

Annex 1: Measurement diagrams to
TEST REPORT
No.: 18-1-0225601T18

According to:
FCC Regulations
Part 15.205 & Part 15.209
Part 15.247

for

Helmut Fischer GmbH

MMS Inspection DPM
MMS Inspection DFT
MMS Inspection SPG
Measurement equipment for corrosion market

FCC ID: 2ATFE-MMSINSPEC00

Laboratory Accreditation and Listings
 Deutsche Akkreditierungsstelle D-PL-12047-01-01 D-PL-12047-01-03 D-PL-12047-01-04
accredited according to DIN EN ISO/IEC 17025
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1. Measurement diagrams

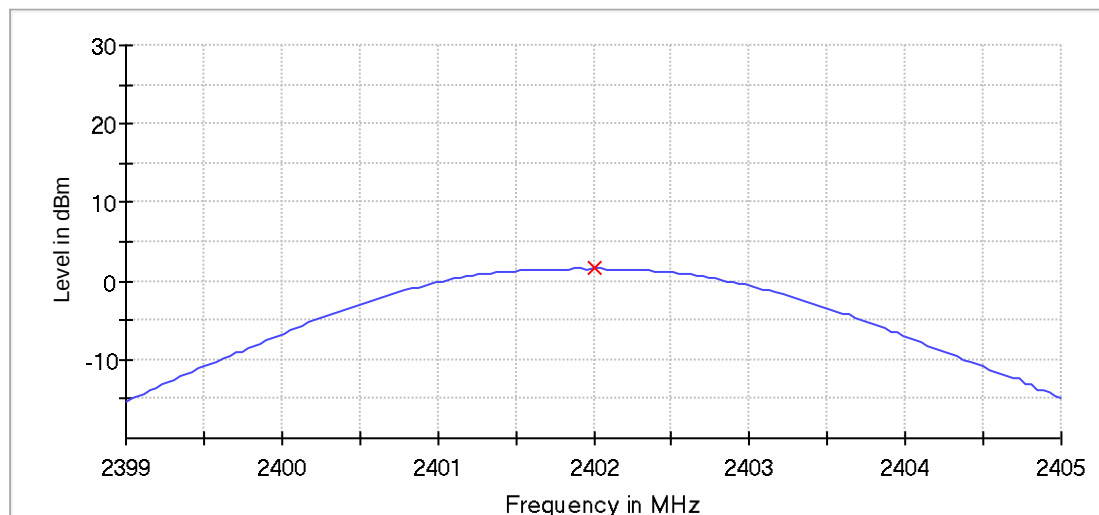
1.1. General Limit – Maximum power output conducted

BT LE					
Max Peak in dBm					
			2402MHz	2441 MHz	2480MHz
DFT	PRBS9	GFSK	0.5	0.3	0.3
SPG	PRBS9	GFSK	1.3	0.8	0.2
DPM	PRBS9	GFSK	1.6	1	0.4

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

Result

DUT Frequency (MHz)	Peak Power (dBm)	Limit Max (dBm)	Result
2402.000000	1.6	30.0	PASS



— Connector 1 × Peak Connector 1

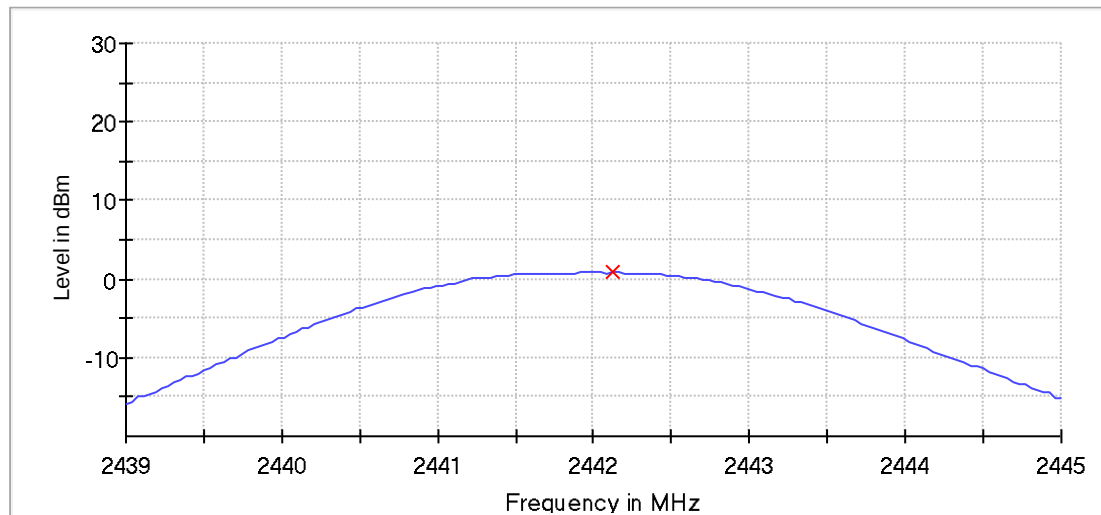
Measurement

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	155	~ 101
SweepTime	2.500 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	4 / max. 150	max. 150
Stable	3 / 3	3
Max Stable Difference	0.11 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	1.0	30.0	PASS



