TEST REPORT

Applicant	:	Shenzhen UniStrong Science & Technology Co.,Ltd.
Address of Applicant	:	B,4-4Factory, Zhengcheng Road, Fuyong Baoan District, Shenzhen, China
Product Name	:	Rugged Smart Tablet
Model No.	:	UT30H
Sample No.	:	E19020010-05#02
FCC ID	:	2AOPD-UT30P
ISED Number	:	11546A-UT30P
Standards	:	FCC CFR47 Part 15, Subpart E RSS-Gen (Issue 5, March 2019) RSS-247 (Issue 2, February 2017)
Date of Receipt	:	2020-2-10
Date of Test	:	2020-2-10 ~ 2020-5-27
Date of Issue	:	2020-5-27

Remark:

This report details the results of the testing carried out on one sample, the results contained in this report do not relate to other samples of the same product. The manufacturer should ensure that all products in series production are in conformity with the product sample detailed in this report.

Prepared by: Jennifer zhou (Jennifer Zhou) Reviewed by: jesse (Jesse) Approved by: Guoyou Chi (Authorized signatory: Guoyou Chi)

TEST REPORT

Revision Record			
Version	**Date**	**Revisions**	**Revised By**
1.0	2019-11-01	Original	--

Contents

1 General Information

1.1 Testing Laboratory

Company Name	ICAS Testing Technology Services (Shanghai) Co., Ltd.
Address	155 Pingbei Rd, Minhang District, Shanghai, China
Telephone	0086 21-51682999
Fax	0086 21-54711112
Homepage	www.icasiso.com

1.2 Details of Application

Company Name	Shenzhen UniStrong Science & Technology Co.,Ltd.
Address	B,4-4Factory, Zhengcheng Road, Fuyong Baoan District, Shenzhen, China
Contact Person	Lili Zheng
Telephone	+86-21-54467182
Email	ll.zheng@unistrong.com

1.3 Details of EUT

Product Name	Rugged Smart Tablet
Brand Name	Unistrong
Model No.	UT30H
FCC ID	2AOPD-UT30P
ISED Number	11546A-UT30P
Mode of Operation	WLAN 802.11a/n(HT20/40)/ac(HT20/40/80)
Frequency Range	Band I: 5150 MHz ~ 5250 MHz Band IV: 5725 MHz ~ 5850 MHz
Modulation Type	256QAM, 64QAM, 16QAM, BPSK, QPSK
Channel Bandwidth	802.11a: 20MHz 802.11n: 20MHz, 40MHz 802.11ac: 20MHz, 40MHz, 80MHz
Antenna Type	Internal Antenna
Antenna Gain	1.6 dBi （max gain）
Extreme Temperature Range	-20℃~ +55℃
Test Voltage	DC 3.8V
Extreme Voltage	Low Voltage: DC 3.0V High Voltage: DC 4.35V
Product Type	Mobile and protable for FCC standard Indoor for IC standard

1.4 DOCUMENT REVISION HISTORY

Revision Number	Report Number	Description of Revision	Date of Issue
1	SHE19020010-03GE	Original Report	2020-5-15
2	SHE19020010-05GE	Amended Report	2020-5-27

They have the same electric circuit ,PCB layout ,RF chip, component.
Except : the differences description of UT30H and UT30P as below:
1 LCD screen of UT30H is different with UT30P
2 The key position of UT30H is different with UT30P
3 the antenna gain of UT30H is different with UT30P

1.5 Test Methodology

47 CFR Part 15, Subpart C (10-1-16 Edition)	Miscellaneous Wireless Communications Services
KDB Publication 789033 D02 v02r01	Guidelines for Compliance Testing of Unlicensed National Information Infrastructure (U-NII) Devices Part 15, Subpart E
KDB Publication 662911 D01 v02r01	Emissions Testing of Transmitters with Multiple Outputs in the Same Band (e.g., MIMO, Smart Antenna, etc)
RSS-Gen (Issue 5, March 2019)	General Requirements for Compliance of Radio Apparatus
RSS-247 (Issue 2, February 2017)	Digital Transmission Systems (DTSs), Frequency Hopping Systems (FHSs) and Licence-Exempt Local Area Network (LE-LAN) Devices
ANSI C63.10-2013	American National Standard for Testing Unlicensed Wireless Devices

Note(s):
All test items were verified and recorded according to the standards and without any addition/deviation/exclusion during the test.

2 Test Condition

2.1 Environmental conditions

Temperature (°C)	18-25
Humidity (%RH)	40-65
Barometric Pressure (mbar)	960-1060

2.2 Equipment List

Name of Equipment	Manufacturer	Model	Serial No.	Cal. Due Date
Spectrum Analyzer	Keysight	N9020B	MY59260184	2020-07-28
Spectrum Analyzer	Rohde & Schwarz	FSV40N	101450	2020-06-24
EMI Test Receiver	Rohde & Schwarz	ESPI3	100173	2020-06-19
EMI Test Receiver	Rohde & Schwarz	ESR 7	101911	2020-06-19
V-network	SCHWARZBECK	NSLK 8127	8127-902	2021-02-20
Wideband Radio Communication Tester	Rohde & Schwarz	CMW 500	100687	2020-08-22
Broadband Antenna	SCHWARZBECK	VULB9163	9163-1037	2020-06-06
Horn Antenna-18G	SCHWARZBECK	BBHA9120D	9120D-1775	2020-06-06
Loop Antenna	SCHWARZBECK	FMZB 1513	N/A	2021-03-19
Horn Antenna-40G	YINGLIAN	LB-180400-KF	N/A	2020-07-26
EMC chamber 9*6*6（L*W*H)	CHANGNING	966	N/A	2020-06-26
Shielded Enclosure 8*5*4（L*W*H)	CHANGNING	854	N/A	2020-08-28
Test Software	BL	BL410_E	N/A	N/A
Power meter	Keysight	U2021XA	MY57200011	2020-07-28

2.3 Measurement Uncertainty

Parameter	Frequency	Uncertainty
Antenna Port Conducted Emission	< 1GHz	± 1.5 dB
	> 1GHz	± 1.5 dB
Radiated Emission	30 MHz – 1 GHz	± 3 dB
	> 1GHz	± 3 dB

3 Test Set-up and Operation Modes

3.1 Details of Test Mode

Using test software was control EUT work in continuous transmitter and receiver mode. Select test channel as below:

For 802.11a/n(HT20), 802.11ac(VHT20)

Band I (5150 – 5250 MHz)		**Band IV (5725 – 5850 MHz)**	
Channel	**Frequency**	**Channel**	**Frequency**
The lowest channel(CH36)	5180MHz	The lowest channel(CH149)	5745MHz
The middle channel(CH44)	5220MHz	The middle channel(CH157)	5785MHz
The highest channel(CH48)	5240MHz	The highest channel(CH165)	5825MHz

For 802.11n(HT40), 802.11ac(VHT40)

Band I (5150 – 5250 MHz)		**Band IV (5725 – 5850 MHz)**	
Channel	**Frequency**	**Channel**	**Frequency**
The lowest channel(CH38)	5190MHz	The lowest channel(CH151)	5755MHz
The highest channel(CH46)	5230MHz	The highest channel(CH159)	5795MHz

For 802.11ac(VHT80)

Band I (5150 – 5250 MHz)		**Band IV (5725 – 5850 MHz)**	
Channel	**Frequency**	**Channel**	**Frequency**
The lowest channel(CH42)	5210MHz	The lowest channel(CH155)	5775MHz

Through Pre-scan under all rate at lowest channel, the data rate as below table described is the worst case, so we choose these data rate for test.

