

Test Report

No B41-17-BE-I1

PRIME Certification Tests Cases for Service Nodes

EQUIPMENT UNDER TEST	THREE-PHASE METER WITH PRIME COMMUNICATIONS
MODEL	HXE310
FIRMWARE VERSION	00_2733c
CERTIFICATION SCOPE	Profile 4 – Electricity Meter with PRIME PHY and PRIME MAC

Responsible for tests	ICT Services Director
Ibone G ^a -Borreguero	Ibon Arechalde



Author: Ibone G^a-Borreguero. Responsible for tests
Reviewer: Ibon Arechalde. ICT Services Director

NOTE: This test report shows the detailed information associated with the Test Report Summary no. B41-17-BE-I1 summary

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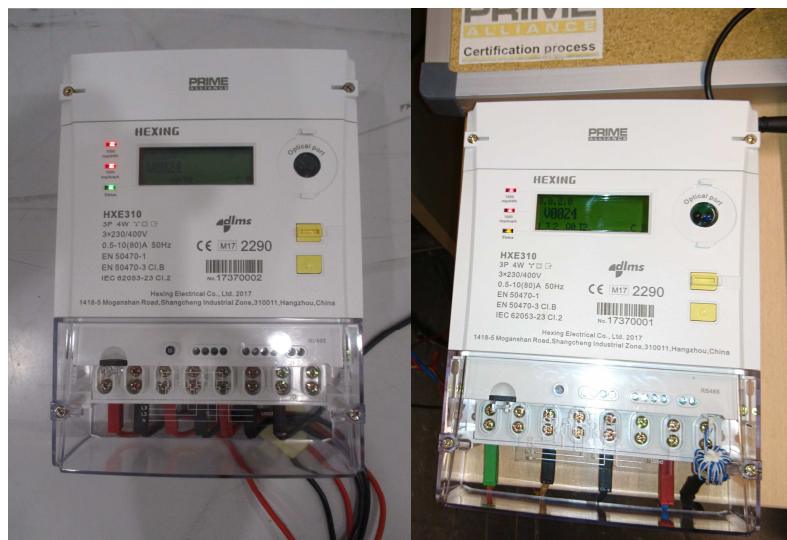
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1.- EQUIPMENT UNDER TEST IDENTIFICATION

Unit:	THREE-PHASE METER WITH PRIME COMMUNICATIONS
Model:	HXE310
Trade Mark:	HEXING
Serial Number:	M1: 17370002 M2: 17370001
Manufacturer:	Hexing Electrical Co., Ltd



The samples were selected and delivered by the applicant.

Equipment characteristics declared by the applicant:

Device type	Electricity Meter with PRIME PHY and PRIME MAC
BaudRate	57600
Firmware version	00_2733c
Applicable Optional tests	PHY layer test cases <ul style="list-style-type: none"> • Signal Quality category • Regulatory category Convergence layer tests PRIME PLC is STCOM05 certified PRIME 1.3.6 (see Annex II and Annex III)

