SCH400 Series

Substation Fanless Computer

IEC 61850-3 Test

Revision Date: Sep. 16. 2021

TEST REPORT

Test Report No.: T210722D10-E
Applicant: PERFECTRON CO.,LTD. TAIWAN BRANCH
Address: 2F., No.190, Sec. 2, Zhongxing Rd., Xindian Dist., New Taipei City 231, Taiwan (R.O.C.)
Manufacturer: PERFECTRON CO.,LTD. TAIWAN BRANCH
Address: 2F., No.190, Sec. 2, Zhongxing Rd., Xindian Dist., New Taipei City 231, Taiwan (R.O.C.)
Equipment Under Test (EUT):
Name: Substation Fanless Computer
Brand Name: PERFECTRON CO.,LTD.
Model No.: SCH-401
Added Model(s): N/A

Standards:

EN 55032: 2015 / A11: 2020 CISPR 32: 2015 (Ed 2.0) / C1: 2016	BS EN 55032: 2015 / A11: 2020
EN IEC 61000-3-2: 2019	BS EN IEC 61000-3-2: 2019
EN 61000-3-3: 2013	BS EN 61000-3-3: 2013
EN 55035: 2017 / A11: 2020	BS EN 55035: 2017 / A11: 2020
IEC 61000-4-2: 2008	IEC 61000-4-6: 2013 + COR1: 2015
IEC 61000-4-3: 2006 + A1: 2007 + A2: 2010	IEC 61000-4-8: 2009
IEC 61000-4-4: 2012	IEC 61000-4-11: 2004 + A1: 2017
IEC 61000-4-5: 2014 + A1: 2017	

Date of Sample Receipt : July 22, 2021
Date of Test : July 22, 2021 & July 30, 2021
Date of Issue : September 23, 2021

Remarks:

This test report can be used for CE and UKCA marking application which is based on equivalent requirements between UK and EU. It is appropriate using designated standards to provide presumption of conformity with GB law.

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Disclaimer

Variants information between/among model numbers / trademarks is provided by the applicant, test results of this test report are applicable to the sample EUT received of main test model name.

Approved By Sam Hu *Date* **September 23, 2021**
Sam Hu (Assistant Manager)

Testing Laboratory 1108

Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 90 days only.
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Electromagnetic compatibility(EMC)

-Testing and measurement techniques

- **IEC 61850-3 :**

  EMC Pre-Test Result.....P3

- **IEC 61000-4-2 :**

  Electrostatic discharge immunity test.....P4

- **IEC 61000-4-3 :**

  Radiated, radio-frequency, electromagnetic field immunity test.....P9

- **IEC 61000-4-4 :**

  Electrical fast transient/burst immunity test.....P11

- **IEC 61000-4-5 :**

  Surge immunity test.....P12

- **IEC 61000-4-6 :**

  Immunity to conducted disturbances, Induced by radio-frequencyfields.....P13

- **IEC 61000-4-8 :**

  Power frequency magnetic field immunity test.....P14

- **IEC 61000-4-11 :**

  Short interruptions and voltage variations immunity tests.....P15

Summary of Results

Emission		
Standard	Test Type	Result
EN 55032: 2015 / A11: 2020 CISPR 32: 2015 (Ed 2.0) / C1: 2016 BS EN 55032: 2015 / A11: 2020	Conducted Emission	PASS
	ISN	PASS
	Radiated Emission	PASS
EN IEC 61000-3-2: 2019 BS EN IEC 61000-3-2: 2019	Harmonic current emissions	N/A
EN 61000-3-3: 2013 BS EN 61000-3-3: 2013	Voltage changes, voltage fluctuations & flicker	N/A

Immunity			
Standard	Test Type	Result	Performance Criteria
IEC 61000-4-2: 2008	ESD	PASS	B
IEC 61000-4-3: 2006 + A1: 2007 + A2: 2010	RS	PASS	A
IEC 61000-4-4: 2012	EFT	PASS	B
IEC 61000-4-5: 2014 + A1: 2017	Surge	PASS	B
IEC 61000-4-6: 2013 + COR1: 2015	CS	PASS	A
IEC 61000-4-8: 2009	PFMF	N/A	A
IEC 61000-4-11: 2004 + A1: 2017	DIP	PASS	C/C/B

Reporting Statements of Conformity

The conformity statement in this report is based solely on the test results, measurement uncertainty is excluded.

Deviation

No deviation from the mentioned test methods and applicable standards.

