Annex 1: Measurement diagrams to
T E S T   R E P O R T
No.: 16-1-0180701T09a

According to:

FCC Regulations
Part 15.205
Part 15.207
Part 15.209
Part 15.247

for

Viessmann Werke GmbH & Co. KG

ViCare Thermostat

FCC ID: 2AIZ9-VT0318

Laboratory Accreditation and Listings		
DAkkS Deutsche Akkreditierungsstelle D-PL-12047-01-01 Accredited EMC-Test Laboratory	Industry Canada Reg. No.: 3462D-1 Reg. No.: 3462D-2 Reg. No.: 3462D-3	VCI Voluntary Controls for Electromagnetic Emissions Reg. No.: R-20013, C-20009, T-20006, G-20013
WiFi ALLIANCE — AUTHORIZED RF LABORATORY	ctia Authorized™ Test Lab Lab Code: 20011130-00	FC MRA US-EU 0003
accredited according to DIN EN ISO/IEC 17025		
CETECOM GmbH Laboratory Radio Communications & Electromagnetic Compatibility Im Teelbruch 116 • 45219 Essen • Germany Registered in Essen, Germany, Reg. No.: HRB Essen 8984 Tel.: + 49 (0) 20 54 / 95 19-954 • Fax: + 49 (0) 20 54 / 95 19-964 E-mail: info@cetecom.com • Internet: www.cetecom.com		

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1. Conducted RF-Measurements

EUT Information for Conducted Measurements

EUT Name:	ViCare Thermostat
Applicant:	Viessmann Werke GmbH & Co. KG
Serial Number:	#21
Hardware Rev:	Rev.C
Software Rev:	STM32: (V1.40.09), EFR32:(Nodetest) Linux: (V0.1.7)
Connected Interfaces	USB cable to Test Laptop with Smart Thermostat WiFi & ZigBee Test Software
Comment:	Conducted Test Sample
Power Supply:	5 V DC via USB Cable
Test Settings:	ViCare Thermostat WiFi & ZigBee Test Software V1.2
Conducted Ports:	ZigBee Port to Test System | WLAN 2.4 GHz Port Terminated with 50 Ohm

Frequencies

ZigBee CH 11 (2405 MHz)	ZigBee CH 18 (2440 MHz)	ZigBee CH 26 (2480 MHz)

Bandwidths

2 MHz (2 MHz)

Power

CH 11 & CH 18: 19,000 dBm (19 dBm)	CH 26: 5,000 dBm

Beamforming Gain

19,000 dBm (19 dBm)	0 dB

Gain Tables

19,000 dBm (19 dBm)	Port 1: Smart Thermostat Antenna Gain;

DUT Settings

No. of transmission chains	1
Equipment Type	Other
Digital Modulation	Yes
Frequency Hopping	No

Hardware Setup: WMS Measurements\WMS for Conducted Measurements

Spectrum Analyzer:	SA FSU 26 (SA FSU 26) @ VISA (ADR TCPIP::192.168.48.145::INST0::INSTR), SN 200571/026, FW 4.51
Vector Generator:	VG SMU200A (VG SMU200A) @ VISA (ADR TCPIP::192.168.48.148::INST0::INSTR), SN 100754, FW 2.1.96.0-02.10.111.189
Generator:	SMF100A (SMF100A) @ VISA (ADR TCPIP::192.168.48.146::INST0::INSTR), SN 102073, FW Rev 2.21.1, 02/2017, CVI 2015
OSP:	OSP (OSP) @ VISA (ADR TCPIP::192.168.48.147::INST0::INSTR), SN OSP120 V02, 101183, FW 2.53.140911
Power Meter:	OSP-B157 Power Meter (OSP-B157 Power Meter) @ USB (ADR 20), SN 25955149, FW 3.1

1.1. RF Peak Output Power – RBW ≥ DTS Bandwidth Method
1.1.1. RBW ≥ DTS Bandwidth Peak Power-ZigBee 2.4 GHz Mode- 2 MHz- 250 kbps

DUT Frequency (MHz)	Peak Power (dBm)	Limit Max (dBm)	Result
2405.000000	17.0	30.0	PASS
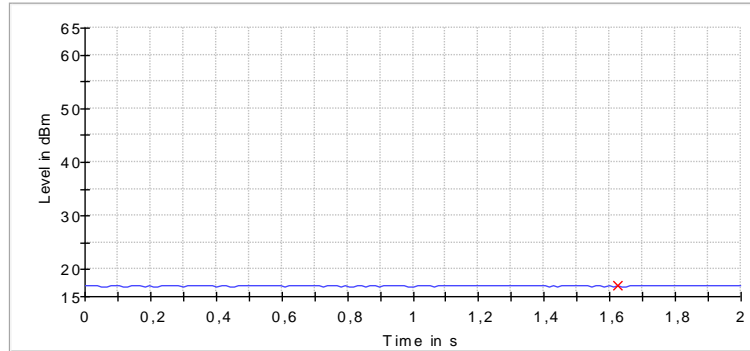
RBW ≥ DTS Bandwidth Peak Power- ZigBee 2.4 GHz Mode- 2 MHz- 250 kbps -PWR-PK-CH11-19dBm

DUT Frequency (MHz)	Peak Power (dBm)	Limit Max (dBm)	Result
2440.000000	16.9	30.0	PASS
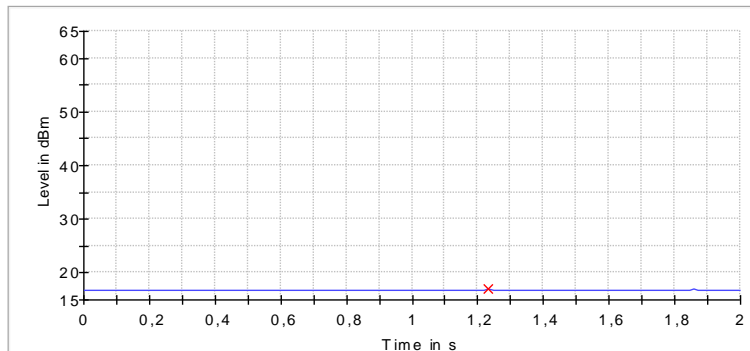
RBW ≥ DTS Bandwidth Peak Power- ZigBee 2.4 GHz Mode- 2 MHz- 250 kbps -PWR-PK-CH18-19dBm

DUT Frequency (MHz)	Peak Power (dBm)	Limit Max (dBm)	Result
2480.000000	5.7	30.0	PASS
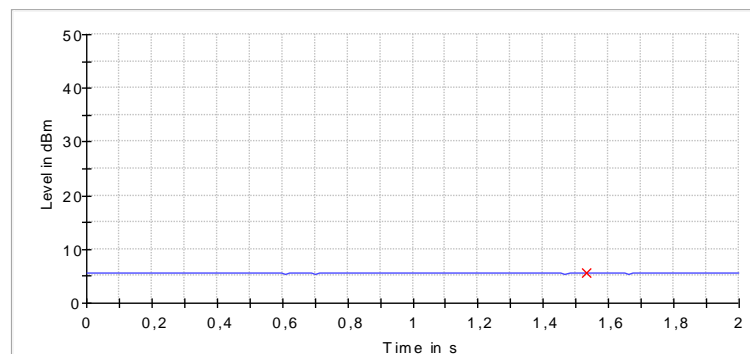
RBW ≥ DTS Bandwidth Peak Power- ZigBee 2.4 GHz Mode- 2 MHz- 250 kbps -PWR-PK-CH26-5dBm

1.2. RF RMS Output Power & Duty Cycle Measurement

1.2.1. RMS Power + Duty Cycle - ZigBee 2.4 GHz Mode- 2 MHz- 250 kbps

DUT Frequency (MHz)	Gated RMS (dBm)	Limit Max (dBm)	Gated EIRP (dBm)	Duty Cycle (%)	Result
2405.000000	17.1	30.0	15.1	100.000	PASS
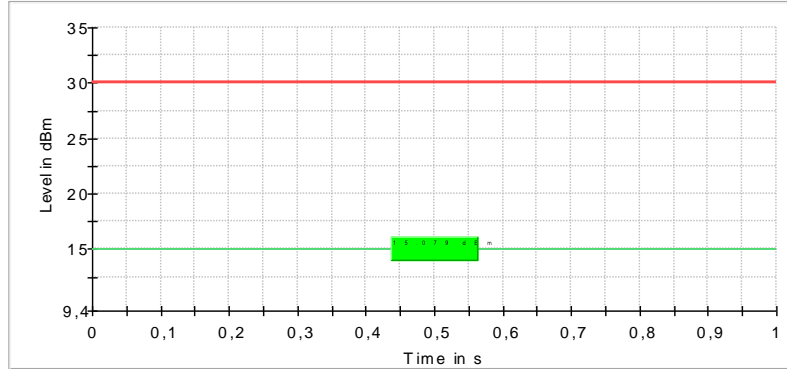
RMS Power + Duty Cycle- ZigBee 2.4 GHz Mode- 2 MHz- 250 kbps -CH11-19dBm

DUT Frequency (MHz)	Gated RMS (dBm)	Limit Max (dBm)	Gated EIRP (dBm)	Duty Cycle (%)	Result
2440.000000	16.9	30.0	14.9	100.000	PASS
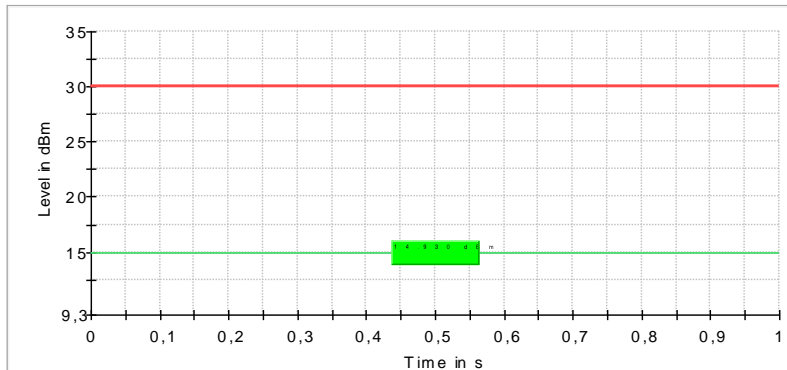
RMS Power + Duty Cycle- ZigBee 2.4 GHz Mode- 2 MHz- 250 kbps -CH18-19dBm

DUT Frequency (MHz)	Gated RMS (dBm)	Limit Max (dBm)	Gated EIRP (dBm)	Duty Cycle (%)	Result
2480.000000	5.2	30.0	3.2	100.000	PASS
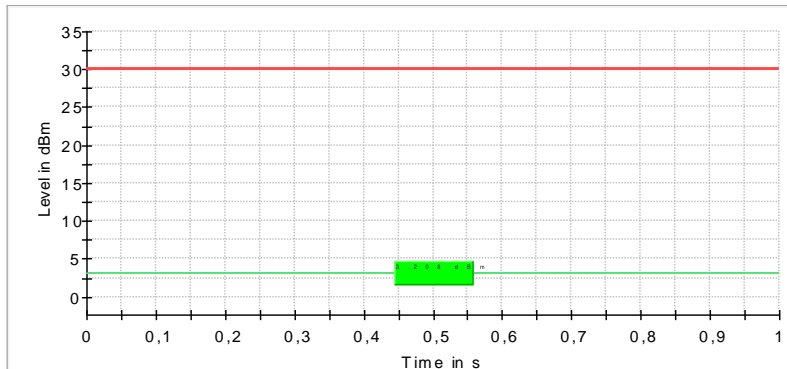
RMS Power + Duty Cycle- ZigBee 2.4 GHz Mode- 2 MHz- 250 kbps - CH26-5dBm

1.3. Power Spectral Density
1.3.1. Power Spectral Density - ZigBee 2.4 GHz Mode- 2 MHz- 250 kbps

DUT Frequency (MHz)	Frequency (MHz)	PSD (dBm)	Limit Max (dBm)	Result
2405.000000	2404.568182	1.233	8.0	**PASS**
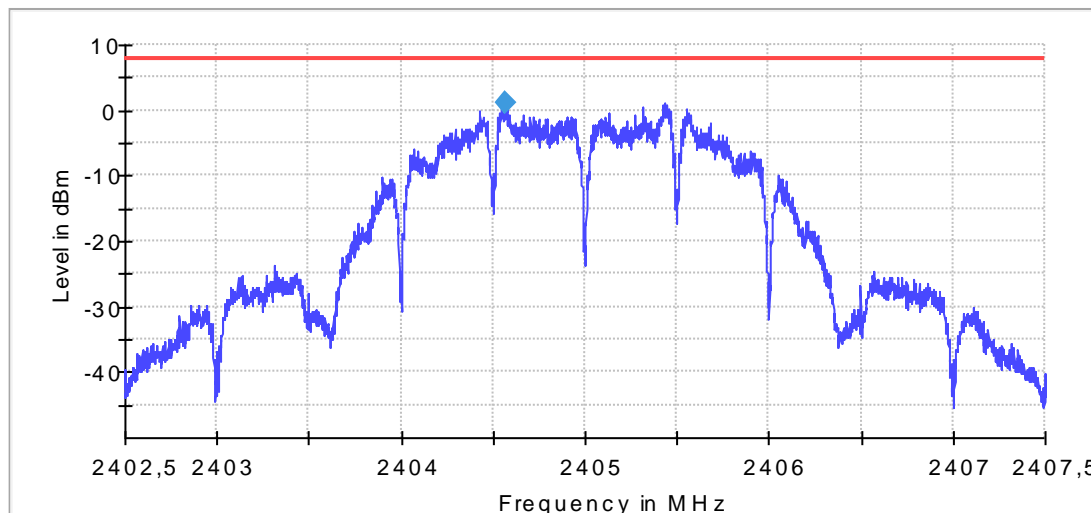
Power Spectral Density - ZigBee 2.4 GHz Mode- 2 MHz- 250 kbps -CH11-19dBm

Measurement

Setting	Instrument Value	Target Value
Start Frequency	2.40250 GHz	2.40250 GHz
Stop Frequency	2.40750 GHz	2.40750 GHz
Span	5.000 MHz	5.000 MHz
RBW	3.000 kHz	<= 3.000 kHz
VBW	10.000 kHz	>= 9.000 kHz
SweepPoints	3301	~ 3333
Sweeptime	115.000 s	AUTO
Reference Level	10.000 dBm	10.000 dBm
Attenuation	35.000 dB	AUTO
Detector	MaxPeak	MaxPeak
SweepCount	1	1
Filter	Channel	Channel
Trace Mode	Max Hold	Max Hold
Sweeptype	Sweep	Sweep
Preamp	off	off

DUT Frequency (MHz)	Frequency (MHz)	PSD (dBm)	Limit Max (dBm)	Result
2440.000000	2439.566667	1.189	8.0	PASS

Power Spectral Density - ZigBee 2.4 GHz Mode- 2 MHz- 250 kbps -CH18-19dBm

Measurement

Setting	Instrument Value	Target Value
Start Frequency	2.43750 GHz	2.43750 GHz
Stop Frequency	2.44250 GHz	2.44250 GHz
Span	5.000 MHz	5.000 MHz
RBW	3.000 kHz	<= 3.000 kHz
VBW	10.000 kHz	>= 9.000 kHz
SweepPoints	3301	~ 3333
Sweeptime	115.000 s	AUTO
Reference Level	10.000 dBm	10.000 dBm
Attenuation	35.000 dB	AUTO
Detector	MaxPeak	MaxPeak
SweepCount	1	1
Filter	Channel	Channel
Trace Mode	Max Hold	Max Hold
Sweeptype	Sweep	Sweep
Preamp	off	off

DUT Frequency (MHz)	Frequency (MHz)	PSD (dBm)	Limit Max (dBm)	Result
2480.000000	2480.434848	-10.919	8.0	PASS
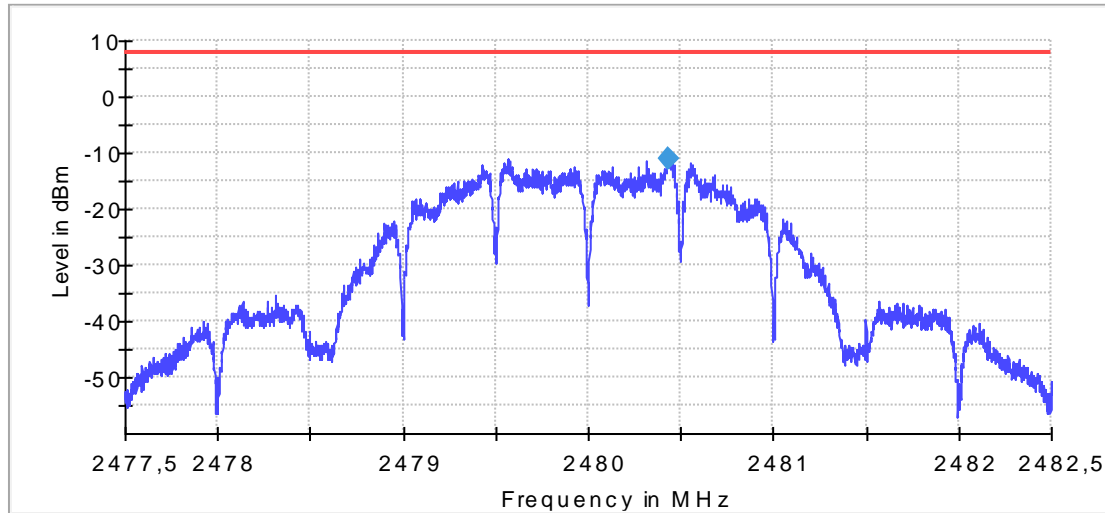
Power Spectral Density - ZigBee 2.4 GHz Mode- 2 MHz- 250 kbps -CH26-5dBm

