
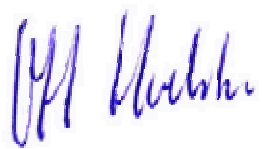


Test Report issued under the responsibility of:



TEST REPORT EN54-25:2008 Fire detection and alarm systems – Part 25: Components using radio links	
Report Reference No.	08092305.s01
Date of issue	November 3, 2008
Total number of pages	28
Testing Laboratory	TÜV Rheinland EPS B.V.
Address	Smidshornerweg 18, 9822TL Niekerk, The Netherlands
Applicant's name	NOFIQ systems B.V.
Address	Nijverheidsweg 16, 9403 VN, Assen
Test specification:	
Standard	EN54-25:2008
Test procedure	TSD EN54-25
Test Report Form No.	EN54-25_2008
Test Report Form(s) Originator	TÜV Rheinland EPS B.V.
Master TRF	2008-10
Test item description	fire detection, alarm and extinguishing system
Trade Mark	NOFIQ
Manufacturer	NOFIQ systems B.V.
Model/Type reference	NOFIQ BASE, NOFIQ BASE-HUB, NOFIQ HUB and NOFIQ FE20
Ratings	Base: 100 - 240VAC, 35W, 45 – 60Hz Hub: 100 – 240VAC, 0,2A, 50/60HZ (out: 4,2VDC 1,2A) by CE marked adapter FE20 : 100 – 240VAC, 0,2A, 50/60HZ (out: 4,2VDC 1,2A) by CE marked adapter All above are also powered by a separate battery

Testing procedure and testing location:	
<input checked="" type="checkbox"/> Testing procedure: ALL	
Tested by (name + signature).....:	L. van Kesteren
	
Approved by (+ signature).....:	O. Hoekstra
	

Summary of testing:	
<p>Tests performed (name of test and test clause): As described in the EN54-25:2008 a transmission threshold needs to be established to be able to determine the degradation of the attenuation due to testing (in effect, aging of the equipment). In establishing this threshold, TUV Rheinland EPS B.V. found that with 56dB attenuation, the system still functions as intended. The manufacturer has declared that when installing a NOFIQ combined fire detection, alarm and extinguishing, a site survey is executed using a portable receiver which determines the field-strength of the components which need to be installed, it also determines the loss of signal in dB's. Based on this and other tests of the system, the system transmission threshold is in such a range that the endurance tests will, according to TUV Rheinland EPS B.V., not yield results in which the system will fail these tests.</p> <p>All environmental tests were conducted by Thales Nederland B.V. with document identification 9505 001 476XX 001</p> <p>The combined fire detection, alarm and extinguishing system meets the requirements of EN54-25:2008</p>	<p>Testing location:</p> <p>TUV Rheinland EPS B.V. Smidshornerweg 18 0922TL Niekerk</p>
Summary of compliance with National Differences: NA	

Base Hub:

↑
THIS SIDE UP

NOFIQ




CE 1856

NOFIQ systems BV
Nijverheidsweg 10
NL-8403 VN Assen
the Netherlands
T +31 (0)992 40 42 01
F +31 (0)992 40 42 82 www.nofiq.com

CRADLE-STICKER

fire prevention at the source

Stickervel NOFIQ® BASE-HUB

NOFIQ

type : N20-BASE_HUB
art. no. : 1020.2000.0000

Made in The Netherlands
www.nofiq.com

Serial No.

CE 1856 


POD ID: V4Q-109920A IC: 7811A-109920A
This device complies with Part 30 of the FCC Rules and 109.200 of IC. Operation is subject to the following conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause occasional operation.

PRODUCT-STICKER

NOFIQ

qty & type : 1 x N20-BASE_HUB
art no. : 1020.2000.0000

Serial No.

CE 1856 

Made in The Netherlands

NOFIQ systems BV
Nijverheidsweg 10
NL-8403 VN Assen
the Netherlands
T +31 (0)992 40 42 01
F +31 (0)992 40 42 82 www.nofiq.com

Hub:

Fire prevention at the source

THIS SIDE UP

CE1856

NOFIQ systems BV
Nijverheidsweg 16
NL-8403 VN Assen
the Netherlands
T +31 (0)922 40 42 01
F +31 (0)922 40 42 82 www.nofiq.com

Stickervel NOFIQ® HUB

type : N20-HUB
art. no.: 1020.3000.0000

Made in The Netherlands
www.nofiq.com

CE1856

POD ID: VAC-10200A IC: 781A-10200A
This device complies with Part 21 of the FCC Rules and Part 27 of IC. Operation is subject to the following conditions: (1) this device must not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause occasional operation.

Serial No.

CRADLE-STICKER
PRODUCT-STICKER

qty & type : 1 x N20-HUB
art no. : 1020.3000.0000

NOFIQ systems BV
Nijverheidsweg 16
NL-8403 VN Assen
the Netherlands
T +31 (0)922 40 42 01
F +31 (0)922 40 42 82
www.nofiq.com

Serial No.

CE1856

Made in The Netherlands

Attention, replace only with original NOFIQ battery pack!

Type power supply: Lithium battery FeS2
Voltage (volt / amp.): 3V / 3000mA
Product number : 1020.4000.0010

FE20:

fire prevention at the source

↑
THIS SIDE UP

NOFIQ®




CE 1856

NOFIQ systems BV
Nijverheidsweg 16
NL-8403 VN Assen
the Netherlands
T +31 (0)922 40 42 01
F +31 (0)922 40 42 82 www.nofiq.com

CRADLE-STICKER

Stickervel NOFIQ® FE-20

NOFIQ®
FirePre® *inbuilt*

type : N20-FE
art. no.: 1020.4000.0000

Made in The Netherlands
www.nofiq.com

Serial No.

CE 1856 


POD ID: V4Q-1020-0A, IC: 7811A-1020-0A
This device complies with Part 91 of the FCC Rules and 95.029 of IC. Operation is subject to the following conditions: (1) This device must accept any interference received, including interference that may cause unintended operation.

PRODUCT-STICKER

NOFIQ®
FirePre® *inbuilt*

qty & type : 1 x N20-FE
art no. : 1020.4000.0000

Serial No.

CE 1856 

Made in The Netherlands

NOFIQ systems BV
Nijverheidsweg 16
NL-8403 VN Assen
the Netherlands
T +31 (0)922 40 42 01
F +31 (0)922 40 42 82 www.nofiq.com

Attention, replace only with original NOFIQ battery pack!

Type power supply: Lithium battery FeS2
Voltage (volt / amp.): 3V / 3000mA
Product number : 1020.4000.0010

Photo's of the EUT:



Base



Overview of the system, Base with base-hub on top, below, FE's and Hubs

Test item particulars	
Classification of installation and use	Stationary equipment
Supply Connection	230VAC / Internally powered cf. EN54-4
Possible test case verdicts:	
- test case does not apply to the test object	N/A
- test object does meet the requirement	P (Pass)
- test object does not meet the requirement	F (Fail)
Testing	
Date of receipt of test item	September 23, 2008
Date (s) of performance of tests	October 28, 2008
General remarks:	
<p>The test results presented in this report relate only to the object tested. This report shall not be reproduced, except in full, without the written approval of the Issuing testing laboratory. "(see Enclosure #)" refers to additional information appended to the report. "(see appended table)" refers to a table appended to the report.</p> <p>Throughout this report a comma (point) is used as the decimal separator.</p>	
General product information:	
<p>The NOFIQ system is a wireless fire detection and extinguishing system based on a Zigbee type RF link. Multiple Fire detection and extinguishing units can be operated and due to the network architecture, always have 2 separate communication paths to the central unit.</p>	

EN54-25_2008			
Clause	Requirement + Test	Result - Remark	Verdict
4.1	General		P
4.2	Radio frequency radio links		P
4.2.1	Immunity to site attenuation		P
	At least 10 dB up to frequencies of 10MHz		P
	For frequencies of > 10MHz as calculated in Annex B		P
	The test includes verification by an assessment and shall be carried out in accordance with 8.2.2.	Test performed satisfactory	P
4.2.2	Alarm signal integrity		P
	The components of the system shall use a transmission protocol on the transmission path and/or the RF link to ensure that no alarm message is lost. The test shall be carried out in accordance with 8.2.3.	Test performed satisfactory	P
4.2.3	Identification of the RF linked component		P
4.2.3.1	Each RF linked component shall be identified by an individual identification code as belonging to one specific FDAS.		P
4.2.3.2	The manufacturer shall provide means to ensure that a RF linked component shall not be accepted by other FDAS. The test shall be carried out in accordance with 8.2.4.	Test performed satisfactory	P
4.2.3.3	The manufacturer shall provide the necessary documentation and/or means for the assessment of this requirement.		P
4.2.4	Receiver performance		P
	The receiver shall meet the requirements given in table 1	Tests were done in accordance with EN300-440 V1.3.1 due to the frequency range of the system. See TNO-EPS report 06062803.r01 for details (Annex to this report)	P

EN54-25_2008			
Clause	Requirement + Test	Result - Remark	Verdict
4.2.5	Immunity to interference		P
4.2.5.1	General		P
	The following kind of interferences on the RF link shall be covered:		P
	a) radio influences from own system;		P
	b) radio influences from other users of the spectrum.		P
	The following influences are not covered:		P
	c) random influences as a result of electromagnetic effects, because these are covered by EMC guidelines (see EN 50130-4);	See report TNO-EPS 06062804.emc, annex to this report	P
	d) deliberate attacks on the radio controlled transmission paths with the help of electromagnetic effects (sabotage via the radio controlled route), because no special sabotage resistance is required for fire alarm systems in the parts of EN 54.		P
4.2.5.2	Availability of RF link in two or more technically similar systems coming from the same manufacturer		P
	The test shall be carried out in accordance with 8.2.6.	Test performed satisfactory	P
4.2.5.3	Availability of the RF link in the presence of other band users		P
	The test shall be carried out in accordance with 8.2.7.		P
4.2.5.4	Integrity of the RF link		P
	The application of one of the interfering RF signals defined in 8.2.7 to one of the FDAS receivers shall cause neither an alarm condition nor a fault warning condition at the CIE.		P
4.2.6	Loss of communication		P
	The test shall be carried out in accordance with 8.2.8.	Test performed satisfactory	P
4.2.7	Antenna		P
	The test shall be carried out in accordance with 8.2.9.	Test performed satisfactory	P
5	Components requirements		P
5.1	In order to comply with this standard the components shall meet the requirements of this clause which shall be verified by visual inspection or engineering assessment, shall be tested as described in Clause 8 and shall meet the requirements of the tests.		P
5.2	General		P

EN54-25_2008			
Clause	Requirement + Test	Result - Remark	Verdict
5.2.1	All components shall meet the requirements of the relevant part of EN 54 and the following additional specific requirements, including the transmission paths and/or radio links.		P
5.2.2	The component shall be designed that the removal from its base and/or point of installation are detected and indicated as a fault.		P
5.2.3	Components that rely on software control in order to fulfil the requirements of this specification shall comply with the relevant part of EN 54.		P
5.3	Power supply equipment		P
5.3.1	The components shall be powered by:		P
	a) an autonomous power source, e.g. a primary battery, or		P
	b) a power supply equipment in accordance with EN 54-4.	See TUV EPS report 08111201.s01_NOFIQ_EN54-4-1997-A12002	P
	NOTE In accordance with EN 54-2 a CIE is powered with power supply equipment complying with EN 54-4.		P
5.3.2	All components powered by an autonomous power source shall comply with the following requirements:		P
	a) the autonomous power source shall be within the enclosure of the component;		P
	b) the autonomous power source shall allow normal operation of the component for a minimum period of 36 months.	Calculation of battery lifetime is attached as appendix	P
5.3.3	All components powered by an autonomous power source shall be able to transmit a fault signal (low power) before the power source fails. The following conditions shall be taken into account:		P
	a) the component shall be capable of generating and transmitting a fault signal within 60 min after replacing a good or new autonomous power source by a preconditioned power source representing a discharged power source at the end of its service life;		P
	b) the component shall be capable of operating as intended when it is activated using the preconditioned power source representing a discharged power source at the end of its service life;		P
	c) the components shall keep the alarm condition and/or another activated condition for at least 30 min (where alarm condition is not applicable). The procedure to verify this requirement is specified in 8.3.4.		P

EN54-25_2008			
Clause	Requirement + Test	Result - Remark	Verdict
5.3.4	The loss of the power source shall be indicated as a fault signal from point in accordance with EN 54-2. Where several power sources are used for different functions in one component, the fault signal shall be given for each power source, see 5.3.3.		P
5.3.5	The component shall either be designed to make polarity reversal impossible or, if not, the polarity of the connections of the power source shall be identifiable and the polarity reversal shall not damage the component. The procedure to verify the reversal of polarity is specified in 8.3.5.		P
5.4	Environmental related requirements		P
5.4.1	Components shall be subjected to the environmental tests defined in the relevant part of EN 54. The functional tests of the radio part of the component before and after the environmental treatment shall be carried out in accordance with 8.3.		P
5.4.2	General test procedure		P
5.4.3	Provision for testing		P
	The manufacturer shall provide a sufficient number of specimens for testing. The required number mentioned in Table 2 is dependent on the type of component to be tested.		P
	Components CIE At least 1 (in accordance with EN 54-2)	2 systems available	P
	Number of specimens Other components (e.g. detectors, manual call points, input/output devices) At least 16 (in accordance with the relevant part of EN 54)	1 system has 10 FE's and 2 hubs, the other systems simulated 510 components by software configuration (10 FE x 51 simulated ID's = 510 components) and 3 hubs	P
6	Documentation		P
	The manufacturer shall prepare the documentation to evaluate the compatibility in the configuration(s) specified by the manufacturer. This documentation shall include at least the following:	Documentation reviewed	P
	a) a list of the relevant components of the fire detection and fire alarm system. This list shall define for each component the functions (a part of this definition shall include a description of the software and of the hardware) and the technical information for each component to facilitate proof of the compatibility of each sub-system inside a global network system;	Documentation reviewed	P
	b) test reports relative to the conformity of the components, with indication of the relevant part of EN 54;	Documentation reviewed	P

EN54-25_2008			
Clause	Requirement + Test	Result - Remark	Verdict
	c) characteristics of the RF link between each component and the CIE;	Documentation reviewed	P
	d) utilisation limits of the system, e.g. configuration, number of components which are able to communicate with one base station, functional limits.	Documentation reviewed	P
7	Marking		P
	The marking shall be in accordance with the marking requirements of the relevant part of EN 54. The element containing radio part shall be additionally clearly marked with:	See marking photo	P
	a) the number of this European Standard, i.e. EN 54-25;		P
	b) marking required by other regulations;		P
	The element containing an autonomous power source shall be additionally clearly marked with: c) the type and the reference of the power source(s) recommended by the manufacturer. These indications shall be visible during its replacement.	Marking present	P
8	Tests		P
8.1.1	General	Considered	P
8.1.2	Standard atmospheric conditions for testing	Considered	P
8.1.3	Operating conditions for tests		P
8.1.4	Mounting and orientation		P
8.1.5	Tolerances		P
8.2	System tests		P
8.2.1	The test order and the number of samples are given in Table 3.		P
8.2.2	Test for immunity to site attenuation		P
8.2.2.1	Object To demonstrate that the appropriate RF link fulfils the requirements defined in 4.2.1 in a medium free from interference and in the relevant frequency band.		P
8.2.2.2	Test procedure In accordance with the manufacturer's documentation the requirement of 4.2.1 shall be verified by engineering assessment. NOTE The assessment takes into account the difference of the technical approaches of different manufacturers to avoid communication loss by site attenuation.	Test performed using conducted RF method with adjustable attenuator.	P

