



IRRADIATION TEST REPORT

DASA RAD reference No.: 700

RADIATION CHARACTERIZATION TEST (Low Dose Rate Testing)

performed on the

UNITRODE

UC1825AJ

Pulse Width Controller

Date : 16.04.1996

Performed by : Dr. R. Rieger
Dornier Satellitensysteme GmbH, RST11
P.O. Box 801169
D-81663 Munich

Telephone : (+89) 607 27205

Telefax : (+89) 607 23583

Approved

RSO4, Parts Engineering

EXPERIMENTAL DETAILS

PROJECT DETAILS

PROJECT : GLS
PURPOSE : Radiation Characterization Test (low dose rate)
ORIGINATOR : Mr. Schrempp, DSS, RST1

TEST SAMPLE DETAILS

DEVICE TYPE : UC1825AJ
FUNCTIONAL ASSIGNMENT : Pulse Width Controller
MANUFACTURER : Unitrode, USA
DETAIL SPECIFICATION : SMD 5962-87681/C
DATE CODE : 5A9521
WAFER LOT :
PACKAGE : DIL16
SAMPLE SIZE : 3 and 1 reference sample
SERIAL NUMBERS : 5, 6, 7 and 1 (reference sample)
REMARKS :

ELECTRICAL TEST DETAILS

TESTED CHARACTERISTICS : ICC, VIO, IIB+, IIB-, AOL, REF, VTH, f, VRVP, IP+, IP-
TEST EQUIPMENT : Dedicated test board
TEST TEMPERATURE : $23 \pm 2^\circ \text{C}$
REMARKS : For electrical measurements see notes on page 10.

IRRADIATION DETAILS

DATE OF TEST : 18-21.03.1996
IRRADIATION SOURCE : Co60 gamma ray
IRRADIATION ENERGY : 1.3 MeV
IRRADIATION TEMPERATURE : $23 \pm 2^\circ \text{C}$
IRRADIATION STEPS : 4 (see Table 1 for details)
DOSE RATE : 0.25 rad(Si)/sec
BIAS CONDITION : See Figure 1 for details
ANNEALING CONDITION : See Table 1 for details
ANNEALING TEMPERATURE : See Table 1 for details

REMARKS

This report covers the irradiation low dose rate (0.25 rad(Si)/sec) test results for the UC1825AJ. Results covering high dose rate (26.6 rad(Si)/sec) are presented in DASA RAD No. 699.

STEP	1	2	3	4	5	6	7	8	9	10	11	12
TOTAL DOSE Krad (Si)	Pre	20	60									
DOSE RATE rad(Si)/sec	-	26.6	26.6									
ANNEALING hours	-			264								
NOTE				1								

- Notes:
- 1) Unbiased annealing
 - 2) Steady state biased annealing at room temperature
 - 3) Accelerating aging (168 hours at 100° C)

TABLE 1
 Irradiation Steps

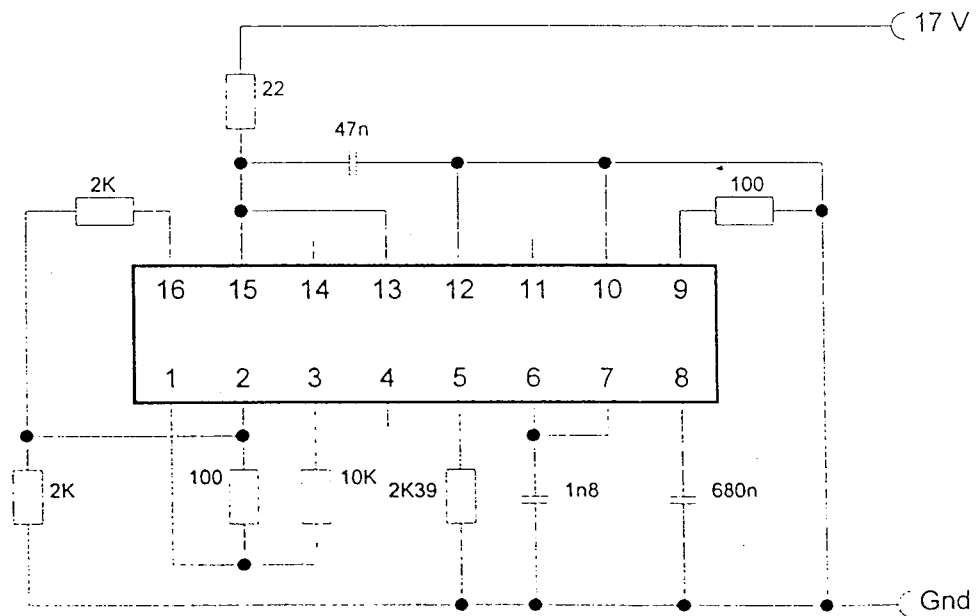


FIGURE 1
 Radiation Bias Conditions

ELECTRICAL MEASUREMENTS

STEP	TEST PARAMETER : ICC									
	SERIAL NUMBER							STATISTICAL VALUE		UNIT
Krad (Si)	5	6	7				1	Mean	St. Devia.	
Pre	27,8	28,3	27,6				31,9	27,9	0,29	mA
20	27,3	27,9	27,3					27,5	0,28	mA
60	26,5	26,9	26,6					26,7	0,17	mA
Anneal 264 hrs	27,0	27,4	27,6				30,9	27,3	0,25	mA

STEP	TEST PARAMETER : Delta ICC									
	SERIAL NUMBER							STATISTICAL VALUE		UNIT
Krad (Si)	5	6	7				1	Mean	St. Devia.	
Pre	0,0	0,0	0,0				0,0	0,00	0,00	mA
20	-0,5	-0,4	-0,3					-0,40	0,08	mA
60	-1,3	-1,4	-1,0					-1,23	0,17	mA
Anneal 264 hrs	-0,8	-0,9	0,0				-1,0	-0,57	0,40	mA

STEP	TEST PARAMETER : VIO									
	SERIAL NUMBER							STATISTICAL VALUE		UNIT
Krad (Si)	5	6	7				1	Mean	St. Devia.	
Pre	-0,05	0,25	-1,09				-0,77	-0,30	0,57	mV
20	0,11	0,45	-0,92					-0,12	0,58	mV
60	0,25	0,59	-0,81					0,01	0,60	mV
Anneal 264 hrs	0,29	0,63	-0,81				-0,76	0,04	0,61	mV

STEP	TEST PARAMETER : Delta VIO									
	SERIAL NUMBER							STATISTICAL VALUE		UNIT
Krad (Si)	5	6	7				1	Mean	St. Devia.	
Pre	0,00	0,00	0,00				0,00	0,00	0,00	mV
20	0,16	0,20	0,17					0,18	0,02	mV
60	0,30	0,34	0,28					0,31	0,02	mV
Anneal 264 hrs	0,34	0,36	0,28				0,01	0,33	0,04	mV

ELECTRICAL MEASUREMENTS cont'd

STEP	TEST PARAMETER : IIB+									
	SERIAL NUMBER							STATISTICAL VALUE		UNIT
Krad (Si)	5	6	7				1	Mean	St. Devia.	
Pre	400	400	500				600	433	47,1	nA
20	700	600	700					667	47,1	nA
60	1100	900	1000					1000	81,6	nA
Anneal 264 hrs	1000	900	1000				600	967	47,1	nA

STEP	TEST PARAMETER : Delta IIB+									
	SERIAL NUMBER							STATISTICAL VALUE		UNIT
Krad (Si)	5	6	7				1	Mean	St. Devia.	
Pre	0	0	0				0	0	0,0	nA
20	300	200	200					233	47,1	nA
60	700	500	500					567	94,3	nA
Anneal 264 hrs	600	500	500				0	533	47,1	nA

STEP	TEST PARAMETER : IIB-									
	SERIAL NUMBER							STATISTICAL VALUE		UNIT
Krad (Si)	5	6	7				1	Mean	St. Devia.	
Pre	500	600	400				400	500	81,6	nA
20	700	700	600					667	47,1	nA
60	1200	1200	1000					1133	94,3	nA
Anneal 264 hrs	1100	1000	800				300	967	124,7	nA

STEP	TEST PARAMETER : Delta IIB-									
	SERIAL NUMBER							STATISTICAL VALUE		UNIT
Krad (Si)	5	6	7				1	Mean	St. Devia.	
Pre	0	0	0				0	0	0,0	nA
20	200	100	200					167	47,1	nA
60	700	600	600					633	47,1	nA
Anneal 264 hrs	600	400	400				-100	467	94,3	nA

ELECTRICAL MEASUREMENTS cont'd

STEP	TEST PARAMETER : AOL									
	SERIAL NUMBER							STATISTICAL VALUE		UNIT
Krad (Si)	5	6	7				1	Mean	St. Devia.	
Pre	78,9	78,4	77,9				77,5	78,4	0,4	dB
20	77,5	78,9	77,9					78,1	0,6	dB
60	77,5	77,9	77,5					77,6	0,2	dB
Anneal 264 hrs	78,4	77,9	77,9				77,5	78,1	0,2	dB

STEP	TEST PARAMETER : Delta AOL									
	SERIAL NUMBER							STATISTICAL VALUE		UNIT
Krad (Si)	5	6	7				1	Mean	St. Devia.	
Pre	0,0	0,0	0,0				0,0	0,00	0,00	dB
20	-1,4	0,5	0,0					-0,30	0,80	dB
60	-1,4	-0,5	-0,4					-0,77	0,45	dB
Anneal 264 hrs	-0,5	-0,5	0,0				0,0	-0,33	0,24	dB

STEP	TEST PARAMETER : REF									
	SERIAL NUMBER							STATISTICAL VALUE		UNIT
Krad (Si)	5	6	7				1	Mean	St. Devia.	
Pre	5,105	5,080	5,094				5,098	5,093	0,010	V
20	5,121	5,087	5,099					5,102	0,014	V
60	5,140	5,095	5,119					5,118	0,018	V
Anneal 264 hrs	5,130	5,090	5,115				5,095	5,112	0,016	V

STEP	TEST PARAMETER : Delta REF									
	SERIAL NUMBER							STATISTICAL VALUE		UNIT
Krad (Si)	5	6	7				1	Mean	St. Devia.	
Pre	0,000	0,000	0,000				0,000	0,000	0,000	V
20	0,016	0,007	0,005					0,009	0,005	V
60	0,035	0,015	0,025					0,025	0,008	V
Anneal 264 hrs	0,025	0,010	0,021				-0,003	0,019	0,006	V

