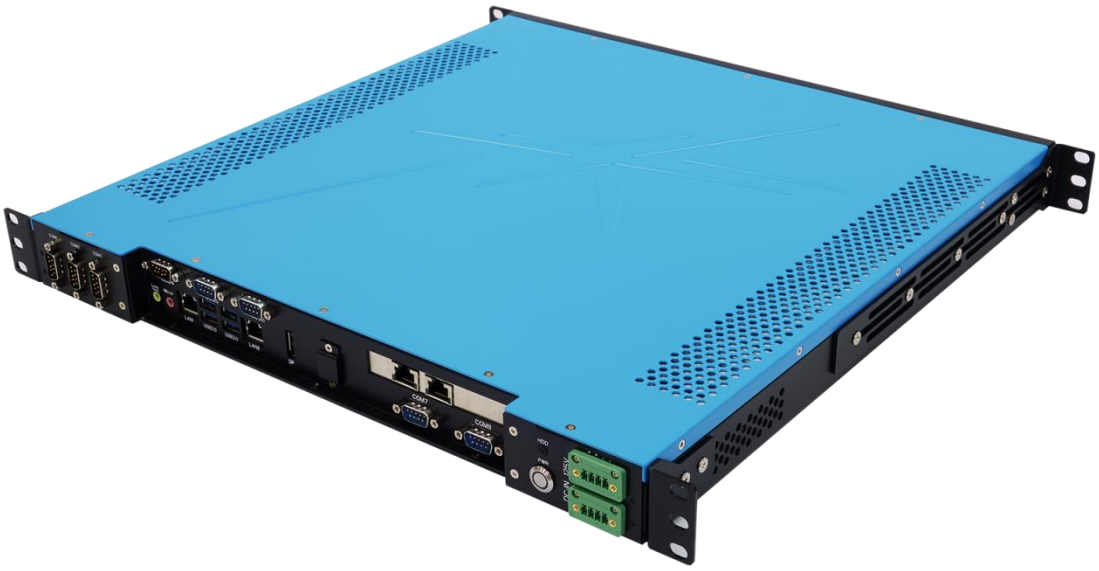
SCH200

IEC-61850-3, IEEE-1613 1U Fanless
Power Automation Computer



IEC 61850-3 Pre-Test

Revision Date: Aug. 19th. 2020

Electromagnetic compatibility (EMC)

-Testing and measurement techniques

IEC 61850-3 EMC Pre-Test Result

Requirements	Testing items	Test Result
IEC 61000-4-2	Level : 3 Contact : 6kV±5% Air : 8kV±5%	A
IEC 61000-4-3	Level : 3 Electric field : 10V/m Frequency Sweep : 80MHz ~ 1GHz Spot : 80MHz, 160MHz, 380MHz, 450MHz, 900MH	A
IEC 61000-4-4	Level : 4 1) Accreditation voltage a) AC, DC Power, Input output port : 4.0kV b) Communication port : 2.0kV 2) Repetition Frequency : 5kHz 3) Burst Continued : 15ms±20% 4) Burst Cycle : 300ms±20% 5) Test polarity and cycle: Positive and negative polarity (more than 60 seconds per polarity)	A
IEC 61000-4-5	Level : 4 1) Voltage wave : 1.2×50 μs, Current wave: 8×20 μs 2) Applied voltage: Common mode (Differential mode) a) AC, DC power : 4.0kV(2.0kV) b) Input output port : 1.0kV(0.5kV) c) Communication port : 2.0kV	A
IEC 61000-4-6	Level : 1) Accreditation voltage : 10V 2) frequency : a) Sweep: 150kHz ~ 80MHz b) Spot: 27MHz, 68 MHz	A

Note:

a) Result A in red font:
EUT went through 1st trial and passed the test under Result B. After doing some enhancements on the EUT, it went through 2nd trial and passed the test under Result A.

