TEST REPORT # EMCC-950432.1FA, 2007-09-18

EQUIPMENT UNDER TEST:

Trade Name:	Telecody
Model:	TX04-315-10
Serial No:	100225
Equipment Category:	Transceiver
Manufacturer:	SOMMER Antriebs- und Funktechnik GmbH
Address:	Hans-Boeckler-Strasse 21-27 73230 Kirchheim/Teck Germany
Phone:	+49-7021-8001-0
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RELEVANT STANDARD(S): 47 CFR Part 15C

RSS-210 Issue 7 (2007-06)

MEASUREMENT PROCEDURE USED:

☒ ANSI C63.4-2003 ☐ FCC/OET MP-4 (1987) ☐ Other

TEST REPORT PREPARED BY:

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TEST PERSONNEL:

Wolfgang Döring

HEAD OF LABORATORY:

Winfried Hoffmann

TEST OF SOMMER ANTRIEBS- UND FUNKTECHNIK GMBH TRANSMITTER TELECODY MODEL TX04-315-10 TO 47 CFR PART 15C AND RSS-210 ISSUE 7 (2007-06)

CONTENTS Page

1 GENERAL INFORMATION

1.1 Purpose

The purpose of this report is to show compliance to the FCC regulations for unlicensed devices operating under section 15.231 of the Code of Federal Regulations title 47.
Further the report addresses compliance with the Industry Canada RSS-210 requirements for the certification of licence-exempt (i.e. unlicensed) low-power radiocommunication devices (LPDs) defined as Category I equipment.

1.2 Limits and Reservations

The test results in this report apply only to the particular Equipment Under Test (EUT) as declared in this report. This test report shall not be reproduced except in full without the written permission of EMCC DR. RAŠEK.

1.3 Test Location

Company Name:	EMCCons DR. RAŠEK
Street:	Moggast, Boelwiese 8
City:	91320 Ebermannstadt
Country:	Germany
Laboratory:	Test Laboratory of EMCC DR. RAŠEK FCC Registration Number: 90566 This site has been fully described in a report submitted to the FCC, and accepted in the letter dated December 15, 2005 Registration Number 90566. Radiated measurements performed on the Open Area Test Site approved by Industry Canada under file number IC 3464-4.
Phone:	+49-9194-9016
Fax:	+49-9194-8125
E-Mail:	emc.cons@emcc.de
Web:	www.emcc.de

1.4 Manufacturer

Company Name:	SOMMER Antriebs- und Funktechnik GmbH
Street:	Hans-Boeckler-Strasse 21-27
City:	73230 Kirchheim/Teck
Country:	Germany
Name for contact purposes:	Mr Dominik Schwarz
Phone:	+49-7021-8001-411
Fax:	+49-7021-8001-403
E-mail:	D.Schwarz@sommer.eu

1.5 Dates

Date of receipt of EUT:	CW 33/2007
Test date:	CW 34 - 36/2007

2 PRODUCT DESCRIPTION

2.1 Equipment Under Test (EUT)

Trade Name:	Telecody
Model:	TX04-315-10
Serial Number:	100225
FCC ID:	T8C003
Industry Canada ID:	6496A-003
Application:	wireless telecommand
Power:	3 V battery, CR123A type
Transmit Frequency:	315 MHz, one RF channe
Modulation:	ASK
Emission designator:	A1D
Lowest frequency in EUT:	9.84375 MHz (clock frequency)
Antenna:	internal, integral antenna
Interface ports:	none
Variants:	Hardware: with or w/o aluminium holder (both tested). Software: Model TX04-315-30 with larger number of codes (not tested) – acc. to the manufacturer: "These two versions only have different software, but they have identical circuits and code format."
Remarks:	none

2.2 EUT Peripherals

None.

2.3 Mode of Operation During Testing

The transmitter was tested in a typical fashion. During preliminary and final emission tests all transmitter channels (buttons) were activated to investigate a worst case emission mode. The emission levels were found to be within 1 dB for all arrangements. The tests were performed with and w/o the aluminium holder. Worst case values are documented.

2.4 Modifications Required for Compliance

None.

3 TEST RESULTS SUMMARY

Summary of Test Results for the following EUT:

Manufacturer: **SOMMER Antriebs- und Funktechnik GmbH**
Device: **Telecody**
Model No.: **TX04-315-10**
Serial Number: **100225**

Requirement	47 CFR Section	RSS, Section	Report Section	Test Result
Antenna Requirement	15.203	RSS-Gen Issue 2 (2007-06), 7.1.4	4	Pass
AC Line Conducted Emissions	15.207	RSS-Gen Issue 2 (2007-06), 7.2.1	5	N.A.
Radiated Spurious Emissions	15.231, 15.209, 15.205(b)	RSS-210 Issue 7 (2007-06), A1.1.2(3)	6	Pass
Periodic Operation Characteristics	15.231(a)	RSS-210 Issue 7 (2007-06), A1.1.1	7	Pass
Field Strength Limits (Fundamental)	15.231(b)	RSS-210 Issue 7 (2007-06), A1.1.2(2)	6	Pass
20 dB Bandwidth (Occupied Bandwidth)	15.231(c)	RSS-210 Issue 7 (2007-06), A1.1.3	8	Pass

N.A. – Not applicable. The EUT is battery powered, only.

The client has made the determination that EUT Condition, Characterization, and Mode of Operation are representative of production units, and meet the requirements of the specifications referenced herein.

Consistent with Industry practice, measurement and test equipment not directly involved in obtaining measurement results but having an impact on measurements (such as cable loss, antenna factors, etc.) are factored into the "Correction Factor" documented in certain test results. Instrumentation employed for testing meets tolerances consistent with known Industry Standards and Regulations.

The measurements contained in this report were made in accordance with the procedure ANSI C63.4 - 2003 and all applicable Public Notices received prior to the date of testing. All emissions from the device were found to be within the limits outlined in this report.
The test results in this report apply only to the particular Equipment Under Test (EUT) as declared in this report.