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ELECTRICAL MEASUREMENTS cont'd

STEP	TEST PARAMETER : VTH										
	SERIAL NUMBER								STATISTICAL VALUE		UNIT
Krad (Si)	5	6	7					1	Mean	St. Devia.	
Pre	1,19	1,22	1,20					1,27	1,20	0,01	V
20	1,20	1,21	1,20						1,20	0,00	V
60	1,19	1,20	1,20						1,20	0,00	V
Anneal 264 hrs	1,20	1,19	1,20					1,27	1,20	0,00	V

STEP	TEST PARAMETER : Delta VTH										
	SERIAL NUMBER								STATISTICAL VALUE		UNIT
Krad (Si)	5	6	7					1	Mean	St. Devia.	
Pre	0,00	0,00	0,00					0,00	0,000	0,000	V
20	0,01	-0,01	0,00						0,000	0,008	V
60	0,00	-0,02	0,00						-0,007	0,009	V
Anneal 264 hrs	0,01	-0,03	0,00					0,00	-0,007	0,017	V

STEP	TEST PARAMETER : f										
	SERIAL NUMBER								STATISTICAL VALUE		UNIT
Krad (Si)	5	6	7					1	Mean	St. Devia.	
Pre	110	110	111					113	110,3	0,5	KHz
20	111	111	111						111,0	0,0	KHz
60	112	111	112						111,7	0,5	KHz
Anneal 264 hrs	112	112	112					114	112,0	0,0	KHz

STEP	TEST PARAMETER : Delta f										
	SERIAL NUMBER								STATISTICAL VALUE		UNIT
Krad (Si)	5	6	7					1	Mean	St. Devia.	
Pre	0	0	0					0	0,0	0,0	KHz
20	1	1	0						0,7	0,5	KHz
60	2	1	1						1,3	0,5	KHz
Anneal 264 hrs	2	2	1					1	1,7	0,5	KHz



ELECTRICAL MEASUREMENTS cont'd

STEP	TEST PARAMETER : VRVP										
	Krad (Si)	SERIAL NUMBER							STATISTICAL VALUE		UNIT
5		6	7					1	Mean	St. Devia.	
Pre	1,69	1,67	1,70					1,68	1,69	0,01	V
20	1,72	1,70	1,71						1,71	0,01	V
60	1,74	1,73	1,72						1,73	0,01	V
Anneal 264 hrs	1,73	1,74	1,72					1,72	1,73	0,01	V

STEP	TEST PARAMETER : Delta VRVP										
	Krad (Si)	SERIAL NUMBER							STATISTICAL VALUE		UNIT
5		6	7					1	Mean	St. Devia.	
Pre	0,00	0,00	0,00					0,00	0,000	0,000	V
20	0,03	0,03	0,01						0,023	0,009	V
60	0,05	0,06	0,02						0,043	0,017	V
Anneal 264 hrs	0,04	0,07	0,02					0,04	0,043	0,021	V

STEP	TEST PARAMETER : IP+										
	Krad (Si)	SERIAL NUMBER							STATISTICAL VALUE		UNIT
5		6	7					1	Mean	St. Devia.	
Pre	2,35	2,40	2,40					2,20	2,38	0,02	A
20	2,25	2,40	2,40						2,35	0,07	A
60	2,05	2,15	2,20						2,13	0,06	A
Anneal 264 hrs	2,10	2,20	2,20					2,35	2,17	0,05	A

STEP	TEST PARAMETER : Delta IP+										
	Krad (Si)	SERIAL NUMBER							STATISTICAL VALUE		UNIT
5		6	7					1	Mean	St. Devia.	
Pre	0,00	0,00	0,00					0,00	0,000	0,000	A
20	-0,10	0,00	0,00						-0,033	0,047	A
60	-0,30	-0,25	-0,20						-0,250	0,041	A
Anneal 264 hrs	-0,25	-0,20	-0,20					0,15	-0,217	0,024	A



ELECTRICAL MEASUREMENTS cont'd

STEP	TEST PARAMETER : IP-										
	Krad (Si)	SERIAL NUMBER							STATISTICAL VALUE		UNIT
5		6	7					1	Mean	St. Devia.	
Pre	1,75	1,80	1,80					1,70	1,78	0,02	A
20	1,70	1,75	1,75						1,73	0,02	A
60	1,55	1,55	1,60						1,57	0,02	A
Anneal 264 hrs	1,55	1,60	1,60					1,75	1,58	0,02	A

STEP	TEST PARAMETER : Delta IP-										
	Krad (Si)	SERIAL NUMBER							STATISTICAL VALUE		UNIT
5		6	7					1	Mean	St. Devia.	
Pre	0,00	0,00	0,00					0,00	0,000	0,000	A
20	-0,05	-0,05	-0,05						-0,050	0,000	A
60	-0,20	-0,25	-0,20						-0,217	0,024	A
Anneal 264 hrs	-0,20	-0,20	-0,20					0,05	-0,200	0,000	A

ELECTRICAL MEASUREMENTS AND TEST CONDITIONS

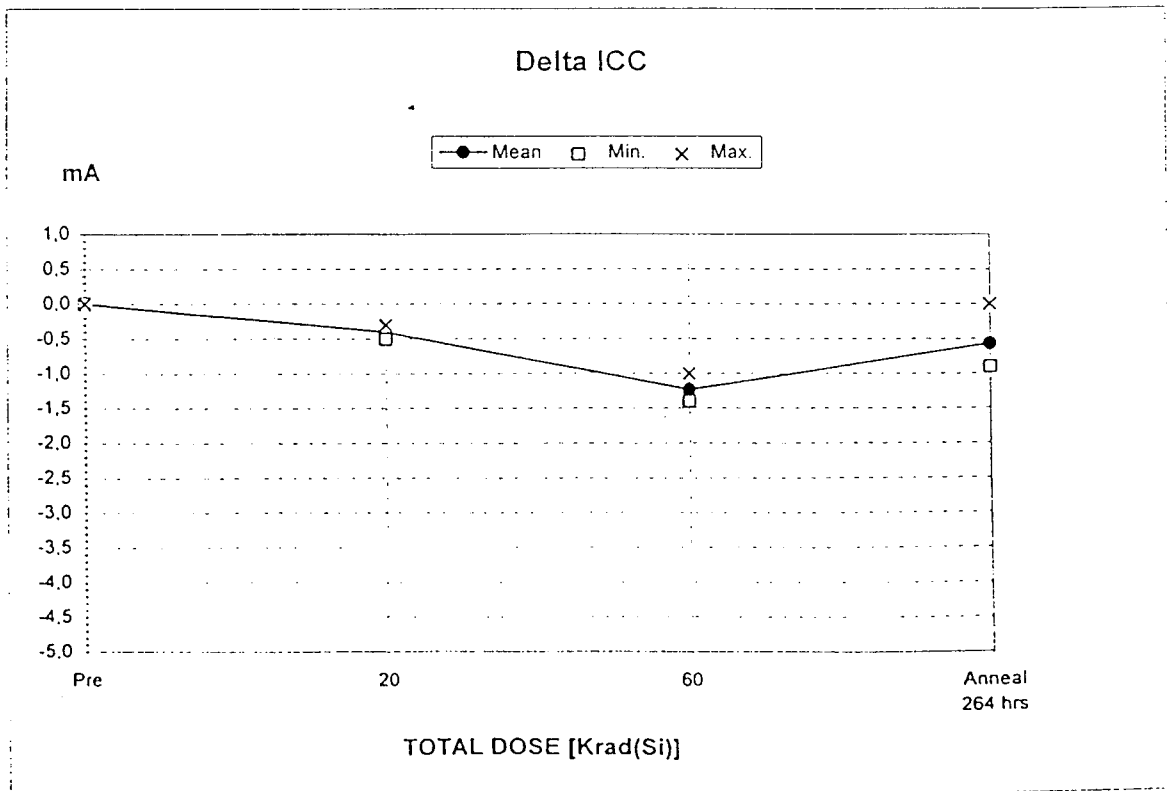
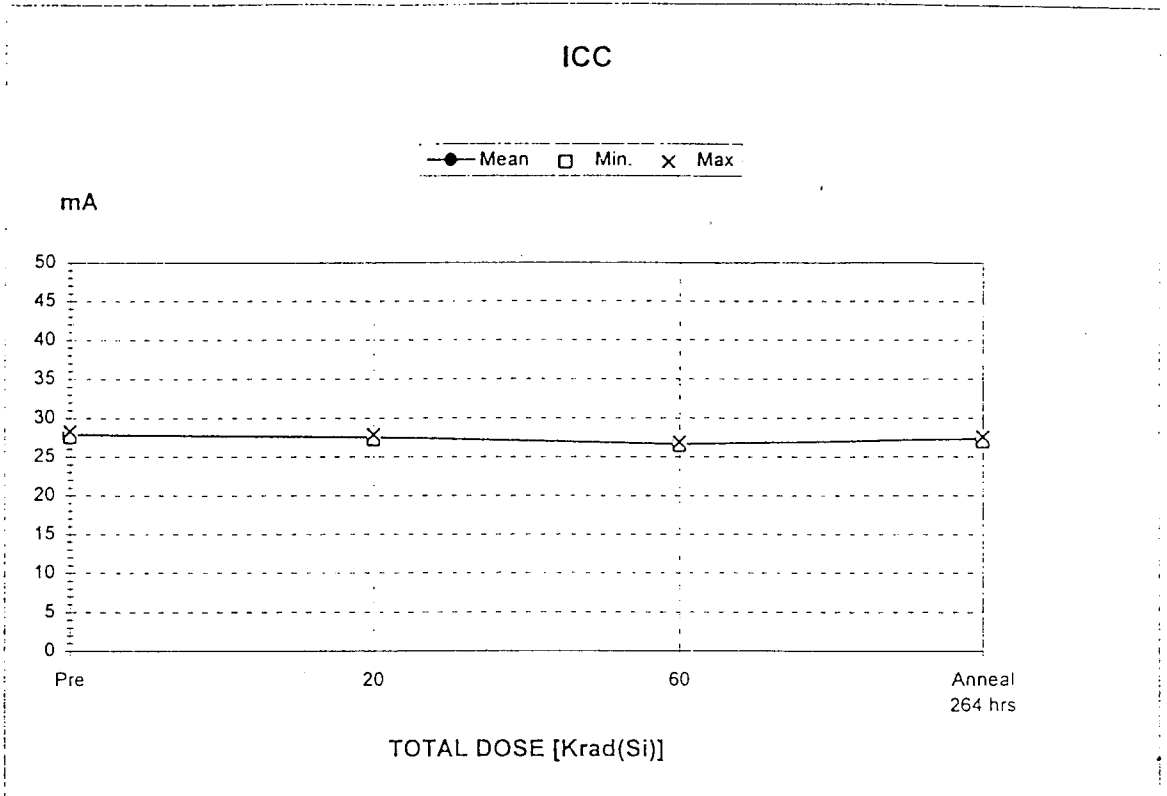
Using a dedicated test board the following test parameters have been measured:

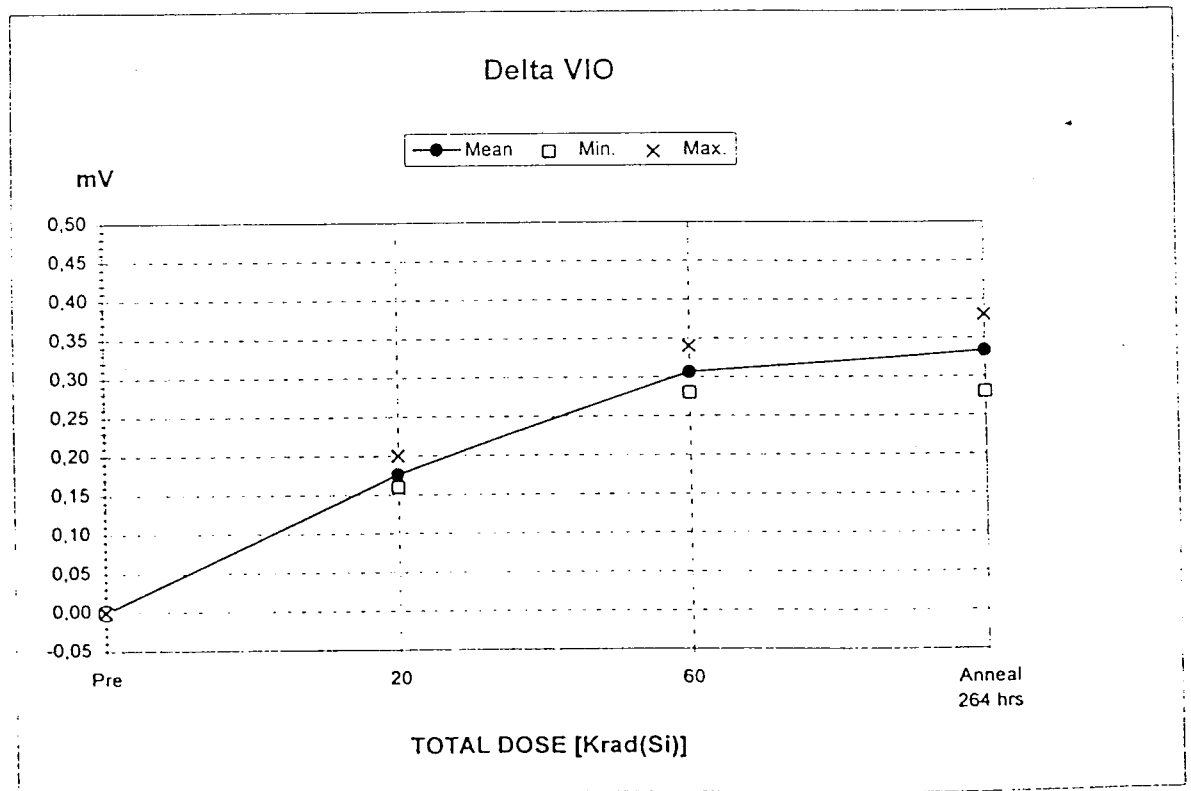
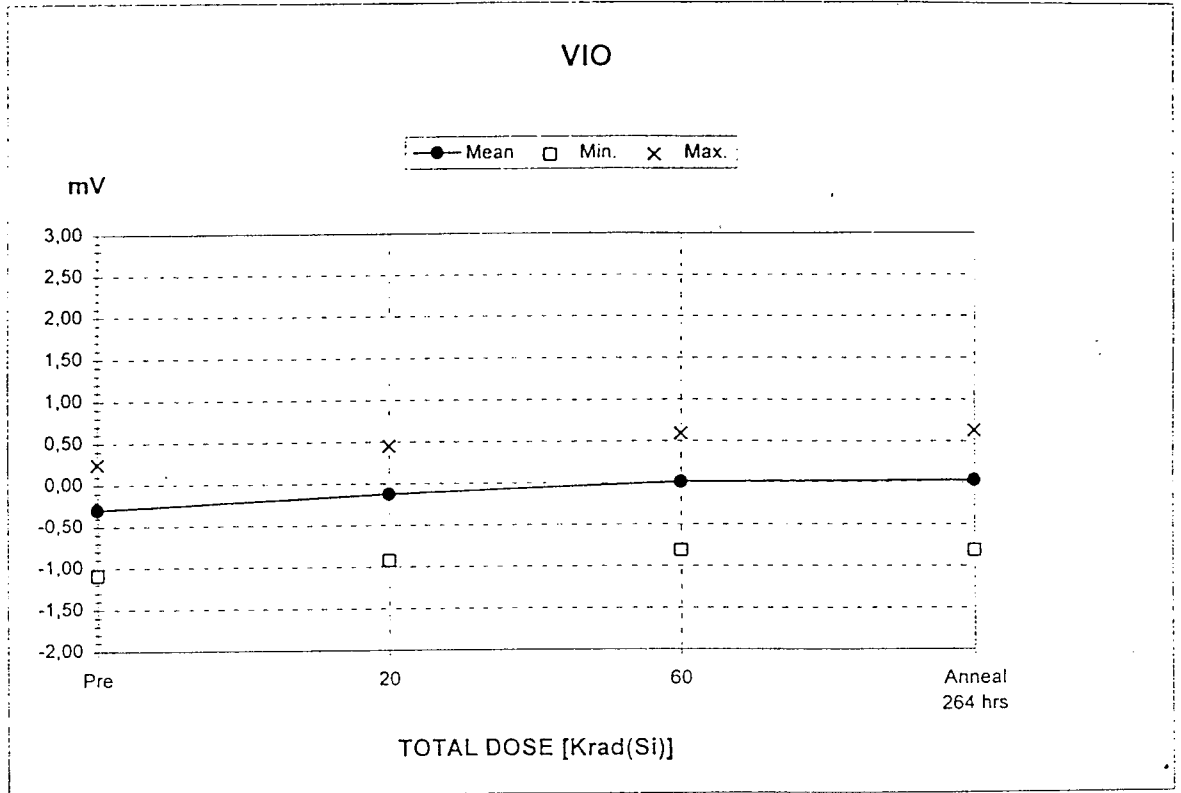
ICC : Supply Current
VIO : Input Offset Voltage; Error Amplifier Section
IIB+ : Input Bias Current; Error Amplifier Section
IIB- : Input Bias Current; Error Amplifier Section
AOL : Open Loop Gain; Error Amplifier Section
REF : Output Voltage; Reference Section
VTH : Shutdown Threshold; Current Limit/Shutdown Section
f : Frequency; Oscillator Section
VRVP : Ramp Voltage (Valley to Peak); Oscillator Section
IP+ : Output (Peak, Source) Short-Circuit Current; Output Section
IP- : Output (Peak, Sink) Short-Circuit Current; Output Section

