



Spec. No. 896

3620-TT/P

DISCRETE SEMICONDUCTOR TEST SYSTEM SPECIFICATIONS

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**SPECIFICATIONS
FOR
DISCRETE DEVICE TESTER : MODEL 3620-TT/P**

1. GENERAL DESCRIPTION

The 3620-TT/P measures electrical characteristics of discrete devices such as transistors, diodes, MOSFET's, thyristors, voltage regulators.

Some of the devices require optional boards to be installed in the 3620-TT/P.

The electrical characteristics are compared with limits, and are judged into 'Pass' or 'Fail'.

The test data are compiled and results are computed by a CPU.

The 3620-TT/P mainframe capability is 1,200 V and 20 A with a resolution of 1 mV and 3 pA, and also designed to accomodated the parallel test site, with multiplexes to 2 channels per each site.

The 3620-TT/P, a state of art combination of a sophisticated tester hardware and a super powerful Compaq System which is almost comparable with a mini-computer system, provides the flexibility for highly diversified and expanding testing requirements.

Four-digit accuracy is generated by high speed, high reliability test system.

With the use of Microsoft Windows software, each modulated mode can be displayed in one screen.

Highly defined operation is performed by the multi-windows function and easier operation by the use of a mouse.

Test programs, routine creation, and control instruction can be edited easily and freely by the user.

Data analysis using a user software is possible, as the file structure of the data file with the test data logged is made public.

The 3620-TT/P which is used not only for the production final test and wafer probing but also for the quality control/assurance, incoming inspection, etc. is almost a tailor-made test system for the users.

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Features :

- (1) Parallel testing can be easily implemented.
- (2) Each testing site provide 2 channel multiplexcer.
- (3) Easy operation by making full use of the Windows functions.
- (4) Test files can be created in the easy-to-see screens generated by the Windows.
- (5) The user is allows to define, freely select, and freely combine the test items.
- (6) Test data are saved in the file.
- (7) Data analysis using a user software is possible as the file structure of the data file is made public.

2. SPECIFICATIONS

(1) 3620-TT/P Tester

CPU	68000 (16 MHz, 0 wait state)
Memory	
Total	512 KB
User Area	256 KB (1024 blocks)
No. of test stations	4
	(Each station can make measures using individual test program.)
Polarity	NPN, PNP
Voltage, Current	1,200 V, 20 A
Testing capacity per test program	
Number of test	250 maximum
Number of sort	32 maximum
Operation time	
Auto test time	Depends upon current and voltage
Manual test time	380 μ s...9.99 s (programmable)
Relay switching time	3 ms/item excepting the following measure items.
	· High voltage measure item
	· High current measure item
	· External tester item
	· In use of high voltage test station
Operation time of CPU	About 0.64 to 4.00 ms/item
	About 0.54 ms or more /sort
Judgement of measure result	Digital comparator method with CPU
Number of sorts	
Manual station	250 sorts (BCD)
Handler station	24 sorts (parallel)

Special note :

When a high-current unit or scanner unit is used, the measurement accuracy of current is limited to the following.

For the details, refer to the operation manual of the corresponding unit.

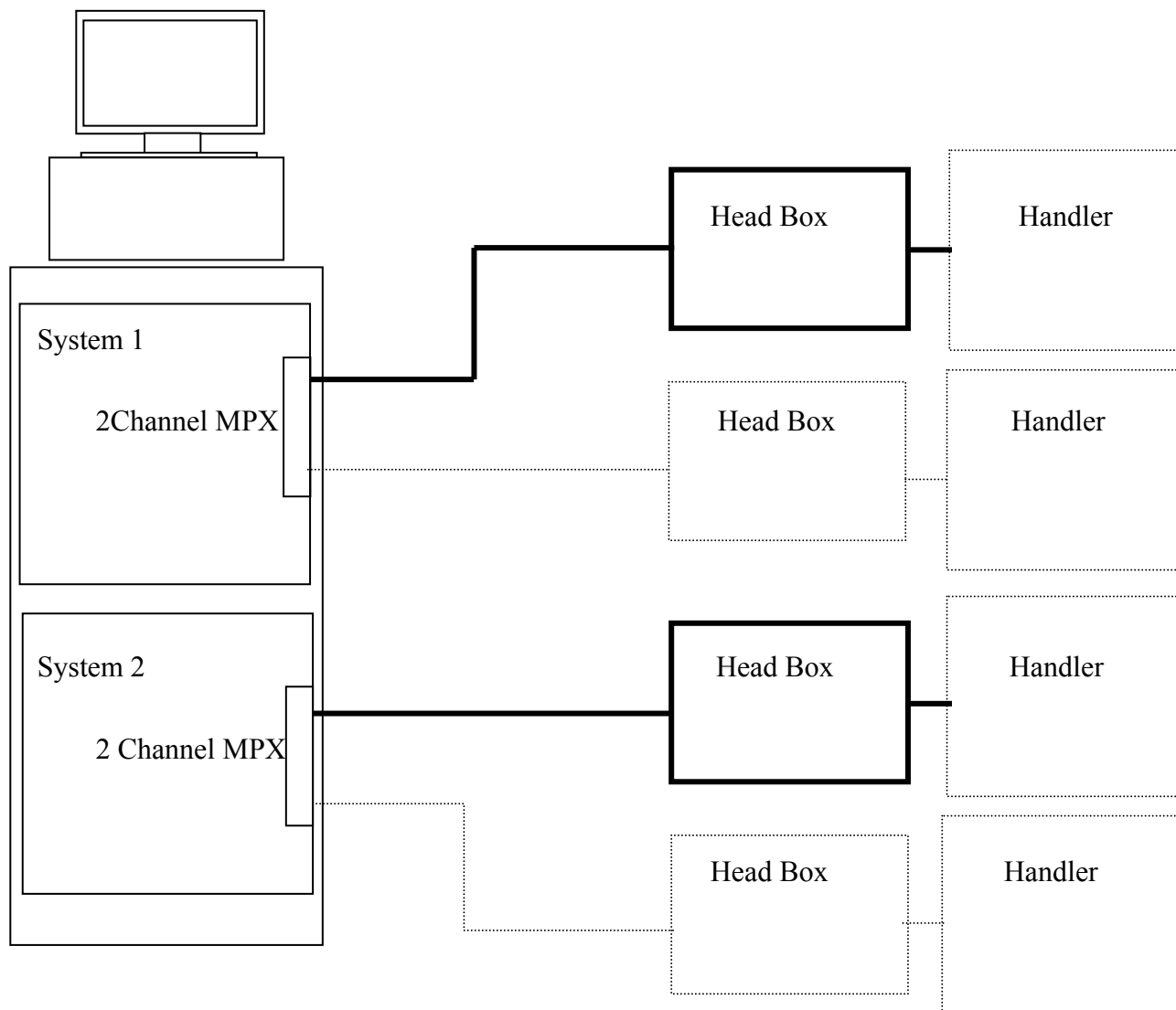
Minimum measure range	: 1.000 μ A
Minimum resolution	: 10 nA

