Project #: 23197-15

Company: The Genie Company, a Division of Overhead Door Corporation

EUT: OU4T

FCC and Industry Canada

Wireless Test Report

Prepared for:

The Genie Company, a Division of Overhead Door Corporation
2170 French Settlement Road
Dallas, TX 75212

By

Nemko PTI, Inc.
1601 North A.W. Grimes Blvd., Suite B
Round Rock, Texas 78665

May 25, 2022

Written by

Shakil Murad
Wireless Engineer

Table of Contents

Compliance Certificate

FCC MRA Designation Number: US5270
NVLAP Accreditation Number: 200062-0

Applicant	Device & Test Identification
The Genie Company, a Division of Overhead Door Corporation 2170 French Settlement Road Dallas, TX 75212	Model(s): **OU4T** FCC ID: **B8QUNI4B** IC ID: **2133A-UNI4B** Laboratory Project ID: **23197-15**

The device named above was tested utilizing the following standards and found to be in compliance with the required criteria:

Test Requirements:

Requirement	Section	Test Description
FCC 47 CFR, Subpart 15 C	15.231 (a) (1)	Manually Operated Transmitter
	15.231 (a) (3)	Periodic Transmissions
	15.231 (b)	Field Strength of Emissions
	15.231 (c)	Bandwidth of Emissions
IC RSS-Gen, Issue 5	6.7	Occupied Bandwidth
IC RSS-210, Issue 10, Annex A	A.1.1 (a)	Manual Operated Transmitter
	A.1.1 (c)	Periodic Transmissions
	A.1.2	Field Strength of Emissions
	A.1.3	Bandwidth of Momentary Signals

I, Shakil Murad, for Nemko PTI, Inc., being familiar with the above requirements and test procedures have reviewed the test setup, measured data, and this report. I believe them to be true and accurate.

NVLAP®
TESTING
NVLAP LAB CODE 200062-0

Shakil Murad
Wireless Engineer

This report has been reviewed and accepted by the Applicant**.** The undersigned is responsible for ensuring that this device will continue to comply with the requirements listed above.

_____
Representative of Applicant

1.0 Introduction

1.1 Scope

This report describes the extent to which the equipment under test (EUT) conformed to the intentional radiator requirements of the United States and Canada.

Nemko PTI, Inc., follows the guidelines of National Institute of Standards and Technology (NIST) for all uncertainty calculations, estimates, and expressions thereof for electromagnetic compatibility testing.

1.2 EUT Description

Manufacturer / Model	Serial #	Description
The Genie Company, a Division of Overhead Door Corporation Model: OU4T	N/A	Universal Transmitter (360, 380, and 412 MHz)

1.3 EUT Test Configuration

The EUT was exercised in a manner consistent with normal operations. The EUT was powered by 3 VDC internal battery during conducted RF testing and an external DC power supply during radiated testing.

1.4 Modifications to Equipment

A small coaxial cable was soldered in its place of the antenna to facilitate conducted RF measurements.

1.5 Test Site

Measurements were made at the Nemko PTI semi-anechoic facility designated Site 45 (FCC 776781, IC 3036B-1) in Austin, Texas. The site is registered with the FCC under Section 2.948 and Industry Canada per RSS-GEN, and is subsequently confirmed by laboratory accreditation (NVLAP). The test site is located at 11400 Burnet Road, Austin, Texas 78758, while the main office is located at 1601 North A.W. Grimes Boulevard, Suite B, Round Rock, Texas, 78665. CAB Identifier: US 0123.

1.6 Measurement Corrections

Parameter	From Sums Of
Radiated Field Strength	Raw Measured Level + Antenna Factor + Cable Losses – Amplifier Gain
Conducted Antenna Port	Raw Measured Level + Attenuator Factor + Cable Losses
Conducted Mains Port	Raw Measured Level + LISN Factor + Cable/Filter/Limiter Losses

Additionally, measurement distance extrapolation factors (such as 1/d above 30 MHz) are applied and documented where used.

1.7 Applicable Documents

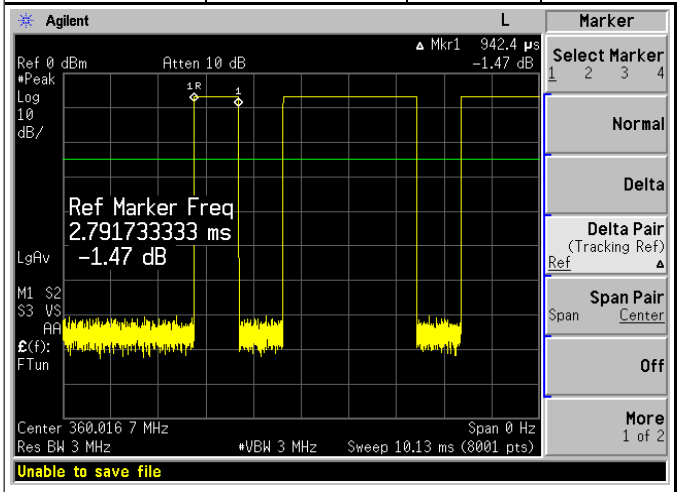
Table 1.7.1: Applicable Documents

Document	Title
47 CFR	Part 15 – Radio Frequency Devices Subpart C -Intentional Radiators
RSS-210, Issue 10	License-Exempt Radio Apparatus: Category I Equipment
RSS-Gen Issue 5	General Requirements and Information for the Certification of Radio Apparatus
ANSI C63.10 2013	American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices

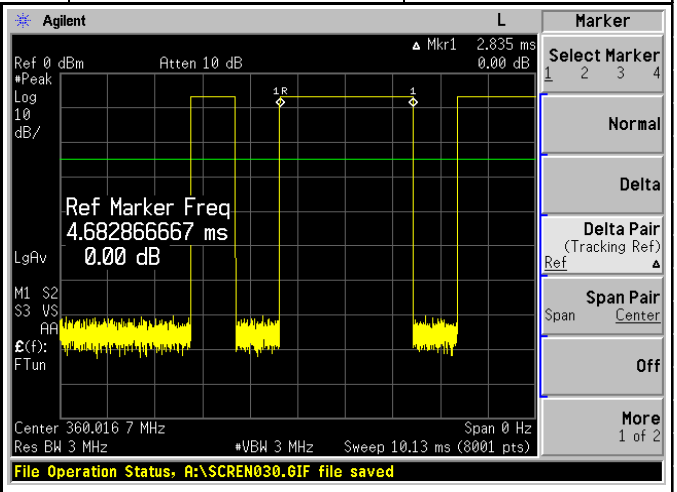
2.0 Duty Cycle

Measurement is based on intervals not to exceed 100 msec. Maximum transmitter on time is divided by the lesser of 100 msec or the actual measured minimum transmitter interval time. The result is converted to dB and applied as needed to peak measurements of transmitter artifacts to determine average power. This is not a pass/fail measurement. Duty cycle was measured for the three channels of the EUT.

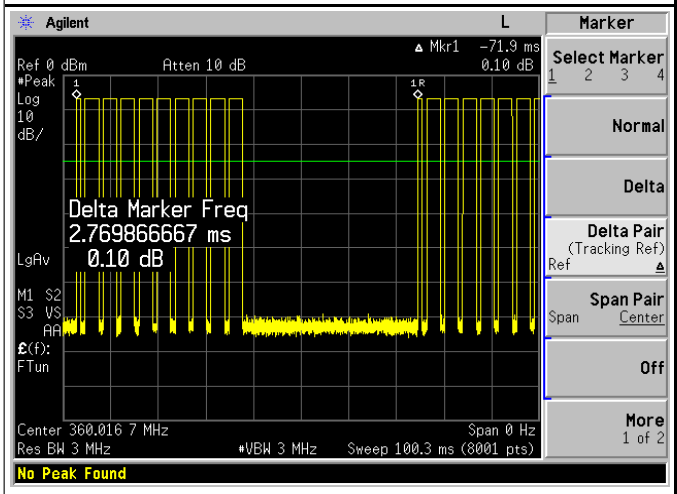
Dyty Cycle - 360 MHz														
Project Number:	**23197-15**				**Test Date(s):**	**5/16/2022**								
Environmental Conditions:	**Temperature**	**22.2**	**°C**		**Humidity**	**49**	**RH**		**Barometric Pressure**	**29.84**	**in Hg**			
Measurement Parameters:	**RBW**	**3**	**MHz**	**VBW**	**3**	**MHz**	**Span**	**0**	**MHz**	**Detector**	**Peak**			
Total On Time (ms)	**Max On Time Allowed (ms)**	**On Time Result**	**Measured Time Interval (ms)**		**Duty Cycle Factor (dB) (20 * Log(On time/Interval)**									
26.4574	**100**	**Pass**	**71.9**		**8.68**									



