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Targus International LLC

TEST REPORT

SCOPE OF WORK
FCC TESTING– MODEL: THZ967

REPORT NUMBER
240708035SZN-001

ISSUE DATE
JULY 29, 2024

PAGES
27

DOCUMENT CONTROL NUMBER
FCC ID 249_C

Targus International LLC

Application for Certification

FCC ID: OXM000154

Wireless Keyboard

Model: THZ967

2.4GHz Transmitter

Report No.: 240708035SZN-001

We hereby certify that the sample of the above item is considered to comply with the requirements of FCC Part 15, Subpart C for Intentional Radiator, mention 47 CFR [10-1-23]

Prepared and Checked by:

Mandy Chen
Engineer

Approved by:

Johnny Wang
Project Engineer
Date: July 29, 2024

MEASUREMENT/TECHNICAL REPORT

This report concerns (check one:) Original Grant X Class II Change _____

Equipment Type: DXX - Part 15 Low Power Communication Device Transmitter

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Deferred grant requested per 47 CFR 0.457(d)(1)(ii)? Yes _____ No X

If yes, defer until:
date

Company Name agrees to notify the Commission by:
date
of the intended date of announcement of the product so that the grant can be issued on that date.

Transition Rules Request per 15.37? Yes _____ No X

If no, assumed Part 15, Subpart C for intentional radiator – the new 47 CFR [10-1-23 Edition] provision.

Report prepared by:

Mandy Chen
Intertek Testing Services Shenzhen Ltd. Longhua Branch
101, 201, Building B, No. 308 Wuhe Avenue, Zhangkengjing Community
GuanHu Subdistrict, LongHua District, Shenzhen, People's Republic of China
Tel / Fax: 86-755-8601 6288/86-755-8601 6752

Table of Contents

1.0 Summary of Test Result

Applicant: Targus International LLC
Applicant Address: 1211 North Miller Street Anaheim, CA 92806 USA
Manufacturer: Targus International LLC
Manufacturer Address: 1211 North Miller Street Anaheim, CA 92806 USA

MODEL: THZ967
FCC ID: OXM000154

Test Specification	Reference	Results
Transmitter Radiated Emission Band edge	15.249 &15.209 &15.205	Pass
Conducted Emission	15.207	Pass
20dB Bandwidth	15.215(c)	Pass

Notes: The EUT uses an Integral Antenna which in accordance to Section 15.203 is considered sufficient to comply with the provisions of this section.

2.0 General Description

2.1 Product Description

The equipment under test (EUT) is a Wireless Keyboard with Bluetooth 5.0 BLE function operating in 2402-2480MHz. The EUT can be powered by DC 5V/500mA. For more detail information pls. refer to the user manual.

Antenna Type: Integral antenna
Modulation Type: GFSK
Antenna Gain: 1.87dBi (This information is provided by applicant, and the applicant is responsible for the authenticity of the provided information.)
Bluetooth Version: 5.0 BLE (Single Mode)

For electronic filing, the brief circuit description is saved with filename: descri.pdf.

2.2 Related Submittal(s) Grants

This is an application for certification of controller unit for the Wireless Keyboard which has Bluetooth function, Other digital functions were reported in the verification report: 240708035SZN-002.

2.3 Test Methodology

Both AC mains line-conducted and radiated emission measurements were performed according to the procedures in ANSI C63.10 (2013). Radiated emission measurement was performed in Semi-anechoic chamber and conducted emission measurement was performed in shield room. For radiated emission measurement, preliminary scans were performed in the semi-anechoic chamber only to determine the worst-case modes. All radiated tests were performed at an antenna to EUT distance of 3 meters, unless stated otherwise in the "Justification Section" of this Application. All other measurements were made in accordance with the procedures in part 2 of CFR 47.

2.4 Test Facility

The Semi-Anechoic chamber and shield room used to collect the radiated data and conducted data are **Intertek Testing Services Shenzhen Ltd. Longhua Branch** and located at 101, 201, Building B, No. 308 Wuhe Avenue, Zhangkengjing Community, GuanHu Subdistrict, LongHua District, ShenZhen, P.R. China. This test facility and site measurement data have been fully placed on file with the FCC (Registration Number: CN1188).

3.0 System Test Configuration

3.1 Justification

The system was configured for testing in a typical fashion (as a customer would normally use it), and in the confines as outlined in ANSI C63.10 (2013).

The EUT was powered by DC 5V/500mA during the test, only the worst data was reported in this report.

For maximizing emissions below 30 MHz, the EUT was rotated through 360°, the bottom of the loop antenna was placed 1 meter above the ground, and the antenna polarization was changed. For maximizing emissions, the EUT was rotated through 360°, the antenna height was varied from 1 meter to 4 meters above the ground plane, and the antenna polarization was changed. This step by step procedure for maximizing emissions led to the data reported in Section 4.

The EUT and transmitting antenna was centered on the turntable.

The equipment under test (EUT) was configured for testing in a typical fashion (as a customer would normally use it). The EUT was placed on a turn table, which enabled the engineer to maximize emissions through its placement in the three orthogonal axes.

3.2 EUT Exercising Software

Test Software: nRF_DTM

3.3 Special Accessories

No special accessories used.

3.4 Equipment Modification

Any modifications installed previous to testing by Targus International LLC will be incorporated in each production model sold / leased in the United States.

No modifications were installed by Intertek Testing Services Shenzhen Ltd Longhua Branch.

3.5 Measurement Uncertainty

When determining the test conclusion, the Measurement Uncertainty of test has been considered.

3.6 Support Equipment List and Description

Description	Manufacturer	Model No.
POWER ADAPTER	XIAOMI (Provided by Intertek)	MDY-09-EW
Type C Cable	DongGuan SanZhong Plastic Hardware Co., Ltd. (provided by client)	THZ967 Power Cable (unshielded, Lengh: 83cm)

4.0 Emission Results

Data is included worst-case configuration (the configuration which resulted in the highest emission levels).

4.1 Radiated Test Results

A sample calculation, configuration photographs and data tables of the emissions are included.

4.1.1 Field Strength Calculation

The field strength is calculated by adding the reading on the Spectrum Analyzer to the factors associated with preamplifiers (if any), antennas, cables, pulse desensitization and average factors (when specified limit is in average and measurements are made with peak detectors). A sample calculation is included below.

FS = RA + AF + CF - AG + PD + AV

Where FS = Field Strength in dBµV/m
RA = Receiver Amplitude (including preamplifier) in dBµV
CF = Cable Attenuation Factor in dB
AF = Antenna Factor in dB/m
AG = Amplifier Gain in dB
PD = Pulse Desensitization in dB
AV = Average Factor in -dB

In the radiated emission table which follows, the reading shown on the data table may reflect the preamplifier gain. An example of the calculations, where the reading does not reflect the preamplifier gain, follows:

FS = RA + AF + CF - AG + PD + AV

Assume a receiver reading of 62.0 dBµV is obtained. The antenna factor of 7.4 dB/m and cable factor of 1.6 dB is added. The amplifier gain of 29 dB is subtracted. The pulse desensitization factor of the spectrum analyzer was 0 dB, and the resultant average factor was -10 dB. The net field strength for comparison to the appropriate emission limit is 32 dBµV/m. This value in dBµV/m was converted to its corresponding level in µV/m.

