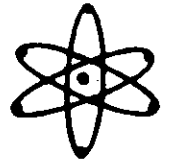


# ICS RADIATION TECHNOLOGIES, INC.



8416 FLORENCE AVENUE • SUITE 207 • DOWNEY, CALIFORNIA 90240-3949 U.S.A.

## ICS Radiation Test Results

**IRHNA57064 60V, N-CHANNEL POWER MOSFET**

**INTERNATIONAL RECTIFIER CORPORATION**

=====

.  
DEVICE TYPE: IRHNA57064 60V, N-CHANNEL POWER MOSFET (IRC) .  
RADIATION SOURCE: BREL FX-75, E-Beam mode .

.  
D/C CIRC 01 || PACKAGE TO-3 || LOT# ER13864 .  
LOG# 974 || TEST DATE 07/10/01 || RTP# 388 .

.  
Test Conductor: Armando R.V. Dantas .  
Test Administrator: Michael K. Gauthier .

ICS RADIATION TECHNOLOGIES, INC.  
8416 Florence Ave, Suite 207  
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FAX: 562-923-3609

INTERNET e-mail: [support@icsrad.com](mailto:support@icsrad.com)

[www.icsrad.com](http://www.icsrad.com)

I C S Radiation Test Results  
IRHNA57064 60V, N-CHANNEL POWER MOSFET (IRC)

## Ipp A

```
=====
AVG DOSE RATE rad(Si)/sec INITIAL 1.54E+11 1.17E+12
AVG PULSE WIDTH seconds 3.64E-08 3.62E-08
----- S/N -----
```

1	0.00E+00	7.30E-01	7.24E+00
2	0.00E+00	6.90E-01	7.24E+00
3	0.00E+00	7.30E-01	7.24E+00
4	0.00E+00	7.30E-01	7.16E+00
5	0.00E+00	7.30E-01	7.16E+00
6	0.00E+00	7.30E-01	7.24E+00
8	0.00E+00	7.30E-01	7.08E+00
9	0.00E+00	7.30E-01	7.16E+00
10	0.00E+00	7.30E-01	7.16E+00
11	0.00E+00	7.10E-01	7.30E+00
MINIMUM	0.00E+00	6.90E-01	7.08E+00
MEAN	0.00E+00	7.24E-01	7.20E+00
MAXIMUM	0.00E+00	7.30E-01	7.30E+00
+P 50/90	0.00E+00	7.30E-01	7.23E+00
-P 50/90	0.00E+00	7.18E-01	7.17E+00
+P 99/90	0.00E+00	7.71E-01	7.42E+00
-P 99/90	0.00E+00	6.77E-01	6.98E+00
SIGMA	0.00E+00	1.39E-02	6.60E-02

