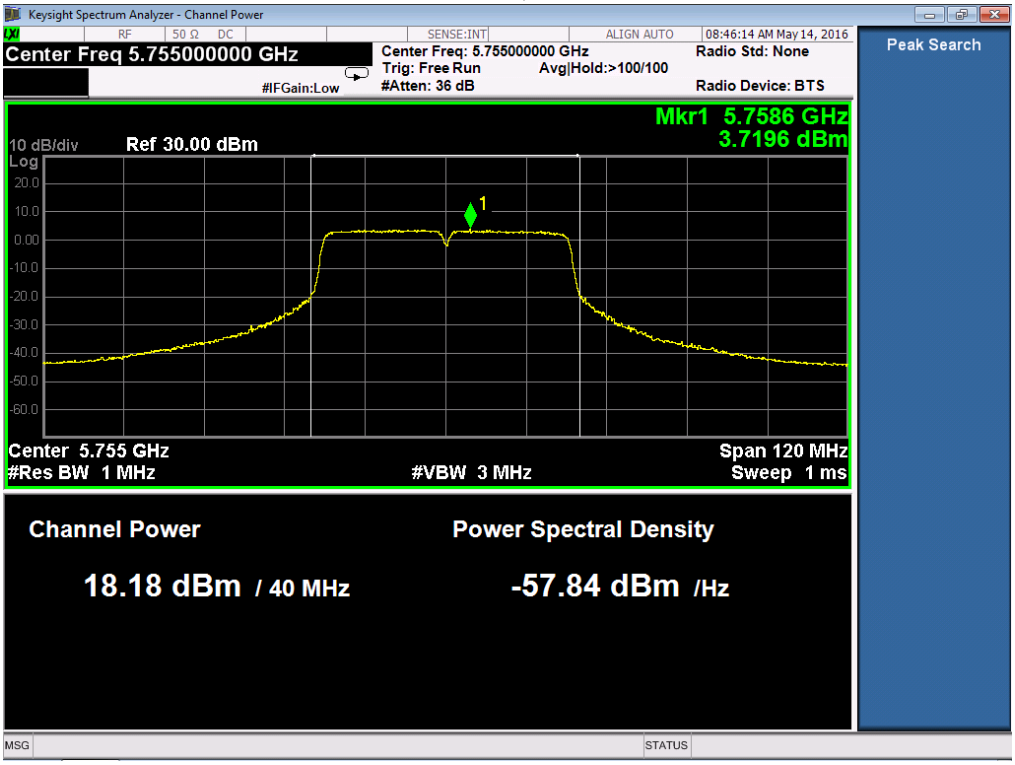
Mode N20, 5825-0



Mode N20, 5825-1

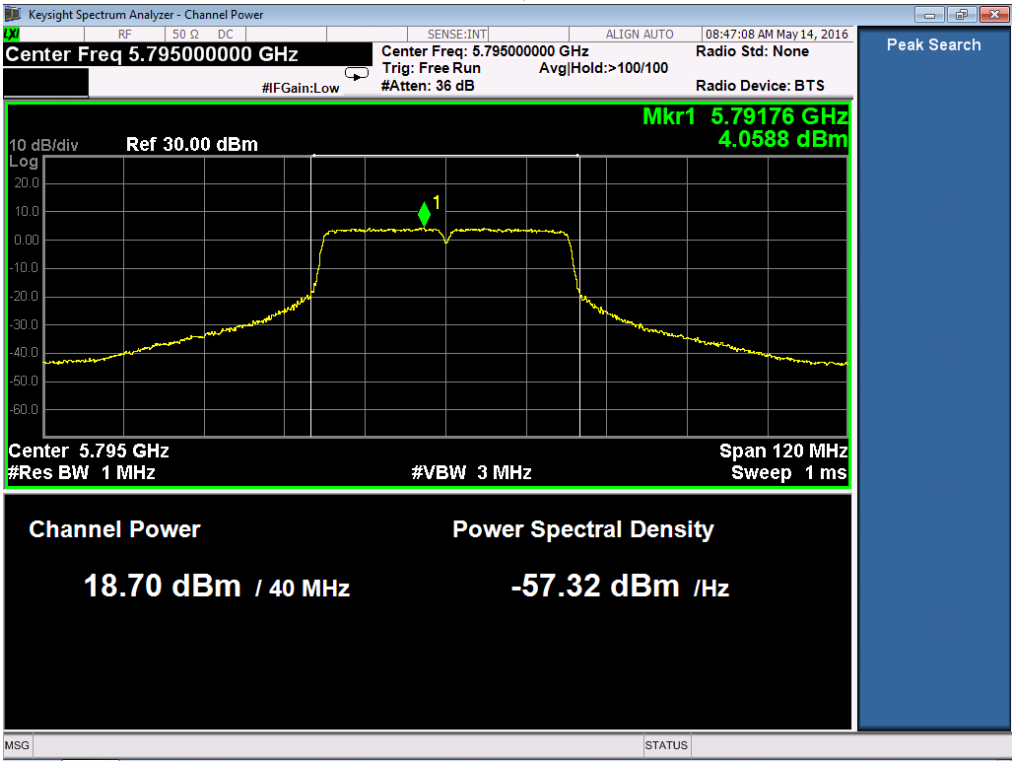


Mode N40, 5755-0

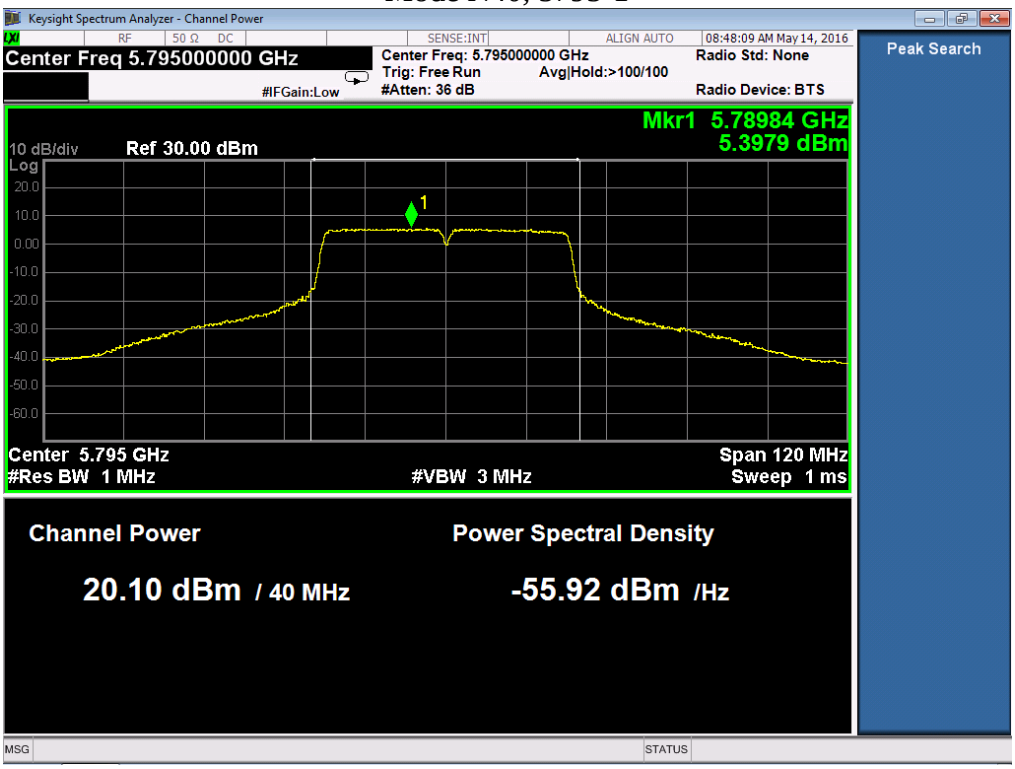


Mode N40, 5755-1

Mode N40, 5795-0



Mode N40, 5795-1



4. Power spectral density

Test result: **Pass**

4.1 Test limit

☐ For outdoor access point operating in 5150-5250MHz: 17dBm/MHz;

☐ For indoor access point operating in 5150-5250MHz: 17dBm/MHz;

☐ For fixed point-to-point access point operating in 5150-5250MHz: 17dBm/MHz;

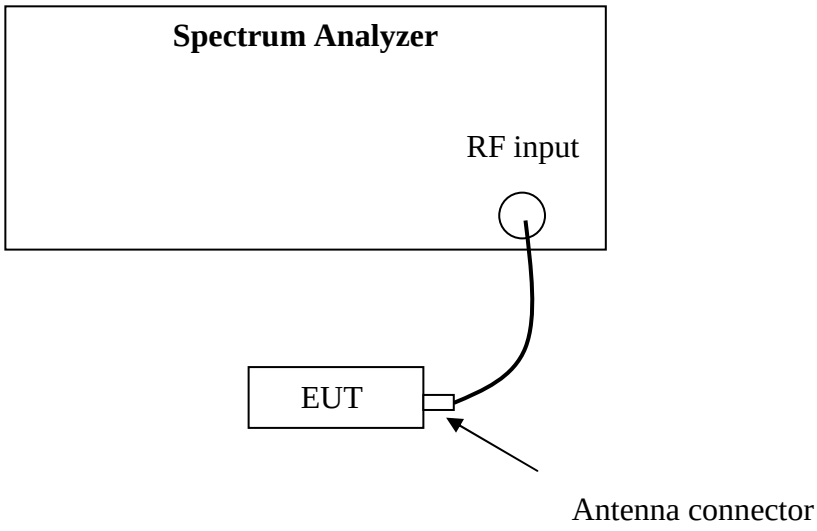
☐ For mobile and portable client devices operating in 5150-5250MHz: 11dBm/MHz;

☐ For device operating in 5.25-5.35 GHz and 5.47-5.725 GHz: 11dBm/MHz;

☒ For device operating in 5.725-5.85 GHz: 30dBm/500kHz;

If the transmitting antenna of directional gain greater than 6dBi is used, the PSD shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.
If there have a beamforming type, the limit should be the less of original and original + 6 – antenna gain-beamforming gain.

4.2 Test Configuration



4.3 Test procedure and test setup

The power spectral density per FCC §15.407(a) was measured from the antenna port of the EUT using a 50 ohm spectrum analyzer with the resolution bandwidth set at 1MHz, the video bandwidth set >RBW (measurement method refer to KDB 789033D02: section F).

(1). Create an average power spectrum for the EUT operating mode being tested by following the instructions in section II.E.2. for measuring maximum conducted output power using a spectrum analyzer or EMI receiver: select the test method SA-1 and apply it.

(2). Use the peak search function on the instrument to find the peak of the spectrum and record its value.

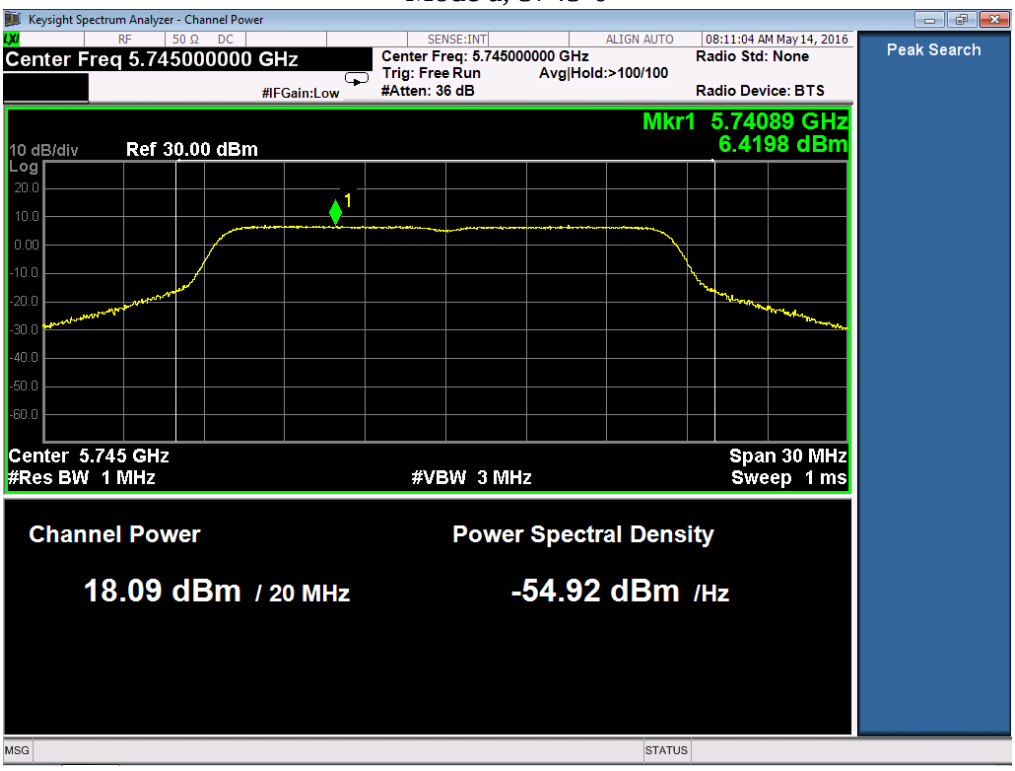
4.4 Test Protocol

Temperature : 25 °C
Relative Humidity : 55 %

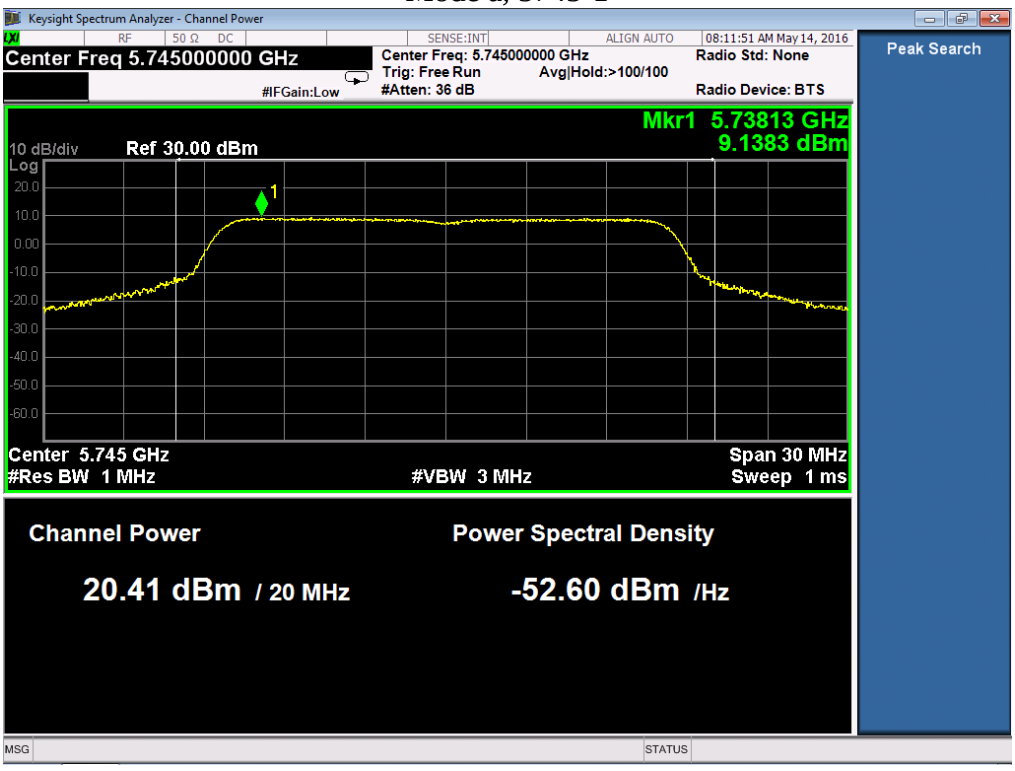
Limit calculation				
Mode	**Chosen Limit (dBm/500kHz)**	**Antenna Gain (dBi)**	**Array Gain (dB)**	**Final Limit (dBm/500kHz)**
a	30	13	3	20
n20	30	13	0	23
n40	30	13	0	23
Note: 1. For 802.11 a mode, the CDD function is applied. 2. Final limit = Chosen limit – (Antenna gain + Array gain -6)				

Test Result							
Mode	**Freq (MHz)**	**Factor (dB)**	**Reading (dBm/MHz)**		**Total PSD (dBm/MHz)**	**Limit (dBm/MHz)**	**Margin (dB)**
			Port 0	**Port 1**			
a	5745	4.14	6.42	9.14	11.00	20.00	9.00
	5785	4.14	6.87	9.55	11.42	20.00	8.58
	5825	4.14	7.44	9.03	11.32	20.00	8.68
n20	5745	4.29	6.60	9.10	11.04	23.00	11.96
	5785	4.29	6.73	9.41	11.28	23.00	11.72
	5825	4.29	7.30	9.11	11.31	23.00	11.69
n40	5755	4.36	3.72	6.01	8.02	23.00	14.98
	5795	4.36	4.06	5.40	7.79	23.00	15.21
Note: 1. Factor = Cable loss + duty cycle. 2. Total PSD = $10 * \lg(10^{\text{port 0} / 10} + 10^{\text{port 1} / 10})$. 3. The test result as well as limit for UNII-3 is showed as dBm/MHz in this report which is stricter than dBm/500kHz required in the FCC rules. 4. The graph below is named as 'Mode *<a/n20/n40>, <channel frequency>-<port>*'.							