Test Personnel: Wolfgang Döring
Issuance Date: 2007-09-18

4 ANTENNA REQUIREMENT

Test Requirement: FCC 47 CFR, Part 15C, Industry Canada RSS-Gen Section 7.1.4

4.1 Regulation

15.203 An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of Part 15C. The manufacturer may design the unit so that the user can replace a broken antenna, but the use of a standard antenna jack or electrical connector is prohibited. This requirement does not apply to carrier current devices or to devices operated under the provisions of Sections 15.211, 15.213, 15.217, 15.219, or 15.221. Further, this requirement does not apply to intentional radiators that must be professionally installed, such as perimeter protection systems and some field disturbance sensors, or to other intentional radiators which, in accordance with Section 15.31(d), must be measured at the installation site. However, the installer shall be responsible for ensuring that the proper antenna is employed so that the limits in this Part are not exceeded.

According to DA 00-2225 "OET Extends Effective Date of Antenna Connector Requirement Indefinitely", dated September 28, 2000, the OET extends the effective date of Public Notice, DA 00-1087, indefinitely.

4.2 Result

Manufacturer:	**SOMMER Antriebs- und Funktechnik GmbH**
Device:	**Telecody**
Model No.:	**TX04-315-10**
Serial Number:	**100225**

The antenna is a permanently attached internal antenna (trace on the PCB).

The EUT meets the requirements of this section.

5 CONDUCTED EMISSIONS TEST

Test Requirement: FCC 47 CFR, Part 15C, Industry Canada RSS-Gen Section 7.2.1
Test Procedure: ANSI C63.4-2003, Industry Canada RSS-Gen

5.1 Regulation

Section 15.207 (a) Except as shown in paragraphs (b) and (c) of this section, for an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the limits in the following table, as measured using a 50 µH/50 ohms line impedance stabilization network (LISN). Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower limit applies at the boundary between the frequency ranges.

Frequency of Emission (MHz)	Conducted Limit (dBuV)	
	Quasi-peak (QP)	Average (AV)
0.15-0.5	66 to 56 *	56 to 46 *
0.5-5	56	46
5-30	60	50

* Decreases with the logarithm of the frequency.

Section 15.207 (c) Measurements to demonstrate compliance with the conducted limits are not required for devices which only employ battery power for operation and which do not operate from the AC power lines or contain provisions for operation while connected to the AC power lines. Devices that include, or make provision for, the use of battery chargers which permit operating while charging, AC adaptors or battery eliminators or that connect to the AC power lines indirectly, obtaining their power through another device which is connected to the AC power lines, shall be tested to demonstrate compliance with the conducted limits.

5.1 Test Equipment

Not applicable.

5.2 Test Procedures

Not applicable.

5.3 Test Results

Manufacturer: **SOMMER Antriebs- und Funktechnik GmbH**
Device: **Telecody**
Model No.: **TX04-315-10**
Serial Number: **100225**

The EUT is battery powered only. Therefore - according to Section 15.207 (d) - conducted emissions measurements to demonstrate compliance with the conducted limits are not required.

6 RADIATED EMISSIONS TESTS

Test Requirement: FCC 47 CFR, Part 15C, Industry Canada RSS-210 Annex 1
Test Procedure: ANSI C63.4-2003, Industry Canada RSS-Gen

6.1 Regulation

Section 15.33 Frequency range of radiated measurements:
(a) Unless otherwise noted in the specific rule section under which the equipment operates for an intentional radiator the spectrum shall be investigated from the lowest radio frequency signal generated in the device, without going below 9 kHz, up to at least the frequency shown in this paragraph:
(1) If the intentional radiator operates below 10 GHz: to the tenth harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower.
(4) If the intentional radiator contains a digital device, regardless of whether this digital device controls the functions of the intentional radiator or the digital device is used for additional control or function purposes other than to enable the operation of the intentional radiator, the frequency range shall be investigated up to the range specified in paragraphs (a)(1)-(a)(3) of this section or the range applicable to the digital device, as shown in paragraph (b)(1) of this Section, whichever is the higher frequency range of investigation.
(b) For unintentional radiators *[Remark: Applies to the receiver part / receive mode]*:
(1) Except as otherwise indicated in paragraphs (b)(2) or (b)(3), for an unintentional radiator, including a digital device, the spectrum shall be investigated from the lowest radio frequency signal generated or used in the device, without going below the lowest frequency for which a radiated emission limit is specified, up to the frequency shown in the following table:

Highest frequency generated or used in the device or on which the device operates or tunes (MHz)	Upper frequency of measurement (MHz)
Below 1.705	30
1.705 - 108	1000
108 - 500	2000
500 - 1000	5000
Above 1000	5th harmonic of the highest frequency or 40 GHz, whichever is lower

(3) Except for a CB receiver, a receiver employing superheterodyne techniques shall be investigated from 30 MHz up to at least the second harmonic of the highest local oscillator frequency generated in the device. If such receiver is controlled by a digital device, the frequency range shall be investigated up to the higher of the second harmonic of the highest local oscillator frequency generated in the device or the upper frequency of the measurement range specified for the digital device in paragraph (b)(1) of this Section.

Section 15.35 Measurement detector functions and bandwidths.
The conducted and radiated emission limits shown in this Part are based on the following, unless otherwise specified elsewhere in this Part:
(a) On any frequency or frequencies below or equal to 1000 MHz, the limits shown are based on measuring equipment employing a CISPR quasi-peak detector function and related measurement bandwidths, unless otherwise specified. The specifications for the measuring instrument using the CISPR quasi-peak detector can be found in Publication 16 of the International Special Committee on Radio Interference (CISPR) of the International Electrotechnical Commission. As an alternative to CISPR quasi-peak measurements, the responsible party, at its option, may demonstrate compliance