CIRCUIT INDUCTANCE (L1) 1uH 20uH

MAX VDSS Applied during pulse = 48 Volts

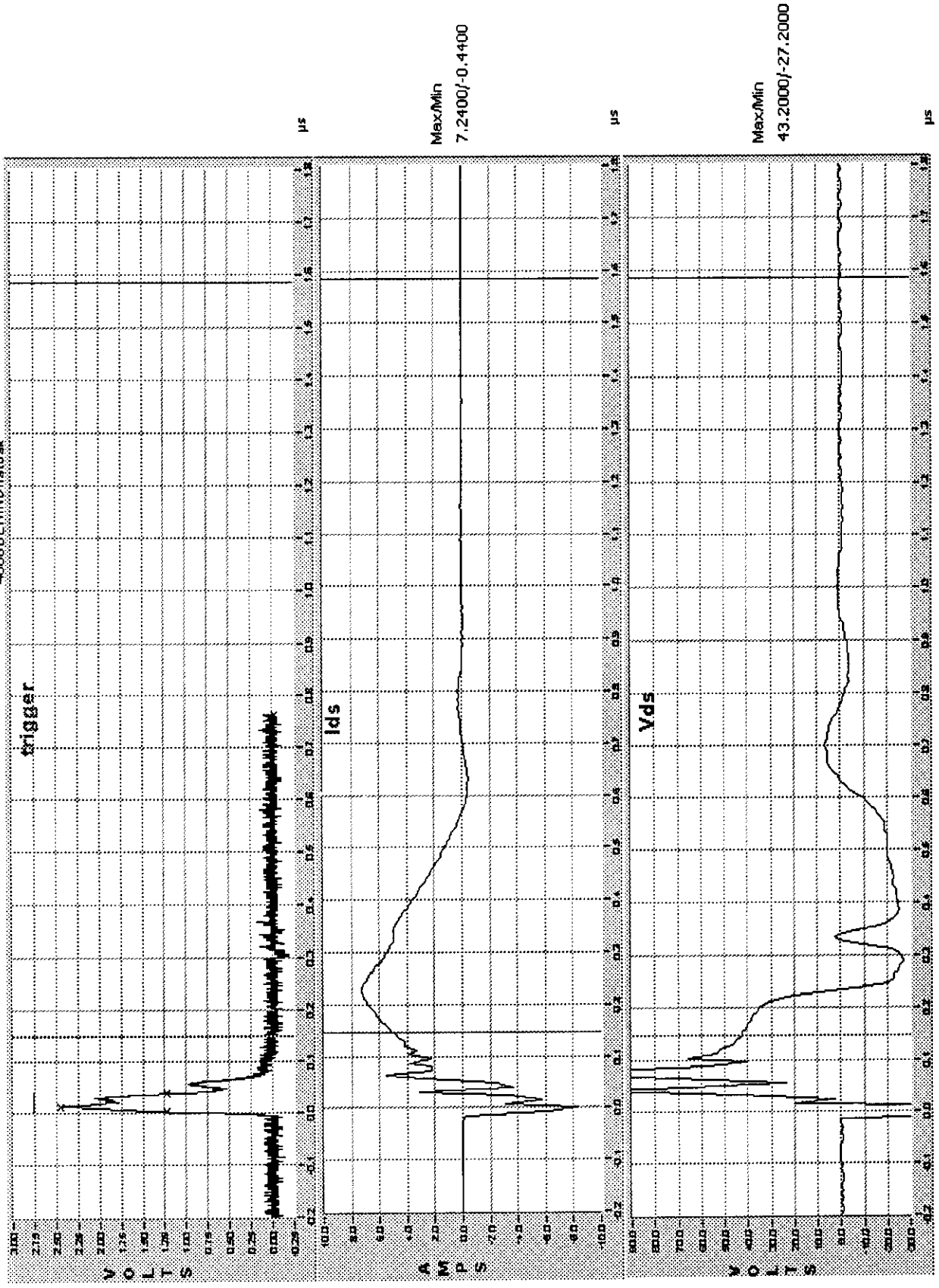
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.....
.
.   DEVICE TYPE   IRHNA57064 60V, PWR N-MOSFET (IRC).
.   RADIATION SOURCE   BREL FX-75, E-Beam mode
.
.   D/C   CIRC 01|| PACKAGE   TO-3   || LOT#   ER13864
.   LOG#  974   || TEST DATE  07/10/01|| RTP#   388
.
.....
I C S RADIATION TECHNOLOGIES, INC.
```



# IRHNA57064 LOG# 974 RAW DATA

<u>Date</u>	<u>Time</u>	<u>S/N</u>	<u>Shot</u>	<u>Pulse Width</u> seconds	<u>Dose Rate</u> rad(SI)/s	<u>Temp</u> °C	<u>Ipp</u> Amps	<u>dT</u> usec	<u>dI/dT</u> A/usec	<u>Vdss Pre</u> Volts	<u>Vdss Post</u> Volts	<u>L1</u> uH
07/10/01	10:54	11	2	3.73E-08	1.60E+11	25.0°C	0.71	0.384	1.85	48	48	1
07/10/01	11:02	10	3	3.52E-08	1.50E+11	25.0°C	0.73	0.396	1.84	48	48	1
07/10/01	13:11	9	6	3.60E-08	1.60E+11	25.0°C	0.73	0.396	1.84	48	48	1
07/10/01	13:05	8	5	3.74E-08	1.60E+11	25.0°C	0.73	0.396	1.84	48	48	1