2.- SUMMARY OF TEST RESULTS

PHY LAYER		
2.2 PHY Test Cases: Functional Category		
2.2.1	Verify error free communication (0.2% FER) checking the complete frame payload when communicating directly over the LISN stated in the PRIME PHY Spec and output level 120 dBuV, PPDU length 256 bytes. D8PSK	NA
2.2.2	Verify error free communication (0.2% FER) checking the complete frame payload when communicating directly over the LISN stated in the PRIME PHY Spec and output level 120 dBuV, PPDU length 256 bytes. D8PSK+CC	NA
2.2.3	Verify error free communication (0.2% FER) checking the complete frame payload when communicating directly over the LISN stated in the PRIME PHY Spec and output level 120 dBuV, PPDU length 256 bytes. DBPSK	NA
2.2.4	Verify error free communication (0.2% FER) checking the complete frame payload when communicating directly over the LISN stated in the PRIME PHY Spec and output level 120dBuV, PPDU length 256 bytes. DBPSK+CC	NA
2.2.5	Verify error free communication (0.2% FER) checking the complete frame payload when communicating directly over the LISN stated in the PRIME PHY Spec and output level 120 dBuV, PPDU length 256 bytes. Modulation type: DQPSK	NA
2.2.6	Verify error free communication (0.2% FER) checking the complete frame payload when communicating directly over the LISN stated in the PRIME PHY Spec and output level 120 dBuV, PPDU length 256 bytes. QPSK+CC	NA
2.2.7	Verify error free communication (0.2% FER) checking the complete frame payload when communicating directly over the LISN stated in the PRIME PHY Spec (20hm) and output level 120 dBuV, PPDU length 256 bytes.DBPSK	NA
2.2.8	Verify error free communication (0.2% FER) checking the complete frame payload when communicating directly over the LISN stated in the PRIME PHY Spec (20hm) and output level 120 dBuV, PPDU length 256 bytes. D8PSK+CC	NA
2.2.9	Verify error free communication (0.2% FER) (checking the complete frame payload) when receiving input signal of 122 dBuV. (DUT is in reception state). Modulation type: D8PSK	NA
2.4 PHY Test Cases: Signal Quality category		
2.4.1	Verify that the EVM of the received signal at output level is above 17dB.	PASS
2.4.2	Verify that the EVM of the transmitted signal output level is above 17dB.	PASS
2.5 PHY Test Cases: Regulatory category		
2.5.1	PHY Test Cases: Regulatory category	PASS
MAC LAYER		
3.2 MAC Test Cases: Service Node Start-up		
3.2.1	Service node start-up (forcing the reception of beacons).	NA
3.2.2	Service node start-up (No PNPDU's are transmit when DUT receives BPDUs).	NA
3.2.3	Service node start-up (Tx rate of PNPDU's reduced by factor of received PNPDU's).	NA

3.2.4	Service node start-up (PNPDU generation latency and transmission parameters).	NA
3.2.5	Service Node start-up (RANDOMness in the transmission of PNPDU's)	NA
3.2.6	Service Node start-up (seeking promotion of DUT).	NA
3.3 MAC Test Cases: Channel Access		
3.3.1	Channel access- Shared Contention Period. Channel is idle	NA
3.3.2	Channel access- Shared Contention Period. Channel is occupied.	NA
3.3.3	Channel access- Contention Free Period.	NA
3.3.4	Channel access-Adaptation to frame structure change (FRA)	NA
3.4 MAC Test Cases: Service Node MAC specific procedures		
3.4.1	Registration accepted (Base Node available when DUT powers up).	NA
3.4.2	Registration accepted (Base Node not available when DUT powers up).	NA
3.4.3	Registration accepted (DUT connected to a Switch node and the Switch node is connected to the Base Node).	NA
3.4.4	Unregistering process initiated by a terminal node.	NA
3.4.5	Unregistering process initiated by the Base node.	NA
3.4.6	Promotion process initiated by the base node.	NA
3.4.7	Promotion process initiated by the service node DUT.	NA
3.4.8	Switching process: 2 levels of switching (DUT1 as a level 1 switch).	NA
3.4.9	Switching process: 2 levels of switching (DUT as a level 2 switch).	NA
3.4.10	Switching functions: BPDU transmissi3n	NA
3.4.11	Switching functions: BPDU updates from FRA control packet	NA
3.4.12	Promotion rejected by the base node.	NA
3.4.13	Demotion process initiated by the base node.	NA
3.4.14	Keep-Alive process (response from DUT).	NA
3.4.15	Keep-Alive process (timeout and disconnect).	NA
3.4.16	Keep-Alive process (changes in Keep Alive timeout).	NA
3.4.17	Connection establishment initiated by the Base node.	NA
3.4.18	Connection establishment initiated by the Service node.	NA
3.4.19	Connection establishment rejected by the Base node.	NA

3.4.20	Connection closing initiated by the Base node.	NA
3.4.21	Connection closing initiated by the Service node.	NA
3.4.22	File transfer process (unicast).	NA
3.4.23	File transfer process (multicast).	NA
3.4.24	Error in the firmware upgrade process.	NA
CONVERGENCE LAYER		
4.2 CL Test Cases: 4-32 Connection establishment		
4.2.1	Correct establishment and disconnection of 4-32 link	PASS
4.3 CL Test Cases: DLMS traffic over 4-32 connection		
4.3.1	CS4-32 is able to pass valid DLMS payload between the meter and the test system.	PASS
4.3 CL Test Cases: 4-32 parameter integrity		
4.4.1	Test that CS4-32 integrity parameter is verified at the DUT.	NA

For more detailed information about the test results see Annex I

3.- APPLICANT

Leilei Zhou

Hexing Electrical Co., Ltd.

