

**Application for Certification
For a Transmitter.**

SnapRays LLC
426 E. 1750 N., Unit D
Vineyard, UT 84057

DTS Transmitter

M/N: 01CL-###-SM10

(Where ### denote any alpha-numeric characters denoting options)
(Options have no effect on radio transmitter)

FCC ID: 2AWY2-SM10
IC : 26430-SM10

REPORT # UT16015A-002

This report was prepared in accordance with the requirements of the FCC Rules and Regulations Part 2, Subpart J, 2.1033, Part 15.247, RSS-247 Issue 2, and other applicable sections of the rules as indicated herein.

Prepared By:

DNB Engineering, Inc.
1100 E Chalk Creek Road
Coalville, UT 84017

8 Oct 2020

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Paragraph numbers in this report follow the application section numbers found in the FEDERAL COMMUNICATIONS COMMISSION Rules and Regulations, Part 2, Subpart J for Certification of electronic equipment.

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1.0 ADMINISTRATIVE DATA

1.1 Certifications and Qualifications

I certify that DNB Engineering, Inc conducted the tests performed in order to obtain the technical data presented in this application. Also, based on the results of the enclosed data, I have concluded that the equipment tested meets or exceeds the requirements of the Rules and Regulations governing this application.

1.2 Measurement Repeatability Information

The test data presented in this report has been acquired using the guidelines set forth in FCC Part 2.1031 through 2.1057, Part 15. The test results presented in this document are valid only for the equipment identified herein under the test conditions described. Repeatability of these test results will only be achieved with identical measurement conditions. These conditions include: The same test distance, EUT Height, Measurement Site Characteristics, and the same EUT System Components. The system must have the same Interconnecting Cables arranged in identical placement to that in the test set-up, with the system and/or EUT functioning in the identical mode of operation (i.e. software and so on) as on the date of the test. Any deviation from the test conditions and the environment on the date of the test may result in measurement repeatability difficulties.

All changes made to the EUT during the course of testing as identified in this test report must be incorporated into the EUT or identical models to ensure compliance with the FCC regulations.



C. L. Payne III (Para. 1.1)
Facility Manager
Coalville Facility.
DNB Engineering, Inc.
Tel. (435) 336-4433
FAX (435) 336-4436

1.3 Test Equipment List

TEST EQUIPMENT LIST - CONDUCTED EMISSIONS					
Description	Manufacturer	Model No.	Asset #	Serial #	Cal Due
LISN	Fisher Custom Communications	FCCLISN5032401	U-286	2020	03 Feb 2021
Spectrum Analyzer	Rhode & Schwarz	FSV30	U-248	101367	27 Aug 2021
TILE Software	ETS Lindgren	3.4.11.13	U-317	8112006	07 Mar 2021

TEST EQUIPMENT LIST - RADIATED EMISSIONS					
Description	Manufacturer	Model No.	Asset #	Serial #	Cal Due
Pre-Amplifier	Hewlett Packard	8447D	U-068	2727A06184	04 Aug 2021
Pre-Amplifier	DNB	S-21G	U-095	U-095-1	03 Feb 2021
BiConiLog Antenna	ETS - Lindgren	3142E	U-255	154973	03 Sep 2021
DRG Horn Antenna	AH Systems	SAS-571	U-071	417	11 Jul 2021
Spectrum Analyzer	Rhode & Schwarz	FSV30	U-248	101367	27 Aug 2021
TILE Software	ETS- Lindgren	3.4.11.13	U-317	8112006	07 Mar 2021

TEST EQUIPMENT LIST - ANTENNA CONDUCTED					
Description	Manufacturer	Model No.	Asset #	Serial #	Cal Due
Spectrum Analyzer	Rhode & Schwarz	FSV30	U-248	101367	27 Aug 2021

1.4 Test Summary Cross Reference

Test Item	FCC Requirement	IC Requirement	Test Method	Result
Antenna Requirement	15.203/15.247	RSS-Gen 6.8	---	Pass
Conducted Emissions (General Provisions)	15.207	RSS-Gen 8.8	ANSI C63.10-2013	N/A
Radiated Emissions (General Provisions)	15.209	RSS-Gen 8.9	ANSI C63.10-2013	Pass
Output Power (FHSS)	15.247 (b,2)	RSS-247 5.4 d)	ANSI C63.10-2013 Clause 11.9.1.1	Pass
Power Spectral Density	15.247 (e)	RSS-247 5.2 b)	ANSI C63.10-2013 Clause 11.10.2	Pass
Band-edge RF Conducted	15.247 (d)	RSS-247 5.5	ANSI C63.10-2013 Clause 11.13.2	Pass
DTS Bandwidth	15.247 (a,2)	RSS-247 5.2 a)	ANSI C63.10-2013 Clause 11.8.1	Pass
99% Occupied Bandwidth	N/A	RSS-Gen 6.7	ANSI C63.10 Clause 6.9.3	Pass
Conducted Spurious	15.247 (d)	RSS-247 5.5	ANSI C63.10-2013 Clause 11.11.3	Pass
Radiated Spurious Emissions	15.247 (d)	RSS-247 5.5	ANSI C63.10-2013 Clause 11.12.2.7	Pass
Restricted Bands	15.247 (d)	RSS-Gen 8.10	ANSI C63.10-2013 Clause 11.12.2	Pass

RSS-GEN Issue 5 Mar 2019
 RSS-247 Issue 2 Feb 2017

Preliminary scans were performed to determine worst case modulation, packet length, and data rates. Only worst case data has been recorded within the body of the test report.

1.5 Measurement Uncertainty

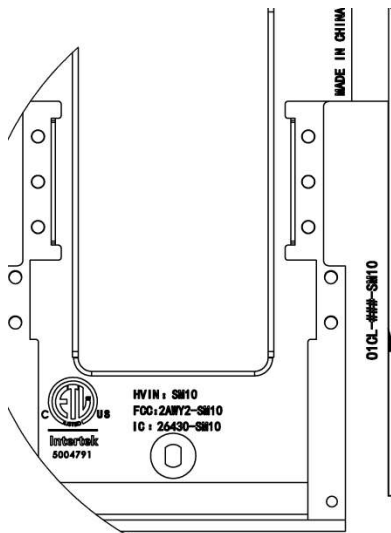
Measurement Type	Uncertainty
AC Conducted Emissions	± 1.67 dB
OATS - Radiated Emissions - Vertical Biconical (30-300MHz)	± 4.17 dB
OATS - Radiated Emissions - Horizontal Biconical (30-300MHz)	± 4.22 dB
OATS - Radiated Emissions - Vertical Log Periodic (300-100MHz)	± 4.92 dB
OATS - Radiated Emissions - Horizontal Log Periodic (300-1000MHz)	± 4.79 dB
OATS - Radiated Emissions - Vertical DRG Horn (> 1GHz)	± 5.74 dB
OATS - Radiated Emissions - Horizontal DRG Horn (>1GHz)	± 5.80 dB
Antenna Conducted Measurements	± 1.96 dB

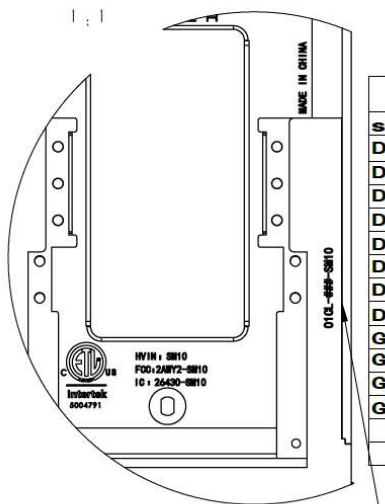
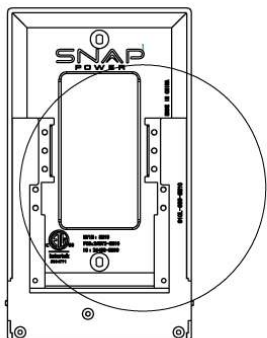
2.1033 (b) (1) Application for Certification

Name of Applicant:	SnapRays LLC 426 E. 1750 N., Unit D Vineyard, UT 84057
FRN Number:	0029776549
Name of Manufacturer :	SnapRays LLC 426 E. 1750 N., Unit D Vineyard, UT 84057
Description:	DTS Transmitter
Model Number(s):	01CL-###-SM10 (Where ### can be any alpha numeric characters)
Anticipated Production Quantity:	Multiple Units
Frequency Band:	2412 - 2464 MHz
Rated Power:	-8.83 dBm (.131 mW)
Type of Signal:	Digital Transmission System (DTS)
Max Data Rate:	1Mb/s
Antenna Type:	Integral - Wire - Monopole
Antenna Gain:	-2dBi

2.1033 (b,2) FCC Identifier

Model Number: 01CL-###-SM10
FCC ID: 2AWY2-SM10
IC: 26430-SM10
HVIN: SM10





M/N : 01CL-###-SM10

M/N:01CL-###-SM10		
style	color	SKU
Duplex	White	01CL-XWH-SM10
Duplex	Light Almond	01CL-XLA-SM10
Duplex	Ivory	01CL-XIV-SM10
Duplex	Black	01CL-XBK-SM10
Decor	White	01CL-CWH-SM10
Decor	LightAlmond	01CL-CLA-SM10
Decor	Ivory	01CL-CIV-SM10
Decor	Black	01CL-CBK-SM10
GFCI	White	01CL-FWH-SM10
GFCI	Light Almond	01CL-FLA-SM10
GFCI	Ivory	01CL-FIV-SM10
GFCI	Black	01CL-FBK-SM10

2.1033 (b,3)	Installation and Operating Instructions -	Supplied separately.
2.1033 (b,4)	Brief Description of Circuit Function -	Supplied separately.
2.1033 (b,5)	Block Diagram -	Supplied separately.
2.1033 (b,7)	Equipment Photographs -	Supplied separately.

2.1033 (b,6) Report of Measurements

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited. This requirement does not apply to carrier current devices or to devices operated under the provisions of §15.211, §15.213, §15.217, §15.219, or §15.221. Further, this requirement does not apply to intentional radiators that must be professionally installed, such as perimeter protection systems and some field disturbance sensors, or to other intentional radiators which, in accordance with §15.31(d), must be measured at the installation site. However, the installer shall be responsible for ensuring that the proper antenna is employed so that the limits in this part are not exceeded.

Pass - Antenna gain is equal to or less than -2dBi

Pass - Antenna is an integral monopole wire antenna

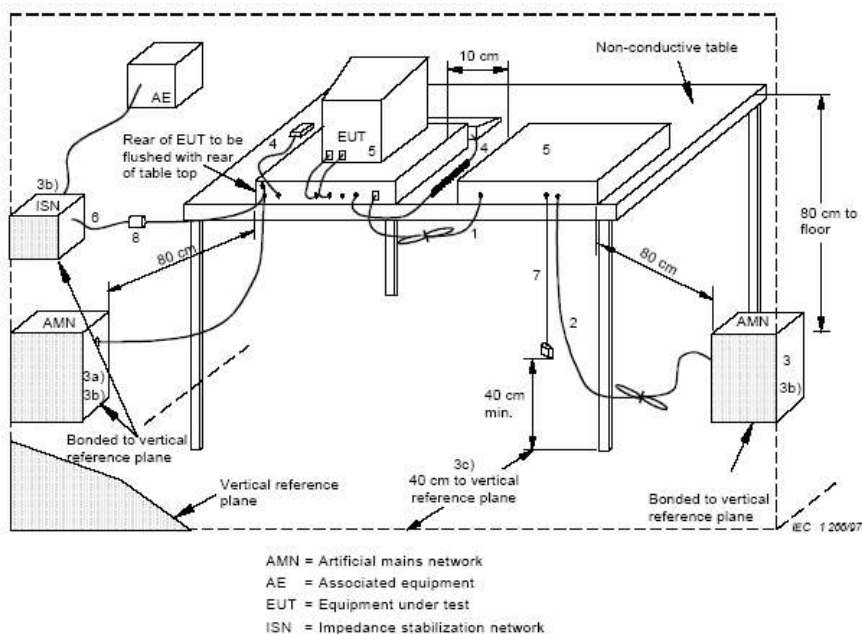
To measure conducted emissions, the EUT was set upon a wooden table in the shielded enclosure. AC power was fed into the EUT from the Artificial Mains Network. With the Artificial Mains Network connected to an Rhode & Schwarz FSV Signal and Spectrum Analyzer, and using Personal Computer with TILES Measurement Software, the spectrum was searched from 0.15 - 30 MHz for emissions emanating from the EUT.