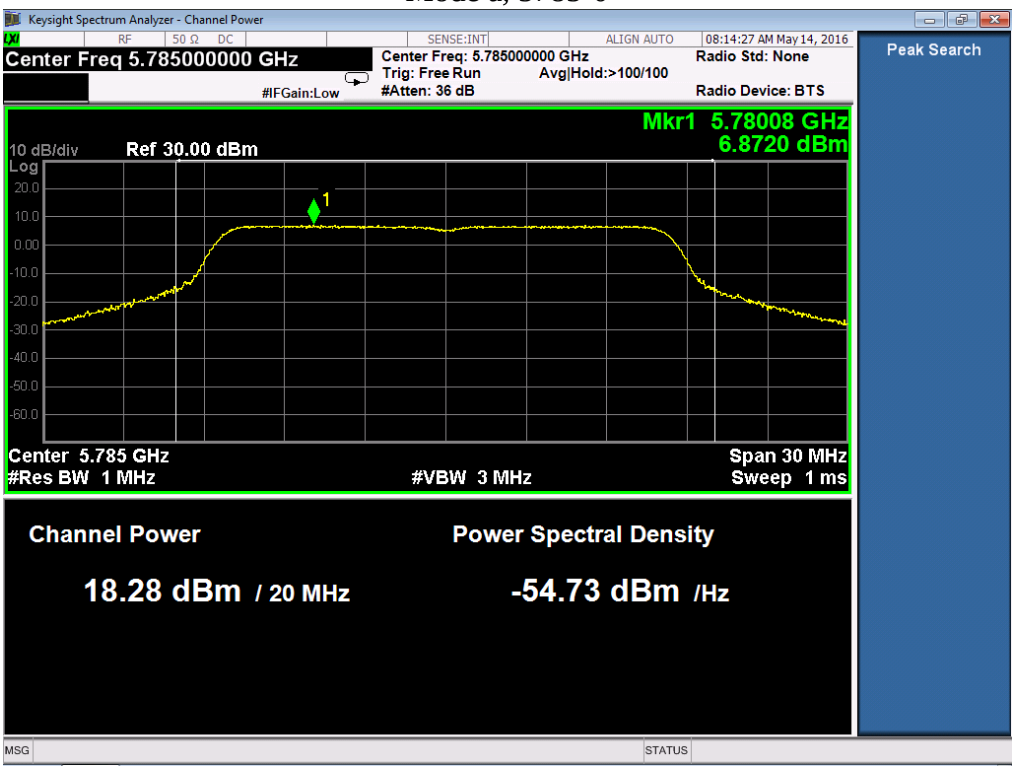
Mode a, 5745-0



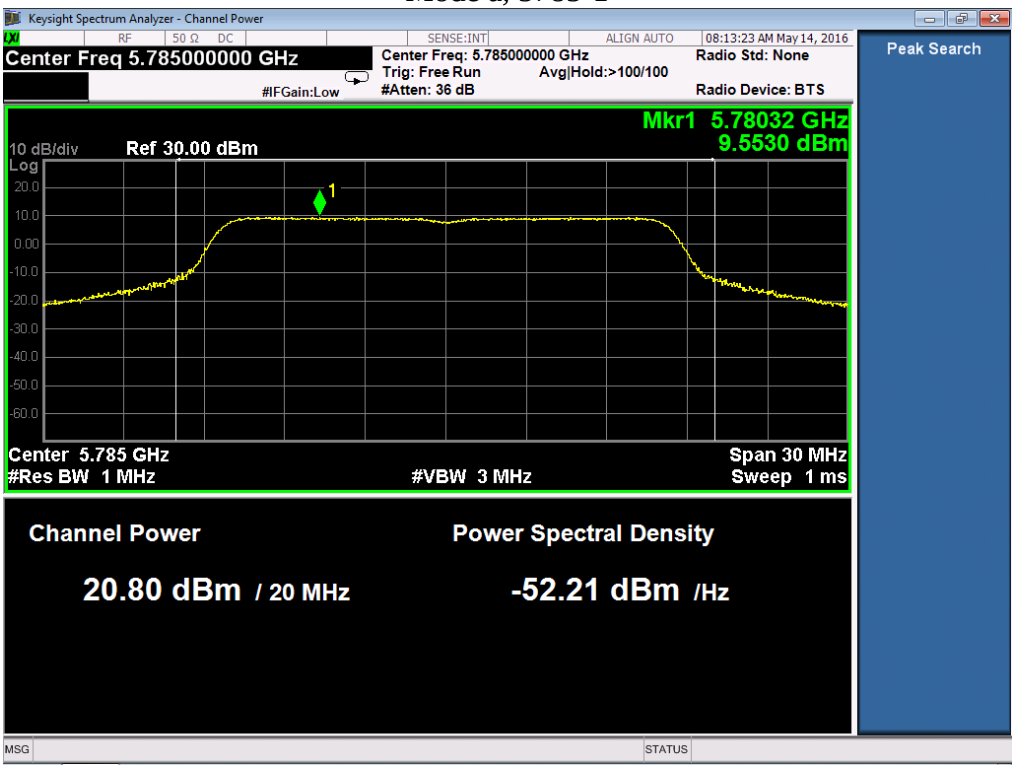
Mode a, 5745-1



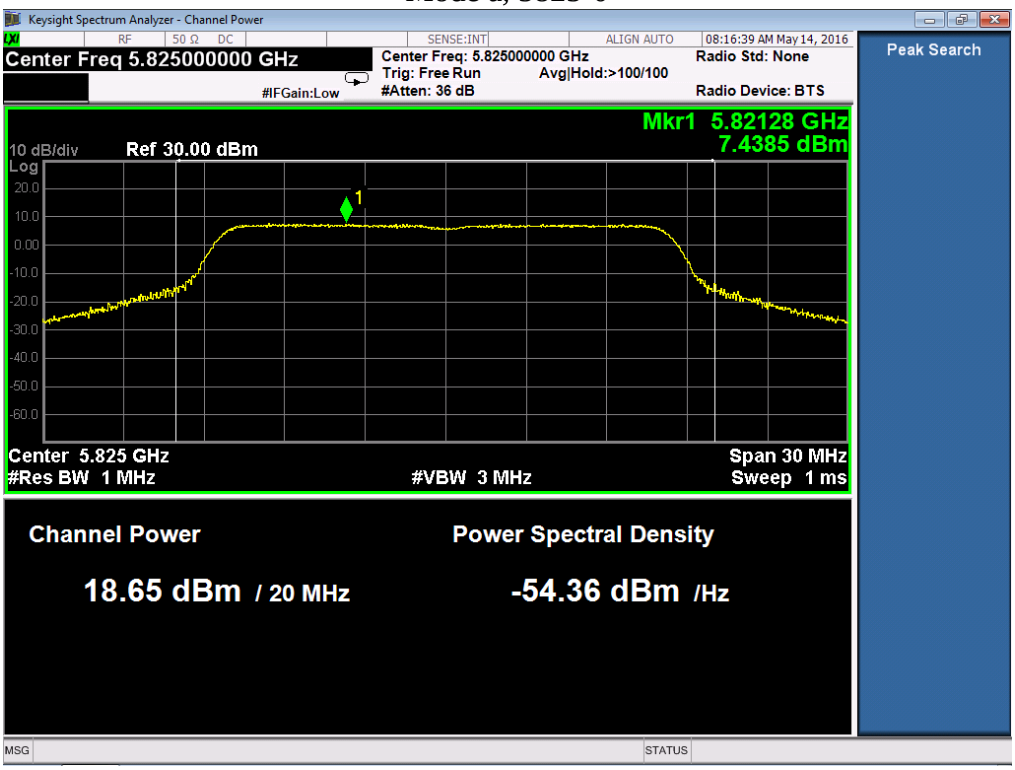
Mode a, 5785-0



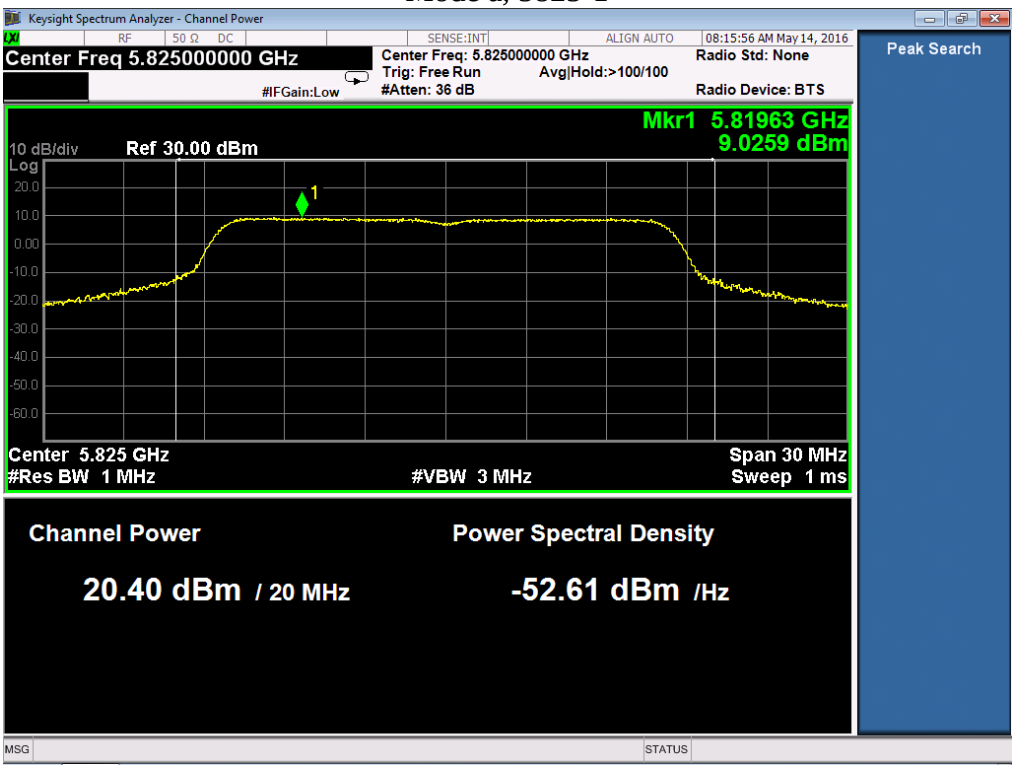
Mode a, 5785-1



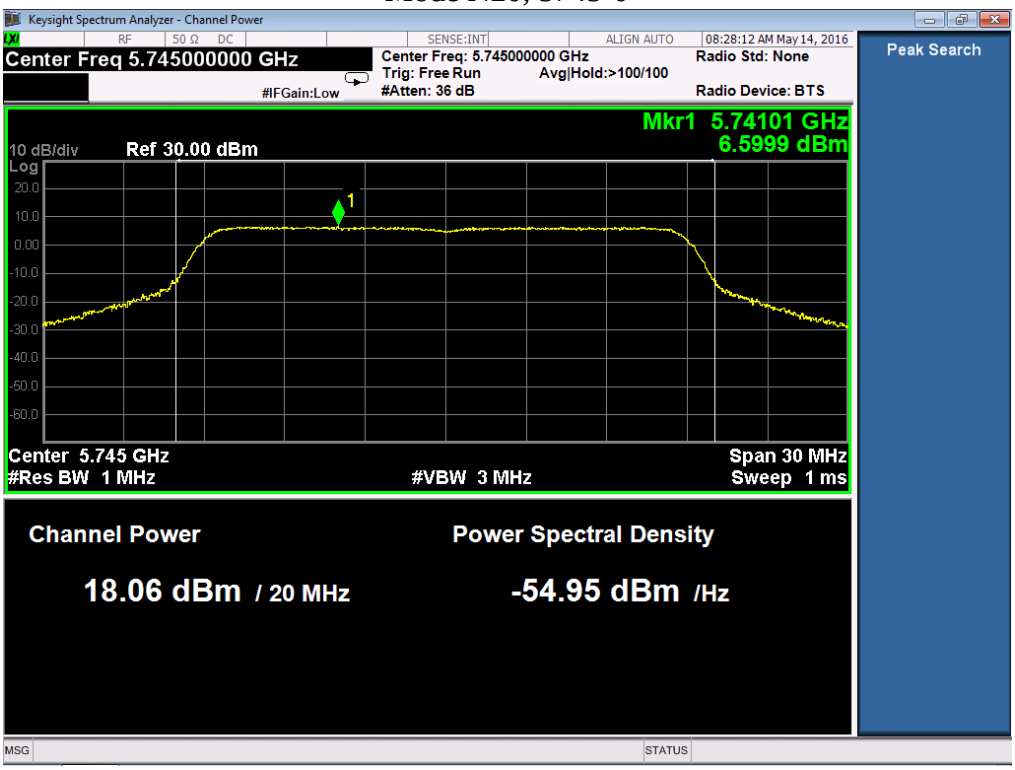
Mode a, 5825-0



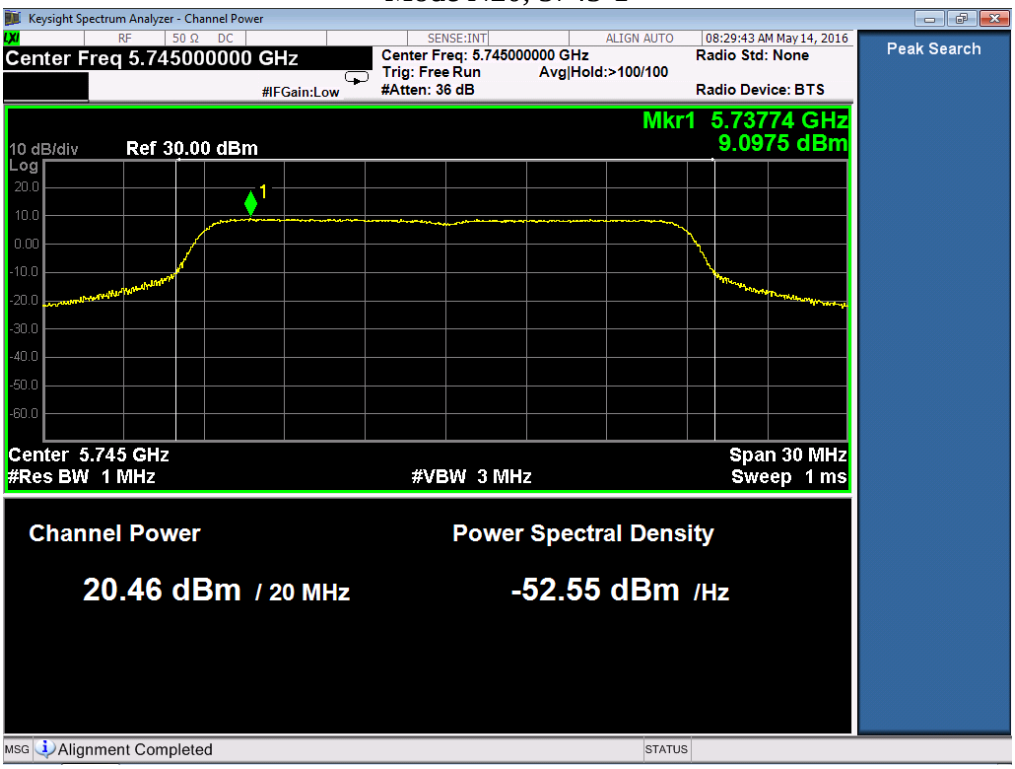
Mode a, 5825-1



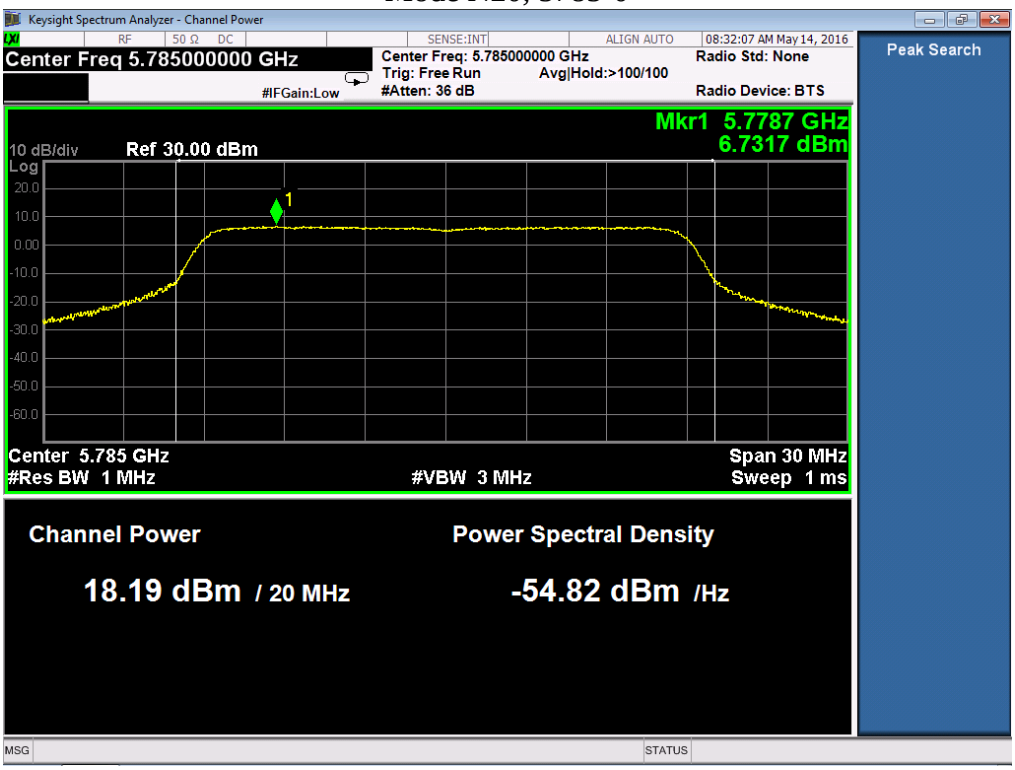
Mode N20, 5745-0



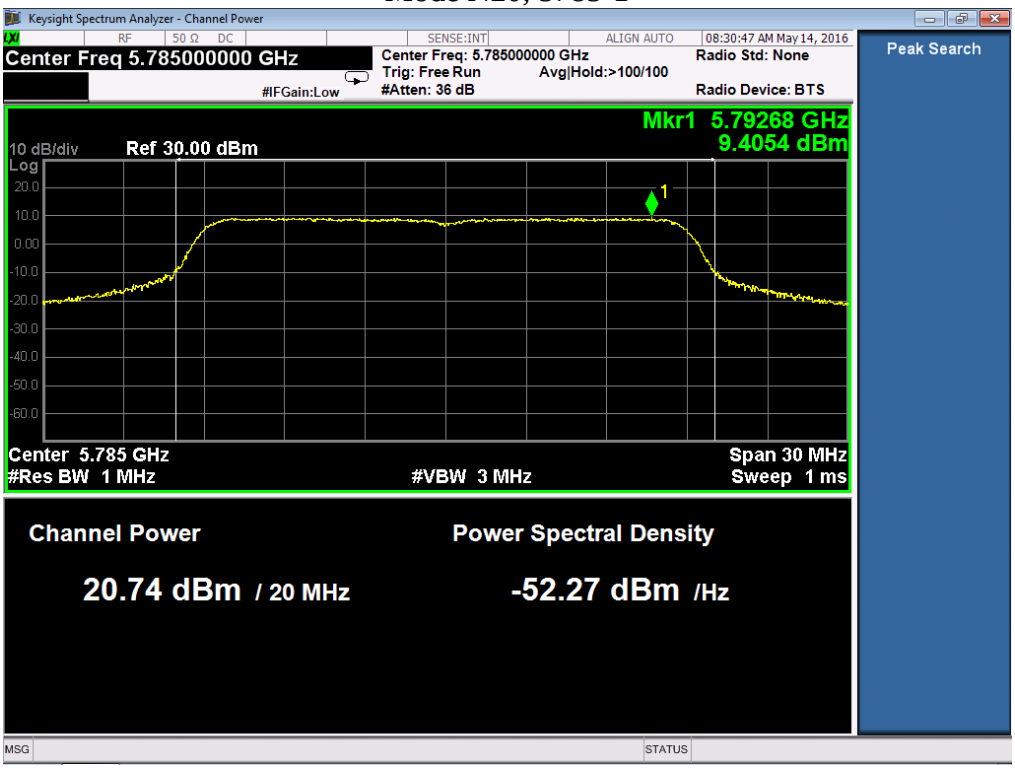
Mode N20, 5745-1



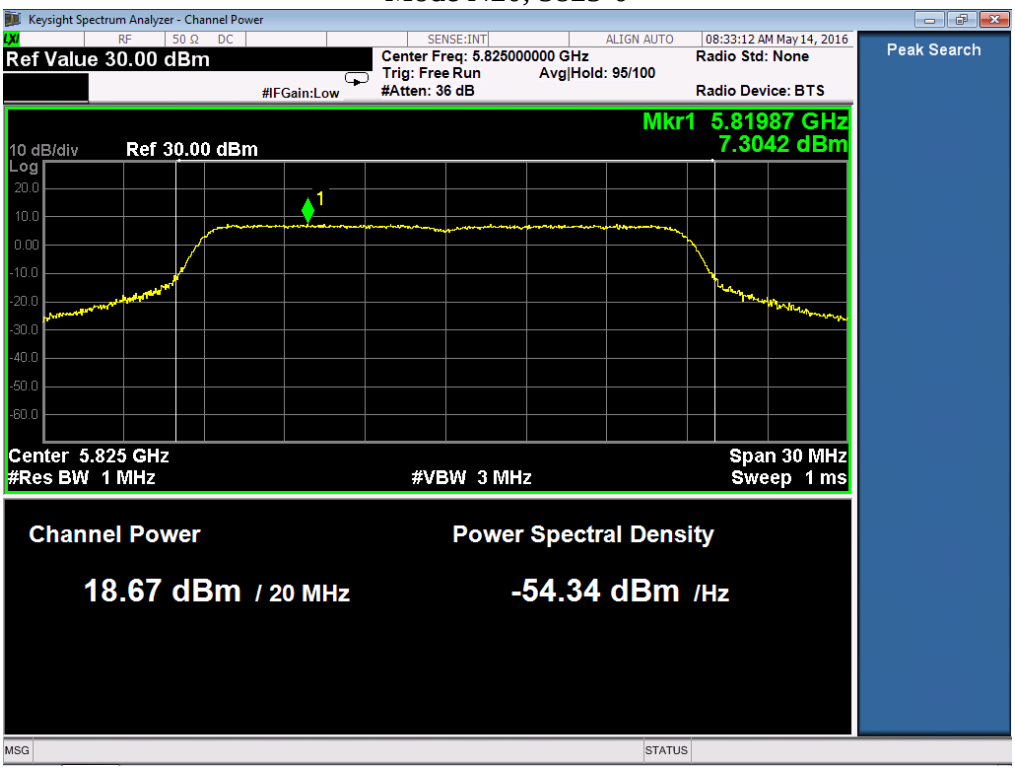
Mode N20, 5785-0



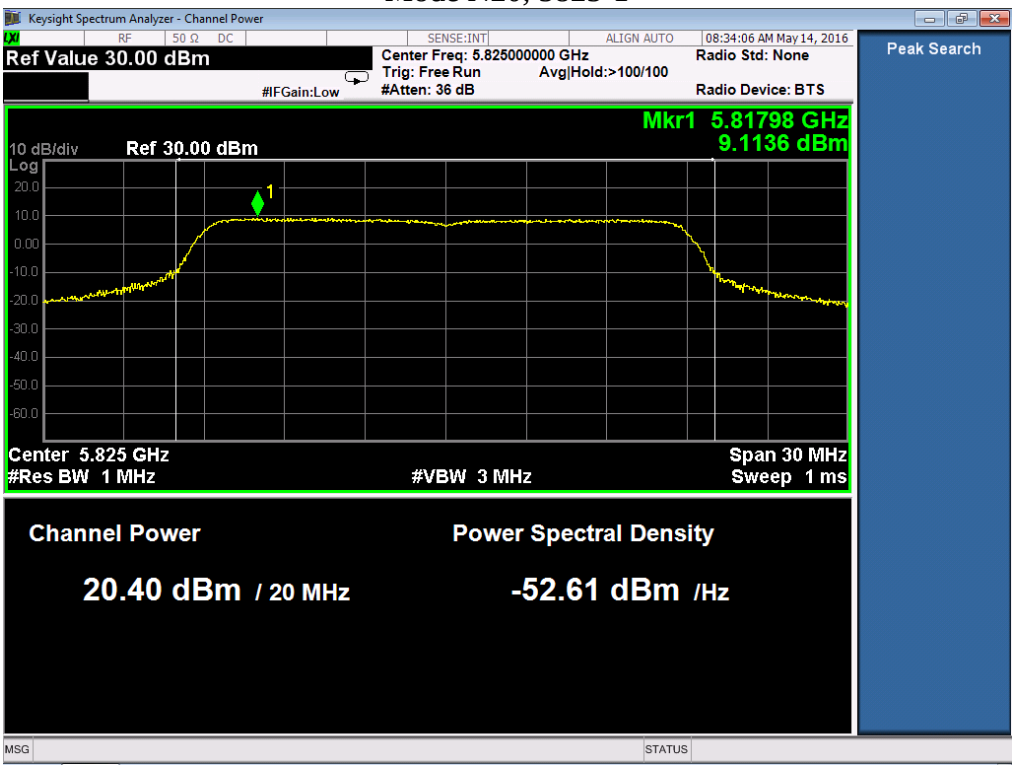
Mode N20, 5785-1



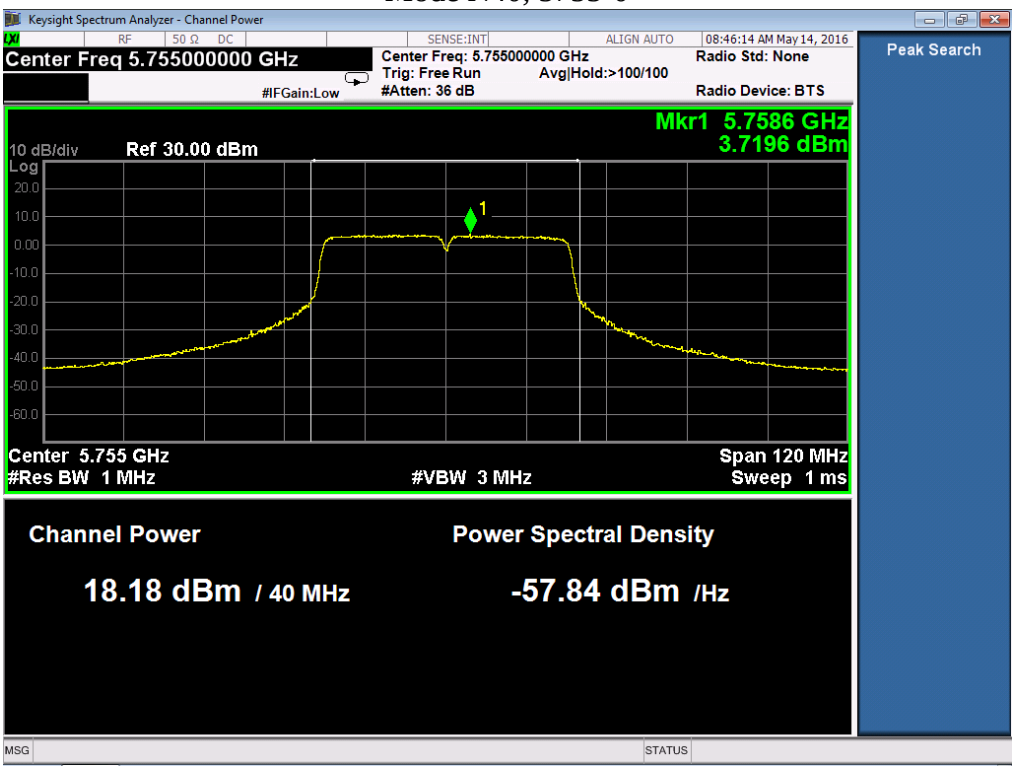
Mode N20, 5825-0



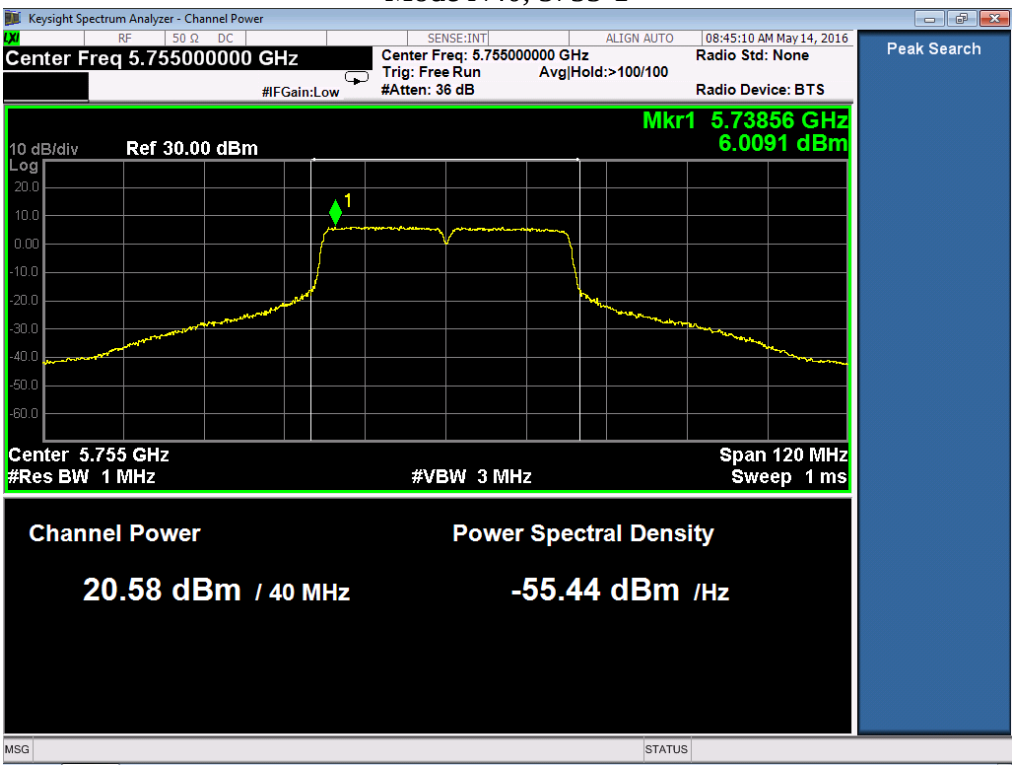
Mode N20, 5825-1



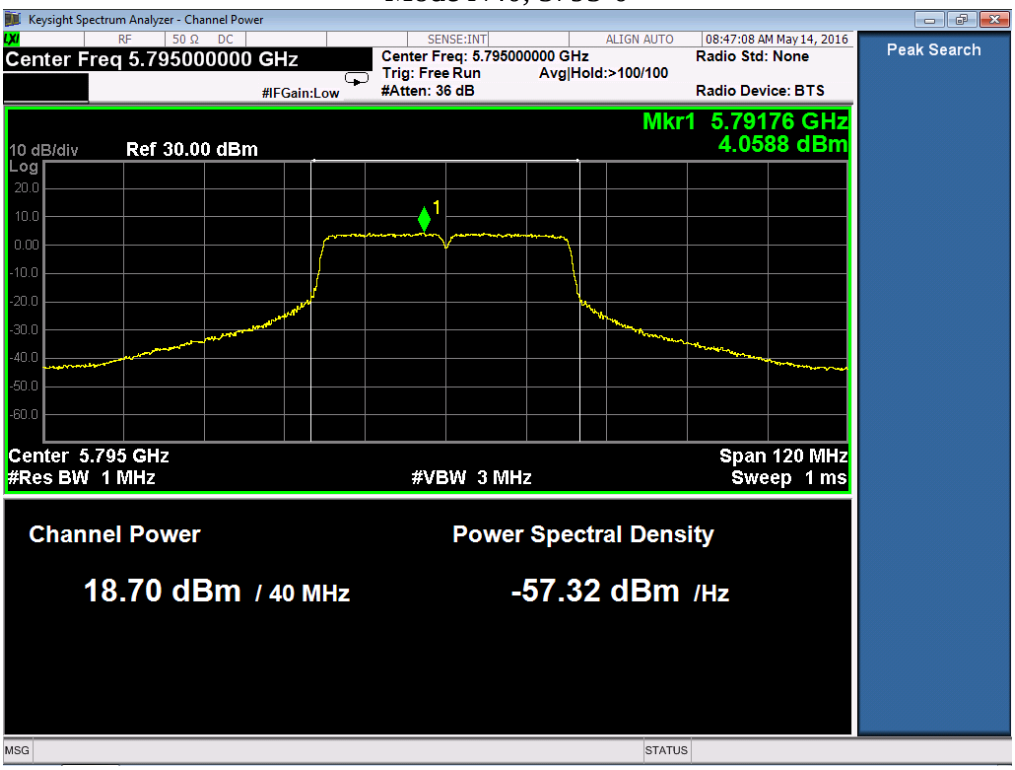
Mode N40, 5755-0



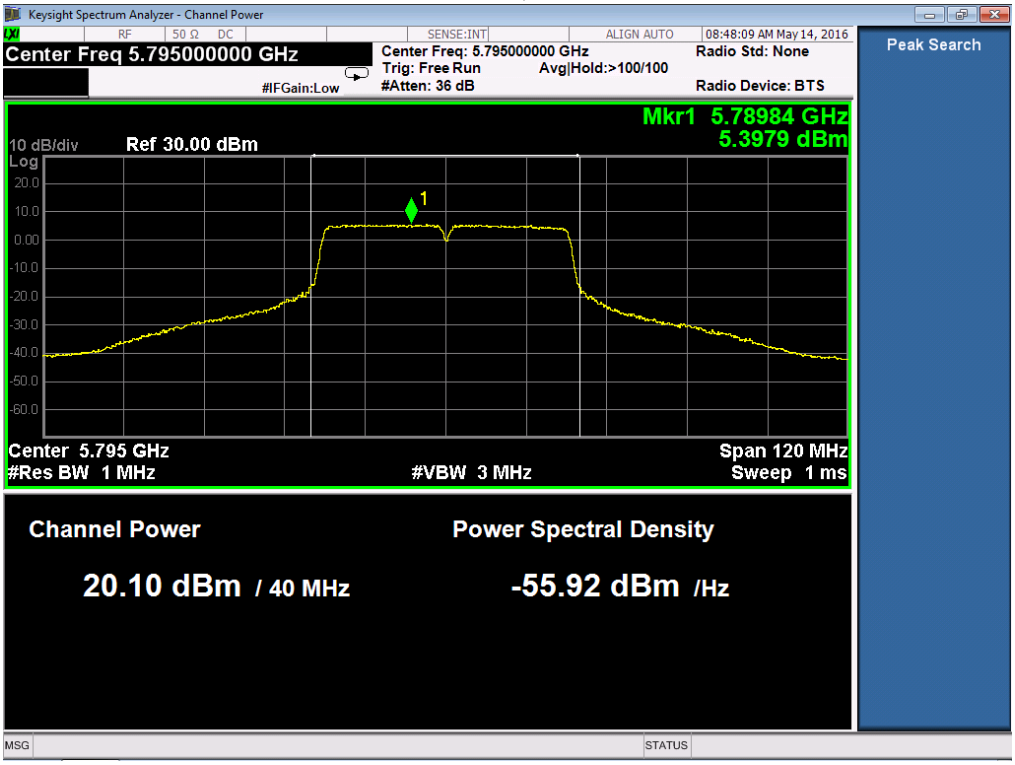
Mode N40, 5755-1



Mode N40, 5795-0



Mode N40, 5795-1