Measurement

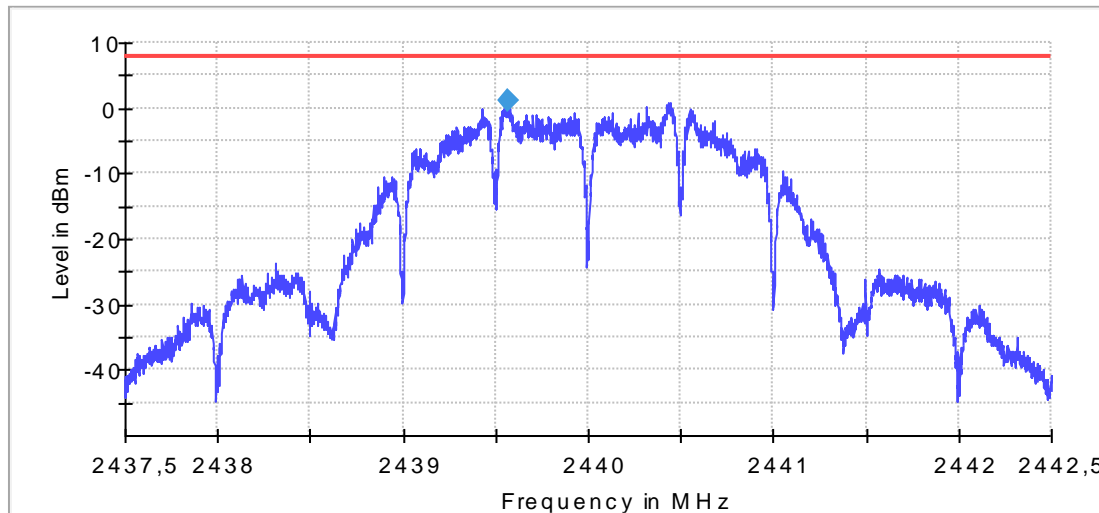| Setting	Instrument Value	Target Value
Start Frequency	2.47750 GHz	2.47750 GHz
Stop Frequency	2.48250 GHz	2.48250 GHz
Span	5.000 MHz	5.000 MHz
RBW	3.000 kHz	<= 3.000 kHz
VBW	10.000 kHz	>= 9.000 kHz
SweepPoints	3301	~ 3333
Sweeptime	115.000 s	AUTO
Reference Level	0.000 dBm	0.000 dBm
Attenuation	25.000 dB	AUTO
Detector	MaxPeak	MaxPeak
SweepCount	1	1
Filter	Channel	Channel
Trace Mode	Max Hold	Max Hold
Sweeptype	Sweep	Sweep
Preamp	off	off

1.4. 6 dB Bandwidth & 99% Occupied Bandwidth
1.4.1. 6 dB BW & 99% OBW - ZigBee 2.4 GHz Mode- 2 MHz- 250 kbps

6 dB Bandwidth

DUT Frequency (MHz)	Bandwidth (MHz)	Limit Min (MHz)	Band Edge Left (MHz)	Band Edge Right (MHz)	Max Level (dBm)	Result
2405.000000	1.818182	0.500000	2404.090909	2405.909091	11.2	PASS
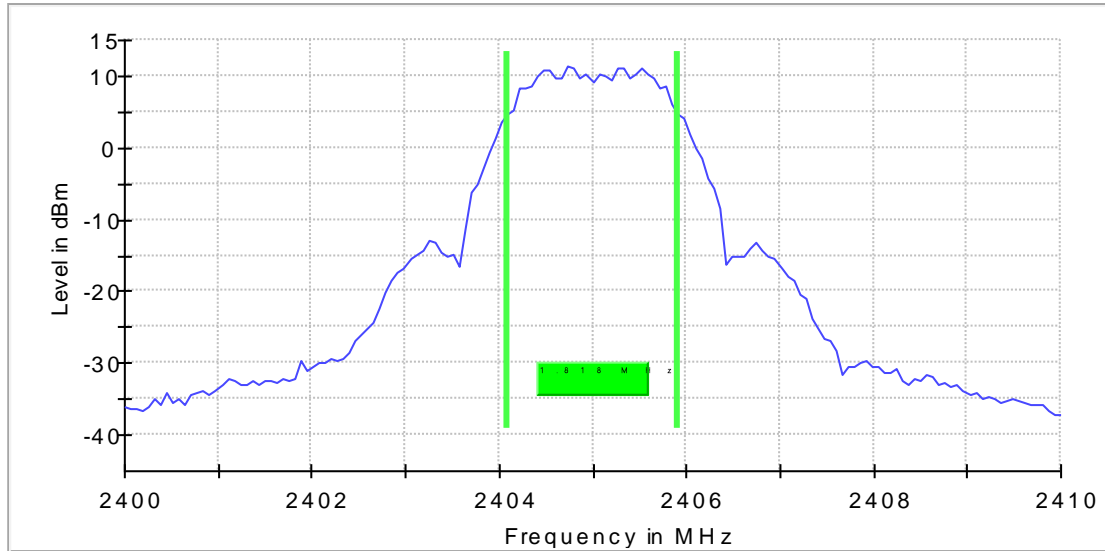
6 dB Bandwidth- ZigBee 2.4 GHz Mode- 2 MHz- 250 kbps -CH11-19dBm

99 % Bandwidth

DUT Frequency (MHz)	Bandwidth (MHz)	Limit Min (MHz)	Limit Max (MHz)	Band Edge Left (MHz)	Limit Min BE L (MHz)
2412.000000	2.29047619	---	---	2403.852381	2400.000000

DUT Frequency (MHz)	Band Edge Right (MHz)	Limit Max BE R (MHz)	Result
2412.000000	2406.142857	2483.500000	PASS
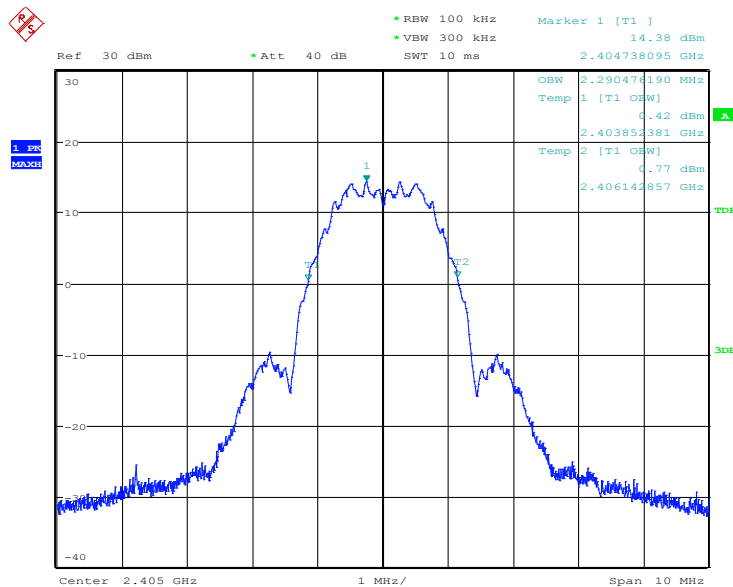
99% Bandwidth-ZigBee 2.4 GHz Mode- 2 MHz- 250 kbps -CH11-19dBm

Measurement

Setting	Instrument Value	Target Value
Start Frequency	2.40000 GHz	2.40000 GHz
Stop Frequency	2.41000 GHz	2.41000 GHz
Span	10.000 MHz	10.000 MHz
RBW	100.000 kHz	~ 100.000 kHz
VBW	300.000 kHz	~ 300.000 kHz
SweepPoints	155	~ 100
Sweeptime	5.000 ms	AUTO
Reference Level	10.000 dBm	10.000 dBm
Attenuation	35.000 dB	AUTO
Detector	MaxPeak	MaxPeak
SweepCount	100	100
Filter	3 dB	3 dB
Trace Mode	Max Hold	Max Hold
Sweeptype	Sweep	AUTO
Preamp	off	off
Stablemode	Trace	Trace
Stablevalue	0.50 dB	0.50 dB
Run	27 / max. 150	max. 150
Stable	15 / 15	15
Max Stable Difference	0.04 dB	0.50 dB

DUT Frequency (MHz)	Bandwidth (MHz)	Limit Min (MHz)	Band Edge Left (MHz)	Band Edge Right (MHz)	Max Level (dBm)	Result
2440.000000	1.753247	0.500000	2439.155844	2440.909091	11.1	PASS
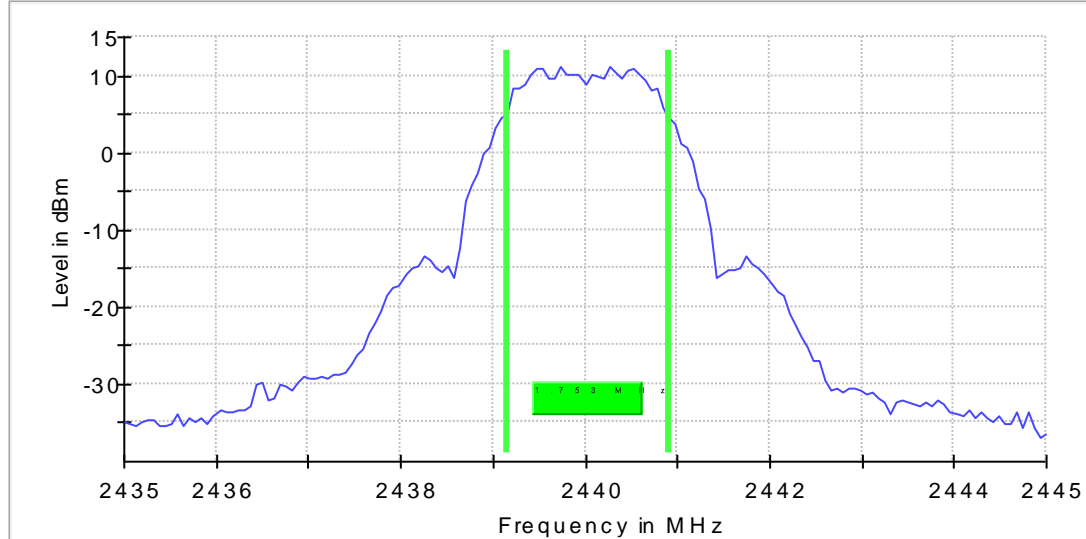
6 dB Bandwidth- ZigBee 2.4 GHz Mode- 2 MHz- 250 kbps -CH18-19dBm

99 % Bandwidth

DUT Frequency (MHz)	Bandwidth (MHz)	Limit Min (MHz)	Limit Max (MHz)	Band Edge Left (MHz)	Limit Min BE L (MHz)
2412.000000	2.29047619	---	---	2438.852381	2400.000000

DUT Frequency (MHz)	Band Edge Right (MHz)	Limit Max BE R (MHz)	Result
2412.000000	2441.142857	2483.500000	PASS
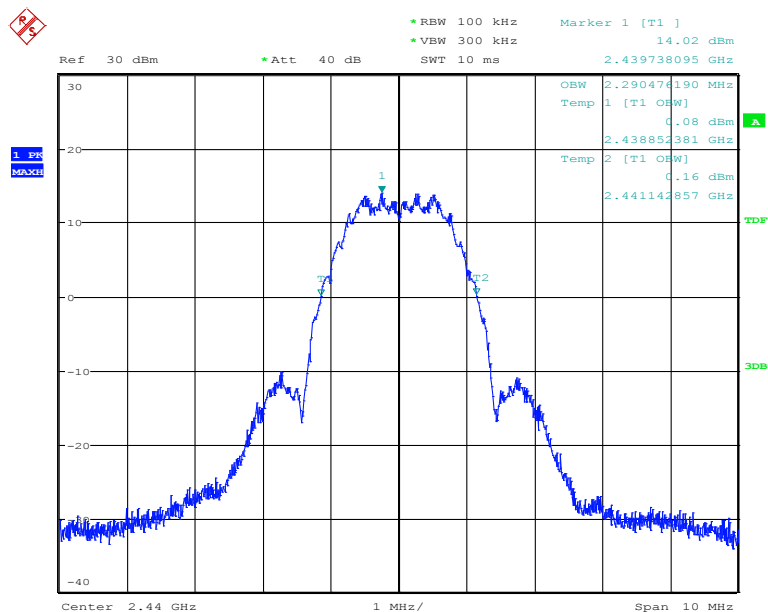
99% Bandwidth- ZigBee 2.4 GHz Mode- 2 MHz- 250 kbps -CH18-19dBm

Measurement

Setting	Instrument Value	Target Value
Start Frequency	2.43500 GHz	2.43500 GHz
Stop Frequency	2.44500 GHz	2.44500 GHz
Span	10.000 MHz	10.000 MHz
RBW	100.000 kHz	~ 100.000 kHz
VBW	300.000 kHz	~ 300.000 kHz
SweepPoints	155	~ 100
Sweeptime	5.000 ms	AUTO
Reference Level	10.000 dBm	10.000 dBm
Attenuation	35.000 dB	AUTO
Detector	MaxPeak	MaxPeak
SweepCount	100	100
Filter	3 dB	3 dB
Trace Mode	Max Hold	Max Hold
Sweeptype	Sweep	AUTO
Preamp	off	off
Stablemode	Trace	Trace
Stablevalue	0.50 dB	0.50 dB
Run	24 / max. 150	max. 150
Stable	15 / 15	15
Max Stable Difference	0.00 dB	0.50 dB

| DUT Frequency (MHz)	Bandwidth (MHz)	Limit Min (MHz)	Band Edge Left (MHz)	Band Edge Right (MHz)	Max Level (dBm)	Result
2480.000000	1.818182	0.500000	2479.090909	2480.909091	-0.6	PASS
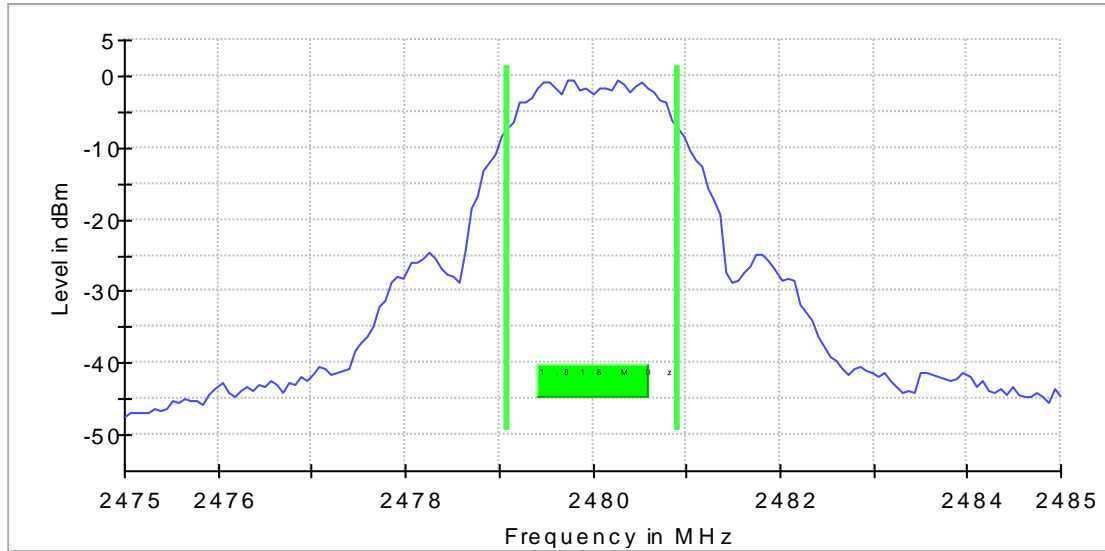
6 dB Bandwidth- ZigBee 2.4 GHz Mode- 2 MHz- 250 kbps –CH26-5 dBm

99 % Bandwidth

DUT Frequency (MHz)	Bandwidth (MHz)	Limit Min (MHz)	Limit Max (MHz)	Band Edge Left (MHz)	Limit Min BE L (MHz)
2412.000000	2.323805524	---	---	2478.833333	2400.000000

