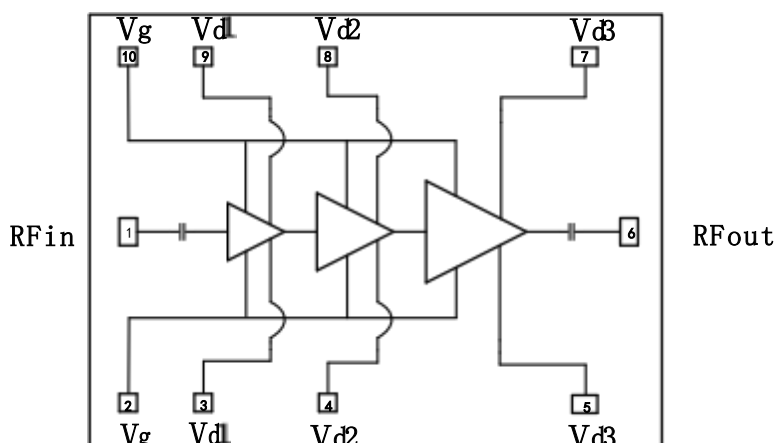


6 GHz-18 GHz | 15W | 28V | GaN MMIC RF PA

General Description

GNNT60180-42B is a broadband high-power amplifier chip fabricated using the GaN HEMT process, operating across a frequency range of 6GHz~18GHz. The chip features dual power supply, with a typical operating voltage of $V_D = +28\text{ V}$ and $I_{DQ} = 1.0\text{ A}$. In continuous wave mode, it delivers a small signal gain of 28 dB and a saturated output power of 15 W with 20% PAE.

Block Diagram



Applications

- Radar
- Wireless Radio
- Testing Instruments
- High-Frequency Broadband Products, etc.

Recommended Operating Conditions

Parameter	Value
Drain-Source Voltage (V_D)	28 V
Quiescent Current (I_{DQ})	1A
Gate-Source Voltage (V_G)	-1.85 V (Typ)
Dynamic Drain Current (I_{DD})	2.8 A (Typ)

Note:

1. All the RF spec tested under recommended conditions.
2. Bias-up Procedure: Set V_G to the pinch-off (V_P) voltage, typically -5 V, then turn on V_D to nominal supply voltage (28V);
3. Bias-down Procedure: Turn off RF signal, then turn off V_D and wait 1 second to allow drain capacitor dissipation, turn off V_G

产品特性

- Operating frequency: 6 GHz ~18 GHz
- Output Power (P_{sat}): $\geq 15\text{ W}$
- Power Gain: $\geq 17\text{ dB}$
- DE@ P_{sat} : $\geq 18\%$
- Operating Voltage: 28 V
- Support CW & Pulse mode
- Size: 3.9mmx3.4mmx0.1mm

**This product is
highly sensitive to
static electricity!**

Absolute Maximum Ratings

Note:

- Operating outside the rated range may cause irreversible damage to the die

Parameter	Range Value
Drain-Source Breakdown Voltage (BV_{DS})	120 V
Drain-Source Voltage Range, (V_D)	20 to 32 V
Gate-Source Voltage Range, (V_G)	-10 to +1 V
DC Power Consumption (P_D)	150 W
Operating Temperature Range (T_W)	-40 to 85 °C
Storage Temperature Range (T_{STG})	-65 to 150 °C
Channel Junction temperature (T_{CH})	225 °C
Sintering temperature (T_M)	310 °C
Maximum Input Power, CW, $T_A = 25^\circ\text{C}$ (P_{in})	30 dBm

RF Characteristics

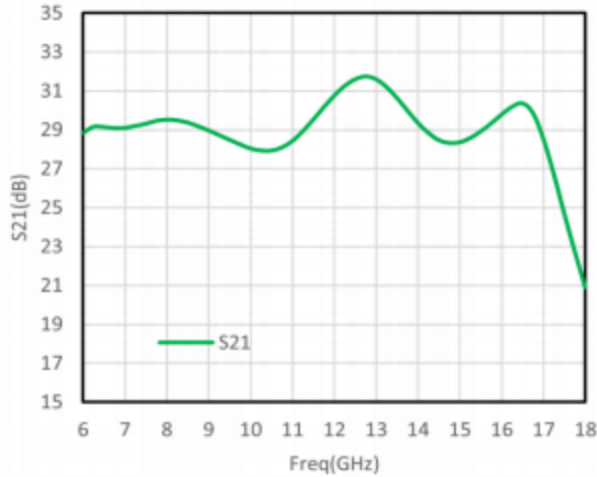
Symbol	Parameter	Min	Typ	Max	Unit
Freq	Frequency	6		18	GHz
G_{LIN}	Linear Gain	21	28	32	dB
ΔG_{sat}	Psat Gain Flatness	-	± 1	-	dB
P_{sat}	Output Power	38.5	42	43.5	dBm
PAE_{sat}	Saturation additional efficiency	13	17	32	%
RL_{IN}	Input Return Loss		-15	-10	dB
RL_{OUT}	Output Return Loss	-4	-	-	dB
Harmonic	Harmonic		-20	-8	dBc