RA = 62.0 dBµV
AF = 7.4 dB/m
CF = 1.6 dB
AG = 29.0 dB
PD = 0 dB
AV = -10 dB
FS = 62 + 7.4 + 1.6 - 29 + 0 = 42 dBµV/m
Level in µV/m = Common Antilogarithm [(42 dBµV/m)/20] = 125.9 µV/m

4.1.2 Radiated Emission Configuration Photograph

For electronic filing, the worst case radiated emission configuration photograph is saved with filename: radiated photos. pdf.

4.1.3 Radiated Emissions

The data on the following page lists the significant emission frequencies, the limit and the margin of compliance. Numbers with a minus sign are below the limit.

Worst Case Radiated Emission
at
40.640000 MHz

Judgement: Passed by 20.2 dB

TEST PERSONNEL:

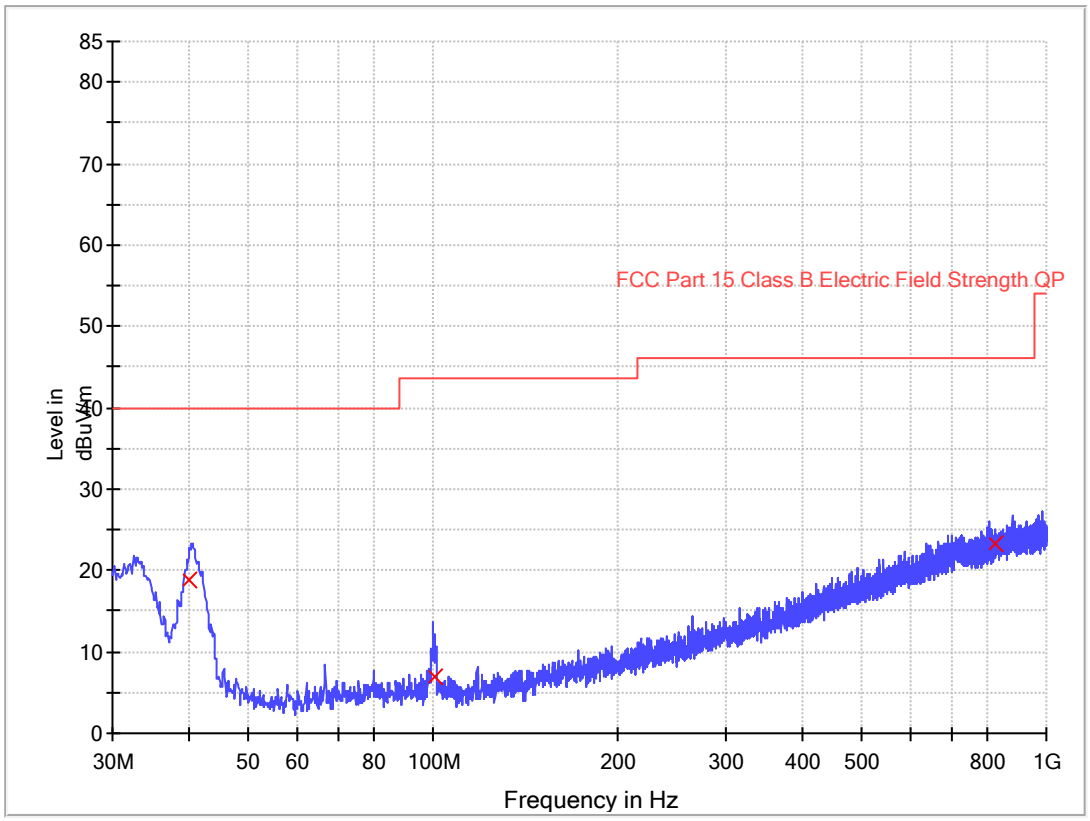
Sign on file

Mandy Chen, Engineer
Typed/Printed Name

July 14, 2024
Date

Applicant: Targus International LLC
Date of Test: July 14, 2024 Model: THZ967
Worst Case Operating Mode: Transmitting(2402MHz)

ANT Polarity: Horizontal

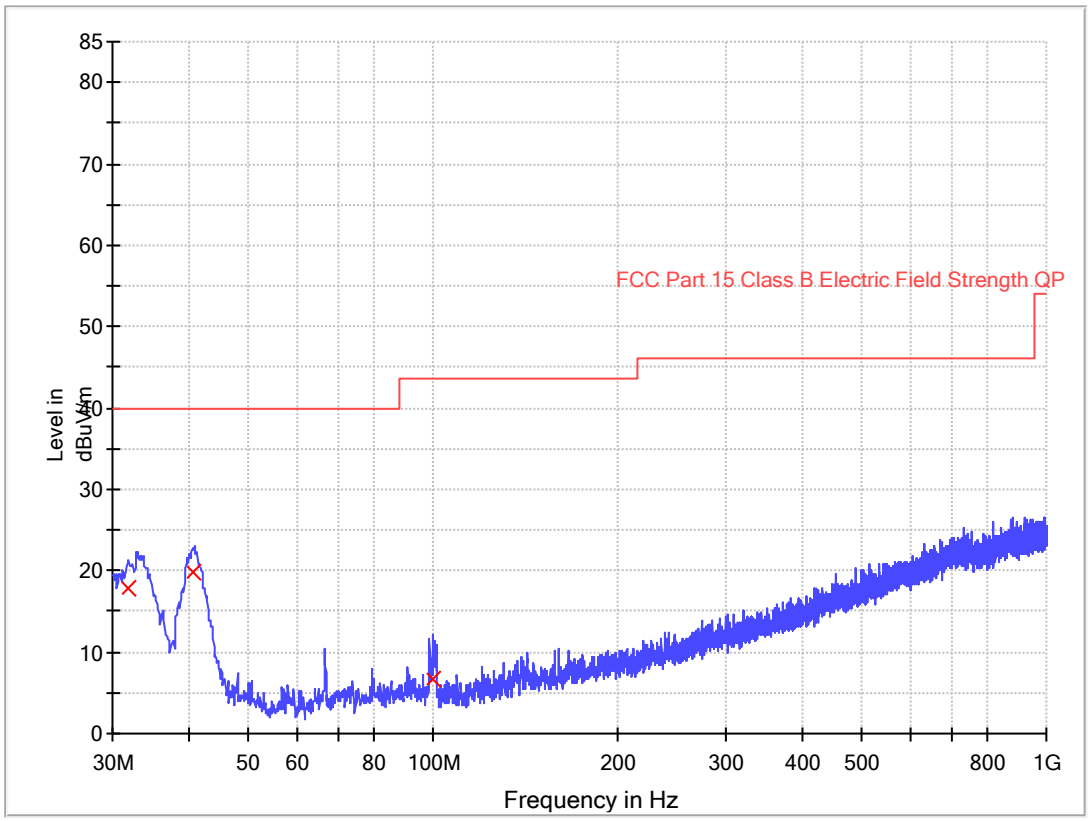


Frequency (MHz)	Quasi Peak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Corr. (dB/m)	Margin - QPK (dB)	Limit - QPK (dBµV/m)
40.040000	18.8	1000.0	120.000	100.0	H	12.9	21.2	40.0
100.931250	7.0	1000.0	120.000	100.0	H	9.2	36.5	43.5
823.460000	23.4	1000.0	120.000	100.0	H	24.6	22.6	46.0