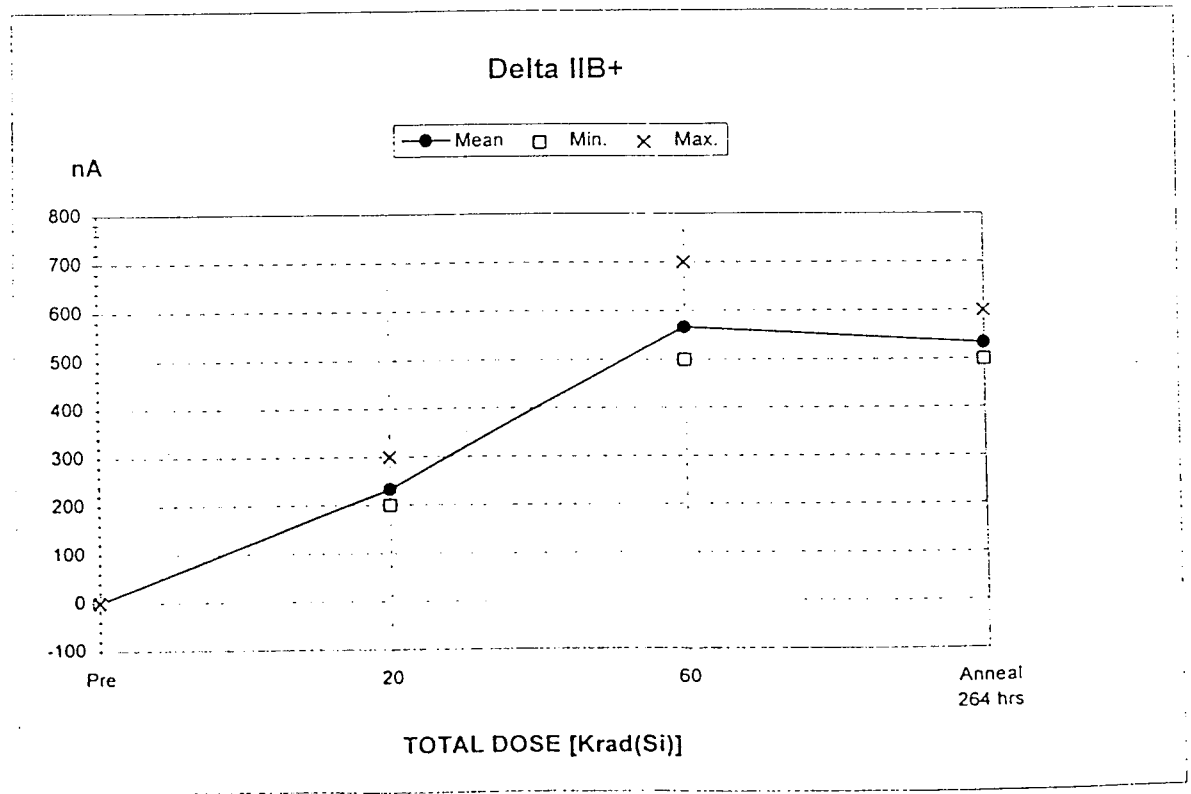
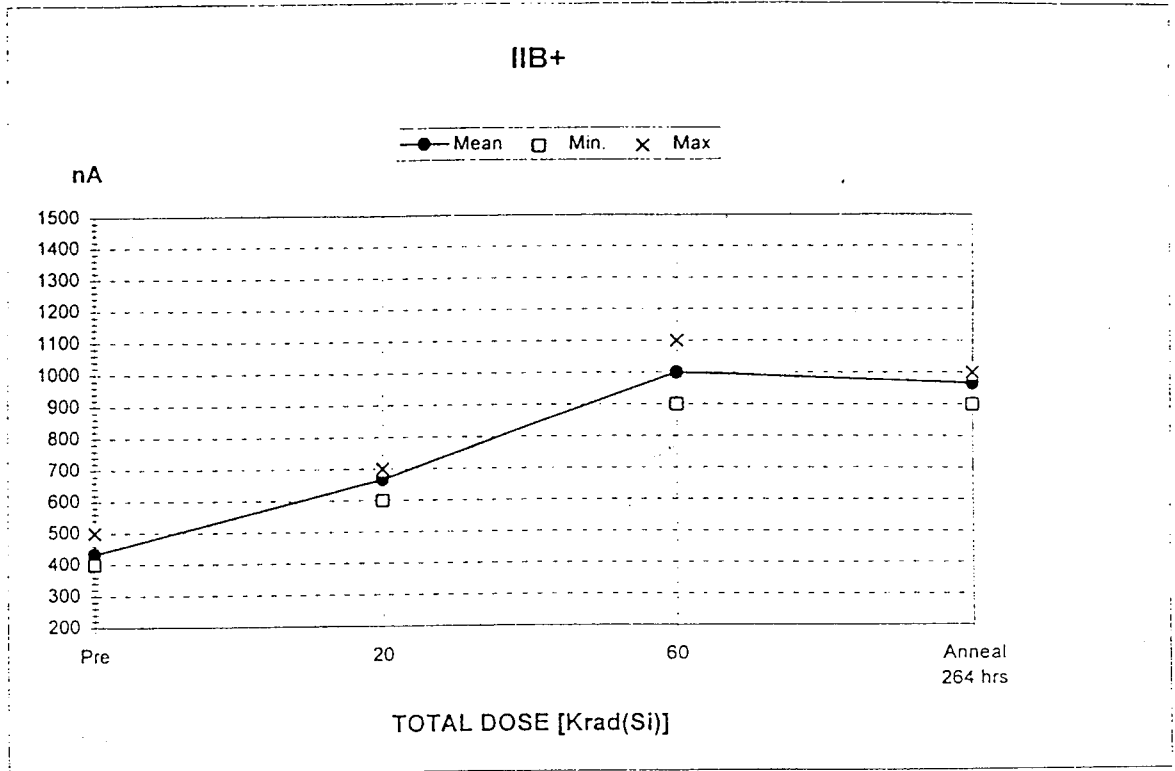
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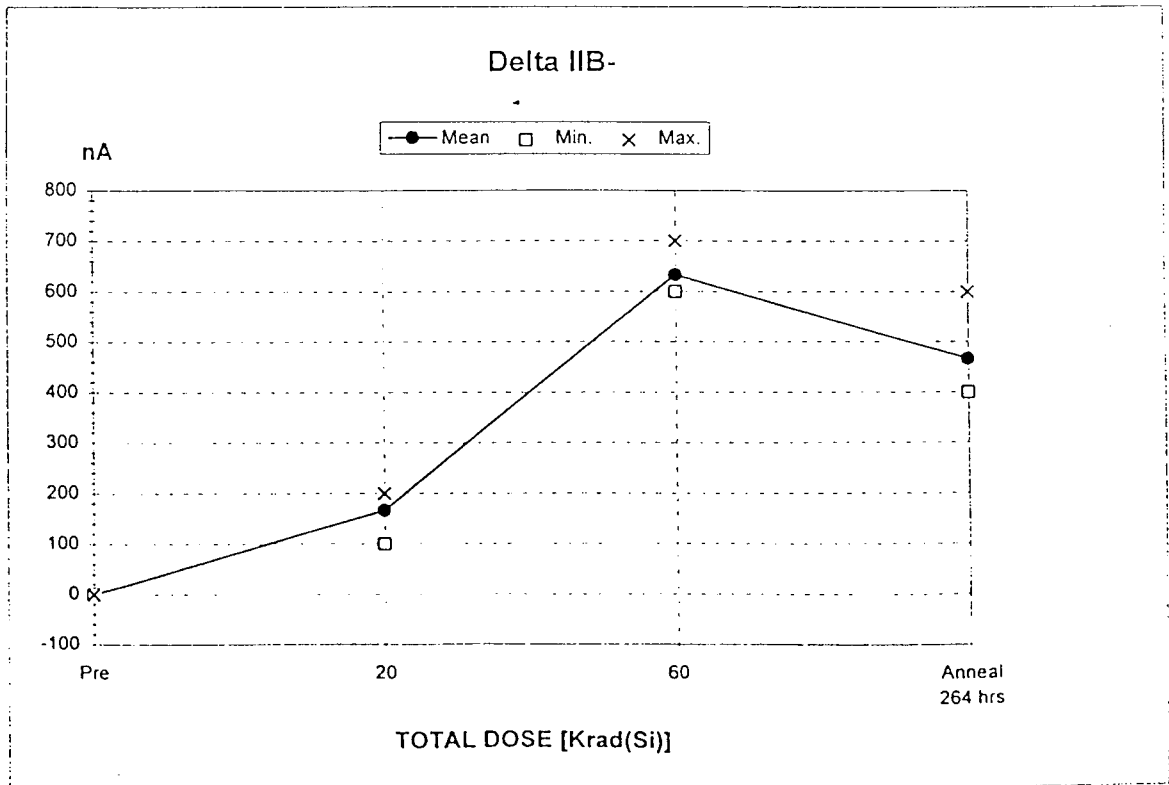
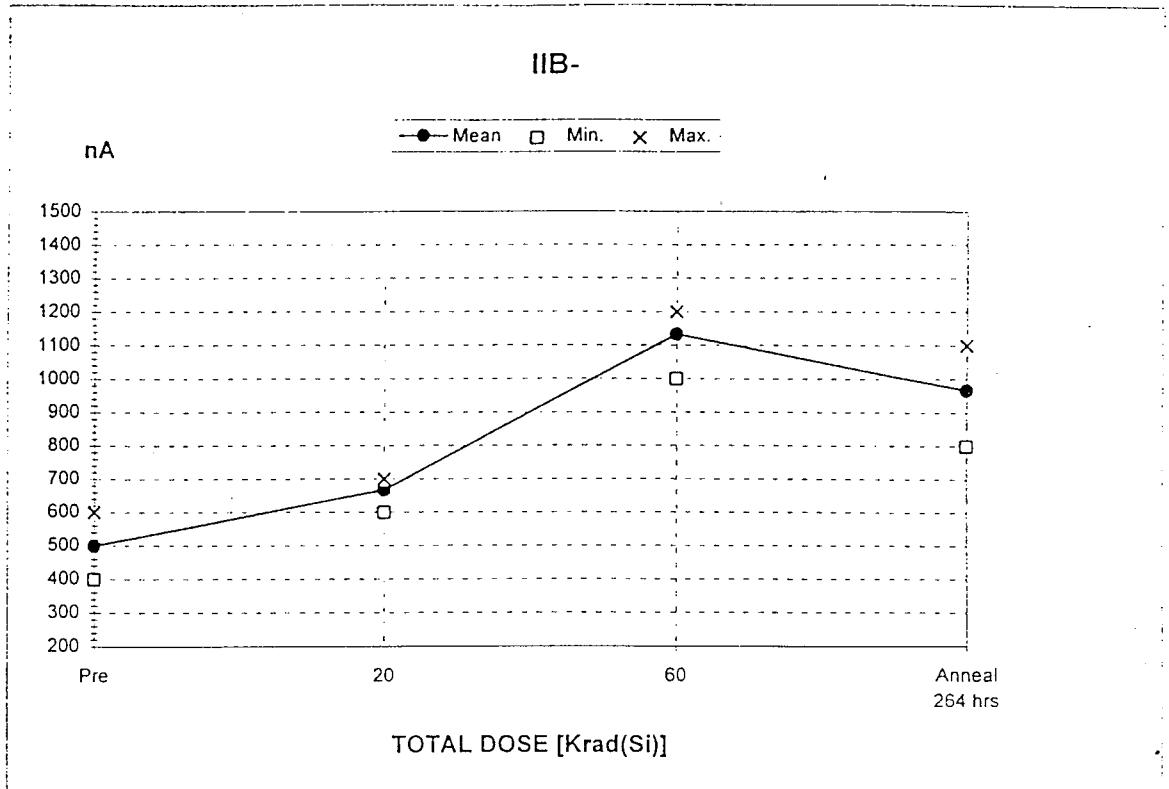
ICC : The tabulated ICC value includes a constant value of 4.2 mA drawn by a resistor network
VIO : ± 0.02 mV
IIB+ : ± 0.2 μ A
IIB- : ± 0.2 μ A
AOL : ± 1.5 dB
REF : ± 3 mV
VTH : ± 4 % (oscilloscope readings)
f : ± 1 KHz
VRVP : ± 4 % (oscilloscope readings)
IP+ : ± 4 % (oscilloscope readings)
IP- : ± 4 % (oscilloscope readings)

Note: For DVM or oscilloscope readings the short term accuracy might be better.

