

TUV Telecom Services, Inc.

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TEST REPORT NO.

CTR13/081701/99

Date: August 26, 1999

Total Number of Pages: 34

Equipment: **PM4351 Comet**

Client: **PMC-Sierra**

Address: **105-8555 Baxter Place
Burnaby, B.C. V5A 4V7
Canada**

European Harmonised Standard: **CTR 12**

European Harmonised Standard: **CTR 13**

Authorised Signature:

August 26, 1999

David A. Freemore

Lead Engineer

Date

Name

Title

Signature

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1 IDENTIFICATION SUMMARY

1.1 Test Laboratory

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UKAS accredited testing laboratory, no. 1845

1.2 Limits and Reservations

This test report satisfies European Standard EN 45001 (1989), ISO Guide 25, NIST Handbook 150 and NAMAS accreditation standard M10. The test results in this test report apply only to the particular System under Test (SUT) and component Implementations under Test (IUTs) declared in this test report.

1.3 Client Information

Name : **PMC-Sierra**
Street : **105-8555 Baxter Place**
City : **Burnaby, B.C. V5A 4V7**
Country : **Canada**
Phone : **+1 (604) 415-6000**
Fax : **+1 (604) 415-6206**

Contact Person : **Fayaz Khaki**
Phone : **+1 (604) 415-6000**
Fax : **+1 (604) 415-6206**

1.4 Product

Supplier's name : **PMC-Sierra**
Street : **105-8555 Baxter Place**
City : **Burnaby, B.C. V5A 4V7**
Country : **Canada**
Phone : **+1 (604) 415-6000**
Fax : **+1 (604) 415-6206**

1.4.1 IUT Identification

Name	PM4351 Comet
Version/Model	Comet Reference Design Board Rev. 2
Serial No.	83110-2-0001
Interface board	--
Chip set	PM4351 Comet Rev. F
Transformer	Midcom 50436
Connector types	Bantam
Interfaces	2 at E1
Software and Version	--

1.4.2 System under Test (SUT)

(If applicable)

SUT Configuration for testing (PC, Bus System, Clock etc.)	Motherboard used for microprocessor interface
Operating System	--
Version No.	--
Miscellaneous	--

1.4.3 Type of Product

Monolithic device which integrates software selectable full featured T1 and E1 framers and T1 and E1 shorthand and longhand line interfaces

1.5 Nature of Conformance Testing

The purpose of Conformance Testing is to increase the probability that different implementations can interwork. However, the complexity of OSI protocols makes exhaustive testing impractical on both technical and economic grounds. Furthermore, there is no guarantee that an IUT which has passed all the relevant tests conforms to a specification. Neither is there any guarantee that such an IUT will interwork with other real open systems. Rather, the passing of the tests gives confidence that the IUT has the stated capabilities and that its behaviour conforms consistently in representative instances of communication.

2 Test Conditions

2.1 Environmental Conditions

Temperature	: In the range of 19°C to 25°C	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No
Relative humidity	: In the range of 10% to 75%	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No

2.2 Power Supply Limitations

All tests were carried out within +/- 5% of the normal operating voltage of 5.0 VDC.

3 System Report Summary

3.1 Test Report Summary

Protocol Standard: *TBR 12 (12.93)*
TBR 12 A1 (01.96)
TBR 13 (01.96)

Protocol Conformance Test Report: *See Section 6*

Abstract Test Suite (ATS) Standard: *TBR 12 (12.93)*
TBR 13 (01.96)

Abstract Test Method: *Remote Single Layer Embedded (RSE)*

Real Test system:

Executable Test Suite (ETS) Identification:

Name : CTS Layer 1 Conformance Tests
Version : A.09.10

Test system Identification:

ISDN-S_{2M}-Test System IPATS:

Manufacturer : Hewlett Packard / Admit Design Systems

Conformance Status:

Static Conformance Errors : **No**
Dynamic Conformance Errors : **No**

Test cases run: 5

Passed : 5
Failed : 0

4 Observations

Date: **August 17, 1999**

No observations have been made during the conformance assessment test.

5 Summary of Compliance

Date: **August 17, 1999**

The test results in this test report apply only to the particular System under Test (SUT) and component Implementations under Test (IUTs) declared in this test report.

The SUT/IUT has not been shown by the conformance assessment to be non-conforming to the specified protocol standard. The test campaign did not reveal errors in the SUT/IUT.

5.1 *Summary of Overvoltage Protection*

Date: **August 17, 1999**

The IUT complies with TBR 12 paragraph 5.4, subclause 5.4.1, 5.4.2 and 5.4.3.

The IUT complies with TBR 13 paragraph 4.4, subclause 4.4.1, 4.4.2 and 4.4.3.

For full test results see test report **046/081701/99**

6 Protocol Conformance Test Report

6.1 Protocol Conformance Test Report Layer 1

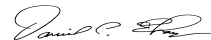
6.1.1 Dates

Receipt of SUT/IUT: **August 16, 1999**

Date of Test: **August 17, 1999**

6.1.2 Operator

Dan Thayer



(Signature)

6.1.3 Test System

Name : CTS Layer 1 Conformance Tests

Version : A.09.10

Test system Identification:

ISDN-S_{2M}-Test System IPATS:

Manufacturer : Hewlett Packard / Admit Design Systems

6.1.4 Test Environment

Temperature : In the range of 19°C to 25°C Yes No

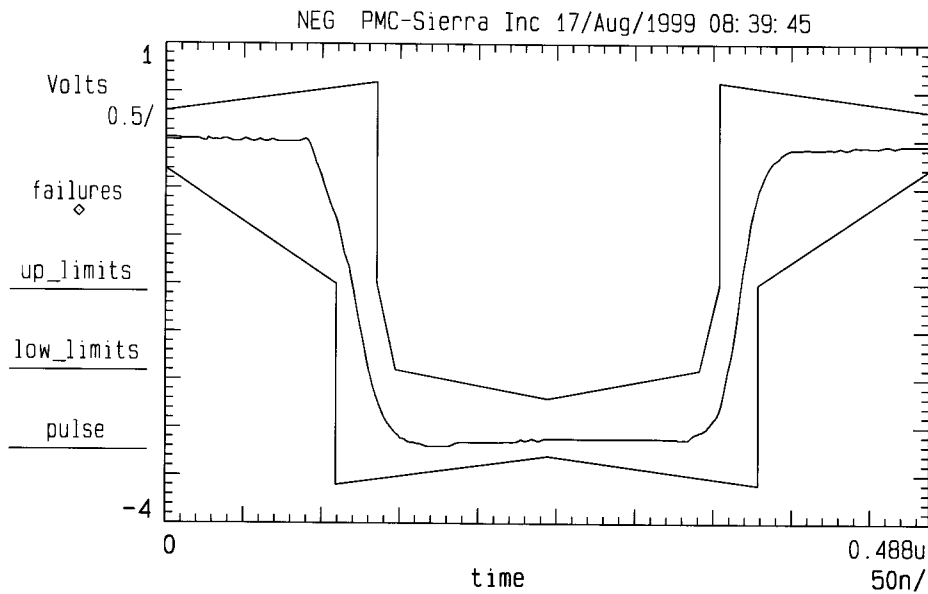
Relative humidity : In the range of 25% to 75% Yes No

All tests are carried out within +/- 5% of the normal operating voltage of 5.0 VDC.

