

**REPORT NO. DL1206178-001  
TYPE TEST REPORT  
OF A  
ELECTROMAGNETIC RELAY**

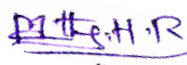
**RENDERED TO**

**M/s. Paramount Industries**  
No 70, 5<sup>th</sup> Cross, SSI Area, Rajajinagar,  
Bangalore - 560 010

**GENERAL:** This Report gives the results of the testing of Electromagnetic Relay type P2-A-FZ-M-24VDC & P2-FZ-24VDC as per Customer requirement with procedure reference to standard IEC/EN 60947-5-1:2004 and IEC 60255-5 Second Edition 2000-12.

Reference Standard IEC/EN 60947-5-1: 2004  
Low voltage switchgear and controlgear- Part 5-1: Control/circuit devices and switching elements-  
Electromechanical control circuit devices  
and  
Reference Standard IEC 60255-5 Second Edition 2000-12  
Electrical relays-Part 5: Insulation coordination for measuring relays and protection equipment –  
Requirements and tests

TESTED BY:

  
**Maruthi. HR**  
Lab Engineer

APPROVED BY:

  
**Raghunath.G**  
Operations Manager

This report is for the exclusive use of Intertek's Client and is provided pursuant to the agreement between Intertek and its Client. Intertek's responsibility and liability are limited to the terms and conditions of the agreement. Intertek assumes no liability to any party, other than to the Client in accordance with the agreement, for any loss, expense or damage occasioned by the use of this report. Only the Client is authorized to copy or distribute this report and then only in its entirety. Any use of the Intertek name or one of its marks for the sale or advertisement of the tested material, product or service must first be approved in writing by Intertek. The observations and test results in this report are relevant only to the sample tested. This report by itself does not imply that the material, product or service is or has ever been under an Intertek certification program

<b>Testing Laboratory Name</b>	<b>Intertek India Pvt. Ltd.</b>
<b>Address</b>	E-20, Phase B-1, Mohan Co-Operative Industrial Area, Mathura Road, New Delhi-110 044, INDIA.
<b>Manufacturer</b>	M/s. Paramount Industries No 70, 5th Cross, SSI Area, Rajajinagar, Bangalore -560 010.
<b>Client Requirement</b>	Electrical Endurance test Impulse voltage test Dielectric test Insulation resistance test
<b>Relevant Standard Specification</b>	As per Customer requirement with procedure reference to standard IEC/EN 60947-5-1: 2004 and IEC 60255-5 Second Edition 2000-12
<b>Test item description.</b>	Electromagnetic Relay
<b>Model/Type reference.</b>	P2-A-FZ-M-24VDC & P2-FZ-24VDC
<b>Technical specification</b>	Refer page 3 of this report
<b>Date of receipt of Test Item</b>	20 <sup>th</sup> June 2012
<b>Date(s) of performance of tests</b>	22 <sup>nd</sup> June 2012 to 29 <sup>th</sup> June 2012
<b>No of sample Received</b>	Four (P2-A-FZ-M-24VDC- Three & P2-FZ-24VDC- One)
<b>Condition of the sample</b>	New
<b>Sample No</b>	ITS1206125, ITS1206126, ITS1206127 & ITS1206128
<b>Test witnessed by</b>	Mr.Akash Ranka from Paramount Industries

<b>Report Composition:</b>	<b>Numbering (Page No's)</b>
Cover page.	1
Product specification/Standard reference	2
Test procedure/General/summery of test results	3
Test Results	4-9
Oscillograms	10-18
Test Set Up	19-21
Drawing	22
Tested equipments lists	23
<b>Total No. of Pages including Cover page</b>	<b>23</b>

**TEST PROCEDURE:**

All the tests conducted as per Test Plan submitted by Client (Paramount Industries) to Intertek India Pvt. Ltd.

Procedure adopted as per IEC/EN 60947-5-1 & IEC 60255-5. No post tests performed after Electrical Endurance.

All the test quantities and test values and testing duration as per Paramount test plan.

**GENERAL**

- a) Test results relate only to the items tested.
- b) Tests performed were based on Client's test procedure.

**TECHNICAL SPECIFICATION**

<b>Model Number</b>	P2-A-FZ-M-24VDC	P2-FZ-24VDC
Rating	220Vdc, 5A	250Vac, 6A/30Vdc, 6A
Method of operation	Electromagnetic	Electromagnetic
Method of control	Automatic	Automatic
Number of contact	2NO	2CO
Coil voltage	24Vdc	24Vdc

NO- Normally open  
 CO-Changeover

**SUMMARY OF TEST RESULTS:**

Sample No	Model No	Tests	Clause / Sub Clause No.	Standard	No. of sample	REMARKS
ITS1206125	P2-A-FZ-M-24VDC	Electrical Endurance test at T <sub>0.95</sub> -7ms**	7.2.4.3b)	IEC/EN 60947-5-1	One	PASS
ITS1206126	P2-A-FZ-M-24VDC	Electrical Endurance test at T <sub>0.95</sub> - 40ms**	7.2.4.3b)	IEC/EN 60947-5-1	One	Fail
ITS1206127	P2-A-FZ-M-24VDC	a) Impulse Voltage Test b) Dielectric test c) Insulation resistance test	6.1.3 6.1.4 6.2.2	IEC 60255-5	One	Pass
ITS1206128	P2-FZ-24VDC	a) Impulse Voltage Test b) Dielectric test c) Insulation resistance test	6.1.3 6.1.4 6.2.2	IEC 60255-5	One	Pass

**Note:** \*\*Test conducted as per client request.

**TEST RESULTS:**

**1) ELECTRICAL ENDURANCE TEST [SUB CLAUSE 7.2.4.3 b) of IEC/EN 60947-5-1: 2004]**

**PROCEDURE**

Contact Load	Make Current			Break Current			Operating Sequence				
	I/le (Adc)	U/Ue (Vdc)	T <sub>0.95</sub> (ms)	I/le (Adc)	U/Ue (Vdc)	T <sub>0.95</sub> (ms)	Rated Coil Voltage (Vdc)	Frequency of Operation per hour	Time (Sec)		No of Cycles
									ON	OFF	
Inductive Load	5	220	7	5	220	7	24	360	1	9	10000
Inductive Load	5	220	40	5	220	40	24	360	1	9	10000

**ELECTRICAL ENDURANCE TEST at 7 ms [SUB CLAUSE 7.2.4.3 b) of IEC/EN 60947-5-1:2004]**

Model	P2-A-FZ-M-24VDC
Contact configuration	NO (1-2 & 7-8)
Sample No.	ITS1206125
Rating	220Vdc, 5A
T <sub>0.95</sub>	7 ms
Operating Frequency	360/h
Coil Voltage	24Vdc
Test Date	22-06-2012 to 23-06-2012
No. of Operations completed	10000
Test Result	Pass
Oscillogram Number (s)	01 to 05

**TEST PARAMETERS:**

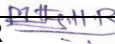

Model No.	No of Operation	Voltage (Vdc)	Current (A)	T <sub>0.95</sub> (ms)	ON Time (Sec)	OFF Time (Sec)
P2-A-FZ-M-24VDC	10000	220	5	7	1.0	9.0

**MEASURED VALUE:**

Model No.	No of Operation	Voltage (Vdc)	Current (A)	T <sub>0.95</sub> (ms)	ON Time (Sec)	OFF Time (Sec)
P2-A-FZ-M-24VDC	10000	220	5	7	1.0	9.0

**NOTE:** A Diode (FR306) was connected across the load during Electrical endurance test

**OBSERVATION:** Result of the above test was acceptable, no contact weld and no electrical failures observed during and after the test.