IEC/EN 61000-4-2 Test Record

Project No.: 7Starlake Test Date: 2020(y)/ 08(m)/ 14(d) Test Mode: DC

EUT: Model: SCH200 Sample No.:

Test Voltage: 125 Vdc Test site: ☒ 5F / ☐ 1F

Environmental Conditions: 22℃, 53% RH Tested by: Eric

Atmospheric Pressure: 1010 mbar Approved by:

Test Specification	☒ IEC 61000-4-2 ☒ EN 61000-4-2 ☐	Required Passing Performance Criterion	B

☐ Simulate single ESD event (either by air or contact discharge), the charge on the EUT shall be removed prior to each applied ESD pulse.

Test Results of Direct Application

Air Discharge										
Test Point	Discharge Level (kV)								Test Result	Remark
	±2	±4	±8							
Front										
Back										
Left										
Right										
Top										
Bottom										
Other										

Contact Discharge										
Test Point	Discharge Level (kV)								Test Result	Remark
	±6									
Front	A								A	The brand of screen: DELL P/N: U2713HMt The brand of DP Cable: BizLink P/N:E164571-ks
Back	A								A	
Left	A								A	
Right	A								A	
Top	A								A	
Bottom	A								A	
Other										

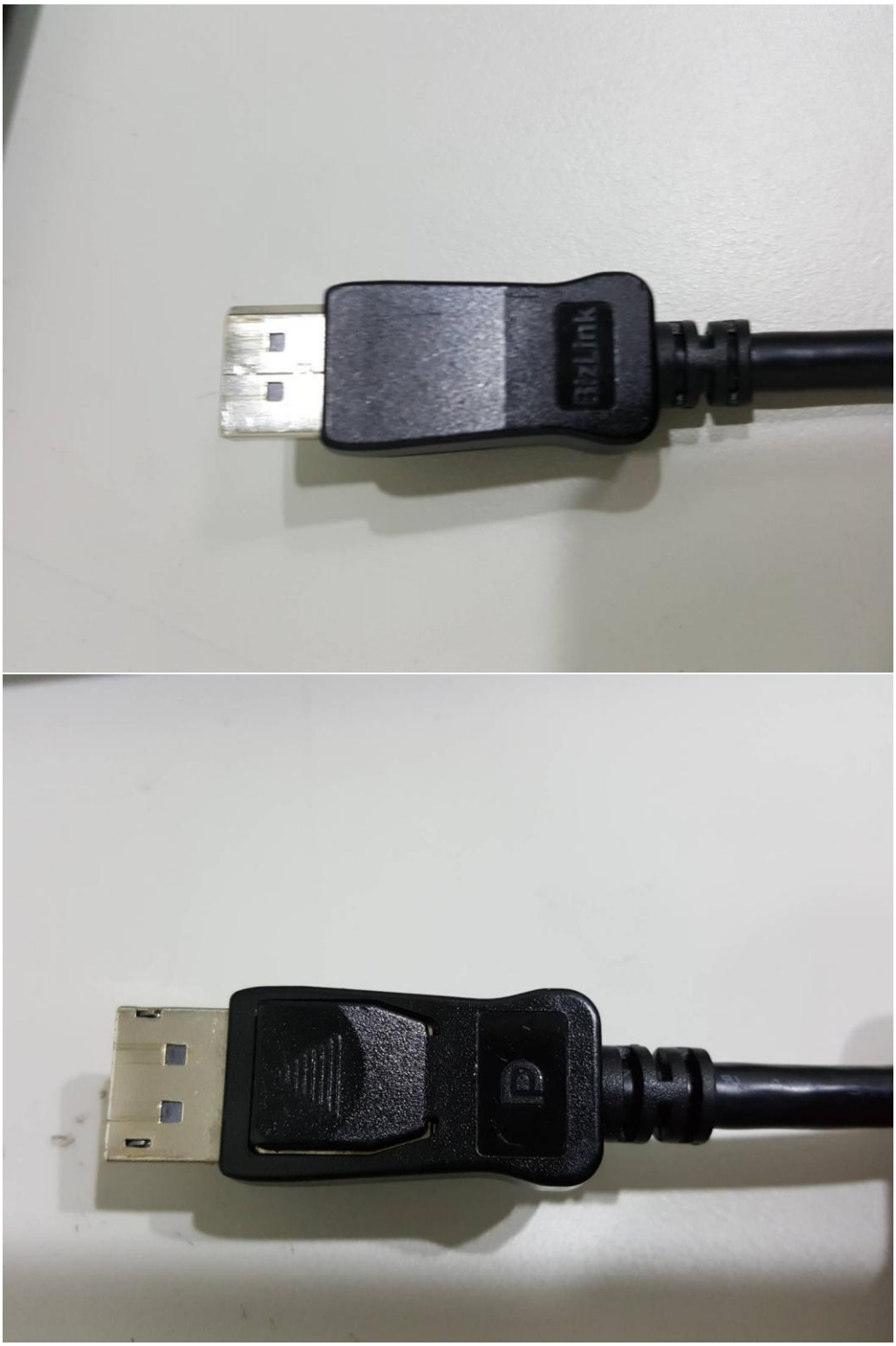
Test Results of Indirect Application

HCP Discharge										
Test Point	Discharge Level (kV)								Test Result	Remark
	±4									
Front	A								A	
Back	A								A	
Left	A								A	
Right	A								A	

VCP Discharge										
Test Point	Discharge Level (kV)								Test Result	Remark
	±4									
Front	A								A	
Back	A								A	
Left	A								A	
Right	A								A	

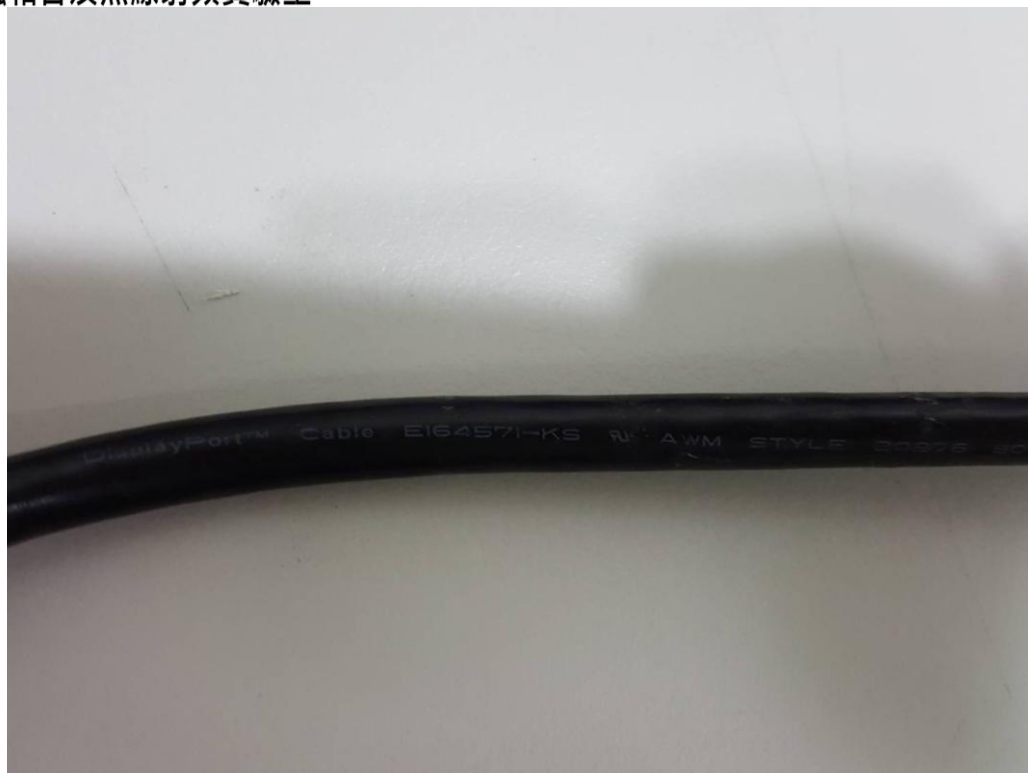
Note:

a) Description of Observation:
Criteria A: The EUT function was correct during the test.
Criteria B: (#1). When EUT was under testing, it impacted on the screen, so the screen blinked or went black. Once the test had been done, the screen returned to normal work automatically.
(#2).
Criteria C: (#1).



