

Annex 2: Measurement diagrams to
PARTIAL TEST REPORT
 No.: 6-0461-14-3-1i

According to:

FCC Part 15.247
 RSS-247, Issue 1

for

Robert Bosch Car Multimedia GmbH

LCN2K70C10
 Radio Navigation System
 (Bluetooth 2.4GHz)

FCC ID: YBN-LCN2K70C10
IC: 9595A-LCN2K70C10
 PMN: Nissan LCN2Kai
 HVIN: LCN2K70C10

Laboratory Accreditation and Listings			
 Deutsche Akkreditierungsstelle D-PL-12047-01-01	 FEDERAL COMMUNICATIONS COMMISSION USA MRA US-EU 0003	 Industry Canada Reg. No.: 3462D-1 Reg. No.: 3462D-2 Reg. No.: 3462D-3	 Voluntary Controls for Electromagnetic Emissions Reg. No.: R-2666 C-2914, T-1967, G-301
 AUTHORIZED RF LABORATORY	 LAB CODE 20011130-00		
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Table of contents

1. RADIATED FIELD STRENGTH MEASUREMENTS ACCORD. §15.209&15.205.....	3
1.1. Magnetic field measurements $f < 30\text{MHz}$	3
1.2. Field strength measurements $30\text{MHz} < f < 1\text{GHz}$	6
1.3. Field strength measurements $f < 18\text{GHz}$	9
2. RADIATED BAND-EDGE MEASUREMENTS ACCORD. §15.209 & §15.205 (§15.247)	18
2.1. Channel 0 (left band edge).....	18
2.2. Channel 78 (right band edge).....	20
3. MPE CALCULATION	22

1. Radiated field strength measurements accord. §15.209&15.205

1.1. Magnetic field measurements $f < 30 \text{ MHz}$

1.1.1. GFSK modulation

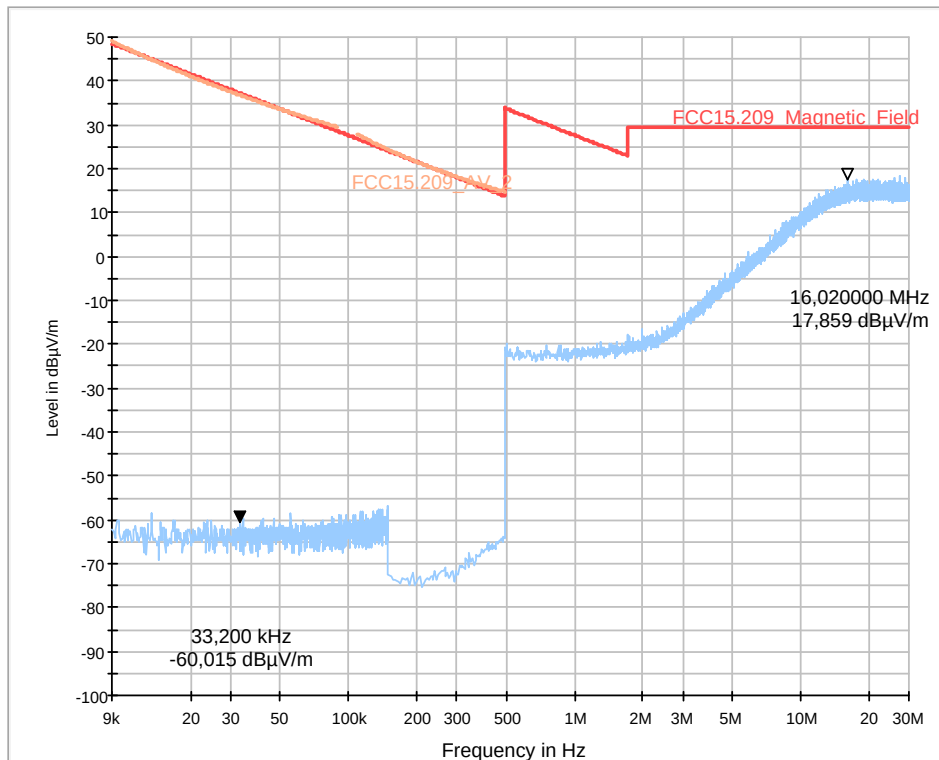
Diagram No. 2.01_TX_ch0_DH5

Test description:	Date: 23.04.2015 Page 1 of 1
Test site and distance:	Magnetic Field Strength Measurement related to 30/300 m distance
Version of Testsoftware:	Ref.-Nr. 441 Semi Anechoic Room (SAR) with 3 m measurement distance
Distance correction:	EMC32 V8.51.0
Technical Data:	used accord. table, pls. see test report
Rec. antenna (pre-scan):	Please see page 2 for detailed data of measurement setup
Used filter:	height 1.00 m, parallel and 90° to EUT polarisation
Test specification:	bypass
	FCC 15.205 § 15.209; RSS-Gen: Issue 4
Operator:	HLA
Operating conditions:	BT TX Ch:00 _DH5
Power during tests:	13,5V DC
Comment 1:	Channel low
Comment 2:	

EUT Information

Manufacturer:	Bosch
EUT:	LCN2K70C10
-----	-----
HW Version:	051
SW Version:	F005
Serial Number:	3202718
Connected Interfaces:	-
Power Supply:	via external power supply, nomVolt: 13.50 VDC

FCC15.209_magn hor+vert



1.1.2. $\pi/4$ DQPSK modulation

Diagram No. 2.02_TX_ch39_2DH5

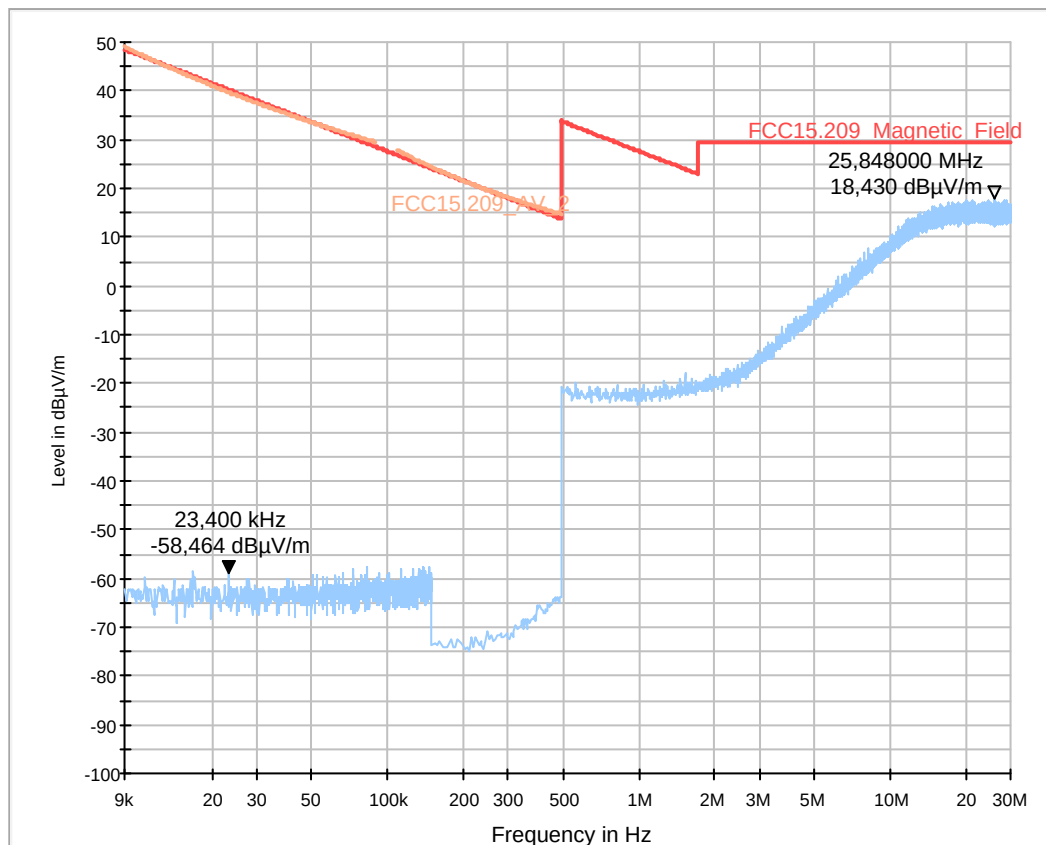
Date: 23.04.2015	Page 1 of 1
Test description:	Magnetic Field Strength Measurement related to 30/300 m distance
Test site and distance:	Ref.-Nr. 441 Semi Anechoic Room (SAR) with 3 m measurement distance
Version of Testsoftware:	EMC32 V8.51.0
Distance correction:	used accord. table, pls. see test report
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 15.209 § 15.209; RSS-Gen: Issue 4
Operator:	HLA
Operating conditions:	BT TX Ch:39_2DH5
Power during tests:	13,5V DC
Comment 1:	Channel low
Comment 2:	

