Annex 1: Measurement diagrams to
T E S T   R E P O R T
No.: 17-1-0060101T11a

According to:

FCC Regulations
Part 15.205
Part 15.207
Part 15.209
Part 15.247

for

Viessmann Werke GmbH & Co. KG

Vitoconnect OT2

FCC ID: 2AIZ9-VC0218

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:	Vitoconnect OT2
Applicant:	Viessmann Werke GmbH & Co.KG
Serial Number:	GNV 7637415600222108
Hardware Rev:	V005, BOM Rev-k
Software Rev:	Linux:0.10.0 | STM:1.33.02 | EFR32 v1.0 | Ember Node Test Application v1.0
Connected Interfaces:	None
Comment:	Conducted Test Sample
Power Supply:	12 VDC using AC/DC Adapter
Test Settings:	Putty Command Line
Conducted Ports:	ZigBee 2.4 GHz 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: 19.50 dBm (19.5dBm)   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 – Band Integrated Method
1.1.1. Band Integrated Peak Power-ZigBee 2.4 GHz Mode- 2 MHz- 250 kbps
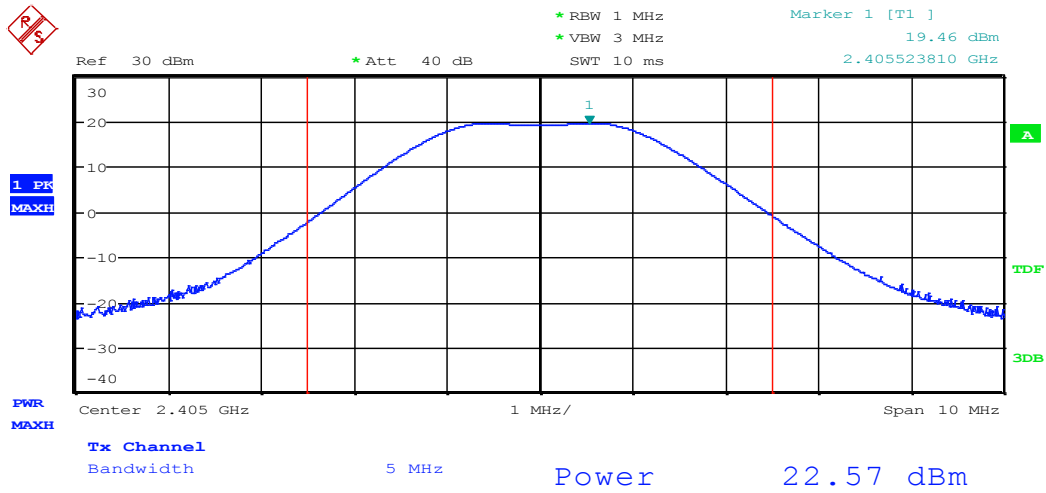
Band Integrated Peak Power- ZigBee 2.4 GHz Mode- 2 MHz- 250 kbps -PWR-PK-CH11-19.5dBm
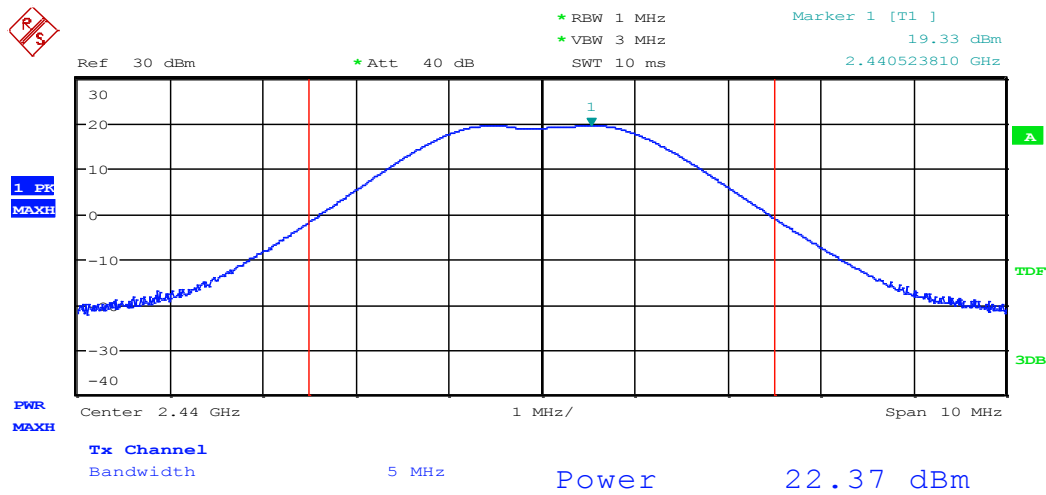
Band Integrated Peak Power- ZigBee 2.4 GHz Mode- 2 MHz- 250 kbps -PWR-PK-CH18-19.5dBm
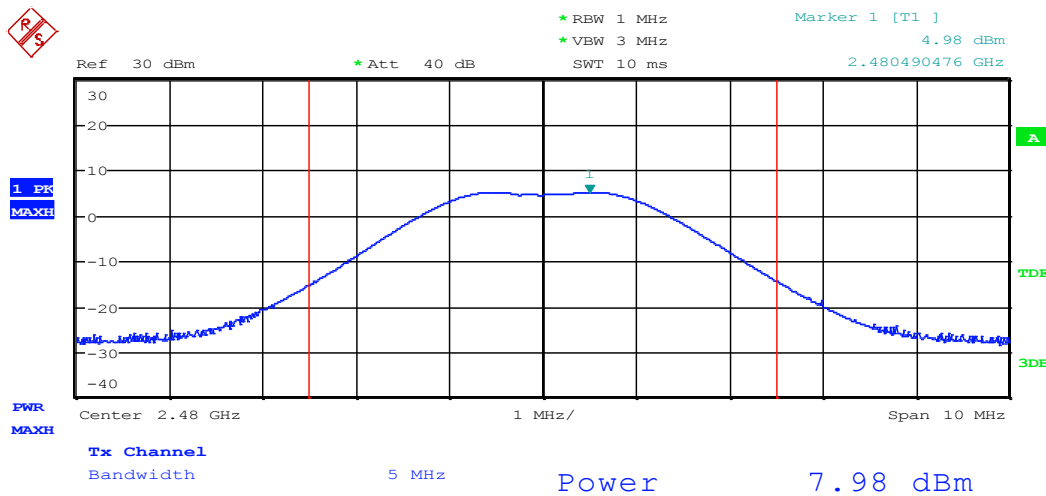
Band Integrated Peak Power- ZigBee 2.4 GHz Mode- 2 MHz- 250 kbps -PWR-PK-CH26-5dBm

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	18.7	30.0	16.7	100.000	PASS
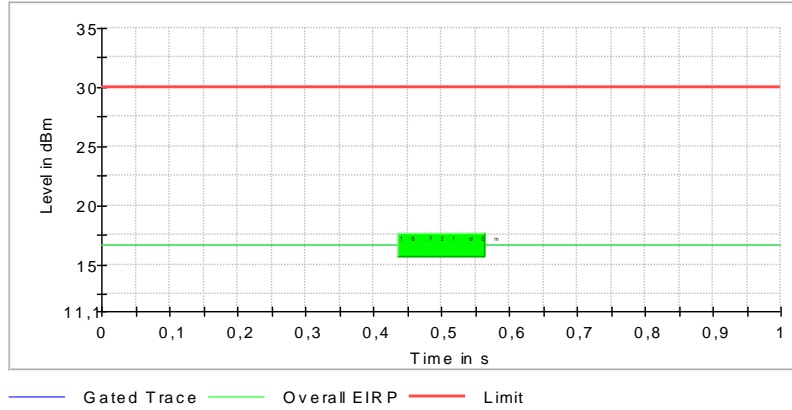
RMS Power + Duty Cycle- ZigBee 2.4 GHz Mode- 2 MHz- 250 kbps -CH11-19.5dBm

DUT Frequency (MHz)	Gated RMS (dBm)	Limit Max (dBm)	Gated EIRP (dBm)	Duty Cycle (%)	Result
2440.000000	18.6	30.0	16.6	100.000	PASS
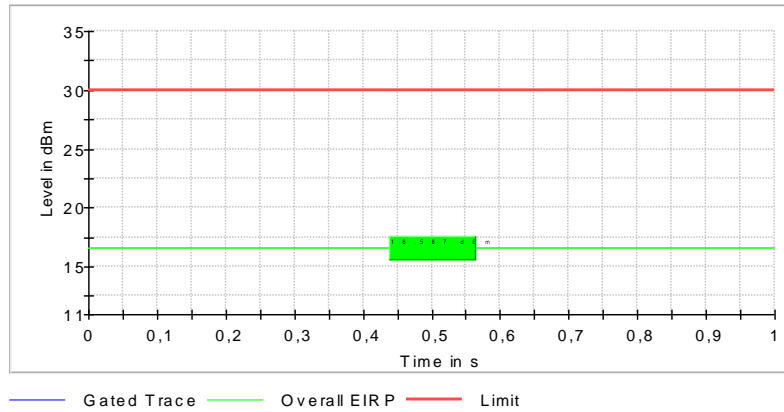
RMS Power + Duty Cycle- ZigBee 2.4 GHz Mode- 2 MHz- 250 kbps -CH18-19.5dBm

DUT Frequency (MHz)	Gated RMS (dBm)	Limit Max (dBm)	Gated EIRP (dBm)	Duty Cycle (%)	Result
2480.000000	4.3	30.0	2.3	100.000	PASS
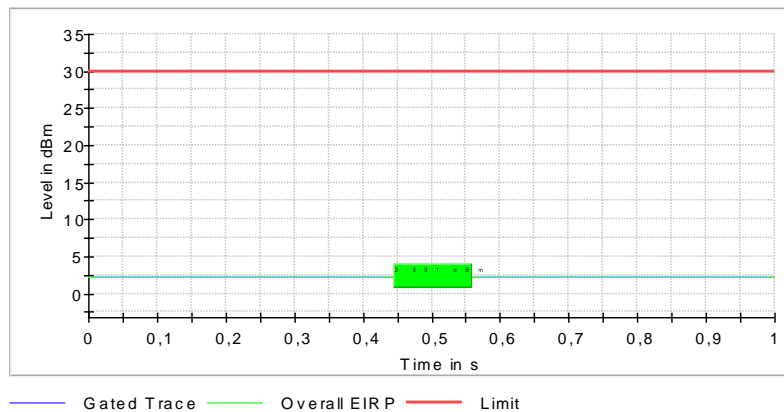
RMS Power + Duty Cycle- ZigBee 2.4 GHz Mode- 2 MHz- 250 kbps - CH26-5dBm

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	2404.551515	-5.497	8.0	PASS
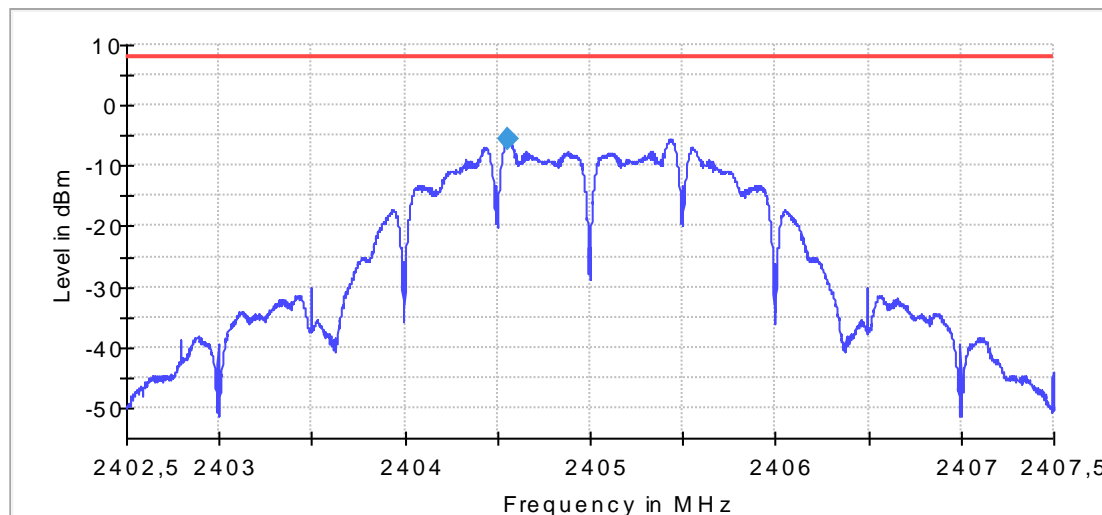
Power Spectral Density - ZigBee 2.4 GHz Mode- 2 MHz- 250 kbps -CH11-19.5dBm