Frequency of emission (MHz)	Conducted Limit (dBuV)	
	Quasi-Peak	Average
0.15 - 0.5	66 to 56*	56 to 46*
0.5 - 5	56	46
5 - 30	60	50

EUT operating conditions:

The software provided by the client to enable the EUT to transmit continuously.

Test Set Up:





1100 E Chalk Creek Road
Coalville, UT 84017
(435) 336-4433
FAX (435) 336-4436

Conducted Emissions

DNB Job Number:	16015	Date:	7 Aug 2020	Specification [X] 15.207 [X] ANSI C63.10-2013
Customer:	SnapRays LLC			
Model Number:	01CL-###-SM10			
Description:	DTS Transmitter			

EUT is in conformance with FCC 15.207

X

YES

NO

Signed

B. Williams

CONDUCTED EMISSIONS

Freq in MHz	Meter Reading dBuV	Factors in dB		Corr'd Reading dBuV	Limit		Lead	Measure Type	Delta dB
		LISN	Cable		dBuV	Type			
0.187	60.78	0.2	0.0	60.96	65.0	QP	Phase	QP	-4.04
0.193	43.81	0.2	0.0	43.98	55.0	AVE	Phase	AVE	-11.02
0.275	60.34	0.1	0.0	60.45	62.0	QP	Phase	QP	-1.55
0.275	43.25	0.1	0.0	43.36	52.0	AVE	Phase	AVE	-8.64
0.374	59.48	0.1	0.0	59.56	60.0	QP	Phase	QP	-0.44
0.374	42.46	0.1	0.0	42.54	50.0	AVE	Phase	AVE	-7.46
0.571	55.89	0.1	0.0	55.95	56.0	QP	Phase	QP	-0.05
0.571	39.19	0.1	0.0	39.25	46.0	AVE	Phase	AVE	-6.75
0.864	49.68	0.1	0.0	49.75	56.0	QP	Phase	QP	-6.25
0.864	33.35	0.1	0.0	33.42	46.0	AVE	Phase	AVE	-12.58
1.140	47.93	0.1	0.1	48.09	56.0	QP	Phase	QP	-7.91
1.140	31.57	0.1	0.1	31.73	46.0	AVE	Phase	AVE	-14.27

		1100 E Chalk Creek Road Coalville, UT 84017 (435) 336-4433 FAX (435) 336-4436			Conducted Emissions					
DNB Job Number:		16015			Date:		6 Mar 2020		Specification [X] 15.207 [X] ANSI C63.10-2013	
Customer:		SnapRays LLC								
Model Number:		01CL-###-SM10								
Description:		DTS Transmitter								
EUT is in conformance with FCC 15.207					X	YES		NO	Signed	<i>Y Staples</i>
CONDUCTED EMISSIONS										
Freq in MHz	Meter Reading dBuV	Factors in dB		Corr'd Reading dBuV	Limit		Lead	Measure Type	Delta dB	
		LISN	Cable		dBuV	Type				
0.214	60.38	0.2	0.0	60.54	64.0	QP	Neutral	QP	-3.46	
0.193	43.52	0.2	0.0	43.69	55.0	AVE	Neutral	AVE	-11.31	
0.275	59.97	0.1	0.0	60.08	62.0	QP	Neutral	QP	-1.92	
0.275	42.96	0.1	0.0	43.07	52.0	AVE	Neutral	AVE	-8.93	
0.375	59.25	0.1	0.0	59.33	60.0	QP	Neutral	QP	-0.67	
0.375	42.32	0.1	0.0	42.40	50.0	AVE	Neutral	AVE	-7.60	
0.570	55.85	0.1	0.0	55.91	56.0	QP	Neutral	QP	-0.09	
0.570	39.15	0.1	0.0	39.21	46.0	AVE	Neutral	AVE	-6.79	
0.717	52.41	0.1	0.0	52.47	56.0	QP	Neutral	QP	-3.53	
0.717	35.90	0.1	0.0	35.96	46.0	AVE	Neutral	AVE	-10.04	
1.061	48.25	0.1	0.1	48.42	56.0	QP	Neutral	QP	-7.58	
1.061	32.17	0.1	0.1	32.34	46.0	AVE	Neutral	AVE	-13.66	
1.342	45.85	0.1	0.1	46.00	56.0	QP	Neutral	QP	-10.00	
1.342	29.91	0.1	0.1	30.06	46.0	AVE	Neutral	AVE	-15.94	
1.469	44.27	0.1	0.1	44.42	56.0	QP	Neutral	QP	-11.58	
1.469	28.45	0.1	0.1	28.60	46.0	AVE	Neutral	AVE	-17.40	

Test Procedure: ANSI C63.10-2013

The EUT was measured on an open area test site (OATS).

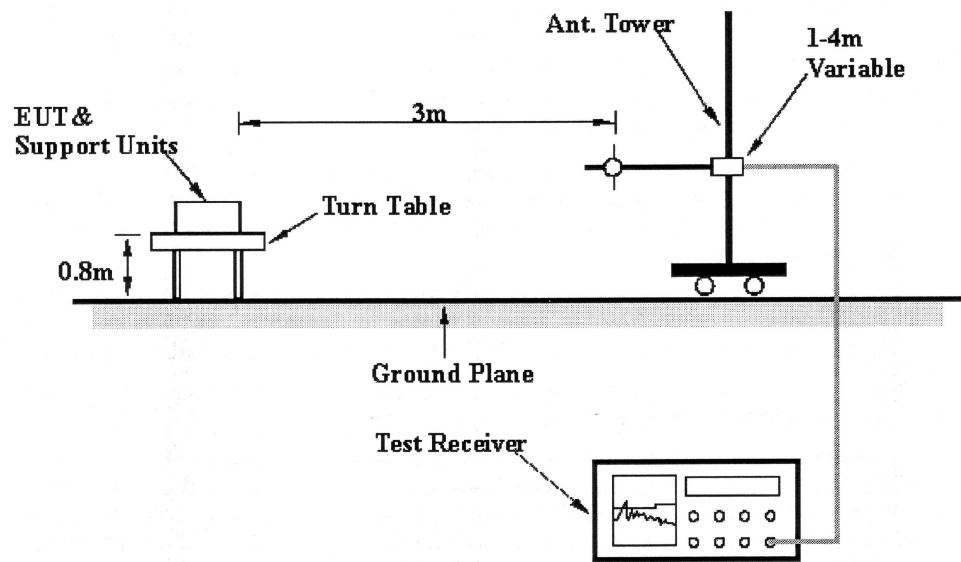
A measuring distance of at least 3 m shall be used for measurements at frequencies up to 1 GHz. For frequencies above 1 GHz, any suitable measuring distance may be used. The equipment size (excluding the antenna) shall be less than 20 % of the measuring distance.

Sufficient precautions shall be taken to ensure that reflections from extraneous objects adjacent to the site do not degrade the measurement results, in particular:

- no extraneous conducting objects having any dimension in excess of a quarter wavelength of the highest frequency tested shall be in the immediate vicinity of the site;
- all cables shall be as short as possible; as much of the cables as possible shall be on the ground plane or preferably below; and the low impedance cables shall be screened.
- EUT was positioned in three orthogonal axis - only the worst case data (X-Axis) has been recorded

The EUT shall be placed upon a non-conductive table (wooden for below 1GHz and styrene above 1GHz) 0.80 meters above the ground plane for frequencies from 30 to 1000MHz and 1.5 meters above the ground plane above 1 GHz and shall be placed in the “worst case” transmitting mode. The EUT shall be rotated 360 degrees to find the azimuth maxima. The receive antenna shall then be raised and lowered between 1 to 4 meters to find the maximum signal emanating from the EUT. This signal strength is then recorded on the data sheets.

Frequency (MHz)	Field Strength (uV/m)	Field Strength (dBuV/m)	Measurement Distance (meters)
.0009 - 0.490	2400/F(kHz)	$20*(\text{Log}_{10}(2400/F(\text{kHz})))$	300
0.490 - 1.705	24000/F(kHz)	$20*(\text{Log}_{10}(24000/F(\text{kHz})))$	30
1.705 - 30.0	30	29.5	30
30 - 88	100	40.0	3
88 - 216	150	43.5	3
216 - 960	200	46.0	3
Above 960	500	54.0	3



		1100 E Chalk Creek Road Coalville, UT 84017 (435) 336-4433 FAX (435) 336-4436		Radiated Emissions (General)								
DNB Job Number:		16015		Date:		7 Aug 2020		Specification [X] 15.209 [X] ANSI C63.10-2013				
Customer:		SnapRays LLC										
Model Number:		01CL-###-SM10										
Description:		DTS Transmitter										
EUT is in conformance with FCC 15.209				X	YES		NO	Signed	B Williams			
Radiated Emissions												
FREQ (Mhz)	S/A Reading	Correction Factors (dB)			dBuV/m			Positions				
		Ant	Cbl	Amp	Corr	Lim	Delta	Typ	Tbl	Pl	Hgt	
37.004	44.73	16.24	0.78	26.56	35.19	40.01	-4.82	QP	287	Vert	2.33	
37.025	44.84	16.23	0.78	26.56	35.29	40.01	-4.72	QP	255	Vert	2.36	
36.986	49.10	16.25	0.78	26.56	39.57	40.01	-0.44	QP	235	Vert	1.00	
37.863	46.07	15.74	0.81	26.54	36.08	40.01	-3.93	QP	195	Vert	2.50	
38.066	45.43	15.62	0.82	26.54	35.34	40.01	-4.67	QP	223	Vert	1.19	
41.205	44.17	13.90	0.92	26.50	32.49	40.01	-7.52	QP	298	Vert	1.55	
35.366	32.54	17.19	0.71	26.59	23.85	40.01	-16.16	QP	238	Horz	1.36	
36.345	36.26	16.62	0.75	26.57	27.06	40.01	-12.95	QP	273	Horz	1.65	
36.615	35.81	16.46	0.76	26.57	26.47	40.01	-13.54	QP	274	Horz	2.20	
214.747	43.99	15.06	2.52	25.97	35.60	43.51	-7.91	QP	224	Horz	1.14	
218.527	47.22	15.20	2.55	25.96	39.01	46.01	-7.00	QP	262	Horz	1.57	
219.945	47.15	15.26	2.56	25.96	39.01	46.01	-7.00	QP	234	Horz	1.35	

EUT was placed in the normal operating position.

11.9.1 Maximum peak conducted output power**11.9.1.1 RBW $\geq$ DTS bandwidth**

The following procedure shall be used when an instrument with a resolution bandwidth that is greater than the DTS bandwidth is available to perform the measurement:

- a) Set the RBW $\geq$ DTS bandwidth.
- b) Set VBW $\geq [3 \times \text{RBW}]$.
- c) Set span $\geq [3 \times \text{RBW}]$.
- d) Sweep time = auto couple.
- e) Detector = peak.
- f) Trace mode = max hold.
- g) Allow trace to fully stabilize.
- h) Use peak marker function to determine the peak amplitude level.

Requirement: FCC Part 15.247 Clause (b,3)

15.247 Operation within the bands 902-928 MHz.

- (b) The maximum peak conducted output power of the intentional radiator shall not exceed the following:
- (3) For systems using digital modulation in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands: 1 Watt. As an alternative to a peak power measurement, compliance with the one Watt limit can be based on a measurement of the maximum conducted output power. Maximum Conducted Output Power is defined as the total transmit power delivered to all antennas and antenna elements averaged across all symbols in the signaling alphabet when the transmitter is operating at its maximum power control level. Power must be summed across all antennas and antenna elements. The average must not include any time intervals during which the transmitter is off or is transmitting at a reduced power level. If multiple modes of operation are possible (e.g., alternative modulation methods), the maximum conducted output power is the highest total transmit power occurring in any mode.

