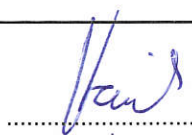


EMC TEST REPORT FCC 47 CFR Part 15B, ISED ICES-003 Issue 6	
Report Reference No	G0M-1901-7989-EF0215B-V01
Testing Laboratory	Eurofins Product Service GmbH
Address	Storkower Str. 38c 15526 Reichenwalde Germany
Accreditation	    DAKKS - Registration number : D-PL-12092-01-03 (ISED) ISED Testing Laboratory site: 3470A-2 DAKKS - Registration number : D-PL-12092-01-04 (FCC) FCC Filed Test Laboratory, Reg.-No.: 96970
Applicant	Amphenol Thermometrics, Inc.
Address	967 Windfall Road PA 15857 St. Marys USA
Test Specification	
Standard	47 CFR Part 15 Subpart B ISED ICES-003 Issue 6 ANSI C63.4:2014
Non-Standard Test Method	None
Equipment under Test (EUT):	
Product Description	Kaye ValProbe RT Pressure Temperature Logger collects Pressure and Temperature data and transmits data to Kaye ValProbe RT Base Station via 2.4 GHz RF channel
Model(s)	RF3050 (X2532-RT)
Additional Model(s)	None
Brand Name(s)	Kaye
Hardware Version(s)	1.2
Software Version(s)	1.2.9
FCC-ID	2AJQZ-VPRT-L1
IC	25680-VPRTL1
Test Result	PASSED

Possible test case verdicts:		
required by standard but not tested	N/T	
not required by standard	N/R	
required by standard but not appl. to test object	N/A	
test object does meet the requirement	P(PASS)	
test object does not meet the requirement	F(FAIL)	
Testing:		
Date of receipt of test item	2019-10-14	
Report:		
Compiled by	Stephan Liebich	
Tested by (+ signature) (Responsible for Test)	Matthias Handrik	
	Stephan Liebich	
Approved by (+ signature) (Deputy Head of Lab)	Jens Marquardt	
Date of Issue	2020-05-06	
Total number of pages	24	
General Remarks:		
The test results presented in this report relate only to the object tested. The results contained in this report reflect the results for this particular model and serial number. It is the responsibility of the manufacturer to ensure that all production models meet the intent of the requirements detailed within this report. This report shall not be reproduced, except in full, without the written approval of the Issuing testing laboratory.		
Additional Comments:		

ADDITIONAL VARIANTS

Additional Variants (not tested and not evaluated variants)		
Not-tested Variant	Description	
1	Product Type Description	Kaye ValProbe RT Std rigid Temperature Logger
	Model name	RF3050 (XSVP-L-T-RT)
	Brand name	Kaye
	Hardware Version	1.2
	Software Version	1.2.9
2	Product Type Description	Kaye ValProbe RT Std single bendable Temperature Logger
	Model name	RF3050 (XSBVP-L-T-RT)
	Brand name	Kaye
	Hardware Version	1.2
	Software Version	1.2.9
3	Product Type Description	Kaye ValProbe RT Std dual bendable Temperature Logger
	Model name	RF3050 (XSDBVP-La-Lb-T-RT)
	Brand name	Kaye
	Hardware Version	1.2
	Software Version	1.2.9
4	Product Type Description	Kaye ValProbe RT Std single flexible Temperature Logger
	Model name	RF3050 (XSFVP-C-L-T-RT)
	Brand name	Kaye
	Hardware Version	1.2
	Software Version	1.2.9
5	Product Type Description	Kaye ValProbe RT Std dual flexible Temperature Logger
	Model name	RF3050 (XSDFVP-Ca-La-Ta-Cb-Lb-Tb-RT)
	Brand name	Kaye
	Hardware Version	1.2
	Software Version	1.2.9
6	Product Type Description	Kaye ValProbe RT G single bendable Temperature Logger
	Model name	RF3050 (XGBVP-L-RT)
	Brand name	Kaye
	Hardware Version	1.2
	Software Version	1.2.9
7	Product Type Description	Kaye ValProbe RT G dual bendable Temperature Logger
	Model name	RF3050 (XGDBVP-La-Lb-RT)
	Brand name	Kaye
	Hardware Version	1.2
	Software Version	1.2.9
8	Product Type Description	Kaye ValProbe RT CR rigid Temperature Logger
	Model name	RF3050 (X2535-RT)
	Brand name	Kaye
	Hardware Version	1.2
	Software Version	1.2.9
Comment: Those named additional variants above have not been tested. Those additional variants of the series have been declared by the manufacturer. The test report explicitly states that those variants were neither tested nor assessed nor evaluated.		

ABBREVIATIONS AND ACRONYMS

Acronyms	
Acronym	Description
EUT	Equipment Under Test
FCC	Federal Communications Commission
ISED	Innovation, Science and Economic Development Canada
T _{NOM}	Nominal operating temperature
V _{NOM}	Nominal supply voltage

VERSION HISTORY

Version History			
Version	Issue Date	Remarks	Revised By
01	2020-05-06	Initial Release	

REPORT INDEX

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2	Result Summary.....	13
2.1	Test Conditions and Results - Radiated emissions acc. to ANSI C63.4.....	14

