

IBN LLC.

Application
For
Certification
FCC ID: 2AALX-HAO

HIGH DEFINITION DIGITAL OTT BOX

Model: HA2800

**Additional Model: HAM2, HAO1, HAO2, HAO3, HAO4, HAO5, HAO6,
HAO7, HAO8, HAO9**

Computer

Report No.: 130514024SZN-002

Prepared and Checked by:

Approved by:

Sign on file

Robert Li
Project Engineer

Billy Li
Supervisor
Date: July 30, 2013

- The test results reported in this test report shall refer only to the sample actually tested and shall not refer or be deemed to refer to bulk from which such a sample may be said to have been obtained.
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TRF No.: FCC 15C_PC_b

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MEASUREMENT / TECHNICAL REPORT

IBN LLC.

MODEL: HA2800

**Additional Model: HAM2, HAO1, HAO2, HAO3, HAO4, HAO5, HAO6,
HAO7, HAO8, HAO9**

FCC ID: 2AALX-HAO

This report concerns (check one:) Original Grant Class II Change

Equipment Type: JBC-Part 15 Class B Computing Device/Personal Computer

Deferred grant requested per 47 CFR 0.457(d)(1)(ii)? Yes No

If yes, defer until: _____
date

Company Name agrees to notify the Commission by: _____
date

of the intended date of announcement of the product so that the grant can be issued on
that date.

Transition Rules Request per 15.37? Yes No

If no, assumed Part 15, Subpart B for unintentional radiator – the new 47 CFR [10-01-12
Edition] provision.

Report prepared by:

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List of attached file

Exhibit Type	File Description	Filename
Test Report	Test Report	report.pdf
Test Setup Photo	Radiated photos	radiated photos.pdf
Test Setup Photo	Conducted photos	conducted photos.pdf
External Photo	External Photos	external photos.pdf
Internal Photo	Internal Photos	internal photos.pdf
Block Diagram	Block Diagram	block.pdf
ID Label / Location	Label Artwork and Location	label.pdf
User Manual	User Manual	manual.pdf
Cover Letter	Confidential Letter	request.pdf
Cover Letter	Letter of Agency	agency.pdf

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EXHIBIT 1

GENERAL DESCRIPTION

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1.0 General Description

1.1 Product Description

The Equipment Under Test (EUT) is a HIGH DEFINITION DIGITAL OTT BOX. The EUT is powered by Adapter with Model: RJ-AS120200U105-B; input: AC 100-240V, 50/60Hz, Max 1.0A; output: DC 12V, 2A.

The Models: HAM2, HAO1, HAO2, HAO3, HAO4, HAO5, HAO6, HAO7, HAO8, HAO9 are the same as the Model: HA2800 in hardware aspect. The difference in model number serves as marketing strategy.

1.2 Related Submittal(s) Grants

This is an application for certification of a computer. The wireless function was reported in the report: 130514024SZN-001.

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1.3 Test Methodology

Both AC mains line-conducted and radiated emission measurements were performed according to the procedures in ANSI C63.4 (2009). Radiated emission measurement was performed in Semi-anechoic chamber and conducted emission measurement was performed in shield room. For radiated emission measurement, preliminary scans were performed in the semi-anechoic chamber only to determine the worst case modes. All radiated tests were performed at an antenna to EUT distance of 3 meters, unless stated otherwise in the "**Justification Section**" of this Application.

1.4 Test Facility

The Semi-anechoic chamber and shielding room used to collect the radiated data and conducted data are **Intertek Testing Services Shenzhen Ltd. Kejiyuan Branch** and located at 6F, D Block, Huahan Building, Langshan Road, Nanshan District, Shenzhen, P. R. China. This test facility and site measurement data have been fully placed on file with the FCC (Registration Number: 242492).

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EXHIBIT 2

SYSTEM TEST CONFIGURATION

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2.0 System Test Configuration

2.1 Justification

The system was configured for testing in a typical fashion (as a customer would normally use it), and in the confines as outlined in ANSI C63.4 (2009).

The device was powered by AC 120V/60Hz during the test. All test modes have been considered, only the worst case data was reported in this report.

For maximizing emissions, the EUT was rotated through 360°, the antenna height was varied from 1 meter to 4 meters above the ground plane, and the antenna polarization was changed. The step by step procedure for maximizing emissions led to the data reported in Exhibit 3.0.

The rear of unit shall be flushed with the rear of the table.

The equipment under test (EUT) was configured for testing in a typical fashion (as a customer would normally use it). The EUT was placed on turntable, which enabled the engineer to maximize emissions through its placement in the three orthogonal axes.

