

**AT1066**

**Low Power CMOS Integrated  
Satellite LNB Tuner**

**Datasheet**

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## Update History

Rev	Date	Author	History Description
1.0	2018.11.05	ATT	The primary datasheet
1.1	2019.05.13	ATT	Change default connection of Rcal to NC
1.2	2020.03.10	ATT	Optimize the system phase noise; Change the default switching mode of HV_sel; Enhance the drive capability of crystal

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## **AT1066**

### ***Low Power CMOS Integrated Satellite LNB Tuner***

#### **General Description**

The AT1066 low power CMOS integrated satellite LNB tuner is designed for LNB (low noise block) at satellite outdoor system or similar DBS (Direct Broadcast Satellite) system application. The RF signal is down converted by AT1066 from 10.7~12.75 GHz to 0.95~2.15 GHz. AT1066 is controlled by 13/18V between vertical & horizontal, 0/22KHz between low band & high band. AT1066 is capable of high gain, low noise, flat gain and low power consumption.

#### **Features**

- Single 5V Supply
- Low Cost 25MHz Xtal
- Input frequency range: 10.7~12.75 GHz
- Integrated VCO, PLL, Mixer Pre-amplifier & L band buffer amplifier.
- Integrated voltage, 22 KHz tone detector.
- Integrated pHEMT FET DC-bias control
- Adjustable Front-end gain control
- Low power consumption
- Lower profile packages: 3x3mm QFN20