Tested By:	Maruthi. H.R. 	Reviewed By:	Ragunath. G 
Ambient Conditions:	25.0°C, 42% RH	Test Date	22-06-2012 to 23-06-2012
Equipment Used	3, 5, 6, 7, 8, 9, 10 & 11		

**ELECTRICAL ENDURANCE TEST at 40 ms [SUB CLAUSE 7.2.4.3 b) of IEC/EN 60947-5-1: 2004]**

<b>Model</b>	<b>P2-A-FZ-M-24VDC</b>
Contact configuration	NO (1-2 & 7-8)
Sample No.	ITS1206126
Rating	220Vdc, 5A
T <sub>0.95</sub>	40 ms
Operating Frequency	360/h
Coil Voltage	24Vdc
Test Date	25-06-2012
No. of Operations completed	30
Test Result	Fail
Oscillogram Number (s)	06 to 10

**TEST PARAMETERS:**

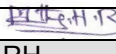

Model No.	No of Operation	Voltage (Vdc)	Current (A)	T <sub>0.95</sub> (ms)	ON Time (Sec)	OFF Time (Sec)
P2-A-FZ-M-24VDC	10000	220	5	40	1.0	9.0

**MEASURED VALUE:**

Model No.	No of Operation	Voltage (Vdc)	Current (A)	T <sub>0.95</sub> (ms)	ON Time (Sec)	OFF Time (Sec)
P2-A-FZ-M-24VDC	30	220	5	40	1.0	9.0

**NOTE:** A Diode (FR306) was connected across the load during Electrical endurance test

**OBSERVATION:** Result of the above **test was not acceptable**, contact welded and electrical failures observed during and after the test.

Tested By:	Maruthi. H.R. 	Reviewed By:	Raghunath. G. 
Ambient Conditions:	25.2°C, 40% RH	Test Date	25-06-2012
Equipment Used	3, 5, 6, 7, 8, 9, 10 & 11		

**2) IMPULSE VOLTAGE WITHSTANDS TEST (SUB-CLAUSE 6.1.3 OF IEC 60255-5)**

Condition of the apparatus : New  
 Model No. : P2-A-FZ-M-24VDC & P2-FZ-24VDC  
 Sample No. : ITS1206127 & ITS1206128  
 Test Voltage (Uimp) : 5kVac  
 Test voltage selection : As per Client declaration.  
 Test Condition : Test in unenergised condition.

**WAVEFORM AND GENERATOR CHARACTERISTICS:**

Rise time : 1.2 µSec  
 Pulse width : 50 µSec  
 Test Voltage : 5kVac  
 No. of Pulses : 3 in each Polarity  
 Polarity : +ve and -ve  
 Interval : 5 second.

**TOLERANCE ON STANDARD IMPULSE:**

Peak Value - ± 3%  
 Front Time - ± 30%  
 Time to half value - ± 20%

**IMPULSE VOLTAGE TEST PROSPECTIVE:**

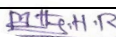

Oscillogram No.	Polarity	Rated Impulse Voltage	No. Shots	Position (Combination)
<b>PROSPECTIVE</b>				
11, 12 & 13	Positive	5.0kV	3	1) All terminals of the Relay and Base metal parts are shorted together with respect to DINRAIL on which it is mounted.
14, 15 & 16	Negative	5.0kV	3	2) Between independent circuits. i.e., a) Between Coil and contacts. b) Between 2 sets of contacts

**NOTE:** All the tests conducted as per Test Plan submitted by Client (Paramount Industries) to Intertek India Pvt. Ltd. Procedure reference as per IEC 60255-5 Second Edition 2000-12  
 Test Voltage considered as per Client declaration, altitude values not consider additionally to the declared values.

**IMPULSE VOLTAGE TEST RESULT:**

Model No./Sample No.	Polarity	Rated Impulse Voltage-kV	No. Shots	Position (Combination)	Observation
P2-A-FZ-M-24VDC /ITS1206127	Positive	5.0	3	1) All terminals of the Relay and Base metal parts are shorted together with respect to DINRAIL on which it is mounted.	Withstood
	Negative	5.0	3		
	Positive	5.0	3	2) Between independent circuits. i.e., a) Between Coil and contacts. b) Between 2 sets of contacts	Withstood Withstood
	Negative	5.0	3		
P2-FZ-24VDC/ ITS1206128	Positive	5.0	3	1) All terminals of the Relay and Base metal parts are shorted together with respect to DINRAIL on which it is mounted.	Withstood
	Negative	5.0	3		
	Positive	5.0	3	2) Between independent circuits. i.e., a) Between Coil and contacts. b) Between 2 sets of contacts	Withstood Withstood
	Negative	5.0	3		

**Observations:** No abnormality noticed, No unintentional disruptive discharge occurred during test; Results of the above tests were acceptable.

Tested By:	Maruthi. H.R. 	Reviewed By:	Raghunath. G 
Ambient Conditions:	24.9°C, 43% RH	Test Date	29-06-2012
Equipment Used	1, 2, 3, 6, 7 & 12		

**3) DIELECTRIC TEST (AC POWER FREQUENCY HIGH VOLTAGE TEST(SUB-CLAUSE 6.1.4 OF IEC 60255-5))**

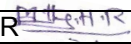

Condition of the sample : As after Impulse voltage withstand test.  
 Model No : P2-A-FZ-M-24VDC & P2-FZ-24VDC  
 Sample No. : ITS1206127 & ITS1206128  
 Test Voltage : 2kVac  
 Test voltage selection : As per Client declaration.

**PROCEDURE:** An alternating-current potential of 2000V ac was applied for 60secs as below:

**TEST RESULTS:**

Test Voltage	Applied between	Duration	Observation
2000V ac	All terminals of the Relay and Base metal parts are shorted together with respect to DINRAIL on which it is mounted.	60Sec	Withstood
	Between Coil and all contact terminals	60 Sec	Withstood
	Between 2 sets of contacts	60 Sec	Withstood

**Result:** No abnormality noticed, the results of this test were considered acceptable.

Tested By:	Maruthi. H.R. 	Reviewed By:	Raghunath. G 
Ambient Conditions:	25.0°C, 42% RH	Test Date	29-06-2012
Equipment Used	3, 4 & 6		



**4) MEASUREMENT OF INSULATION RESISTANCE (SUB-CLAUSE 6.2.2 OF IEC 60255-5)**

Condition of the sample : As after Dielectric test  
 Model No : P2-A-FZ-M-24VDC & P2-FZ-24VDC  
 Sample No. : ITS1206127 & ITS1206128  
 Test Voltage : 500Vdc  
 Insulation resistance : Minimum 100M ohms

**PROCEDURE**

The measurement of insulation resistance may be performed if agreed on between manufacturer and user. The position of this measurement in the sequence of tests is also subject to such agreement.

The insulation resistance shall be measured:

- a) Between each circuit and the exposed conductive parts, the terminals of each independent circuit being connected together;
- b) Between independent circuits, the terminals of each independent circuit being connected together. Unless obvious, the independent circuits are those which are so described by the manufacturer.

Further, by agreement between manufacturer and user, the insulation resistance of open contact circuits may be tested.

Circuits having the same rated insulation voltage may be connected together when being measured to the exposed conductive parts.

The measuring voltage shall be applied directly to the equipment terminals.

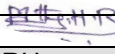

**The insulation resistance shall be determined when a steady value has been reached and at least 5 s after applying a d.c. voltage of 500 V ± 10 %.**

For relays in a new condition, the insulation resistance **shall not be less than 100 MΩ at 500 V d.c.**, unless otherwise agreed between user and manufacturer. In particular, the insulation under test may be paralleled by EMC suppression or other functional components whose insulation resistance is less than 100 MΩ. In such cases, the manufacturer shall verify that such components are undamaged by the testing procedure, and can maintain isolation of hazardous voltages between insulated components .

