Project #: 23553-15

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

EUT: GUK

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): **GUK** FCC ID: **B8QUKEP** IC ID: **2133A-UKEP** Laboratory Project ID: **23553-15**

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: GUK	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

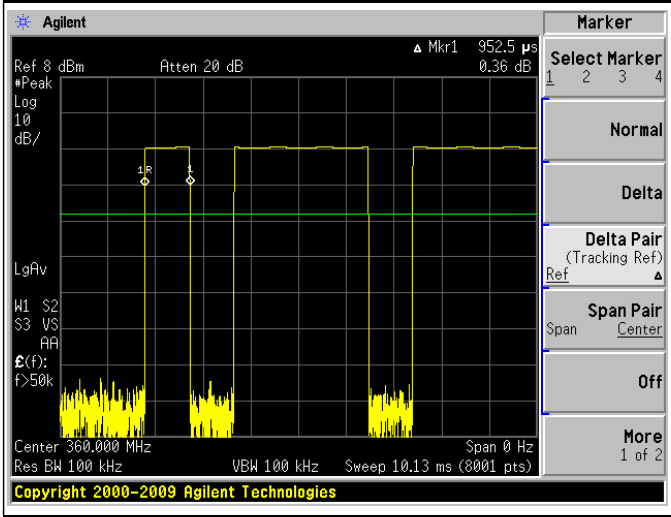
Table 1.7.1: Applicable Documents

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

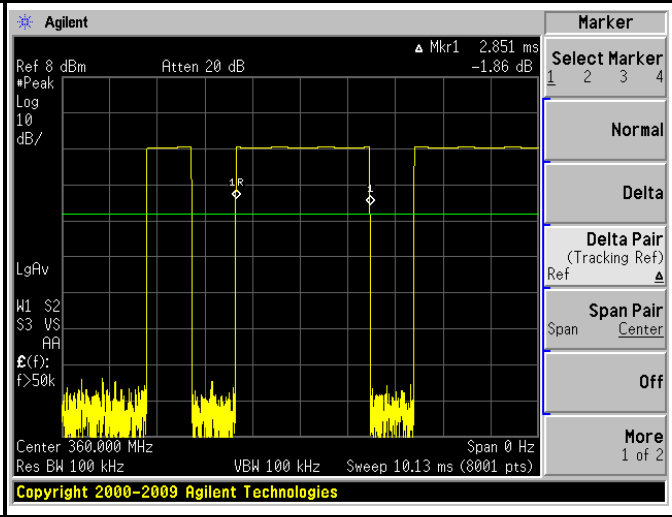
2.0 Duty Cycle

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.

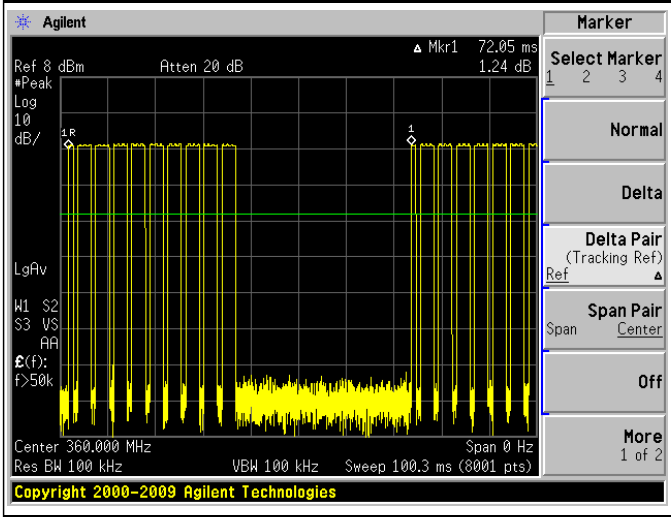
Dyty Cycle - 360 MHz													
Project Number:	**23553-15**				**Test Date(s):**	**91/1/2022**							
Environmental Conditions:	**Temperature**	**24.3**	**°C**		**Humidity**	**49**	**RH**		**Barometric Pressure**	**29.24**	**in Hg**		
Measurement Parameters:	**RBW**	**0.1**	**MHz**	**VBW**	**0.1**	**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)**									
26.6115	**100**	**Pass**	**72.05**	**8.65**									



Transmit Event Time, t1 = 0.9525 ms



Transmit Event Time, t2 = 2.851 ms x 9



Time Interval (Return to channel time), T = 72.05 ms

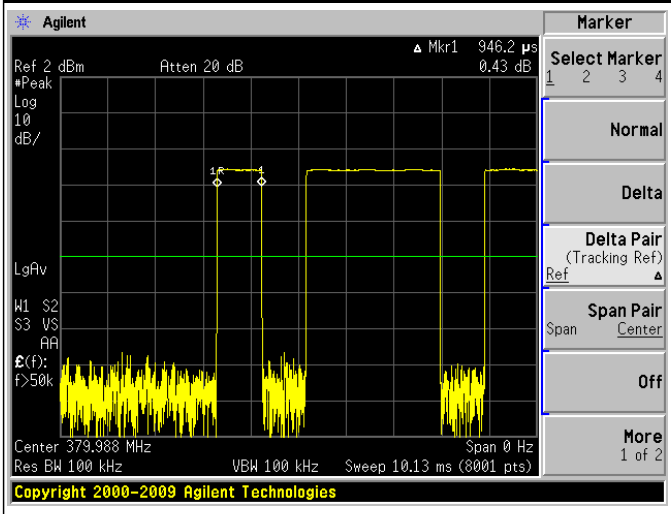
Dyty Cycle - 380 MHz

Project Number:	23553-15	Test Date(s):	9/1/2022

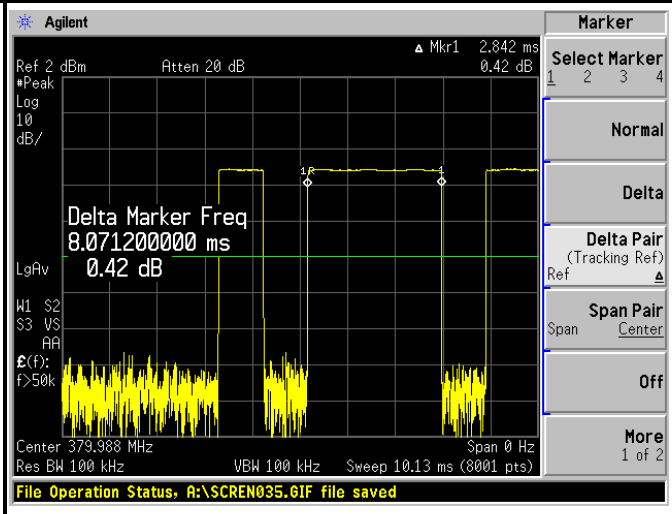
Environmental Conditions:	Temperature	22.2	°C	Humidity	49	RH	Barometric Pressure	29.84	in Hg

