RADIO - TELEVISION MANUFACTURERS ASSOCIATION

ENGINEERING DEPARTMENT

Release No. 1224

August 14, 1953

To Tube Engineers:

The Joint Electron Tube Engineering Council announces registration of the JETEC tube type designations

2N30
2N31
1N151
1N152
1N153

1N94

1N94

according to the ratings and characteristics defined in the attached data sheets on application of

General Electric Company
Syracuse, New York

Very truly yours,

Ralph R Batcher

Chief Engineer
Radio-Electronics-Television Manufacturers Association

RRBatcher:jml
Enclosure

Types 1N91, 1N92, 1N93 and 1N94 were previously issued in Release No. 1146, December 24, 1952

RADIO - TELEVISION MANUFACTURERS ASSOCIATION

ENGINEERING DEPARTMENT

Release No. 1224 Supplement No. 1

August 28, 1953

To Tube Engineers:

On August 14, 1953, the Joint Electron Tube Engineering Council announced registration of JETEC tube type designations

2N30
2N31

The attached data sheets bore the sponsor's designations of G11 and G11A. These types were assigned JETEC type numbers 2N30 and 2N31 respectively.

Very truly yours,

Ralph R. Batcher

Chief Engineer
Radio-Electronics-Television Manufacturers Association

RRBatcher;jml

GERMANIUM PRODUCTS

GERMANIUM TRANSISTORS

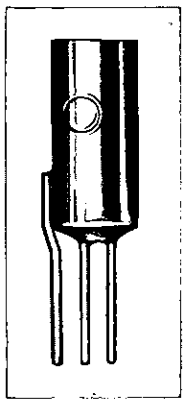
Type G11
Type G11A

General Electric Germanium Transistors are power amplifiers which have been designed to perform many of the various functions of vacuum tubes. Their outstanding characteristics are small size, instantaneous operation (no heater power), low input impedance, high output impedance and long life.

PRINCIPAL APPLICATIONS

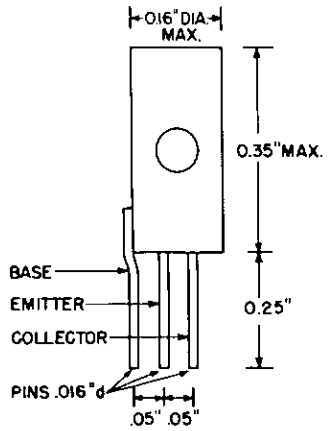
Type G11: Amplifier and oscillator
Type G11A: Counter

PHYSICAL SPECIFICATIONS



Approx. three times actual size.

- Case: Brass
- Pins: Gold plated phosphor bronze
- Impregnation: Filled with moisture resistant wax
- Suggested Means of Connection: Plug into 5- or 7-pin subminiature tube socket
- Mounting: Any position
- Pin Connections:
  Base: Soldered to case
  Emitter: Center pin
  Collector: Opposite base pin



ELECTRICAL CHARACTERISTICS

Absolute Maximum Ratings:

Collector dissipation	100 mw
Collector voltage, V_c	30 volts
Collector current, I_c	7 ma
Emitter current, I_e	3 ma
Emitter peak-inverse voltage	50 volts
Ambient temperature	40°C

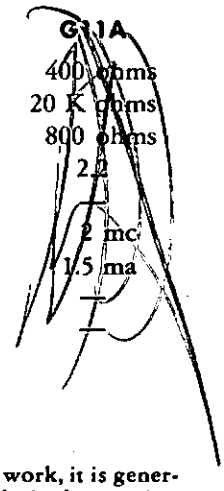
GENERAL ELECTRIC

ELECTRICAL CHARACTERISTICS cont.

Typical Operating Characteristics—Grounded Base Operation:

For V_c = 25 volts, I_e = 0.5 ma, T = 25°C:

	G11	G11A
Base resistance, R_b	200 ohms	400 ohms
Collector resistance, R_c	20 K ohms	20 K ohms
Input resistance, $R_e + R_b$	475 ohms	800 ohms
Current amplification factor, alpha	2.2	2.2
Power gain*	17 db	
Cut-off frequency, F_c**	2 mc	2 mc
I_{co} max.***	—	1.5 ma
Noise figure	57 db	—
Minimum d-c resistance in emitter circuit	500 ohms	—



NOTES:

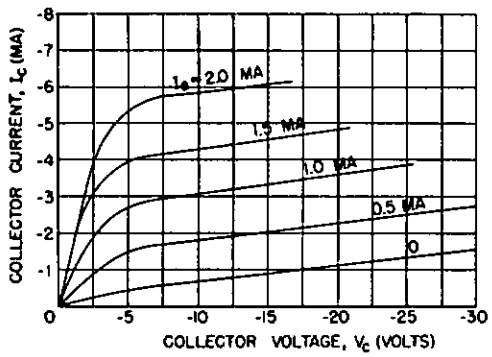
1. Impedances are open circuit measurements.
2. Any germanium transistor may be damaged by excessive voltage surges. In experimental work, it is generally best to connect the transistor in its circuit and raise the voltages gradually until the desired operating condition is reached.

*3. Power gain measured with a 500 ohm external input resistance and a load resistance of 20,000 ohms.

**4. Frequency at which alpha is 3 db down from its 1000 cycle value.

***5. $I_e = 0$ ma, $V_c = -25$ volts.

TYPICAL COLLECTOR CHARACTERISTICS FOR G11 AND G11A



SCOPE OF SPECIFICATIONS

In the construction of the equipment described, the full intent of the specifications will be met. The General Electric Company, however, reserves the right to make any departure from the specification for reasons of improved design.

ELECTRONICS DIVISION
GENERAL ELECTRIC
ELECTRONICS PARK • SYRACUSE, N. Y.

GERMANIUM PRODUCTS

DIFFUSED JUNCTION RECTIFIERS

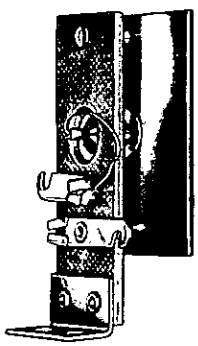
Types 1N91, 1N92, 1N93, 1N94 1N151, 1N152, 1N153

General Electric Diffused Junction Rectifiers bring to the electronic industry characteristics and ratings never before achieved in rectifiers either of the thermionic or metallic types. They combine very low forward resistance with high back resistance to give almost 100% rectification efficiency.

Reliability is featured in the design of these rectifiers, a result of the hermetically sealed construction. Several models are supplied with pigtails which makes them easy to include in an electronic circuit. Medium-current models are also available and are provided with brackets to facilitate mounting on the chassis.

These Rectifiers employ the diffusion principle, developed by General Electric, of creating P-N junctions. This technique has been the subject of considerable research and development and has yielded the products described in this specification sheet.

1N91, 1N92, 1N93



1N94, 1N151, 1N152, 1N153

FEATURES:

LONG LIFE—hermetically sealed construction

HIGH EFFICIENCY—low forward resistance

LOW LEAKAGE—high back resistance

SMALL SIZE—requires a minimum of space

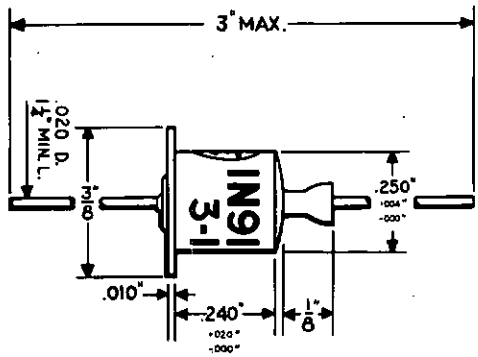
LEADS ATTACHED (1N91, 1N92, 1N93)—for solder-in connection

VERSATILE RATINGS—operation in ambients up to 65°C

GENERAL ELECTRIC

GENERAL PURPOSE TYPES

RTMA TYPE NUMBER	(formerly)
1N91	4JA1A1
1N92	4JA1A2
1N93	4JA1A3



OUTLINE DRAWING

SPECIFICATIONS:

ABSOLUTE MAXIMUM RATINGS:

(for 60 cycle, 55°C, resistive load)