with the emission limits using measuring equipment employing a peak detector function, properly adjusted for such factors as pulse desensitization, as long as the same bandwidths as indicated for CISPR quasi-peak measurements are employed.
Note: For pulse modulated devices with a pulse-repetition frequency of 20 Hz or less and for which CISPR quasi-peak measurements are specified, compliance with the regulations shall be demonstrated using measuring equipment employing a peak detector function, properly adjusted for such factors as pulse desensitization, using the same measurement bandwidths that are indicated for CISPR quasi-peak measurements.
(b) On any frequency of frequencies above 1000 MHz, the radiated limits shown are based upon the use of measurement instrumentation employing an average detector function. When average radiated emission measurements are specified in the regulations, including emission measurements below 1000 MHz, there is also a limit on the radio frequency emissions, as measured using instrumentation with a peak detector function, corresponding to 20 dB above the maximum permitted average limit for the frequency being investigated unless a different peak emission limit is otherwise specified in the rules in this part, e.g., see § 15.255. Unless otherwise specified, measurements above 1000 MHz shall be performed using a minimum resolution bandwidth of 1 MHz. Measurement of AC power line conducted emissions are performed using a CISPR quasipeak detector, even for devices for which average radiated emission measurements are specified.
(c) Unless otherwise specified, e.g. Section 15.255(b), when the radiated emission limits are expressed in terms of the average value of the emission, and pulsed operation is employed, the measurement field strength shall be determined by averaging over one complete pulse train, including blanking intervals, as long as the pulse train does not exceed 0.1 seconds. As an alternative (provided the transmitter operates for longer than 0.1 seconds) or in cases where the pulse train exceeds 0.1 seconds, the measured field strength shall be determined from the average absolute voltage during a 0.1 second interval during which the field strength is at its maximum value. The exact method of calculating the average field strength shall be submitted with any application for certification or shall be retained in the measurement data file for equipment subject to notification or verification.

Section 15.209 (a) Except as provided elsewhere in this subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

Frequency	Field Strength	Measurement distance
(MHz)	(microvolts/meter)	(meters)
0.009–0.490	2400/F(kHz)	300
0.490–1.705	24000/F(kHz)	30
1.705–30.0	30	30
30–88	100	3
88–216	150	3
216–960	200	3
Above 960	500	3

(b) In the emission table above, the tighter limit applies at the band edges.
(c) The level of any unwanted emissions from an intentional radiator operating under these general provisions shall not exceed the level of the fundamental emission. For intentional radiators which operate under the provisions of other sections within this part and which are required to reduce their unwanted emissions to the limits specified in this table, the limits in this table are based on the frequency of the unwanted emission and not the fundamental frequency. However, the level of any unwanted emissions shall not exceed the level of the fundamental frequency.
(d) The emission limits shown in the above table are based on measurements employing a CISPR quasi peak detector except for the frequency bands 9–90 kHz, 110–490 kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector.

(e) The provisions in §§ 15.31, 15.33, and 15.35 for measuring emissions at distances other than the distances specified in the above table, determining the frequency range over which radiated emissions are to be measured, and limiting peak emissions apply to all devices operated under this part.
(f) In accordance with Section 15.33(a), in some cases the emissions from an intentional radiator must be measured to beyond the tenth harmonic of the highest fundamental frequency designed to be emitted by the intentional radiator because of the incorporation of a digital device. If measurements above the tenth harmonic are so required, the radiated emissions above the tenth harmonic shall comply with the general radiated emission limits applicable to the incorporated digital device, as shown in Section 15.109 and as based on the frequency of the emission being measured, or, except for emissions contained in the restricted frequency bands shown in Section 15.205, the limit on spurious emissions specified for the intentional radiator, whichever is the higher limit. Emissions which must be measured above the tenth harmonic of the highest fundamental frequency designed to be emitted by the intentional radiator and which fall within the restricted bands shall comply with the general radiated emission limits in Section 15.109 that are applicable to the incorporated digital device.

Section 15.231(b) In addition to the provisions of Section 15.205, the field strength of emissions from intentional radiators operated under this Section shall not exceed the following:

Fundamental Frequency (MHz)	Field Strength of Fundamental (microvolts/meter)	Field Strength of Spurious Emissions (microvolts/meter)
40.66 - 40.70	2,250	225
70 - 130	1,250	125
130 - 174	1,250 to 3,750 **	125 to 375 **
174 - 260	3,750	375
260 - 470	3,750 to 12,500 **	375 to 1,250 **
Above 470	12,500	1,250

** Linear interpolations

[Where F is the frequency in MHz, the formulas for calculating the maximum permitted fundamental field strengths are as follows: for the band 130-174 MHz, µV/m at 3 meters = 56.81818(F) - 6136.3636; for the band 260-470 MHz, µV/m at 3 meters = 41.6667(F) - 7083.3333. The maximum permitted unwanted emission level is 20 dB below the maximum permitted fundamental level.]

(1) The above field strength limits are specified at a distance of 3 meters. The tighter limits apply at the band edges.

(2) Intentional radiators operating under the provisions of this Section shall demonstrate compliance with the limits on the field strength of emissions, as shown in the above table, based on the average value of the measured emissions. As an alternative, compliance with the limits in the above table may be based on the use of measurement instrumentation with a CISPR quasi-peak detector. The specific method of measurement employed shall be specified in the application for equipment authorization. If average emission measurements are employed, the provisions in Section 15.35 for averaging pulsed emissions and for limiting peak emissions apply. Further, compliance with the provisions of Section 15.205 shall be demonstrated using the measurement instrumentation specified in that section.

(3) The limits on the field strength of the spurious emissions in the above table are based on the fundamental frequency of the intentional radiator. Spurious emissions shall be attenuated to the average (or, alternatively, CISPR quasi-peak) limits shown in this table or to the general limits shown in Section 15.209, whichever limit permits a higher field strength.

6.2 Test Equipment

Type	Manufacturer/ Model No.	EMCC Ident No.	Last Calibration	Calibration Interval
Loop Antenna (1.7 MHz - 30 MHz)	Rohde & Schwarz HFH2-Z2	374	2007-09	36 months
Receiver (1.7 MHz - 30 MHz)	Rohde & Schwarz ESS	264	2006-04	18 months
Antenna (30 MHz - 1 GHz)	EMCO Model 3143	897	2007-09	36 months
Receiver (30 MHz - 1 GHz)	Rohde & Schwarz ESS	303	2007-07	18 months
Antenna (1 GHz – 3.5 GHz)	Schwarzbeck BBHA 9120 D	549	2007-08	36 months
EMI Receiver / Analyzer (30 MHz - 1 GHz prescan) (1 GHz – 3.5 GHz)	Rohde & Schwarz ESU8	516	2007-03	12 months

6.3 Test Procedures

Portable, small, lightweight, or modular devices that may be hand-held, worn on the body, or placed on a table during operation shall be positioned on a nonconducting platform, the top of which is 80 cm above the reference groundplane. Ceiling and wall-mounted devices shall also be positioned on a tabletop for testing purposes.