Limit : 1 watt or 30dBm

Client: SnapRays LLC

Date: 6 Aug 2020

DNB Job: 16015

EUT: DTS Transmitter

Model No: 01CL-###-SM10

Requirement ≤ 1 Watt or 30dBm

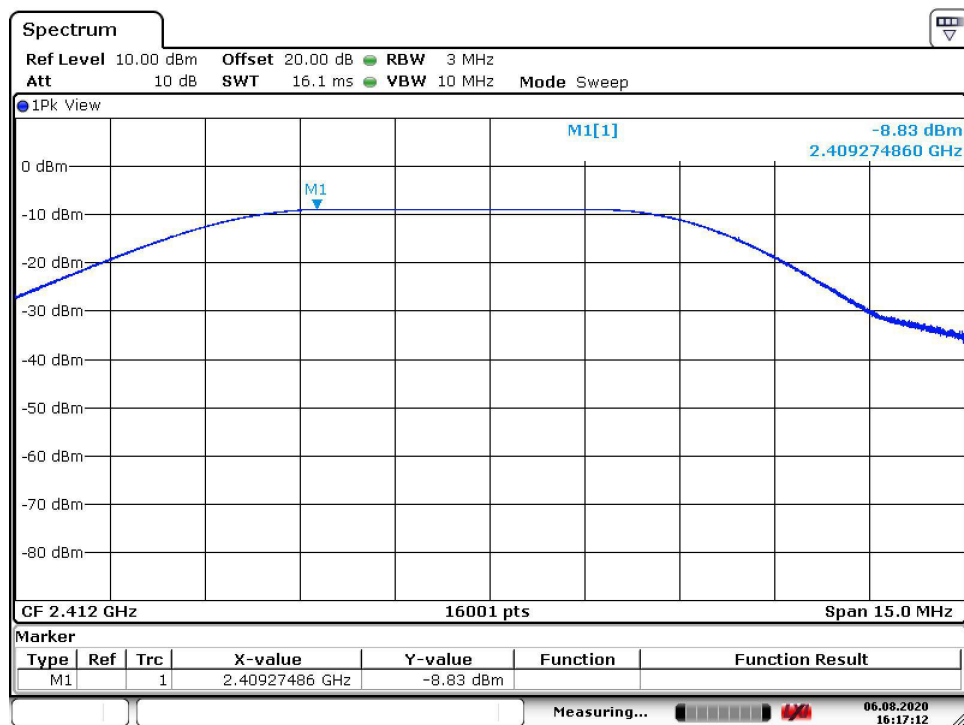
Tech: CL Payne

Data Rate 1Mb/s

Low Channel: 2412 MHz

Power: -8.83 dBm

Result: Pass



Date: 6.AUG.2020 16:17:12

Client: SnapRays LLC

Date: 6 Aug 2020

DNB Job: 16015

EUT: DTS Transmitter

Model No: 01CL-###-SM10

Requirement ≤ 1 Watt or 30dBm

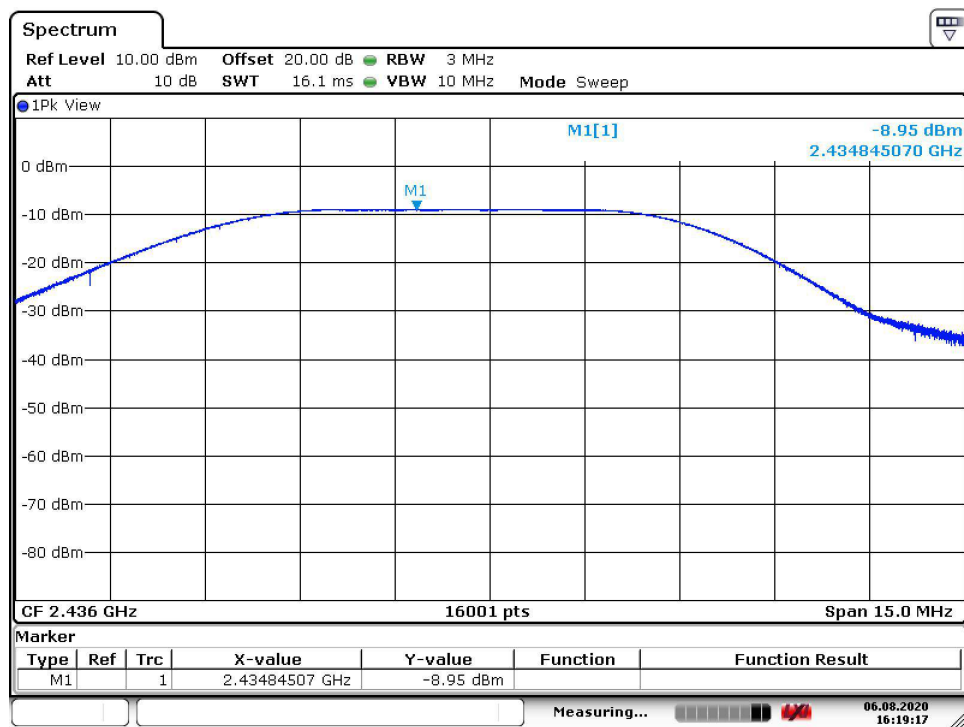
Tech: CL Payne

Data Rate 1Mb/s

Mid Channel: 2436 MHz

Power: -8.95 dBm

Result: Pass



Date: 6.AUG.2020 16:19:17

Client: SnapRays LLC

Date: 6 Aug 2020

DNB Job: 16015

EUT: DTS Transmitter

Model No: 01CL-###-SM10

Requirement ≤ 1 Watt or 30dBm

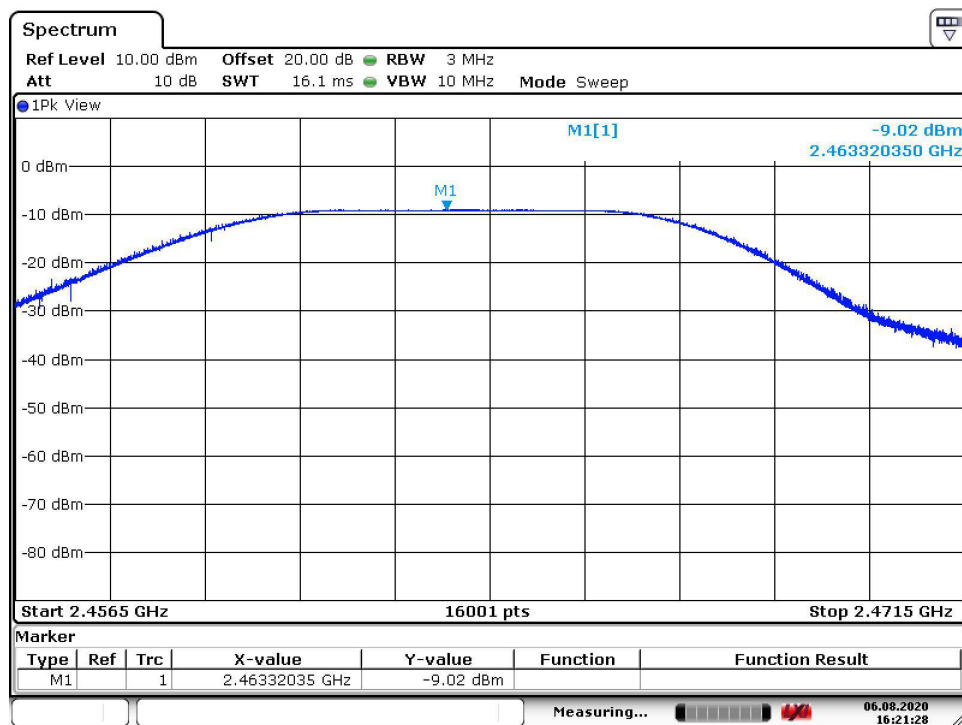
Tech: CL Payne

Data Rate 1Mb/s

High Channel: 2464 MHz

Power: -9.02 dBm

Result: Pass



Date: 6.AUG.2020 16:21:28

Clause 11.10.2 Method PKPSD (peak PSD)

The following procedure shall be used if the maximum peak conducted output power was used to determine compliance, and it is optional if the maximum conducted (average) output power was used to determine compliance:

- a) Set analyzer center frequency to DTS channel center frequency
- b) Set the span to 1.5 times the DTS bandwidth
- c) Set the RBW to $3 \text{ kHz} \leq \text{RBW} \leq 100 \text{ kHz}$
- d) Set the VBW $\geq [3 \times \text{RBW}]$
- e) Detector = peak
- f) Sweep time = auto couple
- g) Trace mode = max hold
- h) Allow trace to fully stabilize
- i) Use the peak marker function to determine the maximum amplitude level within the RBW
- j) If measured value exceeds requirement, then reduce RBW (but no less than 3 kHz) and repeat
- k) Submit plots

Requirement: FCC Part 15.247 Clause (e)

15.247 Power Spectral Density.

- (e) For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission. This power spectral density shall be determined in accordance with the provisions of paragraph (b) of this section. The same method of determining the conducted output power shall be used to determine the power spectral density.

