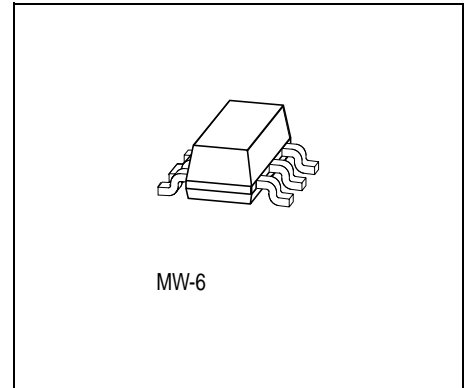


# GaAs MMIC

## Data Sheet

# CMY 91

- GaAs mixer with integrated IF-amplifier for mobile communication
- Frequency range 0.8 GHz to 2.5 GHz
- Very low power consumption (1 mA typ.)
- Single positive supply voltage
- Operating voltage range: 2.7 to 6 V
- Miniature package MW-6 based on SOT-23



ESD: **E**lectrostatic **d**ischarge sensitive device, observe handling precautions!

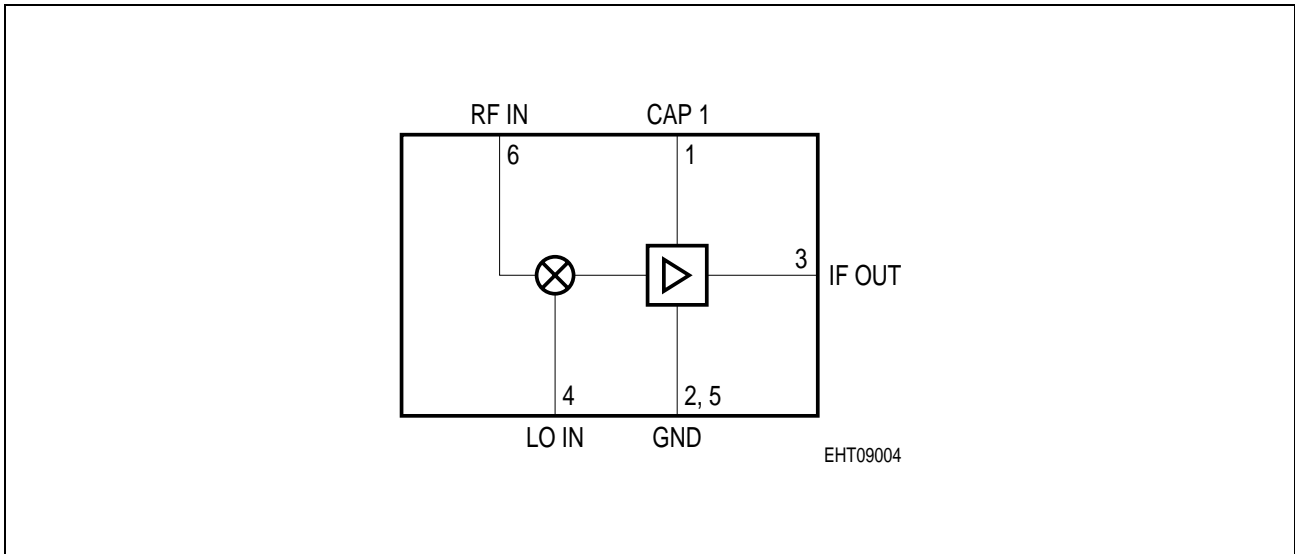
Type	Marking	Ordering Code (taped)	Package <sup>1)</sup>
CMY 91	M2	Q62702-M9	MW-6

<sup>1)</sup> Dimensions see **Page 14**.

Maximum Ratings	Symbol	Value	Unit
Drain-source voltage	$V_{IF-GND}$	8	V
Gate-source voltage range	$V_{LO-GND}$	- 5 ... 0	V
Drain current	$I_{IF}$	20	mA
RF- / LO-peak current	$+ I_{RF} + I_{LO}$	2	mA
Channel temperature	$T_{Ch}$	150	°C
Storage temperature range	$T_{stg}$	- 55 ... + 150	°C
Total power dissipation ( $T_S = t.b.d.$ °C) <sup>1)</sup>	$P_{tot}$	160	mW

<sup>1)</sup>  $T_S$ : Temperature measured at soldering point GND

Thermal Resistance	Symbol	Value	Unit
Channel-soldering point GND	$R_{thChS}$	350	K/W


**Figure 1 Block Diagram**
**Electrical Characteristics**
 $T_A = 25\text{ °C}$ ,  $V_D = 3\text{ V}$ , unless otherwise specified.

 Characteristics of 900 MHz test and application circuit see **Page 8** and **Page 11**.