The EUT was tested on a 0.8 meter high platform. Measurement above 1 GHz performed placing the EUT at 1.5 meter high for better alignment with the antenna.

Preview tests are performed to determine the "worst case" mode of operation. With the EUT operating in "worst case" mode, emissions from the unit are maximized by adjusting the polarization and height of the receive antenna and rotating the EUT on the turntable. Manipulating the system cables also maximizes EUT emissions *[Remark: Not applicable]*. All tests performed with the EUT placed in 3 axis on the nonconductive platform. Worst case emissions are listed under chapter: test results.

New batteries were installed at the beginning of the tests.

Radiated Emissions Test Characteristics	
Frequency range	1.7 MHz – 3,200 MHz
Test distance	3 m*
Test instrumentation resolution bandwidth	10 kHz (1.7 MHz - 30 MHz)
	120 kHz (30 MHz - 1,000 MHz)
	1 MHz (1,000 MHz - 3,500 MHz)
Receive antenna scan height	1 m - 4 m
Receive antenna polarization	Horizontal (H-field, f < 30 MHz)
	Vertical/Horizontal (E-field, f > 30 MHz)

* According to Section 15.31 (f)(1): At frequencies at or above 30 MHz, measurements may be performed at a distance other than what is specified provided: measurements are not made in the near field except where it can be shown that near field measurements are appropriate due to the characteristics of the device; and it can be demonstrated that the signal levels needed to be measured at the distance employed can be detected by the measurement equipment. (...) When performing measurements at a distance other than that specified, the results shall be extrapolated to the specified distance using an extrapolation factor of 20 dB/decade (inverse linear-distance for field strength

measurements; inverse-linear-distance-squared for power density measurements).
According to Section 15.31 (f)(2) At frequencies below 30 MHz, measurements may be performed at a distance closer than that specified in the regulations; however, an attempt should be made to avoid making measurements in the near field. Pending the development of an appropriate measurement procedure for measurements performed below 30 MHz, when performing measurements at a closer distance than specified, the results shall be extrapolated to the specified distance by either making measurements at a minimum of two distances on at least one radial to determine the proper extrapolation factor or by using the square of an inverse linear distance extrapolation factor (40 dB/decade).

6.4 Calculation of Field Strength Limits

Fundamental field strength limits for the band 260 – 470 MHz:

µV/m at 3 meters = 41.6667(F[MHz]) – 7083.3333 = 41.6667* 315 – 7083.3333 = 6,041.7

6,041.7 µV/m corresponds with 75.6 dBµV/m.

The maximum permitted unwanted emission level is 20 dB below the maximum permitted fundamental level, i.e. 55.6 dBµV/m.

6.5 Calculation of Average Correction Factor

The average correction factor is computed by analyzing the "worst case" on time in any 100 mSec time period and using the formula:

Corrections Factor (dB) = 20*log (worst case on time/100 mSec)

Procedure during test:
The relationship between average and peak mode reading has been confirmed by direct measurement using the receiver's average and peak detectors.

All emission measurements performed using the test receiver's average detector and the max. hold facility; i.e. the average value measured directly without the necessity of additional correction factor.

6.6 Field Strength Calculation

The field strength is calculated by adding the Antenna Factor and Cable Factor. The basic equation with a sample calculation is as follows:
FS = RA + AF + CF
where
FS = Field Strength in dBµV/m
RA = Receiver Amplitude in dBµV
AF = Antenna Factor in dB(1/m)
CF = Cable Attenuation Factor in dB
Assume a receiver reading of 23.5 dBµV is obtained. The Antenna Factor of 7.4 dB(1/m) and a Cable Factor of 1.1 dB are added, giving a field strength of 32 dBµV/m. The 32 dBµV/m value can be mathematically converted to its corresponding level in µV/m.
FS = 23.5 + 7.4 + 1.1 = 32 [dBµV/m]
Level in µV/m = Common Antilogarithm (32/20) = 39.8

Note: For measurement up to 1000 MHz the Antenna Factor already includes the cable attenuation.
For test distance other than what is specified, but fulfilling the requirements of Section 15.31 (f)(1) the field strength is calculated by adding additionally an extrapolation factor of 20 dB/decade (inverse linear-distance for field strength measurements). The basic equation with a sample calculation is as follows:
FS = FST + DF

where
FS = Field Strength in dBµV/m
FST = Field Strength at test distance in dBµV/m
DF = Distance Extrapolation Factor in dB,
where DF = 20 log (Dtest/Dspec) where Dtest = Test Distance and Dspec = Specified Distance
Assume the tests performed at a reduced Test Distance of 1.5 m instead of the Specified Distance of 3 m giving a Distance Extrapolation Factor of DF = 20 log(1.5m/3m) = -6 dB.
Assuming a measured field strength level of 32 dBµV/m is obtained. The Distance Factor of -6 dB is added, giving a field strength of 26 dBµV/m. The 26 dBµV/m value can be mathematically converted to its corresponding level in µV/m.
FS = 23.5 + 7.4 + 1.1 - 6 = 26 [dBµV/m]
Level in µV/m = Common Antilogarithm (26/20) = 20

Note: Emissions above 1 GHz measured with a receiver reading in dBm.
For the 50 Ohms system a conversion factor of +107 dB is applicable to convert dBm into dBµV.

The field strength is calculated as follows:
$FS = RA_{dBm} + 107 + AF + CF$
where
FS = Field Strength in dBµV/m
RA_{dBm} = Receiver Amplitude in dBm
AF = Antenna Factor in dB(1/m)
CF = Cable Attenuation Factor in dB
Assume a receiver reading of -89 dBm is obtained. The Conversion Factor of +107 dB, the Antenna Factor of 27.9 dB(1/m) and a Cable Factor of 0.6 dB are added, giving a field strength of 46.5 dBµV/m. The 46.5 dBµV/m value can be mathematically converted to its corresponding level in µV/m.

FS = -89 + 107 + 27.9 + 0.6 = 46.5 [dBµV/m]

6.7 Test Results

Manufacturer: **SOMMER Antriebs- und Funktechnik GmbH**
Device: **Telecody**
Model No.: **TX04-315-10**
Serial Number: **100225**

The EUT meets the requirements of this section.

