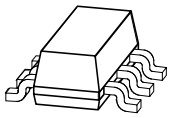
GaAs MMIC

CMY 200

Data Sheet

- Ultralinear Down-converter 1200 MHz to 40 MHz
- Operating Voltage Range: 3 to 6 V
- Very low Current Consumption, typ. 45 mA
- Single ended Input and Output
- RF- and IF-Port Impedance close to 50 Ω
- Very wide LO-Level Range
- All Gold Metallization
- Chip fully passivated
- Very small Outlines



MW-6

ESD: **E**lectro**s**tatic **d**ischarge sensitive device
Observe handling Precautions!

Type	**Marking**	**Ordering Code** (tape and reel)	**Package**
CMY 200	M1	Q62702-M6	MW-6

Maximum Ratings

Parameter	**Symbol**	**Limit Values**		**Unit**
		min.	**max.**	
Supply Voltage to LO-Amp	$V_{D, LO}$	0	6	V
Supply Voltage to IF-Amp	$V_{D, IF}$	0	6	V
DC-Voltage to RF-Port	V_{RF}	– 6	+ 6	V
DC-Voltage to Input LO-Amp	$V_{IN, LO}$	– 3	0	V
RF Input Power	$P_{IN, RF}$	–	10	dBm
LO Input Power	$P_{IN, LO}$	–	10	dBm
Channel Temperature	T_{Ch}	–	150	°C
Storage Temperature	T_{stg}	– 55	150	°C

Thermal Resistance

Parameter	Symbol	Value	Unit
Channel to Soldering Point (GND)	R_{thChS}	≤ 100	K/W

Electrical Characteristics

T_A = 25 °C; V_{DD} = 5 V; see test circuit; f_{RF} = 1224 MHz; f_{LO} = 1185 MHz; P_{LO} = – 2 dBm; f_{IF} = 39 MHz, unless otherwise specified

Parameters	Symbol	Limit Values			Unit	Test Conditions
		min.	typ.	max.		
Operating Current	I_{OP}	25	50	70	mA	–
Required LO-Power	P_{LO}	–	– 5	– 2	dBm	–
Conversion Gain	G_{MIX}	6	8	–	dB	–
Single-Side-Band Noise Figure	F_{SSB}	–	8	10	dB	–
3rd Order IMD 2 Tones	d_{IM3}	–	– 65	– 60	dBc	P_{IN} = 2 × (– 15 dBm); f_{RF1} = 1224 MHz; f_{RF2} = 1219 MHz
3rd Order Input Intercept Point	$IP3_{IN}$	18	21.5	–	dBm	P_{IN} = – 12 dBm; 2 Tones 5 MHz apart
LO Leakage at RF-Port	$P_{LO, RF}$	–	– 9	–	dBm	–
$P_{-1\,dB}$ Output Power	$P_{-1\,dB, out}$	–	17	–	dBm	–