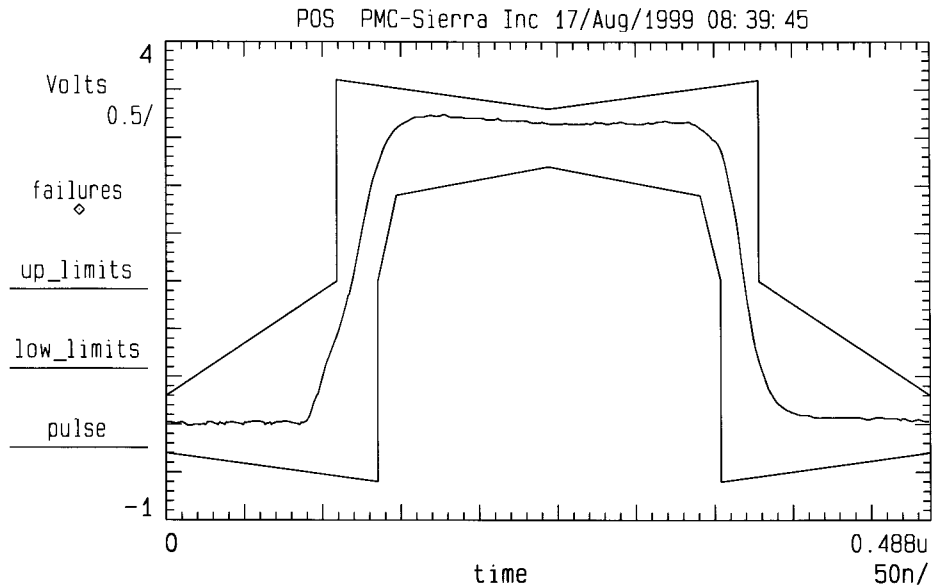


6.5 Test Results

Test Case	TBR 12 / 13	Result	Verdict	Comment
A.2.1	5.2.1.1 / 4.2.1.1	HDB3 code, no errors	pass	
A.2.2	5.2.1.2 / 4.2.1.2	Puls shape	see graphs below	pass
		Peak voltage of space	< ± 0.1V	pass
		Puls ampl. ratio	1.014	pass
		Puls width ratio	1.000	pass



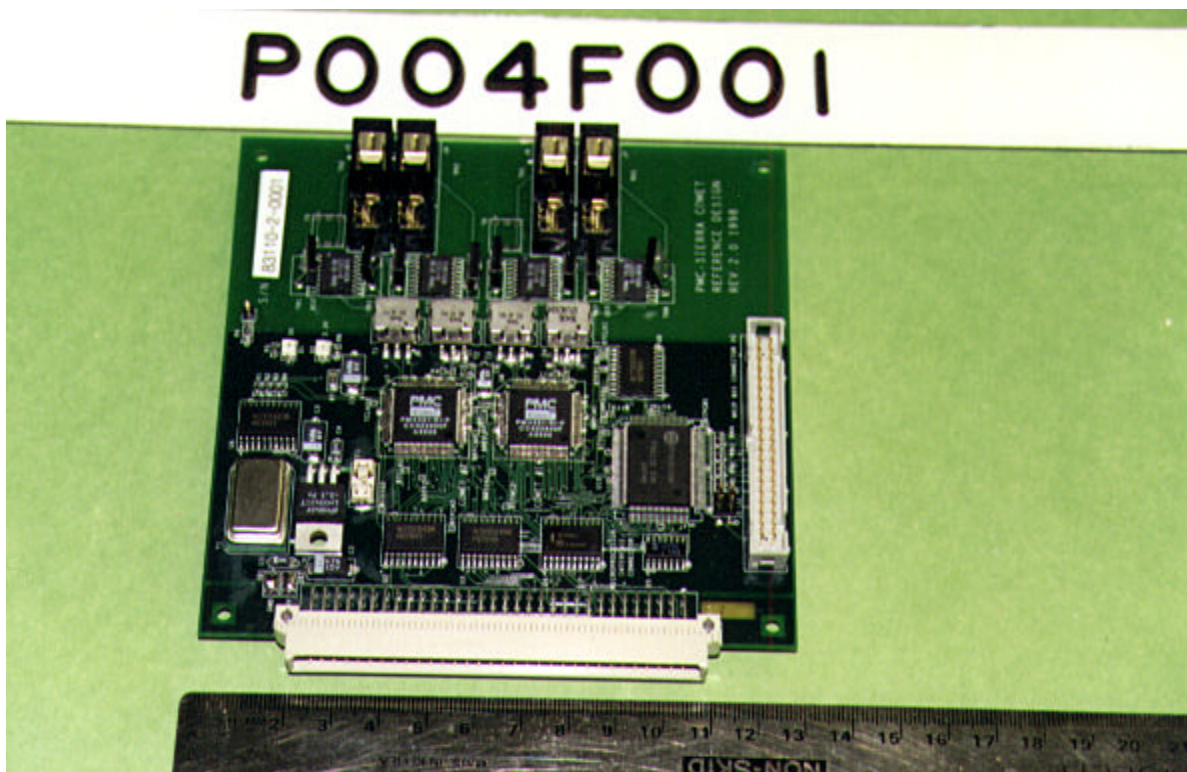
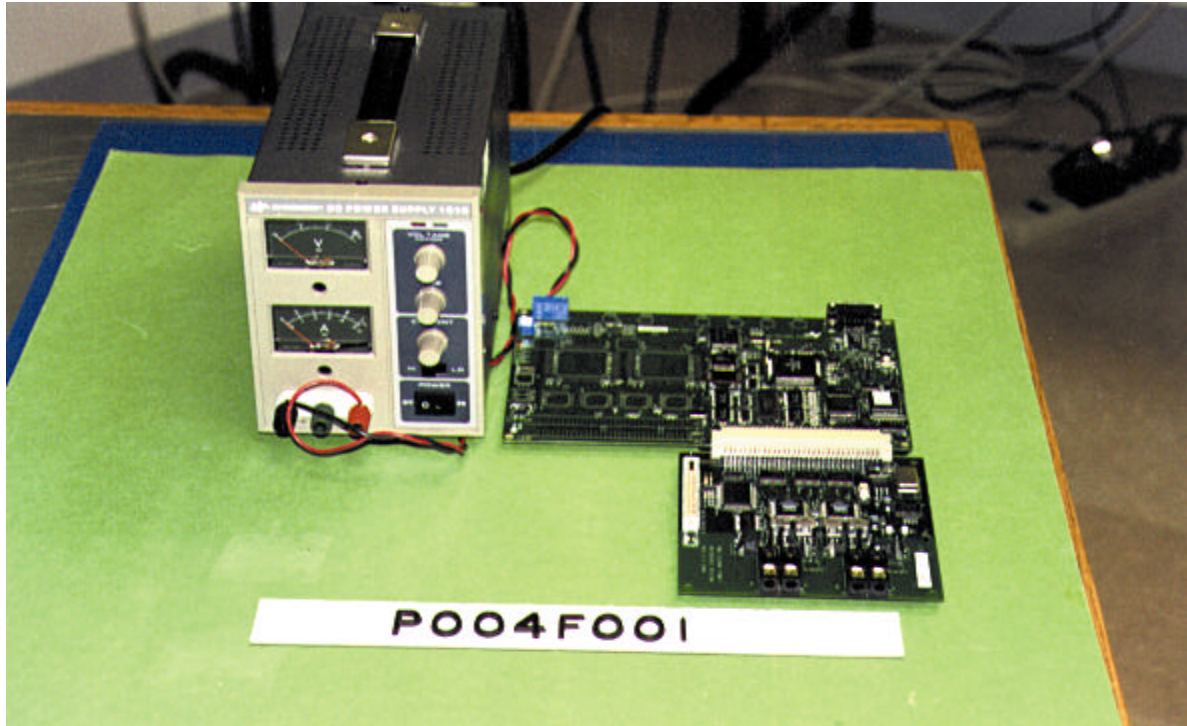
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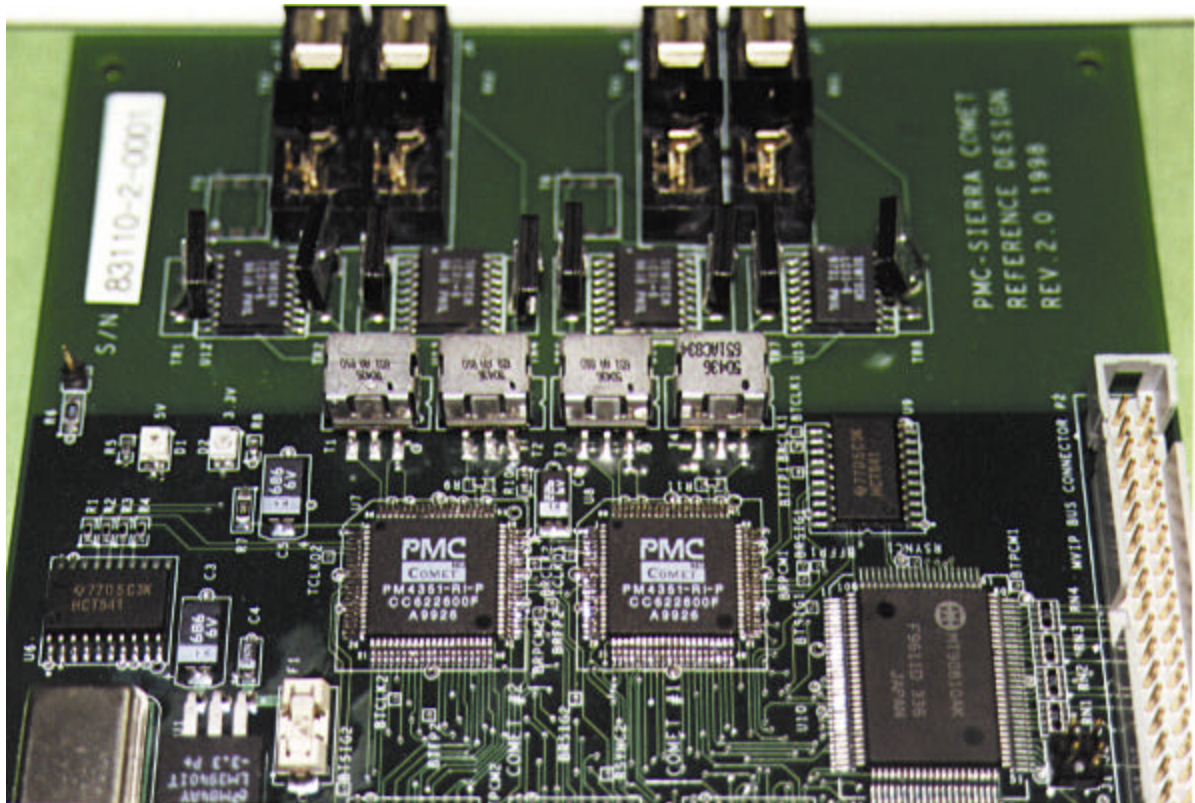
Test Case	TBR 12 / 13	Result	Verdict	Comment	
A.2.3	5.2.1.3 / 4.2.1.3	+30.55 ppm	pass		
A.2.4	5.2.1.4 / 4.2.1.4	20 Hz	0 ppm +50 ppm -50 ppm	0.056 UI 0.058 UI 0.059 UI	pass
		2400 Hz	0 ppm +50 ppm -50 ppm	0.014 UI 0.015 UI 0.019 UI	pass
		18 KHz	0 ppm +50 ppm -50 ppm	0.014 UI 0.015 UI 0.018 UI	pass
		100 KHz	0 ppm +50 ppm -50 ppm	0.014 UI 0.015 UI 0.018 UI	pass

