RIR IN:- 77708

RIR OUT:- 77708

PARTS HISTORY LOG

Radiation Testing

PROGRAMME:- XMM

PART TYPE:- OP604

RADIATION REPORT:- RD 225

IGG TASK NUMBER:- 1500

SUMMARY OF TEST RESULTS

Serial numbers 306 and 278 were below the minimum $I_{C(ON)}$ limit at initial measurements. Serial number 232 failed $I_{C(ON)}$ at 10kRADS and serial number 307 failed this parameter at 20kRADS. The results for I_{CBO} remained well below the maximum limit and showed no significant change throughout the test.

Radiation Report Number:- RD 225

Project:- XMM

Part Type:- OP604 Date Code:- 9603

Manufacturer:- Optek/U IGG Task No:- 1500

Project Approval of Lot Traveller:-

Signed..... Date. 3-6-97..

Position. Component Engineer.

Serial Number Range:-

232 through 308 (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- Jan '95

Irradiation Test Plan- XM-PL-IGG-0058 ISSUE- 3 DATE- Mar '97

Closed/Approved NCR No:- N/A

Approved Waiver No:- WAR N/A

Signed..... Date. 22/5/97.

Upscreening Engineer

Signed..... Date. 21/5/97.

Upscreening Manager

RADIATION REPORT NUMBER:- RD 225 DATE:- 20.5.97

PROJECT:- XMM RIR IN:- 77708

PART NUMBER:- OP604 MANUFACTURER:- Optek/U

PROCUREMENT LEVEL:- ESA/SCC5403/005 DATE CODE:- 9603

TEST METHOD:- ESA/SCC22900 ISSUE- 4 DATE- Jan '95

TEST PLAN:- XM-PL-IGG-0058 ISSUE- 3 DATE- Mar '97

START QUANTITY:- 5

No.	Test (Sample Size)	XM-PL-IGG-0058 Test Method and Conditions	Date in	Qty in	Date out	Qty out	SIGNED Op/QA
1	Serialisation and Selection of Control Sample (100%)	Control Sample= SN 308	01/05/97	5	01/05/97	4 + CONTROL SAMPLE	IGG 16 CT
2	Initial Electrical Measurements (100% read and record)	Table A Testing at IGG	01/05/97	4	01/05/97	2	IGG 16 CT
3	Initial Electrical Measurements (100% read and record)	Table A Testing at ERA	07/05/97	4	07/05/97	2	IGG 16 CT
4	Set-up and apply Bias per Figure 1	Verify Bias Circuit and conditions (in-situ) for all 4 test samples	07/05/97	4	07/05/97	4	IGG 16 CT
5	Irradiation 1 (4 samples)	Dose= 10kRAD(Si) Rate= 10RAD(Si) per second Time= 1000secs	07/05/97	4	07/05/97	4	IGG 16 CT
6	Interim 1 Electrical Measurements (100% read and record)	Table A. Bias to be maintained until testing is performed. Tdwell=10mins maximum	07/05/97	4	07/05/97	1	IGG 16 CT

Report No: RD 225	Part Type: OP604	Date: 20.5.97

No.	Test (Sample Size)	XM-PL-IGG-0058 Test Method and Conditions	Date in	Qty in	Date out	Qty out	SIGNED Op/QA
7	Irradiation 2 (4 samples)	As Test 5	07/05/97	4	07/05/97	4	IGG 16 CT
8	Interim 2 Electrical Measurements (100% read and record)	As Test 6	07/05/97	4	07/05/97	0	IGG 16 CT
9	Irradiation 3 (4 samples)	As Test 5	07/05/97	4	07/05/97	4	IGG 16 CT
10	Interim 3 Electrical Measurements (100% read and record)	As Test 6	07/05/97	4	07/05/97	0	IGG 16 CT
11	Irradiation 4 (4 samples)	Dose= 20kRAD(Si) Rate= 10RAD(Si) per second Time=2000secs	07/05/97	4	07/05/97	4	IGG 16 CT
12	Interim 4 Electrical Measurements (100% read and record)	As Test 6	07/05/97	4	07/05/97	0	IGG 16 CT
13	Irradiation 5 (4 samples)	Dose= 25kRAD(Si) Rate= 10RAD(Si) per second Time=2500secs	07/05/97	4	07/05/97	4	IGG 16 CT
14	Interim 5 Electrical Measurements (100% read and record)	As Test 6	07/05/97	4	07/05/97	0	IGG 16 CT
15	Irradiation 6 (4 samples)	As Test 13	07/05/97	4	07/05/97	4	IGG 16 CT

Report No: RD 225	Part Type: OP604	Date: 20.5.97

No.	Test (Sample Size)	XM-PL-IGG-0058 Test Method and Conditions	Date in	Qty in	Date out	Qty out	SIGNED Op/QA
16	Final Electrical Measurements (100% read and record)	As Test 6 At ERA	07/05/97	4	07/05/97	0	IGG 16 CT
17	Annealing Test (4 samples)	Bias for 24hrs min at +25°C (record exact time)	07/05/97	4	08/05/97	4	IGG 16 CT
18	Post Annealing Electrical Measurements (100% read and record)	Table A	08/05/97	4	08/05/97	0	IGG 16 CT
19	Accelerated Aging under bias (4 samples)	168 hours bias at +100±5°C	08/05/97	4	15/05/97	4	IGG 16 CT
20	Post Aging Electrical Measurements (100% read and record)	Table A	16/05/97	4	16/05/97	0	IGG 16 CT
21	Test Report Collation	[redacted]	[redacted]	[redacted]	21/5/97	[redacted]	IGG 2 CT
22	Test Report Approval	[redacted]	[redacted]	[redacted]	21/5/97	[redacted]	IGG 2 CT
23	NOTES:-						

