

CERTIFICATION TEST REPORT

Report Number. : S-4791615583-E16V3

Applicant : SAMSUNG ELECTRONICS CO., LTD.
129 SAMSUNG-RO, YEONGTONG-GU, SUWON-SI,
GYEONGGI-DO, 16677, KOREA

Model : SM-S937U, SM-S937U1

FCC ID : A3LSMS937U

EUT Description : GSM/WCDMA/LTE 5G NR Phone + BT/BLE,
DTS/UNII a/b/g/n/ac/ax/be, NFC, WPT, UWB and NB NTN

Test Standard(s) : FCC CFR47 PART 25

Date Of Issue:
2025-03-05

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Revision History

Rev.	Issue Date	Revisions	Revised By
V1	2025-02-21	Initial issue	Yeonghwan Hong
V2	2025-02-28	Updated to address TCB's question	Yeonghwan Hong
V3	2025-03-05	Updated to address TCB's question	Yeonghwan Hong

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1. ATTESTATION OF TEST RESULTS

COMPANY NAME: SAMSUNG ELECTRONICS CO., LTD.

EUT DESCRIPTION: GSM/WCDMA/LTE 5G NR Phone + BT/BLE, DTS/UNII a/b/g/n/ac/ax/be, NFC, WPT, UWB and NB NTN

MODEL NUMBER: SM-S937U, SM-S937U1

SERIAL NUMBER: R3CXC0HMH4H (CONDUCTED);
R3CXC0G5R3R (RADIATED);

DATE TESTED: 2025-01-13 ~ 2025-02-20;

APPLICABLE STANDARDS	
STANDARD	TEST RESULTS
CFR 47 Part 25	Complies

UL KOREA LTD. tested the above equipment in accordance with the requirements set forth in the above standards. All indications of Pass/Fail in this report are opinions expressed by UL KOREA LTD. based on interpretations and/or observations of test results. Measurement Uncertainties were not taken into account and are published for informational purposes only. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

Note: The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. This document may not be altered or revised in any way unless done so by UL KOREA LTD. and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by UL KOREA LTD. will constitute fraud and shall nullify the document. This report must not be used by the client to claim product certification, approval, or endorsement by IAS, any agency of the Federal Government, or any agency of any government.

Approved & Released For
UL Korea, Ltd. By:



Seokhwan Hong
Suwon Lab Engineer
UL KOREA LTD.

Tested By:



Yeonghwan Hong
Suwon Lab Engineer
UL KOREA LTD.

2. TEST METHODOLOGY

1. FCC CFR 47 Part 2.
2. FCC CFR 47 Part 25.
3. ANSI TIA-603-E, 2016
4. ANSI C63.26, 2015
5. KDB 971168 D01 Power Meas License Digital Systems v03r01
6. KDB 971168 D02 Misc Rev Approv License Device v02r01
7. KDB 412172 D01 Determining ERP and EIRP v01r01

3. FACILITIES AND ACCREDITATION

The test sites and measurement facilities used to collect data are located at 218 Maeyeong-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16675, Korea. Line conducted emissions are measured only at the 218 address. The following table identifies which facilities were utilized for radiated emission measurements documented in this report. Specific facilities are also identified in the test results sections.

218 Maeyeong-ro	
☐	Chamber 1(3m semi-anechoic chamber)
☒	Chamber 2(3m semi-anechoic chamber)
☐	Chamber 3(3m semi-anechoic chamber)
☐	Chamber 4(3m Full-anechoic chamber)
☐	Chamber 5(3m Full-anechoic chamber)

UL KOREA LTD. is accredited by IAS, Laboratory Code TL-637. The full scope of accreditation can be viewed at <https://www.iasonline.org/wp-content/uploads/2017/05/TL-637-cert-New.pdf>.

4. DECISION RULES AND MEASUREMENT UNCERTAINTY

4.1. METROLOGICAL TRACEABILITY

The measuring equipment utilized to perform the tests documented in this report has been calibrated in accordance with the manufacturer's recommendations, and is traceable to recognized national standards

4.2. SAMPLE CALCULATION

Where relevant, the following sample calculation is provided:

$$\begin{aligned}\text{Field Strength (dBuV/m)} &= \text{Measured Voltage (dBuV)} + \text{Antenna Factor (dB/m)} + \\ &\text{Cable Loss (dB)} - \text{Preamp Gain (dB)} \\ 28.9 \text{ dBuV/m} &= 36.5 \text{ dBuV} + 18.7 \text{ dB/m} + 0.6 \text{ dB} - 26.9 \text{ dB}\end{aligned}$$

4.3. MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the apparatus:

PARAMETER	UNCERTAINTY
Conducted Disturbance, 0.15 to 30 MHz	1.84 dB
Radiated Disturbance, 9 kHz to 30 MHz	2.41 dB
Radiated Disturbance, 30 MHz to 1 GHz	3.69 dB
Radiated Disturbance, 1 GHz to 18 GHz	5.18 dB
Radiated Disturbance, Above 18 GHz	5.07 dB

Uncertainty figures are valid to a confidence level of 95%.

4.4. DECISION RULES

Decision rule for statement(s) of conformity is based on Clause 4.3.3 in IEC Guide 115:2023.

5. EQUIPMENT UNDER TEST

5.1. EUT DESCRIPTION

GSM/WCDMA/LTE 5G NR Phone + BT/BLE, DTS/UNII a/b/g/n/ac/ax/be, NFC, WPT, UWB and NB NTN

This test report addresses the NB NTN operational mode.

Representative model	Difference	Derivative model
		SM-S937U1
SM-S937U	Hardware	Same
	Software	The UI has changed according to Service Provider

Thus, SM-S937U was set for final test.

5.2. MAXIMUM OUTPUT POWER

The transmitter has a maximum peak conducted output power as follows:

FCC Part 25						
Band	Frequency Range [MHz]	SCS	Conducted		Radiated	
			Avg [dBm]	Avg [mW]	Avg [dBm]	Avg [mW]
NB NTN B255	1626.6 ~ 1660.4	3.75 kHz	22.19	165.58	23.32	214.78
		15 kHz	22.61	182.39	27.31	538.27

5.3. DESCRIPTION OF AVAILABLE ANTENNAS

Frequency (MHz)	ANT	Peak Gain (dBi)
NB NTN B255	F	-1.80

5.4. WORST-CASE CONFIGURATION AND MODE

Following modes should be considered as worst-case scenario for all other measurements.

- NB NTN

The worst-case scenario for all measurements is based on the average conducted output power measurement investigation results. Output power measurements were measured on Modulation / SCS / Channel / SC Size modulations. It was found QPSK, SCS 15 kHz results were worst case.

Radiated emission below 1GHz emission was performed with the EUT set to transmit at the channel with highest output power as worst-case scenario.

Radiated emission above 1GHz was performed with the EUT set to transmit low/mid/high channels.

Band	Main ANT	Tune up Limit (dBm)	Sub ANT	Tune up Limit (dBm)
NB NTN B255	E	23.5		

The fundamental and radiated spurious emission were investigated in three orthogonal orientations X, Y and Z, it was determined that below orientation was worst-case orientation for each band.

Band	ANT	EIRP			RSE		
		X	Y	Z	X	Y	Z
NB NTN B255	F	O	-	-	O	-	-

All radiated test was performed attached with travel adapter for the worst-case condition mode.

5.5. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Support Equipment List				
Description	Manufacture	Model	Serial Number	FCC ID
Charger	SAMSUNG	EP-T2510	RF7X1YF85Z1DKA	N/A
Data Cable	SAMSUNG	EP-DN980	N/A	N/A

I/O CABLE

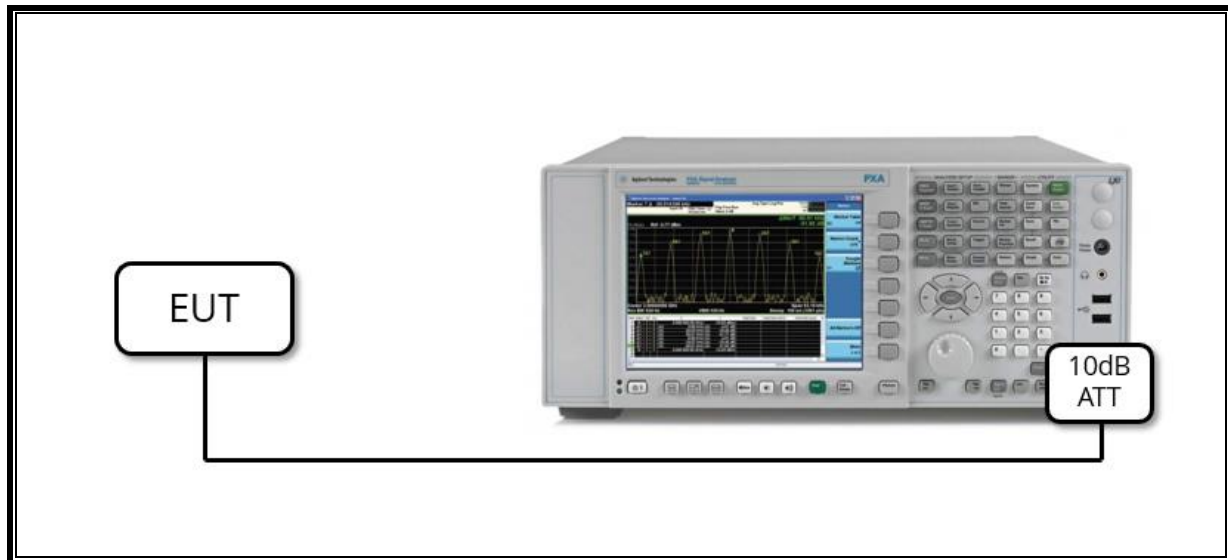
I/O Cable List						
Cable No.	Port	# of identical ports	Connector Type	Cable Type	Cable Length (m)	Remarks
1	DC Power	1	C Type	Shielded	1.0 m	N/A

TEST SETUP

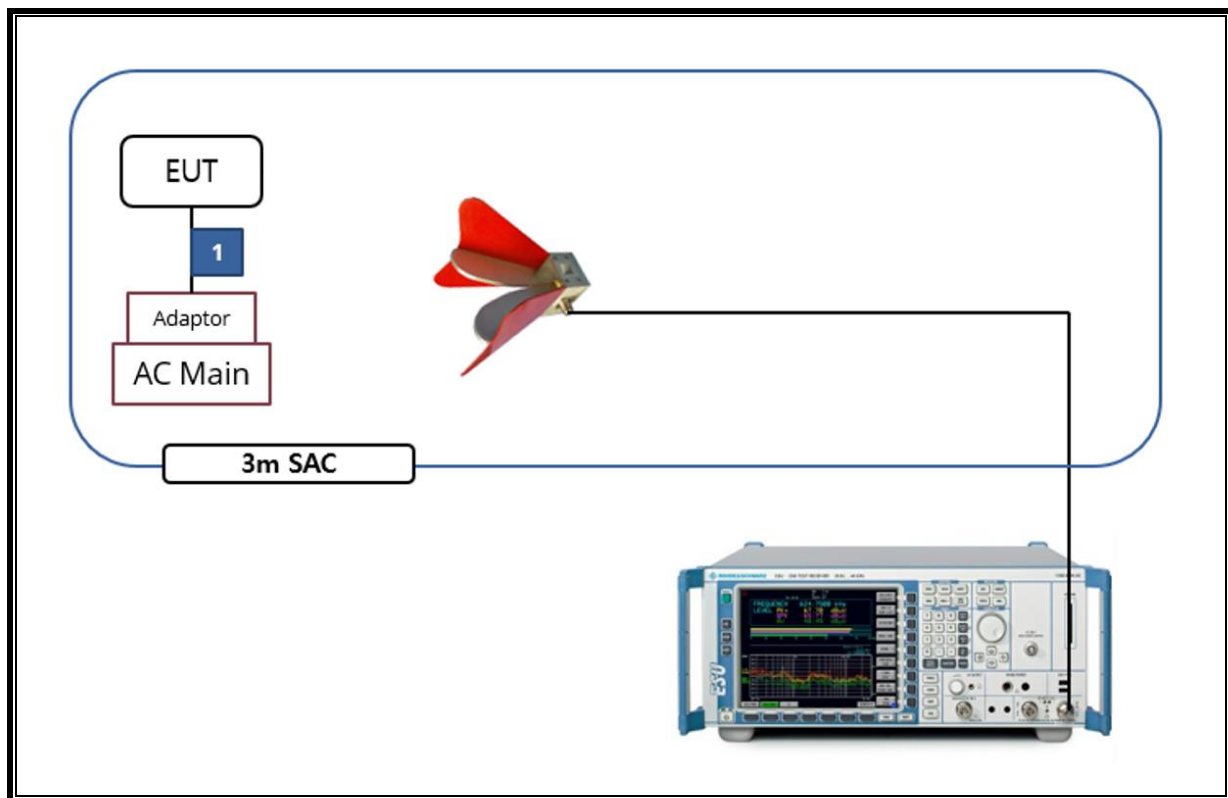
The EUT is a stand-alone unit during the tests.