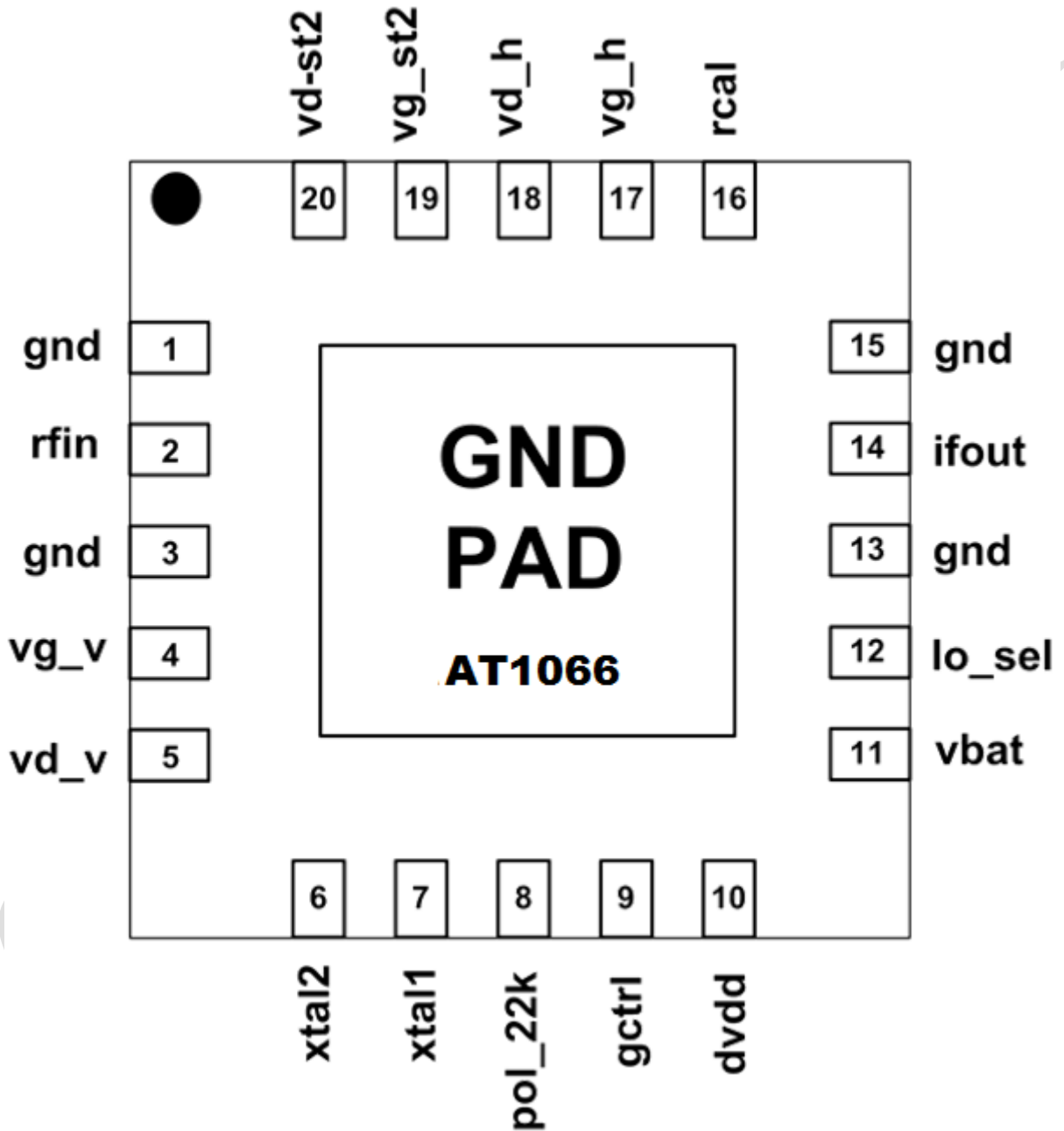
#### **Applications**

- Ku band LNB converters for digital satellite reception
- Ku band LNB for Domestic ABS-S application

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**Pin Information**

Figure 1. AT1066 Pin Information



## Pin Description

Pin number	Pin Name	I/O	DESCRIPTION
1,3,13,15	GND	I	Ground
2	rfin	I	Ku band RF signal input
4	vg_v	I/O	The external vertical polarization FET gate control voltage
5	vd_v.	O	The external vertical polarization FET drain control voltage
6	Xtal1	I/O	Crystal driver input (25MHz is recommended)
7	Xtal2	I/O	Crystal driver output
8	pol_22k	I	Polarization voltage and 22k signal input
9	gctrl	I	Gain adjust control port.
10	hv_sel	O	Polarization selection pin , when floating, pin 17,18 are for horizontal polarization, pin4,5 are for vertical polarization; when connected to gnd, pin 17,18 changed to vertical polarization, and pin4,5 changed to horizontal porarization
11	vbat	I	Supply voltage of the chip, default value is 5V
12	lo_sel	I	LO frequency seletion port. When NC, 10.75GHz LO enabled. When Connected 100k resistor to ground , 11.3GHz LO enabled. When connected to gnd, LO switched between 9.75GHz and 10.6GHz.
14	ifout	O	L band signal output, AC coupling required
16	rcal	I	The phmet fet current adiuption port, default is "NC" for 10mA supply current
17	vg_h	I/O	The external horizotal polarization FET gate control voltage
18	vd_h	O	The external horizontal polarization FET drain control voltage
19	vg_st2	I/O	The external second stage FET gate control voltage
20	vd_st2	O	The external second stage FET drain control voltage

## Lo\_sel Description

Lo_sel (V)	LO frequency (GHz)
NC	10.75GHz to support domestic ABS-S application
Connected 100k resistor to ground	Support 11.3GHz LO
GND	Switched between 9.75GHz and 10.6GHz according the 22k signal on or off

### Gctrl Description

Gctrl (V)	Gain(dB)
NC	44
Connected 100k resistor to ground	38
GND	32

### Hv\_sel Description

Hv_sel I (V)	polarization	
	vg_h&vd_h (pin17&pin18)	vg_v&vd_v (pin4&pin5)
NC	H	V
GND	V	H

### Phemt control pin function discription (hv\_sel is floating)

Polarization voltage (V)	vg_h (pin17)	vd_h (pin18)	vg_v (pin4)	vd_v (pin5)	vg_st2 (pin19)	vd_st2 (pin20)
18	on	on	off	off	on	on
13	off	off	on	on	on	on

### The voltage of the phemt control pins (The default Rcal is NC.)

Polarization voltage (V)	vg_h(V) (pin17)	vd_h(V) (pin18)	vg_v(V) (pin4)	vd_v(V) (pin5)	vg_st2(V) (pin19)	vd_st2(V) (pin20)
18	-0.44	2	0	0	-0.44	2
13	0	0	-0.46	2	-0.44	2

**Pol-22k application description**

<b>VBAT (V)</b>	<b>The H/V switching threshold voltage (V)</b>	<b>The function description</b>
4.5	1.80	>1.82-H , <1.78 – V
5.0	1.82	>1.84-H , <1.80 – V
5.5	1.84	>1.85-H , <1.82 – V

The 22k signal must be fed to this pin through one large capacitor.

