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JAN TRANSISTOR AND DIODE CHARACTERIZATION TEST PROGRAM

FINAL REPORT
FOR
JANTX DIODE
1N649-1

FEBRUARY 1977
Prepared
for

GEORGE C. MARSHALL SPACE FLIGHT CENTER
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
Marshall Space Flight Center, Alabama 35812

MSFC/NASA CONTRACT No. NAS8-31944

by
HIRO TAKEDA

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SUNNYVALE, CALIFORNIA 94086



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DCA RELIABILITY LABORATORY

FORWARD

This report is a statistical summary of the electrical characterization performed on NASA Contract NA8-31944. This is one of a group of thirty-nine (39) such reports prepared on selected JAN and JANTEX Transistors and Diodes for the George C. Marshall Space Flight Center, Huntsville, Alabama. The Contracting Officer's Technical Representative was Mr. Howard B. Meeks.

This work was performed by DCA Reliability Laboratory, Special Products Division, Sunnyvale, California under the management of Mr. Robert Starr with the special assistance of Mr. Barry Lorenzo, Mr. Kenneth Radford and Mr. Hiroharu Takeda.

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1.0 INTRODUCTION

The objective of this characterization program is to provide the necessary data to create a new class of 1950Q detail specifications "JAN A CLASS".

1.1 SAMPLE SELECTION

Sample selection was made according to the following criteria:

1. Manufacturer or qualified distributor.
2. Two vendors.
3. Two date codes.

1.2 PROCUREMENT GUIDELINES

The general guidelines for procurement were:

1. Two QPL vendors
2. JAN or JANTEX
3. Two (2) manufacturing lots (Date Codes), twenty-seven (27) from each lot.

2.0 TECHNICAL SUMMARY

The devices used in this report were JANTX 1N649 Silicon Diodes manufactured by Micro Semiconductor and Semtech.

All data was acquired with three (3) digit accuracy. The data processing and calculation of statistical parameters was performed by the Tektronix S-3260 computer system using four (4) digit display.

2.1 TEST PARAMETERS AND CONDITIONS

2.1.1 I_R $V_R = 600V$ (Max. Rated V_R) $T_A = 25^\circ C$ & $150^\circ C$

2.1.2 I_{R2} $V_R = 600V$ (Max. Rated V_R) $T_A = 25^\circ C$
Reverse Current, applied after stress test of $I_{fsm} = 30A$ (PK), 10 surges of 8.3MS each at 1-minute interval.

2.1.3 B_V $I_R = 50.0uA$ $T_A = 25^\circ C$

2.1.4 V_{F1} $I_F = 40.0mA$ (10% of Rated I_F) $T_A = 25^\circ C$ & $-65^\circ C$

2.1.5 V_{F2} $I_F = 200mA$ (50% of Rated I_F) $T_A = 25^\circ C$ & $-65^\circ C$

2.1.6 V_{F3} $I_F = 400mA$ (100% of Rated I_F) $T_A = 25^\circ C$ & $-65^\circ C$

2.1.7 C_{o1} $V_R = 4.0V$ $f = 100KHZ$ $T_A = 25^\circ C$

2.1 (CONTINUED)

2.1.8 C_{O_2} $V_R = 4.0V$ $f = 1MHz$ $T_A = 25^\circ C$

2.1.9 t_{rr} $T_A = 25^\circ C$

2.2 UNIT DEFINITIONS.

NAME	SYMBOL	MULTIPLIER
Kilo	K	10^3
Milli	M	10^{-3}
Micro	U	10^{-6}
Nano	N	10^{-9}
Pico	P	10^{-12}

Example using a statistical summary section:

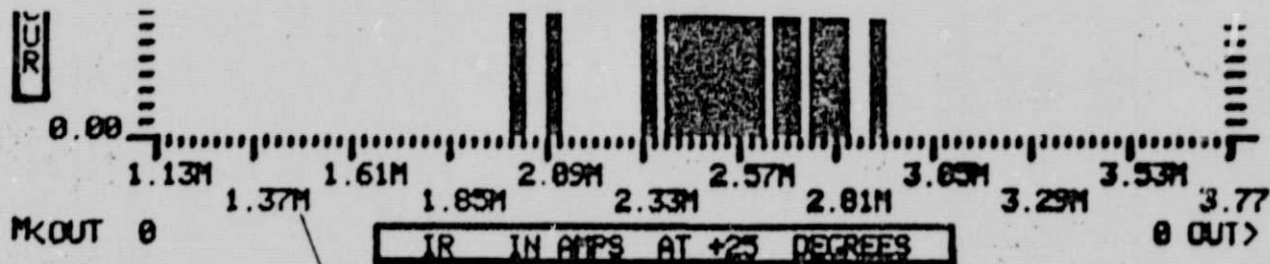
IR IN AMPS AT 25 DEGREES
AT VP=2.64 VOLTS

!MOTO/ 7603!	2.534M	!	218.7U	!	2.010M	!	2.090M	!	2.780M	!
!MD10/ 7550!	2.423M	!	276.9U	!	2.010M	!	2.030M	!	2.780M	!
!SIEM/ 7508!	2.997M	!	426.5U	!	1.820M	!	2.490M	!	3.480M	!

