

1. Features

- Optimized for 400–510 MHz operation
- VCC up to 4.5V
- Output power 31.5dBm @ 3.6V
- High PAE at maximum output power
- Low leakage current
- Single-ended 50 Ω input and output ports
- Fully on-chip matching circuitry

2. Applications

- Automated meter reading
- ISM systems
- IoT Modules
- LoRa

3. Product Highlights

- Small package size
- Support low voltage Vbat
- High Efficiency
- High output power

4. Description

The Geo-Chip GC0631 is a high-performance, high-power PA (Power Amplifier), which is mainly designed for 400-510MHz band applications.

Packaged in a compact LGA 3mm x 3mm x 0.75mm, the GC0631 is a 10-pad PA, exhibits high efficiency, low temperature variation, strong reliability and robust ruggedness.

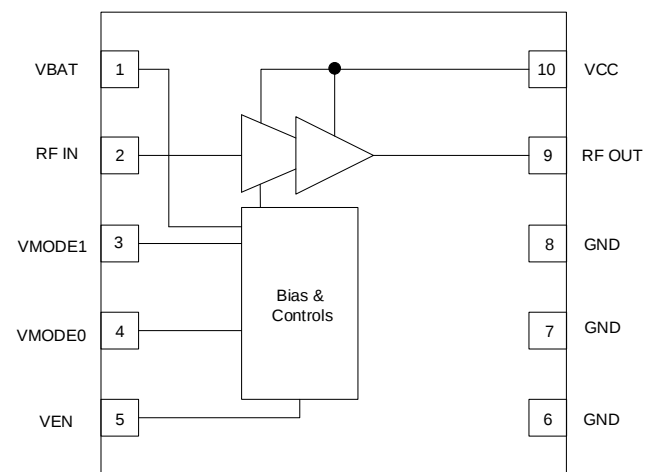


Figure 1 GC0643 Function Block Diagram

5. Absolute Maximum Ratings

Parameters	Symbol	Maximum	Unit
RF Input Power	Pin	7	dBm
Supply Voltage	VBAT	4.5	Volts
Supply Voltage	VCC	5	Volts
Enable Control Voltage	VEN	4.0	Volts
Mode Control Voltage	VMODE	4.0	Volts
Operating Temperature	Tcase	-40~105	°C
Storage Temperature	Tstg	-55~125	°C
ESD (HBM)		2000	Volts
ESD (CDM)		300	Volts

Table 1¹

1.Exposure to maximum rating conditions for extended periods may reduce device reliability. There is no damage to device with only one parameter set at the limit and all other parameters set at or below their nominal value.

6. Pin Description

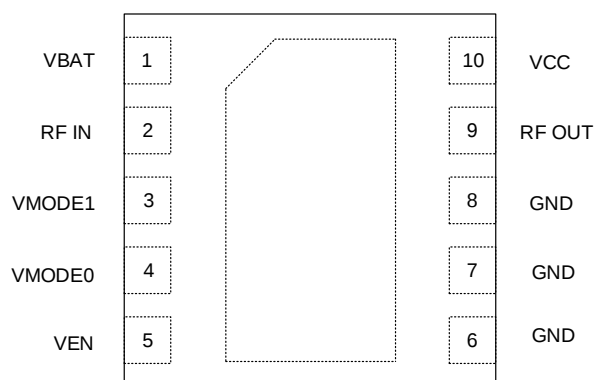


Figure 2 GC0631 Pinout (Top view)

Name	Pin	Description
RF IN	2	RF signal input
RF OUT	9	RF signal output
VBAT	1	Power supply for digital
VCC	10	Power supply for PA
VMODE	3,4	Digital Control signal input for mode selection
VEN	5	PA Enable Control signal
GND	6,7,8	Ground

Table 2

7. Recommended Operating Condition

Parameters	Symbol	Minimum	Nominal	Maximum	Unit
Operating Frequency	f	400	----	510	MHz
Supply Voltage	VBAT	2.1	3.6	4.2	Volts
Supply Voltage	VCC	0.5	3.6	4.5	Volts
Enable Control Voltage High	VEN_High ¹	1.2	----	4.2	Volts
Enable Control Voltage Low	VEN_Low	0	----	0.3	Volts
Mode Control Voltage High	VMODE_High ¹	1.2	----	4.2	Volts
Mode Control Voltage Low	VMODE_Low	0	----	0.3	Volts
Operating Temperature	Tcase	-40	+25	+85	°C