Transmit Event Time, t1 = 0.9424 ms

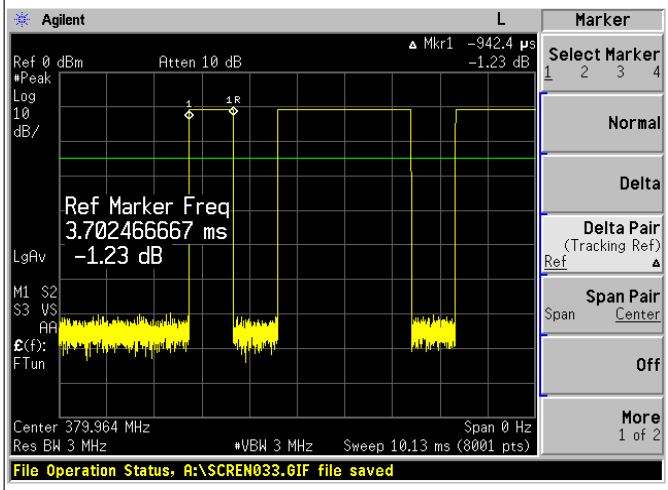


Transmit Event Time, t2 = 2.835 ms x 9

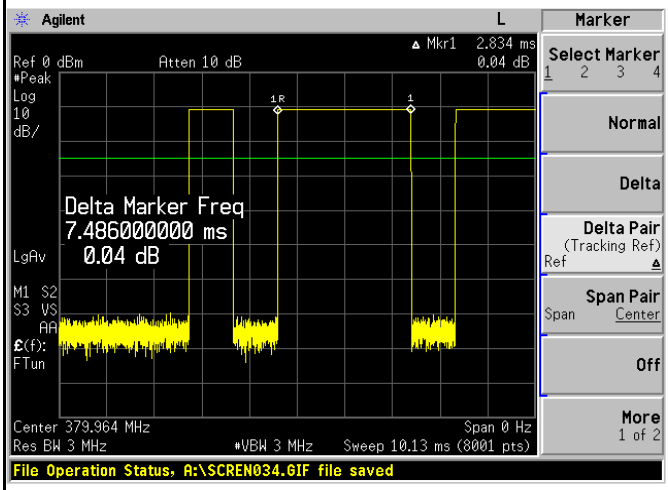


Time Interval (Return to channel time), T = 71.9 ms

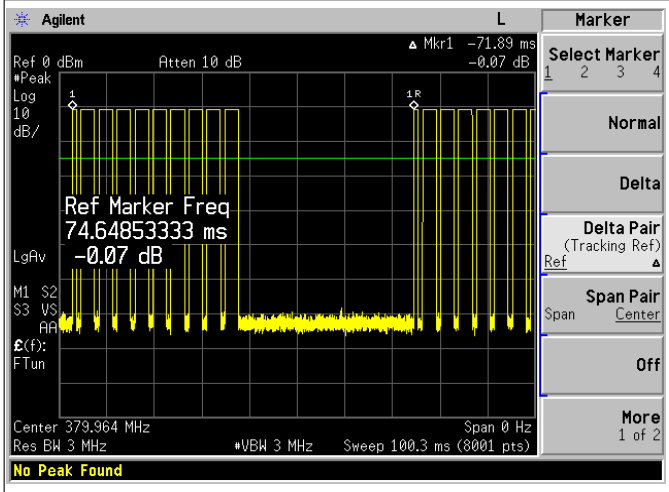
Dyty Cycle - 380 MHz														
Project Number:	**23197-15**				**Test Date(s):**	**5/16/2022**								
Environmental Conditions:	**Temperature**	**22.2**	**°C**		**Humidity**	**49**	**RH**		**Barometric Pressure**	**29.84**	**in Hg**			
Measurement Parameters:	**RBW**	**3**	**MHz**	**VBW**	**3**	**MHz**	**Span**	**0**	**MHz**	**Detector**	**Peak**			
Total On Time (ms)	**Max On Time Allowed (ms)**	**On Time Result**	**Measured Time Interval (ms)**		**Duty Cycle Factor (dB) (20 * Log(On time/Interval)**									
26.4484	**100**	**Pass**	**71.89**		**8.69**									



Transmit Event Time, t1 = 0.9424 ms

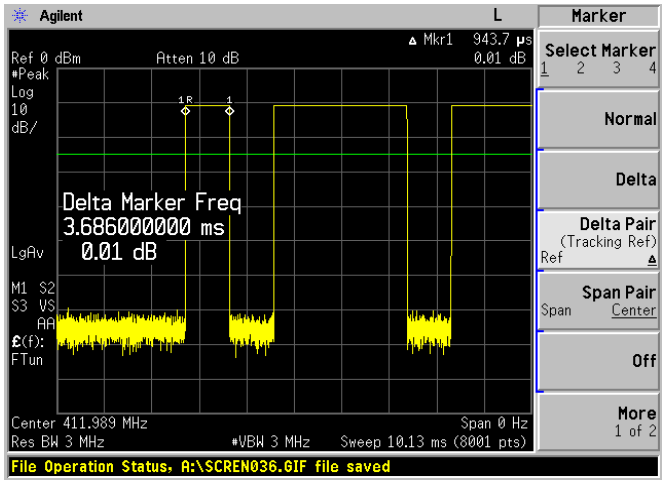


Transmit Event Time, t2 = 2.834 ms x 9

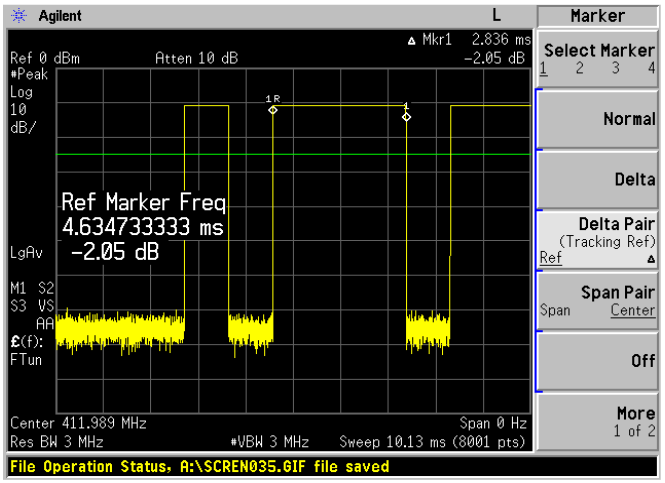


Time Interval (Return to channel time), T = 71.89 ms

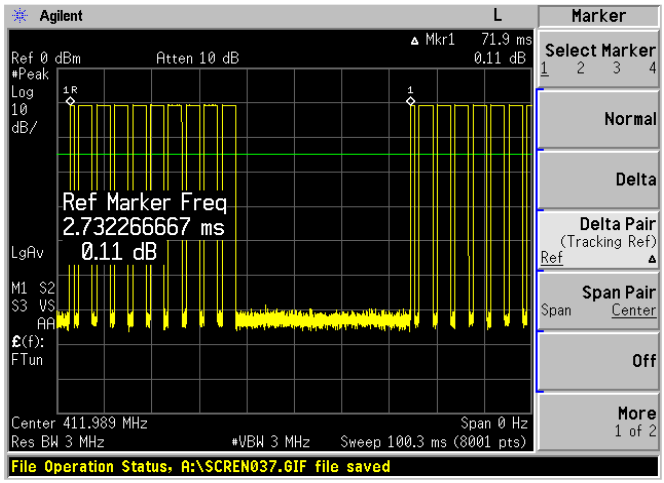
Dyty Cycle - 412 MHz														
Project Number:	**23197-15**				**Test Date(s):**	**5/16/2022**								
Environmental Conditions:	**Temperature**	**22.2**	**°C**		**Humidity**	**49**	**RH**		**Barometric Pressure**	**29.84**	**in Hg**			
Measurement Parameters:	**RBW**	**3**	**MHz**	**VBW**	**3**	**MHz**	**Span**	**0**	**MHz**	**Detector**	**Peak**			
Total On Time (ms)	**Max On Time Allowed (ms)**	**On Time Result**	**Measured Time Interval (ms)**	**Duty Cycle Factor (dB) (20 * Log(On time/Interval)**										
26.4677	**100**	**Pass**	**71.9**	**8.68**										



Transmit Event Time, t1 = 0.9437 ms



Transmit Event Time, t2 = 2.836 ms x 9



Time Interval (Return to channel time), T = 71.9 ms

3.0 Manually Operated Transmitter

3.1 Test Procedure

The radio was connected directly to the spectrum analyzer for measurement. Three channels output power were measured.

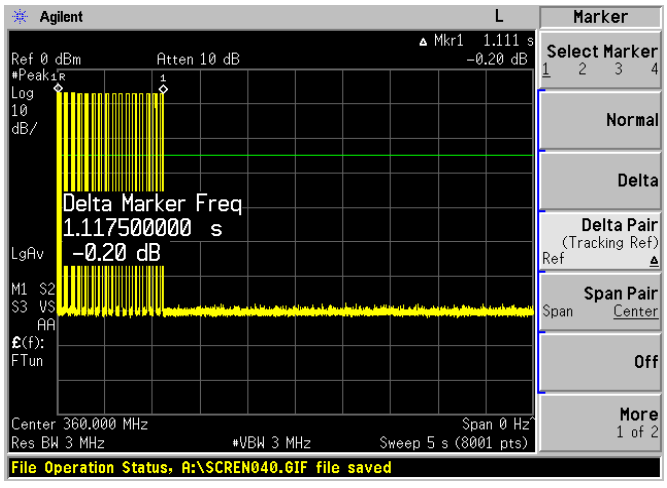
3.2 Test Criteria

Manually operated transmitter shall employ a switch that will automatically deactivate the transmitter within not more than 5 seconds of being released.

