



PARTS HISTORY LOG

Radiation Testing

PROGRAMME:- XMM

PART TYPE:- 54HC109D

RADIATION REPORT:- RD 251

IGG TASK NUMBER:- 1500

SUMMARY OF TEST RESULTS

All test samples failed all measured parameters after 100KRad(Si) but fully recovered after the 168 hours annealing.



Radiation Report Number:- RD 251

Project:- XMM

Part Type:- 54HC109D

Date Code:- 9642

Manufacturer:- STM/F

IGG Task No:- 1500

Project Approval of Lot Traveller:-

Signed.....*A. Annala*.....

Date. 20-1-98.

Position COMPONENT ENGINEER

Serial Number Range:-

043 through 048 (not inclusive)

I certify that the subject component has been tested in accordance with the following radiation specifications:-

Test Method - ESA/SCC22900

ISSUE- 4 DATE- Apr '95

Irradiation Test Plan- XM-PL-IGG-0031 Appendix B

ISSUE- 2A DATE- Jun '96

Closed/Approved NCR No:- N N/A

Approved Waiver No:- WAR N/A

Signed.....*P. A. Russell*.....

Date. 17/12/97.

Upscreening Engineer

Signed.....*[Signature]*.....

Date. 17/12/97.

Upscreening Manager



RADIATION REPORT NUMBER:- RD 251

DATE:- 4.12.97

PROJECT:- XMM

RIR IN:- 79599

PART NUMBER:- 54HC109D

MANUFACTURER:- STM/F

PROCUREMENT LEVEL:- ESA/SCC9306/048-11BF

DATE CODE:- 9642

TEST METHOD:- ESA/SCC22900

ISSUE:- 4 DATE:- Apr'9

IRRADIATION TEST PLAN:-XM-PL-IGG-0031 Appendix B ISSUE:- 2A DATE:- Jun'96

START QUANTITY:- 5

No.	Test (Sample Size)	XM-PL-IGG-0031 Test Method and Conditions	Date in	Qty in	Date out	Qty out	SIGNED Op/QA
1	Serialisation and Selection of Control Samples (100%)	Control Sample = SN 43 (Unbiased)	3/11/97	5	3/11/97	4 + CONTROL SAMPLE	<i>P.R.</i> IGG 18 CT
2	Initial Electrical Measurements (100% read and record)	Table 2dc of Detail Spec. Testing at IGG	3/11/97	4	3/11/97	4	<i>P.R.</i> IGG 18 CT
3	Initial Electrical Measurements (100% read and record)	Table 7 of Detail Spec. Testing at ERA	3/11/97	4	3/11/97	4	<i>P.R.</i> IGG 18 CT
4	Set-up and apply Bias per Figure 1	Verify Bias Circuit and conditions (in-situ) for all 4 test samples	4/11/97	4	4/11/97	4	<i>P.R.</i> IGG 18 CT
5	Irradiation 1 (4 samples)	Dose=100kRAD (Si) Rate=36KRAD (Si) per hour Time=2.78 hours	4/11/97	4	4/11/97	4	<i>P.R.</i> IGG 18 CT
6	Final Electrical Measurements (100% read and record)	As Test 3 At ERA	4/11/97	4	4/11/97	0	<i>P.R.</i> IGG 18 CT



Report No: RD 251		Part Type: 54HC109D			Date: 4.12.97		
No.	Test (Sample Size)	XM-PL-IGG-0031 Test Method and Conditions	Date in	Qty in	Date out	Qty out	SIGNED Op/QA
7	Annealing Electrical Measurements (100% read and record)	After 168 hours bias at +100°C Perform Table 2 dc and Table 7	14/11/97	4	14/11/97	4	<i>P. B. K.</i> IGG 16 CT
8	Test Report Collation				17/12/97		<i>OP</i> IGG 2 CT
9	Test Report Approval				17/12/97		<i>OP</i> IGG 2 CT
10	NOTES:-						



FAILURE LIST AND APPLICABLE NCR

Test No.	Serial Number(s)	Failed Parameter and Failure Mode	Applicable NCR
6	44,45,47,48	FAIL V_{THN} , V_{THP} AND I_{DD} .	-



TEST EQUIPMENT LIST

Item, Type Number and Serial Number	CT Inventory Number	Function	Calibration Due
Item: Radiation Source Type No: Cobalt 60 Serial No: N/A	ERA's Facility	Irradiation	1 / 1 /1998
Item: SZ Type No: M3000 Serial No: 884769	CT339	ATE	28 / 3 /1998
Item: TEKTRONIX Type No: 370 Serial No: 300553	CT217	CURVE TRACER	12 / 2 /1998
Item: THWRLEBY Type No: PL320 Serial No: 2690363	CT288	PSU	22 / 11 /1997
Item: Type No: Serial No:			/ /199
Item: Type No: Serial No:			/ /199
Item: Type No: Serial No:			/ /199
Item: Type No: Serial No:			/ /199
Item: Type No: Serial No:			/ /199
Item: Type No: Serial No:			/ /199
Item: Type No: Serial No:			/ /199
Item: Type No: Serial No:			/ /199