EN54-25_2008			
Clause	Requirement + Test	Result - Remark	Verdict
8.2.2.3	Requirements The assessment shall indicate that the requirements of 4.2.1 are fulfilled.	Fulfilled	P
8.2.3	Test for alarm signal integrity		P
8.2.3.1	Object To demonstrate that an alarm message to or from a component is not lost due to collisions and/or RF link occupation and the system complies with the requirements defined in 4.2.2.		P
8.2.3.2	Procedure 10 components shall be simultaneously triggered to transmit or receive alarm messages by means provided by the manufacturer. If the system capacity is less than 10 components, the maximum number of components shall be triggered.	Test performed using test system 1 where 1 FE was put into alarm mode by use of a heating element. Due to the FE simulating 51 FE's, 51 alarm messages were counted. No alarm messages were lost.	P
8.2.3.3	Requirements The first alarm message shall be indicated within 10 s and the last alarm message within 100 s. No alarm message shall be lost. NOTE The value of 100 s is not intended to show the compliance with the alarm response time or with the fault response time of EN 54-2.		P
8.2.4	Test for identification of RF linked components		P
8.2.4.1	Object To demonstrate, that the component complies with the requirements of 4.2.3.		P

EN54-25_2008			
Clause	Requirement + Test	Result - Remark	Verdict
8.2.4.2	<p>Procedure</p> <p>Verification of the documentation provided by the manufacturer that the requirements in accordance with 4.2.3.1 and 4.2.3.2 are fulfilled.</p>	<p>Transmitters are individually identified on the network by a unique short network address which is a number between 2 to 65534. Each network is identified by a network ID number ranging from 1 to 255. Each network also has its own encryption key. All this provides ample opportunities to ensure a unique identification on a single network. The probability that a transmitter is identified and accepted by another CIE of the same system supplier unintended to receive is assessed to be less than 1:1000 000.</p>	P
8.2.4.3	<p>Requirements</p> <p>The manufacturer shall show that the identification of the RF linked component complies with the requirements defined in 4.2.3. The probability that the RF linked component is identified and accepted as belonging to another system from the same system manufacturer unintended to receive shall be less than 1:1 000 000.</p>		P
8.2.5	Test for the receiver performance		P
8.2.5.1	<p>Object</p> <p>To demonstrate, that the component complies with the requirements of 4.2.4.</p>		P
8.2.5.2	<p>Test procedure</p> <p>The characteristics shall be tested in accordance with Table 4.</p>		P
8.2.5.3	<p>Requirements</p> <p>The requirements in accordance with the test procedures as given in Table 4 shall be fulfilled.</p>		P
8.2.6	Test for mutual disturbance between systems of the same manufacturer		P
8.2.6.1	<p>Object</p> <p>To demonstrate that the component complies with the requirements of 4.2.5.2 and to demonstrate the ability of RF link to convey signals even when many radio components within systems of the same manufacturer and the same system type work in a limited area. The test shall prove the basic function of the component.</p>		P

EN54-25_2008			
Clause	Requirement + Test	Result - Remark	Verdict
8.2.6.2	<p>Test procedure</p> <p>The documentation shall be checked to show that the interaction between the RF links does not negatively impact the transmission time and fault detection time during normal operation as set out in this document. Subsequently two independent base stations each with 5 components shall be set up at the minimum distance between all the components permitted by the manufacturer and commissioned in accordance with the manufacturer's specifications. If the maximum number of components per system is below 5, the maximum number of components shall be installed. The manufacturer shall provide means to ensure the simultaneous triggering of the devices. The test for alarm signal integrity may be combined with this test.</p>	<p>Test was performed using both complete test systems and have those working as intended in each others vicinity. Several alarm messages were triggered in both systems, with no loss of alarm messages. In each system, a FE was removed and this was reported by the CIE. No message from one system was reported on the other.</p>	P
8.2.6.3	<p>Requirements</p> <p>The systems shall operate for 48 h without fault messages and the following shall be met:</p>		P
	a) after triggering of two alarm messages in one of the two systems at an interval within 2 s each message shall be received and/or indicated correctly within 10 s after each activation;		P
	b) after simultaneously triggering of 5 alarm messages in each system (or the maximum number of acceptable alarm messages if less than 5, the following is required for each system:	Fulfilled	P
	1) the first message shall be received and/or indicated correctly within 10 s. To verify that no message has been lost the following 9 messages shall be correctly received and indicated on the appropriate CIE within 100 s,	Fulfilled	P
	2) if the maximum number of components in a system is less than the required number of alarm messages, this maximum number shall be used;		N/A
	The fault or alarm messages shall be correctly addressed within the assigned system without producing a fault or an alarm signal on the non-assigned system.		P
8.2.7	Test of compatibility with other band users		P
8.2.7.1	<p>Object</p> <p>To demonstrate that the component complies with the requirements of 4.2.5.3.</p>		P
8.2.7.2	Test procedure		P

EN54-25_2008			
Clause	Requirement + Test	Result - Remark	Verdict
8.2.7.2.1	The manufacturer shall provide a suitable test equipment and sufficient information about the measures to ensure the availability of the transmission path in the presence of other band users in accordance with the National Regulations where the tested system is used. If a transmission uses one or more remote receivers, an interfering signal shall only be applied to one receiver at any one time. The test shall be repeated for each receiver.		P
8.2.7.2.2	Test procedure for multi-channel components An un-modulated interfering signal sufficient to block the transmission shall be applied to the message recipient (e.g. CIE). NOTE It is generally sufficient if the interfering level on the message recipient is > 10 dB above the current signal level of the transmission in its bandwidth. The test shall be carried out on all of the frequencies used by the component under test. Each frequency shall be blocked for at least 1 s in turn. The time of frequency change shall not exceed 1 s. This procedure shall be continuously repeated for the duration of the function test. After the start of the blocking procedure five separate non-contiguous alarm messages shall be triggered at the transmitting component.	Test was performed using both test systems set up in the anechoic room. A signal generator was used to generate the signal as described in the EN54-25:2008 clause 8.2.7.2.2 both test systems performed as intended during and after the test	P
8.2.7.2.3	Test procedure for single-channel components An un-modulated interfering signal shall be generated to mimic the other users on the wanted channel and shall be sufficient to block the transmission shall be applied to the message recipient (e.g. CIE). The "on" time and "off" time for the interfering signal shall be in accordance with Table 5.		P
8.2.7.3	Requirements The RF links shall operate appropriately and as intended and: a) no un-intentional fault or alarm message shall be indicated on the control equipment when the interfering signal occurs and	Fullfilled	P
	b) all intended messages, e.g. alarm messages shall be processed correctly.	Fullfilled	P
8.2.8	Test for the detection of a loss of communication on a link		P
8.2.8.1	Object of the test To demonstrate the ability of the receiving equipment to detect the loss of the communication with a transmitter in the system. The test shall prove the basic function of the system.		P

EN54-25_2008			
Clause	Requirement + Test	Result - Remark	Verdict
8.2.8.2	Test procedure	Test was performed using test system 2, one FE was removed in either system. All instances of FE power down were reported on the correct CIE.	P
8.2.8.3	Requirements The CIE shall enter the fault warning condition after the loss of communication by the times given in 4.2.6.	Fulfilled	P
8.2.9	Test of the antenna		P
8.2.9.1	Object of the test To demonstrate that an antenna or its cable cannot easily be detached.		P
8.2.9.2	Test procedure		P
8.2.9.3	Requirements The antenna or its cable shall only be detachable by opening the enclosure of the component or by using special tools provided by the manufacturer.	A special tool and torque setting are included in the manual. The antenna cannot be easily removed. (see appended table 8.2.9)	P
8.3	Components tests		P
8.3.1	General		P
8.3.2	Test schedule for components tests		P
8.3.3	Verification of the service life of the autonomous power source(s)		P
8.3.3.1	Object of the verification To demonstrate, by analysis and calculation, that the power source functions during the required time.		P
8.3.3.2	Verification procedure The manufacturer shall provide the electric current consumption of the component powered in quiescent conditions.		P
8.3.3.3	Requirements The service life calculation shall be provided by the manufacturer and shall be verified by the test authority. The requirements of 5.3.2 shall be fulfilled.		P
8.3.4	Test for the low power condition fault signal		P
8.3.4.1	Object of the test		P
8.3.4.2	Test procedure		P

EN54-25_2008			
Clause	Requirement + Test	Result - Remark	Verdict
	a) an autonomous power source recommended by the manufacturer shall be connected to the component. In order to shorten the time until the low power condition threshold is reached, an additional current sink shall be connected to the autonomous power source. The fault signal shall be monitored on the CIE through the real transmission path.		P
	b) after the occurrence of the fault signal the additional current sink shall still remain connected for a further time of 10 % of the days needed for the discharge.		P
	c) the preconditioned power source shall be connected again to the component. The component shall be connected to a suitable monitoring equipment		P
	d) after a period of at least 60 min the powered component shall be triggered to the alarm condition;		P
	e) if the component under test is an intermediate element, a functional test shall be performed in accordance with the manufacturer's requirements.		P
	After that all possible inputs/outputs shall be activated such that the power consumption of the intermediate element is on a maximum level.		P
8.3.4.3	Requirements		P
	a) after reconnecting the preconditioned power source the component shall generate and transmit a fault signal within 60 min;		P
	b) after the occurrence of the fault signal and the subsequent triggering, the component shall recognize and indicate the alarm condition, e.g. sound output. The component shall keep the alarm condition for at least 30 min;		P
	c) if the component under test is an intermediate element, the functional test shall be within the manufacturer's specifications.		P
	The activated inputs/outputs shall not change there preset conditions for at least 30 min.		P
8.3.5	Test for the polarity reversal		P
8.3.5.1	Object of the test		P
8.3.5.2	Test procedure		P
8.3.5.2.1	General		P
8.3.5.2.2	Functional part		P

EN54-25_2008			
Clause	Requirement + Test	Result - Remark	Verdict
	The measurement of the response or the functional test of the powered component shall be carried out as specified in the relevant part of EN 54 to which the component under test shall comply. The polarity shall then be reversed, if this is mechanically possible. This polarity reversal shall be maintained for 2 h, unless a fault signal is transmitted by the component under test.		P
8.3.5.2.3	Radio part		P
	The transmission threshold value shall be determined in accordance with Annex A before and after the polarity reversal test. The threshold values A_{before} and A_{after} shall be recorded for each measurement.		P
8.3.5.3.1	Functional part		P
	The response values (qualitative or quantitative) measured shall comply with the test requirements as defined in the relevant part of EN 54 to which the component under test shall comply. If the component under test is an intermediate element, it shall comply with the manufacturer's specifications when the function tests are performed.		P
8.3.5.3.2	Radio part		P
	The difference $ A_{\text{before}} - A_{\text{after}} $ shall be less than 6 dB.		P
8.3.6	Repeatability test		P
8.3.6.1	Object of the test		P
8.3.6.2	Test procedure		P
8.3.6.3	Requirements		P
	The difference $ A_{\text{max}} - A_{\text{min}} $ shall be less than 6 dB.		P
8.3.7	Reproducibility test		P
8.3.7.1	Object of the test		P
8.3.7.2	Test procedure		P
8.3.7.3	The difference $ A_{\text{max}} - A_{\text{min}} $ shall be less than 6 dB.		P
8.3.8	Variation of supply parameters		P
8.3.8.1	Object of the test		P
8.3.8.2	Test procedure		P
8.3.8.3	The difference $ A_{\text{max}} - A_{\text{min}} $ shall be less than 6 dB.		P
8.3.9	Dry heat (operational)	All environmental tests were performed by THALES, see EN54-4 report appendices	P
8.3.9.1	Object of the test		P

EN54-25_2008			
Clause	Requirement + Test	Result - Remark	Verdict
8.3.9.2	Test procedure		P
8.3.9.3	Requirements		P
	No alarm or fault signal shall be given during the conditioning.		P
	The difference $ A_{\text{during}} - A $ shall be less than 10 dB, where A was measured in reproducibility test.		P
	The difference $ A_{\text{after}} - A $ shall be less than 6 dB, where A was measured in reproducibility test.		P
8.3.10	Dry heat (endurance)		P
8.3.10.1	Object		P
8.3.10.2	Test procedure		P
8.3.10.3	Requirements		P
	No fault signal, attributable to the endurance conditioning, shall be given on reconnection of the specimen.		P
	The difference $ A_{\text{after}} - A $ shall be less than 6 dB, where A was measured in reproducibility test.		P
8.3.11	Cold (operational)		P
8.3.11.1	Object of the test		P
8.3.11.2	Test procedure		P
8.3.11.3	Requirements		P
	No alarm or fault signal shall be given during the conditioning.		P
	The difference $ A_{\text{during}} - A $ shall be less than 10 dB, where A was measured in reproducibility test.		P
	The difference $ A_{\text{after}} - A $ shall be less than 6 dB, where A was measured in reproducibility test.		P
8.3.12	Damp heat, cyclic (operational)		P
8.3.12.1	Object of the test		P
8.3.12.2	Test procedure		P
8.3.12.3	Requirements		P
	No alarm or fault signal shall be given during the conditioning.		P
	The difference $ A_{\text{during}} - A $ shall be less than 10 dB, where A was measured in reproducibility test.		P
	The difference $ A_{\text{after}} - A $ shall be less than 6 dB, where A was measured in reproducibility test.		P
8.3.13	Damp heat, steady state (operational)		P
8.3.13.1	Object of the test		P
8.3.13.2	Test procedure		P
8.3.13.3	Requirements		P

EN54-25_2008			
Clause	Requirement + Test	Result - Remark	Verdict
	No alarm or fault signal shall be given during the conditioning.		P
	The difference $ A_{\text{during}} - A $ shall be less than 10 dB, where A was measured in reproducibility test.		P
	The difference $ A_{\text{after}} - A $ shall be less than 6 dB, where A was measured in reproducibility test.		P
8.3.14	Damp heat, steady state (endurance)		P
8.3.14.1	Object of the test		P
8.3.14.2	Test procedure		P
8.3.14.3	Requirements		P
	No alarm or fault signal shall be given during the conditioning.		P
	The difference $ A_{\text{after}} - A $ shall be less than 6 dB, where A was measured in reproducibility test.		P
8.3.15	SO₂-corrosion (endurance)		P
8.3.15.1	Object of the test		P
8.3.15.2	Test procedure		P
8.3.15.3	Requirements		P
	No alarm or fault signal shall be given during the conditioning.		P
	The difference $ A_{\text{after}} - A $ shall be less than 6 dB, where A was measured in reproducibility test.		P
8.3.16	Shock (operational)		P
8.3.16.1	Object of the test		P
8.3.16.2	Test procedure		P
8.3.16.3	Requirements		P
	No alarm or fault signal shall be given during the conditioning.		P
	The difference $ A_{\text{after}} - A $ shall be less than 6 dB, where A was measured in reproducibility test.		P
8.3.17	Impact (operational)		P
8.3.17.1	Object of the test		P
8.3.17.2	Test procedure		P
8.3.17.3	Requirements		P
	No alarm or fault signal shall be given during the conditioning.		P
	The difference $ A_{\text{after}} - A $ shall be less than 6 dB, where A was measured in reproducibility test.		P
8.3.18	Vibration, sinusoidal (operational)		P
8.3.18.1	Object of the test		P
8.3.18.2	Test procedure		P

