

TEST REPORT

Report Number: 15984607E1V1

Applicant : GROUNDPROBE PTY LTD
72 NEWMARKET ROAD,
WINDSOR, QLD 4030, AUSTRALIA

Model No. : SSR-XT

FCC ID : S491225S5SSRXT

EUT Description : SLOPE STABILITY RADAR MODULE

Test Standard(s) : FCC CFR 47 PART 90 SUBPART F & I

Date Of Issue:
2026-05-29

Prepared by:
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REPORT REVISION HISTORY

Rev.	Issue Date	Revisions	Revised By
V1	2026-05-29	Initial Issue	Thu Chan

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1. ATTESTATION OF TEST RESULTS

Applicant Name and Address	GROUNDPROBE PTY LTD 72 NEWMARKET ROAD, WINDSOR, QLD 4030, AUSTRALIA
Model	SSR-TX
Brand	GROUNDPROBE PTY LTD
FCC ID	S491225S5SSRXT
EUT Description	SLOPE STABILITY RADAR MODULE
Serial Number	25H026
Sample Receipt Date	11-14-2025
Date Tested	11-17-2025 to 12-18-2025
Applicable Standards	FCC PART 90 Subpart F & I
Test Results	COMPLIES
UL Verification Services Inc. tested the above equipment in accordance with the requirements set forth in the above standards. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report. The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. It is the manufacturer's responsibility to assure that additional production units of this model are manufactured with identical electrical and mechanical components. All samples tested were in good operating condition throughout the entire test program. Measurement Uncertainties are published for informational purposes only and were not taken into account unless noted otherwise. This document may not be altered or revised in any way unless done so by UL Verification Services Inc. and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by UL Verification Services Inc. will constitute fraud and shall nullify the document.	
Approved & Released By:	Prepared & Reviewed By:
	
Thu Chan Staff Engineer UL Verification Services, Inc.	Kin Wong Laboratory Engineer Associate UL Verification Services, Inc.
Co-Reviewed By:	
	
Huahan Li Senior Test Engineer UL Verification Services, Inc.	

2. SUMMARY OF TEST RESULTS

Requirement Description	FCC Requirement Clause	Test Limit	Test Condition	Result
Duty Cycle	N/A	N/A	Conducted	Compliant
Modulation	2.1047	N/A	-	Compliant
Occupied Bandwidth	2.1049	N/A	Conducted	Compliant
RF Output Power	2.1046 90.205(r)	N/A	Conducted	Compliant
Frequency Stability	2.1055	Fundamental emissions are contained within allocated frequency band	Conducted	Compliant
Conducted Spurious Emissions	2.1051 2.1057(a)(1)	-13 dBm/MHz for all out-of-band emissions	Conducted	Compliant
Radiated Spurious Emissions	2.1053(a) 2.1057(a)(1)	-13 dBm/MHz for all out-of-band emissions	Radiated	Compliant
RF Exposure	1.1310	1 mW/cm ² for near-field and far-field power density	-	Compliant

3. TEST METHODOLOGY

The tests documented in this report were performed in accordance with:

- FCC CFR 47 Part 2
- FCC CFR 47 Part 90
- FCC OET Bulletin 65
- ANSI C63.26-2015

4. FACILITIES AND ACCREDITATION

UL Verification Services Inc. is accredited by A2LA, certification #0751.05, for all testing performed within the scope of this report. Testing was performed at the locations noted below.

	Address	ISED CABID	ISED Company Number	FCC Registration
☒	Building 1: 47173 Benicia Street, Fremont, CA 94538, USA	US0104	2324A	550739
☐	Building 2: 47266 Benicia Street, Fremont, CA 94538, USA			
☒	Building 3: 843 Auburn Court, Fremont, CA 94538 USA			
☒	Building 4: 47658 Kato Rd, Fremont, CA 94538 USA			
☐	Building 5: 47670 Kato Rd, Fremont, CA 94538 USA			

5. CALIBRATION AND UNCERTAINTY

5.1. METROLOGICAL TRACEABILITY

All test and measuring equipment utilized to perform the tests documented in this report are calibrated on a regular basis, with a maximum time between calibrations of one year or the manufacturers' recommendation, whichever is less, and where applicable is traceable to recognized national standards.

5.2. DECISION RULES

The Decision Rule is based on Simple Acceptance in accordance with ISO Guide 98-4:2012 Clause 8.2. (Measurement uncertainty is not taken into account when stating conformity with a specified requirement.)

5.3. MEASUREMENT UNCERTAINTY

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

PARAMETER	U _{LAB}
Conducted Antenna Port Emission Measurement	1.94 dB
RF Power Measurement Direct Method Using Power Meter	1.3 (Peak), 0.45 (Ave)
Radio Frequency (Spectrum Analyzer)	141.16 Hz
Occupied Bandwidth	1.22%
Worst Case Conducted Disturbance, 9 KHz to 0.15 MHz	3.78 dB
Worst Case Conducted Disturbance, 0.15 to 30 MHz	3.40 dB
Worst Case Radiated Disturbance, 9 KHz to 30 MHz	2.87 dB
Worst Case Radiated Disturbance, 30 to 1000 MHz	6.01 dB
Worst Case Radiated Disturbance, 1000 to 18000 MHz	4.73 dB
Worst Case Radiated Disturbance, 18000 to 26000 MHz	4.51 dB
Worst Case Radiated Disturbance, 26000 to 40000 MHz	5.29 dB
Temperature	±0.9 °C
Voltages	±0.45 %
Time	±0.02 %

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

6. EQUIPMENT UNDER TEST

6.1. DESCRIPTION OF EUT

The EUT is a slope stability radar (SSR) module that detects the movements and potential hazards of mine sites. The SSR-XT model is a 3D real aperture radar suited for targeted monitoring.

Part Number	Serial Number	Description
GP39055	25H026	Radio Frequency Module (RFM)
GP36148	N/A	XT Feed Cable

6.2. DESCRIPTION OF AVAILABLE ANTENNA

The EUT antenna is an external dish antenna, 180 cm in diameter, with a maximum gain of 46 dBi.

6.3. SOFTWARE AND FIRMWARE

The Software version used at test is MonitorIQ version 0.1.2385 (b5b921f7e193+5). The FPGA Firmware version used at test is SSR RCE v7.92

6.4. WORST CASE MODES

The highest power mode is ER_RPN_WAVEFORM and the widest bandwidth mode is SR_SYN_WAVEFORM.

Waveform	Bandwidth	Power (During 'On' Time)	Power
	(MHz)	(dBm)	(mW)
ER_RPN	44.877	15.28	33.73
SR_SYN	96.680	8.25	6.68

6.5. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Peripheral Support Equipment List			
Description	Manufacturer	Model	Serial Number
Laptop	Lenovo	21JK-00Q4AU	PF-5GW9JB

I/O CABLES

I/O Cable List						
Cable No.	Port	No. of Identical Ports	Connector Type	Cable Type	Cable Length (m)	Remarks
1	DC	1	Standard Circular Connector 20AWG 19 Pin Plug Male	UNSHIELDED	5	Breakout cable for DC power
2	ETH	1	M12 X Coded	SHIELDED	5	Ethernet connection for programming waveforms

TEST SETUP

The EUT is powered via an adjustable DC power supply, set at 24 VDC nominal. The waveform modes were configured by the test software, MonitorIQ version 0.1.2385 (b5b921f7e193+5).

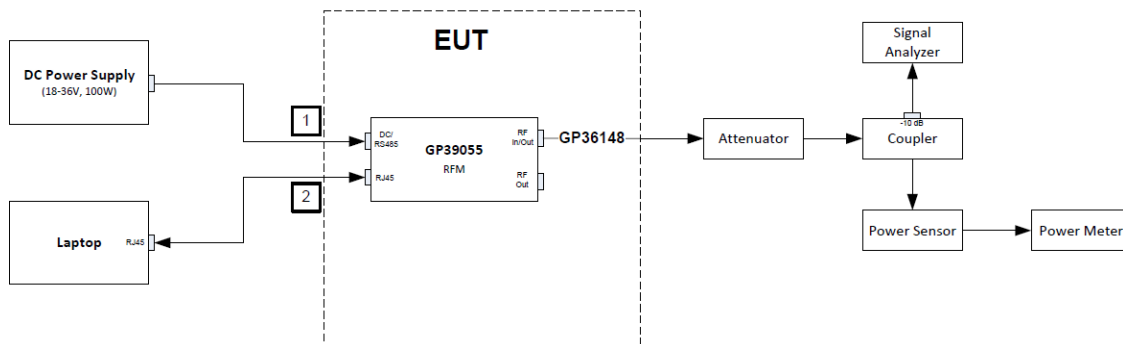
The RF module (GP39055) is connected with a coaxial feed cable (GP36148). The output port of the coaxial feed cable is the antenna port, therefore all conducted measurements were made at the antenna port.

Radiated tests were conducted by terminating the antenna port with 50-Ohm termination.

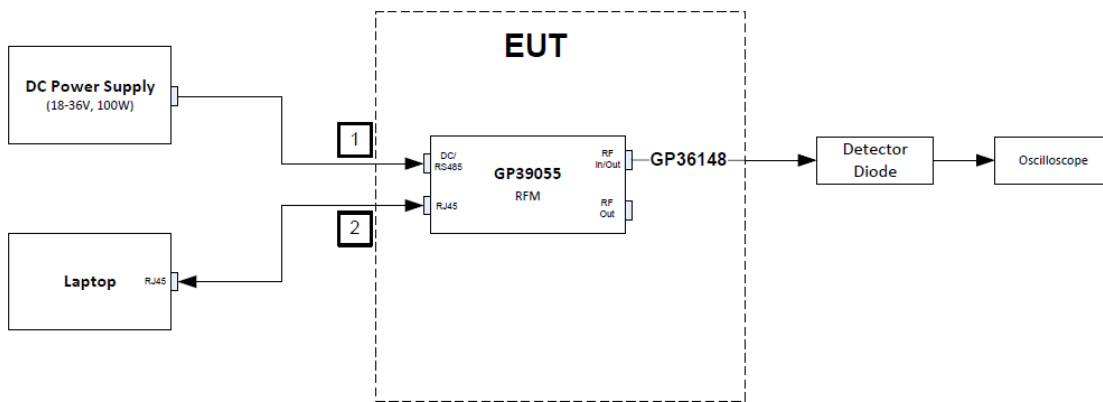
The waveforms, ER_RPN, LR_RPN and SR_SYN, were tested for report purposes.