DUT Frequency (MHz)	Band Edge Right (MHz)	Limit Max BE R (MHz)	Result
2412.000000	2481.157143	2483.500000	PASS
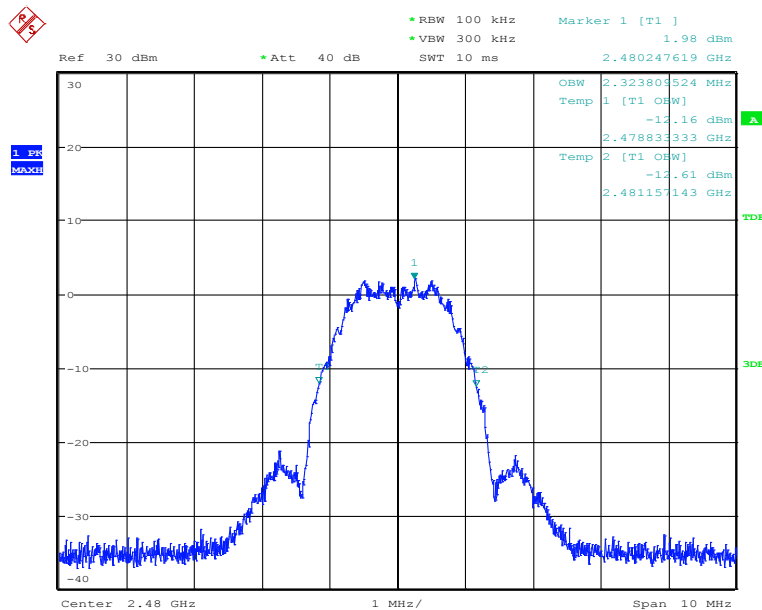
99% Bandwidth- ZigBee 2.4 GHz Mode- 2 MHz- 250 kbps –CH26-5 dBm

Measurement

Setting	Instrument Value	Target Value
Start Frequency	2.47500 GHz	2.47500 GHz
Stop Frequency	2.48500 GHz	2.48500 GHz
Span	10.000 MHz	10.000 MHz
RBW	100.000 kHz	~ 100.000 kHz
VBW	300.000 kHz	~ 300.000 kHz
SweepPoints	155	~ 100
Sweeptime	5.000 ms	AUTO
Reference Level	0.000 dBm	0.000 dBm
Attenuation	25.000 dB	AUTO
Detector	MaxPeak	MaxPeak
SweepCount	100	100
Filter	3 dB	3 dB
Trace Mode	Max Hold	Max Hold
Sweeptype	Sweep	AUTO
Preamp	off	off
Stablemode	Trace	Trace
Stablevalue	0.50 dB	0.50 dB
Run	19 / max. 150	max. 150
Stable	15 / 15	15
Max Stable Difference	0.00 dB	0.50 B

1.5. 20dBc Conducted Spurious Emissions
1.5.1. 20 dBc - ZigBee 2.4 GHz Mode- 2 MHz- 250 kbps
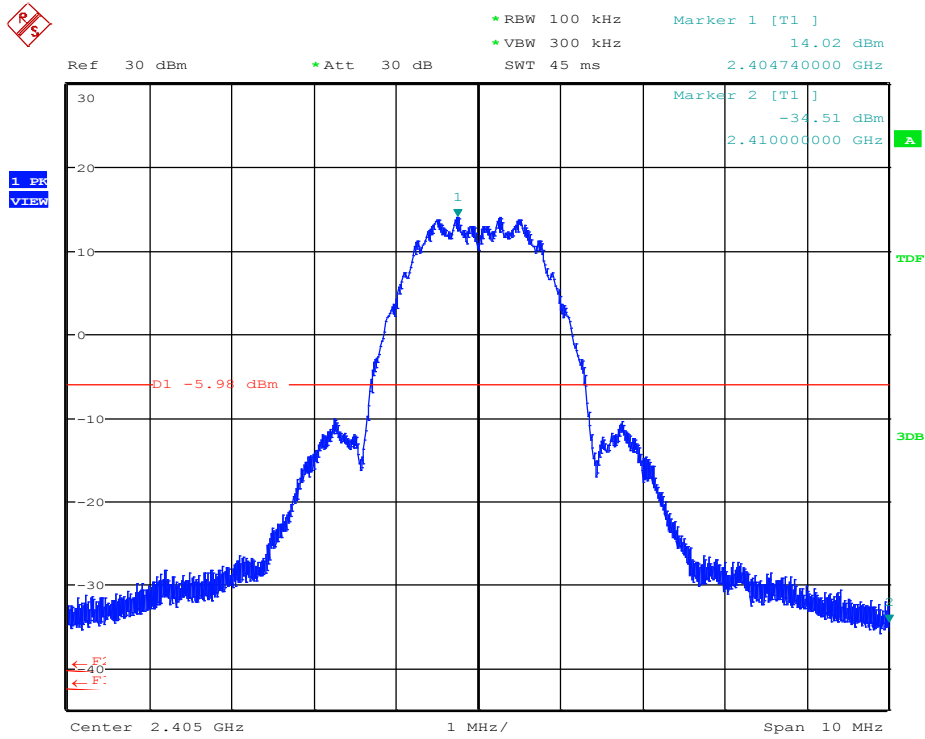
20dBc-Ref- ZigBee 2.4 GHz Mode- 2 MHz- 250 kbps -CH11-19dBm
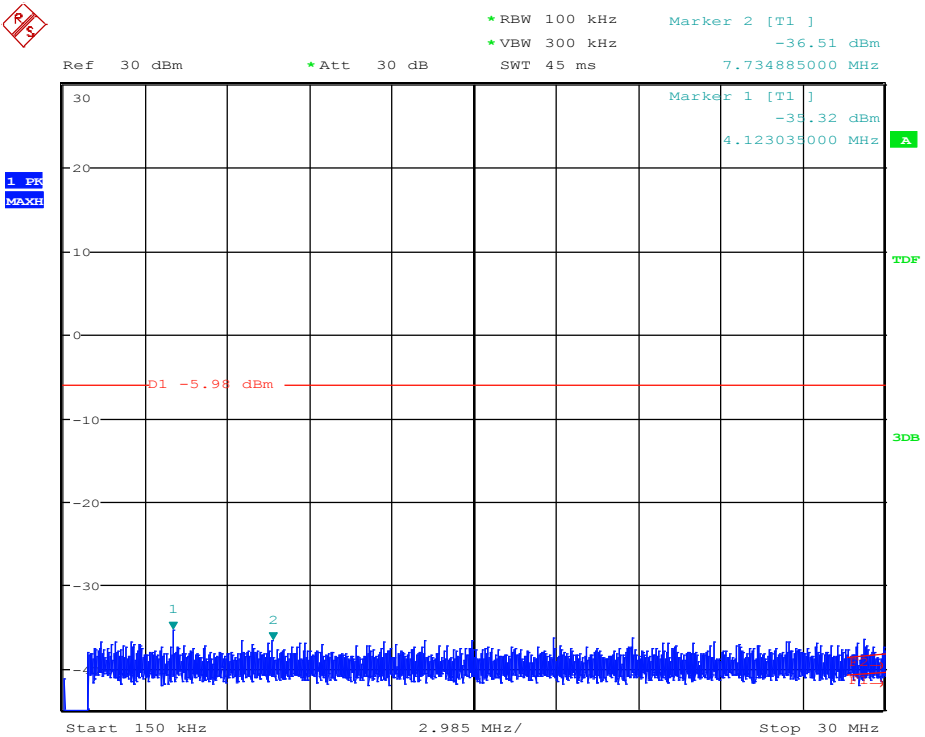
20dBc-0.15MHz-30MHz-ZigBee 2.4 GHz Mode- 2 MHz- 250 kbps -CH11-19dBm
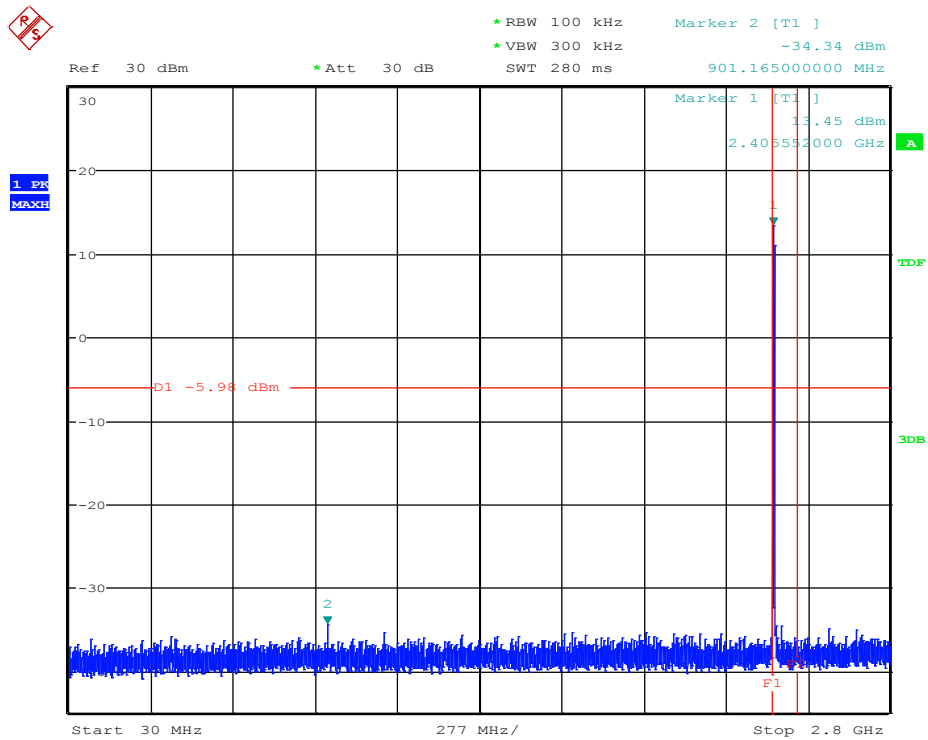
20dBc-30MHz-2.8GHz- ZigBee 2.4 GHz Mode- 2 MHz- 250 kbps -CH11-19dBm
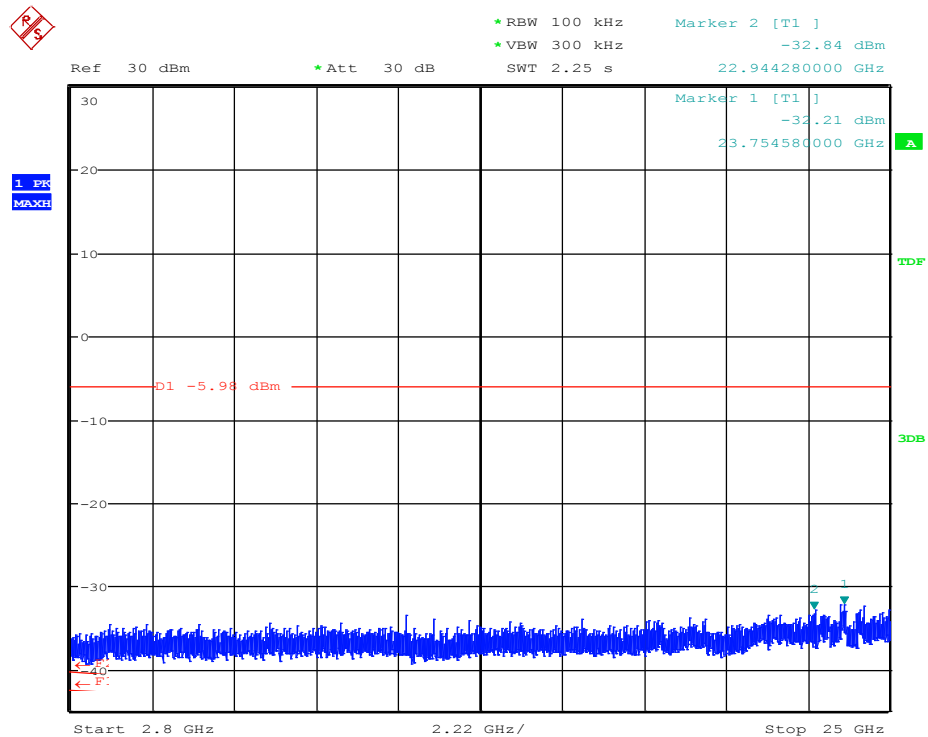
20dBc-2.8GHz-25GHz- ZigBee 2.4 GHz Mode- 2 MHz- 250 kbps -CH11-19dBm
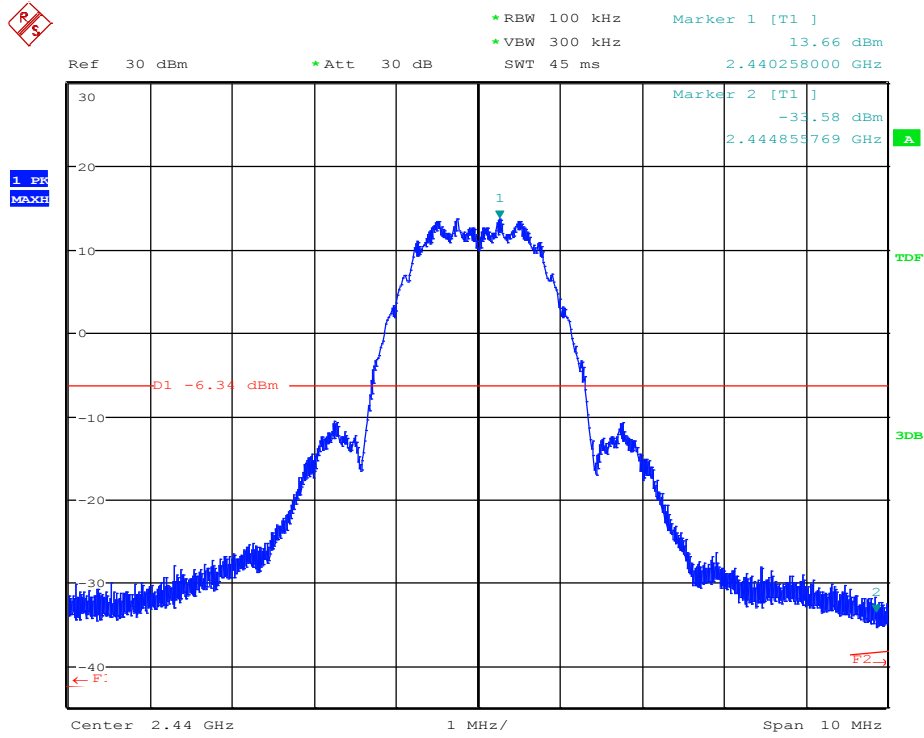
20dBc-Ref- ZigBee 2.4 GHz Mode- 2 MHz- 250 kbps -CH18-19dBm
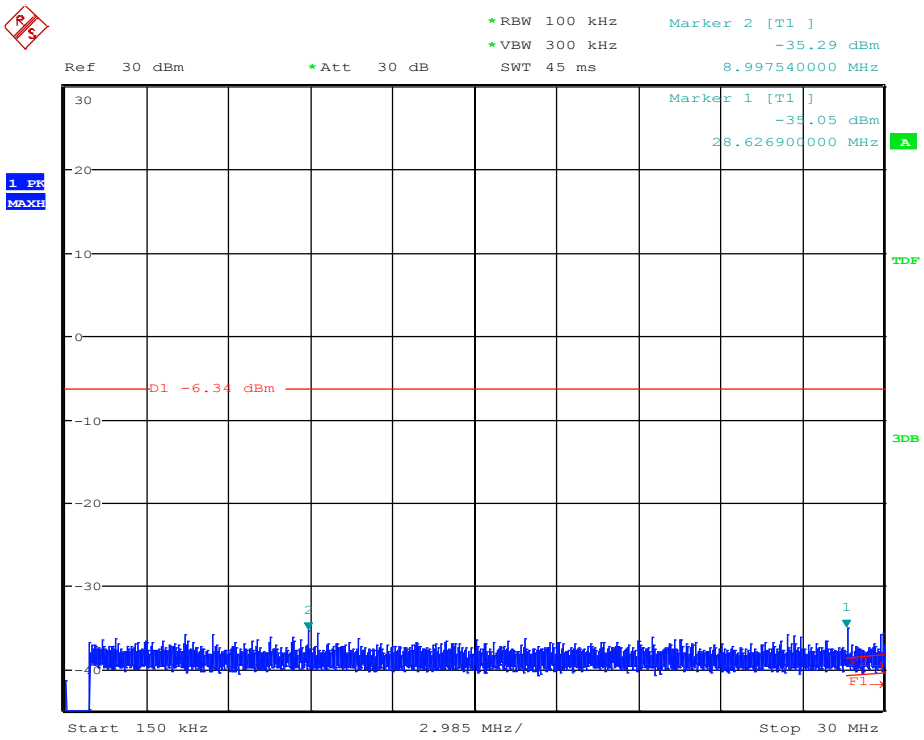
20dBc-0.15MHz-30MHz-ZigBee 2.4 GHz Mode- 2 MHz- 250 kbps -CH18-19dBm
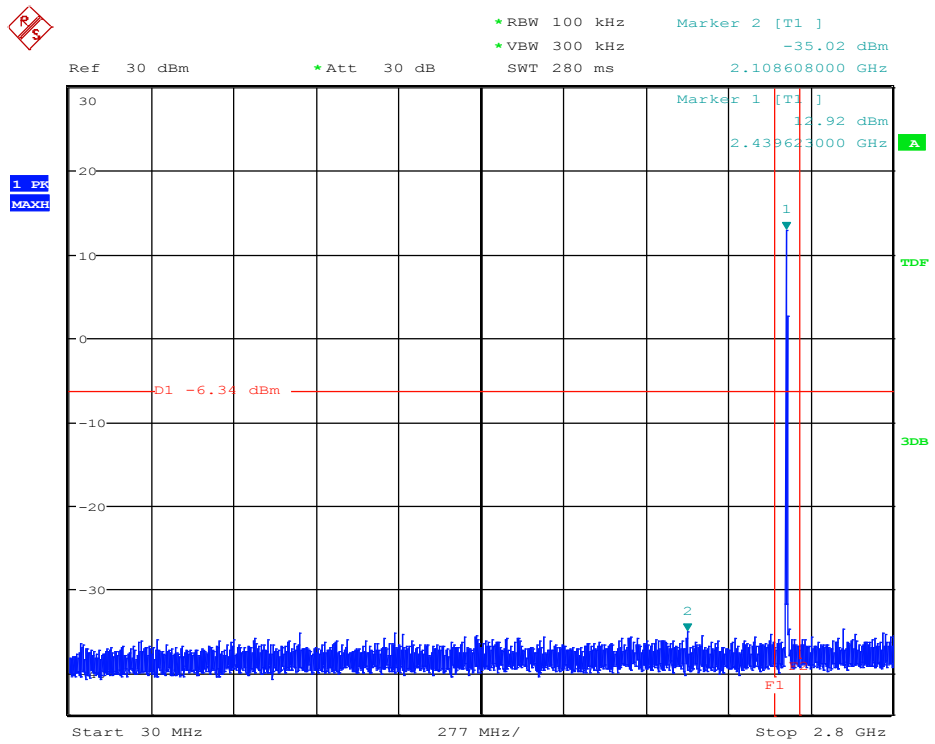
20dBc-30MHz-2.8GHz- ZigBee 2.4 GHz Mode- 2 MHz- 250 kbps -CH18-19dBm
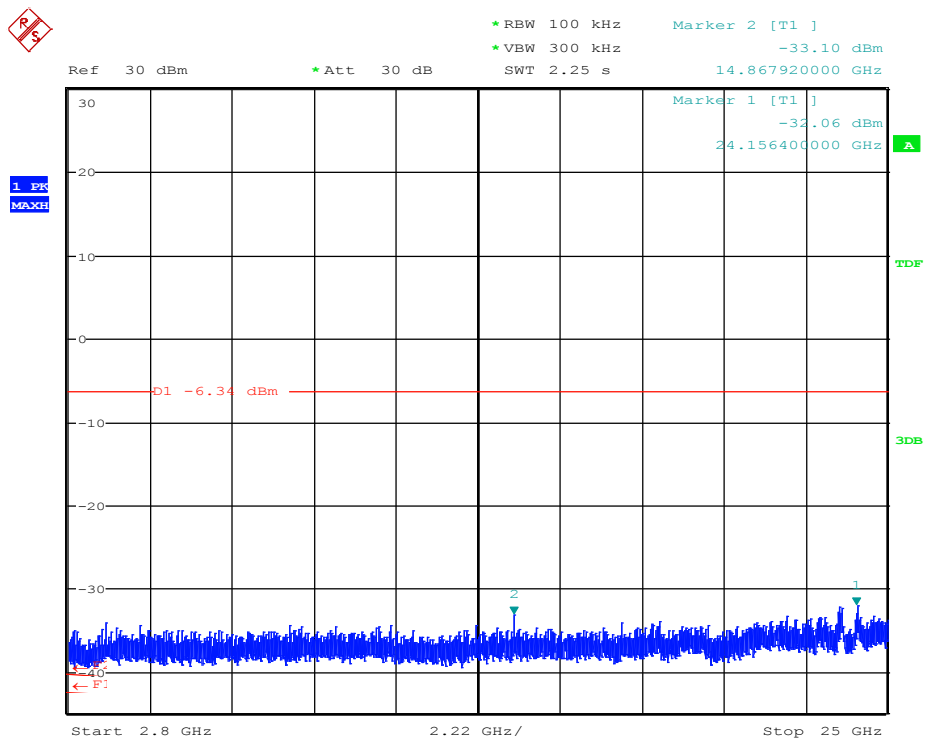
20dBc-2.8GHz-25GHz- ZigBee 2.4 GHz Mode- 2 MHz- 250 kbps -CH18-19dBm
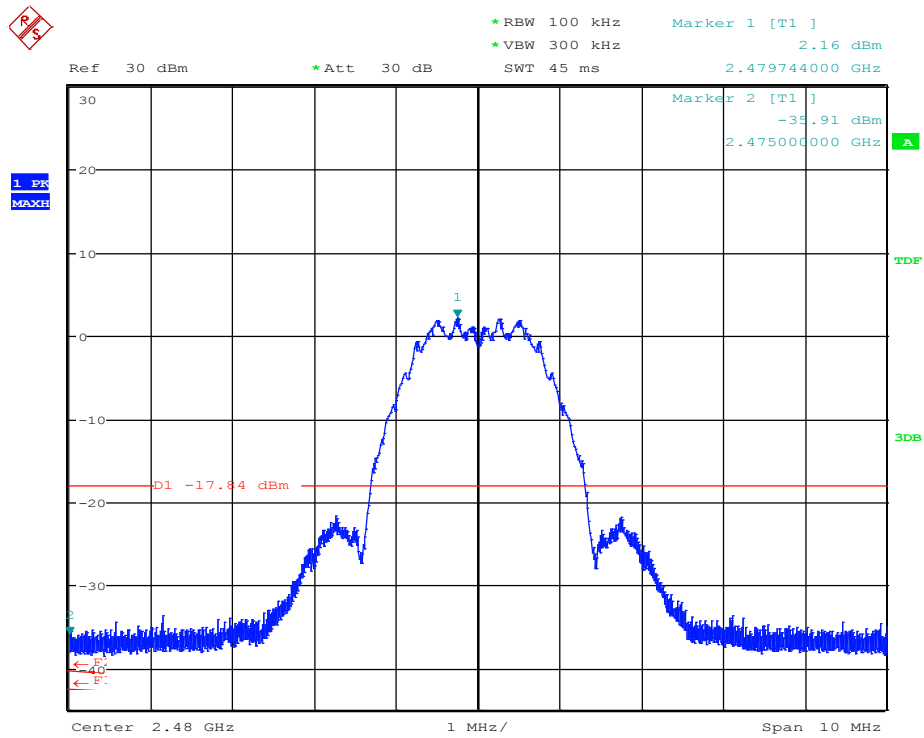
20dBc-Ref- ZigBee 2.4 GHz Mode- 2 MHz- 250 kbps –CH26-5dBm
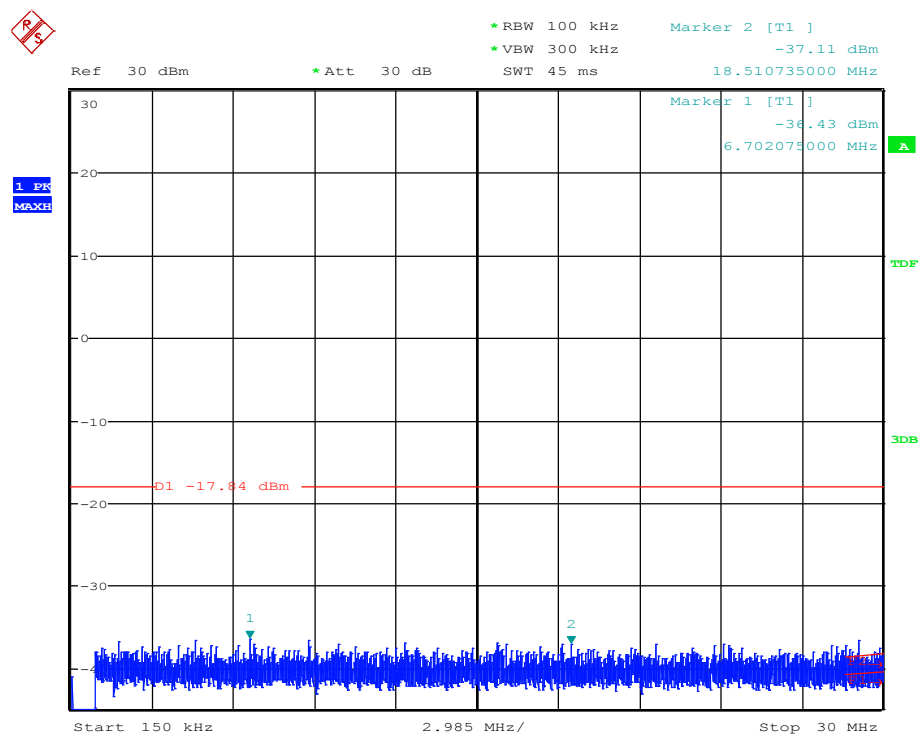
20dBc-0.15MHz-30MHz-ZigBee 2.4 GHz Mode- 2 MHz- 250 kbps –CH26-5dBm
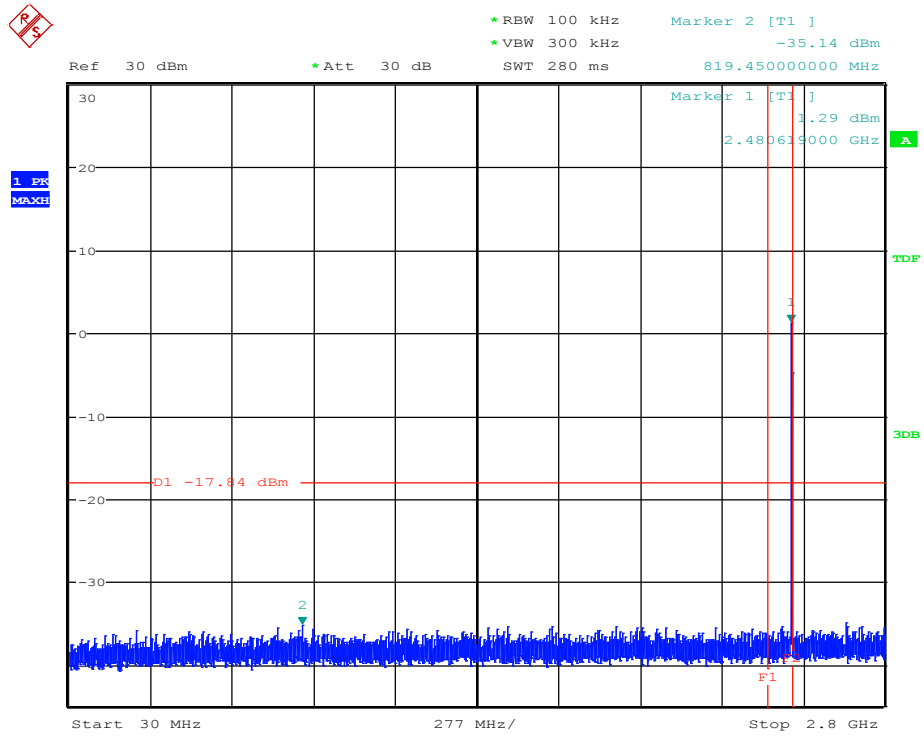
Ref 30 dBm · *Att 30 dB · SWT 280 ms

