GET-30593

# Qualification Test Report on NE681XX

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## 1. Introduction

The NE681XX is the same process on NE856XX.
Therefore, we have performed the NE856XX instead of the NE681XX.
The NE856XX qualification tests were performed by NE85608.

## 2. Qualification test items and failure criteria

2.1 Thermal Environmental Test (Table. 1, 2)
2.2 Mechanical Environmental Test (Table. 1, 2)
2.3 Soldering Heat (Table 1)
2.4 High Temperature Storage Test (Table. 1, 2)
2.5 High Temperature DC Bias Test (Table. 1, 2)

## 3. Result

Tests results are shown in Table 3.
Weibull plot on High Temperature Storage Test result is shown in Fig. 1.
Arreheius plot on this test result shown in Fig. 2.

Table 1 Test Item and Test Condition

| Test Item | Test Condition (MIL-STD 750 Method) | Sample Size |
|---|---|---|
| Thermal Environmental Test<br>a) Soldering Heat<br>b) Temperature Cycling<br>c) Thermal Shock<br>d) Hermetic Seal | <br>2031<br>1051:Cond. D -65℃ ~ +200℃<br>1056:Cond. A<br>1071<br>Fine Leak (Cond. H)<br>Gross Leak (Cond. C) | 8 |
| Mechanical Environmental Test<br>a) Shock<br>b) Vibration Variable Frequency<br><br>c) Constant Acceleration<br>d) Hermetic Seal | <br>2016:1500G, 0.5ms, 3axes, 5times<br>2056:100 ~2000Hz, 20G, 3axes,<br>4min, 4times<br>2006:20000G, 3axes, 1min, 1time<br>1071<br>Fine Leak (Cond. H)<br>Gross Leak (Cond. C) | 8 |
| Solderability | 2026 | 8 |
| High Temperature Storage Test | a) Ta=227℃<br>b) Ta=259℃<br>c) Ta=295℃<br>d) Ta=337℃ | 10<br>10<br>10<br>10 |
| High Temperature DC Bias Test | Ta=100℃, VCB=8V, IC=32m A<br>T=1000Hrs | 8 |

Table. 2 Test Condition and Criteria on NE85608

| Environmental Test | | | |
|---|---|---|---|
| Test Items | Symbol | Test Condition | Criteria |
| Hermetic Seal | | Fine:Cond. H<br>Gross:Cond:C | ~$1\times10^{-8}$ atm cc/sec<br>no stream bubble |
| **High Temperature DC Bias Test** | | | |
| Parameter | Symbol | Test Condition | Criteria |
| Collector Cutoff Current | ICBO | VCB=10V | +100nA or +100% |
| Emitter Cutoff Current | IEBO | VEB=1V | +100nA or +100% |
| DC Current Gain | hFE | VCE=10V, IC=20m A | ±15% |
| **High Temperature Storage Test** | | | |
| Parameter | Symbol | Test Condition | Criteria |
| Collector Cutoff Current | ICBO | VCB=10V | ~2u A |
| Emitter Cutoff Current | IEBO | VEB=1V | ~2u A |
| DC Current Gain | hFE | VCE=10V, IC=20m A | +50% / -25% |

Table. 3 Qualification Test Results

| Test Items | Results(failure/sample) | Reference |
|---|---|---|
| Thermal Environmental Test | 0/8 | ———— |
| Mechanical Environmental Test | 0/8 | ———— |
| Solderability | 0/8 | ———— |
| High Temp. Storage Test a) | 0/10 (at 2000Hrs) | Table. 4 , Fig. 1, Fig. 2 |
| b) | 0/10 (at 2000Hrs) | |
| c) | 0/10 (at 2000Hrs) | |
| d) | 10/10 (at 336Hrs) | |
| High Temp. DC Bias Test | 0/8 (at 1000Hrs) | ———— |

