Test Report

FINAS
Finnish Accreditation Service
T004 (EN ISO/IEC 17025)

INTENTIONAL RADIATOR TESTS ACCORDING TO FCC PART 15 C

Equipment Under Test:	Intelligent Heat Sensor
Model:	SGS530
Manufacturer:	Innohome Oy Linnoitustie 4 B FI-02600 ESPOO FINLAND
Customer:	Innohome Oy Linnoitustie 4 B FI-02600 ESPOO FINLAND
FCC Rule Part: IC Rule Part:	15.231: 2015 RSS-210 Issue 8, 2010 RSS-GEN Issue 4, 2014

Date: 9 August 2016

Issued by:

Emil Haverinen
Testing Engineer

Date: 9 August 2016

Checked by:

Rauno Repo
Testing Engineer

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Equipment Under Test (EUT)

Intelligent Heat Sensor	
Host Model:	SGS530
RF module inside host:	RFTX315A
Serial no:	-
FCC ID:	2AG2GRFTX315A
IC:	21029-RFTX315A

Description of the EUT

Detecting device for stove guard. The EUT transmits heartbeat signals and alarm signals for stove guard. The EUT is normally installed above stove.

Classification of the device

Fixed device	☐
Mobile Device (Human body distance > 20cm)	☒
Portable Device (Human body distance < 20cm)	☐

Modifications Incorporated in the EUT

No modifications were applied to the EUT during testing

Ratings and declarations

Operating Frequency Range (OFR):	315 MHz
Channels:	1
Channel separation:	-
99% Channel bandwidth:	565.705 kHz
Radiated power:	-24.63 dBm
Modulation:	ASK
Antenna gain:	0 dBi

Power Supply

Operating voltage range:	2x 2.2 - 2x 3.3 VDC

Mechanical Size of the EUT

Height: 94 mm	Width:40 mm	Length: 30 mm

Samples

During the tests the EUT was configured to transmit its sequence every 500 ms which differs from normal operation. Normally device transmits heartbeat signal every 12 hour.

Peripherals

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SUMMARY OF TESTING

Test Specification	Description of Test	Result
§15.231(b) / RSS-210 A1.1	Field Strength of the Fundamental Signal	PASS
§15.209(a), §15.231(b) / RSS-GEN, RSS-210 A1.1	Field Strength of Spurious Emissions	PASS
§15.231(c)	20 dB Bandwidth	PASS
RSS-210 A1.1.3	99% Occupied Bandwidth	PASS
§15.231(a) / RSS-210 A1.1.1	Periodic Operation and Dwell Time	PASS

EUT Test Conditions During Testing

The EUT was tested with new batteries while following its normal usage position as far as possible. The EUT was placed on a table 80/150 cm from the ground floor while its front cover was facing upwards.

Test Facility

☐	Testing Location / address: FCC registration number: **90598**	SGS Fimko Ltd Särkiniementie 3 FI-00210, HELSINKI FINLAND
☒	Testing Location / address: FCC registration number: **178986** Industry Canada registration number: **8708A-2**	SGS Fimko Ltd Karakaarenkuja 4 FI-02610, ESPOO FINLAND

TEST RESULTS

Field Strength of the Fundamental Signal

Standard:	ANSI C63.10	(2013)
Tested by:	JSU	
Date:	28.7.2016	
Temperature:	19 °C	
Humidity:	53 % RH	
Measurement uncertainty	± 4.51 dB	Level of confidence 95 % (k = 2)

FCC Rule: 15.231(b)
RSS-210 A1.1

The radiated emission measurements were done within a semi anechoic screened chamber. The EUT was placed on a table 0.8 m above the reflecting ground plane.The measurement distance was 3 meters. The highest fundamental signal was determined during measurements by rotating the turntable and adjusting the antenna height. The measurements were done in horizontal and vertical antenna polarizations.

Results:

Highest Fundamental Signal Strength

Frequency (MHz)	MaxPeak (dBµV/m)	Duty-cycle Correction Factor (dB)	Calculated Average (dBµV/m)	Limit Average (dBµV/m)	Limit Peak (dBµV/m)	Result
315.075000	70.6	-3.6	67.0	75.62	95.62	PASS

Average value is calculated using duty-cycle correction factor described in ANSI C63.10 clause 7.5.

