USE LINK TECHNOLOGIES CO.,LTD.

1. **Product Number : UG-004**

2. **Application:**

This application shall apply for antenna unit which shall be used with an engine for an automobile.(for impedance 50Ω)

3. **Appearance:**

Antenna Unit （refer to an attached drawing）
Dimensions   25mmx25mmx8.8mm
Cable   RG174U
Connector   SMA M C TYPE

4. **Operating Condition:**

Temperature   -40   to   +90 ˚C
Humidity   10   to   95% RH

5. **Storage Condition:**

Temperature   -40   to   +90 ˚C
Humidity   10   to   95% RH

6. Electrical Specification:

＊All value are defined at 25±15 °C ,65±20 % RH, power handling 1 u watt,air
pressure 960 ±100 HPA unless otherwise noted.

6-1) Patch

GPS Band

Characteristics		GPS Band	Glonass Band	Unit
Center Frequency*		1575.42±1.023	1602±2	MHz
Bandwidth (under -10dB return loss)		8 min.	16min	MHz
VSWR		2 max.		
Impedance		50		Ω
Polarization		Linear Polarization		
Gain	Peak	2.36(typical)	2.55 (typical)	dBi
	Efficiency	76.21 (typical)	68.39(typical)	%
Temperature Coefficient of Frequency		0±20 max (@ -40℃~85℃)		ppm/℃

6-2) LNA

Characteristics	GPS Band	Glonass Band
Center Frequency	1575.42±1.023MHz	1602±2MHz
Gain	34 dB typ at 3V	33 dB typ at 3V
Noise Figure	1.5dB at 3V	1.5dB at 3V
Output V.S.W.R	2.0 max	
Input Voltage	DC = 3.0±0.5V	
Current	DC = 12.5mA typ at 3V	

7. Block Diagram:

Antenna

Linear
Gain= 2.5 dBi typ

$S21 = LNA\ Gain = 33\,dB\ min$

AC

| Input Matching Network | LNA | Output Matching Network |

DC   AC   DC
3.0v   SYS
12.5 mA   fo = 1575.42&1602MHz
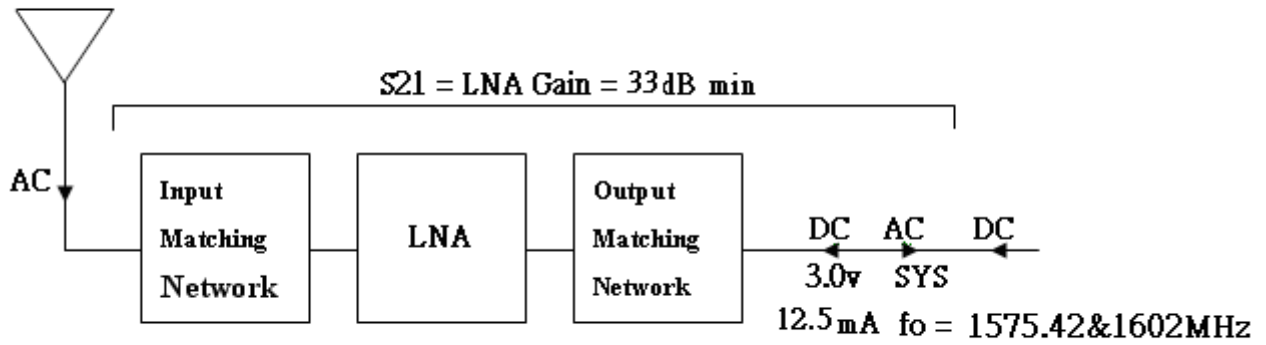
The structure of GPS and Glonass antenna module

8. Measurement Method:

Patch:

a). Reflection Coefficient Measurement

- Equipment : Network Analyzer (Agilent E5071A)(Fig.1)

- Item : S_{11} Log Chart (Return loss)、S_{11} Smith Chart (Impedance)