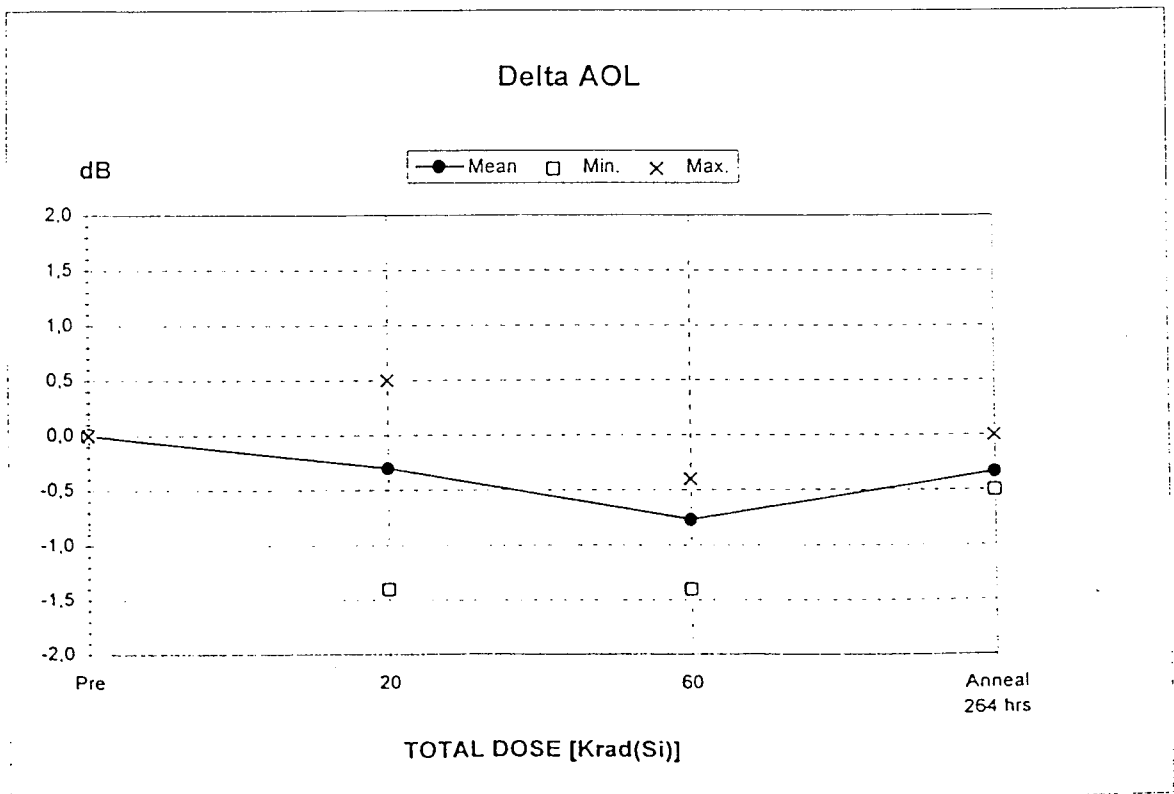
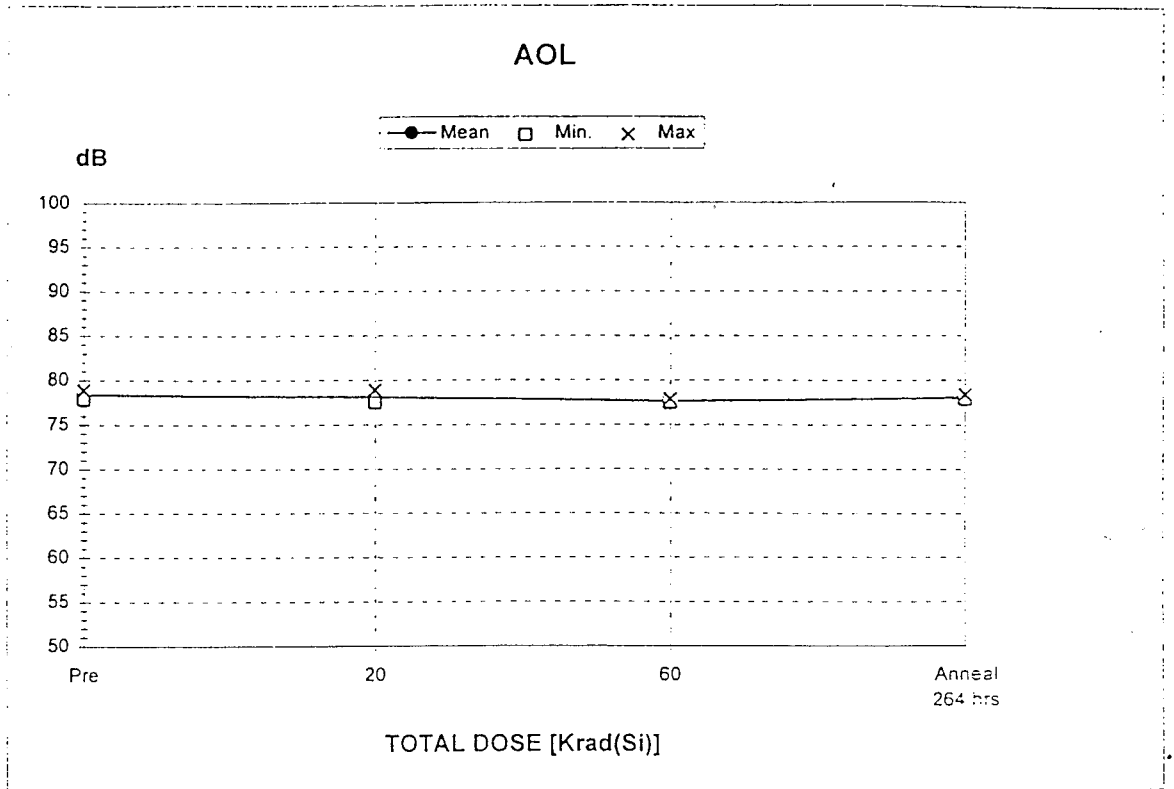


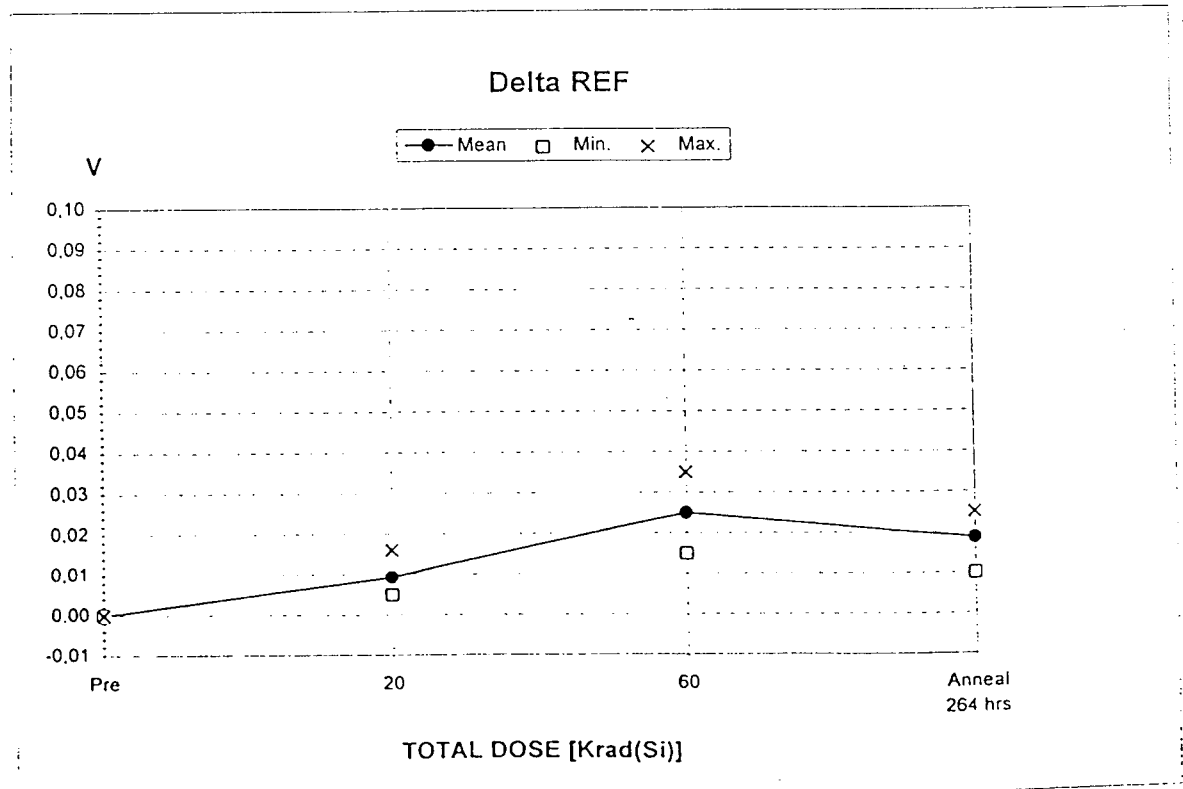
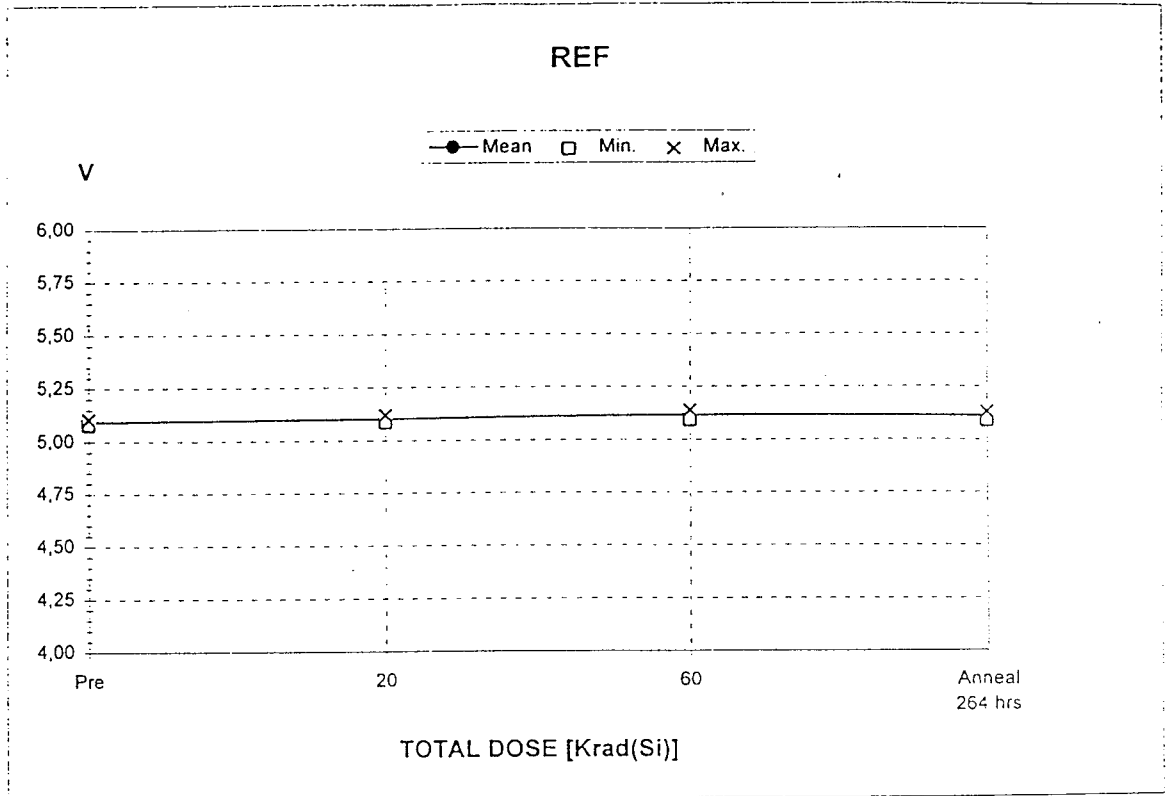