07/10/01	13:25	6	7	3.69E-08	1.60E+11	25.0°C	0.73	0.396	1.84	48	48	1
07/10/01	13:36	5	8	3.67E-08	1.50E+11	25.0°C	0.73	0.396	1.84	48	48	1
07/10/01	13:42	4	9	3.52E-08	1.40E+11	25.0°C	0.73	0.396	1.84	48	48	1
07/10/01	13:49	3	10	3.56E-08	1.50E+11	25.0°C	0.73	0.396	1.84	48	48	1
07/10/01	14:00	2	11	3.70E-08	1.50E+11	25.0°C	0.69	0.392	1.76	48	48	1
07/10/01	14:07	1	12	3.64E-08	1.60E+11	25.0°C	0.73	0.396	1.84	48	48	1
							0.724	0.394	1.83	48	48	1
							MEAN:					
07/11/01	9:07	11	4	3.59E-08	1.20E+12	25.0°C	7.30	0.232	31.21	48	48	20
07/11/01	9:14	10	5	3.54E-08	1.20E+12	25.0°C	7.16	0.232	30.86	48	48	20
07/11/01	9:21	9	6	3.70E-08	1.20E+12	25.0°C	7.16	0.224	31.96	48	48	20
07/11/01	9:30	8	7	3.69E-08	1.10E+12	25.0°C	7.08	0.232	30.52	48	48	20
07/11/01	9:38	6	8	3.63E-08	1.20E+12	25.0°C	7.24	0.224	32.32	48	48	20
07/11/01	9:45	5	9	3.74E-08	1.20E+12	25.0°C	7.16	0.232	30.86	48	48	20