Results file : RD251_54HC1090_INIT_EMS_@_166 from: 03.11.97 / 10:52:23
Operator : PAUL RUSSELL
Part number : 54HC1090
Lot number : RD251
Order number : D/C 9642
Vendor : SGS THOMSON
: CONTROL 43 ; RAD 44,45,47,48
: INITIAL EMS @ 166
: 54HC109 8009306/048 ISS1D RM DC 1.0 IR 31OCT97 16 PIN CMOS

Test steps

1. Continuity test	-1.00	...	-0.30	V
2. IDD	0	...	200	nA
3. Function test	0	...	0	
4. Function test	0	...	0	
5. Function test	0	...	0	
6. VOL1	-10.0	...	100.0	mV
7. VOL2	-10.0	...	100.0	mV
8. VOL3	0.0	...	250.0	mV
9. VOL4	-10.0	...	250.0	mV
10. VOL4	0.0	...	250.0	mV
11. VOH1	1.90	...	2.10	V
12. VOH2	4.40	...	4.60	V
13. VOH3	5.90	...	6.10	V
14. VOH4	3.98	...	4.60	V
15. VOH5	5.48	...	6.10	V
16. IIL	-50.0	...	50.0	nA
17. IIH	-50.0	...	50.0	nA

	43	44	45	47	48
1.1 [V]	-0.51	-0.51	-0.51	-0.51	-0.51
1.2 [V]	-0.53	-0.52	-0.53	-0.53	-0.53
2.1 [nA]	25	24	24	24	24
2.2 [nA]	25	24	24	24	24
3.1 []	0	0	0	0	0
3.2 []	0	0	0	0	0
4.1 []	0	0	0	0	0
4.2 []	0	0	0	0	0
5.1 []	0	0	0	0	0
5.2 []	0	0	0	0	0
6.1 [mV]	2.1	2.1	2.2	2.1	2.1
6.2 [mV]	2.1	2.1	2.2	2.1	2.1
7.1 [mV]	1.4	1.1	1.1	1.2	1.1
7.2 [mV]	1.6	1.2	1.2	1.4	1.3
8.1 [mV]	2.4	1.4	1.4	1.7	1.6
8.2 [mV]	3.0	1.7	1.8	2.3	2.0
9.1 [mV]	117.3	113.9	119.8	113.5	112.1
9.2 [mV]	119.5	115.2	120.5	123.2	113.8
10.1 [mV]	115.7	111.2	116.6	111.4	109.9
10.2 [mV]	119.1	112.9	117.7	124.2	112.0
11.1 [V]	2.00	2.00	2.00	2.00	2.00
11.2 [V]	2.00	2.00	2.00	2.00	2.00
12.1 [V]	4.50	4.50	4.50	4.50	4.50
12.2 [V]	4.50	4.50	4.50	4.50	4.50
13.1 [V]	6.00	6.00	6.00	6.00	6.00
13.2 [V]	6.00	6.00	6.00	6.00	6.00
14.1 [V]	4.37	4.37	4.36	4.36	4.37
14.2 [V]	4.37	4.37	4.37	4.37	4.37
15.1 [V]	5.86	5.36	5.85	5.85	5.86
15.2 [V]	5.86	5.86	5.86	5.86	5.86
16.1 [nA]	-0.2	-0.2	-0.2	-0.2	-0.2
16.2 [nA]	-0.2	-0.2	-0.2	-0.2	-0.2
17.1 [nA]	0.2	0.2	0.2	0.2	0.2
17.2 [nA]	0.4	0.4	0.4	0.4	0.4

=====
Results file : RD251_54HC109D_POST_ANNEAL_EMS from: 14.11.97 / 15:21:50
Operator : PAUL RUSSELL
Part number : 54HC109D
Lot number : RD251
Order number : D/C 9642
Vendor : SGS THOMSON
: CONTROL 43 ; RAD 44,45,47,48
: POST ANNEAL EMS
: 54HC109 SCC9306/048 ISS1D RM DC 1.0 IR 31OCT97 16 PIN CMOS
=====

Test steps

1. Continuity test	-1.00	...	-0.30	V
2. IDD	0	...	200	nA
3. Function test	0	...	0	
4. Function test	0	...	0	
5. Function test	0	...	0	
6. VOL1	-10.0	...	100.0	mV
7. VOL2	-10.0	...	100.0	mV
8. VOL3	0.0	...	250.0	mV
9. VOL4	-10.0	...	250.0	mV
10. VOL4	0.0	...	250.0	mV
11. VOH1	1.90	...	2.10	V
12. VOH2	4.40	...	4.60	V
13. VOH3	5.90	...	6.10	V
14. VOH4	3.98	...	4.60	V
15. VOH5	5.48	...	6.10	V
16. IIL	-50.0	...	50.0	nA
17. IIH	-50.0	...	50.0	nA

