GaAs HEMT **CFH120**
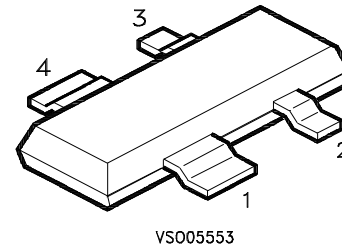
## Preliminary Datasheet

Features

- low noise pseudomorphic HEMT with high associated gain
- low cost plastic package
- for low noise front end amplifiers up to 20 GHz
- For DBS down converters
- Fully RF tested at 12 GHz

ESD: **E**lectro**s**tatic **d**ischarge sensitive device, observe handling precautions!

VS005553

1 = source
2 = drain
3 = source
4 = gate

| Type | Marking | Ordering Code (taped) | Package |
|------|---------|----------------------|---------|
| **CFH120-06** | **H5s** | **Q62705-K0671** | **MW-4** |
| **CFH120-08** | **H3s** | **Q62705-K0603** | **MW-4** |
| **CFH120-10** | **H4s** | **Q62705-K0604** | **MW-4** |

## Maximum Ratings

| Characteristics | Symbol | Max. Value | Unit |
|-----------------|--------|-----------|------|
| Drain-source voltage | $V_{DS}$ | 3.0 | V |
| Drain-gate voltage | $V_{DG}$ | 4.0 | V |
| Gate-source voltage | $V_{GS}$ | -2.0 | V |
| Drain current | $I_D$ | 40 | mA |
| Channel temperature | $T_{Ch}$ | 150 | °C |
| Operating temperature | $Top$ | -30 ... +85 | °C |
| Storage temperature range | $T_{stg}$ | -65 ... +150 | °C |
| Total power dissipation ($T_S \leq 51°C$) 1) | $P_{tot}$ | 180 | mW |
| **Thermal resistance** | | | |
| Channel-soldering point source | $R_{thChS}$ | 690 | K/W |

1) $T_S$: Temperature measured at soldering point

## Electrical Characteristics

unless otherwise specified:

$T_a$ = 25°C;

$V_{DD}$= 2V,

$f_{RF}$ = 12.0GHz;

$Z_S$= $\Gamma_{opt}$, $Z_L$ = $S_{22}$*;

| Characteristics | Symbol | min | typ | max | Unit |
|---|---|---|---|---|---|
| Drain-source saturation current<br>$V_{DS}$ = 2 V    $V_{GS}$ = 0 V | $I_{DSS}$ | 0 | 15 | 35 | mA |
| Pinch-off voltage<br>$V_{DS}$ = 2 V    $I_D$ = 120 µA | $V_{GS(P)}$ | -0.9 | -0.5 | 0.0 | V |
| Gate leakage current<br>$V_{DS}$ = 2 V    $I_D$ = 10 mA | $I_G$ | - | 0.05 | 2 | µA |
| Transconductance<br>$V_{DS}$ = 2 V    $I_D$ = 10 mA | $g_m$ | - | 60 | - | mS |
| Noise figure*<br>$V_{DS}$ = 2 V    $I_D$ = 10 mA    f = 12 GHz<br>CFH120-06<br>CFH120-08<br>CFH120-10 | F | -<br>-<br>- | 0.50<br>0.65<br>0.85 | 0.60<br>0.80<br>1.0 | dB |
| Associated gain*<br>$V_{DS}$ = 2 V    $I_D$ = 10 mA    f = 12 GHz<br>CFH120-06<br>CFH120-08<br>CFH120-10 | $G_a$ | 11.5<br>11.5<br>10.5 | 12.5<br>12.0<br>11.0 | -<br>-<br>- | dB |

* **IMPORTANT NOTE:**
  During production, the DC and RF parameters of all devices are tested according to the specification table above.
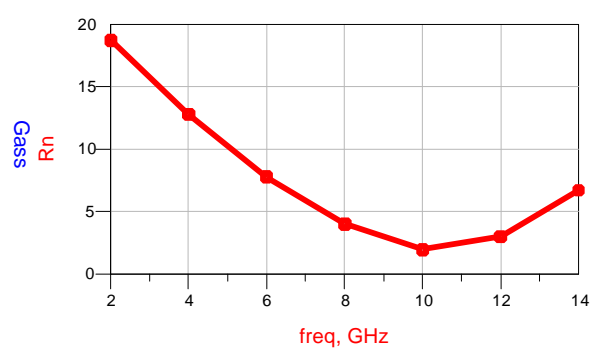
## Typical Measured Data CFH120-06

Common Source Noise – Parameters ($V_{DD}$=2V, $I_D$=10mA, $Z_0$=50$\Omega$)

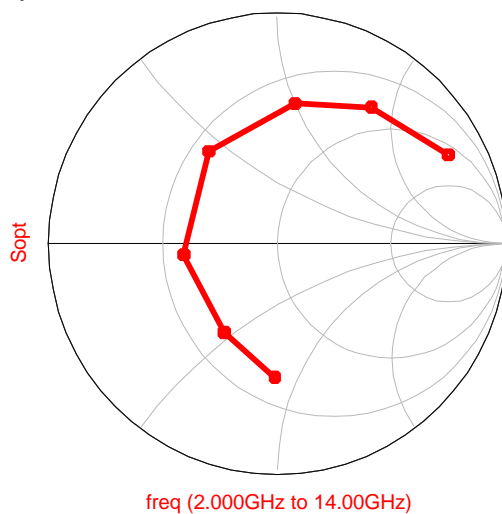| Freq [GHz] | $F_{min}$ [dB] | $G_a$ [dB] | $\underline{G}_{opt}$ | | $R_n/Z_0$ |
| --- | --- | --- | --- | --- | --- |
| | | | Mag | Phase | |
| 2.0 | 0.35 | 20.8 | 0.842 | 27.2 | 0.375 |
| 4.0 | 0.38 | 17.9 | 0.720 | 55.0 | 0.256 |
| 6.0 | 0.40 | 16.2 | 0.612 | 82.6 | 0.155 |
| 8.0 | 0.43 | 14.8 | 0.499 | 126.8 | 0.080 |
| 10.0 | 0.47 | 13.7 | 0.413 | -173.1 | 0.039 |
| 12.0 | 0.51 | 12.6 | 0.450 | -120.8 | 0.060 |
| 14.0 | 0.60 | 11.7 | 0.582 | -90.9 | 0.134 |

Noise figure/associated gain @ $\Gamma_{opt}$
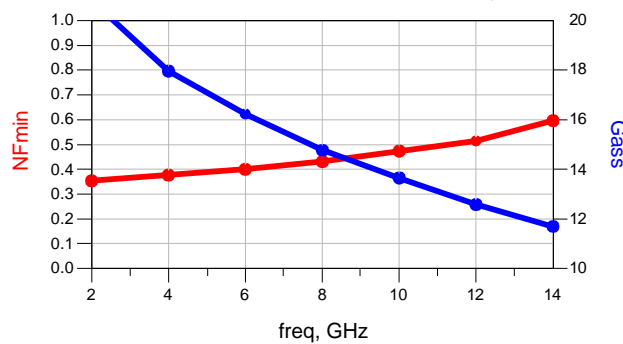


Equivalent noise resistance



Optimum source reflection coefficient



freq (2.000GHz to 14.00GHz)

Noise and gain circles at 12GHz



freq=12GHz
noise circles: 0.52dB, 0.55dB, 0.6dB
gain circles: 12dB, 13dB, 14dB

cir_pts (0.000 to 51.000)
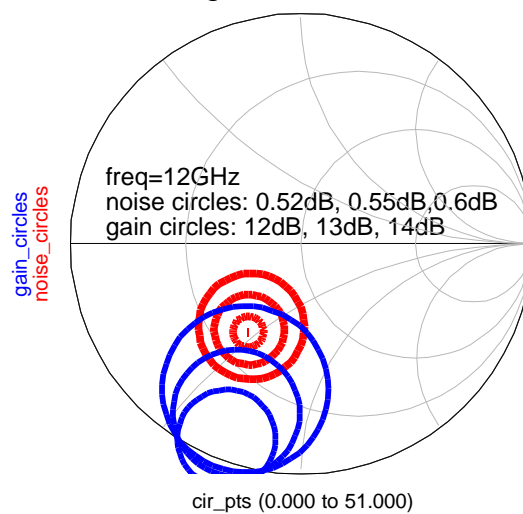
## Typical Measured Data <u>CFH120-06</u>

Common Source S – Parameters ($V_{DD}=2V$, $I_D=0mA$, $Z_0=50\Omega$)

| Freq | $S_{11}$ | | $S_{21}$ | | $S_{12}$ | | $S_{22}$ | |
|---|---|---|---|---|---|---|---|---|
| [GHz] | Mag | Phase | Mag | Phase | Mag | Phase | Mag | Phase |
| 1.0 | 0.955 | -12.5 | 0.047 | 34.4 | 0.044 | 40.1 | 0.963 | -10.9 |
| 1.5 | 0.949 | -16.6 | 0.055 | 38.5 | 0.052 | 42.7 | 0.964 | -15.0 |
| 2.0 | 0.943 | -22.5 | 0.068 | 41.0 | 0.067 | 43.7 | 0.964 | -20.7 |
| 2.5 | 0.943 | -28.0 | 0.083 | 40.2 | 0.082 | 42.3 | 0.962 | -26.1 |
| 3.0 | 0.941 | -33.6 | 0.098 | 37.5 | 0.097 | 39.5 | 0.958 | -31.5 |
| 3.5 | 0.939 | -39.7 | 0.114 | 34.3 | 0.112 | 35.6 | 0.952 | -37.0 |
| 4.0 | 0.934 | -46.1 | 0.130 | 30.1 | 0.128 | 32.1 | 0.947 | -42.6 |
| 4.5 | 0.928 | -52.3 | 0.145 | 25.7 | 0.144 | 27.3 | 0.945 | -48.3 |
| 5.0 | 0.921 | -58.0 | 0.161 | 20.9 | 0.161 | 22.1 | 0.948 | -54.4 |
| 5.5 | 0.915 | -63.5 | 0.178 | 16.1 | 0.178 | 16.7 | 0.943 | -60.5 |
| 6.0 | 0.910 | -69.3 | 0.198 | 10.9 | 0.195 | 11.4 | 0.932 | -66.8 |
| 6.5 | 0.903 | -75.7 | 0.218 | 5.0 | 0.215 | 5.6 | 0.919 | -73.4 |
| 7.0 | 0.891 | -83.1 | 0.238 | -1.8 | 0.236 | -0.5 | 0.910 | -80.3 |
| 7.5 | 0.876 | -91.3 | 0.255 | -9.3 | 0.257 | -7.9 | 0.907 | -87.6 |
| 8.0 | 0.866 | -99.3 | 0.272 | -16.7 | 0.277 | -15.5 | 0.904 | -95.6 |
| 8.5 | 0.854 | -107.3 | 0.292 | -24.4 | 0.295 | -23.8 | 0.891 | -104.2 |
| 9.0 | 0.850 | -115.5 | 0.312 | -32.5 | 0.311 | -32.1 | 0.872 | -112.8 |
| 9.5 | 0.844 | -124.3 | 0.329 | -41.0 | 0.325 | -40.3 | 0.858 | -121.5 |
| 10.0 | 0.831 | -134.1 | 0.344 | -50.4 | 0.342 | -48.9 | 0.851 | -130.7 |
| 10.5 | 0.814 | -144.6 | 0.354 | -60.1 | 0.357 | -58.5 | 0.849 | -140.6 |
| 11.0 | 0.798 | -155.2 | 0.361 | -70.2 | 0.367 | -69.5 | 0.844 | -151.9 |
| 11.5 | 0.794 | -166.2 | 0.367 | -80.4 | 0.369 | -80.6 | 0.833 | -163.9 |
| 12.0 | 0.802 | -177.7 | 0.367 | -91.2 | 0.364 | -91.4 | 0.830 | -176.0 |
| 12.5 | 0.811 | 170.4 | 0.360 | -102.7 | 0.353 | -101.7 | 0.837 | 172.6 |
| 13.0 | 0.817 | 159.1 | 0.342 | -113.6 | 0.341 | -111.6 | 0.856 | 161.9 |
| 13.5 | 0.815 | 149.0 | 0.321 | -123.3 | 0.327 | -121.6 | 0.874 | 151.5 |
| 14.0 | 0.817 | 139.5 | 0.303 | -132.4 | 0.309 | -131.8 | 0.878 | 140.9 |
| 14.5 | 0.829 | 129.4 | 0.288 | -141.7 | 0.288 | -141.9 | 0.875 | 130.6 |
| 15.0 | 0.848 | 117.9 | 0.273 | -152.1 | 0.266 | -151.3 | 0.878 | 120.5 |
| 15.5 | 0.856 | 106.0 | 0.251 | -163.1 | 0.248 | -160.9 | 0.905 | 110.3 |
| 16.0 | 0.856 | 94.9 | 0.223 | -173.7 | 0.227 | -171.2 | 0.913 | 99.8 |
| 16.5 | 0.855 | 85.8 | 0.194 | 177.4 | 0.202 | 178.6 | 0.920 | 89.9 |
| 17.0 | 0.869 | 79.0 | 0.172 | 170.7 | 0.174 | 169.7 | 0.931 | 81.4 |
| 17.5 | 0.894 | 72.3 | 0.155 | 163.5 | 0.151 | 163.0 | 0.933 | 74.8 |
| 18.0 | 0.920 | 67.3 | 0.145 | 157.4 | 0.137 | 159.2 | 0.938 | 70.9 |