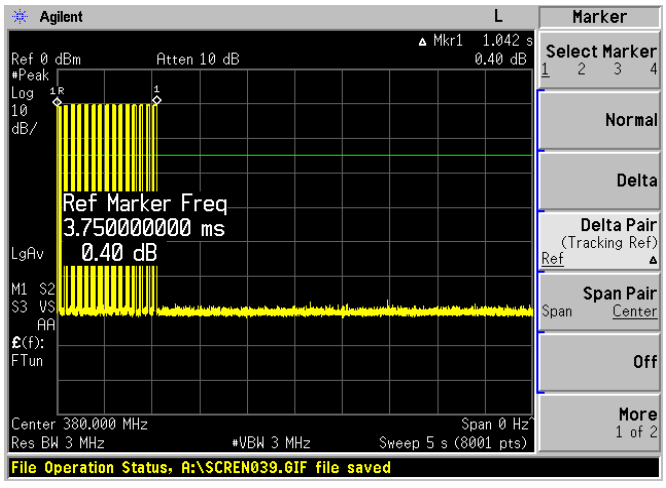
3.1 Test Results

Manually Operated Transmitter													
Project Number:	**23197-15**				**Test Date(s):**	**5/16/2022**							
Environmental Conditions:	**Temperature**	**22.2**	**°C**		**Humidity**	**49**	**RH**		**Barometric Pressure**	**29.84**	**in Hg**		
Measurement Parameters:	**RBW**	**3**	**MHz**	**VBW**	**3**	**MHz**	**Span**	**0**	**MHz**	**Detector**	**Peak**		

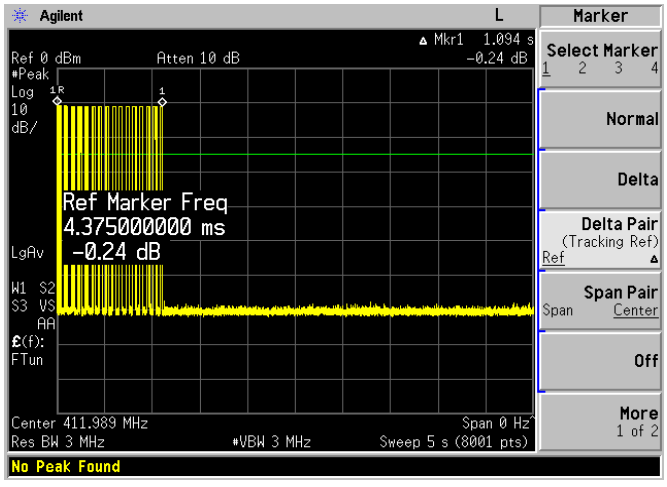
Channel	Frequency (MHz)	Measured Transmission Time (Sec.)	Maximun Deactivation Time Allowed (Sec.)	Test Result
Low	360	1.111	5	Pass
Mid	380	1.042	5	Pass
High	412	1.094	5	Pass



Low Channel



Mid Channel



High Channel

4.0 Bandwidth of Emissions

4.1 Test Criteria

The bandwidth of the emission shall be no wider than 0.25% of the center frequency for devices operating above 70 MHz and below 900MHz.

4.2 Test Results – 20 dB

Occupied Bandwidth - 20 dB														
Project Number:	23197-15					Test Date(s):	5/16/2022							
Environmental Conditions:	Temperature	22.2	°C			Humidity	49	RH	Barometric Pressure	29.84	in Hg			
Measurement Parameters:	RBW	3	kHz	VBW	9	kHz	Span	60	kHz	Detector	Peak			
Measurement Bandwidth:		20	dB											

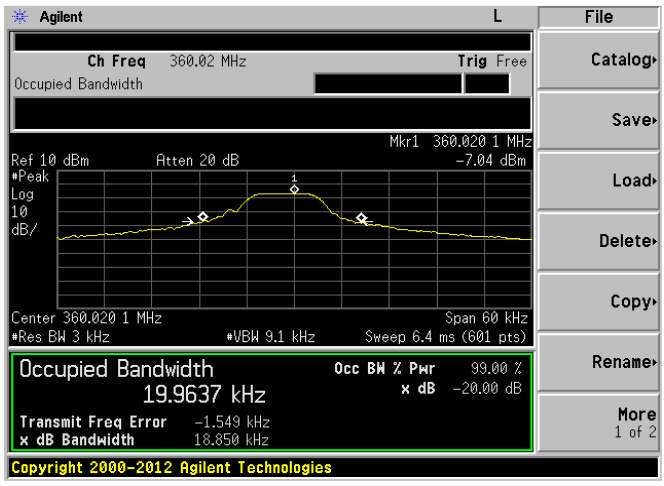
Channel	Frequency (MHz)	Measured Bandwidth (kHz)	Bandwidth Limit (kHz)	Test Result
Low	360	18.85	900	Pass
Mid	380	18.68	950	Pass
High	412	18.371	1030	Pass

4.1 Test Results – 99%

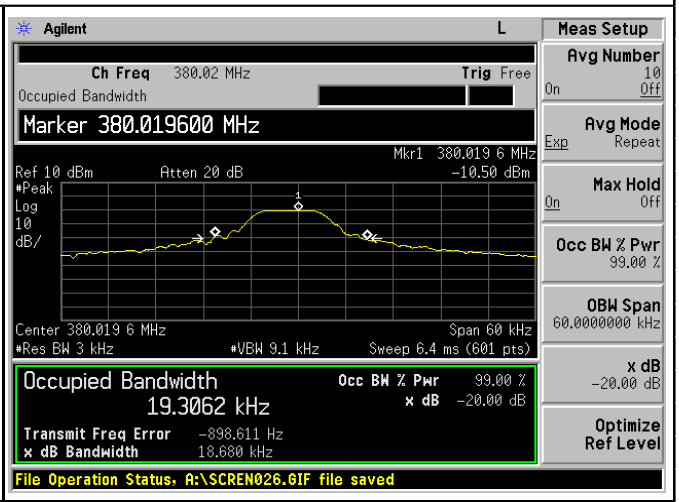
Occupied Bandwidth - 99%														
Project Number:	23197-15					Test Date(s):	5/16/2022							
Environmental Conditions:	Temperature	22.2	°C			Humidity	49	RH	Barometric Pressure	29.84	in Hg			
Measurement Parameters:	RBW	3	kHz	VBW	9	kHz	Span	60	kHz	Detector	Peak			
Measurement Bandwidth:		99	%											

Channel	Frequency (MHz)	Measured Bandwidth (kHz)	Bandwidth Limit (kHz)	Test Result
Low	360	19.9637	N/A	Pass
Mid	380	19.3062	N/A	Pass
High	412	18.2381	N/A	Pass

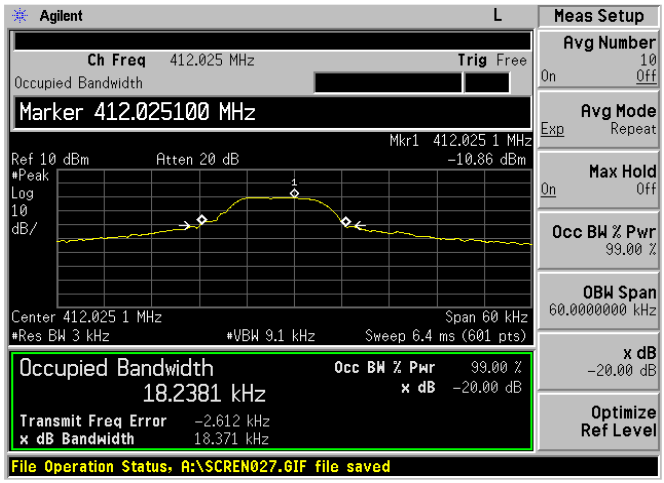
Test Plots – 26 dB and 99%



Low Channel



Mid Channel



High Channel

5.0 Transmitter Radiated Spurious Emissions

5.1 Test Procedure

Radiated emissions are measured with the EUT transmitting on the required frequencies.

