

Annex 1: Measurement diagrams 20-1-0017102T02a-A1

Number of pages:	19	Date of Report:	2021-Mar-16
Testing company:	CETECOM GmbH Im Teelbruch 116 45219 Essen Germany Tel. + 49 (0) 20 54 / 95 19-0 Fax: + 49 (0) 20 54 / 95 19-150	Applicant:	SICK AG
Test Object / Tested Device(s):	UWB Tag, LOCU101-0110		
FCC ID:	WRMLOCU1	IC:	10066A-LOCU1
Testing has been carried out in accordance with:	Title 47 CFR, Chapter I FCC Regulations, Subchapter A §15.247 (DTS) ISED-Regulations RSS-Gen, Issue 5 RSS 247, Issue 2 Deviations, modifications or clarifications (if any) to above mentioned documents are written in each section under "Test method and limit".		



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1 Measurement diagrams

1.1 Radiated Measurements

2.01a_high

Common Information

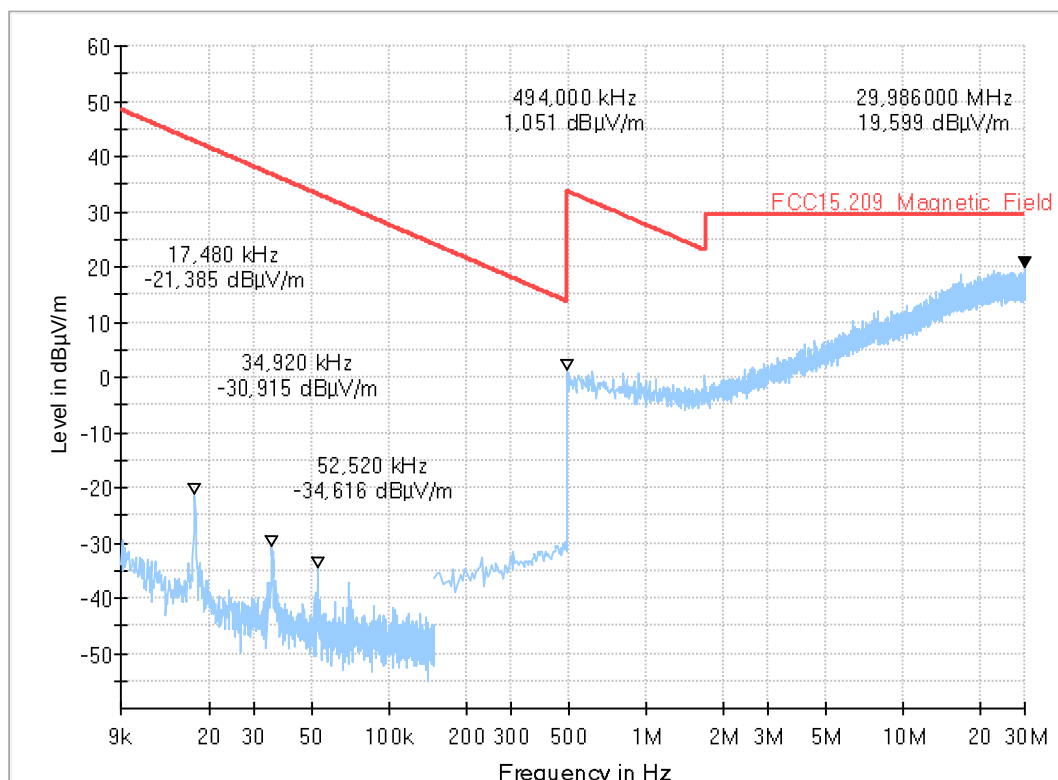
Test Description:	Magnetic Field Strength Measurement related to 30/300 m distance
Test Site Location:	Ref.-Nr. 441 Semi Anechoic Chamber (SAC1) with 3 m measurement distance
Version of Testsoftware:	EMC32 V10.50.0
Distance correction:	used accord. table, pls. see test report
Technical Data:	Please see 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 Standard:	FCC 15.205 § 15.209; RSS-Gen: Issue 5

Operator:	TFra
Operating Mode:	1Mbps PWR4 Channel high EUT Standing
Environmental Conditions::	Humidity : 50%rH; Temperature: 20°C
EUT Setup:	1
Verdict:	Passed
Power Supply	3.7V DC

EUT Information

PMT number:	20-1-00171S26_C01
Manufacturer:	SICK AG

Full Spectrum



2.01b_high

Common Information

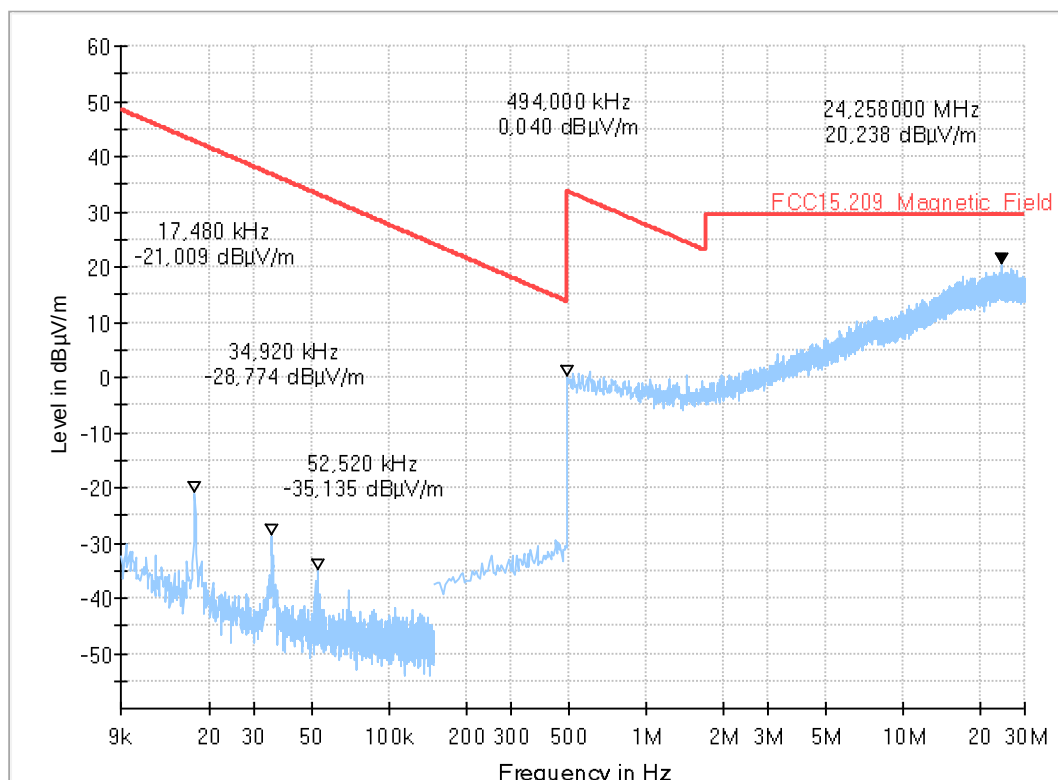
Test Description:	Magnetic Field Strength Measurement related to 30/300 m distance
Test Site Location:	Ref.-Nr. 441 Semi Anechoic Chamber (SAC1) with 3 m measurement distance
Version of Testsoftware:	EMC32 V10.50.0
Distance correction:	used accord. table, pls. see test report
Technical Data:	Please see 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 Standard:	FCC 15.205 § 15.209; RSS-Gen: Issue 5