SETUP DIAGRAM FOR TESTS

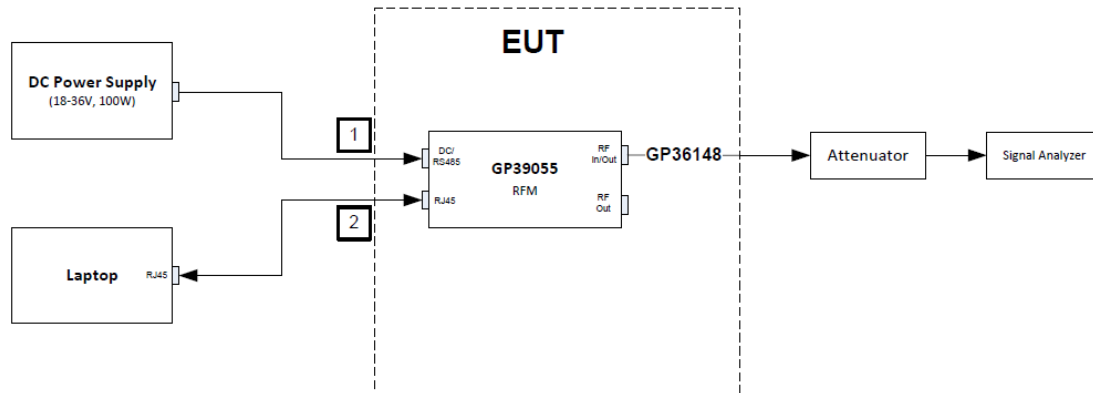
CONDUCTED – Fundamental & Frequency Stability



CONDUCTED – Duty Cycle

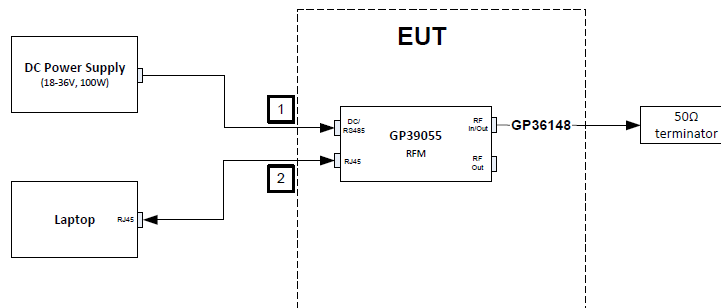


CONDUCTED - Spurious Emissions

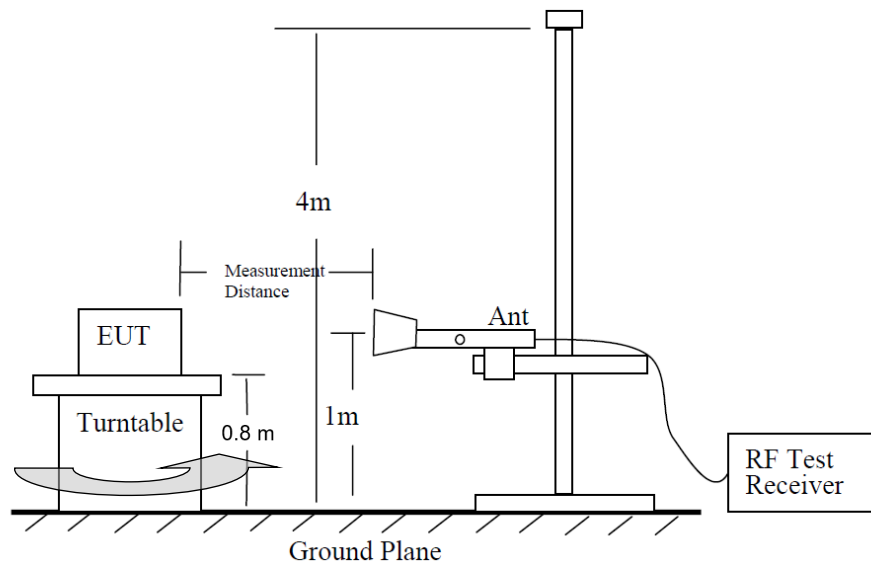


RADIATED - Spurious Emissions

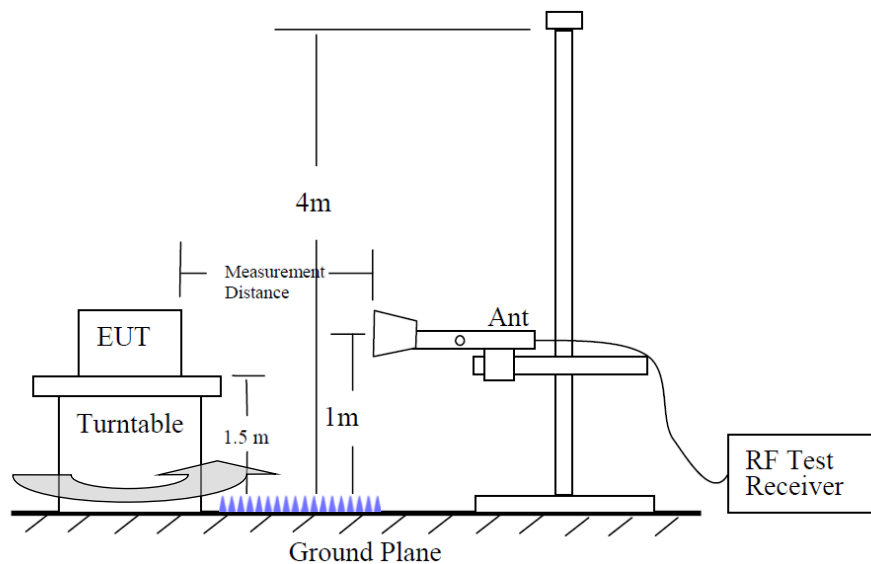
Radiated

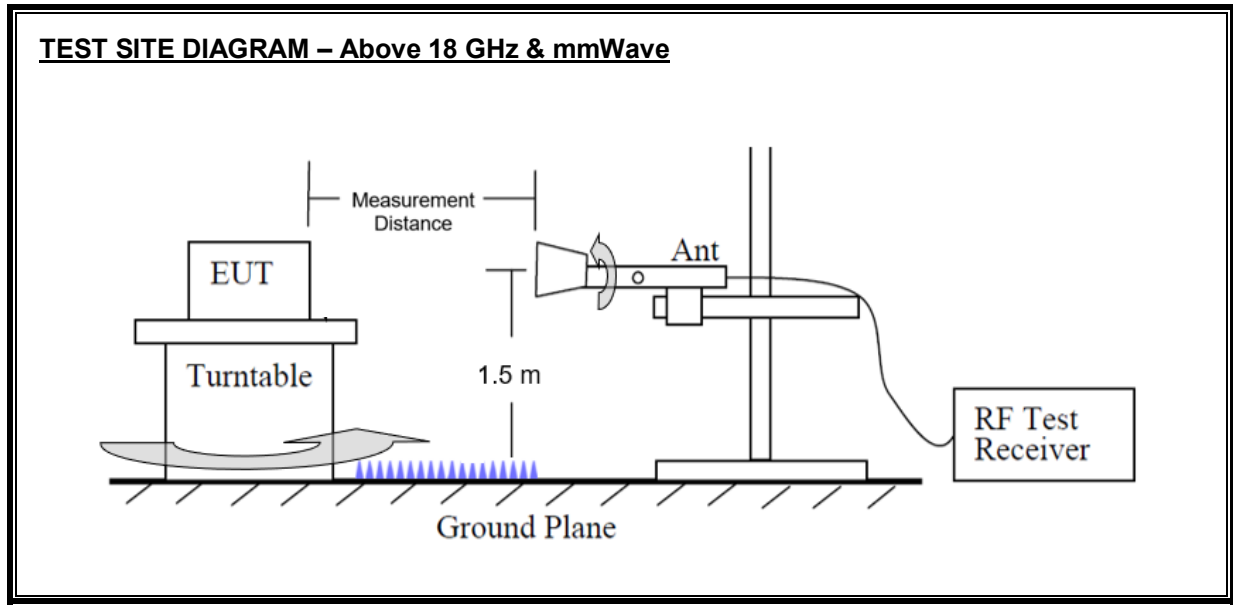


TEST SITE DIAGRAM – Below 1 GHz



TEST SITE DIAGRAM – 1 - 18 GHz





FAR-FIELD DISTANCE AND MEASUREMENT DISTANCE

The equipment under test was transmitting while connected to its integral antenna and placed on a turntable.

The measurement distance is in the far field per formula $2D^2/\lambda$ where D is the larger dimension of the antenna. For fundamental or band edge emissions, the largest far-field distance of either the EUT antenna or measurement antenna shall be used. For above 18 GHz spurious emissions, the far-field distance will be based on the measured antenna. In this case, the measurement antenna has the largest far-field distance. The EUT is manipulated through all orthogonal planes representative of its typical use to achieve the highest EIRP reading on the receive spectrum analyzer.

Frequency Range	Wavelength	Far Field Distance	Measurement Distance Used
(GHz)	(m)	(m)	(m)
18-26.5	0.0113	3.13	3.30
26.5-40	0.0075	2.61	3.00

Radiated power levels are investigated while the receive antenna was rotated through all angles to determine the worst-case polarization/positioning.

7. 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	Local ID	Cal Due
Spectrum Analyzer, 2 Hz to 50 GHz	Rohde & Schwarz	FSW50	215756	02-28-2026
EMI Test Receiver, 1 Hz to 44 GHz	Rohde & Schwarz	ESW44	191429	02-28-2026
Antenna, Horn 18-26.5 GHz	Com-Power	AH-826	222324	09-30-2026
Antenna, Horn 26.5-40 GHz	Com-Power	AH-640	222328	09-30-2026
Antenna, Double Ridge Guide Horn 1 to 18 GHz	ETS	3117	206807	04-30-2027
RF Filter Box, 1-18GHz	UL-FR1	NA	171013	07-30-2026
Amplifier, 9KHz to 1GHz	Sonoma Instrument	310N	230856	07-31-2026
Antenna, Broadband Hybrid, 30MHz to 3GHz	Sunol Sciences Corp.	JB1	80293	05-31-2027
Walkin Environmental Chamber	Espec	Espec EWPX674(2)- (2)12NAL	135570	04-30-2026
Digital Multimeter	Fluke	115	246585	02-28-2026
DC Power Supply	TDK-LAMBDA	GEN30-50	56306	CNR
RF Amplifier, 18-26.5GHz	AMPLICAL	AMP18G26-35-7-MI	196113	10-31-2026
RF Amplifier 26-40GHz	AMPLICAL	AMP26G40-34-10-MI	196397	10-31-2026
350 MHz High Definition Oscilloscope	Teledyne LeCroy	HDO6034	125097	01-31-2026
Diode Detector 0.01 to 33 GHz	Keysight Technologies Inc	8474C	81041	CNR
Power Meter	Keysight Technologies Inc	N1913A	81027	01-31-2026
Power Sensor, 50MHz to 50GHz, - 30dBm to 20dBm	Keysight Technologies Inc	8487A	80153	01-31-2026
Directional Coupler	KRYTAR	152610	246237	11-30-2026
UL EMC Radiated Software	Version	Rev.9.5.25 Aug 2025		
mmWave FR2 Automation Tool Software	Version	V2025.3.0		

8. APPLICABLE LIMITS AND TEST RESULTS

8.1. DUTY CYCLE

LIMIT

None; for reporting purposes only.