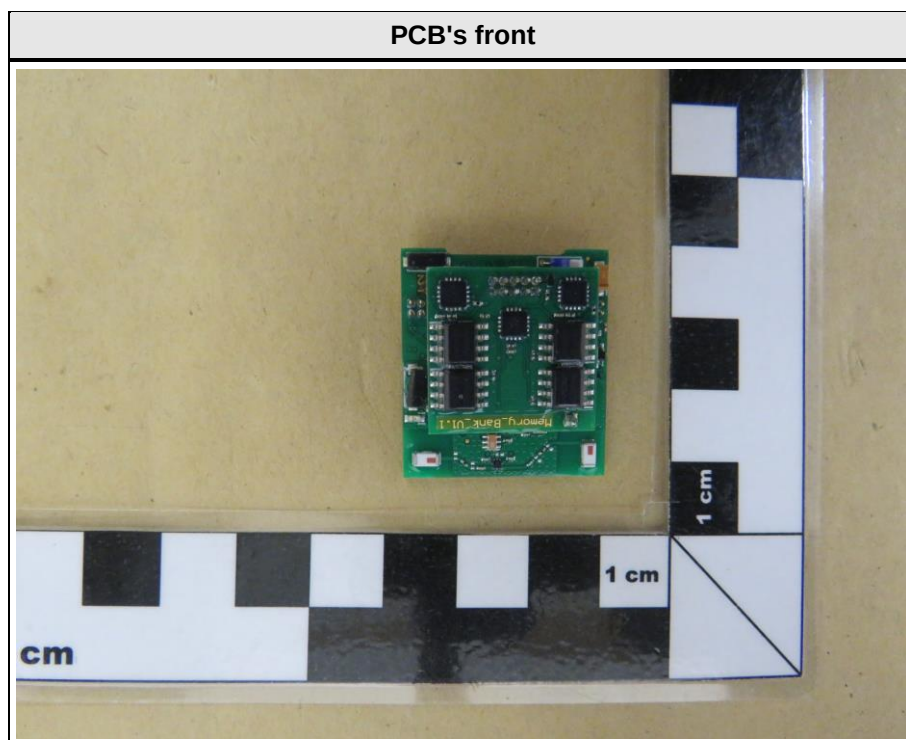
1 Equipment (Test Item) Under Test

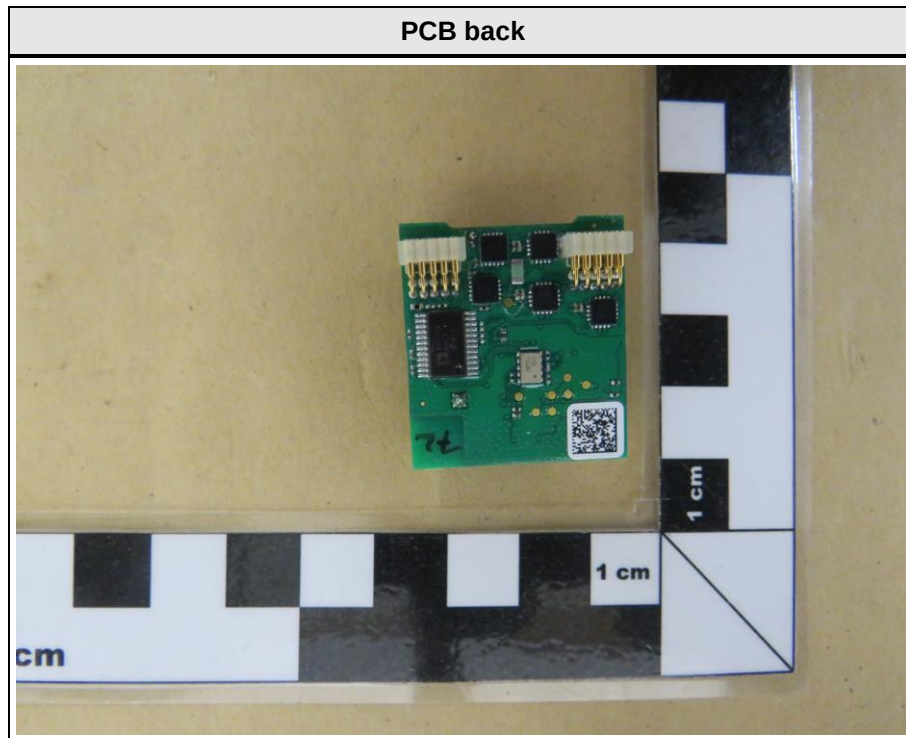
Description	Kaye ValProbe RT Pressure Temperature Logger collects Pressure and Temperature data and transmits data to Kaye ValProbe RT Base Station via 2.4 GHz RF channel	
Model	RF3050 (X2532-RT)	
Additional Model(s)	None	
Brand Name(s)	Kaye	
Serial Number(s)	PD78	
Hardware Version(s)	1.2	
Software Version(s)	1.2.9	
FCC-ID	2AJQZ-VPRT-L1	
IC	25680-VPRTL1	
Class	Class B	
Equipment type	Table top	
Highest internal frequency [MHz]	2480	
Radio Module	Type	ZigBee
	Model	unspecified
	Manufacturer	unspecified
Supply Voltage	V _{NOM}	3.6 V DC (internal battery)
AC/DC-Adaptor	None	
Manufacturer	Amphenol Thermometrics, Inc. 967 Windfall Road PA 15857 St. Marys USA	

1.1 Equipment Ports

Name	Type	Attributes	Comment
Sensor	NE	Count: 2 Direction: IO Service only: No	temperature & pressure
Description:			
AC	AC mains power input/output port		
DC	DC power input/output port		
BAT	DC power input port connected to external battery		
IO	Input/Output port		
TP	Telecommunication port		
NE	Non-electrical port		

1.2 Equipment Photos - Internal





1.3 Equipment Photos - External



1.4 Support Equipment

Product Type	Device	Manufacturer	Model	Comment
MON	Tablet PC	Xplore Technologies	CFT-004	validation Console
AE	Docking station	Xplore Technologies	TCD-001	docking station
AE	Kaye ValProbe RT Base Station	Amphenol Thermometrics, Inc	RF3060	collecting RF data
AE	Fritz!Box	AVM	7050	Router
Description:				
AE	Auxiliary Equipment			
SIM	Simulator			
MON	Monitoring Equipment			
CBL	Connecting Cable			
Comment:				

1.5 Operational Modes

Mode #	Description
1	EUT is connected via ZigBee to BaseStation and provides continuously sensor data.
Comment:	

1.6 EUT Configuration

Configuration #	Description
1	EUT is powered up via internal battery.
Comment:	

1.7 Sample emission level calculation

The following is a description of terms and a sample calculation, as appears in the radiated emissions data table. The numbers used in the calculation are for example only. There is no direct correlation to the specific data taken for the product described in this document:

Reading:

This is the reading obtained on the spectrum analyser in dB μ V. Any external preamplifiers used are taken into account through internal analyser settings.

A.F.:

This is the antenna factor for the receiving antenna. It is a conversion factor, which converts electric fields strengths to voltages, which can be measured directly on the spectrum analyser. It is treated as a loss in dB. Cable losses have been included with the A.F. to simplify the calculations. The antenna factor is used in calculations as follows:

$$\text{Reading on Analyser (dB}\mu\text{V)} + \text{A.F. (dB/m)} = \text{Net field strength (dB}\mu\text{V/m)}$$

Net:

This is the net field strength measurement (as shown above).

Limit:

This is the FCC Class B radiated emission limit (in units of dB μ V/m). The FCC limits are given in units of μ V/m. The following formula is used to convert the units of μ V/m to dB μ V/m:

$$\text{Limit (dB}\mu\text{V/m)} = 20 \cdot \log(\mu\text{V/m})$$

Margin:

This is the margin of compliance below the FCC limit. The units are given in dB. A negative margin indicates the emission was below the limit. A positive margin indicates that the emission exceeds the limit.

Example only:

Reading + AF	= Net Reading	:	Net reading - FCC limit	= Margin
+21.5 dB μ V + 26 dB/m	= 47.5 dB μ V/m	:	47.5 dB μ V/m - 57.0 dB μ V/m	= -9.5 dB

2 Result Summary

FCC 47 CFR Part 15B, ISED ICES-003 Issue 6				
Reference	Requirement	Reference Method	Result	Remarks
Emission				
FCC 15.109 ICES-003, 8, 6.1	Radiated emissions	ANSI C63.4:2014	PASS	-
FCC 15.107 ICES-003, 8, 6.2	AC power line conducted emissions	ANSI C63.4:2014	N/R	-
Comment:				

