

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

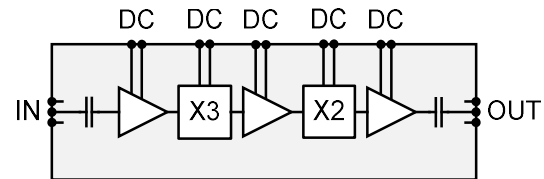


Figure 1. Circuit functional diagram.

ELECTRICAL PERFORMANCE

Table 1. Electrical performance $T_A=25^\circ\text{C}$

| 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 |

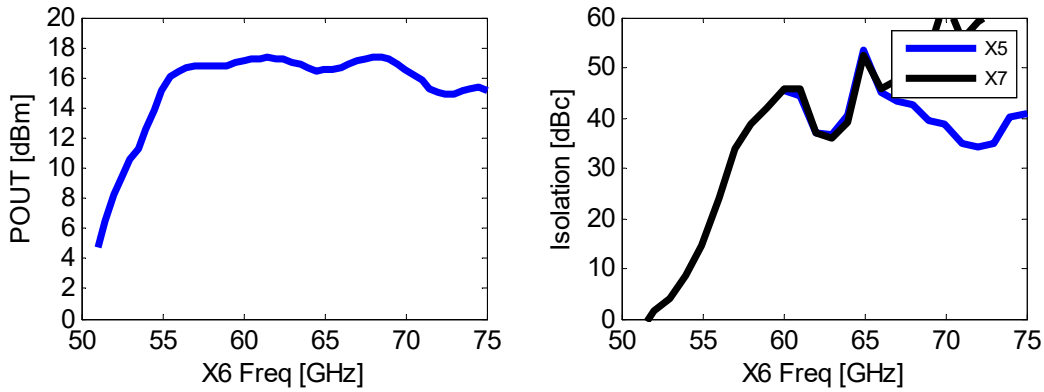


Figure 2. Output power vs X6 output frequency (left). Harmonic isolation vs X6 output frequency (right).

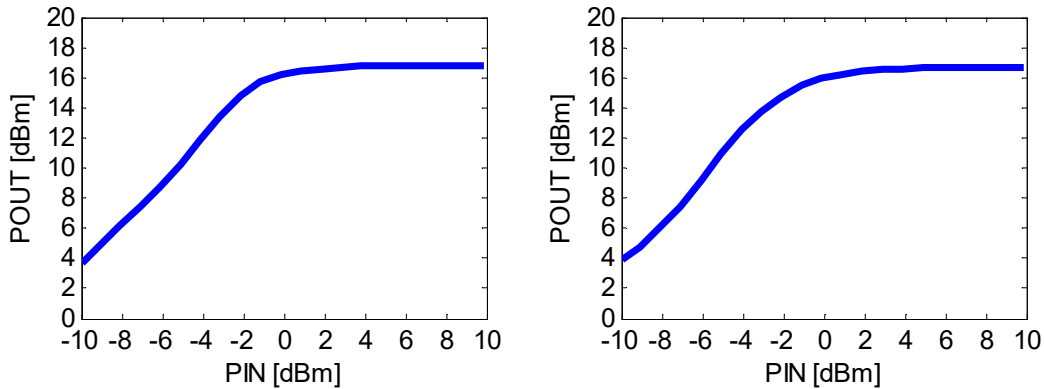


Figure 3. Output power vs input power at 57 GHz (left). Output power vs input power at 66 GHz (right).

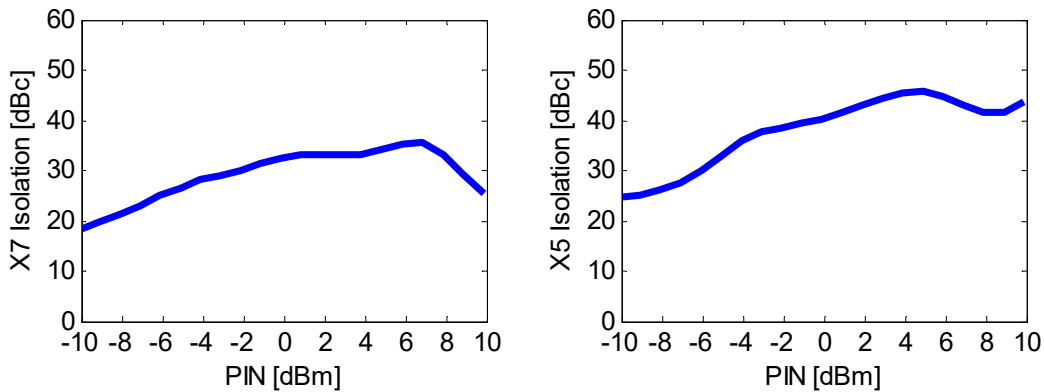


Figure 4. X7 isolation vs input power at 57 GHz (left). X5 isolation vs input power at 66 GHz (right).

