Rad - 91-8

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UNISYS

Interoffice Memorandum

To
K. Castell
Department
Code 711
From
K. Sahu KS
Department
7809
Subject
Radiation Report on SQXO-2-200kHz

Rad-91-8
Date
May 30, 1991
Location
GSFC
Telephone
731-8954
Location
Lanham
cc
V. Edson
G. Krishnan

A radiation evaluation was performed on SQXO-2-200kHz 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 III and Figure 1.

The total dose testing was performed using a cobalt-60 gamma ray source. During the radiation testing, five parts were irradiated under bias (see Figure 1 for bias configuration), and one part (SN 1) was used as a control sample. SNs 2 through 6 were exposed to a total dose of 30 krads at a dose rate of 1500 rads/hour. Table III provides the initial and post 30krad electrical measurement data.

All (5) parts passed all tests after 30 krads irradiation. However, ICC increased by a factor of three from 0.4mA to 1.5mA after 30 krads. Also, a 20% decrease in TF was observed.

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

TABLE I. Part Information

Generic Part Number:	SQXO-2-200kHz
Manufacturer:	Statek Corp.
Lot Date Codes:	9108
Quantity Tested:	6
Serial Numbers of Radiation Samples:	2, 3, 4, 5, 6
Serial Number of Control Sample:	1
Part Function:	Crystall Oscillator
Part Technology:	Hybrid/Bipolar
Package Style:	TO5

TABLE II. Radiation Schedule

EVENTS	DATE
1) Initial Electrical Measurements	04/17/91
2) 30 krads irradiation @ 1500 rads/hr	04/18/91
Post 30 krads Electrical Measurements	04/19/91

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 was performed at 25±C under bias.

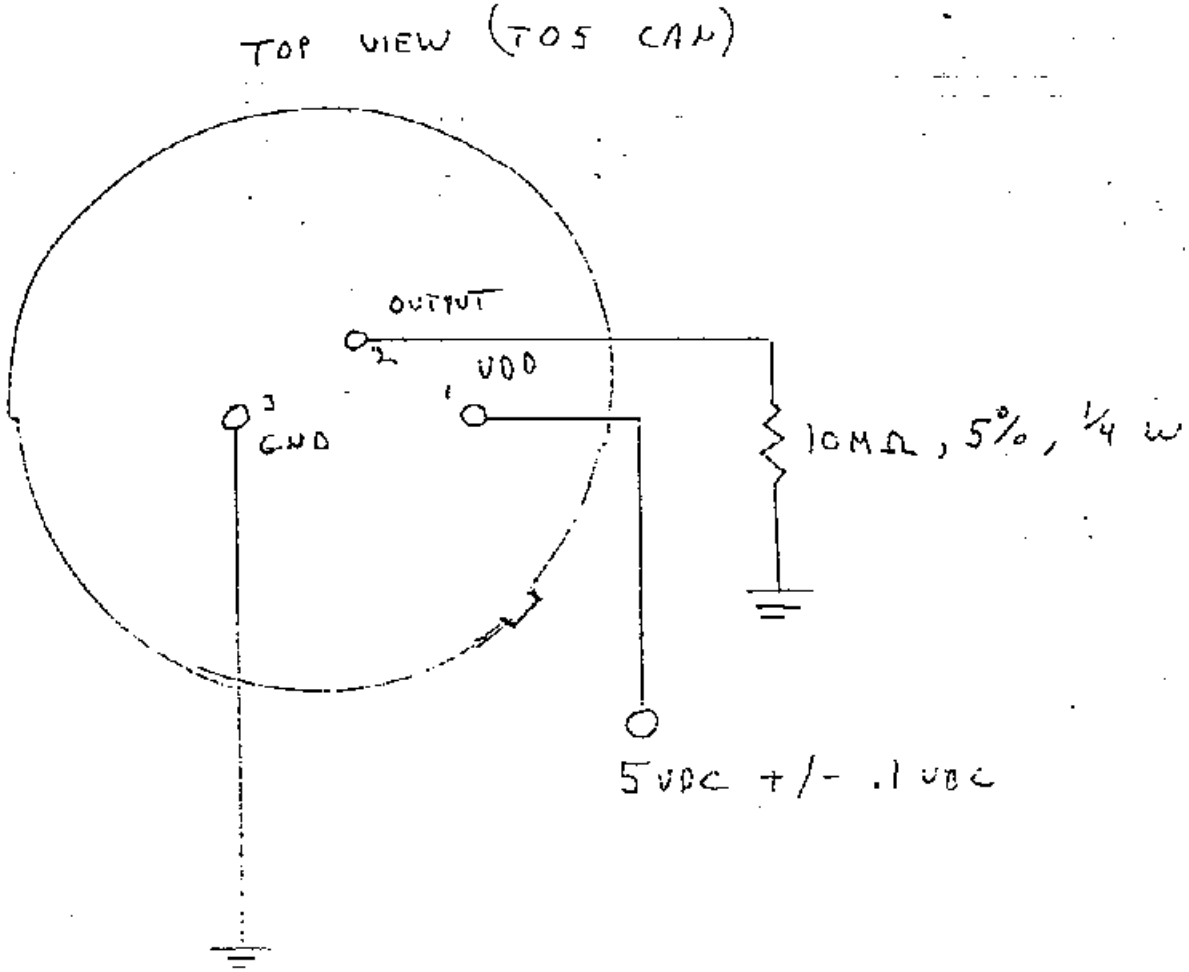
Table III. Summary of Electrical Measurements after Total Dose Exposure for SQXO-2-200kHz 1/

