

**FCC ID: NBG 009272T**

Issue date: 2004-09-09



**Test Report**  
**acc. to the relevant standard:**  
**47 CFR Part 15 C – Intentional Radiators**  
**Measurement Procedure:**  
**ANSI C63.4 - 1992**  
**relating to**  
**Hella KGaA Hueck & Co.**  
**Key 5FA 009 272-30**  
**Key 5FA 009 272-50**

**Measurement of Radio- Noise Emissions**  
**from Low- Voltage Electrical and Electronic Equipment**  
**Technical characteristics and test methods for radio equipment**  
**in the frequency range 9 kHz to 40 GHz**

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Manufacturers Details	
Manufacturer	Hella KGaA Hueck & Co.
Manufacturers Grantee Code	<b>NBG</b>
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Relevant Standard Used	47 CFR Part 15C - Intentional Radiators
	ANSI C63.4-1992

Test Report prepared by	
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Equipment Under Test (EUT)	
Equipment Category	Transmitter
Trade Name	Marquardt
Type designation	Key 5FA 009 272-30 (max. configuration)
Serial No.	---
Variants	Key 5FA 009 272-50

FCC ID: NBG 009272T

Issue date: 2004-09-09

## 0 Test result

CFR Section	Report Chapter	Requirements headline	Test result		
			OK		
15.203	10.1	Antenna requirement	pass	<del>fail</del>	<del>na</del>
15.231 (b)	10.2	Field strength limits (Fundamental)	pass	<del>fail</del>	<del>na</del>
15.205(b) 15.209	10.2	Radiated spurious emissions	pass	<del>fail</del>	<del>na</del>
15.231 (a)	10.4	Periodic operation characteristics	pass	<del>fail</del>	<del>na</del>
15.231 (c)	10.5	20 dB bandwidth	pass	<del>fail</del>	<del>na</del>

Test requirements kept	yes <del>no</del>
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Signature Test Personnel



.....  
Ralf Trepper

Signature of the Company Official



.....  
Manfried Dudde

FCC ID: NBG 009272T

Issue date: 2004-09-09

List of contents	Page
0 Test result.....	3
1 Testing laboratory.....	5
2 Introduction .....	5
3 Product.....	6
4 Test schedule .....	6
5 Product and measurement documentation .....	7
6 Observations and comments.....	7
7 Summary .....	7
8 Conclusions .....	8
9 Operation description .....	9
10.1 Antenna requirement .....	10
10.1.1 Regulation .....	10
10.1.2 Result .....	10
10.2 Radiated emissions .....	11
10.2.1 Regulation .....	11
10.2.2 Test equipment .....	13
10.2.2 Test procedures.....	13
10.2.3 Calculation of field strengths limits .....	14
10.2.4 Calculation of average correction factor.....	14
10.2.5 Calculation of the field strengths .....	14
10.2.6 Result .....	15
10.3.1 Periodic operation.....	18
10.3.1.1 Regulation .....	18
10.3.1.2 Result .....	18
10.3.2 Manually operated transmitter deactivation .....	18
10.3.2.1 Regulation .....	18
10.3.2.2 Result .....	18
10.3.3 Automatically operated transmitter deactivation .....	18
10.3.3.1 Regulation .....	18
10.3.3.2 Result .....	18
10.3.4 Prohibition of periodic transmission .....	19
10.3.4.1 Regulation .....	19
10.3.4.2 Result .....	19
10.3.5 Continuous transmission during an alarm condition.....	19
10.3.5.1 Regulation .....	19
10.3.5.2 Result .....	19
10.4 Bandwidth .....	20
10.4.1 Regulation .....	20
10.4.2 Calculation of the 20 dB bandwidth limit .....	20
10.4.3 Test equipment .....	20
10.4.4 Test procedure .....	20
10.4.5 Test result .....	21
11 Additional information to this test report .....	22

**FCC ID: NBG 009272T**

Issue date: 2004-09-09

## 1 Testing laboratory

Company Name: m.dudde high frequency technology  
Street: Rottland 5a  
City: 51429 Bergisch Gladbach  
Country: Germany

Laboratory:

FCC Registration Number: 699717

This site has been fully described in a report submitted to the FCC, and  
accepted in the letter dated Registration Number .699717

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## 2 Introduction

The test report may only be reproduced or published in full. Reproduction or publication of extracts from the report requires the prior written approval of m. dudde hochfrequenz - technik.