Fig.1 Network Analyzer

b). Pattern Measurement

- Equipment : Anechoic Chamber (Fig.2), Network Analyzer (Agilent E8753ES), Standard Horn
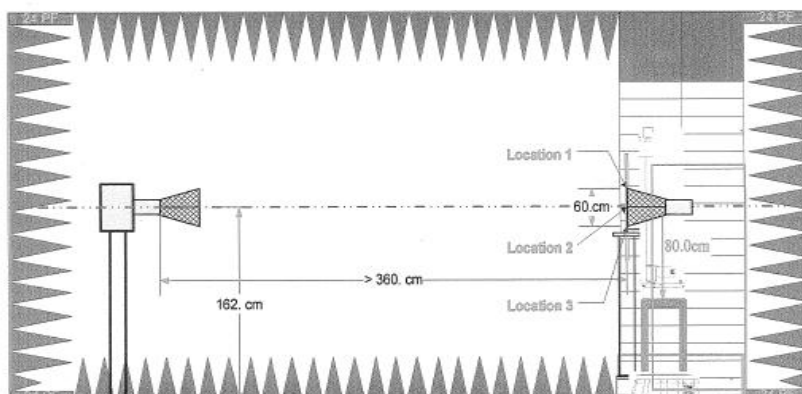
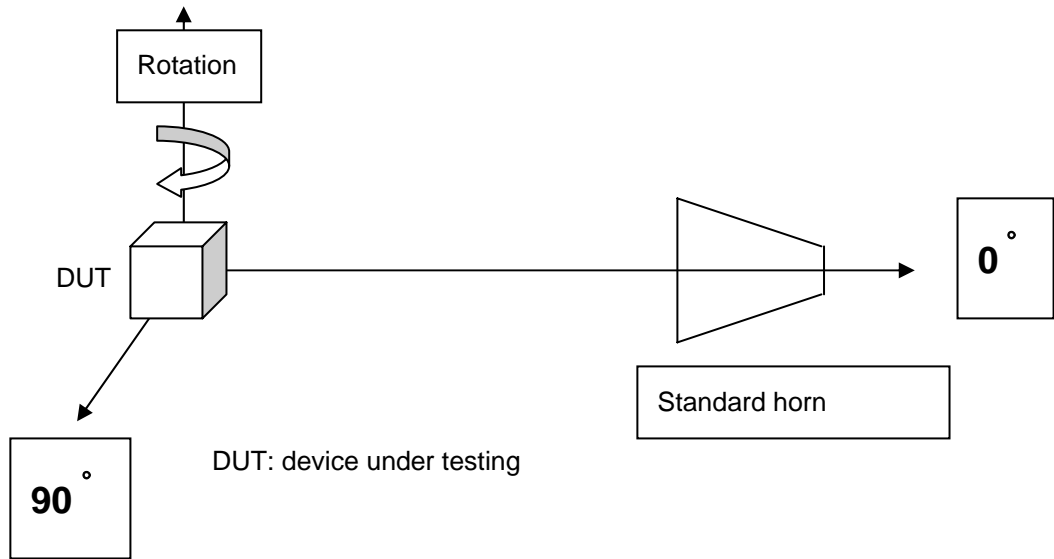- Item : Gain pattern

Fig.2 Quiet room

Rotation

DUT

0°

Standard horn

90°

DUT: device under testing

Fig.3 Schematic of measurement setup.

LNA:

a). Parameter Measurement

- Equipment : Network Analyzer (Agilent E5071B)(Fig.4)

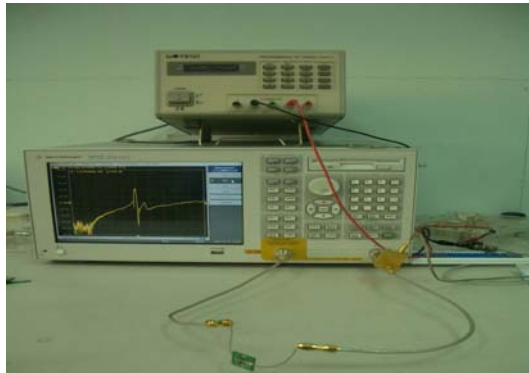- Item : S_{11}, S_{12}, S_{21}, S_{22}

Fig.4 Network Analyzer

b). Noise Figure Measurement

- Equipment : Noise meter (Agilent: E4407B-219)(Fig5)