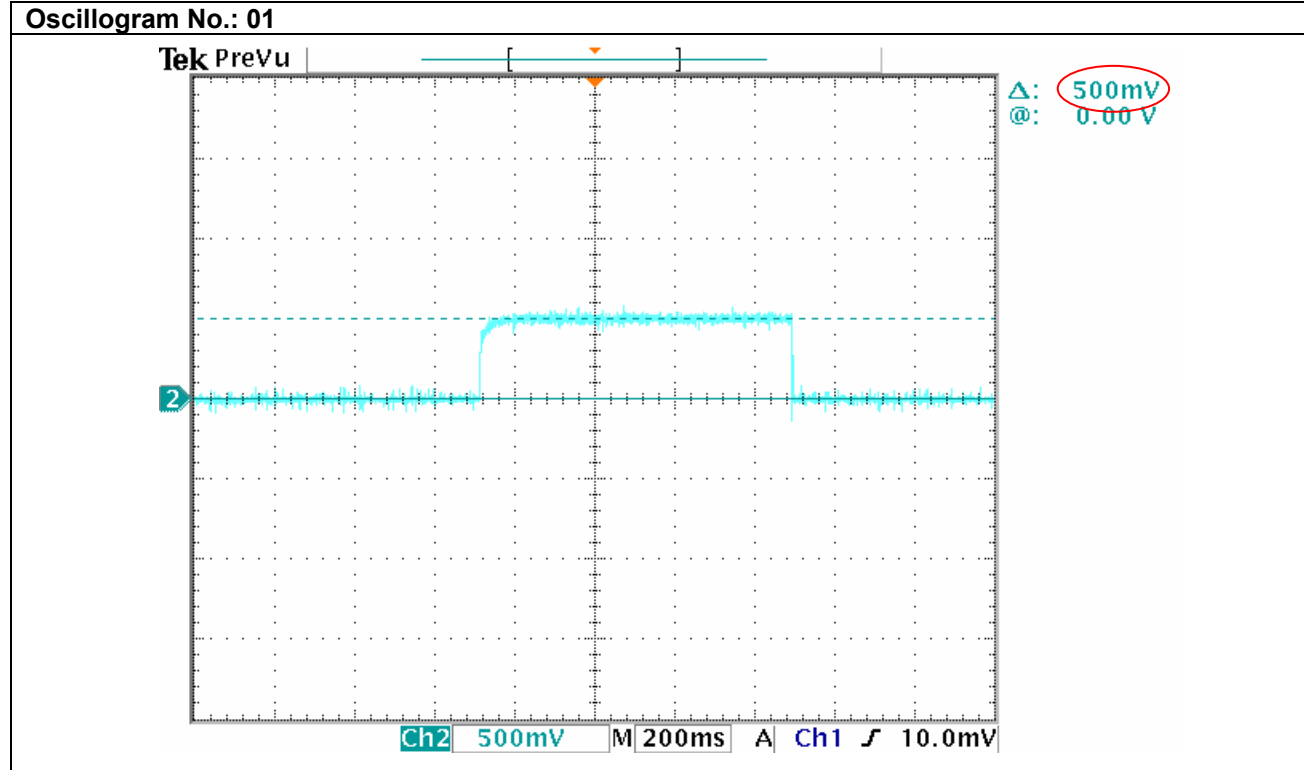
**TEST RESULTS:**

Test Voltage	Applied between	Duration	IR Value	
			Measured	Limit
500V dc	All terminals of the Relay and Base metal parts are shorted together with respect to DINRAIL on which it is mounted.	5 Sec	> 100MΩ	100MΩ
	Between Coil and all contact terminals	5 Sec	> 100MΩ	100MΩ
	Between 2 sets of contacts	5 Sec	> 100MΩ	100MΩ

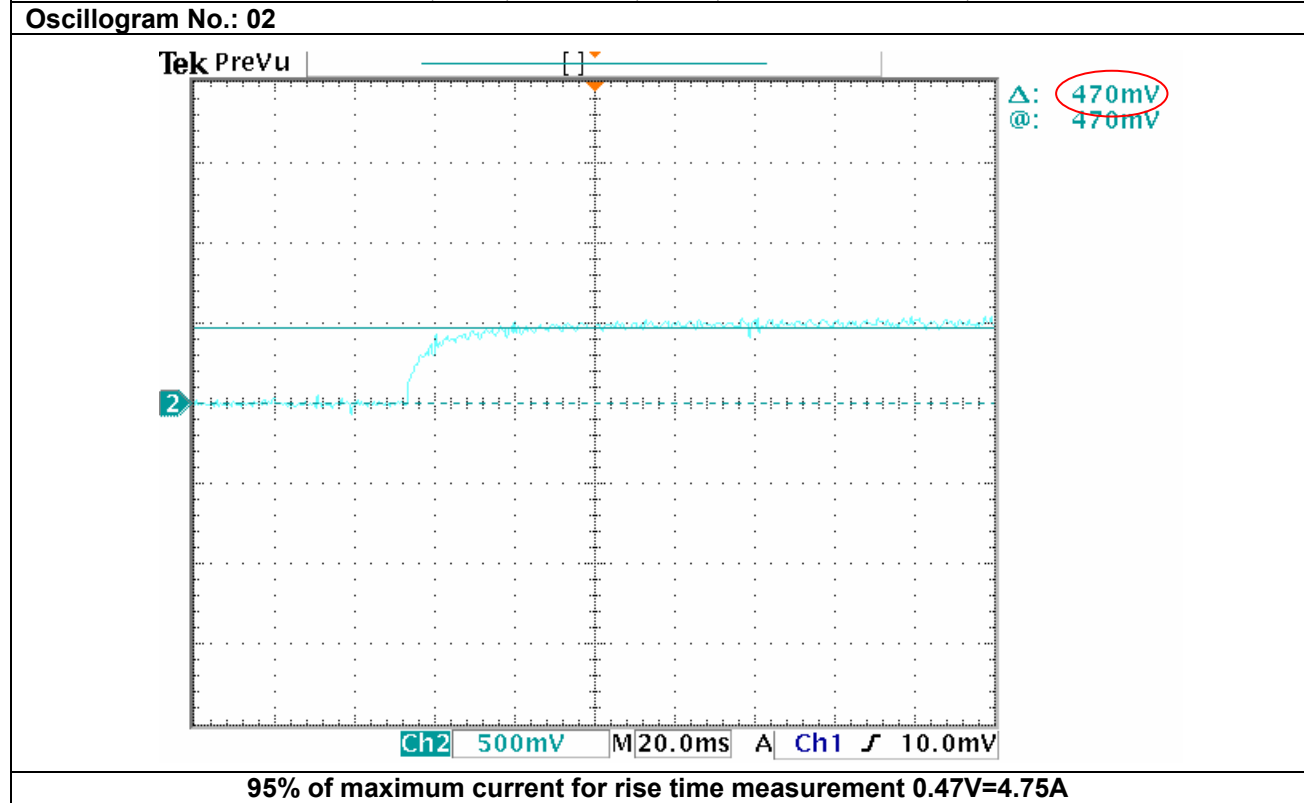
**Result:** The results of this test were considered acceptable.

