

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

■ FEATURES

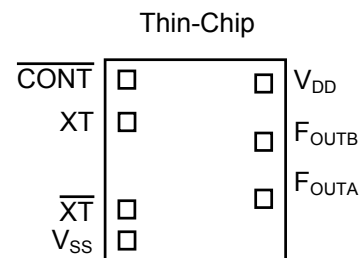
- Operating Voltage 2.7 to 3.6V
- Oscillation Frequency 110MHz to 160MHz
- Output Level LVDS
- Oscillation Stop and Output Stand-by Function
- 3-State Output Buffer
- Oscillation Capacitors Cg and Cd on-Die
- Package Outline Thin-Die
- C-MOS Technology

■PACKAGE OUTLINE



NJU6398C-D

■PAD LOCATION

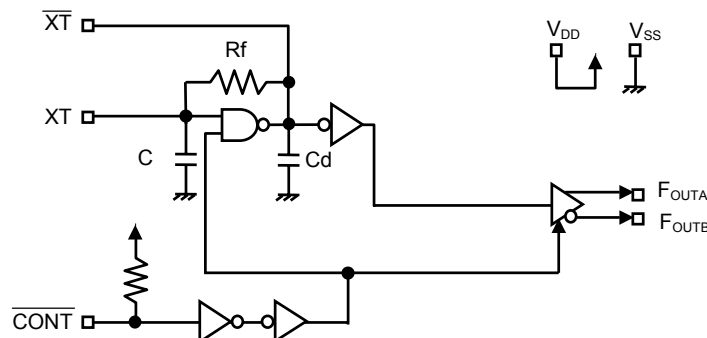


■COORDINATES

No	Pad Name	X	Y
1	CONT	-578.2	688
2	XT	-578.2	405
3	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	
$\overline{\text{CONT}}$	Oscillation and 3-state Output Buffer Control	
	$\overline{\text{CONT}}$	F_{OUT}
	H or OPEN	Output frequency f_0
	L	Oscillation Stop and High impedance Output
$\overline{\text{XT}}$	Quartz Crystal Connecting Terminals	
$\overline{\text{XT}}$		
V_{SS}	$V_{\text{SS}}=0\text{V}$	
F_{OUTA}	LVDS Output, Differential output pair	
F_{OUTB}		
V_{DD}	$V_{\text{DD}}=3.3\text{V}$	

■ ABSOLUTE MAXIMUM RATINGS

(Ta=25°C)

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

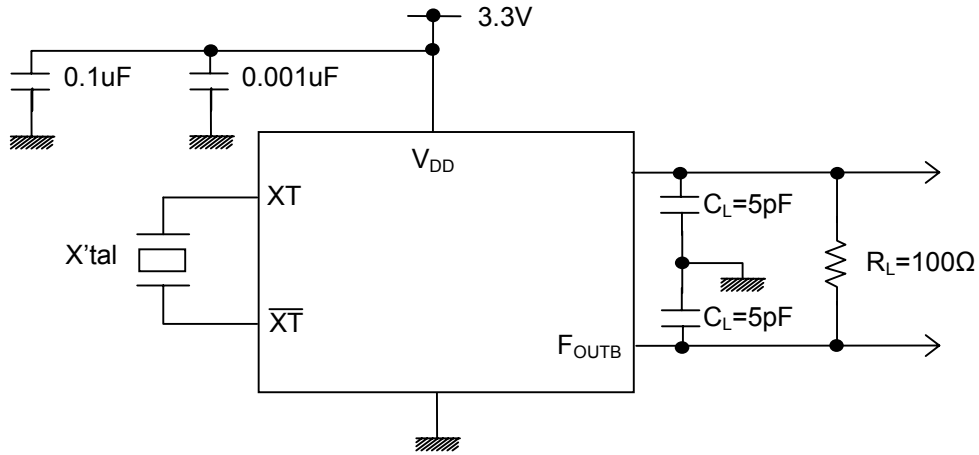
PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNIT	CIR- CUIT
Operating Current	I _{DD1}	fosc=155MHz, C _L =5pF		27	40	mA	1
Oscillation Stopping Current	I _{DD2}	CONT=V _{SS} , No load		2.5	5	uA	
Stand-by Current	I _{st}	CONT=XT=V _{SS} , No load Note4)			1	uA	
Input Voltage	V _{IH}		2.31		3.3	V	
	V _{IL}		0		0.99	V	
Input Current	I _{IN}	CONT=0.8V _{DD}		15.0	20.0	uA	
		CONT=0.2V _{DD}		2.3	3.5	uA	
Output Off Leakage Current	I _{oz}	CONT=V _{SS} , F _{OUTA} and F _{OUTB} =V _{DD} CONT=V _{SS} , F _{OUTA} and F _{OUTB} =V _{SS}			±1	uA	
Feedback Resistance	R _f			1.93		kΩ	
Internal Capacitor	C _g /C _d	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	t _r	R _L =100Ω, C _L =5pF 0.2V _{OD} to 0.8V _{OD}	0.3		1.5	ns	1
Output Signal Fall Time	t _f	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 CONT Terminal.

