SAC3619BQ7

X-Band FEM Chip
8.5GHz~10.5GHz

Rev 1.1

Features

- Frequency: 8.5GHz~10.5GHz
- RX Gain: 22dB
- RX Noise Figure: 1.8dB
- TX P_{-3}dB: 32dBm
- Package: QFN7x7

Typical Applications

X-Band Radar

General Description

The SAC3619Q7 is a GaAs front-end chip (FEM) designed for X-Band radar applications within the 8.5–10.5GHz range. The MMIC combines a T/R switch, low-noise amplifier with limiter, and a power amplifier. The receive path offers 21 dB gain with low noise figure of 1.8dB. The transmit path offers a small signal gain of 21 dB, it can deliver 1.5 W of saturated power with a PAE of 30%.

Electrical Performance

T_A=25℃, Z_0=50Ω, RX ON, V_{D_RX}=+5V, Vee=-12V, Vdd=+5V, Vc=+5V,I_{Vdd}=29mA

Parameter	Min.	Typ.	Max.	Units
Frequency Range		8.5~10.5		GHz
RX Small Signal Gain	—	21	—	dB
Gain Flatness	—	±1.5	—	dB
$VSWR_{RFC}$	—	1.6	2	:1
$VSWR_{RX}$	—	1.6	2	:1
RX Noise Figure	—	1.8	2.2	dB
RX Reverse Isolation	—	30	—	dB
RX Output P_{-1}dB	10	12	—	dBm
RX Supply Current (ID)	—	35	45	mA
RFC power handing ability*	—	—	40	dBm

*PW=100 μ S,10%DC

T_A=25℃, Z_0=50Ω,TX ON, V_{D_TX}=+6V, I_{DQ}=650mA, Vee=-12V, Vdd=+5V, Vc=0V, I_{vdd}=29mA

Parameter	Min.	Typ.	Max.	Units
Frequency Range		8.5~10.5		GHz
TX Small Signal Gain	—	21	—	dB
TX Large Signal Gain	—	20	—	dB
Gain Flatness	—	±1.5	—	dB
$VSWR_{RFC}$	—	2	—	:1
$VSWR_{TX}$	—	1.6	2.5	:1
Saturated Output Power	30	31	—	dBm
PAE at Saturated Power	—	30	—	%
TX Supply Current at Saturated Power	—	900	970	mA
Harmonic Suppression	—	30	—	dBc
Switch Settling Time, Rising Edge	—	—	45	nS
Switch Settling Time, Falling Edge	—	—	75	nS

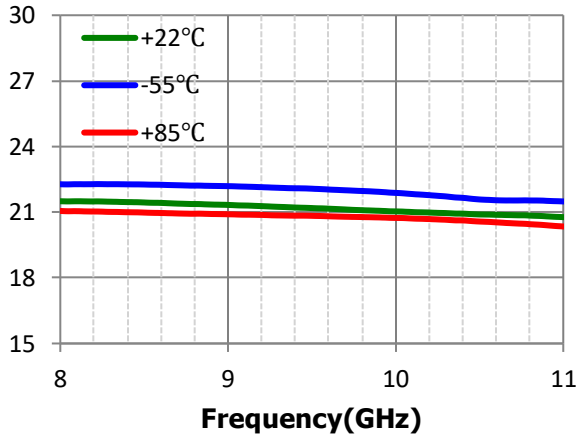
SuperApex,LLC
Address: 1580 S. Milwaukee Avenue, Ste. 405 Libertyville, IL 60048, USA
Tel: 1-847-573-9866, 1-847-505-8319
E-mail: sales@superapexco.com
Website: www.superapexco.com