Remark:
1. Corr. (dB/m) = Antenna Factor (dB/m) + Cable Loss (dB)
2. Quasi Peak (dBµV/m) = Corr. (dB/m) + Read Level (dBµV)
3. Margin (dB) = Limit Line (dBµV/m) – Level (dBµV/m)

Applicant: Targus International LLC
Date of Test: July 14, 2024 Model: THZ967
Worst Case Operating Mode: Transmitting(2402MHz)

ANT Polarity: Vertical



Frequency (MHz)	Quasi Peak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Corr. (dB/m)	Margin - QPK (dB)	Limit - QPK (dBµV/m)
31.940000	17.8	1000.0	120.000	100.0	V	16.9	22.2	40.0
40.640000	19.8	1000.0	120.000	100.0	V	12.6	20.2	40.0
99.597500	6.7	1000.0	120.000	100.0	V	9.3	36.8	43.5

Remark:
1. Corr. (dB/m) = Antenna Factor (dB/m) + Cable Loss (dB)
2. Quasi Peak (dBµV/m) = Corr. (dB/m) + Read Level (dBµV)
3. Margin (dB) = Limit Line (dBµV/m) – Level (dBµV/m)

4.1.4 Transmitter Spurious Emissions (Radiated)

Worst Case Radiated Emission
at
2400.000 MHz

For electronic filing, the worst case radiated emission configuration photograph is saved with filename: radiated photos. pdf.

The data on the following page lists the significant emission frequencies, the limit and the margin of compliance. Numbers with a minus sign are below the limit.

Judgement: Passed by 5.3 dB

TEST PERSONNEL:

Sign on file

Mandy Chen, Engineer
Typed/Printed Name

July 14, 2024
Date

Applicant: Targus International LLC
Date of Test: July 14, 2024 Model: THZ967
Worst Case Operating Mode: Transmitting(2402MHz)

Table 1

Radiated Emissions
(2402 MHz)

Polarization	Frequency (MHz)	Reading (dBµV)	Pre-Amp Gain (dB)	Antenna Factor (dB/m)	Net at 3m (dBµV/m)	Peak Limit at 3m (dBµV/m)	Margin (dB)
Horizontal	2402.000	99.4	36.7	28.1	90.8	114.0	-23.2
Horizontal	4804.000	47.5	36.7	35.5	46.3	74.0	-27.7
Horizontal	7206.000	53.0	36.8	35.6	51.8	74.0	-22.2

Polarization	Frequency (MHz)	Reading (dBµV)	Pre-Amp Gain (dB)	Antenna Factor (dB/m)	Average Factor (-dB)	Net at 3m (dBµV/m)	Average Limit at 3m (dBµV/m)	Margin (dB)
Horizontal	2402.000	99.4	36.7	28.1	15.6	75.2	94.0	-18.8
Horizontal	4804.000	47.5	36.7	35.5	15.6	30.7	54.0	-23.3
Horizontal	7206.000	53.0	36.8	35.6	15.6	36.2	54.0	-17.8

Notes:
1. Peak Detector Data unless otherwise stated.

2. All measurements were made at 3 meter. Harmonic emissions not detected at the 3-meter distance were measured at 0.3-meter and an inverse proportional extrapolation was performed to compare the signal level to the 3-meter limit. No other harmonic emissions than those reported were detected at a test distance of 0.3-meter.

3. Negative value in the margin column shows emission below limit.

4. Horn antenna is used for the emission over 1000MHz.

Applicant: Targus International LLC
Date of Test: July 14, 2024 Model: THZ967
Worst Case Operating Mode: Transmitting(2440MHz)

Table 2

Radiated Emissions
(2440 MHz)

Polarization	Frequency (MHz)	Reading (dBµV)	Pre-Amp Gain (dB)	Antenna Factor (dB/m)	Net at 3m (dBµV/m)	Peak Limit at 3m (dBµV/m)	Margin (dB)
Horizontal	2440.000	98.5	36.7	28.1	89.9	114.0	-24.1
Horizontal	4880.000	46.9	36.7	35.5	45.7	74.0	-28.3
Horizontal	7320.000	51.1	36.8	35.6	49.9	74.0	-24.1

Polarization	Frequency (MHz)	Reading (dBµV)	Pre-Amp Gain (dB)	Antenna Factor (dB/m)	Average Factor (-dB)	Net at 3m (dBµV/m)	Average Limit at 3m (dBµV/m)	Margin (dB)
Horizontal	2440.000	98.5	36.7	28.1	15.6	74.3	94.0	-19.7
Horizontal	4880.000	46.9	36.7	35.5	15.6	30.1	54.0	-23.9
Horizontal	7320.000	51.1	36.8	35.6	15.6	34.3	54.0	-19.7

Notes:
1. Peak Detector Data unless otherwise stated.

2. All measurements were made at 3 meter. Harmonic emissions not detected at the 3-meter distance were measured at 0.3-meter and an inverse proportional extrapolation was performed to compare the signal level to the 3-meter limit. No other harmonic emissions than those reported were detected at a test distance of 0.3-meter.

3. Negative value in the margin column shows emission below limit.

4. Horn antenna is used for the emission over 1000MHz.

Applicant: Targus International LLC
Date of Test: July 14, 2024 Model: THZ967
Worst Case Operating Mode: Transmitting(2480MHz)

Table 3

Radiated Emissions
(2480 MHz)

Polarization	Frequency (MHz)	Reading (dBµV)	Pre-Amp Gain (dB)	Antenna Factor (dB/m)	Net at 3m (dBµV/m)	Peak Limit at 3m (dBµV/m)	Margin (dB)
Horizontal	2480.000	98.2	36.7	28.1	89.6	114.0	-24.4
Horizontal	4960.000	46.8	36.7	35.5	45.6	74.0	-28.4
Horizontal	7440.000	54.1	36.8	35.6	52.9	74.0	-21.1

Polarization	Frequency (MHz)	Reading (dBµV)	Pre-Amp Gain (dB)	Antenna Factor (dB/m)	Average Factor (-dB)	Net at 3m (dBµV/m)	Average Limit at 3m (dBµV/m)	Margin (dB)
Horizontal	2480.000	98.2	36.7	28.1	15.6	74.0	94.0	-20.0
Horizontal	4960.000	46.8	36.7	35.5	15.6	30.0	54.0	-24.0
Horizontal	7440.000	54.1	36.8	35.6	15.6	37.3	54.0	-16.7

Notes:
1. Peak Detector Data unless otherwise stated.