EUT Information

Manufacturer:	Bosch
EuT:	LCN2K70C10

HW Version:	051
SW Version:	F005
Serial Number:	3202718
Connected Interfaces:	-
Power Supply:	via external power supply, nomVolt: 13.50 VDC

FCC15.209_magn hor+vert



1.1.3. 8DPSK modulation

Diagram No. 2.03_TX_ch78_3DH5

Date: 23.04.2015 Page 1 of 1
 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 V8.51.0
 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 15.209 § 15.209; RSS-Gen: Issue 4

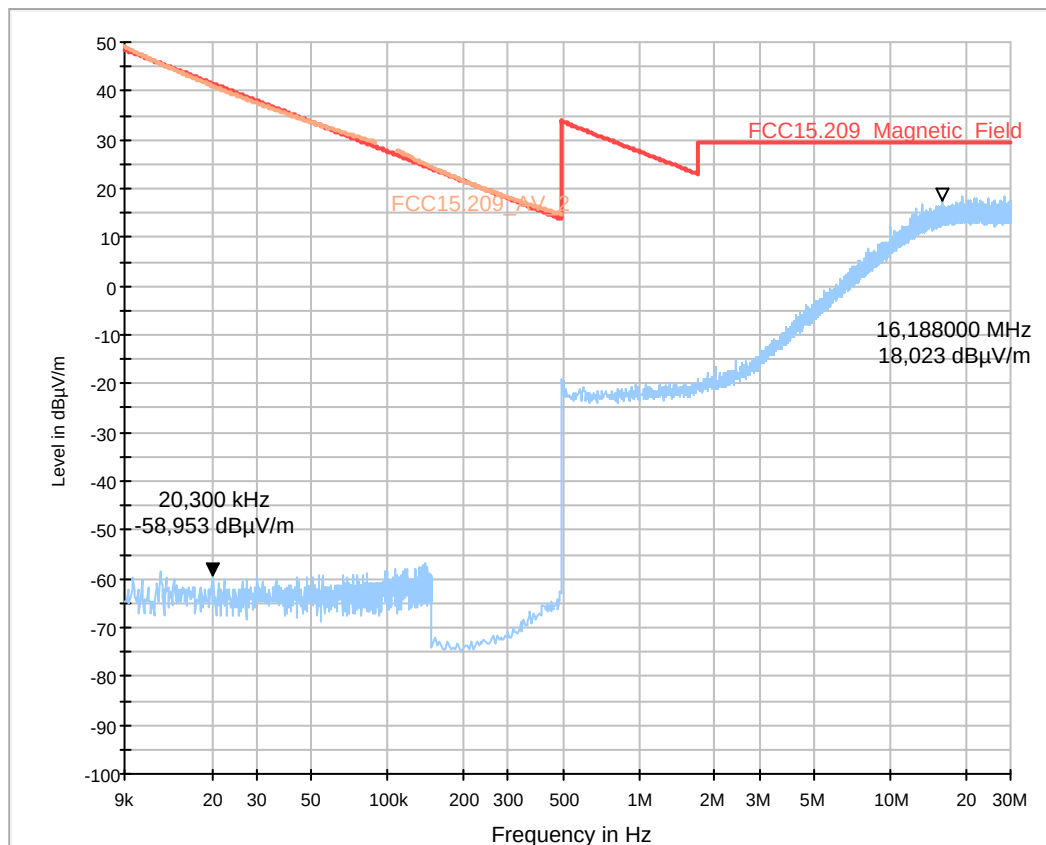
Operator: HLa
 Operating conditions: BT TX Ch:78_3DH5
 Power during tests: 13,5V DC
 Comment 1:
 Comment 2:

EUT Information

Manufacturer: Bosch
 EuT: LCN2K70C10

 HW Version: 051
 SW Version: F005
 Serial Number: 3202718
 Connected Interfaces: -
 Power Supply: via external power supply, nomVolt: 13.50 VDC

FCC15.209_magn hor+vert



1.2. Field strength measurements 30MHz <f <1GHz

1.2.1. GFSK modulation

Diagram No. 3.01_TX_ch0_DH5

22.04.2015 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 V8.51.0
 Distance correction: not used
 Used filter: not used
 Technical Data: please see page 2 for detailed data of measurement setup
 Test specification.: FCC 15.109 Class B; RSS-Gen. Issue 4

Operator: HLa
 Operating conditions: BT TX Ch:00 _DH5
 Power during tests: 13,5V DC
 Comment 1:

EUT Information

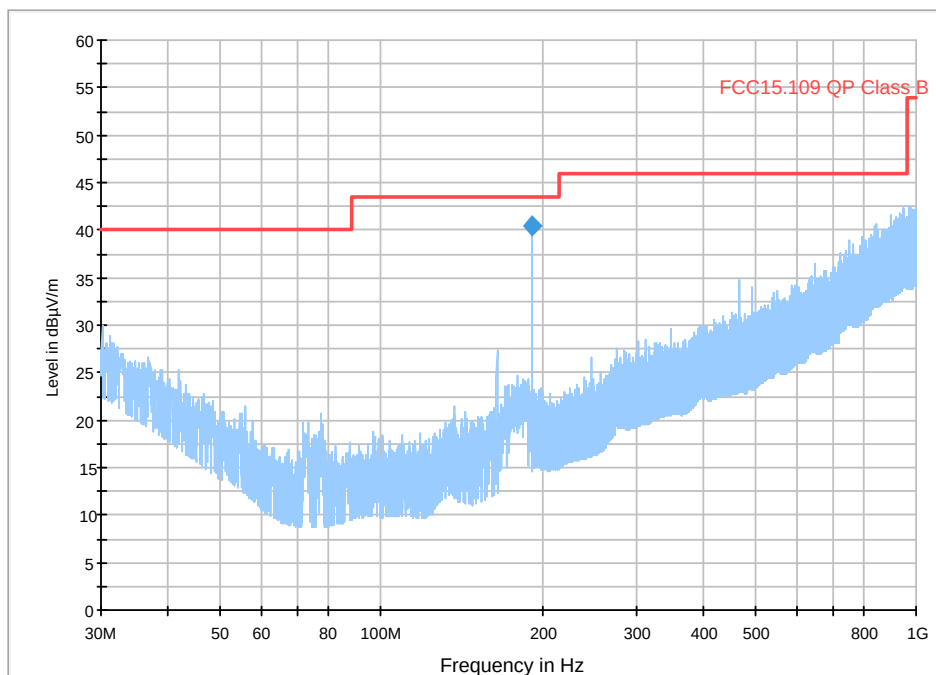
Manufacturer: Bosch
 EuT: LCN2K70C10

HW Version: 051
 SW Version: F005
 Serial Number: 3202718
 Connected Interfaces: -
 Power Supply: via external power supply, nomVolt: 13.50 VDC