07/11/01	9:53	4	10	3.62E-08	1.20E+12	25.0°C	7.16	0.224	31.96	48	48	20
07/11/01	9:59	3	11	3.50E-08	1.20E+12	25.0°C	7.24	0.232	31.21	48	48	20
07/11/01	10:05	2	12	3.64E-08	1.10E+12	25.0°C	7.24	0.232	31.21	48	48	20
07/11/01	10:12	1	13	3.57E-08	1.10E+12	25.0°C	7.24	0.232	31.21	48	48	20
							MEAN:					
							3.62E-08	0.230	31.33	48	48	20

4608BEHIND1atoak



Max/Min  
7.2400/-0.4400

Max/Min  
43.2000/-27.2000

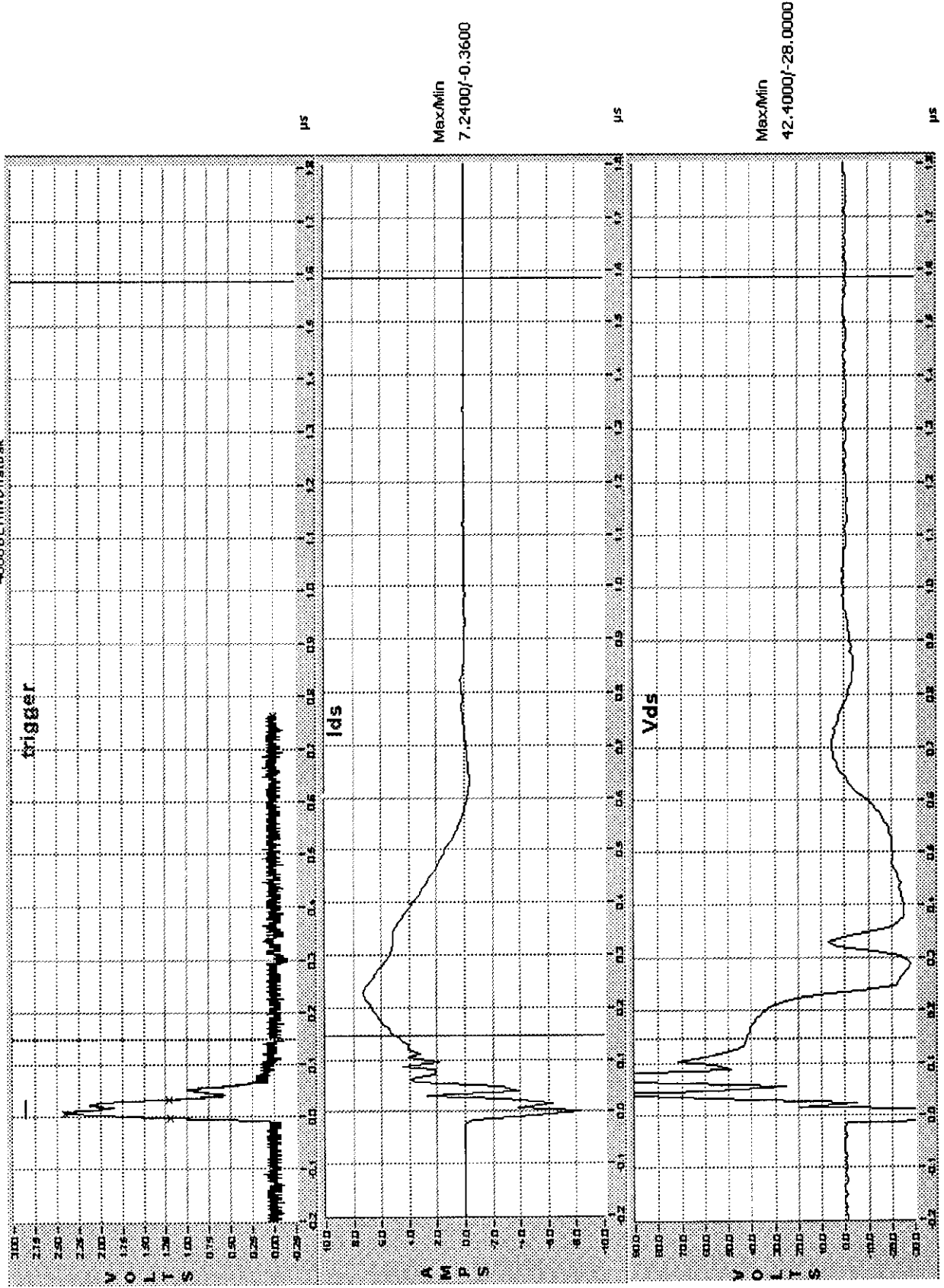
FX-75 E-Beam mode  
Boeing Radiation Effects Lab  
Seattle, Washington  
Date: 7/11/2001 10:12 AM

Temperature 25.0°C  
SN 1 Shot 13

V I(A)  
Vcc Pre 48.0 0.00000  
Vcc Post 48.0 0.00000

Part # IRHNA57064

4608BEHINDatabak



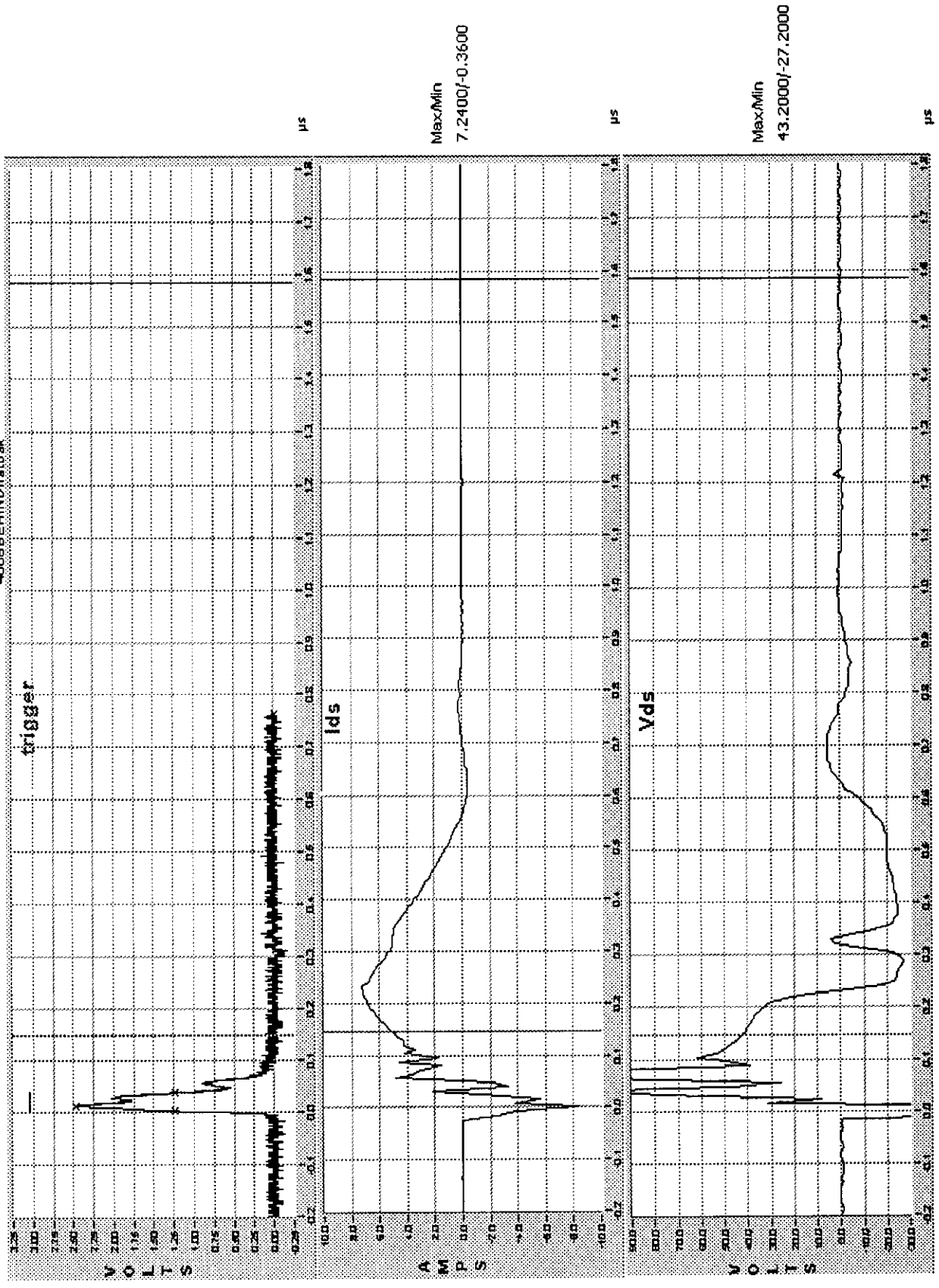
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Max/Min  
42.4000/-28.0000

Part # IRHNA57064  
V (A)  
Vcc Pre 48.0 0.00000  
Vcc Post 48.0 0.00000  
Temperature 25.0°C  
SN 2 Shot 12  
Date: 7/11/2001 10:05 AM

FX-75 E-Beam mode  
