



PRELIMINARY DATASHEET

CGY2190UH/C2

75-110GHz W-band Low Noise Amplifier

DESCRIPTION

The CGY2190UH/C2 is a very high performance W-band Low Noise Amplifier MMIC.

The CGY2190UH/C2 is a 4 stages Low Noise Amplifier with an exceptional Low Noise Figure of 2.8 dB at 90 GHz combined with an ultra low power consumption ($V_D=1$ V, $V_G=0$, total Drain current = 33mA).

This makes the MMIC very suitable for Security Applications (Millimeter wave Imaging), Space (Earth Observation) and Telecommunications.

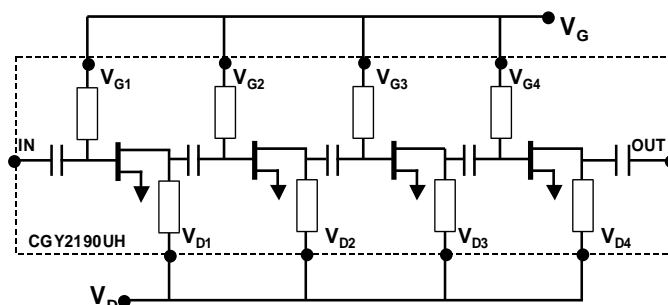
The MMIC is manufactured using OMMIC's advanced proprietary 70 nm MHEMT technology.

FEATURES

- ✓ Suitable for W-band applications
- ✓ Wide frequency range : 75 – 110 GHz
- ✓ 23 dB small signal gain
- ✓ Output P1dB : + 1 dBm
- ✓ Ultra Low Power consumption
(33 mW @ $V_D=1$ & $V_G=0$ V; 22 mW @ $V_D=1.2$ & $V_G=-0.1$ V)
- ✓ Mid-band NF = 2.8 dB at 90 GHz
- ✓ Chip size = 2000 x 3000 μ m
- ✓ Samples Available now
- ✓ Space and MIL-STD Available

APPLICATIONS

- Millimeter Wave active and passive Imaging
- Earth Observation
- E-band communications
- Radar
- General purpose amplifier



Low Noise Amplifier
CGY2190UH/C2 Block Diagram



LIMITING VALUES

$T_{amb} = 25\text{ °C}$ unless otherwise specified

| Symbol | Parameter | Conditions | MIN. | MAX. | UNIT |
|----------------------------------|------------------------------|-------------------------|------|------|------|
| $V_{D1}, V_{D2}, V_{D3}, V_{D4}$ | Drain voltage | | 0 | 2 | V |
| $I_{D\text{ total}}$ | Total Drain current | | | 50 | mA |
| $V_{G1}, V_{G2}, V_{G3}, V_{G4}$ | Gate supply voltage | V_{Dx} open-circuited | -2 | 0,6 | V |
| T_{stg} | Storage temperature | | -55 | +150 | ° C |
| T_j | Junction temperature | | | +150 | ° C |
| T_{amb} | Ambient temperature | | -40 | +85 | ° C |
| $P_{in\text{ max}}$ | Maximum RF input power in CW | | | 16 | dBm |

THERMAL CHARACTERISTICS

| Symbol | Parameter | Value | UNIT |
|---------------|--|-------|-------|
| $R_{th(j-a)}$ | Thermal resistance from junction to ambient ($T_a = 25\text{ °C}$) | TBD | ° C/W |

DC CHARACTERISTICS

$T_{amb} = 25\text{ °C}$, $V_{DD} = 1\text{ V}$; unless otherwise specified.

| Symbol | Parameter | Conditions | MIN. | TYP. | MAX. | UNIT |
|----------------------------------|---------------------|---------------|-------|------|-------|------|
| $V_{D1}, V_{D2}, V_{D3}, V_{D4}$ | Drain voltage | | + 0.8 | + 1 | + 1.2 | V |
| $I_{D\text{ total}}$ | Total Drain current | See notes 1,2 | | 33 | | mA |
| $V_{G1}, V_{G2}, V_{G3}, V_{G4}$ | Gate supply voltage | | -0.1 | 0.0 | 0.1 | V |

NOTE

- As bias is considered to be a drain V_D voltage and a drain current I_D , we have V_{G1} determining the drain current I_{D1} , V_{G2} determining the drain current I_{D2} , V_{G3} determining the drain current I_{D3} and V_{G4} determining the drain current I_{D4} . Bias currents are set in NO RF conditions.
- Total drain current $I_{D\text{ total}} = I_{D1} + I_{D2} + I_{D3} + I_{D4}$ with $I_{D1} = I_{D2} = I_{D3} = I_{D4}$

RF CHARACTERISTICS

$T_{amb} = 25\text{ }^{\circ}\text{C}$, all $V_D = 1\text{ V}$, all $V_G = 0\text{ V}$, $I_{D\text{ total}} = 33\text{ mA}$. On-wafer measurements using $50\text{ }\Omega$ RF probes. Unless otherwise specified.

