# Qualification Test Results on NE272 ser es



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This report presents the qualification test results on NE272 series.

## 1.Test Device

NE272
Al GaAs /In GaAs hetero-junction FET

## 2.Qualification tests

A series of qualification tests consists of following items

1)High temperature DC Bias Test ( H T P T )
2)High temperature Reverse Bias Test ( H T R B T )

The test conditions and sample size are shown in Table 1.
The test parameters were measured before and after the tests.

## 3.Test Results

The summary of qualification test result is presented in Table 3-1,3-2.

1)High Temperature DC Bias Test
The following condition has been adopted:

$V_{DS}$=2V $I_D$=10mA Tch=175℃

The test results are shown in Table 3-1 and Fig.1(1)~Fig.1(8)
The test elapsed for 5000 hours under the above condition.
The changes of all parameters are within the delta criteria.

2)High temperature DC Bias Test
The following condition has been adopted:

$V_{GDS}$= -4V Tch=150℃

The test results are shown in Table 3-2 and Fig.2(1)~Fig.2(8).
The test elapsed for 5000 hours under the above condition.
The changes of all parameters are within the delta criteria.

## 4.Conclusion

From the series of qualification test results described above

t is concluded that:

1)There is no degradation up to 5000 hours at Tch=175℃ in High temperature DC bias test.
2)There is no degradation up to 5000 hours at Tch=150℃ in High temperature Reverse bias test.

NE272 is qua fied for high reliabi ity applications.

## Table 1 Test Item and Test condition

| Test Item | Test Condition | Sample size | Remarks |
|---|---|---|---|
| High temperature DC bias test | $V_{DS}$=2V, $I_D$=10mA.Tch=175℃ 5000 hours or up to F(t)>50% | 10 | Test is continued ; No degradation up to 5000 |
| High temperature reverse bias test | $V_{G-DS}$=−4V,Tch=150℃ 5000 hours or up to F(t)>50% | 10 | Test is continued ; No degradation up to 5000 |

## Table 2 Delta Parameters and Criteria

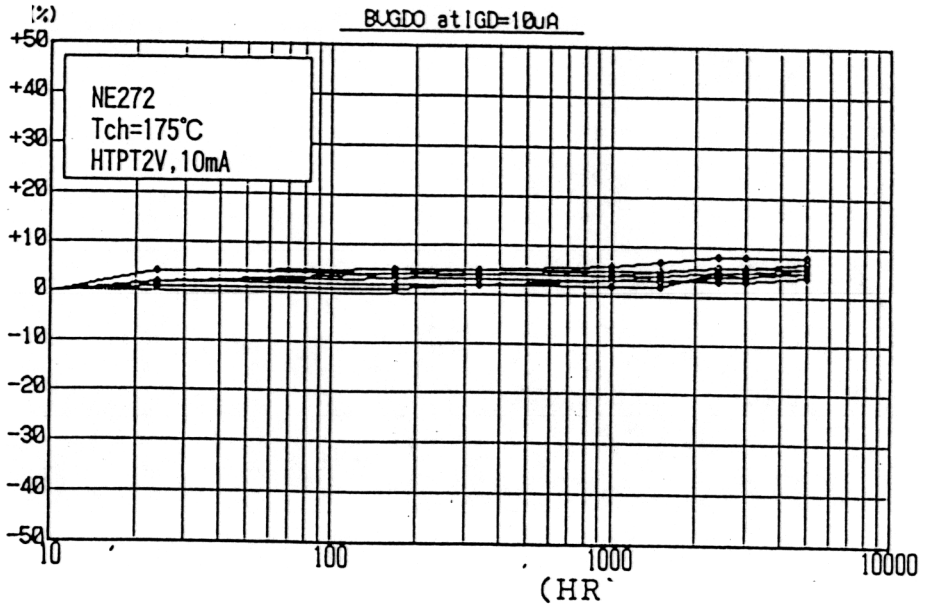
| Parameter | Test condition | Delta Criteria |
|---|---|---|
| $I_{DSS}$ | $V_{DS}$=2V, $V_{GS}$=0V | +20% ~ −20% |
| gm | $V_{DS}$=2V, $I_D$=10mA | +20% ~ −20% |
| $V_{GS(off)}$ | $V_{DS}$=2V, $I_D$=100 μA | +20% ~ −20% |
| $I_{GSO}$ | $V_{GS}$=−3V | +500nA or 100% whichever is greater |
| $B_{VGDO}$ | $I_{GD}$=−10 μA | +20% ~ −20% |
| $V_{GF}$ | $I_{GF}$=1 μA | +20% ~ −20% |
| NF | $V_{DS}$=2V, $I_D$=10mA f=12GHz | +0.2dB ~ −0.2dB |
| Ga | | +0.5dB ~ −0.5dB |

