WAINVAM-MW-GEN01

RF transmitter

2100 MHz to 3500 MHz

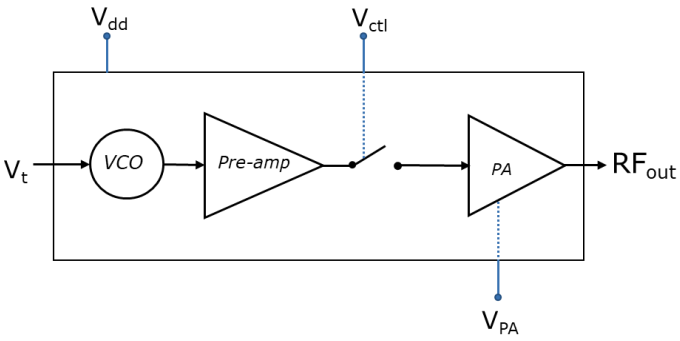
Le monde a ses mesures que la mesure ignore

FEATURES

- Output power: 28 dBm
- Frequency range: 2100 to 3500 MHz
- 50 Ω matched output
- SMA connectors
- Dimensions: 85 mm x 85 mm

APPLICATIONS

- Quantum sensing with NV-centers
- S-band wireless communication system



GENERAL DESCRIPTION

The **WAINVAM-MW-GEN01** is a radio-frequency (RF) transmitter that generates microwaves between 2100 and 3500 MHz. This module is controlled by a TTL to switch ON and OFF the single-ended RF output signal adjustable from 2100 to 3500 MHz with an output power of +20 dBm from 2.7 to 3.2 GHz and up to +28 dBm at 2.87 GHz.

This 85 x 85 mm² board includes a VCO, a pre-amplifier and a power amplifier as well as an RF switch.

This module is designed for quantum sensing with NV-centers but can also be used for multiple standards in the S-band.

SPECIFICATIONS

Parameter	Symbol	Min	Typ	Max	Units
SWITCH					
Isolation		20	35	45	dB
Switching speed	t_{rise}, t_{fall}		60		ns
RF OUTPUT					
RF frequency range	f_{RF}	2100		3500	MHz
Ouput impedance			50		Ω
Return Loss			15		dB
POWER SUPPLY					
Supply Voltage					
LO tuning voltage	V_t	0		5	V
PA supply voltage	V_{PA}		5	6	V
Board supply voltage	V_{dd}		18	20	V
Supply Current					
Board supply current	I_{dd}		170	250	mA
PA supply current	I_{PA}		250	320	mA
PERFORMANCE					
Output power	P_{out}	10	25	28	dBm
Output Third-Order Intercept	OIP_3	36	40		dBm
Phase noise at					
100 kHz offset			-66		dBc/Hz
1 MHz offset			-95		dBc/Hz
10 MHz offset			-120		dBc/Hz

ABSOLUTE MAXIMUM RATINGS

Parameter	Rating
Board Supply Current	250 mA
PA Supply Current	320 mA
Board supply voltage V_{dd}	20 V
PA supply voltage V_{PA}	6V
Temperature	
Operating	-40 to +85 °C
Storage	-45 to +90 °C
ESD Sensitivity (Human Body Model)	1500 V

USER'S GUIDE

Always wear an ESD grounding wrist strap while using the WAINVAM-MW-GEN01 board.

The power-up bias sequence is as follows:

1/ Set V_{dd} to 18 V

2/ Set V_{PA} to 5 V with a current limitation of 280 mA

3/ Set V_{ctl} to 0 V

4/ Adjust V_t between 0 and 5 V to choose the frequency of operation (refer to Fig. 1)

The power-down sequence is as follows:

1/ Remove V_t bias

2/ Remove V_{ctl} bias

3/ Remove V_{PA} bias

4/ Remove V_{dd} bias

To switch ON the RF output, V_{ctl} must be set to 0 V and to switch OFF the RF output, V_{ctl} must be set to 5 V.