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	RMS	RMS
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	2440.430303	-5.717	8.0	PASS
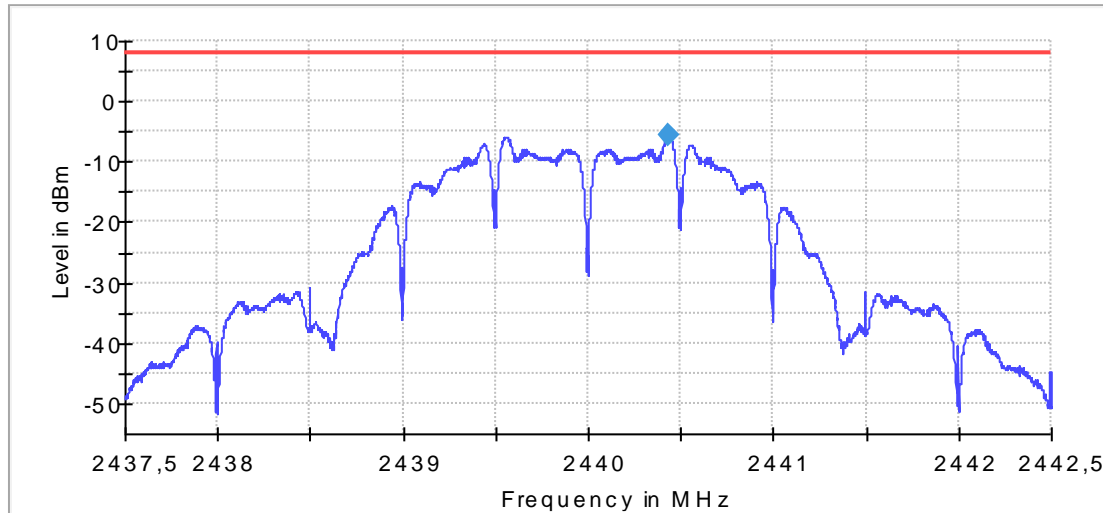
Power Spectral Density - ZigBee 2.4 GHz Mode- 2 MHz- 250 kbps -CH18-19.5dBm

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	RMS	RMS
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	2480.430303	-19.930	8.0	PASS
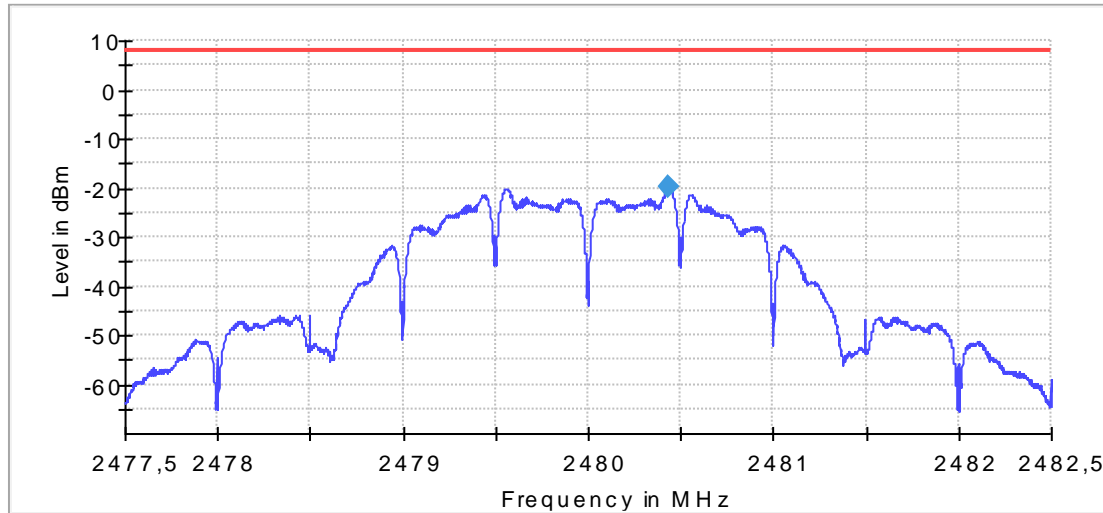
Power Spectral Density - ZigBee 2.4 GHz Mode- 2 MHz- 250 kbps -CH26-5dBm

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	RMS	RMS
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	12.9	PASS
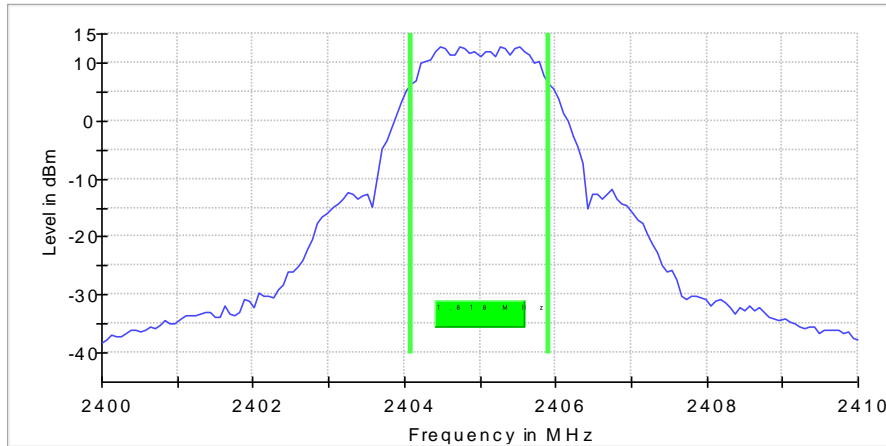
6 dB Bandwidth- ZigBee 2.4 GHz Mode- 2 MHz- 250 kbps -CH11-19.5dBm

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
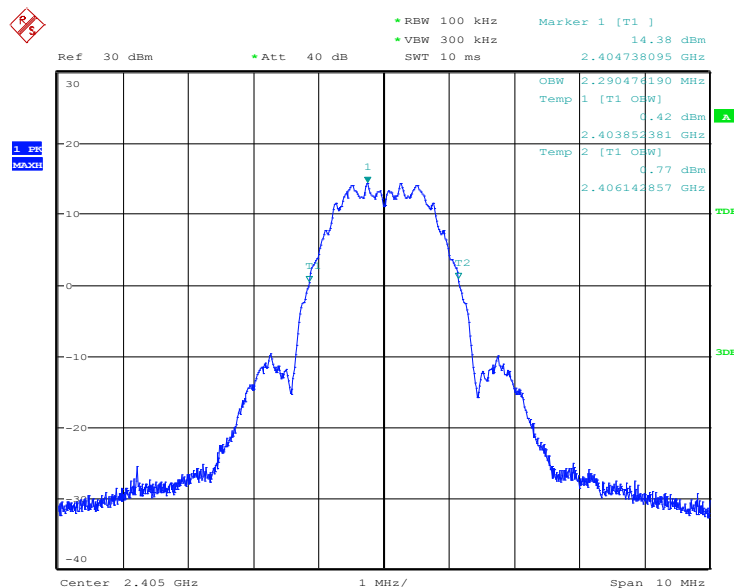
99% Bandwidth-ZigBee 2.4 GHz Mode- 2 MHz- 250 kbps -CH11-19.5dBm

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	25 / 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
2440.000000	1.818182	0.500000	2439.090909	2440.909091	12.8	PASS
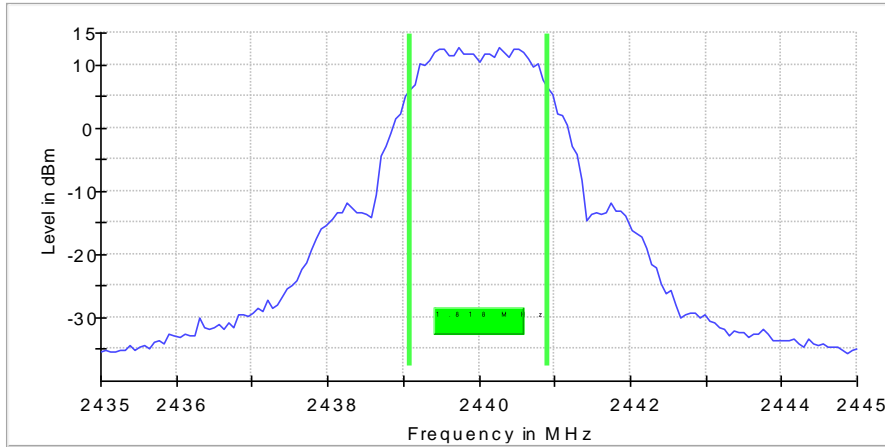
6 dB Bandwidth- ZigBee 2.4 GHz Mode- 2 MHz- 250 kbps -CH18-19.5dBm

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
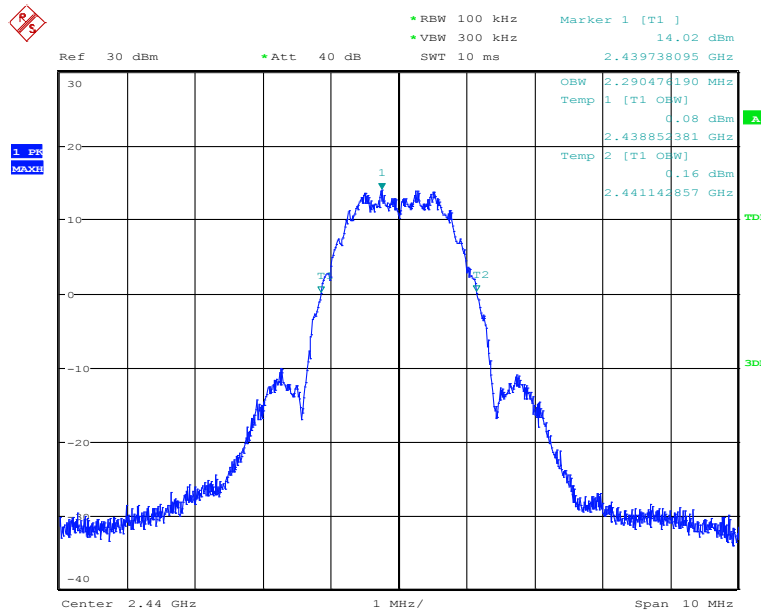
99% Bandwidth- ZigBee 2.4 GHz Mode- 2 MHz- 250 kbps -CH18-19.5dBm

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	22 / max. 150	max. 150
Stable	15 / 15	15
Max Stable Difference	0.16 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	-1.5	PASS
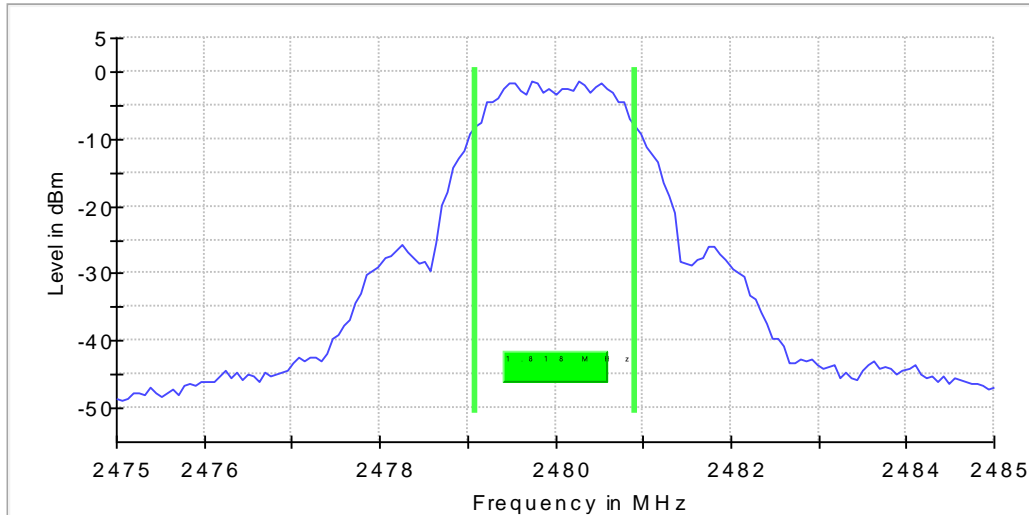
6 dB Bandwidth- ZigBee 2.4 GHz Mode- 2 MHz- 250 kbps –CH26-5 dBm