TEST PROCEDURE

The fundamental signal is measured in conducted setup with the signal feeding to a RF diode detector and measured by an oscilloscope, the duty cycle is then calculated.

TESTED BY

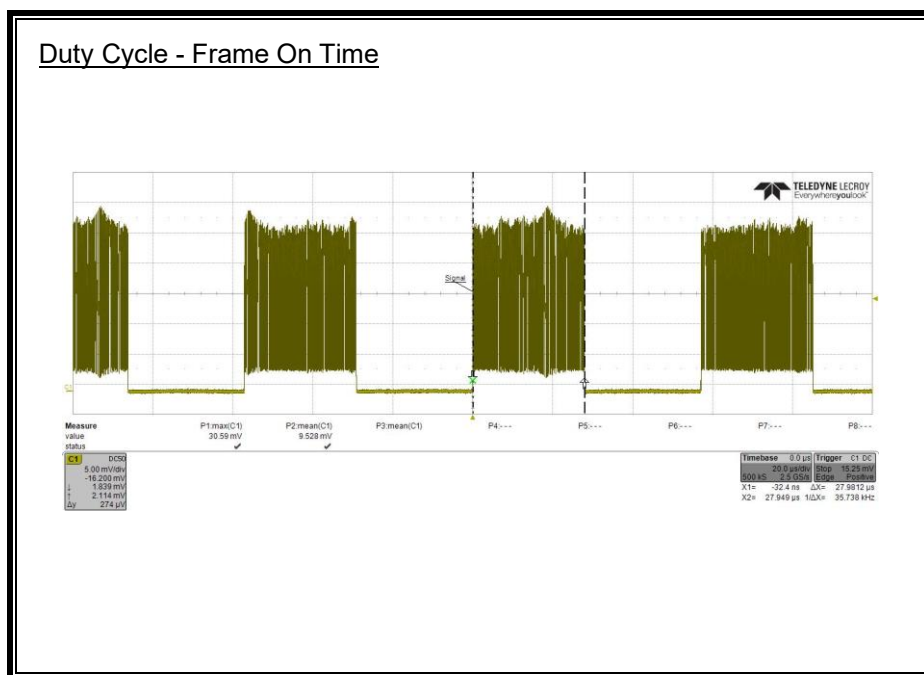
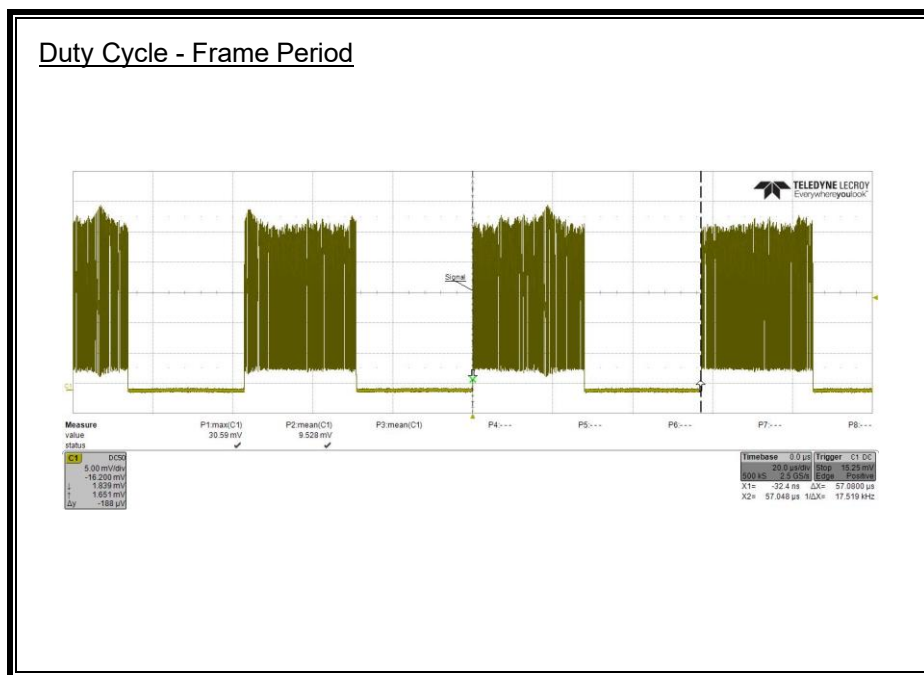
Employee ID: 24303
Test Date: 11-19-2025
Test Location: 01-mmW-A

RESULTS

Waveform	ON Time (usec)	Period (usec)	Duty Cycle (linear)	Duty Cycle (%)	Duty Cycle Corr Fac (dB)
ER_PRN	27.981	57.080	0.490	49.0%	3.10
LR_RPN	16.442	33.687	0.488	48.8%	3.12
SR_SYN	8.100	16.746	0.484	48.4%	3.15

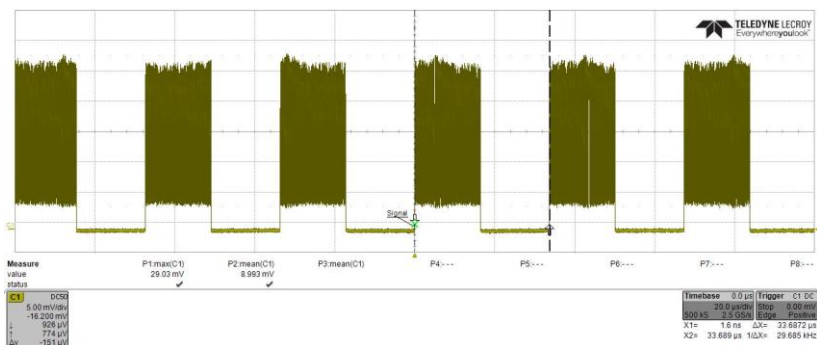
Duty Cycle Correction Factor (dB) = $10 * \log (\text{Duty Cycle})$

8.1.1. Waveform – ER_RPN

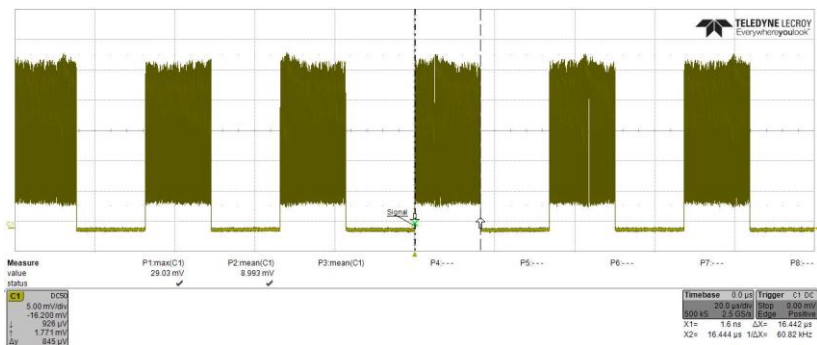


8.1.2. Waveform – LR_RPN

Duty Cycle - Frame Period

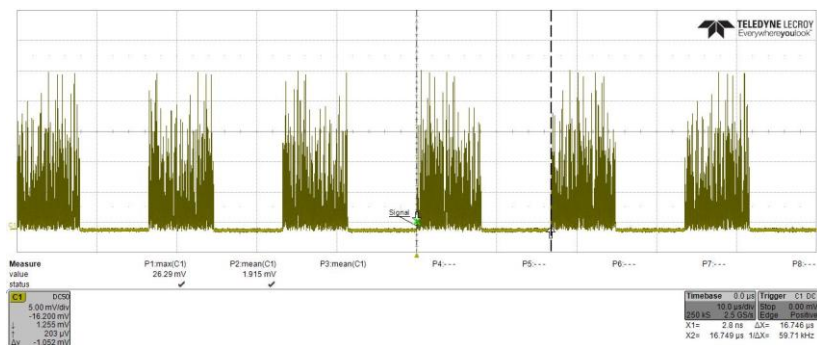


Duty Cycle - Frame On Time

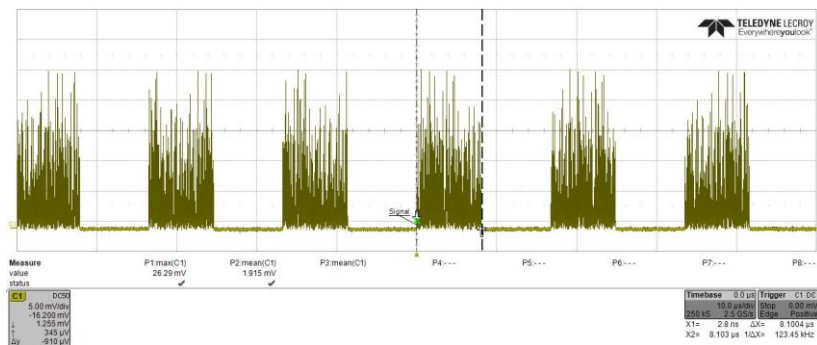


8.1.3. Waveform – SR_SYN

Duty Cycle - Frame Period



Duty Cycle - Frame On Time



8.2. MODULATION

APPLICABLE RULE

§2.1047

DECLARATION

The EUT employs Pulse Modulation, with amplitude modulation applied during the ON time of the pulse.

8.3. OCCUPIED BANDWIDTH

RULE PART

§2.1049

LIMIT

For reporting purposes only.

TEST PROCEDURE

ANSI C63.26-2015 Clause 5.4.4

99% bandwidth measurement function of the signal analyzer was used to measure the occupied bandwidth.

- RBW = 1 ~ 5% of OBW
- VBW = 3 x RBW
- Span = 1.5x of OBW, typical
- Detection = Peak
- Trace Mode = Max Hold
- Sweep = Auto Couple
- The trace was allowed to stabilize

The occupied bandwidth stability with variation of temperature (–30°C to + 50°C) and primary supply voltage is measured for determining the worst case (widest) of occupied bandwidth.

The EUT requires a 24 VDC nominal supply voltage, this correlated to the DC supply voltage being varied from 20.4 VDC to 27.6 VDC at test.