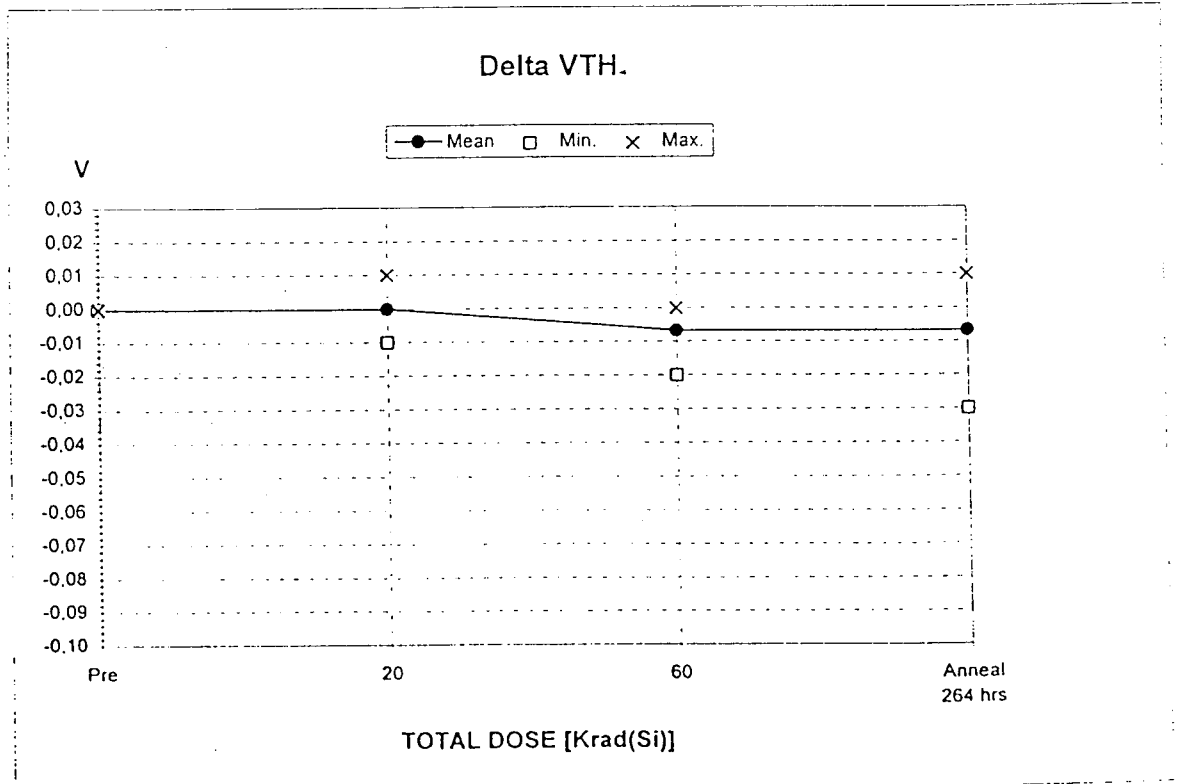
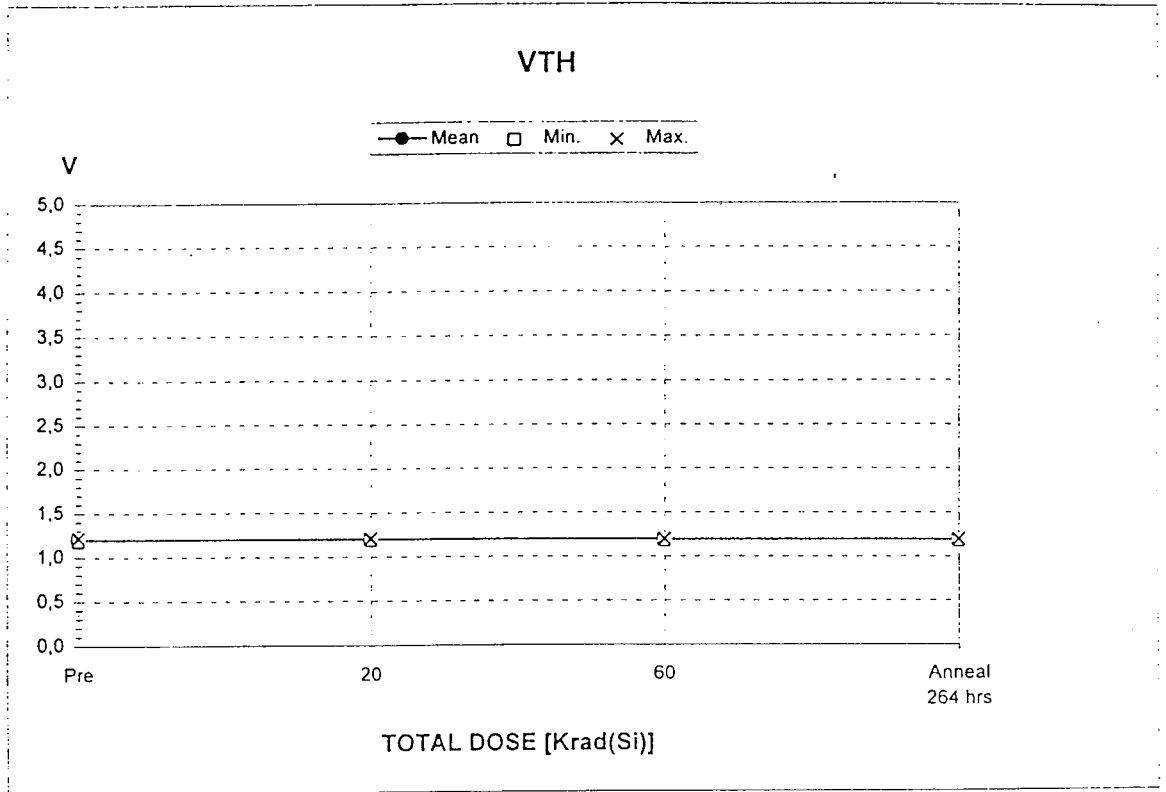


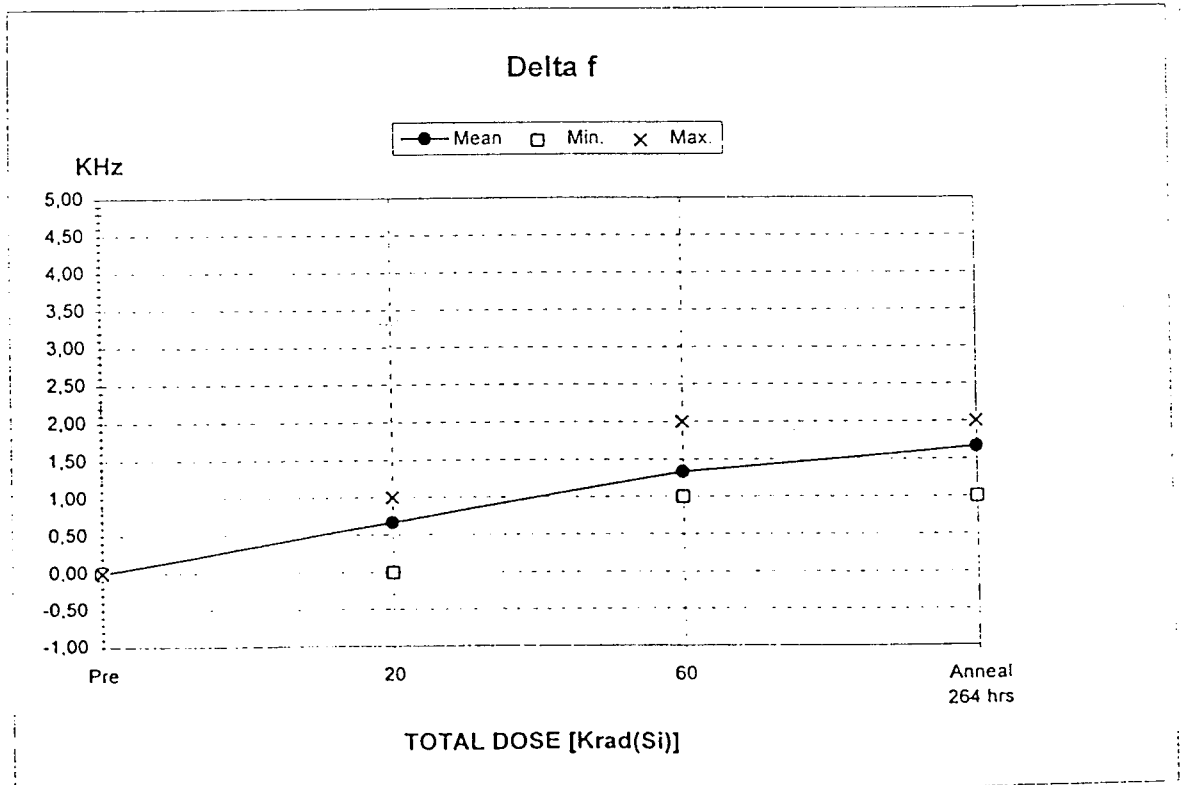
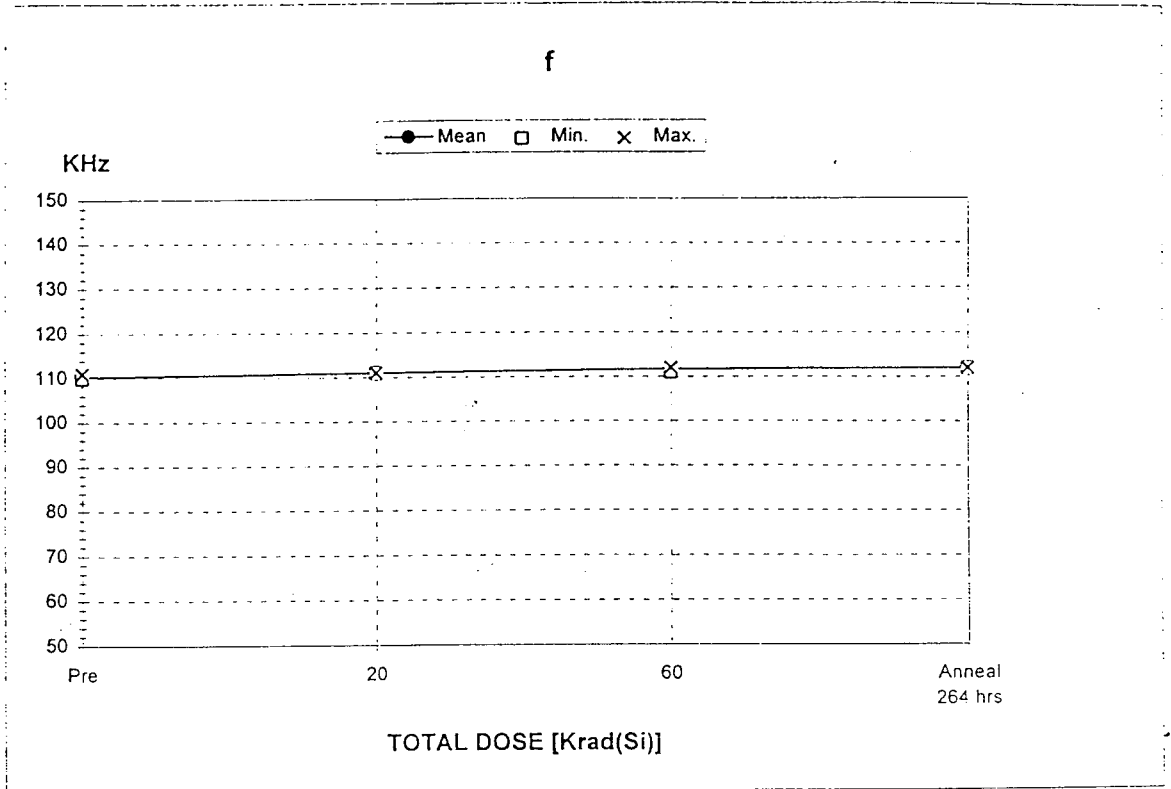