Absolute Maximum Ratings

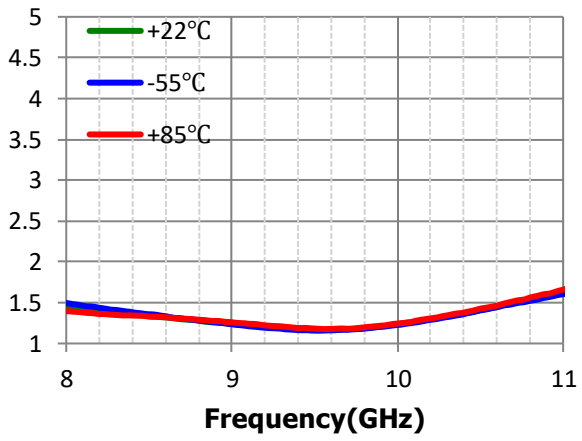
Drain Voltage	+6.5V	Switch Control Current (I_{Vdd})	70mA
Drain Current (TX_VD)	1100mA	SW Control Vc	+5.5V
Gate Voltage (TX_VG)	-5V~-0.2V	Operating Temperature	-55℃～+85℃
Gate Current (TX_IG)	10mA	Storage Temperature	-55℃～+150℃
Switch Driver Voltage (Vee)	-7~-15V	ESD (Human Body Model)	Class 1A
Switch Driver Voltage (Vdd)	+5.5V		

Typical Performance Curve

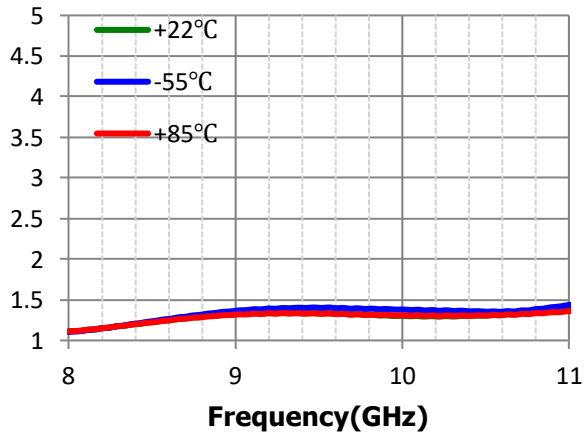
RX SS Gain(dB) vs.Temperature



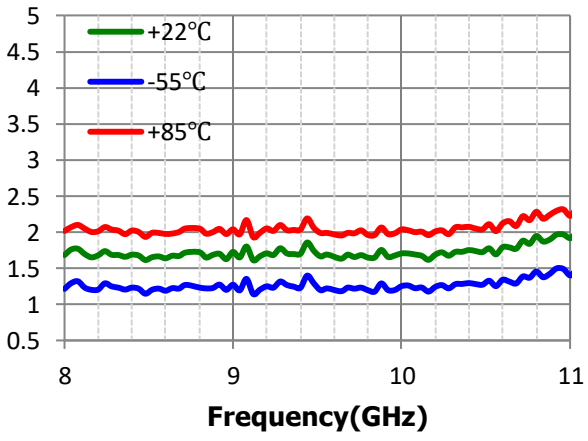
$VSWR_{RFC}$(:1) vs.Temperature(RX_ON)



$VSWR_{RX\_OUT}$(:1) vs.Temperature(RX_ON)