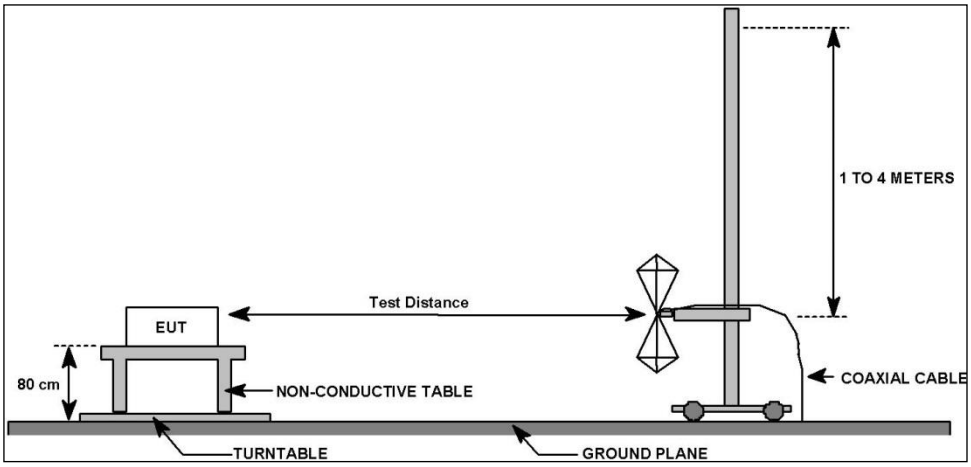


Table 5.1.1: Test Distance, Table Height, and Detection Method

30 MHz to 1 GHz	1 GHz to 18 GHz
3 m, 80 cm	3 m, 1.5 m
Peak	Peak

5.2 Test Criteria

FCC 15.231 (b):
In addition to the provisions of 15.205, the field strength of emissions from intentional radiators operated under this section shall not exceed the following:

Fundamental frequency (MHz)	Field strength of fundamental (microvolts/meter)	Field strength of spurious emissions (microvolts/meter)
40.66-40.70	2,250	225
70-130	1,250	125
130-174	[1] 1,250 to 3,750	[1] 125 to 375
174-260	3,750	375
260-470	[1] 3,750 to 12,500	[1] 375 to 1,250
Above 470	12,500	1,250

[1] Linear interpolations.

RSS-210 A.1.2:

Fundamental frequency (MHz), excluding restricted frequency bands specified in RSS-Gen	Field strength of the fundamental emissions (µV/m at 3 m)
70-130	1,250
130-174	1,250 to 3,750*
174-260**	3,750
260-470**	3,750 to 12,500*
Above 470	12,500

* Linear interpolation with frequency, f, in MHz:
- For 130-174 MHz: Field Strength (µV/m) = (56.82 x f)-6136
- For 260-470 MHz: Field Strength (µV/m) = (41.67 x f)-7083

5.3 Test Results

Three channels were tested. EUT was transmitting continuously unmodulated. Device was tested in 3 orientations (X,Y,Z) to find the worst-case emissions and only the worse case orientation is reported.

The EUT satisfied the requirement. Graphical and tabular data appears below.

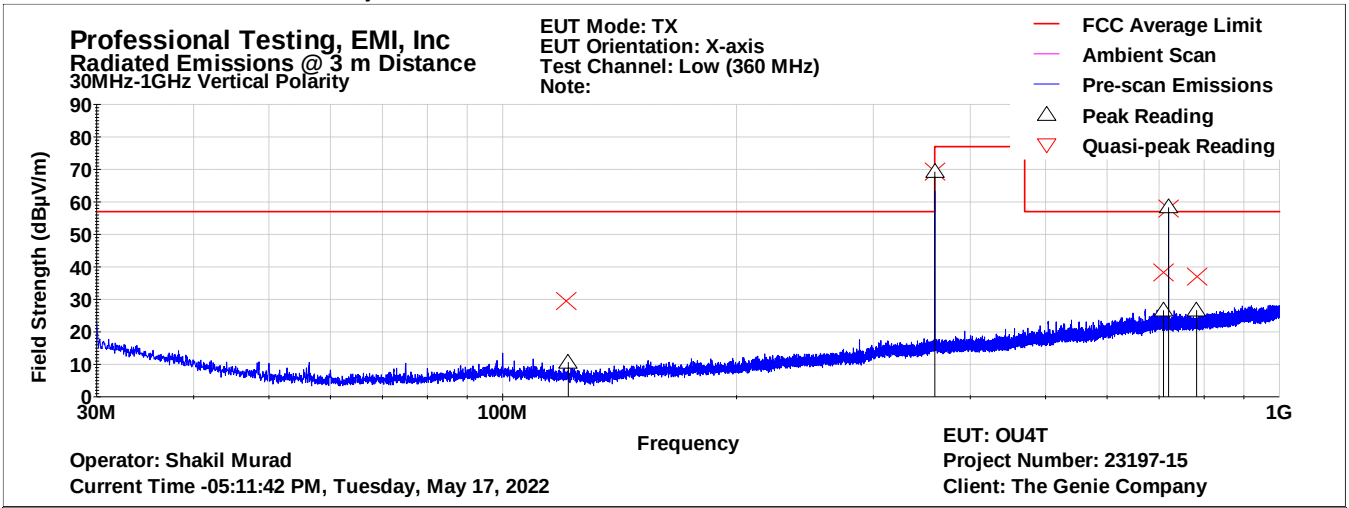
5.3.1 Field Strength of Fundamental

Frequency (MHz)	Peak Emissions (dBµV/m)	Duty Cycle Correction Factor (dB)	Corrected Average Emissions (dBµV/m)	Average Limit (dBµV/m)	Margin (dB)	Results
360	69.300	-8.68	60.62	77.97	17.35	Pass
380	66.190	-8.69	57.5	78.84	21.34	Pass
412	62.634	-8.68	53.954	80.7	26.746	Pass

Average Emissions = Peak Emissions + Duty Cycle Correction Factors

5.3.2 Harmonics and Spurious Emissions - 360 MHz

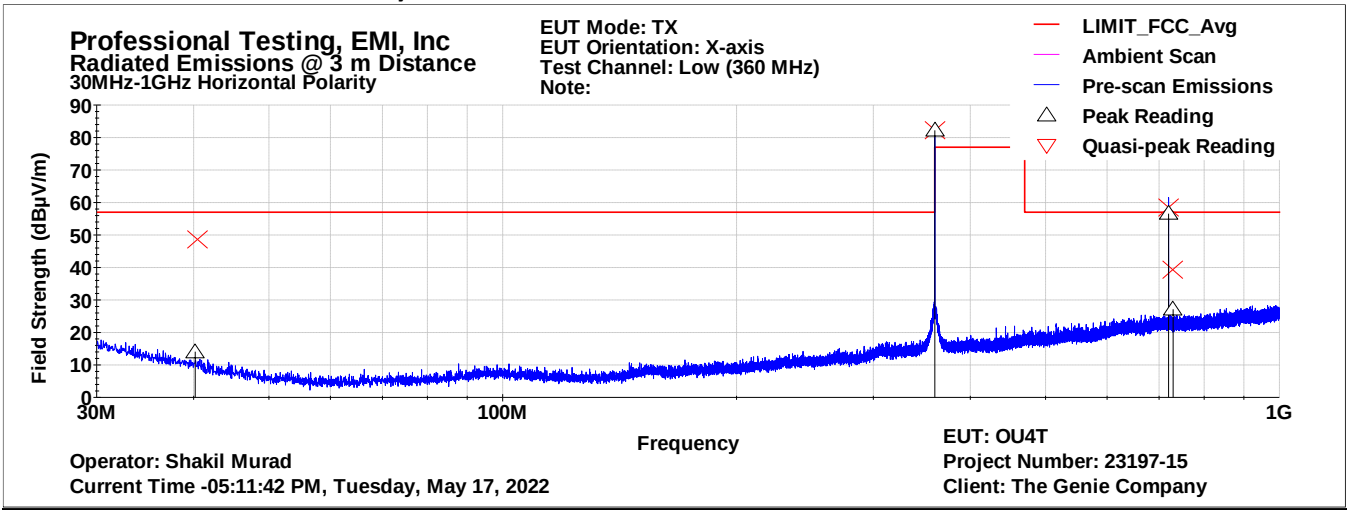
30MHz - 1GHz Vertical Polarity Emissions Data



Frequency (MHz)	EUT Direction (Degrees)	Antenna Height (cm)	Peak (dBµV/m)	Duty Cycle Correction Factor (dB)	Corrected Average (dBµV/m)	Average Limit (dBµV/m)	Results
121.48	244	159	10.674			57.79	Pass
360.02	58	139	69.3	-8.68	60.62	77.79	Fundamental
709.37	161	294	26.599			57.79	Pass
720.04	127	206	58.313	-8.68	49.633	57.79	Pass
782.35	133	260	26.653			57.79	Pass

Note: Duty cycle correction factor is applied to harmonics of the fundamental frequency and compared against the average limit.

