

SA3654 Component Characterization

Federal Manufacturing & Technologies

G. W. Meier

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Final Report

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Final Report
G. W. Meier, Project Leader



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ABSTRACT

AlliedSignal Inc., Federal Manufacturing & Technologies (FM&T), was provided with production capability assurance program (PCAP) funding to develop, characterize, and qualify purchased product components for use on the PRESS-A program. The SA3654, N-Channel, Power MOSFET was identified as a component needing such activity to support PRESS-A. This report presents the characterization activities and results for the SA3654.

SUMMARY

The SA3654 is a radiation-hardened, N-channel, metal oxide semiconductor field effect transistor (MOSFET). The SA3654 is manufactured by International Rectifier Corporation, El Segundo, California. The SA3654 consists of International Rectifier's 7450 die packaged in a TO-254AA hermetically sealed package.

This report presents electrical characterization data gathered on the SA3654 from testing at +25°C, -55°C, and +125°C. This report also briefly discusses the SA3654 assembly process as well as the results of the following evaluations:

- extended high temperature reverse bias,
- high temperature forward bias,
- burn-in,
- total dose, gamma dot, and neutron radiation exposure, and
- a construction analysis of die fabrication, technology, and assembly.

KCD performed electrical testing on the SA3654 per the electrical test requirements. This testing was performed at +25°C, -55°C, and +125°C on a 50 piece sample. In addition to the electrical tests required, electrical characterization testing was performed at a range of forcing functions to better characterize device operation.

Fifty SA3654's were subjected to high temperature forward bias (HTFB), high temperature reverse bias (HTRB), and burn-in. Twenty pieces were subjected to high temperature storage life and solderability tests.

Thirty devices were sent to Sandia National Laboratories, Albuquerque, New Mexico (SNL/NM), for radiation testing. Ten devices each were subjected to neutron radiation, total dose radiation, and gamma dot radiation.

Alliance Analytical, Albuquerque, New Mexico, performed a limited construction analysis on a 15 piece sample. The construction analysis was limited to place emphasis on the die technology

construction. However, a package and assembly verification analysis was also performed to confirm baseline design.

The supplier of the SA3654, International Rectifier, El Segundo, California, was approved to FM&T's FM&T1060 requirements at the time of purchase and characterization testing. Supplier process flow information was obtained, reviewed, and found to be satisfactory.

DISCUSSION

SCOPE AND PURPOSE

Since PRESS-A is a demonstration rather than a stockpile program, this process capability assurance program (PCAP) project was used as the funding vehicle for characterization of the SA3654, radiation-hardened, N-channel MOSFET for use in PRESS-A.

The scope of the project was to perform characterization testing of the SA3654 in conjunction with qualification testing of the SA3654 for use in PRESS-A. However, cancellation of PRESS-A prevented initiation of qualification testing.

ACTIVITY

Background

The SA3654 is a radiation-hardened, N-channel, metal oxide semiconductor field effect transistor (MOSFET). The SA3654 is manufactured by International Rectifier Corporation, El Segundo, California.

Originally, the SA3654 utilized International Rectifier's 450 MOSFET die. However, International Rectifier replaced their 450 wafer line with a new, higher yield, 7450 wafer line with electrical parameters similar to the 450 die. SA3654's fabricated from the new 7450 die were ordered in March 1992.

In July 1992, the associated weapon program was canceled and replaced with the PRESS-A program, which received PCAP funding. SA3654 characterization of the 7450 die continued under PCAP funding because it was needed to maintain a key, radiation hardened die process. Although design responsibilities for International Rectifier devices were transferred to FM&T in August 1991, the SA3654 was retained by SNL/NM because of the radiation hardened die technology. However, PCAP funding was only available to FM&T. As a result, SNL/NM and FM&T component engineering agreed to perform a joint characterization of the SA3654. SNL/NM was to perform surge current and radiation testing. FM&T was to obtain construction analysis and perform all other electrical and environmental testing. All activity was funded under PCAP. Upon the completion of SA3654 characterization and qualification, design responsibility for the SA3654 was to be turned over to FM&T.

The PRESS-A program was canceled in 1994. As a result, the SA3654 will not be qualified for use in any program. The results of construction analysis, radiation testing, surge current testing, electrical, and environmental testing are summarized in this report for future reference and review.

Electrical Characterization

Fifty devices were tested at +25°C, -55°C, and +125°C per the test requirements. The forcing functions, test limits, and test results are summarized in Table 1. The test program and statistical test data are given in Appendix A.

The data in Table 1 indicate device readings were well within the specification limits for +25°C testing. In all cases, the specification limits are many times greater than $\pm 3\sigma$; giving a worst case Cpk of 3.4. Assuming the lot is normally distributed, as is indicated by the test data distribution plots for most of the tests, it can be inferred that International Rectifier has good control of the wafer fabrication process. The standard deviations are small and the distribution narrow when compared to the specification limits.

The lot responded as would be expected for -55°C testing. IGSS and IDSS leakage currents are somewhat lower than at ambient testing. However, the standard deviations are larger. This is due to greater reading variation and additional leakage current caused by the cables and oven door fixturing required for temperature testing. Readings for the remaining electrical parameters also decreased as expected. Again, the standard deviations are small and the distribution is narrow when compared to the specification limits except for leakage current, discussed above, and breakdown voltage, which has a tighter specification limit than at ambient. As with testing at -55°C, testing at +125°C also resulted in slightly larger standard deviations because of the cables and oven door fixturing. Otherwise, the lot responded as expected.

Dynamic test data for capacitance and switching time is given in Table 2. Test results for CISS and CRSS indicate that these parameters have increased for the 7450 die. The specification limit for CISS was 3600 pF maximum for the 450 die. However, test data on the 7450 die resulted in a minimum reading of 3657.0 pF, with an average of 3845.0 pF. Also, the specification limit for CRSS of 100.0 pF maximum for the 450 die is much smaller than the 317.1 pF lot average obtained for the 7450 die. Test results for switching time (td(on) tr, td(off), tf) indicate that significant margin exists between test result values and the specification limits.

In addition to the electrical testing performed, the SA3654 was subjected to additional characterization by electrical tests performed over a range of forcing functions. This testing was performed to obtain information on how the SA3654 operates over a specific range and to extrapolate and estimate its response for a given forcing function. The more significant test results are displayed in Figures 1 through 4. The test program and statistical summaries for characterization testing can be found in Appendix B.

Table 1. SA3654 Electrical Test Summary data

+25°C Statistical Data Summary

Test Name	Forcing Functions		Minimum Limit	Maximum Limit	Minimum Reading	Mean Reading	Maximum Reading	Sigma	Units	Cpk
IGSS+	VGS = +20.0 V			100.0 nA	5.28	44.258	103.08	29.729	pA	1120
IGSS-	VGS = -20.0 V			100.0 nA	-14.04	-157.06	-1042.4	183.71	pA	181
VGS(th)	ID = 1 mA		2.0 V	5.0 V	2.996	3.1029	3.2112	0.042206	Volts	8.7
VGS(th)	ID = 250 µA		2.0 V	5.0 V	2.8492	2.9524	3.0584	0.041105	Volts	7.7
IDSS	VDS = 500 V	VGS = 0		1.0 mA	0.002534	11.093	551	77.913	µA	4.2
IDSS	VDS = 300 V	VGS = 0		30 µA	1.358	10.154	178.68	27.402	nA	365
RDS(on)	VGS = 12 V	ID = 4.7 A		0.60 Ω	0.34391	0.38723	0.43013	0.020533	Ohms	3.4
RDS(on)	VGS = 12 V	ID = 7.75 A		0.80 Ω	0.35221	0.39722	0.44036	0.021329	Ohms	6.3
BVDSS	VGS = 0 V	ID = 1 mA	350 V		541.32	574.37	600.6	17.011	Volts	4.4
GFS	VDS = 15.0 V	ID = 7.75 A	2.3 S		6.25	7.566	8.2237	0.45578	Siemens	3.8
GFS	VDS = 25.0 V	ID = 10.0 A	2.0 S		6.72	8.1215	8.8028	0.47962	Siemens	4.2

-55°C Statistical Data Summary

Test Name	Forcing Functions		Minimum Limit	Maximum Limit	Minimum Reading	Mean Reading	Maximum Reading	Sigma	Units	Cpk
IGSS	VGS = +20.0 V	VDS = 0.0 V		100.0 nA	-29.312	3.7297	32.772	14.446	nA	2.2
IGSS	VGS = -20.0 V	VDS = 0.0 V		100.0 nA	-24.832	3.862	33.28	13.069	nA	2.4
VGS(th)	VDS = VGS	ID = 1.0 mA	2.0 V	5.0 V	3.4924	3.6148	3.738	0.048829	Volts	9.5
VGS(th)	VDS = VGS	ID = 250.0 µA	2.0 V	5.0 V	3.3876	3.5082	3.6312	0.04846	Volts	10.3
IDSS	VGS = 450.0 V	VGS = 0.0 V		1.0 mA	0.002086	11.816	553.88	78.36	µA	4.2
RDS(on)	VGS = 12.0 V	ID = 4.7 A		0.60 Ω	0.17866	0.20106	0.23049	0.01162	Ohms	11.4
BVDSS	VGS = 0.0 V	ID = 1.0 mA	450.0 V		486.12	518.85	542.8	16.217	Volts	1.4

+125°C Statistical Data Summary

Test Name	Forcing Functions		Minimum Limit	Maximum Limit	Minimum Reading	Mean Reading	Maximum Reading	Sigma	Units	Cpk
IGSS	VGS = +20.0 V	VDS = 0.0 V		200.0 nA	6.9248	31.415	141.16	36.424	nA	1.5
IGSS	VGS = -20.0 V	VDS = 0.0 V		200.0 nA	-9.2412	-36.316	-151.36	39.147	nA	1.4
VGS(th)	VDS = VGS	ID = 1.0 mA	1.0 V	5.0 V	2.2828	2.3454	2.4092	0.029947	Volts	14.9
VGS(th)	VDS = VGS	ID = 250.0 µA	2.0 V	5.0 V	2.0588	2.1157	2.1756	0.02838	Volts	1.3
IDSS	VDS = 400.0 V	VGS = 0.0 V		1.0 mA	1.5976	3.8753	24.656	3.4379	µA	96.6
IDSS	VDS = 300.0 V	VGS = 0.0 V		30.0 µA	1.4184	3.1571	11.716	1.712		5.2
RDS(on)	VGS = 12.0 V	ID = 4.7 A		1.25 Ω	0.6543	0.74659	0.84136	0.042212	Ohms	3.97
BVDSS	VGS = 0.0 V	ID = 1.0 mA	500.0 V		582.44	629.11	649.88	17.046	Volts	2.5

Table 2. Dynamic Testing Statistical Data Summary (+25°C)

Test Name	Forcing Functions		Minimum Limit	Maximum Limit	Minimum Reading	Mean Reading	Maximum Reading	Sigma	Units
CISS	VGS = 0.0 V	VDS = 25.0 V		3600.0 pF	3657	3845	4073	110.7	pF
COSS	VGS = 0.0 V	VDS = 25.0 V		600.0 pF	442.3	464.0	490.4	12.2	pF
CRSS	VGS = 0.0 V	VDS = 25.0 V		100.0 pF	297.0	317.1	334.9	9.87	pF
TD(ON)1	VDS = 275.0 V	ID = 11.0 A		45.0 nS	18.80	19.64	20.40	0.37	nS
TR	VDS = 275.0 V	ID = 11.0 A		190.0 nS	6.63	6.94	7.53	0.23	nS
TD(OFF)	VDS = 275.0 V	ID = 11.0 A		190.0 nS	55.2	58.07	60.4	0.936	nS
TF	VDS = 275.0 V	ID = 11.0 A		130.0 nS	7.75	9.20	10.14	0.536	nS

Environmental Characterization

A 46 piece sample was submitted to high temperature gate bias (HTGB) testing. This test is effective in detecting and screening for gate oxide problems. Devices are operated at 80% of the maximum rated gate voltage at an elevated temperature with the drain and source tied together. This 46 piece sample was subjected to a gate voltage of 16 volts at 150°C for 48 hours. After 48 hours, the devices were removed from temperature and bias and subjected to ambient electrical tests with no failures resulting. This indicates that (1) no apparent gate oxide problems or contamination exists and (2) International Rectifier is effective in screening for early failures during their JANTX high reliability testing/processing.

The 46 piece sample from HTGB was submitted to high temperature reverse bias (HTRB). This test is effective in detecting die contamination problems that are revealed as high leakage current readings during post HTRB electrical testing. For HTRB, devices are operated at 80% of the maximum rated drain-to-source voltage at an elevated temperature with the gate and source tied together. This 46 piece sample was subjected to a drain voltage of 400 volts at 150°C for a total of 504 hours. After the first 168 hours, the sample was removed from temperature and bias, electrically tested, and resubmitted to HTRB for an additional 336 hours. The sample was electrically tested again at the end of 504 hours. No electrical test failures occurred after post-168 hour or after post-504 hour testing. A review of the data revealed that no shifting in electrical parameters occurred from post-HTGB to post-168 hour HTRB to post-504 hour HTRB. This indicates that (1) no apparent die contamination exists and (2) International Rectifier is effective in screening for early failures during their JANTX high reliability testing/processing.

SA3654 Leakage Current (IDSS) vs. Drain Voltage (VDS) @ VGS=0V

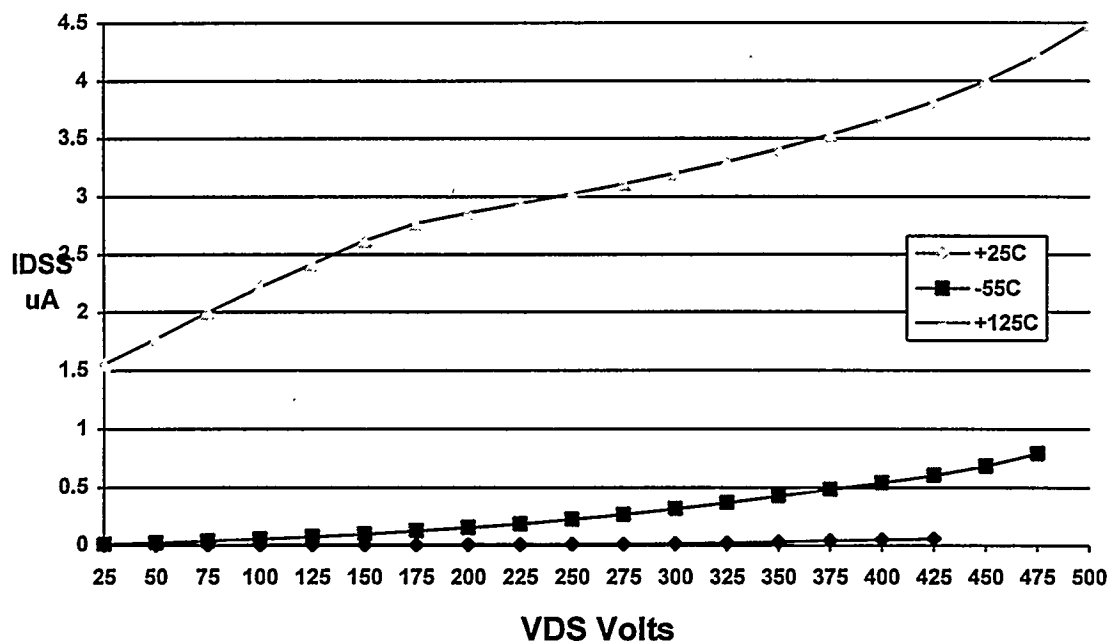


Figure 1

SA3654 VDS vs. Drain Current (ID) @ VGS=5V

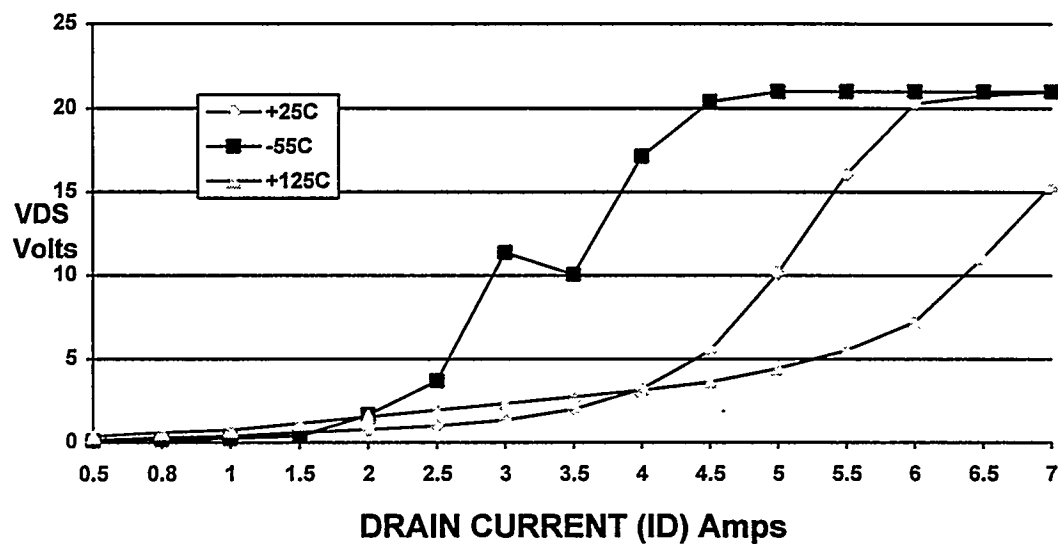


Figure 2

SA3654 **VDS vs. Drain Current (ID) @ +25C**

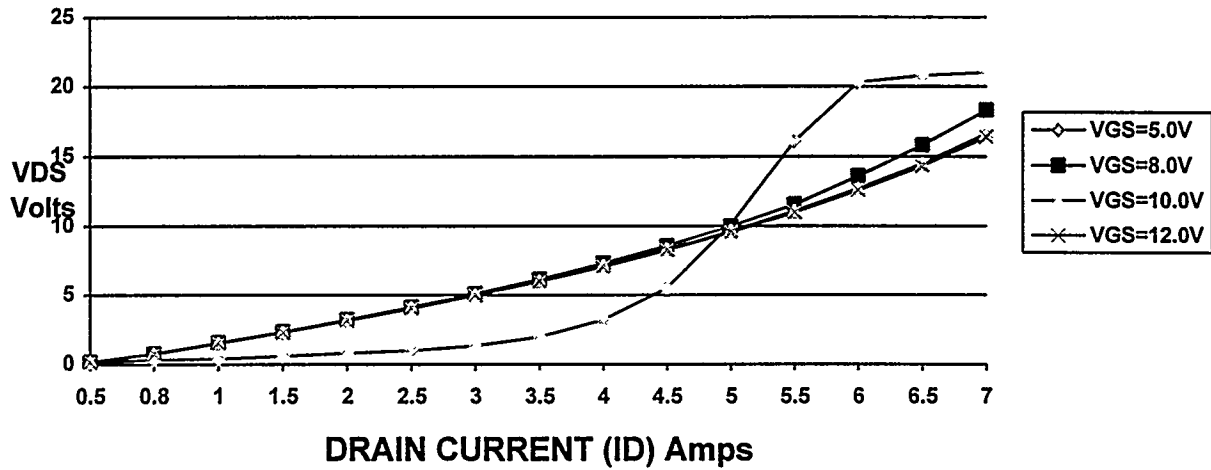


Figure 3

SA3654 **Breakdown Voltage (BVDSS) vs. Drain Current (ID)**

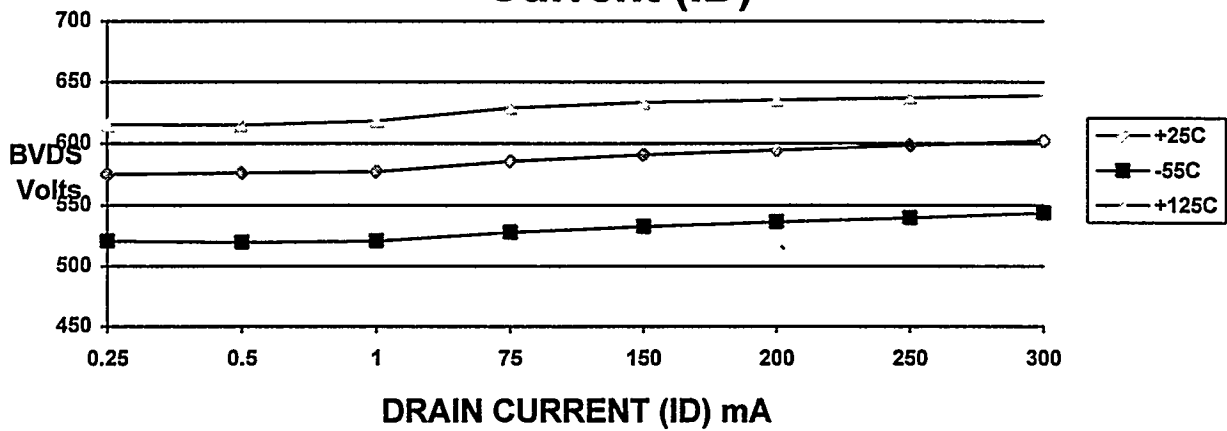


Figure 4

The 46 piece sample from HTRB was submitted to burn-in. Burn-in is effective in detecting die attach problems and in screening for weak devices. During burn-in, devices were operated at $V_{DS} = 12$ volts and a constant drain current of 245 mA to obtain a die junction temperature between 125 and 150°C. After the first 48 hours, the sample was removed from bias, electrically tested, and resubmitted to burn-in for an additional 292 hours. The sample was electrically tested again at the end of 340 hours. No electrical test failures occurred after post-48 hour or after post-340 hour testing. A review of the data revealed that no shifting in electrical parameters occurred from post-48 hour to post-340 hour burn-in. This indicates that (1) no apparent die attach problems exist and (2) International Rectifier is effective in screening for early failures during their JANTX high reliability testing/processing.

As a last test of device reliability, a 20 piece sample was subjected to nonoperating, high temperature storage of 200°C for 1000 hours minimum. This test is effective in detecting any internal device cavity contamination, internal metallization mismatching (i.e., gold to aluminum, causing purple plague), external plating impurities/problems, and any other type of contamination or metallization problem that is accelerated by a high temperature environment. At the completion of 1000 hours, devices were visually inspected per MIL-STD-750, Method 1032, then electrically tested and solder dipped per MIL-STD-750, Method 2026, with no failures resulting. This indicates that no obvious internal cavity or plating problems exist.

Radiation Characterization

Dose-rate, total dose, and neutron radiation characterization testing were performed on a 10 piece sample to determine device response and degradation levels. A copy of the radiation characterization report can be found in Appendix C. A summary of the device response is as follows:

Gamma dose (total dose): The SA3654 remained functional at dose rates up to 1 Mrad (SiO_2) and experienced a VGS degradation of 65% of the preradiation value. I_{gss} and B_{vds} experienced no degradation to a total dose rate of 1 Mrad (SiO_2)

Gamma dot (prompt dose): Dose rates up to 2.0×10^{10} rad(Si)/sec at 200 V V_{DS} bias resulted in prompt photocurrents of 150 amps at a 30 nanosecond pulse width without burn-out. Dose rates up to 1.0×10^{10} rad(Si)/sec at 400 V V_{DS} bias also resulted in prompt photocurrents of 150 amps at a 30 nanosecond pulse width. Device burn-out occurred at dose rates greater than 1.0×10^{10} rad(Si)/sec and 400 V V_{DS} bias.

Neutron fluence: No significant device degradation was observed after exposure to a fluence level of 1×10^{14} n/cm².

Construction Analysis

In May 1994, Analytical Solutions performed a limited construction analysis on 15 SA3654-like devices. The devices were evaluated for possible problems in fabrication, assembly, and construction which were related to device reliability. Die technology was fully characterized while package and assembly methods were verified. Construction analysis was limited to die technology because a full package and assembly construction analysis had previously been performed on the TO-254AA package for the SA3483-1.

Package Technology

The SA3654 is packaged in a TO-254AA power package. Construction analysis verified that package material and assembly are identical to the SA3483-1 which was fully analyzed and documented. The TO-254AA package consists of a tungsten-copper composite metal header which extends beyond the sidewall to form a tab on one end. Package sidewalls are copper with alumina ceramic lead feed-throughs at the other end. The leads are copper core with nickel and gold overplating. The package lid consists of a welded kovar lid. The entire package is underplated with electrolytic nickel and overplated with gold.

Overall package quality was found to be acceptable.

Assembly

The die is attached to a gold-finished, beryllium ceramic die support planchet with a gold/germanium die eutectic. A 10 mil aluminum bond wire connects the source bond land to the source lead. An 8 mil aluminum wire connects the gate bond land to the gate lead. Ultrasonic reverse bonding is utilized to attach the aluminum bond wire to the aluminum bond lands on the die and the gold finished posts on the leads.

No problems were detected with die attach or wire bonding methods/processes.

Die Technology

The 7450 radiation-hardened silicon die is constructed with an epitaxial, double-diffused, N-channel HEXFET process. The top glassivation consists of a single layer of P-doped vapox and thick aluminum metallization. Severe dissolution of polysilicon into the aluminum metallization was observed at the contact windows. This dissolution is attributed to the fact that the aluminum is undoped. The dissolution does not pose a reliability concern.

The polysilicon gate electrode is 0.32 μm thick over a gate oxide thickness of 600 Å. The source contact windows are cut through relatively thick oxide layers; however, no metal step coverage problems were observed.

Overall, die fabrication was found to be acceptable.

Supplier Process Summary

Wafer Fabrication

International Rectifier's generic process flowchart for wafer fabrication reveals that standard industry practice is followed for wafer fabrication. Process control is verified and monitored through oxide thickness measurements taken at critical process steps. Standard die backing is chrome/nickel/silver applied with a sputter type system. Because wafer fabrication is proprietary information, a detailed analysis is not possible.

Assembly

The TO-254AA package is first passed through a hydrogen belt furnace to clean off any oxidation or contamination that may be present. Next, a Pb (95.5%), In (2.5%), Ag (2%) preform is placed on top the BEO die-attach pad. The 7450 die is placed on top of the preform and held in place with a stainless steel weight. The package, preform, and die are then placed in a boat and passed through the hydrogen belt furnace where they are exposed to a maximum temperature of 350°C for 7.5 minutes maximum. A 10 piece process control sample is passed through the furnace prior to the production lot. VSD testing is performed on this 10 piece sample to check for die attach integrity. In addition, 10 parts are pulled every 2 hours of furnace operation and at the end of the lot production for VDS die attach integrity.

Ultrasonic wire bonding is performed utilizing 8 mil Al wire for the gate and 12 mil Al wire for the source. Wire bond monitoring consists of performing bond pull on two parts at the beginning of wire bonding, every two hours following startup, and at the end of the build or shift. In addition to bond pull, 10 pieces are also pulled and visually inspected for wire bond integrity.

Devices are stored in a class 100 clean room prior to receiving a dry nitrogen blow-off operation and a 150°C vacuum bake. Lids are attached by a resistive weld of the kovar lid preform to the kovar seal ring on the TO-254AA package. A 25 piece sample is pulled at the beginning of the weld operation and then every 2 hours during the operation; the samples are subjected to hermetic seal testing and PIND testing as a weld process monitor. Devices are then subjected to JANS high reliability processing per MIL-S-19500.

Quality Assurance

International Rectifier was approved to FM&T's Form 1060 requirements at the time of purchase and characterization testing. Supplier process flow information was obtained, reviewed, and found to be satisfactory.

APPENDIX A

**Test Program
and
Statistical Test Data**

FEL/TEST TEST PROGRAM

REM =SA3654 TESTING PER PS411832 ISS F GM TEST FILE="3654.TES"

DATE=6/10/94

TEST CHECKSUM=965DH

FILE CHECKSUM=FB88H

TEST NUMBER= 1 TEST TYPE=IGSS FWR LIN CY= 0.1
 COVER ON PASS= 0 COVER ON FAIL= 0 V4S=OPEN
 VGS = 20.000V TEST TIME(MS)= 2 (100NA= 10) (10NA= 25) (1NA= 175) (100PA= 1500)
 AUTO RNG=YES [A] IG(MIN)=NONE IG(MAX)= 100.00NA IG(RNG)=100NA

TEST NUMBER= 2 TEST TYPE=IGSS FWR LIN CY= 0.1
 COVER ON PASS= 0 COVER ON FAIL= 0 V4S=OPEN
 VGS =-20.000V TEST TIME(MS)= 2 (100NA= 10) (10NA= 25) (1NA= 175) (100PA= 1500)
 AUTO RNG=YES [A] IG(MIN)=NONE IG(MAX)= 100.00NA IG(RNG)=100NA

TEST NUMBER= 3 TEST TYPE=VIH1 FWR LIN CY= 0.1
 COVER ON PASS= 0 COVER ON FAIL= 0 V4S=OPEN
 ID = 1.0000MA
 COMP= 5.0000V

TEST TIME(MS)= 2
 AUTO RNG=YES [A] VGS(MIN)= 2.0000V VGS(MAX)= 5.0000V

TEST NUMBER= 4 TEST TYPE=VIH1 FWR LIN CY= 0.1
 COVER ON PASS= 0 COVER ON FAIL= 0 V4S=OPEN
 ID = 250.00UA
 COMP= 5.0000V

TEST TIME(MS)= 2
 AUTO RNG=YES [A] VGS(MIN)= 2.0000V VGS(MAX)= 5.0000V

TEST NUMBER= 5 TEST TYPE=IDSK FWR LIN CY= 0.1
 COVER ON PASS= 0 COVER ON FAIL= 0 V4S=OPEN
 VDS = 500.00V VGS = 0.0000V
 TEST TIME(MS)= 2 (100NA= 10) (10NA= 25) (1NA= 175) (100PA= 1500)
 AUTO RNG=YES [A] ID(MIN)=NONE ID(MAX)= 1.0000MA ID(RNG)=1MA

TEST NUMBER= 6 TEST TYPE=IDSK FWR LIN CY= 0.1
 COVER ON PASS= 0 COVER ON FAIL= 0 V4S=OPEN
 VDS = 300.00V VGS = 0.0000V
 TEST TIME(MS)= 2 (100NA= 10) (10NA= 25) (1NA= 175) (100PA= 1500)
 AUTO RNG=YES [A] ID(MIN)=NONE ID(MAX)= 30.000UA ID(RNG)=100UA

TEST NUMBER= 7 TEST TYPE=RDSP FWR LIN CY= 0.1
 COVER ON PASS= 0 COVER ON FAIL= 0 V4S=OPEN
 ID = 4.7000A
 COMP= 5.0000V
 PULSE TIME(.1MS)= 3
 AUTO RNG=YES [A] RDS(MIN)=NONE RDS(MAX)= 600.00MO

FET/TEST TEST PROGRAM

REM =SA3654 TESTING PER PS411832 ISS F GWM TEST FILE="3654.TES"
 DATE=6/10/94

TEST NUMBER= 8 TEST TYPE=RDSP FWR LIN CY= 0.1
 COVER ON PASS= 0 COVER ON FAIL= 0 V4S=OPEN
 ID = 7.7500A VGS = 12.000V
 COMP= 3.0000MA
 PULSE TIME(.1MS)= 3
 AUTO RNG=YES [A] RDS(MIN)=NONE RDS(MAX)= 800.00MO

TEST NUMBER= 9 TEST TYPE=BVDSX FWR LIN CY= 0.1
 COVER ON PASS= 0 COVER ON FAIL= 0 V4S=OPEN
 ID = 1.0000MA VGS = 0.0000V
 COMP= 650.00V
 TEST TIME(MS)= 5
 AUTO RNG=YES [A] VDS(MIN)= 350.00V VDS(MAX)=NONE

TEST NUMBER= 10 TEST TYPE=FX
 COVER ON PASS= 0 COVER ON FAIL= 0
 [A] GFS (MIN)= 2.3000S GFS (MAX)=NONE
 GFS (RESULT)=(NONE "R" T 20) " " NONE

TEST NUMBER= 11 TEST TYPE=FX
 COVER ON PASS= 0 COVER ON FAIL= 0
 [A] GFS (MIN)= 2.0000S GFS (MAX)=NONE
 GFS (RESULT)=(NONE "R" T 23) " " NONE

TEST NUMBER= 20 TEST TYPE=FX
 COVER ON PASS= 0 COVER ON FAIL= 0
 [A] RGFS (MIN)= 2.3000S RGFS (MAX)=NONE
 RGFS (RESULT)=(T 21 " " T 22) " " 500.00M

TEST NUMBER= 21 TEST TYPE=VGSIP FWR LIN CY= 0.1
 COVER ON PASS= 0 COVER ON FAIL= 0 V4S=OPEN
 VDS = 15.000V ID = 7.7500A
 PULSE TIME(.1MS)= 3
 AUTO RNG=YES [A] VGS(MIN)= 0.0000V VGS(MAX)=NONE

TEST NUMBER= 22 TEST TYPE=VGSIP FWR LIN CY= 0.1
 COVER ON PASS= 0 COVER ON FAIL= 0 V4S=OPEN
 VDS = 15.000V ID = 7.2500A
 PULSE TIME(.1MS)= 3
 AUTO RNG=YES [A] VGS(MIN)= 0.0000V VGS(MAX)=NONE

FEI/TEST TEST PROGRAM

REM =SA3654 TESTING PER PS411832 ISS F GWM TEST FILE="3654.TES"
 DATE=6/10/94

TEST NUMBER= 23 TEST TYPE=FX
 COVER ON PASS= 0 COVER ON FAIL= 0
 [A] RGFS (MIN)= 2.0000S RGFS (MAX)=NONE
 RGFS (RESULT)=(T 24 " " T 25) " " 500.00M

TEST NUMBER= 24 TEST TYPE=VGS1P
 COVER ON PASS= 0 COVER ON FAIL= 0
 VDS = 25.000V ID = 10.000A
 PULSE TIME(.1MS)= 3
 AUTO RNG=YES [A] VGS(MIN)= 0.0000V VGS(MAX)=NONE

FWR LIN CY= 0.1
 V4S=OPEN

TEST NUMBER= 25 TEST TYPE=VGS1P
 COVER ON PASS= 0 COVER ON FAIL= 0
 VDS = 25.000V ID = 9.5000A
 PULSE TIME(.1MS)= 3
 AUTO RNG=YES [A] VGS(MIN)= 0.0000V VGS(MAX)=NONE

FWR LIN CY= 0.1
 V4S=OPEN

TEST NUMBER= 41 TEST TYPE=IGSS
 COVER ON PASS= 0 COVER ON FAIL= 0
 VGS = 20.000V
 TEST TIME(MS)= 2 (100NA= 10) (10NA= 25) (1NA= 175)
 AUTO RNG=YES [A] IG(MIN)=NONE IG(MAX)= 100.00NA

FWR LIN CY= 0.1
 V4S=OPEN
 (100PA= 1500)
 IG(RNG)=100NA

TEST NUMBER= 42 TEST TYPE=IGSS
 COVER ON PASS= 0 COVER ON FAIL= 0
 VGS = 20.000V
 TEST TIME(MS)= 2 (100NA= 10) (10NA= 25) (1NA= 175)
 AUTO RNG=YES [A] IG(MIN)=NONE IG(MAX)= 100.00NA