## Typical Measured Data <u>CFH120-06</u>

Common Source S – Parameters ($V_{DD}$=2V, $I_D$=5mA, $Z_0$=50$\Omega$)

| Freq | $S_{11}$ | | $S_{21}$ | | $S_{12}$ | | $S_{22}$ | |
|------|------|-------|------|-------|------|-------|------|-------|
| [GHz] | Mag | Phase | Mag | Phase | Mag | Phase | Mag | Phase |
| 1.0 | 0.980 | -19.5 | 3.943 | 161.0 | 0.027 | 73.9 | 0.720 | -14.7 |
| 1.5 | 0.974 | -25.5 | 3.929 | 155.4 | 0.036 | 68.9 | 0.714 | -19.7 |
| 2.0 | 0.963 | -34.1 | 3.924 | 147.3 | 0.049 | 62.3 | 0.704 | -26.9 |
| 2.5 | 0.952 | -42.8 | 3.931 | 139.2 | 0.061 | 56.4 | 0.693 | -34.0 |
| 3.0 | 0.936 | -51.6 | 3.938 | 130.8 | 0.072 | 49.6 | 0.675 | -41.1 |
| 3.5 | 0.921 | -61.0 | 3.950 | 122.3 | 0.083 | 42.8 | 0.652 | -48.3 |
| 4.0 | 0.899 | -70.7 | 3.936 | 113.7 | 0.093 | 35.8 | 0.629 | -55.6 |
| 4.5 | 0.876 | -80.1 | 3.910 | 105.3 | 0.102 | 29.6 | 0.608 | -63.1 |
| 5.0 | 0.851 | -89.2 | 3.891 | 96.9 | 0.111 | 22.5 | 0.583 | -71.1 |
| 5.5 | 0.827 | -98.4 | 3.876 | 88.6 | 0.120 | 15.8 | 0.554 | -79.0 |
| 6.0 | 0.800 | -108.5 | 3.886 | 80.0 | 0.126 | 8.9 | 0.518 | -87.6 |
| 6.5 | 0.768 | -119.8 | 3.871 | 71.0 | 0.133 | 2.0 | 0.480 | -96.9 |
| 7.0 | 0.735 | -132.0 | 3.814 | 61.9 | 0.139 | -5.2 | 0.444 | -106.9 |
| 7.5 | 0.701 | -144.3 | 3.715 | 52.7 | 0.143 | -12.4 | 0.407 | -117.4 |
| 8.0 | 0.677 | -156.2 | 3.621 | 43.8 | 0.146 | -19.9 | 0.373 | -128.6 |
| 8.5 | 0.657 | -168.3 | 3.542 | 34.8 | 0.146 | -26.9 | 0.340 | -140.5 |
| 9.0 | 0.642 | 179.1 | 3.476 | 25.5 | 0.146 | -34.0 | 0.311 | -153.4 |
| 9.5 | 0.625 | 166.5 | 3.360 | 16.4 | 0.144 | -40.2 | 0.289 | -167.1 |
| 10.0 | 0.610 | 153.9 | 3.225 | 7.6 | 0.140 | -46.3 | 0.275 | 178.3 |
| 10.5 | 0.606 | 141.9 | 3.090 | -0.6 | 0.137 | -52.3 | 0.268 | 163.3 |
| 11.0 | 0.611 | 130.6 | 2.978 | -8.7 | 0.132 | -58.5 | 0.267 | 148.0 |
| 11.5 | 0.623 | 119.7 | 2.852 | -17.0 | 0.126 | -64.4 | 0.276 | 133.3 |
| 12.0 | 0.633 | 109.5 | 2.713 | -25.4 | 0.120 | -69.1 | 0.296 | 120.9 |
| 12.5 | 0.640 | 100.7 | 2.558 | -33.2 | 0.114 | -73.4 | 0.322 | 111.9 |
| 13.0 | 0.642 | 93.3 | 2.410 | -40.1 | 0.109 | -77.2 | 0.346 | 105.2 |
| 13.5 | 0.646 | 86.8 | 2.300 | -46.6 | 0.105 | -81.2 | 0.365 | 98.8 |
| 14.0 | 0.658 | 79.8 | 2.220 | -53.3 | 0.100 | -85.5 | 0.379 | 91.8 |
| 14.5 | 0.676 | 71.8 | 2.152 | -60.6 | 0.095 | -89.4 | 0.395 | 84.3 |
| 15.0 | 0.692 | 63.4 | 2.062 | -68.4 | 0.090 | -92.3 | 0.421 | 76.7 |
| 15.5 | 0.703 | 55.8 | 1.942 | -76.1 | 0.085 | -95.5 | 0.455 | 69.5 |
| 16.0 | 0.711 | 49.9 | 1.806 | -82.6 | 0.080 | -99.4 | 0.489 | 63.2 |
| 16.5 | 0.725 | 45.5 | 1.697 | -88.1 | 0.075 | -102.3 | 0.513 | 58.1 |
| 17.0 | 0.746 | 42.2 | 1.640 | -93.2 | 0.070 | -103.4 | 0.524 | 53.9 |
| 17.5 | 0.770 | 37.8 | 1.603 | -99.3 | 0.066 | -103.8 | 0.537 | 50.0 |
| 18.0 | 0.787 | 34.0 | 1.577 | -104.1 | 0.065 | -104.4 | 0.553 | 47.2 |

## Typical Measured Data <u>CFH120-06</u>

Common Source S – Parameters ($V_{DD}$=2V, $I_D$=10mA, $Z_0$=50$\Omega$)

| Freq | $S_{11}$ | | $S_{21}$ | | $S_{12}$ | | $S_{22}$ | |
|------|-----|-------|-----|-------|-----|-------|-----|-------|
| [GHz] | Mag | Phase | Mag | Phase | Mag | Phase | Mag | Phase |
| 1.0 | 0.981 | -21.3 | 5.529 | 160.3 | 0.028 | 75.8 | 0.666 | -15.8 |
| 1.5 | 0.966 | -27.8 | 5.439 | 153.8 | 0.035 | 68.8 | 0.654 | -21.1 |
| 2.0 | 0.950 | -37.2 | 5.394 | 145.0 | 0.045 | 62.0 | 0.639 | -28.9 |
| 2.5 | 0.935 | -46.5 | 5.363 | 136.4 | 0.055 | 54.8 | 0.622 | -36.4 |
| 3.0 | 0.912 | -56.0 | 5.318 | 127.7 | 0.066 | 48.4 | 0.600 | -44.0 |
| 3.5 | 0.891 | -66.1 | 5.289 | 118.7 | 0.075 | 42.1 | 0.575 | -51.5 |
| 4.0 | 0.864 | -76.5 | 5.233 | 109.6 | 0.084 | 35.5 | 0.548 | -59.4 |
| 4.5 | 0.835 | -86.3 | 5.135 | 101.0 | 0.092 | 28.7 | 0.520 | -67.3 |
| 5.0 | 0.806 | -96.0 | 5.055 | 92.6 | 0.100 | 22.0 | 0.492 | -75.3 |
| 5.5 | 0.775 | -106.0 | 4.971 | 84.0 | 0.107 | 15.4 | 0.460 | -83.5 |
| 6.0 | 0.744 | -116.7 | 4.926 | 75.3 | 0.112 | 8.7 | 0.424 | -92.6 |
| 6.5 | 0.709 | -128.3 | 4.838 | 66.3 | 0.117 | 2.6 | 0.388 | -102.7 |
| 7.0 | 0.676 | -140.8 | 4.714 | 57.3 | 0.121 | -3.8 | 0.350 | -113.8 |
| 7.5 | 0.647 | -153.3 | 4.541 | 48.3 | 0.123 | -10.3 | 0.314 | -125.5 |
| 8.0 | 0.625 | -165.5 | 4.385 | 39.8 | 0.125 | -16.7 | 0.281 | -138.2 |
| 8.5 | 0.607 | -177.9 | 4.245 | 31.1 | 0.125 | -23.0 | 0.253 | -152.0 |
| 9.0 | 0.593 | 169.4 | 4.120 | 22.2 | 0.125 | -29.1 | 0.233 | -166.9 |
| 9.5 | 0.583 | 156.7 | 3.949 | 13.7 | 0.124 | -34.6 | 0.222 | 176.9 |
| 10.0 | 0.577 | 144.6 | 3.765 | 5.5 | 0.123 | -40.1 | 0.221 | 160.2 |
| 10.5 | 0.579 | 133.1 | 3.594 | -2.3 | 0.121 | -45.2 | 0.226 | 144.4 |
| 11.0 | 0.590 | 122.2 | 3.445 | -10.1 | 0.117 | -50.5 | 0.238 | 128.9 |
| 11.5 | 0.605 | 111.9 | 3.297 | -18.1 | 0.113 | -55.6 | 0.258 | 115.4 |
| 12.0 | 0.620 | 102.4 | 3.135 | -25.8 | 0.109 | -59.7 | 0.287 | 104.7 |
| 12.5 | 0.630 | 94.3 | 2.949 | -32.8 | 0.104 | -63.2 | 0.316 | 97.3 |
| 13.0 | 0.634 | 87.5 | 2.782 | -39.0 | 0.102 | -66.7 | 0.340 | 91.7 |
| 13.5 | 0.640 | 81.2 | 2.665 | -45.2 | 0.100 | -70.3 | 0.356 | 86.2 |
| 14.0 | 0.652 | 74.4 | 2.582 | -51.6 | 0.096 | -73.7 | 0.370 | 80.0 |
| 14.5 | 0.672 | 66.6 | 2.494 | -58.8 | 0.093 | -76.5 | 0.388 | 73.4 |
| 15.0 | 0.691 | 58.4 | 2.382 | -66.4 | 0.089 | -79.6 | 0.416 | 66.6 |
| 15.5 | 0.703 | 51.3 | 2.235 | -73.4 | 0.087 | -83.5 | 0.452 | 60.2 |
| 16.0 | 0.711 | 45.8 | 2.085 | -79.6 | 0.083 | -87.4 | 0.484 | 54.6 |
| 16.5 | 0.723 | 42.1 | 1.972 | -84.6 | 0.079 | -90.0 | 0.504 | 50.1 |
| 17.0 | 0.745 | 39.0 | 1.918 | -89.7 | 0.075 | -92.0 | 0.512 | 46.5 |
| 17.5 | 0.768 | 34.6 | 1.880 | -95.6 | 0.072 | -93.2 | 0.523 | 42.8 |
| 18.0 | 0.783 | 31.0 | 1.861 | -100.4 | 0.071 | -94.1 | 0.537 | 39.9 |