(2) Host Computer	
Computer system	Personal computer of 486SX or more Prerequisites: · Hard disk: 75 MB or more · Floppy disk: 3.5 inch, 1.44 MB · Memory: 8 MB or more · Display : Graphic display of 640×480 dots or more
Operating system	Microsoft® Windows™ XP
Peripherals	Color display Keyboard Mouse Printer (optional)
(3) Software	
Comment	20 characters
Join message	128 characters
Sort name	15 characters
Test file capacity	
Test plan	250 tests
Sort plan	250 sorts
Test sequence	250 tests per sort
Item table capacity	600
Counter capacity	
Bin/Sort counter	32 counters, 8 digits
Sort limit counter	32 counters, 5 digits
Sampling counter	32 counters, 8 digits
Test fail counter	250 counters, 8 digits
(4) Physical characteristics	
Power requirement	220V AC±10%, 50/60 Hz
Power consumption	1 kVA
Operating environment	
Temperature	77° ±9° (25±5°C)
Humidity	20 to 60%
Dimensions	550 (w) × 750 (d) × 1,300 (h) mm
Weight	About 160 kg
Color	Ivory
Installation	Both casters and caster stoppers (4 sets)

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and Windows is a trademark of Microsoft Corporation.
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3. SYSTEM ORGANIZATION

3.1 Hardware



3.2 Software

The software operates under Microsoft Windows, a graphics-based operating environment.

(1) Station

Station is the test station control software module used for controlling device testing at test stations.

(2) Datalog

Datalog is the data logging software module used for monitoring test stations.

(3) Editor

Editor is the test program editor software module used for creating and modifying test program files.

(4) Item

Item is the item table editor software module used for modifying the system item table.

(5) Maintenance

Maintenance is the software module used for testing according to the test files assigned to the station, item by item.

(6) Communication

Communication is the software module used for communication between 3620-TT/P and Personal computer (PC).

4. STANDARD ACCESSORIES

4.1 Documents

- | | |
|-----------------------|--------|
| (1) Operation manual | 1 copy |
| (2) Schematic Diagram | 1 copy |

4.2 Maintenance kit

- | | |
|-------------------------------------|------|
| (1) Extension board assembly P-7768 | 1 pc |
| (2) Extension board assembly P-7771 | 1 pc |

4.3 Standard Spare Parts

- | | |
|------------------------------------|--------|
| (1) Mercury switch SWS-MH4-01-2K14 | 20 pcs |
| (2) DIP relay DIW-1013M1 | 5 pcs |
| (3) Photo MOS relay R51-12VL-C | 5 pcs |
| (4) Banana plug TJ-560 | 10 pcs |
| (5) Fuse 2A | 2 pcs |
| (6) Fuse 1A | 5 pcs |

5. WARRANTY

TESEC shall warrant the equipment shipped against defective material/parts, workmanship for a period of one (1) year after delivery or 3,000 hours of actual operation from the date of installation, whichever shall be earlier.

The warranty shall cover neither the consumable parts, nor defects and damages attributed to the abuse, misuse, misapplication, or negligence on the part of the user.

A limited warranty may be considered for the equipment, material, and parts that are relocated from the original destination.

Test Specifications

Transistor

Transistor 1/2

Test Item	Measurement Range	Forcing Range	Fig.*1	Accuracy	Resolution
Leakage Current	ICE : 000.0 pA to 9.999 mA (O,S,R)*6	VCE : 1.00 V to 1.2 kV	①	0.2% + 3 pA 0.4% + 10 mV	3 pA 10 mV
	ICB: 000.0 pA to 9.999 mA (O,S,R)*6	VCB : 1.00 V to 1.2 kV	①	0.2% + 3pA 0.4% + 10 mV	3 pA 10 mV
	IEB: 000.0 pA to 9.999 mA	VEB : 1.00 V to 1.2 kV	①	0.2% + 3 pA 0.4% + 10 mV	3 pA 10 mV
	ICEX: 000.0 pA to 9.999 mA	VCE : 1.00 V to 1.2 kV VX : ± 100 mV to ± 80.0 V	①	0.2% + 3 pA 0.4% + 10 mV 0.5% + 1 mV	3 pA 10 mV 1 mV
	HILCE : 000.0 pA to 20 A (O,S,R)	VCE : 100 mV to 80.0 V	③	0.4% + 1 nA 0.2% + 10 mV	1 nA 10 mV
	HILCB : 000.0 pA to 20 A (O,S,R)	VCB : 100 mV to 80.0 V	③	0.4% + 1 nA 0.2% + 10 mV	1 nA 10 mV
	HILEB : 000.0 pA to 20 A	VEB : 100 mV to 80.0 V	③	0.4% + 1 nA 0.2% + 10 mV	1 nA 10 mV
Breakdown Voltage	BVCE: 0.000 V to 1.2 kV (O,S,R)*6	IC : 100 nA to 500 mA VMAX: 000 V to 1.2 kV	②	0.4% + 10 mV 0.4% + 1 nA -	10 mV 1 nA -
	BVCB: 0.000 V to 1.2 kV (O,S,R)*6	IC : 100 nA to 500 mA VMAX: 000 V to 1.2 kV	②	0.4% + 10 mV 0.4% + 1 nA -	10 mV 1 nA -
	BVEB: 0.000 V to 1.2 kV	IEB : 100 nA to 500 mA VMAX: 000 V to 1.2 kV	②	0.4% + 10 mV 0.4% + 1 nA -	10 mV 1 nA -
	BVCEX: 0.000 V to 1.2 kV	IC : 100 nA to 500 mA VX: ± 100 mV to ± 80.0 V	②	0.4% + 10 mV 0.4% + 1 nA 0.5% + 1 mV	10 mV 1 nA 1 mV
DC Gain	IB : 000.0 pA to 20 A HFE : 10^{-12} to 999 k	VCE : 100 mV to 80.0 V IC: 100 nA to 20A	③ ④	0.4% + 3pA *4 0.2% + 10 mV 0.4% + 1 nA	3pA 10^{-12} 10 mV 1 nA
	RIB : 000.0 pA to 20 A RHFE : 10^{-12} to 999 k *8	VCE : 100 mV to 80.0 V IE: 100 nA to 20A	③ ④	0.4% + 3pA *4 2% + 10 mV 0.4% + 1 nA	3pA 10^{-12} 10 mV 1 nA