Note:

a) EUT went through 1st trial and passed the test under Result B. After investigation, we found the issue was caused by DP cable (P/N:E483319). Thus, we turned to use another DP cable (Brand: BizLink, P/N:E164571-ks), then EUT went through 2nd trial and passed the test under Result A.



Test Instrument

Use Equipment	Item	Equipment	Manufacturer	Model
☒	1	ESD Simulator	Teseq	NSG 437
☐	2	ESD Simulator/ Discharge Gun	NoiseKen	ESS-B3011
☐	3	ESD Simulator/ Discharge Gun	NoiseKen	ESS-2002
☒	3	Digital Thermo-Hygro Meter	N/A	HTC-8
☒	4	Atmosphere pressure meter	N/A	Kat.Nr.45.1000.01

IEC/EN 61000-4-3 Test Record

Project No.: 7Starlake Test Date: 2020(y)/ 08(m)/ 05(d) Test Mode: DC

EUT: Model: SCH200 Sample No.:

Test Voltage: 125 Vdc Tested by: Eric

Environmental Conditions: 23℃, 52% RH Approved by:

Atmospheric Pressure: 1012 mbar

Test Specification	☒ IEC 61000-4-3 ☐ EN 61000-4-3 ☒ ☐	Required Passing Performance Criterion	A

Sweep Rate: ≤1.5×10-3 decades/s Step size: 1 % of preceding frequency value Dwell Time: 1 Sec.

Test Frequency Range: 80 MHz ~ 1000 MHz Antenna High: 1.5 m

Frequency Range (MHz)	Azimuth	Polarity	Field Strength (V/m)	Modulation	Test Result	Remark
80-1000	0	H/V	10	80% AM (1kHz)	A	The brand of screen: DELL P/N: P2317H
80-1000	90	H/V	10	80% AM (1kHz)	A	The brand of screen: DELL P/N: P2317H
80-1000	180	H/V	10	80% AM (1kHz)	A	The brand of screen: DELL P/N: P2317H
80-1000	270	H/V	10	80% AM (1kHz)	A	The brand of screen: DELL P/N: P2317H

Note:

a) Description of Observation:
Criteria A: The EUT function was correct during the test.
Criteria B: (#1).
(#2).
(#3).
Criteria C: (#1).
(#2).
(#3).

b)

Photographs of Test Configuration

Test Instrument

Item	Equipment	Manufacturer	Model
1	RadiCentre ® Modular EMC Test Systems	DARE	CTR1004B
2	RF Signal Generator	DARE	RGN6000B
3	LINEAR POWER RF AMPLIFIER	OPHIR	5225
4	LINEAR POWER RF AMPLIFIER	OPHIR	5193
5	LINEAR POWER RF AMPLIFIER	OPHIR	5022A
6	Periodic Test-Antenna	Schwarzbeck Mess - Elektronik	STLP 9128 E
7	Stacked Microwave Log.-Per. Antenna	Schwarzbeck Mess - Elektronik	STLP 9149
8	Electric Field Probe	FRANKONIA	EFS-10
9	Measurement Software	EMC-RS	Ver: 2.02

IEC/EN 61000-4-4 Test Record

Project No.: 7Starlake Test Date: 2020 (y)/ 08 (m)/ 14(d) Test Mode: DC

EUT: Model: SCH200 Sample No.:

Test Voltage: 125 Vdc Tested by: Eric

Environmental Conditions: 23℃, 54% RH Approved by:

Atmospheric Pressure: 1010 mbar

Test Specification	☒ IEC 61000-4-4 ☒ EN 61000-4-4 ☒ ☐	Required Passing Performance Criterion	B