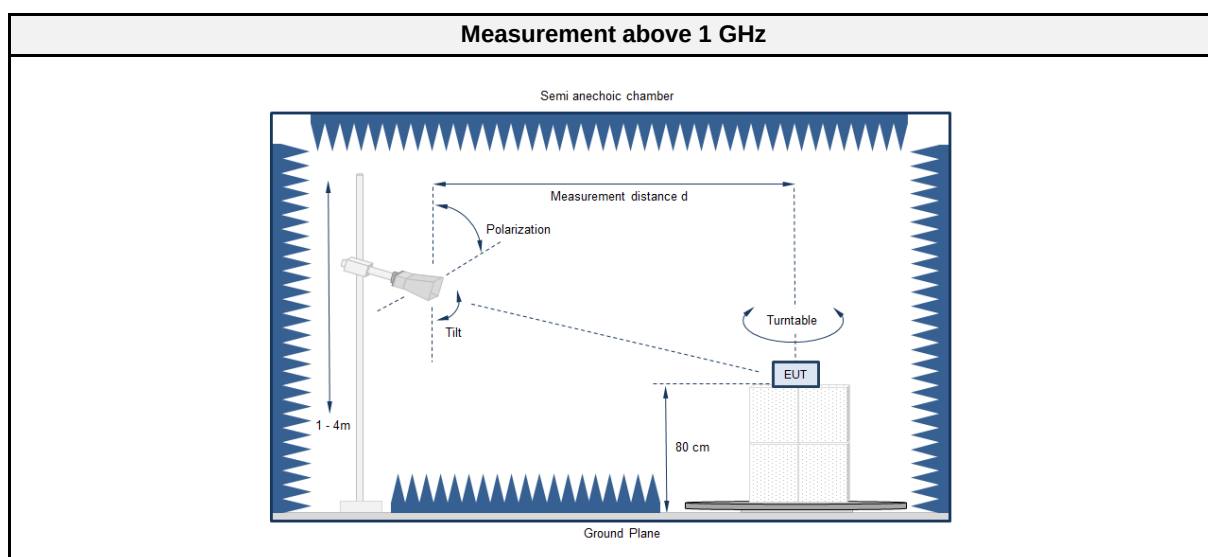
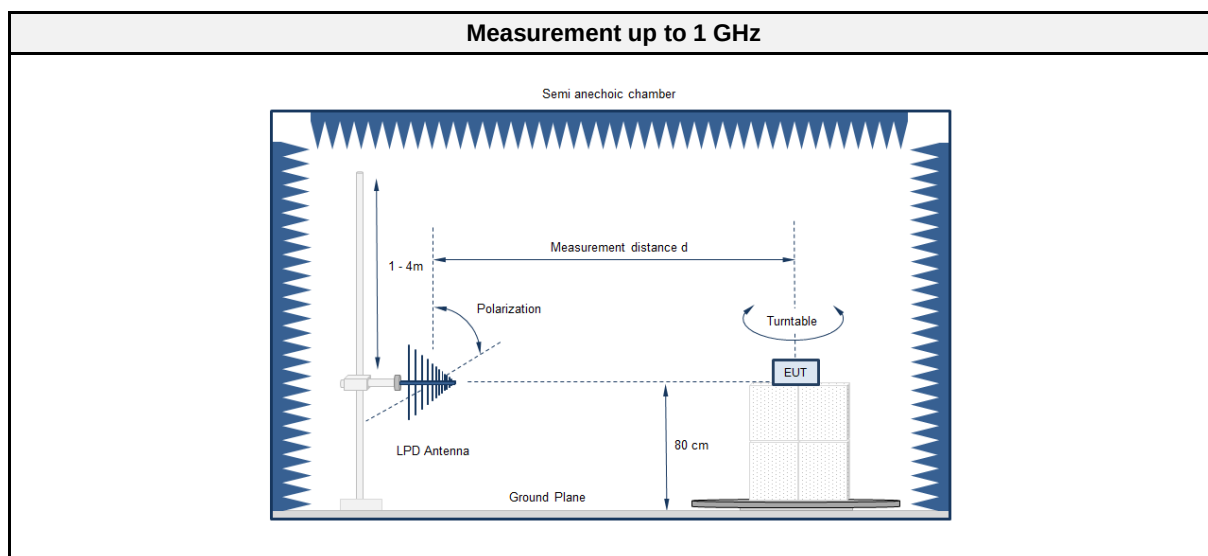
Possible Test Case Verdicts	
PASS	Test object does meet the requirements
FAIL	Test object does not meet the requirements
N/T	Required by standard but not tested
N/R	Not required by standard for the test object

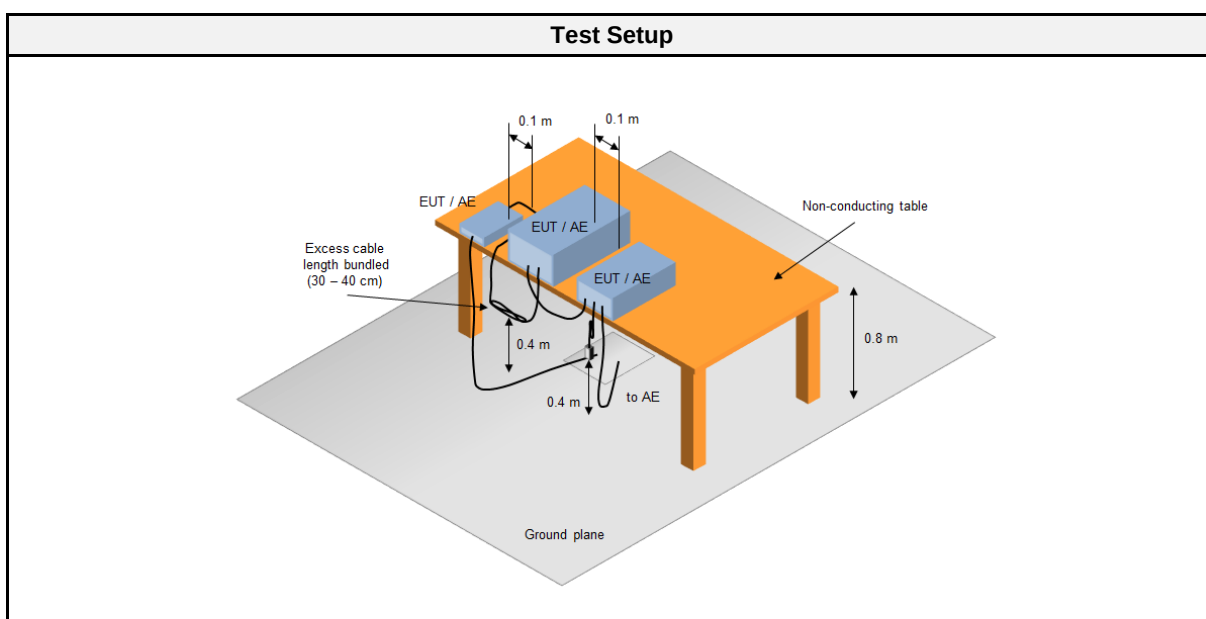
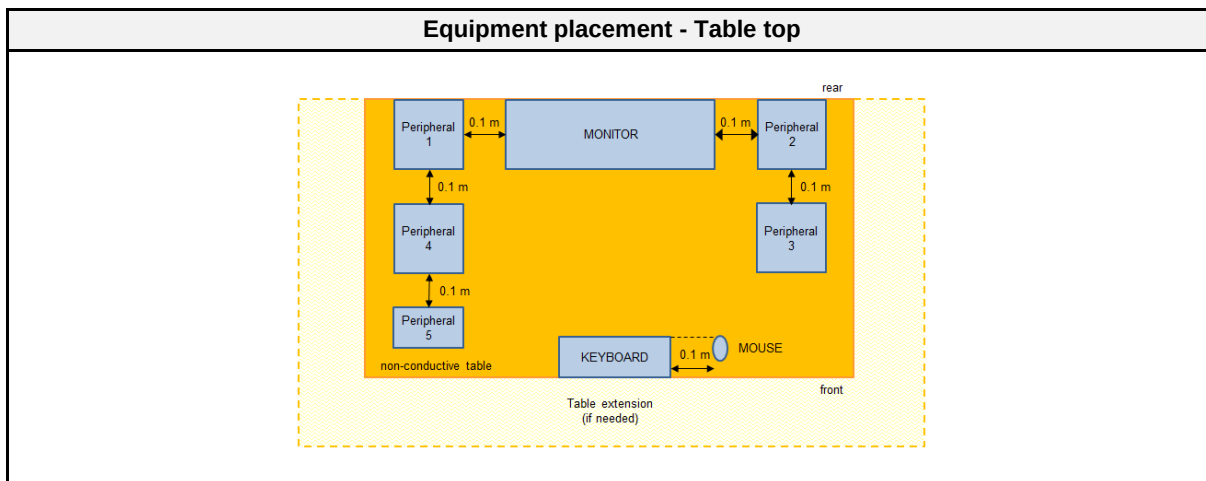
2.1 Test Conditions and Results - Radiated emissions acc. to ANSI C63.4