TESTED BY

Employee IDs: 24303, 103479
Test Date: 11-21-2025
Test Location: Environmental Chamber

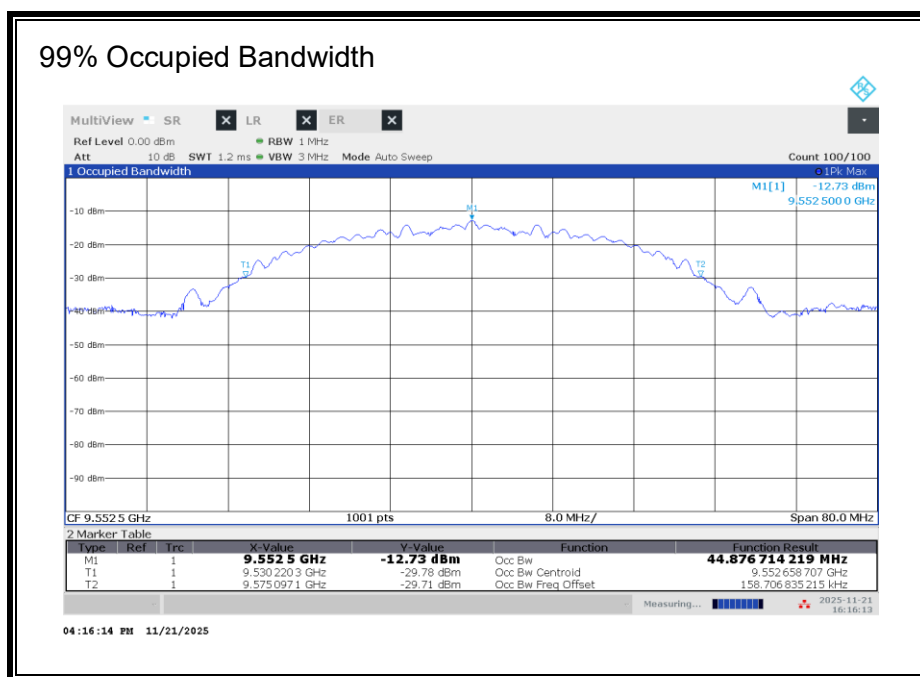
RESULTS

See the following pages.

8.3.1. Waveform – ER_RPN

Frequency vs. Temperatures & Voltages

Temp	20.4 V _{DC}	24.0 V _{DC}	27.6 V _{DC}
	99% OBW	99% OBW	99% OBW
(°C)	(MHz)	(MHz)	(MHz)
50	43.634	43.602	43.587
40	43.528	43.543	43.514
30	43.702	43.816	43.827
20	43.988	43.953	43.885
10	43.661	43.758	43.750
0	44.106	44.218	44.198
-10	43.939	43.945	43.983
-20	44.799	44.877	44.833
-30	44.098	44.103	44.148

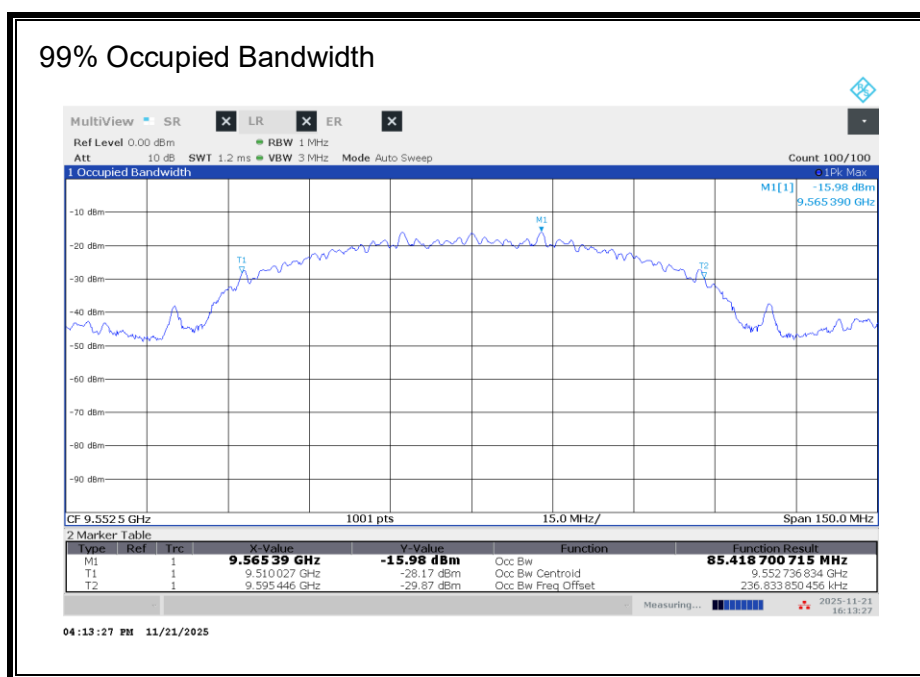


Widest 99% Occupied Bandwidth is 44.877 MHz at -20°C / 24.0 VDC.

8.3.2. Waveform – LR_RPN

Frequency vs. Temperatures & Voltages

Temp	20.4 V _{DC}	24.0 V _{DC}	27.6 V _{DC}
	99% OBW	99% OBW	99% OBW
(°C)	(MHz)	(MHz)	(MHz)
50	84.477	84.496	84.458
40	84.534	84.532	84.515
30	84.508	84.495	84.496
20	84.598	84.562	84.568
10	84.654	84.642	84.646
0	84.728	84.724	84.737
-10	84.954	84.990	85.008
-20	85.382	85.419	85.359
-30	84.934	84.984	84.961

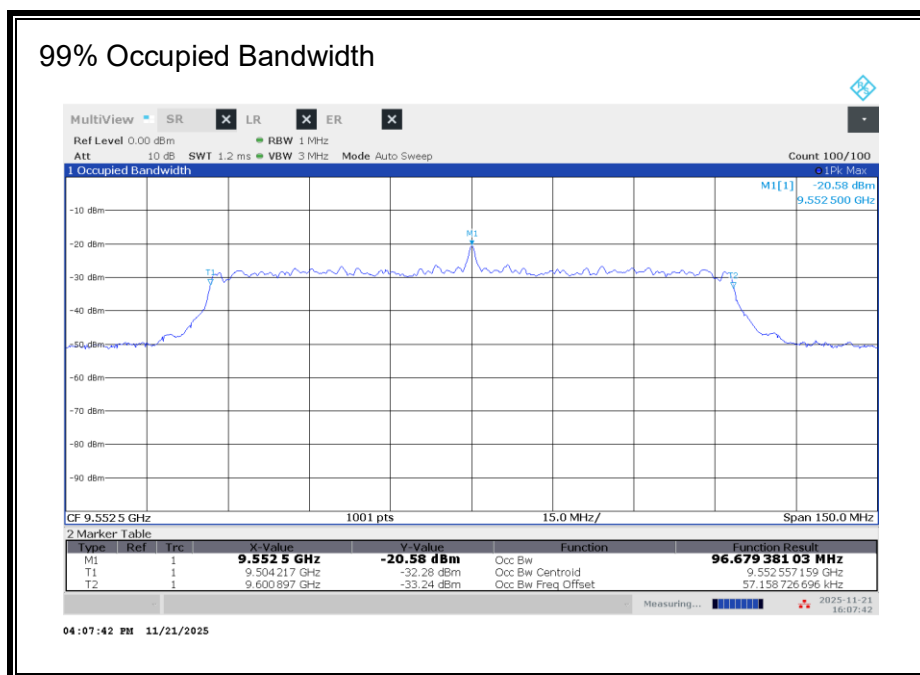


Widest 99% Occupied Bandwidth is 85.419 MHz at -20°C / 24.0 VDC.

8.3.3. Waveform – SR_SYN

Frequency vs. Temperatures & Voltages

Temp	20.4 V _{DC}	24.0 V _{DC}	27.6 V _{DC}
(°C)	99% OBW (MHz)	99% OBW (MHz)	99% OBW (MHz)
50	96.562	96.532	96.530
40	96.529	96.541	96.536
30	96.512	96.544	96.528
20	96.220	96.209	96.220
10	96.531	96.549	96.511
0	96.584	96.589	96.616
-10	96.258	96.295	96.290
-20	96.553	96.674	96.680
-30	96.343	96.349	96.340



Widest 99% Occupied Bandwidth is 96.680 MHz at -20°C / 27.6 VDC.

8.4. RF OUTPUT POWER

RULE PART(S)

§2.1046

§90.205 (r) All other frequency bands. Requested transmitter power will be considered and authorized on a case by case basis.

LIMIT

Reporting requirement only for Equipment Authorization.

Authorized power is determined upon Station licensing.

TEST PROCEDURES

The maximum mean power is measured by a power sensor and power meter in a conducted setup.

Correction Factor = Measurement Cable Loss + Power Splitter Loss + Attenuator Loss

Where,

Measurement Cable Loss = Path Loss of Cable @ 9.5525 GHz

Power Splitter Loss = Path Loss of Power Splitter @ 9.5525 GHz

Attenuator Loss = Path Loss of Attenuator @ 9.5525 GHz

A correction factor of 11.97 dB is applied to the reading of the power meter during test.

The average power sensor corrected measurement is then converted to average power during the ON time by adding the duty cycle factor, calculated show in section 8.1.

The output power stability with variation of temperature (-30°C to $+50^{\circ}\text{C}$) and primary supply voltage is measured for determining the worst case (highest level) of output power.

The EUT requires a 24 VDC nominal supply voltage, this correlated to the DC supply voltage being varied from 20.4 VDC to 27.6 VDC at test.

TESTED BY

Employee IDs: 24303, 103479

Test Date: 11-21-2025

Test Location: Environmental Chamber

RESULTS

See the following pages.

8.4.1. Waveform – ER_RPN

Mean Power vs. Temperatures & Voltages						
Temp	Output Power (dBm)					
(°C)	20.4 V _{DC}		24.0 V _{DC}		27.6 V _{DC}	
	Measured	During ON Time	Measured	During ON Time	Measured	During ON Time
50	9.16	12.26	9.17	12.27	9.18	12.28
40	9.58	12.68	9.57	12.67	9.57	12.67
30	10.05	13.15	10.06	13.16	10.07	13.17
20	10.49	13.59	10.49	13.59	10.48	13.58
10	10.66	13.76	10.66	13.76	10.66	13.76
0	11.10	14.20	11.10	14.20	11.10	14.20
-10	11.60	14.70	11.61	14.71	11.61	14.71
-20	12.18	15.28	12.18	15.28	12.18	15.28
-30	11.90	15.00	11.90	15.00	11.90	15.00

Highest mean output power at ON time for ER_RPN waveform is 15.28 dBm at -20°C.

8.4.2. Waveform – LR_RPN

Mean Power vs. Temperatures & Voltages						
Temp	Output Power (dBm)					
(°C)	20.4 V _{DC}		24.0 V _{DC}		27.6 V _{DC}	
	Measured	During ON Time	Measured	During ON Time	Measured	During ON Time
50	8.94	12.06	8.94	12.06	8.93	12.05
40	9.33	12.45	9.33	12.45	9.34	12.46
30	9.84	12.96	9.83	12.95	9.83	12.95
20	10.27	13.39	10.28	13.40	10.28	13.40
10	10.43	13.55	10.43	13.55	10.43	13.55
0	10.88	14.00	10.88	14.00	10.88	14.00
-10	11.41	14.53	11.41	14.53	11.41	14.53
-20	12.03	15.15	12.03	15.15	12.03	15.15
-30	11.73	14.85	11.73	14.85	11.74	14.86

Highest mean output power at ON time for LR_RPN waveform is 15.15 dBm at -20°C.