Test Case	TBR 13	Result	Verdict	Comment
A.2.5	4.2.1.5	Frame Alignment / CRC-4 / A-bit	pass	

7 Photographs



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8 Test Data

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U.U.T. : PM4351 COMET PMC-Sierra Inc

Test Sequence created on : 17/Aug/1999 08:39:45

Data was stored into : ./TE/CTR13/dir15

S C S SUMMARY

Client : PMC-Sierra Inc.

Contact person : Fayaz Khaki Telephone : (604) 415-6000

Terminal Equipment : Reference Design Board

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I.U.T. : PM4351 COMET PMC-Sierra Inc

Test Sequence created on : 17/Aug/1999 08:39:45

Data was stored into : ./TB/CTR13/dir15

SYSTEM CONFORMANCE STATEMENT (SCS) AND CLIENT CHECKLIST

EQUIPMENT

EQUIPMENT IDENTIFICATION

Type : PM4351 COMET
Name : . Model : .
Version : F Serial No. : 83110-2-0001

SUPPLIER

Company Name : . Telephone : .
Street No. : . Telefax : .
City : . Telex : .
Country : . Teletex : .

MANUFACTURER

Company Name : PMC-Sierra Inc. Telephone : (604) 415-6000
Street No. : 105 -8555 Baxter Place Telefax : (604) 415-6206
City : Burnaby, BC V5A 4V7 Telex : .
Country : Canada Teletex : .

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I.U.T. : PM4351 COMET PMC-Sierra Inc

Test Sequence created on : 17/Aug/1999 08:39:45

Data was stored into : ./TE/CTR13/dir15

PHYSICAL LAYER PICS

OPTIONAL CAPABILITIES

TE/NT2 has only one user-network interface : YES

TE/NT2 has more than one user-network interface : NO

PINX INTERCONNECTIONS

Does the IUT act as a master : NO

Does the IUT act as a slave : YES

MULTI ACCESSSES IUT TIMING METHOD

Only one input used at a point in time to extract synchronization : YES

More than one input used at a point in time to extract synchronization : NO

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..U.T. : PM4351 COMBT PNC-Sierra Inc

Test Sequence created on : 17/Aug/1999 08:39:45

Data was stored into : ./TE/CTR13/dir15

PHYSICAL LAYER PIXIT

Does the TE support PTNX interconnection : N

Is the TE user/network interface at the S ref. point : YES

Does the TE transmit a PRBS $2^{11}-1$ in a time slot : NO

How many accesses has the TE : 1

Which of the accesses has the synchronization : 1

Clock synchronization time sec [FULL RANGE] : 10

Internal clock frequency accuracy better than 1ppm ? : NO

Client's additional informations : Order No.:P004F001 CTR13

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Data retrieved from : ./TS/CTR13/dir15/A21

I.U.T. PM4351 COMBT PMC-Sierra Inc
 Test : HDB3 A.2.1 Signal coding at the output port
 Test Sequence created on : 17/Aug/1999 08:39:45

TEST RESULT : PASSED

Network Em.	I.U.T. rec.	ALARMS					ERRORS count					I.U.T
Freq. CLOCK [Hz]	Freq. CLOCK [Hz]	SGL	AIS	RAI	FML	CRC	CODE	FRAME	CRC	Ebit	sync	
2047999.999	2047999.998	no	no	no	no	no	0	0	0	0	YES	

I.U.T. PM4351 COMBT PMC-Sierra Inc
 Test : AMI A.2.1 Signal coding at the output port
 Test Sequence created on : 17/Aug/1999 08:39:45

TEST RESULT : PASSED

Network Em.	I.U.T. rec.	ALARMS					ERRORS count					I.U.T
Freq. CLOCK [Hz]	Freq. CLOCK [Hz]	SGL	AIS	RAI	FML	CRC	CODE	FRAME	CRC	Ebit	sync	
2048000.000	2047999.994	no	no	no	YES	no	796503	434	551	1	YES	

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Data retrieved from : ./TE/CTR13/dir15/A221