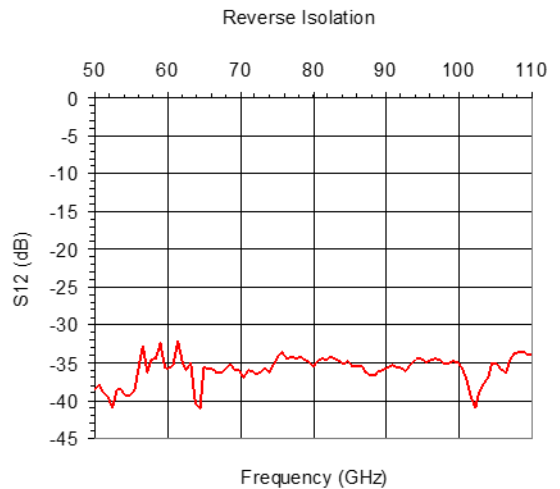
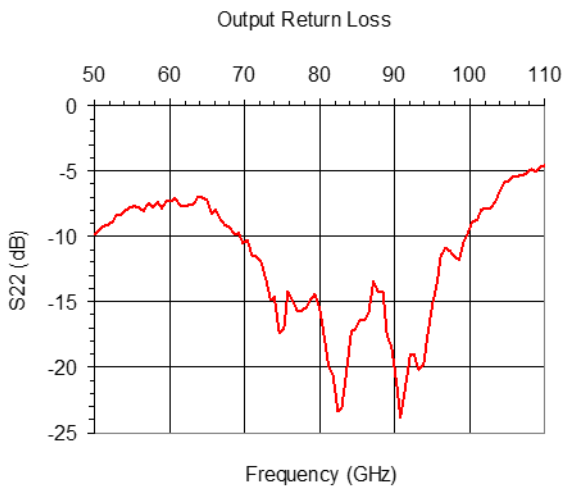
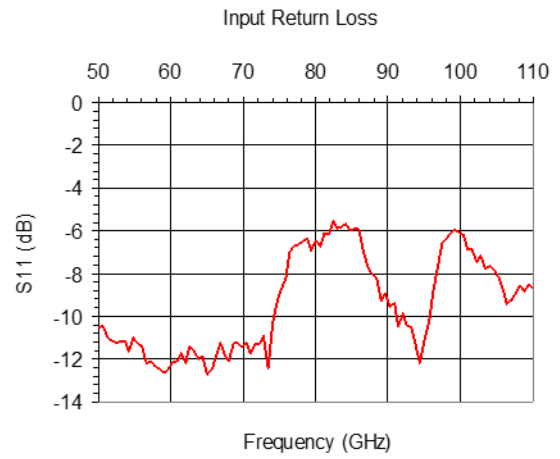
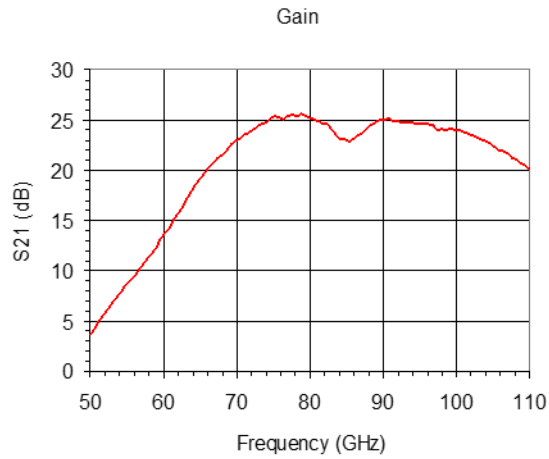
| Symbol | Parameter | Conditions | MIN. | TYP. | MAX. | UNIT |
|--------|-----------------------------|-----------------------|------|------|------|------|
| Gain | Reference Gain | F = 75 GHz to 90 GHz | | 25 | | dB |
| | | F = 90 GHz to 110 GHz | | 22 | | dB |
| S11 | Input return loss | F = 75 GHz to 90 GHz | | -6 | | dB |
| | | F = 90 GHz to 110 GHz | | -6 | | dB |
| S22 | Output return loss | F = 75 GHz to 90 GHz | | -12 | | dB |
| | | F = 90 GHz to 110 GHz | | -4 | | dB |
| S12 | Isolation | F = 75 GHz to 90 GHz | | -35 | | dB |
| P1dB | 1dB compression point | | | 1 | | dBm |
| NF | Noise Figure | F = 90 GHz | | 2.8 | | dB |
| | | F = 75 GHz to 110 GHz | | | 3.3 | dB |
| K | Microwave stability factor. | F = 75 GHz to 110 GHz | 1 | | | |



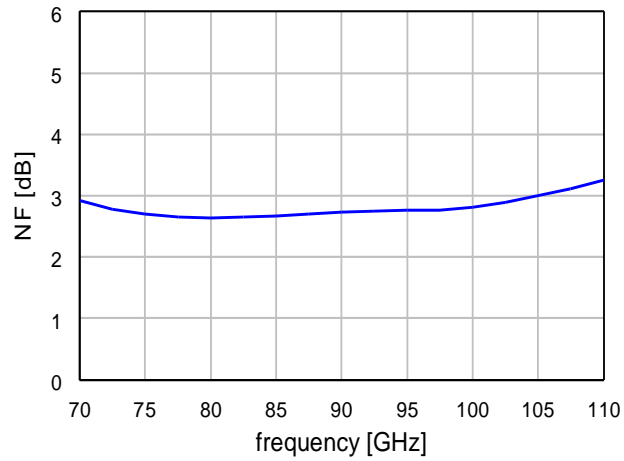
Caution : This device is a high performance RF component and can be damaged by inappropriate handling. Standard ESD precautions should be followed. OMMIC document "OM-CI-MV/ 001/ PG" contains more information on the precautions to take.

MEASURED PERFORMANCE

$T_{amb} = 25\text{ }^{\circ}\text{C}$, all $V_D = 1\text{ V}$, all $V_G = 0\text{ V}$, $I_{D\text{ total}} = 33\text{ mA}$, on wafer measurements.