1418-5 Moganshan Road, Shangcheng Industrial Zone, 310011, Hangzhou
City, CHINA

4.- PLACE OF RECEPTION AND EXECUTION OF THE TESTS

The reception of the equipment took place in the Smart Data & Protocol Laboratory of TECNALIA, in Derio (Spain).

The performing of the test took place in Smart Data & Protocol Laboratory of TECNALIA, in Derio (Spain) and in Electronic devices Laboratory of TECNALIA, in Derio (Spain).

5.- STANDARDS AND TEST PROCEDURES EMPLOYED

Standards:

- Draft Specification for PoweRline Intelligent Metering Evolution. PRIME-Specification v.1.3.6.
- EN 50065-1 (2001): "Signalling on low-voltage electrical installations in the frequency range 3 kHz to 148.5 kHz. Part 1: General requirements, frequency bands and electromagnetic disturbances".
- EN 50065-2-3 (2003) + A1 (2005): "Signalling on low-voltage electrical installations in the frequency range 3 kHz to 148.5 kHz. Part 2-3: Immunity requirements for mains communications equipment and systems operating in the range of frequencies of 3 kHz to 95 kHz and intended for use by electricity suppliers and distributors".
- EN 50065-7 (2001): "Signalling on low-voltage electrical installations in the frequency range 3 kHz to 148.5 kHz. Part 7: Equipment impedance".

Testing procedures:

- PRIME Certification. Test Cases version 1.2

6.- CONCLUSIONS

In view of the results and in the test conditions expressed in the present report, the tested sample of:

Unit:	THREE-PHASE METER WITH PRIME COMMUNICATIONS
Model:	HXE310
Trade Mark:	HEXING
Serial Number:	M2: 17370001
Manufacturer:	Hexing Electrical Co., Ltd

- ✓ **COMPLIES** with PHY layer (signal quality and regulatory) and Convergence layer tests cases defined by PRIME Alliance in its PRIME Certification. Test Cases version 1.2 based on PRIME-Specification v.1.3.6.

- This test report is granted on account of tests made at location of TECNALIA, in Derio (Spain).
- The results of the present report apply only to the samples tested and the moment and conditions under which the measurements were performed.
- The complete results, including remarks and limitations, are laid down in ANNEX I of this report.

ANNEX I. TEST RESULTS

Place: Smart Data & Protocol Laboratory in TECNALIA
Electronic devices Laboratory in TECNALIA

Climatic conditions: 19 °C 44% H.R. 1014 mbar

Responsible: Ibone G^a-Borreguero

Used instruments:

Measurement instruments	
X	SW CURRENT CURRENT PRIME audition v1.2.3ct ✓ PRIME AUDITION TOOL
X	HW CURRENT ✓ BASE NODE (MAC 00:80:E1:00:00:57) ✓ AUX1 (MAC 00:80:E1:00:00:5D) ✓ AUX1 (MAC 00:80:E1:00:00:63) ✓ AUX2 (MAC 00:80:E1:00:00:5F) ✓ SNIFFER
X	EL092142 – LISN
X	EL092017 – LISN PRIME
X	FILTERS WITH VARIABLE ATENUATION
X	EL052008 - CLIMATIC CHAMBER
X	EL022011 - DIGITAL OSCILLOSCOPE
X	EL082055 – AISOLATING TRANSFORM
Data registers storage place	
PRIME laptop /home/conftester/Resultados/CLIENTES/HEXING_TRI	

Results:

4.1. PHY layer

4.1.1. Test setup

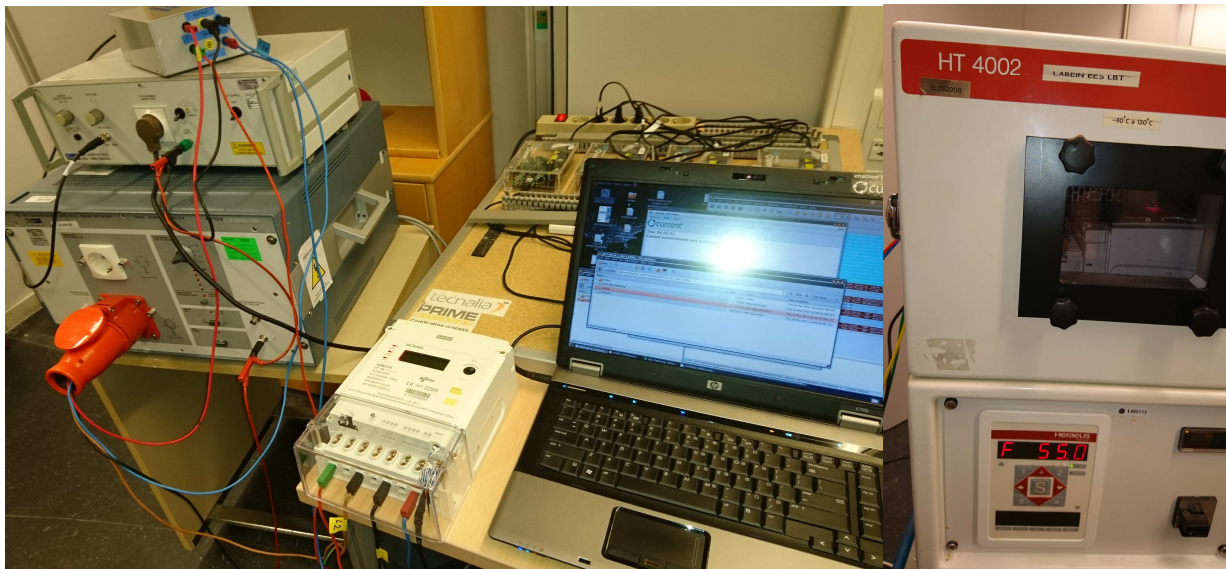
DUT connections:

- Serial Port*-Optical port:
 - to manage the DUT
 - connected to auxiliary PC to configure the DUT in different modes (PHY tx, PHY rx)
 - to access to PIB values with Current PRIME Testing Tool
 - connected to Current PRIME Audition Test Tool

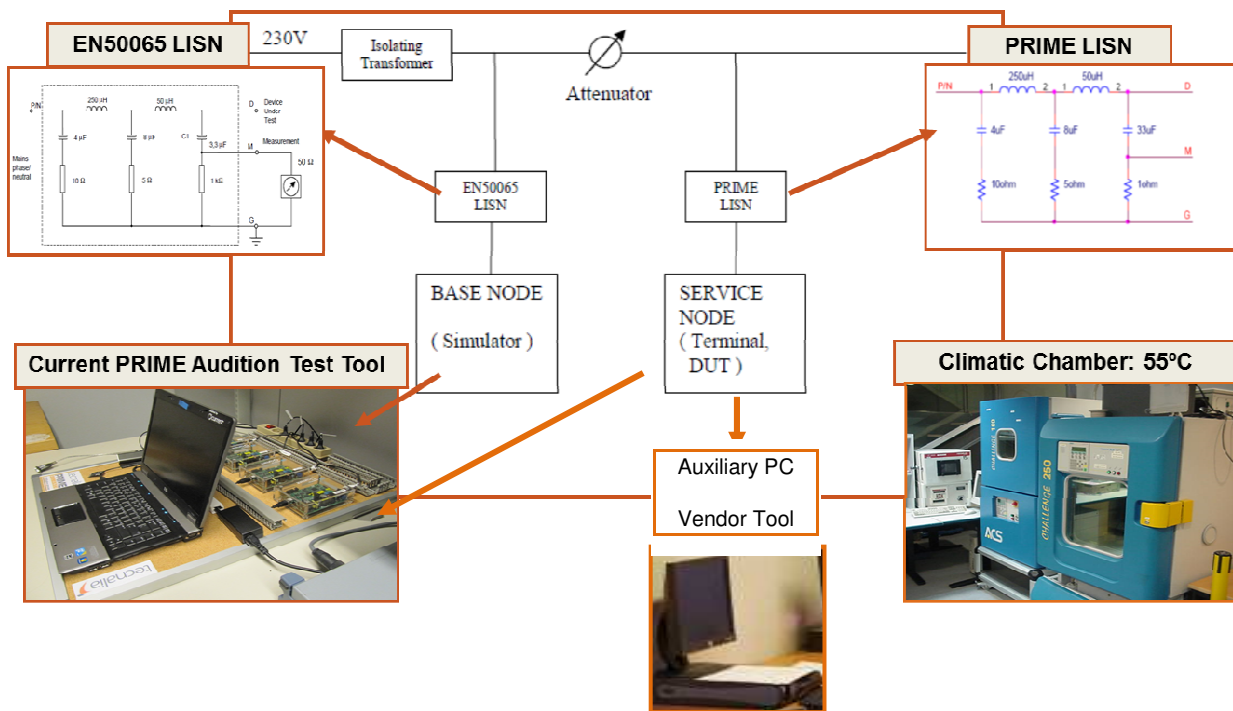
* See Annex IV for DUT configuration and access to the PIB