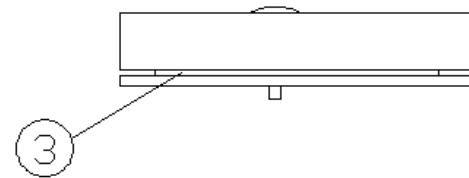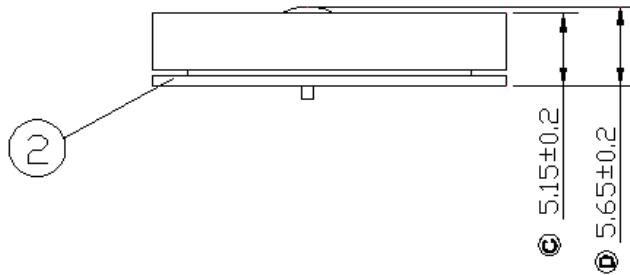- Environment: Shielding Room (Fig.6)
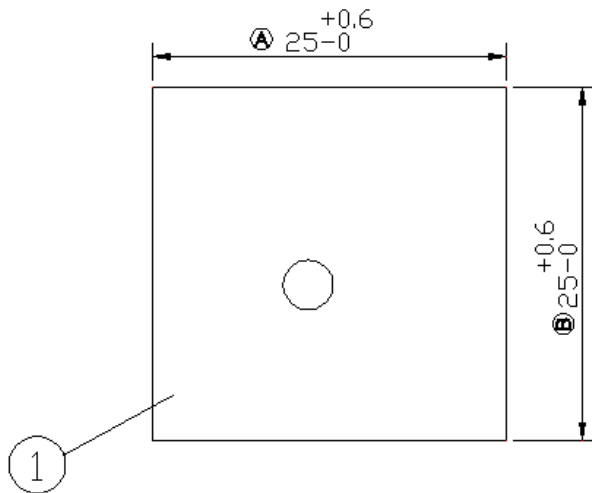
- Item :N.F. (Noise Figure)

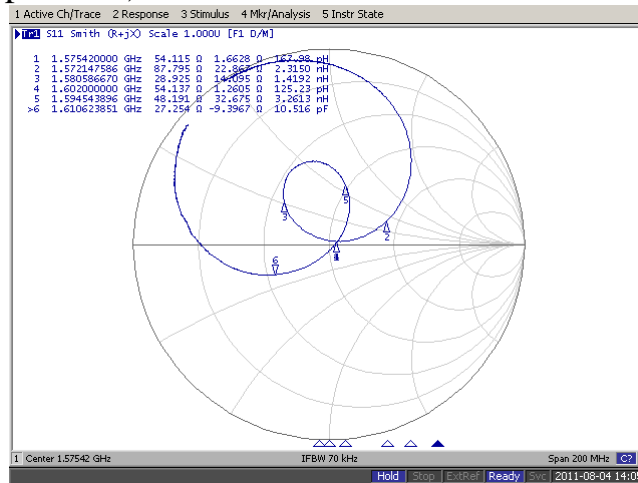Fig. 5 Noise Meter

Fig.6 Shielding Room

9. Antenna Dimensions:

unit:mm

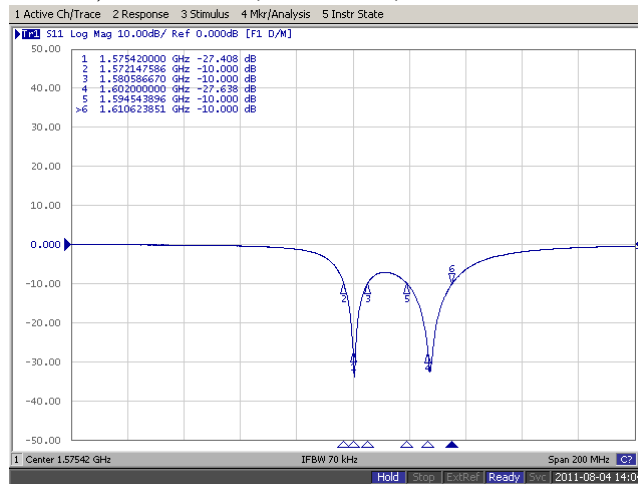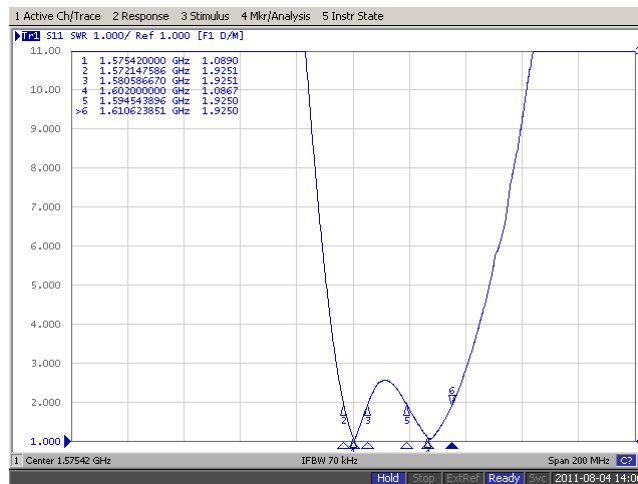| 3	twin adhesive	1
2	LNA(25mm*25mm*0.8mm)	1
1	254_patch(25mm*25mm*4mm)	1
Item	Description	Q'ty
Material		