2.1.1 Information

Test Information	
Reference	FCC 15.109, ICES-003, 8, 6.1
Reference method	ANSI C63.4:2014 Section 8
Equipment class	Class B
Equipment type	Table top
Highest internal frequency [MHz]	2480
Measurement range	30 MHz to 13000 MHz
Temperature [°C]	22
Humidity [%]	46
Operator	Stephan Liebich
Date	2019-10-17

2.1.2 Setup





2.1.3 Equipment

Test Software			
Description	Manufacturer	Name	Version
EMC Software	DARE Instruments	Radimation	2016.1.10

Test Equipment					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Anechoic chamber	Frankonia	AC1	EF00062	2018-07	2021-07
EMI Test Receiver	Rohde & Schwarz Vertriebs GmbH	ESR7	EF00943	2019-07	2020-07
Spectrum analyser	Rohde & Schwarz Vertriebs GmbH	FSU 26	EF01407	2019-07	2020-07
Biconical Antenna	R&S	HK 116	EF00030	2019-04	2022-04
LPD Antenna	R&S	HL 223	EF00187	2019-05	2022-05
Horn antenna	Schwarzbeck	BBHA 9120D	EF01561	2019-10	2020-10
Climatic Sensor	Embedded Data Systems, LLC.	2800100000254 17E	EF01054	2019-05	2020-05

2.1.4 Procedure

Exploratory measurement	
1.	The EUT was placed on a non-conductive table at a height of 0.8m.
2.	The EUT and support equipment, if needed, were set up to simulate typical usage.
3.	Cables, of type and length specified by the manufacturer, were connected to at least one port of each type and were terminated by a device or simulating load of actual usage.
4.	The antenna was placed at a distance of 3 or 10 m.
5.	The received signal was monitored at the measurement receiver.
6.	This procedure has to be performed in both antenna polarizations, horizontal and vertical.
7.	The arrangement of the equipment with the maximum emission level is shown on the setup picture at item 1.3

Final measurement	
1.	The EUT was placed on a 0.8 m non-conductive table at a 3 m distance from the receive antenna. The antenna output was connected to the measurement receiver.
2.	A biconical antenna was used for the frequency range 30 – 200 MHz, a logarithmic periodical antenna was used for the frequency range from 200 – 1000 MHz. Above one 1 GHz a Double Ridged Broadband Horn antenna was used. The antenna was placed on an adjustable height antenna mast.
3.	The EUT and cable arrangement were based on the exploratory measurement results.
4.	Emissions were maximized at each frequency by rotating the EUT and adjusting the receive antenna height and polarization. The maximum values were recorded.
5.	The test data of the worst-case conditions were recorded and shown on the next pages.

2.1.5 Limits

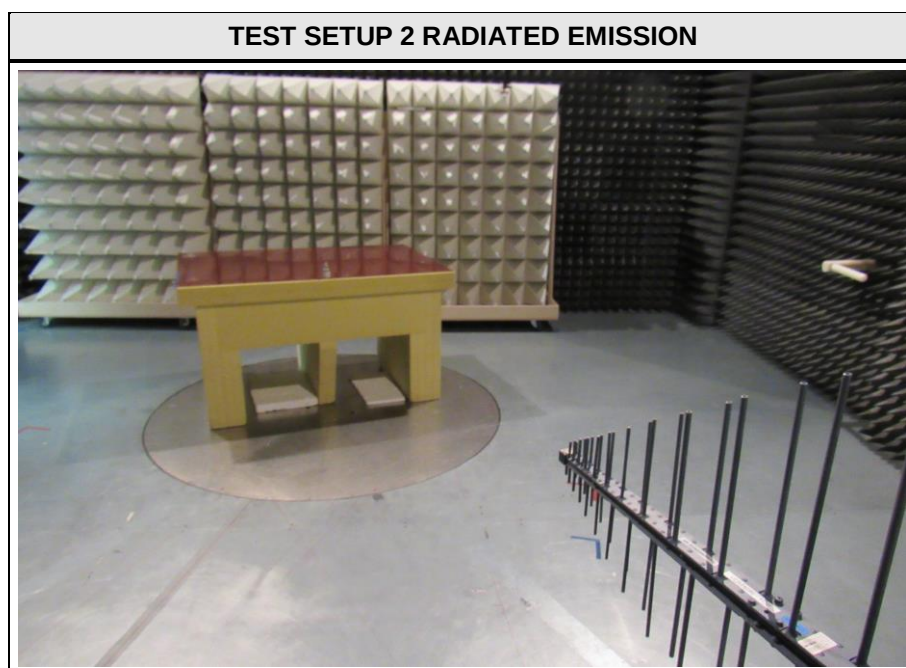
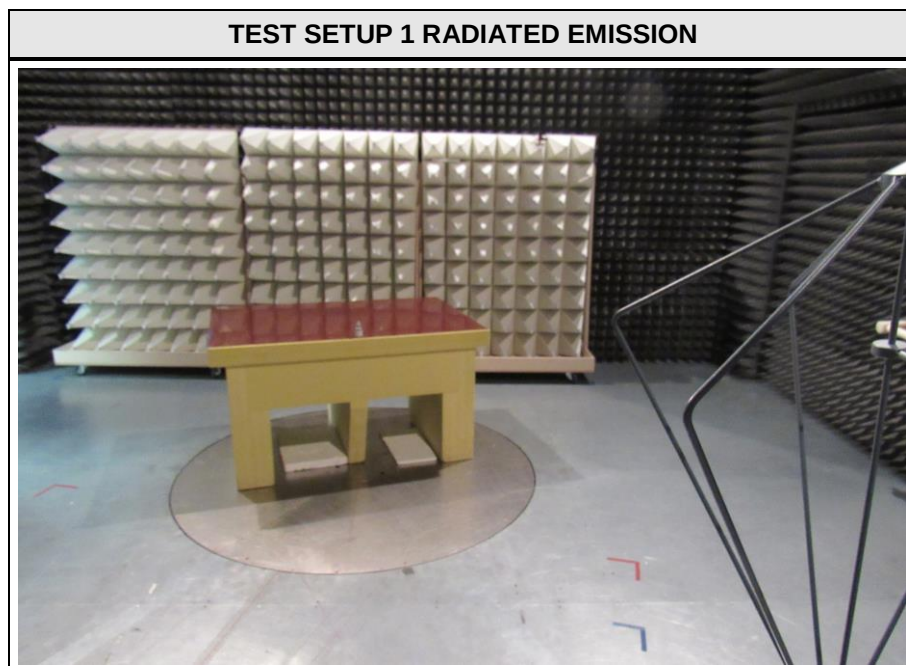
Class B @ 3 m		
Frequency [MHz]	Detector	Limit [dB μ V/m]
30 - 88	Quasi-peak	40
88 - 216	Quasi-peak	43.5
216 - 960	Quasi-peak	46
960 - 1000	Quasi-peak	54
> 1000	Peak	74
	Average	54