Measurement Parameters:	RBW	0.1	MHz	VBW	0.1	MHz	Span	0	MHz	Detector	Peak

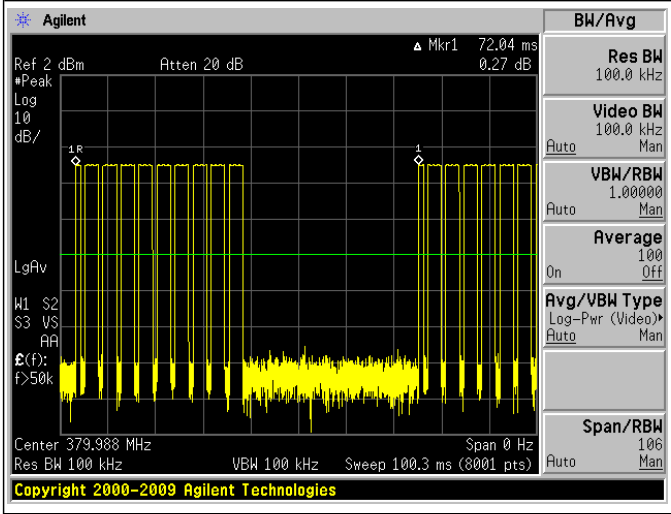
Total On Time (ms)	Max On Time Allowed (ms)	On Time Result	Measured Time Interval (ms)	Duty Cycle Factor (dB) (20 * Log(On time/Interval)
26.5242	100	Pass	72.04	8.68



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

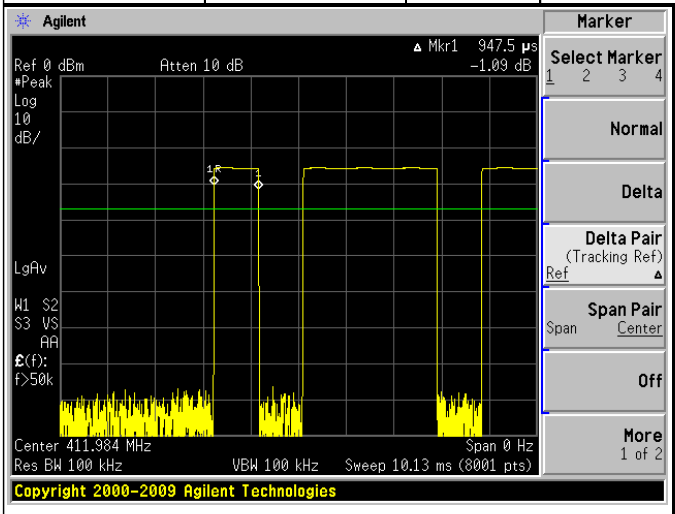
Dyty Cycle - 412 MHz

Project Number:	23553-15	Test Date(s):	9/1/2022

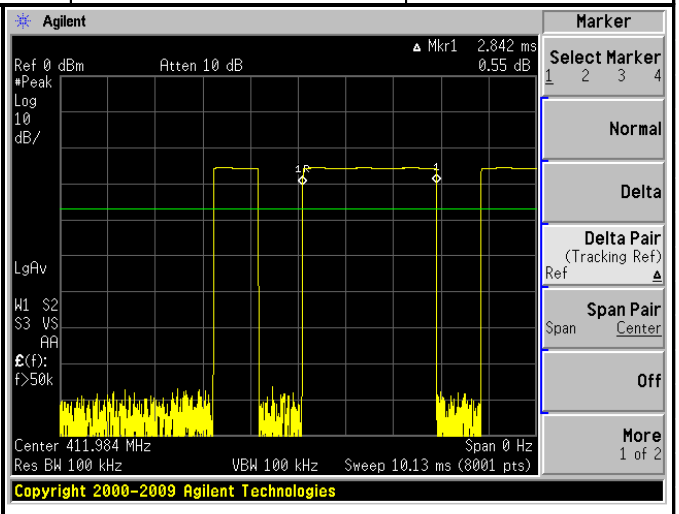
Environmental Conditions:	Temperature	22.2	°C	Humidity	49	RH	Barometric Pressure	29.84	in Hg

Measurement Parameters:	RBW	0.1	MHz	VBW	0.1	MHz	Span	0	MHz	Detector	Peak

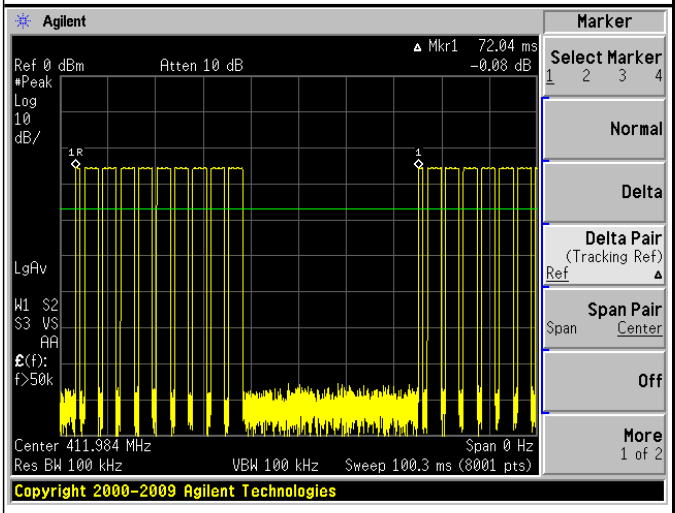
Total On Time (ms)	Max On Time Allowed (ms)	On Time Result	Measured Time Interval (ms)	Duty Cycle Factor (dB) (20 * Log(On time/Interval)
26.5255	100	Pass	72.04	8.68



Transmit Event Time, t1 = 0.9475 ms



Transmit Event Time, t2 = 2.842 ms x 9



Time Interval (Return to channel time), T = 72.04 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.

