

GaN(Si)



Nowadays the manufacture of devices based on gallium nitride is a key trend in the microelectronic industry in the world. According to experts' forecasts, in the near future we will witness a gradual transition from the use of silicon and GaAS to microelectronic products on GaN in some fields. Currently, these segments include: power electronics, power supplies, microwave electronics.

GaN transistors can significantly improve the characteristics of the devices.

Since the gallium nitride structure is a semiconductor with a wide bandgap, it is possible to use an increased supply voltage and achieve higher power density.

The higher power density results in a lower capacitance per unit of output power, which means that transistors with more power at a comparable frequency range can be manufactured.

Key benefits of GaN transistors

work at high temperatures

work at high voltage

work at very high frequency

work in radiation conditions



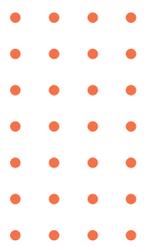
Obtained samples of electronics on GaN(Si)

HEMT and MISHEMT transistors with T-gate > 0.1 μm , breakdown voltage >250V, output power from 10W/mm (150W for amplifier).

Functional range of electronic components and transceiver modules with the following characteristics: operating frequency up to 50 GHz, overall dimensions no more than 4x4x 12mm, output power 1-2W.

Microwave electronics

Parameter	Microwave transistor
Process	GaNSi0,25
Substrate	Si
Heterostructure	epitaxy
Substrate thickness	100 μm
Pinholes to the source	yes
Gate length Lg	0,25 μm
Gain cutoff frequency Ft (@20V)	36 GHz
Saturation current Ids (saturation)	1000 mA/mm
Drain current (@ gmmax)	520 mA/mm
Slope gmmax (@ Idsmax)	280 mS/mm
Breakdown voltage Vbds	>100 V
Gain (@10GHz)	14 dB
Output power (@20V)	3 W/mm



Advantages

High efficiency

High power density

Low capacity

Wide Bandwidth

Small dimensions

Areas of applications

Cellular - base stations 4G / LTE / 5G

Military equipment

Satellite connection

Microwave energy (alternative to magnetrons)

Wired broadband

Wireless communications

Radar / avionics

Power electronics

Power transistor

Parameter

Process	GaNSi0.8
Substrate	Si
Heterostructure	epitaxy
Substrate thickness	100um
Pinholes to the source	yes
Gate length Lg Lg	0.8um
Gain cutoff frequency Ft (@20V)	
Saturation current Ids (saturation)	500mA/mm
Drain current (@ gmmax)	0.5 -20A
Slope gmmax (@ Idsmax)	
Breakdown voltage Vbds	200, 400, 600V
Gain (@10GHz)	
Output power (@20V)	

Advantages

High current density

High electrical strength

High switching frequency

High operating temperature

Minimum noise level

Areas of applications

Power supply

Uninterruptible power supplies

Electric motors (electric vehicles, industry)

Equipment for servers and data centers

Solar energy

Product portfolio

High voltage HEMT transistors

Microwave MIC of Ka and V frequency range

Microwave transistors

Power electronics transceiver modules

Microwave MIC of S and L frequency range

Microwave transceiver modules





JSC TTK together with National Research University of Electronic Technology develop basic technologies and routes for the manufacture of GaN electronics and modern components for power electronics and communication systems.

The implementation of the project will directly or indirectly solve the main priority tasks established by the Science and Technology Strategy development of the Russian Federation.

Zelenograd nanotechnology center is a multifunctional microelectronic complex for the full cycle of development and contract manufacturing of microelectronics and microsystems products with a set of CMOS, MEMS, MOSFET / IGBT technologies, which provides the necessary conditions for the manufacture of a wide range of civil and special-purpose products.

Our advantages:

There is the on-site manufacture of a full cycle with modern equipment

Our qualified personnel have scientific degrees and extensive experience in ICs manufacture

We have developed CMOS technologies from design to manufacture

We established partnerships with DWDM multiplexers manufacturers

We received letters of support from leading multiplexer consumer companies in Russia

We are the first in Russia who are developing domestic multiplexers

We have already manufactured the first samples of crystals of the optical waveguide DWDM multiplexer