— Connector 1 × Peak Connector 1

Peak Power 1

Measurement

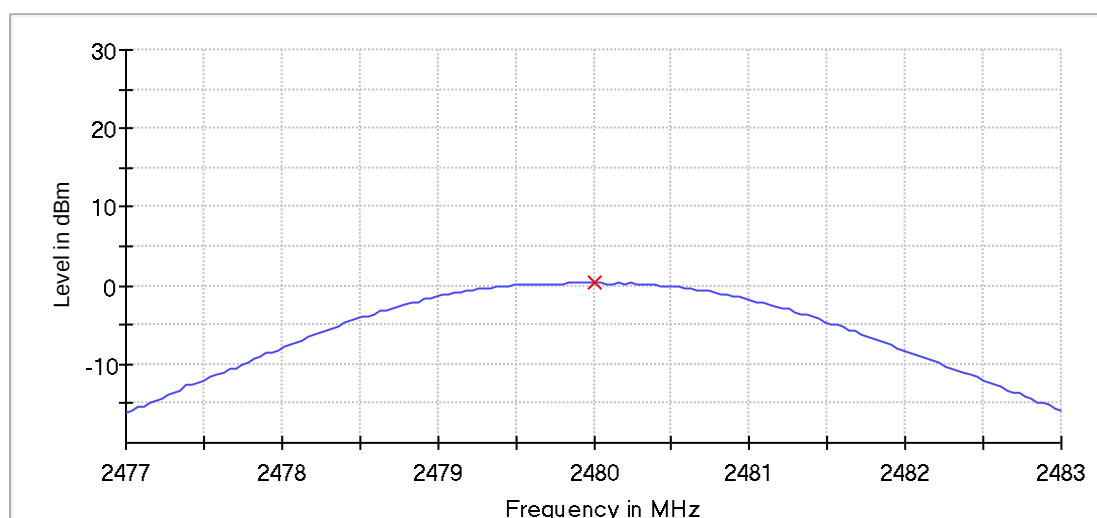
Setting	Instrument Value	Target Value
Start Frequency	2.43900 GHz	2.43900 GHz
Stop Frequency	2.44500 GHz	2.44500 GHz
Span	6.000 MHz	6.000 MHz
RBW	2.000 MHz	>= 1.000 MHz
VBW	10.000 MHz	>= 6.000 MHz
SweepPoints	155	~ 101
SweepTime	2.500 ms	AUTO
Reference Level	10.000 dBm	10.000 dBm
Attenuation	35.000 dB	AUTO
Detector	MaxPeak	MaxPeak
SweepCount	100	100
Filter	3 dB	3 dB
Trace Mode	Max Hold	Max Hold
SweepType	Sweep	AUTO
Preamplifier	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	0.14 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

Result

DUT Frequency (MHz)	Peak Power (dBm)	Limit Max (dBm)	Result
2480.000000	0.4	30.0	PASS



— Connector 1 × Peak Connector 1

Peak Power 1

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	155	~ 101
SweepTime	2.500 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	4 / max. 150	max. 150
Stable	3 / 3	3
Max Stable Difference	0.10 dB	0.50 dB