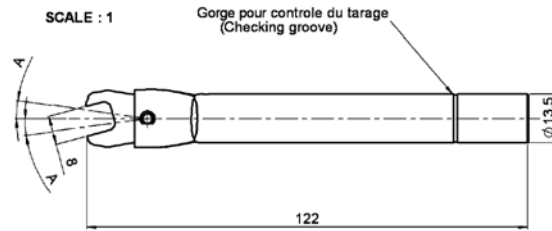
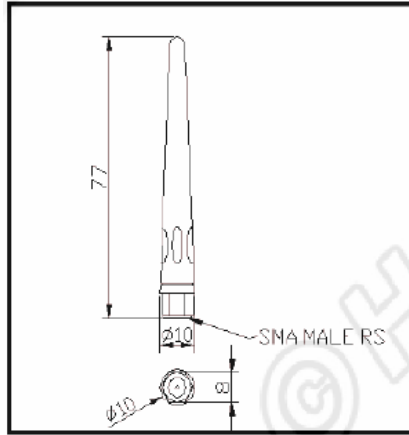
EN54-25_2008			
Clause	Requirement + Test	Result - Remark	Verdict
8.3.18.3	Requirements		P
	No alarm or fault signal shall be given during the conditioning.		P
	The difference $ A_{\text{after}} - A $ shall be less than 6 dB, where A was measured in reproducibility test.		P
8.3.19	Vibration, sinusoidal (endurance)		P
8.3.19.1	Object of the test		P
8.3.19.2	Test procedure		P
8.3.19.3	Requirements		P
	No alarm or fault signal, attributable to the endurance conditioning shall be given on reconnection of the specimen.		P
	The difference $ A_{\text{after}} - A $ shall be less than 6 dB, where A was measured in reproducibility test.		P
8.3.20	Electromagnetic Compatibility (EMC), Immunity tests (operational)	See attached EMC report 06062804.emc	P
8.3.20.1	Object of the test		P
8.3.20.2	The following EMC immunity tests shall be carried out as described in EN 50130-4:		P
	a) electrostatic discharge;		P
	b) radiated electromagnetic fields;		P
	c) conducted disturbances induced by electromagnetic fields;		P
	d) fast transient bursts;		P
	e) slow high energy voltage surges;		P
	f) mains supply voltage variations;		P
	g) mains supply voltage dips and short interruptions.		P
8.3.20.3	Requirements		P
	For these tests the criteria for compliance specified in EN 50130-4, in the appropriate part of EN 54 and the following shall apply:		P
	The difference $ A_{\text{after}} - A $ shall be less than 6 dB, where A was measured in reproducibility test.		P
			-
Annex A			
A.1	Radio frequency shielded test equipment for the component or the radio part of the component transmitting the alarm signal		P
A.2	Radio frequency shielded test equipment for the component or the radio part of the component receiving the alarm signal		P

EN54-25_2008			
Clause	Requirement + Test	Result - Remark	Verdict
A.3	Cable connection between test equipment with component transmitting the alarm signal and test equipment with component receiving the alarm signal		P
A.4	Determination of the transmission threshold <i>A</i>		P
			-
Annex B			
B	Immunity to site attenuation (path loss)		P
			-
Annex C			
C	Data and calculation of the service life of the autonomous power source(s)		P

EN54-25_2008			
Clause	Requirement + Test	Result - Remark	Verdict
			-
Annex ZA			
ZA.1	Scope and relevant clauses		P
ZA.2	Procedures for the attestation of conformity of components using RF links covered by this standard		P
ZA.2.1	System of attestation of conformity		P
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ZA.2.2.1.1	Initial type testing		P
ZA.2.2.2.1	Initial type testing shall be performed to demonstrate conformity with this European Standard.		P
ZA.2.2.2.2	Tests previously performed, such as type tests for product certification, may be taken into account for the purpose of the type testing as required by this European Standard...		P
ZA.2.2.2.3	Where one or more characteristics are the same for products with similar design, construction and functionality, then the results of tests for these characteristics on one product may be applied to the other similar product or products.		P
ZA.2.2.2.4	Test samples shall be representative of the normal production. If the test samples are prototypes, they shall be representative of the intended future production and shall be selected by the manufacturer.		P
ZA.2.2.2.5	All initial type testing and its results shall be documented in a test report. All test reports shall be retained by the manufacturer for at least ten years after the last date of production of the product to which they relate.		P
ZA.2.2.3	Factory production control		P
ZA.2.2.3.1	General		P
ZA.2.2.3.2	General requirements		P
ZA.2.2.3.2	Product specific requirements		P
ZA.2.2.3.4	Initial inspection of factory and FPC		P
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ZA.3	CE marking and labeling and accompanying documentation		P
ZA.4	EC certificate of conformity and EC declaration of conformity		P

EN54-25_2008			
Clause	Requirement + Test	Result - Remark	Verdict

8.2.9	TABLE: Antenna specifications	P
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This wrench is designed to SMA (Brass) connector's coupling nut. Durability : 10 000cycles

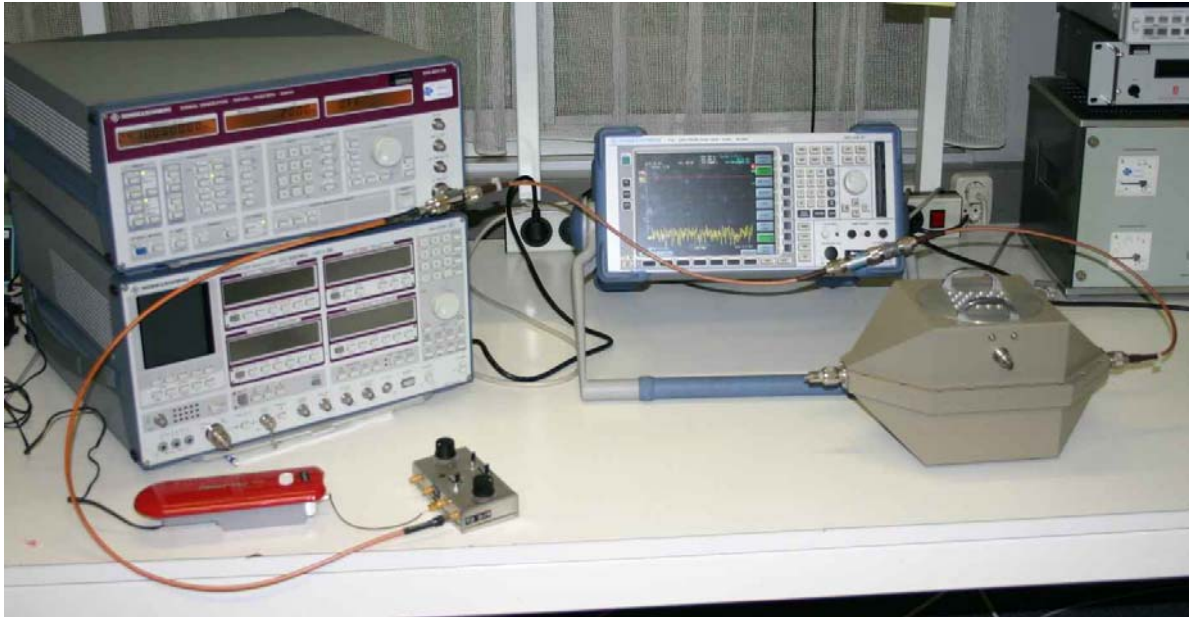
supplementary information:

EN54-25_2008			
Clause	Requirement + Test	Result - Remark	Verdict

Photo's

Typical test set-up

EN54-25_2008			
Clause	Requirement + Test	Result - Remark	Verdict



Receiver and attenuation test set-up



**TEST REPORT CONCERNING THE COMPLIANCE OF
AN ALARM MANAGEMENT SYSTEM, BRAND NOFIQ,
MODEL NOFIQ BASE AND ANCILLARY EQUIPMENT
N20-BASE_HUB, N20-HUB AND N20-FE IN
ACCORDANCE WITH THE STANDARDS:
EN 50130-4: 1995 INCLUDING A1: 1998, A2: 2003;
EN 55022: 1998 INCLUDING A1: 2000, A2: 2003;
EN 55024: 1998 INCLUDING A1: 2001, A2: 2003;**

FCC listed	: 90828
Industry Canada	: 2932G-1
VCCI Registered	: R-1518, C-1598
R&TTE, LVD, EMC Notified Body	: 1856

TÜV Rheinland EPS B.V.
P.O. Box 15
9822 ZG Niekerk (NL)
Smidshornerweg 18
9822 TL Niekerk (NL)

Telephone: +31 594 505005
Telefax: +31 594 504804

Internet: www.tuv-eps.com
E-mail: info@tuv-eps.com

Description of test item

Test item : Alarm Management System
Manufacturer : NOFIQ systems B.V.
Brand mark : Nofiq
Model : NOFIQ BASE,
(with ancillary equipment N20-BASE_HUB, N20-HUB, N20-FE)
Serial number(s) : ---
Receipt number : 2
Receipt date : August 1, 2006

Applicant information

Applicant's representative : Mr. G. M. de Groot
Company : NOFIQ systems B.V.
Address : Nijverheidsweg 16
Postal code : 9403 VN
City : Assen
PO-Box : 510
Postal code : 9400 AM
City : Assen
Country : The Netherlands
Telephone number : +31 (0)592 404201
Telefax number : +31 (0)592 404282
Project : ---

Test performed

Location : Niekerk
Test(s) started : September 14, 2006
Test(s) completed : November 1, 2006
Purpose of test(s) : Compliance with standard
Test specification(s) : EN 50130-4: 1995 + A1: 1998 & A2: 2003;
EN 55022: 1998 + A1: 2000 & A2: 2003; EN 55024: 1998 + A1: 2001 & A2: 2003.

Test engineer : T.E.T. Koning

Projectleader : T.E.T. Koning

Report written by : T.E.T. Koning

Report approved by : H. Pieters

Report date : March 03, 2009

This report is in conformity with NEN-EN-ISO/IEC 17025: 2000.

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The test results relate only to the item(s) tested.

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1 General.

This report replaces the previous version of January 31, 2007 with reference 06062804.emc. A new report was issued due to unclear references in the previous version. In the current version these references have been removed. The indicated measurement results have been unchanged and referenced to standards valid at the date of issuing this report.

1.1 Applied standards.

The Alarm Management System, brand Nofiq, Model NOFIQ BASE has been tested in accordance with the standards:

EN 50130-4: 1995 including A1: 1998 and A2: 2003; EN 55022: 1998 including A1: 2000 and A2: 2003;
EN 55024: 1998 including A1: 2001 and A2: 2003.

1.2 Detailed description of test configuration, input and output ports.

The Alarm Management System brand Nofiq, Model NOFIQ BASE in the configuration as described below, will be referred to as EUT for the purpose of this test report.

1.2.1 Description of test configuration.

Test item : Alarm Management System
Model : NOFIQ BASE
Serial number : ---
Voltage input rating : 220 - 240V 50/60 Hz
Power rating : ---
Remarks : ---

Auxiliary : Base HUB (radio and transmitting station)
Model : N20-BASE_HUB
Serial number : ---
Voltage input rating : Via Alarm Management System
Power rating : ---
Remarks : ---

Auxiliary : Hub (signal repeater, wireless connected)
Model : N20-HUB
Serial number : ---
Voltage input rating : Separate power supply
Power rating : ---
Remarks : ---

Auxiliary : Detection, alarm and extinguishing component (wireless connected)
Model : N20-FE
Serial number : ---
Voltage input rating : Separate power supply
Power rating : ---
Remarks : ---

1.2.2 Description of tested input and output ports.

Number	Terminal	From	To	Remarks
1	230 VAC	Power source	EUT	-
2	Communication	EUT	Communication device	
3	HUB	EUT	Base Hub	Shielded cable

Table 1

1.3 Test conditions.

1.3.1 Environmental conditions.

During all tests the environmental conditions were the following:

Temperature	:	20 - 24 °C
Relative humidity	:	50 - 66 %
Air Pressure	:	86 to 106 kPa

1.3.2 Operation mode(s).

Operation mode 1:

EUT is connected to the Base Hub. The Base Hub is communicating with Fire Extinguishers (FE's) and Hub's. The EUT is reading the status of the FE's and Hub's continuously by means of the wireless connection. The EUT may not generate an unintended alarm. The display will generate information and/or warnings during and after testing.

Operation mode 2:

Intended alarms are simulated by switching-off one of the HUB's. Any intended alarm generated shall be reported by the EUT. Log files are available for monitoring afterwards. The display will generate information and/or warnings during and after testing.



Photo 1. Total set-up of the EUT during testing, including Base Hub, Hub's and FE's

2 Emissions.


2.1 Enclosure.

2.1.1 Radiated electric field strength measurements.

The radiated field strength levels (electric component) have been measured in conformity with- and according to the criteria as stated below.

Basic standard	:	EN 55022: 1998 incl. A1: 2000 and A2: 2003
Test set-up	:	EN 55022: 1998 incl. A1: 2000 and A2: 2003
Measuring distance	:	10 meters
Frequency range 1	:	30 MHz - 230 MHz
Limits	:	30 dB(μ V/m)
Frequency range 2	:	230 MHz - 1000 MHz
Limits	:	37 dB(μ V/m)

Detailed results of the measurements concerning radiated field strength levels (electric component), emitted by the EUT, are depicted in table 2 on the next page of this test report.

Result of the measurements concerning radiated electromagnetic fields (electric component) emitted by the EUT (enclosure)	PASS / FAIL / NOT APPLICABLE
Name of test engineer:	T.E.T. Koning
Signature:	
Date:	December 22, 2006
REMARKS:	NONE.

Utilized test equipment:

Inventory number	Description	Brand	Type
12636	Plastic measurement room	Polyforce	-
13886	Open Area Test Site	Comtest	-
14277	Antenna mast 4m	Heinrich Deisel	MA240
14278	Controller OATS	Heinrich Deisel	HD100
15633	Biconilog antenna 30MHz – 1000MHz	Chase	CBL6111B
15667	EMI test receiver	Rohde & Schwarz	ESCS 30
99108	Turntable OATS	Heinrich Deisel	HD050

Frequency (MHz)	Measurement results dB(μV)/m @ 10 meters Quasi-peak		Limits dB(μV)/m @ 10 meters Quasi-peak	Result
	Vertical	Horizontal		
30.0 –230.0	< 20.0	< 20.0	30.0	PASS
230.0-1000.0	< 20.0	<20.0	37.0	PASS

Table 2

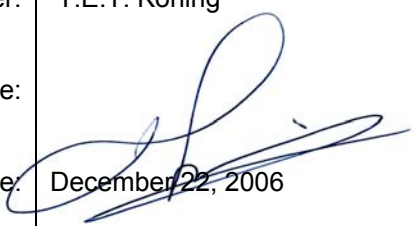
The results of the measurements, carried out in conformity with the standard EN 55022: 1999 incl. A1: 2000 and A2: 2003, concerning radiated field strength levels (electric component), emitted by the EUT in the configuration and operation mode as stated in this test report, are depicted in table 2.

