



160008220394



(2016)国认监认字(080)号



中国认可  
国际互认  
检测  
TESTING  
CNAS L0681

# CERTIFICATE OF TYPE TESTS

No : CTQC/H-17. 041

Intrusted by: Shenzhen Chuangyin Technology Co.,Ltd.

Manufacturer: Jiangxi Chuangyin Technology Co.,Ltd.

Test object name: Combined transformer

Test object type: JLSZXW3-17.5F

Serial No: 705170004

Test items: Routine tests, type tests, chopped lightning impulse test on primary terminals,  
pollution creepage distance measurement.

Standards: IEC61869-1:2007, IEC61869-4:2013, technical contract.

Results: The test results of routine tests, type tests, chopped lightning impulse test  
on primary terminals and pollution creepage distance measurement of  
JLSZXW3-17.5F are in accordance with standards and technical contract.

The sample passed the above tests

Period of validity 5 years

Approved by: Sun Qingyun



2018.07.17

CHINA NATIONAL TRANSFORMER QUALITY SUPERVISION AND TESTING CENTER

SHENYANG TRANSFORMER RESEARCH INSTITUTE CO., LTD.



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# TYPE TEST REPORT

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Intrusted by: Shenzhen Chuangyin Technology Co.,Ltd.

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Kind of testing: Trust testing

CHINA NATIONAL TRANSFORMER QUALITY SUPERVISION AND TESTING CENTER

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## Type Test Report

No: CTQC/H-17.041

Total 59 Page 2

Test object name	Combined transformer	Test object type	JLSZXW3-17.5F
		Brand	/
Entrusted by	Shenzhen Chuangyin Technology Co.,Ltd.	Kind of testing	Trust testing
Manufacturer	Jiangxi Chuangyin Technology Co.,Ltd.	Sampling date	May 05,2017
		Test date	May 09,2017~May 15,2017
Address	No.31, Lushan(E) Rd.,Shacheng Industrial Zones Jiujiang, Jiangxi,China	Serial No	705170004
Standards	IEC61869-1: 2007 IEC61869-4: 2013 Technical contract	Test items	Routine tests; Type tests; Chopped lightning impulse test on primary terminals; Pollution creepage distance measurement
Results	<p>The test results of routine tests, type tests, chopped lightning impulse test on primary terminals and pollution creepage distance measurement of JLSZXW3-17.5F are in accordance with standards and technical contract.</p> <p>The sample passed the above tests.</p> <p>Signing and issuing date: 2018.07.17 Period of validity 5 years</p>		
Note			

Approved by: Sun Qingyun

Checked by: Zheng Jiujiang

Compiled by: Shi Yuxia

- Statement:
1. Testing report is invalid without test special seal.
  2. Testing report is invalid without compiler, checker and approver's signature.
  3. Please inform CTQC in time after received the testing report if you have some disagreement to the testing report.
  4. Testing or witnessing only apply to sample.
  5. Copying testing certificate or testing report is forbidden without written permission from CTQC(except for copying all the testing report).

Test Report			№: CTQC/H-17. 041 Total 59 Page 3	
Test results:				
№	Test items	Specified values	Measured values	Conclusions
		Standards(Technical contract)		
1	Verification of markings (Routine test)	The terminal markings are correct. Indication of relative polarities.	The terminal markings are correct, negative.	Passed
2	Power-frequency voltage withstand tests on secondary terminals (Routine test)	Applied voltage(kV): 3 Duration(s): 60	3 60	Passed
3	Power-frequency voltage withstand test on end terminal of primary terminals (Routine test)	Applied voltage(kV): 20 Duration(s): 60	20 60	Passed
4	Induced voltage withstand test (Routine test)	Applied voltage(kV): 38 Duration(s): 120( $f_n/f$ ) Frequency(Hz): >50	38 40 150	Passed
5	Inter-turn overvoltage test (Routine test)	Applied current(A): 24 Duration(s): 60	24 60	Passed
6	Partial discharge measurement (Routine test)	Measured voltage(kV): 1.2U <sub>m</sub> Duration(s): 40 PD(pC): ≤50	21 40 AP1AP2: 2 BP1BP2: 3 CP1CP2: 8	Passed
		Measured voltage(kV): 1.2U <sub>m</sub> /√3 Duration(s): 40 PD(pC): ≤20	12.1 40 AP1AP2: 2 BP1BP2: 2 CP1CP2: 2	
7	Tests for accuracy (Routine test)	Tests for voltage ratio error and phase displacement: according to clause 7.3.5 of IEC 61869-4:2013	See 4.9.1	Passed
8	Temperature rise test (Type test)	1.0U <sub>pr</sub> Windings temperature rise limit(K): 75	1.0U <sub>pr</sub> BP1-BP2: 31.0 bs1-bs2N: 21.3 B-N: 20.4 b-n: 22.8	Passed
		1.9U <sub>pr</sub> Windings temperature rise limit(K): 75	1.9U <sub>pr</sub> B-N: 12.7 b-n: 16.4	

Test Report		No: CTQC/H-17.041 Total 59 Page 4											
№	Test items	Specified values	Measured values	Conclusions									
		Standards(Technical contract)											
9	Tests for accuracy (Type test)	Tests for voltage ratio error and phase displacement: according to clause 7.2.6 of IEC61869-4:2013	See 4.9.1	Passed									
		Determination of the instrument security factor (FS): as1-as3 12.5VA 0.5S FS5 Primary current: 100.0kA as2-as3 12.5VA 0.5S FS5 Primary current: 50.0kA bs1-bs3 12.5VA 0.5S FS5 Primary current: 100.0kA bs2-bs3 12.5VA 0.5S FS5 Primary current: 50.0kA cs1-cs3 12.5VA 0.5S FS5 Primary current: 100.0kA cs2-cs3 12.5VA 0.5S FS5 Primary current: 50.0kA Composite error: $\geq 10\%$	as1-as3 12.5VA 0.5S FS5 Primary current: 80.64kA as2-as3 12.5VA 0.5S FS5 Primary current: 46.12kA bs1-bs3 12.5VA 0.5S FS5 Primary current: 80.92kA bs2-bs3 12.5VA 0.5S FS5 Primary current: 46.26kA cs1-cs3 12.5VA 0.5S FS5 Primary current: 80.32kA cs2-cs3 12.5VA 0.5S FS5 Primary current: 46.82kA as1-as3: 16.87% as2-as3: 67.17% bs1-bs3: 25.16% bs2-bs3: 70.86% cs1-cs3: 23.51% cs2-cs3: 71.17%										
10	Impulse voltage test on primary terminals (Type test)	Full wave voltage(kV): 95 $\pm 3\%$ 15 positive and 15 negative polarity	93.7~97.0 Each 15 times	Passed									
11	Chopped impulse voltage withstand test on primary terminals (Special test)	Chopped wave voltage(kV): 110 $\pm 3\%$ 2 negative polarity	107.7~110.3 2 times	Passed									
12	Wet test for outdoor type transformers (Type test)	Applied voltage(kV): 38 Duration(s): 30 Frequency(Hz): f>50	38 30 200	Passed									
13	Short-circuit withstand capability test (Type test)	Applied voltage(V): 120 Duration(s): 1.0 Successfully repeat tests after short-circuit withstand capability test	<table border="1"> <thead> <tr> <th>a-n</th> <th>b-n</th> <th>c-n</th> </tr> </thead> <tbody> <tr> <td>124.54</td> <td>123.69</td> <td>124.89</td> </tr> <tr> <td>1.0</td> <td>1.0</td> <td>1.0</td> </tr> </tbody> </table> Passed	a-n	b-n	c-n	124.54	123.69	124.89	1.0	1.0	1.0	Passed
a-n	b-n	c-n											
124.54	123.69	124.89											
1.0	1.0	1.0											

Test Report			№: CTQC/H-17.041 Total 59 Page 5			
№	Test items	Specified values	Measured values			Conclusions
		Standards(Technical contract)				
14	Short-time current tests (Type test)	Rated dynamic current(kA): 4 Rated short-time thermal current(kA): 1.6 Duration of short-time thermal current (s): 1.0 $I^2t(10^6J)$ : 2.56 Successfully repeat tests after short-time current test.	AP1-AP2 4.18 1.65 1.0 2.72 Passed	BP1-BP2 4.18 1.66 1.0 2.76	CP1-CP2 4.16 1.66 1.0 2.76	Passed
15	Pollution creepage distance measurement (Special test)	Minimum creepage distance ratio between phase to earth (mm/kV): $\geq 25$ Creepage distance/arcing distance: $\leq 4.0$	31.4 1.53			Passed
16	Verification of the degree of protection by enclosures (Type test)	IP55 Check in accordance with relevant clauses	See 4.16			Passed

Test Report				No: CTQC/H-17.041 Total 59 Page 6		
<p>1. Test object parameters</p> <p>Rated voltage (kV): <math>12.47/\sqrt{3}</math></p> <p>Highest voltage for equipment (kV): 17.5</p> <p>Rated frequency (Hz): 50</p> <p>Sign of terminal: Negative</p> <p>Insulation level (kV): 17.5/38/95</p> <p>Temperature class of insulation: E</p> <p>Operation condition: Outdoor</p> <p>Height above sea level: <math>\leq 1000\text{m}</math></p> <p>Pollution levels: III</p> <p>Voltage transformer: <span style="float: right;">Rated voltage factor: <math>1.2\sqrt{3}</math> <math>1.5</math> <math>1.9\sqrt{3}</math> (30s/8h <math>\sqrt{3}</math>)</span></p>						
Winding		Primary winding		Secondary winding		
Items			a-n	b-n	c-n	
Terminal markings	A/B/C-N					
Rated voltage (kV)	$12.47/\sqrt{3}$		0.12	0.12	0.12	
Accuracy class	/		0.5	0.5	0.5	
Rated output (VA)	/		50	50	50	
Limit output (VA)	/		500	500	500	
Power factor $\cos\Phi$	/		0.8	0.8	0.8	
<p>Current transformer : <span style="float: right;">Rated continuous thermal current (A): <math>1.2I_{pr}</math></span></p>						
Sign of primary winding terminal	AP1-AP2		BP1-BP2		CP1-CP2	
Sign of secondary winding terminal	as1-as3	as2-as3	bs1-bs3	bs2-bs3	cs1-cs3	cs2-cs3
Rated current ratio(A)	20/5	10/5	20/5	10/5	20/5	10/5
Accuracy class	0.5S	0.5S	0.5S	0.5S	0.5S	0.5S
Rated output (VA)	12.5	12.5	12.5	12.5	12.5	12.5
Power factor	0.8	0.8	0.8	0.8	0.8	0.8
Instrument security factor	5	5	5	5	5	5



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<p>2. Sample condition description:</p> <p>Sample exterior construction and major dimensions(length, width, height)are in compliance with drawings. Measured values: length is 880mm, width is 595mm, height is 430mm.</p>		
Outline dimensions	Rating plate	
CY/QW-P0.705.003.000	CY/QW-P0.705.003.004	
<p>Rating plate and outline drawings see testing report annex. The form, performance data, specifications of sample rating plate are in compliance with drawing. The mark of primary and secondary terminals of the sample is clear and right. The surface of the sample has no collision and damage.</p> <p>3. Standard</p> <p>IEC61869-1: 2007 Instrument transformers-Part 1: General requirements</p> <p>IEC61869-4: 2013 Instrument transformers-Part 4: Additional requirements for combined transformers</p> <p>Technical contract</p>		

Test Report				№: CTQC/H-17.041
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4. Test items and conclusions:				
4.1 Verification of markings (Routine test)				Test date: May 10,2017
Instrument name	Type	№	Accuracy	Period of validity
Up-flow reactor	YL30	SB-102013	/	/
Testing transformer	YDTC-30/2×150	SB-202302	/	/
Standard current transformer	BDL-1	YB-109074	0.01	2018.10.25
Current transformer checkout meter	HESD	YB-114139	2.0	2017.08.24
Standard voltage transformer	HJB10-0.01	YB-210443	0.01	2017.08.19
Voltage transformer checkout meter	PT101	YB-114204	2.0	2017.12.25
The terminal markings are correct, negative, passed.				
4.2 Power-frequency voltage withstand tests on secondary terminals (Routine test)				Test date: May 09,2017
Instrument name	Type	№	Accuracy	Period of validity
Power-frequency high-voltage testing system	AC-2008	YB-114219	3.0	2017.08.11
Humidity: 36.0%; Ambient temperature: 20.9°C; Atmospheric pressure: 100.9kPa				
Applied position	Applied voltage(kV)	Duration(s)	Result	
Secondary terminals to earth	3	60	Passed	
4.3 Power-frequency voltage withstand test on end terminal of primary terminals				Test date: May 09,2017
Instrument name	Type	№	Accuracy	Period of validity
Testing transformer	YDTC-30/2×150	SB-202302	/	/
Power-frequency high-voltage measuring system	TRF150-0.001	YB-116141	3.0	2018.12.15
	PV2-1	YB-219709		2017.08.29
Humidity: 36.0%; Ambient temperature: 20.9°C; Atmospheric pressure: 100.9kPa				
Applied position	Applied voltage(kV)	Duration(s)	Result	
A(APIAP2)N-E	20	60	Passed	
B(BP1BP2)N-E	20	60		
C(CP1CP2)N-E	20	60		

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4.4 Induced voltage withstand test(Routine test)				Test date: May 09,2017		
Instrument name	Type	№	Accuracy	Period of validity		
Testing transformer	YDTW-30/2×150	SB-102021	/	/		
Power-frequency high-voltage measuring system	TRF150-0.001	YB-116141	3.0	2018.12.15		
	PV2-1	YB-219709		2017.08.29		
Humidity: 36.5%; Ambient temperature: 20.9℃; Atmospheric pressure: 100.9kPa						
Applied terminals	Applied voltage(kV)			Frequency (Hz)	Duration(s)	Result
	Standard value	Corrected value	Applied value			
A(AP1AP2)	38	37.9	38	150	40	Passed
B(BP1BP2)	38	37.9	38	150	40	
C(CP1CP2)	38	37.9	38	150	40	
4.5 Inter-turn overvoltage test(Routine test)				Test date: May 10,2017		
Instrument name	Type	№	Accuracy	Period of validity		
Up-flow reactor	YL30	SB-102013	/	/		
Standard current transformer	BDL-1	YB-109074	0.01	2018.10.25		
Open-circuit voltage meter	CT106	YB-319403	3.0	2017.07.13		
Humidity: 36.0%; Ambient temperature: 19.5℃; Atmospheric pressure: 99.8kPa						
Windings	Primary terminal applied current (A)	Peak voltage of the secondary open-circuit terminal(V)	Duration (s)	Result		
as1-as3	24	37	60	Passed		
bs1-bs3	24	35	60			
cs1-cs3	24	37	60			

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4.6 Partial discharge measurement (Routine test)				Test date: May 09,2017		
Instrument name	Type	№	Accuracy	Period of validity		
Testing transformer	YDTC-30/2×150	SB-202302	/	/		
Generator	TFZP500-12	SB-101002	/	/		
Power-frequency high-voltage measuring system	TRF150-0.001	YB-116141	3.0	2018.12.15		
	PV2-1	YB-219709		2017.08.29		
Partial discharge measuring system	TWPD-02	YB-319534	10	2017.12.12		
	TWPD-2B	YB-319201		2017.07.26		
Humidity: 36.5%; Ambient temperature: 20.9℃; Atmospheric pressure: 100.9kPa						
Applied terminals	Applied voltage (kV)	Duration (s)	Measured voltage (kV)	Duration (s)	Partial discharge level (pC)	Result
AP1AP2	38	40	21/12.1	30	2/2	Passed
BP1BP2	38	40	21/12.1	30	3/2	
CP1CP2	38	40	21/12.1	30	8/2	
<p>Note: According to procedure A of clause 7.3.2.2 of IEC61869-1: 2007. Background partial discharge level is &lt;2pC before test and after test.</p> <p>4.7 Tests for accuracy (Routine test) See 4.9.1</p>						

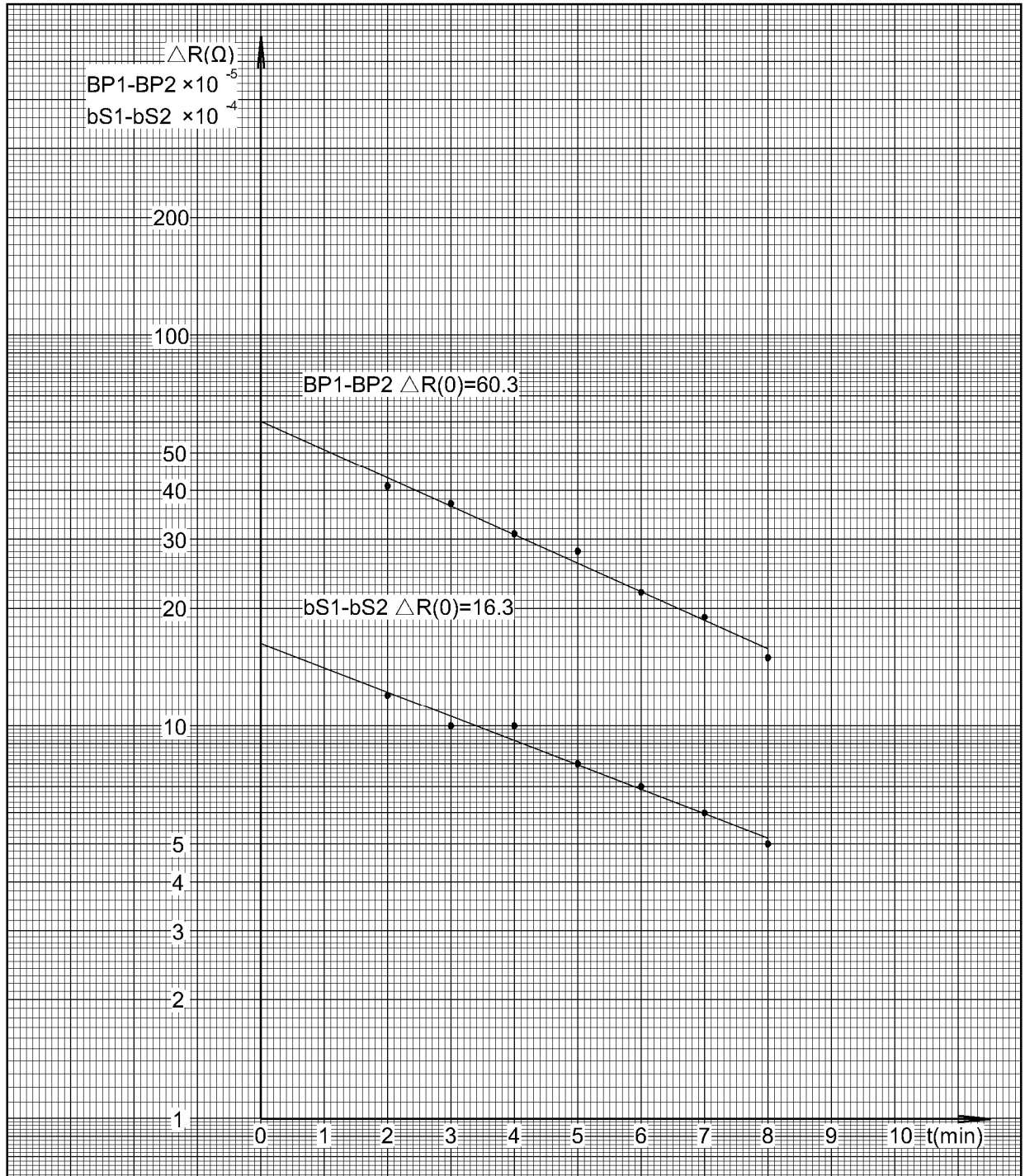
Test Report				№: CTQC/H-17.041 Total 59 Page 11																								
4.8 Temperature rise test (Type test)				Test date: May 12,2017																								
Instrument name	Type	№	Accuracy	Period of validity																								
Testing transformer	YDTC-30/2×150	SB-202302	/	/																								
Power-frequency high-voltage measuring system	TRF150-0.001	YB-116141	3.0	2018.12.15																								
	PV2-1	YB-219709		2017.08.29																								
Transformer temperature rise testing system	JYR0508	YB-328971-1	0.2	2017.04.05																								
D.C. resistance detector	SR3310	YB-104209	0.2	2018.03.13																								
Digital multichannel temperature inspection instrument	DT1000	YB-8001	≤100℃, ±0.5℃ >100℃, ±1.0℃	2017.08.14																								
Volt-ampere meter	T24-AV	YB-105035	0.2	2018.03.14																								
<p>1.0U<sub>pr</sub>: Primary voltage terminals (A, B, C) of voltage transformer are short-circuited, and primary terminals of three-phase current transformer are short-circuited, applied voltage 7.19kV, 500VA of limit output on secondary terminals (a-n, b-n, c-n). Secondary terminals(a1s1-a1s3, b1s1-b1s3, c1s1-c1s3) of current transformer are in series and applied current of 6A, the induced current is 24A on primary current terminals. The test shall be continued until the temperature has reached a steady state.</p> <p>1.9U<sub>pr</sub>: Primary voltage terminals (A, B, C) of voltage transformer are short-circuited, and primary terminals of three-phase current transformer are short-circuited, applied voltage 13.68kV, 50VA of limit output on secondary terminals (a-n, b-n, c-n). Secondary terminals (a1s1-a1s3, b1s1-b1s3, c1s1-c1s3) of current transformer are in series and applied current of 6A, the induced current is 24A on primary current terminals. The test shall be continued until the temperature has reached a steady state (The duration is not less than 8h).</p> <p style="text-align: center;">1.0U<sub>pr</sub> Rated voltage factor</p> <table border="1"> <thead> <tr> <th rowspan="2">Windings</th> <th colspan="2">Measurement of resistance(Ω)</th> <th colspan="2">Ambient temperature(℃)</th> </tr> <tr> <th>Hot R</th> <th>Cold R</th> <th>Hot R</th> <th>Cold R</th> </tr> </thead> <tbody> <tr> <td>BP1-BP2</td> <td>0.002037</td> <td>0.001826</td> <td rowspan="4">20.4</td> <td rowspan="4">21.7</td> </tr> <tr> <td>bS1-bS3</td> <td>0.1961</td> <td>0.1819</td> </tr> <tr> <td>B-N</td> <td>2496</td> <td>2323</td> </tr> <tr> <td>b-n</td> <td>0.4668</td> <td>0.4308</td> </tr> </tbody> </table>						Windings	Measurement of resistance(Ω)		Ambient temperature(℃)		Hot R	Cold R	Hot R	Cold R	BP1-BP2	0.002037	0.001826	20.4	21.7	bS1-bS3	0.1961	0.1819	B-N	2496	2323	b-n	0.4668	0.4308
Windings	Measurement of resistance(Ω)		Ambient temperature(℃)																									
	Hot R	Cold R	Hot R	Cold R																								
BP1-BP2	0.002037	0.001826	20.4	21.7																								
bS1-bS3	0.1961	0.1819																										
B-N	2496	2323																										
b-n	0.4668	0.4308																										
Result: Passed.																												