Final Result 1

Frequency (MHz)	QuasiPeak (dBμV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBμV/m)
192.190000	40.5	1000.0	120.000	168.0	H	219.0	12.2	3.0	43.5

FCC15.109_hor+vert



1.2.2. $\pi/4$ DQPSK modulation

Diagram No. 3.02_TX_ch39_2DH5

22.04.2015 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 V8.51.0
 Distance correction: not used
 Used filter: not used
 Technical Data: please see page 2 for detailed data of measurement setup
 Test specification.: FCC 15.109 Class B; RSS-Gen. Issue 4

Operator: HLa
 Operating conditions: BT TX Ch:39_2-DH5
 Power during tests: 13,5V DC
 Comment 1:

EUT Information

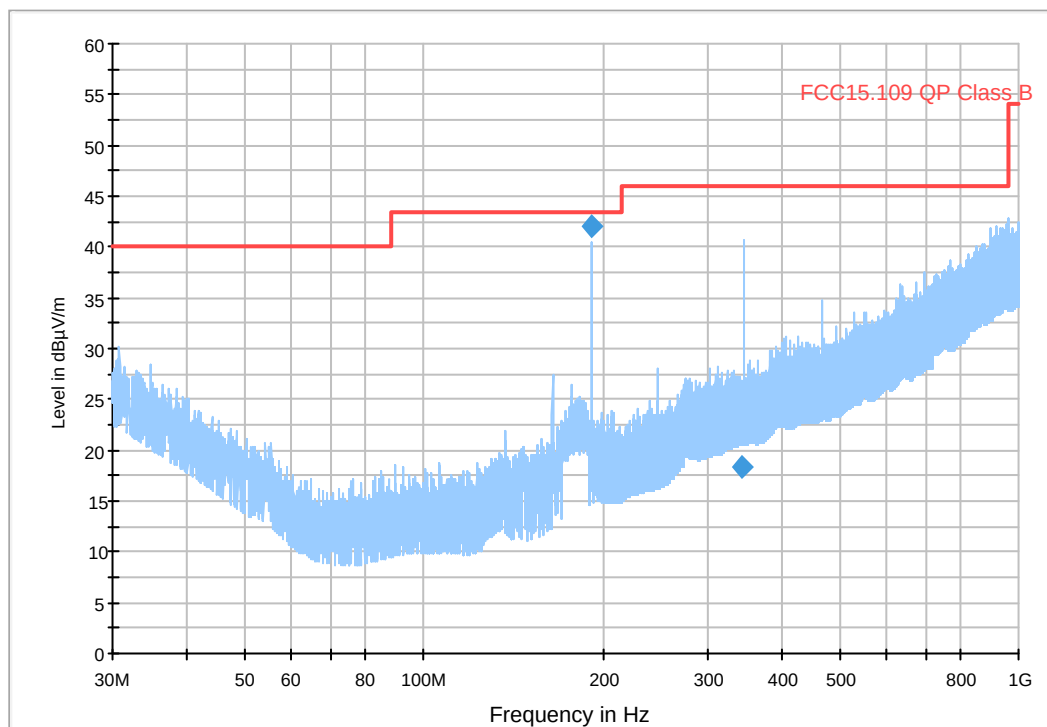
Manufacturer: Bosch
 EuT: LCN2K70C10

 HW Version: 051
 SW Version: F005
 Serial Number: 3202718
 Connected Interfaces: -
 Power Supply: via external power supply, nomVolt: 13.50 VDC

Final Result 1

Frequency (MHz)	QuasiPeak (dB μ V/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dB μ V/m)
192.190000	42.1	1000.0	120.000	157.0	H	213.0	12.2	1.4	43.5
344.090000	18.4	1000.0	120.000	105.0	H	132.0	16.6	27.6	46.0

FCC15.109_hor+vert



1.2.3. 8DPSK modulation

Diagram No. 3.03_TX_ch78_3DH5

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 V8.51.0
 Distance correction: not used
 Used filter: not used
 Technical Data: please see page 2 for detailed data of measurement setup
 Test specification.: FCC 15.109 Class B; RSS-Gen. Issue 4

Operator: HLa
 Operating conditions: BT TX Ch:78_3DH5
 Power during tests: 13,5V DC
 Comment 1:

EUT Information

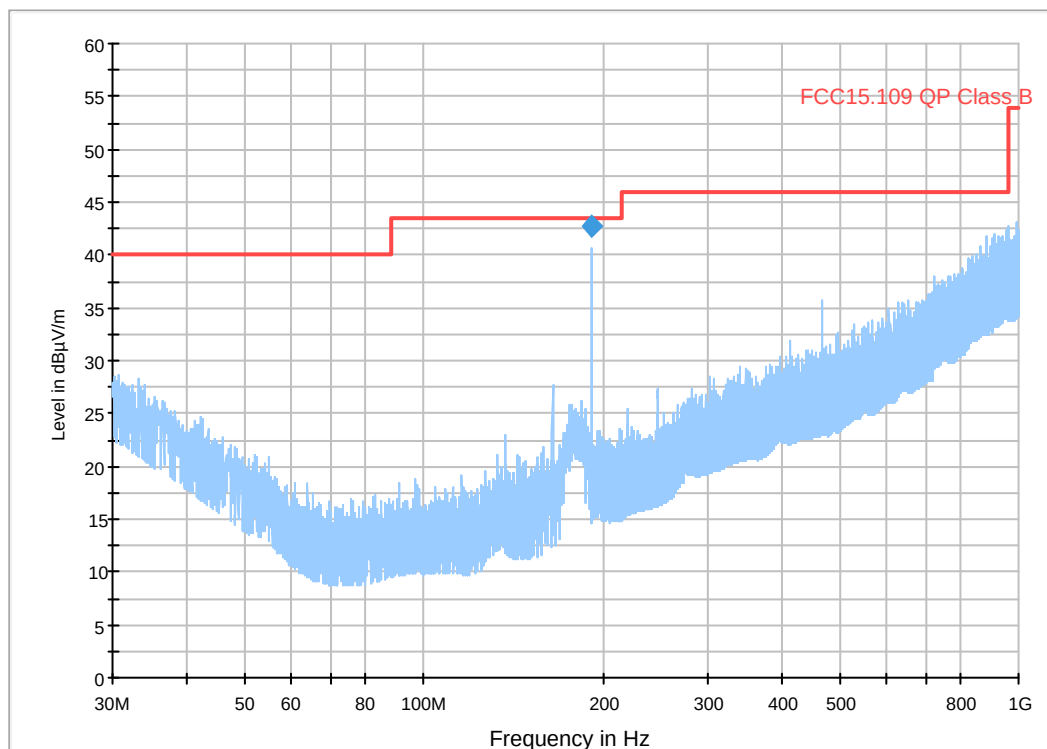
Manufacturer: Bosch
 EuT: LCN2K70C10

 HW Version: 051
 SW Version: F005
 Serial Number: 3202718
 Connected Interfaces: -
 Power Supply: via external power supply, nomVolt: 13.50 VDC

Final Result 1

Frequency (MHz)	QuasiPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
192.190000	42.7	1000.0	120.000	157.0	H	212.0	12.2	0.8	43.5