	43	44	45	47	48
1.1 [V]	-0.61	-0.61	-0.61	-0.61	-0.61
1.2 [V]	-0.63	-0.46	-0.46	-0.45	-0.45
2.1 [nA]	1	5	5	7	7
2.2 [nA]	1	5	5	7	7
3.1 []	0	0	0	0	0
3.2 []	0	0	0	0	0
4.1 []	0	0	0	0	0
4.2 []	0	0	0	0	0
5.1 []	0	0	0	0	0
5.2 []	0	0	0	0	0
6.1 [mV]	2.1	2.0	2.0	1.9	1.9
6.2 [mV]	2.1	2.4	2.5	2.4	2.4
7.1 [mV]	1.2	1.4	1.0	1.0	0.9
7.2 [mV]	1.4	1.4	1.1	1.1	1.0
8.1 [mV]	1.8	3.5	1.3	1.5	1.2
8.2 [mV]	2.2	3.8	1.5	1.7	1.4
9.1 [mV]	116.6	121.3	121.5	115.9	112.8
9.2 [mV]	113.2	115.6	124.0	128.8	129.8
10.1 [mV]	114.4	122.2	119.2	114.2	110.8
10.2 [mV]	116.5	134.4	129.0	124.2	124.7
11.1 [V]	2.00	2.00	2.00	2.00	2.00
11.2 [V]	2.00	2.00	2.00	2.00	2.00
12.1 [V]	4.50	4.50	4.50	4.50	4.50
12.2 [V]	4.50	4.50	4.50	4.50	4.50
13.1 [V]	6.00	6.00	6.00	5.99	6.00
13.2 [V]	6.00	6.00	6.00	6.00	6.00
14.1 [V]	4.37	4.35	4.35	4.35	4.35
14.2 [V]	4.37	4.36	4.35	4.35	4.36
15.1 [V]	5.86	5.84	5.84	5.84	5.85
15.2 [V]	5.86	5.85	5.85	5.84	5.85
16.1 [nA]	-0.3	-0.3	-0.3	-0.3	-0.3
16.2 [nA]	-0.1	-0.1	-0.1	-0.1	-0.1
17.1 [nA]	-0.1	-0.1	-0.1	-0.1	-0.1
17.2 [nA]	-0.0	-0.0	-0.0	-0.0	-0.0



XMM

R1R 79599

RD251

IRRADIATION TEST PLAN NO.

XM-PL-IGG-0031

Issue No. 2
Date: June 1996
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Rev. A

Component No. 54HCXXX 3	Component Designation: Integrated Circuit, Silicon Monolithic, High Speed CMOS 4	Irradiation Spec No. N/A Iss. Rev. 5
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Specifications Generic ESA/SCC 9000 Iss.8 Rev. E Detail As Applicable. 6	Acceptance Evaluation Element Diffusion Lot X 7	Electrical Meas In-situ Remote X 8	Project/Programme XMM 9
-----------------------------------------------------------------------------------	----------------------------------------------------------------	---------------------------------------------	--------------------------------------

Manufacturer: Name:SGS Thomson Address: 3 Rue de Suisse BP 4199 35041 Rennes-Cedex FRANCE 10	Test Facility: Name: Oris-Labra Address: CEA Saclay FRANCE 11	Originator: IGG CT Name: J. Guymer Telephone: 01329 829311 12
-------------------------------------------------------------------------------------------------------------	---------------------------------------------------------------------------	------------------------------------------------------------------------

Radiation Source COBALT 60 13	Sample Size: 4 Control Devices: 1 14	Exposure Single Multiple X 15	Annealing Test YES X NO 16	Radiation Level: 50KRad(Si) 75KRad(Si) 100KRad(Si) 17
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Single Exposure Dose [KRad(Si)] Dose Rate [Rad(Si)/s] Not Applicable Exposure Time 18	Multiple Exposure:			
	Irradiation Steps	1	2	3
	Dose [Krad(Si)]	50	25	25
	Dose Rate [rad(Si)/hr]	200	200	200
	Exposure Time(hours)	250	125	125

Bias Requirements: During Exposure (for in-situ elec. measure): N/A
During and after Exposure (for remote elec. measure): YES

Bias Conditions:
Test Circuits: The Electrical Bias circuit is given in Figure 1 herein.
Voltages: See Figure 1 Tolerance: See Figure 1

Shielding: Shielding is required to minimize dose enhancement effects caused by low energy, scattered radiation. The test specimens shall be enclosed in a Pb/Al container of Pb 1.5mm minimum, surrounding on inner shield of 0.7 to 1.0mm Al. 20

Irradiation Test Sequence 21

Test Step	Description	Requirements
1	Initial Radiation Test per Appendix B	If parts fail, a further 5 pieces will be submitted for RVT Plan XM-PL-IGG-0031, tested from test steps No 2 of the irradiation test sequence.
2	Serialisation Goods Receiving Inspection	If parts are not serialised, serialise them (permanently) sequentially from 1 to 5 inclusive.
3	Initial Electrical Measurements at Room Temperature only	Table 2 of applicable detail specification (see Appendix A herein)
4	Set-up of Test	Verify Figure 1 Bias Circuit and Voltages (In-situ) for all 4 test samples.