Client: SnapRays LLC

Date: 6 Aug 2020

DNB Job: 16015

EUT: DTS Transmitter

Model No: 01CL-###-SM10

Requirement $\leq 8\text{dBm}$

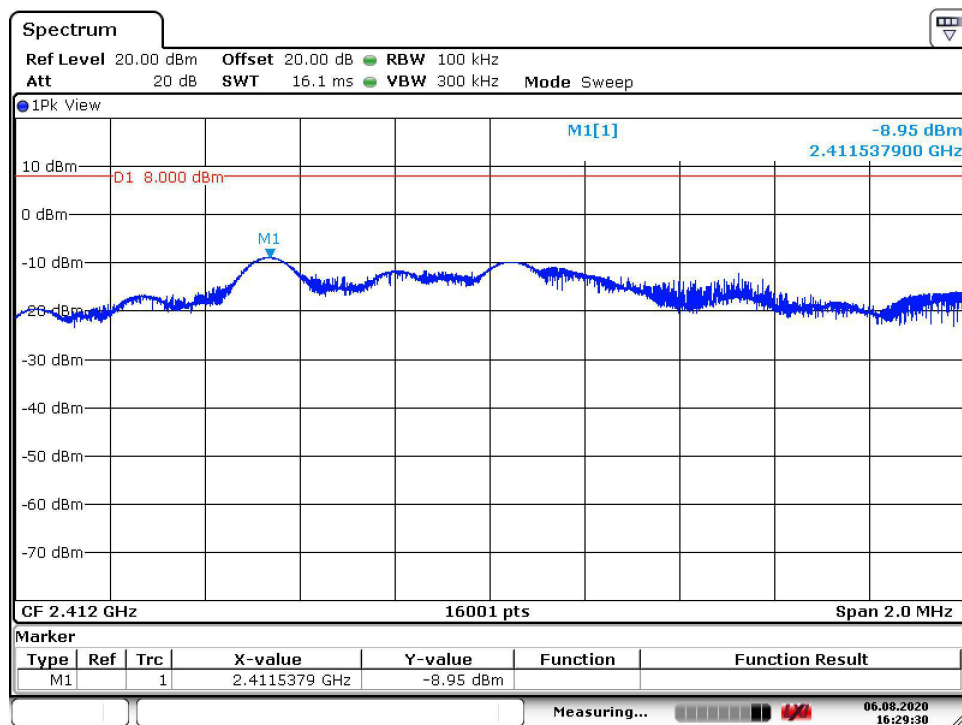
Tech: CL Payne

Data Rate 1Mb/s

Low Channel: 2412 MHz

Power: -8.95 dBm

Result: Pass



Date: 6.AUG.2020 16:29:30

Client: SnapRays LLC

Date: 6 Aug 2020

DNB Job: 16015

EUT: DTS Transmitter

Model No: 01CL-###-SM10

Requirement $\leq 8\text{dBm}$

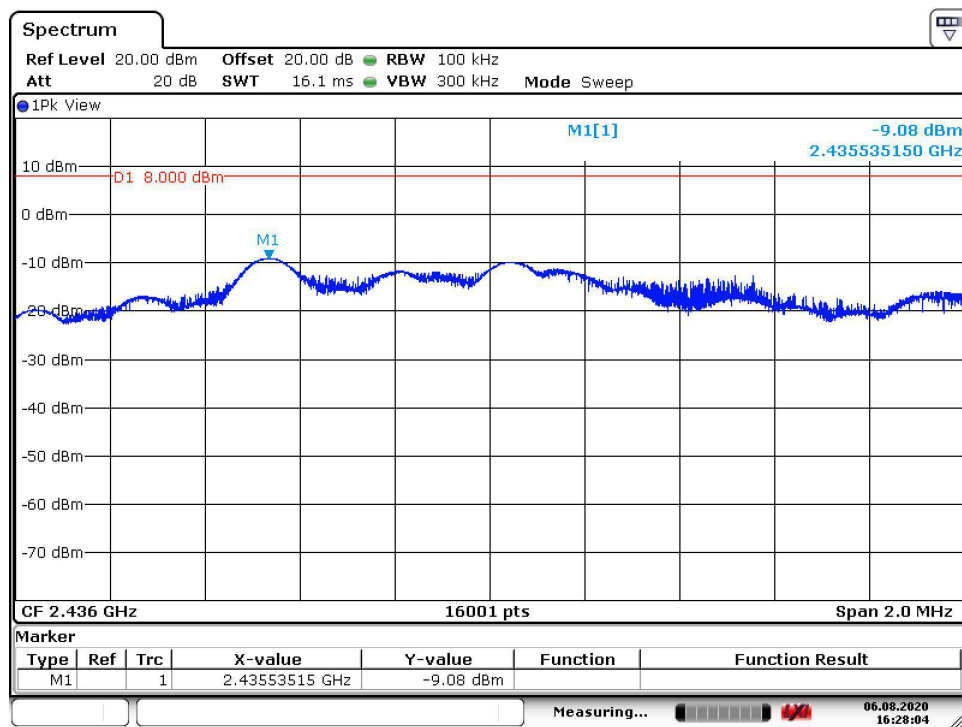
Tech: CL Payne

Data Rate 1Mb/s

Mid Channel: 2436 MHz

Power: -9.08 dBm

Result: Pass



Date: 6.AUG.2020 16:28:04

Client: SnapRays LLC

Date: 6 Aug 2020

DNB Job: 16015

EUT: DTS Transmitter

Model No: 01CL-###-SM10

Requirement $\leq 8\text{dBm}$

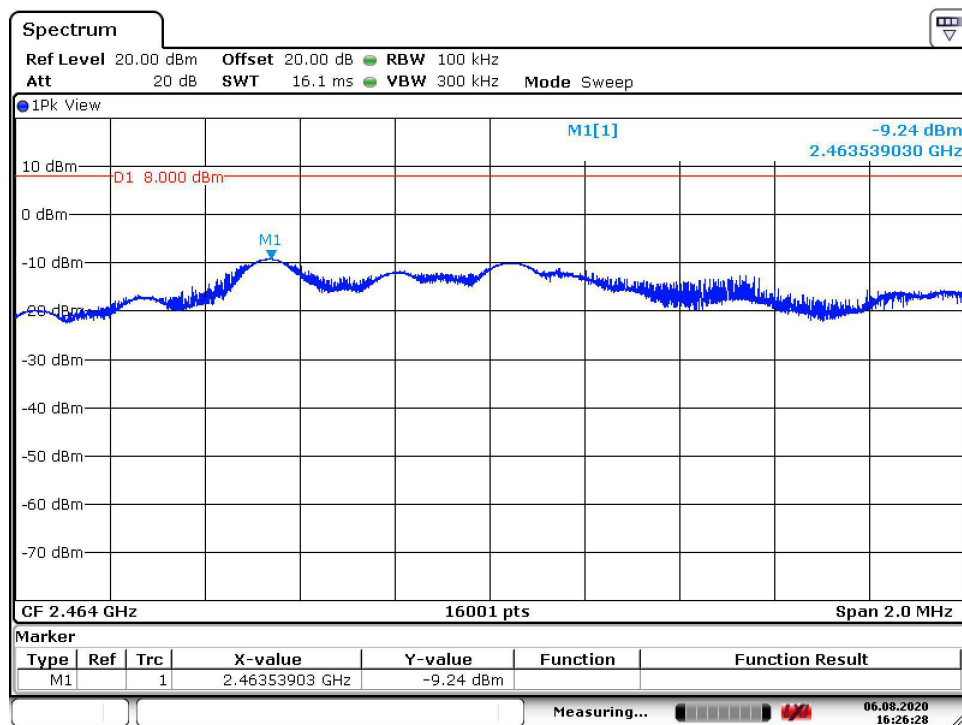
Tech: CL Payne

Data Rate 1Mb/s

High Channel: 2464 MHz

Power: -9.24 dBm

Result: Pass



Date: 6.AUG.2020 16:26:28

For band-edge measurements, use the band-edge procedure in 6.10. Band-edge measurements shall be tested both on single channels, and with the EUT hopping.

6.10 Band-edge testing

The following procedure shall be used when band-edge measurements are required.

6.10.1 Band-edge data reporting requirements

These reporting requirements are applicable to all devices for which band-edge measurements are required. On each operating frequency measured, band-edge emissions shall be reported by providing plots of the measuring instrument display. The axes, the scale units per division, and the limit shall be clearly labeled in the test report. Tabular data are not suitable for reporting band-edge emissions.

6.10.4 Authorized-band band-edge measurements (relative method)

These procedures are applicable for determining compliance at authorized-band band-edges where the requirements are expressed as a value relative to the in-band signal level.

For devices that support frequency hopping, this test sequence shall be performed twice: once with the hopping function turned OFF and then repeated with the hopping function turned ON.

- a) Connect the EMI receiver or spectrum analyzer to the EUT using an appropriate RF cable connected to the EUT output. Configure the spectrum analyzer settings as described in step e) (be sure to enter all losses between the unlicensed wireless device output and the spectrum analyzer).
- b) Set the EUT to the lowest frequency channel (for the hopping on test, the hopping sequence shall include the lowest frequency channel).
- c) Set the EUT to operate at maximum output power and 100% duty cycle, or equivalent “normal mode of operation”.
- d) Blank
- e) Perform the test as follows:
 - 1) Span: Wide enough to capture the peak level of the emission operating on the channel closest to the band edge, as well as any modulation products that fall outside of the authorized band of operation.

15.247 (d) Band-edge RF Conducted (*continued*)

- 2) Reference level: As required to keep the signal from exceeding the maximum instrument input mixer level for linear operation. In general, the peak of the spectral envelope shall be more than $[10 \log (\text{OBW}/\text{RBW})]$ below the reference level. Specific guidance is given in 4.1.5.2.
 - 3) Attenuation: Auto (at least 10 dB preferred).
 - 4) Sweep time: Coupled.
 - 5) Resolution bandwidth: 100 kHz
 - 6) Video bandwidth: 300 kHz
 - 7) Detector: Peak.
 - 8) Trace: Max hold.
- f) Allow the trace to stabilize. For the test with the hopping function turned ON, this can take several minutes to achieve a reasonable probability of intercepting any emissions due to oscillator overshoot.
- g) Set the marker on the emission at the band edge, or on the highest modulation product outside of the band, if this level is greater than that at the band edge. Enable the marker-delta function, and then use the marker-to-peak function to move the marker to the peak of the in-band emission.
- h) Repeat step c) through step e) for every applicable modulation.
- i) Set the EUT to the highest frequency channel (for the hopping on test, the hopping sequence shall include the highest frequency channel) and repeat step c) through step d).
- j) The band-edge measurement shall be reported by providing plot(s) of the measuring instrument display; the plot axes and the scale units per division shall be clearly labeled. Tabular data may be reported in addition to the plot(s).

Requirement: FCC Part 15.247 Clause (d)

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power.

Client: SnapRays LLC

Date: 6 Aug 2020

DNB Job: 16015

EUT: DTS Transmitter

Model No: 01CL-###-SM10

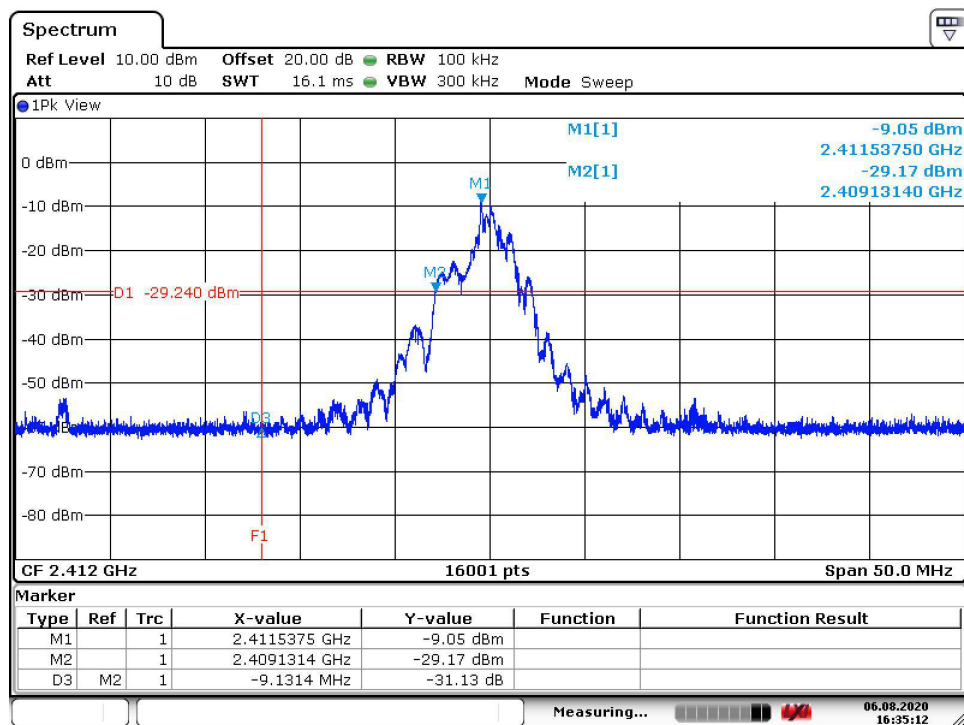
Requirement: Band-Edge Compliance (DTS)

Tech: CL Payne

Low Channel: 2412 MHz

Data Rate: 1Mb/s

Result: Pass



Date: 6.AUG.2020 16:35:12

Client: SnapRays LLC

Date: 7 Aug 2020

DNB Job: 16015

EUT: DTS Transmitter

Model No: 01CL-###-SM10

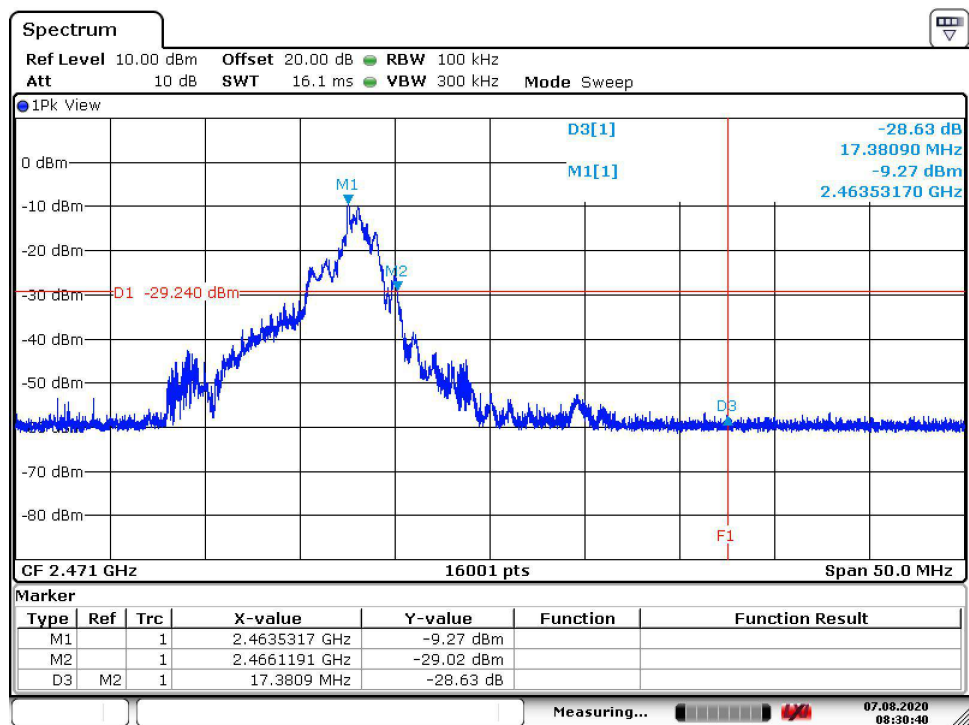
Requirement: Band-Edge Compliance (DTS)

Tech: CL Payne

High Channel: 2464 MHz

Data Rate: 1Mb/s

Result: Pass



Date: 7.AUG.2020 08:30:40

DTS bandwidth measurement procedure

- a) Set RBW = 100 kHz
- b) Set the VBW $\geq [3 \times \text{RBW}]$
 - * per ANSI C63.10-2013 clause 6.9.2 Set the span to 2 to 5 times the OBW
- c) Detector = peak
- d) Trace mode = max hold
- e) Sweep = auto couple
- f) Allow 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 6dB relative to the maximum level measured in the fundamental emission.
- h) Submit this plot(s).