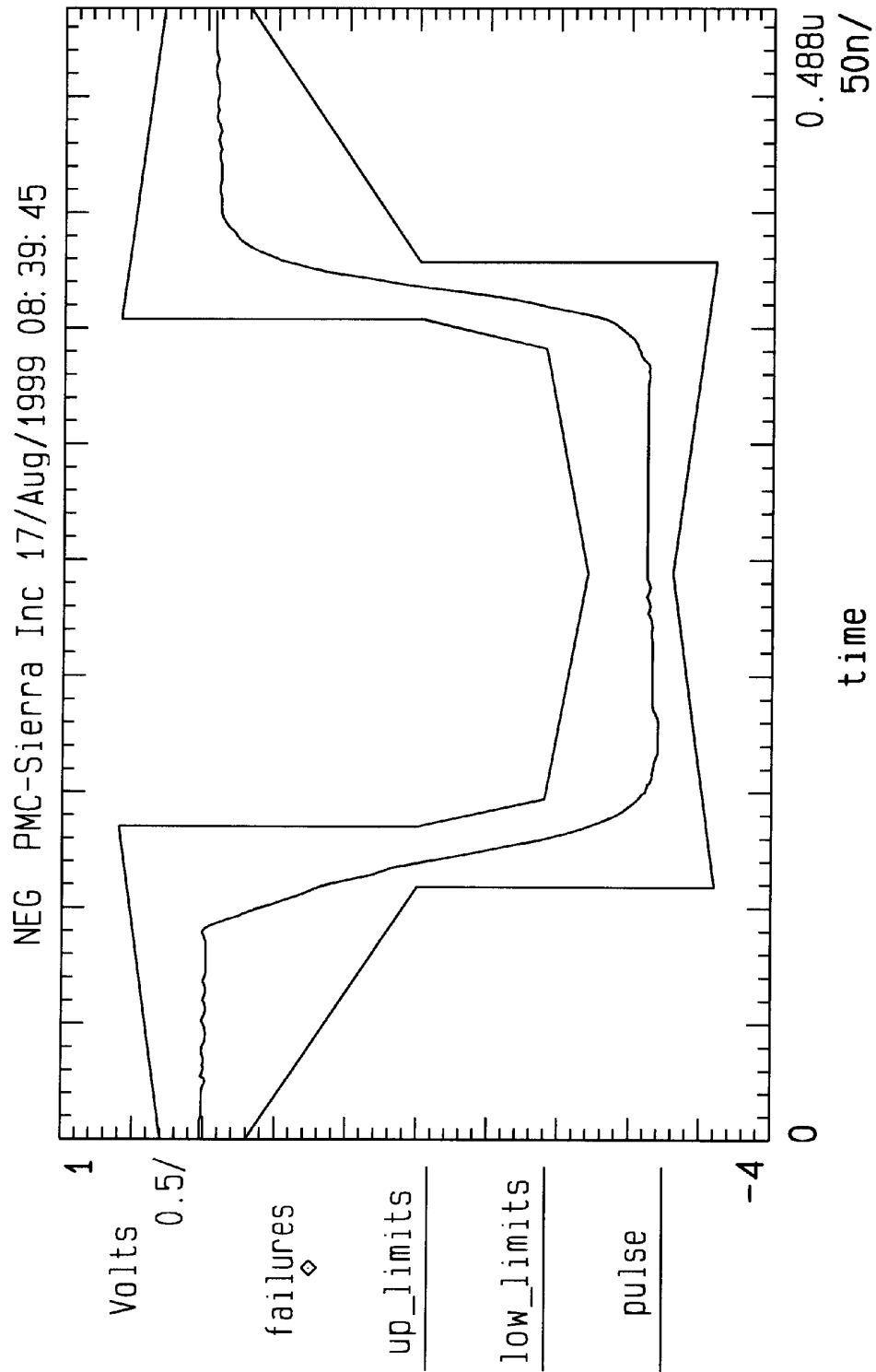
I.U.T. PM4351 COMBT PMC-Sierra Inc
Test : A.2.2.1 Pulse shape and amplitude of a mark (pulse)
Test Sequence created on : 17/Aug/1999 08:39:45
TEST RESULT : PASSED

Details of test results

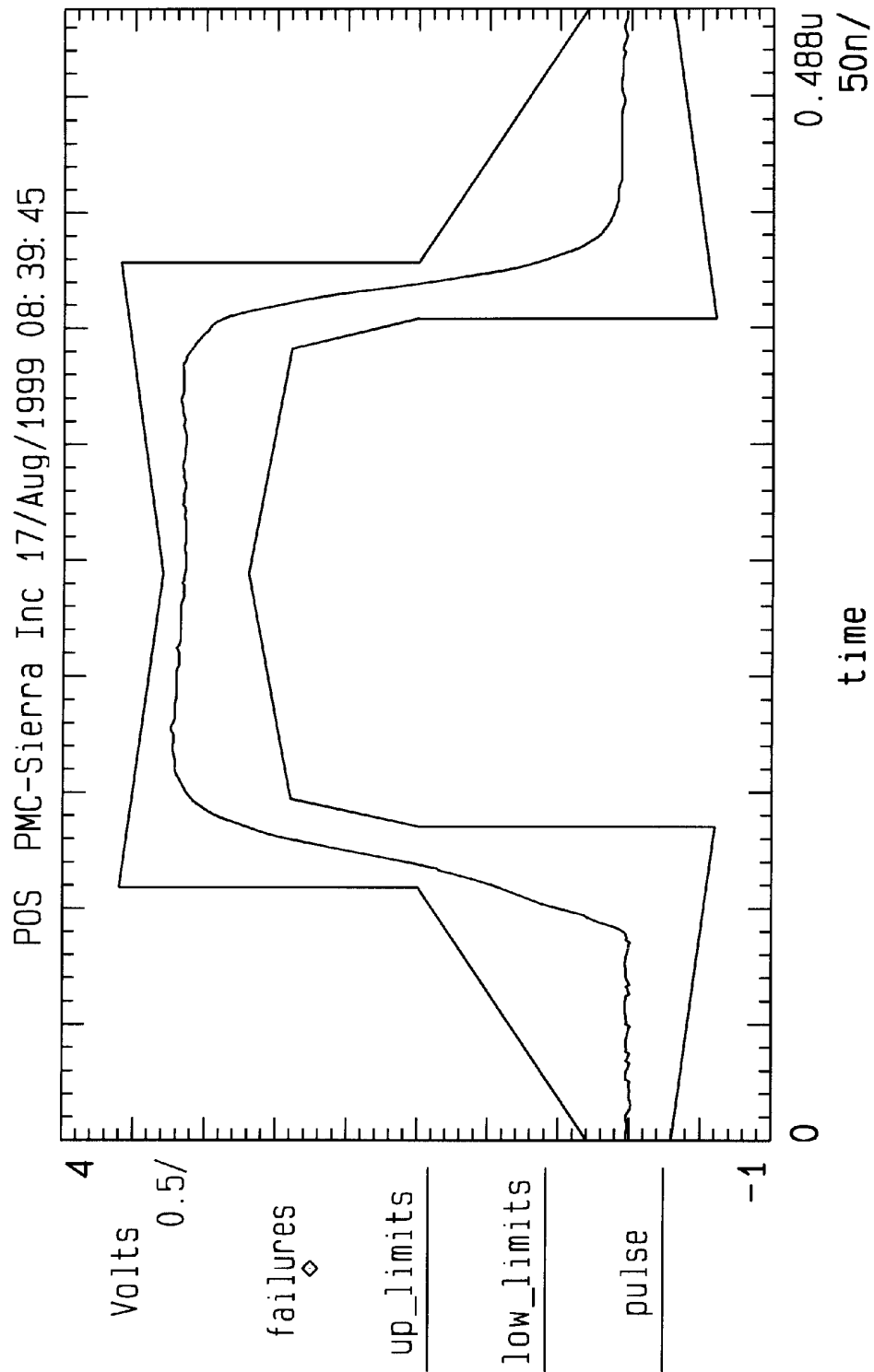
=====			
I.U.T.	PULSES		
state	sample	positive	negative
F 1	one	passed	passed
-----	-----	-----	-----

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Data retrieved from : ./TE/CTR13/dir15/A222

I.U.T. PM4351 COMBT PNC-Sierra Inc
Test : A.2.2.2 Peak voltage of a space (no pulse)

Test Sequence created on : 17/Aug/1999 08:39:45

TEST RESULT : PASSED

Trace of test execution case space after pulses

PARTIAL TEST RESULT : PASSED

Trace of test execution

```

|=====|=====|
| I.U.T. | partial test results | | |
|---|---|---|---|
| state | sample | pos pulse | neg pulse |
|=====|=====|=====|=====|
| F 1 | one | passed | passed |
|-----|-----|-----|-----|