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
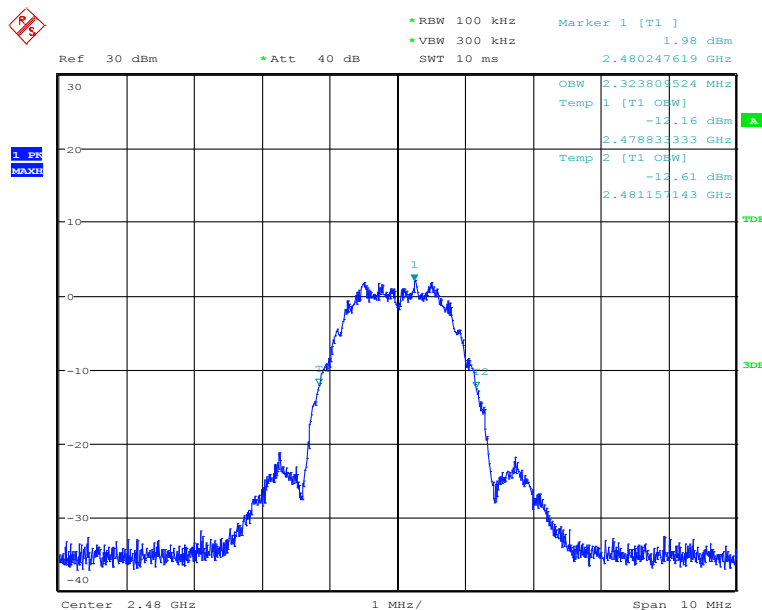
99% Bandwidth- ZigBee 2.4 GHz Mode- 2 MHz- 250 kbps –CH26-5 dBm

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	25 / max. 150	max. 150
Stable	15 / 15	15
Max Stable Difference	0.05 dB	0.50 dB

1.5. 20dBc Conducted Spurious Emissions
1.5.1. 20 dBc - ZigBee 2.4 GHz Mode- 2 MHz- 250 kbps
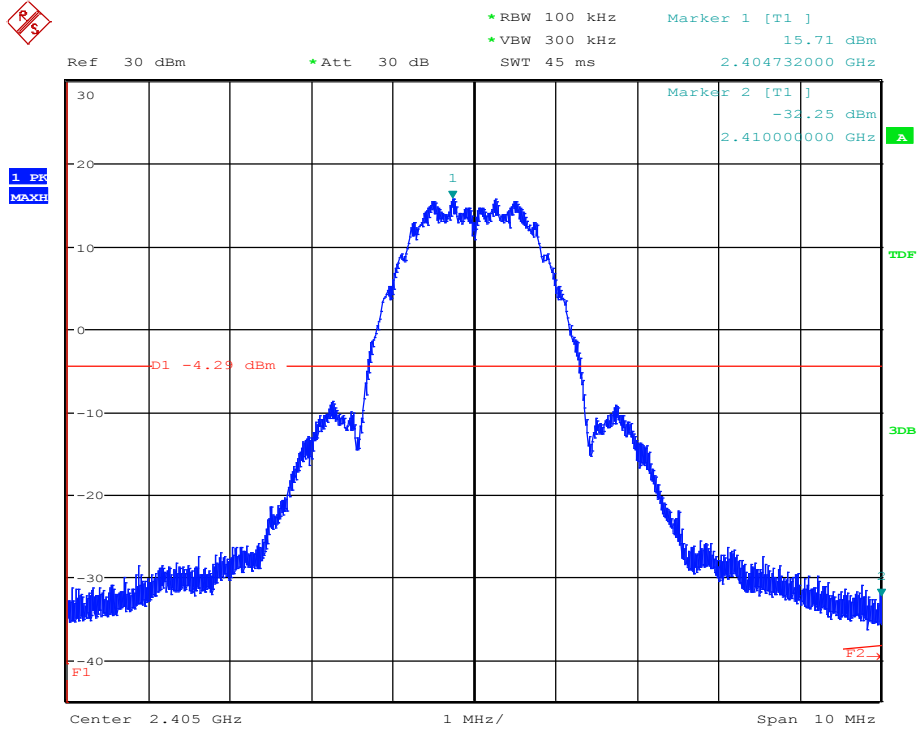
20dBc-Ref- ZigBee 2.4 GHz Mode- 2 MHz- 250 kbps -CH11-19.5dBm
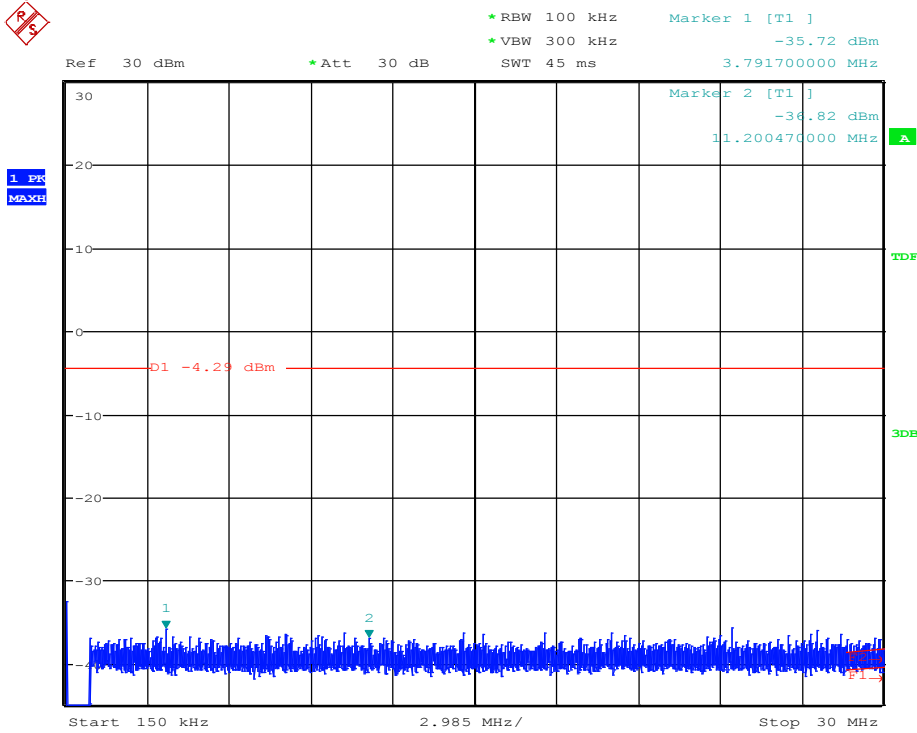
20dBc-0.15MHz-30MHz-ZigBee 2.4 GHz Mode- 2 MHz- 250 kbps -CH11-19.5dBm
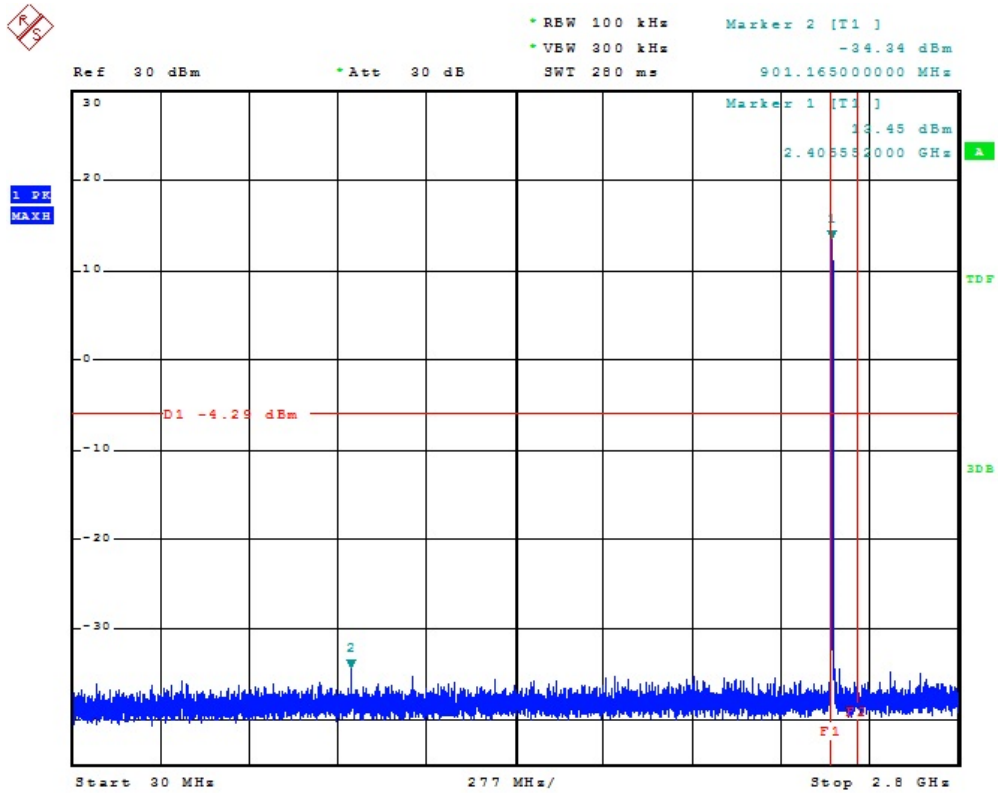
20dBc-30MHz-2.8GHz- ZigBee 2.4 GHz Mode- 2 MHz- 250 kbps -CH11-19.5dBm
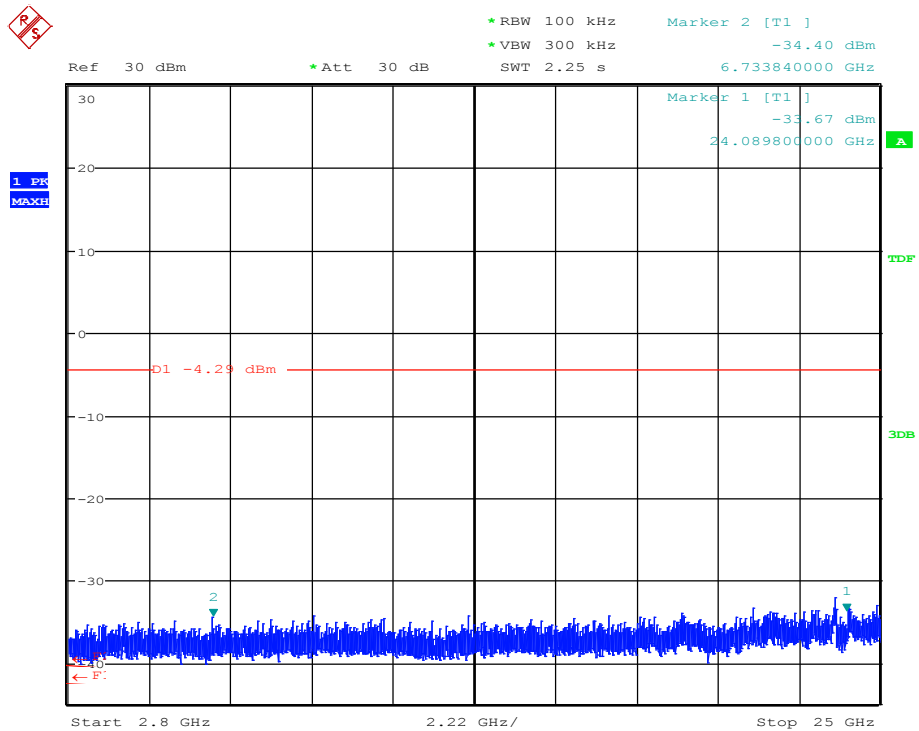
20dBc-2.8GHz-25GHz- ZigBee 2.4 GHz Mode- 2 MHz- 250 kbps -CH11-19.5dBm
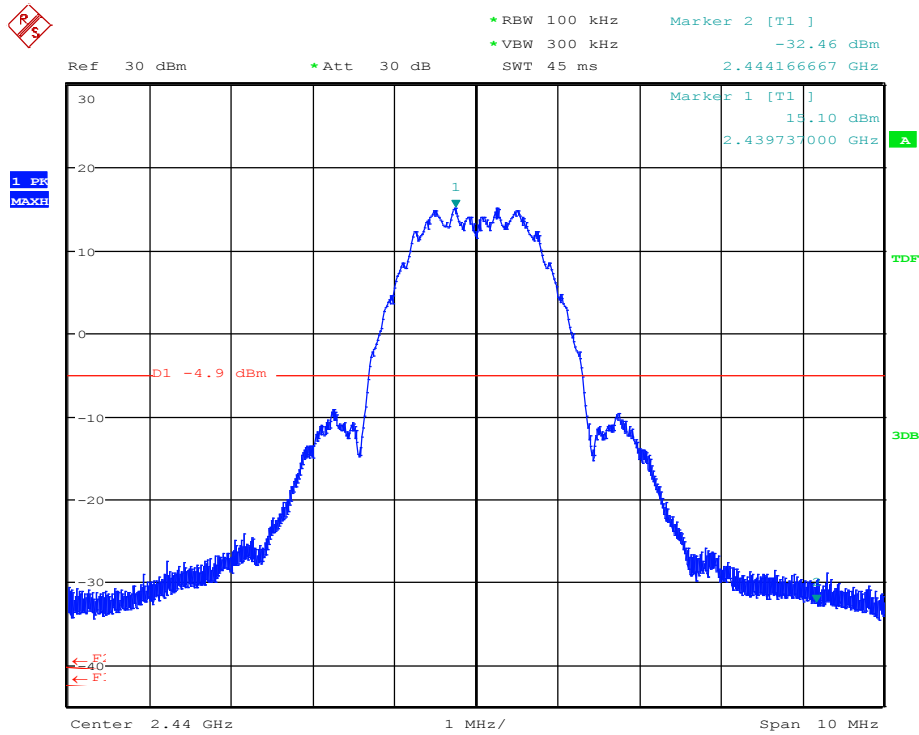
20dBc-Ref- ZigBee 2.4 GHz Mode- 2 MHz- 250 kbps -CH18-19.5dBm
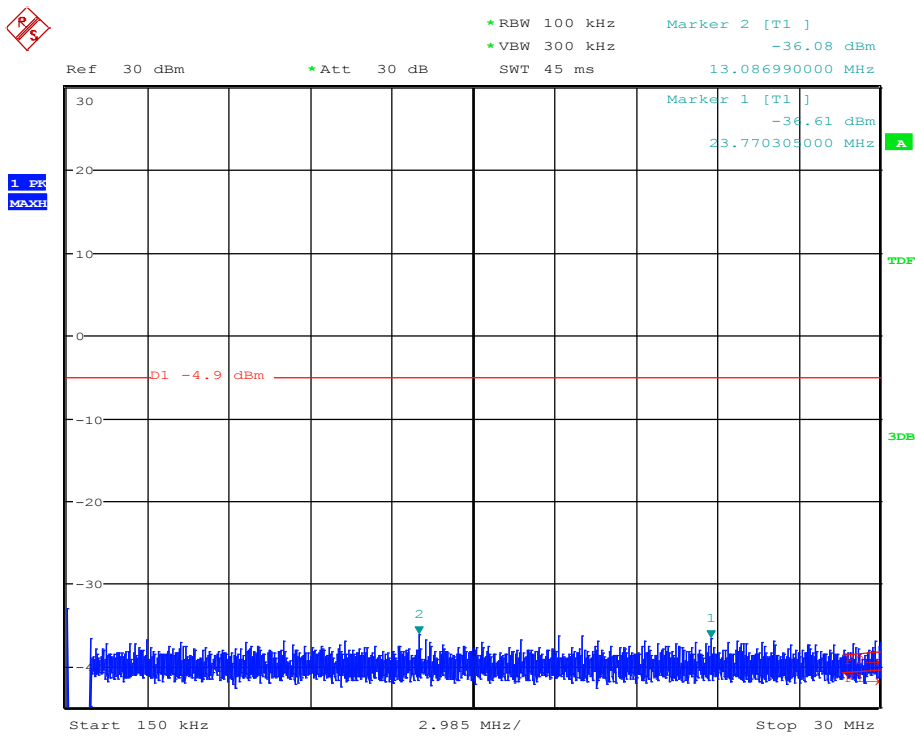
20dBc-0.15MHz-30MHz-ZigBee 2.4 GHz Mode- 2 MHz- 250 kbps -CH18-19.5dBm