This report contains the result of tests performed by m. dudde hochfrequenz - technik for the purpose of a type approval. The order for the carrying out of these tests has been placed by:

### Manufacturer

Company name : **Hella KGaA Hueck & Co.**  
Address : Rixbecker Strasse 75  
Postcode : D-59552  
City/town : Lippstadt  
Country : Germany  
Telephone : +49 (0) 2941 38-8392  
Telefax : +49 (0) 2941 38-47-8392  
E-Mail : [heinz-theo.holle@hella.com](mailto:heinz-theo.holle@hella.com)  
Date of order : 2004-09-03  
References : Mr. Heinz- Theo Holle

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**FCC ID: NBG 009272T**

Issue date: 2004-09-09

### 3 Product

Samples of the following apparatus were submitted for testing:

Type of equipment	: Transmitter
Trademark	: Hella
Type designation	: Key 5FA 009 272-30, Key 5FA 009 272-50
Hardware version	: Key 5FA 009 272-30
Serial number	: ---
Software release	: ---
Equipment used power	: 3.0VDC
Frequency used	: 315 MHz
Generated or used frequencies	: 9.84375 MHz
<b>FCC ID</b>	<b>: NBG 009272T</b>

### 4 Test schedule

Tests were carried out in accordance with the specifications detailed in chapter 7 “Summary“ of this report.

Tests were carried out at:

- m. dudde hochfrequenz - technik, D-51429 Bergisch Gladbach.

The sample of the product was received on:

- **2004-09-06**

The tests were carried out in the following period of time:

- **2004-09-07 - 2004-09-09**

**FCC ID: NBG 009272T**

Issue date: 2004-09-09

## 5 Product and measurement documentation

For issuing this report the following product documentation was used and Annexes was created:

Description:	Date:	Identifications:
External Photographs of the Equipment Under Test		Annex No. 1
Internal Photographs of the Equipment Under Test		Annex No. 2
Occupied Bandwidth Plot		Annex No. 3
FCC ID Label Sample		Annex No. 4
Technical Description / Users Manual		Annex No. 5
Test Setup Photos		Annex No. 6
Block diagram		Annex No. 7
Schematics		Annex No. 8

The above-mentioned documentation will be filed at m. dudde hochfrequenz - technik for a period of 10 years following the issue of this report.

## 6 Observations and comments

## 7 Summary

The product is intended for use in the following areas of application:  
Radio- Noise Emissions from Low- Voltage Electrical and Electronic Equipment  
in the frequency range 9 kHz to 40 GHz

The samples were tested according to the following specification:

47 CFR Part 15 – Intentional Radiators, ANSI C63.4 - 1992

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**FCC ID: NBG 009272T**

Issue date: 2004-09-09

## 8 Conclusions

Samples of the apparatus were found to **CONFORM WITH** the specifications stated in chapter 7 "Summary" of this report.

In the opinion of m. dudde hochfrequenz - technik, the samples satisfied all applicable requirements relating to the network interface types specified in chapter 7 "Summary".

The results of the type tests as stated in this report, are exclusively applicable to the product item as identified in this report. m. dudde hochfrequenz - technik does not accept any responsibility for the results stated in this report, with respect to the properties of product items not involved in these tests.

This report consists of a main module, modules with test results and listed Annexes in chapter 5 "Product documentation". All pages have been numbered consecutively and bear the m. dudde hochfrequenz - technik logo, the report number and sub numbers.  
The total number of pages in this report is **23**.

### Tester:

Date : 2004-09-09


Name : Ralf Trepper

Signature : 

### Technical responsibility for area of testing:

Date : 2004-09-09

Name : Manfred Dudde

Signature : 



## 9 Operation description

### 9.1 EUT Details

The *Key 5FA 009 272-30 and his Variants* are components of a driver authorisation system and have the following function: Remote control for vehicle access via radio signals. A command is transmitted to the vehicle by the key via a HF transmitter after a button has been pressed on the key.

### 9.2 EUT Configuration

#### General function

If no button is pressed, the microcontroller is in "sleep mode", and the transmitter's RF stage is disabled. pressing of any button wakes up the microcontroller. At this time the microcontroller works with an integrated RC-oscillator. The RF transmitter and the crystal oscillator will be switched on via BP23 (On/Off). At the end of a short stabilization phase the clock of the crystal oscillator (CLK) can be used for clocking the microcontroller. Via BP42 (Data) the message data switch the power amplifier on and off and therefore which modulate the RF-carrier.