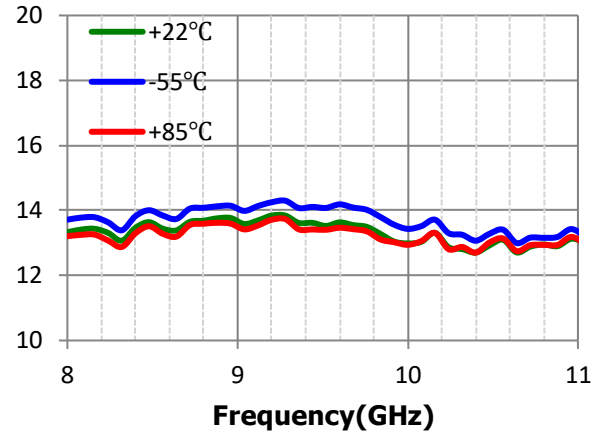


RX Noise Figure(dB) vs.Temperature

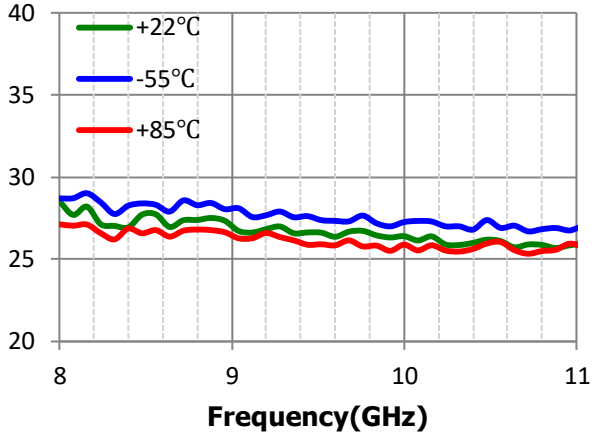


SuperApex,LLC
Address: 1580 S. Milwaukee Avenue, Ste. 405 Libertyville, IL 60048, USA
Tel: 1-847-573-9866, 1-847-505-8319
E-mail: sales@superapexco.com
Website: www.superapexco.com

