Göteborg Microwave Integrated Circuits

Doc. Rev. A02-16

gXSB0024 B
V-band X6 MMIC multiplier
57 – 66 (55 – 75) GHz

FEATURES

- Full V-band coverage, 57 – 66 GHz
- High output power, 16 dBm typ.
- Harmonic isolation, 35 dBc typ.
- High efficiency

DESCRIPTION

The gXSB0024 GaAs pHEMT MMIC is a highly efficient X6 V-band multiplier ideal for point to point radio applications. The integrated input and output buffers deliver high output power at a low drive level. At the recommended drive level of 5 dBm the output power is typically 16 dBm with better than 35 dBc harmonic isolation and 750 mW power dissipation.

TYPICAL APPLICATIONS

- V-band point-to-point radio
- Active imaging and sensors
- Test instrumentation

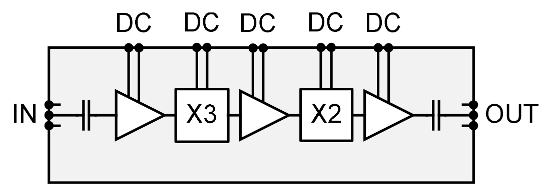

Figure 1. Circuit functional diagram.

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http://www.gotmic.se/

ELECTRICAL PERFORMANCE

Table 1. Electrical performance T_A=25C

Parameter	Min	Typ	Max	Unit
Output frequency	57 (55)		66 (75)	GHz
Input frequency	9.5		11	GHz
Multiplication factor		6		
Output power	14	16	18	dBm
Output power flatness		2		dBpp
Recommended input drive power		5		dBm
Harmonic isolation (relative to X6 output)		35		dBc
Output return loss	8			dB
Input return loss	10			dB
Power dissipation (signal off)		550		mW
Power dissipation (signal on)	700	750	800	mW

MEASURED PERFORMANCE

Measurements have been performed on-wafer at room temperature with typical bias settings and an input drive power if not specified otherwise.

Table 2. Test conditions

Parameter	Setting
Input drive power	5 dBm
Temperature	25°C

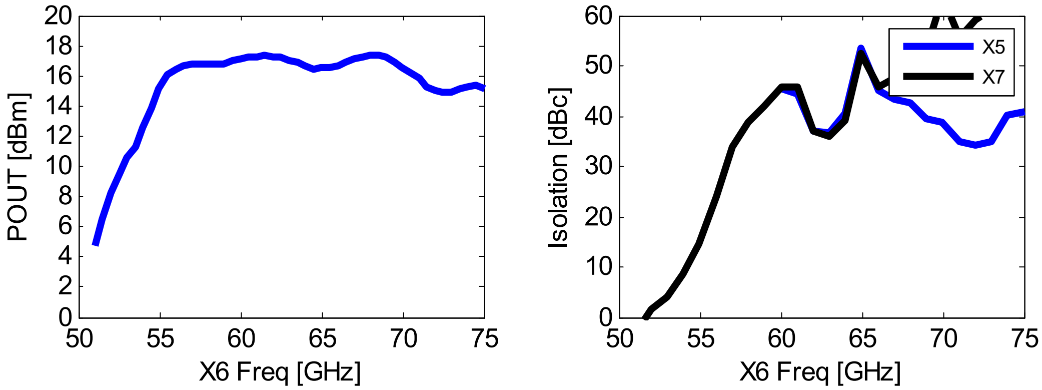


Figure 2. Output power vs X6 output frequency (left). Harmonic isolation vs X6 output frequency (right).

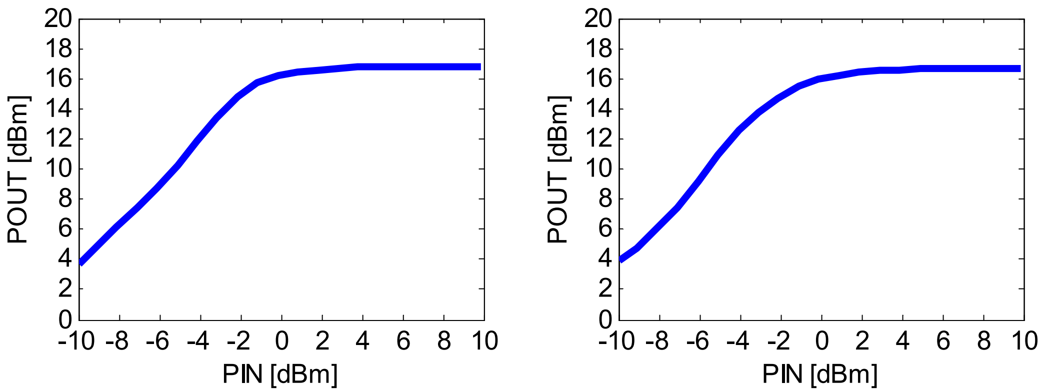


Figure 3. Output power vs input power at 57 GHz (left). Output power vs input power at 66 GHz (right).