Test Report			No: CTQC/H-17.041 Total 59 Page 12	
1.9U <sub>pr</sub> Rated voltage factor				
Windings	Measurement of resistance(Ω)		Ambient temperature(°C)	
	Hot R	Cold R	Hot R	Cold R
B-N	2431	2323	20.9	21.7
b-n	0.4569	0.4308		
Conclusions of temperature rise(K)				
Windings	1.0U <sub>pr</sub> Rated voltage factor		1.9U <sub>pr</sub> Rated voltage factor	
BP1-BP2	31.0		/	
bS1-bS3	21.3		/	
B-N	20.4		12.7	
b-n	22.8		16.4	
Result: Passed.				

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Hot resistance curve

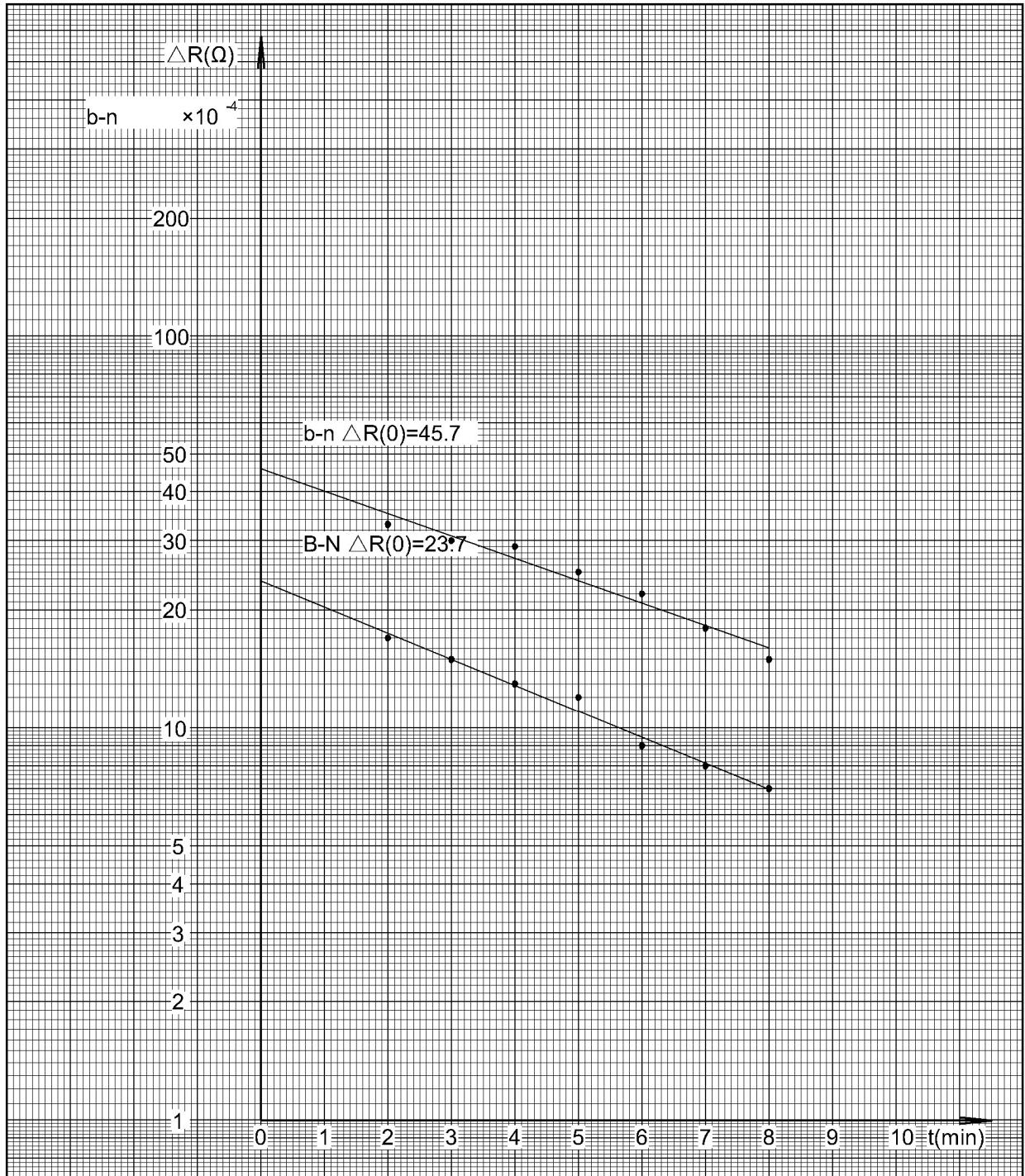


1.0  $U_{pr}$

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Hot resistance curve



1.0 U<sub>pr</sub>

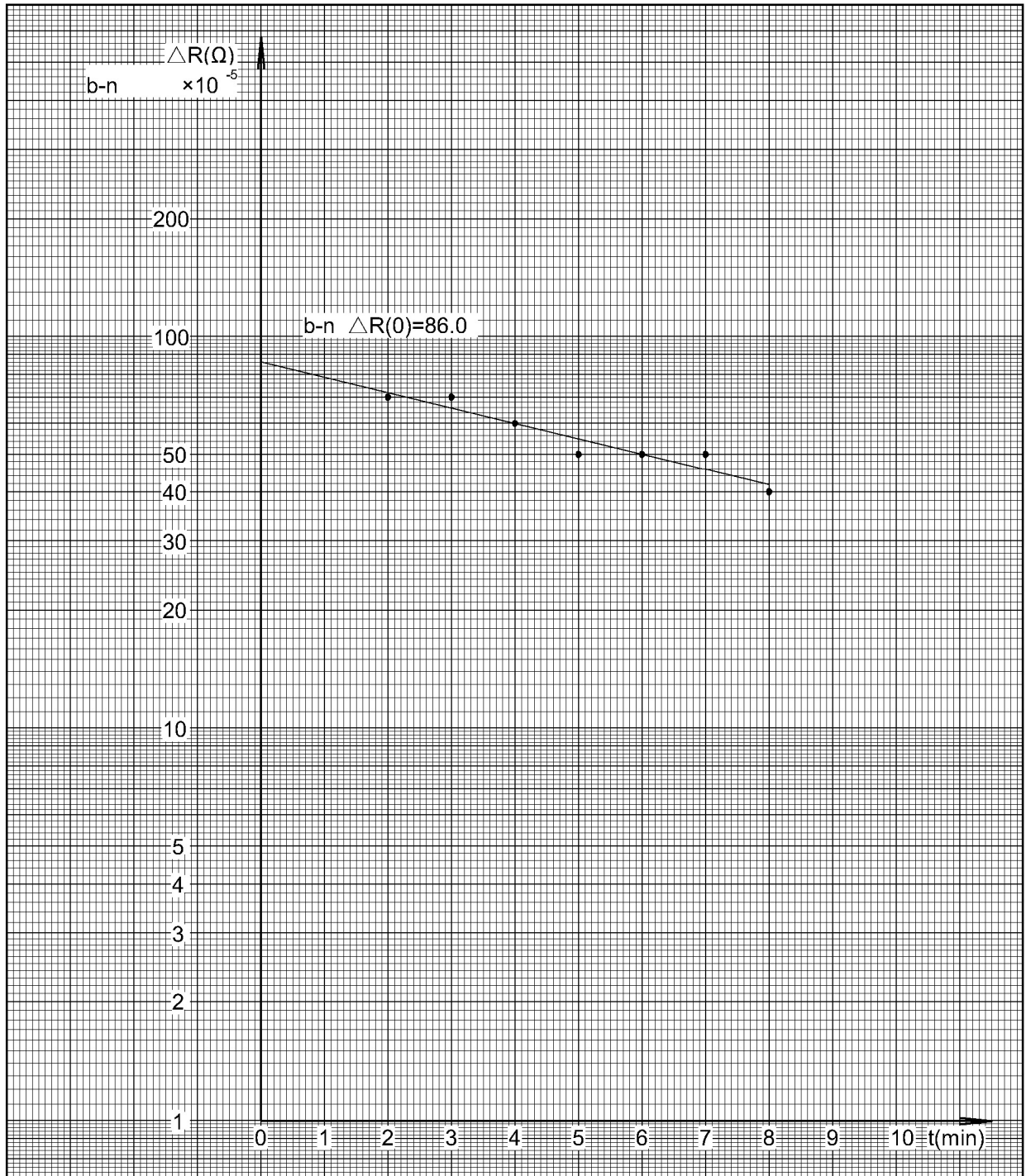


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Hot resistance curve



1.9 U<sub>pr</sub>

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## 4.9 Tests for accuracy (Type test)

## 4.9.1 Tests for voltage ratio error and phase displacement

Test date: May 10, 2017

Instrument name	Type	№	Accuracy	Period of validity
Testing transformer	YDTC-30/2×150	SB-202302	/	/
Standard voltage transformer	HJ-20	YB-110074	0.01	2018.08.19
Voltage transformer checkout meter	PT101	YB-114204	2.0	2017.12.25
Load box	FY60	YB-331031	3.0	2017.08.18
		YB-331029		
		YB-331042		

No current supplied to the current transformer, measure voltage ratio error and phase displacement of the voltage transformer.

Winding	Accuracy class	Voltage ratio	U/Ur (%)	Burden (VA) cosφ=0.8	Ratio error (%)	Phase displacement (′)	Burden (VA) cosφ=0.8	Ratio error (%)	Phase displacement (′)
a-n	0.5	$\frac{12.47\sqrt{3}}{0.12}$	120	50	-0.213	-8.26	12.5	0.250	-2.36
			100		-0.212	-8.32		0.249	-2.37
			80		-0.215	-8.35		0.248	-2.40
b-n	0.5	$\frac{12.47\sqrt{3}}{0.12}$	120	50	-0.202	-7.85	12.5	0.263	-2.29
			100		-0.201	-7.89		0.263	-2.32
			80		-0.203	-7.92		0.262	-2.31
c-n	0.5	$\frac{12.47\sqrt{3}}{0.12}$	120	50	-0.217	-8.25	12.5	0.251	-2.40
			100		-0.218	-8.30		0.251	-2.41
			80		-0.218	-8.35		0.249	-2.43

Result: Passed.

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4.9.2 Influence of the current transformer on the voltage transformer Test date: May 10,2017

Instrument name	Type	№	Accuracy	Period of validity
Up-flow reactor	YL30	SB-102013	/	/
Multipurpose digital meter	K2000	YB-106039	0.5	2017.09.17

The current transformer is supplied with the rated continuous thermal current 24A, 50VA of rated output on secondary terminals of voltage transformer, measure influence of the current transformer on the voltage transformer.

Windings	Measured voltage (mV)	Greatest variation of ratio error at 80% $U_{sr}$ $\pm \Delta \mathcal{E}_V$ (%)	Greatest variation of phase displacement at 80% $U_{sr}$ $\pm \Delta \delta_V$ ( ' )	U/Ur (%)	Corrected error of voltage transformer		
					Burden (VA) $\cos\varphi=0.8$	Ratio error (%)	Phase displacement ( ' )
a-n	21.30	0.022	0.76	120	50	-0.235	-9.02
				100		-0.234	-9.08
				80		-0.237	-9.11
				120	12.5	0.272	-3.12
				100		0.271	-3.13
				80		0.270	-3.16
b-n	23.25	0.024	0.83	120	50	-0.226	-8.68
				100		-0.225	-8.72
				80		-0.227	-8.75
				120	12.5	0.287	-3.12
				100		0.287	-3.15
				80		0.286	-3.14
c-n	9.88	0.010	0.35	120	50	-0.227	-8.60
				100		-0.228	-8.65
				80		-0.228	-8.70
				120	12.5	0.261	-2.75
				100		0.261	-2.76
				80		0.259	-2.78

Result: Passed.

<b>Test Report</b>	№: CTQC/H-17.041 Total 59 Page 18
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## 4.9.3 Test for current ratio error and phase displacement

Test date: May 10,2017

Instrument name	Type	№	Accuracy	Period of validity
Up-flow reactor	YL30	SB-102013	/	/
Standard current transformer	BDL-1	YB-109074	0.01	2018.10.25
Transformer checkout meter	HESD	YB-114139	2.0	2017.08.24
Load box	FY49-B	YB-111146	3.0	2018.02.27

When the voltage transformer is without energized, measure current ratio error and phase displacement of the current transformer.

Winding	Accuracy class	Current ratio	I/I <sub>r</sub> (%)	Burden (VA) cosφ=0.8	Ratio error (%)	Phase displacement (′)	Burden (VA) cosφ=0.8	Ratio error (%)	Phase displacement (′)
as1-as3	0.5S	$\frac{20}{5}$	120	12.5	0.0442	0.496	3.125	0.0587	0.593
			100		0.0442	0.396		0.0575	0.749
			20		0.0256	1.369		0.0530	1.462
			5		0.0159	2.910		0.0539	1.928
			1		0.0073	3.478		0.0549	1.344
as2-as3	0.5S	$\frac{10}{5}$	120	12.5	0.0436	1.403	3.125	0.1037	1.215
			100		0.0523	0.755		0.1006	1.345
			20		-0.0151	2.623		0.0737	3.398
			5		-0.070	7.59		0.076	5.24
			1		-0.092	10.82		0.097	5.71

Test Report								No: CTQC/H-17.041 Total 59 Page 19	
Winding	Accuracy class	Current ratio	I/Ir (%)	Burden (VA) cosφ=0.8	Ratio error (%)	Phase displacement (′)	Burden (VA) cosφ=0.8	Ratio error (%)	Phase displacement (′)
bs1-bs3	0.5S	$\frac{20}{5}$	120	12.5	0.0251	0.978	3.125	0.0509	0.529
			100		0.0201	1.050		0.0488	0.612
			20		-0.0068	1.587		0.0305	1.642
			5		-0.0410	4.295		0.0312	3.210
			1		-0.038	6.22		0.0395	3.193
bs2-bs3	0.5S	$\frac{10}{5}$	120	12.5	0.0123	2.890	3.125	0.0884	0.870
			100		0.0091	1.580		0.0832	0.981
			20		-0.0768	1.363		0.0210	2.972
			5		-0.242	8.39		0.011	7.92
			1		-0.297	19.55		0.025	10.33
cs1-cs3	0.5S	$\frac{20}{5}$	120	12.5	0.0356	0.163	3.125	0.0505	0.484
			100		0.0339	0.128		0.0487	0.532
			20		-0.0085	1.329		0.0323	1.742
			5		-0.0419	4.234		0.0371	3.306
			1		-0.039	5.68		0.0402	3.151
cs2-cs3	0.5S	$\frac{10}{5}$	120	12.5	0.0027	1.935	3.125	0.0884	0.703
			100		0.0219	0.657		0.0846	0.743
			20		-0.0790	1.231		0.0240	2.991
			5		-0.254	8.83		0.012	7.95
			1		-0.316	19.83		0.019	10.48
Result: Passed.									

<b>Test Report</b>	№: CTQC/H-17.041 Total 59 Page 20
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4.9.4 Influence of the voltage transformer on the current transformer Test date: May 10,2017

Instrument name	Type	№	Accuracy	Period of validity
Testing transformer	YDTC-30/2r500	SB-202302	/	/
Multipurpose digital meter	K2000	YB-106039	0.5	2017.09.17

The voltage transformer is applied 1.2 times rated voltage 8.64kV, 4Ω of output on secondary winding of current transformer.

Windings	Earthing terminal	Measured voltage (mV)	Greatest variation of ratio error at 5%I <sub>sr</sub> ±Δε <sub>i</sub> (%)	Greatest variation of phase displacement at 5%I <sub>sr</sub> ±Δδ <sub>i</sub> (´)	I/I <sub>r</sub> (%)	Corrected value of current error		
						Burden (VA) cosφ=0.8	Ratio error (%)	Phase displacement (´)
as1-as3	as1	1.63	0.172	5.917	120	12.5	0.2162	6.413
					100		0.2162	6.313
					20		0.1976	7.286
					5		0.1879	8.827
					1		0.1793	9.395
	as3	1.72			120	3.125	0.2307	6.510
					100		0.2296	6.666
					20		0.225	7.379
					5		0.2259	7.845
					1		0.2269	7.261
as2-as3	as2	1.59	0.175	6.02	120	12.5	0.2186	7.423
					100		0.2273	6.775
					20		-0.1901	8.643
					5		-0.245	13.61
					1		-0.267	16.84
	as3	1.75			120	3.125	0.2787	7.235
					100		0.2756	7.365
					20		0.2487	9.418
					5		0.251	11.26
					1		0.272	11.73

Test Report						No: CTQC/H-17.041 Total 59 Page 21		
Windings	Earthing terminal	Measured voltage (mV)	Greatest variation of ratio error at 5%I <sub>sr</sub> ±Δε <sub>i</sub> (%)	Greatest variation of phase displacement at 5%I <sub>sr</sub> ±Δδ <sub>i</sub> ( $^{\circ}$ )	I/I <sub>r</sub> (%)	Corrected value of current error		
						Burden (VA) cosφ=0.8	Ratio error (%)	Phase displacement ( $^{\circ}$ )
bs1-bs3	bs1	1.61	1.161	5.538	120	12.5	0.1861	6.516
					100		0.1811	6.588
					20		-0.1678	7.125
					5		-0.2020	9.833
					1		-0.1990	11.758
	bs3	1.12			120	3.125	0.2119	6.067
					100		0.2098	6.150
					20		0.1915	7.180
					5		0.1922	8.748
					1		0.2005	8.731
bs2-bs3	bs2	1.08	0.145	4.988	120	12.5	0.1573	7.878
					100		0.1541	6.568
					20		-0.2218	6.351
					5		-0.387	13.38
					1		-0.442	24.54
	bs3	1.45			120	3.125	0.2334	5.858
					100		0.2282	5.969
					20		0.166	7.96
					5		0.156	12.91
					1		0.170	15.318

Test Report						No: CTQC/H-17.041 Total 59 Page 22		
Windings	Earthing terminal	Measured voltage (mV)	Greatest variation of ratio error at 5%I <sub>sr</sub> ±ΔE <sub>i</sub> (%)	Greatest Variation of phase displacement at 5%I <sub>sr</sub> ±Δδ <sub>i</sub> ( $^{\circ}$ )	I/I <sub>r</sub> (%)	Corrected value of current error		
						Burden (VA) cosφ=0.8	Ratio error (%)	Phase displacement ( $^{\circ}$ )
cs1-cs3	cs1	1.62	0.162	5.573	120	12.5	0.1976	5.736
					100		0.1959	5.701
					20		-0.1705	6.902
					5		-0.2039	9.807
					1		-0.2010	11.253
	cs3	0.91			120	3.125	0.2125	6.057
					100		0.2107	6.105
					20		0.1943	7.315
					5		0.1991	8.879
					1		0.2022	8.724
cs2-cs3	cs2	0.84	0.084	2.890	120	12.5	0.0867	4.825
					100		0.1059	3.547
					20		-0.163	4.121
					5		-0.338	11.72
					1		-0.400	22.72
	cs3	0.82			120	3.125	0.1724	3.593
					100		0.1686	3.633
					20		0.108	5.881
					5		0.096	10.84
					1		0.103	13.37
Result: Passed.								



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## 4.9.5 Determination of the instrument security factor (FS)

Test date: May 11,2017

Instrument name	Type	No	Accuracy	Period of validity
16 channels analyzer	DL716	YB-312729	12bit	2017.07.07
Standard current transformer	HL-28	YB-109073	0.02	2019.01.09
Shunt	FL-10/1000(0.1Ω)	YB-316812	0.1	2017.08.23
Shunt	FL-10/1000(0.1Ω)	YB-316816	0.1	2017.08.10
Load box	X <sub>L</sub> , R	YB-319545	3.0	2017.08.11

Winding	Rated primary current (A)	Secondary burden (VA)	Multiple	Applied primary current (kA)	Secondary current(A)		Difference current (A)	Composite error (%)
					Standard	Sample		
as1-as3	20	12.5	5	80.64 (20.16A×20/5)	20.16	18.46	3.40	16.87
as2-as3	10	12.5	5	46.12 (23.06A×10/5)	23.06	13.88	15.49	67.17
bs1-bs3	20	12.5	5	80.92 (20.23A×20/5)	20.23	17.80	5.09	25.16
bs2-bs3	10	12.5	5	46.26 (23.13A×10/5)	23.13	12.98	16.39	70.86
cs1-cs3	20	12.5	5	80.32 (20.08A×20/5)	20.08	17.92	4.72	23.51
cs2-cs3	10	12.5	5	46.82 (23.41A×10/5)	23.41	13.15	16.66	71.17

Test oscillograms are shown in pages 24~29.

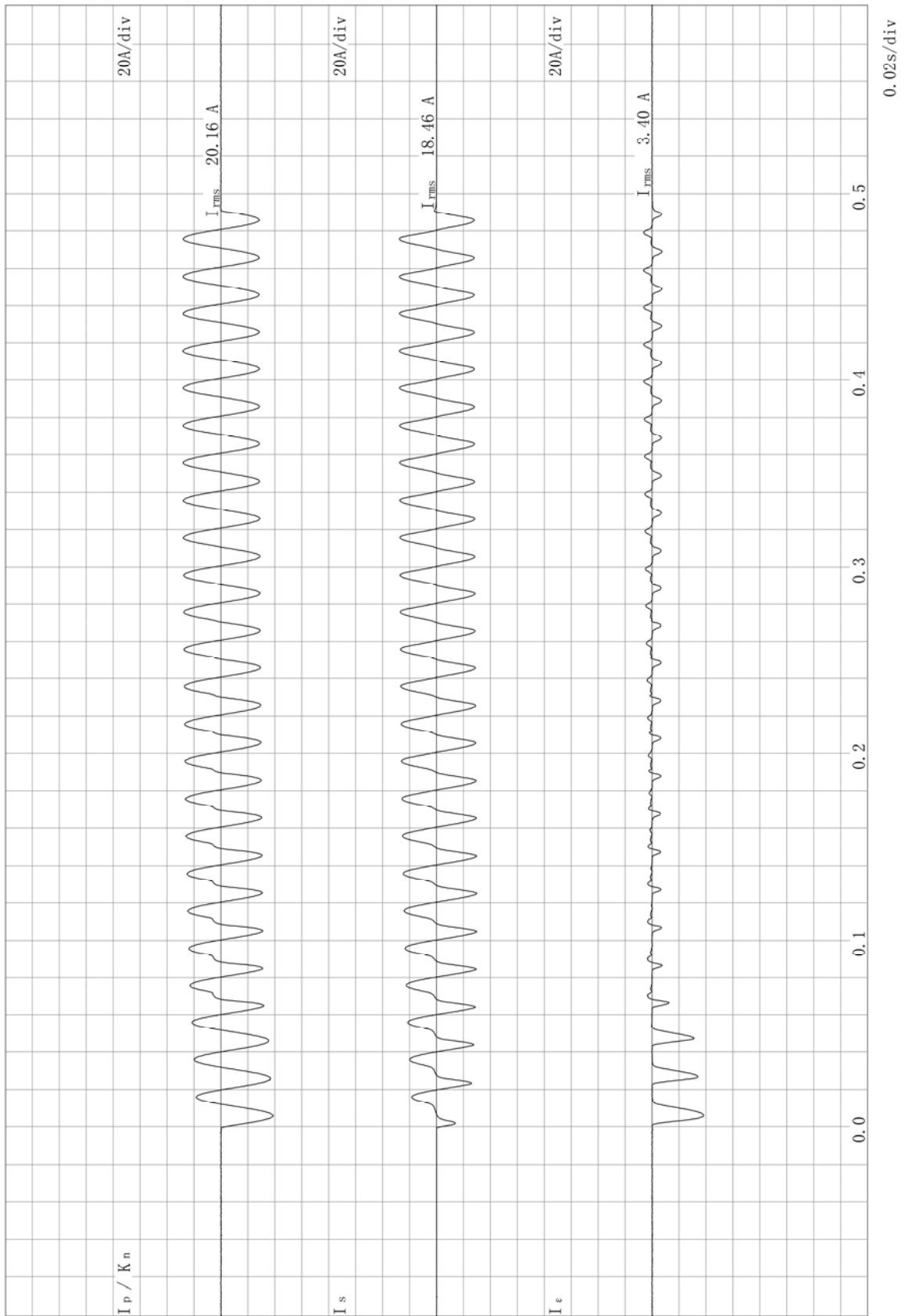
Result: Passed.