Burst: 15 ms / 300 ms Test Duration: 1 min Pulse Rate: 5 kHz

Test Point		Pulse Voltage (kV)	Pulse Polarity (+/-)	Test Result	Remark
DC Power Port	L	1,2,3,4	(+/-)	A	The brand of screen: DELL P/N: U2713HMt
					The brand of screen: DELL P/N: P2317H
					The brand of DP Cable:BizLink P/N: E164571-ks
	N	1,2,3,4	(+/-)	A	The brand of screen: DELL P/N: U2713HMt
					The brand of screen: DELL P/N: P2317H
					The brand of DP Cable:BizLink P/N: E164571-ks
	L + N	1,2,3,4	(+/-)	A	The brand of screen: DELL P/N: U2713HMt
					The brand of screen: DELL P/N: P2317H
					The brand of DP Cable:BizLink P/N: E164571-ks
Signal Ports Telecommunication Ports	RJ45	1,2	(+/-)	A	The brand of screen: DELL P/N: U2713HMt
					The brand of screen: DELL P/N: P2317H
					The brand of DP Cable:BizLink P/N:
	Coaxial	0.5	(+/-)		

Note:

a) Description of Observation:

Criteria A: The EUT function was correct during the test.

Criteria B: (#1). The screen connecting with DP Port of EUT blinked while under testing. Once the test had been done, the screen returned to normal work automatically.

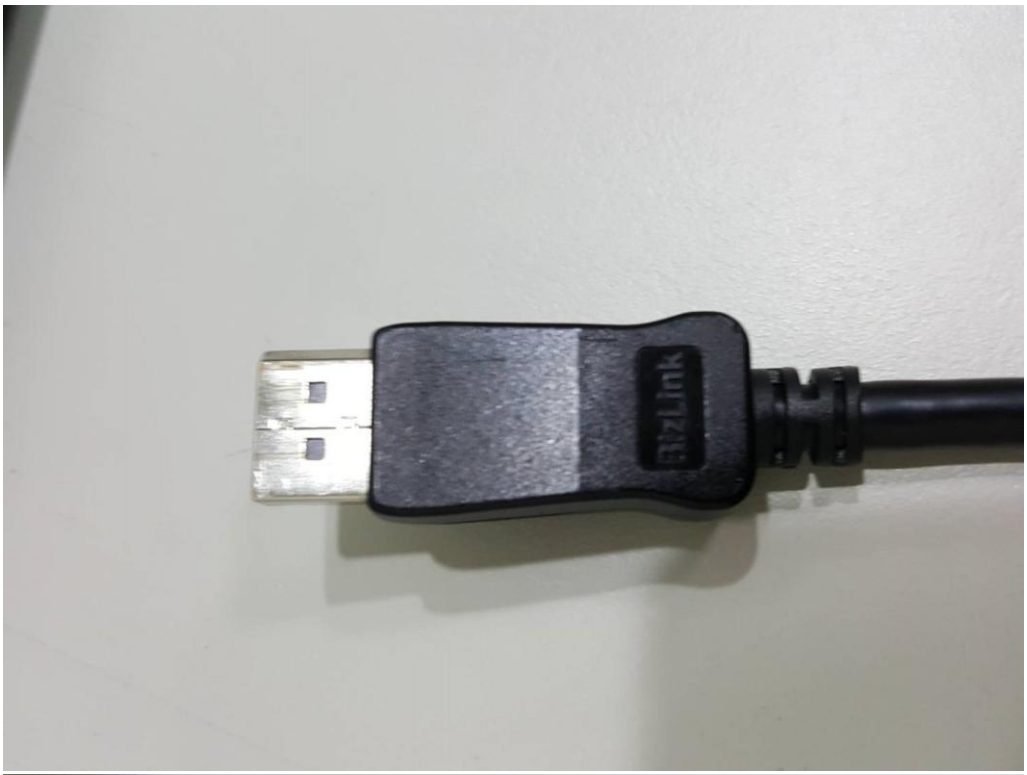
(#2).

