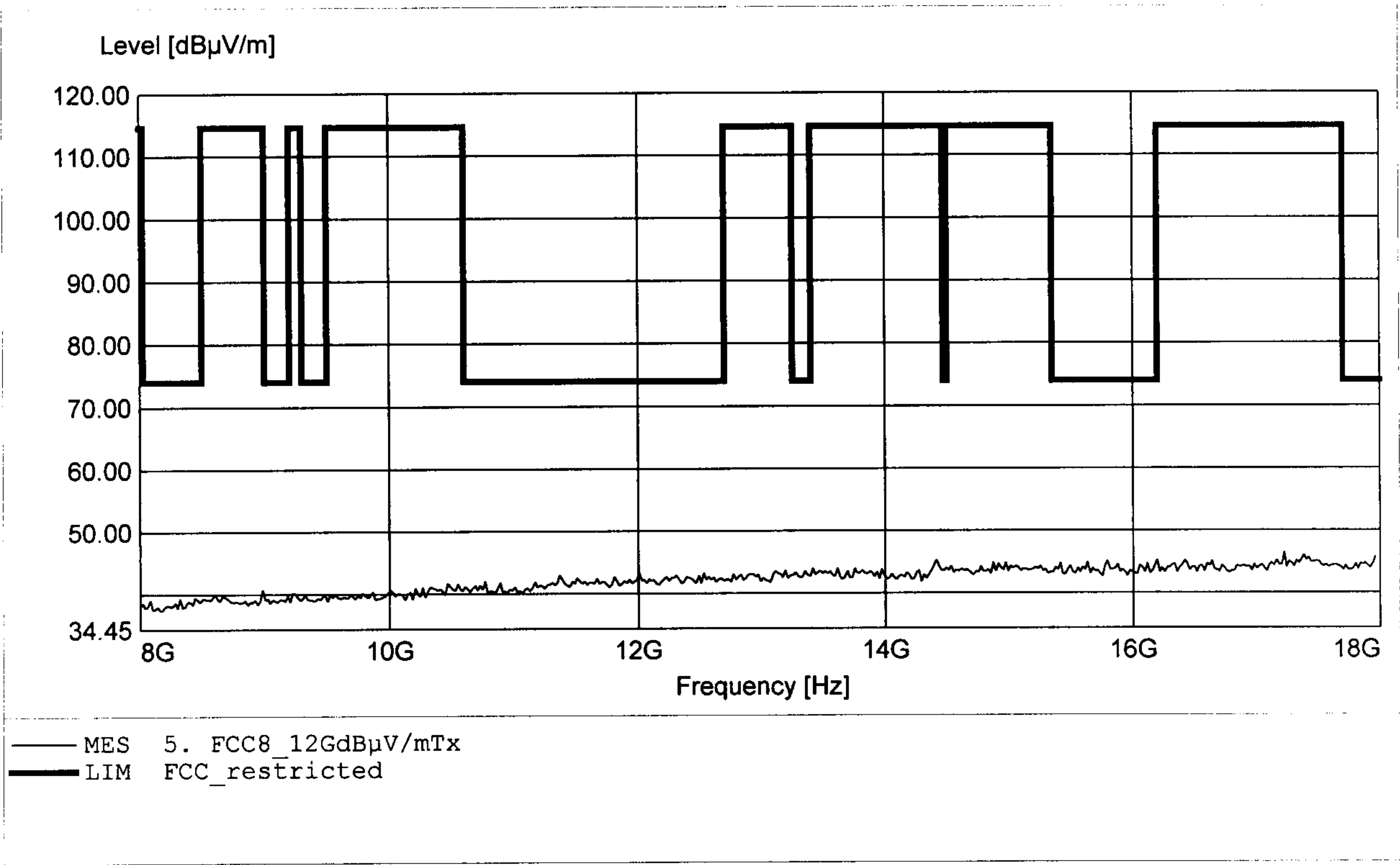


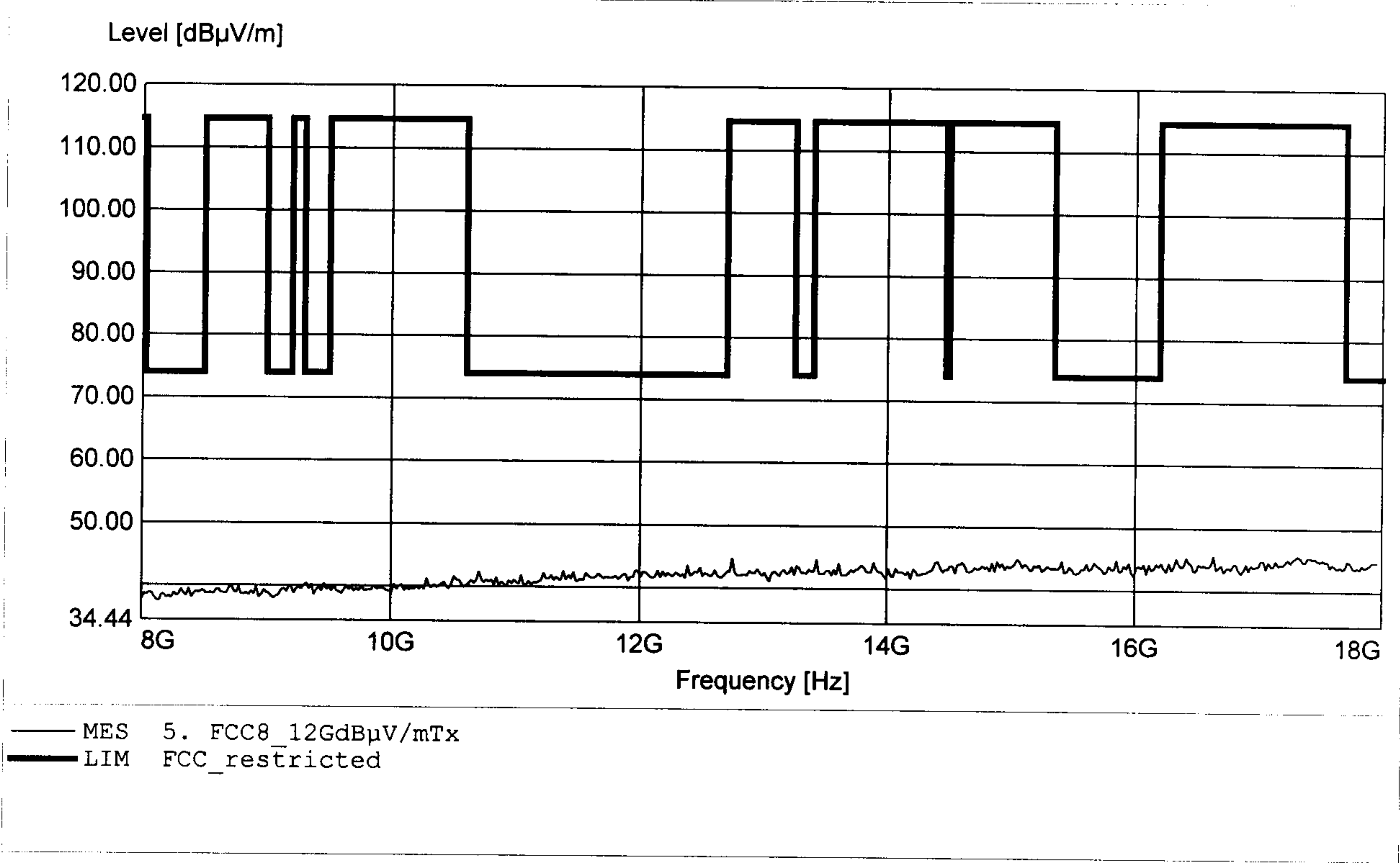
Spurious emissions Field Strength Tx
FCC RULES PART 15, SUBPART C

EUT: M3 Ceotronics V1.1 DECT@ISM Module 2.4 GHz
Model: HMO-1000178-1000215 / Ch:0 / Ant.:2
Applicant: CeoTronics AG
Temperature/ Voltage: 23°C / 3.6 V DC (rechargeable battery)
Test Site / Operator: ETS / Mr. Hoppe
Test Specification: according to § 15.247 Limit 20dB up peak detector
Comment 1: Dist.: 3m, Ant.: HL025, Ampl.:8-18GHz
Comment 2: Freq:17218,43MHz Emax:46,47dBµV/m RBW=100KHz



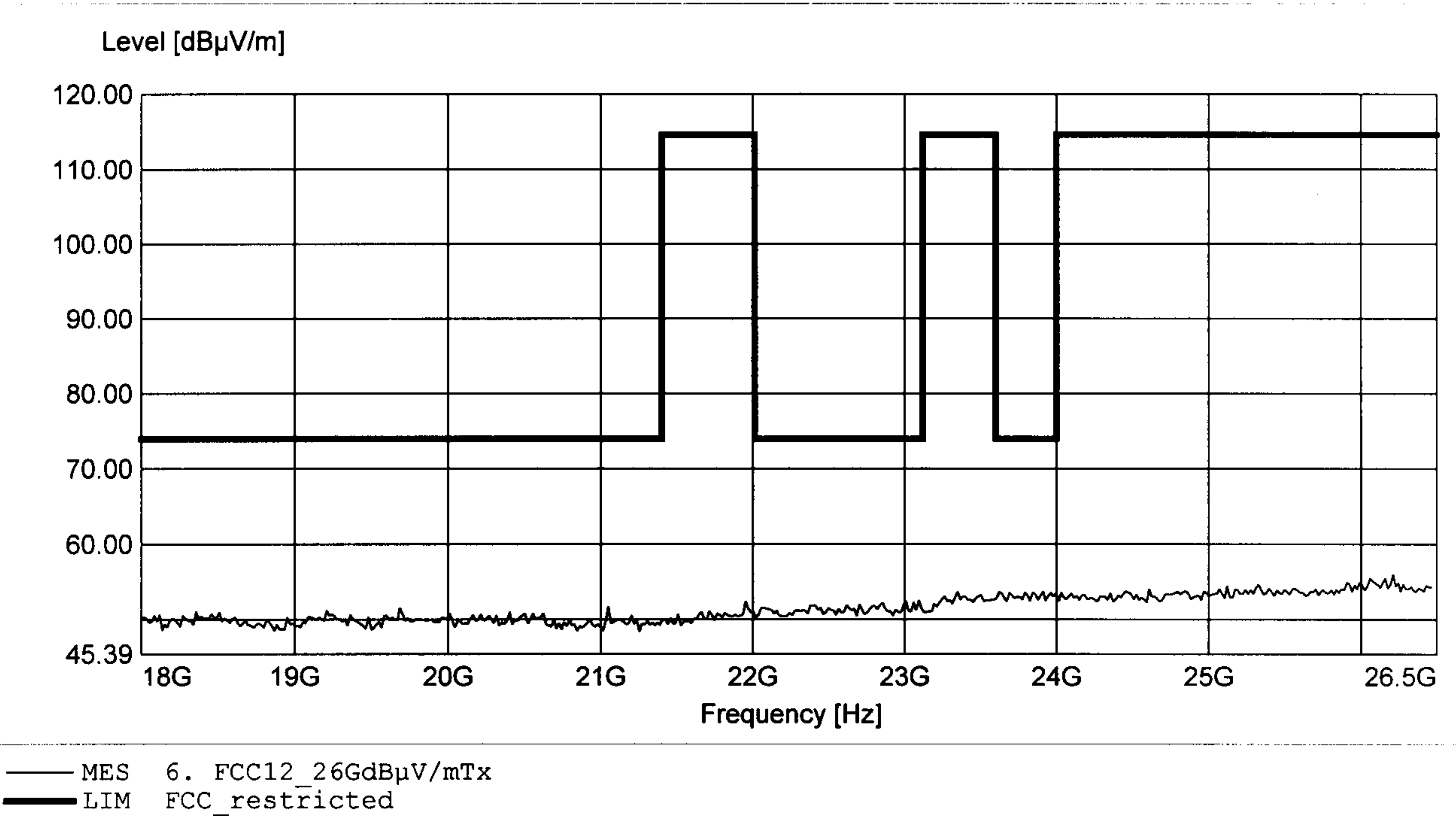
Spurious emissions Field Strength Tx
FCC RULES PART 15, SUBPART C

EUT: M3 Ceotronics V1.1 DECT@ISM Module 2.4 GHz
Model: HMO-1000178-1000215 / Ch:0 / Ant.:2
Applicant: CeoTronics AG
Temperature/ Voltage: 23°C / 3.6 V DC (rechargeable battery)
Test Site / Operator: ETS / Mr. Hoppe
Test Specification: according to § 15.247 Limit 20dB up peak detector
Comment 1: Dist.: 3m, Ant.: HL025, Ampl.:8-18GHz
Comment 2: Freq:16637,27MHz Emax:45,70dBµV/m RBW=100KHz



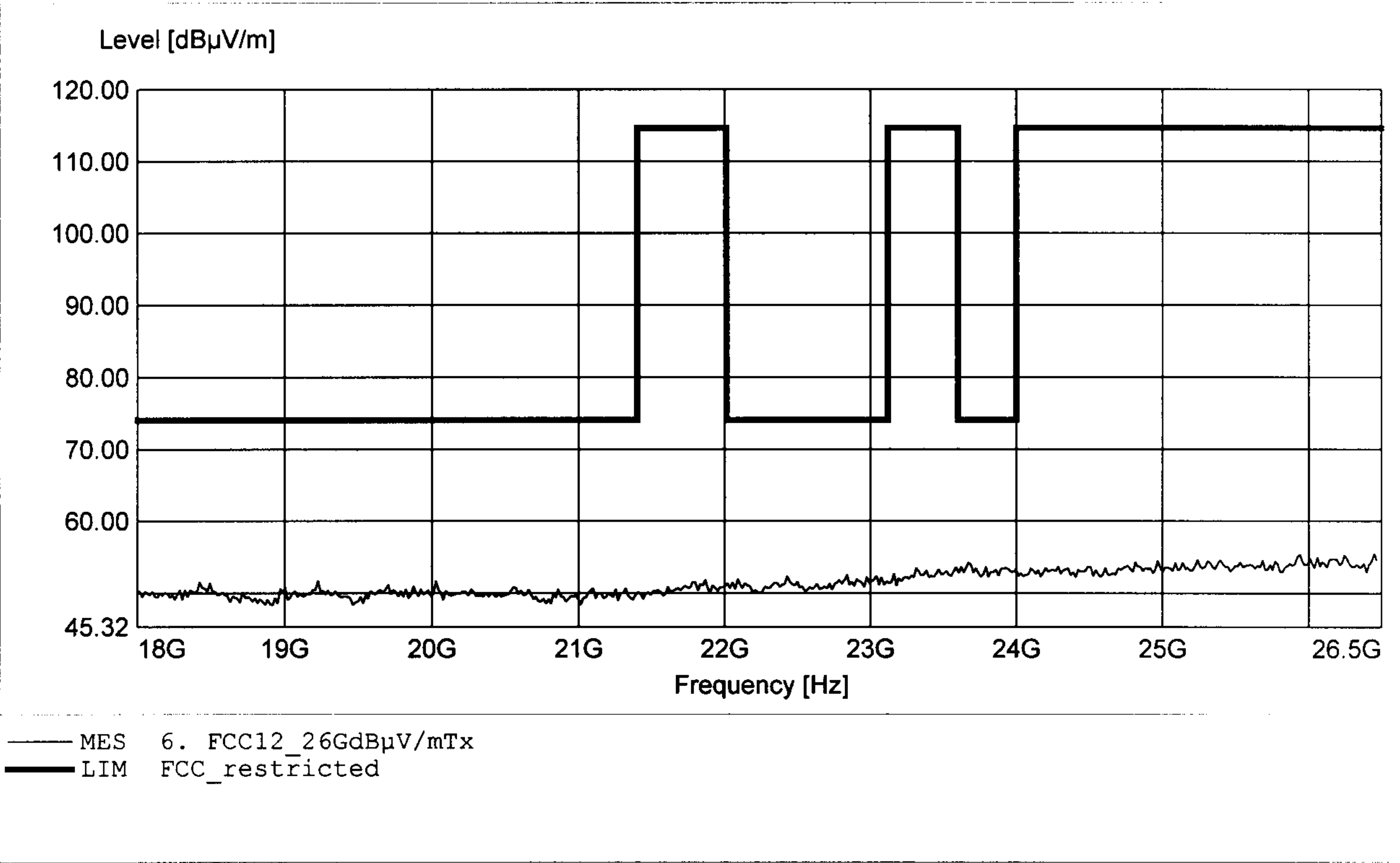
Spurious emissions Field Strength Tx
FCC RULES PART 15, SUBPART C

EUT: M3 Ceotronics V1.1 DECT@ISM Module 2.4 GHz
Model: HMO-1000178-1000215 / Ch:0 / Ant.:2
Applicant: CeoTronics AG
Temperature/ Voltage: 23°C / 3.6 V DC (rechargeable battery)
Test Site / Operator: ETS / Mr. Hoppe
Test Specification: according to § 15.247 Limit 20dB up peak detector
Comment 1: Dist.: 3m, Ant.: HL025, Ampl.:18-26GHz
Comment 2: Freq:26210,02MHz Emax:56,2dBµV/m RBW=100KHz



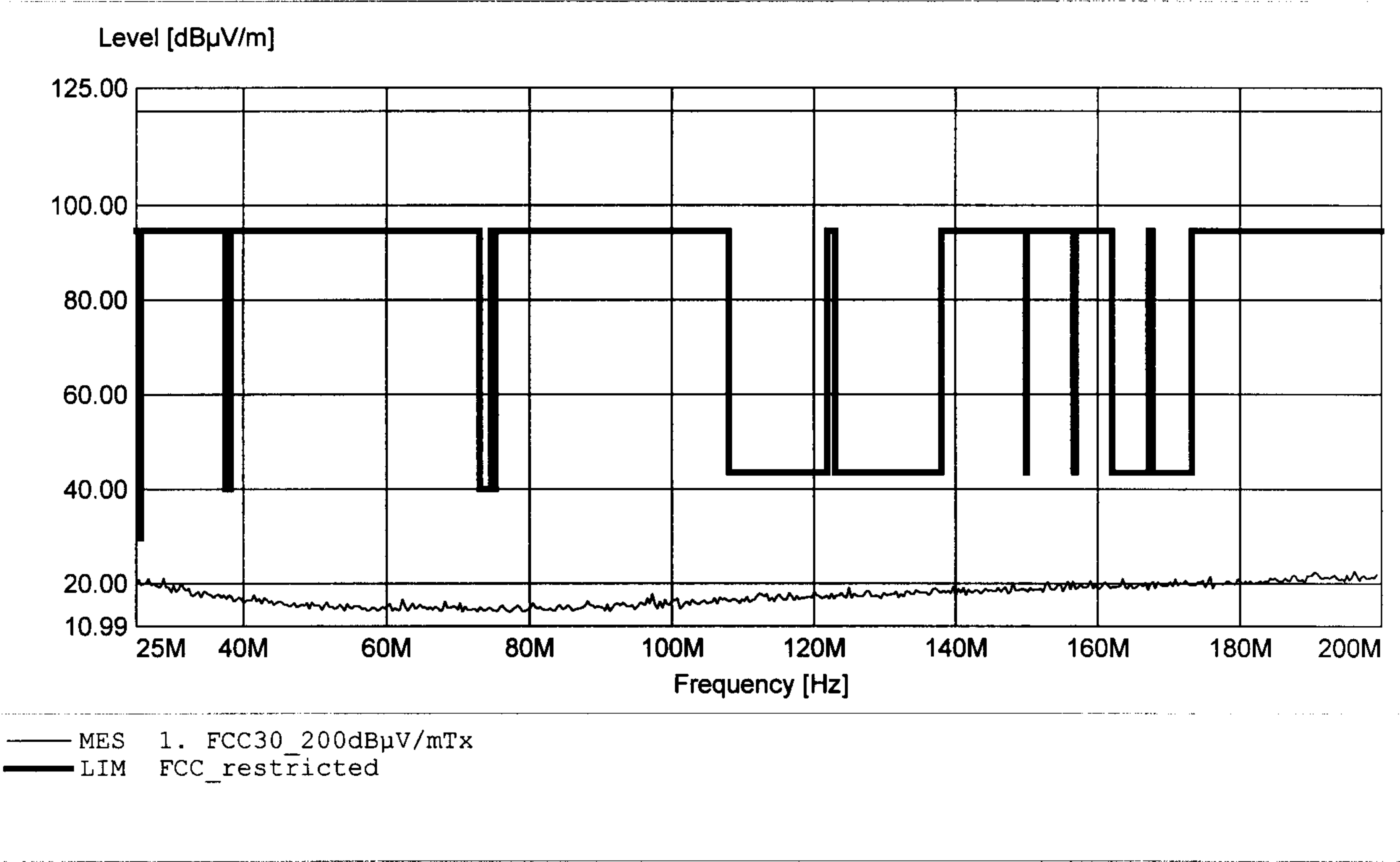
Spurious emissions Field Strength Tx
FCC RULES PART 15, SUBPART C

EUT: M3 Ceotronics V1.1 DECT@ISM Module 2.4 GHz
Model: HMO-1000178-1000215 / Ch:0 / Ant.:2
Applicant: CeoTronics AG
Temperature/ Voltage: 23°C / 3.6 V DC (rechargeable battery)
Test Site / Operator: ETS / Mr. Hoppe
Test Specification: according to § 15.247 Limit 20dB up peak detector
Comment 1: Dist.: 3m, Ant.: HL025, Ampl.:18-26GHz
Comment 2: Freq:26448,89MHz Emax:55,49dBµV/m RBW=100KHz