4.9.6 The result of Tests for accuracy: Passed.

## Test Report

No: CTQC/H-17.041

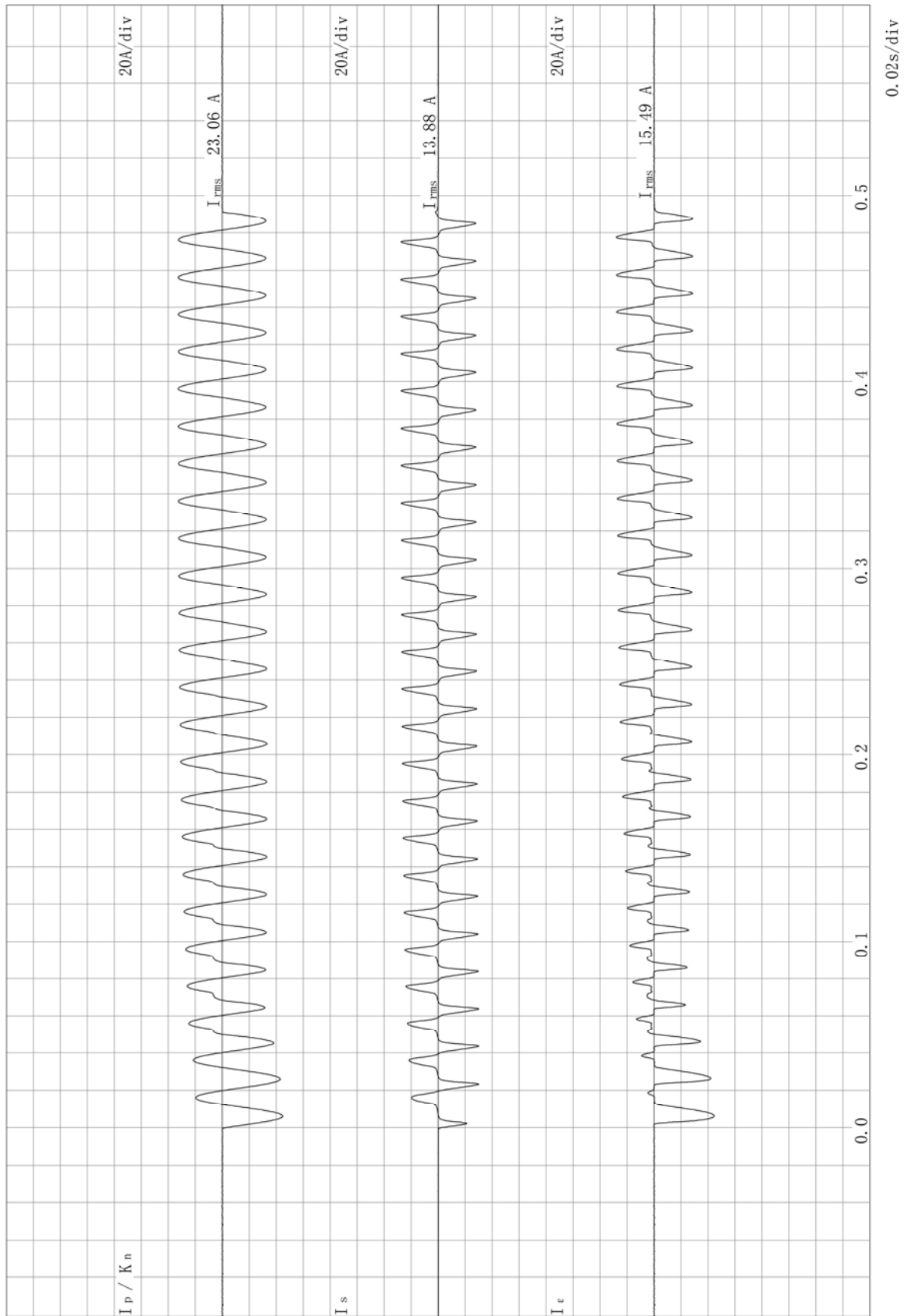
Total 59 Page 24



## Test Report

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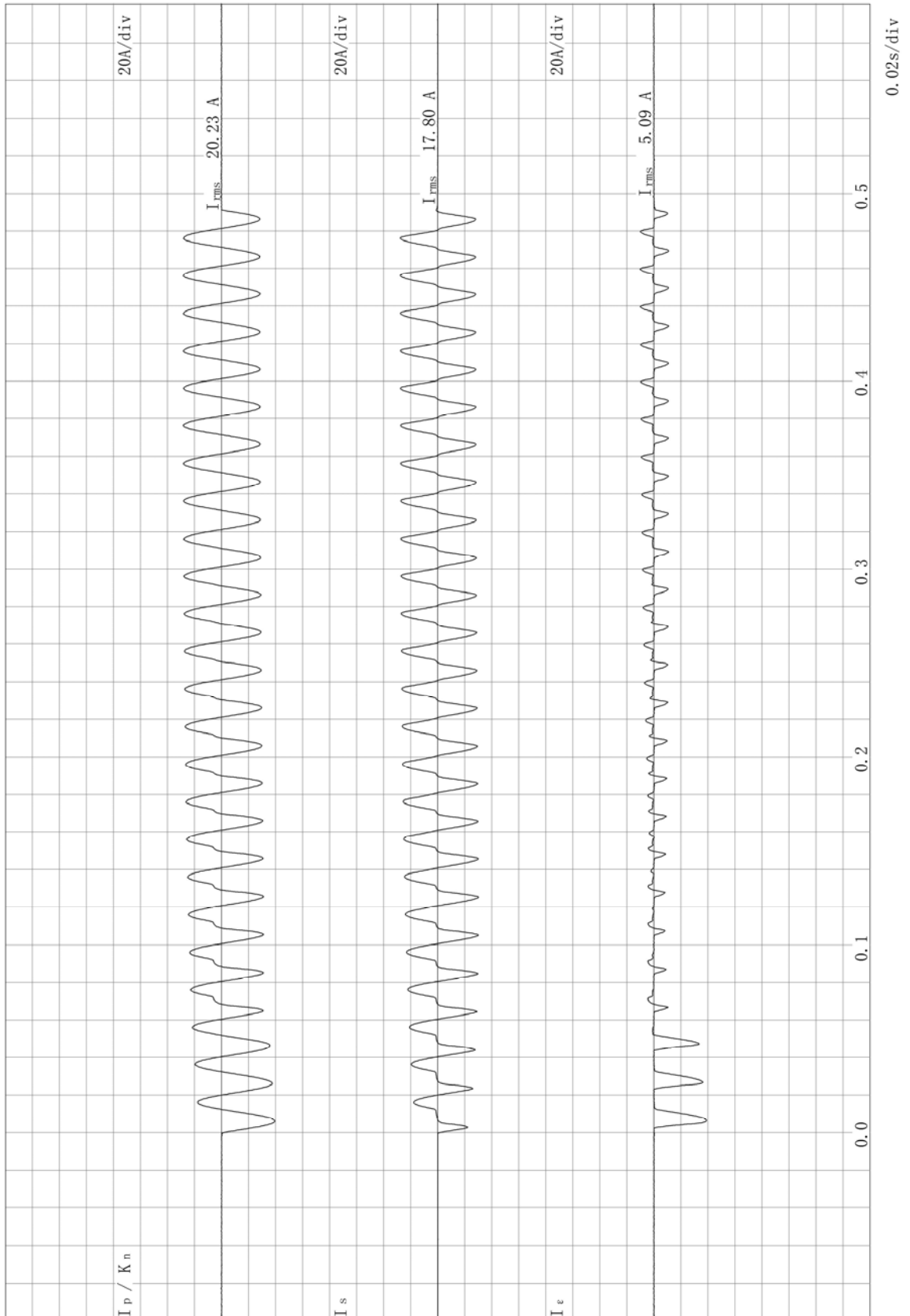


HI7041 as2-as3

## Test Report

No: CTQC/H-17.041

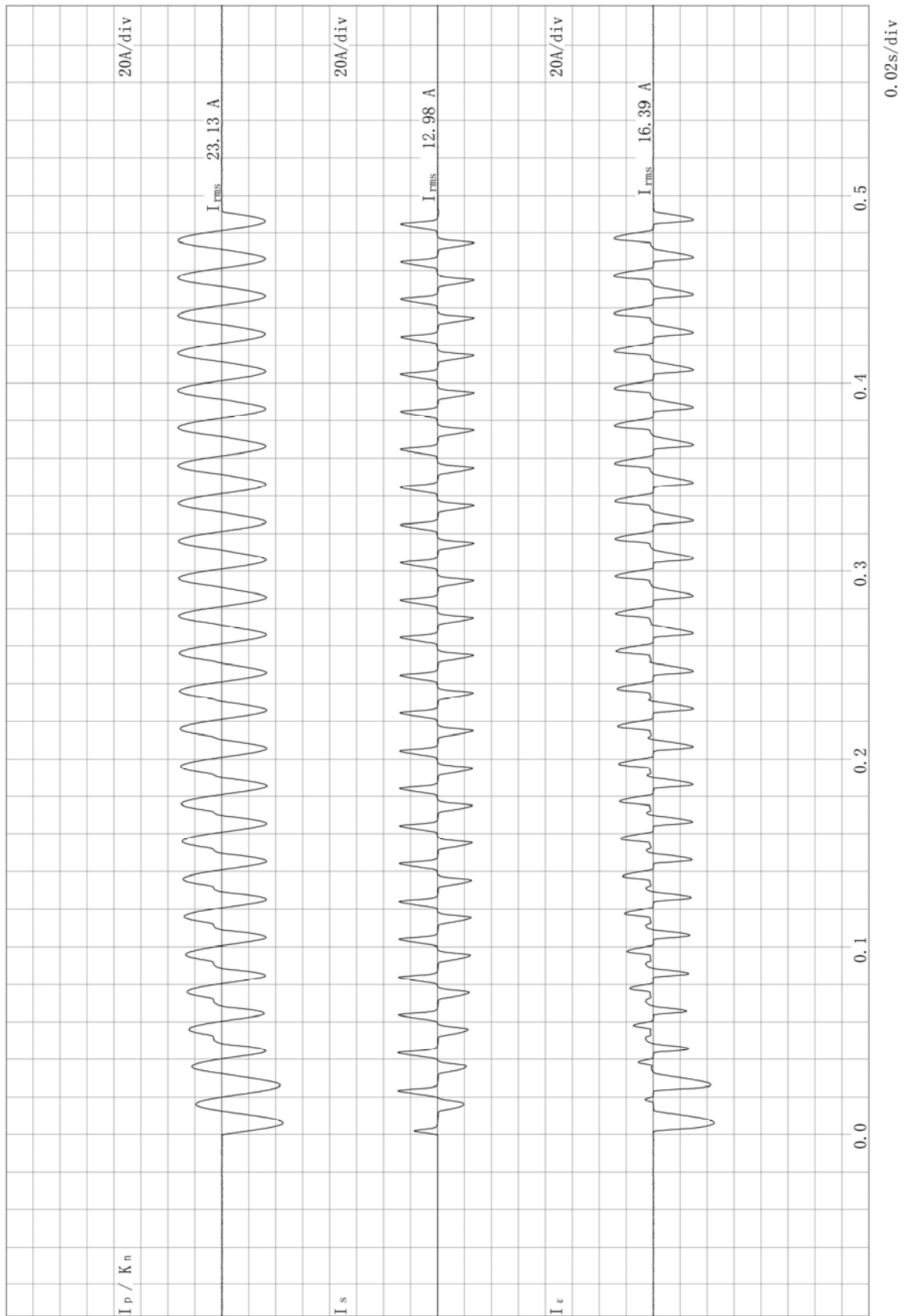
Total 59 Page 26



## Test Report

No: CTQC/H-17.041

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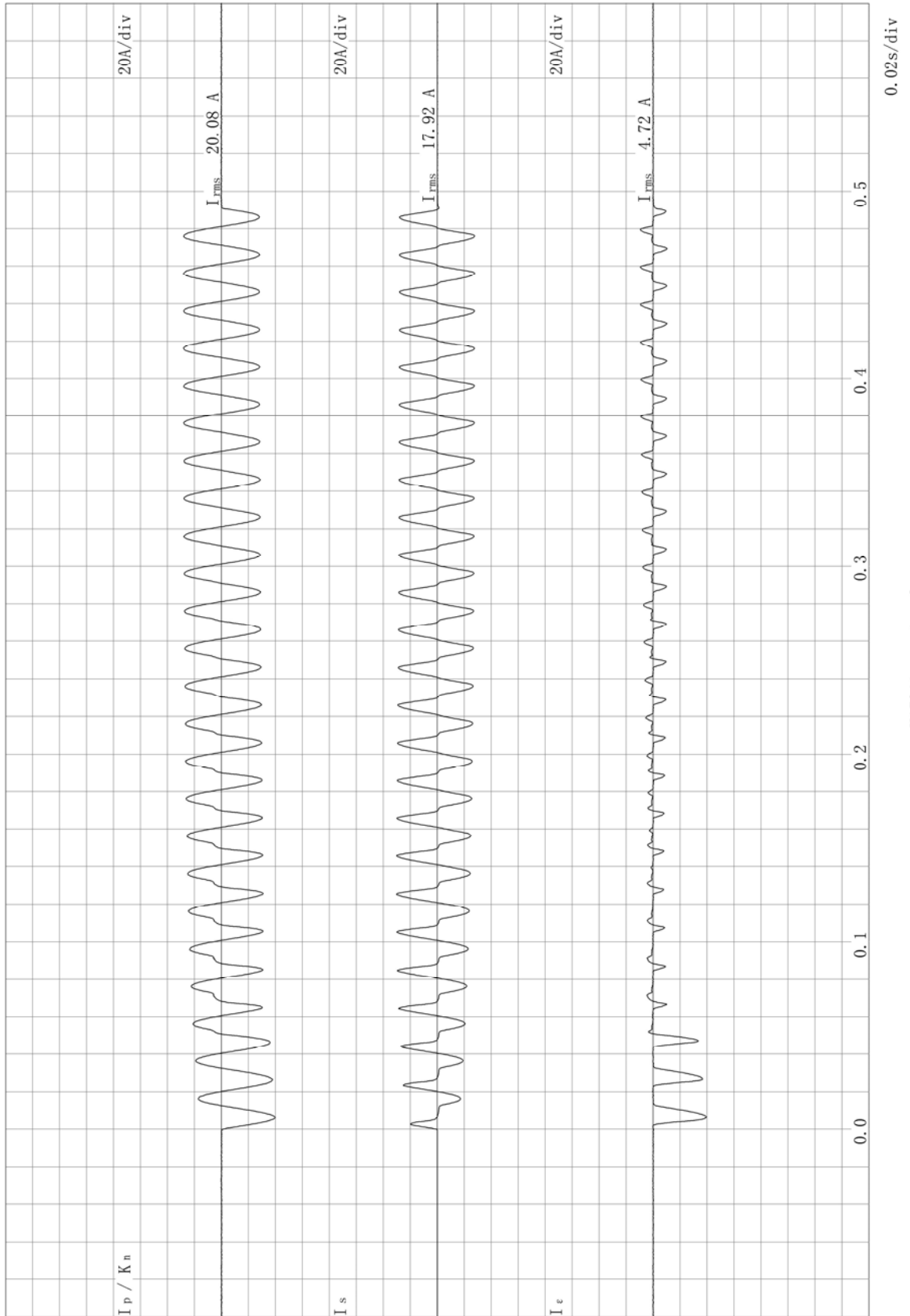


HI7041 bs2-bs3

## Test Report

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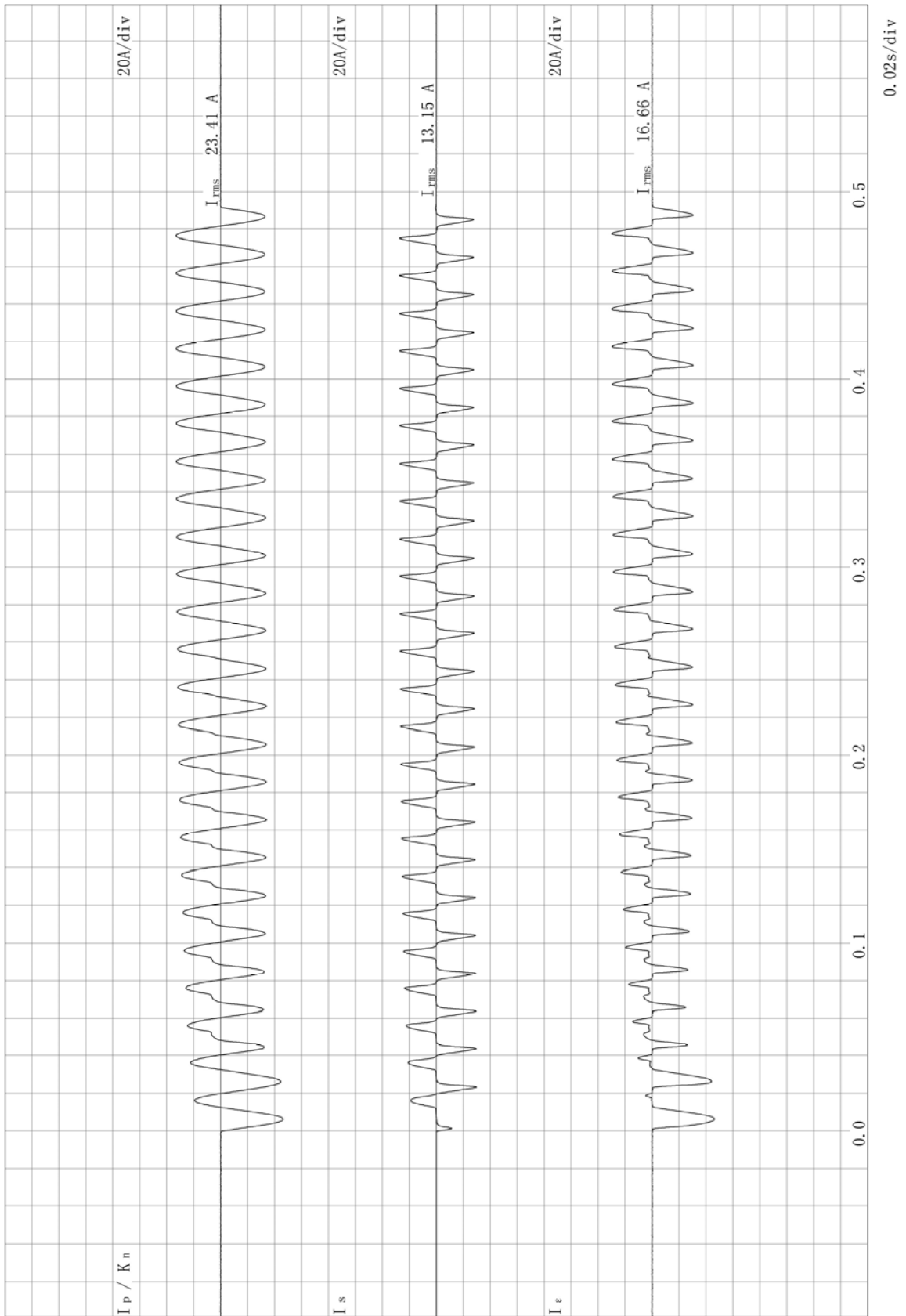


HI7041 csl-cs3

## Test Report

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H17041 cs2-cs3

Test Report				№: CTQC/H-17.041 Total 59 Page 30
4.10 Impulse voltage test on primary terminals (Type test)				Test date: May 15, 2017
Instrument name	Type	№	Accuracy	Period of validity
Impulse voltage measurement system	400kV resistance divider	SB-110837	3.0	2018.12.16
	DP04034 Oscilloscope	YB-112133		
<p>Humidity: 32.0%; Ambient temperature: 17.9°C; Atmospheric pressure: 101.2kPa.</p> <p>Full wave rated withstand voltage: 95 kV                      15 positive and 15 negative polarity</p> <p>Chopped wave rated withstand voltage: 110 kV                  2 negative polarity</p> <p>Test sequence:</p> <p>Negative polarity    Positive polarity</p> <p>One reference full wave impulse;                      One reference full wave impulse;</p> <p>One rated full wave impulse.                              Fifteen rated full wave impulse.</p> <p>One reference chopped wave impulse;</p> <p>Two rated chopped wave impulse.</p> <p>Fourteen rated full wave impulse.</p> <p>Test records:</p> <p>T1: Front time;                      T2: Time to half value;                      Tc: Time to chopping;</p> <p>K: Factor of over zero;              Up: Peak voltage.</p> <p>Result: Passed.</p> <p>4.11 Chopped impulse voltage withstand test on primary terminals (special test)</p> <p style="padding-left: 20px;">See 4.10</p>				



## Test Report

No: CTQC/H-17.041

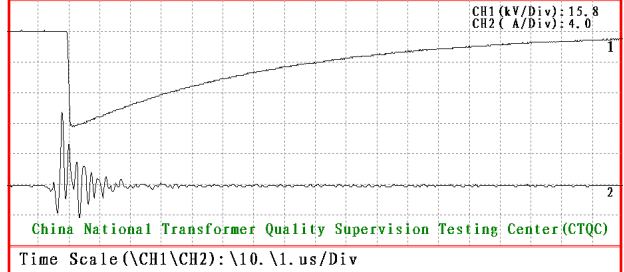
Total 59 Page 31

Tested terminal: AP1AP2  
 Test polarity: Negative  
 CH1: Voltage records  
 CH2: Capacitive transferred current

### Lightning Impulse Voltage

T1=1.15us T2=51.2us Up=49.4kV

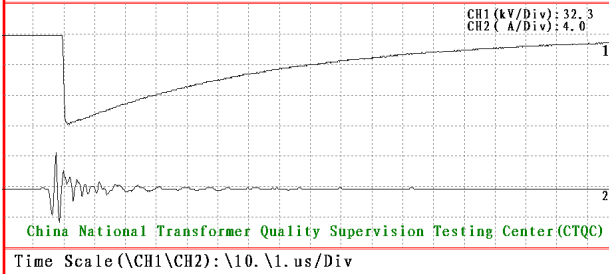
Memo: Phase AP1P2 (H17041-L01)



### Lightning Impulse Voltage

T1=1.08us T2=50.8us Up=94.3kV

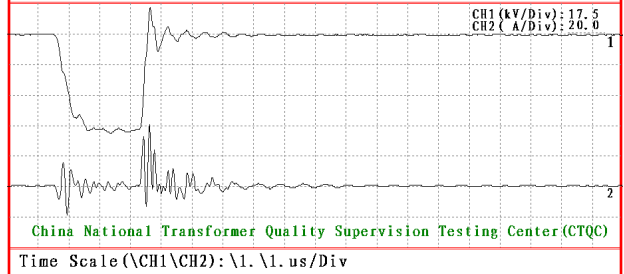
Memo: Phase AP1P2 (H17041-L02)