```

Trace of test execution case space before pulses

PARTIAL TEST RESULT : PASSED

Trace of test execution

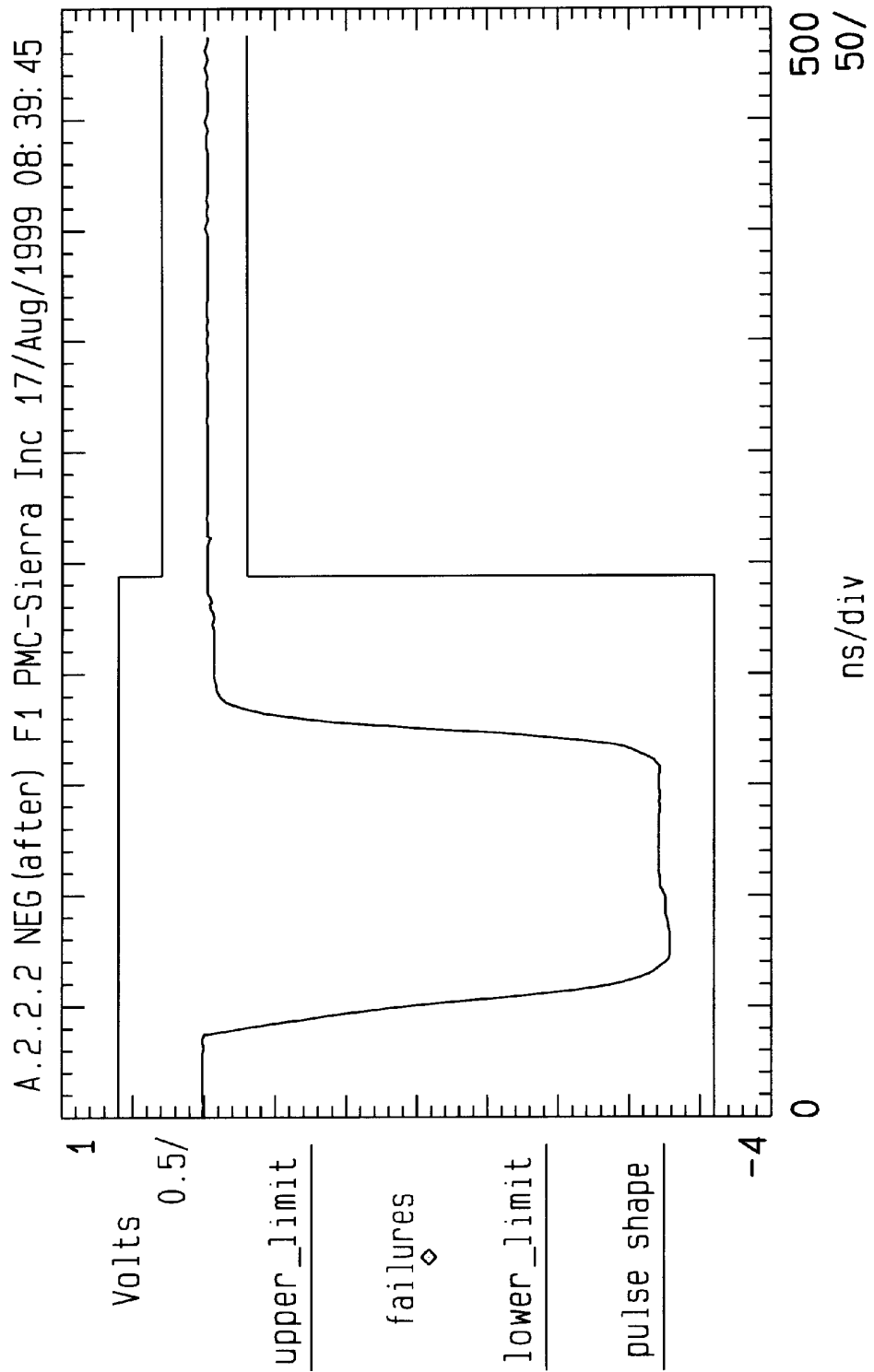
```

|=====|=====|
| I.U.T. | partial test results | | |
|---|---|---|---|
| state | sample | pos pulse | neg pulse |
|=====|=====|=====|=====|
| F 1 | one | passed | passed |
|-----|-----|-----|-----|

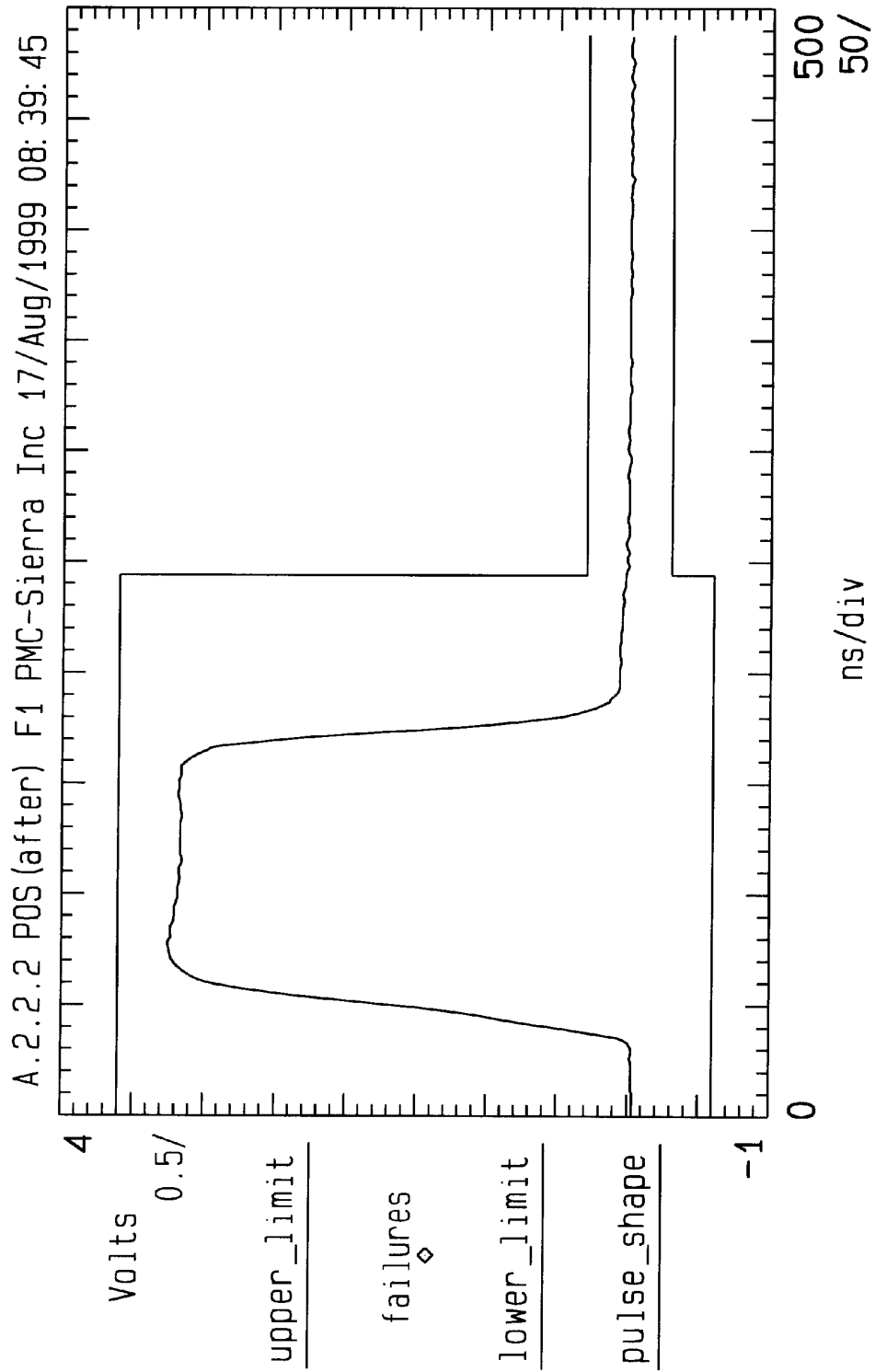
```