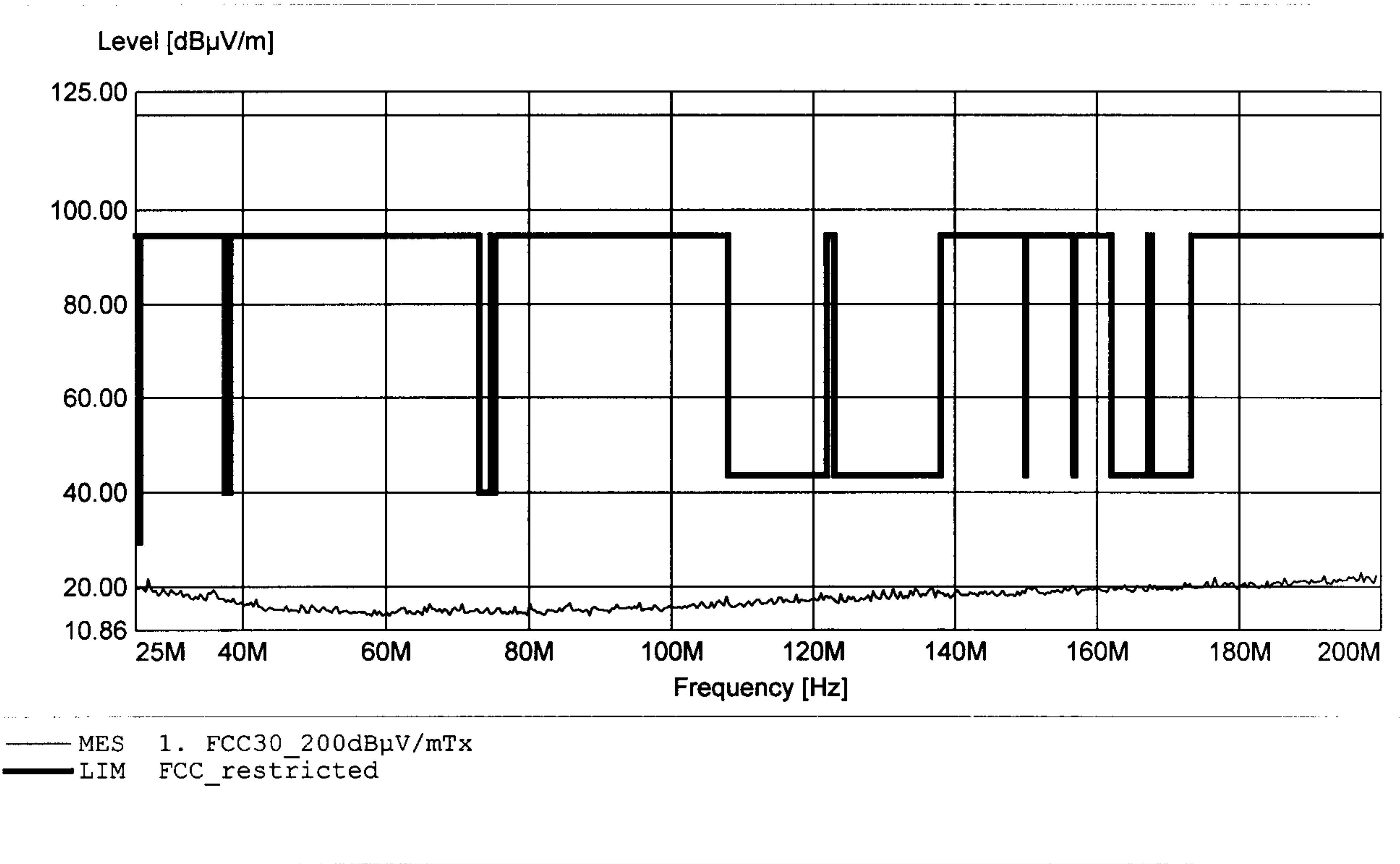
Spurious emissions Field Strength Tx
FCC RULES PART 15, SUBPART C

EUT: M3 Ceotronics V1.1 DECT@ISM Module 2.4 GHz
Model: HMO-1000178-1000215 / Ch:22 / Ant.:2
Applicant: CeoTronics AG
Temperature/ Voltage: 23°C / 3.6 V DC (rechargeable battery)
Test Site / Operator: ETS / Mr. Hoppe
Test Specification: according to § 15.247
Comment 1: Dist.: 3m, Ant.: HK116
Comment 2: Freq:196,14MHz Emax:22,79dBµV/m RBW=100KHz



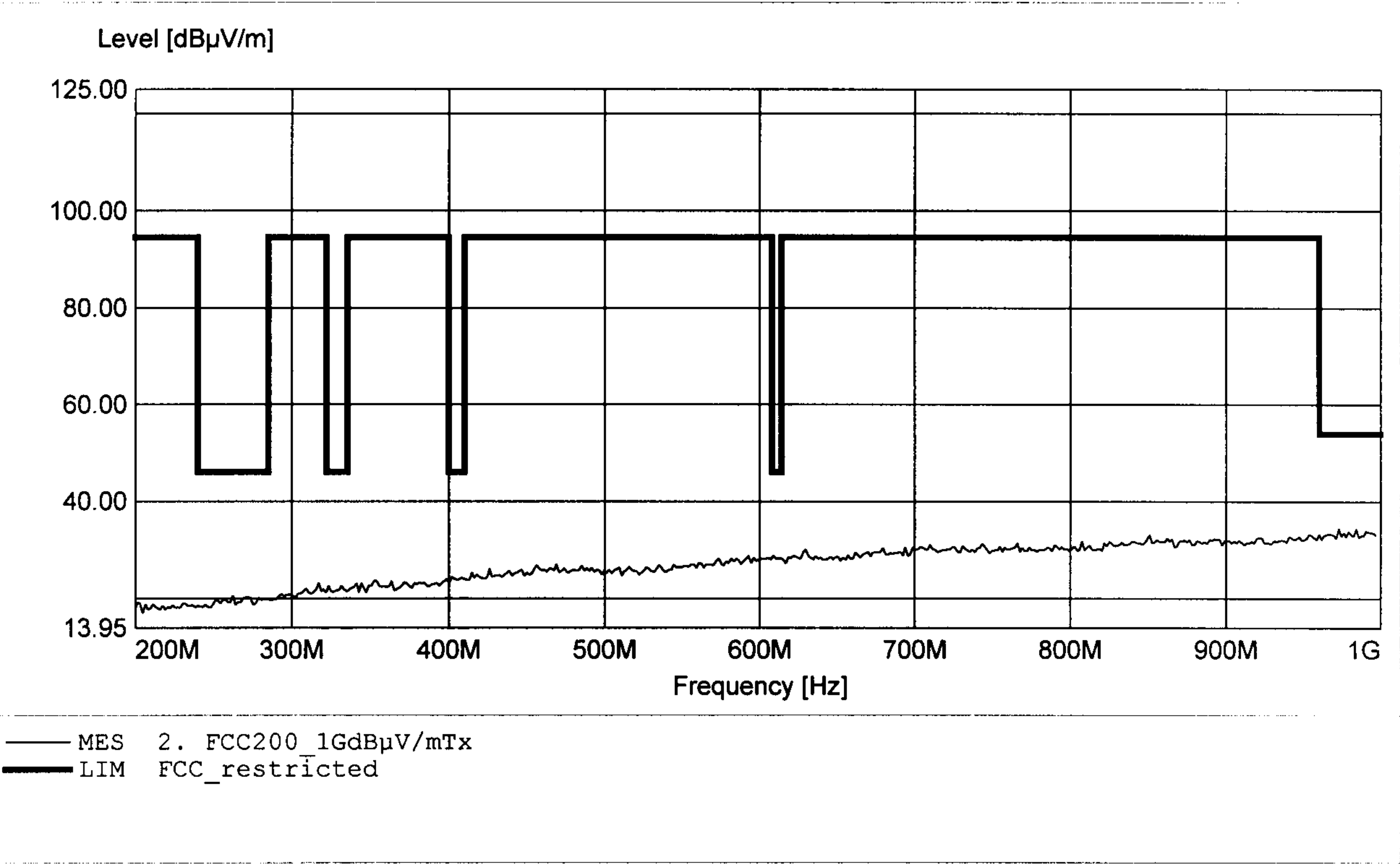
Spurious emissions Field Strength Tx
FCC RULES PART 15, SUBPART C

EUT: M3 Ceotronics V1.1 DECT@ISM Module 2.4 GHz
Model: HMO-1000178-1000215 / Ch:22 / Ant.:2
Applicant: CeoTronics AG
Temperature/ Voltage: 23°C / 3.6 V DC (rechargeable battery)
Test Site / Operator: ETS / Mr. Hoppe
Test Specification: according to § 15.247
Comment 1: Dist.: 3m, Ant.: HK116
Comment 2: Freq:197,19MHz Emax:23,10dBµV/m RBW=100KHz



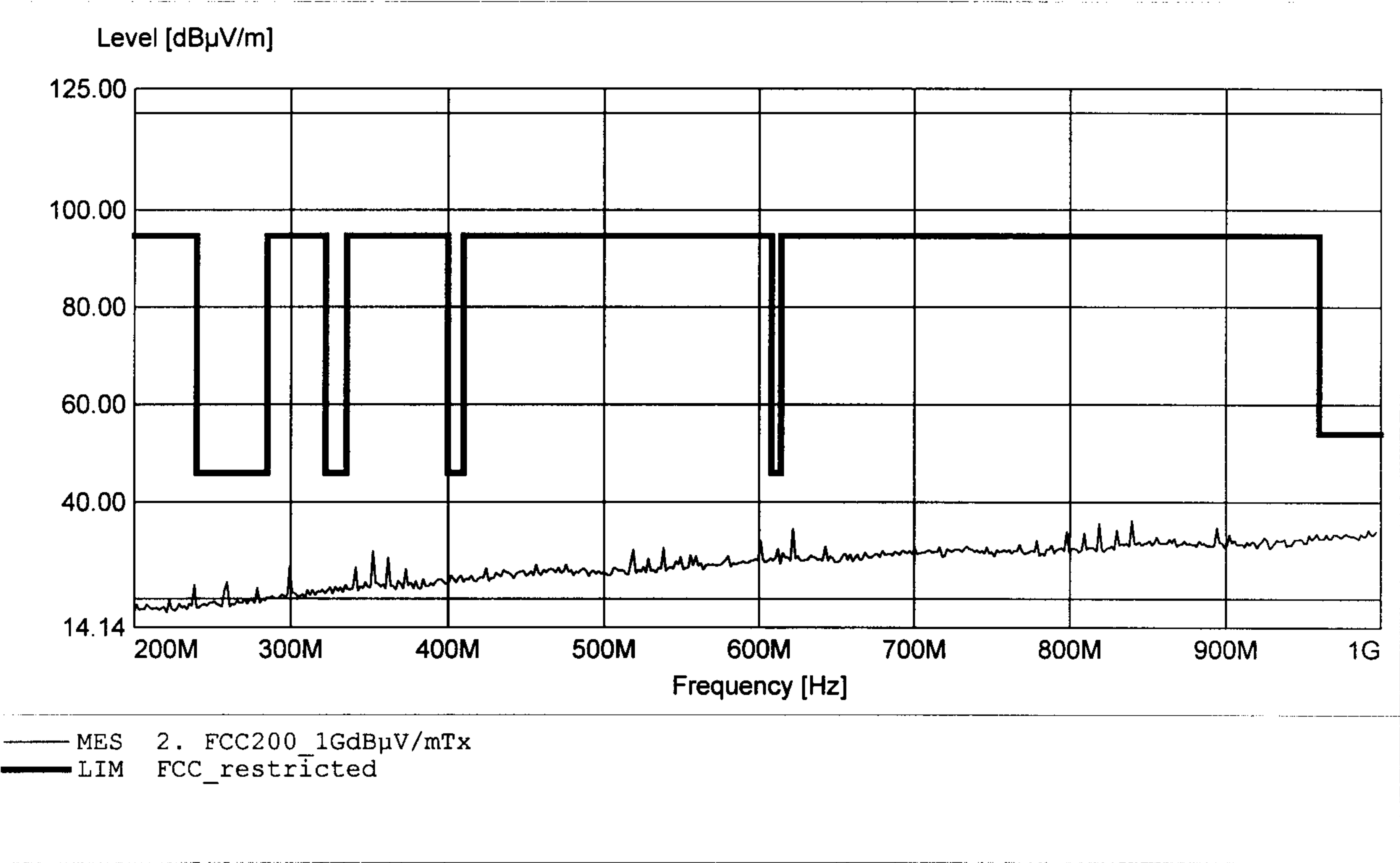
Spurious emissions Field Strength Tx
FCC RULES PART 15, SUBPART C

EUT: M3 Ceotronics V1.1 DECT@ISM Module 2.4 GHz
Model: HMO-1000178-1000215 / Ch:22 / Ant.:2
Applicant: CeoTronics AG
Temperature/ Voltage: 23°C / 3.6 V DC (rechargeable battery)
Test Site / Operator: ETS / Mr. Hoppe
Test Specification: according to § 15.247
Comment 1: Dist.: 3m, Ant.: HL223
Comment 2: Freq:839,67MHz Emax:36,31dBµV/m RBW=100KHz



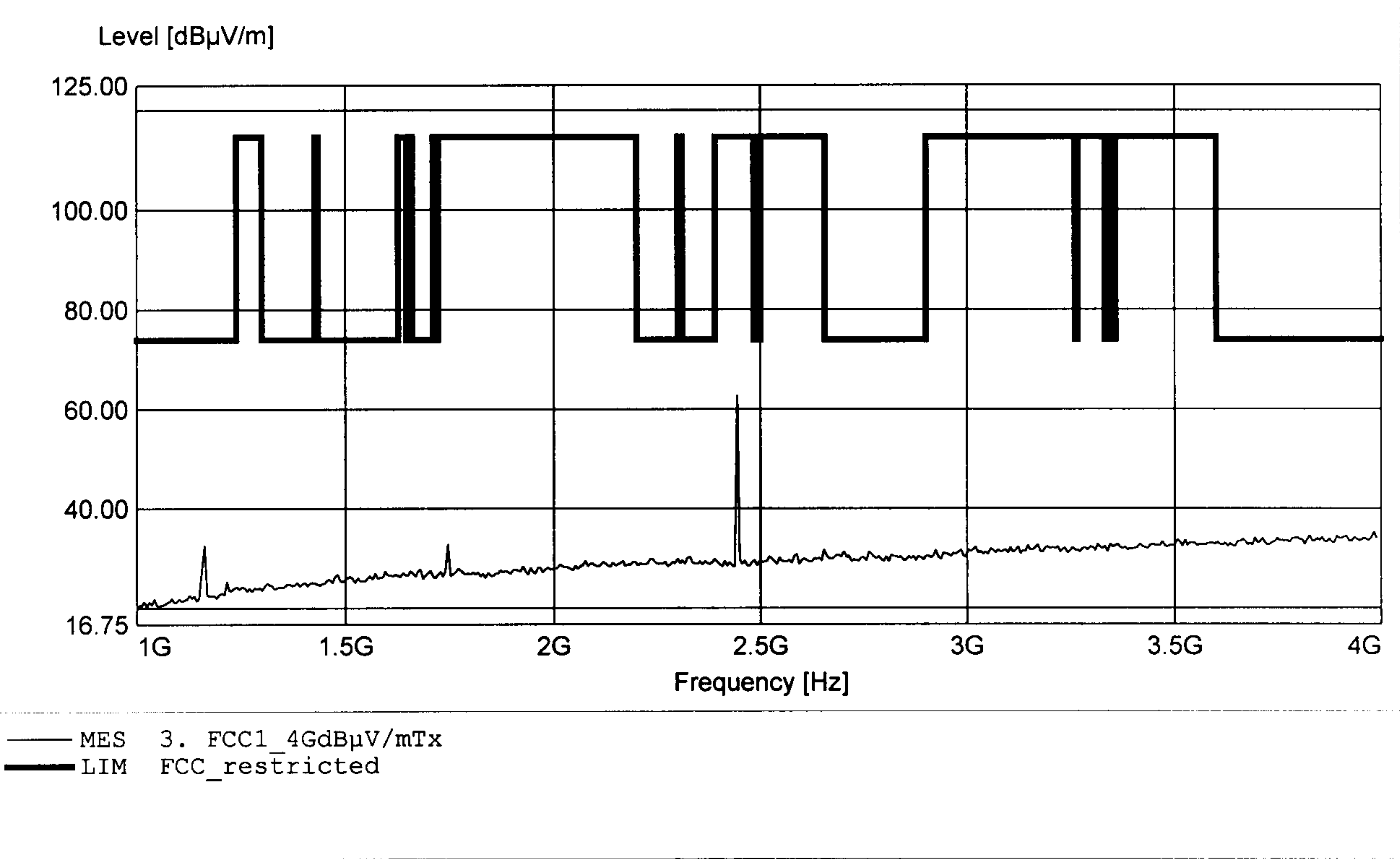
Spurious emissions Field Strength Tx
FCC RULES PART 15, SUBPART C

EUT: M3 Ceotronics V1.1 DECT@ISM Module 2.4 GHz
Model: HMO-1000178-1000215 / Ch:22 / Ant.:2
Applicant: CeoTronics AG
Temperature/ Voltage: 23°C / 3.6 V DC (rechargeable battery)
Test Site / Operator: ETS / Mr. Hoppe
Test Specification: according to § 15.247
Comment 1: Dist.: 3m, Ant.: HL223
Comment 2: Freq:839,67MHz Emax:36,31dBµV/m RBW=100KHz



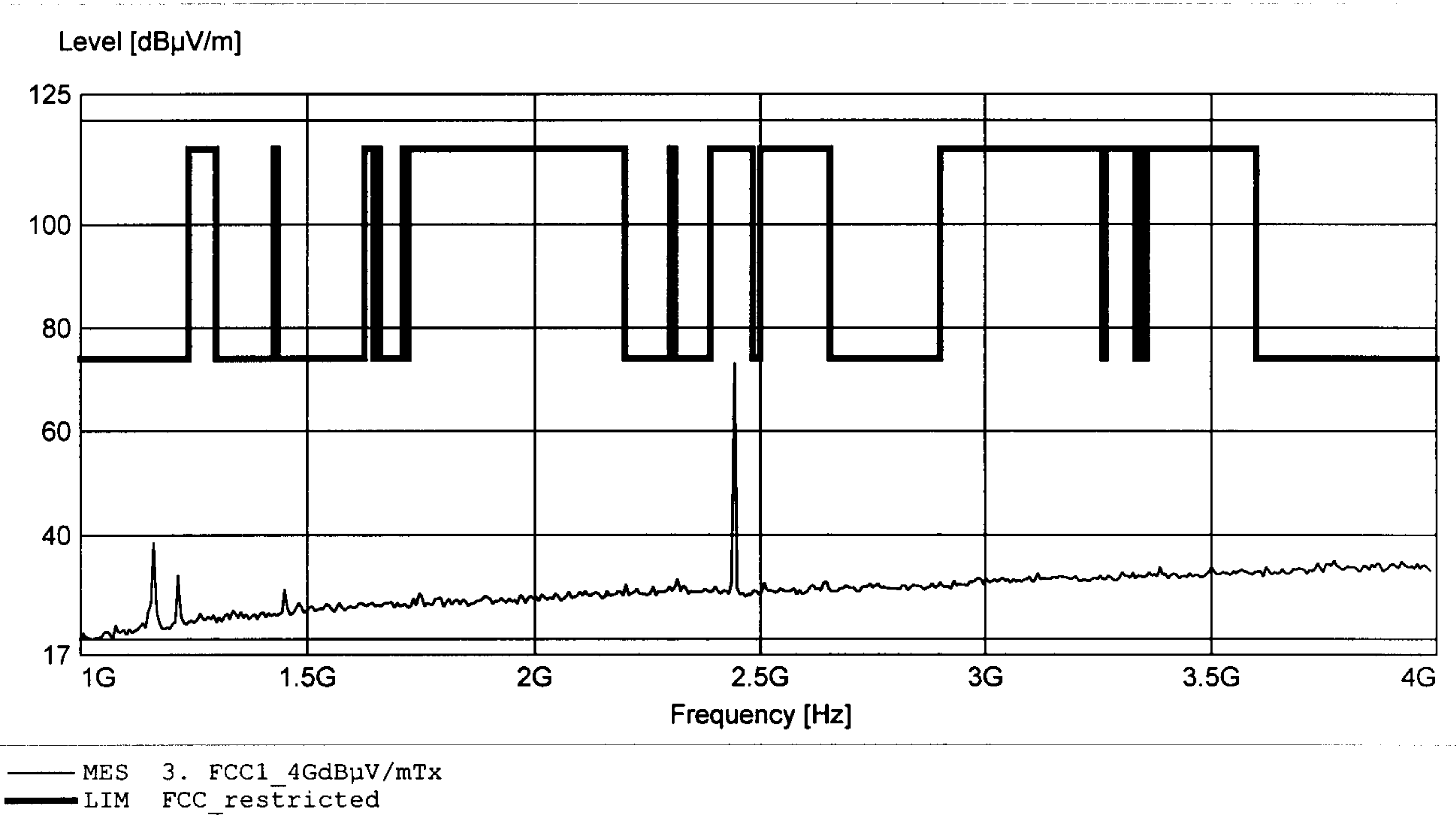
Spurious emissions Field Strength Tx
FCC RULES PART 15, SUBPART C