1.2. General Limit - Radiated field strength emissions below 30 MHz

2.01_TX_CH37_2402MHz_laying

Common Information

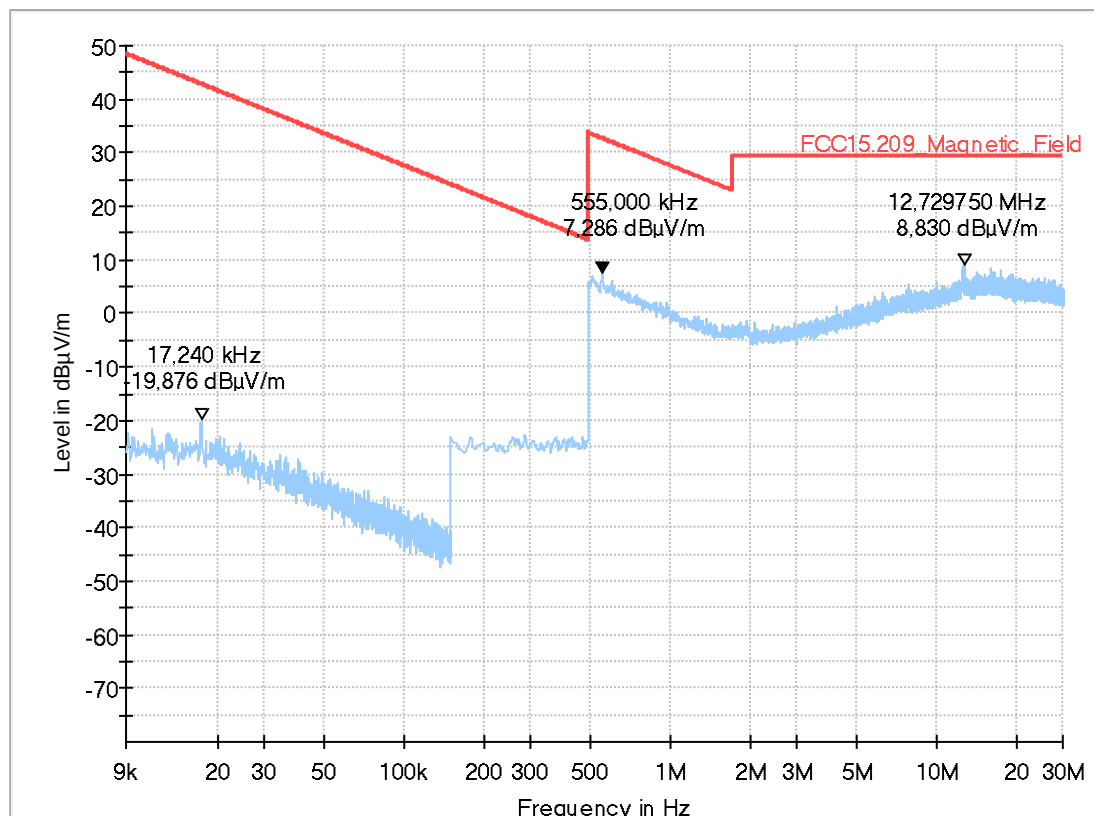
Test description:	Magnetic Field Strength Measurement related to 30/300 m distance
Test site and distance:	Ref.-Nr. 441 Semi Anechoic Room (SAR) with 3 m measurement distance
Version of Testsoftware:	EMC32 V9.25.0
Distance correction:	used accord. table, pls. see test report
Technical Data:	Please see 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; RSS-Gen: Issue 4

Operator:	MBe
Operation mode:	BT LE ch 37
Power during tests:	Battery laying

EUT Information

Manufacturer:	Helmut Fischer GmbH
Model:	SPG
Type:	MMS Inspection Device
HW:	C1.3-10142823
SW:	1.1.0-S
Serial Nr.:	56
Power Supply:	Battery