All test were measured with FTM software used to allow 100% duty cycle transmission.

SETUP DIAGRAM FOR TESTS (CONDUCTED TEST SETUP)



SETUP DIAGRAM FOR TESTS (RADIATED TEST SETUP)



6. TEST AND MEASUREMENT EQUIPMENT

The following test and measurement equipment was utilized for the tests documented in this report:

Test Equipment List				
Description	Manufacturer	Model	S/N	Cal Due
Antenna, Tuned Dipole 400~1000 MHz	ETS	3121D DB-4	00164753	2027-01-08
Directional Antenna	Cobham	FPA3-0.8-6.0R/1329	110367-0003	N/A
Directional Antenna	Cobham	FPA3-0.8-6.0R/1329	80108-0004	N/A
Antenna, Horn, 40 GHz	ETS	3116C	00166155	2026-07-23
Antenna, Horn, 40 GHz	ETS	3116C	00168645	2025-10-06
Preamplifier	ETS	3116C-PA	00168841	2025-07-25
Antenna, Bilog, 30MHz-1GHz	SCHWARZBECK	VULB 9163	750	2026-07-30
Antenna, Bilog, 30MHz-1GHz	SCHWARZBECK	VULB 9163	845	2026-07-30
Antenna, Bilog, 30MHz-1GHz	SCHWARZBECK	VULB 9163	749	2026-08-12
Antenna, Horn, 18 GHz	ETS	3115	00167211	2026-07-17
Antenna, Horn, 18 GHz	ETS	3115	00161451	2026-07-17
Antenna, Horn, 18 GHz	ETS	3117	00168724	2026-07-17
Antenna, Horn, 18 GHz	ETS	3117	00168717	2026-07-17
Communications Test Set	R&S	CMW500	169797	2025-07-23
DC Power Supply	Agilent / HP	E3640A	MY54226395	2025-07-24
Preamplifier, 1000 MHz	Sonoma	310N	341282	2025-07-22
Preamplifier, 1000 MHz	Sonoma	310N	370599	2025-07-22
Preamplifier, 1000 MHz	Sonoma	310N	351741	2025-07-22
Preamplifier, 18 GHz	Miteq	AFS42-00101800-25-S-42	2029169	2025-07-23
Preamplifier, 18 GHz	B&Z Technologies, LLC	BZR-01001800-231040-182020	28451	2025-07-22
Preamplifier, 18 GHz	B&Z Technologies, LLC	BZR-01001800-231040-181515	23576	2025-07-25
Spectrum Analyzer, 44 GHz	Agilent / HP	N9030A	MY54170614	2025-07-24
Spectrum Analyzer, 44 GHz	Agilent / HP	N9030A	MY54490312	2026-01-02
Spectrum Analyzer, 44 GHz	KEYSIGHT	N9030B	MY57143717	2025-07-23
EMI Test Receive, 40 GHz	R&S	ESU40	100439	2025-07-23
EMI Test Receive, 40 GHz	R&S	ESU40	100457	2025-07-22
High Pass Filter 1.2GHz	Micro-Tronics	HPM50108-02	G005	2025-07-23
High Pass Filter 1.2GHz	Micro-Tronics	HPM50108-02	G006	2025-07-23
High Pass Filter 2.8GHz	Micro-Tronics	HPM50111-02	010	2025-07-23
High Pass Filter 2.8GHz	Micro-Tronics	HPM50111-02	011	2025-07-23
High Pass Filter 4GHz	Micro-Tronics	HPM50118-02	G001	2025-07-23
High Pass Filter 4GHz	Micro-Tronics	HPM50118-02	G002	2025-07-23
Attenuator	PASTERNAK	PE7087-10	A009	2025-07-23
Attenuator	PASTERNAK	PE7087-10	A001	2025-07-23
Attenuator	PASTERNAK	PE7087-10	A008	2025-07-23
Attenuator	PASTERNAK	PE7004-10	2	2025-07-23
Attenuator	PASTERNAK	PE7395-10	A011	2025-07-25
Antenna, Loop, 9kHz-30MHz	R&S	HFH2-Z2	100418	2025-09-07
Temperature Chamber	ESPEC	SH-642	93001109	2025-07-23
Power Splitter	MINI-CIRCUITS	WA1534	UL003	2026-01-03
Power Splitter	MINI-CIRCUITS	WA1534	UL004	2026-01-03
UXM 5G Wireless Test Platform	KEYSIGHT	E7515B	MY57510655	2026-01-03
UL Software				
Description	Manufacturer	Model	Version	
Antenna port test software	UL	CLT	Ver 3.4	
Radiated software	UL	UL EMC	Ver 9.5	
Antenna port test software (5G NR FR1)	UL	UL iM	Ver 1.06	

7. TEST RESULTS SUMMARY

FCC Part Section	Test Description	Test Limit	Test Condition	Test Result
25.204 (a)	Conducted RF Output Power	40 dBW	Conducted	Complies
2.1049	99% Bandwidth	N/A		Complies
25.202 (f)(1)&(2)	Emission Mask – Within 250% of Authorized Bandwidth	Section 25.202 (f)		Complies
25.202 (f)(3)	Out of Band Emissions	-13 dBm	Conducted & Radiated	Complies
25.204 (a)	Equivalent Isotropic Radiated Power	40 dBW	Radiated	Complies
25.216 (c)&(h)	Additional Unwanted Emission (1559 – 1610 MHz)	Section 25.216		Complies
25.216 (i)	Carrier-Off State Emissions (1559 – 1610 MHz)	-50 dBm		Complies
25.202 (d)	Frequency Stability	0.001%		Complies

8. CONDUCTED RESULTS

8.1. CONDUCTED OUTPUT POWER

Test Procedure

ANSI C63.26-2015

NOTE

The Conducted Output Powers were measured with FTM software used to allow 100% duty cycle transmission.

RESULTS

See the following pages.

SCS	Modulation	SC Size	Maximum Average Power (dBm)			
			Measured Pwr (dBm)			Tune-up Limit
			261505	261674	261843	
			1626.60 MHz	1643.50 MHz	1660.40 MHz	
3.75 kHz	BPSK	1SC0	21.70	21.68	21.46	23.5
		1SC24	22.18	22.15	21.85	23.5
		1SC47	21.75	21.67	21.51	23.5
	QPSK	1SC0	21.71	21.65	21.46	23.5
		1SC24	22.19	22.13	21.91	23.5
		1SC47	21.70	21.68	21.42	23.5
15 kHz	BPSK	1SC0	21.93	21.99	21.73	23.5
		1SC6	22.55	22.41	22.31	23.5
		1SC11	22.04	21.96	21.77	23.5
	QPSK	1SC0	21.99	21.99	21.65	23.5
		1SC6	22.45	22.61	22.13	23.5
		1SC11	21.92	21.91	21.67	23.5
		3SC0	22.13	22.04	21.87	23.5
		3SC6	22.18	22.13	21.88	23.5
		3SC9	22.13	22.07	21.85	23.5
		6SC0	22.18	22.16	21.92	23.5
		6SC6	22.22	22.22	21.99	23.5
		12SC0	22.12	22.04	21.78	23.5

8.2. OCCUPIED BANDWIDTH

RULE PART(S)

FCC: §2.1049

LIMITS

For reporting purposes only

TEST PROCEDURE

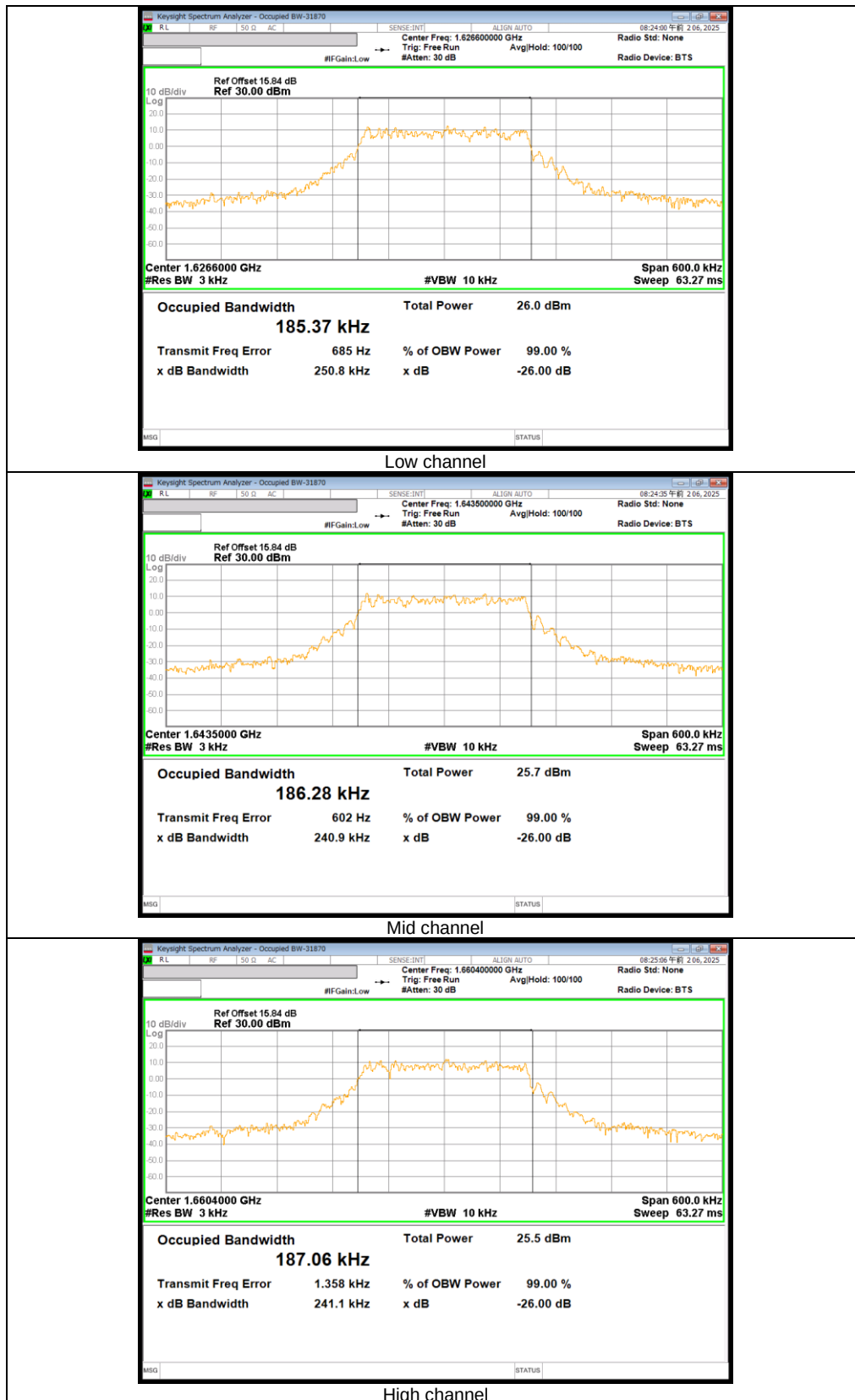
The transmitter output was connected to a calibrated coaxial cable, the other end of which was connected to a spectrum analyzer. The occupied bandwidth was measured with the spectrum analyzer at Low, Mid, High channel in each band. The -26dB bandwidth was also measured and recorded.

RESULTS

See the following pages.

