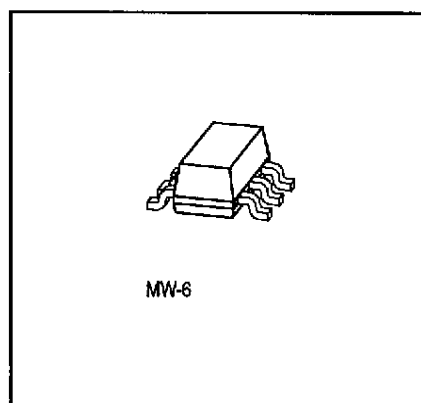


GaAs MMIC

Data Sheet

CMY 200

- 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



ESD: Electrostatic discharge 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

$T_A = 25^\circ\text{C}$; $V_{DD} = 5\text{ V}$; see test circuit; $f_{RF} = 1224\text{ MHz}$; $f_{LO} = 1185\text{ MHz}$; $P_{LO} = -2\text{ dBm}$; $f_{IF} = 39\text{ MHz}$, 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	–
3 rd Order IMD 2 Tones	d_{IM3}	–	– 65	– 60	dBc	$P_{IN} = 2 \times (-15\text{ dBm})$; $f_{RF1} = 1224\text{ MHz}$; $f_{RF2} = 1219\text{ MHz}$
3 rd Order Input Intercept Point	$IP3_{IN}$	18	21.5	–	dBm	$P_{IN} = -12\text{ dBm}$; 2 Tones 5 MHz apart
LO Leakage at RF-Port	$P_{LO, RF}$	–	– 9	–	dBm	–
$P_{-1\text{ dB}}$ Output Power	$P_{-1\text{ dB, out}}$	–	17	–	dBm	–