Test Personnel: Wolfgang Döring

Test Date: 2007-08-23, -24, -27, 2007-09-03

Detailed test data please refer to the following pages.

6.7.1 Magnetic Field (f = 1.7 MHz to 30 MHz)

The magnetic field test was performed in a distance of 2 m. Therefore a distance correction factor of 47 dB is applicable (= correction from 30 m to 2 m).
The plot below shows the worst case emissions of the EUT in TX and standby mode. No emissions were detected. The noise is < 33 dBµV/m (worst case), which means a corrected result of < - 18 dBµV/m at 30 m. The limit to §15.209 (a) is 30 µV/m (= 29.5 dBµV/m) at 30 m.

EMCCons DR.RASEK

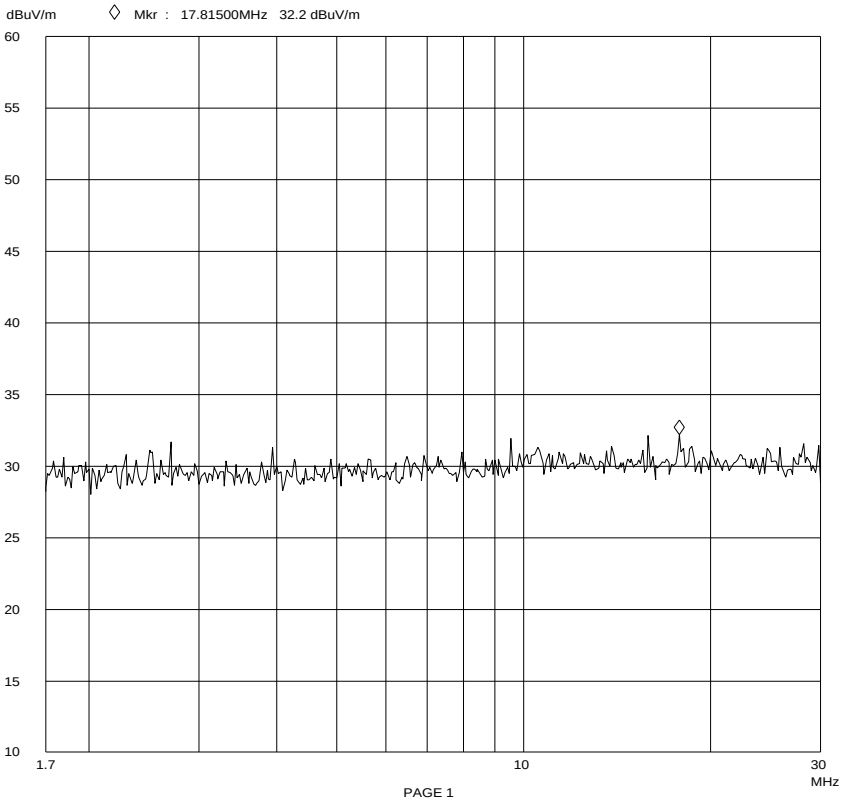
03. Sep 07 14:08

H-FIELD EMISSIONS d=2m

EUT:	TX04-315-10 SN100225
Manuf:	Sommer
Op Cond:	Transmitting
Operator:	Doering
Test Spec:	47CFR Part15C
Comment:	EUT / antenna all orientations
	EUT w/o holder

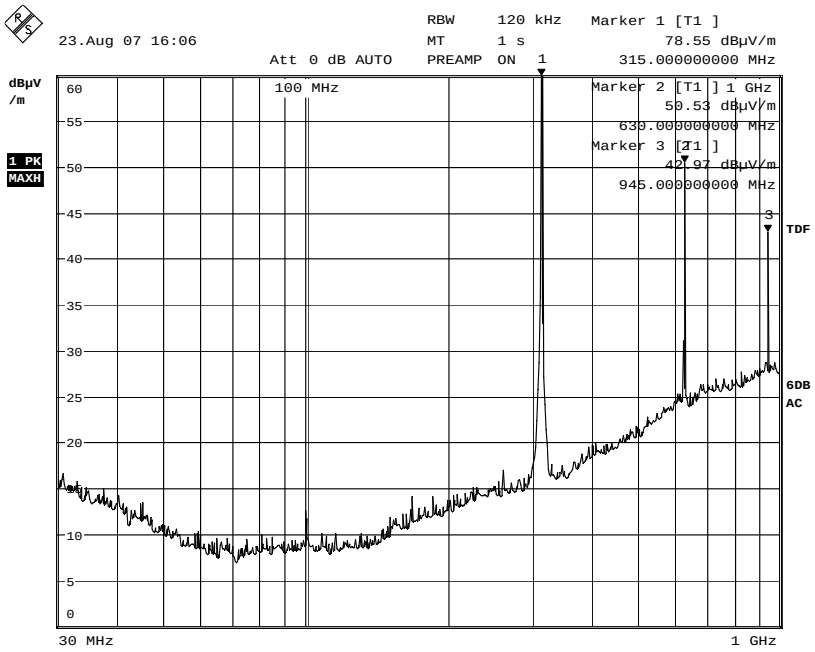
Scan Settings (1 Range)

Frequencies			Receiver Settings					
Start	Stop	Step	IF BW	Detector	M-Time	Atten	Preamp	OpRge
1.7M	30M	5k	10k	PK	10ms	0dBLD ON		30dB