### Chopped Lightning Impulse Voltage

T1=1.20us Tc=2.93us K=15% Up=56.5kV

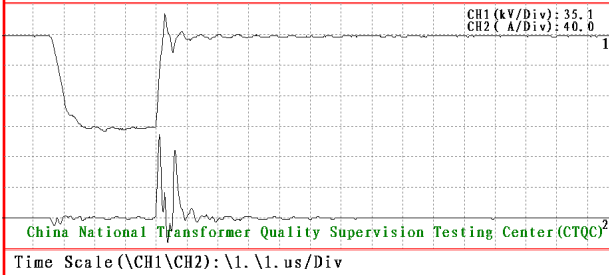
Memo: Phase AP1P2 (H17041-L03)



### Chopped Lightning Impulse Voltage

T1=1.07us Tc=3.71us K=12% Up=107.8kV

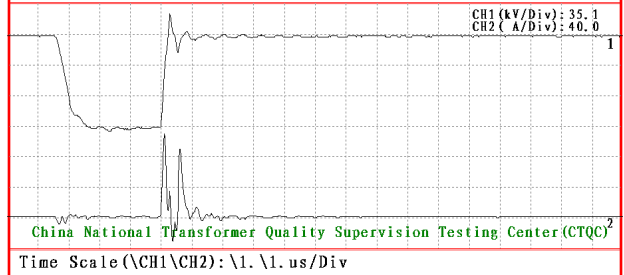
Memo: Phase AP1P2 (H17041-L04)



### Chopped Lightning Impulse Voltage

T1=1.07us Tc=3.51us K=12% Up=108.8kV

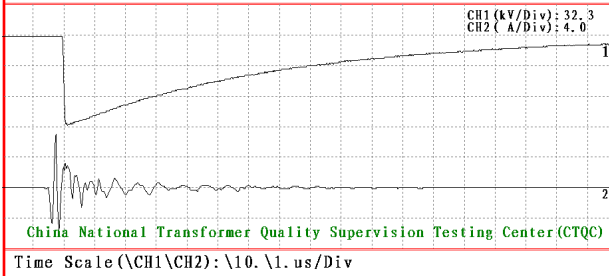
Memo: Phase AP1P2 (H17041-L05)



### Lightning Impulse Voltage

T1=1.03us T2=51.1us Up=93.7kV

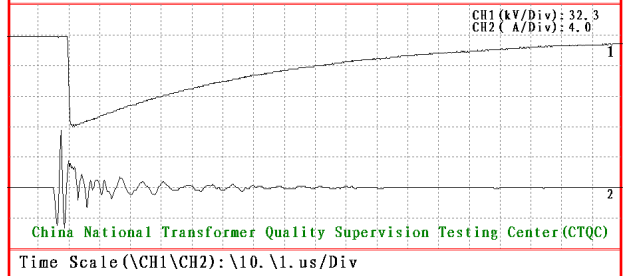
Memo: Phase AP1P2 (H17041-L06)



### Lightning Impulse Voltage

T1=1.08us T2=51.5us Up=95.3kV

Memo: Phase AP1P2 (H17041-L07)

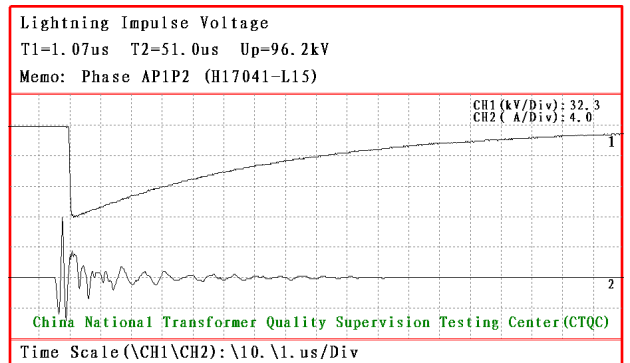
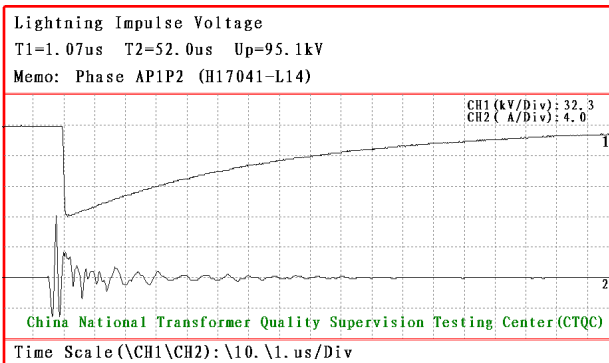
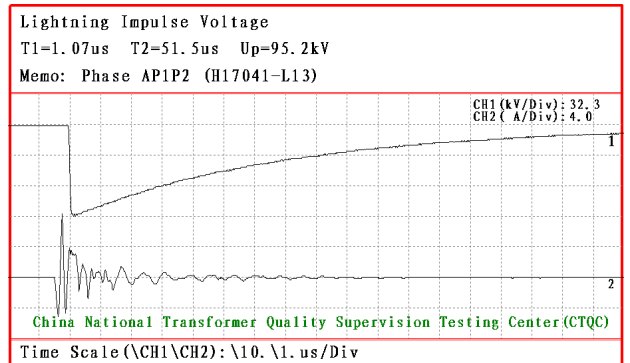
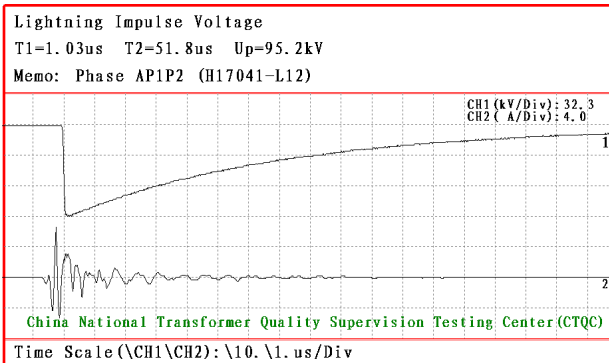
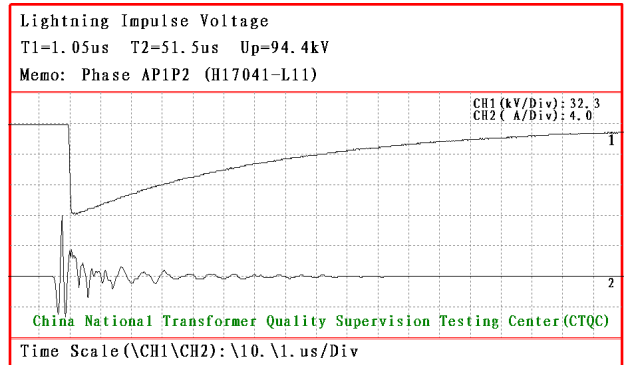
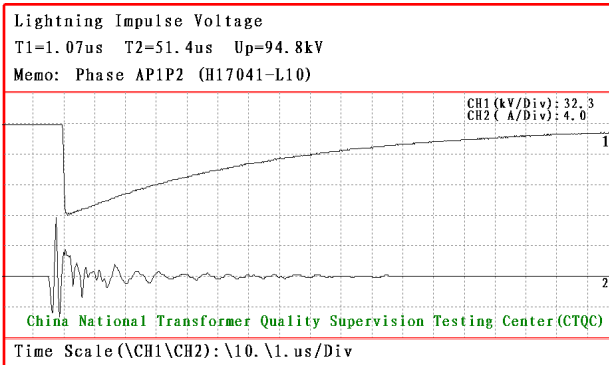
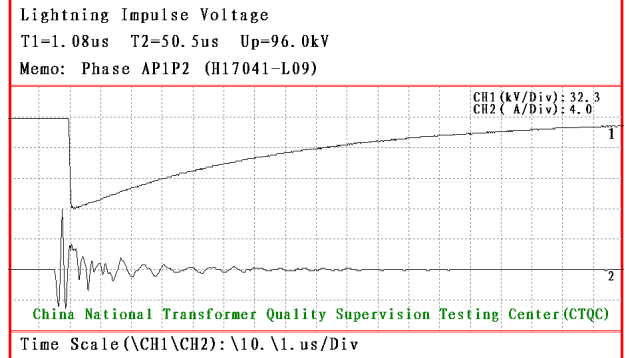
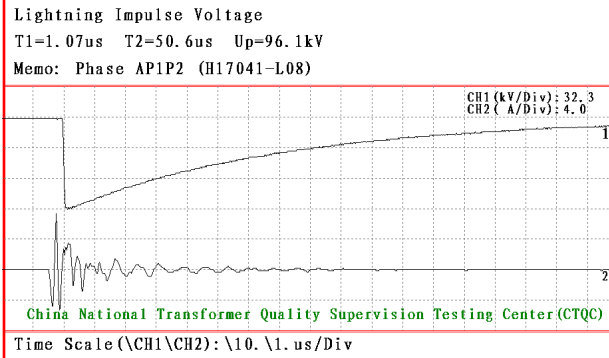


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Tested terminal: AP1AP2 Test polarity: Negative CH1:Voltage records CH2:Capacitive transferred current

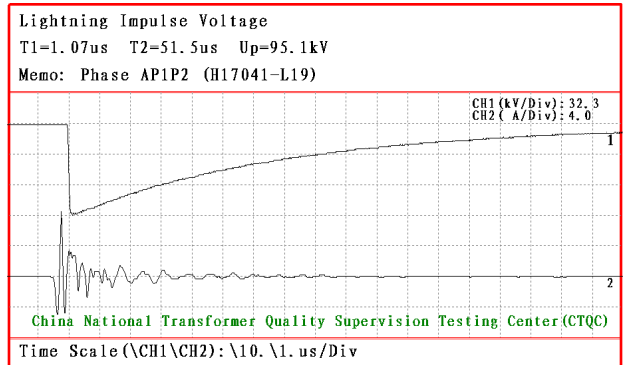
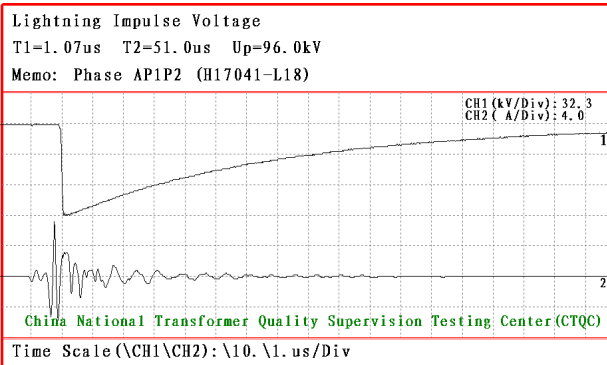
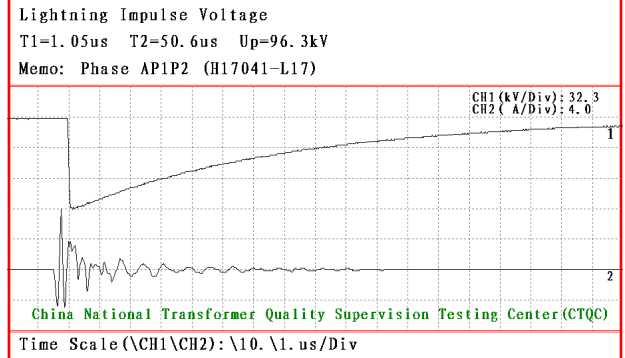
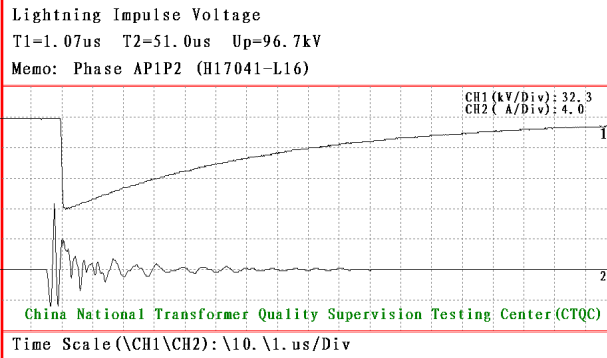


## Test Report

No: CTQC/H-17.041

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Tested terminal: AP1AP2 Test polarity: Negative CH1: Voltage records CH2: Capacitive transferred current

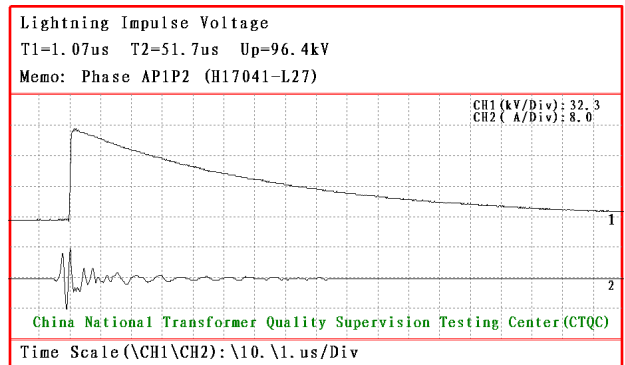
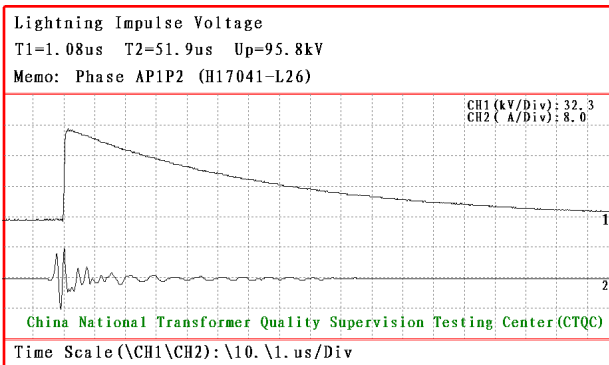
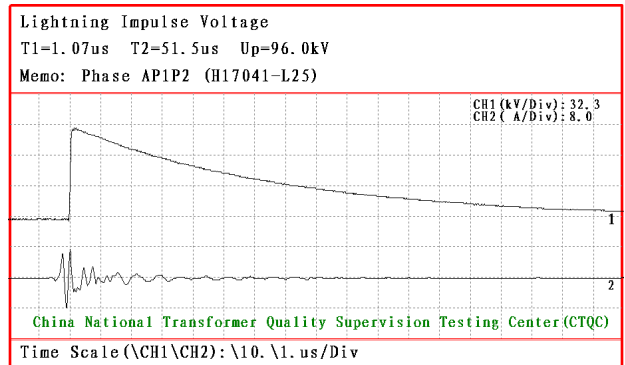
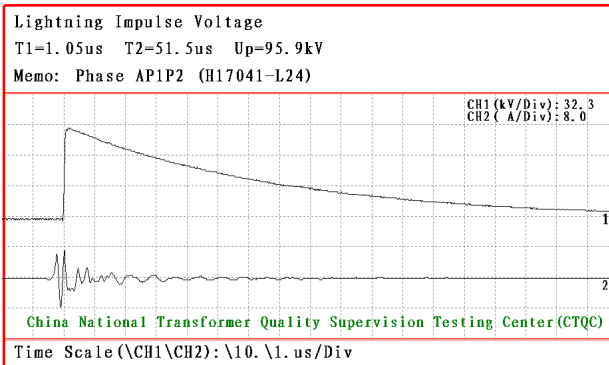
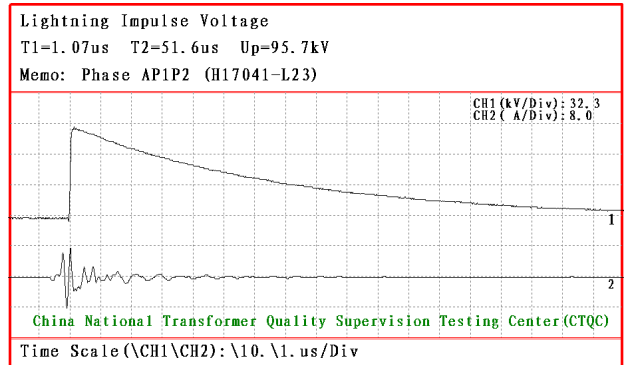
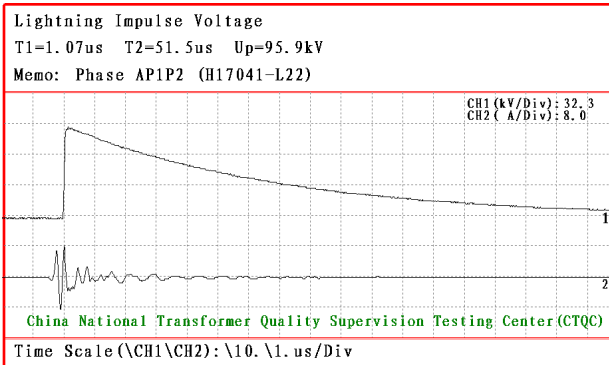
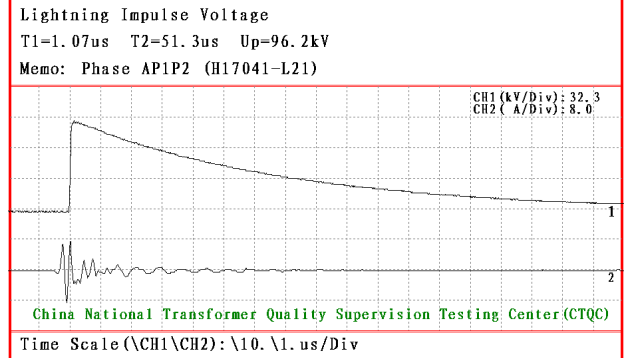
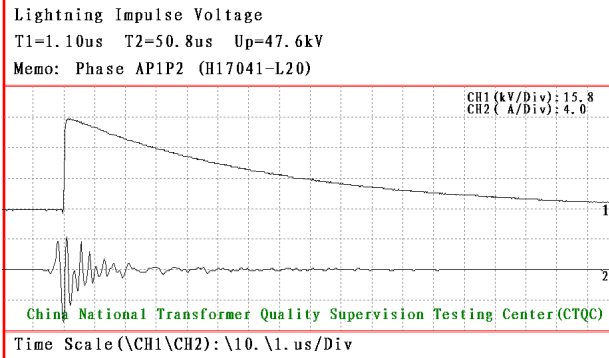


## Test Report

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Tested terminal: AP1AP2 Test polarity: Positive CH1:Voltage records CH2:Capacitive transferred current

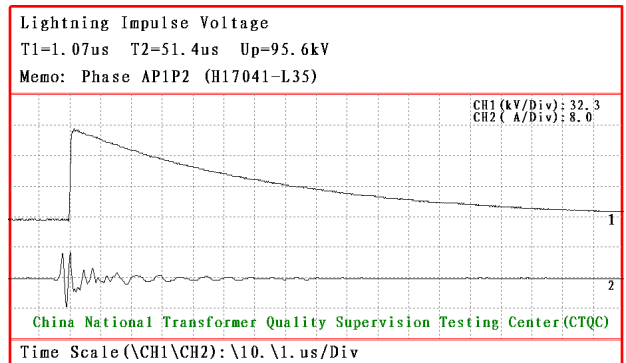
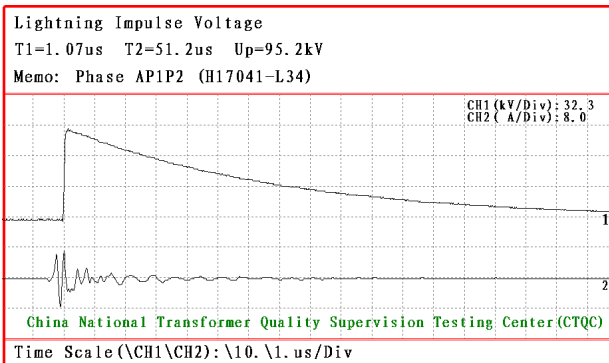
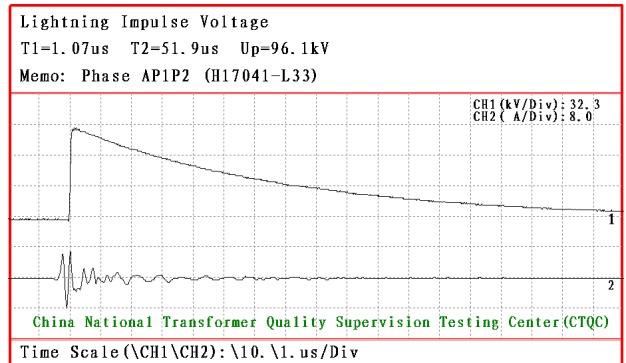
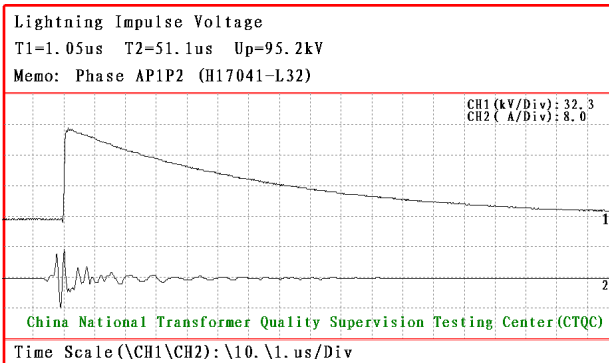
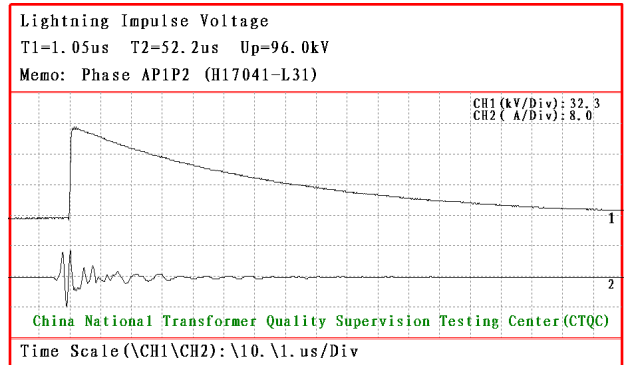
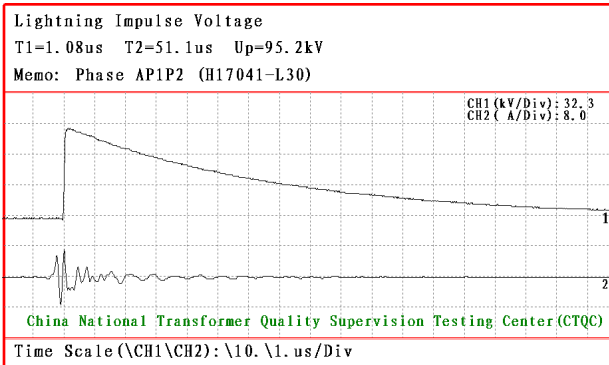
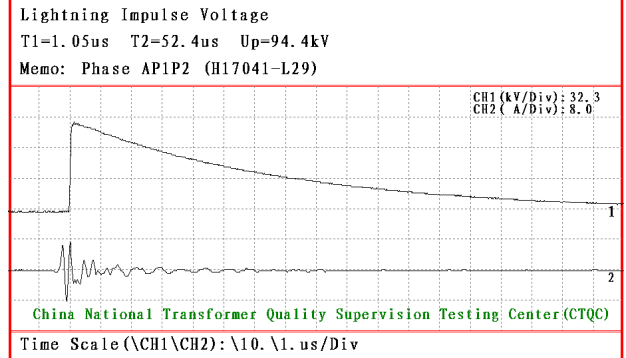
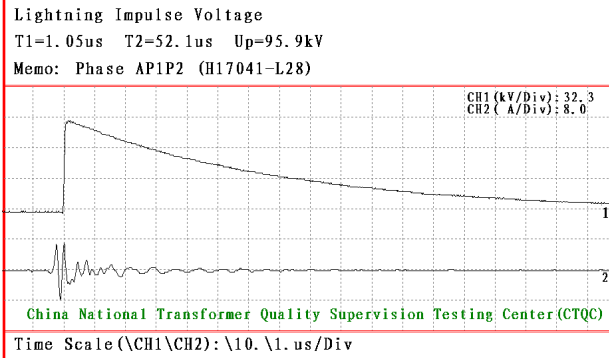