Band	Modulation	SCS	SC Size	Channel	99% BW (kHz)	-26dB BW (kHz)
NB NTN B255	QPSK	15 kHz	12SC0	1626.6	185.37	250.8
				1643.5	186.28	240.9
				1660.4	187.06	241.1

8.2.1. OCCUPIED BANDWIDTH RESULT



8.3. IN-BAND EMISSION MASK WITHIN 250% OF AUTHORIZED BANDWIDTH

LIMITS

FCC §25.202

(f) Emission limitations. Except for SDARS terrestrial repeaters and as provided for in paragraph (i), the mean power of emissions shall be attenuated below the mean output power of the transmitter in accordance with the schedule set forth in paragraphs (f)(1) through (f)(4) of this section. The out-of-band emissions of SDARS terrestrial repeaters shall be attenuated in accordance with the schedule set forth in paragraph (h) of this section.

(1) In any 4 kHz band, the center frequency of which is removed from the assigned frequency by more than 50 percent up to and including 100 percent of the authorized bandwidth: 25 dB;

(2) In any 4 kHz band, the center frequency of which is removed from the assigned frequency by more than 100 percent up to and including 250 percent of the authorized bandwidth: 35 dB;

TEST PROCEDURE

- (a) EUT was connected to a spectrum analyzer.
- (b) The limits within 250% of the authorized bandwidth (230 kHz) are relative to the total in-band (channel) power.
- (c) RBW is set to ≥ 4 kHz, VBW set to at least 3 times the RBW.
- (d) Detector: RMS / Trace: Max Average
- (e) Sweep time: Set to 2ms multiplied by the number of points to obtain the average over 2ms.

NOTE1

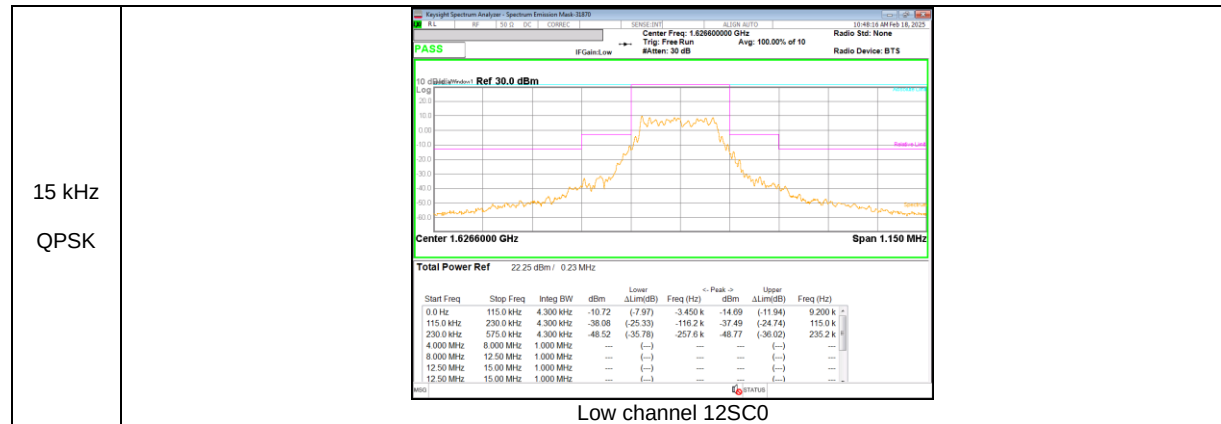
All modulations (BPSK, QPSK) were investigated to determine the worst case configuration. All modes of operation were investigated and the worst case configuration results are reported in this section.

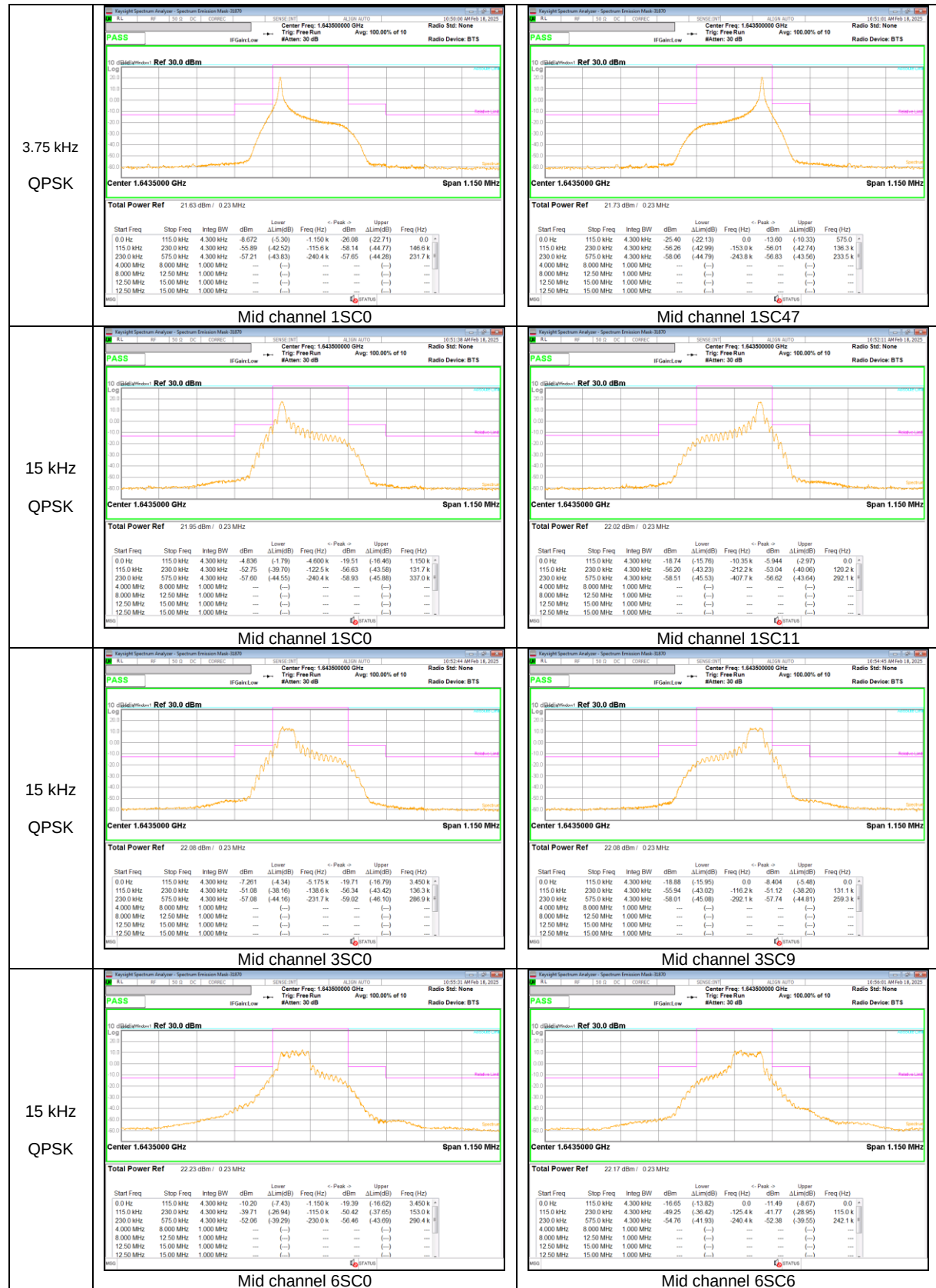
RESULTS

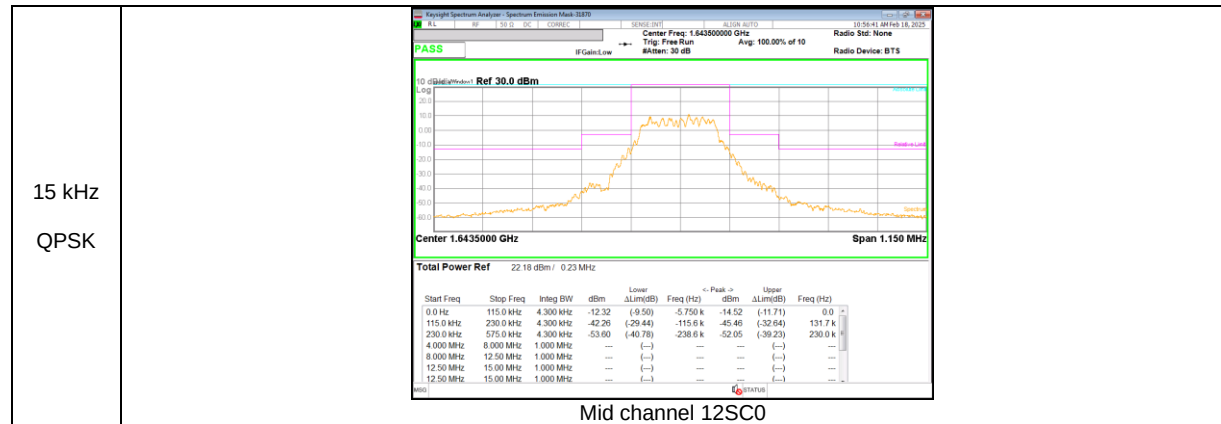
See the next page.

8.3.1. EMISSION MASK RESULT

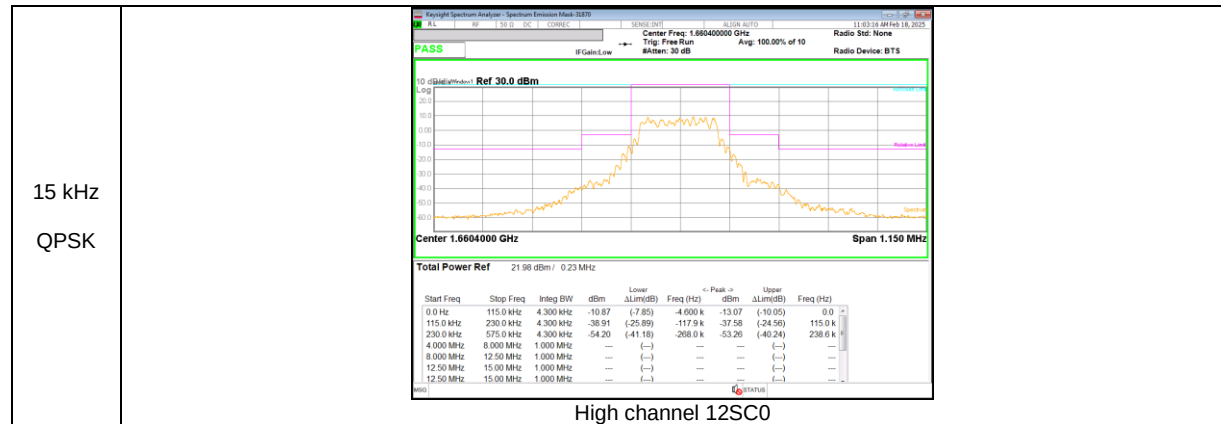












8.4. CONDUCTED SPURIOUS EMISSIONS

LIMITS

FCC §25.202

(f) Emission limitations. Except for SDARS terrestrial repeaters and as provided for in paragraph (i), the mean power of emissions shall be attenuated below the mean output power of the transmitter in accordance with the schedule set forth in paragraphs (f)(1) through (f)(4) of this section. The out-of-band emissions of SDARS terrestrial repeaters shall be attenuated in accordance with the schedule set forth in paragraph (h) of this section.

(3) In any 4 kHz band, the center frequency of which is removed from the assigned frequency by more than 250 percent of the authorized bandwidth: An amount equal to 43 dB plus 10 times the logarithm (to the base 10) of the transmitter power in watts;

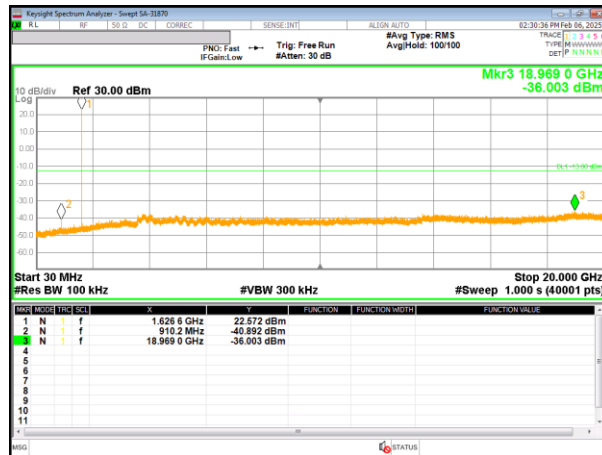
TEST PROCEDURE

- (a) EUT was connected to a spectrum analyzer.
- (b) Set display line at -13 dBm (the limit of $43 + 10\log(P)$)
- (c) RBW is set to $\geq 4\text{kHz}$, VBW set to at least 3 times the RBW.
- (d) Detector: Peak / Trace: Max hold
- (e) Sweep time: Set to 2ms multiplied by the number of points to obtain the average over 2ms.
- (f) Multiple sweeps with max hold enabled are made to capture the maximum average.

