6 - 18 GHz High Power Amplifier

GaAs Monolithic Microwave IC

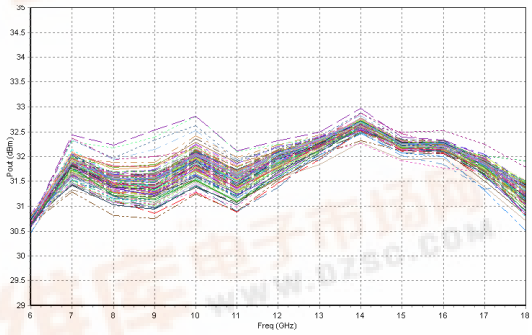
Preliminary

Description

The **CHA6517** is a Dual channel monolithic three-stage GaAs high power amplifier designed for wide band applications.
This device is manufactured using a UMS 0.25 µm Power pHEMT process, including, via holes through the substrate and air bridges.

To simplify the assembly process:

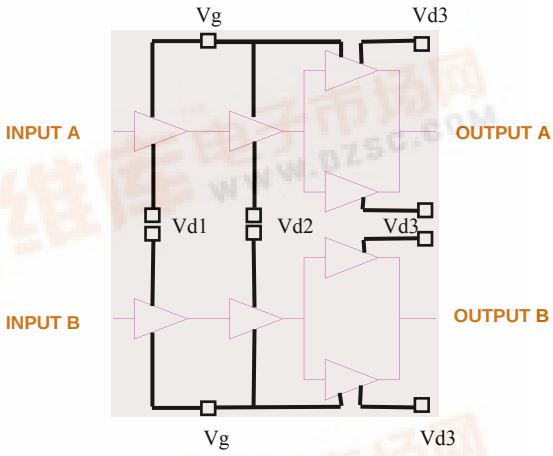
- the backside of the chip is both RF and DC grounded
- bond pads and back side are gold plated for compatibility with eutectic die attach method and thermosonic or thermocompression bonding process.



Output Power versus Frequency

Main Features

- 0.25 µm Power pHEMT Technology
- 6 – 18 GHz Frequency Range
- 32dBm Output Power per channel
- Compatible for balanced configuration
- 22dB nominal Gain
- Quiescent Bias point : 600mA @ 8V per channel
- Chip size: 4.32 x 3.90 x 0.07 mm



Main Characteristics

Tamb = +25℃ (Tamb is the back-side of the chip)

Symbol	Parameter	Min	Typ	Max	Unit
F_op	Operating frequency range	6		18	GHz
Psat	Saturated output power	30	32		dBm
G_lin	Linear gain	19	22		dB

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Electrical Characteristics

Preliminary

Tamb = 25℃ (2), Vd=8V, Id (Quiescient) = 0.6A, Pulsed biasing mode, each channel

Symbol	Parameter	Min	Typ	Max	Unit
F_op	Operating frequency	6		18	GHz
G_lin	Linear gain (Pin=-5dBm)	19	22		dB
RL_in	Input Return Loss		-14	-8	dB
RL_out	Output Return Loss		-8	-4	dB
Psat	Saturated output power (Pin=11dBm)	30	32		dBm
PAE_sat	Power Added Efficiency in saturation		15		%
Vd	Positive supply voltage		8		V
Id	Power supply quiescent current (1)		0.6		A
Vg	Negative supply voltage		-0.4		V
Top	Operating temperature range (2)	-40		+70	℃

(1) This parameter is fixed by gate voltage Vg
(2) The reference is the back-side of the chip

Absolute Maximum Ratings (1)

Symbol	Parameter	Values	Unit
Pin (2)	Maximum Input power	19	dBm
Vd (2)	Positive supply voltage without RF power	8.5	V
Id (2)	Positive supply quiescent current	1	A
Pd (2)	Power dissipation	13.5	W
Tj	Junction temperature	175	℃
Tstg	Storage temperature range	-55 to +125	℃

(1) Operation of this device above anyone of these parameters may cause permanent damage.
(2) These values are specified for Tamb = 25℃

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Typical measured characteristics

