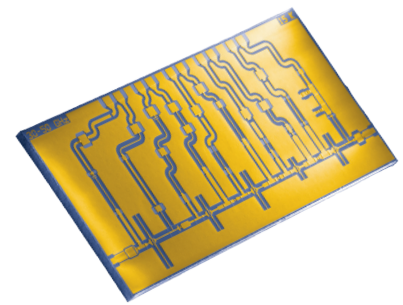


## pH-100 Series Ultra Low Noise pHEMT based MMICs and Foundry Services

The pH-100 series devices are AlInAs/InGaAs pHEMTs on InP substrates with a gate length of 100 nm. The gate width and number of fingers can be customized according to the application. The transistor technology provides ultimate noise performance at cryogenic temperatures and offers outstanding noise figures at room temperature. All typical passive elements, such as thin film resistors, capacitors and inductors are included in the PDK to allow for microstrip and coplanar circuit designs. There are two MIM capacitor options to enable small capacitance values as well as compact high-capacitance elements.

### Transistor Characteristics (4 x 20 $\mu\text{m}$ Device)

Temperature	300 K	15 K
Cutoff Frequency $f_T$	220 GHz	235 GHz
Cutoff Frequency $f_{MAX}$	550 GHz	800 GHz
Transconductance $gm$	1250 mS/mm	1500 mS/mm
Maximum Drain Current $I_{DSmax}$	800 mA/mm	1000 mA/mm
Gate-Drain Breakdown Voltage $V_{GDbreak}$	-2.5 V	-2.5 V
Noise Figure $NF_{min}$ (@30 GHz)	0.6 dB	0.08 dB



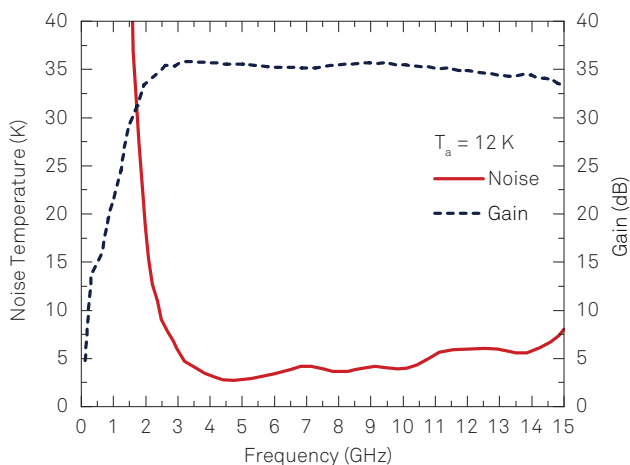
### Passive Characteristics

MIM Capacitor 1	370 pF/mm <sup>2</sup>
MIM Capacitor 2	2800 pF/mm <sup>2</sup>
TF Resistor	30 $\Omega$ /□
Spiral Inductors	0.4 - 3.7 nH

### Transistor Sizes

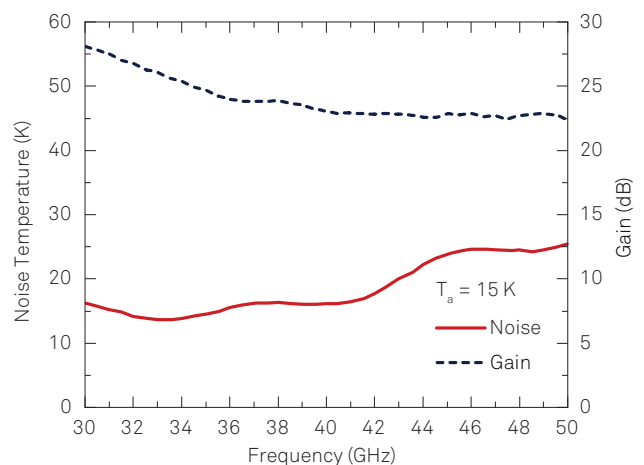
Gate Length	100 nm
Number of Gate Fingers	2 / 4 / 6
Gate Finger Width	10–150 $\mu\text{m}$

### Cryogenic 4–12 GHz MMIC LNA Module



The 4–12 GHz connectorized module was designed, assembled and measured by a customer using DIRAMICS' foundry service for the MMIC. The average noise temperature over the full band is 4K.

### Cryogenic 30–50 GHz MMIC LNA Module



The 30–50 GHz connectorized module was assembled and measured by an external partner using a MMIC designed and fabricated by DIRAMICS. The average noise temperature over the full band is 18.7K.