

Total Dose Test
Multiplexer HCF 4051 BM1 SMD
Manufactured by SGS Thomson

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1 Tested Devices

- Single 8-channel analog multiplexer, HCF 4051 BM1 from SGS Thomson
- Temperature range: $-40^{\circ}\text{C} \dots +85^{\circ}\text{C}$
- Package: 16-lead plastic SOIC (Suffix M1)
- Package marks: HCF 4051 ST, 90A927
- SGS Thomson data sheet: June 1989
- vH&S order 004474-SESAME-Zi/00

1.1 Device Marking

Six devices irradiated; two devices for reference. Only one device per total dose step is tested.

Mark	Total Dose
0K/1	0 kRad H ₂ O (reference)
0K/2	0 kRad H ₂ O (reference)
5K/1	5 kRad H ₂ O
5K/2	5 kRad H ₂ O
10K/1	10 kRad H ₂ O
10K/2	10 kRad H ₂ O
22K/1	22 kRad H ₂ O
22K/2	22 kRad H ₂ O

2 Radiation Facility

Radiation Facility at ESTEC, Noordwijk, The Netherlands.

Date	2 March 2000	3 March 2000	2 March 2000
Total Dose	5 krad (H ₂ O)	10 krad (H ₂ O)	22 kRad (H ₂ O)
Log File	d:\data\vh-s5k.txt	d:\data\vh-s10k.txt	d:\data\vh-s15k.txt
Device	unbiased		
Project	vH&S		
Dosemeter	Farmer 2670		
Chamber	NE 0.6cc air ionisation type 2571 serial no. 2915		
Dose Rate	24 rad/min (H ₂ O)		
Test Eng.	Bob Nickson, QCA, ESTEC, Noordwijk		

All pins of all tested devices shorted during irradiation. No annealing was performed after irradiation.

3 Measured Device Parameters

- Currents I_{DD} and I_{EE} see section 4.
- R_{ON} see section 5.
- Threshold voltage $V_{INL} \leftrightarrow V_{INH}$ at EN input see section 6.

4 I_{DD}/I_{EE} Test

Measurements done at 6 April 2000, vH&S.

4.1 Test Setup

Pins 6, 8 (V_{SS}), 9, 10, 11 connected to GND.

Pin 1, 2, 3, 4, 5, 12, 13, 14, 15 floating between V_{DD} and V_{EE} .

Pin 16 (V_{DD}) connected to +5 V.

Pin 7 (V_{EE}) connected to -5 V.

4.2 Test Results

The current was measured with a digital multimeter. The current consumption of all devices were lower than 100 nA. There was no current indicated by the digital multimeter.

5 R_{ON} Test

Measurements done at 6 April 2000, vH&S.

5.1 Test Setup

Pins 6, 8 (V_{SS}), 9, 10, 11 connected to GND.

Pins 1, 2, 4, 5, 12, 14, 15 floating between V_{DD} and V_{EE} .

Pin 13 connected to +4 V.

Pin 3 connected through 1 k Ω to GND.

Pin 16 (V_{DD}) connected to +5 V.

Pin 7 (V_{EE}) connected to -5 V.

Resistance R_{ON} calculated by voltage drop over 1 k Ω resistor.

5.2 Test Results

Device	Total Dose	R_{ON}
0K/1	0 kRad H ₂ O	188,5 Ω
10K/1	10 kRad H ₂ O	189,3 Ω
22K/1	22 kRad H ₂ O	192,9 Ω

6 V_{EN} Threshold Voltage Test

Measurements done at 6 April 2000, vH&S.

6.1 Test Setup

Pins 8 (V_{SS}), 9, 10, 11 connected to GND.

Pins 1, 2, 4, 5, 12, 14, 15 floating between V_{DD} and V_{EE} .

Pin 13 connected to +4 V.

Pin 3 connected through 50 k Ω to GND.

Pin 6 connected to a adjustable voltage source. Pin 16 (V_{DD}) connected to +5 V.

Pin 7 (V_{EE}) connected to -5 V.

The voltage at Pin 6 was measured with a digital voltmeter.

6.2 Test Results

Device	Total Dose	V_{EN}	
		EN=0 to EN=1	EN=1 to EN=0
0K/1	0 kRad H ₂ O	2,394 V	2,312 V
10K/1	10 kRad H ₂ O	2,128 V	2,034 V
22K/1	22 kRad H ₂ O	1,970 V	1,902 V