Annex 1: Measurement diagrams 20-1-0017102T04a-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, LOCU111-0020**		
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

2.01a_low

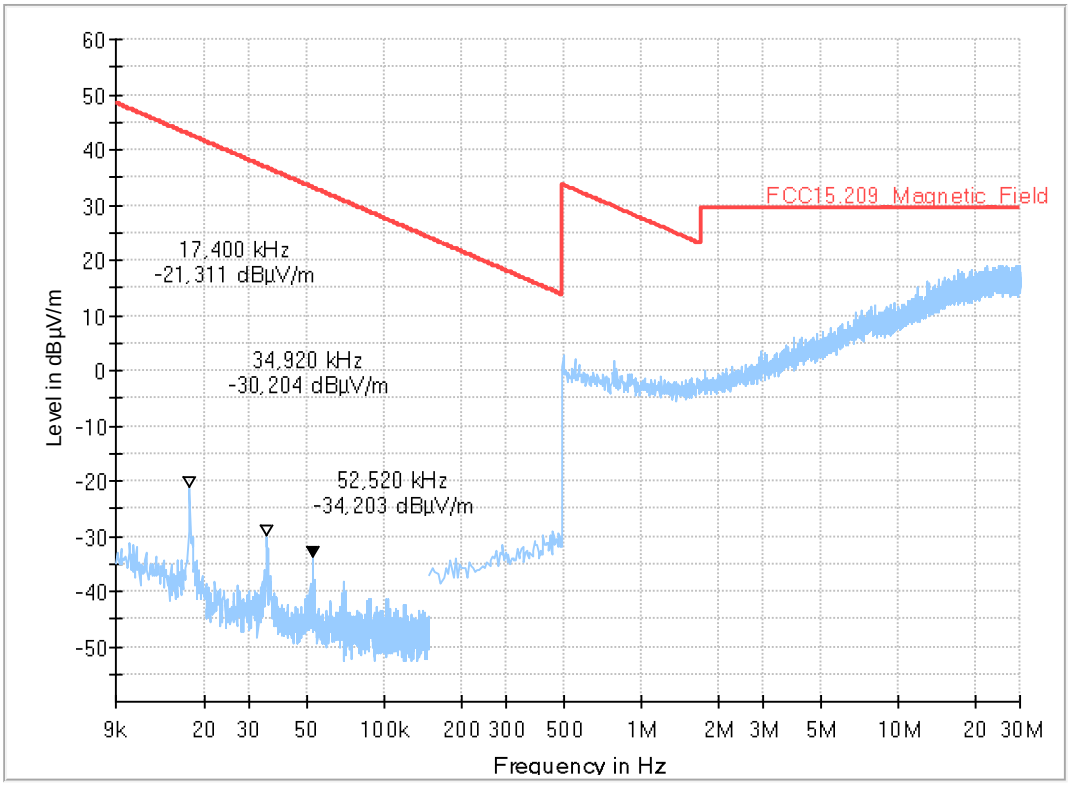
Common Information

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 low | EUT Laying
Environmental Conditions::	Humidity : 50%rH; Temperature: 20°C
EUT Setup:	1
Verdict:	Passed
Power Supply::	12 V DC

EUT Information

PMT number:	20-1-00171S28_C01
Manufacturer:	SICK AG

Full Spectrum



2.01b_low

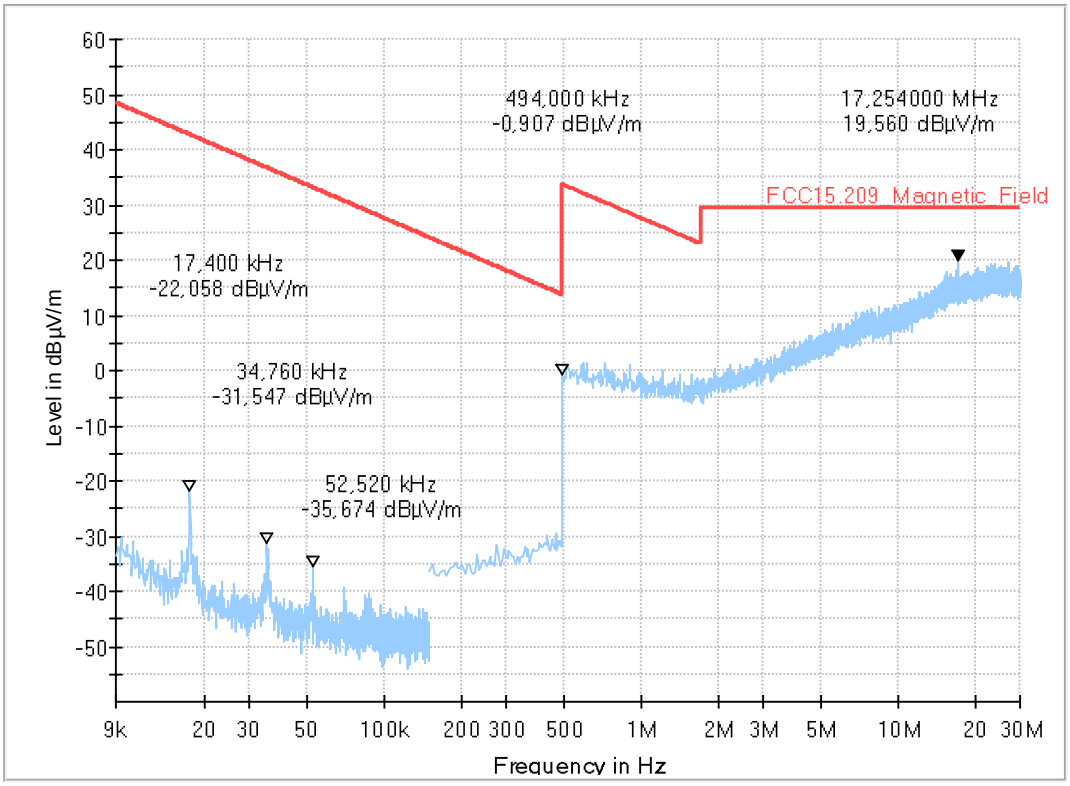
Common Information

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 low | EUT Laying
Environmental Conditions::	Humidity : 50%rH; Temperature: 20°C
EUT Setup:	1
Verdict:	Passed
Power Supply::	12 V DC