Transistor 2/2

Test Item	Measurement Range	Forcing Range	Fig. *1	Accuracy	Resolution
Saturation Voltage	VCESAT : 000.0 mV to 20.00 V	IC : 100 nA to 20 A	④	0.2% + 1 mV	1 mV
		IB : 100 nA to 20 A	④	0.4% + 1 nA	1 nA
				④	0.4% + 1 nA
	VBESAT : 000.0 mV to 20.00 V	IC : 100 nA to 20 A	④	0.2% + 1 mV	1 mV
		IB : 100 nA to 20 A	④	0.4% + 1 nA	1 nA
				④	0.4% + 1 nA
RVSAT : 000.0 mV to 20.00 V	IE : 100 nA to 20 A	④	0.2% + 1 mV	1 mV	
	IB : 100 nA to 20 A	④	0.4% + 1 nA	1 nA	
			④	0.4% + 1 nA	1 nA
Forward Voltage	VFBC : 000.0 mV to 20.00 V	IB : 100 nA to 20 A	④	0.2% + 1 mV	1 mV
				④	0.4% + 1 nA
	VFBE : 000.0 mV to 20.00 V	IB : 100 nA to 20 A	④	0.2% + 1 mV	1 mV
Base Turn-on Voltage	BTON : 000.0 mV to 20.00 V	VCE : 100 mV to 80.0 V	③	0.2% + 10 mV	10 mV
		IC : 100 nA to 20 A	④	0.4% + 1 nA	1 nA
AC Gain	IB : 000.0 pA to 800.0 mA	VCE : 100 mV to 80.0 V	③	3% + 3 nA	3 nA
		IC*7 : 1.00 μ A to 800 mA	⑤	0.5% + 3 mV	10 mV
				⑤	0.5% + 3 nA
	HFE : 10^{-12} to 999 k (IB: 000.0 pA to 800.0 mA)	VCE : 100 mV to 80.0 V	③	*4	10^{-12}
		IC*7 : 1.00 μ A to 800 mA	⑤	0.5% + 3 mV	10 mV
				0.5% + 3 nA	10 nA

Notes

(1) *1 : Numbers ① to ⑤ show item number of the Application Ranges.

(2) *4 : The IC/IB computation is truncated after 4 digits.

(3) *6 : () shows the base-emitter (gate-cathode, gate-source) condition.

O : open, S : short, R : resistance

(4) *7 : Bias is modulated 10% peak to peak (1 kHz AC).

(5) *8 : IB (HFE) measurement are conducted after the collector and emitter are switched in the 3620-TT.

FET

FET 1/2

Test Item	Measurement Range	Forcing Range	Fig.*1	Accuracy	Resolution
Leakage Current	IDS : 000.0 pA to 9.999 mA (O,S) *6	VDS : 1.00 V to 1.2 kV	①	0.2% + 3 pA 0.4% + 10 mV	3 pA 10 mV
	IDG : 000.0 pA to 9.999 mA (O) *6	VVG : 1.00 V to 1.2 kV	①	0.2% + 3 pA 0.4% + 10 mV	3 pA 10 mV
	ISG : 000.0 pA to 9.999 mA (O,S)	VSG : 1.00 V to 1.2 kV	①	0.2% + 3 pA 0.4% + 10 mV	3 pA 10 mV
	IDSX: 000.0 pA to 9.999 mA	VCE : 1.00 V to 1.2 kV VX : ±100 mV to ±80.0 V	①	0.2% + 3 pA 0.4% + 10 mV 0.2% + 1 mV	3 pA 10 mV 10 mV
Breakdown Voltage	BVDS: 0.000 V to 1.2 kV (O,S) *6	ID : 100 nA to 500 mA VMAX: 000 V to 1.2 kV	②	0.4% + 10 mV 0.4% + 1 nA -	10 mV 1 nA -
	BVDG: 0.000 V to 1.2 kV (O,S) *6	ID : 100 nA to 500 mA VMAX: 000 V to 1.2 kV	②	0.4% + 10 mV 0.4% + 1 nA -	10 mV 1 nA -
	BVSG: 0.000 V to 1.2 kV (O,S)	ISG : 100 nA to 500 mA VMAX: 000 V to 1.2 kV	②	0.4% + 10 mV 0.4% + 1 nA -	10 mV 1 nA -
	BVDSX: 0.000 V to 1.2 kV	ID : 100 nA to 500 mA VX : ±100 mV to ±80.0 V	②	0.4% + 1 nA 0.4% + 10 mA 0.5% + 1 mV	10 mV 1 nA 1 mV
Forward Voltage	VFGD: 000.0 mV to 20.00 V	IG : 100 nA to 20 A	④	0.2% + 1 mV 0.4% + 1 nA	1 mV 1 nA
	VFGS: 000.0 mV to 20.00 V	IG : 100 nA to 20 A	④	0.2% + 10 mV 0.4% + 1 nA	10 mV 1 nA
Pinch-off Voltage	VP: 000.0 mV to 20.00 V	VDS : 1.00 V to 80.0 V	③	0.2% + 1 mV 0.2% + 10 mV	1 mV 10 mV
		IDS : 100 nA to 20 A	④	0.4% + 1 nA	1 nA
Threshold Voltage	VTH: 000.0 mV to 20.00 V	IG(IDS) : 100 nA to 20A	④	0.2% + 1 mV 0.4% + 1 nA	1 mV 1 nA

FET 2/2

Test Item	Measurement Range	Forcing Range	Fig. *1	Accuracy	Resolution
Drain -Source Voltage	VDSON : 000.0 mV to 20.00 V	ID : 100 nA to 20 A	④	0.2% + 1 mV	1 mV
		VG : ± 100 mV to ± 80.0 V		0.4% + 1 nA	1 nA
				0.2% + 1 mV	10 mV
Drain -Source Resistance	RDON : 1.000 mR to 999.9 MR (VDS: 100.0 mV to 20.00 V)	ID : 100 nA to 20 A	④	0.2% + 1 mV*8	1 mV*8
		VG : ± 100 mV to ± 80.0 V		0.4% + 1 nA	1 nA
				0.2% + 1 mV	10 mV
Drain -Source Current	IDSON : 000.0 pA to 20 A	VDS : 1.00 V to 80.0 V	③	0.4% + 3 pA	3 pA
		IG : 100 nA to 20 A	④	0.4% + 10 mV	10 mV
	IDON : 000.0 pA to 20 A	VDS : 1.00 V to 80.0 V	③	0.4% + 3 pA	3 pA
		VX : ± 100 mV to ± 80.0 V		0.4% + 10 mV	10 mV
				0.2% + 1 mV	10 mV
Drain -Source Current	HIDSS : 000.0 pA to 20 A	VDS : 1.00 V to 80.0 V	③	0.4% + 3 pA	3 pA
				0.4% + 10 mV	10 mV
Forward Trans- conductance	GMPA : 000.0 μ S to 999.9 kS *9 (Δ VGS: 00.00 to 9.999 V)	VDS : 1.00 to 80.0 V	③	0.5% + 1 mV	1 mV
		ID : 10.0 mA to 20 A	④	0.2% + 10 mV	10 mV
				0.4% + 10 μ A	10 μ A
	GMV : 00.00 μ S to 99.99 mS	VDS : 1.00 to 80.0 V	⑤	0.5% + 3 μ S	3 μ S
		VX : *7		0.5% + 3 mV	10 mV
				0.5%	
GMI : 00.00 μ S to 99.99 mS	VDS : 1.00 to 80.0 V	⑤	0.5% + 3 μ S	3 μ S	
	ID : 1.00 μ A to 800 mA		0.5% + 3 mV	10 mV	
				0.5% + 3 nA	3 nA