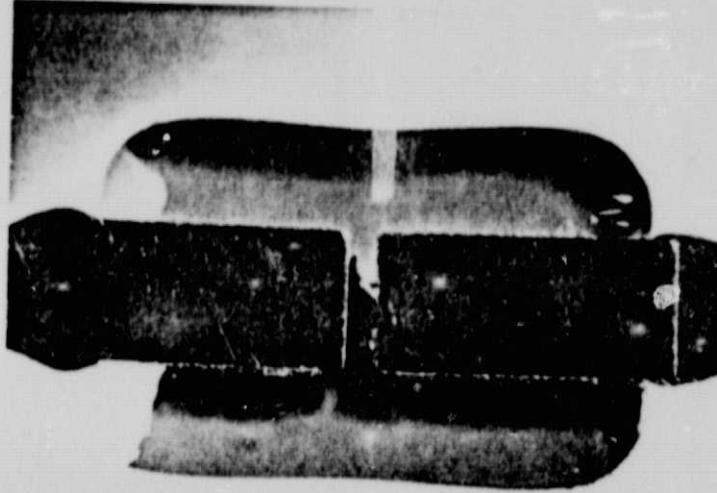
Milli

Micro

Example using a histogram:



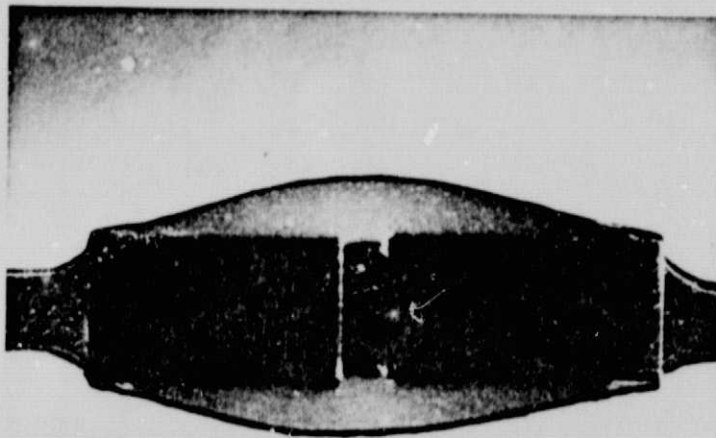
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Device Number E027304
25 Diameters

FIGURE 1
D/C 7635
Mfg: MSC

Typical Overall Cross-sectional
View



Device Number E027249
25 Diameters

FIGURE 2
D/C 7602
Mfg: Semtech

Typical Overall Cross-sectional
View



Device Number E027277
25 Diameters

FIGURE 3
D/C 7632
Mfg: Semtech

Typical Overall Cross-sectional
View

3.0 STATISTICAL SUMMARY

The Statistical Summary, pages 3-2 to 3-5, are a consolidated presentation of the data acquired formatted for easy Vendor to Vendor and date code to date code analysis. Each parameter is presented with Test Conditions, Mean, Standard Deviation, Lowest Reading, 10% Point (where 10% of all readings are equal to or less than the indicated reading), 90% Point (where 90% of all readings are equal to or less than the indicated reading) and the Highest Reading.

It should be noted the Mean presented in the summary may vary slightly from that presented on the Histograms due to a slight variation in the data base used for calculation.

EXAMPLE:

MICRO SEMICONDUCTOR:	I_R	$V_R = 600V$	$T_A = 25^{\circ}C$
Summary:	MEAN	16.27M	
Histogram:	MEAN	1.830N	



PART NUMBER : 10649

VENDOR : MICRO SEMICOND

DATE CODE : 7635

VENDOR : SEMTECH

DATE CODE : 7632

VENDOR : SEMTECH

DATE CODE : 7602

VEND / DC	MEAN	STD. DEV.	LOW PT	10% PT	90% PT	HIGH PT.
-----------	------	-----------	--------	--------	--------	----------

1R IN AMPS AT 25 DEGREES
AT VR=600 VOLTS

MSI / 7635	16.27M	115.1M	340.0P	640.0P	2.520N	830.0M
SEMT/ 7632	18.65N	9.158N	800.0P	5.500N	28.50N	37.90N
SEMT/ 7602	20.96N	8.877N	6.800N	9.700N	31.00N	46.80N