## Typical Measured Data <u>CFH120-06</u>

Common Source S – Parameters ($V_{DD}=2V$, $I_D=15mA$, $Z_0=50\Omega$)

| Freq | $S_{11}$ | | $S_{21}$ | | $S_{12}$ | | $S_{22}$ | |
|---|---|---|---|---|---|---|---|---|
| [GHz] | Mag | Phase | Mag | Phase | Mag | Phase | Mag | Phase |
| 1.0 | 0.979 | -21.9 | 6.294 | 159.2 | 0.026 | 72.8 | 0.648 | -16.4 |
| 1.5 | 0.965 | -28.8 | 6.231 | 152.7 | 0.033 | 68.1 | 0.636 | -21.9 |
| 2.0 | 0.946 | -38.5 | 6.155 | 143.6 | 0.043 | 61.5 | 0.619 | -29.7 |
| 2.5 | 0.927 | -48.2 | 6.097 | 134.8 | 0.053 | 54.8 | 0.599 | -37.6 |
| 3.0 | 0.901 | -57.9 | 6.034 | 125.9 | 0.062 | 47.4 | 0.576 | -45.3 |
| 3.5 | 0.877 | -68.2 | 5.990 | 116.8 | 0.072 | 41.2 | 0.547 | -53.2 |
| 4.0 | 0.848 | -78.7 | 5.892 | 107.9 | 0.080 | 34.4 | 0.518 | -61.2 |
| 4.5 | 0.813 | -88.8 | 5.745 | 99.1 | 0.087 | 28.0 | 0.490 | -69.0 |
| 5.0 | 0.782 | -98.7 | 5.616 | 90.5 | 0.094 | 21.6 | 0.460 | -77.3 |
| 5.5 | 0.748 | -108.8 | 5.506 | 81.9 | 0.100 | 15.9 | 0.426 | -85.7 |
| 6.0 | 0.713 | -119.6 | 5.425 | 73.3 | 0.106 | 9.7 | 0.389 | -94.9 |
| 6.5 | 0.677 | -131.5 | 5.309 | 64.5 | 0.111 | 3.4 | 0.352 | -105.4 |
| 7.0 | 0.645 | -144.1 | 5.147 | 55.5 | 0.114 | -2.9 | 0.316 | -117.0 |
| 7.5 | 0.616 | -157.0 | 4.951 | 46.6 | 0.116 | -8.9 | 0.282 | -129.4 |
| 8.0 | 0.599 | -169.3 | 4.762 | 38.3 | 0.118 | -15.1 | 0.251 | -142.8 |
| 8.5 | 0.585 | 178.6 | 4.590 | 29.8 | 0.118 | -20.9 | 0.227 | -157.5 |
| 9.0 | 0.574 | 166.1 | 4.438 | 21.2 | 0.118 | -26.5 | 0.211 | -173.8 |
| 9.5 | 0.564 | 153.7 | 4.248 | 12.8 | 0.117 | -31.8 | 0.205 | 169.3 |
| 10.0 | 0.559 | 141.5 | 4.039 | 5.0 | 0.116 | -37.0 | 0.208 | 152.2 |
| 10.5 | 0.566 | 130.1 | 3.849 | -2.7 | 0.114 | -41.6 | 0.219 | 136.3 |
| 11.0 | 0.577 | 119.7 | 3.678 | -10.3 | 0.112 | -47.0 | 0.237 | 121.6 |
| 11.5 | 0.595 | 109.3 | 3.516 | -18.0 | 0.109 | -51.8 | 0.261 | 109.0 |
| 12.0 | 0.613 | 100.0 | 3.333 | -25.5 | 0.105 | -56.0 | 0.291 | 99.3 |
| 12.5 | 0.623 | 92.0 | 3.129 | -32.5 | 0.102 | -59.3 | 0.320 | 92.5 |
| 13.0 | 0.628 | 85.4 | 2.957 | -38.7 | 0.101 | -62.5 | 0.343 | 87.3 |
| 13.5 | 0.634 | 79.5 | 2.841 | -44.7 | 0.098 | -65.8 | 0.360 | 82.0 |
| 14.0 | 0.647 | 72.8 | 2.744 | -51.0 | 0.095 | -69.4 | 0.374 | 76.1 |
| 14.5 | 0.666 | 65.2 | 2.662 | -57.8 | 0.093 | -72.6 | 0.393 | 69.7 |
| 15.0 | 0.687 | 57.2 | 2.552 | -65.3 | 0.091 | -75.6 | 0.421 | 63.1 |
| 15.5 | 0.698 | 50.2 | 2.402 | -72.1 | 0.088 | -79.1 | 0.456 | 57.1 |
| 16.0 | 0.707 | 44.9 | 2.249 | -78.1 | 0.085 | -83.1 | 0.488 | 51.6 |
| 16.5 | 0.720 | 41.3 | 2.126 | -83.0 | 0.081 | -86.2 | 0.507 | 47.3 |
| 17.0 | 0.743 | 38.0 | 2.061 | -87.9 | 0.078 | -88.1 | 0.514 | 43.8 |
| 17.5 | 0.765 | 33.7 | 2.024 | -93.7 | 0.074 | -89.2 | 0.524 | 40.2 |
| 18.0 | 0.779 | 30.1 | 2.004 | -98.5 | 0.073 | -89.8 | 0.536 | 37.4 |

## Typical Measured Data <u>CFH120-06</u>

Common Source S – Parameters ($V_{DD}$=2V, $I_D$=20mA, $Z_0$=50$\Omega$)

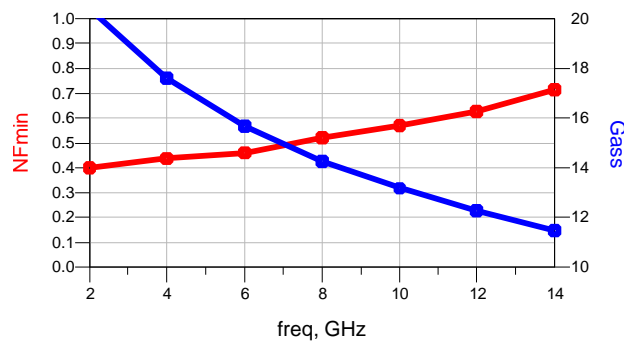| Freq | $S_{11}$ | | $S_{21}$ | | $S_{12}$ | | $S_{22}$ | |
|------|-----|-------|-----|-------|-----|-------|-----|-------|
| [GHz] | Mag | Phase | Mag | Phase | Mag | Phase | Mag | Phase |
| 1.0 | 0.975 | -22.4 | 6.940 | 158.6 | 0.025 | 72.4 | 0.641 | -16.9 |
| 1.5 | 0.957 | -29.3 | 6.842 | 152.2 | 0.033 | 68.0 | 0.628 | -22.5 |
| 2.0 | 0.937 | -39.1 | 6.751 | 142.9 | 0.043 | 62.3 | 0.611 | -30.5 |
| 2.5 | 0.918 | -49.0 | 6.673 | 133.7 | 0.053 | 55.0 | 0.592 | -38.6 |
| 3.0 | 0.892 | -59.0 | 6.588 | 124.8 | 0.063 | 48.1 | 0.566 | -46.5 |
| 3.5 | 0.863 | -69.6 | 6.506 | 115.7 | 0.071 | 41.7 | 0.538 | -54.5 |
| 4.0 | 0.831 | -80.1 | 6.377 | 106.6 | 0.079 | 35.1 | 0.507 | -62.4 |
| 4.5 | 0.797 | -90.3 | 6.208 | 97.9 | 0.086 | 28.4 | 0.477 | -70.5 |
| 5.0 | 0.764 | -100.1 | 6.052 | 89.4 | 0.092 | 22.0 | 0.446 | -78.9 |
| 5.5 | 0.731 | -110.4 | 5.923 | 80.8 | 0.098 | 16.1 | 0.411 | -87.3 |
| 6.0 | 0.696 | -121.2 | 5.798 | 72.2 | 0.102 | 10.1 | 0.374 | -96.7 |
| 6.5 | 0.658 | -133.2 | 5.650 | 63.5 | 0.107 | 4.3 | 0.336 | -107.3 |
| 7.0 | 0.625 | -145.9 | 5.454 | 54.7 | 0.110 | -1.8 | 0.299 | -119.3 |
| 7.5 | 0.599 | -158.6 | 5.236 | 45.9 | 0.112 | -8.3 | 0.267 | -132.1 |
| 8.0 | 0.581 | -171.1 | 5.026 | 37.6 | 0.114 | -14.0 | 0.239 | -145.9 |
| 8.5 | 0.568 | 176.8 | 4.834 | 29.2 | 0.115 | -19.4 | 0.217 | -160.8 |
| 9.0 | 0.557 | 164.2 | 4.671 | 20.6 | 0.115 | -24.6 | 0.203 | -177.4 |
| 9.5 | 0.548 | 151.9 | 4.470 | 12.4 | 0.114 | -29.7 | 0.200 | 165.3 |
| 10.0 | 0.545 | 139.9 | 4.242 | 4.8 | 0.113 | -34.9 | 0.206 | 148.2 |
| 10.5 | 0.553 | 128.6 | 4.036 | -2.7 | 0.111 | -39.9 | 0.219 | 132.4 |
| 11.0 | 0.568 | 118.1 | 3.867 | -10.0 | 0.109 | -44.8 | 0.238 | 118.3 |
| 11.5 | 0.586 | 108.0 | 3.701 | -17.6 | 0.106 | -49.2 | 0.264 | 106.3 |
| 12.0 | 0.602 | 98.8 | 3.509 | -25.1 | 0.104 | -52.8 | 0.295 | 96.7 |
| 12.5 | 0.613 | 91.0 | 3.299 | -32.1 | 0.101 | -56.4 | 0.324 | 90.2 |
| 13.0 | 0.618 | 84.6 | 3.125 | -38.2 | 0.099 | -59.6 | 0.347 | 85.1 |
| 13.5 | 0.625 | 78.7 | 2.994 | -43.9 | 0.097 | -62.6 | 0.364 | 80.0 |
| 14.0 | 0.640 | 71.9 | 2.891 | -50.2 | 0.096 | -66.4 | 0.378 | 74.3 |
| 14.5 | 0.660 | 64.5 | 2.800 | -57.0 | 0.093 | -70.0 | 0.396 | 68.0 |
| 15.0 | 0.679 | 56.7 | 2.690 | -64.3 | 0.091 | -73.5 | 0.424 | 61.5 |
| 15.5 | 0.690 | 49.8 | 2.533 | -71.2 | 0.089 | -76.9 | 0.460 | 55.4 |
| 16.0 | 0.699 | 44.5 | 2.367 | -77.0 | 0.086 | -80.5 | 0.491 | 50.0 |
| 16.5 | 0.714 | 40.8 | 2.242 | -81.9 | 0.082 | -84.1 | 0.510 | 45.9 |
| 17.0 | 0.737 | 37.7 | 2.184 | -86.9 | 0.077 | -85.9 | 0.515 | 42.5 |
| 17.5 | 0.759 | 33.4 | 2.148 | -92.7 | 0.075 | -87.4 | 0.525 | 38.9 |
| 18.0 | 0.775 | 29.9 | 2.126 | -97.3 | 0.074 | -88.6 | 0.538 | 36.2 |