EUT: M3 Ceotronics V1.1 DECT@ISM Module 2.4 GHz
Model: HMO-1000178-1000215 / Ch:22 / Ant.:2
Applicant: CeoTronics AG
Temperature/ Voltage: 23°C / 3.6 V DC (rechargeable battery)
Test Site / Operator: ETS / Mr. Hoppe
Test Specification: according to § 15.247 Limit 20dB up peak detector
Comment 1: Dist.: 3m, Ant.: HL025, Notch-filter
Comment 2: Freq:2442,88MHz Emax:62,92dBµV/m RBW=100KHz



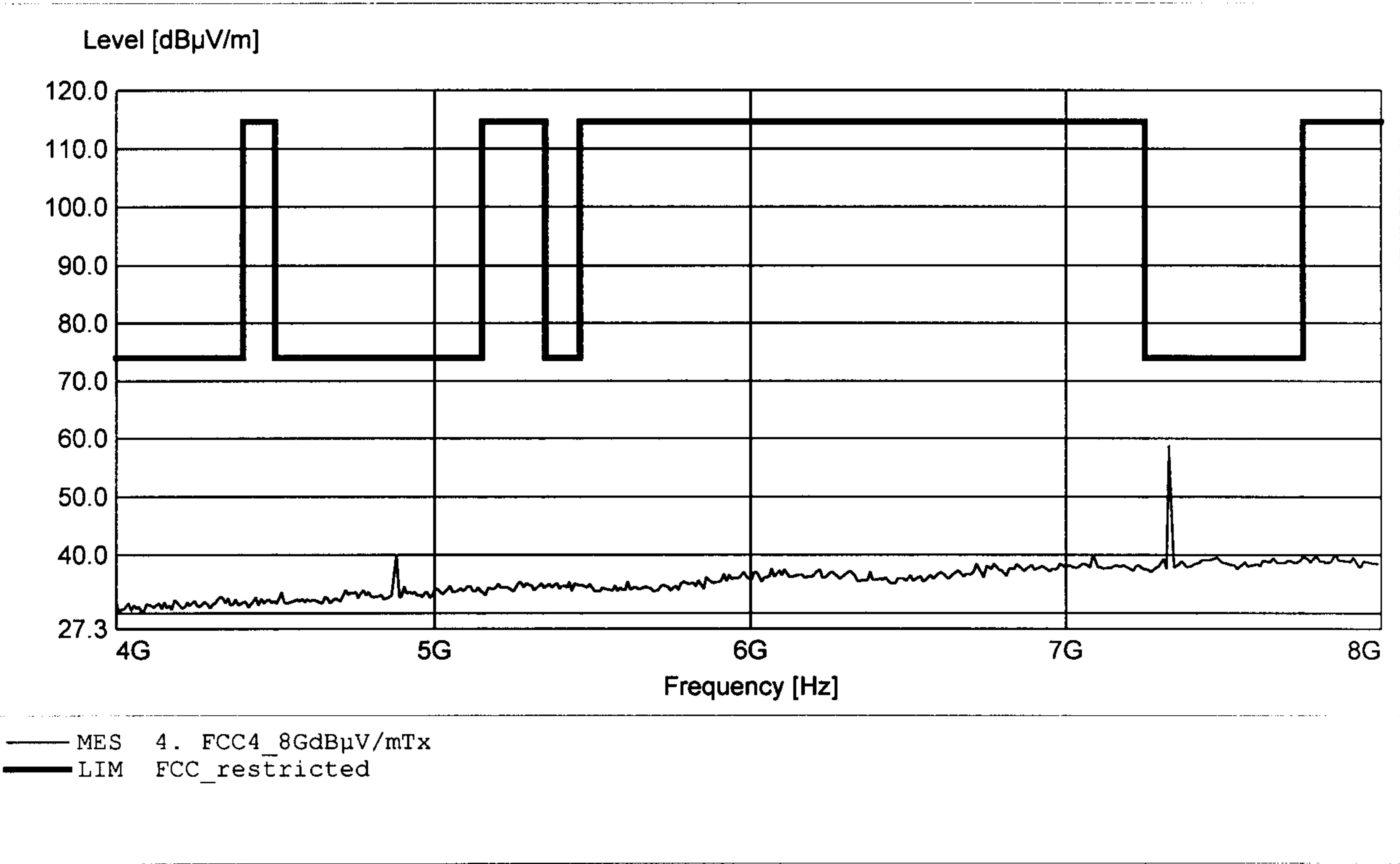
Spurious emissions Field Strength Tx
FCC RULES PART 15, SUBPART C

EUT: M3 Ceotronics V1.1 DECT@ISM Module 2.4 GHz
Model: HMO-1000178-1000215 / Ch:22 / Ant.:2
Applicant: CeoTronics AG
Temperature/ Voltage: 23°C / 3.6 V DC (rechargeable battery)
Test Site / Operator: ETS / Mr. Hoppe
Test Specification: according to § 15.247 Limit 20dB up peak detector
Comment 1: Dist.: 3m, Ant.: HL025, Notch-filter
Comment 2: Freq:2442,88MHz Emax:73,11dBµV/m RBW=100KHz



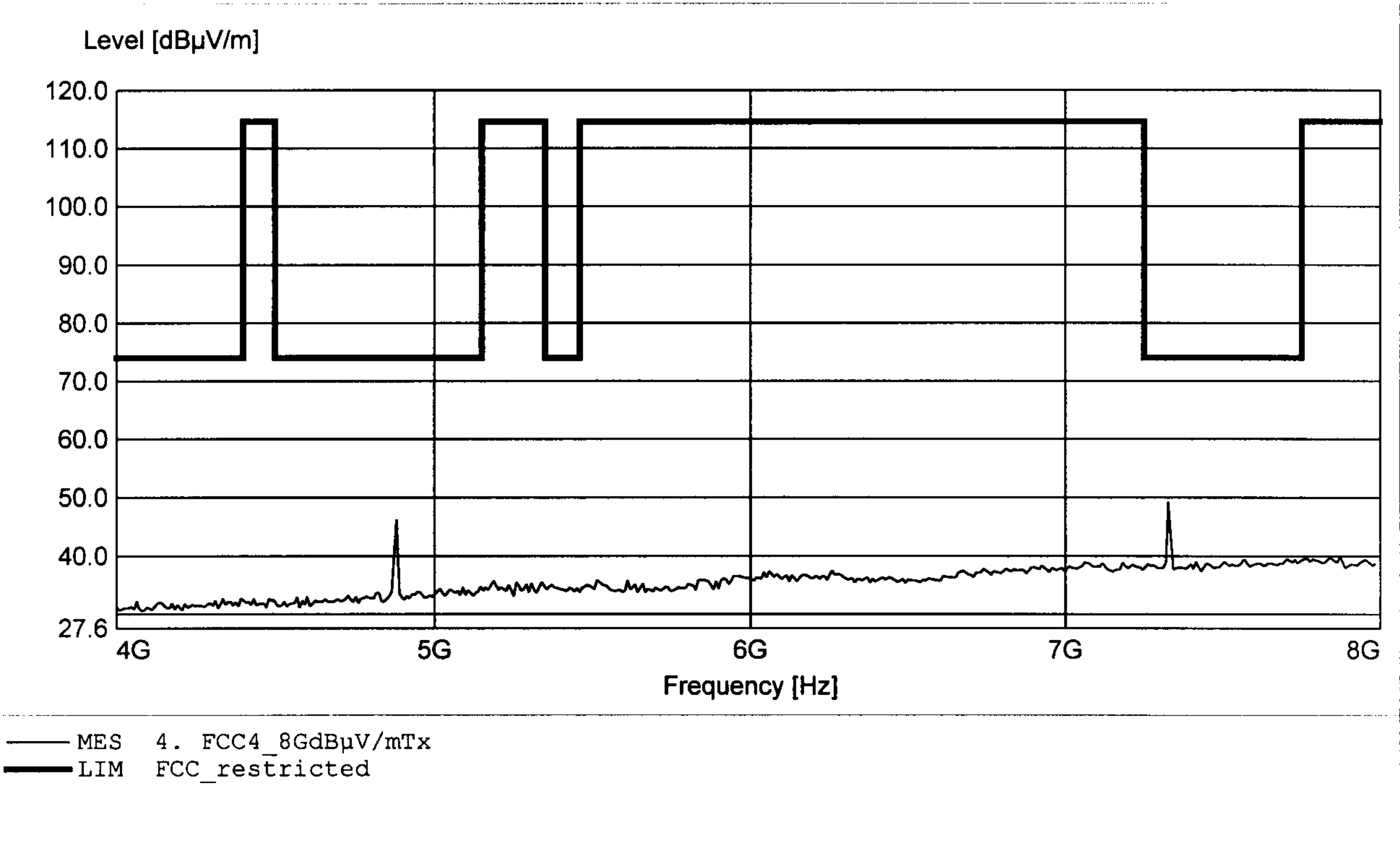
Spurious emissions Field Strength Tx
FCC RULES PART 15, SUBPART C

EUT: M3 Ceotronics V1.1 DECT@ISM Module 2.4 GHz
Model: HMO-1000178-1000215 / Ch:22 / Ant.:2
Applicant: CeoTronics AG
Temperature/ Voltage: 23°C / 3.6 V DC (rechargeable battery)
Test Site / Operator: ETS / Mr. Hoppe
Test Specification: according to § 15.247 Limit 20dB up peak detector
Comment 1: Dist.: 3m, Ant.: HL025, Ampl.:4-8GHz
Comment 2: Freq:7326,65MHz Emax:58,79dBµV/m RBW=100KHz



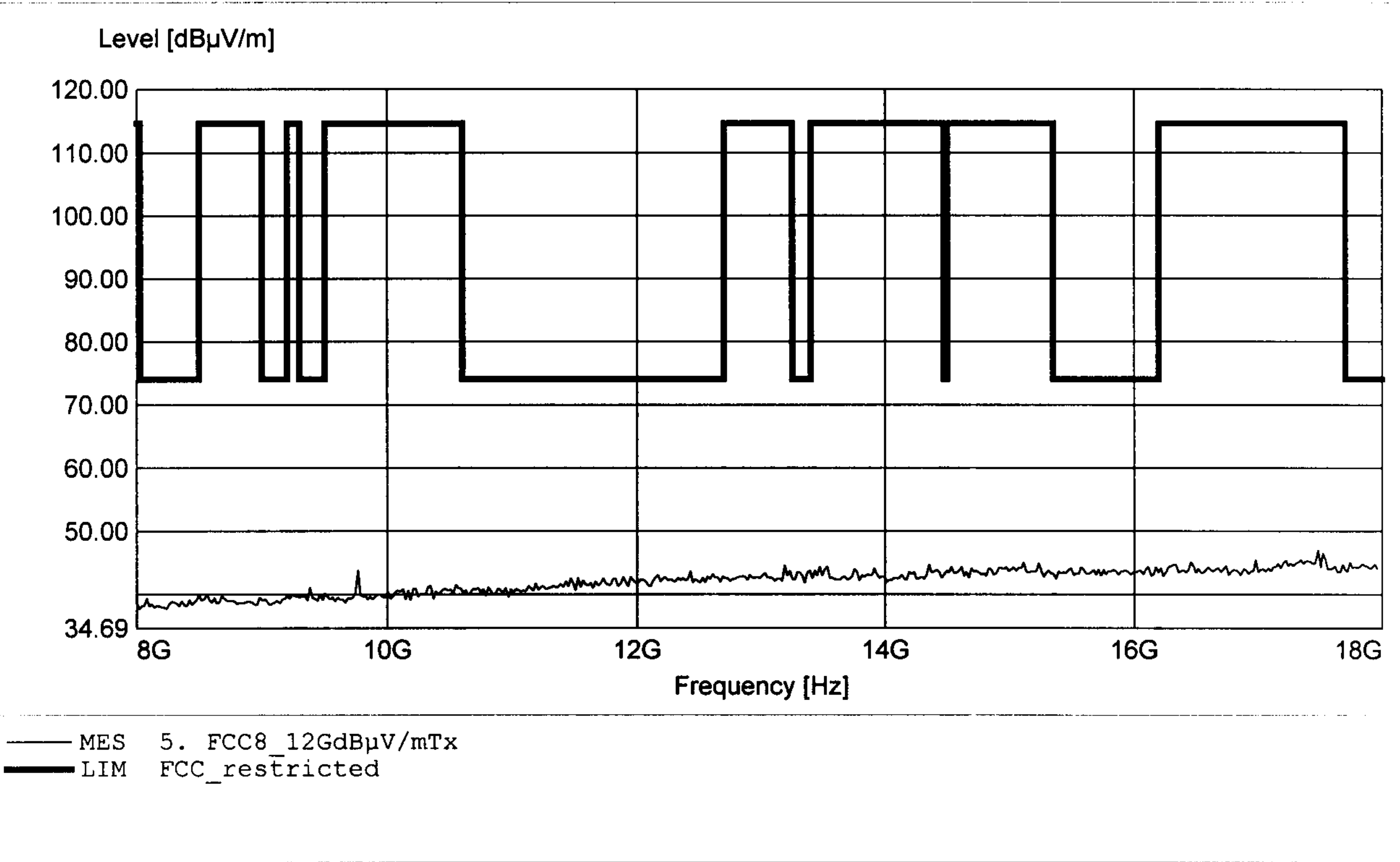
Spurious emissions Field Strength Tx
FCC RULES PART 15, SUBPART C

EUT: M3 Ceotronics V1.1 DECT@ISM Module 2.4 GHz
Model: HMO-1000178-1000215 / Ch:22 / Ant.:2
Applicant: CeoTronics AG
Temperature/ Voltage: 23°C / 3.6 V DC (rechargeable battery)
Test Site / Operator: ETS / Mr. Hoppe
Test Specification: according to § 15.247 Limit 20dB up peak detector
Comment 1: Dist.: 3m, Ant.: HL025, Ampl.:4-8GHz
Comment 2: Freq:7326,65MHz Emax:49,29dBµV/m RBW=100KHz



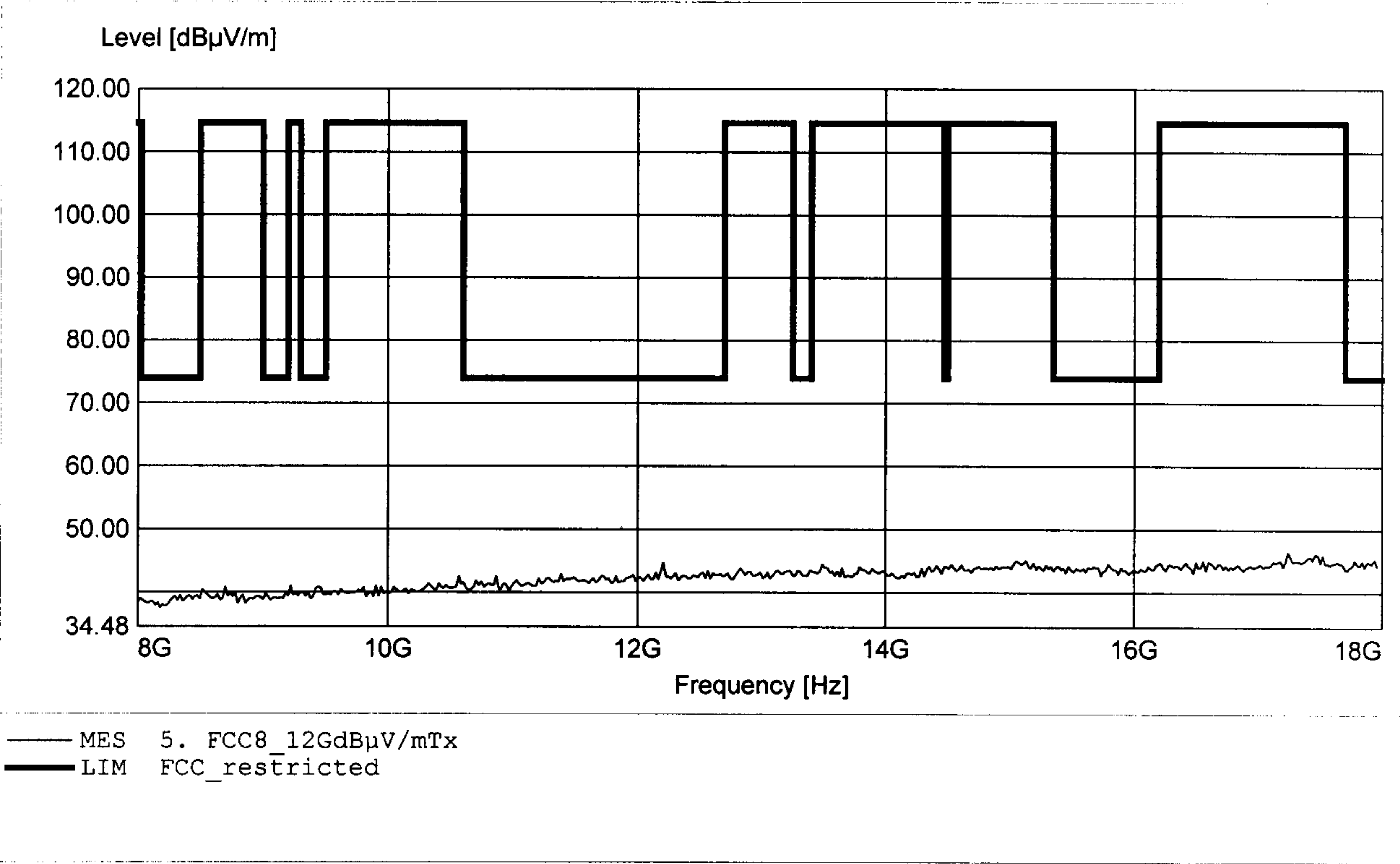
Spurious emissions Field Strength Tx
FCC RULES PART 15, SUBPART C

EUT: M3 Ceotronics V1.1 DECT@ISM Module 2.4 GHz
Model: HMO-1000178-1000215 / Ch:22 / Ant.:2
Applicant: CeoTronics AG
Temperature/ Voltage: 23°C / 3.6 V DC (rechargeable battery)
Test Site / Operator: ETS / Mr. Hoppe
Test Specification: according to § 15.247 Limit 20dB up peak detector
Comment 1: Dist.: 3m, Ant.: HL025, Ampl.:8-18GHz
Comment 2: Freq:17478,05MHz Emax:47,5dBµV/m RBW=100KHz



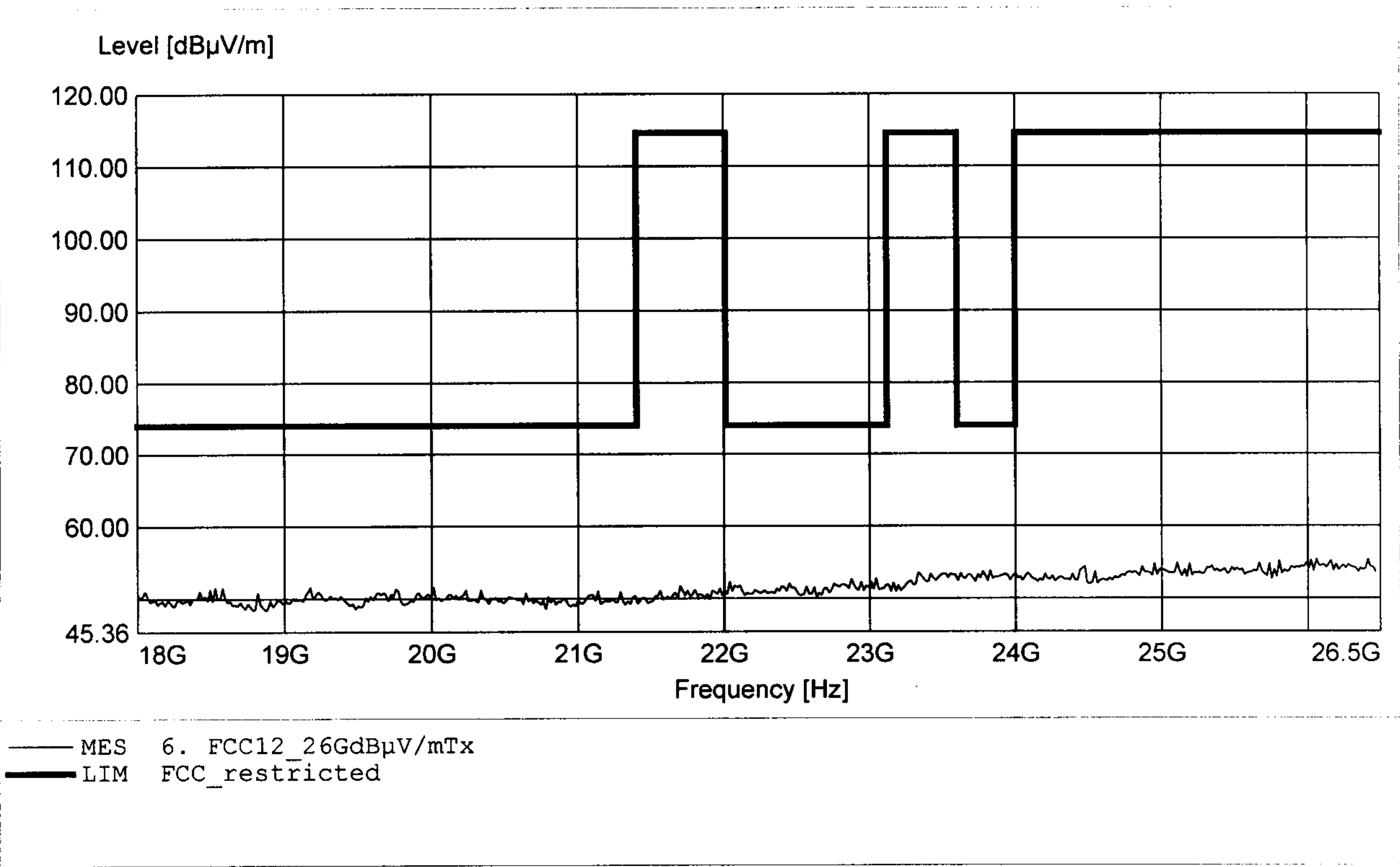
Spurious emissions Field Strength Tx
FCC RULES PART 15, SUBPART C

