Project #: 23543-15

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

EUT: GUWWC2

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

September 21, 2022

Written by

Shakil Murad
Wireless Engineer

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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): **GUWWC2** FCC ID: **B8QUWWC2** IC ID: **2133A-UWWC2** Laboratory Project ID: **23543-15**

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: GUWWC2	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

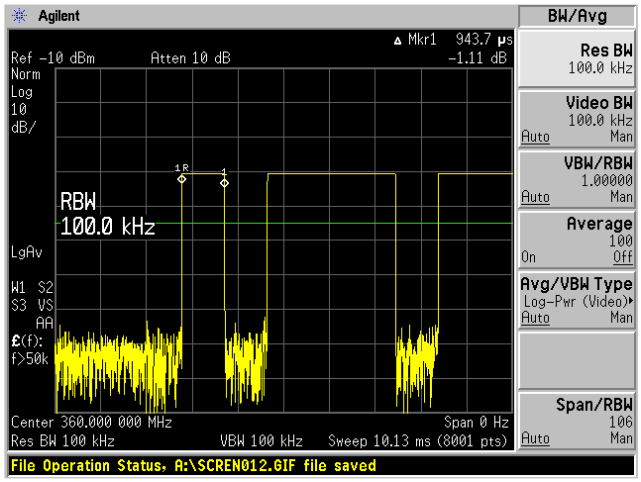
Table 1.7.1: Applicable Documents

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

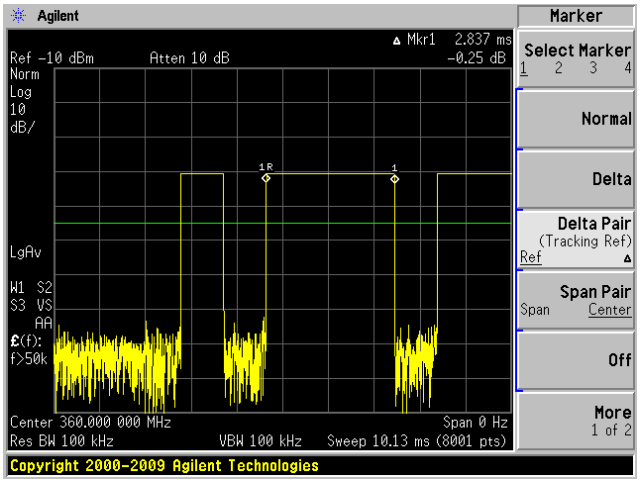
2.0 Duty Cycle

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.

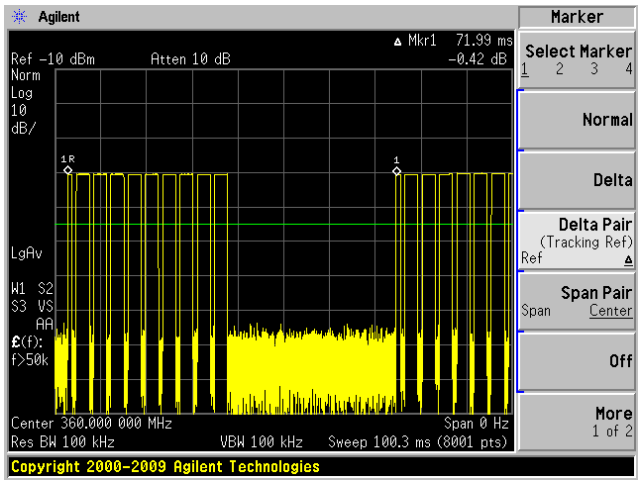
Dyty Cycle - 360 MHz														
Project Number:	**23543-15**				**Test Date(s):**	**9/1/2022**								
Environmental Conditions:	**Temperature**	**24.3**	**°C**		**Humidity**	**49**	**RH**	**Barometric Pressure**	**29.24**	**in Hg**				
Measurement Parameters:	**RBW**	**0.1**	**MHz**	**VBW**	**0.1**	**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)**									
26.48	**100**	**Pass**	**71.99**		**8.69**									



Transmit Event Time, t1 = 0.9437 ms

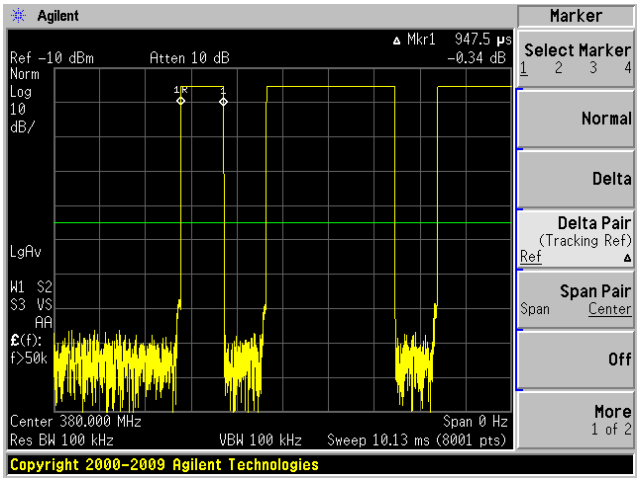


Transmit Event Time, t2 = 2.837 ms x 9

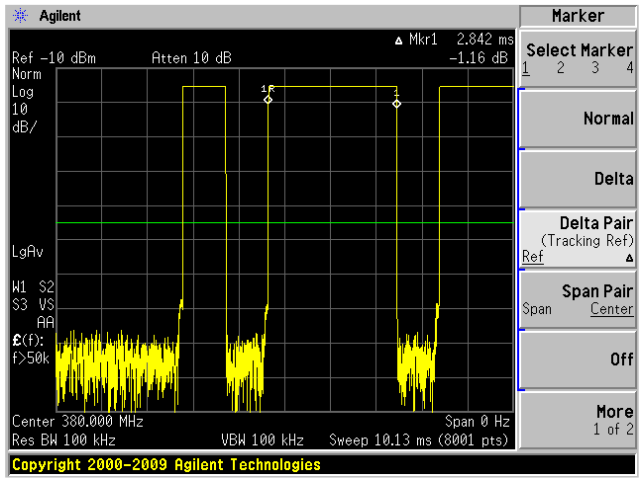


Time Interval (Return to channel time), T = 71.9 ms

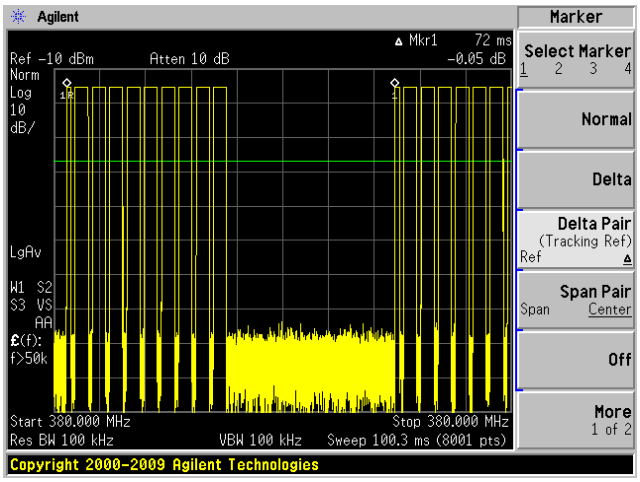
Dyty Cycle - 380 MHz														
Project Number:	**23543-15**				**Test Date(s):**	**9/1/2022**								
Environmental Conditions:	**Temperature**	**24.3**	**°C**		**Humidity**	**49**	**RH**		**Barometric Pressure**	**29.24**	**in Hg**			
Measurement Parameters:	**RBW**	**0.1**	**MHz**		**VBW**	**0.1**	**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)**									
26.53	**100**	**Pass**	**72**		**8.67**									



