Envisat-1	TOTAL DOSE RADIATION TEST PLAN No. PO-PL-TLG-PL-2022	Issue: 1 Rev.: Date: 11/11/94 Page: 1/5

SCC Component No.: HUYTL05501B		Component Designation: OP400AY				Irradiation Spec. No.: PO-PL-TLG-PL-0500 Iss. 2		
Gen. Spec.: SCC 9000 8 Det. Spec.: HUY-SP-TL-055 1 Amend.:		Evaluation: - Acceptance Wafer: - Acceptance Lot: X				Project/Programme: ENVISAT-1		
Family/Group: 08/09	Technology: BIPOLAR	Functional Assignment: BIPOLAR QUAD OP AMP				Package: DIL-14		
Manuf.Name: ANALOG DEVICES Address: U.S.A.		Test House: TECNOLOGICA Address: MADRID (SPAIN)				Origin. Name: TECNOLOGICA Address: SEVILLA (SPAIN)		
Radiation Source: Cobalt-60 Facility Name: CIEMAT Address: MADRID (SPAIN)		Sample Size: 5 Irradiation Devices: 4 Control Devices: 1				Level of Interest: 10 to 20 KRads(Si)		

EXPERIMENTAL STEPS	1	2	3	4	5	6	7	8
PROCESS	Irrad.	Irrad.	Irrad.	Irrad.	Ann.	Ann.		
Dose [KRad (Si)]	5	5	10	10	--	--		
Cumulative Dose [KRad(Si)]	5	10	20	30	--	--		
Dose Rate [KRad(Si)/Hr]	20	20	20	20	--	--		
Exposure Time (Hr)	0.25	0.25	0.5	0.5	24	168		
Temperature (°C)	25	25	25	25	25	25		

Irradiation Conditions:	Irradiation Measurements Interval:	Annealing Conditions:
Biased: X Unbiased: - Test Circuit: Figure 1	Remote Test: - In situ Test: X	Biased: X Unbiased: - Test Circuit: Figure 1

Electrical parameters to be tested:

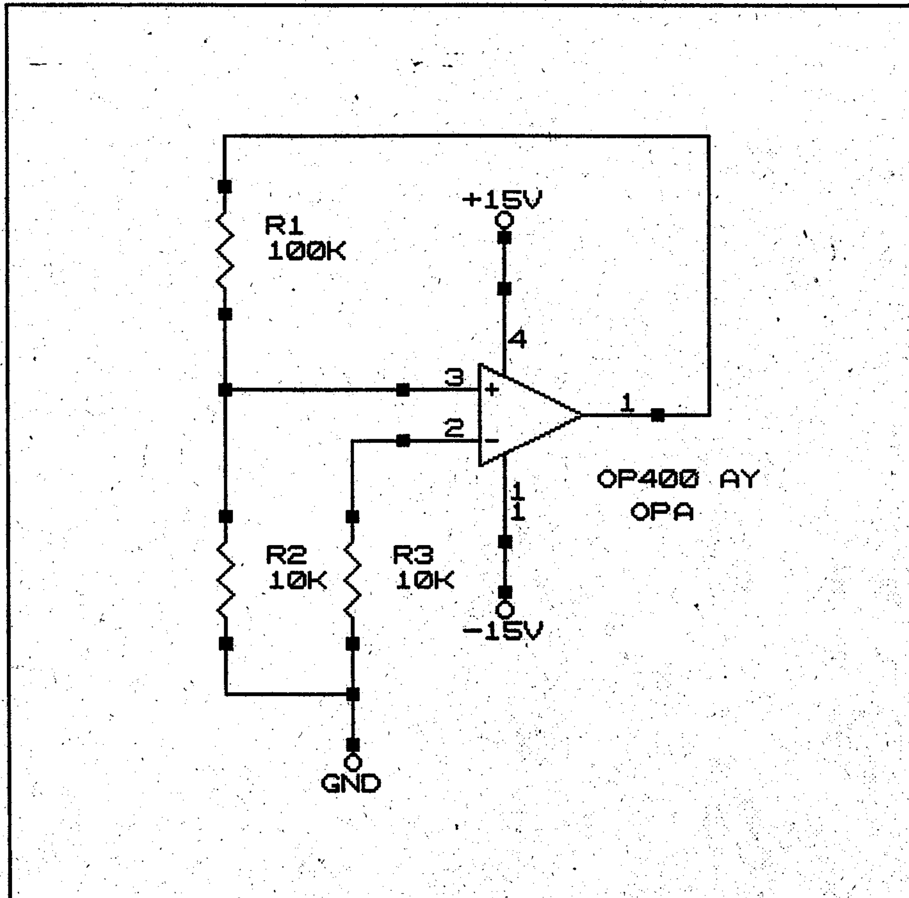
V_{OS} , I_{OS} , I_{B+} , I_{B-} , PSRR, A_{VO1} , A_{VO2} , V_{O1}, V_{O2}, SR+ , SR-.

