

### 50MHz VCXO IC

#### ■GENERAL DESCRIPTION

The NJU6343 is VCXO IC up to 50MHz, which consists of an oscillation amplifier, internal variable capacitor, divider, and 3-state output buffer. The pull range is  $\pm 100\text{ppm}$  to use internal variable capacitor only, depend on the external crystal parameters.

The oscillation amplifier is realized very low standby current using NAND circuit.

The 3-state output buffer is C-MOS compatible and up to 30pF load.

#### ■PACKAGE OUTLINE

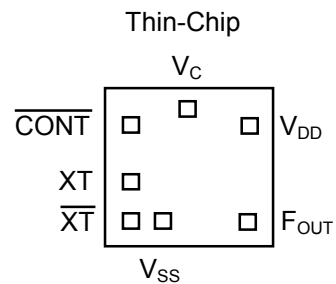


NJU6343AC-D

#### ■FEATURES

- Operating Voltage 3.0 to 3.6V
- Maximum Oscillation Frequency 50MHz
- Frequency Pulling Range  $\pm 100\text{ppm}$
- Low Operating Current
- High Fan-out  $I_{OH}/I_{OL}=6\text{mA} @3.3\text{V}$
- Oscillation Stop and Output Stand-by Function
- 3-State Output Buffer
- Internal Variable Capacitor
- Package Outline Thin-Chip
- C-MOS Technology

#### ■PAD LOCATION



#### ■LINE-UP TABLE

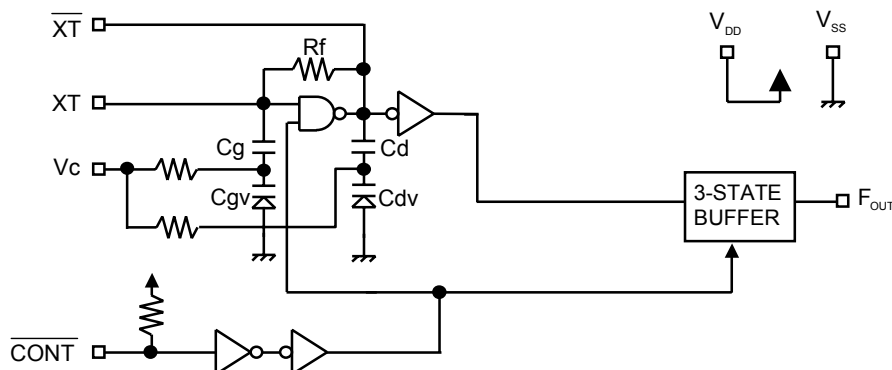
Type No.	F <sub>OUT</sub>	Internal Connect	C <sub>g</sub> /C <sub>d</sub>
NJU6343 A	f <sub>0</sub>	—	23/23pF

#### ■PAD CONFIGURATION

No	Pad Name	X	Y
1	CONT	-400	215
2	XT	-400	-75
3	XT	-400	-300
4	V <sub>SS</sub>	-235	-300
5	F <sub>OUT</sub>	400	-300
6	V <sub>DD</sub>	400	200
7	V <sub>C</sub>	-10	300

Starting Point: Chip Center Unit[um]  
 Chip Size: 1.1x0.9mm  
 Thin-Chip Thickness(-D): 200±20um  
 Pad Size: 90x90um  
 Note1) Substrate: V<sub>DD</sub> level

#### ■BLOCK DIAGRAM



**■ TERMINAL DESCRIPTION**

SYMBOL	FUNCTION	
$\overline{\text{CONT}}$	Oscillation and 3-state Output Buffer Control	
	$\overline{\text{CONT}}$	$F_{\text{OUT}}$
	H or OPEN	Output frequency $f_0$
	L	Oscillation Stop and High impedance Output
$\overline{\text{XT}}$	Quartz Crystal Connecting Terminals	
$V_{\text{SS}}$	$V_{\text{SS}}=0\text{V}$	
$F_{\text{OUT}}$	Frequency Output	
$V_{\text{C}}$	Frequency Control	
$V_{\text{DD}}$	$V_{\text{DD}}=3.3\text{V}$	