TYPICAL PERFORMANCE CHARACTERISTICS

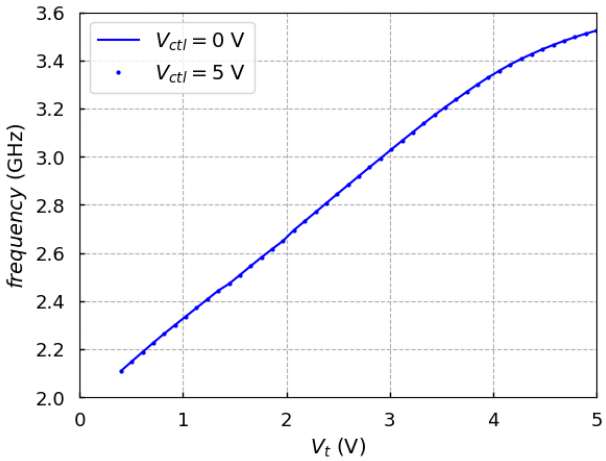


Figure 1. Frequency versus the tuning voltage of the VCO, V_t.

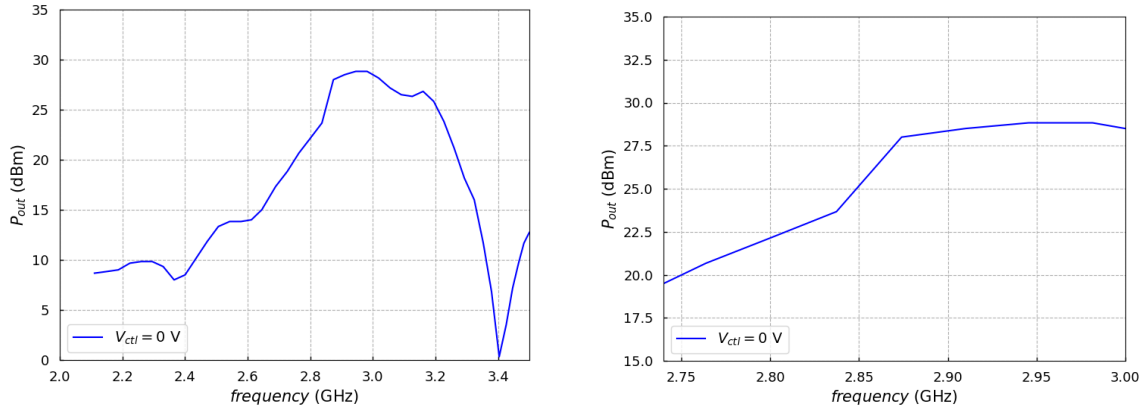


Figure 2. Output power, P_{out}, versus the frequency when RF is ON (V_{ctl} = 0 V).

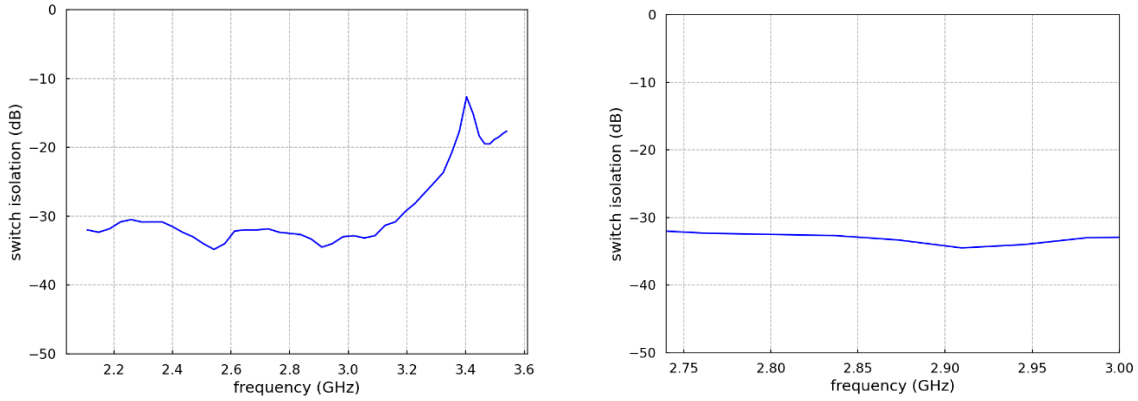


Figure 3. Switch isolation versus the frequency.