Auxiliary PC with the following Software:

- Vendor Tool: to manage and configure the DUT in PHY mode.



The setup of the PHY layer tests is the following one:



DUT has to be configured in PHY reception and PHY transmission mode.

4.1.2. Test results

CODE	DESCRIPTION	RESULT	EXPECTED	STAT.	COMMENTS
2.4 PHY Test Cases: Signal Quality category					
2.4.1	Verify that the EVM of the received signal at output level of 120 dBuV is above 17dB.	18.00 dB	>17 dB	PASS	Sample: M2
2.4.2	Verify that the EVM of the transmitted signal output level of 120 dBuV is above 17dB.	17.96 dB	>17 dB	PASS	Sample: M2

PHY Test Cases: Regulatory category

DUT is EN50065-1, EN50065-2-3 and EN50065-7 compliant in order to be PRIME compliant.

- According to Test report No. B41-17-BD-I1 (M1) of Electronic devices Laboratory in TECNALIA laboratory. DUT identification

And the tested sample of:

Unit: THREE-PHASE METER WITH PRIME COMMUNICATIONS
Brand: HEXING
Model: HXE310

Manufacturer: Hexing Electrical Co., Ltd.

PRIME version: 00_2733c

Serial numbers: M1: 17370002

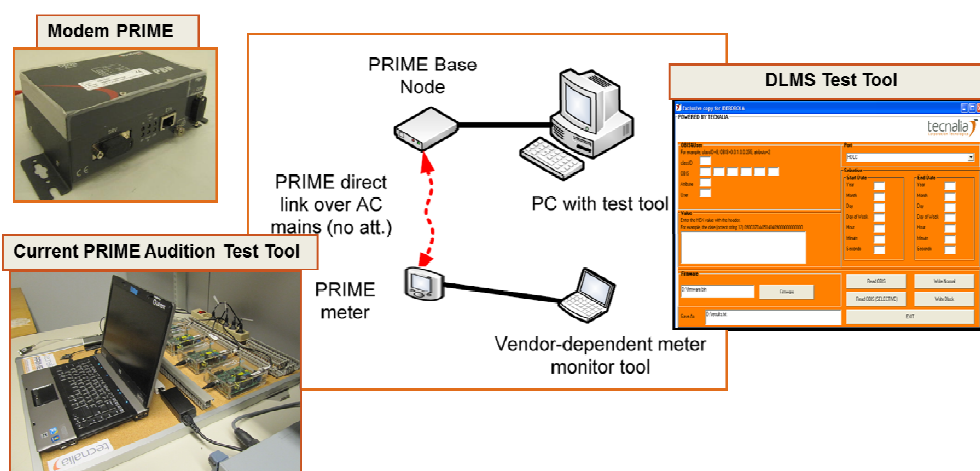
- **COMPLIES** with EN 50065-1:2011.
- **COMPLIES** with EN 50065-2-3:2003+A1:2005.
- **COMPLIES** with EN 50065-7:2001.