Report No: RD 225 Part Type: OP604 Date: 20.5.97

FAILURE LIST AND APPLICABLE NCR

Test No.	Serial Number(s)	Failed Parameter and Failure Mode	Applicable NCR
2	278, 306	FAILED $I_{C(ON)}$.	-
6	232	FAILED $I_{C(ON)}$.	-
8	307	FAILED $I_{C(ON)}$.	-

Report No: RD 225 Part Type: OP604 Date: 20.5.97

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: TEKTRONIX Type No: 370 Serial No: 300553	CT217	CURVE TRACER	12 / 2 /1998
Item: FARNELL Type No: LT30 Serial No: 008970	CT141	PSU	- / - /199- N/A
Item: THURLBY Type No: 1503-HA Serial No: B9773-HA	CT209	DMM	06 /08 /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

INITIALS @ IGG

I.G.G. COMPONENT TECHNOLOGY LTD.

REPORT NO. RD225

PART TYPE OP 604 OPTION SHEET 1 OF 10

ELECTRICAL MEASUREMENTS w.r.t. XM-PL-166-0058 Table A

Parameter Serial No's	I_{CEO} (pA)	$I_{C(ON)}$ (mA)					
CONTROL 308	190	9.84					
232 (Pos^n 1)	108	8.22					
307 (Pos^n 2)	112	8.90					
306 (Pos^n 3)	104	6.64	FAIL				
278 (Pos^n 4)	262	5.38	FAIL				
	–						
Limit	≤25 nA	≥ 7.0 mA					
Condition	V_{CE} = 10V	V_{CE} = 5V SEE NOTE					

Measured by P. B. Russell Date 1ST MAY 1997

Test Equipment used:-

EQUIPMENT	CT NUMBER
TEKTRONIX 370 CURVE TRACER	CT217

NOTE : BIAS CIRCUIT USED AS LIGHT SOURCE.

INITIALS @ ERA

I.G.G. COMPONENT TECHNOLOGY LTD.

REPORT NO. RD225

PART TYPE OP 604 OPTION SHEET 2 OF 10

ELECTRICAL MEASUREMENTS w.r.t. XM-PL-166-0058 Table A

Parameter Serial No's	I_{CEO} (pA)	$I_{C(ON)}$ (mA)					
CONTROL 308	-112	9·86					
232 (Pos^ 1)	-782	8·28					
307 (Pos^ 2)	-708	8·96					
306 (Pos^ 3)	-772	6·66	FAIL				
278 (Pos^ 4)	-716	5·54	FAIL				
Limit	≤25 nA	≥ 7·0mA					
Condition	V_{CE} = 10V	V_{CE} = 5V					

Measured by P.A. Russell Date 7TH MAY 1997

Test Equipment used:-

EQUIPMENT	CT NUMBER
TEKTRONIX 370 CURVE TRACER	CT217

EMS @ 10KRAD

I.G.G. COMPONENT TECHNOLOGY LTD.

REPORT NO. RD225

PART TYPE OP 604 OPTION SHEET 3 OF 10

ELECTRICAL MEASUREMENTS w.r.t. XM-PL-166-0058 Table A

Parameter Serial No's	I_{CEO} (pA)	$I_{C(ON)}$ (mA)					
CONTROL 308	-118	9.88					
232 (Pos^ 1)	-502	6.44	FAIL				
307 (Pos^ 2)	-610	7.44					
306 (Pos^ 3)	-508	5.20	FAIL				
278 (Pos^ 4)	62	4.04	FAIL				
Limit	≤25 nA	≥ 7.0 mA					
Condition	V_{CE} = 10V	V_{CE} = 5V					

Measured by P.A. Russell Date 7TH MAY 1997

Test Equipment used:-

EQUIPMENT	CT NUMBER
TEKTRONIX 370 CURVE TRACER	CT217

EMS @ 20KRAD

I.G.G. COMPONENT TECHNOLOGY LTD.

REPORT NO. RD225

PART TYPE OP 604 OPTION SHEET 4 OF 10

ELECTRICAL MEASUREMENTS w.r.t. XM-PL-166-0058 Table A

Parameter Serial No's	I_{CEO} (pA)	$I_{C(ON)}$ (mA)					
CONTROL 308	-102	9.92					
232 (Pos^ 1)	-1280	5.28	FAIL				
307 (Pos^ 2)	-940	6.38	FAIL				
306 (Pos^ 3)	-170	4.24	FAIL				
278 (Pos^ 4)	-178	3.34	FAIL				
Limit	≤25 nA	≥ 7.0mA					
Condition	V_{CE} = 10V	V_{CE} = 5V					

Measured by P. A. Russell Date 7TH MAY 1997

Test Equipment used:-

EQUIPMENT	CT NUMBER
TEKTRONIX 370 CURVE TRACER	CT217

EMS @ 30 KRAD

I.G.G. COMPONENT TECHNOLOGY LTD.