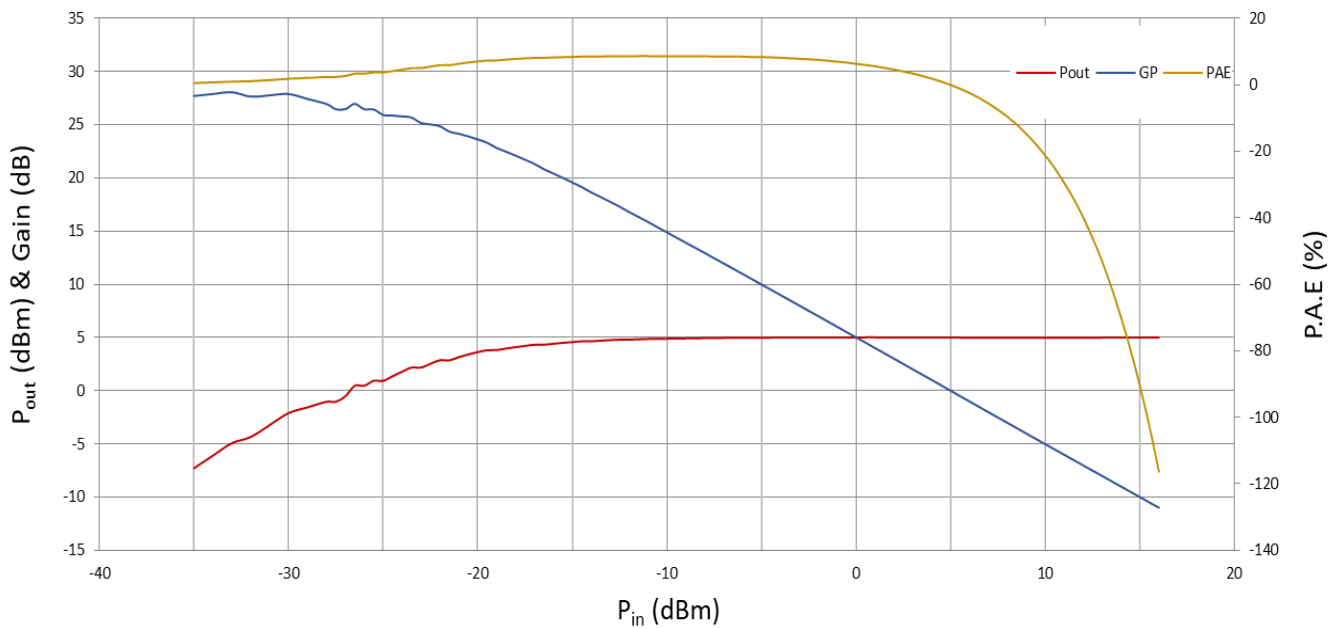


S-PARAMETERS VS. FREQUENCY



NOISE FIGURE VS. FREQUENCY (SIMULATIONS)

P_{out} , Gain, PAE vs. P_{in} @ 90 GHz



POWER & GAIN COMPRESSION, PAE VS. INPUT POWER

CGY2190UH/C2 TYPICAL SCATTERING PARAMETERS
 $T_{amb} = 25^{\circ}\text{C}$, all $V_D = 1\text{ V}$, all $V_G = 0\text{ V}$, $I_{D\text{ total}} = 33\text{ mA}$, on wafer measurements.