Correction factor equation:
δ(dB) = 20 log (Δ) , where Δ is duty-cycle

Δ = 66.125 ms / 100 ms = 66.215 %
20 log (0.66125) = -3.593 dB

The maximum inspection interval for the duty-cycle correction is 100 ms and since the EUT normally transmits every 12 hour, the 100 ms interval is used.

Duty-cycle is measured as another test and is included in this report.

Field strength of Spurious Emissions 30 – 6500 MHz

Standard:	ANSI C63.10	(2013)
Tested by:	JSU	
Date:	28.7.2016	
Humidity:	19 °C	
Temperature:	53 % RH	
Measurement uncertainty	± 4.51 dB	Level of confidence 95 % (k = 2)

FCC Rule: §15.209(a), §15.231(b)
RSS-GEN, RSS-210 A1.1

The radiated emission measurements were done within a semi anechoic screened chamber. The EUT was placed on a table 0.8 m above the reflecting ground plane.The measurement distance was 3 meters. The highest emission signal was determined during measurements by rotating the turntable and adjusting the antenna height. The measurements were done in horizontal and vertical antenna polarizations. Floor absorbers and 1.5 m table was used for measurements over 1 GHz.

15.209 limits:

Frequency range [MHz]	Limit [µV/m]	Limit [dBµV/m]	Detector
30 - 80	100	40.0	Quasi-peak
88 - 216	150	43.5	Quasi-peak
216 - 960	200	46.0	Quasi-peak
960 - 1000	500	53.9	Quasi-peak
Above 1000	500	53.9	Average
Above 1000	5000	73.9	Peak

Table 1: Peak field strength of spurious emissions

Frequency (MHz)	MaxPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	QP/Peak Limit (dBµV/m)
598.985000	27.8	1000.0	120.000	248.0	H	178.0	22.8	18.2	46.0
630.115000	31.7	1000.0	120.000	233.0	V	172.0	24.5	14.3	46.0
945.155000	43.2	1000.0	120.000	100.0	H	49.0	28.5	2.8	46.0
1259.950000	53.0	1000.0	1000.000	348.0	H	0.0	-1.9	20.9	73.9
1890.650000	43.4	1000.0	1000.000	332.0	H	183.0	2.8	30.5	73.9
3150.700000	46.9	1000.0	1000.000	280.0	H	80.0	6.5	27.0	73.9

Table 2: Average field strength of spurious emissions (calculated from peak values)

Frequency (MHz)	Average (dBµV/m)	Margin (dB)	QP/Average Limit (dBµV/m)
598.985000	24.2	21.8	46.0
630.115000	28.1	17.9	46.0
945.155000	39.6	6.4	46.0
1259.950000	49.4	4.5	53.9
1890.650000	39.8	14.1	53.9
3150.700000	43.3	10.6	53.9

99 % Occupied Bandwidth and 20 dB Bandwidth

Standard:	ANSI C63.10	(2013)
Tested by:	EHA & JSU	
Date:	28.7.2016	
Humidity:	19 °C	
Temperature:	53 % RH	
Measurement uncertainty	± 2.87 dB	Level of confidence 95 % (k = 2)

FCC Rule: 15.231(c)
RSS-210 A1.1.3

Bandwidth was measured within a semi anechoic screened chamber. The EUT was placed on a table 0.8 m above the reflecting ground plane. The measurement distance was 3 meters. Limit is 0.25% of the devices operating frequency.