1

2

Irradiation Test Sequence (Cont.)

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Test Step	Description	Requirements
5	Irradiation Exposure	Verify Radiation dose rate and position in the chamber to achieve required dose. Verify and witness duration of exposure to achieve required dose
6	Intermediate Electrical Measurements	Bias to be maintained until test is performed. Test per Table 7 of applicable detail specification (see Appendix A herein) - Read and Record - 5 parts. Test to be performed immediately upon removal from chamber (less than 10 mins interval). Upon completion of test devices to be replaced in bias circuit (4 parts) and returned to chamber. Maximum interval between two consecutive exposures to be (30 mins).
7 to 12	Repeat Set-up/Exposure/Test sequence up to Total Dose of 100KRad(Si) as per Plan above	Repeat Step 4, 5, 6 for a total of 3 cycles up to the total dose of 100KRad(Si) at accumulated dose of 50, 75, and 100KRad(Si). (See Remark 1).
13	Annealing	To be 24 hours at +25°C under Figure 1 bias.
14	Post Annealing Electrical Measurements	As per Step 6.
15	Accelerated ageing under bias	Bake at +100°C under Figure 1 bias for 168 hours.
16	Final Electrical Measurements	Per Table A herein - Read and Record - 5 parts.
17	Total Dose Irradiation Test Report	ESA/SCC No. 22900.

Remarks

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1. The set-up/exposure/test sequence shall be stopped for any device that exhibits repeated functional failure.
2. Electrical testing shall be performed on the same test equipment from test steps 2 to step 16.



XMM

IRRADIATION TEST PLAN NO.

XM-PL-IGG-0031

ISSUE NO. 2

Date: June 1996

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REV. A

1

2

FIGURE 1 - ELECTRICAL CIRCUIT FOR IRRADIATION

As per applicable detail specification
(see Appendix A herein)



APPENDIX A

DEVICE TYPE	ESA/SCC DETAIL SPECIFICATION	ISSUE	REV	USER	UNIT
54HC00	9201/105	1	C	AEO LABEN	DBU RTU, CDMU, 1750 μ PR
54HC02	9201/113	1	A	LABEN TERMA EKU MSSL	RTU, CDMU, 1750 μ PR PDU EXP EXP
54HC03	9201/114	1	A	LABEN	RTU, CDMU, 1750 μ PR
54HC04	9401/033	1	A	LABEN GALILEO TERMA EKU EPIC MSSL	RTU, CDMU, 1750 μ PR STR PDU EXP EXP EXP
54HC08	9201/106	1	A	MSSL EPIC LABEN EKU ETCA GALILEO TERMA	EXP EXP RTU, CDMU, 1750 μ PR EXP MRU STR PDU
54HC11	9201/117	1	A	MSSL EKU	EXP EXP
54HC14	9409/007	1	A	MSSL EPIC EKU ETCA GALILEO TERMA AEO LABEN	EXP EXP EXP MRU STR PDU DBU RTU, CDMU, 1750 μ PR
54HC21	9201/108	1	A	EPIC LABEN MSSL	EXP RTU, CDMU, 1750 μ PR EXP
54HC32	9201/111	1	A	MSSL EPIC EKU LABEN ETCA GALILEO TERMA	EXP EXP EXP RTU, CDMU, 1750 μ PR MRU STR PDU



APPENDIX A

DEVICE TYPE	ESA/SCC DETAIL SPECIFICATION	ISSUE	REV	USER	UNIT
54HC74	9203/050	1	C	EKU ETCA GALILEO TERMA LABEN EPIC MSSL	EXP MRU STR PDU RTU, CDMU, 1750 μ PR EXP EXP
54HC85	9209/004	1	B	EKU LABEN EPIC	EXP RTU, CDMU, 1750 μ PR EXP
54HC123	9207/006	1	B	ETCA	MRU
54HC125	9401/039	1	B	MSSL EPIC LABEN	EXP EXP RTU, CDMU, 1750 μ PR
54HC137	9205/013	1	B	LABEN	RTU, CDMU, 1750 μ PR
54HC138	9408/046	1	B	MSSL EPIC GALILEO EKU LABEN	EXP EXP STR EXP RTU, CDMU, 1750 μ PR
54HC139	9205/017	1	B	LABEN EKU	RTU, CDMU, 1750 μ PR EXP
54HC148	9410/017	1	B	TERMA	PDU
54HC151	9408/054	1	B	MSSL EKU	EXP EXP
54HC157	9408/057	1	B	MSSL EPIC	EXP EXP
54HC163	9204/073	1	B	MSSL TERMA	EXP PDU
54HC164	9306/041	1	A	MSSL EPIC ETCA GALILEO TERMA EKU LABEN	EXP EXP MRU STR PDU EXP RTU, CDMU, 1750 μ PR
54HC165	9306/042	1	B	MSSL TERMA EKU	EXP PDU EXP
54HC166	9306/043	1	B	LABEN	RTU, CDMU, 1750 μ PR