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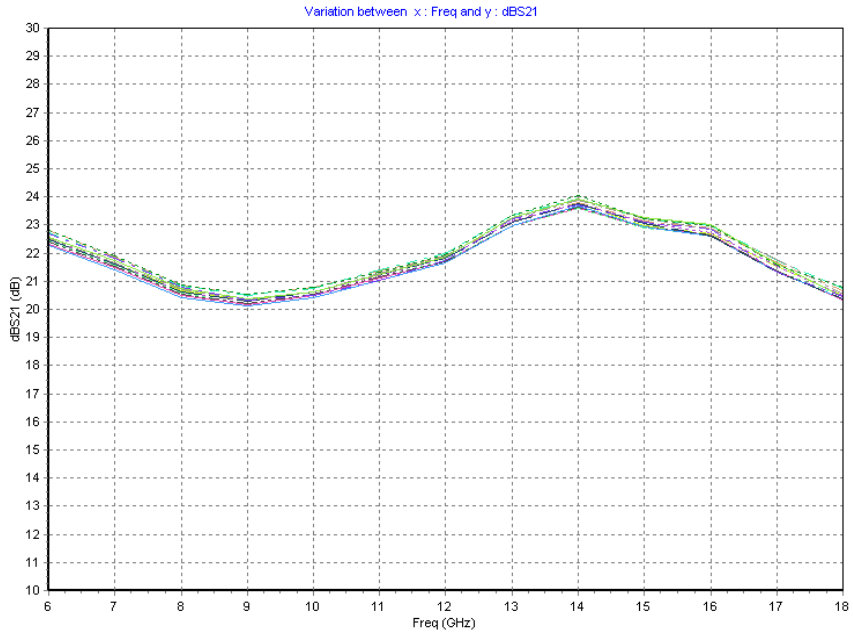
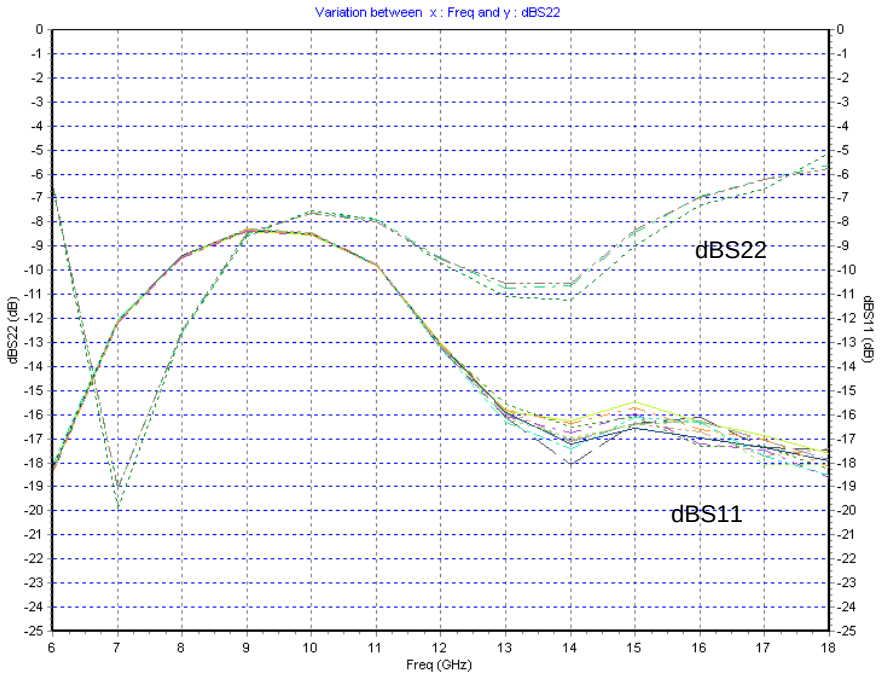
On Wafer Measurements, S parameters (one channel):
Tamb=25°C, Vd=8V, Id (Quiescient) = 0.6A, pulsed mode:



Gain



Input and Output Return losses

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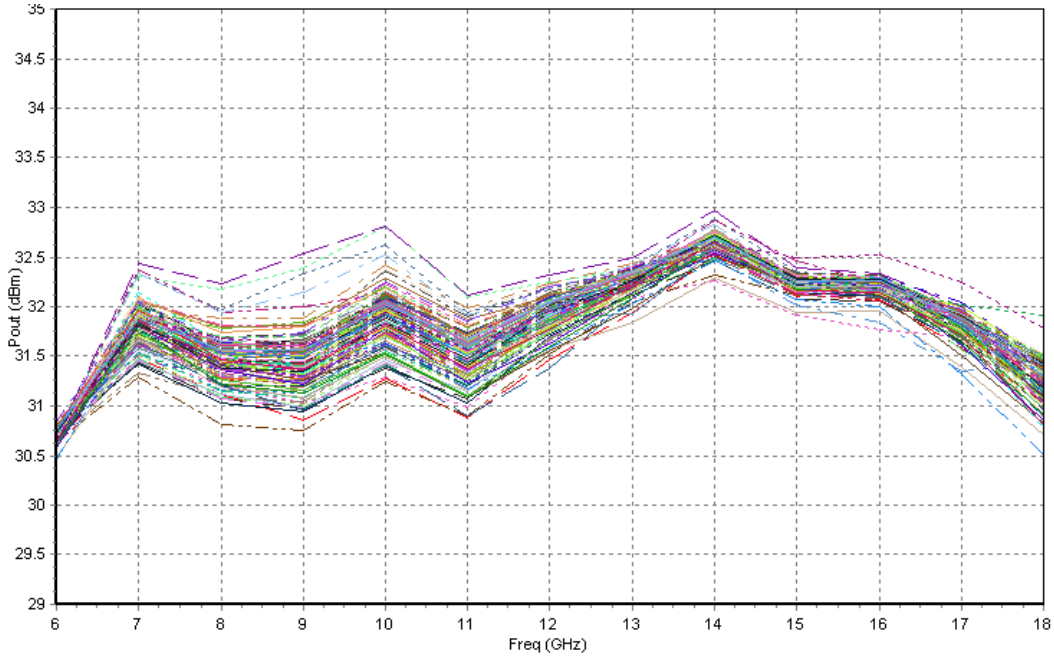
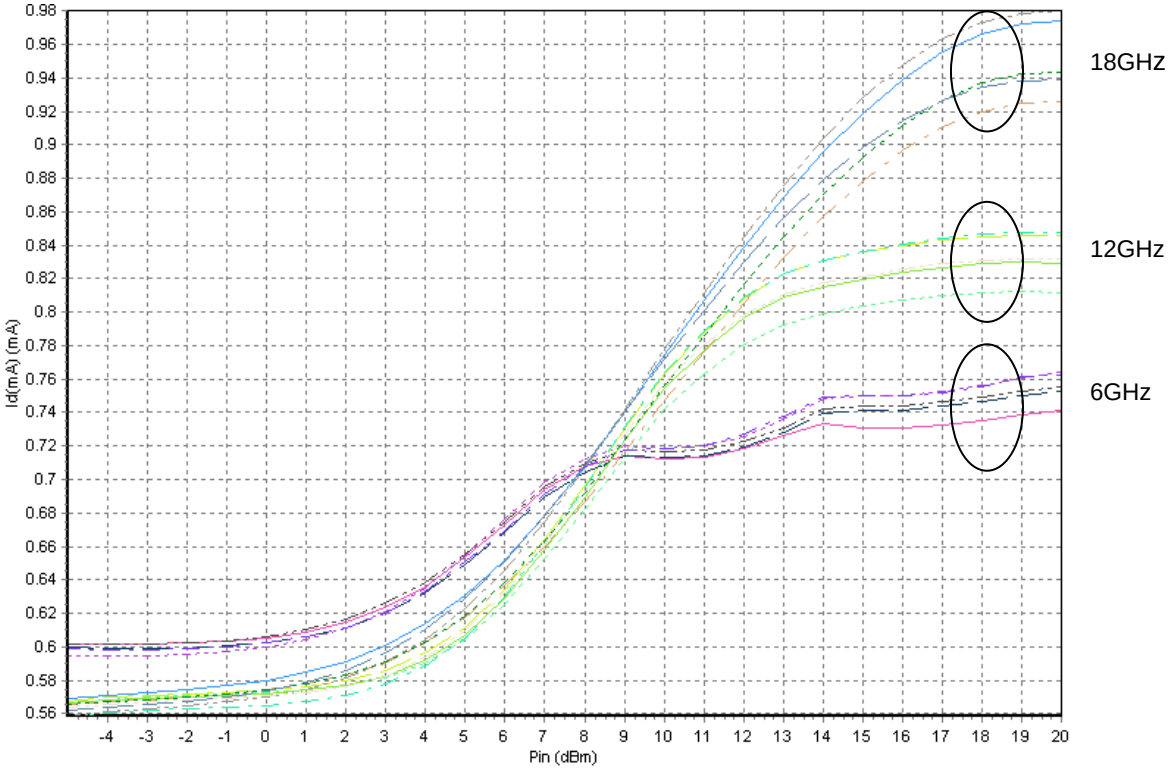
On Wafer Measurements (one channel):
Tamb=25°C, Vd=8V, Id (Quiescient) = 0.6A, Pin=11dBm , pulsed mode:

Preliminary



Output Power versus Frequency



Id versus Pin

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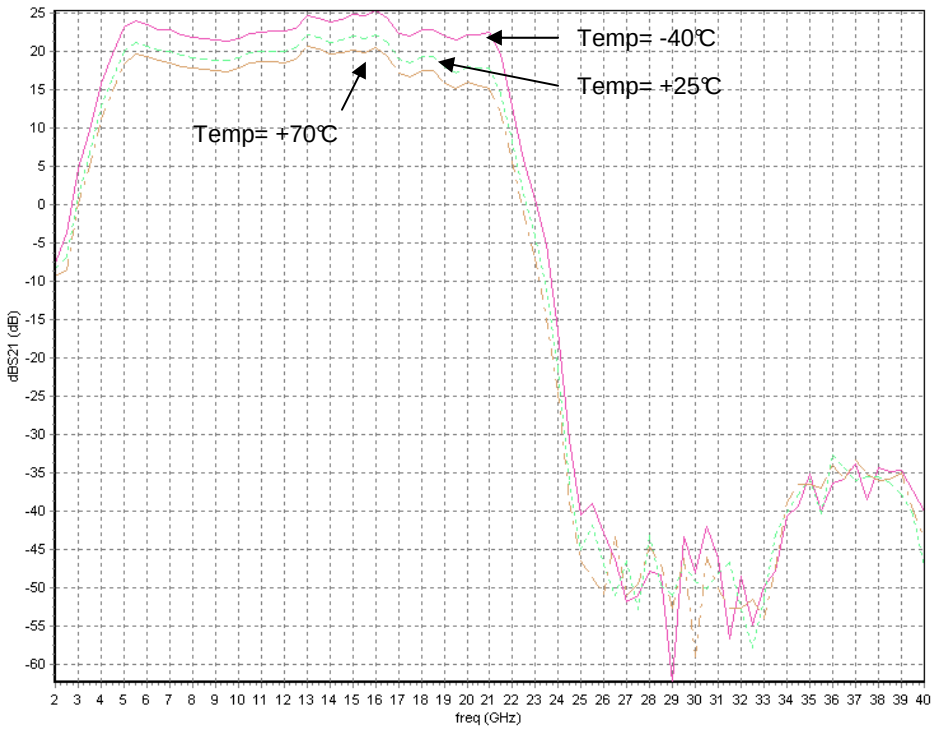
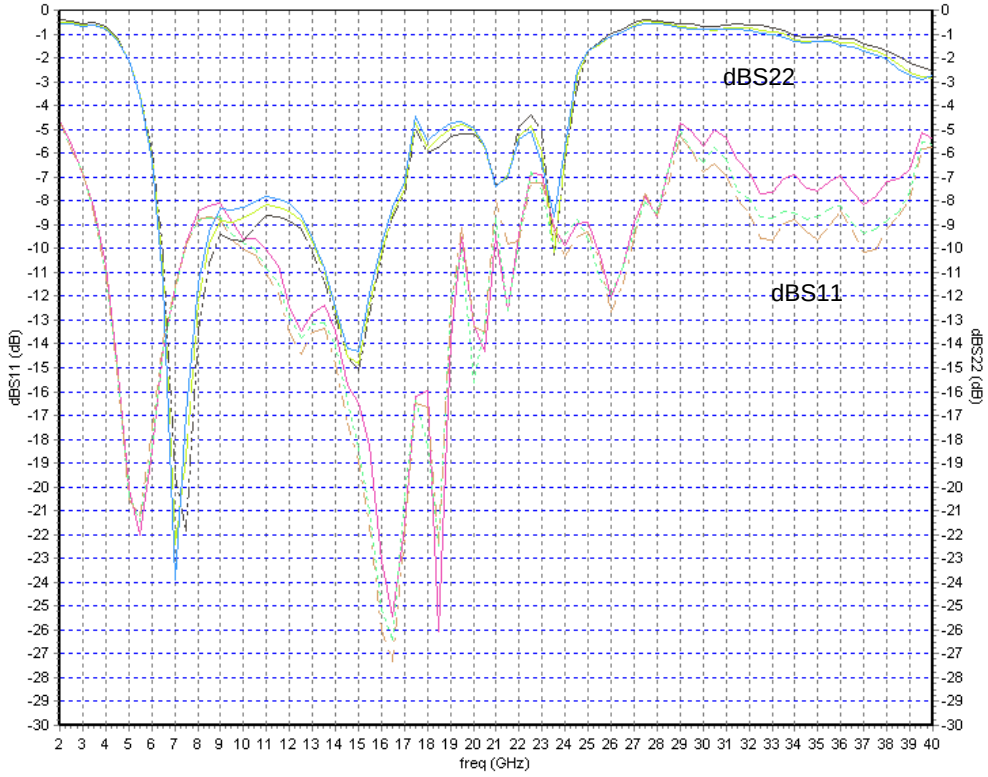
In test jig Measurements (one channel):
Vd=8V, Id (Quiescient) = 0.6A, S parameters, CW mode:



Gain versus Frequency and Temperature (-40℃, +25℃ and +70℃)



Input and Output Return losses versus Frequency and Temperature

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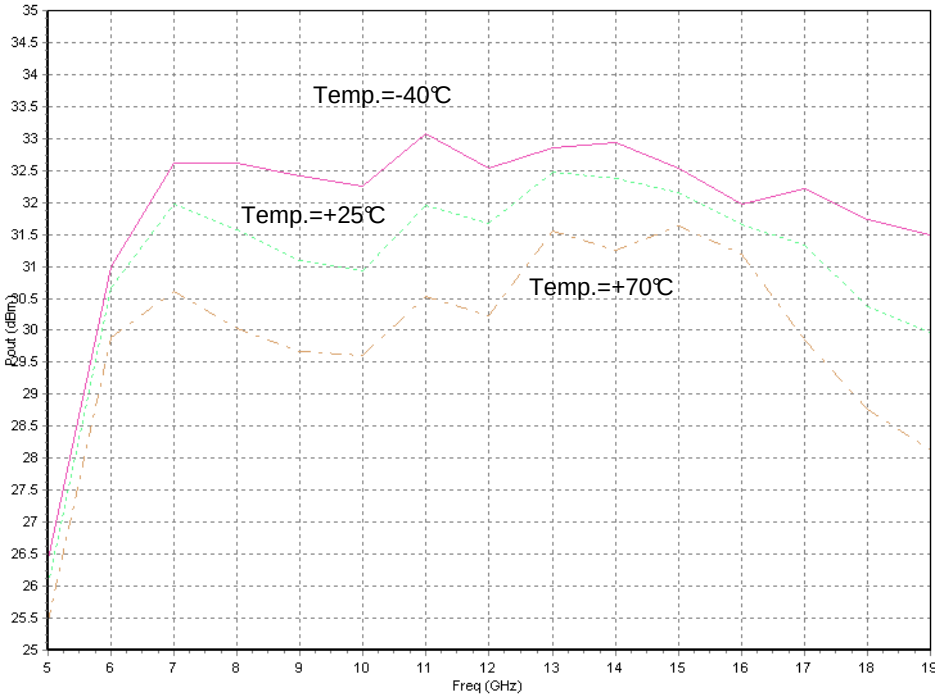
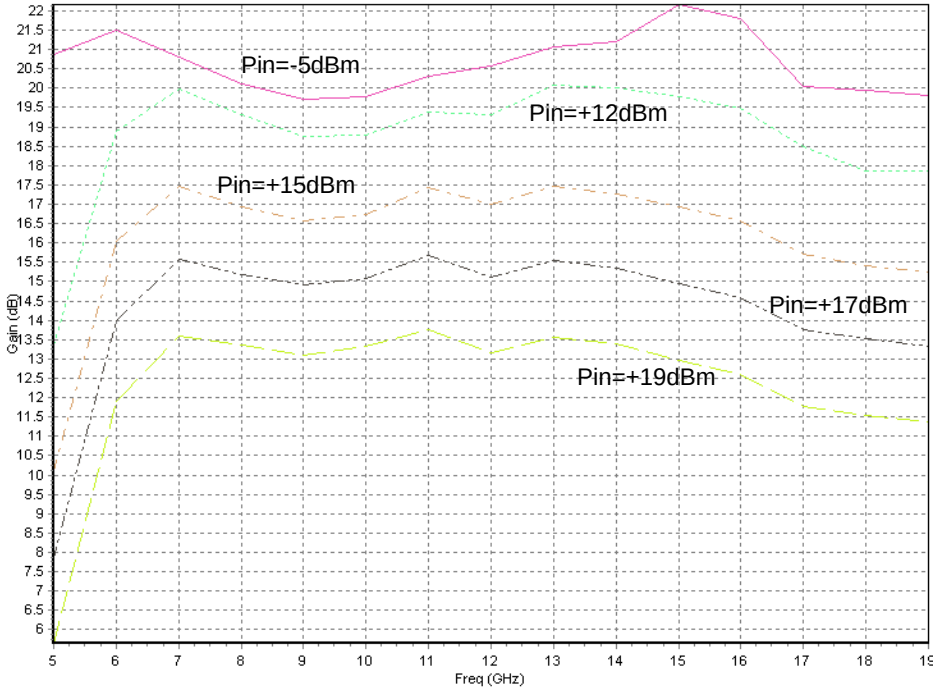
In test jig Measurements (one channel):
Vd=8V, Id (Quiescient) = 0.6A, Power measurements, CW mode



