

Test Report

Product: Vehicle interconnection decoder

Trade Mark: N/A

Model Number: SGXU2501-EVO

FCC ID: 2BR3YSGXU2501

Prepared for

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Prepared by

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TEST RESULT CERTIFICATION

Applicant's Name..... : Shenzhen Yunlu Changxing Trade Co., Ltd.
Address : Room 115, 1st Floor, Liangji Zhihui Building, No. 184, Qingquan Road, Longhua Street, Longhua District, Shenzhen
Manufacturer's Name : Shenzhen Yunlu Changxing Trade Co., Ltd.
Address : Room 115, 1st Floor, Liangji Zhihui Building, No. 184, Qingquan Road, Longhua Street, Longhua District, Shenzhen

Product description

Product name : Vehicle interconnection decoder
Model Number : SGXU2501-EVO
Standards : FCC Part 15.407
Test procedure : IEEE/ANSI C63.10-2020
789033 D02 General UNII Test Procedures New Rules v02r01

This device described above has been tested by Shenzhen HongBiao Certification& Testing Co., Ltd and the test results show that the equipment under test (EUT) is in compliance with the EMC requirements. And it is applicable only to the tested sample identified in the report.

Date of Test

Date (s) of performance of tests : Sept. 05, 2025~Sept. 18, 2025

Test Result..... : **Pass**

Testing Engineer :

Zoe Su

(Z o e S u)

Technical Manager :

Gary Lu

(G a r y L u)

Authorized Signatory :

Leo Su

(L e o S u)

[illegible]

1 General Description

1.1 Description of EUT

Product name:	Vehicle interconnection decoder
Model name:	SGXU2501-EVO
Series Model:	SGXU2501-CIC, SGXU2501-NBT, SGXU2501-LRH, SGXU2501-Q5H, SGXU2501-Q5L, SGXU2501-Q7, SGXU2501-LEX, SGXU2501-LEX-V, SGXU2501-MQB, SGXU2501-POS, SGXU2501-LRB, SGXU2501-VOL, SGXU2501-VOL-V, SGXU2501-4X, SGXU2501-5X
Different of series model:	All models of circuits and modules are the same, except for the model and accessory wires and plugs.
Frequency range:	U-NII-3: 5745 MHz to 5825 MHz
Modulation type:	802.11n/ac: OFDM(BPSK,QPSK,16QAM,64QAM,256QAM)
Transfer rate:	802.11n(HT20/HT40): MCS0-MCS7 802.11ac(VHT20): NSS1, MCS0-MCS8 802.11ac(VHT40): NSS1, MCS0-MCS9
Channel bandwidth:	802.11n: 20 MHz, 40 MHz 802.11ac: 20 MHz, 40 MHz
Antenna type:	External Antenna
Antenna gain:	6.49dBi
Max. output power:	17.25dBm
Hardware version:	V1.0
Software version:	V1.0
Battery:	N/A
Power supply:	Input: 10-14V, Rated power 12V Output: DC 5V/1A
Adapter information:	N/A

1.2 Test Mode

For 802.11n(HT20)/ ac(VHT20)

U-NII-3(5725 - 5850 MHz)		
Channel Number	Channel	Frequency (MHz)
149	Low	5745
157	Mid	5785
165	High	5825

For 802.11n (HT40)/ac (VHT40)

U-NII-3(5725 - 5850 MHz)		
Channel Number	Channel	Frequency (MHz)
151	Low	5755
159	High	5795

1.3 Operation Channel List

For U-NII-3:

20 MHz		40 MHz		80 MHz	
Channel Number	Frequency (MHz)	Channel Number	Frequency (MHz)	Channel Number	Frequency (MHz)
149	5745	151	5755	155	5775
153	5765	159	5795	--	--
157	5785	--	--	--	--
161	5805	--	--	--	--
165	5825	--	--	--	--

1.4 Test Setup

See photographs of the test setup in the report for the actual setup and connections between EUT and support equipment.

1.5 Power setting configuration parameters

During testing, Channel and Power Controlling Software provided by the customer was used to control the operating channel as well as the output power level. The RF output power selection is for the setting of RF output power expected by the customer and is going to be fixed on the firmware of the final end product. Transmitting duty cycle is no less 98%.

The software is TermAssist and SecureCRT tool Use together.

Test Items	Mode	Data Rate	TX/RX
Radiated Emissions	802.11n/ac(HT20/40)	MCSO	TX
Duty Cycle	802.11n/ac(HT20/40)	MCSO	TX
Band Edge	802.11n/ac(HT20/40)	MCSO	TX
6dB Bandwidth	802.11n/ac(HT20/40)	MCSO	TX
26dB Bandwidth and 99% Occupied Bandwidth	802.11n/ac(HT20/40)	MCSO	TX

Conducted Output Power	802.11n/ac(HT20/40)	MCSO	TX
Power Spectral Density	802.11n/ac(HT20/40)	MCSO	TX
Frequency Stability	Un-modulation	/	TX

1.6 Ancillary Equipment

Equipment	Model	S/N	Manufacturer
Laptop	BDR-WDH	A3RQPM242 0002411	Honor Terminal Co., Ltd.
Battery	6-QW-45(370)-L	2C24H6K166 0C	Camel Group Co.,Ltd.
Car accessories	/	/	/

Note: The laptop is used to assist the RF test. In order to prevent the laptop from causing unnecessary impact on the test, the laptop will be removed from the test environment after the EUT successfully transmits at a fixed frequency using the laptop.

2 Summary of Test Result

No.	Standard Section	Test Item	Result	Remark
1	15.203/15.407	Antenna Requirement	Pass	
2	15.207	Power Line Conducted Emission	N/A	
3	15.407(b) 15.209	Radiation Spurious Emission	Pass	
4	15.407(a)	RF Output Power	Pass	
5	15.407(a)	Power Spectral Density	Pass	
6	15.407(a)	26dB Emission Bandwidth and Occupied bandwidth	Pass	
7	15.407(e)	6 dB bandwidth	Pass	
8	15.407(b)	Out Of Band Emission	Pass	
9	15.407(b)	Spurious RF Conducted Emissions	Pass	
10	15.407(g)	Frequency Stability	Pass	

Note: "N/A" means the test item not applicable.

3 Test Facilities and Accreditations

3.1 Test Laboratory

Test Site	Shenzhen HongBiao Certification& Testing Co., Ltd
Test Site Location	Room 102, 201, Building 2, Yuanwanggu RFID Industrial Park, Tongguan Road, Tianliao Community, Yutang Street, Guangming District, Shenzhen, China
Telephone:	(86-755) 2998 9321
Fax:	(86-755) 2998 5110
FCC Registration No.:	CN1341
A2LA Certificate No.:	6765.01

3.2 Environmental Conditions

During the measurement the environmental conditions were within the listed ranges:

Temperature:	15°C~35°C
Relative Humidity:	20%~75%
Air Pressure:	98kPa~101kPa

3.3 Measurement Uncertainty

The reported uncertainty of measurement $y \pm U$, where expended uncertainty U is based on a standard uncertainty multiplied by a coverage factor of $k=2$, providing a level of confidence of approximately 95 %.

The data and results quoted in this document are true and accurate values, and uncertainties are not involved in the calculations.

In addition, components and mass production processes that are similar to testing equipment may introduce additional deviations, and the manufacturer is solely responsible for the continued compliance of the equipment.

Measurement Frequency Range	U, (dB)	Note
RF frequency	2×10^{-5}	
RF power, conducted	± 0.57 dB	
Conducted emission(150kHz~30MHz)	± 2.5 dB	
Radiated emission(9kHz-30MHz)	± 2.5 dB	
Radiated emission(30MHz~1GHz)	± 4.2 dB	
Radiated emission (above 1GHz)	± 4.7 dB	
Occupied Bandwidth	$\pm 3\%$	
Temperature	± 1 degree	

Humidity	± 5 %	
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3.4 Test Software

Software name	Manufacturer	Model	Version
Conducted Emission test Software	Farad	EZ-EMC	EMC-CON 3A1.1+
Radiated Emission test Software	Farad	EZ-EMC	FA-03A2
RF Test System	MWRF	MTS 8310	2.0.0.0

4 List of Test Equipment

Radiation emission							
Item	Equipment No.	Equipment name	Manufacturer	Model	Serial No.	Calibration date	Due date
1	HB-E001	Horn Antenna	Schwarzbeck	BBHA 9120D	02592	2024-05-18	2026-05-17
2	HB-E002	Biconical log-periodic composite antenna	Schwarzbeck	VULB 9168	01340	2024-05-18	2026-05-17
3	HB-E003	SHF-EHF Horn	Schwarzbeck	BBHA 9170	01193	2024-05-18	2026-05-17
4	HB-E005	Preamplifier	Noyetec	LAN-0118	NYCM1420102	2025-05-07	2026-05-06
5	HB-E006	Preamplifier	Noyetec	LAN-1840	NYCM1420103	2025-05-07	2026-05-06
6	HB-E007	EMI TEST RECEIVER	R&S	ESR7	102520	2025-05-07	2026-05-06
7	HB-E009	POSITINAL COTROLLE R	Noyetec	N/A	N/A	/	/
8	HB-E013	RF switch	Noyetec	NY-RF4	NY0CM1420204	/	/
9	HB-E066	Illuminance Tester	TASI	TA8121	N/A	2025-05-13	2026-05-12
10	HB-E075	Active loop antenna	Schwarzbeck	FMZB 1519B	1519B-245	2024-05-18	2026-05-17
11	HB-E076	Preamplifier	Hewlett Packard	8447D	1937A02278	2025-05-07	2026-05-06
Conduction emission							
Item	Equipment No.	Equipment name	Manufacturer	Model	Serial No.	Calibration date	Due date
1	HB-E014	4 Path V-LISN	Schwarzbeck	NNLK 8121	00770	2025-05-07	2026-05-06
2	HB-E015	Pulse Limiter	Schwarzbeck	VTSD 9561-F	00949	2025-05-07	2026-05-06
3	HB-E016	Absorb clamp	ZHINAN	ZN23201	N/A	2025-05-10	2026-05-09
4	HB-E059	Attenuator	Xianghua	TS2-6-1	220215166	2025-05-10	2026-05-09
5	HB-E069	EMI TEST RECEIVER	R&S	ESCI	N/A	2025-05-07	2026-05-06
RF							
Item	Equipment No.	Equipment name	Manufacturer	Model	Serial No.	Calibration date	Due date
1	HB-E041	MXG AnaioG Signal Generator	Agilent	N5181A	MY47070421	2025-05-07	2026-05-06

2	HB-E042	WIDEBAND RADIO COMMUNICA TION TESTER	R&S	CMW500	132108	2025-05-08	2026-05-07
3	HB-E043	MXG Anaio Signal Generator	Agilent	N5182A	US46240335	2025-05-08	2026-05-07
4	HB-E044	Signal& spectrum Analyzer	R&S	FSV3044	101264	2025-05-07	2026-05-06
5	HB-E045	RF Control Box	Noyetec	NY100-R FCB	N/A	2025-05-08	2026-05-07
6	HB-E058	Thermometer Clock Humidity Monitor	N/A	HTC-1S	N/A	2025-05-09	2026-05-08

Note: the calibration interval of the above test instruments is 12&24 months and the calibrations are traceable to international system unit (SI).

5 Test Item And Results

5.1 Antenna Requirement

5.1.1 Standard Requirement

15.203 requirement: For intentional device, according to 15.203: 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

5.1.2 Test Result

The antenna is External Antenna, which was permanently affixed to the device and un-replaced, complies with 15.203. In addition, the maximum antenna gain is 6.49dBi.

5.2 Power Line Conducted Emission

5.2.1 Limits

Limits – Class B		
Frequency (MHz)	Limit (dBμV)	
	Quasi-Peak	Average
0.15 to 0.5	66 to 56*	56 to 46*
0.5 to 5	56	46
5 to 30	60	50

Note:

- the tighter limit applies at the band edges.
- the limit of " * " marked band means the limitation decreases linearly with the logarithm of the frequency in the range.

5.2.2 Test Procedures

a) EUT Operating Conditions

The EUT was configured for testing in a typical fashion (as a customer would normally use it). The EUT has been programmed to continuously transmit during test. This operating condition was tested and used to collect the included data.

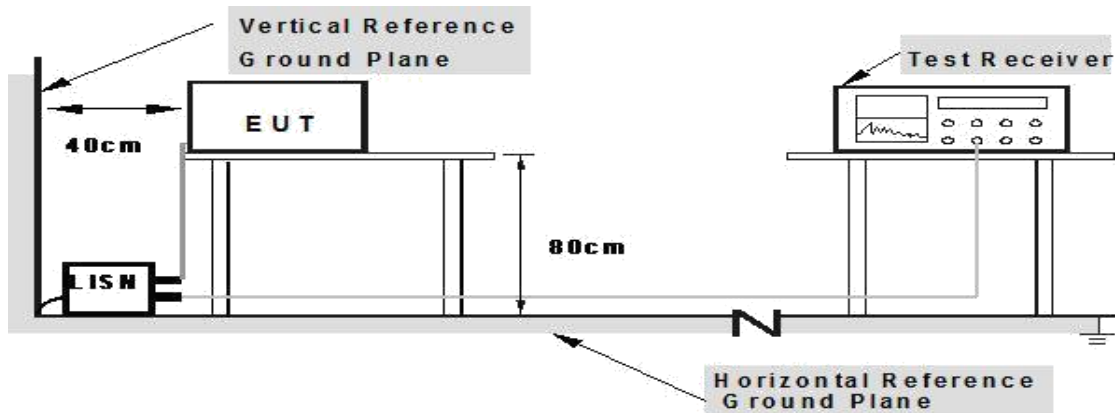
b) The following table is the setting of the receiver

Receiver Parameters	Setting
Attenuation	10 dB
Start Frequency	0.15 MHz
Stop Frequency	30 MHz
IF Bandwidth	9 kHz

- The EUT was placed 0.8 meters from the horizontal ground plane with EUT being connected to the power mains through a line impedance stabilization network (LISN). All other support equipment powered from additional LISN(s). The LISN provide 50 Ohm/ 50uH of coupling impedance for the measuring instrument.
- Interconnecting cables that hang closer than 40 cm to the ground plane shall be folded back and forth in the center forming a bundle 30 to 40 cm long.
- I/O cables that are not connected to a peripheral shall be bundled in the center. The end of the cable may be terminated, if required, using the correct terminating impedance. The overall length shall not exceed 1 m.
- LISN is at least 80 cm from nearest part of EUT chassis.
- For the actual test configuration, please refer to the related Item – photographs of the test

setup.

5.2.3 Test Setup



5.2.4 Test Result

Note: This device is powered by DC, so it is not suitable for this project.