**■ ABSOLUTE MAXIMUM RATINGS**

(Ta=25°C)

PARAMETER	SYMBOL	RATING	UNIT
Supply Voltage	$V_{\text{DD}}$	-0.5 to +7.0	V
Input Voltage	$V_{\text{IN}}$	$V_{\text{SS}}-0.5$ to $V_{\text{DD}}+0.5$	V
Output Voltage	$V_{\text{O}}$	-0.5 to $V_{\text{DD}}+0.5$	V
Input Current	$I_{\text{IN}}$	$\pm 10$	mA
Output Current	$I_{\text{O}}$	$\pm 25$	mA
Operating Temperature Range	$T_{\text{opr}}$	-40 to +85	°C
Storage Temperature Range	$T_{\text{stg}}$	-55 to +125	°C

 Note2) If the supply voltage( $V_{\text{DD}}$ ) is less than 7.0V, the input voltage do not over the  $V_{\text{DD}}$  level.

 Note3) Decoupling capacitor should be connected between  $V_{\text{DD}}$  and  $V_{\text{SS}}$  due to the stabilized operation for the circuit.

## ■ ELECTRICAL CHARACTERISTICS

(Ta=25°C)

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNIT
Operating Voltage	V <sub>DD</sub>		3.0	3.3	3.6	V

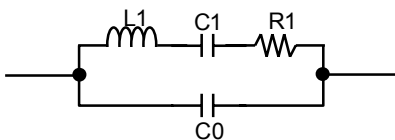
(V<sub>DD</sub>=3.3V, V<sub>C</sub>=V<sub>DD</sub>/2, Ta=25°C)

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNIT
Operating Current	I <sub>DD</sub>	Type A, fosc=20MHz, C <sub>L</sub> =15pF			5	mA
Oscillation Stopping Current	I <sub>STB</sub>	CONT=V <sub>SS</sub> , No load		2	5	uA
Stand-by Current	I <sub>st</sub>	CONT=XT=V <sub>SS</sub> , No load Note4)			1	uA
Input Voltage	V <sub>IH</sub>		2.3		3.3	V
	V <sub>IL</sub>		0		1.0	V
Output Current	I <sub>OH</sub>	V <sub>OH</sub> =2.97V	6			mA
	I <sub>OL</sub>	V <sub>OL</sub> =0.33V	6			mA
Input Current	I <sub>IN</sub>	CONT=0.8V <sub>DD</sub>		10	15	uA
		CONT=0.2V <sub>DD</sub>		1.8	3.0	uA
Control Input Voltage	V <sub>C</sub>		0		V <sub>DD</sub>	V
Control Input Current	I <sub>VC</sub>	V <sub>C</sub> =0 to V <sub>DD</sub>			±1	uA
3-state Off Leakage Current	I <sub>OZ</sub>	CONT=V <sub>SS</sub> , F <sub>OUT</sub> =V <sub>DD</sub> or V <sub>SS</sub>			±0.1	uA
Feedback Resistance	R <sub>f</sub>			255		kΩ
Internal Capacitor	C <sub>g</sub> /C <sub>d</sub>	fosc=20MHz		23/23		pF
	C <sub>gv</sub> /C <sub>dv</sub>	fosc=20MHz, V <sub>C</sub> =0V Note5)		10/10		pF
		fosc=20MHz, V <sub>C</sub> =V <sub>DD</sub> Note5)		4/4		pF
Maximum Oscillation Frequency	F <sub>MAX</sub>		50			MHz
Frequency Pulling Range	Δf/f <sub>0</sub>	V <sub>C</sub> =0 to V <sub>DD</sub>		±100		ppm
Frequency Linearity	Lin	V <sub>C</sub> =0.1V <sub>DD</sub> to 0.9V <sub>DD</sub>		±10		%
Output Signal Symmetry	SYM	C <sub>L</sub> =15pF, @V <sub>DD</sub> /2	45	50	55	%
		C <sub>L</sub> =30pF, @V <sub>DD</sub> /2	45	50	55	
Output Signal Rise Time	tr	C <sub>L</sub> =15pF, 0.1V <sub>DD</sub> to 0.9V <sub>DD</sub>		2.5	5.0	ns
		C <sub>L</sub> =30pF, 0.1V <sub>DD</sub> to 0.9V <sub>DD</sub>		4.0	8.0	
Output Signal Fall Time	tf	C <sub>L</sub> =15pF, 0.9V <sub>DD</sub> to 0.1V <sub>DD</sub>		2.5	5.0	ns
		C <sub>L</sub> =30pF, 0.9V <sub>DD</sub> to 0.1V <sub>DD</sub>		4.0	8.0	
Output Disable time	t <sub>PLZ</sub>	C <sub>L</sub> =15pF, R <sub>UP</sub> =10kΩ, V <sub>C</sub> =0V			150	ns
Output Enable Time	t <sub>PZL</sub>	C <sub>L</sub> =15pF, R <sub>UP</sub> =10kΩ, V <sub>C</sub> =0V			150	ns
Oscillation Starting	t <sub>START</sub>	C <sub>L</sub> =15pF, V <sub>trigger</sub> =0.9V		1.5	10	ms