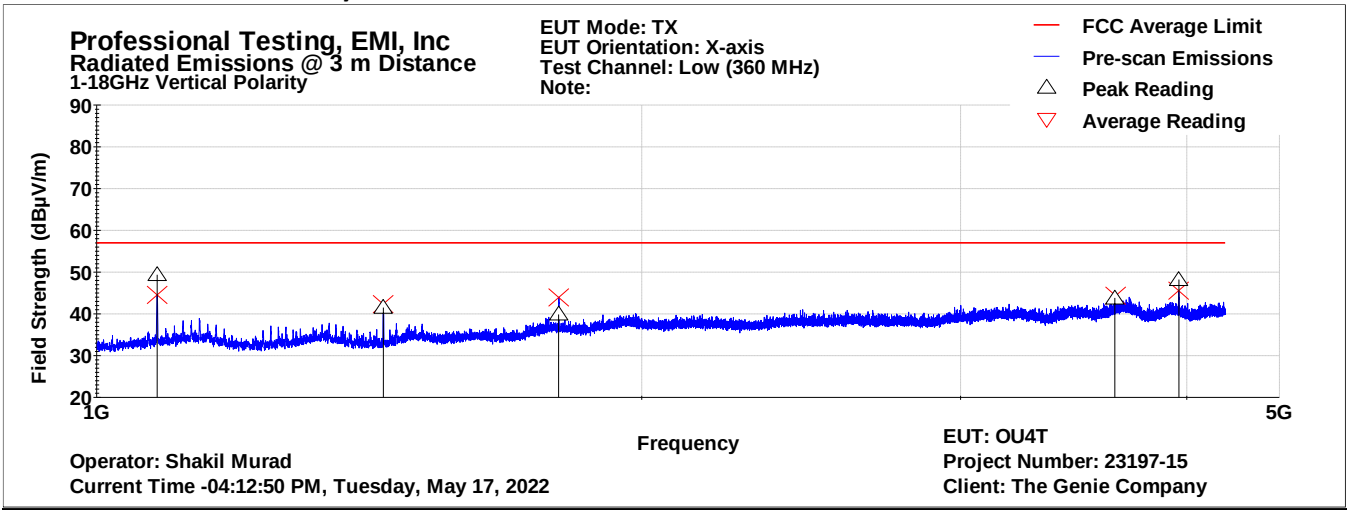
30MHz - 1GHz Horizontal Polarity Emissions Data



Frequency (MHz)	EUT Direction (Degrees)	Antenna Height (cm)	Peak (dBµV/m)	Duty Cycle Correction Factor (dB)	Corrected Average (dBµV/m)	Average Limit (dBµV/m)	Results
40.189	262	222	14.057			57.79	Pass
360.02	269	104	82.195	-8.68	73.515	77.79	Fundamental
720.05	2	128	56.541	-8.68	47.861	57.79	Pass
729.77	170	129	27.101			57.79	Pass

Note: Duty cycle correction factor is applied to harmonics of the fundamental frequency and compared against the average limit.

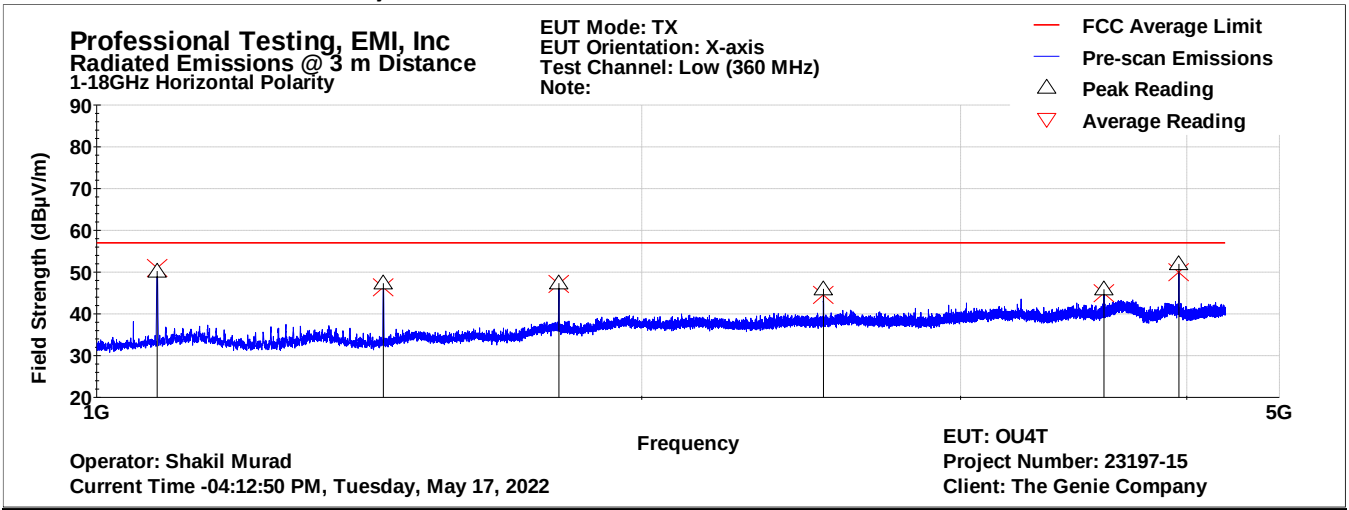
1GHz - 5GHz Vertical Polarity Emissions Data



Frequency (MHz)	EUT Direction (Degrees)	Antenna Height (cm)	Peak (dBµV/m)	Duty Cycle Correction Factor (dB)	Corrected Average (dBµV/m)	Average Limit (dBµV/m)	Results
1080	163	103	49.361	-8.68	40.681	57.79	Pass
1440.1	163	373	41.491	-8.68	32.811	57.79	Pass
1799.5	4	210	39.861	-8.68	31.181	57.79	Pass
3650.6	186	134	43.805			57.79	Pass
3960.2	106	107	48.203	-8.68	39.523	57.79	Pass

Note: Duty cycle correction factor is applied to harmonics of the fundamental frequency and compared against the average limit.

1GHz - 5GHz Horizontal Polarity Emissions Data

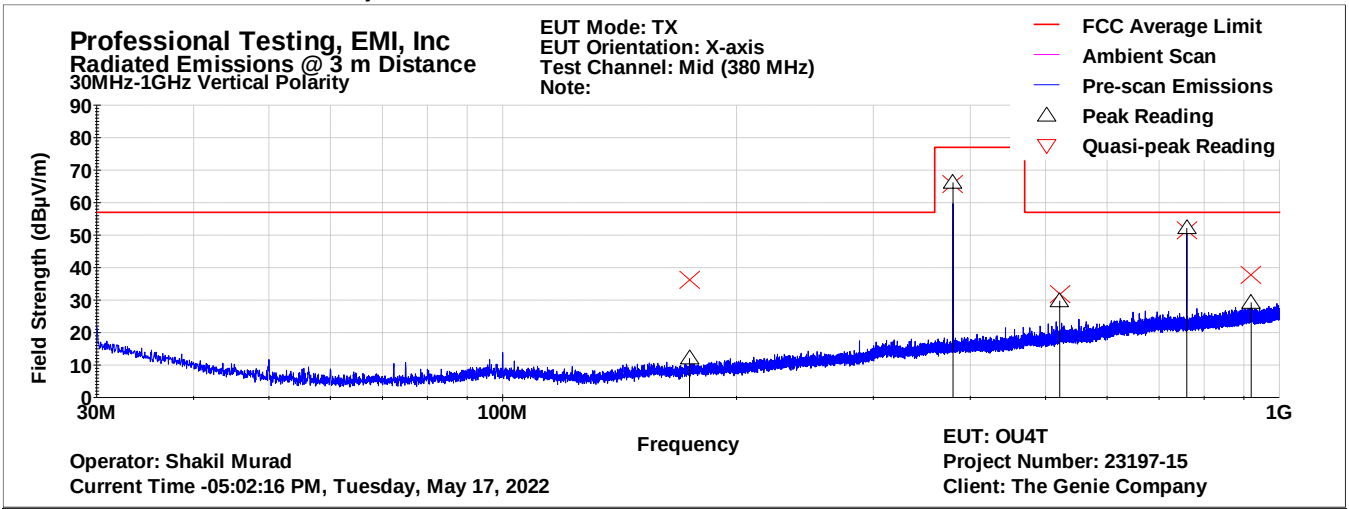


Frequency (MHz)	EUT Direction (Degrees)	Antenna Height (cm)	Peak (dBµV/m)	Duty Cycle Correction Factor (dB)	Corrected Average (dBµV/m)	Average Limit (dBµV/m)	Results
1080.1	273	213	50.25	-8.68	41.57	57.79	Pass
1440.1	231	196	47.32	-8.68	38.64	57.79	Pass
1800.1	200	196	47.349	-8.68	38.669	57.79	Pass
2520	40	281	45.978	-8.68	37.298	57.79	Pass
3600.2	250	291	45.874	-8.68	37.194	57.79	Pass
3960.2	59	155	51.952	-8.68	43.272	57.79	Pass

Note: Duty cycle correction factor is applied to harmonics of the fundamental frequency and compared against the average limit.