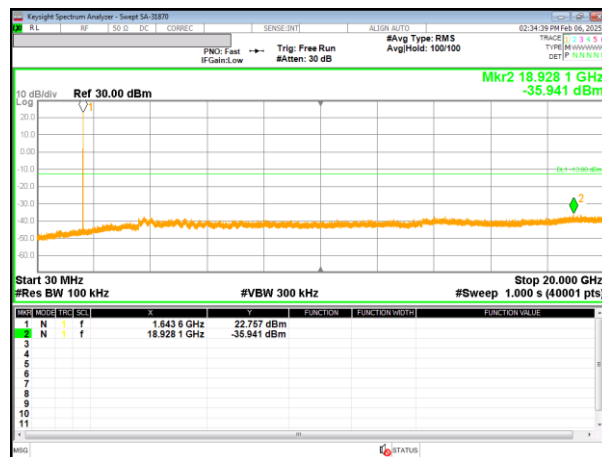
RESULTS

See the next page.

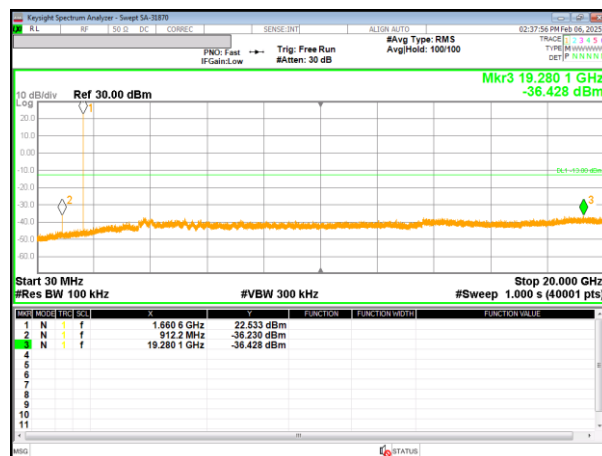
8.4.1. OUT OF BAND EMISSIONS RESULT



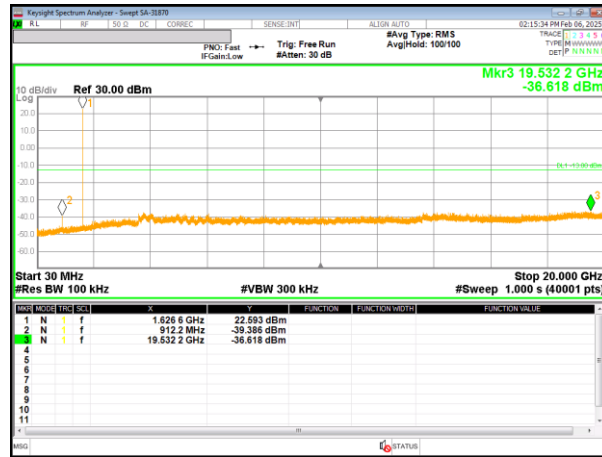
Low channel 3.75 kHz SCS BPSK 1SC24



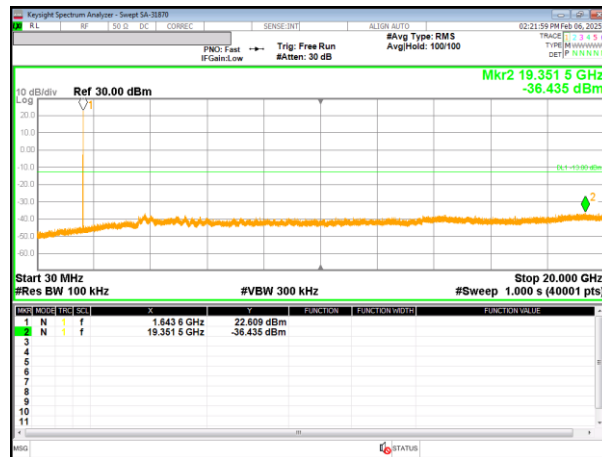
Mid channel 3.75 kHz SCS BPSK 1SC24



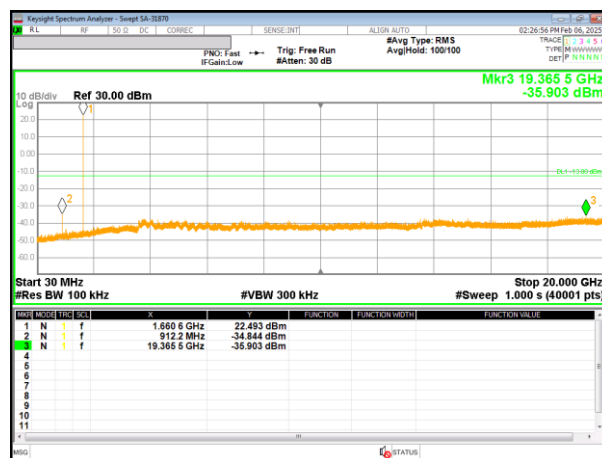
High channel 3.75 kHz SCS BPSK 1SC24



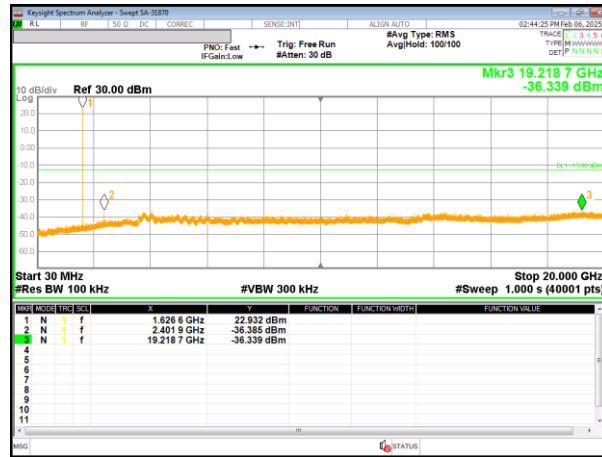
Low channel 3.75 kHz SCS QPSK 1SC24



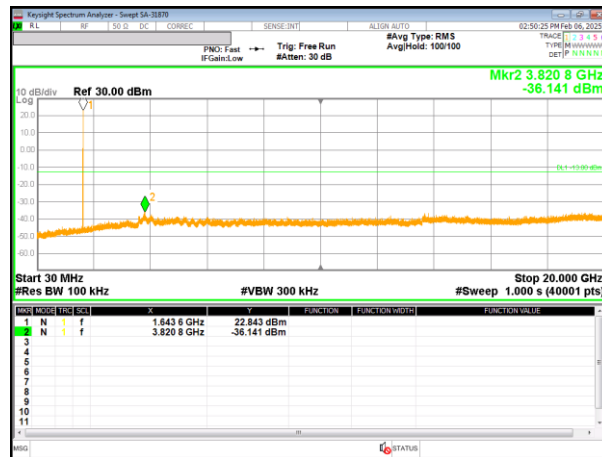
Mid channel 3.75 kHz SCS QPSK 1SC24



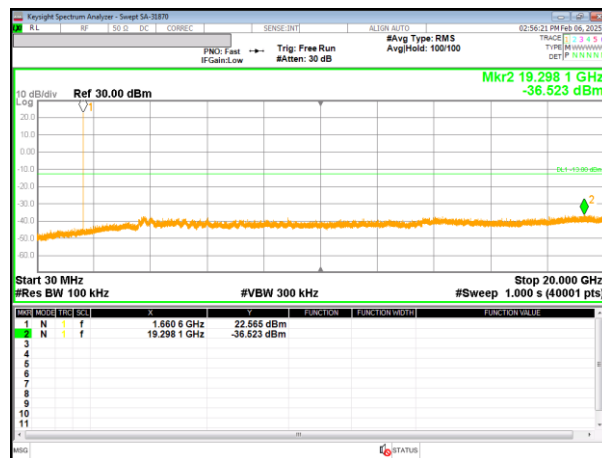
High channel 3.75 kHz SCS QPSK 1SC24



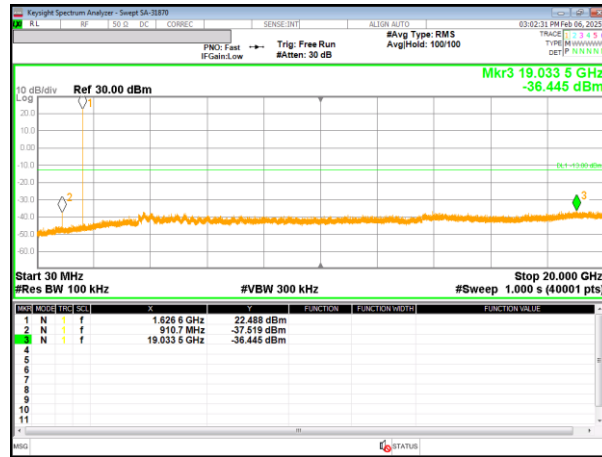
Low channel 15 kHz SCS BPSK 1SC6



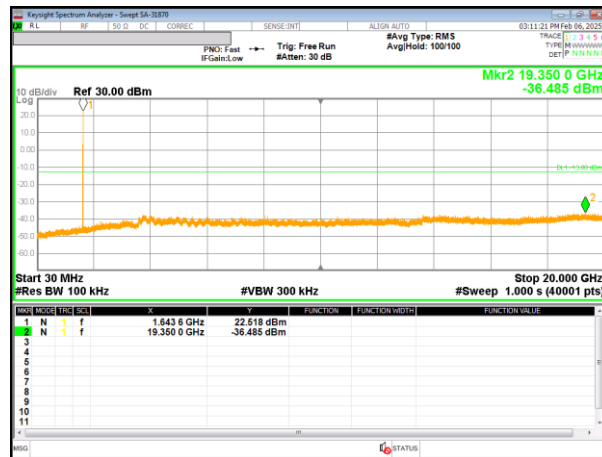
Mid channel 15 kHz SCS BPSK 1SC6



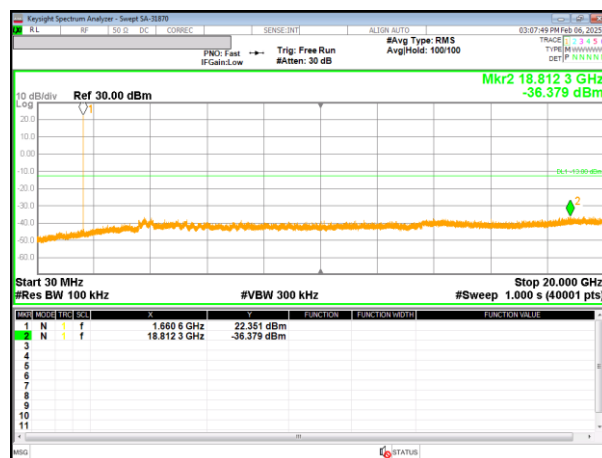
High channel 15 kHz SCS BPSK 1SC6



Low channel 15 kHz SCS BPSK 1SC6



Mid channel 15 kHz SCS BPSK 1SC6



High channel 15 kHz SCS BPSK 1SC6

9. RADIATED TEST RESULTS

9.1. RADIATED POWER (EIRP)

RULE PART(S)

FCC: §25.204(a)

LIMITS

In bands shared coequally with terrestrial radio communication services, the equivalent isotropically radiated power transmitted in any direction towards the horizon by an earth station, other than an ESV, operating in frequency bands between 1 and 15 GHz, shall not exceed the following limits except as provided for in paragraph (c) of this section:

- + 40 dBW in any 4 kHz band for $\theta \leq 0^\circ$
- + 40 + 3 θ dBW in any 4 kHz band for $0^\circ < \theta \leq 5^\circ$

where θ is the angle of elevation of the horizon viewed from the center of radiation of the antenna of the earth station and measured in degrees as positive above the horizontal plane and negative below it.