APPENDIX A

DEVICE TYPE	ESA/SCC DETAIL SPECIFICATION	ISSUE	REV	USER	UNIT
54HC175	9203/052	1	B	EPIC LABEN	EXP RTU, CDMU, 1750 μ PR
54HC191	9204/066	1	B	LABEN	RTU, CDMU, 1750 μ PR
54HC193	9204/065	1	B	MSSL GALILEO EKU LABEN	EXP STR EXP RTU, CDMU, 1750 μ PR
54HC240	9401/034	1	A	GALILEO LABEN	STR RTU, CDMU, 1750 μ PR
54HC242	9405/011	1	A	LABEN	RTU, CDMU, 1750 μ PR
54HC243	9405/012	1	A	LABEN	RTU, CDMU, 1750 μ PR
54HC244	9401/048	1	A	MSSL EKU ETCA GALILEO TERMA LABEN AEO	EXP EXP MRU STR PDU RTU, CDMU, 1750 μ PR DBU
54HC245	9405/013	1	A	MSSL GALILEO LABEN EKU	EXP STR RTU, CDMU, 1750 μ PR EXP
54HC253	9408/058	1	B	MSSL TERMA	EXP PDU
54HC257	9408/047	1	B	LABEN	RTU, CDMU, 1750 μ PR
54HC273	9203/053	1	A	MSSL ETCA EKU LABEN	EXP MRU EXP RTU, CDMU, 1750 μ PR
54HC280	9208/003	1	A	ETCA TERMA	MRU PDU
54HC283	9202/075	1	B	MSSL	EXP
54HC373	9203/059	1	A	GALILEO LABEN EKU	STR RTU, CDMU, 1750 μ PR EXP
54HC374	9203/060	1	C	MSSL EPIC LABEN	EXP EXP RTU, CDMU, 1750 μ PR



APPENDIX A

DEVICE TYPE	ESA/SCC DETAIL SPECIFICATION	ISSUE	REV	USER	UNIT
54HC386	9201/121	1	A	LABEN	RTU, CDMU, 1750 μ PR
54HC393	9204/074	1	B	EKU	EXP
54HC541	9401/047	1	C	MSSL TERMA	EXP PDU
54HC574	9203/054	1	C	EKU TERMA	EXP PDU
54HC688	9209/005	1	A	LABEN EPIC	RTU, CDMU, 1750 μ PR EXP
54HC4002	9201/130	1	A	LABEN	RTU, CDMU, 1750 μ PR
54HC4040	9204/069	1	B	MSSL EKU LABEN	EXP EXP RTU, CDMU, 1750 μ PR
54HC4049	9401/037	1	B	LABEN	RTU, CDMU, 1750 μ PR
54HC4050	9401/038	1	B	LABEN	RTU, CDMU, 1750 μ PR
54HC4075	9201/129	1	A	LABEN	RTU, CDMU, 1750 μ PR
54HCT240	9401/045	1	A	LABEN	CDMU



APPENDIX B

UDCS#0109648

54HCMOS 100KRad RAD Method Issue C Dec 95

Sample Size: 4 + 1 Control device

Conditions: Dose Rate = 3.6KRad to 36KRad hr⁻¹ per ESA/SCC 22900 Issue 4, Para 3.3, Window 1.

6V @ Room temperature worst case bias conditions fig 6 ESA/SCC Relevant Detail Specification.

Source Location: ORIS-LABRA, CEA, SACLAY, FRANCE

Operating Mode: If parts not serialised, serialise them (permanently) sequentially from 1 to 5 inclusive.
Pre-rad Table 2 - GO-NO-GO.
Table 7 - Read & Record
Non-stop irradiation
4 hours under worst case bias transportation
168 hours 6V 100°C annealing
Table 2 - GO-NO-GO, including 2.5V function test
Table 7 - Read & record

Parameters guaranteed by Design: Switching times < 1.50x pre-rad individual value.

Measurement tables: Per Table 2 of relevant detail spec.