EUT Information

PMT number:	20-1-00171S28_C01
Manufacturer:	SICK AG

Full Spectrum



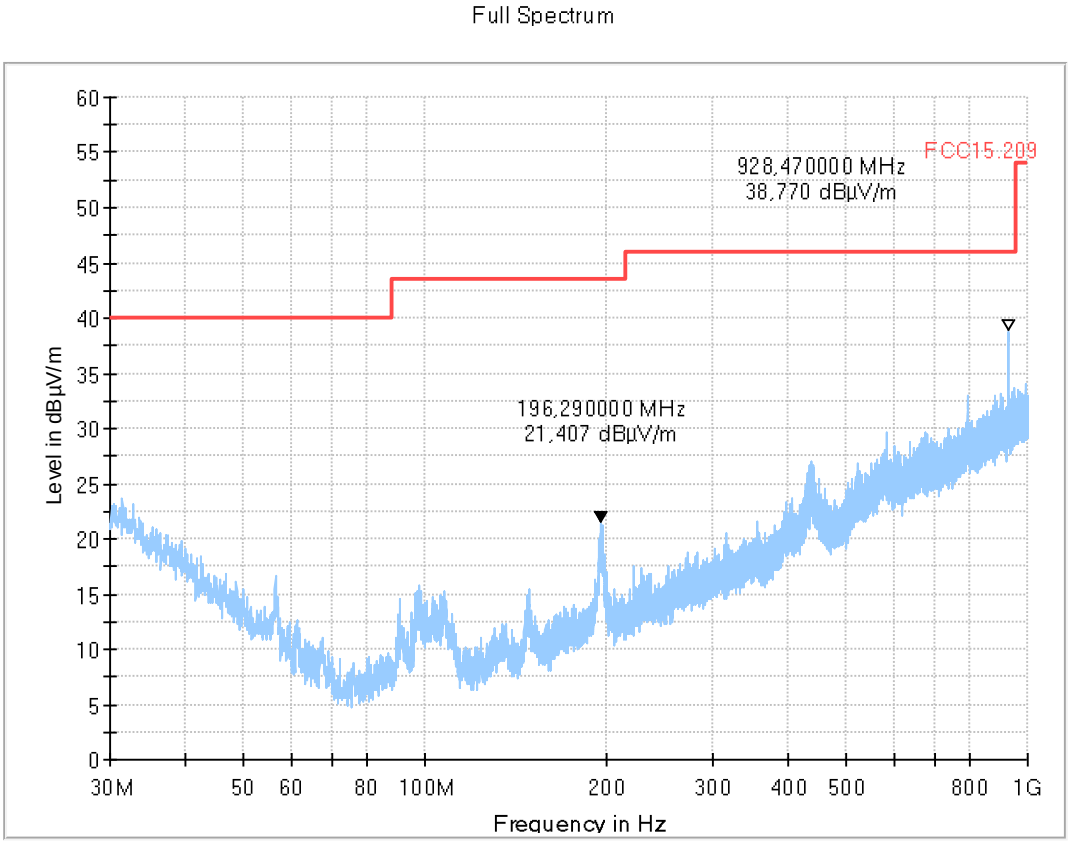
3.01a_low

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 : 55%rH; Temperature: 20°C
Operator Name:	Mah
EUT Setup:	1
Operating Mode:	1MBps | PWR4| Channel low | EUT Standing
Power Supply::	12 V DC
Verdict:	Passed

EUT Information

PMT number:	20-1-00171S28_C01
Manufacturer:	SICK AG



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

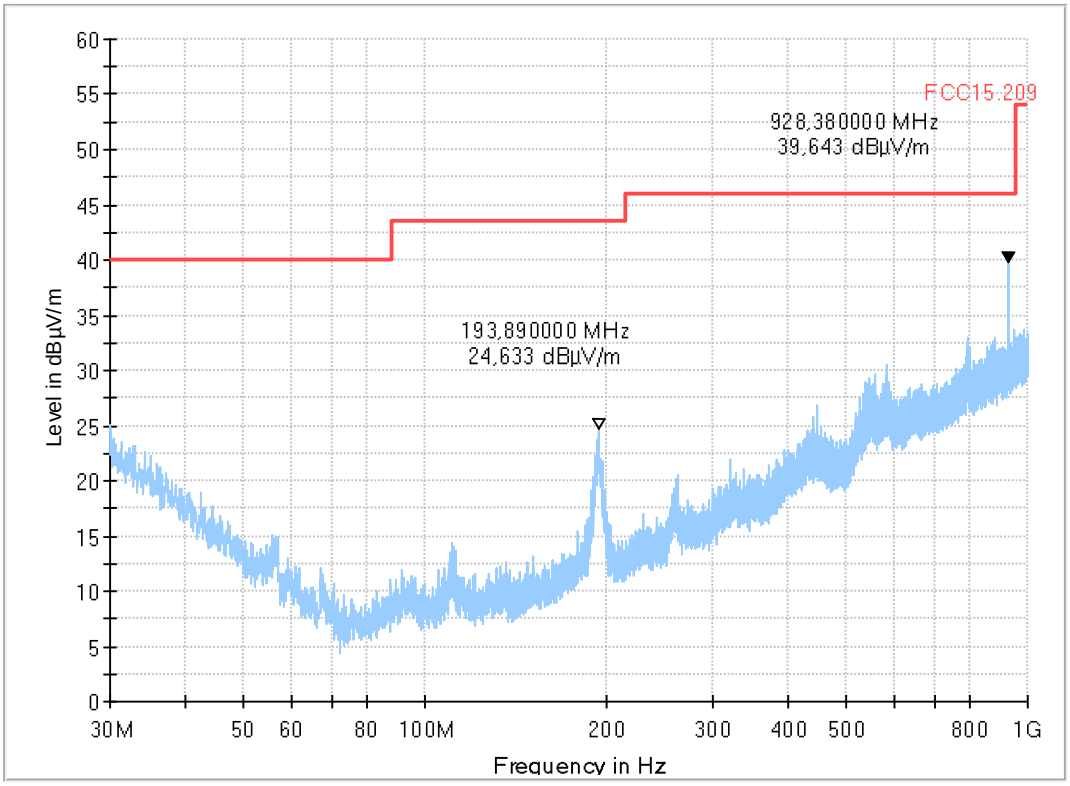
3.01b_low

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:	Mah
EUT Setup:	1
Operating Mode:	1MBps | PWR4| Channel low | EUT Laying
Power Supply::	12 V DC
Verdict:	Passed