Requirement: FCC Part 15.247 Clause (a,2)

The 6 dB DTS bandwidth shall be greater than 500 kHz.

Client: SnapRays LLC

Date: 6 Aug 2020

DNB Job: 16015

EUT: DTS Transmitter

Model No: 01CL-###-SM10

Requirement: 6dB Bandwidth greater than 500kHz

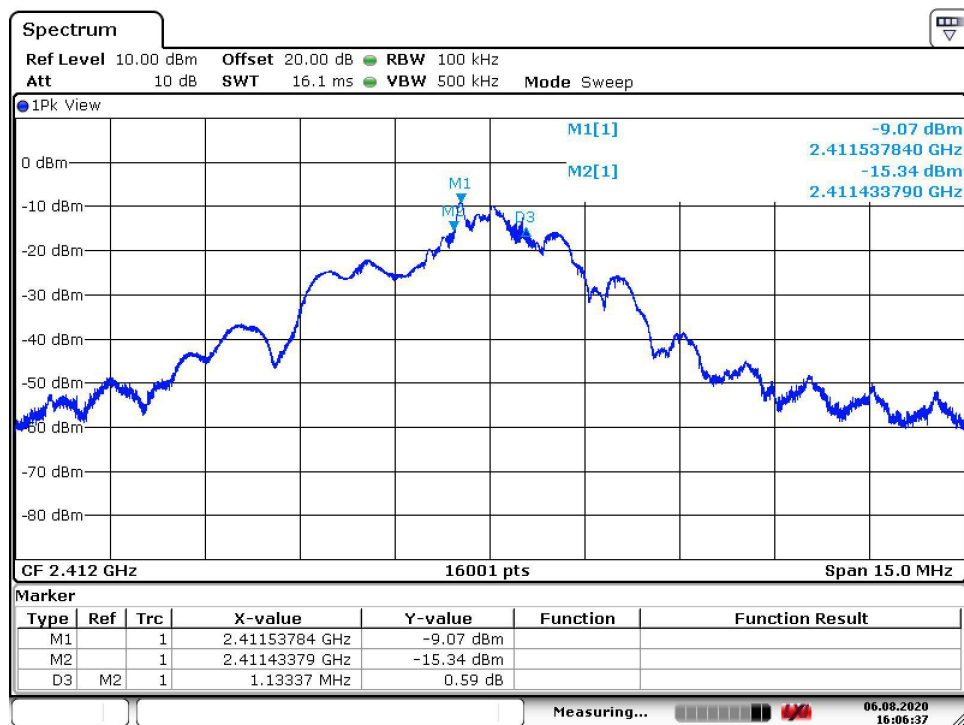
Tech: CL Payne

Data Rate: 1 Mb/s

Low Channel: 2412

6dB Bandwidth = 1.13337 MHz

Result: Pass



Date: 6.AUG.2020 16:06:37

Client: SnapRays LLC

Date: 6 Aug 2020

DNB Job: 16015

EUT: DTS Transmitter

Model No: 01CL-###-SM10

Requirement: 6dB Bandwidth greater than 500kHz

Tech: CL Payne

Data Rate: 1 Mb/s

Mid Channel: 2436

6dB Bandwidth = 1.13524 MHz

Result: Pass



Date: 6.AUG.2020 16:02:29

Client: SnapRays LLC

Date: 6 Aug 2020

DNB Job: 16015

EUT: DTS Transmitter

Model No: 01CL-###-SM10

Requirement: 6dB Bandwidth greater than 500kHz

Tech: CL Payne

Data Rate: 1 Mb/s

High Channel: 2464

6dB Bandwidth = 1.11743 MHz

Result: Pass



Date: 6.AUG.2020 15:58:45

Occupied bandwidth—power bandwidth (99%) measurement procedure

The occupied bandwidth is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers are each equal to 0.5% of the total mean power of the given emission. The following procedure shall be used for measuring 99% power bandwidth:

- a) The instrument center frequency is set to the nominal EUT channel center frequency. The frequency span for the spectrum analyzer shall be between 1.5 times and 5.0 times the OBW.
- b) The nominal IF filter bandwidth (3 dB RBW) shall be in the range of 1% to 5% of the OBW, and VBW shall be approximately three times the RBW, unless otherwise specified by the applicable requirement.
- c) Set the reference level of the instrument as required, keeping the signal from exceeding the maximum input mixer level for linear operation. In general, the peak of the spectral envelope shall be more than $[10 \log (OBW/RBW)]$ below the reference level. Specific guidance is given in 4.1.5.2.
- d) Step a) through step c) might require iteration to adjust within the specified range.
- e) 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.
- f) Use the 99% power bandwidth function of the instrument (if available) and report the measured bandwidth.
- g) If the instrument does not have a 99% power bandwidth function, then the trace data points are recovered and directly summed in linear power terms. 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% power bandwidth is the difference between these two frequencies.
- h) The occupied bandwidth shall be reported by providing plot(s) of the measuring instrument display; the plot axes and the scale units per division shall be clearly labeled. Tabular data may be reported in addition to the plot(s).