Class A @ 10 m		
Frequency [MHz]	Detector	Limit [dB μ V/m]
30 - 88	Quasi-peak	39
88 - 216	Quasi-peak	43.5
216 - 960	Quasi-peak	46.5
960 - 1000	Quasi-peak	49.5
> 1000	Peak	69.5
	Average	49.5

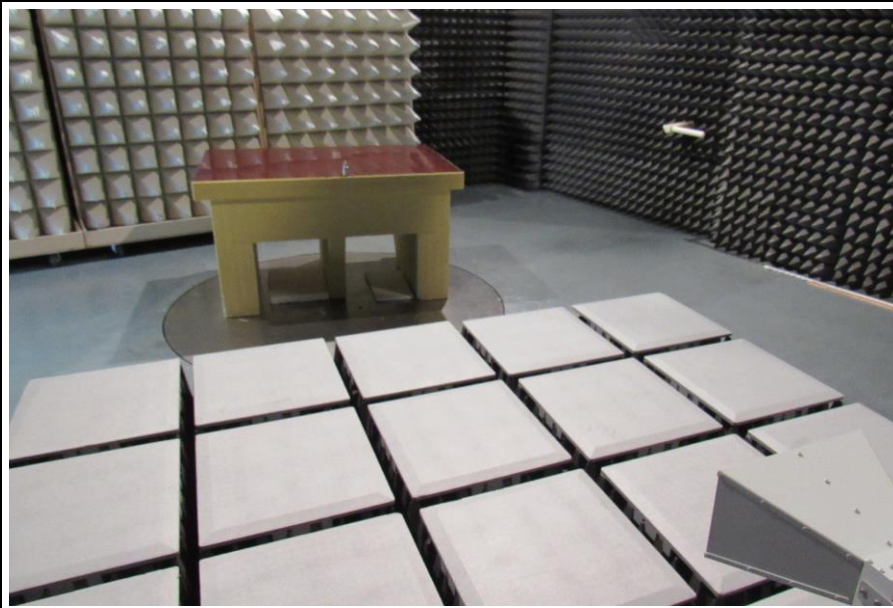
2.1.6 Results

Test Results			
Operational mode	EUT Configuration	Verdict	Remark
1	1	PASS	-

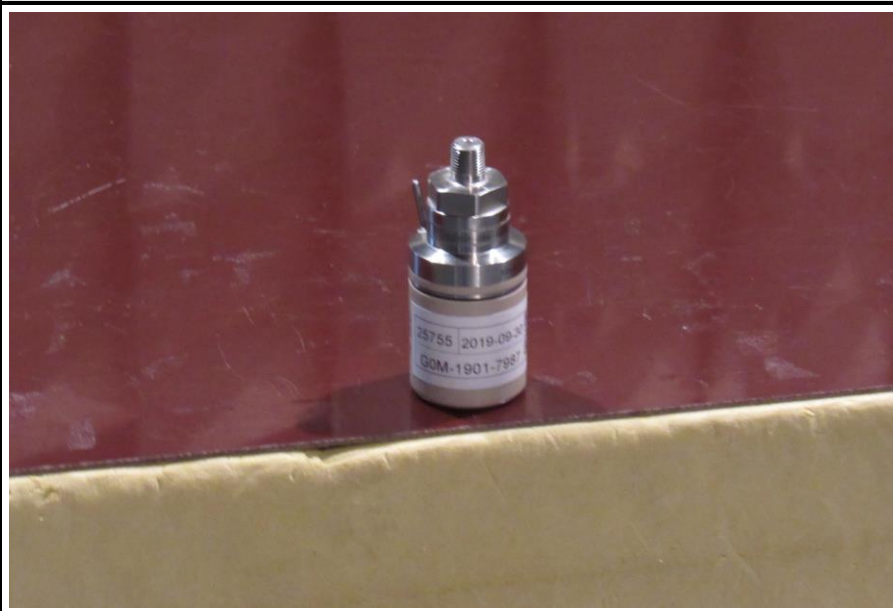
2.1.7 Setup Photos



TEST SETUP 3 RADIATED EMISSION



TEST SETUP FOCUS RADIATED EMISSION



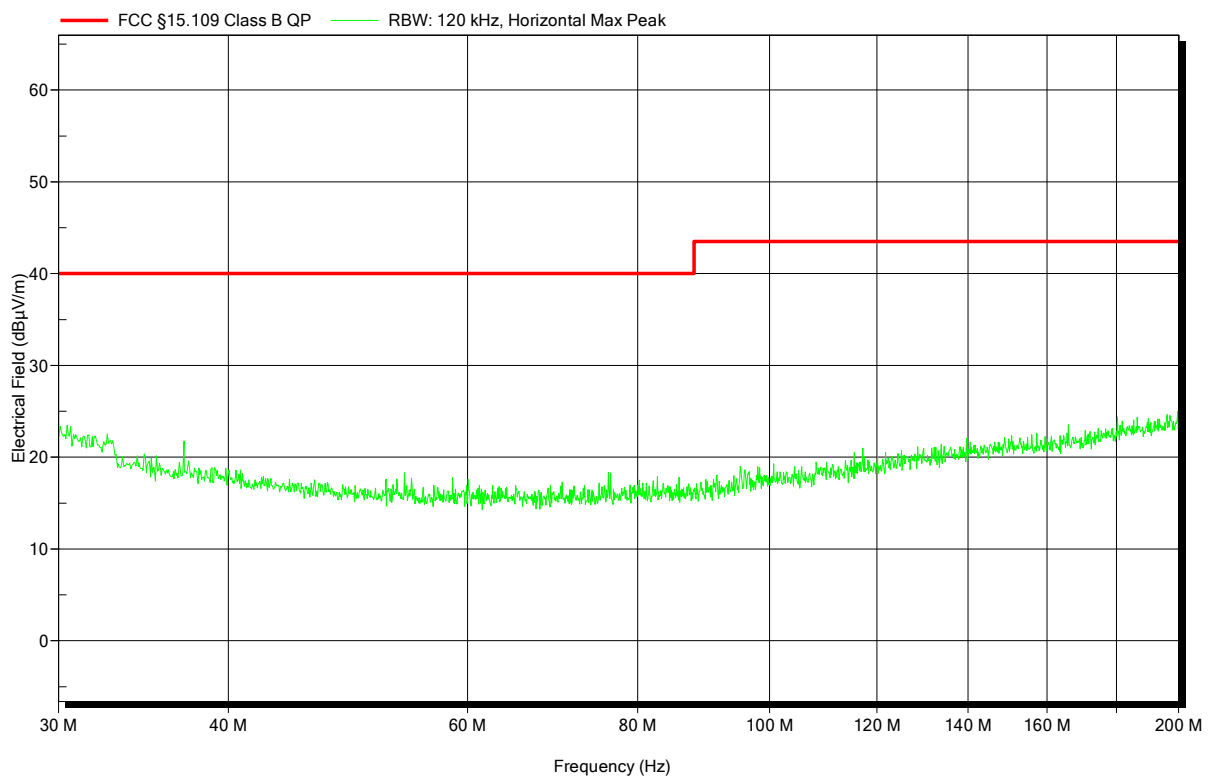
2.1.8 Records

Radiated emissions according to FCC Part 15b

Project number: G0M-1901-7989

Applicant: Amphenol Thermometrics, Inc.
 EUT Name: Kaye ValProbe RT Pressure Temperature Logger
 Model: RF3050 (X2532-RT)
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Liebich
 Test Conditions: Tnom: 22°C, Unom: 3.6 V DC (internal battery)
 Antenna: Rohde & Schwarz HK 116, Horizontal
 Measurement distance: 3m
 Mode: 1
 Test Date: 2019-10-17

