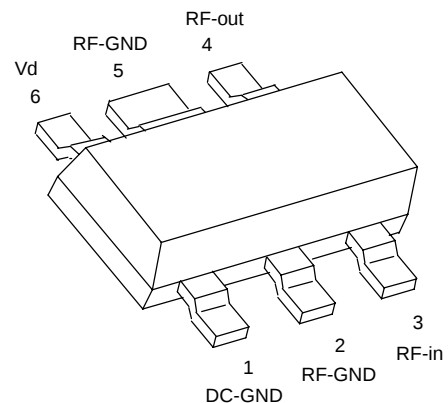


*Preliminary data*

- \* Low noise preamplifier for mobile communication (PCN, DECT, GSM) in 2.7V to 6V systems
- \* Biased monolithic microwave IC (MMIC)
- \* Easily matchable to 50Ω
- \* No bias coil needed
- \* Single positive supply voltage
- \* Low noise figure and high gain  
NF=1.3dB, G=16.5dB @ 3V, 950MHz (typ.)  
NF=1.7dB, G=12dB @ 3V, 1.85GHz (typ.)
- \* Low power consumption
- \* Frequency range 200 MHz ... 2.5 GHz
- \* Miniature package MW6 based on SOT23



ESD: Electrostatic discharge sensitive device,  
observe handling precautions!

| Type   | Marking | Ordering code<br>(taped) | Package 1) |
|--------|---------|--------------------------|------------|
| CGY 59 | Y5      | Q68000-A8887             | MW-6       |

| Maximum ratings                                                        | Symbol      |            | Unit |
|------------------------------------------------------------------------|-------------|------------|------|
| Drain voltage                                                          | $V_D$       | 8          | V    |
| Channel temperature                                                    | $T_{Ch}$    | 150        | °C   |
| Storage temperature range                                              | $T_{stg}$   | -55...+150 | °C   |
| Total power dissipation ( $T_S \leq 132^\circ\text{C}$ ) <sup>2)</sup> | $P_{tot}$   | 80         | mW   |
| <b>Thermal resistance</b>                                              |             |            |      |
| Channel-soldering point (GND)                                          | $R_{thChS}$ | $\leq 220$ | K/W  |
| Junction-ambient <sup>3)</sup>                                         | $R_{thJA}$  | $< 300$    | K/W  |

1) Dimensions see chapter Package Outlines

2) Please care for sufficient heat dissipation on the pcb!

3) Package mounted on alumina 15mm x16.7 mm x0.7 mm

**Electrical characteristics of CGY59 in GSM application circuit (see page 4)** $T_A = 25^\circ\text{C}$  $f = 950\text{MHz}$  $R_S = R_L = 50\Omega$ 

unless otherwise specified

| Characteristics                                                                                                                                      | Symbol     | min    | typ          | max    | Unit |
|------------------------------------------------------------------------------------------------------------------------------------------------------|------------|--------|--------------|--------|------|
| Drain current                                                                                                                                        | $I_D$      | -      | 6            | -      | mA   |
| Power Gain<br>Ud = 3V<br>Ud = 5V                                                                                                                     | $G$        | -<br>- | 16.5<br>18   | -<br>- | dB   |
| Noise figure<br>Ud = 3V<br>Ud = 5V                                                                                                                   | $F$        | -<br>- | 1.3<br>1.3   | -<br>- | dB   |
| Input return loss<br>Ud = 3V<br>Ud = 5V                                                                                                              | $RL_{in}$  | -<br>- | 10<br>11     | -<br>- | dB   |
| Output return loss<br>Ud = 3V<br>Ud = 5V                                                                                                             | $RL_{out}$ | -<br>- | 11<br>9      | -<br>- | dB   |
| Third order input intercept point<br>two-tone intermodulation test<br>f1 = 950MHz, f2 = 951MHz<br>Pin = -20dBm (both carriers)<br>Ud = 3V<br>Ud = 5V | $IP_3$     | -<br>- | -4<br>-2     | -<br>- | dBm  |
| Input power at<br>1dB gain compression<br>Ud = 3V<br>Ud = 5V                                                                                         | $P_{-1dB}$ | -<br>- | -13<br>-11.5 | -<br>- | dBm  |