Parameters	Symbol	Limit Values			Unit	Test Conditions
		min.	typ.	max.		
Drain-source breakdown voltage	$V_{(BR)\text{ IF-GND}}$	8	–	–	V	$I_{IF} = 500\text{ }\mu\text{A}$ $V_{LO-GND} = 0\text{ V}$ $V_{RF-GND} = 4\text{ V}$ CAP-pin not connected
Drain current	$I_D$	0.8	1	1.4	mA	$V_{RF-GND} = 0\text{ V}$ $V_{LO-GND} = 0\text{ V}$ $V_{IF-GND} = 3\text{ V}$ CAP-pin not connected
Conversion gain	$G_C$	–	5.5	–	dB	$f_{RF} = 920\text{ MHz}$ $f_{LO} = 965\text{ MHz}$ $f_{IF} = 45\text{ MHz}$ $P_{LO} = -3\text{ dBm}$
Single sideband noise figure	$F_{SSB}$	–	9	–	dB	$f_{RF} = 920\text{ MHz}$ $f_{LO} = 965\text{ MHz}$ $f_{IF} = 45\text{ MHz}$ $P_{LO} = -3\text{ dBm}$

**Electrical Characteristics (cont'd)**
 $T_A = 25\text{ °C}$ ,  $V_D = 3\text{ V}$ , unless otherwise specified.

 Characteristics of 900 MHz test and application circuit see **Page 8** and **Page 11**.

Parameters	Symbol	Limit Values			Unit	Test Conditions
		min.	typ.	max.		
3 <sup>rd</sup> order intermodulation	$IP3$	–	– 2	–	dBm	$f_{RF} = 920\text{ MHz}$ $f_{LO} = 965\text{ MHz}$ $f_{IF} = 45\text{ MHz}$ $P_{LO} = -3\text{ dBm}$
LO/RF isolation	$ISO_{LO/RF}$	–	11	–	dB	$f = 965\text{ MHz}$

**Electrical Characteristics**
 $T_A = 25\text{ °C}$ ,  $V_D = 3\text{ V}$ ; CAP-pin connected to ground by 680  $\Omega$  resistor.

Parameters	Symbol	Limit Values			Unit	Test Conditions
		min.	typ.	max.		
Drain current	$I_D$	–	2.5	–	mA	$V_{RF-GND} = 0\text{ V}$ $V_{LO-GND} = 0\text{ V}$ $V_{IF-GND} = 3\text{ V}$
Conversion gain	$G_C$	–	9.5	–	dB	$f_{RF} = 920\text{ MHz}$ $f_{LO} = 965\text{ MHz}$ $f_{IF} = 45\text{ MHz}$ $P_{LO} = -3\text{ dBm}$
Single sideband noise figure	$F_{SSB}$	–	8.0	–	dB	$f_{RF} = 920\text{ MHz}$ $f_{LO} = 965\text{ MHz}$ $f_{IF} = 45\text{ MHz}$ $P_{LO} = -3\text{ dBm}$
3 <sup>rd</sup> order intermodulation	$IP3$	–	0	–	dBm	$f_{RF} = 920\text{ MHz}$ $f_{LO} = 965\text{ MHz}$ $f_{IF} = 45\text{ MHz}$ $P_{LO} = -3\text{ dBm}$
LO/RF isolation	$ISO_{LO/RF}$	–	11	–	dB	$f = 965\text{ MHz}$

 Not used ports were terminated by 50  $\Omega$ .

 Please make sure that LO-signal is clean of noise and spurious at  $f = f_{LO} \pm f_{IF}$ .

**Electrical Characteristics**
 $T_A = 25\text{ °C}$ ,  $V_D = 3\text{ V}$  unless otherwise specified.

 Characteristics of 1450 MHz application circuit see **Page 9** and **Page 11**.

Parameters	Symbol	Limit Values			Unit	Test Conditions
		min.	typ.	max.		
Drain-source breakdown voltage	$V_{(BR)\text{ IF-GND}}$	8	–	–	V	$I_{IF} = 500\text{ }\mu\text{A}$ $V_{LO-GND} = 0\text{ V}$ $V_{RF-GND} = 4\text{ V}$ CAP-pin not connected
Drain current	$I_D$	0.8	1	1.4	mA	$V_{RF-GND} = 0\text{ V}$ $V_{LO-GND} = 0\text{ V}$ $V_{IF-GND} = 3\text{ V}$ CAP-pin not connected
Conversion gain	$G_C$	–	5.5	–	dB	$f_{RF} = 1450\text{ MHz}$ $f_{LO} = 1350\text{ MHz}$ $f_{IF} = 100\text{ MHz}$ $P_{LO} = -3\text{ dBm}$
Single sideband noise figure	$F_{SSB}$	–	10	–	dB	$f_{RF} = 1450\text{ MHz}$ $f_{LO} = 1350\text{ MHz}$ $f_{IF} = 100\text{ MHz}$ $P_{LO} = -3\text{ dBm}$
3 <sup>rd</sup> order intermodulation	$IP3$	–	-2	–	dBm	$f_{RF} = 1450\text{ MHz}$ $f_{LO} = 1350\text{ MHz}$ $f_{IF} = 100\text{ MHz}$ $P_{LO} = -3\text{ dBm}$
LO/RF isolation	$Iso_{LO/RF}$	–	8	–	dB	$f = 1350\text{ MHz}$

**Electrical Characteristics**
 $T_A = 25\text{ °C}$ ,  $V_D = 3\text{ V}$ ; CAP-pin connected to ground by 680  $\Omega$  resistor.