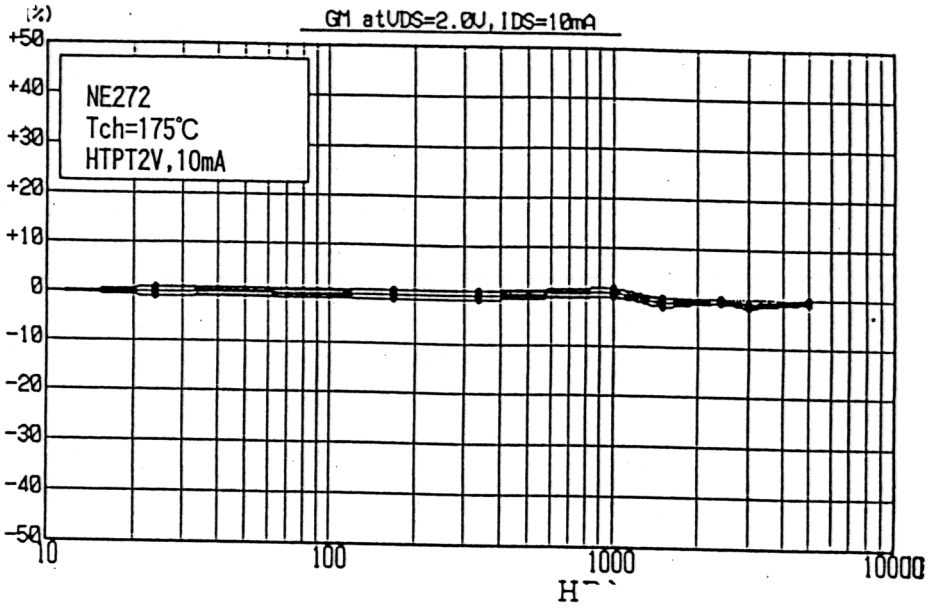
Table 3-1. Summary of Qualification Test Result

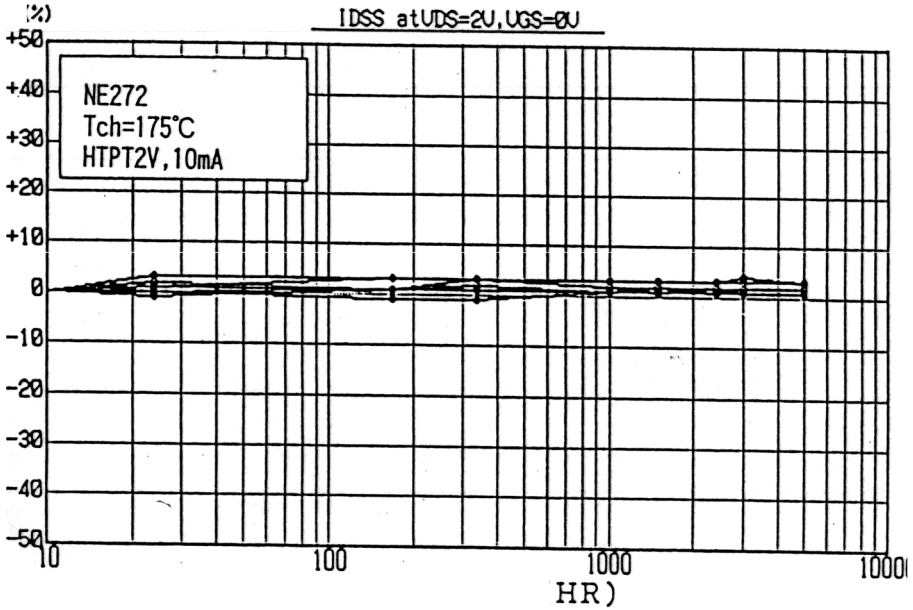
| TEST ITEM | TEST CONDITION | CUMULATIVE FAILURE NUMBER WITH ELAPSED TIME | | | | | | REF. FIG. OR TABLE |
|---|---|---|---|---|---|---|---|---|
| | | 168H | 336H | 1000H | 1500H | 3000H | 5000H | |
| HIGH TEMPERATURE DC BIAS TEST | $V_{DS}$ = 2V<br>$I_D$ =10mA<br>Tch=175℃ | 0/10 | 0/10 | 0/10 | 0/10 | 0/10 | 0/10 | FIG. 1 |