**Electrical characteristics of CGY59 in 1850 MHz application circuit (see page 4)**

$T_A = 25^\circ\text{C}$

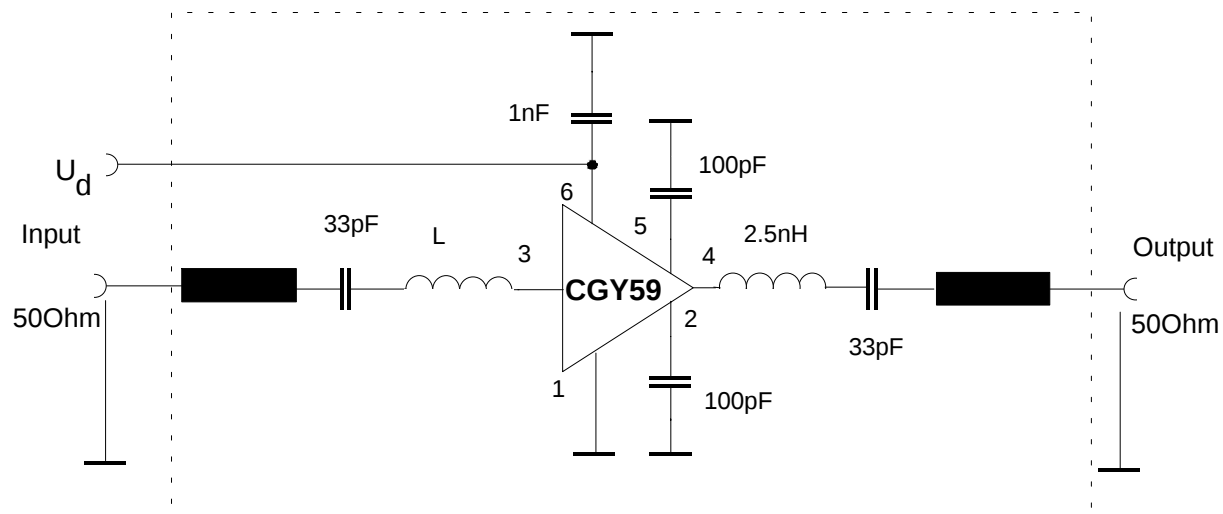
$f = 1850\text{MHz}$

$R_S = R_L = 50\Omega$

unless otherwise specified

| Characteristics                                                                                                                                        | Symbol     | min    | typ          | max    | Unit |
|--------------------------------------------------------------------------------------------------------------------------------------------------------|------------|--------|--------------|--------|------|
| Drain current                                                                                                                                          | $I_D$      | -      | 6            | -      | mA   |
| Power Gain<br>Ud = 3V<br>Ud = 5V                                                                                                                       | $G$        | -<br>- | 12<br>13     | -<br>- | dB   |
| Noise figure<br>Ud = 3V<br>Ud = 5V                                                                                                                     | $F$        | -<br>- | 1.70<br>1.65 | -<br>- | dB   |
| Input return loss<br>Ud = 3V<br>Ud = 5V                                                                                                                | $RL_{in}$  | -<br>- | 15<br>16     | -<br>- | dB   |
| Output return loss<br>Ud = 3V<br>Ud = 5V                                                                                                               | $RL_{out}$ | -<br>- | 15.5<br>13   | -<br>- | dB   |
| Third order input intercept point<br>two-tone intermodulation test<br>f1 = 1850MHz, f2 = 1851MHz<br>Pin = -20dBm (both carriers)<br>Ud = 3V<br>Ud = 5V | $IP_3$     | -<br>- | 1<br>2       | -<br>- | dBm  |
| Input power at<br>1dB gain compression<br>Ud = 3V<br>Ud = 5V                                                                                           | $P_{-1dB}$ | -<br>- | -8<br>-6     | -<br>- | dBm  |