Full Spectrum



2.02_TX_CH37_2402MHz_standing

Common Information

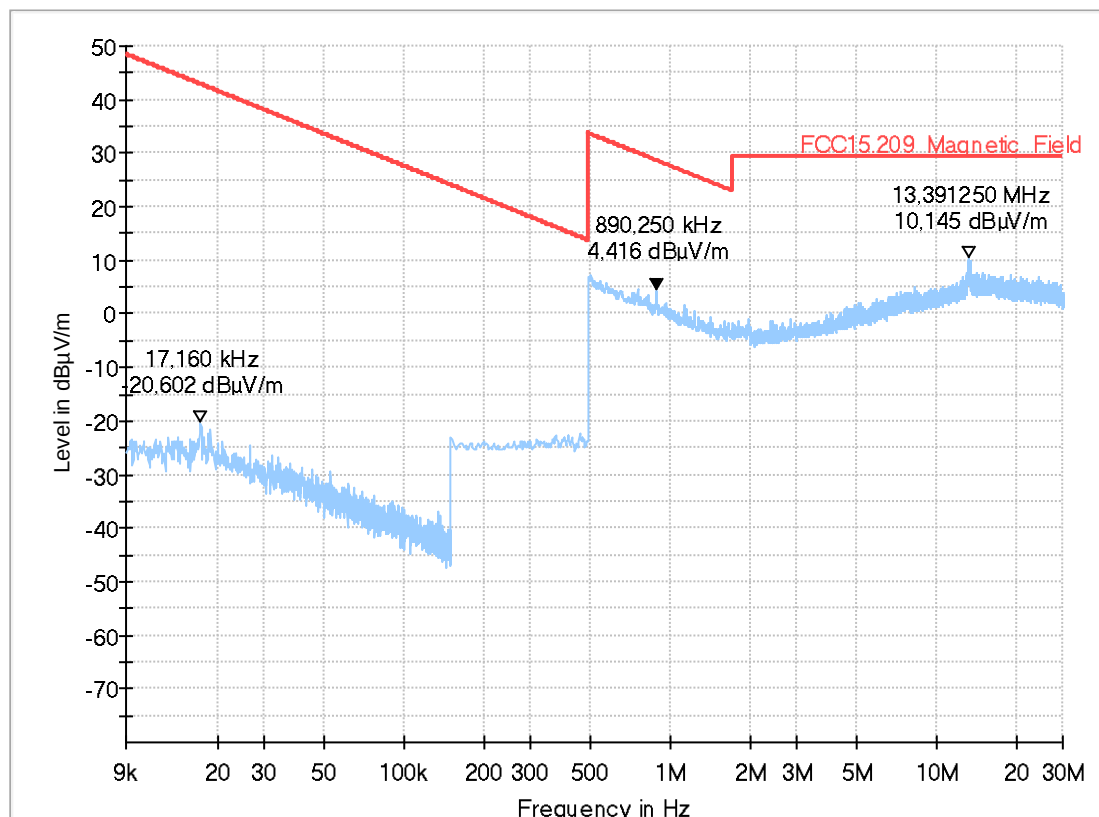
Test description:	Magnetic Field Strength Measurement related to 30/300 m distance
Test site and distance:	Ref.-Nr. 441 Semi Anechoic Room (SAR) with 3 m measurement distance
Version of Testsoftware:	EMC32 V9.25.0
Distance correction:	used accord. table, pls. see test report
Technical Data:	Please see 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; RSS-Gen: Issue 4

Operator:	MBe
Operation mode:	BT LE ch 37
Power during tests:	Battery standing

EUT Information

Manufacturer:	Helmut Fischer GmbH
Model:	SPG
Type:	MMS Inspection Device
HW:	C1.3-10142823
SW:	1.1.0-S
Serial Nr.:	56
Power Supply:	Battery