FWR LIN CY= 0.1
 V4S=OPEN
 (100PA= 1500)
 IG(RNG)=100NA

TEST NUMBER= 43 TEST TYPE=VTH1
 COVER ON PASS= 0 COVER ON FAIL= 0
 ID = 1.0000MA
 COMP= 6.0000V
 TEST TIME(MS)= 2
 AUTO RNG=YES [A] VGS(MIN)= 2.0000V VGS(MAX)= 5.0000V

FWR LIN CY= 0.1
 V4S=OPEN

TEST NUMBER= 44 TEST TYPE=VTH1
 COVER ON PASS= 0 COVER ON FAIL= 0
 ID = 250.000IA
 COMP= 6.0000V
 TEST TIME(MS)= 2
 AUTO RNG=YES [A] VGS(MIN)= 2.0000V VGS(MAX)= 5.0000V

FWR LIN CY= 0.1
 V4S=OPEN

FET/TEST TEST PROGRAM

REM =SA3654 TESTING PER PS411832 ISS F GWM TEST FILE="3654.TES"
 DATE=6/10/94

TEST NUMBER= 45
 COVER ON PASS= 0
 VDS = 450.00V
 TEST TIME(MS)= 2 (100NA= 10) (10NA= 25) (1NA= 175)
 AUTO RNG=YES [A] ID(MIN)=NONE ID(MAX)= 1.0000MA
 FWR LIN CY= 0.1
 V4S=OPEN
 (100PA= 1500)
 ID(RNG)=1UA

TEST NUMBER= 46
 COVER ON PASS= 0
 ID = 4.7000A
 COMP= 5.0000V
 PULSE TIME(.1MS)= 3
 AUTO RNG=YES [A] RDS(MIN)=NONE RDS(MAX)= 600.00MO
 FWR LIN CY= 0.1
 V4S=OPEN

TEST NUMBER= 47
 COVER ON PASS= 0
 ID = 1.0000MA
 COMP= 650.00V
 TEST TIME(MS)= 5
 AUTO RNG=YES [A] VDS(MIN)= 450.00V VDS(MAX)=NONE
 FWR LIN CY= 0.1
 V4S=OPEN

TEST NUMBER= 61
 COVER ON PASS= 0
 VGS = 20.000V
 TEST TIME(MS)= 2 (100NA= 10) (10NA= 25) (1NA= 175)
 AUTO RNG=YES [A] IG(MIN)=NONE IG(MAX)= 200.00NA
 FWR LIN CY= 0.1
 V4S=OPEN
 (100PA= 1500)
 IG(RNG)=1UA

TEST NUMBER= 62
 COVER ON PASS= 0
 VGS =-20.000V
 TEST TIME(MS)= 2 (100NA= 10) (10NA= 25) (1NA= 175)
 AUTO RNG=YES [A] IG(MIN)=NONE IG(MAX)= 200.00NA
 FWR LIN CY= 0.1
 V4S=OPEN
 (100PA= 1500)
 IG(RNG)=1UA

TEST NUMBER= 63
 COVER ON PASS= 0
 ID = 1.0000MA
 COMP= 6.0000V
 TEST TIME(MS)= 2
 AUTO RNG=YES [A] VGS(MIN)= 1.0000V VGS(MAX)= 5.0000V
 FWR LIN CY= 0.1
 V4S=OPEN

TEST NUMBER= 64
 COVER ON PASS= 0
 ID = 250.00UA
 COMP= 6.0000V
 TEST TIME(MS)= 2
 AUTO RNG=YES [A] VGS(MIN)= 2.0000V VGS(MAX)= 5.0000V
 FWR LIN CY= 0.1
 V4S=OPEN

FET/TEST TEST PROGRAM

REM =SA3654 TESTING PER PS411832 ISS F GMM TEST FILE="3654.TES"
 DATE=6/10/94

TEST NUMBER= 65 TEST TYPE=IDSX FWR LIN CY= 0.1
 COVER ON PASS= 0 COVER ON FAIL= 0 V4S=OPEN
 VDS = 400.00V VGS = 0.0000V
 TEST TIME(MS)= 2 (100NA= 10) (10NA= 25) (1NA= 175) (100PA= 1500)
 AUTO RNG=YES [A] ID(MIN)=NONE ID(MAX)= 1.0000MA ID(RNG)=1MA

TEST NUMBER= 66 TEST TYPE=IDSX FWR LIN CY= 0.1
 COVER ON PASS= 0 COVER ON FAIL= 0 V4S=OPEN
 VDS = 300.00V VGS = 0.0000V
 TEST TIME(MS)= 2 (100NA= 10) (10NA= 25) (1NA= 175) (100PA= 1500)
 AUTO RNG=YES [A] ID(MIN)=NONE ID(MAX)= 30.0000UA ID(RNG)=100UA

TEST NUMBER= 67 TEST TYPE=RDSP FWR LIN CY= 0.1
 COVER ON PASS= 0 COVER ON FAIL= 0 V4S=OPEN
 ID = 4.7000A VGS = 12.000V
 COMP= 6.0000V COMP= 3.0000MA
 PULSE TIME(.1MS)= 3
 AUTO RNG=YES [A] RDS(MIN)=NONE RDS(MAX)= 1.25000

TEST NUMBER= 68 TEST TYPE=BVD SX FWR LIN CY= 0.1
 COVER ON PASS= 0 COVER ON FAIL= 0 V4S=OPEN
 ID = 1.0000MA VGS = 0.0000V
 COMP= 650.00V
 TEST TIME(MS)= 5
 AUTO RNG=YES [A] VDS(MIN)= 500.00V VDS(MAX)=NONE

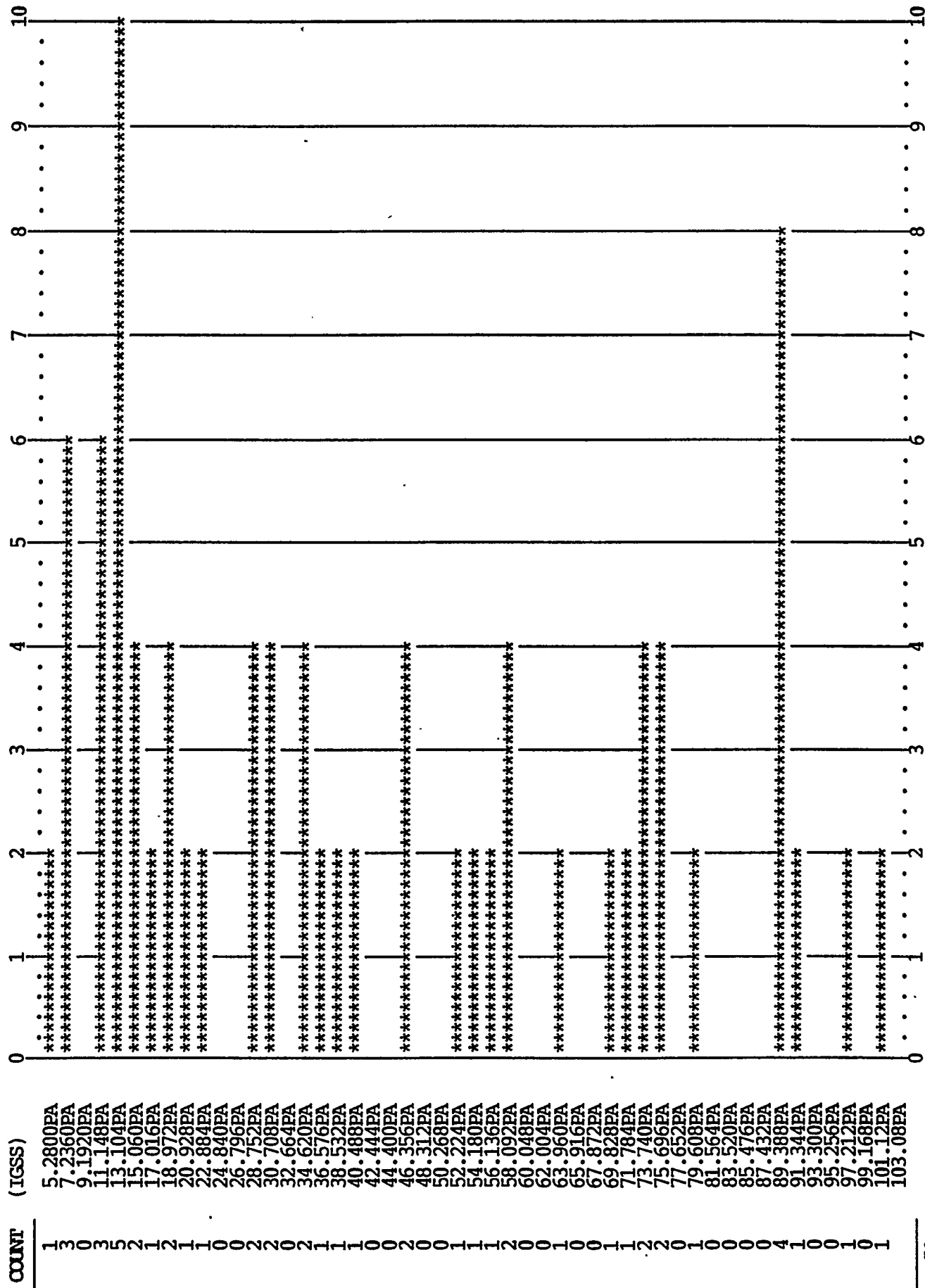
TEST NUMBER=200 TEST TYPE=KEL FWR LIN CY= 0.1
 COVER ON PASS= 0 COVER ON FAIL= 0
 IK = 50.000MA
 COMP= 10.000V
 TEST TIME(MS)= 1
 AUTO RNG=NO [A] KEL(MIN)=NONE KEL(MAX)= 1.0000V

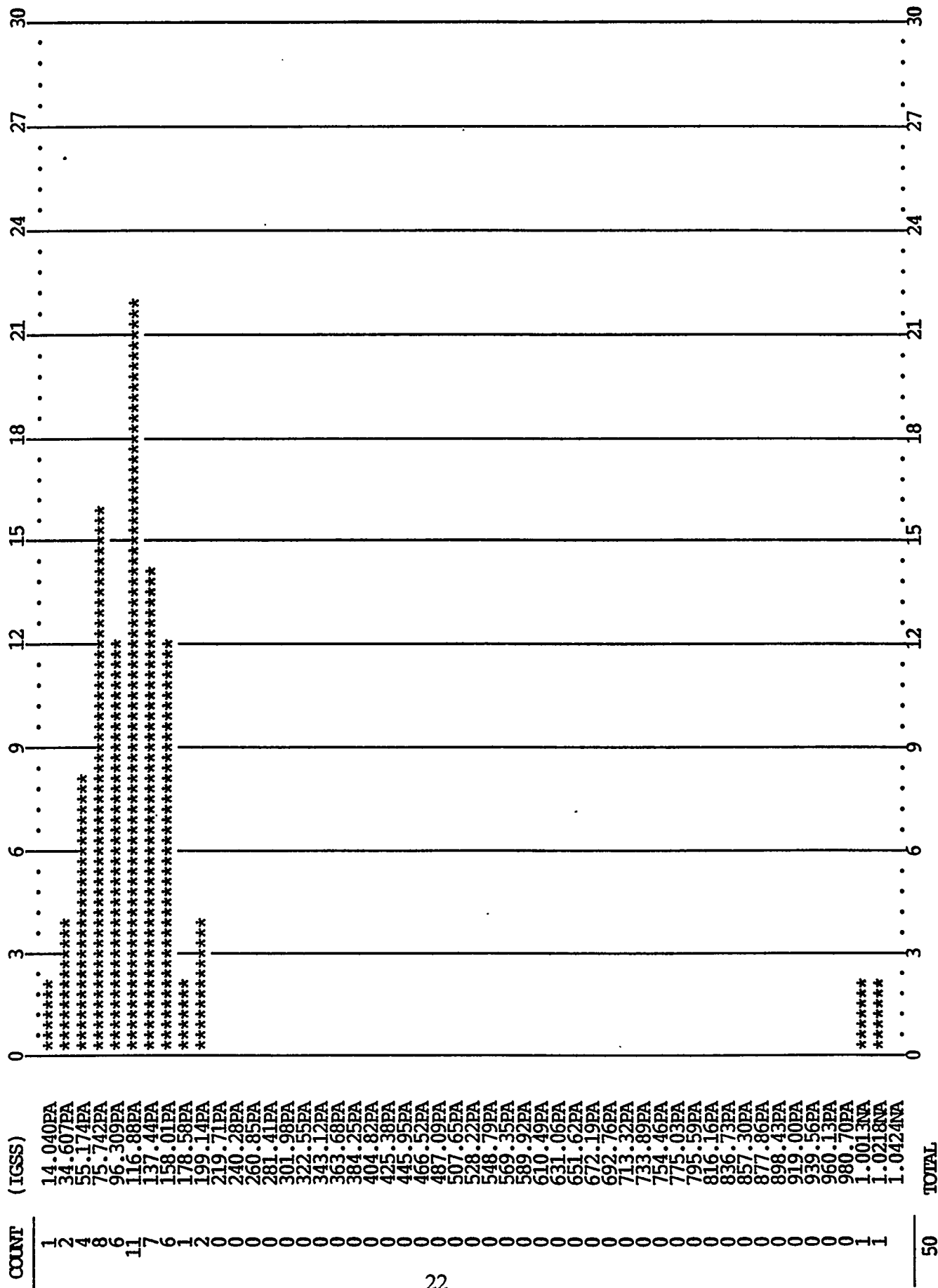
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TESTS REFERENCED IN THE SORTS OF THE RUN FILE.

TEST NO.	TEST TYPE	FORCING CONDITIONS			TEST LIMITS		A S PLC	COP COF	AUTO MEAS. RING? RANGE	TEST TIMES (MS)
		BIAS#1	BIAS#2	BIAS#3	MINIMUM	MAXIMUM				
1	IGSS	VGS= 20.000V	V4S= OPEN			100.000V A 0.1			YES	100NA 2,10,25,175,1500
2	IGSS	VGS= 20.000V	V4S= OPEN			100.000V A 0.1			YES	100NA 2,10,25,175,1500
3	VTH1	ID = 1.0000MA	V4S= OPEN		2.0000V	5.0000V A 0.1			YES	
4	VTH1	CMP= 5.0000V								
5	IDSX	ID = 250.001A	V4S= OPEN		2.0000V	5.0000V A 0.1			YES	2
6	IDSX	CMP= 5.0000V								
7	RDSP	VDS= 500.00V	VGS= 0.0000V	V4S= OPEN		1.0000MA A 0.1			YES	1MA 2,10,25,175,1500
8	RDSP	VDS= 300.00V	VGS= 0.0000V	V4S= OPEN		30.0000A A 0.1			YES	100UA 2,10,25,175,1500
9	BVDSX	ID = 4.7000A	VGS= 12.000V	V4S= OPEN		600.000A A 0.1			YES	300US
10	GFSS	ID = 5.0000V	CMP= 3.0000MA	V4S= OPEN						
11	GFSS	CMP= 5.0000V	VGS= 12.000V	V4S= OPEN					YES	300US
20	RGFS	ID = 7.7500A	CMP= 3.0000MA	V4S= OPEN	350.00V	800.000A A 0.1			YES	5
21	VGS1P	ID = 1.0000MA	VGS= 0.0000V	V4S= OPEN						
22	VGS1P	CMP= 650.00V								
23	RGFS	RESULT= { "R" T20 }								
24	VGS1P	RESULT= { "R" T21 }								
25	VGS1P	RESULT= { "R" T22 }								
200	KEL	RESULT= { "R" T23 }								
		RESULT= { "R" T24 }								
		RESULT= { "R" T25 }								
		RESULT= { "R" T26 }								
		RESULT= { "R" T27 }								
		RESULT= { "R" T28 }								
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		RESULT= { "R" T195 }								

TEST# -SEG	TYPE	COUNT	LOW SKEW	MEAN KURTOSIS	HIGH CPK(- 3)	STANDARD 1SD	DEVIATION 3SD	5%	PERCENTILE 50%	95%	PASS% NORM
1-1	IGSS	50	5.2800PA 412.85M -14.040PA	44.258PA -1.2614 -157.06PA	103.08PA 1.1207K -1.0424NA	29.729PA 183.71PA 42.206MW	89.188PA 551.13PA 126.62MW	8.5200PA 47.360PA 3.0356V	38.440PA 130.56PA 3.1008V	92.720PA 211.96PA 3.1620V	100.00% NO 100.00% NO
2-1	IGSS	50	-4.1847 -15.902M	3.1029V 136.10M	3.2112V 8.7105	41.105MW 3.0584V	123.31MW	2.8896V	2.9508V	3.0108V	100.00% YES
3-1	VTH1	50	27.325M 2.5340NA	69.049M 11.0930A	7.7234 551.00UA	77.913UA 4.2308	233.74UA	2.9984NA	7.3856NA	539.80NA	100.00% YES
4-1	VTH1	50	6.6522 1.3580NA	43.117 10.154NA	4.2308 178.68NA	27.402NA 20.533MO	82.207NA	2.0220NA	4.5612NA	26.888NA	100.00% NO
5-1	IDSX	50	5.1245 343.91MO	27.002 387.23MO	364.81 430.13MO	20.533MO 21.329MO	61.598MO	361.11MO	383.06MO	422.35MO	100.00% YES
6-1	IDSX	50	275.02M 352.21MO	-848.26M 397.22MO	3.4543 440.36MO	21.329MO 17.011V	63.988MO	369.96MO	392.15MO	433.96MO	100.00% NO
7-1	RDSP	50	259.76M 541.32V	-903.01M 574.37V	6.2946 600.60V	17.011V 455.78MS	51.034V	545.72V	569.88V	598.44V	100.00% NO
8-1	BVDSX	50	-19.128M 6.2500S	-1.1603 7.5662S	4.3964 8.2237S	455.78MS 8.8514	1.3673S	6.6489S	7.7160S	8.1169S	100.00% NO
9-1	GFS	50	-989.53M 6.7204S	636.60M 8.1215S	3.8514 8.8028S	479.62MS	1.4388S	7.0225S	8.2237S	8.6806S	100.00% NO
10-1	GFS	50	-1.0365	698.42M	4.2544						



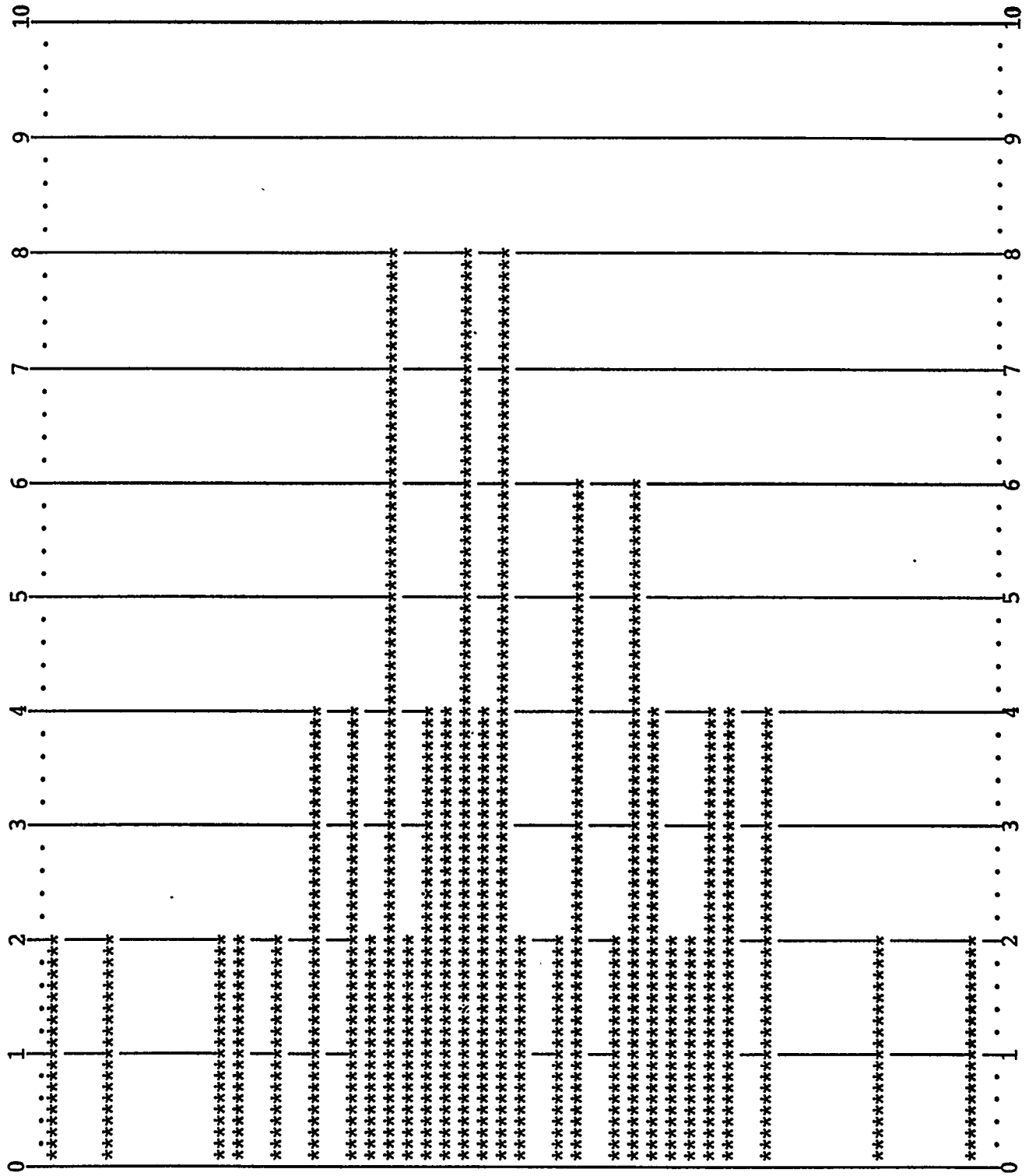


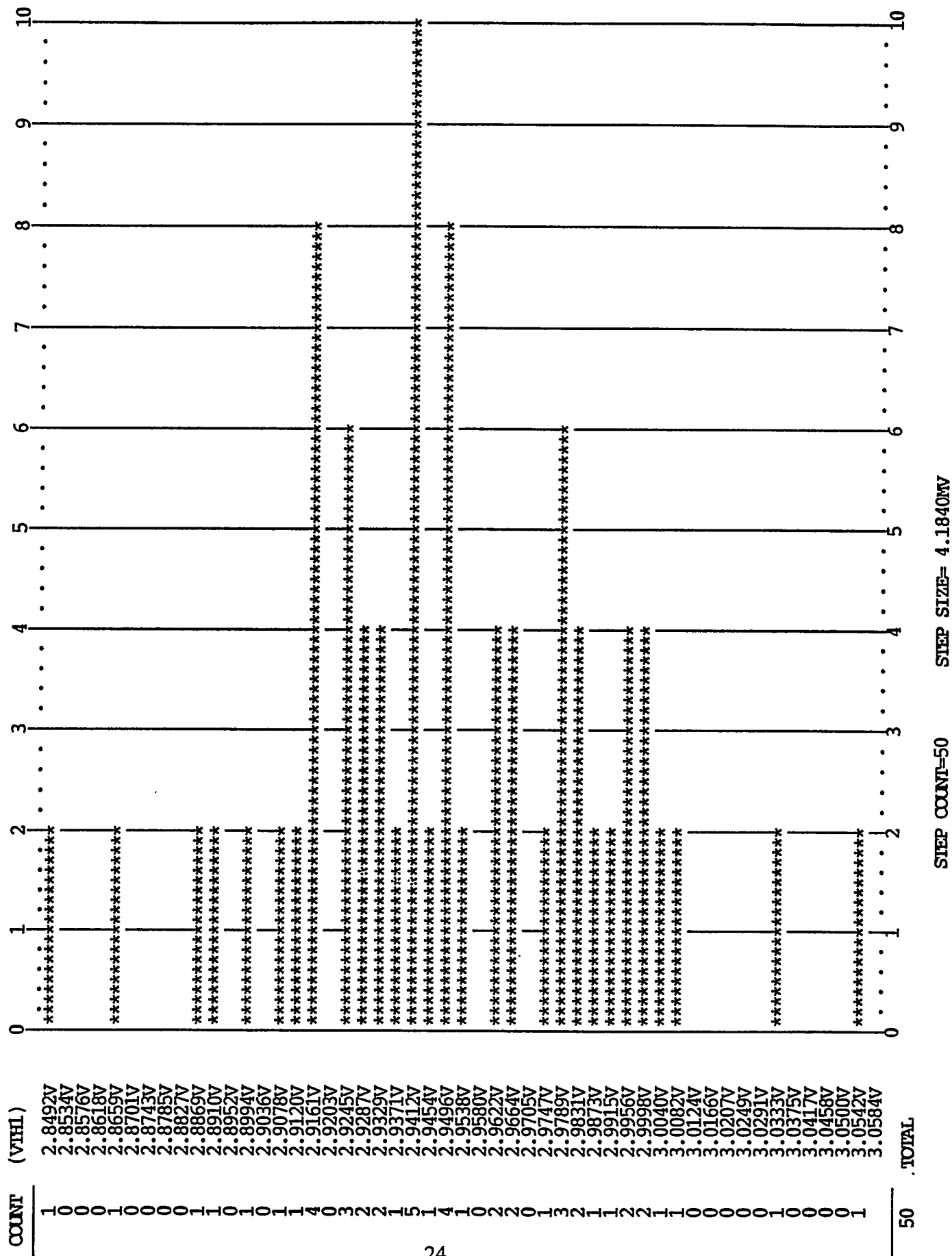
STEP COUNT=50 STEP SIZE= 20.567PA

COUNT	(VTH1)
1	2.9960V
0	3.0003V
0	3.0046V
1	3.0089V
0	3.0132V
0	3.0175V
0	3.0218V
0	3.0261V
0	3.0304V
1	3.0347V
1	3.0390V
0	3.0433V
1	3.0476V
0	3.0520V
2	3.0563V
0	3.0606V
2	3.0649V
1	3.0692V
4	3.0735V
1	3.0778V
2	3.0821V
2	3.0864V
4	3.0907V
2	3.0950V
4	3.0993V
1	3.1036V
0	3.1079V
1	3.1122V
3	3.1165V
0	3.1208V
1	3.1251V
3	3.1294V
2	3.1337V
1	3.1380V
1	3.1423V
2	3.1466V
2	3.1509V
0	3.1552V
2	3.1596V
0	3.1639V
0	3.1682V
0	3.1725V
0	3.1768V
0	3.1811V
1	3.1854V
0	3.1897V
0	3.1940V
0	3.1983V
0	3.2026V
1	3.2069V
	3.2112V

TOTAL

50





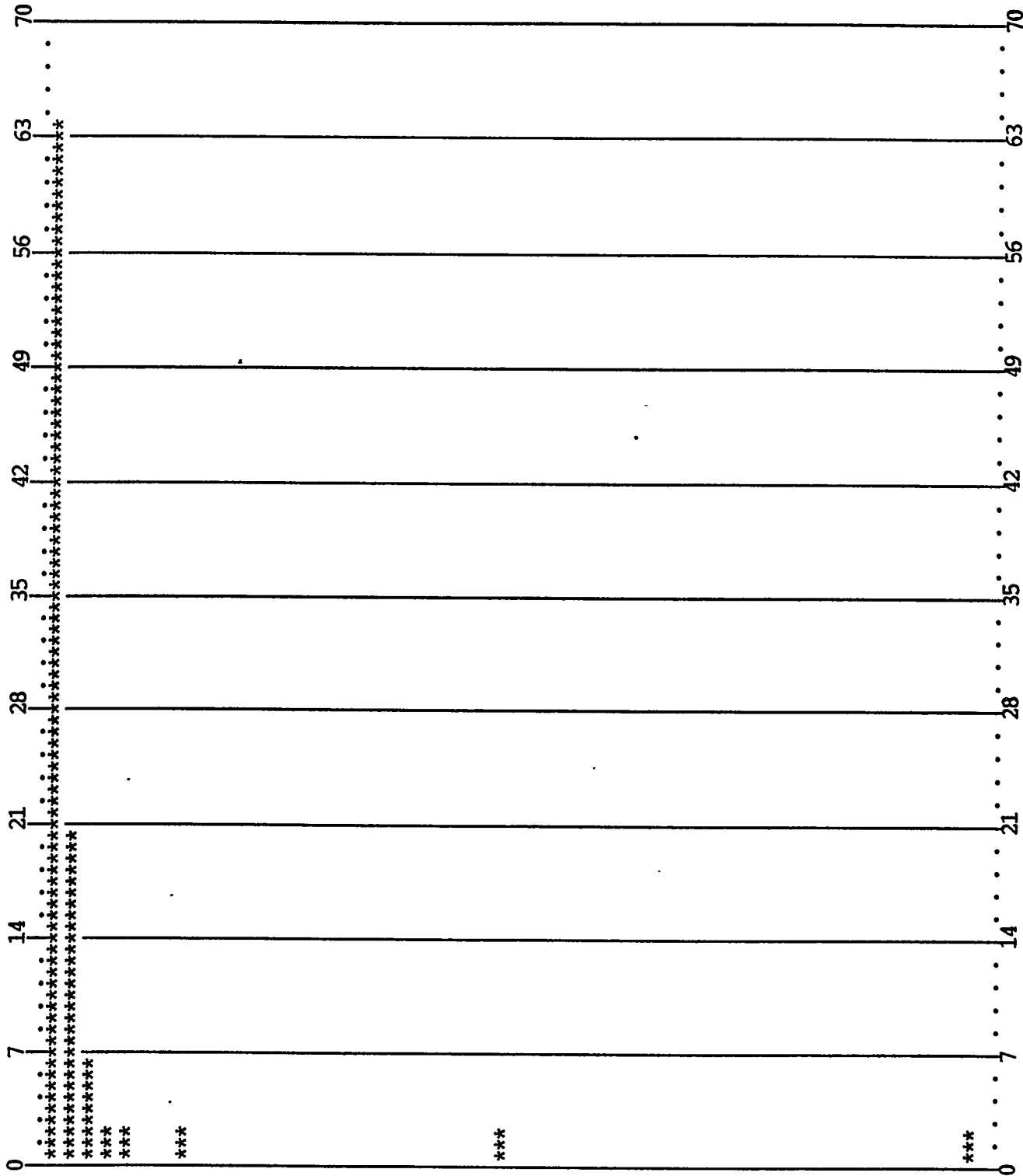
COUNT	(IDSX)
49	2.5340UA
0	11.022UA
0	22.042UA
0	33.062UA
0	44.082UA
0	55.102UA
0	66.122UA
0	77.142UA
0	88.162UA
0	99.182UA
0	110.20UA
0	121.22UA
0	132.24UA
0	143.26UA
0	154.28UA
0	165.30UA
0	176.32UA
0	187.34UA
0	198.36UA
0	209.38UA
0	220.40UA
0	231.42UA
0	242.44UA
0	253.46UA
0	264.48UA
0	275.50UA
0	286.52UA
0	297.54UA
0	308.56UA
0	319.58UA
0	330.60UA
0	341.62UA
0	352.64UA
0	363.66UA
0	374.68UA
0	385.70UA
0	396.72UA
0	407.74UA
0	418.76UA
0	429.78UA
0	440.80UA
0	451.82UA
0	462.84UA
0	473.86UA
0	484.88UA
0	495.90UA
0	506.92UA
0	517.94UA
0	528.96UA
1	539.98UA
1	551.00UA
50	TOTAL

STEP COUNT=50 STEP SIZE= 11.020UA

COUNT	(IDSX)
32	1.3580NA
10	4.9044NA
3	8.4509NA
1	11.997NA
1	15.544NA
0	19.090NA
0	22.637NA
1	26.183NA
0	29.730NA
0	33.276NA
0	36.822NA
0	40.369NA
0	43.915NA
0	47.462NA
0	51.008NA
0	54.555NA
0	58.101NA
0	61.647NA
0	65.194NA
0	68.740NA
0	72.287NA
0	75.833NA
0	79.380NA
0	82.926NA
1	86.473NA
0	90.019NA
0	93.565NA
0	97.112NA
0	100.66NA
0	104.20NA
0	107.75NA
0	111.30NA
0	114.84NA
0	118.39NA
0	121.94NA
0	125.48NA
0	129.03NA
0	132.58NA
0	136.12NA
0	139.67NA
0	143.22NA
0	146.76NA
0	150.31NA
0	153.85NA
0	157.40NA
0	160.95NA
0	164.49NA
0	168.04NA
0	171.59NA
1	175.13NA
	178.68NA

26

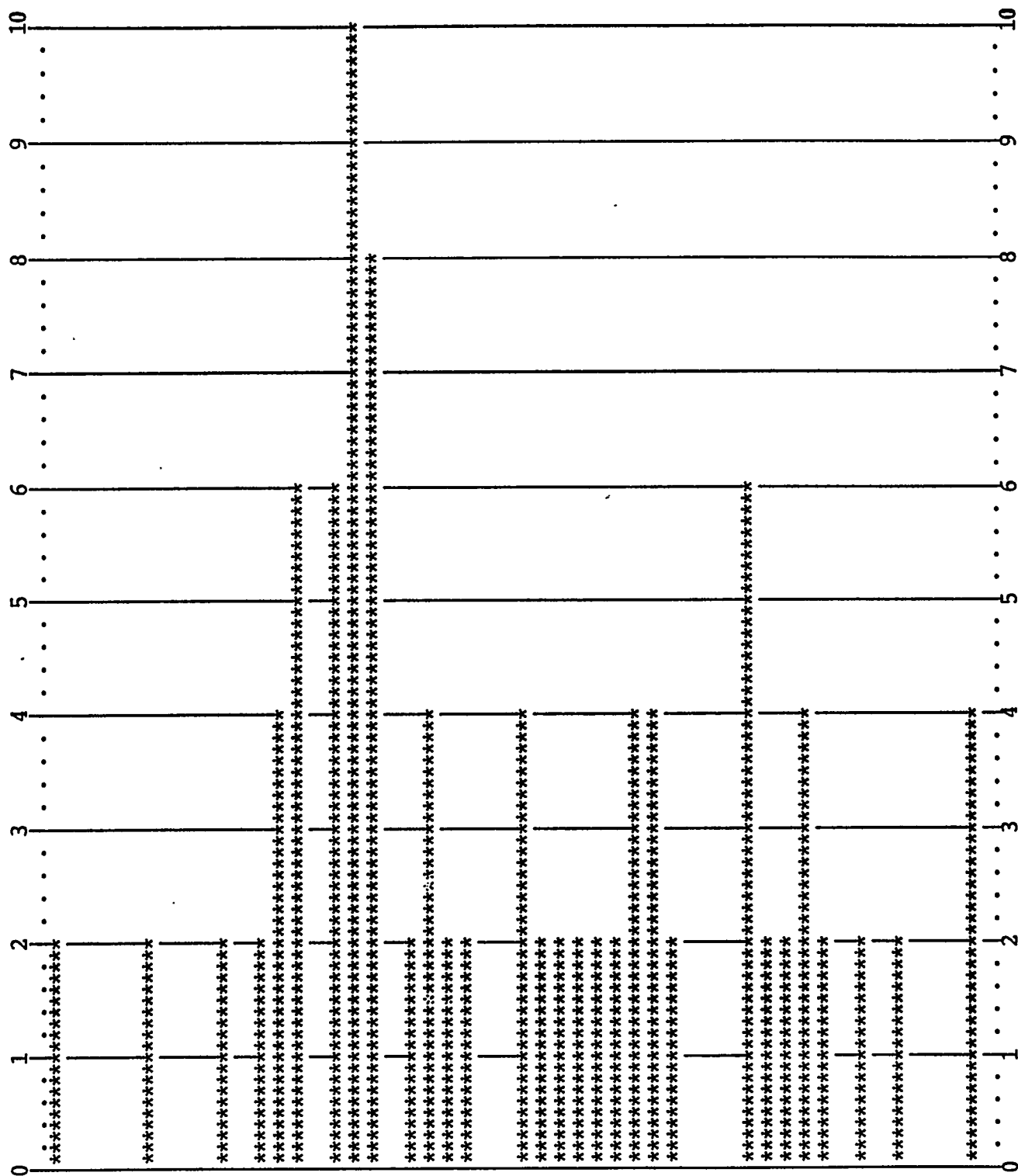
PERCENTAGE



STEP COUNT=50 STEP SIZE= 3.5464NA

COUNT	(RDSP)
1	343.91MO
0	345.64MO
0	347.36MO
0	349.09MO
0	350.81MO
1	352.54MO
0	354.26MO
0	355.98MO
0	357.71MO
1	359.43MO
0	361.16MO
1	362.88MO
2	364.61MO
3	366.33MO
0	368.05MO
3	369.78MO
5	371.50MO
4	373.23MO
0	374.95MO
1	376.68MO
2	378.40MO
1	380.12MO
1	381.85MO
0	383.57MO
0	385.30MO
2	387.02MO
1	388.75MO
1	390.47MO
1	392.19MO
1	393.92MO
1	395.64MO
2	397.37MO
2	399.09MO
1	400.82MO
0	402.54MO
0	404.26MO
0	405.99MO
3	407.71MO
1	409.44MO
1	411.16MO
2	412.89MO
1	414.61MO
0	416.33MO
1	418.06MO
0	419.78MO
1	421.51MO
0	423.23MO
0	424.95MO
0	426.68MO
0	428.40MO
2	430.13MO
50	TOTAL