## Test Report

No: CTQC/H-17.041

Total 59 Page 35

Tested terminal: AP1AP2 Test polarity: Positive CH1:Voltage records CH2:Capacitive transferred current

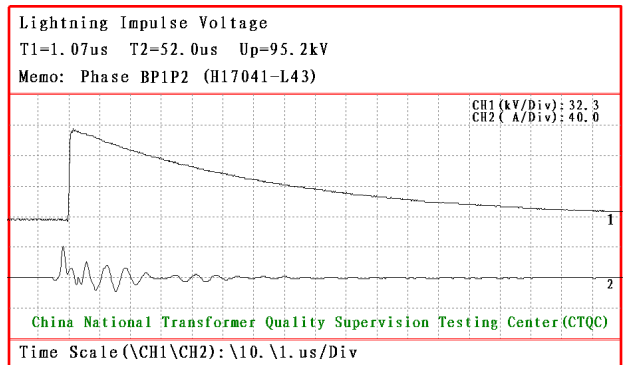
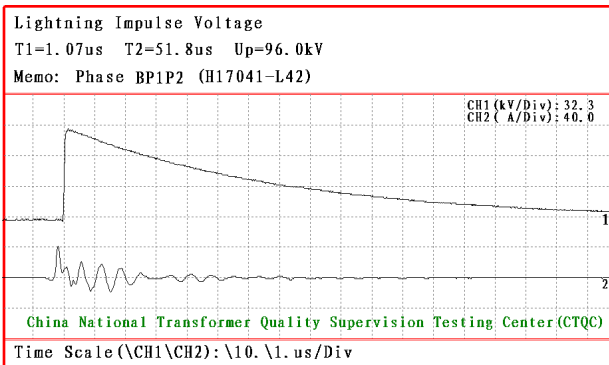
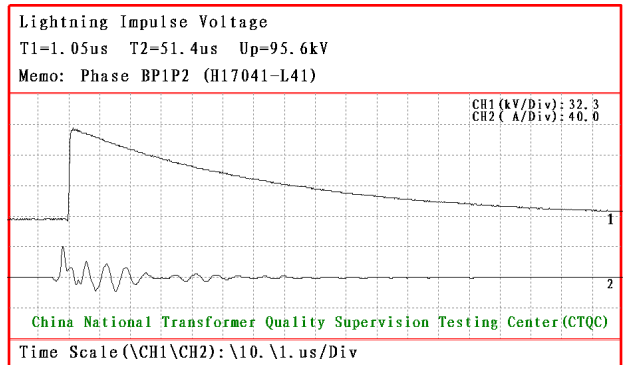
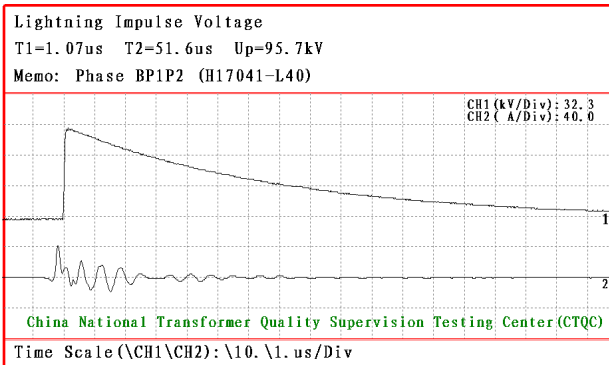
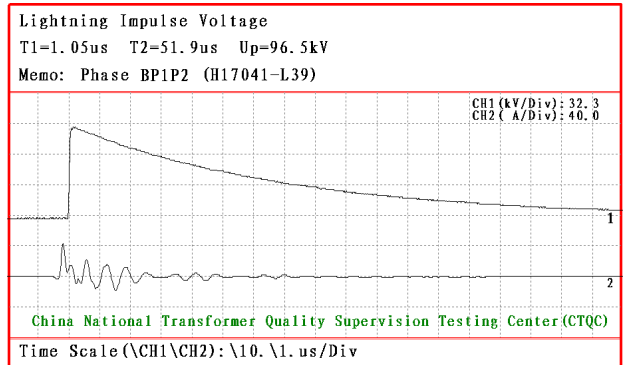
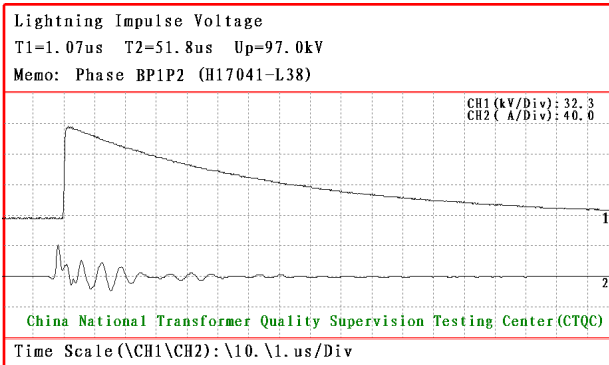
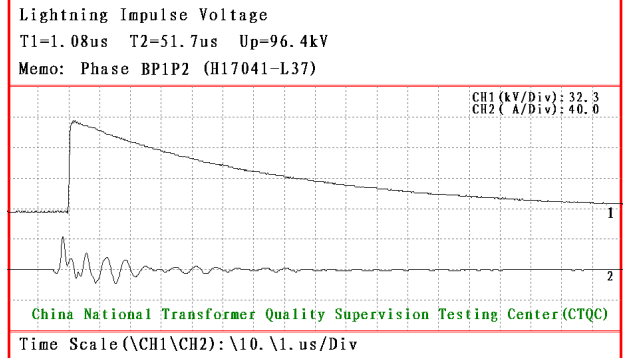
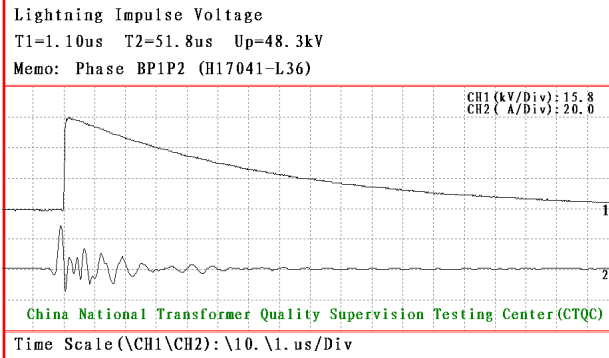


## Test Report

No: CTQC/H-17.041

Total 59 Page 36

Tested terminal: BP1BP2 Test polarity: Positive CH1:Voltage records CH2:Capacitive transferred current

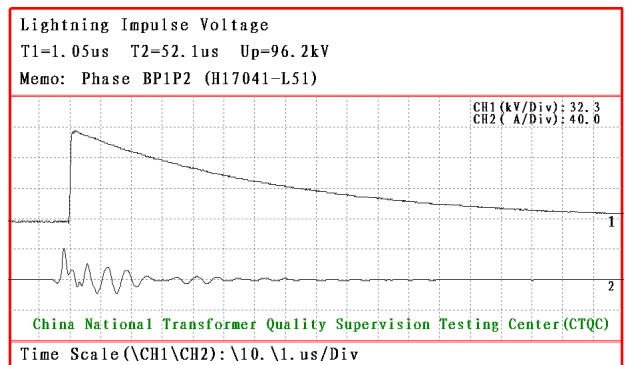
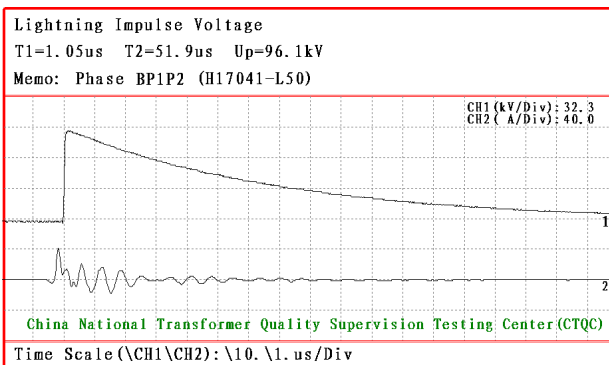
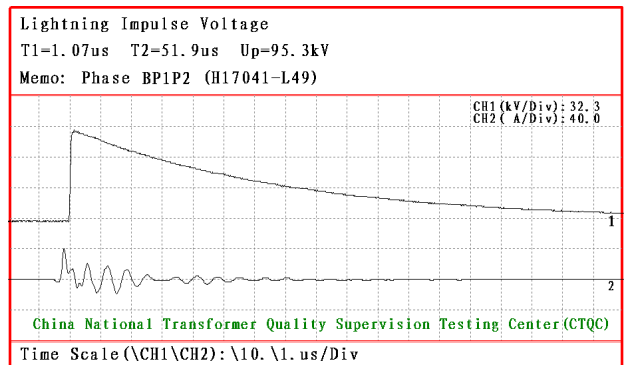
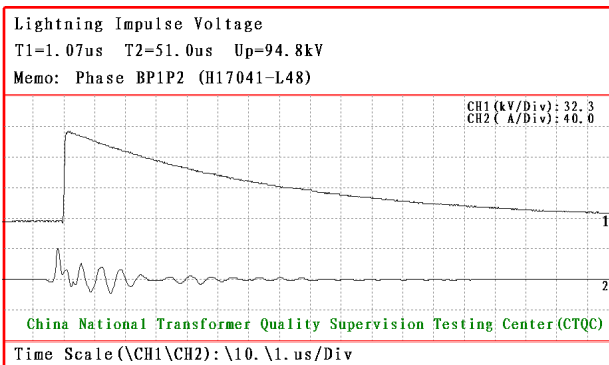
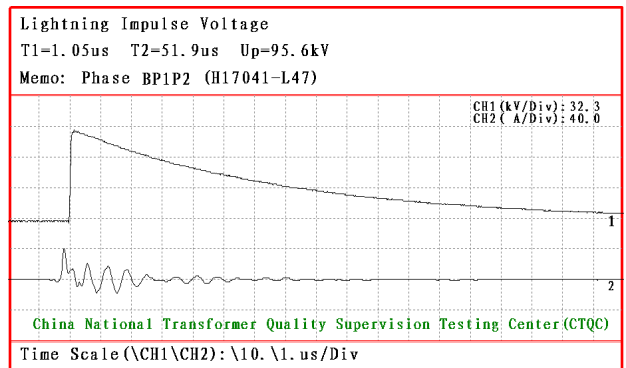
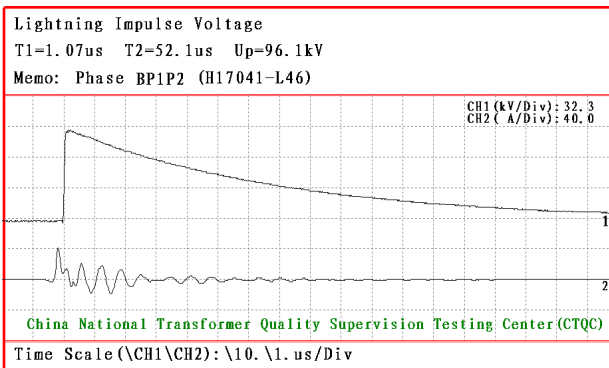
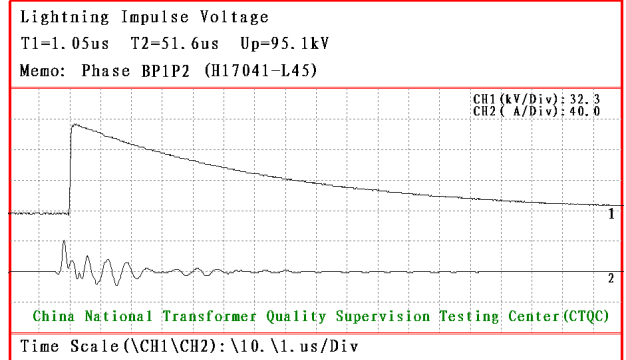
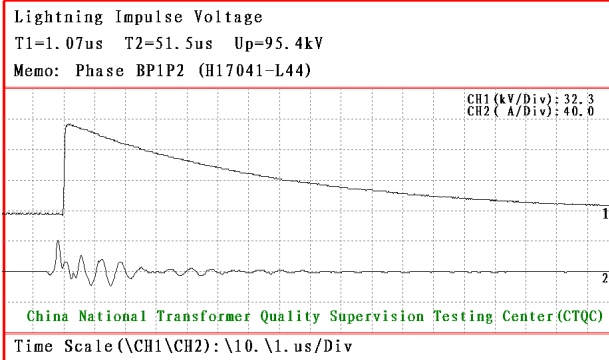


## Test Report

No: CTQC/H-17.041

Total 59 Page 37

Tested terminal: BP1BP2 Test polarity: Positive CH1:Voltage records CH2:Capacitive transferred current



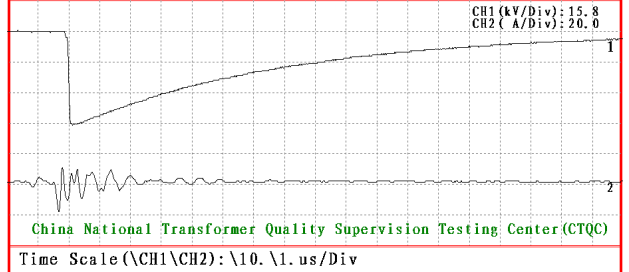
## Test Report

No: CTQC/H-17.041

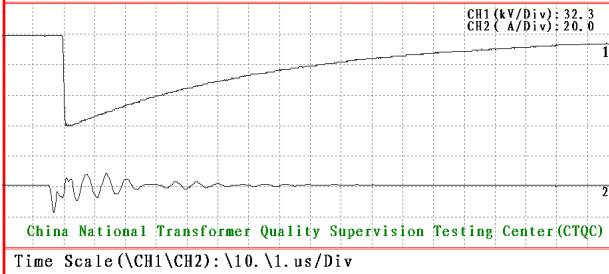
Total 59 Page 38

Tested terminal: BP1BP2  
 Test polarity: Negative  
 CH1: Voltage records  
 CH2: Capacitive transferred current

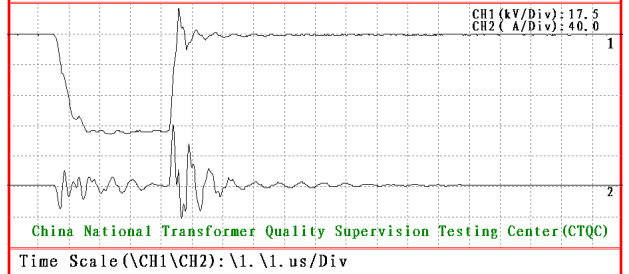
Lightning Impulse Voltage  
 T1=1.13us T2=51.1us Up=48.6kV  
 Memo: Phase BP1P2 (H17041-L52)



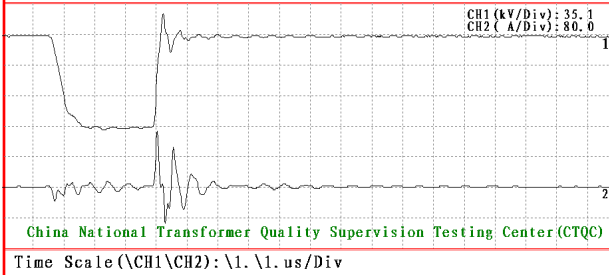
Lightning Impulse Voltage  
 T1=1.07us T2=51.3us Up=96.0kV  
 Memo: Phase BP1P2 (H17041-L53)



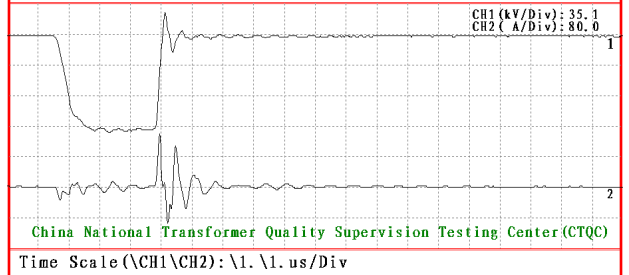
Chopped Lightning Impulse Voltage  
 T1=1.20us Tc=3.9us K=14% Up=57.2kV  
 Memo: Phase BP1P2 (H17041-L54)



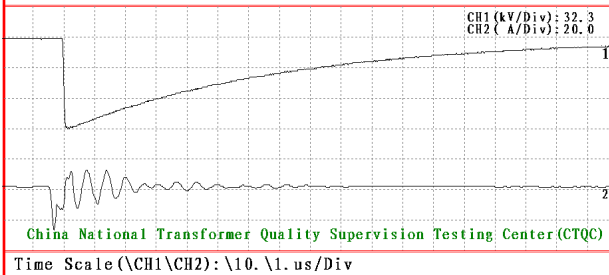
Chopped Lightning Impulse Voltage  
 T1=1.05us Tc=3.44us K=12% Up=107.7kV  
 Memo: Phase BP1P2 (H17041-L55)



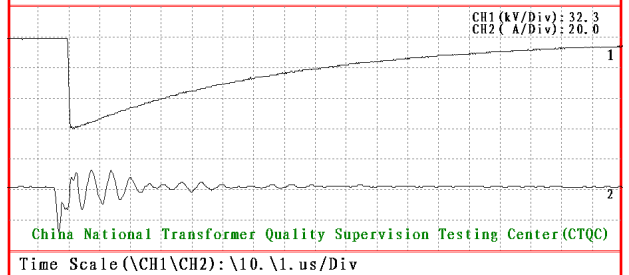
Chopped Lightning Impulse Voltage  
 T1=1.05us Tc=3.35us K=12% Up=110.0kV  
 Memo: Phase BP1P2 (H17041-L56)



Lightning Impulse Voltage  
 T1=1.05us T2=52.3us Up=95.5kV  
 Memo: Phase BP1P2 (H17041-L57)



Lightning Impulse Voltage  
 T1=1.07us T2=51.0us Up=95.8kV  
 Memo: Phase BP1P2 (H17041-L58)

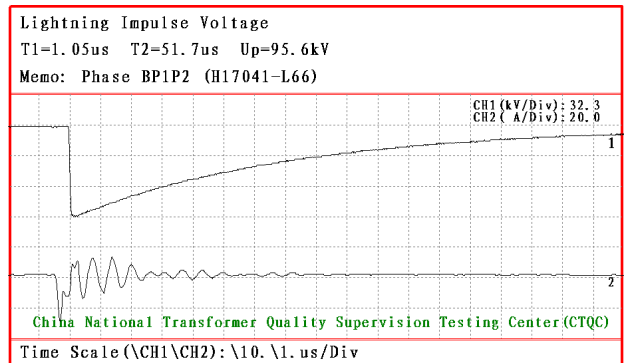
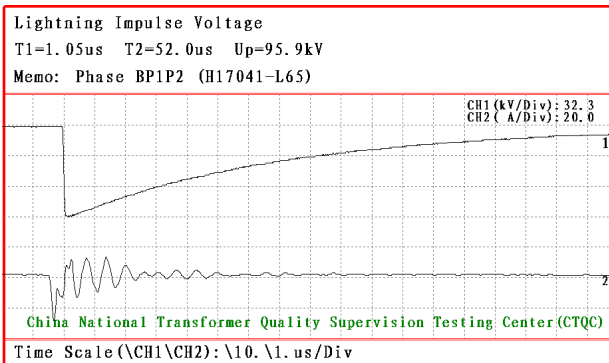
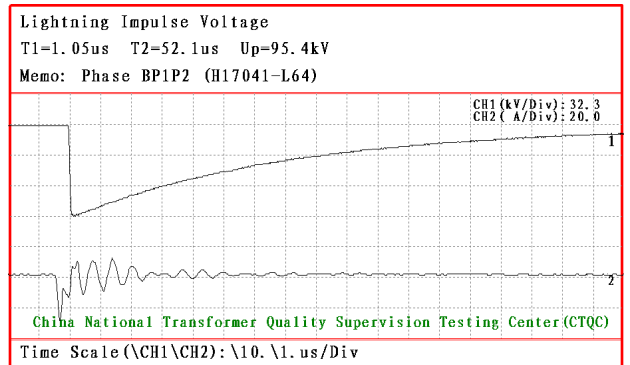
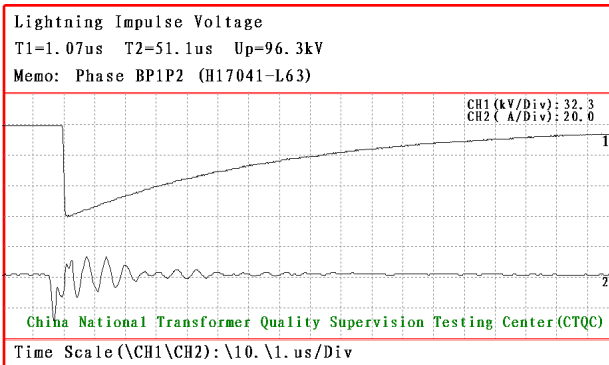
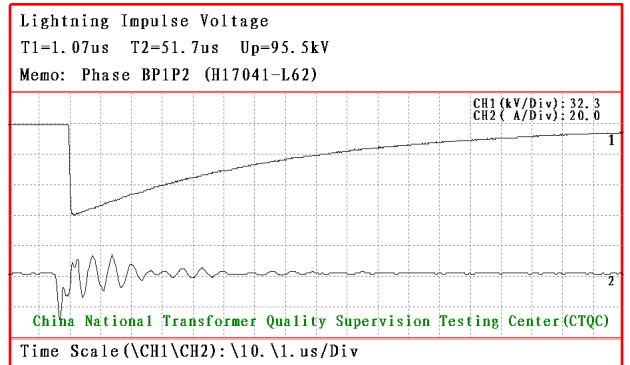
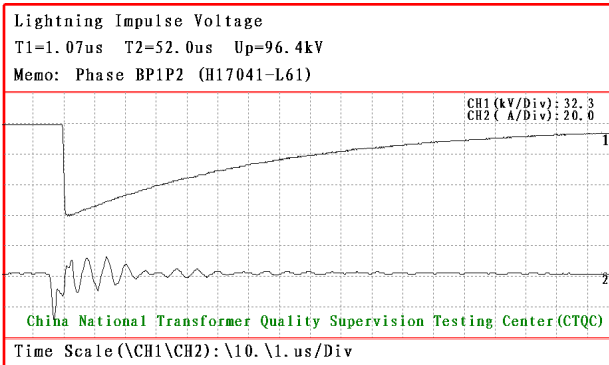
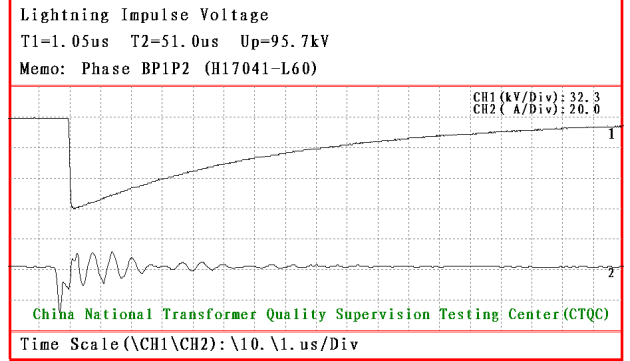
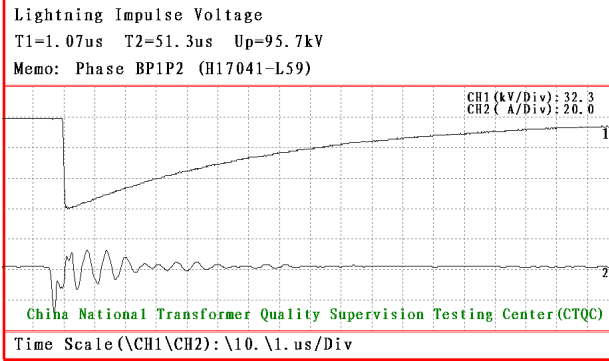