2.2 AC mains power input port.

The disturbance voltage levels at the AC mains power input port of the EUT has been measured in conformity with and according to the criteria as stated below.

Basic standard	:	EN 55022: 1998 incl. A1: 2000 and A2: 2003
Test set-up	:	EN 55022: 1998 incl. A1: 2000 and A2: 2003
Frequency range 1	:	0.15 MHz – 0.5 MHz
Limit	:	66.0 –56.0 dB(μV) quasi peak, 56.0 – 46.0 dB(μV) average
Frequency range 2	:	0.5 – 5.0 MHz
Limit	:	56.0 dB(μV) quasi peak, 46.0 dB(μV) average
Frequency range 2	:	5.0 - 30 MHz
Limit	:	60.0 dB(μV) quasi peak, 50.0 dB(μV) average

Detailed results of the measurements concerning conducted emission levels, emitted by the EUT, are depicted in Table 3 of this test report.

Result of the measurements concerning the emission of disturbance voltage levels at the AC mains input port of the EUT	PASS / FAIL/ NOT APPLICABLE
Name of test engineer:	T.E.T. Koning
Signature:	
Date:	December 22, 2006
REMARKS:	NONE

Utilized test equipment:

Inventory number	Description	Brand	Type
12507	Artificial mains network 3-phase	Rohde & Schwarz	ESH2-Z5
13313	Impulse limiter	Rohde & Schwarz	ESH3Z2.357...
15667	EMI test receiver	Rohde & Schwarz	ESCS 30

Frequency (MHz)	Measured levels				Limits	
	Line		Neutral		QP (dBμV)	AV (dBμV)
	QP (dBμV)	AV (dBμV)	QP (dBμV)	AV (dBμV)		
0.15 - 0.5	< 30.0	< 15.0	< 30.0	< 15.0	66.0-56.0	66.0-56.0
0.5 – 5.0	< 30.0	< 15.0	< 30.0	< 15.0	56.0	56.0
5.0 – 30.0	< 30.0	< 15.0	< 30.0	< 15.0	60.0	60.0


Table 3

The results of the measurements concerning conducted disturbance levels, emitted by the EUT in the configuration and operation mode(s) as stated in this test report, are depicted in table 3.

2.3 Harmonic current emissions.

The emission of harmonic currents at the AC mains connection terminals of the EUT to be measured in conformity with- and according to the criteria as stated below.


Basic standard : EN 61000-3-2: 2000 incl. A2:2005
Test set-up : EN 61000-3-2: 2000 incl. A2:2005
Frequency range : 100 Hz - 2000 Hz

Result of the measurements concerning the emission of harmonic currents at the AC mains connection terminals of the EUT.	PASS / FAIL / NOT APPLICABLE
<p style="text-align: right;">Name of test engineer:</p> <p style="text-align: right;">Signature:</p> <p style="text-align: right;">Date:</p>	<p>T.E.T. Koning</p>  <p>December 22, 2006</p>
<p>REMARKS:</p> <p>EUT requires << 75 W and has an internal UPS.</p>	

2.4 Voltage fluctuations and flicker.

Voltage fluctuations and flicker at the AC mains connection terminals of the EUT to be measured in conformity with- and according to the criteria as stated below.

Basic standard : EN 61000-3-3: 1995 incl. A1:2001
Test set-up : EN 61000-3-3: 1995 incl. A1:2001

Result of the measurements concerning voltage fluctuations and flicker at the AC mains connection terminals of the EUT.	PASS / FAIL / NOT APPLICABLE
<p style="text-align: right;">Name of test engineer:</p> <p style="text-align: right;">Signature:</p> <p style="text-align: right;">Date:</p>	<p>T.E.T. Koning</p>  <p>December 22, 2006</p>
<p>REMARKS:</p> <p>EUT is deemed not to generate voltage variations and flicker.</p>	

3 Immunity.

3.1 Performance criteria.

The general principles (performance criteria) for the evaluation of the immunity test results are the following.

3.1.1 Performance criterion A.

During testing, normal performance within the specification limits. There shall be no unintentional alarm during “stand-by/listening” mode. Every alarm request shall be recorded/displayed. See paragraph 1.3.2. of this report for details.

3.1.2 Performance criterion B.

During testing, temporary degradation, or loss of function or performance which is self recovering. There shall be no unintentional alarm during “stand-by/listening” mode after finishing of each test. Every alarm request shall be recorded/displayed after finishing of each test. See paragraph 1.3.2. of this report for details.

3.1.3 Performance criterion C.


During testing, temporary degradation, or loss of function or performance which requires operator intervention or system reset occurs. There shall be no unintentional alarm during “stand-by/listening” mode after finishing of each test which cannot be recovered by an operator. Every alarm request shall be recorded/displayed after finishing of each test which cannot be recovered by an operator. See paragraph 1.3.2. of this report for details.

3.2 Enclosure port.

3.2.1 Radio-frequency electromagnetic field. Amplitude modulated.

The susceptibility of the EUT to radio-frequency electromagnetic fields has been tested in conformity with-and according to the criteria as stated below. Tested in mode 1 and 2.

Basic standard	:	EN 61000-4-3: 2002 and EN 50130-4:1995 (Incl. A1:1998, A2:2003)
Test set-up	:	EN 61000-4-3: 2002 and EN 50130-4:1995 (Incl. A1:1998, A2:2003)
Frequency range 1	:	80 MHz - 2000 MHz as below and 1400-2000 MHz 200 Hz block pulse
Frequency range 2	:	80 – 1000 MHz, pulse modulated (50% on/50% off)
Field strength level	:	10 V _{rms} /m (selected without modulation, applied with modulation)
Modulation	:	1 kHz, modulation depth 80% and pulse modulated as above
Performance criterion	:	A

Result of the tests concerning the susceptibility of the EUT to radio-frequency electromagnetic fields (amplitude modulated, enclosure port)	PASS / FAIL / NOT APPLICABLE
Name of test engineer:	T.E.T. Koning
Signature:	
Date:	December 22, 2006
REMARKS:	
NONE.	

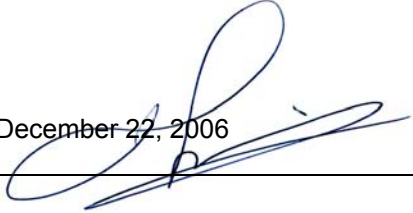
Utilized test equipment:

Inventory number	Description	Brand	Type
12441	Tripod	EMCO	TR3
12520	Function generator	Tabor Electronics	8241
14051	Compact anechoic room	Euroshield/ Comtest	RFSD-F-100
14298	Amplifier 0.01 MHz-220 MHz	SPS/Comtech	SPS7010
14307	Amplifier 200 MHz-1000 MHz	SPS/Comtech	SPS8030
15392	Signal generator 0.1 MHz-2048 MHz	Rohde & Schwarz	SMY02
99107	Turntable anechoic room + controller	Heinrich Deisel	HD050
13826	Amplifier 1-2 GHz/30W	MilMega	--
12484	Gain horn	EMCO	3115

3.2.2 Electrostatic discharge.

The susceptibility of the EUT to electrostatic discharges has been tested in conformity with- and according to the criteria as stated below. Tested in mode 1 and 2.

Basic standard : EN 61000-4-2: 2002 and EN 50130-4:1995 (Incl. A1:1998, A2:2003)
Test set-up : EN 61000-4-2: 2002 and EN 50130-4:1995 (Incl. A1:1998, A2:2003)
Test levels : ±2 kV, ±4 kV and ±8 kV air discharge
 ±4 kV and ±6 kV contact discharge
Performance criterion : B for both EN 61000-4-2 and EN 50130-4

Result of the tests concerning the susceptibility of the EUT to electrostatic discharges (enclosure port)	PASS / FAIL / NOT APPLICABLE
Name of test engineer:	T.E.T. Koning
Signature:	
Date:	December 22, 2006
REMARKS:	
NONE.	

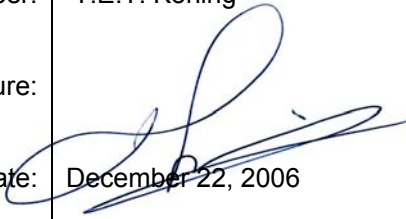
Utilized test equipment:

Inventory number	Description	Brand	Type
99002	ESD simulator system	Schaffner	NSG 435-01

3.2.3 50 Hz magnetic field.

The susceptibility of the EUT to radio-frequency electromagnetic fields to be tested in conformity with-and according to the criteria as stated below.

Basic standard : EN 61000-4-8: 2002
Test set-up : EN 61000-4-8: 2002
Frequency range : 50 Hz
Field strength level : 30 A/m
Modulation : Not applicable
Performance criterion : Not applicable

Result of the tests concerning the susceptibility of the EUT to radio-frequency electromagnetic fields (enclosure port)	PASS / FAIL / NOT APPLICABLE
Name of test engineer:	T.E.T. Koning
Signature:	
Date:	December 22, 2006
REMARKS: No 50 Hz magnetic sensitive parts.	

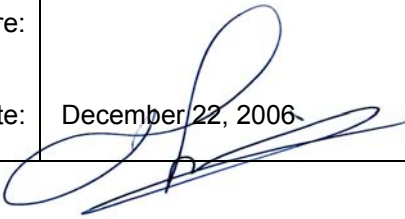
3.3 Signal ports including telecommunication ports.

3.3.1 Radio-frequency (common mode). Amplitude modulated.

The susceptibility of the EUT to radio-frequency (common mode)¹⁾, amplitude modulated, has been tested in conformity with- and according to the criteria as stated below. Tested at ports 2 and 3 and in mode 1 and 2.

Basic standard : EN 61000-4-6: 2004 and EN 50130-4:1995 (Incl. A1:1998, A2:2003)
Test set-up : EN 61000-4-6: 2004 and EN 50130-4:1995 (Incl. A1:1998, A2:2003)
Frequency range : 0.15 MHz - 80 MHz
Test level : 10 Vrms (selected without modulation, applied with modulation)
Modulation : 1 kHz, modulation depth 80%
Source impedance : 150 Ohms
Performance criterion : A

¹⁾ Conducted only on ports interfacing with cables whose total length, according to the manufacturer's functional specification, may exceed 3 meters.

Result of the tests concerning the susceptibility of the EUT to radio-frequency (common mode, amplitude modulated, ports for signal lines including telecommunication ports)	PASS / FAIL / NOT APPLICABLE
Name of test engineer:	T.E.T. Koning
Signature:	
Date:	December 22, 2006
REMARKS:	
NONE.	

Utilized test equipment:

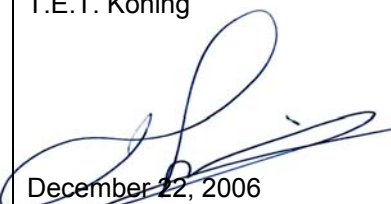
Inventory number	Description	Brand	Type
15690	Signal generator 0.1 MHz - 1000 MHz	Rohde & Schwarz	SMG
15627	Amplifier 10 kHz - 250 MHz, 75 Watts	Amplifier Research	75A250
99039	Attenuator 6 dB	Trilithic	HFP-560/6-NM/NF
99138	RF injection clamp	Lüthi	EM101
99393	Power meter	Rohde & Schwarz	NRVD
99395	Power sensor, 2 mV - 100 V	Rohde & Schwarz	URV5-Z4
59601/x	CDN coupling devices	Air Parts	Mx
-	Test software conducted immunity	Rohde & Schwarz	ES-K1
-	Personal computer + monitor	Hewlett-Packard	HP Vectra VE 5/75

3.3.2 Surges common mode.

The susceptibility of the EUT to surges has been tested in conformity with- and according to the criteria as stated below. Tested on ports 2 and 3 and in mode 1 and 2.

Basic standard : EN 50130-4:1995 (Incl. A1:1998, A2:2003)¹⁾
Test set-up : EN 50130-4:1995 (Incl. A1:1998, A2:2003)
Source impedance : 42 ohm
Test level : ± 0.5 and 1 kV (line to ground)
Tr/Th : 1.2/50 (8/20) µs
Number of pulses : 5
Performance criterion : B

¹⁾ EN 50130-4 requires such tests to be carried out on a piece of shielded cable (in case of normally shielded port) of 20 m.

Result of the tests concerning the susceptibility of the EUT to surges (telecommunication port, common mode)	PASS / FAIL / NOT APPLICABLE
Name of test engineer:	T.E.T. Koning
Signature:	
Date:	December 22, 2006
REMARKS:	NONE

Utilized test equipment:

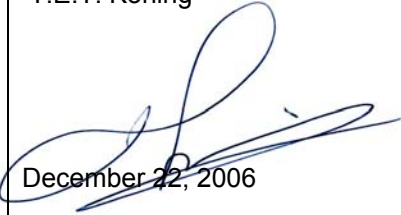
Inventory number	Description	Brand	Type
15108	Surge simulator syst. mainframe 25A	Schaffner	NSG 2050
15111	Pulse network 1.2/50 µs 6.6 kV 3.3 kA	Schaffner	PNW 2050
99004	3-phase coupling network 25A	Schaffner	CDN 133
99006	1-phase Schuko coupling adapter 16A	Schaffner	INA 252
99008	Blind cover	Schaffner	-
99010	3-phase IEC 309 coupling adapter 32A	Schaffner	INA 250
99029	Software control package	Schaffner	WIN 2050

3.3.3 Fast transients.

The susceptibility of the EUT to fast transients¹⁾ has been tested in conformity with- and according to the criteria as stated below. Tested at ports 2 and 3 and in mode 1 and 2.

Basic standard : EN 61000-4-4: 2004 and EN 50130-4: 1995 (Incl. A1:1998, A2:2003)
Test set-up : EN 61000-4-4: 2004 and EN 50130-4: 1995 (capacitive clamp; Incl. A1:1998, A2:2003)
Test level : ± 0.25, 0.5 and 1 kV
Tr/Th : 5/50 ns
Repetition frequency : 5 kHz
Performance criterion : B

¹⁾ Conducted only on ports interfacing with cables whose total length, according to the manufacturer's functional specification, may exceed 3 meters

Result of the tests concerning the susceptibility of the EUT to fast transients	PASS / FAIL / NOT APPLICABLE
Name of test engineer:	T.E.T. Koning
Signature:	
Date:	December 22, 2006
REMARKS:	NONE

Utilized test equipment:

Inventory number	Description	Brand	Type
15110	Three phase burst simulator system	Schaffner	NSG 2025-4
99001	IEC 1000-4-4 capacitive coupling clamp	Schaffner	CDN 126
99005	3-phase IEC 309 coupling adapter 32A	Schaffner	INA 250
99006	1-phase Schuko coupling adapter 16A	Schaffner	INA 252
99007	Blind cover	Schaffner	-
99014	Attenuator 30 dB for burst verification	Schaffner	INA 265
99015	Software control package	Schaffner	WIN 2025

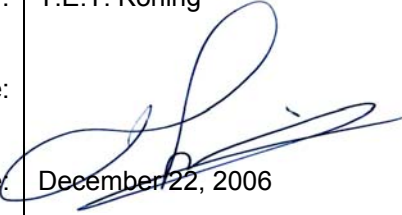
3.4 DC input and DC output ports.