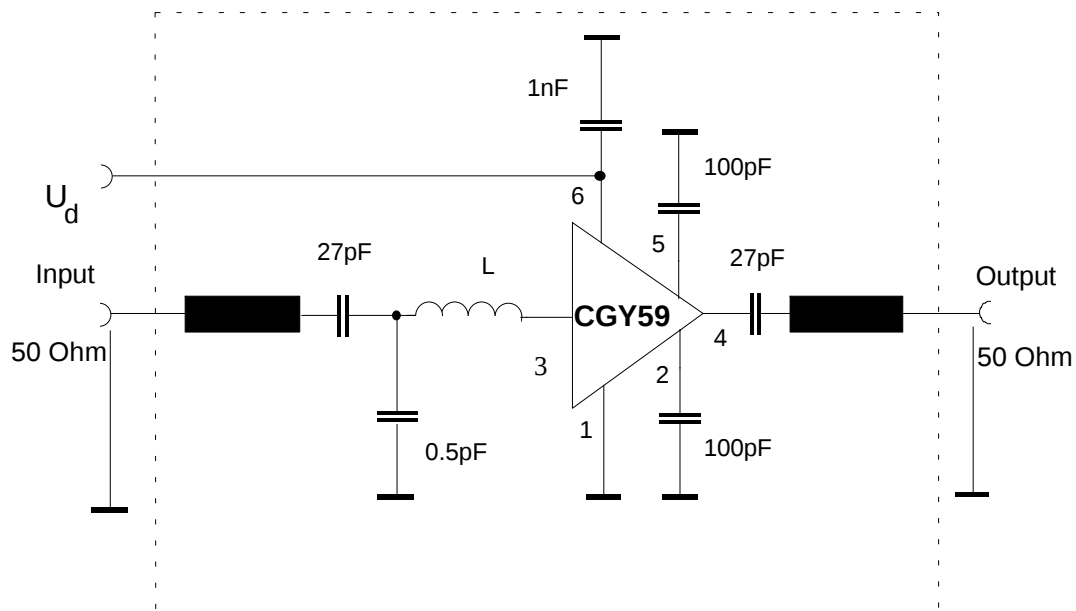
## 950MHz Application (GSM)



50 Ohm Microstripline

L = Inductor 22nH (Coilcraft 0805CS-220-XMBC)

## 1850MHz Application (PCN, DECT)

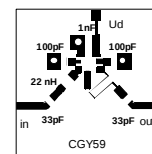
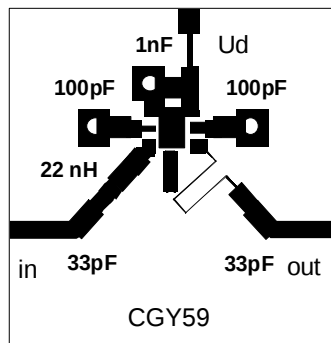


50 Ohm Microstripline

L = Inductor 6.8nH (Coilcraft 0805CS-060-XMBC)

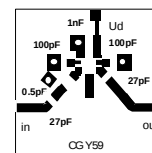
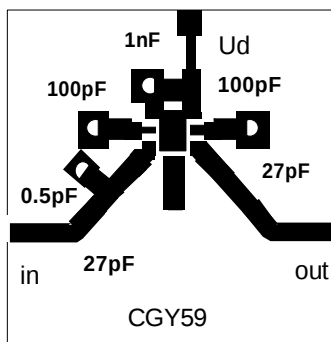
## PCB - Layouts for Application Circuits

950MHz GSM - application board:



Actual size  
( 20 x 20 mm )

1850MHz PCN -, DECT - application board:



Actual size  
( 20 x 20 mm )

PCB - data: Glass fiber teflon board (double sided) TACONIC TLX-9-0150-CH/CH  
 $\epsilon_r = 2.45$  thickness = 0.4mm

