

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

Table.2 Test Condition and Criteria on NE85608

Environmental Test			
Test Items	Symbol	Test Condition	Criteria
Hermetic Seal		Fine:Cond.H Gross:Cond:C	$\sim 1 \times 10^{-8}$ atm cc/sec 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	$\pm 15\%$
High Temperature Storage Test			
Parameter	Symbol	Test Condition	Criteria
Collector Cutoff Current	ICBO	VCB=10V	$\sim 2\mu$ A
Emitter Cutoff Current	IEBO	VEB=1V	$\sim 2\mu$ 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)	—————

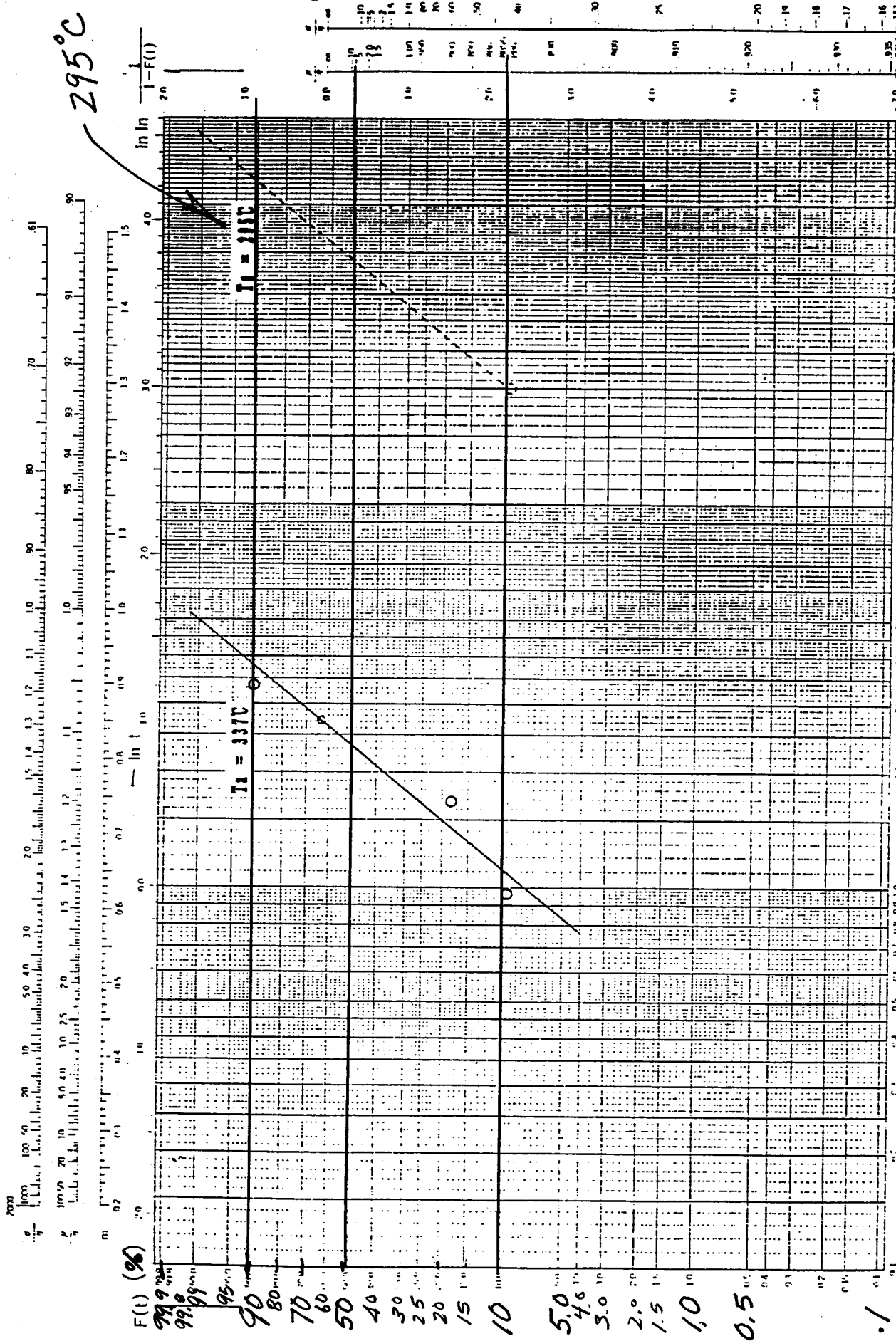


Fig. 3 Weibull Plot of HT Test on NB5500 / 681

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$$F(t) = 1 - e^{-\left(\frac{t}{T_1}\right)^m}$$

$$\mu = T_0^m \left[\Gamma\left(1 + \frac{1}{m}\right) \right]$$

$$\sigma = T_0^m \left\{ \Gamma\left(1 + \frac{2}{m}\right) - \Gamma^2\left(1 + \frac{1}{m}\right) \right\}^{\frac{1}{2}}$$