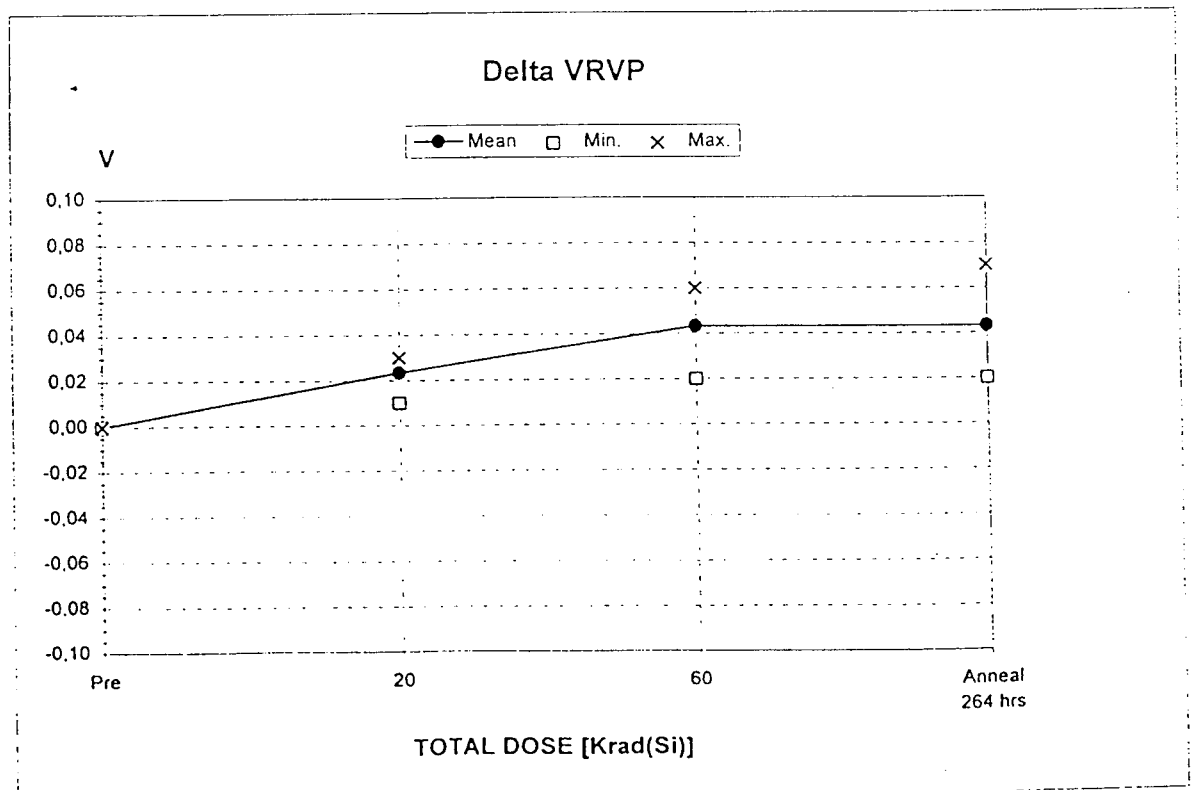
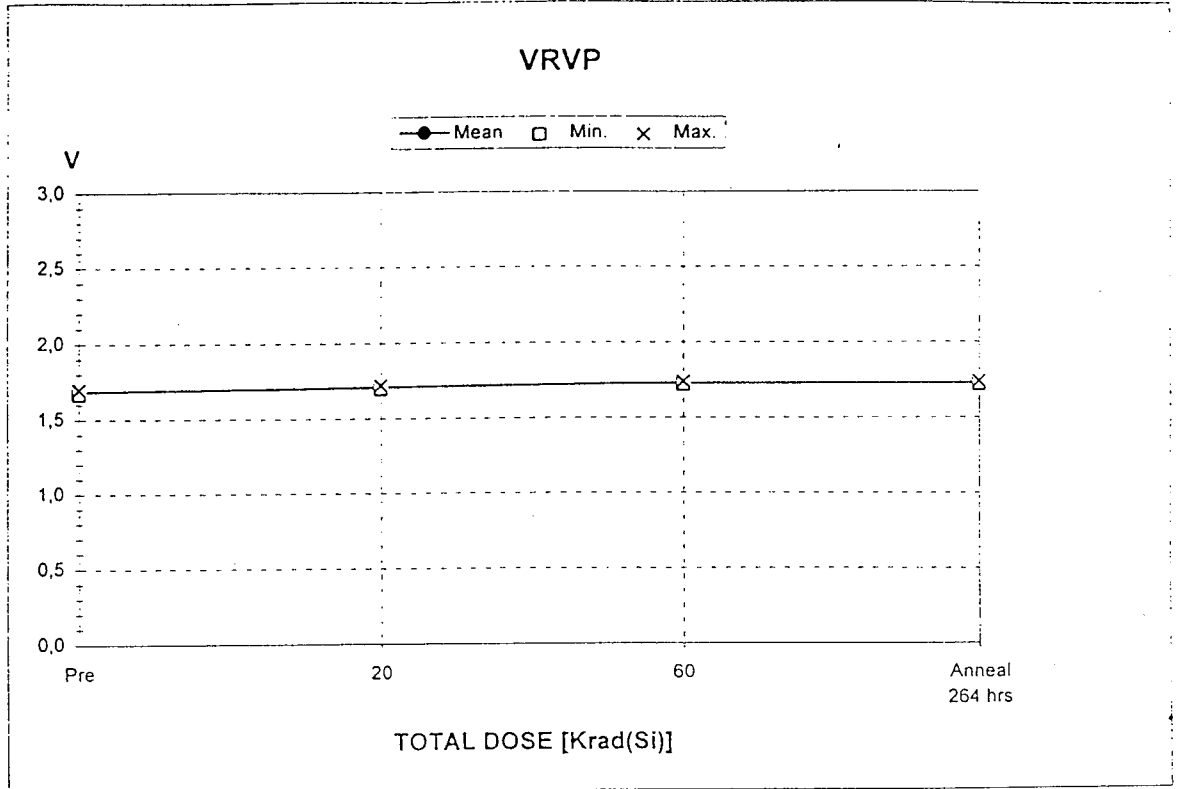
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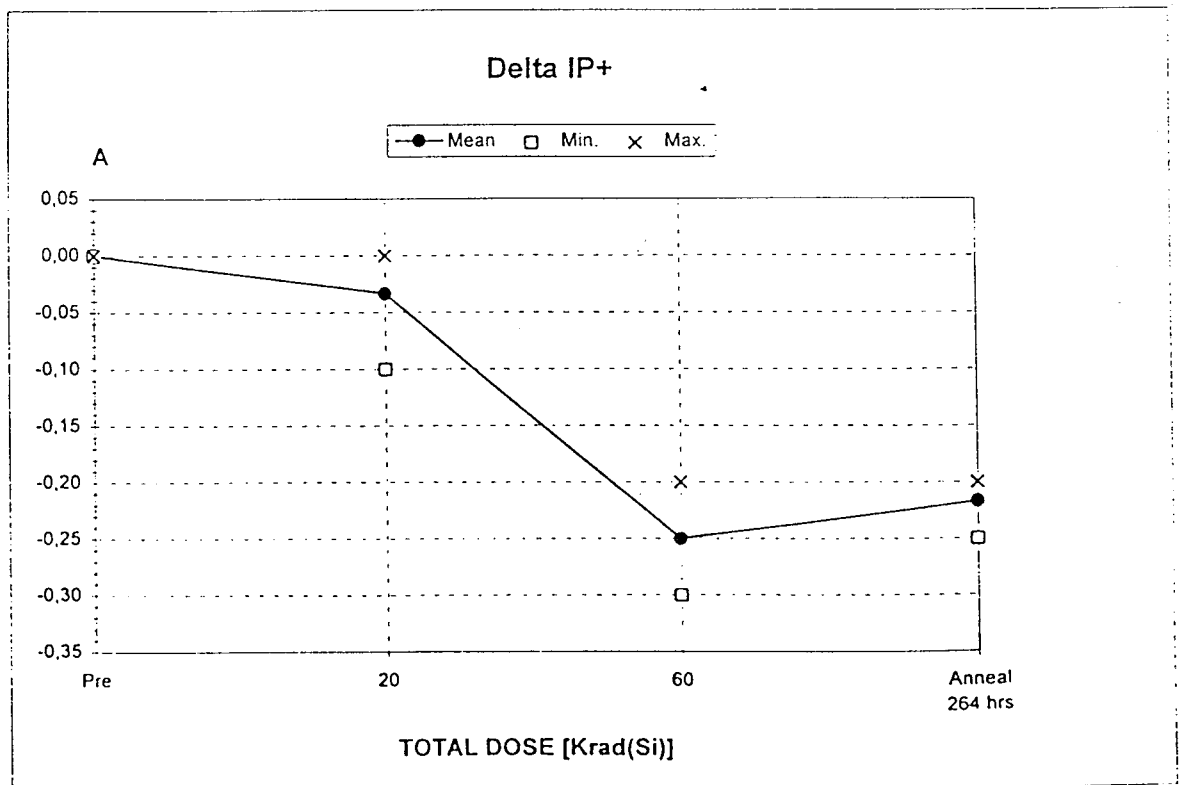
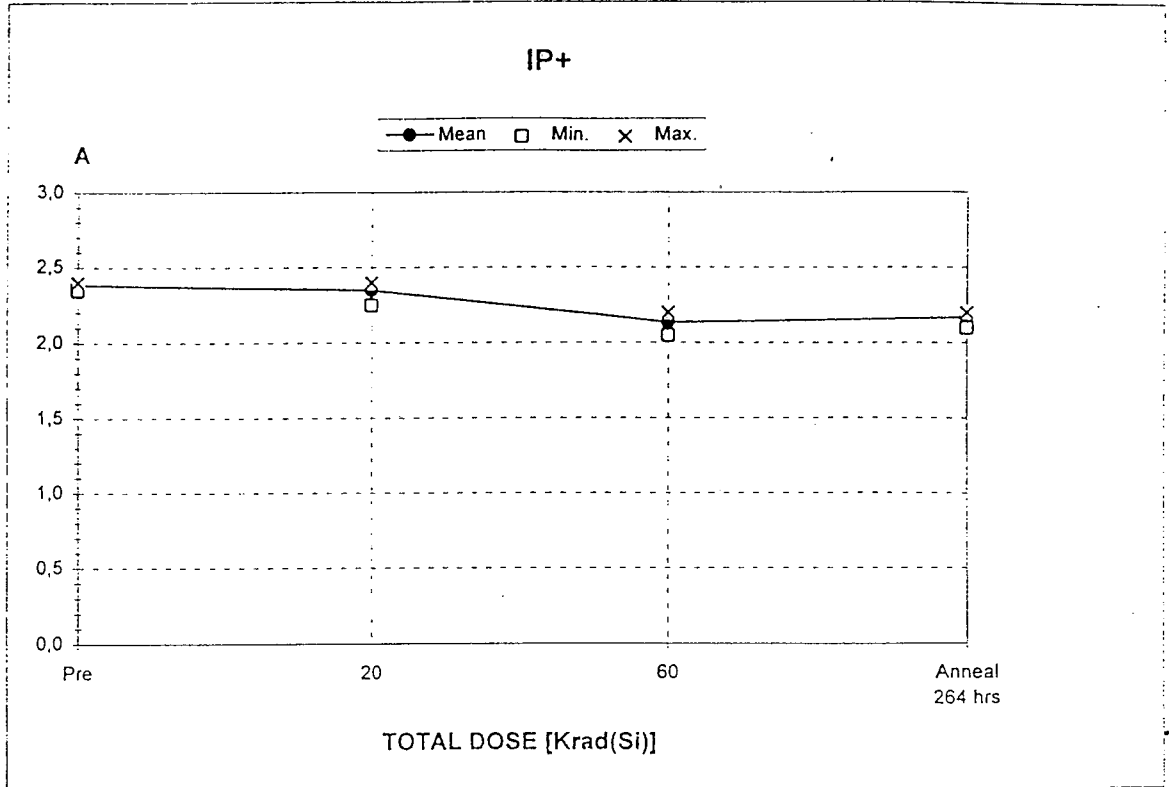