for frequencies from 50 to 75 GHz

| Frequency | Mag S11 | Ang S11 | Mag S21 | Ang S21 | Mag S12 | Ang S12 | Mag S22 | Ang S22 |
|-----------|-----------|---------|----------|----------|-----------|---------|-----------|----------|
| 50 | 0.2982181 | 136.858 | 1.521719 | 10.62 | 0.0117366 | -84.57 | 0.3220791 | -105.187 |
| 50.6 | 0.2991305 | 135.317 | 1.637569 | 0.524 | 0.0128172 | -75.579 | 0.3351781 | -108.824 |
| 51.2 | 0.2835923 | 134.306 | 1.770367 | -10.313 | 0.0112012 | -94.585 | 0.3455057 | -111.285 |
| 51.8 | 0.2778504 | 133.489 | 1.903314 | -21.099 | 0.010644 | -88.193 | 0.3521712 | -112.989 |
| 52.4 | 0.2738388 | 130.7 | 2.048315 | -31.831 | 0.008989 | -64.295 | 0.3608411 | -116.582 |
| 53 | 0.2751059 | 129.038 | 2.188627 | -41.882 | 0.0116846 | -91.635 | 0.3813257 | -118.968 |
| 53.6 | 0.2765462 | 126.888 | 2.332392 | -51.728 | 0.0118958 | -85.777 | 0.3830699 | -122.125 |
| 54.2 | 0.2619643 | 125.367 | 2.487604 | -62.164 | 0.0108184 | -83.997 | 0.3994495 | -126.31 |
| 54.8 | 0.2809864 | 122.725 | 2.673945 | -72.443 | 0.0108903 | -29.815 | 0.4097102 | -132.232 |
| 55.4 | 0.2732295 | 117.981 | 2.812046 | -83.773 | 0.011644 | -51.307 | 0.4131721 | -135.05 |
| 56 | 0.2705325 | 112.859 | 2.946667 | -93.418 | 0.0159126 | -40.277 | 0.405599 | -138.205 |
| 56.6 | 0.2463726 | 107.568 | 3.147299 | -102.512 | 0.0230115 | -63.697 | 0.3969322 | -138.668 |
| 57.2 | 0.2489077 | 109.277 | 3.404848 | -113.103 | 0.0153749 | -69.989 | 0.4215285 | -143.315 |
| 57.8 | 0.2422256 | 100.417 | 3.620036 | -122.707 | 0.0187579 | -81.681 | 0.4086497 | -145.846 |
| 58.4 | 0.2378602 | 100.862 | 3.850288 | -133.011 | 0.0189255 | -72.538 | 0.4283686 | -150.561 |
| 59 | 0.2335796 | 94.917 | 4.10372 | -141.985 | 0.0238764 | -84.268 | 0.4068177 | -151.811 |
| 59.6 | 0.2369317 | 97.477 | 4.528957 | -152.773 | 0.0165251 | -73.493 | 0.429353 | -155.864 |
| 60.2 | 0.2464809 | 91.685 | 4.847024 | -162.774 | 0.0163471 | -68.783 | 0.4289137 | -159.973 |
| 60.8 | 0.2483342 | 84.272 | 5.207413 | -172.673 | 0.0172508 | -88.765 | 0.4413541 | -162.8 |
| 61.4 | 0.2591242 | 73.774 | 5.682133 | 176.394 | 0.0247541 | -77.49 | 0.4154444 | -166.051 |
| 62 | 0.2458217 | 70.619 | 6.085452 | 166.117 | 0.0175594 | -75.628 | 0.4118215 | -167.949 |
| 62.6 | 0.2680267 | 62.404 | 6.620348 | 154.984 | 0.0159432 | -72.091 | 0.4143946 | -172.18 |
| 63.2 | 0.2612176 | 57.9 | 7.173803 | 142.953 | 0.0177334 | -79.43 | 0.420069 | -177.368 |
| 63.8 | 0.2505264 | 55.189 | 7.838798 | 131.245 | 0.0094205 | -67.578 | 0.4500825 | 178.264 |
| 64.4 | 0.2543381 | 47.702 | 8.596288 | 119.366 | 0.0088168 | -70.58 | 0.4461989 | 170.771 |
| 65 | 0.2312036 | 42.353 | 9.094391 | 106.89 | 0.0164677 | -73.685 | 0.432794 | 168.368 |
| 65.6 | 0.2374708 | 34.358 | 9.6807 | 93.77 | 0.0163844 | -67.345 | 0.3864835 | 160.709 |
| 66.2 | 0.2532244 | 30.807 | 10.40626 | 81.68 | 0.015959 | -70.452 | 0.4003494 | 155.025 |
| 66.8 | 0.2740742 | 23.728 | 10.94241 | 67.229 | 0.0151887 | -73.56 | 0.366474 | 149.648 |
| 67.4 | 0.2551124 | 18.489 | 11.51559 | 55.283 | 0.0153067 | -69.594 | 0.349087 | 142.173 |
| 68 | 0.2484943 | 7.039 | 11.93738 | 43.165 | 0.0161808 | -62.632 | 0.3460235 | 138.589 |
| 68.6 | 0.2730486 | 3.253 | 12.48595 | 30.313 | 0.0173403 | -69.704 | 0.3226236 | 140.687 |
| 69.2 | 0.2741468 | 3.875 | 13.37799 | 17.378 | 0.01615 | -74.528 | 0.3258093 | 130.308 |
| 69.8 | 0.2684623 | -7.119 | 13.87262 | 5.173 | 0.0157844 | -73.698 | 0.297912 | 127.274 |
| 70.4 | 0.2736076 | -15.218 | 14.42307 | -7.601 | 0.0142821 | -68.789 | 0.3057601 | 123.643 |
| 71 | 0.2585235 | -16.089 | 14.98746 | -21.1 | 0.0159524 | -66.429 | 0.2654508 | 112.747 |
| 71.6 | 0.2715395 | -16.204 | 15.28708 | -33.657 | 0.0156963 | -68.569 | 0.2655582 | 101.973 |
| 72.2 | 0.2729822 | -27.197 | 15.79285 | -44.836 | 0.0150619 | -65.126 | 0.2531583 | 99.92 |
| 72.8 | 0.2838779 | -27.418 | 16.49534 | -58.369 | 0.0153393 | -64.86 | 0.2177594 | 98.672 |
| 73.4 | 0.239591 | -23.568 | 16.87806 | -70.031 | 0.0163565 | -61.756 | 0.1800343 | 76.348 |

| | | | | | | | | |
|------|-----------|---------|----------|---------|-----------|---------|-----------|--------|
| 74 | 0.3038566 | -27.664 | 17.38081 | -84.102 | 0.0153231 | -60.2 | 0.1854885 | 78.999 |
| 74.6 | 0.3372033 | -19.578 | 18.12516 | -97.492 | 0.0173941 | -56.281 | 0.1356745 | 72.564 |

CGY2190UH/C2 TYPICAL SCATTERING PARAMETERS
 $T_{amb} = 25^{\circ}\text{C}$, all $V_D = 1\text{ V}$, all $V_G = 0\text{ V}$, $I_{D\text{ total}} = 33\text{ mA}$, on wafer measurements.