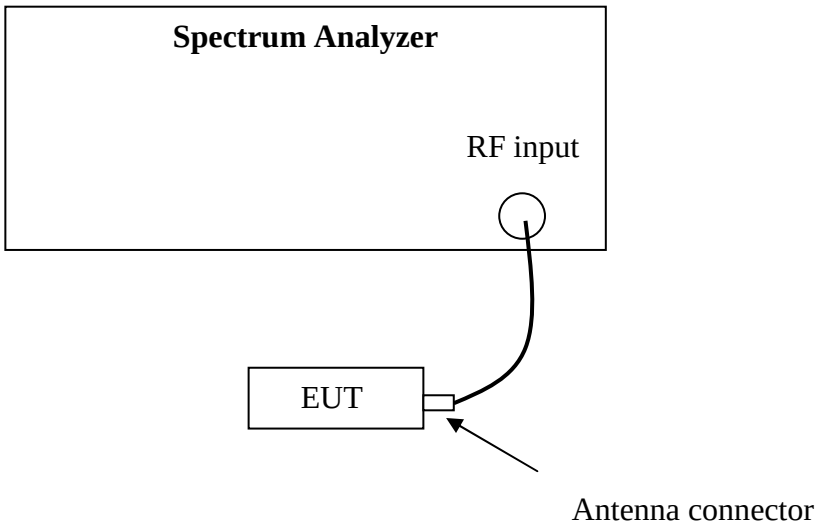
5. Minimum 6dB Bandwidth

Test result: PASS

5.1 Limit

For systems using digital modulation techniques that may operate in the 5725 - 5850 MHz band, the minimum 6 dB bandwidth shall be at least 500 kHz.

5.2 Test Configuration



5.3 Test Procedure and test setup

The power spectrum density per FCC §15.407(a)(6) was measured from the antenna port of the EUT. Using a 50ohm spectrum analyzer (measurement method refers to KDB 789033D02: Section C).

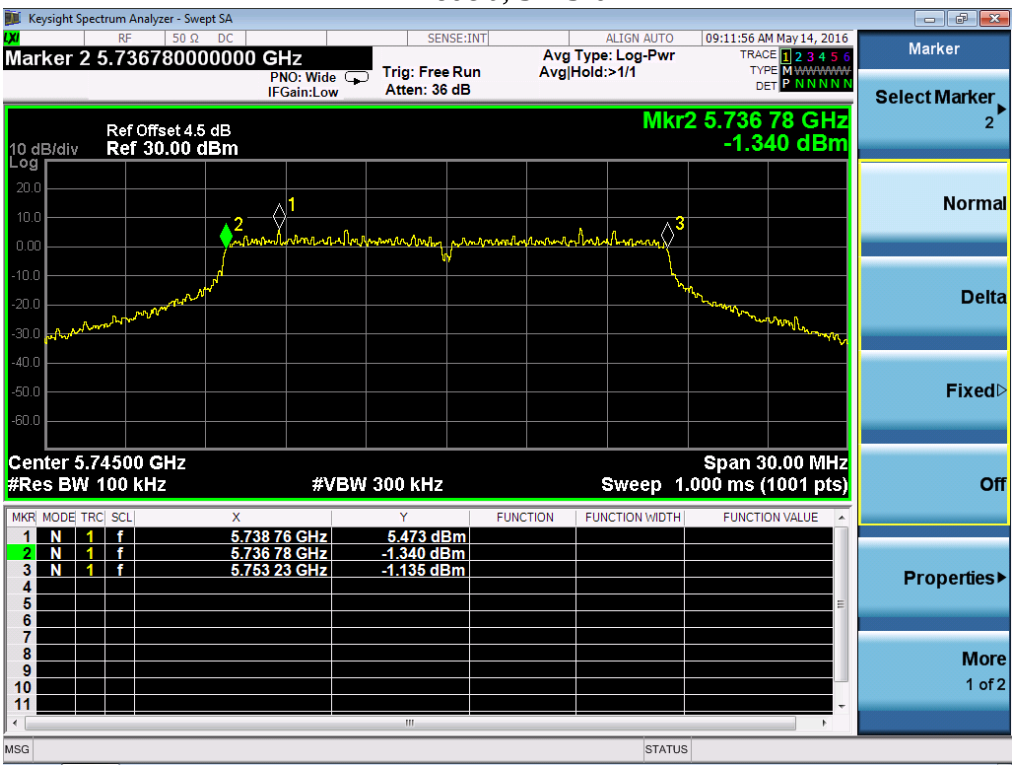
a) Set RBW = 100 kHz.
b) Set the video bandwidth (VBW) ≥ 3 RBW.
c) Detector = Peak.
d) Trace mode = max hold.
e) Sweep = auto couple.
f) Allow the trace to stabilize.
g) Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.
Note: The automatic bandwidth measurement capability of a spectrum analyzer or EMI receiver may be employed if it implements the functionality described above.