Test of IEC 61000-4-2

Test Instruments

Immunity Shielded Room					
EQUIPMENT TYPE	Manufacturer	Model Number	Serial Number	Calibration Date	Calibration Due
Aneroid Barometer	SATO	7610-20	89090	09/01/2020	08/31/2021
ESD Simulator	Teseq	NSG 438	1581	12/24/2020	12/23/2021
Thermo-Hygro Meter	Wisewind	201A	SD-S039	01/06/2021	01/05/2022
Testing Site : No.163-1, Jhongsheng Rd., Xindian Dist., New Taipei City, Taiwan					

EUT Operating Condition

Environment:

Temperature	Humidity	Air Pressure
18 °C	43 %RH	1008 hpa

Results of Electrostatic Discharge Test (ESD)

Model No.	: SCH-401
Tested By	: Rax Chen
Tested Date	: July 30, 2021
Test Mode	: Mode 1
Basic Standard	: IEC 61000-4-2
Discharge Impedance	: 330 ohm / 150 pF
Discharge Voltage	: Air Discharge: ±2, 4, 8 kV Contact Discharge: ±2, 4 kV HCP/VCP: ±2, 4 kV
Polarity	: Positive/Negative
Number of Discharge	: 10 times at each test point
Discharge Mode	: Single Discharge
Discharge Period	: 1 second

A.Observations:

Test points: 1. Front side. 2. Back side. 3. Left side. 4. Right side.
5. Top side. 6. Bottom side.

Direct Application			Test Results	
Discharge Level (kV)	Polarity (+/-)	Test Point	Contact Discharge	Air Discharge
2, 4, 8 (Air.)	+/-	1~2	N/A	A
2, 4 (Cont.)	+/-	1, 3~5	A	N/A
2, 4 (Cont.)	+/-	2	B	N/A

Remark: A: No degradation of performance or loss of function.
B: As ±4kV contact discharge tests, the data accessing via LAN was paused. It could become normal after test stop
N/A: Not Applicable

B.Observations:

Test points: 1. Front side. 2. Back side. 3. Left side. 4. Right side.

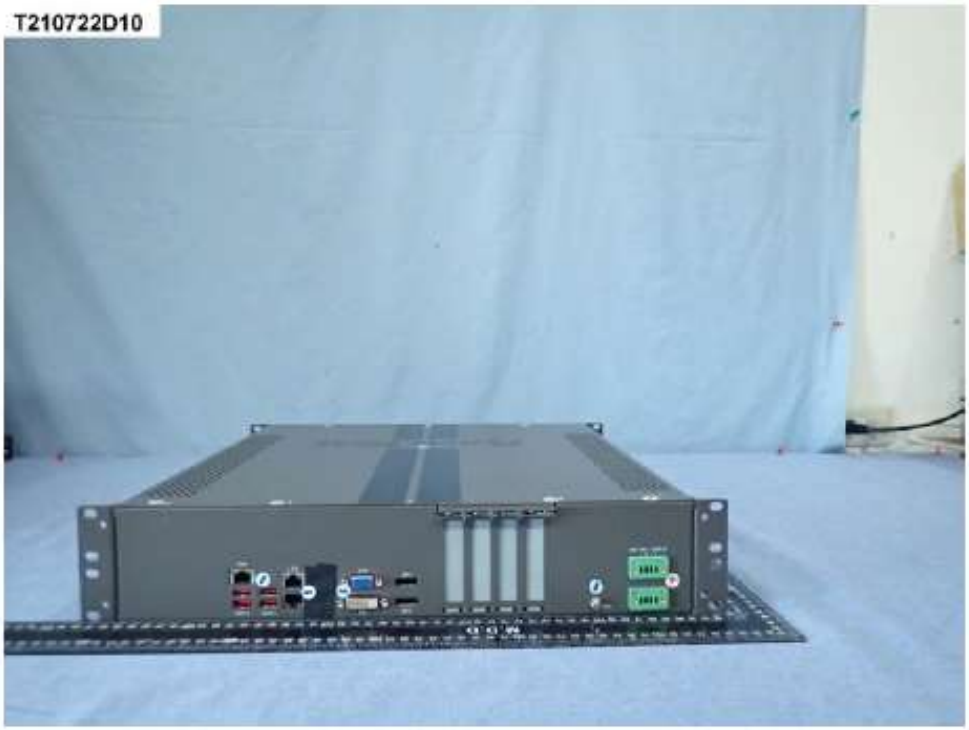
Indirect Application			Test Results	
Discharge Level (kV)	Polarity (+/-)	Test Point	Horizontal Coupling	Vertical Coupling
2, 4	+/-	1~4	A	A

Remark: A: No degradation of performance or loss of function.