for frequencies from 75 to 100 GHz

| Frequency | Mag S11 | Ang S11 | Mag S21 | Ang S21 | Mag S12 | Ang S12 | Mag S22 | Ang S22 |
|-----------|-----------|----------|----------|----------|-----------|---------|-----------|----------|
| 75.2 | 0.3655878 | -24.299 | 18.67595 | -111.818 | 0.0199878 | -54.233 | 0.1409742 | 59.869 |
| 75.8 | 0.3898939 | -35.717 | 18.20294 | -127.467 | 0.0207195 | -62.569 | 0.1952892 | 47.808 |
| 76.4 | 0.448431 | -46.965 | 17.92479 | -141.083 | 0.0189113 | -67.116 | 0.1796639 | 36.699 |
| 77 | 0.4628063 | -49.398 | 18.6772 | -152.687 | 0.0193694 | -66.885 | 0.1634366 | 22.432 |
| 77.6 | 0.4640689 | -56.878 | 18.87635 | -166.893 | 0.0188255 | -68.302 | 0.1638689 | 4.367 |
| 78.2 | 0.4751359 | -62.992 | 18.40462 | 179.078 | 0.0193441 | -68.497 | 0.1681725 | -6.57 |
| 78.8 | 0.4786509 | -65.523 | 19.07763 | 166.057 | 0.0187892 | -69.165 | 0.1826266 | -39.229 |
| 79.4 | 0.4496713 | -72.751 | 18.6877 | 152.727 | 0.0180221 | -66.299 | 0.1901534 | -61.98 |
| 80 | 0.4731657 | -77.917 | 18.13652 | 137.502 | 0.0167318 | -67.727 | 0.1681515 | -55.456 |
| 80.6 | 0.461199 | -80.981 | 17.97556 | 125.02 | 0.0182252 | -65.854 | 0.1294181 | -80.202 |
| 81.2 | 0.4936127 | -86.962 | 17.40521 | 110.853 | 0.0190084 | -67.739 | 0.1021526 | -81.483 |
| 81.8 | 0.4914949 | -90.904 | 16.89226 | 99.593 | 0.0186373 | -67.104 | 0.0926112 | -92.888 |
| 82.4 | 0.5299829 | -89.714 | 16.94704 | 87.856 | 0.019495 | -67.381 | 0.0678824 | -106.315 |
| 83 | 0.508279 | -91.238 | 15.92358 | 77.125 | 0.0189078 | -66.758 | 0.0696541 | -103.062 |
| 83.6 | 0.5123367 | -99.679 | 15.0448 | 65.824 | 0.0181864 | -66.356 | 0.0963001 | -79.514 |
| 84.2 | 0.5196509 | -108.313 | 14.27014 | 56.676 | 0.0174247 | -69.697 | 0.1376533 | -66.491 |
| 84.8 | 0.5017485 | -113.184 | 14.13922 | 47.603 | 0.0180619 | -73.054 | 0.1393447 | -63.875 |
| 85.4 | 0.5082548 | -116.098 | 13.90955 | 40.977 | 0.0166947 | -75.173 | 0.1523791 | -72.122 |
| 86 | 0.5036548 | -122.802 | 14.42556 | 32.144 | 0.0167937 | -69.739 | 0.1507656 | -78.458 |
| 86.6 | 0.4476695 | -126.204 | 14.9775 | 24.26 | 0.016895 | -68.223 | 0.1612786 | -96.979 |
| 87.2 | 0.4101446 | -130.524 | 15.39975 | 12.799 | 0.0154421 | -65.364 | 0.2121881 | -102.226 |
| 87.8 | 0.3979397 | -132.423 | 16.28458 | 0.687 | 0.0146738 | -67.396 | 0.193052 | -106.305 |
| 88.4 | 0.3868184 | -134.904 | 16.87831 | -12.549 | 0.0145329 | -61.666 | 0.1938861 | -113.297 |
| 89 | 0.3427024 | -133.05 | 17.24059 | -25.946 | 0.0156177 | -58.291 | 0.133881 | -133.297 |
| 89.6 | 0.3570098 | -134.666 | 17.89789 | -39.238 | 0.0157422 | -56.226 | 0.1178564 | -132.091 |
| 90.2 | 0.3332651 | -131.862 | 17.81166 | -52.628 | 0.0164443 | -56.233 | 0.0865232 | -121.035 |
| 90.8 | 0.3392017 | -131.761 | 18.09841 | -65.873 | 0.0171386 | -55.398 | 0.0645768 | -88.292 |
| 91.4 | 0.2991918 | -132.749 | 17.49998 | -80.417 | 0.0167264 | -56.121 | 0.0830255 | -100.231 |
| 92 | 0.3208926 | -134.377 | 17.52068 | -93.001 | 0.0164651 | -54.966 | 0.1111984 | -95.725 |
| 92.6 | 0.3013404 | -138.285 | 17.36959 | -105.713 | 0.0155776 | -53.094 | 0.1118116 | -113.767 |
| 93.2 | 0.2978264 | -140.496 | 17.30036 | -117.703 | 0.016884 | -51.449 | 0.0976565 | -94.747 |
| 93.8 | 0.2679875 | -141.926 | 17.22009 | -129.359 | 0.0178283 | -49.553 | 0.1023382 | -64.22 |
| 94.4 | 0.2463734 | -123.718 | 17.03136 | -140.927 | 0.0191523 | -47.702 | 0.1305663 | -36.465 |
| 95 | 0.2782122 | -122.688 | 17.17265 | -152.801 | 0.0186418 | -55.31 | 0.1721944 | -52.232 |
| 95.6 | 0.3064077 | -116.064 | 16.8933 | -165.376 | 0.0179834 | -51.948 | 0.2093689 | -59.919 |
| 96.2 | 0.3581428 | -119.208 | 16.97392 | -176.541 | 0.0187232 | -54.221 | 0.2663027 | -71.537 |
| 96.8 | 0.4107239 | -119.24 | 16.69737 | 170.805 | 0.0190478 | -51.253 | 0.2865073 | -74.918 |
| 97.4 | 0.4703694 | -123.539 | 15.89973 | 157.71 | 0.0184244 | -53.336 | 0.2753621 | -78.598 |
| 98 | 0.4788866 | -130.672 | 16.02182 | 145.539 | 0.0176359 | -54.508 | 0.2652815 | -80.086 |
| 98.6 | 0.4957076 | -139.38 | 15.91841 | 133.695 | 0.0176033 | -60.33 | 0.2584856 | -84.825 |

| | | | | | | | | |
|------|-----------|----------|----------|---------|-----------|---------|-----------|---------|
| 99.2 | 0.5037282 | -151.15 | 16.14377 | 123.005 | 0.0180435 | -58.439 | 0.3024211 | -87.474 |
| 99.8 | 0.4969701 | -156.154 | 15.87777 | 111.259 | 0.017998 | -62.262 | 0.3260347 | -87.194 |