Client: SnapRays LLC

Date: 6 Aug 2020

DNB Job: 16015

EUT: DTS Transmitter

Model No: 01CL-###-SM10

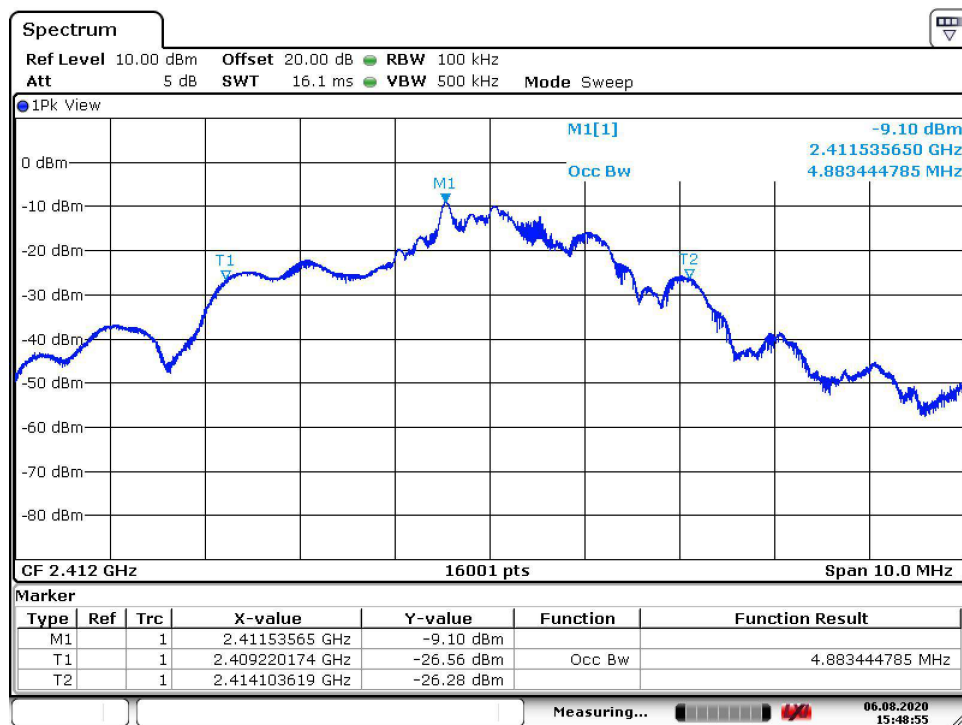
Requirement: 99% Occupied Bandwidth

Tech: CL Payne

Data Rate: 1 Mb/s

Low Channel: 2412

99% Occupied Bandwidth = 4.883444785 MHz



Date: 6.AUG.2020 15:48:55

Client: SnapRays LLC

Date: 6 Aug 2020

DNB Job: 16015

EUT: DTS Transmitter

Model No: 01CL-###-SM10

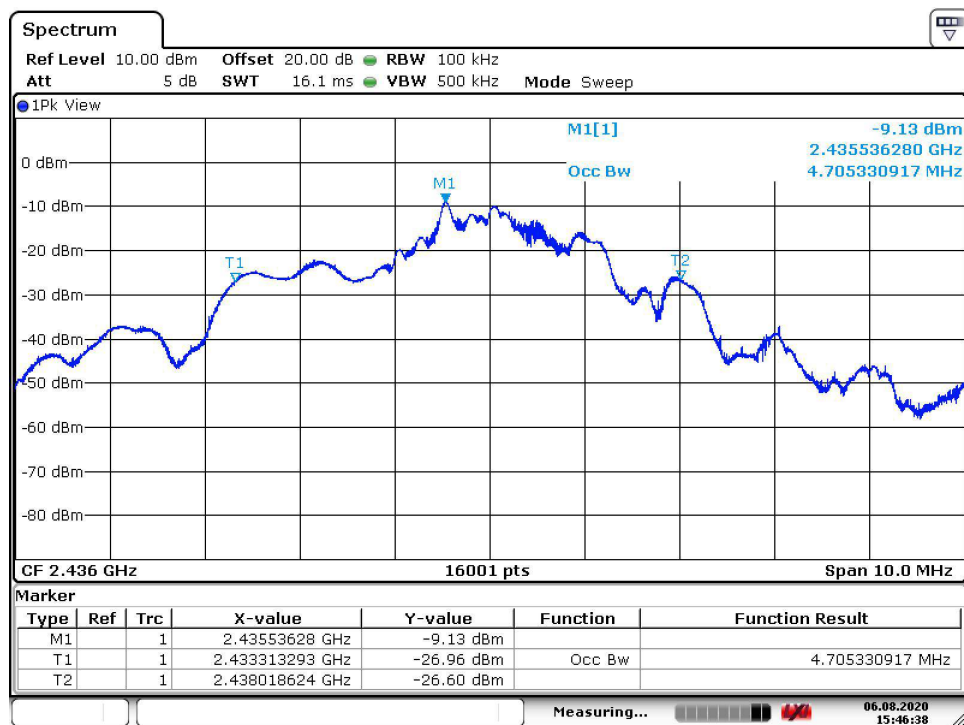
Requirement: 99% Occupied Bandwidth

Tech: CL Payne

Data Rate: 1 Mb/s

Mid Channel: 2436

99% Occupied Bandwidth = 4.705330917 MHz



Date: 6.AUG.2020 15:46:38

Client: SnapRays LLC

Date: 6 Aug 2020

DNB Job: 16015

EUT: DTS Transmitter

Model No: 01CL-###-SM10

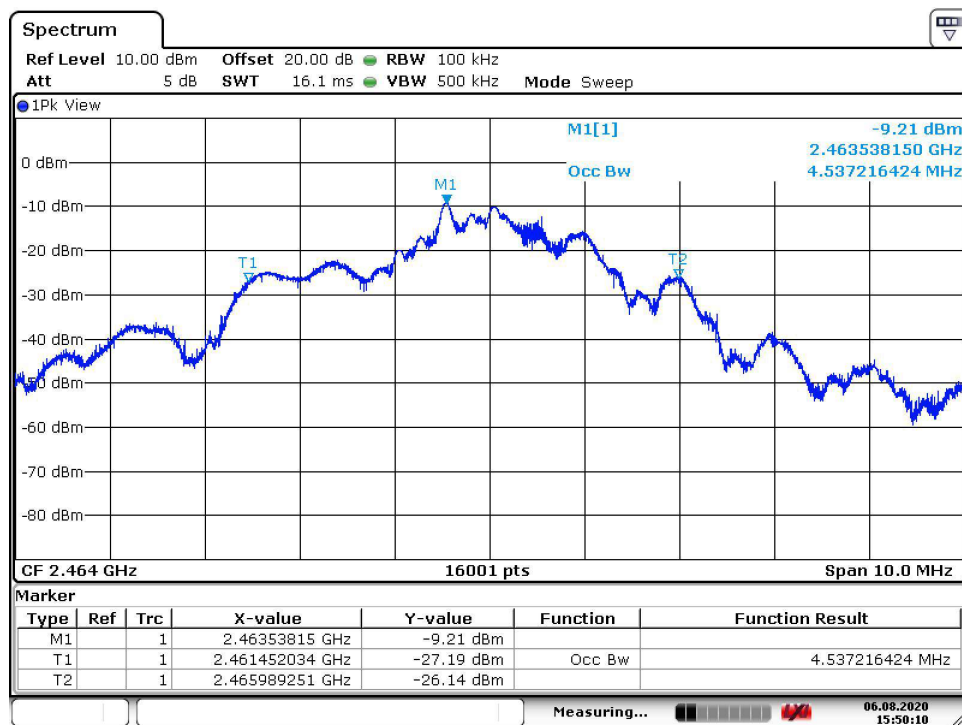
Requirement: 99% Occupied Bandwidth

Tech: CL Payne

Data Rate: 1 Mb/s

High Channel: 2464

99% Occupied Bandwidth = 4.537216424 MHz



Date: 6.AUG.2020 15:50:10

Conducted spurious emissions shall be measured for the transmit frequency, per 5.5 and 5.6, and at the maximum transmit powers.

Connect the primary antenna port through an attenuator to the spectrum analyzer input; in the results, account for all losses between the unlicensed wireless device output and the spectrum analyzer. The instrument shall span 30 MHz to 10 times the operating frequency in GHz, with a resolution bandwidth of 100 kHz, video bandwidth of 300 kHz, and a coupled sweep time with a peak detector. The band 30 MHz to the highest frequency may be split into smaller spans, as long as the entire spectrum is covered.

Requirement: FCC Part 15.247 Clause (d)

- (d) In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits.

Client: SnapRays LLC

Date: 7 Aug 2020

DNB Job: 16015

EUT: DTS Transmitter

Model No: 01CL-###-SM10

Requirement: Conducted spurious emission <20dB of peak

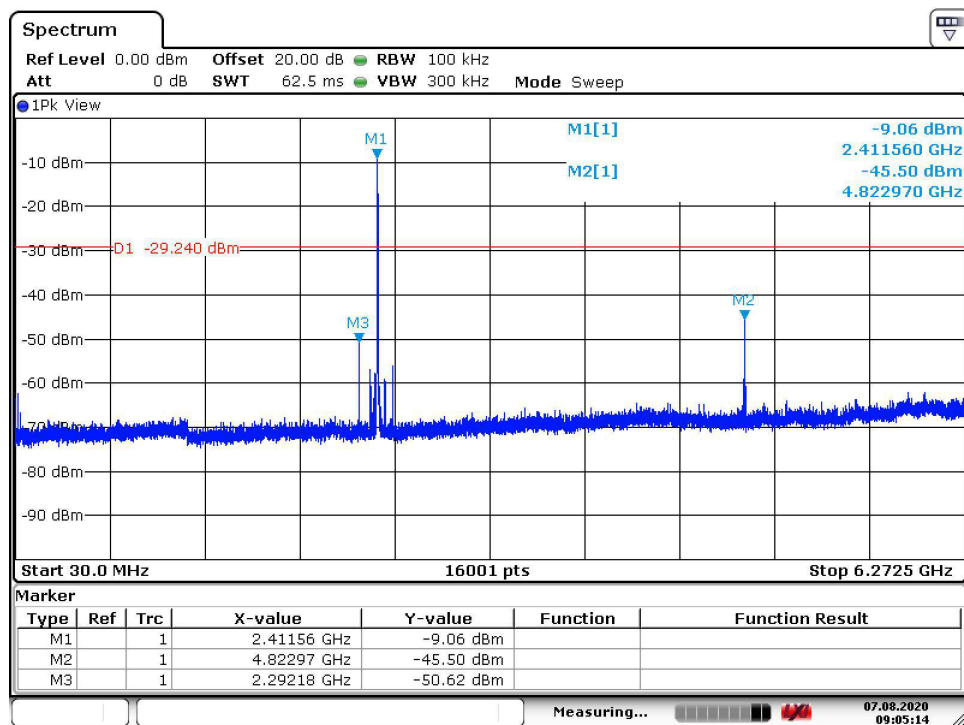
Tech: CL Payne

Data Rate: 1Mb/s Minimum PSD Reading = -9.24 dBm (Worst case)

Low Channel: 2412 MHz Requirement = -29.24 dBm

Result: Pass

Frequency range: 30MHz to 6.2725GHz



Date: 7.AUG.2020 09:05:14

Client: SnapRays LLC

Date: 7 Aug 2020

DNB Job: 16015

EUT: DTS Transmitter

Model No: 01CL-###-SM10

Requirement: Conducted spurious emission <20dB of peak

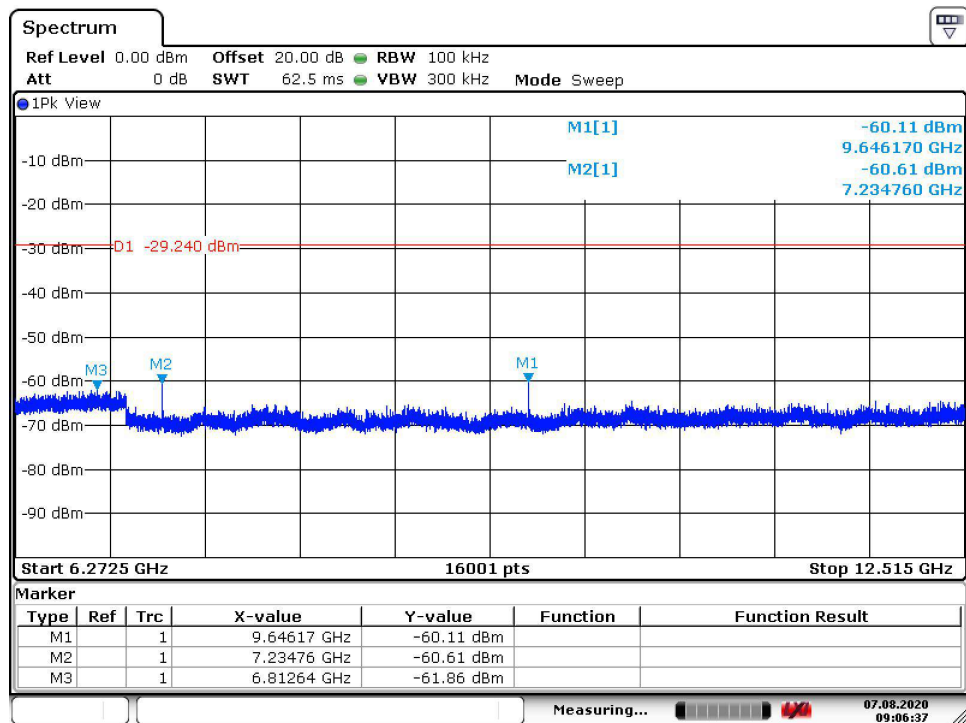
Tech: CL Payne

Data Rate: 1Mb/s Minimum PSD Reading = -9.24 dBm (Worst case)

Low Channel: 2412 MHz Requirement = -29.24 dBm

Result: Pass

Frequency range: 6.2725GHz to 12.515GHz



Date: 7.AUG.2020 09:06:37

Client: SnapRays LLC

Date: 7 Aug 2020

DNB Job: 16015

EUT: DTS Transmitter

Model No: 01CL-###-SM10

Requirement: Conducted spurious emission <20dB of peak

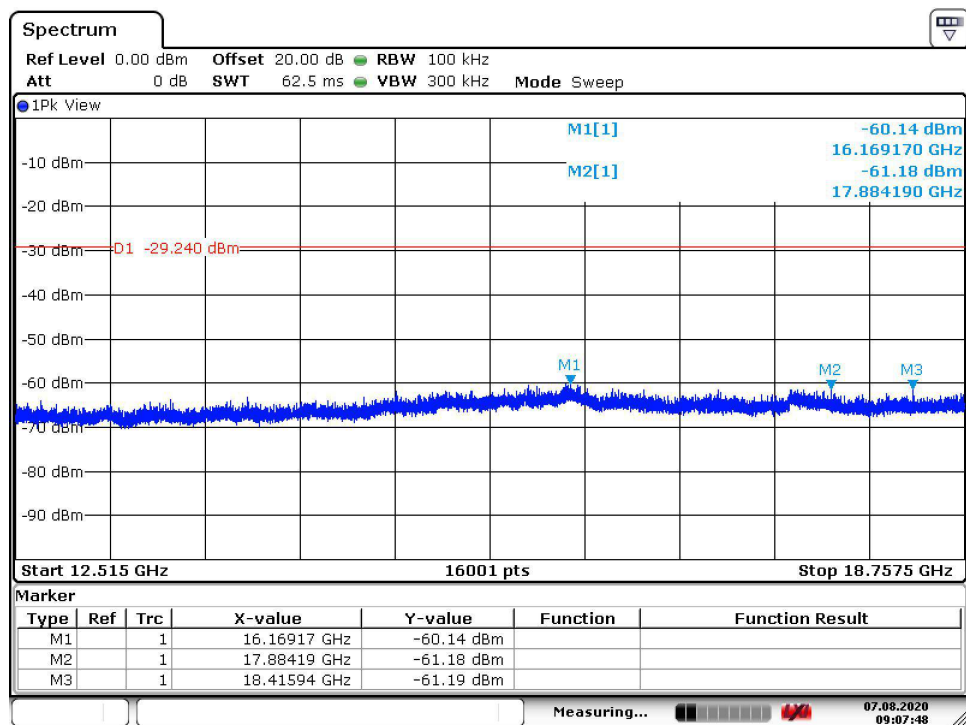
Tech: CL Payne

Data Rate: 1Mb/s Minimum PSD Reading = -9.24 dBm (Worst case)