## Typical Measured Data <u>CFH120-08</u>

Common Source Noise – Parameters ($V_{DD}$=2V, $I_D$=10mA, $Z_0$=50$\Omega$)

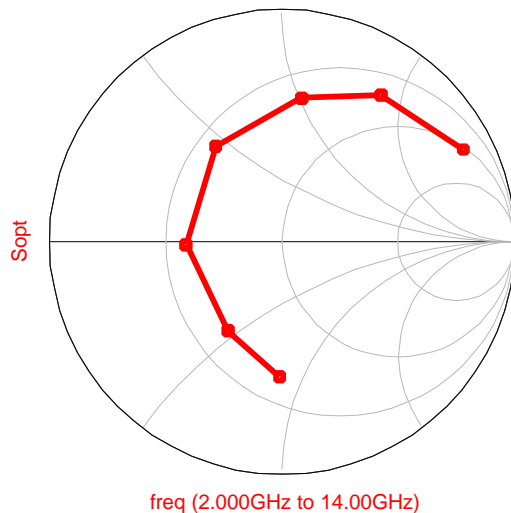| Freq [GHz] | $F_{min}$ [dB] | $G_a$ [dB] | $\underline{G}_{opt}$ Mag | Phase | $R_n/Z_0$ |
|---|---|---|---|---|---|
| 2.0 | 0.40 | 20.4 | 0.875 | 26.8 | 0.399 |
| 4.0 | 0.44 | 17.6 | 0.761 | 56.0 | 0.283 |
| 6.0 | 0.46 | 15.7 | 0.623 | 82.3 | 0.176 |
| 8.0 | 0.52 | 14.3 | 0.499 | 124.8 | 0.095 |
| 10.0 | 0.57 | 13.2 | 0.413 | -178.1 | 0.040 |
| 12.0 | 0.63 | 12.3 | 0.450 | -120.8 | 0.042 |
| 14.0 | 0.71 | 11.5 | 0.582 | -90.9 | 0.099 |

Noise figure/associated gain @ $\Gamma_{opt}$
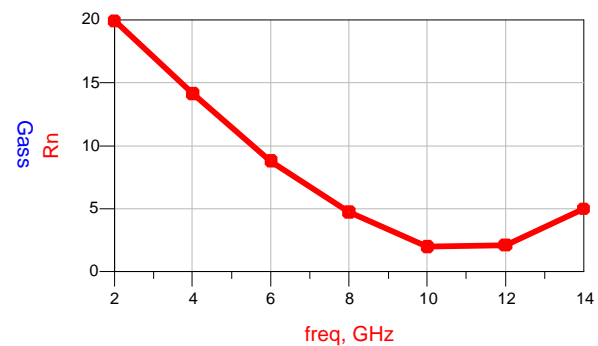


Equivalent noise resistance



Optimum source reflection coefficient



freq (2.000GHz to 14.00GHz)

Noise and gain circles at 12GHz



freq=12GHz
noise circles: 0.65dB, 0.7dB, 0.75dB, 0.8dB
gain circles: 11.5dB, 12dB, 13dB, 14dB

cir_pts (0.000 to 51.000)
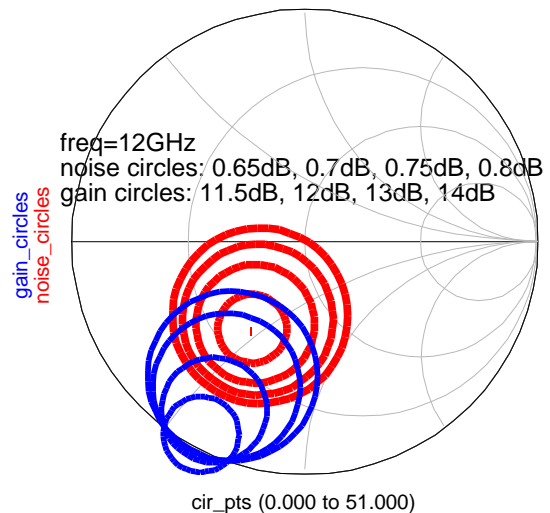
## Typical Measured Data <u>CFH120-08</u>

Common Source S – Parameters ($V_{DD}$=2V, $I_D$=0mA, $Z_0$=50$\Omega$)

| Freq | $S_{11}$ | | $S_{21}$ | | $S_{12}$ | | $S_{22}$ | |
|---|---|---|---|---|---|---|---|---|
| [GHz] | Mag | Phase | Mag | Phase | Mag | Phase | Mag | Phase |
| 1.0 | 0.999 | -13.6 | 0.041 | 102.3 | 0.036 | 74.7 | 0.989 | -11.4 |
| 1.5 | 0.993 | -18.1 | 0.051 | 93.6 | 0.047 | 70.1 | 0.988 | -15.6 |
| 2.0 | 0.986 | -24.4 | 0.066 | 83.1 | 0.062 | 65.4 | 0.988 | -21.4 |
| 2.5 | 0.985 | -30.4 | 0.082 | 73.9 | 0.079 | 60.0 | 0.987 | -27.1 |
| 3.0 | 0.977 | -36.4 | 0.098 | 65.6 | 0.095 | 54.2 | 0.981 | -32.9 |
| 3.5 | 0.980 | -43.1 | 0.114 | 58.0 | 0.111 | 47.8 | 0.977 | -38.7 |
| 4.0 | 0.979 | -49.9 | 0.130 | 50.3 | 0.128 | 42.0 | 0.973 | -44.4 |
| 4.5 | 0.972 | -56.4 | 0.146 | 43.2 | 0.145 | 35.6 | 0.973 | -50.3 |
| 5.0 | 0.963 | -62.6 | 0.163 | 36.6 | 0.162 | 29.0 | 0.973 | -56.8 |
| 5.5 | 0.958 | -68.8 | 0.181 | 30.0 | 0.179 | 22.3 | 0.966 | -63.3 |
| 6.0 | 0.957 | -75.1 | 0.200 | 23.0 | 0.195 | 16.0 | 0.956 | -70.0 |
| 6.5 | 0.950 | -82.2 | 0.220 | 15.8 | 0.213 | 9.4 | 0.945 | -76.7 |
| 7.0 | 0.938 | -90.3 | 0.239 | 7.7 | 0.233 | 2.4 | 0.938 | -83.7 |
| 7.5 | 0.923 | -98.9 | 0.256 | -1.0 | 0.252 | -5.8 | 0.937 | -91.7 |
| 8.0 | 0.913 | -107.3 | 0.271 | -9.3 | 0.271 | -14.7 | 0.933 | -100.5 |
| 8.5 | 0.907 | -115.7 | 0.286 | -17.8 | 0.286 | -23.9 | 0.924 | -109.5 |
| 9.0 | 0.906 | -124.3 | 0.304 | -26.8 | 0.299 | -32.6 | 0.905 | -118.5 |
| 9.5 | 0.901 | -133.7 | 0.319 | -36.2 | 0.309 | -41.3 | 0.891 | -127.5 |
| 10.0 | 0.888 | -143.9 | 0.328 | -46.0 | 0.321 | -50.5 | 0.888 | -137.4 |
| 10.5 | 0.873 | -154.6 | 0.333 | -56.4 | 0.331 | -60.7 | 0.890 | -148.1 |
| 11.0 | 0.861 | -165.3 | 0.333 | -67.0 | 0.334 | -72.2 | 0.886 | -160.2 |
| 11.5 | 0.862 | -176.1 | 0.333 | -77.8 | 0.328 | -83.8 | 0.875 | -172.6 |
| 12.0 | 0.872 | 172.7 | 0.327 | -89.0 | 0.316 | -94.8 | 0.871 | 175.2 |
| 12.5 | 0.884 | 161.3 | 0.311 | -100.3 | 0.300 | -105.2 | 0.879 | 163.7 |
| 13.0 | 0.884 | 150.7 | 0.288 | -110.9 | 0.281 | -115.3 | 0.897 | 152.8 |
| 13.5 | 0.877 | 141.4 | 0.265 | -120.1 | 0.263 | -125.2 | 0.913 | 142.2 |
| 14.0 | 0.877 | 132.6 | 0.245 | -128.8 | 0.243 | -135.3 | 0.913 | 131.9 |
| 14.5 | 0.888 | 123.0 | 0.228 | -137.6 | 0.220 | -144.7 | 0.909 | 121.8 |
| 15.0 | 0.902 | 112.1 | 0.210 | -147.4 | 0.198 | -153.6 | 0.914 | 111.9 |
| 15.5 | 0.904 | 100.6 | 0.186 | -158.0 | 0.179 | -162.9 | 0.929 | 101.8 |
| 16.0 | 0.899 | 90.0 | 0.160 | -167.8 | 0.159 | -172.8 | 0.936 | 91.4 |
| 16.5 | 0.894 | 81.8 | 0.135 | -175.1 | 0.136 | 177.5 | 0.943 | 81.8 |
| 17.0 | 0.902 | 75.4 | 0.116 | 179.2 | 0.113 | 169.7 | 0.950 | 74.0 |
| 17.5 | 0.926 | 68.8 | 0.101 | 173.3 | 0.093 | 164.1 | 0.951 | 67.9 |
| 18.0 | 0.949 | 63.7 | 0.093 | 168.1 | 0.082 | 160.7 | 0.961 | 64.3 |

## Typical Measured Data <u>CFH120-08</u>

Common Source S – Parameters ($V_{DD}$=2V, $I_D$=5mA, $Z_0$=50Ω)