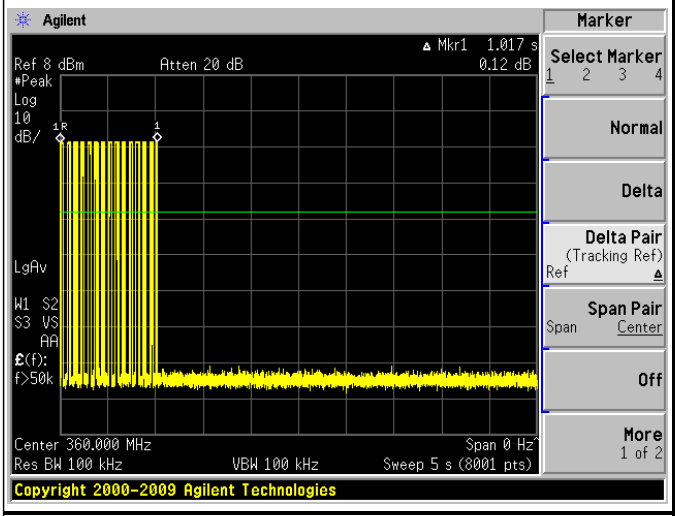
3.2 Test Criteria

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

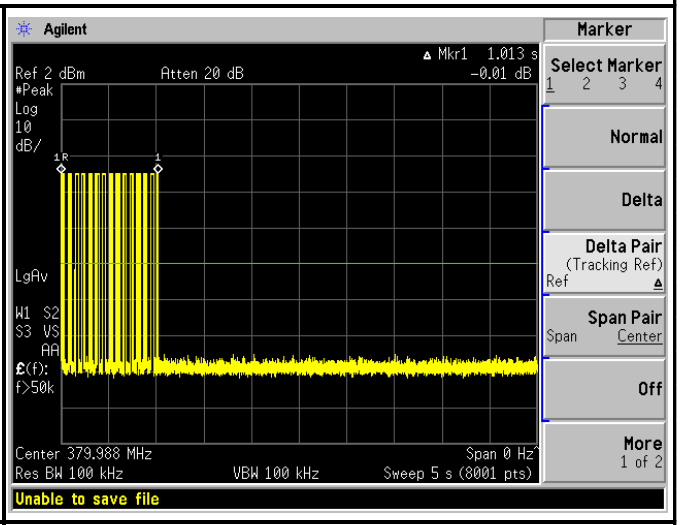
3.1 Test Results

Manually Operated Transmitter													
Project Number:	**23553-15**				**Test Date(s):**								
Environmental Conditions:	**Temperature**	**22.2**	**°C**		**Humidity**	**49**	**RH**		**Barometric Pressure**	**29.84**	**in Hg**		
Measurement Parameters:	**RBW**	**0.1**	**MHz**		**VBW**	**0.1**	**MHz**		**Span**	**0**	**MHz**	**Detector**	**Peak**

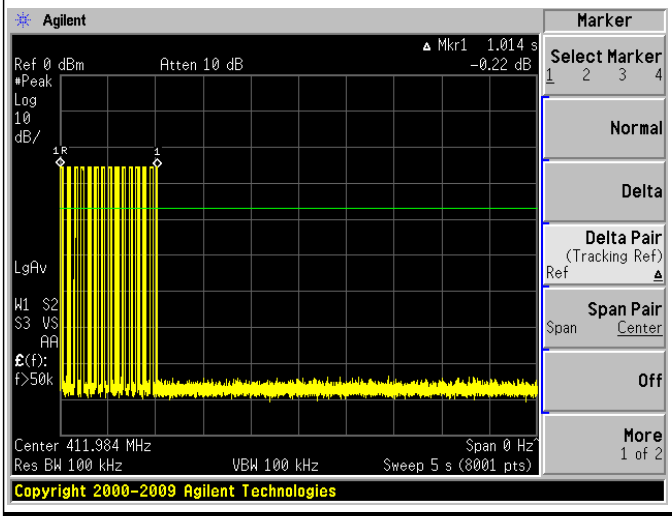
Channel	Frequency (MHz)	Measured Transmission Time (Sec.)	Maximun Deactivation Time Allowed (Sec.)	Test Result
Low	360	1.017	5	Pass
Mid	380	1.013	5	Pass
High	412	1.014	5	Pass



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

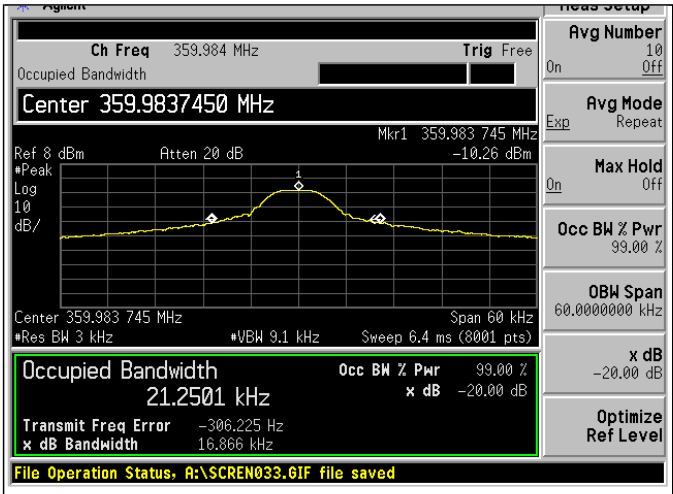
Occupied Bandwidth													
Project Number:	23553-15				Test Date(s):	9/1/2022							
Environmental Conditions:	Temperature	22.2	°C		Humidity	49	RH	Barometric Pressure	29.84	in Hg			
Measurement Parameters:	RBW	3	kHz		VBW	9	kHz	Span	60	kHz	Detector	Peak	
Measurement Bandwidth:		20	dB										

Channel	Frequency (MHz)	Measured Bandwidth (kHz)	Bandwidth Limit (kHz)	Test Result
Low	360	16.866	900	Pass
Mid	380	15.312	950	Pass
High	412	17.382	1030	Pass

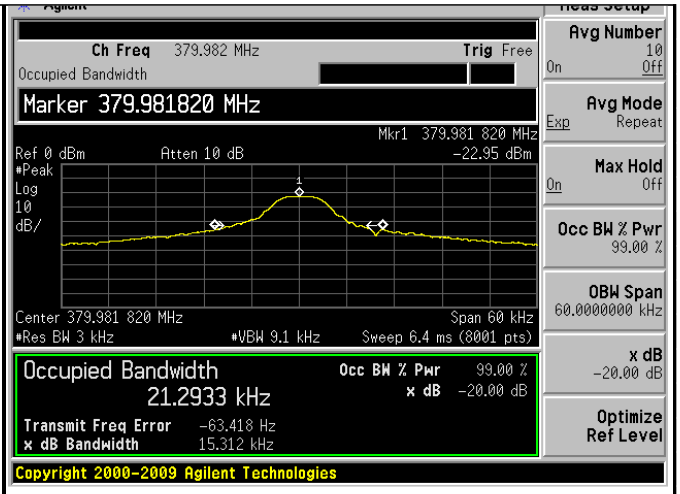
Measurement Bandwidth:	99	%

Channel	Frequency (MHz)	Measured Bandwidth (kHz)	Bandwidth Limit (kHz)	Test Result
Low	360	21.2601	N/A	Pass
Mid	380	21.2933	N/A	Pass
High	412	19.8124	N/A	Pass

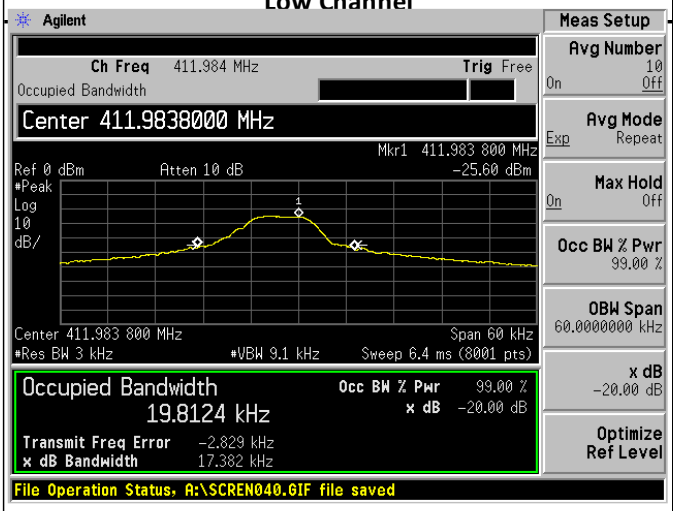
Test Plots – 26 dB and 99%



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.