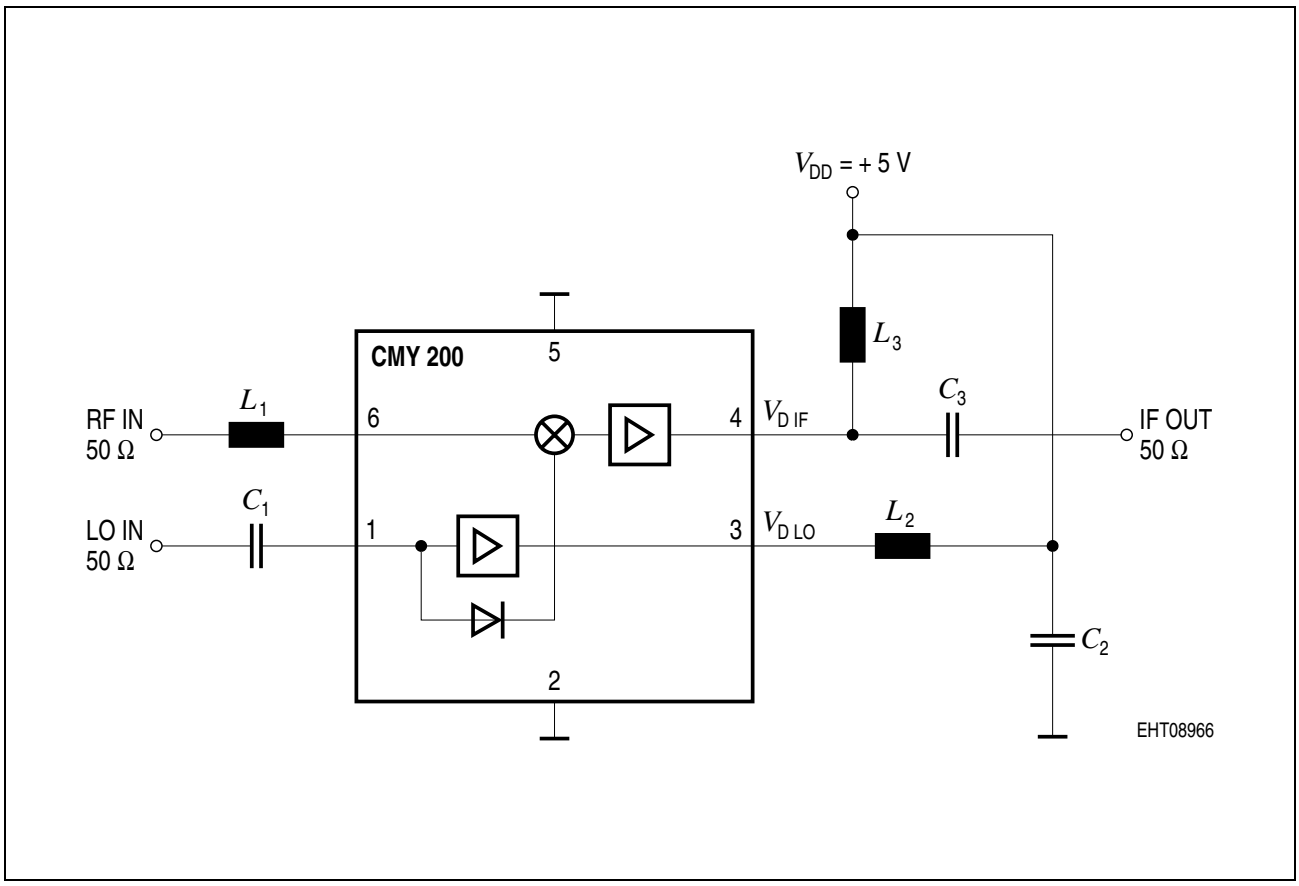


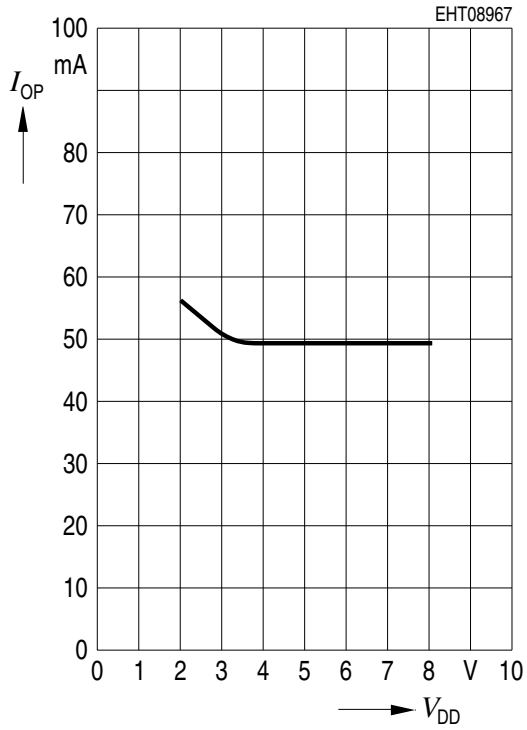
Figure 1 Test Circuit

L_1	L_2	L_3	C_1	C_2	C_3
nH	**nH**	**µH**	**pF**	**pF**	**nF**
6[1)]	12[2)]	22	22	47	1

1) Approximate value for RF-frequency 1224 MHz (the value can be tuned for minimum F_{SSB} at RF-frequency).
2) Approximate value for LO-frequency 1185 MHz (the value is tuned for max. gain of the LO-amplifier at LO-frequency; Indicator is e.g. a minimum DC-current consumption into port 3 at very low LO-power (< – 10 dBm) into port 1 or a maximum available G_{MIX} at very low LO-power (< – 10 dBm) into port 1).