PERCENTAGE



PERCENTAGE

COUNT	(RDSP)
1	352.21MO
0	353.97MO
0	355.73MO
0	357.50MO
0	359.26MO
1	361.02MO
0	362.78MO
0	364.55MO
0	366.31MO
0	368.07MO
1	369.84MO
0	371.60MO
1	373.36MO
5	375.13MO
0	376.89MO
3	378.65MO
2	380.42MO
5	382.18MO
2	383.94MO
1	385.71MO
1	387.47MO
1	389.23MO
2	390.99MO
0	392.76MO
0	394.52MO
1	396.28MO
1	398.05MO
1	399.81MO
1	401.57MO
2	403.34MO
0	405.10MO
1	406.86MO
3	408.63MO
1	410.39MO
1	412.15MO
0	413.91MO
0	415.68MO
1	417.44MO
3	419.20MO
1	420.97MO
0	422.73MO
2	424.49MO
1	426.26MO
1	428.02MO
0	429.78MO
0	431.55MO
1	433.31MO
0	435.07MO
0	436.84MO
2	438.60MO
	440.36MO
50	TOTAL

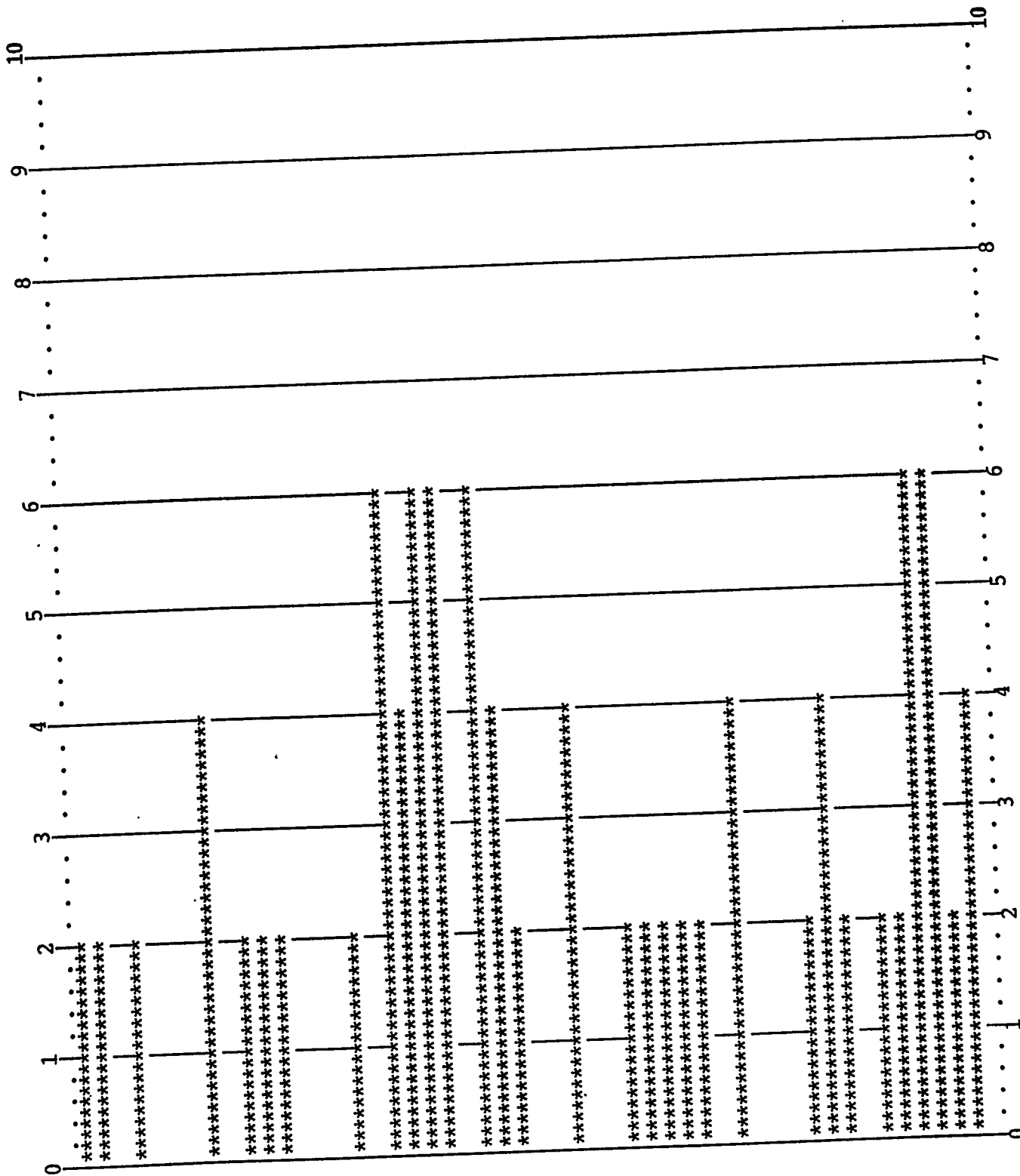
PERCENTAGE

COUNT

(BVDSX)

541.32V
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543.69V
544.88V
546.06V
547.25V
548.43V
549.62V
550.80V
551.99V
553.18V
554.36V
555.55V
556.73V
557.92V
559.10V
560.29V
561.48V
562.66V
563.85V
565.03V
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576.89V
578.07V
579.26V
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582.82V
584.00V
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586.37V
587.56V
588.74V
589.93V
591.12V
592.30V
593.49V
594.67V
595.86V
597.04V
598.23V
599.41V
600.60V

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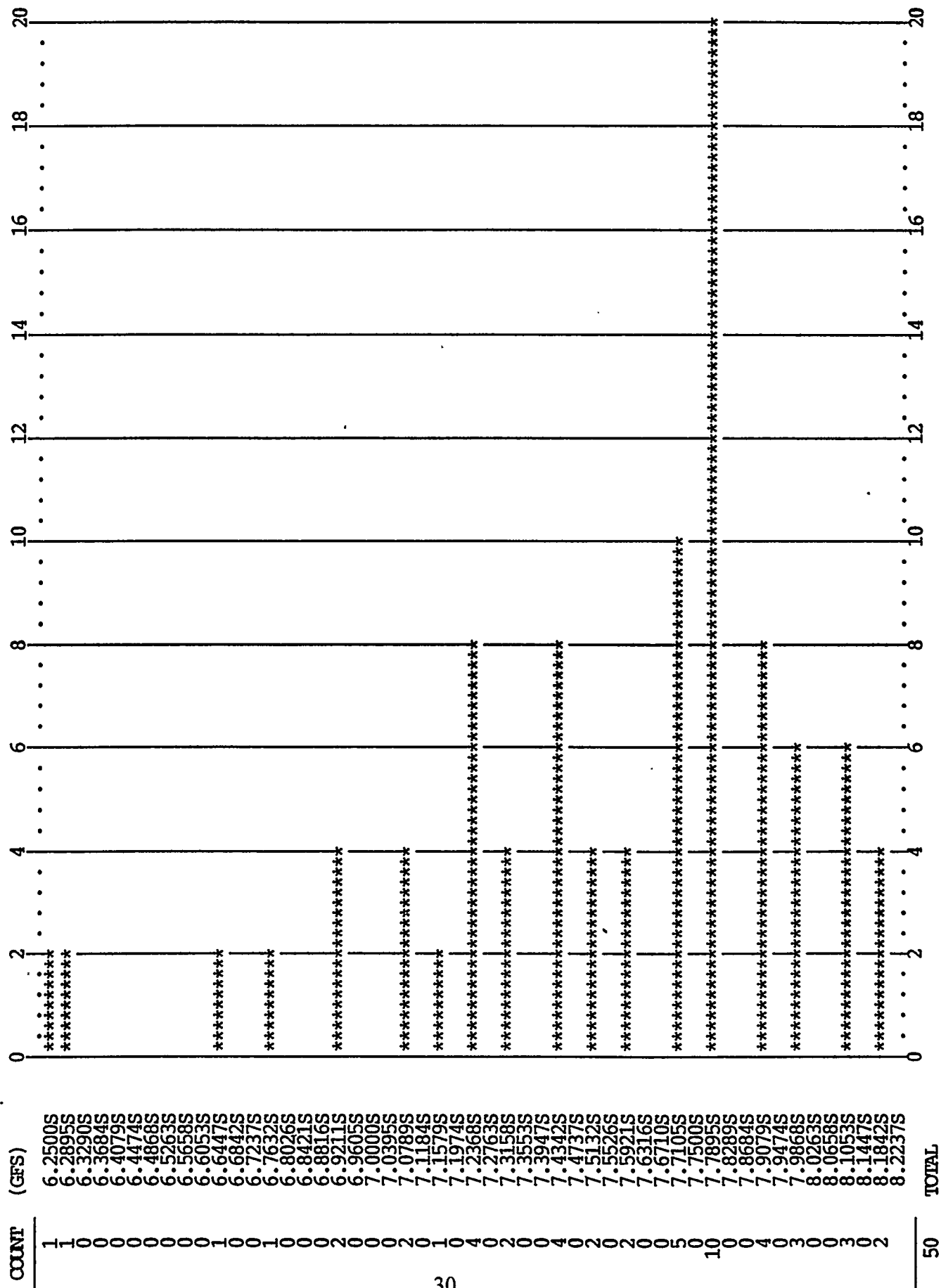


TOTAL

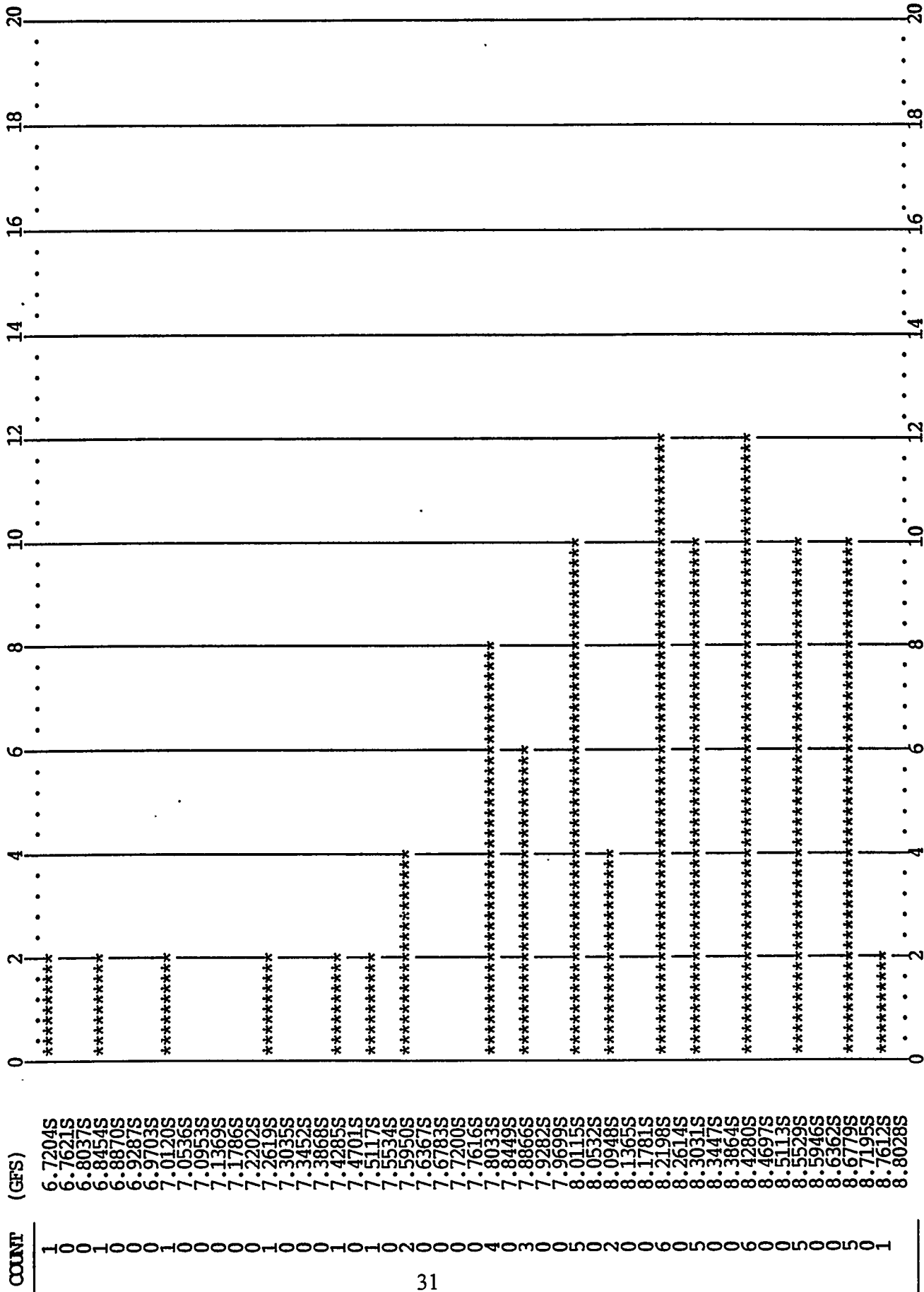
50

STEP COUNT=50 STEP SIZE= 1.1856V

PERCENTAGE



STEP COUNT=50 STEP SIZE= 39.473MS



TOTAL

50

STEP COUNT=50 STEP SIZE= 41.648MS

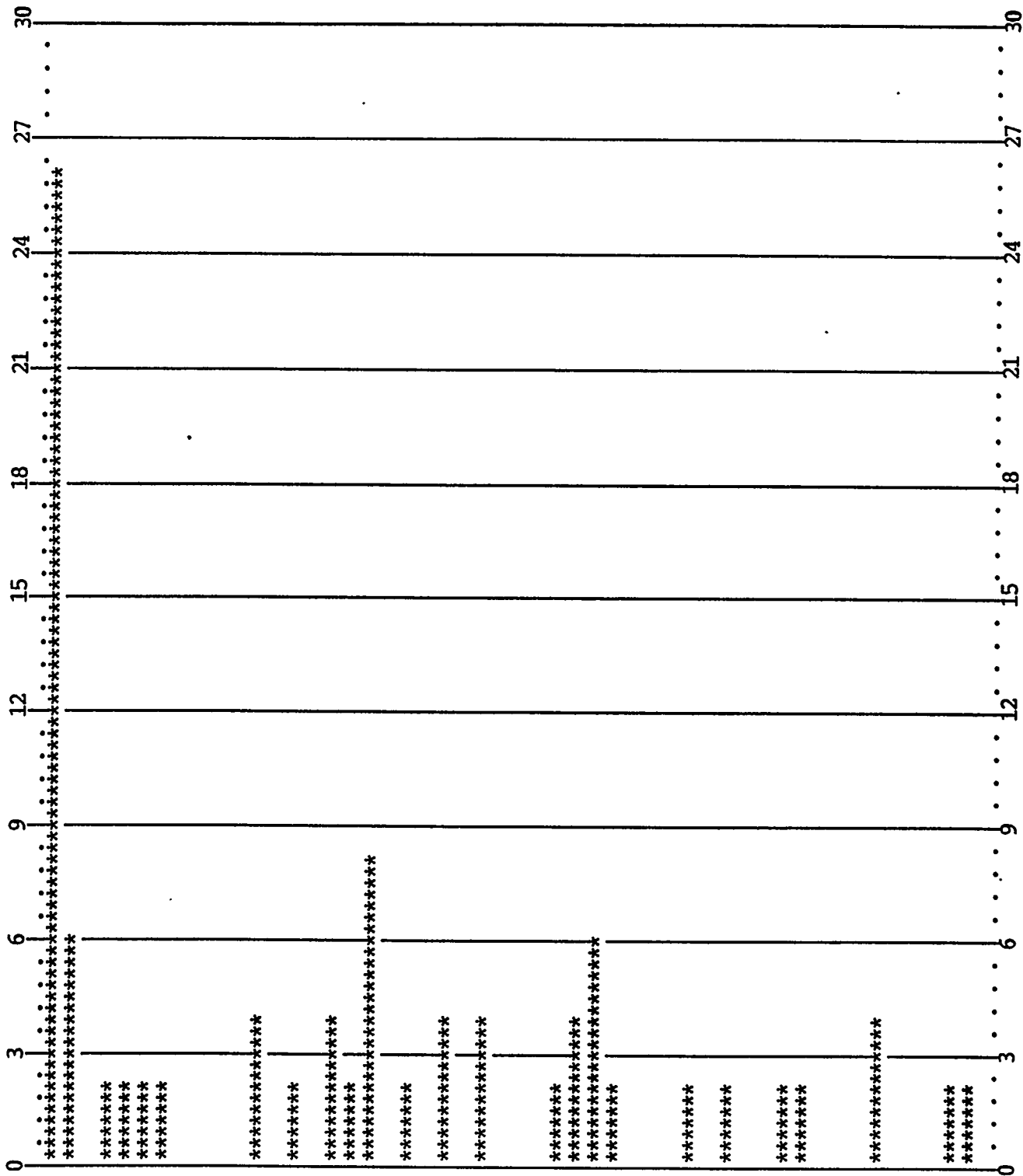
TESTS REFERENCED IN THE SORTS OF THE RUN FILE.

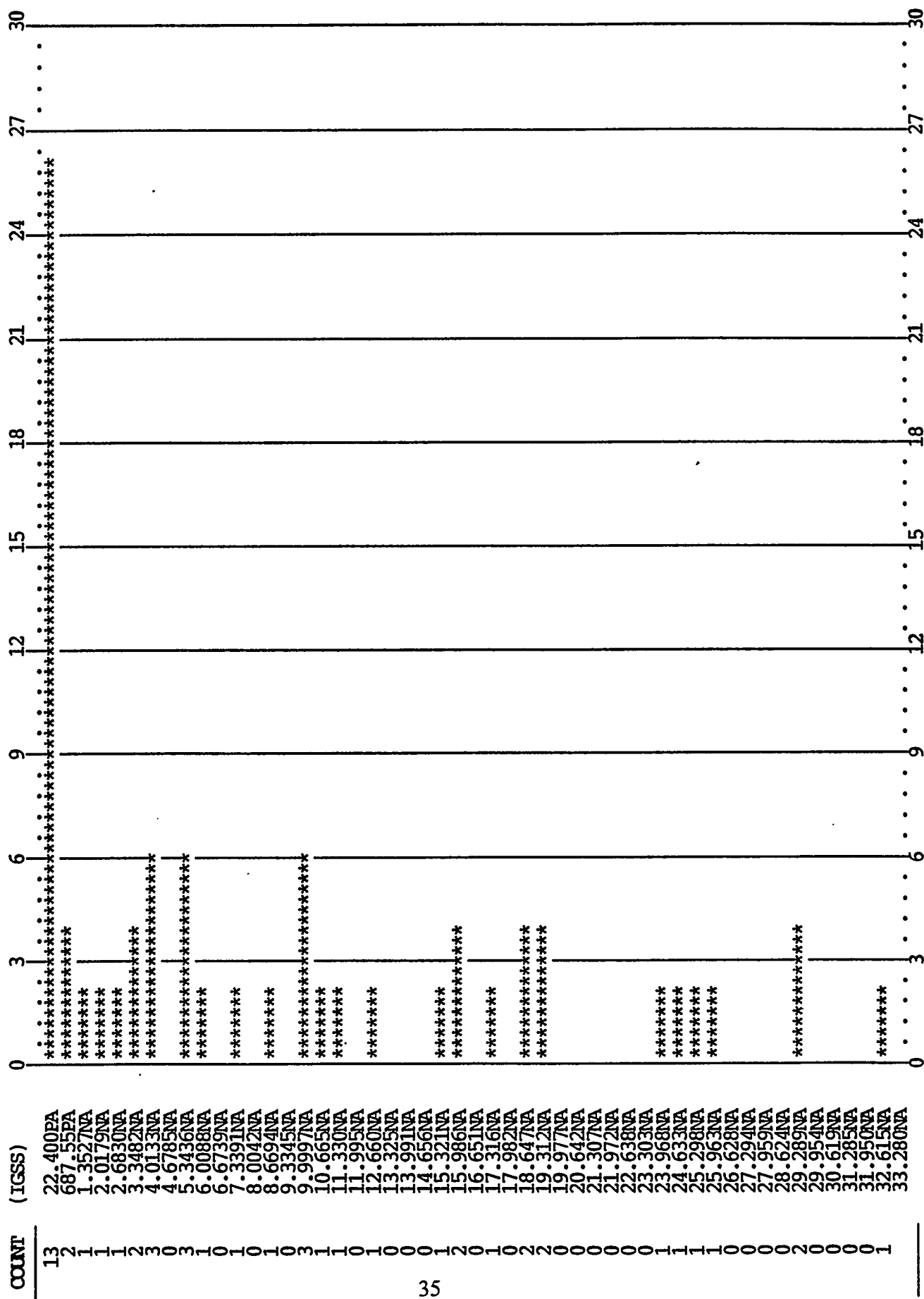
TEST NO.	TEST TYPE	FORCING CONDITIONS		TEST LIMITS		COF	AUTO MEAS. RNG? RANGE	TEST TIMES (MS)
		BIAS#1	BIAS#2	BIAS#3	MINIMUM	MAXIMUM		
41	IGSS	VGS= 20.000V	V4S= OPEN		100.000V	A 0.1	YES	100NA 2,10,25,175,1500
42	IGSS	VGS=-20.000V	V4S= OPEN		100.000V	A 0.1	YES	100NA 2,10,25,175,1500
43	VIHL	ID = 1.0000MA	V4S= OPEN		5.0000V	A 0.1	YES	100NA 2
44	VIHL	CMP= 6.0000V						
44	VIHL	ID = 250.000A	V4S= OPEN		2.0000V	A 0.1	YES	2
45	IDSX	CMP= 6.0000V						
45	IDSX	VDS= 450.00V	VGS= 0.0000V	V4S= OPEN	1.0000V	A 0.1	YES	1MA 2,10,25,175,1500
46	RDSP	ID = 4.7000A	VGS= 12.000V	V4S= OPEN	600.000V	A 0.1	YES	300US
46	RDSP	CMP= 5.0000V	CMP= 3.0000MA					
47	BVDSX	ID = 1.0000MA	VGS= 0.0000V	V4S= OPEN	450.00V	A 0.1	YES	5
200	KEL	CMP= 650.00V						
200	KEL	IK = 50.000MA			1.0000V	A 0.1	NO	1
200	KEL	CMP= 10.000V						

TEST# -SEG	TYPE	COUNT	LOW SKEW	MEAN KURTOSIS	HIGH CPK(- 3)	STANDARD 1SD	DEVIATION 3SD	5%	PERCENTILE 50%	95%	PASS% NORM
41-1	IGSS	50	4.1600PA -216.23M	3.7297NA -224.98M	32.772NA 2.2214	14.446NA	43.338NA	37.080PA	10.496NA	29.312NA	100.00% YES
42-1	IGSS	50	22.400PA 363.85M	3.8620NA -282.06M	33.280NA 2.4521	13.069NA	39.207NA	172.00PA	5.9388NA	29.508NA	100.00% YES
43-1	VIH1	50	3.4924V -86.964M	3.6148V -12.007M	3.7380V 9.4565	48.829MV	146.49MV	3.5352V	3.6108V	3.6852V	100.00% YES
44-1	VIH1	50	3.3876V -53.829M	3.5082V -74.656M	3.6312V 10.262	48.460MV	145.38MV	3.4324V	3.5044V	3.5760V	100.00% YES
45-1	IDSX	50	2.0864NA 6.6178	11.816UA 42.800	553.88UA 4.2036	78.360UA	235.08UA	5.2224NA	17.148NA	1.7960UA	100.00% NO
46-1	RDSP	50	178.66MO 542.04M	201.06MO -309.15M	230.49MO 11.443	11.621MO	34.863MO	186.28MO	198.94MO	220.97MO	100.00% NO
47-1	BVDSX	50	486.12V -139.51M	518.85V -1.0968	542.80V 1.4151	16.217V	48.652V	489.00V	516.52V	540.84V	100.00% NO

COUNT	(IGSS)
13	4.1600PA
3	659.52PA
0	1.3149NA
1	1.9702NA
1	2.6256NA
1	3.2809NA
1	3.9363NA
0	4.5917NA
0	5.2470NA
0	5.9024NA
0	6.5577NA
2	7.2131NA
0	7.8684NA
1	8.5238NA
0	9.1792NA
2	9.8345NA
1	10.490NA
4	11.145NA
0	11.801NA
1	12.456NA
0	13.111NA
2	13.767NA
0	14.422NA
2	15.077NA
0	15.733NA
0	16.388NA
0	17.043NA
1	17.699NA
2	18.354NA
3	19.010NA
1	19.665NA
0	20.320NA
0	20.976NA
0	21.631NA
1	22.286NA
0	22.942NA
1	23.597NA
0	24.252NA
0	24.908NA
1	25.563NA
1	26.218NA
0	26.874NA
0	27.529NA
0	28.185NA
2	28.840NA
0	29.495NA
0	30.151NA
0	30.806NA
1	31.461NA
1	32.117NA
1	32.772NA
50	TOTAL