EUT: M3 Ceotronics V1.1 DECT@ISM Module 2.4 GHz
Model: HMO-1000178-1000215 / Ch:22 / Ant.:2
Applicant: CeoTronics AG
Temperature/ Voltage: 23°C / 3.6 V DC (rechargeable battery)
Test Site / Operator: ETS / Mr. Hoppe
Test Specification: according to § 15.247 Limit 20dB up peak detector
Comment 1: Dist.: 3m, Ant.: HL025, Ampl.:8-18GHz
Comment 2: Freq:17238,47MHz Emax:46,52dBµV/m RBW=100KHz



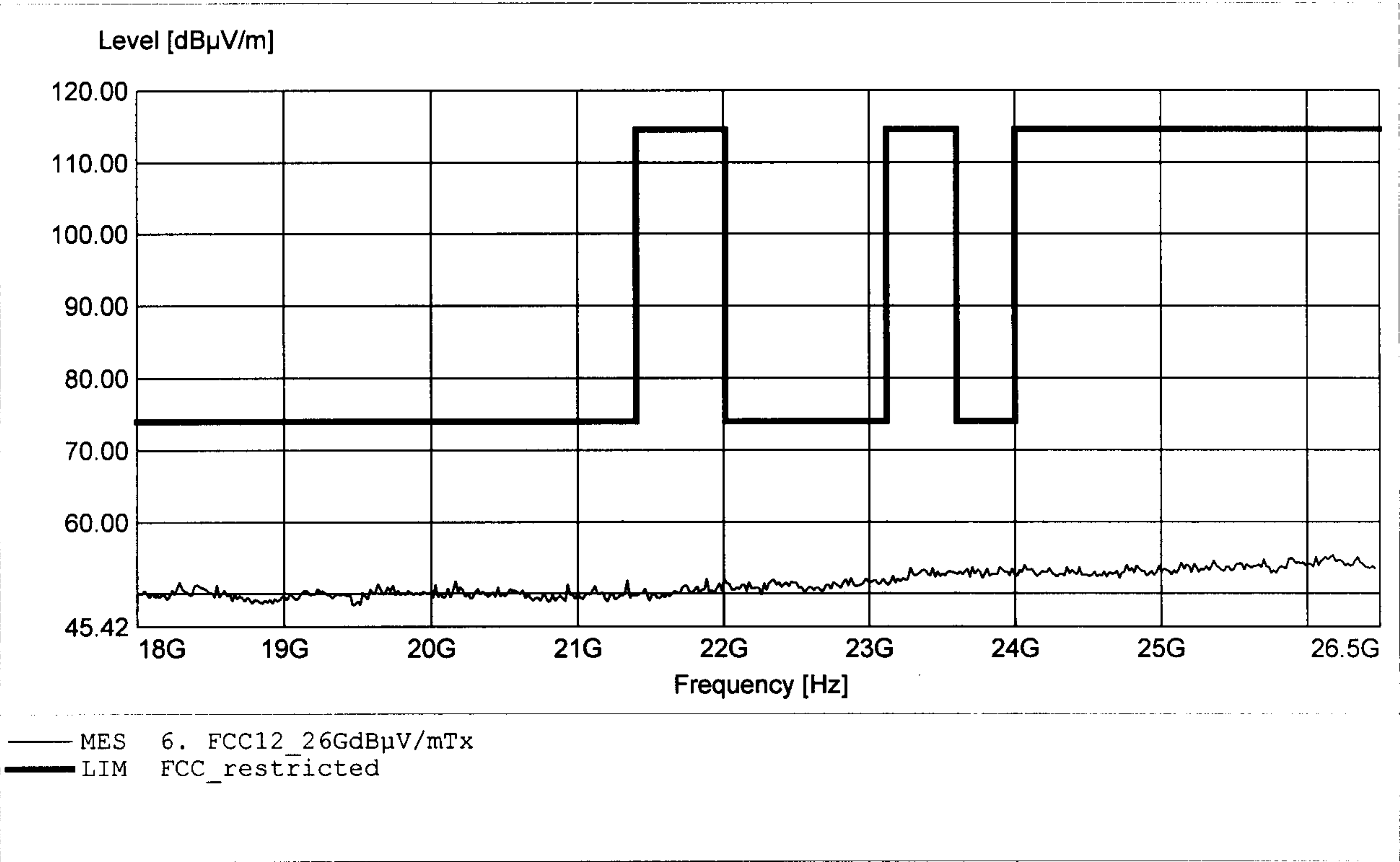
Spurious emissions Field Strength Tx
FCC RULES PART 15, SUBPART C

EUT: M3 Ceotronics V1.1 DECT@ISM Module 2.4 GHz
Model: HMO-1000178-1000215 / Ch:22 / Ant.:2
Applicant: CeoTronics AG
Temperature/ Voltage: 23°C / 3.6 V DC (rechargeable battery)
Test Site / Operator: ETS / Mr. Hoppe
Test Specification: according to § 15.247 Limit 20dB up peak detector
Comment 1: Dist.: 3m, Ant.: HL025, Ampl.:18-26GHz
Comment 2: Freq:26414,82MHz Emax:55,44dBµV/m RBW=100KHz



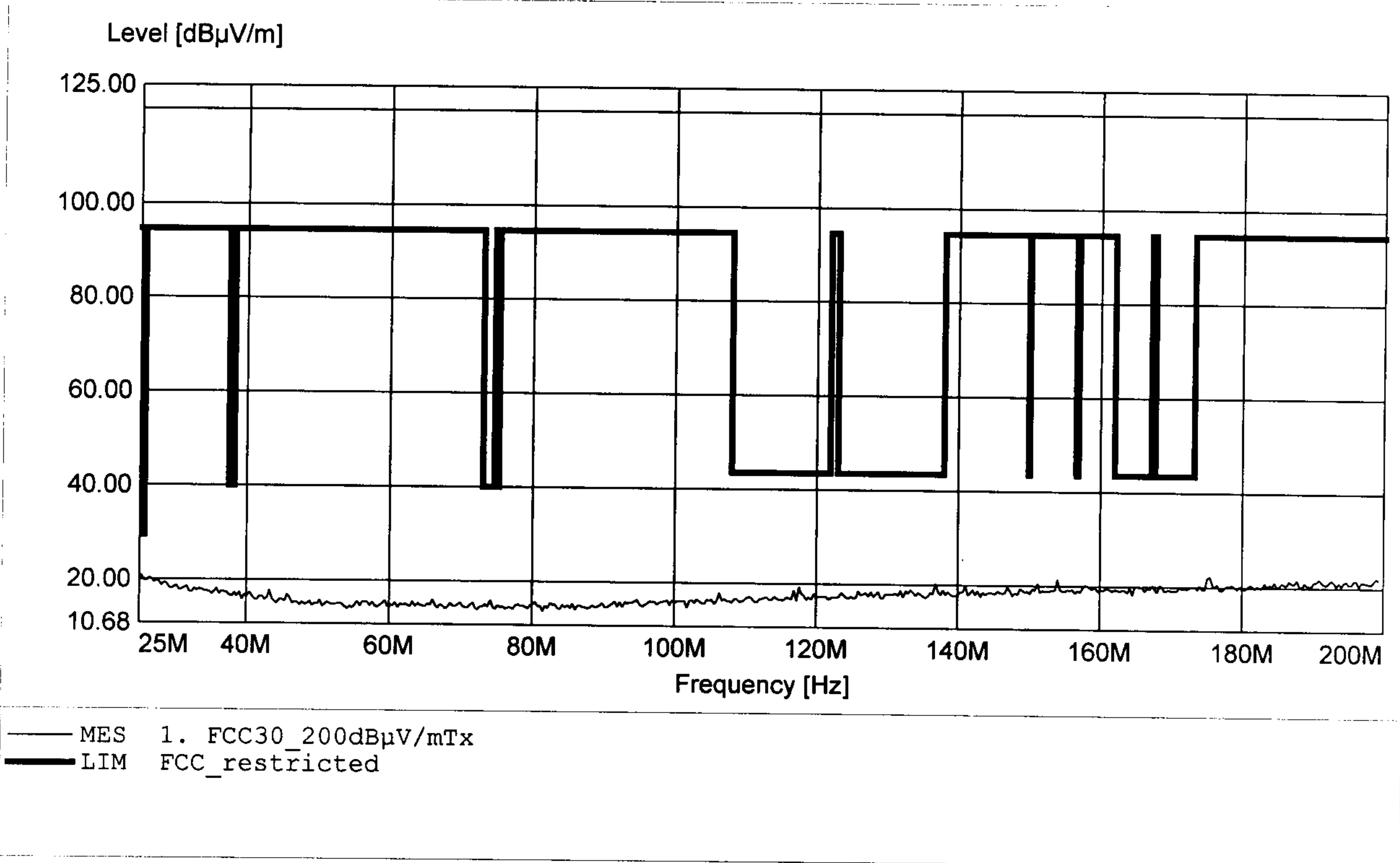
Spurious emissions Field Strength Tx
FCC RULES PART 15, SUBPART C

EUT: M3 Ceotronics V1.1 DECT@ISM Module 2.4 GHz
Model: HMO-1000178-1000215 / Ch:22 / Ant.:2
Applicant: CeoTronics AG
Temperature/ Voltage: 23°C / 3.6 V DC (rechargeable battery)
Test Site / Operator: ETS / Mr. Hoppe
Test Specification: according to § 15.247 Limit 20dB up peak detector
Comment 1: Dist.: 3m, Ant.: HL025, Ampl.:18-26GHz
Comment 2: Freq:26176,35MHz Emax:55,36dBµV/m RBW=100KHz



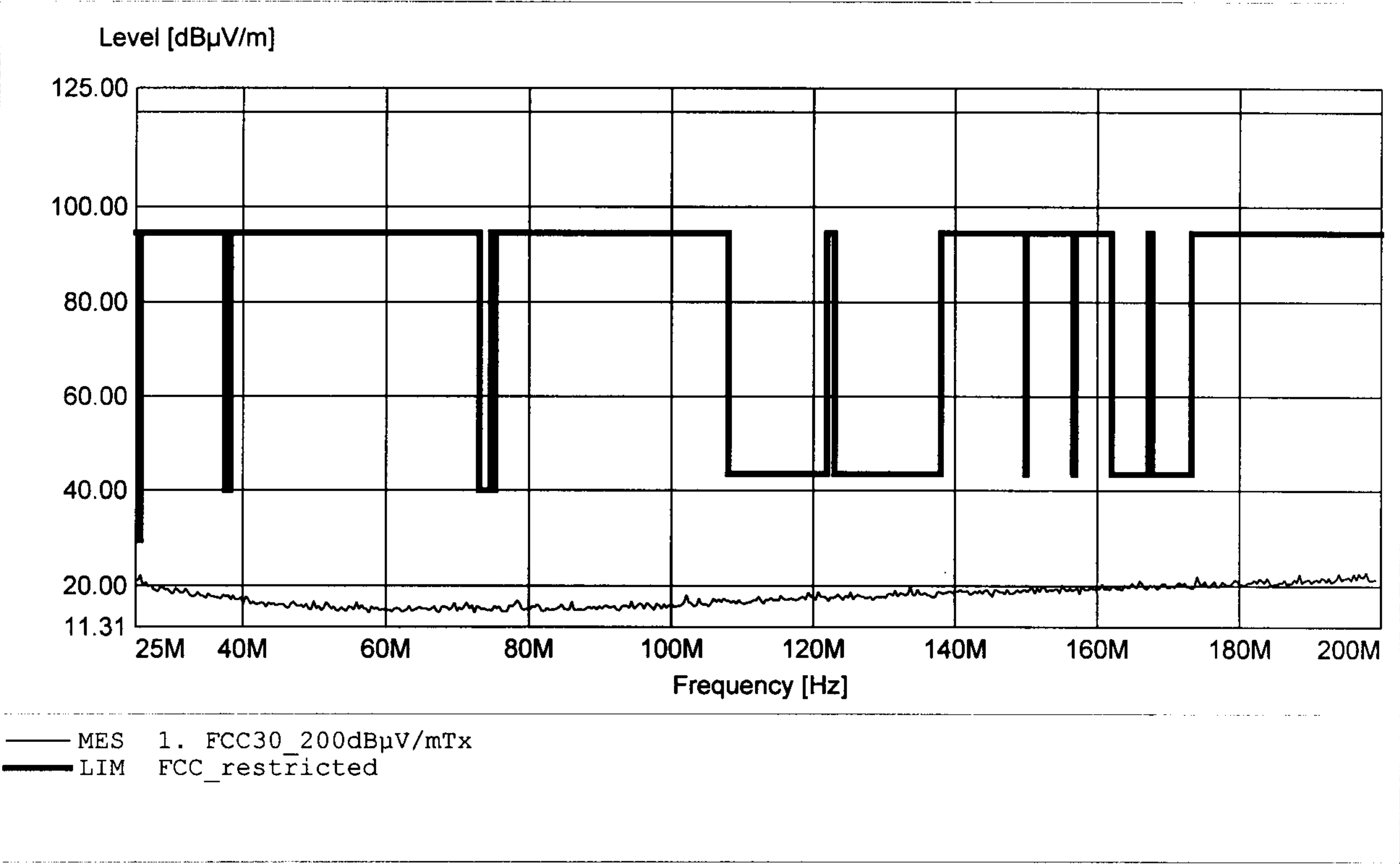
Spurious emissions Field Strength Tx
FCC RULES PART 15, SUBPART C

EUT: M3 Ceotronics V1.1 DECT@ISM Module 2.4 GHz
Model: HMO-1000178-1000215 / Ch:44 / Ant.:2
Applicant: CeoTronics AG
Temperature/ Voltage: 23°C / 3.6 V DC (rechargeable battery)
Test Site / Operator: ETS / Mr. Hoppe
Test Specification: according to § 15.247
Comment 1: Dist.: 3m, Ant.: HK116
Comment 2: Freq:175,45MHz Emax:22,28dBµV/m RBW=100KHz



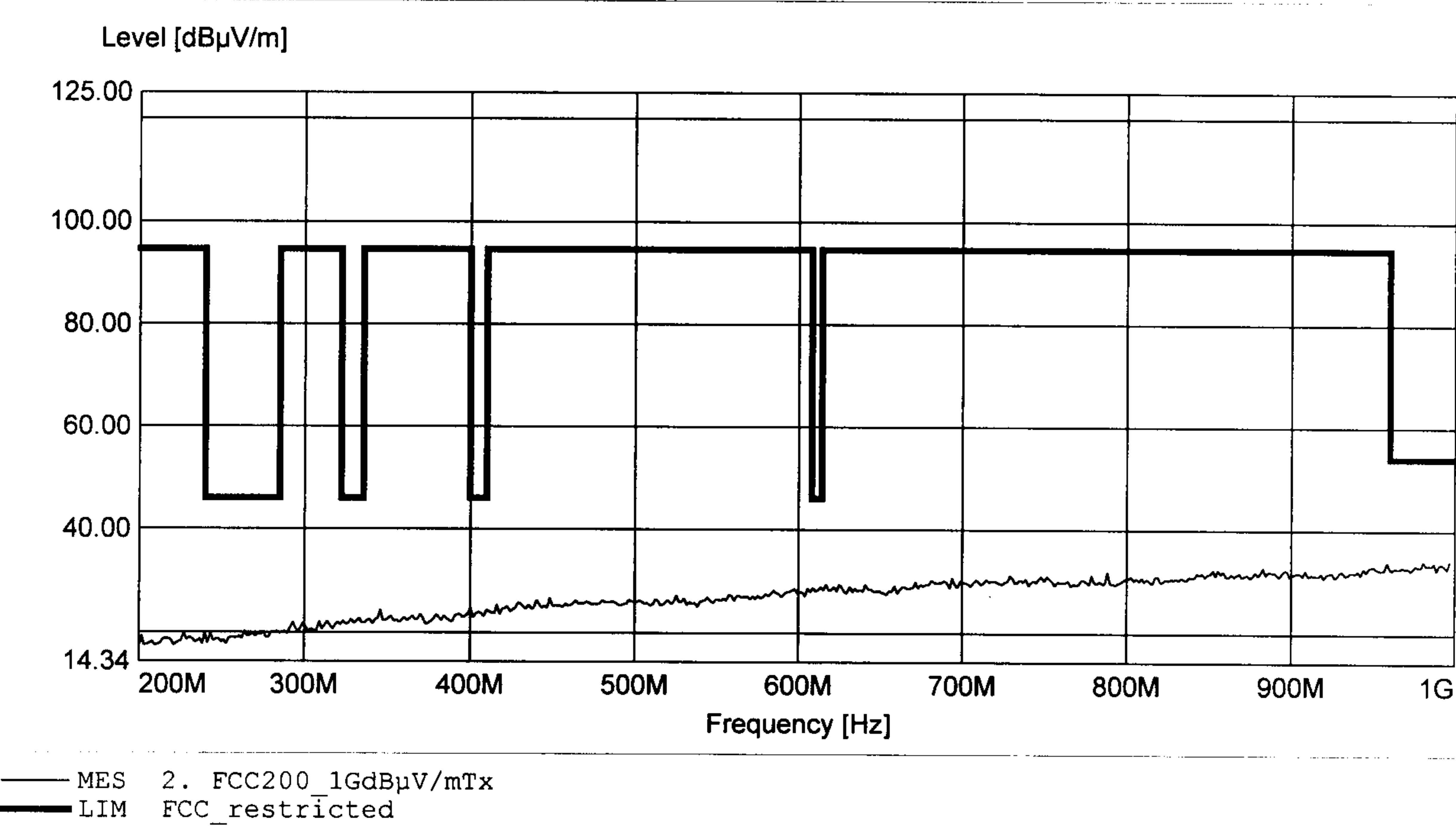
Spurious emissions Field Strength Tx
FCC RULES PART 15, SUBPART C

EUT: M3 Ceotronics V1.1 DECT@ISM Module 2.4 GHz
Model: HMO-1000178-1000215 / Ch:44 / Ant.:2
Applicant: CeoTronics AG
Temperature/ Voltage: 23°C / 3.6 V DC (rechargeable battery)
Test Site / Operator: ETS / Mr. Hoppe
Test Specification: according to § 15.247
Comment 1: Dist.: 3m, Ant.: HK116
Comment 2: Freq:197,89MHz Emax:22,97dBµV/m RBW=100KHz



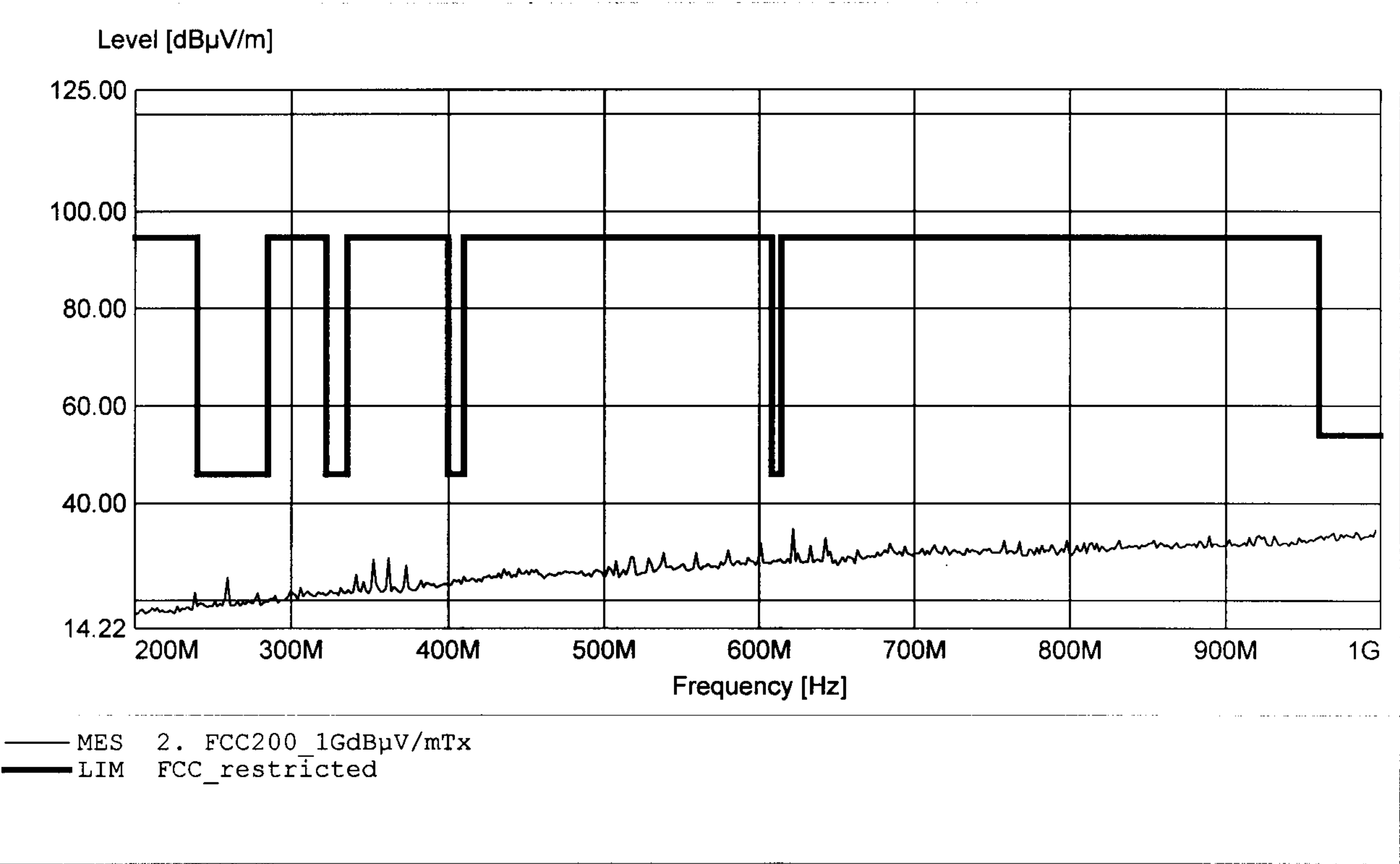
Spurious emissions Field Strength Tx
FCC RULES PART 15, SUBPART C