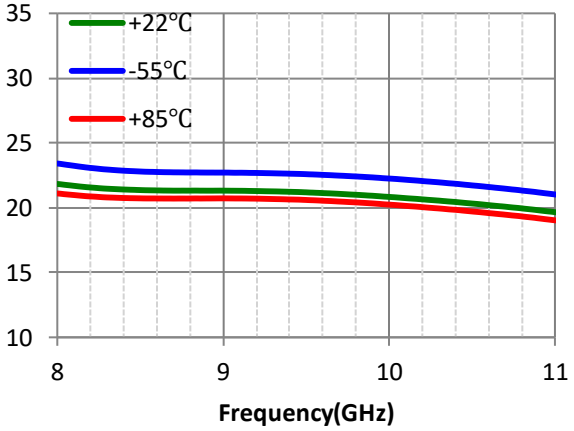
RX OP-1dB(dBm) vs.Temperature



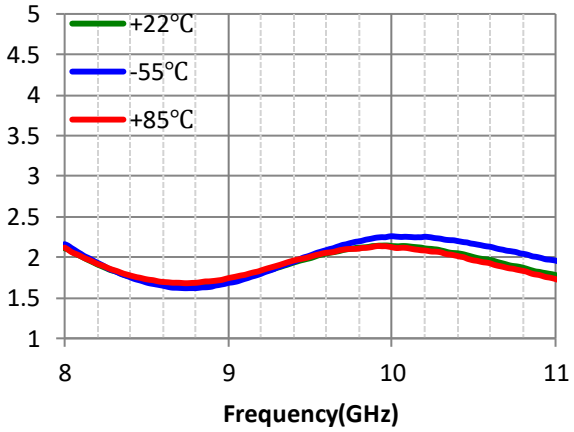
RX OIP3(dBm) vs.Temperature



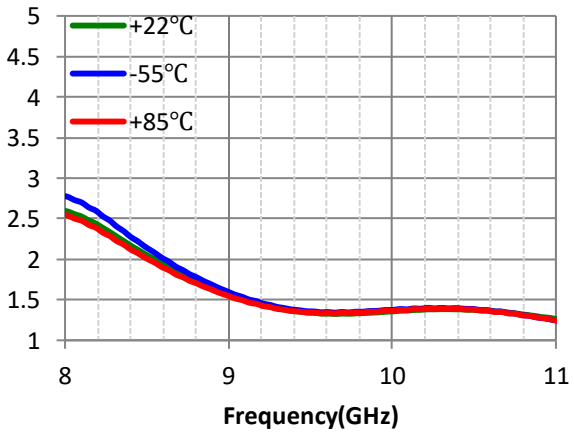
TX SSGain(dB) vs.Temperature



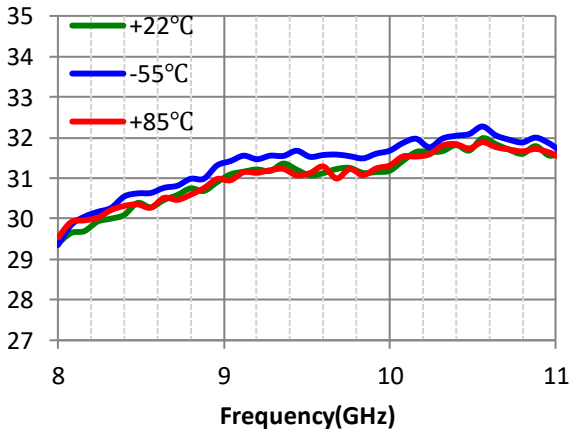
$VSWR_{TX\_IN}$(:1) vs.Temperature(TX_ON)



$VSWR_{RFC}$(:1) vs.Temperature(TX_ON)

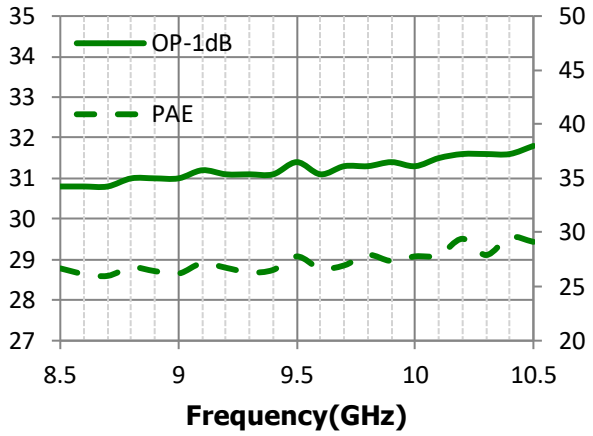


TX OP-1dB(dBm)vs.Temperature(TX_ON)

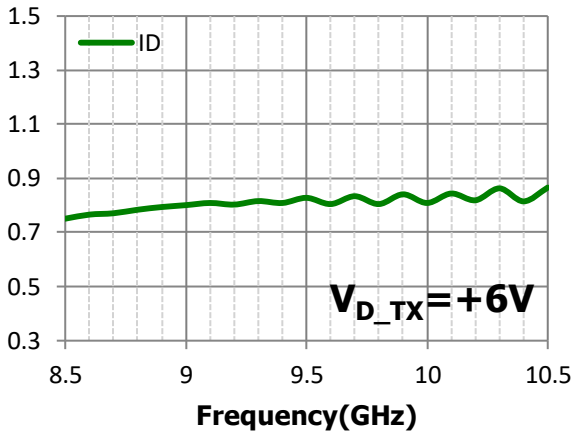


SuperApex,LLC
Address: 1580 S. Milwaukee Avenue, Ste. 405 Libertyville, IL 60048, USA
Tel: 1-847-573-9866, 1-847-505-8319
E-mail: sales@superapexco.com
Website: www.superapexco.com