8.4.3. Waveform – SR_SYN

Mean Power vs. Temperatures & Voltages						
Temp	Output Power (dBm)					
(°C)	20.4 V _{DC}		24.0 V _{DC}		27.6 V _{DC}	
	Measured	During ON Time	Measured	During ON Time	Measured	During ON Time
50	1.63	4.78	1.65	4.80	1.66	4.81
40	2.02	5.17	2.53	5.68	2.01	5.16
30	2.52	5.67	2.53	5.68	2.54	5.69
20	3.02	6.17	2.99	6.14	2.98	6.13
10	3.12	6.27	3.13	6.28	3.13	6.28
0	3.61	6.76	3.62	6.77	3.61	6.76
-10	4.23	7.38	4.23	7.38	4.24	7.39
-20	5.10	8.25	5.09	8.24	5.09	8.24
-30	4.67	7.82	4.66	7.81	4.65	7.80

Highest mean output power at ON time for SR_SYN waveform is 8.25 dBm at -20°C / 20.4 V DC.

8.5. FREQUENCY STABILITY

RULE PART(S)

§2.1055 (a) (1) The frequency stability shall be measured with variation of ambient temperature as follows: From -30° to $+50^{\circ}$ centigrade for all equipment except that specified in paragraphs (a) (2) and (3) of this section.

§2.1055 (d) (1) The frequency stability shall be measured with variation of primary supply voltage as follows: Vary primary supply voltage from 85 to 115 percent of the nominal value for other than hand carried battery equipment.

TEST PROCEDURES

ANSI C63.26-2015 Section 5.6

Test procedures for temperature variation:

- a. Position the EUT in temperature/humidity chamber with power off.
- b. Set the chamber temperature to 50°C and stabilize the EUT for at least 30 minutes.
- c. Record maximum change in frequency within one minute after powering the EUT.
- d. Decrease chamber temperature at 10°C intervals from 50°C to -30°C . Record maximum change in frequency at each temperature.
- e. A period of at least 30 minutes is provided to allow stabilization of the equipment at each temperature level.

- Temp. = -30°C to $+50^{\circ}\text{C}$

Test procedures for voltage variation:

- a. Position the EUT in temperature/humidity chamber with power off.
- b. Set the chamber temperature to 20°C .
- c. Record maximum frequency change within one minute after powering the EUT.
- d. The primary supply voltage is varied from 85% to 115% of the nominal value for hand-carried, battery-powered equipment. Primary supply voltage is reduced to the battery operating end point which shall be specified by the manufacturer.

- Voltage = (85% - 115%)
- Nominal: 24.0 V DC; Low: 20.4 V DC; High: 27.6 V DC

The maximum peak to peak delta was calculated as follows:

Maximum Peak to Peak Delta = $(\text{Min } F_L - \text{Max } F_L) + (\text{Min } F_H - \text{Max } F_H)$
Min F_L = Minimum value from all F_L readings
Max F_L = Maximum value from all F_L readings
Min F_H = Minimum value from all F_H readings
Max F_H = Maximum value from all F_H readings

TESTED BY

Employee IDs: 24303, 103479
Test Date: 11-21-2025
Test Location: Environmental Chamber

RESULTS

8.5.1. Waveform – ER_RPN

Temp	20.4 V _{DC}		24.0 V _{DC}		27.6 V _{DC}	
	F _L	F _H	F _L	F _H	F _L	F _H
(°C)	(GHz)	(GHz)	(GHz)	(GHz)	(GHz)	(GHz)
50	9.5308	9.5744	9.5308	9.5744	9.5308	9.5744
40	9.5308	9.5744	9.5308	9.5744	9.5309	9.5744
30	9.5308	9.5745	9.5307	9.5745	9.5307	9.5746
20	9.5307	9.5747	9.5307	9.5746	9.5307	9.5746
10	9.5307	9.5744	9.5307	9.5745	9.5307	9.5745
0	9.5305	9.5746	9.5305	9.5747	9.5305	9.5747
-10	9.5306	9.5746	9.5306	9.5746	9.5306	9.5746
-20	9.5302	9.5750	9.5302	9.5751	9.5302	9.5750
-30	9.5305	9.5746	9.5305	9.5746	9.5305	9.5747

Maximum Peak to Peak Delta **0.0014 GHz** (1.4 MHz)

8.5.2. Waveform – LR_RPN

Temp	20.4 V _{DC}		24.0 V _{DC}		27.6 V _{DC}	
	F _L	F _H	F _L	F _H	F _L	F _H
(°C)	(GHz)	(GHz)	(GHz)	(GHz)	(GHz)	(GHz)
50	9.5104	9.5949	9.5104	9.5949	9.5104	9.5949
40	9.5104	9.5949	9.5104	9.5949	9.5104	9.5949
30	9.5104	9.5949	9.5104	9.5949	9.5104	9.5949
20	9.5103	9.5949	9.5104	9.5949	9.5104	9.5949
10	9.5103	9.5949	9.5103	9.5950	9.5103	9.5949
0	9.5102	9.5950	9.5103	9.5950	9.5102	9.5950
-10	9.5102	9.5951	9.5101	9.5951	9.5101	9.5951
-20	9.5100	9.5954	9.5100	9.5954	9.5101	9.5954
-30	9.5102	9.5951	9.5102	9.5951	9.5102	9.5952

Maximum Peak to Peak Delta **0.00096 GHz** (1.0 MHz)

8.5.3. Waveform – SR_SYN

Temp	20.4 V _{DC}		24.0 V _{DC}		27.6 V _{DC}	
	F _L	F _H	F _L	F _H	F _L	F _H
(°C)	(GHz)	(GHz)	(GHz)	(GHz)	(GHz)	(GHz)
50	9.5043	9.6008	9.5043	9.6008	9.5043	9.6009
40	9.5043	9.6008	9.5043	9.6008	9.5043	9.6008
30	9.5043	9.6009	9.5043	9.6008	9.5043	9.6008
20	9.5044	9.6007	9.5045	9.6007	9.5044	9.6007
10	9.5043	9.6008	9.5043	9.6008	9.5043	9.6008
0	9.5042	9.6008	9.5042	9.6008	9.5042	9.6009
-10	9.5044	9.6007	9.5044	9.6007	9.5044	9.6007
-20	9.5043	9.6008	9.5042	9.6009	9.5042	9.6009
-30	9.5044	9.6007	9.5044	9.6007	9.5044	9.6007

Maximum Peak to Peak Delta 0.0005 GHz (0.5 MHz)

8.6. CONDUCTED SPURIOUS EMISSIONS

APPLICABLE RULES

§2.1051 The radio frequency voltage or powers generated within the equipment and appearing on a spurious frequency shall be checked at the equipment output terminals when properly loaded with a suitable artificial antenna. Curves or equivalent data shall show the magnitude of each harmonic and other spurious emission that can be detected when the equipment is operated under the conditions specified in §2.1049 as appropriate. The magnitude of spurious emissions which are attenuated more than 20 dB below the permissible value need not be specified.

§2.1057 (a) (1) In all of the measurements set forth in §§2.1051 and 2.1053, the spectrum shall be investigated from the lowest radio frequency signal generated in the equipment, without going below 9 kHz, up to at least the frequency shown below: If the equipment operates below 10 GHz: to the tenth harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower.

LIMIT

§90.210 (c) (3) *Emission Mask C*. For transmitters that are not equipped with an audio low-pass filter, the power of any emission must be attenuated below the unmodulated carrier output power (P in watts) as follows: On any frequency removed from the center of the authorized bandwidth by more than 250 percent of the authorized bandwidth: At least $43 + 10 \log (P)$ dB.

For frequencies outside the authorized band of 9500 to 10,000 MHz, the attenuation must be at least $43 + 10 \log(P_m)$ dB. P_m is defined as the mean power of the radar in Watts. This equation will result in a -13 dBm limit line, regardless of the value of P_m :

$$P_m \text{ (dBW)} - \text{attenuation} = P_m \text{ (dBW)} - (43 + 10 \log(P_m)) = -43 \text{ dBW} = -13 \text{ dBm}.$$

$$\text{Max. Declared Output Power, } P = 35 \text{ dBm} = 3.16278\text{W}$$

$$\text{Limit} = 35 - (43 + 10 \log (P)) = 35 - 48 = -13 \text{ dBm}$$

TEST PROCEDURE

The conducted spurious emission is measured using spectrum analyzer. The EUT is programmed for its worst-case pulse radar operation mode with highest output power, which is ER_RPN waveform.

A correction factor of cable loss is applied to the reading of the spectrum analyzer during test.

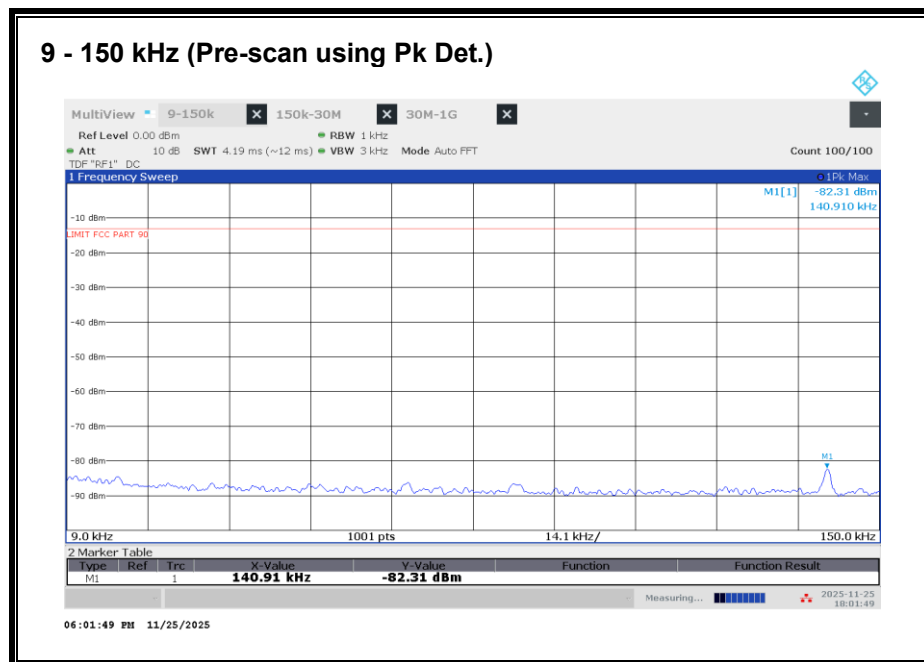
TESTED BY

Employee IDs: 24303, 103479
Test Dates: 11-25-2025 to 12-18-2025
Test Location: 01-mmW-A