5.3 Radiated Emission

5.3.1 Limits

1. For transmitters operating in the 5.15-5.25 GHz band:

All emissions outside of the 5.15-5.35 GHz band shall not exceed an e.i.r.p. of -27 dBm/MHz.

2. For transmitters operating in the 5.25-5.35 GHz band:

All emissions outside of the 5.15-5.35 GHz band shall not exceed an e.i.r.p. of -27 dBm/MHz.

3. For transmitters operating in the 5.47-5.725 GHz band:

All emissions outside of the 5.47-5.725 GHz band shall not exceed an e.i.r.p. of -27 dBm/MHz.

4. For transmitters operating in the 5.725-5.85 GHz band:

(i) All emissions shall be limited to a level of -27 dBm/MHz at 75 MHz or more above or below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above or below the band edge, and from 25 MHz above or below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above or below the band edge, and from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge.

(ii) Devices certified before March 2, 2017 with antenna gain greater than 10 dBi may demonstrate compliance with the emission limits in §15.247(d), but manufacturing, marketing and importing of devices certified under this alternative must cease by March 2, 2018. Devices certified before March 2, 2018 with antenna gain of 10 dBi or less may demonstrate compliance with the emission limits in §15.247(d), but manufacturing, marketing and importing of devices certified under this alternative must cease before March 2, 2020.

Frequencies (MHz)	Field Strength (microvolts/meter)	Measurement Distance (meters)
0.009~0.490	2400/F(KHz)	300
0.490~1.705	24000/F(KHz)	30
1.705~30.0	30	30
30~88	100	3
88~216	150	3
216~960	200	3
Above 960	500	3

Frequency Range	RBW	VBW	Measurement
30MHz-1GHz	1MHz	3MHz	Peak
Above 1GHz	1MHz	10Hz ^{Note1}	Average
	1MHz	>1/T ^{Note2}	Average
Note1	When duty cycle is no less than 98%		

Note2	When duty cycle is less than 98%
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Receiver Parameter	Setting
Attenuation	Auto
Start ~ Stop Frequency	9kHz~150kHz / RB 200Hz for QP
Start ~ Stop Frequency	150kHz~30MHz / RB 9kHz for QP
Start ~ Stop Frequency	30MHz~1000MHz / RB 120kHz for QP

5.3.2 Test Procedures

The measuring distance of at 3 m shall be used for measurements at frequency up to 1GHz. For frequencies above 1GHz, any suitable measuring distance may be used.

The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter open area test site. The table was rotated 360 degrees to determine the position of the highest radiation.

The height of the equipment or of the substitution antenna shall be 0.8 m; the height of the test antenna shall vary between 1 m to 4 m. Both horizontal and vertical polarizations of the antenna are set to make the measurement.

For emission measurements above 1 GHz, the EUT shall be placed at a height of 1.5 m above the floor on a support that is RF transparent for the frequencies of interest. Final measurements for the EUT require a measurement antenna height scan of 1 m to 4 m.

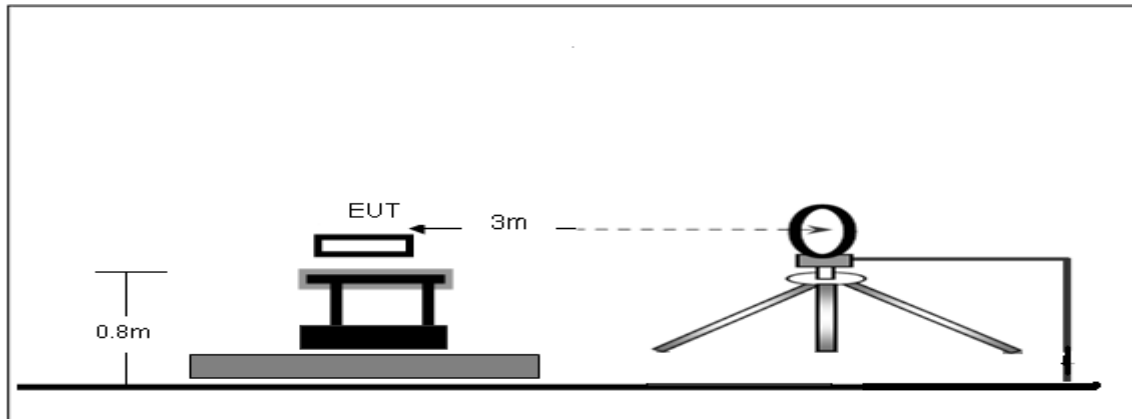
The initial step in collecting conducted emission data is a spectrum analyzer peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak detector mode re-measured.

If the Peak Mode measured value compliance with and lower than Quasi Peak Mode Limit, the EUT shall be deemed to meet QP Limits and then no additional QP Mode measurement performed. For the actual test configuration, please refer to the related Item –EUT Test Photos.

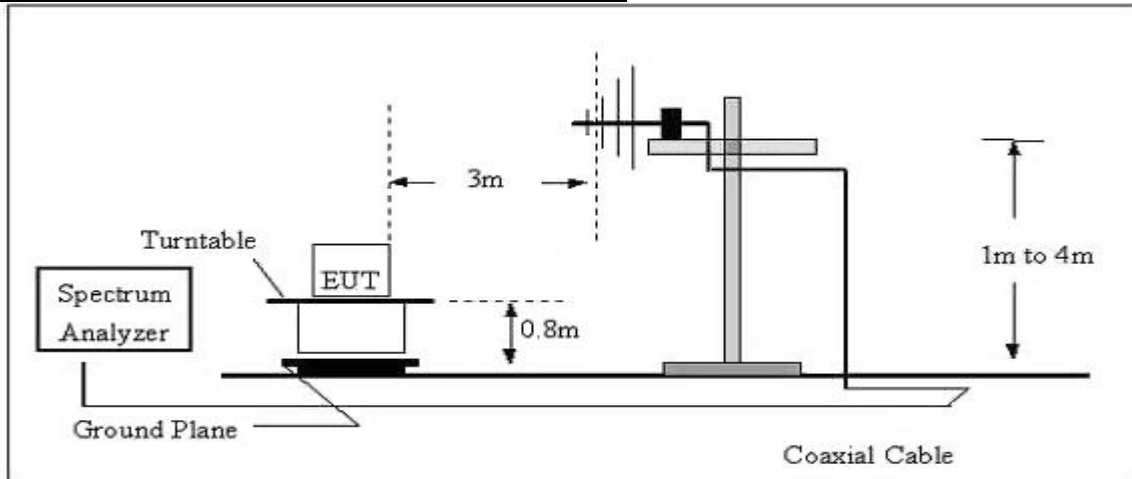
Note: Both horizontal and vertical antenna polarities were tested and performed pretest to three orthogonal axis. The worst case emissions were reported

5.3.3 Test Setup

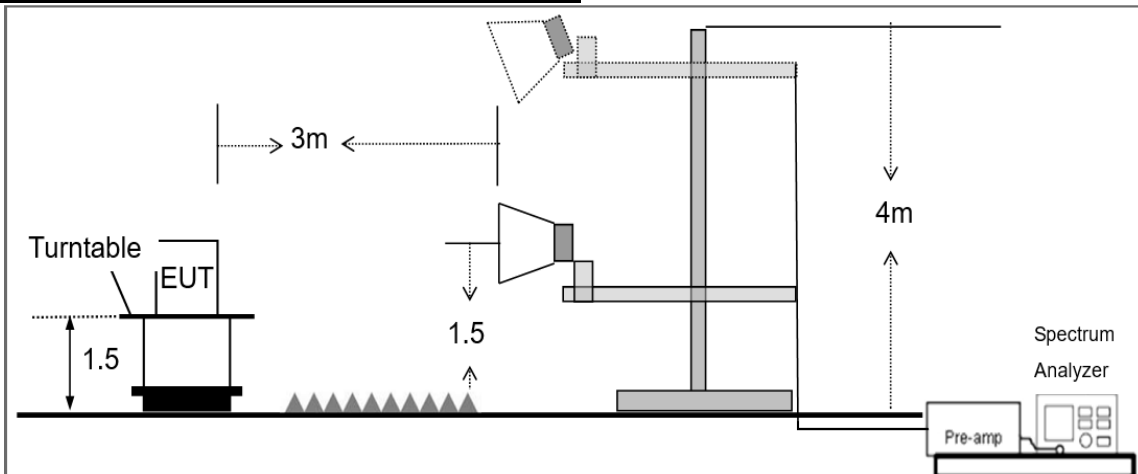
Radiated Emission Test-Up Frequency Below 30MHz



Radiated Emission Test-Up Frequency 30MHz~1GHz



Radiated emission test-up frequency above 1GHz



5.3.4 Test Result

Below 30MHz

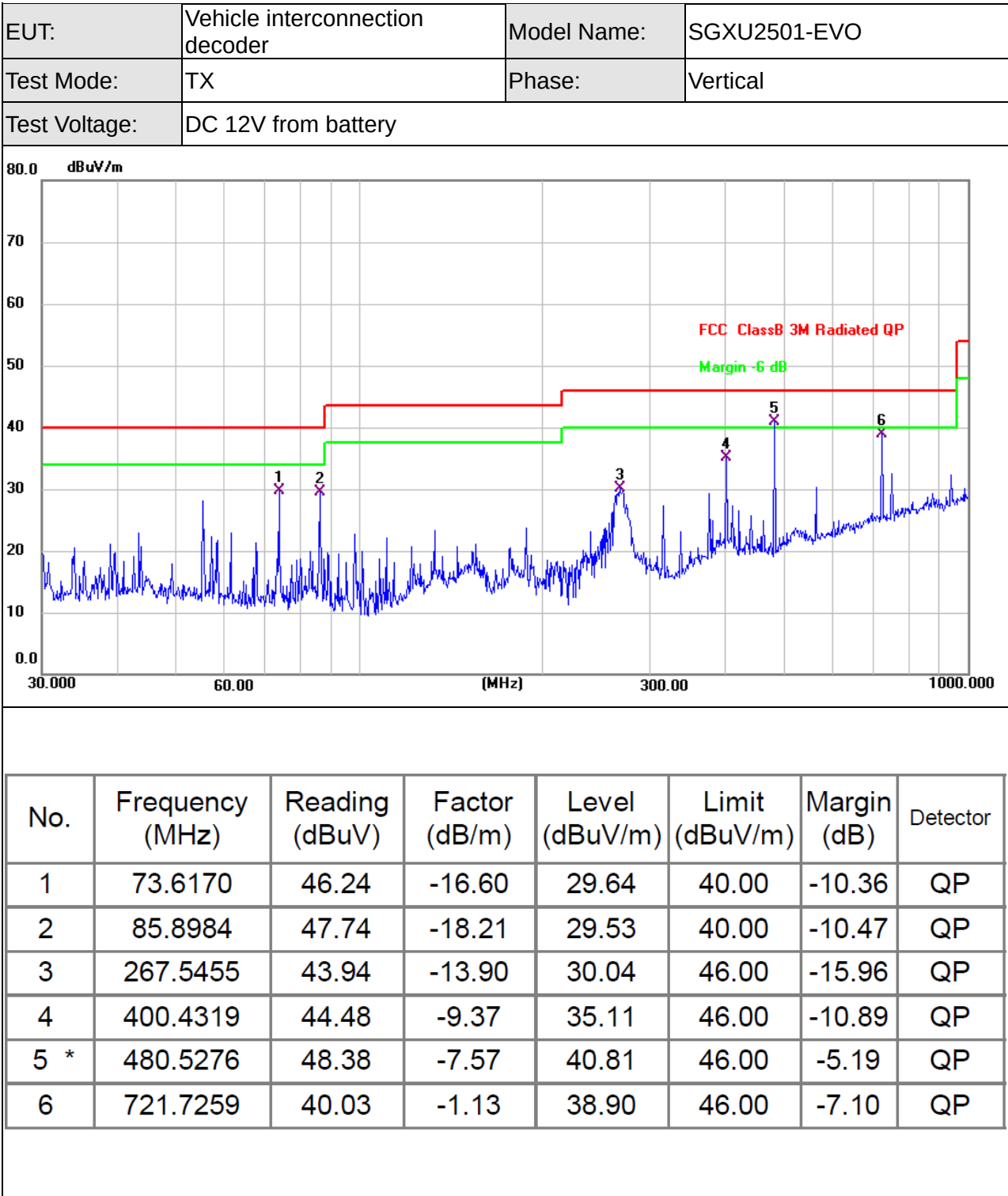
EUT:	Vehicle interconnection decoder	Model Name:	SGXU2501-EVO
Pressure:	1010 hPa	Test Voltage:	DC 12V from battery
Test Mode:	TX	Polarization:	--

Freq.	Reading	Limit	Margin	State
(MHz)	(dBuV/m)	(dBuV/m)	(dB)	P/F
--	--	--	--	Pass
--	--	--	--	Pass

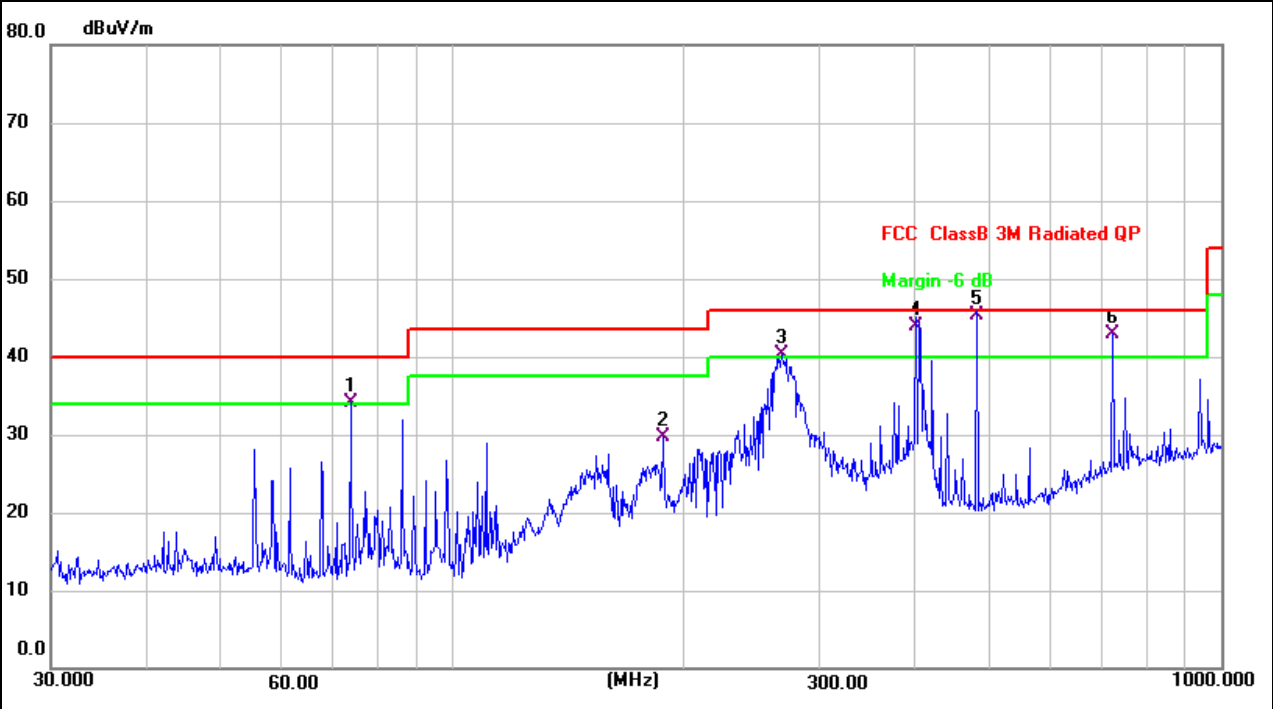
Note:

1. For 9kHz-30MHz, 18-40GHz the amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.
2. Distance extrapolation factor = $40 \log (\text{specific distance}/\text{test distance})$ (dB);
3. Limit line = specific limits (dBuV) + distance extrapolation factor.