2. All measurements were made at 3 meter. Harmonic emissions not detected at the 3-meter distance were measured at 0.3-meter and an inverse proportional extrapolation was performed to compare the signal level to the 3-meter limit. No other harmonic emissions than those reported were detected at a test distance of 0.3-meter.

3. Negative value in the margin column shows emission below limit.

4. Horn antenna is used for the emission over 1000MHz.

4.2 Conducted Emission Configuration Photograph

For electronic filing, the worst case radiated emission configuration photographs are saved with filename: conducted photos.pdf.

4.2.1 Conducted Emission

Worst Case Conducted Configuration
at
0.550000MHz

Judgement: Passed by 12.9dB margin

TEST PERSONNEL:

Sign on file

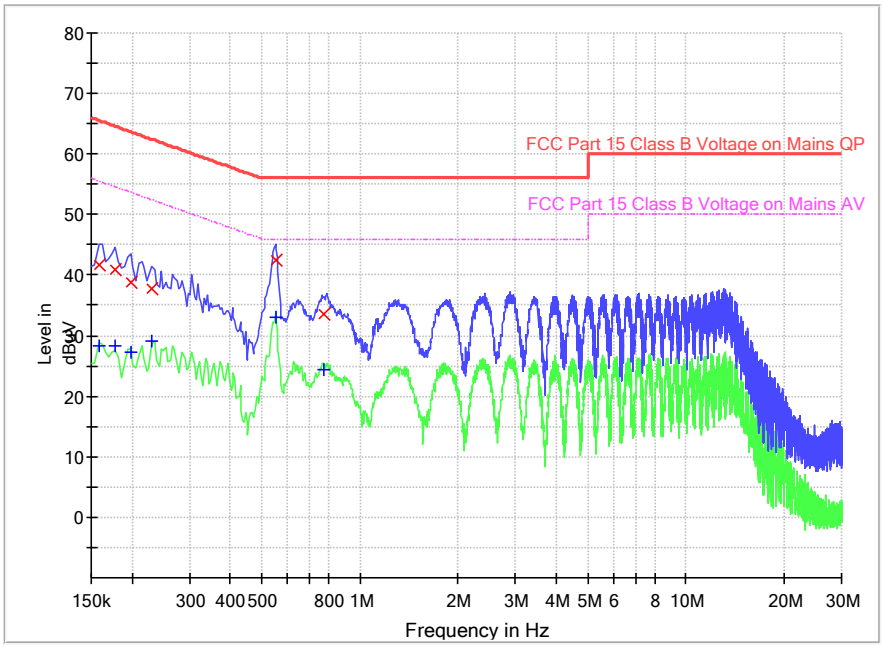
Mandy Chen, Engineer
Typed/Printed Name

14 July 2024
Date

Applicant: Targus International LLC
Date of Test: 14 July 2024 Model: THZ967
Worst Case Operating Mode: Transmitting(2402MHz)
Phase: Live

Graphic / Data Table

Conducted Emissions
Pursuant to FCC 15.207: Emissions Requirement



Limit and Margin QP

Frequency (MHz)	Quasi Peak (dBµV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.158000	41.7	9.000	L1	9.6	23.9	65.6
0.178000	40.9	9.000	L1	9.6	23.7	64.6
0.198000	38.8	9.000	L1	9.6	24.9	63.7
0.230000	37.8	9.000	L1	9.6	24.6	62.4
0.550000	42.6	9.000	L1	9.6	13.4	56.0
0.778000	33.6	9.000	L1	9.6	22.4	56.0

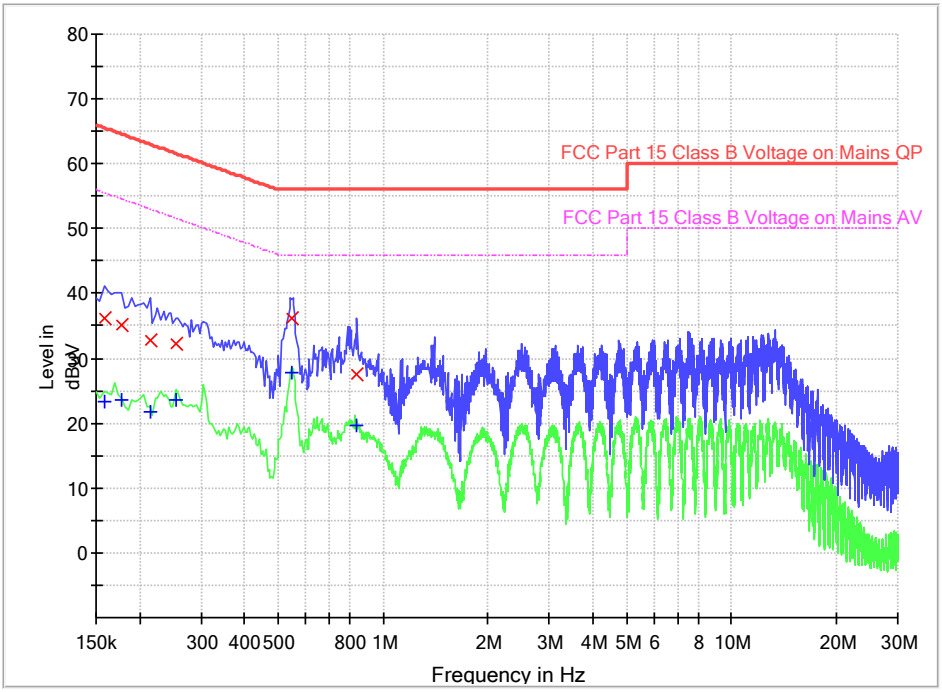
Limit and Margin AV

Frequency (MHz)	Average (dBµV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.158000	28.4	9.000	L1	9.6	27.2	55.6
0.178000	28.4	9.000	L1	9.6	26.2	54.6
0.198000	27.2	9.000	L1	9.6	26.5	53.7
0.230000	29.1	9.000	L1	9.6	23.3	52.4
0.550000	33.1	9.000	L1	9.6	12.9	46.0
0.778000	24.4	9.000	L1	9.6	21.6	46.0

Applicant: Targus International LLC
Date of Test: 14 July 2024 Model: THZ967
Worst Case Operating Mode: Transmitting(2402MHz)
Phase: Neutral

Graphic / Data Table

Conducted Emissions
Pursuant to FCC 15.207: Emissions Requirement



Limit and Margin QP

Frequency (MHz)	Quasi Peak (dBµV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.158000	36.1	9.000	N	9.6	29.5	65.6
0.178000	35.1	9.000	N	9.6	29.5	64.6
0.214000	32.9	9.000	N	9.6	30.1	63.0
0.254000	32.2	9.000	N	9.6	29.4	61.6
0.546000	36.3	9.000	N	9.6	19.7	56.0
0.842000	27.6	9.000	N	9.6	28.4	56.0

Limit and Margin AV

Frequency (MHz)	Average (dBµV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.158000	23.4	9.000	N	9.6	32.2	55.6
0.178000	23.5	9.000	N	9.6	31.1	54.6
0.214000	21.8	9.000	N	9.6	31.2	53.0
0.254000	23.7	9.000	N	9.6	27.9	51.6
0.546000	27.8	9.000	N	9.6	18.2	46.0
0.842000	19.6	9.000	N	9.6	26.4	46.0

5.0 Equipment Photographs

For electronic filing, the photographs of the tested EUT are saved with filename: external photos.pdf & internal photos.pdf.

