LVDS-output Quartz Crystal Oscillator IC

■GENERAL DESCRIPTION

The NJU6398 is a quartz crystal oscillator IC with LVDS output, from 110MHz to 160MHz frequency output, which consists of an oscillation amplifier, LVDS output, and 3-state output buffer for each LVDS. The oscillation amplifier realizes very low oscillation stop current with NAND circuit. The NJU6398 is suitable for mobile, optical communications (including WDM system), PC & Peripherals, telecommunications, LAN/WAN, and wireless systems

■PACKAGE OUTLINE

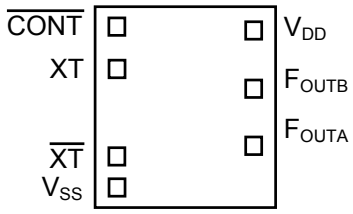
NJU6398C-D

■ FEATURES

- ●Operating Voltage 2.7 to 3.6V
- ●Oscillation Frequency 110MHz to 160MHz
- ●Output Level LVDS
- ●Oscillation Stop and Output Stand-by Function
- ●3-State Output Buffer
- ●Oscillation Capacitors Cg and Cd on-Die
- ●Package Outline Thin-Die
- ●C-MOS Technology

■PAD LOCATION

Thin-Chip

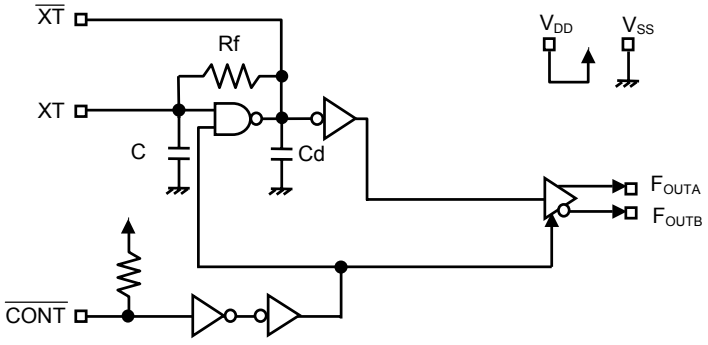


■COORDINATES

No	Pad Name	X	Y
1	$\overline{CONT}$	-578.2	688
2	XT	-578.2	405
3	$\overline{XT}$	-578.2	-535.7
4	V_{SS}	-578.2	-689.7
5	F_{OUTA}	609	-476.7
6	F_{OUTB}	609	105.6
7	V_{DD}	609	706

Starting Point:Die Center Unit[um]
Die Size:1.55x1.70mm
Die Thickness(-D):200±20um
Pad Size:90x90um
Note1) Substrate: V_{SS} level

■BLOCK DIAGRAM



■TERMINAL DESCRIPTION

SYMBOL	FUNCTION	
$\overline{CONT}$	Oscillation and 3-state Output Buffer Control	
	$\overline{CONT}$	F_{OUT}
	H or OPEN	Output frequency f_0
	L	Oscillation Stop and High impedance Output
XT	Quartz Crystal Connecting Terminals	
$\overline{XT}$		
V_{SS}	V_{SS}=0V	
F_{OUTA}	LVDS Output, Differential output pair	
F_{OUTB}		
V_{DD}	V_{DD}=3.3V	

■ABSOLUTE MAXIMUM RATINGS

(Ta=25°C)

PARAMETER	SYMBOL	RATING	UNIT
Supply Voltage	V_{DD}	-0.5 to +7.0	V
Input Voltage	V_{IN}	V_{SS}-0.5 to V_{DD}+0.5	V
Output Voltage	V_O	-0.5 to V_{DD}+0.5	V
Input Current	I_{IN}	±10	mA
Output Current	I_O	±25	mA
Operating Temperature Range	Topr	-40 to +85	°C
Storage Temperature Range	Tstg	-55 to +125	°C

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

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

■ELECTRICAL CHARACTERISTICS

(Ta=25°C)

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNIT
Operating Voltage	V_{DD}		2.7		3.6	V