Parameters	Symbol	Limit Values			Unit	Test Conditions
		min.	typ.	max.		
Drain current	$I_D$	–	2.5	–	mA	$V_{RF-GND} = 0\text{ V}$ $V_{LO-GND} = 0\text{ V}$ $V_{IF-GND} = 3\text{ V}$
Conversion gain	$G_C$	–	7.5	–	dB	$f_{RF} = 1450\text{ MHz}$ $f_{LO} = 1350\text{ MHz}$ $f_{IF} = 100\text{ MHz}$ $P_{LO} = -3\text{ dBm}$
Single sideband noise figure	$F_{SSB}$	–	9.5	–	dB	$f_{RF} = 1450\text{ MHz}$ $f_{LO} = 1350\text{ MHz}$ $f_{IF} = 100\text{ MHz}$ $P_{LO} = -3\text{ dBm}$
3 <sup>rd</sup> order intermodulation	$IP3$	–	0	–	dBm	$f_{RF} = 1450\text{ MHz}$ $f_{LO} = 1350\text{ MHz}$ $f_{IF} = 100\text{ MHz}$ $P_{LO} = -3\text{ dBm}$
LO/RF isolation	$ISO_{LO/RF}$	–	8	–	dB	$f = 1350\text{ MHz}$

 Not used ports were terminated by 50  $\Omega$ .

**Electrical Characteristics**
 $T_A = 25\text{ °C}$ ,  $V_D = 3\text{ V}$  unless otherwise specified.

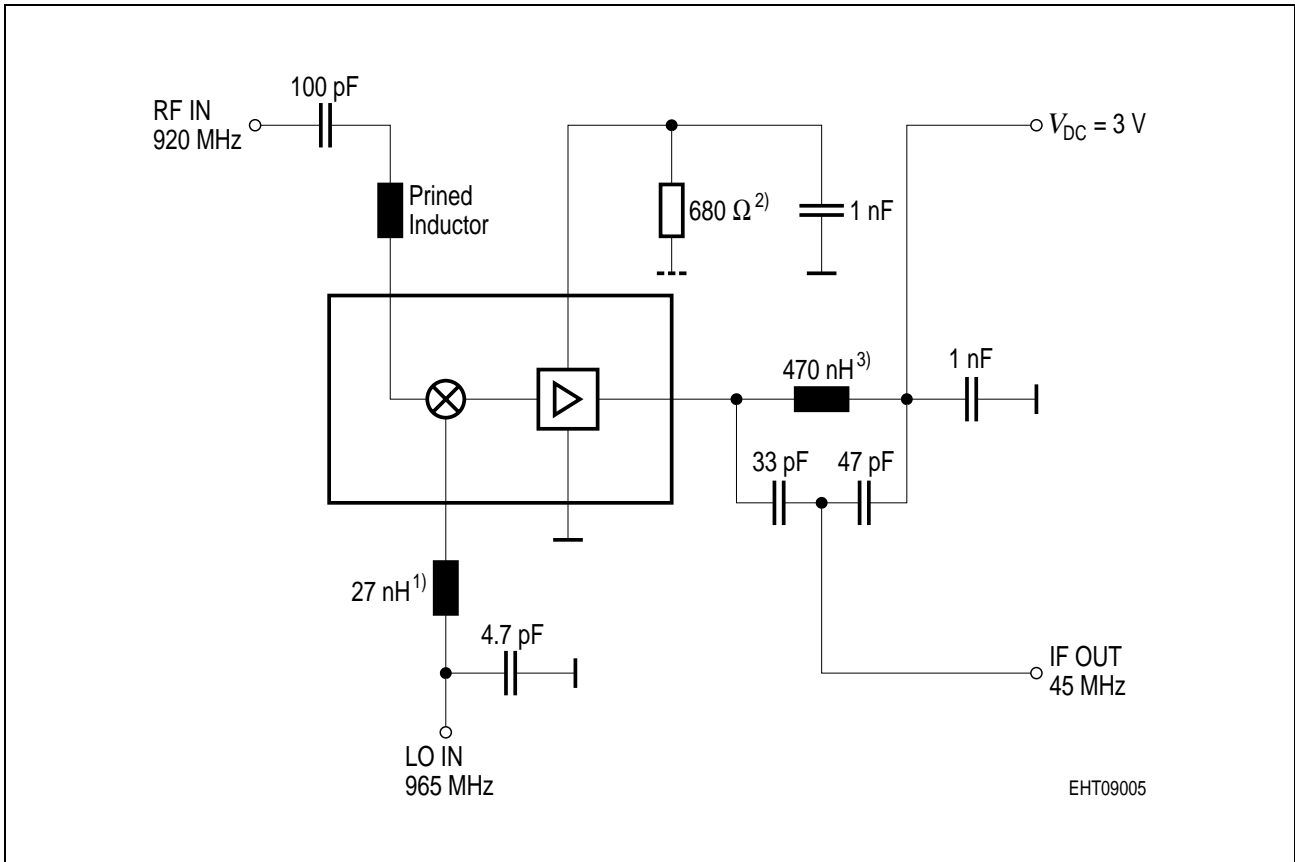
 Characteristics of 1900 MHz application see **Page 10** and **Page 12**.