Frequency range (30MHz – 1GHz)



EUT:	Vehicle interconnection decoder	Model Name:	SGXU2501-EVO
Test Mode:	TX	Phase:	Horizontal
Test Voltage:	DC 12V from battery		



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1 !	73.6170	50.66	-16.60	34.06	40.00	-5.94	QP
2	187.7530	45.54	-15.88	29.66	43.50	-13.84	QP
3 !	267.5455	54.23	-13.90	40.33	46.00	-5.67	QP
4 !	400.4319	53.27	-9.37	43.90	46.00	-2.10	QP
5 *	480.5276	52.97	-7.57	45.40	46.00	-0.60	QP
6 !	721.7259	44.00	-1.13	42.87	46.00	-3.13	QP

Frequency range (1GHz-40GHz)

For U-NII-3

Polar	Frequency	Meter Reading	Cable loss	Antenna Factor	Preamp Factor	Emission Level	Limits	Margin	Detector Type
(H/V)	(MHz)	(dBuV)	(dB)	dB/m	(dB)	(dBuV/m)	(dBuV/m)	(dB)	
Low Channel (5745 MHz)-Above 1G									
Vertical	4680.394	59.57	5.94	35.40	44.00	56.91	74.00	-17.09	Pk
Vertical	4680.307	45.54	5.94	35.40	44.00	42.88	54.00	-11.12	AV
Vertical	11491.531	60.61	8.46	39.75	44.50	64.32	74.00	-9.68	Pk
Vertical	11490.504	45.57	8.46	39.75	44.50	49.28	54.00	-4.72	AV
Vertical	17235.373	56.65	10.12	38.80	44.10	61.47	74.00	-12.53	Pk
Vertical	17236.915	40.73	10.12	38.80	42.70	46.95	54.00	-7.05	AV
Horizontal	4679.728	58.73	5.94	35.18	44.00	55.85	74.00	-18.15	Pk
Horizontal	4679.556	44.93	5.94	35.18	44.00	42.05	54.00	-11.95	AV
Horizontal	11492.409	59.65	8.46	38.71	44.50	62.32	74.00	-11.68	Pk
Horizontal	11491.437	46.10	8.46	38.71	44.50	48.77	54.00	-5.23	AV
Horizontal	17236.984	60.67	10.12	38.38	44.10	65.07	74.00	-8.93	Pk
Horizontal	17236.502	43.41	10.12	38.38	44.10	47.81	54.00	-6.19	AV
middle Channel (5785 MHz)-Above 1G									
Vertical	4594.343	58.43	6.48	36.35	44.05	57.21	74.00	-16.79	Pk
Vertical	4594.003	45.13	6.48	36.35	44.05	43.91	54.00	-10.09	AV
Vertical	11570.545	61.16	8.47	37.88	44.51	63.00	74.00	-11.00	Pk
Vertical	11571.036	45.59	8.47	37.88	44.51	47.43	54.00	-6.57	AV
Vertical	17356.609	57.91	10.12	38.8	44.10	62.73	74.00	-11.27	Pk
Vertical	17356.581	42.18	10.12	38.8	42.70	48.40	54.00	-5.60	AV
Horizontal	4592.838	60.89	6.48	36.37	44.05	59.69	74.00	-14.31	Pk
Horizontal	4593.435	45.40	6.48	36.37	44.05	44.20	54.00	-9.80	AV
Horizontal	11571.020	61.05	8.47	38.64	44.50	63.66	74.00	-10.34	Pk
Horizontal	11571.525	46.78	8.47	38.64	44.50	49.39	54.00	-4.61	AV
Horizontal	17355.356	61.63	10.12	38.38	44.10	66.03	74.00	-7.97	Pk
Horizontal	17355.136	45.48	10.12	38.38	44.10	49.88	54.00	-4.12	AV
High Channel (5825 MHz)-Above 1G									
Vertical	5039.771	60.09	7.10	37.24	43.50	60.93	74.00	-13.07	Pk
Vertical	5040.617	47.57	7.10	37.24	43.50	48.41	54.00	-5.59	AV
Vertical	11651.821	55.53	8.46	37.68	44.50	57.17	74.00	-16.83	Pk
Vertical	11651.250	42.63	8.46	37.68	44.50	44.27	54.00	-9.73	AV
Vertical	17476.738	61.16	10.12	38.8	44.10	65.98	74.00	-8.02	Pk
Vertical	17475.890	41.24	10.12	38.8	42.70	47.46	54.00	-6.54	AV
Horizontal	5039.370	67.97	7.10	37.24	43.50	68.81	74.00	-5.19	Pk
Horizontal	5039.790	43.03	7.10	37.24	43.50	43.87	54.00	-10.13	AV
Horizontal	11651.834	58.50	8.46	38.57	44.50	61.03	74.00	-12.97	Pk
Horizontal	11650.831	44.71	8.46	38.57	44.50	47.24	54.00	-6.76	AV
Horizontal	17476.652	60.04	10.12	38.38	44.10	64.44	74.00	-9.56	Pk
Horizontal	17475.200	45.43	10.12	38.38	44.10	49.83	54.00	-4.17	AV

Note:

All modes have been tested, and only the worst mode 802.11n20 mode is mentioned in the report.

5.3.5 Radiated Band Edge

For U-NII-3

For 802.11n20 mode: (CH149 5745MHz&CH165 5825MHz)

Polarization	Frequency (MHz)	Read Level (dBuV)	Cable loss (dB)	Antenna Factor dB/m	Preamp Factor (dB)	Emission Level (dBuV/m)	Limits (dBuV/m)	Over Limit (dB)	Detec tor Type
Horizontal	5725	68.48	8.69	29.4	42.59	63.98	74	-10.02	Pk
Horizontal	5850	65.32	9.37	30.41	43.25	61.85	74	-12.15	Pk
Vertical	5725	69.05	9.21	29.4	42.59	65.07	74	-8.93	Pk
Vertical	5850	62.09	9.12	30.41	43.25	58.37	74	-15.63	Pk
Horizontal	5725	45.92	8.69	29.4	42.59	41.42	54	-12.58	AV
Horizontal	5850	52.46	8.46	30.41	43.25	48.08	54	-5.92	AV
Vertical	5725	49.21	9.21	29.4	42.59	45.23	54	-8.77	AV
Vertical	5850	51.67	9.12	30.41	43.25	47.95	54	-6.05	AV

For 802.11n40 mode: (CH151 5755MHz&CH159 5795MHz)

Polarization	Frequency (MHz)	Read Level (dBuV)	Cable loss (dB)	Antenna Factor dB/m	Preamp Factor (dB)	Emission Level (dBuV/m)	Limits (dBuV/m)	Over Limit (dB)	Detec tor Type
Horizontal	5725	67.15	8.69	29.4	42.59	62.65	74	-11.35	Pk
Horizontal	5850	65.15	9.37	30.41	43.25	61.68	74	-12.32	Pk
Vertical	5725	68.82	9.21	29.4	42.59	64.84	74	-9.16	Pk
Vertical	5850	61.52	9.12	30.41	43.25	57.80	74	-16.20	Pk
Horizontal	5725	46.37	8.69	29.4	42.59	41.87	54	-12.13	AV
Horizontal	5850	50.70	8.46	30.41	43.25	46.32	54	-7.68	AV
Vertical	5725	49.66	9.21	29.4	42.59	45.68	54	-8.32	AV
Vertical	5850	49.71	9.12	30.41	43.25	45.99	54	-8.01	AV

For 802.11ac20 mode: (CH149 5745MHz&CH165 5825MHz)

Polarization	Frequency	Read Lavel	Cable loss	Antenna Factor	Preampl Factor	Emission Level	Limits	Over Limit	Detector Type
	(MHz)	(dBuV)	(dB)	dB/m	(dB)	(dBuV/m)	(dBuV/m)	(dB)	
Horizontal	5725	67.02	8.69	29.4	42.59	62.52	74	-11.48	Pk
Horizontal	5850	62.68	9.37	30.41	43.25	59.21	74	-14.79	Pk
Vertical	5725	70.25	9.21	29.4	42.59	66.27	74	-7.73	Pk
Vertical	5850	61.39	9.12	30.41	43.25	57.67	74	-16.33	Pk
Horizontal	5725	45.91	8.69	29.4	42.59	41.41	54	-12.59	AV
Horizontal	5850	51.51	8.46	30.41	43.25	47.13	54	-6.87	AV
Vertical	5725	49.71	9.21	29.4	42.59	45.73	54	-8.27	AV
Vertical	5850	50.42	9.12	30.41	43.25	46.70	54	-7.30	AV

For 802.11ac40 mode: (CH151 5755MHz&CH159 5795MHz)

Polarization	Frequency	Read Lavel	Cable loss	Antenna Factor	Preampl Factor	Emission Level	Limits	Over Limit	Detector Type
	(MHz)	(dBuV)	(dB)	dB/m	(dB)	(dBuV/m)	(dBuV/m)	(dB)	
Horizontal	5725	65.89	8.69	29.4	42.59	61.39	74	-12.61	Pk
Horizontal	5850	64.52	9.37	30.41	43.25	61.05	74	-12.95	Pk
Vertical	5725	69.60	9.21	29.4	42.59	65.62	74	-8.38	Pk
Vertical	5850	59.54	9.12	30.41	43.25	55.82	74	-18.18	Pk
Horizontal	5725	46.58	8.69	29.4	42.59	42.08	54	-11.92	AV
Horizontal	5850	50.53	8.46	30.41	43.25	46.15	54	-7.85	AV
Vertical	5725	50.02	9.21	29.4	42.59	46.04	54	-7.96	AV
Vertical	5850	51.93	9.12	30.41	43.25	48.21	54	-5.79	AV

5.4 Peak Output Power

5.4.1 Limit

For client devices in the 5.15-5.25 GHz band, the maximum conducted output power over the frequency band of operation shall not exceed 250 mW provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

For the 5.25-5.35 GHz and 5.47-5.725 GHz band

For the 5.25-5.35 GHz and 5.47-5.725 GHz bands, the maximum conducted output power over the frequency bands of operation shall not exceed the lesser of 250 mW or $11 \text{ dBm} + 10 \log B$, where B is the 26 dB emission bandwidth in megahertz. In addition, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

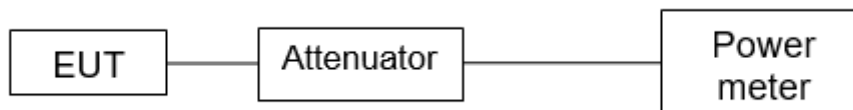
For the band 5.725-5.85 GHz

The maximum conducted output power over the frequency band of operation shall not exceed 1 W. If transmitting antennas of directional gain greater than 6 dBi are used, the maximum conducted output power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

5.4.2 Test Procedure

The maximum peak conducted output power may be measured using a broadband Average RF power meter. The power meter shall have a video bandwidth that is greater than or equal to the emission bandwidth and utilize a fast-responding diode detector.

5.4.3 Test Setup



5.4.4 Test Results

EUT:	Vehicle interconnection decoder	Model Name:	SGXU2501-EVO
Test Mode:	TX	Test Voltage:	DC 12V from battery

Directional gain and the maximum output power limit:

Frequency Band	Gain (dBi)	Correlated chins directional gain(dBi)	Conducted Power Limit (dBm)
U-NII-3	6.49	6.49	29.51

Note: Basic methodology with N_{ANT} transmit antennas, each with the same directional gain G_{ANT} dBi, being driven by N_{ANT} transmitter outputs of equal power.

Directional gain is to be computed as follows:

Directional gain = $G_{ANT} + 10 \log(N_{ANT})$ dBi

The limit should be calculated as below: Limit = $30 - (\text{Directional gain} - 6) = 29.51 \text{ dBm}$

For U-NII-3

Modulation mode	Test Channel	Frequency(MHz)	Average Conducted Power	Limit (dBm)
			(dBm)	
11n (HT20)	CH149	5745	16.38	29.51
11n (HT20)	CH157	5785	17.44	29.51
11n (HT20)	CH165	5825	17.43	29.51
11n (HT40)	CH151	5755	17.66	29.51
11n (HT40)	CH159	5795	17.76	29.51
11ac (VHT20)	CH149	5745	16.44	29.51
11ac (VHT20)	CH157	5785	17.42	29.51
11ac (VHT20)	CH165	5825	17.59	29.51
11ac (VHT40)	CH151	5755	17.39	29.51
11ac (VHT40)	CH159	5795	18.71	29.51

5.5 Power Spectral Density

5.5.1 Limit

For the band 5.15-5.25 GHz

For client devices in the 5.15-5.25 GHz band, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

For the band 5.25-5.35 GHz and 5.47-5.725 GHz

The maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

For the band 5.725-5.85 GHz

The maximum power spectral density shall not exceed 30 dBm in any 500-kHz band. If transmitting antennas of directional gain greater than 6 dBi are used, the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

5.5.2 Test Procedure

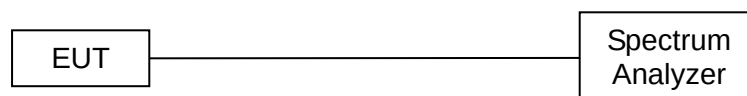
For U-NII-1

1. Set analyzer center frequency to NII channel center frequency.
2. Set the RBW $\geq$ 1MHz.
3. Set the VBW $\geq$ 3 x RBW.
4. Detector = RMS.
5. Sweep time = auto couple.
6. Trace mode = max hold.
7. Allow trace to fully stabilize.
8. Use the peak marker function to determine the maximum amplitude level.