TEST PROCEDURE

ANSI / TIA / EIA 603 E Clause 2.2.17; ESU40 setting reference to 971168 D01 v03r01

For radiated output power measurement with a ESU40:

- a) Set the RBW $\geq$ OBW
- b) Set VBW $\geq 3 \times$ RBW;
- c) Set span $\geq 2 \times$ RBW;
- d) Sweep time = auto couple;
- e) Detector = rms;
- f) Ensure that the number of measurement points $\geq 2 \times$ span/RBW;
- g) Trace Mode = average;

NOTE1

All modulations (BPSK, QPSK), SCS and SC Size were investigated to determine the worst case configuration. All modes of operation were investigated and the worst case configuration results are reported in this section.

TEST RESULTS

Band	SCS / SC Size	Modulation	Frequency (MHz)	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBd)	ERP (dBm)	ERP (mW)	Limit (dBm)	Delta (dB)
NB NTN B255	3.75 kHz / 1SC0	BPSK	1626.60	18.26	H	4.21	9.05	23.10	204.17	70.00	-46.90
			1643.50	17.85	H	4.23	9.14	22.76	188.80	70.00	-47.24
			1660.40	18.24	H	4.25	9.23	23.22	209.89	70.00	-46.78
		QPSK	1626.60	17.93	H	4.21	9.05	22.77	189.23	70.00	-47.23
			1643.50	17.74	H	4.23	9.14	22.65	184.08	70.00	-47.35
			1660.40	18.08	H	4.25	9.23	23.06	202.30	70.00	-46.94
	3.75 kHz / 1SC24	BPSK	1626.60	17.63	H	4.21	9.05	22.47	176.60	70.00	-47.53
			1643.50	17.34	H	4.23	9.14	22.25	167.88	70.00	-47.75
			1660.40	17.73	H	4.25	9.23	22.71	186.64	70.00	-47.29
		QPSK	1626.60	17.82	H	4.21	9.05	22.66	184.50	70.00	-47.34
			1643.50	17.62	H	4.23	9.14	22.53	179.06	70.00	-47.47
			1660.40	17.98	H	4.25	9.23	22.96	197.70	70.00	-47.04
	3.75 kHz / 1SC47	BPSK	1626.60	18.09	H	4.21	9.05	22.93	196.34	70.00	-47.07
			1643.50	17.99	H	4.23	9.14	22.90	194.98	70.00	-47.10
			1660.40	18.03	H	4.25	9.23	23.01	199.99	70.00	-46.99
		QPSK	1626.60	17.78	H	4.21	9.05	22.62	182.81	70.00	-47.38
			1643.50	17.75	H	4.23	9.14	22.66	184.50	70.00	-47.34
			1660.40	18.34	H	4.25	9.23	23.32	214.78	70.00	-46.68
	15 kHz / 1SC0	BPSK	1626.60	17.89	H	4.21	9.05	22.73	187.50	70.00	-47.27
			1643.50	17.55	H	4.23	9.14	22.46	176.20	70.00	-47.54
			1660.40	17.93	H	4.25	9.23	22.91	195.43	70.00	-47.09
		QPSK	1626.60	17.79	H	4.21	9.05	22.63	183.23	70.00	-47.37
			1643.50	17.42	H	4.23	9.14	22.33	171.00	70.00	-47.67
			1660.40	17.80	H	4.25	9.23	22.78	189.67	70.00	-47.22
	15 kHz / 1SC6	BPSK	1626.60	18.02	H	4.21	9.05	22.86	193.20	70.00	-47.14
			1643.50	17.67	H	4.23	9.14	22.58	181.13	70.00	-47.42
			1660.40	19.28	H	4.25	9.23	24.26	266.69	70.00	-45.74
		QPSK	1626.60	18.24	H	4.21	9.05	23.08	203.24	70.00	-46.92
			1643.50	17.86	H	4.23	9.14	22.77	189.23	70.00	-47.23
			1660.40	18.22	H	4.25	9.23	23.20	208.93	70.00	-46.80
	15 kHz / 1SC11	BPSK	1626.60	17.88	H	4.21	9.05	22.72	187.07	70.00	-47.28
			1643.50	17.55	H	4.23	9.14	22.46	176.20	70.00	-47.54
			1660.40	17.96	H	4.25	9.23	22.94	196.79	70.00	-47.06
		QPSK	1626.60	18.08	H	4.21	9.05	22.92	195.88	70.00	-47.08
			1643.50	17.80	H	4.23	9.14	22.71	186.64	70.00	-47.29
			1660.40	18.23	H	4.25	9.23	23.21	209.41	70.00	-46.79
	15 kHz / 3SC0	QPSK	1626.60	20.38	H	4.21	9.05	25.22	332.66	70.00	-44.78
			1643.50	20.07	H	4.23	9.14	24.98	314.77	70.00	-45.02
			1660.40	20.33	H	4.25	9.23	25.31	339.63	70.00	-44.69
	15 kHz / 3SC6	QPSK	1626.60	20.28	H	4.21	9.05	25.12	325.09	70.00	-44.88
			1643.50	20.01	H	4.23	9.14	24.92	310.46	70.00	-45.08
			1660.40	20.24	H	4.25	9.23	25.22	332.66	70.00	-44.78
	15 kHz / 3SC9	QPSK	1626.60	20.49	H	4.21	9.05	25.33	341.19	70.00	-44.67
			1643.50	20.99	H	4.23	9.14	25.90	389.05	70.00	-44.10
			1660.40	21.31	H	4.25	9.23	26.29	425.60	70.00	-43.71
	15 kHz / 6SC0	QPSK	1626.60	21.66	H	4.21	9.05	26.50	446.68	70.00	-43.50
			1643.50	22.12	H	4.23	9.14	27.03	504.66	70.00	-42.97
			1660.40	19.94	H	4.25	9.23	24.92	310.46	70.00	-45.08
	15 kHz / 6SC6	QPSK	1626.60	21.89	H	4.21	9.05	26.73	470.98	70.00	-43.27
			1643.50	22.40	H	4.23	9.14	27.31	538.27	70.00	-42.69
			1660.40	20.70	H	4.25	9.23	25.68	369.83	70.00	-44.32
	15 kHz / 12SC0	QPSK	1626.60	21.68	H	4.21	9.05	26.52	448.75	70.00	-43.48
			1643.50	22.10	H	4.23	9.14	27.01	502.34	70.00	-42.99
			1660.40	20.40	H	4.25	9.23	25.38	345.14	70.00	-44.62

9.2. FIELD STRENGTH OF SPURIOUS RADIATION

LIMITS

FCC §25.202

(f) Emission limitations. Except for SDARS terrestrial repeaters and as provided for in paragraph (i), the mean power of emissions shall be attenuated below the mean output power of the transmitter in accordance with the schedule set forth in paragraphs (f)(1) through (f)(4) of this section. The out-of-band emissions of SDARS terrestrial repeaters shall be attenuated in accordance with the schedule set forth in paragraph (h) of this section.

(3) In any 4 kHz band, the center frequency of which is removed from the assigned frequency by more than 250 percent of the authorized bandwidth: An amount equal to 43 dB plus 10 times the logarithm (to the base 10) of the transmitter power in watts;

TEST PROCEDURE

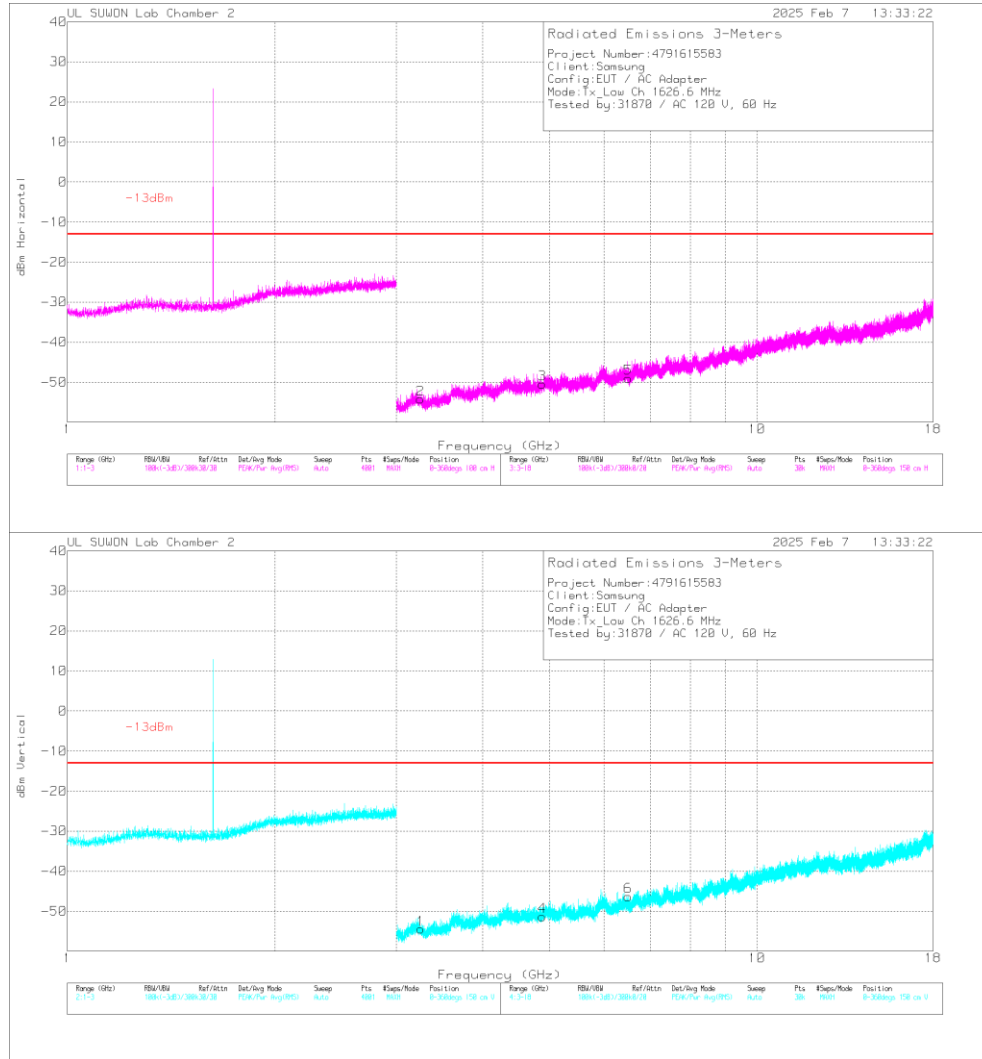
- (a) EUT was connected to a spectrum analyzer.
- (b) Set display line at -13 dBm (the limit of $43 + 10\log(P)$)
- (c) RBW is set to $\geq 4\text{kHz}$, VBW set to at least 3 times the RBW.
- (d) Detector: RMS / Trace: Max hold
- (e) Sweep time: Set to 2ms multiplied by the number of points to obtain the average over 2ms.
- (f) Multiple sweeps with max hold enabled are made to capture the maximum average.

RESULTS

See the next page.