20dBc-30MHz-2.8GHz- ZigBee 2.4 GHz Mode- 2 MHz- 250 kbps -CH18-19.5dBm

20dBc-2.8GHz-25GHz- ZigBee 2.4 GHz Mode- 2 MHz- 250 kbps -CH18-19.5dBm
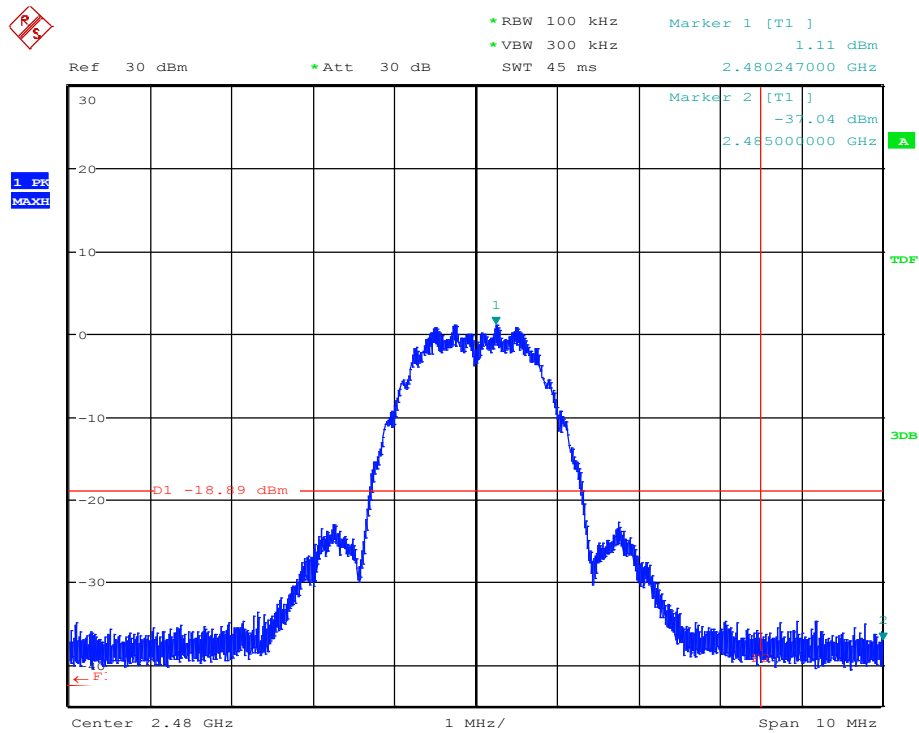
RBW 100 kHz Marker 1 [T1]
VBW 300 kHz   1.11 dBm
Ref 30 dBm   *Att 30 dB   SWT 45 ms   2.480247000 GHz
Marker 2 [T1]
-37.04 dBm
2.485000000 GHz A
D1 -18.89 dBm
Center 2.48 GHz   1 MHz/   Span 10 MHz

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

RBW 100 kHz Marker 1 [T1]
VBW 300 kHz   -35.54 dBm
Ref 30 dBm   *Att 30 dB   SWT 45 ms   4.815555000 MHz
Marker 2 [T1]
-36.81 dBm
14.030250000 MHz A
D1 -18.89 dBm
Start 150 kHz   2.985 MHz/   Stop 30 MHz

20dBc-0.15MHz-30MHz-ZigBee 2.4 GHz Mode- 2 MHz- 250 kbps –CH26-5dBm

20dBc-30MHz-2.8GHz- ZigBee 2.4 GHz Mode- 2 MHz- 250 kbps –CH26-5dBm
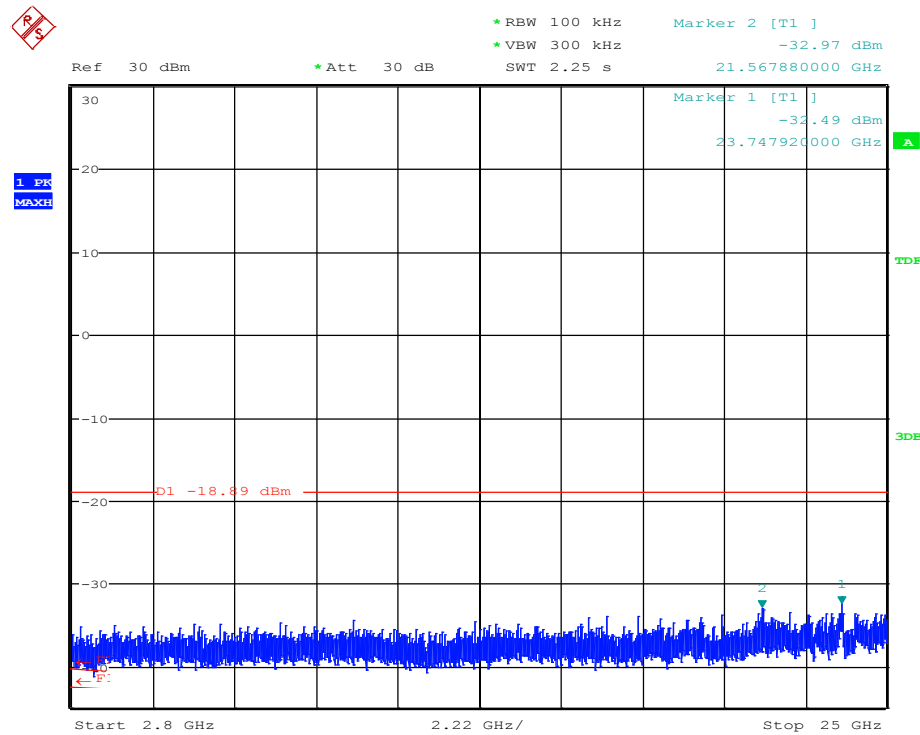
20dBc-2.8GHz-25GHz- ZigBee 2.4 GHz Mode- 2 MHz- 250 kbps –CH26-5dBm

2. Radiated Field Strength Measurements

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

Diagram No. 2.01_Vitoconnect OT2-ZigBee-TX-B.W.2MHz-250Kbps-Ch11-19.5dBm

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:	RIs
Operating conditions:	Continuous TX-ZigBee-2.4GHz Mode-B.W. 2 MHz-250Kbps-Ch 11 (2405 MHz)-PWR+19.5dBm

EUT Information

Applicant: Viessmann Werke GmbH & Co.KG

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EUT:	Vitoconnect OT2
S/N:	GNV 7637415600219108
HW version:	V005, BOM Rev-k
SW version:	Linux:0.10.0 | STM:1.33.02 | EFR32 | v1.0
	Ember Node Test Application v1.0 Jul 1 2016
Connected Interfaces:	Optolink Via USB + UART 2 + Opentherm Loop(Master to Slave)
Test Mode Configurations:	OpenTherm & Optolink Communication Loop + Processor Load 25%
Power Supply:	12 VDC using AC/DC Adapter
AC/DC Adapter Details:	PHIHONG|Model:PSAC12R-120|Input:Ac100-240V 50-60Hz 0.5A
Line Power Supply:	120 V AC 60 Hz

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)
13.274000	8.22	29.54	21.32	1000.0	10.000	100.0	V	98.0	90.0	-1.7
27.550000	8.77	29.54	20.77	1000.0	10.000	100.0	V	239.0	0.0	0.5

(continuation of the "Final_Result" table from column 17 ...)

Frequency (MHz)	Comment
13.274000	12:41:04 - 06.08.2017
27.550000	12:35:40 - 06.08.2017

Diagram No. 2.02_Vitoconnect OT2-ZigBee-TX-B.W.2MHz-250Kbps-Ch18-19.5dBm

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 18 (2440 MHz)-PWR+19.5dBm

EUT Information

Applicant:	Viessmann Werke GmbH & Co.KG
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EUT:	Vitoconnect OT2
S/N:	GNV 7637415600219108
HW version:	V005, BOM Rev-k
SW version:	Linux:0.10.0	STM:1.33.02	EFR32	v1.0
	Ember Node Test Application v1.0 Jul 1 2016
Connected Interfaces:	Optolink Via USB + UART 2 + Opentherm Loop(Master to Slave)
Test Mode Configurations:	OpenTherm & Optolink Communication Loop + Processor Load 25%
Power Supply:	12 VDC using AC/DC Adapter
AC/DC Adapter Details:	PHIHONG|Model:PSAC12R-120|Input:Ac100-240V 50-60Hz 0.5A
Line Power Supply:	120 V AC 60 Hz

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)
9.266000	-3.51	29.54	33.05	1000.0	10.000	100.0	H	261.0	90.0	-5.0
13.314000	7.77	29.54	21.77	1000.0	10.000	100.0	V	138.0	90.0	-1.6

(continuation of the "Final_Result" table from column 17 ...)