Transmit Event Time, t1 = 0.9475 ms

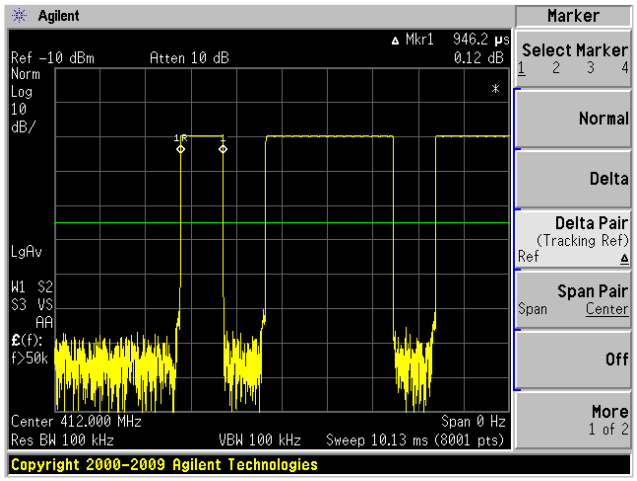


Transmit Event Time, t2 = 2.842 ms x 9

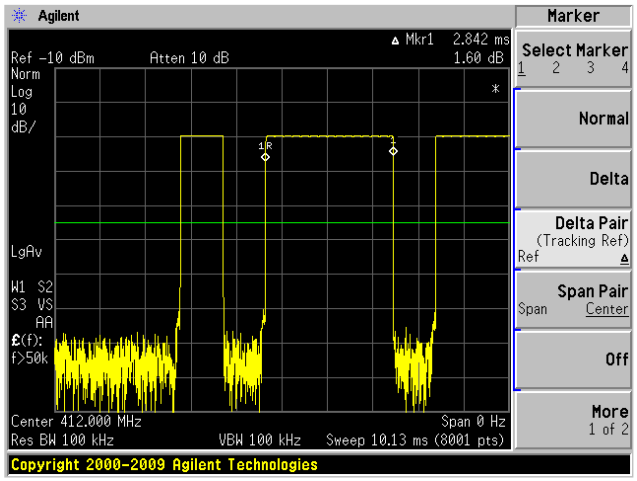


Time Interval (Return to channel time), T = 72 ms

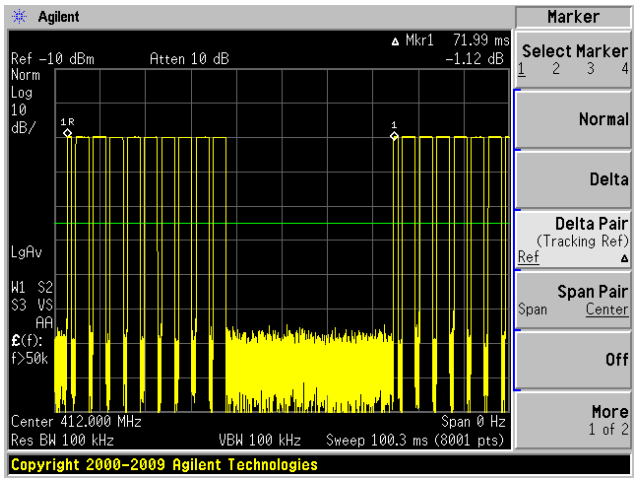
Dyty Cycle - 412 MHz														
Project Number:	**23543-15**				**Test Date(s):**	**9/1/2022**								
Environmental Conditions:	**Temperature**	**24.3**	**°C**		**Humidity**	**49**	**RH**		**Barometric Pressure**	**29.24**	**in Hg**			
Measurement Parameters:	**RBW**	**0.1**	**MHz**		**VBW**	**0.1**	**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)**								
26.5242	**100**	**Pass**		**71.99**		**8.67**								



Transmit Event Time, t1 = 0.9462 ms



Transmit Event Time, t2 = 2.842 ms x 9



Time Interval (Return to channel time), T = 71.99 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.

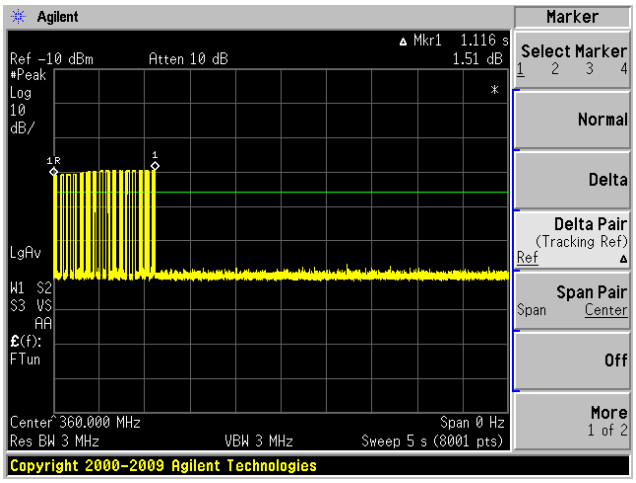
3.2 Test Criteria

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

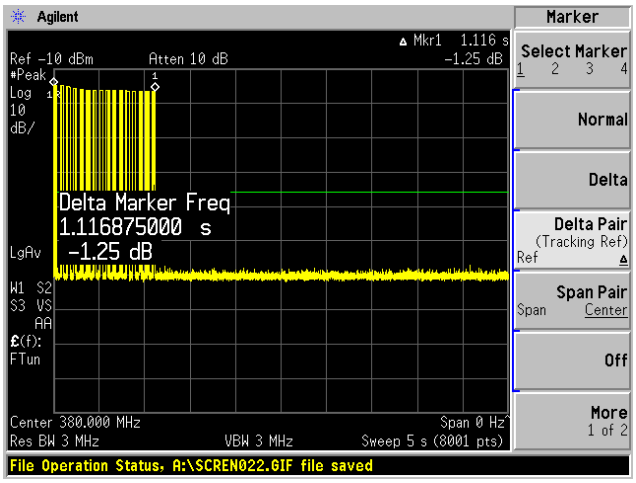
3.1 Test Results

Manually Operated Transmitter													
Project Number:	**23543-15**				**Test Date(s):**	**9/1/2022**							
Environmental Conditions:	**Temperature**	**24.3**	**°C**		**Humidity**	**49**	**RH**		**Barometric Pressure**	**29.24**	**in Hg**		
Measurement Parameters:	**RBW**	**3**	**MHz**		**VBW**	**3**	**MHz**		**Span**	**0**	**MHz**	**Detector**	**Peak**