The frequency range from 30MHz to 6GHz was searched for spurious emissions from the device. Only those emissions reported were detected. All other emissions were at least 20 dB below the applicable limits.

2.2 EUT Exercising Software

N/A

2.3 Special Accessories

N/A

2.4 Equipment Modification

Any modifications installed previous to testing by IBN LLC. will be incorporated in each production model sold / leased in the United States.

No modifications were installed by Intertek Testing Services Shenzhen Ltd. Kejiyuan Branch.

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2.5 Measurement Uncertainty

When determining the test conclusion, the Measurement Uncertainty of test has been considered.

2.6 Support Equipment List and Description

This product was tested in the following configuration:

Refer List:

Description	Manufacturer	Model No.
USB Memory1	TOSHIBA	UHYBS-004G-BL
USB Memory2	SanDisk	SDCZ36-002G-P36
USB Memory3	SSK	SFD010
USB Memory4	SanDisk	SDCZ36-004G-P36
Dummy Load	N/A	N/A
Adapter	Shenzhen ruijing Industrial Co. Ltd	Model: RJ-AS120200U105-B Input: AC 100-240V, 50/60Hz, 1.0A Output: DC 12V, 2A
Router	TP-Link	S535D24
RJ 45 Cable	N/A	Unshielded 4.0m
AV Cable	N/A	Unshielded 1.5m
Infrared receiver	N/A	NA
SPDIF Cable	N/A	Unshielded 4.5m
SPDIF load	N/A	N/A
HDMI Cable	N/A	Unshielded 1.2m
Test TV	SONY	KDL-24EX520

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EXHIBIT 3

EMISSION RESULTS

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3.0 Emission Results

Data is included worst case configuration (the configuration which resulted in the highest emission levels). A sample calculation, configuration photographs and data tables of the emissions are included.

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3.1 Field Strength Calculation

The field strength is calculated by adding the reading on the Spectrum Analyzer to the factors associated with preamplifiers (if any), antennas, cables, pulse desensitization and average factors (when specified limit is in average and measurements are made with peak detectors). A sample calculation is included below.

$$FS = RA + AF + CF - AG + PD$$

where FS = Field Strength in $\text{dB}\mu\text{V}/\text{m}$

RA = Receiver Amplitude (including preamplifier) in $\text{dB}\mu\text{V}$

CF = Cable Attenuation Factor in dB

AF = Antenna Factor in dB/m

AG = Amplifier Gain in dB

PD = Pulse Desensitization in dB

In the radiated emission table which follows, the reading shown on the data table may reflect the preamplifier gain. An example of the calculations, where the reading does not reflect the preamplifier gain, follows:

$$FS = RA + AF + CF - AG + PD + AV$$

Example

Assume a receiver reading of 62.0dB μ V is obtained. The antenna factor of 7.4dB/m and cable factor of 1.6dB is added. The amplifier gain of 29dB is subtracted. The pulse desensitization factor of the spectrum analyzer was 0dB, and the resultant average factor was -10dB. The net field strength for comparison to the appropriate emission limit is 32dB μ V/m. This value in dB μ V/m was converted to its corresponding level in μ V/m.

RA = 62.0dB μ V

AF = 7.4dB/m

CF = 1.6dB

AG = 29.0dB

PD = 0dB

$$FS = 62 + 7.4 + 1.6 - 29 + 0 = 42\text{dB}\mu\text{V}/\text{m}$$

$$\text{Level in } \mu\text{V}/\text{m} = \text{Common Antilogarithm } [(42\text{dB}\mu\text{V}/\text{m})/20] = 125.9\mu\text{V}/\text{m}$$

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3.2 Radiated Emission Configuration Photograph

**Worst Case Radiated Emission
At
1510.000 MHz (USB Play with HDMI Output)**

For electronic filing, the worst case radiated emission configuration photograph is saved with filename: radiated photos.pdf.

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3.3 Radiated Emission Data

The data on the following page lists the significant emission frequencies, the limit and the margin of compliance. Numbers with a minus sign are below the limit.

Judgement: Passed by 2.8dB margin

TEST PERSONNEL:

Sign on file

Robert Li Project Engineer
Typed/Printed Name

July 30, 2013
Date

INTERTEK TESTING SERVICES

Company: IBM LLC.