### 9.3 EUT measurement description

The *Key 5FA 009 272-30* was tested in a typical fashion.. During preliminary emission tests the *Key 5FA 009 272-30* was operated in continuous transmitting mode for worst case emission mode investigation. Therefore, final qualification testing was completed with *Key 5FA 009 272-30* operated in all continuous modes. All tests performed with applicant typical voltage (3.0 Volts DC).

**FCC ID: NBG 009272T**

Issue date: 2004-09-09

## 10.1 Antenna requirement

### 10.1.1 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.

### 10.1.2 Result

The equipment meets the requirements	yes <sup>*</sup>	<del>no</del>	<del>n.a.</del>
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yes<sup>\*</sup> : antenna is part on the PCB

Further test results are attached	<del>yes</del>	no	page no:
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n.a<sup>x</sup> see page no. 23

FCC ID: NBG 009272T

Issue date: 2004-09-09

## 10.2 Radiated emissions

### 10.2.1 Regulation

Test Requirement: FCC CFR47, Part 15C clause 15.231 Test Procedure: ANSI C63.4:1992

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,  $\mu\text{V/m}$  at 3 meters =  $56.81818(F) - 6136.3636$ ; for the band 260-470 MHz,  $\mu\text{V/m}$  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

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.

Test Requirement: FCC CFR47, Part 15C Section 15.209 Test Procedure: ANSI C63.4:1992

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 (MHz)	Field strength (microvolts/meter)	Measurement distance (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.

**FCC ID: NBG 009272T**

Issue date: 2004-09-09

### 10.2.2 Test equipment

Type	Manufacturer/ Model No.	Serial No.	Last Calibration	Next Calibration
Receiver (9 kHz –26.5 GHz)	Hewlett Packard Spectrum Analyzer 8593E (171)	3528U00990	2004/07	2006/07
Pre Amplifier (100kHz - 1.3GHz)	Hewlett Packard 8447 E (166a)	1726A00705	2002/04	2006/04
Bilog Antenna (30- 1000 MHz)	CHASE CBL611A (167)	1517	2002/04	2008/04
Horn antenna (0,86-8,5 GHz)	Schwarzbeck BBHA 9120 A (284)	236	1998/01	2008/01

### 10.2.2 Test procedures

The EUT and this peripheral (when additional equipment exist) are placed on a turn table which is 0.8m above ground. The turn table would be allowed to rotate 360 degrees to determine the position of the maximum emission level. The test distance between The EUT and the receiving antenna are 3m. To find the maximum emission, the polarization of the receiving antenna are changed in horizontal and vertical polarization, the position of the EUT was changed in different orthogonal determinations.

ANSI C63.4: 1992 Section 8 “Radiated Emissions Testing”

<b>Radiated Emissions Test Characteristics</b>	
Frequency range	30 MHz - 4,000 MHz
Test distance	3 m*
Test instrumentation resolution bandwidth	120 kHz (30 MHz - 1,000 MHz)
	1 MHz (1000 MHz - 4,000 MHz)
Receive antenna scan height	1 m - 4 m
Receive antenna polarization	Vertical/Horizontal

\* 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).

**FCC ID: NBG 009272T**

Issue date: 2004-09-09

### 10.2.3 Calculation of field strengths limits

For example: Transmitter working on 315 MHz

Limit for Average measurements  $\rightarrow 41.6667 \cdot (315 \text{ MHz}) - 7083.3333 = 6041.677 \mu\text{V/m} = 75.6 \text{ dB}\mu\text{V/m @3m}$

Limit for Peak measurements  $\rightarrow$  Limit for Average measurements + 20dB = 95.6dB $\mu\text{V/m @3m}$

### 10.2.4 Calculation of average correction factor

The average correction factor is computed by analyzing the "worst case" on time in any 100msec time period and using the formula: Corrections Factor +  $20 \cdot \log(\text{worst case on time}/100\text{msec})$  Analysis of the remote transmitter worst case on time in any 100msec time period is an on time of 50msec, there for the correction factor is  $20 \cdot \log(50/100) = -6 \text{ dB}$ . The maximum correction factor to be applied is 20 dB per section 15.35 of the FCC rules.