Notes

- (1) *1 : Numbers ① to ⑤ show item number of the Application Ranges.
- (2) *6 : () shows the base-emitter (gate-cathode, gate-source) condition.
O : open, S : short, R : resistance
- (3) *7 : Modulation is fixed at 100 mV peak-to-peak.
VGS_{DC} : ± 100 mV to ± 80.0 V
VGS_{AC} : fixed at 100 mV peak-to-peak.
- (4) *8 : The value converted into voltage is shown.
- (5) *9 : A GMP Board (PT8821) is required.

Thyristor

Thyristor 1/2

Test Item	Measurement Range	Forcing Range	Fig. *1	Accuracy	Resolution
Leakage Current	IDRM : 000.0 pA to 9.999 mA *6	VDR : 1.00 V to 1.2 kV	①	0.4% + 3 pA 0.4% + 10 mV	3 pA 10 mV
	IRGM : 000.0 pA to 9.999 mA	VRG : 1.00 V to 1.2 kV	①	0.4% + 3 pA 0.4% + 10 mV	3 pA 10 mV
Breakdown Voltage	VDRM: 0.000 V to 1.2 kV *6	ID : 100 nA to 500 mA VMAX: 000 V to 1.2 kV	②	0.4% + 10 mV 0.4% + 10 nA -	10 mV 10 nA -
	VRGM: 0.000 V to 1.2 kV	IRG : 100 nA to 500 mA VMAX: 000 V to 1.2 kV	②	0.4% + 10 mV 0.4% + 10 nA -	10 mV 10 nA -
Forward Voltage	VGFM: 000.0 m V to 20.00 V	IGF : 100 nA to 20 A	④	0.4% + 1 mV 0.4% + 10 nA	1 mV 1 nA
On Voltage	VTM: 000.0 mV to 20.00 V	IT : 100 nA to 20 A	④	0.4% + 1 mV 0.4% + 10 nA	10 mV 1 nA
		IG : 100 nA to 20 A	④	0.4% + 10 nA	1 nA
Trigger Current	IGTF: 000 nA to 200 mA *6	VAK : 4.00 to 80.0 V RL: 10 to 150 Ω	④ ③	1% + 10 nA 0.4% + 10 mV 2% + 500 mΩ	1 nA 10 mV 10 Ω
	IGTS: 000 nA to 200 mA *6 *4	VAK : 4.00 to 80.0 V RL: 10 to 150 Ω	④ ③	1% + 10 nA 0.4% + 10 mV 2% + 500 mΩ	1 nA 10 mV 10 Ω
Trigger Voltage	VGTF: 000 mV to 20.0 V *6	VAK : 4.00 to 80.0 V RL: 10 to 150 Ω	④ ③	1% + 1 mV 0.4% + 10 mV 2% + 500 mΩ	1 mV 10 mV 10 Ω
	VGTS: 000 mV to 20.0 V *6 *4	VAK : 4.00 to 80.0 V RL: 10 to 150 Ω	④ ③	1% + 1 mV 0.4% + 10 mV 2% + 500 mΩ	1 mV 10 mV 10 Ω

Thyristor 2/2

Test Item	Measurement Range	Forcing Range	Fig. *1	Accuracy	Resolution
Holding Current *4	IH : 000 nA to 200 mA		④	1% + 10 nA	1 nA
	*6	IT : 100 nA to 20 A	④	0.4% + 10 nA	1 nA
		IG : 100 μ A to 20 A	④	0.4% + 10 μ A	1 μ A
Latching Current *2	ILF : 100 μ A to 200 mA		-	1% + 1 μ A	1 μ A
	*6	IG : 1.00 to 99.9 mA		1%	10 μ A
	ILS : 100 μ A to 200 mA		-	1% + 1 μ A	1 μ A
	*6	IG : 1.00 to 99.9 mA		1%	10 μ A

Notes

(1) Following internal option is required :

Opto-thyristor Option Boards (PT9016-01, P-8379 (3))

1 pc

(2) *1 : Numbers ① to ⑤ shows Item number of the Application Ranges.

(3) *2 : Latching Current Option Board (PT0316) is required.

(4) *4 : The first 3 digits are effective, and the last digit is always 0.

(5) *6 : () shows the base-emitter (gate-cathode, gate-source) condition.

O : open, S : short, R : resistance

Voltage regulator

Voltage regulator 1/1

Test Item	Measurement Range	Forcing Range	Fig. *1	Accuracy	Resolution
Output Voltage	VOUT: 000.0 m to 20.00 V	VIN: 1.00 to 80.0 V IOUT: 100 nA to 20.0 A	-	0.5% + 1 mV 0.5% + 10 mV 0.5% + 1 nA	0.1 mV 10 mV 1 nA
Quiescent Current	IQ : 000.0 nA to 20.00 A	VIN: 1.00 to 80.0 V IOUT: 100 nA to 20.0 A	-	0.5% + 10 nA 0.5% + 10 mV 0.5% + 1 nA	0.1 nA 10 mV 1 nA
Breakdown	IBD: 000.0 nA to 20.00 A	VIN: 1.00 to 80.0 V	-	0.5% + 10 nA 0.5% + 10 mV	0.1 nA 10 mV
Input Isolation Current	INPUTI: 000.0 nA to 9.999 A	VIN: 100 mV to 40.0 V	-	0.4% + 1 nA 0.5% + 1mV	0.1 nA 1 mV
Short Circuit Current Limit	ISC: 000.0 nA to 9.999 A	VIN: 100 mV to 40.0 V	-	0.4% + 1 nA 0.5% + 1 mV	0.1 nA 1 mV
Bias Current	IQIN: 000.0 nA to 9.999 A	VIN: 100 mV to 40.0 V IOUT: 100 nA to 20.0 A	-	0.4% + 1 nA 0.5% + 1 mV 0.5% + 1 nA	0.1 nA 1 mV 1 nA
Peak Output Current	IPEAK: 000.0 nA to 9.999 A	VIN: 100mV to 80.0V VOUT: 100mV to 80.0V	-	0.4% + 1 nA 0.5% + 1 mV 0.5% + 1 nA	0.1 nA 1 mV 1 mV