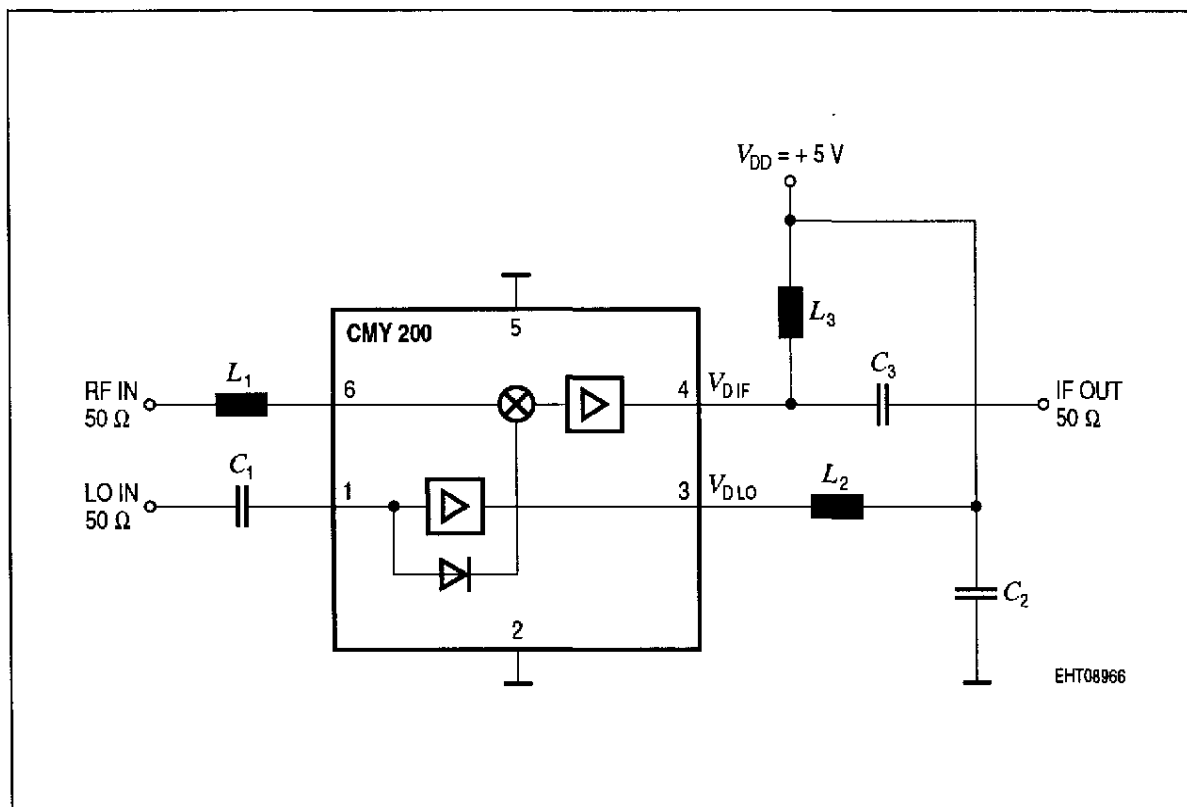


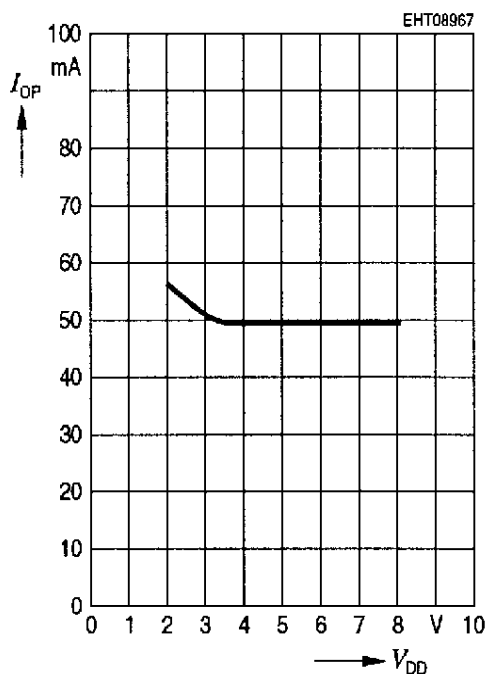
Figure 1 Test Circuit

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

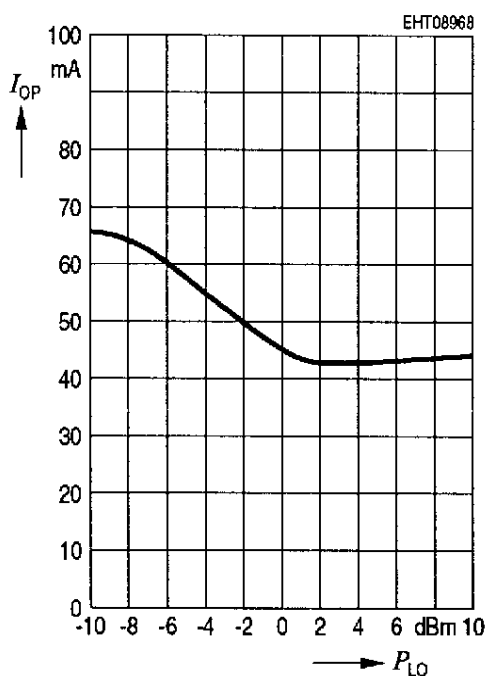
¹⁾ Approximate value for RF-frequency 1224 MHz (the value can be tuned for minimum F_{SSB} at RF-frequency).