Note:

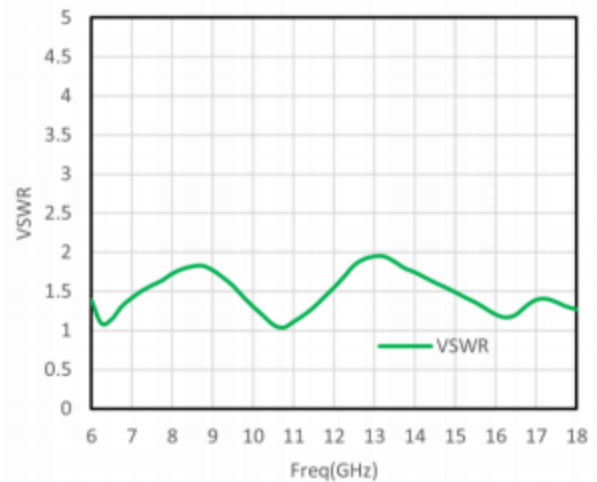
- Test condition: $T_A = 25^\circ\text{C}$, $V_D = 28\text{V}$, $IDQ = 1.0\text{A}$, CW

Typical RF Test Data Graphic (VD =28 V , IDQ =1A , CW)

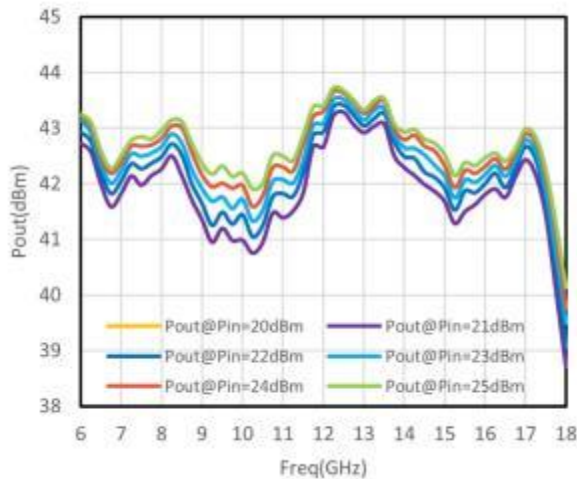
Small signal gain S21



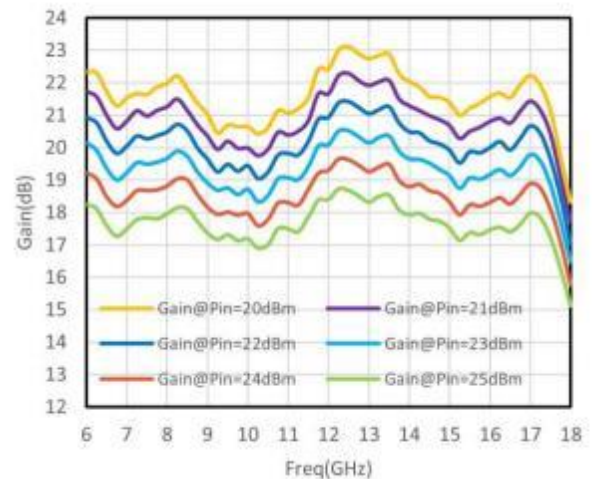
Input VSWR



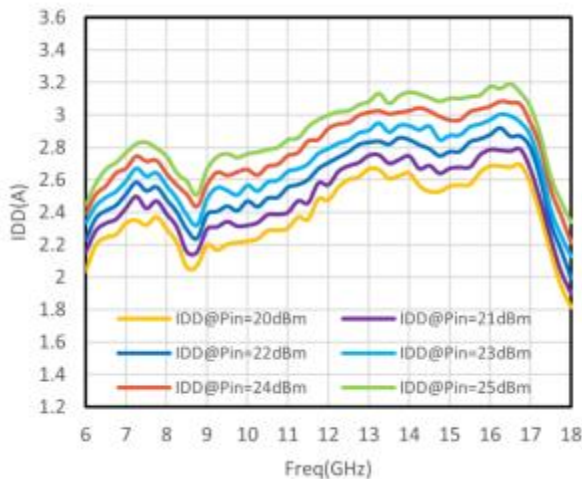