For U-NII-3

1. Set analyzer center frequency to NII channel center frequency.
2. Set the RBW $\geq$ 500kHz.
3. Set the VBW $\geq$ 3 x RBW.
4. Detector = RMS.
5. Sweep time = auto couple.
6. Trace mode = max hold.
7. Allow trace to fully stabilize.
8. Use the peak marker function to determine the maximum amplitude level.

5.5.3 Test Setup



5.5.4 Test Results

EUT:	Vehicle interconnection decoder	Model Name:	SGXU2501-EVO
Test Mode:	TX	Test Voltage:	DC 12V from battery

Directional gain and the maximum output power limit:

Frequency Band	Gain (dBi)	Correlated chins directional gain(dBi)	PSD Limit (dBm/MHz)
U-NII-3	6.49	6.49	29.51

Note: Basic methodology with N_{ANT} transmit antennas, each with the same directional gain G_{ANT} dBi, being driven by N_{ANT} transmitter outputs of equal power.

Directional gain is to be computed as follows:

Directional gain = $G_{ANT} + 10 \log(N_{ANT})$ dBi

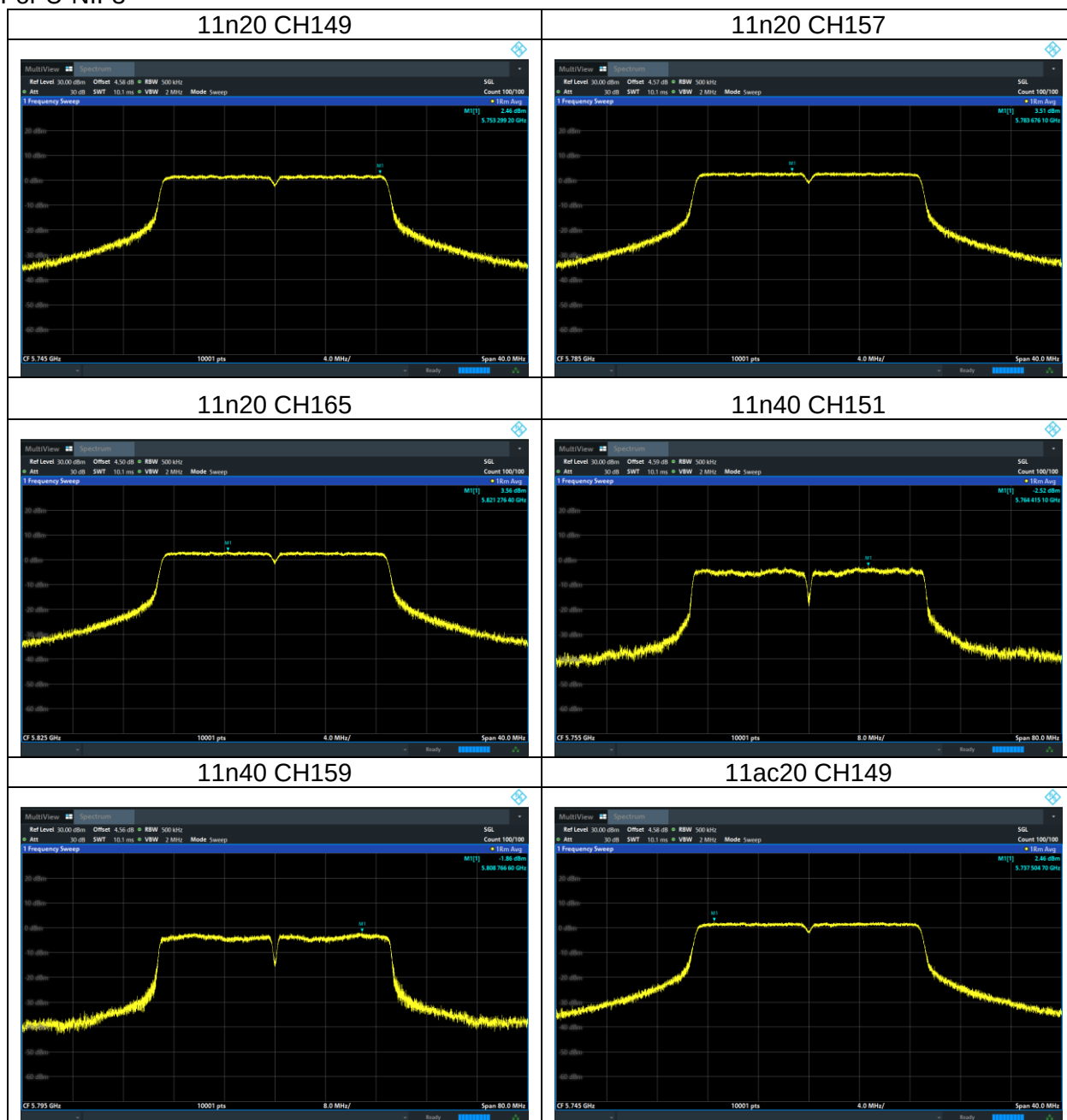
The limit should be calculated as below: Limit = $30 - (\text{Directional gain} - 6) = 29.51\text{dbm}$

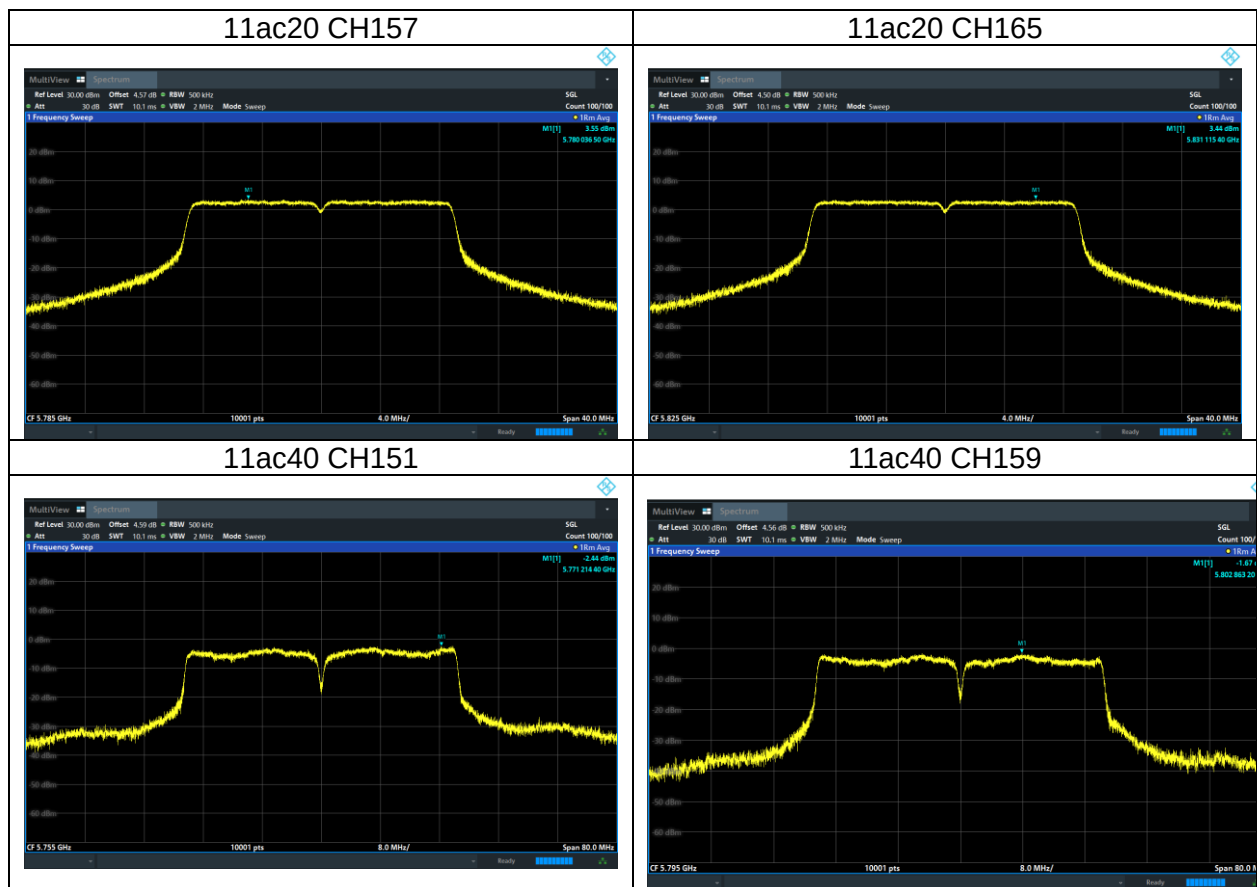
For U-NII-3

Mode	Channel	Frequency (MHz)	Conducted PSD (dBm)	Duty Factor (dB)	Total PSD (dBm)	Limit (dBm/MHz)	Result
11n(HT20)	CH149	5745	2.46	0.34	2.8	29.51	Pass
11n(HT20)	CH157	5785	3.51	0.34	3.85	29.51	Pass
11n(HT20)	CH165	5825	3.56	0.34	3.9	29.51	Pass
11n(HT40)	CH151	5755	-2.52	4.16	1.64	29.51	Pass
11n(HT40)	CH159	5795	-1.86	4.13	2.27	29.51	Pass
11ac(VHT20)	CH149	5745	2.46	0.34	2.8	29.51	Pass
11ac(VHT20)	CH157	5785	3.55	0.33	3.88	29.51	Pass
11ac(VHT20)	CH165	5825	3.44	0.34	3.78	29.51	Pass
11ac(VHT40)	CH151	5755	-2.44	4.12	1.68	29.51	Pass
11ac(VHT40)	CH159	5795	-1.67	4.14	2.47	29.51	Pass

Test plots

For U-NII-3





5.6 26dB Emission Bandwidth and Occupied bandwidth

5.6.1 Limit

For purposes of this subpart the emission bandwidth shall be determined by measuring the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, that are 26 dB down relative to the maximum level of the modulated carrier

5.6.2 Test Procedure

26dB Emission bandwidth

Set RBW = approximately 1% of the emission bandwidth.

Set VBW $\geq 3 \times \text{RBW}$

Detector = Peak.

Trace mode = Max hold.

Measure the maximum width of the emission that is 26 dB down from the peak of the emission.

Occupied Bandwidth

Set Span = 1.5 times to 5.0 times the OBW

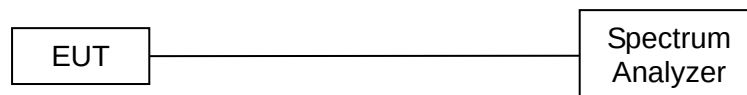
Set RBW = 1% to 5% of the OBW.

Set VBW $\geq 3 \times \text{RBW}$, Detector = Peak.

Trace mode = Max hold.

Use the 99% power bandwidth function of the instrument.

5.6.3 Test Setup

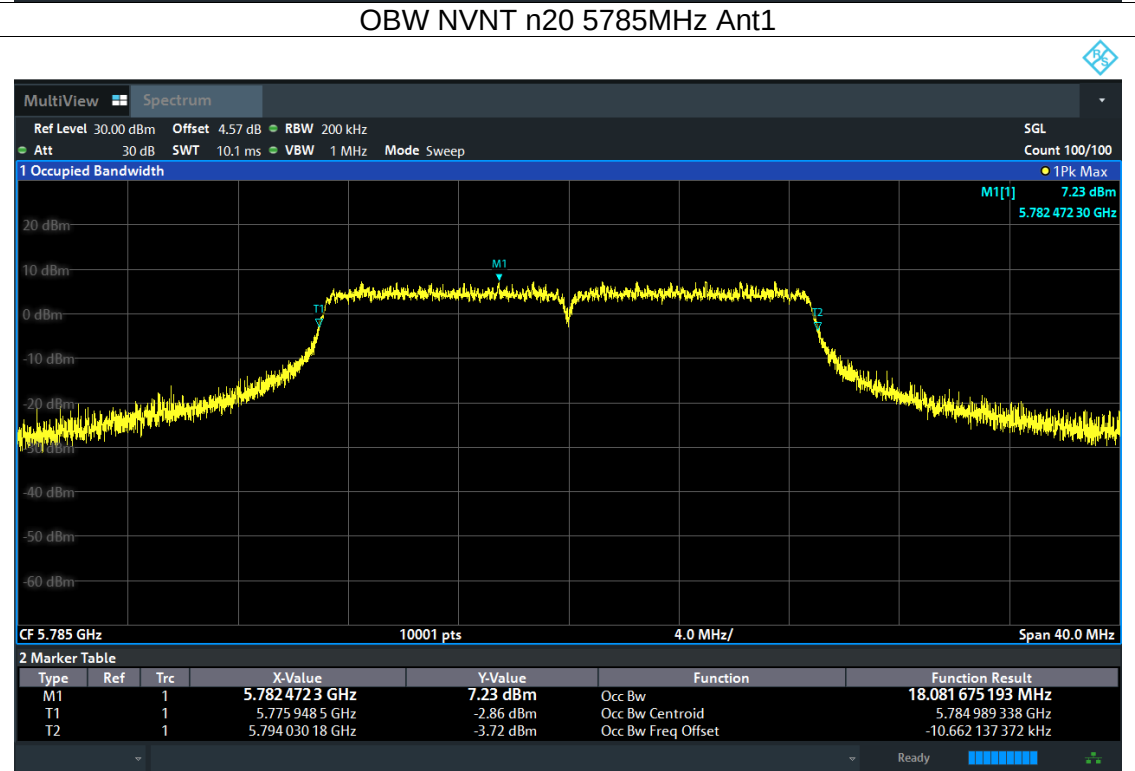
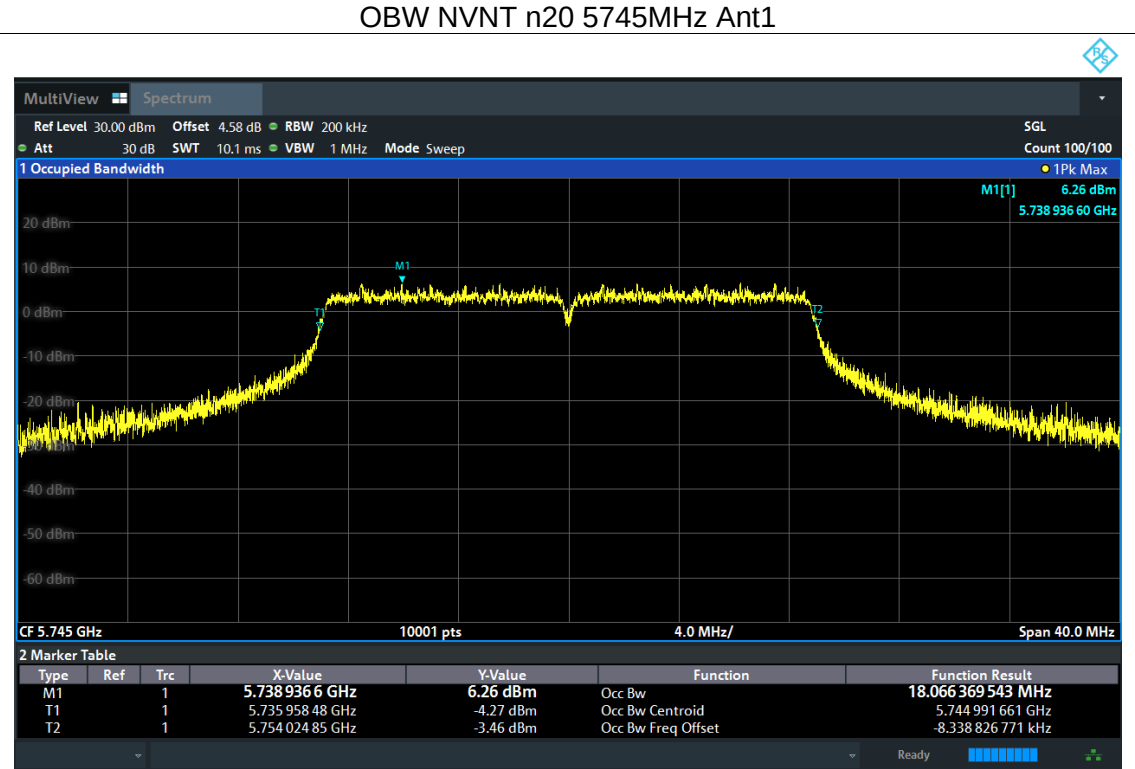