ESD Test point

Front

Back



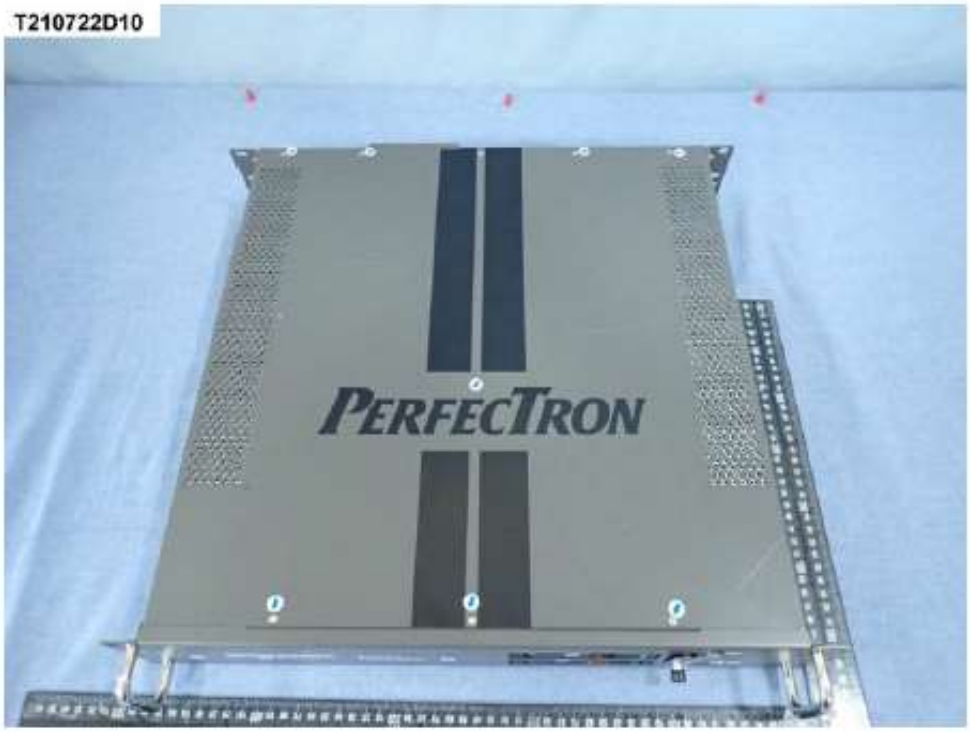
Air Discharge: ↑
Contact Discharge: ↑

Left

Right

Air Discharge: ↑
Contact Discharge: ↑

Top



Air Discharge:
Contact Discharge:

Test of IEC 61000-4-3

Test Instruments

844 RS Chamber					
EQUIPMENT TYPE	Manufacturer	Model Number	Serial Number	Calibration Date	Calibration Due
Electric Field Probe	AR	FL7006	0356656	10/14/2020	10/13/2021
Field of Calibration	CCS	Chamber#RS	80-1000MHz	02/26/2021	02/25/2022
RF Power Meter	Boonton	4242	17419	03/17/2021	03/16/2022
Power Sensor	Boonton	51011A-EMC	36833	03/17/2021	03/16/2022
Power Sensor	Boonton	51011A-EMC	36834	03/17/2021	03/16/2022
Signal Generator	Agilent	N5181A	MY47421336	11/15/2020	11/14/2021
Thermo-Hygro Meter	Wisewind	N/A	SD-S019	10/19/2020	10/18/2021
Broadband Antenna	Schwarzbeck	VUSLP 9111E	D-69250	N.C.R	N.C.R
Power Amplifier	Milmega	80RF1000-600	1079361	N.C.R	N.C.R
Field of Calibration	CCS	Chamber#RS	1000-6000M	02/25/2021	02/24/2022
Direction Coupler	AR	DC7144A	306217	N.C.R	N.C.R
Microwave Antenna	Schwarzbeck	STLP 9149	767	N.C.R	N.C.R
Power Amplifier	AR	60S1G3	302728	N.C.R	N.C.R
Power Amplifier	Milmega	AS1860-100	1075832	N.C.R	N.C.R
Power Amplifier	Teseq	CBA6G-100D	1087370	N.C.R	N.C.R
Test Software	EmcwareVer. 2.6.0.16				
Testing Site : No.163-1, Jhongsheng Rd., Xindian Dist., New Taipei City, Taiwan					

EUT Operating Condition

Environment:

Temperature	Humidity	Air Pressure
22 °C	53 %RH	1009 hpa

Results of Radiated Radio Frequency Electromagnetic (RS)