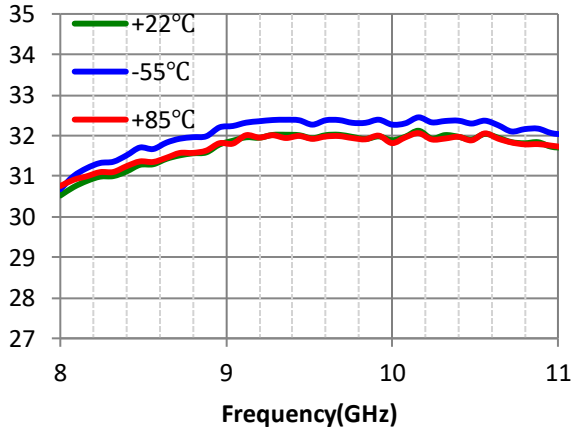
TX OP-1dB(dBm)、PAE(%) vs.Frequency



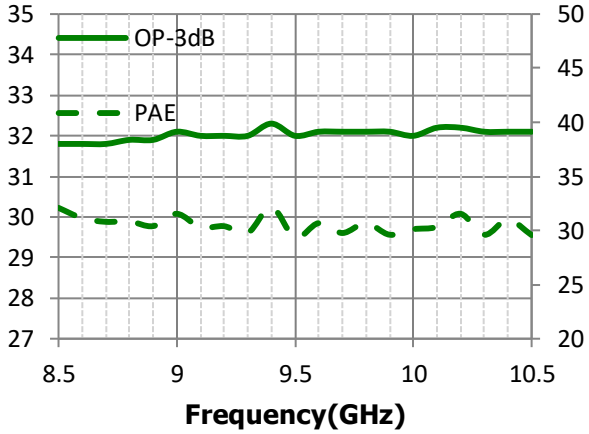
TX_IDrain(A)@OP-1dB



TX OP-3dB(dBm)vs.Temperature(TX_ON)

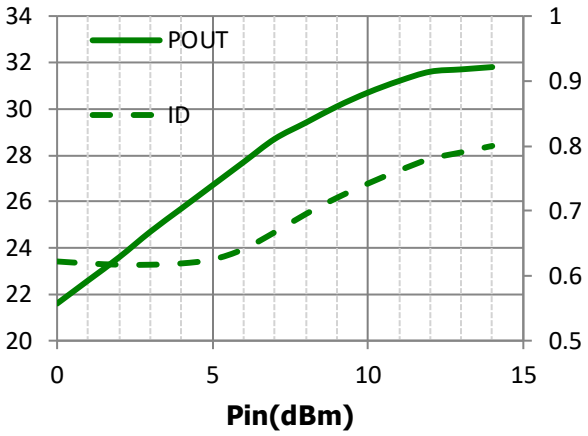


TX OP-3dB(dBm)、PAE(%)vs.Frequency

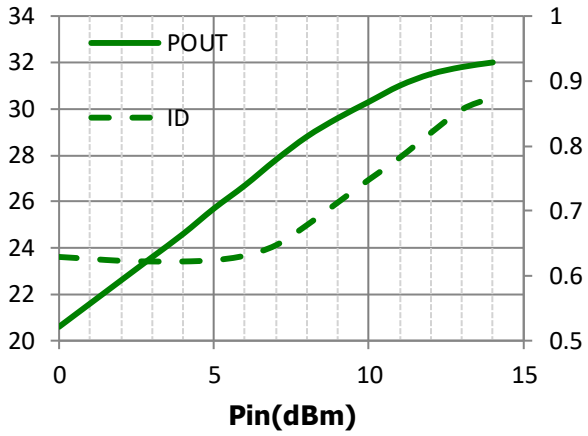


SuperApex,LLC
Address: 1580 S. Milwaukee Avenue, Ste. 405 Libertyville, IL 60048, USA
Tel: 1-847-573-9866, 1-847-505-8319
E-mail: sales@superapexco.com
Website: www.superapexco.com