## Test Report

No: CTQC/H-17.041  
Total 59 Page 39

Tested terminal: BP1BP2 Test polarity: Negative CH1: Voltage records CH2: Capacitive transferred current

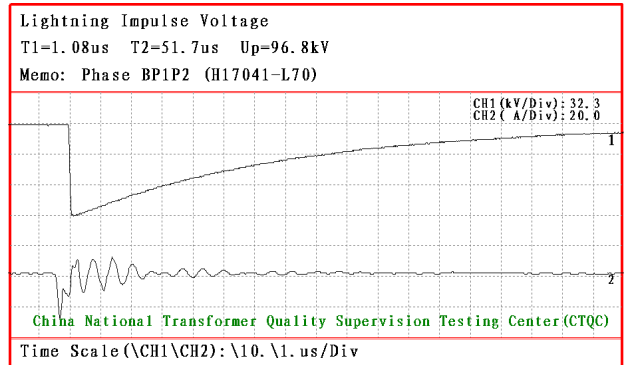
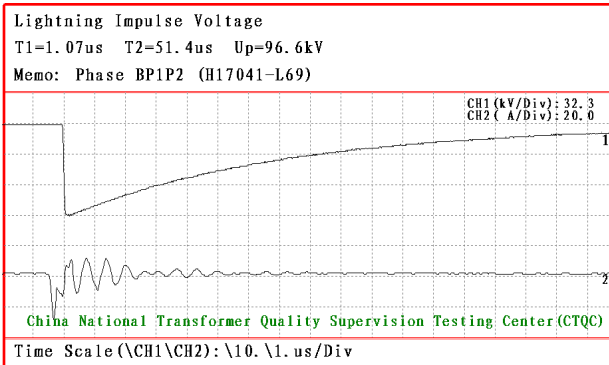
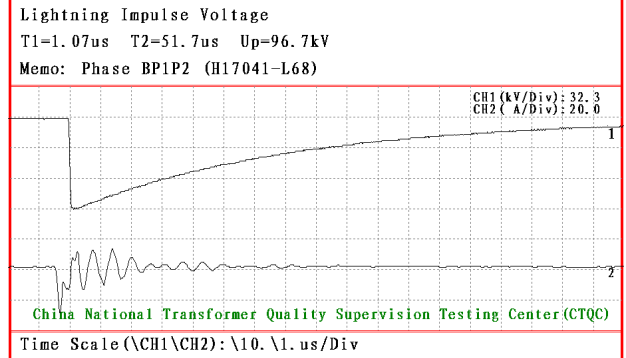
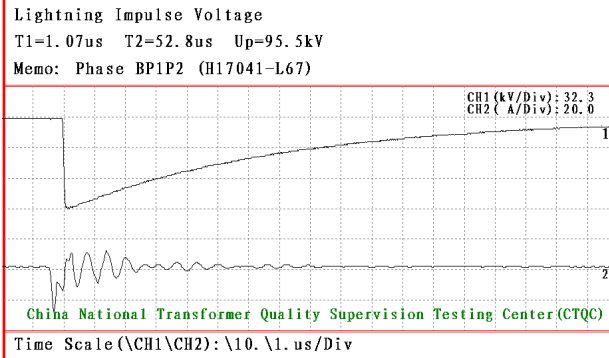


## Test Report

No: CTQC/H-17.041

Total 59 Page 40

Tested terminal: BP1BP2 Test polarity: Negative CH1:Voltage records CH2:Capacitive transferred current



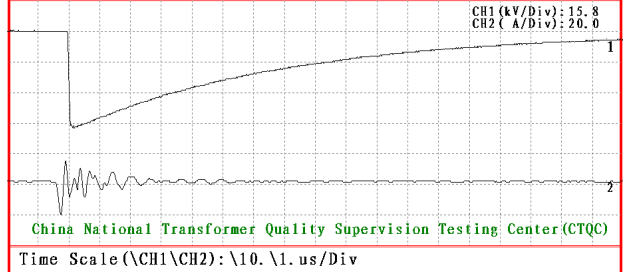
## Test Report

No: CTQC/H-17.041

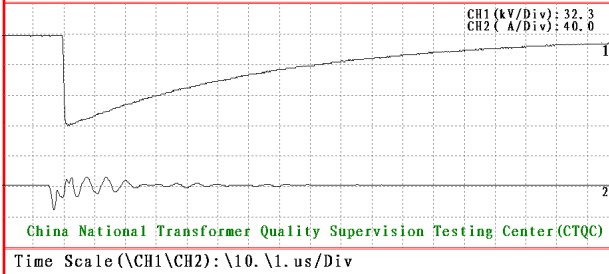
Total 59 Page 41

Tested terminal: CP1CP2  
 Test polarity: Negative  
 CH1: Voltage records  
 CH2: Capacitive transferred current

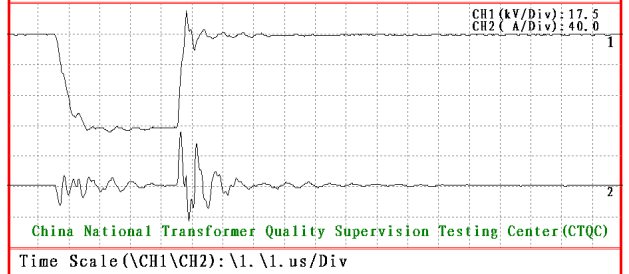
Lightning Impulse Voltage  
 T1=1.13us T2=49.3us Up=48.4kV  
 Memo: Phase CP1P2 (H17041-L71)



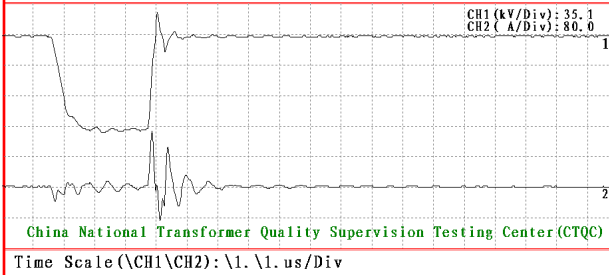
Lightning Impulse Voltage  
 T1=1.07us T2=52.1us Up=95.3kV  
 Memo: Phase CP1P2 (H17041-L72)



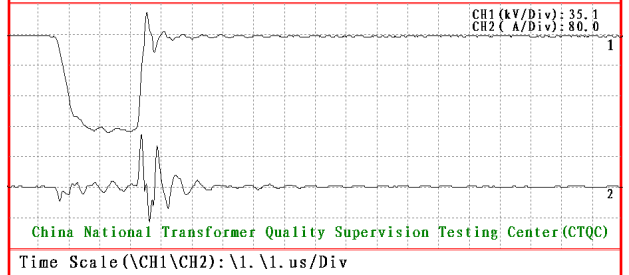
Chopped Lightning Impulse Voltage  
 T1=1.20us Tc=4.15us K=11% Up=55.7kV  
 Memo: Phase CP1P2 (H17041-L73)



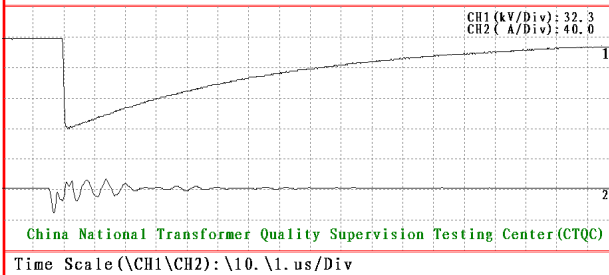
Chopped Lightning Impulse Voltage  
 T1=1.07us Tc=3.27us K=12% Up=110.3kV  
 Memo: Phase CP1P2 (H17041-L74)



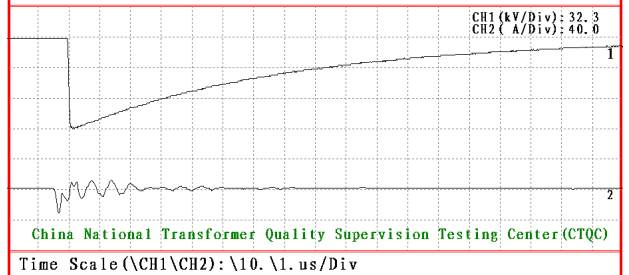
Chopped Lightning Impulse Voltage  
 T1=1.07us Tc=2.76us K=13% Up=110.1kV  
 Memo: Phase CP1P2 (H17041-L75)



Lightning Impulse Voltage  
 T1=1.07us T2=52.3us Up=95.4kV  
 Memo: Phase CP1P2 (H17041-L76)



Lightning Impulse Voltage  
 T1=1.03us T2=51.5us Up=95.5kV  
 Memo: Phase CP1P2 (H17041-L77)

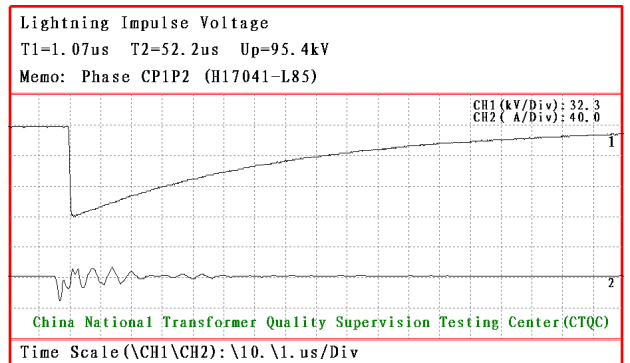
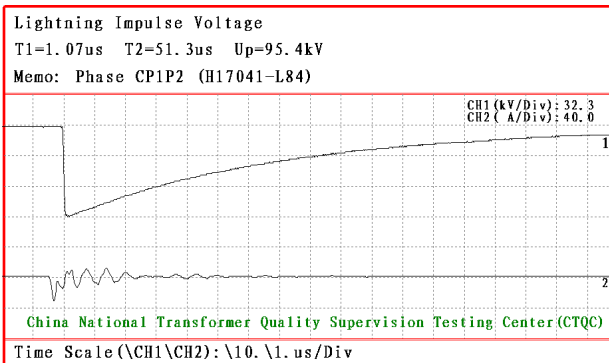
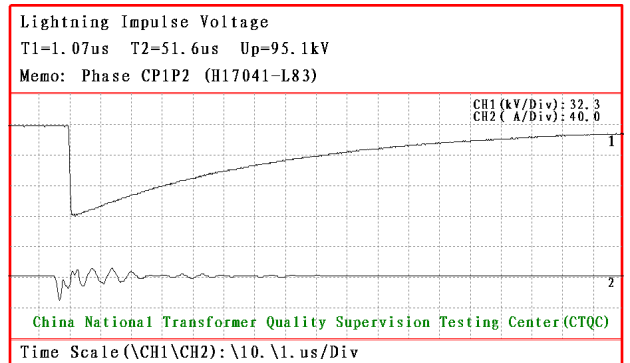
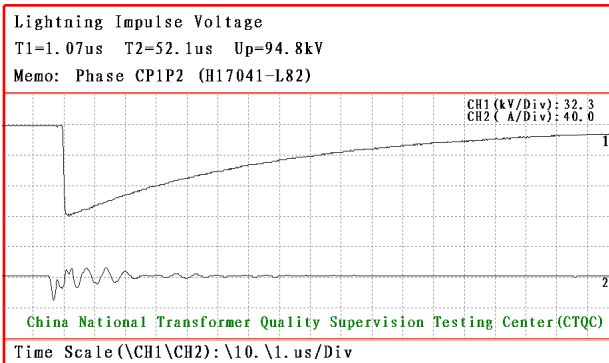
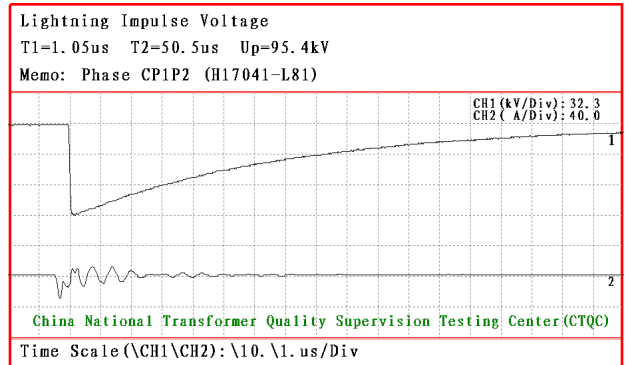
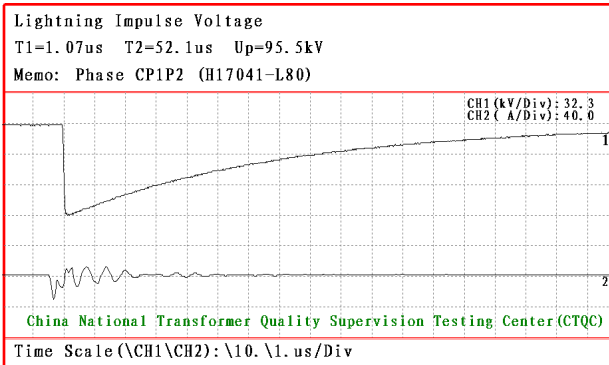
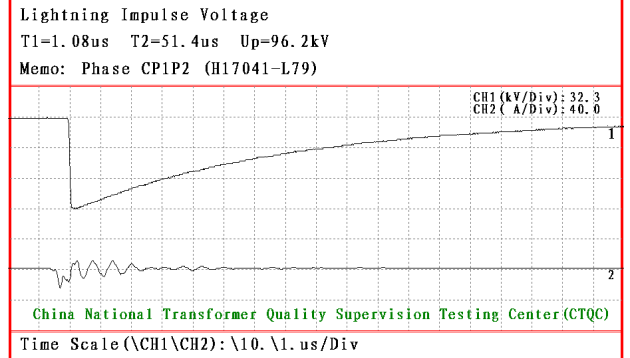
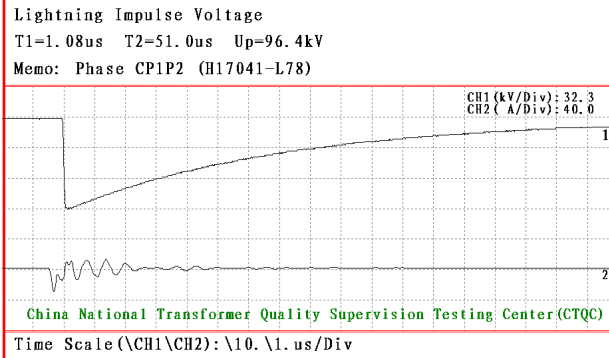


## Test Report

No: CTQC/H-17.041

Total 59 Page 42

Tested terminal: CP1CP2 Test polarity: Negative CH1:Voltage records CH2:Capacitive transferred current

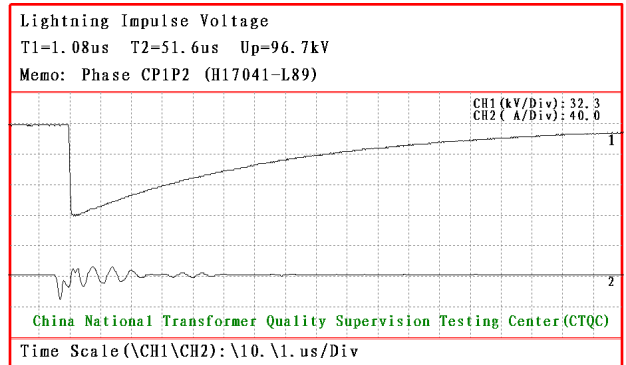
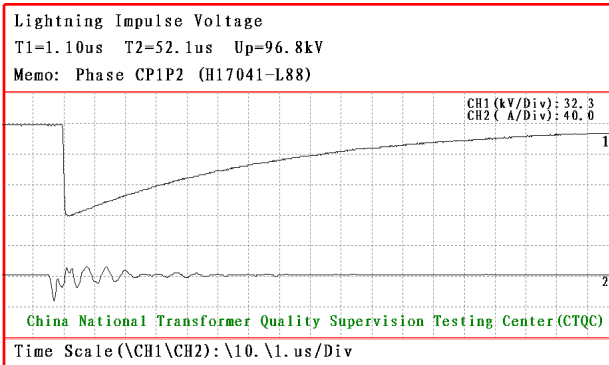
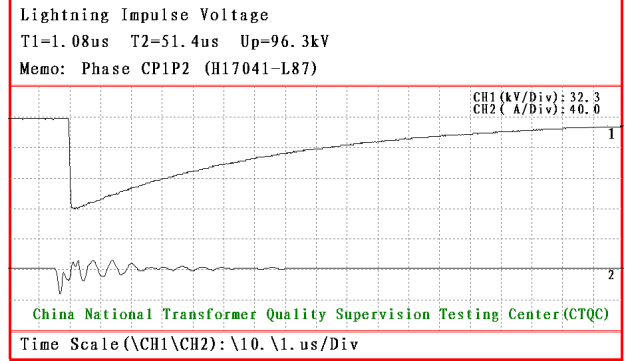
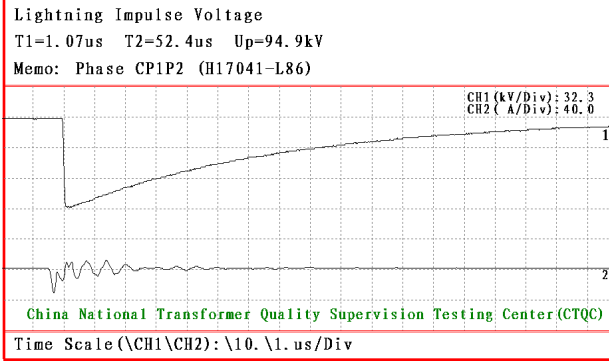


## Test Report

No: CTQC/H-17.041

Total 59 Page 43

Tested terminal: CP1CP2 Test polarity: Negative CH1:Voltage records CH2:Capacitive transferred current

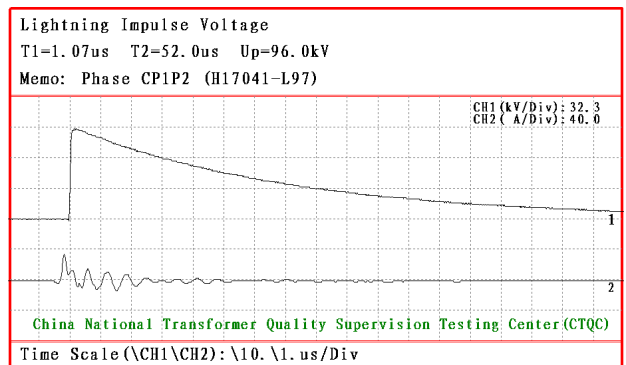
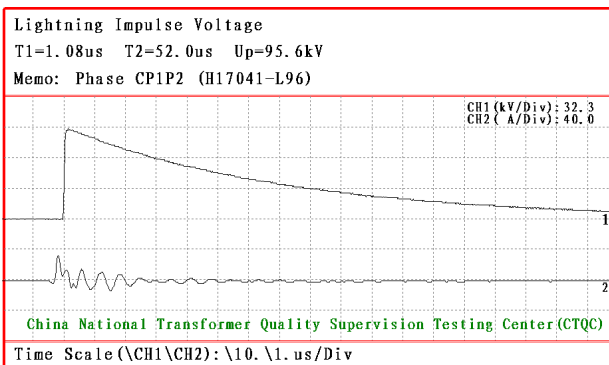
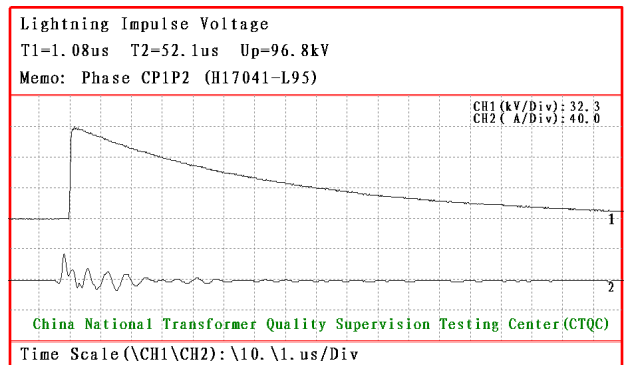
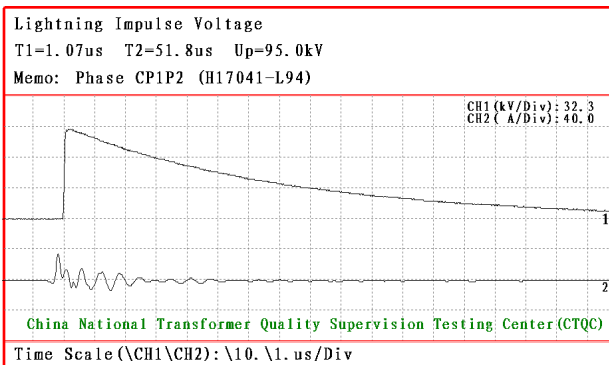
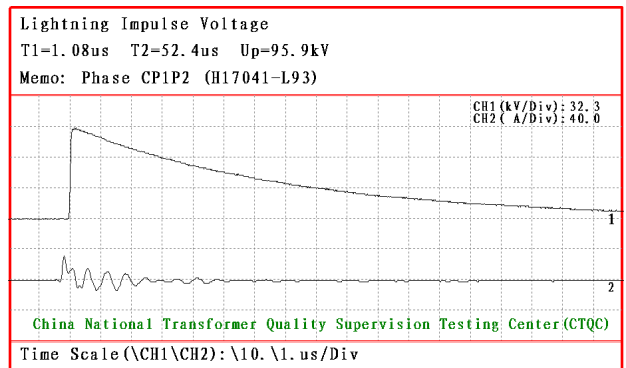
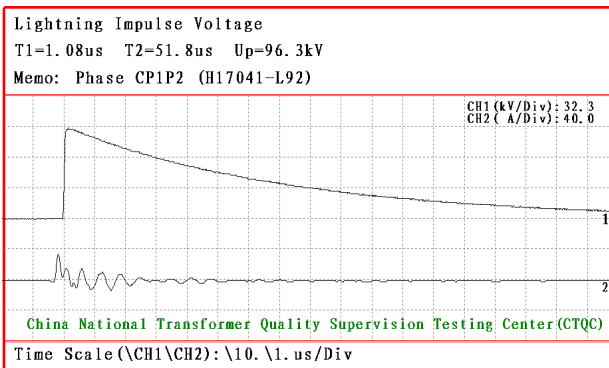
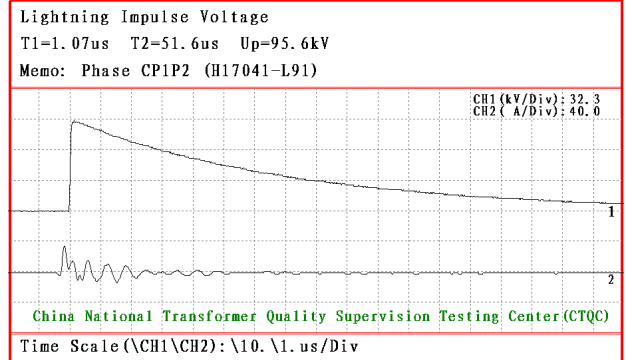
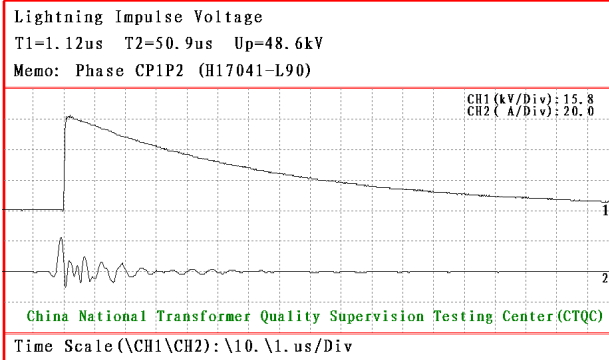