### 10.2.5 Calculation of the field strengths

The field strength is calculated by the following calculation:

Corrected Level = Receiver Level + Correction Factor (without the use of an Pre-Amplifier)

Corrected Level = Receiver Level + Correction Factor – Pre-Amplifier (with the use of an Pre-Amplifier)

Receiver Level : Receiver reading without correction factors

Correction Factor : Antenna factor + cable loss

For example:

The receiver reading is 32.7 dB $\mu\text{V}$ . The Antenna Factor for the measured frequency is +2.5 dB(1/m) and the Cable Factor for the measured frequency is 0.71 dB, giving a field strength of 35.91dB $\mu\text{V/m}$ .

The 35.91dB $\mu\text{V/m}$  value can be mathematically converted to its corresponding level in  $\mu\text{V/m}$ .

Level in  $\mu\text{V/m}$  = Common Antilogarithm  $(35.91/20) = 39.8$

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).

FCC ID: NBG 009272T

Issue date: 2004-09-09

## 10.2.6 Result

TRANSMITTER SPURIOUS RADIATION (Section 15.231(b))										
f (MHz)	Bandwidth (kHz)/Type of Detector	Noted Receiver- level  dBμV	Test Distance  m	Correction Factor  dB	Distance Extrapol. Factor dB	Level Corrected dBμV/m	Limit dBμV/m	Margin dBμV/m	Polarisation EUT / Antenna	Antenna Height cm
315.0000	120, QPK	69.26	3	-7.50	0	61.76	75.6	13.84	H / H	100
	120, AV	68.52	3	-7.50	0	61.02	75.6	14.58	H / H	100
630.0000	120, QPK	28.89	3	-1.90	0	26.99	55.6	28.61	H / H	199
	120, AV	28.74	3	-1.90	0	26.84	55.6	28.76	H / H	199
945.0000	120, QPK	22.59	3	+1.20	0	23.79	55.6	31.81	H / H	110
	120, AV	22.12	3	+1.20	0	23.32	55.6	32.28	H / H	110
1,260.0000	1000, AV	< 4.5	3	+29.7	0	34.20	55.6	21.40	H,V/H,V	100-400
1,575.0000	1000, AV	< 4.5	3	+25.63	0	30.13	55.6	25.47	H,V/H,V	100-400
1,890.0000	1000, AV	< 4.5	3	+26.57	0	31.07	55.6	24.53	H,V/H,V	100-400
2,205.0000	1000, AV	< 10	3	+27.27	0	37.27	54.0	16.73	H,V/H,V	100-400
2,520.0000	1000, AV	< 10	3	+27.82	0	37.82	55.6	17.78	H,V/H,V	100-400
2,835.0000	1000, AV	< 10	3	+28.07	0	38.07	54.0	15.93	H,V/H,V	100-400
3,150.0000	1000, AV	< 10	3	+28.59	0	38.57	55.6	17.03	H,V/H,V	100-400
3,465.0000	1000, AV	< 10	3	+29.41	0	39.41	55.6	16.19	H,V/H,V	100-400
Measurement uncertainty			4 dB							

\* Bandwidth = the measuring receiver bandwidth

- Remark: \*<sup>1</sup> noise floor noise level of the measuring instrument ≤ 3.5dBμV @ 3m distance (30 – 1,000 MHz)  
 Remark: \*<sup>2</sup> noise floor noise level of the measuring instrument ≤ 4.5 dBμV @ 3m distance (1,000 – 2,000 MHz)  
 Remark: \*<sup>3</sup> noise floor noise level of the measuring instrument ≤ 10 dBμV @ 3m distance (2,000 – 5,500 MHz)  
 Remark: \*<sup>4</sup> noise floor noise level of the measuring instrument ≤ 14 dBμV @ 3m distance (5,500 – 14,500 MHz)  
 Remark: \*<sup>5</sup> for using a pre-amplifier in the range between 100 kHz and 1,000 MHz  
 Remark: \*<sup>6</sup> for using a pre-amplifier in the range between 4.0 GHz and 18.0 GHz

The equipment meets the requirements	yes	no	n.a.
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Further test results are attached	yes	no	Annex no: 6
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n.a <sup>x</sup> see page no. 22