5.4 Test Protocol

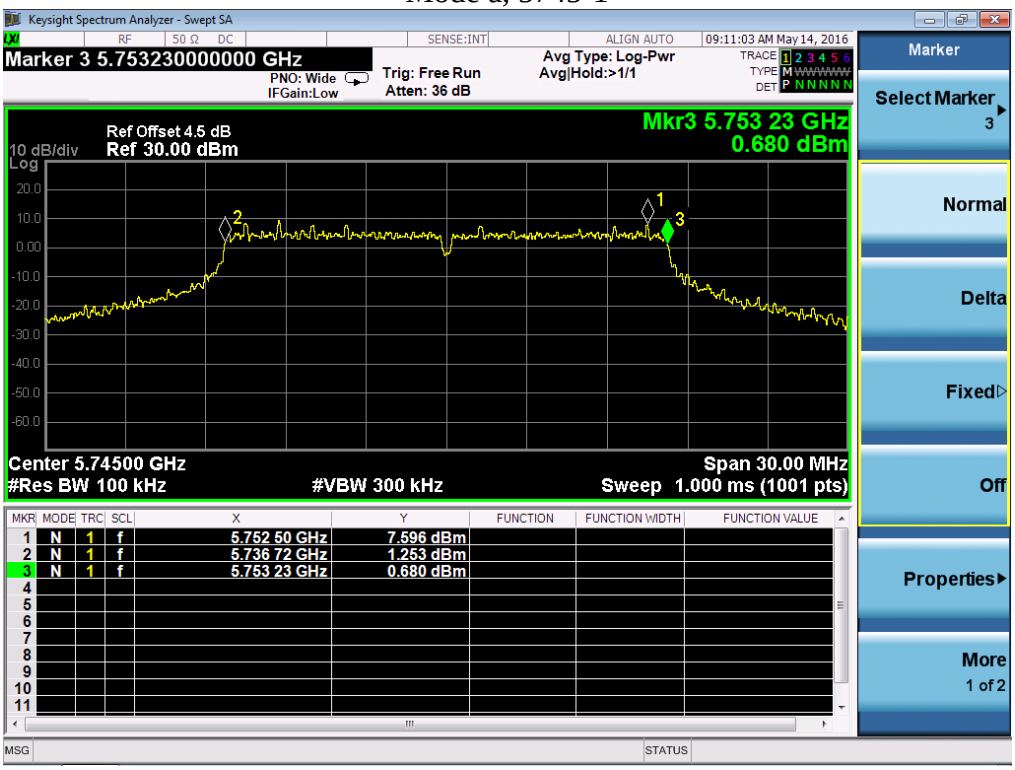
Temperature : 25 °C
Relative Humidity : 55 %

Modulation	Frequency (MHz)	Minimum 6dB Bandwidth (MHz)		Limits (MHz)
		Port 0	Port 1	
a	5745	> 0.5	> 0.5	> 0.5
	5785	> 0.5	> 0.5	> 0.5
	5825	> 0.5	> 0.5	> 0.5
n20	5745	> 0.5	> 0.5	> 0.5
	5785	> 0.5	> 0.5	> 0.5
	5825	> 0.5	> 0.5	> 0.5
n40	5755	> 0.5	> 0.5	> 0.5
	5795	> 0.5	> 0.5	> 0.5