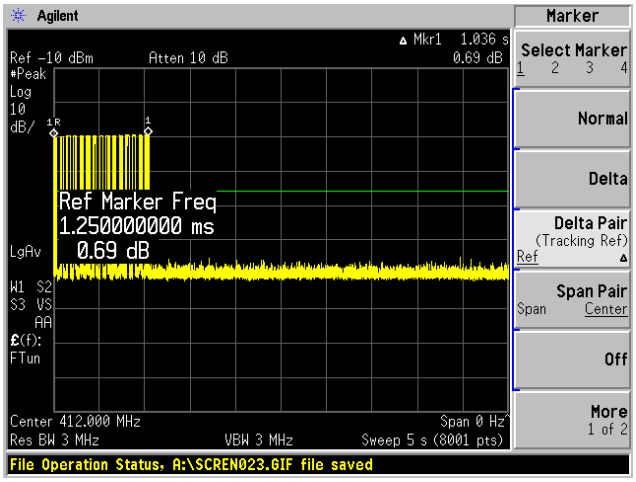
Channel	Frequency (MHz)	Measured Transmission Time (Sec.)	Maximun Deactivation Time Allowed (Sec.)	Test Result
Low	360	1.116	5	Pass
Mid	380	1.116	5	Pass
High	412	1.036	5	Pass



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

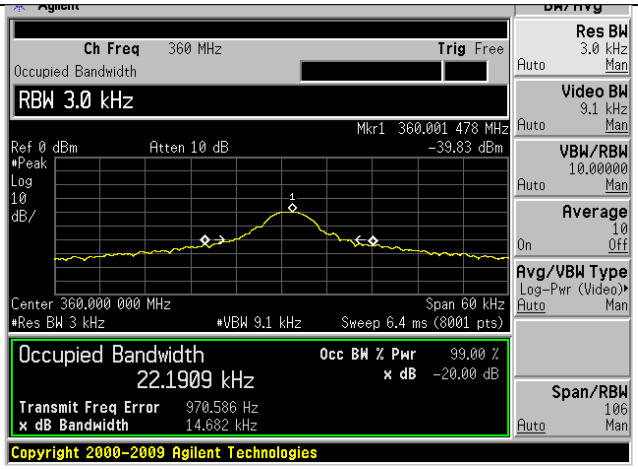
Occupied Bandwidth														
Project Number:	23543-15				Test Date(s):	9/1/2022								
Environmental Conditions:	Temperature	24.3	°C		Humidity	49	RH		Barometric Pressure	29.24	in Hg			
Measurement Parameters:	RBW	3	kHz		VBW	9	kHz		Span	60	kHz		Detector	Peak
Measurement Bandwidth:		20	dB											

Channel	Frequency (MHz)	Measured Bandwidth (kHz)	Bandwidth Limit (kHz)	Test Result
Low	360	14.682	900	Pass
Mid	380	15.464	950	Pass
High	412	16.46	1030	Pass

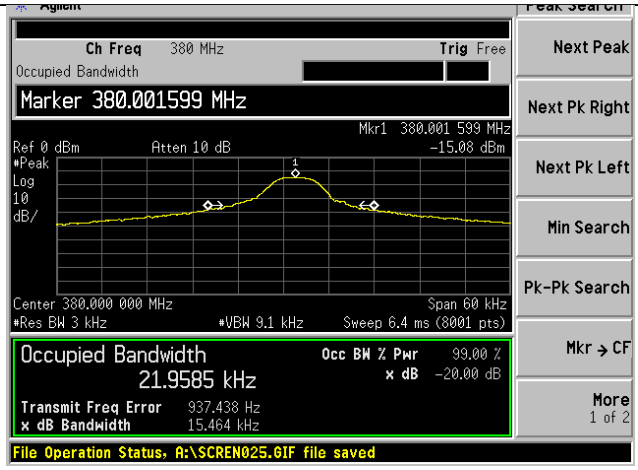
Measurement Bandwidth:	99	%

Channel	Frequency (MHz)	Measured Bandwidth (kHz)	Bandwidth Limit (kHz)	Test Result
Low	360	22.1909	N/A	Pass
Mid	380	21.9585	N/A	Pass
High	412	20.5499	N/A	Pass

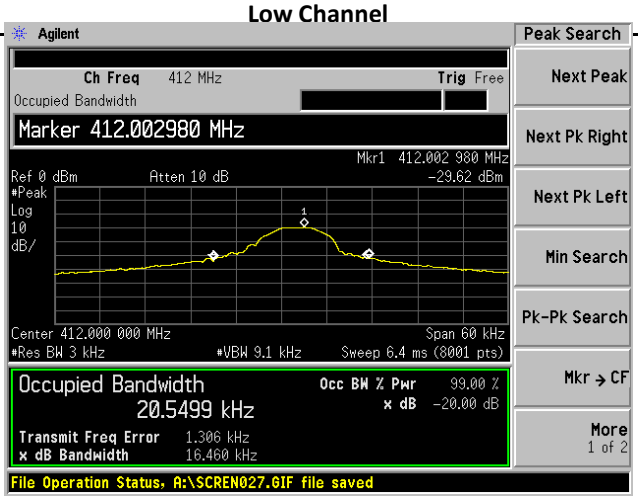
Test Plots – 26 dB and 99%



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.

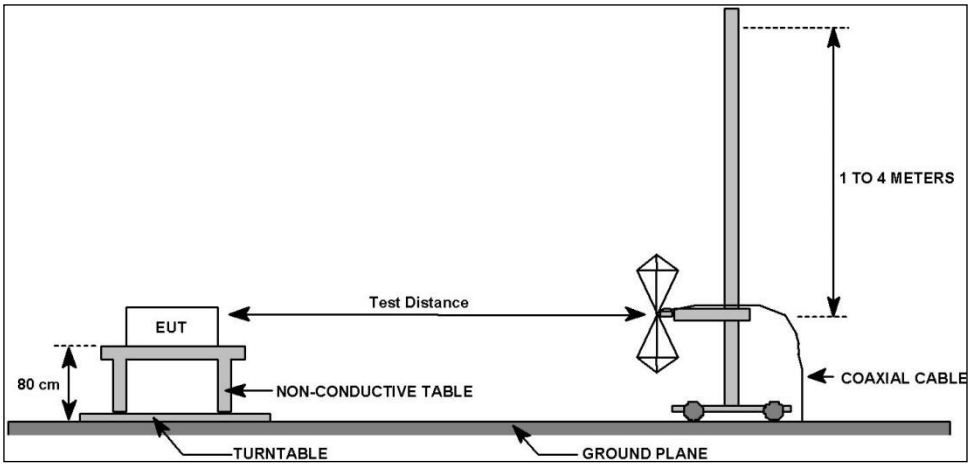


Table 5.1.1: Test Distance, Table Height, and Detection Method

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 modulated. Device was tested in normal installation orientation.