Characteristic	Symbol	Pre-Rad	100KRad	Delta
Quiescent Current	I _{DD}	100nA	50µA	-
Threshold Voltage N-Channel	V _{THN}	-0.45/1.45V	-0.20/-2.00V	1.5V
Threshold Voltage P-Channel	V _{THP}	+0.45/+1.35V	+0.40/+1.9V	1.5V

Remarks: If no part exhibits a failure then accept the lot.

Report: A total dose irradiation test report shall be submitted including a summary of pre and post Table 2 Go-no-Go and pre and post results for Table 7 - Read and Record.

I.G.G. COMPONENT TECHNOLOGY LTD.

REPORT NO. RD251

PART TYPE 54HC109D OPTION _____ SHEET 2 OF 3

ELECTRICAL MEASUREMENTS w.r.t. XM-PL-166-0031 Table _____

POST RAD EMS

Parameter Serial No's	V _{THN} (V)	V _{THP} (V)	I _{DD} (nA) PATTERN 1	I _{DD} (nA) PATTERN 2			
43	-1.18	0.85	6 nA	6 nA			
44 FAIL	85 mV	-0.88	2200 μA	6.86 mA			
45 FAIL	97 mV	-0.88	1995 μA	6.35 mA			
47 FAIL	106 mV	-0.90	3180 μA	9.66 mA			
48 FAIL	109 mV	-0.90	2990 μA	9.21 mA			
Limit	≥ -2.00 V ≤ -0.20 V	≥ 0.40 V ≤ 1.90 V	≤ 50 mA	≤ 50 mA			
Condition	V _{IN} = V _{DD} = 5V I _{SS} = -10 mA I _J = GND	V _{IN} = V _{SS} = -5V I _{DD} = 10 mA I _J = GND	V _{DD} = 6V V _{SS} = 0V	V _{DD} = 6V V _{SS} = 0V			

Measured by P. Russell

Date 4 TH Nov '97

Test Equipment used:-

EQUIPMENT

CT NUMBER

TEKTRONIX 370
CURVE TRACER

CT217

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DELTEST 3300*
 DIGITAL CMOS FAMILY RUN-TEST S/W V:5.30

=====

TEST PGM: 800P306/049 V:1.1
 WICE : 54HC1892I12H TYPE: 16-PIN

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OPERATOR: CONAN SWATTON
 DATE : 10/09/97
 TECH : RIR:79599
 NF LOT: D/C:9642
 SC LOG: DISABLED

WARD BAND (N)

=====

WICE: 40

TESTS*	*RESULTS*	
- FUNCTIONAL	PASS	
- VOH	7:	6.00 V
- VOL	6:	< 0.01 V
- IIN	12:	3 NA
- IIN	14:	25 NA
- IDD		27 NA
- IDD	<	1 NA

TEST	VOH	VOL	IIN	IIN
	(V)	(V)	(NA)	(NA)
N				
1	.....	.....	1	18
2	.....	.....	1	-24
3	.....	.....	0	7
4	.....	.....	1	6
5	.....	.....	1	17
6	6.00	< 0.01	.....	.....
7	6.00	< 0.01	.....	.....
8	.....	.....	.....	.....
9	6.00	< 0.01	.....	.....
0	6.00	< 0.01	.....	.....
1	.....	.....	2	5
2	.....	.....	3	24
3	.....	.....	1	2
4	.....	.....	2	25
5	.....	.....	1	-13
6	.....	.....	.....	.....

```

TESTS*          *RESULTS*
1- FUNCTIONAL    PASS
2- VOH           7:  5.00 V
3- VOL           6:  < 0.01 V
4- IIN          11:   3 NA
5- IIN           4:   24 NA
6- IOO           28 NA
7- IOO           <  1 NA

```

TEST	VOH (V)	VOL (V)	IIN (NA)	IIN (NA)
1	.....	.....	1	3
2	.....	.....	1	-24
3	.....	.....	-1	7
4	.....	.....	1	24
5	.....	.....	0	3
6	6.00	< 0.01	.....	.....
7	6.00	< 0.01	.....	.....
8	.....	.....	.....	.....
9	6.00	< 0.01	.....	.....
10	6.00	< 0.01	.....	.....
11	.....	.....	3	5
12	.....	.....	3	6
13	.....	.....	-1	10
14	.....	.....	2	5
15	.....	.....	1	-10
16	.....	.....	.....	.....