Tested By:	Maruthi. H.R. 	Reviewed By:	Raghunath. G 
Ambient Conditions:	25.1°C, 41% RH	Test Date	29-06-2012
Equipment Used	3, 4 & 6		

**OSCILLOGRAMS FOR ELECTRICAL ENDURANCE TEST: 220V, 5A, 7ms**

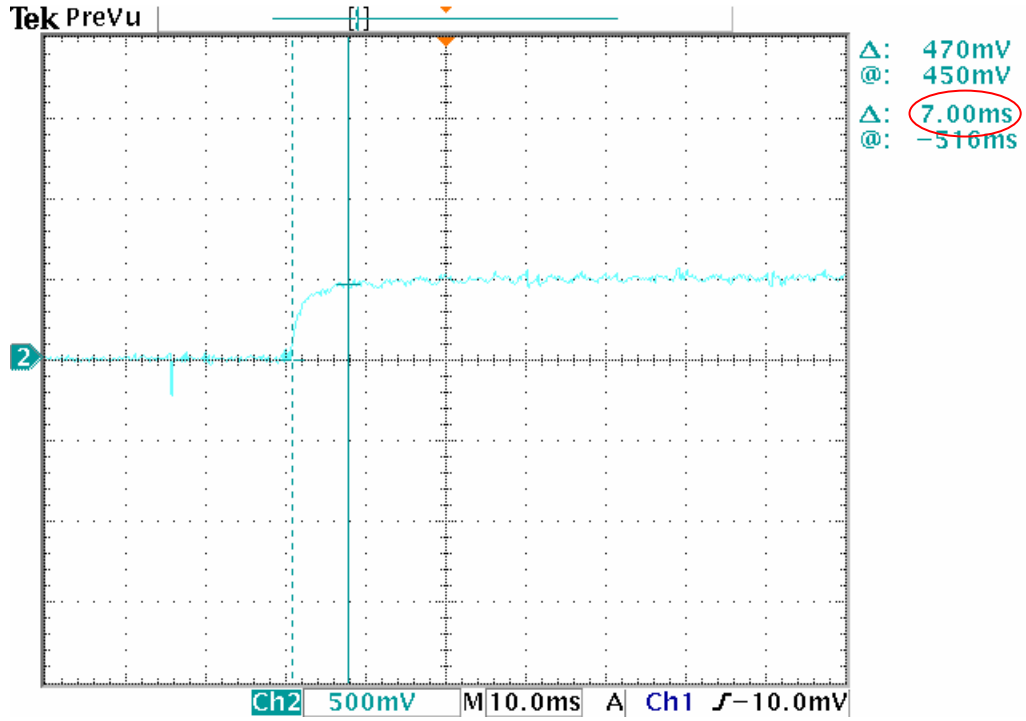


Shunt  $0.1\Omega:20A$ ,  $V=IR$ ,  $V=0.1 \times 20$ ,  $V=2V$ , Therefore  $0.1V=1A$ ,  $0.5V=5A$



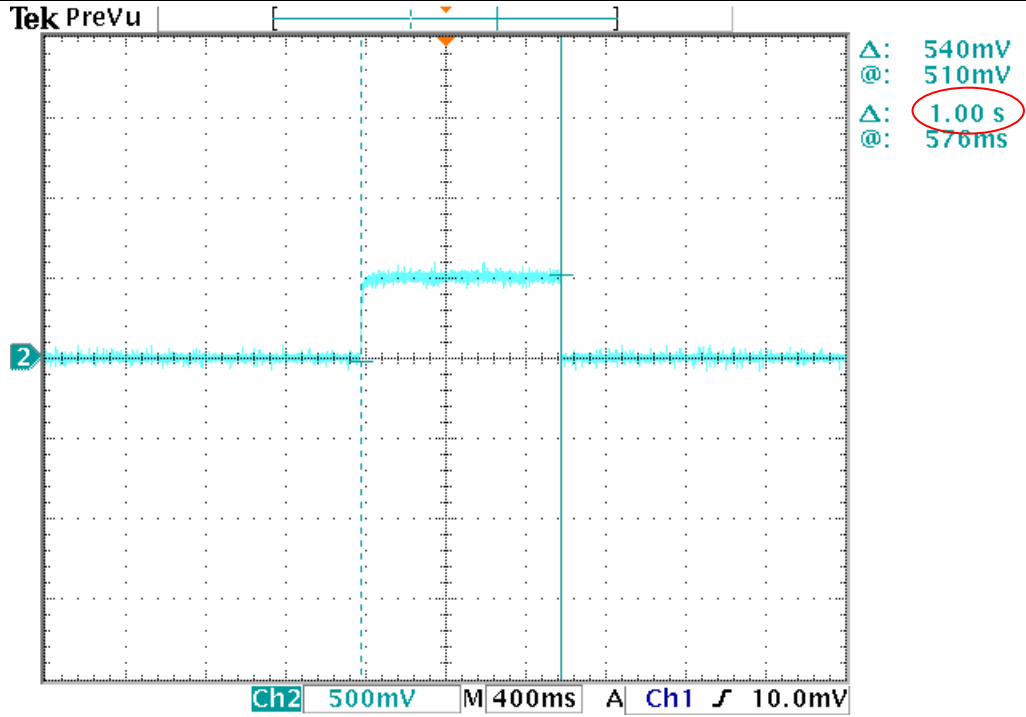
95% of maximum current for rise time measurement  $0.47V=4.75A$