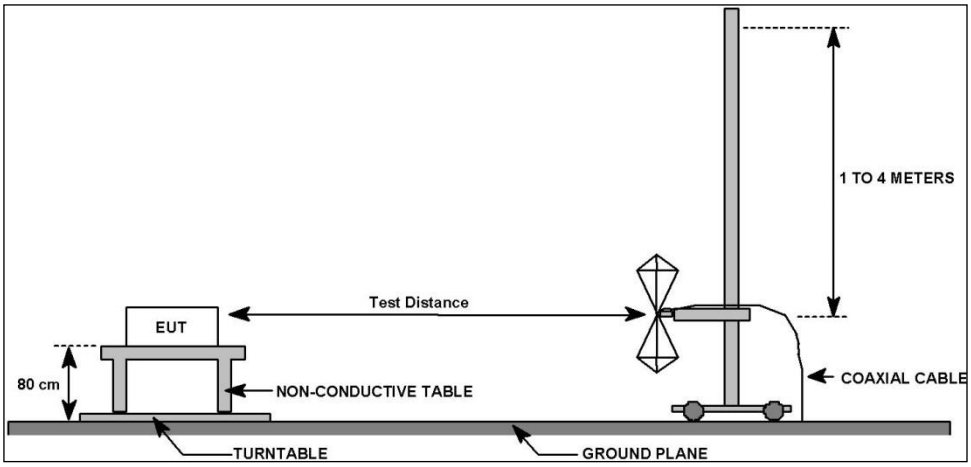


Table 5.1.1: Test Distance, Table Height, and Detection Method

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. The device was tested in normal installation orientation.

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

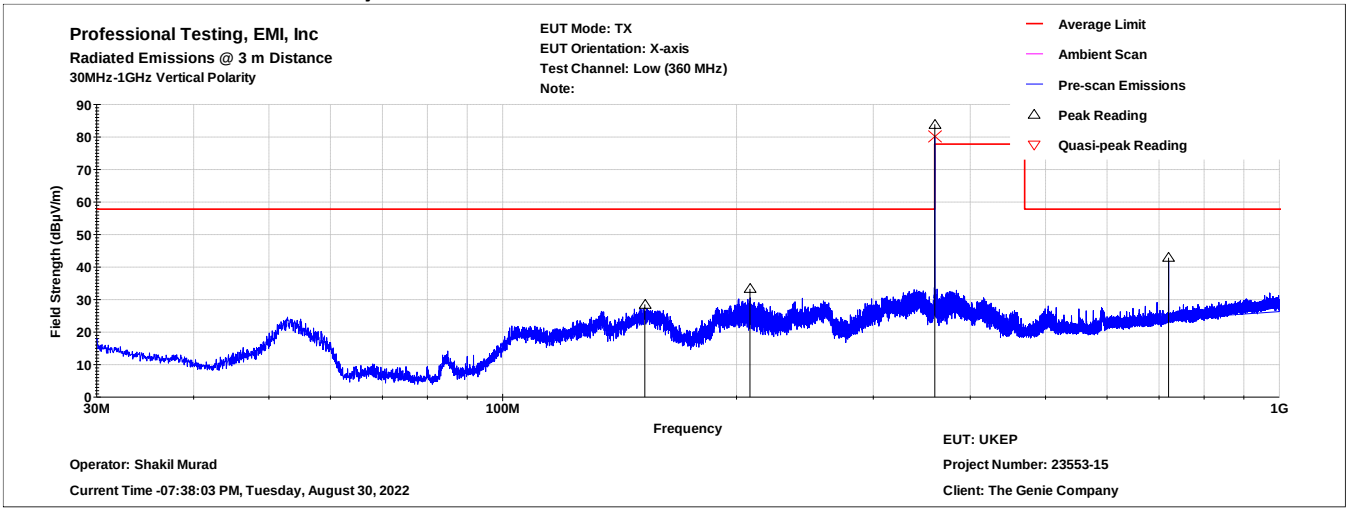
5.3.1 Field Strength of Fundamental

Frequency (MHz)	Peak Emissions (dBµV/m)	Duty Cycle Correction Factor (dB)	Corrected Average Emissions (dBµV/m)	Average Limit (dBµV/m)	Results
360	83.882	-8.65	75.232	77.97	Pass
380	83.489	-8.68	74.809	78.84	Pass
412	87.268	-8.68	78.588	80.7	Pass

Average Emissions = Peak Emissions + Duty Cycle Correction Factors

5.3.2 Harmonics and Spurious Emissions - 360 MHz

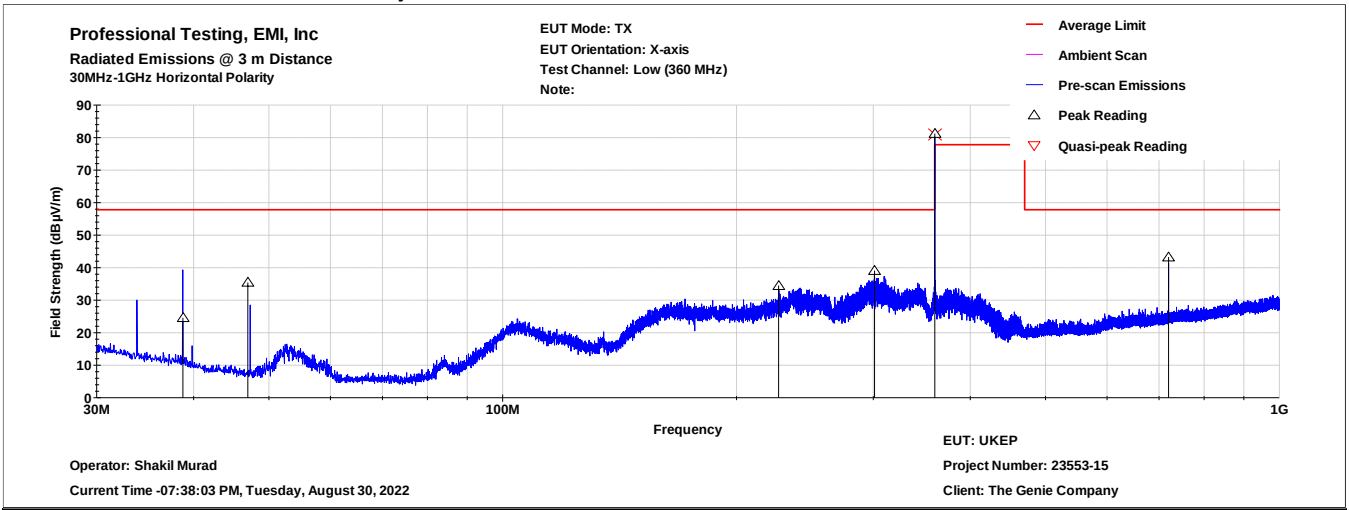
30MHz - 1GHz Vertical Polarity Emissions Data



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
52.753	137	133	26.346			57.79	Pass
152.415	328	133	28.505			57.79	Pass
208.139	65	103	33.298			57.79	Pass
360.021	246	160	83.882	-8.65	75.232	77.79	Pass Fundamental
720.045	169	236	42.869	-8.65	34.219	57.79	Pass