Type	**Data rate**
802.11a	6Mbps
802.11n(HT20), 802.11ac(VHT20)	MCS4
802.11n(HT40), 802.11ac(VHT40)	MCS3
802.11ac(VHT80)	MCS4

The basic operation modes are:

A. On
   1. WLAN mode
      a. Transmitting
      b. Receiving

B. Standby

C. Off

3.2 Special Accessories and Auxiliary Equipment

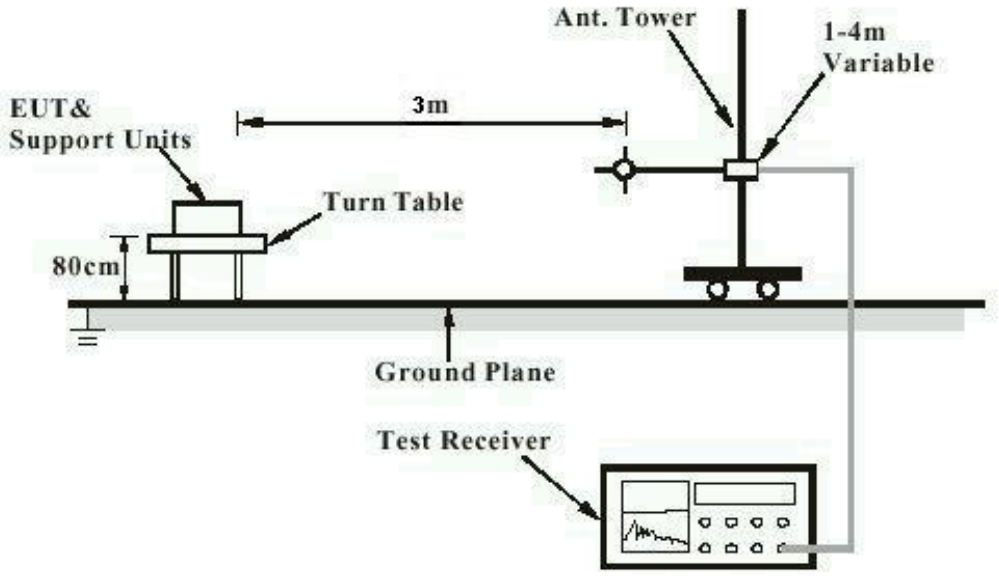
Description	Manufacturer	Model No.	Serial No.
Laptop	Lenovo	TP00083A	N/A

3.3 Support Software

Description	Manufacturer	Software Name
Software	Qualcomm	QRCT

3.4 Test Setup Diagram

Diagram of Measurement Configuration for Radiation Test



Note: Measurements above 1GHz are done with a table height of 1.5m. In addition, there is RF absorbing material on the floor of the test site for above 1GHz measurement.

Diagram of Measurement Equipment Configuration for Conduction Measurement

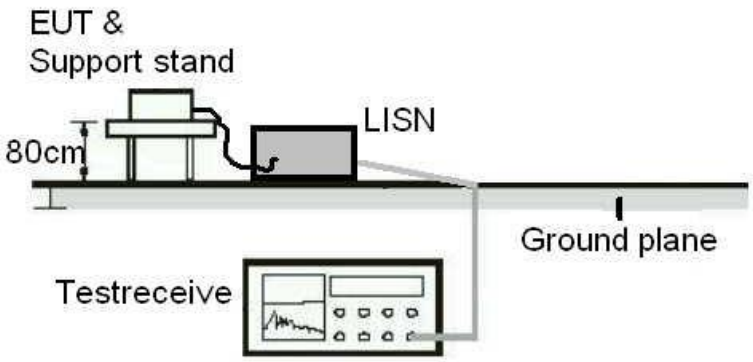
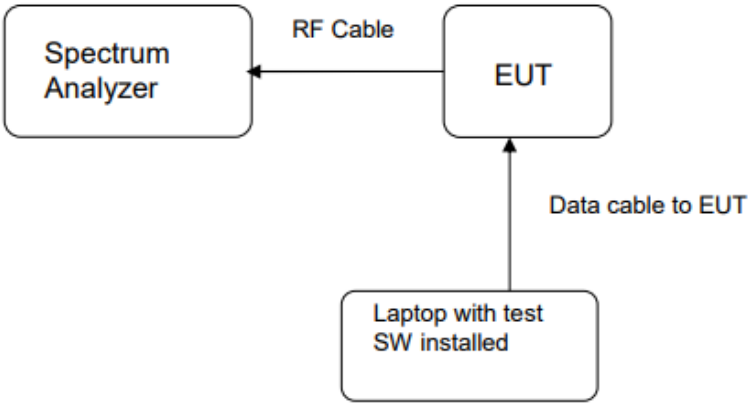
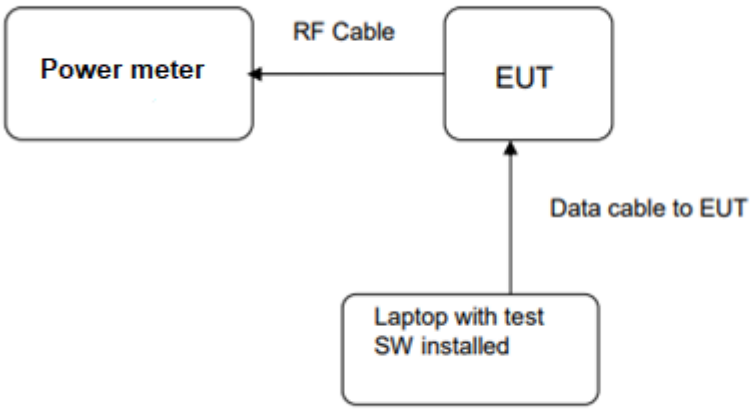


Diagram of Measurement Equipment Configuration for Transmitter Measurement





4 Test Results

4.1 Transmitter Requirement & Test Suites

4.1.1 Antenna Requirement

RESULT: **PASS**

Test standard	:	FCC Part 15.407(a), 15.203 RSS-247 6.2
Requirement	:	The use of approved antennas only with directional gains that do not exceed 6 dBi

According to the manufacturer declaration, the EUT has an antenna with a gain of 1.6 dBi. The antenna is an antenna with no possibility of replacement with a non-approvrd antenna by the end-user.

Therefore, the EUT is considered to comply with this provision.

4.1.2 Peak Output Power and E.I.R.P

RESULT: **PASS**

Test standard : FCC Part 15.407(a)
RSS-247 6.2
Requirement : ANSI C63.10-2013, KDB 789033

Kind of test site : Shielded room

Test setup

Test Channel : Low/Middle/High
Operation Mode : A.1.a
Ambient temperature : 25°C
Relative humidity : 52%

Table 1: Peak Output Power

Band I (5150 – 5250 MHz)

Test Mode	Test Channel (MHz)	Measured Peak Output Power		FCC Limit (mW)
		(dBm)	(mW)	
802.11a	5180	10.88	12.25	250
	5220	10.67	11.67	
	5240	10.51	11.25	
802.11n(HT20)	5180	9.73	9.40	
	5220	9.49	8.89	
	5240	9.45	8.81	
802.11ac(VHT20)	5180	11.46	14.00	
	5220	11.43	13.90	
	5240	11.40	13.80	
802.11n(HT40)	5190	9.82	9.59	
	5230	9.41	8.73	
802.11ac(VHT40)	5190	11.20	13.18	
	5230	11.07	12.79	
802.11ac(VHT80)	5210	10.19	10.45	

Band IV (5725 – 5850 MHz)

Test Mode	Test Channel (MHz)	Measured Peak Output Power		FCC Limit (W)
		(dBm)	(mW)	
802.11a	5745	11.68	14.72	1
	5785	11.27	13.40	