Parameters	Symbol	Limit Values			Unit	Test Conditions
		min.	typ.	max.		
Drain-source breakdown voltage	$V_{(BR)\text{ IF-GND}}$	8	–	–	V	$I_{IF} = 500\text{ }\mu\text{A}$ $V_{LO-GND} = 0\text{ V}$ $V_{RF-GND} = 4\text{ V}$ CAP-pin not connected
Drain current	$I_D$	0.8	1	1.4	mA	$V_{RF-GND} = 0\text{ V}$ $V_{LO-GND} = 0\text{ V}$ $V_{IF-GND} = 3\text{ V}$ CAP-pin not connected
Conversion gain	$G_C$	–	5	–	dB	$f_{RF} = 1900\text{ MHz}$ $f_{LO} = 1800\text{ MHz}$ $f_{IF} = 100\text{ MHz}$ $P_{LO} = -3\text{ dBm}$
Single sideband noise figure	$F_{SSB}$	–	10.5	–	dB	$f_{RF} = 1900\text{ MHz}$ $f_{LO} = 1800\text{ MHz}$ $f_{IF} = 100\text{ MHz}$ $P_{LO} = -3\text{ dBm}$
3 <sup>rd</sup> order intermodulation	$IP3$	–	-2	–	dBm	$f_{RF} = 1900\text{ MHz}$ $f_{LO} = 1800\text{ MHz}$ $f_{IF} = 100\text{ MHz}$ $P_{LO} = -3\text{ dBm}$
LO/RF isolation	$Iso_{LO/RF}$	–	8	–	dB	$f = 1800\text{ MHz}$

**Electrical Characteristics**
 $T_A = 25\text{ °C}, V_D = 3\text{ V};$  CAP-pin connected to ground by 680  $\Omega$  resistor.

Parameters	Symbol	Limit Values			Unit	Test Conditions
		min.	typ.	max.		
Drain current	$I_D$	–	2.5	–	mA	$V_{RF-GND} = 0\text{ V}$ $V_{LO-GND} = 0\text{ V}$ $V_{IF-GND} = 3\text{ V}$
Conversion gain	$G_C$	–	7.5	–	dB	$f_{RF} = 1900\text{ MHz}$ $f_{LO} = 1800\text{ MHz}$ $f_{IF} = 100\text{ MHz}$ $P_{LO} = -3\text{ dBm}$
Single sideband noise figure	$F_{SSB}$	–	9.5	–	dB	$f_{RF} = 1900\text{ MHz}$ $f_{LO} = 1800\text{ MHz}$ $f_{IF} = 100\text{ MHz}$ $P_{LO} = -3\text{ dBm}$
3 <sup>rd</sup> order intermodulation	$IP3$	–	0	–	dBm	$f_{RF} = 1900\text{ MHz}$ $f_{LO} = 1800\text{ MHz}$ $f_{IF} = 100\text{ MHz}$ $P_{LO} = -3\text{ dBm}$
LO/RF isolation	$ISO_{LO/RF}$	–	8	–	dB	$f = 1800\text{ MHz}$