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

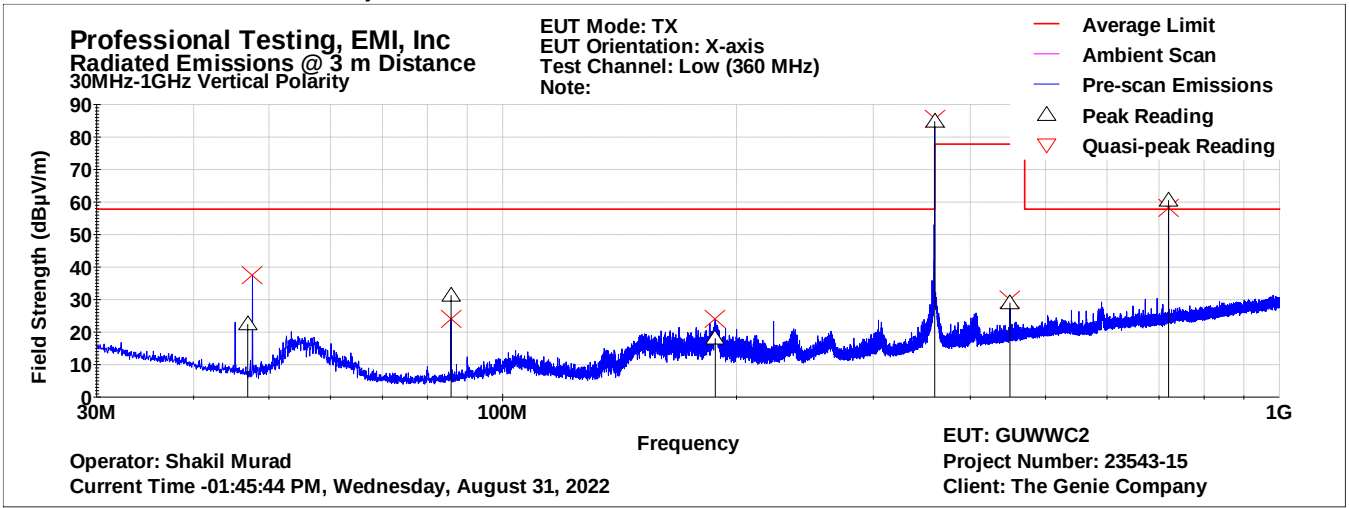
5.3.1 Field Strength of Fundamental

Frequency (MHz)	Peak Emissions (dBµV/m)	Duty Cycle Correction Factor (dB)	Corrected Average Emissions (dBµV/m)	Average Limit (dBµV/m)	Results
360	84.837	-8.69	76.147	77.97	Pass
380	81.888	-8.67	73.218	78.84	Pass
412	79.693	-8.67	71.023	80.7	Pass

Average Emissions = Peak Emissions + Duty Cycle Correction Factors

5.3.2 Harmonics and Spurious Emissions - 360 MHz

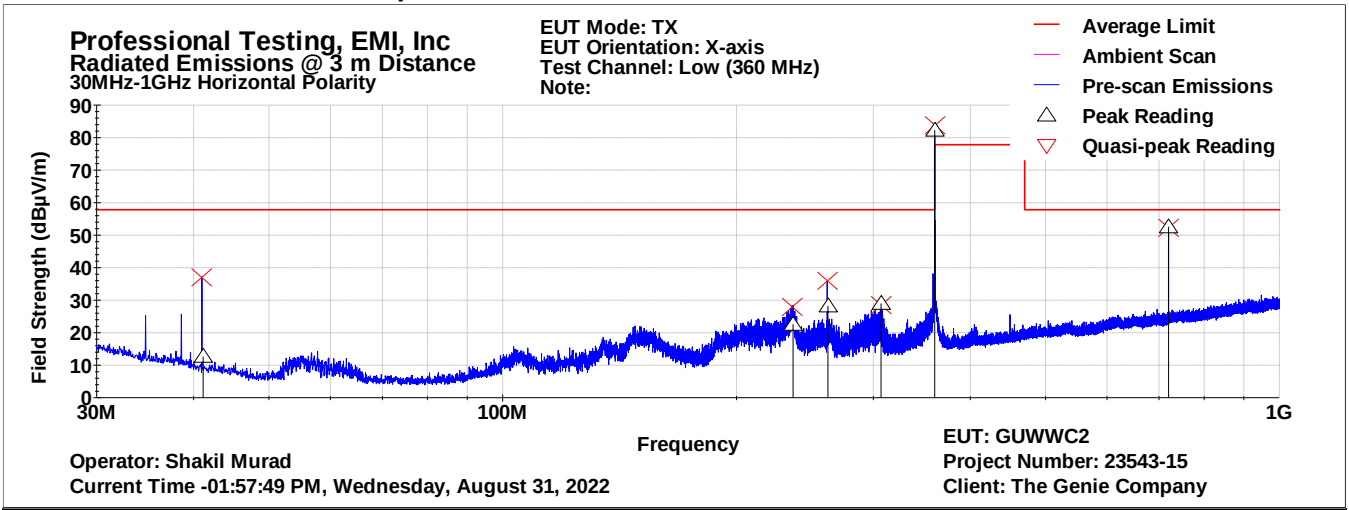
30MHz - 1GHz Vertical Polarity Emissions Data



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
46.952	92	314	22.442			57.79	Pass
85.817	254	363	31.356			57.79	Pass
187.857	23	407	18.088			57.79	Pass
359.999	85	140	84.837	-8.69	76.147	77.79	Pass Fundamental
449.987	205	120	29.027			57.79	Pass
720.002	310	235	60.551	-8.69	51.861	57.79	Pass