	5825	11.38	13.74	
802.11n(HT20)	5745	10.77	11.94	
	5785	10.45	11.09	
	5825	10.36	10.86	
802.11ac(VHT20)	5745	12.44	17.54	
	5785	12.24	16.75	
	5825	12.23	16.71	
802.11n(HT40)	5755	9.88	9.73	
	5795	9.91	9.79	
802.11ac(VHT40)	5755	11.97	15.74	
	5795	11.94	15.63	
802.11ac(VHT80)	5775	10.96	12.47	

Table 2: E.I.R.P

Band I (5150 – 5250 MHz)

Test Mode	Test Channel (MHz)	E.I.R.P		IC Limit (mW)
		(dBm)	(mW)	
802.11a	5180	12.48	17.70	200 mW or 10 dBm + 10log B, which is less
	5220	12.27	16.87	
	5240	12.11	16.26	
802.11n(HT20)	5180	11.33	13.58	
	5220	11.09	12.85	
	5240	11.05	12.74	
802.11ac(VHT20)	5180	13.06	20.23	
	5220	13.03	20.09	
	5240	13	19.95	
802.11n(HT40)	5190	11.42	13.87	
	5230	11.01	12.62	
802.11ac(VHT40)	5190	12.8	19.05	
	5230	12.67	18.49	
802.11ac(VHT80)	5210	11.79	15.10	

Band IV (5725 – 5850 MHz)

Test Mode	Test Channel (MHz)	E.I.R.P		IC Limit (mW)
		(dBm)	(mW)	
802.11a	5745	12.77	18.92	200 mW or 10 dBm + 10log B, which is less
	5785	12.36	17.22	
	5825	12.47	17.66	
802.11n(HT20)	5745	11.86	15.35	
	5785	11.54	14.26	
	5825	11.45	13.96	
802.11ac(VHT20)	5745	13.53	22.54	
	5785	13.33	21.53	
	5825	13.32	21.48	
802.11n(HT40)	5755	10.97	12.50	
	5795	11	12.59	
802.11ac(VHT40)	5755	13.06	20.23	
	5795	13.03	20.09	
802.11ac(VHT80)	5775	12.05	16.03	

Note:

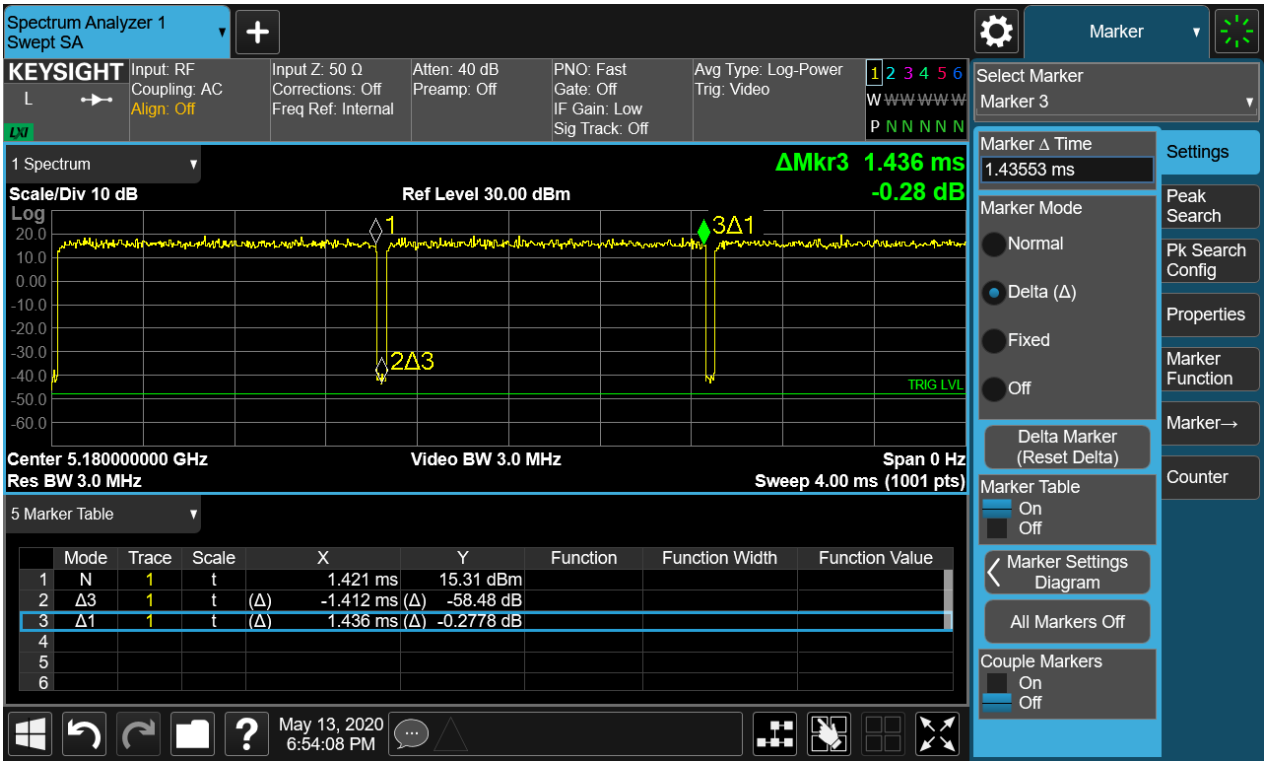
B is the 99% emissions bandwidth in MHz.