Table. 4 Result of HT Test on NE85608

| Test Item | Test Cond | Sample Size | Result (Failure/Sample) | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 24H | 48H | 96H | 168H | 336H | 504H | 672H | 840H | 1000H | 1500H | 2000H |
| High Temp. Storage Test | Ta=227℃ | 10 | 0/10 | 0/10 | 0/10 | 0/10 | 0/10 | 0/10 | 0/10 | 0/10 | 0/10 | 0/10 | 0/10 |
| | Ta=259℃ | 10 | 0/10 | 0/10 | 0/10 | 0/10 | 0/10 | 0/10 | 0/10 | 0/10 | 0/10 | 0/10 | 0/10 |
| | Ta=295℃ | 10 | 0/10 | 0/10 | 0/10 | 0/10 | 0/10 | 0/10 | 0/10 | 0/10 | 0/10 | 0/10 | 0/10 |
| | Ta=337℃ | 10 | 0/10 | 0/10 | 1/10 | 2/10 | 10/10 | - | - | - | - | - | - |

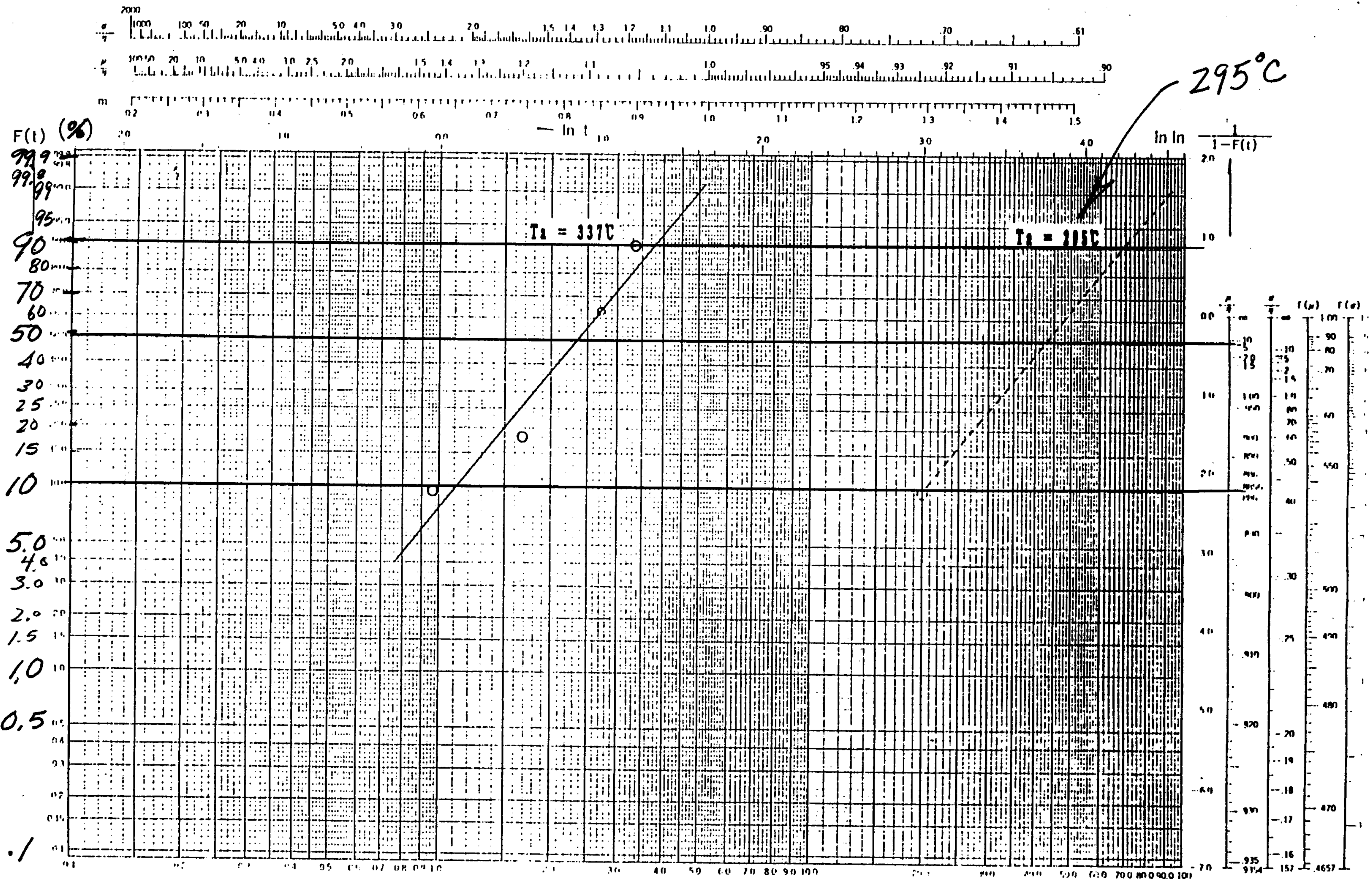


**Fig. 3 Weibull Plot of HT Test on NE85608**

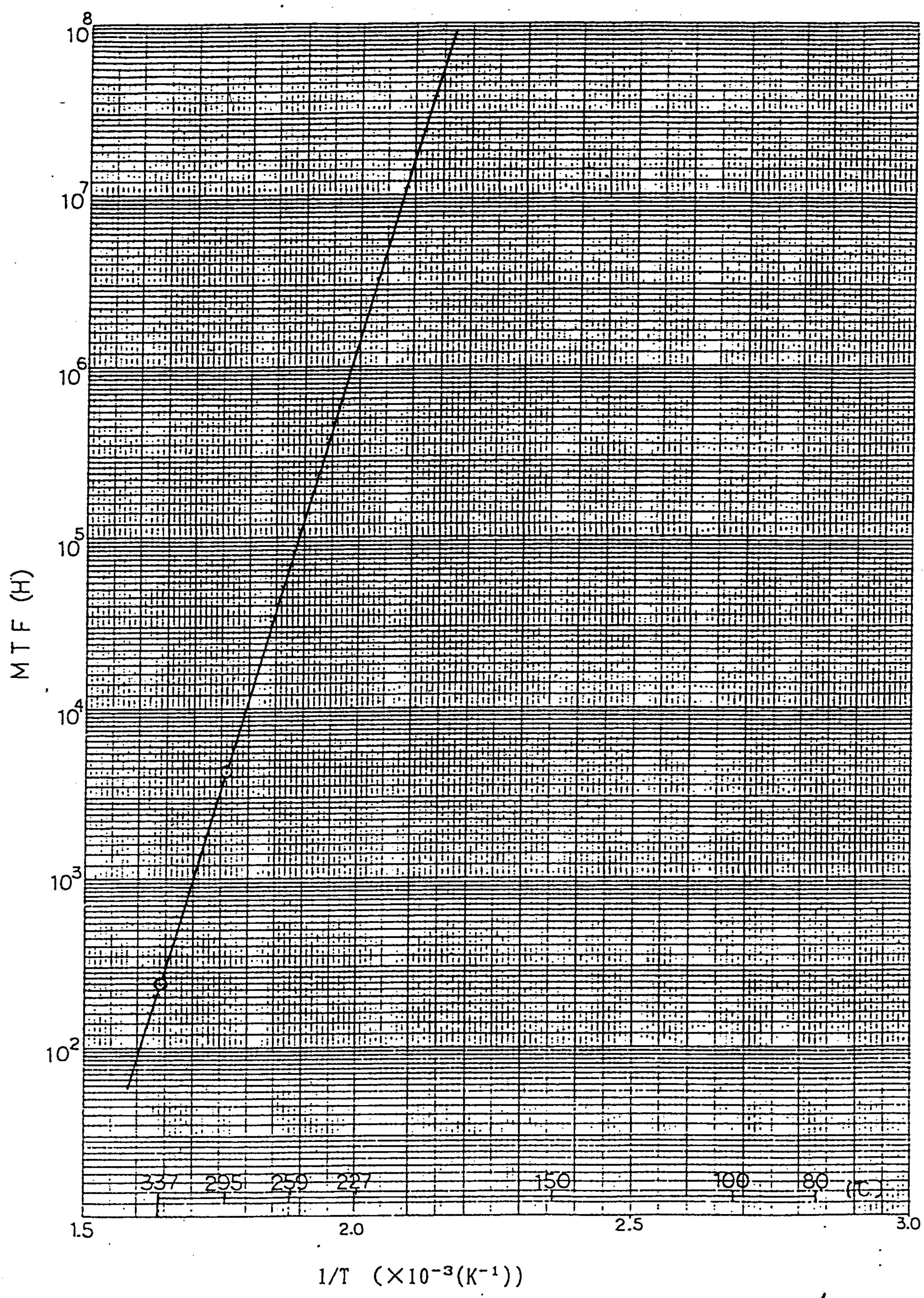


Fig. 2 Arrhenius Plot of HT test on NE85608/681