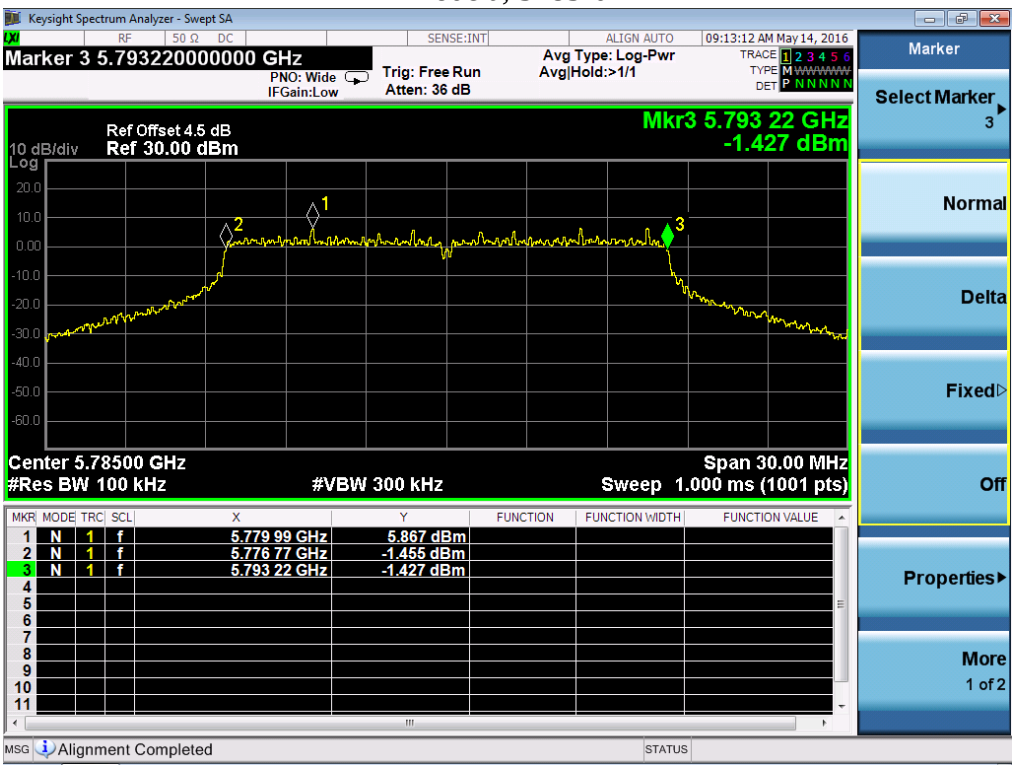
Mode a, 5745-0



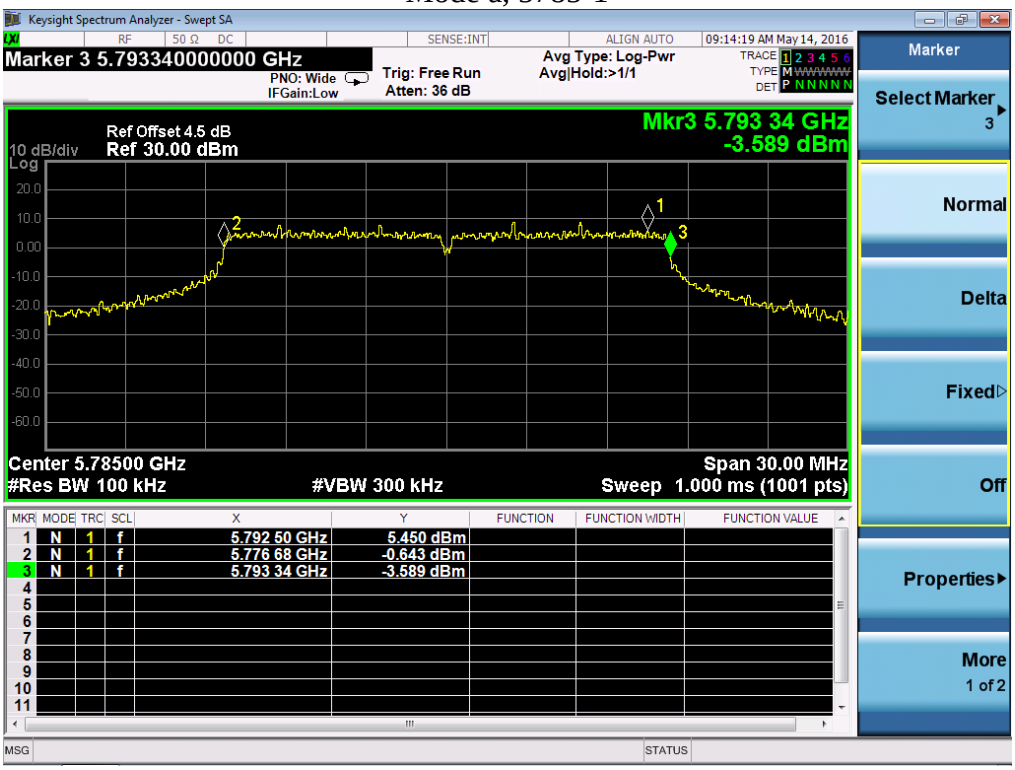
Mode a, 5745-1



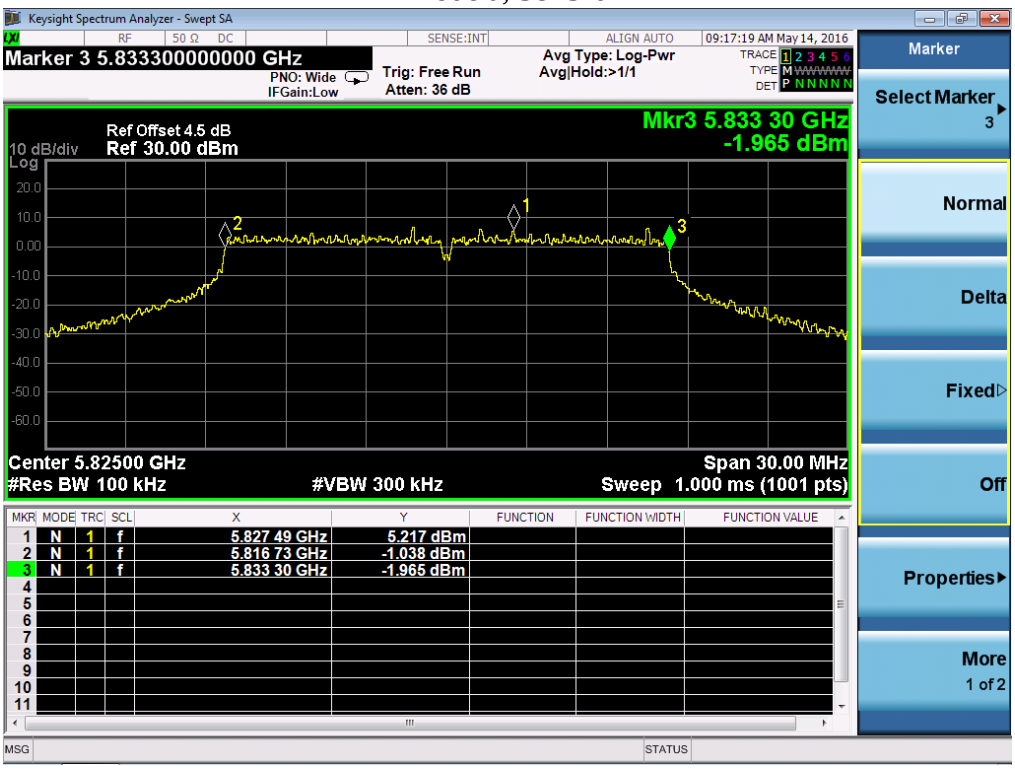
Mode a, 5785-0



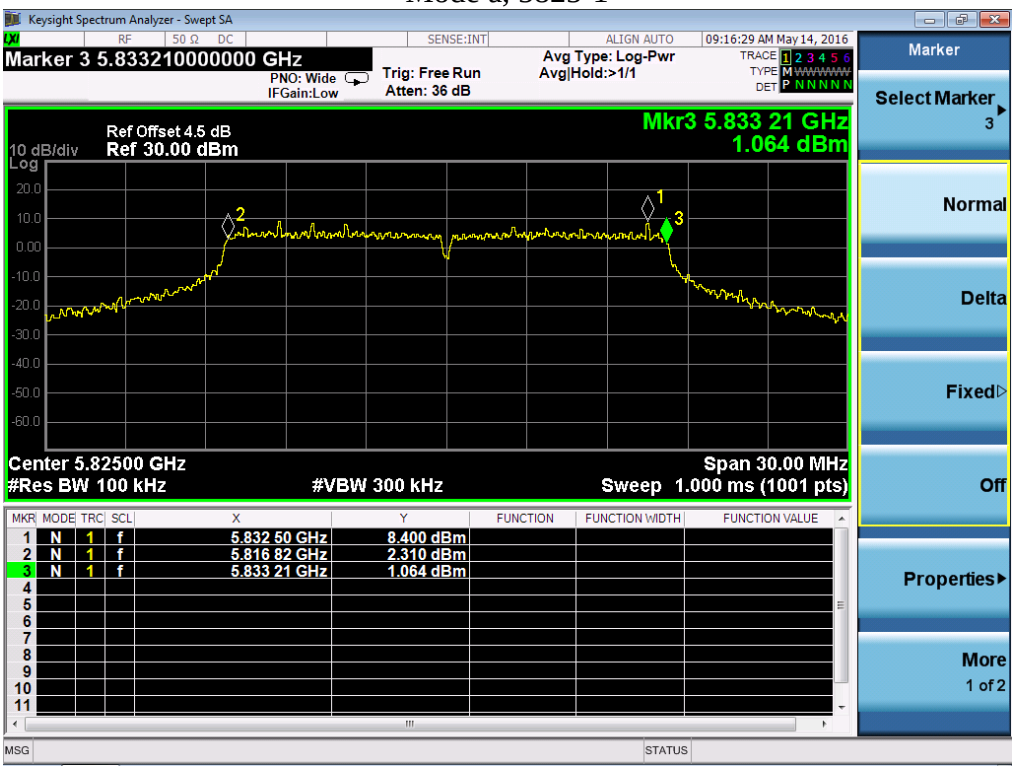
Mode a, 5785-1



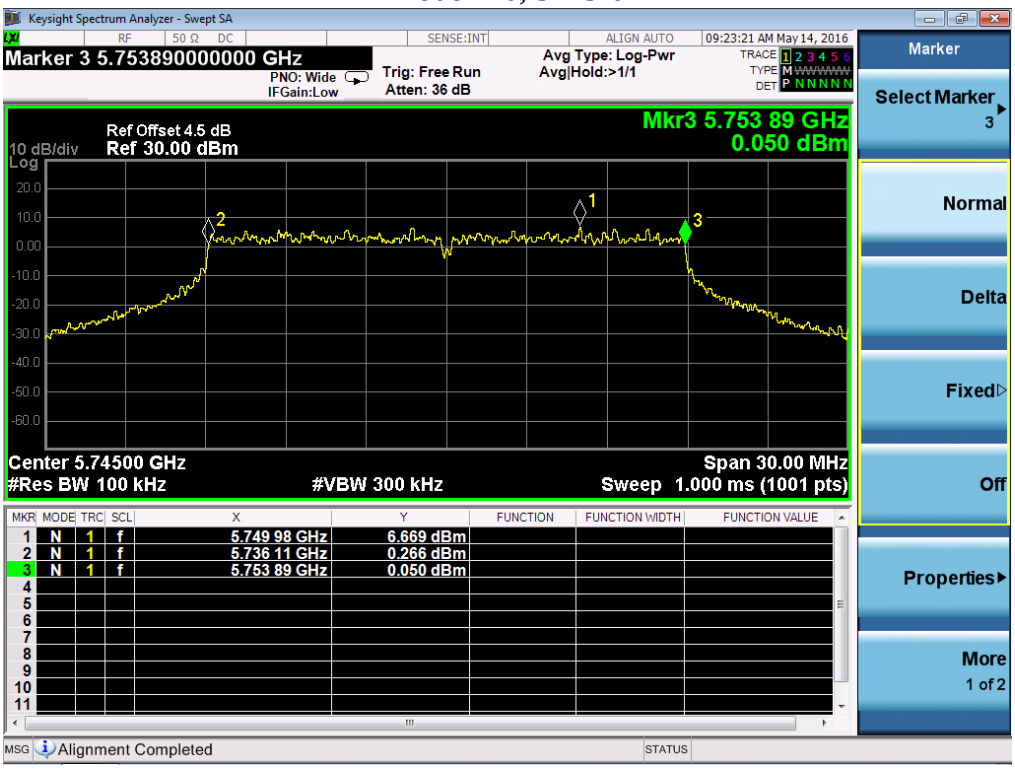
Mode a, 5825-0



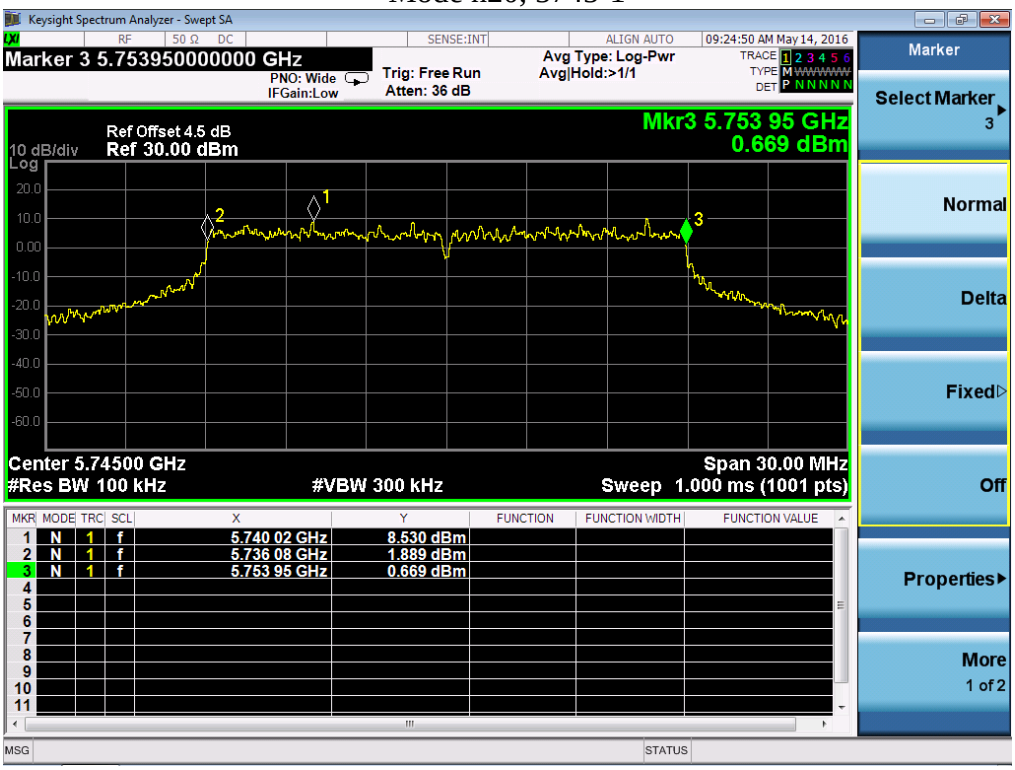
Mode a, 5825-1



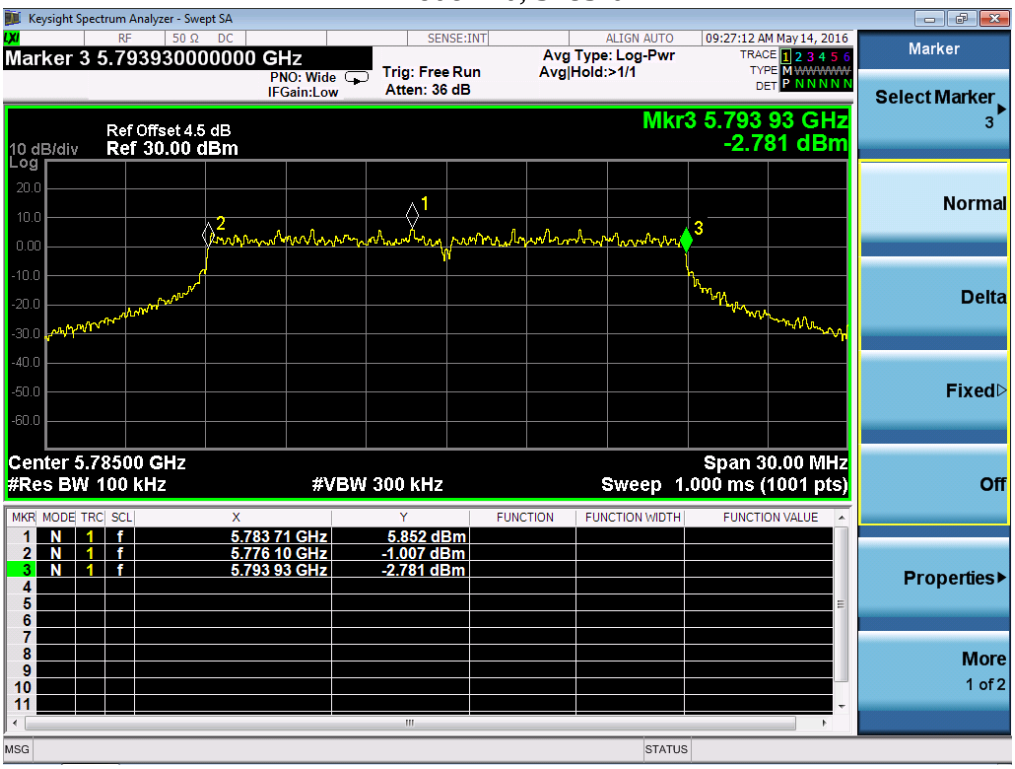
Mode n20, 5745-0



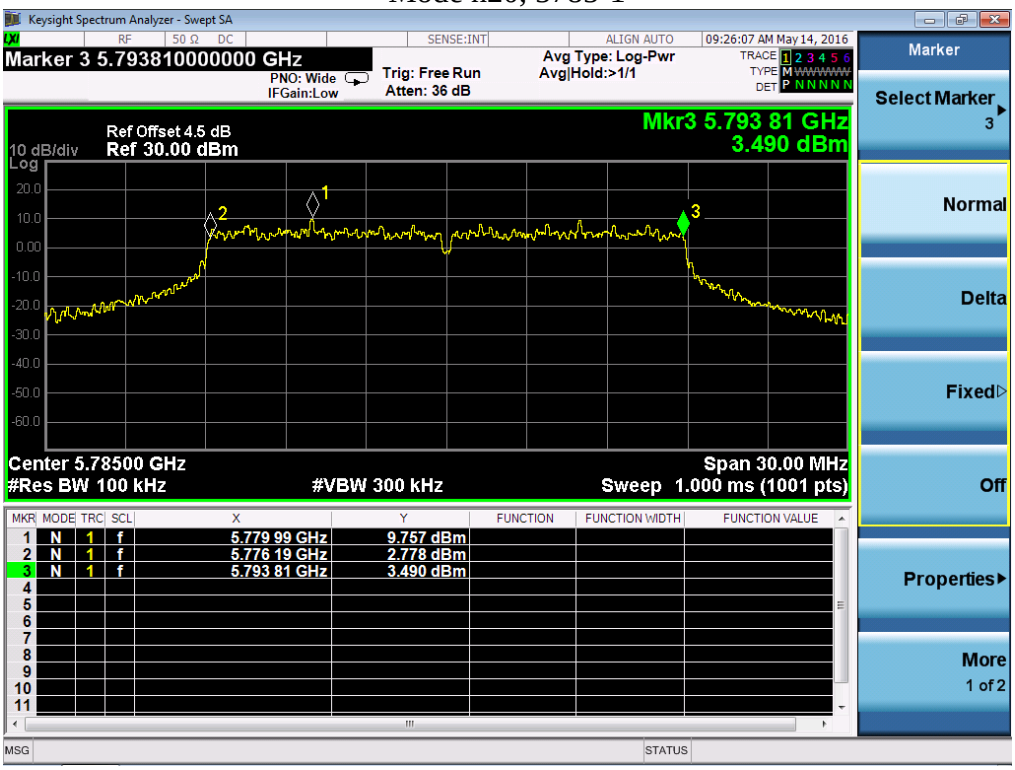
Mode n20, 5745-1



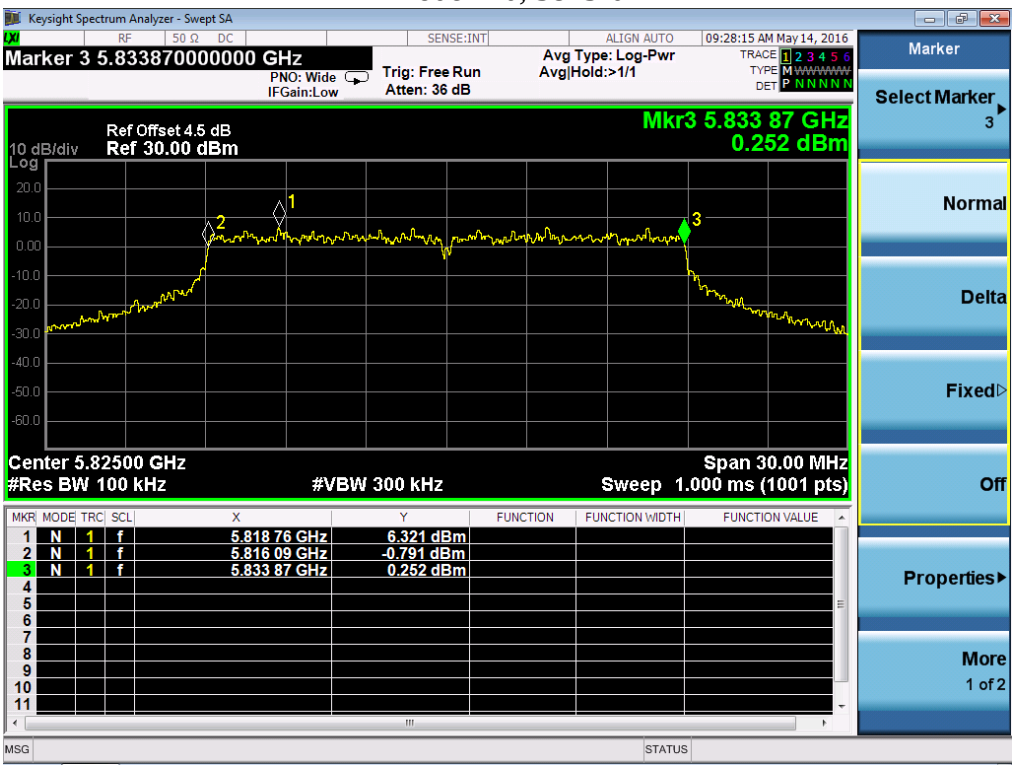
Mode n20, 5785-0



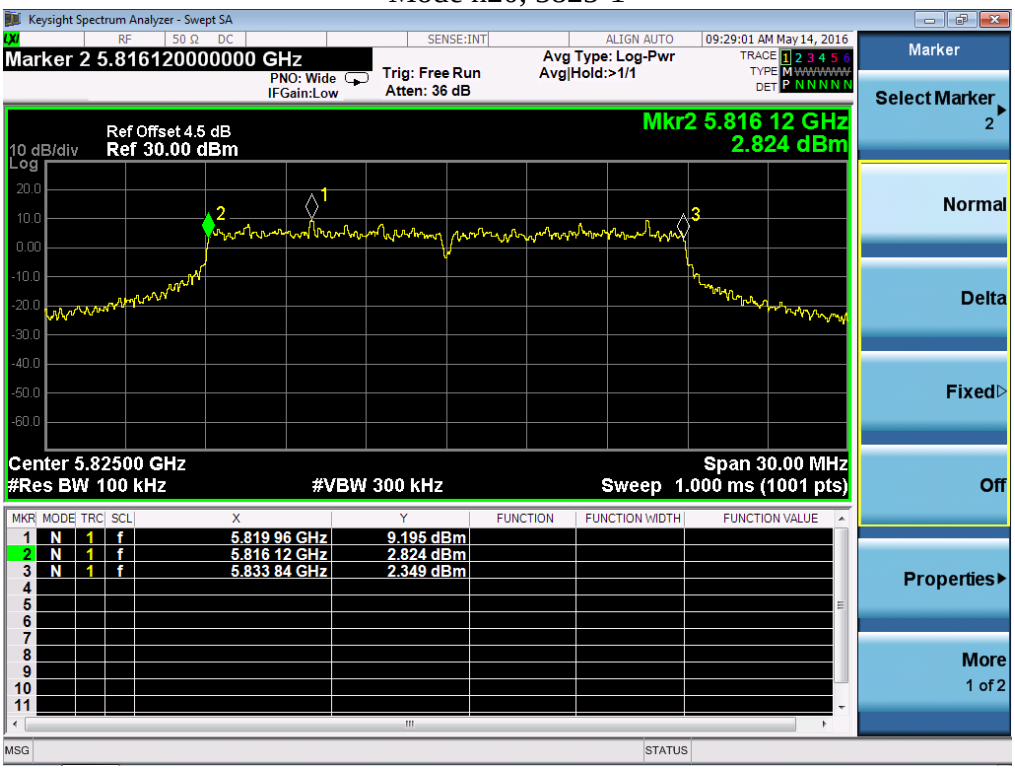
Mode n20, 5785-1



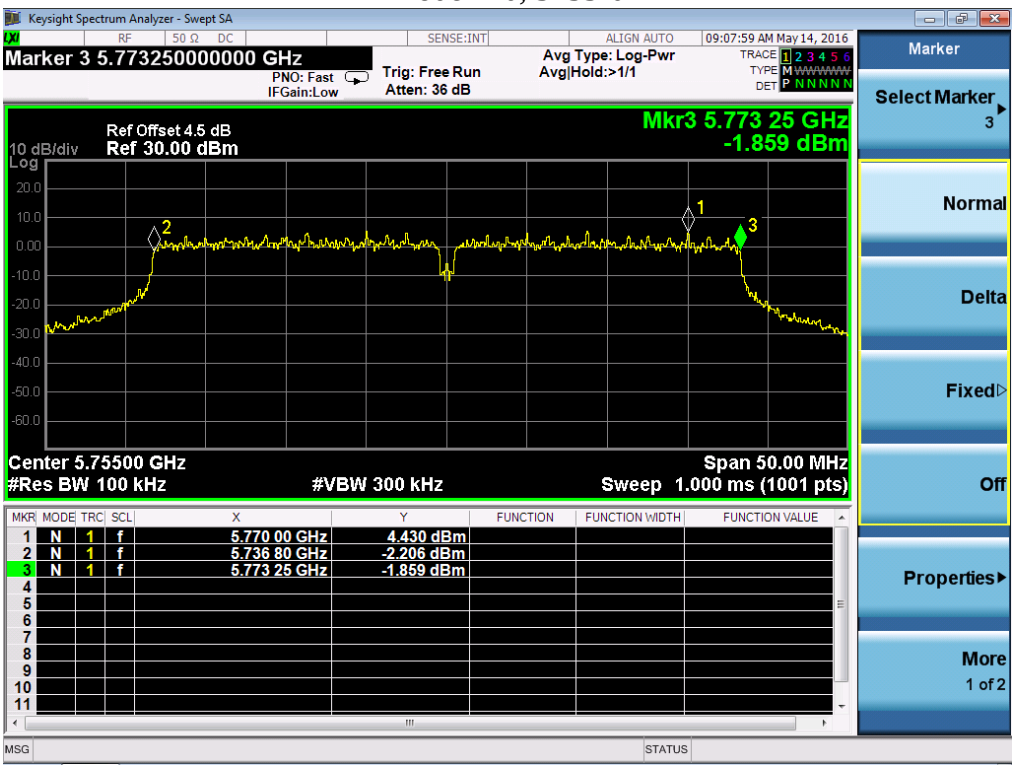
Mode n20, 5825-0



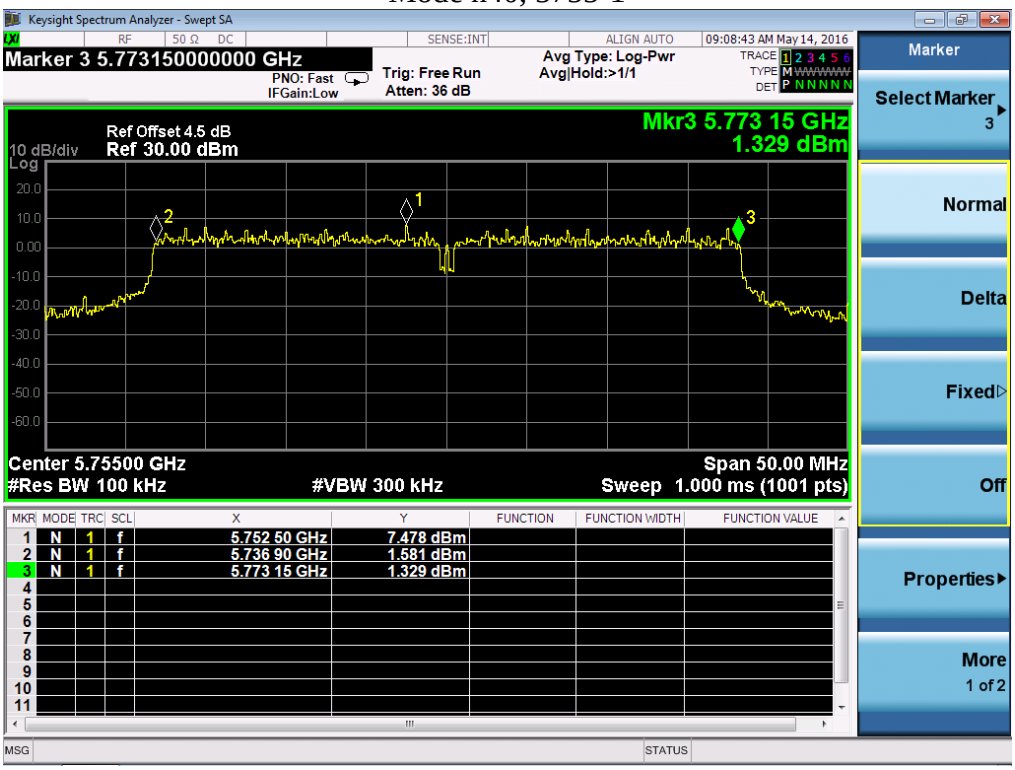
Mode n20, 5825-1



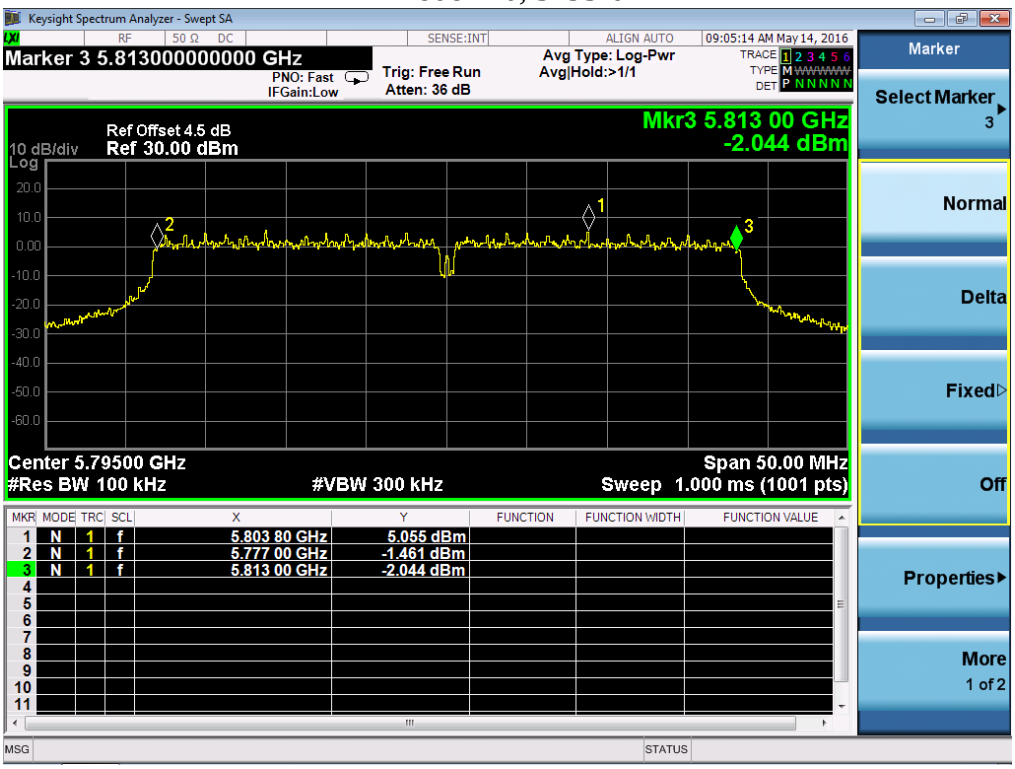
Mode n40, 5755-0



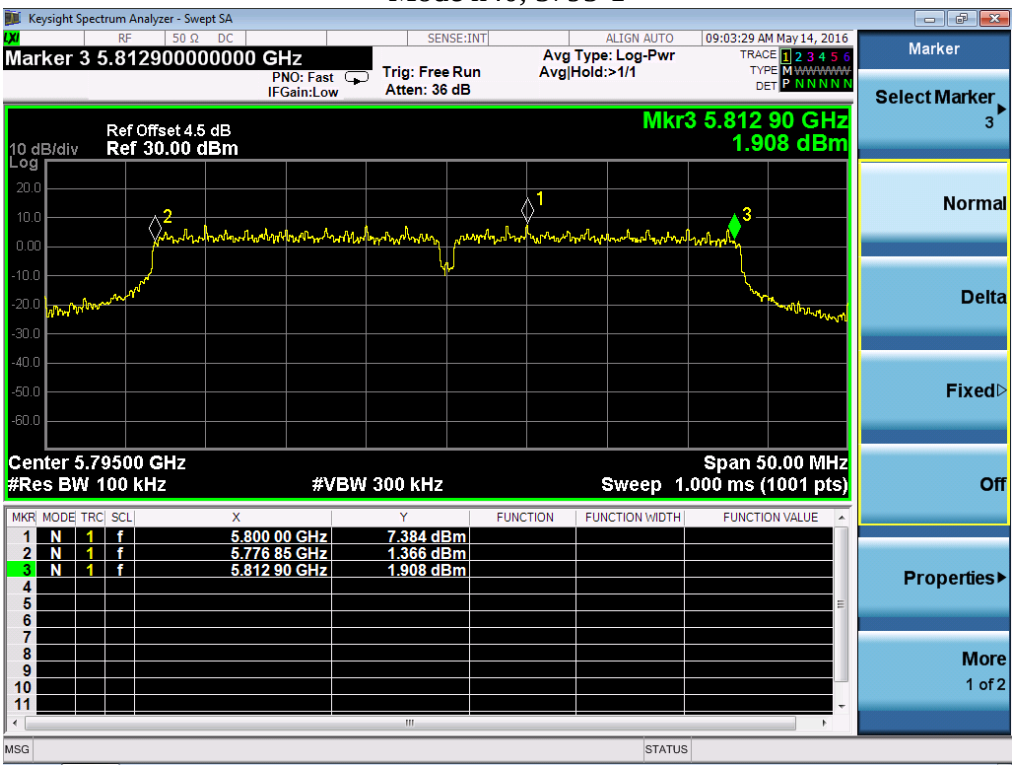
Mode n40, 5755-1



Mode n40, 5795-0



Mode n40, 5795-1



6. Radiated emission

Test result: PASS

6.1 Test limit

6.1.1 The radiated emissions which are lower than 1GHz or fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in § 15.209(a) showed as below:

Frequency (MHz)	Field Strength (dBuV/m)	Measurement Distance (m)
30 - 88	40.0	3
88 - 216	43.5	3
216 - 960	46.0	3
Above 960	54.0	3

6.1.2 The emission which is outside the restrict bands, should comply with the EIRP limit as below:

☐ For transmitters operating in the 5.15–5.25 / 5.25 – 5.35 / 5.47 – 5.725 GHz band:

