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|-------------------|--------------------|-----------------------|------------|
| Registration No.  | Number 00084       |                       |            |
| Registration Date | September 27, 2011 | Registration Category | Category 1 |

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| Name<br>(Model, etc.)     | 4 GHz Band Microwave Traveling-Wave Tube                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| Location                  | Musashino City, Tokyo Metropolis                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|                           | NTT Information Network Laboratory Group                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| Owner<br>(Custodian)      | NTT Information Network Laboratory Group                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| Manufacturer<br>(Company) | NEC Corporation                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| Year Manufactured         | 1961                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| Reason For<br>Selection   | <p>The traveling wave tube appeared when the results of an experiment in microwave amplification by using it were announced in England in 1947, and it began to be used in Japan from around 1952 for TV link-ups and for telephone lines.</p> <p>Conventional traveling wave tubes of the time had to have an electric magnet and a power supply for the magnet to focus electronic beams. These were very heavy and could not be carried by one person alone. PPM (Periodic Permanent Magnet) technology was able to focus electronic beams efficiently with a small magnet. This focusing was accomplished by using a permanent magnet aligned periodically instead of using an electric magnet. This discovery was made in 1951 by Seki Takeo and other researchers at the Nippon Telegraph and Telephone Public Corporation.</p> <p>By eliminating the need for an electric magnet, PPM technology made the creation of small and light traveling wave tubes possible. As a result, this technology spread all over the world. It achieved great success in the fields of terrestrial channels, satellite communication, satellite broadcasting, and microwave measuring instruments. Especially as related to satellites, PPM technology was essential. Without it, on-board satellite transmitters would have been impossible. Japan can be proud before the entire world for its discovery of PPM technology. In 1955, this technology was adapted for the first time to 4W75A, and the preservation of the oldest existing class of traveling wave tube of the time is a valuable memento of past technology.</p> |
| Registration<br>Standard  | 1 - B                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |

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|-----------------------------|--------------------------------------------------------------------------------------|
| Open/Closed<br>to Public    | Open to Public                                                                       |
| Photo                       |  |
| Other useful<br>information |                                                                                      |