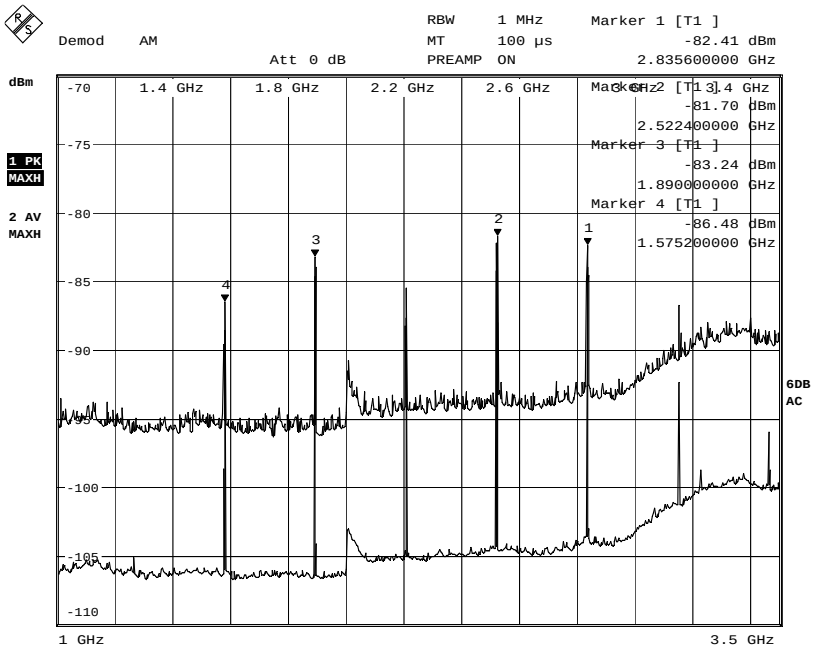
Plot 6.7.1: Magnetic Field emissions at 2m distance

6.7.2 Electric Field (f = 30 MHz to 3.5 GHz)



TX04-315-10: TX modulated mode, spurious prescan d=3m
Date: 23.AUG.2007 16:06:13

Plot 6.7.2-1: representative pre-scan plot (30 MHz to 1 GHz)



TX04-315-10 w/o holder d=3m EUT:v+h+h1, ANT:v
Date: 27.AUG.2007 10:28:57

Plot 6.7.2-2: representative pre-scan plot (30 MHz to 1 GHz)

TEST OF SOMMER ANTRIEBS- UND FUNKTECHNIK GMBH TRANSMITTER TELECODY MODEL TX04-315-10 TO 47 CFR PART 15C AND RSS-210 ISSUE 7 (2007-06)

EMCCons DR. RASEK
Moggast, Boelwiese 8
D-91320 Ebermannstadt

Project#	950432.1F	Date	Name
gemessen, tested:		2007-08-24	Döring

Emissions, Field Strength

FCC Section 15.231
emissions up to 1GHz

Meßabstand, Test Distance d (m): 3
Antennas: EMCO 3143, SN 1269, 3m

Gerätetyp, Unit type:	TX04-315-10		
Ser.-Nr., S/N:	100225		
Betr.-Zustand, Oper. condition:	transmitting	315	MHz
Hersteller, Manufacturer:	Sommer		

Bemerkungen, Remarks:

AF includes antenna cable attenuation

Frequency Frequenz	Detector	Reading Anzeigewert	Ant. Factor Ant. Faktor	Cable Att. Dämpfung	Result @ d Ergebnis in d	Dist. Corr. Abst.K.	Result Ergebnis	Result Ergebnis	Limit Grenzwert	Limit Grenzwert	Margin	Polari-sation	Remarks Bemerkungen
MHz		dBµV	dB	dB	dBµV/m	dB	dBµV/m	µV/m	dBµV/m	µV/m	dB	EUT/ANT	
315	AV	55.5	17.4	0	72.9	0.0	72.9	4415.7	75.6	6041.8	2.7	h/h	fundamental; w/o holder
315	Peak	70	17.4	0	87.4	0.0	87.4	23442.3	95.6	60417.7	8.2	h/h	
630	AV	20.6	23.9	0	44.5	0.0	44.5	167.9	55.6	604.2	11.1	h/h	w/o holder
630	Peak	35.1	23.9	0	59	0.0	59.0	891.3	75.6	6041.8	16.6	h/h	
915	AV	10.7	27.6	0	38.3	0.0	38.3	82.2	55.6	604.2	17.3	h/h	w/o holder
915	Peak	24.7	27.6	0	52.3	0.0	52.3	412.1	75.6	6041.8	23.3	h/h	

Table 6.7.2-1: Final results, emissions up to 1 GHz, receiver bandwidth 120 kHz, worst-case results listed, only

EMCCons DR. RASEK
Moggast, Boelwiese 8
D-91320 Ebermannstadt

Project#	950432.1F	Date	Name
gemessen, tested:		2007-08-27	Döring

Emissions, Field Strength

FCC Section 15.231
spurious emissions, harmonics above 1 GHz

Meßabstand, Test Distance d (m): 3
Antenna: BBHA 9120D, S/N 248

Gerätetyp, Unit type:	TX04-315-10		
Ser.-Nr., S/N:	100225		
Betr.-Zustand, Oper. condition:	transmitting	315	MHz
Hersteller, Manufacturer:	Sommer		

Bemerkungen, Remarks:

Frequency Frequenz	Detector	Reading Anzeigewert	Ant. Factor Ant. Faktor	Cable Att. Dämpfung	Result @ d Ergebnis in d	Dist. Corr. Abst.K.	Result Ergebnis	Result Ergebnis	Limit Grenzwert	Limit Grenzwert	Margin	Polari-sation	Remarks Bemerkungen
MHz		dBm	dB	dB	dBµV/m	dB	dBµV/m	µV/m	dBµV/m	µV/m	dB	EUT/ANT	
1260	AV	-103.9	25.3	0.5	28.9	0.00	28.90	27.86	55.62	604.18	26.72	h/h	w/o holder
1260	Peak	-90.4	25.3	0.5	42.4	0.00	42.40	131.83	75.62	6041.77	33.22	h/h	w/o holder
1575	AV	-98.5	25.2	0.5	34.2	0.00	34.20	51.29	53.98	500.00	19.78	h/h	w/o holder
1575	Peak	-85.1	25.2	0.5	47.6	0.00	47.60	239.88	73.98	5000.00	26.38	h/h	w/o holder
1890	AV	-90.7	25.5	0.6	42.4	0.00	42.40	131.83	55.62	604.18	13.22	h/v	w/o holder
1890	Peak	-77.9	25.5	0.6	55.2	0.00	55.20	575.44	75.62	6041.77	20.42	h/v	w/o holder
2205	AV	-89	27.9	0.6	46.5	0.00	46.50	211.35	53.98	500.00	7.48	h/h	w/o holder
2205	Peak	-76.1	27.9	0.6	59.4	0.00	59.40	933.25	73.98	5000.00	14.58	h/h	w/o holder
2520	AV	-95	27.6	0.7	40.3	0.00	40.30	103.51	55.62	604.18	15.32	h/h	w/o holder
2520	Peak	-81.7	27.6	0.7	53.6	0.00	53.60	478.63	75.62	6041.77	22.02	h/h	w/o holder
2835	AV	-91.6	28	0.7	44.1	0.00	44.10	160.32	53.98	500.00	9.88	h1/h	with holder
2835	Peak	-78.5	28	0.7	57.2	0.00	57.20	724.44	73.98	5000.00	16.78	h1/h	with holder
3150	AV	-94.5	28.5	0.8	41.8	0.00	41.80	123.03	55.62	604.18	13.82	h1/h	with holder
3150	Peak	-81.2	28.5	0.8	55.1	0.00	55.10	568.85	75.62	6041.77	20.52	h1/h	with holder