* RBW 100 kHz
* VBW 300 kHz

Marker 2 [T1]
-35.14 dBm
819.450000000 MHz

Marker 1 [T1]
1.29 dBm
2.480619000 GHz · A

1 PK MAXH

TDF

3DB

D1 -17.84 dBm

Start 30 MHz · 277 MHz/ · Stop 2.8 GHz

20dBc-30MHz-2.8GHz- ZigBee 2.4 GHz Mode- 2 MHz- 250 kbps –CH26-5dBm

Ref 30 dBm · *Att 30 dB · SWT 2.25 s

* RBW 100 kHz
* VBW 300 kHz

Marker 2 [T1]
-33.77 dBm
23.181820000 GHz

Marker 1 [T1]
-32.18 dBm
23.727940000 GHz · A

1 PK MAXH

TDF

3DB

D1 -17.84 dBm

Start 2.8 GHz · 2.22 GHz/ · Stop 25 GHz
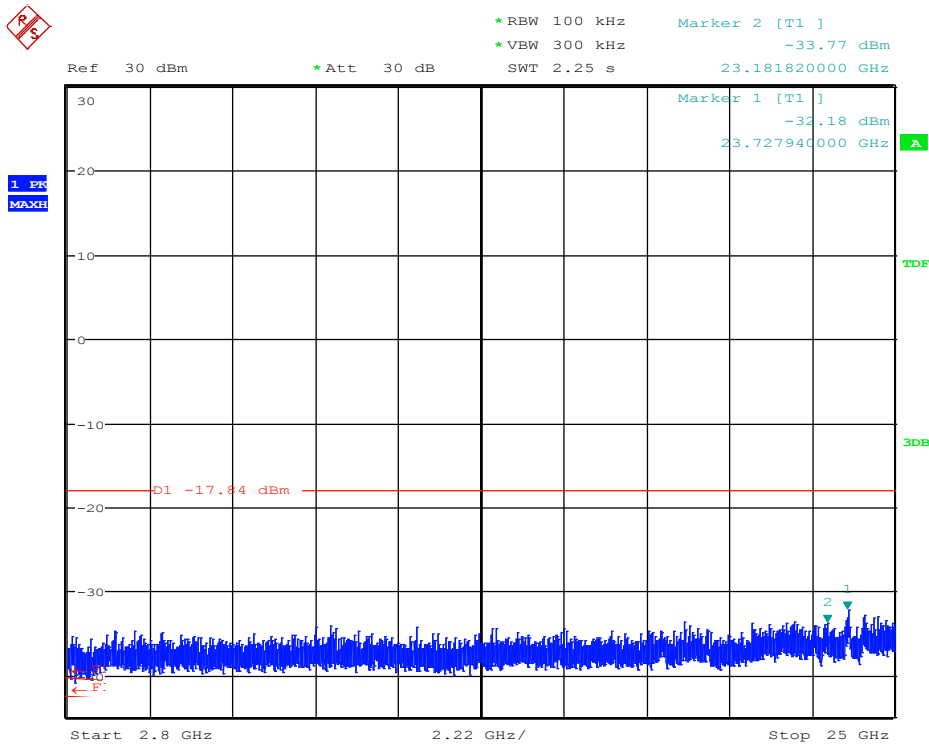
20dBc-2.8GHz-25GHz- ZigBee 2.4 GHz Mode- 2 MHz- 250 kbps –CH26-5dBm

2. Radiated Field Strength Measurements

2.1. Radiated Field Strength Emissions – 9 kHz to 30 MHz

Diagram No. 2.01_ ViCare Thermostat -ZigBee-TX-B.W.2MHz-250Kbps-Ch11-19dBm

Common Information

Test description:	Magnetic Field Strength Measurement related to 30/300 m distance
Test site and distance:	Ref.-Nr. 441 Semi Anechoic Room (SAR) with 3 m measurement distance
Version of Testsoftware:	EMC32 V9.25.0
Distance correction:	used accord. table, pls. see test report
Technical Data:	Please see page 2 for detailed data of measurement setup
Rec. antenna (pre-scan):	height 1.00 m, parallel and 90° to EUT polarisation
Used filter:	bypass
Test specification:	FCC 15.205 § 15.209
Operator:	APh
Operating conditions:	Continuous TX-ZigBee-2.4GHz Mode-B.W. 2 MHz-250Kbps-Ch 11 (2405 MHz)-PWR+19dBm

EUT Information

Applicant:	Viessmann Werke GmbH & Co. KG
Model:	ViCare Thermostat
Type:	N/A-
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EUT:	ViCare Thermostat
HW version:	Rev.C
SW version:	STM32: (V1.40.09), EFR32:(Nodetest) Linux: (V0.1.7)
Test Application:	Smart Thermostat WiFi & ZigBee Test V1.2
Serial number:	#22
Connected Interfaces:	Open Therm Cable 12 meters + DC Power Cable 2 meters
Test Mode Configurations:	ViCare Thermostat WiFi & ZigBee Test Software
Power Supply:	12 VDC using Laboratory Power Supply +
Power Supply:	5 VDC using AC/DC Adapter
AC/DC Adapter Details:	PHIHONG Technology|Model:PSM10R-050|Input:Ac120V 60Hz 0.3A

Full Spectrum

Diagram No. 2.02_ ViCare Thermostat -ZigBee-TX-B.W.2MHz-250Kbps-Ch18-19dBm

Common Information

Test description:	Magnetic Field Strength Measurement related to 30/300 m distance
Test site and distance:	Ref.-Nr. 441 Semi Anechoic Room (SAR) with 3 m measurement distance
Version of Testsoftware:	EMC32 V9.25.0
Distance correction:	used accord. table, pls. see test report
Technical Data:	Please see page 2 for detailed data of measurement setup
Rec. antenna (pre-scan):	height 1.00 m, parallel and 90° to EUT polarisation
Used filter:	bypass
Test specification:	FCC 15.205 § 15.209
Operator:	APh
Operating conditions:	Continuous TX-ZigBee-2.4GHz Mode-B.W. 2 MHz-250Kbps-Ch 18 (2440 MHz)-PWR+19dBm