@

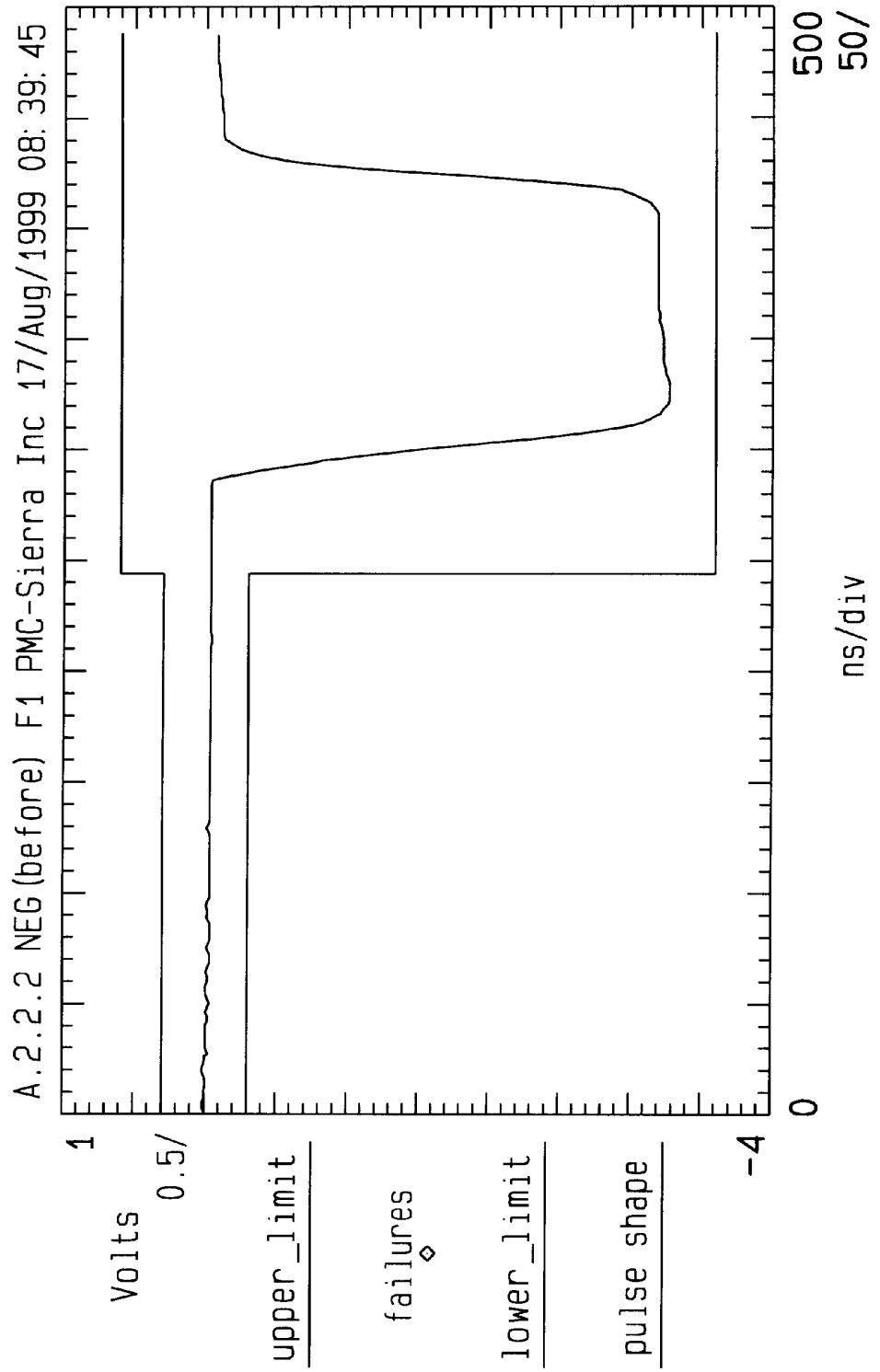
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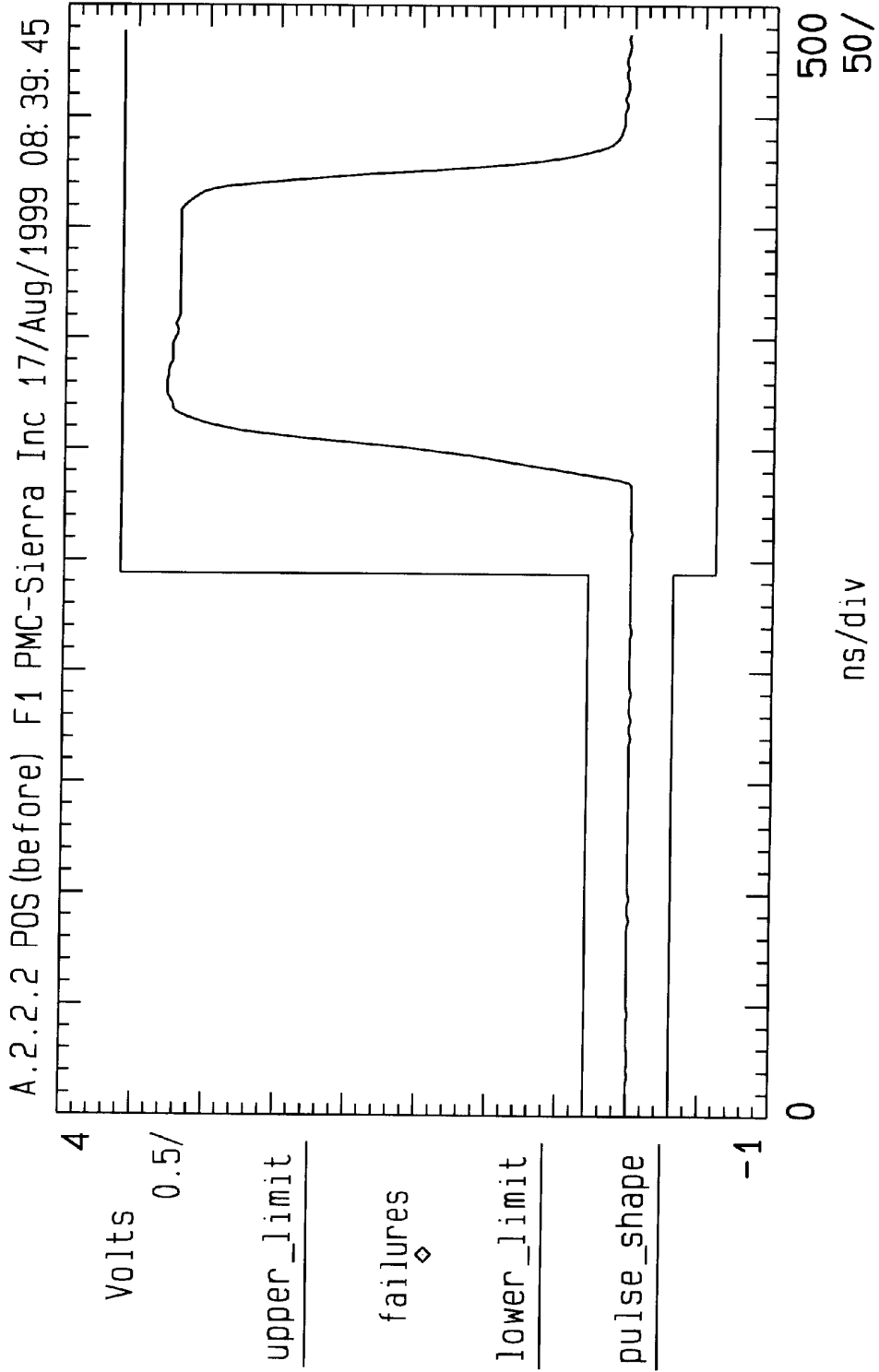
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Data retrieved from : ./TE/CTR13/dir15/A223