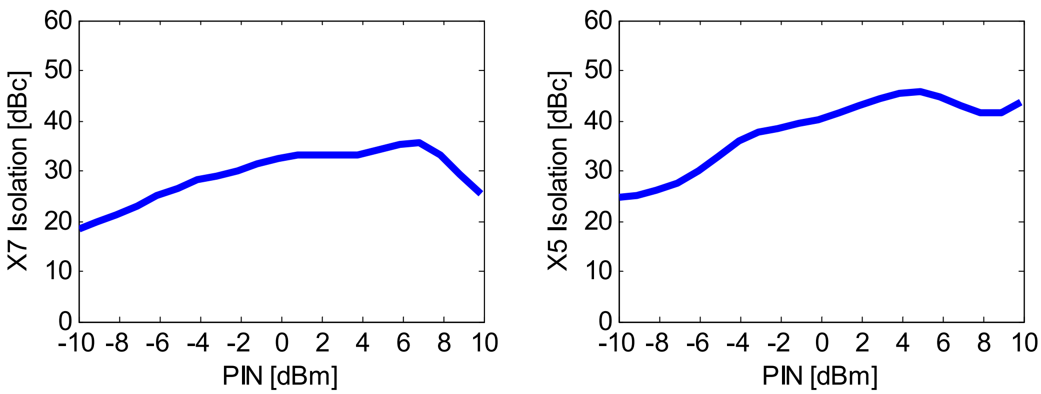
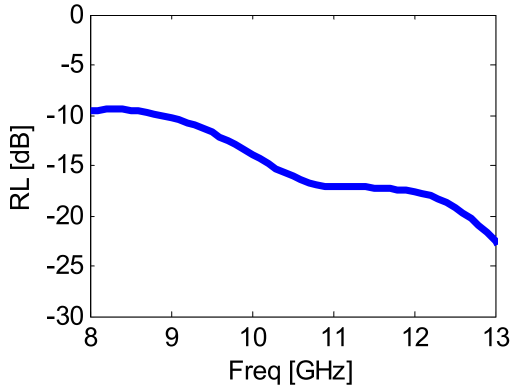


Figure 4. X7 isolation vs input power at 57 GHz (left). X5 isolation vs input power at 66 GHz (right).



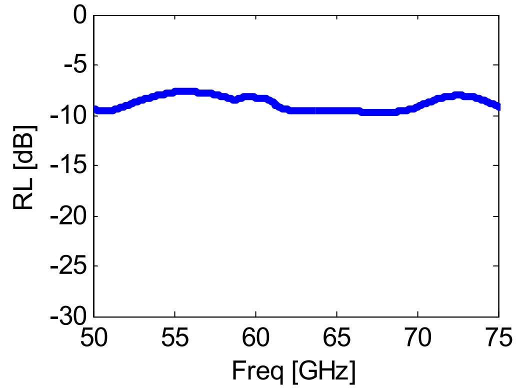


Figure 5. Input return loss (left). Output return loss (right).

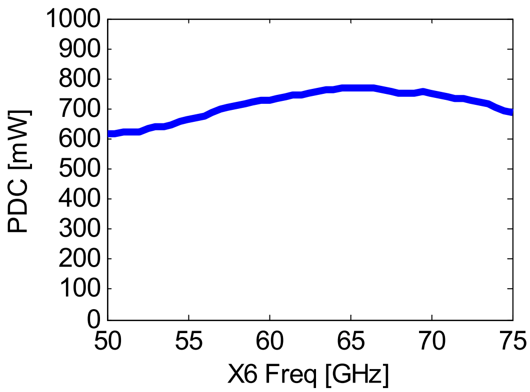


Figure 6. Power dissipation vs X6 output frequency.

Recommended Operating Conditions

Apply the gate (VG_…) supplies first followed by the drain (VD_…) supplies. Gate voltages are adjusted within the typical min/max range to obtain the specified drain currents. The drain currents are stated with all input signals off.

