Government Systems Group

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DATE: June 7, 1995

PPM-95-156

TO: S. Hull/311

FROM: K. Sahu/300.1 KS

SUBJECT: Radiation Report on: TLE2142
Project: HST/STIS
Control #: 12742
Job #: EE56307
Project part #: 5962-9321604QPA

cc: B. Fafaul/311
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A radiation evaluation was performed on TLE2142 (Dual Op Amp) to determine the total dose tolerance of these parts. A brief summary of the test results is provided below. For detailed information, refer to Tables I through IV and Figure 1.

The total dose testing was performed using a ^{60}Co gamma ray source. During the radiation testing, five parts were irradiated under bias (see Figure 1 for bias configuration) and one part was used as a control sample. The total dose radiation levels were 1, 2, 3 and 10 krads* . The dose rate was between 0.05 and 0.35 krads/hour (see Table II for radiation schedule). After each radiation exposure, parts were electrically tested according to the test conditions and the specification limits** listed in Table III.

All parts passed initial electrical measurements. All irradiated parts passed all electrical tests throughout all irradiation steps.

Table IV provides a summary of the functional test results and the mean and standard deviation values for each parameter after each irradiation exposure.

Any further details about this evaluation can be obtained upon request. If you have any questions, please call me at (301) 731-8954.

* The term rads, as used in this document, means rads(silicon). All radiation levels cited are cumulative.

** These are manufacturer's pre-irradiation data specification limits. No post-irradiation limits were provided by the manufacturer at the time these tests were performed.

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Figure 1. Radiation Bias Circuit for TLE2142