Output Power vs. Input Power



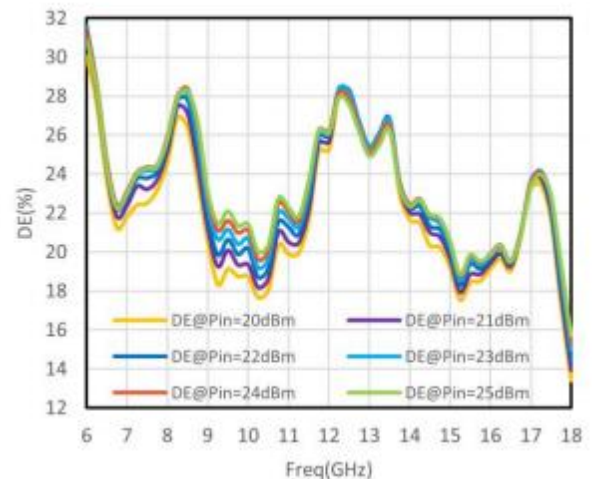
Power Gain vs. Input Power



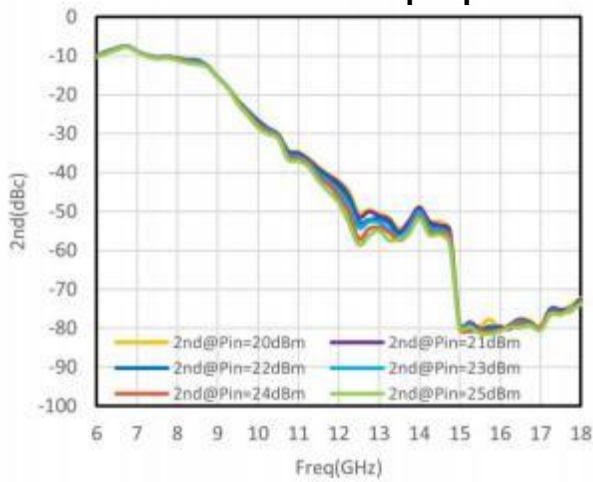
Drain current vs. Input Power



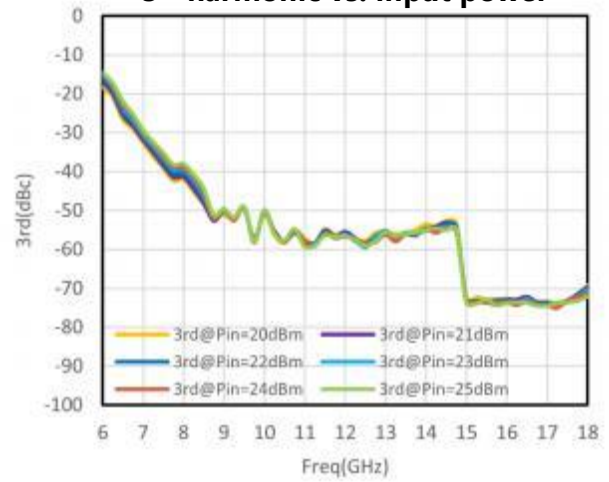
PAE vs. Input Power



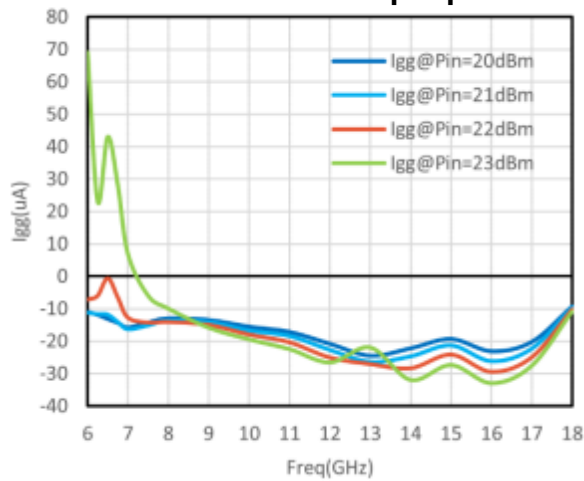
2nd harmonic vs. Input power



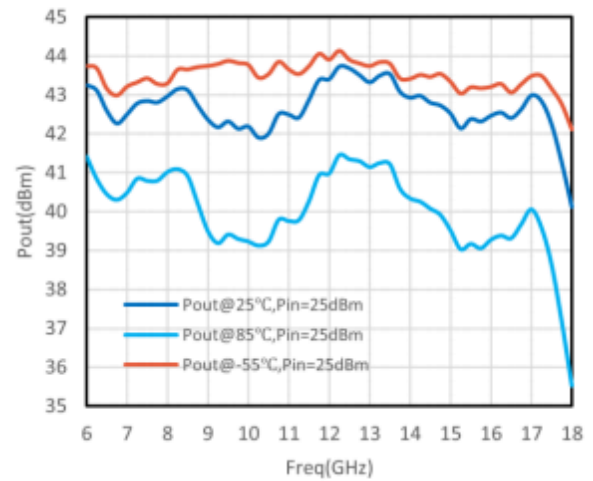