PERCENTAGE

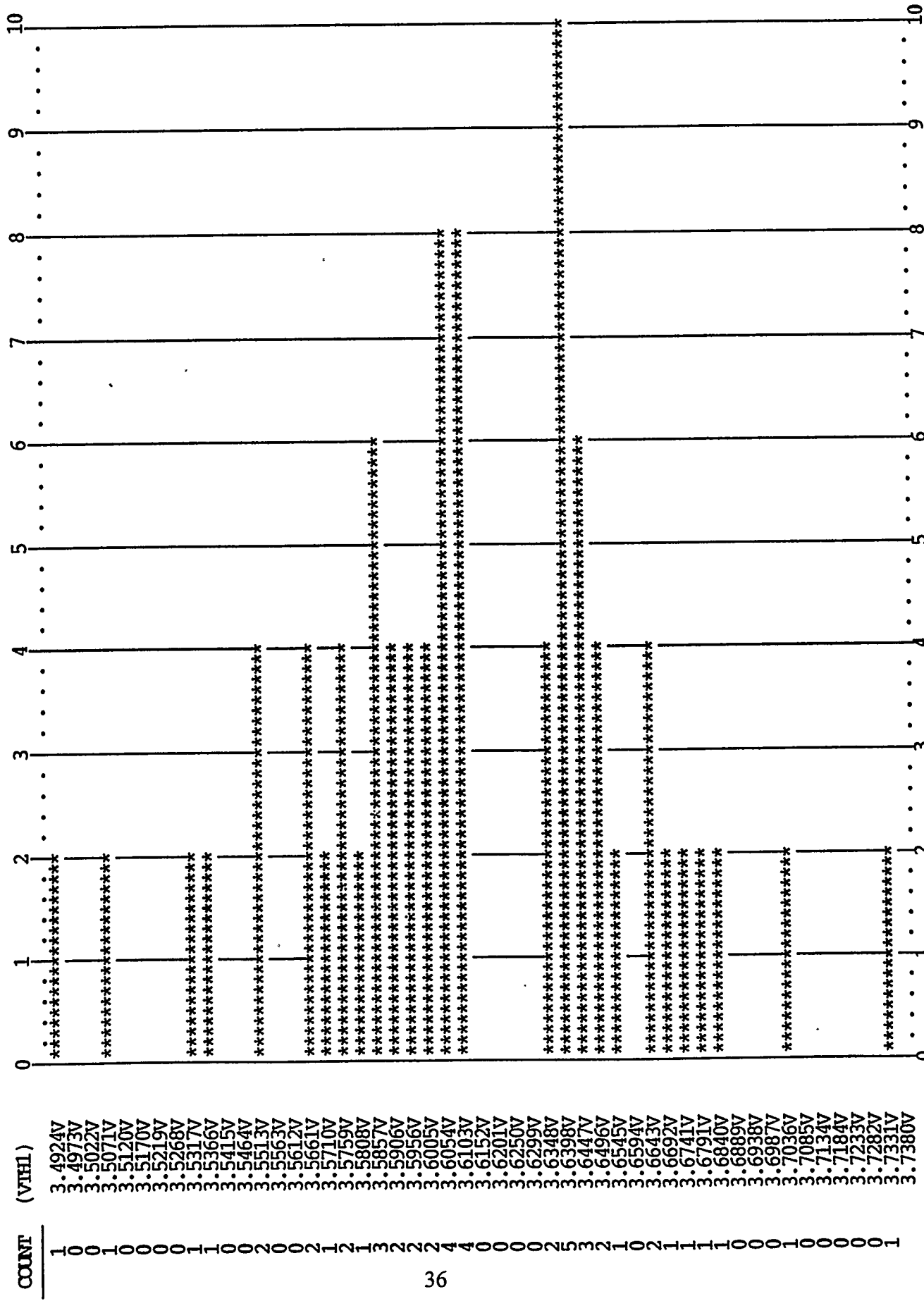




50 TOTAL

STEP COUNT=50 STEP SIZE= 665.15PA

PERCENTAGE

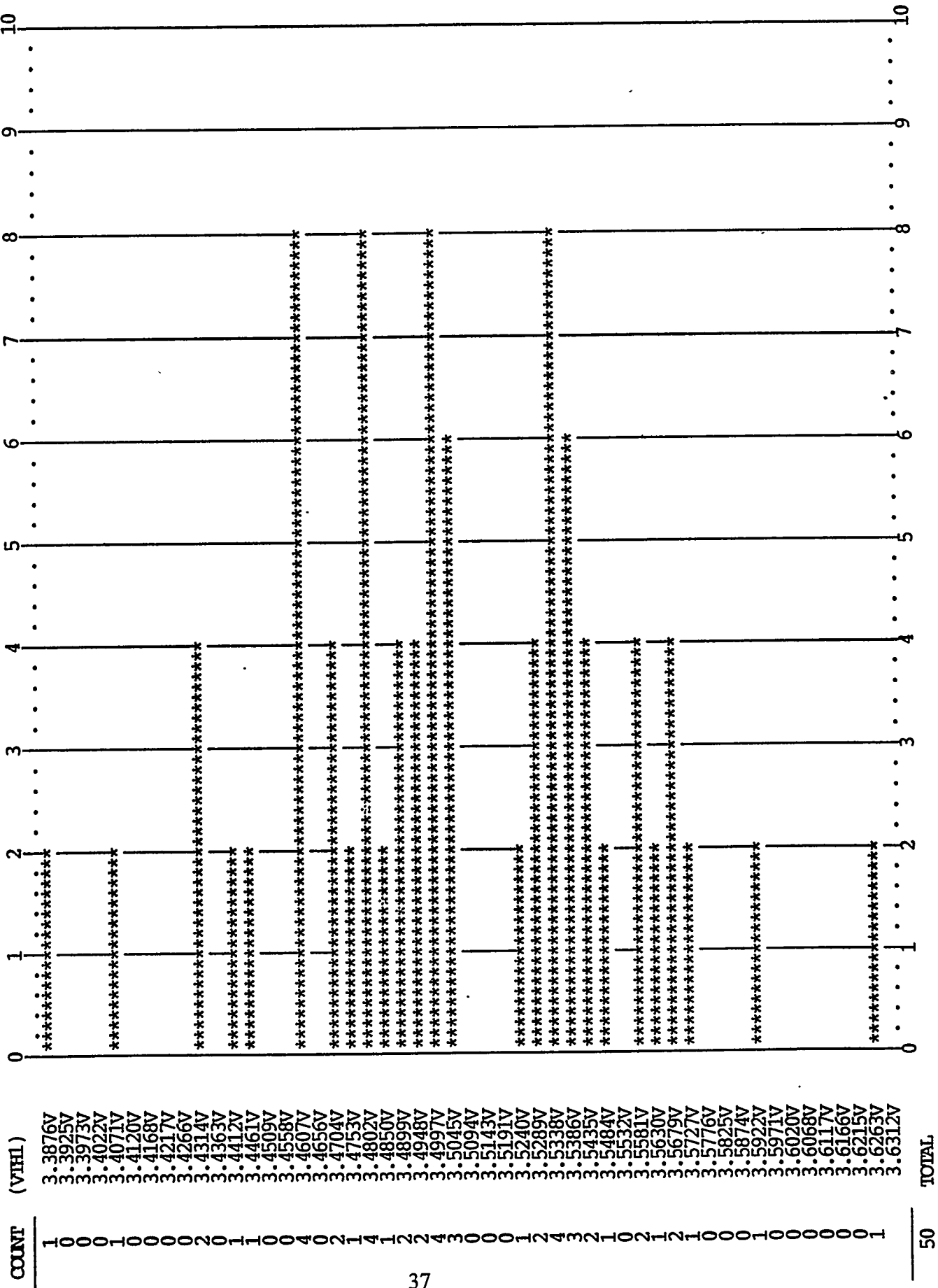


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TOTAL

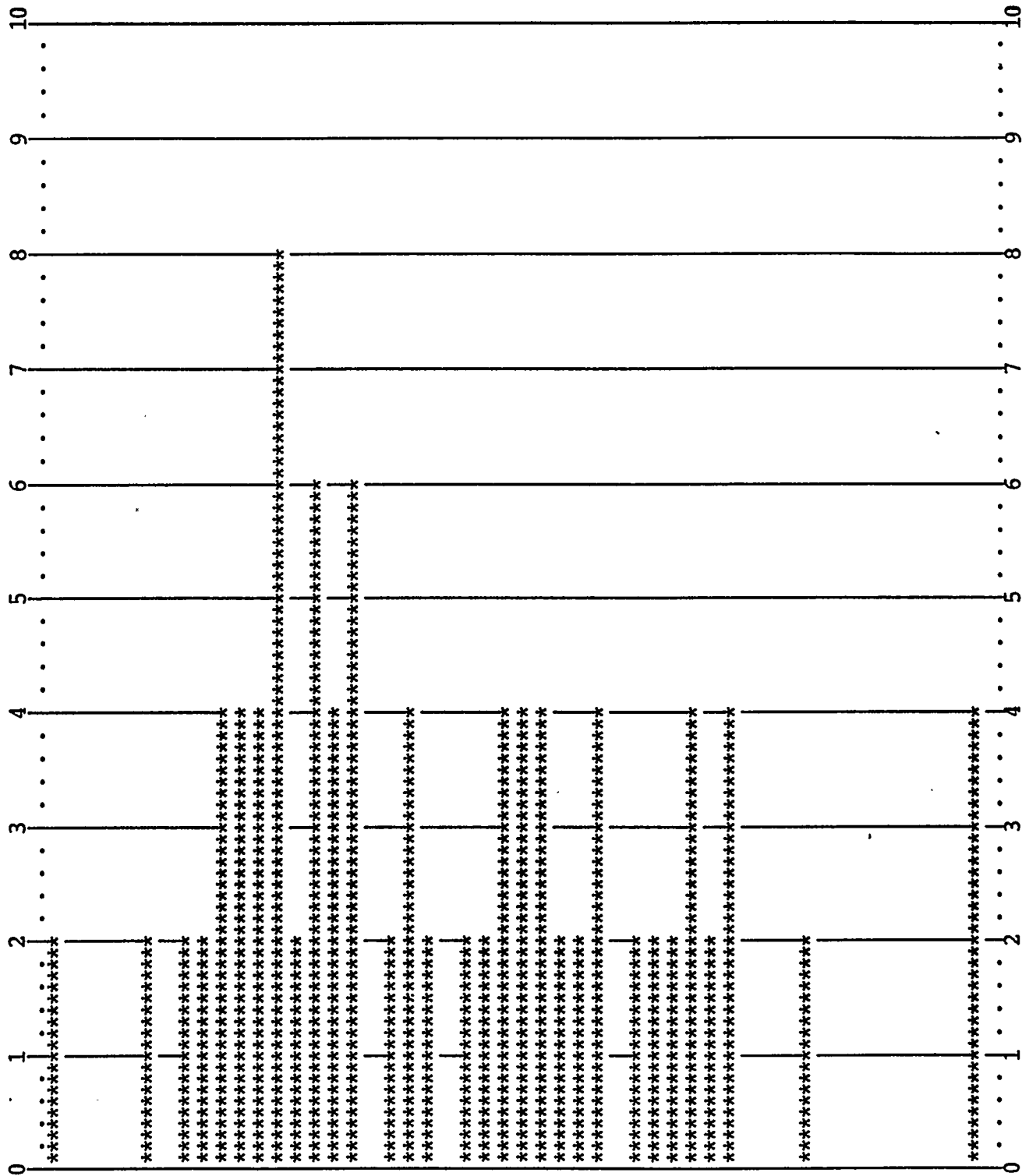
STEP COUNT=50

STEP SIZE= 4.9120mV

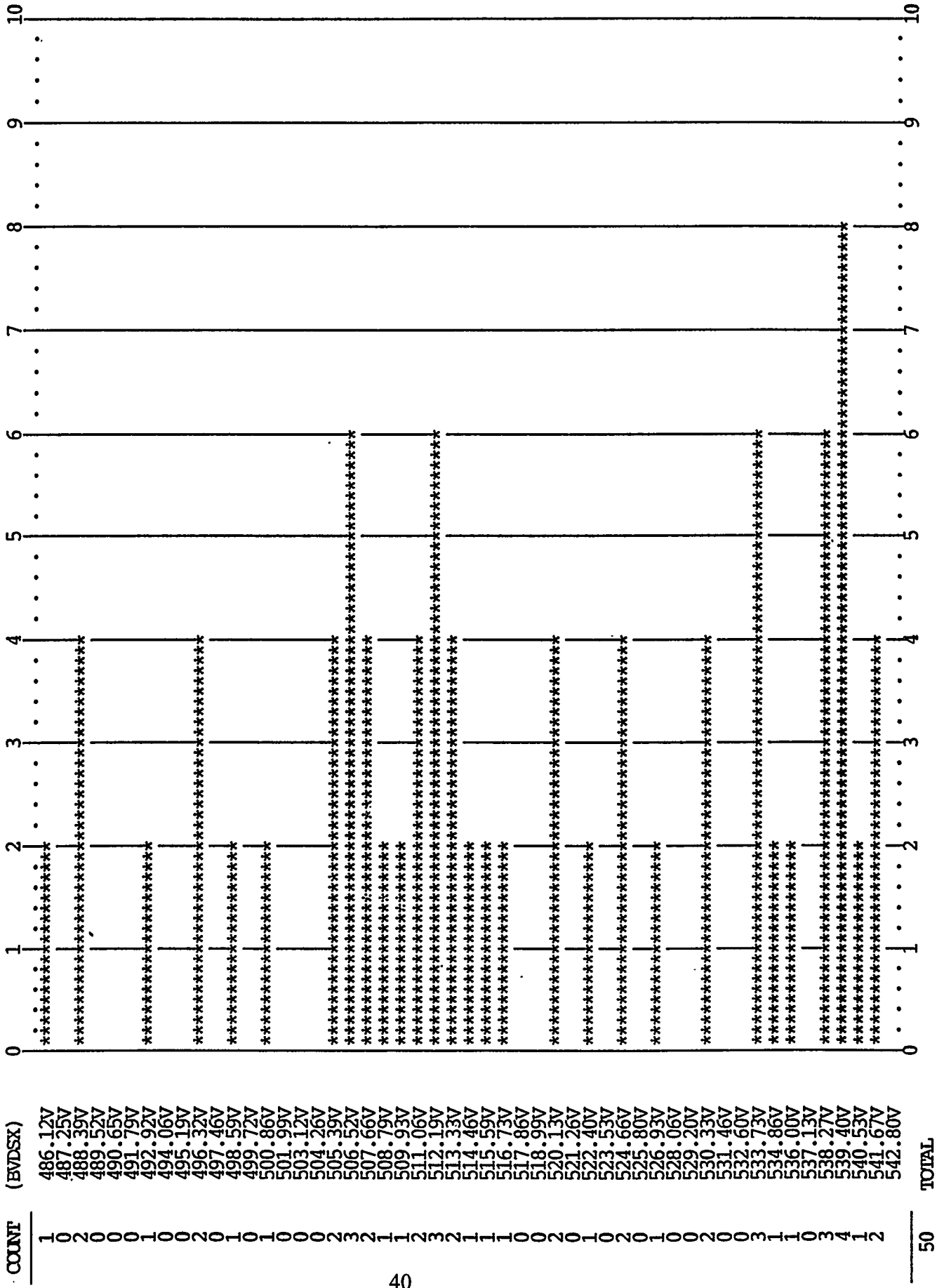


COUNT	(RDSP)
1	178.66MO
0	179.69MO
0	180.73MO
0	181.77MO
0	182.80MO
1	183.84MO
0	184.87MO
1	185.91MO
1	186.95MO
2	187.98MO
2	189.02MO
2	190.06MO
4	191.09MO
1	192.13MO
3	193.17MO
2	194.20MO
3	195.24MO
0	196.28MO
1	197.31MO
2	198.35MO
1	199.39MO
0	200.42MO
1	201.46MO
1	202.50MO
2	203.53MO
2	204.57MO
2	205.61MO
1	206.64MO
1	207.68MO
2	208.72MO
0	209.75MO
1	210.79MO
1	211.83MO
1	212.86MO
2	213.90MO
1	214.94MO
2	215.97MO
0	217.01MO
0	218.05MO
0	219.08MO
1	220.12MO
0	221.16MO
0	222.19MO
0	223.23MO
0	224.27MO
0	225.30MO
0	226.34MO
0	227.38MO
0	228.41MO
2	229.45MO
	230.49MO
50	TOTAL

PERCENTAGE



STEP COUNT=50 STEP SIZE= 1.0366MO

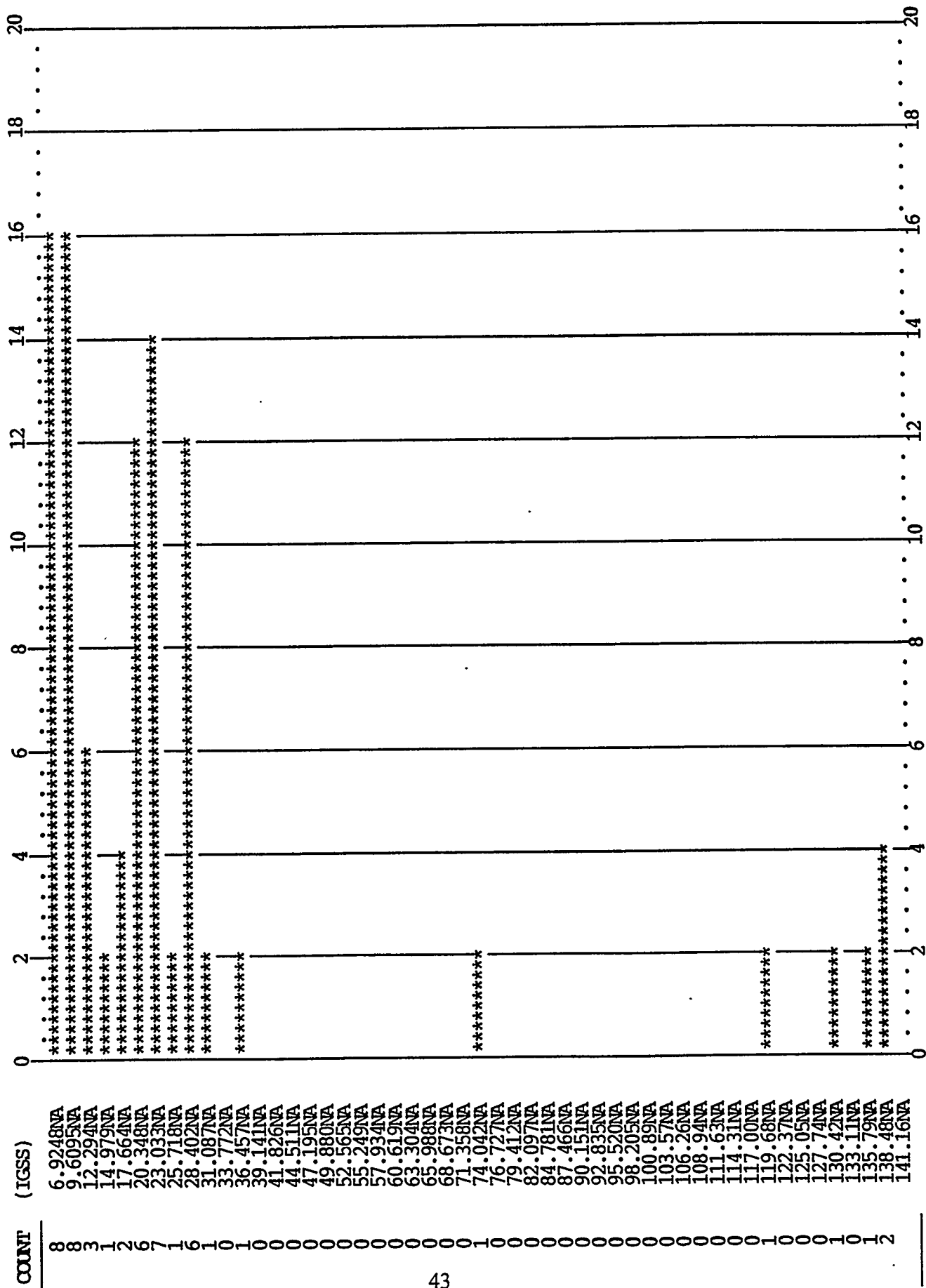


TESTS REFERENCED IN THE SORTS OF THE RUN FILE.

TEST NO.	TEST TYPE	FORCING CONDITIONS		TEST LIMITS		COP	COF	AUTO MEAS. RANG? RANGE	TEST TIMES (MS)
		BIAS#1	BIAS#2	BIAS#3	MINIMUM	MAXIMUM	A	S	PLC
61	IGSS	VGS= 20.000V	V4S= OPEN			200.00NA	A	0.1	
62	IGSS	VGS=-20.000V	V4S= OPEN			200.00NA	A	0.1	
63	VH1	ID = 1.0000MA	V4S= OPEN		1.0000V	5.0000V	A	0.1	
		CMF= 6.0000V							
64	VH1	ID = 250.001A	V4S= OPEN		2.0000V	5.0000V	A	0.1	
		CMF= 6.0000V							
65	IDSX	VDS= 400.00V	VGS= 0.0000V	V4S= OPEN		1.0000MA	A	0.1	
66	IDSX	VDS= 300.00V	VGS= 0.0000V	V4S= OPEN		30.0000UA	A	0.1	
67	RDSP	ID = 4.7000A	VGS= 12.000V	V4S= OPEN		1.2500O	A	0.1	
		CMF= 6.0000V	CMF= 3.0000MA						
68	BVDSX	ID = 1.0000MA	VGS= 0.0000V	V4S= OPEN	500.00V				
		CMF= 650.00V							
200	KEL	IK = 50.000MA				1.0000V	A	0.1	
		CMF= 10.000V							

TEST# -SEG	TYPE	COUNT	LOW SKEW	MEAN KURTOSIS	HIGH CFK(3)	STANDARD DEVIATION 1SD	3SD	5%	PERCENTILE 50%	95%	PASS% NORM
61-1	IGSS	50	6.9248NA 2.2079	31.415NA 3.5234	141.16NA 1.5428	36.424NA	109.27NA	7.7136NA	22.400NA	137.00NA	100.00%
62-1	IGSS	50	-9.2412NA -2.1171	-36.316NA 2.9208	-151.36NA 1.3937	39.147NA	117.44NA	11.644NA	25.532NA	142.72NA	100.00%
63-1	VIH1	50	2.2828V -120.26M	2.3454V -441.45M	2.4092V 14.976	29.947MV	89.841MV	2.2884V	2.3484V	2.3976V	100.00%
64-1	VIH1	50	2.0588V -72.499M	2.1157V -604.57M	2.1756V 1.3594	28.380MV	85.140MV	2.0620V	2.1172V	2.1624V	100.00%
65-1	IDSX	50	1.5976UA 4.5395	3.8753UA 23.971	24.656UA 96.583	3.4379UA	10.314UA	1.8396UA	3.0720UA	8.8060UA	100.00%
66-1	IDSX	50	1.4184UA 2.7422	3.1571UA 10.337	11.716UA 5.2266	1.7120UA	5.1359UA	1.6788UA	2.8092UA	5.7592UA	100.00%
67-1	RDSP	50	654.30MO 247.46M	746.59MO -780.59M	841.36MO 3.9753	42.212MO	126.64MO	682.72MO	740.26MO	818.89MO	100.00%
68-1	BVDSX	50	582.44V -391.84M	629.11V -542.25M	649.88V 2.5248	17.046V	51.137V	603.96V	625.72V	649.84V	100.00%

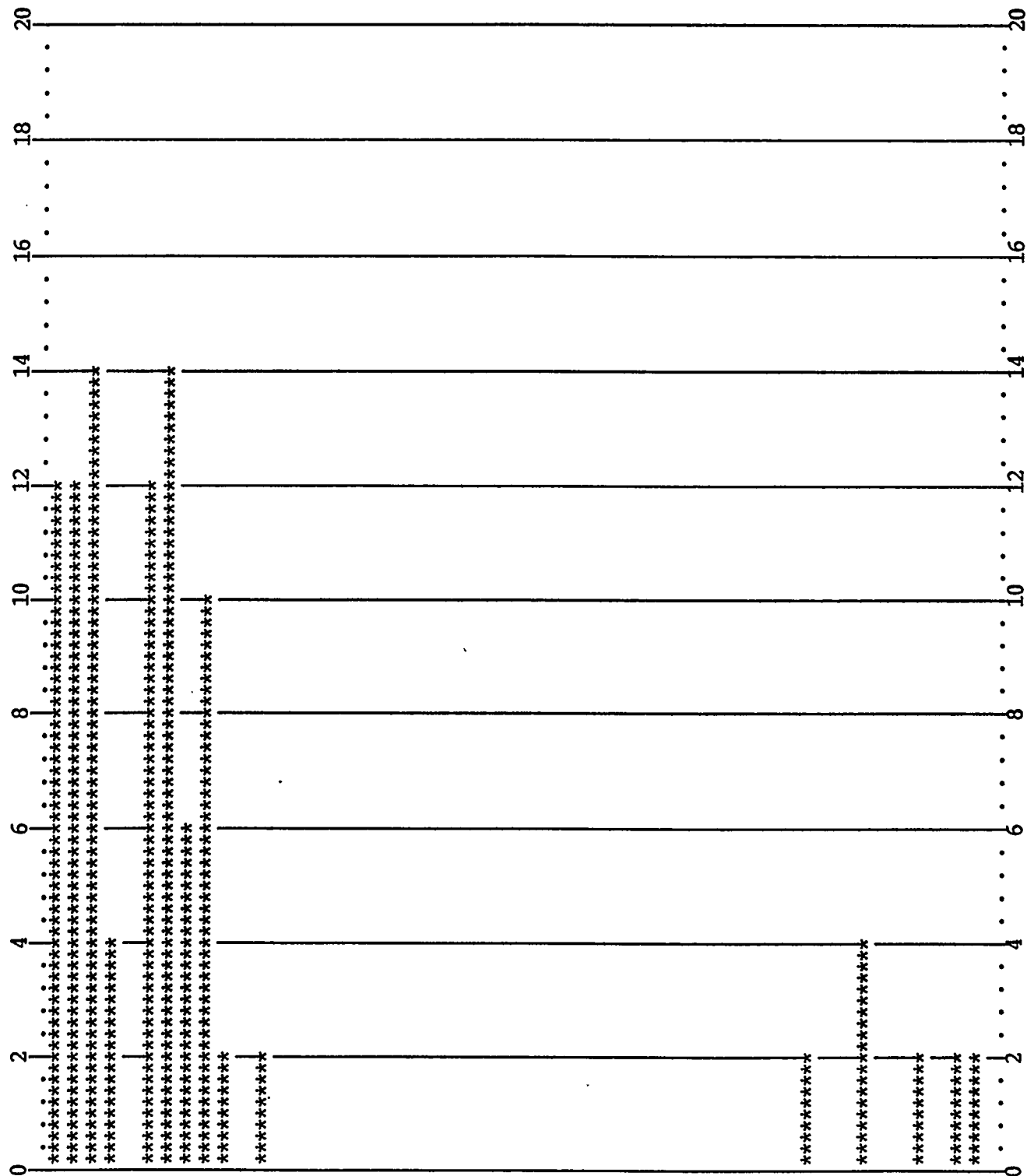
PERCENTAGE



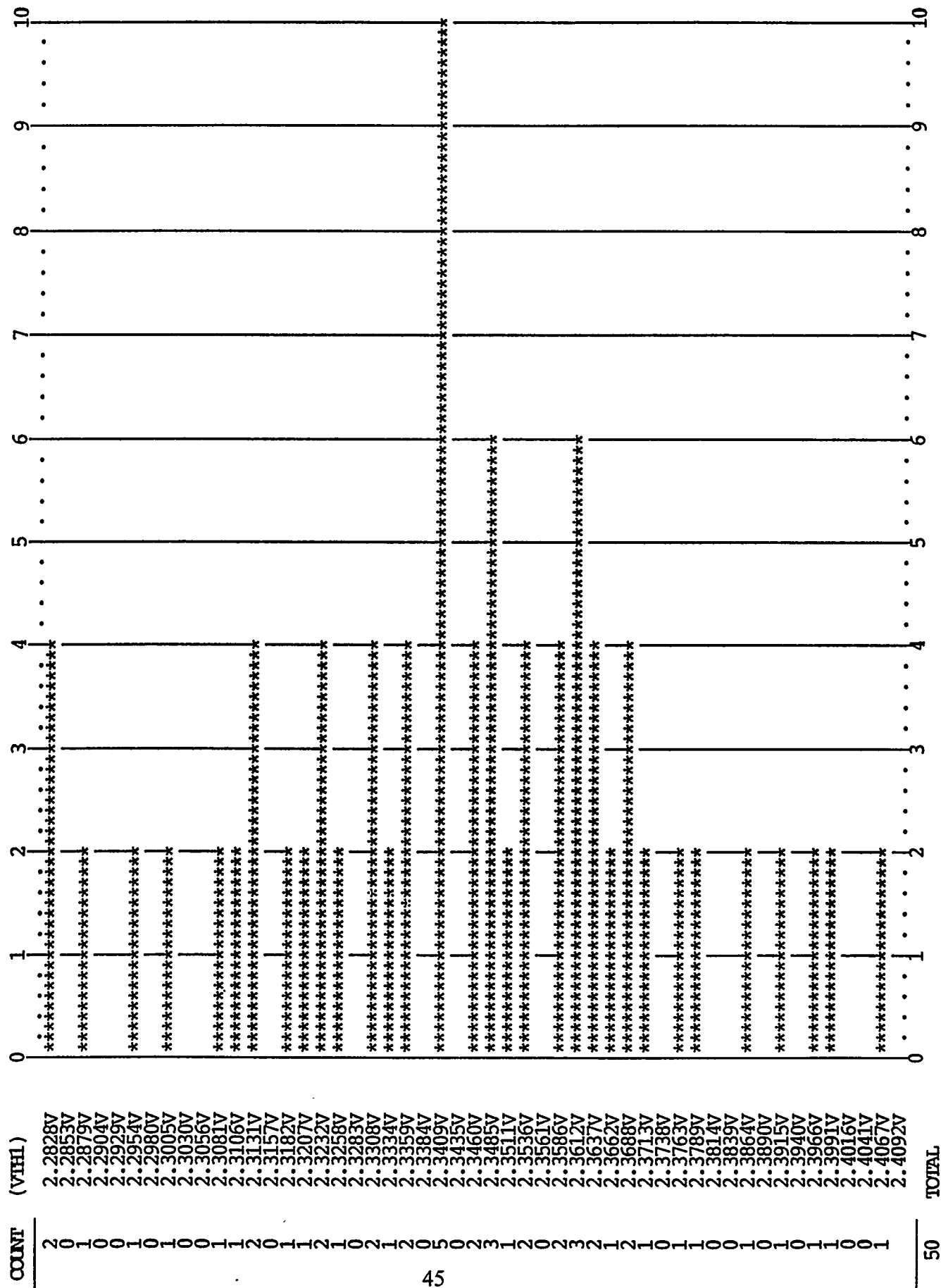
STEP COUNT=50 STEP SIZE= 2.6847NA

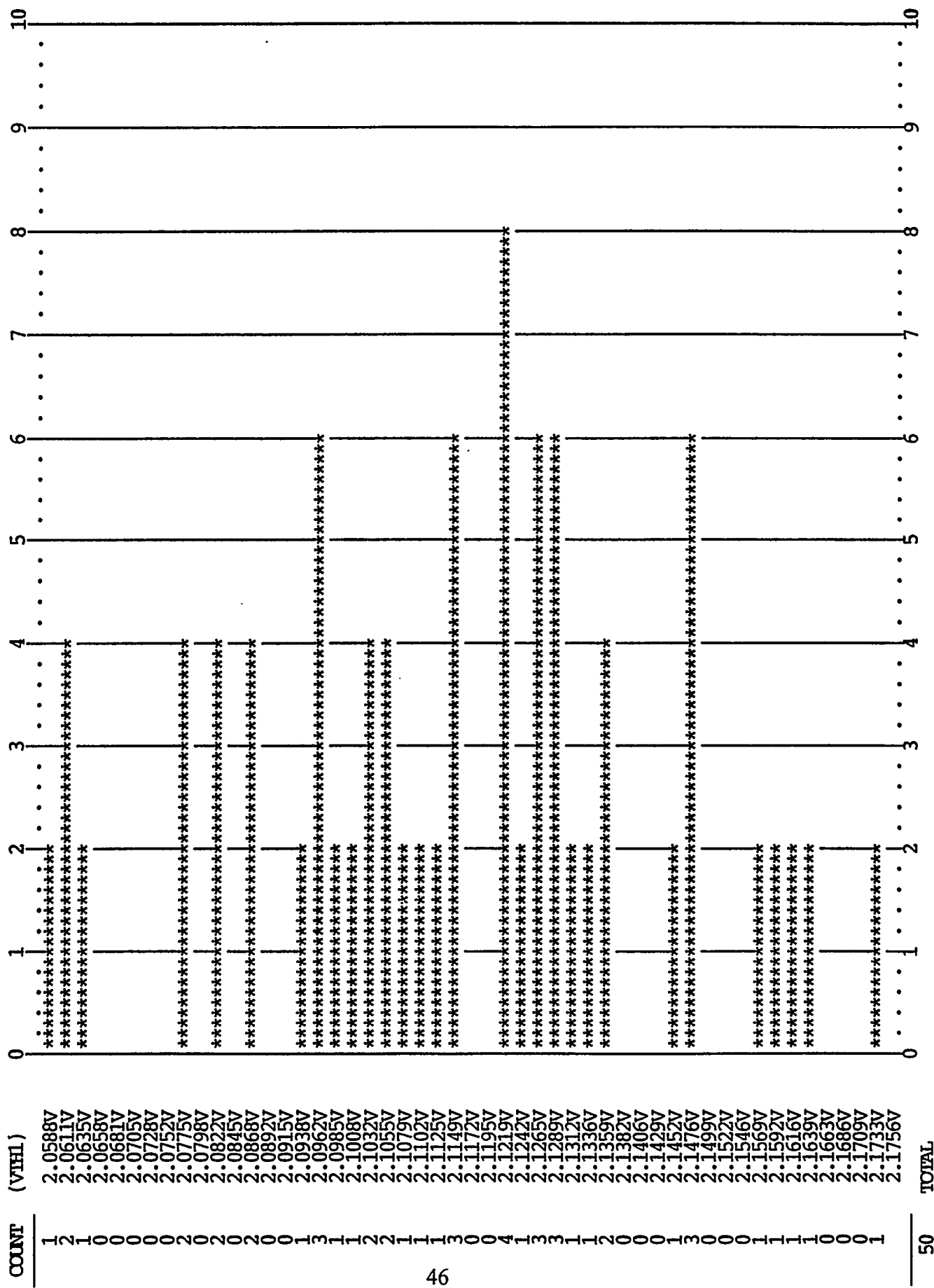
COUNT	(IGSS)
6	9.2412NA
6	12.084NA
7	14.926NA
2	17.768NA
0	20.611NA
6	23.453NA
7	26.295NA
3	29.138NA
5	31.980NA
1	34.823NA
0	37.665NA
1	40.507NA
0	43.350NA
0	46.192NA
0	49.034NA
0	51.877NA
0	54.719NA
0	57.562NA
0	60.404NA
0	63.246NA
0	66.089NA
0	68.931NA
0	71.773NA
0	74.616NA
0	77.458NA
0	80.301NA
0	83.143NA
0	85.985NA
0	88.828NA
0	91.670NA
0	94.512NA
0	97.355NA
0	100.20NA
0	103.04NA
0	105.88NA
0	108.72NA
0	111.57NA
0	114.41NA
0	117.25NA
0	120.09NA
1	122.94NA
0	125.78NA
0	128.62NA
2	131.46NA
0	134.31NA
0	137.15NA
1	139.99NA
0	142.83NA
1	145.68NA
1	148.52NA
	151.36NA
50	TOTAL

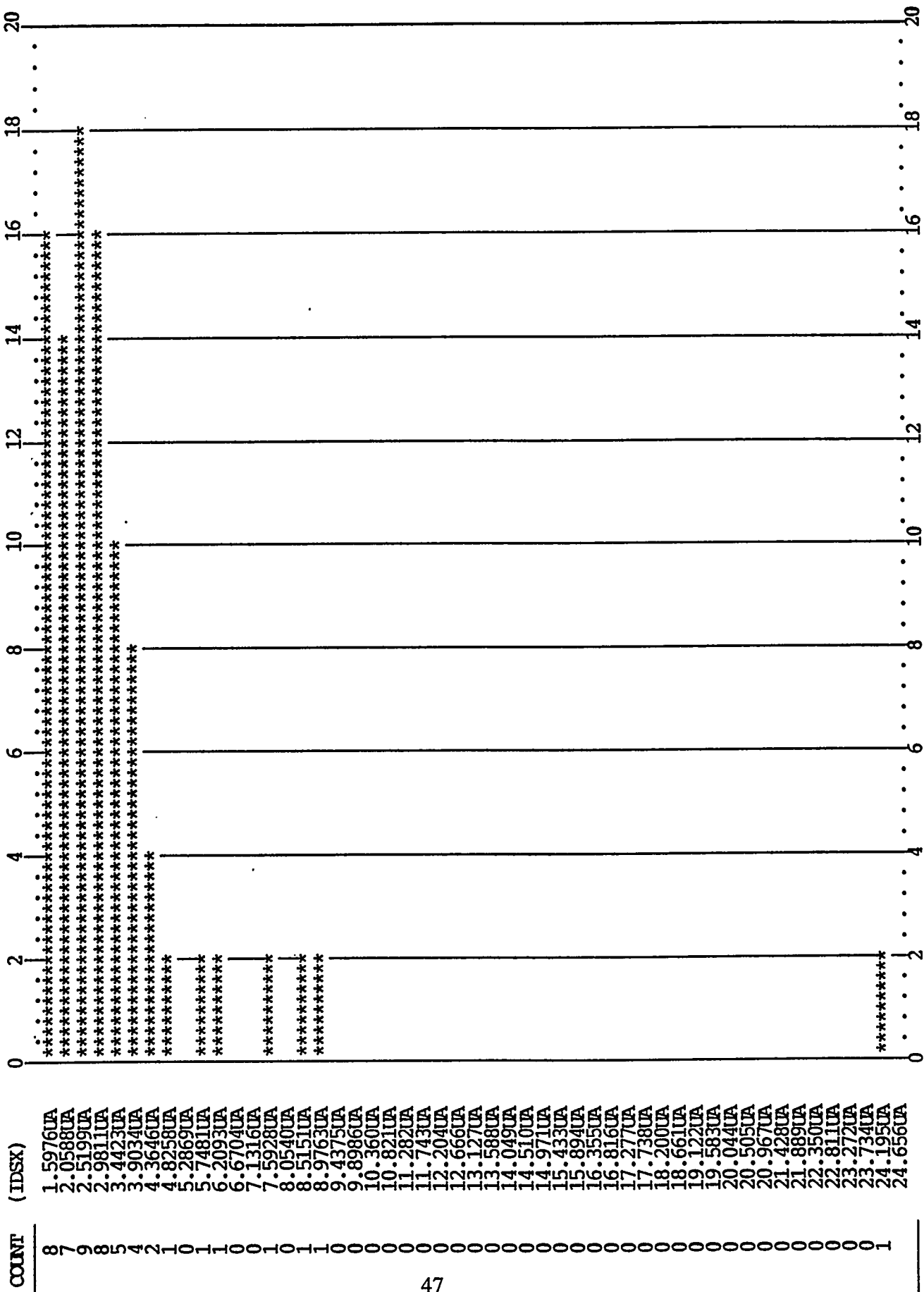
PERCENTAGE



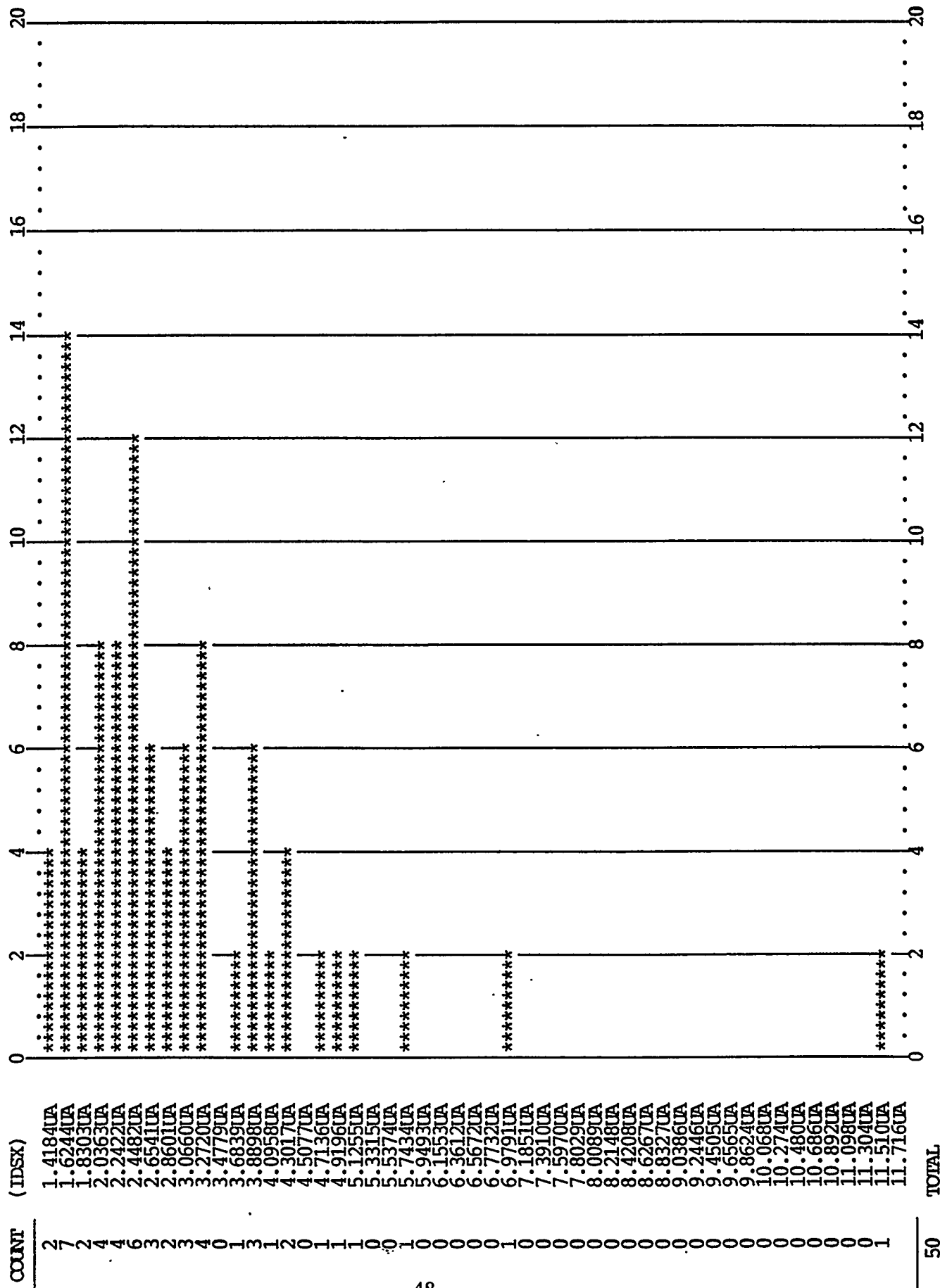
STEP COUNT=50 STEP SIZE= 2.8424NA

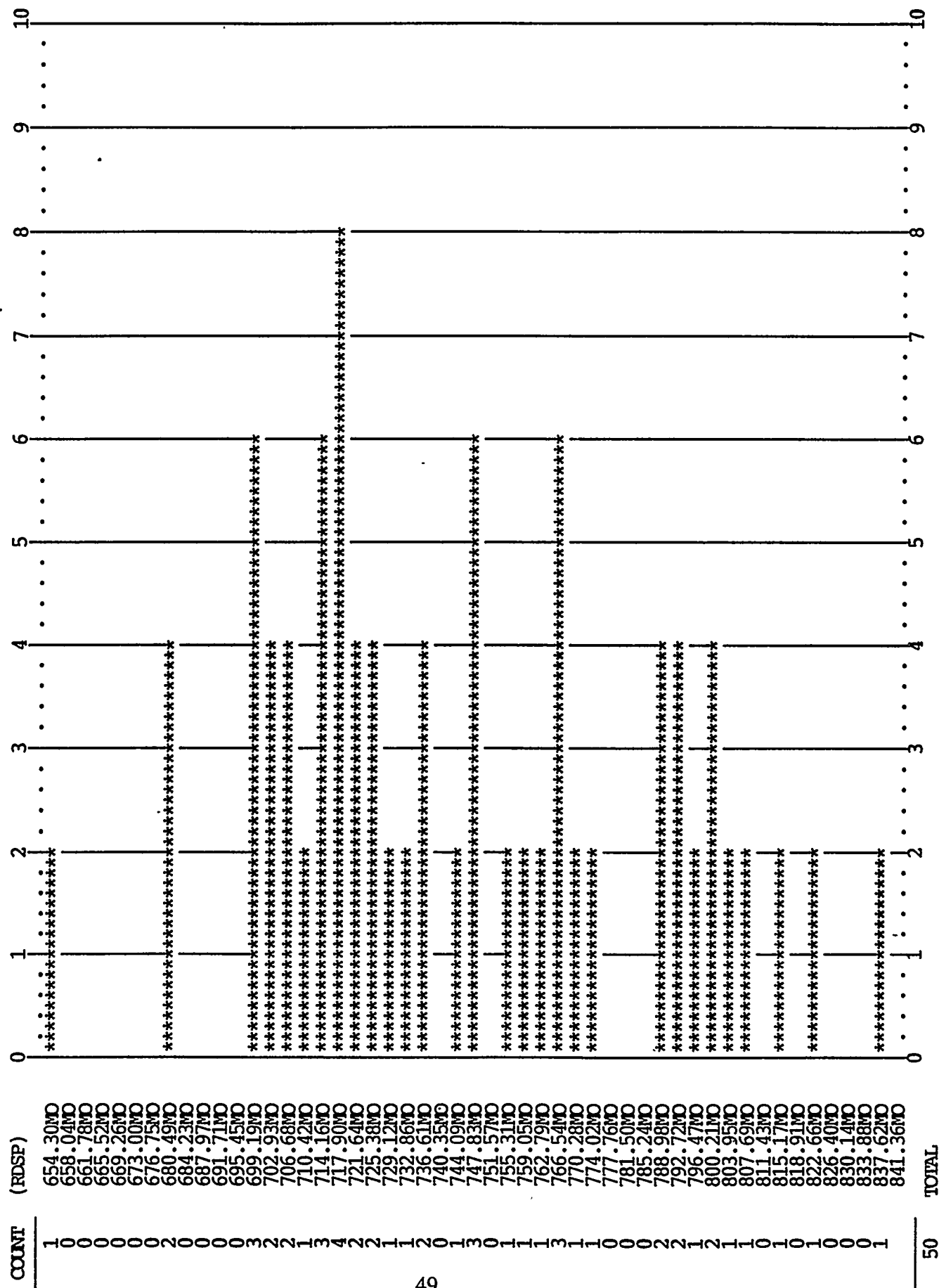






STEP COUNT=50 STEP SIZE= 461.17NA







KANSAS CITY DIVISION
KCD 1280 GED

SWITCHING TIME TEST RESULTS

Date: 6-28-1994

Time 14:34

Device: SA3654

Lot Number: 9230

Operator: THE SHIRL

POLARITY : N

Id PEAK [A]: 11.00

Vdd(suppl) [V]: 275.00

Id(supply) [A]: 1.60

Pers. Bd. ID: SA3654

Total bin 1 (PASS): 30

Total bin 2 (FAIL): 0

Result	Mean	Standard Deviation
td on (ns)	19.71	0.37
trise (ns)	6.97	0.24
td off (ns)	57.97	0.97
tfall (ns)	9.17	0.59