Zener Diode and Diode**Zener Diode 1/1**

Test Item	Measurement Range	Forcing Range	Fig. *1	Accuracy	Resolution
Reverse Current	IR : 000.0 pA to 9.999 mA	VAK : 1.00 V to 1.2 kV	①	0.2% + 3 pA	3 pA
				0.4% + 10 mV	10 mV
Reverse Voltage	VZ: 0.000 V to 1.2 kV	IAK : 100 nA to 500 mA	②	0.4% + 10 mV	10 mV
		VMAX: 000 V to 1.2 kV		0.4% + 1 nA	1 nA
				-	-
Forward Voltage	VF: 000.0 mV to 20.00V	IAK : 100 nA to 20.0 A	④	0.2% + 1 mV	1 mV
				0.4% + 1 nA-	1 nA-
Zener Impedance	ZZ: 10.00 R to 999.9 kR		⑤	2% ± 2 R	10 mR
	(VZ(AC):0.000mV to 9.999V) ((DC): 1.00V to 1.2 kV)	IAK ^{*3} :1.00 μA to 500 mA VMAX: 000 V to 1.2 kV		0.5% + 10 nV	10 nA
	ZZL: 0.000 mR to 9.999 MR		⑥	-	1 μR
	(VF(AC):0.000mV to 9.999V) ((DC): 1.00V to 9.99 V)	IAK ^{*3} :1.00 μA to 800 mA		0.5% + 10 nV	10 nA

Notes

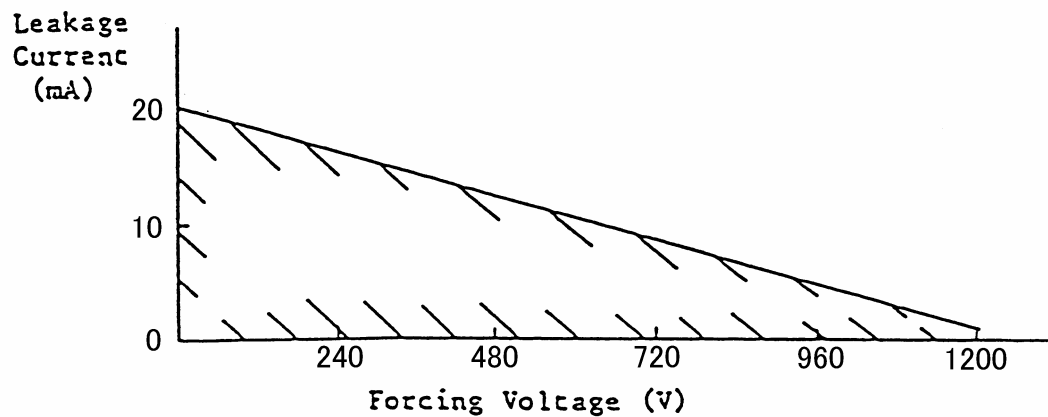
- (1) *1 : The numbers shown in the column correspond to those in Application Ranges.
(2) *3 : Bias is modulated 10 % peak to peak (1 kHz AC).
(3) *4 : ZZ = Collector – emitter voltage (AC) is measured.
ZZL = Emitter – collector voltage (AC) is measured.

Application Ranges

① Range

* Applied for Leakage Current measurements

* Power source : High voltage generator boards (PT9207, PT9208)



The range of measurement may be determined by the formula below, provided $I \geq 1$ mA.

$$I = 2 (1250 - E) / (100 + TM) \quad (\text{mA})$$

E : Bias voltage (V)

TM : Forcing time (ms)

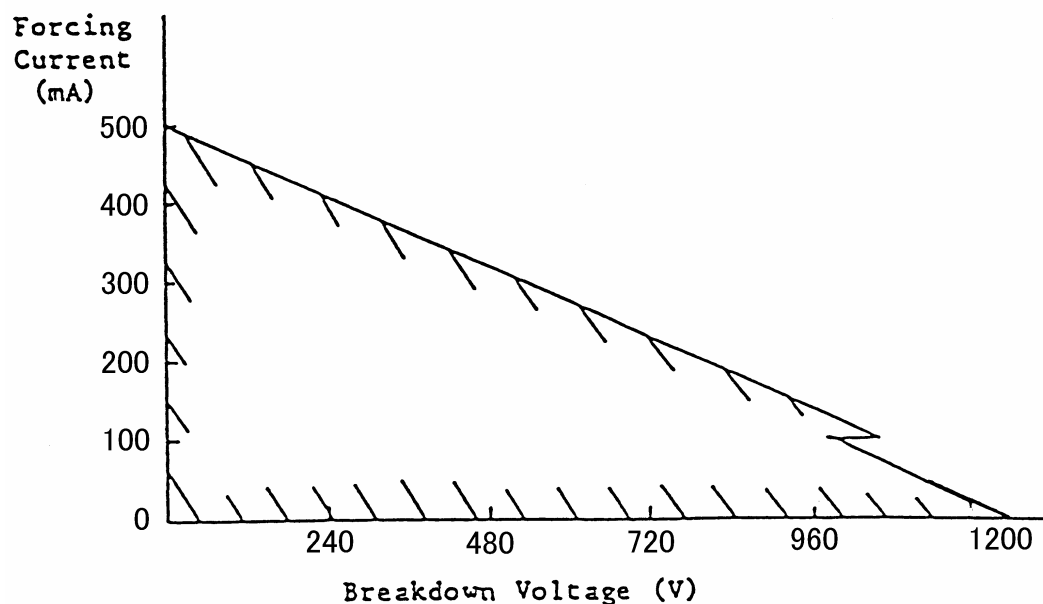
For $I < 1$ mA

$$I = (1250 - E) / 50 \quad (\text{mA})$$

② Range

* Applied to Breakdown Voltage

* Power source : High voltage generator boards (PT9207, PT9208) and
Current generator board (IC) (P-8379)



The range of measurement may be determined by the formula below,
provided $I \geq 1$ mA.

$$E = 1320 - A \times I - (I \times TM) / 2 \quad (\text{V})$$

I : Bias current (mA)
 TM : Forcing time (ms)
 A : Constant set by bias current (mA)