Boeing Radiation Effects Lab  
Seattle, Washington

4608BEHIND1 ato.ak



Max/Min  
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Max/Min  
43.2000/-27.2000

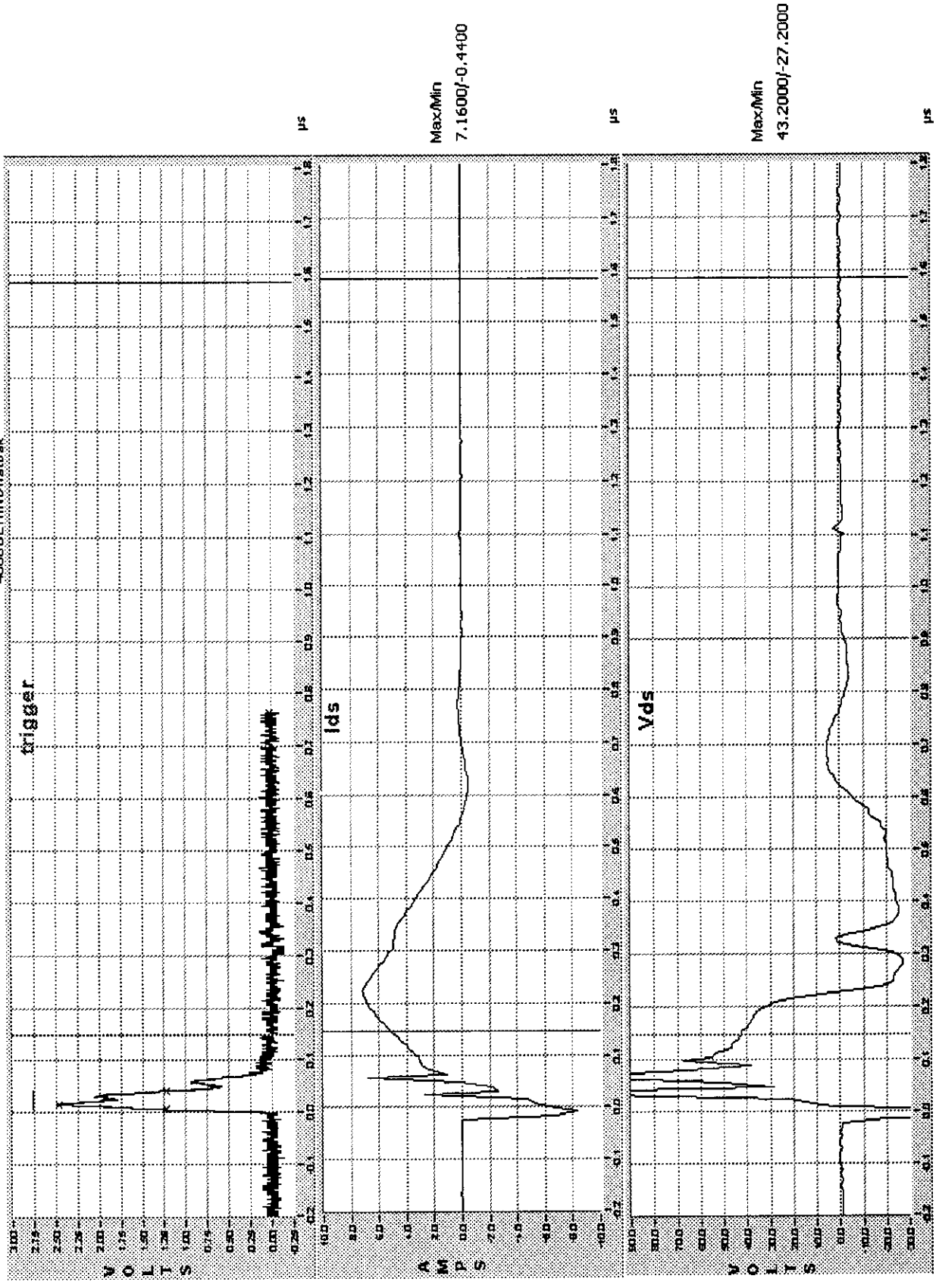
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Boeing Radiation Effects Lab  
Seattle, Washington  
Date: 7/11/2001 9:59 AM

Temperature 25.0°C  
SN 3 Shot 11

V I(A)  
Vcc Pre 48.0 0.00000  
Vcc Post 48.0 0.00000

Part # IRHNA57064

4608BEHINDflatoak



Part # RHNA57064

Vcc Pre 48.0 Vcc Post 48.0

V (A) 0.00000 0.00001

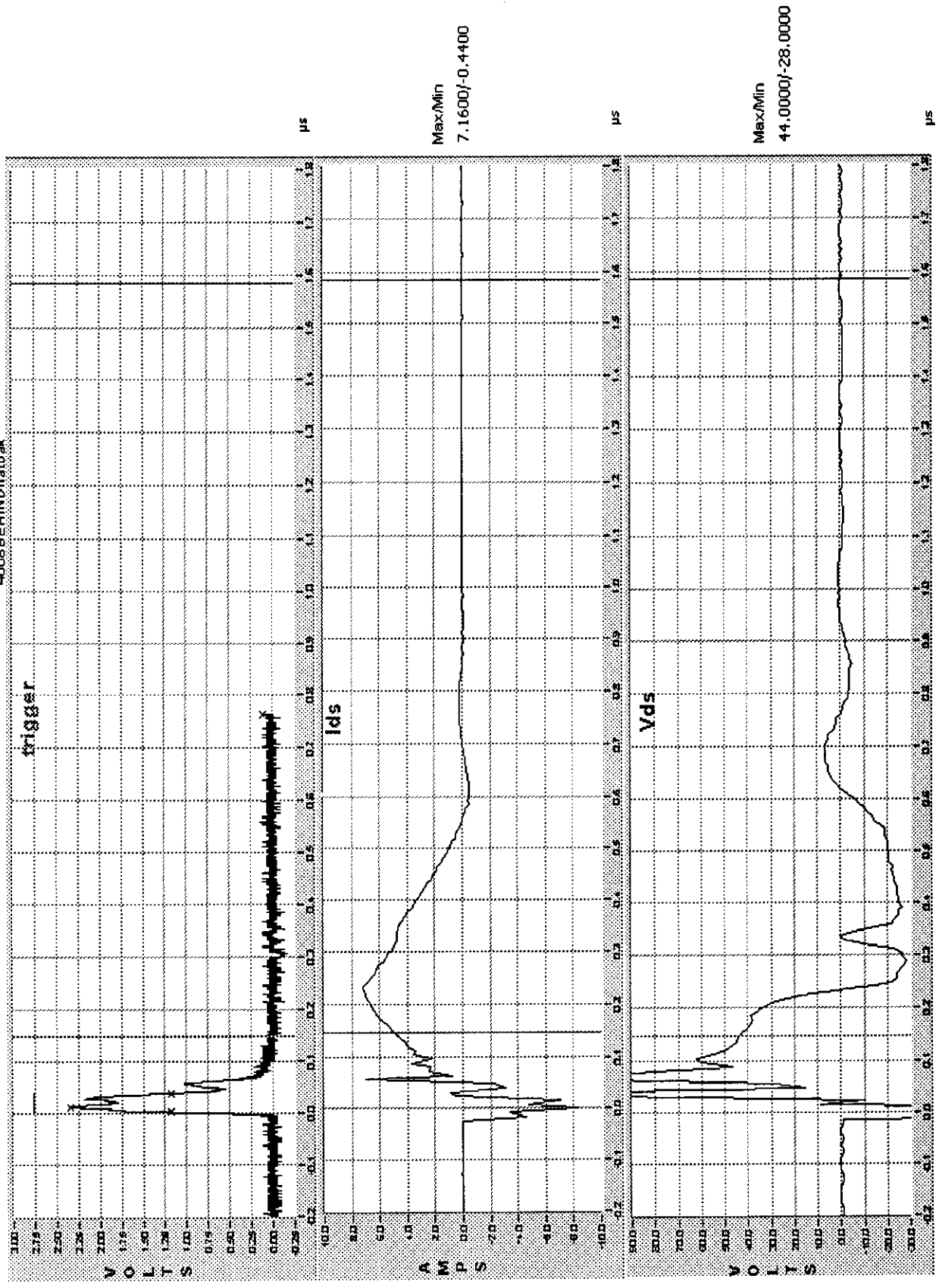
Temperature 25.0°C

S/N 4 Shot 10

FX-75 E-Beam mode  
Boeing Radiation Effects Lab  
Seattle, Washington  
Date: 7/11/2001 9:53 AM



4608BEHINDf1ato.ak

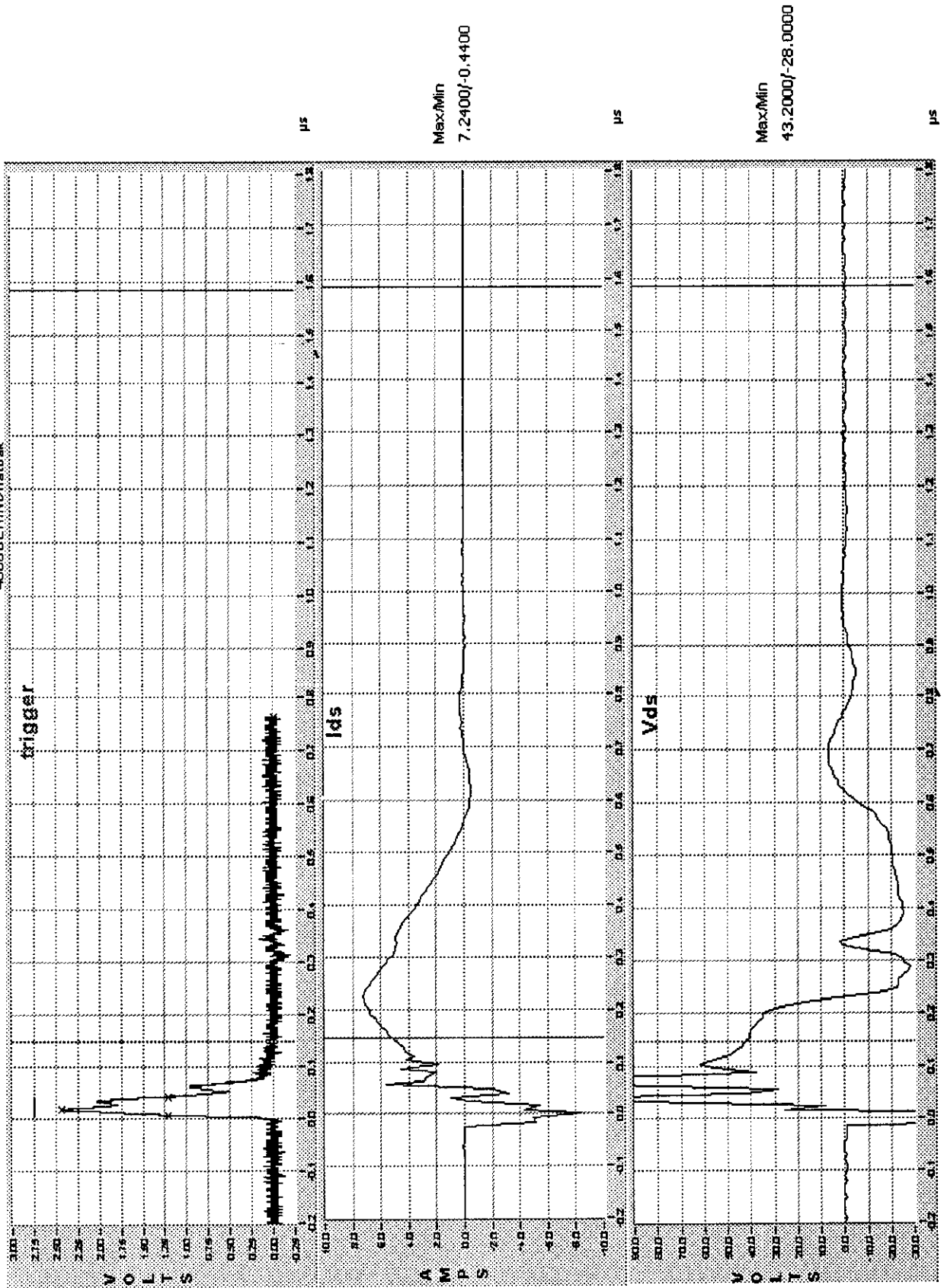


Part # IRHNA57064

V	(A)	Temperature	25.0°C	
Vcc Pre	48.0	0.00000	SIN 5	Shot 9
Vcc Post	48.0	0.00000		

FX-75 E-Beam mode  
Boeing Radiation Effects Lab  
Seattle, Washington  