EUT: M3 Ceotronics V1.1 DECT@ISM Module 2.4 GHz
Model: HMO-1000178-1000215 / Ch:44 / Ant.:2
Applicant: CeoTronics AG
Temperature/ Voltage: 23°C / 3.6 V DC (rechargeable battery)
Test Site / Operator: ETS / Mr. Hoppe
Test Specification: according to § 15.247
Comment 1: Dist.: 3m, Ant.: HL223
Comment 2: Freq:996,79MHz Emax:34,28dBµV/m RBW=100KHz



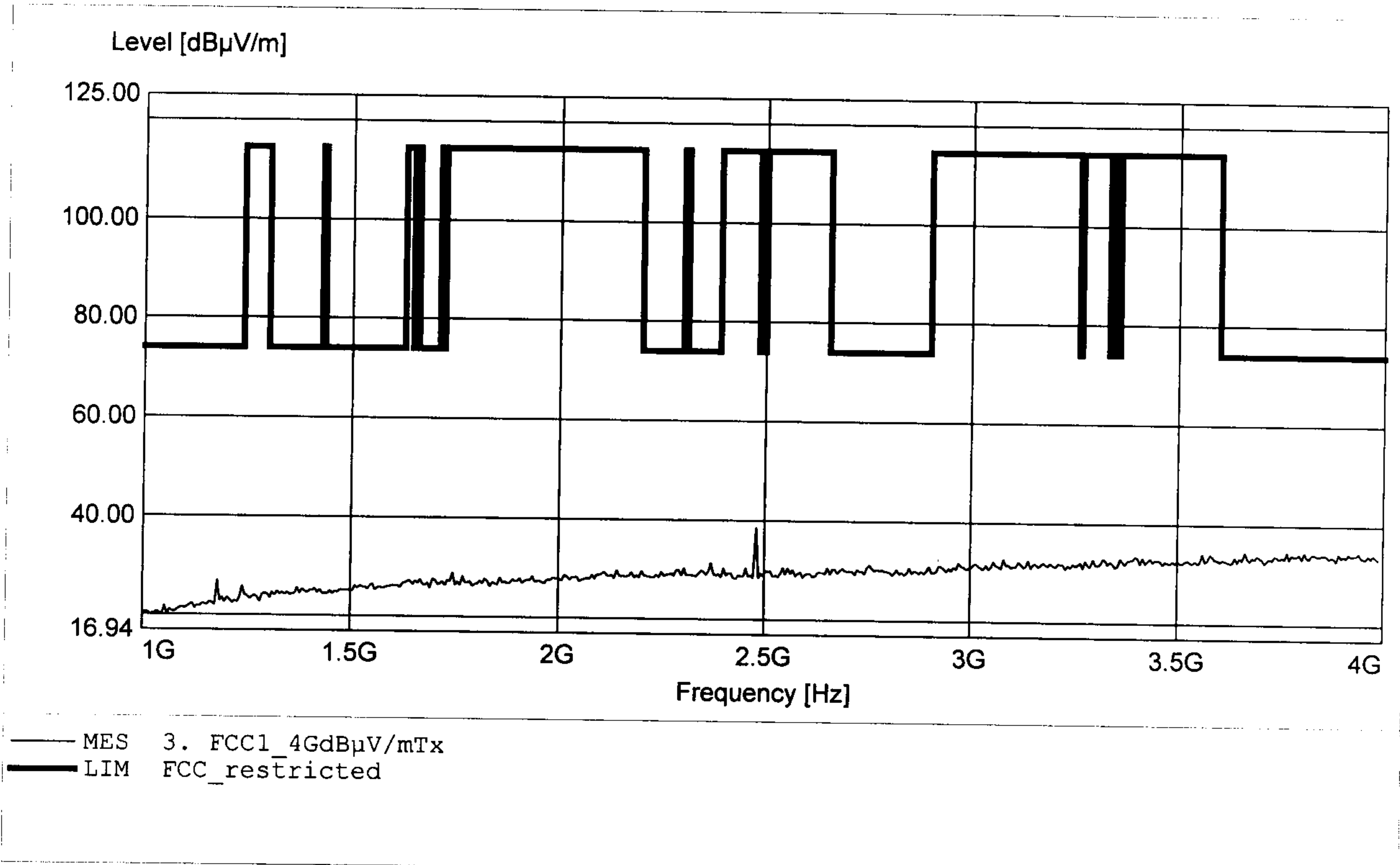
Spurious emissions Field Strength Tx
FCC RULES PART 15, SUBPART C

EUT: M3 Ceotronics V1.1 DECT@ISM Module 2.4 GHz
Model: HMO-1000178-1000215 / Ch:44 / Ant.:2
Applicant: CeoTronics AG
Temperature/ Voltage: 23°C / 3.6 V DC (rechargeable battery)
Test Site / Operator: ETS / Mr. Hoppe
Test Specification: according to § 15.247
Comment 1: Dist.: 3m, Ant.: HL223
Comment 2: Freq:621,64MHz Emax:34,82dBµV/m RBW=100KHz



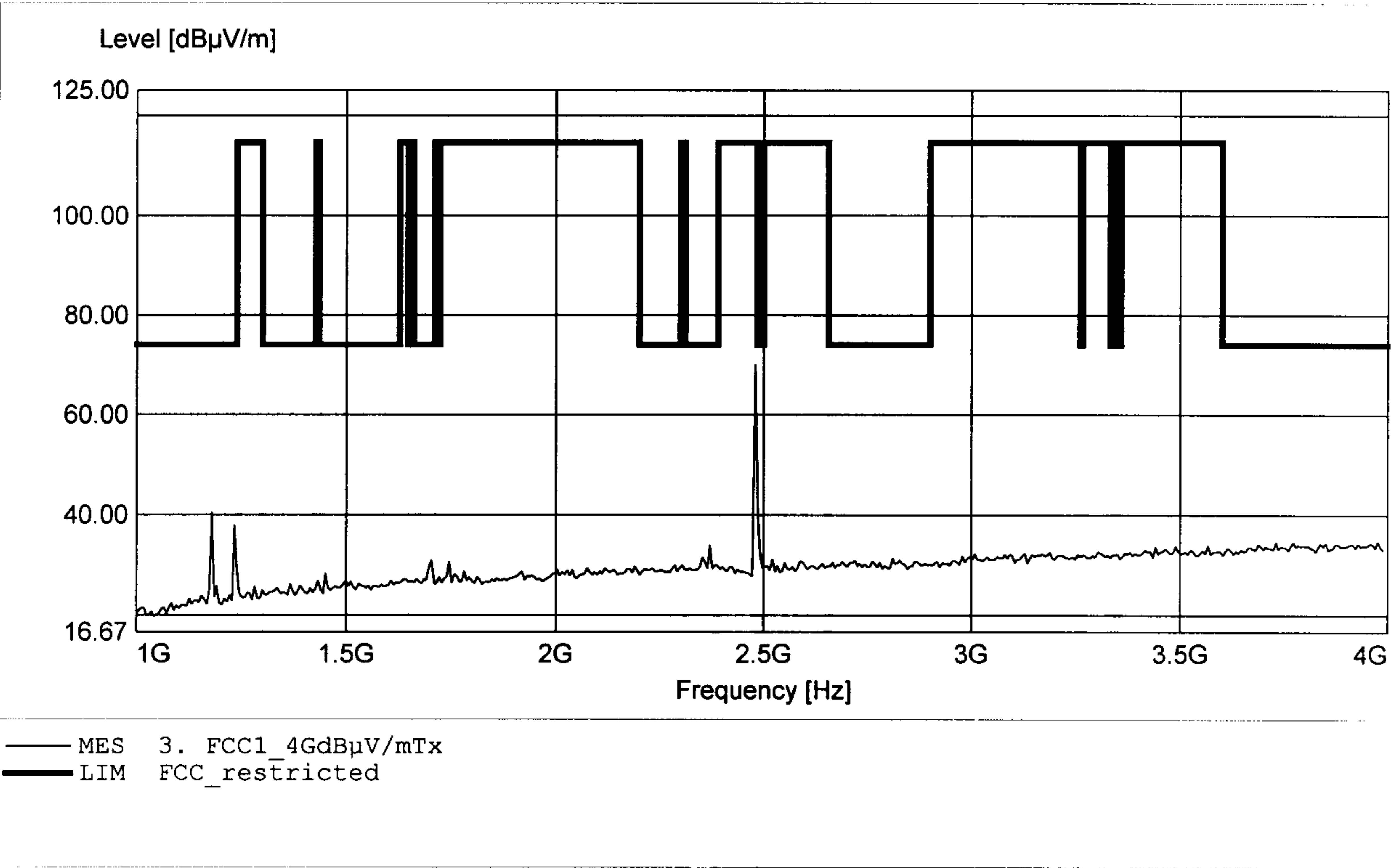
Spurious emissions Field Strength Tx
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EUT: M3 Ceotronics V1.1 DECT@ISM Module 2.4 GHz
Model: HMO-1000178-1000215 / Ch:44 / Ant.:2
Applicant: CeoTronics AG
Temperature/ Voltage: 23°C / 3.6 V DC (rechargeable battery)
Test Site / Operator: ETS / Mr. Hoppe
Test Specification: according to § 15.247 Limit 20dB up peak detector
Comment 1: Dist.: 3m, Ant.: HL025, Notch-filter
Comment 2: Freq:2478,95MHz Emax:38,59dBµV/m RBW=100KHz



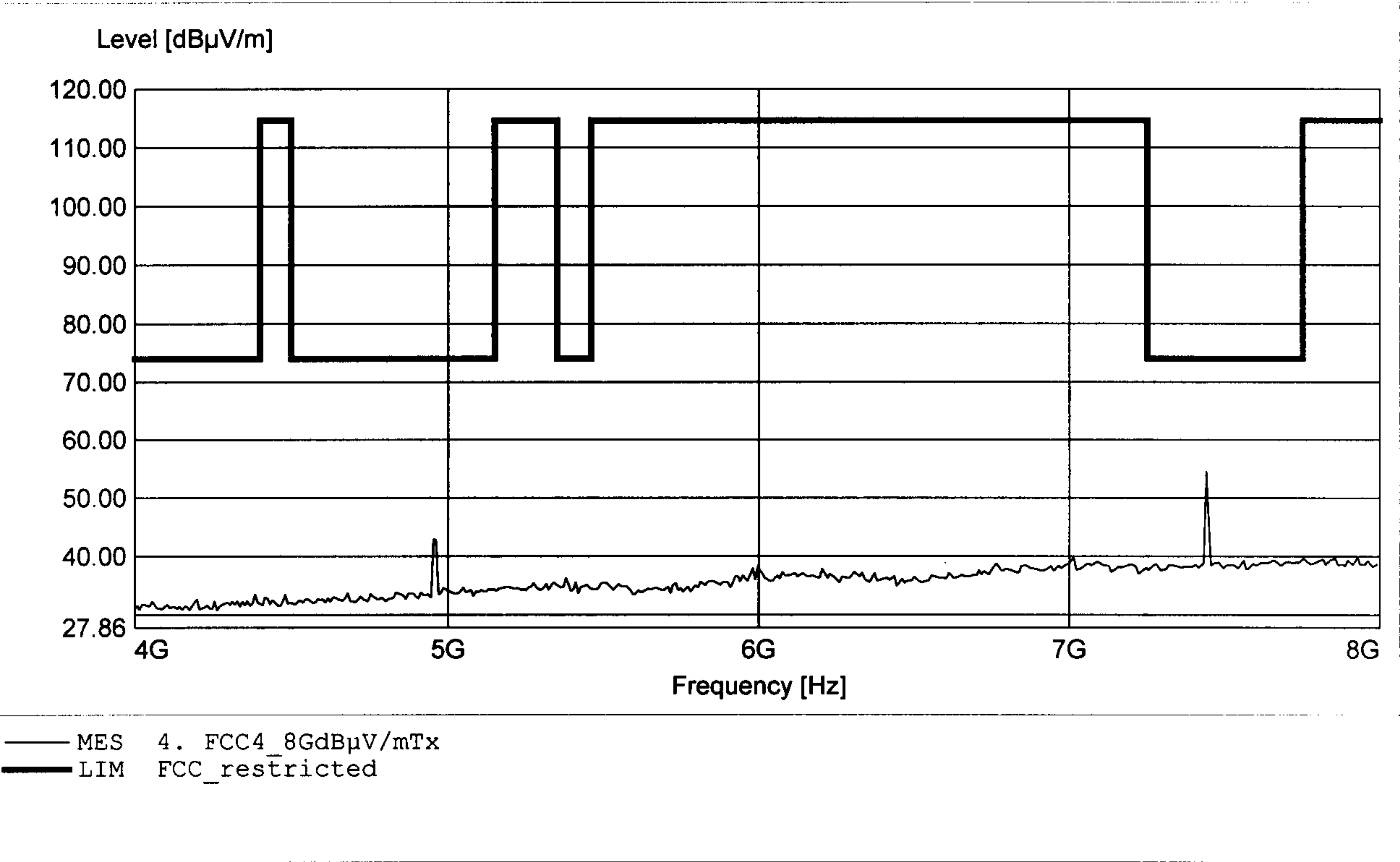
Spurious emissions Field Strength Tx
FCC RULES PART 15, SUBPART C

EUT: M3 Ceotronics V1.1 DECT@ISM Module 2.4 GHz
Model: HMO-1000178-1000215 / Ch:44 / Ant.:2
Applicant: CeoTronics AG
Temperature/ Voltage: 23°C / 3.6 V DC (rechargeable battery)
Test Site / Operator: ETS / Mr. Hoppe
Test Specification: according to § 15.247 Limit 20dB up peak detector
Comment 1: Dist.: 3m, Ant.: HL025, Notch-filter
Comment 2: Freq:2478,95MHz Emax:70,12dBµV/m RBW=100KHz



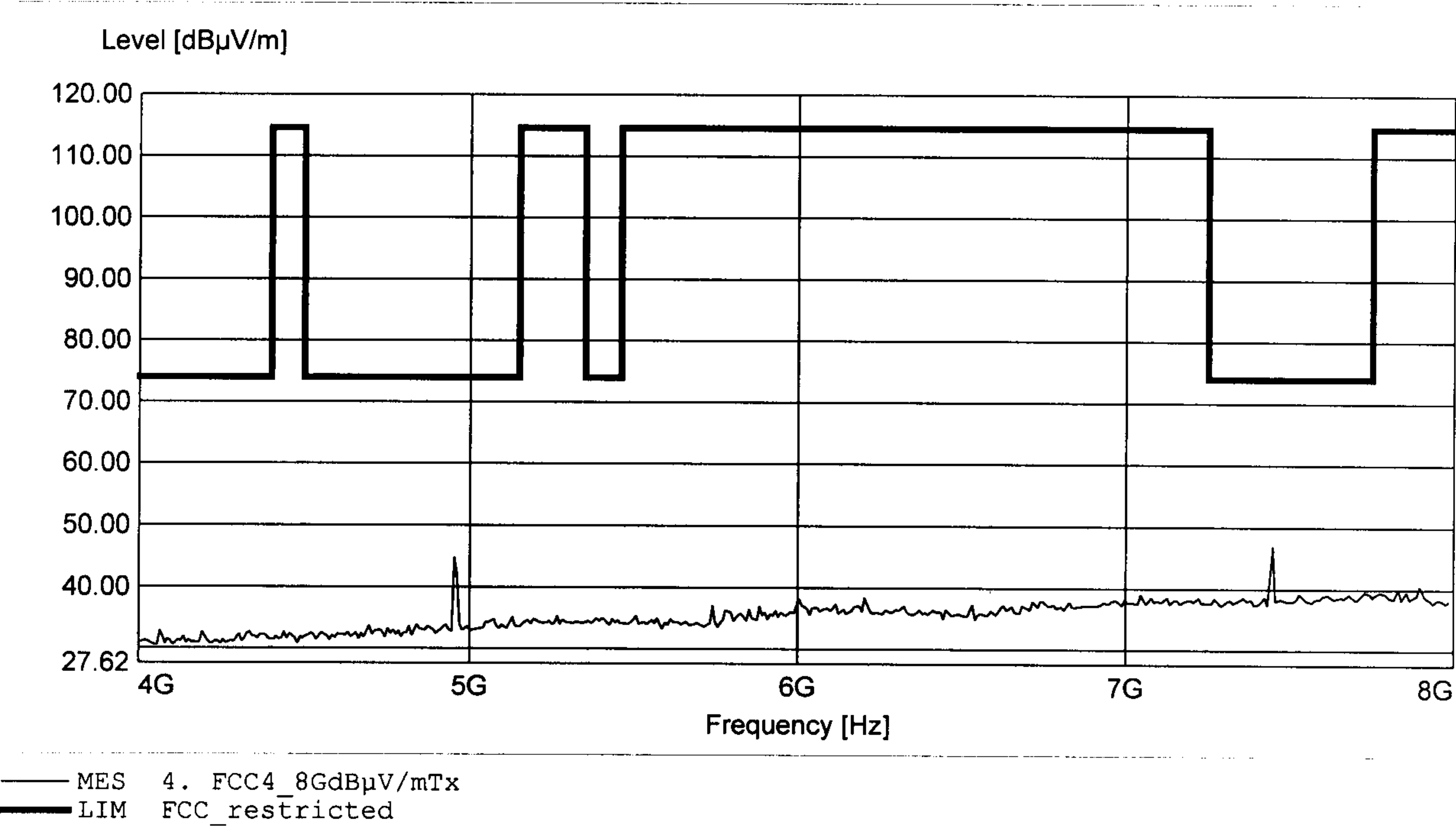
Spurious emissions Field Strength Tx
FCC RULES PART 15, SUBPART C

EUT: M3 Ceotronics V1.1 DECT@ISM Module 2.4 GHz
Model: HMO-1000178-1000215 / Ch:44 / Ant.:2
Applicant: CeoTronics AG
Temperature/ Voltage: 23°C / 3.6 V DC (rechargeable battery)
Test Site / Operator: ETS / Mr. Hoppe
Test Specification: according to § 15.247 Limit 20dB up peak detector
Comment 1: Dist.: 3m, Ant.: HL025, Ampl.:4-8GHz
Comment 2: Freq:7438,87MHz Emax:54,63dBµV/m RBW=100KHz



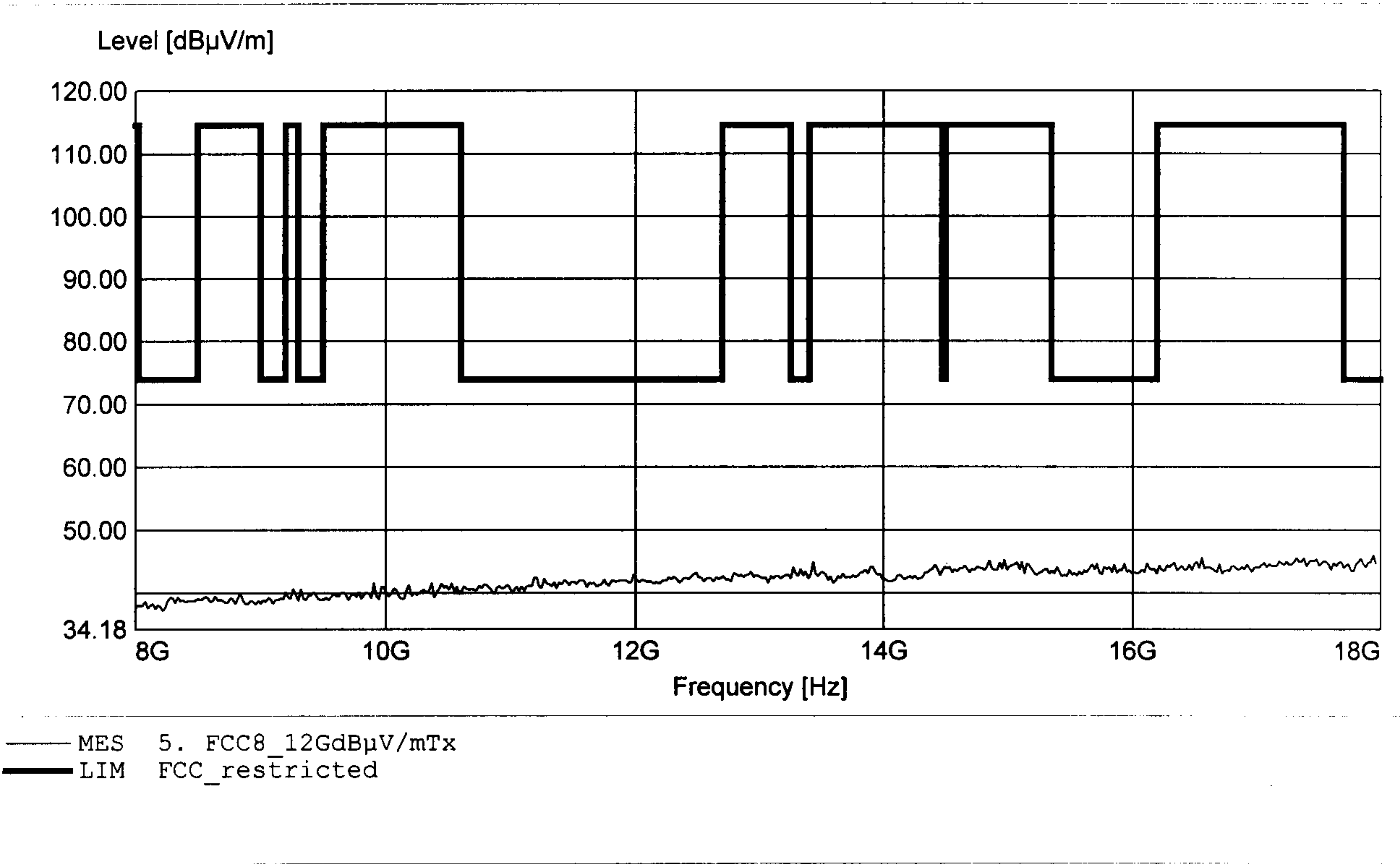
Spurious emissions Field Strength Tx
FCC RULES PART 15, SUBPART C