RESULTS

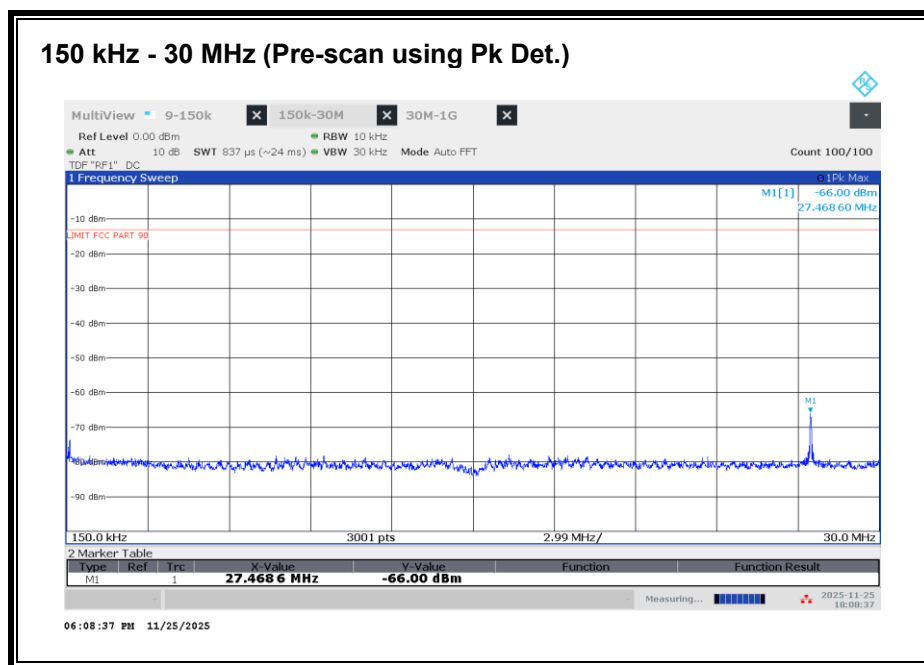
See the following pages.

8.6.1. 9 – 150 kHz



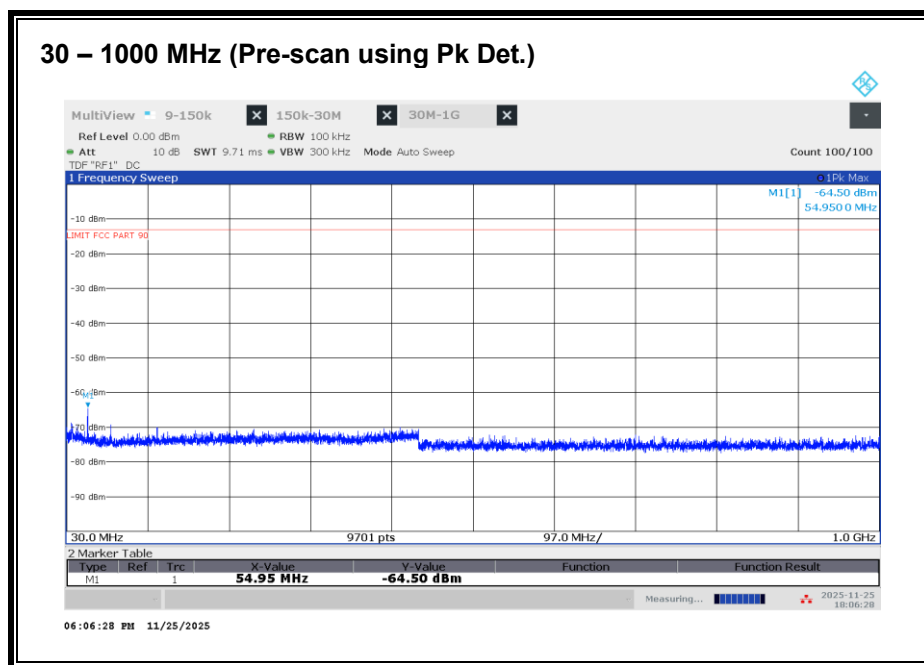
Freq.	Detection	Corrected Power	Avg Power Limit	Margin
(kHz)		(dBm)	(dBm)	(dB)
140.910	Peak	-82.31	-13.00	-69.31

8.6.2. 150 kHz – 30 MHz



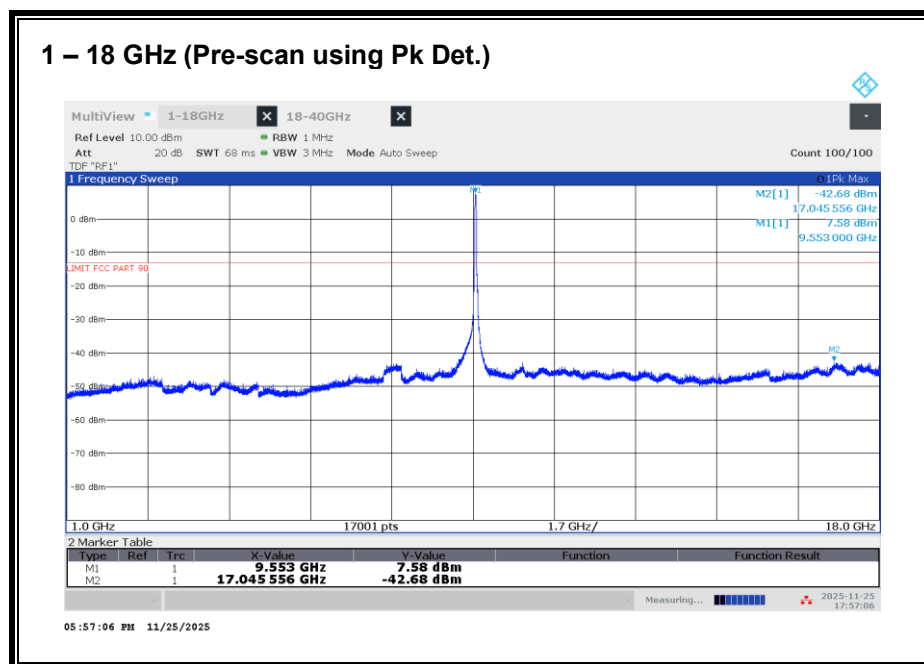
Freq.	Detection	Corrected Power	Avg Power Limit	Margin
(MHz)		(dBm)	(dBm)	(dB)
27.469	Peak	-66.00	-13.00	-53.00

8.6.3. 30 – 1000 MHz



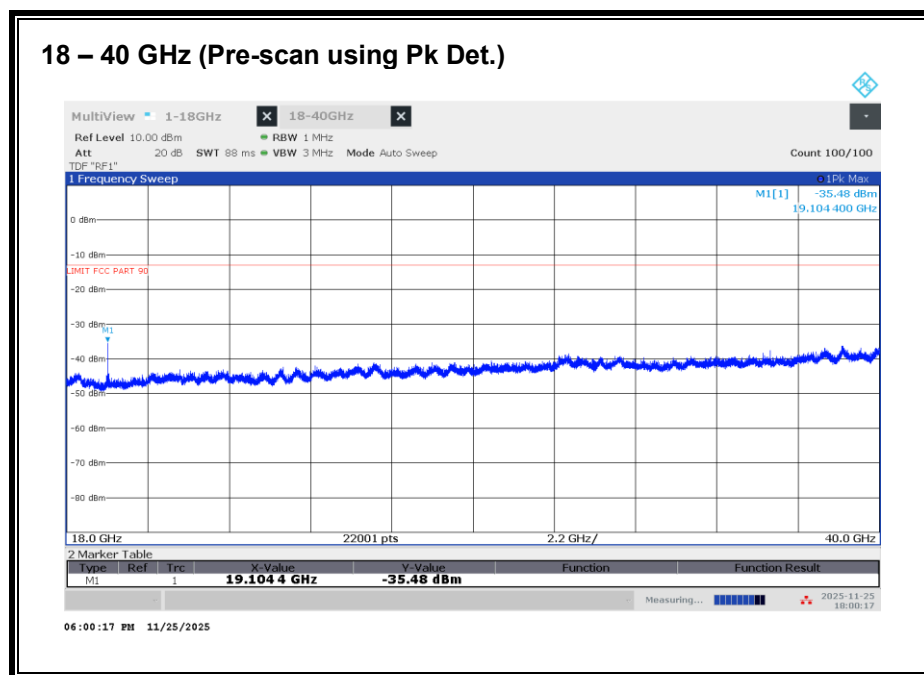
Freq.	Detection	Corrected Power	Avg Power Limit	Margin
(MHz)		(dBm)	(dBm)	(dB)
54.950	Peak	-64.50	-13.00	-51.50

8.6.4. 1 - 18 GHz



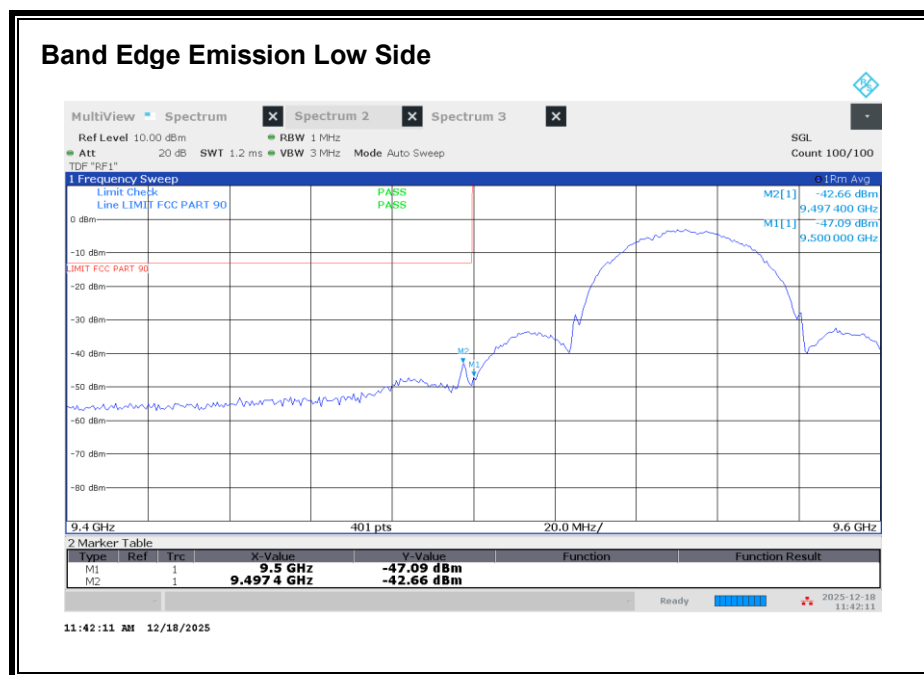
No emission detected using Peak Detection.
Marker M1 is the fundamental signal.