Frequency (MHz)	Comment
9.266000	13:55:01 - 06.08.2017
13.314000	14:00:24 - 06.08.2017

Diagram No. 2.03_Vitoconnect OT2-ZigBee-TX-B.W.2MHz-250Kbps-Ch26-5dBm
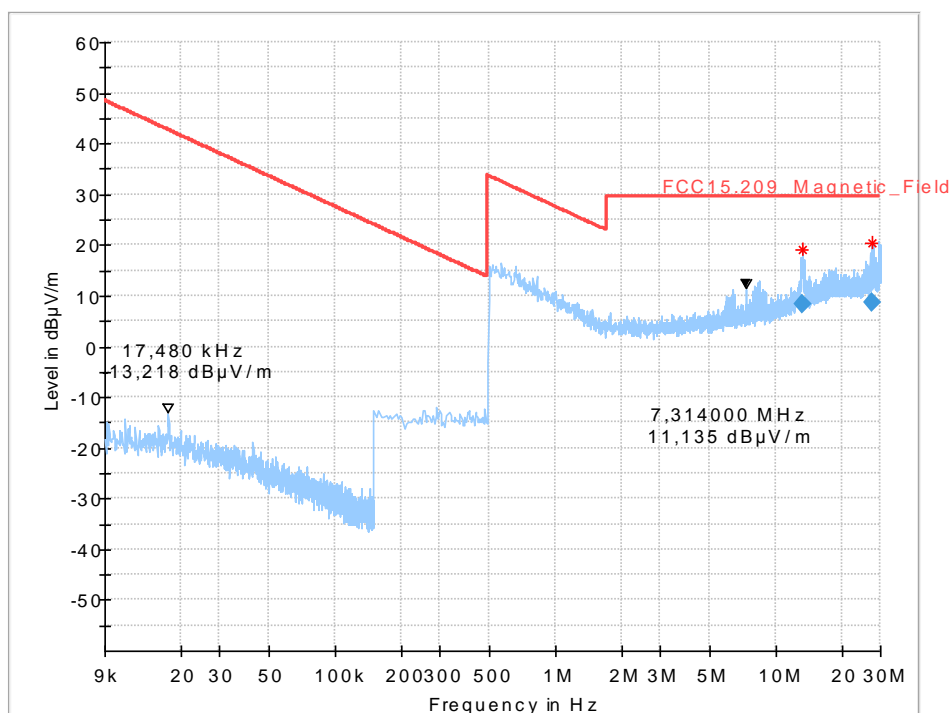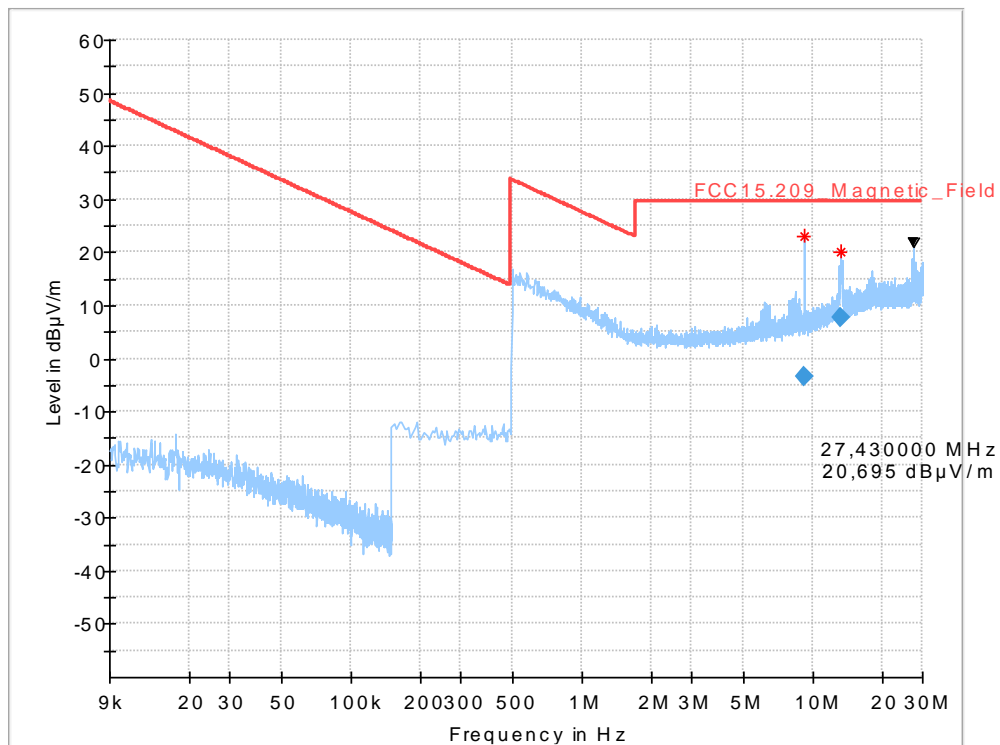
Common Information

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
\--------------------------------------   --
EUT: Vitoconnect OT2
S/N: GNV 7637415600219108
HW version: V005, BOM Rev-k
SW version: Linux:0.10.0 | STM:1.33.02 | EFR32 | v1.0
                             Ember Node Test Application v1.0 Jul 1 2016
Connected Interfaces: Optolink Via USB + UART 2 + Opentherm Loop(Master to Slave)
Test Mode Configurations: OpenTherm & Optolink Communication Loop + Processor Load 25%
Power Supply: 12 VDC using AC/DC Adapter
AC/DC Adapter Details: PHIHONG|Model:PSAC12R-120|Input:Ac100-240V 50-60Hz 0.5A
Line Power Supply: 120 V AC 60 Hz

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)
13.266000	8.89	29.54	20.65	1000.0	10.000	100.0	V	45.0	0.0	-1.7

(continuation of the "Final_Result" table from column 17 ...)

Frequency (MHz)	Comment
13.266000	15:15:13 - 06.08.2017

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

Diagram No. 3.01_Vitoconnect OT2-ZigBee-TX-B.W.2MHz-250Kbps-Ch11-19.5dBm
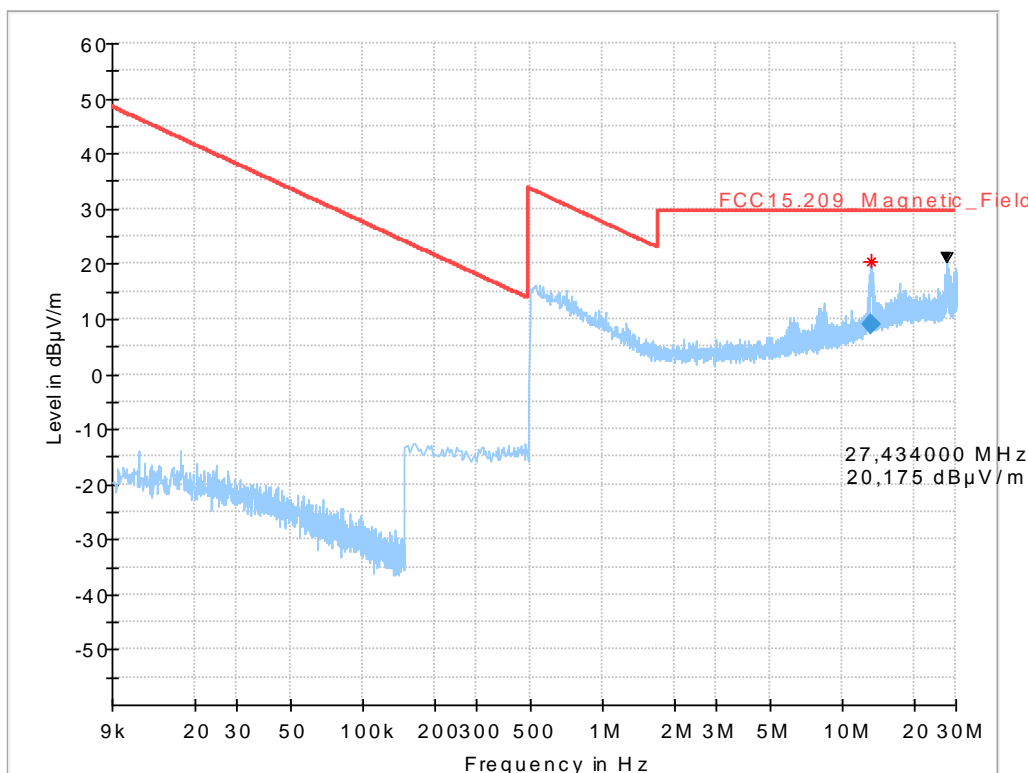
Common Information

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
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+19.5dBm

EUT Information

Applicant:	Viessmann Werke GmbH & Co.KG
--	--
EUT:	Vitoconnect OT2
S/N:	GNV 7637415600219108
HW version:	V005, BOM Rev-k
SW version:	Linux:0.10.0 | STM:1.33.02 | EFR32 | v1.0
	Ember Node Test Application v1.0 Jul 1 2016
Connected Interfaces:	Optolink Via USB + UART 2 + Opentherm Loop(Master to Slave)
Test Mode Configurations:	OpenTherm & Optolink Communication Loop + Processor Load 25%
Power Supply:	12 VDC using AC/DC Adapter
AC/DC Adapter Details:	PHIHONG|Model:PSAC12R-120|Input:Ac100-240V 50-60Hz 0.5A
Line Power Supply:	120 V AC 60 Hz

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)
63.152000	33.89	40.00	6.11	1000.0	120.000	198.0	V	49.0	0.0	7.8
240.104000	23.45	46.00	22.55	1000.0	120.000	105.0	H	240.0	90.0	13.1

Diagram No. 3.02_Vitoconnect OT2-ZigBee-TX-B.W.2MHz-250Kbps-Ch18-19.5dBm

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
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+19.5dBm

EUT Information

Applicant:	Viessmann Werke GmbH & Co.KG
---------------------------------------	---
EUT:	Vitoconnect OT2
S/N:	GNV 7637415600219108
HW version:	V005, BOM Rev-k
SW version:	Linux:0.10.0 | STM:1.33.02 | EFR32 | v1.0
	Ember Node Test Application v1.0 Jul 1 2016
Connected Interfaces:	Optolink Via USB + UART 2 + Opentherm Loop(Master to Slave)
Test Mode Configurations:	OpenTherm & Optolink Communication Loop + Processor Load 25%
Power Supply:	12 VDC using AC/DC Adapter
AC/DC Adapter Details:	PHIHONG|Model:PSAC12R-120|Input:Ac100-240V 50-60Hz 0.5A
Line Power Supply:	120 V AC 60 Hz

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)
63.204000	28.58	40.00	11.42	1000.0	120.000	128.0	V	223.0	0.0	7.8
63.656000	32.96	40.00	7.04	1000.0	120.000	211.0	V	-32.0	0.0	7.7
64.160000	35.95	40.00	4.05	1000.0	120.000	119.0	V	105.0	0.0	7.5
95.792000	29.08	43.50	14.42	1000.0	120.000	149.0	V	90.0	90.0	8.2