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

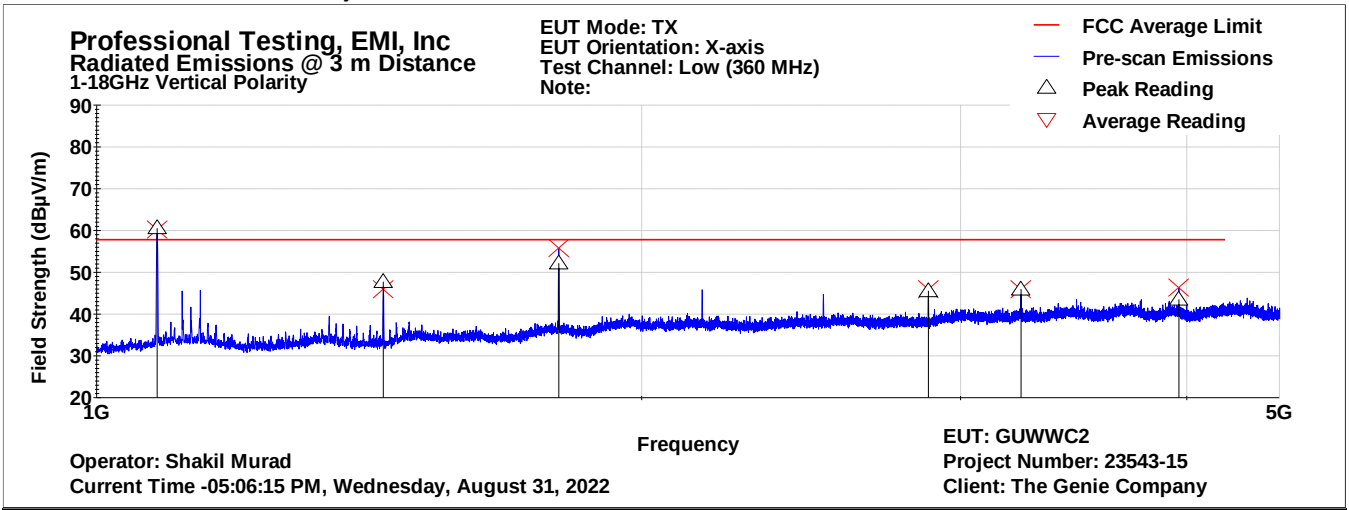
30MHz - 1GHz Horizontal Polarity Emissions Data



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
41.148	210	413	12.632			57.79	Pass
236.503	339	382	22.599			57.79	Pass
262.249	118	266	28.197			57.79	Pass
306.974	158	129	28.934			57.79	Pass
359.996	4	105	82.31	-8.69	73.62	77.79	Pass Fundamental
719.997	183	108	52.576	-8.69	43.886	57.79	Pass

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

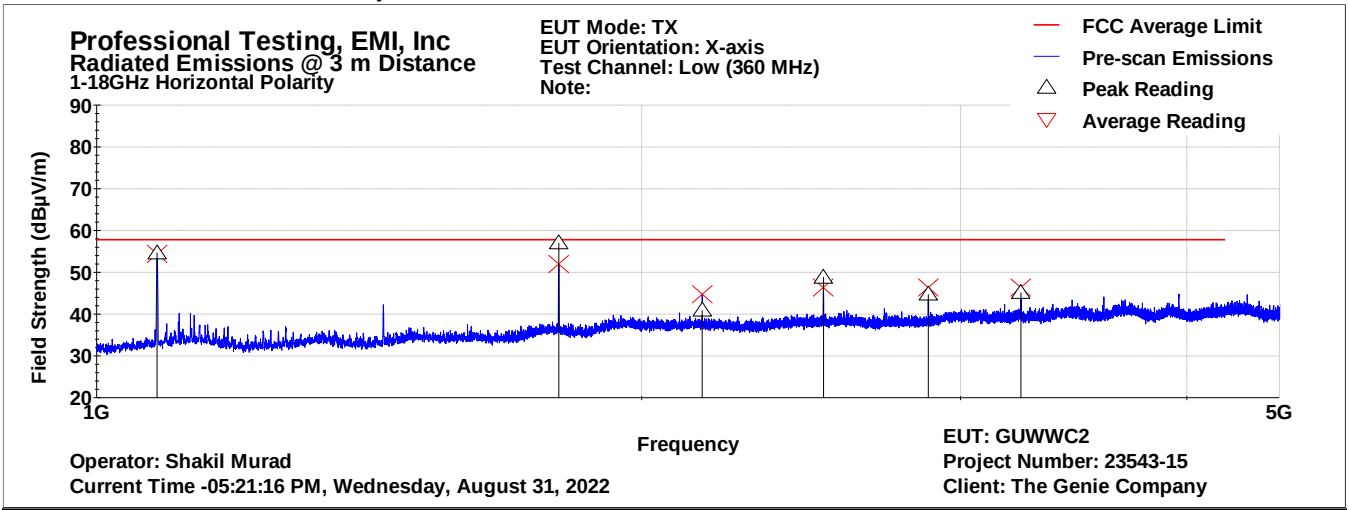
1GHz - 5GHz Vertical Polarity Emissions Data



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
1080.03	173	136	60.544	-8.69	51.854	57.79	Pass
1439.86	0	287	47.762	-8.69	39.072	57.79	Pass
1799.92	172	343	52.173	-8.69	43.483	57.79	Pass
2880.07	0	254	45.56	-8.69	36.87	57.79	Pass
3239.96	322	155	45.97	-8.69	37.28	57.79	Pass
3960.39	251	263	43.541	-8.69	34.851	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

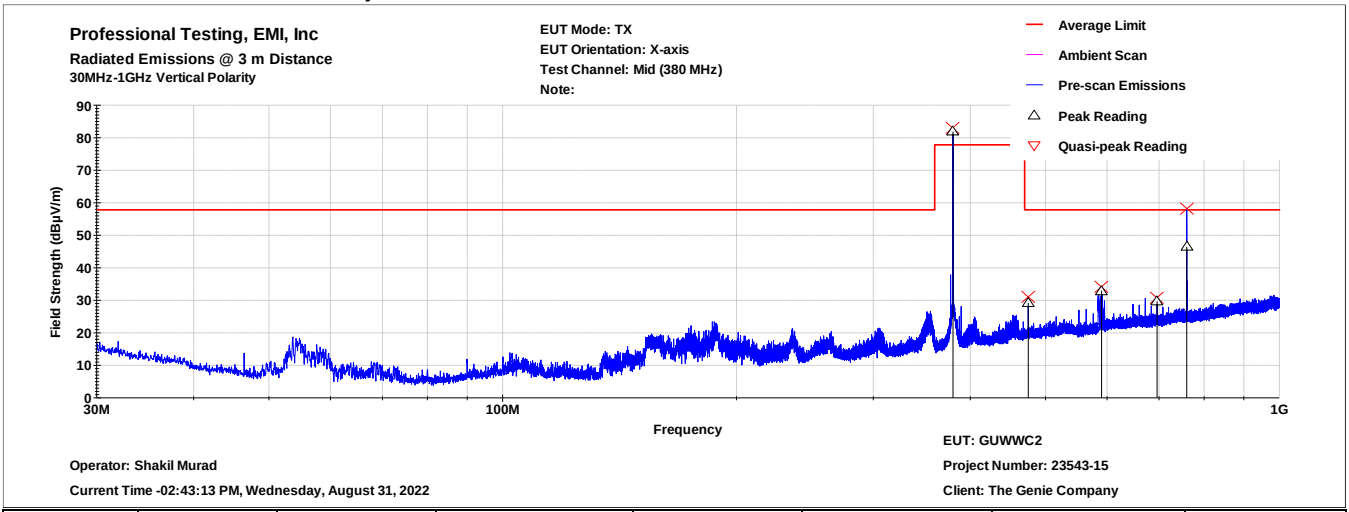


Frequency (MHz)	EUT Direction (Degrees)	Antenna Height (cm)	Peak (dBµV/m)	Duty Cycle Correction Factor (dB)	Corrected Average (dBµV/m)	Average Limit (dBµV/m)	Results
1079.91	47	310	54.683	-8.69	45.993	57.79	Pass
1799.97	245	196	57.004	-8.69	48.314	57.79	Pass
2159.88	51	349	40.928	-8.69	32.238	57.79	Pass
2520.41	74	108	48.849	-8.69	40.159	57.79	Pass
2879.68	53	127	44.729	-8.69	36.039	57.79	Pass
3239.79	82	103	45.154	-8.69	36.464	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

