



**National Semiconductor Corporation
Radiation Effects Laboratory
South Portland, Maine 04106**

ANALOG TOTAL DOSE RADIATION REPORT

Customer: Rad Qual

Part Type: LMH6715AJ-QML

Input Bias Circuit: 07082HRA2

Dose Rate: 53.44 RadS(Si)/sec.

Test Program Used: SC-LMH6715-RAD

Tester: SC-HP-RAD

Wafer Run Number: EM03034L

Wafer Number: #20

Package Type: JCDIP008

Production Lot # 7W0072F019

IPI #: N/A

Disposition: Passed up to 300k Rads

Summary:

Passes Room Temp @: Pre-Rad, Post 100k Rads, Post 200k Rads, Post 300k Rads.

Part Out of Room Temp Spec @: N/A

Functional Failed @: N/A

Parameters over Limit: N/A

Review By: Mike Maher

Reviewed By QA: Mike Maher March 28th, 2003

Note:

These parts may be dose rate sensitive in a space environment and demonstrate enhanced low dose rate effect.

Standard Test Flow Sheet For Rad Testing Customer Special Attachment Rad Hard Linear

NSID# LMH6715AJ-QMLV LOT# 7W0072F019 IPI# N/A

Test Program: SC-LMH6715-RAD

Machine: HP Operator: Shaw Mead/Richard Leong Bias Board: 07082HR

Start Time__09__:__00_AM__

Finish Time__12__:__15_PM__

Start Date: __03__/_05__/_03__

Finish Date: __03__/_05__/_03__

QA: __03__/_28__/_03__

Control Units s/n: #__1__ #__2__ #__ #__

Duts : #__3__ #__4__ #__5__ #__6__ #__7__

Duts : #__8__ #__ #__ #__ #__

Duts : #__ #__ #__ #__ #__

Duts : #__ #__ #__ #__ #__

Location Step	Operation Mtd/Cond	Qty In	Qty Out	Var	Mech	Rej	FF
PASS	Pre - Rad Read/Rec. Tp1	6	6	0	0	0	0
	<i>Irradiation</i> <i>100k</i> <i>Level</i>	6	6	0	0	N/A	N/A
PASS	Post Rad Read/Rec. Tp2	6	6	0	0	0	0
	<i>Irradiation</i> <i>200k</i> <i>Level</i>	6	6	0	0	N/A	N/A
FAIL	Post Rad Read/Rec. Tp3	6	6	0	0	0	0

**Standard Test Flow Sheet For Rad Testing
Customer Special Attachment
Rad Hard Linear**

NSID# LMH6715AJ-QMLV **LOT#** 7W0072F019 **IPI#** N/A

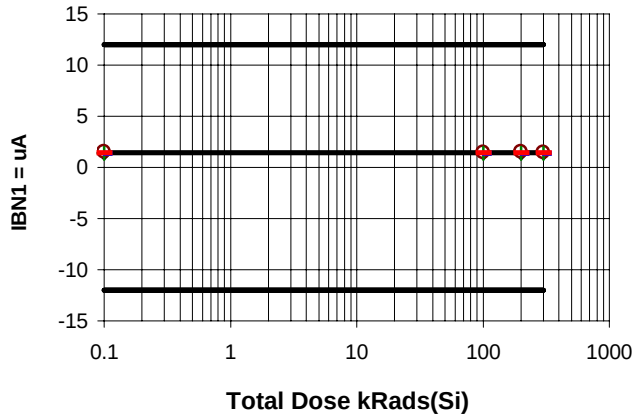
Location Step	Operation Mtd/Cond	Qty In	Qty Out	Var	Mech	Rej	FF
	<i>Irradiation</i> 300k <i>Level</i>	6	6	0	0	N/A	N/A
PASS	Post Rad Read/Rec. Tp4	6	6	0	0	0	0
	<i>Irradiation</i> ____k <i>Level</i>	0	0	0	0	N/A	N/A
N/A	Post Rad Read/Rec. Tp5	0	0	0	0	0	0
	<i>Irradiation</i> ____k <i>Level</i>	0	0	0	0	N/A	N/A
N/A	Post Rad Read/Rec. Tp6	0	0	0	0	0	0
	<i>Irradiation</i> ____k <i>Level</i>	0	0	0	0	N/A	N/A
N/A	Post Rad Read/Rec. Tp7	0	0	0	0	0	0
	<i>Irradiation</i> ____k <i>Level</i>	0	0	0	0	N/A	N/A