$I \geq 100$ mA	$A = 1.8$
10 mA $\leq I < 100$ mA	$A = 2.8$
$I < 10$ mA	$A = 13$

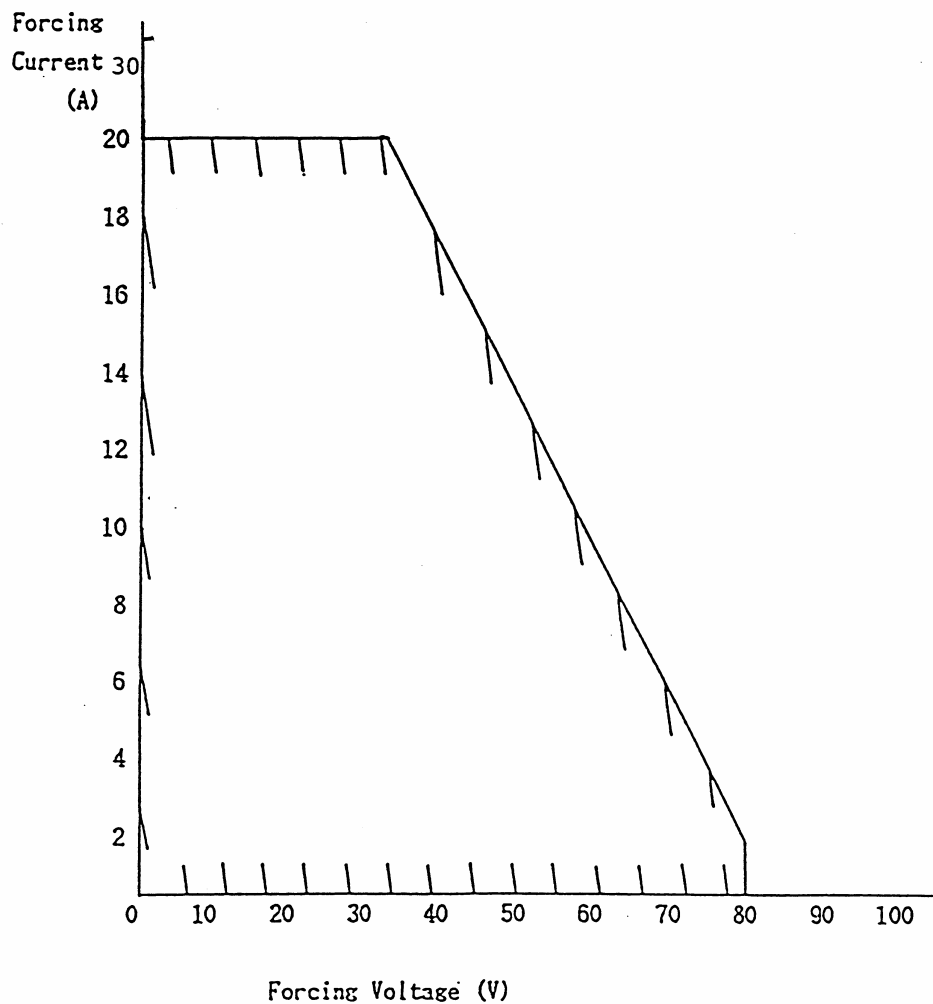
For $I < 1$ mA

$$E = 1320 - A \times I (\text{V})$$

③ Range

* Applied to VDS-IDS, VCE-IC, etc., in the measurements of HFE, pinch-off voltage, etc.

* Power source : Low voltage generator board (P-8380)



The range of forcing conditions may be determined by the formula below.

$$E = 80 - 6 \times I \times TM / 1000 \quad (\text{V})$$

E : Bias voltage (V)

I : Bias current (mA)

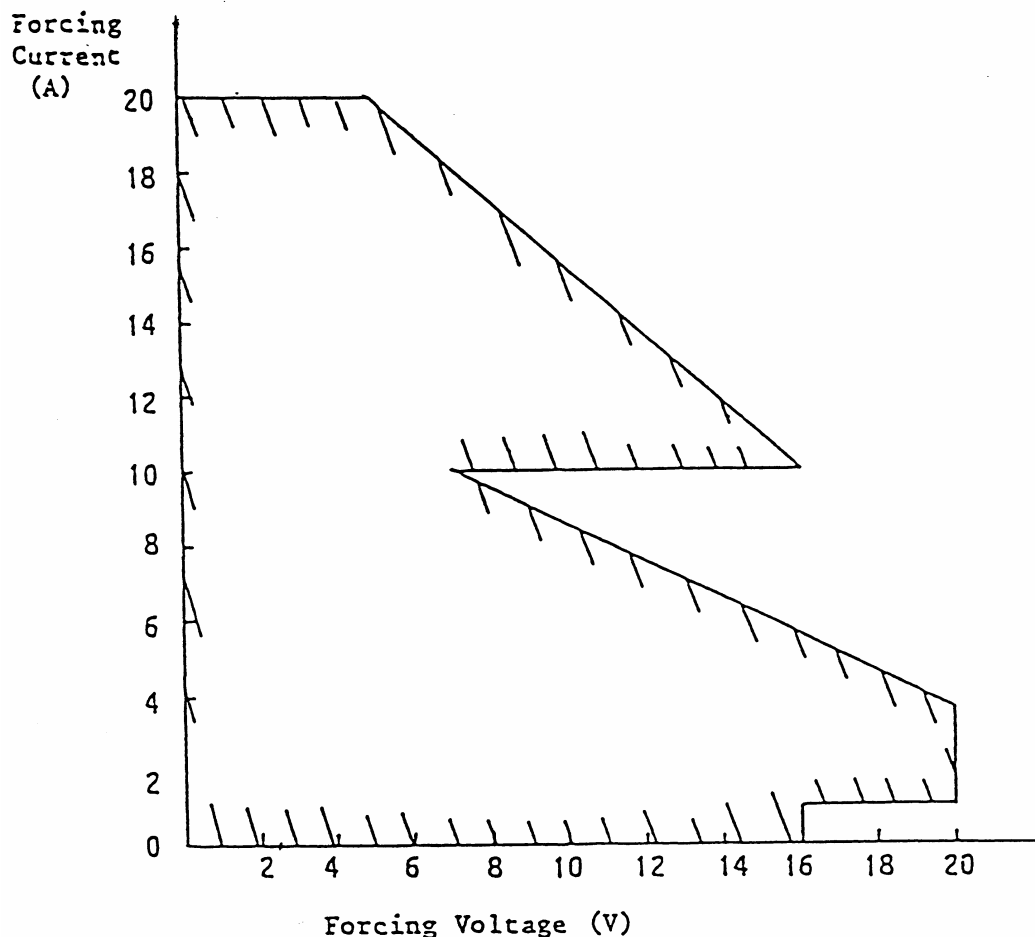
TM : Forcing time (ms)

④ Range

* Applied to VCE-IC, VBE-IB, etc., in the measurements of VCESAT, VBESAT, etc.