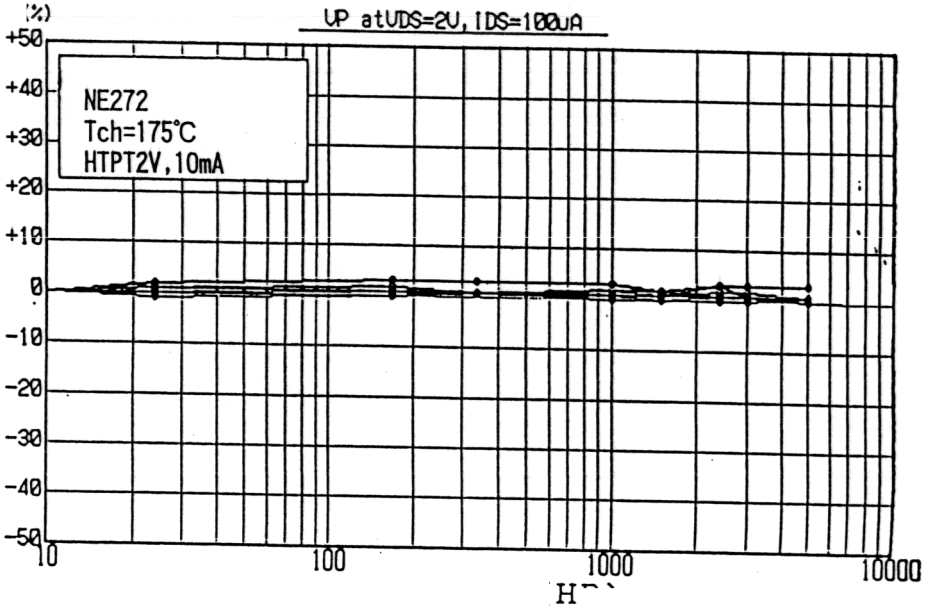
Table 3-2. Summary of Qualification Test Result

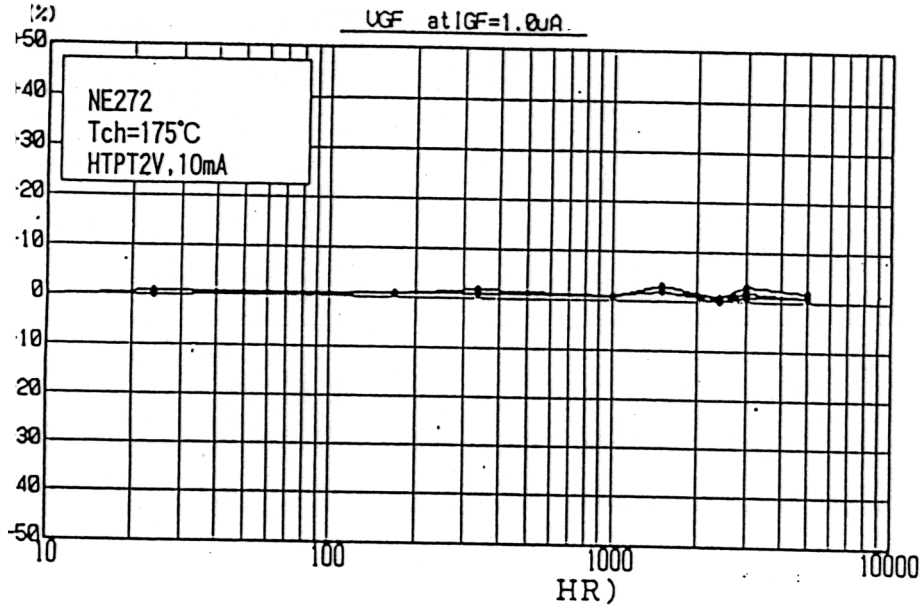
| TEST ITEM | TEST CONDITION | CUMULATIVE FAILURE NUMBER WITH ELAPSED TIME | | | | | | REF. FIG. OR TABLE |
|---|---|---|---|---|---|---|---|---|
| | | 168H | 336H | 1000H | 1500H | 3000H | 5000H | |
| HIGH TEMPERATURE REVERSE BIAS TEST | $V_{G\text{-}DS}$ = -4V<br>Tch=150℃ | 0/10 | 0/10 | 0/10 | 0/10 | 0/10 | 0/10 | FIG. 2 |