## Typical S- and Noise-Parameters

$V_D = 3 \text{ V}$

$Z_0 = 50 \Omega$

| f/GHz | S11   |      | S21  |      | S12   |      | S22   |      |
|-------|-------|------|------|------|-------|------|-------|------|
|       | MAG   | ANG  | MAG  | ANG  | MAG   | ANG  | MAG   | ANG  |
| 0.1   | 0.999 | -4   | 4.30 | -177 | 0.006 | -75  | 0.261 | -17  |
| 0.2   | 0.998 | -6.6 | 4.32 | -173 | 0.011 | 97.6 | 0.251 | -10  |
| 0.3   | 0.997 | -10  | 4.30 | -167 | 0.010 | 94   | 0.247 | -11  |
| 0.4   | 0.982 | -14  | 4.26 | 161  | 0.016 | 76   | 0.238 | -12  |
| 0.5   | 0.970 | -18  | 4.24 | 156  | 0.019 | 78   | 0.232 | -13  |
| 0.6   | 0.958 | -21  | 4.16 | 151  | 0.020 | 78   | 0.226 | -15  |
| 0.7   | 0.940 | -24  | 4.13 | 146  | 0.023 | 73   | 0.221 | -16  |
| 0.8   | 0.918 | -27  | 4.02 | 141  | 0.026 | 79   | 0.218 | -18  |
| 0.9   | 0.889 | -32  | 3.91 | 136  | 0.031 | 79   | 0.209 | -22  |
| 1.0   | 0.870 | -34  | 3.82 | 132  | 0.033 | 76   | 0.195 | -21  |
| 1.1   | 0.845 | -37  | 3.76 | 128  | 0.036 | 75   | 0.189 | -23  |
| 1.2   | 0.829 | -39  | 3.63 | 123  | 0.039 | 73   | 0.186 | -24  |
| 1.3   | 0.806 | -42  | 3.58 | 119  | 0.041 | 72   | 0.177 | -24  |
| 1.4   | 0.789 | -45  | 3.47 | 115  | 0.043 | 71   | 0.173 | -24  |
| 1.5   | 0.765 | -47  | 3.39 | 111  | 0.046 | 71   | 0.166 | -24  |
| 1.6   | 0.748 | -50  | 3.29 | 107  | 0.046 | 72   | 0.159 | -24  |
| 1.7   | 0.725 | -52  | 3.21 | 104  | 0.051 | 71   | 0.154 | -22  |
| 1.8   | 0.703 | -54  | 3.14 | 100  | 0.051 | 71   | 0.147 | -21  |
| 1.9   | 0.695 | -56  | 3.08 | 97   | 0.055 | 69   | 0.140 | -18  |
| 2.0   | 0.664 | -58  | 2.98 | 93   | 0.056 | 71   | 0.135 | -15  |
| 2.1   | 0.644 | -59  | 2.86 | 90   | 0.059 | 70   | 0.129 | -13  |
| 2.2   | 0.631 | -61  | 2.83 | 86   | 0.062 | 69   | 0.123 | -9.6 |
| 2.3   | 0.605 | -63  | 2.79 | 83   | 0.063 | 69   | 0.114 | -3.4 |
| 2.4   | 0.590 | -65  | 2.70 | 80   | 0.064 | 69   | 0.109 | 2.7  |
| 2.5   | 0.570 | -67  | 2.65 | 76   | 0.065 | 70   | 0.106 | 9.2  |

| f   | Fmin | $\Gamma_{opt}$ |     | RN       |
|-----|------|----------------|-----|----------|
| GHz | dB   | MAG            | ANG | $\Omega$ |
|     |      | -              | deg |          |
| 0.8 | 1.15 | 0.77           | 19  | 59.7     |
| 1.0 | 1.19 | 0.74           | 22  | 56.4     |
| 1.2 | 1.24 | 0.72           | 27  | 54.0     |
| 1.4 | 1.31 | 0.71           | 32  | 51.8     |
| 1.6 | 1.39 | 0.70           | 36  | 49.6     |
| 1.8 | 1.49 | 0.68           | 39  | 47.3     |
| 2.0 | 1.62 | 0.66           | 43  | 43.9     |

S- and noise-parameters are also available on CD-ROM.