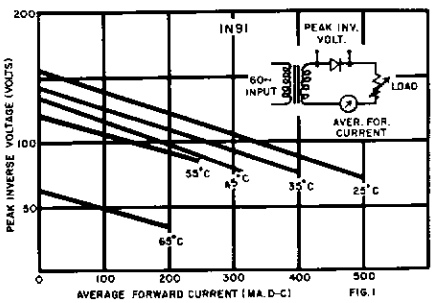
	1N91	1N92	1N93
Peak Inverse Voltage (volts)*	100	200	300
Peak Forward Current (amps)	0.47	0.31	0.25
D-C Output Current (ma.)*	150	100	75
D-C Surge Current (amps)	25	25	25
Full Load Voltage Drop (volts)	0.5	0.5	0.5
Leakage Current (ma., @ Rated P.I.V.)	2.7	1.9	1.2
Continuous Reverse Working Voltage (volts)	30	65	100
Operating Frequency (Kc)	50	50	50
Storage Temperature (°C)	85	85	85

** Typical Absolute Maximum Ratings. For other combinations and for ratings at other than 55°C, refer to Figures 1, 2 and 3.*

ABSOLUTE MAXIMUM RATINGS:

(for 60 cycle, resistive load)

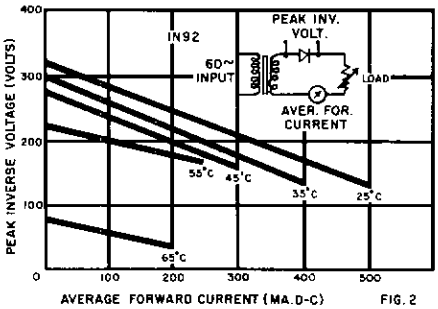
FIGURE 1



ABSOLUTE MAXIMUM RATINGS

IN91

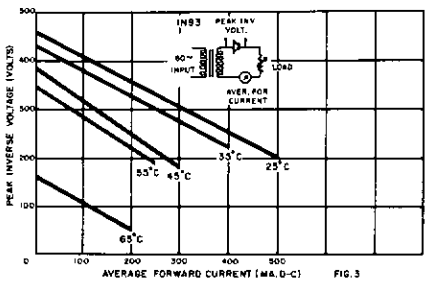
FIGURE 2



ABSOLUTE MAXIMUM RATINGS

IN92

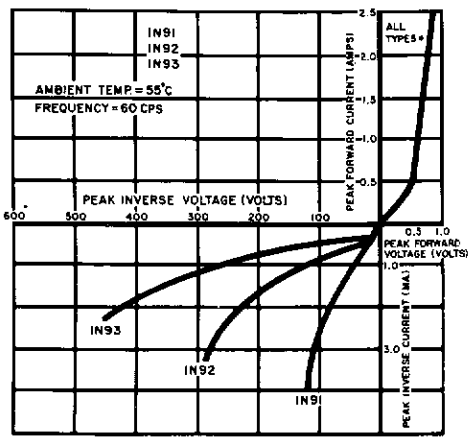
FIGURE 3



ABSOLUTE MAXIMUM RATINGS

IN93

NOTE: These curves on the 1N91, 1N92 and 1N93 rectifiers establish ratings on the respective models. An individual rectifier may be operated at any voltage-current point on or below the temperature characteristic for the particular model. The Peak Inverse Voltage-D-C Output Current ratings given on the previous page constitute one point on these curves.