Full Spectrum



1.3. General Limit - Radiated field strength emissions, 30 MHz - 1 GHz

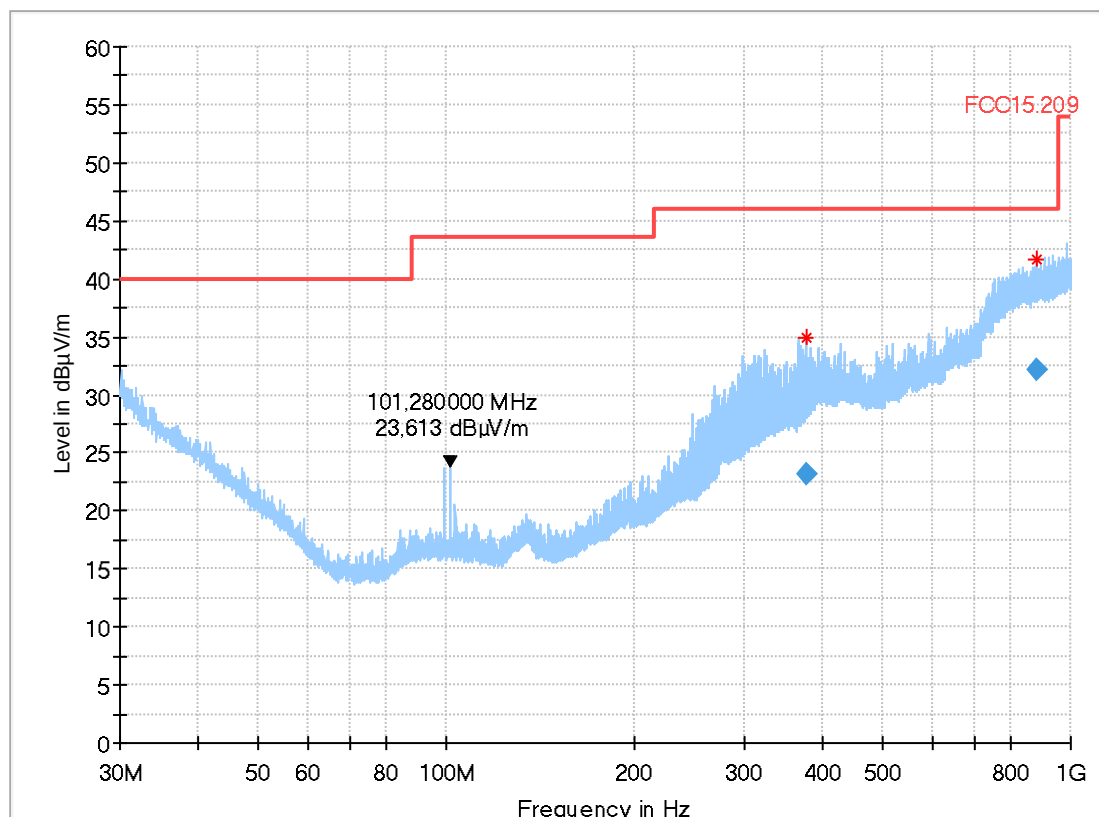
3.01_TX_CH37_2402MHz_laying

Test description:	07.02.2019 Page 1 of 1
Test site and distance:	Electric Field Strength Measurement
Version of Testsoftware:	Ref.-Nr. 441 Semi Anechoic Room (SAR) with 3 m measurement distance
Distance correction:	EMC32 V9.25.0
Used filter:	not used
Test specification.:	not used
	FCC 15.209; RSS-Gen: Issue 3
Operator:	MBe
Operating Mode:	BT LE ch.37
Power during tests:	Battery
Comment 1:	laying

EUT Information

Manufacturer:	Helmut Fischer GmbH
Model:	SPG
Type:	MMS Inspection Device
HW:	C1.3-10142823
SW:	1.1.0-S
Serial Nr.:	56
Power Supply:	Battery

Full Spectrum



Final_Result

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
376.080000	23.12	46.00	22.88	1000.0	120.000	282.0	H	0.0	17.1
882.780000	32.22	46.00	13.78	1000.0	120.000	260.0	V	145.0	26.3

3.02_TX_CH37_2402MHz_standing

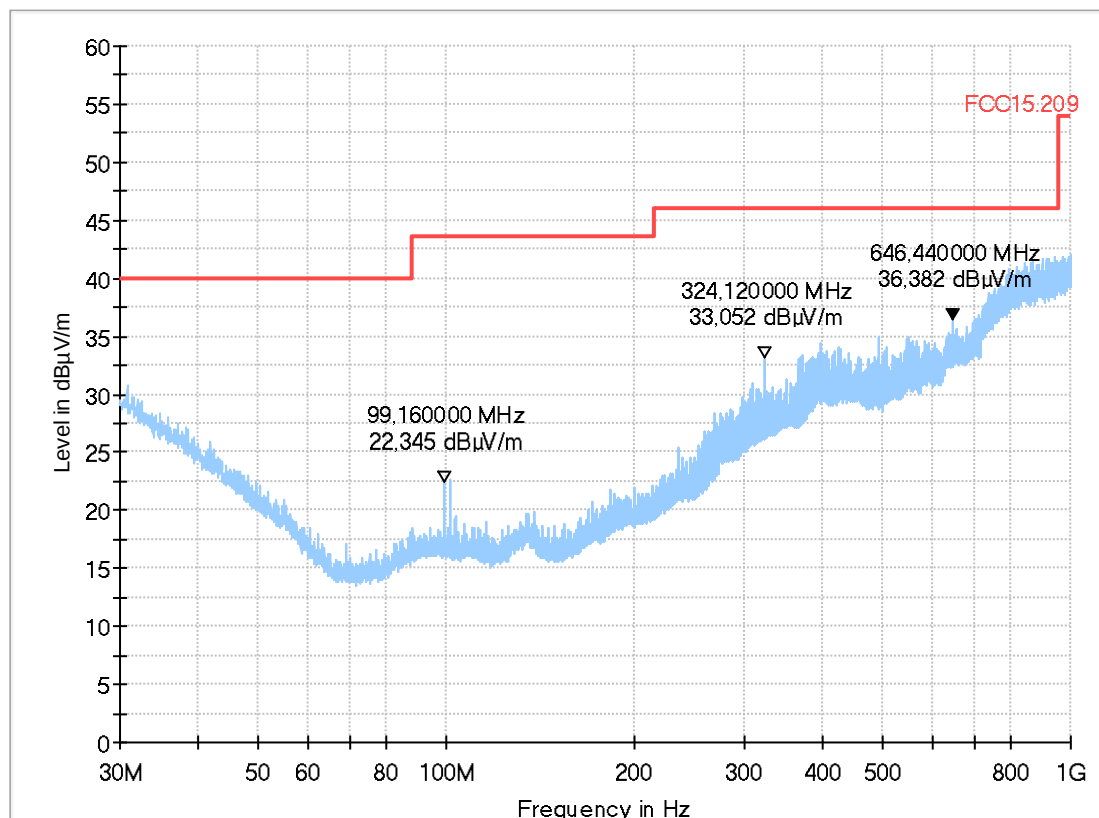
07.02.2019 Page 1 of 1
 Test description: Electric Field Strength Measurement
 Test site and distance: Ref.-Nr. 441 Semi Anechoic Room (SAR) with 3 m measurement distance
 Version of Testsoftware: EMC32 V9.25.0
 Distance correction: not used
 Used filter: not used
 Test specification.: FCC 15.209; RSS-Gen: Issue 3