REPORT NO. RD225

PART TYPE OP 604 OPTION SHEET 5 OF 10

ELECTRICAL MEASUREMENTS w.r.t. XM-PL-166-0058 Table A

Parameter Serial No's	I_{CEO} (pA)	$I_{C(ON)}$ (mA)					
CONTROL 308	-120	9.88					
232 (Pos= 1)	-288	4.44	FAIL				
307 (Pos= 2)	-112	5.58	FAIL				
306 (Pos= 3)	-182	3.52	FAIL				
278 (Pos= 4)	-42	2.88	FAIL				
	-						
Limit	≤25 nA	≥ 7.0 mA					
Condition	V_{CE} = 10V	V_{CE} = 5V					

Measured by I.A. Lunnell Date 7TH MAY 1997

Test Equipment used:-

EQUIPMENT	CT NUMBER
TEKTRONIX 370 CURVE TRACER	CT217

EMS @ 50 KRAD

I.G.G. COMPONENT TECHNOLOGY LTD.

REPORT NO. RD225

PART TYPE OP 604 OPTION SHEET 6 OF 10

ELECTRICAL MEASUREMENTS w.r.t. XM-PL-166-0058 Table A

Parameter Serial No's	I_{CEO} (pA)	$I_{C(ON)}$ (mA)					
CONTROL 308	-102	9.88					
232 (Pos= 1)	-6	3.33	FAIL				
307 (Pos= 2)	-4	4.44	FAIL				
306 (Pos= 3)	16	2.54	FAIL				
278 (Pos= 4)	112	2.19	FAIL				
	-						
Limit	≤25 nA	≥ 7.0mA					
Condition	V_{CE} = 10V	V_{CE} = 5V					

Measured by P.G. Russell Date 7TH MAY 1997

Test Equipment used:-

EQUIPMENT	CT NUMBER
TEKTRONIX 370 CURVE TRACER	CT217

EMS @ 75 KRAD

I.G.G. COMPONENT TECHNOLOGY LTD.

REPORT NO. RD225

PART TYPE OP 604 OPTION SHEET 7 OF 10

ELECTRICAL MEASUREMENTS w.r.t. XM-PL-166-0058 Table A

Parameter Serial No's	I_{CEO} (pA)	$I_{C(ON)}$ (mA)					
CONTROL 308	-112	9·84					
232 (Pos 1)	-98	2·54	FAIL				
307 (Pos 2)	-62	3·43	FAIL				
306 (Pos 3)	-72	1·80	FAIL				
278 (Pos 4)	24	1·61	FAIL				
Limit	≤25 nA	≥ 7·0 mA					
Condition	V_{CE} = 10V	V_{CE} = 5V					

Measured by I.D. Russell Date 7TH MAY 1997

Test Equipment used:-

EQUIPMENT	CT NUMBER
TEKTRONIX 370 CURVE TRACER	CT217

EMS @ 100KRAD

I.G.G. COMPONENT TECHNOLOGY LTD.

REPORT NO. RD225

PART TYPE OP 604 OPTION SHEET 8 OF 10

ELECTRICAL MEASUREMENTS w.r.t. XM-PL-166-0058 Table A

Parameter Serial No's	I_{CEO} (pA)	$I_{C(ON)}$ (mA)					
CONTROL 308	-74	9.88					
232 (Pos^ 1)	-768	2.06	FAIL				
307 (Pos^ 2)	-818	2.74	FAIL				
306 (Pos^ 3)	-748	1.39	FAIL				
278 (Pos^ 4)	74	1.23	FAIL				
	-						
Limit	≤25 nA	≥ 7.0mA					
Condition	V_{CE} = 10V	V_{CE} = 5V					

Measured by P. A. Russell Date 7TH MAY 1997

Test Equipment used:-

EQUIPMENT	CT NUMBER
TEKTRONIX 370 CURVE TRACER	CT217

POST ANNEAL EMS

I.G.G. COMPONENT TECHNOLOGY LTD.

REPORT NO. RD225

PART TYPE OP 604 OPTION SHEET 9 OF 10

ELECTRICAL MEASUREMENTS w.r.t. XM-PL-166-0058 Table A

Parameter Serial No's	I_{CEO} (pA)	$I_{C(ON)}$ (mA)					
CONTROL 308	182	9.82					
232 (Pos^n 1)	462	3.44	FAIL				
307 (Pos^n 2)	478	4.02	FAIL				
306 (Pos^n 3)	442	2.48	FAIL				
278 (Pos^n 4)	732	2.04	FAIL				
Limit	≤25 nA	≥ 7.0 mA					
Condition	V_{CE} = 10V	V_{CE} = 5V					

Measured by P. A. Russell Date 8TH MAY 1997

Test Equipment used:-

EQUIPMENT	CT NUMBER
TEKTRONIX 370 CURVE TRACER	CT217

POST AGEING EMS

I.G.G. COMPONENT TECHNOLOGY LTD.