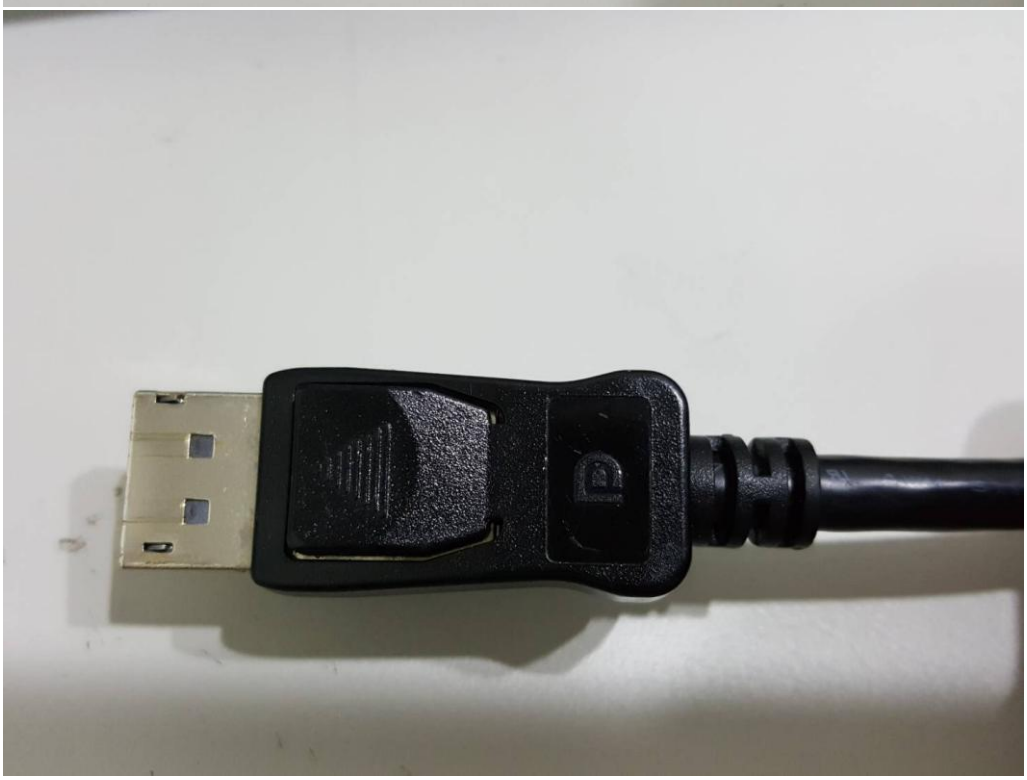
(#3).

Criteria C: (#1).

(#2).