Date: 7/11/2001 9:45 AM

4608BEHIND1a1oak



Max/Min  
7.2400/-0.4400

Max/Min  
43.2000/-28.0000

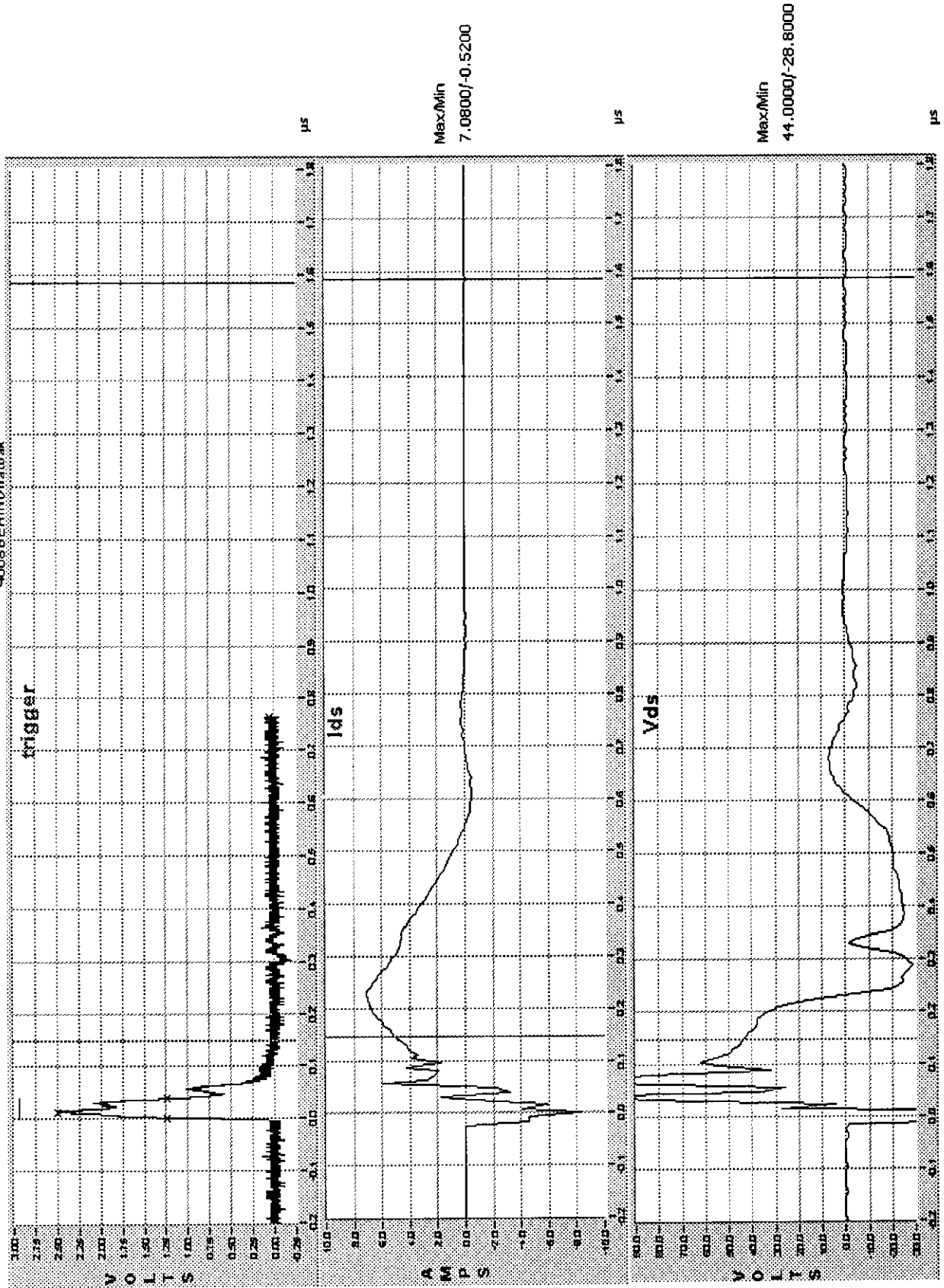
FX-75 E-Beam mode  
Boeing Radiation Effects Lab  
Seattle, Washington  
Date: 7/1/2001 9:38 AM

V<sub>ds</sub> temperature 25.0°C  
V<sub>ds</sub> SMD 6 Shot 8

V (A) 48.0 0.00000  
V<sub>cc</sub> Pre 48.0 0.00000  
V<sub>cc</sub> Post 48.0 0.00000

Part # IRHNA57064

4008BEHIND\data/ak



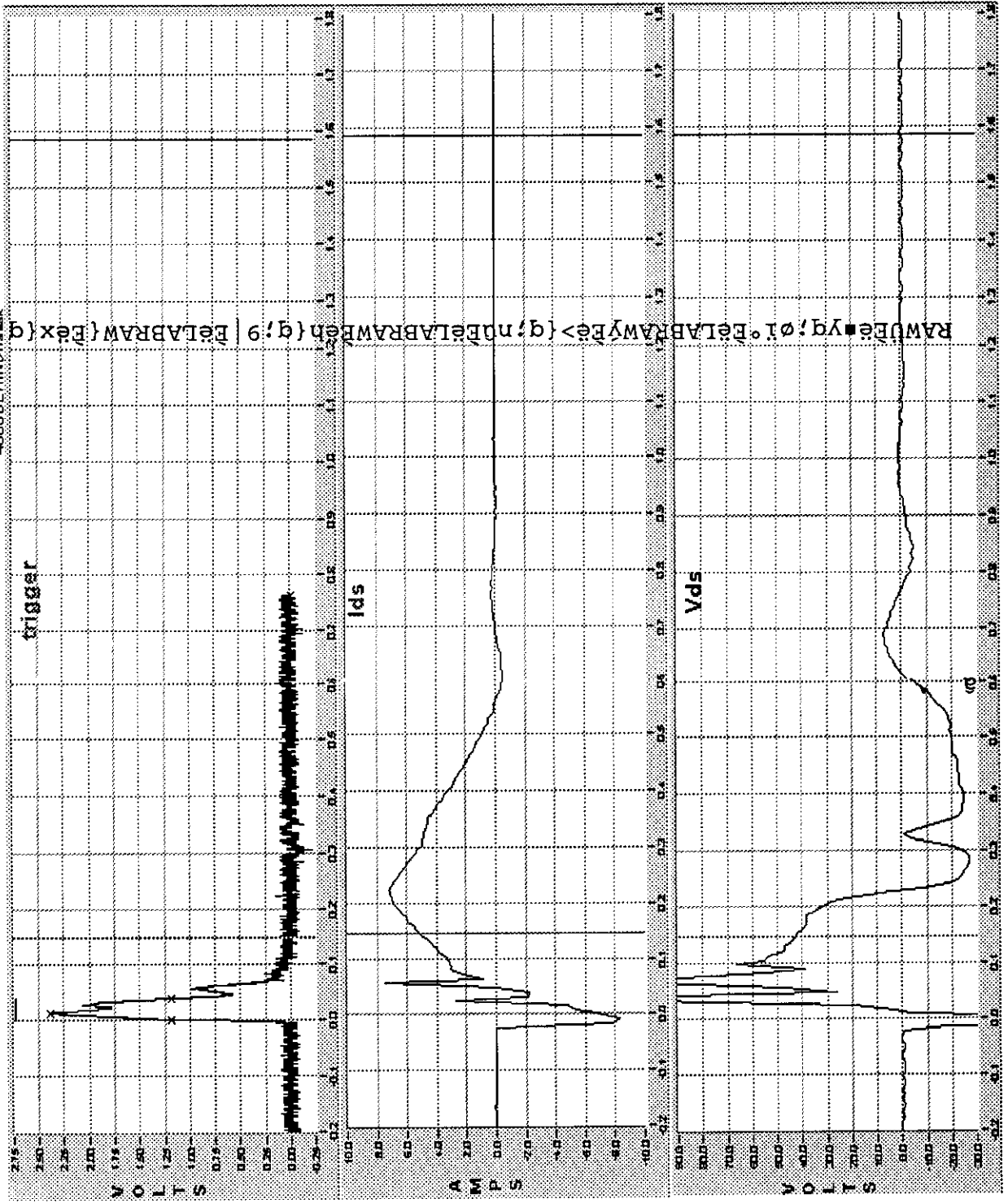
FX-75 E-Beam mode  
Boeing Radiation Effects Lab  
Seattle, Washington  
Date: 7/11/2001 9:30 AM

Temperature 25.0°C  
SIN 8 Shot 7

V (kA)  
Vcc Pre 48.0 0.00000  
Vcc Post 48.0 -0.00000

Part # RHNA57064

4608BEHIND1.kak



Max/Min  
7.1610/-0.4400

Max/Min  
43.2400/-27.2000

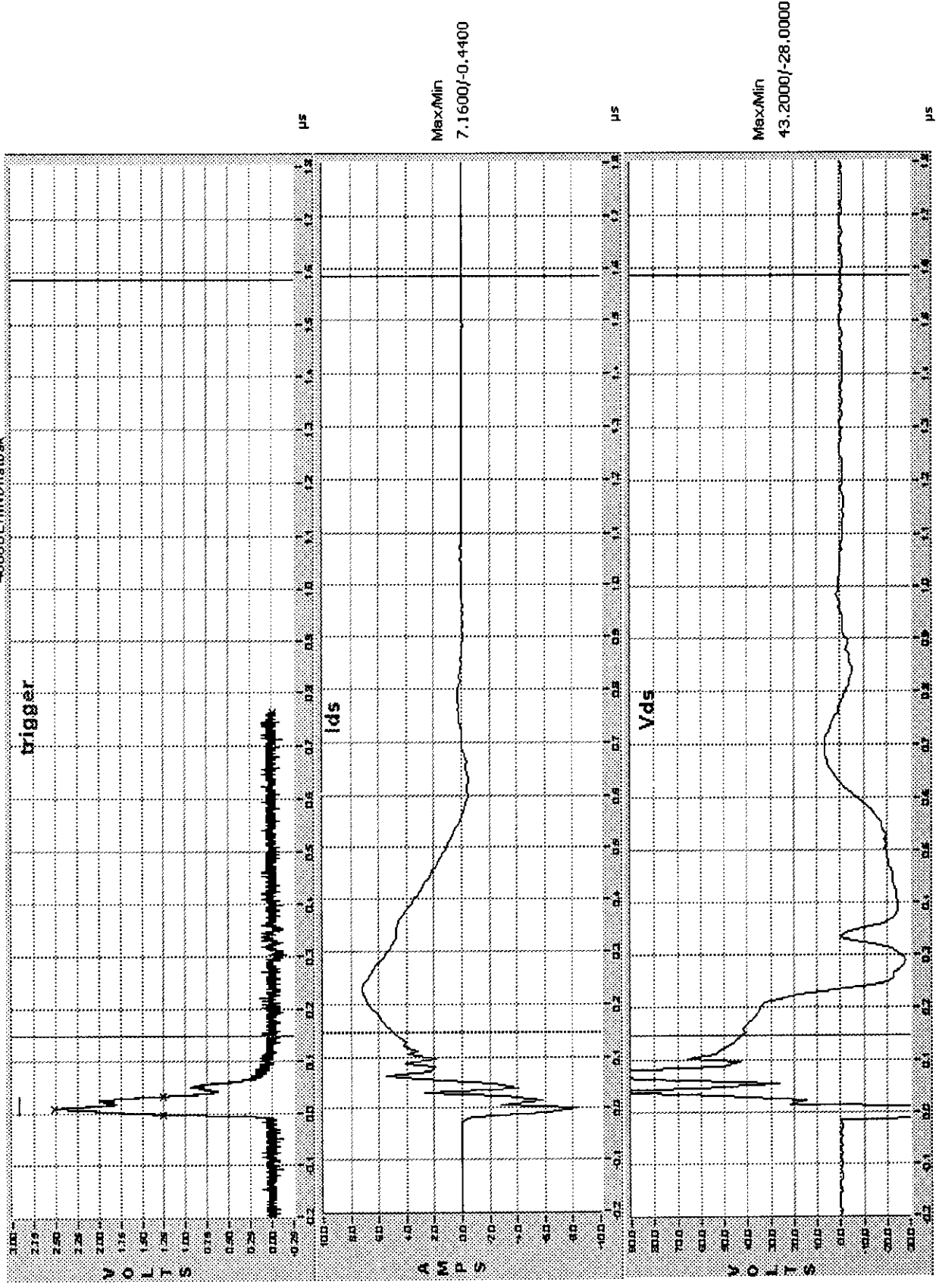
Part # IRHNA57064  
Temperature 25.0°C  
SN 9 Shot 6  
Date: 7/1/2001 9:21 AM

V 48.0  
Vcc Pre 48.0  
Vcc Post 48.0

KA3888  
0.00000  