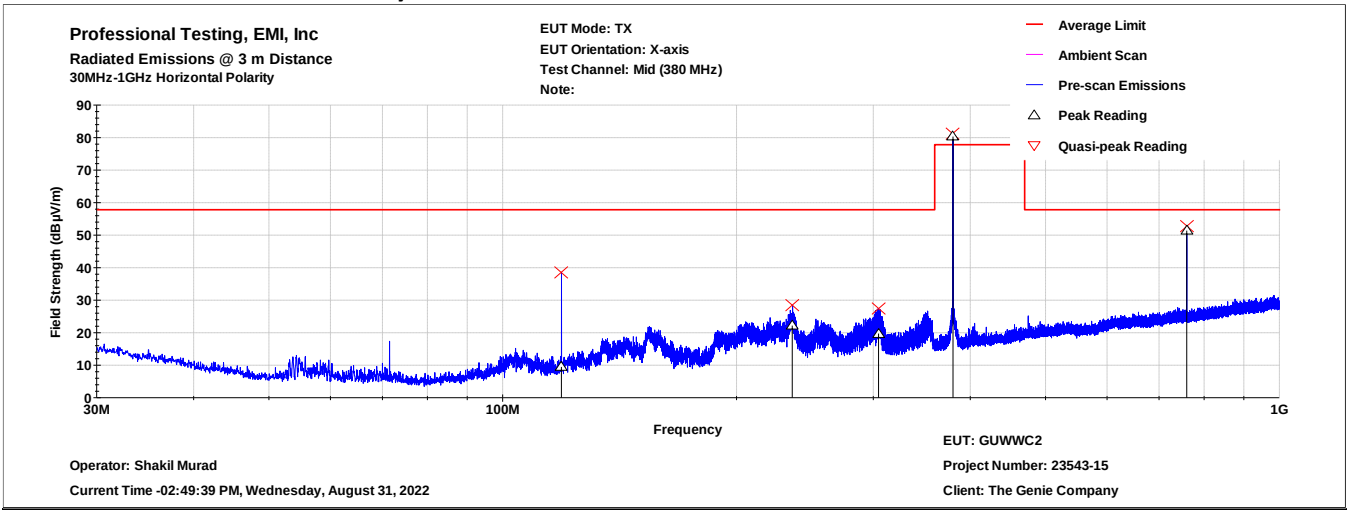
30MHz - 1GHz Vertical Polarity Emissions Data



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
379.997	246	103	81.888	-8.67	73.218	78.84	Pass Fundamental
474.997	27	103	29.137			58.84	Pass
590.314	3	416	32.952			58.84	Pass
695.997	294	103	29.721			58.84	Pass
759.994	233	177	46.435	-8.67	37.765	58.84	Pass

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

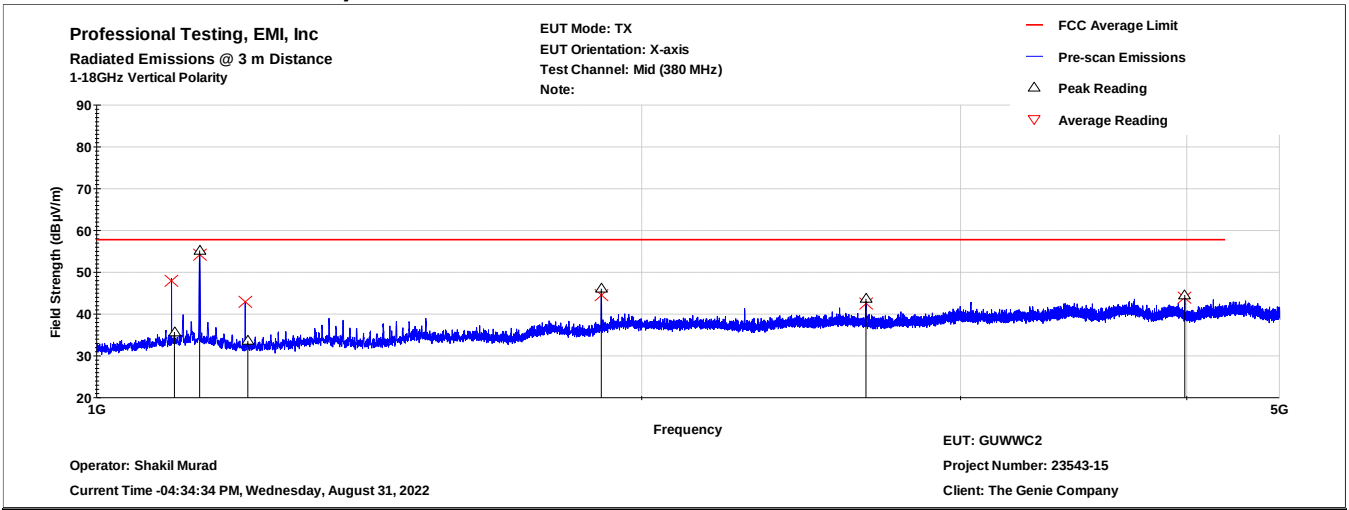
30MHz - 1GHz Horizontal Polarity Emissions Data



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
118.99	336	237	9.445			58.84	Pass
235.959	197	111	22.169			58.84	Pass
304.802	119	103	19.699			58.84	Pass
379.996	156	106	80.317	-8.67	71.647	78.84	Pass Fundamental
759.994	335	103	51.372	-8.67	42.702	58.84	Pass