EUT Information

Applicant:	Viessmann Werke GmbH & Co. KG
Model:	ViCare Thermostat
Type:	N/A-
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EUT:	ViCare Thermostat
HW version:	Rev.C
SW version:	STM32: (V1.40.09), EFR32:(Nodetest) Linux: (V0.1.7)
Test Application:	Smart Thermostat WiFi & ZigBee Test V1.2
Serial number:	#22
Connected Interfaces:	Open Therm Cable 12 meters + DC Power Cable 2 meters
Test Mode Configurations:	ViCare Thermostat WiFi & ZigBee Test Software
Power Supply:	12 VDC using Laboratory Power Supply +
Power Supply:	5 VDC using AC/DC Adapter
AC/DC Adapter Details:	PHIHONG Technology|Model:PSM10R-050|Input:Ac120V 60Hz 0.3A

Full Spectrum

Final_Result

Frequency (MHz)	RMS (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Elevation (deg)	Corr. (dB)
13.230000	8.78	29.54	20.76	1000.0	10.000	100.0	V	37.0	90.0	-1.7

Diagram No. 2.03_ ViCare Thermostat -ZigBee-TX-B.W.2MHz-250Kbps-Ch26-5dBm

Common Information

Test description:	Magnetic Field Strength Measurement related to 30/300 m distance
Test site and distance:	Ref.-Nr. 441 Semi Anechoic Room (SAR) with 3 m measurement distance
Version of Testsoftware:	EMC32 V9.25.0
Distance correction:	used accord. table, pls. see test report
Technical Data:	Please see page 2 for detailed data of measurement setup
Rec. antenna (pre-scan):	height 1.00 m, parallel and 90° to EUT polarisation
Used filter:	bypass
Test specification:	FCC 15.205 § 15.209
Operator:	APh
Operating conditions:	Continuous TX-ZigBee-2.4GHz Mode-B.W. 2 MHz-250Kbps-Ch 26 (2480 MHz)-PWR+5dBm

EUT Information

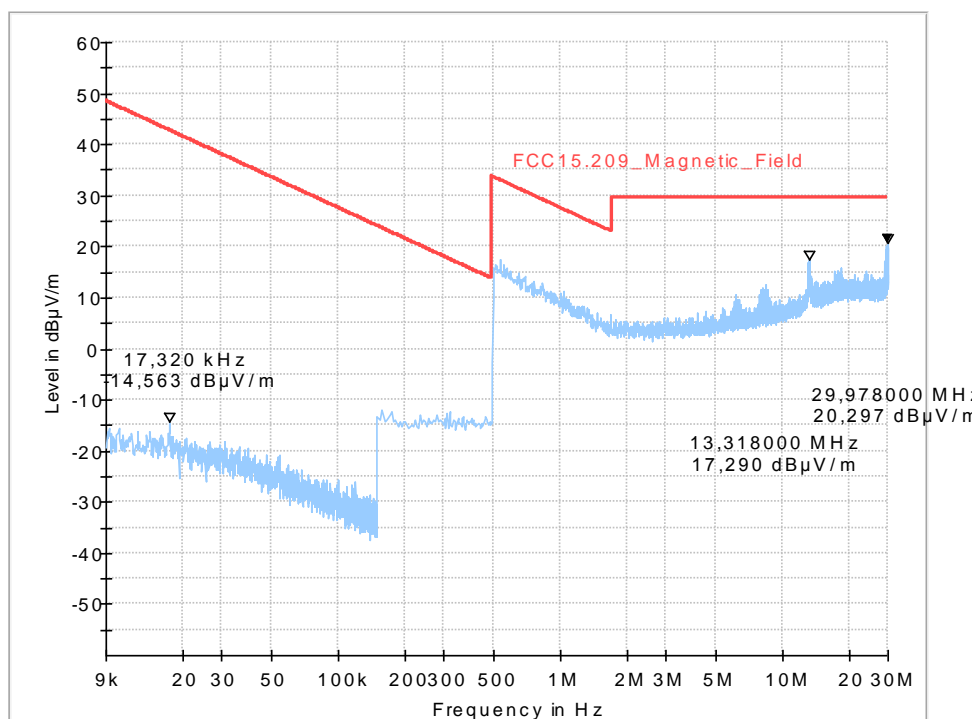|	
Applicant:	Viessmann Werke GmbH & Co. KG
Model:	ViCare Thermostat
Type:	N/A-
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EUT:	ViCare Thermostat
HW version:	Rev.C
SW version:	STM32: (V1.40.09), EFR32:(Nodetest) Linux: (V0.1.7)
Test Application:	Smart Thermostat WiFi & ZigBee Test V1.2
Serial number:	#22
Connected Interfaces:	Open Therm Cable 12 meters + DC Power Cable 2 meters
Test Mode Configurations:	ViCare Thermostat WiFi & ZigBee Test Software
Power Supply:	12 VDC using Laboratory Power Supply +
Power Supply:	5 VDC using AC/DC Adapter
AC/DC Adapter Details:	PHIHONG Technology|Model:PSM10R-050|Input:Ac120V 60Hz 0.3A

Full Spectrum

Final_Result

Frequency (MHz)	RMS (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Elevation (deg)	Corr. (dB)
13.230000	7.55	29.54	21.99	1000.0	10.000	100.0	V	136.0	0.0	-1.7

2.2. Radiated Field Strength Emissions – 30 MHz to 1 GHz

Diagram No. 3.01_ ViCare Thermostat -ZigBee-TX-B.W.2MHz-250Kbps-Ch11-19dBm

Common Information

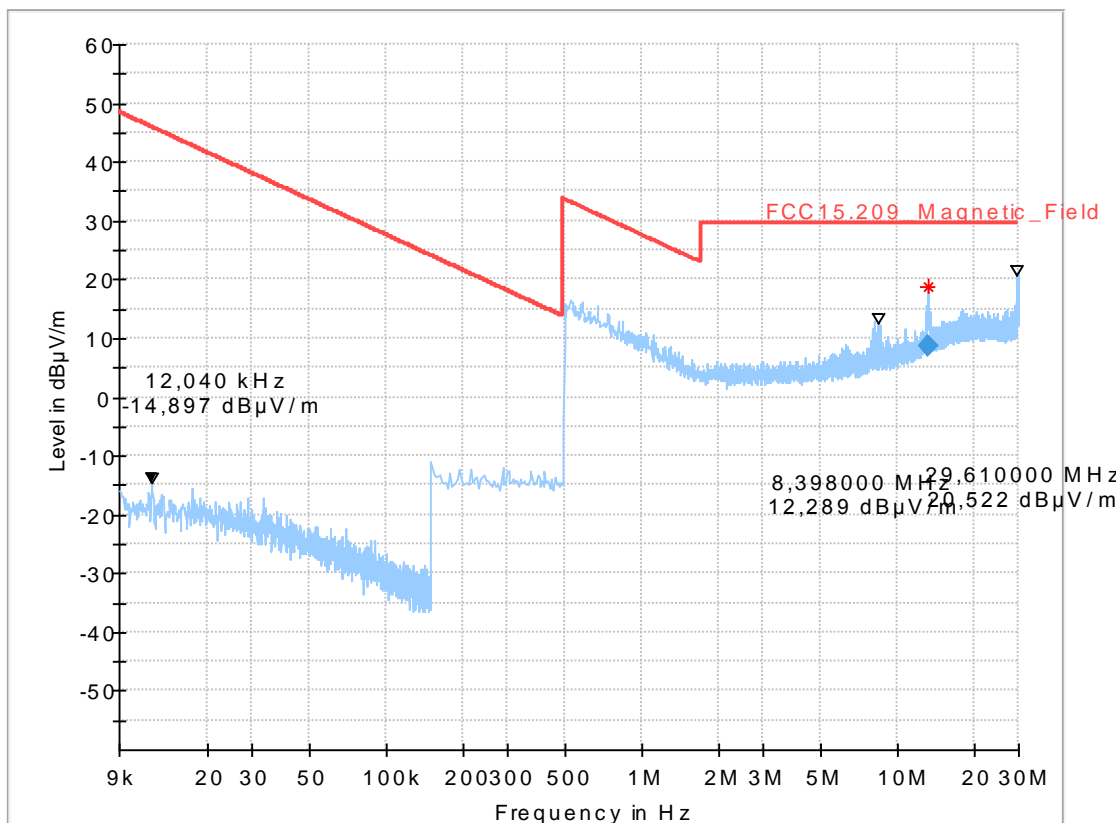|	
Test description:	Electric Field Strength Measurement
Test site and distance:	Ref.-Nr. 441 Semi Anechoic Room (SAR) with 3 m measurement distance
Version of Testsoftware:	EMC32 V9.25.0
Distance correction:	not used
Used filter:	not used
Technical Data:	please see page 2 for detailed data of measurement setup
Test specification.:	FCC 15.205 § 15.209
Operator:	TFr
Operating conditions:	Continuous TX-ZigBee-2.4GHz Mode-B.W. 2 MHz-250Kbps-Ch 11 (2405 MHz)-PWR+19dBm

EUT Information

Applicant:	Viessmann Werke GmbH & Co. KG
Model:	ViCare Thermostat
Type:	N/A-
--	---
EUT:	ViCare Thermostat
HW version:	Rev.C
SW version:	STM32: (V1.40.09), EFR32:(Nodetest) Linux: (V0.1.7)
Test Application:	Smart Thermostat WiFi & ZigBee Test V1.2
Serial number:	#22
Connected Interfaces:	Open Therm Cable 12 meters + DC Power Cable 2 meters
Test Mode Configurations:	ViCare Thermostat WiFi & ZigBee Test Software
Power Supply:	12 VDC using Laboratory Power Supply +
Power Supply:	5 VDC using AC/DC Adapter
AC/DC Adapter Details:	PHIHONG Technology|Model:PSM10R-050|Input:Ac120V 60Hz 0.3A

Full Spectrum

Final_Result

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Elevation (deg)	Corr. (dB)
50.884000	23.07	40.00	16.93	1000.0	120.000	121.0	V	305.0	0.0	12.6
259.172000	34.93	46.00	11.07	1000.0	120.000	142.0	H	289.0	90.0	13.6
275.580000	17.02	46.00	28.98	1000.0	120.000	346.0	H	290.0	0.0	14.7

Diagram No. 3.02_ ViCare Thermostat -ZigBee-TX-B.W.2MHz-250Kbps-Ch18-19dBm
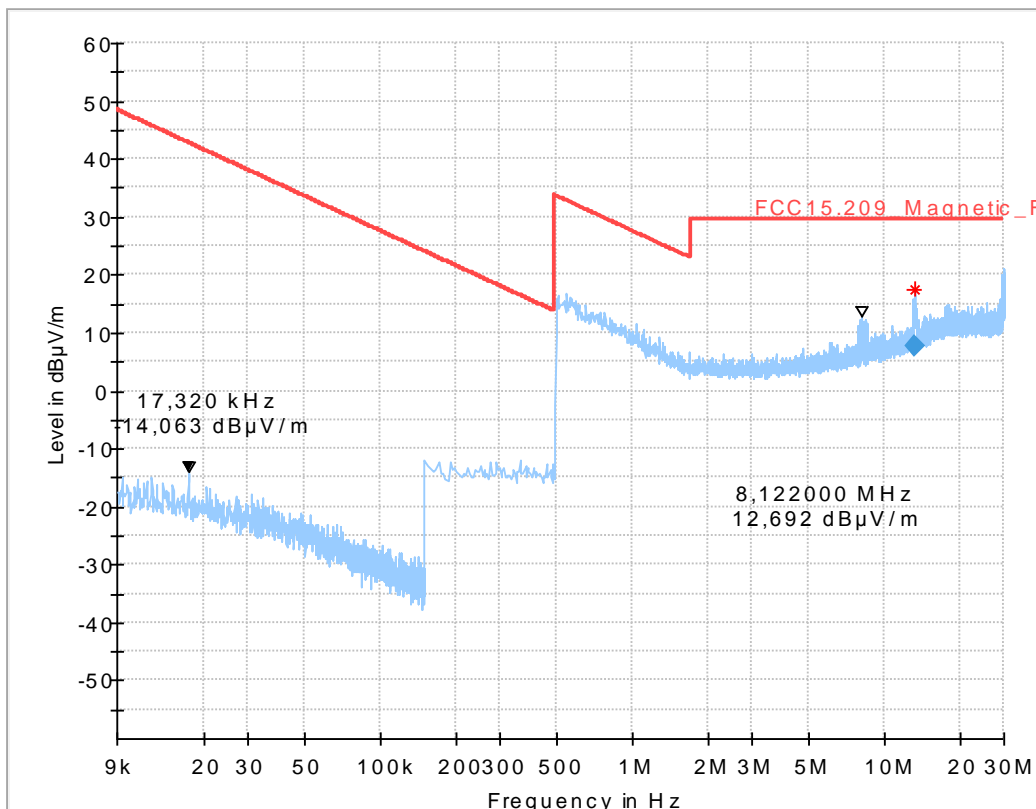
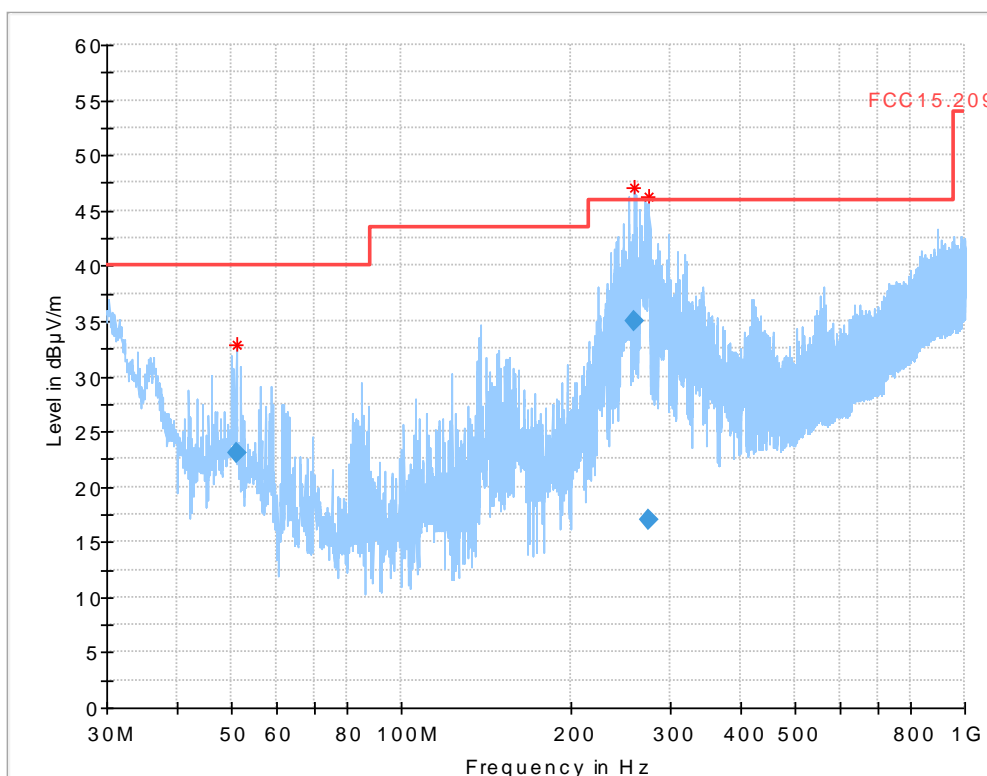### Common Information

Test description:	Electric Field Strength Measurement
Test site and distance:	Ref.-Nr. 441 Semi Anechoic Room (SAR) with 3 m measurement distance
Version of Testsoftware:	EMC32 V9.25.0
Distance correction:	not used
Used filter:	not used
Technical Data:	please see page 2 for detailed data of measurement setup
Test specification.:	FCC 15.205 § 15.209
Operator:	TFr
Operating conditions:	Continuous TX-ZigBee-2.4GHz Mode-B.W. 2 MHz-250Kbps-Ch 18 (2440 MHz)-PWR+19dBm

EUT Information

Applicant:	Viessmann Werke GmbH & Co. KG
Model:	ViCare Thermostat
Type:	N/A-
--------------------------------------	---
EUT:	ViCare Thermostat
HW version:	Rev.C
SW version:	STM32: (V1.40.09), EFR32:(Nodetest) Linux: (V0.1.7)
Test Application:	Smart Thermostat WiFi & ZigBee Test V1.2
Serial number:	#22
Connected Interfaces:	Open Therm Cable 12 meters + DC Power Cable 2 meters
Test Mode Configurations:	ViCare Thermostat WiFi & ZigBee Test Software
Power Supply:	12 VDC using Laboratory Power Supply +
Power Supply:	5 VDC using AC/DC Adapter
AC/DC Adapter Details:	PHIHONG Technology|Model:PSM10R-050|Input:Ac120V 60Hz 0.3A