* Power source : Current generator board (IC) (P-8379)

Current generator board (IB) (P-8379)



The range of forcing conditions may be determined by the formula below.

$$E = 27 - N - I(TM + 0.6) / 1000 \quad (\text{V})$$

E : Bias voltage (V)

N : Constant set by bias current (mA)

I : Bias current (mA)

TM : Forcing time (ms)

Example

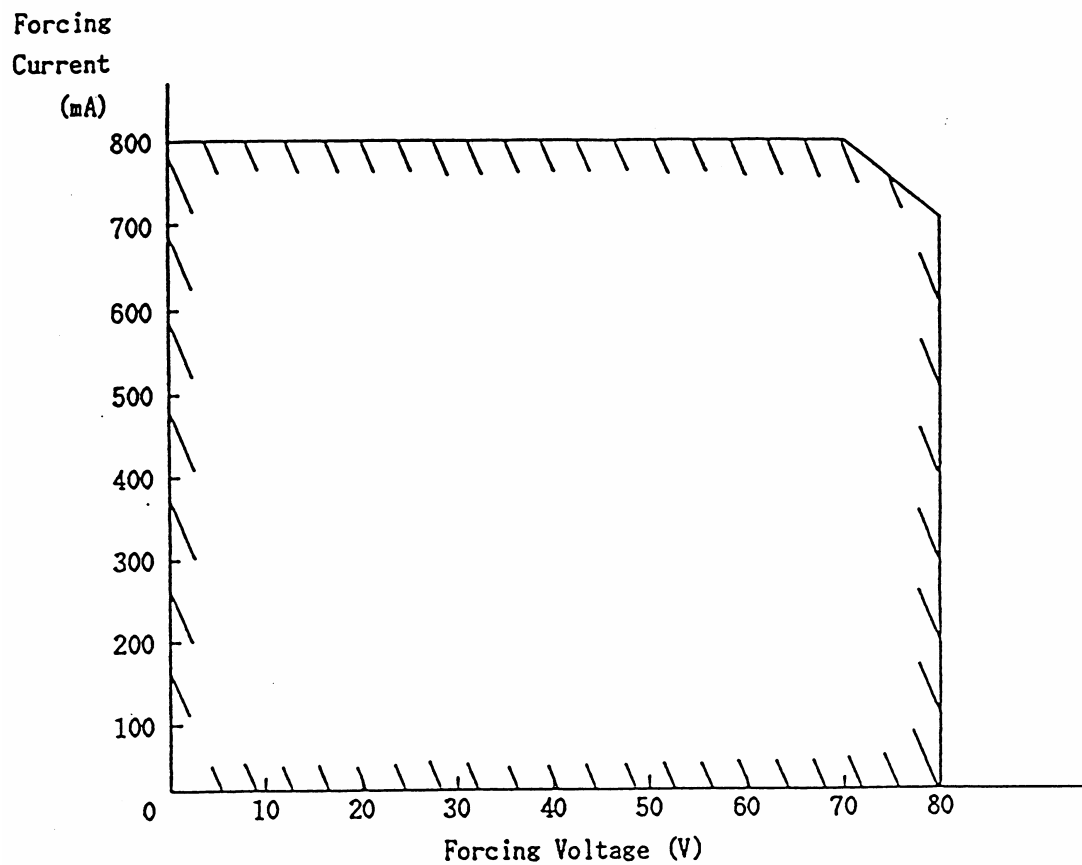
$$I = 135 \text{ mA} \rightarrow N = 1.35$$

$$I = 4.25 \text{ A} \rightarrow N = 4.25$$

⑤ Range

* Applied to VDS-IDS, VCE-IC, etc., in the AC measurement of GM, HFE, etc.

* Power source : Low voltage generator board (P-8380)



Forcing time = 20 ms

INPUT/OUTPUT EXAMPLE

Modify Test Dialog Box

Test Number: <input type="text" value="42"/>	Test Item: <input type="text" value="ICE0"/>	<input type="button" value="Modify Test"/>
Limit: <input type="text" value="190.0m"/> A	<input checked="" type="radio"/> Min <input type="radio"/> Max	Options <input type="checkbox"/> Auto Range <input type="checkbox"/> Cont Power <input type="checkbox"/> AC Test <input type="checkbox"/> Reverse <input type="checkbox"/> Osc Inhibit <input type="checkbox"/> AR Inhibit
Bias 1: VCE <input type="text" value="2.00"/> V		
Bias 2: <input type="text"/>		
Test Time: <input type="text" value="20.0m"/> s	<input type="checkbox"/> Restore	
Pass Test: <input type="text"/>	<input type="radio"/> Branch <input type="radio"/> Cover	
Fail Test: <input type="text"/>	<input type="radio"/> Branch <input type="radio"/> Cover	
<input type="button" value="Change"/> <input type="button" value="Cancel"/>		

Modify Sort Dialog Box

Sort Number: <input type="text" value="2"/>	<input type="button" value="Modify Sort"/>																																																																																			
Sort Name: <input type="text" value="PASS"/>	Sort Type <input checked="" type="radio"/> And <input type="radio"/> Reject <input type="radio"/> Or <input type="radio"/> Osc <input type="radio"/> All																																																																																			
Sort Bin: <input type="text" value="202"/>																																																																																				
Test Sequence: <input type="checkbox"/> All Pass																																																																																				
<table border="1" style="width: 100%; text-align: center;"> <tr><td>2</td><td>3</td><td>4</td><td>5</td><td>6</td><td>7</td><td>8</td><td>9</td><td>10</td><td>11</td><td>12</td><td>13</td><td>14</td><td>15</td><td>16</td><td>17</td><td>18</td><td>19</td><td>20</td><td>↑</td></tr> <tr><td>21</td><td>22</td><td>23</td><td>24</td><td>25</td><td>26</td><td>27</td><td>28</td><td>29</td><td>30</td><td>31</td><td>32</td><td>33</td><td>34</td><td>35</td><td>36</td><td>37</td><td></td><td></td><td></td><td></td></tr> <tr><td>38</td><td>39</td><td>40</td><td>41</td><td>42</td><td>43</td><td>44</td><td>45</td><td>46</td><td>47</td><td>48</td><td>49</td><td>50</td><td>51</td><td>52</td><td>53</td><td>54</td><td></td><td></td><td></td><td></td></tr> <tr><td>55</td><td>56</td><td>57</td><td>58</td><td>59</td><td>60</td><td>61</td><td>62</td><td>63</td><td>64</td><td>65</td><td>66</td><td>67</td><td>68</td><td>69</td><td>70</td><td>71</td><td></td><td></td><td></td><td>↓</td></tr> </table>		2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	↑	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37					38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54					55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71				↓
2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	↑																																																																	
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38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54																																																																				
55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71				↓																																																																
<input type="button" value="Change"/> <input type="button" value="Cancel"/>																																																																																				

Data Logging

Set Logging								
F#15	Bin 5	SECOND-FAIL						
T1	CONT	PASSED	FT2	BUCEO	373.5 U	FT3	BUCEO	376.7 U
FT4	BUEB	0.386 U	T5	ICEO	0.000uA	T6	ICBO	0.0nA
T7	IEB	1.1nA	T8	ICER	0.0nA	FT9	UCESAT	OVER
FT10	UBESAT	OVER	T11	HFE	367.6K	T12	HFE	OVER
T13	HFE	OVER	T14	HFE	OVER	FT15	BUCEO	21.9 U
FT16	BUCBO	52.2 U	FT17	UCESAT	OVER	T18	UBESAT	0.0mU
T19	HFE	OVER						