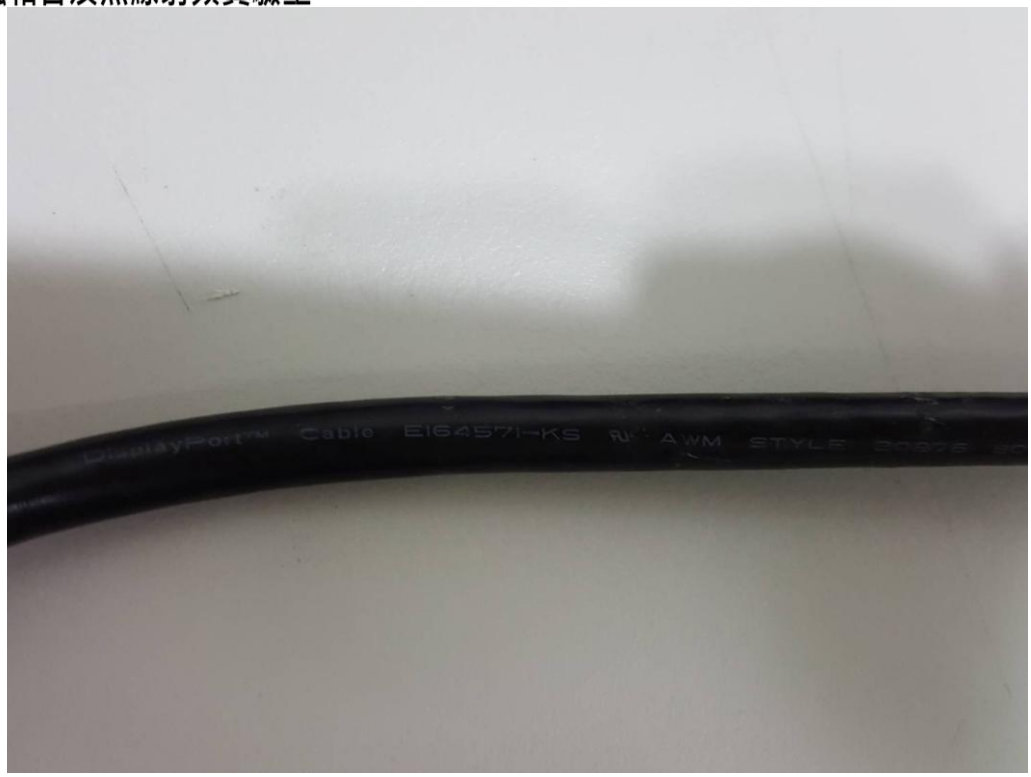
b)





Note:

a) EUT went through 1st trial and passed the test under Result B. After investigation, we found the issue was caused by DP cable (P/N:E483319). Thus, we turned to use another DP cable (Brand: BizLink, P/N:E164571-ks), then EUT went through 2nd trial and passed the test under Result A.



Test Instrument

Item	Equipment	Manufacturer	Model
1	EMS Generator	Thermo	EMC Pro
2	Clamp	KeyTek	CCL
3	Measurement Software	CEWare32	Ver: 4.1

IEC/EN 61000-4-5 Test Record

Project No.: 7Starlake Test Date: 2020(y)/ 08(m)/ 03(d) Test Mode: DC

EUT: Model: SCH200 Sample No.:

Test Voltage: 125 Vdc Test site: ☒ 5F / ☐ 1F

Environmental Conditions: 23℃, 53% RH Tested by: Eric

Atmospheric Pressure: 1010 mbar Approved by:

Test Specification	☒ IEC 61000-4-5 ☒ EN 61000-4-5 ☐ ☐	Required Passing Test Result	AC/DC Power ports – B Signal/Telecom ports – C

AC/DC Power Port:

Waveform: 1.2/50μs(8/20μs) Repetition rate: 60 Sec. Times: 5 time/each condition

AC Power Port									
Test Point	Phase	Polarity (+/-)	Test Voltage (kV)					Test Result	Remark
			0.5	1	2				
L to N	0°	+/-							
	90°	+/-							
	180°	+/-							
	270°	+/-							
L to PE	0°	+/-							
	90°	+/-							
	180°	+/-							
	270°	+/-							
N to PE	0°	+/-							
	90°	+/-							
	180°	+/-							
	270°	+/-							

DC Power Port							
Test Point	Polarity (+/-)	Test Voltage (kV)				Test Result	Remark
		2	4				
L-G	+/-	A	A			A	
	+/-						
	+/-						

Note:

a) Description of Observation:
Criteria A: The EUT function was correct during the test.
Criteria B: (#1).
(#2).
Criteria C: (#1).
(#2).

b)

IEC/EN 61000-4-5 Test Record

Project No.: 7Starlake Test Date: 2020(y)/ 08(m)/ 03(d) Test Mode: DC

EUT: Model: SCH200 Sample No.:

Test Voltage: 125 Vdc Tested by: Eric

Environmental Conditions: 23℃, 53% RH Approved by:

Atmospheric Pressure: 1010 mbar

Test Specification	☒ IEC 61000-4-5 ☒ EN 61000-4-5 ☐ ☐	Required Passing Test Result	AC/DC Power ports – B Signal/Telecom ports – C

