gXSB0025 A
E-band X6 MMIC multiplier
71 – 86 (68 – 88) GHz

FEATURES

- Full E-band coverage, 71 – 86 GHz
- High output power, 14 dBm typ.
- Harmonic isolation, 30 dBc typ.
- High efficiency

TYPICAL APPLICATIONS

- E-band point-to-point radio
- Active imaging and sensors
- Automotive radar
- Test instrumentation

DESCRIPTION

The gXSB0025 GaAs pHEMT MMIC is a highly efficient X6 E-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 14 dBm with better than 30 dBc harmonic isolation and 500 mW power dissipation.

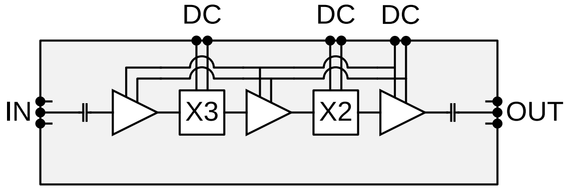

Figure 1. Circuit functional diagram.

Electrical Performance

Table 1. Electrical performance T_A=25C

Parameter	Min	Typ	Max	Unit
Output frequency	71		86	GHz
Input frequency	11.8		14.4	GHz
Multiplication factor		6		
Output power	12	14		dBm
Output power flatness		2		dBpp
Recommended input drive power		5		dBm
Harmonic isolation (relative to X6 output)		30		dBc
Output return loss	10			dB
Input return loss	10			dB
Power dissipation (signal off)		400		mW
Power dissipation (signal on)	450	500	550	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

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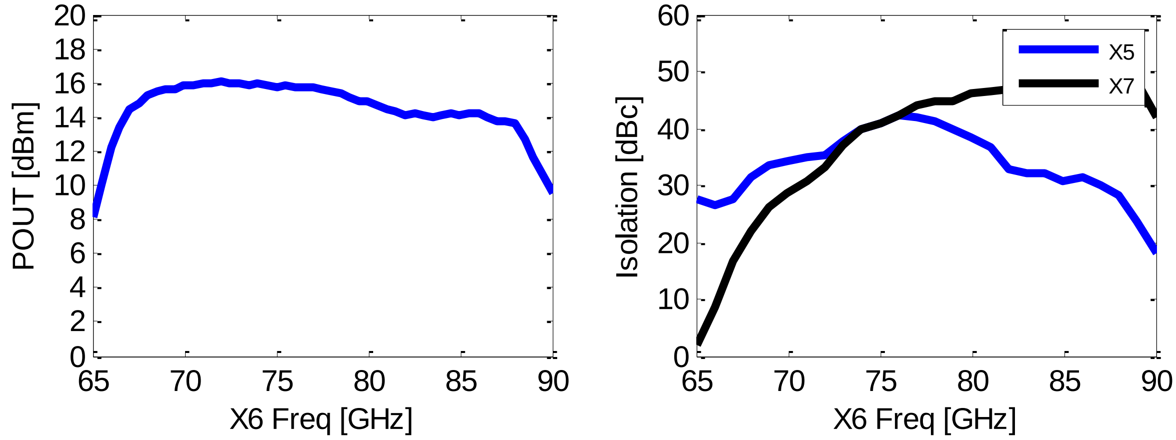

Figure 2. Output power vs X6 output frequency (left). Harmonic isolation vs X6 output frequency (right).