## Test Report

No: CTQC/H-17.041

Total 59 Page 44

Tested terminal: CP1CP2 Test polarity: Positive CH1:Voltage records CH2:Capacitive transferred current

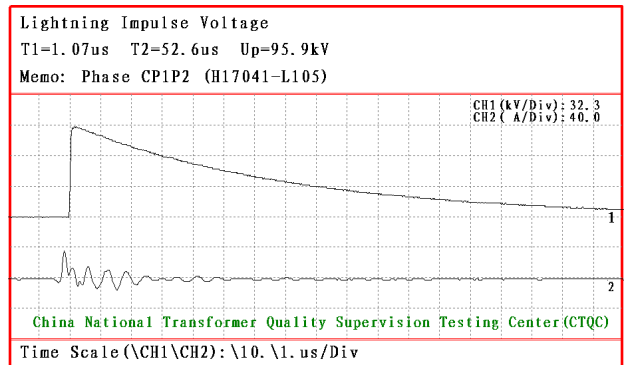
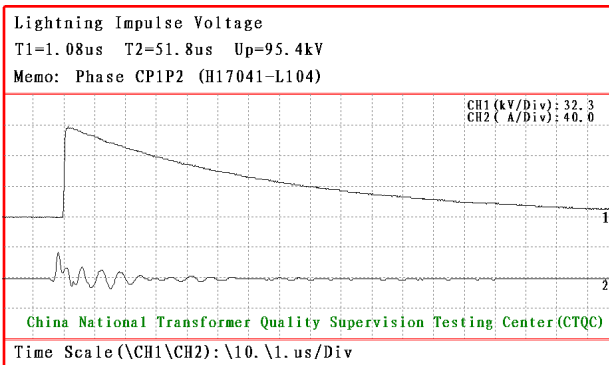
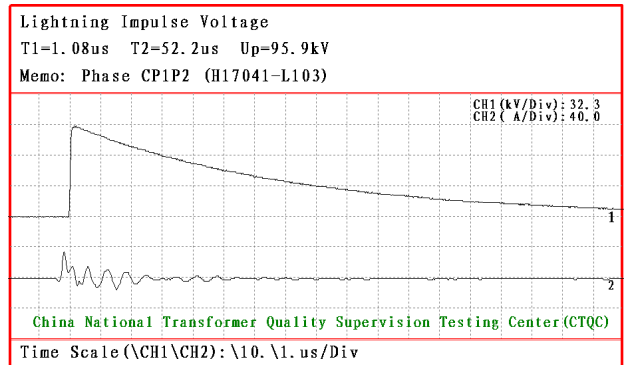
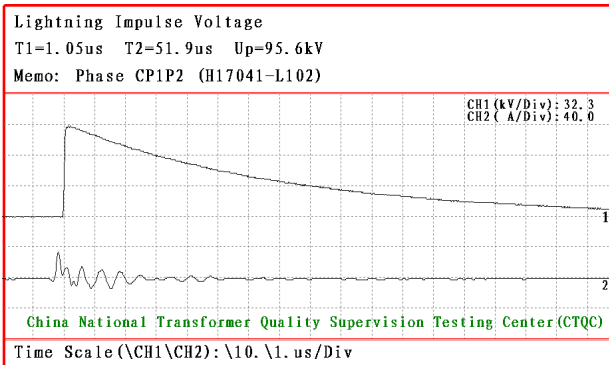
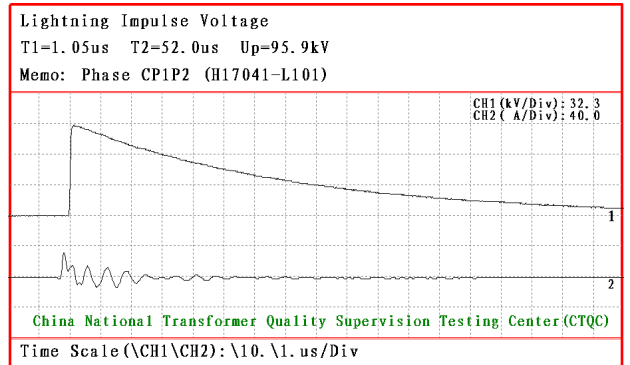
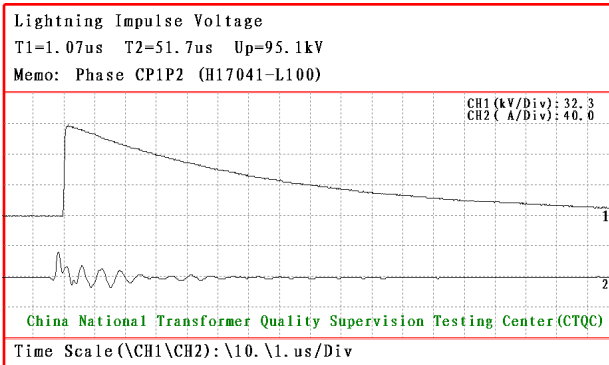
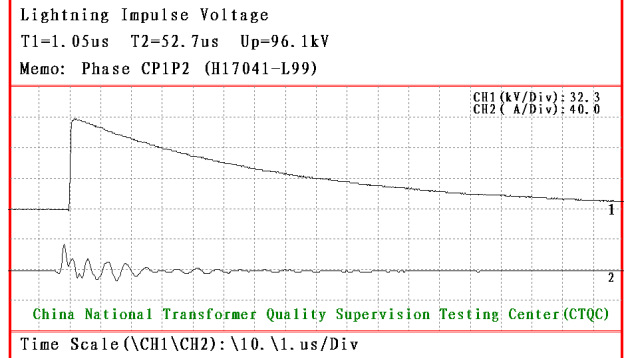
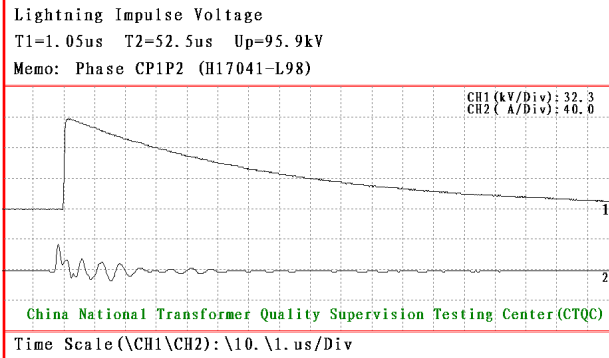


## Test Report

No: CTQC/H-17.041

Total 59 Page 45

Tested terminal: CP1CP2 Test polarity: Positive CH1:Voltage records CH2:Capacitive transferred current



Test Report				№: CTQC/H-17.041 Total 59 Page 46			
4.12 Wet test for outdoor type transformers (Type test)				Test date: May 11,2017			
Instrument name	Type	№	Accuracy	Period of validity			
Testing transformer	YDTCW-4500/3×500	SB-318709	/	/			
Power-frequency high-voltage measuring system	TRF1500-0.001	YB-318890	3.0	2018.12.15			
	PV2-1	YB-318890-2		2018.12.16			
Humidity: 61.0%; Ambient temperature: 20.0℃; Atmospheric pressure: 99.9kPa							
Applied position	Applied voltage(kV)			Frequency (Hz)	Duration (s)	Result	
	Standards value	Corrected value	Applied value				
A(AP1AP2)	38	38	38	200	30	Passed	
B(BP1BP2)	38	38	38	200	30		
C(CP1CP2)	38	38	38	200	30		
The conductivity of the water was 93μs/cm( 20℃). Vertical component: 1.6mm/min, horizontal component: 1.5mm/min.							
4.13 Short-circuit withstand capability test (Type test)				Test date: May 11,2017			
4.13.1 Short-circuit withstand capability test				Ambient temperature: 19.1℃			
Instrument name	Type	№	Accuracy	Period of validity			
16 channels analyzer	DL716	YB-312729	12bit	2017.07.07			
Shunt	FL-5/5000(1 Ω)	YB-316807	0.1	2017.08.11			
Current transformer	LMAJ1-10	YB-310780	0.2	2017.06.08			
Voltage transformer	HJ12-2	YB-320103	0.5	2019.01.04			
The primary terminals(A, B, C-N) are short-circuited, applied rated voltage on secondary terminals(a-n, b-n, c-n), measuring current on secondary terminals, duration is 1.0s. The test waveshapes have no distortion, the oscillograms is shown in page 48. It is not visibly damaged, the photos before and after S.C.T. are shown in page 59.							
/	Rated value	Measured value					
Windings	a, b, c-n	a-n	b-n	c-n			
Primary terminals rated voltage (V)	120	124.54	123.69	124.89			
Duration (s)	1.0	1.0	1.0	1.0			
Secondary terminals current r.m.s. (A)	/	a-n	64.07	b-n	64.21	c-n	64.07
The conductivity of the primary copper winding is 57m/Ω.mm <sup>2</sup> at 20℃, which is larger than 97% of the value (58 m/Ω.mm <sup>2</sup> ), the calculated short-time current density in the primary winding is 21.84A/mm <sup>2</sup> , which is less than 180 A/mm <sup>2</sup> . The insulation next to the surface of the conductor doesn't have to be disassembled.							

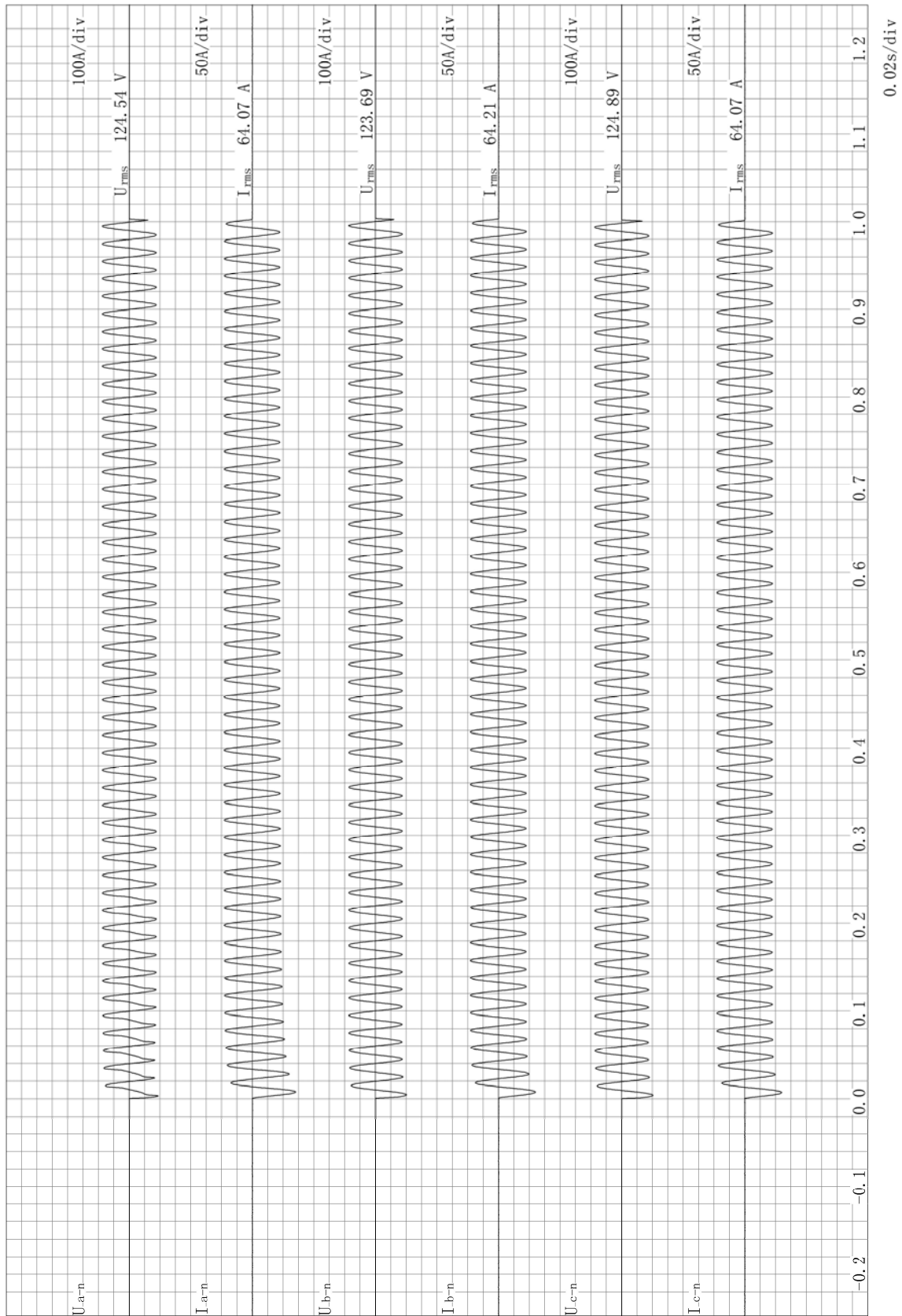


Test Report				№: CTQC/H-17.041 Total 59 Page 47			
4.13.2 Test items after short-circuit withstand capability test See 4.14.2							
4.13.3 Result: Passed.							
4.14 Short-time current tests(Type test)							
4.14.1 Short-time current tests				Test date: May 11,2017 Ambient temperature: 19.1℃			
Instrument name	Type	№	Accuracy	Period of validity			
16 channels analyzer	DL716	YB-312729	12bit	2017.07.07			
Standard transformer	LRGBT-05	SB-312658	0.2	2018.11.20			
Shunt	FL-5/5000(1 Ω)	YB-316809	0.1	2017.08.10			
Injected dynamic and thermal current on primary terminals of transformer, the secondary terminals are short-circuited with earth, the test current values are compliance with standards. Test oscillogram is shown in page 49~50. It is not visibly damaged after S.C.T. The photos before and after S.C.T. are shown in page 59.							
Rated dynamic current (kA)			Rated short-time thermal current (kA)				
Standard value	Measured value			Standard value	Measured value		
	AP1-AP2	BP1-BP2	CP1-CP2		AP1-AP2	BP1-BP2	CP1-CP2
4.0	4.18	4.18	4.16	1.6	1.65	1.66	1.66
Duration(s)			$I^2t(10^6J)$				
Standard value	Measured value			Standard value	Measured value		
	AP1-AP2	BP1-BP2	CP1-CP2		AP1-AP2	BP1-BP2	CP1-CP2
1.0	1.0	1.0	1.0	2.56	2.72	2.76	2.76
The conductivity of the primary copper winding is $58m/\Omega \cdot mm^2$ , which is larger than 0.97 of the value ( $58m/\Omega \cdot mm^2$ , at 20℃) and the calculated short-time current density in the primary winding is $138.33A/mm^2$ , it's less than $180A/mm^2$ . The insulation next to the surface of the conductor doesn't have to be examined.							
Result: Passed.							

## Test Report

No: CTQC/H-17.041

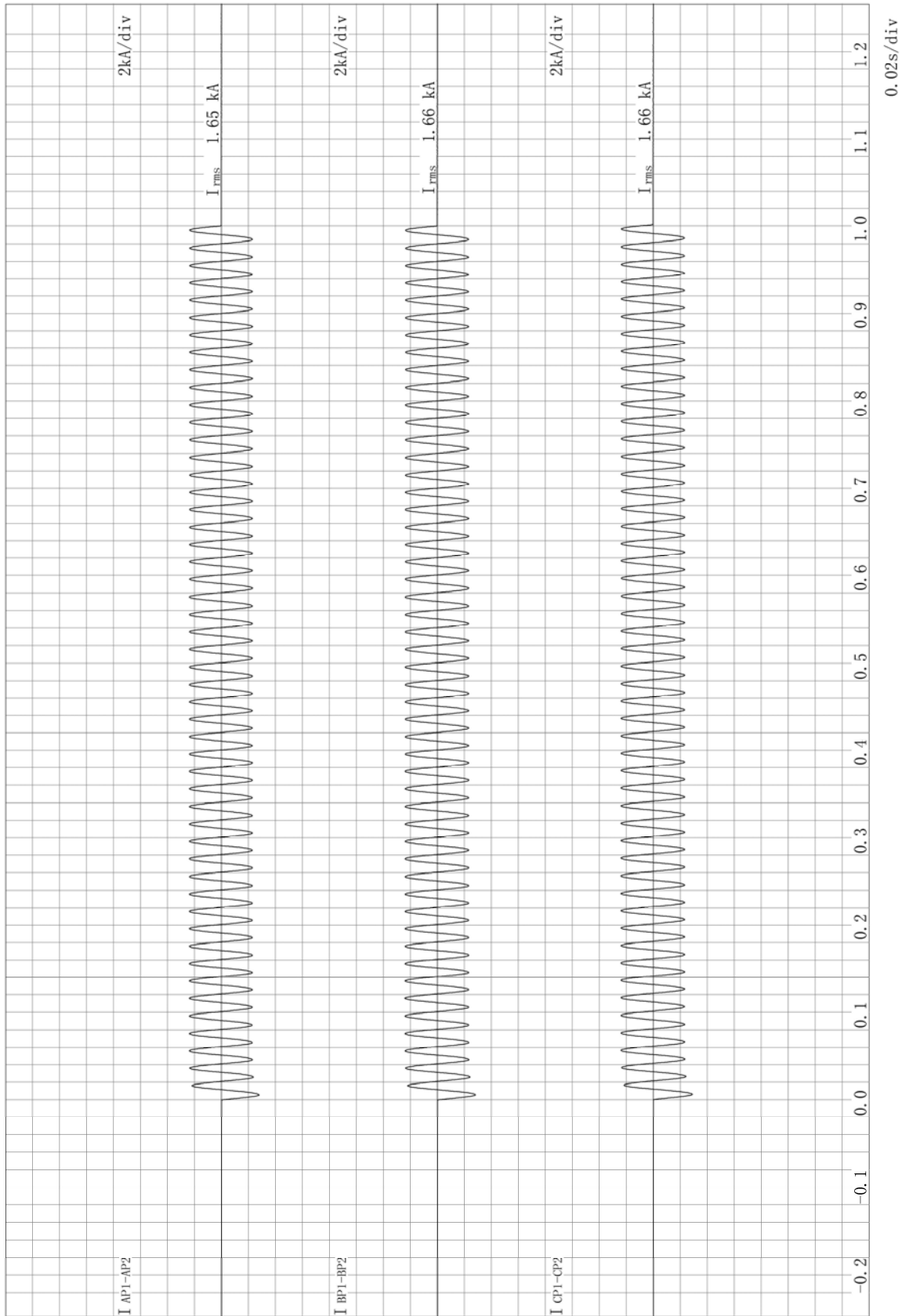
Total 59 Page 48



HI7041

Test Report

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Total 59 Page 49

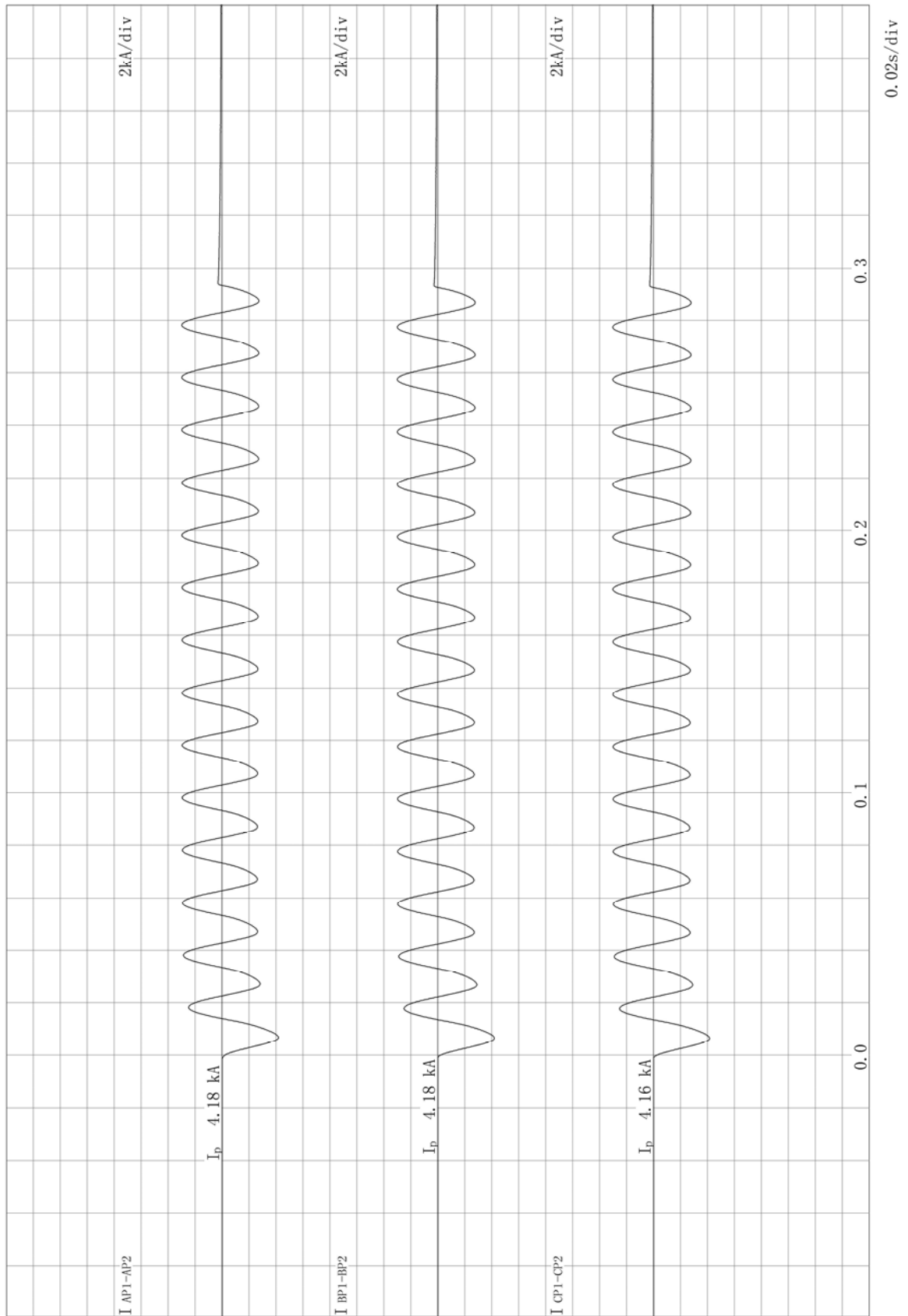


HI7041

## Test Report

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H17041

Test Report				№: CTQC/H-17.041 Total 59 Page 51	
4.14.2 Test items after short-circuit withstand capability test and short-time current tests					
4.14.2.1 Power-frequency voltage withstand tests on secondary terminals Test date: May 15,2017					
Instrument name	Type	№	Accuracy	Period of validity	
Power-frequency high-voltage testing system	AC-2008	YB-114219	3.0	2017.08.11	
Humidity: 32.0%; Ambient temperature: 17.9°C; Atmospheric pressure: 101.2kPa					
Applied position	Applied voltage(kV)	Duration(s)	Result		
Secondary terminals to earth	2.7	60	Passed		
4.14.2.2 Power-frequency voltage withstand test on end terminal of primary terminals					
Test date: May 15,2017					
Instrument name	Type	№	Accuracy	Period of validity	
Testing transformer	YDTC-30/2×150	SB-202302	/	/	
Power-frequency high-voltage measuring system	TRF150-0.001	YB-116141	3.0	2018.12.15	
	PV2-1	YB-219709		2017.08.29	
Humidity: 32.0%; Ambient temperature: 17.9°C; Atmospheric pressure: 101.2kPa					
Applied position	Applied voltage(kV)	Duration(s)	Result		
A(APIAP2)N-E	18	60	Passed		
B(BP1BP2)N-E	18	60			
C(CP1CP2)N-E	18	60			