Low Channel: 2412 MHz Requirement = -29.24 dBm

Result: Pass

Frequency range: 12.515GHz to 18.7575GHz



Date: 7.AUG.2020 09:07:48

Client: SnapRays LLC

Date: 7 Aug 2020

DNB Job: 16015

EUT: DTS Transmitter

Model No: 01CL-###-SM10

Requirement: Conducted spurious emission <20dB of peak

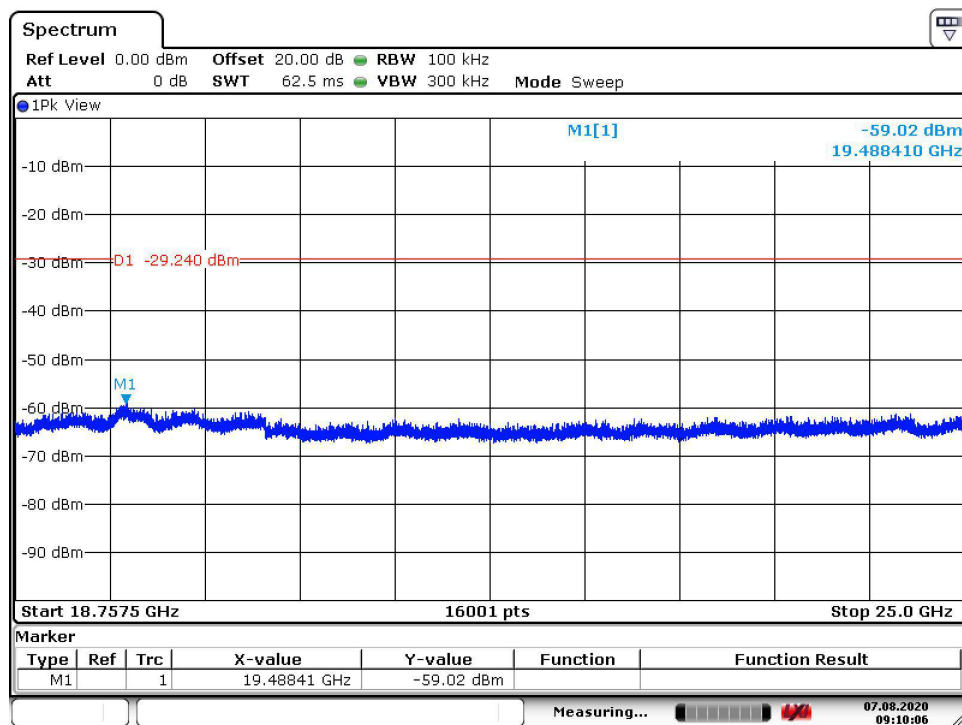
Tech: CL Payne

Data Rate: 1Mb/s Minimum PSD Reading = -9.24 dBm (Worst case)

Low Channel: 2412 MHz Requirement = -29.24 dBm

Result: Pass

Frequency range: 18.7575GHz to 25GHz



Date: 7.AUG.2020 09:10:07

Client: SnapRays LLC

Date: 7 Aug 2020

DNB Job: 16015

EUT: DTS Transmitter

Model No: 01CL-###-SM10

Requirement: Conducted spurious emission <20dB of peak

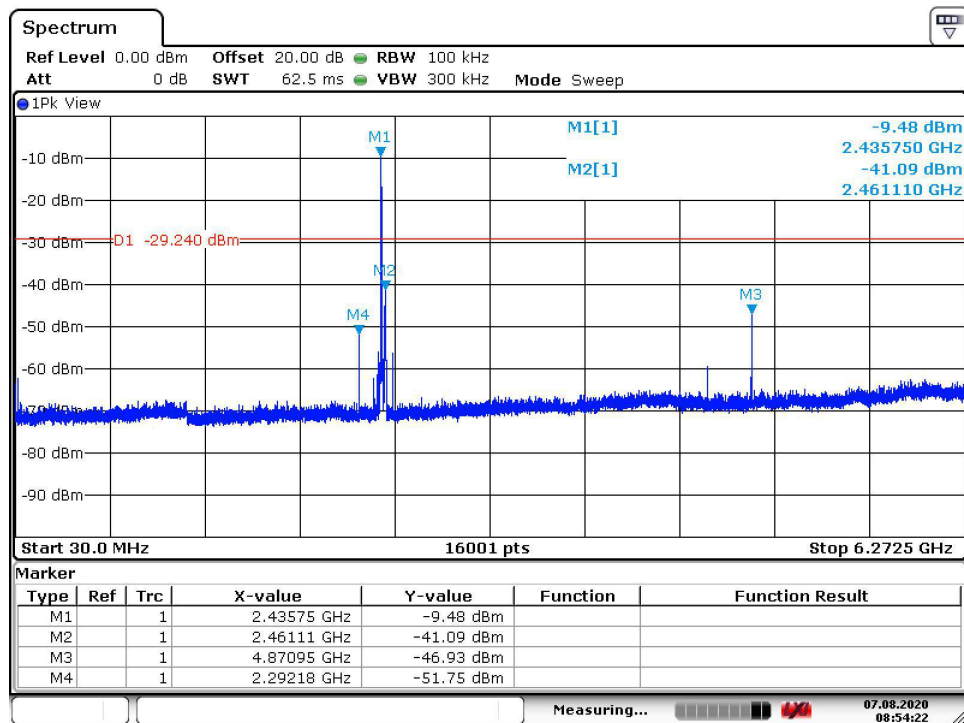
Tech: CL Payne

Data Rate: 1Mb/s Minimum PSD Reading = -9.24 dBm (Worst case)

Mid Channel: 2436 MHz Requirement = -29.24 dBm

Result: Pass

Frequency range: 30MHz to 6.2725GHz



Date: 7.AUG.2020 08:54:23

Client: SnapRays LLC

Date: 7 Aug 2020

DNB Job: 16015

EUT: DTS Transmitter

Model No: 01CL-###-SM10

Requirement: Conducted spurious emission <20dB of peak

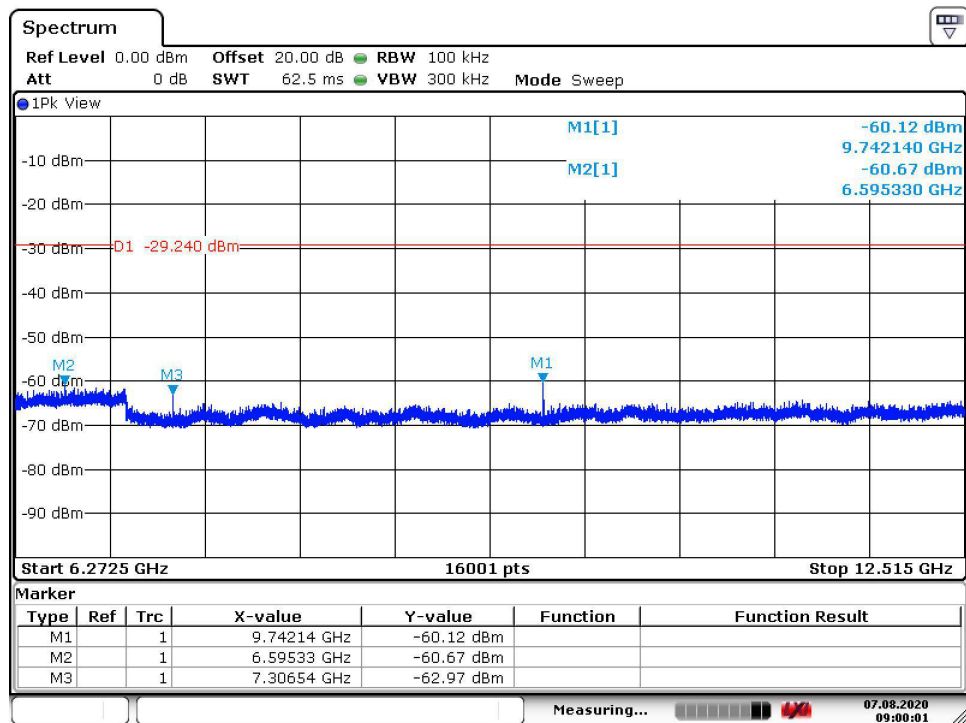
Tech: CL Payne

Data Rate: 1Mb/s Minimum PSD Reading = -9.24 dBm (Worst case)

Mid Channel: 2436 MHz Requirement = -29.24 dBm

Result: Pass

Frequency range: 6.2725GHz to 12.515GHz



Date: 7.AUG.2020 09:00:02

Client: SnapRays LLC

Date: 7 Aug 2020

DNB Job: 16015

EUT: DTS Transmitter

Model No: 01CL-###-SM10

Requirement: Conducted spurious emission <20dB of peak

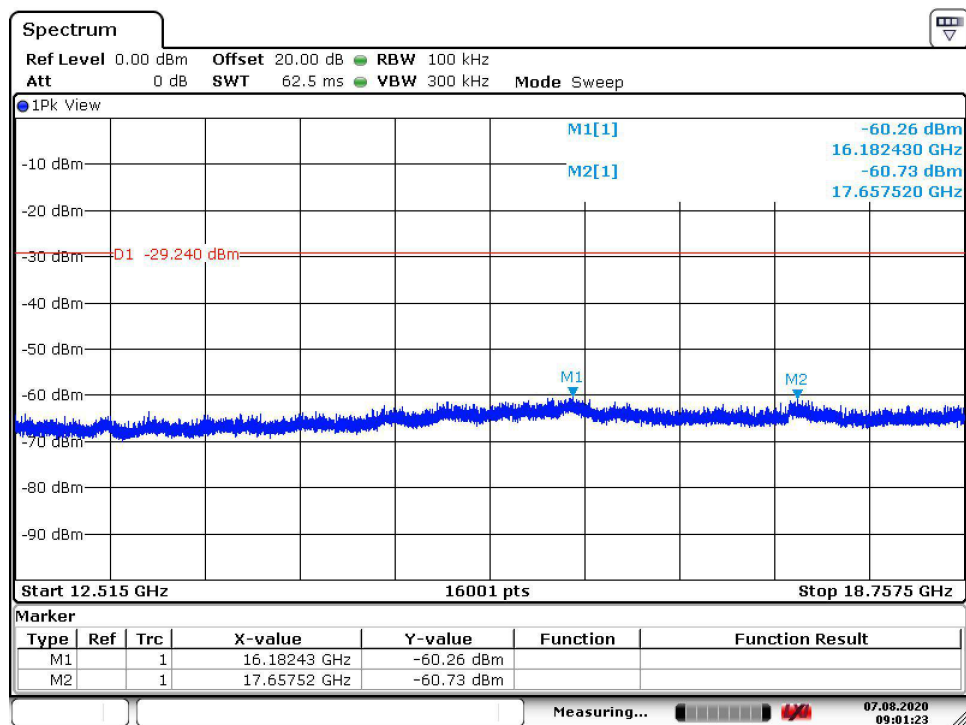
Tech: CL Payne

Data Rate: 1Mb/s Minimum PSD Reading = -9.24 dBm (Worst case)

Mid Channel: 2436 MHz Requirement = -29.24 dBm

Result: Pass

Frequency range: 12.515GHz to 18.7575GHz



Date: 7.AUG.2020 09:01:24

Client: SnapRays LLC

Date: 7 Aug 2020

DNB Job: 16015

EUT: DTS Transmitter

Model No: 01CL-###-SM10

Requirement: Conducted spurious emission <20dB of peak

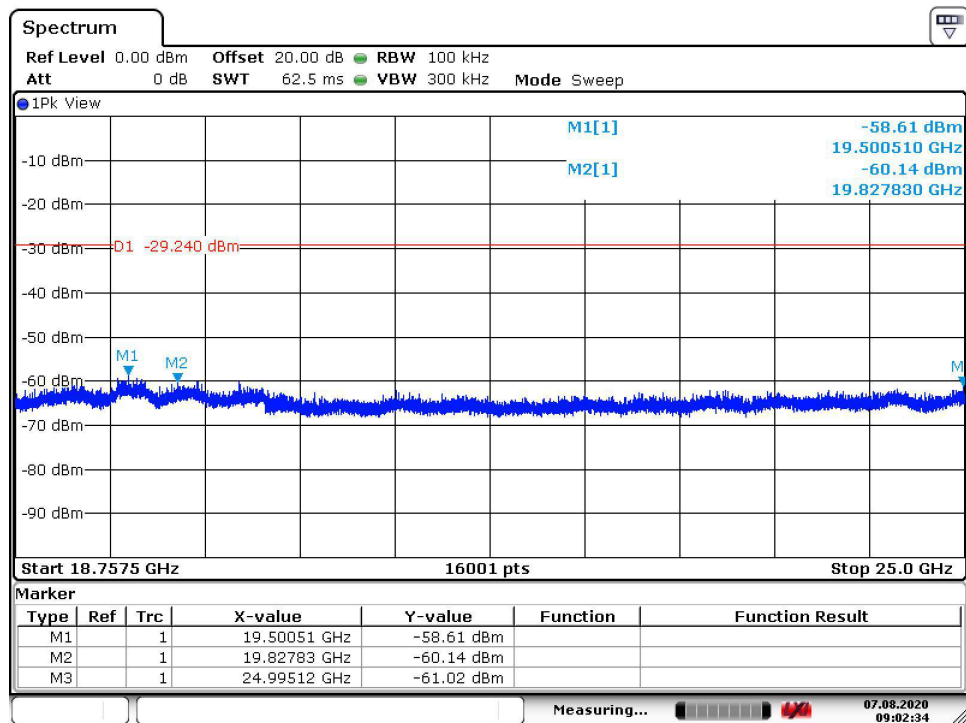
Tech: CL Payne

Data Rate: 1Mb/s Minimum PSD Reading = -9.24 dBm (Worst case)