Note: All irradiation's are done per MAS-5010

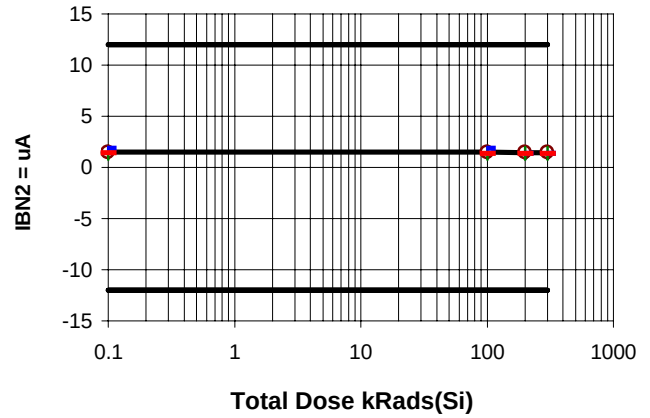


LMH6715AJ-QML Total Dose Radiation Test Characteristics

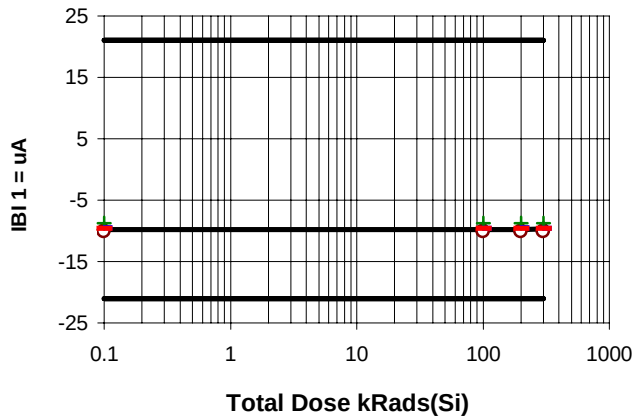
Input Bias Current (Non-Inverting 1)
vs Total Dose



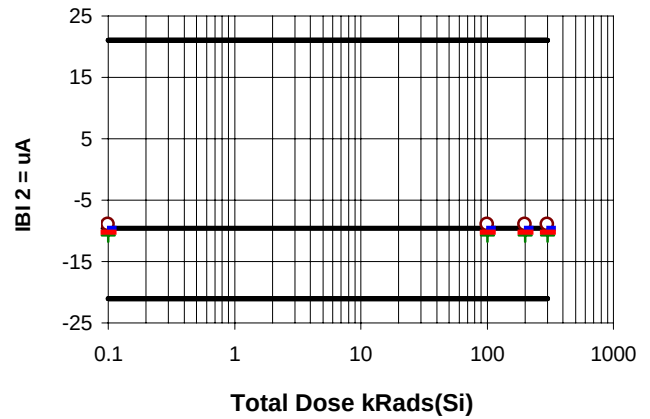
Input Bias Current (Non-Inverting 2)
vs Total Dose