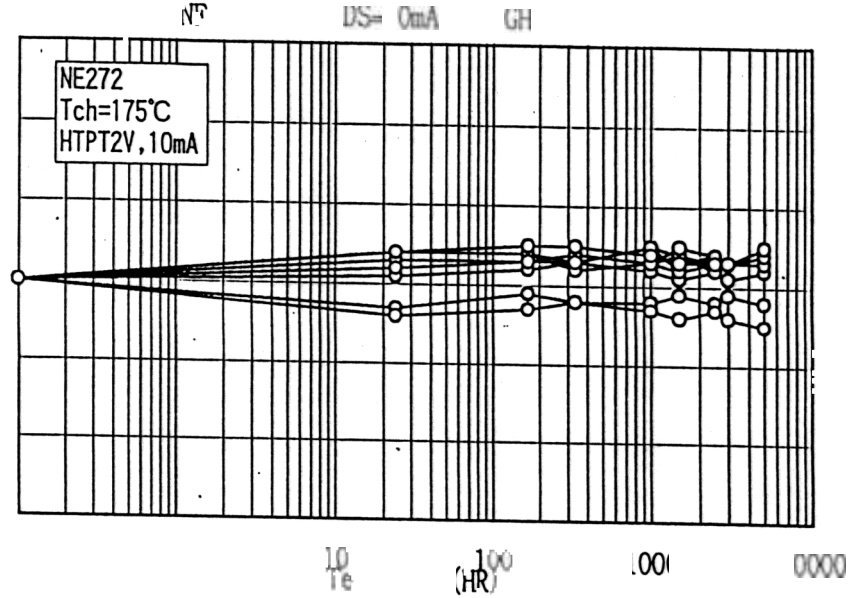

BVGDO at IGD=10uA
(%)
+50
+40
+30
+20
+10
0
-10
-20
-30
-40
-50
NE272
Tch=175°C
HTPT2V,10mA
10
100
1000
10000
(HR

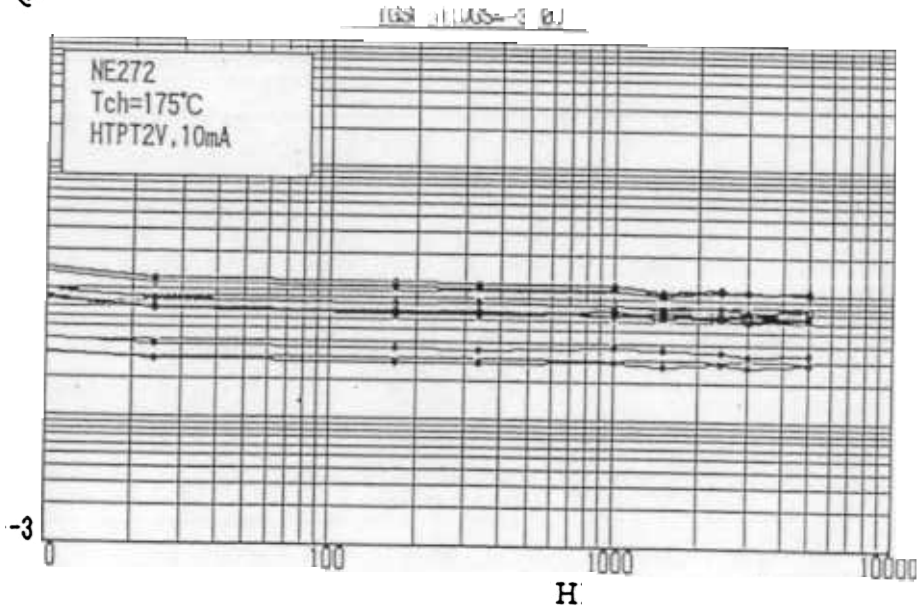

GM at VDS=2.0V, IDS=10mA
(%)
+50
+40
+30
+20
+10
0
-10
-20
-30
-40
-50
NE272
Tch=175°C
HTPT2V,10mA
10
100
1000
10000