Frequency (MHz)	EIRP Limit (dBm)	Equivalent Field Strength (3m) (dBμV/m)
<5150	-27	68.20
>5350		
<5470		
>5725		

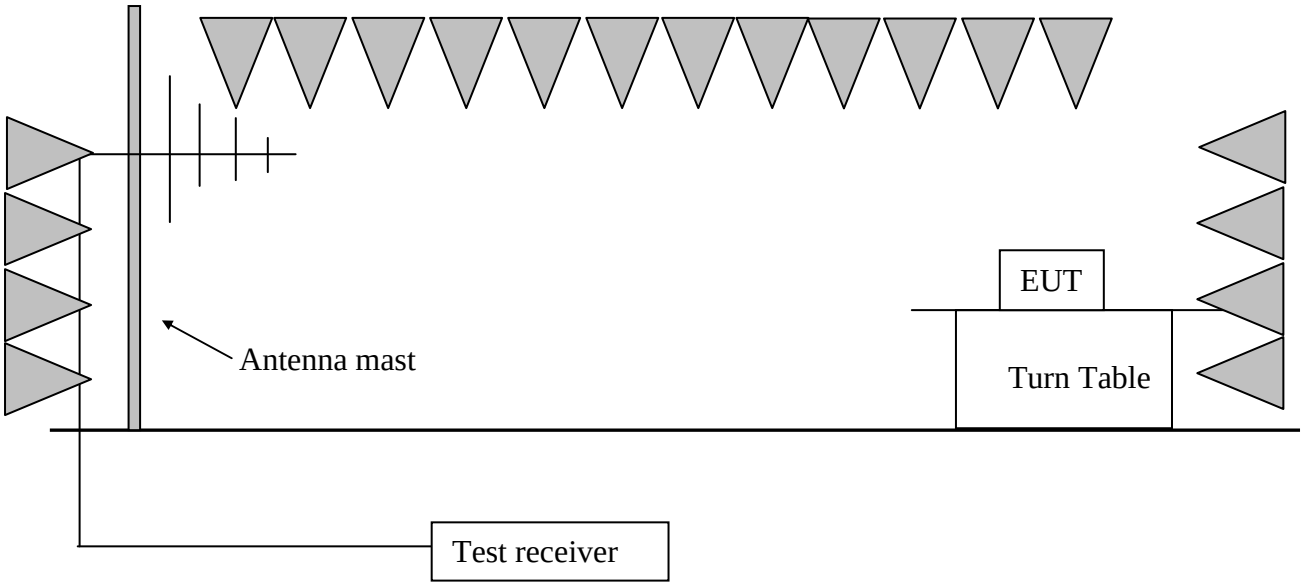
☐ For transmitters operating in the 5.15–5.25 / 5.25 – 5.35 / 5.47 – 5.725 GHz band Assessed with 15.209(a):

Frequency (MHz)	Field Strength (dBuV/m)	Measurement Distance (m)
30 - 88	40.0	3
88 - 216	43.5	3
216 - 960	46.0	3
Above 960	54.0	3

☒ For transmitters operating in the 5.725 – 5.85GHz band:

Frequency (MHz)	EIRP Limit (dBm/MHz)	Equivalent Field Strength (3m) (dBμV/m)
<5650	-27	68.20
5650 ~ 5700	-27 ~ 10	68.20 ~ 105.20
5700 ~ 5720	10 ~ 15.6	105.20 ~ 110.80
5720 ~ 5725	15.6 ~ 27	110.8 ~ 122.2
5850 ~ 5855	27 ~ 15.6	122.2 ~ 110.8
5855 ~ 5875	15.6 ~ 10	110.8 ~ 105.20
5875 ~ 5925	10 ~ -27	105.20 ~ 68.20
>5925	-27	68.20

6.2 Test Configuration



6.3 Test procedure and test setup

The measurement was applied in a semi-anechoic chamber. While testing for spurious emission higher than 1GHz, if applied, the pre-amplifier would be equipped just at the output terminal of the antenna.

Tabletop devices shall be placed on a non-conducting platform with nominal top surface dimensions 1 m by 1.5 m. For emissions testing at or below 1 GHz, the table height shall be 80 cm above the reference ground plane. For emission measurements above 1 GHz, the table height shall be 1.5 m.

The turntable rotated 360 degrees to determine the position of the maximum emission level. The EUT was set 3 meters away from the receiving antenna which was mounted on an antenna mast. The antenna moved up and down between from 1meter to 4 meters to find out the maximum emission level.

The EUT was tested according to KDB 789033D02: Section G.

The radiated emission was measured using the Spectrum Analyzer with the resolutions bandwidth set as:

RBW = 300 Hz, VBW = 1 kHz (9 kHz~150 kHz);
RBW = 10 kHz, VBW = 30 kHz (150 kHz~30MHz);
RBW = 100 kHz, VBW = 300 kHz (30MHz~1GHz for PK)
RBW = 1MHz, VBW = 3MHz (>1GHz for PK);

Remark:
1. Factor= Antenna Factor + Cable Loss (-Amplifier, is employed)
2. Measured level= Original Receiver Reading + Factor
3. Margin = Limit – Measured level
4. If the PK measured level is lower than AV limit, the AV test can be elided.

Example:

Assuming Antenna Factor = 30.20dB/m, Cable Loss = 2.00dB,
Gain of Preamplifier = 32.00dB, Original Receiver Reading = 10dBuV.
Then Factor = 30.20 + 2.00 – 32.00 = 0.20dB/m;
Measured level = 10dBuV + 0.20dB/m = 10.20dBuV/m
Assuming limit = 54dBuV/m,
Measured level = 10.20dBuV/m, then Margin = 54 - 10.20 = 43.80dBuV/m.

6.4 Test protocol

Temperature: 25 °C Relative Humidity: 55 %

Mode a

Freq (MHz)	Antenna	Frequency (MHz)	Correct Factor (dB/m)	Corrected Reading (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
5745	V	5751.66	43.80	122.30	/	/	PK
	V	131.08	15.10	41.00	43.50	2.50	PK
	H	340.02	16.60	43.50	46.00	2.50	PK
	H	749.23	22.90	35.70	46.00	10.30	PK
	V	1000.00	24.60	35.30	54.00	18.70	PK
	V	5683.04	43.80	64.30	68.20	3.90	PK
	V	5704.20	43.80	64.50	105.20	40.70	PK
	V	5724.01	43.80	96.30	110.80	14.50	PK
	V	11496.99	7.40	47.80	54.00	6.20	PK
	V	17250.50	12.20	57.60	74.00	16.40	PK
	V	17250.50	12.20	45.00	54.00	9.00	AV
5785	V	5789.33	43.80	122.50	/	/	PK
	V	131.08	15.10	41.00	43.50	2.50	PK
	H	340.02	16.60	43.50	46.00	2.50	PK
	H	749.23	22.90	35.70	46.00	10.30	PK
	V	1000.00	24.60	35.30	54.00	18.70	PK
	V	11547.40	7.60	49.10	54.00	4.90	PK
	V	17355.80	12.50	57.20	74.00	16.80	PK
	V	17355.80	12.50	44.40	54.00	9.60	AV
5825	V	5818.83	43.90	122.60	/	/	PK
	V	131.08	15.10	41.00	43.50	2.50	PK
	H	340.02	16.60	43.50	46.00	2.50	PK
	H	749.23	22.90	35.70	46.00	10.30	PK
	V	1000.00	24.60	35.30	54.00	18.70	PK
	V	5850.00	43.90	84.20	110.80	26.60	PK
	V	5859.31	43.90	76.50	105.20	28.70	AV

	V	5889.37	43.90	64.90	68.20	3.30	PK
	V	17492.98	12.70	56.10	74.00	17.90	PK
	V	17492.98	12.70	41.60	54.00	12.40	AV

Mode n20

Freq (MHz)	Antenna	Frequency (MHz)	Correct Factor (dB/m)	Corrected Reading (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
5745	V	5751.66	43.80	120.90	/	/	PK
	V	131.08	15.10	41.00	43.50	2.50	PK
	H	340.02	16.60	43.50	46.00	2.50	PK
	H	749.23	22.90	35.70	46.00	10.30	PK
	V	1000.00	24.60	35.30	54.00	18.70	PK
	V	5683.04	43.80	64.30	68.20	3.90	PK
	V	5704.20	43.80	64.50	105.20	40.70	PK
	V	5724.01	43.80	96.30	110.80	14.50	PK
	V	11496.99	7.40	47.80	54.00	6.20	PK
	V	17250.50	12.20	57.10	74.00	16.90	PK
	V	17250.50	12.20	44.60	54.00	9.40	AV
5785	V	5789.33	43.80	121.10	/	/	PK
	V	131.08	15.10	41.00	43.50	2.50	PK
	H	340.02	16.60	43.50	46.00	2.50	PK
	H	749.23	22.90	35.70	46.00	10.30	PK
	V	1000.00	24.60	35.30	54.00	18.70	PK
	V	11547.40	7.60	49.10	54.00	4.90	PK
	V	17355.80	12.50	56.90	74.00	17.10	PK
	V	17355.80	12.50	44.10	54.00	9.90	AV
5825	V	5818.83	43.90	121.30	/	/	PK
	V	131.08	15.10	41.00	43.50	2.50	PK
	H	340.02	16.60	43.50	46.00	2.50	PK
	H	749.23	22.90	35.70	46.00	10.30	PK
	V	1000.00	24.60	35.30	54.00	18.70	PK

	V	5850.00	43.90	84.90	110.80	25.90	PK
	V	5859.31	43.90	77.20	105.20	28.00	AV
	V	5894.18	43.90	64.80	68.20	3.40	PK
	V	17492.98	12.70	55.90	74.00	18.10	PK
	V	17492.98	12.70	41.50	54.00	12.50	AV

Mode n40

Freq (MHz)	Antenna	Frequency (MHz)	Correct Factor (dB/m)	Corrected Reading (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
5755	V	5741.40	43.80	118.10	/	/	PK
	V	131.08	15.10	41.00	43.50	2.50	PK
	H	340.02	16.60	43.50	46.00	2.50	PK
	H	749.23	22.90	35.70	46.00	10.30	PK
	V	1000.00	24.60	35.30	54.00	18.70	PK
	V	5661.56	43.80	65.30	68.20	2.90	PK
	V	5711.26	43.80	88.60	105.20	16.60	PK
	V	5724.33	43.80	96.40	110.80	14.40	PK
	V	11496.99	7.40	45.00	54.00	9.00	PK
	V	17272.54	12.30	56.30	74.00	17.70	PK
	V	17272.54	12.30	44.70	54.00	9.30	AV
5795	V	5797.81	44.41	113.10	/	/	PK
	V	131.08	15.10	41.00	43.50	2.50	PK
	H	340.02	16.60	43.50	46.00	2.50	PK
	H	749.23	22.90	35.70	46.00	10.30	PK
	V	1000.00	24.60	35.30	54.00	18.70	PK
	V	5850.00	43.90	80.20	110.80	30.60	PK
	V	5859.31	43.90	76.30	105.20	28.90	PK
	V	5888.97	43.90	65.10	68.20	3.10	PK
	V	11585.17	7.30	42.90	54.00	11.10	PK
	V	17382.76	12.50	49.70	54.00	4.30	PK

Note: for band edge emission of UNII-3, the lowest limit and highest reading for each frequency stage is showed in this report.

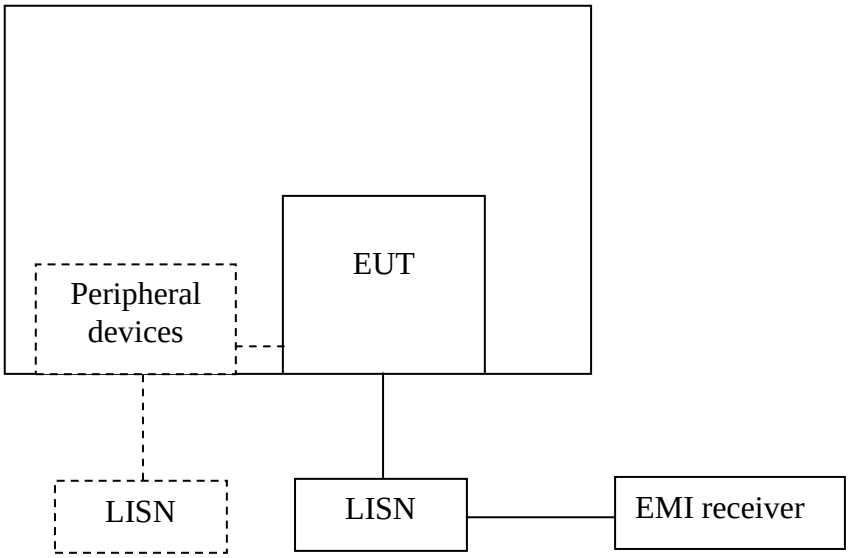
7. Power line conducted emission

Test result: **Pass**

7.1 Limit

Frequency of Emission (MHz)	Conducted Limit (dBuV)	
	QP	AV
0.15-0.5	66 to 56*	56 to 46 *
0.5-5	56	46
5-30	60	50
* Decreases with the logarithm of the frequency.		

7.2 Test configuration



☒ For table top equipment, wooden support is 0.8m height table

☐ For floor standing equipment, wooden support is 0.1m height rack.

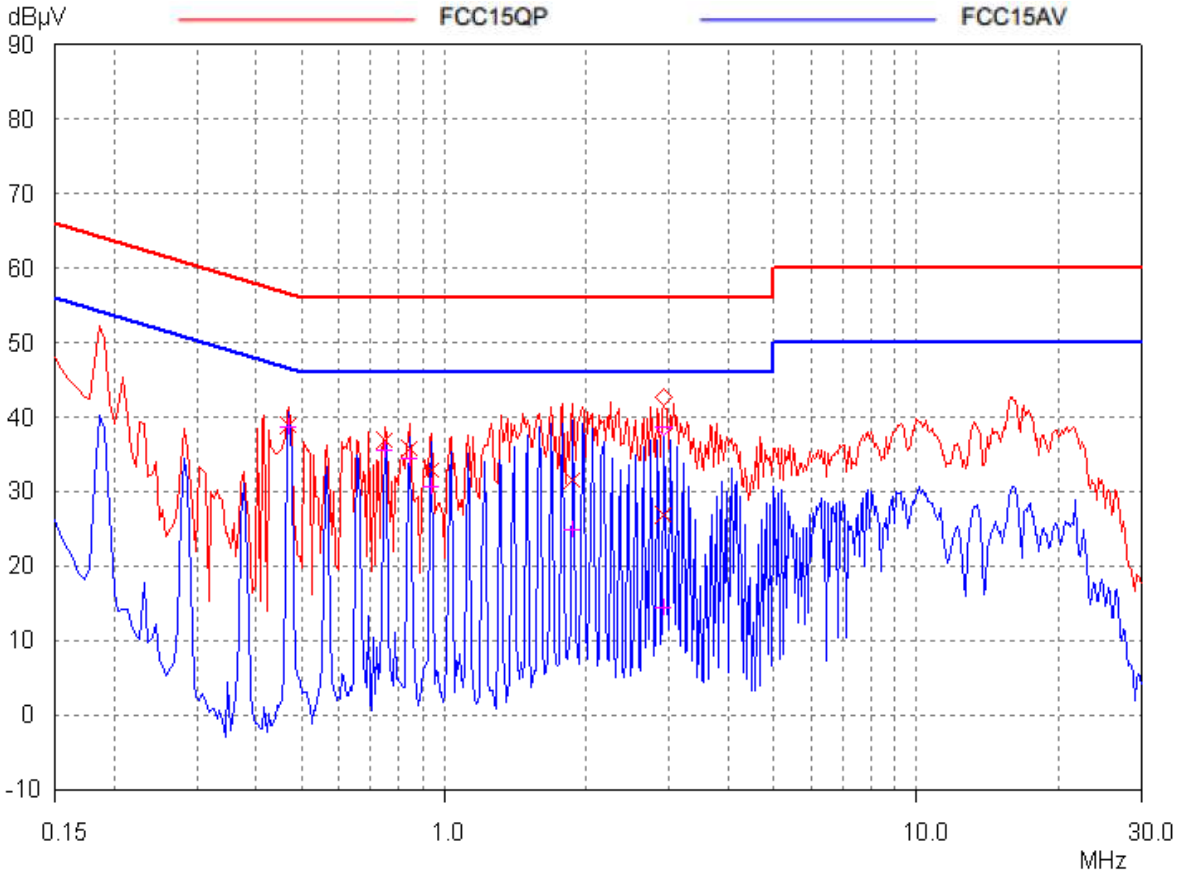
7.3 Test procedure and test set up

The EUT are connected to the main power through a line impedance stabilization network (LISN). This provides a 50Ω/50uH coupling impedance for the measuring equipment. The peripheral devices are also connected to the main power through a LISN that provides a 50Ω/50uH coupling impedance with 50Ω termination.
Both sides (Line and Neutral) of AC line are checked for maximum conducted interference. In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.4 on conducted measurement.
The bandwidth of the test receiver is set at 9 kHz.

7.4 Test protocol

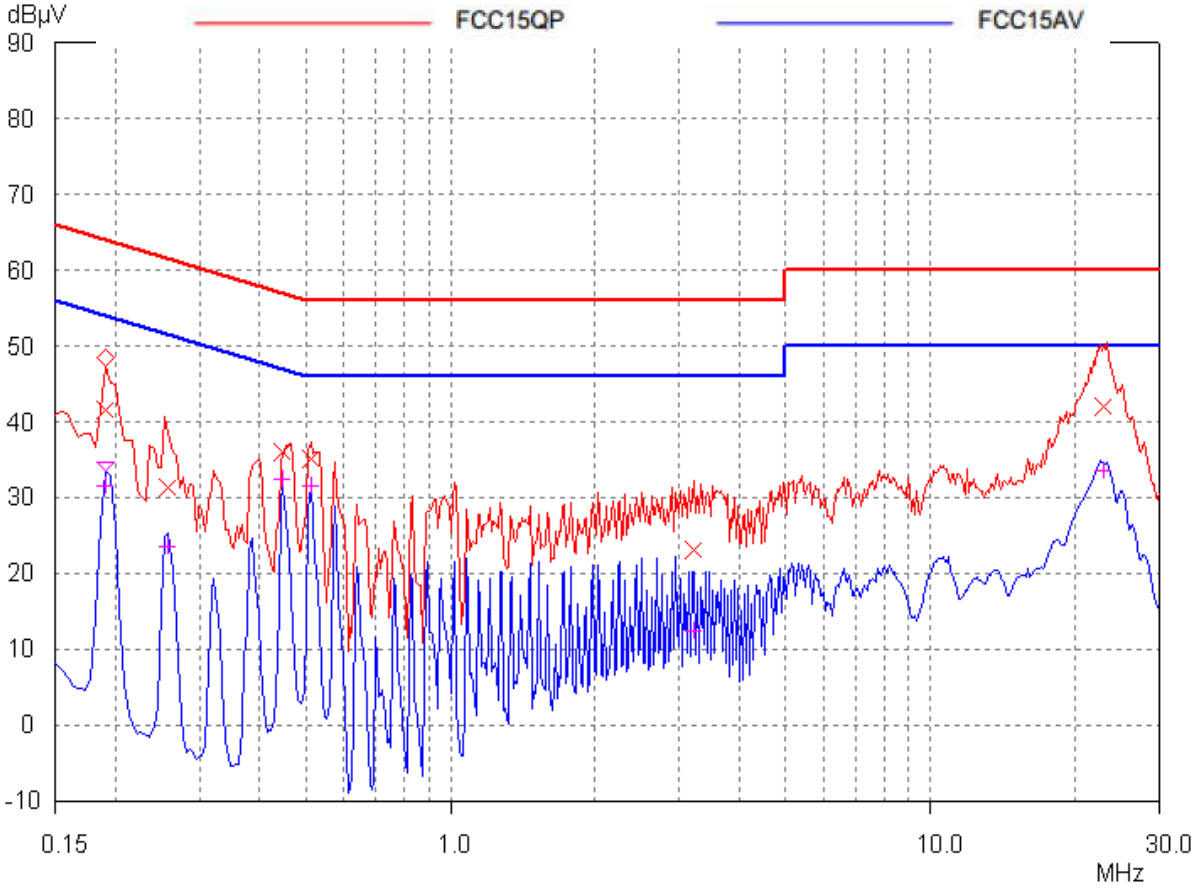
Temperature : 25°C
Relative Humidity : 55 %

AC mains powered



Frequency	Correct Factor (dB)	Corrected Reading (dBuV)		Limit (dBuV)		Margin (dB)	
		QP	AV	QP	AV	QP	AV
0.47 (N)	3.00	38.88	38.60	56.52	46.52	17.64	7.92
0.75 (N)	3.00	36.94	35.56	56.00	46.00	19.06	10.44
0.84 (N)	3.00	35.80	34.36	56.00	46.00	20.20	11.64
0.94 (L)	3.00	32.90	30.75	56.00	46.00	23.10	15.25
1.87 (L)	3.00	31.46	24.80	56.00	46.00	24.54	21.20
2.90 (N)	3.00	26.95	14.47	56.00	46.00	29.05	31.53
Remark: 1. Correction Factor (dB) = LISN Factor (dB) + Cable Loss (dB). 2. Margin (dB) = Limit - Corrected Reading.							