EVIDENCE: 45

```

TESTS*          *RESULTS*
1- FUNCTIONAL    PASS
2- VOH           7:  6.00 V
3- VOL           6:  < 0.01 V
4- IIN          12:   3 NA
5- IIN           4:   24 NA
6- IOO           28 NA
7- IOO           <  1 NA

```

TEST	VOH (V)	VOL (V)	IIN (NA)	IIN (NA)
1	.....	.....	1	3
2	.....	.....	1	-24
3	.....	.....	-1	7
4	.....	.....	1	24
5	.....	.....	-1	3
6	6.00	< 0.01	.....	.....
7	6.00	< 0.01	.....	.....
8	.....	.....	.....	.....
9	6.00	< 0.01	.....	.....
10	6.00	< 0.01	.....	.....
11	.....	.....	2	5
12	.....	.....	3	6
13	.....	.....	1	10
14	.....	.....	2	5
15	.....	.....	1	-10
16	.....	.....	.....	.....

```

FUNCTIONAL
PASS
- VDH 7: 6.00 V
- VOL 6: < 0.01 V
- IIN 12: 3 NA
- IIN 2: -24 NA
- IDD 28 NA
- IDD < 1 NA

```

ST	VDH (V)	VOL (V)	IIN (NA)	IIN (NA)
1	.....	.....	1	2
2	.....	.....	1	-24
3	.....	.....	0	7
4	.....	.....	0	6
5	.....	.....	0	3
6	6.00	< 0.01	.....	.....
7	6.00	< 0.01	.....	.....
8	.....	.....	.....	.....
9	6.00	< 0.01	.....	.....
10	6.00	< 0.01	.....	.....
11	.....	.....	2	5
12	.....	.....	3	6
13	.....	.....	1	10
14	.....	.....	2	5
15	.....	.....	1	-2
16	.....	.....	.....	.....

VICE: 47

```

TESTS* *RESULTS*
- FUNCTIONAL PASS
- VDH 7: 6.00 V
- VOL 6: < 0.01 V
- IIN 12: 3 NA
- IIN 2: -24 NA
- IDD 28 NA
- IDD < 1 NA

```

ST	VDH (V)	VOL (V)	IIN (NA)	IIN (NA)
N	.....	.....	1	2
1	.....	.....	1	-24
2	.....	.....	-1	23
3	.....	.....	1	6
4	.....	.....	0	17
5	6.00	< 0.01	.....	.....
6	6.00	< 0.01	.....	.....
7	.....	.....	.....	.....
8	6.00	< 0.01	.....	.....
9	6.00	< 0.01	.....	.....
10	.....	.....	2	5
11	.....	.....	3	6
12	.....	.....	1	2
13	.....	.....	2	5
14	.....	.....	1	-10
15	.....	.....	2	23
16	.....	.....	1	-10
17	.....	.....	.....	.....

ICE: 44

TESTS* *RESULTS*
FUNCTIONAL PASS

ICE: 42

TESTS* *RESULTS*
- FUNCTIONAL PASS
- VGH 7: 6.00 U
- VOL 6: < 0.01 U
- IIN 12: 3 NA
- IIN 4: 24 NA
- IDD 28 NA
- IDD < 1 NA

ST	VGH (V)	VOL (V)	IIN (NA)	IIN (NA)
.....	.....	.....	1	3
.....	.....	.....	1	-24
.....	.....	.....	-1	7
.....	.....	.....	0	24
.....	.....	.....	-1	3
.....	6.00	< 0.01	.....	.....
.....	6.00	< 0.01	.....	.....
.....
.....	6.00	< 0.01	.....	.....
.....	6.00	< 0.01	.....	.....
.....	.....	.....	2	5
.....	.....	.....	3	6
.....	.....	.....	1	18
.....	.....	.....	2	5
.....	.....	.....	1	-18
.....

DELTEST 13309*
DIGITAL CMOS FAMILY DATA ENTRY 8/10 10:53.08

TEST PGM: 8009306/048 V11.1
DEVICE : 54HC1092I1RH TYPE: 16-PIN

DEFAULT CONDITIONS*

TESTS*	*LIMITS*	*CONDITIONS*
- FUNCTIONAL		VDD= 6.00 S/D=300
- VOH	5.90 V	VDD= 6.00
- VOL	0.10 V	VDD= 6.00
- IIN	50 NA	VDD= 6.00 VIN=VSS
- IIN	50 NA	VDD= 6.00 VIN=VDD
- IDD	0.12 mA	VDD= 6.00 VIN=VSS
- IDD	0.12 mA	VDD= 6.00 VIN=VDD