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

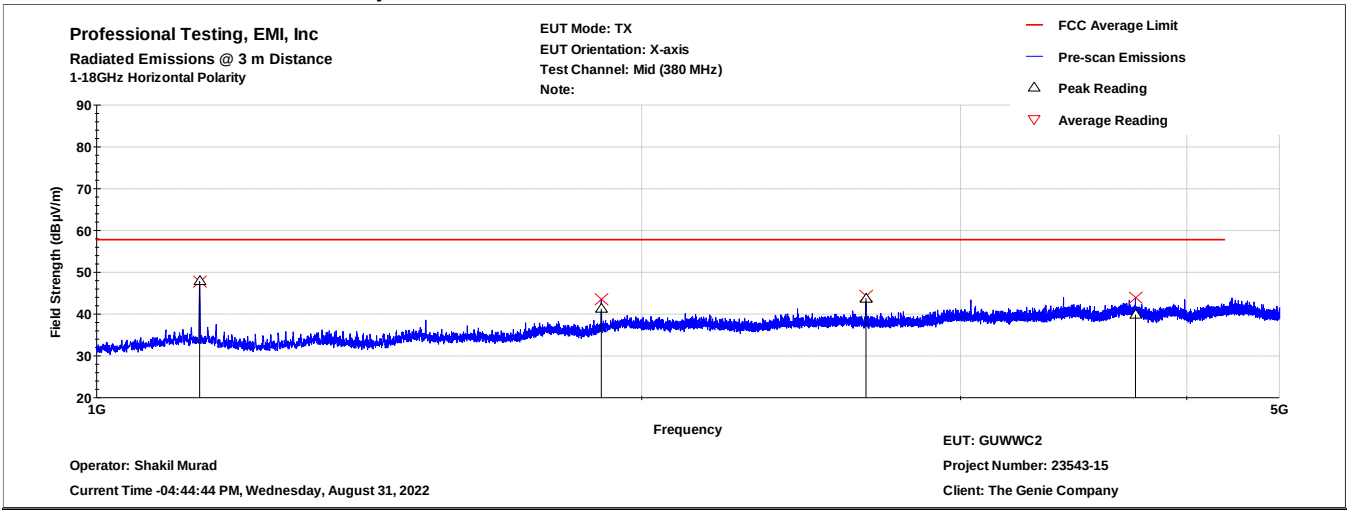
1GHz - 5GHz Vertical Polarity Emissions Data



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
1103.93	7	107	35.724			58.84	Pass
1140.01	74	177	55.222	-8.67	46.552	58.84	Pass
1211.94	6	108	33.568			58.84	Pass
1899.96	165	213	46.058	-8.67	37.388	58.84	Pass
2659.96	3	333	43.656	-8.67	34.986	58.84	Pass
3990.01	78	108	44.551			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

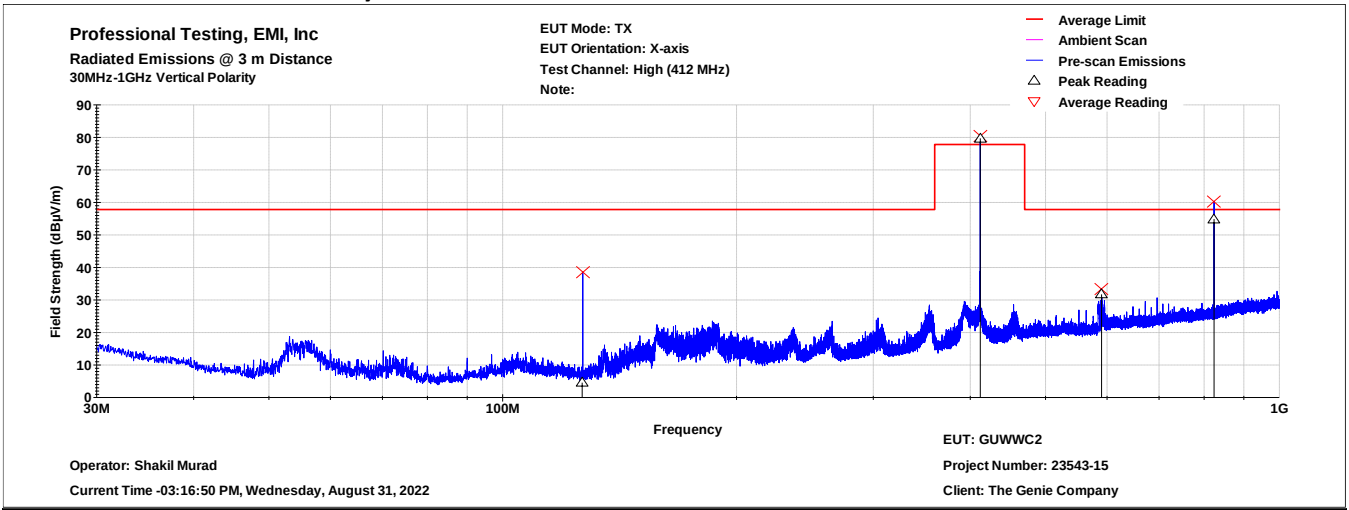


Frequency (MHz)	EUT Direction (Degrees)	Antenna Height (cm)	Peak (dBµV/m)	Duty Cycle Correction Factor (dB)	Corrected Average (dBµV/m)	Average Limit (dBµV/m)	Results
1140.01	244	103	47.918	-8.67	39.248	58.84	1140.01
1899.97	355	361	41.263	-8.67	32.593	58.84	1899.97
2659.99	50	108	43.811	-8.67	35.141	58.84	2659.99
3747.75	2	103	39.882			58.84	3747.75

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

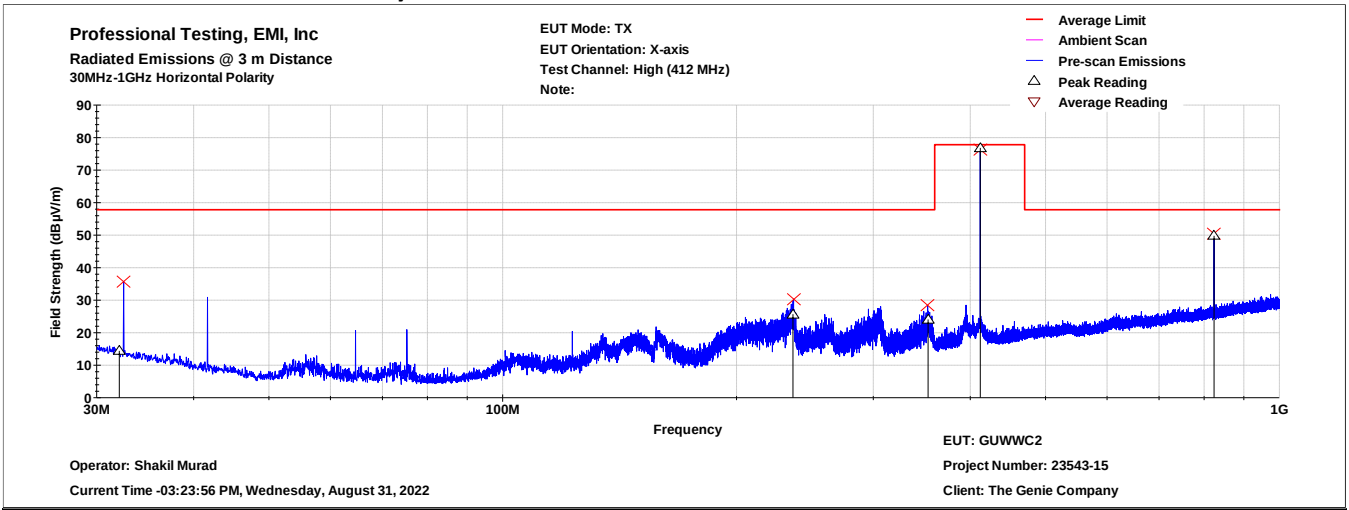
30MHz - 1GHz Vertical Polarity Emissions Data



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
126.579	345	278	4.553			60.7	Pass
411.996	283	103	79.693	-8.67	71.023	80.7	Pass Fundamental
590.29	338	277	31.706			60.7	Pass
823.993	167	103	54.879	-8.67	46.209	60.7	Pass