3rd harmonic vs. Input power



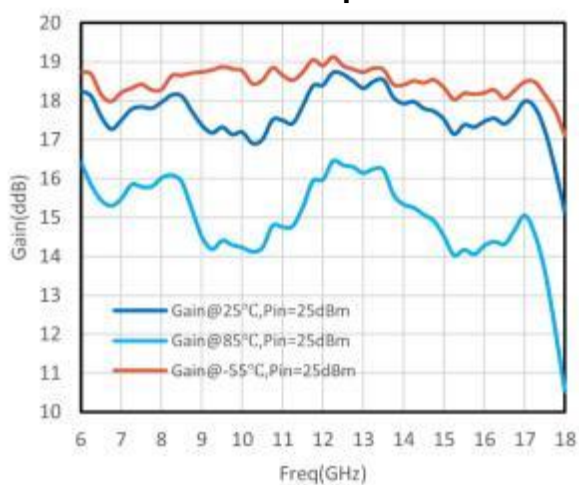
Gate current vs. Input power



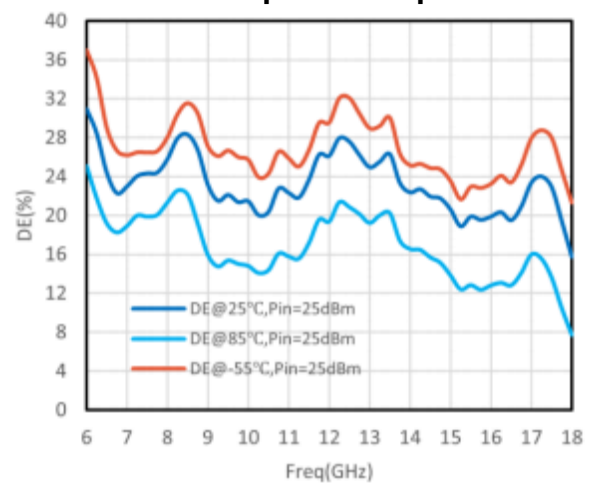
Pout vs. Frequency Over temperatures



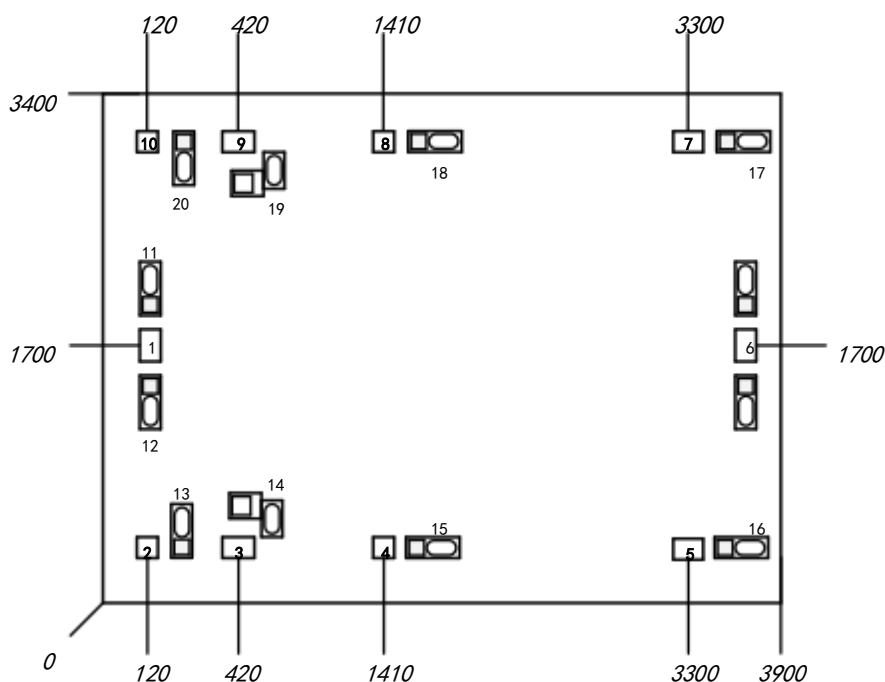
Power Gain vs. Temperatures vs. Freq



PAE vs. Freq Over Temperatures



Mechanical Information



Note:

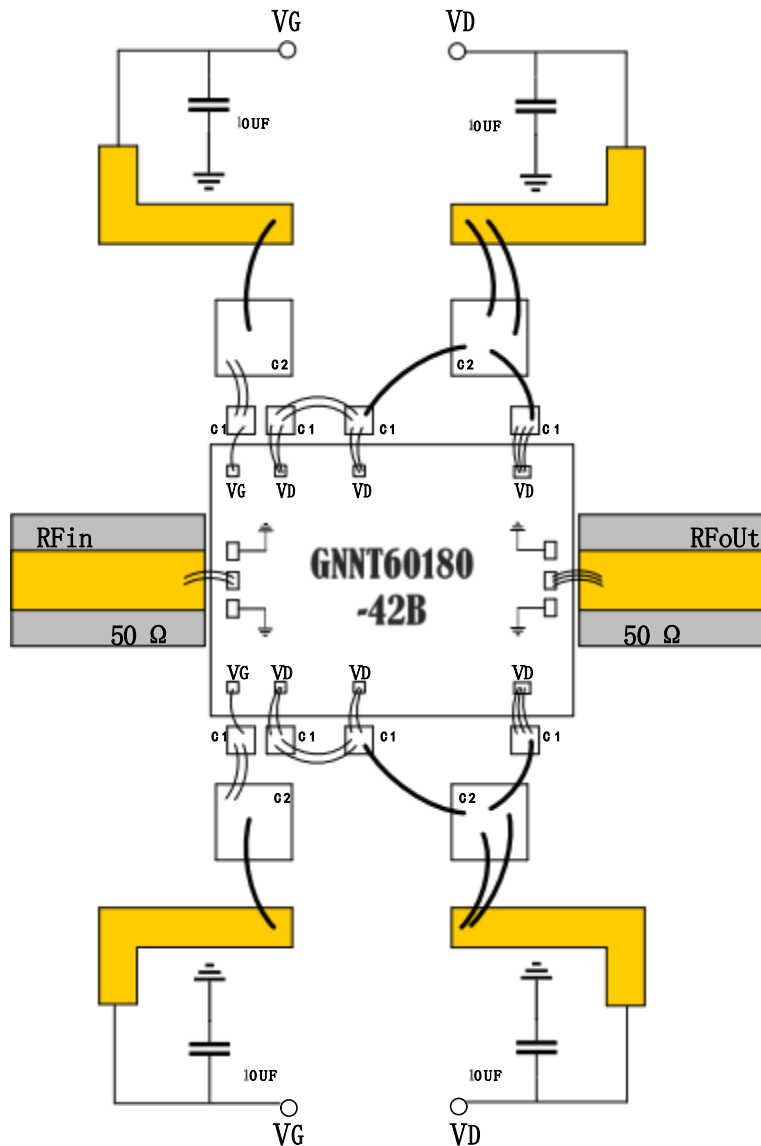
1. All dimension tolerances are ± 0.10 or ± 0.20 μm .

This package is lead-free/RoHS compliant.

Bonding PIN Definition

PIN	Symbol	Description
1	RFin	RF signal input with an external 50Ω system and built-in DC Block function
6	RFout	RF signal output with an external 50Ω system and built-in DC Block function
2,10	VG	Gate negative voltage Supply
3,9	VD1	Gate negative voltage Supply 1
4,8	VD2	Drain + 28 V voltage Supply 2
5,7	VD3	Drain + 28 V voltage Supply 3
11 to 20	GND	Connect to Ground

Reference Design Circuit



Note:

1. It is recommended to use molybdenum-copper as the substrate for chips, with a preference for gold-tin eutectic alloy to ensure proper grounding.
2. The RF port is constructed using three gold wires with a diameter of 25 μm bonded together, and the RF microstrip line is positioned as close as possible to the chip's input and output RF ports.
3. Pay attention to heat dissipation design to prevent excessive chip junction temperature; during ensure the surface temperature of the substrate does not exceed 85°C.
4. This product is electrostatic-sensitive; take anti-static precautions during use and assembly by wearing an anti-static grounding bracelet and ensuring proper grounding of the sintering and bonding stations.

For external capacitors, a capacitor with a nominal capacitance of 1200 PF is recommended. The distance between the capacitor and the chip should be as small as possible; additionally, a 1.2 nF filter capacitor must be connected externally to the Gate and Drain.

Revision History

Data	Revision	Status
2024/08/30	GNNT60180-42B_Ver2.0	Preliminary Datasheet