Unit	td(on)	tr	td(off)	tf	Bin
13	20.00	7.00	59.60	9.09	PASS
14	19.20	7.00	59.20	9.80	PASS
110	20.40	6.63	59.40	9.53	PASS
111	20.00	6.98	59.20	9.31	PASS
112	20.00	6.73	59.00	9.55	PASS
119	19.60	6.74	59.20	9.50	PASS
124	20.00	6.70	59.80	9.69	PASS
125	20.00	6.74	59.00	10.14	PASS
130	20.00	6.83	59.00	9.60	PASS
132	20.00	6.77	59.00	8.87	PASS
133	20.00	6.70	59.00	8.60	PASS
135	20.00	6.70	59.80	9.50	PASS
137	19.60	6.70	59.40	9.45	PASS
138	20.40	6.90	59.80	10.13	PASS
139	20.00	7.01	59.40	9.47	PASS
24	19.60	7.33	59.00	9.15	PASS
23	19.60	7.10	59.00	9.60	PASS
26	18.80	7.00	59.60	9.05	PASS
215	20.00	7.20	59.40	9.13	PASS
218	19.60	7.24	59.80	8.65	PASS
220	19.20	6.76	59.20	9.20	PASS
222	19.20	7.07	59.20	9.00	PASS
227	19.60	7.50	59.80	7.87	PASS
232	19.60	7.12	59.40	8.50	PASS
234	19.20	7.15	59.80	8.36	PASS
235	19.60	7.33	59.00	9.20	PASS
236	19.60	7.53	59.20	7.75	PASS
237	19.20	6.90	59.20	9.50	PASS
32	19.60	6.80	59.80	9.75	PASS
33	19.60	7.03	59.00	8.90	PASS

SWITCHING TIME TEST RESULTS

Date: 6-28-1994

Time 14:46

Device: SA3654

Lot Number: 9230

Operator: THE SHIRL

POLARITY: N

Id PEAK [A]: 11.00

Vdd(suppl) [V]: 275.00

Id(supply) [A]: 1.60

Pers. Bd. ID: SA3654

Total bin 1 (PASS): 16

Total bin 2 (FAIL): 0

Result	Mean	Standard Deviation
td on (ns)	19.53	0.32
trise (ns)	6.89	0.19
td off (ns)	58.25	0.80
tfall (ns)	9.26	0.38

Unit	td(on)	tr	td(off)	tf	Bin
34	20.00	7.07	56.80	9.56	PASS
35	19.60	7.23	57.20	9.44	PASS
310	19.60	6.90	58.40	9.16	PASS
752	19.60	6.76	57.20	9.45	PASS
754	18.80	6.73	58.00	10.00	PASS
756	19.60	6.90	58.40	8.53	PASS
757	19.60	6.78	58.40	8.78	PASS
763	18.80	6.82	58.80	9.43	PASS
766	19.60	6.72	60.40	8.70	PASS
767	19.60	6.72	58.00	9.85	PASS
768	19.60	6.83	58.80	9.09	PASS
771	19.60	6.87	58.40	9.37	PASS
775	19.60	6.80	58.40	9.45	PASS
776	19.20	6.94	58.00	9.31	PASS
780	19.60	6.70	58.80	9.05	PASS
81	20.00	7.40	58.00	9.04	PASS