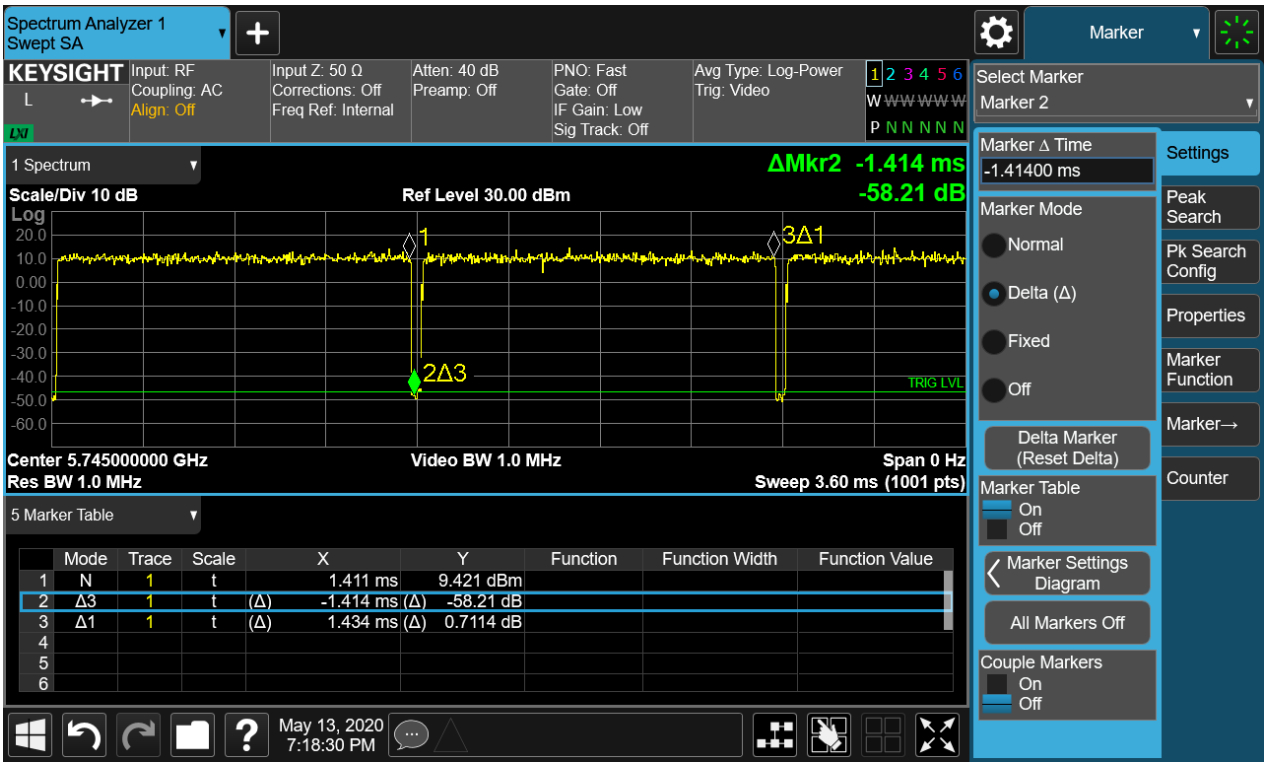
5G BAND1 antenna peak gain is 1.6

5G BAND4 antenna peak gain is 1.09

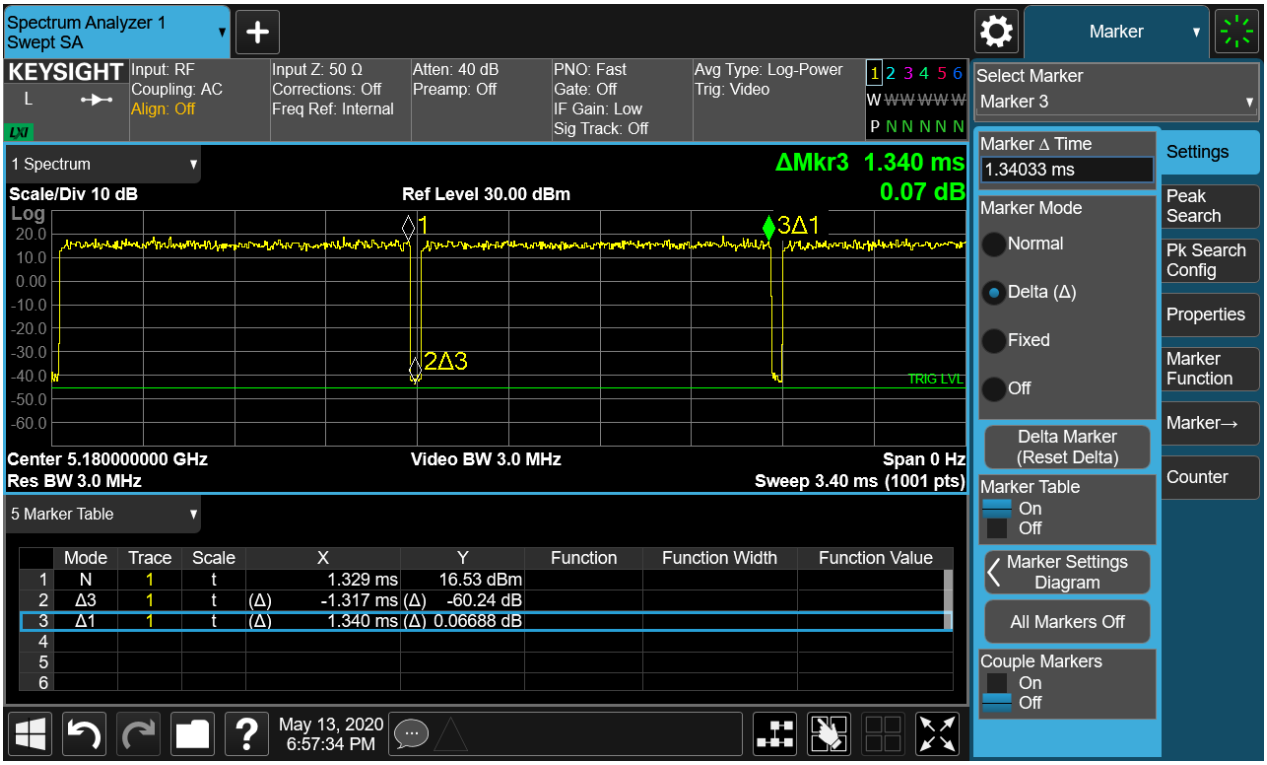
Duty cycle factor =10*log(1/duty cycle)