8.6.5. 18 – 40 GHz



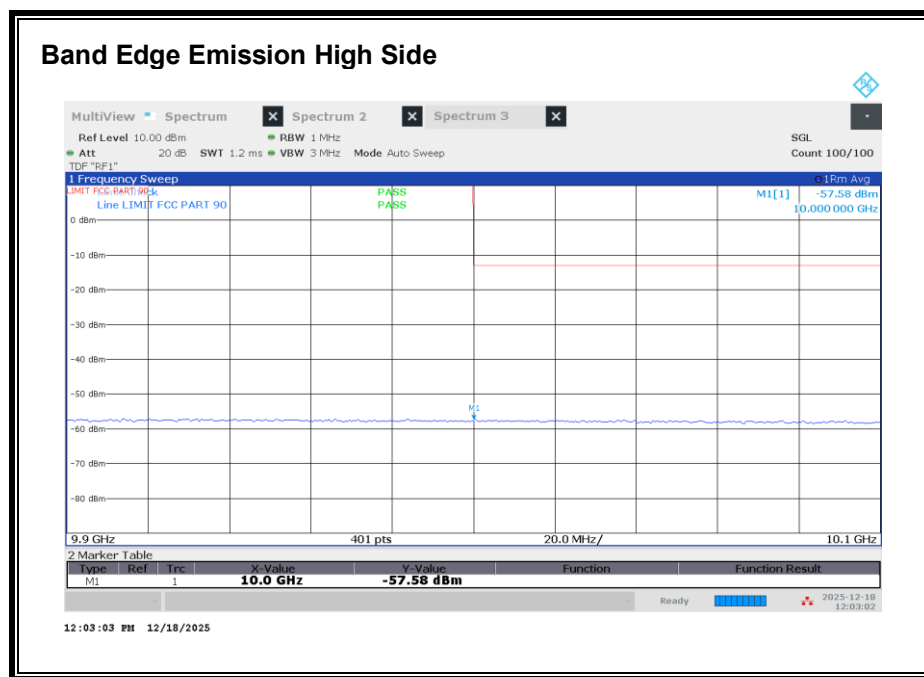
Freq.	Detection	Corrected Power	Avg Power Limit	Margin
(GHz)		(dBm)	(dBm)	(dB)
19.104	Peak	-35.48	-13.00	-22.48

8.6.6. Band Edge Emission, Low Side



Freq.	Detection	Measured Power	Duty Cycle Factor	Corrected Power	Avg Power Limit	Margin
(GHz)		(dBm)	(dB)	(dBm)	(dBm)	(dB)
9.500	Avg	-47.09	3.10	-43.99	-13.00	-30.99
9.497	Avg	-42.66	3.10	-39.56	-13.00	-26.56

8.6.7. Band Edge Emission, High Side



Freq.	Detection	Measured Power	Duty Cycle Factor	Corrected Power	Avg Power Limit	Margin
(GHz)		(dBm)	(dB)	(dBm)	(dBm)	(dB)
10.000	Avg	-57.58	3.10	-54.48	-13.00	-41.48

8.7. RADIATED SPURIOUS EMISSIONS

RULE PART(S)

§2.1053 (a) Measurements shall be made to detect spurious emissions that may be radiated directly from the cabinet, control circuits, power leads, or intermediate circuit elements under normal conditions of installation and operation. Curves or equivalent data shall be supplied showing the magnitude of each harmonic and other spurious emission. For this test, single sideband, independent sideband, and controlled carrier transmitters shall be modulated under the conditions specified in paragraph (c) of §2.1049, as appropriate.

§2.1057 (a) (1) In all of the measurements set forth in §§2.1051 and 2.1053, the spectrum shall be investigated from the lowest radio frequency signal generated in the equipment, without going below 9 kHz, up to at least the frequency shown below: If the equipment operates below 10 GHz: to the tenth harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower.

LIMIT

§90.210 (c) (3) *Emission Mask C*. For transmitters that are not equipped with an audio low-pass filter, the power of any emission must be attenuated below the unmodulated carrier output power (P in watts) as follows: On any frequency removed from the center of the authorized bandwidth by more than 250 percent of the authorized bandwidth: At least $43 + 10 \log(P)$ dB.

For frequencies outside the authorized band of 9500 to 10,000 MHz, the attenuation must be at least $43 + 10 \log(P_m)$ dB. P_m is defined as the mean power of the radar in Watts. This equation will result in a -13 dBm limit line, regardless of the value of P_m : P_m (dBW) - attenuation = P_m (dBW) - $(43 + 10 \log(P_m))$ = -43 dBW = -13 dBm.

Max. Declared Output Power, $P = 35$ dBm = 3.16278W

Limit = $35 - (43 + 10 \log(P)) = 35 - 48 = -13$ dBm

TEST PROCEDURES

ANSI C63.26-2015 Clause 5.5 and Annex C.5.2.

The signal output is scanned using a peak detector. Any spurious or harmonic within 6 dB of the limit is measured using average detectors.

EIRP of RSE was calculated using the equations on ANSI C63.26-2015 Annex C.5.2. The total correction factor of cable loss, horn antenna gain, LNA gain, and far-field path loss were calculated using equations C.8 and C.9, and pre-loaded into spectrum analyzer.

Sample calculation of EIRP:

Total Correction Factor = Cable Loss (dB) – Horn Ant Gain (dBi) – LNA Gain (dB) + Path Loss (dB)
= $4 - 23 - 30 + 71$
= 22 dB

EIRP = $P_{\text{measured}}(\text{dBm})$, where Total Correction Factor preloaded.

The highest power waveform ER_RPN is used for worst case radiated emissions.

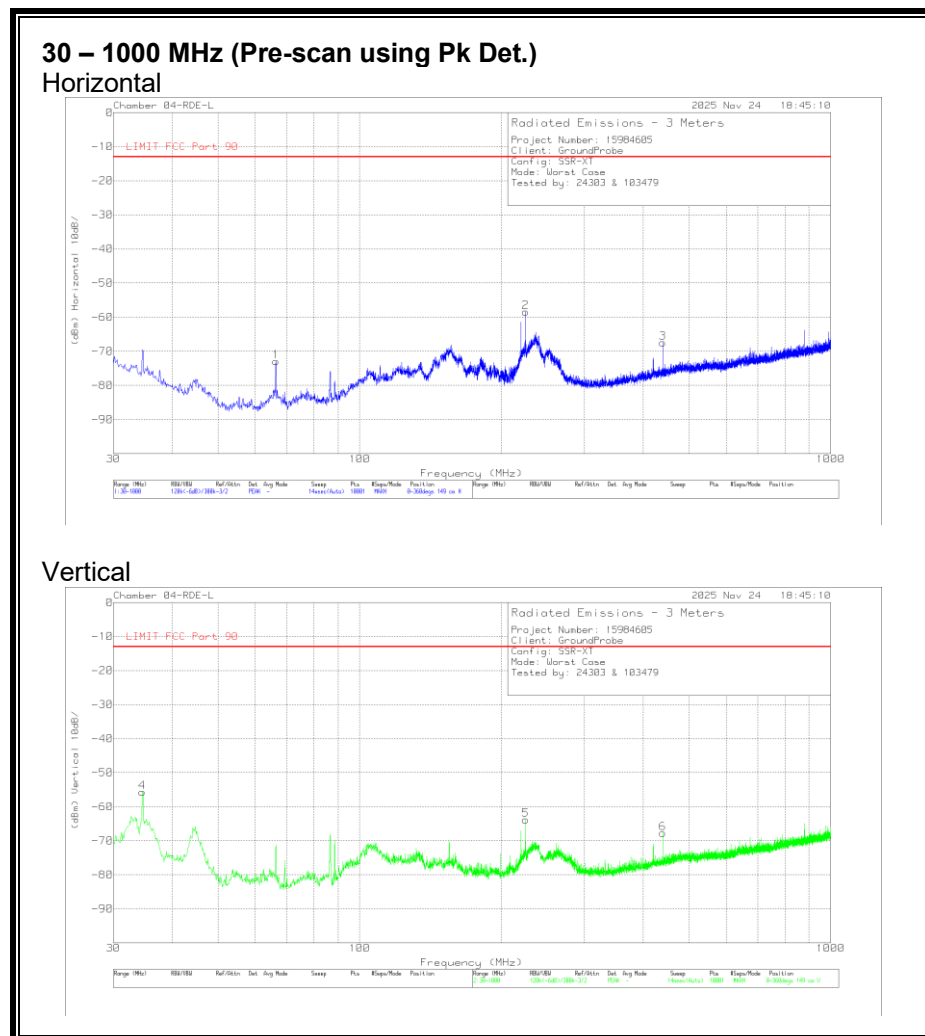
TESTED BY

Employee IDs: 24303, 103479, 27780
Test Dates: 11-24-2025 to 11-25-2025
Test Location Below 18 GHz: 04-RDE-L
Test Location Above 18 GHz: 01-mmW-A

RESULTS

See the following pages.