Test Report				№: CTQC/H-17.041
				Total 59 Page 52
4.14.2.3 Induced voltage withstand test				Test date: May 15,2017
Instrument name	Type	№	Accuracy	Period of validity
Testing transformer	YDTW-30/2×150	SB-202302	/	/
Generator	TFZP500-12	SB-101002	/	/
Power-frequency high-voltage measuring system	TRF150-0.001	YB-116141	3.0	2018.12.15
	PV2-1	YB-219709		2017.08.29
Humidity: 32.0%; Ambient temperature: 17.9°C; Atmospheric pressure: 101.2kPa				
Applied position	Applied voltage(kV)	Frequency(Hz)	Duration(s)	Result
A(AP1AP2)	34.2	150	40	Passed
B(BP1BP2)	34.2	150	40	
C(CP1CP2)	34.2	150	40	
4.14.2.4 Inter-turn overvoltage test				Test date: May 15,2017
Instrument name	Type	№	Accuracy	Period of validity
Up-flow reactor	YL30	SB-102013	/	/
Standard current transformer	BDL-1	YB-109074	0.01	2018.10.25
Open-circuit voltage meter	CT106	YB-114140	3.0	2017.12.25
Humidity: 32.0%; Ambient temperature: 17.9°C; Atmospheric pressure: 101.2kPa				
Windings	Primary terminal applied current (A)	Peak voltage of secondary open-circuit terminal(V)	Duration (s)	Result
as1-as3	21.6	34	60	Passed
bs1-bs3	21.6	34	60	
cs1-cs3	21.6	34	60	

Test Report				№: CTQC/H-17.041 Total 59 Page 53		
4.14.2.5 Partial discharge measurement				Test date: May 15,2017		
Instrument name	Type	№	Accuracy	Period of validity		
Testing transformer	YDTC-30/2×150	SB-202302	/	/		
Generator	TFZP500-12	SB-101002	/	/		
Power-frequency high-voltage measuring system	TRF150-0.001	YB-116141	3.0	2018.12.15		
	PV2-1	YB-219709		2017.08.29		
Partial discharge measuring system	TWPD-02	YB-319534	10	2017.12.12		
	TWPD-2B	YB-319201		2017.07.26		
Humidity: 32.0%; Ambient temperature: 17.9°C; Atmospheric pressure: 101.2kPa						
Applied terminals	Applied voltage (kV)	Duration (s)	Measured voltage (kV)	Duration (s)	Partial discharge level (pC)	Result
A(AP1AP2)	34.2	40	21/12.1	30	6/2	Passed
B(BP1BP2)	34.2	40	21/12.1	30	3/2	
C(CP1CP2)	34.2	40	21/12.1	30	4/2	
<p>Note: According to procedure A of clause 7.3.2.2 of IEC61869-1: 2007. Background partial discharge level is &lt;2pC before test and after test.</p>						

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## 4.14.2.6 Tests for accuracy

## 4.14.2.6.1 Tests for voltage ratio error and phase displacement

Test date: May 15,2017

Instrument name	Type	№	Accuracy	Period of validity
Testing transformer	YDTW-150/150	SB-102021	/	/
Standard voltage transformer	HJ-20	YB-110074	0.01	2018.08.19
Voltage transformer checkout meter	PT101	YB-114204	2.0	2017.12.25
Load box	FY60	YB-331031	3.0	2017.08.18
		YB-331029		
		YB-331042		

No current supplied to the current transformer, measure voltage ratio error and phase displacement of the voltage transformer.

Winding	Accuracy class	Voltage ratio	U/Ur (%)	Burden (VA) cosφ=0.8	Ratio error (%)	Phase displacement (′)	Burden (VA) cosφ=0.8	Ratio error (%)	Phase displacement (′)
a-n	0.5	$\frac{12.47/\sqrt{3}}{0.12}$	120	50	-0.210	-8.30	12.5	0.250	-2.36
			100		-0.211	-8.36		0.249	-2.38
			80		-0.213	-8.39		0.247	-2.40
b-n	0.5	$\frac{12.47/\sqrt{3}}{0.12}$	120	50	-0.197	-7.89	12.5	0.262	-2.24
			100		-0.197	-7.94		0.261	-2.25
			80		-0.199	-7.95		0.260	-2.27
c-n	0.5	$\frac{12.47/\sqrt{3}}{0.12}$	120	50	-0.217	-8.26	12.5	0.251	-2.37
			100		-0.218	-8.26		0.250	-2.38
			80		-0.218	-8.33		0.249	-2.41

Result: Passed.



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## 4.14.2.6.2 Test for current ratio error and phase displacement

Test date: May 10,2017

Instrument name	Type	No	Accuracy	Period of validity
Up-flow reactor	YL30	SB-102013	/	/
Standard current transformer	BDL-1	YB-109074	0.01	2018.10.25
Transformer checkout meter	HESD	YB-114139	2.0	2017.08.24
Load box	FY49-B	YB-111146	3.0	2018.02.27

When the voltage transformer is without energized, measure current ratio error and phase displacement of the current transformer.

Winding	Accuracy class	Current ratio	I/Ir (%)	Burden (VA) cosφ=0.8	Ratio error (%)	Phase displacement (′)	Burden (VA) cosφ=0.8	Ratio error (%)	Phase displacement (′)
as1-as3	0.5S	$\frac{20}{5}$	120	12.5	0.0376	0.869	3.125	0.0460	1.986
			100		0.0244	1.475		0.0456	2.188
			20		0.0177	2.243		0.0546	1.926
			5		0.0156	3.060		0.0585	2.164
			1		0.0176	3.512		0.0623	2.283
as2-as3	0.5S	$\frac{10}{5}$	120	12.5	0.0365	1.592	3.125	0.0956	1.941
			100		0.0436	1.053		0.0955	1.795
			20		-0.0159	2.281		0.0788	3.346
			5		-0.073	7.26		0.085	5.03
			1		-0.082	10.37		0.098	6.11

Test Report								No: CTQC/H-17.041 Total 59 Page 56	
Winding	Accuracy class	Current ratio	I/Ir (%)	Burden (VA) cosφ=0.8	Ratio error (%)	Phase displacement (′)	Burden (VA) cosφ=0.8	Ratio error (%)	Phase displacement (′)
bs1-bs3	0.5S	$\frac{20}{5}$	120	12.5	0.0241	1.114	3.125	0.0457	1.244
			100		0.0172	1.179		0.0446	1.266
			20		-0.0052	1.441		0.0356	1.932
			5		-0.0331	3.853		0.0398	3.162
			1		-0.021	6.16		0.0487	3.789
bs2-bs3	0.5S	$\frac{10}{5}$	120	12.5	0.0152	1.342	3.125	0.0933	0.571
			100		0.0299	0.301		0.0885	0.644
			20		-0.0649	0.904		0.0326	2.796
			5		-0.215	7.22		0.019	7.75
			1		-0.257	17.02		0.037	9.81
cs1-cs3	0.5S	$\frac{20}{5}$	120	12.5	0.0245	0.918	3.125	0.0385	2.851
			100		0.0130	1.417		0.0406	1.585
			20		-0.0178	2.236		0.0352	2.402
			5		-0.0387	4.966		0.0475	3.754
			1		-0.025	7.13		0.0543	4.362
cs2-cs3	0.5S	$\frac{10}{5}$	120	12.5	-0.048	1.873	3.125	0.0749	1.675
			100		0.0181	0.333		0.0728	1.373
			20		-0.1046	1.474		0.0154	3.726
			5		-0.275	10.20		0.007	9.46
			1		-0.307	20.97		0.031	11.46

Result: Passed.

4.14.3 The results of short-time current tests and short-circuit withstand capability test:  
Passed.

Test Report			No: CTQC/H-17.041 Total 59 Page 57	
4.15 Pollution creepage distance measurement (Special test)			Test date: May 15,2017	
Pollution level	Highest voltage for equipment(kV)	Creepage distance (mm)	Arcing distance (mm)	
III	17.5	550	360	
Minimum creepage distance ratio between phase to earth(mm/ kV)		Creepage distance/arcing distance		
Standard value	Calculated value	Standard value	Calculated value	
≥25	31.4	≤4.0	1.53	
Result: Passed.				
4.16 Verification of the degree of protection by enclosures (Type test)			Test date: May 15,2017	
4.16.1 Tests for protection against solid foreign objects				
The test is carried out on the secondary terminal box and bracket cable box which are consistent with the secondary terminal box and bracket cable box attached to the transformer body. Transformer secondary terminal box and bracket cable box are put at the normal working position in experiment box where the powder circulation pump is suitable to maintain the talcum powder in suspension. The amount of talcum powder to be used is 2kg per cubic metre of the test chamber volume, duration 8h. There are no obvious dust deposition in the secondary terminals box and bracket cable box.				
Result: Passed.				
4.16.2 Tests for protection against water				
Internal diameter for the nozzle(mm)	6.3			
Delivery(L/min)	12.5			
Distance from nozzle to sample surface(m)	2.5			
Duration(min)	3			
Temperature of the sample(°C)	21.0			
Water temperature(°C)	20.5			
Area of the sample(m <sup>2</sup> )	<0.041(Secondary terminal box); <0.089(Bracket cable outlet box)			
Spray the instrument transformer secondary terminal box with the raining device for wet test, no water stain found inside the testing product.				
Note: The test is carried out on the secondary terminal box and bracket cable box which are consistent with the secondary terminal box and bracket cable box attached to the transformer body.				
Result: Passed.				

Test Report	No: CTQC/H-17.041 Total 59 Page 58
<p data-bbox="213 338 624 369">4.16.3 Mechanical impact test</p> <p data-bbox="1211 338 1481 369">Test date: May 15,2017</p> <p data-bbox="213 409 1473 627">Test is performed on the transformer secondary terminal box and bracket cable box. The hammer drop height is 400mm each time producing 2J impact power. 3 impacts is applied on the weakest points of the shell(on the front, on the top of the secondary terminal box and on the front, on the top, on side of bracket cable box). All together 15 impacts.(Porcelain insulator and fittings such as part of the shell wasn't performed the test). After the test, the enclosures shall not be cracked, and the deformation of the enclosures shall not affect the normal performance of the transformer and do not degrade the protective level.</p> <p data-bbox="213 654 400 685">Result: Passed.</p> <p data-bbox="213 736 1469 808">4.16.4 Degrees of protection provided by enclosures is IP55 and degrees of mechanical impact is IK7 for the sample.</p>	

## Test Report

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Before test:

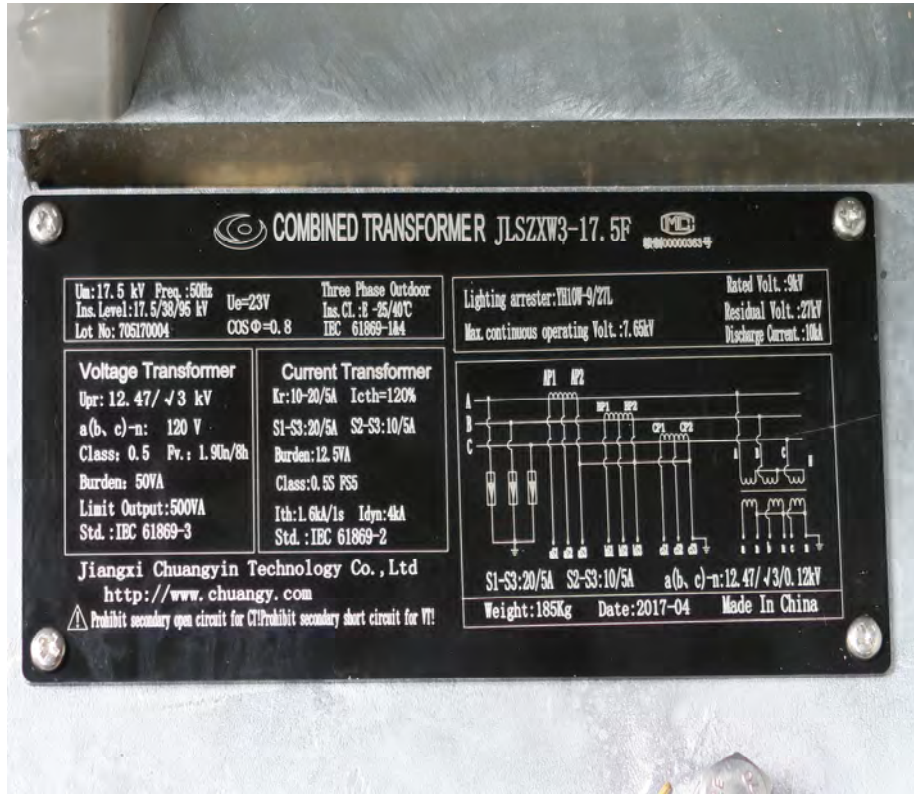


After test:



RATING PLATE PHOTO

Rating plate:



TRANSFORMER DRAWINGS



2/5

郑林



COMBINED TRANSFORMER JLSZXW3-17.5F

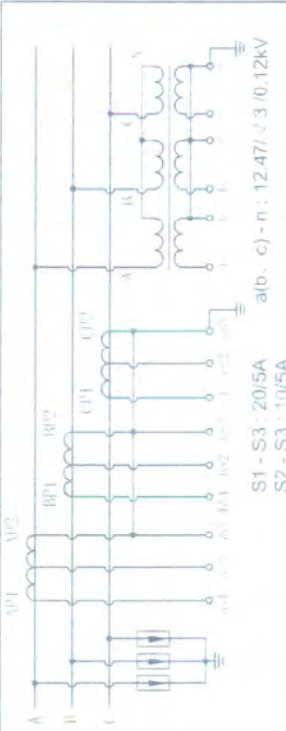


Um: 17.5 kV Freq.: 50 Hz Three Phase Outdoor  
 Ins. Level: 17.5/38/95 kV Ue=xxV Ins. Cl.: E -25/40 °C  
 Lot No: 70517xxxx COSφ=0.8 IEC 61869-1&4

**Voltage Transformer**  
 U<sub>Pr</sub>: 12.47/√3 kV  
 a(b, c)-n: 120 V  
 Class: 0.5 Fv: 1.9Un/8h  
 Burden: 50VA  
 Limit Output: 500VA  
 Std.: IEC 61869-3

**Current Transformer**  
 Kr: 10-20/5A I<sub>cth</sub>=120%  
 S1-S3: 20/5A S2-S3: 10/5A  
 Burden: 12.5VA  
 Class: 0.5S FS5  
 I<sub>lth</sub>: 1.6kA/1s I<sub>dyn</sub>: 4kA  
 Std.: IEC 61869-2

Lighting arrester: YH10W-9/27L  
 Rated Volt.: 9kV  
 Residual Volt.: 27kV  
 Discharge Current.: 10kA  
 Max. continuous operating Volt.: 7.65kV



Weight: xxx kg Date: YYYY-MM Made In China

Jiangxi Chuangyin Technology Co., Ltd  
<http://www.chuangyin.com>

⚠ Prohibit secondary open circuit for CT! Prohibit secondary short circuit for VT!

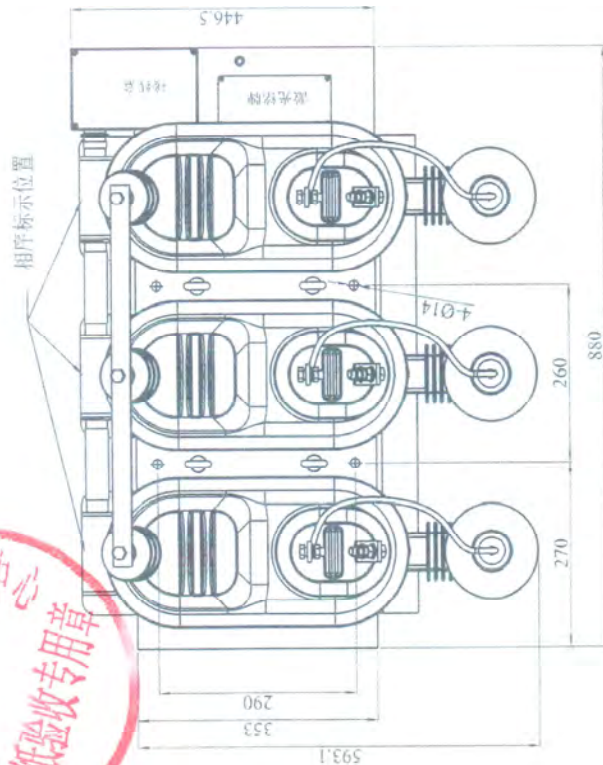
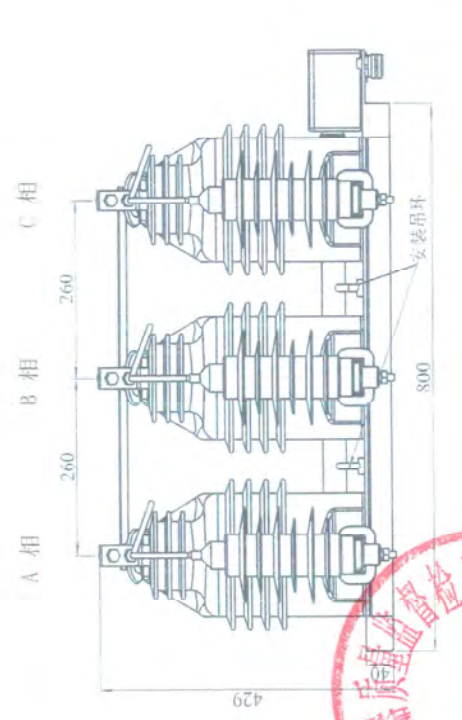
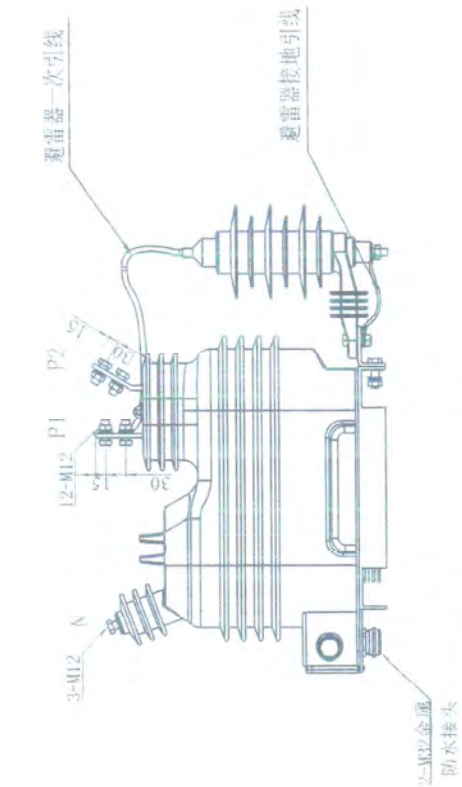


本公司委	编号	标记	日期	JLSZXW3-17.5F			CY/QW-PO. 705. 003. 004
	项目	设计	审核	电流电压组合式互感器			名称: 激光铭牌
	校核	批准	比例	A			深圳市创银科技股份有限公司
标准化			版本	A			
				共 页			



资料

郑光明



A  
310241-801748  
41 00203A

出线盒相序及  
变比标示不意



未注公差	±0.5°	变更内容	容量	日期
角	±0.5°	项目	设计	日期
3-6	±1	设计	校对	日期
6-30	±1.5	审核	批准	日期
30-120	±2.5	批	准	日期
120-1000	±4	批	准	日期
1000-2000	±6	批	准	日期

JLSZXW3-17.5F		名称: 外形图
电流电压组合式互感器		深圳市创银科技股份有限公司
视图	版本	比例
	A	1:1
第 1 页	共 1 页	

图1 外形尺寸



# CHPTL

中国大容量试验联盟(简称 CHPTL)是中国同类试验机构的唯一协作组织, 隶属于中国电工技术学会. 其主要目标是规范国家标准, 行业标准及 IEC 标准在电力设备(交流 1000V 以上 直流 1200V 以上)Type test 试验中的协调应用.

China High Power Testing liaison (CHPTL) is the only organization in China which is formed to promote and coordinate the application of IEC/GB standard as well as industry standards in power electrical equipment type test (AC above 1000V, DC above 1200V). CHPTL is under the leadership and management of China Electro-technical Society.

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The members of CHPTL are as follows:

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Xi'an High Voltage Apparatus Research Institute Co., Ltd. (XIHARI)

中国电力科学研究院(CEPRI)

China Electrical Power Research Institute (CEPRI)

辽宁高压电器产品质量检测有限公司(AQTC)

Liaoning High Voltage Apparatus Quality Test Co., Ltd. (AQTC)

沈阳变压器研究院股份有限公司变压器实验室(STRI)

Shenyang Transformer Institute Co., Ltd Transformer Laboratory (STRI)

上海电气输配电试验中心有限公司(SETC)

Shanghai Electric Power Transmission & Distribution Testing Center Co., Ltd. (SETC)

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Power Industry Reactive Compensation Equipment Quality Inspection & Test Center(PRCIQTC)

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