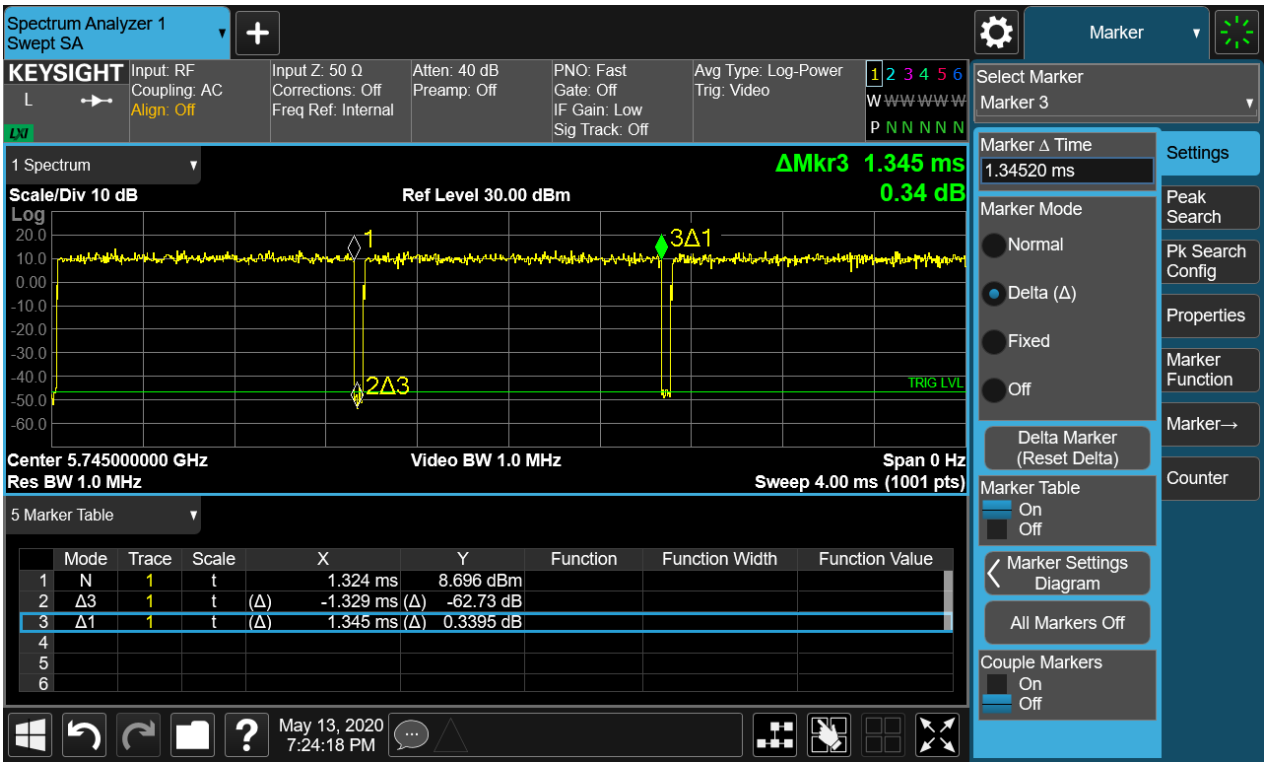
802.11a > 98%



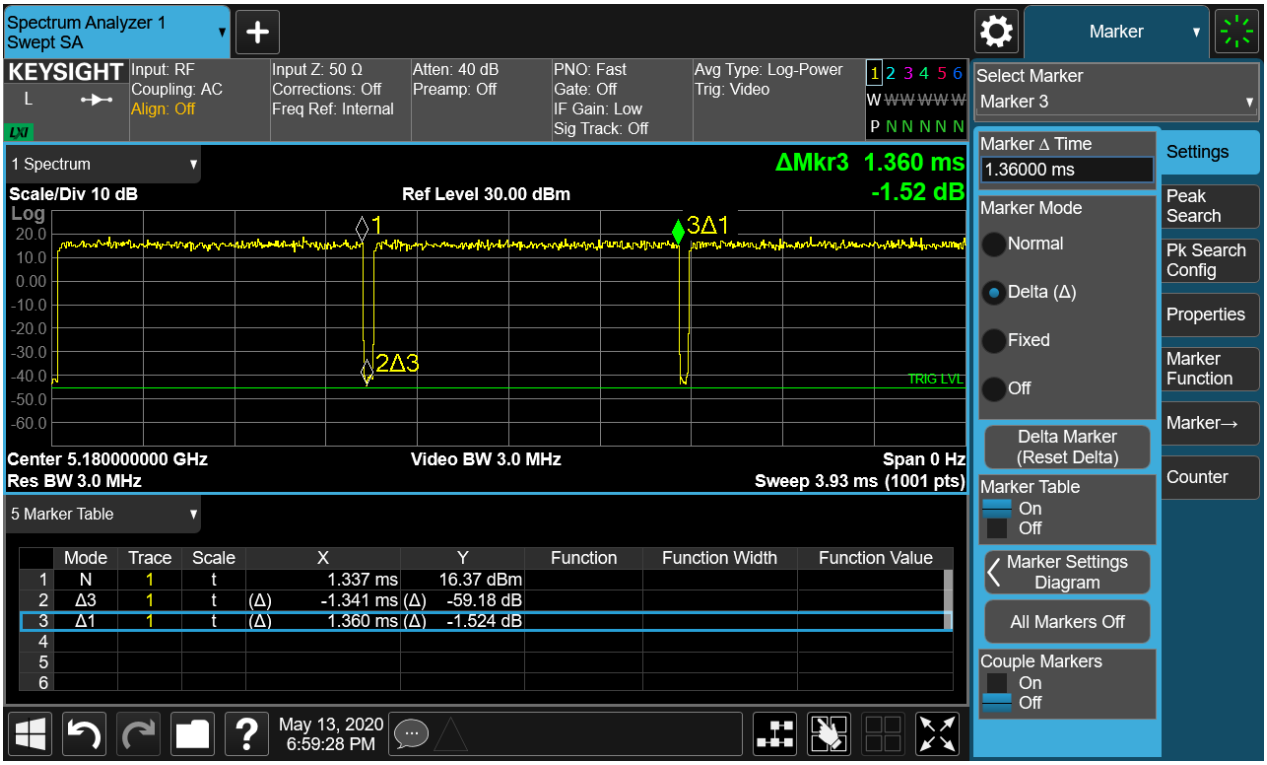


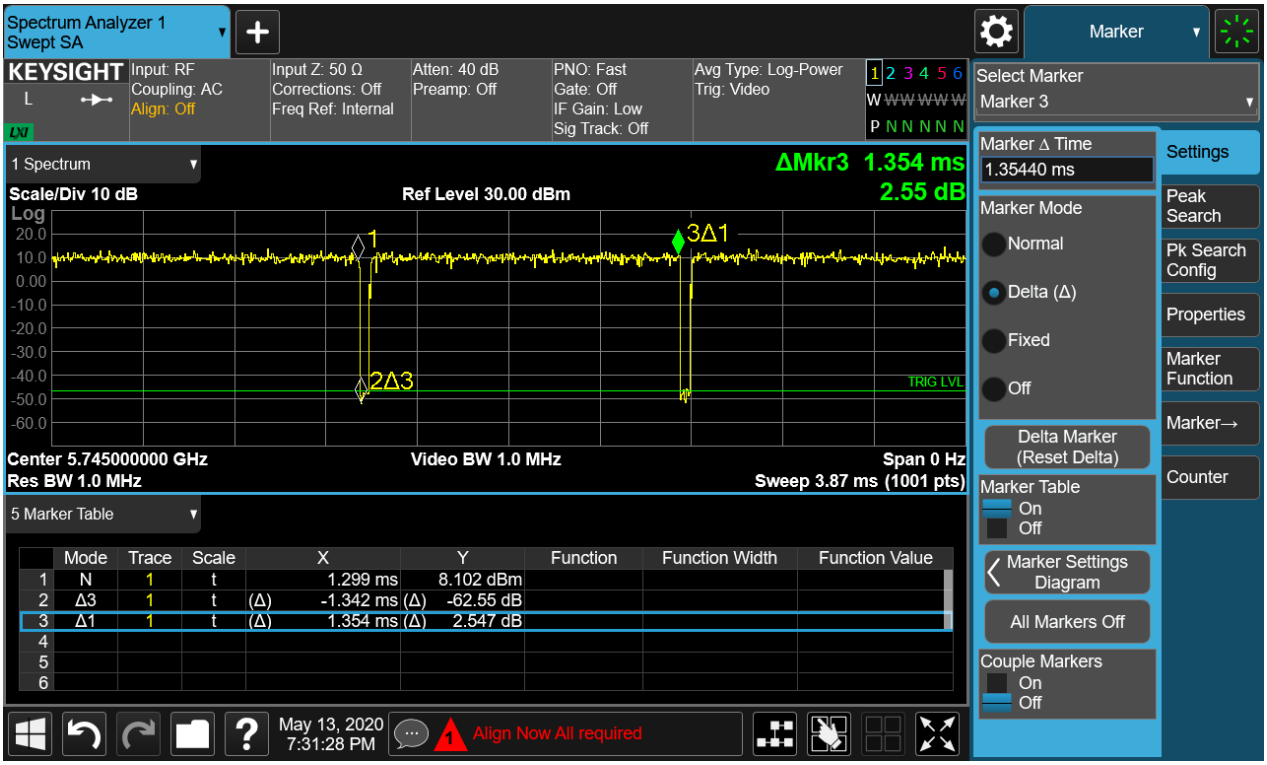
802.11n20 > 98%


Spectrum Analyzer 1
Swept SA
KEYSIGHT
Input: RF
Coupling: AC
Align: Off
Input Z: 50 Ω
Corrections: Off
Freq Ref: Internal
Atten: 40 dB
Preamp: Off
PNO: Fast
Gate: Off
IF Gain: Low
Sig Track: Off
Avg Type: Log-Power
Trig: Video
Marker
Select Marker
Marker 3
1 Spectrum
ΔMkr3 1.340 ms
0.07 dB
Scale/Div 10 dB
Ref Level 30.00 dBm
Log
20.0
10.0
0.00
-10.0
-20.0
-30.0
-40.0
-50.0
-60.0
1
3Δ1
2Δ3
TRIG LVL
Center 5.180000000 GHz
Res BW 3.0 MHz
Video BW 3.0 MHz
Span 0 Hz
Sweep 3.40 ms (1001 pts)
5 Marker Table
Mode Trace Scale X Y Function Function Width Function Value
1 N 1 t 1.329 ms 16.53 dBm
2 Δ3 1 t (Δ) -1.317 ms (Δ) -60.24 dB
3 Δ1 1 t (Δ) 1.340 ms (Δ) 0.06688 dB
4
5
6
Marker Δ Time
1.34033 ms
Marker Mode
Normal
Delta (Δ)
Fixed
Off
Delta Marker (Reset Delta)
Marker Table
On
Off
Marker Settings Diagram
All Markers Off
Couple Markers
On
Off
Settings
Peak Search
Pk Search Config
Properties
Marker Function
Marker→
Counter
May 13, 2020
6:57:34 PM