5.3.3 Harmonics and Spurious Emissions - 380 MHz

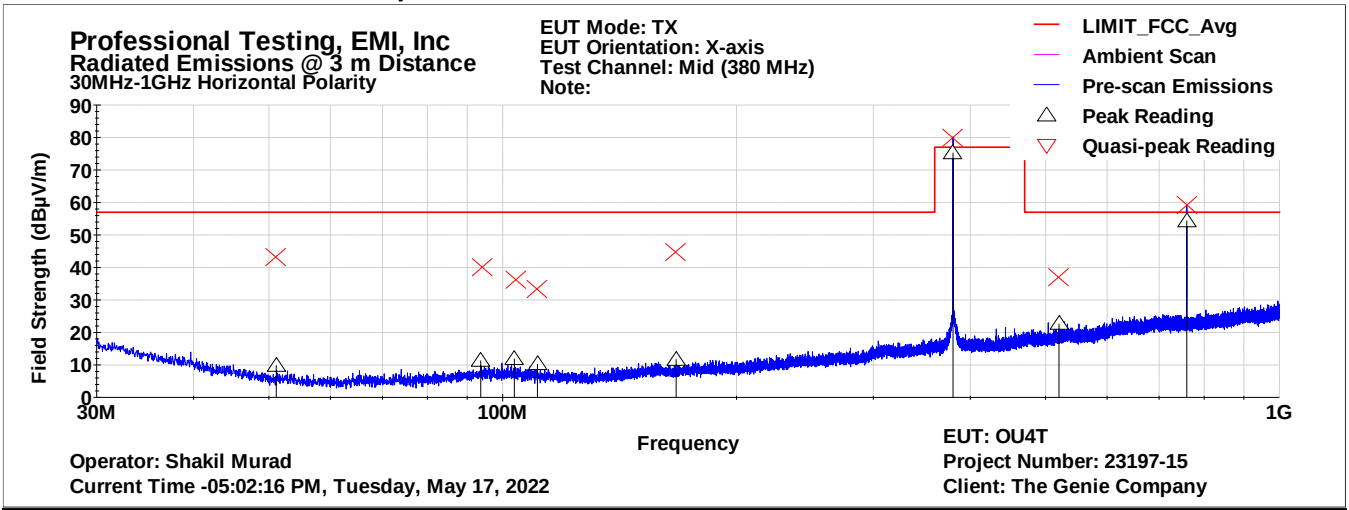
30MHz - 1GHz Vertical Polarity Emissions Data



Frequency (MHz)	EUT Direction (Degrees)	Antenna Height (cm)	Peak (dBµV/m)	Duty Cycle Correction Factor (dB)	Corrected Average (dBµV/m)	Average Limit (dBµV/m)	Results
173.96	249	287	12.093			58.84	Pass
380.02	58	144	66.19	-8.69	57.5	78.84	Fundamental
521.36	116	321	29.801			58.84	Pass
760.04	266	193	52.172	-8.69	43.482	58.84	Pass
919.76	351	282	29.264			58.84	Pass

Note: Duty cycle correction factor is applied to harmonics of the fundamental frequency and compared against the average limit.

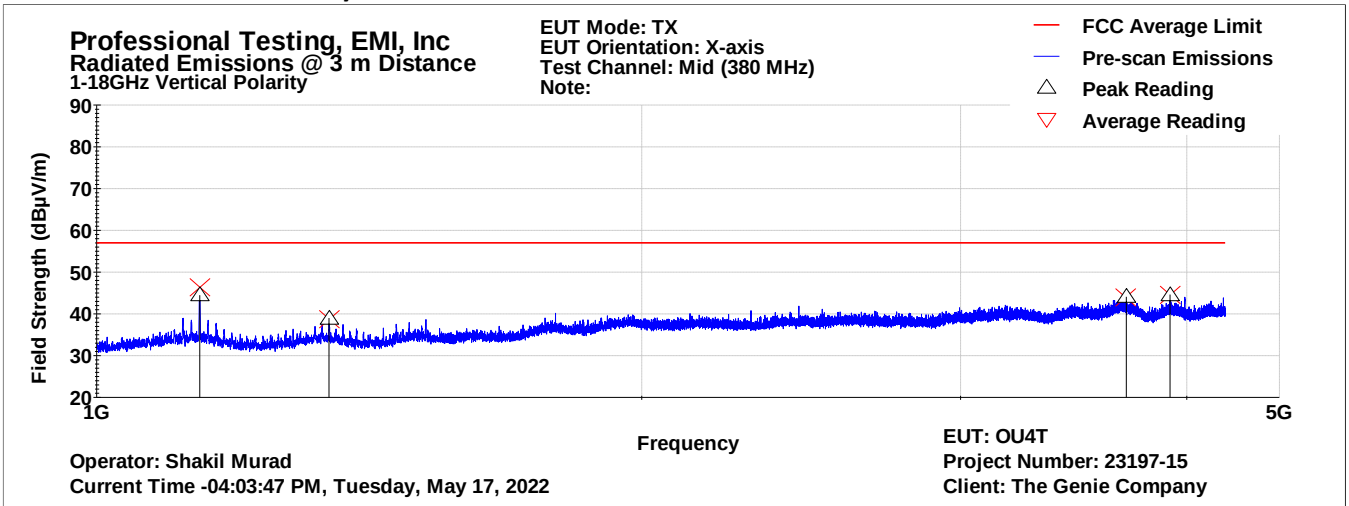
30MHz - 1GHz Horizontal Polarity Emissions Data



Frequency (MHz)	EUT Direction (Degrees)	Antenna Height (cm)	Peak (dBµV/m)	Duty Cycle Correction Factor (dB)	Corrected Average (dBµV/m)	Average Limit (dBµV/m)	Results
51.106	187	103	9.884			58.84	Pass
93.687	299	290	11.362			58.84	Pass
103.5	310	259	11.919			58.84	Pass
110.84	185	152	10.274			58.84	Pass
167.21	239	372	11.717			58.84	Pass
380.02	102	128	75.305	-8.69	66.615	78.84	Fundamental
520.25	312	281	22.621			58.84	Pass
760.04	148	128	54.393	-8.69	45.703	58.84	Pass

Note: Duty cycle correction factor is applied to harmonics of the fundamental frequency and compared against the average limit.

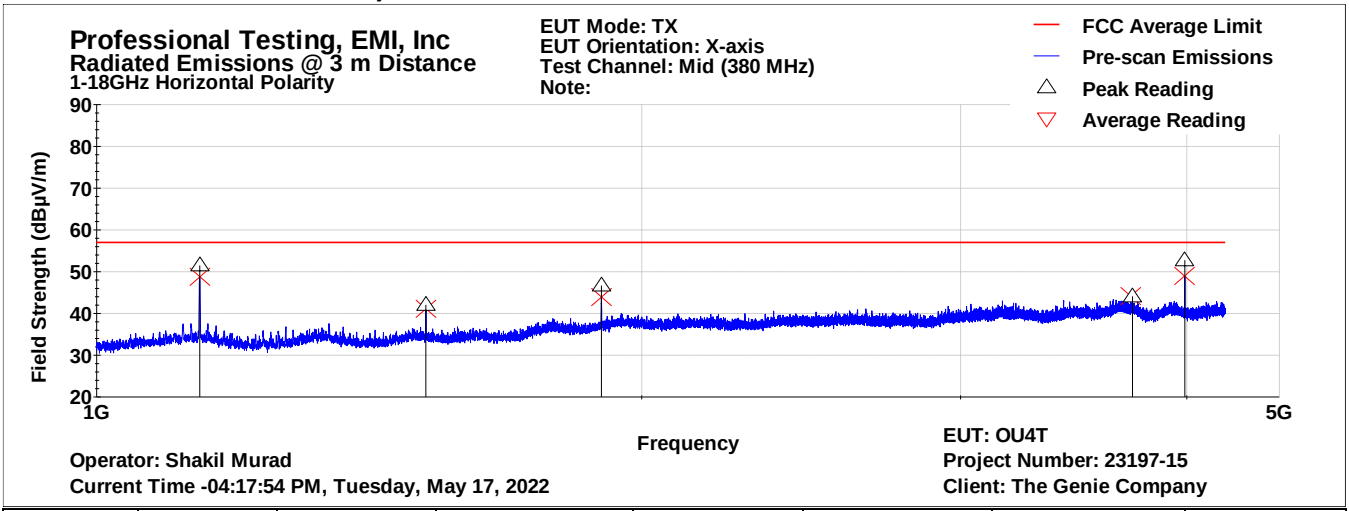
1GHz - 5GHz Vertical Polarity Emissions Data



Frequency (MHz)	EUT Direction (Degrees)	Antenna Height (cm)	Peak (dBµV/m)	Duty Cycle Correction Factor (dB)	Corrected Average (dBµV/m)	Average Limit (dBµV/m)	Results
1140.07	207	342	44.465	-8.69	35.775	58.84	Pass
1343.85	336	246	38.984			58.84	Pass
3704.20	346	246	44.072			58.84	Pass
3915.69	172	302	44.616			58.84	Pass

Note: Duty cycle correction factor is applied to harmonics of the fundamental frequency and compared against the average limit.