Note4) Excluding input current on CONT=V<sub>SS</sub> Terminal.

Note5) The C<sub>gv</sub> and C<sub>dv</sub> is design value.

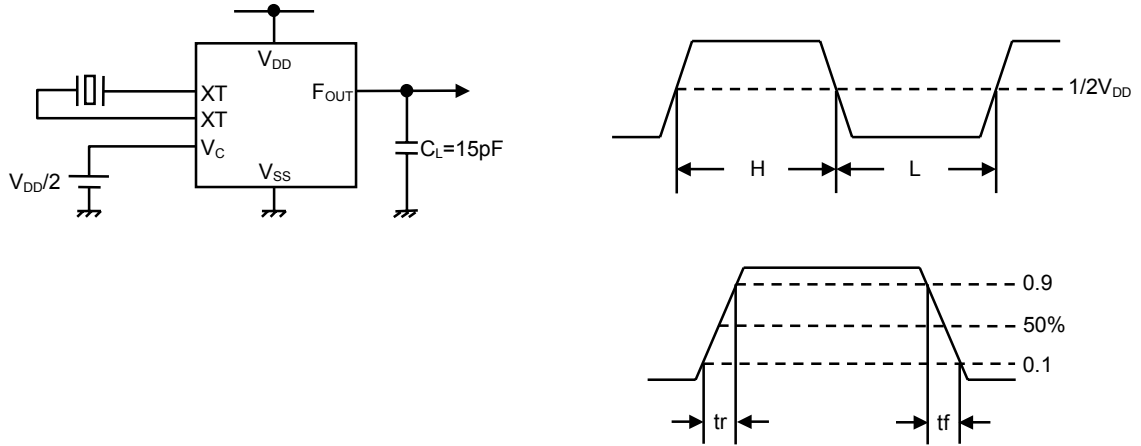
## ■ STANDARD CRYSTAL PARAMETERS FOR ELECTRICAL MEASUREMENTS



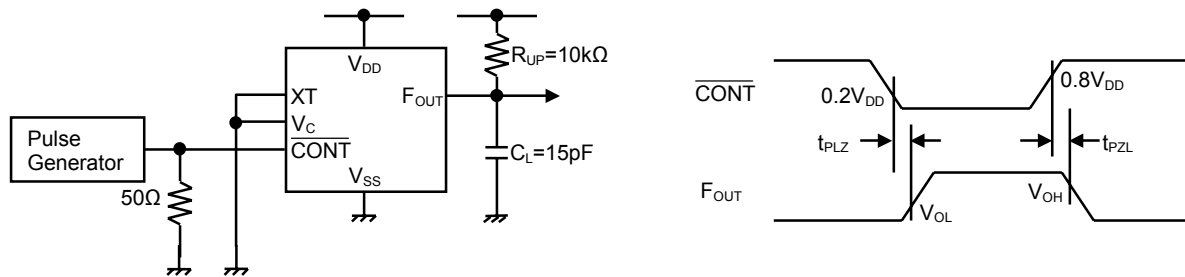
f[MHz]	R1[Ω]	L1[mH]	C1[fF]	C0[pF]	γ
20	16.9	4.7	13.6	3.1	227