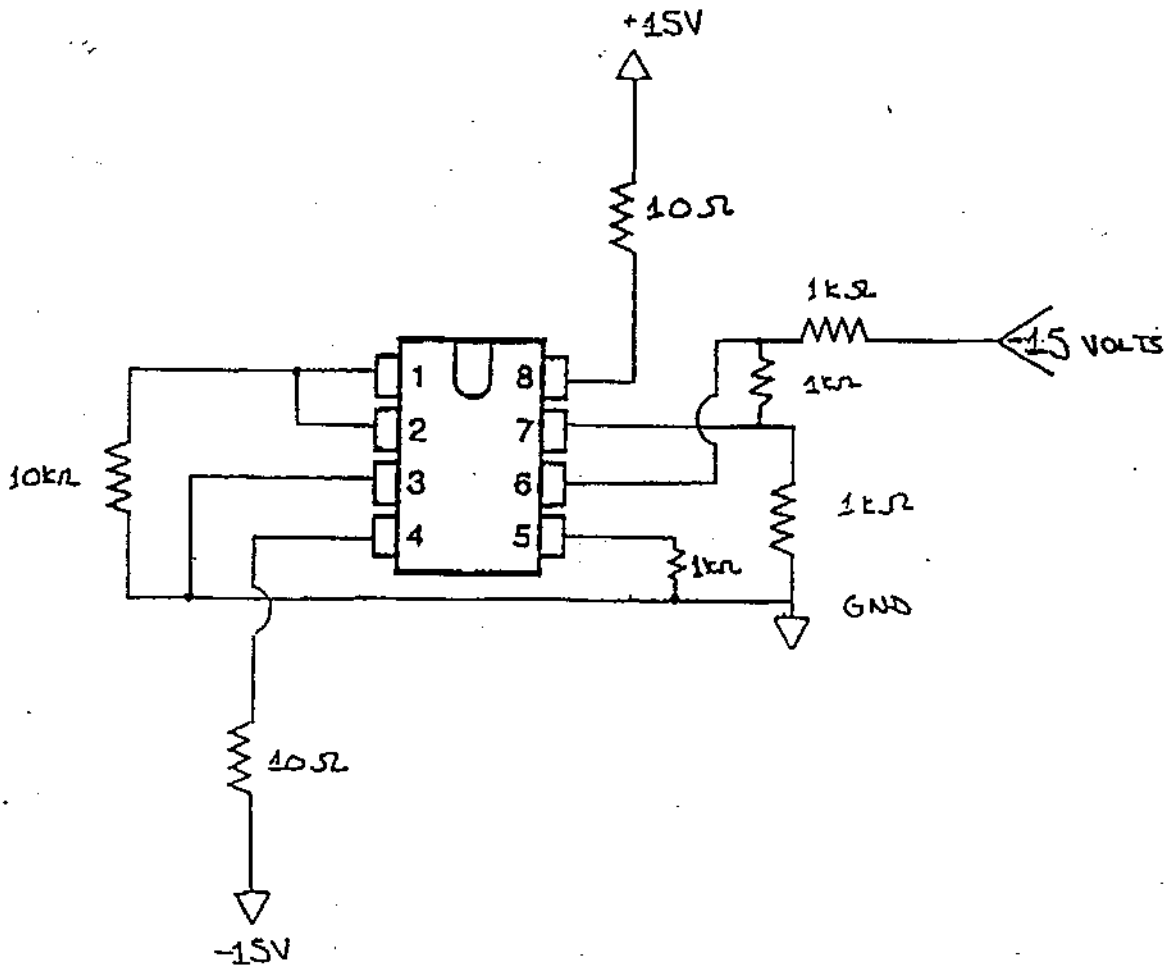

TABLE I. Part Information

Generic Part Number:	TLE2142*
HST/STIS Part Number	5962-9321604QPA
HST/STIS Control Number:	12742
Charge Number:	EE56307
Manufacturer:	Texas Instruments
Lot Date Code (LDC):	9437BA (S/N 22, 23, 24), 9440A (S/N 25, 26, 27)
Quantity Tested:	6
Serial Number of Control Samples:	22
Serial Numbers of Radiation Samples:	23, 24, 25, 26, 27
Part Function:	Dual Op Amp
Part Technology:	Bipolar, JFET
Package Style:	8-pin DIP
Test Equipment:	A540
Engineer:	C. Nguyen

* No radiation tolerance/hardness was guaranteed by the manufacturer for this part.

TABLE II. Radiation Schedule for TLE2142

EVENT	DATE
1) INITIAL ELECTRICAL MEASUREMENTS	05/05/95
2) 1.0 KRAD IRRADIATION (0.05 KRADS/HOUR)	05/05/95
POST-1.0 KRAD ELECTRICAL MEASUREMENT	04/08/95
3) 2.0 KRAD IRRADIATION (0.05 KRADS/HOUR)	05/08/95
POST-2.0 KRAD ELECTRICAL MEASUREMENT	04/09/95
3) 3.0 KRAD IRRADIATION (0.05 KRADS/HOUR)	05/10/95
POST-3.0 KRAD ELECTRICAL MEASUREMENT	05/12/95
4) 10.0 KRAD IRRADIATION (0.35 KRADS/HOUR)	05/12/95
POST-10.0 KRAD ELECTRICAL MEASUREMENT	05/15/95

PARTS WERE IRRADIATED AND ANNEALED UNDER BIAS; SEE FIGURE 1.

Table III. Electrical Characteristics of TLE2142

TEST CONDITIONS: Voltage supplies = +/- 15V , Rs =50 ohms
unless otherwise noted;