6.0 Product Labelling

For electronic filing, the FCC ID label artwork and the label location are saved with filename: label.pdf.

7.0 Technical Specifications

For electronic filing, the block diagram and schematics of the tested EUT are saved with filename: block.pdf and circuit.pdf respectively.

8.0 Instruction Manual

For electronic filing, a preliminary copy of the Instruction Manual is saved with filename: manual.pdf.

This manual will be provided to the end-user with each unit sold/leased in the United States.

9.0 Miscellaneous Information

This miscellaneous information includes details of the measured bandedge, 20dB Bandwidth, the test procedure and calculation of factor such as pulse desensitization.

9.1 Bandedge Plot

The test plots are attached as below. From the plot, the field strength of any emissions outside of the specified frequency band are attenuated to the general radiated emission limits in section 15.209. It fulfils the requirement of 15.249(d).

Peak Measurement

Restricted-band band-edge tests shall be performed as radiated measurements, i.e (Band-edge Plot).

(i) Lower channel 2402.000 MHz:

Polarization	Frequency (MHz)	Reading (dBµV)	Pre-Amp Gain (dB)	Antenna Factor (dB/m)	Net at 3m (dBµV/m)	Peak Limit at 3m (dBµV/m)	Margin (dB)
Horizontal	2400.000	71.7	36.7	28.1	63.1	74.0	-10.9

Polarization	Frequency (MHz)	Reading (dBµV)	Pre-Amp Gain (dB)	Antenna Factor (dB/m)	Net at 3m (dBµV/m)	Average Limit at 3m (dBµV/m	Margin (dB)
Horizontal	2400.000	57.3	36.7	28.1	48.7	54.0	-5.3

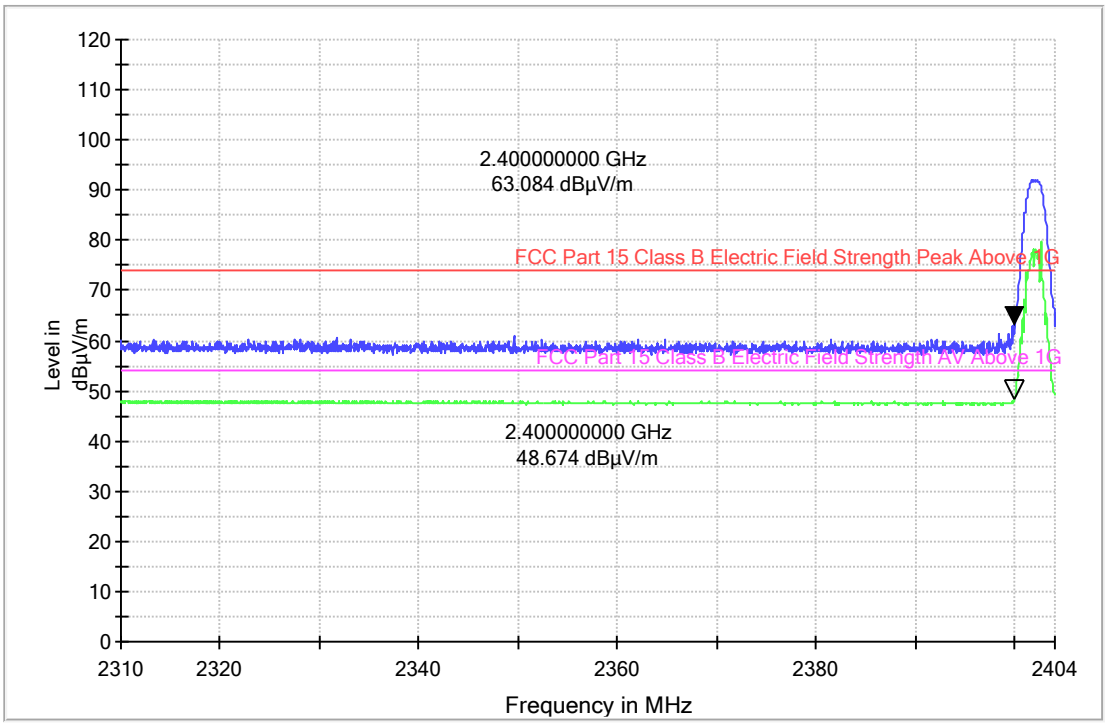
(ii) Upper channel 2480.000 MHz:

Polarization	Frequency (MHz)	Reading (dBµV)	Pre-Amp Gain (dB)	Antenna Factor (dB/m)	Net at 3m (dBµV/m)	Peak Limit at 3m (dBµV/m)	Margin (dB)
Horizontal	2483.500	66.3	36.8	29.1	58.6	74.0	-15.4