Output power versus Frequency and Temperature (Pin=+12dBm)



Gain versus Frequency and Input power (Temp.=+25℃)

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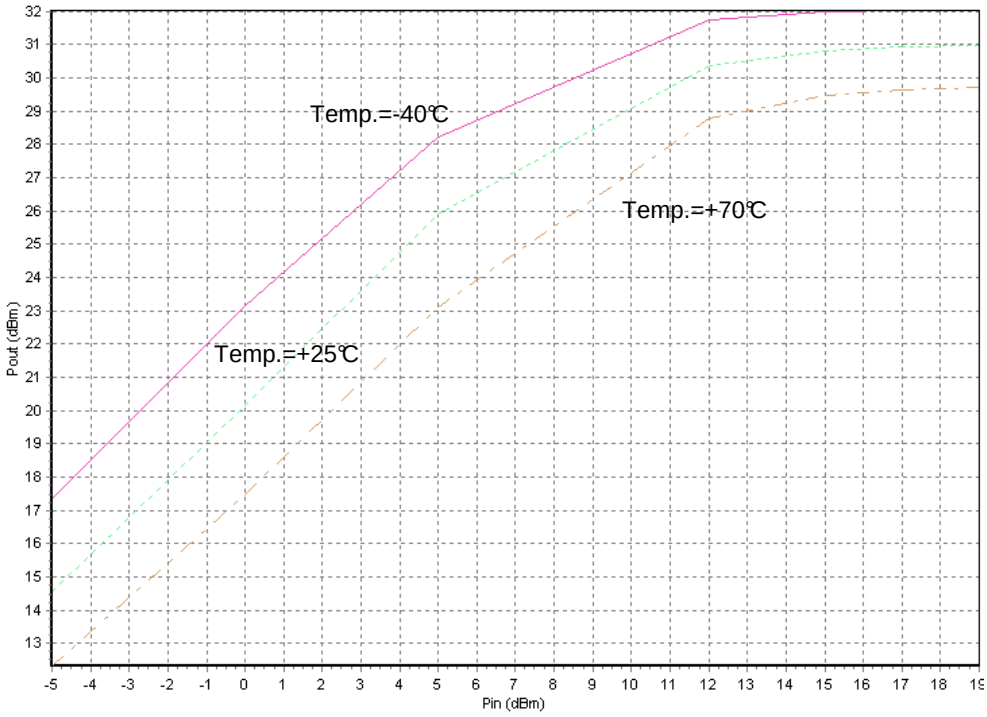
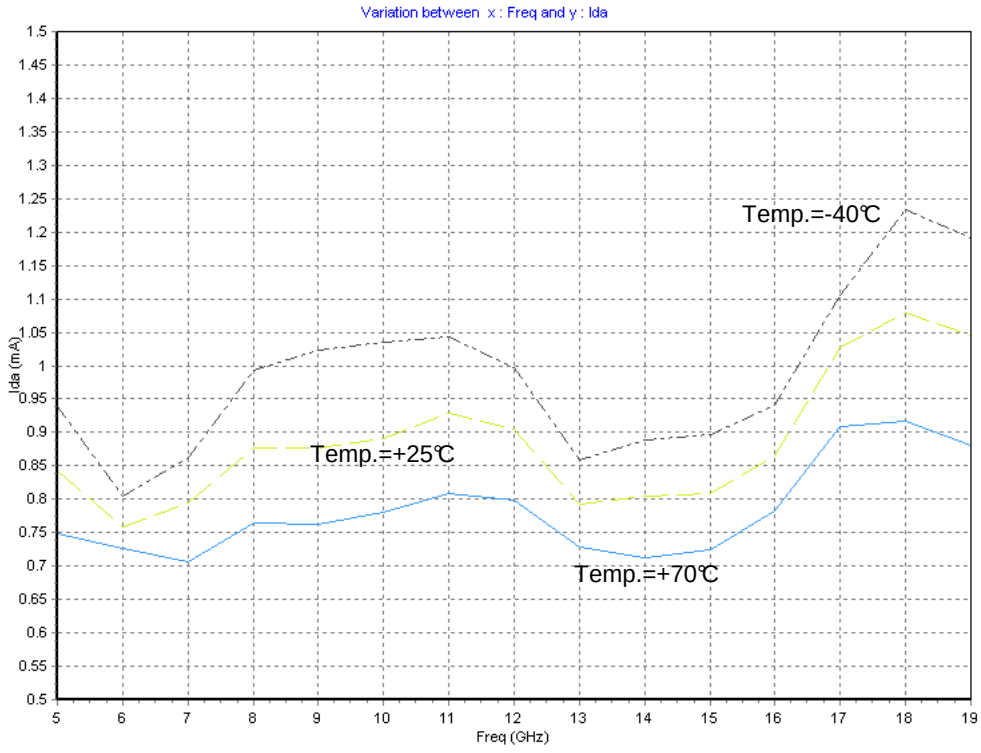