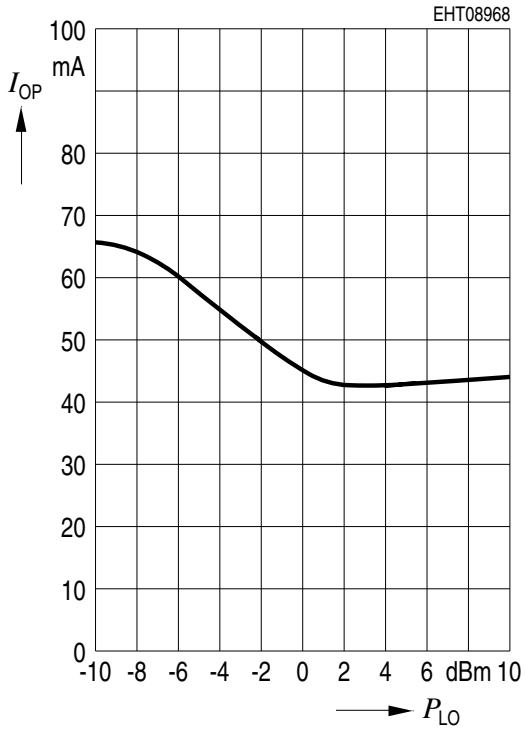
Operating Current $I_{OP} = f(V_{DD})$

P_{LO} = – 2 dBm



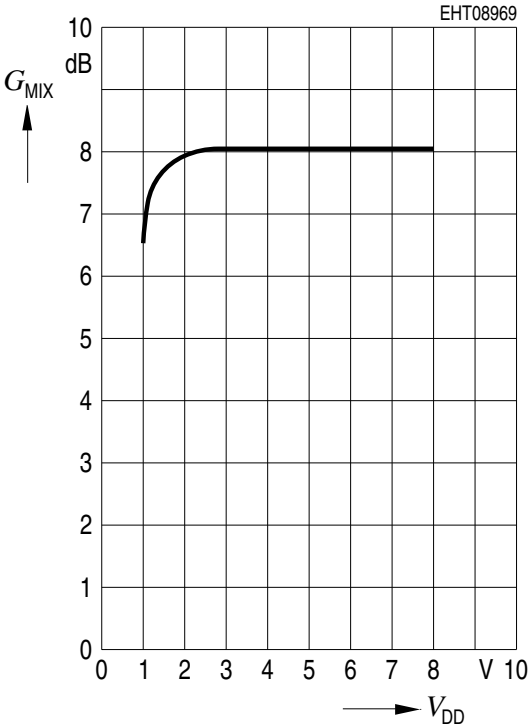
Operating Current $I_{OP} = f(P_{LO})$

V_{DD} = + 5 V



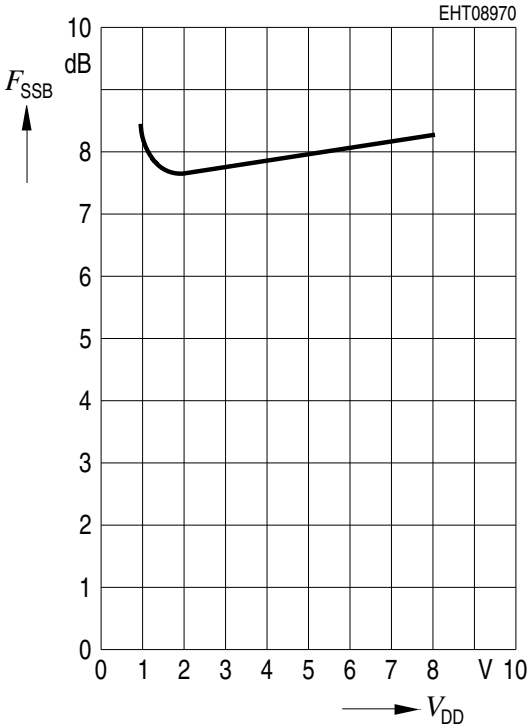
Conversion Gain $G_{MIX} = f(V_{DD})$

P_{LO} = – 2 dBm, f_{RF} = 1224 MHz;