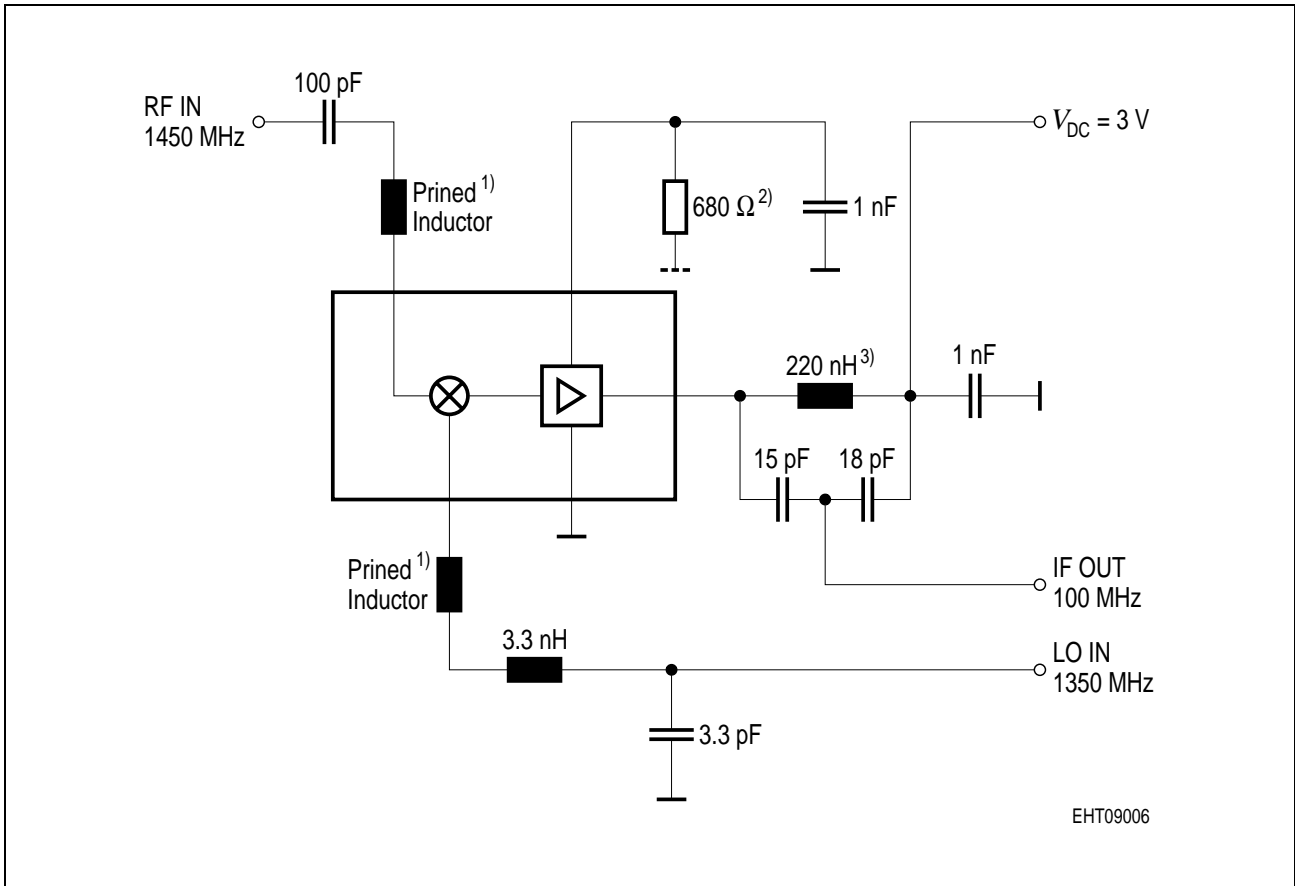
 Not used ports were terminated by 50  $\Omega$ .



**Figure 2 900 MHz Measurement and Application Circuit**

- 1) Epcos SIMID 01-coil; Ordering code: B82412-A3270-M
- 2) Optional resistor increases IF-amplifier operating current and improves conversion gain and intermodulation performance (minimum value: 27 Ω)
- 3) Epcos SIMID 01-coil; Ordering code: B82412-A3471-K