<b>The 22k switching threshold Vpp (mV)</b>	<b>The LO frequency (GHz)</b>
$\geq 220$	10.6
<180	9.75
>180 & <220	Forbidden

The 22k signal detector frequency range

<b>The 22K switching threshold Vpp (mV)</b>	<b>The 22k signal detector frequency range (KHz)</b>	
	<b>MIN</b>	<b>MAX</b>
$\leq 200\text{mV}$	19	26
>200mV & $\leq 600\text{mV}$	18	28

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**Electrical Specifications**

Parameter	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNIT	
Supply voltage	V <sub>BAT</sub>	RF input and IF output AC coupled	4.5	5	6.5	V	
Supply current	I <sub>cc</sub>	RF input and IF output AC coupled	65	67	70	mA	
Integrated phase noise density	Φ <sub>nλ</sub> (itg)	Integration offset frequency = 1kHz to 10MHz					
		Lo=9.75GHz		1.2		°RMS	
		Lo=10.6GHz		1.3		°RMS	
		Lo=10.75GHz		1.3		°RMS	
Image rejection ratio	IMRR	Lo=11.3GHz		1.4		°RMS	
		Lo=9.75GHz	30		38	dB	
		Lo=10.6GHz	32		36	dB	
		Lo=10.75GHz	30		35	dB	
RF input frequency	f <sub>IN</sub>		10.70		12.75	GHz	
Single sideband noise figure	NF <sub>SSB</sub>	Lo=9.75GHz		6		dB	
		Lo=10.6GHz		6		dB	
		Lo=10.75GHz		6		dB	
		Lo=11.3GHz		6		dB	
Conversion gain	G <sub>conv</sub>	G <sub>ctrl</sub> =NC	Lo=9.75GHz	39		43	dB
			Lo=10.6GHz	43		45	dB
			Lo=10.75GHz	43		45	dB
			Lo=11.3GHz	42		44	dB
Conversion gain variation	ΔG <sub>conv</sub>	Lo=9.75GHz			4	dB	
		Lo=10.6GHz			2	dB	
		Lo=10.75GHz			2	dB	
		Lo=11.3GHz			2	dB	
Input reflection coefficient	S <sub>11</sub>				-10	dB	
Output reflection coefficient	S <sub>22</sub>				-12	dB	
Output third-order intercept point	OIP <sub>3</sub>	Carrier power= -10dBm (measured at output)					
		G <sub>ctrl</sub> =NC	16		17	dBm	
		G <sub>ctrl</sub> connected 100k resistor to ground	15		16	dBm	
Output 1-dB	OP <sub>1dB</sub>	G <sub>ctrl</sub> =gnd	11.5		13	dBm	
		G <sub>ctrl</sub> =NC	5		7	dBm	