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

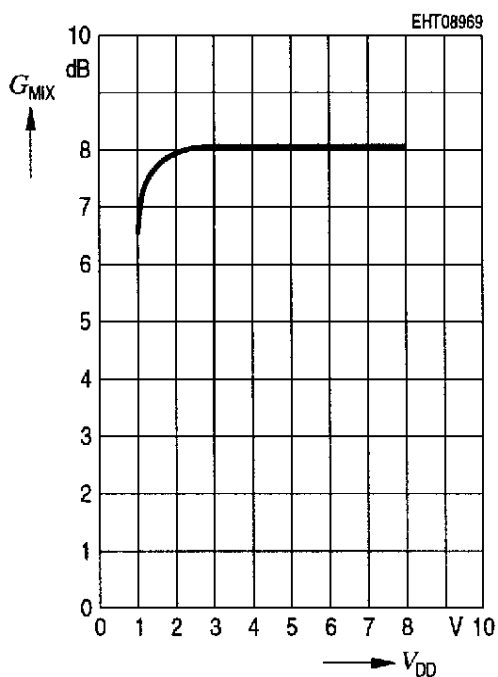
 $P_{LO} = -2 \text{ dBm}$


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

 $V_{DD} = +5 \text{ V}$


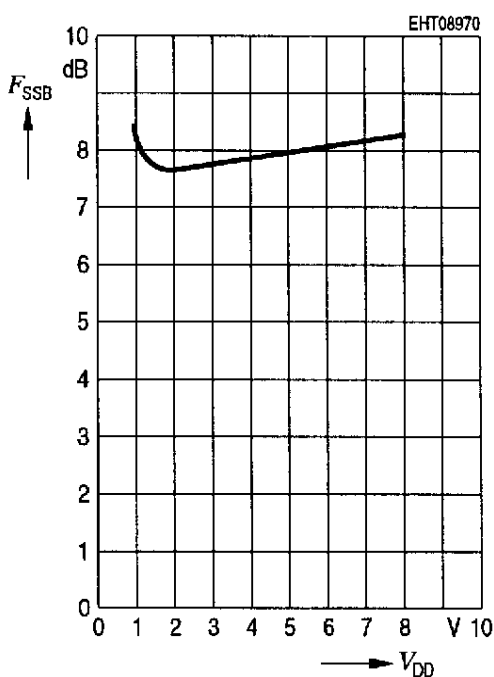
Conversion Gain $G_{MIX} = f(V_{DD})$

 $P_{LO} = -2 \text{ dBm}$, $f_{RF} = 1224 \text{ MHz}$;

 $f_{LO} = 1185 \text{ MHz}$


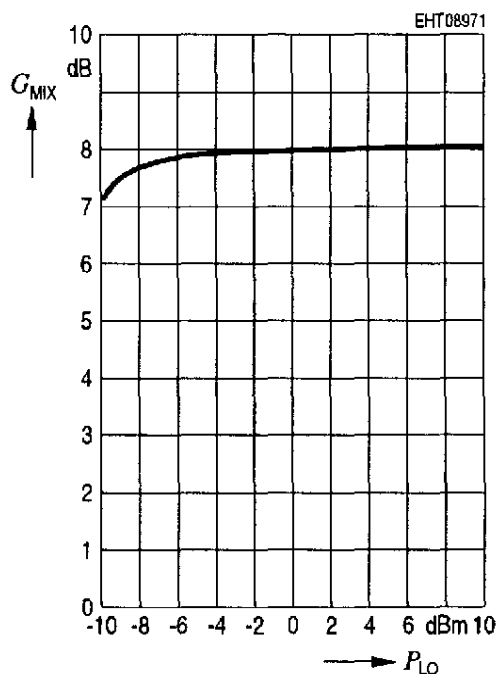
SSB Noise Figure $F_{SSB} = f(V_{DD})$

 $P_{LO} = -2 \text{ dBm}$; $f_{RF} = 1224 \text{ MHz}$;