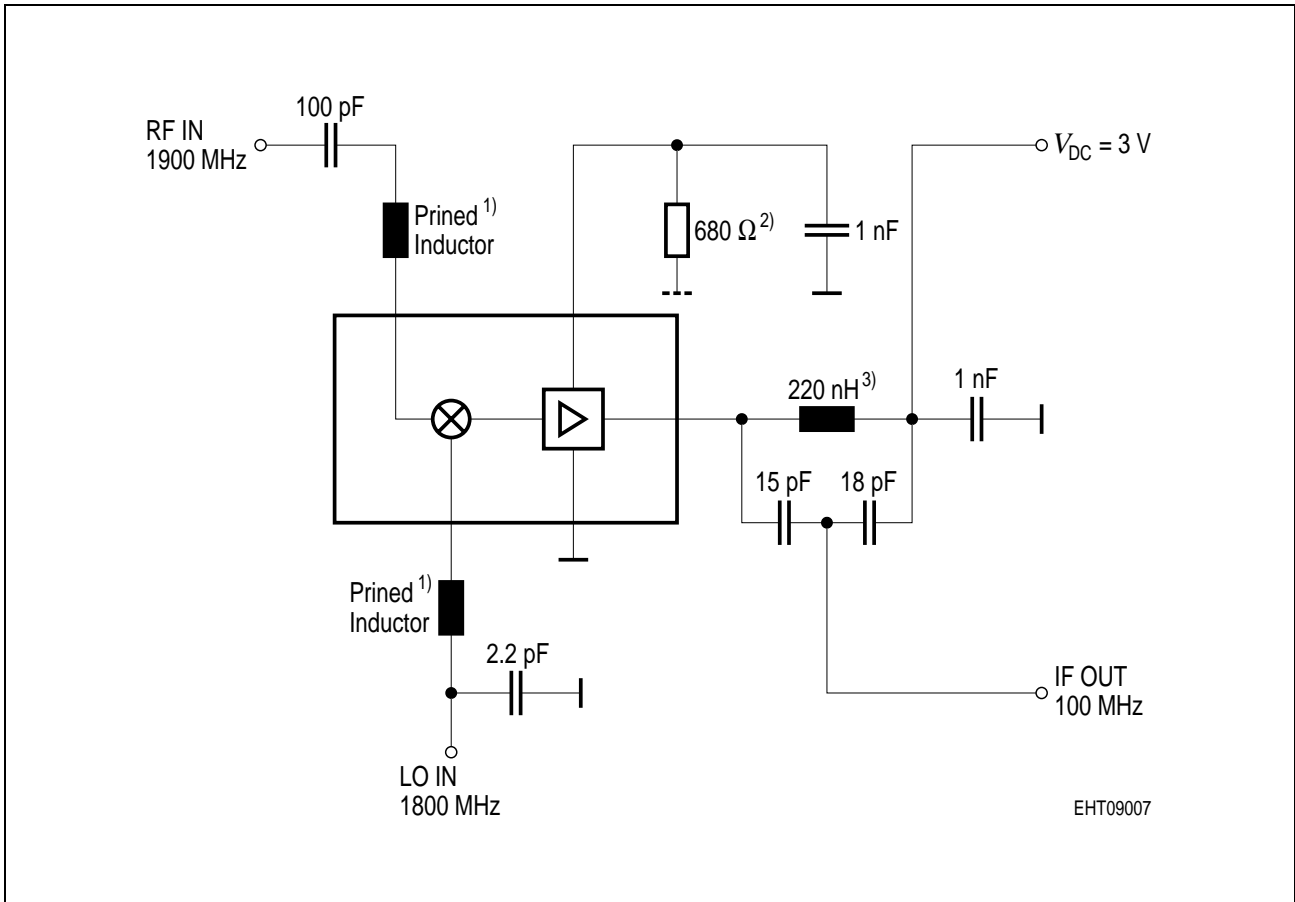




EHT09006

**Figure 3 1450 MHz Measurement and Application Circuit**

- 1) Tune for optimum match
- 2) Optional resistor increases IF-amplifier operating current and improves conversion gain and intermodulation performance (minimum value: 27  $\Omega$ )
- 3) Epcos SIMID 01-coil; Ordering code: B82412-A3221-K



EHT09007

**Figure 4 1900 MHz Measurement and Application Circuit**

- 1) Tune for optimum match
- 2) Optional resistor increases IF-amplifier operating current and improves conversion gain and intermodulation performance (minimum value: 27  $\Omega$ )
- 3) Epcos SIMID 01-coil; Ordering code: B82412-A3221-M