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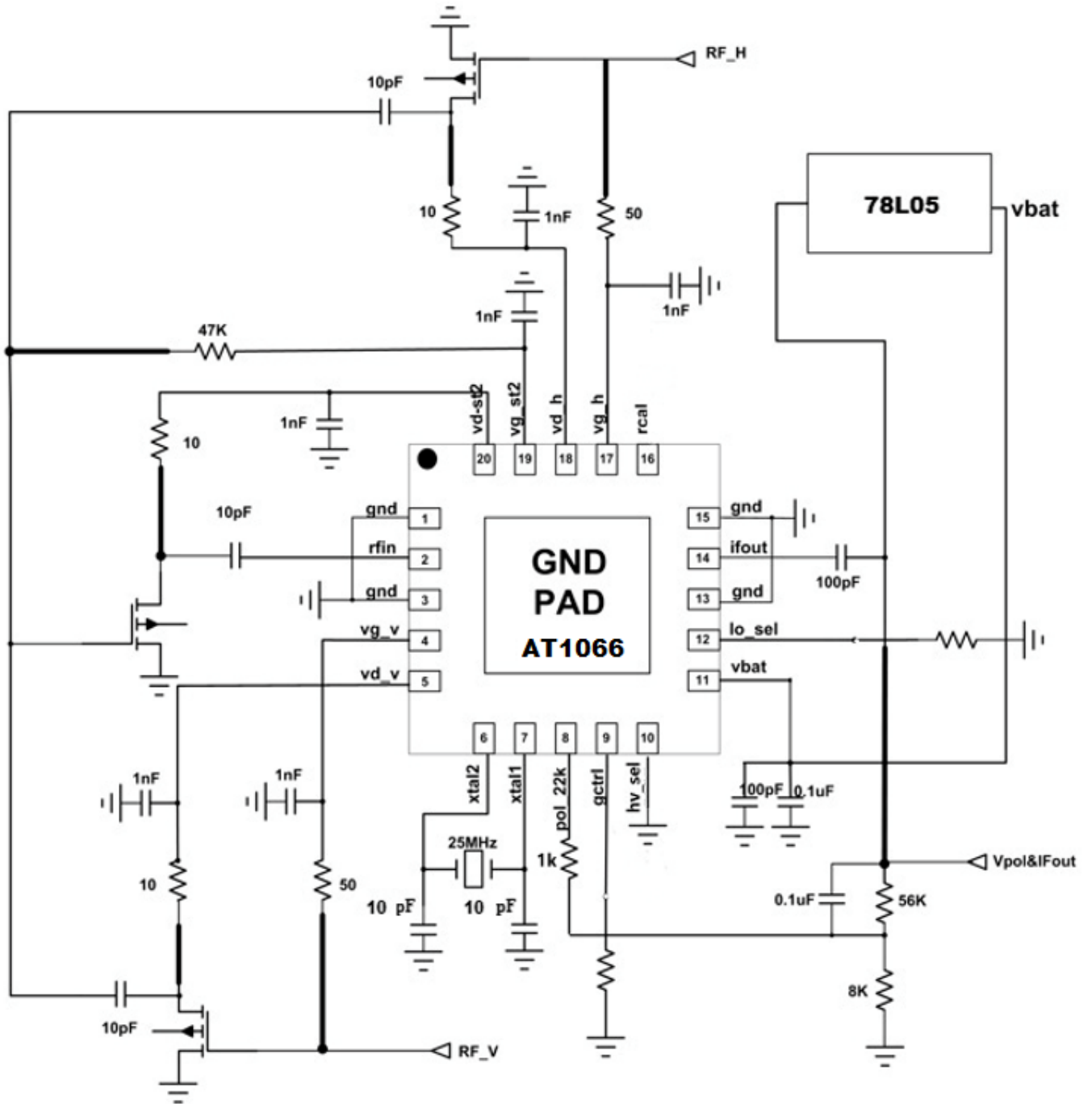
compression point		Gctrl connected 100k resistor to ground	5	6	dBm
		Gctrl=gnd	-1	3	dBm
Local oscillator to RF leakage	$\alpha_{L(RF)lo}$	Lo=9.75GHz		-57	dBm
		Lo=10.6GHz		-54	dBm
		Lo=10.75GHz		-54	dBm
		Lo=11.3GHz		-55	dBm
Local oscillator to IF leakage	$\alpha_{L(IF)lo}$	Lo=9.75GHz		-57	dBm
		Lo=10.6GHz		-58	dBm
		Lo=10.75GHz		-57	dBm
		Lo=11.3GHz		-55	dBm
Local oscillator Freqnecy probably tuning range			9.65	12.25	GHz
Spurious response on pin IFOUT	$\alpha_{resp(sp)IF\_OUT}$	Center frequency = 1.6GHz		-69	dBm
Spot phase noise	PN	$\Delta f=1\text{kHz}$		-82.7	dBc/Hz
		$\Delta f=10\text{kHz}$		-93.3	dBc/Hz
		$\Delta f=100\text{kHz}$		-96.8	dBc/Hz
		$\Delta f=1\text{MHz}$		-105.3	dBc/Hz

**Absolute Maximum ratings**

Symbol	Description	MIN	MAX	UNIT
VDD	Power supply voltage	0	8	V
T <sub>op</sub>	Operating ambient Temperature	-40	85	°C
T <sub>stg</sub>	Storage Temperature	-40	150	°C