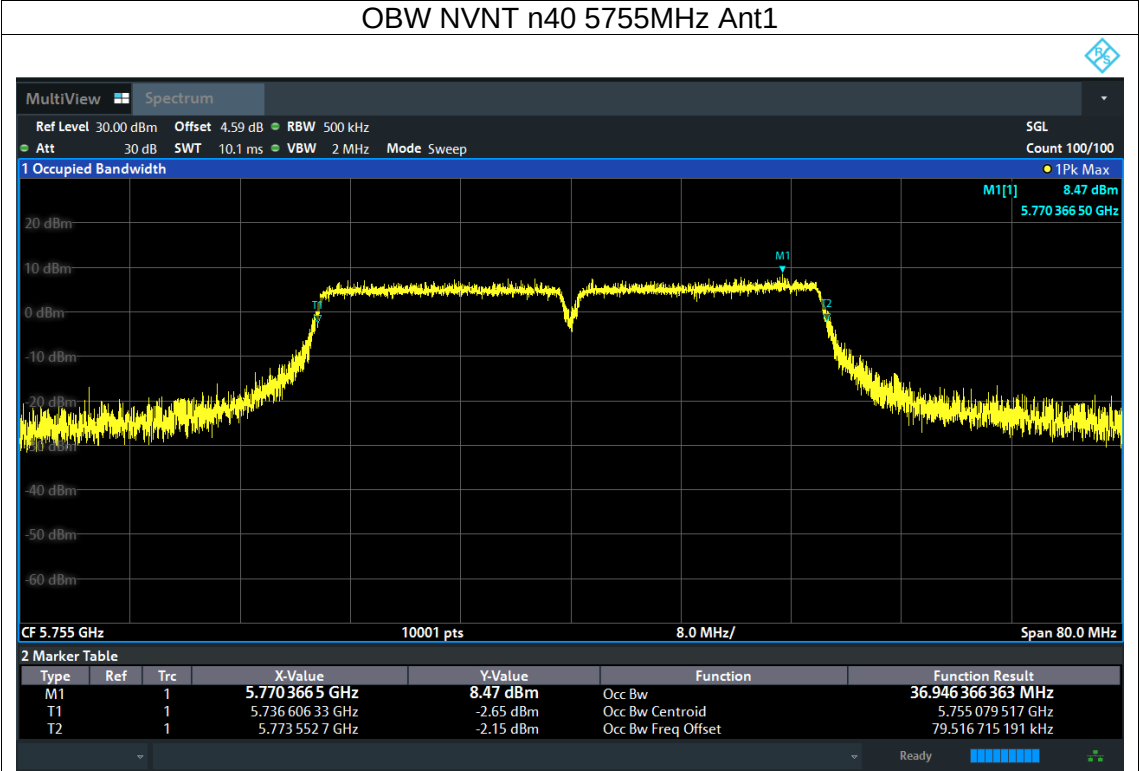
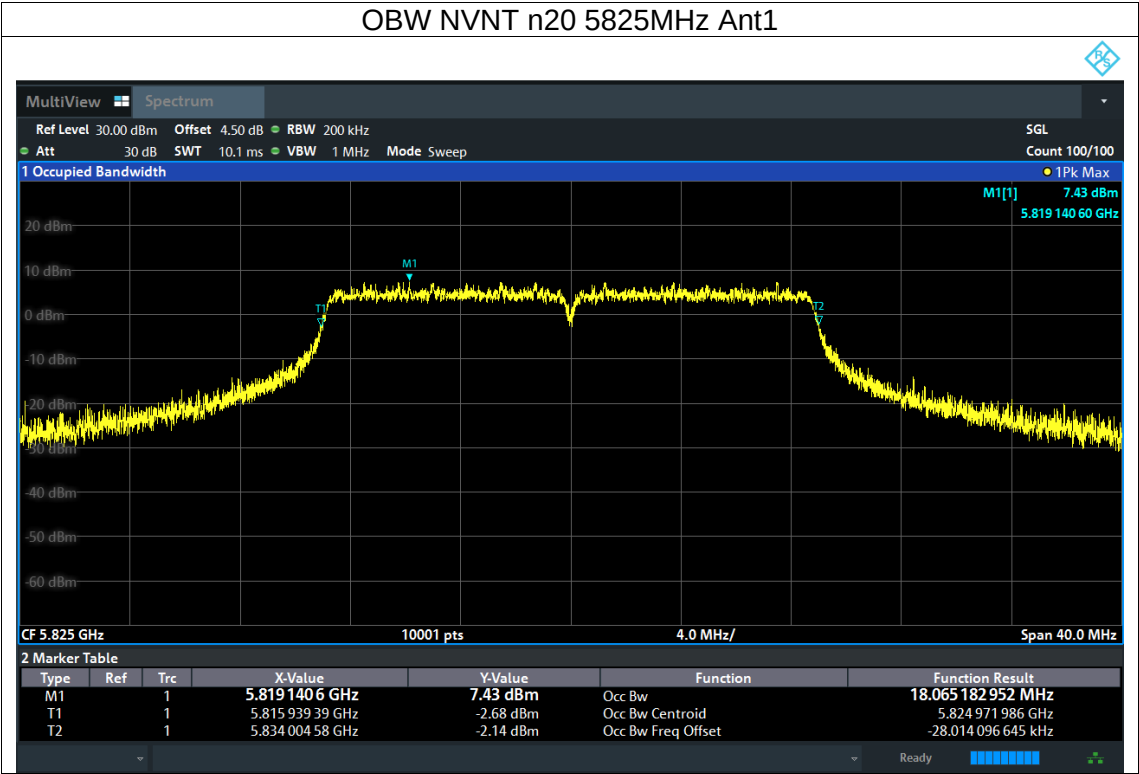
5.6.4 Test Results

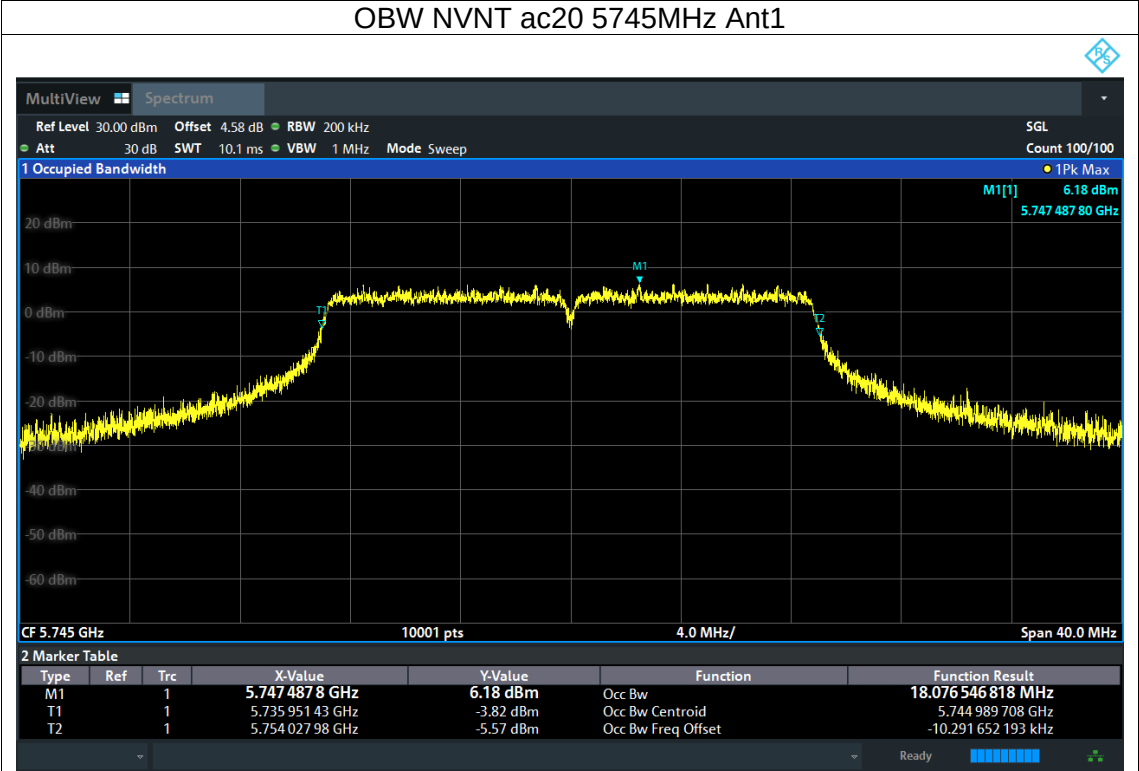
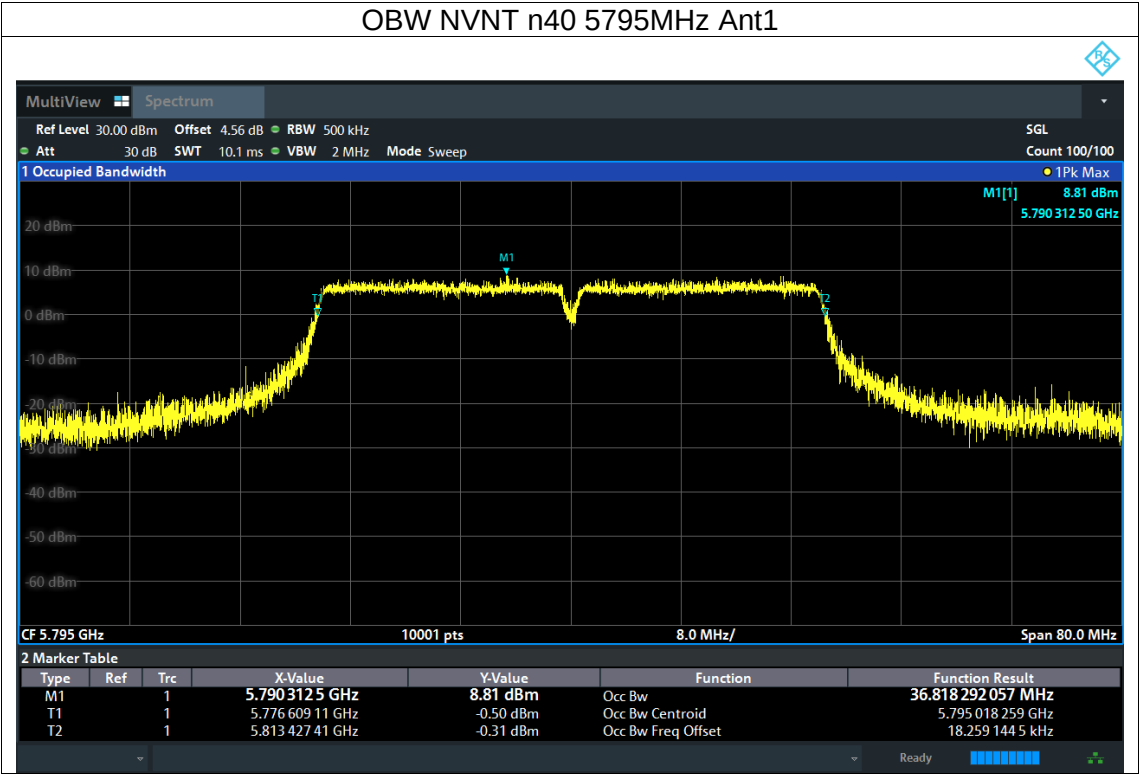
For U-NII-3