FCC ID: NBG 009272T

Issue date: 2004-09-09

TRANSMITTER SPURIOUS RADIATION BELOW 30 MHz (Section 15.205, 15.209)									
f (MHz)	Bandwidth (kHz), Type of detector	Noted receiver level  dBμV	Test distance  m	Correction factor  dB	Distance Extrapol. factor dB	Level corrected  dBμV/m	Limit  dBμV/m	Margin  dBμV/m	Polarisation EUT / antenna orientation
0.1200	PK/0.2kHz	< 4.0	10	20.2	-59.1	-34.90	Pk46.0- @ 300	80.90	V, H/0-360°
	AV/0.2kHz	< 4.0	10	20.2	-59.1	-34.90	AV26.0 @ 300	80.90	V, H/0-360°
0.5000	AV/0.2kHz	< 4.0	10	20.2	-19.1	5.10	AV33.6 @ 30	28.5	V, H/0-360°
1.5000	AV/0.2kHz	< 4.0	10	20.2	-19.1	5.10	AV24.1 @ 30	19.00	V, H/0-360°
3.0000	AV/9.0kHz	< 4.0	10	20.2	-19.1	5.10	AV29.5 @ 30	24.4	V, H/0-360°
5.0000	AV/9.0kHz	< 4.0	10	20.2	-19.1	5.10	AV29.5 @ 30	24.4	V, H/0-360°
8.0000	AV/9.0kHz	< 4.0	10	20.2	-19.1	5.10	AV29.5 @ 30	24.4	V, H/0-360°
10.0000	AV/9.0kHz	< 4.0	10	20.2	-19.1	5.10	AV29.5 @ 30	24.4	V, H/0-360°
20.0000	AV/9.0kHz	< 4.0	10	20.2	-19.1	5.10	AV29.5 @ 30	24.4	V, H/0-360°
30.0000	AV/9.0kHz	< 4.0	10	20.2	-19.1	5.10	AV29.5 @ 30	24.4	V, H/0-360°
No emissions detected									
Measurement uncertainty			4 dB						

Remark: \*<sup>1</sup> Noise level of the measuring instrument ≤ 4.0dBμV @ 10m distance (0.009 MHz –30 MHz)

Remark: \* Peak Limit according to Section 15.35 (b).

The equipment meets the requirements	yes	no	n.a.
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Further test results are attached	yes	no	page no:
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n.a<sup>x</sup> see page no. 22



FCC ID: NBG 009272T

Issue date: 2004-09-09

**TRANSMITTER SPURIOUS RADIATION ABOVE 30 MHz (Section 15.205, 15.209)**

f (MHz)	Bandwidth (kHz)/Type of detector	Noted receiver level dBμV	Test distance m	Correction factor dB	Distance Extrapol. factor dB	AV Correction factor dB	Level corrected dBμV/m	Limit dBμV/m	Margin dBμV/m	Polaris. EUT / antenna	Antenna height cm
30.0000	100, AV	≤ 3.5	3	-2.60	0	0	0.90	40.00	39.10	H,V/H,V	100-400
88.0000	100, AV	≤ 3.5	3	-10.80	0	0	-7.30	40.00	47.30	H,V/H,V	100-400
216.0000	100, AV	≤ 3.5	3	-10.30	0	0	-6.80	43.50	50.30	H,V/H,V	100-400
960.0000	100, AV	≤ 3.5	3	8.50	0	0	12.00	43.50	31.50	H,V/H,V	100-400
1700.0000	1000, AV	≤ 4.5	3	3.80	0	0	8.30	54.00	45.70	H,V/H,V	100-400
2250.0000	1000, AV	≤ 10	3	8.00	0	0	18.00	54.00	36.00	H,V/H,V	100-400
4000.0000	1000, AV	≤ 10	3	8.40* <sup>6</sup>	0	0	18.40	54.00	35.60	H,V/H,V	100-400
5000.0000	1000, AV	≤ 10	3	9.10* <sup>6</sup>	0	0	19.40	54.00	34.60	H,V/H,V	100-400
7500.0000	1000, AV	≤ 14	3	12.9* <sup>6</sup> <sub>0</sub>	0	0	26.90	54.00	27.10	H,V/H,V	100-400
8300.0000	1000, AV	≤ 14	3	14.80* <sup>6</sup>	0	0	28.80	54.00	25.20	H,V/H,V	100-400
9400.0000	1000, AV	≤ 14	3	16.00* <sup>6</sup>	0	0	30.00	54.00	24.00	H,V/H,V	100-400
11000.0000	1000, AV	≤ 14	3	18.25* <sup>6</sup>	0	0	32.25	54.00	21.75	H,V/H,V	100-400
Measurement uncertainty			4 dB								