Output power versus Frequency and Temperature (Freq=18GHz)



Id current versus Frequency and Temperature (Pin=+17dBm)

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Chip Mechanical Data and Pin references

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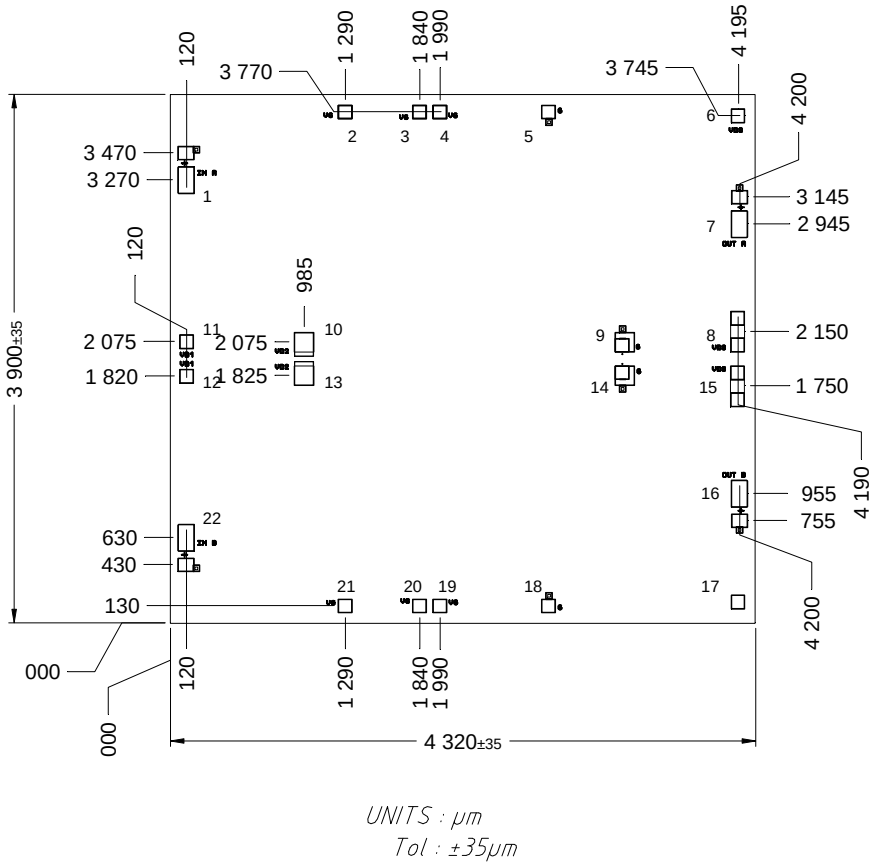