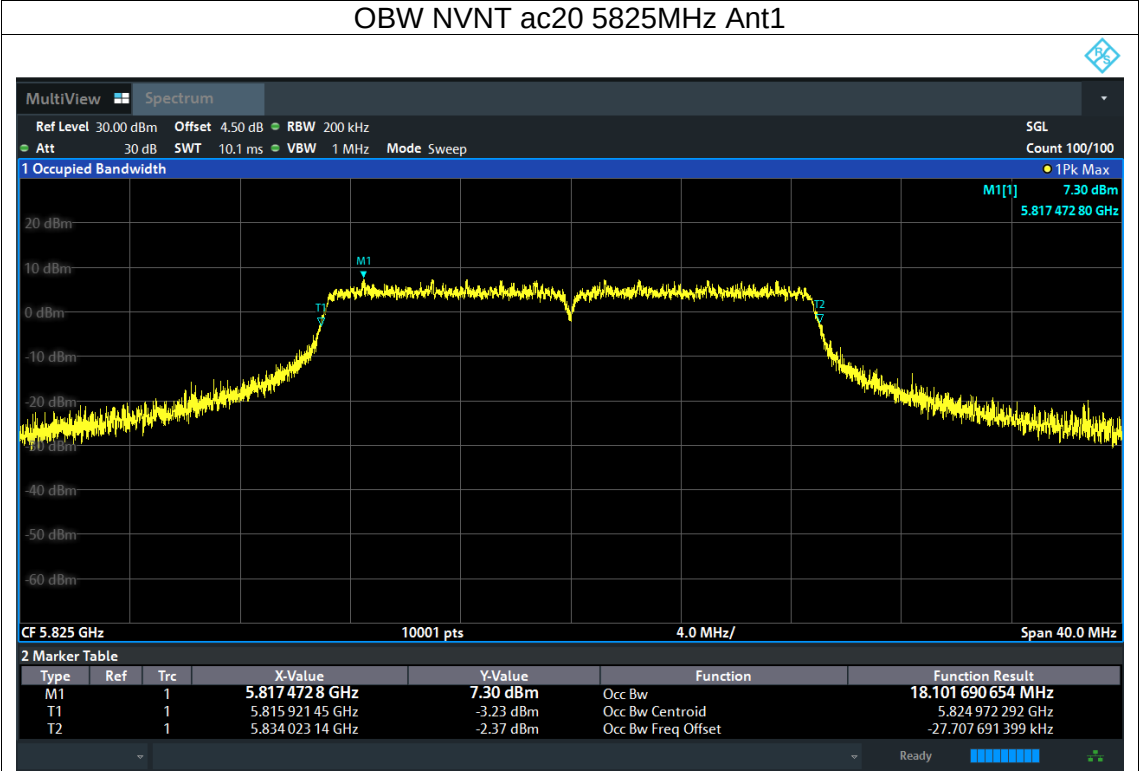
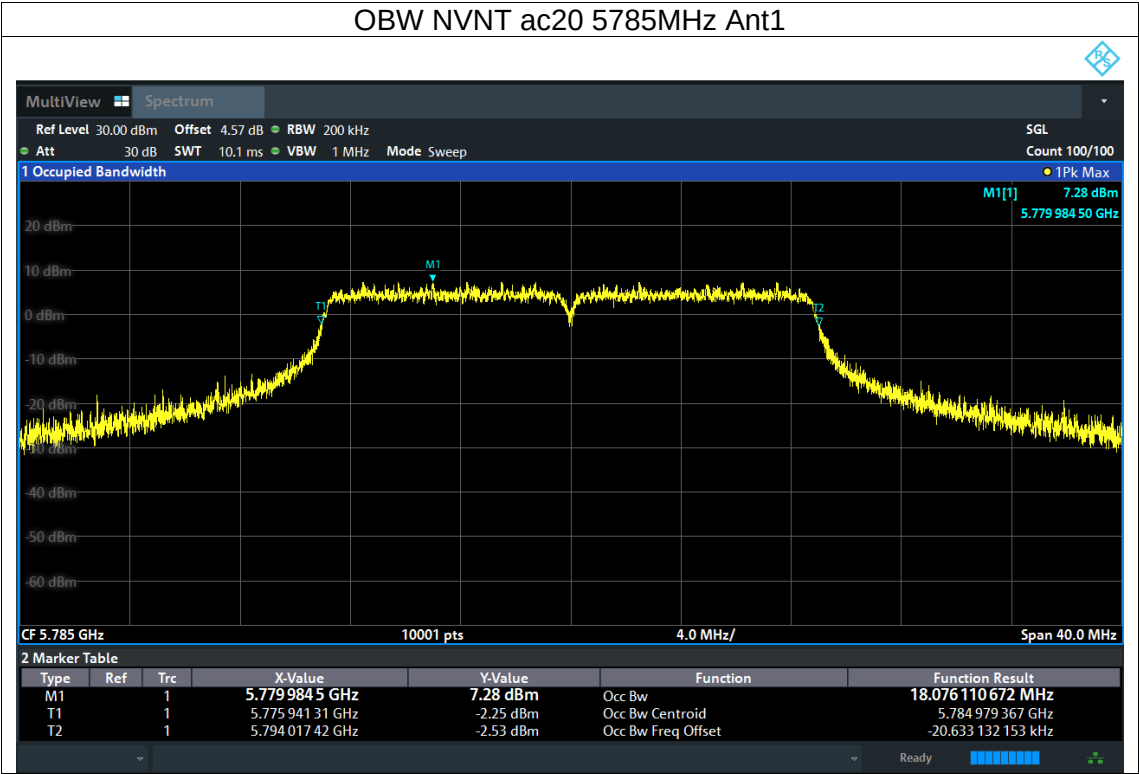
Channel	Frequency (MHz)	99% bandwidth	Limit (kHz)	Result
11n (HT20)	5745	18.066	/	Pass
11n (HT20)	5785	18.082	/	Pass
11n (HT20)	5825	18.065	/	Pass
11n (HT40)	5755	36.946	/	Pass
11n (HT40)	5795	36.818	/	Pass
11ac (VHT20)	5745	18.077	/	Pass
11ac (VHT20)	5785	18.076	/	Pass
11ac (VHT20)	5825	18.102	/	Pass
11ac (VHT40)	5755	37.528	/	Pass
11ac (VHT40)	5795	36.908	/	Pass

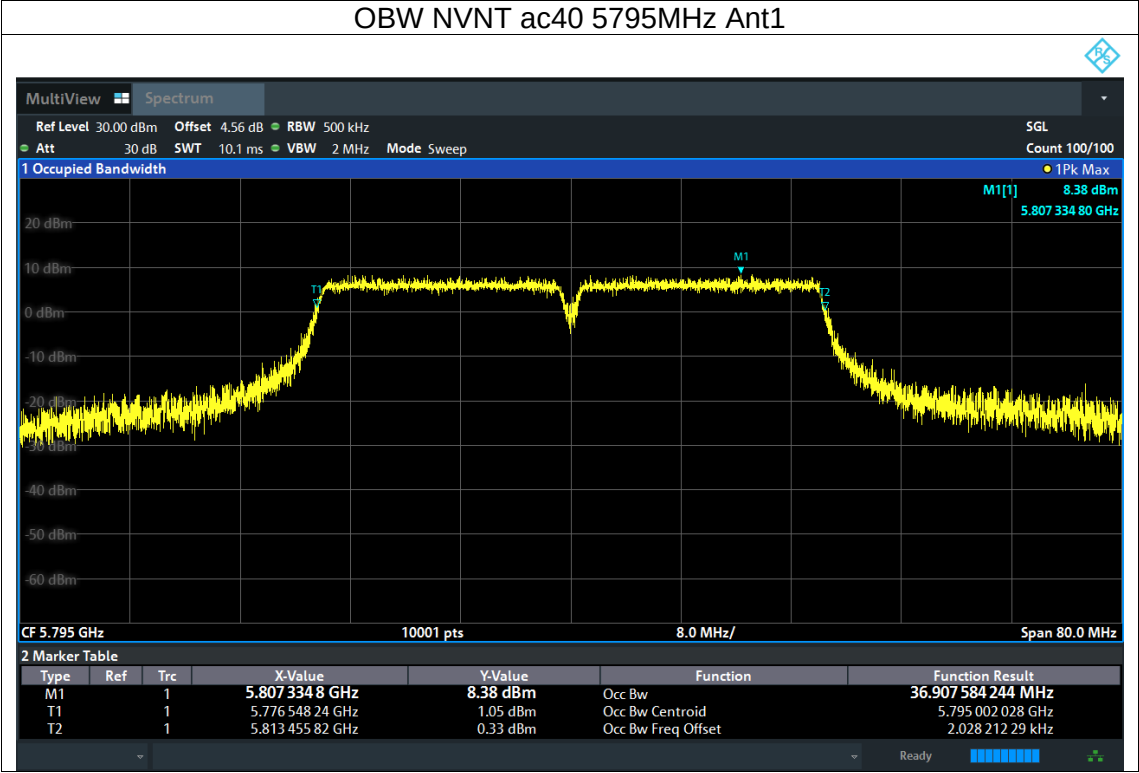
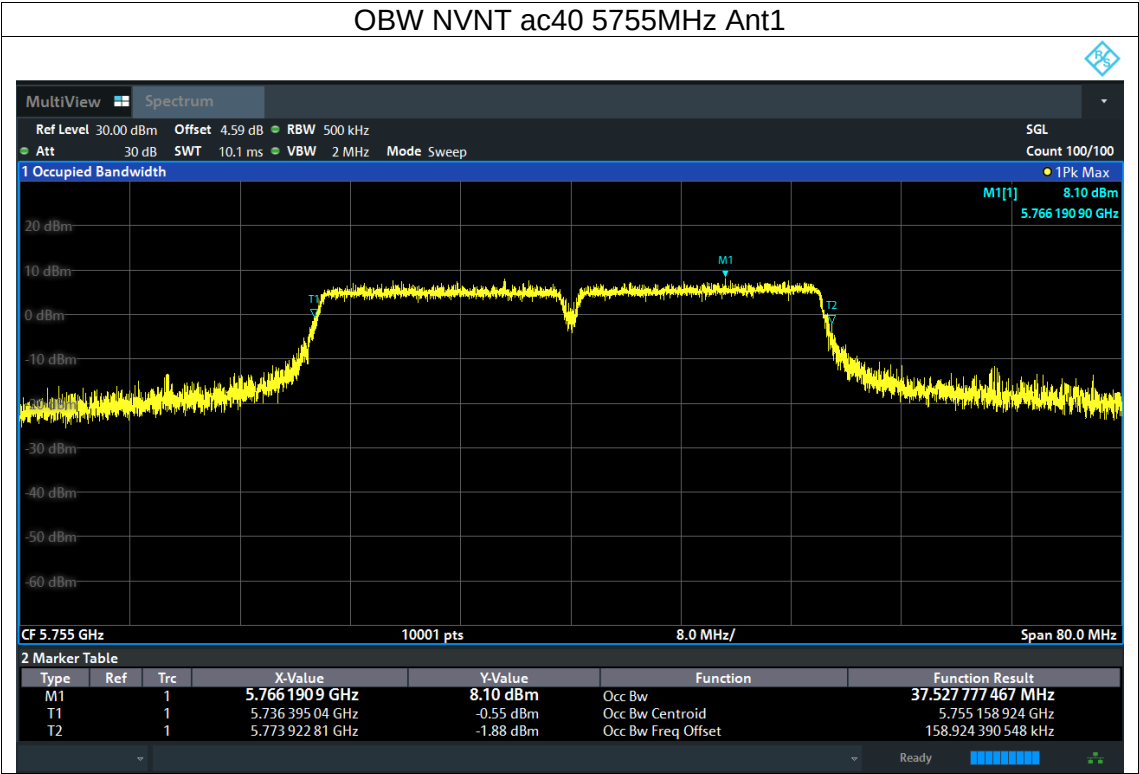
Test plots:











5.7 6 dB Bandwidth

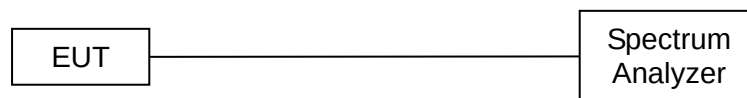
5.7.1 Limit

(e) Within the 5.725-5.85 GHz band, the minimum 6 dB bandwidth of U-NII devices shall be at least 500 kHz.

5.7.2 Test Procedure

1. Set RBW= 100 kHz.
2. Set the video bandwidth (VBW) $\geq 3 \times$ RBW.
3. Detector = Peak.
4. Trace mode = max hold.
5. Sweep = auto couple.
6. Allow the trace to stabilize.
7. Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower) that are attenuated by 26 dB relative to the maximum level measured in the fundamental emission.