1GHz - 5GHz Horizontal Polarity Emissions Data

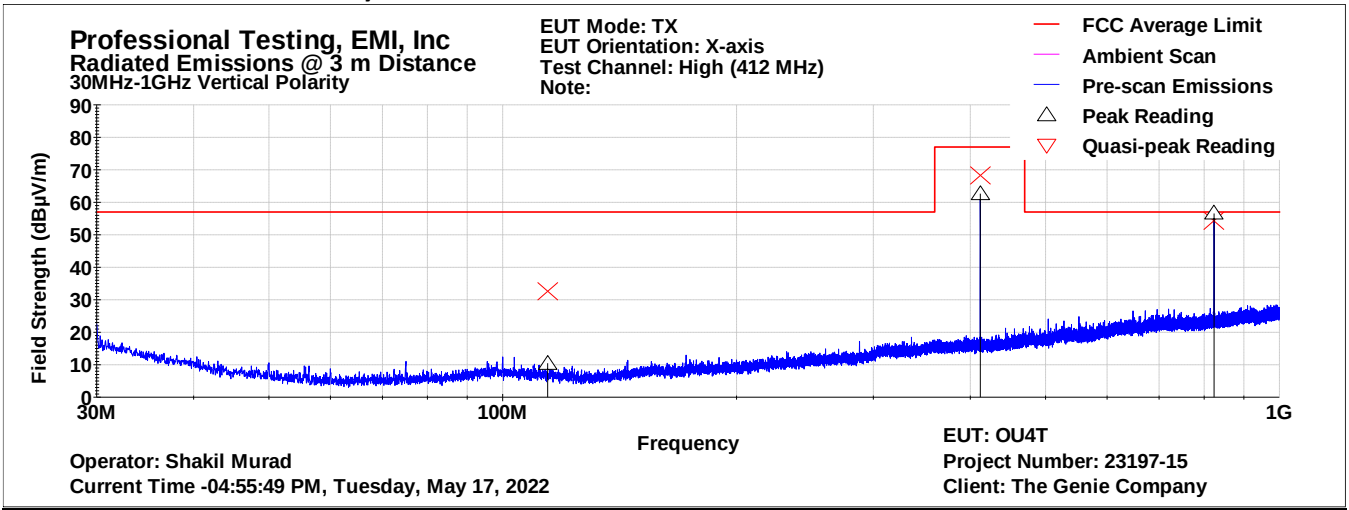


Frequency (MHz)	EUT Direction (Degrees)	Antenna Height (cm)	Peak (dBµV/m)	Duty Cycle Correction Factor (dB)	Corrected Average (dBµV/m)	Average Limit (dBµV/m)	Results
1140.1	238	304	51.5	-8.69	42.81	58.84	Pass
1520	220	177	42.048	-8.69	33.358	58.84	Pass
1900.1	27	400	46.662	-8.69	37.972	58.84	Pass
3733.2	7	375	44.103			58.84	Pass
3990.2	71	108	52.747			58.84	Pass

Note: Duty cycle correction factor is applied to harmonics of the fundamental frequency and compared against the average limit.

5.3.4 Harmonics and Spurious Emissions - 412 MHz

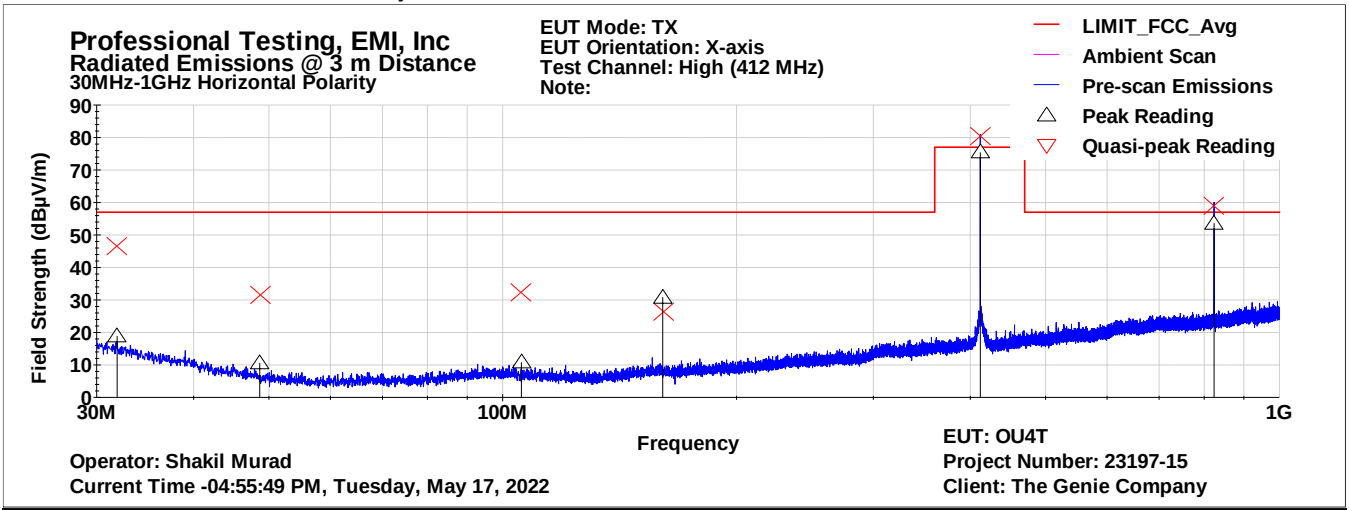
30MHz - 1GHz Vertical Polarity Emissions Data



Frequency (MHz)	EUT Direction (Degrees)	Antenna Height (cm)	Peak (dBµV/m)	Duty Cycle Correction Factor (dB)	Corrected Average (dBµV/m)	Average Limit (dBµV/m)	Results
114.25	5	416	10.436			60.7	Pass
412.02	247	103	62.634	-8.68	53.954	80.7	Fundamental
824.05	234	103	56.535	-8.68	47.855	60.7	Pass

Note: Duty cycle correction factor is applied to harmonics of the fundamental frequency and compared against the average limit.

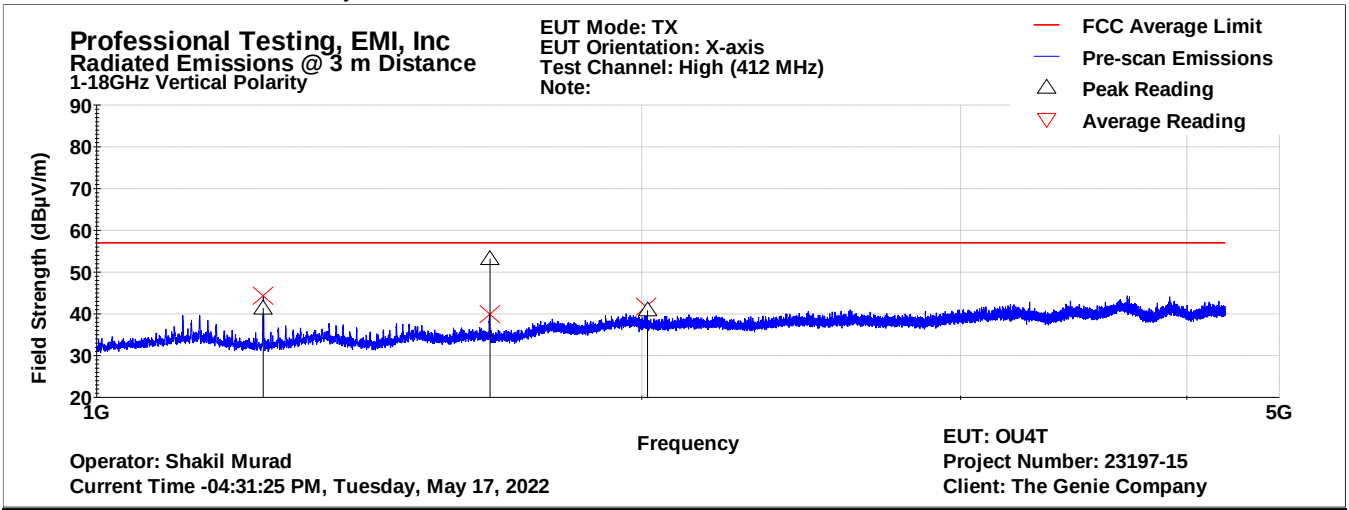
30MHz - 1GHz Horizontal Polarity Emissions Data



Frequency (MHz)	EUT Direction (Degrees)	Antenna Height (cm)	Peak (dBµV/m)	Duty Cycle Correction Factor (dB)	Corrected Average (dBµV/m)	Average Limit (dBµV/m)	Results
31.884	358	377	18.849			60.7	Pass
48.661	321	100	10.589			60.7	Pass
105.68	189	317	10.788			60.7	Pass
160.72	338	268	30.839	-8.68	22.159	60.7	Pass
412.02	261	128	75.398	-8.68	66.718	80.7	Fundamental
824.05	176	128	53.601	-8.68	44.921	60.7	Pass

Note: Duty cycle correction factor is applied to harmonics of the fundamental frequency and compared against the average limit.