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

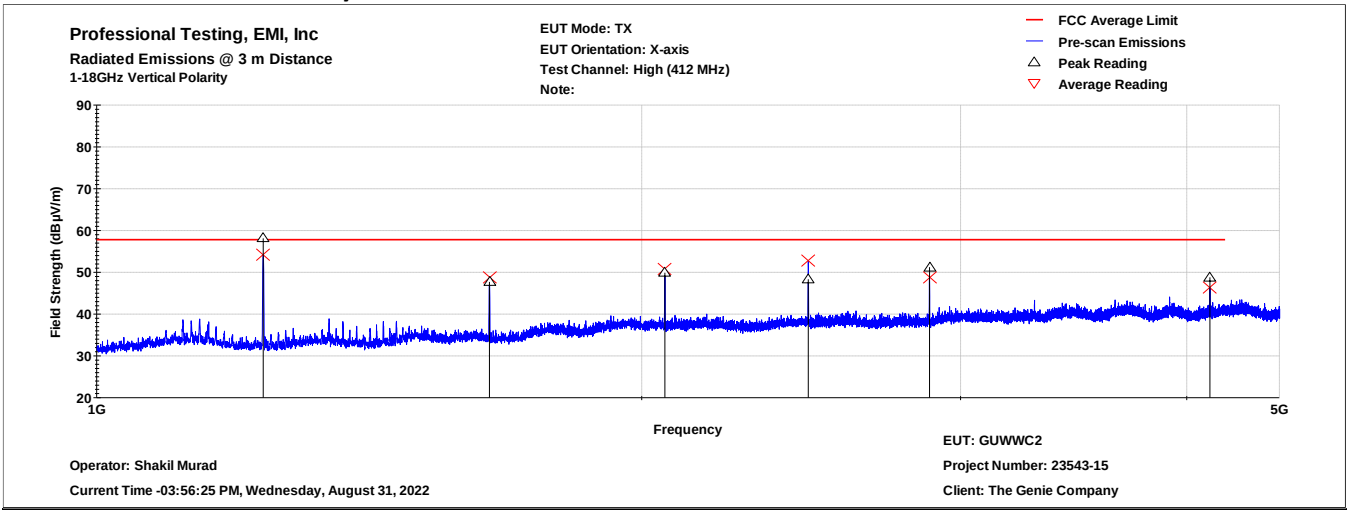
30MHz - 1GHz Horizontal Polarity Emissions Data



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
32.083	112	413	14.392			60.7	Pass
236.481	193	111	25.661			60.7	Pass
352.982	193	103	24.041			60.7	Pass
412.003	2	106	76.841	-8.67	68.171	80.7	Pass Fundamental
823.994	325	103	49.775	-8.67	41.105	60.7	Pass

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

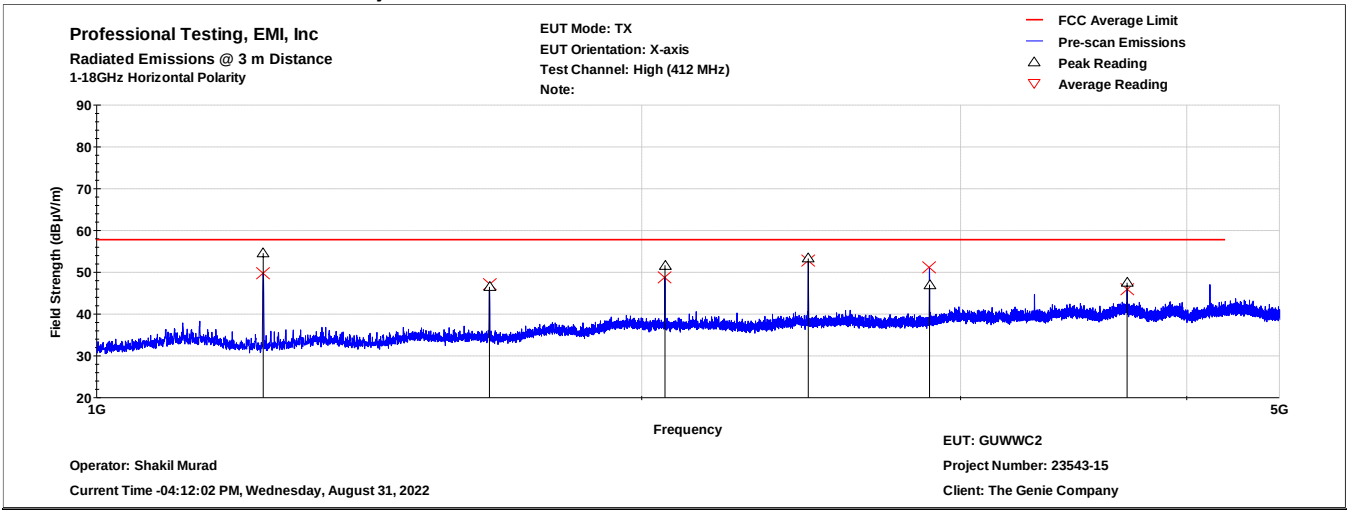
1GHz - 5GHz Vertical Polarity Emissions Data



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
1235.98	71	143	58.109	-8.67	49.439	60.7	Pass
1648.01	176	188	47.683	-8.67	39.013	60.7	Pass
2060	8	398	49.89	-8.67	41.22	60.7	Pass
2472.03	228	156	48.311	-8.67	39.641	60.7	Pass
2884.02	320	195	51.221	-8.67	42.551	60.7	Pass
4119.82	155	157	48.781	-8.67	40.111	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
1235.97	8	309	54.573	-8.67	45.903	60.7	Pass
1648.05	240	133	46.511	-8.67	37.841	60.7	Pass
2060.06	245	108	51.676	-8.67	43.006	60.7	Pass
2471.94	57	232	53.294	-8.67	44.624	60.7	Pass
2884.14	2	132	47.045	-8.67	38.375	60.7	Pass
3707.71	99	134	47.49	-8.67	38.82	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

Asset#	Manufacturer	Model	Equipment Nomenclature	Serial Number	Calibration Due Date
A102	Weinschel	1B-10	Attenuator, N, 10dB, DC-12.4GHz	None	9/21/2023
1937	Agilent	E4440A - AYZ	PSA , 3 Hz - 26.5 GHz, Opt. AYZ	MY44808298	11/12/2022

2.2 Radiated Spurious Emissions

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	9/9/2023
C233	HP	310/98580	Computer	2751A26643	N/A
1926	ETS-Lindgren	3142D	Antenna, Biconilog, 26 MHz - 6 GHz	135454	7/15/2023
1457	HP	8447D	Preamp, .1-1300MHz	1937A02800	10/21/2022
C289	Pasternack	PE354-24	Cable, N-SMA, 0.610m Blue	1310	9/9/2024
C030	none	none	Cable Coax, N-N, 30m, 1 - 18GHz	None	9/9/2023
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