DELTEST 3300

DIGITAL CMOS FAMILY DATA ENTRY S/W V:5.30

TEST PGM: SCC9306/048 V:1.1
DEVICE : 54HC109211RH TYPE: 16-PIN

PIN NO.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	PARAMETRICS
ASSIGNMENT	I	I	I	I	I	O	O	O	O	O	I	I	I	I	I	D	H L Z N
STEP 0000	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	- - - -
0001	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	- - - -
0002	0	1	1	0	1	L	M	.	H	L	1	0	1	1	0	.	Y Y - -
0003	1	0	0	0	0	H	L	.	L	H	0	0	0	0	1	.	Y Y - -
0004	1	0	0	0	1	H	L	.	L	H	1	0	0	0	1	.	- - - -
0005	1	0	0	1	1	L	H	.	H	L	1	1	0	0	1	.	Y Y - -
0006	1	1	1	0	1	L	H	.	H	L	1	0	1	1	1	.	- - - -
0007	1	1	1	1	1	H	L	.	L	H	1	1	1	1	1	.	Y Y - -
0008	0	0	0	0	0	H	H	.	H	H	0	0	0	0	0	.	- - - -
0009	1	0	0	0	0	H	L	.	L	H	0	0	0	0	1	.	- - - -
0010	0	1	0	0	0	H	H	.	H	H	0	0	0	1	0	.	- - - -
0011	0	0	1	0	0	H	H	.	H	H	0	0	1	0	0	.	- - - -
0012	0	0	0	1	0	H	H	.	H	H	0	1	0	0	0	.	- - - -
0013	0	0	0	0	1	L	H	.	H	L	1	0	0	0	0	.	- - - -
0014	1	0	0	0	0	H	L	.	L	H	0	0	0	0	1	.	- - - -
0015	0	0	0	0	1	L	H	.	H	L	1	0	0	0	0	.	- - - -
0016	1	0	0	1	0	H	L	.	L	H	0	1	0	0	1	.	- - - -
0017	0	0	0	1	1	L	H	.	H	L	1	1	0	0	0	.	- - - -
0018	1	0	1	0	0	H	L	.	L	H	0	0	1	0	1	.	- - - -
0019	0	0	1	0	1	L	H	.	H	L	1	0	1	0	0	.	- - - -
0020	1	0	1	1	0	H	L	.	L	H	0	1	1	0	1	.	- - - -
0021	0	0	1	1	1	L	H	.	H	L	1	1	1	0	0	.	- - - -
0022	1	1	0	0	0	H	L	.	L	H	0	0	0	1	1	.	- - - -
0023	0	1	0	0	1	L	H	.	H	L	1	0	0	1	0	.	- - - -
0024	1	1	0	1	0	H	L	.	L	H	0	1	0	1	1	.	- - - -
0025	0	1	0	1	1	L	H	.	H	L	1	1	0	1	0	.	- - - -
0026	1	1	1	0	0	H	L	.	L	H	0	0	1	1	1	.	- - - -
0027	0	1	1	0	1	L	H	.	H	L	1	0	1	1	0	.	- - - -
0028	1	1	1	1	0	H	L	.	L	H	0	1	1	1	1	.	- - - -
0029	0	1	1	1	1	L	H	.	H	L	1	1	1	1	0	.	- - - -
0030	1	1	0	0	1	L	H	.	H	L	1	0	0	1	1	.	- - - -
0031	1	1	0	1	1	H	L	.	L	H	1	1	0	1	1	.	- - - -
0032	1	1	0	0	1	H	L	.	L	H	1	0	0	1	1	.	- - - -
0033	1	1	0	1	1	L	H	.	H	L	1	1	0	1	1	.	- - - -
0034	1	0	1	0	1	L	H	.	H	L	1	0	1	0	1	.	- - - -
0035	1	0	1	1	1	L	H	.	H	L	1	1	1	0	1	.	- - - -
0036	1	0	0	0	1	L	H	.	L	H	1	1	0	0	1	.	- - - -
0037	1	0	0	1	1	L	H	.	L	H	1	1	1	0	1	.	- - - -
0038	1	0	0	0	1	L	H	.	L	H	1	1	0	0	1	.	- - - -
0039	1	0	1	1	1	L	H	.	L	H	1	1	1	0	1	.	- - - -

I.G.G. COMPONENT TECHNOLOGY LTD.

REPORT NO RD251

PART TYPE 54HC109D OPTION _____ SHEET 3 OF 3

ELECTRICAL MEASUREMENTS w.r.t. YM-PL-166-0031 Table _____

POST ANNEAL EMS

Parameter Serial No's	V _{THN} (V)	V _{THP} (V)	I _{DD} (nA) PATTERN 1	I _{DD} (nA) PATTERN 2		
43	-1.18	0.85	20	21		
44	-1.08	1.16	13	13		
45	-1.08	1.16	22	18		
47	-1.06	1.16	18	16		
48	-1.06	1.17	18	16		
Limit	$\geq -1.45V$ $\leq -0.45V$	$\geq 0.45V$ $\leq 1.35V$	$\leq 100nA$	$\leq 100nA$		
Condition	V _{IN} = V _{DD} = 5V I _{SS} = -10mA 1J = GND	V _{IN} = V _{SS} = -5V I _{DD} = 10mA 1J = GND	V _{DD} = 6V V _{SS} = 0V	V _{DD} = 6V V _{SS} = 0V		

Measured by P.A. Russell

Date 14 TH NOV '97

Test Equipment used:- **EQUIPMENT** **CT NUMBER**

TEKTRONIX 370 CT217

CURVE TRACER