REPORT NO. RD225

PART TYPE OP 604 OPTION SHEET 10 OF 10

ELECTRICAL MEASUREMENTS w.r.t. XM-PL-166-0058 Table A

Parameter Serial No's	I_{CEO} (pA)	$I_{C(ON)}$ (mA)					
CONTROL 308	198	9.82					
232 (Pos^ 1)	510	5.74	FAIL				
307 (Pos^ 2)	494	6.68	FAIL				
306 (Pos^ 3)	556	4.68	FAIL				
278 (Pos^ 4)	955	3.84	FAIL				
	–						
	–						
Limit	≤25 nA	≥ 7.0 mA					
Condition	V_{CE} = 10V	V_{CE} = 5V					

Measured by P.D. Mansell Date 16TH MAY 1997

Test Equipment used:-

EQUIPMENT	CT NUMBER
TEKTRONIX 370 CURVE TRACER	CT217

RADIATION TEST SUMMARY

PART TYPE : OP604

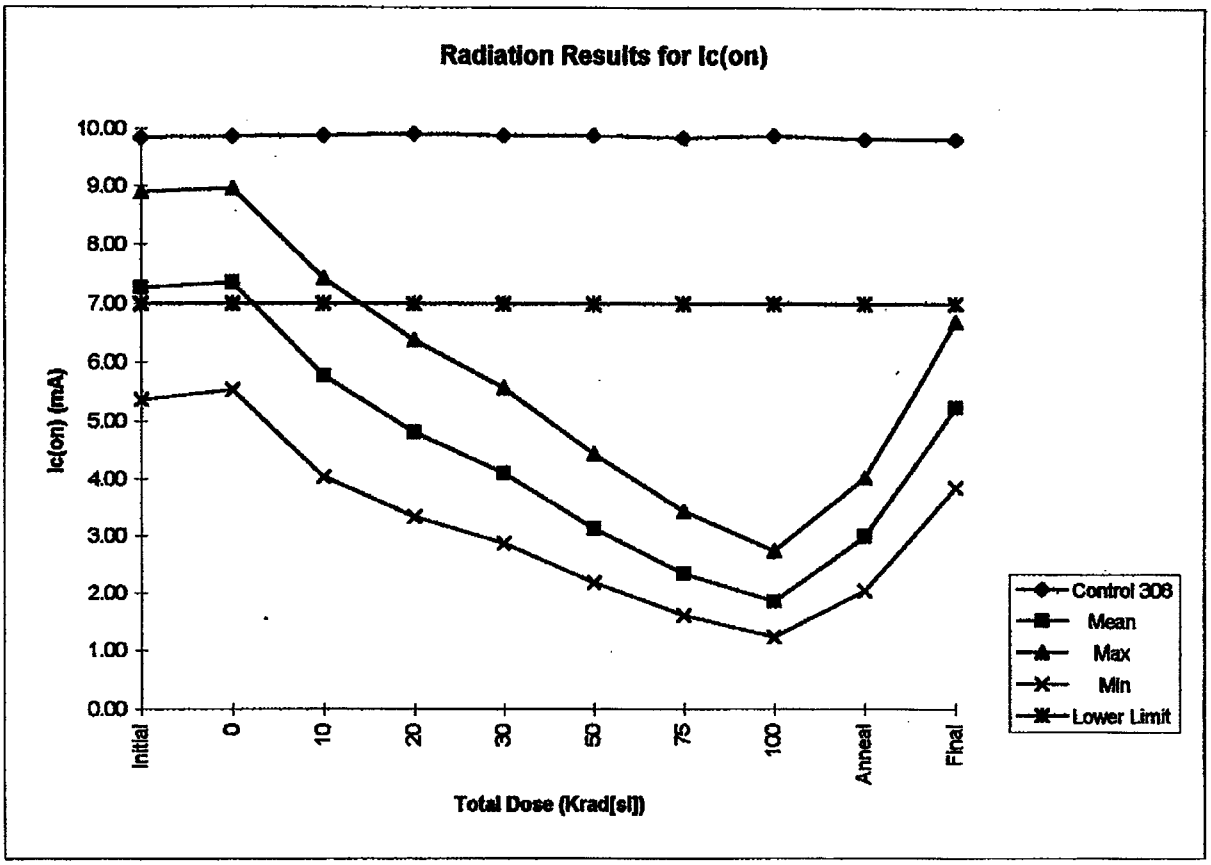
DESCRIPTION : HI-REL NPN PHOTOTRANSISTOR

REPORT NO. : RD 225

PARAMETERS PLOTTED :

Ic(on)

NOTE : The results for Iceo showed no significant change and hence a plot was not considered necessary.



Dose (kRad)	Control 308	Mean	Max	Min	Lower Limit	Upper Limit	Std.Dev.
	(mA)	(mA)	(mA)	(mA)	(mA)	(mA)	
Initial	9.84	7.29	8.90	5.38	7.0	-	1.58
0	9.86	7.36	8.96	5.54	7.0	-	1.55
10	9.88	5.78	7.44	4.04	7.0	-	1.48
20	9.92	4.81	6.38	3.34	7.0	-	1.31
30	9.88	4.11	5.58	2.88	7.0	-	1.17
50	9.88	3.13	4.44	2.19	7.0	-	1.00
75	9.84	2.35	3.43	1.61	7.0	-	0.83
100	9.88	1.86	2.74	1.23	7.0	-	0.69
Anneal	9.82	3.00	4.02	2.04	7.0	-	0.90
Final	9.82	5.24	6.68	3.84	7.0	-	1.24

Lot size for statistics : 4 devices

RD 225 Date code 9603

XMM	IRRADIATION TEST PLAN NO. XM-PL-IGG-0058 (1)	Issue No. 3 Date: March 1997 Page: 1/4 (2)

Component No. ESA/SCC 5403/05 (3)	Component Designation: Hi-Rel NPN Phototransistor Type: OP604 (4)	Irradiation Spec No. N/A Iss. Rev. (5)

Specification (6)	Acceptance (7)	Electrical Meas. (8)	Project/Programme (9)
Generic: ESA/SCC 5000 Iss. 8 Detail: ESA/SCC 5403/05 Draft D	Evaluation ___ Element Diffusion ___ Lot X	In-situ ___ Remote X	XMM