9. Electrical Characteristics

Patch:

a).S_{11} Smith Chart (Impedance):

| 1 Active Ch/Trace | 2 Response | 3 Stimulus | 4 Mkr/Analysis | 5 Instr State |

S11 Smith (R+jX) Scale 1.000U [F1 D/M]

```
1  1.575420000 GHz   54.115 Ω   1.6628 Ω   163.98 pH
2  1.572147586 GHz   87.795 Ω   22.867 Ω   2.3150 nH
3  1.580586670 GHz   28.925 Ω   14.095 Ω   1.4192 nH
4  1.602000000 GHz   54.137 Ω   1.2605 Ω   125.23 pH
5  1.594543896 GHz   48.191 Ω   32.675 Ω   3.2613 nH
>6 1.610623851 GHz   27.254 Ω  -9.3967 Ω   10.516 pF
```

1 Center 1.57542 GHz   IFBW 70 kHz   Span 200 MHz   C?
Hold | Stop | ExtRef | Ready | Svc | 2011-08-04 14:05
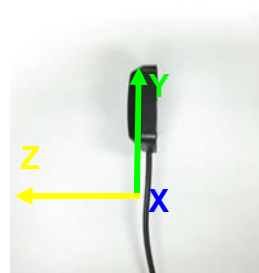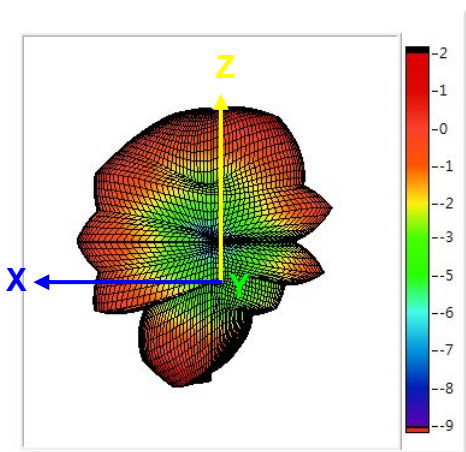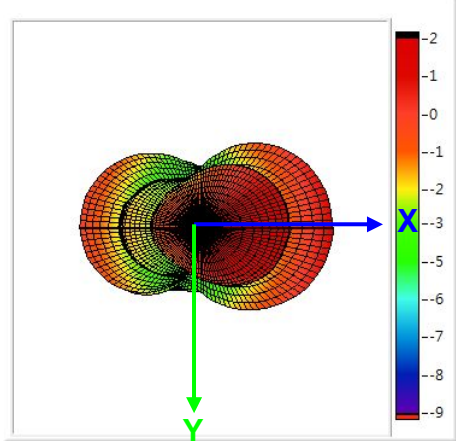
b).S_{11} Log Chart (Return loss): Bandwidth(S11<-10dB):

| 1 Active Ch/Trace | 2 Response | 3 Stimulus | 4 Mkr/Analysis | 5 Instr State |

S11 Log Mag 10.00dB/ Ref 0.000dB [F1 D/M]

```
1  1.575420000 GHz  -27.408 dB
2  1.572147586 GHz  -10.000 dB
3  1.580586670 GHz  -10.000 dB
4  1.602000000 GHz  -27.638 dB
5  1.594543896 GHz  -10.000 dB
>6 1.610623851 GHz  -10.000 dB
```