f_{LO} = 1185 MHz



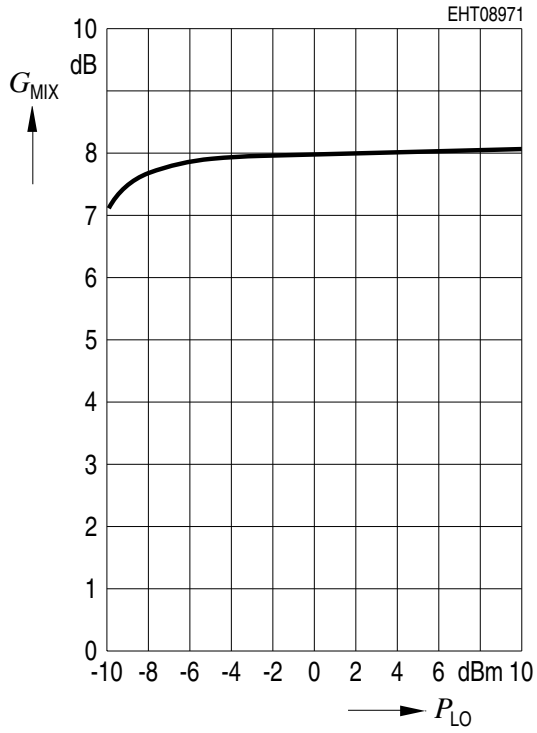
SSB Noise Figure $F_{SSB} = f(V_{DD})$

P_{LO} = – 2 dBm; f_{RF} = 1224 MHz,
f_{LO} = 1185 MHz



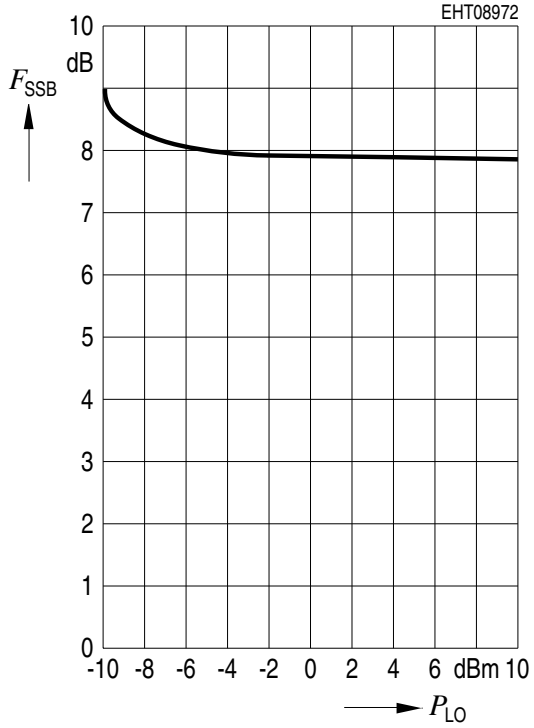
Conversion Gain $G_{MIX} = f(P_{LO})$

V_{DD} = 5 V, f_{RF} = 1224 MHz;
f_{LO} = 1185 MHz



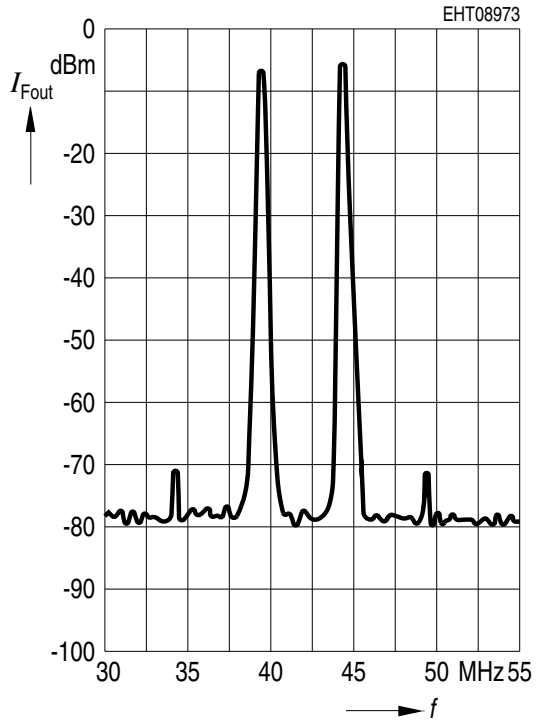