3.4.1 Radio-frequency (common mode). Amplitude modulated.

The susceptibility of the EUT to radio-frequency (common mode)¹⁾, amplitude modulated, to be tested in conformity with- and according to the criteria as stated below

Basic standard : EN 61000-4-6: 1996
Test set-up : EN 61000-4-6: 1996
Frequency range : 0.15 MHz - 80 MHz
Test level : 10 Vrms (selected without modulation, applied with modulation)
Modulation : 1 kHz, modulation depth 80%
Source impedance : 150 Ohms
Performance criterion : not applicable

¹⁾ Conducted only on ports interfacing with cables whose total length, according to the manufacturer's functional specification, may exceed 3 meters

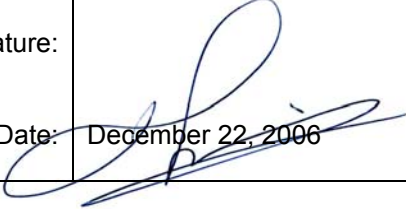
Result of the tests concerning the susceptibility of the EUT to radio-frequency (common mode, amplitude modulated, DC input and DC output ports)	PASS / FAIL / NOT APPLICABLE
Name of test engineer:	T.E.T. Koning
Signature:	
Date:	December 22, 2006
REMARKS: EUT has no external DC ports.	

3.4.2 Surges.

The susceptibility of the EUT to surges¹⁾ to be tested in conformity with- and according to the criteria as stated below.

Basic standard : EN 61000-4-5: 1995
Test set-up : EN 61000-4-5: 1995
Test level 1 : ±0.5 kV, ±1.0 kV and ±2.0 kV (line to earth)
Test level 2 : ±0.5 kV and ±1.0 kV (line to line)
Tr/Th : 1.2/50 (8/20) µs
Number of pulses : 5
Performance criterion : Not applicable


¹⁾ Applicable only to input ports

Result of the tests concerning the susceptibility of the EUT to surges (DC input and DC output power ports)	PASS/ FAIL / NOT APPLICABLE
Name of test engineer:	T.E.T. Koning
Signature:	
Date:	December 22, 2006
REMARKS: EUT has no external DC ports.	

3.4.3 Fast transients (common mode).

The susceptibility of the EUT to fast transients (common mode) to be tested in conformity with-and according to the criteria as stated below.

Basic standard : EN 61000-4-4: 2004
Test set-up : EN 61000-4-4: 2004
Test level : ± 1 kV and ± 2 kV
Tr/Th : 5/50 ns
Repetition frequency : 5 kHz
Performance criterion : Not applicable


Result of the tests concerning the susceptibility of the EUT to fast transients (common mode, DC input and DC output power ports)	PASS / FAIL / NOT APPLICABLE
Name of test engineer: Signature: Date:	T.E.T. Koning  December 22, 2006
REMARKS: EUT has no external DC ports.	

3.5 AC input and AC output power ports.

3.5.1 Radio-frequency (common mode). Amplitude modulated.

The susceptibility of the EUT to radio-frequency (common mode), amplitude modulated, has been tested in conformity with- and according to the criteria as stated below. Tested at port 1 and in mode 1 and 2.

Basic standard	:	EN 61000-4-6: 2004 and EN 50130-4: 1995 (Incl. A1:1998, A2:2003)
Test set-up	:	EN 61000-4-6: 2004 and EN 50130-4: 1995 (Incl. A1:1998, A2:2003)
Frequency range	:	0.15 MHz - 80 MHz
Test level 1	:	10 Vrms (selected without modulation, applied with modulation)
Test level 2	:	10 Vrms (selected without pulse modulation, applied with pulse modulation)
Modulation 1	:	1 kHz, modulation depth 80%
Modulation 2	:	50% on, 50% off carrier wave
Source impedance	:	150 Ohms
Performance criterion	:	A

Result of the tests concerning the susceptibility of the EUT to radio-frequency (common mode, amplitude modulated, AC input and AC output power ports)	PASS / FAIL / NOT APPLICABLE
Name of test engineer:	T.E.T. Koning
Signature:	
Date:	December 22, 2006
REMARKS:	
NONE.	

Utilized test equipment:

Inventory number	Description	Brand	Type
15690	Signal generator 0.1 MHz - 1000 MHz	Rohde & Schwarz	SMG
15627	Amplifier 10 kHz - 250 MHz, 75 Watts	Amplifier Research	75A250
99039	Attenuator 6 dB	Trilithic	HFP-560/6-NM/NF
99138	RF injection clamp	Lüthi	EM101
99393	Power meter	Rohde & Schwarz	NRVD
99395	Power sensor, 2 mV - 100 V	Rohde & Schwarz	URV5-Z4
59601/x	CDN coupling devices	Air Parts	Mx
-	Test software conducted immunity	Rohde & Schwarz	ES-K1
-	Personal computer + monitor	Hewlett-Packard	HP Vectra VE 5/75

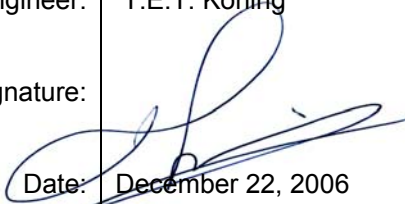
3.5.2 Voltage dips and interruptions.

The susceptibility of the EUT to voltage dips and interruptions¹⁾ has been tested in conformity with- and according to the criteria as stated below. Tested at port 1 and in mode 1 and 2.

Basic standard	:	EN 61000-4-11: 2004 and EN 50130-4: 1995 (Incl. A1:1998, A2:2003)
Test set-up	:	EN 61000-4-11: 2004 and EN 50130-4: 1995 (Incl. A1:1998, A2:2003)
Test level (EN 55024)	:	Reduction of the supply voltage of > 95% for 0.5 period ²⁾
Test level (EN 50130-4)	:	Reduction of the supply voltage with 60% for 0.5, 1, 5, 10 periods
Performance criterion	:	B for EN 55024, A for EN 50130-4
Test level (EN 55024)	:	Reduction of the supply voltage of > 95% for 0.5 period ²⁾
Test level (EN 50130-4)	:	Reduction of the supply voltage with 100% for 0.5, 1, 5 periods
Performance criterion	:	B for EN 55024, A for EN 50130-4
Test level (EN 55024)	:	Reduction of the supply voltage of > 95% for 250 periods ²⁾
Performance criterion	:	C

¹⁾ Applicable only to input ports

²⁾ Voltage shift at zero crossing

Result of the tests concerning the susceptibility of the EUT to voltage dips and interruptions (AC input and AC output power ports)	PASS / FAIL / NOT APPLICABLE
Name of test engineer:	T.E.T. Koning
Signature:	
Date:	December 22, 2006
REMARKS:	NONE.

Utilized test equipment:

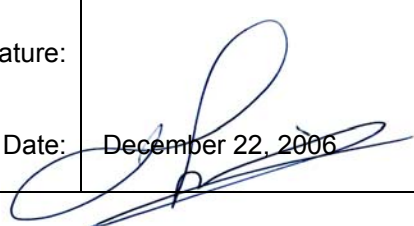
Inventory number	Description	Brand	Type
15354	Proflin interface	Schaffner	CCN2000-3P/5
99009	Blind cover	Schaffner	-
99030	Universal power analyzer/flicker meter	Voltech	PM 3000A
99031	Proflin AC switching unit	Schaffner	888-0165-V2.30
99032	AC power source	Schaffner	3120-AMX
99033	AC power source	Schaffner	3120-AMX
99034	Magnetic module	Schaffner	134350
99035	Magnetic module	Schaffner	134350
99036	Personal computer	Dell	Dimension 133
99037	System cabinet	Schaffner	30U/He
99038	System cabinet	Schaffner	30U/He

3.5.3 Surges.

The susceptibility of the EUT to surges¹⁾ has been tested in conformity with- and according to the criteria as stated below. Tested on port 1 and in mode 1 and 2.

Basic standard : EN 61000-4-5: 2002 and EN 50130-4:1995 (Incl. A1:1998, A2:2003)
Test set-up : EN 61000-4-5: 2002 and EN 50130-4:1995 (Incl. A1:1998, A2:2003)
Test level 1 : ±0.5 kV, ±1.0 kV and ±2.0 kV (line to earth)
Test level 2 : ±0.5 kV and ±1.0 kV (line to line)
Tr/Th : 1.2/50 (8/20) µs
Number of pulses : 5
Performance criterion : B

¹⁾ Applicable only to input ports

Result of the tests concerning the susceptibility of the EUT to surges (AC input and AC output power ports)	PASS / FAIL / NOT APPLICABLE
Name of test engineer:	T.E.T. Koning
Signature:	
Date:	December 22, 2006
REMARKS:	NONE.


Utilized test equipment:

Inventory number	Description	Brand	Type
15108	Surge simulator syst. mainframe 25A	Schaffner	NSG 2050
15111	Pulse network 1.2/50 µs 6.6 kV 3.3 kA	Schaffner	PNW 2050
99004	3-phase coupling network 25A	Schaffner	CDN 133
99006	1-phase Schuko coupling adapter 16A	Schaffner	INA 252
99008	Blind cover	Schaffner	-
99010	3-phase IEC 309 coupling adapter 32A	Schaffner	INA 250
99029	Software control package	Schaffner	WIN 2050

3.5.4 Fast transients (common mode).

The susceptibility of the EUT to fast transients (common mode) has been tested in conformity with- and according to the criteria as stated below. Tested at port 1 and in mode 1 and 2.

Basic standard : EN 61000-4-4: 2004 and EN 50130-4:1995 (Incl. A1:1998, A2:2003)
Test set-up : EN 61000-4-4: 2004 and EN 50130-4:1995 (Incl. A1:1998, A2:2003)
Test level : ±0.5 kV, 1 kV
Tr/Th : 5/50 ns
Repetition frequency : 5 kHz
Performance criterion : B

Result of the tests concerning the susceptibility of the EUT to fast transients (common mode, AC input and AC output power ports)	PASS / FAIL / NOT APPLICABLE
Name of test engineer:	T.E.T. Koning
Signature:	
Date:	December 22, 2006
REMARKS: NONE.	

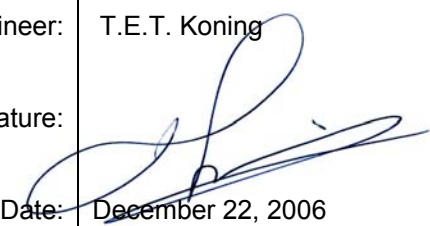
Utilized test equipment:

Inventory number	Description	Brand	Type
15110	Three phase burst simulator system	Schaffner	NSG 2025-4
99001	IEC 1000-4-4 capacitive coupling clamp	Schaffner	CDN 126
99005	3-phase IEC 309 coupling adapter 32A	Schaffner	INA 250
99006	1-phase Schuko coupling adapter 16A	Schaffner	INA 252
99007	Blind cover	Schaffner	-
99014	Attenuator 30 dB for burst verification	Schaffner	INA 265
99015	Software control package	Schaffner	WIN 2025

3.5.5 Voltage variations.

The susceptibility of the EUT to voltage variations has been tested in conformity with- and according to the criteria as stated below. Tested at port 1 and in mode 1 and 2.

Basic standard : EN 50130-4: 1995 (Incl. A1:1998, A2:2003)
Test set-up : EN 50130-4: 1995 (Incl. A1:1998, A2:2003)
Test level (a) : decreasing of the supply voltage of +10%
Performance criterion : A
Test level (b) : Increasing of the supply voltage of -15%
Performance criterion : A

Result of the tests concerning the susceptibility of the EUT to voltage dips and interruptions (AC input and AC output power ports)	PASS / FAIL / NOT APPLICABLE
Name of test engineer:	T.E.T. Koning
Signature:	
Date:	December 22, 2006
REMARKS: NONE.	

Utilized test equipment:

Inventory number	Description	Brand	Type
99220	Separation transformer	RFT	LSS020

4 Conclusion.

The Alarm Management System, brand Nofiq, Model Nofiq BASE, complies with the requirements of the standards EN 50130-4: 1995 + A1: 1998 & A2: 2003; EN 55022: 1998 + A1: 2000 & A2: 2003; EN 55024: 1998 + A1: 2001 & A2: 2003 in the configuration and operation mode(s) as stated and tested in this test report.



**TEST REPORT OF A 2.4 GHZ IEEE 802.15 ZIGBEE
FIRE CONTROL AND INDICATING APPARATUS: HUB
AND FIRE EXTINGUISHER, BRAND NOFIQ, MODEL
NOFIQ N20-FE, IN CONFORMITY WITH
ETSI EN 300 440-1 V1.3.1 AND
ETSI EN 300 440-2 V1.1.1**

FCC listed	: 90828
Industry Canada	: 2932G-1
VCCI Registered	: R-1518, C-1598
R&TTE, LVD, EMC Notified Body	: 1856

TÜV Rheinland EPS B.V.
P.O. Box 15
9822 ZG Niekerk (NL)
Smidshornerweg 18
9822 TL Niekerk (NL)

Telephone: +31 594 505005
Telefax: +31 594 504804

Internet: www.tuv-eps.com
E-mail: info@tuv-eps.com

Description of test item

Test item : 2.4 GHz IEEE 802.15 ZigBee
Fire control and indicating apparatus: Fire Extinguisher
Manufacturer : NOFIQ Systems B.V.
Brand mark : NOFIQ
Model : NOFIQ N20-FE
Serial number(s) : -
Receipt number : 1
Receipt date : July 20, 2006

Applicant information

Applicant's representative : Mr. G.M. de Groot
Company : NOFIQ Systems B.V.
Address : Nijverheidsweg 16
Postal code : 9403 VN
City : Assen
PO-Box : 510
Postal code : 9400 AM
City : Assen
Country : The Netherlands
Telephone number : +31 (0)592 404201
Telefax number : +31 (0)592 404282

Test(s) performed

Location : Niekerk
Test(s) started : November 6, 2006
Test(s) completed : November 7, 2006
Purpose of test(s) : Type approval / certification
Test specification(s) : ETSI EN 300 440-1 V1.3.1 and ETSI EN 300 440-2 V1.1.1

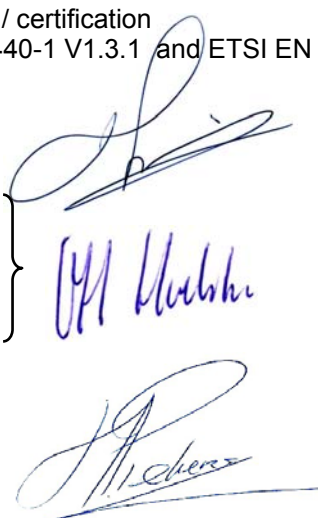
Project leader : T.E.T. Koning

Test engineer : O.H. Hoekstra

Report written by : O.H. Hoekstra

Report approved by : H. Pieters

Report date : March 4, 2009



This report is in conformity with NEN-EN-ISO/IEC 17025: 2000.