EUT: M3 Ceotronics V1.1 DECT@ISM Module 2.4 GHz
Model: HMO-1000178-1000215 / Ch:44 / Ant.:2
Applicant: CeoTronics AG
Temperature/ Voltage: 23°C / 3.6 V DC (rechargeable battery)
Test Site / Operator: ETS / Mr. Hoppe
Test Specification: according to § 15.247 Limit 20dB up peak detector
Comment 1: Dist.: 3m, Ant.: HL025, Ampl.:4-8GHz
Comment 2: Freq:7446,01MHz Emax:47,1dBµV/m RBW=100KHz



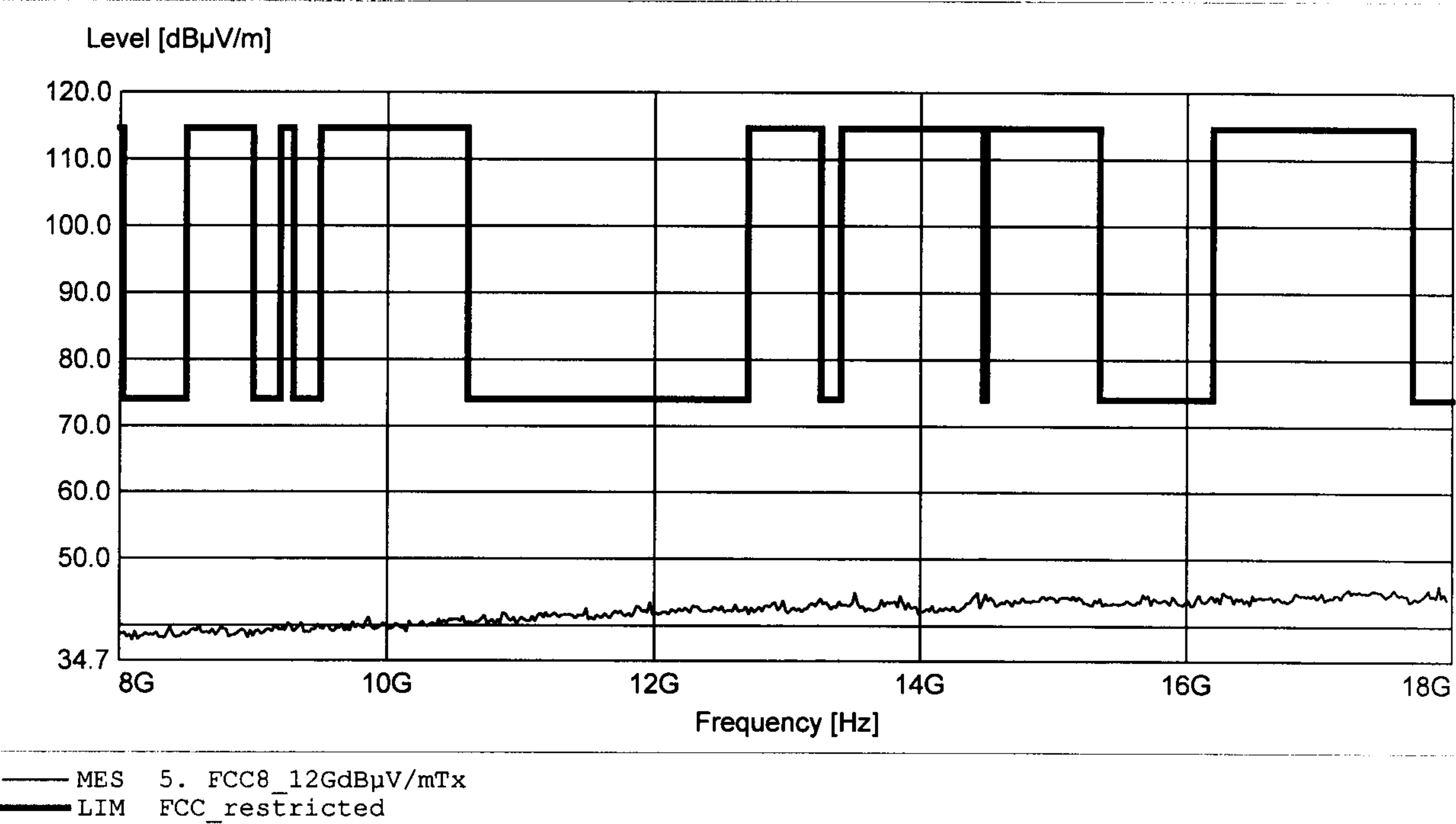
Spurious emissions Field Strength Tx
FCC RULES PART 15, SUBPART C

EUT: M3 Ceotronics V1.1 DECT@ISM Module 2.4 GHz
Model: HMO-1000178-1000215 / Ch:44 / Ant.:2
Applicant: CeoTronics AG
Temperature/ Voltage: 23°C / 3.6 V DC (rechargeable battery)
Test Site / Operator: ETS / Mr. Hoppe
Test Specification: according to § 15.247 Limit 20dB up peak detector
Comment 1: Dist.: 3m, Ant.: HL025, Ampl.:8-18GHz
Comment 2: Freq:17939,07MHz Emax:46,7dBµV/m RBW=100KHz



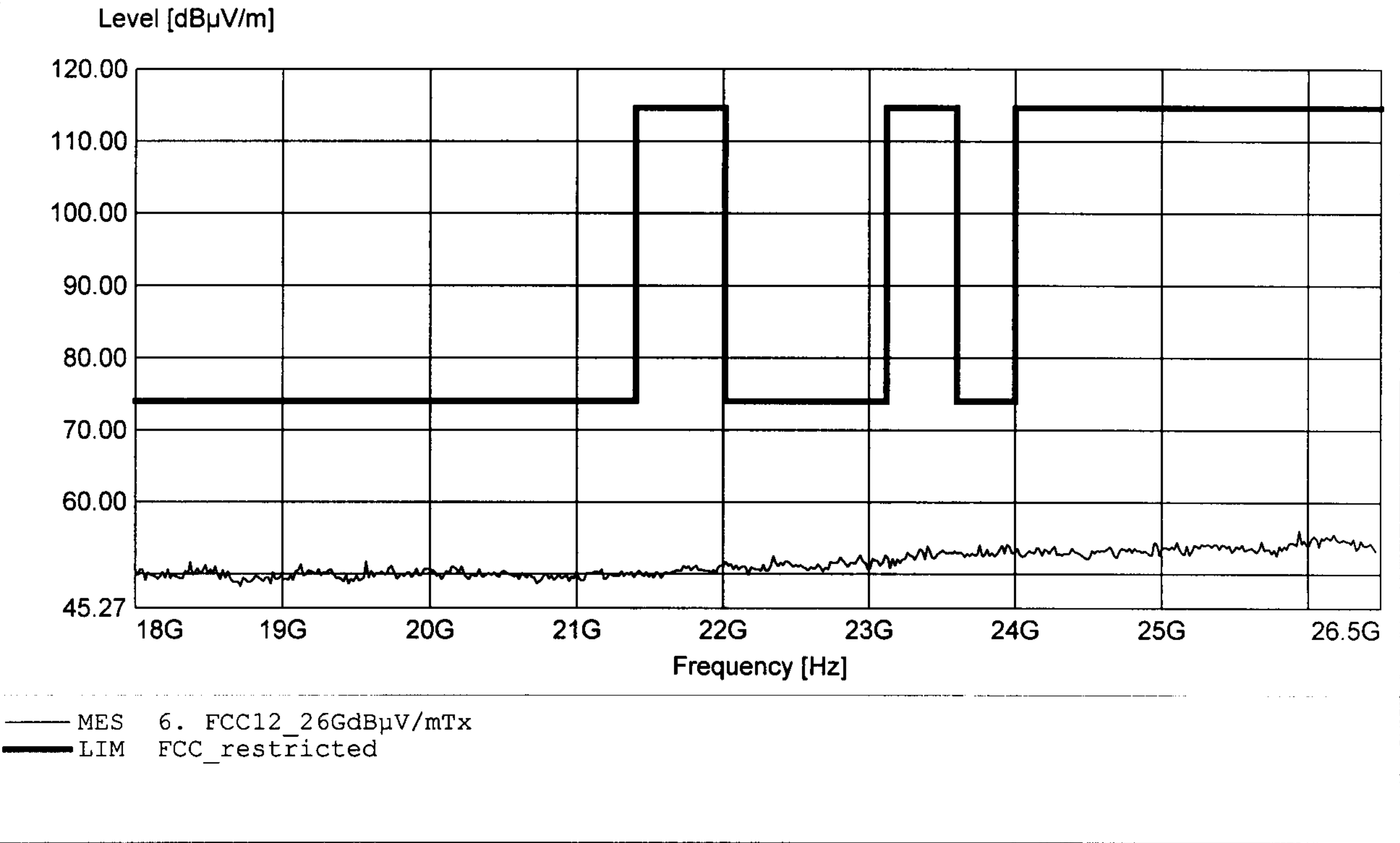
Spurious emissions Field Strength Tx
FCC RULES PART 15, SUBPART C

EUT: M3 Ceotronics V1.1 DECT@ISM Module 2.4 GHz
Model: HMO-1000178-1000215 / Ch:44 / Ant.:2
Applicant: CeoTronics AG
Temperature/ Voltage: 23°C / 3.6 V DC (rechargeable battery)
Test Site / Operator: ETS / Mr. Hoppe
Test Specification: according to § 15.247 Limit 20dB up peak detector
Comment 1: Dist.: 3m, Ant.: HL025, Ampl.:8-18GHz
Comment 2: Freq:17899,09MHz Emax:46,9dBµV/m RBW=100KHz



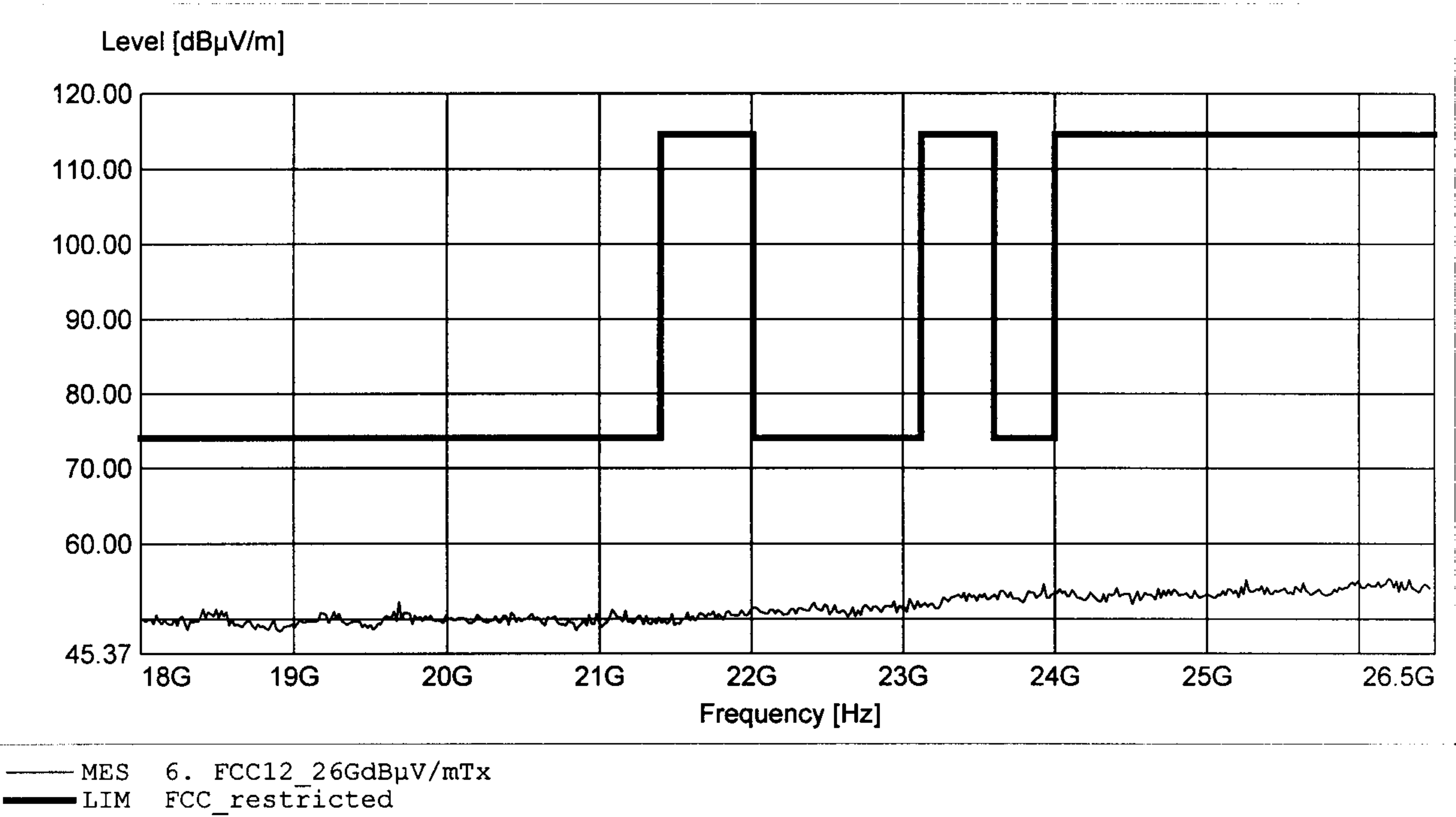
Spurious emissions Field Strength Tx
FCC RULES PART 15, SUBPART C

EUT: M3 Ceotronics V1.1 DECT@ISM Module 2.4 GHz
Model: HMO-1000178-1000215 / Ch:44 / Ant.:2
Applicant: CeoTronics AG
Temperature/ Voltage: 23°C / 3.6 V DC (rechargeable battery)
Test Site / Operator: ETS / Mr. Hoppe
Test Specification: according to § 15.247 Limit 20dB up peak detector
Comment 1: Dist.: 3m, Ant.: HL025, Ampl.:18-26GHz
Comment 2: Freq:25937,87MHz Emax:56,12dBµV/m RBW=100KHz



Spurious emissions Field Strength Tx
FCC RULES PART 15, SUBPART C

EUT: M3 Ceotronics V1.1 DECT@ISM Module 2.4 GHz
Model: HMO-1000178-1000215 / Ch:44 / Ant.:2
Applicant: CeoTronics AG
Temperature/ Voltage: 23°C / 3.6 V DC (rechargeable battery)
Test Site / Operator: ETS / Mr. Hoppe
Test Specification: according to § 15.247 Limit 20dB up peak detector
Comment 1: Dist.: 3m, Ant.: HL025, Ampl.:18-26GHz
Comment 2: Freq:26193,38MHz Emax:55,33dBµV/m RBW=100KHz





Appendix D

Spurious Emissions conducted - Transmitter operating

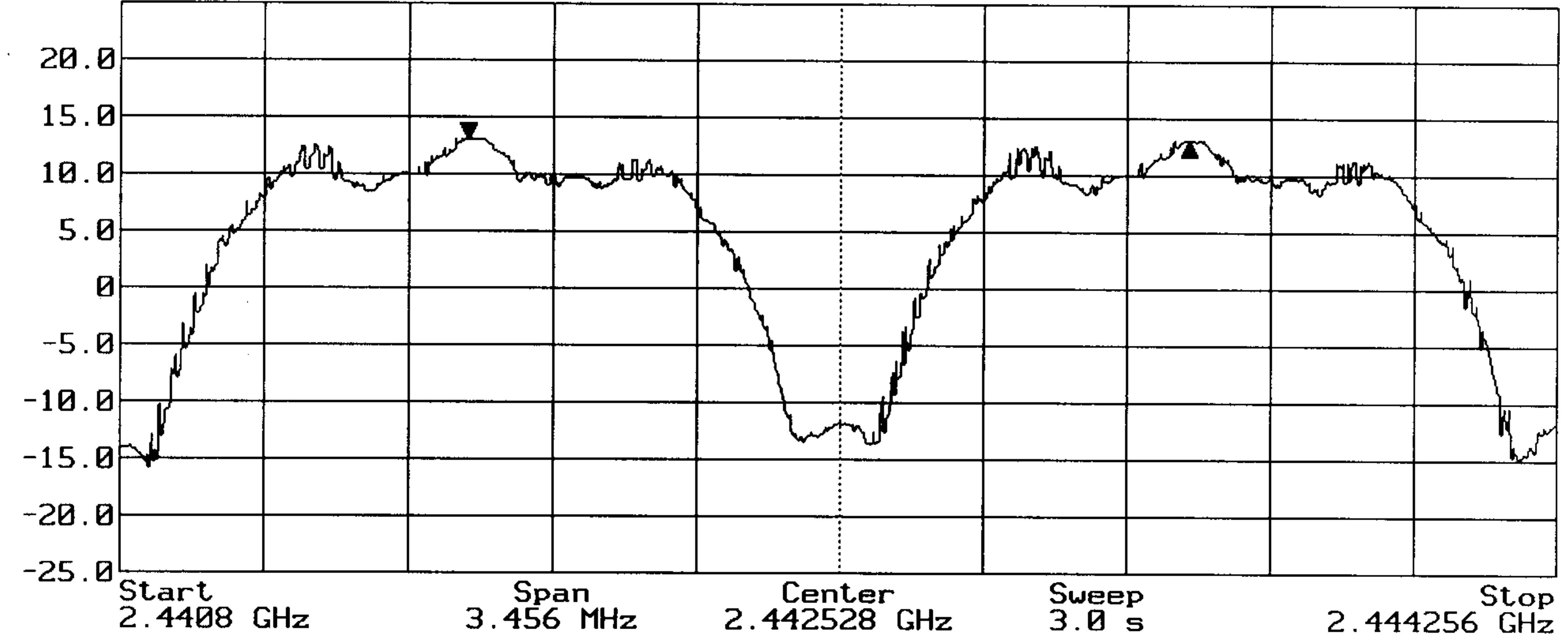


Appendix E

Carrier Frequency Separation

Date 03.May.'01Time 14:18:48
Ref.Lvl 24.90 dBmDelta 0 dB
CF.Stp 345.600 kHzRF.Att 40 dB
Unit [dBm]

Res.Bw 116.0 kHz[imp]Vid.Bw 100 kHz





Appendix F

Number of Hopping Frequencies



Date 03.May.'01 Time 15:11:43

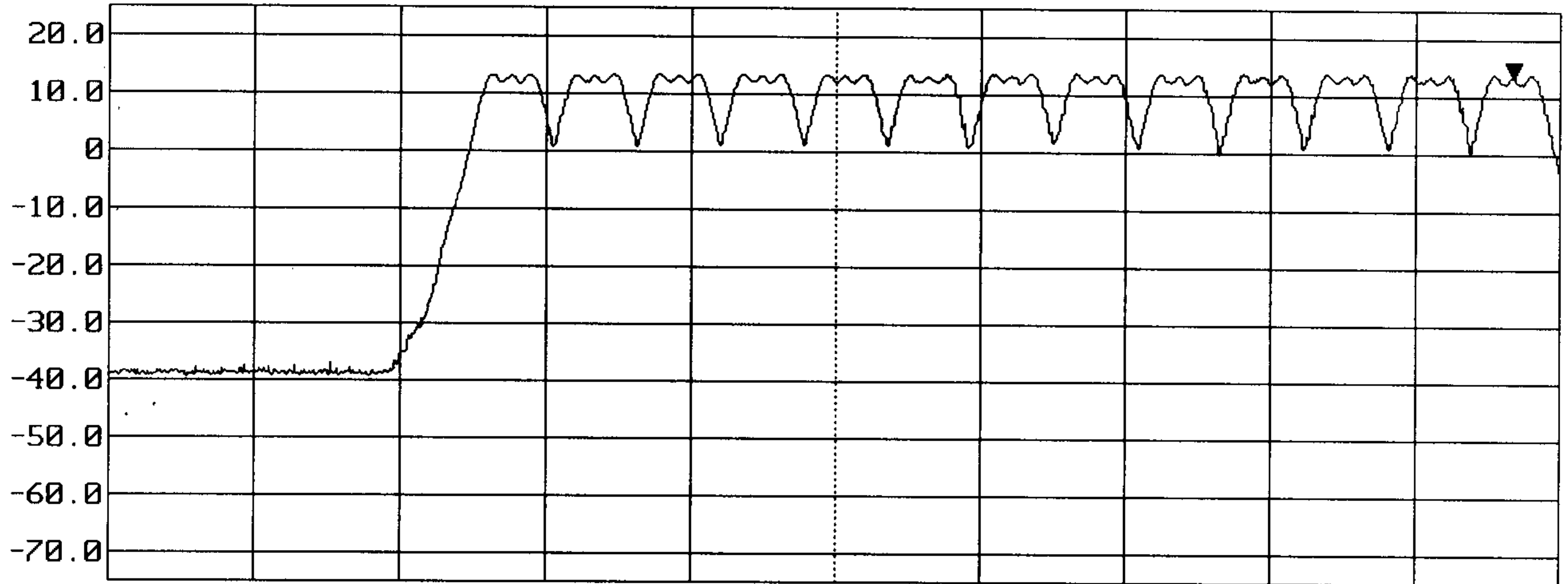
Ref.Lvl 24.90 dBm Marker 13.43 dBm

2.42441 GHz

Res.Bw 493.2 kHz[imp] Vid.Bw 1 MHz

CF.Stp 3.000 MHz RF.Att 40 dB

Unit [dBm]