SSB Noise Figure $F_{SSB} = f(P_{LO})$

V_{DD} = + 5 V; f_{RF} = 1224 MHz;
f_{LO} = 1185 MHz



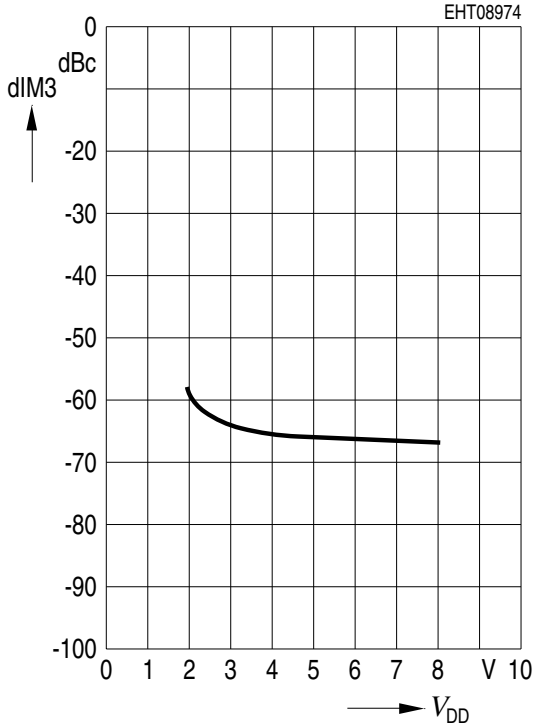
Third Order IMD $IF_{OUT} = f(f)$

P_{IN} = 2 × – 15 dBm, P_{LO} = – 2 dBm

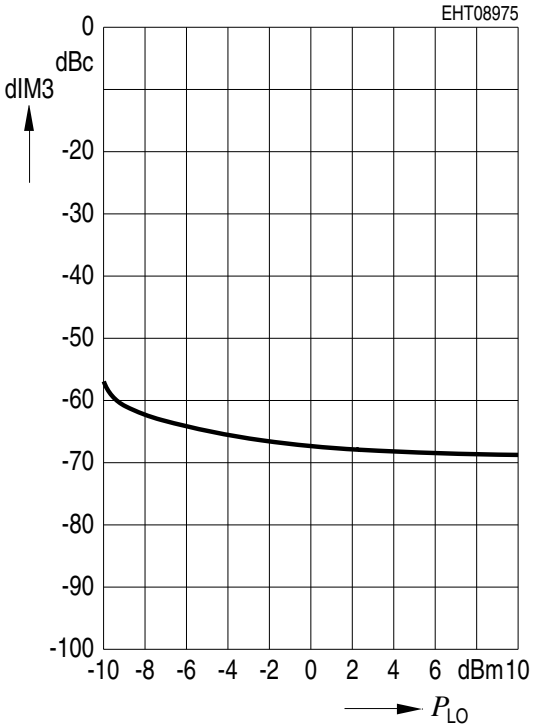


Third Order IMD $d_{IM3} = f(V_{DD})$