Table 3

1. VEN/VMODE voltage level must not exceed VBAT voltage
2. VBAT must be prior to VEN for the power on sequence.

8. Control Logic (VCC & Vbat on)

Mode	VEN	VMODE0	VMODE1
Power up mode	1	1	1
Power down mode	0	X	X

Table 4

"1" denotes high voltage state (> 1.2 V)

"0" denotes low voltage stage (< 0.3 V) at control pins

"X" denotes do not care: either "1" or "0" can be applied.

9. Electrical Specifications

VBAT=3.6V, VCC=3.6V, Temp=25°C, CW Test

Parameters	Conditions	Min	Typ	Max	Units
Frequency range		400	450	510	MHz
Saturated power(Psat)			31.5		dBm
Quiescent Current			76		mA
Power Added Efficiency	@Psat		48		%
Gain			30		dB
Harmonics	2fo@Psat		-45		dBc
	3fo@Psat		-55		dBc
S11			-20		dB
Stability	VSWR = 6:1, all phase			-60	dBc
Ruggedness	VSWR = 6:1, all phase	No damage or degradation			
Rise/Fall Time	RF			1	us
Leakage Current	VCC = High, Enable = Low,VMODE = Low			0.5	uA

Table 5

10. Typical Performance Curves

10.1 S Parameters

Conditions: VCC=VBAT=VEN= 3.6V, VMODE0=VMODE1=3.6V, Temp=25°C

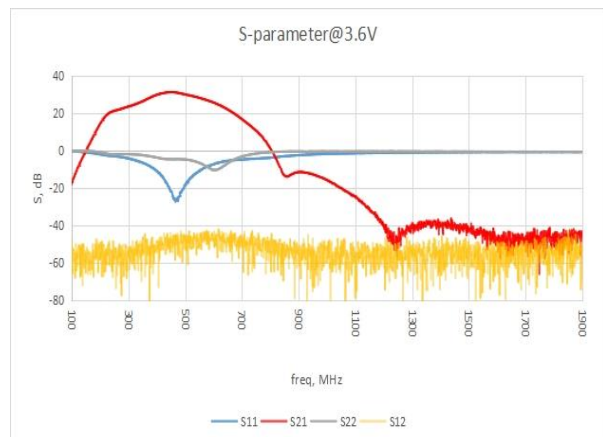


Figure 3

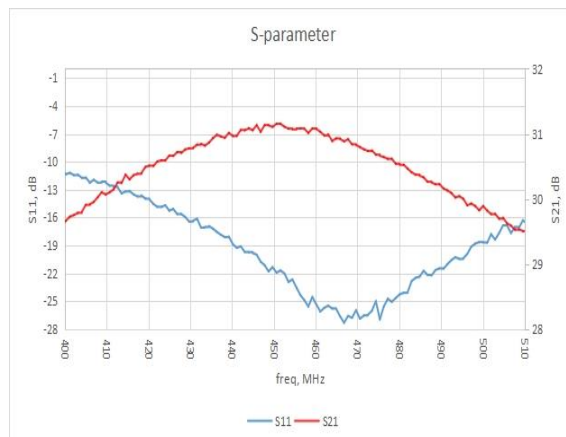


Figure 4

10.2 Efficiency & Icc

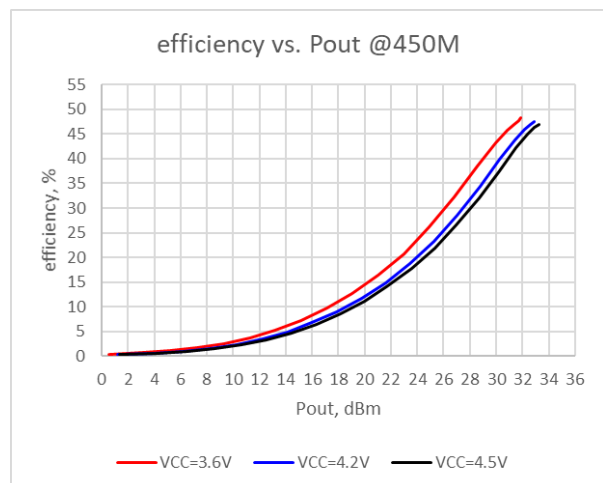


Figure 5

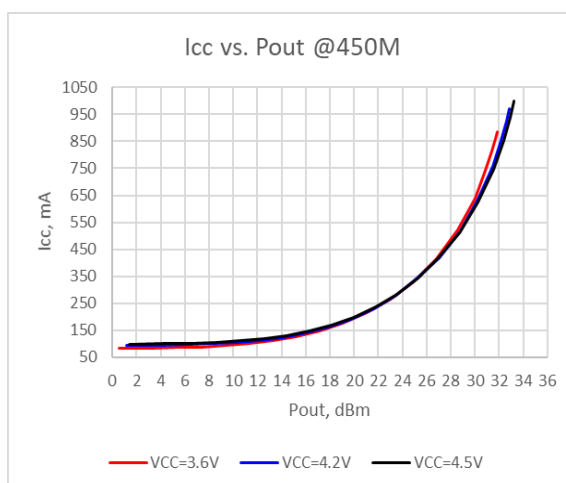


Figure 6

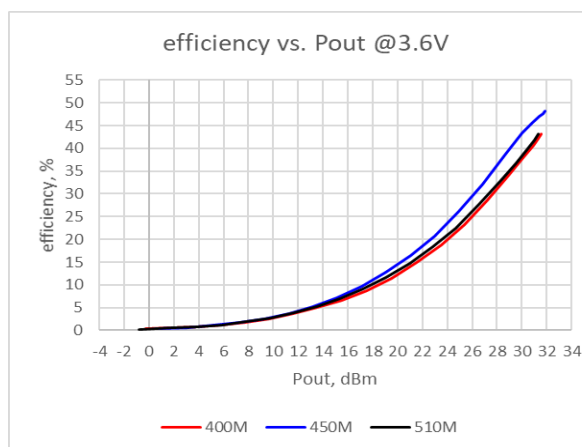


Figure 7

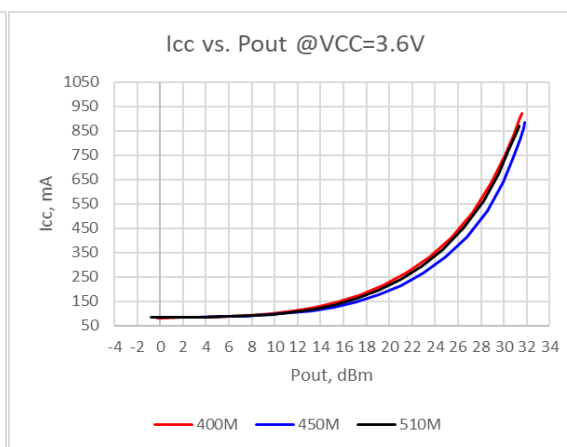


Figure 8