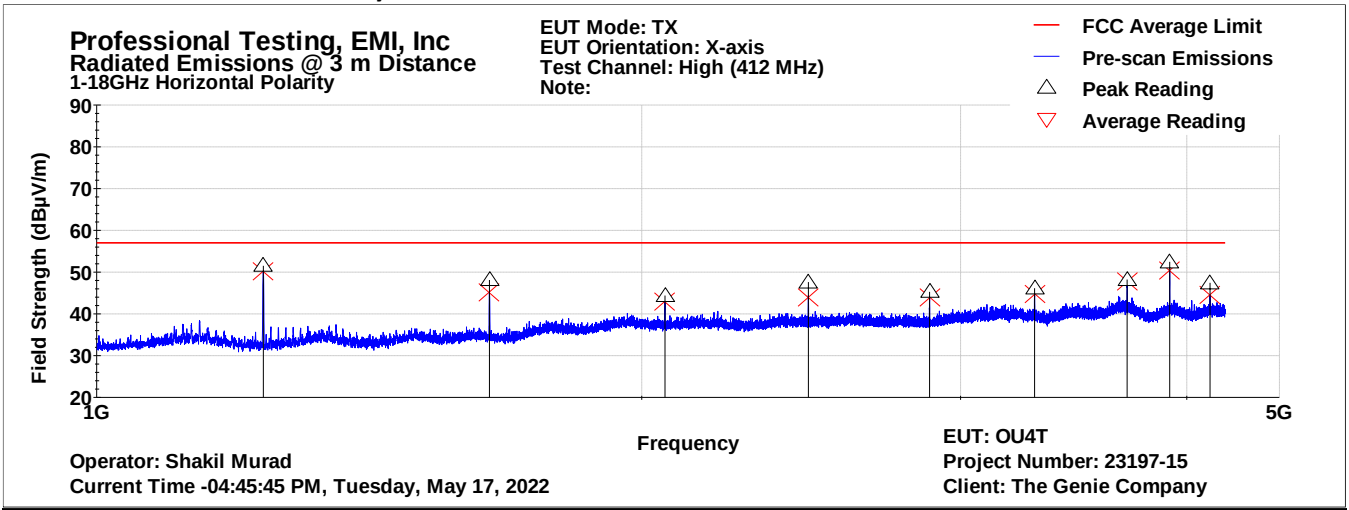
1GHz - 5GHz Vertical Polarity Emissions Data



Frequency (MHz)	EUT Direction (Degrees)	Antenna Height (cm)	Peak (dBµV/m)	Duty Cycle Correction Factor (dB)	Corrected Average (dBµV/m)	Average Limit (dBµV/m)	Results
1236	162	195	41.421	-8.68	32.741	60.7	Pass
1649.3	61	290	53.139	-8.68	44.459	60.7	Pass
2014.8	118	274	40.821			60.7	Pass

Note: Duty cycle correction factor is applied to harmonics of the fundamental frequency and compared against the average limit.

1GHz - 5GHz Horizontal Polarity Emissions Data



Frequency (MHz)	EUT Direction (Degrees)	Antenna Height (cm)	Peak (dBµV/m)	Duty Cycle Correction Factor (dB)	Corrected Average (dBµV/m)	Average Limit (dBµV/m)	Results
1236.1	227	216	51.493	-8.68	42.813	60.7	Pass
1648.1	316	324	48.102	-8.68	39.422	60.7	Pass
2060.1	112	375	44.383	-8.68	35.703	60.7	Pass
2472.2	324	257	47.594	-8.68	38.914	60.7	Pass
2884.3	28	108	45.27	-8.68	36.59	60.7	Pass
3296.1	146	353	46.138	-8.68	37.458	60.7	Pass
3708.2	238	132	48.202	-8.68	39.522	60.7	Pass
3914.2	60	132	52.457			60.7	Pass
4120.5	58	264	47.436	-8.68	38.756	60.7	Pass

Note: Duty cycle correction factor is applied to harmonics of the fundamental frequency and compared against the average limit.

1.0 Measurement Bandwidths

Radiated Emissions Spectrum Analyzer Bandwidth and Measurement Time - Peak Scan				
Frequency Band Start (MHz)	**Frequency Band Stop (MHz)**	**6 dB Bandwidth (kHz)**	**Number of Ranges Used**	**Measurement Time per Range**
0.009	0.15	0.3	2	Multiple Sweeps
0.15	30	9	6	Multiple Sweeps
30	1000	120	2	Multiple 800 mS Sweeps
1000	6000	1000	2	Multiple Sweeps
6000	18000	1000	2	Multiple Sweeps
18000	26500	1000	2	Multiple Sweeps

*Notes:
1. The settings above are specifically calculated for the E4440A series of spectrum analyzers, which have 8,000 data points per range.
2. The measurement receiver resolution bandwidth setting was 300 Hz for quasi-peak measurements from 9-150 kHz.
3. The measurement receiver resolution bandwidth setting was 9 kHz for quasi-peak measurements from 0.15-30 MHz.
4. The measurement receiver resolution bandwidth setting was 120 kHz for quasi-peak measurements from 30-1000 MHz.
5. The measurement receiver resolution bandwidth setting was 1 MHz for average measurements from 1-18 GHz.

2.0 Test Equipment

2.1 Conducted Measurements at the Antenna Port

Test Equipment List					
Asset#	**Manufacturer**	**Model**	**Equipment Nomenclature**	**Serial Number**	**Calibration Due Date**
A102	Weinschel	1B-10	Attenuator, N, 10dB, DC-12.4GHz	None	9/21/2023
2295	Keysight	E4440A-AYZ	PSA Spectrum Analyzer	MY46186204	1/5/2023

2.2 Radiated Spurious Emissions

Radiated Emissions Test Equipment List					
Tile! Software Version:		**Version: 7.1.2.17 (Jan 08, 2016 - 02:12:48 PM) or 4.1.A.0, April 14, 2009, 11:01:00PM**			
Test Profile:		**2020_RE_Unintentional_TILE7_v4**			
Asset #	**Manufacturer**	**Model**	**Equipment Nomenclature**	**Serial Number**	**Calibration Due Date**
1509A	Braden	TDK 10M	TDK 10M Chamber, NSA < 1 GHz	DAC-012915-005	4/9/2023
1969	HP	11713A	Attenuator/Switch Driver	3748A04113	N/A
942	EMCO	11968D	Turntable, 4ft.	9510-1835	N/A
1326	EMCO	1051-12	Controller, Antenna Mast	9101-1564	N/A
1244	EMCO	1050C	Controller, Antenna Mast	1100	N/A
C027	none	RG214	Cable Coax, N-N, 25m, 25MHz - 1GHz	None	9/14/2022
C233	Sucoflex	None	Cable, SMA-SMA, 7.62m, 9kHz - 1.5 GHz, Purple	None	10/22/2023
2172	ETS-Lindgren	3142C	Antenna, Biconilog, 26 MHz-3GHz	49383	3/11/2023
1457	HP	8447D	Preamp, .1-1300MHz	1937A02800	10/21/2022
C289	Pasternack	PE354-24	Cable, N-SMA, 0.610m Blue	1310	9/9/2022
C030	none	none	Cable Coax, N-N, 30m, 1 - 18GHz	None	9/15/2022
C038	none	LMR-400	Cable Coax, N-N, 0.15m	None	N/A
1780	ETS-Lindgren	3117	Antenna, Double Ridged Guide Horn, 1 - 18 GHz	110313	4/16/2023
2004	Miteq	AFS44-00101800-2S-10P-44	Amplifier, 40dB, 100MHz-18GHz	None	1/14/2024
1937	Agilent	E4440A - AYZ	PSA , 3 Hz - 26.5 GHz, Opt. AYZ	MY44808298	11/12/2022

Appendix: Policy, Rationale, and Evaluation of EMC Measurement Uncertainty

All uncertainty calculations, estimates and expressions thereof shall be in accordance with NIST policy. Since PTI operates in accordance with NIST (NVLAP) Handbook 150-11: 2007, all instrumentation having an effect on the accuracy or validity of tests shall be periodically calibrated or verified traceable to national standards by a competent calibration laboratory. The certificates of calibration or verification on this instrumentation shall include estimates of uncertainty as required by NIST Handbook 150-11.

1. Rationale and Summary of Expanded Uncertainty.

Each piece of instrumentation at Nemko PTI that is used in making measurements for determining conformance to a standard (or limit), shall be assessed to evaluate its contribution to the overall uncertainty of the measurement in which it is used. The assessment of each item will be based on either a type A evaluation or a type B evaluation. Most of the evaluations will be type B, since they will be based on the manufacturer's statements or specifications of the calibration tolerances, or uncertainty will be stated along with a brief rationale for the type of evaluation and the resulting stated uncertainties.

The individual uncertainties included in the combined standard uncertainty for a specific test result will depend on the configuration in which the item of instrumentation is used. The combination will always be based on the law of propagation of uncertainty. Any systematic effects will be accommodated by including their uncertainties, in the calculation of the combined standard uncertainty; except that if the direction and amount of the systematic effect cannot be determined and separated from its uncertainty, the whole effect will be treated as uncertainty and combined along with the other elements of the test setup.

Type A evaluations of standard uncertainty will usually be based on calculating the standard deviation of the mean of a series of independent observations, but may be based on a least-squares curve fit or the analysis of variance for unusual situations. Type B evaluations of standard uncertainty will usually be based on manufacturer's specifications, data provided in calibration reports, and experience. The type of probability distribution used (normal, rectangular, a priori, or u-shaped) will be stated for each Type B evaluation.

In the evaluation of the uncertainty of each type of measurement, the uncertainty caused by the operator will be estimated. One notable operator contribution to measurement uncertainty is the manipulation of cables to maximize the measured values of radiated emissions. The operator contribution to measurement uncertainty is evaluated by having several operators independently repeat the same test. This results in a Type A evaluation of operator-contributed measurement uncertainty.

A summary of the expanded uncertainties of Nemko PTI measurements is shown as Table 1. These are the worst-case uncertainties considering all operative influence factors.

Table 1: Summary of Measurement Uncertainties for Site 45

Type of Measurement	Frequency Range	Meas. Dist.	Expanded Uncertainty U, dB (k=2)
Mains Conducted Emissions	150 kHz to 30 MHz	N/A	2.9
Telecom Conducted Emissions	150 kHz to 30 MHz	N/A	2.8
Radiated Emissions	30 to 1,000 MHz	10 m	4.8
	1 to 18 GHz	3 m	5.7

End of Report