POE powered



Frequency	Correct Factor (dB)	Corrected Reading (dBuV)		Limit (dBuV)		Margin (dB)	
		QP	AV	QP	AV	QP	AV
0.19 (L)	3.00	45.54	31.44	64.01	54.01	22.47	22.57
0.26 (L)	3.00	31.40	23.60	61.50	51.50	30.10	27.90
0.45 (N)	3.00	35.97	32.49	56.93	46.93	20.96	14.44
0.51 (L)	3.00	35.13	31.52	56.00	46.00	20.87	14.48
3.18 (N)	3.00	23.03	12.39	56.00	46.00	32.97	33.61
22.79 (L)	3.00	41.99	33.53	60.00	50.00	18.01	16.47
Remark: 1. Correction Factor (dB) = LISN Factor (dB) + Cable Loss (dB). 2. Margin (dB) = Limit - Corrected Reading.							

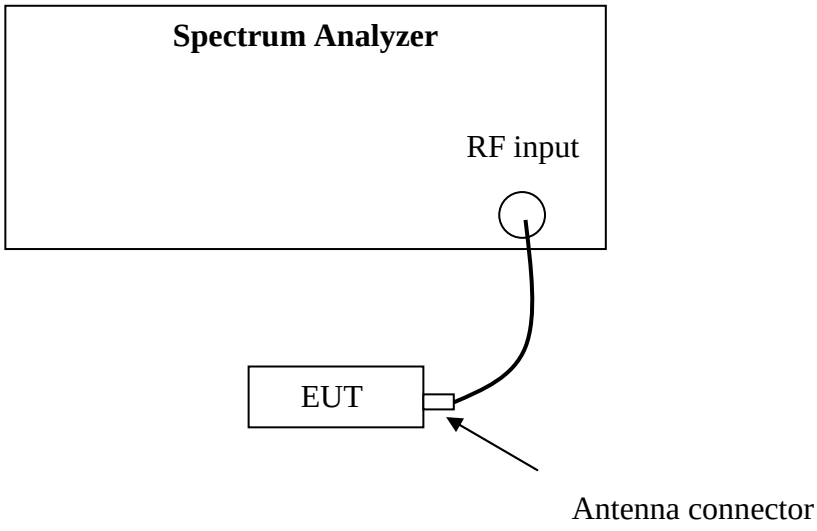
8. Emission Bandwidth (99%)

Test Status: Tested

8.1 Test limit

None

8.2 Test Configuration



8.3 Test procedure and test setup

The bandwidth was measured from the antenna port of the EUT according to the measurement method refer to KDB 789033D02: section D.

99 Percent Occupied Bandwidth

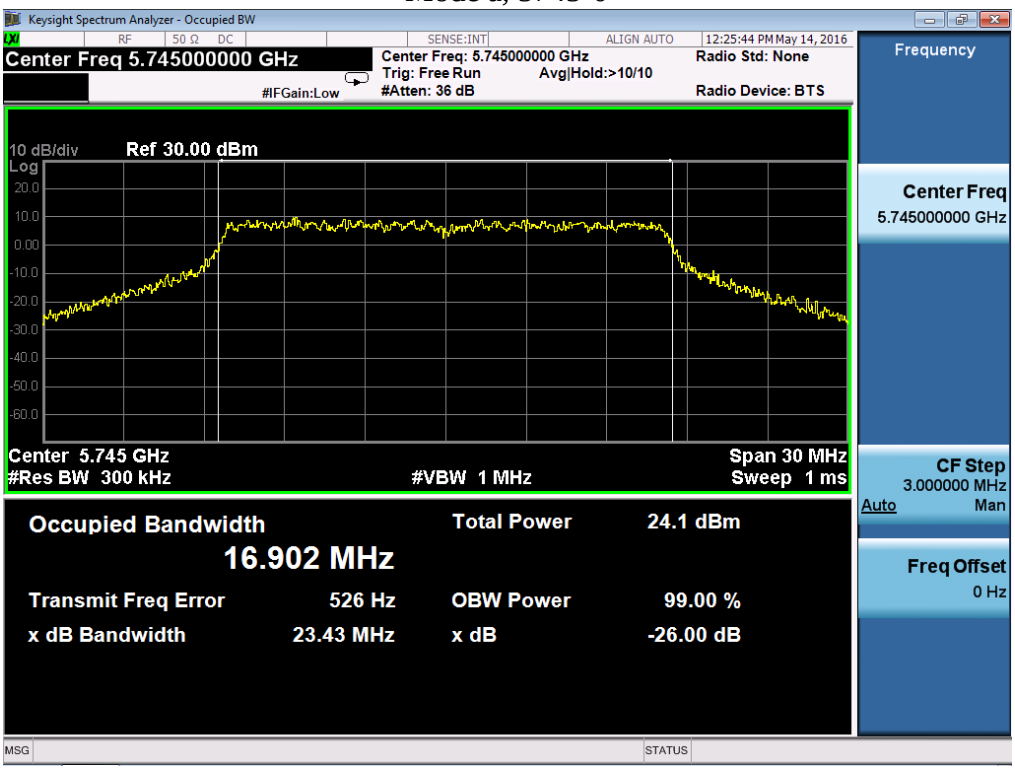
The following procedure shall be used for measuring (99 %) power bandwidth:
1. Set center frequency to the nominal EUT channel center frequency.
2. Set span = 1.5 times to 5.0 times the OBW.
3. Set RBW = 1 % to 5 % of the OBW
4. Set VBW ≥ 3 · RBW
5. Video averaging is not permitted. Where practical, a sample detection and single sweep mode shall be used. Otherwise, peak detection and max hold mode (until the trace stabilizes) shall be used.
6. Use the 99 % power bandwidth function of the instrument (if available).
7. If the instrument does not have a 99 % power bandwidth function, the trace data points are recovered and directly summed in power units. The recovered amplitude data points, beginning at the lowest frequency, are placed in a running sum until 0.5 % of the total is reached; that frequency is recorded as the lower frequency. The process is repeated until 99.5 % of the total is reached; that frequency is recorded as the upper frequency. The 99% occupied bandwidth is the difference between these two frequencies.

8.4 Test protocol

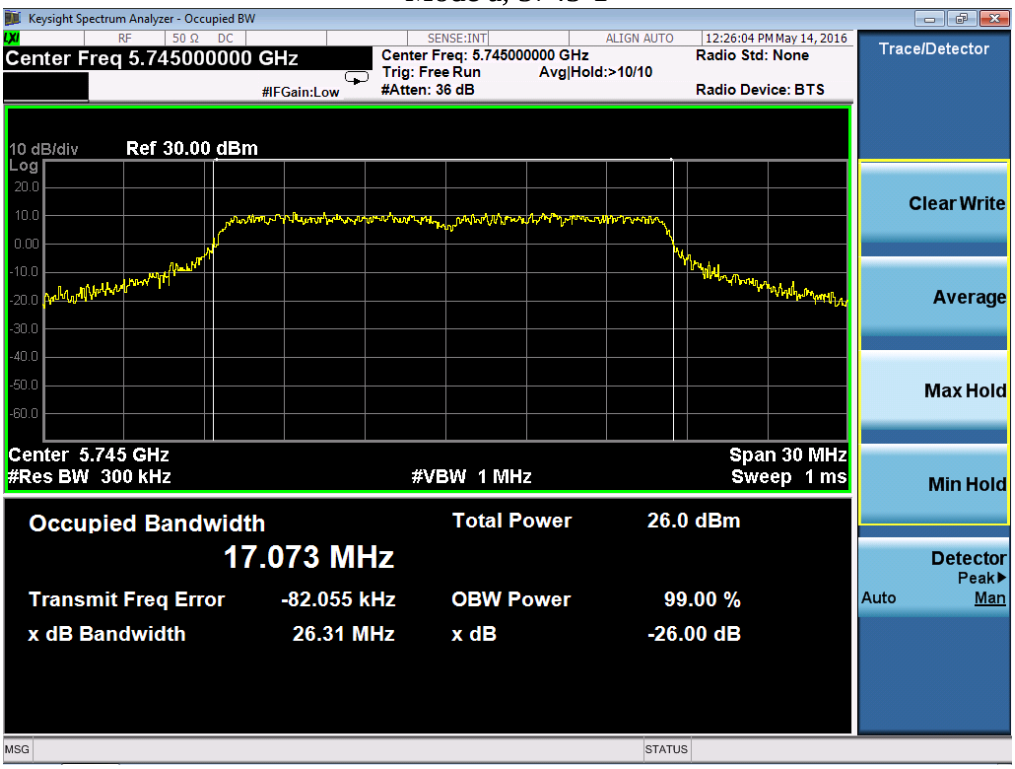
Temperature : 25 °C
Relative Humidity : 55 %

Mode	Frequency (MHz)	99% Bandwidth (MHz)	
		Port 0	Port 1
a	5745	16.90	17.07
	5785	16.97	17.15
	5825	16.93	17.29
n20	5745	18.08	18.12
	5785	18.09	18.09
	5825	17.93	18.13
n40	5755	36.80	37.18
	5795	36.96	37.33