Manufacturer: Optek Technology Inc. Address: 1215 W. Crosby Road Carrollton Texas 75006 (10)	Test Facility: ERA Address: Leatherhead Surrey ENGLAND (11)	Originator: IGG CT Name: J. Arnold (12)

Radiation Source: (13)	Sample Size: 4 (14)	Exposure: (15)	Annealing Test: (16)	Radiation Level: (17)
COBALT 60	Control Devices: 1	Single ___ Multiple X	YES X NO ___	10kRAD(Si), 50kRAD(Si) 20kRAD(Si), 75kRAD(Si) 30kRAD(Si), 100kRAD(Si)

Single Exposure:
Dose [kRAD(Si)]
Dose Rate [RAD(Si)/s]
Exposure Time

Not Applicable (18)

Multiple Exposure: (19)

Irradiation Steps	1	2	3	4	5	6
Dose [kRAD(Si)]	10	10	10	20	25	25
Dose Rate [RAD(Si)/s]	10	10	10	10	10	10
Exposure Time (secs)	1000	1000	1000	2000	2500	2500

Bias Requirements: During Exposure (for in-situ electrical measurements): N/A
During and after Exposure (for remote electrical measurements): 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 an inner shield of 0.7 to 1.0mm Al. (20)

Irradiation Test Sequence (21)

Test Step	Description	Requirements
1	Serialization Goods Receiving Inspection	If parts are not serialized, serialize them (permanently) sequentially from 1 to 5 inclusive.
2	Initial Electrical Measurements at Room Temperature only	Per Table A herein.
3	Set-up of Test	Verify Figure 1 Bias Circuit and Voltages (In-situ) for all 5 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.

Irradiation Test Sequence (Cont.) 21

Test Step	Description	Requirements
5	Intermediate Electrical Measurements	Bias to be maintained until measurements are performed. Test per Table A herein - (Read and Record) - on all 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.
6 to 21	Repeat Set-up/Exposure/Test sequence upto Total Dose of 100kRAD(Si) as per Plan above.	Repeat Steps 3, 4, 5 for a total of 6 cycles upto the total dose of 100kRAD(Si) at accumulated doses of 10, 20, 30, 50, 75 and 100kRAD(Si). (See Remark 2).
22	Annealing	To be 24 hours at +25°C under Figure 1 bias.
23	Accelerated Ageing under Bias	Bake at +100°C under Figure 1 bias for 168 hours.
24	Final Electrical Measurements	Per Table A herein - (Read and Record) - on all 5 parts.
25	Total Dose Irradiation Test Report	ESA/SCC No. 22900.

Remarks 22

1. Performed for the purposes of correlation.
2. The set up exposure/test sequence shall be stopped for any device that exhibits repeated functional failure.
3. Electrical testing shall be performed on the same test equipment from test step 2 through 24.

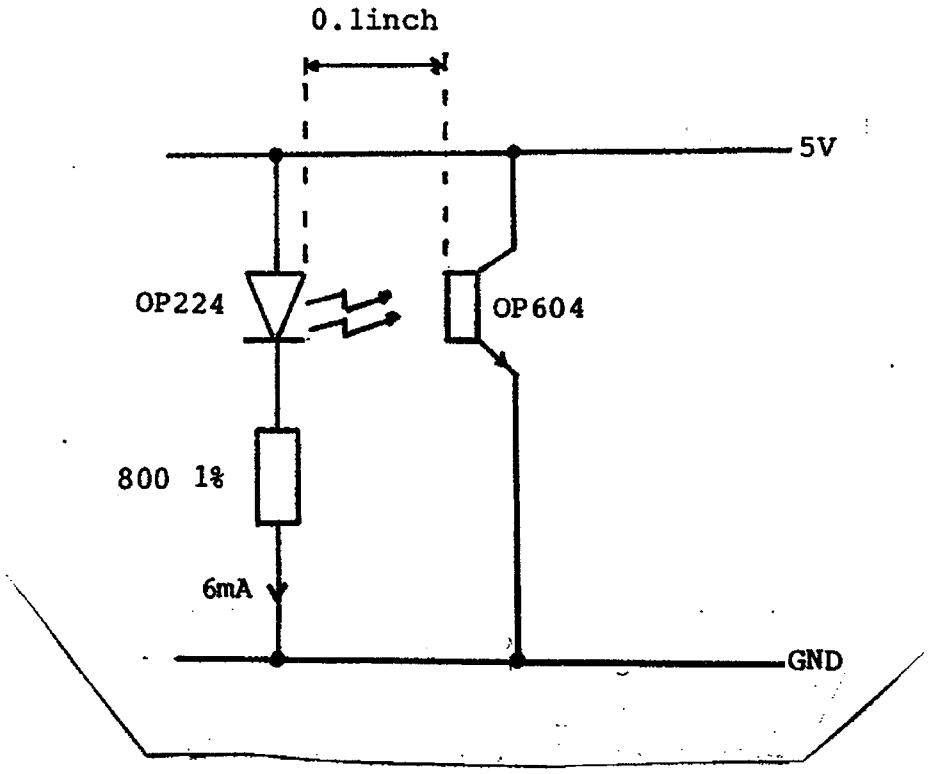
TABLE A - ELECTRICAL MEASUREMENTS AT ROOM TEMPERATURE - T_{amb} = +25 ±5°C BEFORE, AT INTERMEDIATE POINTS AND ON COMPLETION OF IRRADIATION