9.2.1. Above 1GHz

Low CHANNEL RESULTS



Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBm)	Det	3117_00168724	3GHz_HP(dB)	Conversion Factor(dB)	Corrected Reading dBm	-13dBm	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
2	3.25299	-71.03	Pk	32.8	-27.8	11.8	-54.23	-	-	0-360	150	H
3	4.88094	-69.36	Pk	34	-26.9	11.8	-50.46	-	-	0-360	150	H
5	6.50638	-70.71	Pk	35.4	-25.5	11.8	-49.01	-	-	0-360	150	H
1	3.25349	-71.29	Pk	32.8	-27.8	11.8	-54.49	-	-	0-360	150	V
4	4.87894	-70.3	Pk	34	-26.8	11.8	-51.3	-	-	0-360	150	V
6	6.50638	-68.02	Pk	35.4	-25.5	11.8	-46.32	-	-	0-360	150	V

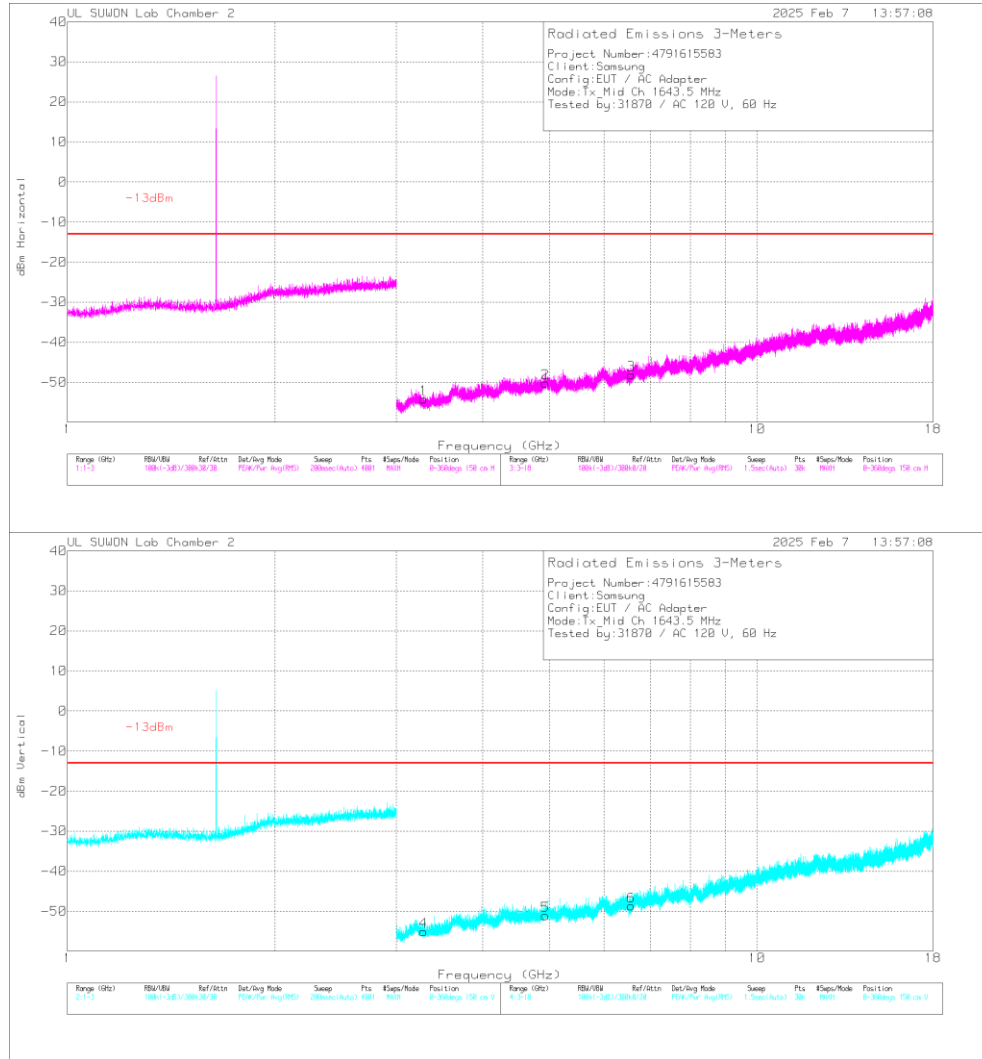
Pk - Peak detector

Radiated Emissions

Frequency (GHz)	Meter Reading (dBm)	Det	3117_00168724	3GHz_HP(dB)	Conversion Factor(dB)	Corrected Reading dBm	-13dBm	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
.25299	-73.82	RMS	32.8	-27.8	11.8	-57.02	-13	-44.02	360	150	H
4.88094	-70.31	RMS	34	-26.9	11.8	-55.41	-13	-42.41	360	150	H
6.50638	-69.91	RMS	35.4	-25.5	11.8	-52.21	-13	-39.21	360	150	H
3.25349	-71.11	RMS	32.8	-27.8	11.8	-56.31	-13	-43.31	285.1	198	V
4.87894	-71.46	RMS	34	-26.8	11.8	-54.46	-13	-41.46	285.1	198	V
6.50638	-71.59	RMS	35.4	-25.5	11.8	-52.89	-13	-39.89	285.1	198	V

RMS - RMS detection

Mid CHANNEL RESULTS



Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBm)	Det	3117_00168724	3GHz_HP(dB)	Conversion Factor(dB)	Corrected Reading dBm	-13dBm	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	3.28449	-70.54	Pk	32.7	-28.1	11.8	-54.14	-	-	0-360	150	H
2	4.93343	-69.66	Pk	34	-26.3	11.8	-50.16	-	-	0-360	150	H
3	6.57088	-70.03	Pk	35.4	-25.3	11.8	-48.13	-	-	0-360	150	H
4	3.28449	-71.5	Pk	32.7	-28.1	11.8	-55.1	-	-	0-360	150	V
5	4.93343	-70.56	Pk	34	-26.3	11.8	-51.06	-	-	0-360	150	V
6	6.57088	-70.6	Pk	35.4	-25.3	11.8	-48.7	-	-	0-360	150	V

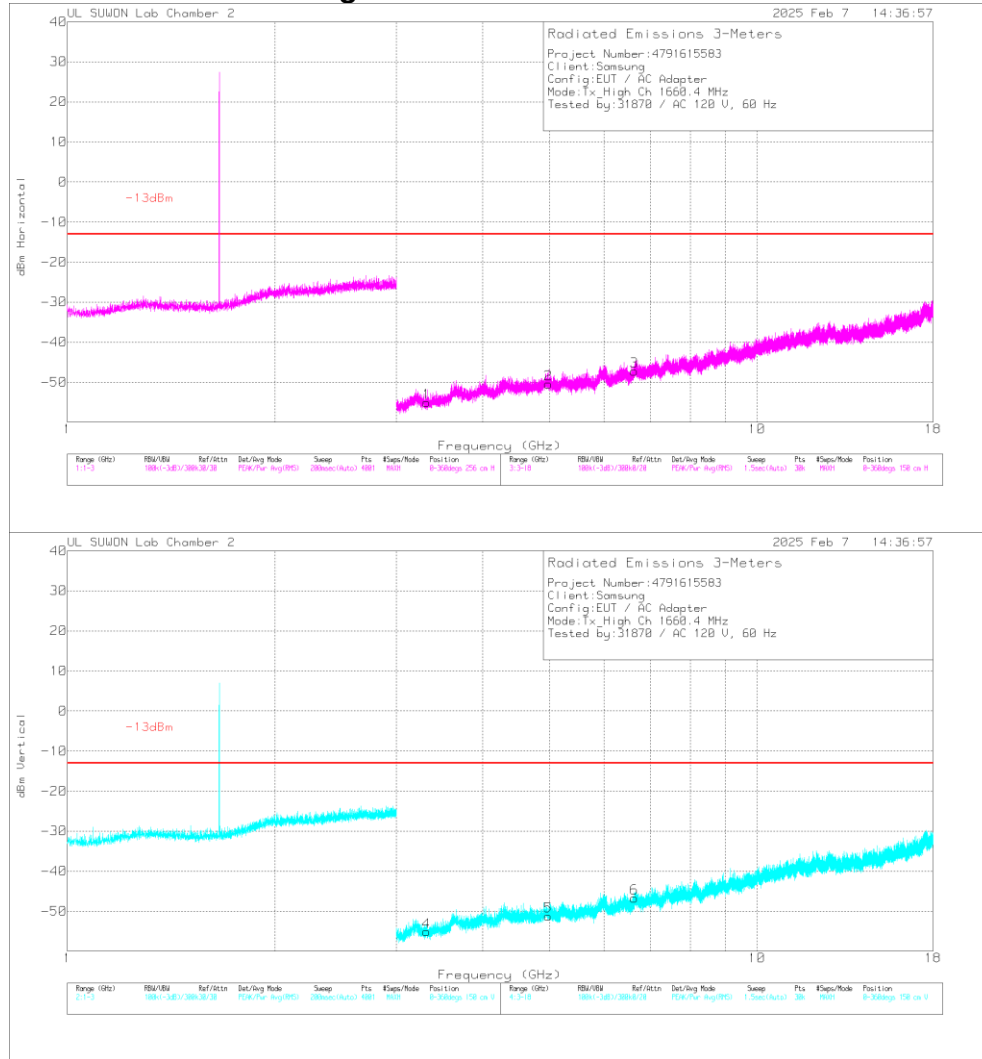
Pk - Peak detector

Radiated Emissions

Frequency (GHz)	Meter Reading (dBm)	Det	3117_00168724	3GHz_HP(dB)	Conversion Factor(dB)	Corrected Reading dBm	-13dBm	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
3.28449	-76.89	RMS	32.7	-28.1	11.8	-60.49	-13	-47.49	3	294	H
4.93343	-71.88	RMS	34	-26.3	11.8	-52.38	-13	-39.38	3	294	H
6.57088	-72.93	RMS	35.4	-25.3	11.8	-51.03	-13	-38.03	3	294	H
3.28449	-74.04	RMS	32.7	-28.1	11.8	-57.64	-13	-44.64	331	256	V
4.93343	-69.78	RMS	34	-26.3	11.8	-50.28	-13	-37.28	331	256	V
6.57088	-72.7	RMS	35.4	-25.3	11.8	-50.8	-13	-37.80	331	256	V

RMS - RMS detection

High CHANNEL RESULTS



Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBm)	Det	3117_00168724	3GHz_HP(dB)	Conversion Factor[dB]	Corrected Reading dBm	-13dBm	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	3.32099	-71.33	Pk	32.7	-28.2	11.8	-55.03	-	-	0-360	150	H
2	4.98343	-69.98	Pk	34	-26.3	11.8	-50.48	-	-	0-360	150	H
3	6.64288	-70.41	Pk	35.4	-24	11.8	-47.21	-	-	0-360	150	H
4	3.32049	-71.43	Pk	32.7	-28.2	11.8	-55.13	-	-	0-360	150	V
5	4.97993	-70.66	Pk	34	-26.3	11.8	-51.16	-	-	0-360	150	V
6	6.64288	-69.87	Pk	35.4	-24	11.8	-46.67	-	-	0-360	150	V

Pk - Peak detector

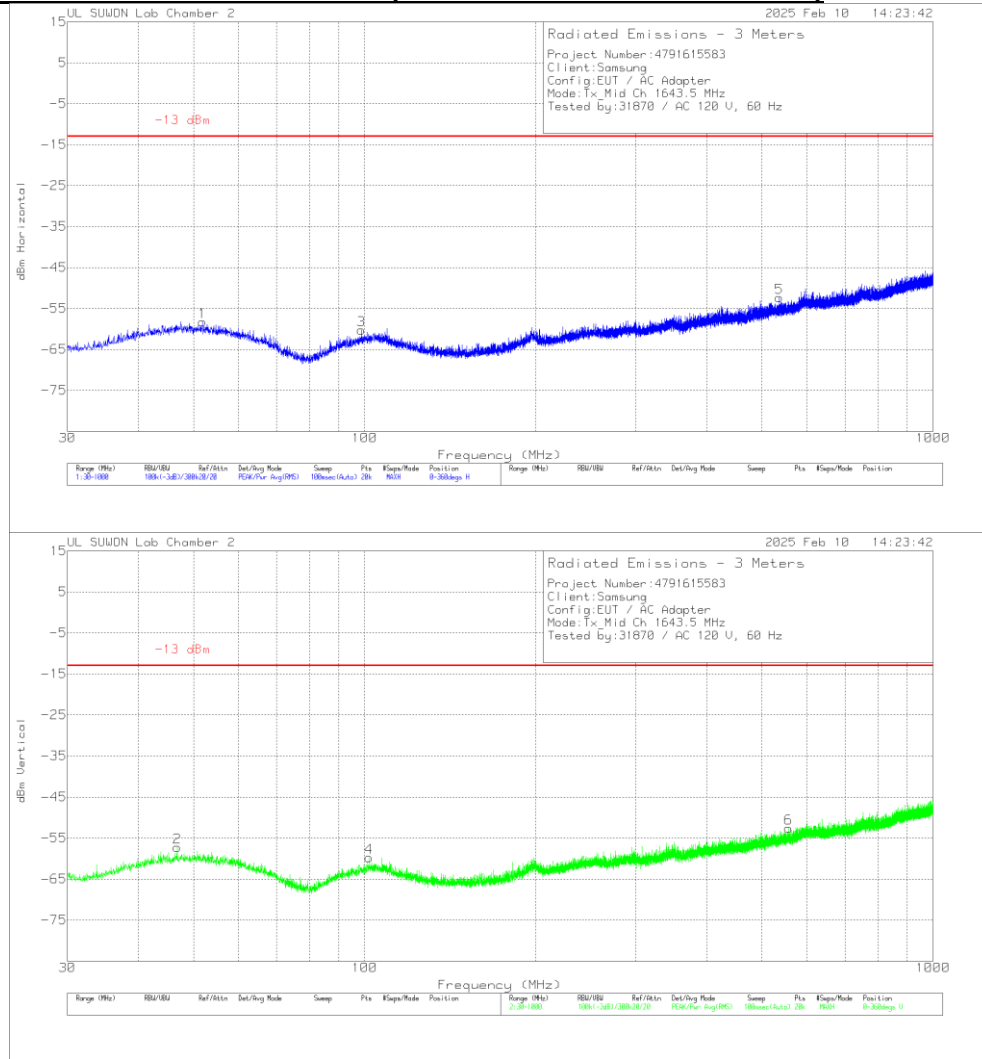
Radiated Emissions

Frequency (GHz)	Meter Reading (dBm)	Det	3117_00168724	3GHz_HP(dB)	Conversion Factor[dB]	Corrected Reading dBm	-13dBm	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
3.32099	-76.9	RMS	32.7	-28.2	11.8	-60.6	-13	-47.6	148	208	H
4.98343	-75.93	RMS	34	-26.3	11.8	-56.43	-13	-43.43	148	208	H
6.64288	-76.94	RMS	35.4	-24	11.8	-53.74	-13	-40.74	148	208	H
3.32049	-76.92	RMS	32.7	-28.2	11.8	-60.62	-13	-47.62	301	242	V
4.97993	-75.93	RMS	34	-26.3	11.8	-56.43	-13	-43.43	301	242	V
6.64288	-76.93	RMS	35.4	-24	11.8	-53.73	-13	-40.73	301	242	V