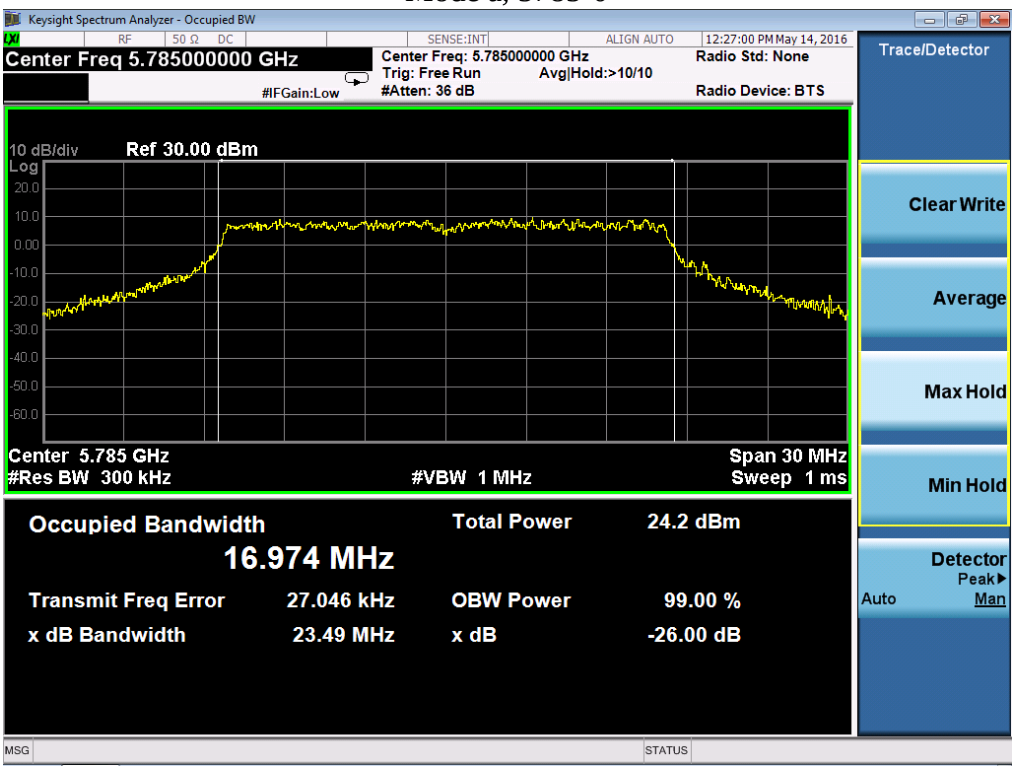
Mode a, 5745-0



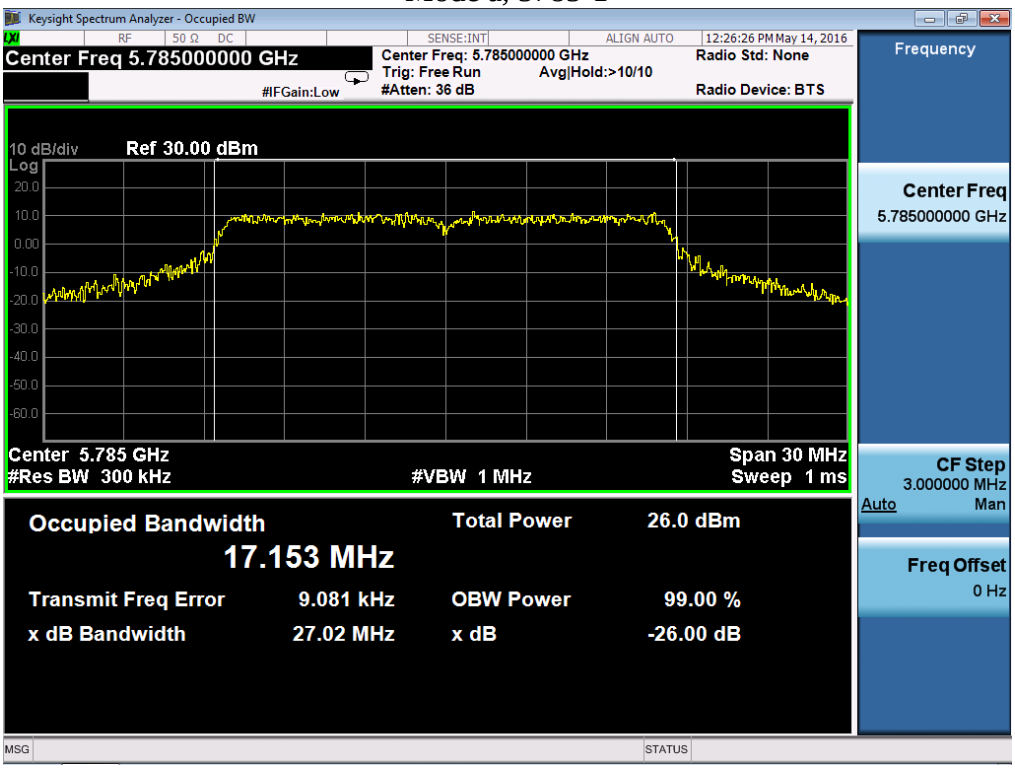
Mode a, 5745-1



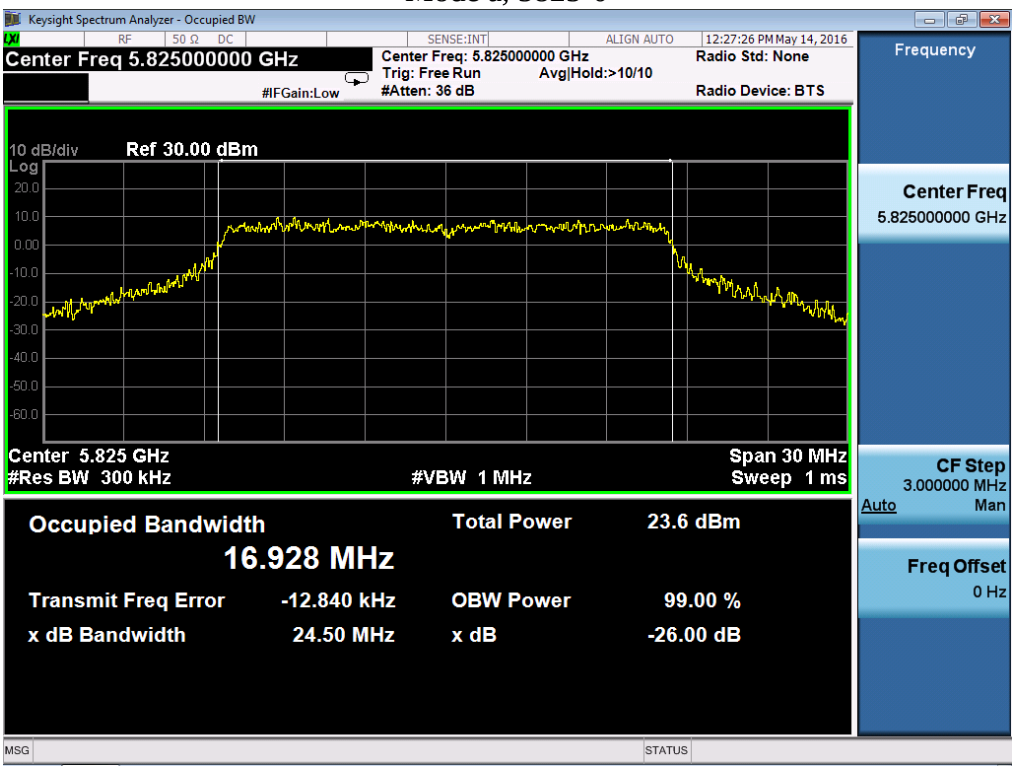
Mode a, 5785-0



Mode a, 5785-1

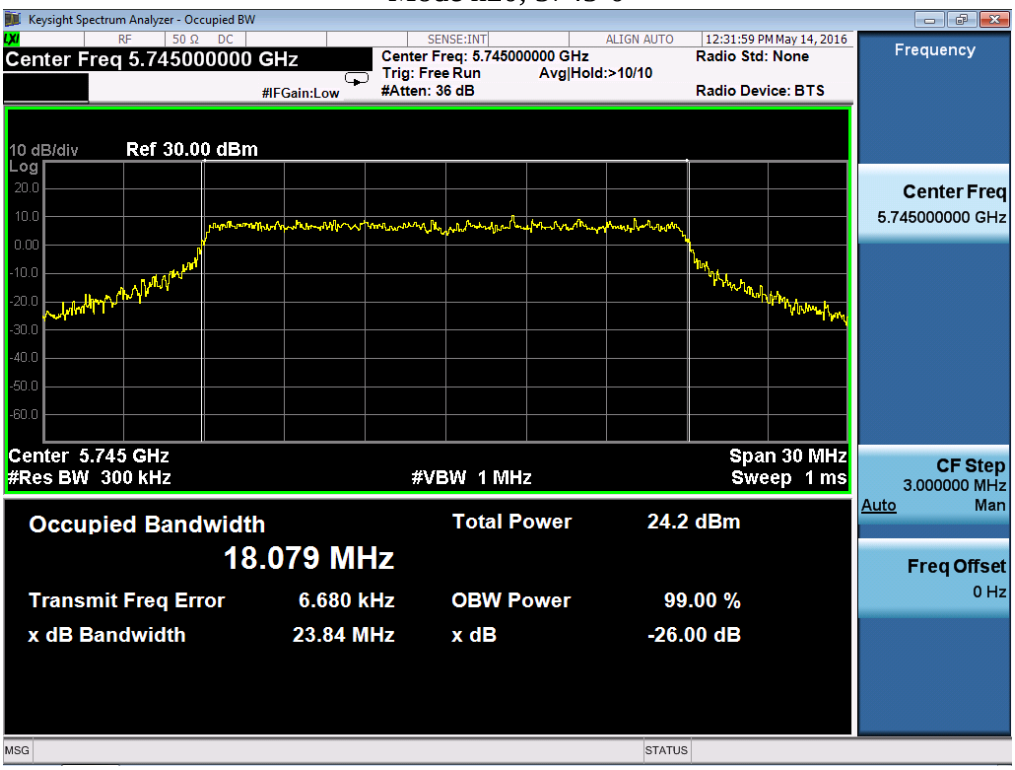


Mode a, 5825-0

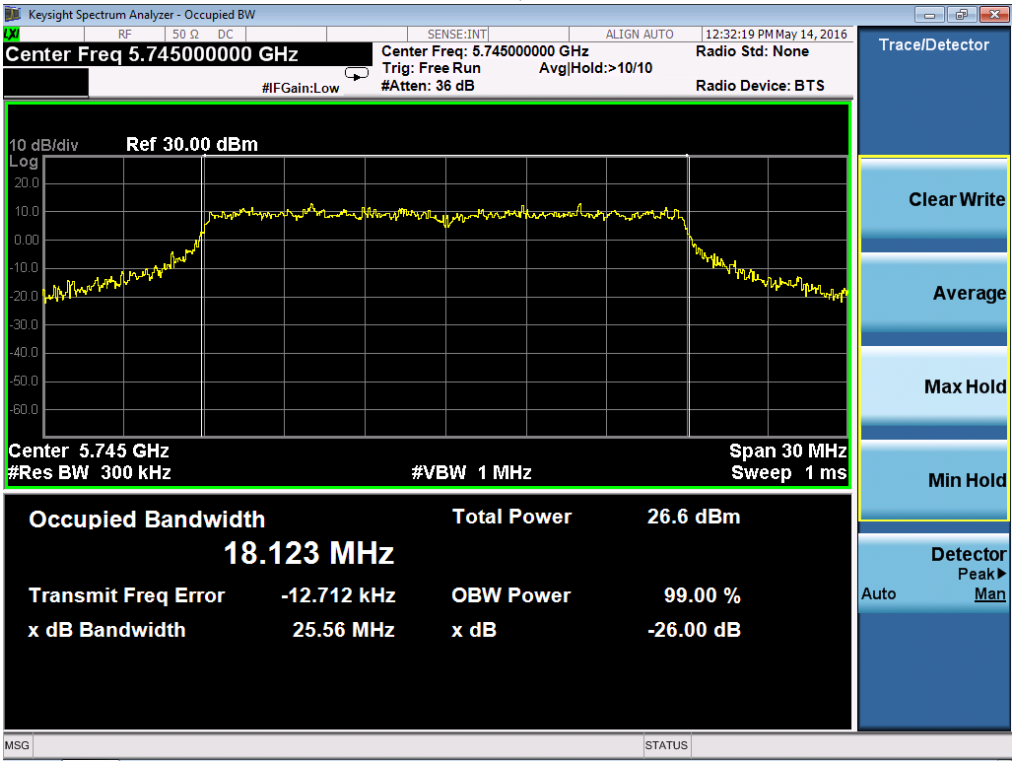


Mode a, 5825-1

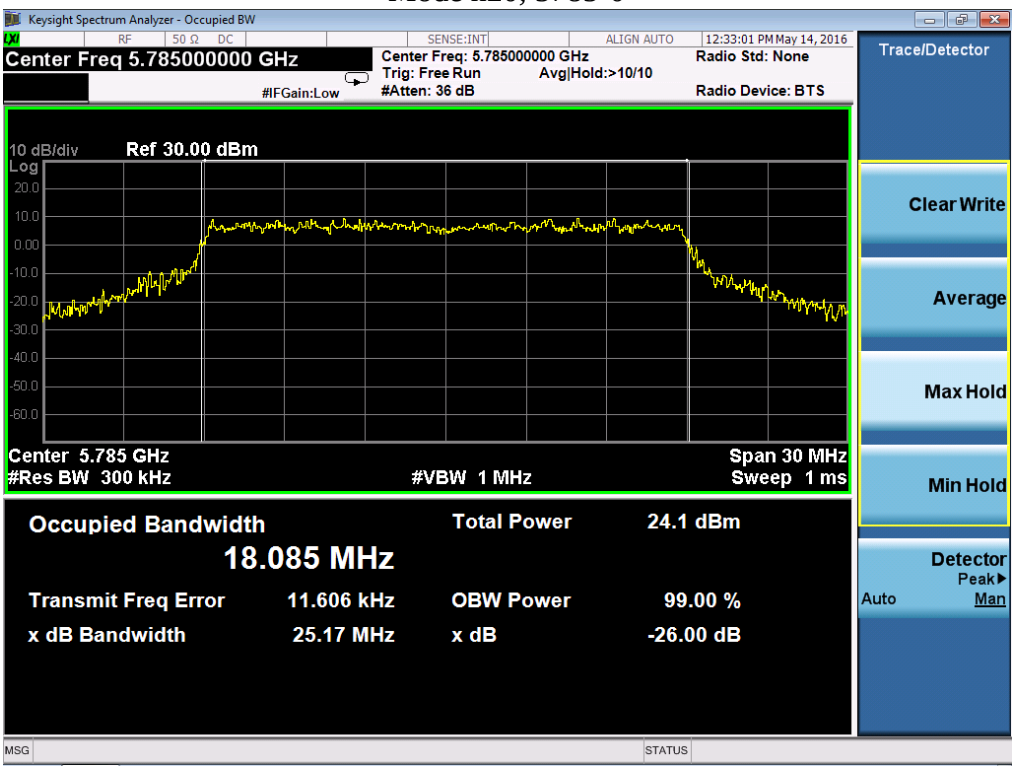
Mode n20, 5745-0



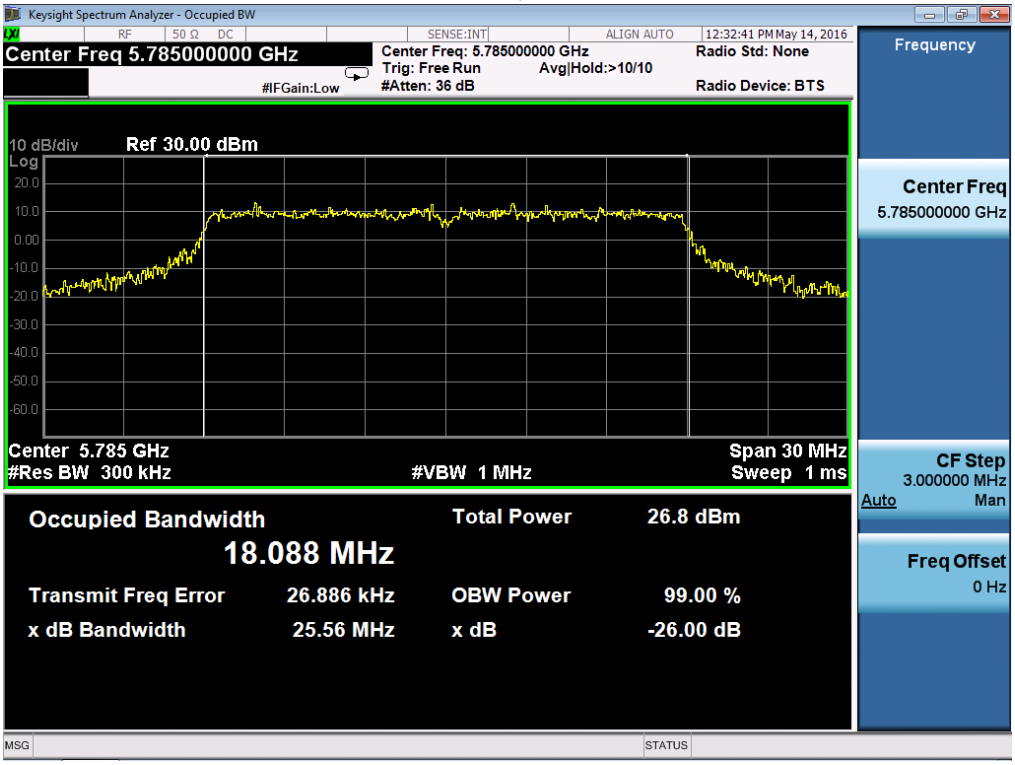
Mode n20, 5745-1



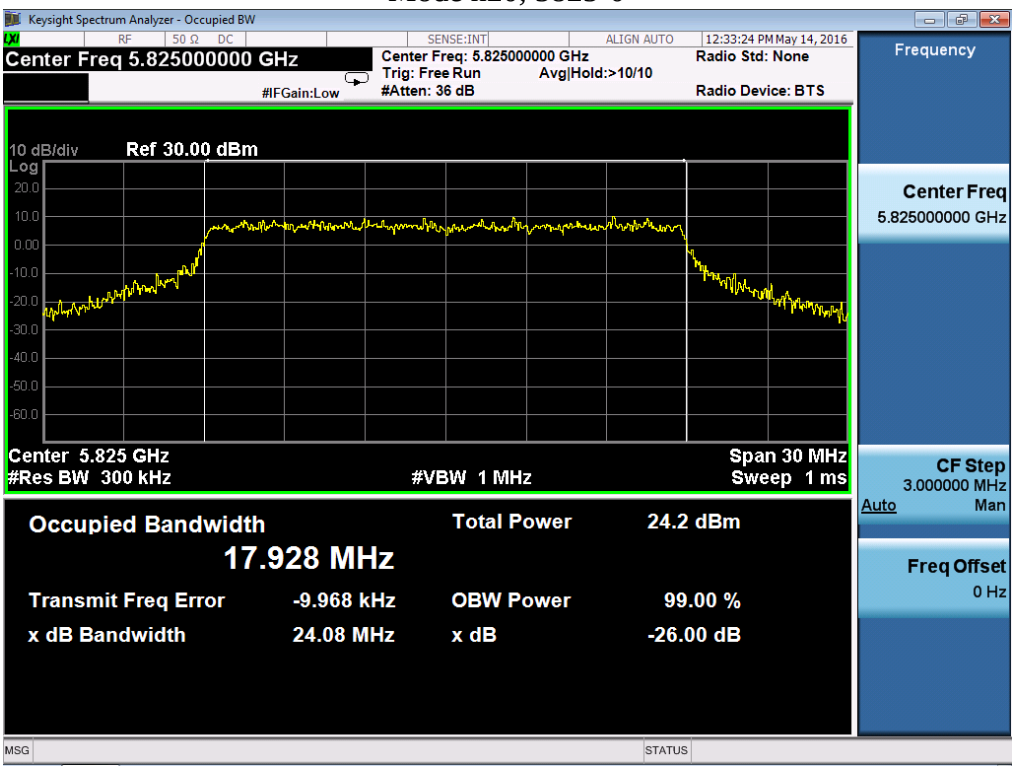
Mode n20, 5785-0



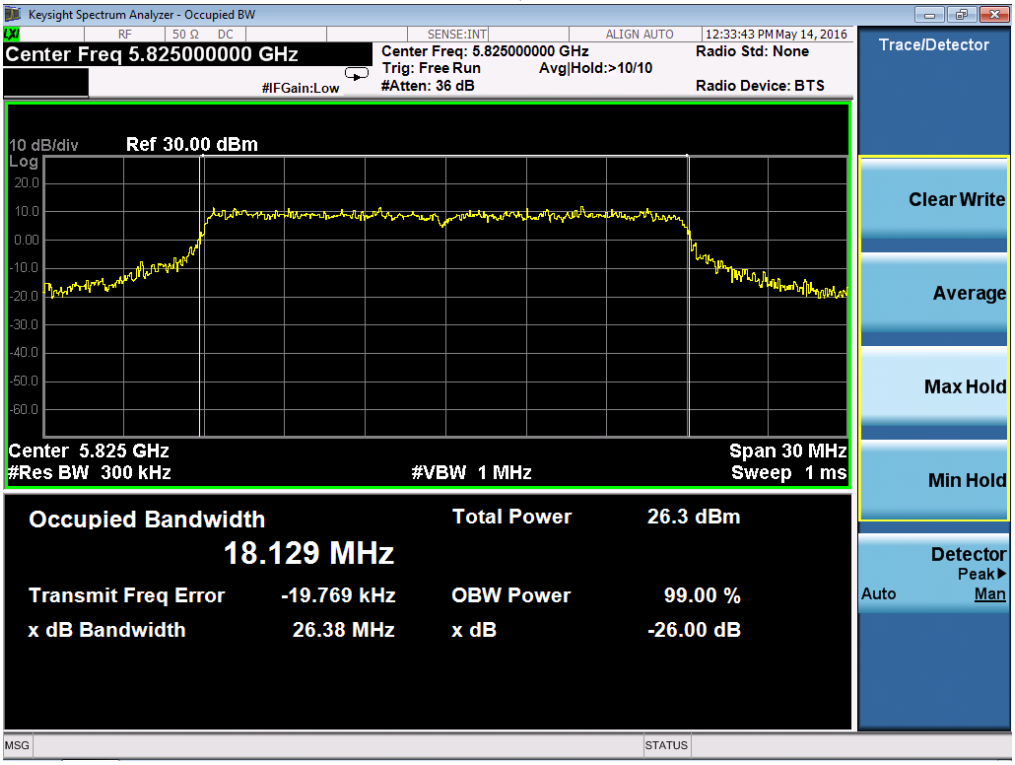
Mode n20, 5785-1



Mode n20, 5825-0

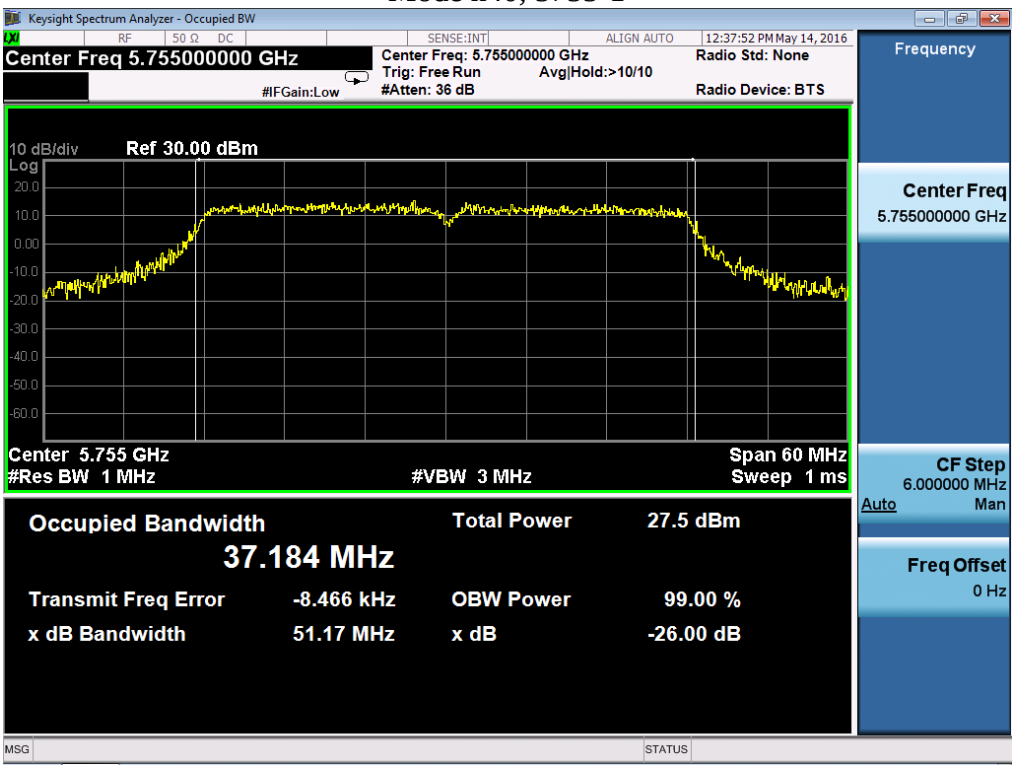


Mode n20, 5825-1

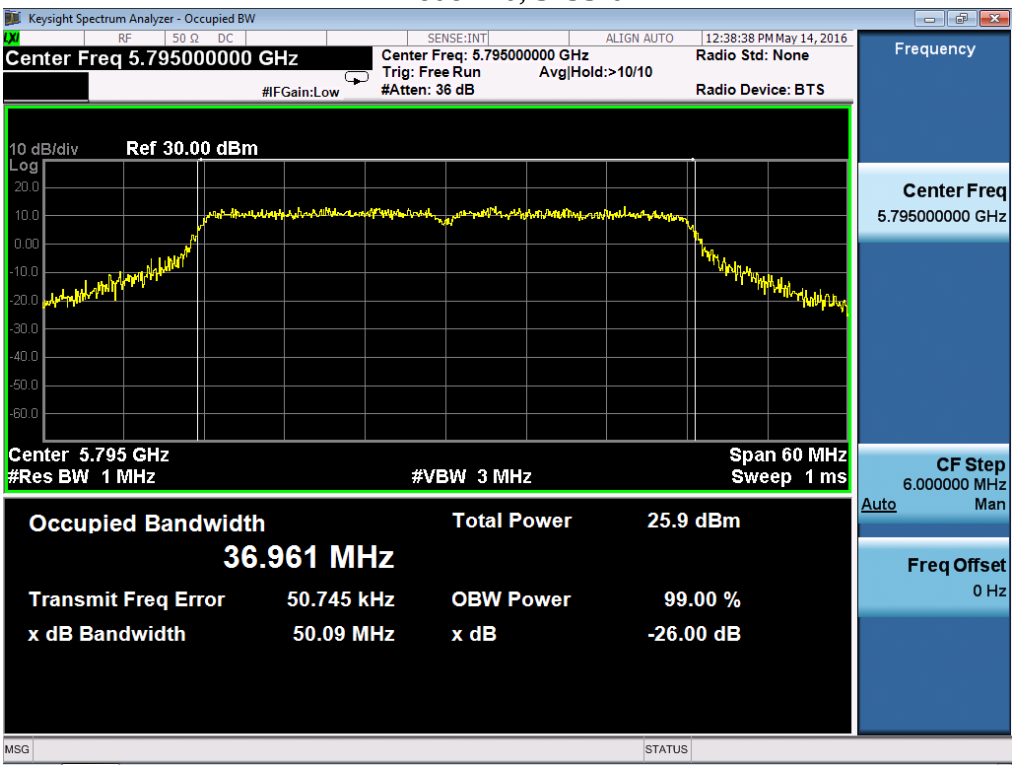


Mode n40, 5755-0

Mode n40, 5755-1



Mode n40, 5795-0



Mode n40, 5795-1