| Freq [GHz] | $S_{11}$ Mag | $S_{11}$ Phase | $S_{21}$ Mag | $S_{21}$ Phase | $S_{12}$ Mag | $S_{12}$ Phase | $S_{22}$ Mag | $S_{22}$ Phase |
|---|---|---|---|---|---|---|---|---|
| 1.0 | 0.984 | -19.7 | 3.859 | 161.1 | 0.029 | 75.6 | 0.719 | -14.5 |
| 1.5 | 0.974 | -25.8 | 3.845 | 155.1 | 0.037 | 69.2 | 0.711 | -19.6 |
| 2.0 | 0.962 | -34.6 | 3.836 | 146.7 | 0.048 | 62.1 | 0.699 | -26.9 |
| 2.5 | 0.949 | -43.4 | 3.836 | 138.5 | 0.060 | 55.8 | 0.683 | -34.3 |
| 3.0 | 0.934 | -52.3 | 3.825 | 130.2 | 0.070 | 49.1 | 0.663 | -41.4 |
| 3.5 | 0.923 | -61.5 | 3.829 | 121.5 | 0.081 | 42.6 | 0.642 | -48.6 |
| 4.0 | 0.904 | -70.9 | 3.817 | 113.0 | 0.091 | 35.9 | 0.619 | -55.7 |
| 4.5 | 0.883 | -80.0 | 3.773 | 104.5 | 0.100 | 29.3 | 0.595 | -63.1 |
| 5.0 | 0.858 | -88.7 | 3.747 | 96.2 | 0.109 | 22.2 | 0.570 | -71.1 |
| 5.5 | 0.833 | -97.8 | 3.740 | 88.0 | 0.117 | 15.8 | 0.539 | -79.0 |
| 6.0 | 0.807 | -107.5 | 3.742 | 79.4 | 0.124 | 9.3 | 0.504 | -87.4 |
| 6.5 | 0.777 | -118.1 | 3.725 | 70.6 | 0.131 | 2.7 | 0.466 | -96.5 |
| 7.0 | 0.746 | -129.5 | 3.663 | 61.4 | 0.136 | -4.4 | 0.430 | -106.6 |
| 7.5 | 0.715 | -141.2 | 3.572 | 52.2 | 0.139 | -11.5 | 0.396 | -117.4 |
| 8.0 | 0.691 | -152.2 | 3.489 | 43.4 | 0.142 | -18.4 | 0.362 | -128.9 |
| 8.5 | 0.670 | -163.4 | 3.418 | 34.7 | 0.142 | -25.2 | 0.332 | -140.8 |
| 9.0 | 0.651 | -174.9 | 3.356 | 25.7 | 0.142 | -31.7 | 0.306 | -153.4 |
| 9.5 | 0.632 | 173.1 | 3.271 | 16.8 | 0.140 | -37.8 | 0.285 | -167.1 |
| 10.0 | 0.615 | 161.2 | 3.158 | 8.2 | 0.138 | -43.9 | 0.272 | 177.7 |
| 10.5 | 0.605 | 149.3 | 3.030 | -0.1 | 0.136 | -49.9 | 0.269 | 162.2 |
| 11.0 | 0.604 | 138.0 | 2.914 | -8.5 | 0.132 | -55.7 | 0.271 | 146.3 |
| 11.5 | 0.611 | 127.2 | 2.810 | -16.9 | 0.125 | -61.1 | 0.283 | 132.0 |
| 12.0 | 0.620 | 117.1 | 2.686 | -25.2 | 0.119 | -65.9 | 0.304 | 119.8 |
| 12.5 | 0.628 | 108.4 | 2.541 | -33.0 | 0.114 | -69.9 | 0.332 | 111.1 |
| 13.0 | 0.629 | 100.8 | 2.403 | -39.9 | 0.109 | -73.3 | 0.358 | 104.2 |
| 13.5 | 0.630 | 94.1 | 2.296 | -46.4 | 0.104 | -76.9 | 0.378 | 98.0 |
| 14.0 | 0.639 | 87.1 | 2.229 | -53.1 | 0.100 | -80.7 | 0.392 | 91.3 |
| 14.5 | 0.655 | 78.9 | 2.167 | -60.6 | 0.095 | -83.9 | 0.408 | 84.0 |
| 15.0 | 0.671 | 69.8 | 2.080 | -68.7 | 0.091 | -86.7 | 0.435 | 76.3 |
| 15.5 | 0.682 | 61.5 | 1.958 | -76.3 | 0.087 | -89.9 | 0.471 | 69.1 |
| 16.0 | 0.693 | 55.0 | 1.828 | -83.2 | 0.082 | -93.1 | 0.506 | 62.6 |
| 16.5 | 0.706 | 50.2 | 1.719 | -88.7 | 0.077 | -95.6 | 0.528 | 57.5 |
| 17.0 | 0.730 | 46.1 | 1.665 | -94.1 | 0.073 | -97.3 | 0.538 | 53.2 |
| 17.5 | 0.756 | 41.4 | 1.629 | -100.3 | 0.069 | -97.9 | 0.551 | 49.3 |
| 18.0 | 0.772 | 37.5 | 1.609 | -105.3 | 0.068 | -98.1 | 0.567 | 46.5 |

## Typical Measured Data CFH120-08

Common Source S – Parameters ($V_{DD}$=2V, $I_D$=10mA, $Z_0$=50$\Omega$)

| Freq | $S_{11}$ | | $S_{21}$ | | $S_{12}$ | | $S_{22}$ | |
|------|-----|-------|-----|-------|-----|-------|-----|-------|
| [GHz] | Mag | Phase | Mag | Phase | Mag | Phase | Mag | Phase |
| 1.0 | 0.983 | -21.1 | 5.110 | 160.0 | 0.027 | 74.1 | 0.666 | -15.9 |
| 1.5 | 0.968 | -27.7 | 5.041 | 153.6 | 0.035 | 67.8 | 0.655 | -21.0 |
| 2.0 | 0.951 | -37.1 | 4.989 | 144.8 | 0.046 | 61.0 | 0.639 | -28.5 |
| 2.5 | 0.937 | -46.3 | 4.965 | 136.2 | 0.056 | 54.8 | 0.623 | -35.9 |
| 3.0 | 0.918 | -55.5 | 4.928 | 127.5 | 0.066 | 48.4 | 0.601 | -43.4 |
| 3.5 | 0.897 | -65.4 | 4.897 | 118.4 | 0.075 | 41.7 | 0.576 | -50.7 |
| 4.0 | 0.871 | -75.4 | 4.832 | 109.3 | 0.084 | 35.1 | 0.546 | -58.4 |
| 4.5 | 0.844 | -85.0 | 4.749 | 100.9 | 0.093 | 28.7 | 0.519 | -66.1 |
| 5.0 | 0.815 | -94.3 | 4.668 | 92.6 | 0.100 | 22.1 | 0.490 | -74.0 |
| 5.5 | 0.786 | -103.8 | 4.602 | 84.3 | 0.106 | 15.9 | 0.457 | -81.8 |
| 6.0 | 0.756 | -114.1 | 4.555 | 75.7 | 0.111 | 10.0 | 0.421 | -90.4 |
| 6.5 | 0.723 | -125.1 | 4.483 | 66.7 | 0.116 | 3.9 | 0.383 | -100.2 |
| 7.0 | 0.690 | -137.0 | 4.365 | 57.8 | 0.120 | -2.4 | 0.345 | -110.9 |
| 7.5 | 0.662 | -149.0 | 4.220 | 49.0 | 0.122 | -8.9 | 0.310 | -122.4 |
| 8.0 | 0.643 | -160.5 | 4.093 | 40.5 | 0.124 | -15.1 | 0.279 | -134.6 |
| 8.5 | 0.626 | -171.8 | 3.975 | 31.9 | 0.125 | -21.2 | 0.252 | -147.4 |
| 9.0 | 0.609 | 176.5 | 3.867 | 23.3 | 0.125 | -27.0 | 0.229 | -161.6 |
| 9.5 | 0.595 | 164.7 | 3.727 | 14.9 | 0.123 | -32.1 | 0.216 | -177.2 |
| 10.0 | 0.582 | 152.9 | 3.565 | 6.8 | 0.122 | -37.4 | 0.211 | 165.8 |
| 10.5 | 0.580 | 141.5 | 3.417 | -1.3 | 0.120 | -42.5 | 0.217 | 148.7 |
| 11.0 | 0.585 | 130.8 | 3.303 | -9.1 | 0.118 | -47.6 | 0.230 | 132.7 |
| 11.5 | 0.596 | 120.3 | 3.175 | -16.9 | 0.114 | -52.2 | 0.250 | 118.8 |
| 12.0 | 0.609 | 110.6 | 3.019 | -24.8 | 0.110 | -55.9 | 0.277 | 108.0 |
| 12.5 | 0.618 | 102.3 | 2.860 | -32.3 | 0.107 | -59.2 | 0.306 | 100.0 |
| 13.0 | 0.623 | 95.3 | 2.709 | -38.7 | 0.104 | -62.5 | 0.332 | 93.9 |
| 13.5 | 0.626 | 88.9 | 2.601 | -44.8 | 0.101 | -65.7 | 0.350 | 88.6 |
| 14.0 | 0.635 | 82.1 | 2.521 | -51.2 | 0.099 | -69.0 | 0.365 | 82.6 |
| 14.5 | 0.654 | 74.2 | 2.449 | -58.4 | 0.096 | -72.0 | 0.383 | 75.8 |
| 15.0 | 0.670 | 65.7 | 2.361 | -66.2 | 0.094 | -74.6 | 0.411 | 68.6 |
| 15.5 | 0.681 | 58.0 | 2.232 | -73.4 | 0.091 | -77.8 | 0.447 | 62.0 |
| 16.0 | 0.688 | 51.9 | 2.094 | -79.9 | 0.088 | -81.5 | 0.482 | 56.1 |
| 16.5 | 0.704 | 47.5 | 1.982 | -85.2 | 0.083 | -84.8 | 0.504 | 51.4 |
| 17.0 | 0.728 | 43.6 | 1.922 | -90.5 | 0.080 | -86.9 | 0.513 | 47.7 |
| 17.5 | 0.752 | 39.0 | 1.885 | -96.5 | 0.078 | -87.9 | 0.525 | 44.2 |
| 18.0 | 0.768 | 35.3 | 1.865 | -101.4 | 0.077 | -88.4 | 0.539 | 41.4 |

## Typical Measured Data CFH120-08

Common Source S – Parameters ($V_{DD}$=2V, $I_D$=15mA, $Z_0$=50$\Omega$)

| Freq | $S_{11}$ | | $S_{21}$ | | $S_{12}$ | | $S_{22}$ | |
|------|-----|-------|------|--------|------|-------|------|-------|
| [GHz] | Mag | Phase | Mag | Phase | Mag | Phase | Mag | Phase |
| 1.0 | 0.977 | -21.8 | 5.836 | 159.1 | 0.026 | 73.6 | 0.647 | -16.2 |
| 1.5 | 0.963 | -28.7 | 5.771 | 152.7 | 0.034 | 67.0 | 0.634 | -21.6 |
| 2.0 | 0.944 | -38.4 | 5.703 | 143.7 | 0.044 | 60.8 | 0.615 | -29.4 |
| 2.5 | 0.928 | -47.9 | 5.666 | 134.8 | 0.055 | 54.7 | 0.597 | -37.0 |
| 3.0 | 0.905 | -57.4 | 5.597 | 126.0 | 0.064 | 48.0 | 0.572 | -44.5 |
| 3.5 | 0.883 | -67.6 | 5.517 | 116.9 | 0.073 | 41.5 | 0.543 | -52.2 |
| 4.0 | 0.854 | -77.7 | 5.425 | 107.8 | 0.081 | 35.2 | 0.514 | -59.9 |
| 4.5 | 0.825 | -87.7 | 5.304 | 99.0 | 0.088 | 28.8 | 0.486 | -67.4 |
| 5.0 | 0.796 | -97.1 | 5.192 | 90.7 | 0.095 | 22.3 | 0.456 | -75.5 |
| 5.5 | 0.766 | -106.9 | 5.101 | 82.3 | 0.101 | 16.4 | 0.422 | -83.7 |
| 6.0 | 0.733 | -117.2 | 5.027 | 73.7 | 0.105 | 10.3 | 0.383 | -92.9 |
| 6.5 | 0.699 | -128.6 | 4.931 | 64.8 | 0.110 | 4.2 | 0.344 | -103.1 |
| 7.0 | 0.667 | -140.7 | 4.771 | 55.9 | 0.114 | -2.3 | 0.307 | -114.2 |
| 7.5 | 0.639 | -152.6 | 4.601 | 47.5 | 0.117 | -8.3 | 0.273 | -126.1 |
| 8.0 | 0.618 | -164.1 | 4.439 | 39.2 | 0.119 | -14.0 | 0.245 | -139.1 |
| 8.5 | 0.601 | -175.2 | 4.302 | 30.6 | 0.119 | -19.4 | 0.224 | -153.0 |
| 9.0 | 0.586 | 173.1 | 4.181 | 22.0 | 0.118 | -24.9 | 0.207 | -168.2 |
| 9.5 | 0.574 | 161.2 | 4.023 | 13.8 | 0.118 | -29.5 | 0.198 | 175.0 |
| 10.0 | 0.564 | 149.4 | 3.842 | 5.9 | 0.117 | -34.9 | 0.200 | 156.9 |
| 10.5 | 0.565 | 138.1 | 3.674 | -1.8 | 0.116 | -39.8 | 0.212 | 139.7 |
| 11.0 | 0.571 | 127.4 | 3.531 | -9.3 | 0.115 | -44.6 | 0.230 | 124.4 |
| 11.5 | 0.584 | 116.9 | 3.385 | -17.2 | 0.111 | -49.2 | 0.254 | 111.7 |
| 12.0 | 0.599 | 107.4 | 3.227 | -24.9 | 0.108 | -52.9 | 0.284 | 101.7 |
| 12.5 | 0.608 | 99.2 | 3.050 | -32.1 | 0.106 | -56.0 | 0.314 | 94.8 |
| 13.0 | 0.612 | 92.3 | 2.884 | -38.4 | 0.103 | -59.4 | 0.339 | 89.8 |
| 13.5 | 0.617 | 86.0 | 2.770 | -44.4 | 0.102 | -62.5 | 0.356 | 84.9 |
| 14.0 | 0.628 | 79.2 | 2.691 | -50.8 | 0.099 | -65.9 | 0.370 | 79.3 |
| 14.5 | 0.644 | 71.3 | 2.620 | -57.9 | 0.096 | -68.7 | 0.388 | 72.8 |
| 15.0 | 0.661 | 62.8 | 2.527 | -65.4 | 0.094 | -72.1 | 0.416 | 65.9 |
| 15.5 | 0.672 | 55.2 | 2.386 | -72.6 | 0.093 | -75.6 | 0.452 | 59.6 |
| 16.0 | 0.683 | 49.1 | 2.236 | -79.0 | 0.090 | -79.4 | 0.486 | 54.2 |
| 16.5 | 0.698 | 44.7 | 2.119 | -84.2 | 0.086 | -82.5 | 0.505 | 50.0 |
| 17.0 | 0.721 | 41.0 | 2.064 | -89.3 | 0.083 | -84.7 | 0.513 | 46.3 |
| 17.5 | 0.745 | 36.2 | 2.028 | -95.4 | 0.080 | -85.7 | 0.524 | 42.8 |
| 18.0 | 0.761 | 32.2 | 2.005 | -100.0 | 0.079 | -85.7 | 0.536 | 40.2 |