EUT Information

PMT number:	20-1-00171S28_C01
Manufacturer:	SICK AG



Remark Peak at 928.380 MHz is a known external Interferer from outside the chamber, not related to results

4.01a_low

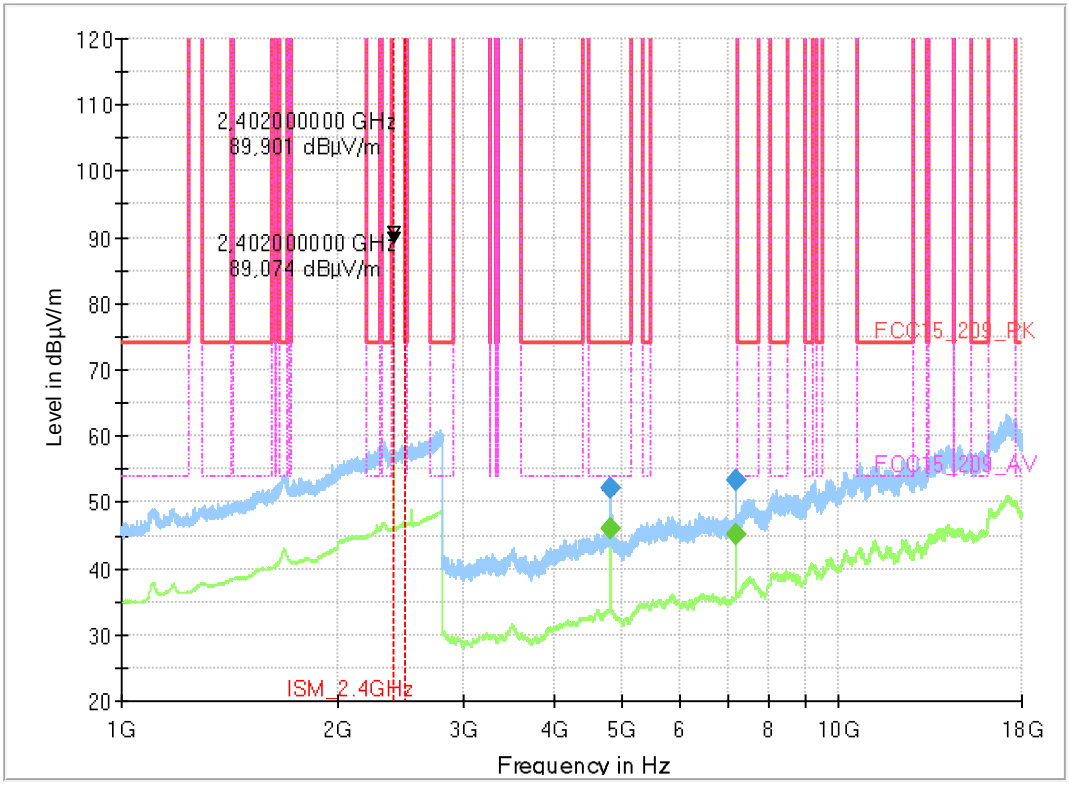
Common Information

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:	PWR4 | 1MBps | Channel low
Operator:	HEI
Power Supply::	12 V DC
EUT Setup:	1
Verdict:	Passed

EUT Information

PMT number:	20-1-00171S28_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)
4803.600000	52.14	---	74.00	21.86	100.0	1000.000	155.0	V	43.0	90.0	6
4804.000000	---	46.15	54.00	7.85	100.0	1000.000	155.0	V	42.0	90.0	6
7205.600000	53.36	---	150.00	96.64	100.0	1000.000	155.0	V	225.0	0.0	12
7206.400000	---	45.03	150.00	104.97	100.0	1000.000	155.0	V	225.0	0.0	12