Signal Ports Telecommunication Ports:

Waveform: ☒ 1.2/50μs(8/20μs) ☐ 10/700μs(5/320μs) Repetition rate: 60 Sec. Times: 5 time/each condition

Test Point	Polarity (+/-)	Test Voltage (kV)					Test Result	Remark
		0.5	1	2				
RJ45 L-G	+/-		B	B			B	
	+/-							
	+/-							
	+/-							
	+/-							
	+/-							
	+/-							
	+/-							
	+/-							
	+/-							

Note:

a) Description of Observation:
Criteria A: The EUT function was correct during the test.
Criteria B: (#1). The LAN port of EUT had encountered ping disconnect, but returned to normal work automatically.
(#2).
Criteria C: (#1).
(#2).

b)

Photographs of Test Configuration

Test Instrument

Item	Equipment	Manufacturer	Model
1	EMS Generator	HAEFELY	AXOS8 (5F)
2	Surge CDN	3cTest	CDN-405T8A1 (5F)
3	20KV EMS Generator	3cTest	SG5020H (1F)
4	Surge CDN	3cTest	SGN2232S20 (1F)

IEC/EN 61000-4-6 Test Record

Project No.: 7Starlake Test Date: 2020(y)/ 07 (m)/ 27(d) Test Mode: DC

EUT: Model: SCH200 Sample No.:

Test Voltage: 125 Vdc Tested by: Eric

Environmental Conditions: 23 ℃, 53% RH Approved by:

Atmospheric Pressure: 1010 mbar

Test Specification	☒ IEC 61000-4-6 ☒ EN 61000-4-6 ☐ ☐ _____	Required Passing Performance Criterion	A

Step size: 1 % of preceding frequency value Dwell Time: 1 Sec.

Test Frequency Range: 0.15 MHz ~ 80 MHz

Frequency Range (MHz)	Tested Port	Injection Method	Test Level (Vr.m.s.)	Modulation	Test Result	Remark
0.15 - 80	DC Power	CDN-M2	10	80% AM, 1kHz	A	
0.15 - 80	RJ45	CLAMP	10	80% AM, 1kHz	A	

Note:

a) Description of Observation:

Criteria A: The EUT function was correct during the test.

Criteria B: (#1).
(#2).
(#3).

Criteria C: (#1).
(#2).
(#3).

b)

Photographs of Test Configuration

Test Instrument

Item	Equipment	Manufacturer	Model
1	Coupling clamp according to IEC 6100-4-6	FRANKONIA	EMCL-20
2	CDN for power supply lines	FRANKONIA	CDN M2+M3
3	6 dB Attenuator	BIRD	75-A-FFN-06
4	Compact Immunity Test System acc	FRANKONIA	CIT-10/75
5	CDN for screened lines	FRANKONIA	RJ45S
6	50ohm Termination	N/A	N/A
7	Measurement Software	HUBERT	Ver: 1.1.2

IEC/EN 61000-4-8 Test Record

Project No.: 7Starlake Test Date: 2020(y)/ 07 (m)/ 27(d) Test Mode: DC

EUT: Model: SCH200 Sample No.:

Test Voltage: 125 Vdc Tested by: Eric

Environmental Conditions: 23 ℃, 53% RH Approved by:

Atmospheric Pressure: 1010 mbar

Test Specification	☒ IEC 61000-4-8 ☒ EN 61000-4-8 ☒	Required Passing Test Result	A

Test Coil Position	Frequency (Hz)	Magnetic Strength (A/m)	Test Result	Remark
X - Axis	50/60	100	A	Note ☒1 ☐2
Y - Axis	50/60	100	A	Note ☒1 ☐2
Z - Axis	50/60	100	A	Note ☒1 ☐2

Note:

1. There was no change compared with initial operation during the test.
2. The EUT was interrupted during the test. It could become normal after test stop.

Photographs of Test Configuration

Test Instrument

Item	Equipment	Manufacturer	Model
1	PFMF	HAEFELY	MFS-100