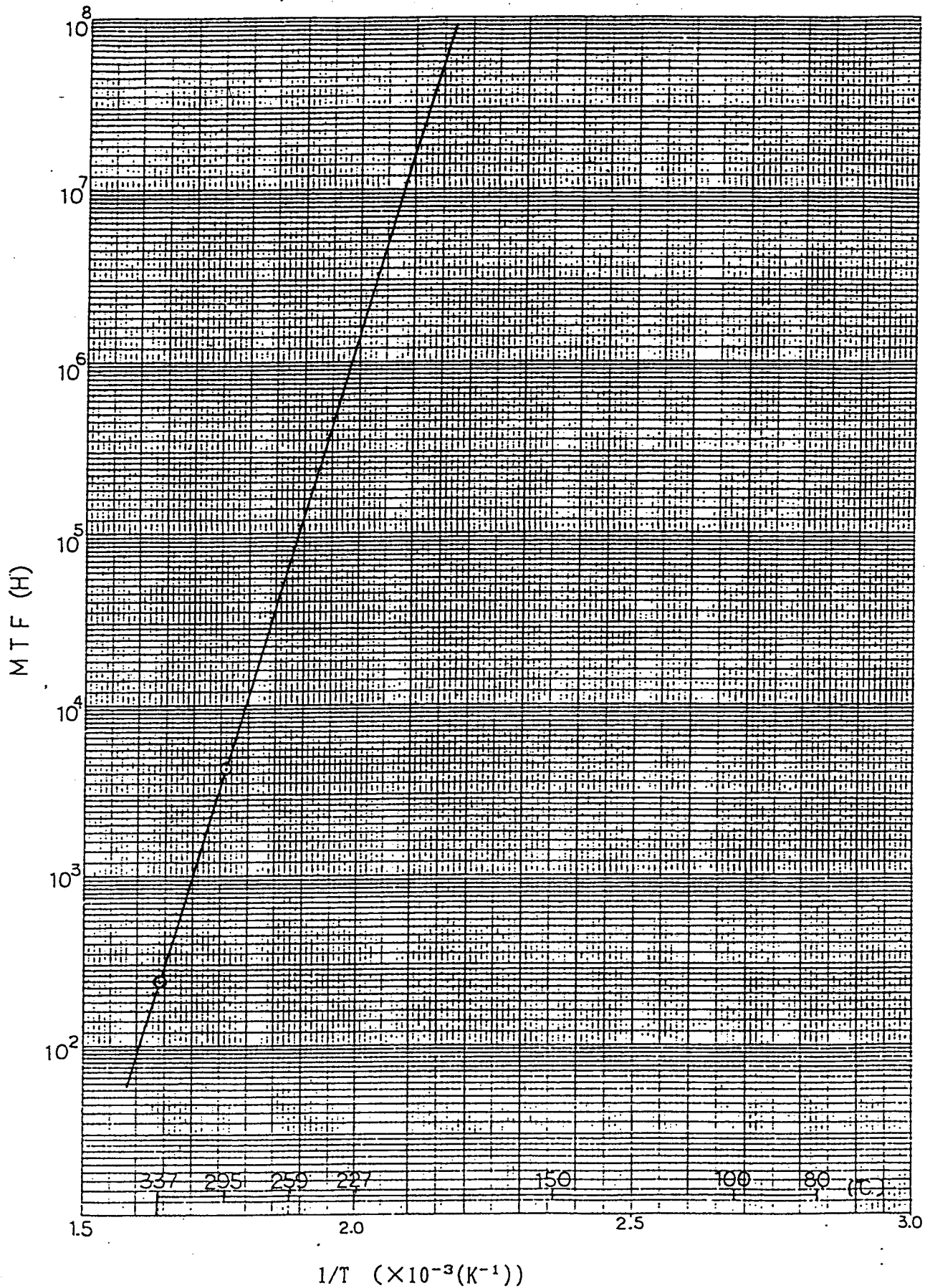


Fig. 2 Arrhenius Plot of HT test on NE85608/681