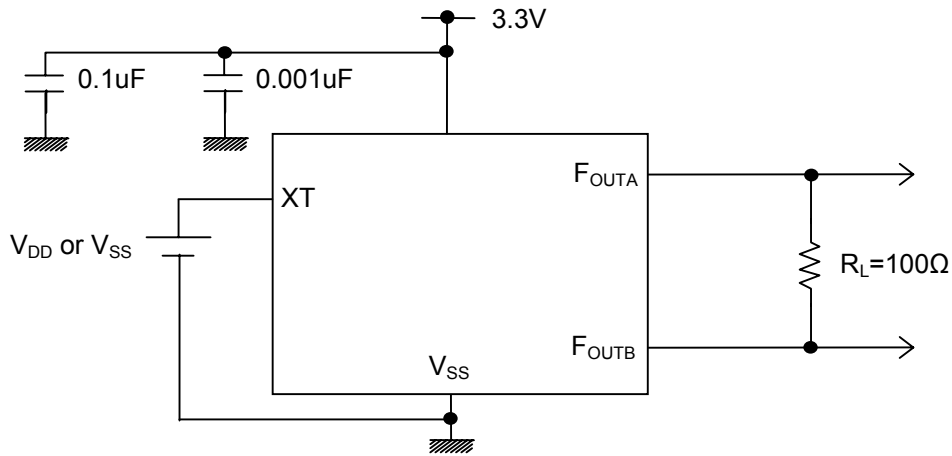
Note5) Design guarantee.

MEASUREMENT CIRCUITS

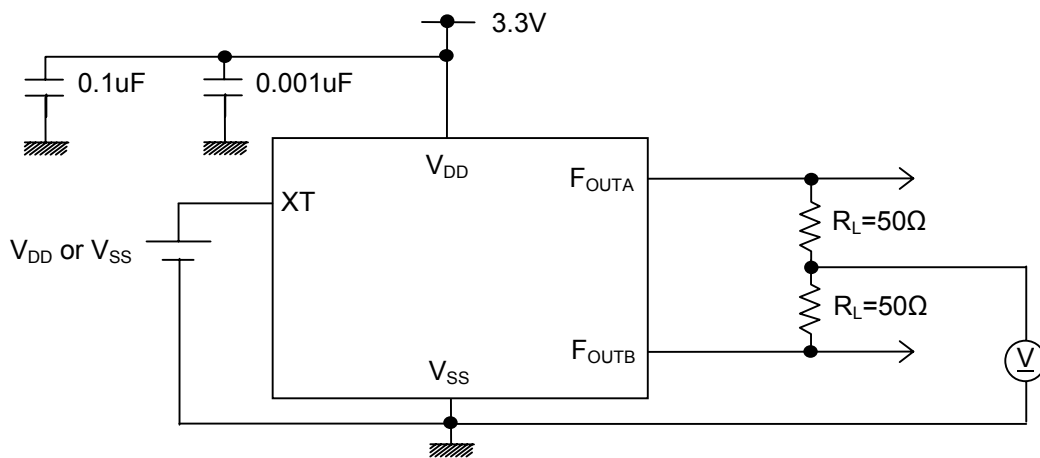
(1) Operating Current / Output Signal Symmetry / Output Signal Rise / Fall Time