FCC15.109_hor+vert



1.3. Field strength measurements $f < 18\text{GHz}$

1.3.1. GFSK modulation

Diagram No.: 4.01_TX_ch0_DH5

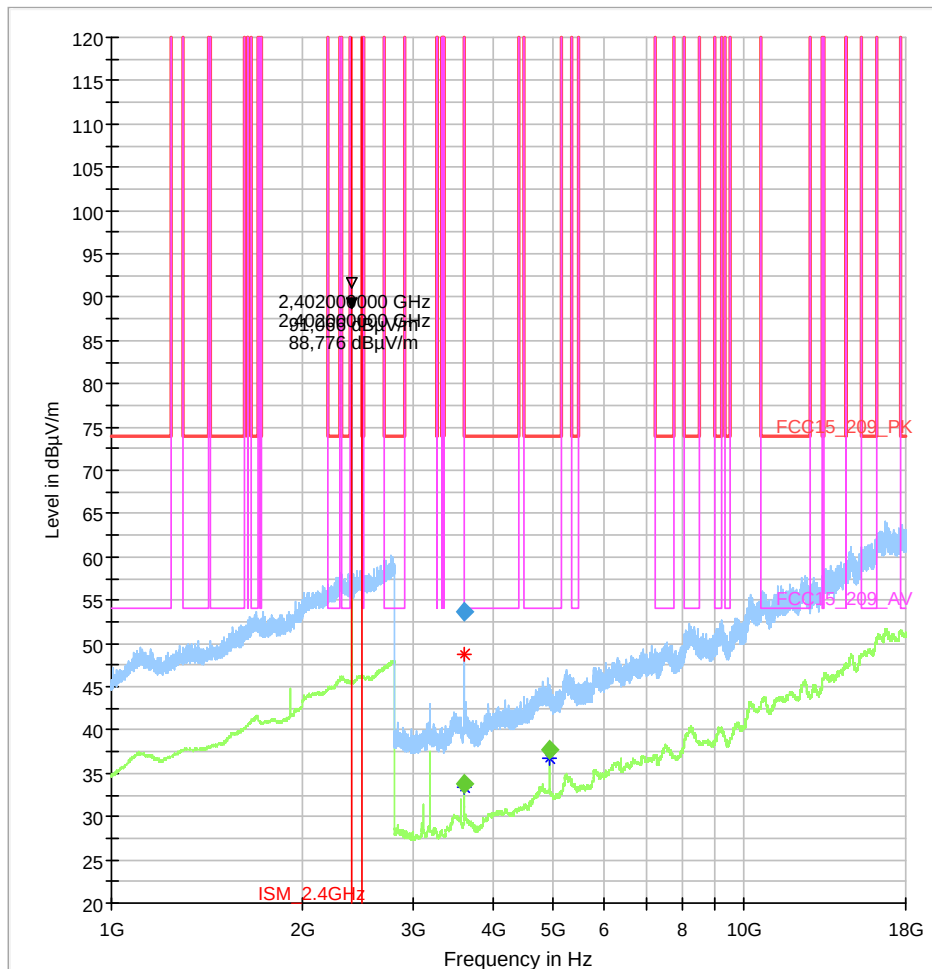
Common Information

Test Description:	Radiated field strength emission in 3m distance
Test Site:	CETECOM GmbH Essen
Test Standard:	FCC 15.247&15.209 Intentional Radiator
Antenna polarisation:	horizontal/vertical
Operation mode:	TX, continuous
Operator Name:	MFr
Comment:	Channel no.00 _DH5

EUT Information

Manufacturer:	Bosch
EuT:	LCN2K70C10
HW Version:	051
SW Version:	F005
Serial Number:	3202718
Connected Interfaces:	-
Power Supply:	via external power supply, nomVolt: 13.50 VDC
Comments:	

Full Spectrum



Final_Result

Frequency (MHz)	MaxPeak (dBµV/m)	RMS (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Measurement Time	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Elevation (deg)
3612.540000	53.69	---	74.00	20.31	100.0	1000.000	155.0	H	144.0	0.0
3614.340000	---	33.72	54.00	20.28	100.0	1000.000	155.0	H	150.0	0.0
4920.980000	---	37.71	54.00	16.29	100.0	1000.000	155.0	V	224.0	0.0

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

Frequency (MHz)	Correction	Comment
3612.540000	0.5	17:50:23 - 21.04.2015
3614.340000	0.5	17:51:41 - 21.04.2015
4920.980000	4.5	17:53:15 - 21.04.2015

1.3.2. $\pi/4$ DQPSK modulation

Diagram No.: 4.02_TX_ch39_2-DH5

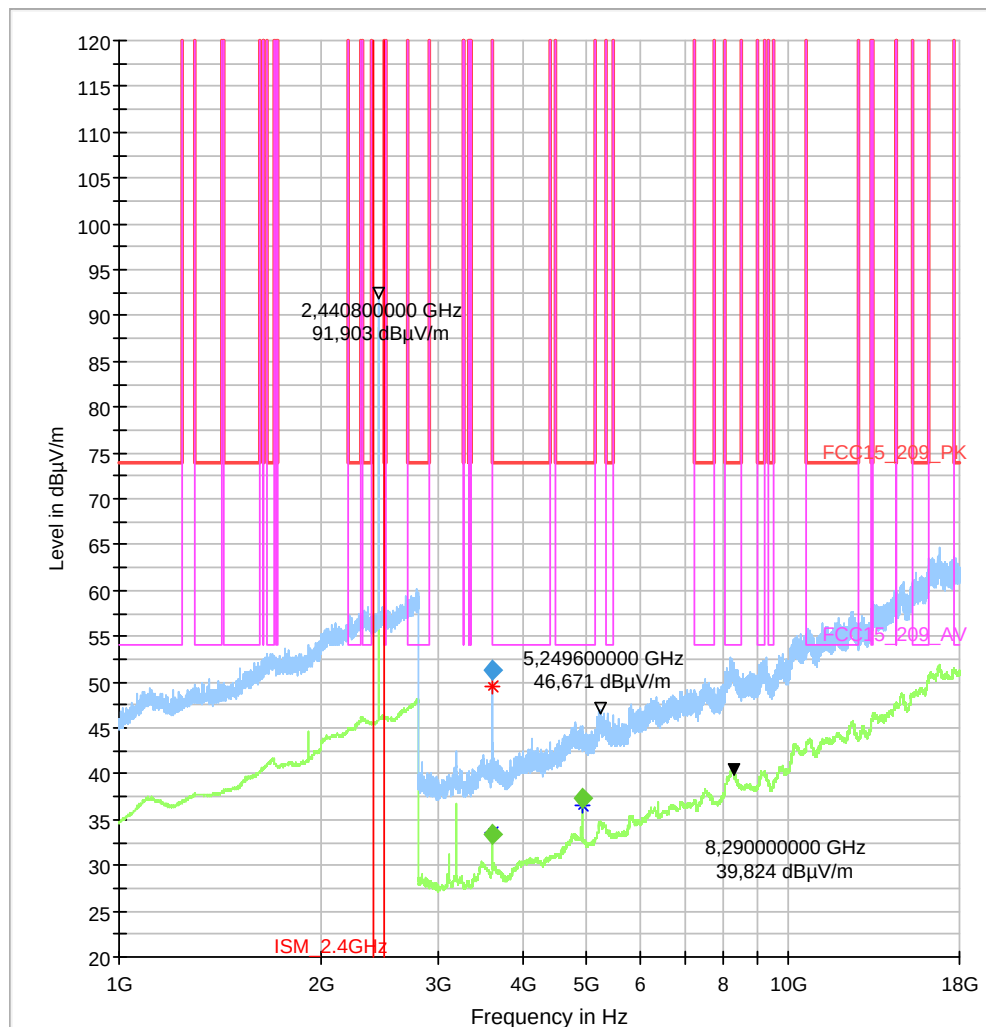
Common Information

Test Description:	Radiated field strength emission in 3m distance
Test Site:	CETECOM GmbH Essen
Test Standard:	FCC 15.247&15.209 Intentional Radiator
Antenna polarisation:	horizontal/vertical
Operation mode:	TX, continuous
Operator Name:	MFr/HLa
Comment:	Channel no.39_2-DH5

