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From
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Subject
 Radiation Report on DPAD1-3
 ISTEP Non-Common Buy
 Part No. SNJ0134

PPM-91-655
 Date
 October 28, 1991

Location
 Lanham

Telephone
 731-8954

Location
 Lanham

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A radiation evaluation was performed on DPAD1-3 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 cobalt-60 gamma ray source. During the radiation testing, eight parts were irradiated under bias (see Figure 1 for bias configuration), and two parts were used as control samples. The total dose radiation steps were 10, 20, 50 and 100 krads*. After 100 krads, parts were annealed at 25°C for 24 and 168 hours. Irradiation was continued to 200 and 300 krads, followed by a high temperature (100°C) annealing step of 168 hours. The dose rate was between 0.1 to 5.2 krads/hour, depending on the total dose level (see Table II for radiation schedule). After each radiation exposure and annealing treatment, parts were electrically tested according to the test conditions and the specification limits listed in Table III.

All (8) parts passed all initial electrical measurement tests. However, after the first total dose exposure of 10 krads, all parts exceeded the maximum specification limit of 1pA for I_R . I_R increased with each total dose to 100 krads, and no significant recovery was observed after annealing the parts for 24 and 168 hours at 25°C. I_R further degraded on exposures to 200 and 300 krads (readings of several nano-Amps were observed after 300 krads). However, a significant decrease in I_R was observed in all parts after 168 hours of annealing at 100°C, but not enough to bring the parts within the maximum specification limit for this parameter. Note that all parts passed V_F and V_{BR} tests to 300 krads. Table IV provides the mean and standard deviation values of I_R , V_F and V_{BR} over the eight irradiated parts after each radiation and annealing step.

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

* In this report, the term "rads" is used as an abbreviation for rads (Si).

TABLE I. Part Information

Generic Part Number:	DPAD1-3
ISTP Non-Common Buy Part Number:	SNJ0134
ISTP Non-Common Buy Control Number:	2766A
Charge Number:	C14559
Manufacturer:	Interfet Corp.
Quantity Procured:	100
Lot Date Code:	9126
Quantity Tested:	10
Serial Numbers of Radiation Samples:	12, 13, 14, 15, 16, 17, 18, 19
Serial Numbers of Control Samples:	10, 11
Part Function:	Dual, pico-Amp Diodes
Part Technology:	N-Channel JFET
Package Style:	T072 (Can)
Test Engineer:	Anh Phung

TABLE II. Radiation Schedule

EVENTS	DATE
1) Initial Electrical Measurements	09/10/91
2) 10 krads irradiation @ 500 rads/hr Post 10 krads Electrical Measurements	09/19/91 09/20/91
3) 20 krads irradiation @ 149 rads/hr Post 20 krads Electrical Measurements	09/20/91 09/23/91
4) 50 krads irradiation @ 1500 rads/hr Post 50 krads Electrical Measurements	09/23/91 09/24/91
5) 100 krads irradiation @ 2500 rads/hr Post 100 krads Electrical Measurements	09/24/91 09/25/91
6) 24 hrs annealing at 25°C Post 24 hr Electrical Measurements	09/25/91 09/26/91
7) 168 hrs annealing at 25°C Post 168 hr Electrical Measurements	09/25/91 10/02/91
8) 200 krads irradiation @ 4660 rads/hr Post 200 krads Electrical Measurements	10/02/91 10/03/91
9) 300 krads irradiation @ 5260 rads/hr Post 300 krads Electrical Measurements	10/03/91 10/04/91
10) 168 hrs annealing at 100°C Post 168 hr Electrical Measurements	10/04/91 10/11/91

Notes:

- All parts were radiated under bias at the cobalt-60 gamma ray facility at GSFC.
- All electrical measurements were performed off-site at 25°C.
- Annealing performed under bias.

Table III. Electrical Characteristics of DPAD1-3

PARAMETER	TEST CONDITIONS	MIN	MAX	UNIT
I_R	$V_R = 20V$		1	PA
BV_R	$I_R = 1\mu A$	45		V
V_F	$I_F = 5mA$		1.5	V

TABLE IV: Summary of Electrical Measurements after Total Dose Exposures and Annealing for DPAD1-3

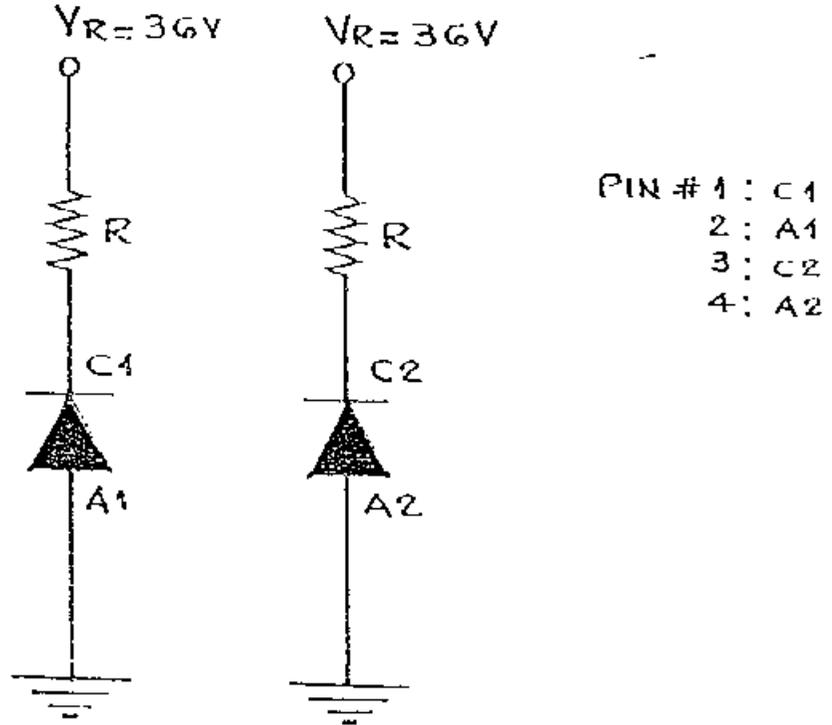
Parameters	Spec. Limits min max	Total Dose Exposure (krads)																				
		Initials			10			20			50			100			24 hrs			168 hrs		
		mean	sd	pass	mean	sd	pass	mean	sd	pass	mean	sd	pass	mean	sd	pass	mean	sd	pass	mean	sd	pass
-R	PA	-	.14	.16	1.2	1	Pass	4.2	2.1	4.7	11	284	127	189	73	113	40					
VBR	V	45	Pass		Pass		Pass			Pass		Pass		Pass		Pass						
VF	V	1.5	.89	0	.89	0	.89	0	.90	0	.89	0	.90	0	.89	0	.89	0	.89	0	.89	0

Parameters	Spec. Limits min max	TDE (krads)						Anneal 100°C				
		200			300			168 hrs				
		mean	sd	pass	mean	sd	pass	mean	sd	pass		
IR	PA	1	1297	719	4411	2339	22	10				
VBR	V	45	Pass		Pass		Pass		Pass			
VF	V	1.5	.89	0	.89	0	.89	0	.89	0	.89	0

Note:

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

Figure 1. Radiation Bias Circuit for DPAD1-3



$R = 100K\Omega \pm 5\%, 1W$