## Typical S- and Noise-Parameters

$V_D = 5 \text{ V}$

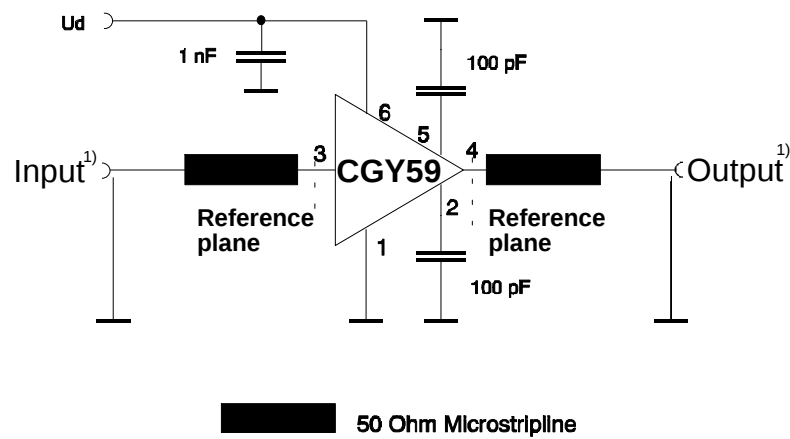
$Z_0 = 50 \Omega$

| f/GHz | S11   |      | S21  |      | S12   |     | S22   |      |
|-------|-------|------|------|------|-------|-----|-------|------|
|       | MAG   | ANG  | MAG  | ANG  | MAG   | ANG | MAG   | ANG  |
| 0.1   | 0.998 | -3.4 | 4.99 | -177 | 0.007 | -73 | 0.366 | -15  |
| 0.2   | 0.997 | -6.8 | 4.97 | -173 | 0.008 | 30  | 0.331 | -8.8 |
| 0.3   | 0.995 | -10  | 4.99 | -167 | 0.012 | 96  | 0.328 | -9.2 |
| 0.4   | 0.976 | -14  | 4.98 | 161  | 0.012 | 82  | 0.316 | -11  |
| 0.5   | 0.963 | -17  | 4.91 | 156  | 0.014 | 89  | 0.318 | -12  |
| 0.6   | 0.957 | -21  | 4.81 | 151  | 0.020 | 77  | 0.306 | -14  |
| 0.7   | 0.942 | -24  | 4.76 | 146  | 0.022 | 83  | 0.302 | -16  |
| 0.8   | 0.920 | -27  | 4.63 | 141  | 0.027 | 79  | 0.297 | -17  |
| 0.9   | 0.887 | -31  | 4.50 | 136  | 0.031 | 79  | 0.289 | -21  |
| 1.0   | 0.871 | -33  | 4.40 | 132  | 0.033 | 75  | 0.276 | -21  |
| 1.1   | 0.846 | -36  | 4.31 | 128  | 0.035 | 75  | 0.269 | -22  |
| 1.2   | 0.826 | -39  | 4.16 | 123  | 0.037 | 75  | 0.263 | -22  |
| 1.3   | 0.807 | -41  | 4.12 | 119  | 0.039 | 70  | 0.256 | -24  |
| 1.4   | 0.788 | -44  | 4.01 | 116  | 0.042 | 73  | 0.246 | -24  |
| 1.5   | 0.762 | -46  | 3.91 | 112  | 0.043 | 72  | 0.240 | -24  |
| 1.6   | 0.744 | -49  | 3.77 | 108  | 0.047 | 71  | 0.234 | -25  |
| 1.7   | 0.723 | -51  | 3.69 | 105  | 0.048 | 71  | 0.229 | -24  |
| 1.8   | 0.703 | -53  | 3.60 | 101  | 0.051 | 70  | 0.221 | -23  |
| 1.9   | 0.687 | -55  | 3.50 | 98   | 0.052 | 71  | 0.215 | -22  |
| 2.0   | 0.665 | -57  | 3.42 | 94   | 0.054 | 72  | 0.208 | -21  |
| 2.1   | 0.647 | -58  | 3.28 | 91   | 0.057 | 72  | 0.203 | -20  |
| 2.2   | 0.636 | -60  | 3.25 | 88   | 0.058 | 70  | 0.193 | -59  |
| 2.3   | 0.611 | -62  | 3.20 | 84   | 0.060 | 69  | 0.184 | -17  |
| 2.4   | 0.595 | -63  | 3.14 | 82   | 0.062 | 70  | 0.176 | -14  |
| 2.5   | 0.573 | -66  | 3.06 | 78   | 0.063 | 71  | 0.172 | -11  |

| f   | Fmin | $\Gamma_{opt}$ |     | RN       |
|-----|------|----------------|-----|----------|
| GHz | dB   | MAG            | ANG | $\Omega$ |
| 0.8 | 1.13 | 0.76           | 18  | 58.5     |
| 1.0 | 1.16 | 0.74           | 21  | 56.3     |
| 1.2 | 1.21 | 0.73           | 27  | 52.7     |
| 1.4 | 1.26 | 0.72           | 30  | 49.1     |
| 1.6 | 1.33 | 0.70           | 34  | 48.5     |
| 1.8 | 1.42 | 0.68           | 38  | 45.2     |
| 2.0 | 1.55 | 0.66           | 42  | 43.4     |

S- and noise-parameters are also available on CD-ROM.

## Application Circuit for measuring S-parameters

 $f = 200\text{MHz to } 2.5\text{GHz}$ 

1) Caution! DC - decoupling capacitors are not integrated in device is an approved CECC manufacturer.