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

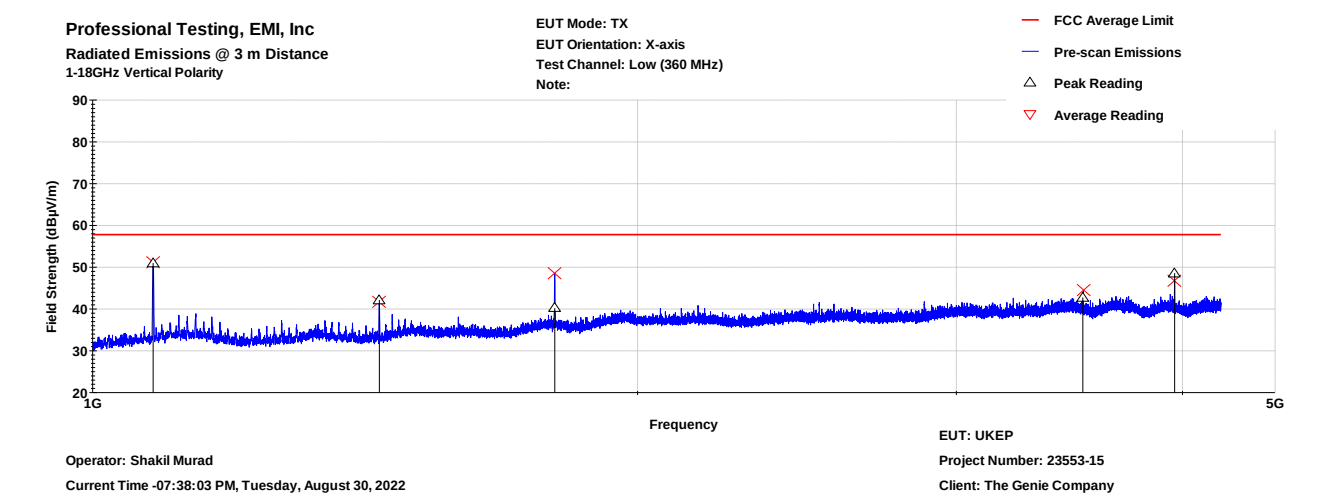
30MHz - 1GHz Horizontal Polarity Emissions Data



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
33.889	315	374	35.745			57.79	Pass
38.743	130	349	24.54			57.79	Pass
46.964	230	412	35.395			57.79	Pass
226.563	220	129	34.482			57.79	Pass
301.182	86	105	39.061			57.79	Pass
360.023	224	244	81.213	-8.65	72.563	77.79	Pass Fundamental
720.043	303	108	43.248	-8.65	34.598	57.79	Pass

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

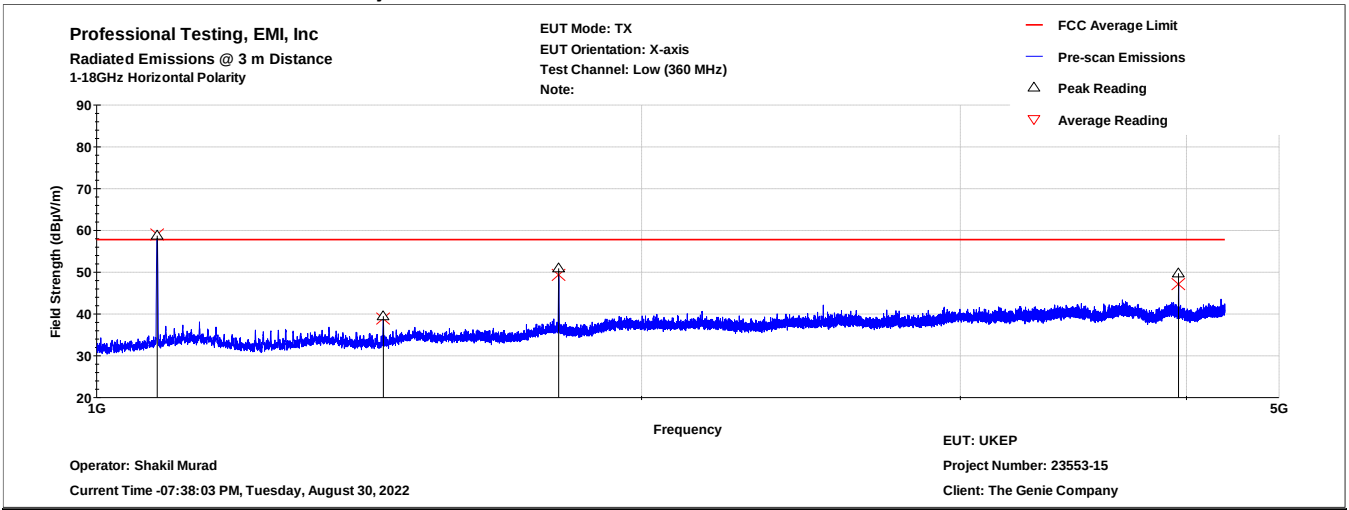
1GHz - 5GHz Vertical Polarity Emissions Data



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
1080.05	231	178	50.988	-8.65	42.338	57.97	Pass
1440.14	211	375	42.166	-8.65	33.516	57.97	Pass
1800.17	165	373	40.215	-8.65	31.565	57.97	Pass
3523.83	215	375	42.747			57.97	Pass
3960.32	355	108	48.565	-8.65	39.915	57.97	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