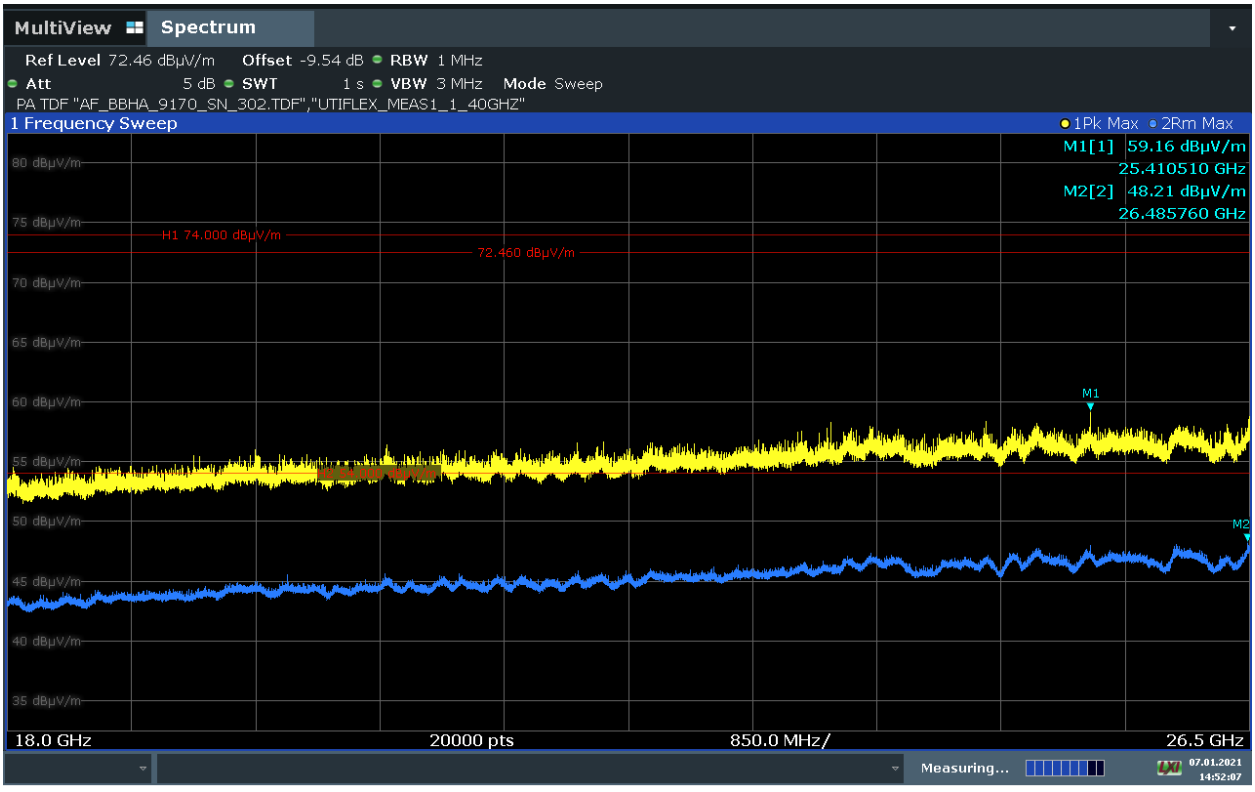
4.01b

Common Information

Test Description:	Radiated field strength emission in 3m distance
Test Site:	Fully Anechoic Chamber (FAC1)
Test Standard:	FCC 15.247&15.209 Intentional Radiator / RSS-Gen, Issue 5
Antenna polarisation:	horizontal/vertical
Operating Mode:	PWR4 | 1MBps | Channel low
Operator:	HEI
Power Supply::	12 V DC
EUT Setup:	1
Verdict:	Passed

EUT Information

PMT number:	20-1-00171S28_C01
Manufacturer:	SICK AG



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9.01_BE_low

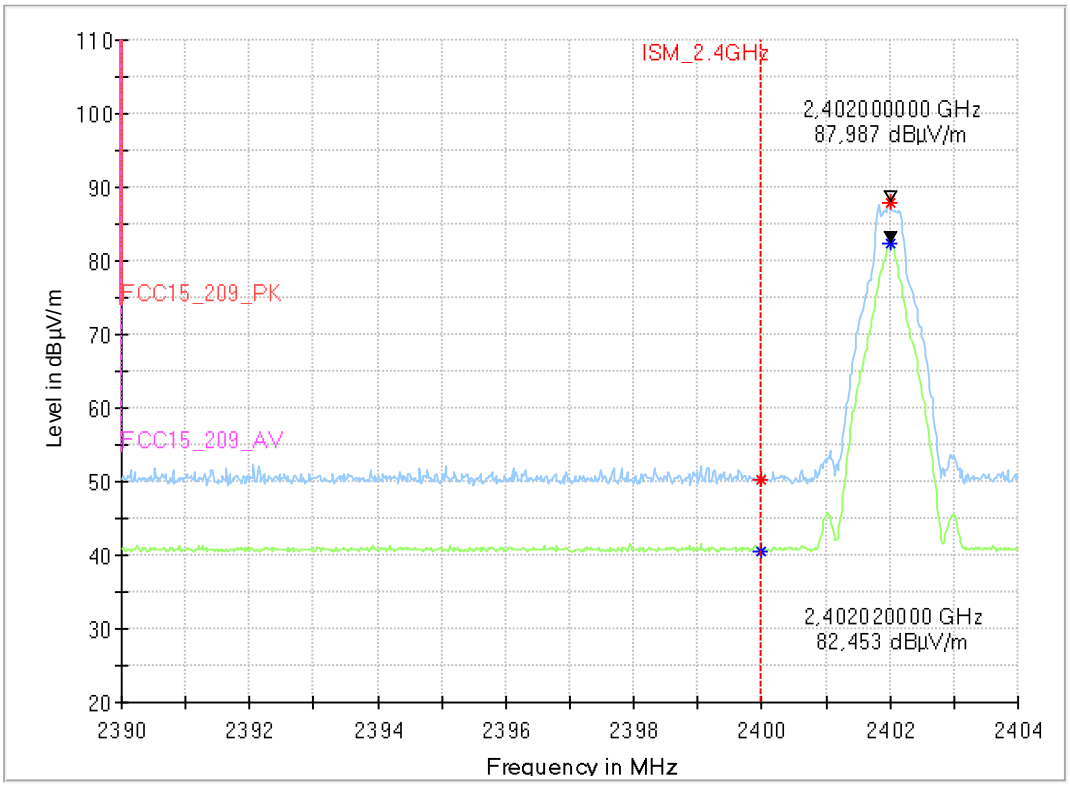
Common Information

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:	PWR4 | 1MBps | Channel low
Operator:	TFra
Power Supply::	12 V DC
EUT Setup:	1
Verdict:	Passed

EUT Information

PMT number:	20-1-00171S28_C01
Manufacturer:	SICK AG

Full Spectrum



Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	RMS (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Elevation (deg)	Corr. (dB/m)
2400.000000	---	40.62	150.00	109.38	155.0	V	245.0	0.0	36
2400.000000	50.25	---	150.00	99.75	155.0	V	310.0	90.0	36
2402.000000	87.99	---	150.00	62.01	155.0	V	335.0	90.0	36
2402.020000	---	82.45	150.00	67.55	155.0	V	335.0	90.0	36