Operator:	TFra
Operating Mode:	1Mbps PWR4 Channel high EUT Laying
Environmental Conditions:	Humidity : 50%rH; Temperature: 20°C
EUT Setup:	1
Verdict:	Passed
Power Supply	3.7V DC
Comment:	

EUT Information

PMT number:	20-1-00171S26_C01
Manufacturer:	SICK AG

Full Spectrum



3.01a_high

Common Information

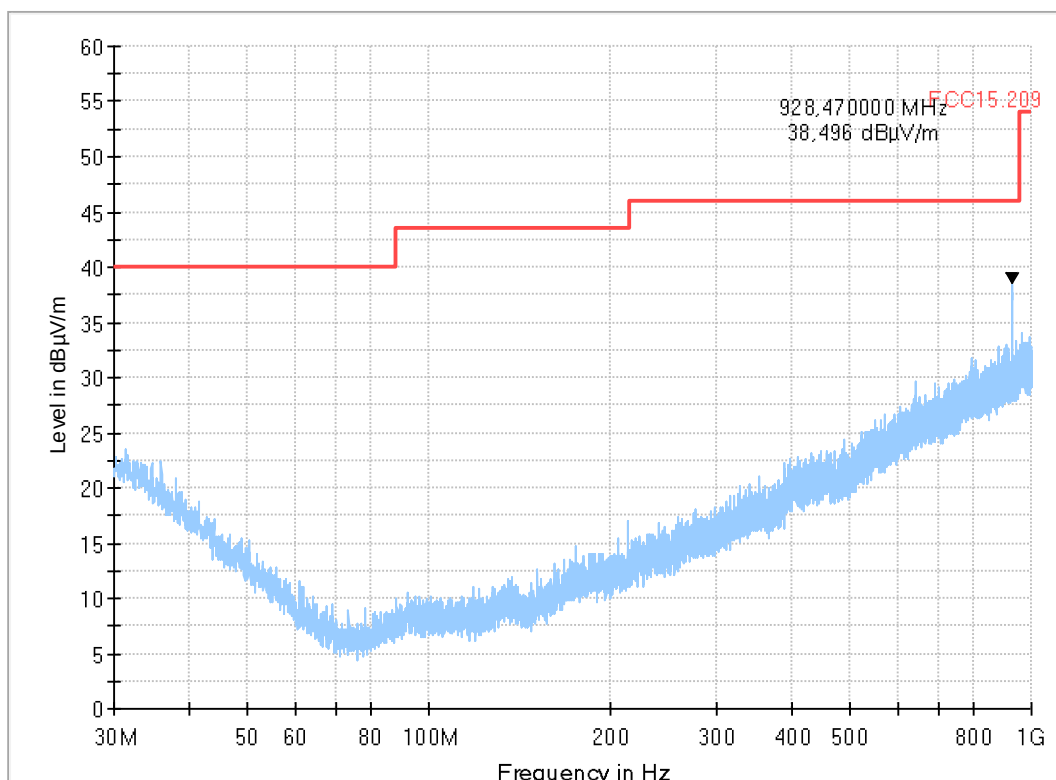
Test Description: Radiated field strength emission in 3m distance
Test Site: CETECOM GmbH Essen
Test Standard: FCC 15.205&15.209 RSS Gen Issue 5 Intentional Radiator
Antenna polarisation: horizontal/vertical

Environmental Conditions: Humidity : 50%rH; Temperature: 20°C
Operator Name: Tfra
Power Supply: 3.7V DC
Operating Mode: 1Mbps | PWR4| Channel high| EUT Standing
Verdict: Passed

EUT Information

PMT number: 20-1-00171S26_C01
Manufacturer: SICK AG

Full Spectrum



Remark: Peak at 928.470 MHz is a known external interferer from outside the chamber, not related to results

3.01b_high

Common Information

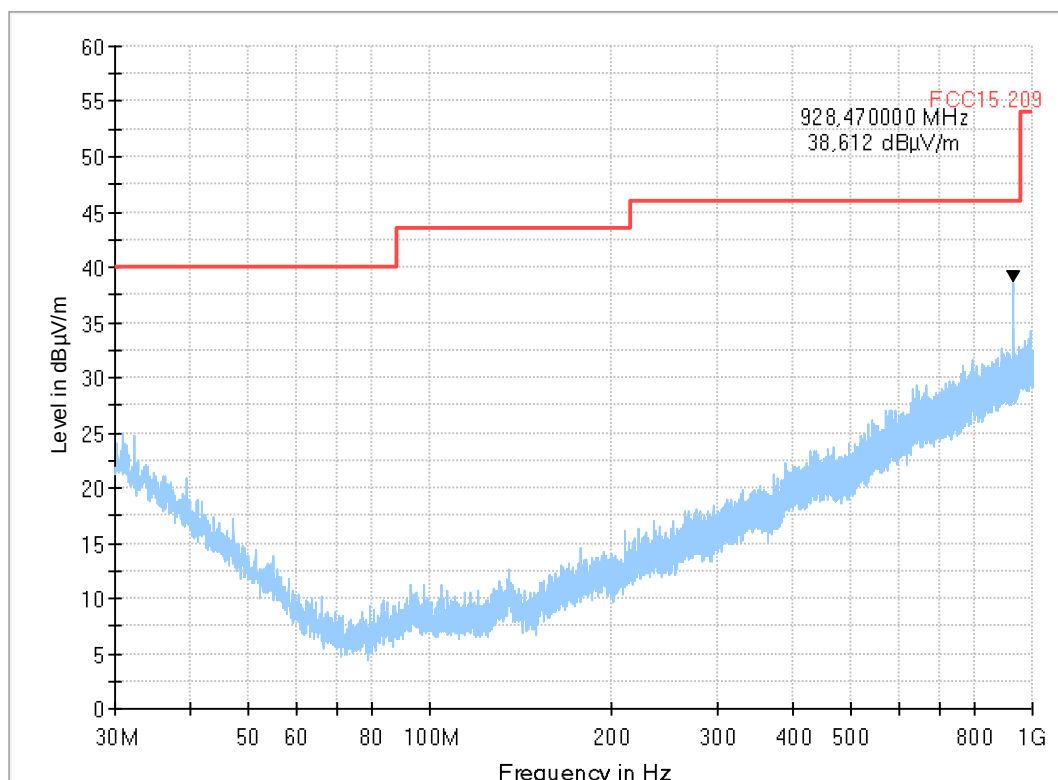
Test Description: Radiated field strength emission in 3m distance
Test Site: CETECOM GmbH Essen
Test Standard: FCC 15.205&15.209 RSS Gen Issue 5 Intentional Radiator
Antenna polarisation: horizontal/vertical