EUT Information

Manufacturer:	Bosch
EuT:	LCN2K70C10
HW Version:	051
SW Version:	F005
Serial Number:	3202718
Connected Interfaces:	-
Power Supply:	via external power supply, nomVolt: 13.50 VDC
Comments:	

Full Spectrum



Final Result

Frequency (MHz)	MaxPeak (dB μ V/m)	RMS (dB μ V/m)	Limit (dB μ V/m)	Margi n (dB)	Meas . Time	Bandwidht h (kHz)	Heigh t (cm)	Po l	Azimut h (deg)	Elevatio n (deg)	Corr . (dB)
3612.540000	51.31	---	74.00	22.69	100.0	1000.000	155.0	V	135.0	0.0	0.5
3614.340000	---	33.31	54.00	20.69	100.0	1000.000	155.0	V	140.0	0.0	0.5
4920.980000	---	37.31	54.00	16.69	100.0	1000.000	155.0	V	224.0	0.0	4.5

1.3.3. 8DPSK modulation

Diagram No.: 4.03_TX_ch78_3-DH5

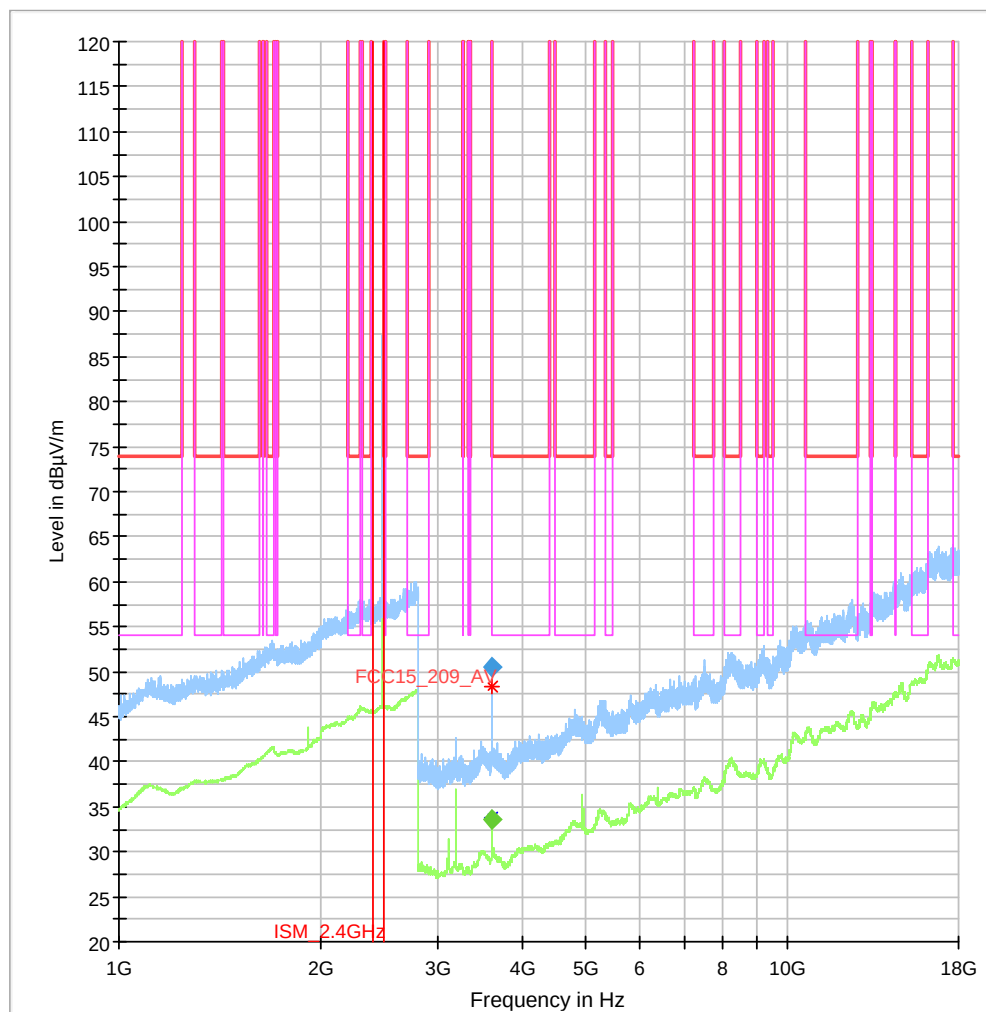
Common Information

Test Description:	Radiated field strength emission in 3m distance
Test Site:	CETECOM GmbH Essen
Test Standard:	FCC 15.247&15.209 Intentional Radiator
Antenna polarisation:	horizontal/vertical
Operation mode:	TX, continuous
Operator Name:	MFr/HLa
Comment:	Channel no.78_3-DH5

EUT Information

Manufacturer:	Bosch
EuT:	LCN2K70C10
HW Version:	051
SW Version:	F005
Serial Number:	3202718
Connected Interfaces:	-
Power Supply:	via external power supply, nomVolt: 13.50 VDC
Comments:	

Full Spectrum



Final_Result

Frequency (MHz)	MaxPeak (dB μ V/m)	RMS (dB μ V/m)	Limit (dB μ V/m)	Margi n (dB)	Meas . Time	Bandwidht h (kHz)	Heigh t (cm)	Po l	Azimut h (deg)	Elevatio n (deg)
3612.100000	50.58	---	74.00	23.42	100.0	1000.000	155.0	V	180.0	0.0
3614.860000	---	33.55	54.00	20.45	100.0	1000.000	155.0	H	148.0	0.0

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

Frequency (MHz)	Corr .	Comment
3612.100000	0.5	21:36:11 - 21.04.2015
3614.860000	0.5	21:37:45 - 21.04.2015

Diagram No.: 4.04_TX_ch0_DH5

Common Information

Test Description:	Radiated field strength emission in 1m distance
Test Site:	CETECOM GmbH Essen
Test Standard:	FCC 15.247, 15.205&15.209 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:	TX mode continuous
Operator Name:	MFr
Comment:	Channel 0. DH5

EUT Information

Manufacturer:	Bosch
EuT:	LCN2K70C10
-----	-----
HW Version:	051
SW Version:	F005
Serial Number:	3202718
Connected Interfaces:	-
Power Supply:	via external power supply, nomVolt: 13.50 VDC
Comments:	