Full Spectrum

Final_Result

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/ m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Elevation (deg)	Corr. (dB)
30.200000	32.63	40.00	7.37	1000.0	120.000	118.0	V	159.0	90.0	21.4
247.248000	34.76	46.00	11.24	1000.0	120.000	105.0	H	295.0	90.0	13.1
265.228000	43.75	46.00	2.25	1000.0	120.000	126.0	H	281.0	0.0	14.2

Diagram No. 3.03_ ViCare Thermostat -ZigBee-TX-B.W.2MHz-250Kbps-Ch26-5 dBm

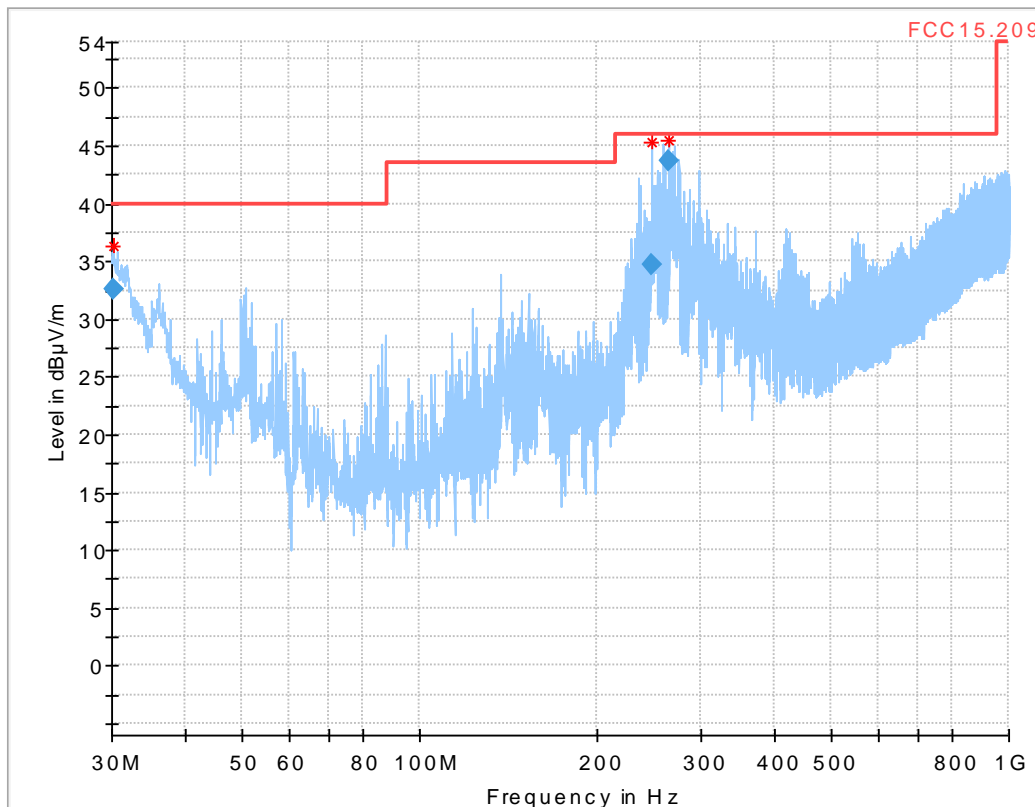**Common Information**

Test description:	Electric Field Strength Measurement
Test site and distance:	Ref.-Nr. 441 Semi Anechoic Room (SAR) with 3 m measurement distance
Version of Testsoftware:	EMC32 V9.25.0
Distance correction:	not used
Used filter:	not used
Technical Data:	please see page 2 for detailed data of measurement setup
Test specification.:	FCC 15.205 § 15.209
Operator:	TFr
Operating conditions:	Continuous TX-ZigBee-2.4GHz Mode-B.W. 2 MHz-250Kbps-Ch 26 (2480 MHz)- PWR+5 dBm

EUT Information

Applicant:	Viessmann Werke GmbH & Co. KG
Model:	ViCare Thermostat
Type:	N/A-
--	---
EUT:	ViCare Thermostat
HW version:	Rev.C
SW version:	STM32: (V1.40.09), EFR32:(Nodetest) Linux: (V0.1.7)
Test Application:	Smart Thermostat WiFi & ZigBee Test V1.2
Serial number:	#22
Connected Interfaces:	Open Therm Cable 12 meters + DC Power Cable 2 meters
Test Mode Configurations:	ViCare Thermostat WiFi & ZigBee Test Software
Power Supply:	12 VDC using Laboratory Power Supply +
Power Supply:	5 VDC using AC/DC Adapter
AC/DC Adapter Details:	PHIHONG Technology|Model:PSM10R-050|Input:Ac120V 60Hz 0.3A

Full Spectrum

Final_Result

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Elevation (deg)	Corr. (dB)
50.868000	21.85	40.00	18.15	1000.0	120.000	113.0	V	0.0	0.0	12.6
247.160000	34.80	46.00	11.20	1000.0	120.000	118.0	H	257.0	90.0	13.1
255.860000	33.77	46.00	12.23	1000.0	120.000	105.0	H	257.0	90.0	13.4
259.024000	35.55	46.00	10.45	1000.0	120.000	143.0	H	287.0	90.0	13.6
271.092000	37.39	46.00	8.61	1000.0	120.000	118.0	H	290.0	0.0	14.6
275.544000	40.43	46.00	5.57	1000.0	120.000	105.0	H	273.0	0.0	14.7
297.328000	36.50	46.00	9.50	1000.0	120.000	121.0	H	325.0	0.0	15.0
910.260000	31.68	46.00	14.32	1000.0	120.000	112.0	V	270.0	90.0	27.4

2.3. Radiated Field Strength Emissions – 1 GHz to 18 GHz

Diagram No.: 4.01_ ViCare Thermostat -ZigBee-TX-B.W.2MHz-250Kbps-Ch11-19dBm

Common Information

Test Description:	Radiated Field Strength Emissions in 3m distance
Test Site:	CETECOM GmbH Essen
Test Standard:	FCC 15.205,15.209 & FCC 15.247 Intentional Radiator
Antenna polarisation:	horizontal/vertical
Operation mode:	Continuous TX-ZigBee-2.4GHz Mode-B.W. 2 MHz-250Kbps-Ch 11 (2405 MHz)-PWR+19 dBm
Operator Name:	RIs

EUT Information

Applicant:	Viessmann Werke GmbH & Co. KG
Model:	ViCare Thermostat
Type:	N/A-
--------------------------------------	---
EUT:	ViCare Thermostat
HW version:	Rev.C
SW version:	STM32: (V1.40.09), EFR32:(Nodetest) Linux: (V0.1.7)
Test Application:	Smart Thermostat WiFi & ZigBee Test V1.2
Serial number:	#22
Connected Interfaces:	Open Therm Cable 12 meters + DC Power Cable 2 meters
Test Mode Configurations:	ViCare Thermostat WiFi & ZigBee Test Software
Power Supply:	12 VDC using Laboratory Power Supply +
Power Supply:	5 VDC using AC/DC Adapter
AC/DC Adapter Details:	PHIHONG Technology|Model:PSM10R-050|Input:Ac120V 60Hz 0.3A

Final_Result

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Elevation (deg)
4809.000000	---	42.67	54.00	11.33	1000.000	155.0	H	87.0	90.0
4811.000000	51.39	---	74.00	22.61	1000.000	155.0	H	88.0	90.0
7216.440000	---	50.15	150.00	99.85	1000.000	155.0	H	72.0	90.0
7216.640000	58.98	---	150.00	91.02	1000.000	155.0	H	71.0	90.0

Frequency (MHz)	Corr. (dB)
4809.000000	4.9
4811.000000	4.9
7216.440000	10.7
7216.640000	10.7

Final_Result

Diagram No.: 4.02_ ViCare Thermostat -ZigBee-TX-B.W.2MHz-250Kbps-Ch18-19dBm
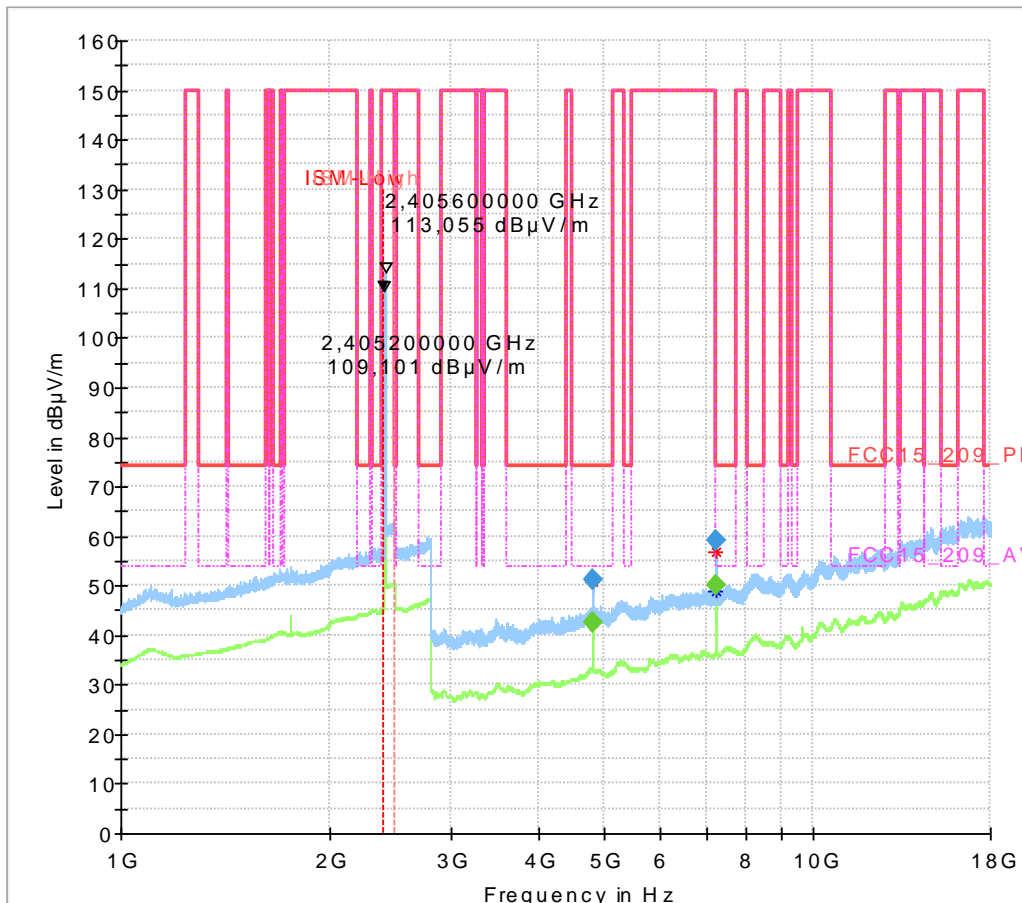
Common Information

Test Description:	Radiated Field Strength Emissions in 3m distance
Test Site:	CETECOM GmbH Essen
Test Standard:	FCC 15.205,15.209 & FCC 15.247 Intentional Radiator
Antenna polarisation:	horizontal/vertical
Operation mode:	Continuous TX-ZigBee-2.4GHz Mode-B.W. 2 MHz-250Kbps-Ch 18 (2440 MHz)-PWR+19 dBm
Operator Name:	RIs

EUT Information

Applicant:	Viessmann Werke GmbH & Co. KG
Model:	ViCare Thermostat
Type:	N/A-
--	--
EUT:	ViCare Thermostat
HW version:	Rev.C
SW version:	STM32: (V1.40.09), EFR32:(Nodetest) Linux: (V0.1.7)
Test Application:	Smart Thermostat WiFi & ZigBee Test V1.2
Serial number:	#22
Connected Interfaces:	Open Therm Cable 12 meters + DC Power Cable 2 meters
Test Mode Configurations:	ViCare Thermostat WiFi & ZigBee Test Software
Power Supply:	12 VDC using Laboratory Power Supply +
Power Supply:	5 VDC using AC/DC Adapter
AC/DC Adapter Details:	PHIHONG Technology|Model:PSM10R-050|Input:Ac120V 60Hz 0.3A

Final_Result

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Elevation (deg)
4879.000000	51.35	---	74.00	22.65	1000.000	155.0	H	89.0	90.0
4881.000000	---	42.36	54.00	11.64	1000.000	155.0	H	89.0	90.0
7318.240000	59.99	---	74.00	14.01	1000.000	155.0	H	72.0	90.0
7318.560000	---	52.13	54.00	1.87	1000.000	155.0	H	72.0	90.0

Frequency (MHz)	Corr. (dB)
4879.000000	4.7
4881.000000	4.7
7318.240000	10.6
7318.560000	10.6

Diagram No.: 4.03_ ViCare Thermostat -ZigBee-TX-B.W.2MHz-250Kbps-Ch26-5dBm
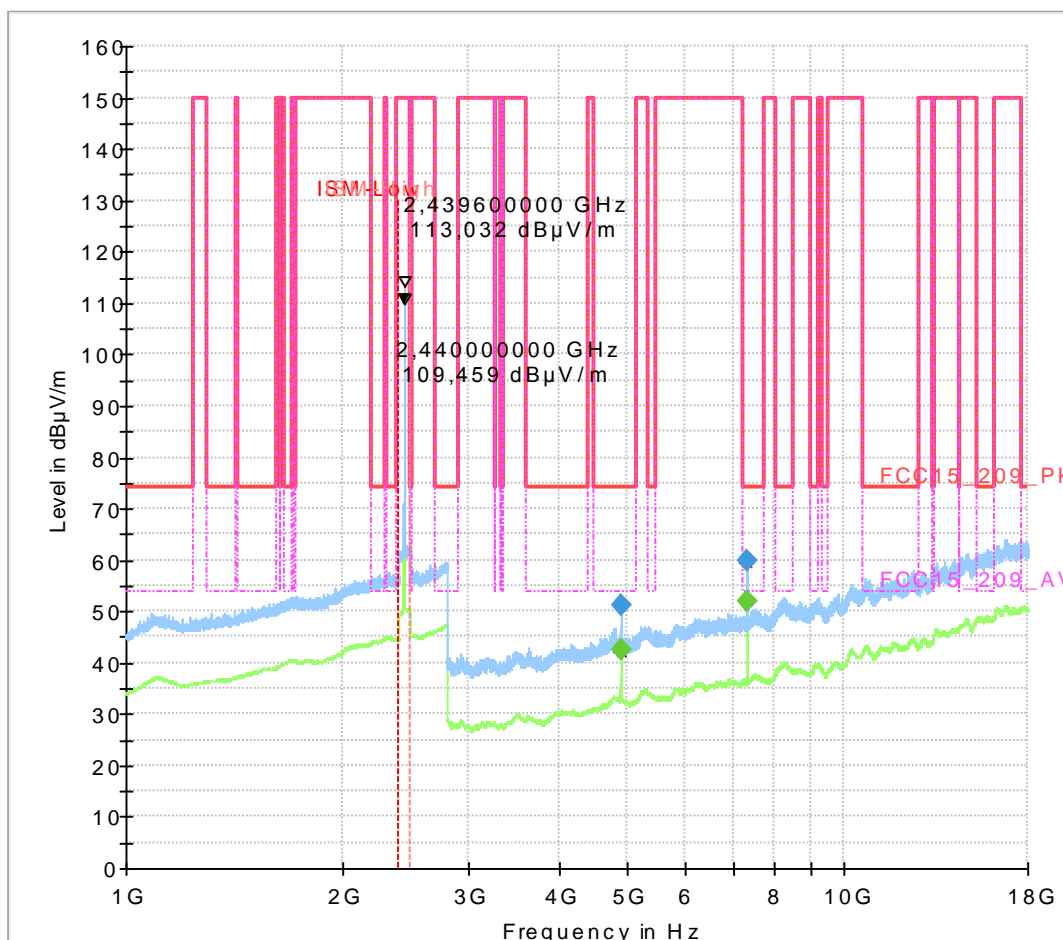
Common Information

Test Description:	Radiated Field Strength Emissions in 3m distance
Test Site:	CETECOM GmbH Essen
Test Standard:	FCC 15.205,15.209 & FCC 15.247 Intentional Radiator
Antenna polarisation:	horizontal/vertical
Operation mode:	Continuous TX-ZigBee-2.4GHz Mode-B.W. 2 MHz-250Kbps-Ch 26 (2480 MHz)- PWR+5 dBm
Operator Name:	RIs

EUT Information

Applicant:	Viessmann Werke GmbH & Co. KG
Model:	ViCare Thermostat
Type:	N/A-
--------------------------------------	---
EUT:	ViCare Thermostat
HW version:	Rev.C
SW version:	STM32: (V1.40.09), EFR32:(Nodetest) Linux: (V0.1.7)
Test Application:	Smart Thermostat WiFi & ZigBee Test V1.2
Serial number:	#22
Connected Interfaces:	Open Therm Cable 12 meters + DC Power Cable 2 meters
Test Mode Configurations:	ViCare Thermostat WiFi & ZigBee Test Software
Power Supply:	12 VDC using Laboratory Power Supply +
Power Supply:	5 VDC using AC/DC Adapter
AC/DC Adapter Details:	PHIHONG Technology|Model:PSM10R-050|Input:Ac120V 60Hz 0.3A