8.7.1. 30 – 1000 MHz

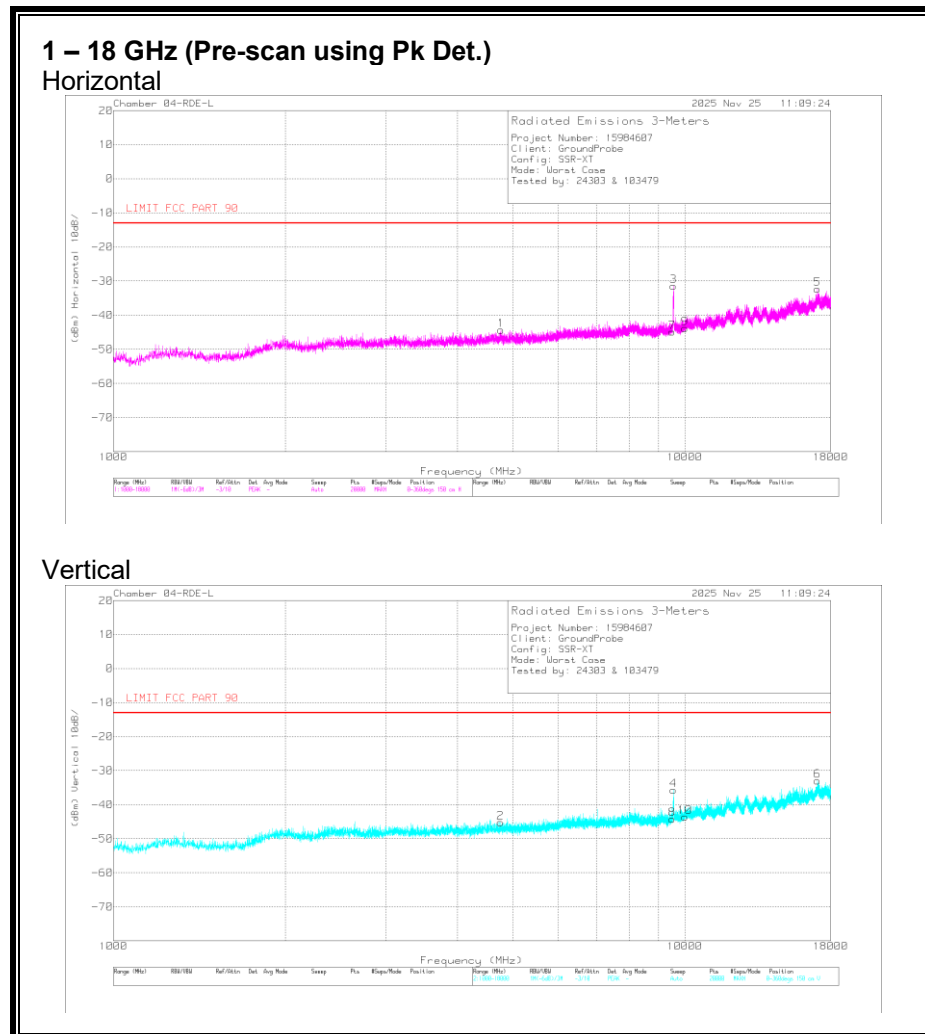


Trace Markers

Marker	Frequency (MHz)	Meter Reading (dBm)	Det	174374 ACF (dB/m)	Amp/Cbbs (dB)	Unit Conversion (dB)	Corrected Reading (dBm)	LIMIT FCC Part 90 (dBm)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	66.375	-67.29	Pk	14.00	-31.40	11.80	-72.89	-13.00	-59.89	0-360	149	H
2	224.970	-56.55	Pk	16.80	-30.40	11.80	-58.35	-13.00	-45.35	0-360	149	H
3	440.019	-71.98	Pk	22.50	-29.70	11.80	-67.38	-13.00	-54.38	0-360	149	H
4	34.559	-59.46	Pk	23.80	-31.70	11.80	-55.56	-13.00	-42.56	0-360	149	V
5	224.970	-61.94	Pk	16.80	-30.40	11.80	-63.74	-13.00	-50.74	0-360	149	V
6	440.019	-72.27	Pk	22.50	-29.70	11.80	-67.67	-13.00	-54.67	0-360	149	V

Pk - Peak detector

8.7.2. 1 - 18 GHz



Trace Markers

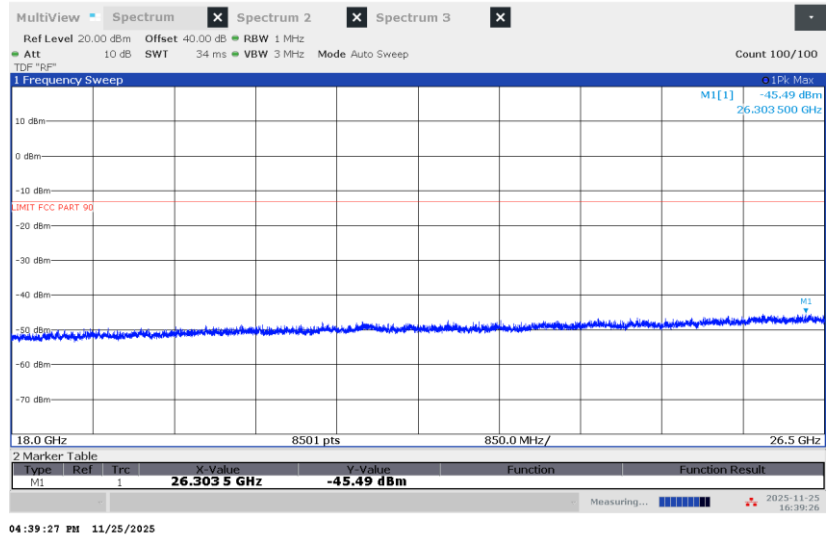
Marker	Frequency (MHz)	Meter Reading (dBm)	Det	206807 ACF (dB/m)	Amp/Cbl (dB)	Unit Conversion (dB)	10 DB PAD (dB)	Corrected Reading (dBm)	LIMIT FCC PART 90 (dBm)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	4763.990	-55.48	Pk	34.30	-44.90	11.80	10.00	-44.28	-13.00	-31.28	0-360	150	H
2	4762.290	-56.28	Pk	34.30	-44.90	11.80	10.00	-45.08	-13.00	-32.08	0-360	150	V
*3	9559.083	-47.63	Pk	36.80	-42.30	11.80	10.00	-31.33	-13.00	-18.33	0-360	150	H
*4	9546.332	-51.83	Pk	36.80	-42.40	11.80	10.00	-35.63	-13.00	-22.63	0-360	150	V
5	17076.863	-55.61	Pk	41.80	-40.20	11.80	10.00	-32.21	-13.00	-19.21	0-360	150	H
6	17073.463	-56.22	Pk	41.80	-40.20	11.80	10.00	-32.82	-13.00	-19.82	0-360	150	V
7	9500.430	-61.40	Pk	36.70	-41.90	11.80	10.00	-44.80	-13.00	-31.60	0-360	150	H
8	9500.430	-60.74	Pk	36.70	-41.90	11.80	10.00	-44.14	-13.00	-31.14	0-360	150	V
9	10000.255	-61.53	Pk	37.70	-41.70	11.80	10.00	-43.73	-13.00	-30.73	0-360	150	H
10	10000.255	-61.30	Pk	37.70	-41.70	11.80	10.00	-43.50	-13.00	-30.50	0-360	150	V

Pk - Peak detector

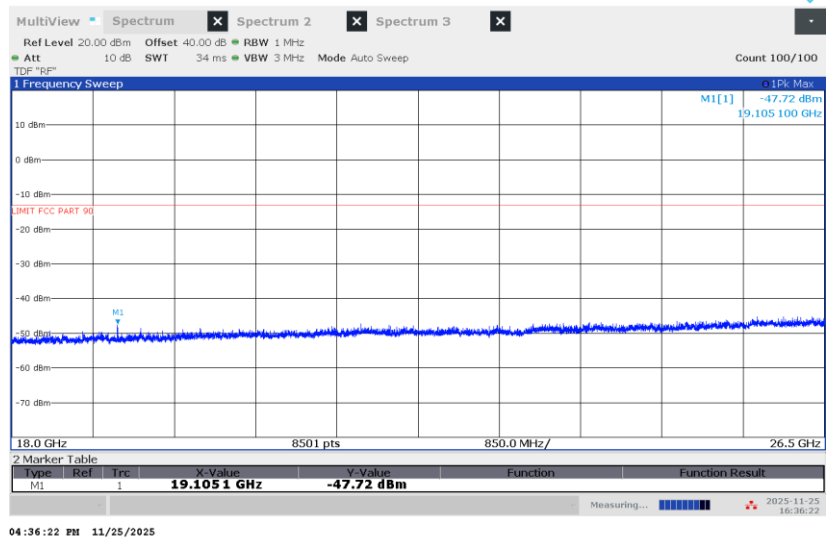
- * Markers 3 and 4 are the fundamental signal.
- * Markers 7 and 8 are low side BE emission.
- * Markers 9 and 10 are high side BE emission.

8.7.3. 18 – 26.5 GHz

26.5 - 40 GHz (Pre-scan using Pk Det.) Horizontal



18 – 26.5 GHz (Pre-scan using Pk Det.) Vertical

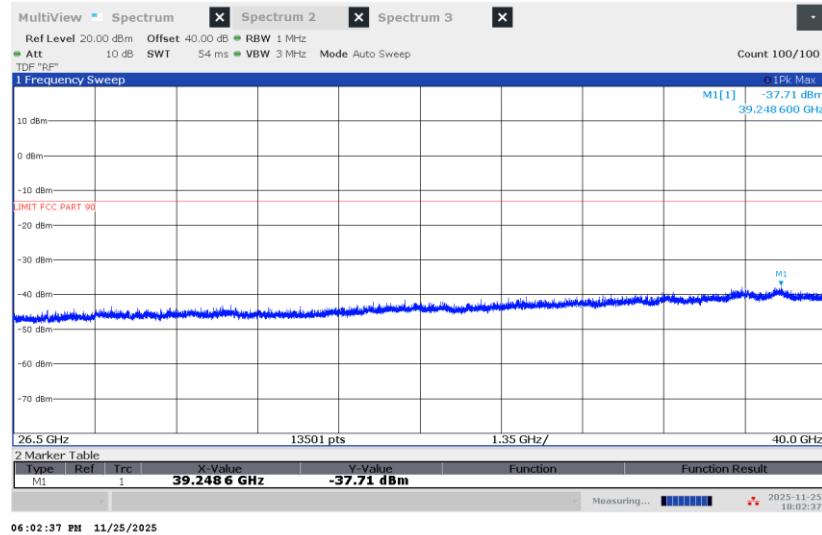


Using peak detection, no emissions below a 20 dB margin were detected.

8.7.4. 26.5 - 40 GHz

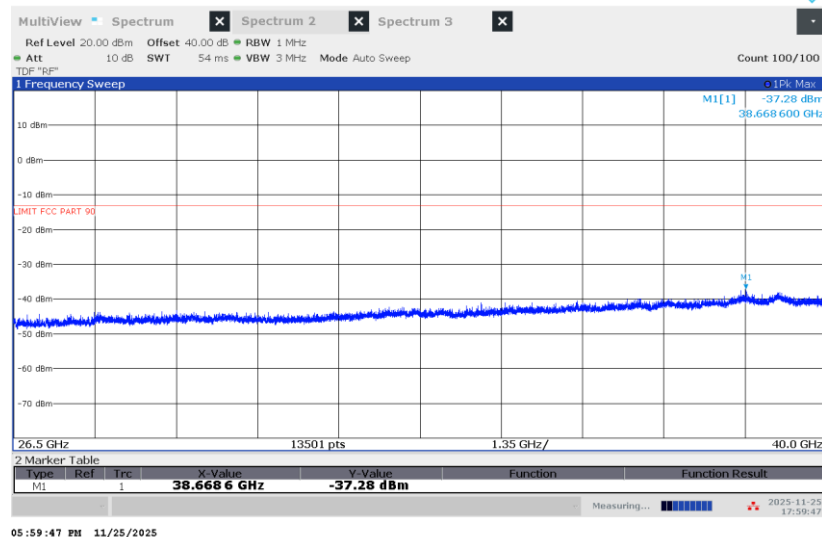
26.5 - 40 GHz (Pre-scan using Pk Det.)

Horizontal



26.5 - 40 GHz (Pre-scan using Pk Det.)

Vertical



Using peak detection, no emissions below a 20 dB margin were detected.

END OF REPORT