Environmental Conditions: Humidity : 50%rH; Temperature: 20°C
Operator Name: Tfra
Power Supply: 3.7V DC
Operating Mode: 1Mbps | PWR4 | Channel high | EUT Laying
Verdict: Passed

EUT Information

PMT number: 20-1-00171S26_C01
Manufacturer: SICK AG

Full Spectrum



Remark: Peak at 928.470 MHz is a known external Interferer from outside the chamber, not related to results

4.01a

Common Information

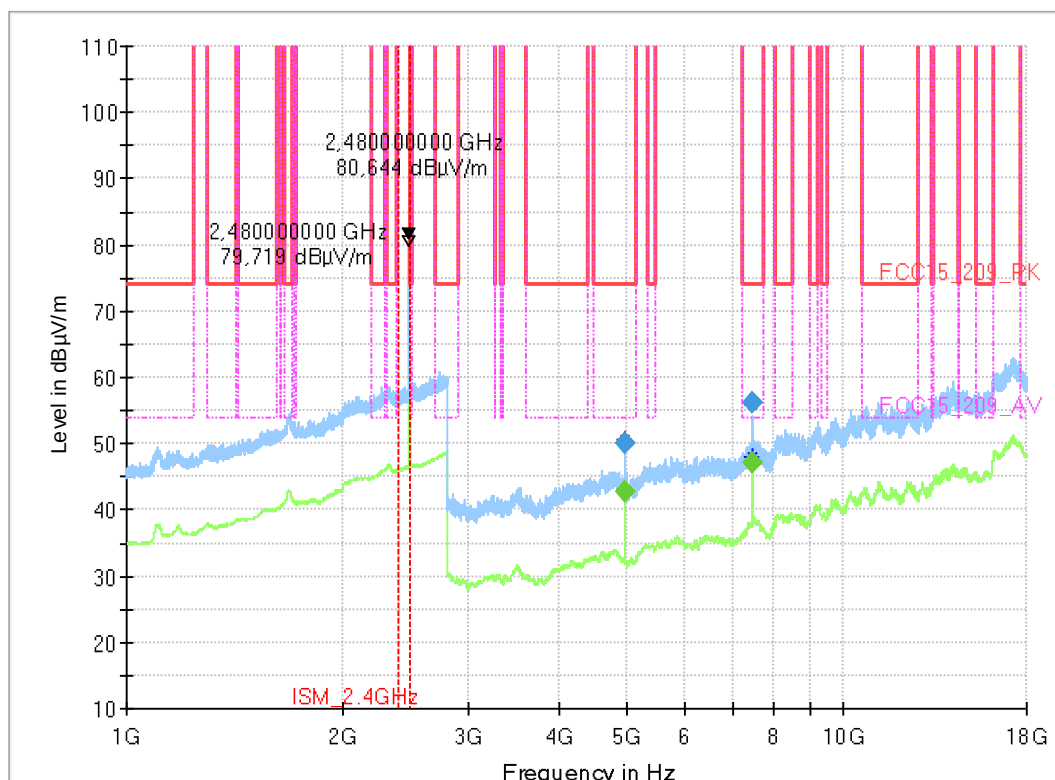
Test Description: Radiated field strength emission in 3m distance
 Test Site: Fully Anechoic Chamber (FAC1) - EMC32 V10.50.0
 Test Standard: FCC 15.247&15.209 Intentional Radiator / RSS-Gen, Issue 5
 Antenna polarisation: horizontal/vertical

Operating Mode: 1Mbps | PWR4| Channel high
 Operator: TFra
 Power Supply: 3.7V DC
 EUT Setup: 1
 Verdict: Passed

EUT Information

PMT number: 20-1-00171S26_C01
 Manufacturer: SICK AG

Full Spectrum



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)	Corr. (dB/m)
4959.600000	50.11	---	74.00	23.89	100.0	1000.000	155.0	V	44.0	90.0	5
4960.000000	---	42.77	54.00	11.23	100.0	1000.000	155.0	V	46.0	90.0	5
7440.000000	56.28	---	74.00	17.72	100.0	1000.000	155.0	H	216.0	0.0	13
7440.400000	---	47.21	54.00	6.79	100.0	1000.000	155.0	H	221.0	0.0	13