**Reference Design**

Figure 2. AT1066 Reference design



**Package Outline**

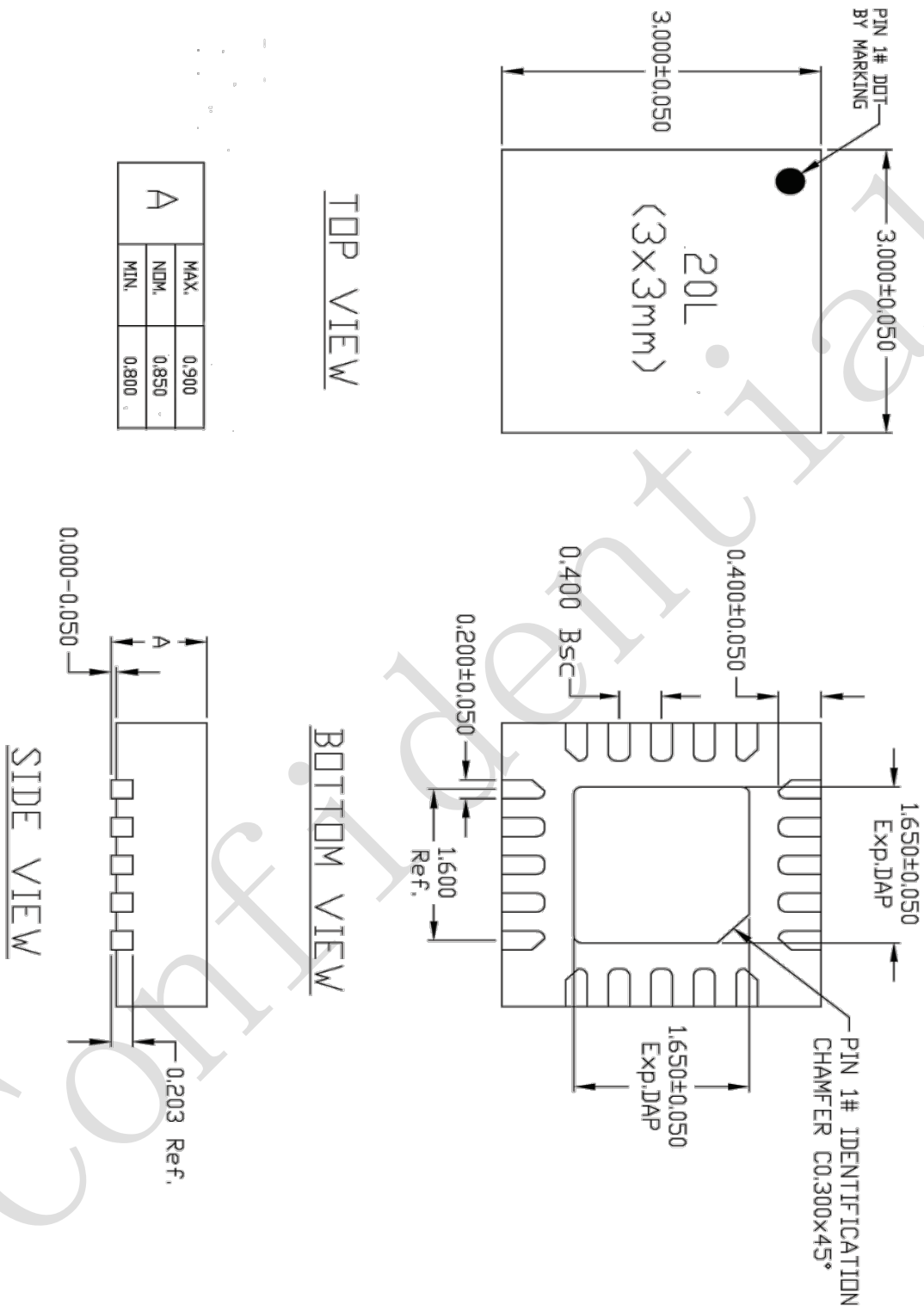
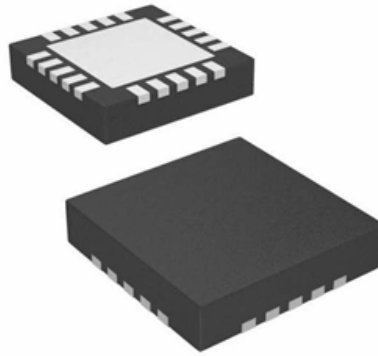


Figure 3. QFN3x3-20 Package



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For more information, please contact us.



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