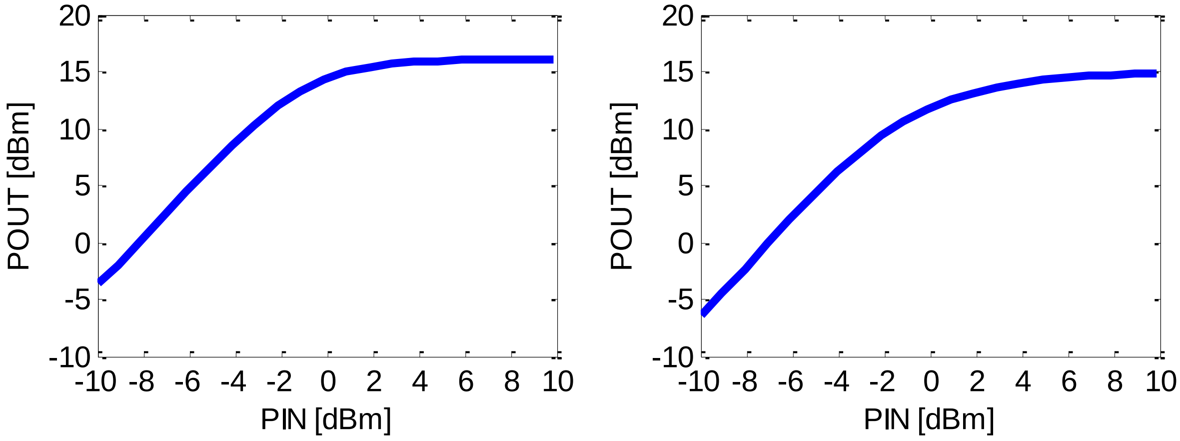

Figure 3. Output power vs input power at 71 GHz (left). Output power vs input power at 86 GHz (right).

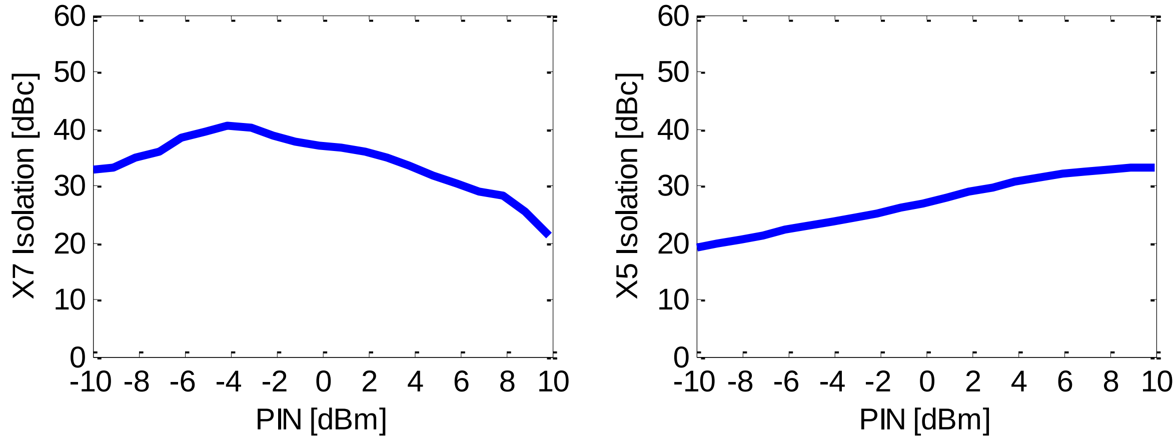

Figure 4. X7 **isolation vs input power at 71 GHz (left).** X5 **isolation vs input power at 86 GHz (right).**

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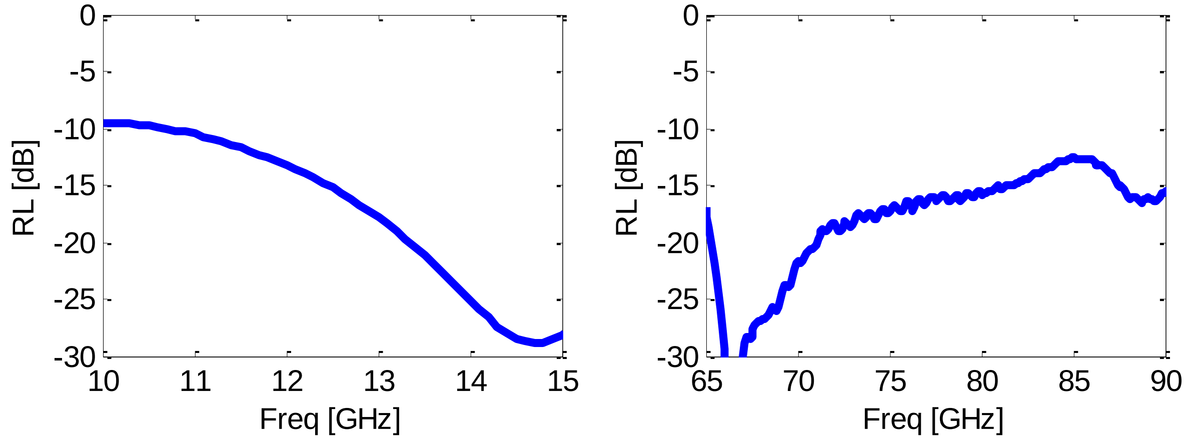

Figure 5. Input return loss (left). Output return loss (right).