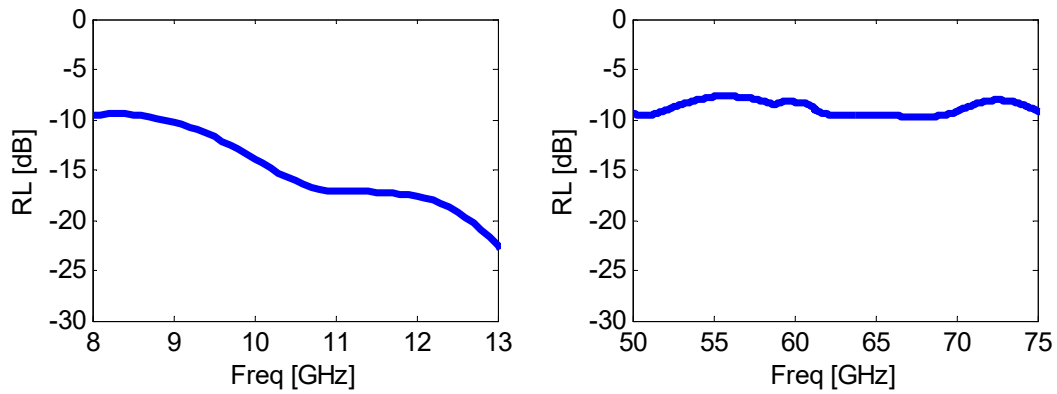


Figure 5. Input return loss (left). Output return loss (right).

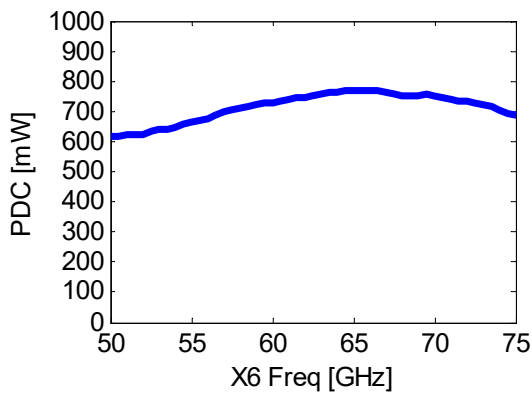


Figure 6. Power dissipation vs X6 output frequency.

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.

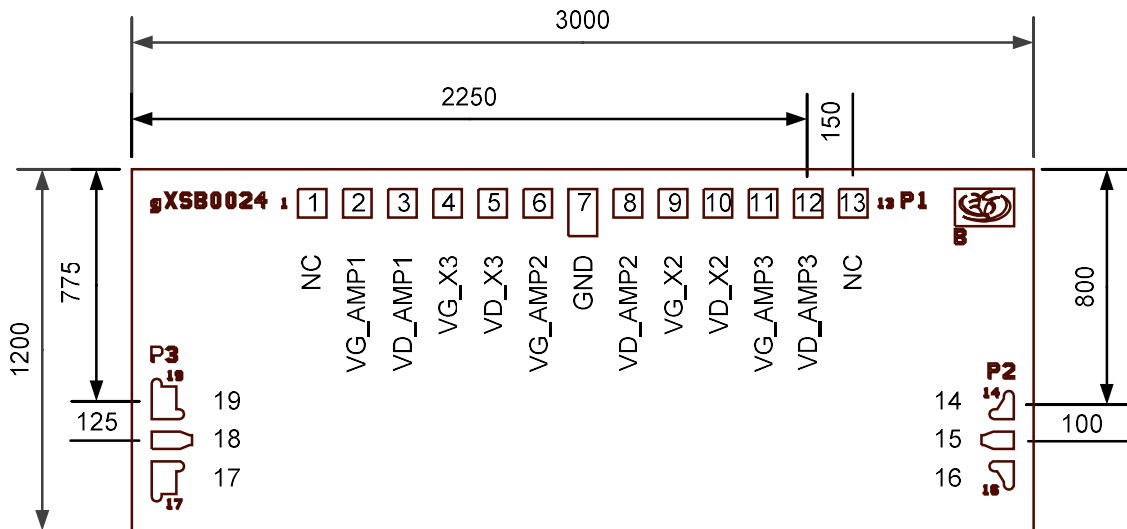


Figure 7. Outline drawing, dimensions are in μm .