Spectrum Analyzer 1
Swept SA
KEYSIGHT
Input: RF
Coupling: AC
Align: Off
Input Z: 50 Ω
Corrections: Off
Freq Ref: Internal
Atten: 40 dB
Preamp: Off
PNO: Fast
Gate: Off
IF Gain: Low
Sig Track: Off
Avg Type: Log-Power
Trig: Video
Marker
Select Marker
Marker 3
1 Spectrum
ΔMkr3 1.345 ms
0.34 dB
Scale/Div 10 dB
Ref Level 30.00 dBm
Log
20.0
10.0
0.00
-10.0
-20.0
-30.0
-40.0
-50.0
-60.0
1
3Δ1
2Δ3
TRIG LVL
Center 5.745000000 GHz
Res BW 1.0 MHz
Video BW 1.0 MHz
Span 0 Hz
Sweep 4.00 ms (1001 pts)
5 Marker Table
Mode Trace Scale X Y Function Function Width Function Value
1 N 1 t 1.324 ms 8.696 dBm
2 Δ3 1 t (Δ) -1.329 ms (Δ) -62.73 dB
3 Δ1 1 t (Δ) 1.345 ms (Δ) 0.3395 dB
4
5
6
Marker Δ Time
1.34520 ms
Marker Mode
Normal
Delta (Δ)
Fixed
Off
Delta Marker (Reset Delta)
Marker Table
On
Off
Marker Settings Diagram
All Markers Off
Couple Markers
On
Off
Settings
Peak Search
Pk Search Config
Properties
Marker Function
Marker→
Counter
May 13, 2020
7:24:18 PM