9.02_BE_high

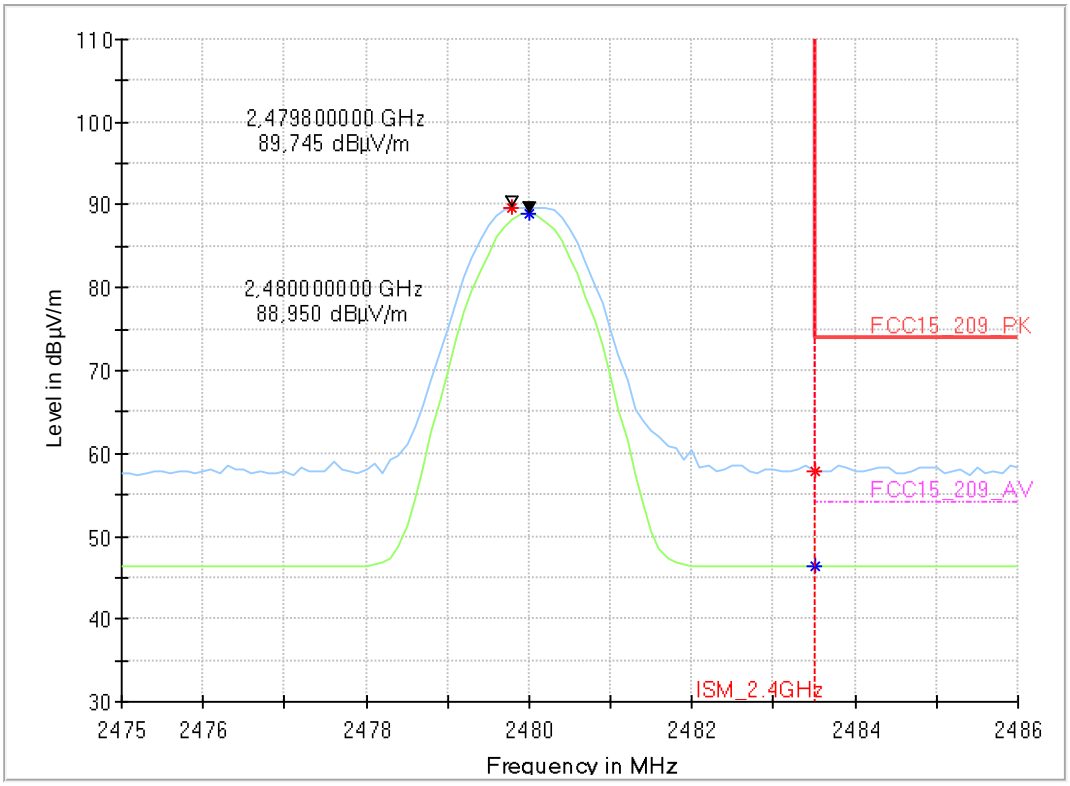
Common Information

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::	12 V DC
EUT Setup:	1
Verdict:	Passed

EUT Information

PMT number:	20-1-00171S28_C01
Manufacturer:	SICK AG

Full Spectrum



Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	RMS (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Elevation (deg)	Corr. (dB/m)
2479.800000	89.75	---	150.00	60.25	155.0	V	210.0	90.0	36
2480.000000	---	88.95	150.00	61.05	155.0	V	210.0	90.0	36
2483.500000	---	46.38	54.00	7.62	155.0	V	141.0	90.0	36
2483.500000	57.74	---	74.00	16.26	155.0	V	141.0	90.0	36

1.1 Conducted Measurements

Peak output power (Sweep)

Mode	DUT Frequency (MHz)	Peak Power (dBm)	Limit Max (dBm)	Result
1MBps | PWR4| Channel 2402MHz	**2402.000000**	**3.4**	**30.0**	**PASS**
1MBps | PWR4| Channel 2440MHz	2440.000000	3.1	30.0	PASS
1MBps | PWR4| Channel 2442MHz	2442.000000	3.1	30.0	PASS
1MBps | PWR4| Channel 2480MHz	2480.000000	3.3	30.0	PASS

RF output power

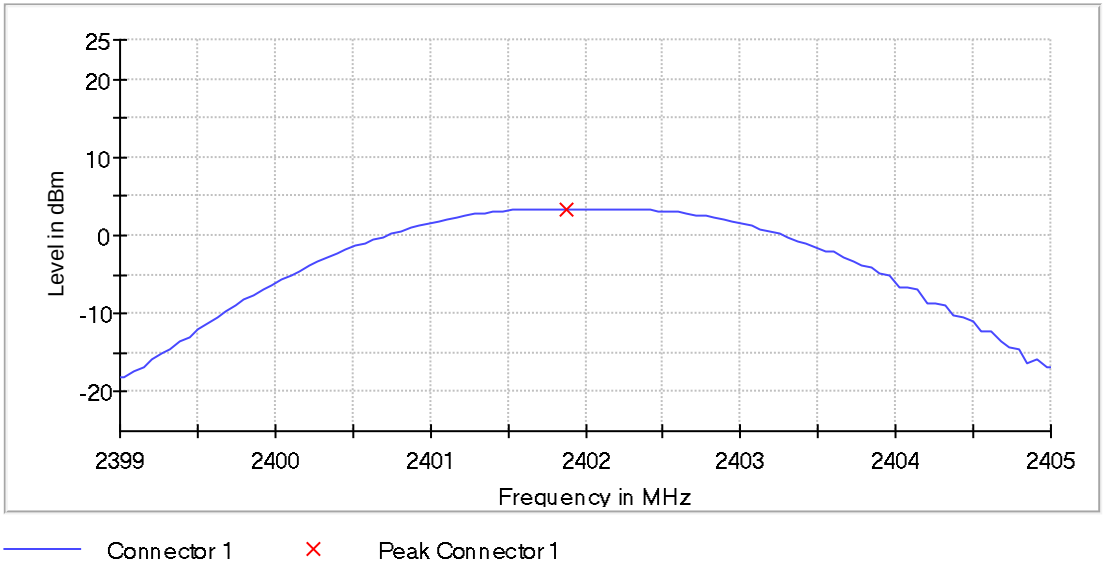
Mode	DUT Frequency	Gated RMS (dBm)	Limit Max (dBm)	DutyCycle (%)	Result
1MBps | PWR4| Channel 2402MHz	**2402.000000**	**3.1**	**30.0**	**94.794**	**PASS**
1MBps | PWR4| Channel 2440MHz	2440.000000	2.8	30.0	94.793	PASS
1MBps | PWR4| Channel 2442MHz	2442.000000	2.8	30.0	94.793	PASS
1MBps | PWR4| Channel 2480MHz	2480.000000	3.1	30.0	94.792	PASS

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

Test according to FCC title 47 part 15 §15.247(b), KDB 558074 D01 DTS Meas Guidance v04 and ANSI C63.10-2013

Result

DUT Frequency (MHz)	Peak Power (dBm)	Limit Max (dBm)	Result
2402.000000	3.4	30.0	PASS



