0.5 µm MESFET – PE Foundry Process

DESCRIPTION

The PE process utilizes molecular beam epitaxy (MBE) to implement a MESFET active layer structure that achieves high breakdown and high efficiency for multi-watt power applications thru 18 GHz. Wafer diameter is 100 mm. The focus is on products for moderate to high volume applications. MACOM offers a full range of foundry services to meet the requirements for custom designing a MMIC-based die or packaged product. The linearity on this MESFET process is higher than traditional pHEMT processes.

FEATURES

- High Breakdown Voltage
- High Efficiency
- Excellent Linearity

APPLICATIONS

- High Power Amplifiers and Driver Amplifiers for Applications up to 15 GHz
- VSAT Power Amplifiers
- High Efficiency Power Amplifiers

PERFORMANCE SUMMARY

Parameter	Test Conditions	Units	Typical
MAG	V_{DS} = 8 V, I_{DS} = 40% I_{DSS} 2 GHz 12 GHz	dB	22.0 13.5
P @ 1 dBc	V_{DS} = 8 V, I_{DS} = 40% I_{DSS} 2 GHz 12 GHz	mW/mm	680 525
PAE	V_{DS} = 8 V, I_{DS} = 40% I_{DSS} 2 GHz 12 GHz	%	50 41
FT	V_{DS} = 8 V, I_{DS} = 40% I_{DSS}	GHz	20
MTTF	V_{DS} = 9.5 V, I_{DS} = 50% I_{DSS}, T_{CH} = 125 °C	Hours	3 x 10^6

0.5 µm MESFET – PE Foundry Process (continued)

ELECTRICAL SPECIFICATIONS: T_A = +25 °C

Parameter	Test Conditions	Units	Min.	Typ.	Max.
200 µm PCM FET					
I_{DSS}	V_{DS} = 3 V, V_{GS} = 0 V	mA/mm	190	240	270
DC GM	V_{DS} = 3 V, I_{DS} = 50% I_{DSS}	mS/mm	145	150	185
V_P	V_{DS} = 3 V, I_{DS} = 2.5% I_{DSS}	V	-1.3	-1.8	-2.2
BV_{gd}	I_G = 1 mA/mm	V	-11	-15	—
Ft	V_{DS} = 3 V, I_{DS} = 50% I_{DSS}	GHz	20	26	34
Sheet Resistances					
NDRS (N-GaAs)	I = 20 mA	Ω/sq	340	375	410
NCRS (NiCr)	I = 10 mA	Ω/sq	40	50	60
MIM Capacitors					
Capacitance/Unit Area	f = 1 MHz	pF/mm²	360	400	440
Capacitor Leakage	V = 10 V	µA	—	—	0.5

0.5 µm MESFET – PE Foundry Process (continued)

BENEFITS OF USING MACOM AS A FOUNDRY SERVICE:

- Over 17 years of GaAs MMIC production experience
- A complete offering of stable and mature GaAs production processes for commercial handset, infrastructure, and military applications
- Superior device performance to meet the most stringent specifications
- World-class testing and modeling capabilities
- Shortest production cycle time in the industry
- Proven manufacturer of microwave components and systems for more than 50 years

MACOM FOUNDRY SERVICES INCLUDE::

- Support in:
  - Layout
  - DRC and LVS Checking
  - Technical Consultation
- Provide Design Kit including Transistor Models and Passive Models to Assist Design

FOUNDRY SERVICES AVAILABLE UPON REQUEST:

- Extract Small Signal, Noise, and Large Signal Models
- Provide Transistor Characterization Data in:
  - Small Signal Measurements
  - Load Pull Measurements
- Perform Circuit Test at:
  - Wafer Level
  - Package Level
- Production Qualification Testing