I.U.T. PM4351 COMET PMC-Sierra Inc

Test : A.2.2.3 Ratio of the amplitude of pos & neg pulses at the centre

Test Sequence created on : 17/Aug/1999 08:39:45

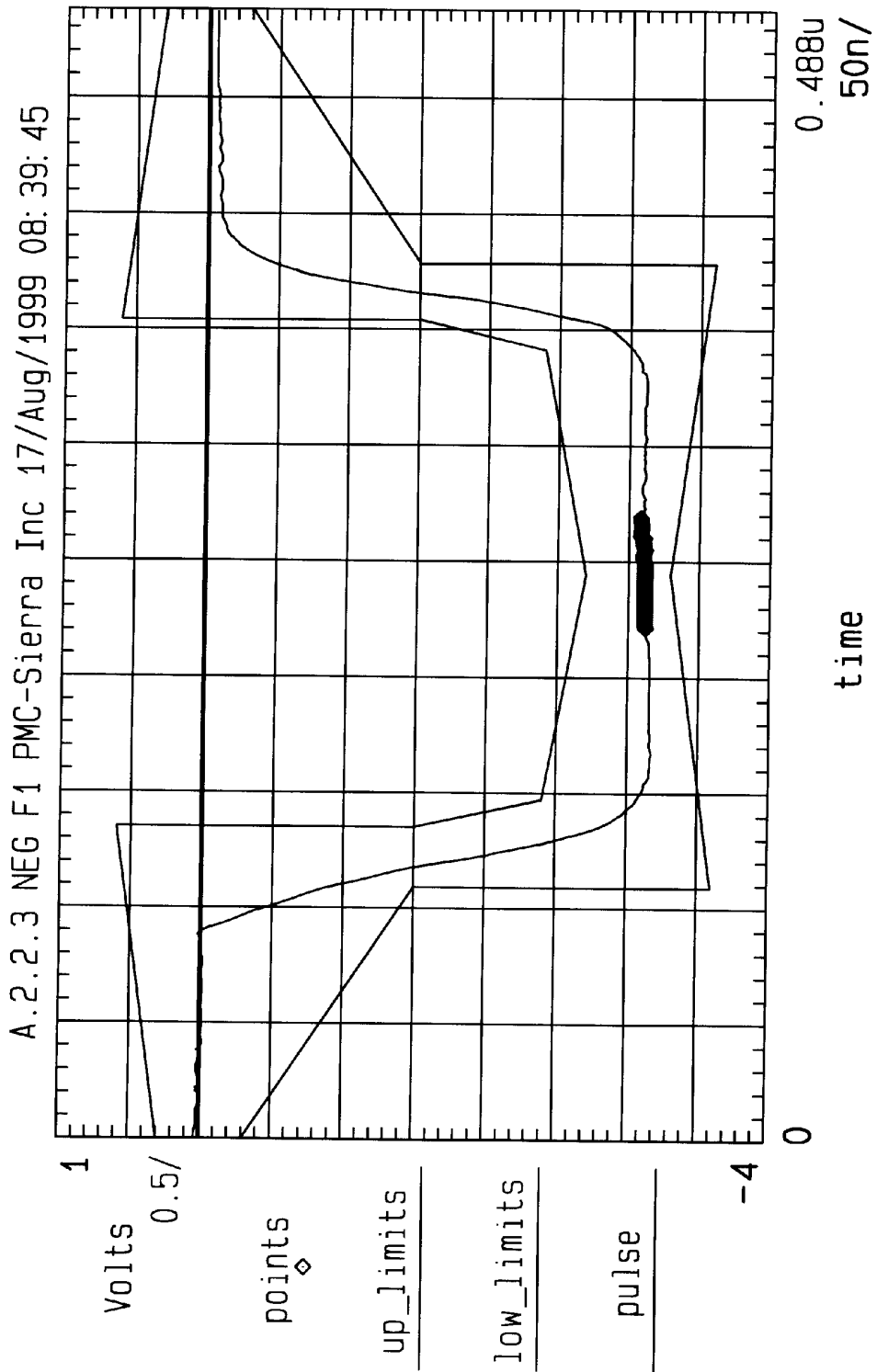
TEST RESULT : PASSED

Trace of test execution

```
|=====|=====|=====|=====|
| I.U.T | Sample | Ampl. | Pass |
| state |        | Ratio | Fail |
|=====|=====|=====|=====|
| F 1  | one    | 1.014 | pass |
|-----|-----|-----|-----|
```

*

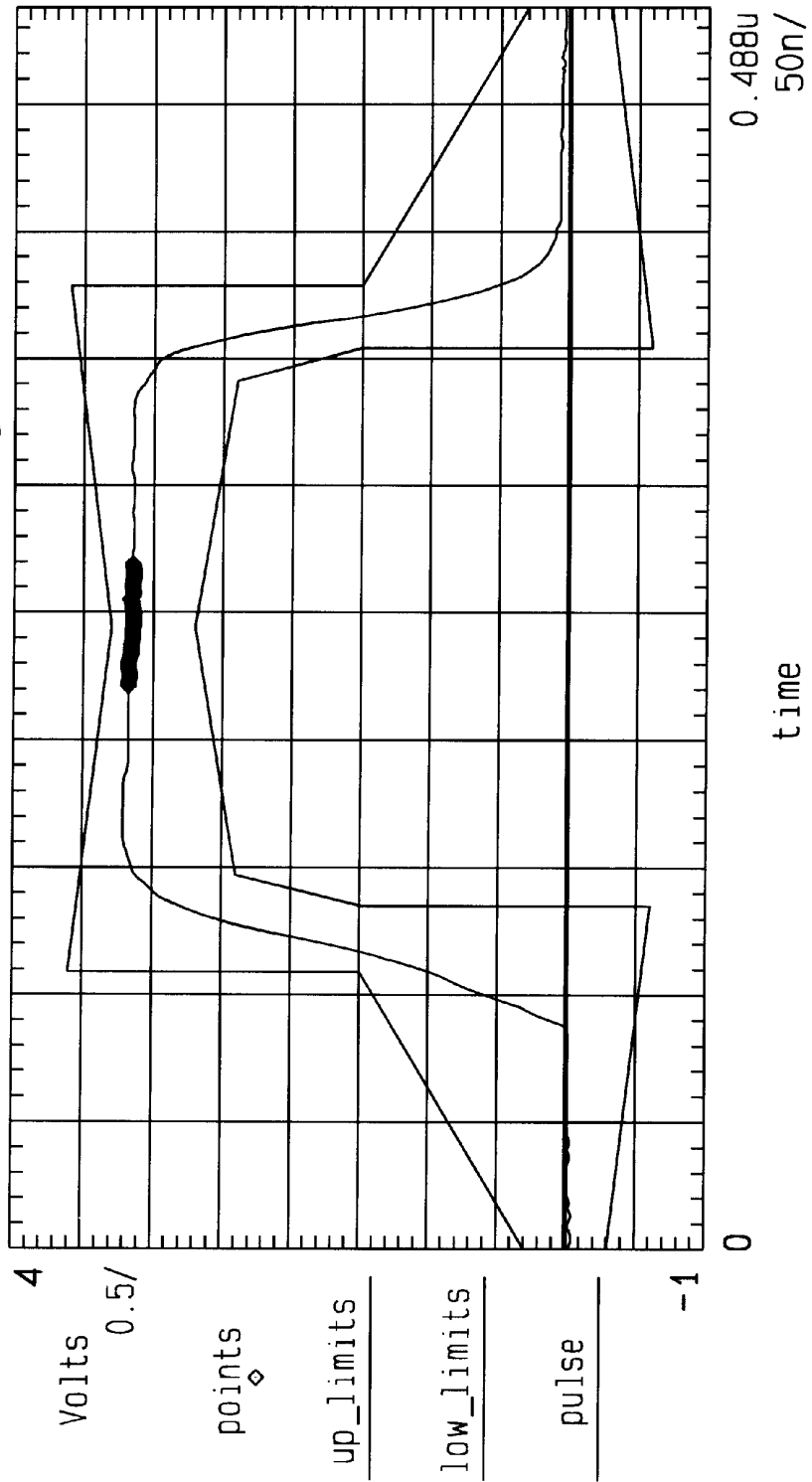
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A.2.2.3 POS F1 PMC-Sierra Inc 17/Aug/1999 08:39:45