4.01b

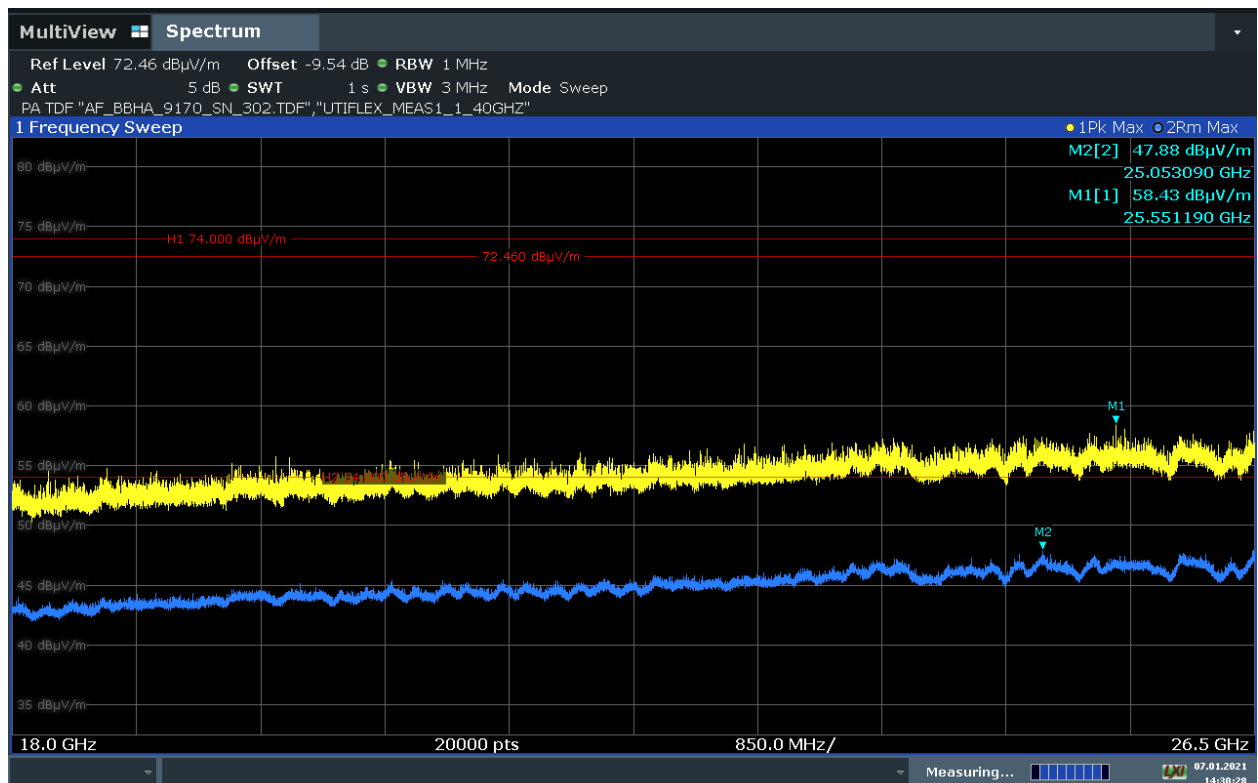
Common Information

Test Description: Radiated field strength emission in 3m distance
Test Site: Fully Anechoic Chamber (FAC2)
Test Standard: FCC 15.247&15.209 Intentional Radiator / RSS-Gen, Issue 5
Antenna polarisation: horizontal/vertical

Operating Mode: 1Mbps | PWR4 | Channel high
Operator: Mah
Power Supply: 3.7V DC
EUT Setup: 1
Verdict: Passed

EUT Information

PMT number: 20-1-00171S26_C01
Manufacturer: SICK AG



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9.01_BE_low

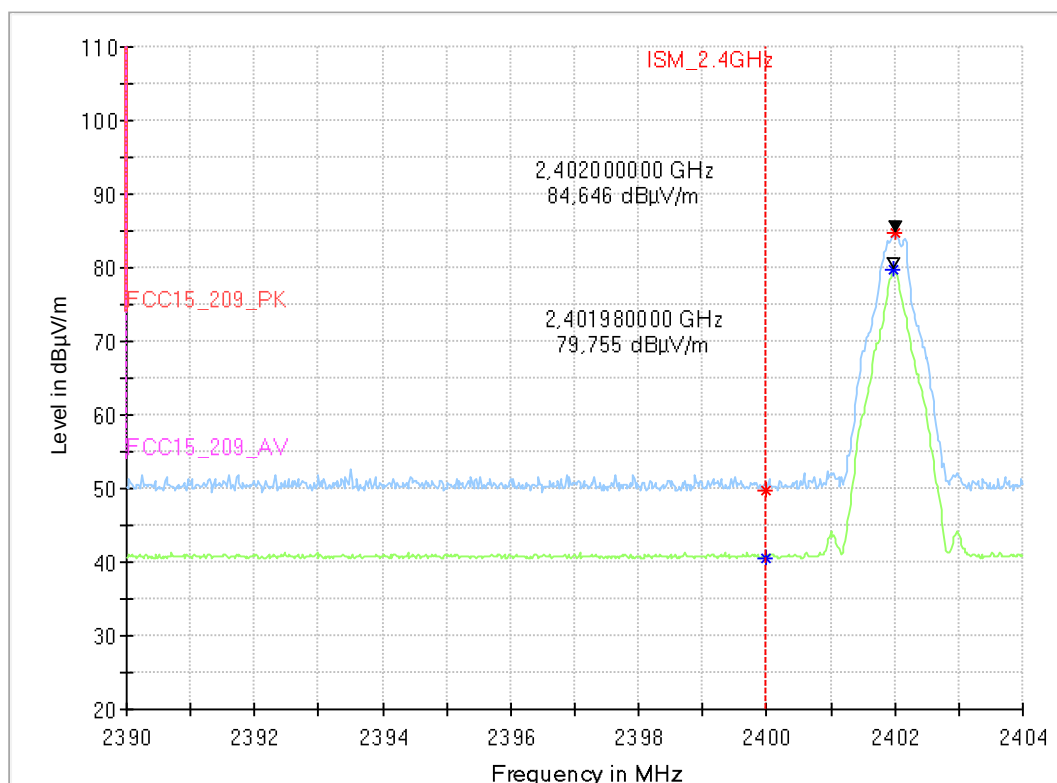
Common Information

Test Description:	Band-Edge: Radiated Field Strength Emissions in 3m distance
Test Site:	Fully Anechoic Chamber (FAC1) - EMC32 V10.50.0
Test Standard:	FCC 15.247&15.209 Intentional Radiator / RSS-Gen, Issue 5
Antenna polarisation:	horizontal/vertical
Operating Mode:	1Mbps PWR4 Channel low
Operator:	TFra
Power Supply:	3.7V DC
EUT Setup:	1
Verdict:	Passed

EUT Information

PMT number:	20-1-00171S26_C01
Manufacturer:	SICK AG

Full Spectrum



Critical_Freqs

Frequency (MHz)	MaxPeak (dBμV/m)	RMS (dBμV/m)	Limit (dBμV/m)	Margin	Height	Pol	Azimuth	Elevation	Corr. (dB/m)
2400.000000	---	40.58	150.00	109.42	155.0	H	46.0	90.0	36
2400.000000	49.85	---	150.00	100.15	155.0	H	46.0	90.0	36
2401.980000	---	79.75	150.00	70.25	155.0	V	162.0	90.0	36
2402.000000	84.65	---	150.00	65.35	155.0	H	300.0	0.0	36