Chip thickness = 70µm +/- 10µm
HF pads (1, 7, 16, 22) = 118 x 196
DC pads = 96 x 96

Pin number	Pin name	Description
1, 22	IN	Input RF port
2, 3, 4, 19, 20, 21	VG	Negative supply voltage
5, 9, 14, 18	GND	Ground (NC)
6, 8, 10, 11, 12, 13, 15, 17	VD	Positive supply voltage
7, 16	OUT	Output RF port

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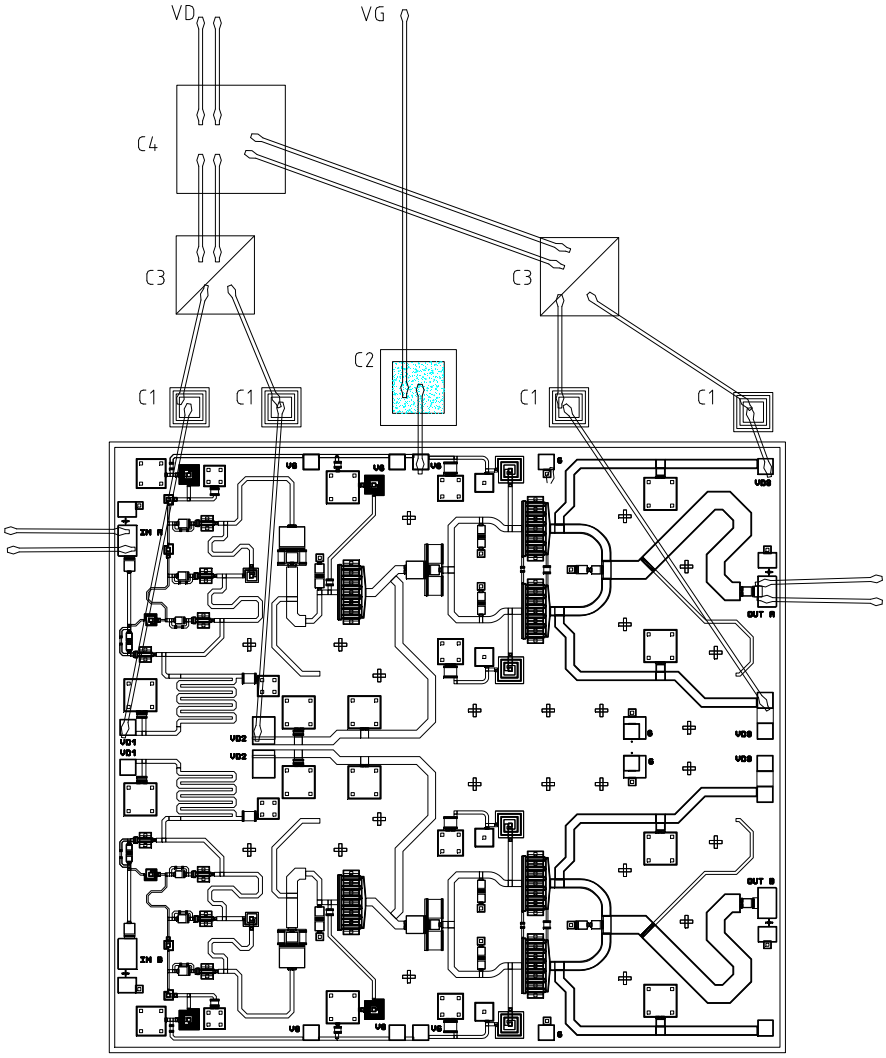

Assembly recommendations (one channel)

For thermal and electrical considerations, the chip should be brazed on a metal base plate. The RF and DC connections should be done according to the following table:

Port	Connection	External capacitor
IN (1, 22)	Inductance (Lbonding) = 0.3nH	
OUT (7, 16)	Inductance (Lbonding) = 0.3nH	
VD (6, 8, 10, 11, 12, 13, 15, 17)	Inductance ≤ 1nH	C1 ~ 22pF C3~ 1nF C4~100nF
VG (2, 3, 4, 19, 20, 21)	Inductance ≤ 1nH	C2~ 120pF

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Ordering Information

Chip form : CHA6517-99F/00

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