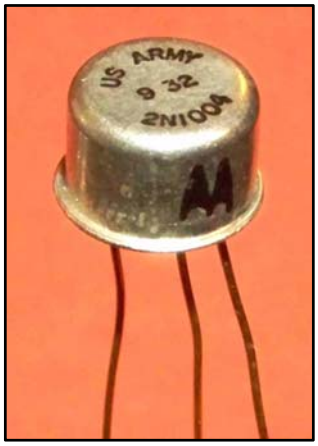
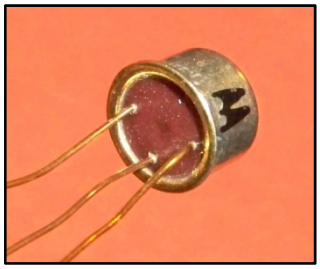


Transistor Size (1/4" OD X 1/4" H)
Date Code 9 32 (1959 Week 32)



Bottom View Showing Glass Header

MOTOROLA 2N1004

TYPE
Germanium PNP Drift Transistor

USAGE
6 MC Video Amplifier

LISTING DATES
Sig C: FY 1956
U.S. ARMY: 1959
JEDEC Registration: 1963

CASE STYLES
Standard TO-5
Silver Metal with Glass Header

AVAILABILITY
Rare (Limited Production)

HISTORIC NOTES
Motorola was one of nine companies participating in the Signal Corps FY-1956 transistor Production Engineering Measures program. Although Motorola was known primarily as a pioneer in developing early germanium power transistors, such as the 2N176, for use in automobile radios, the company was also developing expertise in the manufacture of high speed germanium transistor technology such as "drift" and "diffused base". This approach well met the Signal Corps PEM initiative for FY-1956, which was aimed at supporting the development of the next breakthroughs in transistor technology that could achieve better high frequency performance than the existing alloy junction and surface barrier devices from the mid 1950s. The 2N1004 type was developed initially with support from the Sig C PEM program, and based on contract success, was further qualified to meet U.S. Army specifications. The glass header used for the lead seal, as shown above, represents a fairly early and somewhat primitive approach for transistor packaging technology - this technique was soon abandoned due to structural and performance degradation issues. The 2N1004 was likely never sold commercially, with only limited production for the Signal Corps and the U.S. Army.

MOTOROLA 2N1004 – Page 2

Company	Device Designation	Material	Polarity	Application	Power Dissipation	Frequency Response	Fabrication Technique
MOTOROLA	2N1003	Ge	*p-n-p*	12.5 Mc-20-db a	120 mw @ 25°C ambient temp.		D
	2N700	Ge	*p-n-p*	70 Mc-24-db a	75 mw @ 25°C ambient temp.	280 Mc f_t	DBT
	2N1004	Ge	*p-n-p*	video amplifier	120 mw @ 25°C ambient temp.		D

Materials — *Fabrication Technique*

Legend: Ge—germanium; Si—silicon — DBT—Diffused Base Transistor; D—Drift

The FY-56 Sig C PEM program lists three devices under contract with Motorola, as shown above. The 2N1003 and 2N1004 are listed as "Drift" transistors, with only limited high frequency performance (up to 12.5 MC). The 2N700 was one of the first Motorola diffused base/mesa transistors available, and performed up to 70 MC – it sold well commercially and was the basis for a long line of similar Motorola mesa transistors (both germanium and silicon) into the 1980s.

JOINT ELECTRON DEVICE ENGINEERING COUNCIL

Announcement of
Electron Device Type Registration
Release No. 4260 May 13, 1963

The Joint Electron Device Engineering Council announces the registration of the following electron device designations

2N1003 *
2N1004 *

Motorola Semiconductor Products Incorporated Phoenix, Arizona

* The sponsor has indicated that these devices are obsolete and are no longer being manufactured. Registration is being completed for record purposes.

The 2N1003 is a Germanium PNP transistor designed as a 12.5 MC IF Amplifier.

The 2N1004 is a Germanium PNP transistor designed as a 6 MC Video Amplifier.

The JEDEC listing above provides additional information for the 2N1003/1004. As was common in this timeframe, these two transistor types were likely produced on the same "lines", and then tested to determine resultant characteristics. The higher frequency units were 2N1003, while the slower units were labeled as 2N1004. RCA was the major supplier of drift transistors, as this technology had been developed originally at RCA by Herbert Kroemer. RCA manufactured a complete family of high speed drift transistors, beginning with the famous 2N247. Motorola never entered large scale production of drift transistors and this technology was competitive for only a few years (mid 1950s to mid 1960s). These Motorola devices were obsolete by 1963, and represent an important early transistor technology.