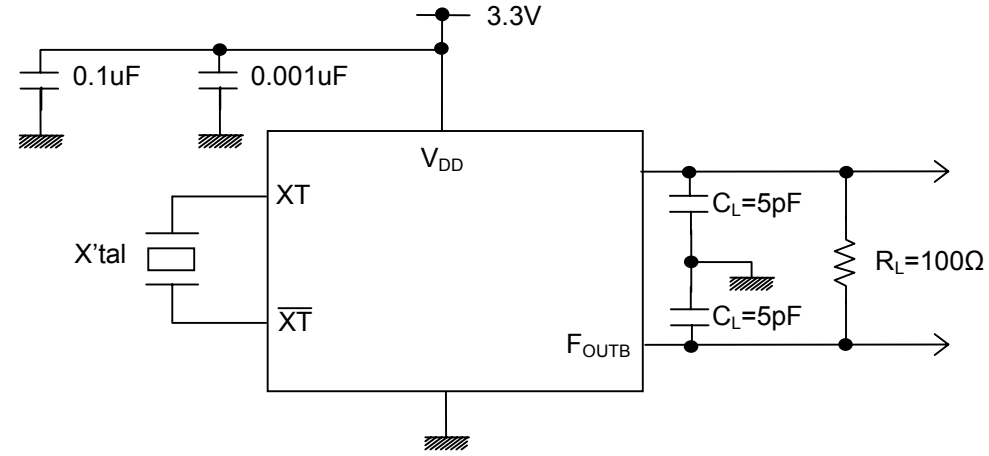
(V_{DD}=3.3V,Ta=25°C)

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNIT	CIR-CUIT
Operating Current	I_{DD1}	fosc=155MHz,C_L=5pF		27	40	mA	1
Oscillation Stopping Current	I_{DD2}	$\overline{CONT}$=V_{SS}, No load		2.5	5	uA	
Stand-by Current	Ist	$\overline{CONT}$=XT=V_{SS}, No load Note4)			1	uA	
Input Voltage	V_{IH}		2.31		3.3	V	
	V_{IL}		0		0.99	V	
Input Current	I_{IN}	$\overline{CONT}$=0.8V_{DD}		15.0	20.0	uA	
		$\overline{CONT}$=0.2V_{DD}		2.3	3.5	uA	
Output Off Leakage Current	I_{OZ}	$\overline{CONT}$=V_{SS}, F_{OUTA} and F_{OUTB} =V_{DD} $\overline{CONT}$=V_{SS}, F_{OUTA} and F_{OUTB} =V_{SS}			±1	uA	
Feedback Resistance	Rf			1.93		kΩ	
Internal Capacitor	Cg/Cd	fosc=155MHz		9/14		pF	
Maximum Oscillation Frequency	f_{MAX}		160			MHz	
Output Signal Symmetry	SYM	F_{OUTA} − F_{OUTB}, C_L=5pF, R_L=100Ω @1/2V_{OD}, Hi side	45	50	55	%	1
Differential Output Voltage	$\|V_{OD}\|$		250	350	450	mV	2
Δ Differential Output Voltage	ΔV_{OD}			2	35	mV	2
Offset Voltage	V_{OS}		1.125	1.25	1.375	V	3
Δ Offset Voltage	ΔV_{OS}			2	25	mV	3
Output Short Current 1	I_{OS} (SHORT)				24	mA	4
Output Short Current 2	I_{OSD} (SHORT)				12	mA	5
Differential Output Ripple	V_{OR}	Note5)			±150	mVp-p	6
Output Signal Rise Time	tr	R_L=100Ω, C_L=5pF 0.2V_{OD} to 0.8V_{OD}	0.3		1.5	ns	1
Output Signal Fall Time	tf	R_L=100Ω, C_L=5pF 0.8V_{OD} to 0.2V_{OD}	0.3		1.5	ns	1
Output Disable Time	t_{PLZ}	C_L=5pF,R_{UP}=10kΩ			100	ns	8
Output Enable Time	t_{PZL}	C_L=5pF,R_{UP}=10kΩ			100	ns	8