Measurement type	Measured Bandwidth (kHz)	Limit (kHz)	Result
99 %	565.705	787.5	PASS
20 dB	389.423	787.5	PASS

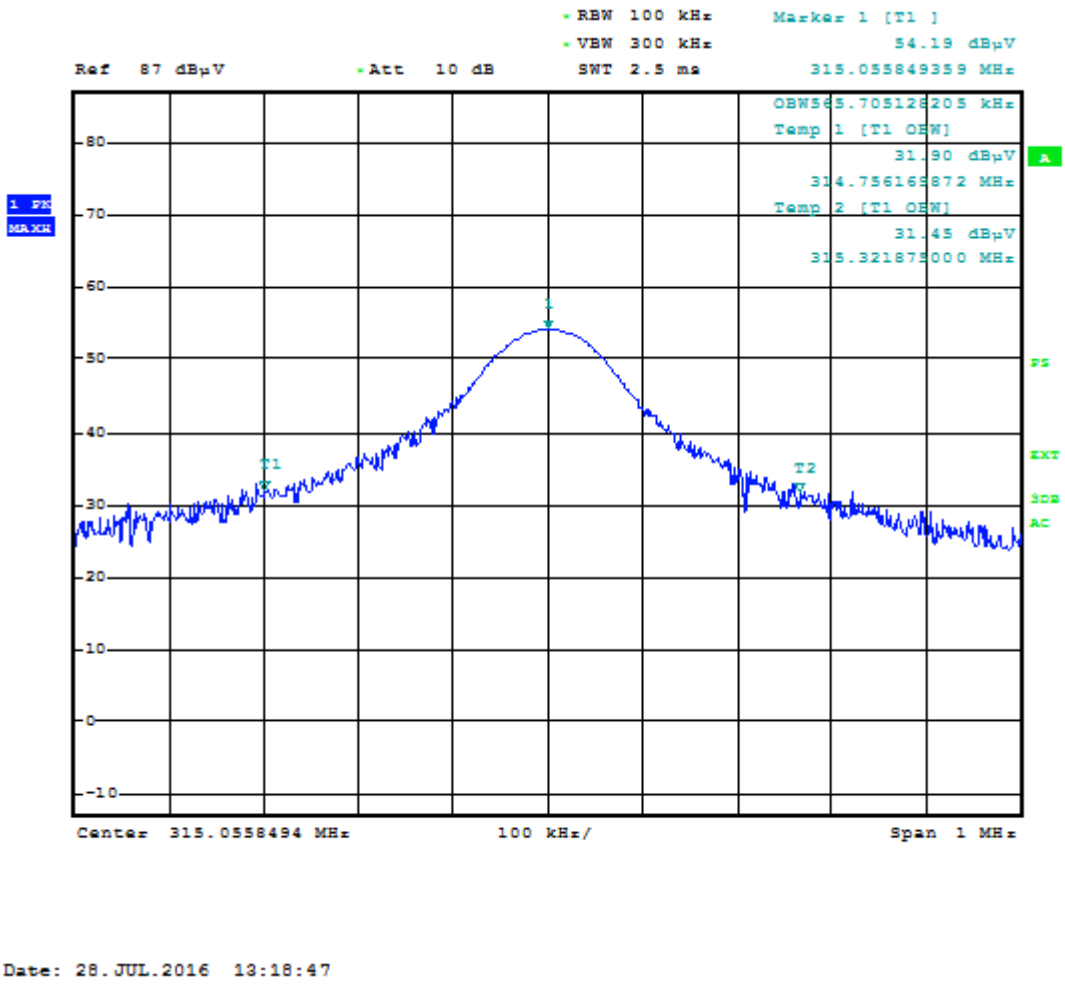

Figure 1. Screen capture of the 99 % OBW

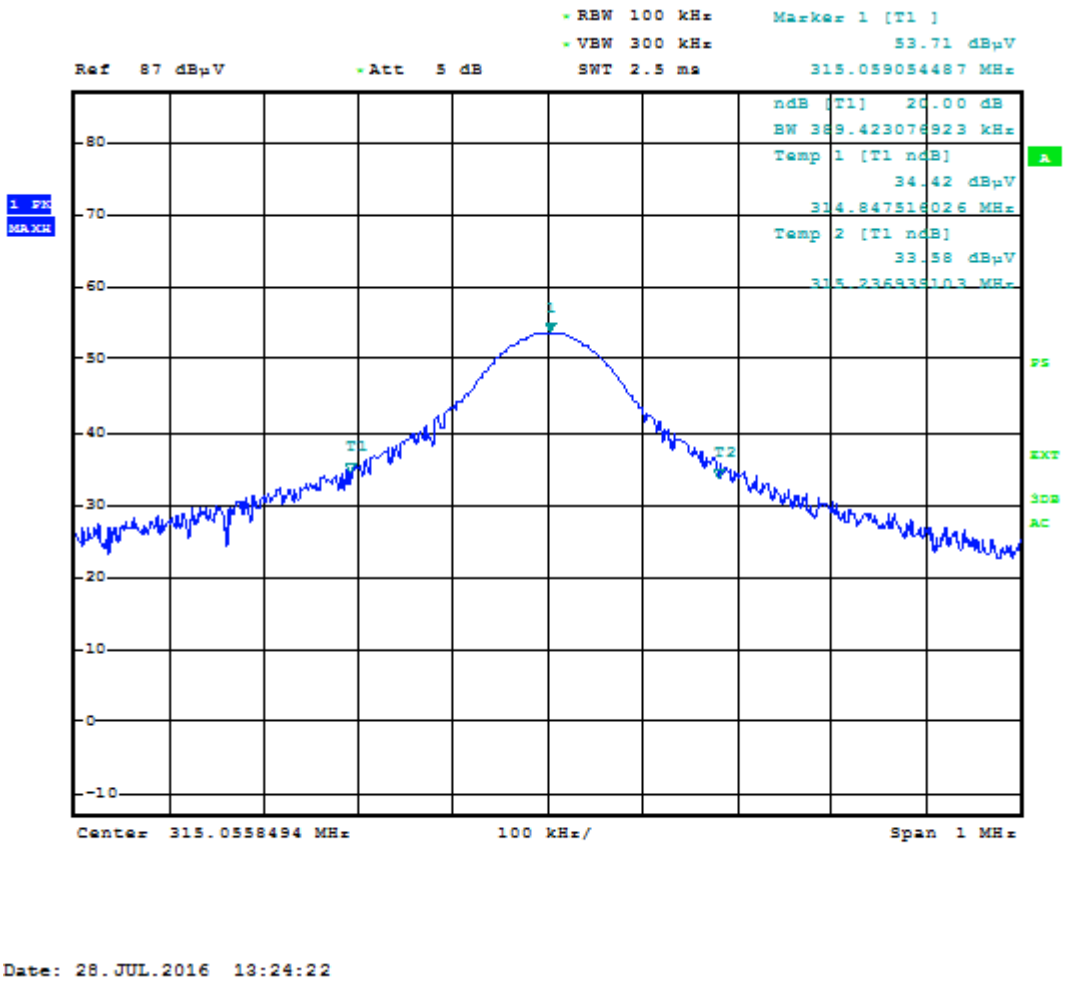

Figure 2. Screen capture of the 20 dB BW

Periodic Operation and Dwell Time

Standard:	ANSI C63.10	(2013)
Tested by:	EHA & JSU	
Date:	28.7.2016	
Humidity:	19 °C	
Temperature:	53 % RH	
Measurement uncertainty	± 500ns	Level of confidence 95 % (k = 2)

FCC Rule: §15.231(a)
RSS-210 A1.1.1

Signal parameters were measured within a semi anechoic screened chamber. The EUT was placed on a table 0.8 m above the reflecting ground plane. The measurement distance was 3 meters.