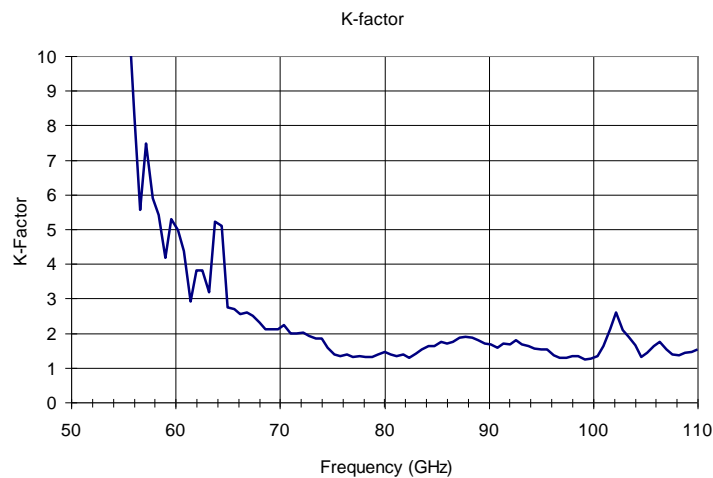
GY2190UH/C2 TYPICAL SCATTERING PARAMETERS
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for frequencies from 100 to 110 GHz

| Frequency | Mag S11 | Ang S11 | Mag S21 | Ang S21 | Mag S12 | Ang S12 | Mag S22 | Ang S22 |
|-----------|-----------|----------|----------|---------|-----------|---------|-----------|----------|
| 100.4 | 0.4883492 | -162.859 | 15.88958 | 99.061 | 0.0164471 | -61.476 | 0.3589204 | -90.307 |
| 101 | 0.452923 | -163.94 | 15.56929 | 86.901 | 0.0142966 | -62.96 | 0.365615 | -93.516 |
| 101.6 | 0.4533625 | -166.881 | 15.21612 | 74.987 | 0.0106666 | -56.222 | 0.3971485 | -93.538 |
| 102.2 | 0.4233523 | -168.718 | 14.83496 | 63.068 | 0.008945 | -37.094 | 0.4056313 | -93.436 |
| 102.8 | 0.4388847 | -173.155 | 14.47684 | 50.097 | 0.0112758 | -25.785 | 0.4060111 | -94.921 |
| 103.4 | 0.4097394 | 178.69 | 14.19749 | 38.423 | 0.0129611 | -33.353 | 0.4288204 | -99.865 |
| 104 | 0.4147567 | 173.582 | 13.8526 | 26.547 | 0.014237 | -22.752 | 0.4695547 | -104.544 |
| 104.6 | 0.4083843 | 167.572 | 13.62229 | 14.365 | 0.0176424 | -20.787 | 0.5090374 | -110.269 |
| 105.2 | 0.3904379 | 168.47 | 13.05179 | 2.063 | 0.0173289 | -18.369 | 0.5168212 | -110.139 |
| 105.8 | 0.3647446 | 164.578 | 12.65758 | -10.024 | 0.0159788 | -24.888 | 0.5362576 | -110.94 |
| 106.4 | 0.3379544 | 160.117 | 12.3979 | -21.567 | 0.0152392 | -22.532 | 0.5374929 | -115.181 |
| 107 | 0.3458246 | 151.787 | 12.01139 | -33.835 | 0.0181428 | -21.728 | 0.5439451 | -120.8 |
| 107.6 | 0.3551902 | 144.107 | 11.58376 | -46.117 | 0.0206512 | -19.794 | 0.5490074 | -125.567 |
| 108.2 | 0.3735513 | 139.76 | 11.25829 | -57.673 | 0.0208611 | -19.756 | 0.5710843 | -126.77 |
| 108.8 | 0.3623558 | 131.721 | 10.83785 | -70.638 | 0.0211204 | -21.418 | 0.5616172 | -131.055 |
| 109.4 | 0.3752054 | 130.444 | 10.57739 | -82.9 | 0.020305 | -19.35 | 0.5803059 | -134.312 |
| 110 | 0.3680994 | 121.867 | 10.11837 | -95.105 | 0.020294 | -19.779 | 0.5875989 | -135.482 |

STABILITY

K factor can be computed from the S parameters over frequency and gives the following :



The device is unconditionally stable in its usable range.

APPLICATION INFORMATION

Typical application scheme

A recommended typical module layout is proposed below. In this figure, RF input and output are using coplanar transmission lines, however, microstrip transmission lines can be used with similar performances. All path lengths and physical sizes of the components should be minimized.

The device have been designed and optimized to support a bonding equivalent to an inductance of 80nH to connect the 50 Ohms coplanar or microstrip transmission lines. In order to minimize inductance, a Ribbon bonding technique can also be used.

All others bonding inductances (i.e. to pads V_{D1} , V_{D2} , V_{D3} , V_{D4} , and V_{G1} , V_{G2} , V_{G3} , V_{G4}) should also be kept as short as possible.

High frequency decoupling capacitors are available on-chip, external decoupling chip capacitors >47 pF and 100nF Surface Mount capacitors are used to improve the power supply rejection. Very low frequency decoupling capacitors (1uF) can also be implemented, at very high frequencies, each transistor of the die has a very high gain.

Via holes are available on-chip to connect the front side to the back side of the chip. A good RF grounding connection should be maintained between the backside of the chip and system ground. AuSn or silver conductive epoxy material can be used for die attach.