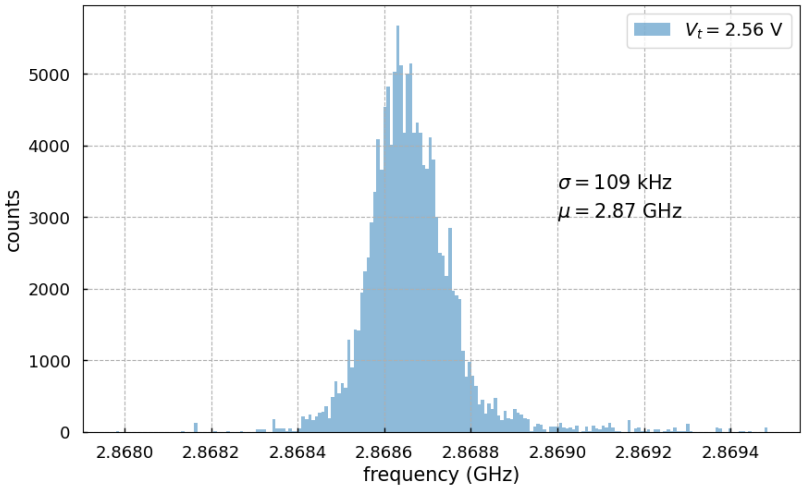


Figure 4. Jitter at 2.87 GHz

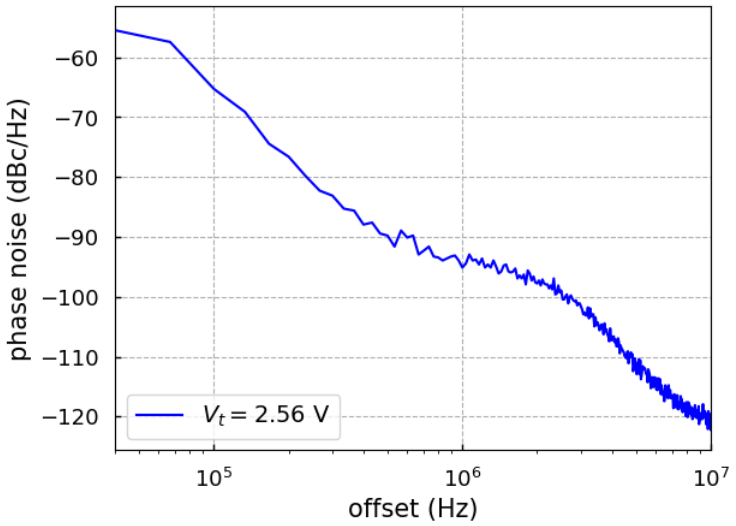


Figure 5. Phase noise versus offset frequency

APPLICATION EXAMPLE in NV magnetometry

The output of the WAINVAM-MW-GEN01 can be connected to a resonator in order to generate a magnetic field around an NV center dopped diamond. By combining this excitation with an optical pumping with a green laser, a red photoluminescence (PL) is emitted by the diamond sample. This PL intensity drops when the RF excitation frequency matches the resonance transition of the NV center.

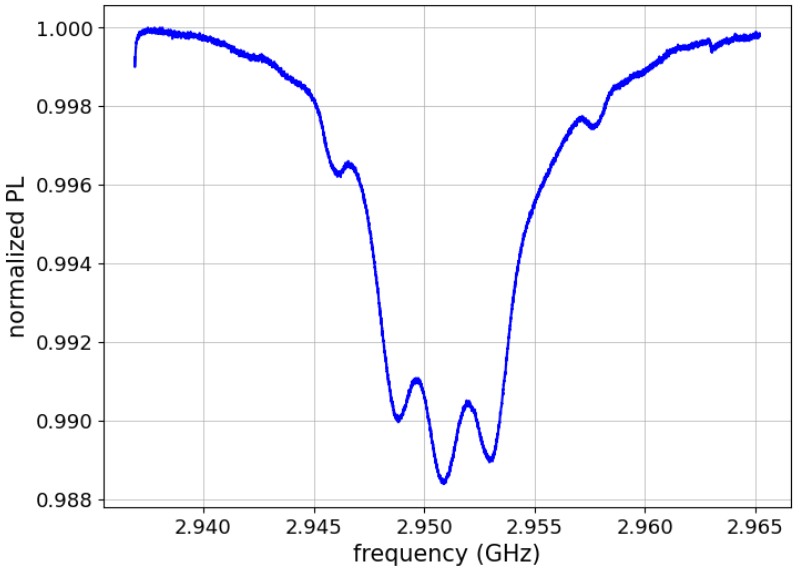


Figure 6. Magnetic resonance of an NV dopped diamond with a bias magnetic field. Hyperfine transitions ($\Delta f = 2.156$ MHz) are also visible.

PICTURE OF THE BOARD