Start 2.39537 GHz

Span 30 MHz

Center 2.41037 GHz

Sweep 3.0 s

Stop 2.42537 GHz



Date 03.May.'01 Time 15:20:28

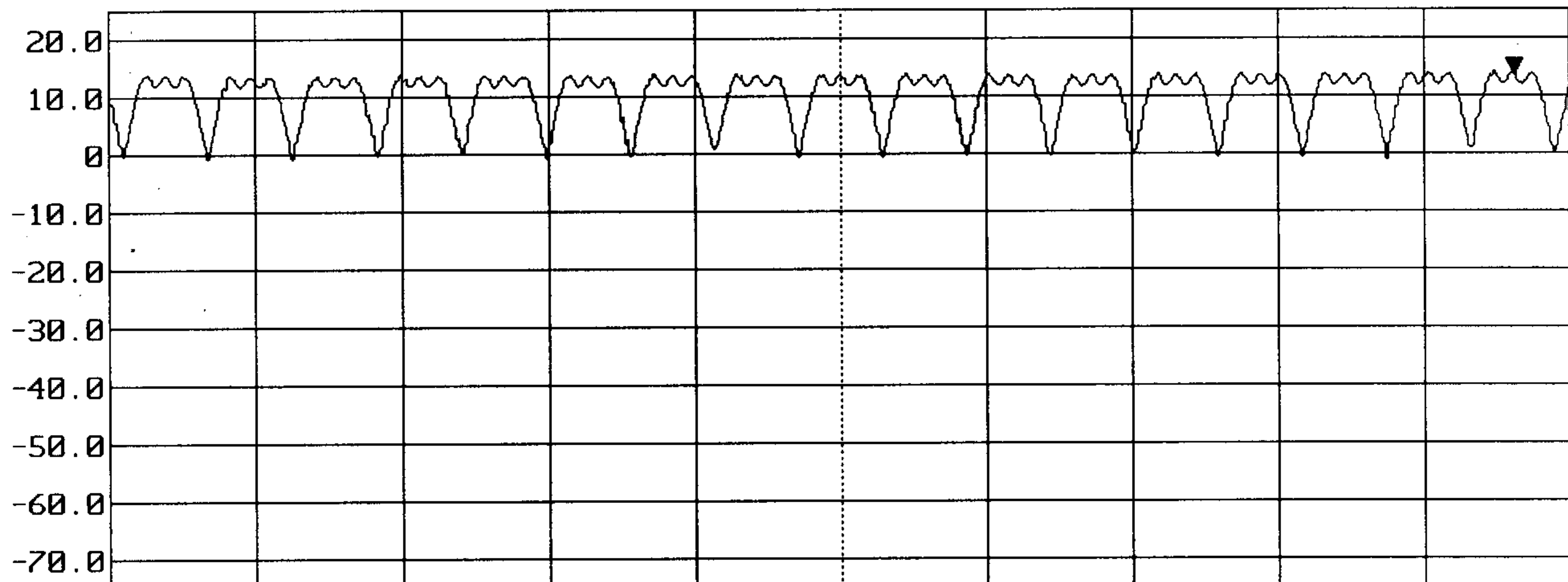
Ref.Lvl 24.90 dBm Marker 13.73 dBm

2.45380 GHz

Res.Bw 493.2 kHz[imp] Vid.Bw 100 kHz

CF.Stp 3.000 MHz RF.Att 40 dB

Unit [dBm]



Start 2.42493 GHz

Span 30 MHz

Center 2.43993 GHz

Sweep 3.0 s

Stop 2.45493 GHz



Date 03.May.'01Time 15:28:12

Ref.Lvl 24.90 dBm

Marker 13.83 dBm

2.45549 GHz

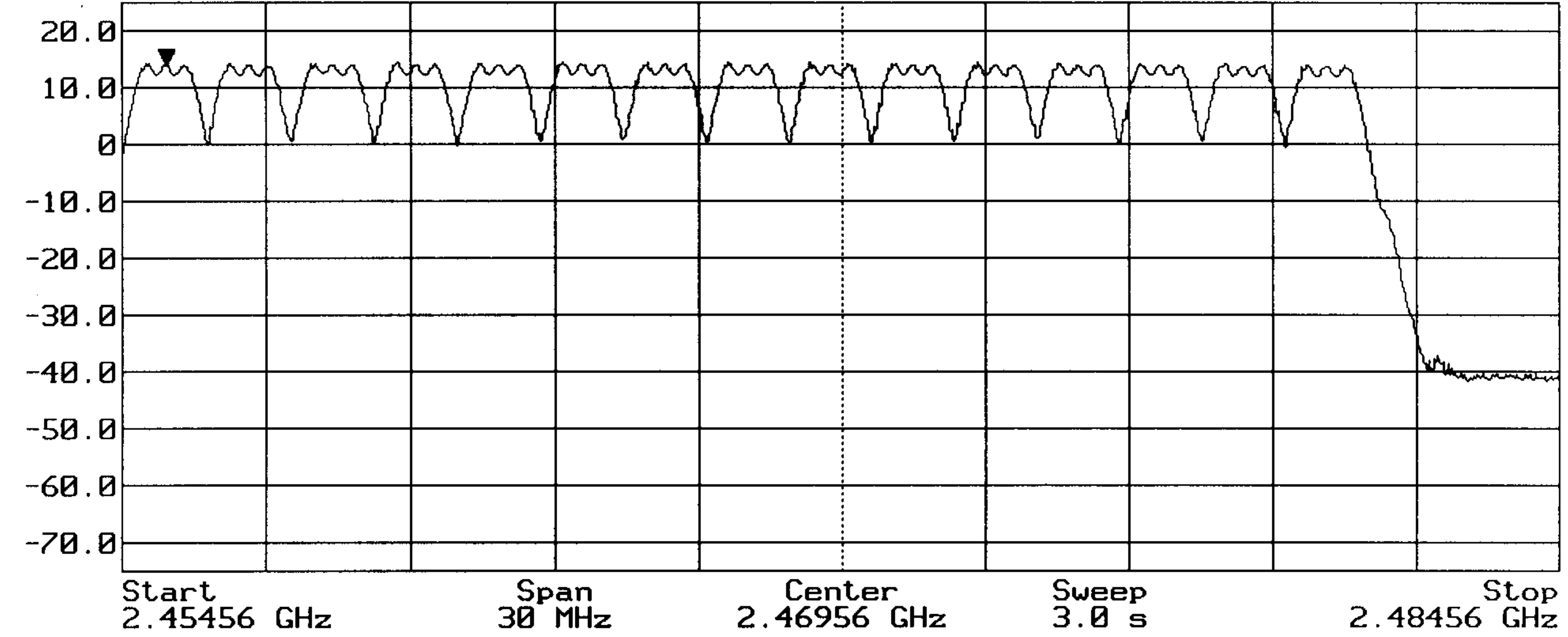
Res.Bw 493.2 kHz[imp]

Uid.Bw 100 kHz

CF.Stp 3.000 MHz

RF.Att 40 dB

Unit [dBm]





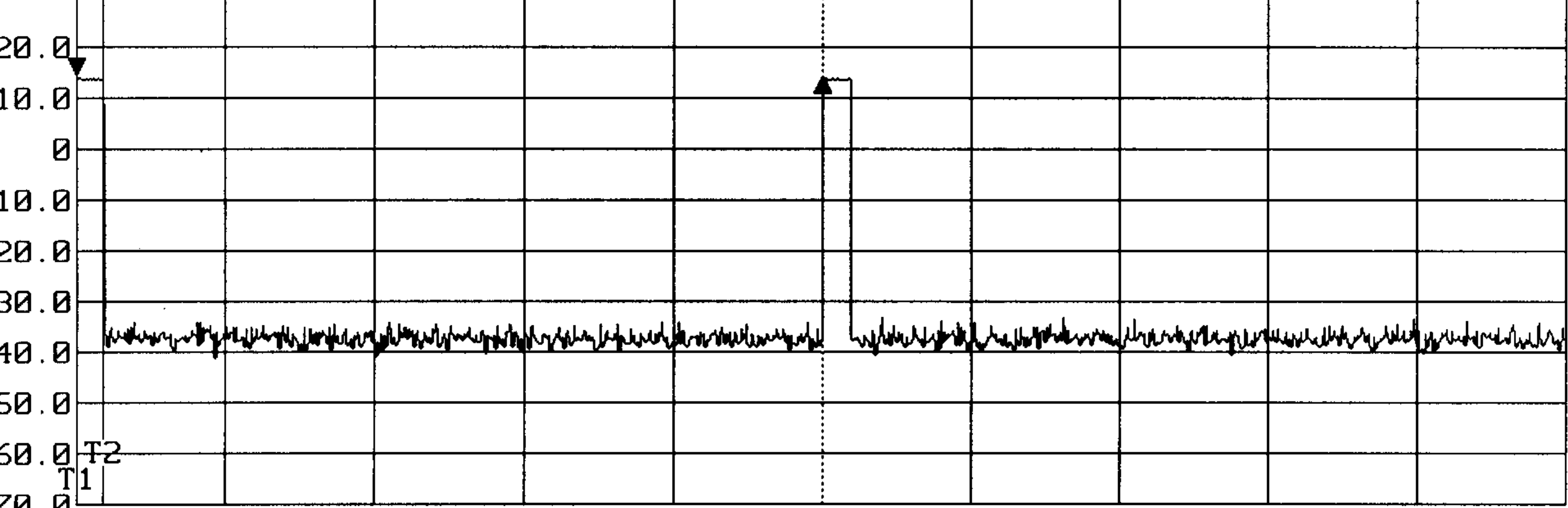
Appendix G

Time of Occupancy (Dwell Time)



Date 02.May.'01 Time 13:49:49 TRG Res.Bw 1.0 MHz[imp] Vid.Bw 1 MHz
Ref.Lvl 29.80 dBm Delta -0.28 dB CF.Stp 74.413 kHz RF.Att 40 dB
Unit [dBm]

T1 0 s D1 OFF
T2 377.777 μs D2 OFF
T1-T2 377.777 μs D1-D2 OFF



Span 0 Hz Center 2.441664 GHz Sweep 20 ms

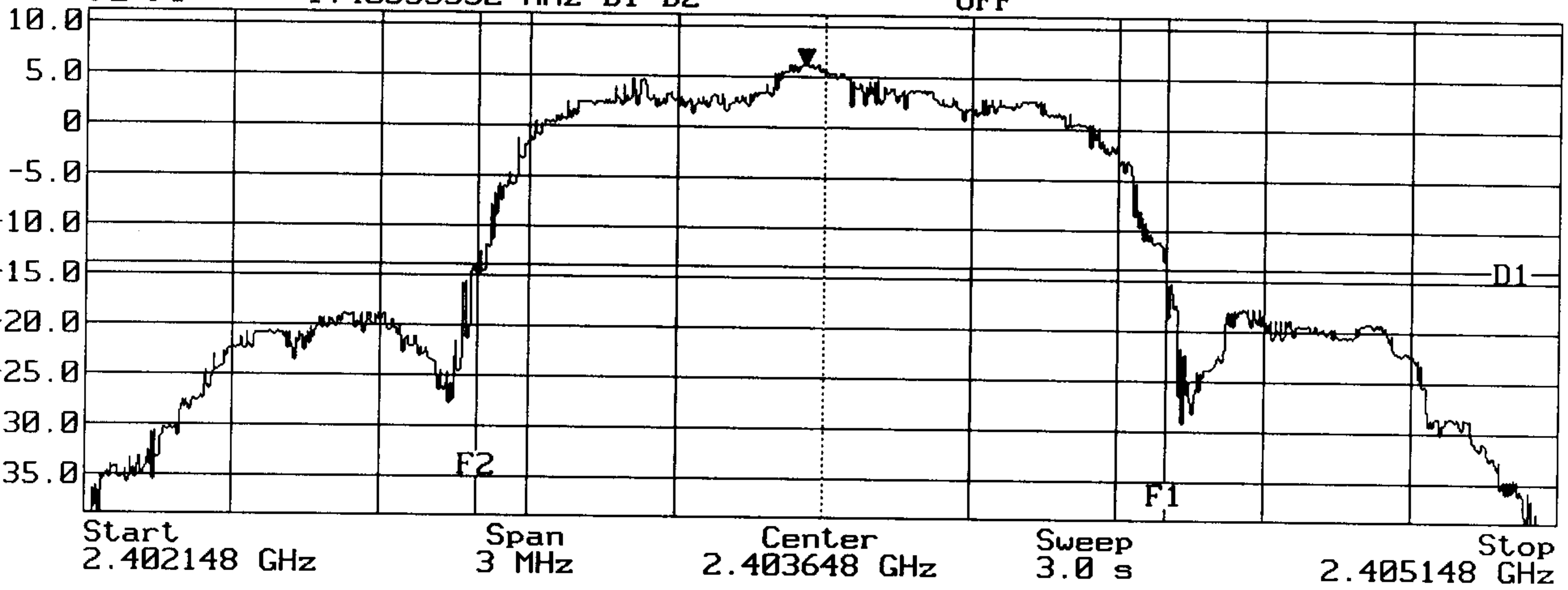


Appendix H

20dB Bandwidth

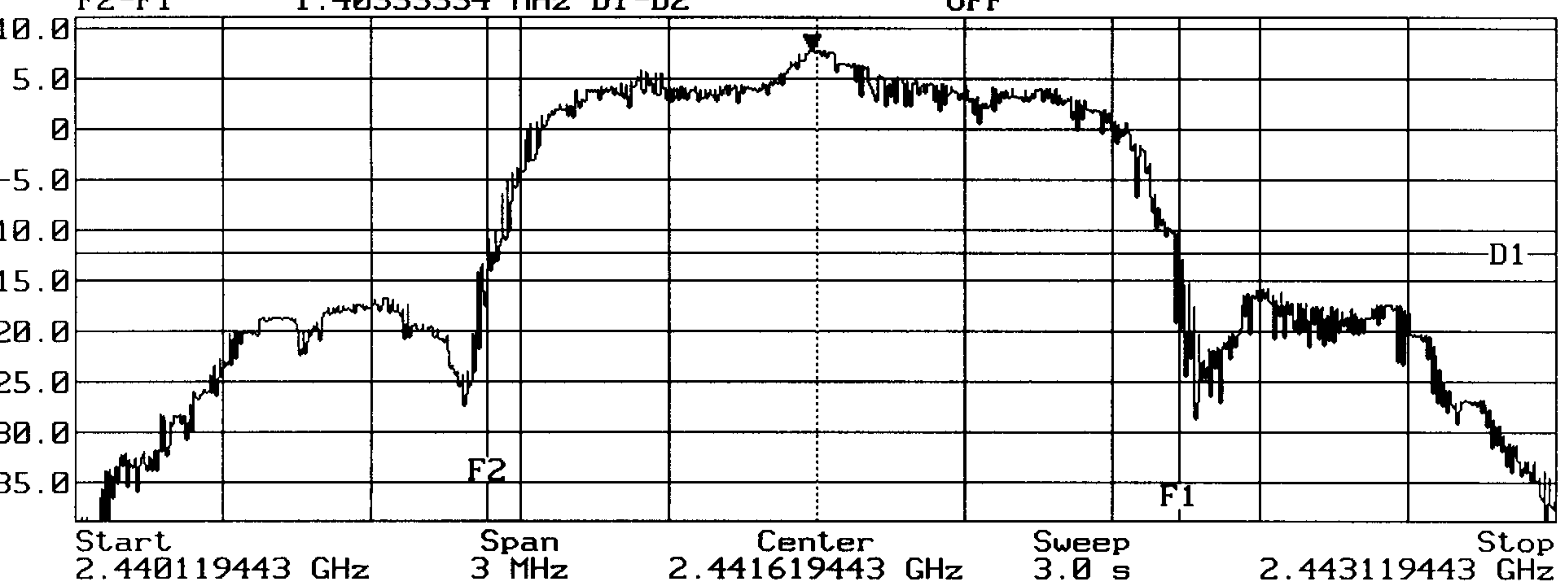


Date 02.May.'01 Time 14:23:35 Res.Bw 31.0 kHz[imp] Vid.Bw 30 kHz
Ref.Lvl 11.00 dBm Marker 6.12 dBm CF.Stp 300.000 kHz RF.Att 40 dB
Unit [dBm]
F1 2.40435133331 GHz D1 -13.88 dBm
F2 2.40294799999 GHz D2 OFF
F2-F1 1.40333332 MHz D1-D2 OFF





Date 02.May.'01 Time 14:58:55 Res.Bw 29.9 kHz[imp] Vid.Bw 300 kHz
Ref.Lvl 11.00 dBm Marker 7.67 dBm CF.Stp 300.000 kHz RF.Att 40 dB
Unit [dBm]
F1 2.44235944299 GHz D1 -12.33 dBm
F2 2.44095610965 GHz D2 OFF
F2-F1 1.40333334 MHz D1-D2 OFF





Date 02.May.'01 Time 14:53:43

Ref.Lvl 11.00 dBm Marker 7.86 dBm

F1 2.48037333332 GHz D1

F2 2.47896742261 GHz D2

F2-F1 1.40591071 MHz D1-D2

Res.Bw 29.9 kHz[imp] Vid.Bw 300 kHz

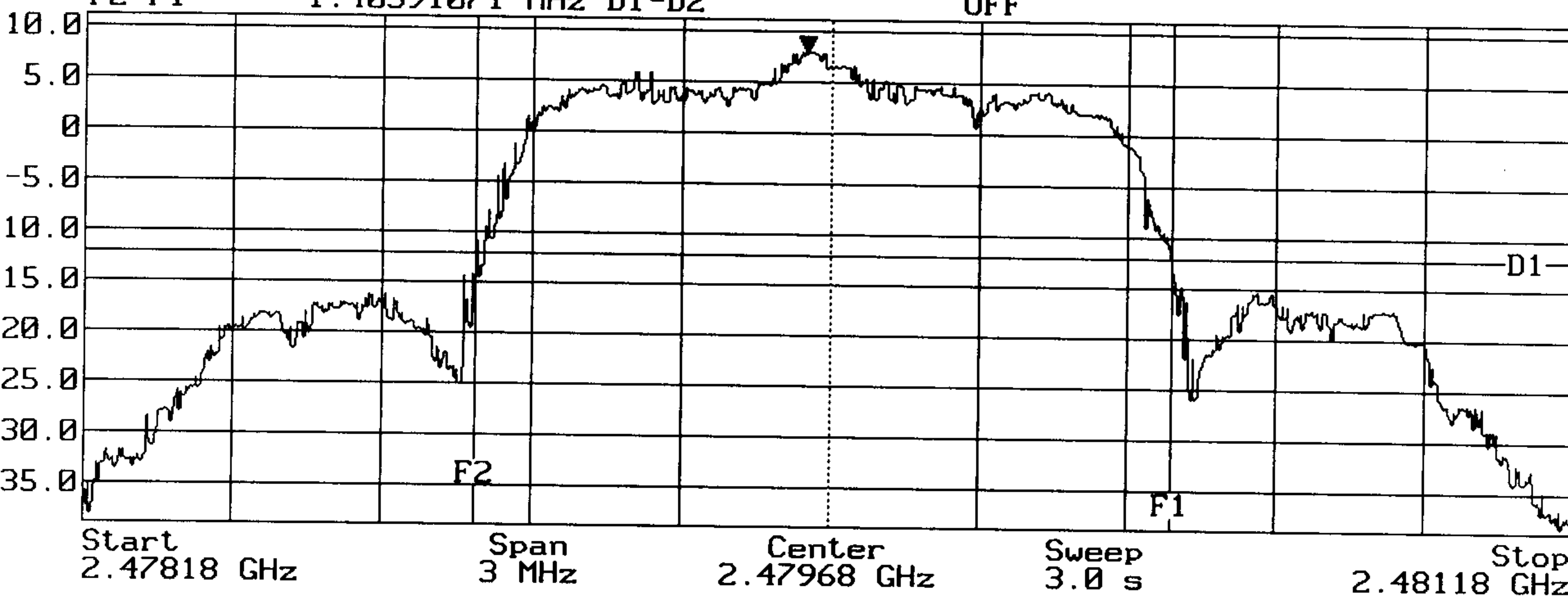
CF.Stp 300.000 kHz RF.Att 40 dB

Unit [dBm]

-12.14 dBm

OFF

OFF





Appendix I

Band-edge Compliance of RF Emissions



Date 02.May.'01 Time 14:36:24

Ref.Lvl 29.80 dBm Marker 12.31 dBm

F1 2.400000000000 GHz D1

F2 2.40293687683 GHz D2

F2-F1 -2.93687683 MHz D1-D2

Res.Bw 116.0 kHz[imp]