1 Center 1.57542 GHz   IFBW 70 kHz   Span 200 MHz   C?
Hold | Stop | ExtRef | Ready | Svc | 2011-08-04 14:04

c).S_{11} SWR(VSWR):

| 1 Active Ch/Trace | 2 Response | 3 Stimulus | 4 Mkr/Analysis | 5 Instr State |

S11 SWR 1.000/ Ref 1.000 [F1 D/M]

```
1  1.575420000 GHz  1.0890
2  1.572147586 GHz  1.9251
3  1.580586670 GHz  1.9251
4  1.602000000 GHz  1.0867
5  1.594543896 GHz  1.9250
>6 1.610623851 GHz  1.9250
```

1 Center 1.57542 GHz   IFBW 70 kHz   Span 200 MHz   C?
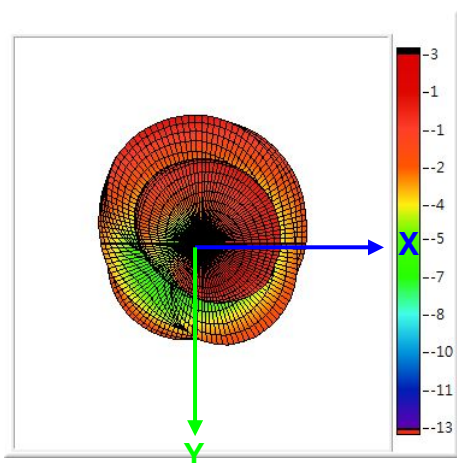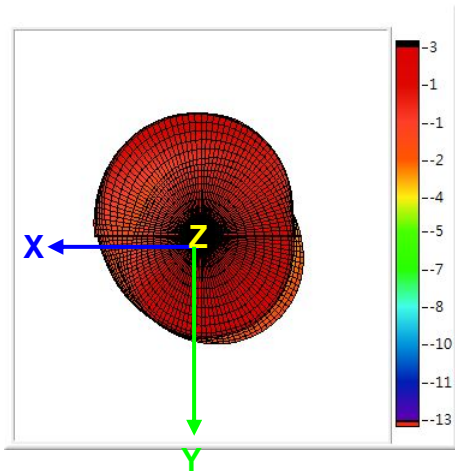Hold | Stop | ExtRef | Ready | Svc | 2011-08-04 14:06
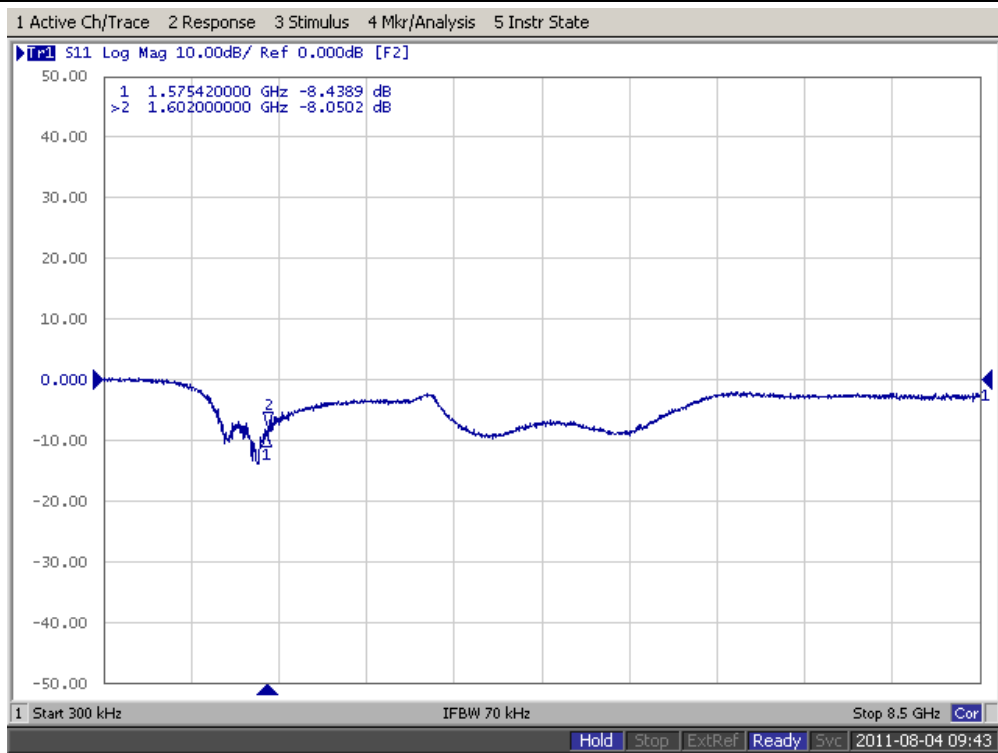
d)Three D Radiation Pattern(@1575.42MHz)
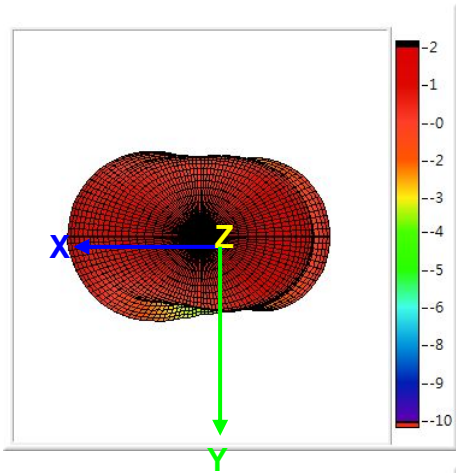
e)Three D Radiation Pattern(@1602MHz)
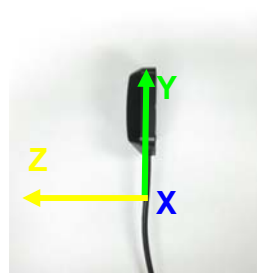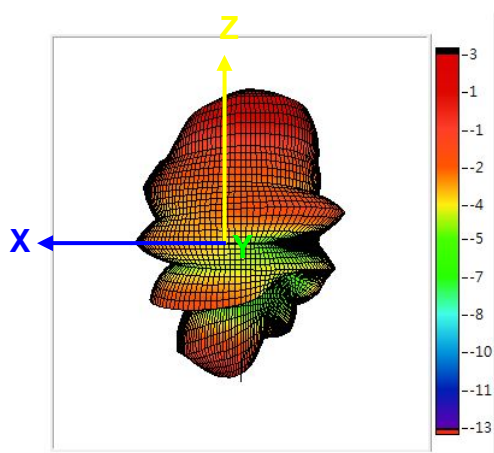
Low noise amplifier (LNA):