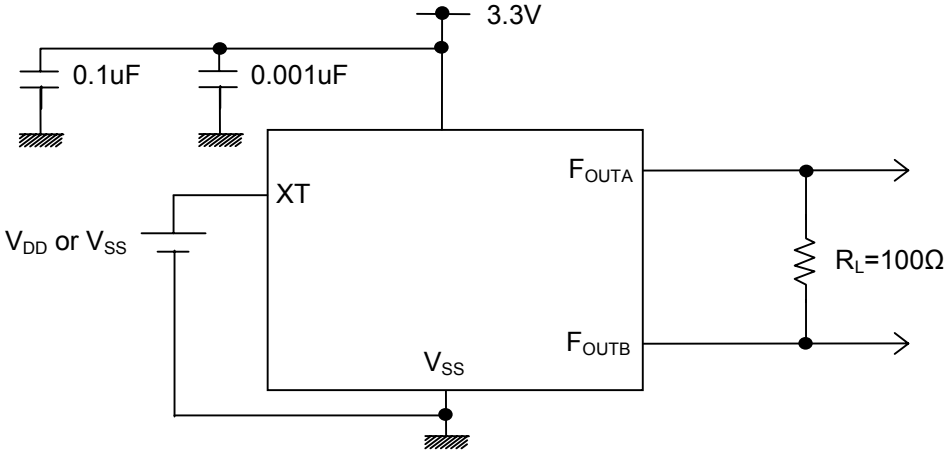
Note4) Excluding input current on $\overline{CONT}$ Terminal.
Note5) Design guarantee.

■MEASUREMENT CIRCUITS

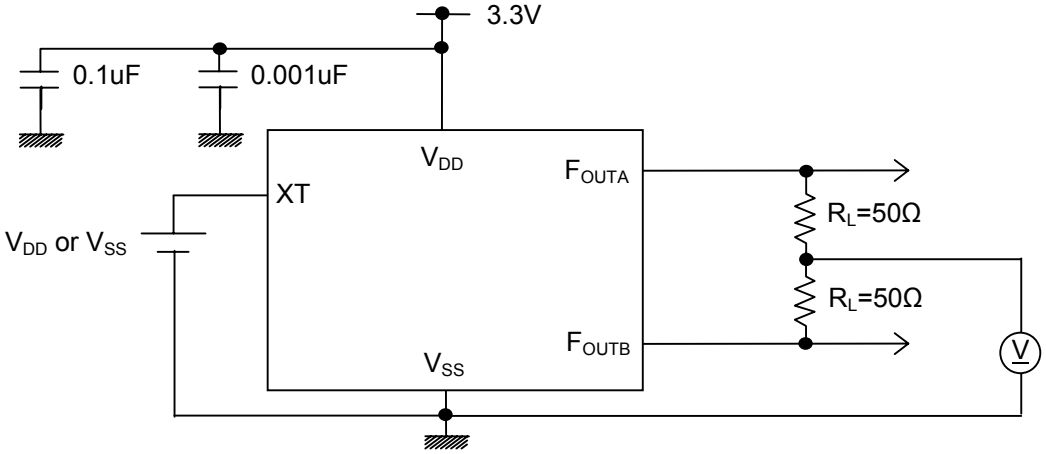
(1) Operating Current / Output Signal Symmetry / Output Signal Rise / Fall Time