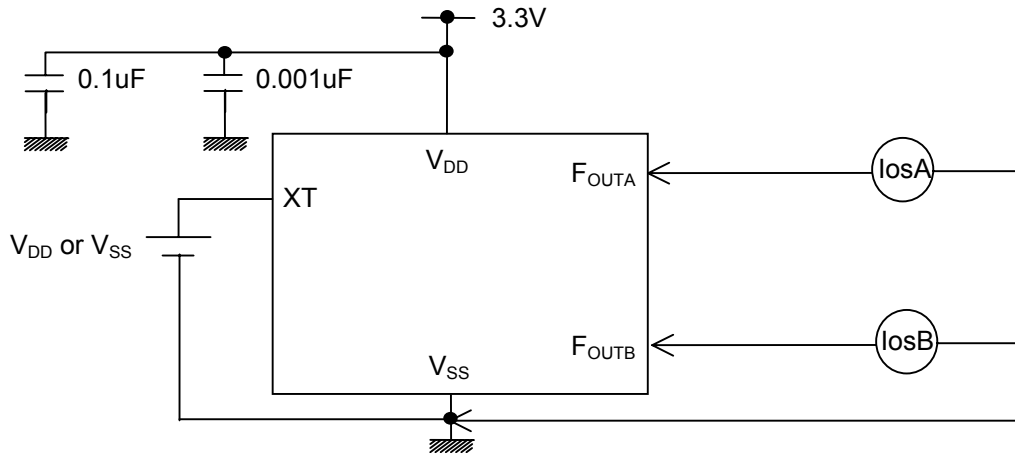
(2) Differential Output Voltage



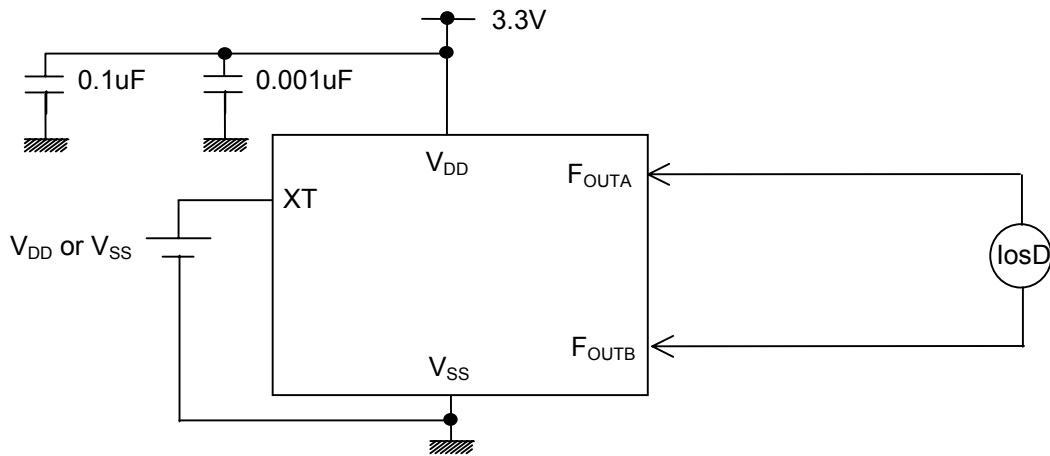
(3) Offset Voltage



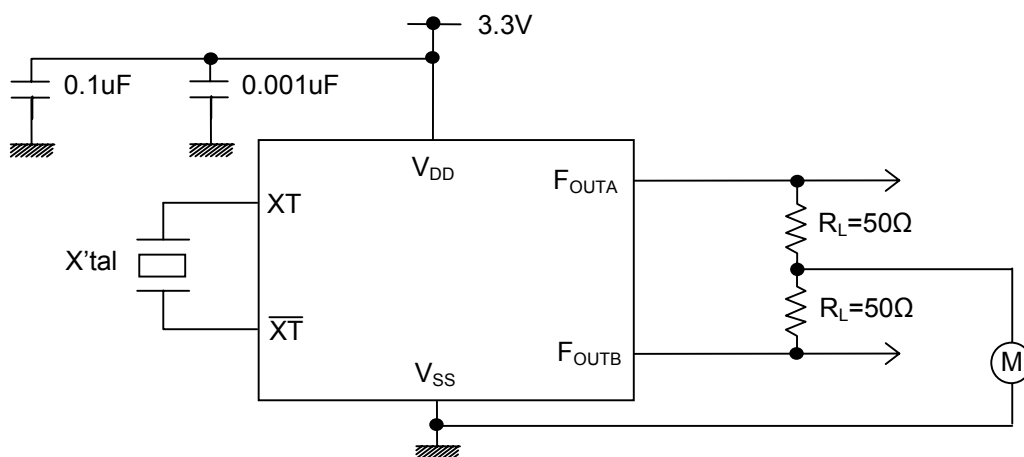
(4) Output Short Current 1