9.02_BE_high

Common Information

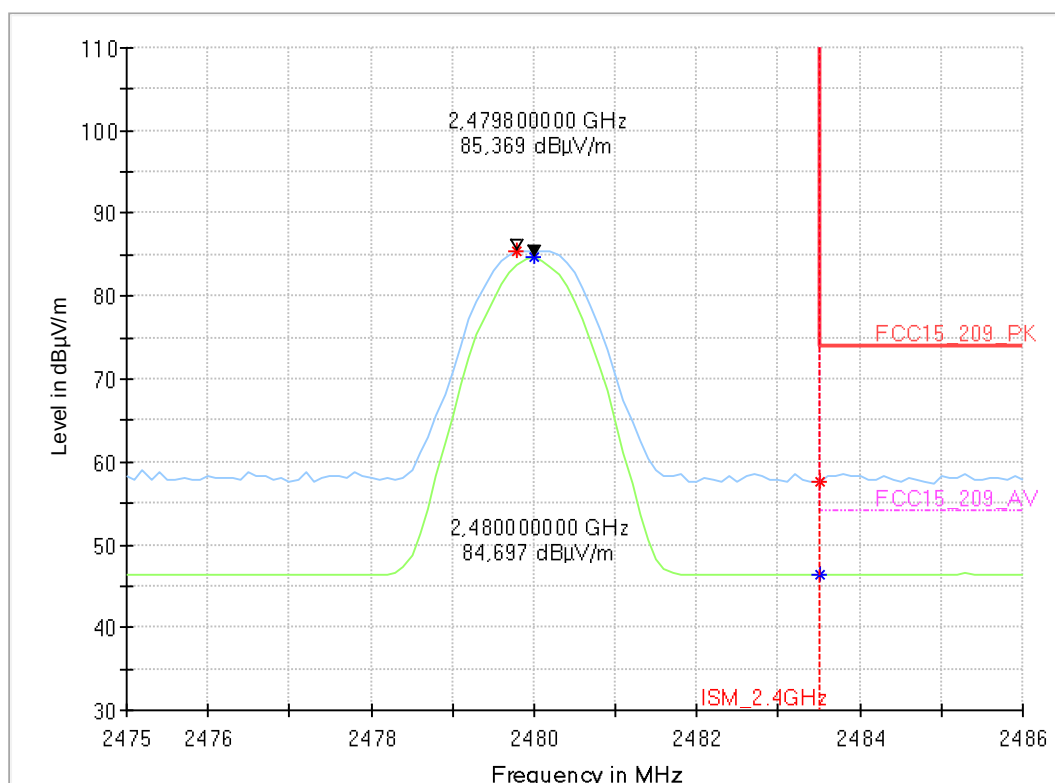
Test Description: Band-Edge: Radiated Field Strength Emissions in 3m distance
 Test Site: Fully Anechoic Chamber (FAC1) - EMC32 V10.50.0
 Test Standard: FCC 15.247&15.209 Intentional Radiator / RSS-Gen, Issue 5
 Antenna polarisation: horizontal/vertical

Operating Mode: 1Mbps | PWR4 | Channel high
 Operator: TFra
 Power Supply: 3.7V DC
 EUT Setup: 1
 Verdict: Passed

EUT Information

PMT number: 20-1-00171S26_C01
 Manufacturer: SICK AG

Full Spectrum



Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	RMS (dBµV/m)	Limit (dBµV/m)	Margin	Height	Pol	Azimuth	Elevation	Corr. (dB/m)
2479.800000	85.37	---	150.00	64.63	155.0	V	166.0	90.0	36
2480.000000	---	84.70	150.00	65.30	155.0	V	166.0	90.0	36
2483.500000	57.55	---	74.00	16.45	155.0	H	202.0	90.0	36
2483.500000	---	46.43	54.00	7.57	155.0	H	307.0	0.0	36

1.2 Conducted Measurements

Peak output power (Sweep)

Mode	DUT Frequency (MHz)	Peak Power (dBm)	Limit Max (dBm)	Result
10,000 ; 2402MHz	2402.000000	3.1	30.0	PASS
10,000 ; 2440MHz	2440.000000	3.1	30.0	PASS
10,000 ; 2442MHz	2442.000000	3.1	30.0	PASS
10,000 ; 2480MHz	2480.000000	3.2	30.0	PASS

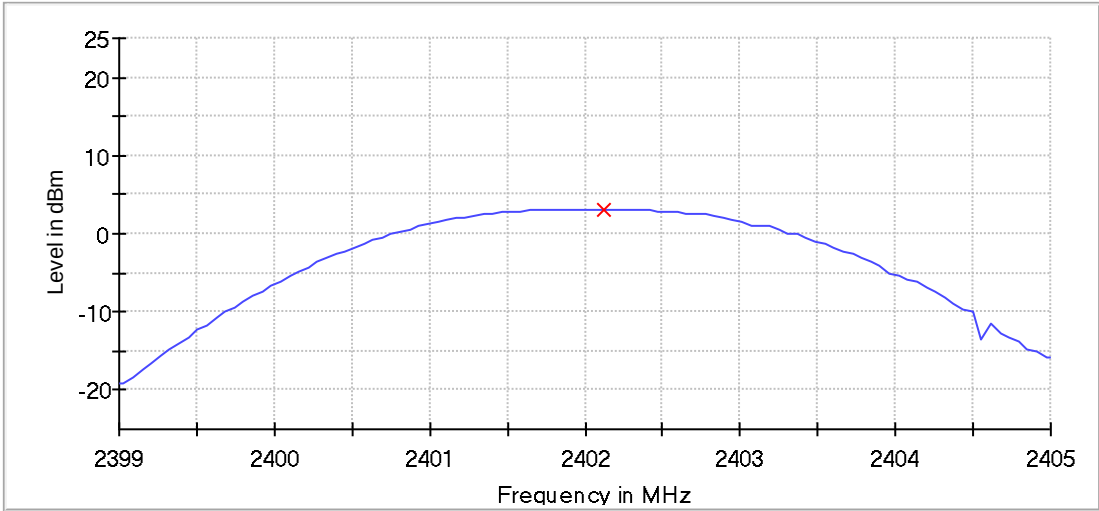
RF output power

Mode	DUT Frequency	Gated RMS	Limit Max (dBm)	DutyCycle (%)	Result
10,000 ; 2402MHz	2402.0000	3.2	30.0	94.798	PASS
10,000 ; 2440MHz	2440.0000	3.0	30.0	94.797	PASS
10,000 ; 2442MHz	2442.0000	3.0	30.0	94.796	PASS
10,000 ; 2480MHz	2480.0000	3.2	30.0	94.796	PASS

Peak output power (Sweep) (2402 MHz; 10,000 dBm; 1 MHz)

Result

DUT Frequency (MHz)	Peak Power (dBm)	Limit Max (dBm)	Result
2402.000000	3.1	30.0	PASS