Operator: MBe
 Operating Mode: BT LE ch.37
 Power during tests: Battery
 Comment 1: laying

EUT Information

Manufacturer: Helmut Fischer GmbH
 Model: SPG
 Type: MMS Inspection Device
 HW: C1.3-10142823
 SW: 1.1.0-S
 Serial Nr.: 56
 Power Supply: Battery

Full Spectrum



1.4. General Limit - Radiated emissions, above 1 GHz

4.01a_TX_CH37_2402MHz

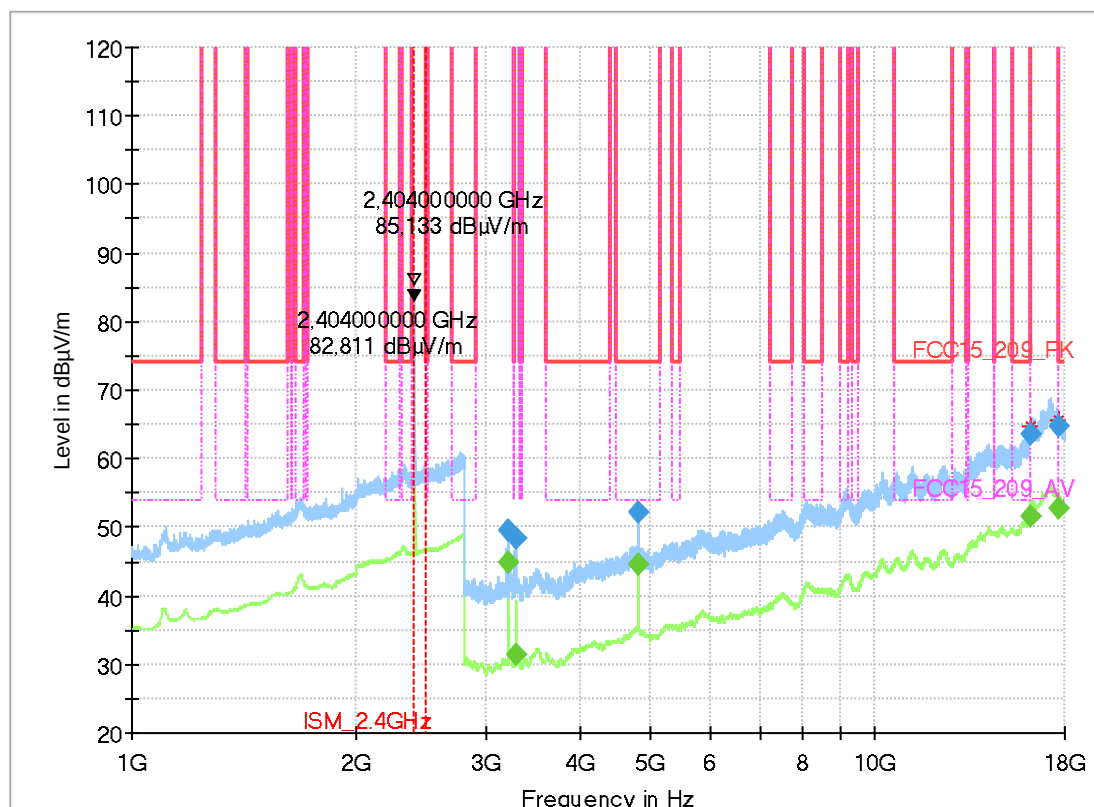
Common Information

Test Description:	Radiated field strength emission in 3m distance
Test Site:	CETECOM GmbH Essen
Test Standard:	FCC 15.247&15.209 Intentional Radiator / RSS-Gen, Issue 4
Antenna polarisation:	horizontal/vertical
Operating Mode:	BTLE Ch01 2402MHz TX
Operator:	RLs

EUT Information

Manufacturer:	Helmut Fischer GmbH
Product:	Messgerät
Model:	MMS Inspection DPM
HW version:	Revision C1.3 - 10142823
SW version:	1.1.0-S
Serial number:	56
Power Supply:	2x AA Battery (1.5V)