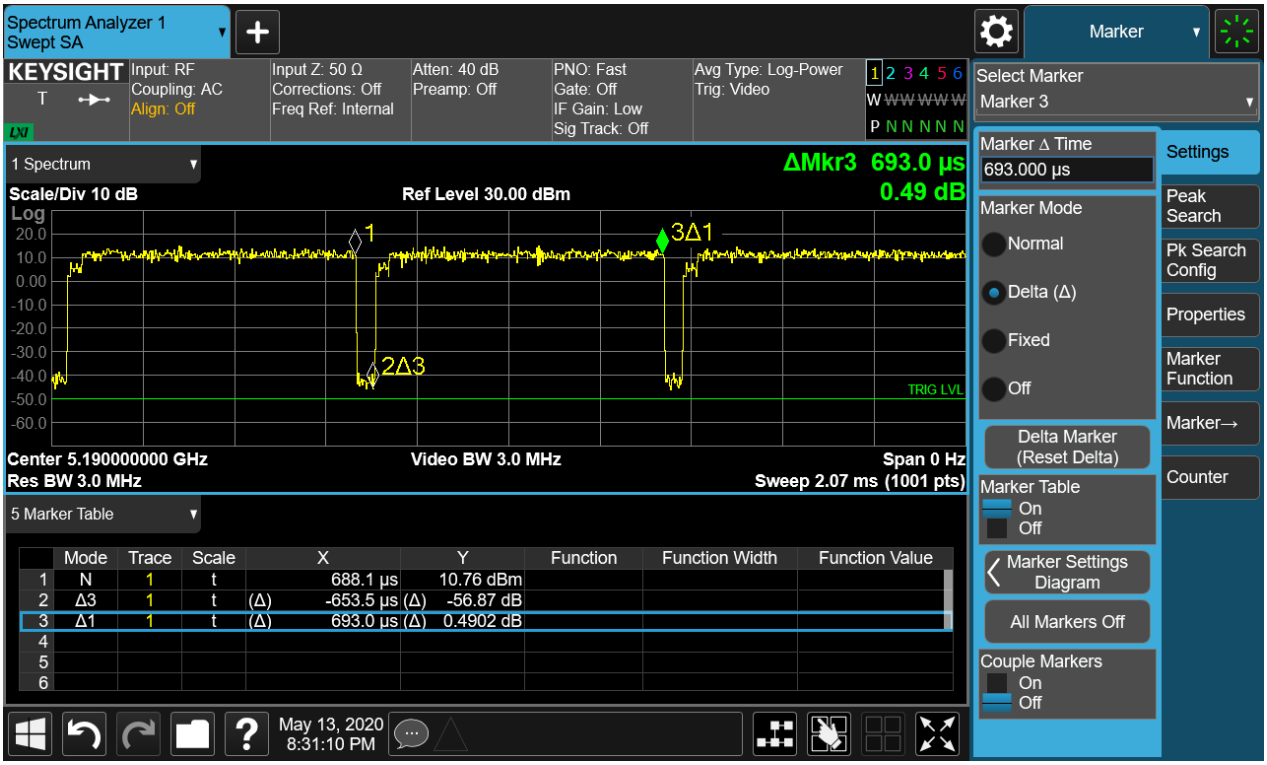
802.11ac20 > 98%

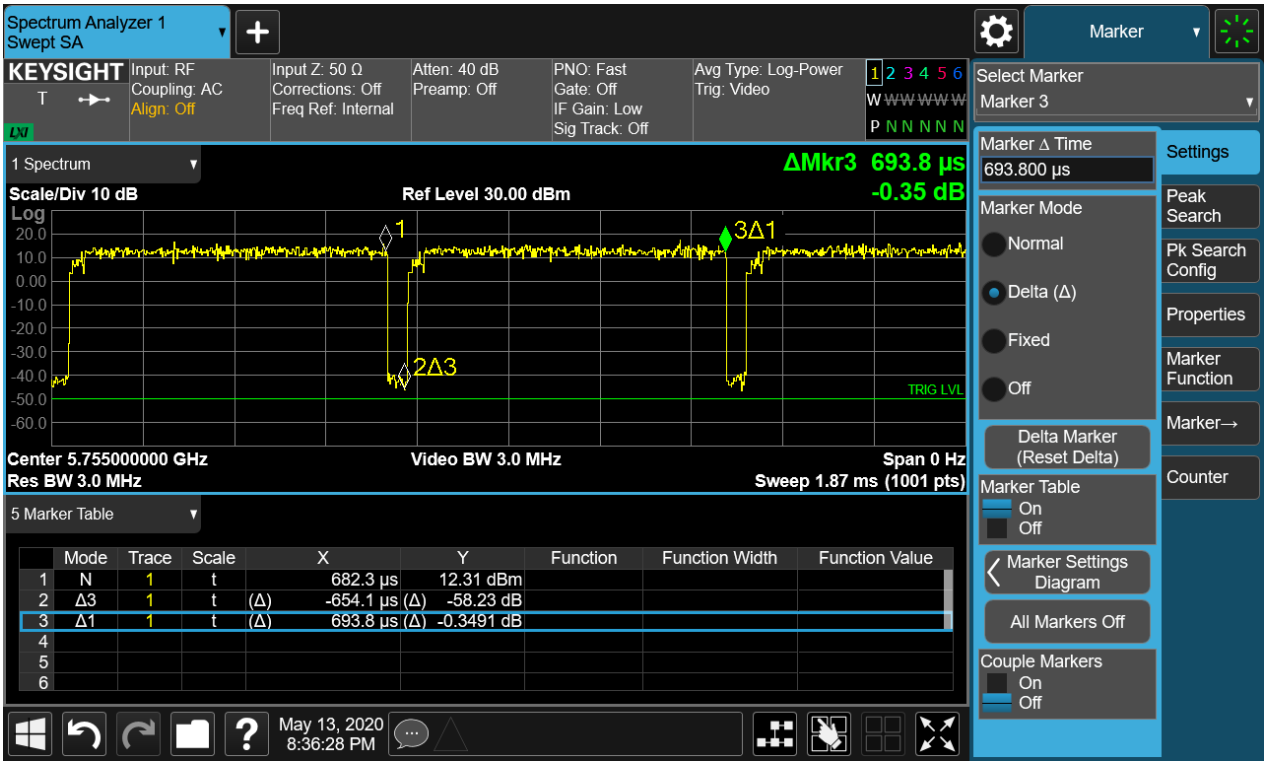




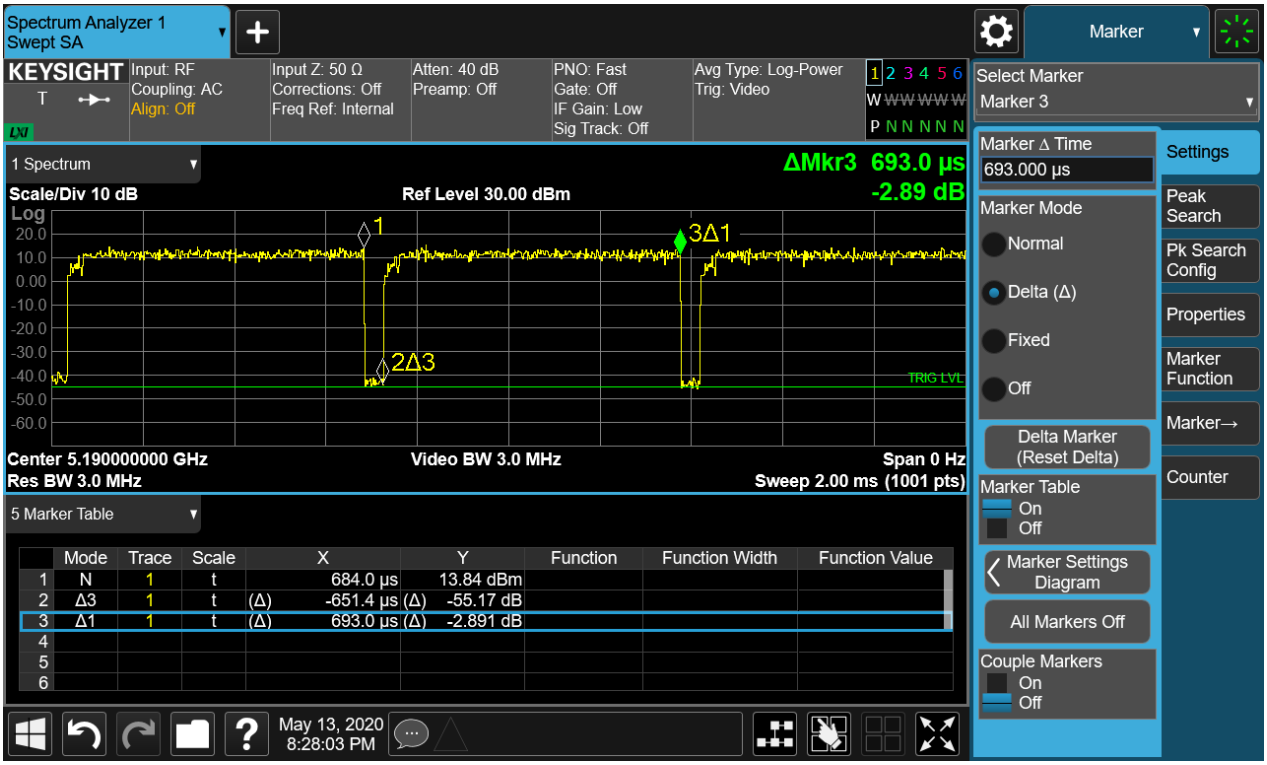
802.11ac40 (B1)=10*log(1/(653.5/693))=0.25

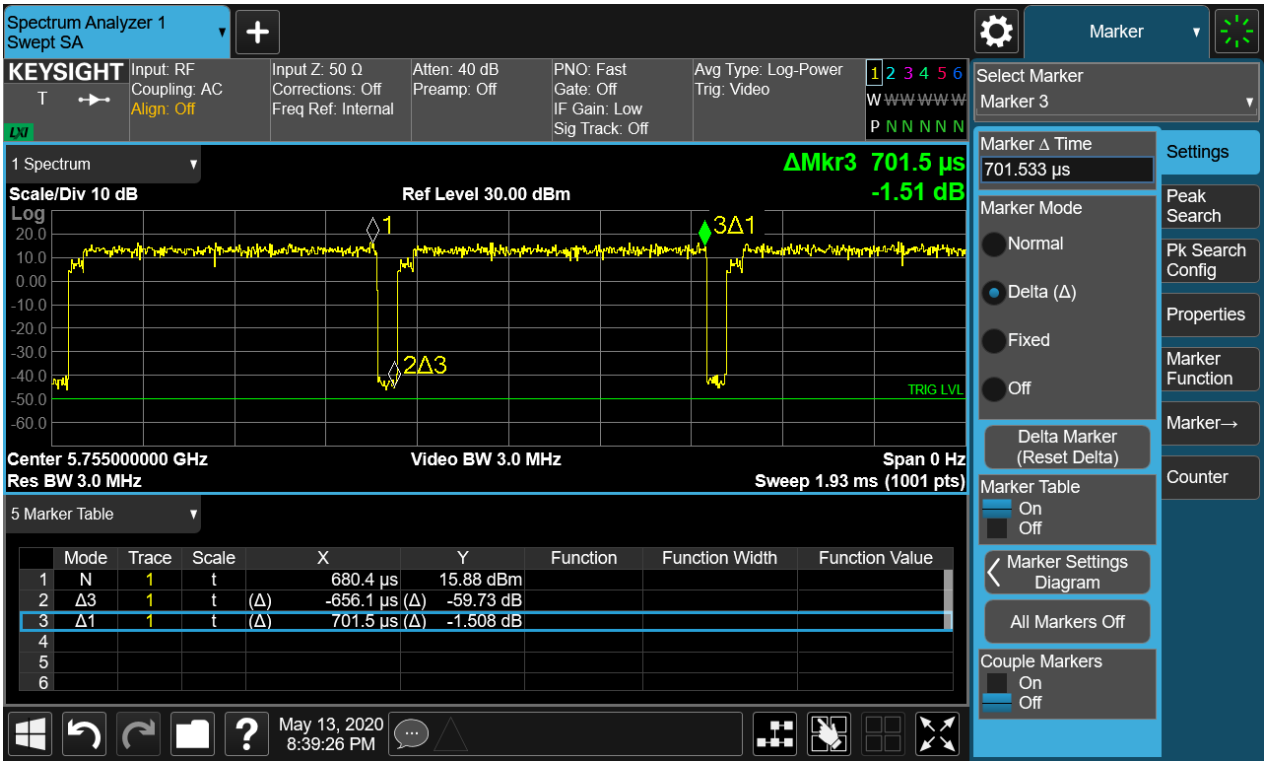
802.11ac40 (B4)=10*log(1/(654.1/693.8))=0.26