NO.	CHARACTERISTICS	SYMBOL	TEST METHOD MIL-STD-750	TEST CONDITIONS	LIMITS		UNIT
					MIN.	MAX.	
1	Dark Current	I_{CEO}	3041	V_{CE} = 10.0Vdc	-	25	mA
2	On-State Collector Current	$I_{C(ON)}$	-	V_{CE} = 5.0Vdc E_e = 20mW/cm$_2$ (Note 1)	7.0	-	mA

NOTES:

1. Light source is an unfiltered tungsten lamp operating at CT = 2870K or equivalent source.

FIGURE 1 - ELECTRICAL CIRCUIT FOR IRRADIATION TESTING



XM-NC-IGG-0552	NON-CONFORMANCE REPORT NO: N51552.	SHEET 1 OF INITIATOR: SL DATE: 1.7.97.
TASK NO: 1500.		

MANUFACTURER/COUNTRY: OPTEK / U.	RIR: 77708 & 77707
SUPPLIER/COUNTRY: ——	
PART TYPE: OP224 & OP604.	VALUE:
DETAIL SPECIFICATION: XM-PL-IGG-0058	ISSUE: 3.
COMPONENT NUMBER: OP224S & OP604S.	PROJECT REFERENCE: (if applicable)
P.O. NO: CT 11876.	PLIN NO: 151253 (OP224) & 151252 (OP604)
P.O. ITEM No : (if no RIR)	SAR:
LOT NO:	DATECODE: 9539 & 9603.

N.C. DETECTED AT: RADIATION TESTING	QUANTITY: 5
DURING: E.M. Ic(on)	SERIAL NO: (or Range:)

DETAILS OF NON-CONFORMANCE: (INCLUDING PRELIMINARY DISPOSITION)

Two parts from (5 Pcs) FAILED INITIAL E.M. ON Ic(on) PARAMETER.

ALL PARTS FAILED Ic(on) AT 20 KRADS. DORNIER REQUEST NCR TO BE RAISED.

DOR/ESA/ALENIA / MMS ST INFORMED ref fax XM-FX-IGG-5693.

DATED 1.7.97. AWAIT MMS ST & DORNIER RESPONSE.

1.7.97.

USER (MMSS)/DORN/ESA/ALENIA ADVISED OF RADIATION RESULTS (RD 225) AND REQUESTED TO SUPPLY COMMENTS REF. XM-FX-IGG-5673 DATED 21-7-97

MMS/S — ACCEPT REF XM-MMS-146-97 DATED 21-7-97
DORN — ACCEPT REF PCB 26 XM-MM-IGG-5810 DATED 23-7-97
ESA —
ALENIA — 〃

FINAL DISPOSITION:	MAJOR: ✓ MINOR:

ACCEPT AS IS M Wakelin 29-7-97

MRB BOARD: M. WAKELIN D. GRUCKY.

SIGNED (CHAIRMAN MRB): M Wakelin	DATE: 29-7-97
REPORT REFERENCE (or N/A): N/A	

Fax/Télécopie

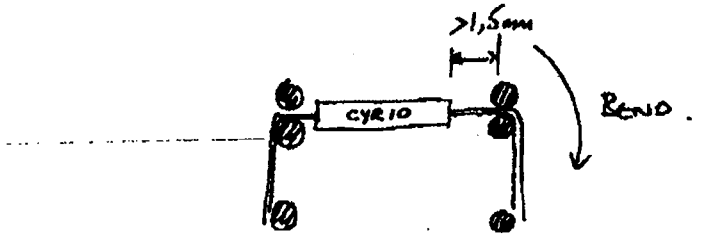
MATRA MARCONI SPACE

TO /A: M Wakelin	COMPANY/SOCIETE: IGG Component Technology *FAX 01329.82.9312*
FROM/DE: M Roe (MMS)	COPIES TO : ESTEC A Elding Fax 00.31.71.565.4896 DS T Standberg Fax 00.49.75458.4166 ALENIA P Santoro Fax 00.39.11.7180.537 MMS(B) P Airey Fax 6883 MMS(S) F McMahon SPC F476 RJ Davies SPC F486 A Ward Fax 3418
DATE: 21 July, 1997	
This facsimile consists of 1 pages, this number includes this page Cet envoi comprend pages, ce nombre inclut cette page Direct lines: Fax : +44 (0) 1438 773778 Phone : +44 (0) 1438 773330	If you do not receive legible copies of all pages, please telephone immediately: Si vous n'avez pas reçu clairement cet envoi veuillez nous contacter par téléphone au: +44 (0) 14 38 77 33 70

SUBJECT/OBJET: XMM Parts Non-Conformance N51526 **REF: XM.MMS.146.97**

Reference documents:
(1) XMM Project identification XM.NC.IGG.0526
(2) PCB 25
(3) IGG Fax XM.FX.IGG.5742
(4) IGG fax XM.FX.IGG.5673 (OP604 RVT)
(5) IGG fax XM.FX.IGG.5595 (CYR20 5n1)

In response to subject fax (1)..(3) above which relates to the lead bending and package cracking of CYR10/180pF capacitor, MMS has reveiwed the lead bending and forming criterion applied to the component in order to mount it on the PCB, with the following results:-



As can be seen from the above figure, the leads will be supported close to the component body, and will be bent a minimum of approximately 1mm from the glass body. Note that the wire diameter is 0.49<Ø<0.61mm.
Tooling at MMS ensures the lead length close to the body is held stable.
I trust this provides sufficient information to assess suitability of the procured parts.