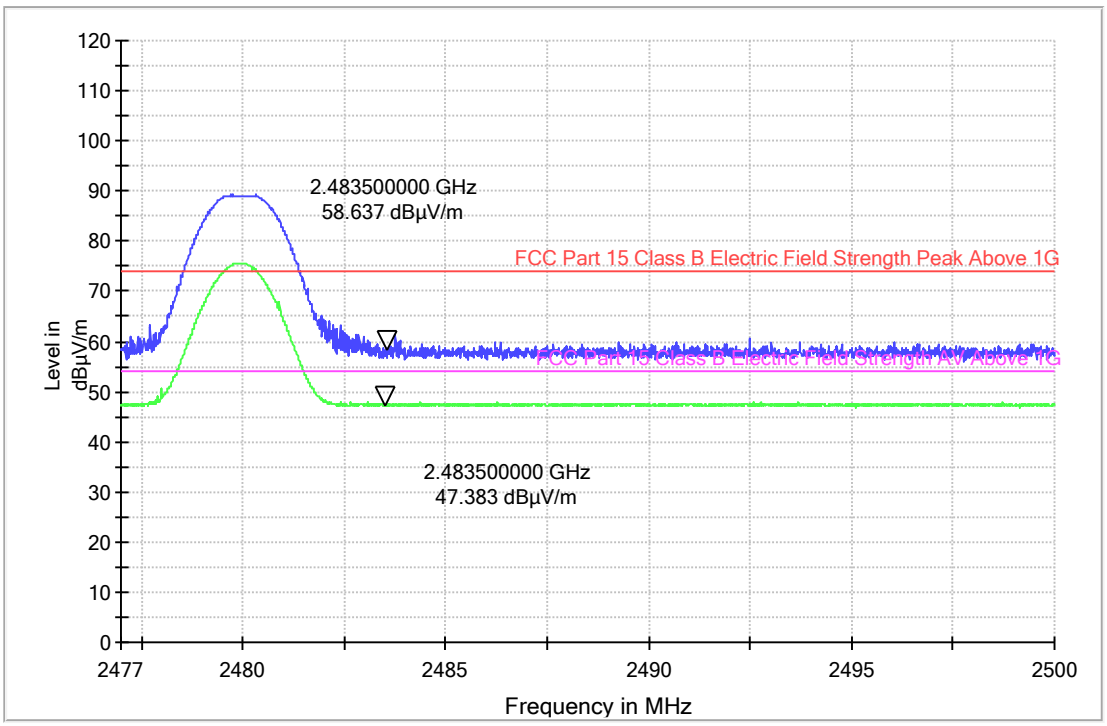
Polarization	Frequency (MHz)	Reading (dBµV)	Pre-Amp Gain (dB)	Antenna Factor (dB/m)	Net at 3m (dBµV/m)	Average Limit at 3m (dBµV/m	Margin (dB)
Horizontal	2483.500	55.1	36.8	29.1	47.4	54.0	-6.6

The resultant field strength meets the general radiated emission limit in section 15.209, which does not exceed 74dBµv/m (Peak Limit) and 54dBµv/m (Average Limit).

Lowest frequency Channel

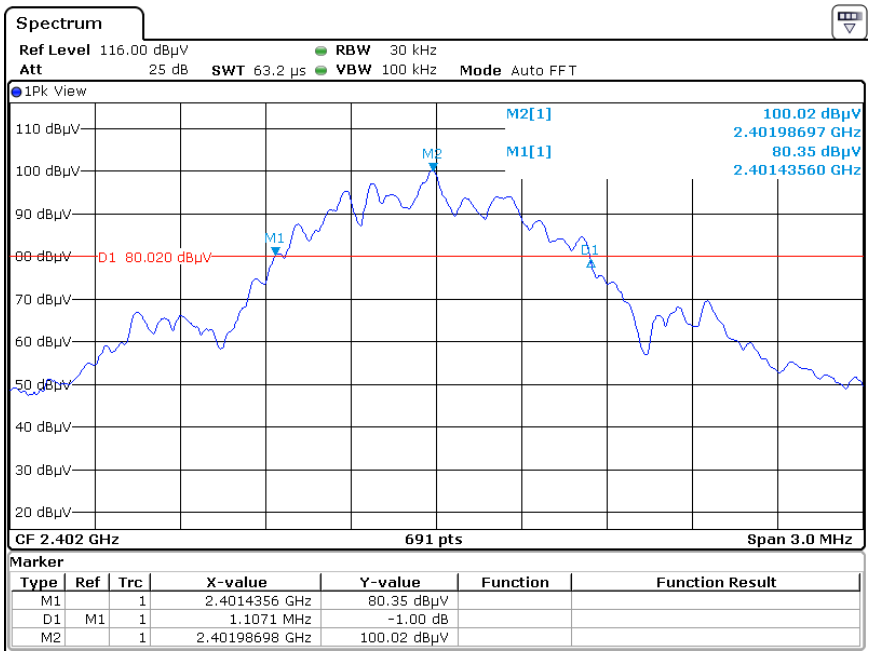


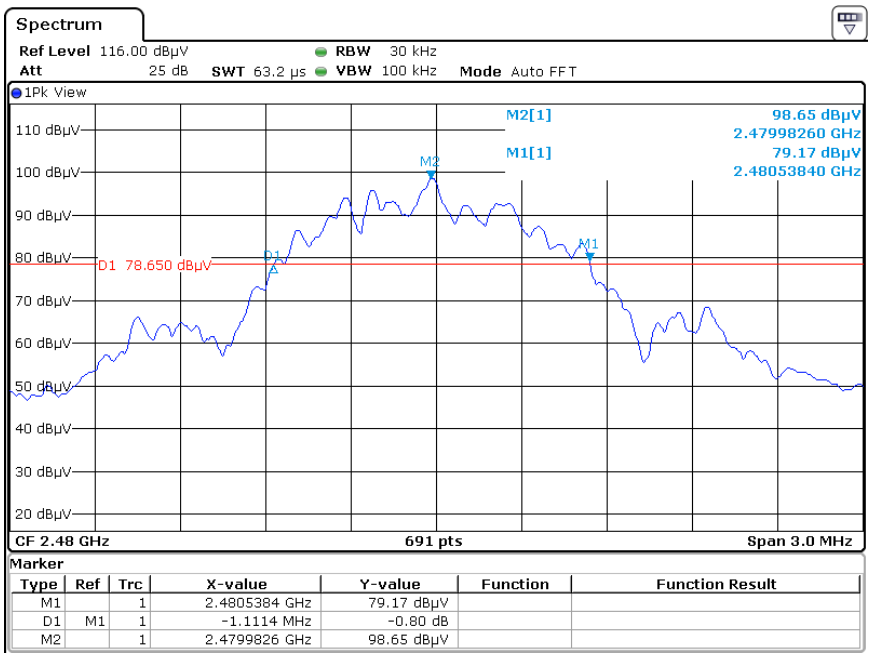
Highest frequency Channel



9.2 20dB Bandwidth

Pursuant to FCC part 15 Section 15.215(c), the 20dB bandwidth of the emission was contained within the frequency band designated (mentioned as above) which the EUT operated. The effects, if any, from frequency sweeping, frequency hopping, other modulation techniques and frequency stability over excepted variations in temperature and supply voltage were considered. The test plots are reported as below.





9.3 Discussion of Pulse Desensitization

Pulse desensitivity is not applicable for this device. The effective period (T_{eff}) is approximately 0.1044ms for a digital "1" bit, as shown in the plots of Section 9.4. With a resolution bandwidth (3 dB) of 100 kHz, the pulse desensitivity factor was 0 dB

9.4 Calculation of Average Factor

Averaging factor in dB = 20 log (duty cycle)

The specification for output field strengths in accordance with the FCC rules specify measurements with an average detector. During testing, a spectrum analyzer incorporating a peak detector was used. Therefore, a reduction factor can be applied to the resultant peak signal level and compared to the limit for measurement instrumentation incorporating an average detector.