Table 3. Electrical settings, P1 pads

Connector P1	Pad No.	Bias settings (V / mA)			Function
		Min	Typ	Max	
NC	1				NC
VG_AMP1[1]	2	-0.7	-0.5	-0.3	Input
VD_AMP1[2]	3	3.2	3.3 / 24	3.4	Input
VG_X3	4	-0.95	-0.75	-0.55	Input
VD_X3	5	4.0	5.0 / 10	6.0	Input
VG_AMP2[1]	6	-0.7	-0.5	-0.3	Input
GND	7				Ground
VD_AMP2[2]	8	3.2	3.3 / 94	3.4	Input
VG_X2	9	-1.0	-0.8	-0.6	Input
VD_X2[2]	10	3.2	3.3 / 5	3.4	Input
VG_AMP3[1]	11	-0.7	-0.5	-0.3	Input
VD_AMP3[2]	12	3.2	3.3 / 35	3.4	Input
NC	13				NC

Table 4. Electrical settings, P2 pads

Connector P2	Pad No.	Settings	Function
GND	14		Ground
RF_OUT	15	50 Ohm, open-circuit at DC	Output
GND	16		Ground

Table 5. Electrical settings, P3 pads

Connector P3	Pad No.	Settings	Function
GND	17		Ground

[1] VG_AMP1, VG_AMP2 and VG_AMP3 may share the same external supply. Adjust the common gate voltage to obtain the combined total AMP1 + AMP2 + AMP3 current in the table.

[2] VD_AMP1, VD_AMP2, VD_AMP3 and VD_X2 may share the same external supply.

RF_IN	18	50 Ohm, open-circuit at DC	Output
GND	19		Ground

Absolute Maximum Ratings

Table 6. Absolute Maximum Ratings

Gate supply voltage	-2 to + 0.7 V
Drain supply voltage (VD_X3 supply voltage)	4.5 V (6.0 V)
Gate-drain breakdown	8 V
ID_AMP1	30 mA
ID_X3	30 mA
ID_AMP2	120 mA
ID_X2	80 mA
ID_AMP3	60 mA
Input level	+ 15 dBm
Operating temperature	-40 to + 85 C
Storage temperature	-65 to +150 C

Outline Drawing

Dimensions are in µm. Substrate thickness is 50 µm (GaAs). Drawing is also available in dxf-file format on the web.

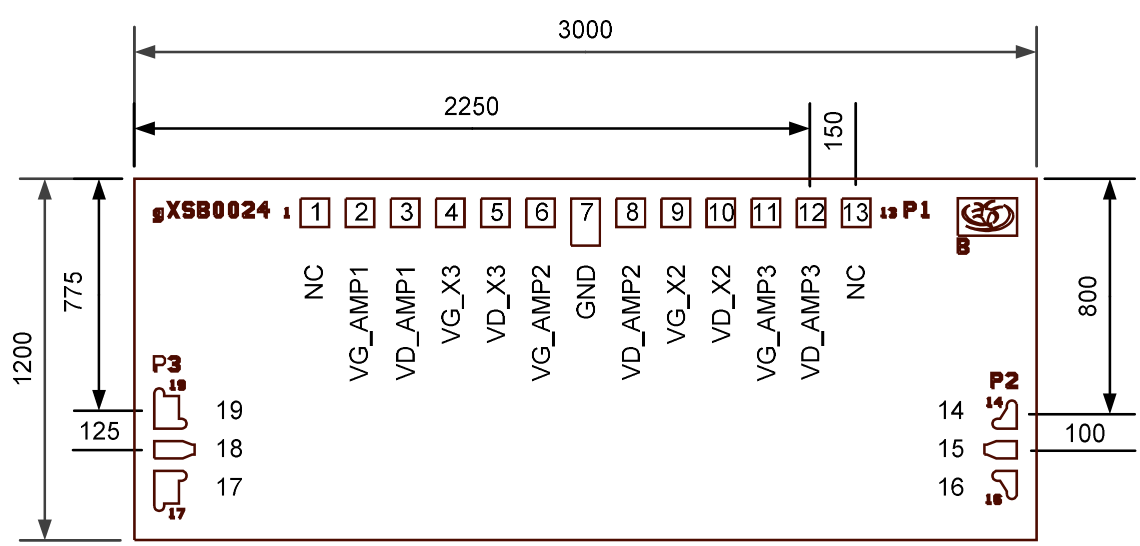


Figure 7. Outline drawing, dimensions are in um.