Measurement

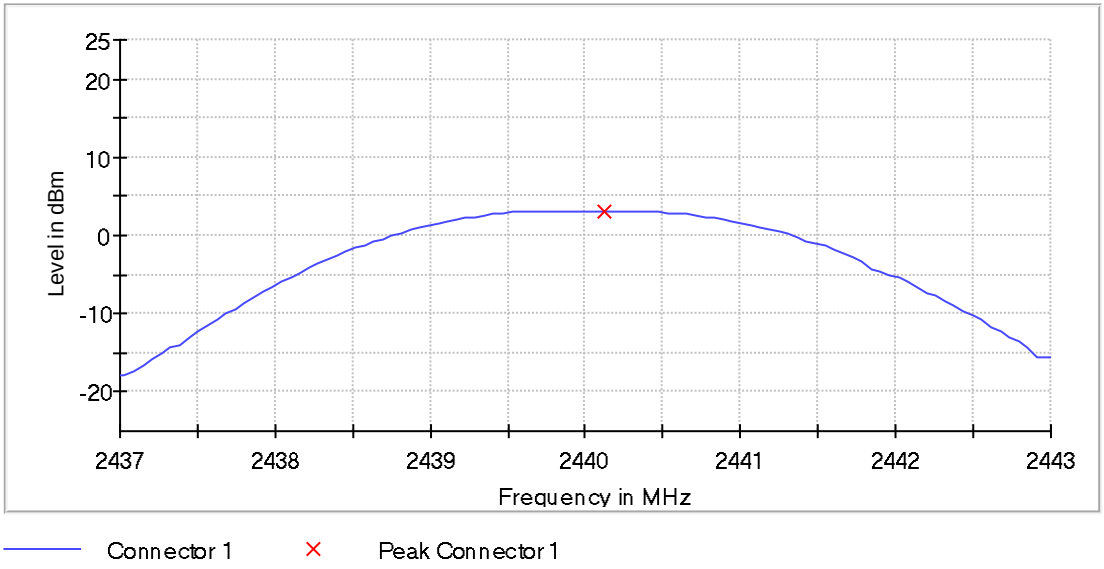
Setting	Instrument Value	Target Value
Start Frequency	2.39900 GHz	2.39900 GHz
Stop Frequency	2.40500 GHz	2.40500 GHz
Span	6.000 MHz	6.000 MHz
RBW	2.000 MHz	>= 1.000 MHz
VBW	10.000 MHz	>= 6.000 MHz
SweepPoints	101	~ 101
Sweeptime	1.000 ms	AUTO
Reference Level	10.000 dBm	10.000 dBm
Attenuation	20.000 dB	AUTO
Detector	MaxPeak	MaxPeak
SweepCount	100	100
Filter	3 dB	3 dB
Trace Mode	Max Hold	Max Hold
Sweeptype	Sweep	AUTO
Preamp	off	off
Stablemode	Trace	Trace
Stablevalue	0.50 dB	0.50 dB
Run	4 / max. 150	max. 150
Stable	3 / 3	3
Max Stable Difference	0.17 dB	0.50 dB

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

Test according to FCC title 47 part 15 §15.247(b), KDB 558074 D01 DTS Meas Guidance v04 and ANSI C63.10-2013

Result

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



Measurement

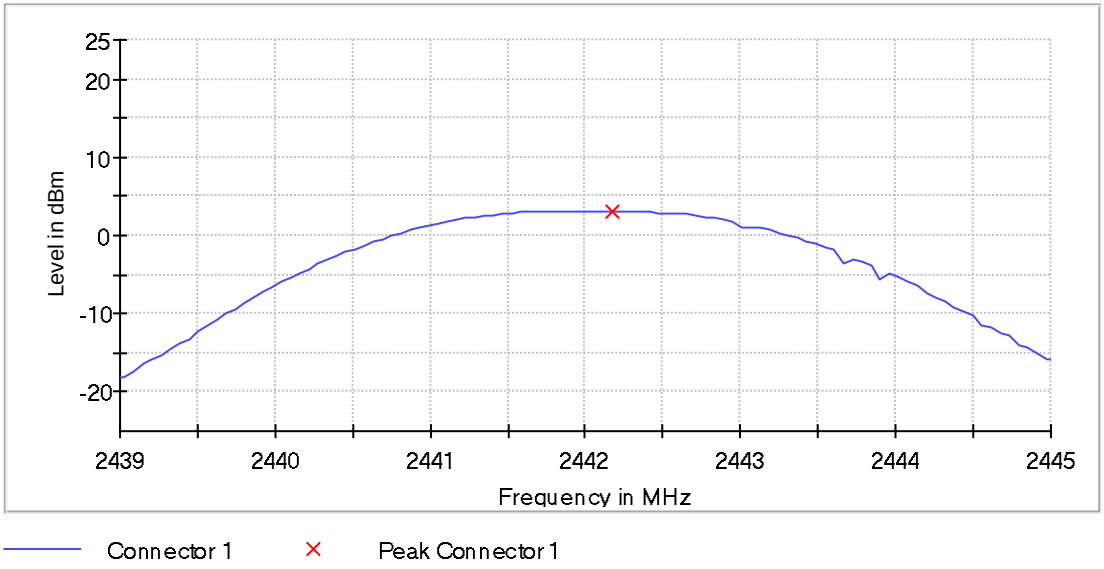
Setting	Instrument Value	Target Value
Start Frequency	2.43700 GHz	2.43700 GHz
Stop Frequency	2.44300 GHz	2.44300 GHz
Span	6.000 MHz	6.000 MHz
RBW	2.000 MHz	>= 1.000 MHz
VBW	10.000 MHz	>= 6.000 MHz
SweepPoints	101	~ 101
Sweeptime	1.000 ms	AUTO
Reference Level	10.000 dBm	10.000 dBm
Attenuation	20.000 dB	AUTO
Detector	MaxPeak	MaxPeak
SweepCount	100	100
Filter	3 dB	3 dB
Trace Mode	Max Hold	Max Hold
Sweeptype	Sweep	AUTO
Preamp	off	off
Stablemode	Trace	Trace
Stablevalue	0.50 dB	0.50 dB
Run	9 / max. 150	max. 150
Stable	3 / 3	3
Max Stable Difference	0.15 dB	0.50 dB