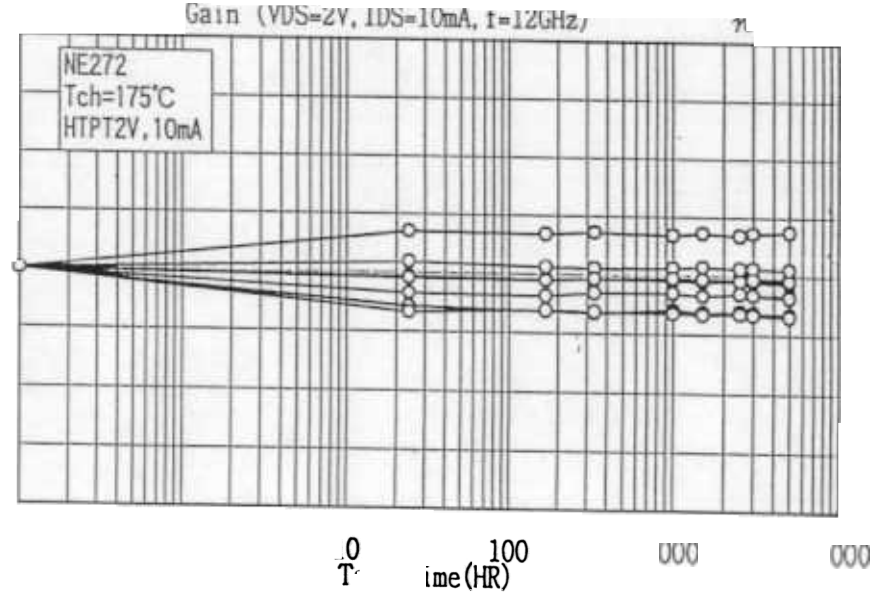

IDSS at VDS=2V, VGS=0V
(%)
+50
+40
+30
+20
+10
0
-10
-20
-30
-40
-50
NE272
Tch=175°C
HTPT2V,10mA
10
100
1000
HR)

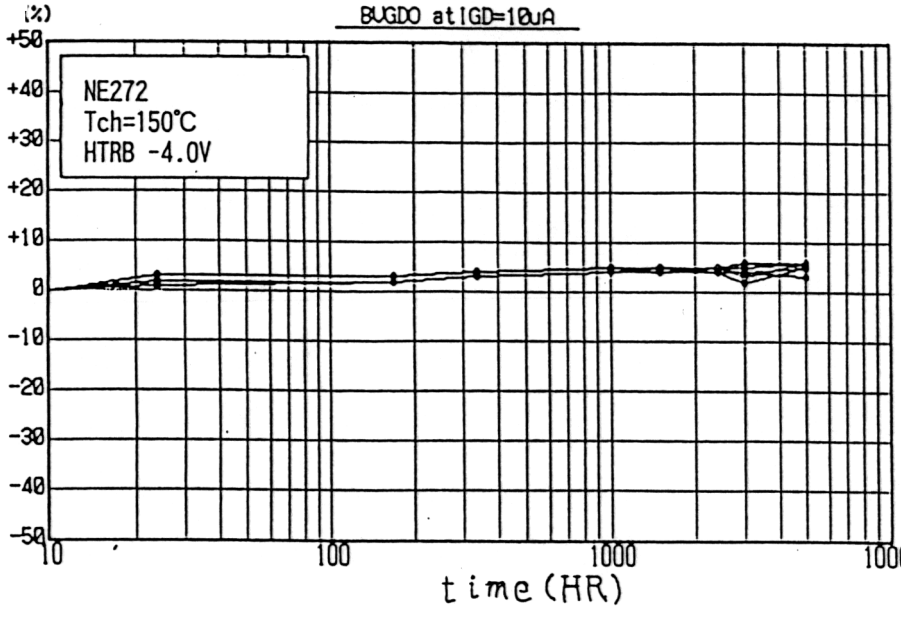

VP at VDS=2V, IDS=100uA
(%)
+50
+40
+30
+20
+10
0
-10
-20
-30
-40
-50
NE272
Tch=175°C
HTPT2V,10mA
10
100
1000
10000