PCB - Layouts for Application Circuits

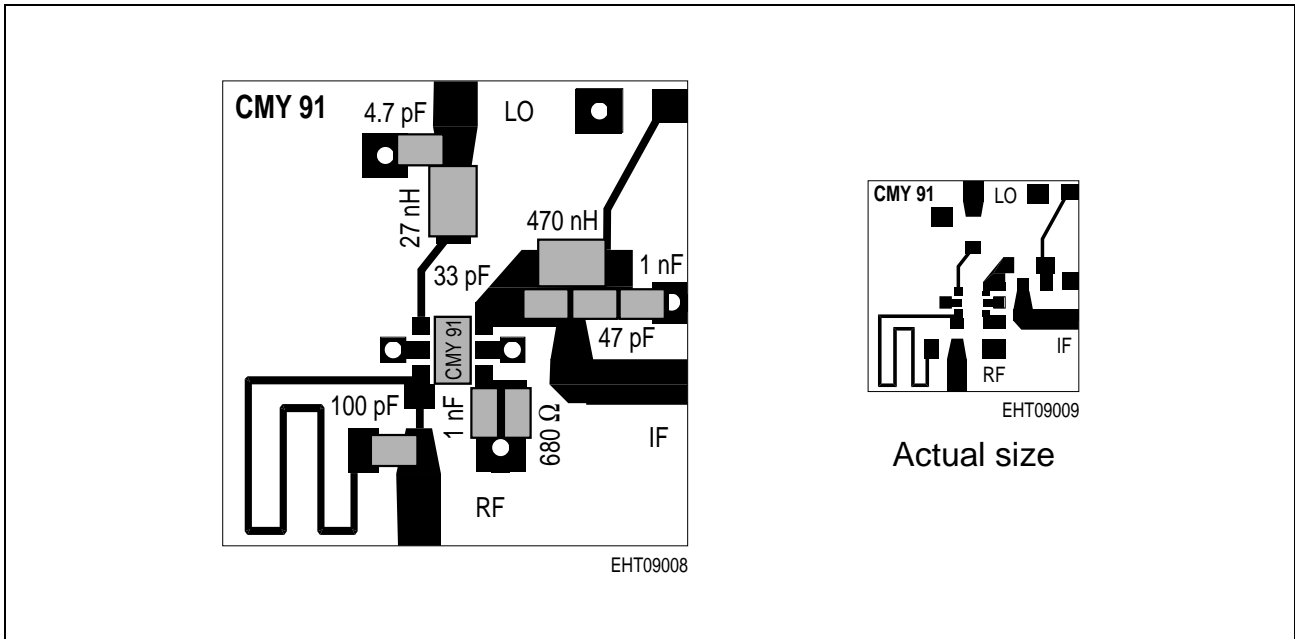


Figure 5 900 MHz - Application Board

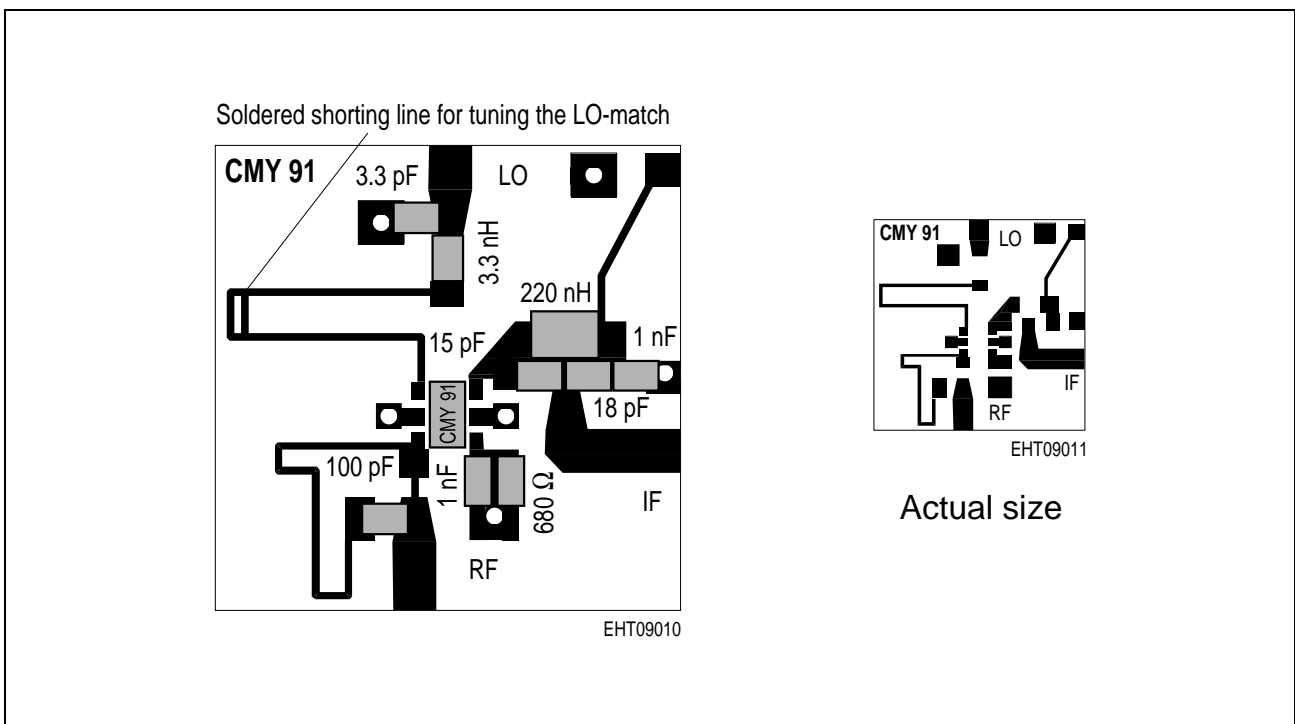
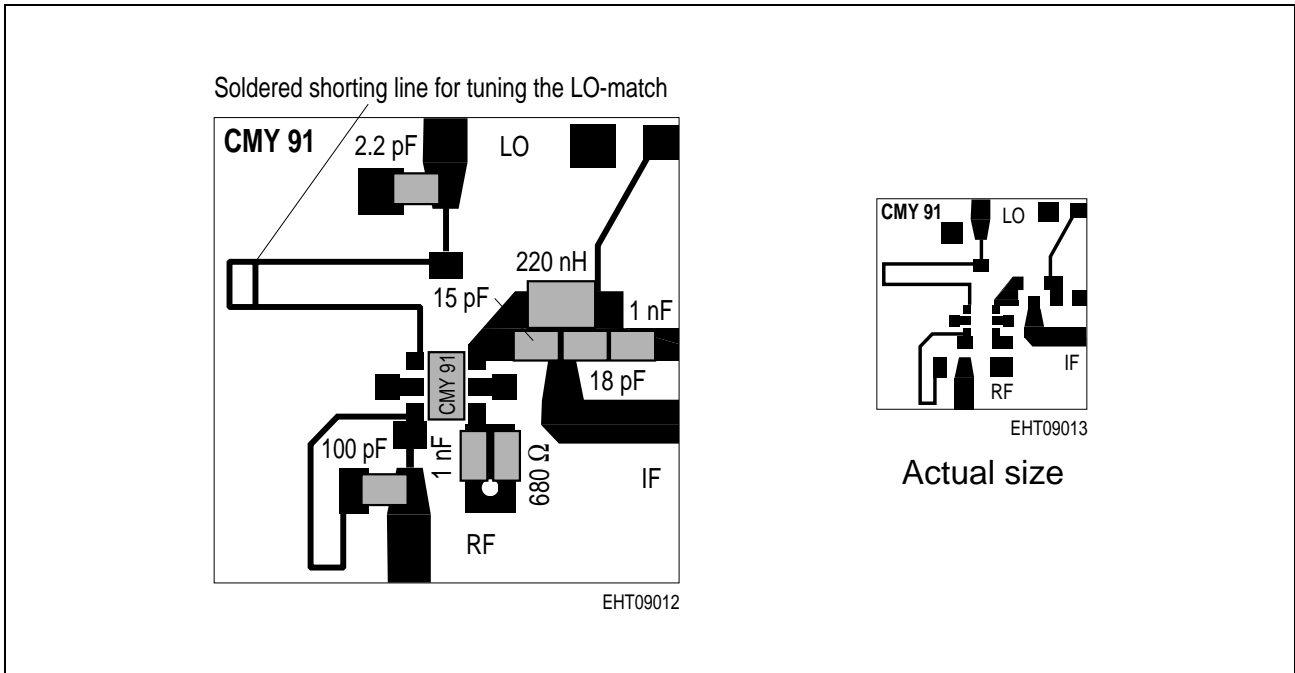