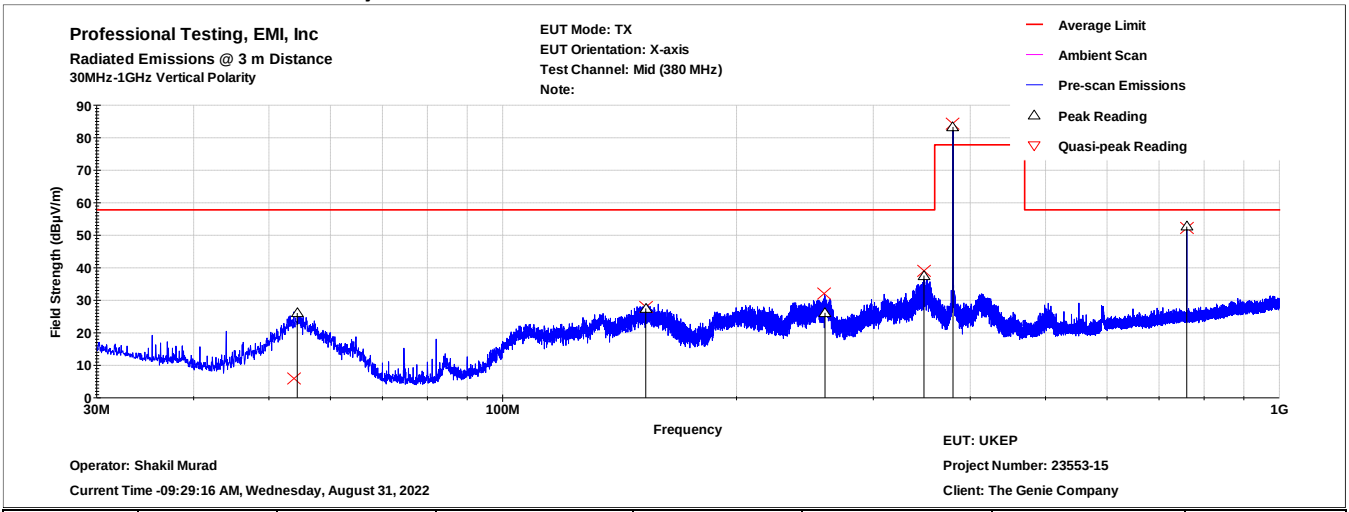


Frequency (MHz)	EUT Direction (Degrees)	Antenna Height (cm)	Peak (dBµV/m)	Duty Cycle Correction Factor (dB)	Corrected Average (dBµV/m)	Average Limit (dBµV/m)	Results
1080.13	229	103	58.738	-8.65	50.088	57.97	Pass
1440.15	315	180	39.468	-8.65	30.818	57.97	Pass
1799.99	273	107	50.918	-8.65	42.268	57.97	Pass
3960.04	45	142	49.733	-8.65	41.083	57.97	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

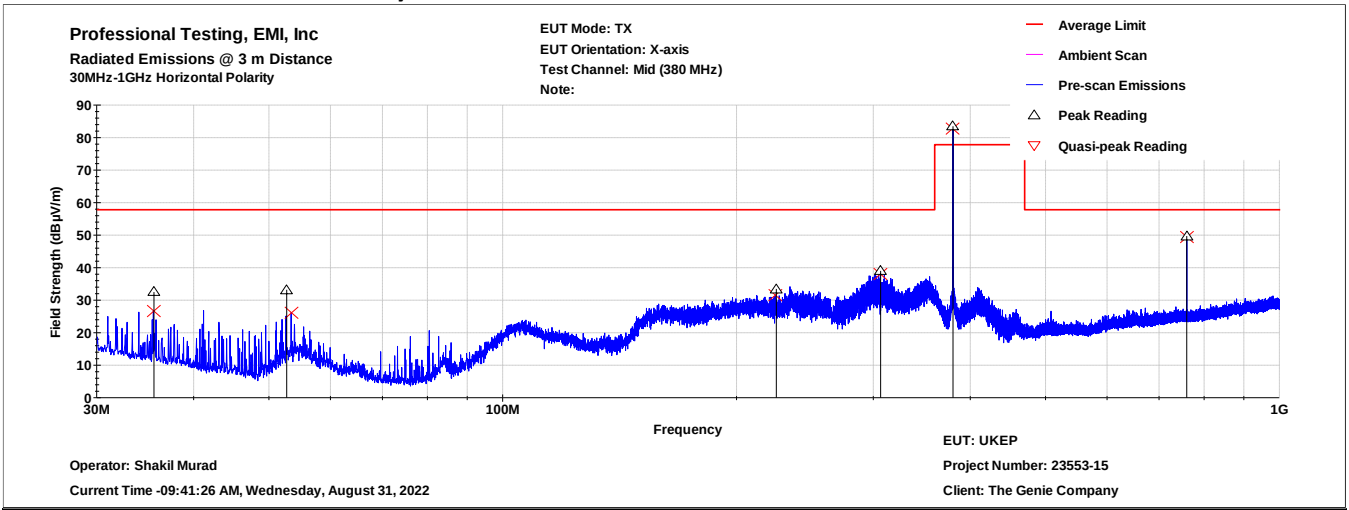
30MHz - 1GHz Vertical Polarity Emissions Data



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
54.377	172	267	26.086			58.84	Pass
152.814	218	124	27.504			58.84	Pass
260.047	341	103	26.15			58.84	Pass
348.669	32	132	37.613			58.84	Pass
380.012	243	103	83.312	-8.68	74.632	78.84	Pass Fundamental
760.036	186	214	52.641	-8.68	43.961	58.84	Pass

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

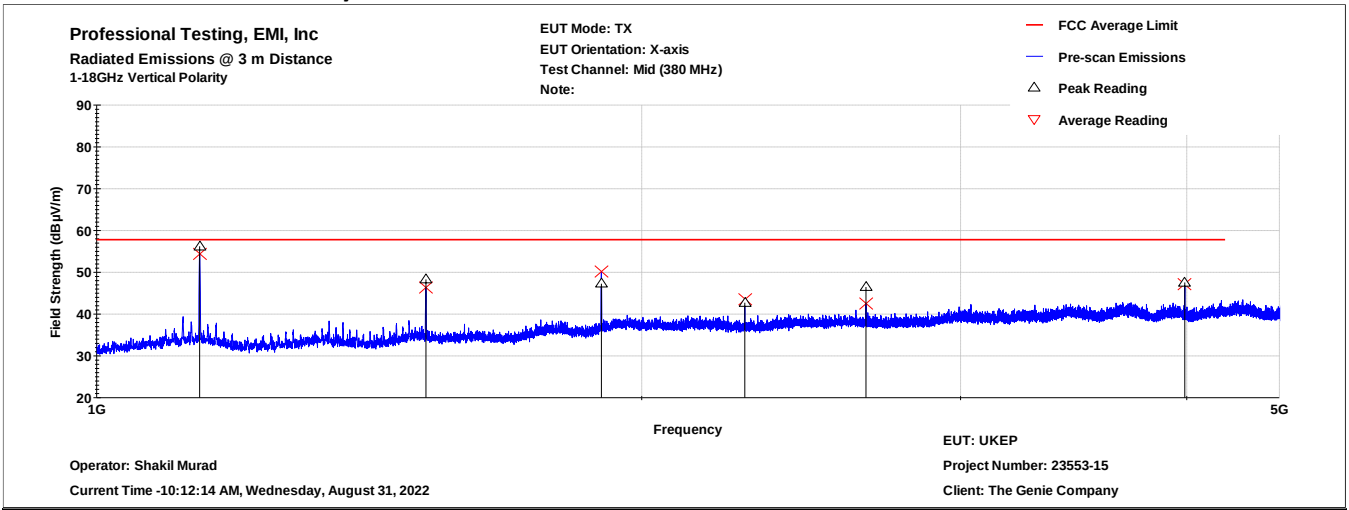
30MHz - 1GHz Horizontal Polarity Emissions Data



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
35.559	185	109	32.491			58.84	Pass
52.707	57	365	33.166			58.84	Pass
225.059	216	155	33.455			58.84	Pass
306.64	92	109	38.977			58.84	Pass
380.025	101	103	83.489	-8.68	74.809	78.84	Pass Fundamental
760.027	122	106	49.7	-8.68	41.02	58.84	Pass