Connector 1 Peak Connector 1

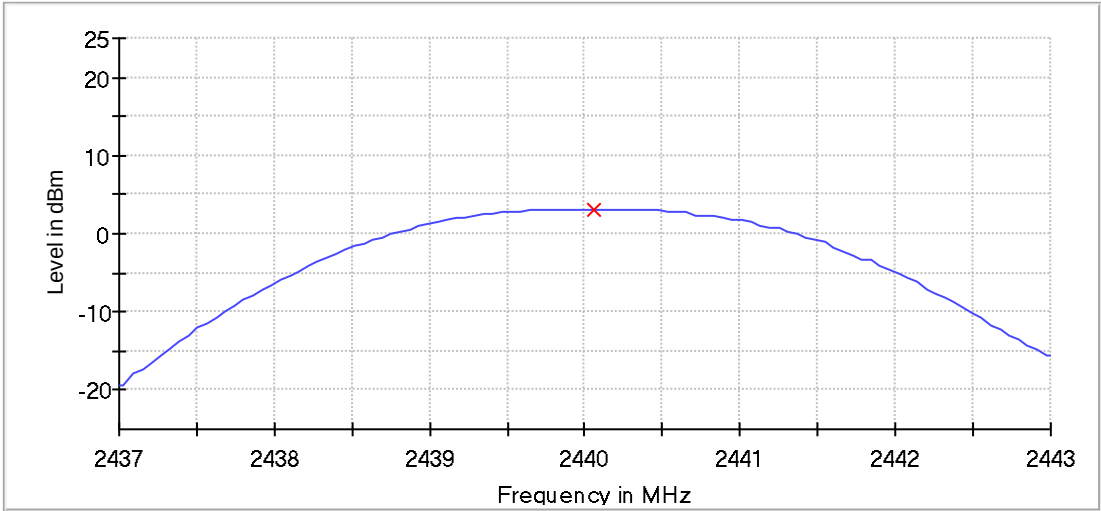
Measurement

Setting	Instrument Value	Target Value
Start Frequency	2.39900 GHz	2.39900 GHz
Stop Frequency	2.40500 GHz	2.40500 GHz
Span	6.000 MHz	6.000 MHz
RBW	2.000 MHz	>= 1.000 MHz
VBW	10.000 MHz	>= 6.000 MHz
SweepPoints	101	~ 101
SweepTime	1.000 ms	AUTO
Reference Level	10.000 dBm	10.000 dBm
Attenuation	20.000 dB	AUTO
Detector	MaxPeak	MaxPeak
SweepCount	100	100
Filter	3 dB	3 dB
Trace Mode	Max Hold	Max Hold
SweepType	Sweep	AUTO
Preamplifier	off	off
Stablemode	Trace	Trace
Stablevalue	0.50 dB	0.50 dB
Run	7 / max. 150	max. 150
Stable	3 / 3	3
Max Stable Difference	0.11 dB	0.50 dB

Peak output power (Sweep) (2440 MHz; 10,000 dBm; 1 MHz)

Result

DUT Frequency (MHz)	Peak Power (dBm)	Limit Max (dBm)	Result
2440.000000	3.1	30.0	PASS



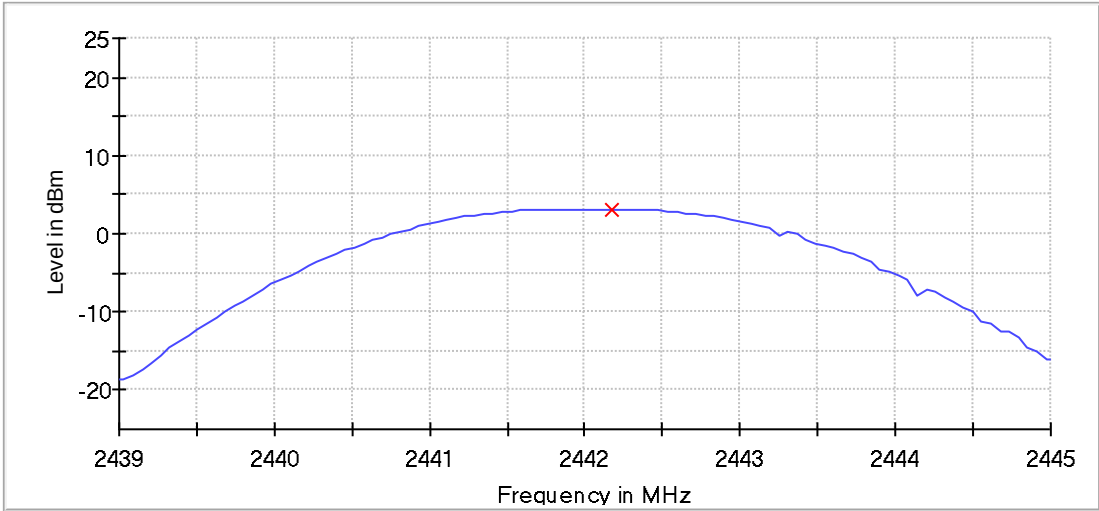
Measurement

Setting	Instrument Value	Target Value
Start Frequency	2.43700 GHz	2.43700 GHz
Stop Frequency	2.44300 GHz	2.44300 GHz
Span	6.000 MHz	6.000 MHz
RBW	2.000 MHz	>= 1.000 MHz
VBW	10.000 MHz	>= 6.000 MHz
SweepPoints	101	~ 101
SweepTime	1.000 ms	AUTO
Reference Level	10.000 dBm	10.000 dBm
Attenuation	20.000 dB	AUTO
Detector	MaxPeak	MaxPeak
SweepCount	100	100
Filter	3 dB	3 dB
Trace Mode	Max Hold	Max Hold
SweepType	Sweep	AUTO
Preamplifier	off	off
Stablemode	Trace	Trace
Stablevalue	0.50 dB	0.50 dB
Run	7 / max. 150	max. 150
Stable	3 / 3	3
Max Stable Difference	0.29 dB	0.50 dB

Peak output power (Sweep) (2442 MHz; 10,000 dBm; 1 MHz)

Result

DUT Frequency (MHz)	Peak Power (dBm)	Limit Max (dBm)	Result
2442.000000	3.1	30.0	PASS