Regarding OP604 RVT (ref (4) , MMS can confirm the degredation is in line with expected values used in the Worst case analysis, and we therefore can accept these parts.

With regard to failure of CYR20 glass capacitors, and in response to (5) above, MMS cannot accept these parts until we are satisfied that they are fit for Flight. IGG proposal to conduct life test would therefore be a sensible approach. Unfortunately this is likely to impact on the already critical schedule, and therefore MMS suggests that alternatives may be a quicker solution. We could accept 4.7nF value in lieu of the 5.1nF.
Could IGG please advise recommended way forward.

Best Regards,

Mark W B Roe

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X M M

XMM Reference: XM-FX-IGG-5673

IGG Fax Ref.: D77825
Date: 1st July 1997

TO:

DORNIER	:	**U. GAGEUR/K. HAAS**
ESA	:	**J. MINNEE/J. VAN DOOREN/R. THOMAS/R. LAINE**
ALENIA	:	**P. SANTORO/P. PEZZELLA**
MMS, St	:	**M. ROE**

COPY: IGG : D. GRUCHY/M. WAKELIN

SUBJECT: **XMM - PARTS NON-CONFORMANCE [redacted]**

XMM Project Identification: XM-NC-IGG-0552

1. NCR INTRODUCTION

Title	:	RVT non-compliance
Part Type	:	OP224 and OP604
Component No.	:	OP224S and OP604S
Lot/Date Code	:	OP224 = 9539 and OP604 = 9603
Manufacturer	:	Optek, USA
NCR Level	:	1 (Major)
User(s)	:	MMS, Stevenage

2. NON-CONFORMANCE DESCRIPTION

Stated During	:	RVT Testing
Location	:	IGG
Date Raised	:	1st July 1997
Description	:	RVT Testing in accordance with Irradiation Test Plan No. XM-PL-IGG-0058 Issue 3 (application test/biasing) recorded parametric $I_{C(ON)}$ failure at initial testing. On 2 OP224/OP604 pair, parts failed Radiation Test Plan limit of 7.0mA min. This parameter degraded with total dose until all samples failed at 20kRADS.

AUTHORISED
QA/4/XMM/001 Issue 1

INCLUDING THIS PAGE, THIS MESSAGE CONSISTS OF 2 PAGES

3. IGG's PROPOSED DISPOSITION

User to review Total Dose Test Data Report No. RD225, and advise Dornier of proposed corrective action on application.

4. FURTHER MRB DISPOSITION REQUIRED FROM:

MMS, Stevenage and Dornier.

Best regards

S. LUK

Fax/Télécopie

MATRA MARCONI SPACE

TO /A: D Gruchy

COMPANY/SOCIETE: IGG Component Technology
FAX 01329.820312....

FROM/DE: M Roe (MMS)

COPIES TO :

Dornier Syst	T [illegible]	00 49 75456 4196
ESTEC	A [illegible] } J Mines }	00 31 71 565 4895
MMB	M [illegible] / P Airey (XMM) } N Marshall (XMM) } M Brewer / M Burton (INTEGRAL) }	8863
MMS	P McMahon	SPC F476
	RJ Davies	SPC F406
	A Ward	SPC F406

DATE: 2 December, 1996

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SUBJECT/OBJET: XMM/Integral Optos (OP604/OP224) REF: XM-MMS-0182-96

28/11 10820

Further to your Fax (ref XM.FX.IGG.3650), regarding the radiation tolerance of the OP604 and OP224 devices.

MMS (and BAe formally) have used these parts for many years in Spaceflight hardware, and so have accumulated several Radiation reports regarding the hardness issue.
It is the view of MMS that the OP604 specifically, (being a two terminal photo-transistor) is susceptible to cumulative dose radiation, and would not meet its procurement specification limits at 100Krads. Conversely the OP224 is a GaAs LED, and therefore may be considered to be rad-hard.

I append for your information, a page from a recent MMS Radiation report for these devices - when tested as a discrete opto-coupler under conditions similar to that seen in the XMM/INTEGRAL RWA application.

As you can see the 'coupled gain' Ic/If falls off with radiation, to approx. 50% at 100Krads.

In view of the above, I am surprised that the recent XMM PCB classified these parts as "..insensitive".

I await your response.