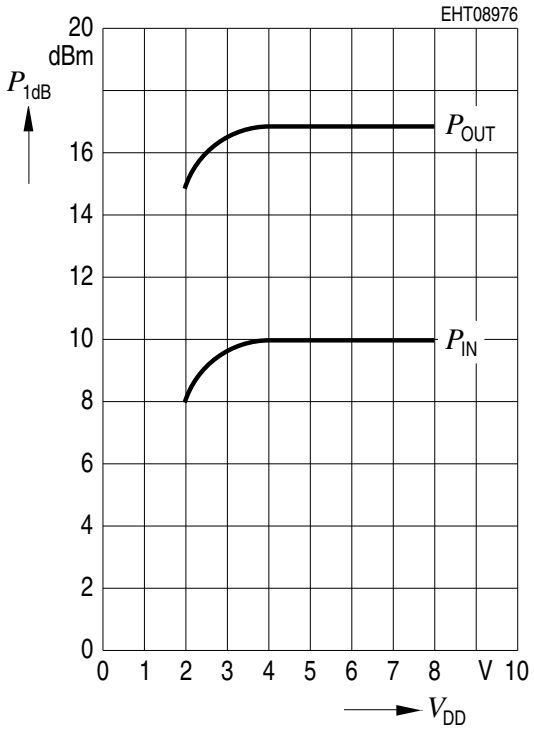
P_{IN} = 2 × – 15 dBm, P_{LO} = – 2 dBm



Third Order IMD $d_{IM3} = P_{LO}$
V_{DD} = + 5 V, P_{IN} = – 12 dBm
Tones 5 MHz apart

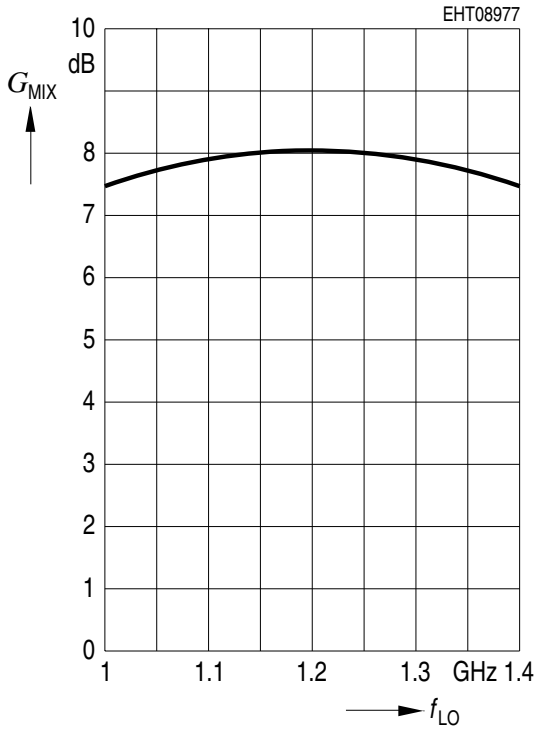


Power at 1 dB Gain Compression
$P_{-1\ dBm} = f(V_{DD})$, P_{LO} = – 2 dBm;
f_{RF} = 1224 MHz; f_{LO} = 1185 MHz