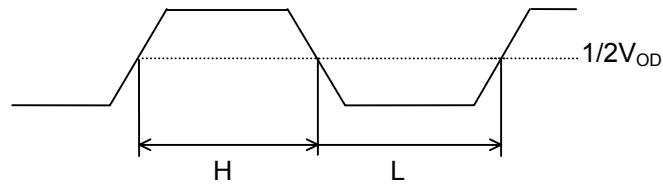
(5) Output Short Current 2



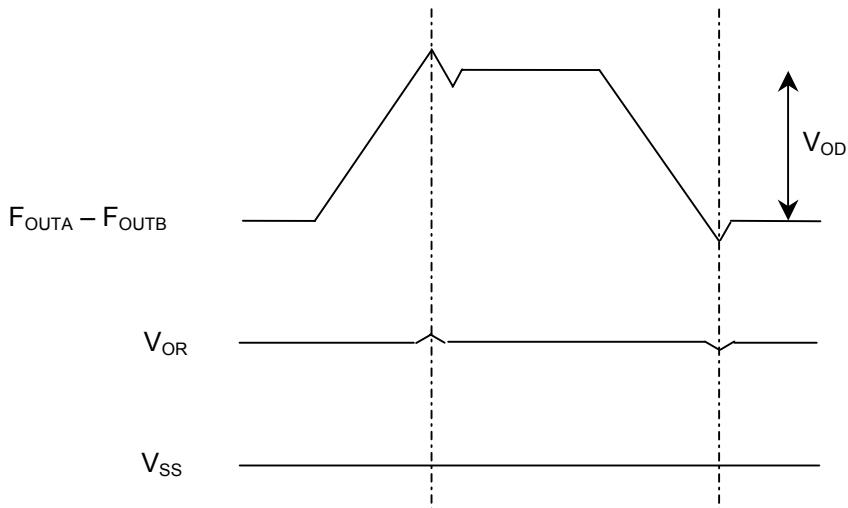
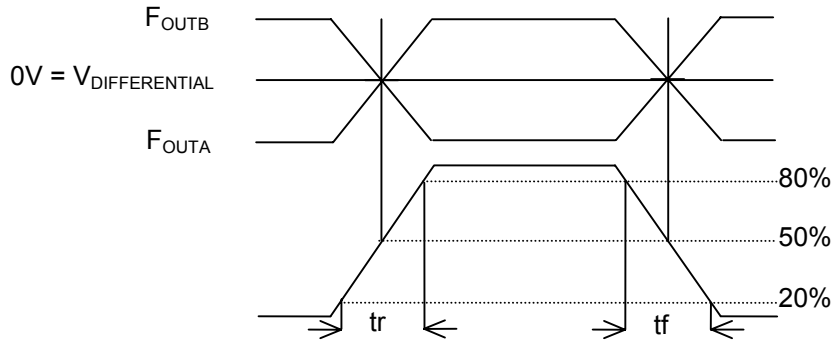
(6) Differential Output Ripple