5.7.3 Test Setup



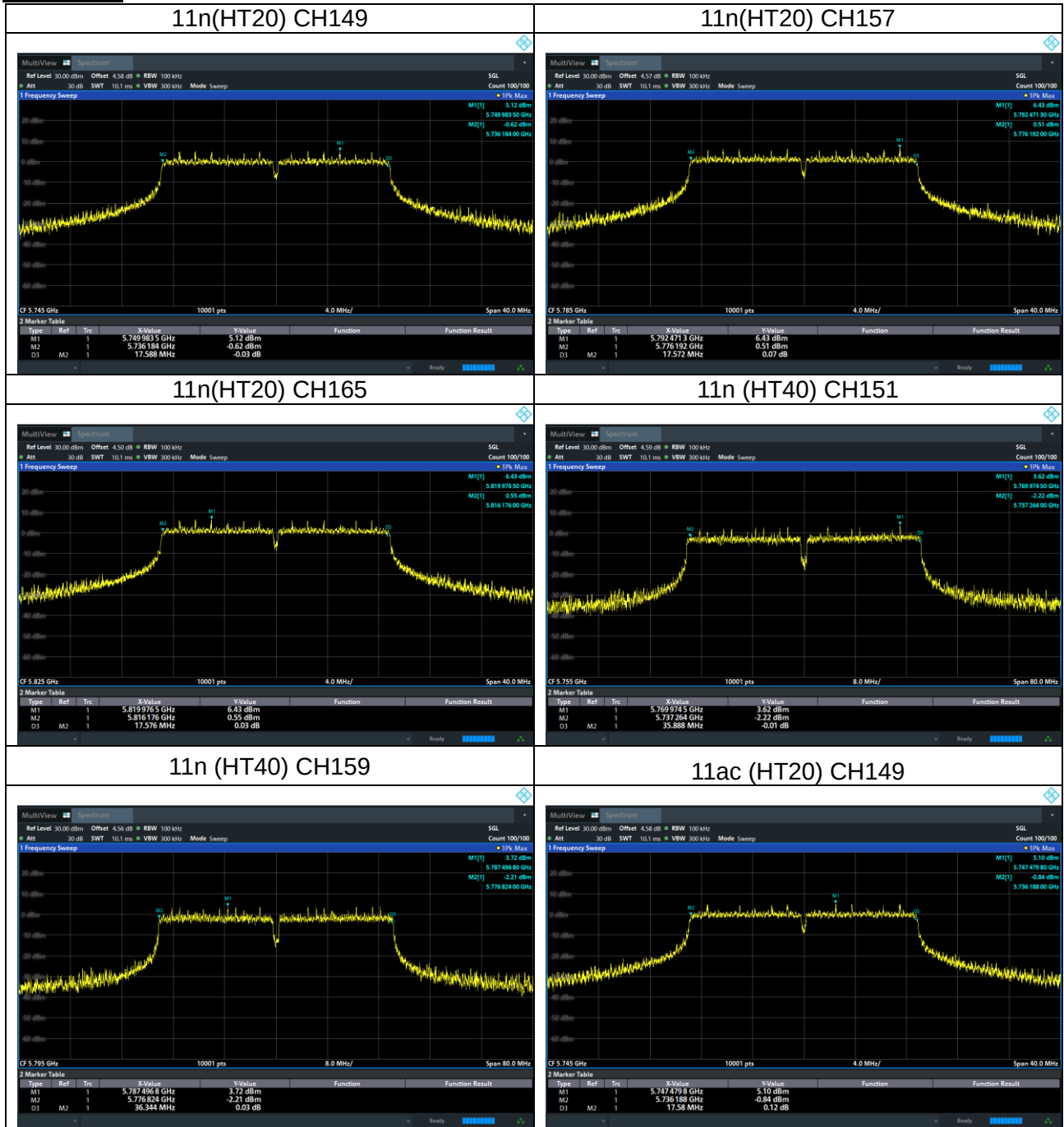
5.7.4 Test Results

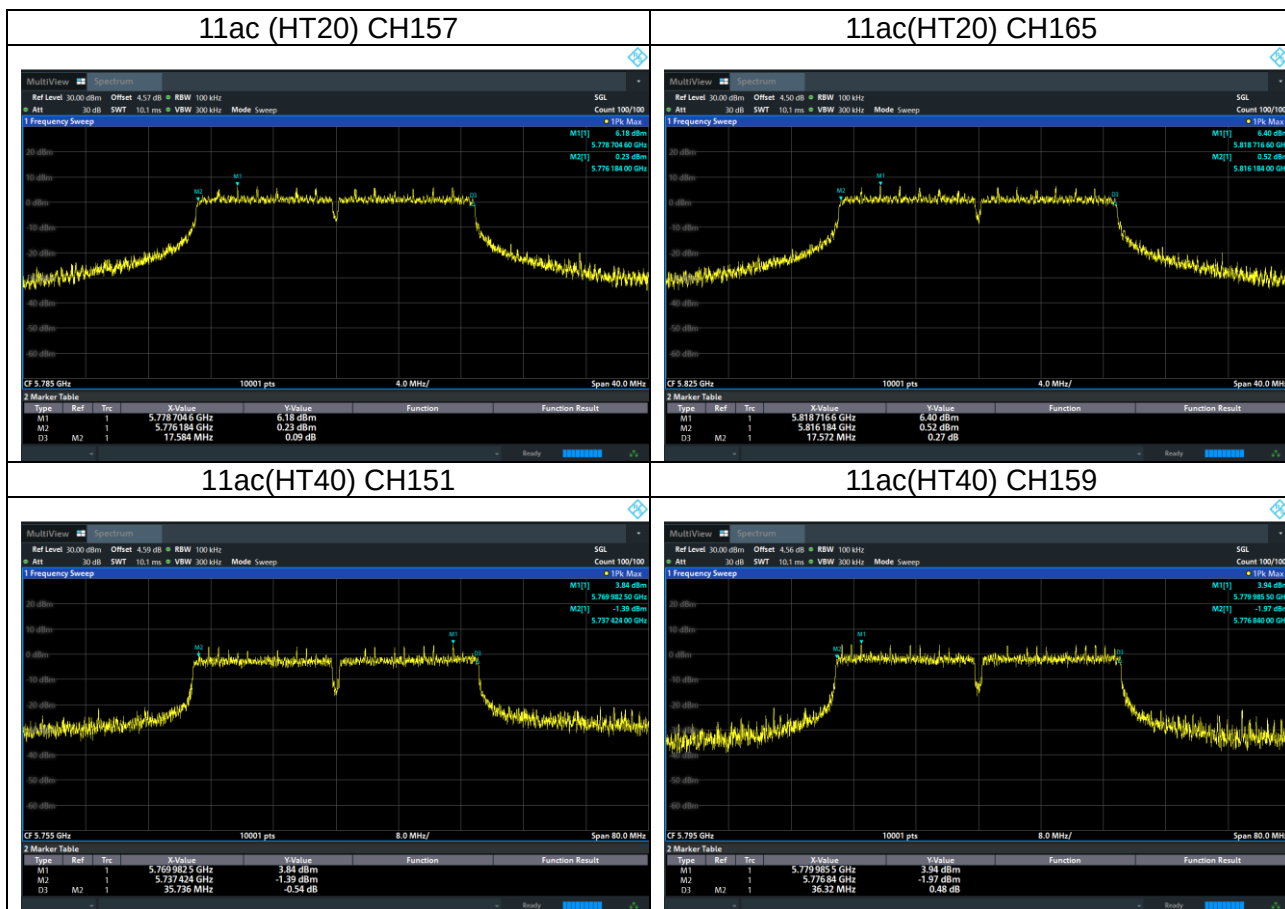
EUT:	Vehicle interconnection decoder	Model Name:	SGXU2501-EVO
Test Mode:	TX	Test Voltage:	DC 12V from battery

For U-NII-3

Channel	Test Channel	Frequency (MHz)	6dB bandwidth (MHz)	Limit (kHz)	Result
11n (HT20)	CH149	5745	17.588	500	Pass
11n (HT20)	CH157	5785	17.572	500	Pass
11n (HT20)	CH165	5825	17.576	500	Pass
11n (HT40)	CH151	5755	35.888	500	Pass
11n (HT40)	CH159	5795	36.344	500	Pass
11ac (VHT20)	CH149	5745	17.58	500	Pass
11ac (VHT20)	CH157	5785	17.584	500	Pass
11ac (VHT20)	CH165	5825	17.572	500	Pass
11ac (VHT40)	CH151	5755	35.736	500	Pass
11ac (VHT40)	CH159	5795	36.32	500	Pass

Test plots:
For U-NII-3





5.8 Out Of Band Emission

5.8.1 Limit

According to FCC §15.407(b).

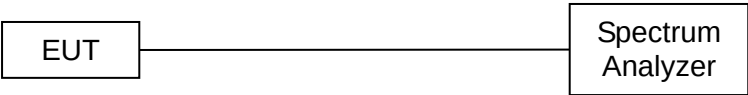
Undesirable emission limits. Except as shown in paragraph (b)(7) of this section, the maximum emissions outside of the frequency bands of operation shall be attenuated in accordance with the following limits:

- (1) For transmitters operating in the 5.15–5.25 GHz band: All emissions outside of the 5.15–5.35 GHz band shall not exceed an e.i.r.p. of –27 dBm/MHz.
- (2) For transmitters operating in the 5.25–5.35 GHz band: All emissions outside of the 5.15–5.35 GHz band shall not exceed an e.i.r.p. of –27 dBm/MHz.
- (3) For transmitters operating in the 5.47–5.725 GHz band: All emissions outside of the 5.47–5.725 GHz band shall not exceed an e.i.r.p. of –27 dBm/MHz.
- (4) For transmitters operating solely in the 5.725–5.850 GHz band:
 - (i) All emissions shall be limited to a level of –27 dBm/MHz at 75 MHz or more above or below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above or below the band edge, and from 25 MHz above or below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above or below the band edge, and from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge.

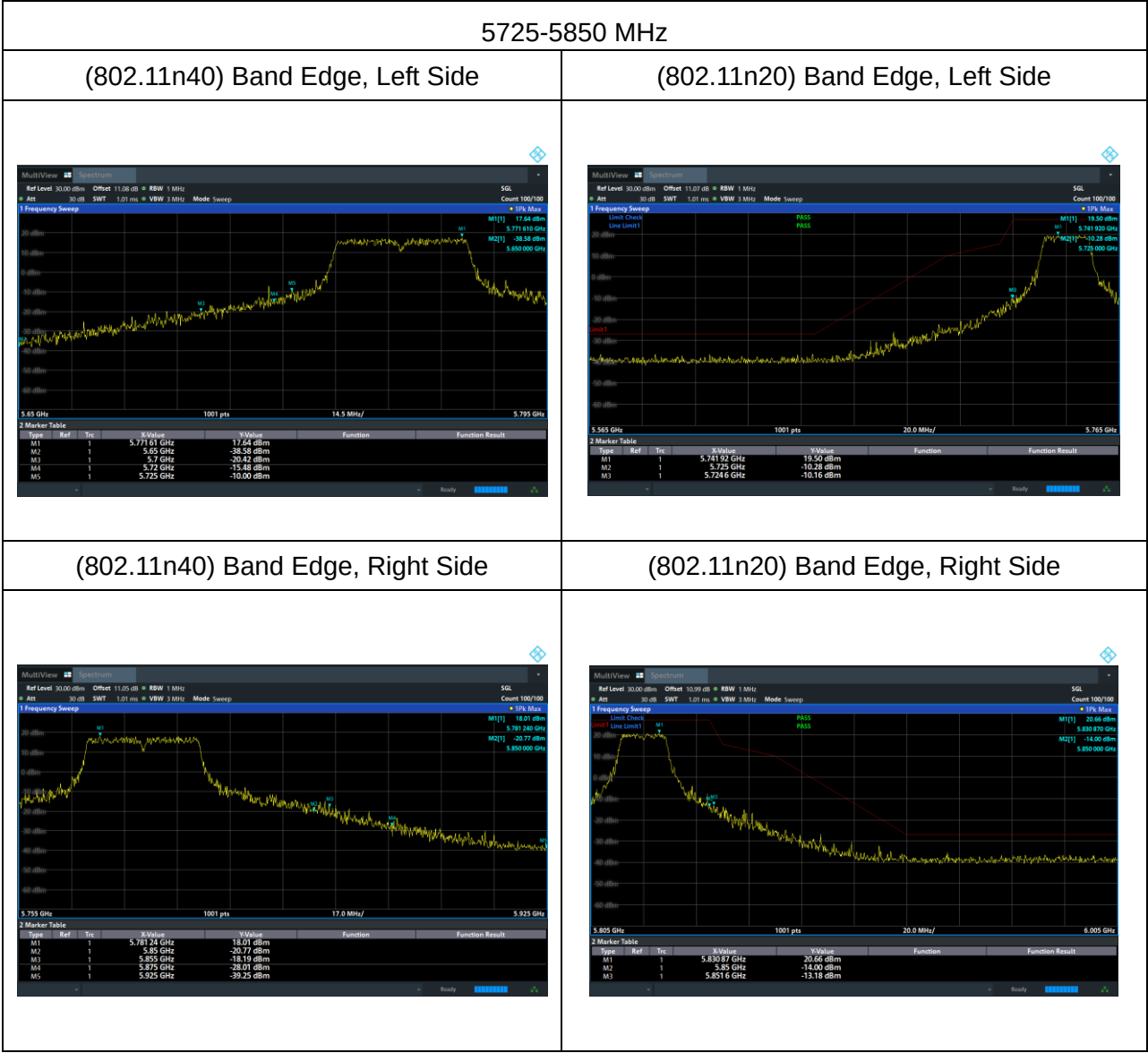
5.8.2 Test Procedure

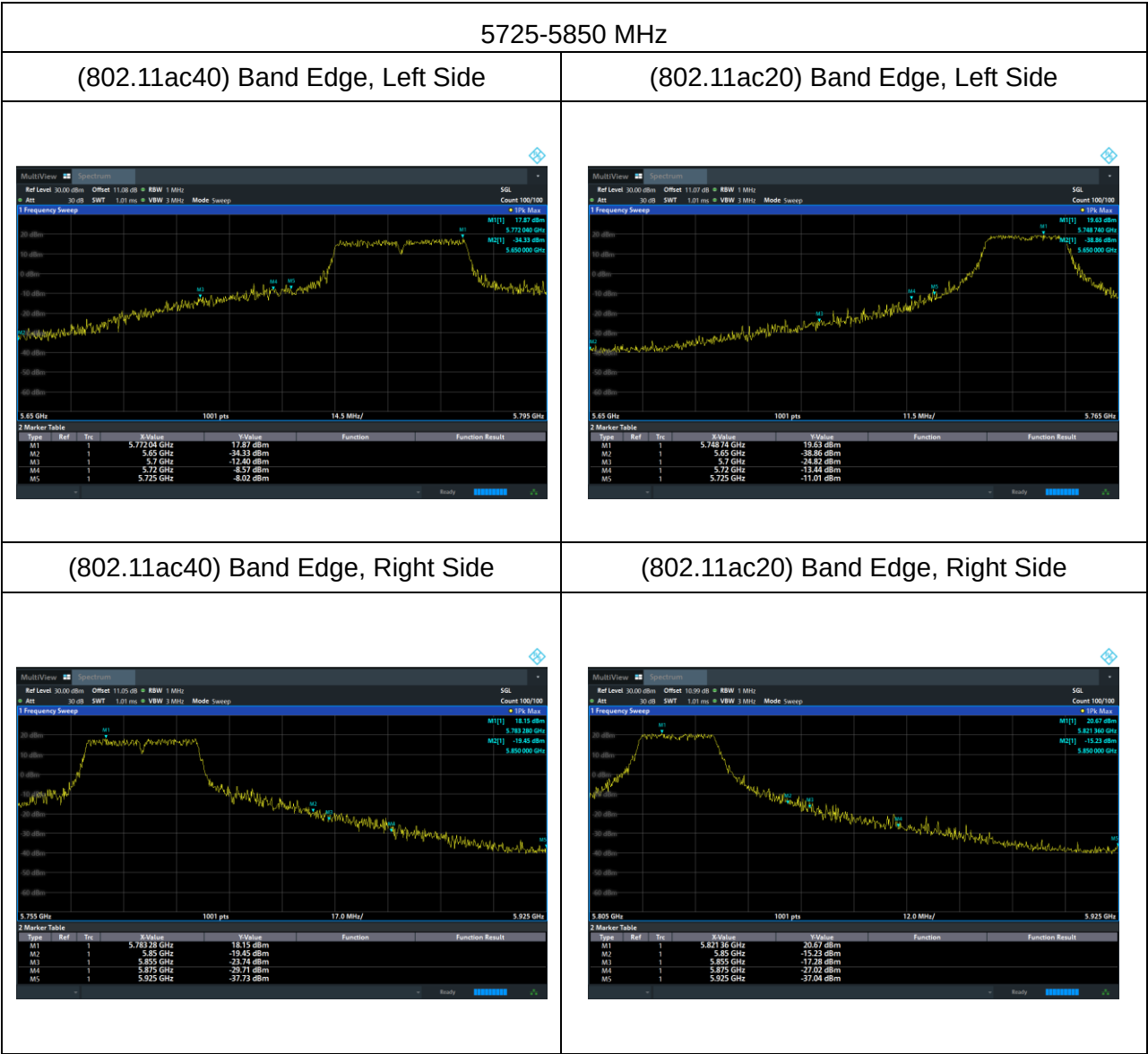
- a. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
- b. Position the EUT without connection to measurement instrument. Turn on the EUT and connect its antenna terminal to measurement instrument via a low loss cable. Then set it to any one measured frequency within its operating range, and make sure the instrument is operated in its linear range.
- c. Set RBW of spectrum analyzer to 1 MHz with a convenient frequency span.
- d. Measure the highest amplitude appearing on spectral display and set it as a reference level. Plot the graph with marking the highest point and edge frequency.
- e. Repeat above procedures until all measured frequencies were complete.

5.8.3 Test Setup



5.8.4 Test Results





5.9 Spurious RF Conducted Emissions

5.9.1 Limit

According to FCC §15.407(b).