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Data retrieved from : ./TB/CTR13/dir15/A224

I.U.T. PM4351 COMBT PMC-Sierra Inc

Test : A.2.2.4 Ratio of pos & neg pulse widths at 1/2 amplitude

Test Sequence created on : 17/Aug/1999 08:39:45

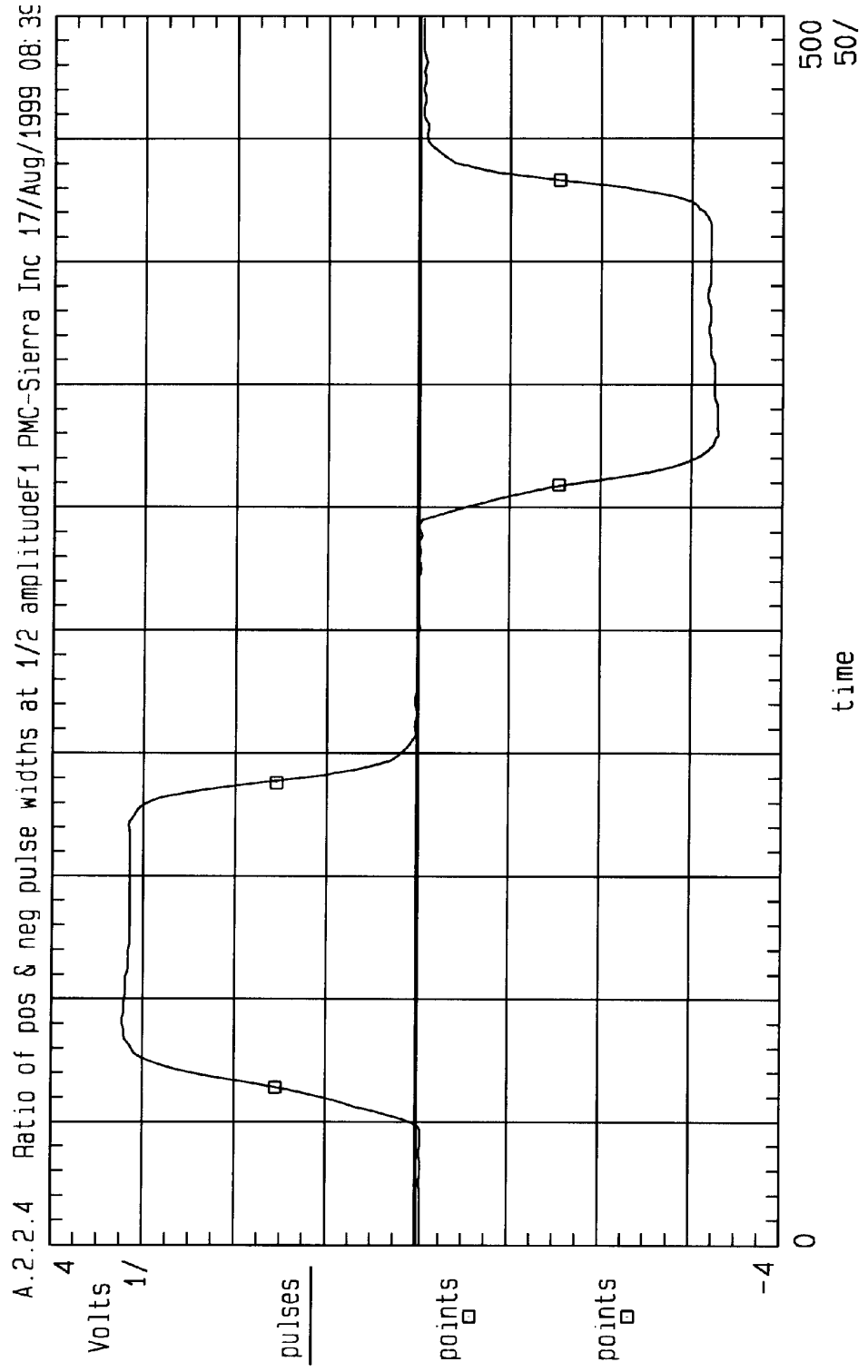
TEST RESULT : PASSED

Trace of test execution

I.U.T	Sample	Width	Width	Widths	Pass
state		pos ns	neg ns	RATIO	Fail
P 1	one	250	250	1.000	pass

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Data retrieved from : ./TB/CTR13/dir15/A23

I.U.T. PM4351 COMET PMC-Sierra Inc
Test : A.2.3 Clock accuracy at the output port
Test Sequence created on : 17/Aug/1999 08:39:45
TEST RESULT : PASSED

Measured bit rate [Hz]	deviation [ppm]	Limits [ppm]
2048062.576	+30.55	+/- 50

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Data retrieved from : ./TE/CTR13/dir15/C2821_no_6dB_Cable

I.U.T. PM4351 COMET PMC-Sierra Inc
 Test : A.2.4 Jitter & Wander transfer(without 6dB cable)
 Test Configuration: IUT's output timing is referenced to RBC CLK from data stream
 TEST EXECUTION CONDITIONS: 6dB cable not inserted
 Test Sequence created on : 17/Aug/1999 08:39:45
 TEST RESULT : PASSED

		NT clock freq 2.048 MHz				NT clock freq 2.048 MHz				NT clock freq 2.048 MHz									
		nominal				plus 50 ppm				minus 50 ppm									
NT JITTER	IUT's	Measurement filters		IUT's		Measurement filters		IUT's		Measurement filters		IUT's							
		measur. limits	signal	measur. limits	signal	measur. limits	signal	measur. limits	signal	measur. limits	signal								
		4 Hz	40 Hz	4 Hz	40 Hz	4 Hz	40 Hz	4 Hz	40 Hz	4 Hz	40 Hz	4 Hz	40 Hz						
		1.6 UI	0.11 UI	1.6 UI	0.11 UI	1.6 UI	0.11 UI	1.6 UI	0.11 UI	1.6 UI	0.11 UI	1.6 UI	0.11 UI						
[Hz]	[UI]	NOF	SYN	Jitt	V	Jitt	V	NOF	SYN	Jitt	V	Jitt	V	NOF	SYN	Jitt	V	Jitt	V
1	2.6																		
2	2.3																		
3	2.1																		
6	1.87																		
10	1.7																		
20	1.5	yes	yes	0.116r	p	0.056r	p	yes	yes	0.117r	p	0.058r	p	yes	yes	0.119r	p	0.059r	p
30	1.5																		
100	1.5																		
300	1.5																		
1000	1.5																		
2000	1.5																		
2400	1.5	yes	yes	0.016r	p	0.014r	p	yes	yes	0.017r	p	0.015r	p	yes	yes	0.020r	p	0.019r	p
3600	1																		
6000	0.6																		
10000	0.36																		
18000	0.2	yes	yes	0.016r	p	0.014r	p	yes	yes	0.017r	p	0.015r	p	yes	yes	0.020r	p	0.018r	p
36000	0.2																		
60000	0.2																		
100000	0.2	yes	yes	0.016r	p	0.014r	p	yes	yes	0.018r	p	0.015r	p	yes	yes	0.021r	p	0.018r	p

IUT's SIGNAL : SIGNAL Received from I.U.T. Jitt : Measured Jitter R : Measure range 10 U
 NOF : NORMAL OPERATION FRAMES V : Partial Verdict r : Measure range 1 UI
 * SYNC : I.U.T. synchronized to the Network X : Result Overage
 @

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Data retrieved from : ./TE/CTR13/dir15/A25

I.U.T. PM4351 COMET PMC-Sierra Inc
Test : A.2.5 Frame Structure
Test Sequence created on : 17/Aug/1999 08:39:45
TEST RESULT : PASSED

ALARMS				ERRORS count								ERROR FREE SECONDS							
STATE	-----			-----			-----		-----			-----		-----		-----			
Num.	SIG	AIS	RAI	FML	CRC	BIT	CODE	PRAME	CRC	E_bit	BIT	CODE	FRAME	CRC	E_bit				
F1	no	no	no	no	no	0	0	0	0	0	0	5	5	5	5				