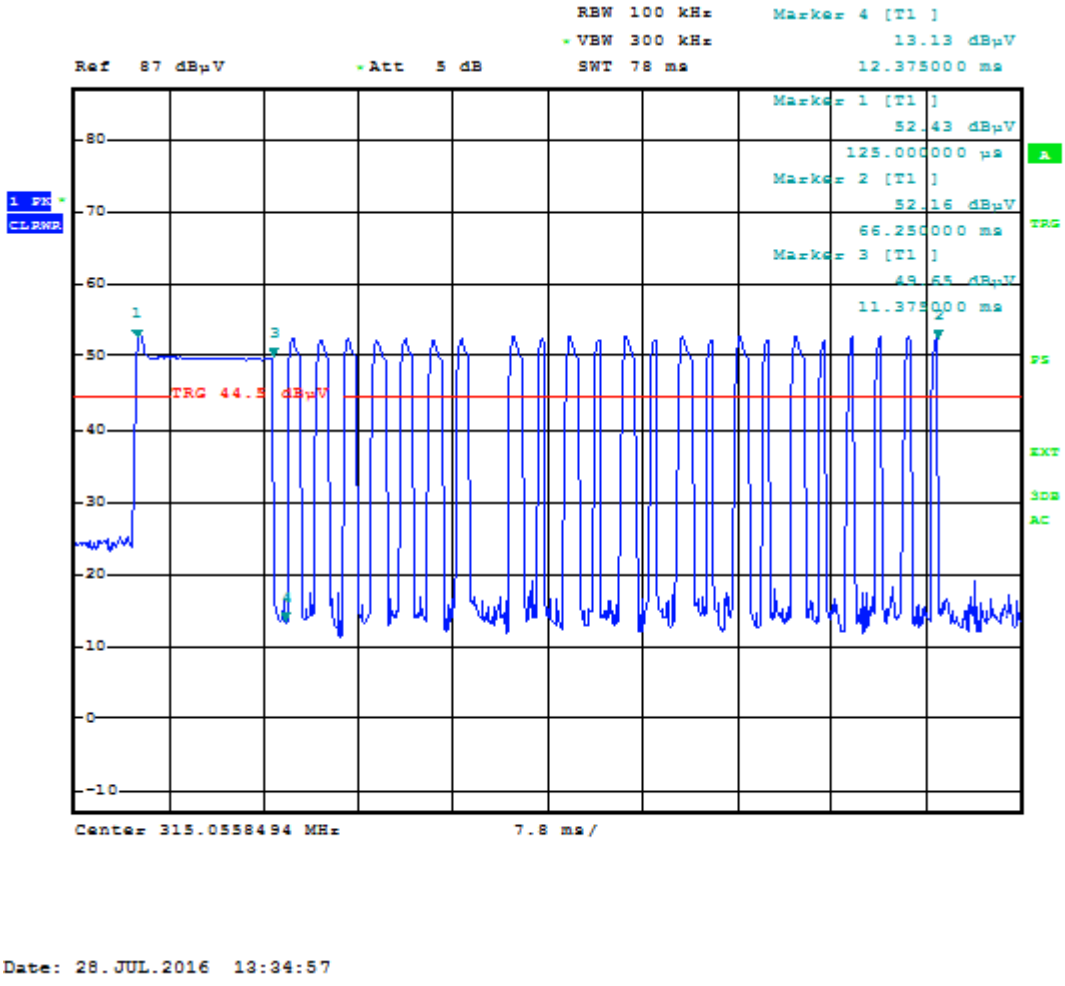

Figure 3. Transmission sequence of the EUT

Total length of the transmission burst is **66.125 ms.** (small caps were not included to calculations)