Connector 1 × Peak Connector 1

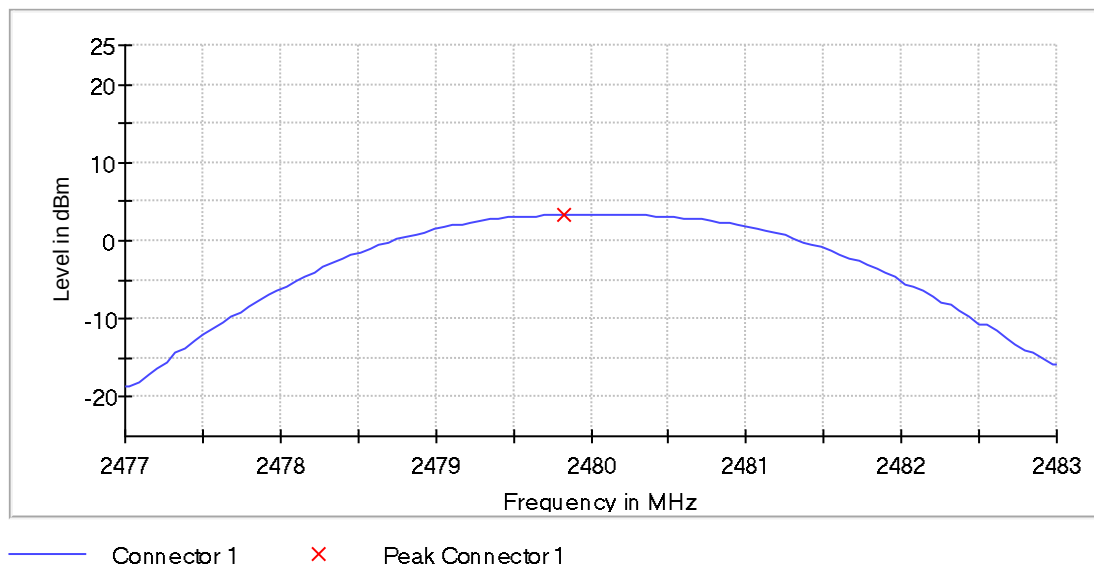
Measurement

Setting	Instrument Value	Target Value
Start Frequency	2.43900 GHz	2.43900 GHz
Stop Frequency	2.44500 GHz	2.44500 GHz
Span	6.000 MHz	6.000 MHz
RBW	2.000 MHz	>= 1.000 MHz
VBW	10.000 MHz	>= 6.000 MHz
SweepPoints	101	~ 101
Sweeptime	1.000 ms	AUTO
Reference Level	10.000 dBm	10.000 dBm
Attenuation	20.000 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	6 / max. 150	max. 150
Stable	3 / 3	3
Max Stable Difference	0.40 dB	0.50 dB

Peak output power (Sweep) (2480 MHz; 10,000 dBm; 1 MHz)

Result

DUT Frequency (MHz)	Peak Power (dBm)	Limit Max (dBm)	Result
2480.000000	3.2	30.0	PASS



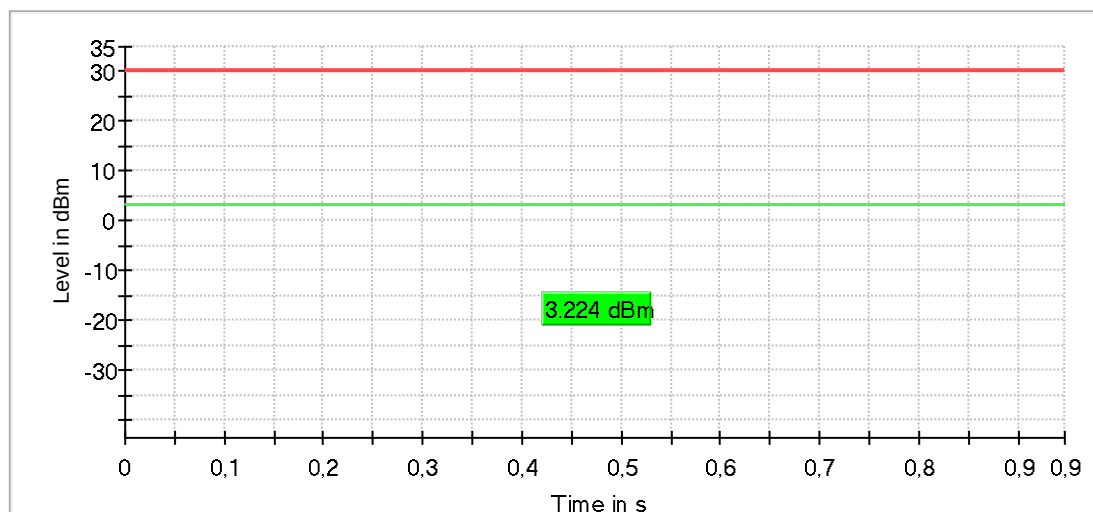
Measurement

Setting	Instrument Value	Target Value
Start Frequency	2.47700 GHz	2.47700 GHz
Stop Frequency	2.48300 GHz	2.48300 GHz
Span	6.000 MHz	6.000 MHz
RBW	2.000 MHz	≥ 1.000 MHz
VBW	10.000 MHz	≥ 6.000 MHz
SweepPoints	101	~ 101
SweepTime	1.000 ms	AUTO
Reference Level	10.000 dBm	10.000 dBm
Attenuation	20.000 dB	AUTO
Detector	MaxPeak	MaxPeak
SweepCount	100	100
Filter	3 dB	3 dB
Trace Mode	Max Hold	Max Hold
SweepType	Sweep	AUTO
Preamplifier	off	off
Stablemode	Trace	Trace
Stablevalue	0.50 dB	0.50 dB
Run	10 / max. 150	max. 150
Stable	3 / 3	3
Max Stable Difference	0.05 dB	0.50 dB

RF output power (2402 MHz; 10,000 dBm; 1 MHz)

Result

DUT Frequency (MHz)	Gated RMS (dBm)	Limit Max (dBm)	DutyCycle (%)	Result
2402.000000	3.2	30.0	94.798	PASS