Oscillogram No.: 03



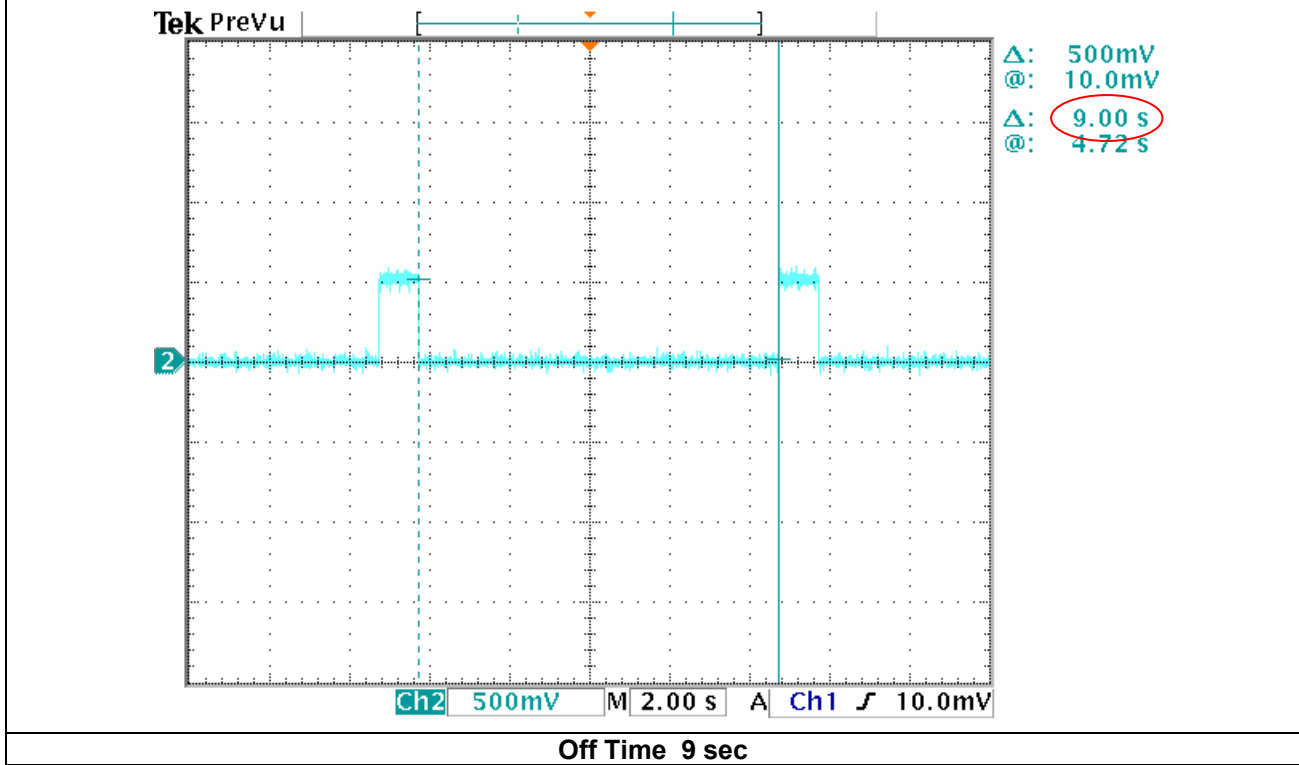
T0.95 = 7ms

Oscillogram No.: 04

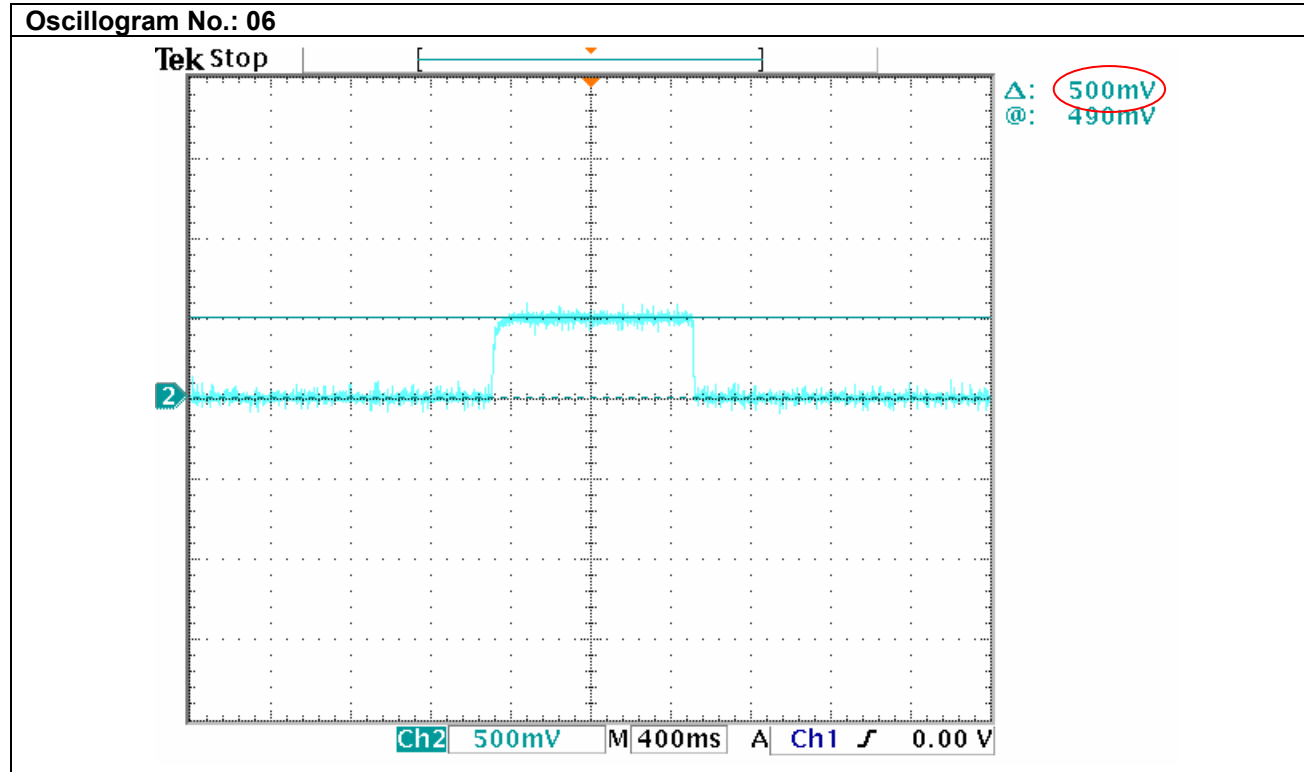


ON Time 1.00 sec

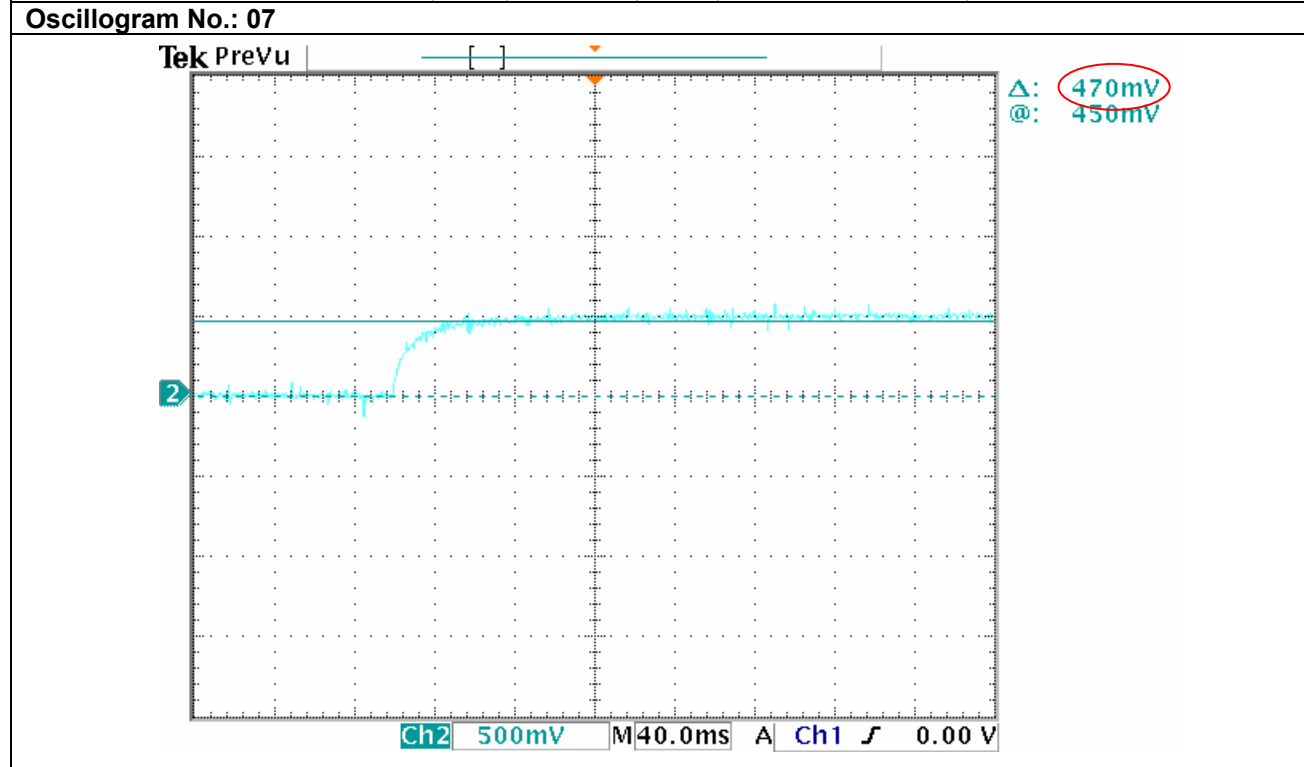
Oscillogram No.: 05



**OSCILLOGRAMS FOR ELECTRICAL ENDURANCE