0.00001

FX-75 E-Beam mode  
Boeing Radiation Effects Lab  
Seattle, Washington

4008BEHINDflatoak



μs

Max/Min  
7.1600/-0.4400

μs

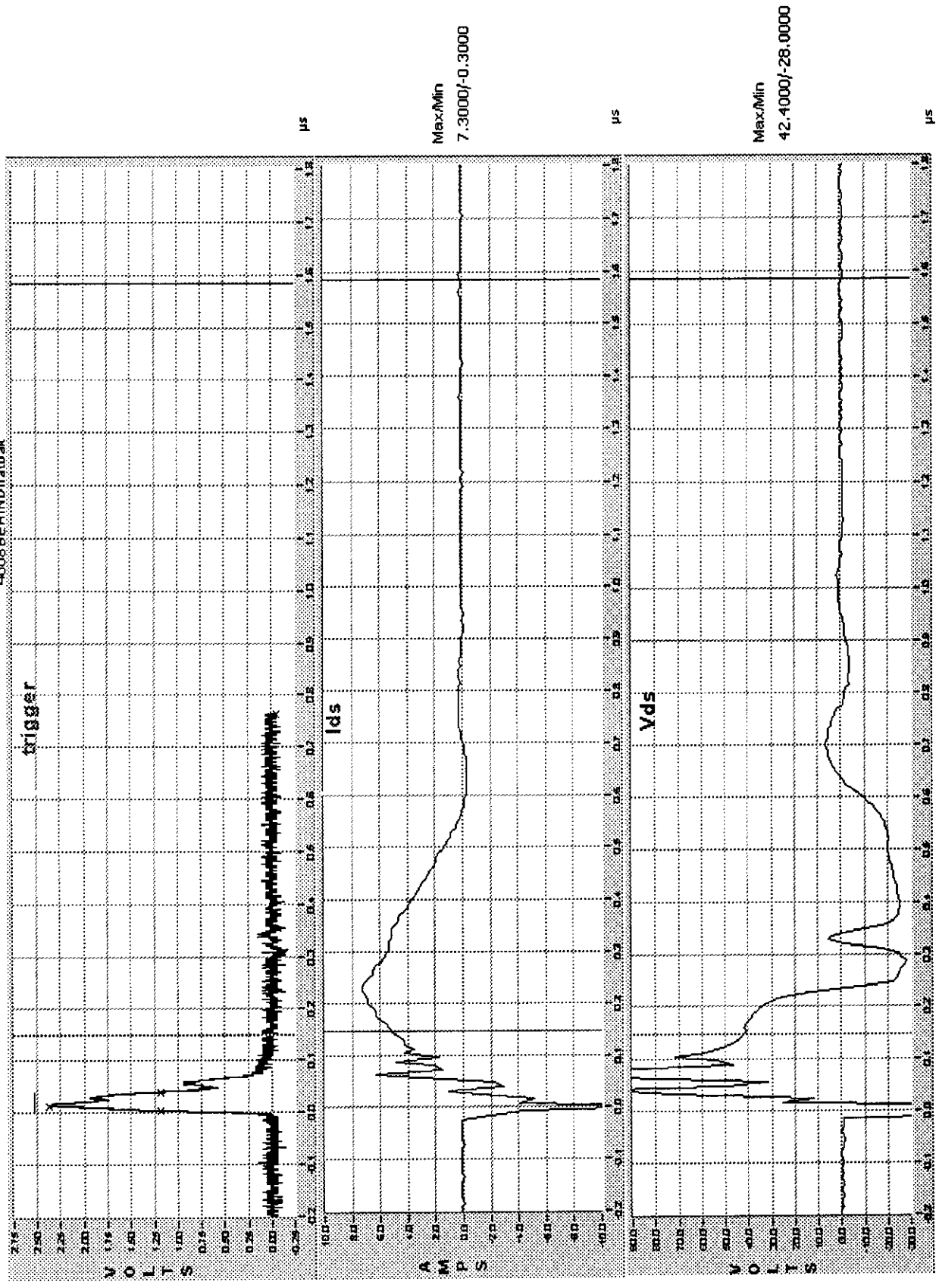
Max/Min  
43.2000/-28.0000

μs

Part # IR-NA57064  
Vcc Pre 48.0 0.00000  
Vcc Post 48.0 -0.00001  
Temperature 25.0°C  
SN 10 Shot 5  
Date: 7/11/2001 9:14 AM

FX-75 E-Beam mode  
Boeing Radiation Effects Lab  
Seattle, Washington

4608BEHINDlatok



Max/Min  
7.3000/-0.3000

Max/Min  
42.4000/-28.0000

FX-75 E-Beam mode  
Boeing Radiation Effects Lab  
Seattle, Washington  
Date: 7/11/2001 9:07 AM

Temperature 25.0°C  
SIN 11 Shot 4

V I(A)  
Vcc Pre 48.0 0.00000  
Vcc Post 48.0 -0.00000

Part # RHNA57064

RADIATION TEST PROCEDURE

No. 388

Device Type: IRHNA57064 60V, N-CHANNEL POWER MOSFET  
 Manufacturer: IRC  
 Lot No: ER13864 Wafer# Date Code:  
 Package Type: TO-3  
 No. of Devices Supplied: 10  
 No. of Devices to be tested: 10