Parameters		Spec. Limits min	Spec. Limits max	Initials mean	Initials sd	Total Dose Exposure (krads) 30 mean	Total Dose Exposure (krads) 30 sd
ICC	mA		2.0	0.34	0.02	1.47	0.10
Freq @ 5V	kHz	199.96	200.04	200.000	0.005	200.006	0.006
Freq @4.5V	kHz	199.96	200.04	200.000	0.005	200.003	0.007
Freq @5.5V	kHz	199.96	200.04	200.000	0.002	200.005	0.005
dF(4.5V-5.5V)	%		.02	0.0001	0.0001	0.00006	0.00005
TR	ns		250	19.2	0.3	20.6	1.0
TF	ns		250	21.0	1.0	17.4	0.7
VOH	V	4.75		4.92	0	4.91	0
VOL	V		0.25	0.08	0	0.09	0

Note:

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.

Figure 1. Radiation Bias Circuit for SOXO-2-200KHz



OFFICE OF FLIGHT ASSURANCE

EEE TEST AND INSPECTION

PART NO. SQXO-2-200KHZ JOB NO. ES14213

TYPE CRYSTAL - Oscillator DATE 041791

QTY. -6- TECHNICIAN Sol

TEST NO. -5- TEST NAME Initial Elec. Meas.

S/N	DESCRIPTION						
	f_1 @ 5V	f_2 @ 4.5V	f_3 @ 5.5V	t_r	t_f	V_{OL}	V_{OH}
1	200.00155KHZ	200.00017KHZ	200.00130KHZ	19.2NS	19.9NS	0.08V	4.92V
2	199.99951KHZ	199.99835KHZ	199.99955KHZ	19.2NS	20.4NS		
3	200.00917KHZ	200.00821KHZ	200.00947KHZ	19.1NS	19.5NS		
4	199.99989KHZ	199.99941KHZ	200.00031KHZ	19.0NS	20.3NS		
5	200.00241KHZ	200.00144HHZ	200.00246KHZ	19.5NS	21.5NS		
6	200.00019KHZ	199.99920KHZ	200.00067KHZ	19.1NS	21.5NS		
	200.00063KHZ	199.99976KHZ	200.00108KHZ	19.2NS	20NS		

S/N	Δ freq.	I_{CC}
1	0.00012%	0.32 MA.
2	0.00002%	0.35MA.
3	0.00017%	0.36MA
4	-0.00020%	0.35MA.
5	0.00024%	0.32 MA.
6	0.00023%	0.33 MA.
1	0.00012%	0.32 MA
	Philips PM 6666 FREQ. Counter.	
	FLUKE 8840A DMM.	
	H/P 6621A P-Sup.	

I_{CC} < 2 MA.

F_1 @ 5V

F_2 @ 4.5V > 179,960 HZ < 200,040 HZ

F_3 @ 5.5V

t_r < 250 NSEC.

t_f < 250 NSEC.

V_{OH} < 0.95 x V_{CC}

V_{OL} < 0.05 x V_{CC}

Δf < 0.02%

EEE TEST AND INSPECTION

BENCH TEST

PART NO. : SQXO-2-200KHz

PART NAME : Crystal oscillator

QTY TO TEST : 6

EQUIP. USED : Philips PM6666 F-counter.

JOB NUMBER : ES14213

TECHNICIAN : SN

DATE : 04 1991

TEST NAME : RAD. Elec. # 1

PARAMETER :

LIMIT

S/N	FREQ +5V	S/N	FREQ +4.5V	S/N	FREQ +5.5V	S/N	tr	tf
1	200.00001KHz		200.00010KHz		200.00072KHz		18.7nS	20nS
2	200.00116KHz		200.00082KHz		200.00107KHz		17.7nS	16.7nS
3	200.01102KHz		200.01072KHz		200.01111KHz		20nS	17.4nS
4	200.00229KHz		200.00203KHz		200.00234KHz		21nS	17.7nS
5	200.00400KHz		200.00353KHz		200.00362KHz		20.7nS	17.5nS
6	200.00248KHz		200.00216KHz		200.00267KHz		20.1nS	17.6nS
	Icc		VOH VOL		Δ FREQ.			
1	340 μAmps		4.916V 84mV		0.00032%			
2	1.41mA.		4.91V 90mV		0.00044%			
3	1.45mA.				0.00044%			
4	1.59mA.				0.0000449%			
5	1.44mA.				0.00018%			
6	1.34mA.				0.0000947%			