Model No. : SCH-401
Tested By : Rax Chen
Tested Date : July 22, 2021
Test Mode : Mode 1
Basic Standard : IEC 61000-4-3
Frequency range : 80 MHz - 1000 MHz
Frequency range : 1800 MHz, 2600 MHz, 3500 MHz, 5000 MHz (±1%)
Field strength : 3 V/m
Modulation : 80% AM (1kHz)
Frequency step : 1 % of fundamental
Polarity of Antenna : Horizontal and Vertical
Dwell Time : 3 seconds
Test distance : 3 m

No.	Frequency (MHz)	Antenna Orientation	Observation	EUT Orientation
1	80 - 1000	Vertical/Horizontal	A	0 degree
2	80 - 1000	Vertical/Horizontal	A	90 degree
3	80 - 1000	Vertical/Horizontal	A	180 degree
4	80 - 1000	Vertical/Horizontal	A	270 degree

Remark: A: No degradation of performance or loss of function.

No.	Frequency (MHz)	Antenna Orientation	Observation	EUT Orientation
1	1800, 2600, 3500, 5000 (±1%)	Vertical/Horizontal	A	0 degree
2	1800, 2600, 3500, 5000 (±1%)	Vertical/Horizontal	A	90 degree
3	1800, 2600, 3500, 5000 (±1%)	Vertical/Horizontal	A	180 degree
4	1800, 2600, 3500, 5000 (±1%)	Vertical/Horizontal	A	270 degree

Remark: A: No degradation of performance or loss of function.

Test of IEC 61000-4-4

Test Instruments

Immunity Shield Room					
EQUIPMENT TYPE	Manufacturer	Model Number	Serial Number	Calibration Date	Calibration Due
Capacitive Clamp	EMC-Partner	CN-EFT1000	589	06/07/2021	06/06/2022
EMC Test System	Teseq	NSG 3060	1718	12/15/2020	12/14/2021
Software	WIN 3000Ver. 1.3.2				
Testing Site : No.163-1, Jhongsheng Rd., Xindian Dist., New Taipei City, Taiwan					

EUT Operating Condition

Environment:

Temperature	Humidity	Air Pressure
20 °C	53 %RH	1007 hpa

Results of Electrical Fast Transient (EFT)

Model No. : SCH-401
Tested By : Rax Chen
Tested Date : July 30, 2021
Test Mode : Mode 1
Basic Standard : IEC 61000-4-4
Test Voltage : DC Input: ± 0.5 kV
Signal/Comm. : ± 0.5 kV
Polarity : Positive/Negative
Impulse Frequency : 5 kHz
Tr/Th : 5/50ns
Burst : 15ms/300ms

Observation:

Test Point	Polarity	Test Level (kV)	Results
L	+/-	0.5	A
N	+/-	0.5	A
PE	+/-	0.5	A
L-N	+/-	0.5	A
L-PE	+/-	0.5	A
N-PE	+/-	0.5	A
L-N-PE	+/-	0.5	A
RJ45	+/-	0.5	A

Remark: A: No degradation of performance or loss of function

Test of IEC 61000-4-5

Test Instruments

Immunity Shield Room					
EQUIPMENT TYPE	Manufacturer	Model Number	Serial Number	Calibration Date	Calibration Due
CDN	EMC-Partner	CDN-UTP8	1505	12/15/2020	12/14/2021
EMC Test System	Teseq	NSG 3060	1718	12/15/2020	12/14/2021
Software	WIN 3000Ver. 1.3.2				
Testing Site : No.163-1, Jhongsheng Rd., Xindian Dist., New Taipei City, Taiwan					

EUT Operating Condition

Environment:

Temperature	Humidity	Air Pressure
20 °C	53 %RH	1007 hpa

Results of Surge Test

Model No. : SCH-401
Tested By : Rax Chen
Tested Date : July 30, 2021
Test Mode : Mode 1
Basic Standard : IEC 61000-4-5
Test Rate : 1 pulse every minute
No. of Tests : 5 positive and 5 negative pulses
Waveform : 1.2/50μs (8/20μs)

Observation Description

DC input line:

Test Point	Phase Angle (degree)	Polarity (+/-)	Test Level (kV)	Observation
L – N	0	+/-	0.5	A
L – PE	0	+/-	0.5	A
N – PE	0	+/-	0.5	A

Remark: A: No degradation of performance or loss of function.