RMS - RMS detection

9.3. WORST CASE BELOW 1 GHz

SPURIOUS EMISSIONS 30 TO 1000 MHz (WORST-CASE CONFIGURATION)



Trace Markers

Marker	Frequency (MHz)	Meter Reading (dBm)	Det	VULB9163_749	Below_1G(dB)	Conversion Factor[dB]	Corrected Reading dBm	-13 dBm	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	51.8726	-58.3	Pk	19.9	-31.6	11.8	-58.2	-13	-45.2	0-360	100	H
3	98.6732	-58.06	Pk	17.3	-31.3	11.8	-60.26	-13	-47.26	0-360	200	H
5	535.9311	-57.68	Pk	23.2	-29.7	11.8	-52.38	-13	-39.38	0-360	200	H
2	46.7803	-57.37	Pk	20	-31.7	11.8	-57.27	-13	-44.27	0-360	200	V
4	101.8255	-57.94	Pk	17.6	-31.2	11.8	-59.74	-13	-46.74	0-360	100	V
6	556.4458	-58.17	Pk	23.5	-29.7	11.8	-52.57	-13	-39.57	0-360	200	V

Pk - Peak detector

9.4. ADDITIONAL UNWANTED EMISSION (1559 MHz – 1610 MHz)

LIMITS

FCC §25.216

(c) The e.i.r.p. density of emissions from mobile earth stations placed in service after July 21, 2002 with assigned uplink frequencies between 1610 MHz and 1660.5 MHz shall not exceed -70 dBW/MHz, averaged over any 2 millisecond active transmission interval, in the band 1559–1605 MHz. The e.i.r.p. of discrete emissions of less than 700 Hz bandwidth from such stations shall not exceed -80 dBW, averaged over any 2 millisecond active transmission interval, in the 1559–1605 MHz band.

(h) Mobile earth stations manufactured more than six months after Federal Register publication of the rule changes adopted in FCC 03-283 with assigned uplink frequencies in the 1626.5-1660.5 MHz band shall suppress the power density of emissions in the 1605-1610 MHz band-segment to an extent determined by linear interpolation from -70 dBW/MHz at 1605 MHz to -46 dBW/MHz at 1610 MHz, averaged over any 2 millisecond active transmission interval. The e.i.r.p of discrete emissions of less than 700 Hz bandwidth from such stations shall not exceed a level determined by linear interpolation from -80 dBW at 1605 MHz to -56 dBW at 1610 MHz, averaged over any 2 millisecond active transmission interval.

TEST PROCEDURE

KDB 971168 D01 v03r01/ D02 v02/r01

- (a) EUT was connected to a spectrum analyzer.
- (c) RBW is set to 100 kHz, VBW set to at least 3 times the RBW.
- (d) Detector: RMS / Trace: Max hold
- (e) Sweep time: Set to 2ms multiplied by the number of points to obtain the average over 2ms.
- (f) Multiple sweeps with max hold enabled are made to capture the maximum average.

NOTE1

For the additional unwanted emission value measured in 100 kHz, even if reference bandwidth 1MHz is applied, it is below limit.

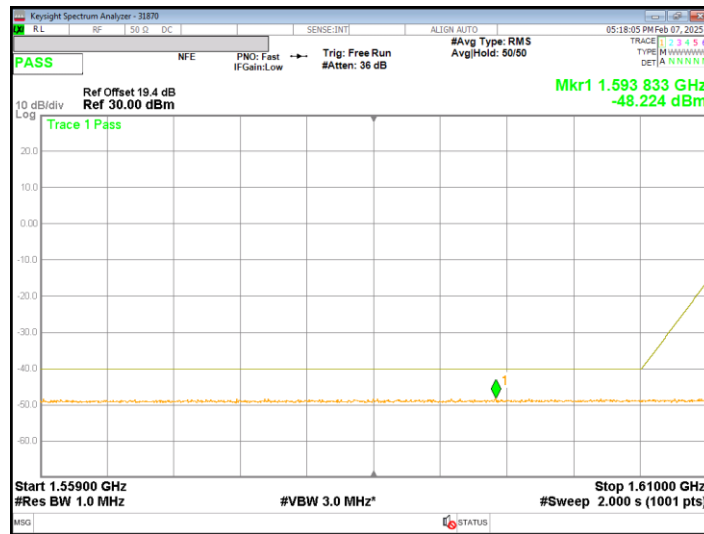
NOTE2

All modulations (BPSK, QPSK), SCS and SC Size were investigated to determine the worst case configuration. All modes of operation were investigated and the worst case configuration results are reported in this section.

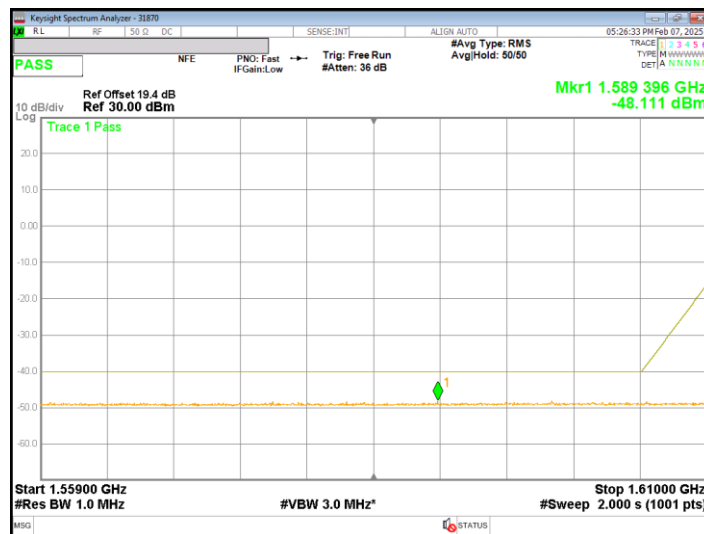
RESULTS

See the next page.

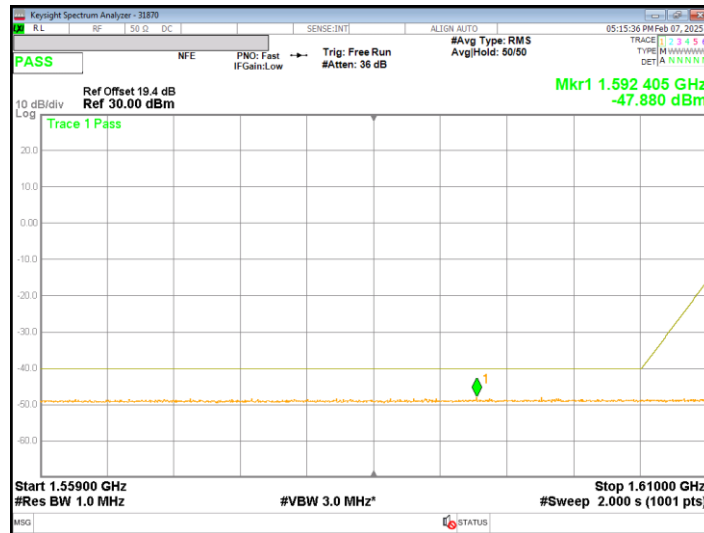
9.4.1. ADDITIONAL UNWANTED EMISSION RESULT



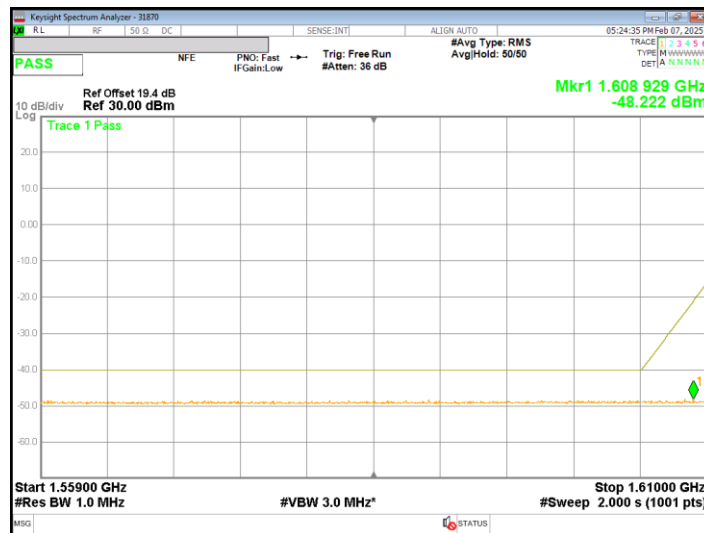
HORIZONTAL
QPSK / 15 kHz / 6SC6 / Low channel



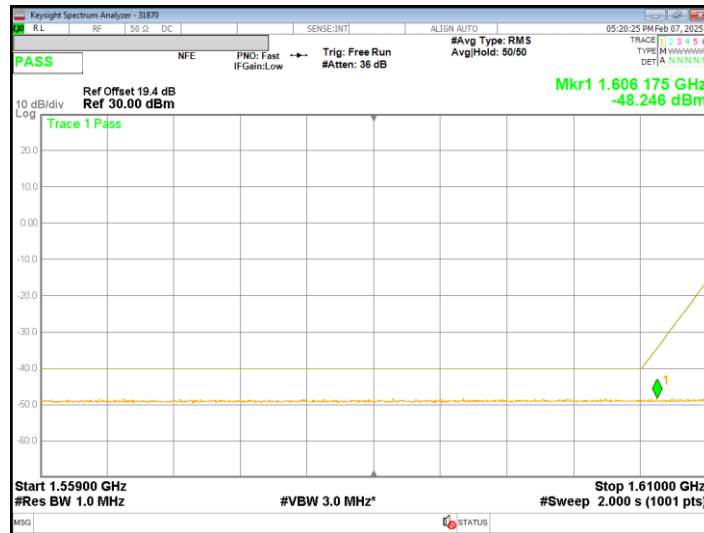
VERTICAL
QPSK / 15 kHz / 6SC6 / Low channel



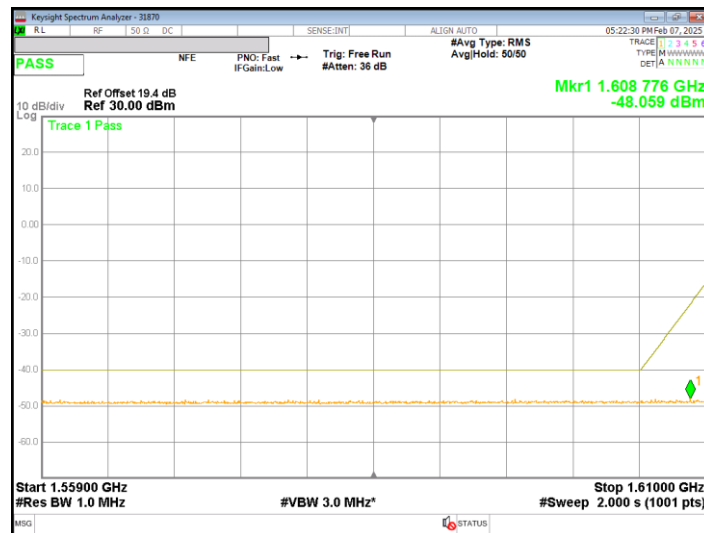
HORIZONTAL
QPSK / 15 kHz / 6SC6 / Mid channel



VERTICAL
QPSK / 15 kHz / 6SC6 / Mid channel



HORIZONTAL
QPSK / 15 kHz / 6SC6 / High channel



VERTICAL
QPSK / 15 kHz / 6SC6 / High channel

9.5. CARRIER-OFF STATE EMISSIONS

LIMITS

FCC §25.216

(i) The e.i.r.p density of carrier-off state emissions from mobile earth stations manufactured more than six months after Federal Register publication of the rule changes adopted in FCC 03–283 with assigned uplink frequencies between 1 and 3 GHz shall not exceed –80 dBW/MHz in the 1559–1610 MHz band averaged over any two millisecond interval.