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

Test according to FCC title 47 part 15 §15.247(b), KDB 558074 D01 DTS Meas Guidance v04 and ANSI C63.10-2013

Result

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



Measurement

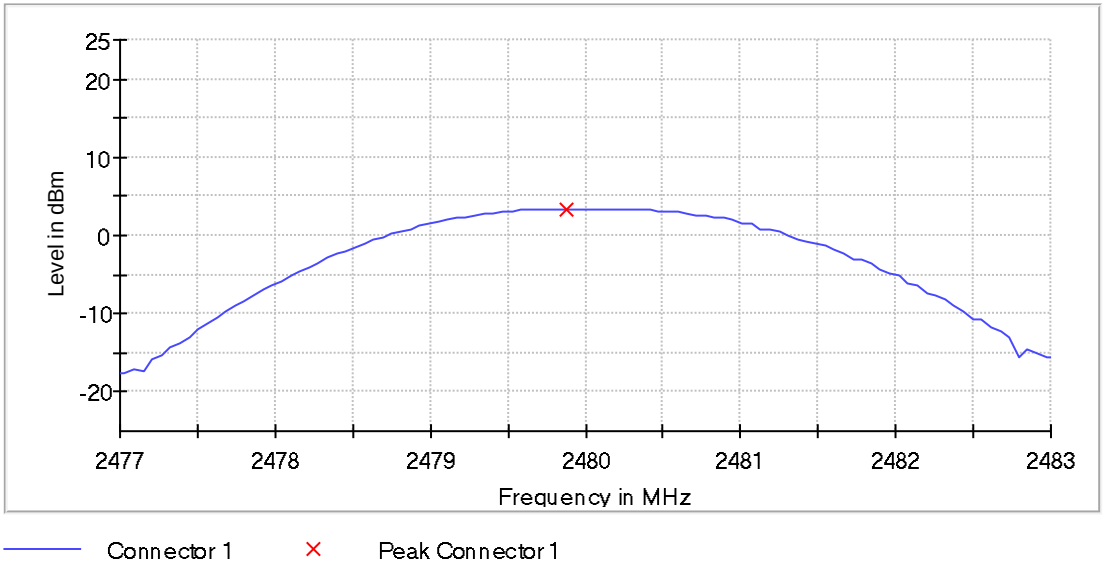
Setting	Instrument Value	Target Value
Start Frequency	2.43900 GHz	2.43900 GHz
Stop Frequency	2.44500 GHz	2.44500 GHz
Span	6.000 MHz	6.000 MHz
RBW	2.000 MHz	>= 1.000 MHz
VBW	10.000 MHz	>= 6.000 MHz
SweepPoints	101	~ 101
Sweeptime	1.000 ms	AUTO
Reference Level	10.000 dBm	10.000 dBm
Attenuation	20.000 dB	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	8 / max. 150	max. 150
Stable	3 / 3	3
Max Stable Difference	0.08 dB	0.50 dB

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

Test according to FCC title 47 part 15 §15.247(b), KDB 558074 D01 DTS Meas Guidance v04 and ANSI C63.10-2013

Result

DUT Frequency (MHz)	Peak Power (dBm)	Limit Max (dBm)	Result
2480.000000	3.3	30.0	PASS



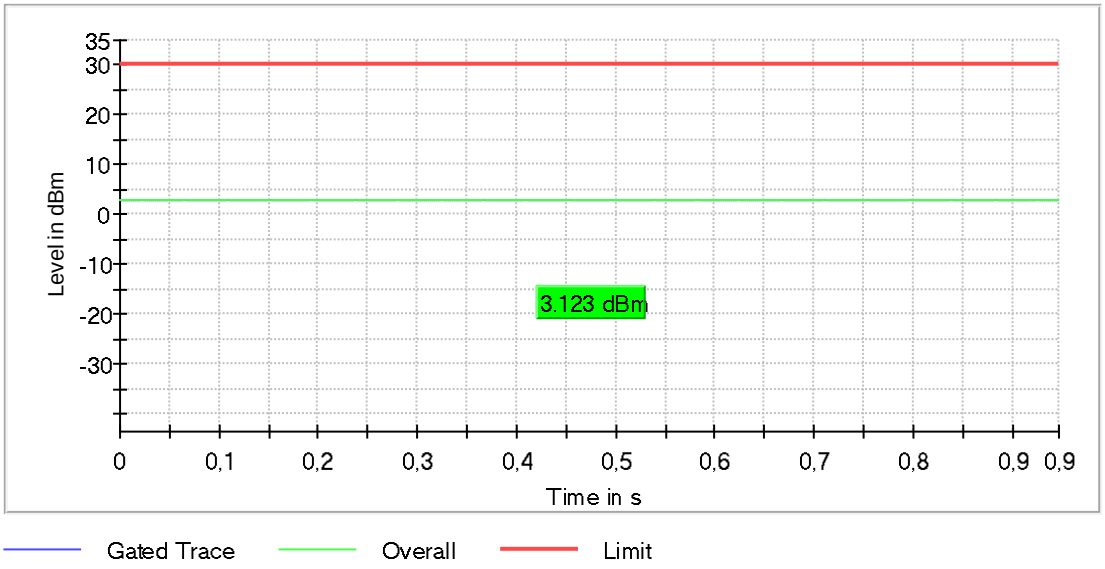
Measurement

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
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	0.07 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	3.1	30.0	94.794	PASS