RADIATION CONDITIONS: MIL STD 883E, Method 1020/1021

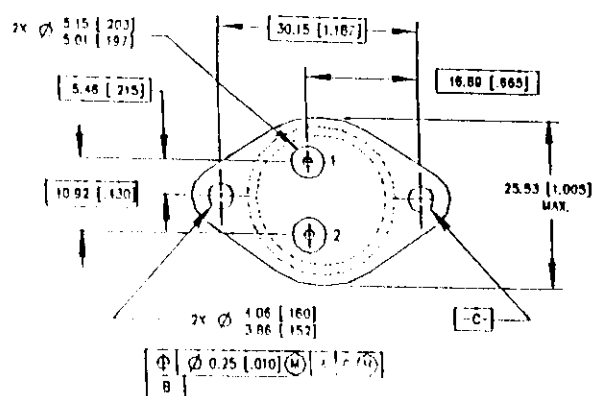
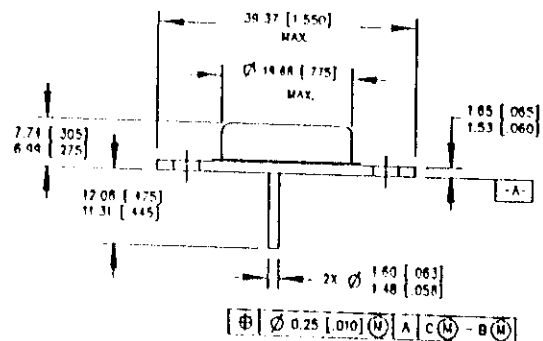
Facility: FX-75 Flash X-Ray (BREL) Energy: E-Beam Mode

AVG DOSE RATE [rad(Si)/sec]	1.54E+11	1.17E+12
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AVG PULSE WIDTH [Seconds]	3.64E-08	3.62E-08
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BIAS CONDITIONS DURING IRRADIATION:

- 1 SOURCE
- 2 GATE
- 3 DRAIN (Case)

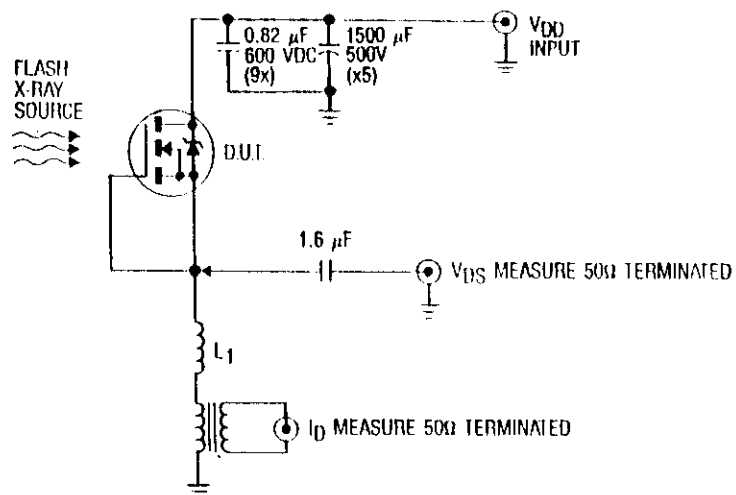


July 6, 2001

RADIATION TEST PROCEDURE

No. 388

Device Type: IRIINA5706, 60V, N-CHANNEL POWER MOSFET



High Dose Rate (Gamma Dot)  
Test Circuit



July 6, 2001

RADIATION TEST PROCEDURE

No. 388

**Device Type: IRHNA57064 60V, N-CHANNEL POWER MOSFET**

<b>TEST NUMBER</b>	<b>TEST DESCRIPTION</b>	<b>DELTA LIMIT</b>	<b>TEST LIMITS</b>	
			<u>MIN</u>	<u>MAX</u>
1	Ipp			
2	DI/dT			

Measurements shall be made at room (ambient) temperature.