Distr: RB HP B. Zolland (QCA)

Prepared by: J. A. VAQUERO Date: 11/11/94 Signature:	Checked by: J.M VALVERDE Date: 12/11/94 Signature:	Approved by: I. ALARCÓN Date: 14/11/94 Signature:

TLF140B

FIGURE 1.-TEST CIRCUIT



IRRADIATION TEST SEQUENCE

Test Step	Description	Requirements
1	Sample serialization	
2	Initial Electrical Measurements	Per Table A herein.
3	Set-up of Test	Verify bias circuit for all test samples.
4	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.
5	Intermediate Electrical Measurements	Test per Table B herein. Read & Record. Test to be performed immediately upon removal from chamber. Disconnect bias immediately after leaving irradiation chamber. Maximum interval between two consecutive exposures to be 2 hours.
6 to 14	Repeat Set-Up / Exposure / Electrical Measurements up to Total Dose of 30 KRad(Si)	Repeat steps 3, 4 and 5 for a total of 4 cycles up to the Total Dose of 30 KRad(Si) at cumulative dose: 5, 10, 20 and 30 Krads.
15	Annealing 24 hours at Room Temperature	Within 2 hour after the last irradiation step, the device shall be biased according to the circuit of Figure 1 and placed during 24 hours in a chamber at 25°C.
16	Electrical Measurements	After the first annealing period, bias shall be disconnected, and electrical measurements per Table B herein taken (Read & Record).
17	Annealing 168 hours at Room Temperature	Within 1 hour after the first annealing, the devices shall be biased according to the circuit of Figure 1 and placed during 24 hours in a chamber at 25°C.
18	Electrical Measurements	After the second annealing period, bias shall be disconnected, and electrical measurements per Table A herein taken (Read & Record).
19	Test Report	

TABLE A - ELECTRICAL MEASUREMENTS AT ROOM TEMPERATURE BEFORE AND ON COMPLETION OF IRRADIATION TESTING

No.	CHARACTERISTIC	Symbol	883 TEST METHOD	TEST CONDITIONS (NOTE 1)	LIMITS		UNIT
					MIN	MAX	
1 to 4	Input Offset Voltage	V_{OS}	4001	V_{cm} = 0V, V_{OUT} = 0V	-	150	μV
5 to 8	Input Offset Current	I_{OS}	4001	V_{cm} = 0V, V_{OUT} = 0V	-1.0	1.0	nA
9 to 12	Input Bias Current (+)	I_{B+}	4001	V_{cm} = 0V, V_{OUT} = 0V	-	3.0	nA
13 to 16	Input Bias Current (-)	I_{B-}	4001	V_{cm} = 0V, V_{OUT} = 0V	-	3.0	nA
17 to 20	Power Supply Rejection Ratio	PSRR	4003	V± = ±3V to ±18V	115	-	dB
21 to 24	Large Signal Voltage Gain	A_{VO1}	4004	V_O = +10V, RL = 10K	134	-	dB
25 to 28	Large Signal Voltage Gain	A_{VO2}	4004	V_O = +10V, RL = 2K	126	-	dB
29 to 32	Output Voltage Swing	V_{O1}	4004	RL = 10K	±12	-	V
33 to 36	Output Voltage Swing	V_{O2}	4004	RL = 2K	±11	-	V
37 to 40	Slew Rate	SR+	4002	AVCL = +500	0.1	-	V/μs
41 to 44	Slew Rate	SR-	4002	AVCL = +500	0.1	-	V/μs

NOTE:

1. V+ = 15V, V- = -15V, unless otherwise specified.

TABLE B - ELECTRICAL MEASUREMENTS AT INTERMEDIATE POINTS OF IRRADIATION TESTING (NOTE 1)

No.	CHARACTERISTIC	Symbol	883 TEST METHOD	TEST CONDITIONS (NOTE 2)	LIMITS		UNIT
					MIN	MAX	
9 to 12	Input Bias Current (+)	I_{B+}	4001	V_{cm} = 0V, V_{OUT} = 0V	-	15.0	nA
13 to 16	Input Bias Current (-)	I_{B-}	4001	V_{cm} = 0V, V_{OUT} = 0V	-	15.0	nA
17 to 20	Power Supply Rejection Ratio	PSRR	4003	$V_{\pm}$ = ±3V to ±18V	110	-	dB
21 to 24	Large Signal Voltage Gain	A_{VO1}	4004	V_O = +10V, RL = 10K	120	-	dB
25 to 28	Large Signal Voltage Gain	A_{VO2}	4004	V_O = +10V, RL = 2K	115	-	dB
37 to 40	Slew Rate	SR	4002	AVCL = 500	0.01	-	V/μs
37 to 40	Slew Rate	SR	4002	AVCL = 500	0.01	-	V/μs

NOTES:

1. V+ = 15V, V- = -15V, unless otherwise specified.
2. Other measurements as per table A