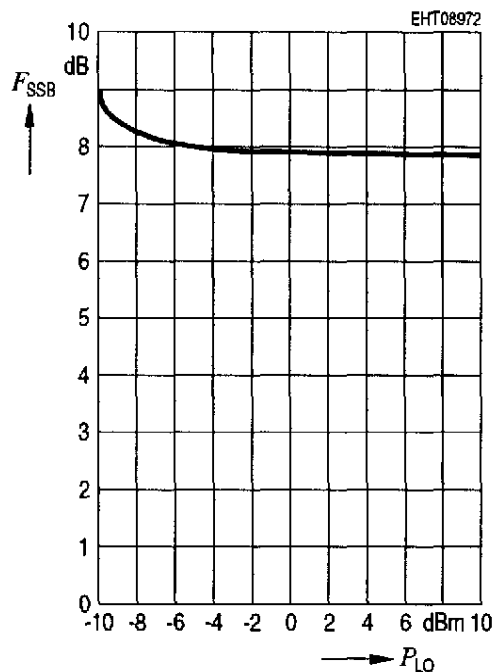
 $f_{LO} = 1185 \text{ MHz}$


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

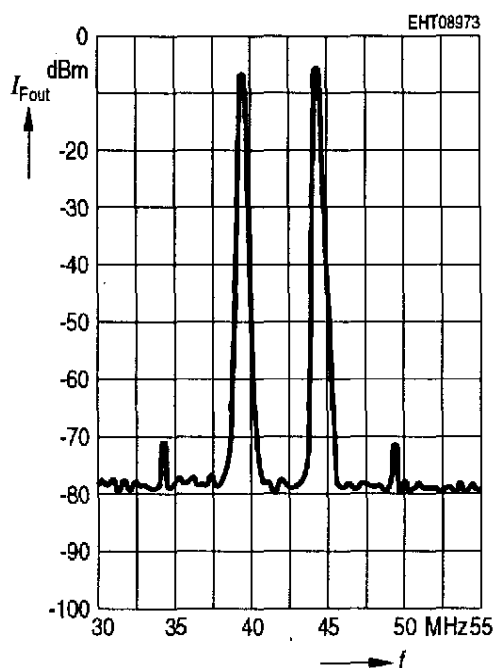
$V_{\text{DD}} = 5 \text{ V}$, $f_{\text{RF}} = 1224 \text{ MHz}$;
 $f_{\text{LO}} = 1185 \text{ MHz}$


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

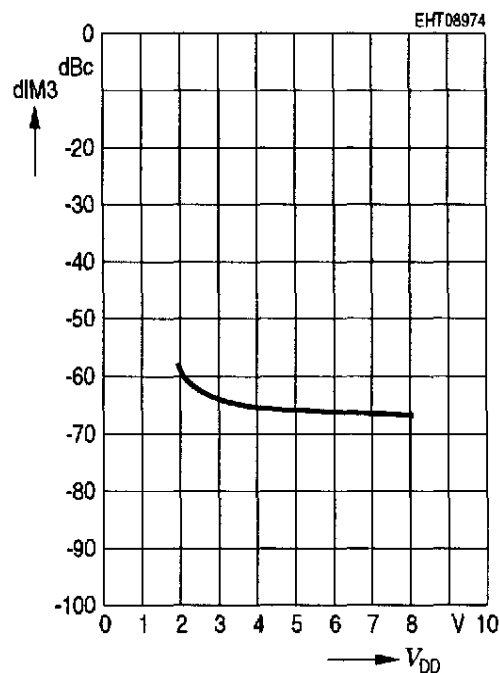
$V_{\text{DD}} = +5 \text{ V}$; $f_{\text{RF}} = 1224 \text{ MHz}$;
 $f_{\text{LO}} = 1185 \text{ MHz}$


Third Order IMD $I_{\text{FOUT}} = f(f)$

$P_{\text{IN}} = 2 \times -15 \text{ dBm}$, $P_{\text{LO}} = -2 \text{ dBm}$


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

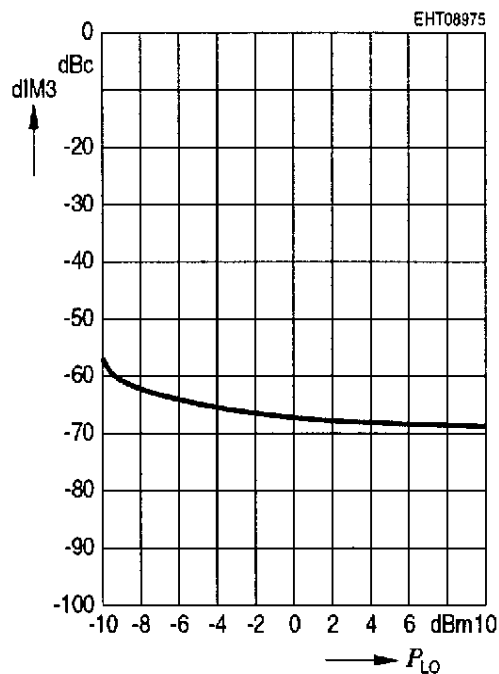
$P_{\text{IN}} = 2 \times -15 \text{ dBm}$, $P_{\text{LO}} = -2 \text{ dBm}$