10.3 Gain vs Pout

Conditions: VBAT=VEN= 3.6V, VMODE0=VMODE1=3.6V, Temp=25°C

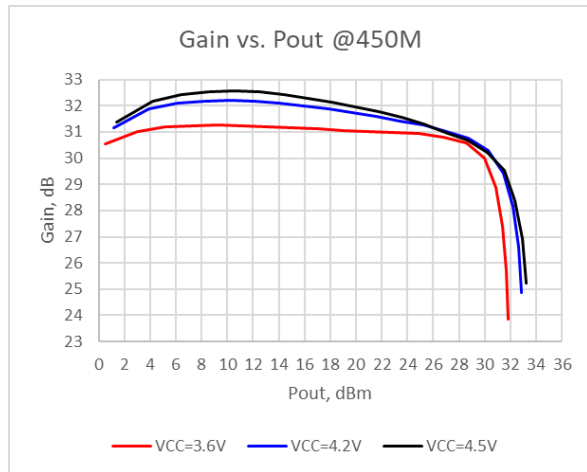


Figure 9

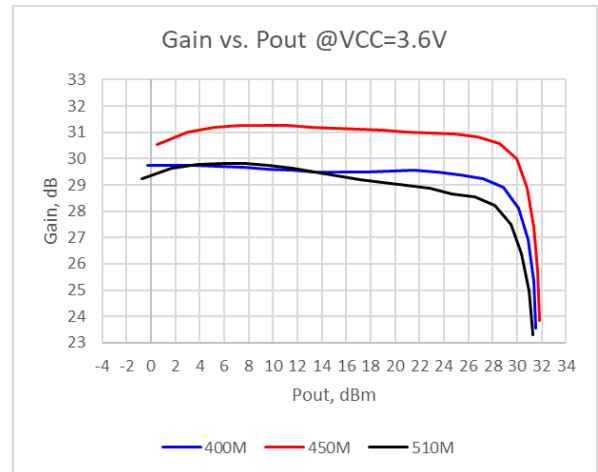


Figure 10

11. Application Schematic

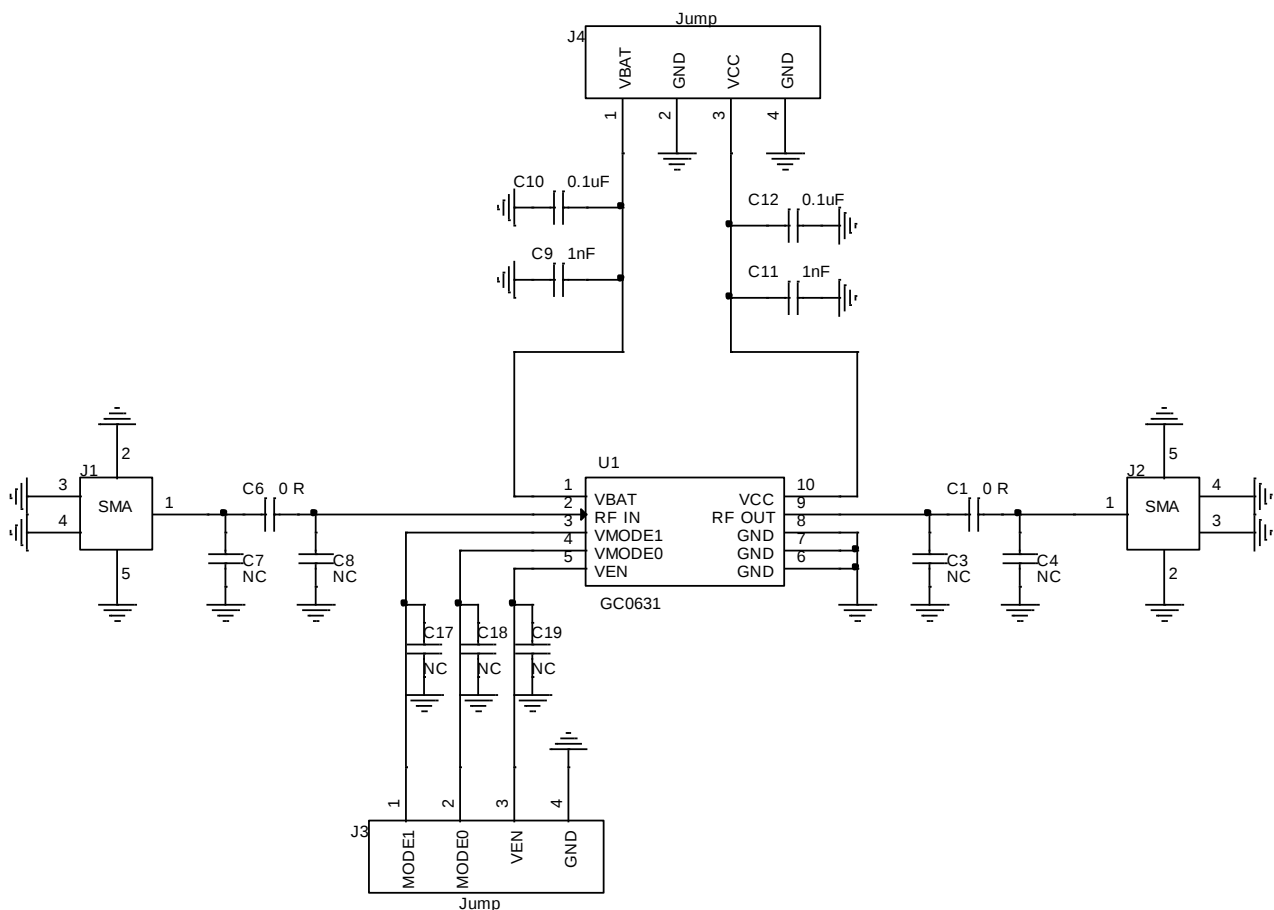


Figure 11

12. Package Dimensions

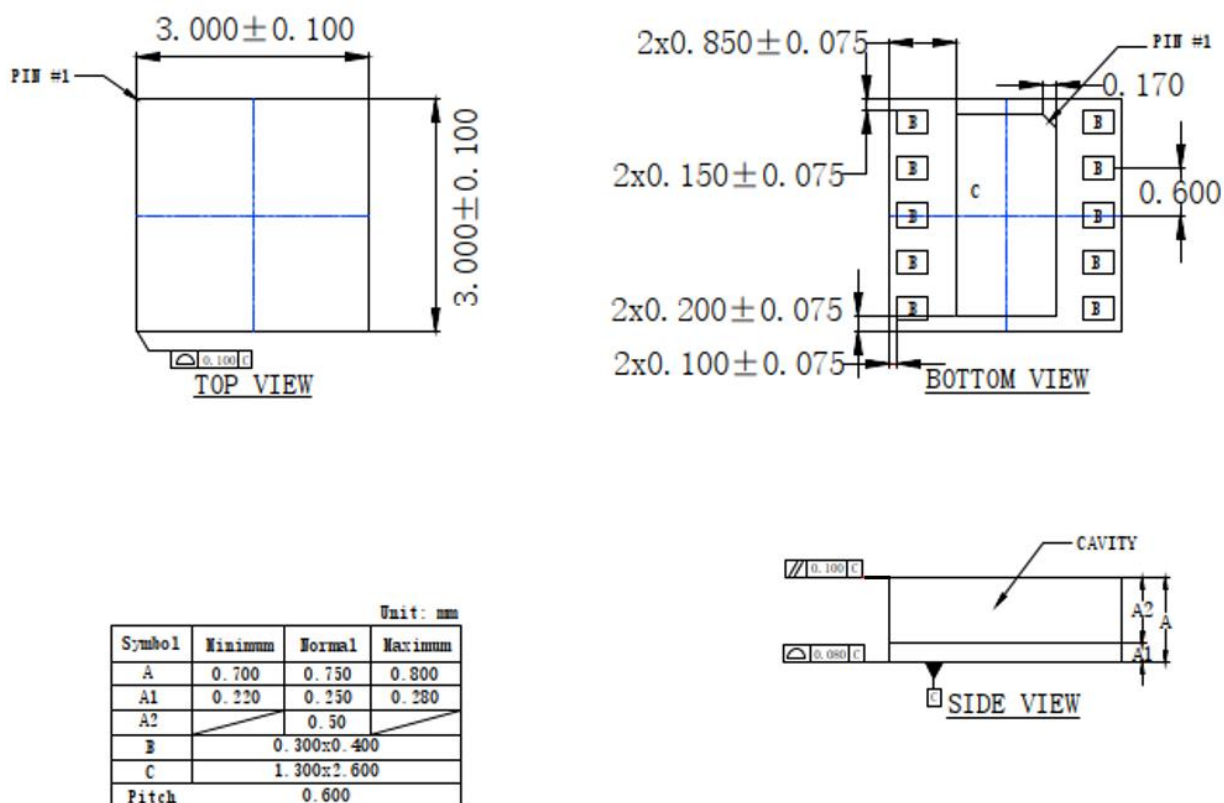


Figure 12

13. Part Marking

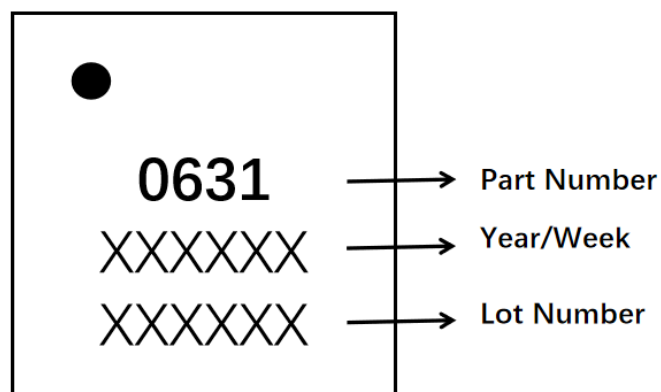


Figure 13 Typical Part Markings(Top View)