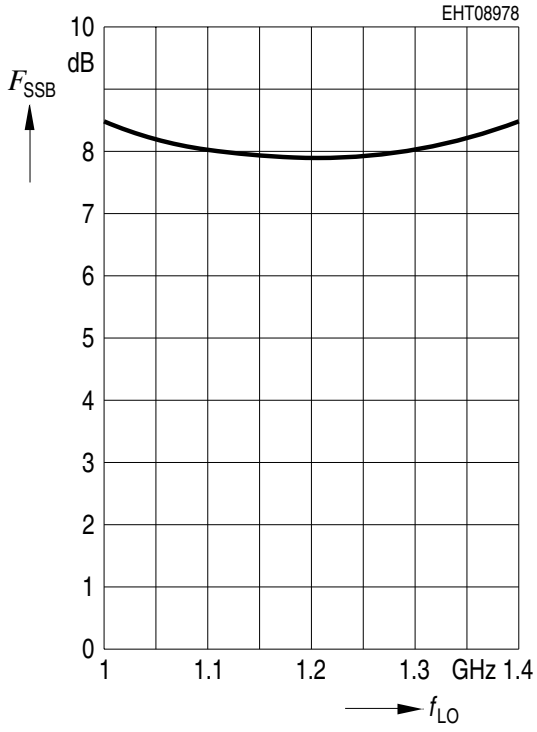
Conversion Gain $G_{MIX} = f(f_{LO})$

$P_{LO} = -2$ dBm; $f_{RF} = f_{LO} + f_{IF}$; $f_{IF} = 39$ MHz



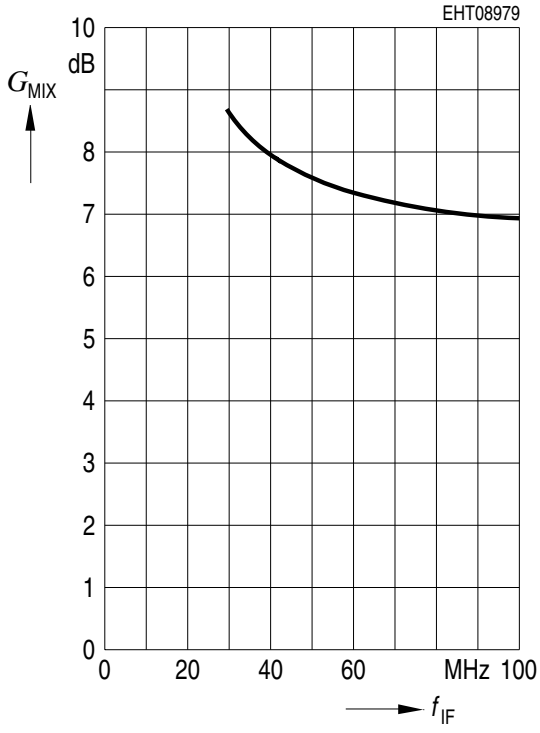
SSB Noise Figure $F_{SSB} = f(f_{LO})$

$P_{LO} = -2$ dBm; $f_{RF} = f_{LO} + f_{IF}$; $f_{IF} = 39$ MHz



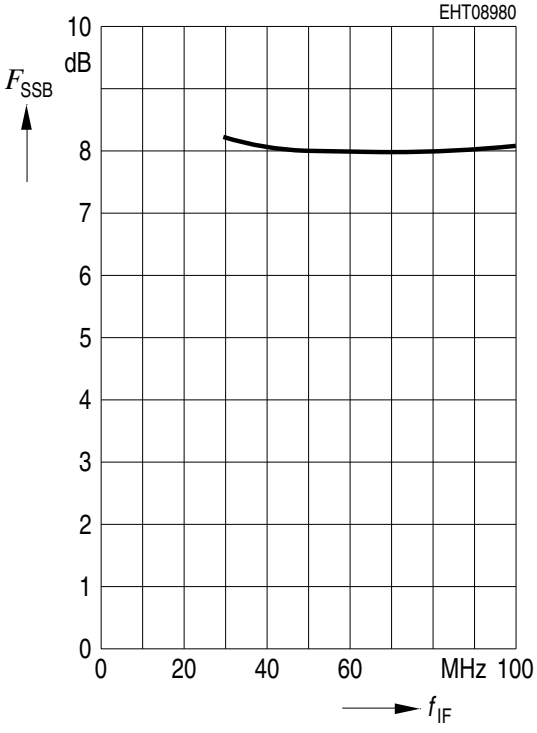
Conversion Gain $G_{MIX} = f(f_{IF})$

f_{LO} = 1185 MHz, $P_{LO} = -2$ dBm;
$f_{RF} = f_{LO} + f_{IF}$



SSB Noise Figure $F_{SSB} = f(f_{IF})$

f_{LO} = 1185 MHz; $P_{LO} = -2$ dBm;
$f_{RF} = f_{LO} + f_{IF}$



Typical Reflexion Coefficients of CMY 200, Z_0 = 50 Ω

f	Input Impedance into RF-Port (Pin #6) @ P_{LO} = – 2 dBm; f_{LO} = 1185 MHz		Impedance into IF-Port (Pin #4) @ P_{LO} = – 2 dBm; f_{LO} = 1185 MHz		Input Impedance into LO-Port (Pin #1)	
	Reflexion Coefficient		Reflexion Coefficient		Reflexion Coefficient	
MHz	Mag	Ang	Mag	Ang	Mag	Ang
100	0.94	– 22	0.25	– 1	0.98	– 6
200	0.82	– 40	0.32	4	0.97	– 12
300	0.75	– 50	0.34	– 1	0.98	– 17
400	0.69	– 63	0.35	– 7	0.99	– 22
500	0.64	– 76	0.32	– 14	1.0	– 28
600	0.57	– 89	0.27	– 17	1.02	– 33
700	0.48	– 102	0.22	– 11	1.04	– 40
800	0.36	– 112	0.21	7	1.05	– 43
900	0.23	– 117	0.26	19	1.06	– 55
1000	0.13	– 105	0.32	22	1.07	– 61
1050	0.15	– 53	–	–	–	–
1100	0.21	– 44	0.41	15	1.00	– 75
1150	0.33	– 43	–	–	0.94	– 80
1200	0.42	– 52	0.45	9	0.88	– 83
1250	0.47	– 67	–	–	0.80	– 86
1300	0.47	– 73	0.47	3	0.75	– 87
1350	0.48	– 80	–	–	0.69	– 87
1400	0.47	– 84	0.48	– 2	0.65	– 87
1450	–	–	–	–	0.62	– 86
1500	0.44	– 91	0.49	– 5	0.60	– 85
1600	0.42	– 97	0.50	– 8	0.58	– 85
1700	0.40	– 103	0.50	– 9	0.55	– 86
1800	0.38	– 108	0.50	–	0.53	– 87

Typical Reflexion Coefficients of CMY 200, Z_0 = 50 Ω (cont'd)