Diagram No. 3.03_Vitoconnect OT2-ZigBee-TX-B.W.2MHz-250Kbps-Ch26-5 dBm

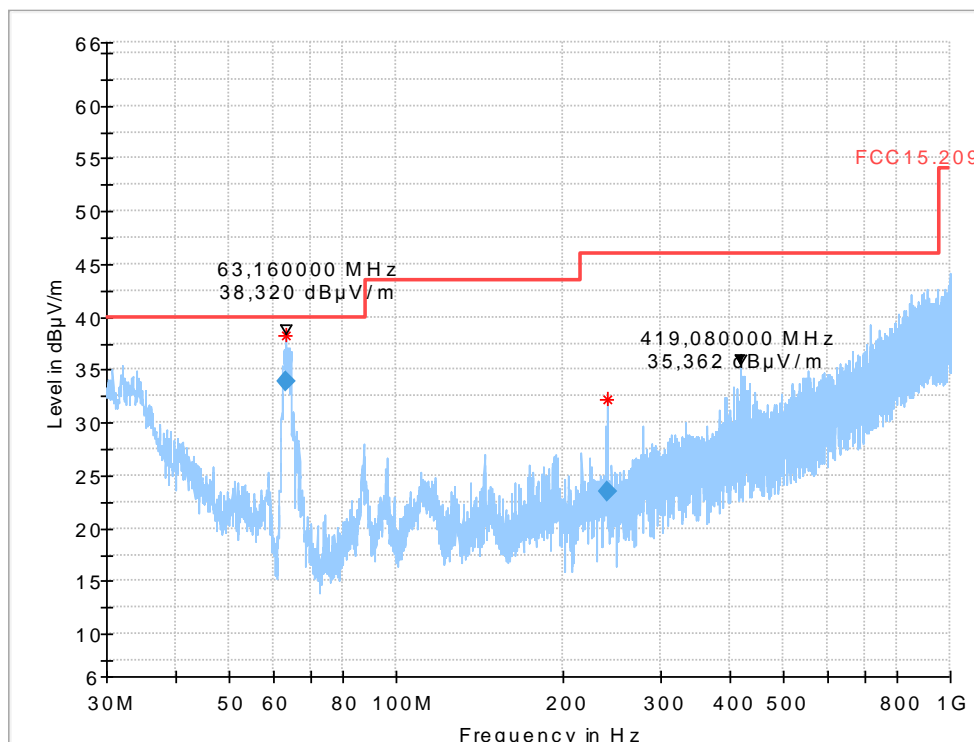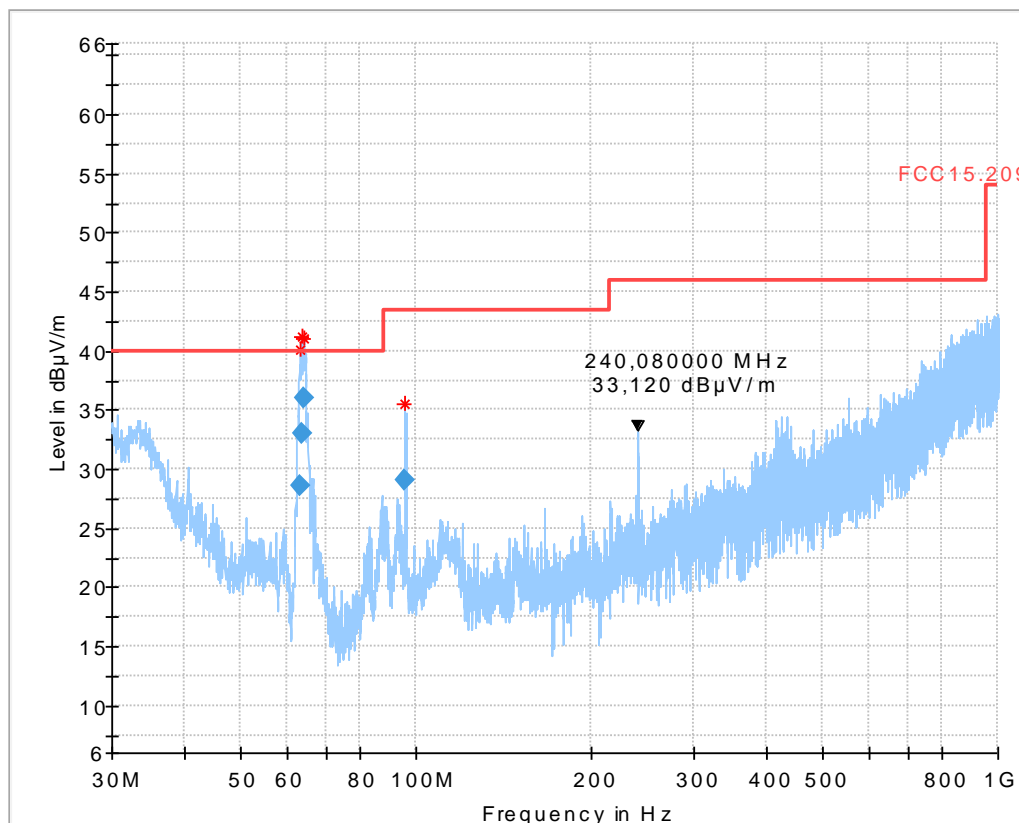## Common Information

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
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
--	--
EUT:	Vitoconnect OT2
S/N:	GNV 7637415600219108
HW version:	V005, BOM Rev-k
SW version:	Linux:0.10.0 | STM:1.33.02 | EFR32 | v1.0
	Ember Node Test Application v1.0 Jul 1 2016
Connected Interfaces:	Optolink Via USB + UART 2 + Opentherm Loop(Master to Slave)
Test Mode Configurations:	OpenTherm & Optolink Communication Loop + Processor Load 25%
Power Supply:	12 VDC using AC/DC Adapter
AC/DC Adapter Details:	PHIHONG|Model:PSAC12R-120|Input:Ac100-240V 50-60Hz 0.5A
Line Power Supply:	120 V AC 60 Hz

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)
33.396000	31.74	40.00	8.26	1000.0	120.000	179.0	H	-24.0	90.0	20.0
64.032000	33.66	40.00	6.34	1000.0	120.000	162.0	V	264.0	90.0	7.5
64.664000	37.40	40.00	2.60	1000.0	120.000	170.0	V	288.0	90.0	7.3

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

Diagram No.: 4.01_Vitoconnect OT2-ZigBee-TX-B.W.2MHz-250Kbps-Ch11-19.5dBm

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 11 (2405 MHz)-PWR+19.5dBm
Operator Name:	KIv

EUT Information

Applicant: Viessmann Werke GmbH & Co.KG

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EUT: Vitoconnect OT2
S/N: GNV 7637415600219108
HW version: V005, BOM Rev-k
SW version: Linux:0.10.0 | STM:1.33.02 | EFR32 | v1.0
                           Ember Node Test Application v1.0 Jul 1 2016
Connected Interfaces: Optolink Via USB + UART 2 + Opentherm Loop(Master to Slave)
Test Mode Configurations: OpenTherm & Optolink Communication Loop + Processor Load 25%
Power Supply: 12 VDC using AC/DC Adapter
AC/DC Adapter Details: PHIHONG|Model:PSAC12R-120|Input:Ac100-240V 50-60Hz 0.5A
Line Power Supply: 120 V AC 60 Hz

Final_Result

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Elevation (deg)
2985.920000	---	29.82	150.00	120.18	1000.000	155.0	V	96.0	90.0
2986.080000	42.41	---	150.00	107.59	1000.000	155.0	V	95.0	90.0
3288.000000	---	28.62	150.00	121.38	1000.000	155.0	H	-20.0	0.0
3288.400000	41.76	---	150.00	108.24	1000.000	155.0	H	-42.0	0.0
4181.520000	---	30.13	54.00	23.87	1000.000	155.0	H	169.0	0.0
4809.000000	52.96	---	74.00	21.04	1000.000	155.0	H	0.0	0.0
4924.040000	---	31.91	54.00	22.09	1000.000	155.0	H	294.0	90.0
12500.200000	---	44.99	54.00	9.01	1000.000	155.0	H	90.0	90.0
15695.920000	60.67	---	74.00	13.33	1000.000	155.0	H	118.0	90.0
17872.360000	64.15	---	74.00	9.85	1000.000	155.0	H	46.0	90.0
17904.320000	---	50.79	54.00	3.22	1000.000	155.0	V	207.0	0.0

(continuation of the "Final_Result" table from column 16 ...)

Frequency (MHz)	Corr. (dB)	Comment
2985.920000	-1.0	23:19:03 - 26.06.2017
2986.080000	-1.0	23:05:46 - 26.06.2017
3288.000000	-0.3	23:08:07 - 26.06.2017
3288.400000	-0.3	22:57:43 - 26.06.2017
4181.520000	2.1	23:10:17 - 26.06.2017
4809.000000	4.9	22:59:36 - 26.06.2017
4924.040000	4.5	23:16:39 - 26.06.2017
12500.200000	20.2	23:14:37 - 26.06.2017
15695.920000	24.2	23:01:40 - 26.06.2017
17872.360000	26.7	23:03:36 - 26.06.2017
17904.320000	26.7	23:12:19 - 26.06.2017

Diagram No.: 4.02_Vitoconnect OT2-ZigBee-TX-B.W.2MHz-250Kbps-Ch18-19.5dBm
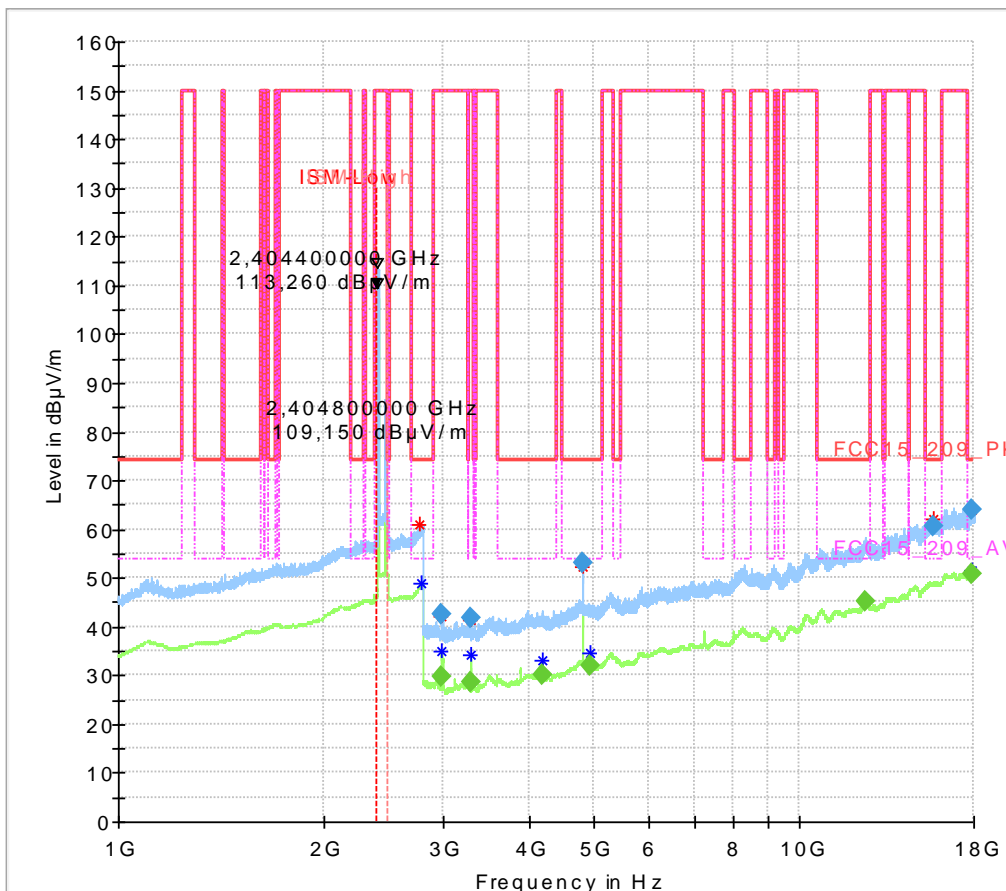
Common Information

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 18 (2440 MHz)-PWR+19.5dBm
Operator Name:	APh

EUT Information

Applicant:	Viessmann Werke GmbH & Co.KG
--	---
EUT:	Vitoconnect OT2
S/N:	GNV 7637415600219108
HW version:	V005, BOM Rev-k
SW version:	Linux:0.10.0	STM:1.33.02	EFR32	v1.0
	Ember Node Test Application v1.0 Jul 1 2016
Connected Interfaces:	Optolink Via USB + UART 2 + Opentherm Loop(Master to Slave)
Test Mode Configurations:	OpenTherm & Optolink Communication Loop + Processor Load 25%
Power Supply:	12 VDC using AC/DC Adapter
AC/DC Adapter Details:	PHIHONG|Model:PSAC12R-120|Input:Ac100-240V 50-60Hz 0.5A
Line Power Supply:	120 V AC 60 Hz

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	---	44.02	54.00	9.98	1000.000	155.0	H	309.0	0.0
4881.000000	---	44.00	54.00	10.00	1000.000	155.0	H	310.0	0.0
4881.000000	53.24	---	74.00	20.76	1000.000	155.0	H	308.0	0.0
12433.800000	56.32	---	74.00	17.68	1000.000	155.0	V	299.0	90.0
12499.160000	---	45.00	54.00	9.00	1000.000	155.0	H	189.0	90.0
15562.120000	60.73	---	74.00	13.27	1000.000	155.0	V	-31.0	90.0
15880.520000	---	48.53	54.00	5.47	1000.000	155.0	H	262.0	0.0
17807.640000	---	50.67	54.00	3.33	1000.000	155.0	V	10.0	0.0

Diagram No.: 4.03_Vitoconnect OT2-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+5dBm
Operator Name:	APh

EUT Information

Applicant:	Viessmann Werke GmbH & Co.KG
-------------------------------------	--
EUT:	Vitoconnect OT2
S/N:	GNV 7637415600219108
HW version:	V005, BOM Rev-k
SW version:	Linux:0.10.0 | STM:1.33.02 | EFR32 | v1.0
	Ember Node Test Application v1.0 Jul 1 2016
Connected Interfaces:	Optolink Via USB + UART 2 + Opentherm Loop(Master to Slave)
Test Mode Configurations:	OpenTherm & Optolink Communication Loop + Processor Load 25%
Power Supply:	12 VDC using AC/DC Adapter
AC/DC Adapter Details:	PHIHONG|Model:PSAC12R-120|Input:Ac100-240V 50-60Hz 0.5A
Line Power Supply:	120 V AC 60 Hz