FCC_Sweep_15.407_18_40GHz_Pre

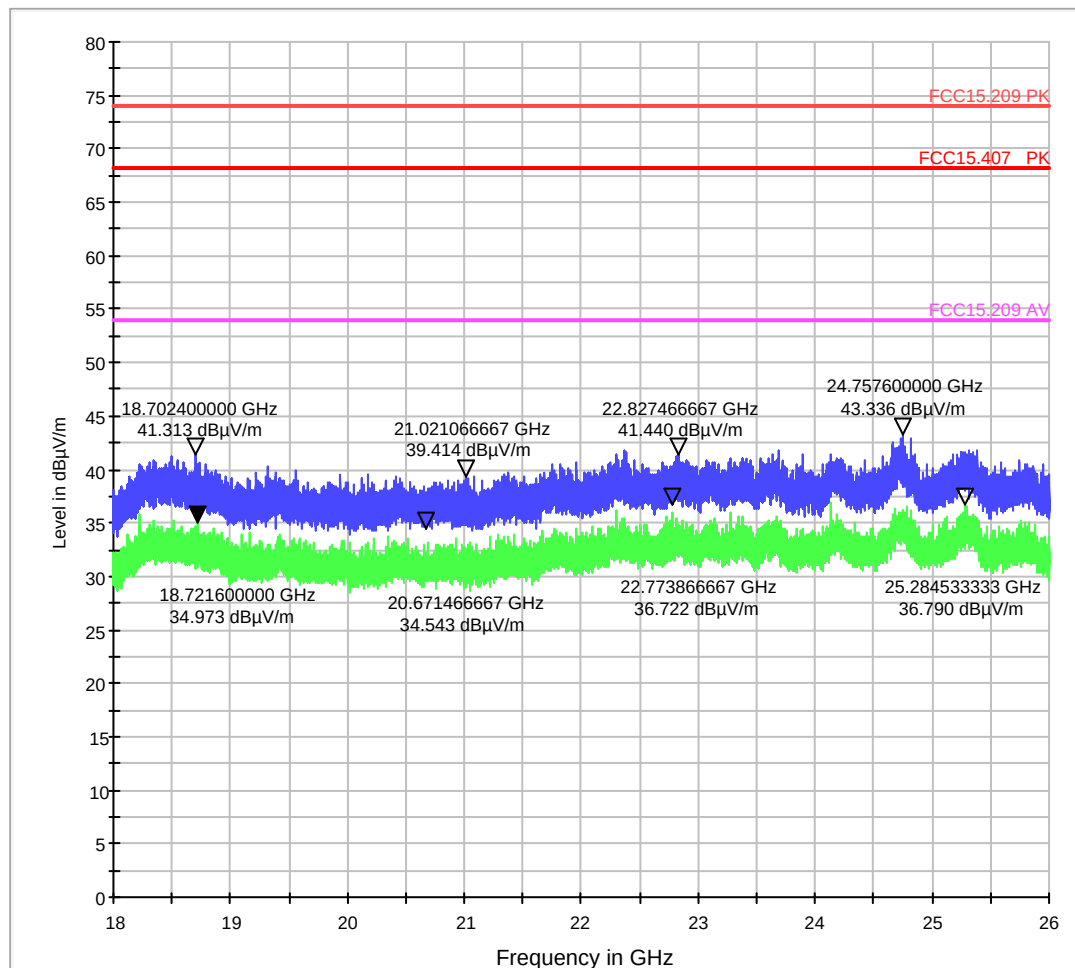


Diagram No.:4.05_TX_ch39_2-DH5.Pdf

Common Information

Test Description:	Radiated field strength emission in 1m distance
Test Site:	CETECOM GmbH Essen
Test Standard:	FCC 15.247, 15.205&15.209 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:	TX mode continuous
Operator Name:	MFr
Comment:	Channel 39 . 2DH5

EUT Information

Manufacturer:	Bosch
EUT:	LCN2K70C10
HW Version:	051
SW Version:	F005
Serial Number:	3202718
Connected Interfaces:	-
Power Supply:	via external power supply, nomVolt: 13.50 VDC
Comments:	