Figure 6 1450 MHz - Application Board<sup>1)</sup>

<sup>1)</sup> PCB - data: Glass fiber epoxy board (double sided),  $\epsilon_r = 4.8$ , thickness = 1 mm



**Figure 7 1900 MHz - Application Board<sup>1)</sup>**

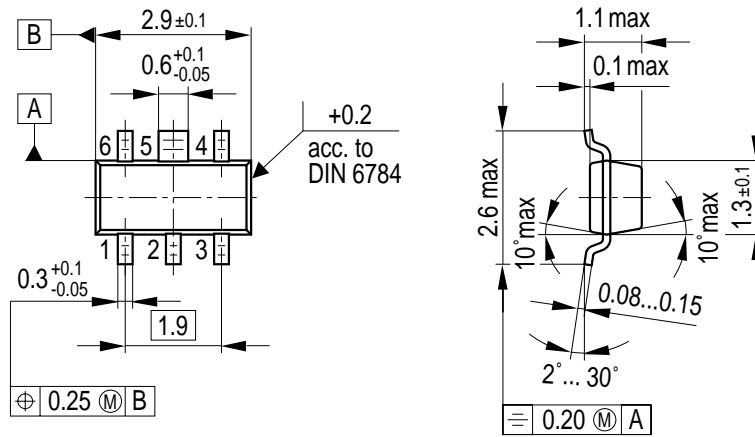
<sup>1)</sup> PCB - data: Glass fiber epoxy board (double sided),  $\epsilon_r = 4.8$ , thickness = 1 mm

<b>Dim.</b>	<b>min.</b>	<b>nom.</b>	<b>max.</b>	<b>Gradient</b>	<b>Remark</b>
A	–	–	1.1	–	–
A <sub>1</sub>	–	–	0.1	–	–
A <sub>2</sub>	–	–	1.0	–	–
b	–	0.3	–	–	–
b <sub>1</sub>	–	0.6	–	–	–
c	0.08	–	0.15	–	–
D	2.8	–	3.0	–	–
E	1.2	–	1.4	–	–
e	–	0.95	–	–	–
e <sub>1</sub>	–	1.9	–	–	–
H <sub>E</sub>	–	–	2.6	–	–
L <sub>E</sub>	–	–	0.6	–	–
a	–	–	–	max. 10°	1)
q	–	–	–	2° ... 30°	–

1) Applicable on all sides.

Package Outlines

**MW-6**  
(Special Package)



GPW05794

**Sorts of Packing**

Package outlines for tubes, trays etc. are contained in our Data Book "Package Information".

**SMD = Surface Mounted Device**

Dimensions in mm