Final_Result

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Elevation (deg)
4179.840000	---	29.80	54.00	24.20	1000.000	155.0	H	173.0	0.0
4959.000000	---	41.24	54.00	12.76	1000.000	155.0	V	-12.0	0.0
4959.000000	50.22	---	74.00	23.78	1000.000	155.0	V	-10.0	0.0
15530.400000	---	48.49	54.00	5.51	1000.000	155.0	H	90.0	90.0
16060.520000	60.64	---	74.00	13.36	1000.000	155.0	V	-20.0	0.0
17817.680000	63.02	---	74.00	10.98	1000.000	155.0	H	284.0	0.0
17928.680000	---	50.78	54.00	3.22	1000.000	155.0	V	91.0	0.0

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

Diagram No.: 4.01a_Vitoconnect OT2-ZigBee-TX-B.W.2MHz-250Kbps-Ch11-19.5dBm

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 11 (2405 MHz)-PWR+19.5dBm
Operator Name:	TFr

EUT Information

Applicant:	Viessmann Werke GmbH & Co.KG
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EUT:	Vitoconnect OT2
S/N:	GNV 7637415600219108
HW version:	V005, BOM Rev-k
SW version:	Linux:0.10.0 | STM:1.33.02 | EFR32 | v1.0
	Ember Node Test Application v1.0 Jul 1 2016
Connected Interfaces:	Optolink Via USB + UART 2 + Opentherm Loop(Master to Slave)
Test Mode Configurations:	OpenTherm & Optolink Communication Loop + Processor Load 25%
Power Supply:	12 VDC using AC/DC Adapter
AC/DC Adapter Details:	PHIHONG|Model:PSAC12R-120|Input:Ac100-240V 50-60Hz 0.5A
Line Power Supply:	120 V AC 60 Hz

EMI Scan_18_40GHz_Pre

Diagram No.: 4.02a_ Vitoconnect OT2-ZigBee-TX-B.W.2MHz-250Kbps-Ch18-19.5dBm

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 18 (2440 MHz)-PWR+19.5dBm
Operator Name:	TFr
:	

EUT Information

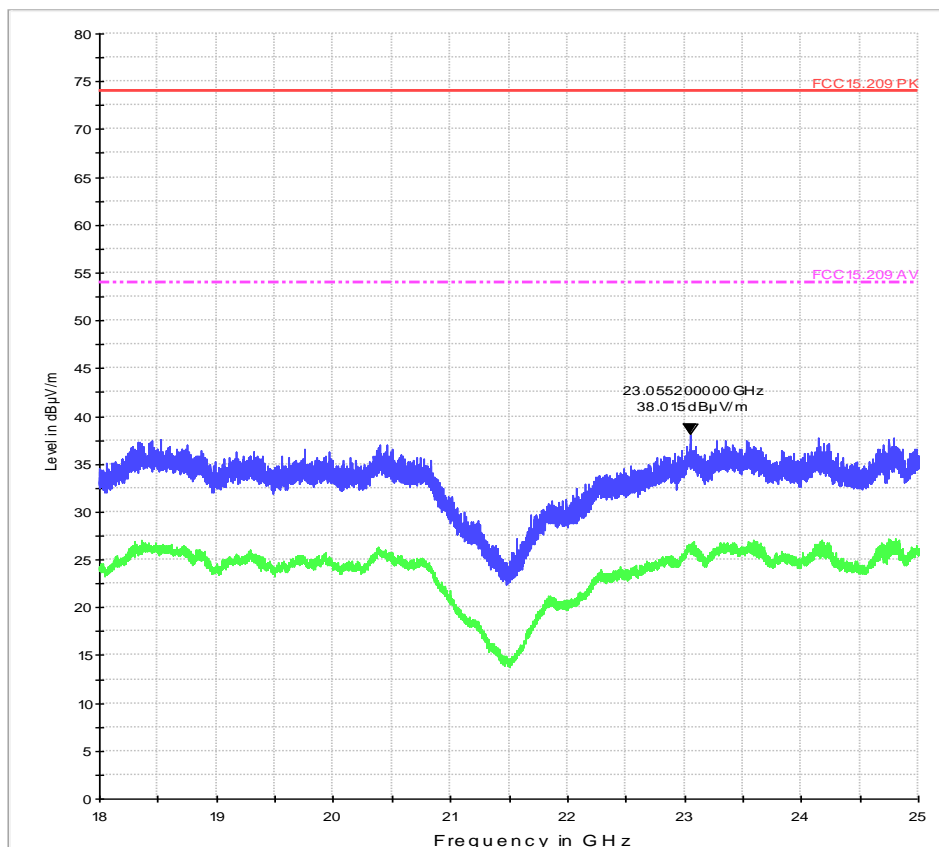|	
Applicant:	Viessmann Werke GmbH & Co.KG
--	--
EUT:	Vitoconnect OT2
S/N:	GNV 7637415600219108
HW version:	V005, BOM Rev-k
SW version:	Linux:0.10.0	STM:1.33.02	EFR32	v1.0
	Ember Node Test Application v1.0 Jul 1 2016
Connected Interfaces:	Optolink Via USB + UART 2 + Opentherm Loop(Master to Slave)
Test Mode Configurations:	OpenTherm & Optolink Communication Loop + Processor Load 25%
Power Supply:	12 VDC using AC/DC Adapter
AC/DC Adapter Details:	PHIHONG|Model:PSAC12R-120|Input:Ac100-240V 50-60Hz 0.5A
Line Power Supply:	120 V AC 60 Hz

EMIScan_18_40GHz_Pre

Diagram No.: 4.03a_Vitoconnect OT2-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 (2480 MHz)-PWR+5dBm
Operator Name:	TFr

EUT Information

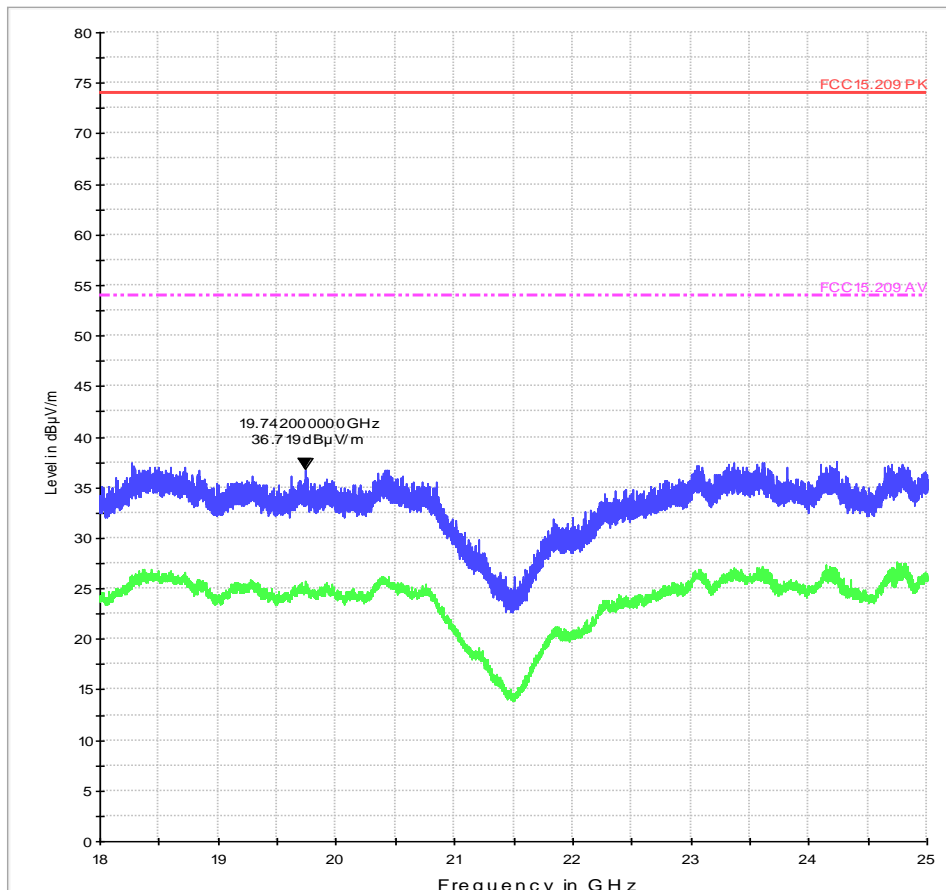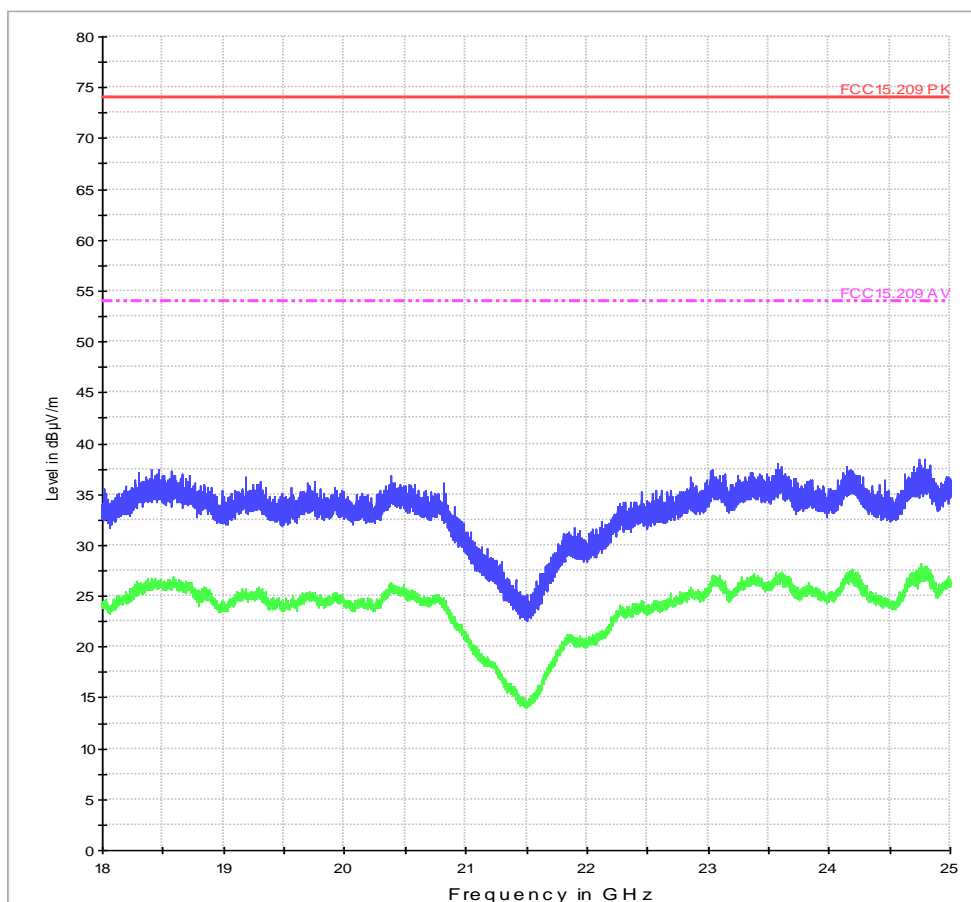|	
Applicant:	Viessmann Werke GmbH & Co.KG
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EUT:	Vitoconnect OT2
S/N:	GNV 7637415600219108
HW version:	V005, BOM Rev-k
SW version:	Linux:0.10.0	STM:1.33.02	EFR32	v1.0
	Ember Node Test Application v1.0 Jul 1 2016
Connected Interfaces:	Optolink Via USB + UART 2 + Opentherm Loop(Master to Slave)
Test Mode Configurations:	OpenTherm & Optolink Communication Loop + Processor Load 25%
Power Supply:	12 VDC using AC/DC Adapter
AC/DC Adapter Details:	PHIHONG|Model:PSAC12R-120|Input:Ac100-240V 50-60Hz 0.5A
Line Power Supply:	120 V AC 60 Hz

EMIScan_18_40GHz_Pre

3. Radiated Band-Edge Measurements

Diagram No.: 9.01_BE Low-Vitoconnect OT2-ZigBee-TX-B.W.2MHz-250Kbps-Ch11-19.5 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+19.5dBm
Operator Name:	APh

EUT Information

Applicant:	Viessmann Werke GmbH & Co.KG
---------------------------------------	---
EUT:	Vitoconnect OT2
S/N:	GNV 7637415600219108
HW version:	V005, BOM Rev-k
SW version:	Linux:0.10.0 | STM:1.33.02 | EFR32 | v1.0
	Ember Node Test Application v1.0 Jul 1 2016
Connected Interfaces:	Optolink Via USB + UART 2 + Opentherm Loop(Master to Slave)
Test Mode Configurations:	OpenTherm & Optolink Communication Loop + Processor Load 25%
Power Supply:	12 VDC using AC/DC Adapter
AC/DC Adapter Details:	PHIHONG|Model:PSAC12R-120|Input:Ac100-240V 50-60Hz 0.5A
Line Power Supply:	120 V AC 60 Hz