Third Order IMD $d_{IM3} = P_{LO}$

$V_{DD} = +5\text{ V}$, $P_{IN} = -12\text{ dBm}$

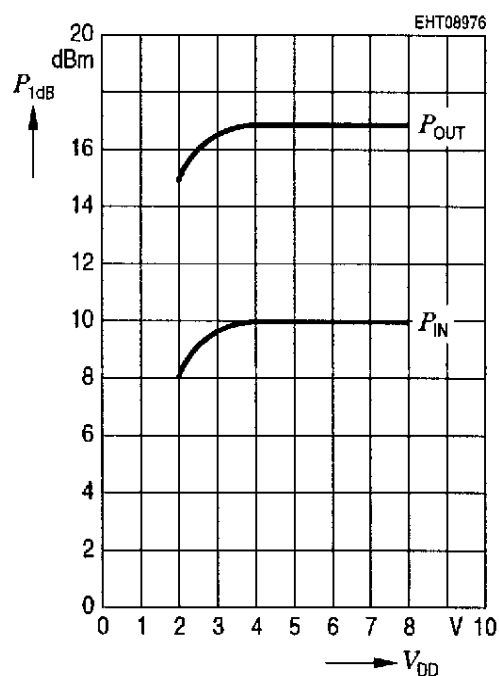
Tones 5 MHz apart

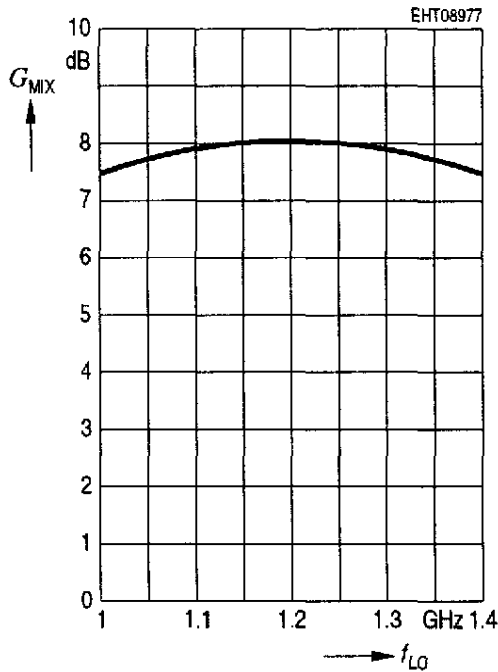
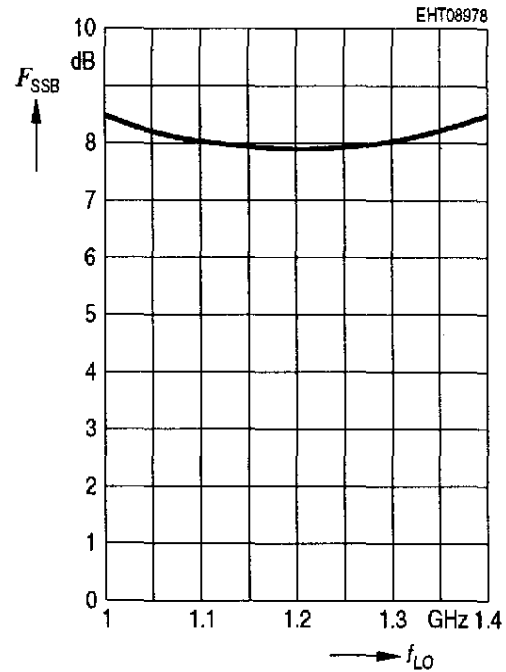
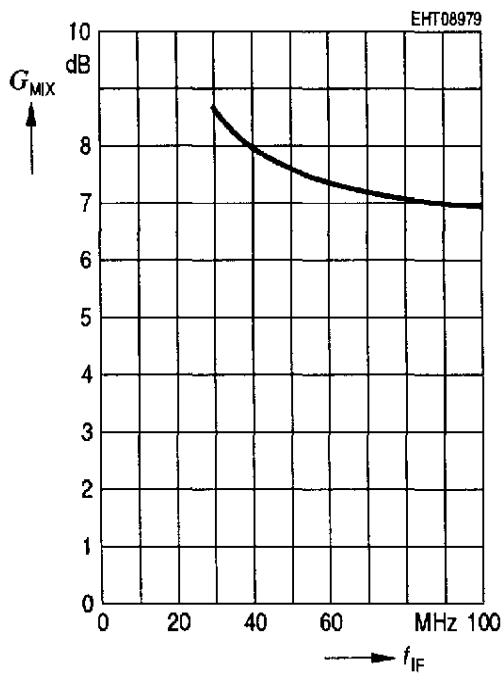
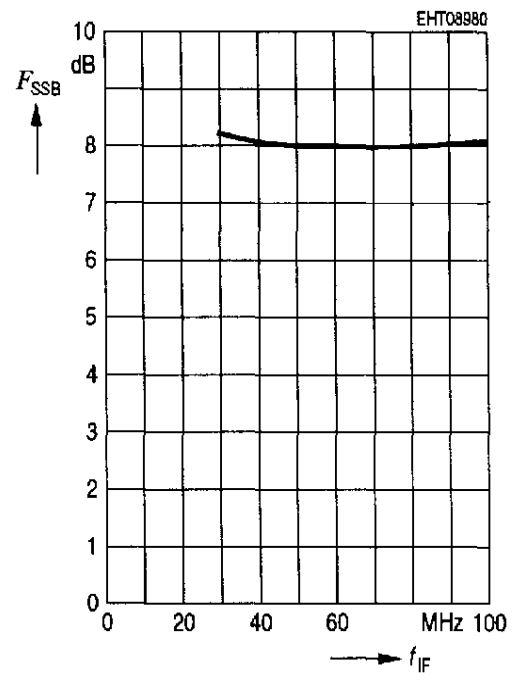