Date of Test: July 30, 2013

Model: HA2800

Worst case Operating Mode: USB Play with HDMI Output

Radiated Emissions Table

Polarization	Frequency (MHz)	Reading (dB μ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dB μ V/m)	Limit at 3m (dB μ V/m)	Margin (dB)
Horizontal	199.750	46.3	20.0	9.1	35.4	43.5	-8.1
Horizontal	293.840	52.4	20.0	9.1	41.5	46.0	-4.5
Horizontal	750.000	49.7	20.0	9.0	38.7	46.0	-7.3
Horizontal	1870.000	63.5	20.0	10.5	50.0	54.0	-4.0
Vertical	128.455	40.0	20.0	9.4	29.4	43.5	-14.1
Vertical	321.970	51.1	20.0	9.1	40.2	46.0	-5.8
Vertical	936.465	51.4	20.0	9.0	40.4	46.0	-5.6
Vertical	1510.000	74.3	20.0	10.5	51.2	54.0	-2.8

NOTES:

1. Quasi-Peak detector is used for frequency up to 1GHz and Peak detector is used for frequency from 1-6GHz.
2. All measurements were made at 3 meters. Harmonic emissions not detected at the 3 meter distances were measured at 0.3- meter and an inverse proportional extrapolation was performed to compare the signal level to the 3 meter limit. No other harmonic emissions than those reported were detected at a test distance of 0.3-meter.
3. Negative value in the margin column shows emission below limit.

Test Engineer: Robert Li

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3.4 Conducted Emission at Mains Terminal

Worst Case Conducted Configuration
At
4.402 MHz (iPTV Mode with HDMI Output)

For electronic filing, the worst case conducted emission configuration at photograph is saved with filename: conducted photos.pdf.

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3.5 Conducted Emission Data

Judgement: Passed by 10.6 dB margin

TEST PERSONNEL:

Sign on file

Robert Li Project Engineer

Typed/Printed Name

July 30, 2013

Date

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Company: IBM LLC.

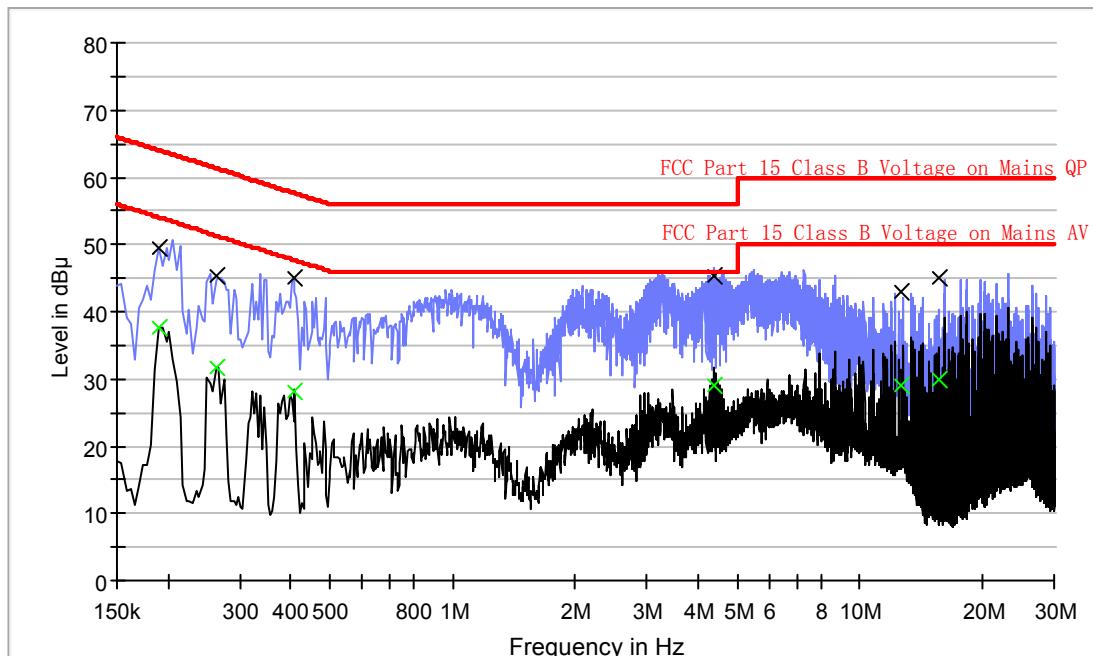
Date of Test: July 30, 2013

Model: HA2800

Worst Case Operating Mode: iPTV with HDMI output

Phase: Live

Conducted Emission Test - FCC



Result Table QP

Frequency (MHz)	QuasiPeak (dB μ V)	Line	Corr. (dB)	Margin (dB)	Limit (dB μ V)
0.190000	49.6	L1	9.6	14.4	64.0
0.262000	45.2	L1	9.6	16.2	61.4
0.406000	45.0	L1	9.6	12.7	57.7
4.402000	45.4	L1	9.7	10.6	56.0
12.600000	43.0	L1	10.1	17.0	60.0
15.600000	45.0	L1	10.3	15.0	60.0