1P IN AMPS AT 150 DEGREES
AT VR=600 VOLTS

MSI / 7635	559.5N	256.7N	187.0N	264.0N	914.0N	1.520U
SEMT/ 7632	30.61U	8.242U	13.90U	16.30U	38.90U	46.90U
SEMT/ 7602	16.08U	3.835U	9.490U	10.30U	19.30U	25.90U

1R2 IN AMPS AT 25 DEGREES
AT VR=600 VOLTS (POST BV)

MSI / 7635	1.845N	1.491N	670.0P	970.0P	2.470N	9.640N
SEMT/ 7632	27.65N	9.347N	11.50N	12.90N	40.20N	46.00N
SEMT/ 7602	30.32N	5.399N	22.40N	23.00N	35.40N	43.80N



VEND / DC	MEAN	STD. DEV.	LOW PT	10% PT	90% PT	HIGH PT.
-----------	------	-----------	--------	--------	--------	----------

BV IN VOLTS AT 25 DEGREES
AT IR=50.0 UA

MSI / 7635	838.4	36.42	776.0	798.0	872.0	961.0
SEMT/ 7632	983.6	55.88	832.0	864.0	1.029K	1.047K
SEMT/ 7602	844.0	148.9	732.0	732.0	1.099K	1.135K

VF1 IN VOLTS AT 25 DEGREES
AT IF=40.0 MA

MSI / 7635	826.5M	13.62M	815.0M	820.0M	829.0M	919.0M
SEMT/ 7632	777.7M	4.229M	770.0M	770.0M	783.0M	787.0M
SEMT/ 7602	768.2M	5.299M	753.0M	762.0M	774.0M	782.0M

VF1 IN VOLTS AT -65 DEGREES
AT IF=40.0 MA

MSI / 7635	925.4M	3.640M	918.0M	920.0M	930.0M	933.0M
SEMT/ 7632	888.0M	2.764M	883.0M	883.0M	892.0M	894.0M
SEMT/ 7602	815.5M	3.941M	878.0M	879.0M	889.0M	893.0M

VF2 IN VOLTS AT 25 DEGREES
AT IF=200 MA

MSI / 7635	913.2M	10.64M	898.0M	904.0M	919.0M	978.0M
SEMT/ 7632	887.1M	8.421M	870.0M	874.0M	898.0M	901.0M
SEMT/ 7602	873.0M	8.820M	854.0M	858.0M	882.0M	894.0M



VEND / DC	MEAN	STD. DEV.	LOW PT	10% PT	90% PT	HIGH PT.
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VF2 IN VOLTS AT -65 DEGREES
AT IF=200 MA

MSI / 7635	1.004	16.92M	986.0M	992.0M	1.030	1.070
SEMT/ 7632	973.9M	6.160M	961.0M	964.0M	982.0M	984.0M
SEMT/ 7602	968.6M	6.735M	956.0M	958.0M	974.0M	984.0M

VF3 IN VOLTS AT 25 DEGREES
AT IF=400 MA

MSI / 7635	955.8M	96.84M	273.1M	958.0M	978.0M	983.0M
SEMT/ 7632	956.0M	11.90M	931.0M	935.0M	971.0M	974.0M
SEMT/ 7602	940.2M	12.30M	917.0M	919.0M	953.0M	966.0M

VF3 IN VOLTS AT -65 DEGREES
AT IF=400 MA

MSI / 7635	1.085	19.16M	1.060	1.070	1.100	1.180
SEMT/ 7632	1.060	11.48M	1.040	1.040	1.070	1.080
SEMT/ 7602	1.053	15.51M	999.0M	1.040	1.070	1.080

CO1 FARADS AT 25 DEGREES
AT 100 KHZ AND VR=4.0 VOLTS

MSI / 7635	2.403P	<1.00P	2.000P	2.100P	2.670P	2.800P
SEMT/ 7632	7.947P	<1.00P	6.910P	7.040P	8.510P	9.110P
SEMT/ 7602	9.800P	<1.00P	7.950P	8.250P	10.52P	11.05P



DCA RELIABILITY LABORATORY

PART NUMBER : 1N649

VEND / DC	MEAN	STD. DEV.	LOW PT	10% PT	90% PT	HIGH PT.
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CO2 PARAS AT 25 DEGREES
AT 1MHZ AND VR=4.0 VOLTS

MSI / 7635	2.405P	<1.00P	2.000P	2.120P	2.650P	2.790P
SEMT/ 7632	7.018P	<1.00P	6.070P	6.220P	7.460P	7.980P
SEMT/ 7602	9.210P	<1.00P	7.330P	7.640P	10.02P	10.34P

TTP IN SEC.S AT 25 DEGREES

MSI / 7635	705.4N	81.62N	560.0N	580.0N	800.0N	920.0N
SEMT/ 7632	915.6N	152.5N	540.0N	640.0N	1.080U	1.150U
SEMT/ 7602	1.010U	177.3N	640.0N	700.0N	1.200U	1.260U