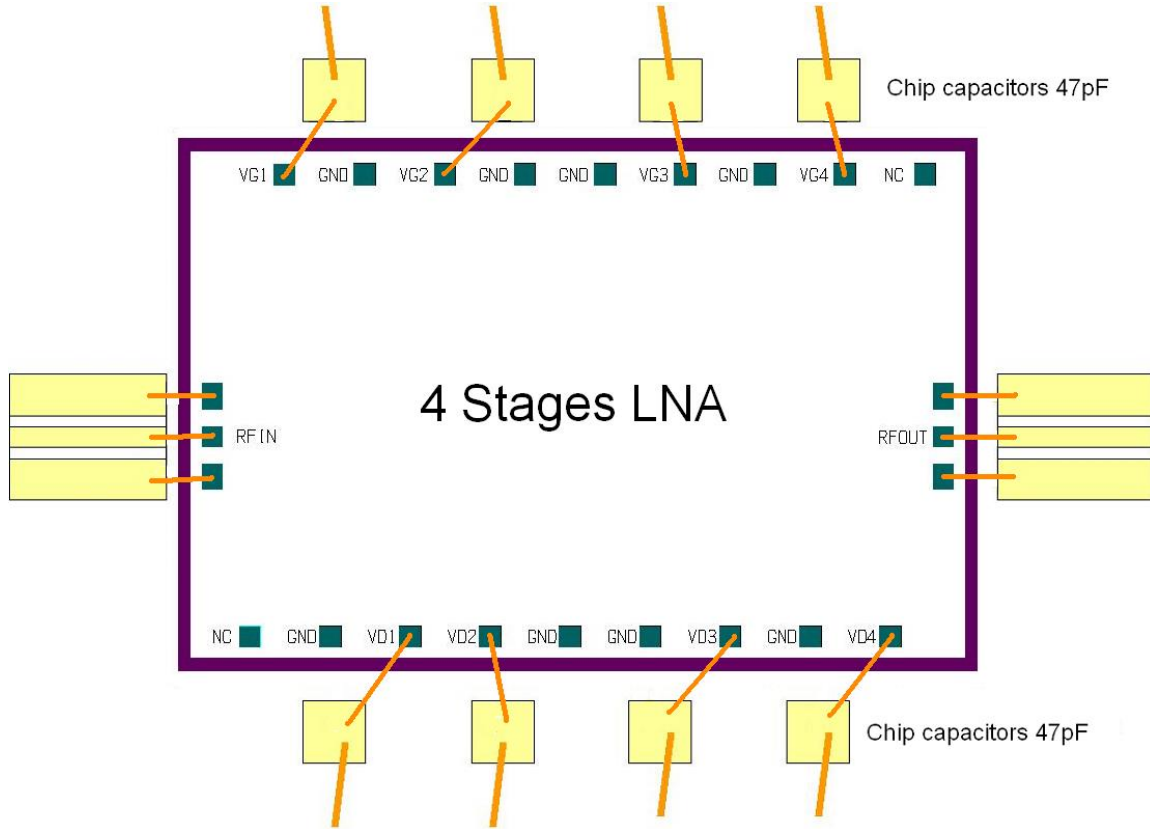


Figure 2: CGY2190UH/C2 die layout: coplanar assembly

OPERATING AND HANDLING INSTRUCTIONS

The CGY2190UH/C2 is a very high performance device and as such, care must be taken at all time to avoid damages due to inappropriate handling, mounting, packaging and biasing conditions.

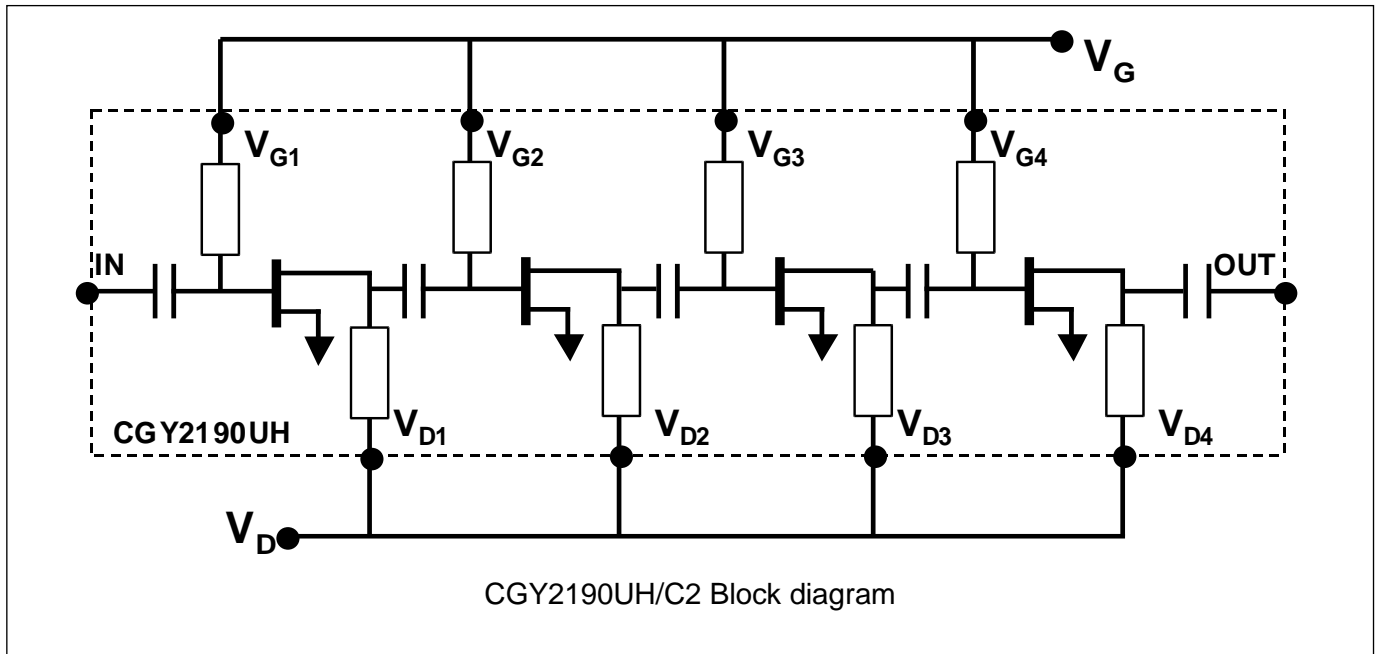
1- Power Supply Sequence

The following power supply sequence is recommended.

- a) Pinch off the device by setting $V_{G1} = V_{G2} = V_{G3} = V_{G4} = -1 \text{ V}$.
- b) Increase $V_D = 1.0 \text{ V}$ while monitoring the drain current.
- c) Increase the gate voltages V_G from -1 V to the value needed to reach the targetted drain current $I_{Dtotal} = 33 \text{ mA}$ (typically $V_{G1} = 0\text{V}$)
- d) Apply the RF input signal.