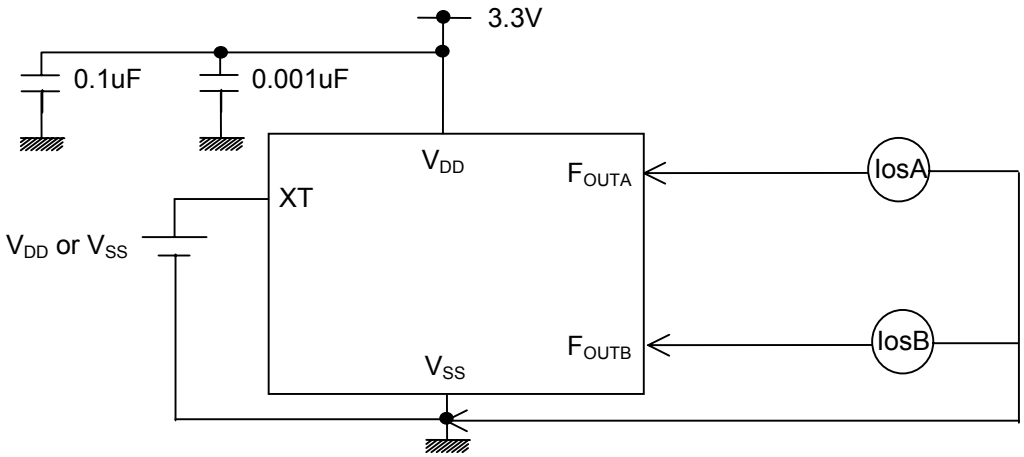
(2) Differential Output Voltage



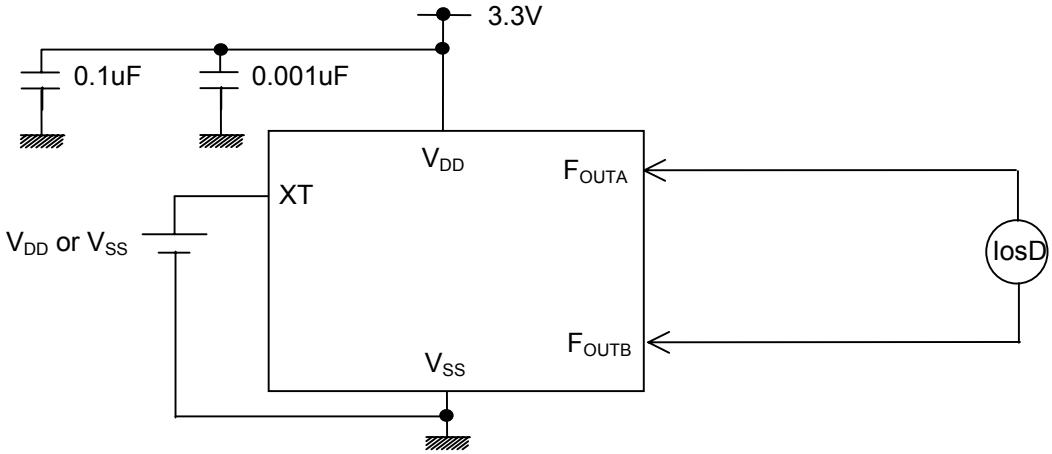
(3) Offset Voltage



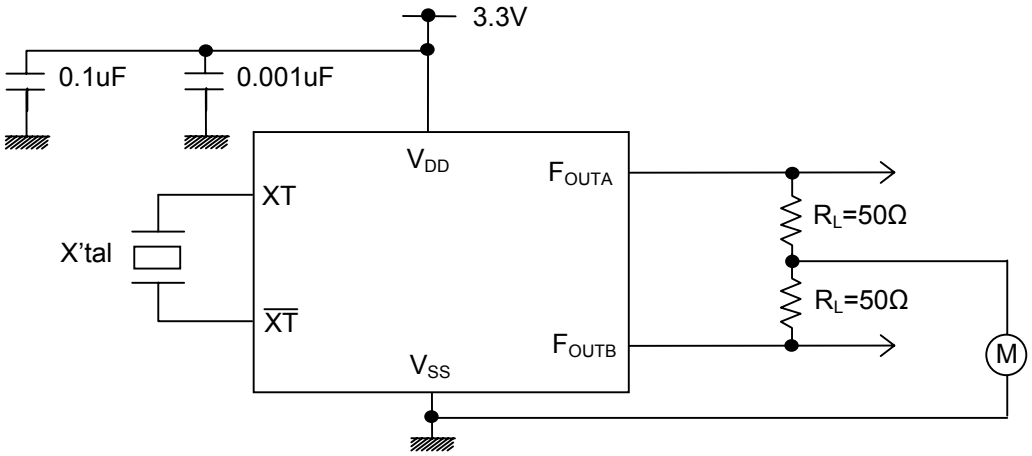
(4) Output Short Current 1



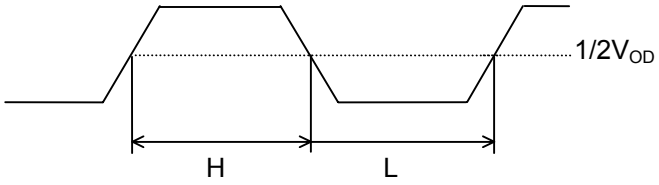
(5) Output Short Current 2