\* Bandwidth = the measuring receiver bandwidth

Remark: \*<sup>1</sup> noise floor noise level of the measuring instrument ≤ 3.5dBμV @ 3m distance (30 – 1,000 MHz)  
 Remark: \*<sup>2</sup> noise floor noise level of the measuring instrument ≤ 4.5 dBμV @ 3m distance (1,000 – 2,000 MHz)  
 Remark: \*<sup>3</sup> noise floor noise level of the measuring instrument ≤ 10 dBμV @ 3m distance (2,000 – 5,500 MHz)  
 Remark: \*<sup>4</sup> noise floor noise level of the measuring instrument ≤ 14 dBμV @ 3m distance (5,500 – 14,500 MHz)  
 Remark: \*<sup>5</sup> for using a pre-amplifier in the range between 100 kHz and 1,000 MHz  
 Remark: \*<sup>6</sup> for using a pre-amplifier in the range between 4.0 GHz and 18.0 GHz

The equipment meets the requirements	yes	no	n.a.
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Further test results are attached	yes	no	page no:
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n.a.<sup>x</sup> see page no. 22

**FCC ID: NBG 009272T**

Issue date: 2004-09-09

## 10.3 Periodic operation characteristics

### 10.3.1 Periodic operation

#### 10.3.1.1 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.

#### 10.3.1.2 Result

The equipment meets the requirements	yes	no	n.a.
Further test results are attached	yes	no	Annex : 15.231 (a)

### 10.3.2 Manually operated transmitter deactivation

#### 10.3.2.1 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.

#### 10.3.2.2 Result

The equipment meets the requirements	yes	no	n.a.
Further test results are attached	yes	no	Annex : 15.231 (a)

### 10.3.3 Automatically operated transmitter deactivation

#### 10.3.3.1 Regulation

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

#### 10.3.3.2 Result

The equipment meets the requirements	yes	no	n.a.
Further test results are attached	yes	no	page no:

**FCC ID: NBG 009272T**

Issue date: 2004-09-09

#### 10.3.4 Prohibition of periodic transmission

##### 10.3.4.1 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.

##### 10.3.4.2 Result

The equipment meets the requirements	<del>yes</del>	<del>no</del>	n.a.
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Further test results are attached	yes	no	page no:
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#### 10.3.5 Continuous transmission during an alarm condition

##### 10.3.5.1 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.

##### 10.3.5.2 Result

The equipment meets the requirements	<del>yes</del>	<del>no</del>	n.a.
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Further test results are attached	yes	no	page no:
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**FCC ID: NBG 009272T**

Issue date: 2004-09-09

## 10.4 Bandwidth

### 10.4.1 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.

### 10.4.2 Calculation of the 20 dB bandwidth limit

The 20 dB bandwidth limit =  $0.0025 * 315 \text{ MHz} = 0.7875 \text{ MHz} = 787.5 \text{ kHz}$

### 10.4.3 Test equipment

Type	Manufacturer/ Model No.	Serial No.	Last Calibration	Next Calibration
Receiver (30MHz – 26.5GHz)	Hewlett Packard Spectrum Analyzer (171) 8593 E	3528U00990	07/2004	07/2006
Test fixture	Dudde	none	02/2004	02/2006

### 10.4.4 Test procedure

ANSI C63.4-1992 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.

**FCC ID: NBG 009272T**

Issue date: 2004-09-09

#### 10.4.5 Test result

The measured 20 dB bandwidth is: .....**63.00 kHz**

The equipment meets the requirements	<b>yes</b>	<del>no</del>	<del>na</del>
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Further test results are attached	<b>yes</b>	<del>no</del>	Annex no: 3
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**FCC ID: NBG 009272T**

Issue date: 2004-09-09

## 11 Additional information to this test report

### Remarks

- |                   |   |
|-------------------|---|
| n.a. <sup>1</sup> | not applicable, because antenna is part of the PCB      |
| n.a. <sup>2</sup> | not applicable, because EUT is directly battery powered |

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**FCC ID: NBG 009272T**

Issue date: 2004-09-09

**End of test report**