APPENDIX B

Characterization Test Program and Statistical Test Data

FET/TEST TEST PROGRAM

```

REM =SA3654 CHARACTERIZATION TESTING GMM      TEST FILE="3654CHR.TES"
DATE=6/9/94
TEST CHECKSUM=826CH      FILE CHECKSUM=42DBH

TEST NUMBER= 1          TEST TYPE=ICSS          FWR LIN CY= 0.1
COVER ON PASS= 0        COVER ON FAIL= 0        V4S=OPEN
VGS = 20.000V           ( 10NA= 25) ( 1NA= 175) (100PA= 1500)
TEST TIME(MS)= 2 (10NA= 10) IG(MIN)=NONE      IG(MAX)= 300.00NA IG(RNG)=1UA
AUTO RNG=YES [A] IG(MIN)=NONE

TEST NUMBER= 2          TEST TYPE=ICSS          FWR LIN CY= 0.1
COVER ON PASS= 0        COVER ON FAIL= 0        V4S=OPEN
VGS =-20.000V           ( 10NA= 10) ( 1NA= 175) (100PA= 1500)
TEST TIME(MS)= 2 (10NA= 10) IG(MIN)=NONE      IG(MAX)= 300.00NA IG(RNG)=1UA
AUTO RNG=YES [A] IG(MIN)=NONE

TEST NUMBER= 3          TEST TYPE=VIH1          FWR LIN CY= 0.1
COVER ON PASS= 0        COVER ON FAIL= 0        V4S=OPEN
ID = 100.00NA           ( 10NA= 25) ( 1NA= 175) (100PA= 1500)
COMP= 15.000V           IG(MIN)=NONE           IG(MAX)= 300.00NA IG(RNG)=1UA
TEST TIME(MS)= 2 VGS(MIN)=NONE                 VGS(MAX)= 10.000V
AUTO RNG=YES [A] VGS(MIN)=NONE

TEST NUMBER= 4          TEST TYPE=VIH1          FWR LIN CY= 0.1
COVER ON PASS= 0        COVER ON FAIL= 0        V4S=OPEN
ID = 500.00NA           ( 10NA= 25) ( 1NA= 175) (100PA= 1500)
COMP= 15.000V           IG(MIN)=NONE           IG(MAX)= 300.00NA IG(RNG)=1UA
TEST TIME(MS)= 2 VGS(MIN)=NONE                 VGS(MAX)= 10.000V
AUTO RNG=YES [A] VGS(MIN)=NONE

TEST NUMBER= 5          TEST TYPE=VIH1          FWR LIN CY= 0.1
COVER ON PASS= 0        COVER ON FAIL= 0        V4S=OPEN
ID = 1.0000UA           ( 10NA= 25) ( 1NA= 175) (100PA= 1500)
COMP= 15.000V           IG(MIN)=NONE           IG(MAX)= 300.00NA IG(RNG)=1UA
TEST TIME(MS)= 2 VGS(MIN)=NONE                 VGS(MAX)= 10.000V
AUTO RNG=YES [A] VGS(MIN)=NONE

TEST NUMBER= 6          TEST TYPE=VIH1          FWR LIN CY= 0.1
COVER ON PASS= 0        COVER ON FAIL= 0        V4S=OPEN
ID = 25.000UA           ( 10NA= 25) ( 1NA= 175) (100PA= 1500)
COMP= 15.000V           IG(MIN)=NONE           IG(MAX)= 300.00NA IG(RNG)=1UA
TEST TIME(MS)= 2 VGS(MIN)=NONE                 VGS(MAX)= 10.000V
AUTO RNG=YES [A] VGS(MIN)=NONE

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FET/TEST TEST PROGRAM

REM =SA3654 CHARACTERIZATION TESTING GWM TEST FILE="3654CHR.TES"
 DATE=6/9/94

TEST NUMBER= 7 TEST TYPE=VTH1 EWR LIN CY= 0.1
 COVER ON PASS= 0 COVER ON FAIL= 0 V4S=OPEN
 ID = 50.000UA
 COMP= 15.000V
 TEST TIME(MS)= 2
 AUTO RNG=YES [A] VGS(MIN)=NONE VGS(MAX)= 10.000V

TEST NUMBER= 8 TEST TYPE=VTH1 EWR LIN CY= 0.1
 COVER ON PASS= 0 COVER ON FAIL= 0 V4S=OPEN
 ID = 100.000UA
 COMP= 15.000V
 TEST TIME(MS)= 2
 AUTO RNG=YES [A] VGS(MIN)=NONE VGS(MAX)= 10.000V

TEST NUMBER= 9 TEST TYPE=VTH1 EWR LIN CY= 0.1
 COVER ON PASS= 0 COVER ON FAIL= 0 V4S=OPEN
 ID = 250.000UA
 COMP= 15.000V
 TEST TIME(MS)= 2
 AUTO RNG=YES [A] VGS(MIN)=NONE VGS(MAX)= 10.000V

TEST NUMBER= 10 TEST TYPE=VTH1 EWR LIN CY= 0.1
 COVER ON PASS= 0 COVER ON FAIL= 0 V4S=OPEN
 ID = 500.000UA
 COMP= 15.000V
 TEST TIME(MS)= 2
 AUTO RNG=YES [A] VGS(MIN)=NONE VGS(MAX)= 10.000V

TEST NUMBER= 11 TEST TYPE=VTH1 EWR LIN CY= 0.1
 COVER ON PASS= 0 COVER ON FAIL= 0 V4S=OPEN
 ID = 1.0000MA
 COMP= 15.000V
 TEST TIME(MS)= 2
 AUTO RNG=YES [A] VGS(MIN)=NONE VGS(MAX)= 10.000V

TEST NUMBER= 12 TEST TYPE=VTH1 EWR LIN CY= 0.1
 COVER ON PASS= 0 COVER ON FAIL= 0 V4S=OPEN
 ID = 50.000MA
 COMP= 15.000V
 TEST TIME(MS)= 2
 AUTO RNG=YES [A] VGS(MIN)=NONE VGS(MAX)= 10.000V

FET/TEST TEST PROGRAM

REM =SA3654 CHARACTERIZATION TESTING GYM TEST FILE="3654CHR.TES"
 DATE=6/9/94

TEST NUMBER= 13
 COVER ON PASS= 0
 ID = 100.000A
 COMP= 15.000V
 PULSE TIME(.1MS)= 3
 AUTO RNG=YES [A] VGS(MIN)=NONE VGS(MAX)= 10.000V
 TEST TYPE=VTH1P
 COVER ON FAIL= 0
 PWR LIN CY= 0.1
 V4S=OPEN

TEST NUMBER= 14
 COVER ON PASS= 0
 ID = 500.000A
 COMP= 15.000V
 PULSE TIME(.1MS)= 3
 AUTO RNG=YES [A] VGS(MIN)=NONE VGS(MAX)= 10.000V
 TEST TYPE=VTH1P
 COVER ON FAIL= 0
 PWR LIN CY= 0.1
 V4S=OPEN

TEST NUMBER= 15
 COVER ON PASS= 0
 ID = 2.0000A
 COMP= 20.000V
 PULSE TIME(.1MS)= 3
 AUTO RNG=YES [A] VGS(MIN)=NONE VGS(MAX)= 15.000V
 TEST TYPE=VTH1P
 COVER ON FAIL= 0
 PWR LIN CY= 0.1
 V4S=OPEN

TEST NUMBER= 16
 COVER ON PASS= 0
 ID = 4.0000A
 COMP= 20.000V
 PULSE TIME(.1MS)= 3
 AUTO RNG=YES [A] VGS(MIN)=NONE VGS(MAX)= 15.000V
 TEST TYPE=VTH1P
 COVER ON FAIL= 0
 PWR LIN CY= 0.1
 V4S=OPEN

TEST NUMBER= 17
 COVER ON PASS= 0
 ID = 6.0000A
 COMP= 20.000V
 PULSE TIME(.1MS)= 3
 AUTO RNG=YES [A] VGS(MIN)=NONE VGS(MAX)= 20.000V
 TEST TYPE=VTH1P
 COVER ON FAIL= 0
 PWR LIN CY= 0.1
 V4S=OPEN

TEST NUMBER= 18
 COVER ON PASS= 0
 ID = 8.0000A
 COMP= 20.000V
 PULSE TIME(.1MS)= 3
 AUTO RNG=YES [A] VGS(MIN)=NONE VGS(MAX)= 20.000V
 TEST TYPE=VTH1P
 COVER ON FAIL= 0
 PWR LIN CY= 0.1
 V4S=OPEN

FET/TEST TEST PROGRAM

REM =SA3654 CHARACTERIZATION TESTING GWM TEST FILE="3654CHR.TES"
 DATE=6/9/94

TEST NUMBER= 19 TEST TYPE=VTH1P PWR LIN CY= 0.1
 COVER ON PASS= 0 COVER ON FAIL= 0 V4S=OPEN
 ID = 10.000A
 COMP= 20.000V
 PULSE TIME(.1MS)= 3
 AUTO RNG=YES [A] VGS(MIN)=NONE VGS(MAX)= 20.000V

TEST NUMBER= 20 TEST TYPE=VTH1P PWR LIN CY= 0.1
 COVER ON PASS= 0 COVER ON FAIL= 0 V4S=OPEN
 ID = 12.000A
 COMP= 20.000V
 PULSE TIME(.1MS)= 3
 AUTO RNG=YES [A] VGS(MIN)=NONE VGS(MAX)= 20.000V

TEST NUMBER= 21 TEST TYPE=VTH1P PWR LIN CY= 0.1
 COVER ON PASS= 0 COVER ON FAIL= 0 V4S=OPEN
 ID = 14.000A
 COMP= 25.000V
 PULSE TIME(.1MS)= 3
 AUTO RNG=YES [A] VGS(MIN)=NONE VGS(MAX)= 20.000V

TEST NUMBER= 22 TEST TYPE=VTH1P PWR LIN CY= 0.1
 COVER ON PASS= 0 COVER ON FAIL= 0 V4S=OPEN
 ID = 16.000A
 COMP= 30.000V
 PULSE TIME(.1MS)= 3
 AUTO RNG=YES [A] VGS(MIN)=NONE VGS(MAX)= 20.000V

TEST NUMBER= 23 TEST TYPE=VTH1P PWR LIN CY= 0.1
 COVER ON PASS= 0 COVER ON FAIL= 0 V4S=OPEN
 ID = 18.000A
 COMP= 30.000V
 PULSE TIME(.1MS)= 3
 AUTO RNG=YES [A] VGS(MIN)= 1.0000V VGS(MAX)=NONE

TEST NUMBER= 24 TEST TYPE=VTH1P PWR LIN CY= 0.1
 COVER ON PASS= 0 COVER ON FAIL= 0 V4S=OPEN
 ID = 20.000A
 COMP= 30.000V
 PULSE TIME(.1MS)= 3
 AUTO RNG=YES [A] VGS(MIN)= 1.0000V VGS(MAX)=NONE

FEL/TEST TEST PROGRAM

REM =SA3654 CHARACTERIZATION TESTING GWM TEST FILE="3654CHR.TES"
 DATE=6/9/94

TEST NUMBER= 25 TEST TYPE=VIHLP FWR LIN CY= 0.1
 COVER ON PASS= 0 COVER ON FAIL= 0 V4S=OPEN
 ID = 22.000A
 COMP= 30.000V
 PULSE TIME(.1MS)= 3
 AUTO RNG=YES [A] VGS(MIN)= 1.0000V VGS(MAX)=NONE

TEST NUMBER= 26 TEST TYPE=VIHLP FWR LIN CY= 0.1
 COVER ON PASS= 0 COVER ON FAIL= 0 V4S=OPEN
 ID = 24.000A
 COMP= 30.000V
 PULSE TIME(.1MS)= 3
 AUTO RNG=YES [A] VGS(MIN)= 1.0000V VGS(MAX)=NONE

TEST NUMBER= 27 TEST TYPE=VIHLP FWR LIN CY= 0.1
 COVER ON PASS= 0 COVER ON FAIL= 0 V4S=OPEN
 ID = 26.000A
 COMP= 30.000V
 PULSE TIME(.1MS)= 3
 AUTO RNG=YES [A] VGS(MIN)= 1.0000V VGS(MAX)=NONE

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TEST NUMBER= 28 TEST TYPE=VIHLP FWR LIN CY= 0.1
 COVER ON PASS= 0 COVER ON FAIL= 0 V4S=OPEN
 ID = 28.000A
 COMP= 30.000V
 PULSE TIME(.1MS)= 3
 AUTO RNG=YES [A] VGS(MIN)= 1.0000V VGS(MAX)=NONE

TEST NUMBER= 29 TEST TYPE=IDSX FWR LIN CY= 1.0
 COVER ON PASS= 0 COVER ON FAIL= 0 V4S=OPEN
 VDS = 25.000V VGS = 0.0000V (100PA= 1500)
 TEST TIME(MS)= 2 (100NA= 25) (1NA= 175) ID(RNG)=1MA
 AUTO RNG=YES [A] ID(MIN)=NONE ID(MAX)= 1.0000MA

TEST NUMBER= 30 TEST TYPE=IDSX FWR LIN CY= 1.0
 COVER ON PASS= 0 COVER ON FAIL= 0 V4S=OPEN
 VDS = 50.000V VGS = 0.0000V (100PA= 1500)
 TEST TIME(MS)= 2 (100NA= 25) (1NA= 175) ID(RNG)=1MA
 AUTO RNG=YES [A] ID(MIN)=NONE ID(MAX)= 1.0000MA

REM =SA3654 CHARACTERIZATION TESTING GWM TEST FILE="3654CHR.TES"
 DATE=6/9/94

TEST NUMBER= 31 TEST TYPE=IDSX FWR LIN CY= 1.0
 COVER ON PASS= 0 COVER ON FAIL= 0 V4S=OPEN
 VDS = 75.000V VGS = 0.0000V
 TEST TIME(MS)= 2 (100NA= 10) (10NA= 25) (1NA= 175) (100PA= 1500)
 AUTO RNG=YES [A] ID(MIN)=NONE ID(MAX)= 1.0000MA ID(RNG)=1MA

TEST NUMBER= 32 TEST TYPE=IDSX FWR LIN CY= 1.0
 COVER ON PASS= 0 COVER ON FAIL= 0 V4S=OPEN
 VDS = 100.00V VGS = 0.0000V
 TEST TIME(MS)= 2 (100NA= 10) (10NA= 25) (1NA= 175) (100PA= 1500)
 AUTO RNG=YES [A] ID(MIN)=NONE ID(MAX)= 1.0000MA ID(RNG)=1MA

TEST NUMBER= 33 TEST TYPE=IDSX FWR LIN CY= 1.0
 COVER ON PASS= 0 COVER ON FAIL= 0 V4S=OPEN
 VDS = 125.00V VGS = 0.0000V
 TEST TIME(MS)= 2 (100NA= 10) (10NA= 25) (1NA= 175) (100PA= 1500)
 AUTO RNG=YES [A] ID(MIN)=NONE ID(MAX)= 1.0000MA ID(RNG)=1MA

TEST NUMBER= 34 TEST TYPE=IDSX FWR LIN CY= 1.0
 COVER ON PASS= 0 COVER ON FAIL= 0 V4S=OPEN
 VDS = 150.00V VGS = 0.0000V
 TEST TIME(MS)= 2 (100NA= 10) (10NA= 25) (1NA= 175) (100PA= 1500)
 AUTO RNG=YES [A] ID(MIN)=NONE ID(MAX)= 1.0000MA ID(RNG)=1MA

TEST NUMBER= 35 TEST TYPE=IDSX FWR LIN CY= 1.0
 COVER ON PASS= 0 COVER ON FAIL= 0 V4S=OPEN
 VDS = 175.00V VGS = 0.0000V
 TEST TIME(MS)= 2 (100NA= 10) (10NA= 25) (1NA= 175) (100PA= 1500)
 AUTO RNG=YES [A] ID(MIN)=NONE ID(MAX)= 1.0000MA ID(RNG)=1MA

TEST NUMBER= 36 TEST TYPE=IDSX FWR LIN CY= 1.0
 COVER ON PASS= 0 COVER ON FAIL= 0 V4S=OPEN
 VDS = 200.00V VGS = 0.0000V
 TEST TIME(MS)= 2 (100NA= 10) (10NA= 25) (1NA= 175) (100PA= 1500)
 AUTO RNG=YES [A] ID(MIN)=NONE ID(MAX)= 1.0000MA ID(RNG)=1MA

TEST NUMBER= 37 TEST TYPE=IDSX FWR LIN CY= 1.0
 COVER ON PASS= 0 COVER ON FAIL= 0 V4S=OPEN
 VDS = 225.00V VGS = 0.0000V
 TEST TIME(MS)= 2 (100NA= 10) (10NA= 25) (1NA= 175) (100PA= 1500)
 AUTO RNG=YES [A] ID(MIN)=NONE ID(MAX)= 1.0000MA ID(RNG)=1MA

FET/TEST TEST PROGRAM

REM =SA3654 CHARACTERIZATION TESTING GW TEST FILE="3654CHR.TES"
 DATE=6/9/94

TEST NUMBER= 38 TEST TYPE=IDSX FWR LIN CY= 1.0
 COVER ON PASS= 0 COVER ON FAIL= 0 V4S=OPEN
 VDS = 250.00V VGS = 0.0000V (100PA= 1500)
 TEST TIME(MS)= 2 (100NA= 10) (10NA= 25) (1NA= 175)
 AUTO RNG=YES [A] ID(MIN)=NONE ID(MAX)= 1.0000MA ID(RNG)=IMA

TEST NUMBER= 39 TEST TYPE=IDSX FWR LIN CY= 1.0
 COVER ON PASS= 0 COVER ON FAIL= 0 V4S=OPEN
 VDS = 275.00V VGS = 0.0000V (100PA= 1500)
 TEST TIME(MS)= 2 (100NA= 10) (10NA= 25) (1NA= 175)
 AUTO RNG=YES [A] ID(MIN)=NONE ID(MAX)= 1.0000MA ID(RNG)=IMA

TEST NUMBER= 40 TEST TYPE=IDSX FWR LIN CY= 1.0
 COVER ON PASS= 0 COVER ON FAIL= 0 V4S=OPEN
 VDS = 300.00V VGS = 0.0000V (100PA= 1500)
 TEST TIME(MS)= 2 (100NA= 10) (10NA= 25) (1NA= 175)
 AUTO RNG=YES [A] ID(MIN)=NONE ID(MAX)= 1.0000MA ID(RNG)=IMA

TEST NUMBER= 41 TEST TYPE=IDSX FWR LIN CY= 1.0
 COVER ON PASS= 0 COVER ON FAIL= 0 V4S=OPEN
 VDS = 325.00V VGS = 0.0000V (100PA= 1500)
 TEST TIME(MS)= 2 (100NA= 10) (10NA= 25) (1NA= 175)
 AUTO RNG=YES [A] ID(MIN)=NONE ID(MAX)= 1.0000MA ID(RNG)=IMA

TEST NUMBER= 42 TEST TYPE=IDSX FWR LIN CY= 1.0
 COVER ON PASS= 0 COVER ON FAIL= 0 V4S=OPEN
 VDS = 350.00V VGS = 0.0000V (100PA= 1500)
 TEST TIME(MS)= 2 (100NA= 10) (10NA= 25) (1NA= 175)
 AUTO RNG=YES [A] ID(MIN)=NONE ID(MAX)= 1.0000MA ID(RNG)=IMA

TEST NUMBER= 43 TEST TYPE=IDSX FWR LIN CY= 1.0
 COVER ON PASS= 0 COVER ON FAIL= 0 V4S=OPEN
 VDS = 375.00V VGS = 0.0000V (100PA= 1500)
 TEST TIME(MS)= 2 (100NA= 10) (10NA= 25) (1NA= 175)
 AUTO RNG=YES [A] ID(MIN)=NONE ID(MAX)= 1.0000MA ID(RNG)=IMA

TEST NUMBER= 44 TEST TYPE=IDSX FWR LIN CY= 1.0
 COVER ON PASS= 0 COVER ON FAIL= 0 V4S=OPEN
 VDS = 400.00V VGS = 0.0000V (100PA= 1500)
 TEST TIME(MS)= 2 (100NA= 10) (10NA= 25) (1NA= 175)
 AUTO RNG=YES [A] ID(MIN)=NONE ID(MAX)= 50.0000MA ID(RNG)=100MA

FET/TEST TEST PROGRAM

REM =SA3654 CHARACTERIZATION TESTING GNM TEST FILE="3654CHR.TES"
 DATE=6/9/94

TEST NUMBER= 45 TEST TYPE=IDSX FWR LIN CY= 1.0
 COVER ON PASS= 0 COVER ON FAIL= 0 V4S=OPEN
 VDS = 425.00V VGS = 0.0000V
 TEST TIME(MS)= 2 (100NA= 10) (10NA= 25) (1NA= 175) (100PA= 1500)
 AUTO RNG=YES [A] ID(MIN)=NONE ID(MAX)= 50.000MA ID(RNG)=100MA

TEST NUMBER= 46 TEST TYPE=IDSX FWR LIN CY= 1.0
 COVER ON PASS= 0 COVER ON FAIL= 0 V4S=OPEN
 VDS = 450.00V VGS = 0.0000V
 TEST TIME(MS)= 2 (100NA= 10) (10NA= 25) (1NA= 175) (100PA= 1500)
 AUTO RNG=YES [A] ID(MIN)=NONE ID(MAX)= 50.000MA ID(RNG)=100MA

TEST NUMBER= 47 TEST TYPE=IDSX FWR LIN CY= 1.0
 COVER ON PASS= 0 COVER ON FAIL= 0 V4S=OPEN
 VDS = 475.00V VGS = 0.0000V
 TEST TIME(MS)= 2 (100NA= 10) (10NA= 25) (1NA= 175) (100PA= 1500)
 AUTO RNG=YES [A] ID(MIN)=NONE ID(MAX)= 50.000MA ID(RNG)=100MA

TEST NUMBER= 48 TEST TYPE=IDSX FWR LIN CY= 1.0
 COVER ON PASS= 0 COVER ON FAIL= 0 V4S=OPEN
 VDS = 500.00V VGS = 0.0000V
 TEST TIME(MS)= 2 (100NA= 10) (10NA= 25) (1NA= 175) (100PA= 1500)
 AUTO RNG=YES [A] ID(MIN)=NONE ID(MAX)= 50.000MA ID(RNG)=100MA

TEST NUMBER= 49 TEST TYPE=VDSP FWR LIN CY= 0.1
 COVER ON PASS= 0 COVER ON FAIL= 0 V4S=OPEN
 ID = 500.00MA VGS = 5.0000V
 COMP= 50.000V COMP= 3.0000MA
 PULSE TIME(.1MS)= 3 VDS(MIN)=NONE VDS(MAX)= 20.000V
 AUTO RNG=YES [A] VDS(MIN)=NONE

TEST NUMBER= 50 TEST TYPE=VDSP FWR LIN CY= 0.1
 COVER ON PASS= 0 COVER ON FAIL= 0 V4S=OPEN
 ID = 800.00MA VGS = 5.0000V
 COMP= 50.000V COMP= 3.0000MA
 PULSE TIME(.1MS)= 3 VDS(MIN)=NONE VDS(MAX)= 20.000V
 AUTO RNG=YES [A] VDS(MIN)=NONE

TEST NUMBER= 51 TEST TYPE=VDSP FWR LIN CY= 0.1
 COVER ON PASS= 0 COVER ON FAIL= 0 V4S=OPEN
 ID = 1.0000A VGS = 5.0000V
 COMP= 50.000V COMP= 3.0000MA
 PULSE TIME(.1MS)= 3 VDS(MIN)=NONE VDS(MAX)= 20.000V
 AUTO RNG=YES [A] VDS(MIN)=NONE

FET/TEST PROGRAM

REM =SA3654 CHARACTERIZATION TESTING GMM TEST FILE="3654CHR.TES"
 DATE=6/9/94

TEST NUMBER= 52
 COVER ON PASS= 0
 ID = 1.5000A
 COMP= 50.000V
 PULSE TIME(.1MS)= 3
 AUTO RNG=YES [A] VDS(MIN)=NONE VDS(MAX)= 20.000V
 TEST TYPE=VDSP
 COVER ON FAIL= 0
 VGS = 5.0000V
 COMP= 3.0000MA
 FWR LIN CY= 0.1
 V4S=OPEN

TEST NUMBER= 53
 COVER ON PASS= 0
 ID = 2.0000A
 COMP= 50.000V
 PULSE TIME(.1MS)= 3
 AUTO RNG=YES [A] VDS(MIN)=NONE VDS(MAX)= 20.000V
 TEST TYPE=VDSP
 COVER ON FAIL= 0
 VGS = 5.0000V
 COMP= 3.0000MA
 FWR LIN CY= 0.1
 V4S=OPEN

TEST NUMBER= 54
 COVER ON PASS= 0
 ID = 2.5000A
 COMP= 50.000V
 PULSE TIME(.1MS)= 3
 AUTO RNG=YES [A] VDS(MIN)= 50.000MV VDS(MAX)=NONE
 TEST TYPE=VDSP
 COVER ON FAIL= 0
 VGS = 5.0000V
 COMP= 3.0000MA
 FWR LIN CY= 0.1
 V4S=OPEN

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TEST NUMBER= 55
 COVER ON PASS= 0
 ID = 3.0000A
 COMP= 50.000V
 PULSE TIME(.1MS)= 3
 AUTO RNG=YES [A] VDS(MIN)= 50.000MV VDS(MAX)=NONE
 TEST TYPE=VDSP
 COVER ON FAIL= 0
 VGS = 5.0000V
 COMP= 3.0000MA
 FWR LIN CY= 0.1
 V4S=OPEN

TEST NUMBER= 56
 COVER ON PASS= 0
 ID = 3.5000A
 COMP= 50.000V
 PULSE TIME(.1MS)= 3
 AUTO RNG=YES [A] VDS(MIN)= 50.000MV VDS(MAX)=NONE
 TEST TYPE=VDSP
 COVER ON FAIL= 0
 VGS = 5.0000V
 COMP= 3.0000MA
 FWR LIN CY= 0.1
 V4S=OPEN

TEST NUMBER= 57
 COVER ON PASS= 0
 ID = 4.0000A
 COMP= 50.000V
 PULSE TIME(.1MS)= 3
 AUTO RNG=YES [A] VDS(MIN)= 1.0000V VDS(MAX)=NONE
 TEST TYPE=VDSP
 COVER ON FAIL= 0
 VGS = 5.0000V
 COMP= 3.0000MA
 FWR LIN CY= 0.1
 V4S=OPEN

FET/TEST TEST PROGRAM

REM =SA3654 CHARACTERIZATION TESTING GWM TEST FILE="3654CHR.IES"
 DATE=6/9/94

TEST NUMBER= 58
 COVER ON PASS= 0
 ID = 4.5000A
 COMP= 50.000V
 PULSE TIME(.1MS)= 3
 AUTO RNG=YES [A] VDS(MIN)= 1.0000V VDS(MAX)=NONE
 TEST TYPE=VDSP
 COVER ON FAIL= 0
 VGS = 5.0000V
 COMP= 3.0000MA
 FWR LIN CY= 0.1
 V4S=OPEN

TEST NUMBER= 59
 COVER ON PASS= 0
 ID = 5.0000A
 COMP= 50.000V
 PULSE TIME(.1MS)= 3
 AUTO RNG=YES [A] VDS(MIN)= 1.0000V VDS(MAX)=NONE
 TEST TYPE=VDSP
 COVER ON FAIL= 0
 VGS = 5.0000V
 COMP= 3.0000MA
 FWR LIN CY= 0.1
 V4S=OPEN

TEST NUMBER= 60
 COVER ON PASS= 0
 ID = 5.5000A
 COMP= 50.000V
 PULSE TIME(.1MS)= 3
 AUTO RNG=YES [A] VDS(MIN)= 1.0000V VDS(MAX)=NONE
 TEST TYPE=VDSP
 COVER ON FAIL= 0
 VGS = 5.0000V
 COMP= 3.0000MA
 FWR LIN CY= 0.1
 V4S=OPEN

TEST NUMBER= 61
 COVER ON PASS= 0
 ID = 6.0000A
 COMP= 50.000V
 PULSE TIME(.1MS)= 3
 AUTO RNG=YES [A] VDS(MIN)= 1.0000V VDS(MAX)=NONE
 TEST TYPE=VDSP
 COVER ON FAIL= 0
 VGS = 5.0000V
 COMP= 3.0000MA
 FWR LIN CY= 0.1
 V4S=OPEN

TEST NUMBER= 62
 COVER ON PASS= 0
 ID = 6.5000A
 COMP= 50.000V
 PULSE TIME(.1MS)= 3
 AUTO RNG=YES [A] VDS(MIN)= 1.0000V VDS(MAX)=NONE
 TEST TYPE=VDSP
 COVER ON FAIL= 0
 VGS = 5.0000V
 COMP= 3.0000MA
 FWR LIN CY= 0.1
 V4S=OPEN

TEST NUMBER= 63
 COVER ON PASS= 0
 ID = 7.0000A
 COMP= 50.000V
 PULSE TIME(.1MS)= 3
 AUTO RNG=YES [A] VDS(MIN)= 1.0000V VDS(MAX)=NONE
 TEST TYPE=VDSP
 COVER ON FAIL= 0
 VGS = 5.0000V
 COMP= 3.0000MA
 FWR LIN CY= 0.1
 V4S=OPEN

FEI/TEST TEST PROGRAM

REM =SA3654 CHARACTERIZATION TESTING GMM TEST FILE="3654CHR.TES"
 DATE=6/9/94

TEST NUMBER= 64 TEST TYPE=VDSP FWR LIN CY= 0.1
 COVER ON PASS= 0 COVER ON FAIL= 0 V4S=OPEN
 ID = 500.000A VGS = 8.0000V
 COMP= 50.000V COMP= 3.0000MA
 PULSE TIME(.1MS)= 3
 AUTO RNG=YES [A] VDS(MIN)=NONE VDS(MAX)= 20.000V

TEST NUMBER= 65 TEST TYPE=VDSP FWR LIN CY= 0.1
 COVER ON PASS= 0 COVER ON FAIL= 0 V4S=OPEN
 ID = 2.0000A VGS = 8.0000V
 COMP= 50.000V COMP= 3.0000MA
 PULSE TIME(.1MS)= 3
 AUTO RNG=YES [A] VDS(MIN)=NONE VDS(MAX)= 20.000V

TEST NUMBER= 66 TEST TYPE=VDSP FWR LIN CY= 0.1
 COVER ON PASS= 0 COVER ON FAIL= 0 V4S=OPEN
 ID = 4.0000A VGS = 8.0000V
 COMP= 50.000V COMP= 3.0000MA
 PULSE TIME(.1MS)= 3
 AUTO RNG=YES [A] VDS(MIN)=NONE VDS(MAX)= 20.000V

TEST NUMBER= 67 TEST TYPE=VDSP FWR LIN CY= 0.1
 COVER ON PASS= 0 COVER ON FAIL= 0 V4S=OPEN
 ID = 6.0000A VGS = 8.0000V
 COMP= 50.000V COMP= 3.0000MA
 PULSE TIME(.1MS)= 3
 AUTO RNG=YES [A] VDS(MIN)= 1.0000V VDS(MAX)=NONE

TEST NUMBER= 68 TEST TYPE=VDSP FWR LIN CY= 0.1
 COVER ON PASS= 0 COVER ON FAIL= 0 V4S=OPEN
 ID = 8.0000A VGS = 8.0000V
 COMP= 50.000V COMP= 3.0000MA
 PULSE TIME(.1MS)= 3
 AUTO RNG=YES [A] VDS(MIN)= 1.0000V VDS(MAX)=NONE

TEST NUMBER= 69 TEST TYPE=VDSP FWR LIN CY= 0.1
 COVER ON PASS= 0 COVER ON FAIL= 0 V4S=OPEN
 ID = 10.000A VGS = 8.0000V
 COMP= 50.000V COMP= 3.0000MA
 PULSE TIME(.1MS)= 3
 AUTO RNG=YES [A] VDS(MIN)= 1.0000V VDS(MAX)=NONE

FET/TEST TEST PROGRAM

REM =SA3654 CHARACTERIZATION TESTING GNM TEST FILE="3654CHR.TES"
 DATE=6/9/94

TEST NUMBER= 70
 COVER ON PASS= 0
 ID = 12.000A
 COMP= 50.000V
 PULSE TIME(.1MS)= 3
 AUTO RNG=YES [A] VDS(MIN)= 1.0000V VDS(MAX)=NONE
 TEST TYPE=VDSP
 COVER ON FAIL= 0
 VGS = 8.0000V
 COMP= 3.0000MA
 FMR LIN CY= 0.1
 V4S=OFFEN

TEST NUMBER= 71
 COVER ON PASS= 0
 ID = 14.000A
 COMP= 50.000V
 PULSE TIME(.1MS)= 3
 AUTO RNG=YES [A] VDS(MIN)= 1.0000V VDS(MAX)=NONE
 TEST TYPE=VDSP
 COVER ON FAIL= 0
 VGS = 8.0000V
 COMP= 3.0000MA
 FMR LIN CY= 0.1
 V4S=OFFEN

TEST NUMBER= 72
 COVER ON PASS= 0
 ID = 16.000A
 COMP= 50.000V
 PULSE TIME(.1MS)= 3
 AUTO RNG=YES [A] VDS(MIN)= 1.0000V VDS(MAX)=NONE
 TEST TYPE=VDSP
 COVER ON FAIL= 0
 VGS = 8.0000V
 COMP= 3.0000MA
 FMR LIN CY= 0.1
 V4S=OFFEN

TEST NUMBER= 73
 COVER ON PASS= 0
 ID = 18.000A
 COMP= 50.000V
 PULSE TIME(.1MS)= 3
 AUTO RNG=YES [A] VDS(MIN)= 1.0000V VDS(MAX)=NONE
 TEST TYPE=VDSP
 COVER ON FAIL= 0
 VGS = 8.0000V
 COMP= 3.0000MA
 FMR LIN CY= 0.1
 V4S=OFFEN

TEST NUMBER= 74
 COVER ON PASS= 0
 ID = 20.000A
 COMP= 50.000V
 PULSE TIME(.1MS)= 3
 AUTO RNG=YES [A] VDS(MIN)= 1.0000V VDS(MAX)=NONE
 TEST TYPE=VDSP
 COVER ON FAIL= 0
 VGS = 8.0000V
 COMP= 3.0000MA
 FMR LIN CY= 0.1
 V4S=OFFEN

TEST NUMBER= 75
 COVER ON PASS= 0
 ID = 22.000A
 COMP= 50.000V
 PULSE TIME(.1MS)= 3
 AUTO RNG=YES [A] VDS(MIN)= 1.0000V VDS(MAX)=NONE
 TEST TYPE=VDSP
 COVER ON FAIL= 0
 VGS = 8.0000V
 COMP= 3.0000MA
 FMR LIN CY= 0.1
 V4S=OFFEN

FET/TEST TEST PROGRAM

REM =SA3654 CHARACTERIZATION TESTING GW TEST FILE="3654CHR.TES"
DATE=6/9/94

TEST NUMBER= 76 TEST TYPE=VDSP FWR LIN CY= 0.1
COVER ON PASS= 0 COVER ON FAIL= 0 V4S=OPEN
ID = 24.000A VGS = 8.0000V
COMP= 50.000V COMP= 3.0000MA
PULSE TIME(.1MS)= 3
AUTO RNG=YES [A] VDS(MIN)= 1.0000V VDS(MAX)=NONE

TEST NUMBER= 77 TEST TYPE=VDSP FWR LIN CY= 0.1
COVER ON PASS= 0 COVER ON FAIL= 0 V4S=OPEN
ID = 26.000A VGS = 8.0000V
COMP= 50.000V COMP= 3.0000MA
PULSE TIME(.1MS)= 3
AUTO RNG=YES [A] VDS(MIN)= 1.0000V VDS(MAX)=NONE

TEST NUMBER= 78 TEST TYPE=VDSP FWR LIN CY= 0.1
COVER ON PASS= 0 COVER ON FAIL= 0 V4S=OPEN
ID = 28.000A VGS = 8.0000V
COMP= 50.000V COMP= 3.0000MA
PULSE TIME(.1MS)= 3
AUTO RNG=YES [A] VDS(MIN)= 1.0000V VDS(MAX)=NONE

TEST NUMBER= 79 TEST TYPE=VDSP FWR LIN CY= 0.1
COVER ON PASS= 0 COVER ON FAIL= 0 V4S=OPEN
ID = 500.000A VGS = 10.000V
COMP= 50.000V COMP= 3.0000MA
PULSE TIME(.1MS)= 3
AUTO RNG=YES [A] VDS(MIN)=NONE VDS(MAX)= 20.000V

TEST NUMBER= 80 TEST TYPE=VDSP FWR LIN CY= 0.1
COVER ON PASS= 0 COVER ON FAIL= 0 V4S=OPEN
ID = 2.0000A VGS = 10.000V
COMP= 50.000V COMP= 3.0000MA
PULSE TIME(.1MS)= 3
AUTO RNG=YES [A] VDS(MIN)=NONE VDS(MAX)= 20.000V

TEST NUMBER= 81 TEST TYPE=VDSP FWR LIN CY= 0.1
COVER ON PASS= 0 COVER ON FAIL= 0 V4S=OPEN
ID = 4.0000A VGS = 10.000V
COMP= 50.000V COMP= 3.0000MA
PULSE TIME(.1MS)= 3
AUTO RNG=YES [A] VDS(MIN)= 50.000V VDS(MAX)=NONE

FET/TEST TEST PROGRAM

REM =SA3654 CHARACTERIZATION TESTING GWM TEST FILE="3654CHR.TES"
 DATE=6/9/94

TEST NUMBER= 82 TEST TYPE=VDSP PWR LIN CY= 0.1
 COVER ON PASS= 0 COVER ON FAIL= 0 V4S=OPEN
 ID = 6.0000A VGS = 10.000V
 COMP= 50.000V COMP= 3.0000MA
 PULSE TIME(.1MS)= 3
 AUTO RNG=YES [A] VDS(MIN)= 1.0000V VDS(MAX)=NONE

TEST NUMBER= 83 TEST TYPE=VDSP PWR LIN CY= 0.1
 COVER ON PASS= 0 COVER ON FAIL= 0 V4S=OPEN
 ID = 8.0000A VGS = 10.000V
 COMP= 50.000V COMP= 3.0000MA
 PULSE TIME(.1MS)= 3
 AUTO RNG=YES [A] VDS(MIN)= 1.0000V VDS(MAX)=NONE

TEST NUMBER= 84 TEST TYPE=VDSP PWR LIN CY= 0.1
 COVER ON PASS= 0 COVER ON FAIL= 0 V4S=OPEN
 ID = 10.000A VGS = 10.000V
 COMP= 50.000V COMP= 3.0000MA
 PULSE TIME(.1MS)= 3
 AUTO RNG=NO [A] VDS(MIN)= 1.0000V VDS(MAX)=NONE

TEST NUMBER= 85 TEST TYPE=VDSP PWR LIN CY= 0.1
 COVER ON PASS= 0 COVER ON FAIL= 0 V4S=OPEN
 ID = 12.000A VGS = 10.000V
 COMP= 50.000V COMP= 3.0000MA
 PULSE TIME(.1MS)= 3
 AUTO RNG=YES [A] VDS(MIN)= 1.0000V VDS(MAX)=NONE

TEST NUMBER= 86 TEST TYPE=VDSP PWR LIN CY= 0.1
 COVER ON PASS= 0 COVER ON FAIL= 0 V4S=OPEN
 ID = 14.000A VGS = 10.000V
 COMP= 50.000V COMP= 3.0000MA
 PULSE TIME(.1MS)= 3
 AUTO RNG=YES [A] VDS(MIN)= 1.0000V VDS(MAX)=NONE

TEST NUMBER= 87 TEST TYPE=VDSP PWR LIN CY= 0.1
 COVER ON PASS= 0 COVER ON FAIL= 0 V4S=OPEN
 ID = 16.000A VGS = 10.000V
 COMP= 50.000V COMP= 3.0000MA
 PULSE TIME(.1MS)= 3
 AUTO RNG=YES [A] VDS(MIN)= 1.0000V VDS(MAX)=NONE

FET/TEST TEST PROGRAM

REM =SA3654 CHARACTERIZATION TESTING GYM TEST FILE="3654CHR.TES"
DATE=6/9/94

TEST NUMBER= 88 TEST TYPE=VDSP FMR LIN CY= 0.1
COVER ON PASS= 0 COVER ON FAIL= 0 V4S=OPEN
ID = 18.000A VGS = 10.000V
COMP= 50.000V COMP= 3.0000MA
PULSE TIME(.1MS)= 3
AUTO RNG=YES [A] VDS(MIN)= 1.0000V VDS(MAX)=NONE

TEST NUMBER= 89 TEST TYPE=VDSP FMR LIN CY= 0.1
COVER ON PASS= 0 COVER ON FAIL= 0 V4S=OPEN
ID = 20.000A VGS = 10.000V
COMP= 50.000V COMP= 3.0000MA
PULSE TIME(.1MS)= 3
AUTO RNG=YES [A] VDS(MIN)= 1.0000V VDS(MAX)=NONE

TEST NUMBER= 90 TEST TYPE=VDSP FMR LIN CY= 0.1
COVER ON PASS= 0 COVER ON FAIL= 0 V4S=OPEN
ID = 22.000A VGS = 10.000V
COMP= 50.000V COMP= 3.0000MA
PULSE TIME(.1MS)= 3
AUTO RNG=YES [A] VDS(MIN)= 1.0000V VDS(MAX)=NONE

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TEST NUMBER= 91 TEST TYPE=VDSP FMR LIN CY= 0.1
COVER ON PASS= 0 COVER ON FAIL= 0 V4S=OPEN
ID = 24.000A VGS = 10.000V
COMP= 50.000V COMP= 3.0000MA
PULSE TIME(.1MS)= 3
AUTO RNG=YES [A] VDS(MIN)= 1.0000V VDS(MAX)=NONE

TEST NUMBER= 92 TEST TYPE=VDSP FMR LIN CY= 0.1
COVER ON PASS= 0 COVER ON FAIL= 0 V4S=OPEN
ID = 26.000A VGS = 10.000V
COMP= 50.000V COMP= 3.0000MA
PULSE TIME(.1MS)= 3
AUTO RNG=YES [A] VDS(MIN)= 1.0000V VDS(MAX)=NONE

TEST NUMBER= 93 TEST TYPE=VDSP FMR LIN CY= 0.1
COVER ON PASS= 0 COVER ON FAIL= 0 V4S=OPEN
ID = 28.000A VGS = 10.000V
COMP= 50.000V COMP= 3.0000MA
PULSE TIME(.1MS)= 3
AUTO RNG=YES [A] VDS(MIN)= 1.0000V VDS(MAX)=NONE

FET/TEST TEST PROGRAM

REM =SA3654 CHARACTERIZATION TESTING GMM TEST FILE="3654CHR.TES"
 DATE=6/9/94

TEST NUMBER= 94 TEST TYPE=VDSP FWR LIN CY= 0.1
 COVER ON PASS= 0 COVER ON FAIL= 0 V4S=OPEN
 ID = 500.000A VGS = 12.000V
 COMP= 50.000V
 PULSE TIME(.1MS)= 3
 AUTO RNG=YES [A] VDS(MIN)=NONE VDS(MAX)= 20.000V

TEST NUMBER= 95 TEST TYPE=VDSP FWR LIN CY= 0.1
 COVER ON PASS= 0 COVER ON FAIL= 0 V4S=OPEN
 ID = 2.0000A VGS = 12.000V
 COMP= 50.000V
 PULSE TIME(.1MS)= 3
 AUTO RNG=YES [A] VDS(MIN)=NONE VDS(MAX)= 20.000V

TEST NUMBER= 96 TEST TYPE=VDSP FWR LIN CY= 0.1
 COVER ON PASS= 0 COVER ON FAIL= 0 V4S=OPEN
 ID = 4.0000A VGS = 12.000V
 COMP= 50.000V
 PULSE TIME(.1MS)= 3
 AUTO RNG=YES [A] VDS(MIN)= 50.000MV VDS(MAX)=NONE

TEST NUMBER= 97 TEST TYPE=VDSP FWR LIN CY= 0.1
 COVER ON PASS= 0 COVER ON FAIL= 0 V4S=OPEN
 ID = 6.0000A VGS = 12.000V
 COMP= 50.000V
 PULSE TIME(.1MS)= 3
 AUTO RNG=YES [A] VDS(MIN)= 1.0000V VDS(MAX)=NONE

TEST NUMBER= 98 TEST TYPE=VDSP FWR LIN CY= 0.1
 COVER ON PASS= 0 COVER ON FAIL= 0 V4S=OPEN
 ID = 8.0000A VGS = 12.000V
 COMP= 50.000V
 PULSE TIME(.1MS)= 3
 AUTO RNG=YES [A] VDS(MIN)= 1.0000V VDS(MAX)=NONE

TEST NUMBER= 99 TEST TYPE=VDSP FWR LIN CY= 0.1
 COVER ON PASS= 0 COVER ON FAIL= 0 V4S=OPEN
 ID = 10.000A VGS = 12.000V
 COMP= 50.000V
 PULSE TIME(.1MS)= 3
 AUTO RNG=YES [A] VDS(MIN)= 1.0000V VDS(MAX)=NONE

FET/TEST TEST PROGRAM

REM =SA3654 CHARACTERIZATION TESTING GMM TEST FILE="3654CHR.TES"
 DATE=6/9/94

TEST NUMBER=100 TEST TYPE=VDSP FWR LIN CY= 0.1
 COVER ON PASS= 0 COVER ON FAIL= 0 V4S=OPEN