Test temperature : 25oC

tst #	Test name	Min	Max	Conditions
1	+Icc	0.00 ma	9.00 ma	noload Vic =2.5v
2	-Icc	-9.00 ma	0.00 ma	noload Vic =2.5v
3	Voh1_2K	13.30 v		Ioh =-15ma
4	Voh2_2K	13.30 v		Ioh =-15ma
5	Vol1_2K		-13.40 v	Iol = 15ma
6	Vol2_2K		-13.40 v	Iol = 15ma
7	vio 1	-750.0 uv	750.0 uv	Vic =0.0v
8	vio 2	-750.0 uv	750.0 uv	Vic =0.0v
9	+ibias 1	-1.50 ua	0.00 ua	Vic =0.0v
10	+ibias 2	-1.50 ua	0.00 ua	Vic =0.0v
11	-ibias 1	-1.50 ua	0.00 ua	Vic =0.0v
12	-ibias 2	-1.50 ua	0.00 ua	Vic =0.0v
13	iio 1	-0.10 ua	0.10 ua	Vic =0.0v
14	iio 2	-0.10 ua	0.10 ua	Vic =0.0v
15	Avo 1(V/mv)	100.0 V/mv		Rl =2K Vout=+/-10v
16	Avo 2(V/mv)	100.0 V/mv		Rl =2K Vout=+/-10v
17	psrr 1	90.0 db		Vcc=+/-2.5v Vcc=+/-15v
18	psrr 2	90.0 db		Vcc=+/-2.5v Vcc=+/-15v

TABLE IV: Summary of Electrical Measurements after Total Dose Exposures and Annealing for TLE2142 /1

Test #	Parameters	Units	Spec. Lim./2 min	Spec. Lim./2 max	Initial mean	Initial sd	Total Dose Exposure (krads) 1 mean	1 sd	2 mean	2 sd	3 mean	3 sd	10 mean	10 sd
1	Idd	mA	0.00	9.00	7.34	.20	7.43	.20	7.36	.20	7.41	.25	7.34	.20
2	Iss	mA	-9.00	0.00	-7.33	.20	-7.42	.21	-7.37	.20	-7.40	.24	-7.34	.20
3	Voh1_2K	V	13.30	-	13.8	.01	13.8	.01	13.8	.02	13.8	.02	13.8	.02
4	Voh2_2K	V	13.30	-	13.8	.01	13.8	.01	13.8	.01	13.8	.02	13.8	.01
5	Vol1_2K	V	-	-13.40	14.9	0	-14.9	0	-14.9	.01	-14.9	0	-14.9	0
6	Vol2_2K	V	-	-13.40	14.9	0	-14.9	0	-14.9	.01	-14.9	0	-14.9	0
7	vio1	µV	-750.0	750.0	277	204	304	169	275	205	276	207	266	204
8	vio2	µV	-750.0	750.0	362	117	389	120	392	117	393	114	393	116
9	+ibias 1	µA	-1.50	0.01	-0.94	.05	-1.00	.06	-1.05	.05	-1.00	.05	-1.00	.06
10	- ibias 1	µA	-1.50	0.01	-0.93	.05	-1.00	.06	-1.05	.06	-1.00	.06	-1.00	.06
11	+ibias 2	µA	-1.50	0.01	-0.92	.04	-1.00	.04	-1.04	.04	-1.00	.04	-1.00	.05
12	- ibias 2	µA	-1.50	0.01	-0.91	.03	-1.00	.04	-1.03	.04	-1.00	.04	-1.00	.05
13	iio 1	µA	-0.100	0.100	-0.01	0	-0.01	0	-0.01	0	-0.01	0	-0.01	0
14	iio 2	µA	-0.100	1	-0.01	.01	-0.01	.01	-0.02	.01	-0.02	.01	-0.04	.01
15	Avo 1	V/mV	100.0	-	316	36	313	48	316	46	313	37	308	36
16	Avo 2	V/mV	100.0	-	283	27	267	27	276	26	279	25	273	27
17	psrr 1	db	90.0	-	96.6	6.9	94.6	3.0	96.3	6.5	96.4	6.8	96.2	6.7
18	psrr 2	db	90.0	-	93.6	2.1	93.9	2.3	94.0	2.2	94.1	2.1	94.2	2.1

Notes:

1/ The mean and standard deviation values were calculated over the five parts irradiated in this testing. The control sample remained constant throughout the testing and is not included in this table.

2/ These are manufacturer's pre-irradiation data sheet specification limits. No post-irradiation limits were provided by the manufacturer at the time the tests were performed.

Radiation-sensitive parameters: none.