— Gated Trace — Overall — Limit

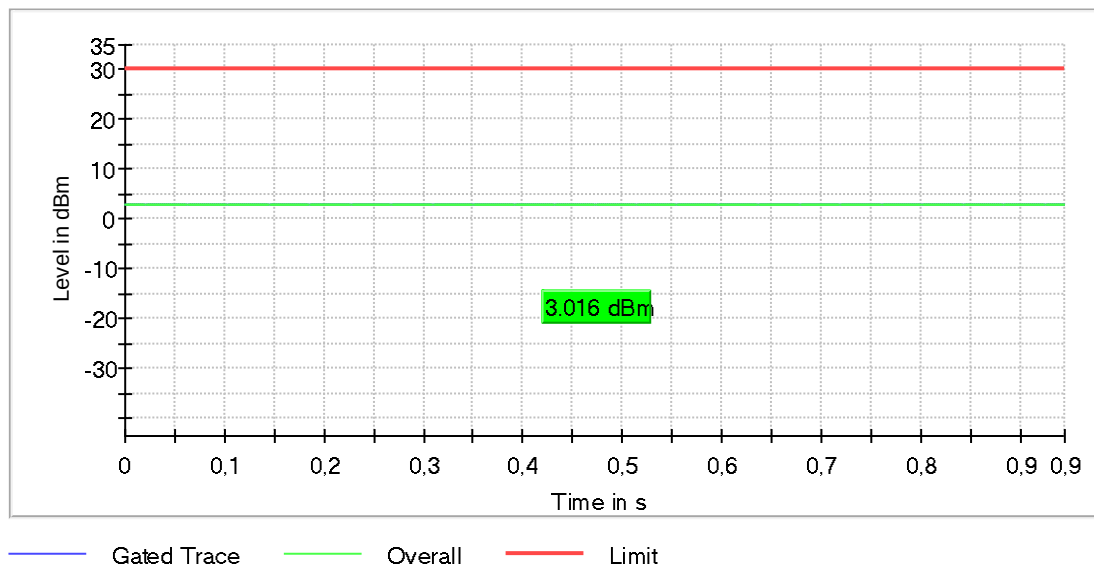
OSP PowerMeter settings

Setting	Instrument Value	Target Value
Measurement Time	1.000 s	1.000 s
Points	1000000	1000000
Time resolution	1.000 μ s	1.000 μ s

RF output power (2440 MHz; 10,000 dBm; 1 MHz)

Result

DUT Frequency (MHz)	Gated RMS (dBm)	Limit Max (dBm)	DutyCycle (%)	Result
2440.000000	3.0	30.0	94.797	PASS



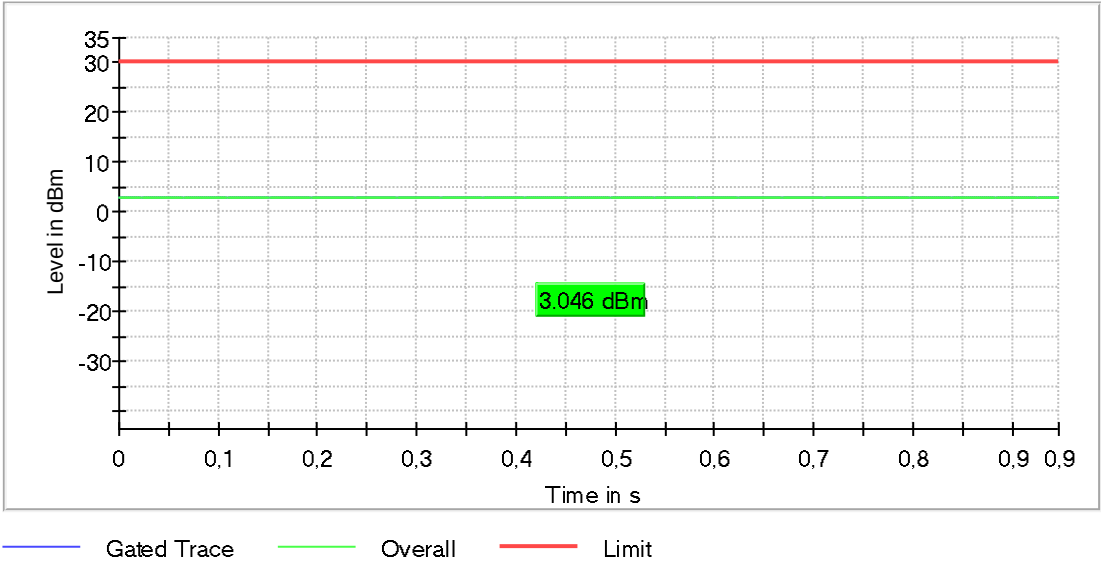
OSP PowerMeter settings

Setting	Instrument Value	Target Value
Measurement Time	1.000 s	1.000 s
Points	1000000	1000000
Time resolution	1.000 μ s	1.000 μ s

RF output power (2442 MHz; 10,000 dBm; 1 MHz)

Result

DUT Frequency (MHz)	Gated RMS (dBm)	Limit Max (dBm)	DutyCycle (%)	Result
2442.000000	3.0	30.0	94.796	PASS



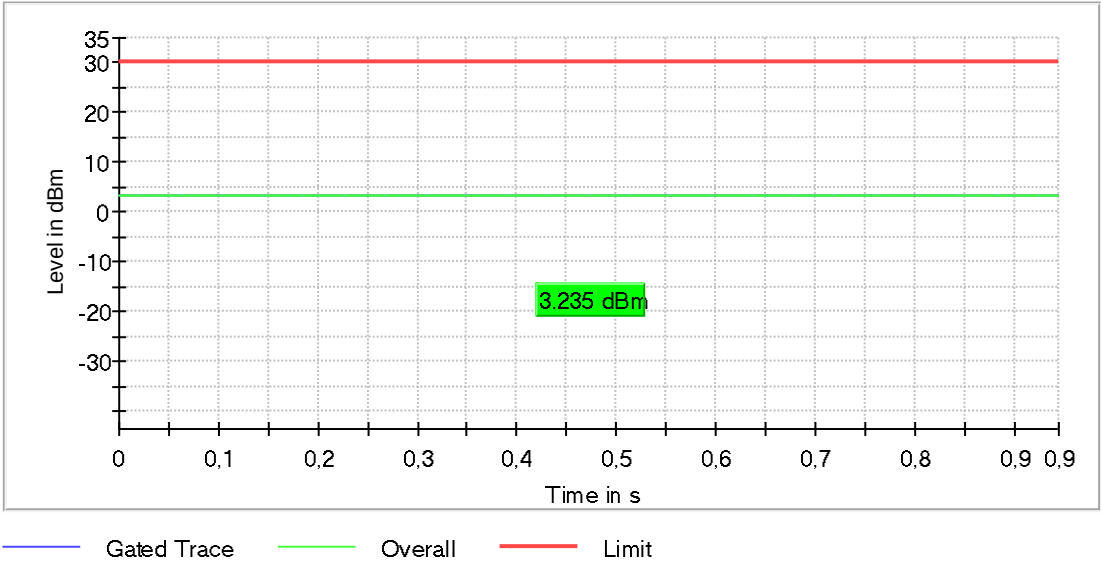
OSP PowerMeter settings

Setting	Instrument Value	Target Value
Measurement Time	1.000 s	1.000 s
Points	1000000	1000000
Time resolution	1.000 μ s	1.000 μ s

RF output power (2480 MHz; 10,000 dBm; 1 MHz)

Result

DUT Frequency (MHz)	Gated RMS (dBm)	Limit Max (dBm)	DutyCycle (%)	Result
2480.000000	3.2	30.0	94.796	PASS



OSP PowerMeter settings

Setting	Instrument Value	Target Value
Measurement Time	1.000 s	1.000 s
Points	1000000	1000000
Time resolution	1.000 µs	1.000 µs

End Of Annex 1