a).S11: (The input power of network analyzer is -40dBm)

Tr1 S11 Log Mag 10.00dB/ Ref 0.000dB [F2]

50.00

1   1.575420000 GHz -8.4389 dB
>2 1.602000000 GHz -8.0502 dB

40.00

30.00

20.00

10.00

0.000

-10.00

-20.00

-30.00

-40.00

-50.00

1 Start 300 kHz   IFBW 70 kHz   Stop 8.5 GHz Cor

Hold | Stop | ExtRef | Ready | Svc | 2011-08-04 09:43

b). S12: (The input power of network analyzer is -40dBm)

Tr2 S12 Log Mag 10.00dB/ Ref 0.000dB [F2]

50.00

1   1.575420000 GHz -38.349 dB
>2 1.602000000 GHz -41.377 dB

40.00

30.00

20.00

10.00

0.000

-10.00

-20.00

-30.00

-40.00

-50.00

1 Start 300 kHz   IFBW 70 kHz   Stop 8.5 GHz Cor

Hold | Stop | ExtRef | Ready | Svc | 2011-08-04 09:44

c).S21 (Gain): (The input power of network analyzer is -40dBm)

Tr3 S21 Log Mag 10.00dB/ Ref 0.000dB [F2]

```
50.00
        1  1.575420000 GHz  34.116 dB
       >2  1.602000000 GHz  33.712 dB
40.00

30.00

20.00

10.00

0.000

-10.00

-20.00

-30.00

-40.00

-50.00
```

1 Start 300 kHz   IFBW 70 kHz   Stop 8.5 GHz Cor

Hold   Stop   ExtRef   Ready   Svc   2011-08-04 09:44

d). S22: (The input power of network analyzer is -40dBm)

Tr4 S22 Log Mag 10.00dB/ Ref 0.000dB [F2]

```
50.00
        1  1.575420000 GHz  -17.440 dB
       >2  1.602000000 GHz  -18.630 dB
40.00

30.00

20.00

10.00

0.000

-10.00

-20.00

-30.00

-40.00

-50.00
```

1 Start 300 kHz   IFBW 70 kHz   Stop 8.5 GHz Cor

Hold   Stop   ExtRef   Ready   Svc   2011-08-04 09:44

e). N.F. (Noise Figure):