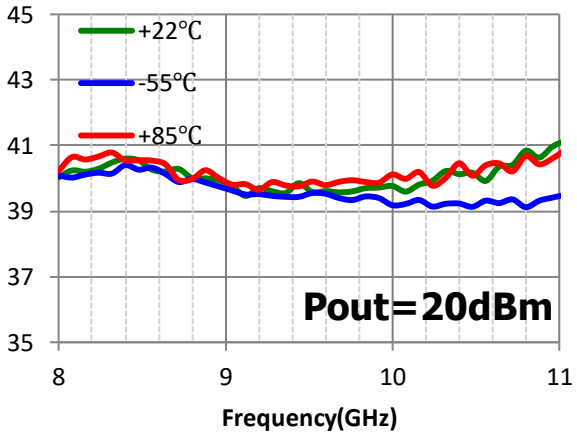
I_D(A)vs.Pout,f=8.5GHz



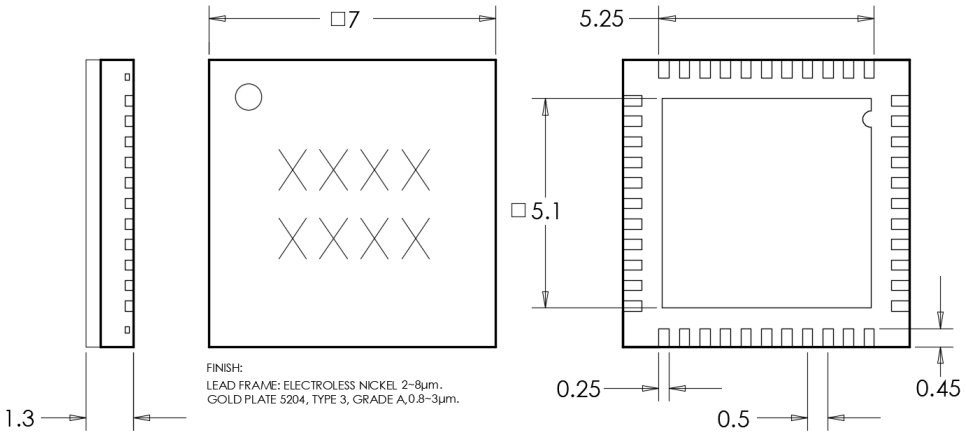
I_D(A)vs.Pout,f=10GHz



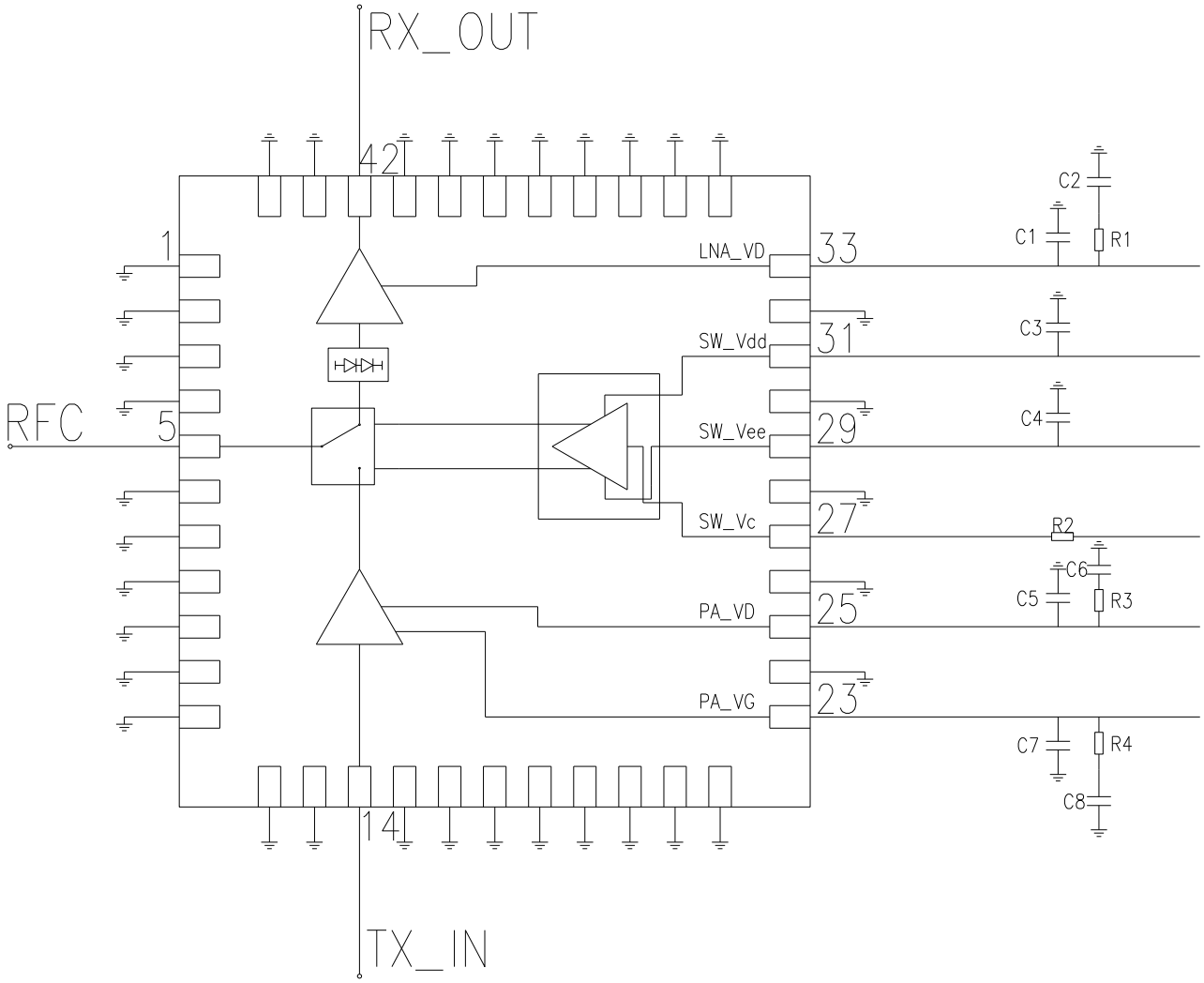
TX OIP3(dBm) vs.Temperature



Outline Drawing(mm)



Application Circuit



BOM

No.	Value	P/N
R2	680Ω	-
R1, R3, R4	10Ω	-
C1, C2, C5, C6, C8	0.1 μF	-
C7	1000 pF	
C3, C4	1 μF	

Pin Descriptions

No.	Func.	No.	Func.	No.	Func.	No.	Func.
1	Connect to GND	12	Connect to GND	23	Gate Bias, PA	34	Connect to GND
2	Connect to GND	13	Connect to GND	24	Connect to GND	35	Connect to GND
3	Connect to GND	14	TX signal input (AC Coupled)	25	Drain Bias, PA	36	Connect to GND
4	Connect to GND	15	Connect to GND	26	Connect to GND	37	Connect to GND
5	RFC（AC Coupled）	16	Connect to GND	27	SW Control Vc	38	Connect to GND
6	Connect to GND	17	Connect to GND	28	Connect to GND	39	Connect to GND
7	Connect to GND	18	Connect to GND	29	SW Vee	40	Connect to GND
8	Connect to GND	19	Connect to GND	30	Connect to GND	41	Connect to GND
9	Connect to GND	20	Connect to GND	31	SW Vdd	42	RX signal output (AC Coupled)