 ID = 12.000A VGS = 12.000V
 COMP= 50.000V COMP= 3.0000MA
 PULSE TIME(.1MS)= 3
 AUTO RNG=YES [A] VDS(MIN)= 1.0000V VDS(MAX)=NONE

TEST NUMBER=101 TEST TYPE=VDSP FWR LIN CY= 0.1
 COVER ON PASS= 0 COVER ON FAIL= 0 V4S=OPEN
 ID = 14.000A VGS = 12.000V
 COMP= 50.000V COMP= 3.0000MA
 PULSE TIME(.1MS)= 3
 AUTO RNG=YES [A] VDS(MIN)= 1.0000V VDS(MAX)=NONE

TEST NUMBER=102 TEST TYPE=VDSP FWR LIN CY= 0.1
 COVER ON PASS= 0 COVER ON FAIL= 0 V4S=OPEN
 ID = 16.000A VGS = 12.000V
 COMP= 50.000V COMP= 3.0000MA
 PULSE TIME(.1MS)= 3
 AUTO RNG=YES [A] VDS(MIN)= 1.0000V VDS(MAX)=NONE

TEST NUMBER=103 TEST TYPE=VDSP FWR LIN CY= 0.1
 COVER ON PASS= 0 COVER ON FAIL= 0 V4S=OPEN
 ID = 18.000A VGS = 12.000V
 COMP= 50.000V COMP= 3.0000MA
 PULSE TIME(.1MS)= 3
 AUTO RNG=YES [A] VDS(MIN)= 1.0000V VDS(MAX)=NONE

TEST NUMBER=104 TEST TYPE=VDSP FWR LIN CY= 0.1
 COVER ON PASS= 0 COVER ON FAIL= 0 V4S=OPEN
 ID = 20.000A VGS = 12.000V
 COMP= 50.000V COMP= 3.0000MA
 PULSE TIME(.1MS)= 3
 AUTO RNG=YES [A] VDS(MIN)= 1.0000V VDS(MAX)=NONE

TEST NUMBER=105 TEST TYPE=VDSP FWR LIN CY= 0.1
 COVER ON PASS= 0 COVER ON FAIL= 0 V4S=OPEN
 ID = 22.000A VGS = 12.000V
 COMP= 50.000V COMP= 3.0000MA
 PULSE TIME(.1MS)= 3
 AUTO RNG=YES [A] VDS(MIN)= 1.0000V VDS(MAX)=NONE

FET/TEST TEST PROGRAM

REM =SA3654 CHARACTERIZATION TESTING GMM TEST FILE="3654CHR.TES"
DATE=6/9/94

TEST NUMBER=106
COVER ON PASS= 0
ID = 24.000A
COMP= 50.000V
PULSE TIME(.1MS)= 3
AUTO RNG=YES [A] VDS(MIN)= 1.0000V VDS(MAX)=NONE
TEST TYPE=VDSP
COVER ON FAIL= 0
VGS = 12.000V
COMP= 3.0000MA
FWR LIN CY= 0.1
V4S=OPEN

TEST NUMBER=107
COVER ON PASS= 0
ID = 26.000A
COMP= 50.000V
PULSE TIME(.1MS)= 3
AUTO RNG=YES [A] VDS(MIN)= 1.0000V VDS(MAX)=NONE
TEST TYPE=VDSP
COVER ON FAIL= 0
VGS = 12.000V
COMP= 3.0000MA
FWR LIN CY= 0.1
V4S=OPEN

TEST NUMBER=108
COVER ON PASS= 0
ID = 28.000A
COMP= 50.000V
PULSE TIME(.1MS)= 3
AUTO RNG=YES [A] VDS(MIN)= 1.0000V VDS(MAX)=NONE
TEST TYPE=VDSP
COVER ON FAIL= 0
VGS = 12.000V
COMP= 3.0000MA
FWR LIN CY= 0.1
V4S=OPEN

TEST NUMBER=109
COVER ON PASS= 0
ID = 250.001A
COMP= 650.00V
TEST TIME(MS)= 5
AUTO RNG=YES [A] VDS(MIN)= 1.0000V VDS(MAX)=NONE
TEST TYPE=BVDSX
COVER ON FAIL= 0
VGS = 0.0000V
FWR LIN CY= 0.1
V4S=OPEN

TEST NUMBER=110
COVER ON PASS= 0
ID = 500.001A
COMP= 650.00V
TEST TIME(MS)= 5
AUTO RNG=YES [A] VDS(MIN)= 1.0000V VDS(MAX)=NONE
TEST TYPE=BVDSX
COVER ON FAIL= 0
VGS = 0.0000V
FWR LIN CY= 0.1
V4S=OPEN

TEST NUMBER=111
COVER ON PASS= 0
ID = 1.0000MA
COMP= 650.00V
TEST TIME(MS)= 5
AUTO RNG=YES [A] VDS(MIN)= 1.0000V VDS(MAX)=NONE
TEST TYPE=BVDSX
COVER ON FAIL= 0
VGS = 0.0000V
FWR LIN CY= 0.1
V4S=OPEN

FET/TEST PROGRAM

REM =SA3654 CHARACTERIZATION TESTING GMM TEST FILE="3654CHR.TES"
 DATE=6/9/94

TEST NUMBER=112
 COVER ON PASS= 0
 ID = 75.000MA
 COMP= 650.00V
 TEST TIME(MS)= 5
 AUTO RNG=YES [A] VDS(MIN)= 1.0000V VDS(MAX)=NONE
 TEST TYPE=BVDSX
 COVER ON FAIL= 0
 VGS = 0.0000V
 FWR LIN CY= 0.1
 V4S=OPEN

TEST NUMBER=113
 COVER ON PASS= 0
 ID = 150.00MA
 COMP= 650.00V
 TEST TIME(MS)= 5
 AUTO RNG=YES [A] VDS(MIN)= 1.0000V VDS(MAX)=NONE
 TEST TYPE=BVDSX
 COVER ON FAIL= 0
 VGS = 0.0000V
 FWR LIN CY= 0.1
 V4S=OPEN

TEST NUMBER=114
 COVER ON PASS= 0
 ID = 200.00MA
 COMP= 650.00V
 TEST TIME(MS)= 5
 AUTO RNG=YES [A] VDS(MIN)= 1.0000V VDS(MAX)=NONE
 TEST TYPE=BVDSX
 COVER ON FAIL= 0
 VGS = 0.0000V
 FWR LIN CY= 0.1
 V4S=OPEN

TEST NUMBER=115
 COVER ON PASS= 0
 ID = 250.00MA
 COMP= 650.00V
 TEST TIME(MS)= 5
 AUTO RNG=YES [A] VDS(MIN)= 1.0000V VDS(MAX)=NONE
 TEST TYPE=BVDSX
 COVER ON FAIL= 0
 VGS = 0.0000V
 FWR LIN CY= 0.1
 V4S=OPEN

TEST NUMBER=116
 COVER ON PASS= 0
 ID = 300.00MA
 COMP= 650.00V
 TEST TIME(MS)= 5
 AUTO RNG=YES [A] VDS(MIN)= 1.0000V VDS(MAX)=NONE
 TEST TYPE=BVDSX
 COVER ON FAIL= 0
 VGS = 0.0000V
 FWR LIN CY= 0.1
 V4S=OPEN

TEST NUMBER=117
 COVER ON PASS= 0
 IS = 2.0000A
 COMP= 5.0000V
 PULSE TIME(.1MS)= 3
 AUTO RNG=YES [A] VSD(MIN)=NONE VSD(MAX)= 20.000V
 TEST TYPE=VSDP
 COVER ON FAIL= 0
 VGS = 0.0000V
 COMP= 3.0000MA
 FWR LIN CY= 0.1
 V4S=OPEN

FEI/TEST TEST PROGRAM

REM =SA3654 CHARACTERIZATION TESTING GM TEST FILE="3654CHR.TES"
DATE=6/9/94

TEST NUMBER=118
COVER ON PASS= 0
IS = 4.0000A
COMP= 5.0000V
PULSE TIME(.1MS)= 3
AUTO RNG=YES [A] VSD(MIN)=NONE VSD(MAX)= 20.000V
TEST TYPE=VSDP
COVER ON FAIL= 0
VGS = 0.0000V
COMP= 3.0000MA
FWR LIN CY= 0.1
V4S=OPEN

TEST NUMBER=119
COVER ON PASS= 0
IS = 6.0000A
COMP= 5.0000V
PULSE TIME(.1MS)= 3
AUTO RNG=YES [A] VSD(MIN)=NONE VSD(MAX)= 20.000V
TEST TYPE=VSDP
COVER ON FAIL= 0
VGS = 0.0000V
COMP= 3.0000MA
FWR LIN CY= 0.1
V4S=OPEN

TEST NUMBER=120
COVER ON PASS= 0
IS = 8.0000A
COMP= 5.0000V
PULSE TIME(.1MS)= 3
AUTO RNG=YES [A] VSD(MIN)=NONE VSD(MAX)= 20.000V
TEST TYPE=VSDP
COVER ON FAIL= 0
VGS = 0.0000V
COMP= 3.0000MA
FWR LIN CY= 0.1
V4S=OPEN

TEST NUMBER=121
COVER ON PASS= 0
IS = 10.000A
COMP= 5.0000V
PULSE TIME(.1MS)= 3
AUTO RNG=YES [A] VSD(MIN)=NONE VSD(MAX)= 20.000V
TEST TYPE=VSDP
COVER ON FAIL= 0
VGS = 0.0000V
COMP= 3.0000MA
FWR LIN CY= 0.1
V4S=OPEN

TEST NUMBER=122
COVER ON PASS= 0
IS = 12.000A
COMP= 5.0000V
PULSE TIME(.1MS)= 3
AUTO RNG=YES [A] VSD(MIN)=NONE VSD(MAX)= 20.000V
TEST TYPE=VSDP
COVER ON FAIL= 0
VGS = 0.0000V
COMP= 3.0000MA
FWR LIN CY= 0.1
V4S=OPEN

TEST NUMBER=123
COVER ON PASS= 0
IS = 14.000A
COMP= 5.0000V
PULSE TIME(.1MS)= 3
AUTO RNG=YES [A] VSD(MIN)=NONE VSD(MAX)= 20.000V
TEST TYPE=VSDP
COVER ON FAIL= 0
VGS = 0.0000V
COMP= 3.0000MA
FWR LIN CY= 0.1
V4S=OPEN

FET/TEST TEST PROGRAM

REM =SA3654 CHARACTERIZATION TESTING GMM TEST FILE="3654CHR.TES"
DATE=6/9/94

TEST NUMBER=124 TEST TYPE=VSDP FWR LIN CY= 0.1
COVER ON PASS= 0 COVER ON FAIL= 0 V4S=OPEN
IS = 16.000A VGS = 0.0000V
COMP= 5.0000V COMP= 3.0000MA
PULSE TIME(.1MS)= 3
AUTO RNG=YES [A] VSD(MIN)=NONE VSD(MAX)= 20.000V

TEST NUMBER=125 TEST TYPE=VSDP FWR LIN CY= 0.1
COVER ON PASS= 0 COVER ON FAIL= 0 V4S=OPEN
IS = 18.000A VGS = 0.0000V
COMP= 5.0000V COMP= 3.0000MA
PULSE TIME(.1MS)= 3
AUTO RNG=YES [A] VSD(MIN)=NONE VSD(MAX)= 20.000V

TEST NUMBER=126 TEST TYPE=VSDP FWR LIN CY= 0.1
COVER ON PASS= 0 COVER ON FAIL= 0 V4S=OPEN
IS = 20.000A VGS = 0.0000V
COMP= 5.0000V COMP= 3.0000MA
PULSE TIME(.1MS)= 3
AUTO RNG=YES [A] VSD(MIN)=NONE VSD(MAX)= 20.000V

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TEST NUMBER=127 TEST TYPE=VSDP FWR LIN CY= 0.1
COVER ON PASS= 0 COVER ON FAIL= 0 V4S=OPEN
IS = 2.0000A VGS = 5.0000V
COMP= 5.0000V COMP= 3.0000MA
PULSE TIME(.1MS)= 3
AUTO RNG=YES [A] VSD(MIN)=NONE VSD(MAX)= 20.000V

TEST NUMBER=128 TEST TYPE=VSDP FWR LIN CY= 0.1
COVER ON PASS= 0 COVER ON FAIL= 0 V4S=OPEN
IS = 4.0000A VGS = 5.0000V
COMP= 5.0000V COMP= 3.0000MA
PULSE TIME(.1MS)= 3
AUTO RNG=YES [A] VSD(MIN)=NONE VSD(MAX)= 20.000V

TEST NUMBER=129 TEST TYPE=VSDP FWR LIN CY= 0.1
COVER ON PASS= 0 COVER ON FAIL= 0 V4S=OPEN
IS = 6.0000A VGS = 5.0000V
COMP= 5.0000V COMP= 3.0000MA
PULSE TIME(.1MS)= 3
AUTO RNG=YES [A] VSD(MIN)=NONE VSD(MAX)= 20.000V

FET/TEST TEST PROGRAM

REM =SA3654 CHARACTERIZATION TESTING GWM TEST FILE="3654CHR.TES"
 DATE=6/9/94

TEST NUMBER=130
 COVER ON PASS= 0
 IS = 8.0000A
 COMP= 5.0000V
 PULSE TIME(.1MS)= 3
 AUTO RNG=YES [A] VSD(MIN)=NONE VSD(MAX)= 20.000V
 TEST TYPE=VSDP
 COVER ON FAIL= 0
 VGS = 5.0000V
 COMP= 3.0000MA
 FWR LIN CY= 0.1
 V4S=OPEN

TEST NUMBER=131
 COVER ON PASS= 0
 IS = 10.000A
 COMP= 5.0000V
 PULSE TIME(.1MS)= 3
 AUTO RNG=YES [A] VSD(MIN)=NONE VSD(MAX)= 20.000V
 TEST TYPE=VSDP
 COVER ON FAIL= 0
 VGS = 5.0000V
 COMP= 3.0000MA
 FWR LIN CY= 0.1
 V4S=OPEN

TEST NUMBER=132
 COVER ON PASS= 0
 IS = 12.000A
 COMP= 5.0000V
 PULSE TIME(.1MS)= 3
 AUTO RNG=YES [A] VSD(MIN)=NONE VSD(MAX)= 20.000V
 TEST TYPE=VSDP
 COVER ON FAIL= 0
 VGS = 5.0000V
 COMP= 3.0000MA
 FWR LIN CY= 0.1
 V4S=OPEN

TEST NUMBER=133
 COVER ON PASS= 0
 IS = 14.000A
 COMP= 5.0000V
 PULSE TIME(.1MS)= 3
 AUTO RNG=YES [A] VSD(MIN)=NONE VSD(MAX)= 20.000V
 TEST TYPE=VSDP
 COVER ON FAIL= 0
 VGS = 5.0000V
 COMP= 3.0000MA
 FWR LIN CY= 0.1
 V4S=OPEN

TEST NUMBER=134
 COVER ON PASS= 0
 IS = 16.000A
 COMP= 5.0000V
 PULSE TIME(.1MS)= 3
 AUTO RNG=YES [A] VSD(MIN)=NONE VSD(MAX)= 20.000V
 TEST TYPE=VSDP
 COVER ON FAIL= 0
 VGS = 5.0000V
 COMP= 3.0000MA
 FWR LIN CY= 0.1
 V4S=OPEN

TEST NUMBER=135
 COVER ON PASS= 0
 IS = 18.000A
 COMP= 5.0000V
 PULSE TIME(.1MS)= 3
 AUTO RNG=YES [A] VSD(MIN)=NONE VSD(MAX)= 20.000V
 TEST TYPE=VSDP
 COVER ON FAIL= 0
 VGS = 5.0000V
 COMP= 3.0000MA
 FWR LIN CY= 0.1
 V4S=OPEN

FET/TEST TEST PROGRAM

REM =SA3654 CHARACTERIZATION TESTING GMM TEST FILE="3654CHR.TES"
 DATE=6/9/94

TEST NUMBER=136 TEST TYPE=VSDP FWR LIN CY= 0.1
 COVER ON PASS= 0 COVER ON FAIL= 0 V4S=OFFEN
 IS = 20.000A VGS = 5.000V
 COMP= 5.000V COMP= 3.000MA
 PULSE TIME(.1MS)= 3
 AUTO RNG=YES [A] VSD(MIN)=NONE VSD(MAX)= 20.000V

TEST NUMBER=137 TEST TYPE=VSDP FWR LIN CY= 0.1
 COVER ON PASS= 0 COVER ON FAIL= 0 V4S=OFFEN
 IS = 2.0000A VGS = 10.000V
 COMP= 5.000V COMP= 3.000MA
 PULSE TIME(.1MS)= 3
 AUTO RNG=YES [A] VSD(MIN)=NONE VSD(MAX)= 20.000V

TEST NUMBER=138 TEST TYPE=VSDP FWR LIN CY= 0.1
 COVER ON PASS= 0 COVER ON FAIL= 0 V4S=OFFEN
 IS = 4.0000A VGS = 10.000V
 COMP= 5.000V COMP= 3.000MA
 PULSE TIME(.1MS)= 3
 AUTO RNG=YES [A] VSD(MIN)=NONE VSD(MAX)= 20.000V

TEST NUMBER=139 TEST TYPE=VSDP FWR LIN CY= 0.1
 COVER ON PASS= 0 COVER ON FAIL= 0 V4S=OFFEN
 IS = 6.0000A VGS = 10.000V
 COMP= 5.000V COMP= 3.000MA
 PULSE TIME(.1MS)= 3
 AUTO RNG=YES [A] VSD(MIN)=NONE VSD(MAX)= 20.000V

TEST NUMBER=140 TEST TYPE=VSDP FWR LIN CY= 0.1
 COVER ON PASS= 0 COVER ON FAIL= 0 V4S=OFFEN
 IS = 8.0000A VGS = 10.000V
 COMP= 5.000V COMP= 3.000MA
 PULSE TIME(.1MS)= 3
 AUTO RNG=YES [A] VSD(MIN)=NONE VSD(MAX)= 20.000V

TEST NUMBER=141 TEST TYPE=VSDP FWR LIN CY= 0.1
 COVER ON PASS= 0 COVER ON FAIL= 0 V4S=OFFEN
 IS = 10.000A VGS = 10.000V
 COMP= 5.000V COMP= 3.000MA
 PULSE TIME(.1MS)= 3
 AUTO RNG=YES [A] VSD(MIN)=NONE VSD(MAX)= 20.000V

FET/TEST TEST PROGRAM

REM =SA3654 CHARACTERIZATION TESTING GWM TEST FILE="3654CHR.TES"
DATE=6/9/94

TEST NUMBER=142 TEST TYPE=VSDP FWR LIN CY= 0.1
COVER ON PASS= 0 COVER ON FAIL= 0 V4S=OPEN
IS = 12.000A VGS = 10.000V
COMP= 5.000V COMP= 3.0000MA
PULSE TIME(.1MS)= 3
AUTO RNG=YES [A] VSD(MIN)=NONE VSD(MAX)= 20.000V

TEST NUMBER=143 TEST TYPE=VSDP FWR LIN CY= 0.1
COVER ON PASS= 0 COVER ON FAIL= 0 V4S=OPEN
IS = 14.000A VGS = 10.000V
COMP= 5.000V COMP= 3.0000MA
PULSE TIME(.1MS)= 3
AUTO RNG=YES [A] VSD(MIN)=NONE VSD(MAX)= 20.000V

TEST NUMBER=144 TEST TYPE=VSDP FWR LIN CY= 0.1
COVER ON PASS= 0 COVER ON FAIL= 0 V4S=OPEN
IS = 16.000A VGS = 10.000V
COMP= 5.000V COMP= 3.0000MA
PULSE TIME(.1MS)= 3
AUTO RNG=YES [A] VSD(MIN)=NONE VSD(MAX)= 20.000V

TEST NUMBER=145 TEST TYPE=VSDP FWR LIN CY= 0.1
COVER ON PASS= 0 COVER ON FAIL= 0 V4S=OPEN
IS = 18.000A VGS = 10.000V
COMP= 5.000V COMP= 3.0000MA
PULSE TIME(.1MS)= 3
AUTO RNG=YES [A] VSD(MIN)=NONE VSD(MAX)= 20.000V

TEST NUMBER=146 TEST TYPE=VSDP FWR LIN CY= 0.1
COVER ON PASS= 0 COVER ON FAIL= 0 V4S=OPEN
IS = 20.000A VGS = 10.000V
COMP= 5.000V COMP= 3.0000MA
PULSE TIME(.1MS)= 3
AUTO RNG=YES [A] VSD(MIN)=NONE VSD(MAX)= 20.000V

TEST NUMBER=147 TEST TYPE=VSDP FWR LIN CY= 0.1
COVER ON PASS= 0 COVER ON FAIL= 0 V4S=OPEN
IS = 2.000A VGS = 20.000V
COMP= 5.000V COMP= 3.0000MA
PULSE TIME(.1MS)= 3
AUTO RNG=YES [A] VSD(MIN)=NONE VSD(MAX)= 20.000V

FET/TEST TEST PROGRAM

REM =SA3654 CHARACTERIZATION TESTING GMM TEST FILE="3654CHR.TES"
 DATE=6/9/94

TEST NUMBER=148
 COVER ON PASS= 0
 IS = 4.0000A
 COMP= 5.0000V
 PULSE TIME(.1MS)= 3
 AUTO RNG=YES [A] VSD(MIN)=NONE VSD(MAX)= 20.000V
 TEST TYPE=VSDP
 COVER ON FAIL= 0
 VGS = 20.000V
 COMP= 3.0000MA
 FWR LIN CY= 0.1
 V4S=OFFEN

TEST NUMBER=149
 COVER ON PASS= 0
 IS = 6.0000A
 COMP= 5.0000V
 PULSE TIME(.1MS)= 3
 AUTO RNG=YES [A] VSD(MIN)=NONE VSD(MAX)= 20.000V
 TEST TYPE=VSDP
 COVER ON FAIL= 0
 VGS = 20.000V
 COMP= 3.0000MA
 FWR LIN CY= 0.1
 V4S=OFFEN

TEST NUMBER=150
 COVER ON PASS= 0
 IS = 8.0000A
 COMP= 5.0000V
 PULSE TIME(.1MS)= 3
 AUTO RNG=YES [A] VSD(MIN)=NONE VSD(MAX)= 20.000V
 TEST TYPE=VSDP
 COVER ON FAIL= 0
 VGS = 20.000V
 COMP= 3.0000MA
 FWR LIN CY= 0.1
 V4S=OFFEN

TEST NUMBER=151
 COVER ON PASS= 0
 IS = 10.000A
 COMP= 5.0000V
 PULSE TIME(.1MS)= 3
 AUTO RNG=YES [A] VSD(MIN)=NONE VSD(MAX)= 20.000V
 TEST TYPE=VSDP
 COVER ON FAIL= 0
 VGS = 20.000V
 COMP= 3.0000MA
 FWR LIN CY= 0.1
 V4S=OFFEN

TEST NUMBER=152
 COVER ON PASS= 0
 IS = 12.000A
 COMP= 5.0000V
 PULSE TIME(.1MS)= 3
 AUTO RNG=YES [A] VSD(MIN)=NONE VSD(MAX)= 20.000V
 TEST TYPE=VSDP
 COVER ON FAIL= 0
 VGS = 20.000V
 COMP= 3.0000MA
 FWR LIN CY= 0.1
 V4S=OFFEN

TEST NUMBER=153
 COVER ON PASS= 0
 IS = 14.000A
 COMP= 5.0000V
 PULSE TIME(.1MS)= 3
 AUTO RNG=YES [A] VSD(MIN)=NONE VSD(MAX)= 20.000V
 TEST TYPE=VSDP
 COVER ON FAIL= 0
 VGS = 20.000V
 COMP= 3.0000MA
 FWR LIN CY= 0.1
 V4S=OFFEN

FET/TEST TEST PROGRAM

REM =SA3654 CHARACTERIZATION TESTING GMM TEST FILE="3654CHR.TES"
 DATE=6/9/94

TEST NUMBER=154
 COVER ON PASS= 0
 IS = 16.000A
 COMP= 5.0000V
 PULSE TIME(.1MS)= 3
 AUTO RNG=YES [A] VSD(MIN)=NONE VSD(MAX)= 20.000V
 TEST TYPE=VSDP
 COVER ON FAIL= 0
 VGS = 20.000V
 COMP= 3.0000MA
 FWR LIN CY= 0.1
 V4S=OPEN

TEST NUMBER=155
 COVER ON PASS= 0
 IS = 18.000A
 COMP= 5.0000V
 PULSE TIME(.1MS)= 3
 AUTO RNG=YES [A] VSD(MIN)=NONE VSD(MAX)= 20.000V
 TEST TYPE=VSDP
 COVER ON FAIL= 0
 VGS = 20.000V
 COMP= 3.0000MA
 FWR LIN CY= 0.1
 V4S=OPEN

TEST NUMBER=156
 COVER ON PASS= 0
 IS = 20.000A
 COMP= 5.0000V
 PULSE TIME(.1MS)= 3
 AUTO RNG=YES [A] VSD(MIN)=NONE VSD(MAX)= 20.000V
 TEST TYPE=VSDP
 COVER ON FAIL= 0
 VGS = 20.000V
 COMP= 3.0000MA
 FWR LIN CY= 0.1
 V4S=OPEN

TEST NUMBER=157
 COVER ON PASS= 0
 [A] GFS (MIN)=NONE
 GFS (RESULT)=(NONE "R" T194) " " NONE
 TEST TYPE=FX
 COVER ON FAIL= 0
 GFS (MAX)= 20.000S

TEST NUMBER=158
 COVER ON PASS= 0
 [A] GFS (MIN)=NONE
 GFS (RESULT)=(NONE "R" T197) " " NONE
 TEST TYPE=FX
 COVER ON FAIL= 0
 GFS (MAX)= 20.000S

TEST NUMBER=194
 COVER ON PASS= 0
 [A] RGFS (MIN)=NONE
 RGFS (RESULT)=(T195 "-" T196) "/" 500.00M
 TEST TYPE=FX
 COVER ON FAIL= 0
 RGFS (MAX)= 5.0000S

TEST NUMBER=195
 COVER ON PASS= 0
 VGS = 15.000V
 PULSE TIME(.1MS)= 3
 AUTO RNG=YES [A] VGS(MIN)=NONE VGS(MAX)= 10.000V
 TEST TYPE=VGS1P
 COVER ON FAIL= 0
 ID = 7.7500A
 FWR LIN CY= 0.1
 V4S=OPEN

FET/TEST TEST PROGRAM

REM =SA3654 CHARACTERIZATION TESTING GMM TEST FILE="3654CHR.TES"
DATE=6/9/94

TEST NUMBER=196 TEST TYPE=VGS1P PWR LIN CY= 0.1
COVER ON PASS= 0 COVER ON FAIL= 0 V4S=OPEN
VDS = 15.000V ID = 7.2500A
PULSE TIME(.1MS)= 3
AUTO RNG=YES [A] VGS(MIN)=NONE VGS(MAX)= 10.000V

TEST NUMBER=197 TEST TYPE=EX
COVER ON PASS= 0 COVER ON FAIL= 0
[A] RGFS (MIN)=NONE RGFS (MAX)= 10.000S
RGFS (RESULT)=(T198 "-" T199) "/" 500.00M

TEST NUMBER=198 TEST TYPE=VGS1P PWR LIN CY= 0.1
COVER ON PASS= 0 COVER ON FAIL= 0 V4S=OPEN
VDS = 25.000V ID = 10.000A
PULSE TIME(.1MS)= 3
AUTO RNG=YES [A] VGS(MIN)=NONE VGS(MAX)= 10.000V

TEST NUMBER=199 TEST TYPE=VGS1P PWR LIN CY= 0.1
COVER ON PASS= 0 COVER ON FAIL= 0 V4S=OPEN
VDS = 25.000V ID = 9.5000A
PULSE TIME(.1MS)= 3
AUTO RNG=YES [A] VGS(MIN)=NONE VGS(MAX)= 10.000V

TEST NUMBER=200 TEST TYPE=REL PWR LIN CY= 0.1
COVER ON PASS= 0 COVER ON FAIL= 0
IK = 50.000MA
COMP= 10.000V
TEST TIME(MS)= 1
AUTO RNG=NO [A] REL(MIN)=NONE REL(MAX)= 1.0000V

=====

FET/TEST DATA REPORT

REM =CHRI AMBIENT TESTS
 DATE=6-20-94
 BINS=ALL-->1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17,18,19,20,21,22,23,24

RUN FILE="3654CHRI.RUN"

SERIAL NUMBERS= 13 TO 780

TEST#	LOG	USED	LOW	HIGH	MEAN	SIGMA
-SEG	TEST	TYPE	COUNT	COUNT		
1-1	IGSS	A	50	17.920PA	60.450PA	32.075PA
2-1	IGSS	A	50	-17.600PA	-185.62PA	207.42PA
3-1	VTH1	V	50	31.100MV	35.248MV	7.5720MV
4-1	VTH1	V	50	186.20MV	201.77MV	35.883MV
5-1	VTH1	V	50	383.96MV	411.08MV	51.833MV
6-1	VTH1	V	50	2.5040V	2.6433V	49.281MV
7-1	VTH1	V	50	2.6096V	2.7248V	44.768MV
8-1	VTH1	V	50	2.6876V	2.8035V	43.435MV
9-1	VTH1	V	50	2.7888V	2.9054V	43.182MV
10-1	VTH1	V	50	2.8652V	2.9829V	43.525MV
11-1	VTH1	V	50	2.9404V	3.0597V	43.948MV
12-1	VTH1	V	50	3.3964V	3.5239V	47.564MV
13-1	VTH1P	V	50	3.4952V	3.7448V	48.636MV
14-1	VTH1P	V	50	3.7656V	3.6250V	54.652MV
15-1	VTH1P	V	50	4.0840V	3.9035V	70.002MV
16-1	VTH1P	V	50	4.2968V	4.4750V	88.409MV
17-1	VTH1P	V	50	4.4232V	4.6236V	106.04MV
18-1	VTH1P	V	50	4.5304V	4.7573V	125.99MV
19-1	VTH1P	V	50	4.8744V	5.2427V	190.34MV
20-1	VTH1P	V	50	5.7224V	6.2236V	262.83MV
21-1	VTH1P	V	50	6.7296V	7.3538V	327.98MV
22-1	VTH1P	V	50	7.8248V	8.5836V	398.90MV
23-1	VTH1P	V	50	9.0072V	9.9179V	477.75MV
24-1	VTH1P	V	50	10.284V	11.368V	567.55MV
25-1	VTH1P	V	50	11.673V	12.949V	670.32MV
26-1	VTH1P	V	50	13.178V	14.687V	795.71MV
27-1	VTH1P	V	50	14.830V	16.684V	1.0138V
28-1	VTH1P	V	50	16.729V	19.012V	1.1740V

FET/TEST DATA REPORT

REM =CHR2 AMBIENT TESTS--50 PCS. RUN FILE="3654CHR2.RUN"
 DATE=6-20-94 SERIAL NUMBERS= 13 TO 780
 BINS=ALL--1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17,18,19,20,21,22,23,24

TEST#	LOG USED	TYPE	COUNT	LOW	HIGH	MEAN	SIGMA
29-1 IDSX	A	50	50	1.076NA	5.306NA	2.8167NA	1.0662NA
30-1 IDSX	A	50	50	1.1701NA	7.8012NA	3.4612NA	1.4854NA
31-1 IDSX	A	50	50	1.3560NA	11.840NA	4.3467NA	2.2896NA
32-1 IDSX	A	50	50	1.5312NA	11.813NA	5.1105NA	2.6188NA
33-1 IDSX	A	50	50	1.6908NA	11.765NA	5.5845NA	2.6921NA
34-1 IDSX	A	50	50	1.8304NA	12.724NA	6.0017NA	2.5998NA
35-1 IDSX	A	50	50	1.9300NA	15.012NA	6.7756NA	3.1231NA
36-1 IDSX	A	50	50	1.9828NA	17.328NA	7.4465NA	3.7974NA
37-1 IDSX	A	50	50	2.0336NA	22.180NA	7.9769NA	4.8511NA
38-1 IDSX	A	50	50	2.0884NA	90.564NA	10.439NA	14.196NA
39-1 IDSX	A	50	50	2.1552NA	126.24NA	11.831NA	19.381NA
40-1 IDSX	A	50	50	2.2064NA	245.80NA	16.496NA	37.431NA
41-1 IDSX	A	50	50	2.2436NA	412.64NA	22.221NA	61.898NA
42-1 IDSX	A	50	50	2.3156NA	766.64NA	31.685NA	111.96NA
43-1 IDSX	A	50	50	2.3832NA	932.88NA	42.660NA	146.94NA
44-1 IDSX	A	50	50	2.4824NA	1.1280UA	50.245NA	184.16NA
45-1 IDSX	A	50	50	2.5920NA	1.3296UA	59.820NA	220.84NA
46-1 IDSX	A	50	50	2.7764NA	68.944UA	1.4219UA	9.7454UA
47-1 IDSX	A	50	50	2.9996NA	286.76UA	5.7945UA	40.546UA
48-1 IDSX	A	50	50	3.3424NA	515.16UA	10.393UA	72.843UA

FET/TEST DATA REPORT

REM = AMBIENT CHR3 TESTS—50 PCS. RUN FILE="3654CHR3.RUN"
 DATE=6-23-94 SERIAL NUMBERS= 13 TO 780
 BINS=ALL—>1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17,18,19,20,21,22,23,24

TEST# -SEG	TEST TYPE	LOG COUNT	USED COUNT	LOW	HIGH	MEAN	SIGMA
49-1	VDSP	V	50	173.07mV	224.48mV	196.95mV	12.204mV
50-1	VDSP	V	50	284.40mV	360.24mV	318.50mV	18.060mV
51-1	VDSP	V	50	354.40mV	449.92mV	398.47mV	22.617mV
52-1	VDSP	V	50	535.60mV	679.84mV	602.34mV	33.924mV
53-1	VDSP	V	50	718.88mV	910.24mV	807.28mV	44.808mV
54-1	VDSP	V	50	902.40mV	1.1387V	1.0140V	55.939mV
55-1	VDSP	V	50	1.0872V	5.5344V	1.3534V	700.22mV
56-1	VDSP	V	50	1.2740V	21.000V	2.0000V	2.8922V
57-1	VDSP	V	50	1.4636V	21.000V	3.2366V	4.3499V
58-1	VDSP	V	50	1.6530V	21.000V	5.5130V	5.2099V
59-1	VDSP	V	50	1.8287V	21.000V	10.154V	6.9051V
60-1	VDSP	V	50	3.4648V	21.000V	16.087V	6.2969V
61-1	VDSP	V	50	5.5864V	21.000V	20.304V	2.9084V
62-1	VDSP	V	50	10.974V	21.000V	20.799V	1.4179V
63-1	VDSP	V	50	21.000V	21.000V	21.000V	0.0000V
64-1	VDSP	V	50	172.47mV	216.96mV	193.38mV	10.800mV
65-1	VDSP	V	50	689.68mV	867.92mV	774.44mV	43.316mV
66-1	VDSP	V	50	1.3860V	1.7424V	1.5567V	86.954mV
67-1	VDSP	V	50	2.1064V	2.6528V	2.3684V	133.41mV
68-1	VDSP	V	50	2.8640V	3.6096V	3.2237V	183.10mV
69-1	VDSP	V	50	3.6648V	4.6320V	4.1321V	237.18mV
70-1	VDSP	V	50	4.5168V	5.7328V	5.1038V	297.69mV
71-1	VDSP	V	50	5.4296V	6.9360V	6.1541V	367.04mV
72-1	VDSP	V	50	6.4200V	8.2768V	7.3019V	447.92mV
73-1	VDSP	V	50	7.5008V	9.8664V	8.5685V	549.86mV
74-1	VDSP	V	50	8.6848V	11.974V	9.9887V	700.71mV
75-1	VDSP	V	50	9.9968V	13.299V	11.562V	788.71mV
76-1	VDSP	V	50	11.474V	21.000V	13.629V	1.7554V
77-1	VDSP	V	50	13.156V	21.000V	15.810V	1.7287V
78-1	VDSP	V	50	15.128V	21.000V	18.321V	1.5842V

FET/TEST DATA REPORT

REM = AMBIENT CH4 TESTS—50 PCS. RUN FILE="3654CH4.RUN"
 DATE=6-24-94 SERIAL NUMBERS= 13 TO 780
 BINS=ALL—>1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17,18,19,20,21,22,23,24

TEST#	TEST	TYPE	LOG	USED	LOW	HIGH	MEAN	SIGMA
-SEG				COUNT				
79-1	VDSP	V	50	50	169.88mV	211.36mV	189.60mV	9.4869mV
80-1	VDSP	V	50	50	682.80mV	849.28mV	762.50mV	38.329mV
81-1	VDSP	V	50	50	1.3766V	1.7089V	1.5379V	76.809mV
82-1	VDSP	V	50	50	2.0912V	2.5944V	2.3367V	117.63mV
83-1	VDSP	V	50	50	2.8296V	3.5192V	3.1704V	161.27mV
84-1	VDSP	V	50	50	3.6160V	4.5056V	4.0578V	208.48mV
85-1	VDSP	V	50	50	4.4496V	5.5584V	5.0032V	260.93mV
86-1	VDSP	V	50	50	5.3400V	6.6952V	6.0196V	319.77mV
87-1	VDSP	V	50	50	6.3000V	7.9312V	7.1214V	385.75mV
88-1	VDSP	V	50	50	7.3424V	9.2872V	8.3216V	460.73mV
89-1	VDSP	V	50	50	8.4744V	10.784V	9.6379V	548.44mV
90-1	VDSP	V	50	50	9.7160V	12.446V	11.092V	648.38mV
91-1	VDSP	V	50	50	11.086V	14.306V	12.704V	765.89mV
92-1	VDSP	V	50	50	12.601V	16.450V	14.513V	912.17mV
93-1	VDSP	V	50	50	14.282V	19.111V	16.625V	1.1621V
94-1	VDSP	V	50	50	170.71mV	214.72mV	191.49mV	10.051mV
95-1	VDSP	V	50	50	682.88mV	850.48mV	763.81mV	38.691mV
96-1	VDSP	V	50	50	1.3685V	1.7018V	1.5310V	77.361mV
97-1	VDSP	V	50	50	2.0808V	2.5864V	2.3299V	118.00mV
98-1	VDSP	V	50	50	2.8256V	3.5136V	3.1667V	161.68mV
99-1	VDSP	V	50	50	3.6080V	4.4928V	4.0504V	208.80mV
100-1	VDSP	V	50	50	4.4368V	5.5360V	4.9903V	260.53mV
101-1	VDSP	V	50	50	5.3208V	6.6616V	5.9989V	318.74mV
102-1	VDSP	V	50	50	6.2712V	7.8792V	7.0902V	383.79mV
103-1	VDSP	V	50	50	7.3008V	9.2120V	8.2769V	457.83mV
104-1	VDSP	V	50	50	8.4176V	10.676V	9.5745V	542.19mV
105-1	VDSP	V	50	50	9.6408V	12.295V	11.005V	639.56mV
106-1	VDSP	V	50	50	10.982V	14.101V	12.588V	753.46mV
107-1	VDSP	V	50	50	12.462V	16.143V	14.352V	888.94mV
108-1	VDSP	V	50	50	14.116V	18.655V	16.395V	1.1197V

FET/TEST DATA REPORT

REM =AMBIENT CHR5 TESTS-50 PCS. RUN FILE="3654CHR5.RUN"
 DATE=6-24-94 SERIAL NUMBERS= 13 TO 780
 BINS=ALL->1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17,18,19,20,21,22,23,24

TEST# -SEG	TEST TYPE	LOG COUNT	USED COUNT	LOW	HIGH	MEAN	SIGMA
109-1	BVDSX V	50	50	471.12V	604.36V	575.29V	22.199V
110-1	BVDSX V	50	50	498.72V	604.64V	576.42V	19.842V
111-1	BVDSX V	50	50	544.72V	604.80V	577.42V	16.911V
112-1	BVDSX V	50	50	556.12V	610.04V	585.96V	14.397V
113-1	BVDSX V	50	50	561.04V	615.24V	591.22V	14.417V
114-1	BVDSX V	50	50	564.48V	619.24V	594.94V	14.549V
115-1	BVDSX V	50	50	568.00V	623.32V	598.74V	14.715V
116-1	BVDSX V	50	50	571.56V	627.44V	602.60V	14.903V
117-1	VSDP V	50	50	750.32MV	762.64MV	754.28MV	3.0482MV
118-1	VSDP V	50	50	824.96MV	837.52MV	830.80MV	2.5966MV
119-1	VSDP V	50	50	856.16MV	870.24MV	863.79MV	3.0684MV
120-1	VSDP V	50	50	891.36MV	908.00MV	899.27MV	3.7834MV
121-1	VSDP V	50	50	932.40MV	952.32MV	941.71MV	4.6401MV
122-1	VSDP V	50	50	970.96MV	999.52MV	982.44MV	5.9962MV
123-1	VSDP V	50	50	1.0073V	1.0349V	1.0197V	6.3407MV
124-1	VSDP V	50	50	1.0420V	1.0739V	1.0563V	7.3021MV
125-1	VSDP V	50	50	1.0734V	1.1156V	1.0923V	8.9850MV
126-1	VSDP V	50	50	1.1094V	1.1491V	1.1272V	9.1584MV
127-1	VSDP V	50	50	624.72MV	649.12MV	635.19MV	5.8053MV
128-1	VSDP V	50	50	727.36MV	743.20MV	734.18MV	3.7360MV
129-1	VSDP V	50	50	792.48MV	806.64MV	800.00MV	3.6212MV
130-1	VSDP V	50	50	844.24MV	861.68MV	853.85MV	4.1884MV
131-1	VSDP V	50	50	891.84MV	912.08MV	902.62MV	5.0336MV
132-1	VSDP V	50	50	934.88MV	962.32MV	948.16MV	6.0628MV
133-1	VSDP V	50	50	976.48MV	1.0069V	991.11MV	7.0585MV
134-1	VSDP V	50	50	1.0163V	1.0523V	1.0323V	8.1420MV
135-1	VSDP V	50	50	1.0534V	1.0934V	1.0717V	9.3348MV
136-1	VSDP V	50	50	1.0908V	1.1342V	1.1109V	10.1444MV

FET/TEST DATA REPORT

REM =AMBIENT CHR6 TESTS--50 PCS. RUN FILE="3654CHR6.RUN"
 DATE=6-24-94 SERIAL NUMBERS= 13 TO 780
 BINS=ALL-->1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17,18,19,20,21,22,23,24

TEST#	TEST	TYPE	LOG COUNT	USED COUNT	LOW	HIGH	MEAN	SIGMA
137-1	VSDP	V	50	50	622.72mV	652.16mV	636.01mV	6.4446mV
138-1	VSDP	V	50	50	742.64mV	775.44mV	751.00mV	5.0939mV
139-1	VSDP	V	50	50	787.52mV	806.24mV	796.01mV	3.7424mV
140-1	VSDP	V	50	50	837.28mV	859.12mV	847.65mV	4.3751mV
141-1	VSDP	V	50	50	882.64mV	909.76mV	895.40mV	5.5519mV
142-1	VSDP	V	50	50	924.24mV	955.04mV	939.09mV	6.2240mV
143-1	VSDP	V	50	50	965.28mV	995.68mV	980.94mV	6.8705mV
144-1	VSDP	V	50	50	1.0032V	1.0424V	1.0213V	7.9715mV
145-1	VSDP	V	50	50	1.0408V	1.0819V	1.0600V	8.9374mV
146-1	VSDP	V	50	50	1.0764V	1.1228V	1.0980V	9.9497mV
147-1	VSDP	V	50	50	631.84mV	653.76mV	641.30mV	6.1879mV
148-1	VSDP	V	50	50	733.60mV	763.84mV	742.10mV	4.8068mV
149-1	VSDP	V	50	50	791.44mV	806.24mV	799.73mV	3.2904mV
150-1	VSDP	V	50	50	840.56mV	859.28mV	850.24mV	4.2171mV
151-1	VSDP	V	50	50	884.24mV	907.12mV	896.26mV	4.9976mV
152-1	VSDP	V	50	50	926.48mV	955.68mV	939.65mV	6.2028mV
153-1	VSDP	V	50	50	965.12mV	997.12mV	980.74mV	6.8673mV
154-1	VSDP	V	50	50	1.0025V	1.0396V	1.0206V	7.8268mV
155-1	VSDP	V	50	50	1.0402V	1.0802V	1.0590V	8.7528mV
156-1	VSDP	V	50	50	1.0758V	1.1210V	1.0969V	9.8259mV
157-1	GFS	S	50	50	6.1881S	8.2237S	7.5861S	466.90mS
158-1	GFS	S	50	50	6.6489S	8.8028S	8.0835S	476.63mS

FET/TEST DATA REPORT

REM =COLD CHRL TESTS--50 PCS. RUN FILE="3654CHRL.RUN"
 DATE=6-24-94 SERIAL NUMBERS= 13 TO 780