TEST PROCEDURE

KDB 971168 D01 v03r01/ D02 v02/r01

- (a) EUT was connected to a spectrum analyzer.
- (c) RBW is set to 1MHz, VBW set to at least 3 times the RBW.
- (d) Detector: RMS / Trace: Max hold
- (e) Sweep time: Set to 2ms multiplied by the number of points to obtain the average over 2ms.
- (f) Multiple sweeps with max hold enabled are made to capture the maximum average.

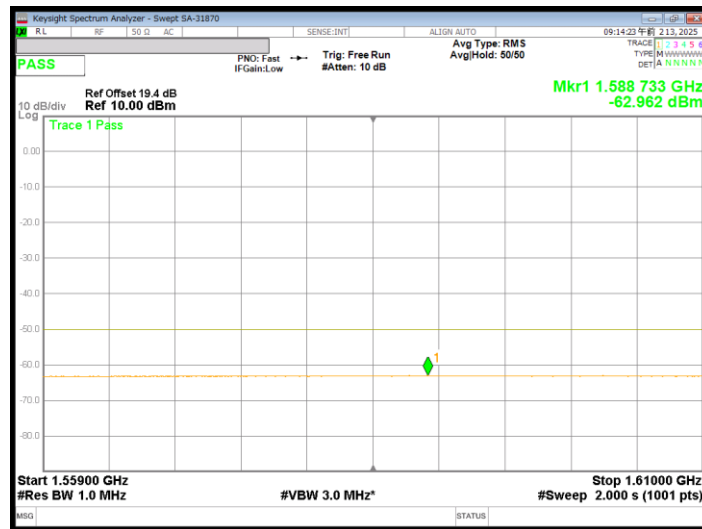
NOTE

All modulations (BPSK, QPSK), SCS and SC Size were investigated to determine the worst case configuration. All modes of operation were investigated and the worst case configuration results are reported in this section.

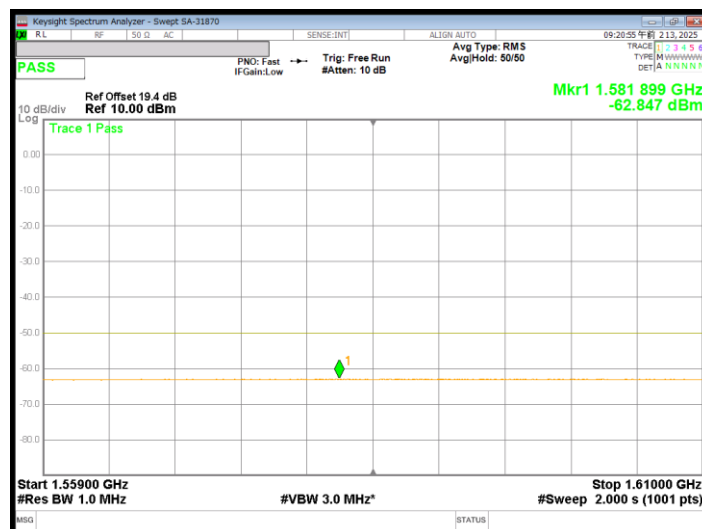
RESULTS

See the next page.

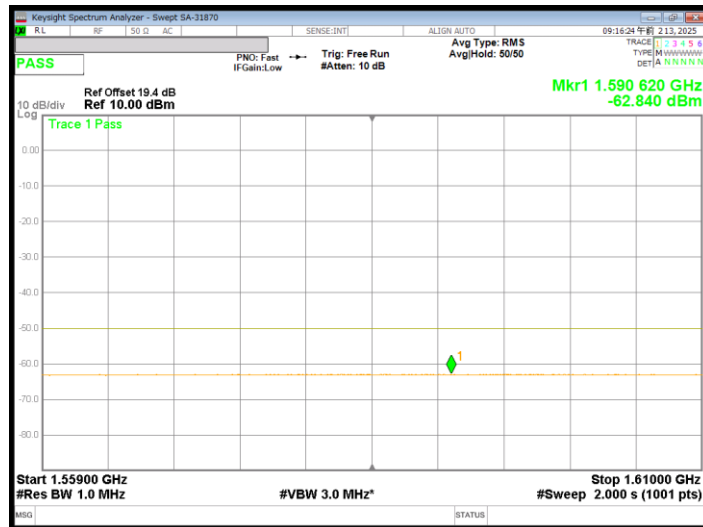
9.5.1. CARRIER-OFF STATE EMISSIONS RESULT



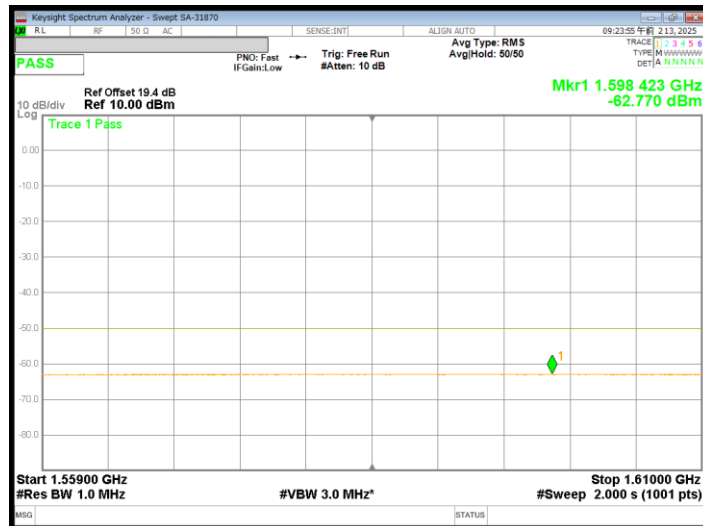
HORIZONTAL
QPSK / 15 kHz / 6SC6 / Low channel



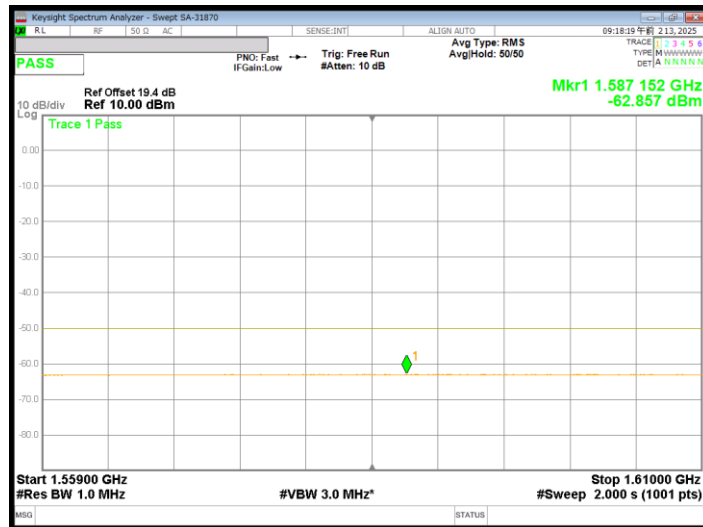
VERTICAL
QPSK / 15 kHz / 6SC6 / Low channel



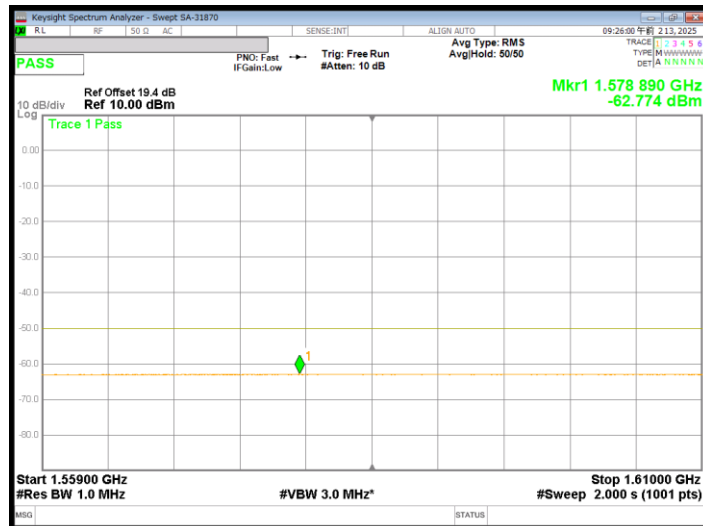
HORIZONTAL
QPSK / 15 kHz / 6SC6 / Mid channel



VERTICAL
QPSK / 15 kHz / 6SC6 / Mid channel



HORIZONTAL
QPSK / 15 kHz / 6SC6 / High channel



VERTICAL
QPSK / 15 kHz / 6SC6 / High channel

10. Frequency Stability

LIMITS

FCC § 25.202

(d) Frequency tolerance, Earth stations. The carrier frequency of each earth station transmitter authorized in these services shall be maintained within 0.001 percent of the reference frequency.

TEST PROCEDURE

Use spectrum with Frequency Error measurement capability,

- Temp. = -30°C to +50°C
- Voltage = (85% - 115%)

Low Voltage: 3.7 V / Normal Voltage: 3.88V / Max Voltage: 4.45 V

The EUT is place inside a temperature chamber. The temperature is set to 20°C and allowed to stabilize. After sufficient soak time, the transmitting frequency error is measured. The temperature is increase by 10 degrees, allowed to stabilize and soak, and then the measurement is repeated. This is repeated until +50°C is reached.

NOTE

Test were performed each lowest or highest frequency on the modulation condition of widest bandwidth.(Please refer to OBW results)

RESULTS

Reference Frequency: EUT Channel 1626.6 MHz @ 20°C Limit: ± 10 ppm = 16.26 kHz							
Reference Frequency	1626.6 MHz	Frequency Stability					
Power	Envir.	F Low @ -10 dB BW (MHz)	F High @ -10 dB BW (MHz)	Frequency Reading (MHz)	Delta (Hz)	Delta (ppm)	Limit (ppm)
(Vdc)	Temp (°C)						
3.88	50	1626.431610	1626.763315	1626.597463	-2537.500000	-1.671	10
3.88	40	1626.431230	1626.763305	1626.597268	-2732.500000	-1.791	10
3.88	30	1626.434100	1626.763250	1626.598675	-1325.000000	-0.926	10
3.88	20	1626.437250	1626.763112	1626.600181	181.000000	0.000	10
3.88	10	1626.437120	1626.763105	1626.600113	112.500000	-0.042	10
3.88	0	1626.437360	1626.763191	1626.600276	275.500000	0.058	10
3.88	-10	1626.437410	1626.764123	1626.600767	766.500000	0.360	10
3.88	-20	1626.437780	1626.764215	1626.600998	997.500000	0.502	10
3.88	-30	1626.437912	1626.764298	1626.601105	1105.000000	0.568	10

Reference Frequency: EUT Channel 1626.600181 MHz @ 20°C Limit: ± 10 ppm = 16.26 kHz							
Power Supply	Envir.	Frequency Deviation Measured with Time Elapse					
(Vdc)	Temp (°C)	F Low @ -10 dB BW (MHz)	F High @ -10 dB BW (MHz)	Frequency Reading (MHz)	Delta (Hz)	Delta (ppm)	Limit (ppm)
15%	20	1626.432500	1626.765210	1626.598855	-1145.000000	-0.815	10
-15%	20	1626.432530	1626.764189	1626.598360	-1640.500000	-1.120	10
End Point Voltage	20	1626.436120	1626.764012	1626.600066	66.000000	-0.071	10

END OF TEST REPORT