Index 2

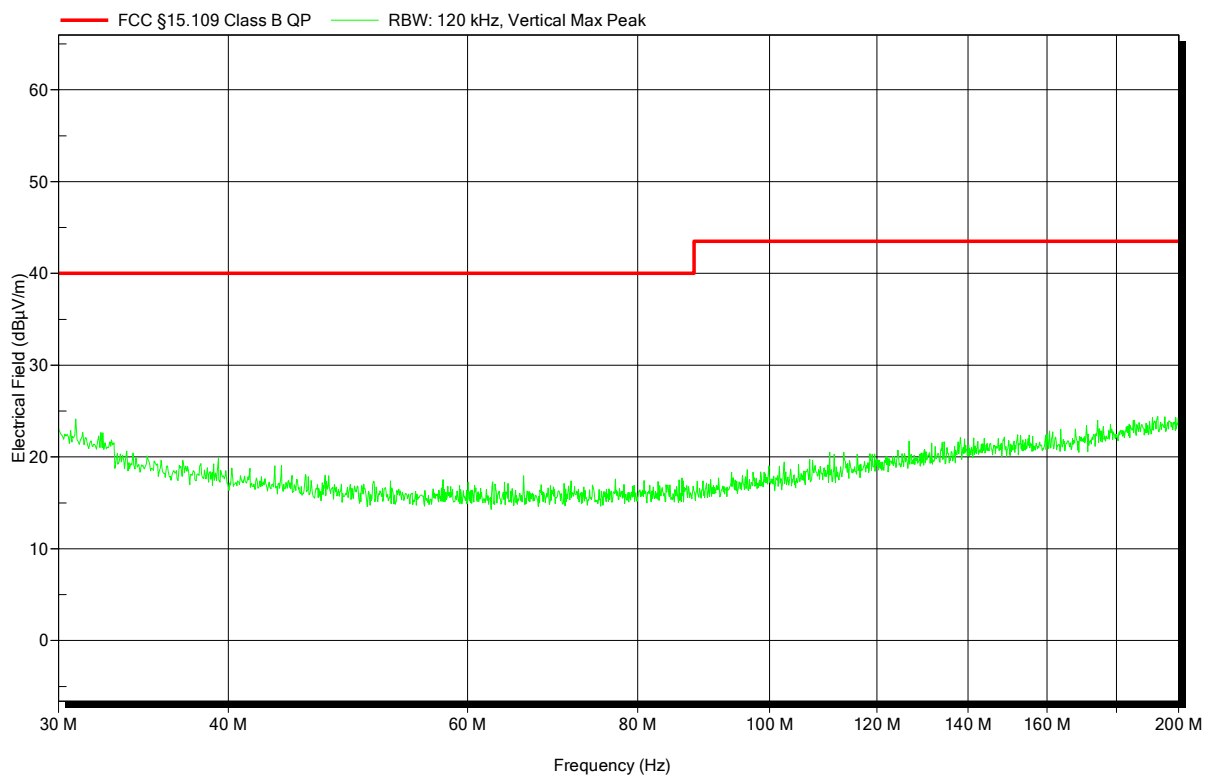


Radiated emissions according to FCC Part 15b

Project number: G0M-1901-7989

Applicant:	Amphenol Thermometrics, Inc.
EUT Name:	Kaye ValProbe RT - Pressure Temperature Logger
Model:	RF3050 (X2532-RT)
Test Site:	Eurofins Product Service GmbH
Operator:	Mr. Liebich
Test Conditions:	Tnom: 22°C, Unom: 3.6 V DC (internal battery)
Antenna:	Rohde & Schwarz HK 116, Vertical
Measurement distance:	3m
Mode:	1
Test Date:	2019-10-17

Index 1

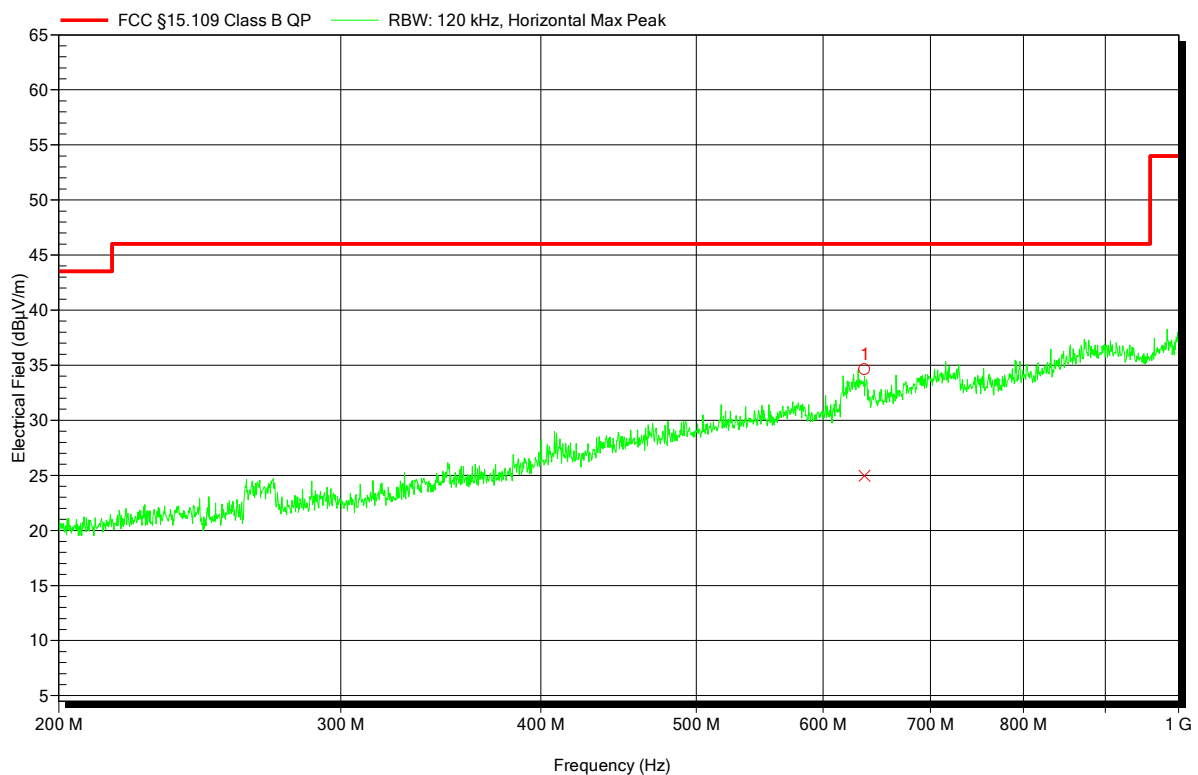


Radiated emissions according to FCC Part 15b

Project number: G0M-1901-7989

Applicant: Amphenol Thermometrics, Inc.
EUT Name: Kaye ValProbe RT Pressure Temperature Logger
Model: RF3050 (X2532-RT)
Test Site: Eurofins Product Service GmbH
Operator: Mr. Liebich
Test Conditions: Tnom: 22°C, Unom: 3.6 V DC (internal battery)
Antenna: Rohde & Schwarz HL 223, Horizontal
Measurement distance: 3m
Mode: 1
Test Date: 2019-10-17