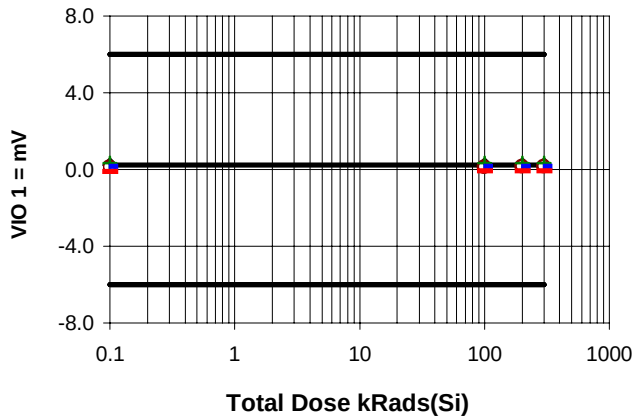
Input Bias Current (Inverting 1)
vs Total Dose



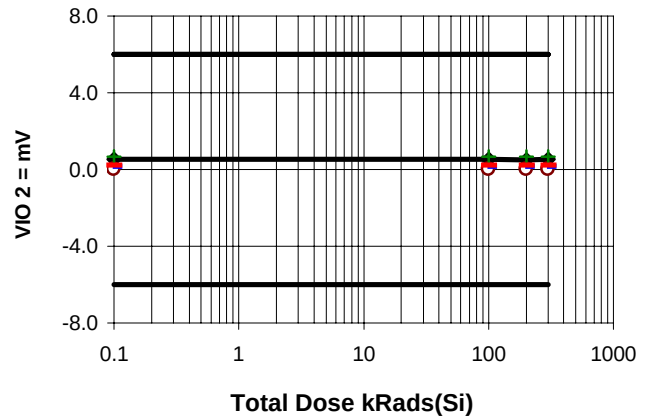
Input Bias Current (Inverting 2)
vs Total Dose



Input Offset Voltage 1
vs Total Dose



Input Offset Voltage 2
vs Total Dose



Note 1 : Solid lines indicate minimum and maximum limits of the Microcircuit Data Sheet (MDS).

Note 2 : Dose Rate = 53.44 Rads(Si)/sec, Av = +2, Rf = 500 Ohms, Vcc = +/-5V, RI = 100 Ohms; unless specified otherwise.



LMH6715AJ-QML

Total Dose Radiation Test Characteristics

Input Bias Current (Non-Inverting 1)

vs Total Dose

Dose	Avg.	Min.	Max.	S. Dev.	Fail ¹
0.1	1.432	1.381	1.536	0.056	0
100	1.423	1.369	1.529	0.058	0
200	1.426	1.369	1.540	0.061	0
300	1.423	1.366	1.528	0.057	0

Input Bias Current (Non-Inverting 2)

vs Total Dose

Dose	Avg.	Min.	Max.	S. Dev.	Fail ¹
0.1	1.511	1.398	1.899	0.193	0
100	1.492	1.394	1.845	0.176	0
200	1.418	1.386	1.492	0.039	0
300	1.413	1.373	1.481	0.037	0

Input Bias Current (Inverting 1)

vs Total Dose

Dose	Avg.	Min.	Max.	S. Dev.	Fail ¹
0.1	-9.756	-11.515	-8.743	0.977	0
100	-9.765	-11.504	-8.745	0.968	0
200	-9.769	-11.508	-8.739	0.971	0
300	-9.709	-11.115	-8.756	0.829	0

Input Bias Current (Inverting 2)

vs Total Dose

Dose	Avg.	Min.	Max.	S. Dev.	Fail ¹
0.1	-9.542	-10.695	-8.600	0.782	0
100	-9.542	-10.699	-8.597	0.785	0
200	-9.548	-10.699	-8.612	0.786	0
300	-9.552	-10.702	-8.608	0.784	0

Input Offset Voltage 1

vs Total Dose

Dose	Avg.	Min.	Max.	S. Dev.	Fail ¹
0.1	0.226	-0.087	0.702	0.270	0
100	0.231	-0.080	0.707	0.270	0
200	0.229	-0.081	0.701	0.268	0
300	0.229	-0.083	0.699	0.267	0

Input Offset Voltage 2

vs Total Dose

Dose	Avg.	Min.	Max.	S. Dev.	Fail ¹
0.1	0.538	-0.258	2.435	0.977	0
100	0.532	-0.255	2.391	0.959	0
200	0.501	-0.253	2.211	0.889	0
300	0.528	-0.258	2.378	0.955	0

Note 1 : Solid lines indicate minimum and maximum limits of the Microcircuit Data Sheet (MDS).