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The test results relate only to the item(s) tested.

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1 General.

This report replaces the previous version of January 31, 2007 with reference 06062803.r01. A new report was issued due to unclear references in the previous version. In the current version these references have been removed. The indicated measurement results have been unchanged and referenced to standards valid at the date of issuing this report.

1.1 Applied standards.

The 2.4 GHz IEEE 802.15 ZigBee Fire control and indicating apparatus: Fire Extinguisher, brand NOFIQ, model NOFIQ N20-FE, operates at frequencies between 2400 MHz and 2483.5 MHz and is classified as an short range device, of which the parameters to comply with are described in ERC/REC 70-03.

The relevant ETSI standard, applicable to this type of equipment, as indicated in Annex 1 of ERC/REC 70-03, is:

EN 300 440-1 V1.3.1; Electromagnetic compatibility and radio spectrum matters (ERM); Short range devices (SRD); Radio equipment to be used in the 1 GHz to 40 GHz frequency range; Part 1: Technical characteristics and tests methods.

EN 300 440-2 V1.1.1; Electromagnetic compatibility and radio spectrum matters (ERM); Short range devices (SRD); Radio equipment to be used in the 1 GHz to 40 GHz frequency range; Part 2: Harmonized EN under Article 3(2) of the R&TTE Directive.

For the test methods, according to the EN 300 440-1 V1.3.1 document, the uncertainty figures have been calculated according to the methods described in the ETR 100-028-1 and ETR 100-028-2.

The expansion factor used is 1,96 (which provides a confidence level of 95% (Gaussian)).

1.2 Description of the EUT.

The 2.4 GHz IEEE 802.15 ZigBee Fire control and indicating apparatus: Fire Extinguisher, brand NOFIQ, model NOFIQ N20-FE, will be referred to as EUT for the purpose of this test report.

The EUT utilizes Direct Sequence Spread Spectrum (DSSS) modulation techniques and is intended for use in a fire control system and has an integrated antenna.

2 Remarks.

The clauses between brackets, as mentioned in this test report, refer to the clauses as mentioned in the ETSI EN 300 440 document(s).

The EUT was tested for the frequency band of 2400 MHz to 2483.5 MHz.

2.1 RF and antenna characteristics.

This section refers to the standard EN 300 440-2 V1.1.1 and ERC/REC 70-03.

2.1.1 Regulatory parameters related to Annex 1.

Frequency Band (ERC/REC 70-3)	Power / Magnetic field (ERC/REC 70-3)	Duty Cycle (ERC/REC 70-3E)	Applicable
6765 - 6795 kHz	42 dB μ A/m at 10m	No Restriction	
13.553 – 13.567 MHz	42 dB μ A/m at 10 meter	No Restriction	
26.957 – 27.283 MHz	42 dB μ A/m at 10 meter 10 mW e.r.p..	No Restriction	
40.660 – 40.700 MHz	10 mW e.r.p.	No Restriction	
433.050 – 434.790 MHz	10 mW e.r.p.	< 10 %	
433.050 – 434.790 MHz	1 mW e.r.p. -13 dBm/10kHz	up to 100 %	
434.040 – 434.790 MHz	10 mW e.r.p.	up to 100 %	
868.000 – 868.600 MHz	25 mW e.r.p.	< 1.0 %	
868.700 – 869.200 MHz	25 mW e.r.p.	< 0.1 %	
869.300 – 869.400 MHz	10 mW e.r.p.	No Restriction	
869.400 – 869.650 MHz	500 mW e.r.p.	< 10 %	
869.700 – 870.000 MHz	5 mW e.r.p.	up to 100%	
2400 – 2483.5 MHz	10 mW e.i.r.p.	No Restriction	X
5725 – 5875 MHz	25 mW e.i.r.p.	No Restriction	
24.00 – 24.25 GHz	100 mW e.i.r.p.	No Restriction	
61.0 – 61.5 GHz	100 mW e.i.r.p.	No Restriction	
122 – 123 GHz	100 mW e.i.r.p.	No Restriction	
244 – 246 GHz	100 mW e.i.r.p.	No Restriction	
138.2 – 138.45 MHz	10 mW e.r.p.	< 1.0 %	

3 Test conditions.

3.1 Standard- and extreme test conditions.

The tests are carried out under the following standard- and extreme test conditions.

3.1.1 Standard test condition.

Temperature : +20 °C to +22 °C
Relative humidity : 40 % to 60 %
Air Pressure : 86kPa – 106 kPa
Supply voltage : 3.0 VDC Battery and 4.0VDC from power supply

3.1.2 Extreme test conditions.

Temperature : -20 °C and +55 °C
Supply voltage : 2.55 VDC (min) and 3.00 VDC (max)

4 Test frequencies.

Test channel	EUT channel	Test frequency (MHz)
1	11	2405
2	18	2440
3	26	2480

5 Essential radio test suites (overview).

An overview of radio test suites, as laid out in EN 300 440-2 V1.1.1, and a summary of test results is given below.

5.1 Transmitter test suites and overview of results.

Essential radio test suite	Applicable	Report clause	Compliance results
4.1.1 Effective radiated RF power	Yes	5.1	Pass
4.1.2 Permitted range of operating frequencies	Yes	5.2	Pass
4.1.3 Spurious emissions transmitter operating – radiated	Yes	5.3	Pass
4.1.3 Spurious emissions transmitter operating – conducted	No	5.4	Not Applicable *)
4.1.3 Spurious emissions transmitter standby – radiated	No	5.3	Not Applicable *)
4.1.3 Spurious emissions transmitter standby – conducted	No	5.4	Not Applicable *)
4.1.4 Duty cycle	Yes	5.5	Pass
4.3 Power limits for 2,45 GHz RFID systems	No	-	Not Applicable *)

5.2 Receiver test suites and overview of results.

Essential radio test suite	Applicable	Report clause	Compliance results
4.2.1 Adjacent channel selectivity – in band	No	-	Not Applicable *)
4.2.2 Adjacent band selectivity	No	-	Not Applicable *)
4.2.3 Blocking or desensitization	No	-	Not Applicable *)
4.2.4 Spurious radiations	Yes	-	Pass

*) Not applied in the design of the EUT.

6 Transmitter test results.

6.1 Transmitter E.I.R.P. (clause 7.2.1).

6.1.1 Test conditions.

Ambient temperature : +21 °C
Relative humidity : 50 %

6.1.2 Test results Bandwidth (IEEE 802.15 mode).

Rated output power : +0 dBm E.I.R.P.
Gain of antenna assembly : +3.0 dBi
Duty cycle of the equipment during the test : x = 1 (see clause 7.1.2.2 step 1)

The plots of the measurement results may be found in section 7 of this test report.

Minimum 6 dB bandwidth (kHz)		
Channel 1 (2405 MHz)	Channel 2 (2440 MHz)	Channel 3 (2480 MHz)
1600	1575	1600

Table 1 - Minimum 6 dB bandwidth.

As the bandwidth of the spread spectrum equipment has a channel bandwidth above 1 MHz, the Equivalent Isotropically Radiated Power (EIRP) tests in accordance with clause 7.1.2.2 are applicable.

6.1.3 Test results transmitter E.I.R.P.(IEEE 802.15 mode).

Rated output power : +0 dBm E.I.R.P.
 Gain of antenna assembly : +3.0 dBi
 Duty cycle of the equipment during the test : x = 1 (see clause 7.1.2.2 step 1)

TEST CONDITIONS		TRANSMITTER POWER (dBm)		
		test channel 1 lowest frequency	test channel 2 middle frequency	test channel 3 highest frequency
$T_{nom} = +21\text{ °C}$	$V_{nom} = 3.00\text{ VDC}$	Av= -1.2 dBm Pk= -0.2 dBm	Av= -0.85 dBm Pk= +0.2 dBm	Av= -2.1 dBm Pk= -1.1 dBm
$T_{min} = -20\text{ °C}$	$V_{min} = 2.55\text{ VDC}$	Av= +1.4 dBm Pk= +2.4 dBm	Av= +2.5 dBm Pk= +3.5 dBm	Av= +2.2 dBm Pk= +3.1 dBm
	$V_{max} = 3.00\text{ VDC}$	Av= +1.4 dBm Pk= +2.4 dBm	Av= +2.5 dBm Pk= +3.5 dBm	Av= +2.2 dBm Pk= +3.1 dBm
$T_{max} = +55\text{ °C}$	$V_{min} = 2.55\text{ VDC}$	Av= -3.7 dBm Pk= -2.6 dBm	Av= -3.4 dBm Pk= -2.3 dBm	Av= -5.0 dBm Pk= -4.0 dBm
	$V_{max} = 3.00\text{ VDC}$	Av= -3.7 dBm Pk= -2.6 dBm	Av= -3.3 dBm Pk= -2.3 dBm	Av= -5.0 dBm Pk= -4.0 dBm
Measurement uncertainty		-1.13dB / +1.00 dB		

Note : Av is the average power as defined in clause 7.1.2.2 step 2 (P)
 Pk is the peak power as defined in clause 7.1.2.2. step 4
 Power control at setting 31 (maximum)

6.1.4 Limits (clause 7.1.3)

The effective radiated power is defined as the total power of the transmitter and is calculated according to the procedure given in clause 7.1.2.2.

The effective radiated power shall be equal to or less than 14 dBm (25 mW) e.i.r.p. This limit shall apply for any combination of power level and intended antenna assembly.

The peak power shall be equal to or less than 14 dBm + 3 dB (17 dBm or 50 mW) e.i.r.p. This limit shall apply for any combination of power level and intended antenna assembly.

6.1.5 Test equipment used (for reference see equipment list).

12608	12609	12640	13526	99068	99077
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6.2 Permitted range of operating frequencies – Non FHSS equipment (clause 7.2.2).

6.2.1 Test conditions.

Ambient temperature : +21 °C
Relative humidity : 50 %

6.2.2 Test results (IEEE 802.15 mode).

Gain of antenna assembly : +3.0 dBi

Test conditions		Frequency (MHz) at which -74.8 dBm/Hz occurs	
		lowest	highest
$T_{nom} = +21\text{ °C}$	$V_{nom} = 3.00\text{ VDC}$	2404.000	2481.125
$T_{min} = -20\text{ °C}$	$V_{min} = 2.55\text{ VDC}$	2404.125	2481.125
	$V_{max} = 3.00\text{ VDC}$	2403.500	2481.125
$T_{max} = +55\text{ °C}$	$V_{min} = 2.55\text{ VDC}$	2404.000	2481.125
	$V_{max} = 3.00\text{ VDC}$	2404.000	2481.125
Measured frequencies (lowest and highest)		$f_L = 2403.500$	$f_H = 2481.125$
Measurement uncertainty		± 272 Hz @ $f_o = 2400\text{ MHz}$	

6.2.3 Limits (clause 7.2)

The frequency range of the equipment is determined by the lowest and highest frequencies occupied by the power envelope.

f_H is the highest frequency of the power envelope: it is the frequency furthest above the frequency of maximum power where the output power drops below the level of -74.8 dBm/Hz e.i.r.p. spectral power density (-30 dBm if measured in a 30 kHz bandwidth). f_L is the lowest frequency of the power envelope; it is the frequency furthest below the frequency of maximum power where the output power drops below the level equivalent to -74.8 dBm/Hz e.i.r.p. spectral power density (or -30 dBm if measured in a 30 kHz bandwidth).

For a given operating frequency, the width of the power envelope is ($f_H - f_L$). In equipment that allows adjustment or selection of different operating frequencies, the power envelope takes up different positions in the allocated band. The frequency range is determined by the lowest value of f_L and the highest value of f_H resulting from the adjustment of the equipment to the lowest and highest operating frequencies. For all equipment the frequency range shall lie within the band 2400 MHz to 2483.5 MHz ($f_L > 2400\text{ MHz}$ and $f_H < 2483.5\text{ MHz}$).

6.2.4 Test equipment used (for reference see equipment list).

12640	13664	99077
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6.3 Transmitter spurious emissions (radiated, clause 7.3).

6.3.1 Test conditions.

Ambient temperature : +21 °C
Relative humidity : 50 %
Transmitter mode : operating, modulated (IEEE 802.15 mode)

6.3.2 Test results (IEEE 802.15 mode).

6.3.2.1 Test channel 1: lowest operating frequency.

Frequency (MHz)	Measurement bandwidth (kHz)	Spurious emission level (dBm)	
		V	H
< 1000	100	< -70.0	< -70.0
4810	1000	-51.3	-50.2
Other frequencies	1000	< -60.0	< -60.0
Measurement uncertainty		-2.40dB / +1.60dB	

6.3.2.2 Test channel 2: middle operating frequency.

Frequency (MHz)	Measurement bandwidth (kHz)	Spurious emission level (dBm)	
		V	H
< 1000	100	< -70.0	< -70.0
4880	1000	-50.6	-49.5
Other frequencies	1000	< -60.0	< -60.0
Measurement uncertainty		-2.40dB / +1.60dB	

6.3.2.3 Test channel 3: highest operating frequency.

Frequency (MHz)	Measurement bandwidth (kHz)	Spurious emission level (dBm)	
		V	H
< 1000	100	< -70.0	< -70.0
4960	1000	-52.1	-50.8
Other frequencies	1000	< -60.0	< -60.0
Measurement uncertainty		-2.40dB / +1.60dB	

6.3.3 Limits (clause 7.3.7).

Frequency range	Maximum power ERP (dBm)	Measurement bandwidth (kHz)
25 – 47 MHz	-36.0	100
47 - 74 MHz	-54.0	100
74 - 87.5 MHz	-36.0	100
87.5 - 118 MHz	-54.0	100
118 - 174 MHz	-36.0	100
174 - 230 MHz	-54.0	100
230 - 470 MHz	-36.0	100
470 - 862 MHz	-54.0	100
862 - 1000 MHz	-36.0	100
1 - 40 GHz	-30.0	1000

6.3.4 Test equipment used (for reference see equipment list).

12483	12484	12488	12605	12608	12609	13078	13526	13596	13664
14051	15633	15667	99061	99076	99136	99538			

6.4 Transmitter spurious emissions (conducted, clause 7.3).

6.4.1 Test conditions.

Ambient temperature : +21 °C
Relative humidity : 50 %
Transmitter mode : operating, modulated (IEEE 802.15 mode)

6.4.2 Test results (IEEE 802.15 mode).

6.4.2.1 Test channel 1: lowest operating frequency.

Frequency (MHz)	Measurement bandwidth (kHz)	Spurious emission level (dBm)
< 1000	100	< -70.0
1000 - 12750	1000	< -60.0
Measurement uncertainty	-2.40dB / +1.60dB	

6.4.2.2 Test channel 2: middle operating frequency.

Frequency (MHz)	Measurement bandwidth (kHz)	Spurious emission level (dBm)
< 1000	100	< -70.0
1000 - 12750	1000	< -60.0
Measurement uncertainty	-2.40dB / +1.60dB	

6.4.2.3 Test channel 3: highest operating frequency.

Frequency (MHz)	Measurement bandwidth (kHz)	Spurious emission level (dBm)
< 1000	100	< -70.0
1000 - 12750	1000	< -60.0
Measurement uncertainty	-2.40dB / +1.60dB	

6.4.3 Limits (clause 7.3.7).

Frequency range	Maximum power ERP (dBm)	Measurement bandwidth (kHz)
25 – 47 MHz	-36.0	100
47 - 74 MHz	-54.0	100
74 - 87.5 MHz	-36.0	100
87.5 - 118 MHz	-54.0	100
118 - 174 MHz	-36.0	100
174 - 230 MHz	-54.0	100
230 - 470 MHz	-36.0	100
470 - 862 MHz	-54.0	100
862 - 1000 MHz	-36.0	100
1 - 40 GHz	-30.0	1000

6.4.4 Test equipment used (for reference see equipment list).

12608	12609	13526	13664	15667	99538
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6.5 Duty cycle.