10	Connect to GND	21	Connect to GND	32	Connect to GND	43	Connect to GND
11	Connect to GND	22	Connect to GND	33	LNA, VD Bias	44	Connect to GND

Control Table

RX_ON	TX_ON
1.Set VG_TX=-5V(Mute PA) 2.Set Vc = +5V 3.Set VD_RX=+5V 4.In Receive	1. Set VD_RX=0V 2.Set Vc = GND 3. Set VG_TX=-0.75V typ. 4.In Transmit

Attention:

1. The moisture resistance level of the packaged product is 2a, the storage environment is less than or equal to 30 ℃/60% RH, and the lifespan of the surrounding workshop,
2. When using packaged products, try to use thin RF boards and increase the number of grounding vias at the bottom of the device to reduce grounding inductance,
3. Remove the vacuum packaging and bake in a 125+/-5 ℃ environment for 6 hours before soldering.

SuperApex,LLC
Address: 1580 S. Milwaukee Avenue, Ste. 405 Libertyville, IL 60048, USA
Tel: 1-847-573-9866, 1-847-505-8319
E-mail: sales@superapexco.com
Website: www.superapexco.com

Revision History

Revision	Date	Comment
1.0	Jul 25, 2025	First Release
1.1	Oct 22, 2025	Add TX Supply Current at Saturated Power