Result Table AV

Frequency (MHz)	Average (dB μ V)	Line	Corr. (dB)	Margin (dB)	Limit (dB μ V)
0.190000	37.7	L1	9.6	16.3	54.0
0.262000	31.8	L1	9.6	19.6	51.4
0.406000	28.2	L1	9.6	19.5	47.7
4.402000	28.9	L1	9.7	17.1	46.0
12.600000	29.0	L1	10.1	21.0	50.0
15.600000	29.8	L1	10.3	20.2	50.0

Test Engineer: Robert Li

TRF No.: FCC 15C_PC_b
FCC ID: 2AALX-HAO

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Company: IBM LLC.

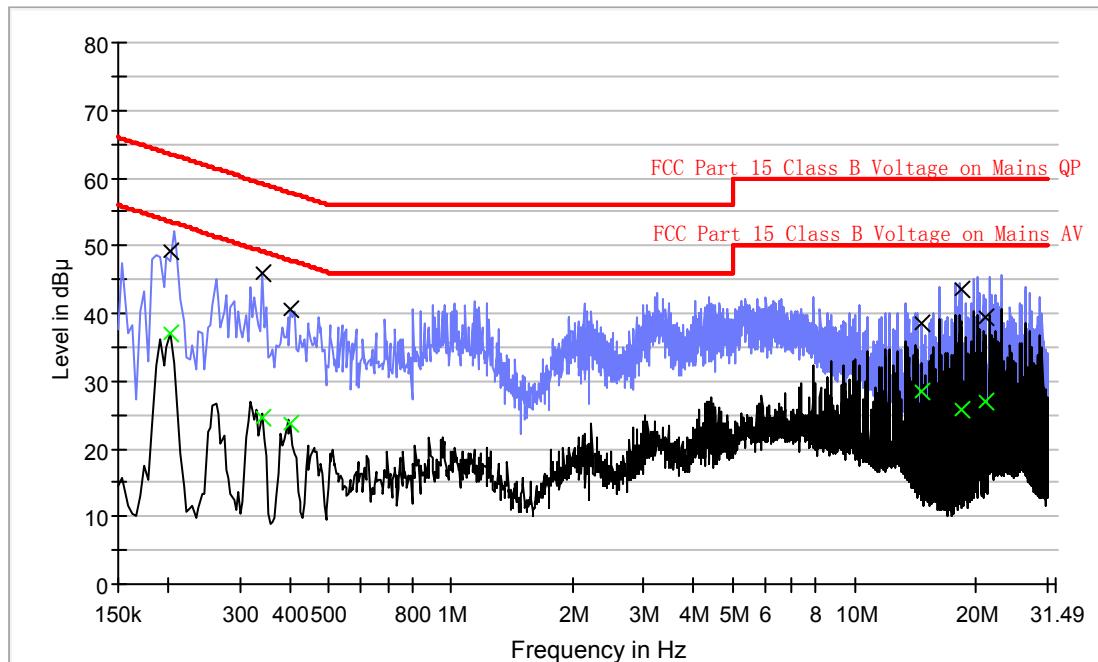
Date of Test: July 30, 2013

Model: HA2800

Worst Case Operating Mode: iPTV with HDMI output

Phase: Neutral

Conducted Emission Test FCC Part 15



Result Table QP

Frequency (MHz)	QuasiPeak (dB μ V)	Line	Corr. (dB)	Margin (dB)	Limit (dB μ V)
0.202000	49.3	N	9.6	14.2	63.5
0.342000	45.9	N	9.6	13.3	59.2
0.402000	40.6	N	9.6	17.2	57.8
14.600000	38.4	N	10.2	21.6	60.0
18.500000	43.6	N	10.5	16.4	60.0
21.000000	39.4	N	10.6	20.6	60.0

Result Table AV

Frequency (MHz)	Average (dB μ V)	Line	Corr. (dB)	Margin (dB)	Limit (dB μ V)
0.202000	36.9	N	9.6	16.6	53.5
0.342000	24.5	N	9.6	24.7	49.2
0.402000	23.9	N	9.6	24.0	47.8
14.600000	28.4	N	10.2	21.6	50.0
18.500000	25.7	N	10.5	24.3	50.0
21.000000	26.9	N	10.6	23.1	50.0

Test Engineer: Robert Li

TRF No.: FCC 15C_PC_b
FCC ID: 2AALX-HAO

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EXHIBIT 4

EQUIPMENT PHOTOGRAPHS

TRF No.: FCC 15C_PC_b
FCC ID: 2AALX-HAO

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4.0 Equipment Photographs

For electronic filing, photographs of the tested EUT are saved with filename: external photos.pdf and internal photos.pdf.