FCC_Sweep_15.407_18_40GHz_Pre

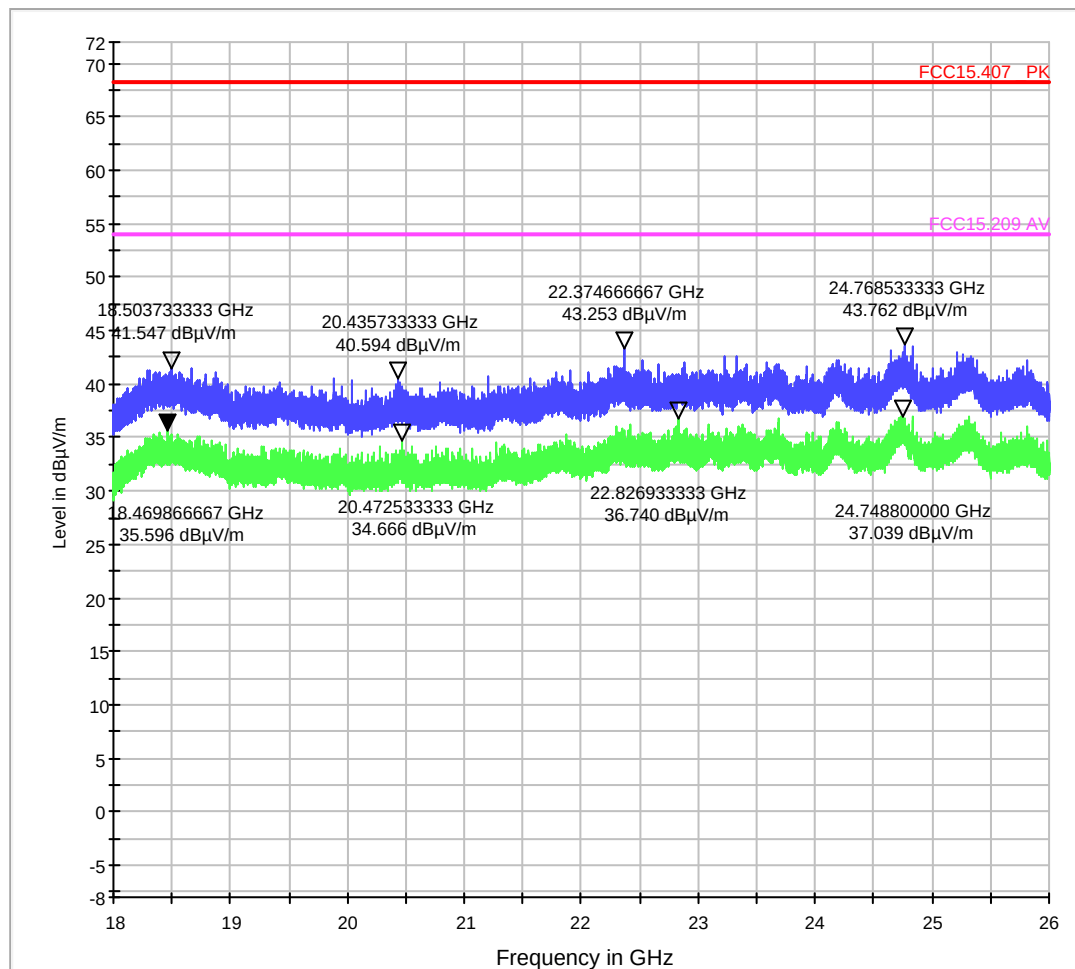


Diagram No.: 4.06_TX_ch78_3-DH5

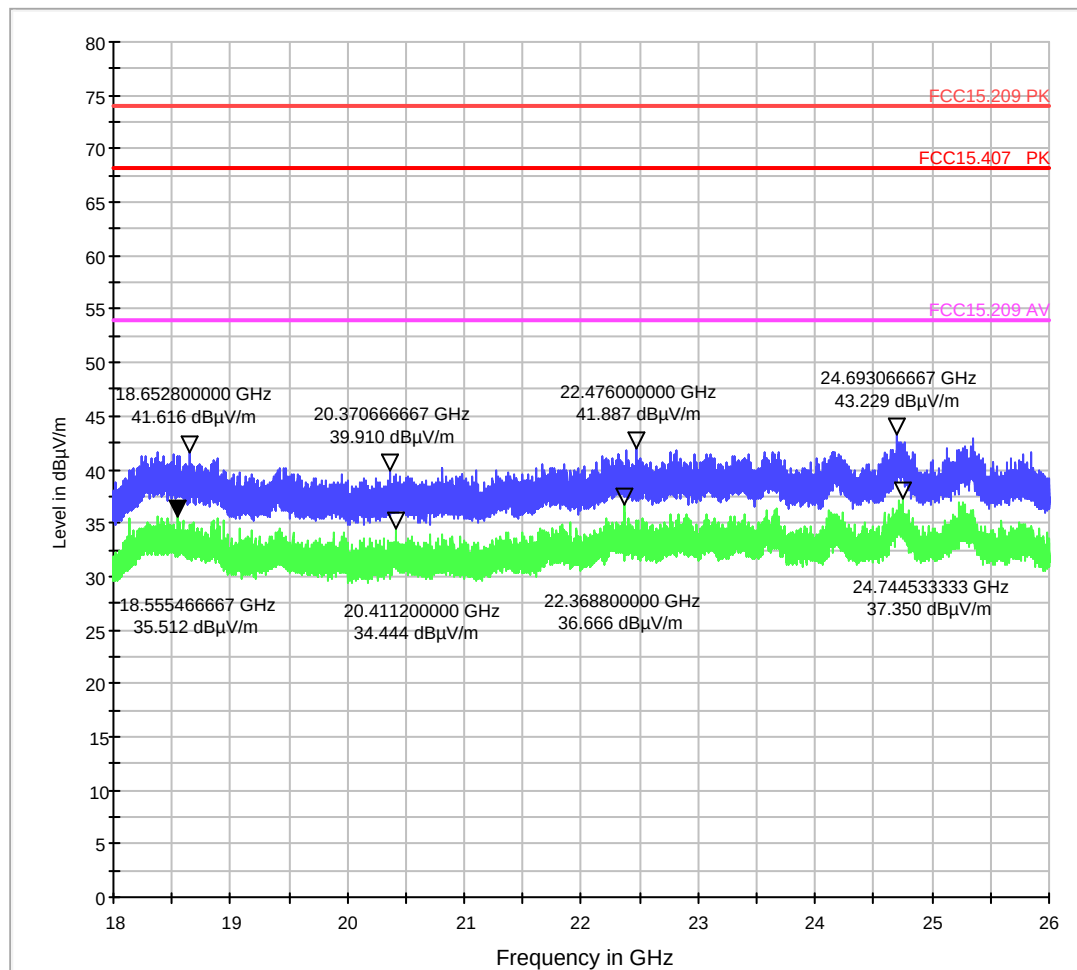
Common Information

Test Description:	Radiated field strength emission in 1m distance
Test Site:	CETECOM GmbH Essen
Test Standard:	FCC 15.247, 15.205&15.209 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:	TX mode continuous
Operator Name:	MFr
Comment:	Channel 78. 3-DH5

EUT Information

Manufacturer:	Bosch
EuT:	LCN2K70C10
-----	-----
HW Version:	051
SW Version:	F005
Serial Number:	3202718
Connected Interfaces:	-
Power Supply:	via external power supply, nomVolt: 13.50 VDC
Comments:	

FCC_Sweep_15.407_18_40GHz_Pre



2. Radiated band-edge measurements accord. §15.209 & §15.205 (§15.247)

2.1. Channel 0 (left band edge)

Diagram No.: 9.01_BE_low_ch0_DH5

Common Information

Test Description:	Radiated Band-Edge Emissions in 3m distance
Test Site:	CETECOM GmbH Essen
Test Standard:	FCC 15.205&15.209 Intentional Radiator
Antenna polarisation:	horizontal/vertical
Operation mode:	TX, continuous
Operator Name:	Lor
Comment:	Channel no. low/high

EUT Information

Manufacturer:	Bosch
EuT:	LCN2K70C10
HW Version:	051
SW Version:	F005
Serial Number:	3202718
Connected Interfaces:	-
Power Supply:	via external power supply, nomVolt: 13.50 VDC
Comments:	

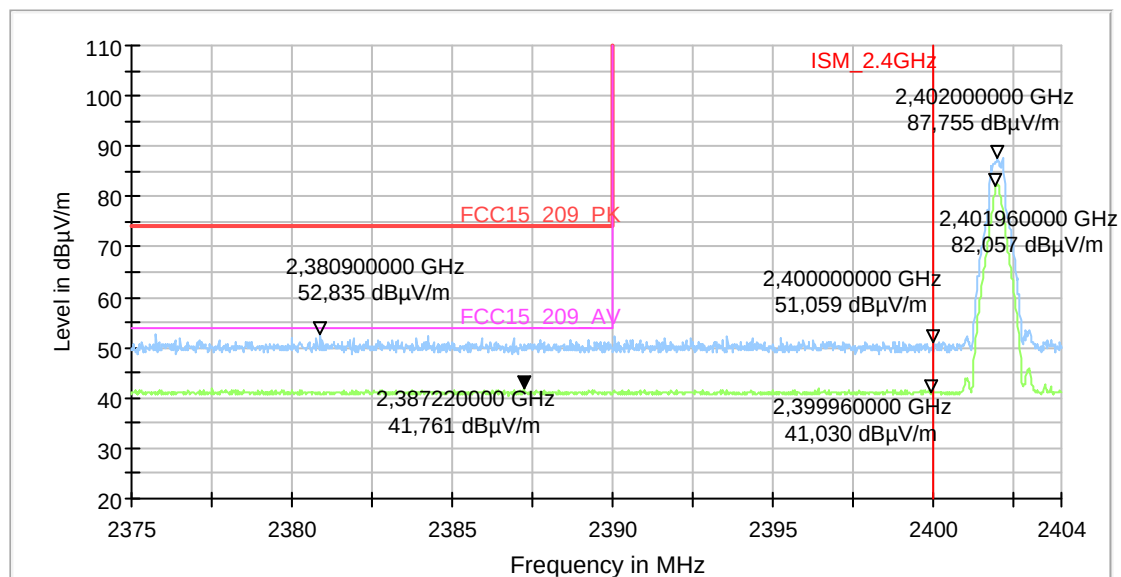


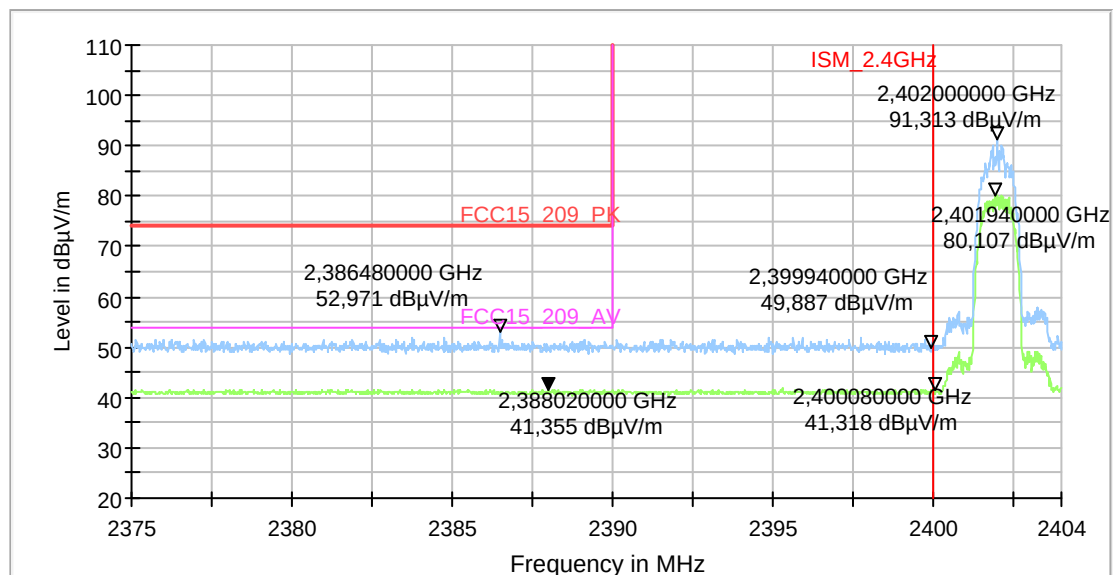
Diagram No.: 9.03_BE_low_ch0_3-DH5

Common Information

Test Description:	Radiated Band-Edge Emissions in 3m distance
Test Site:	CETECOM GmbH Essen
Test Standard:	FCC 15.205&15.209 Intentional Radiator
Antenna polarisation:	horizontal/vertical
Operation mode:	TX, continuous
Operator Name:	MFr/HLa
Comment:	Channel no.00_3DH5