4.2. Convergence layer

4.2.1. Test setup - DUT Connections:

- Serial port – Optical port:
 - to access to PIB values with Current PRIME Testing Tool
 - connected to Current PRIME Audition Test Tool
- Start the test with “DLMS Tool” from Tecnia and read/write several DLMS OBIS code

The setup of the MAC layer tests is the following one:



4.3.2. Test results

CODE	DESCRIPTION	RESULT	EXPECTED	STAT.	COMMENTS
4.2 CS Test Cases: 4-32 Connection establishment					
4.2.1	Correct establishment and disconnection of 4-32 link	Successful 4-32 connection establishment	Successful 4-32 connection establishment	PASS	Sample: M2
4.3 CS Test Cases: DLMS traffic over 4-32 connection					
4.3.1	CS4-32 is able to pass valid DLMS payload between the meter and the test system.	Valid DLMS payload	Valid DLMS payload	PASS	Sample: M2
4.4 CS Test Cases: 4-32 parameter integrity					
4.4.1	Test that CS4-32 integrity parameter is verified at the DUT.		Successful 4-32 parameter integrity	N/A	Skipping this test from the certification.



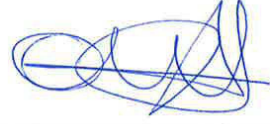
ANNEX II. PRIME CERTIFICATION V1.3.6 OF STCOMET10

Test Report Summary No B41-17-AC-I1 summary

PRIME Certification Tests Cases for Service Nodes

EQUIPMENT UNDER TEST	Smart meter and powerline communication system-on-chip (evaluation board)
MODEL	STCOMET10
FIRMWARE VERSION	00_2733c
CERTIFICATION SCOPE¹	PRIME PHY/MAC implementation
MANUFACTURER	STMicroelectronics S.r.l.
APPLICANT	STMicroelectronics S.r.l.
DATE OF RECEPTION	7th February 2017
PRIME SPECIFICATION VERSION	PRIME-Specs V1.3.6
TEST CASE VERSION	PRIME Certification Tests Cases for Service Nodes version 1.2
DATE OF EXECUTION	7th February 2017 to 9th February 2017
DATE OF ISSUE OF REPORT	Brussels, 16 th February 2017



Responsible for tests	Head of EMC&Telecom Laboratory	PRIME Alliance Vice President
		
Marta Castro	Ibon Arechalde	Oscar Marquez

* This test report summary is granted on account of tests made at location of TECNALIA: Parque Tecnológico de Bizkaia, c/ Geldo, Edificio 700 E-48160 Derio – Bizkaia- Spain.

* The results of the present report apply only to the samples tested and the moment and conditions under which the measurements were performed.

* The complete results, including remarks and limitations, are laid down in our complete test report no. B41-17-AC-I1 which can be obtained at TECNALIA. The certificate and the test report are indivisible.

* The test report summary is issued by PRIME Alliance. It shall not be reproduced, in total or in part and in whatever way, without written permission of TECNALIA

¹ IMPORTANT: Remarks apply to the implementation of this function. See complete test report (ANNEX I) for full details

ANNEX III. STCOMET PLATFORM FAMILY DESCRIPTION

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STCOMET Platform Family Description Version 1.1

1. General information regarding the platform family.

The STCOMET is a device that integrates a power line communication (PLC) modem, a high-performance application core and metrology functions.

The PLC modem architecture has been designed to target EN50065, FCC, ARIB compliant PLC applications

The metrology sub-system is suitable for EN 50470-1, EN 50470-3, IEC 62053-21, IEC 62053-22 and IEC 62053-23 compliant class1, class0.5 and class0.2 AC metering applications.