Bin Result			
STATION	TESTFILE	BIN	SORTNAME
A	2SB622	2	KELVIN
B	SCR_TEST		
*F	ED105	10	PASS

Test Sequence																					
STATION	TESTFILE	BIN	SORTNAME																		
*A	2SB622	2	KELVIN																		
			1F	2	3	4F	5	6F	7F	8F	9	10	11	12	13F	14F	15	16			
			17F	18	19F	20F	21F	22F	23												
B	SCR_TEST																				
F	ED105	10	PASS																		
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19

Data File Contents												
DataFile	ED105	DeviceName	ED105	TimePoint	0	Date	10					
TestFile	ED105	LotName	LOT B	Operator	MARK	Made	9					
Comment	Ukeire	Check					Stn A	Qt				
TEST		1	2	3	4	5	6					
ITEM		CONT	BUCEO	BUCEO	BUEB	ICEO	ICBO					
LIMIT			400.0 U	400.0 U	7.000 U	1.000uA	100.0nA					
BIAS1			1.00mA	100 uA	10.0uA	400 U	400 U					
BIAS2			999 U	999 U	100 U							
1	10	PASS	516.3	515.6	9.999	16.00n	3.500r					
2	10	PASS	471.4	477.7	9.999	4.000n	1.000r					
3	10	PASS	525.7	535.2	9.999	21.00n	20.80r					
4	10	PASS	520.7	530.3	9.999	10.00n	9.000r					
5	10	PASS	496.5	510.9	9.999	19.00n	15.80r					
SER#	BIN	+										+

The examples below show different types of counter display.

The Sum Select counter is counting the total number of devices sorted to bins 3, 5 and 8 collectively

Station A		Test by Branch	
FileName 2SB622		Polarity NPN	
SumBin	3 5 8		
SumBin Total		28 16.0 %	28 16.0 %
Bin SortName		Sub Percent	Lot Percent
2 KELVIN		3 1.7 %	3 1.7 %
3 FIRST-FAIL		14 8.0 %	14 8.0 %
5 SECOND-FAIL		6 3.4 %	6 3.4 %
8 THIRD-FAIL		8 4.6 %	8 4.6 %
10 PASS		115 65.7 %	115 65.7 %
1 OSC		0 0.0 %	0 0.0 %
24 REJECT		29 16.6 %	29 16.6 %
Total		175	175

Bin sub & lot counter display

Station A		Test by Branch		Rate
FileName 2SB622		Polarity NPN		Quantity 500
Bin SortName		Sub Percent		Sampled Percent
2 KELVIN		3 1.7 %		3 1.7 %
3 FIRST-FAIL		14 8.0 %		17 9.7 %
5 SECOND-FAIL		6 3.4 %		23 13.1 %
8 THIRD-FAIL		8 4.6 %		31 17.7 %
10 PASS		115 65.7 %		146 83.4 %
1 OSC		0 0.0 %		0 0.0 %
24 REJECT		29 16.6 %		175 100.0 %
Total		175		175 100.0 %

Sampling counter display

Test Fail Counter					
Station A		Test by Branch			
FileName 2SB622		Polarity NPN			
TR Item	#Tested	Percent	#Failed	Percent	
1 CONT	175	100.0 %	175	100.0 %	↑
2 ICBO	175	100.0 %	0	0.0 %	
3 IEB	175	100.0 %	0	0.0 %	
4 BUCEO	175	100.0 %	175	100.0 %	
5 HFE	175	100.0 %	0	0.0 %	
6 VCESAT	175	100.0 %	175	100.0 %	
7 BUCBO	175	100.0 %	175	100.0 %	
8 BUEB	175	100.0 %	175	100.0 %	
9 ICEO	175	100.0 %	0	0.0 %	
10 ICBO	175	100.0 %	0	0.0 %	↓
Total		175			

Test Fail counter display

Test program output example

Filename: ED105.TST
 Polarity: NPN
 Comment : Ukeire Check

Date Created: 12 Dec 1988
 Date Printed: 14 Dec 1988
 Maximum Test: 21

Page 1 of 1

TEST	ITEM	LIMIT	BIAS 1	BIAS 2	TIME	PASS	FAIL	OPTIONS
T1	CONT							
T2	BVCEO	>400.0 V	IC -1.00mA	VMAX=999 V	5.00ms			Ar
T3	BVCEO	>400.0 V	IC -100 uA	VMAX=999 V	2.50ms			Ar
T4	BVEB	>7.000 V	IEB -10.0uA	VMAX=100 V	2.50ms			
T5	ICEO	<1.000uA	VCE =400 V		20.0ms			
T6	ICBO	<100.0nA	VCB =400 V		20.0ms			
T7	IEB	<100.0nA	VEB =4.00 V		20.0ms			
T8	ICER	<100.0nA	VCE =400 V		20.0ms			
T9	VCESAT	<300.0mV	IC -150 mA	IB -15.0mA	380 us			
T10	VBESAT	<800.0mV	IC -150 mA	IB -15.0mA	380 us			
T11	HFE	>45.00	VCE -15.0 V	IC -50.0mA	380 us			Ar
T12	HFE	>50.00	VCE -15.0 V	IC -150 mA	380 us			Ar
T13	HFE	>50.00	VCE -15.0 V	IC -500 mA	380 us			Ar
T14	HFE	>10.00	VCE -15.0 V	IC -1.00 A	380 us			Ar
T15	EXT	>30.0 m						
T16	SAME	<200.0m	T# -15					Ar
T17	BVCEO	>320.0 V	IC -1.00mA	VMAX=999 V	5.00ms			
T18	BVCBO	>320.0 V	IC -0.0 uA	VMAX=999 V	2.50ms			
T19	VCESAT	<300.0mV	IC -150 mA	IB -15.0mA	380 us			
T20	VBESAT	<800.0mV	IC -150 mA	IB -15.0mA	380 us			
T21	HFE	>50.00	VCE -15.0 V	IC -150 mA	380 us			Ar

Filename: ED105.TST
 Polarity: NPN
 Comment : Ukeire Check

Date Created: 12 Dec 1988
 Date Printed: 14 Dec 1988
 Maximum Sort: 6

Page 1 of 1

SORT	SORT NAME	BIN	TESTS
S1	CONT-FAIL	2	1F
S2	+SECOND-FAIL	5	17F 18F 19F 20F 21F
S3	+EXT-FAIL	7	15F 16F
S4	PASS	10	1 2 3 4 5 6 7 8 9 10 11
S5	OSC	1	Osc
S6	REJECT	3	Reject