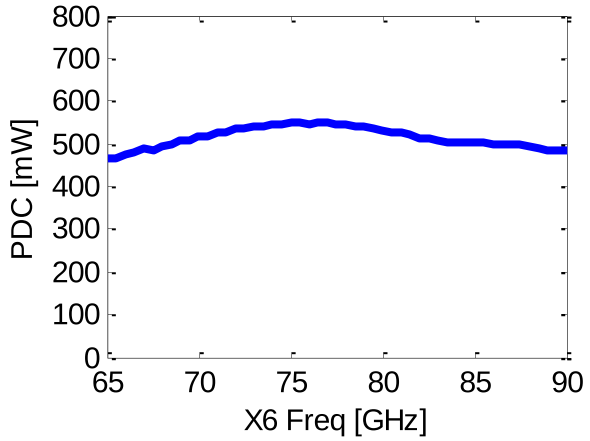

Figure 6. Power dissipation vs X6 output frequency.

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	
VG_X3	1	-0.95	-0.75	-0.55	Input
VG_X2	2	-1.0	-0.8	-0.6	Input
VD_X3	3	4.0	5.0 / 8	6.0	Input
VD_X2	4	3.2	3.3 / 3	3.4	Input
GND	5				Ground
VG_AMP	6	-0.65	-0.45	-0.25	Input
VD_AMP	7	3.2	3.3 / 105	3.4	Input
NC	8				NC
NC	9				NC

Table 4. Electrical settings, P2 pads

Connector P2	Pad No.	Settings	Function
GND	10		Ground
RF_OUT	11	50 Ohm, open-circuit at DC	Output
GND	12		Ground

Table 5. Electrical settings, P3 pads

Connector P3	Pad No.	Settings	Function
GND	13		Ground
RF_IN	14	50 Ohm, open-circuit at DC	Input
GND	15		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_X3	30 mA
ID_X2	40 mA
ID_AMP	150 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.

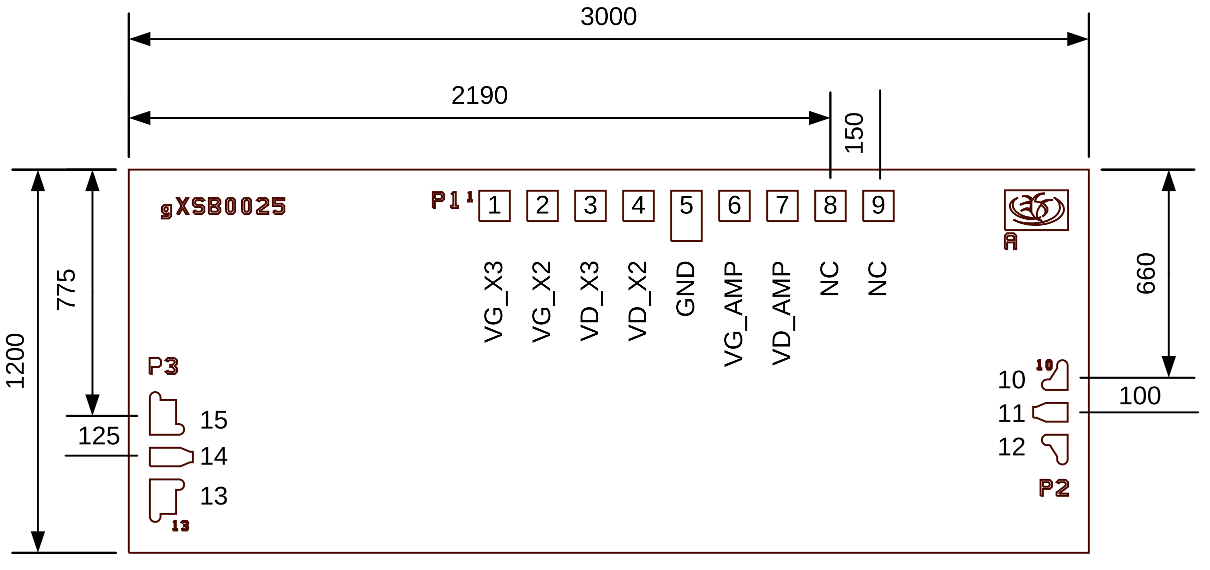

Figure 7. Outline drawing, dimensions are in um.

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