TEST: 220V, 5A, 40ms**

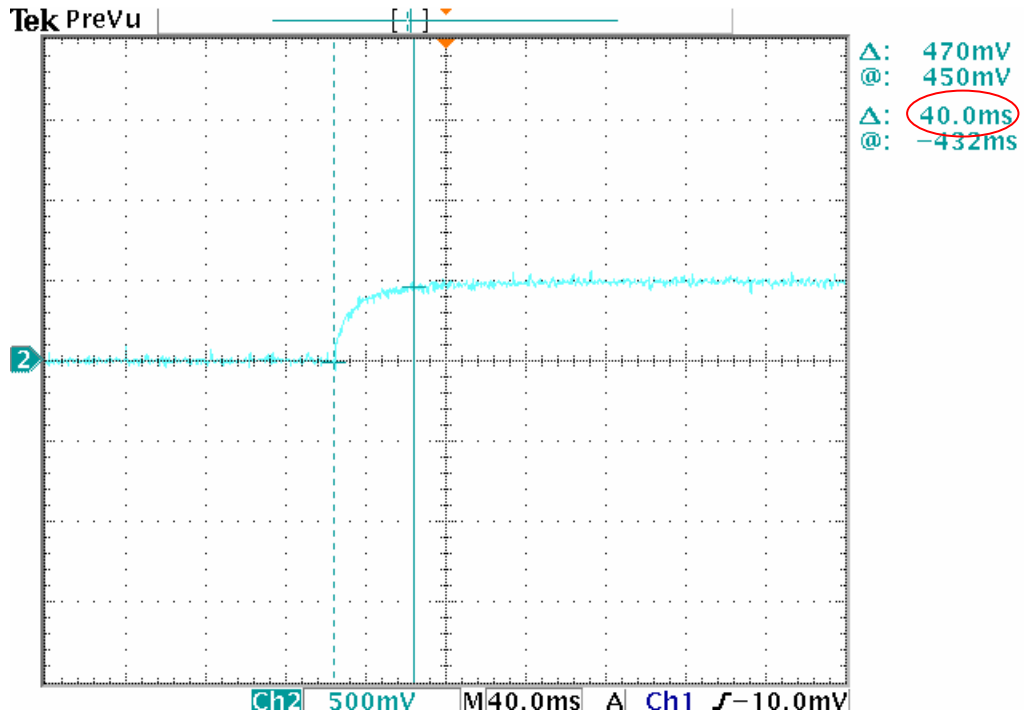


Shunt 0.1Ω:20A,  $V=IR$ ,  $V=0.1 \times 20$ ,  $V=2V$ , Therefore  $0.1V=1A$ ,  $0.5V=5A$



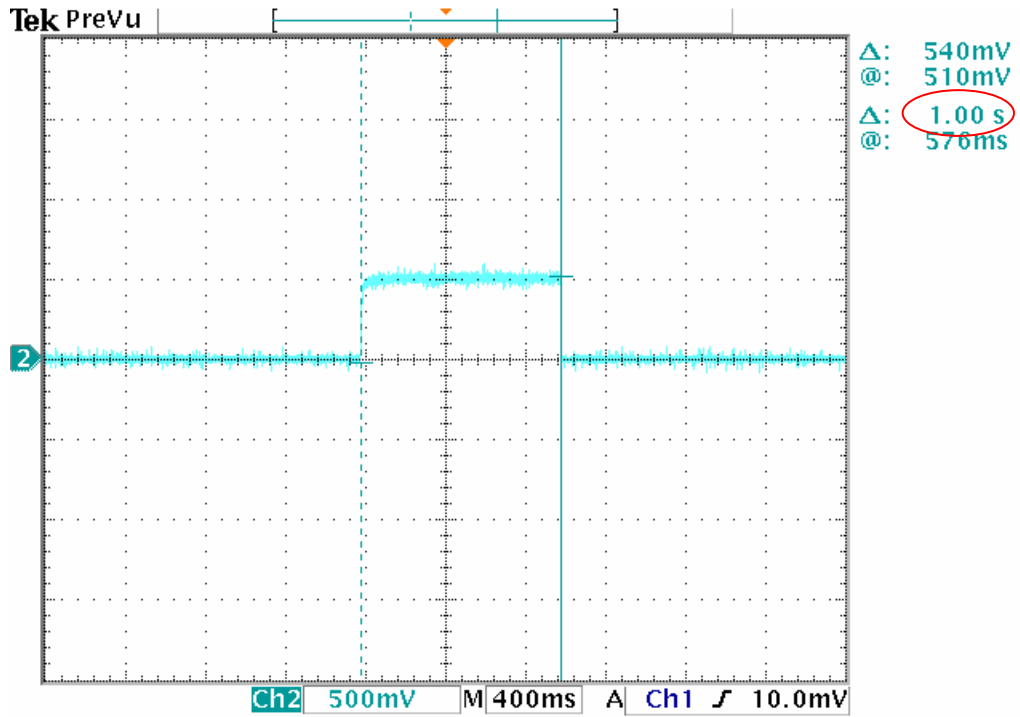
95% of maximum current for rise time measurement  $0.47V=4.75A$