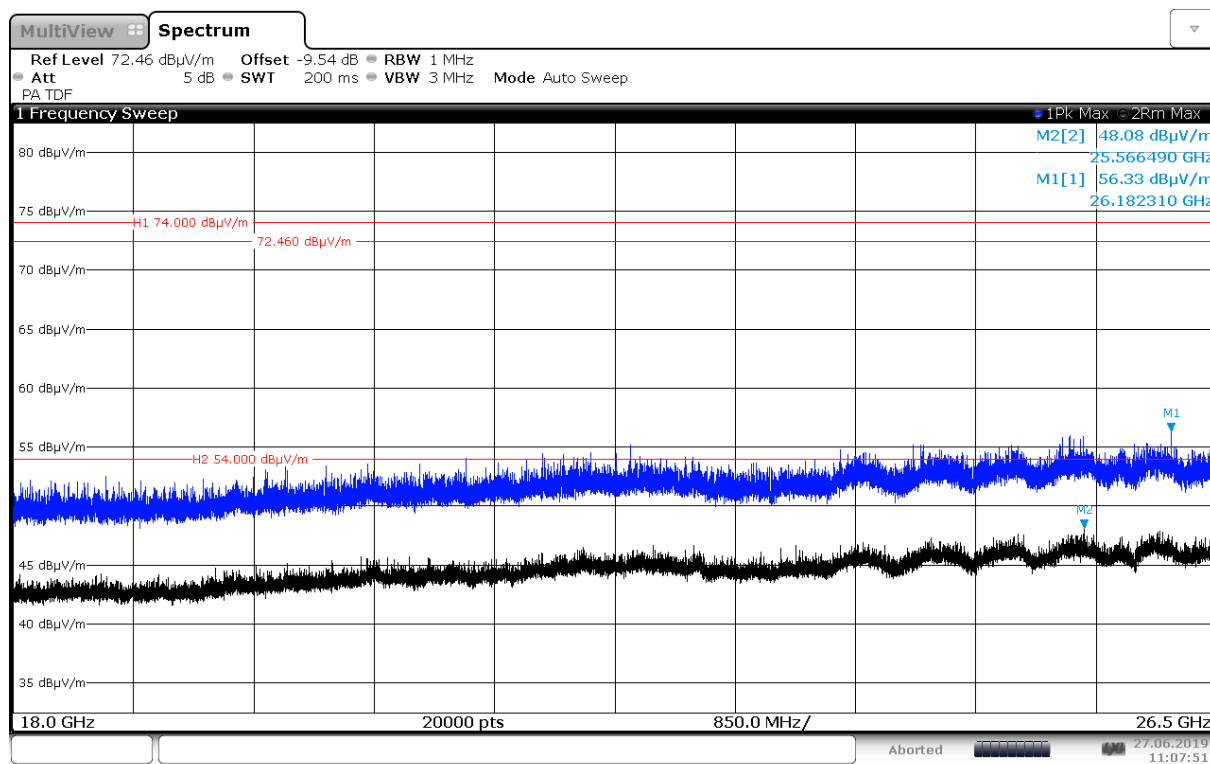
Full Spectrum



Final Result

Frequency (MHz)	MaxPeak (dBμV/m)	RMS (dBμV/m) + DC correction Factppor (dB)	Limit (dBμV/ m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Pol	Azimuth (deg)	Elevation (deg)	Corr. (dB/m)
3205.200000	49.54	---	150.00	100.46	100.0	1000.000	H	323.0	90.0	2
3205.200000	---	45.52	150.00	104.48	100.0	1000.000	H	324.0	90.0	2
3282.400000	---	32.2	150.00	117.80	100.0	1000.000	H	94.0	90.0	2
3282.800000	48.24	---	150.00	101.76	100.0	1000.000	H	326.0	90.0	2
4808.000000	---	45.48	54.00	8.52	100.0	1000.000	H	233.0	90.0	6
4808.000000	52.24	---	74.00	21.76	100.0	1000.000	V	232.0	90.0	6
16196.800000	---	52.24	54.00	1.76	100.0	1000.000	H	239.0	90.0	28
16200.000000	63.59	---	74.00	10.41	100.0	1000.000	V	105.0	0.0	28
17700.000000	---	53.5	54.00	0.5	100.0	1000.000	V	2.0	90.0	29
17700.000000	64.65	---	74.00	9.35	100.0	1000.000	V	173.0	0.0	29

4.01B_BT_LE_ch37_2402MHz



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1.5. RF-Parameter - Band Edge compliance measurements