DYNAMIC VOLTAGE-CURRENT CHARACTERISTICS

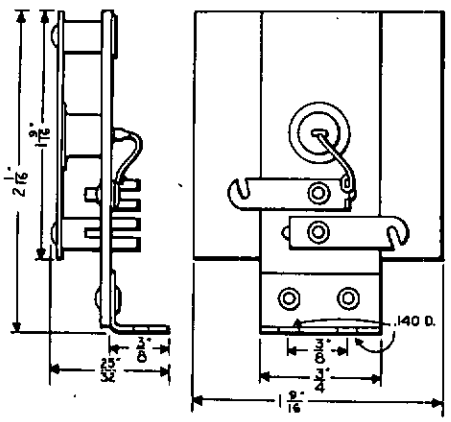
IN91, IN92, IN93

DIFFUSED JUNCTION RECTIFIER

TELEVISION MODEL

RTMA TYPE NUMBER	(formerly)
1N94	4JA2A4
1N151	—
1N152	—
1N153	—

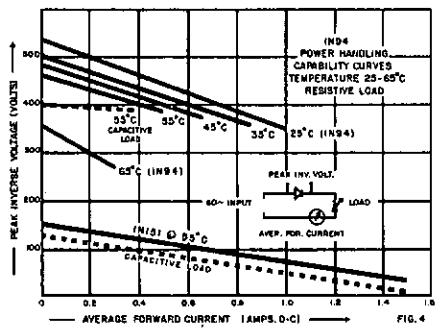
194



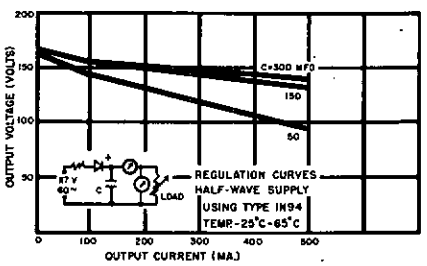
OUTLINE DRAWING

ABSOLUTE MAXIMUM RATINGS:
(for 60 cycle, 55°C, resistive load)

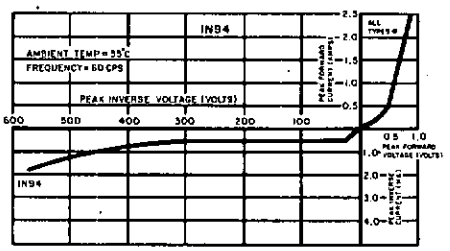
	1N151	1N152	1N153	1N94	
RMS Input Voltage	35	70	105	130	Volts
Peak Inverse Voltage	100	200	300	380	Volts
Peak Forward Current	1.57	1.57	1.57	1.57	Amps.
D-C Output Current	500	500	500	500	Ma.
D-C Output Current (Capacitive Load)	350	350	350	350	Ma.
D-C Surge Current	25	25	25	25	Amps.
Full Load Voltage Drop, Peak	0.7	0.7	0.7	0.7	Volts
Leakage Current (at Rated P.I.V.)	2.4	1.9	1.2	0.8	Ma.
Continuous Reverse Working Voltage	30	65	100	185	Volts
Operating Frequency	50	50	50	50	KC
Storage Temperature	85	85	85	85	°C



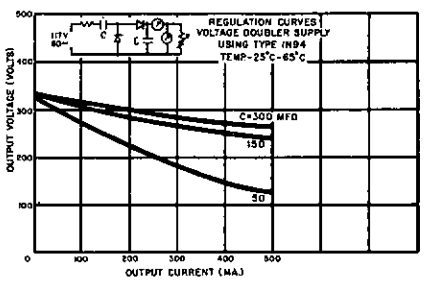
ABSOLUTE MAXIMUM RATINGS
FOR 60 CYCLE, RESISTIVE LOAD



REGULATION CURVE
HALF-WAVE SUPPLY



DYNAMIC VOLTAGE-CURRENT
CHARACTERISTIC



REGULATION CURVE
VOLTAGE DOUBLER SUPPLY

ECG-10B REP. 6/53

PRINTED IN U.S.A.

ELECTRONICS DIVISION
GENERAL ELECTRIC
ELECTRONICS PARK • SYRACUSE, N.Y.

TENTATIVE SPECIFICATION*

G11A (SWITCHING TYPE)

GERMANIUM WHISKER TRANSISTOR

Parameter	Operating Point	Min.	Max.
Alpha (1)	I_e= -0.1 ma, V_c= -15 v	--	0.3
Alpha (2)	I_e= +.05 ma, V_c= -15 v	2.5	--
Alpha (3)	I_e= +1.0 ma, V_c= -15 v	2.0	--
**Cut-off frequency	I_e= 0.5 ma, V_c= -15 v	3.0 mc	--
Off collector current, I_{co}	I_e= 0 ma, V_c= -15 v	--	0.8 ma
On collector voltage, $V_{3,4}$	I_e= +3 ma, I_c= -4 ma	--	2.0 v
Reverse emitter resistance, r_{er}	V_e= -10 v, I_c= 0 ma	100K ohms	--
***D. C. base resistance, r_{bo}	I_e= 0.V_c = -15 v	--	500 ohms

*This specification supercedes the electrical characteristics given for type G11A on publication number ECG-1B dated December, 1952.

**Frequency at which alpha is 3 db down from its 1000 cycle value.

***$r_{bo} = \frac{V_e}{I_{co}}$

In the construction of the equipment described, the full intent of the specification will be met. The General Electric Company, however, reserves the right to make any departure from the specification for reasons of improved design.

ELECTRONICS DIVISION

G E N E R A L E L E C T R I C

Electronics Park, Syracuse 1, N. Y.