Note 2 : Dose Rate = 53.44 Rads(Si)/sec, Av = +2, Rf = 500 Ohms, Vcc = +/-5V, RI = 100 Ohms; unless specified otherwise.



LMH6715AJ-QML Total Dose Radiation Test Characteristics

Input Bias Current (Non-Inverting 1) vs Total Dose

Dose	D1	D2	D3	D4	D5	D6
0.1	1.5356	1.4010	1.3807	1.4375	1.4386	1.3983
100	1.5294	1.3944	1.3688	1.4331	1.4300	1.3829
200	1.5404	1.3993	1.3689	1.4288	1.4288	1.3889
300	1.5275	1.4022	1.3661	1.4268	1.4302	1.3833

Input Bias Current (Non-Inverting 2) vs Total Dose

Dose	D1	D2	D3	D4	D5	D6
0.1	1.4981	1.3982	1.8986	1.4119	1.4211	1.4384
100	1.4856	1.3941	1.8446	1.3953	1.4051	1.4265
200	1.4918	1.3966	1.3862	1.3963	1.4083	1.4281
300	1.4814	1.3971	1.3726	1.3980	1.4070	1.4244

Input Bias Current (Inverting 1) vs Total Dose

Dose	D1	D2	D3	D4	D5	D6
0.1	-10.1018	-8.7432	-9.5271	-9.5559	-9.0912	-11.5147
100	-10.1044	-8.7448	-9.5390	-9.5822	-9.1180	-11.5042
200	-10.1180	-8.7387	-9.5297	-9.5991	-9.1201	-11.5079
300	-10.1253	-8.7560	-9.5416	-9.5854	-9.1323	-11.1151

Input Bias Current (Inverting 2) vs Total Dose

Dose	D1	D2	D3	D4	D5	D6
0.1	-8.9721	-10.6952	-9.5326	-10.1989	-9.2535	-8.5997
100	-8.9651	-10.6986	-9.5389	-10.1982	-9.2522	-8.5967
200	-8.9627	-10.6989	-9.5409	-10.2233	-9.2492	-8.6116
300	-8.9776	-10.7021	-9.5400	-10.2190	-9.2650	-8.6082

Input Offset Voltage 1 vs Total Dose

Dose	D1	D2	D3	D4	D5	D6
0.1	0.1126	0.3416	0.1646	-0.0866	0.1237	0.7022
100	0.1162	0.3442	0.1673	-0.0799	0.1290	0.7065
200	0.1178	0.3422	0.1652	-0.0805	0.1273	0.7009
300	0.1175	0.3438	0.1676	-0.0832	0.1319	0.6992

Input Offset Voltage 2 vs Total Dose

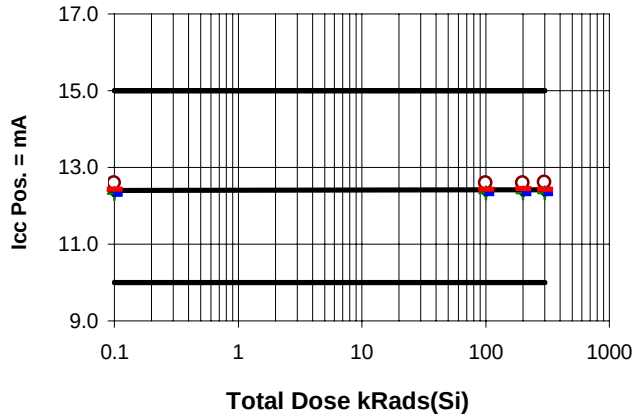
Dose	D1	D2	D3	D4	D5	D6
0.1	-0.00601	0.65578	0.17683	0.22245	2.43468	-0.25816
100	-0.00620	0.66079	0.17694	0.22487	2.39107	-0.25453
200	-0.00881	0.65508	0.17647	0.22772	2.21057	-0.25325
300	-0.00631	0.65320	0.17616	0.22562	2.37821	-0.25794