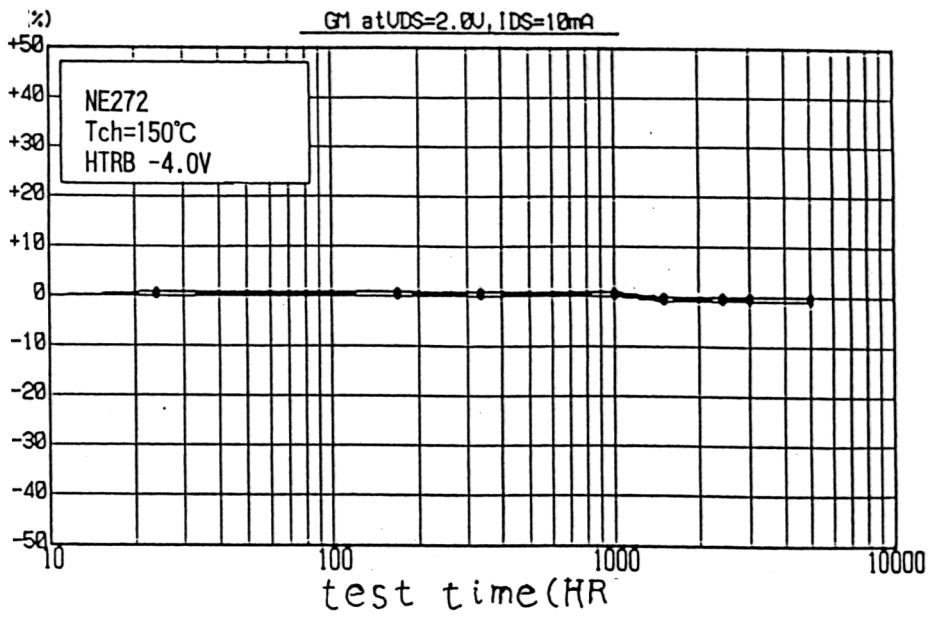

UGF at IGF=1.0uA
NE272
Tch=175°C
HTPT2V,10mA
50
40
30
20
10
0
10
20
30
40
50
10
100
1000
10000
HR)

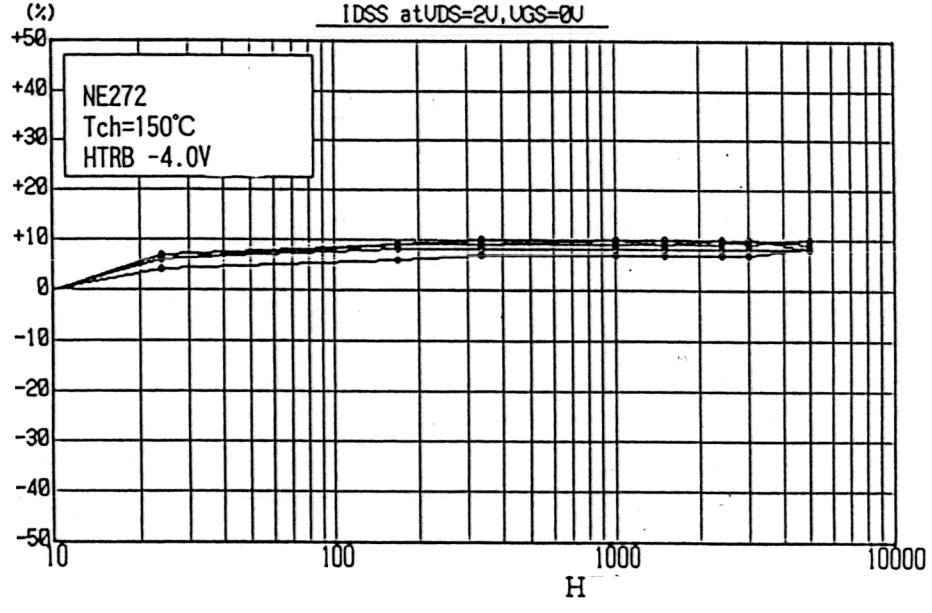

DS= 0mA
GH
NE272
Tch=175°C
HTPT2V,10mA
(dB)
10
100
000
0000
(HR)