EUT Information

Manufacturer:	Bosch
EuT:	LCN2K70C10
HW Version:	051
SW Version:	F005
Serial Number:	3202718
Connected Interfaces:	-
Power Supply:	via external power supply, nomVolt: 13.50 VDC
Comments:	



2.2. Channel 78 (right band edge)

Diagram No.: 9.02_BE_high_ch78_3-DH5

Common Information

Test Description:	Radiated Band-Edge Emissions in 3m distance
Test Site:	CETECOM GmbH Essen
Test Standard:	FCC 15.205&15.209 Intentional Radiator
Antenna polarisation:	horizontal/vertical
Operation mode:	TX, continuous
Operator Name:	HLa
Comment:	Channel no.78_3-DH5

EUT Information

Manufacturer:	Bosch
EuT:	LCN2K70C10
HW Version:	051
SW Version:	F005
Serial Number:	3202718
Connected Interfaces:	-
Power Supply:	via external power supply, nomVolt: 13.50 VDC
Comments:	

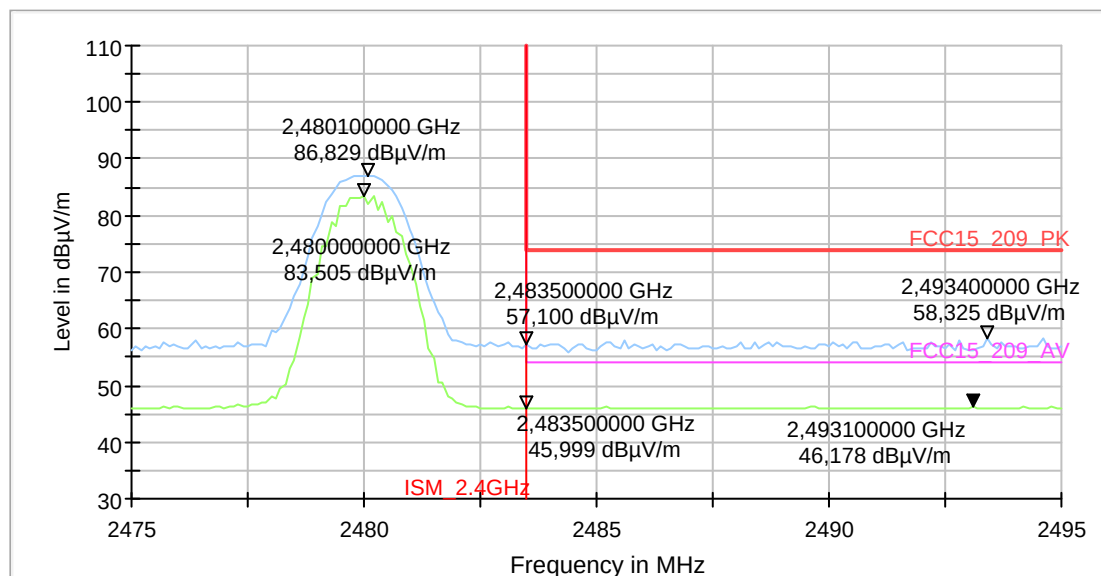
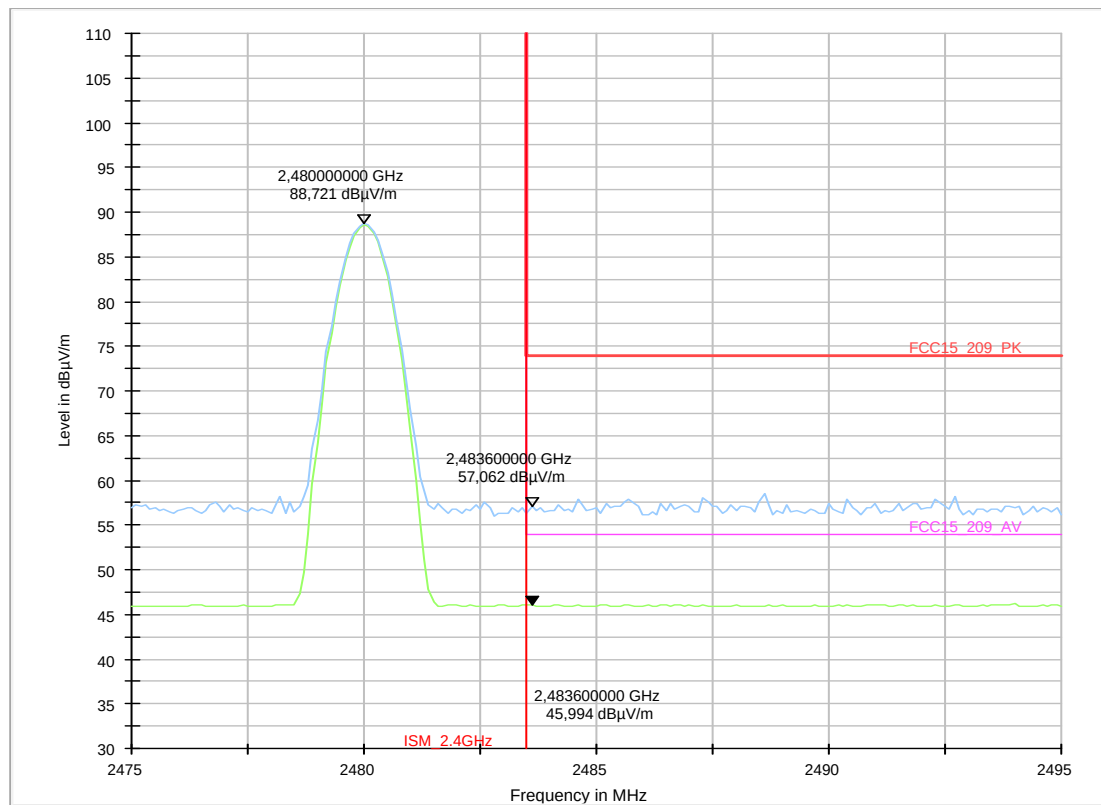


Diagram No.: 9.04_BE_high_ch78_DH5**Common Information**

Test Description:	Radiated Band-Edge Emissions in 3m distance
Test Site:	CETECOM GmbH Essen
Test Standard:	FCC 15.205&15.209 Intentional Radiator
Antenna polarisation:	horizontal/vertical
Operation mode:	TX, continuous
Operator Name:	Lor
Comment:	Channel no.78 DH5

EUT Information

Manufacturer:	Bosch
EuT:	LCN2K70C10
-----	-----
HW Version:	051
SW Version:	F005
Serial Number:	3202718
Connected Interfaces:	-
Power Supply:	via external power supply, nomVolt: 13.50 VDC
Comments:	



3. MPE calculation

A minimum distance to the user of 20cm is assumed.

Following calculations show assumption with the limits with a duty-cycle of 60%. (3 active slots maximum of a maximum of 5 slots)

Operation Mode	Frequency on channel (MHz)	Declared maximum conducted output power (dBm)	Antenna Gain Max. (dBi)	Max. positive tolerance according manufacturer (dB)	Declared maximum output power (Measured+ Tune-up) (dBm)	Duty cycle	Declared Maximum conducted output power (W)	Equivalent conducted output power (maximum conducted output power x duty cycle) (mW)
BT 2.4GHz	2402,0	1,83	1,50	0,00	3,33	60%	0,002	1,29
	2441,0	1,33	1,50		2,83		0,002	1,15
	2480,0	0,24	1,50		1,74		0,001	0,90

Maximum calculated MPE value:		
MPE-Limit:	1	[mW/cm ²]
Highest MPE value:	0,0003	[mW/cm ²]
Margin to limit	0,9997	[mW/cm ²]

Note: the device is exempt from routine (RF exposure) evaluation because the eirp exemption limit for 2480MHz is 33.7dBm (see 2.5.2 of RSS-102 i5) which is way above the eirp of the BT transmitter under consideration