## Typical Measured Data CFH120-08

Common Source S – Parameters ($V_{DD}$=2V, $I_D$=20mA, $Z_0$=50$\Omega$)

| Freq | $S_{11}$ | | $S_{21}$ | | $S_{12}$ | | $S_{22}$ | |
|------|------|-------|------|-------|------|-------|------|-------|
| [GHz] | Mag | Phase | Mag | Phase | Mag | Phase | Mag | Phase |
| 1.0 | 0.980 | -22.7 | 6.342 | 158.6 | 0.026 | 70.0 | 0.637 | -16.5 |
| 1.5 | 0.961 | -29.5 | 6.265 | 152.1 | 0.033 | 66.4 | 0.626 | -22.1 |
| 2.0 | 0.943 | -39.2 | 6.183 | 143.0 | 0.044 | 61.0 | 0.609 | -30.0 |
| 2.5 | 0.925 | -49.0 | 6.113 | 134.1 | 0.054 | 54.6 | 0.588 | -37.5 |
| 3.0 | 0.901 | -58.7 | 6.025 | 125.1 | 0.063 | 47.7 | 0.563 | -45.3 |
| 3.5 | 0.875 | -68.9 | 5.934 | 115.9 | 0.071 | 41.3 | 0.536 | -52.7 |
| 4.0 | 0.842 | -79.4 | 5.804 | 106.9 | 0.078 | 35.0 | 0.503 | -60.3 |
| 4.5 | 0.813 | -89.2 | 5.654 | 98.2 | 0.085 | 29.1 | 0.471 | -68.1 |
| 5.0 | 0.782 | -98.7 | 5.522 | 89.7 | 0.092 | 23.2 | 0.441 | -76.3 |
| 5.5 | 0.751 | -108.4 | 5.408 | 81.3 | 0.097 | 17.1 | 0.407 | -84.4 |
| 6.0 | 0.719 | -118.7 | 5.316 | 72.9 | 0.102 | 11.2 | 0.368 | -93.5 |
| 6.5 | 0.686 | -129.9 | 5.188 | 64.2 | 0.106 | 5.2 | 0.330 | -103.8 |
| 7.0 | 0.650 | -142.0 | 5.015 | 55.4 | 0.109 | -1.0 | 0.292 | -114.7 |
| 7.5 | 0.619 | -153.8 | 4.819 | 46.9 | 0.112 | -7.2 | 0.258 | -125.8 |
| 8.0 | 0.599 | -164.9 | 4.645 | 38.8 | 0.114 | -12.6 | 0.232 | -138.5 |
| 8.5 | 0.581 | -176.1 | 4.504 | 30.6 | 0.115 | -17.9 | 0.216 | -153.6 |
| 9.0 | 0.568 | 172.2 | 4.382 | 22.1 | 0.116 | -23.0 | 0.202 | -169.7 |
| 9.5 | 0.554 | 160.3 | 4.222 | 13.8 | 0.115 | -27.7 | 0.198 | 172.8 |
| 10.0 | 0.545 | 148.3 | 4.036 | 5.9 | 0.114 | -32.7 | 0.201 | 154.9 |
| 10.5 | 0.545 | 136.6 | 3.862 | -1.7 | 0.114 | -38.1 | 0.215 | 138.2 |
| 11.0 | 0.553 | 125.6 | 3.709 | -9.2 | 0.112 | -42.6 | 0.233 | 123.1 |
| 11.5 | 0.568 | 115.1 | 3.552 | -17.0 | 0.109 | -46.9 | 0.258 | 110.8 |
| 12.0 | 0.583 | 105.4 | 3.383 | -24.6 | 0.107 | -50.5 | 0.289 | 101.4 |
| 12.5 | 0.593 | 97.1 | 3.207 | -31.6 | 0.104 | -53.8 | 0.319 | 94.7 |
| 13.0 | 0.597 | 89.9 | 3.037 | -38.0 | 0.103 | -57.5 | 0.344 | 89.6 |
| 13.5 | 0.601 | 83.5 | 2.923 | -43.9 | 0.101 | -60.6 | 0.362 | 84.9 |
| 14.0 | 0.611 | 76.4 | 2.839 | -50.2 | 0.099 | -64.2 | 0.375 | 79.6 |
| 14.5 | 0.629 | 68.2 | 2.764 | -57.3 | 0.097 | -67.4 | 0.393 | 73.4 |
| 15.0 | 0.647 | 59.5 | 2.655 | -64.9 | 0.095 | -70.8 | 0.422 | 66.7 |
| 15.5 | 0.660 | 51.7 | 2.509 | -71.9 | 0.095 | -74.2 | 0.458 | 60.7 |
| 16.0 | 0.673 | 45.7 | 2.351 | -78.2 | 0.092 | -77.9 | 0.490 | 55.0 |
| 16.5 | 0.690 | 41.2 | 2.233 | -83.4 | 0.088 | -81.0 | 0.509 | 50.8 |
| 17.0 | 0.715 | 37.1 | 2.176 | -88.6 | 0.084 | -83.5 | 0.517 | 47.4 |
| 17.5 | 0.738 | 32.2 | 2.144 | -94.7 | 0.082 | -85.1 | 0.526 | 44.0 |
| 18.0 | 0.753 | 28.2 | 2.114 | -99.5 | 0.082 | -85.6 | 0.539 | 41.3 |

## Typical Measured Data <u>CFH120-10</u>

Common Source S – Parameters ($V_{DD}$=2V, $I_D$=0mA, $Z_0$=50$\Omega$)

| Freq | $S_{11}$ | | $S_{21}$ | | $S_{12}$ | | $S_{22}$ | |
|---|---|---|---|---|---|---|---|---|
| [GHz] | Mag | Phase | Mag | Phase | Mag | Phase | Mag | Phase |
| 1.0 | 0.898 | -13.9 | 0.067 | 24.5 | 0.065 | 26.1 | 0.957 | -12.4 |
| 1.5 | 0.891 | -17.9 | 0.074 | 27.9 | 0.073 | 28.6 | 0.956 | -16.1 |
| 2.0 | 0.884 | -23.5 | 0.086 | 30.6 | 0.087 | 30.3 | 0.954 | -21.5 |
| 2.5 | 0.881 | -29.5 | 0.102 | 31.0 | 0.102 | 30.2 | 0.953 | -27.2 |
| 3.0 | 0.878 | -35.7 | 0.120 | 29.3 | 0.119 | 28.3 | 0.945 | -32.9 |
| 3.5 | 0.874 | -42.0 | 0.138 | 26.3 | 0.136 | 25.7 | 0.938 | -38.5 |
| 4.0 | 0.868 | -48.6 | 0.156 | 22.1 | 0.155 | 22.3 | 0.931 | -44.5 |
| 4.5 | 0.861 | -55.0 | 0.175 | 17.5 | 0.174 | 17.9 | 0.928 | -50.7 |
| 5.0 | 0.853 | -61.2 | 0.195 | 12.6 | 0.195 | 13.0 | 0.924 | -57.1 |
| 5.5 | 0.846 | -67.2 | 0.216 | 7.5 | 0.215 | 7.5 | 0.917 | -63.7 |
| 6.0 | 0.836 | -73.4 | 0.239 | 2.0 | 0.236 | 1.9 | 0.901 | -70.5 |
| 6.5 | 0.823 | -80.4 | 0.263 | -4.6 | 0.258 | -4.2 | 0.888 | -77.6 |
| 7.0 | 0.809 | -88.1 | 0.285 | -11.8 | 0.281 | -11.0 | 0.875 | -85.3 |
| 7.5 | 0.794 | -96.4 | 0.306 | -19.5 | 0.306 | -18.5 | 0.864 | -93.7 |
| 8.0 | 0.781 | -104.9 | 0.327 | -27.6 | 0.329 | -26.8 | 0.851 | -102.8 |
| 8.5 | 0.769 | -113.4 | 0.349 | -35.7 | 0.349 | -35.3 | 0.837 | -112.3 |
| 9.0 | 0.761 | -122.2 | 0.371 | -44.4 | 0.368 | -43.9 | 0.820 | -122.1 |
| 9.5 | 0.749 | -131.6 | 0.391 | -53.6 | 0.385 | -52.9 | 0.808 | -132.3 |
| 10.0 | 0.738 | -141.6 | 0.405 | -63.3 | 0.401 | -62.3 | 0.800 | -143.1 |
| 10.5 | 0.726 | -152.3 | 0.415 | -73.6 | 0.414 | -72.6 | 0.791 | -154.5 |
| 11.0 | 0.718 | -163.2 | 0.420 | -84.0 | 0.420 | -83.4 | 0.783 | -166.8 |
| 11.5 | 0.720 | -174.7 | 0.420 | -94.9 | 0.417 | -94.3 | 0.778 | -179.5 |
| 12.0 | 0.727 | 173.5 | 0.414 | -105.8 | 0.408 | -105.2 | 0.784 | 167.9 |
| 12.5 | 0.743 | 161.7 | 0.402 | -116.7 | 0.395 | -115.6 | 0.801 | 156.2 |
| 13.0 | 0.755 | 150.4 | 0.383 | -127.3 | 0.380 | -125.8 | 0.823 | 145.2 |
| 13.5 | 0.763 | 139.8 | 0.360 | -137.2 | 0.361 | -136.1 | 0.840 | 134.8 |
| 14.0 | 0.772 | 129.6 | 0.340 | -146.7 | 0.340 | -146.1 | 0.849 | 124.6 |
| 14.5 | 0.783 | 118.9 | 0.321 | -156.3 | 0.317 | -156.0 | 0.856 | 114.5 |
| 15.0 | 0.797 | 107.6 | 0.300 | -166.5 | 0.295 | -165.8 | 0.871 | 104.6 |
| 15.5 | 0.808 | 96.0 | 0.275 | -176.8 | 0.273 | -175.5 | 0.900 | 94.7 |
| 16.0 | 0.818 | 85.3 | 0.247 | 173.3 | 0.250 | 174.8 | 0.927 | 85.1 |
| 16.5 | 0.830 | 76.5 | 0.220 | 164.8 | 0.224 | 165.5 | 0.940 | 76.7 |
| 17.0 | 0.847 | 68.7 | 0.197 | 157.3 | 0.198 | 157.3 | 0.939 | 69.6 |
| 17.5 | 0.868 | 61.8 | 0.181 | 150.8 | 0.176 | 151.1 | 0.938 | 63.8 |
| 18.0 | 0.890 | 56.9 | 0.174 | 145.7 | 0.164 | 147.4 | 0.942 | 60.3 |