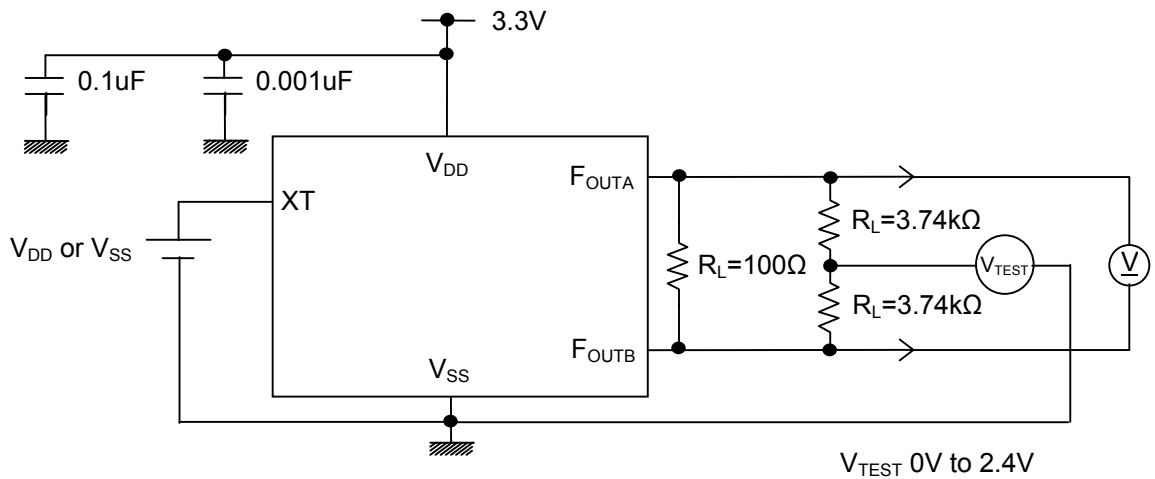
Output Signal Symmetry



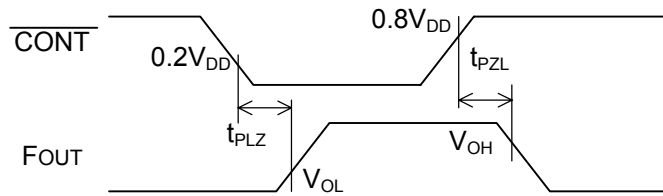
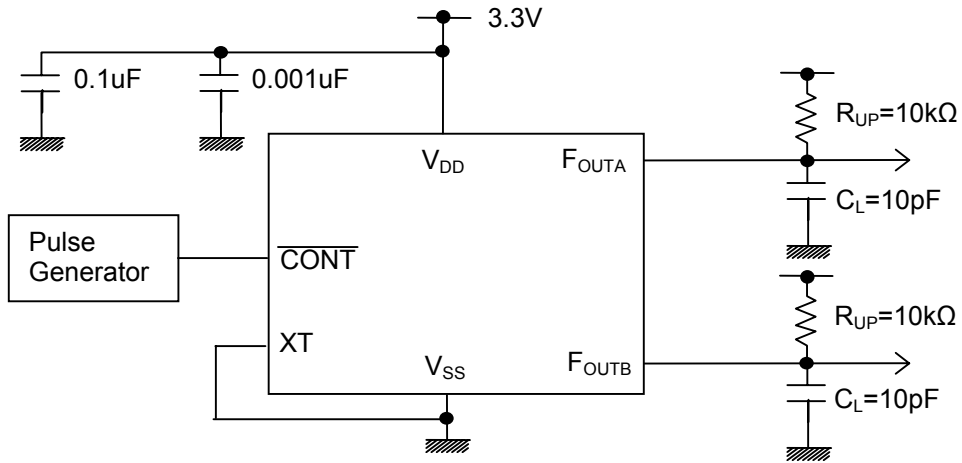
$$V_{\text{DIFFERENTIAL}} = F_{\text{OUTA}} - F_{\text{OUTB}}$$



(7) FULL LOAD DC Test



(8) Output Disable Time / Output Enable Time



[CAUTION]
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