Diagram No.: 9.02_BE High-Vitoconnect OT2-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

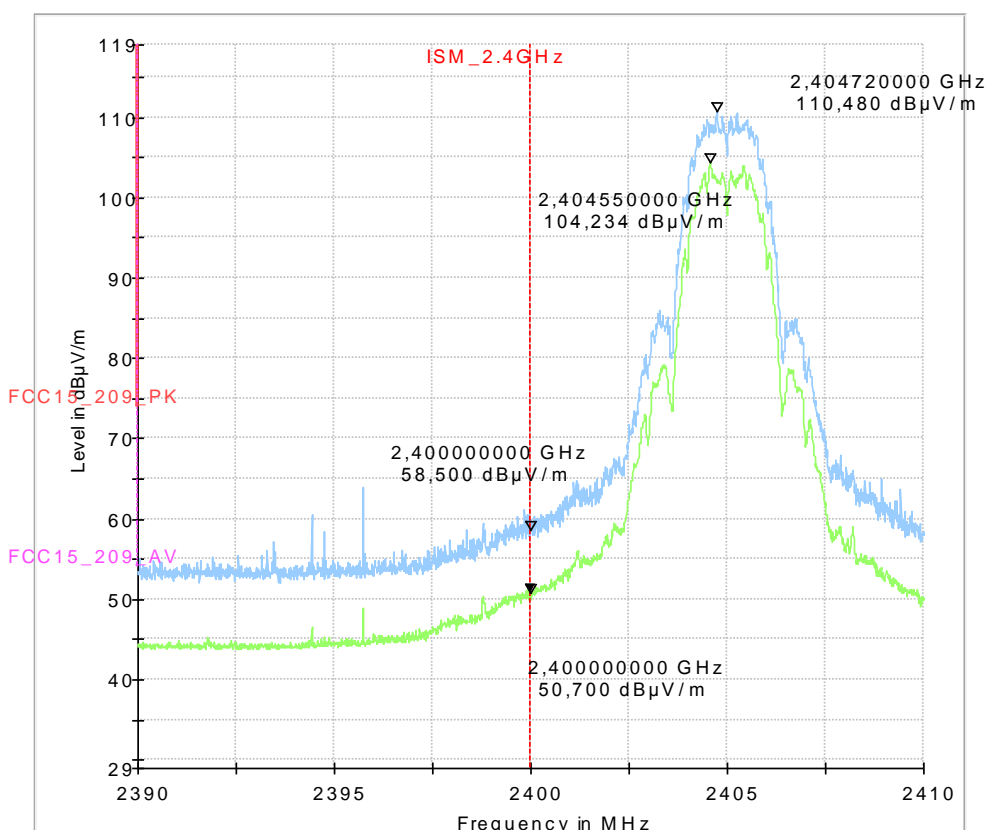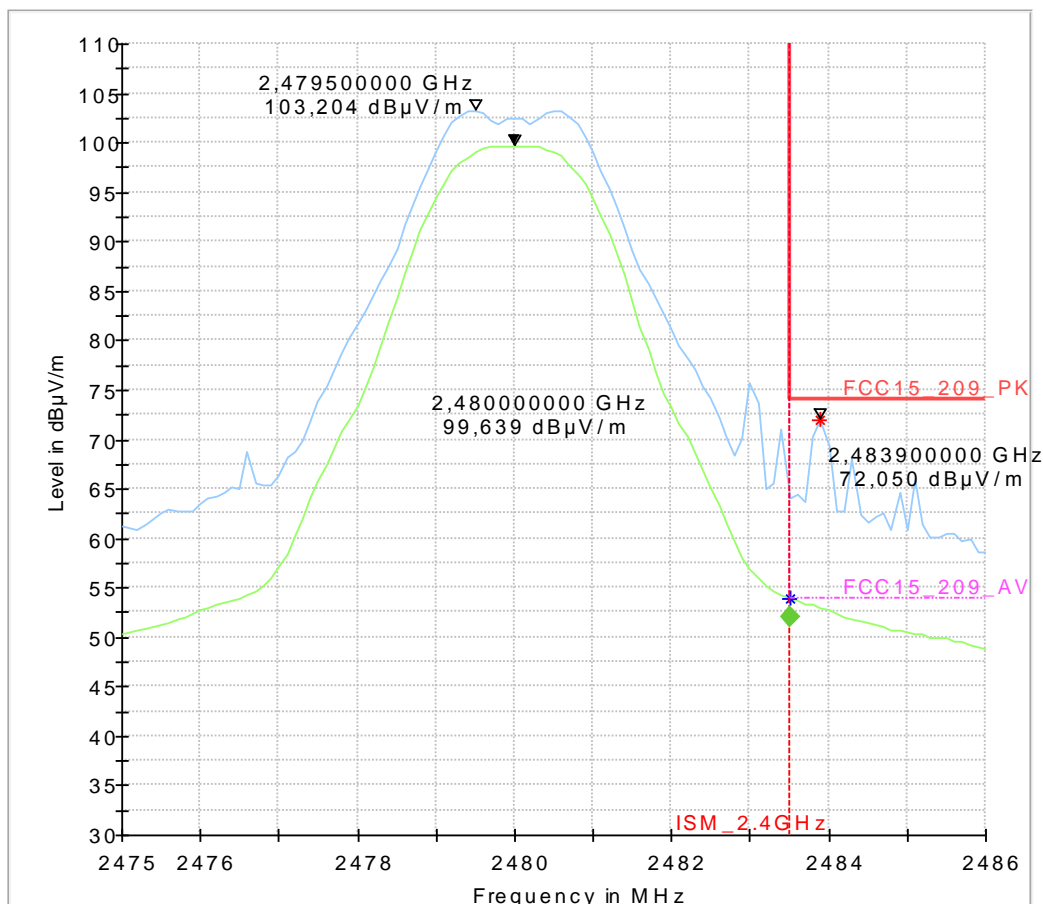|	
Applicant:	Viessmann Werke GmbH & Co.KG
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EUT:	Vitoconnect OT2
S/N:	GNV 7637415600219108
HW version:	V005, BOM Rev-k
SW version:	Linux:0.10.0 | STM:1.33.02 | EFR32 | v1.0
	Ember Node Test Application v1.0 Jul 1 2016
Connected Interfaces:	Optolink Via USB + UART 2 + Opentherm Loop(Master to Slave)
Test Mode Configurations:	OpenTherm & Optolink Communication Loop + Processor Load 25%
Power Supply:	12 VDC using AC/DC Adapter
AC/DC Adapter Details:	PHIHONG|Model:PSAC12R-120|Input:Ac100-240V 50-60Hz 0.5A
Line Power Supply:	120 V AC 60 Hz

Final_Result

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	---	52.06	54.00	1.94	100.0	1000.000	155.0	H	32.0	0.0

(continuation of the "Final_Result" table from column 16 ...)

Frequency (MHz)	Corr. (dB)	Comment
2483.500000	35.9	11:47:02 - 10.07.2017

4. AC Power Lines Conducted Emissions Measurements

Diagram No.: 1.01 – Vitoconnect OT2‑ZigBee-TX-B.W.2MHz-250Kbps-Ch18-19.5dBm
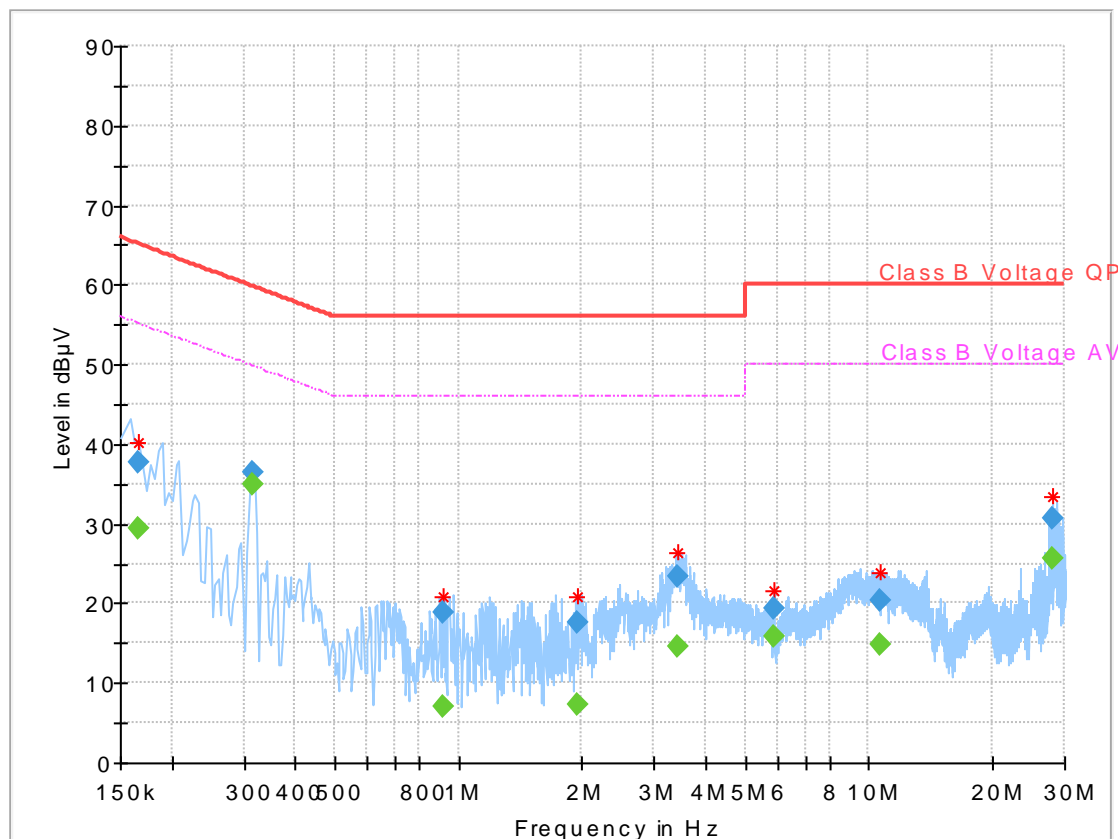
Common Information

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 & FCC 15.247 Intentional Radiator
Operating Mode:	Continuous TX-ZigBee-2.4GHz Mode-B.W. 2 MHz-250Kbps-Ch 18 (2440 MHz)-PWR+19.5 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
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EUT:	Vitoconnect OT2
S/N:	GNV 7637415600219108
HW version:	V005, BOM Rev-k
SW version:	Linux:0.10.0 | STM:1.33.02 | EFR32 | v1.0
	Ember Node Test Application v1.0 Jul 1 2016
Connected Interfaces:	Optolink Via USB + UART 2 + Opentherm Loop(Master to Slave)
Test Mode Configurations:	OpenTherm & Optolink Communication Loop + Processor Load 25%
Power Supply:	12 VDC using AC/DC Adapter
AC/DC Adapter Details:	PHIHONG|Model:PSAC12R-120|Input:Ac100-240V 50-60Hz 0.5A
Line Power Supply:	120 V AC 60 Hz

Full Spectrum

Final_Result

Frequency (MHz)	QuasiPeak (dBµV)	CAverage (dBµV)	Limit (dBµV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	PE	Corr. (dB)
0.166563	37.83	---	65.13	27.30	1000.0	9.000	N	GND	0.1
0.166563	---	29.48	55.13	25.65	1000.0	9.000	N	GND	0.1
0.316563	36.41	---	59.80	23.39	1000.0	9.000	L1	GND	0.1
0.316563	---	34.91	49.80	14.89	1000.0	9.000	L1	GND	0.1
0.917500	---	7.04	46.00	38.96	1000.0	9.000	L1	GND	0.2
0.917500	18.96	---	56.00	37.04	1000.0	9.000	L1	GND	0.2
1.953281	17.71	---	56.00	38.29	1000.0	9.000	L1	GND	0.3
1.953281	---	7.26	46.00	38.74	1000.0	9.000	L1	GND	0.3
3.417500	---	14.57	46.00	31.43	1000.0	9.000	L1	GND	0.4
3.417500	23.40	---	56.00	32.60	1000.0	9.000	L1	GND	0.4
5.870156	19.30	---	60.00	40.70	1000.0	9.000	L1	GND	0.4
5.870156	---	15.75	50.00	34.25	1000.0	9.000	L1	GND	0.4
10.635313	---	14.83	50.00	35.17	1000.0	9.000	N	GND	0.4
10.635313	20.30	---	60.00	39.70	1000.0	9.000	N	GND	0.4
28.019688	---	25.66	50.00	24.34	1000.0	9.000	N	GND	0.6
28.019688	30.66	---	60.00	29.34	1000.0	9.000	N	GND	0.6