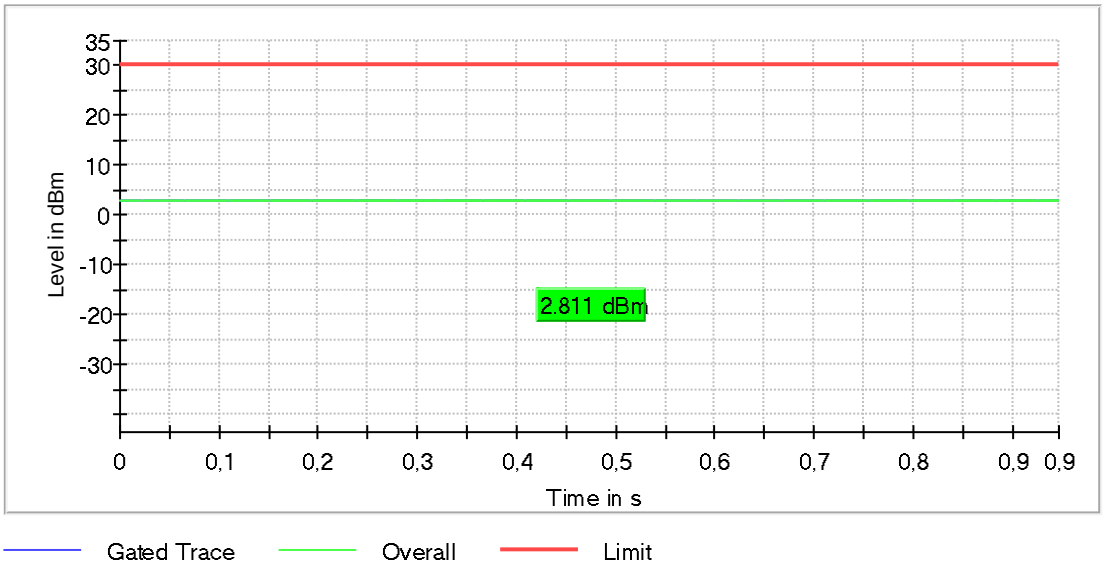
OSP PowerMeter settings

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

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

Result

DUT Frequency (MHz)	Gated RMS (dBm)	Limit Max (dBm)	DutyCycle (%)	Result
2440.000000	2.8	30.0	94.793	PASS



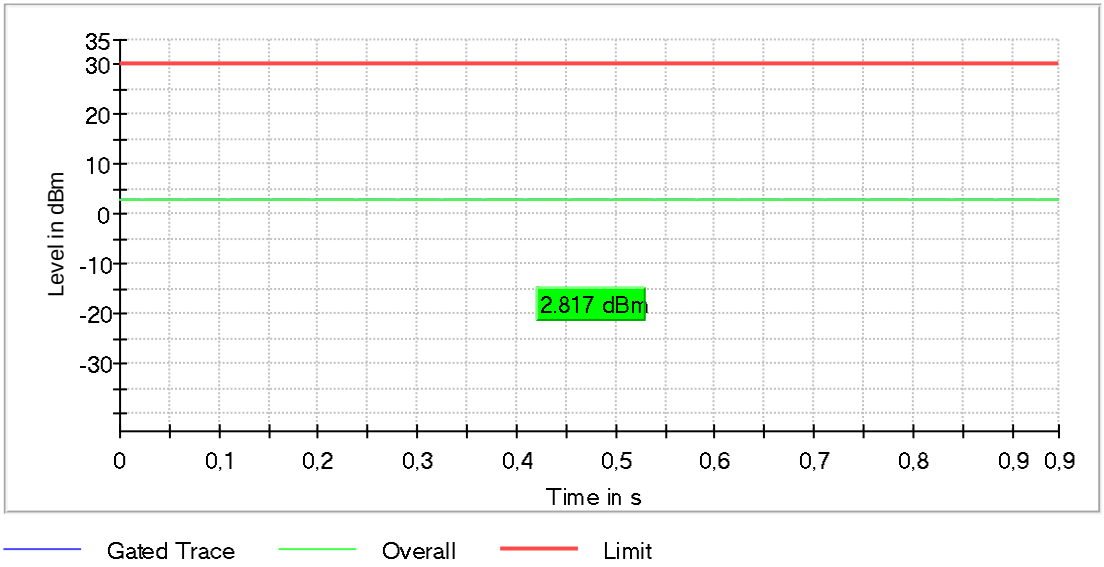
OSP PowerMeter settings

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

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

Result

DUT Frequency (MHz)	Gated RMS (dBm)	Limit Max (dBm)	Gated EIRP (dBm)	DutyCycle (%)	Result
2442.000000	2.8	30.0	2.8	94.793	PASS



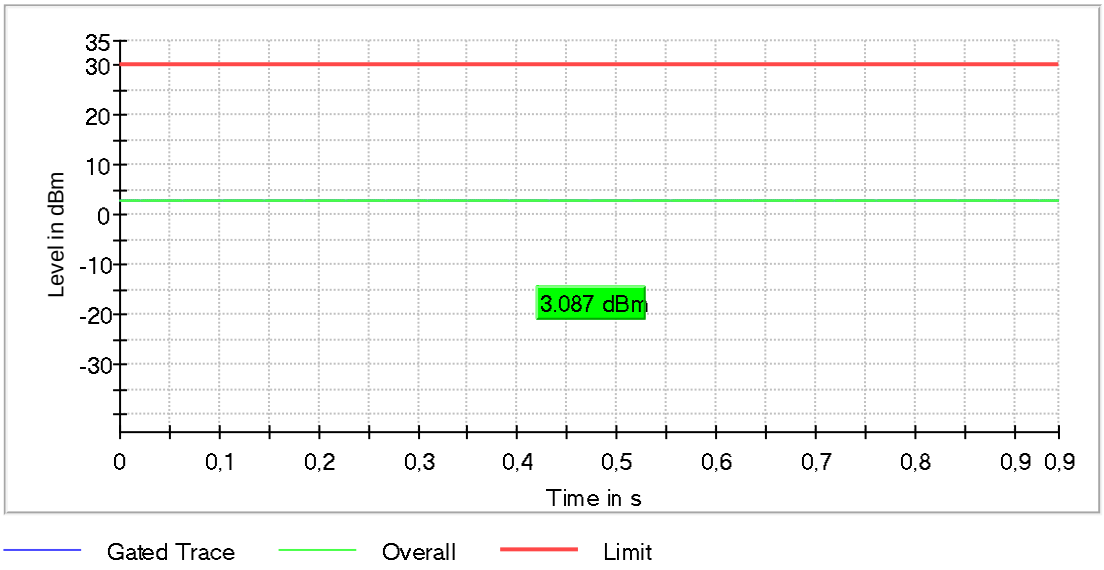
OSP PowerMeter settings

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

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

Result

DUT Frequency (MHz)	Gated RMS (dBm)	Limit Max (dBm)	Gated EIRP (dBm)	DutyCycle (%)	Result
2480.000000	3.1	30.0	3.1	94.792	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