2- Mounting and ESD handling precautions

For high performance devices such as CGY2190UH/C2, care must be taken while mounting, bonding and eventually sealing the packages and hence obtain the most reliable long-term operation. The temperature, duration, material and sealing techniques compatible with GaAs MMICs and the precautions to be taken are described in OMMIC's document "OM-CI-MV/001/PG", entitled, "Precautions for III-V users".

BLOCK DIAGRAM AND PAD CONFIGURATION

PAD POSITION

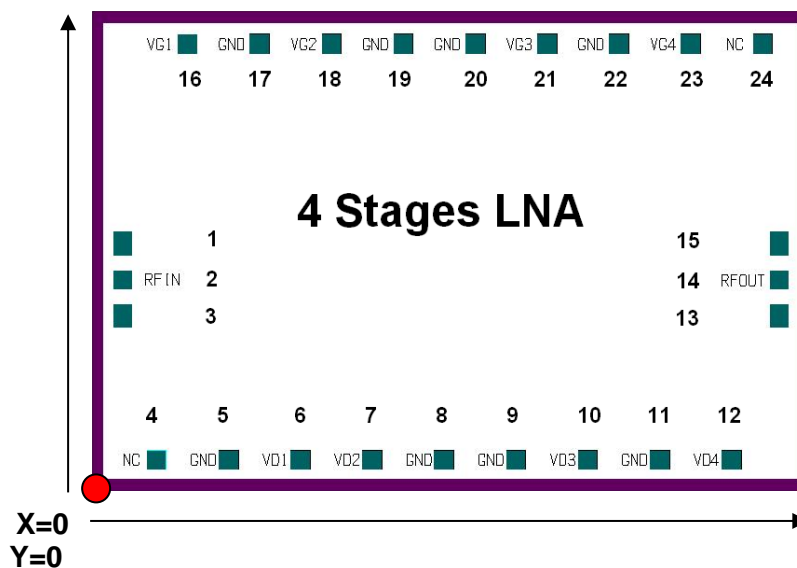
| SYMBOL | PAD | COORDINATES (1) | | DESCRIPTION |
|-----------------|-----|-----------------|------|--|
| | | X | Y | |
| GND | 1 | 130 | 730 | Connected to ground with on-chip via hole |
| IN | 2 | 130 | 880 | RF input |
| GND | 3 | 130 | 1030 | Connected to ground with on-chip via hole |
| NC | 4 | 270 | 130 | Not Connected |
| GND1 | 5 | 570 | 130 | Connected to ground with on-chip via hole |
| V _{D1} | 6 | 870 | 130 | Drain supply voltage 1 (2) |
| V _{D2} | 7 | 1170 | 130 | Drain supply voltage 2 (2) |
| GND2 | 8 | 1470 | 130 | Connected to ground with on-chip via holes |
| GND3 | 9 | 1770 | 130 | Connected to ground with on-chip via holes |
| V _{D3} | 10 | 2070 | 130 | Drain supply voltage 3 (2) |
| GND4 | 11 | 2370 | 130 | Connected to ground with on-chip via holes |
| V _{D4} | 12 | 2670 | 130 | Drain supply voltage 4 (2) |
| GND | 13 | 2870 | 730 | Connected to ground with on-chip via hole |
| OUT | 14 | 2870 | 880 | RF output |

| | | | | |
|-----------------|----|------|------|---|
| GND | 15 | 2870 | 1030 | Connected to ground with on-chip via hole |
| V _{G1} | 16 | 400 | 1860 | Gate supply voltage 1 (2) |
| GND | 17 | 700 | 1860 | Connected to ground with on-chip via hole |
| V _{G2} | 18 | 1000 | 1860 | Gate supply voltage 2 (2) |
| GND | 19 | 1300 | 1860 | Connected to ground with on-chip via hole |
| GND | 20 | 1600 | 1860 | Connected to ground with on-chip via hole |
| V _{G3} | 21 | 1900 | 1860 | Gate supply voltage 3 (2) |
| GND | 22 | 2200 | 1860 | Connected to ground with on-chip via hole |
| V _{G4} | 23 | 2500 | 1860 | Gate supply voltage 4 (2) |
| NC | 24 | 2800 | 1860 | Not Connected |

NOTE

- (1) All x and y coordinates in μm represent the position of the centre of the pad with respect to the lower left corner of the chip layout (see the bonding pattern).
- (2) Must be decoupled to ground using external capacitor(s)

BONDING PADS



MECHANICAL INFORMATION

| PARAMETER | | VALUE |
|------------------------|---|---|
| Size | | 2000 x 3000 μm (Tolerance : +/- 15 μm) |
| Thickness | | 100 μm |
| Backside material | | TiAu |
| Passivation | | PECVD deposited Si_3N_4 |
| Bonding pad dimensions | GND | 60 x 100 μm |
| | IN, OUT, V_{G1} , V_{G2} , V_{G3} , V_{G4} , V_{D1} , V_{D2} , V_{D3} , V_{D4} , GND1, GND2 | 80 x 80 μm |

DEFINITIONS

Limiting values definition

Limiting values given are in accordance with the Absolute Maximum Rating System (IEC 60134). Stress above one or more of the limiting values may cause permanent damage to the device. These are stress ratings only and operation of the device at these or at any other conditions above those given in the Characteristics sections of the specification is not implied. Exposure to limiting values for extended periods may affect device reliability.

Application information

Applications that are described herein for any of these products are for illustrative purposes only. OMMIC makes no representation or warranty that such applications will be suitable for the specified use without further testing or modification.

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ORDERING INFORMATION

| Generic type | Package type | Version | Description |
|--------------|--------------|---------|---|
| CGY2190UH | Bare Die | C2 | MHEMT Semi-conductor die. External dimensions : 2000 x 3000 μm (Tolerance : $\pm 15 \mu\text{m}$). Die thickness: 0.1 mm. Backside material: TiAu |