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

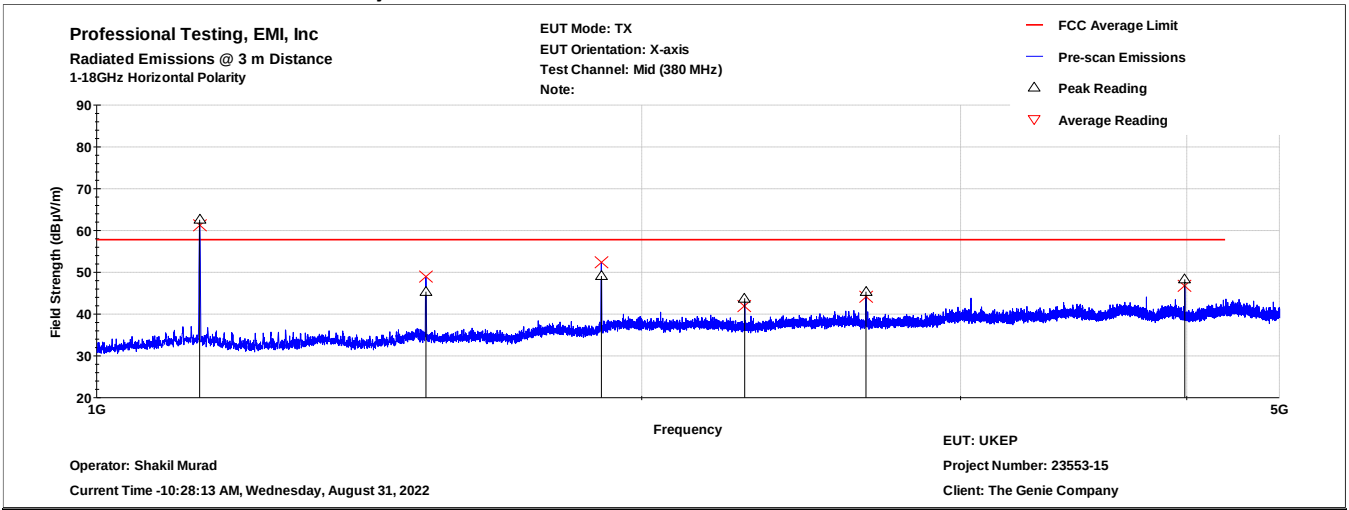
1GHz - 5GHz Vertical Polarity Emissions Data



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
1140.01	30	352	56.216	-8.68	47.536	58.84	Pass
1520.08	98	369	48.29	-8.68	39.61	58.84	Pass
1900.2	328	246	47.257	-8.68	38.577	58.84	Pass
2280.28	163	179	42.701	-8.68	34.021	58.84	Pass
2660.03	159	223	46.464	-8.68	37.784	58.84	Pass
3990.21	169	132	47.553			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

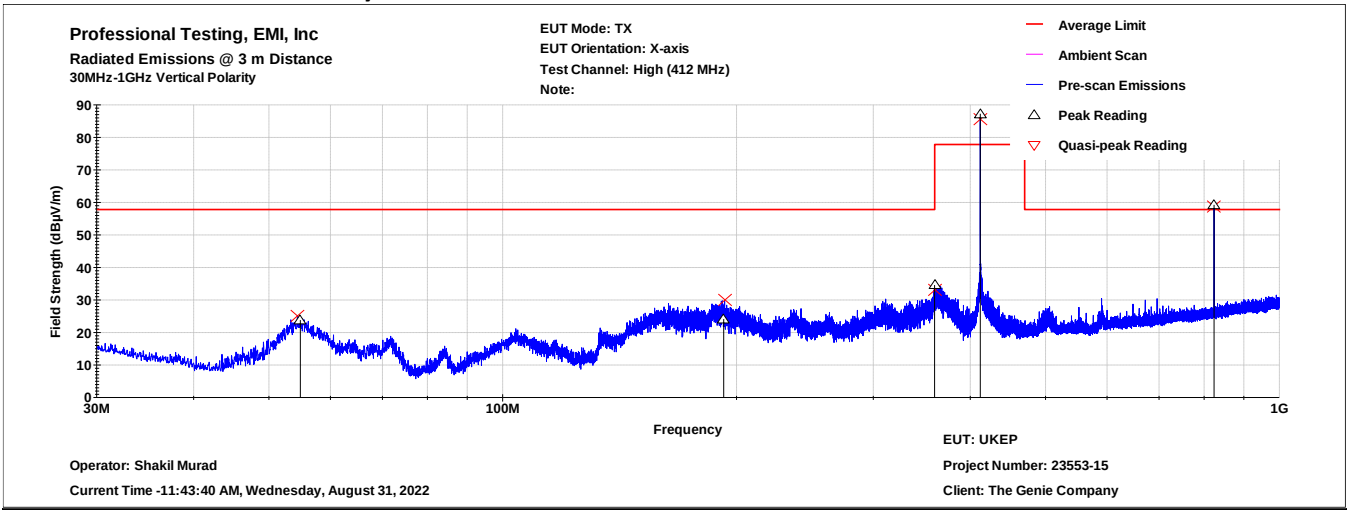


Frequency (MHz)	EUT Direction (Degrees)	Antenna Height (cm)	Peak (dBµV/m)	Duty Cycle Correction Factor (dB)	Corrected Average (dBµV/m)	Average Limit (dBµV/m)	Results
1140.02	82	145	62.552	-8.68	53.872	58.84	Pass
1520.07	92	375	45.346	-8.68	36.666	58.84	Pass
1900.09	7	268	49.108	-8.68	40.428	58.84	Pass
2279.84	53	196	43.769	-8.68	35.089	58.84	Pass
2660.21	69	210	45.356	-8.68	36.676	58.84	Pass
3990.03	212	108	48.296			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

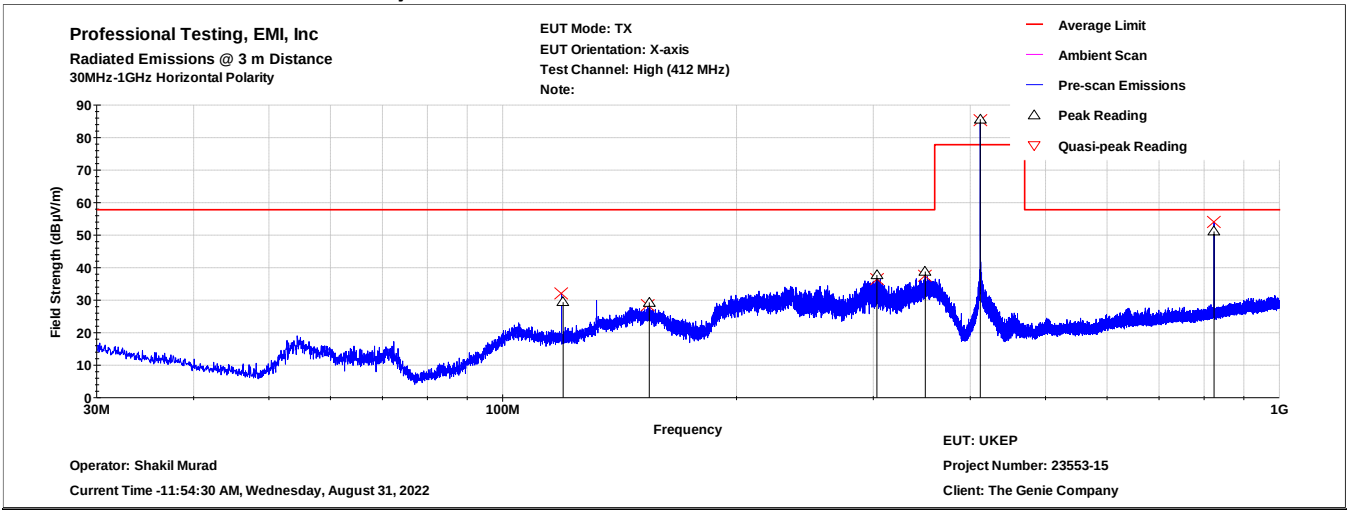
30MHz - 1GHz Vertical Polarity Emissions Data