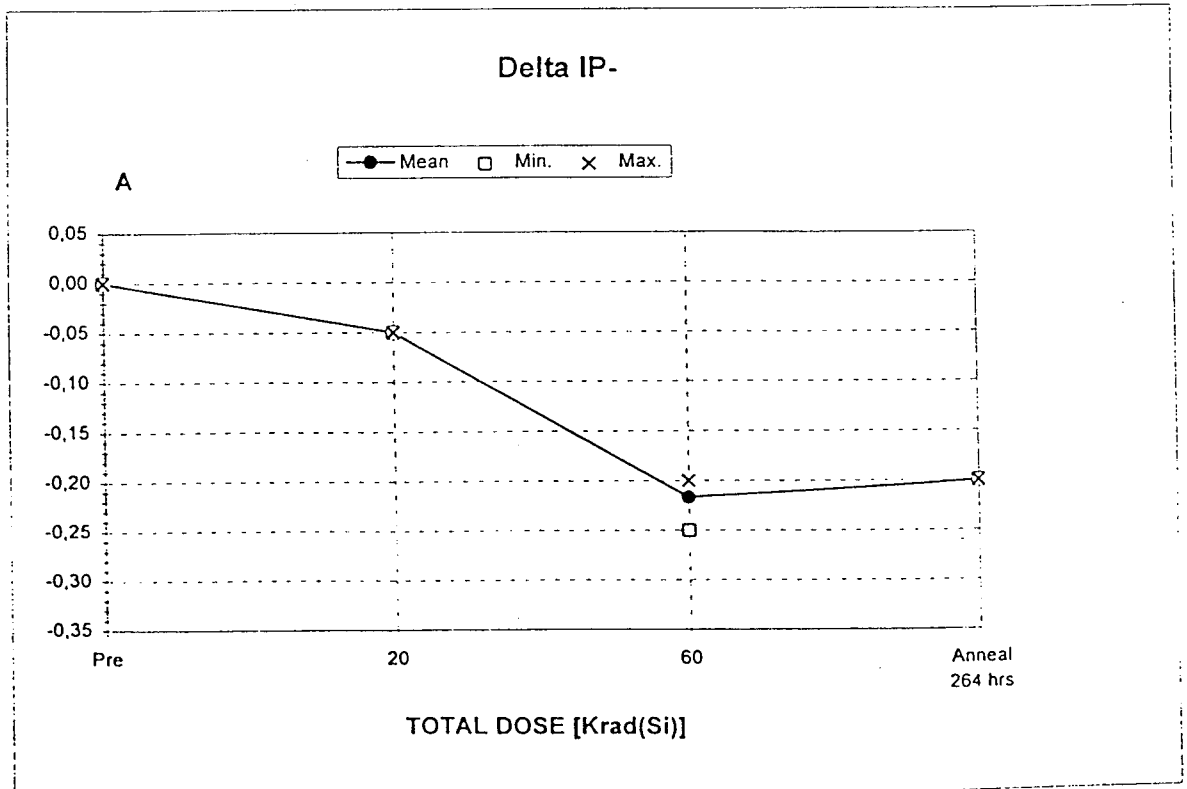
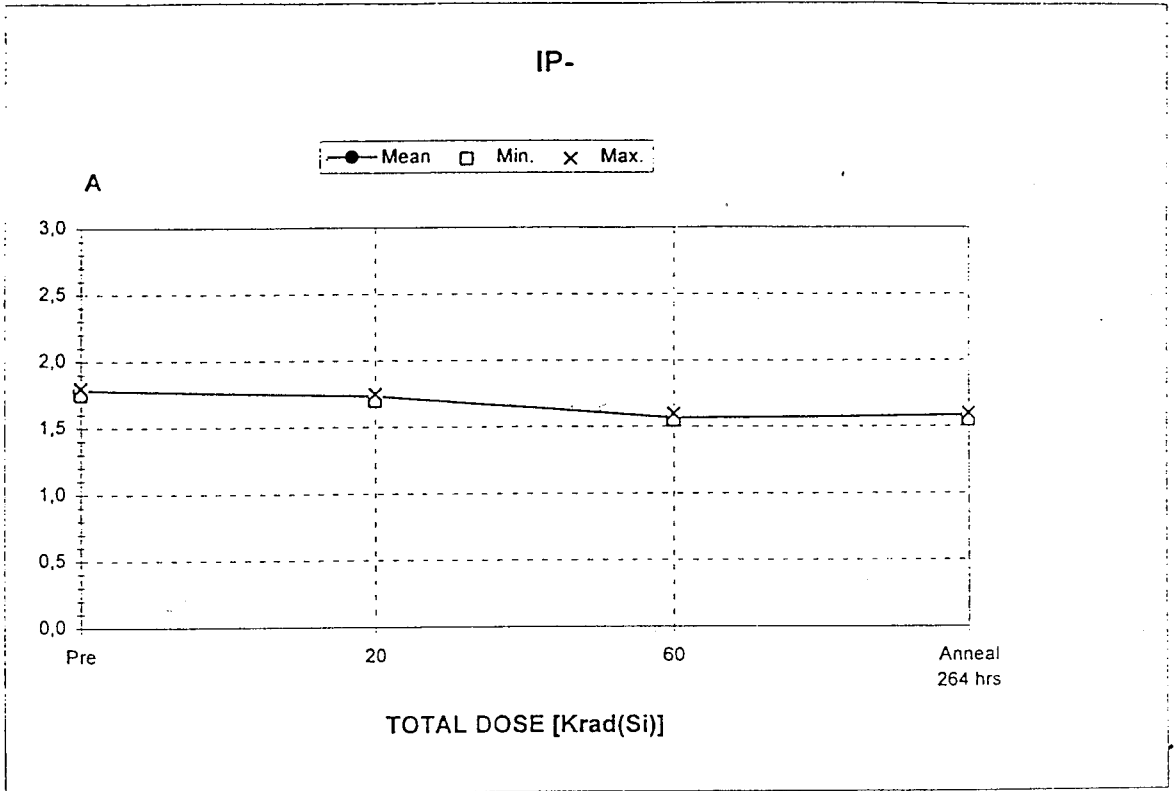




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