Index 4



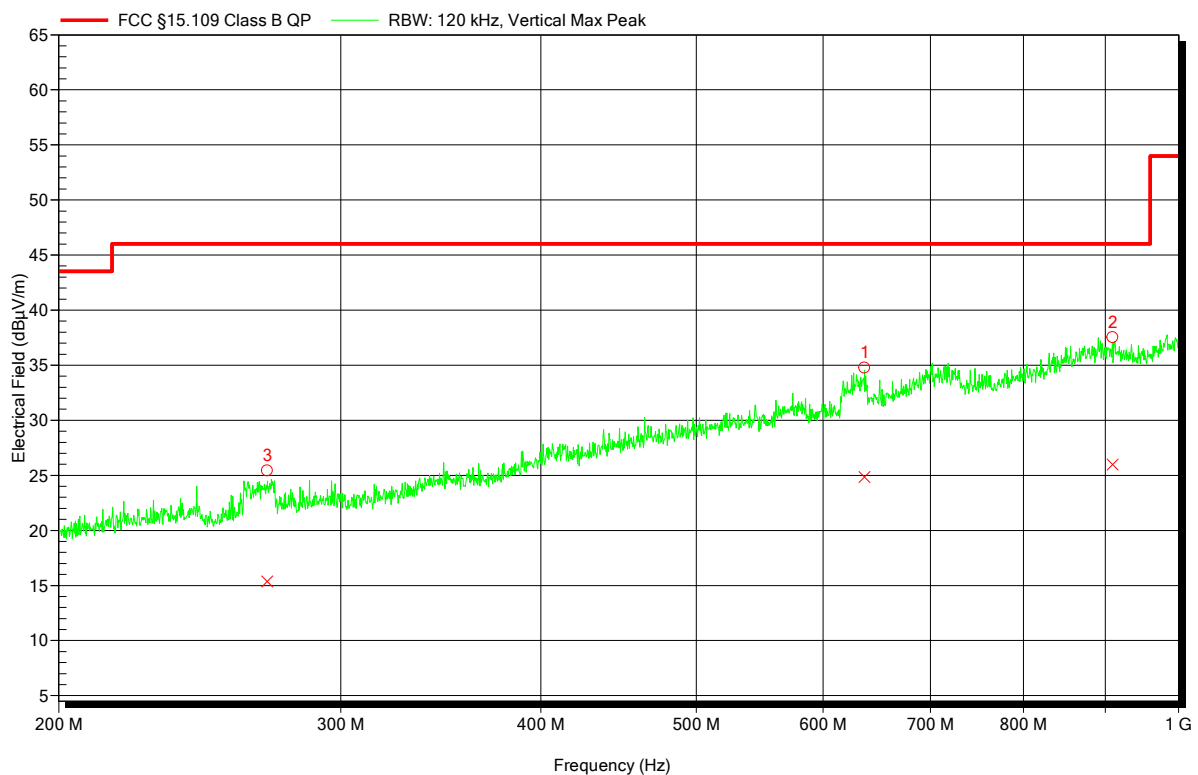
Peak Number	Frequency	Quasi-Peak	Quasi-Peak Limit	Quasi-Peak Difference	Quasi-Peak Status	Angle	Height
1	636.62 MHz	24.95 dBµV/m	46.02 dBµV/m	-21.07 dB	Pass	0 Degree	1 m

Radiated emissions according to FCC Part 15b

Project number: G0M-1901-7989

Applicant: Amphenol Thermometrics, Inc.
EUT Name: Kaye ValProbe RT Pressure Temperature Logger
Model: RF3050 (X2532-RT)
Test Site: Eurofins Product Service GmbH
Operator: Mr. Liebich
Test Conditions: Tnom: 22°C, Unom: 3.6 V DC (internal battery)
Antenna: Rohde & Schwarz HL 223, Vertical
Measurement distance: 3m
Mode: 1
Test Date: 2019-10-17

Index 3



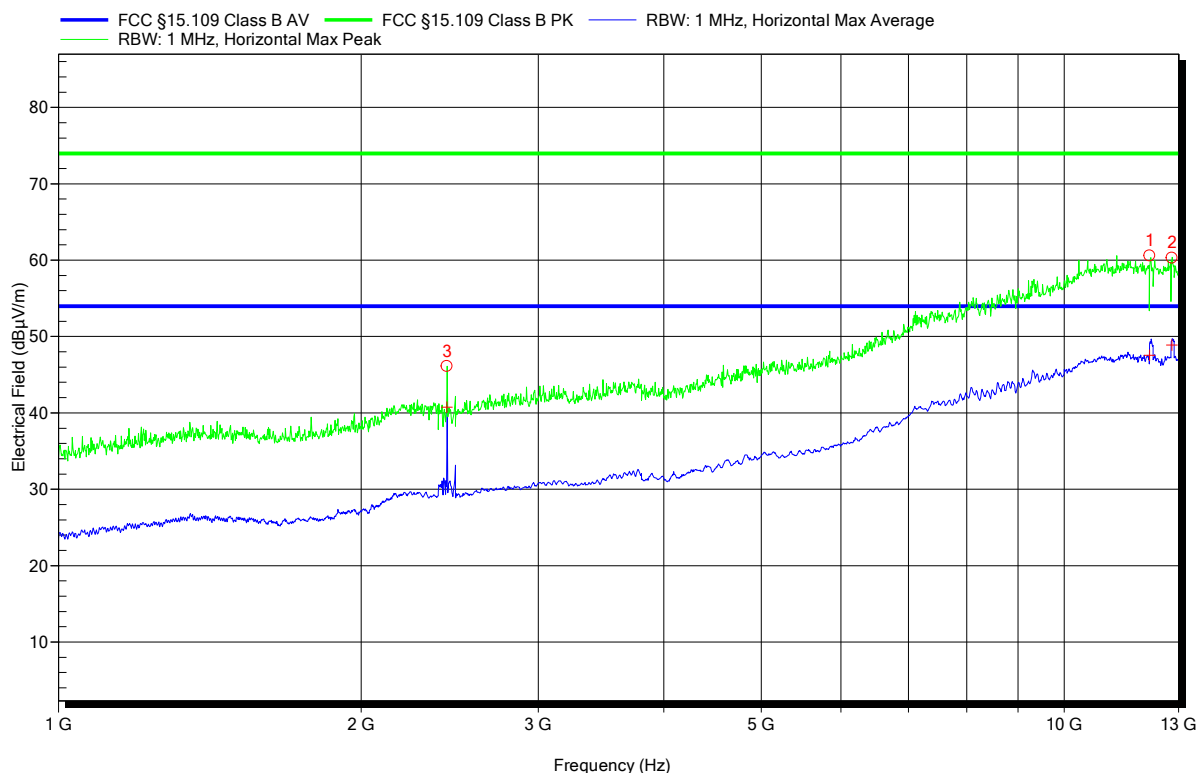
Peak Number	Frequency	Quasi-Peak	Quasi-Peak Limit	Quasi-Peak Difference	Quasi-Peak Status	Angle	Height
1	636.8 MHz	24.84 dBμV/m	46.02 dBμV/m	-21.18 dB	Pass	0 Degree	1 m
2	909.62 MHz	25.99 dBμV/m	46.02 dBμV/m	-20.03 dB	Pass	0 Degree	1 m
3	269.96 MHz	15.36 dBμV/m	46.02 dBμV/m	-30.66 dB	Pass	0 Degree	1 m