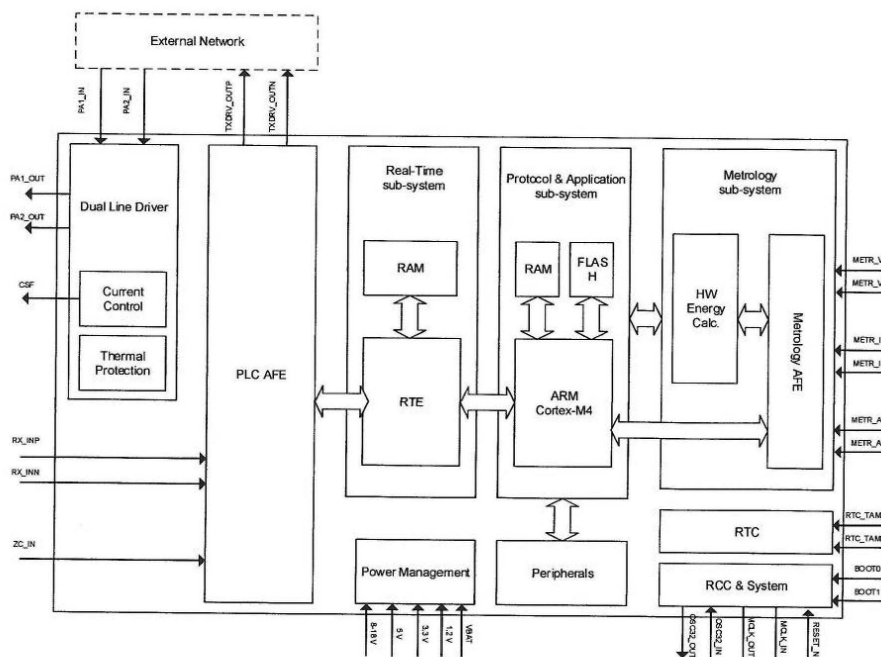


Figure 1: STCOMET Platform Block Diagram

STCOMET Platform has 4 part numbers based on the same tape-out:

STCOMET10 and STCOMET05: STCOMET10 version has 1MByte of embedded flash, while STCOMET05 supports 640kByte

STCOM10 and STCOM05: STCOMxx version does not support the metrology function. STCOM10 version has 1MByte of embedded flash, while the STCOM05 support 640kByte

Vendor part number nomenclature:

STCOMET10, STCOMET05, STCOM10, STCOM05

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2. Part numbers used for prior certification.

Certificate number:	B41-17-AC-I1
Device name:	STCOMET10
Certification scope:	PRIME PHY/MAC implementation (Feb 2017)
PRIME Specification Version	PRIME-Specs V1.3.6
Test Case Version	PRIME Certification Test Cases for Service Nodes version 1.2
Firmware Version	00_2733c

Exact part number of all the chips running PRIME-PLC stack in the certified platform	What each part number runs: MAC, PHY or other parts of the stack?
#1 STCOMET10	PHY+MAC

3. Part numbers for which the certification extension is required.

The table below lists the part numbers for each of the chips for which the certification extension is required and the changes compared to certified part number

4.1: Part numbers fulfilling all the conditions above and joining the Platform Family for STCOMET:

Exact part number	Software version running on this chip	Short description of the changes compared to certified part number
STCOMET05	00_2733c	640kByte of flash memory embedded available
STCOM10	00_2733c	Metrology function not supported
STCOM05	00_2733c	Metrology function not supported and 640kByte of flash memory embedded available

5. Commitment.

By signing this commitment letter, STMicroelectronics confirms the following regarding the differences between the part numbers in the table above and the certified part number STCOMET10:

1. No change occurred on the software;
2. The part number is based on the same design database and,
3. Only clearly physically isolated modules (hard macros), not used by PRIME-PLC stack, may have been added or removed and,
4. Only internal memory size (ROM, RAM or Flash) may have changed and,
5. There is no other change of any type.