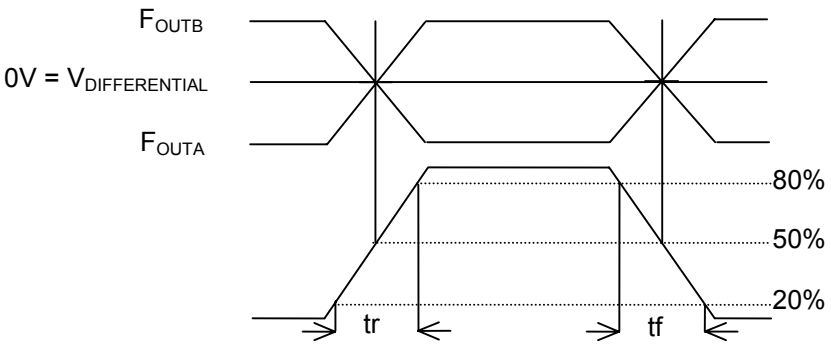
(6) Differential Output Ripple

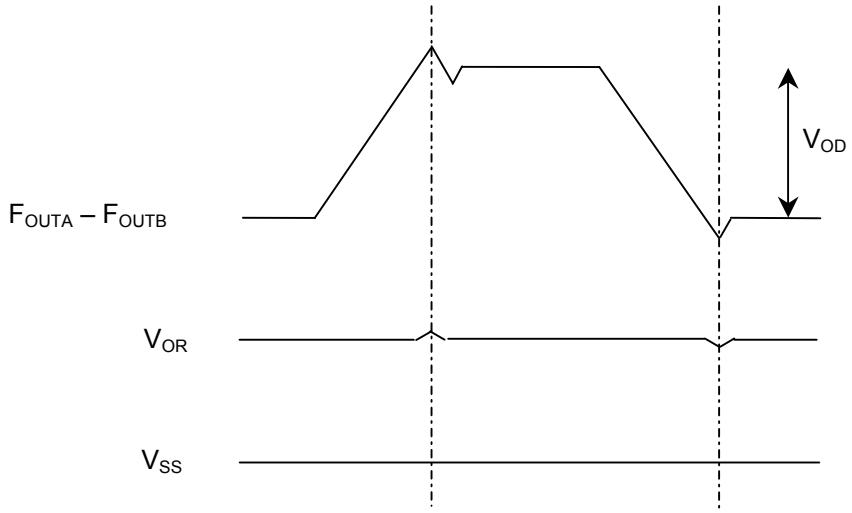


Output Signal Symmetry

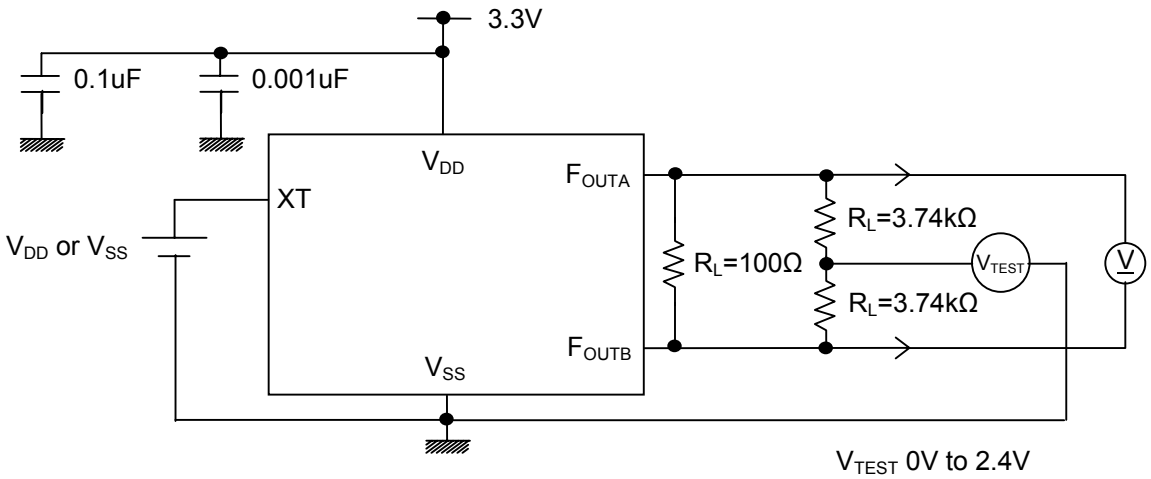


$V_{DIFFERENTIAL} = F_{OUTA} - F_{OUTB}$





(7) FULL LOAD DC Test



(8) Output Disable Time / Output Enable Time