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EXHIBIT 5

PRODUCT LABELLING

TRF No.: FCC 15C_PC_b
FCC ID: 2AALX-HAO

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5.0 Product Labelling

For electronics filing, the FCC ID label artwork and the label location are saved with filename: label.pdf.

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EXHIBIT 6

TECHNICAL SPECIFICATIONS

TRF No.: FCC 15C_PC_b
FCC ID: 2AALX-HAO

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6.0 Technical Specifications

For electronic filing, the block diagram of the tested EUT is saved with filename: block.pdf.

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EXHIBIT 7

INSTRUCTION MANUAL

TRF No.: FCC 15C_PC_b
FCC ID: 2AALX-HAO

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7.0 Instruction Manual

For electronic filing, a preliminary copy of the Instruction Manual is saved with filename: manual.pdf.

This manual will be provided to the end-user with each unit sold / leased in the United States.

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EXHIBIT 8

MISCELLANEOUS INFORMATION

TRF No.: FCC 15C_PC_b
FCC ID: 2AALX-HAO

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8.0 Miscellaneous Information

This miscellaneous information includes emission measuring procedure.

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8.1 Emissions Test Procedures

The following is a description of the test procedure used by Intertek Testing Services in the measurements of computer peripheral operating under Part 15, Subpart B rules.

The test set-up and procedures described below are designed to meet the requirements of ANSI C63.4 – 2009.

The computer peripheral equipment under test (EUT) is placed on a wooden turntable which is four feet in diameter and approximately one meter in height above the ground plane. During the radiated emissions test, the turntable is rotated and any cables leaving the EUT are manipulated to find the configuration resulting in maximum emissions. The antenna height and polarization are varied during the testing to search for maximum signal levels. The height of the antenna is varied from one to four meters.

Detector function for radiated emissions are in QP mode from the frequency band 30MHz to 1GHz with RBW setting 120kHz and in PK & AV mode from frequency band 1GHz to 6GHz with RBW setting 1MHz. Detector function for conducted emissions are in QP & AV mode and IFBW setting is 9kHz from the frequency band 150kHz to 30MHz.

For radiated emission, the frequency range scanned is 30MHz to 6GHz. For line-conducted emissions, the range scanned is 150kHz to 30MHz.

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8.1 Emissions Test Procedures (cont'd)

The EUT is warmed up for 15 minutes prior to the test.

Conducted measurements are made as described in ANSI C63.4 – 2009.

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EXHIBIT 9

TEST EQUIPMENT LIST

TRF No.: FCC 15C_PC_b
FCC ID: 2AALX-HAO

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9.0 Test Equipment List

Equipment No.	Equipment	Manufacturer	Model No.	Serial No.	Cal. Date	Due Date
SZ061-03	BiConiLog Antenna	ETS	3142C	00078828	29-Jun-13	29-Jun-14
SZ185-01	EMI Receiver	R&S	ESCI	100547	12-Mar-13	12-Mar-14
SZ061-08	Horn Antenna	ETS	3115	00092346	03-Nov-12	03-Nov-13
SZ056-03	Spectrum Analyzer	R&S	FSP 30	101148	12-Mar-13	12-Mar-14
SZ181-04	Preamplifier	Agilent	8449B	3008A02474	12-Mar-13	12-Mar-14
SZ188-01	Anechoic Chamber	ETS	RFD-F/A-100	4102	02-Mar-13	02-Mar-14
SZ062-02	RF Cable	RADIALL	RG 213U	--	26-Feb-13	26-Aug-13
SZ062-05	RF Cable	RADIALL	0.04-26.5GHz	--	22-Apr-13	22-Oct-13
SZ062-12	RF Cable	RADIALL	0.04-26.5GHz	--	22-Apr-13	22-Oct-13
SZ185-02	EMI Test Receiver	R&S	ESCI	100692	05-Nov-12	05-Nov-13
SZ187-01	Two-Line V-Network	R&S	ENV216	100072	05-Nov-12	05-Nov-13
SZ187-02	Two-Line V-Network	R&S	ENV216	100073	05-Nov-12	05-Nov-13
SZ188-03	Shielding Room	ETS	RFD-100	4100	10-Sep-12	10-Sep-13