Table 6.7.2-2: Final results, emissions above 1 GHz, receiver bandwidth 1000 kHz, worst-case results listed, only

7 PERIODIC OPERATION CHARACTERISTICS

Test Requirement: FCC CFR47 Part 15C, Industry Canada RSS-210 Annex 1

7.1 Periodic Operation

7.1.1 Regulation

15.231(a) The provisions of this Section are restricted to periodic operation within the band 40.66 - 40.70 MHz and above 70 MHz. Except as shown in paragraph (e) of this Section, the intentional radiator is restricted to the transmission of a control signal such as those used with alarm systems, door openers, remote switches, etc. Radio control of toys is not permitted. Continuous transmissions, such as voice or video, and data transmissions are not permitted. The prohibition against data transmissions does not preclude the use of recognition codes. Those codes are used to identify the sensor that is activated or to identify the particular component as being part of the system.

7.1.2 Result

Manufacturer: **SOMMER Antriebs- und Funktechnik GmbH**
Device: **Telecody**
Model No.: **TX04-315-10**
Serial Number: **100225**

The EUT meets the requirements of this section.

7.2 Manually Operated Transmitter Deactivation

7.2.1 Regulation

15.231(a1) A manually operated transmitter shall employ a switch that will automatically deactivate the transmitter within not more than 5 seconds of being released.

7.2.2 Result

Manufacturer: **SOMMER Antriebs- und Funktechnik GmbH**
Device: **Telecody**
Model No.: **TX04-315-10**
Serial Number: **100225**

Transmitter ceases immediately after being released. The EUT meets the requirements of this section.

7.3 Automatically Operated Transmitter Deactivation

7.3.1 Regulation

15.231(a2) A transmitter activated automatically shall cease transmission within 5 seconds after activation.

7.3.2 Result

Manufacturer: **SOMMER Antriebs- und Funktechnik GmbH**
Device: **Telecody**
Model No.: **TX04-315-10**
Serial Number: **100225**

The EUT does not have automatic transmission.

7.4 Prohibition of Periodic Transmission

7.4.1 Regulation

15.231(a3) Periodic transmissions at regular predetermined intervals are not permitted. However, polling or supervision transmissions to determine system integrity of transmitters used in security or safety applications are allowed if the periodic rate of transmission does not exceed one transmission of not more than one second duration per hour for each transmitter.

7.4.2 Result

Manufacturer: **SOMMER Antriebs- und Funktechnik GmbH**
Device: **Telecody**
Model No.: **TX04-315-10**
Serial Number: **100225**

The EUT does not employ periodic transmission.

7.5 Continuous Transmission During an Alarm Condition

7.5.1 Regulation

15.231(a4) Intentional radiators which are employed for radio control purposes during emergencies involving fire, security, and safety of life, when activated to signal an alarm, may operate during the pendency of the alarm condition.

7.5.2 Result

Manufacturer: **SOMMER Antriebs- und Funktechnik GmbH**
Device: **Telecody**
Model No.: **TX04-315-10**
Serial Number: **100225**

This section is not applicable to the EUT.

8 BANDWIDTH

Test Requirement: FCC CFR47 Part 15C, Industry Canada RSS-210 Annex 1
Test Procedure: ANSI C63.4:2003, Industry Canada RSS-Gen

8.1 Regulation

15.231(c) The bandwidth of the emission shall be no wider than 0.25% of the center frequency for devices operating above 70 MHz and below 900 MHz. For devices operating above 900 MHz, the emission shall be no wider than 0.5% of the center frequency. Bandwidth is determined at the points 20 dB down from the modulated carrier.

8.2 Calculation of 20 dB Bandwidth Limit

The 20 dB bandwidth limit = 0.0025 * 315 MHz = 0.7875 MHz = 787.5 kHz

8.3 Test Equipment

Type	Manufacturer/ Model No.	EMCC Ident No.	Last Calibration	Calibration Interval
Antenna	EMCO Model 3142	1448	2007-09	36 months
EMI Receiver / Analyzer	Rohde & Schwarz ESU8	516	2007-03	12 months
EMI Receiver / Analyzer	Rohde & Schwarz ESMI	410	2007-03	18 months

8.4 Test Procedure

ANSI C63.4-2003 Section 13.1.7 Occupied Bandwidth Measurements.
(...) The bandwidth is measured at an amplitude level reduced from the reference level by a specified ratio. The reference level is the level of the highest amplitude signal observed from the transmitter at either the fundamental frequency or first-order modulation products in all typical modes of operation, including the unmodulated carrier, even if atypical. Once the reference level is established, the equipment is conditioned with typical modulating signals to produce worst-case (i.e., the widest) bandwidth. (...) In order to measure the modulated signal properly, a resolution bandwidth that is small compared to the bandwidth required by the procuring or regulatory agency shall be used on the measuring instrument. However, the 6 dB resolution bandwidth of the measuring instrument shall be set to a value greater than 5% of the bandwidth requirements. When no bandwidth requirements are specified, the minimum resolution bandwidth of the measuring instrument is given in the following table:

Fundamental frequency	**Minimum resolution bandwidth**
9 kHz to 30 MHz	1 kHz
30 to 1000 MHz	10 kHz
1000 MHz to 40 GHz	100 kHz

8.5 Test Result

Manufacturer: **SOMMER Antriebs- und Funktechnik GmbH**
Device: **Telecody**
Model No.: **TX04-315-10**
Serial Number: **100225**