Signal line:
Test Rate : 1 pulse every minute
No. of Tests : 5 positive and 5 negative pulses
Waveform : 10/700μs

Observation Description

Signal line:

Test Point	Phase Angle (degree)	Polarity (+/-)	Test Level (kV)	Observation
RJ45	No phase angle (degree)	+/-	1	B

Remark: B: During the test, data accessing via LAN port was paused. It could become normal after test stopped.

Test of IEC 61000-4-6

Test Instruments

CS Room					
EQUIPMENT TYPE	Manufacturer	Model Number	Serial Number	Calibration Date	Calibration Due
CDN	Teseq	CDN S751A	46649	11/16/2020	11/15/2021
CDN	Teseq	CDN M016	35821	11/16/2020	11/15/2021
CDN	TESEQ	CDN T400A	28547	11/16/2020	11/15/2021
CDN	FCC	FCC-801-M3-25A	9973	11/16/2020	11/15/2021
CDN	Teseq	CDN T8A-10	57182	05/26/2021	05/25/2022
Compact Immunity Test System	TESEQ	NSG 4070	39581	11/20/2020	11/19/2021
Test Software	NSG 4070 Control Program V1.2.0				
Testing Site : No.163-1, Jhongsheng Rd., Xindian Dist., New Taipei City, Taiwan					

EUT Operating Condition

Environment:

Temperature	Humidity	Air Pressure
23 °C	54 %RH	1007 hpa

Results of Immunity to Conducted Disturbances (CS)

Model No. : SCH-401
Tested By : Rax Chen
Tested Date : July 30, 2021
Test Mode : Mode 1
Basic Standard : IEC 61000-4-6
Frequency range : 0.15 MHz -10 MHz
Field strength : 3 Vrms
Frequency range : 10 MHz - 30 MHz
Field strength : 3 V to 1Vrms
Frequency range : 30 MHz - 80 MHz
Field strength : 1 Vrms
Modulation : 80% AM, 1 kHz Sinewave
Frequency step : 1 % of fundamental
Dwell Time : 3 seconds
Coupling Method : CDN-M3; CDN-T8

Cable Description	Frequency (MHz)	Observation
DC input	0.15 – 80	A

Signal Ports

Cable Description	Frequency (MHz)	Observation
RJ45	0.15 – 80	A

Remark: A: No degradation of performance or loss of function.

Test of IEC 61000-4-8

Test Instruments

Immunity Shield Room					
EQUIPMENT TYPE	Manufacturer	Model Number	Serial Number	Calibration Date	Calibration Due
Testing Site : No.163-1, Jhongsheng Rd., Xindian Dist., New Taipei City, Taiwan					

EUT Operating Condition

Environment:

Temperature	Humidity	Air Pressure
N/A	N/A	N/A

Result of Immunity to Power Frequency Magnetic Field

Model No. : SCH-401
Tested By : N/A
Tested Date : N/A
Test Mode : N/A
Basic Standard : IEC 61000-4-8
Power Frequency : 50 Hz
Magnetic Field : 1 A/m(r.m.s)
Coil Orientation : X, Y, Z Axis
Observation : N/A

Remark: N/A: There is no any sensitive part for magnetic field test. Applicable only to equipment containing susceptible to magnetic field.

Test of IEC 61000-4-11

Test Instruments

Immunity Shielded Room					
EQUIPMENT TYPE	Manufacturer	Model Number	Serial Number	Calibration Date	Calibration Due
Testing Site : No.163-1, Jhongsheng Rd., Xindian Dist., New Taipei City, Taiwan					

EUT Operating Condition

Environment:

Temperature	Humidity	Air Pressure
N/A	N/A	N/A

Results of Voltage Dips Immunity Test

Model No. : SCH-401
Tested By : N/A
Tested Date : N/A
Test Mode : N/A
Basic Standard : IEC 61000-4-11
EUT Rated Voltage : 230 Volts.
Reduction Voltage : 30, >95 % Ut
Phase Angle : 0,180 degree
Total events : 3 dropouts
Event interval : 10 seconds

Test Power: 230Vac, 50Hz			
Environmental phenomena	**Test specification (% reduction)**	**Duration (in periods of the rated frequency)**	**Observation**
Voltage Interruptions	>95	250	N/A
Voltage dips	30	25	N/A
	>95	0.5	N/A

Test Power: 230Vac, 60Hz			
Environmental phenomena	**Test specification (% reduction)**	**Duration (in periods of the rated frequency)**	**Observation**
Voltage Interruptions	>95	300	N/A
Voltage dips	30	30	N/A

Remark: N/A: The subject equipment is not intended to be connected to AC mains supply. Therefore, this test is not applicable.