Manufacturer's declaration

Duty cycle class: Class 4

6.5.1.1 Limits.

In the period of 1 hour the duty cycle shall not exceed the values given in table below

Duty cycle class	Duty cycle ratio	Applicable
1	< 0.1 %	
2	< 1.0 %	
3	< 10.0 %	
4	up to 100 %	X

7 Receiver test results.

7.1 Receiver spurious emissions (radiated, clause 8.4).

7.1.1 Test conditions.

Ambient temperature : +21 °C
Relative humidity : 50 %

7.1.2 Test results.

7.1.2.1 Test channel 1: lowest operating frequency.

Frequency (MHz)	Measurement bandwidth (kHz)	Spurious emission level (dBm)	
		V	H
< 1000	100	< -70.0	< -70.0
4810	1000	-57.6	-53.5
Other frequencies	1000	< -60.0	< -60.0
Measurement uncertainty	-2.40dB / +1.60dB		

7.1.2.2 Test channel 2: middle operating frequency.

Frequency (MHz)	Measurement bandwidth (kHz)	Spurious emission level (dBm)	
		V	H
< 1000	100	< -70.0	< -70.0
4880	1000	-56.3	-52.7
Other frequencies	1000	< -60.0	< -60.0
Measurement uncertainty	-2.40dB / +1.60dB		

7.1.2.3 Test channel 3: highest operating frequency.

Frequency (MHz)	Measurement bandwidth (kHz)	Spurious emission level (dBm)	
		V	H
< 1000	100	< -70.0	< -70.0
4960	1000	-58.1	-54.2
Other frequencies	1000	< -60.0	< -60.0
Measurement uncertainty	-2.40dB / +1.60dB		

7.1.3 Limits (clause 8.4.5).

Frequency range	Limit
30 MHz to 1 GHz	-57 dBm
Above 1 GHz to 12.75 GHz	-47 dBm

7.1.3.1 Test equipment used (for reference see equipment list).

12483	12484	12488	12605	12608	12609	13078	13526	13594	13664
14051	15633	15667	99061	99538					

7.2 Receiver spurious emissions (conducted, clause 8.4).

7.2.1 Test conditions.

Ambient temperature : +21 °C
Relative humidity : 50 %

7.2.2 Test results.

7.2.2.1 Test channel 1: lowest operating frequency.

Frequency (MHz)	Measurement bandwidth (kHz)	Spurious emission level (dBm)
< 1000	100	< -70.0
1000 - 12750	1000	< -70.0
Measurement uncertainty	-2.40dB / +1.60dB	

7.2.2.2 Test channel 2: middle operating frequency.

Frequency (MHz)	Measurement bandwidth (kHz)	Spurious emission level (dBm)
< 1000	100	< -70.0
1000 - 12750	1000	< -70.0
Measurement uncertainty	-2.40dB / +1.60dB	

7.2.2.3 Test channel 3: highest operating frequency.

Frequency (MHz)	Measurement bandwidth (kHz)	Spurious emission level (dBm)
< 1000	100	< -70.0
1000 - 12750	1000	< -70.0
Measurement uncertainty	-2.40dB / +1.60dB	

7.2.3 Limits (clause 5.3.2).

7.2.3.1 Narrowband spurious emission limits for receivers.

Frequency range	Limit
30 MHz to 1 GHz	-57 dBm
Above 1 GHz to 12.75 GHz	-47 dBm

7.2.3.2 Wideband spurious emission limits for receivers.

Frequency range	Limit
30 MHz to 1 GHz	-107 dBm/Hz
Above 1 GHz to 12.75 GHz	-97 dBm/Hz

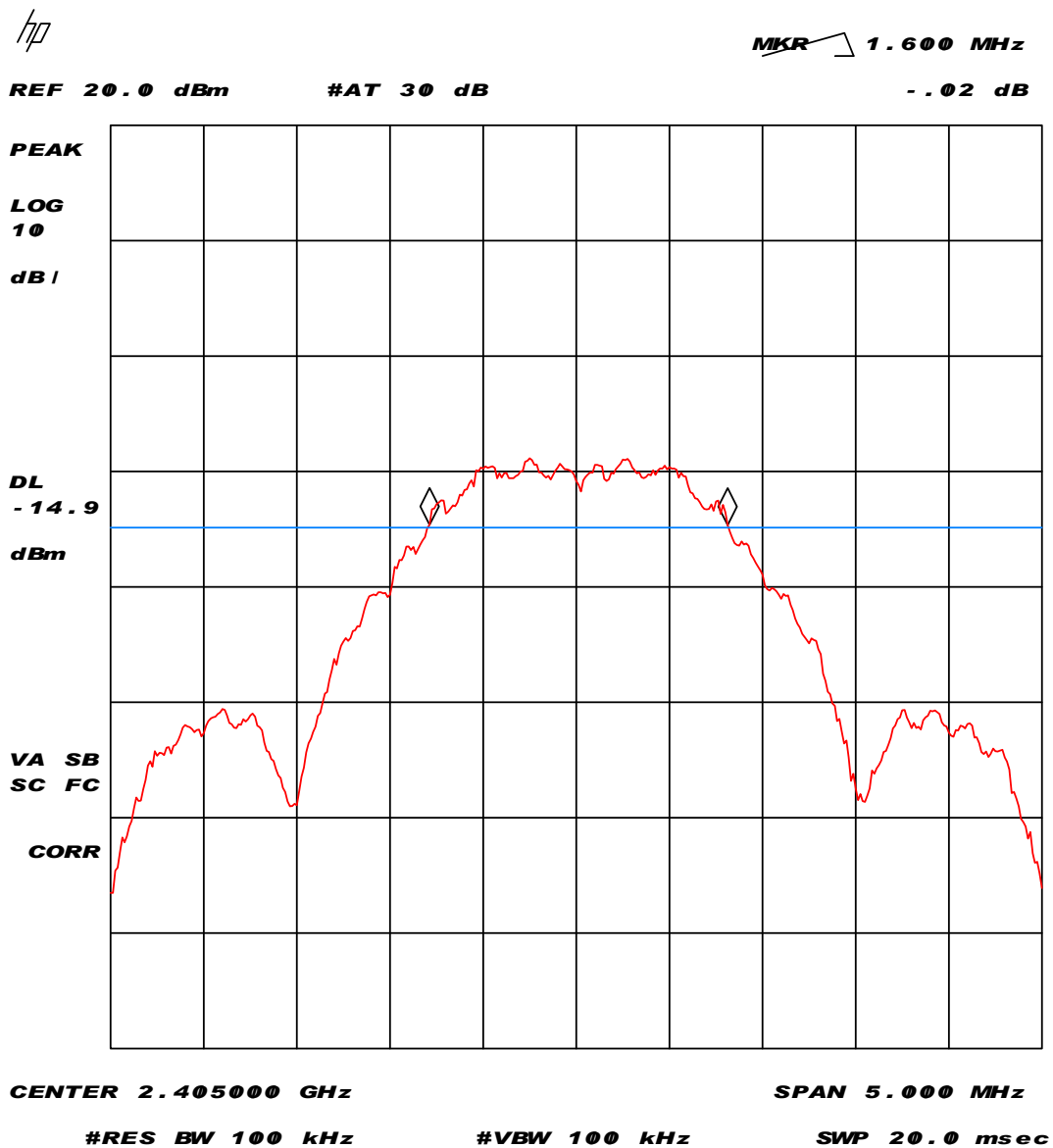
7.2.4 Test equipment used (for reference see equipment list).

12605	12608	12609	13526	13664	15667	99538
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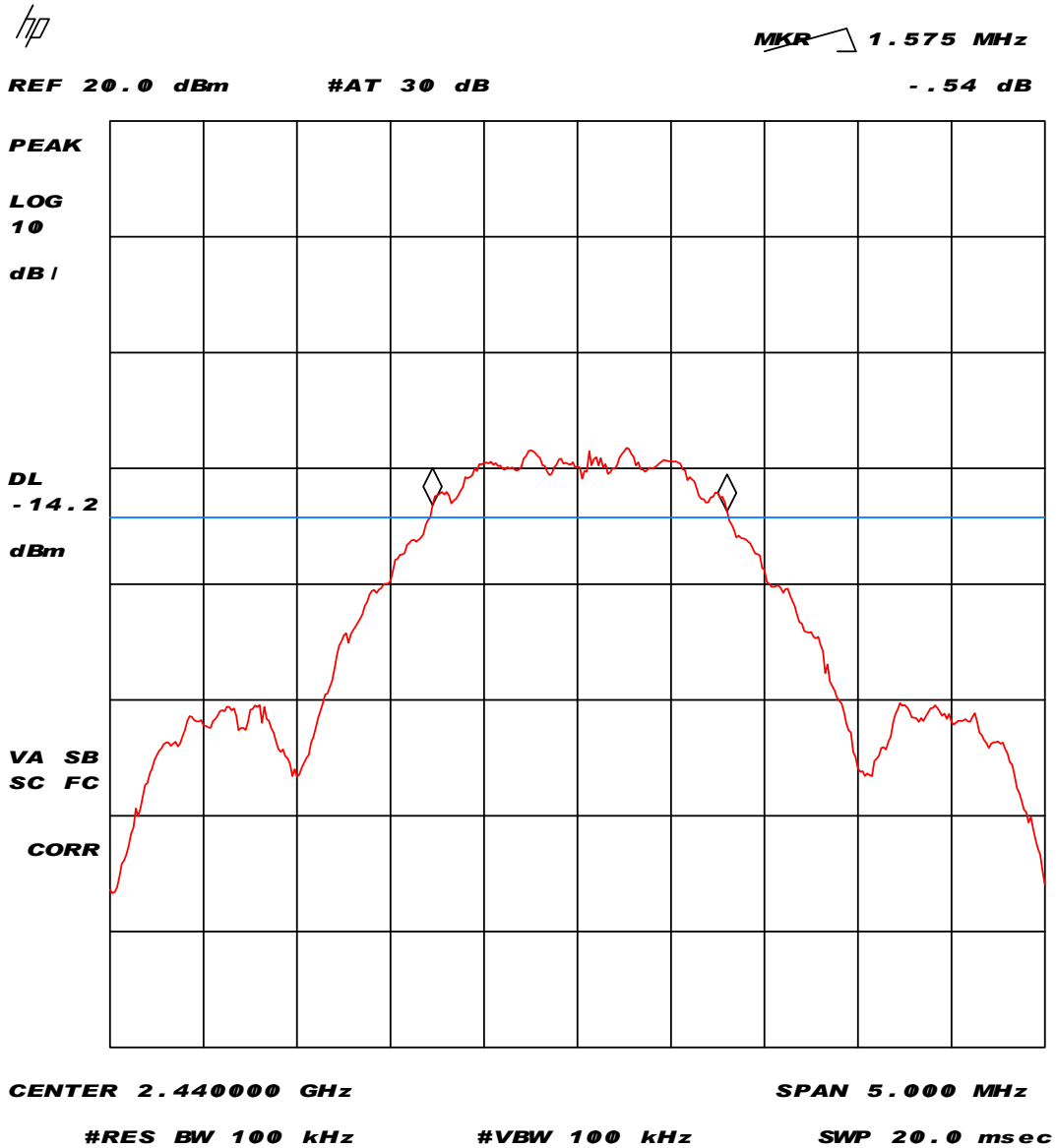
8 Plots of measurement data.

For reference purposes and visualization of spectrum analyzer settings during the measurements, a selection of plots of measurement data is included in this test report.

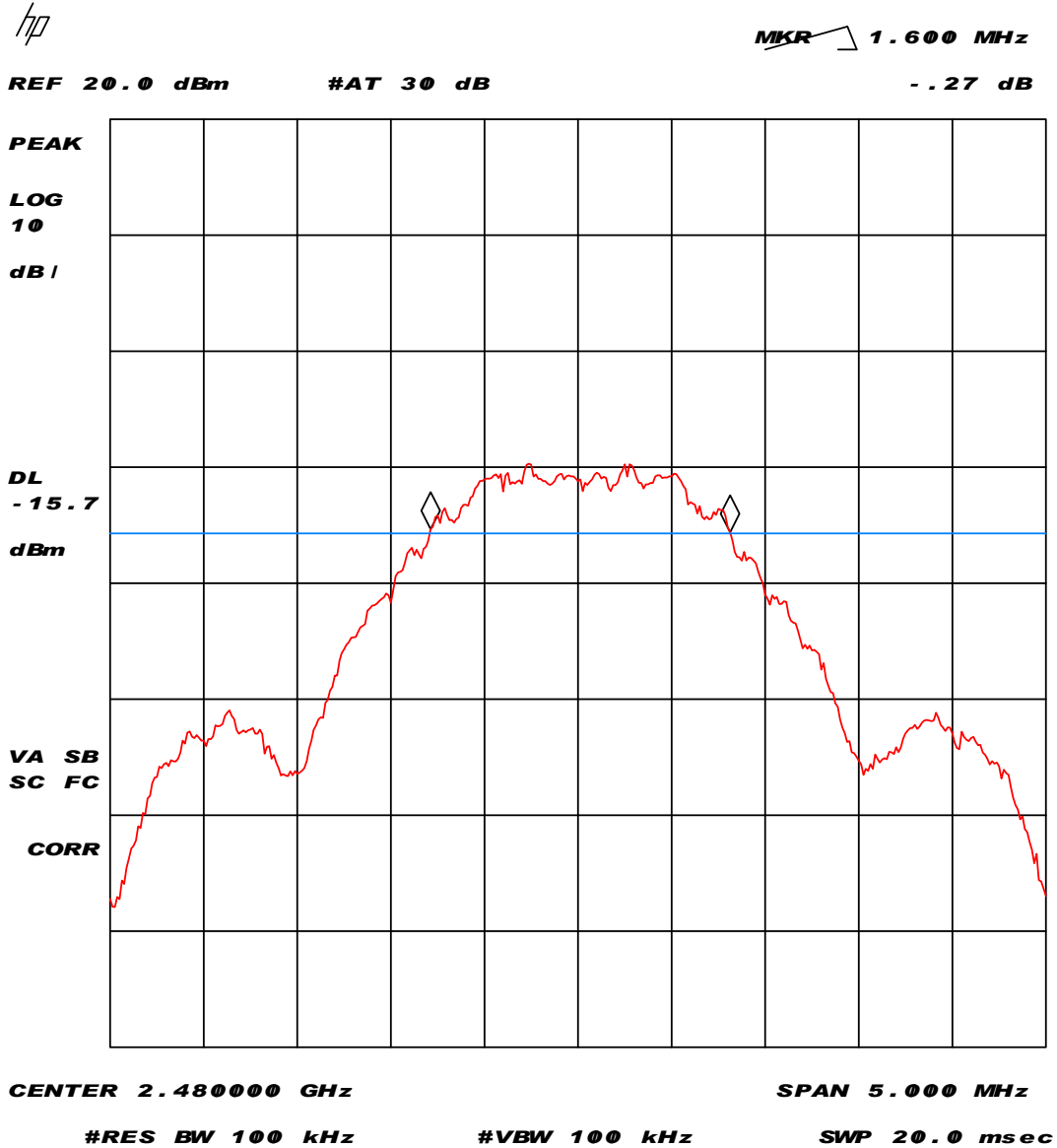
8.1 Bandwidth (IEEE 802.15 mode).