Power at 1 dB Gain Compression

$P_{-1\text{ dBm}} = f(V_{DD})$, $P_{LO} = -2\text{ dBm}$;

$f_{RF} = 1224\text{ MHz}$; $f_{LO} = 1185\text{ MHz}$



Conversion Gain $G_{\text{MIX}} = f(f_{\text{LO}})$
 $P_{\text{LO}} = -2 \text{ dBm}; f_{\text{RF}} = f_{\text{LO}} + f_{\text{IF}}; f_{\text{IF}} = 39 \text{ MHz}$

SSB Noise Figure $F_{\text{SSB}} = f(f_{\text{LO}})$
 $P_{\text{LO}} = -2 \text{ dBm}; f_{\text{RF}} = f_{\text{LO}} + f_{\text{IF}}; f_{\text{IF}} = 39 \text{ MHz}$

Conversion Gain $G_{\text{MIX}} = f(f_{\text{IF}})$
 $f_{\text{LO}} = 1185 \text{ MHz}; P_{\text{LO}} = -2 \text{ dBm};$
 $f_{\text{RF}} = f_{\text{LO}} + f_{\text{IF}}$

SSB Noise Figure $F_{\text{SSB}} = f(f_{\text{IF}})$
 $f_{\text{LO}} = 1185 \text{ MHz}; P_{\text{LO}} = -2 \text{ dBm};$
 $f_{\text{RF}} = f_{\text{LO}} + f_{\text{IF}}$


Typical Reflexion Coefficients of CMY 200, $Z_0 = 50 \Omega$

f MHz	Input Impedance into RF-Port (Pin #6) @ $P_{LO} = -2 \text{ dBm}$; $f_{LO} = 1185 \text{ MHz}$		Impedance into IF-Port (Pin #4) @ $P_{LO} = -2 \text{ dBm}$; $f_{LO} = 1185 \text{ MHz}$		Input Impedance into LO-Port (Pin #1)	
	Reflexion Coefficient		Reflexion Coefficient		Reflexion Coefficient	
	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, $Z_0 = 50 \Omega$ (cont'd)

f	Input Impedance into RF-Port (Pin #6) @ $P_{LO} = -2 \text{ dBm};$ $f_{LO} = 1185 \text{ MHz}$		Impedance into IF-Port (Pin #4) @ $P_{LO} = -2 \text{ dBm};$ $f_{LO} = 1185 \text{ MHz}$		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 50Ω .

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

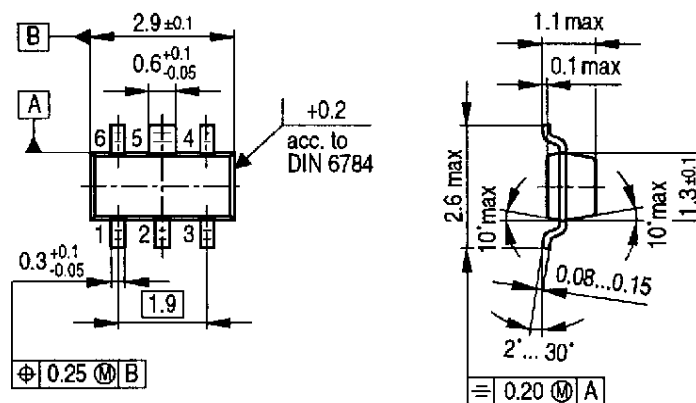
The LO-port is a high impedance port with a inner DC connection (internal AGC for LO buffer), a external DC block is necessary.

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 ($R < 300 \Omega$).

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