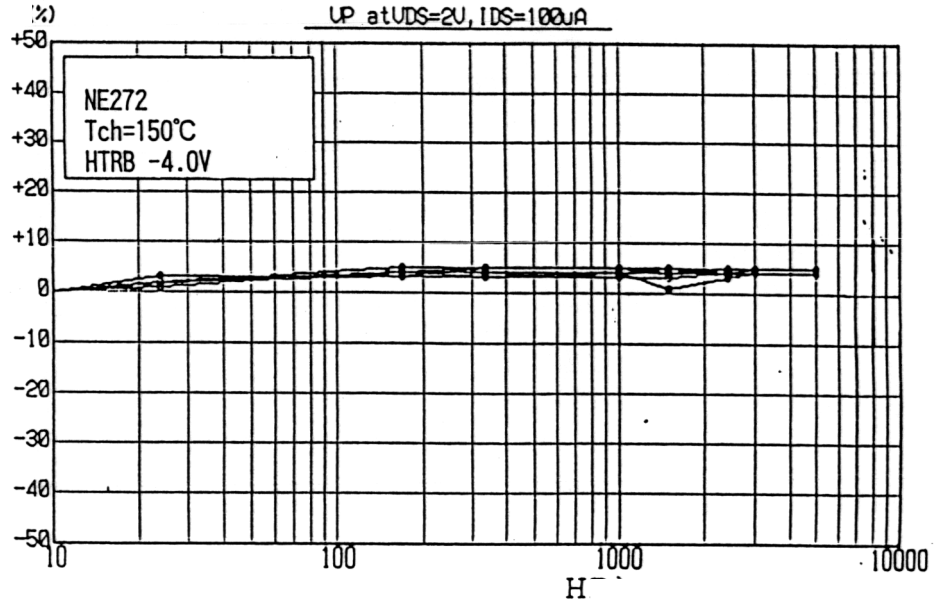

NE272
Tch=175°C
HTPT2V,10mA
-3
0
100
1000
10000
H

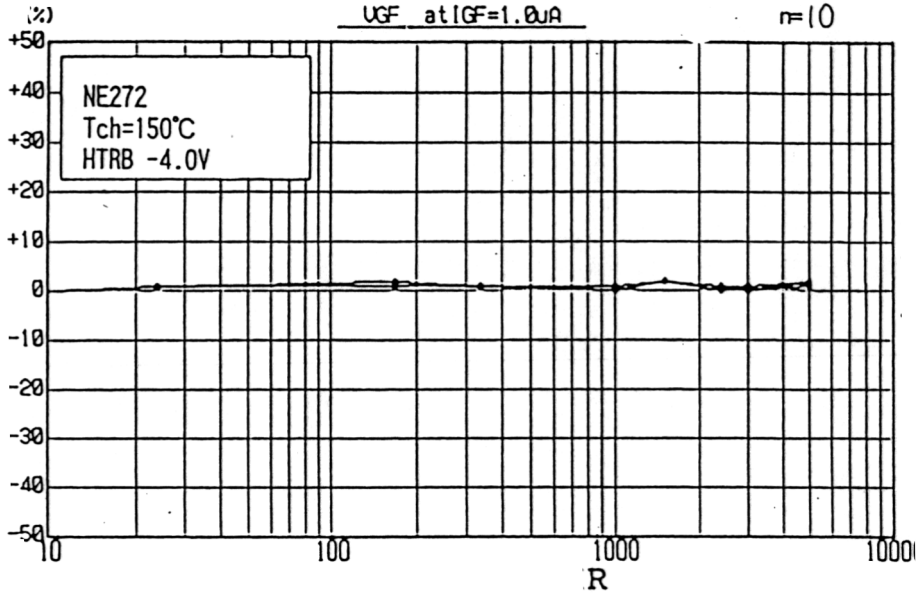

Gain (VDS=2V, IDS=10mA, f=12GHz)
NE272
Tch=175°C
HTPT2V,10mA
ΔGain(dB)
0
100
000
000
ime(HR)

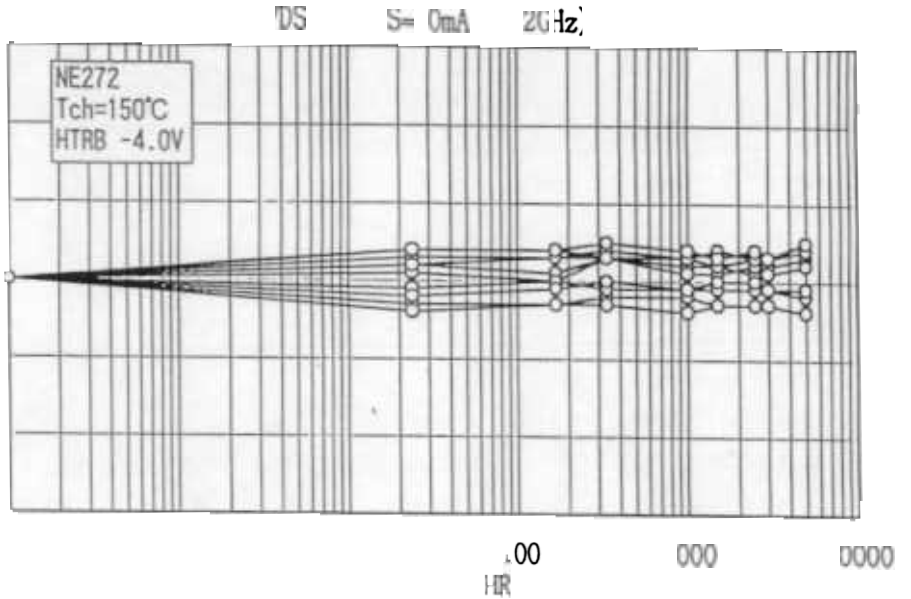

(%)
BVGDO at IGD=10uA
NE272
Tch=150°C
HTRB -4.0V
+50
+40
+30
+20
+10
0
-10
-20
-30
-40
-50
10
100
1000
time(HR)