Plot 1 – Bandwidth at channel 1 (2405 MHz).

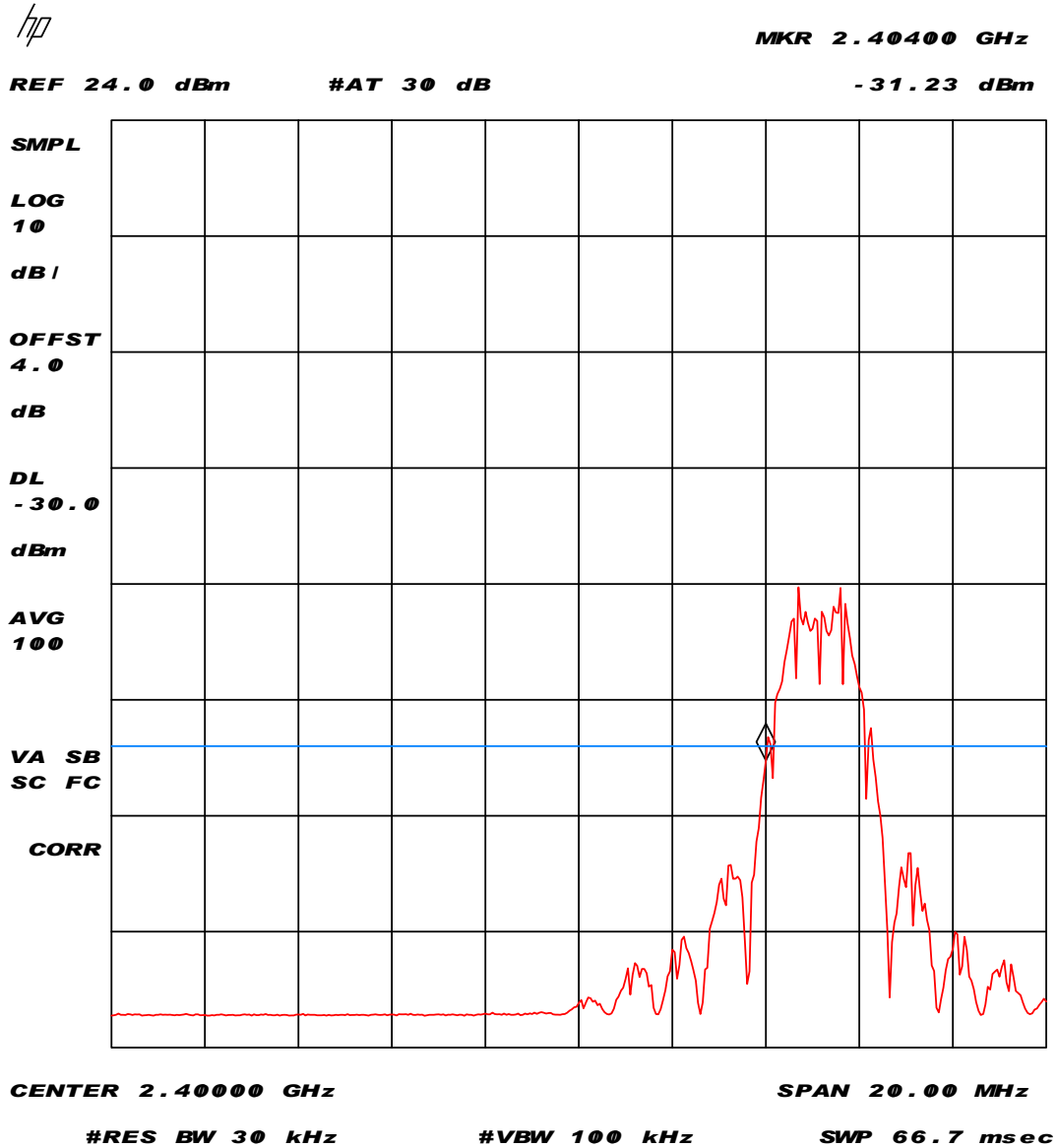


Plot 2 – Bandwidth at channel 2 (2440 MHz).

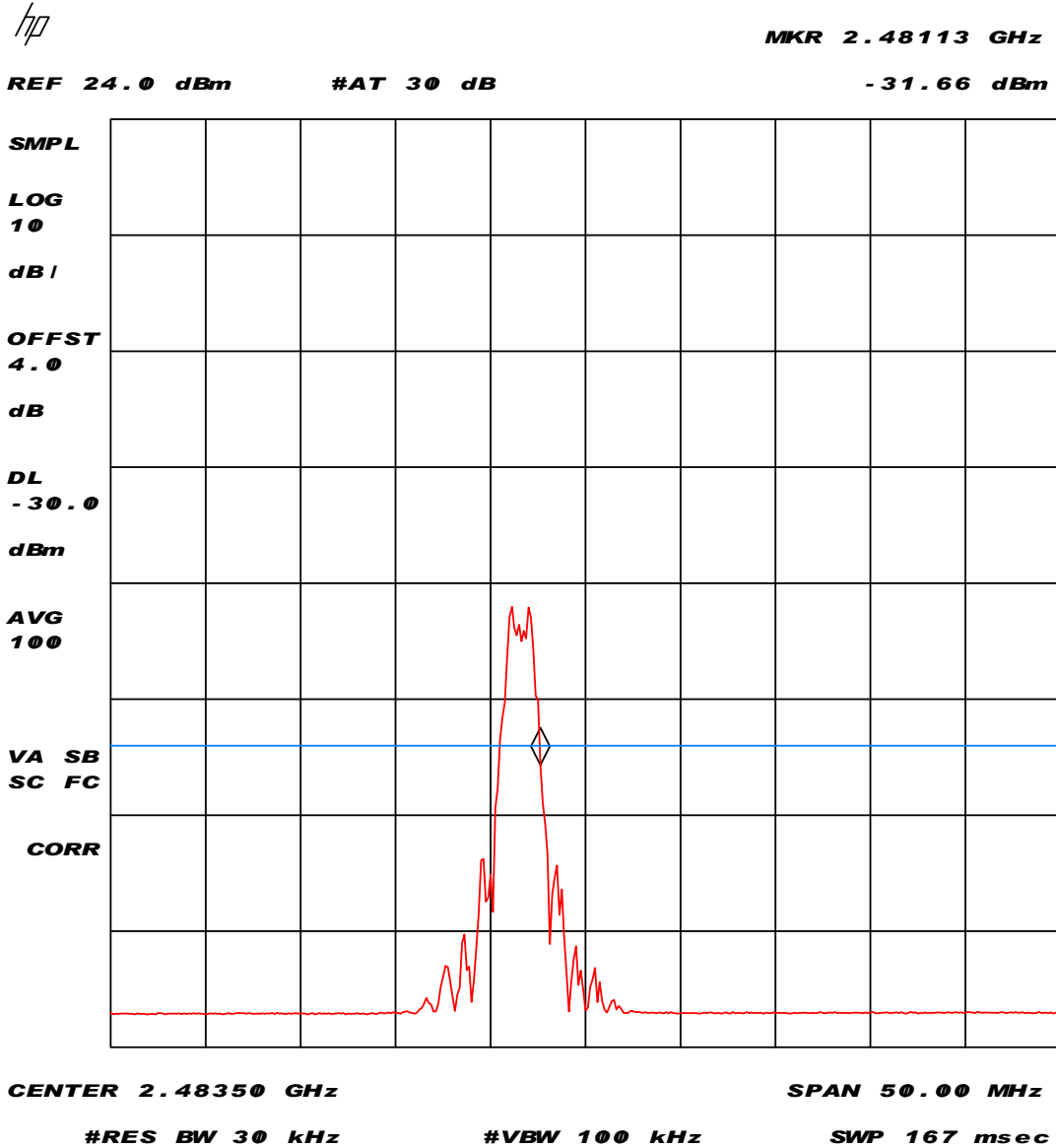


Plot 3 – Bandwidth at channel 3 (2480 MHz).

8.2 Frequency range (IEEE 802.15 mode).



Plot 4 – Frequency range (lowest frequency).



Plot 5 – Frequency range (highest frequency).

9 Additional information supplementary to the test report.

Photographs of the equipment.

10 Test equipment and ancillaries used for tests.

To facilitate inclusion of the test equipment, used for performing the tests, on each page of this test report, each item of test equipment and ancillaries, such as cables, must be identified (numbered) by the test laboratory.

Inventory number	Description	Brand	Type
12471	Biconical antenna 20MHz-200MHz	EATON	94455-1
12473	Log-per antenna 200-1000MHz	EATON	96005
12476	Antenna mast	EMCO	TR3
12477	Antenna mast 1-4 mtr	Poelstra	--
12482	Loop antenna	EMCO	6507
12483	Guidehorn	EMCO	3115
12484	Guidehorn	EMCO	3115
12488	Guidehorn 18 - 40 GHz	EMCO	RA42-K-F-4B-C
12520	Burst generator	Tabor	8201
12533	Signalgenerator	Marconi	2032
12559	Digital storage oscilloscope	Le Croy	9310M
12561	DC Power Supply 20A/70V	DELTA	SM7020D
12567	Plotter	HP	7440A
12605	Calibrated dipole 28MHz-1GHz	Emco	3121c
12608	HF milliwattmeter	Hewlett Packard	HP435a
12609	Power sensor 10MHz-18GHz	Hewlett Packard	HP8481A
12636	Polyester chamber	Polyforce	--
12640	Temperature chamber	Heraeus	VEM03/500
13078	Preamplifier 0.1 GHz - 12 GHz	Miteq	AMF-3D-001120-35-14p
13452	Digital multi meter	HP	34401A
13526	Signalgenerator 20 GHz	Hewlett & Packard	83620A
13594	Preamplifier 10 GHz - 25 GHz	Miteq	AMF-6D-100250-10p
13664	Spectrum analyzer	HP	HP8593E
13886	Open Area testsite	Comtest	--
14051	Anechoic room	Comtest	--
14450	2.4 GHz bandrejectfilter	BSC	XN-1783
15633	Biconilog Testantenna	Chase	CBL 6111B
15667	Measuring receiver	R&S	ESCS 30
99045	DC Power Supply 3A/30V	DELTA	E030/3
99055	Non-conducting support	NMi	--
99061	Non-conducting support 150cm	NMi	--
99068	Detector N-F/BNC-F	Radiall	R451576000
99069	Cable 5m RG214	NMi	--
99071	Cable 10m RG214	NMi	--
99076	Bandpassfilter 4 - 10 GHz	Reactel	7AS-7G-6G-511
99077	Regulating trafo	RFT	LTS006
99112	Tripod	Chase	--
99136	Bandpassfilter 10 - 26.5 GHz	Reactel	9HS-10G/26.5G-S11
99538	Spectrum analyzer	Rohde & Schwarz	FSP40

1 Introduction

1.1 Document Scope

Nofiq FE R03 battery life calculation.

1.2 Purpose

This document contains the calculations made to determine the expected battery life of the Nofiq FE release 03.

2 FE normal situation

2.1 Basic assumptions

The intended batteries for the Nofiq FE are the L91 from Energizer. These have a rated capacity of 3000 mAh at 200 mA load down to 1 Volt. The minimum voltage necessary for the FE to function is 2,1 Volt or else the radio may stop functioning. Unfortunately the analog circuit needs at least 2,5 Volt or else it's functioning outside the specification. (There are two L91 used in series.)

However, the batteries are used at a much lower load. The expectation is that the full rated capacity can be used before voltage drop is too high.

Batteries degrade with temperature. The Nofiq FE is expected to be used in harsh environments with higher temperature than a living room. At 45 degrees Celcius the service grade is 32 % after 15 years.

The Nofiq FE contains parts with different power usage and duty cycle. The radio and user interface part are calculated.

The radio is only used to send a heart beat and to do a parent search. A typical day counts 288 heart beats using at about 25 ms radio activity each and two standard parent search actions for 1000 ms. These numbers are a little bit exaggerated to 40 ms and three parent search actions to sum up to a duty cycle of 0,0168 %.

The user interface is normally only used to signal the sending of a heart beat. Every heart beat the green led flashes for 100 ms. Duty cycle: 0,0333 %.

2.2 Battery life expectancy

Table 1 Calculation

			DC:	power usage	% of total
Radio on:	21 mA	0.000168		0.0847 mAh	5.495 %
Radio off:	1.00E-03 mA	0.999832		0.0240 mAh	1.557 %
Analog on:	0.02 mA	1		0.4800 mAh	31.149 %
Microcontroller on:	2.5 mA	0.005		0.3000 mAh	19.468 %
Microcontroller off:	0.003 mA	0.995		0.0716 mAh	4.649 %
Battery degrade @45C	0.017535 mA	1		0.4208 mAh	27.310 %
User interface	20 mA	0.000333		0.1598 mAh	10.373 %
			total:	1.5410 mAh	
days:	2199.8874				
months:	72.275561				
years:	6.0229634				

According to the calculation above the design target of 2 years battery life shouldn't be a problem.

3 Influences

There are a few parameters which have impact on the battery life expectancy.

3.1 Temperature

Temperature:	-10	0	20	40	45 degrees Celcius
Degrade	1	3	10	40	68 %
Available power	80	87	100	108	113 %
Degrade	0.0044	0.0143	0.0548	0.2366	0.4208 mAh a day
Available power	2400	2610	3000	3240	3390 mAh available
days:	2134.23	2300.70	2553.40	2388.15	2200.01
months:	70.12	75.59	83.89	78.46	72.28
years:	5.84	6.30	6.99	6.54	6.02

3.2 Alert mode

When the device is in alert mode the user interface consumes much more power. The buzzer follows the led which has a duty cycle of 20 %, (on-off-on-off/100ms, on every second). The led consumes about 20 mA and the buzzer around 2 mA. One day the user interface in alert consumes $22 \text{ mA} \cdot 0,2 \cdot 24 \text{ hour} = 105,6 \text{ mAh}$. Normally it does 0,16 mAh. One day Alert mode consumes $(105,6 - 0,16)/1,54 = 68,5$ days of battery life expectancy!

3.3 Error mode

When the device is in error mode the user interface consumes also more power. The buzzer follows the led which has a duty cycle of 10 %, (on-off-on-off/100ms, on every 2 second). The led consumes about 20 mA and the buzzer around 2 mA. One day the user interface in alert consumes $22 \text{ mA} \cdot 0,1 \cdot 24 \text{ hour} = 52,8 \text{ mAh}$. Normally it does 0,16 mAh. One day Alert mode consumes $(52,8 - 0,16)/1,54 = 34,2$ days of battery life expectancy!