Note : Dose Rate = 53.44 Rads(Si)/sec, Av = +2, Rf = 500 Ohms, Vcc = +/-5V, RI = 100 Ohms; unless specified otherwise.

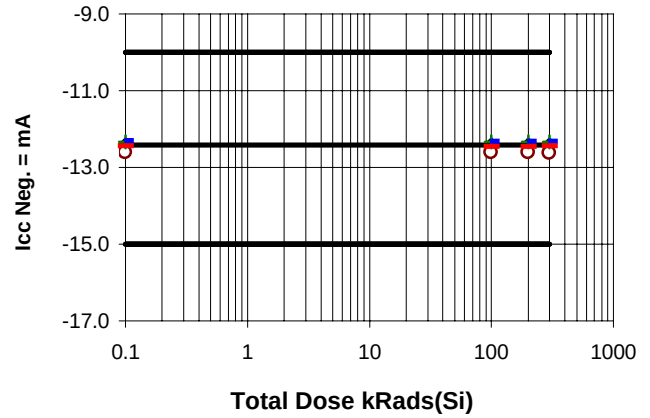


LMH6715AJ-QML Total Dose Radiation Test Characteristics

Supply Current Positive (RL = Infinite)
vs Total Dose



Supply Current Negative (RL = Infinite)
vs Total Dose



Note 1 : Solid lines indicate minimum and maximum limits of the Microcircuit Data Sheet (MDS).

Note 2 : Dose Rate = 53.44 Rads(Si)/sec, Av = +2, Rf = 500 Ohms, Vcc = +/-5V, RI = 100 Ohms; unless specified otherwise.



LMH6715AJ-QML

Total Dose Radiation Test Characteristics

Supply Current Positive (RL = Infinitive)

vs Total Dose

Dose	Avg.	Min.	Max.	S. Dev.	Fail ¹
0.1	12.407	12.302	12.596	0.164	0
100	12.417	12.314	12.605	0.163	0
200	12.413	12.311	12.600	0.162	0
300	12.418	12.316	12.609	0.166	0

Supply Current Negative (RL = Infinitive)

vs Total Dose

Dose	Avg.	Min.	Max.	S. Dev.	Fail ¹
0.1	-12.409	-12.597	-12.304	0.163	0
100	-12.419	-12.606	-12.316	0.163	0
200	-12.415	-12.602	-12.312	0.162	0
300	-12.420	-12.610	-12.317	0.165	0

Note 1 : Solid lines indicate minimum and maximum limits of the Microcircuit Data Sheet (MDS).

Note 2 : Dose Rate = 53.44 Rads(Si)/sec, Av = +2, Rf = 500 Ohms, Vcc = +/-5V, RI = 100 Ohms; unless specified otherwise.



LMH6715AJ-QML Total Dose Radiation Test Characteristics

Supply Current Positive (RL = Infinitive) vs Total Dose

Dose	D1	D2	D3	D4
0.1	12.5958	12.3219	12.3024	12.4305
100	12.6050	12.3305	12.3144	12.4406
200	12.6004	12.3287	12.3108	12.4469
300	12.6089	12.3282	12.3156	12.4376

Supply Current Negative (RL = Infinitive) vs Total Dose

Dose	D1	D2	D3	D4
0.1	-12.5967	-12.3255	-12.3045	-12.4330
100	-12.6065	-12.3337	-12.3162	-12.4423
200	-12.6024	-12.3316	-12.3120	-12.4479
300	-12.6104	-12.3313	-12.3171	-12.4397