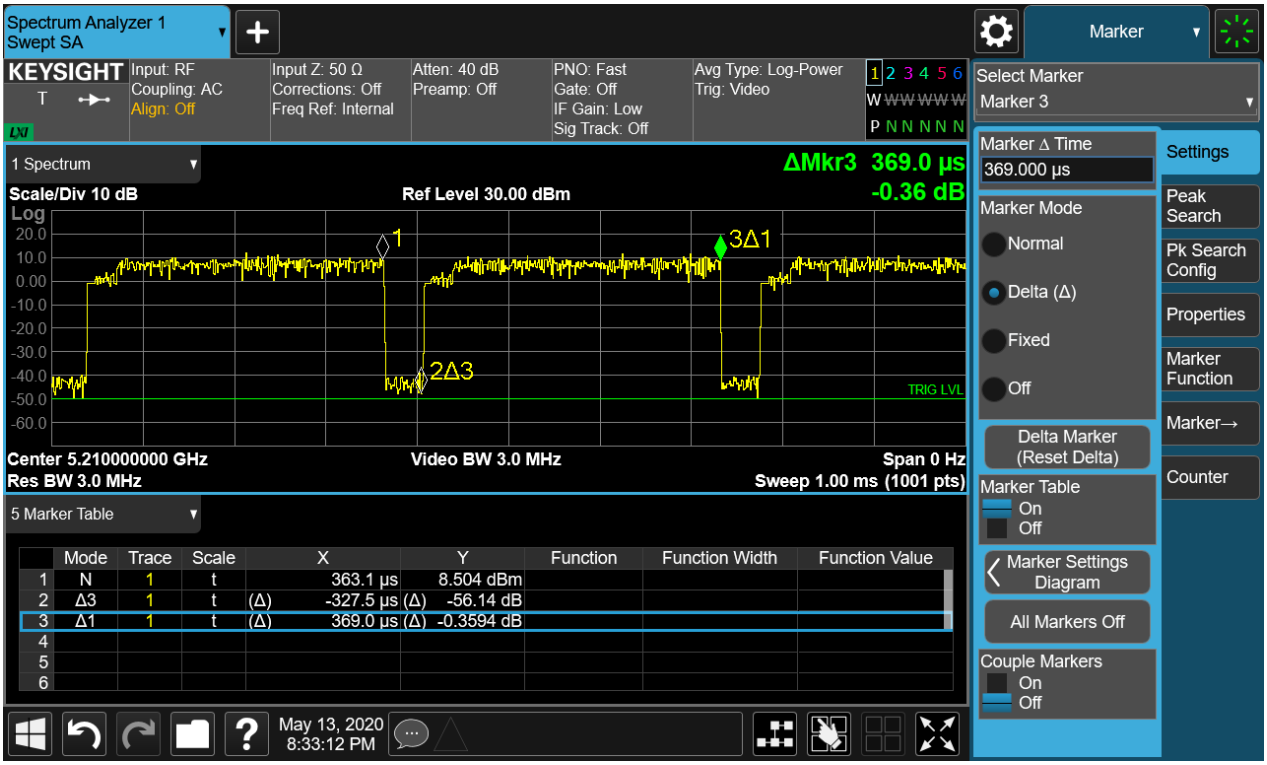
802.11n40 (B1)=10*log(1/(651.4/693))=0.27
802.11n40 (B4)=10*log(1/(656.1/701.5))=0.29

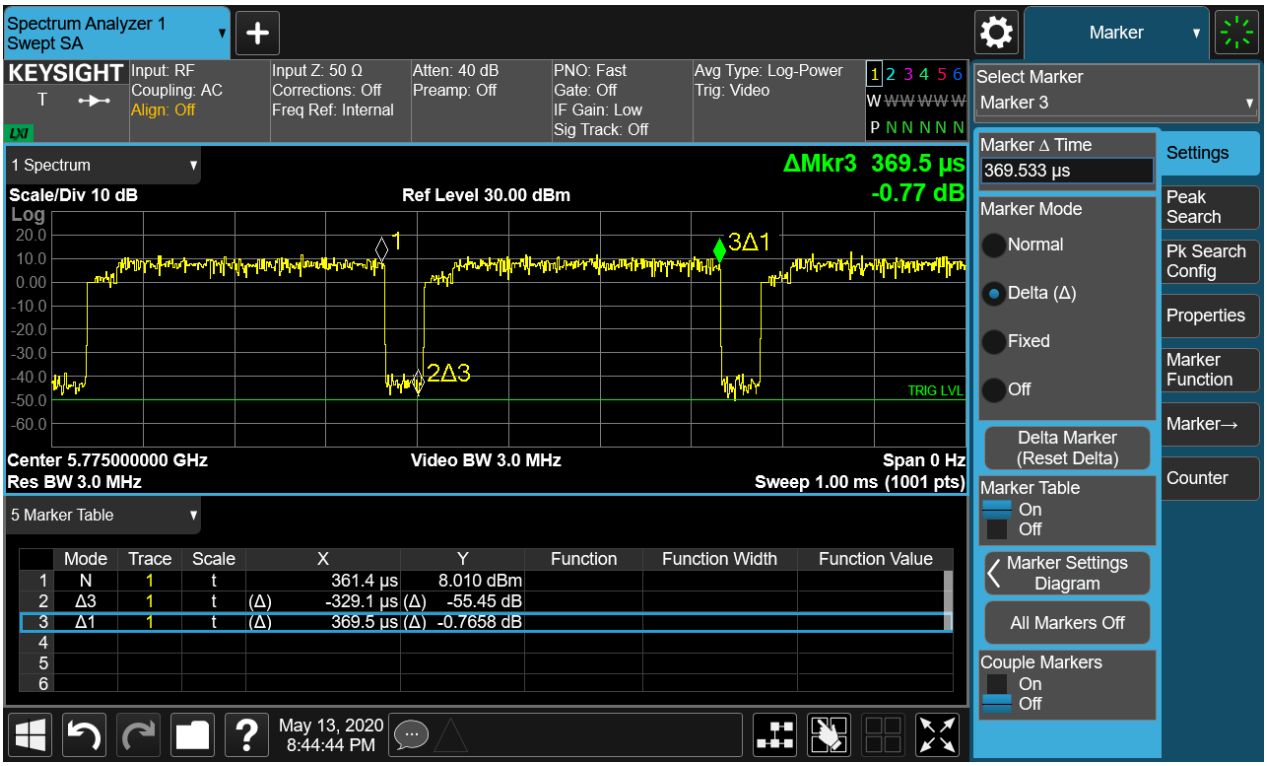




802.11ac80 (B1)=10*log(1/(327.5/369))=0.52

802.11ac80 (B4)=10*log(1/(329.1/369.5))=0.50





4.1.3 Spurious Emission

RESULT: **PASS**

Test standard	:	FCC Part 15.407(b) RSS-247 6.2
Requirement	:	ANSI C63.10-2013
Kind of test site	:	3m Semi-Anechoic Chamber

Test setup

Test Channel	:	Low/Middle/High
Operation Mode	:	A
Ambient temperature	:	25°C
Relative humidity	:	52%

For details refer to following test plot.

Notes:

1. For 9 kHz ~ 30 MHz, the amplitude of spurious emissions that are attenuated by more than 20dB below the permissible. The value has no need to be reported.
2. The spurious above 18GHz is noise only and 20dB below the limit. The value has no need to be reported.
3. The EUT is working in the Normal link mode below 1 GHz.
4. Test plots please refer to the document “Annex No:EXHIBIT A ”.

4.1.4 Band Edge (Restricted-band band-edge)

RESULT: **PASS**

Test standard	:	FCC Part 15.407(b) RSS-247 6.2
Requirement	:	ANSI C63.10-2013, KDB 789033
Kind of test site	:	3m Semi-Anechoic Chamber

Test setup

Test Channel	:	Low/Middle/High
Operation Mode	:	A.1
Ambient temperature	:	25°C
Relative humidity	:	52%

For details refer to following test plot.

1. Test plots please refer to the document “Annex No:EXHIBIT A ”.

End of the report