Radiated emissions according to FCC Part 15b

Project number: G0M-1901-7989

Applicant: Amphenol Thermometrics, Inc.
 EUT Name: Kaye ValProbe RT Pressure Temperature Logger
 Model: RF3050 (X2532-RT)
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Liebich
 Test Conditions: Tnom: 22°C, Unom: 3.6 V DC (internal battery)
 Antenna: Schwarzbek BBHA 9120D, Horizontal
 Measurement distance: 3m
 Mode: 1
 Test Date: 2019-10-17

Index 12



Peak Number	Frequency	Peak	Peak Limit	Peak Difference	Peak Status	Angle	Height
1	12.16 GHz	60.6 dBμV/m	73.98 dBμV/m	-13.38 dB	Pass	0 Degree	1 m
2	12.794 GHz	60.29 dBμV/m	73.98 dBμV/m	-13.68 dB	Pass	0 Degree	1 m
3	2.434 GHz	46.11 dBμV/m	73.98 dBμV/m	-27.87 dB	Pass	0 Degree	1 m

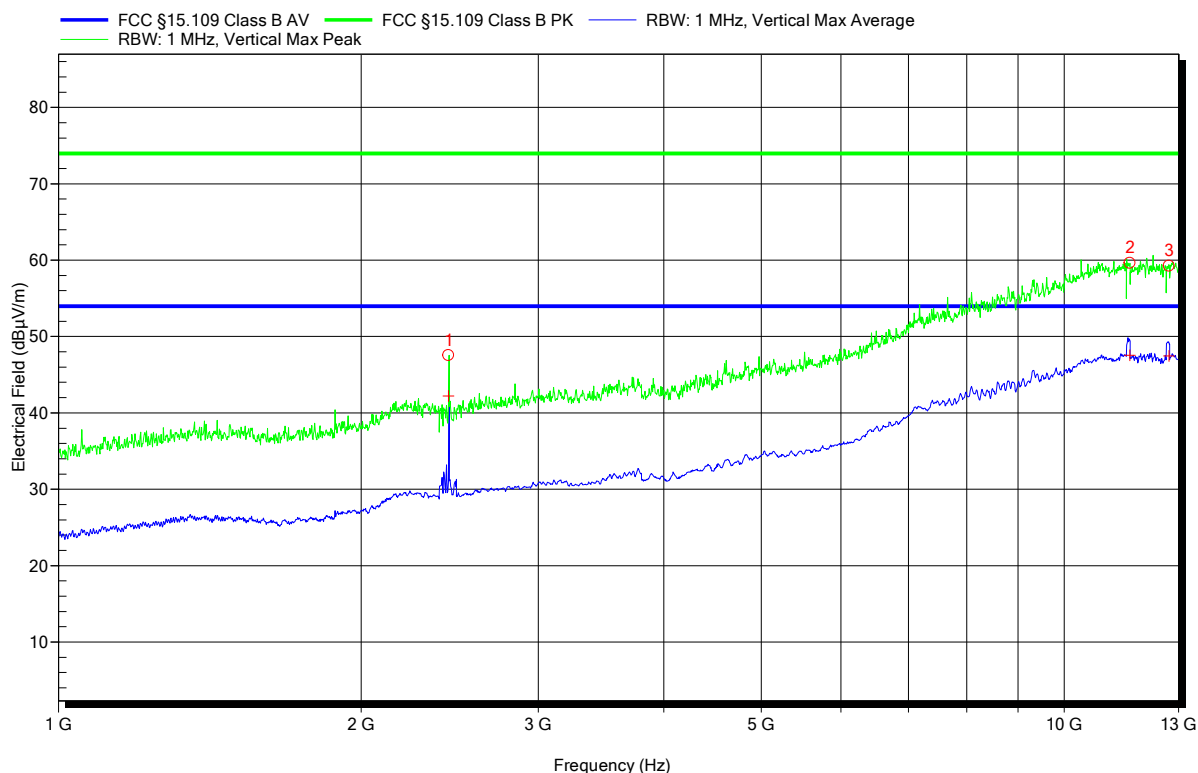
Peak Number	Frequency	Average	Average Limit	Average Difference	Average Status	Angle	Height
1	12.16 GHz	47.56 dBμV/m	53.98 dBμV/m	-6.42 dB	Pass	0 Degree	1 m
2	12.794 GHz	48.88 dBμV/m	53.98 dBμV/m	-5.09 dB	Pass	0 Degree	1 m
3	2.434 GHz	40.75 dBμV/m	53.98 dBμV/m	-13.23 dB	Pass	0 Degree	1 m

Radiated emissions according to FCC Part 15b

Project number: G0M-1901-7989

Applicant: Amphenol Thermometrics, Inc.
 EUT Name: Kaye ValProbe RT Pressure Temperature Logger
 Model: RF3050 (X2532-RT)
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Liebich
 Test Conditions: Tnom: 22°C, Unom: 3.6 V DC (internal battery)
 Antenna: Schwarzbeck BBHA 9120D, Vertical
 Measurement distance: 3m
 Mode: 1
 Test Date: 2019-10-17

Index 11



Peak Number	Frequency	Peak	Peak Limit	Peak Difference	Peak Status	Angle	Height
1	2.443 GHz	47.54 dBμV/m	73.98 dBμV/m	-26.44 dB	Pass	0 Degree	1 m
2	11.625 GHz	59.63 dBμV/m	73.98 dBμV/m	-14.34 dB	Pass	0 Degree	1 m
3	12.711 GHz	59.27 dBμV/m	73.98 dBμV/m	-14.71 dB	Pass	0 Degree	1 m

Peak Number	Frequency	Average	Average Limit	Average Difference	Average Status	Angle	Height
1	2.443 GHz	42.2 dBμV/m	53.98 dBμV/m	-11.78 dB	Pass	0 Degree	1 m
2	11.625 GHz	47.55 dBμV/m	53.98 dBμV/m	-6.42 dB	Pass	0 Degree	1 m
3	12.711 GHz	47.47 dBμV/m	53.98 dBμV/m	-6.51 dB	Pass	0 Degree	1 m