Oscillogram No.: 08



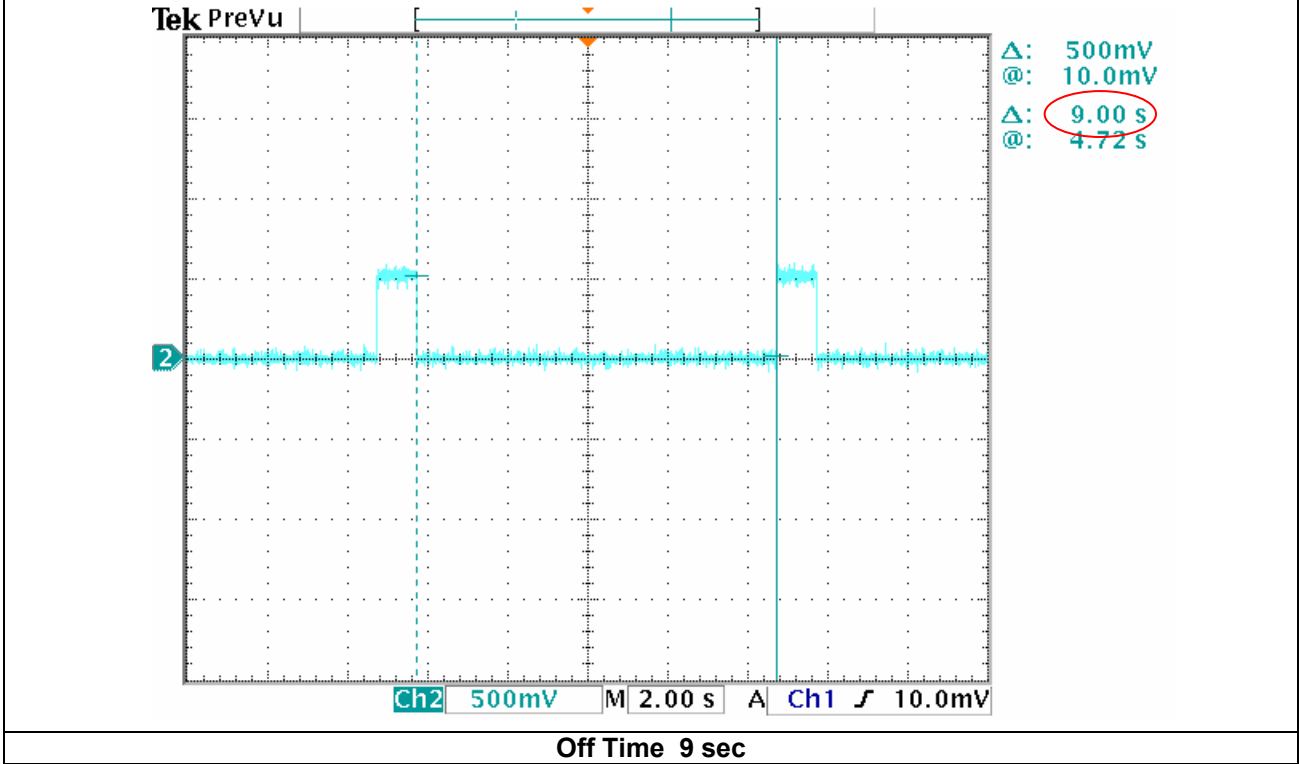
T0.95 = 40ms

Oscillogram No.: 09



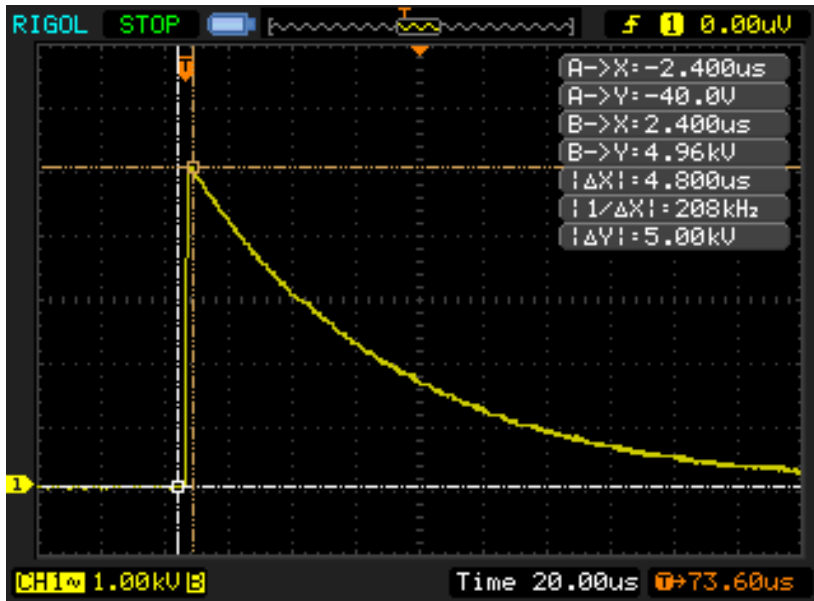
ON Time 1.00 sec

Oscillogram No.: 10



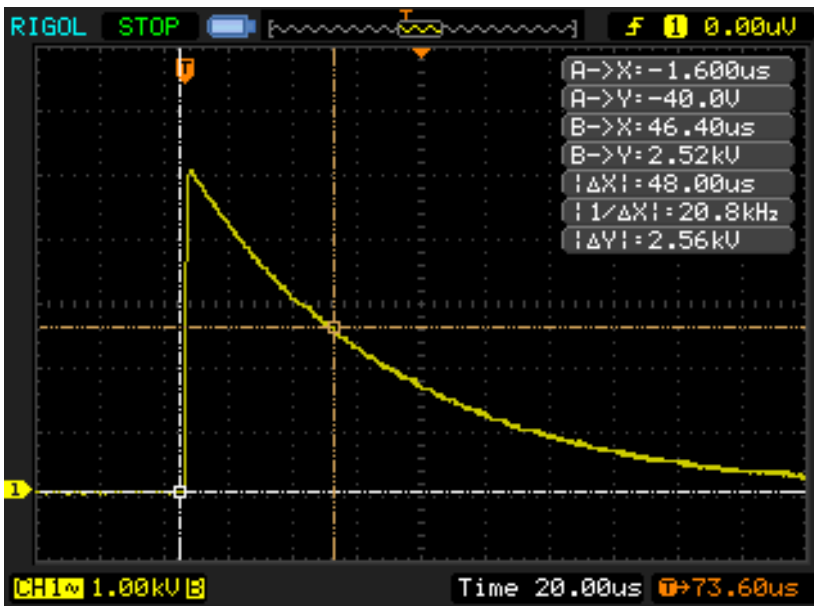
**OSCILLOGRAMS FOR IMPULSE VOLTAGE TEST:**

Oscillogram No.: 11



Peak Voltage  $\Delta Y=5.00KV$

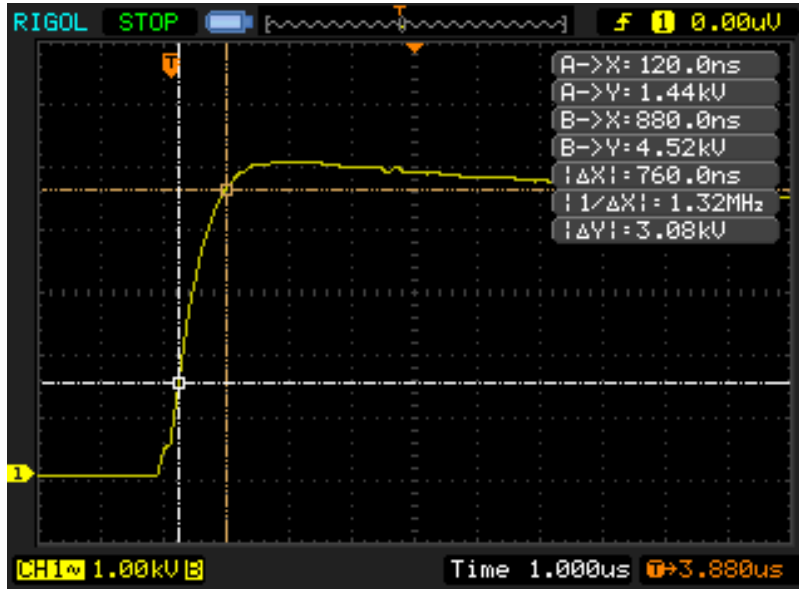
Oscillogram No.: 12



Wave Tail  $\Delta X=48.00us$

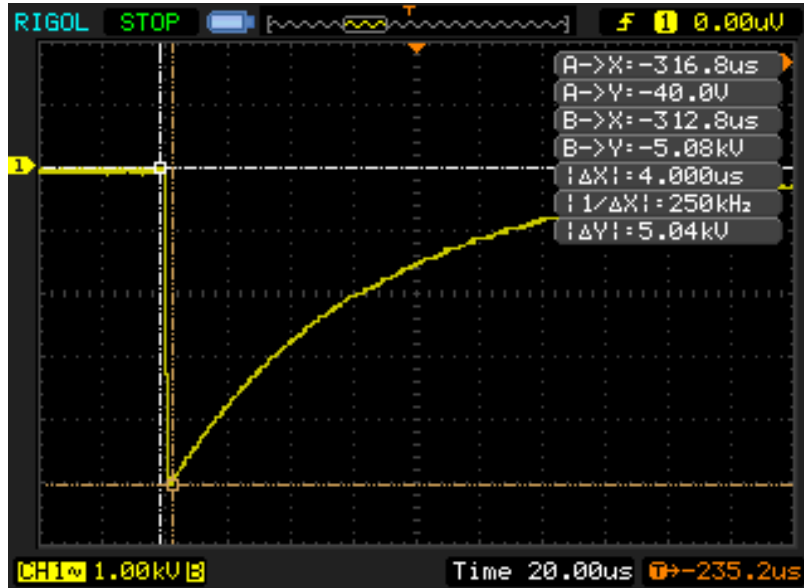


**Oscillogram No.: 13**



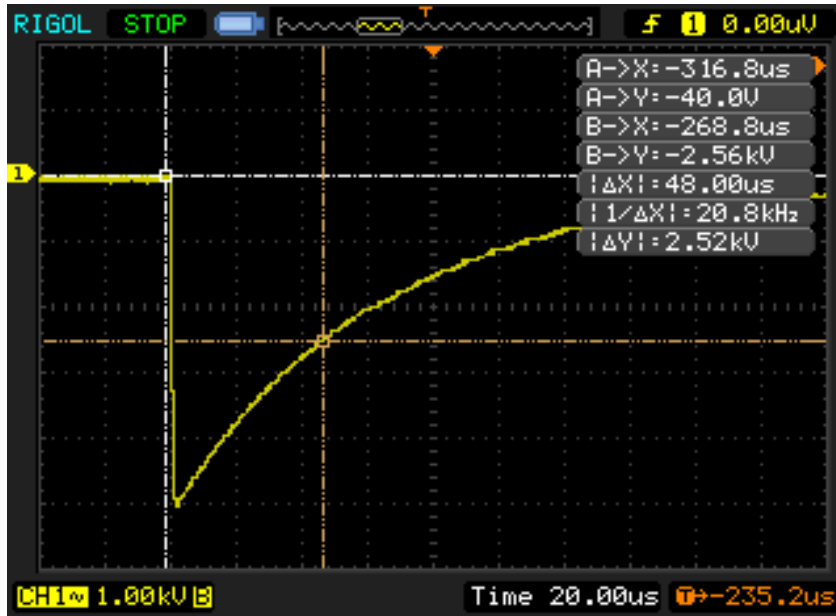
Wave Front  $\Delta X = (760/1000)1.67 = 1.27\mu s$