Best Regards,

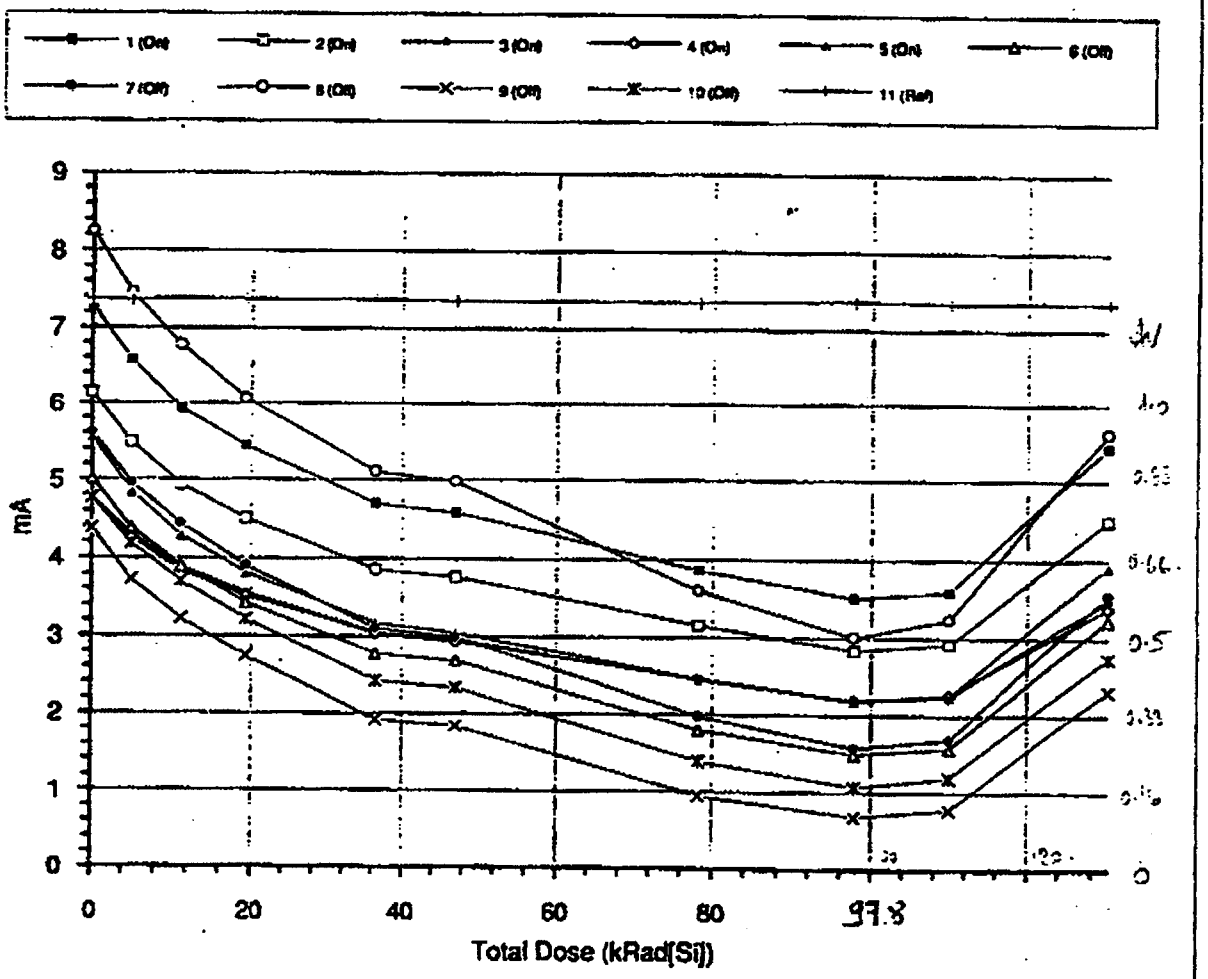
Mark W B Roe

OP224
5402/005

Total Dose Radiation Testing

MATRA MARCONI SPACE

Date: December 95.		Fig. 7
Type: **PAIR OP604/224**	Date Code:	Manufacturer: **OPTEK**
Tested Parameter: **Ic(6mA)**		Radiation Source: **Co60** Dose Rate: **<= 0.36 kRad/h.**
Test Conditions: **Vce=5V, If=6mA.**		
Irradiation Conditions: **Static On(Sn1 to 5), Off(Sn6 to 10).**		Number of irradiated devices: 10



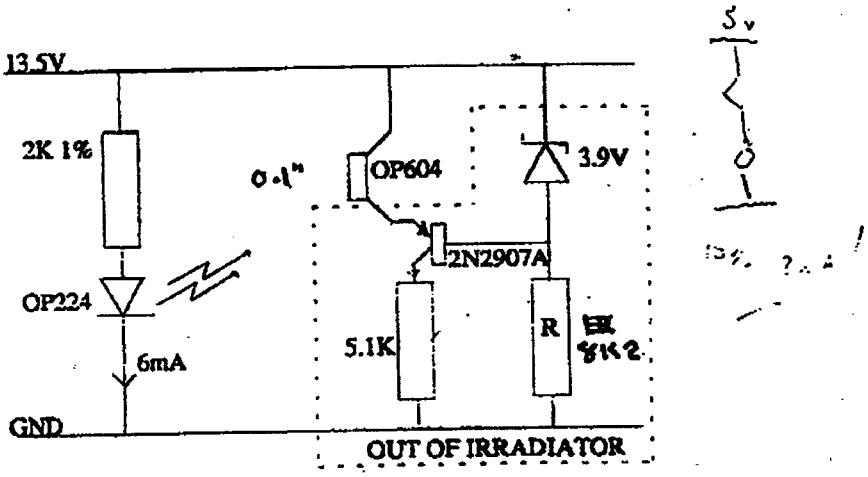
The two last points correspond to the post annealing measurements.

II.3 EXPERIMENTAL CONDITIONS

IRRADIATION FACILITY	
Place:	MATRA VELIZY (France)
Type:	Cobalt 60 Shepherd 484
Activity:	9 Curies
Calibration Date:	09/09/95

EXPOSURE TYPE	
Type:	Multiple Exposures
Steps:	5.1, 11.2, 19.3, 36.4, 47, 78.2, 97.8 kRad[Si].

BIASING CONDITIONS



COMMENTS

5 pairs were biased in Static On mode

5 pairs in Static Off mode with all pins connected to ground.