Final_Result

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Elevation (deg)
4959.000000	47.54	---	74.00	26.46	1000.000	155.0	V	351.0	0.0
4961.000000	---	37.54	54.00	16.46	1000.000	155.0	V	-7.0	0.0

Frequency (MHz)	Corr. (dB)
4959.000000	4.3
4961.000000	4.3

2.3.1. Radiated Field Strength Emissions – 18 GHz to 25 GHz

Diagram No.: 4.01a_ ViCare Thermostat -ZigBee-B.W. 2MHz-250Kbps-CH11-19dBm
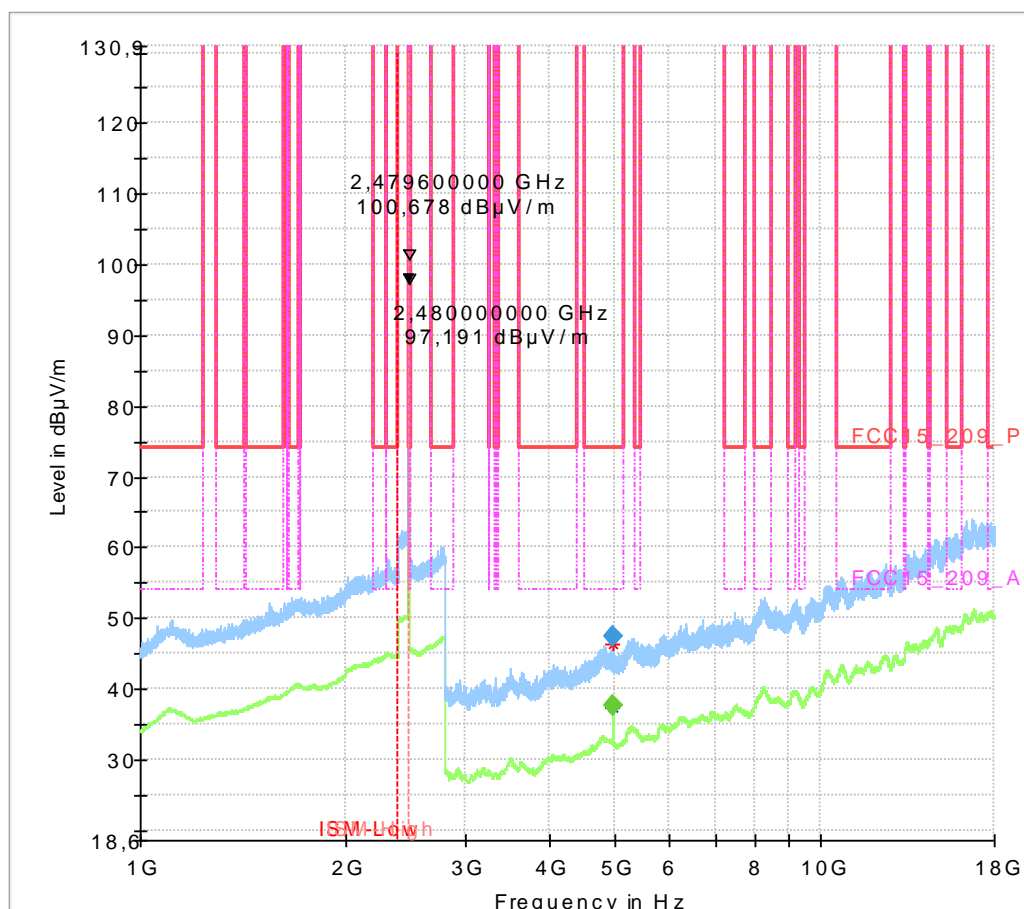
Common Information

Test Description:	Radiated field strength emission in 1m distance
Test Site:	CETECOM GmbH Essen
Test Standard:	FCC 15.205,15.209 & FCC 15.247 Intentional Radiator
Antenna polarisation:	horizontal/vertical
Distance correction factor	3 to 1m: -10.5 dB applying to measurement results
SW-Version:	EMC32 V8.53.0
Operation mode:	Continuous TX-ZigBee-2.4GHz Mode-B.W. 2 MHz-250Kbps-Ch 11 (2405 MHz)-PWR+19 dBm
Operator Name:	TFr

EUT Information

Applicant:	Viessmann Werke GmbH & Co. KG
Model:	ViCare Thermostat
Type:	N/A-
--------------------------------------	---
EUT:	ViCare Thermostat
HW version:	Rev.C
SW version:	STM32: (V1.40.09), EFR32:(Nodetest) Linux: (V0.1.7)
Test Application:	Smart Thermostat WiFi & ZigBee Test V1.2
Serial number:	#22
Connected Interfaces:	Open Therm Cable 12 meters + DC Power Cable 2 meters
Test Mode Configurations:	ViCare Thermostat WiFi & ZigBee Test Software
Power Supply:	12 VDC using Laboratory Power Supply +
Power Supply:	5 VDC using AC/DC Adapter
AC/DC Adapter Details:	PHIHONG Technology|Model:PSM10R-050|Input:Ac120V 60Hz 0.3A

EMIScan_18_40GHz_Pre

Diagram No.: 4.02a_ ViCare Thermostat -ZigBee-TX-B.W.2MHz-250Kbps-CH18-19dBm

Common Information

Test Description:	Radiated field strength emission in 1m distance
Test Site:	CETECOM GmbH Essen
Test Standard:	FCC 15.205,15.209 & FCC 15.247 Intentional Radiator
Antenna polarisation:	horizontal/vertical
Distance correction factor	3 to 1m: -10.5 dB applying to measurement results
SW-Version:	EMC32 V8.53.0
Operation mode:	Continuous TX-ZigBee-2.4GHz Mode-B.W. 2 MHz-250Kbps-Ch 18 (2440 MHz)-PWR+19 dBm
Operator Name:	TFr

EUT Information

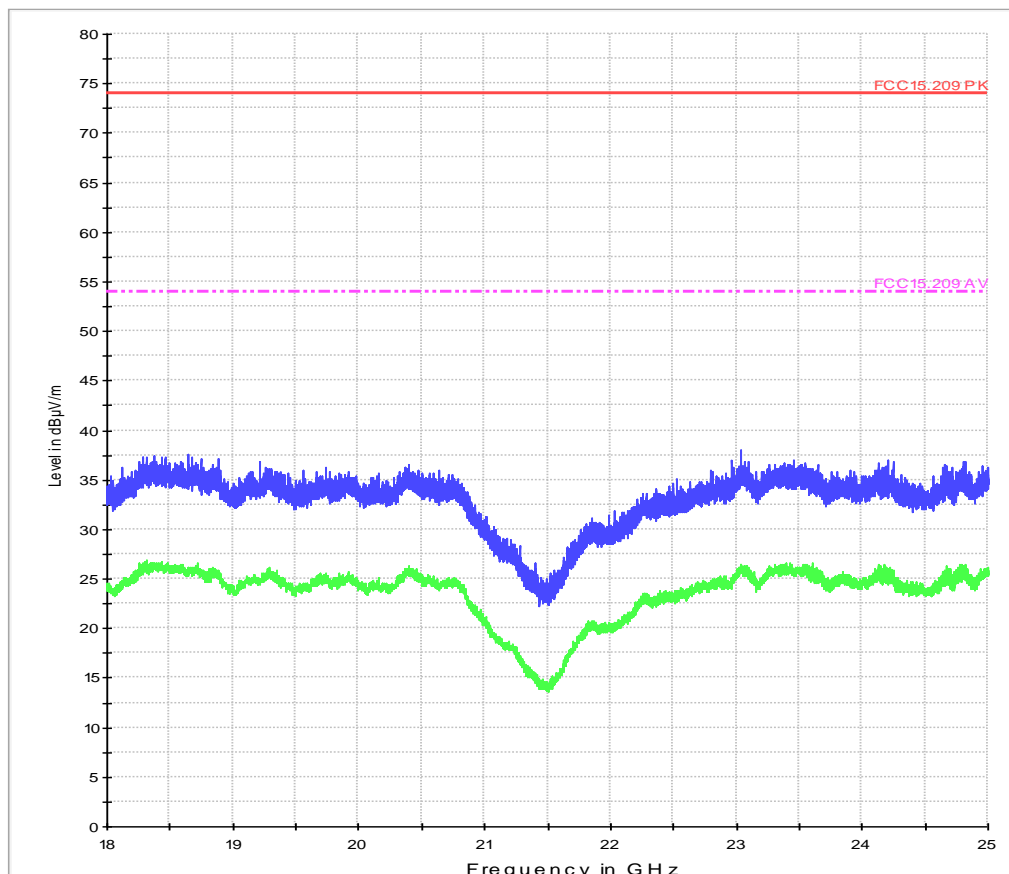|	
Applicant:	Viessmann Werke GmbH & Co. KG
Model:	ViCare Thermostat
Type:	N/A-
--------------------------------------	--
EUT:	ViCare Thermostat
HW version:	Rev.C
SW version:	STM32: (V1.40.09), EFR32:(Nodetest) Linux: (V0.1.7)
Test Application:	Smart Thermostat WiFi & ZigBee Test V1.2
Serial number:	#22
Connected Interfaces:	Open Therm Cable 12 meters + DC Power Cable 2 meters
Test Mode Configurations:	ViCare Thermostat WiFi & ZigBee Test Software
Power Supply:	12 VDC using Laboratory Power Supply +
Power Supply:	5 VDC using AC/DC Adapter
AC/DC Adapter Details:	PHIHONG Technology|Model:PSM10R-050|Input:Ac120V 60Hz 0.3A

EMI Scan_18_40GHz_Pre

Diagram No.: 4.03a_ ViCare Thermostat -ZigBee-TX-B.W.2MHz-250Kbps-CH26-5dBm

Common Information

Test Description:	Radiated field strength emission in 1m distance
Test Site:	CETECOM GmbH Essen
Test Standard:	FCC 15.205,15.209 & FCC 15.247 Intentional Radiator
Antenna polarisation:	horizontal/vertical
Distance correction factor	3 to 1m: -10.5 dB applying to measurement results
SW-Version:	EMC32 V8.53.0
Operation mode:	Continuous TX-ZigBee-2.4GHz Mode-B.W. 2 MHz-250Kbps-Ch 26 (2440 MHz)-PWR+5 dBm
Operator Name:	TFr

EUT Information

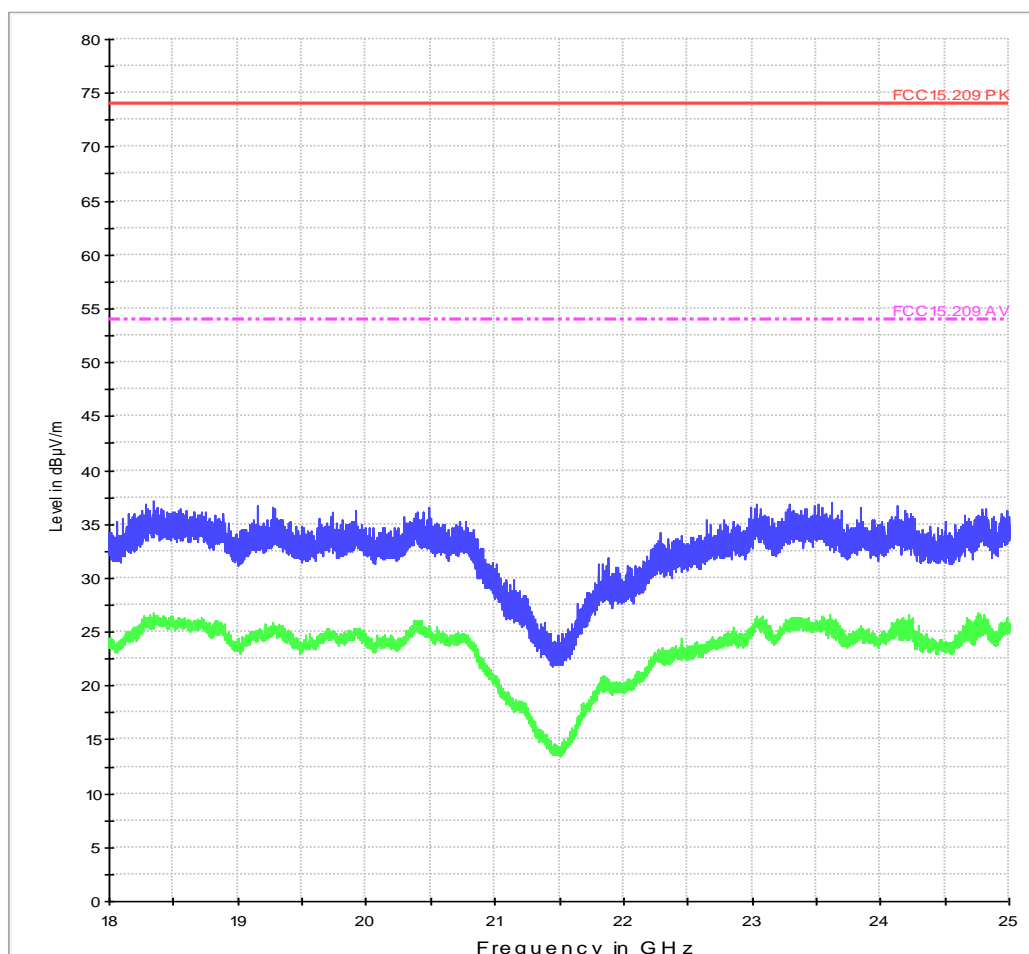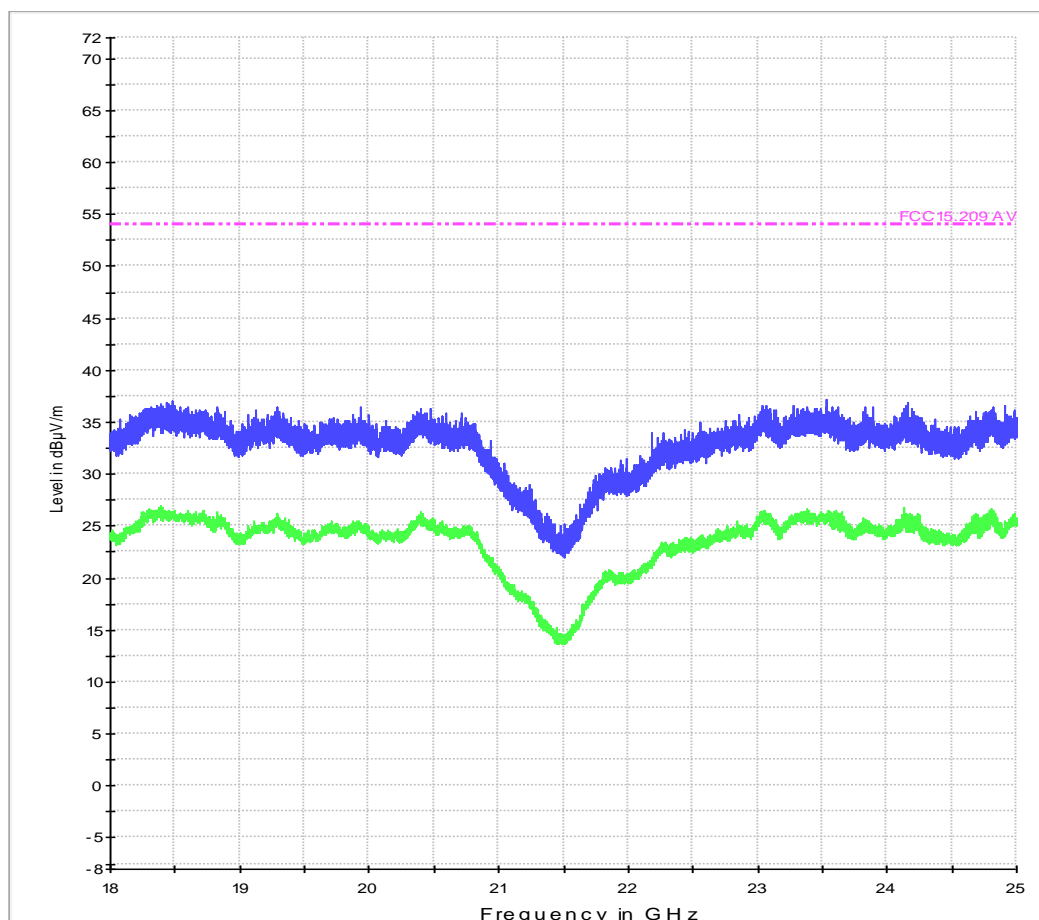|	
Applicant:	Viessmann Werke GmbH & Co. KG
Model:	ViCare Thermostat
Type:	N/A-
---------------------------------------	--
EUT:	ViCare Thermostat
HW version:	Rev.C
SW version:	STM32: (V1.40.09), EFR32:(Nodetest) Linux: (V0.1.7)
Test Application:	Smart Thermostat WiFi & ZigBee Test V1.2
Serial number:	#22
Connected Interfaces:	Open Therm Cable 12 meters + DC Power Cable 2 meters
Test Mode Configurations:	ViCare Thermostat WiFi & ZigBee Test Software
Power Supply:	12 VDC using Laboratory Power Supply +
Power Supply:	5 VDC using AC/DC Adapter
AC/DC Adapter Details:	PHIHONG Technology|Model:PSM10R-050|Input:Ac120V 60Hz 0.3A