## Typical Measured Data <u>CFH120-10</u>

Common Source S – Parameters ($V_{DD}$=2V, $I_D$=5mA, $Z_0$=50$\Omega$)

| Freq | $S_{11}$ | | $S_{21}$ | | $S_{12}$ | | $S_{22}$ | |
|------|-----|-------|-----|-------|-----|-------|-----|-------|
| [GHz] | Mag | Phase | Mag | Phase | Mag | Phase | Mag | Phase |
| 1.0 | 0.982 | -22.2 | 4.059 | 158.7 | 0.037 | 72.8 | 0.732 | -17.0 |
| 1.5 | 0.968 | -28.3 | 3.994 | 153.0 | 0.046 | 66.1 | 0.720 | -22.2 |
| 2.0 | 0.953 | -37.0 | 3.942 | 144.7 | 0.059 | 58.9 | 0.705 | -29.4 |
| 2.5 | 0.940 | -46.5 | 3.936 | 135.9 | 0.073 | 52.0 | 0.685 | -37.4 |
| 3.0 | 0.924 | -56.4 | 3.939 | 126.8 | 0.087 | 44.8 | 0.663 | -45.3 |
| 3.5 | 0.904 | -66.5 | 3.933 | 117.9 | 0.100 | 37.8 | 0.638 | -53.3 |
| 4.0 | 0.883 | -77.0 | 3.918 | 108.7 | 0.112 | 30.6 | 0.609 | -61.7 |
| 4.5 | 0.862 | -87.2 | 3.883 | 99.8 | 0.124 | 23.4 | 0.579 | -70.1 |
| 5.0 | 0.836 | -97.4 | 3.848 | 90.7 | 0.134 | 16.1 | 0.546 | -79.0 |
| 5.5 | 0.809 | -107.9 | 3.822 | 81.7 | 0.143 | 8.9 | 0.508 | -88.4 |
| 6.0 | 0.777 | -119.1 | 3.801 | 72.4 | 0.151 | 1.7 | 0.467 | -98.8 |
| 6.5 | 0.744 | -131.4 | 3.741 | 62.9 | 0.158 | -5.9 | 0.424 | -110.1 |
| 7.0 | 0.712 | -144.3 | 3.658 | 53.3 | 0.163 | -13.5 | 0.383 | -122.6 |
| 7.5 | 0.684 | -157.2 | 3.544 | 43.8 | 0.166 | -21.4 | 0.346 | -136.2 |
| 8.0 | 0.663 | -170.1 | 3.428 | 34.4 | 0.168 | -29.2 | 0.315 | -150.7 |
| 8.5 | 0.645 | 177.3 | 3.327 | 25.0 | 0.168 | -36.7 | 0.292 | -166.4 |
| 9.0 | 0.629 | 164.6 | 3.215 | 15.7 | 0.166 | -43.7 | 0.278 | 177.1 |
| 9.5 | 0.616 | 152.1 | 3.087 | 6.7 | 0.164 | -50.6 | 0.275 | 160.4 |
| 10.0 | 0.609 | 140.0 | 2.941 | -2.1 | 0.160 | -57.2 | 0.279 | 144.2 |
| 10.5 | 0.608 | 128.4 | 2.790 | -10.5 | 0.155 | -63.7 | 0.291 | 129.2 |
| 11.0 | 0.614 | 117.4 | 2.661 | -18.9 | 0.148 | -70.1 | 0.308 | 115.9 |
| 11.5 | 0.624 | 107.0 | 2.527 | -27.1 | 0.141 | -76.0 | 0.331 | 104.6 |
| 12.0 | 0.632 | 97.6 | 2.395 | -35.0 | 0.134 | -81.0 | 0.358 | 95.8 |
| 12.5 | 0.641 | 89.6 | 2.259 | -42.4 | 0.127 | -85.8 | 0.385 | 89.1 |
| 13.0 | 0.643 | 82.6 | 2.133 | -49.2 | 0.121 | -90.0 | 0.408 | 83.4 |
| 13.5 | 0.648 | 76.0 | 2.032 | -55.7 | 0.115 | -94.6 | 0.425 | 78.0 |
| 14.0 | 0.660 | 68.9 | 1.951 | -62.5 | 0.109 | -99.2 | 0.440 | 72.0 |
| 14.5 | 0.675 | 61.3 | 1.871 | -69.7 | 0.104 | -103.7 | 0.459 | 65.6 |
| 15.0 | 0.688 | 53.5 | 1.783 | -77.3 | 0.099 | -107.9 | 0.487 | 59.3 |
| 15.5 | 0.699 | 46.4 | 1.673 | -84.4 | 0.093 | -112.1 | 0.518 | 53.5 |
| 16.0 | 0.709 | 40.8 | 1.565 | -90.8 | 0.087 | -116.3 | 0.546 | 48.5 |
| 16.5 | 0.723 | 36.6 | 1.480 | -96.4 | 0.081 | -120.2 | 0.561 | 44.5 |
| 17.0 | 0.742 | 32.5 | 1.420 | -102.0 | 0.075 | -123.2 | 0.569 | 40.9 |
| 17.5 | 0.762 | 28.2 | 1.388 | -107.7 | 0.071 | -125.2 | 0.580 | 37.6 |
| 18.0 | 0.779 | 24.8 | 1.376 | -112.4 | 0.069 | -126.3 | 0.590 | 35.2 |

## Typical Measured Data <u>CFH120-10</u>

Common Source S – Parameters ($V_{DD}$=2V, $I_D$=10mA, $Z_0$=50$\Omega$)

| Freq | $S_{11}$ | | $S_{21}$ | | $S_{12}$ | | $S_{22}$ | |
|------|------|-------|------|-------|------|-------|------|-------|
| [GHz] | Mag | Phase | Mag | Phase | Mag | Phase | Mag | Phase |
| 1.0 | 0.978 | -23.2 | 5.240 | 158.3 | 0.035 | 74.9 | 0.686 | -17.8 |
| 1.5 | 0.964 | -30.1 | 5.179 | 151.9 | 0.044 | 67.0 | 0.673 | -23.5 |
| 2.0 | 0.950 | -40.2 | 5.127 | 142.6 | 0.057 | 59.1 | 0.655 | -31.9 |
| 2.5 | 0.936 | -50.3 | 5.107 | 133.5 | 0.069 | 51.9 | 0.634 | -40.1 |
| 3.0 | 0.914 | -60.6 | 5.070 | 124.1 | 0.082 | 44.4 | 0.606 | -48.5 |
| 3.5 | 0.889 | -71.5 | 5.028 | 114.8 | 0.094 | 37.3 | 0.574 | -57.0 |
| 4.0 | 0.862 | -82.8 | 4.960 | 105.3 | 0.106 | 30.4 | 0.540 | -65.7 |
| 4.5 | 0.834 | -93.5 | 4.848 | 96.0 | 0.115 | 23.1 | 0.505 | -74.8 |
| 5.0 | 0.805 | -104.0 | 4.748 | 86.8 | 0.123 | 15.7 | 0.469 | -84.5 |
| 5.5 | 0.775 | -115.0 | 4.668 | 77.6 | 0.130 | 8.6 | 0.428 | -94.6 |
| 6.0 | 0.745 | -127.0 | 4.611 | 68.3 | 0.137 | 1.6 | 0.387 | -105.8 |
| 6.5 | 0.713 | -139.7 | 4.511 | 59.0 | 0.142 | -5.8 | 0.345 | -118.7 |
| 7.0 | 0.682 | -153.0 | 4.342 | 49.5 | 0.146 | -12.9 | 0.308 | -133.2 |
| 7.5 | 0.654 | -166.0 | 4.148 | 40.1 | 0.148 | -20.1 | 0.277 | -148.8 |
| 8.0 | 0.637 | -178.7 | 3.990 | 31.2 | 0.149 | -27.3 | 0.255 | -165.5 |
| 8.5 | 0.623 | 168.7 | 3.837 | 22.3 | 0.148 | -34.2 | 0.242 | 177.1 |
| 9.0 | 0.612 | 156.0 | 3.688 | 13.2 | 0.147 | -40.4 | 0.241 | 159.5 |
| 9.5 | 0.604 | 143.5 | 3.514 | 4.6 | 0.145 | -46.4 | 0.251 | 142.6 |
| 10.0 | 0.600 | 131.8 | 3.323 | -3.8 | 0.142 | -52.4 | 0.270 | 127.0 |
| 10.5 | 0.604 | 120.8 | 3.145 | -11.6 | 0.137 | -58.7 | 0.292 | 113.4 |
| 11.0 | 0.614 | 110.7 | 2.995 | -19.3 | 0.132 | -64.3 | 0.315 | 101.5 |
| 11.5 | 0.629 | 100.7 | 2.849 | -27.3 | 0.125 | -69.2 | 0.340 | 91.8 |
| 12.0 | 0.641 | 91.7 | 2.692 | -35.0 | 0.121 | -73.6 | 0.371 | 84.5 |
| 12.5 | 0.648 | 83.9 | 2.524 | -42.1 | 0.116 | -77.6 | 0.399 | 79.0 |
| 13.0 | 0.649 | 77.5 | 2.376 | -48.3 | 0.112 | -81.5 | 0.420 | 74.5 |
| 13.5 | 0.654 | 71.5 | 2.273 | -54.3 | 0.109 | -85.8 | 0.434 | 69.4 |
| 14.0 | 0.666 | 64.7 | 2.187 | -60.8 | 0.104 | -89.9 | 0.447 | 63.9 |
| 14.5 | 0.685 | 57.1 | 2.113 | -68.0 | 0.100 | -93.7 | 0.465 | 58.1 |
| 15.0 | 0.700 | 49.1 | 2.018 | -75.5 | 0.096 | -97.4 | 0.493 | 52.0 |
| 15.5 | 0.708 | 42.0 | 1.884 | -82.4 | 0.092 | -101.4 | 0.527 | 46.7 |
| 16.0 | 0.715 | 36.7 | 1.754 | -88.4 | 0.087 | -105.6 | 0.553 | 41.9 |
| 16.5 | 0.727 | 33.2 | 1.658 | -93.2 | 0.081 | -109.7 | 0.564 | 38.1 |
| 17.0 | 0.747 | 29.9 | 1.618 | -98.3 | 0.076 | -112.3 | 0.565 | 35.1 |
| 17.5 | 0.768 | 24.9 | 1.586 | -104.5 | 0.073 | -113.8 | 0.573 | 31.7 |
| 18.0 | 0.785 | 20.9 | 1.561 | -109.4 | 0.070 | -114.5 | 0.589 | 28.9 |