14. Packaging Information

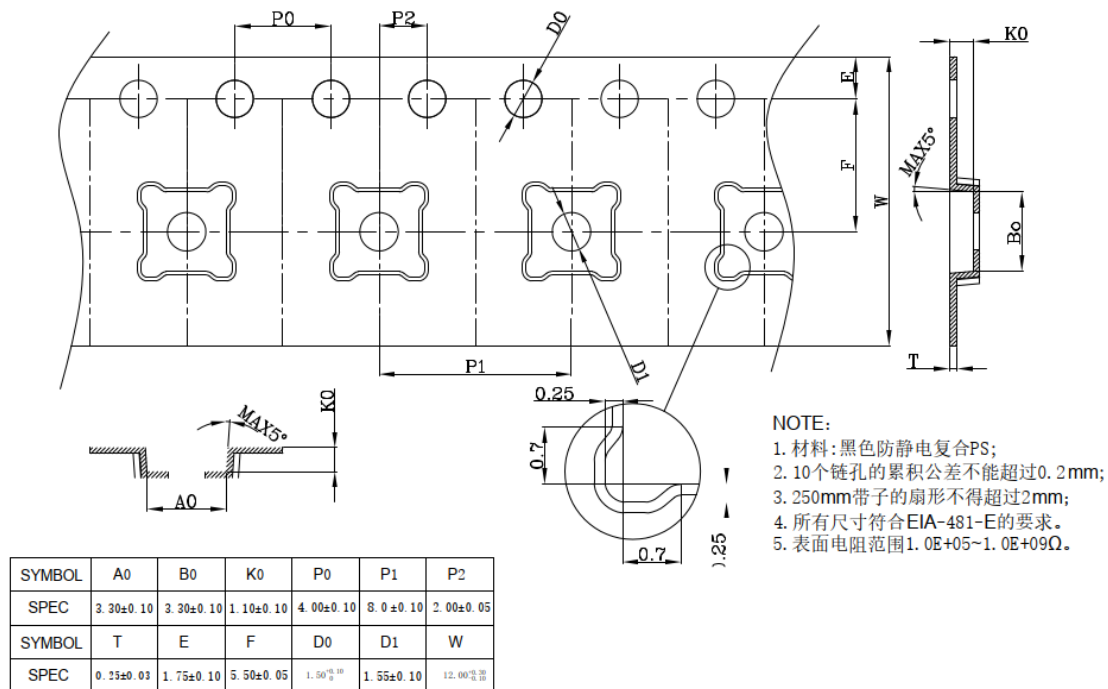


Figure 14

15. Ordering Information

Model	Package	Packaging Form	Minimum Order Quantity
G0631	LGA30 4*4	Tape and Reel	3000

16. Revision Record

Version	Date	Description
0.1	03/2022	First release to customer
0.9	11/2022	Add application info.
1.0	11/2023	Review and update Performance info.

17. Disclaimer

Information in this document is provided in connection with Hangzhou Geo-chip Technology Co., Ltd. These materials are provided by Geo-chip as a service to its customers and may be used for informational purposes only. The information provided here is believed to be reliable; Geo-chip assumes no responsibility for errors or omissions in these materials. Geo-chip assumes no reliability for the use of this information and all such information should entirely be at the user's own risk. Specifications described and contained here are subjected to change without notice on the purpose of improving the design and performance.

All of this information described herein should not be implied or granted for any third party. Geo-chip does not authorize or warrant any Geo-chip products for use in the life support devices or systems.

For technical questions and additional information about Hangzhou Geo-chip Technology Co., Ltd.

Website: www.geochipinc.com

China

Tel: + 86-571 26283530