**Oscillogram No.: 14**



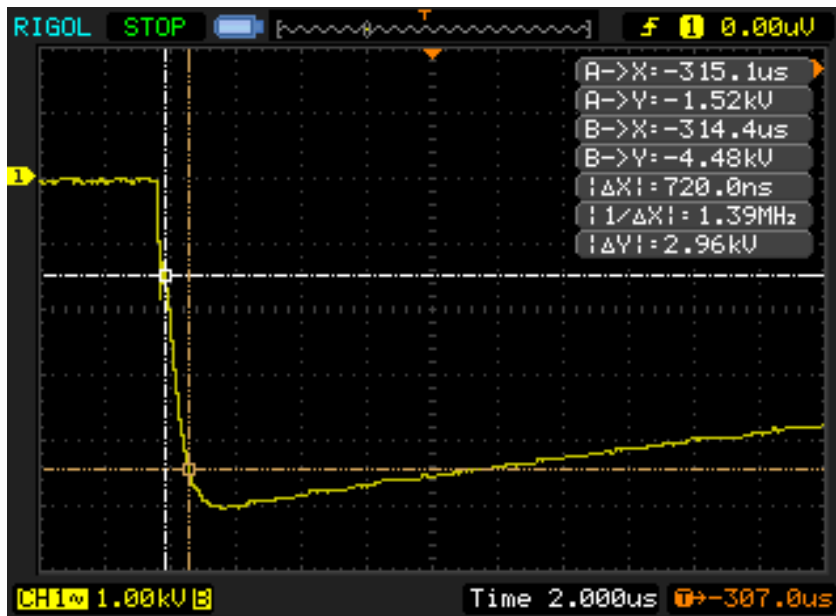
Peak Voltage  $\Delta Y = 5.04KV$

**Oscillogram No.: 15**



**Wave Tail  $\Delta X = 48.00\mu s$**

**Oscillogram No.: 16**



**Wave Front  $\Delta X = (760/1000)1.67 = 1.20\mu s$**

**TEST SET UP**



**Electrical Endurance Test setup**



**Test Voltage 220V DC**



**Test Current 5.07A**

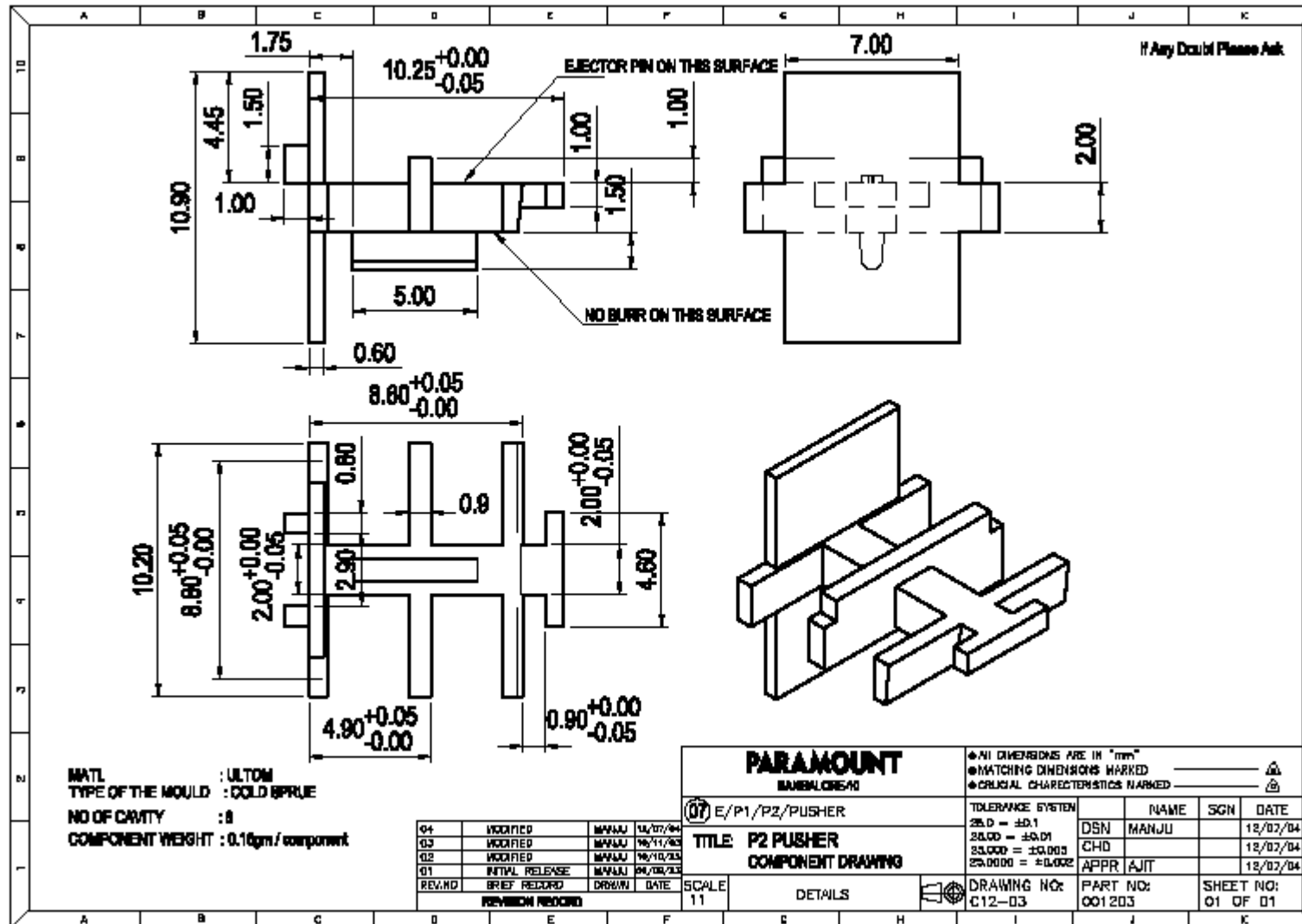


**Impulse Test Setup**



**High voltage & Insulation resistance Test Setup**

**DRAWING FOR MODEL: P2-A-FZ-M-24VDC & P2-FZ-24VDC**



**TABLE OF TEST EQUIPMENT USED:**

Sl.No.	Equipment Type	Serial No	Cal. Due Date
1	Impulse Tester	ETLB 0053	07-Dec-2012
2	Digital Oscilloscope	ETLB 0052	15-Nov-2012
3	Hygro thermometer	ETLB-0011	21-Feb-2013
4	Electrical safety compliance analyzer	ETLB-0017	15-Jul-2012
5	Oscilloscope	ETLB-0013	14-Mar-2013
6	Stopwatch	ETLB-0023	14-Jul-2012
7	Digital voltmeter	ETLB-0054/A	7-Dec-2012
8	Digital DC voltmeter	ETLB-0054/B	11-Nov-2012
9	Digital Ammeter	ETLB-0054/C	11-Nov-2012
10	Digital time interval meter	ETLB-0054/D	7-Dec-2012
11	Digital counter1	ETLB-0036/D	16-Feb-2013
12	Digital time interval meter	ETLB-0053/B	7-Dec-2012