## Typical Measured Data <u>CFH120-10</u>

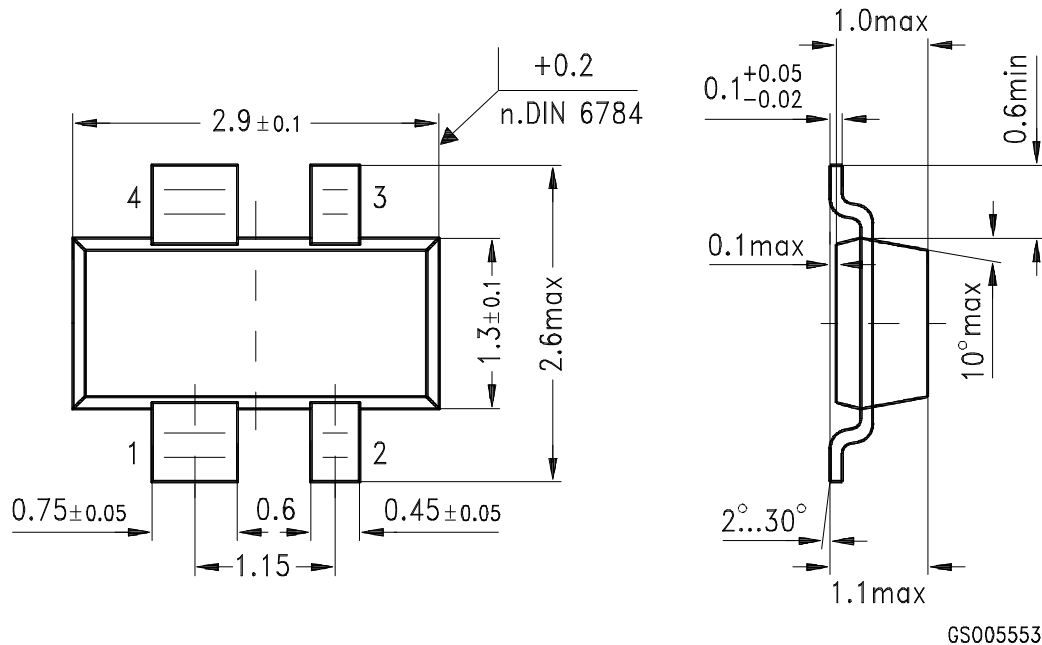Common Source S – Parameters ($V_{DD}$=2V, $I_D$=15mA, $Z_0$=50$\Omega$)

| Freq | $S_{11}$ | | $S_{21}$ | | $S_{12}$ | | $S_{22}$ | |
|------|-----|-------|------|-------|------|-------|------|-------|
| [GHz] | Mag | Phase | Mag | Phase | Mag | Phase | Mag | Phase |
| 1.0 | 0.977 | -23.7 | 6.164 | 157.3 | 0.033 | 72.0 | 0.663 | -18.4 |
| 1.5 | 0.959 | -31.1 | 5.990 | 150.8 | 0.043 | 66.2 | 0.650 | -24.5 |
| 2.0 | 0.941 | -41.6 | 5.916 | 141.3 | 0.056 | 59.4 | 0.631 | -33.2 |
| 2.5 | 0.924 | -52.0 | 5.856 | 132.1 | 0.068 | 51.3 | 0.606 | -41.8 |
| 3.0 | 0.901 | -62.5 | 5.780 | 122.7 | 0.079 | 43.8 | 0.576 | -50.6 |
| 3.5 | 0.876 | -73.8 | 5.709 | 112.9 | 0.091 | 36.8 | 0.544 | -59.4 |
| 4.0 | 0.844 | -85.3 | 5.588 | 103.3 | 0.100 | 30.0 | 0.508 | -68.3 |
| 4.5 | 0.812 | -96.3 | 5.428 | 94.0 | 0.108 | 22.9 | 0.471 | -77.7 |
| 5.0 | 0.780 | -107.2 | 5.296 | 84.8 | 0.116 | 15.2 | 0.434 | -87.8 |
| 5.5 | 0.750 | -118.3 | 5.170 | 75.9 | 0.123 | 8.3 | 0.394 | -98.1 |
| 6.0 | 0.717 | -130.3 | 5.064 | 66.7 | 0.130 | 1.4 | 0.351 | -109.8 |
| 6.5 | 0.684 | -143.0 | 4.926 | 57.3 | 0.135 | -5.3 | 0.311 | -123.8 |
| 7.0 | 0.654 | -156.5 | 4.722 | 47.9 | 0.137 | -12.4 | 0.276 | -139.3 |
| 7.5 | 0.632 | -169.6 | 4.486 | 38.6 | 0.139 | -19.3 | 0.250 | -156.3 |
| 8.0 | 0.617 | 177.8 | 4.296 | 30.0 | 0.139 | -26.0 | 0.233 | -174.2 |
| 8.5 | 0.605 | 165.2 | 4.121 | 21.2 | 0.140 | -32.2 | 0.227 | 167.7 |
| 9.0 | 0.595 | 152.5 | 3.949 | 12.3 | 0.138 | -38.2 | 0.233 | 150.0 |
| 9.5 | 0.589 | 140.2 | 3.753 | 3.8 | 0.137 | -44.3 | 0.252 | 133.8 |
| 10.0 | 0.588 | 128.6 | 3.535 | -4.3 | 0.135 | -50.0 | 0.275 | 119.3 |
| 10.5 | 0.594 | 117.9 | 3.351 | -12.1 | 0.131 | -55.6 | 0.299 | 106.6 |
| 11.0 | 0.605 | 107.8 | 3.186 | -19.5 | 0.126 | -60.9 | 0.325 | 95.6 |
| 11.5 | 0.623 | 98.1 | 3.021 | -27.3 | 0.121 | -65.7 | 0.352 | 86.9 |
| 12.0 | 0.638 | 89.3 | 2.851 | -34.8 | 0.117 | -69.6 | 0.382 | 80.1 |
| 12.5 | 0.645 | 81.8 | 2.672 | -41.8 | 0.113 | -73.4 | 0.410 | 74.9 |
| 13.0 | 0.647 | 75.5 | 2.525 | -47.8 | 0.109 | -77.2 | 0.430 | 70.5 |
| 13.5 | 0.651 | 69.5 | 2.419 | -53.6 | 0.105 | -81.2 | 0.444 | 65.8 |
| 14.0 | 0.664 | 62.9 | 2.335 | -59.9 | 0.101 | -85.4 | 0.455 | 60.4 |
| 14.5 | 0.684 | 55.5 | 2.253 | -66.9 | 0.098 | -89.1 | 0.474 | 54.6 |
| 15.0 | 0.698 | 47.8 | 2.151 | -74.1 | 0.095 | -92.5 | 0.503 | 48.9 |
| 15.5 | 0.707 | 40.8 | 2.013 | -81.0 | 0.092 | -96.8 | 0.536 | 43.5 |
| 16.0 | 0.713 | 35.6 | 1.881 | -86.8 | 0.087 | -101.2 | 0.561 | 38.8 |
| 16.5 | 0.725 | 32.1 | 1.784 | -91.7 | 0.081 | -104.7 | 0.571 | 35.1 |
| 17.0 | 0.746 | 28.7 | 1.738 | -96.5 | 0.077 | -107.4 | 0.570 | 32.3 |
| 17.5 | 0.770 | 24.0 | 1.704 | -102.6 | 0.073 | -109.5 | 0.577 | 29.1 |
| 18.0 | 0.786 | 19.9 | 1.685 | -107.7 | 0.072 | -110.7 | 0.591 | 26.3 |

## Typical Measured Data CFH120-10

Common Source S – Parameters ($V_{DD}$=2V, $I_D$=20mA, $Z_0$=50$\Omega$)

| Freq | $S_{11}$ | | $S_{21}$ | | $S_{12}$ | | $S_{22}$ | |
|------|------|-------|------|-------|------|-------|------|-------|
| [GHz] | Mag | Phase | Mag | Phase | Mag | Phase | Mag | Phase |
| 1.0 | 0.978 | -24.1 | 6.570 | 156.9 | 0.032 | 70.1 | 0.660 | -18.9 |
| 1.5 | 0.960 | -31.8 | 6.485 | 150.3 | 0.041 | 64.6 | 0.644 | -25.2 |
| 2.0 | 0.940 | -42.6 | 6.389 | 140.7 | 0.055 | 57.8 | 0.623 | -34.0 |
| 2.5 | 0.920 | -53.2 | 6.317 | 131.2 | 0.067 | 51.3 | 0.599 | -42.9 |
| 3.0 | 0.889 | -63.9 | 6.217 | 121.7 | 0.077 | 44.0 | 0.567 | -51.6 |
| 3.5 | 0.862 | -75.2 | 6.116 | 112.1 | 0.089 | 36.8 | 0.532 | -60.7 |
| 4.0 | 0.832 | -86.6 | 5.972 | 102.5 | 0.098 | 29.9 | 0.495 | -69.9 |
| 4.5 | 0.799 | -97.8 | 5.793 | 93.0 | 0.106 | 23.1 | 0.458 | -79.5 |
| 5.0 | 0.766 | -108.7 | 5.631 | 83.9 | 0.113 | 15.8 | 0.420 | -89.6 |
| 5.5 | 0.735 | -119.9 | 5.498 | 74.9 | 0.119 | 8.9 | 0.378 | -100.1 |
| 6.0 | 0.702 | -131.8 | 5.357 | 65.6 | 0.125 | 2.1 | 0.336 | -112.5 |
| 6.5 | 0.668 | -144.8 | 5.204 | 56.2 | 0.130 | -4.9 | 0.297 | -127.0 |
| 7.0 | 0.638 | -158.3 | 4.977 | 47.0 | 0.134 | -11.7 | 0.265 | -143.3 |
| 7.5 | 0.615 | -171.6 | 4.727 | 38.1 | 0.135 | -18.4 | 0.242 | -160.5 |
| 8.0 | 0.601 | 175.8 | 4.511 | 29.5 | 0.135 | -24.7 | 0.227 | -178.9 |
| 8.5 | 0.590 | 163.3 | 4.310 | 20.9 | 0.135 | -30.8 | 0.225 | 162.9 |
| 9.0 | 0.583 | 150.7 | 4.125 | 12.1 | 0.133 | -37.0 | 0.235 | 145.4 |
| 9.5 | 0.578 | 138.5 | 3.920 | 3.8 | 0.132 | -42.8 | 0.255 | 129.9 |
| 10.0 | 0.579 | 127.2 | 3.703 | -4.2 | 0.129 | -48.3 | 0.280 | 116.1 |
| 10.5 | 0.586 | 116.6 | 3.501 | -11.8 | 0.127 | -53.6 | 0.305 | 103.9 |
| 11.0 | 0.598 | 106.8 | 3.328 | -19.3 | 0.123 | -58.8 | 0.331 | 93.3 |
| 11.5 | 0.614 | 96.9 | 3.162 | -26.9 | 0.119 | -63.3 | 0.359 | 84.7 |
| 12.0 | 0.629 | 88.2 | 2.979 | -34.1 | 0.115 | -67.3 | 0.390 | 78.1 |
| 12.5 | 0.638 | 80.7 | 2.791 | -40.9 | 0.111 | -71.0 | 0.418 | 73.1 |
| 13.0 | 0.642 | 74.6 | 2.637 | -46.7 | 0.108 | -74.9 | 0.438 | 68.9 |
| 13.5 | 0.650 | 68.6 | 2.528 | -52.5 | 0.105 | -78.9 | 0.451 | 64.3 |
| 14.0 | 0.664 | 62.0 | 2.437 | -58.8 | 0.101 | -83.2 | 0.462 | 59.0 |
| 14.5 | 0.682 | 54.7 | 2.348 | -65.7 | 0.098 | -86.8 | 0.479 | 53.2 |
| 15.0 | 0.697 | 47.1 | 2.243 | -72.9 | 0.095 | -90.1 | 0.508 | 47.7 |
| 15.5 | 0.705 | 40.2 | 2.107 | -79.6 | 0.092 | -94.1 | 0.542 | 42.4 |
| 16.0 | 0.712 | 35.1 | 1.963 | -85.3 | 0.087 | -98.8 | 0.566 | 37.7 |
| 16.5 | 0.725 | 31.5 | 1.858 | -89.9 | 0.082 | -102.6 | 0.576 | 34.0 |
| 17.0 | 0.744 | 28.1 | 1.816 | -94.9 | 0.078 | -104.7 | 0.575 | 31.1 |
| 17.5 | 0.766 | 23.3 | 1.786 | -100.9 | 0.075 | -106.5 | 0.582 | 27.8 |
| 18.0 | 0.783 | 19.3 | 1.761 | -105.9 | 0.073 | -107.9 | 0.595 | 25.1 |

## Semiconductor Device Outline MW-4



GS005553

Approx. weight: 0.02 g