MEASUREMENT CIRCUITS

(1) Operating Current / Output Signal Symmetry / Output Signal Rise & Fall Time ( $C_L=15\text{pF}$ )

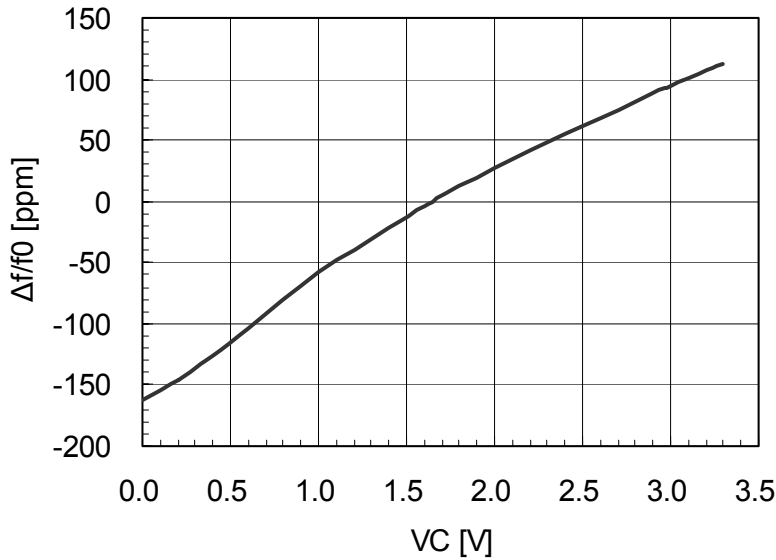


(2) Output Disable & Enable Time ( $C_L=15\text{pF}$ ,  $R_{UP}=10\text{k}\Omega$ ,  $V_C=0\text{V}$ )

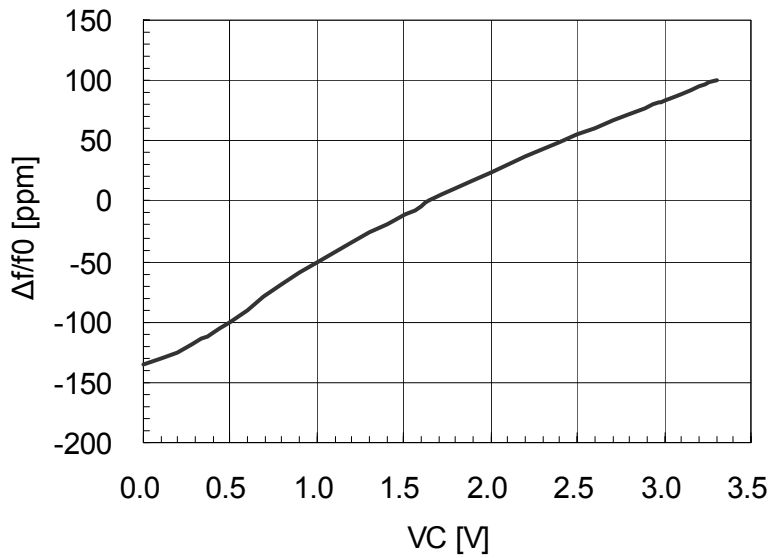


## ■ TYPICAL CHARACTERISTICS

(1) Frequency Pulling Range 1 ( $V_{DD} = 3.3V$ ,  $f_0 = 20MHz$ ,  $R1 = 16.9\Omega$ ,  $L1 = 4.7mH$ ,  $C1 = 13.6fF$ ,  $C0 = 3.1pF$ ,  $\gamma = 227$ )



(2) Frequency Pulling Range 2 ( $V_{DD} = 3.3V$ ,  $f_0 = 21MHz$ ,  $R1 = 13.1\Omega$ ,  $L1 = 7.4mH$ ,  $C1 = 7.8fF$ ,  $C0 = 1.8pF$ ,  $\gamma = 238$ )



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