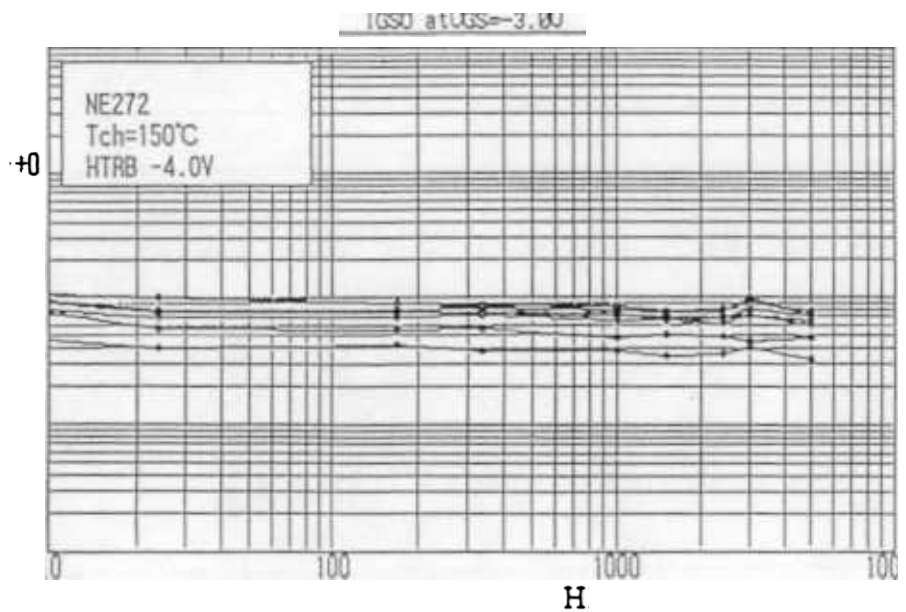

(%)
GM at VDS=2.0V, IDS=10mA
NE272
Tch=150°C
HTRB -4.0V
+50
+40
+30
+20
+10
0
-10
-20
-30
-40
-50
10
100
1000
10000
test time(HR

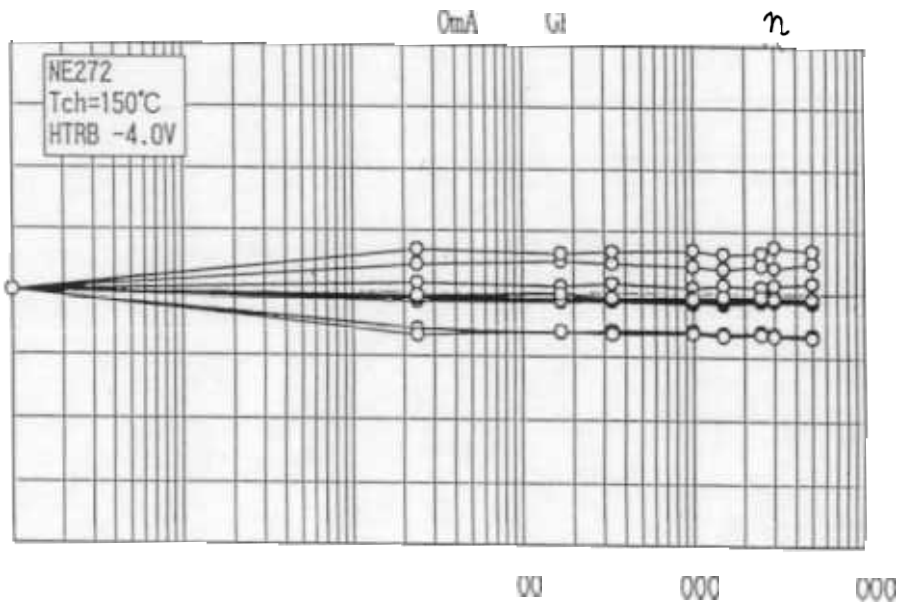

(%)
IDSS at VDS=2V, VGS=0V
NE272
Tch=150°C
HTRB -4.0V
+50
+40
+30
+20
+10
0
-10
-20
-30
-40
-50
10
100
1000
10000
H


(%)
VP at VDS=2V, IDS=100uA
NE272
Tch=150°C
HTRB -4.0V
+50
+40
+30
+20
+10
0
-10
-20
-30
-40
-50
10
100
1000
10000
H


(%)
VGF atIGF=1.0uA
n=10
NE272
Tch=150°C
HTRB -4.0V
+50
+40
+30
+20
+10
0
-10
-20
-30
-40
-50
10
100
1000
1000
R


DS
S= 0mA
2GHz)
NE272
Tch=150°C
HTRB -4.0V
HR


IGSO atVGS=-3.0V
NE272
Tch=150°C
HTRB -4.0V
+0
100
1000
H


0mA
NE272
Tch=150°C
HTRB -4.0V