9.01_BTLE_BE_Low_2.402GHz

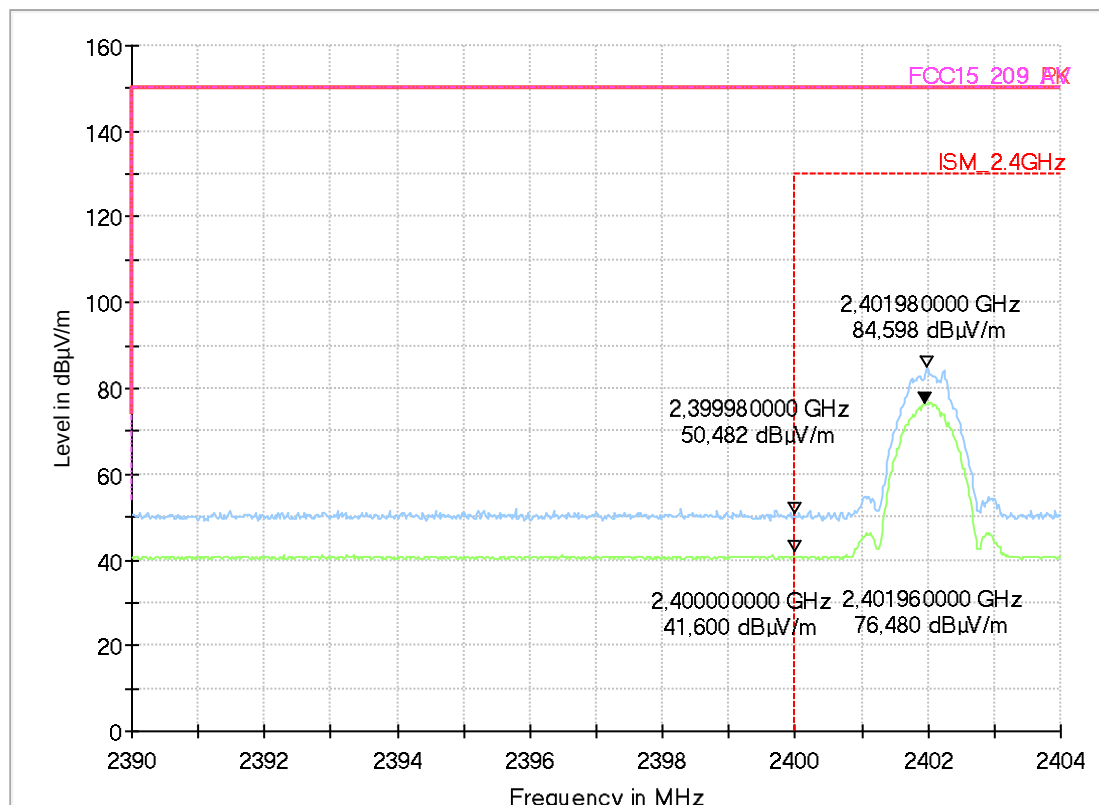
Common Information

Test Description:	Band-Edge: Radiated Field Strength Emissions Emissions in 3m distance
Test Site:	CETECOM GmbH Essen
Test Standard:	FCC 15.247&15.209 Intentional Radiator / RSS-Gen, Issue 4
Antenna polarisation:	horizontal/vertical
Operating Mode:	BT LE Low
Operator:	LKu
Environmental Conditions:	Humidity: 61%rH; Temperature: 20.4°C
Comment:	Channel 2.402GHz
EUT Setup:	DPM
Verdict:	Passed

EUT Information

Manufacturer:	Helmut Fischer GmbH
Product:	Messgerät
Model:	MMS Inspection DPM
HW version:	Revision C1.3 - 10142823
SW version:	1.1.0-S
Serial number:	56
Power Supply:	2x AA Battery (1.5V)

Full Spectrum



9.02_BTLE_BE_High_2.48GHz

Common Information

Test Description:	Band-Edge: Radiated Field Strength Emissions Emissions in 3m distance
Test Site:	CETECOM GmbH Essen
Test Standard:	FCC 15.247&15.209 Intentional Radiator / RSS-Gen, Issue 4
Antenna polarisation:	horizontal/vertical
Operating Mode:	BT LE High
Operator:	LKu
Comment:	Channel high
Environmental Conditions:	Humidity : 61%rH; Temperature: 21°C
EUT Setup:	DPM
Verdict:	Passed

EUT Information

Manufacturer:	Helmut Fischer GmbH
Product:	Messgerät
Model:	MMS Inspection DPM
HW version:	Revision C1.3 - 10142823
SW version:	1.1.0-S
Serial number:	56
Power Supply:	2x AA Battery (1.5V)

Full Spectrum