EMI Scan_18_40GHz_Pre

3. Radiated Band-Edge Measurements

Diagram No.: 9.01_BE Low- ViCare Thermostat -ZigBee-TX-B.W.2MHz-250Kbps-Ch11-19 dBm

Common Information

Test Description:	Band-Edge: Radiated Field Strength Emissions in 3m distance
Test Site:	CETECOM GmbH Essen
Test Standard:	FCC 15.205,15.209 & FCC 15.247 Intentional Radiator
Antenna polarisation:	horizontal/vertical
Operation mode:	Continuous TX-ZigBee-2.4GHz Mode-B.W. 2 MHz-250Kbps-Ch 11 (2405 MHz)-PWR+19 dBm
Operator Name:	APh

EUT Information

Applicant:	Viessmann Werke GmbH & Co. KG
Model:	ViCare Thermostat
Type:	N/A-
---------------------------------------	---
EUT:	ViCare Thermostat
HW version:	Rev.C
SW version:	STM32: (V1.40.09), EFR32:(Nodetest) Linux: (V0.1.7)
Test Application:	Smart Thermostat WiFi & ZigBee Test V1.2
Serial number:	#22
Connected Interfaces:	Open Therm Cable 12 meters + DC Power Cable 2 meters
Test Mode Configurations:	ViCare Thermostat WiFi & ZigBee Test Software
Power Supply:	12 VDC using Laboratory Power Supply +
Power Supply:	5 VDC using AC/DC Adapter
AC/DC Adapter Details:	PHIHONG Technology|Model:PSM10R-050|Input:Ac120V 60Hz 0.3A

Diagram No.: 9.02_BE High- ViCare Thermostat -ZigBee-TX-B.W.2MHz-250Kbps-Ch26-5dBm

Common Information

Test Description:	Band-Edge: Radiated Field Strength Emissions in 3m distance
Test Site:	CETECOM GmbH Essen
Test Standard:	FCC 15.205,15.209 & FCC 15.247 Intentional Radiator
Antenna polarisation:	horizontal/vertical
Operation mode:	Continuous TX-ZigBee-2.4GHz Mode-B.W. 2 MHz-250Kbps-Ch 26 (2480 MHz)-PWR+5dBm
Operator Name:	APh

EUT Information

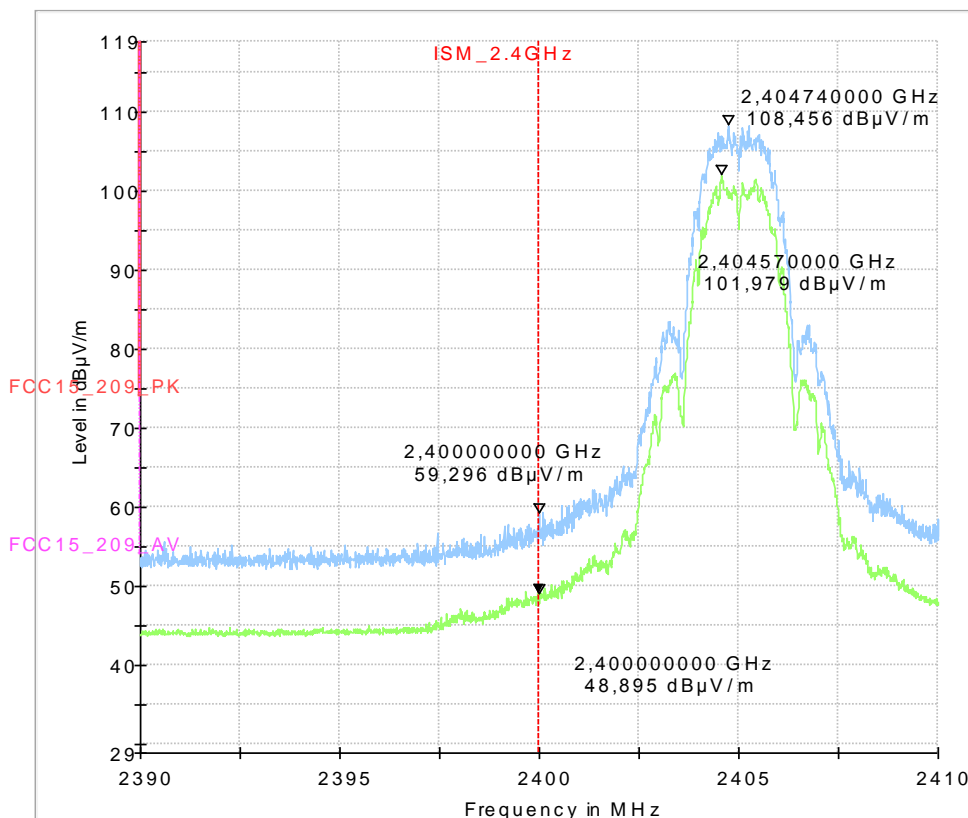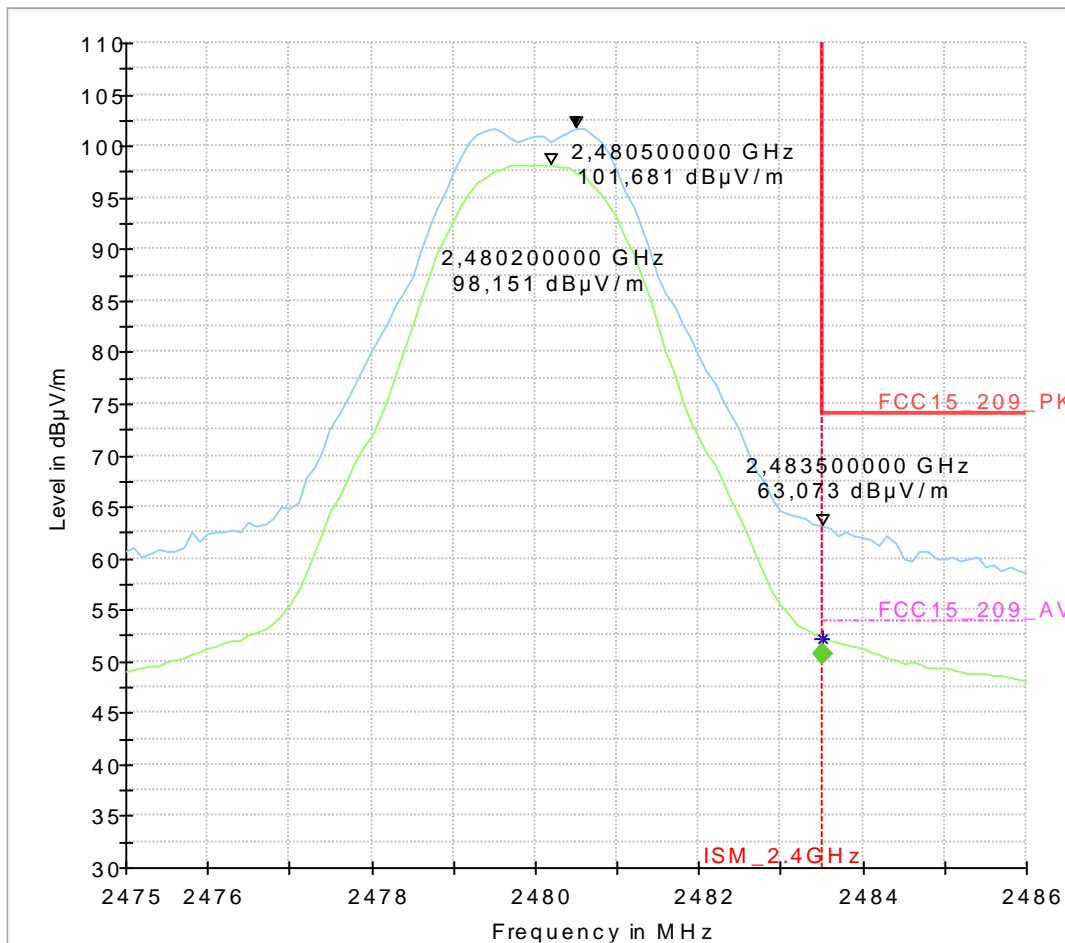|	
Applicant:	Viessmann Werke GmbH & Co. KG
Model:	ViCare Thermostat
Type:	N/A-
-------------------------------------	---
EUT:	ViCare Thermostat
HW version:	Rev.C
SW version:	STM32: (V1.40.09), EFR32:(Nodetest) Linux: (V0.1.7)
Test Application:	Smart Thermostat WiFi & ZigBee Test V1.2
Serial number:	#22
Connected Interfaces:	Open Therm Cable 12 meters + DC Power Cable 2 meters
Test Mode Configurations:	ViCare Thermostat WiFi & ZigBee Test Software
Power Supply:	12 VDC using Laboratory Power Supply +
Power Supply:	5 VDC using AC/DC Adapter
AC/DC Adapter Details:	PHIHONG Technology|Model:PSM10R-050|Input:Ac120V 60Hz 0.3A

Final_Result

CETECOM-TR16-1-0180701T09a-A1

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Elevation (deg)
2483.500000	---	50.76	54.00	3.24	100.0	1000.000	155.0	H	296.0	0.0

Frequency (MHz)	Corr. (dB)
2483.500000	35.9

4. AC Power Lines Conducted Emissions Measurements

Diagram No.: 1.01 - ViCare Thermostat -ZigBee-TX-B.W.2MHz-250Kbps-Ch18-19dBm
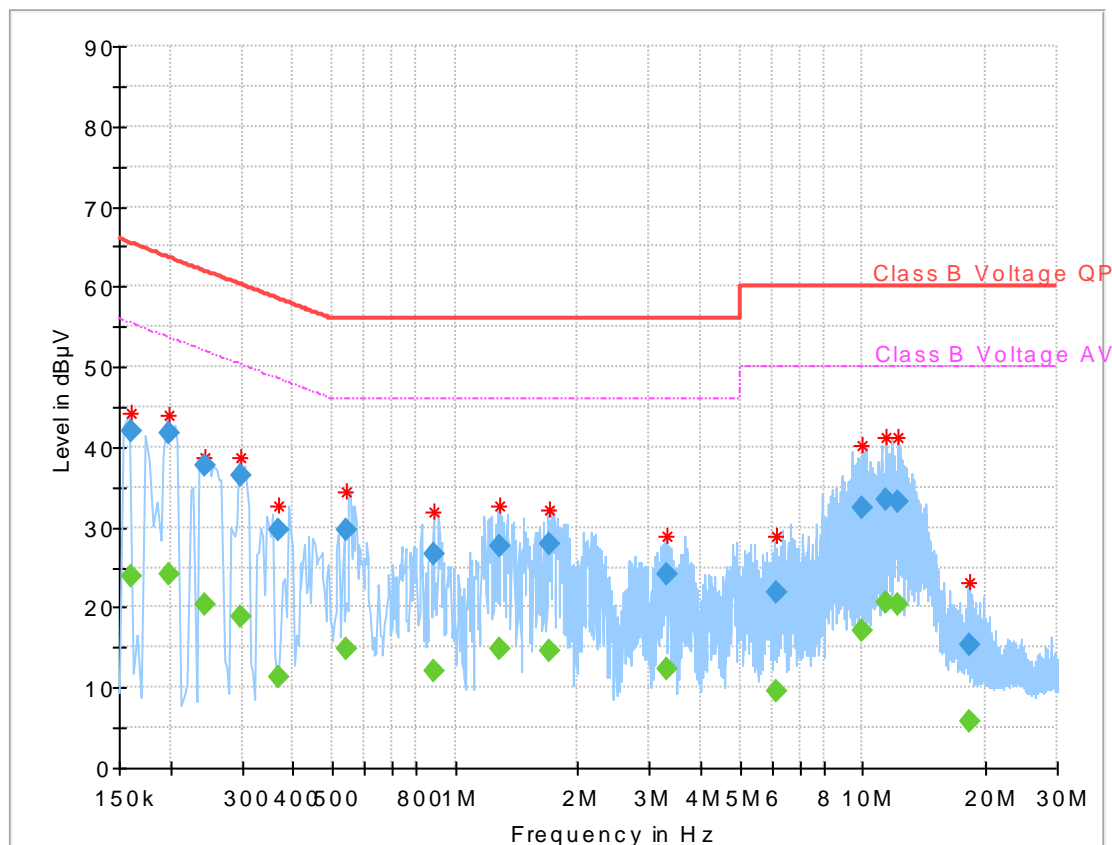
Common Information

Test Description:	Conducted Voltage Measurement Class B
Test Site & Location:	Conducted Emission, CETECOM GmbH Essen
Test Software:	R&S EMC32 v9.15
Test Specification:	FCC 15.207
Operating Mode:	Continuous TX-ZigBee-2.4GHz Mode-B.W. 2 MHz-250Kbps-Ch 18 (2440 MHz)-PWR+19 dBm
Measured on line:	N/L1
Diagram details:	Shows the peak values as a sum of measured ports in maxhold mode
Environmental Conditions:	Humidity: 47%rH; Temperature: 21°C
Operator:	HLa

EUT Information

Applicant:	Viessmann Werke GmbH & Co. KG
Model:	ViCare Thermostat
Type:	N/A-
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EUT:	ViCare Thermostat
HW version:	Rev.C
SW version:	STM32: (V1.40.09), EFR32:(Nodetest) Linux: (V0.1.7)
Test Application:	Smart Thermostat WiFi & ZigBee Test V1.2
Serial number:	#22
Connected Interfaces:	Open Therm Cable 12 meters + DC Power Cable 2 meters
Test Mode Configurations:	ViCare Thermostat WiFi & ZigBee Test Software
Power Supply:	12 VDC using Laboratory Power Supply +
Power Supply:	5 VDC using AC/DC Adapter
AC/DC Adapter Details:	PHIHONG Technology|Model:PSM10R-050|Input:Ac120V 60Hz 0.3A

Full Spectrum

Final_Result

Frequency (MHz)	QuasiPeak (dBµV)	CAverage (dBµV)	Limit (dBµV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	PE	Corr. (dB)
0.160000	---	23.98	55.46	31.48	1000.0	9.000	L1	GND	0.1
0.160000	41.97	---	65.46	23.49	1000.0	9.000	L1	GND	0.1
0.199375	---	24.20	53.64	29.44	1000.0	9.000	L1	GND	0.1
0.199375	41.81	---	63.64	21.83	1000.0	9.000	L1	GND	0.1
0.243438	---	20.45	51.98	31.53	1000.0	9.000	N	GND	0.1
0.243438	37.82	---	61.98	24.16	1000.0	9.000	N	GND	0.1
0.297031	---	18.79	50.33	31.54	1000.0	9.000	N	GND	0.1
0.297031	36.39	---	60.33	23.94	1000.0	9.000	N	GND	0.1
0.369688	---	11.26	48.51	37.25	1000.0	9.000	L1	GND	0.1
0.369688	29.55	---	58.51	28.96	1000.0	9.000	L1	GND	0.1
0.539844	---	14.84	46.00	31.16	1000.0	9.000	L1	GND	0.1
0.539844	29.71	---	56.00	26.29	1000.0	9.000	L1	GND	0.1
0.889219	---	12.16	46.00	33.84	1000.0	9.000	N	GND	0.2
0.889219	26.71	---	56.00	29.29	1000.0	9.000	N	GND	0.2
1.283594	---	14.84	46.00	31.16	1000.0	9.000	N	GND	0.3
1.283594	27.66	---	56.00	28.34	1000.0	9.000	N	GND	0.3
1.701563	27.95	---	56.00	28.05	1000.0	9.000	N	GND	0.3
1.701563	---	14.47	46.00	31.53	1000.0	9.000	N	GND	0.3
3.321563	24.18	---	56.00	31.82	1000.0	9.000	L1	GND	0.4
3.321563	---	12.41	46.00	33.59	1000.0	9.000	L1	GND	0.4
6.121719	---	9.46	50.00	40.54	1000.0	9.000	L1	GND	0.4
6.121719	21.78	---	60.00	38.22	1000.0	9.000	L1	GND	0.4
9.999531	---	17.07	50.00	32.93	1000.0	9.000	N	GND	0.4
9.999531	32.52	---	60.00	27.48	1000.0	9.000	N	GND	0.4
11.399063	---	20.58	50.00	29.42	1000.0	9.000	N	GND	0.5
11.399063	33.45	---	60.00	26.55	1000.0	9.000	N	GND	0.5
12.197188	---	20.26	50.00	29.74	1000.0	9.000	N	GND	0.5
12.197188	33.26	---	60.00	26.74	1000.0	9.000	N	GND	0.5
18.207188	---	5.84	50.00	44.16	1000.0	9.000	N	GND	0.6
18.207188	15.35	---	60.00	44.65	1000.0	9.000	N	GND	0.6