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As drawn up and signed:

For STMicroelectronics, a manufacturing company having registered address at

Signature:

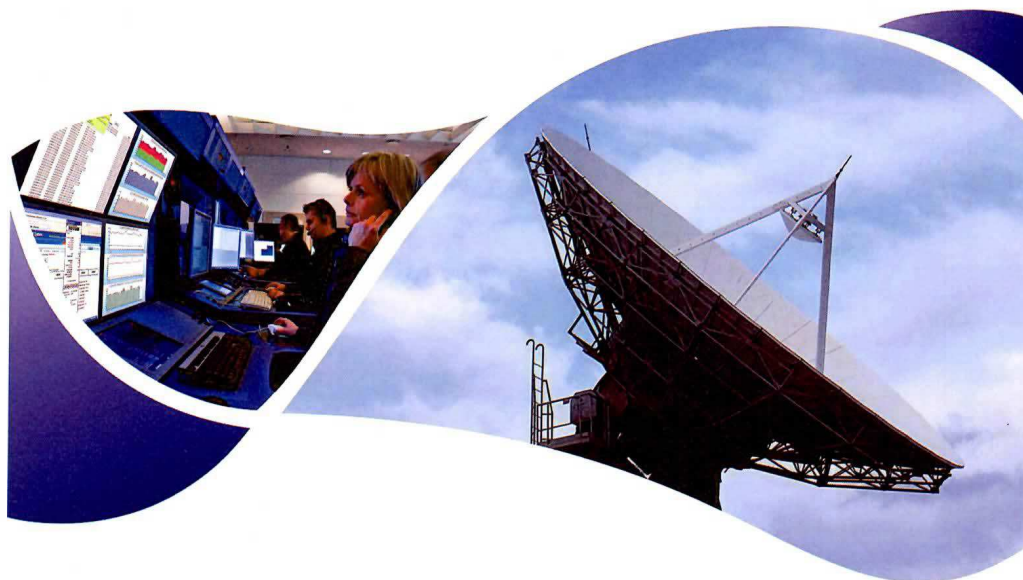


Name: ...

Title: DIVISIONAL MANAGER

Date: ... 2/10/2017

ANNEX IV. DUT CONFIGURATION AND ACCESS TO PIB



HXE310

Focus on creating value for clients



Explain of the auxiliary wires In HXE310 Meter for PRIME certification

Manufacturer company name: Hexing Electrical Co., Ltd

Model/type indication: HXE310

We had welded two auxiliary wires on the PCB for the MAC test and others test with GUI app, mean the two auxiliary wires just for the PRIME tests, because there are some specific operation in the tests which you need, such as, only TX mode, only RX mode, packages of TX mode, TX mode with D8PSK or others parameters.

But in the normal meter the PRIME is an ad-hoc network communicate system, the system will select the best mode to communicate without manual configurations, so the two wires just for your tests with the GUI app, and they will no need in the normal product(show as cutoff result).

There are Figures show as before cutoff and Cutoff result

Figure 1

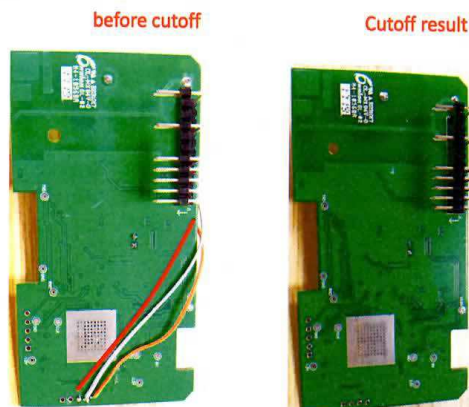
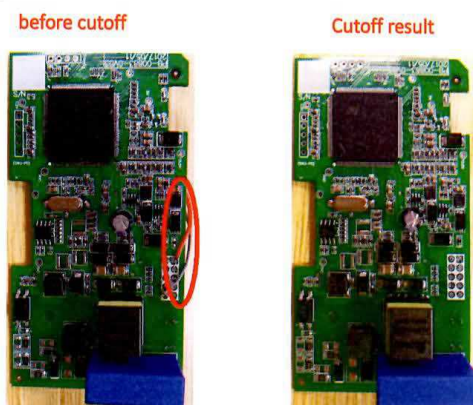


Figure 2



COMPANY HEADQUARTERS

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Hangzhou City, China

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