Mid Channel: 2436 MHz Requirement = -29.24 dBm

Result: Pass

Frequency range: 18.7575GHz to 25GHz



Date: 7.AUG.2020 09:02:34

Client: SnapRays LLC

Date: 7 Aug 2020

DNB Job: 16015

EUT: DTS Transmitter

Model No: 01CL-###-SM10

Requirement: Conducted spurious emission <20dB of peak

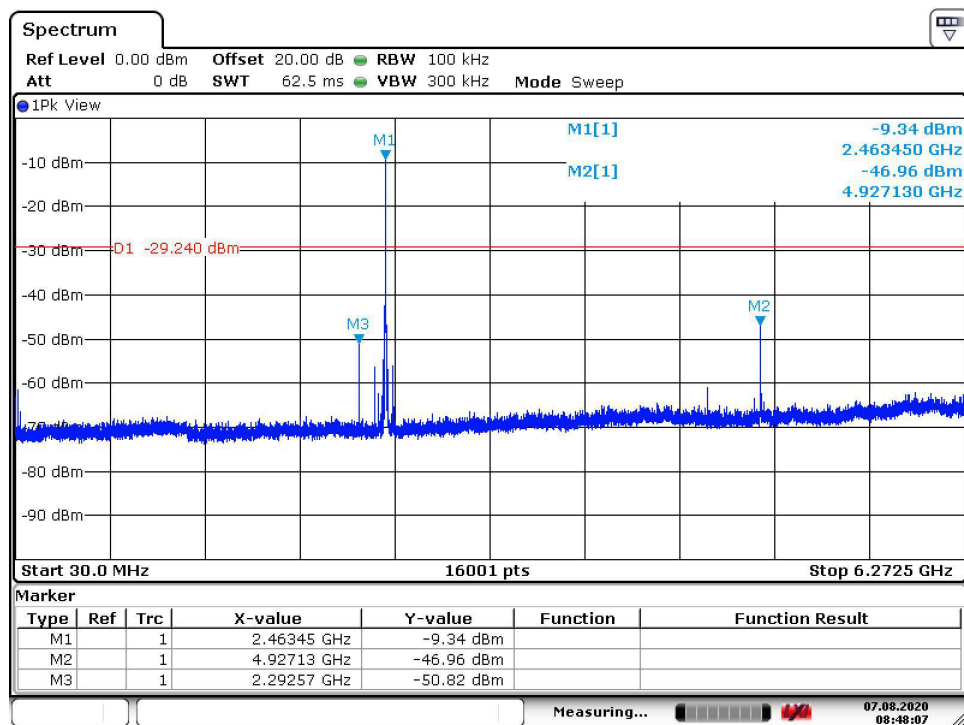
Tech: CL Payne

Data Rate: 1Mb/s Minimum PSD Reading = -9.24 dBm (Worst case)

High Channel: 2464 MHz Requirement = -29.24 dBm

Result: Pass

Frequency range: 30MHz to 6.2725GHz



Date: 7.AUG.2020 08:48:07

Client: SnapRays LLC

Date: 7 Aug 2020

DNB Job: 16015

EUT: DTS Transmitter

Model No: 01CL-###-SM10

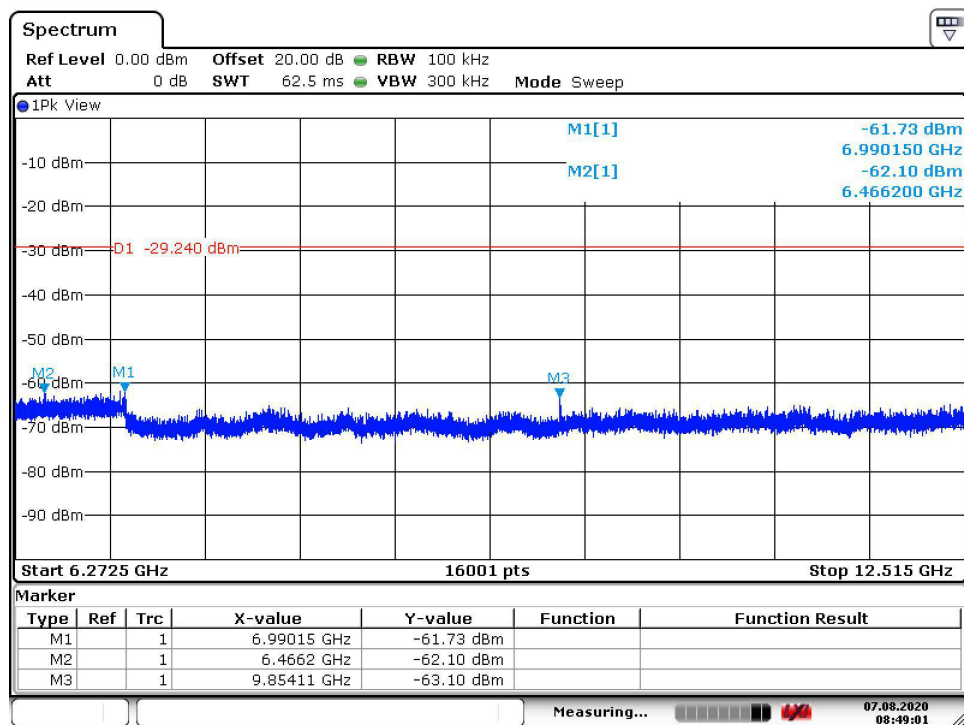
Requirement: Conducted spurious emission <20dB of peak

Tech: CL Payne

High Channel: 2464 MHz Requirement = -29.24 dBm

Result: Pass

Frequency range: 6.2725GHz to 12.515GHz



Date: 7.AUG.2020 08:49:01

Client: SnapRays LLC

Date: 7 Aug 2020

DNB Job: 16015

EUT: DTS Transmitter

Model No: 01CL-###-SM10

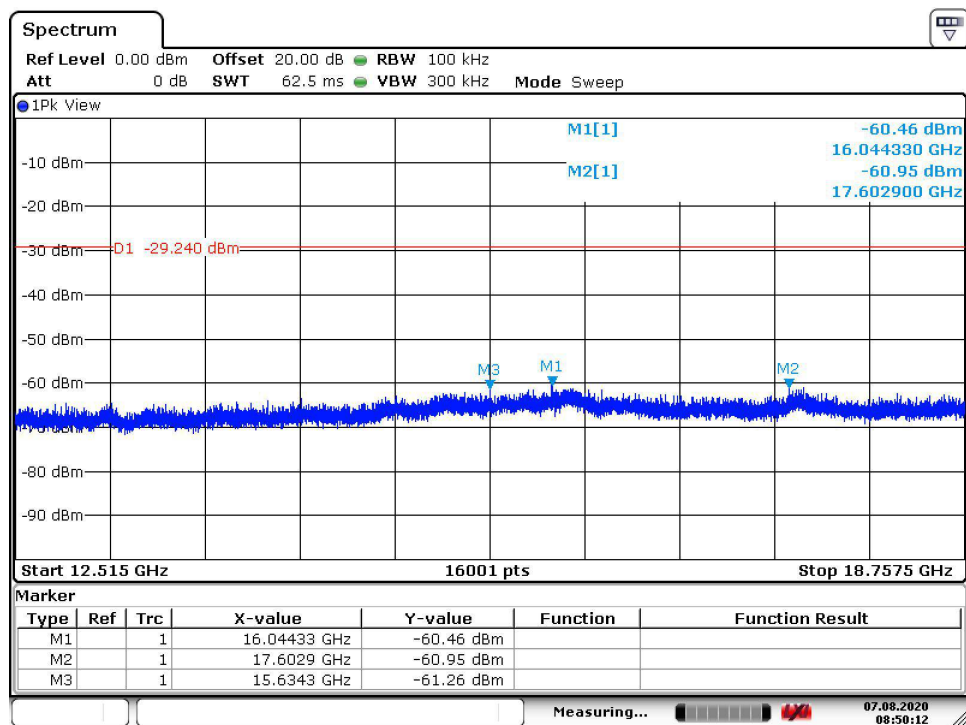
Requirement: Conducted spurious emission <20dB of peak

Tech: CL Payne

High Channel: 2464 MHz Requirement = -29.24 dBm

Result: Pass

Frequency range: 12.515GHz to 18.7575GHz



Date: 7.AUG.2020 08:50:12

Client: SnapRays LLC

Date: 7 Aug 2020

DNB Job: 16015

EUT: DTS Transmitter

Model No: 01CL-###-SM10

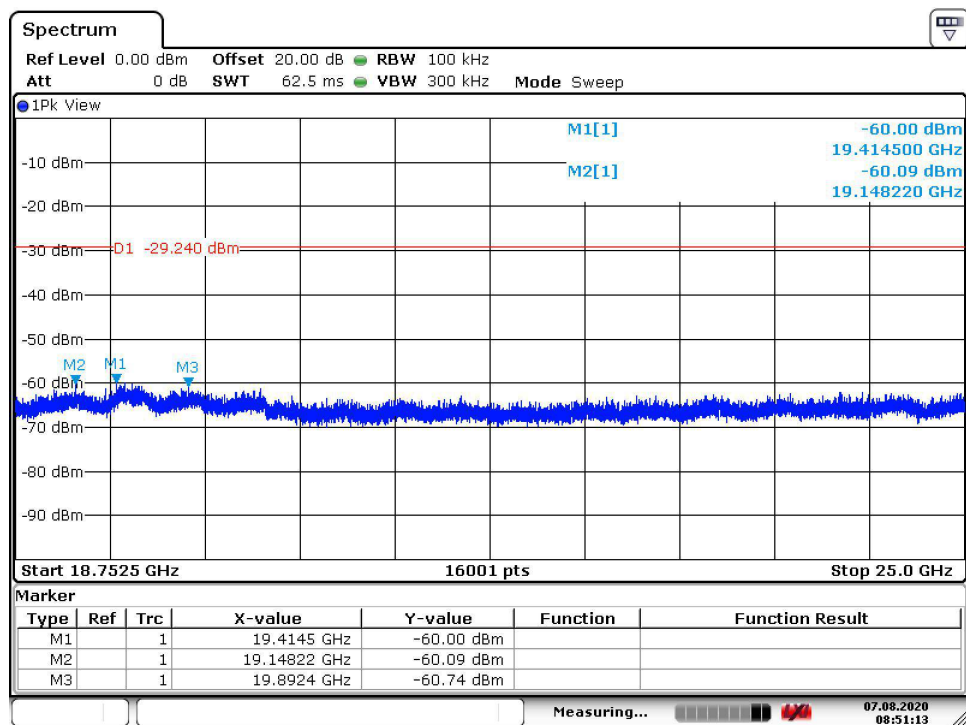
Requirement: Conducted spurious emission <20dB of peak

Tech: CL Payne

High Channel: 2464 MHz Requirement = -29.24 dBm

Result: Pass

Frequency range: 18.7575GHz to 25GHz



Date: 7.AUG.2020 08:51:13