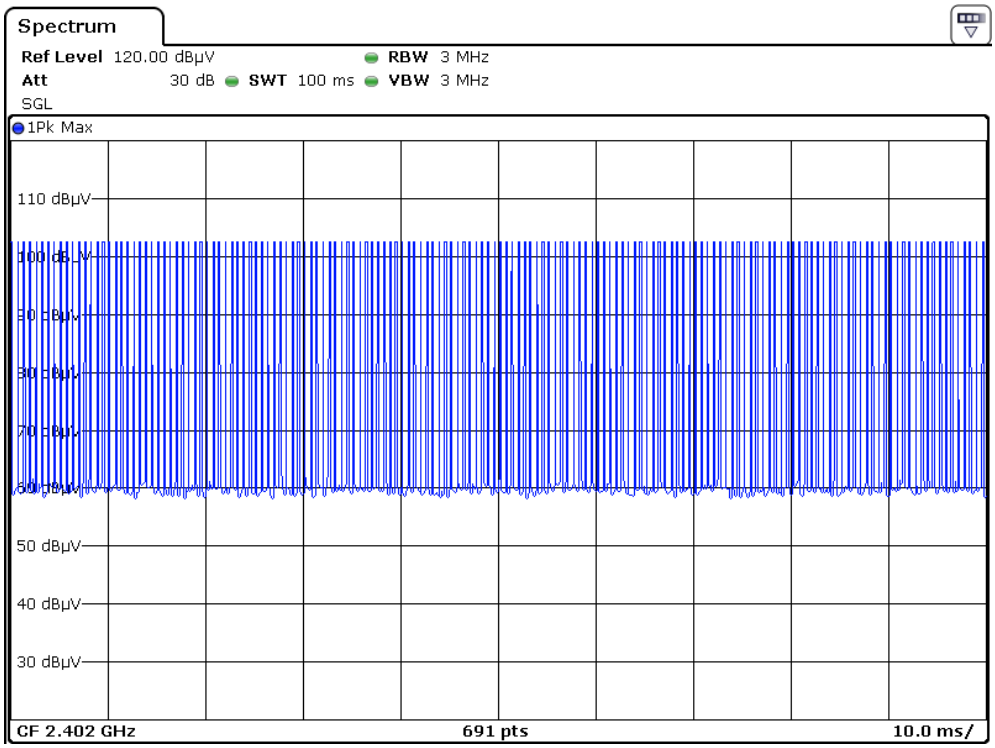
The time period over which the duty cycle is measured is 100 milliseconds, or the repetition cycle, whichever is a shorter time frame. The worst case (highest percentage on) duty cycle is used for the calculation. The duty cycle is measured by placing the spectrum analyzer in zero scan (receiver mode) and linear mode at maximum bandwidth (3 MHz at 3 dB down) and viewing the resulting time domain signal output from the analyzer on a Tektronix oscilloscope. The oscilloscope is used because of its superior time base and triggering facilities.

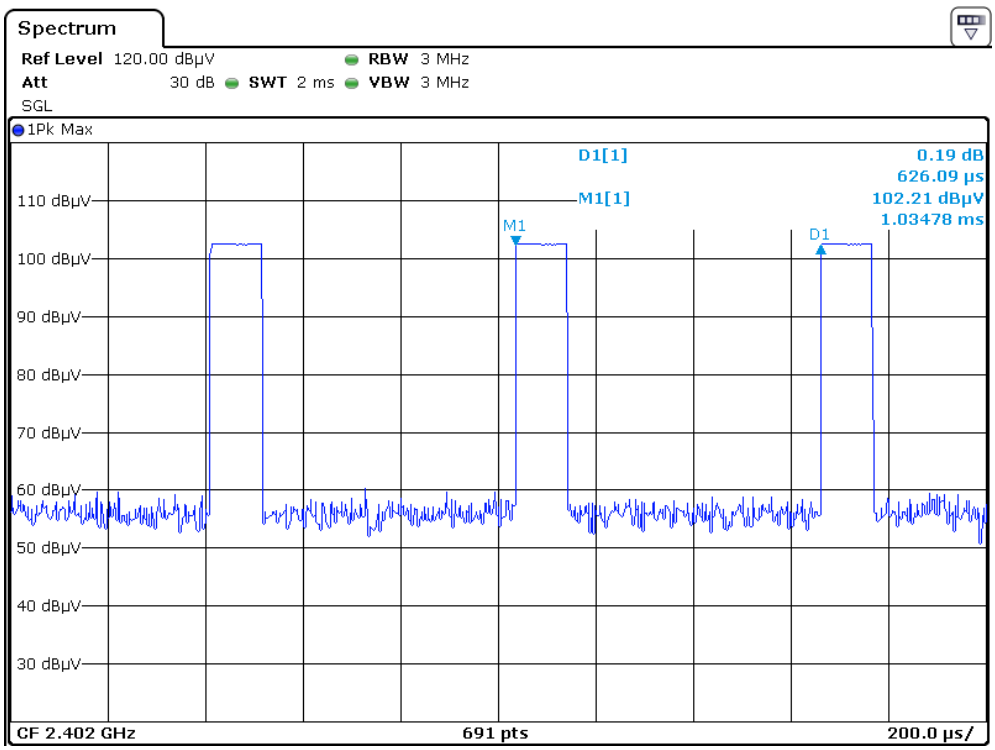
The duty cycle is simply the on-time divided by the period:

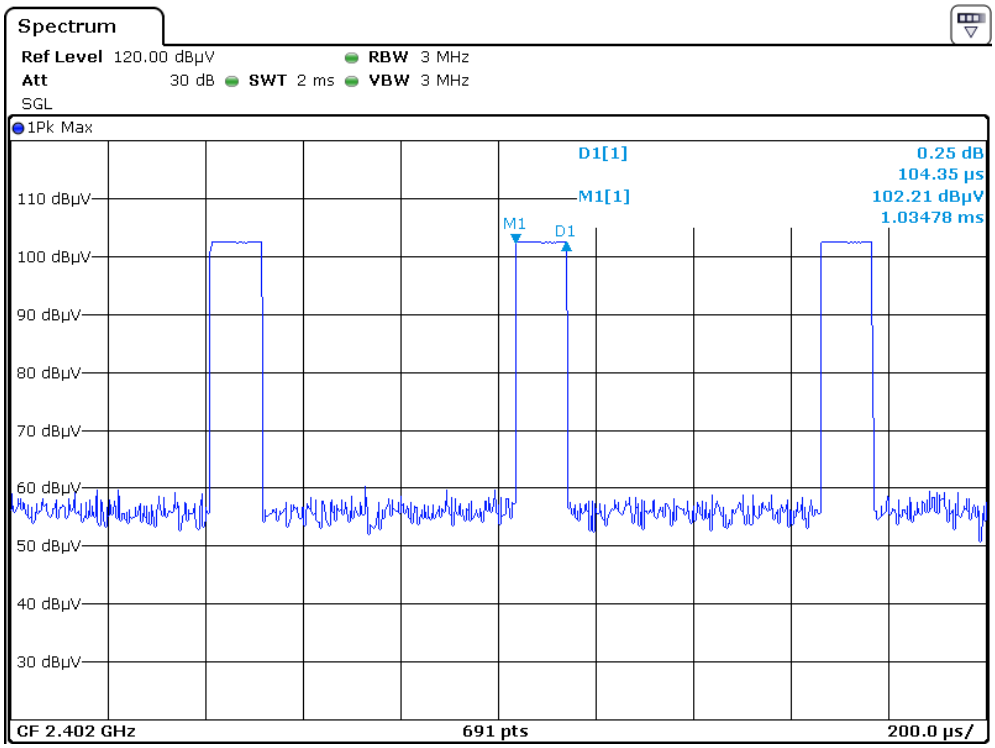
The duration of one cycle = 0.6261ms
Effective period of the cycle = 0.1044ms
DC =0.1044ms / 0.6261ms =0.1667 or 16.67%

Therefore, the averaging factor is found by $20 \log_{10}$ (0.1667) = -15.6dB

The test plots are attached as below.