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
54.876	122	247	23.799			60.7	Pass
192.541	214	124	24.117			60.7	Pass
359.899	73	214	34.578			60.7	Pass
412.031	56	103	87.268	-8.68	78.588	80.7	Pass Fundamental
824.059	207	136	59.241	-8.68	50.561	60.7	Pass

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

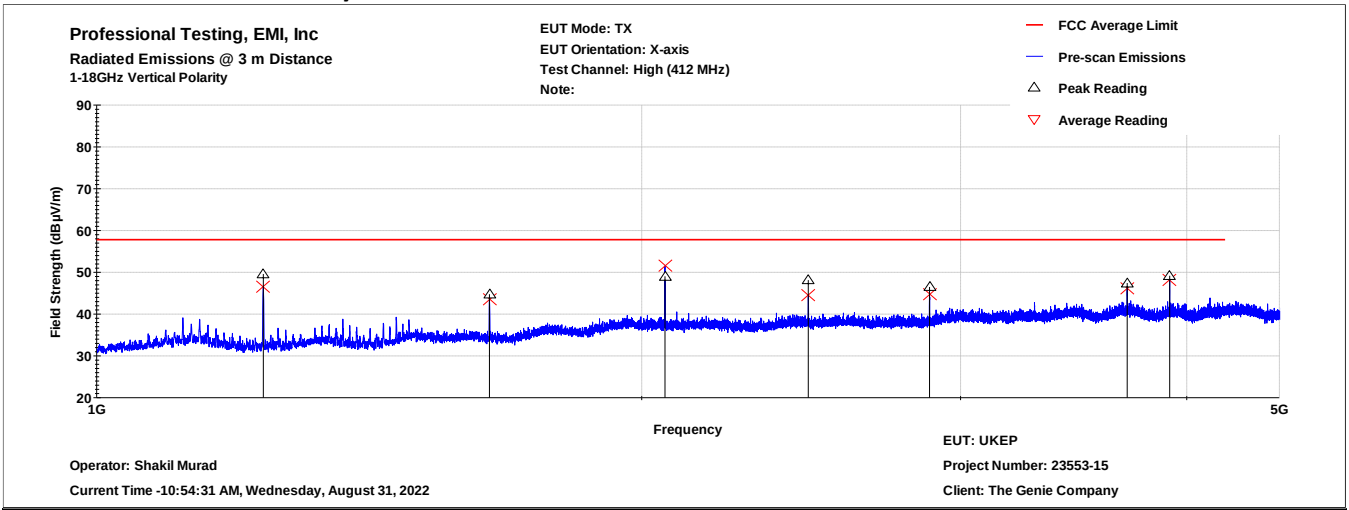
30MHz - 1GHz Horizontal Polarity Emissions Data



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
119.619	356	178	29.358			60.7	Pass
154.425	356	109	29.301			60.7	Pass
303.299	143	127	37.722			60.7	Pass
350.088	270	103	38.788			60.7	Pass
412.028	281	106	85.644	-8.68	76.964	80.7	Pass Fundamental
824.063	128	109	51.109	-8.68	42.429	60.7	Pass

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

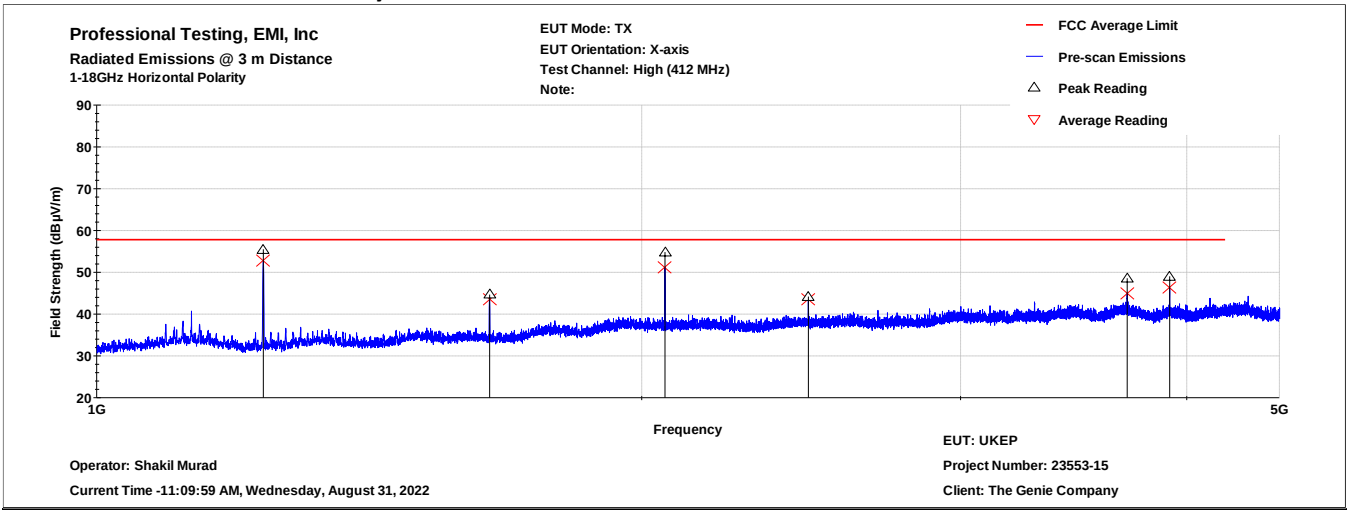
1GHz - 5GHz Vertical Polarity Emissions Data



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
1236.15	120	291	49.559	-8.68	40.879	60.7	Pass
1648.05	169	375	44.733	-8.68	36.053	60.7	Pass
2060.16	343	282	49.034	-8.68	40.354	60.7	Pass
2472.11	251	352	48.11	-8.68	39.43	60.7	Pass
2884.1	352	238	46.483	-8.68	37.803	60.7	Pass
3708.35	310	375	47.424	-8.68	38.744	60.7	Pass
3914.24	185	263	49.162			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
1236.09	48	132	55.508	-8.68	46.828	60.7	Pass
1648.31	126	356	44.657	-8.68	35.977	60.7	Pass
2060.13	69	266	54.832	-8.68	46.152	60.7	Pass
2472.24	6	166	44.184	-8.68	35.504	60.7	Pass
3708.35	273	215	48.568	-8.68	39.888	60.7	Pass
3914.32	223	108	49.031	-8.68	40.351	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