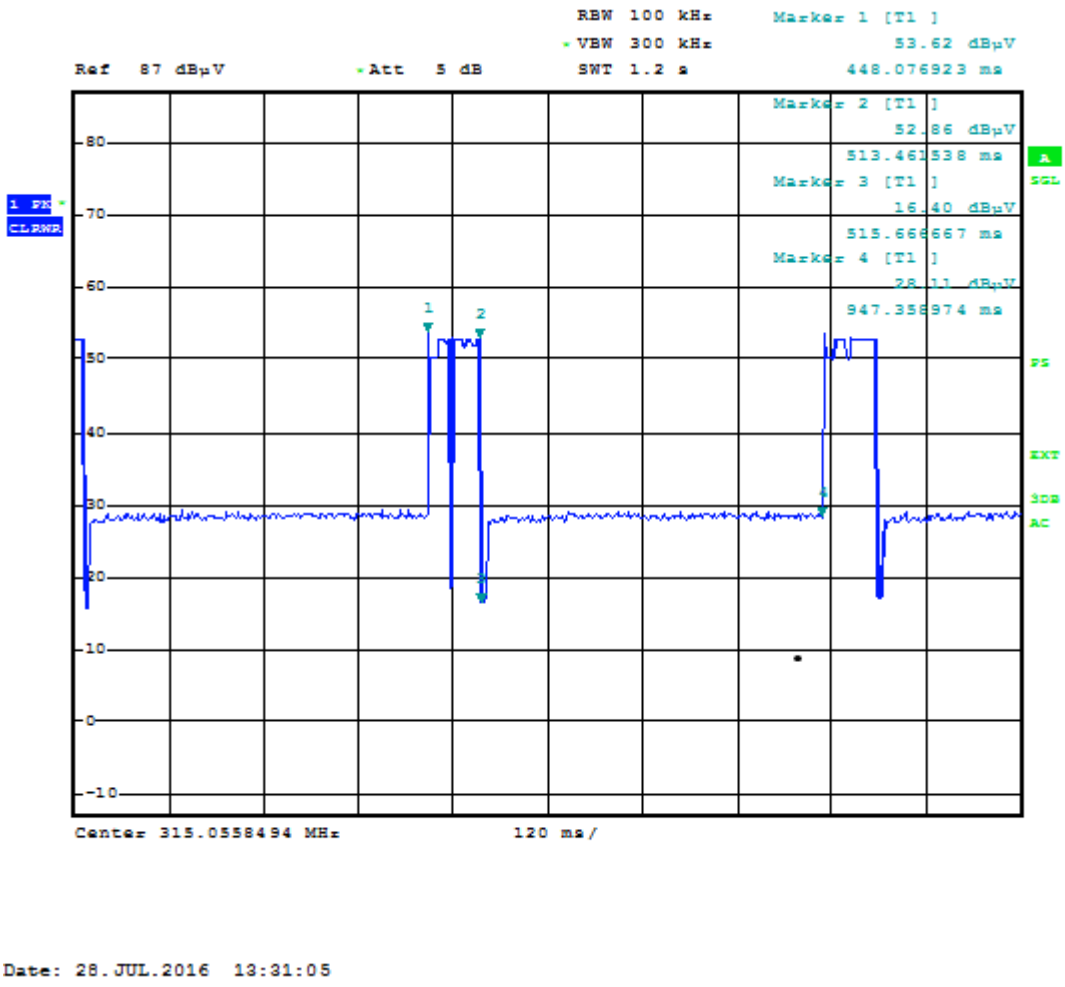

Figure 4. Transmission sequence of the EUT (special configuration provided for the tests)

Normally device transmits every 12 hour as declared by the manufacturer.
Graph shows that time between start of the first pulse and start of the second pulse is **499.28 ms.**

TEST EQUIPMENT

Equipment	Manufacturer	Type	Serial no	Inv.no	Cal. due
EMI RECEIVER	ROHDE & SCHWARZ	ESU 26	100185	8453	2017-06-09
SIGNAL ANALYZER	ROHDE & SCHWARZ	FSV40	101068	9093	2017-06-09
TEST SOFTWARE	ROHDE & SCHWARZ	EMC-32	-	-	-
AVG POWER SENSOR	ROHDE & SCHWARZ	NRP-Z91	100267	9878	2018-03-09
ANTENNA (30-1000 MHz)	SCHWARZBECK	VULB 9168	8168-503	8911	2016-11-04
ANTENNA MAST	DEISEL	MA240	240/455	5017	-
TURNTABLE	DEISEL	DS420	-	5015	-
CONTROLLER	COMTEST	HD100	100/457	5018	-
ANTENNA (1-18 GHz)	EMCO	3117	29617	7293	2017-03-03
ANTENNA (18-26.5 GHz)	EMCO	3160- 09	030232-022	7294	2017-03-16
PREAMPLIFIER (0.5-26GHz)	HP	83017A	3950M00102	5226	2017-02-03
ATTENUATOR 10 dB	HUBER & SUHNER	6810.17B	-	-	2016-08-26
HIGH PASS FILTER	WAINWRIGHT	WHKX	10	8267	2016-08-26
AC Power Source	CALIFORNIA INSTRUMENTS	5001 iX Series II	58209	7826	-

All used measurement equipment was calibrated (if required).