Spectrum
Ref Level 120.00 dBµV
RBW 3 MHz
Att 30 dB SWT 100 ms VBW 3 MHz
SGL
1Pk Max
110 dBµV
100 dBµV
90 dBµV
80 dBµV
70 dBµV
60 dBµV
50 dBµV
40 dBµV
30 dBµV
CF 2.402 GHz
691 pts
10.0 ms/


Spectrum
Ref Level 120.00 dBµV
RBW 3 MHz
Att 30 dB SWT 2 ms VBW 3 MHz
SGL
1Pk Max
D1[1]
0.19 dB
626.09 µs
M1[1]
102.21 dBµV
1.03478 ms
M1
D1
110 dBµV
100 dBµV
90 dBµV
80 dBµV
70 dBµV
60 dBµV
50 dBµV
40 dBµV
30 dBµV
CF 2.402 GHz
691 pts
200.0 µs/


Spectrum
Ref Level 120.00 dBµV
RBW 3 MHz
Att 30 dB SWT 2 ms VBW 3 MHz
SGL
1Pk Max
D1[1] 0.25 dB
104.35 µs
M1[1] 102.21 dBµV
1.03478 ms
110 dBµV
100 dBµV
90 dBµV
80 dBµV
70 dBµV
60 dBµV
50 dBµV
40 dBµV
30 dBµV
M1
D1
CF 2.402 GHz
691 pts
200.0 µs/

9.5 Emissions Test Procedures

The following is a description of the test procedure used by Intertek Testing Services in the measurements of transmitters operating under Part 15, Subpart C rules.

The test set-up and procedures described below are designed to meet the requirements of ANSI C63.10 - 2013.

The transmitting equipment under test (EUT) is placed on a styrene turntable which is four feet in diameter and approximately 0.8 meter up to 1GHz and 1.5 meter above 1GHz in height above the ground plane. During the radiated emissions test, the turntable is rotated and any cables leaving the EUT are manipulated to find the configuration resulting in maximum emissions. The EUT is adjusted through all three orthogonal axes to obtain maximum emission levels. The antenna height and polarization are varied during the testing to search for maximum signal levels.

Detector function for radiated emissions is in peak mode. Average readings, when required, are taken by measuring the duty cycle of the equipment under test and subtracting the corresponding amount in dB from the measured peak readings. A detailed description for the calculation of the average factor can be found in Section 9.4.

The frequency range scanned is from the lowest radio frequency signal generated in the device which is greater than 9 kHz to the tenth harmonic of the highest fundamental frequency or 40 GHz, whichever is lower.

9.5 Emissions Test Procedures (cont'd)

The EUT is warmed up for 15 minutes prior to the test.

AC power to the unit is varied from 85% to 115% nominal and variation in the fundamental emission field strength is recorded. If battery powered, a new, fully charged battery is used.

The IF bandwidth used for measurement of radiated signal strength was 10 kHz for emission below 30 MHz and 120 kHz for emission from 30 MHz to 1000 MHz. Where pulsed transmissions of short enough pulse duration warrant, a greater bandwidth is selected according to the recommendations of Hewlett Packard Application Note 150-2. A discussion of whether pulse desensitivity is applicable to this unit is included in this report (See Section 9.3). Above 1000 MHz, a resolution bandwidth of 1 MHz is used, RBW 3MHz used for fundamental emission.

Transmitter measurements are normally conducted at a measurement distance of three meters. However, to assure low enough noise floor in the restricted bands and above 1 GHz, signals are acquired at a distance of one meter or less. All measurements are extrapolated to three meters using inverse scaling, but those measurements taken at a closer distance are so marked.

10.0 Test Equipment List

Equipment No.	Equipment	Manufacturer	Model No.	Serial No.	Cal. Date	Due Date
SZ061-12	BiConiLog Antenna	ETS	3142E	00166158	04-Aug-2021	04-Aug-2024
SZ185-03	EMI Receiver	R&S	ESR7	101975	23-Apr-2024	23-Apr-2025
SZ061-08	Horn Antenna	ETS	3115	00092346	05-Sep-2021	05-Sep-2024
SZ061-07	Pyramidal Horn Antenna	ETS	3160-09	00083067	31-Aug-2022	31-Aug-2025
SZ061-06	Active Loop Antenna	Electro-Metrics	EM-6876	217	05-May-2024	05-May-2027
SZ056-03	Spectrum Analyzer	R&S	FSP 30	101148	22-Apr-2024	22-Apr-2025
SZ056-06	Signal Analyzer	R&S	FSV 40	101101	13-Dec-2023	13-Dec-2024
SZ181-04	Preamplifier	Agilent	8449B	3008A02474	22-Apr-2024	22-Apr-2025
SZ188-01	Anechoic Chamber	ETS	RFD-F/A-100	4102	12-Dec-2021	12-Dec-2024
SZ062-23	RF Cable	RADIALL	SF104PE	--	26-Sep-2023	26-Sep-2024
SZ062-35	RF Cable	RADIALL	A50-3.5M3.5M-8M	--	26-Sep-2023	26-Sep-2024
SZ062-30	RF Cable	RADIALL	A50-3.5M3.5M-4.5M	--	26-Sep-2023	26-Sep-2024
SZ067-04	Notch Filter	Micro-Tronics	BRM50702-02	--	23-Apr-2024	23-Apr-2025
SZ185-02	EMI Test Receiver	R&S	ESCI	100692	09-Jul-2024	09-Jul-2025
SZ187-01	Two-Line V-Network	R&S	ENV216	100072	18-Oct-2023	19-Oct-2024
SZ187-02	Two-Line V-Network	R&S	ENV216	100072	23-Apr-2024	23-Apr-2025
SZ062-16	RF Cable	HUBER+SUHNER	CBL2-BN-1m	110127-2231000	10-Jul-2024	10-Jul-2025
SZ188-03	Shielding Room	ETS	RFD-100	4100	20-Dec-2022	20-Dec-2025

********** End of Report**********