Vid.Bw

1 MHz

CF.Stp 500.541 kHz

RF.Att

40 dB

Unit

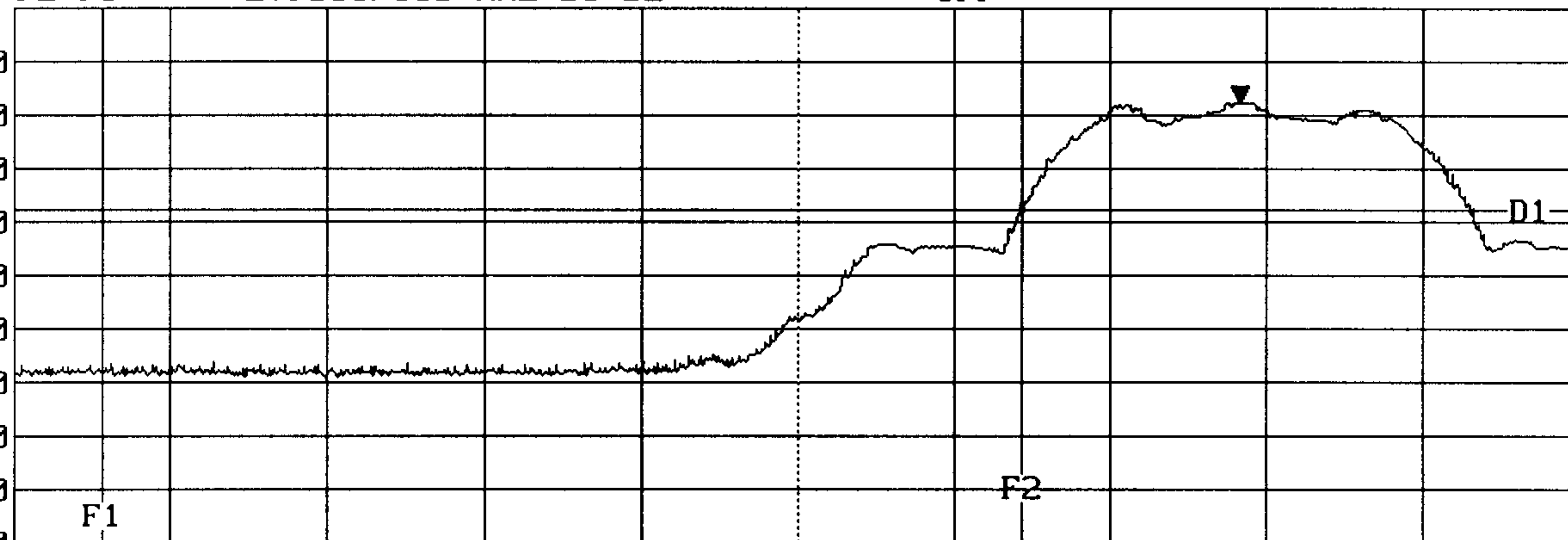
[dBm]

-7.69 dBm

OFF

OFF

20.0
10.0
0
-10.0
-20.0
-30.0
-40.0
-50.0
-60.0
-70.0



Start
2.399713 GHz

Span
5.005 MHz

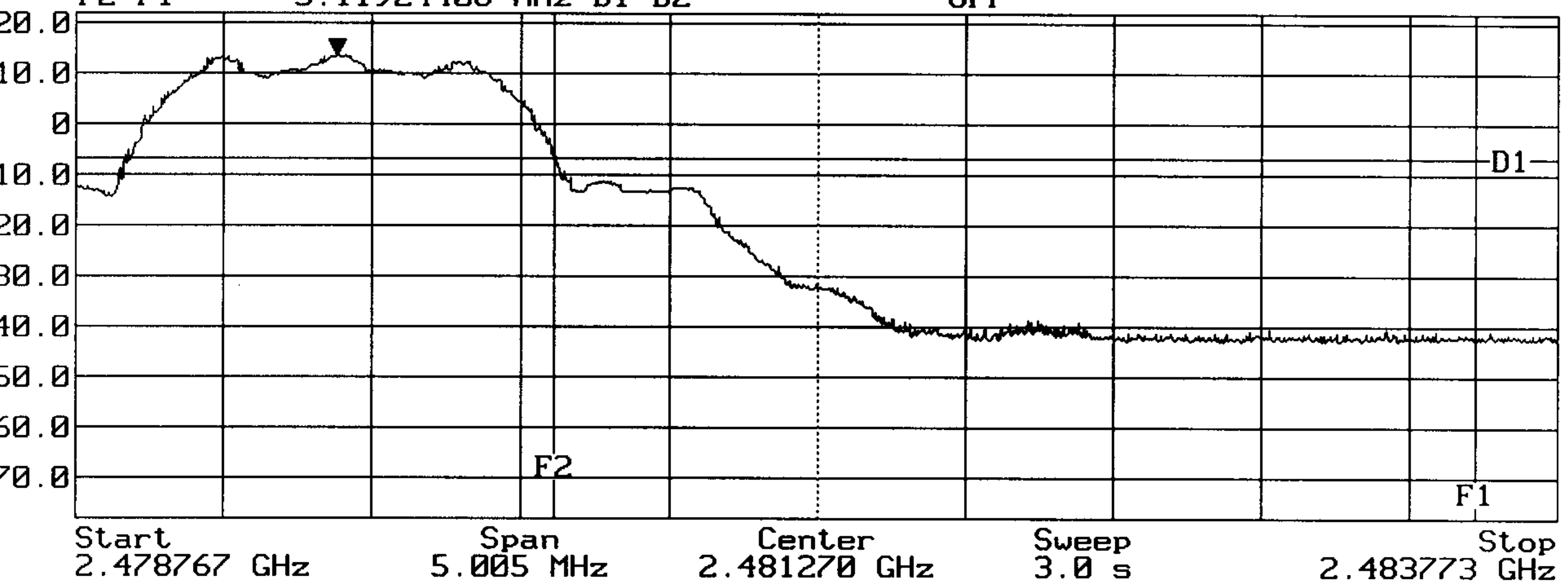
Center
2.402216 GHz

Sweep
3.0 s

Stop
2.404718 GHz



Date 02.May.'01 Time 14:45:51 Res.Bw 116.0 kHz[imp] Vid.Bw 1 MHz
Ref.Lvl 21.70 dBm Marker 13.38 dBm CF.Stp 500.541 kHz RF.Att 40 dB
Unit [dBm]
F1 2.48350000000 GHz D1 -6.73 dBm
F2 2.48038075594 GHz D2 OFF
F2-F1 3.11924406 MHz D1-D2 OFF





Appendix J

Conducted Measurement at (AC) Power Line

Appendix K

DECT M3 evaluation-kit Introduction

FhG IIS-A

DECT M3 evaluation-kit Introduction

DECT_DSY-1000169

	Edition 02	Version 01
Author:	Elfriede Fritschle, Roland Sturm	
Date:	29 March 2001	

List of revisions

[illegible]

1 Table of contents

1	Table of contents	3
2	Declaration	4
3	General	5
4	References	6
5	Evaluation Board	6
5.1	Socket pin assignment	6
5.2	Operation elements	6
5.3	Power supply and rechargeable batteries	7
6	Setting-up operation	7
6.1	Test set-up	7
6.2	Interface configuration	7
6.3	Initialization	7
6.4	Subscription	8
6.5	Synchronisation and location	8
6.6	Connection set-up	8
6.7	Change from DATA MODE into ONLINE COMMAND MODE	9
6.7.1	Change by command	9
6.7.2	Change by control line	9
6.7.3	Reduced function in the ONLINE COMMAND MODE	9
6.8	Change from ONLINE COMMAND MODE into DATA MODE	10
6.9	Disconnection	10
6.9.1	Disconnection by command	10
6.9.2	Disconnection by control line	11

2 Declaration

Use and operation of the DECT M3 evaluation-kit has to be done at your own risk, in particular we do not assume any liability for the operability or suitability for a certain purpose or failures or damages caused by using or operating the DECT M3 evaluation-kits.

The technology contained in the DECT M3 evaluation-kit remains our exclusive property. This contract of purchase does not grant rights of use of any kind. The DECT M3 evaluation-kit may only be used for data transmission by the contractor. It may not be copied, duplicated, modified or altered, neither completely nor partially.

Fraunhofer Institute for Integrated Circuits, Applied Electronics

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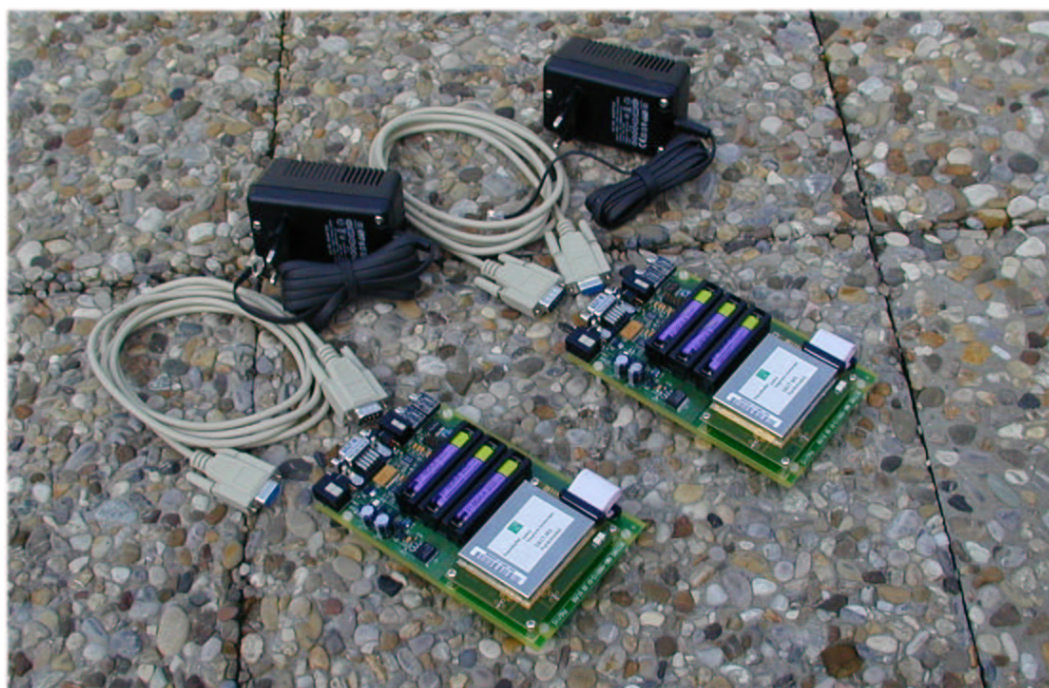
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3 General

The DECT M3 evaluation-kit allows you to test the advantages of the DECT radio technology for wireless speech and data communication in various applications and environments.



A DECT M3 evaluation-kit consists of:

- 2 DECT M3 radio modules
- 2 motherboards with power-regulator and RS-232 line driver
- 2 power supplies
- 2 serial cables
- 2 headsets (optional)

The modules support digital communication according to the DECT standard. The transmission uses a single DECT bearer with a resulting data rate of 24 kbit/s over the air.

The serial software-interface operates with an AT-modem compatible command set, the baudrate is adjustable.

Simultaneous voice and data transmission is supported. Connecting a headset or telephone receiver is possible.

One module is configured as a base station, the other one as a mobile station. The modules are already subscribed to each other.

4 References

- [1] FhG, Technical Description DECT M3 Radio Module Version M3.2, DECTH8S_DSY-1000115
- [2] FhG, DECT M3 radio modem User Manual, DECT_DSY-1000099

5 Evaluation Board

5.1 Socket pin assignment

The evaluation board contains the following connectors:

Connector	Function
CON1	4 pin RJ-45 Western jack for a headset
CON2	9 pin RS232C socket for connecting the controlling data terminal
CON3	6 pin Western jack for connecting the plug-in power supply
CON4	3,5mm stereo socket for connecting a headset receiver
CON5	3,5mm stereo socket for connecting a headset microphone

5.2 Operation elements

The evaluation board has the following operation and configuration elements:

Element	Function
SW1	switch for switching on /off of the wireless module (LED1 signals operating mode)
SW2	key to activate reset of the wireless module
SW3	six DIP switches for the configuration of the radio module, seizure dependent on application
SW4	key (depending on application) to establish or disconnect a connection or for on-air subscription (ref [2])

5.3 Power supply and rechargeable batteries

The Evaluation board may only be operated using three 1,2V NiMH cells size AA or using the plug-in power supply. When using the plug-in power supply (independent of the position of switch SW1) the batteries, if inserted, will be recharged. Charging time is approx. 24 hours. The rechargeable batteries may always stay in the evaluation board. Disconnecting the plug-in power supply will automatically activate the batteries in the evaluation board (and vice versa).

6 Setting-up operation

6.1 Test set-up

Both DECT M3 evaluation-kits must each be connected to a free com-port of a PC.

An appropriate terminal programme, such as Hyper Terminal, should be started on this computer.

The terminal programme must have activated its hardware handshake (RTS/CTS).

6.2 Interface configuration

The V.24 interface is preset with 57,600 bps (8 data bits, 1 stop bit, no parity). This can be set to another rate by using the command:

AT+IPR=transfer rate

with *transfer rate* = {9600, 19200, 38400, 57600, 115200}

This rate is saved automatically and will be used after each reset or power-on.

There will always be a hardware-handshake by means of RTS/CTS-control lines.

6.3 Initialization

After a hardware reset the module will be initialized as follows

- **ATQ0** Output feedback
- **ATE1** Switch on command echo
- **ATV1** Output feedback as text
- **AT&D2** If the computer's DTR line is set to OFF the module in an active connection will switch from DATA MODE into ONLINE COMMAND MODE. The connection will be disconnected
- **AT&C1** DCD line when connected ON

With the exception of the transfer rate these settings can be restored by the command **AT&F** during operation.

6.4 Subscription

Before a mobile part (further on named PP = portable part) can set up a connection to a base station (further on FP = Fixed Part) or a FP can set up a connection to a PP, the respective connecting partner must initially be registered. Doing this the PP must be informed about the DECT identity of the desired FPs or the FP must be informed about the DECT identity of the PP.

This must only be done once as long as there is no log off. [Ref. 2]

The modules have been subscribed to each other by the manufacturer.

6.5 Synchronisation and location

A PP can only set up a connection to a FP if it has been synchronized with the FP and been located. This will be done once after each reset or power-on and it will take only a few seconds.

After successful synchronization and location both the modules' LEDs will be on.

6.6 Connection set-up

A PP can only set up a connection to a FP if it has been synchronized with this FP. Connection set-up will be made by this command:

ATD[<T,P>][<class><agent>][<class called><agent called>]

The wireless module which started the connection set-up will receive the message **CONNECT** after a successful connection and will change into DATA MODE. The wireless module that was called will acknowledge the call with **RING**. At this point the connection has been established and the module is in ONLINE COMMAND MODE. If the user accepts the connection with **ATA** the module will change into DATA MODE and data transmission will set in.

set-up party	called party
...	...
Input: ATD401801	
Result: OK	
	Output: RING
	Input: ATA
Result: CONNECT	Result: CONNECT

The DECT M3 evaluation-kits always have the following number no matter if mobile part or base station.

ATD401801

6.7 Change from DATA MODE into ONLINE COMMAND MODE

In an active connection the module normally is in DATA MODE. In this operating mode all data sent by the user to the module will be received and transmitted. Thus commands will not be recognized. If the module is required to accept commands a switch into the ONLINE COMMAND MODE, in which the module accepts commands, is necessary.

The opposite party cannot recognize this change of operating modes; the connection will not be interrupted.

6.7.1 Change by command

This is done by the escape sequence +++ which is sent to the wireless module by the user.

PP		FP	
Input:	+++	Input:	+++
Result::	OK	Result:	OK

The escape sequence and thus the successful change from DATA MODE into ONLINE COMMAND MODE will be confirmed with **OK** by the radio module. Please note: Before the transmission of the escape sequence the user **may not send signals** to the module for at least **100 ms!**

6.7.2 Change by control line

If the DTR-control line of the computer connected with the wireless module is set to OFF there will be a change from DATA MODE into ONLINE COMMAND MODE in an active connection. For this the wireless module has to be configured with **AT&D1**. The wireless module will confirm this change with **OK**.

6.7.3 Reduced function in the ONLINE COMMAND MODE

The following functions **cannot be executed** in the ONLINE COMMAND MODE and will thus be ended with an **ERROR** message

- further connection set up

6.8 Change from ONLINE COMMAND MODE into DATA MODE

By entering the command **ATO** the user will exit the ONLINE COMMAND MODE and enter into the DATA MODE. This will be confirmed by the wireless module with the message **CONNECT**

	PP
Input:	ATO0
Result:	OK

	FP
Input:	ATO0
Result:	OK

6.9 Disconnection

6.9.1 Disconnection by command

If an active connection is to be disconnected one must change from DATA MODE into ONLINE COMMAND MODE. After the wireless module confirmed the ONLINE COMMAND MODE the user may send the command for connection set up (**ATH**) to the module.

	disconnecting party
	...
	<i>Change into the ONLINE COMMAND MODE has already occurred (either by DTR-line or +++)</i>
Input:	ATH
Result:	OK
Result:	NO CARRIER

	opposite party
	...
Result:	NO CARRIER

6.9.2 Disconnection by control line

If the DTR-control line of the computer which is connected to the wireless module is set into the off mode an active line will be disconnected.

The module changes into the ONLINE COMMAND MODE.

This will only happen if the module initially has been initialized with **AT&D2**

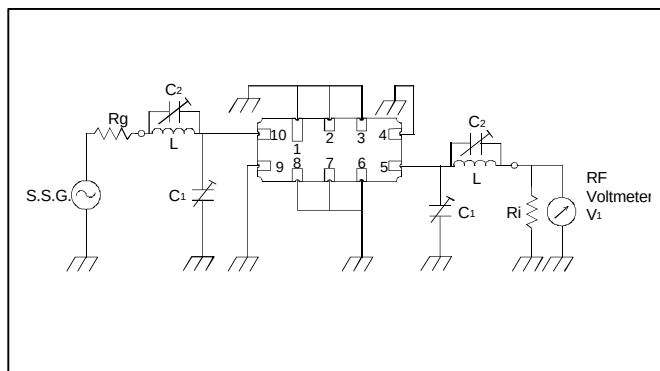
disconnecting party	opposite party
...	...
<i>DTR-line off</i>	
Result: OK	
Result: NO CARRIER	Result: NO CARRIER

***** End of document *****

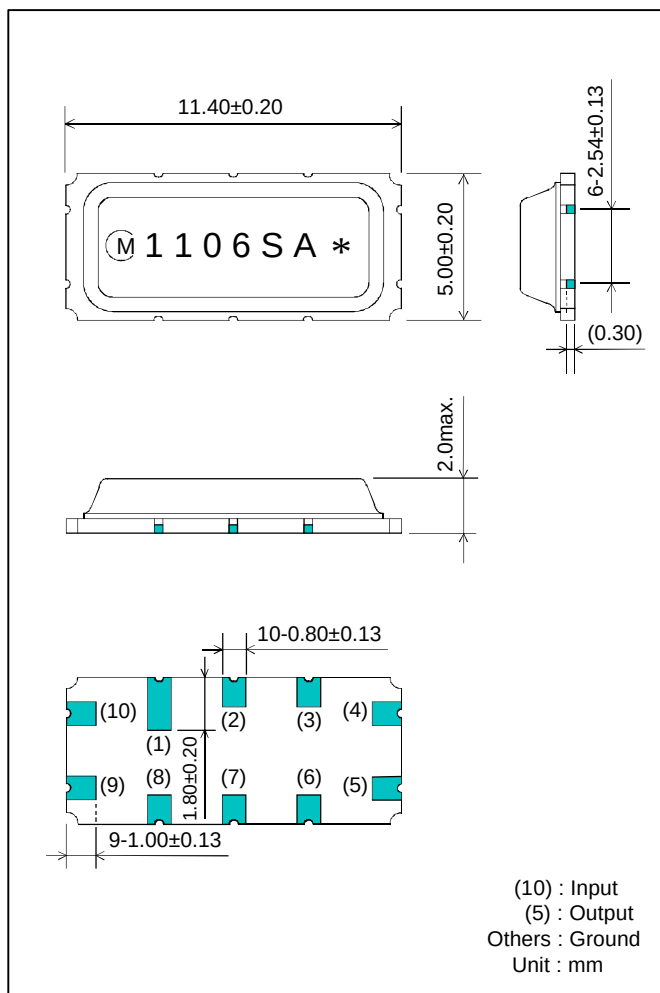
Feature

1. Stable Characteristics
2. Low Insertion loss (4.5dB max.)
3. Balance type

Test Circuit



Package Dimensions



Specification (-10 ... +60 deg.C)

Item	Specification
Nominal Center Frequency (fc)	110.592 MHz
3dB bandwidth (from fc)	+/- 576kHz min.
Stop Band Attenuation (from minimum loss point)	
1) at fc -5.184 MHz	50 dB min.
2) at fc -3.456 MHz	45 dB min.
3) at fc +/- 1.150 MHz	10 dB min.
4) at fc +/- 1.728 MHz	30 dB min.
5) at fc +/- 3.456 MHz	40 dB min.
6) at fc +/- 5.184 MHz	40 dB min.
Insertion Loss (at minimum loss point)	4.5 dB max.
Group Delay Time Deviation (within fc +/- 576 kHz)	0.7μs max.
Input/Output Imp. (nominal)	300 ohm//1.2μH

Frequency Characteristics