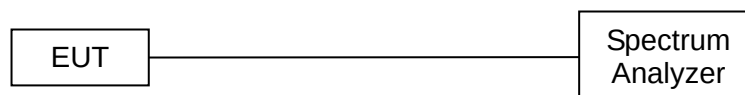
Undesirable emission limits. Except as shown in paragraph (b)(7) of this section, the maximum emissions outside of the frequency bands of operation shall be attenuated in accordance with the following limits:

- (1) For transmitters operating in the 5.15–5.25 GHz band: All emissions outside of the 5.15–5.35 GHz band shall not exceed an e.i.r.p. of -27 dBm/MHz.
- (2) For transmitters operating in the 5.25–5.35 GHz band: All emissions outside of the 5.15–5.35 GHz band shall not exceed an e.i.r.p. of -27 dBm/MHz.
- (3) For transmitters operating in the 5.47–5.725 GHz band: All emissions outside of the 5.47–5.725 GHz band shall not exceed an e.i.r.p. of -27 dBm/MHz.
- (4) For transmitters operating solely in the 5.725–5.850 GHz band:
 - (i) All emissions shall be limited to a level of -27 dBm/MHz at 75 MHz or more above or below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above or below the band edge, and from 25 MHz above or below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above or below the band edge, and from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge.

5.9.2 Test Procedure

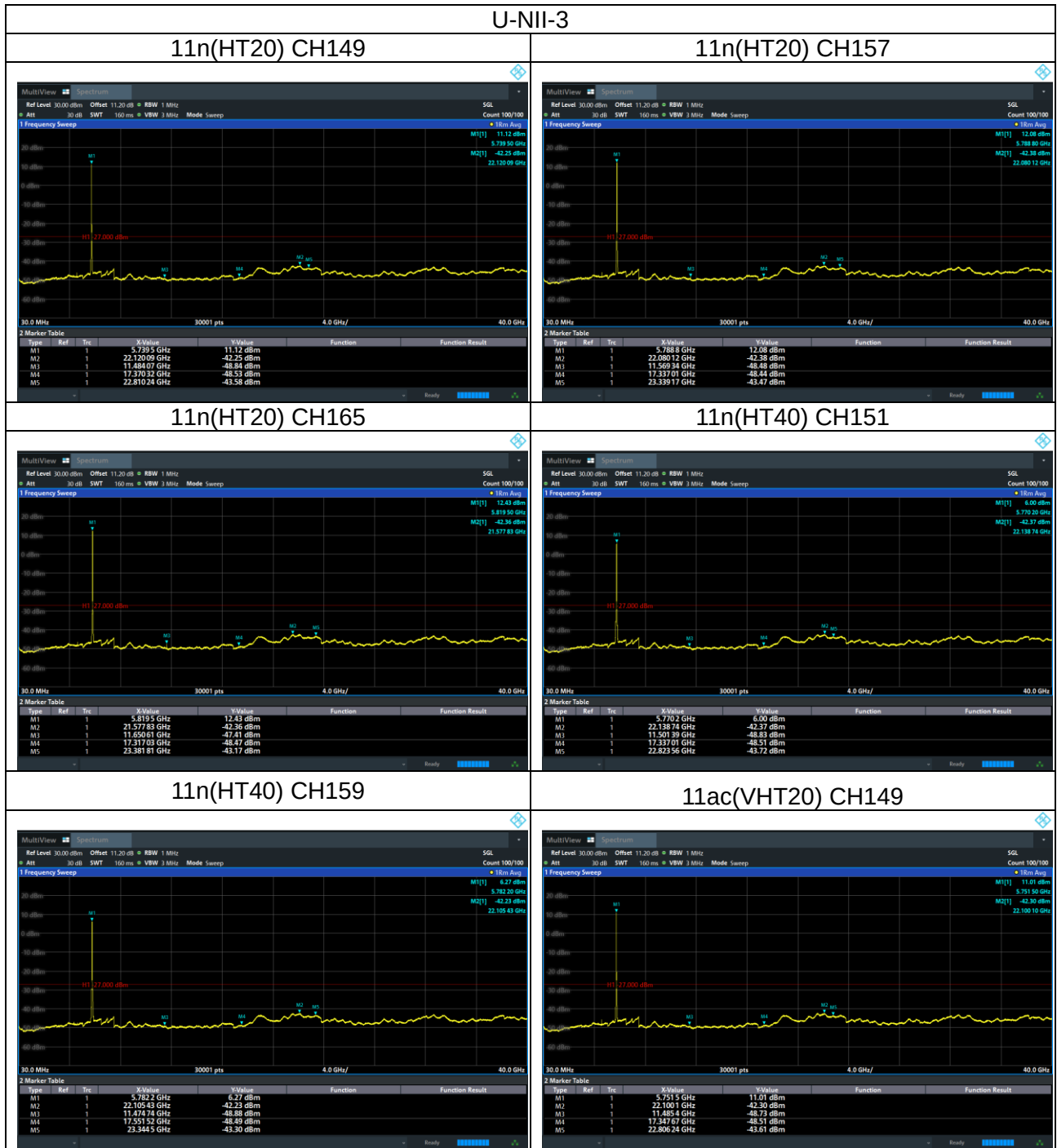
The Spurious RF conducted emissions compliance of RF radiated emission should be measured by following the guidance in ANSI C63.10-2020 with respect to maximizing the emission by rotating the EUT, measuring the emission while the EUT is situated in three orthogonal planes (if appropriate), adjusting the measurement antenna height and polarization etc. Set RBW=100kHz and VBW=300kHz to measure the avg field strength, and measure frequency range from 9kHz to 26.5GHz.

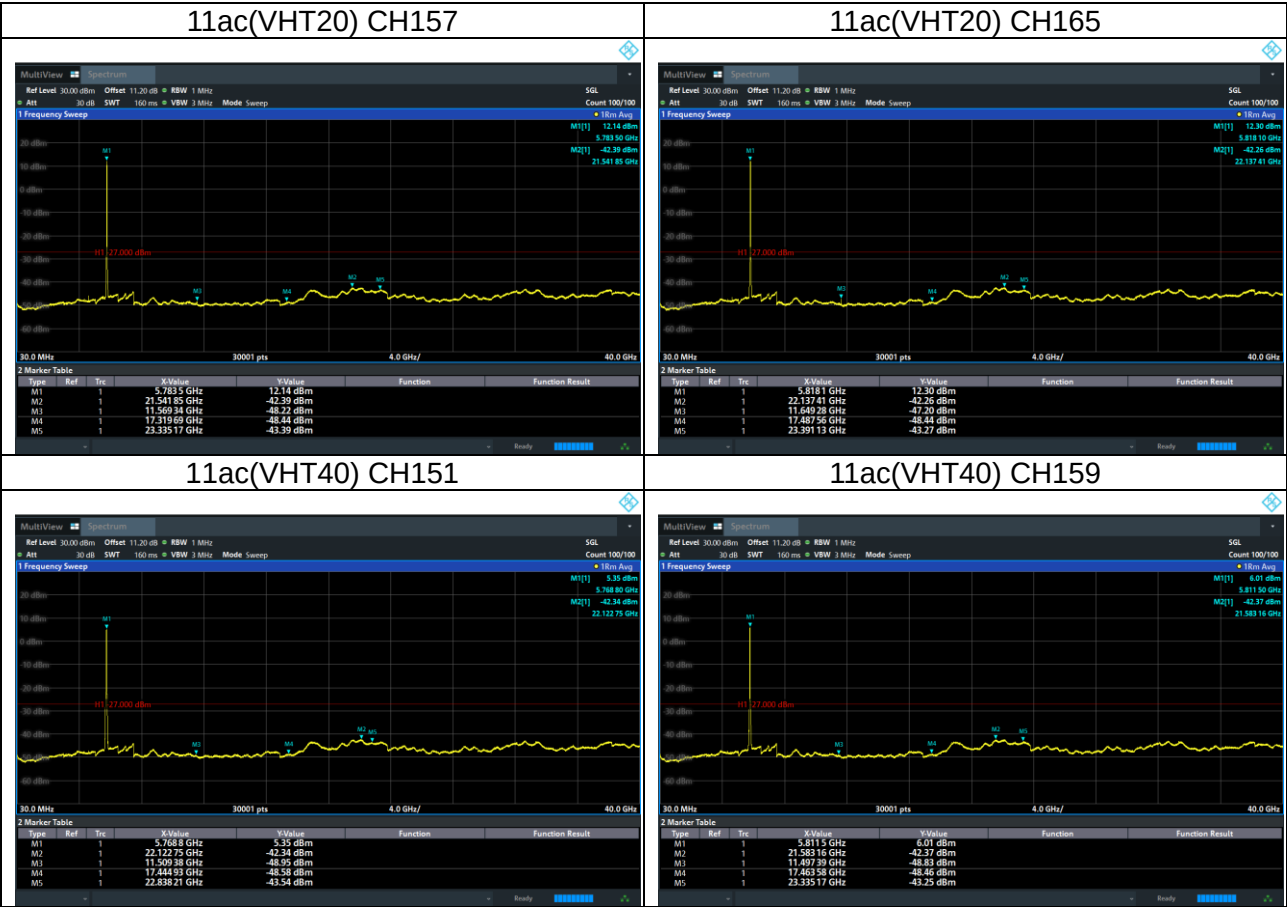
5.9.3 Test Setup



5.9.4 Test Results

Note: The measurement frequency range is from 9kHz to the 10th harmonic of the fundamental frequency; The lowest, middle and highest channels are tested to verify the spurious emissions and band edge measurement data.





5.10 Frequency Stability

5.10.1 Limit

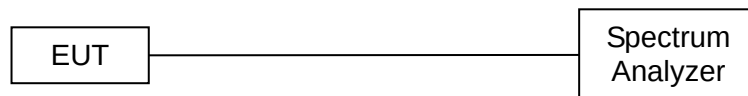
Manufactures of U-NII devices are responsible for ensuring frequency stability such that an emission is maintained within the band of operation under all conditions of normal operation as specified in the user's manual.

The transmitter center frequency tolerance shall be ± 20 ppm maximum for the 5 GHz band (IEEE 802.11n specification).

5.10.2 Test Procedure

1. The transmitter output (antenna port) was connected to the spectrum analyzer.
2. EUT have transmitted absence of modulation signal and fixed channelize.
3. Set the spectrum analyzer span to view the entire absence of modulation emissions bandwidth.
4. Set RBW = 10 kHz, VBW = 10 kHz with peak detector and maxhold settings.
5. f_c is declaring of channel frequency. Then the frequency error formula is $(f_c - f)/f_c \times 10^6$ ppm and the limit is less than ± 20 ppm (IEEE 802.11n specification).
6. The test extreme voltage is to change the primary supply voltage from 85 to 115 percent of the nominal value
7. Extreme temperature is $-20^{\circ}\text{C} \sim 70^{\circ}\text{C}$.

5.10.3 Test Setup



5.10.4 Test Results

EUT:	Vehicle interconnection decoder	Model Name:	SGXU2501-EVO
Test Mode:	TX	Test Voltage:	DC 12V from battery

Voltage vs. Frequency Stability

TEST CONDITIONS				Reference Frequency: 5745MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
T nom (° C)	20	V nom (V)	12.00	5745.01098	5745	0.01098	-1.9115
		V max (V)	13.80	5745.00798	5745	0.00798	-1.3885
		V min (V)	10.20	5745.00450	5745	0.00450	-0.7837
Limits				± 20 ppm			
Result				Complies			

Temperature vs. Frequency Stability

TEST CONDITIONS				Reference Frequency: 5745MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
V nom (V)	12	T (°C)	-20	5745.00326	5745	0.00326	-0.5679
		T (°C)	-10	5745.00388	5745	0.00388	-0.6749
		T (°C)	0	5745.00622	5745	0.00622	-1.0819
		T (°C)	10	5745.00716	5745	0.00716	-1.2471
		T (°C)	20	5745.01297	5745	0.01297	-2.2570
		T (°C)	30	5745.00372	5745	0.00372	-0.6474
		T (°C)	40	5745.00621	5745	0.00621	-1.0816
		T (°C)	50	5745.00284	5745	0.00284	-0.4945
		T (°C)	60	5745.01276	5745	0.01276	-2.2217
		T (°C)	70	5745.01189	5745	0.01189	-2.0694
Limits				± 20 ppm			
Result				Complies			

Voltage vs. Frequency Stability

Temperature vs. Frequency Stability

TEST CONDITIONS				Reference Frequency: 5785MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
V nom (V)	12	T (°C)	-20	5785.01020	5785	0.01020	-1.7625
		T (°C)	-10	5785.01282	5785	0.01282	-2.2166
		T (°C)	0	5785.00124	5785	0.00124	-0.2141
		T (°C)	10	5785.00447	5785	0.00447	-0.7727
		T (°C)	20	5785.00874	5785	0.00874	-1.5105
		T (°C)	30	5785.01110	5785	0.01110	-1.9186
		T (°C)	40	5785.01274	5785	0.01274	-2.2020
		T (°C)	50	5785.00557	5785	0.00557	-0.9629
		T (°C)	60	5785.00678	5785	0.00678	-1.1719
		T (°C)	70	5785.00081	5785	0.00081	-0.1401
Limits				± 20 ppm			
Result				Complies			

Voltage vs. Frequency Stability

TEST CONDITIONS				Reference Frequency: 5825MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
T nom (°C)	20	V nom (V)	120.00	5825.01095	5825	0.01095	-1.8801
		V max (V)	138.00	5825.00419	5825	0.00419	-0.7187
		V min (V)	102.00	5825.00153	5825	0.00153	-0.2629
Limits				± 20 ppm			
Result				Complies			

Temperature vs. Frequency Stability

TEST CONDITIONS				Reference Frequency: 5825MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
V nom (V)	12	T (°C)	-20	5825.00899	5825	0.00899	-1.5425
		T (°C)	-10	5825.00487	5825	0.00487	-0.8367
		T (°C)	0	5825.00566	5825	0.00566	-0.9715
		T (°C)	10	5825.00538	5825	0.00538	-0.9235
		T (°C)	20	5825.00001	5825	0.00001	-0.0009
		T (°C)	30	5825.00624	5825	0.00624	-1.0721
		T (°C)	40	5825.00574	5825	0.00574	-0.9851
		T (°C)	50	5825.00243	5825	0.00243	-0.4168
		T (°C)	60	5825.01153	5825	0.01153	-1.9791
		T (°C)	70	5825.00775	5825	0.00775	-1.3297
Limits				± 20 ppm			
Result				Complies			

6 Photographs of the Test Setup

Radiated Emission Below 1GHz



Radiated Emission Above 1GHz



7 Photographs of the EUT

Please refer to report HB20250905063E-01 for product photos.

******* END OF REPORT *******