f	**Input Impedance into RF-Port (Pin #6) @ P_{LO} = – 2 dBm; f_{LO} = 1185 MHz**		**Impedance into IF-Port (Pin #4) @ P_{LO} = – 2 dBm; f_{LO} = 1185 MHz**		**Input Impedance into LO-Port (Pin #1)**	
	Reflexion Coefficient		**Reflexion Coefficient**		**Reflexion Coefficient**	
MHz	**Mag**	**Ang**	**Mag**	**Ang**	**Mag**	**Ang**
1900	0.36	– 111	0.50	– 13	0.50	– 88
2000	0.36	– 113	0.50	– 14	0.48	– 90

Supplementary Remarks to CMY 200

This ultralinear down-converter device is developed especially for an excellent intermodulation performance at low DC power consumption and a low demand of LO power as used e.g. for the second mixer of double conversion TV tuners.

So this down-converter is optimized for a RF-frequency of 1200 MHz (1000 MHz to 1400 MHz) and an IF-frequency range of about 40 MHz to 100 MHz.

This mixer MMIC device contains a mixer, a gain controlled LO buffer stage and an IF amplifier stage mounted into the very small MW-6 plastic package.

All ports are unsymmetric, RFport and IFport are near 50 Ω.

The RFport is matched to 50 Ω simply by a series inductance (the parasitic capacitance at the RF-port to ground must be kept as small as possible).

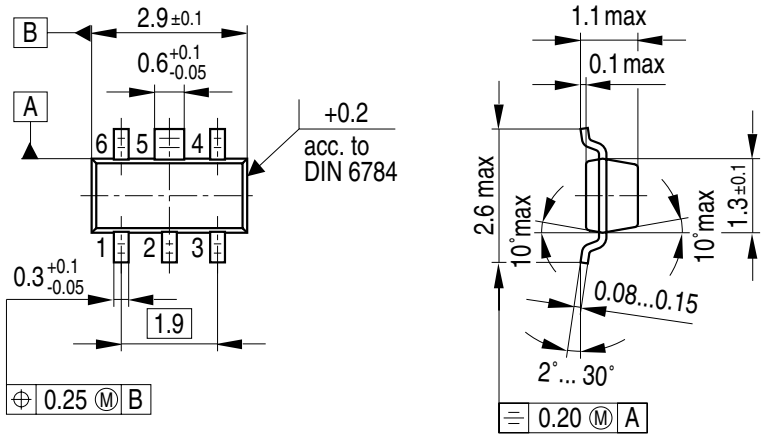
The LO-port is a high impedance port with a inner DC connection (internal AGC for LO buffer), a external DC block is necessary.

The LO port has a slightly negative input impedance within a frequency range of 500 MHz to 1100 MHz, no high source impedance should appear within this frequency range, if DC is blocked or LO is matched (R < 300 Ω).

Any noise spurious onto the LO source with the frequencies $f = f_{LO} \pm f_{IF}$ should be avoided.

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