 BINS=ALL-->1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17,18,19,20,21,22,23,24

TEST#	TEST	TYPE	LOG	USED	LOW	HIGH	MEAN	SIGMA
-SEG			COUNT	COUNT				
1-1	IGSS	A	46	46	35.960NA	-46.192NA	-1.6650NA	16.848NA
2-1	IGSS	A	46	46	-34.300NA	38.116NA	-2.3691NA	15.164NA
3-1	VIHL	V	46	46	22.332NA	49.148NA	31.471NA	5.6652NA
4-1	VIHL	V	46	46	174.04NA	277.72NA	201.70NA	24.749NA
5-1	VIHL	V	46	46	368.60NA	524.76NA	394.46NA	31.567NA
6-1	VIHL	V	46	46	3.0632V	3.4572V	3.3190V	75.180NA
7-1	VIHL	V	46	46	3.2636V	3.5100V	3.3810V	54.760NA
8-1	VIHL	V	46	46	3.3176V	3.5616V	3.4354V	50.791NA
9-1	VIHL	V	46	46	3.3860V	3.6300V	3.5047V	49.725NA
10-1	VIHL	V	46	46	3.4384V	3.6836V	3.5583V	49.784NA
11-1	VIHL	V	46	46	3.4900V	3.7372V	3.6113V	50.100NA
12-1	VIHL	V	46	46	3.8272V	4.0896V	3.9553V	52.932NA
13-1	VIHL	V	46	46	3.9064V	4.1744V	4.0354V	53.976NA
14-1	VIHL	V	46	46	4.1032V	4.4128V	4.2390V	62.855NA
15-1	VIHL	V	46	46	4.2208V	4.6416V	4.3837V	83.247NA
16-1	VIHL	V	46	46	4.1928V	4.7256V	4.3819V	105.10NA
17-1	VIHL	V	46	46	4.1064V	4.7408V	4.3232V	123.95NA
18-1	VIHL	V	46	46	3.9944V	4.7200V	4.2367V	142.54NA
19-1	VIHL	V	46	46	3.9192V	4.6976V	4.1884V	148.03NA
20-1	VIHL	V	46	46	4.3792V	5.0712V	4.6769V	148.45NA
21-1	VIHL	V	46	46	5.0784V	5.8848V	5.4365V	181.61NA
22-1	VIHL	V	46	46	5.8408V	6.7896V	6.2685V	218.44NA
23-1	VIHL	V	46	46	6.6496V	7.7560V	7.1561V	258.84NA
24-1	VIHL	V	46	46	7.4992V	8.7888V	8.0974V	304.76NA
25-1	VIHL	V	46	46	8.3984V	9.8944V	9.0994V	356.98NA
26-1	VIHL	V	46	46	9.3480V	11.078V	10.170V	416.85NA
27-1	VIHL	V	46	46	10.365V	12.354V	11.317V	484.12NA
28-1	VIHL	V	46	46	11.446V	13.732V	12.549V	561.13NA

FET/TEST DATA REPORT

REM =COLD--CHR2 TESTS--50 PCS. RIN FILE="3654CHR2.RUN"
 DATE=6-24-94 SERIAL NUMBERS= 13 TO 780
 BINS=ALL-->1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17,18,19,20,21,22,23,24

TEST#	-SEG	TEST	TYPE	LOG	USED	LOW	HIGH	MEAN	SIGMA
				COUNT	COUNT				
29-1	1	IDSX	A	46	46	43.360PA	173.20NA	10.601NA	31.215NA
30-1	1	IDSX	A	46	46	25.600PA	356.24NA	23.223NA	67.939NA
31-1	1	IDSX	A	46	46	41.560PA	551.28NA	37.910NA	111.01NA
32-1	1	IDSX	A	46	46	12.800PA	756.40NA	55.773NA	165.54NA
33-1	1	IDSX	A	46	46	3.2000PA	1.0736UA	76.040NA	230.49NA
34-1	1	IDSX	A	46	46	57.600PA	1.5400UA	98.629NA	306.19NA
35-1	1	IDSX	A	46	46	19.200PA	2.1568UA	125.02NA	400.98NA
36-1	1	IDSX	A	46	46	49.600PA	2.8488UA	154.11NA	507.80NA
37-1	1	IDSX	A	46	46	44.800PA	3.6332UA	185.31NA	627.33NA
38-1	1	IDSX	A	46	46	20.800PA	4.6496UA	222.02NA	777.92NA
39-1	1	IDSX	A	46	46	46.800PA	5.9500UA	265.59NA	968.19NA
40-1	1	IDSX	A	46	46	96.360PA	7.4960UA	315.88NA	1.1940UA
41-1	1	IDSX	A	46	46	48.000PA	9.1844UA	369.27NA	1.4409UA
42-1	1	IDSX	A	46	46	64.000PA	10.976UA	426.39NA	1.7045UA
43-1	1	IDSX	A	46	46	139.28PA	12.972UA	486.11NA	1.9931UA
44-1	1	IDSX	A	46	46	141.32PA	14.972UA	542.57NA	2.2780UA
45-1	1	IDSX	A	46	46	143.36PA	17.160UA	606.27NA	2.5922UA
46-1	1	IDSX	A	46	46	132.60PA	19.488UA	683.38NA	2.9345UA
47-1	1	IDSX	A	46	46	124.96PA	22.512UA	788.53NA	3.3803UA
48-1	1	IDSX	A	46	46	138.24PA	42.492UA	1.1876MA	6.3087MA

FET/TEST DATA REPORT

REM =COLD-CHR3 TESTS=50 PCS. RUN FILE="3654CHR3.RUN"
 DATE=6-24-94 SERIAL NUMBERS= 13 TO 780
 BINS=ALL->1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17,18,19,20,21,22,23,24

TEST#	-SEG	TEST	TYPE	LOG COUNT	USED COUNT	LOW	HIGH	MEAN	SIGMA
49-1	VDSP	V	46	46	97.144MV	128.95MV	110.60MV	6.6221MV	
50-1	VDSP	V	46	46	156.74MV	210.40MV	178.98MV	11.136MV	
51-1	VDSP	V	46	46	198.17MV	271.36MV	224.41MV	14.003MV	
52-1	VDSP	V	46	46	297.60MV	270.32V	392.96MV	348.81MV	
53-1	VDSP	V	46	46	389.44MV	15.620V	1.6558V	3.4727V	
54-1	VDSP	V	46	46	484.08MV	21.000V	3.7029V	5.0362V	
55-1	VDSP	V	46	46	584.56MV	21.000V	11.384V	7.7121V	
56-1	VDSP	V	46	46	712.24MV	21.000V	10.071V	8.4016V	
57-1	VDSP	V	46	46	1.6818V	21.000V	17.131V	6.1157V	
58-1	VDSP	V	46	46	3.6648V	21.000V	20.421V	2.8719V	
59-1	VDSP	V	46	46	21.000V	21.000V	21.000V	0.0000V	
60-1	VDSP	V	46	46	21.000V	21.000V	21.000V	0.0000V	
61-1	VDSP	V	46	46	21.000V	21.000V	21.000V	0.0000V	
62-1	VDSP	V	46	46	21.000V	21.000V	21.000V	0.0000V	
63-1	VDSP	V	46	46	21.000V	21.000V	21.000V	0.0000V	
64-1	VDSP	V	46	46	93.264MV	119.10MV	103.67MV	6.2026MV	
65-1	VDSP	V	46	46	363.52MV	470.40MV	409.41MV	24.249MV	
66-1	VDSP	V	46	46	729.68MV	939.68MV	821.26MV	49.224MV	
67-1	VDSP	V	46	46	1.1061V	1.4257V	1.2480V	74.720MV	
68-1	VDSP	V	46	46	1.4998V	1.9329V	1.6945V	101.84MV	
69-1	VDSP	V	46	46	1.9126V	2.4728V	2.1657V	131.83MV	
70-1	VDSP	V	46	46	2.3496V	3.0496V	2.6702V	165.34MV	
71-1	VDSP	V	46	46	2.8176V	3.6920V	3.2140V	201.55MV	
72-1	VDSP	V	46	46	3.3232V	4.4768V	3.8041V	248.77MV	
73-1	VDSP	V	46	46	3.8736V	5.7400V	4.4663V	349.55MV	
74-1	VDSP	V	46	46	4.4672V	6.4288V	5.2098V	410.15MV	
75-1	VDSP	V	46	46	5.1112V	12.378V	6.1901V	1.0447V	
76-1	VDSP	V	46	46	5.8848V	11.750V	7.1341V	893.16MV	
77-1	VDSP	V	46	46	6.7216V	18.682V	8.4463V	1.7872V	
78-1	VDSP	V	46	46	8.0200V	21.000V	9.7613V	2.0838V	

FET/TEST DATA REPORT

REM =COLD-CHR4 TESTS-50 PCS. RUN FILE="3654CHR4.RUN"
 DATE=6-24-94 SERIAL NUMBERS= 13 TO 780
 BINS=ALL->1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17,18,19,20,21,22,23,24

TEST# -SEG	TEST TYPE	LOG COUNT	USED COUNT	LOW	HIGH	MEAN	SIGMA
79-1	VDSP	46	46	94.368MV	116.98MV	103.24MV	5.6674MV
80-1	VDSP	46	46	361.20MV	461.28MV	401.71MV	23.476MV
81-1	VDSP	46	46	719.84MV	918.64MV	807.11MV	45.753MV
82-1	VDSP	46	46	1.0878V	1.3920V	1.2231V	70.440MV
83-1	VDSP	46	46	1.4690V	1.8843V	1.6560V	96.309MV
84-1	VDSP	46	46	1.8728V	2.4000V	2.1113V	124.06MV
85-1	VDSP	46	46	2.2952V	2.9504V	2.5953V	154.32MV
86-1	VDSP	46	46	2.7448V	3.5424V	3.1134V	187.52MV
87-1	VDSP	46	46	3.2256V	4.1792V	3.6728V	225.32MV
88-1	VDSP	46	46	3.7488V	4.8760V	4.2801V	266.95MV
89-1	VDSP	46	46	4.3136V	5.6400V	4.9438V	314.60MV
90-1	VDSP	46	46	4.9320V	6.4840V	5.6715V	368.59MV
91-1	VDSP	46	46	5.6048V	7.4240V	6.4746V	429.88MV
92-1	VDSP	46	46	6.3496V	8.4688V	7.3620V	499.60MV
93-1	VDSP	46	46	7.1664V	9.6344V	8.3434V	580.04MV
94-1	VDSP	46	46	97.480MV	124.28MV	106.71MV	6.3914MV
95-1	VDSP	46	46	353.28MV	457.28MV	397.83MV	23.289MV
96-1	VDSP	46	46	707.04MV	915.44MV	794.93MV	47.423MV
97-1	VDSP	46	46	1.0733V	1.3914V	1.2091V	72.736MV
98-1	VDSP	46	46	1.4515V	1.8794V	1.6393V	97.788MV
99-1	VDSP	46	46	1.8490V	2.3880V	2.0900V	125.18MV
100-1	VDSP	46	46	2.2704V	2.9288V	2.5690V	156.38MV
101-1	VDSP	46	46	2.7096V	3.5112V	3.0803V	189.42MV
102-1	VDSP	46	46	3.1880V	4.1400V	3.6324V	226.15MV
103-1	VDSP	46	46	3.7016V	4.8224V	4.2303V	266.57MV
104-1	VDSP	46	46	4.2560V	5.5696V	4.8827V	312.59MV
105-1	VDSP	46	46	4.8608V	6.3880V	5.5957V	365.77MV
106-1	VDSP	46	46	5.5208V	7.2936V	6.3816V	424.64MV
107-1	VDSP	46	46	6.2624V	8.2968V	7.2492V	492.94MV
108-1	VDSP	46	46	7.0616V	9.4176V	8.2076V	572.01MV

FET/TEST DATA REPORT

REM =COLD--CHR5 TESTS--50 PCS. RUN FILE="3654CHR5.RUN"
 DATE=6-24-94 SERIAL NUMBERS= 13 TO 780
 BINS=ALL-->1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17,18,19,20,21,22,23,24

TEST#	LOG	USED	LOW	HIGH	MEAN	SIGMA
-SEG	TEST	TYPE	COUNT	COUNT		
109-1	BVDSX	V	46	46	520.96V	15.310V
110-1	BVDSX	V	46	46	520.03V	16.220V
111-1	BVDSX	V	46	46	520.99V	15.205V
112-1	BVDSX	V	46	46	528.05V	13.786V
113-1	BVDSX	V	46	46	532.74V	13.827V
114-1	BVDSX	V	46	46	536.37V	13.956V
115-1	BVDSX	V	46	46	539.99V	14.172V
116-1	BVDSX	V	46	46	543.77V	14.313V
117-1	VSDP	V	46	46	899.88mV	2.9455mV
118-1	VSDP	V	46	46	959.57mV	2.2547mV
119-1	VSDP	V	46	46	1.0054V	3.1173mV
120-1	VSDP	V	46	46	1.0515V	3.5768mV
121-1	VSDP	V	46	46	1.0948V	4.3003mV
122-1	VSDP	V	46	46	1.1368V	5.0107mV
123-1	VSDP	V	46	46	1.1755V	5.6502mV
124-1	VSDP	V	46	46	1.2113V	6.4198mV
125-1	VSDP	V	46	46	1.2530V	7.6091mV
126-1	VSDP	V	46	46	1.2960V	8.3884mV
127-1	VSDP	V	46	46	471.86mV	25.052mV
128-1	VSDP	V	46	46	854.01mV	14.704mV
129-1	VSDP	V	46	46	954.26mV	4.3246mV
130-1	VSDP	V	46	46	1.0075V	4.2973mV
131-1	VSDP	V	46	46	1.0543V	4.8489mV
132-1	VSDP	V	46	46	1.0995V	5.5492mV
133-1	VSDP	V	46	46	1.1440V	6.3465mV
134-1	VSDP	V	46	46	1.1877V	7.1639mV
135-1	VSDP	V	46	46	1.2310V	7.9973mV
136-1	VSDP	V	46	46	1.2738V	8.9921mV

FET/TEST DATA REPORT

REM =COLD-CHR6 TESTS-50 PCS.

RUN FILE="3654CHR6.RUN"

DATE=6-24-94

SERIAL NUMBERS= 13 TO 780

BINS=ALL->1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17,18,19,20,21,22,23,24

TEST#	-SEG	TEST	TYPE	LOG	USED	LOW	HIGH	MEAN	SIGMA
				COUNT	COUNT				
137-1	VSDP	V		46		370.64mV	486.88mV	419.77mV	25.793mV
138-1	VSDP	V		46		729.20mV	876.16mV	809.61mV	34.888mV
139-1	VSDP	V		46		948.96mV	971.36mV	957.91mV	5.3358mV
140-1	VSDP	V		46		1.0115V	1.0290V	1.0214V	4.0064mV
141-1	VSDP	V		46		1.0574V	1.0754V	1.0677V	4.6514mV
142-1	VSDP	V		46		1.1008V	1.1250V	1.1126V	5.1915mV
143-1	VSDP	V		46		1.1437V	1.1694V	1.1553V	5.7634mV
144-1	VSDP	V		46		1.1786V	1.2113V	1.1965V	6.9695mV
145-1	VSDP	V		46		1.2217V	1.2525V	1.2368V	7.3087mV
146-1	VSDP	V		46		1.2547V	1.2930V	1.2753V	8.2273mV
147-1	VSDP	V		46		371.68mV	469.52mV	410.91mV	23.166mV
148-1	VSDP	V		46		717.36mV	863.44mV	795.92mV	36.216mV
149-1	VSDP	V		46		939.84mV	961.36mV	947.54mV	5.0881mV
150-1	VSDP	V		46		1.0051V	1.0189V	1.0120V	3.5719mV
151-1	VSDP	V		46		1.0493V	1.0680V	1.0582V	4.2796mV
152-1	VSDP	V		46		1.0910V	1.1117V	1.1018V	4.9993mV
153-1	VSDP	V		46		1.1321V	1.1566V	1.1448V	5.7857mV
154-1	VSDP	V		46		1.1735V	1.2013V	1.1871V	6.6199mV
155-1	VSDP	V		46		1.2130V	1.2445V	1.2292V	7.4675mV
156-1	VSDP	V		46		1.2527V	1.2886V	1.2711V	8.6589mV
157-1	GFS	S		46		6.7204S	9.3284S	8.4091S	559.88mS
158-1	GFS	S		46		7.1839S	9.9207S	9.0310S	630.62mS

FET/TEST DATA REPORT

REM =HOT-CHR1 TESTS=50 PCS. RUN FILE="3654CHR1.RUN"
 DATE=6-24-94 SERIAL NUMBERS= 13 TO 780
 BINS=ALL->1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17,18,19,20,21,22,23,24

TEST#	LOG	USED	LOW	HIGH	MEAN	SIGMA
-SEG	TEST	TYPE	COUNT	COUNT		
1-1	IGSS	A	46	208.04NA	41.075NA	49.953NA
2-1	IGSS	A	46	-11.520NA	-46.755NA	55.566NA
3-1	VTHL	V	46	6.4640MV	8.8142MV	786.49UV
4-1	VTHL	V	46	49.148MV	74.301MV	10.214MV
5-1	VTHL	V	46	170.20MV	220.18MV	19.814MV
6-1	VTHL	V	46	1.6176V	1.6933V	30.725MV
7-1	VTHL	V	46	1.7440V	1.8229V	30.316MV
8-1	VTHL	V	46	1.8644V	1.9463V	30.856MV
9-1	VTHL	V	46	2.0184V	2.1032V	31.873MV
10-1	VTHL	V	46	2.1324V	2.2201V	32.891MV
11-1	VTHL	V	46	2.2436V	2.3338V	33.803MV
12-1	VTHL	V	46	2.8648V	2.9689V	40.048MV
13-1	VTHLP	V	46	2.9840V	3.0909V	41.367MV
14-1	VTHLP	V	46	3.2776V	3.3930V	47.419MV
15-1	VTHLP	V	46	3.5320V	3.6695V	67.345MV
16-1	VTHLP	V	46	3.7192V	3.9731V	122.76MV
17-1	VTHLP	V	46	5.2224V	5.7008V	233.13MV
18-1	VTHLP	V	46	6.9904V	7.6559V	325.18MV
19-1	VTHLP	V	46	8.8608V	9.7274V	424.04MV
20-1	VTHLP	V	46	10.836V	11.927V	533.07MV
21-1	VTHLP	V	46	12.941V	14.279V	656.45MV
22-1	VTHLP	V	46	15.184V	16.918V	876.03MV
23-1	VTHLP	V	46	17.796V	19.866V	892.30MV
24-1	VTHLP	V	46	20.758V	20.995V	35.740MV
25-1	VTHLP	V	46	21.000V	21.000V	0.0000V
26-1	VTHLP	V	46	21.000V	21.000V	0.0000V
27-1	VTHLP	V	46	21.000V	21.000V	0.0000V
28-1	VTHLP	V	46	21.000V	21.000V	0.0000V

FEE/TEST DATA REPORT

REM =HOT-CHR2 TESTS-50 PCS. RUN FILE="3654CHR2.RUN"
 DATE-6-24-94 SERIAL NUMBERS= 13 TO 780
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TEST#	TEST TYPE	LOG COUNT	USED COUNT	LOW	HIGH	MEAN	SIGMA
29-1	IDSX A	46	46	1.0584UA	2.2016UA	1.5595UA	359.98NA
30-1	IDSX A	46	46	1.1740UA	2.5432UA	1.7739UA	420.77NA
31-1	IDSX A	46	46	1.2592UA	2.9000UA	2.0039UA	488.95NA
32-1	IDSX A	46	46	1.3964UA	3.3416UA	2.2232UA	558.52NA
33-1	IDSX A	46	46	1.4996UA	3.6680UA	2.4215UA	628.70NA
34-1	IDSX A	46	46	1.5364UA	4.0128UA	2.6255UA	718.37NA
35-1	IDSX A	46	46	1.5808UA	4.5600UA	2.7717UA	795.77NA
36-1	IDSX A	46	46	1.6056UA	5.1448UA	2.8627UA	855.49NA
37-1	IDSX A	46	46	1.6336UA	5.5812UA	2.9431UA	908.42NA
38-1	IDSX A	46	46	1.6616UA	6.0976UA	3.0279UA	983.47NA
39-1	IDSX A	46	46	1.6884UA	6.7004UA	3.1147UA	1.0753UA
40-1	IDSX A	46	46	1.7096UA	7.2688UA	3.2043UA	1.1721UA
41-1	IDSX A	46	46	1.7548UA	7.8016UA	3.3029UA	1.2805UA
42-1	IDSX A	46	46	1.7852UA	8.3548UA	3.4118UA	1.4057UA
43-1	IDSX A	46	46	1.8240UA	8.9348UA	3.5337UA	1.5485UA
44-1	IDSX A	46	46	1.8704UA	9.5596UA	3.6681UA	1.7031UA
45-1	IDSX A	46	46	1.9068UA	10.248UA	3.8219UA	1.8725UA
46-1	IDSX A	46	46	1.9612UA	11.092UA	4.0028UA	2.0603UA
47-1	IDSX A	46	46	2.0356UA	12.288UA	4.2179UA	2.2654UA
48-1	IDSX A	46	46	2.1308UA	13.688UA	4.4857UA	2.5076UA

FET/TEST DATA REPORT

REM =H01-CHR3 TESTS-50 PCS. RUN FILE="3654CHR3.RUN"
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 BINS=ALL->1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17,18,19,20,21,22,23,24

TEST#	TEST	TYPE	LOG	USED	LOW	HIGH	MEAN	SIGMA
-SEG			COUNT	COUNT				
49-1	VDSP	V	46	46	341.20MV	423.52MV	381.19MV	19.393MV
50-1	VDSP	V	46	46	547.20MV	681.84MV	612.14MV	31.600MV
51-1	VDSP	V	46	46	686.00MV	854.32MV	766.03MV	39.393MV
52-1	VDSP	V	46	46	1.0348V	1.2891V	1.1555V	59.379MV
53-1	VDSP	V	46	46	1.3882V	1.7284V	1.5494V	79.760MV
54-1	VDSP	V	46	46	1.7440V	2.1824V	1.9492V	100.69MV
55-1	VDSP	V	46	46	2.1056V	2.6336V	2.3546V	122.43MV
56-1	VDSP	V	46	46	2.4528V	3.0760V	2.7431V	143.31MV
57-1	VDSP	V	46	46	2.8360V	3.5736V	3.1603V	166.01MV
58-1	VDSP	V	46	46	3.2008V	5.4512V	3.6419V	391.37MV
59-1	VDSP	V	46	46	3.5832V	17.591V	4.4687V	2.2384V
60-1	VDSP	V	46	46	3.9800V	21.000V	5.5474V	3.6849V
61-1	VDSP	V	46	46	4.3848V	21.000V	7.2423V	4.6312V
62-1	VDSP	V	46	46	4.7720V	21.000V	11.093V	6.1826V
63-1	VDSP	V	46	46	5.4808V	21.000V	15.441V	5.9084V
64-1	VDSP	V	46	46	336.48MV	418.80MV	375.01MV	19.741MV
65-1	VDSP	V	46	46	1.3468V	1.6811V	1.5058V	79.471MV
66-1	VDSP	V	46	46	2.7192V	3.3904V	3.0401V	159.88MV
67-1	VDSP	V	46	46	4.1632V	5.2032V	4.6606V	247.21MV
68-1	VDSP	V	46	46	5.6872V	7.1304V	6.3777V	341.92MV
69-1	VDSP	V	46	46	7.3144V	9.2080V	8.2182V	446.78MV
70-1	VDSP	V	46	46	9.0584V	11.466V	10.207V	565.59MV
71-1	VDSP	V	46	46	10.958V	13.982V	12.386V	704.14MV
72-1	VDSP	V	46	46	13.031V	16.966V	14.805V	885.44MV
73-1	VDSP	V	46	46	15.341V	21.000V	17.705V	1.2354V
74-1	VDSP	V	46	46	18.162V	21.000V	20.474V	668.50MV
75-1	VDSP	V	46	46	21.000V	21.000V	21.000V	0.0000V
76-1	VDSP	V	46	46	21.000V	21.000V	21.000V	0.0000V
77-1	VDSP	V	46	46	21.000V	21.000V	21.000V	0.0000V
78-1	VDSP	V	46	46	21.000V	21.000V	21.000V	0.0000V

FET/TEST DATA REPORT

REM =HOT-CHRA TESTS--50 PCS. RUN FILE="3654CHRA.RUN"
 DATE=6-24-94 SERIAL NUMBERS= 1 TO 780
 BINS=ALL->1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17,18,19,20,21,22,23,24

TEST# -SEG	TEST TYPE	LOG COUNT	USED COUNT	LOW	HIGH	MEAN	SIGMA
79-1	VDSP	46	46	339.36mV	412.16mV	375.06mV	18.393mV
80-1	VDSP	46	46	1.3331V	1.6610V	1.4941V	77.638mV
81-1	VDSP	46	46	2.6984V	3.3528V	3.0132V	157.08mV
82-1	VDSP	46	46	4.1240V	5.1352V	4.6133V	242.71mV
83-1	VDSP	46	46	5.6224V	7.0248V	6.3026V	336.48mV
84-1	VDSP	46	46	7.2224V	9.0464V	8.1077V	437.81mV
85-1	VDSP	46	46	8.9304V	11.234V	10.049V	552.81mV
86-1	VDSP	46	46	10.774V	13.621V	12.161V	682.10mV
87-1	VDSP	46	46	12.784V	16.317V	14.479V	834.49mV
88-1	VDSP	46	46	14.986V	19.571V	17.170V	1.1095V
89-1	VDSP	46	46	17.603V	21.000V	20.032V	924.97mV
90-1	VDSP	46	46	20.674V	21.000V	20.993V	48.007mV
91-1	VDSP	46	46	21.000V	21.000V	21.000V	0.0000V
92-1	VDSP	46	46	21.000V	21.000V	21.000V	0.0000V
93-1	VDSP	46	46	21.000V	21.000V	21.000V	0.0000V
94-1	VDSP	46	46	342.24mV	426.48mV	383.17mV	21.594mV
95-1	VDSP	46	46	1.3435V	1.6770V	1.5039V	79.938mV
96-1	VDSP	46	46	2.6936V	3.3800V	3.0270V	163.53mV
97-1	VDSP	46	46	4.1288V	5.1608V	4.6282V	248.87mV
98-1	VDSP	46	46	5.6272V	7.0408V	6.3174V	343.06mV
99-1	VDSP	46	46	7.2192V	9.0624V	8.1191V	444.98mV
100-1	VDSP	46	46	8.9216V	11.251V	10.055V	560.56mV
101-1	VDSP	46	46	10.753V	13.622V	12.155V	692.36mV
102-1	VDSP	46	46	12.749V	16.271V	14.456V	841.84mV
103-1	VDSP	46	46	14.939V	19.487V	17.112V	1.1152V
104-1	VDSP	46	46	17.498V	21.000V	19.965V	960.45mV
105-1	VDSP	46	46	20.493V	21.000V	20.989V	74.783mV
106-1	VDSP	46	46	21.000V	21.000V	21.000V	0.0000V
107-1	VDSP	46	46	21.000V	21.000V	21.000V	0.0000V
108-1	VDSP	46	46	21.000V	21.000V	21.000V	0.0000V

FET/TEST DATA REPORT

REM =HOT-CHR5 TESTS=50 PCS. RUN FILE="3654CHR5.RUN"
 DATE=6-24-94 SERIAL NUMBERS= 13 TO 780
 BINS=ALL-->1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17,18,19,20,21,22,23,24

TEST# -SEG	TEST TYPE	LOG COUNT	USED COUNT	LOW	HIGH	MEAN	SIGMA
109-1	BVDSX V	46	46	15.304V	649.88V	615.81V	91.886V
110-1	BVDSX V	46	46	23.836V	650.32V	615.44V	90.944V
111-1	BVDSX V	46	46	36.840V	649.88V	618.64V	88.989V
112-1	BVDSX V	46	46	265.64V	649.84V	629.33V	56.099V
113-1	BVDSX V	46	46	312.36V	650.48V	633.35V	49.451V
114-1	BVDSX V	46	46	330.44V	650.32V	635.57V	46.847V
115-1	BVDSX V	46	46	343.88V	649.84V	637.47V	44.888V
116-1	BVDSX V	46	46	357.40V	650.24V	639.32V	42.945V
117-1	VSDP V	46	46	607.84V	632.56V	619.08V	7.0438V
118-1	VSDP V	46	46	698.96V	720.56V	708.86V	5.0780V
119-1	VSDP V	46	46	768.72V	795.44V	781.44V	5.3826V
120-1	VSDP V	46	46	838.80V	865.68V	852.68V	6.0982V
121-1	VSDP V	46	46	904.24V	934.48V	919.91V	7.1856V
122-1	VSDP V	46	46	965.44V	1.0019V	983.81V	8.4669V
123-1	VSDP V	46	46	1.0237V	1.0674V	1.0458V	9.8028V
124-1	VSDP V	46	46	1.0806V	1.1301V	1.1057V	11.286V
125-1	VSDP V	46	46	1.1345V	1.1881V	1.1623V	12.316V
126-1	VSDP V	46	46	1.1854V	1.2547V	1.2187V	14.010V
127-1	VSDP V	46	46	512.16V	527.92V	520.18V	4.6168V
128-1	VSDP V	46	46	626.00V	644.64V	634.71V	4.9850V
129-1	VSDP V	46	46	712.32V	737.36V	724.20V	5.7466V
130-1	VSDP V	46	46	792.88V	823.68V	806.40V	7.0637V
131-1	VSDP V	46	46	864.72V	902.00V	883.00V	8.7638V
132-1	VSDP V	46	46	932.48V	973.84V	954.15V	9.5685V
133-1	VSDP V	46	46	998.16V	1.0434V	1.0221V	10.587V
134-1	VSDP V	46	46	1.0591V	1.1104V	1.0875V	11.845V
135-1	VSDP V	46	46	1.1189V	1.1778V	1.1512V	13.172V
136-1	VSDP V	46	46	1.1781V	1.2430V	1.2134V	14.528V

FET/TEST DATA REPORT

REM =HOT-CHR6 TESTS=50 PCS.

DATE=6-24-94 RUN FILE="3654CHR6.RUN"

SERIAL NUMBERS= 13 TO 780

BINS=ALL->1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17,18,19,20,21,22,23,24

TEST# -SEG	TEST	TYPE	LOG COUNT	USED COUNT	LOW	HIGH	MEAN	SIGMA
137-1	VSDP	V	46	46	507.12mV	530.80mV	520.83mV	5.3578mV
138-1	VSDP	V	46	46	626.00mV	641.20mV	634.35mV	4.0687mV
139-1	VSDP	V	46	46	718.32mV	737.60mV	729.46mV	4.8401mV
140-1	VSDP	V	46	46	796.16mV	820.16mV	809.55mV	6.1733mV
141-1	VSDP	V	46	46	866.08mV	897.60mV	884.03mV	7.3480mV
142-1	VSDP	V	46	46	933.44mV	975.04mV	955.02mV	9.4099mV
143-1	VSDP	V	46	46	1.0013V	1.0454V	1.0221V	9.9299mV
144-1	VSDP	V	46	46	1.0620V	1.1149V	1.0868V	10.828mV
145-1	VSDP	V	46	46	1.1174V	1.1808V	1.1482V	12.908mV
146-1	VSDP	V	46	46	1.1776V	1.2382V	1.2080V	13.662mV
147-1	VSDP	V	46	46	497.76mV	529.92mV	521.09mV	5.5059mV
148-1	VSDP	V	46	46	622.64mV	642.80mV	633.21mV	4.3107mV
149-1	VSDP	V	46	46	709.76mV	730.32mV	719.81mV	4.8618mV
150-1	VSDP	V	46	46	784.24mV	810.32mV	798.00mV	6.0415mV
151-1	VSDP	V	46	46	854.56mV	886.64mV	871.33mV	7.4066mV
152-1	VSDP	V	46	46	920.96mV	959.44mV	941.08mV	8.9506mV
153-1	VSDP	V	46	46	985.20mV	1.0300V	1.0085V	10.243mV
154-1	VSDP	V	46	46	1.0470V	1.0991V	1.0741V	11.885mV
155-1	VSDP	V	46	46	1.1077V	1.1664V	1.1381V	13.450mV
156-1	VSDP	V	46	46	1.1667V	1.2320V	1.2011V	15.418mV
157-1	GFS	S	46	46	5.3419S	6.7935S	6.3334S	338.41mS
158-1	GFS	S	46	46	5.7340S	7.2674S	6.7465S	359.03mS

APPENDIX C

Radiation Characterization Test Report

Sandia National Laboratories

P.O. Box 5800
Albuquerque, New Mexico 87185-1083

date: May 5, 1995
to: Jerry Villanueva 2252 MS-0525
from: *Gerald L. Hash*
Gerald L. Hash, 1332 MS-1083
subject: Radiation Characterization SA3654 Transistors

Introduction

Department 1332 was requested to characterize the dose-rate response and the radiation degradation following total dose and neutron irradiation of the SA3654 HEXFET transistor. The dose-rate characterization was performed at the Boeing Physical Sciences Laboratory in Seattle at their Linear Accelerator (LINAC) facility. Total dose and neutron evaluations were performed by department 1332 at Sandia National Laboratories in Albuquerque.

Dose-rate Characterization

As stated the dose-rate evaluation was performed at the Boeing LINAC in Seattle Wa. The LINAC was operated at an energy of 10 MeV and a radiation pulse width of 30 nano-seconds (ns). In this mode the machine produced dose-rates to a maximum of

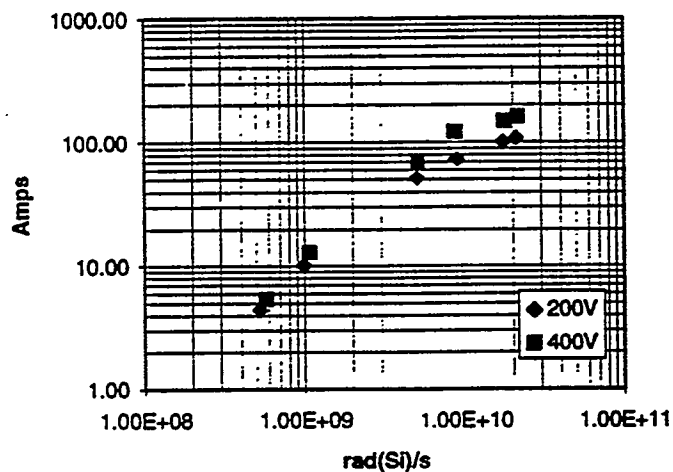


Figure 1 Transient Photocurrent of SA3654 when Exposed to 30 ns Radiation Pulses.

3×10^{10} rad(Si)/s at the device. Each device was placed in the LINAC beam and exposed to radiation pulses ranging in intensity from 5×10^8 rad(Si)/s to 2×10^{10} rad(Si)/s at bias (V_{DS}) levels of 200 and 400 volts. A .1 μ f and a 4.0 μ f capacitor were connected in parallel on DUT card as by-pass capacitors. During each radiation pulse the transient photocurrent generated by the SA3654 under test was recorded on a digitizing oscilloscope. The photocurrent values obtained during the above dose-rate testing are presented graphically in figure 1. The magnitude of the photocurrent generated by the SA3654 for various radiation intensities and bias conditions, shown in figure 1, should prove useful for product engineers and system designers. Burn-out due to excessive photocurrent was not observed in any of the devices tested with a bias of 200 volts. With 400 volts bias applied the devices were burned out at dose rates above 1×10^{10} rad(Si)/s. Table 1 shows the no-burn-out and burn-out levels for five devices that were characterized.

Table 1. No Burn-out and Burn-out Dose-rate Levels Found for SA3654 with 400 Volts Applied		
Serial Number	No Burn-out (rad(Si)/s)	Burn-out (rad(Si)/s)
7	1.80×10^{10}	2.20×10^{10}
19	1.80×10^{10}	2.30×10^{10}
22	1.40×10^{10}	2.00×10^{10}
29	9.60×10^9	1.70×10^{10}
38	1.85×10^{10}	2.12×10^{10}

Total Dose Characterization

Total dose evaluations were performed at Sandia National Laboratories by department 1332. The devices were exposed in a J. L. Shepherd ^{60}Co cell at a dose-rate of 80 rad(SiO_2)/s with +10 volts bias applied to the gate while the drain and source were grounded. This represents a worst case bias condition for N-Channel HEXFETs. I_{GSS} at $\pm 20\text{V}$, V_{GS} at $I_D = 250 \mu\text{A}$ and 1 mA, and BV_{DSS} at $I_D = 1 \text{ mA}$ were measured to characterize the degradation of the devices. These electrical parameters were measured before irradiation (prerad) and after total dose levels of 50, 80, 100, 150, 200 krad(SiO_2), and 1 Mrad(SiO_2). The VGS data collected during pre and post electrical testing for all 10 devices tested were averaged and normalized to the prerad value. Figure 2 shows that the VGS degradation curves for $I_D = 250 \mu\text{A}$ and $I_D = 1 \text{ mA}$ fall on top of each other, proving that postrad VGS values will be the same fraction of the prerad value regardless of what the device current is. I_{GSS} and BV_{DSS} showed no degradation to a total dose of 1 Mrad(SiO_2).

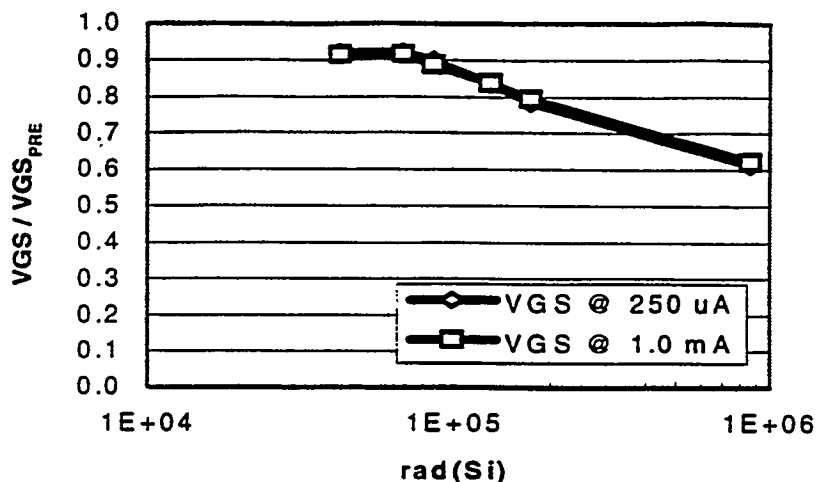


Figure 2 Normalized V_{GS} Values as a Function of Total Dose.

Neutron Characterization

Neutron evaluations of the SA3654 HEXFET were performed at Sandia National Laboratories by department 1332. Ten devices were irradiated to 1×10^{12} , 5×10^{12} , 1×10^{13} , 5×10^{13} , 1×10^{14} n/cm^2 at Sandia's SPR III reactor with no bias applied. I_{GSS} at 20V, V_{GS} at $I_D = 250$ uA and 1 mA, and BV_{DSS} at $I_D = 1$ mA were measured prerad and after

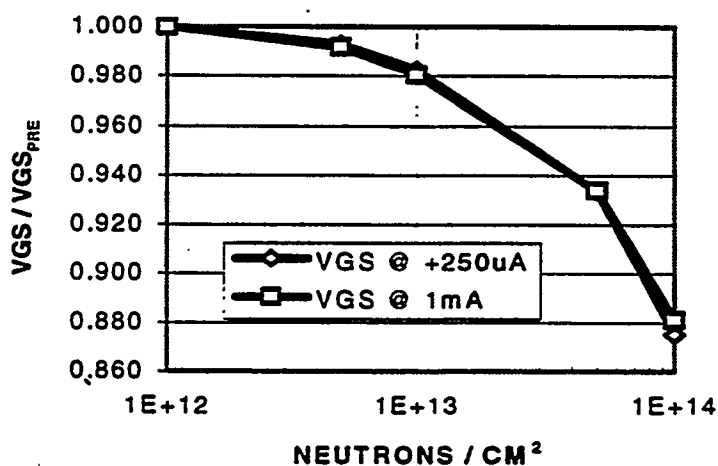


Figure 3 Normalized V_{GS} Values as a Function of Neutron Fluence.

each of the above neutron levels. V_{GS} values decreased and BV_{DSS} increased as a function of neutron level. I_{GSS} did not change due to neutron exposure. Figure 3 shows the normalized degradation values of V_{GS} at both 250 uA and 1 mA. It can be seen that at 1×10^{14} n/cm^2 V_{GS} values have degraded to approximately .88 of their prerad value. The

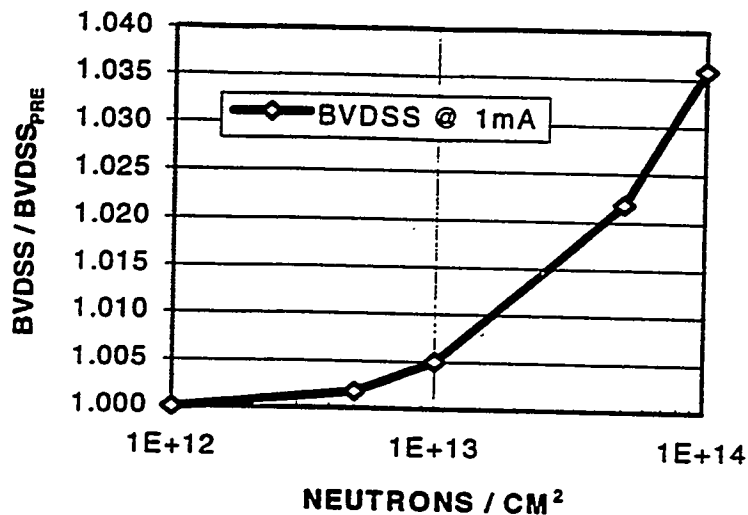


Figure 4 Normalized BV_{DSS} Values as a Function of Neutron neutron to gamma ratio at SPR III is 4×10^9 , thus at 1×10^{14} n/cm² the devices were exposed to 25 krad(SiO₂) gamma radiation. It is suspected that the degradation in V_{GS} seen here can be attributed to the total dose instead of neutron displacement damage. In fact the degradation seen here correlates quite well with values obtained in earlier total dose testing. Figure 4 shows the changes seen in BV_{DSS} as a function of neutron fluence. These changes are small, showing approximately a 3 percent increase at a fluence of 1×10^{14} n/cm².

Conclusions

It has been shown that SA3654 HEXFET transistors will withstand gamma dose-rates above 2.0×10^{10} rad(Si)/s without burning out when operated at 200 V bias levels and that approximately 150 amps of photocurrent will be generated at this point. When operated at 400 V bias the devices will likely burn out when exposed to dose-rates above 1.0×10^{10} . This work has shown that SA3654 HEXFETs will still function following exposure to 1 Mrad(SiO₂) and that V_{GS} will degrade to about .65 of its prerad value. The SA3654 is quite tolerant of neutron irradiation. No significant degradation was observed following exposure to a fluence level of 1×10^{14} n/cm².