The measured 20 dB bandwidth is: ..... **45.3 kHz**
The measured 99% bandwidth (according to RSSGen) is: ..... **45.3 kHz**

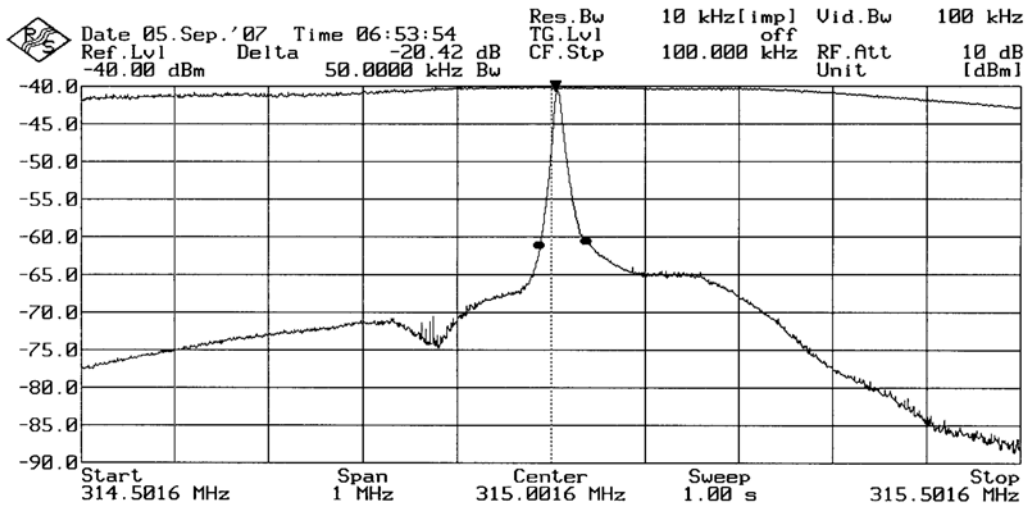
For detailed bandwidth plots refer to the following page.

The EUT meets the requirements of this section.

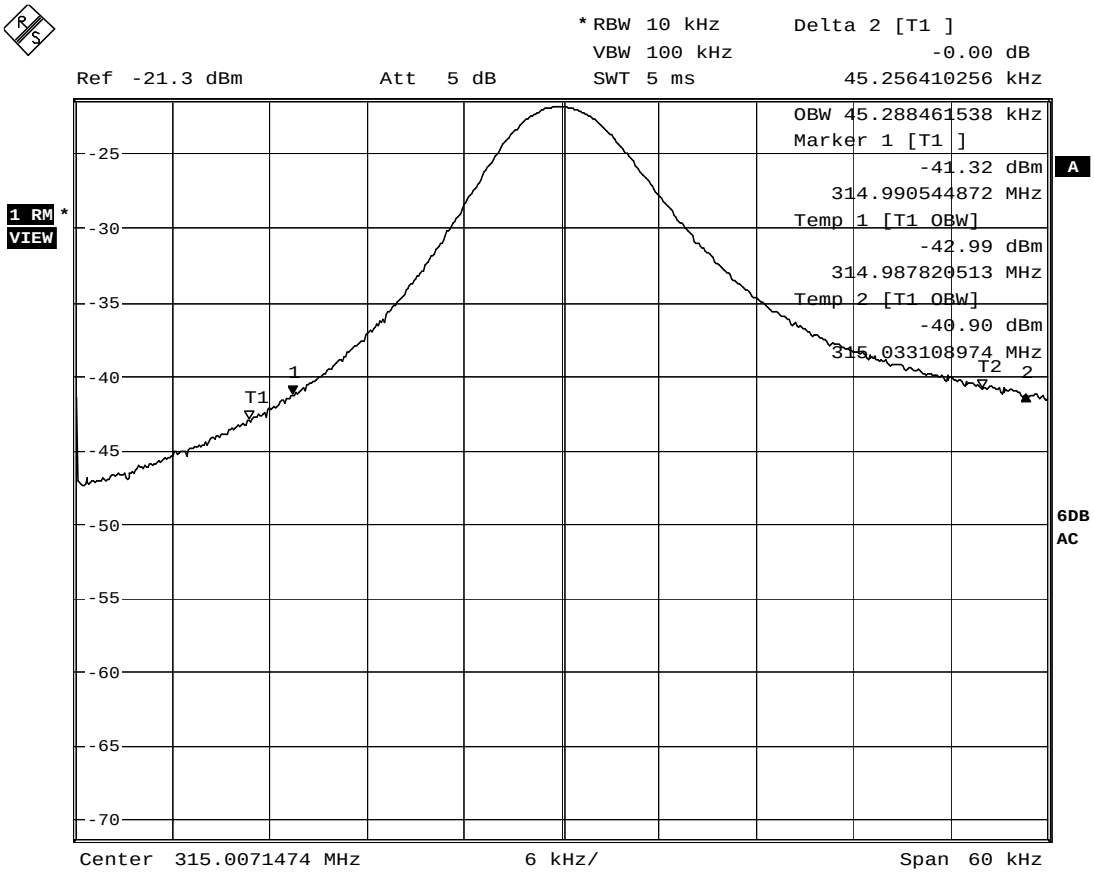
Test Personnel: Wolfgang Döring

Test Date: 2007-09-04+05

TEST OF SOMMER ANTRIEBS- UND FUNKTECHNIK GMBH TRANSMITTER TELECODY MODEL TX04-315-10 TO 47 CFR PART 15C AND RSS-210 ISSUE 7 (2007-06)



Plot 8.5-1: overview plot – antenna measurement



TX04-315-10 bandwidth

Date: 4.SEP.2007 17:51:55

Plot 8.5-2: detailed bandwidth plot – test fixture measurement

9 MISCELLANEOUS COMMENTS AND NOTES

None.

10 LIST OF ANNEXES

The following annexes are separated parts to this test report. These annexes may be file attachments for electronic filing.

Annex	Description	Pages
Annex 1	Photographs of test setups	6
Annex 2	Photographs of equipment under test (EUT) external views	3
Annex 3	Photographs of equipment under test (EUT) internal views	3