

## QUARTZ CRYSTAL OSCILLATOR

**GENERAL DESCRIPTION**

The NJU6391 series is a 3V operation C-MOS quartz crystal oscillator which consists of an oscillation amplifier and a 3-state output buffer.

This series are classed into three versions A, B and C according to their oscillation frequency range mentioned in the line-up table.

The oscillation amplifier incorporates feed-back resistance and oscillation capacitors(Cg, Cd), therefore, it requires no external component except quartz crystal.

Driverbility of the 3-state output buffer is 8mA (sink/source), thus it can drive C-MOS load.

**PACKAGE OUTLINE**


NJU6391XC

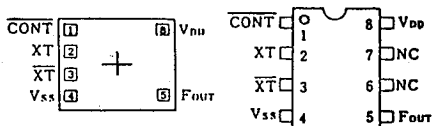


NJU6391XE

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**FEATURES**

- Low Operating Voltage. -- 2.4~3.6V
- Maximum Oscillation Frequency (See Line-Up Table)
- Low Operating Current
- High Fan-out --  $I_{OL}/I_{OH}=8mA$
- 3-state Output Buffer
- Oscillation Capacitors Cg and Cd on-chip
- NAND Type Oscillation Amplifier ( not Inverter )
- Oscillation Stand-by Function ( Non Pull-up Resistance )
- Package Outline -- CHIP / EMP 8
- C-MOS Technology

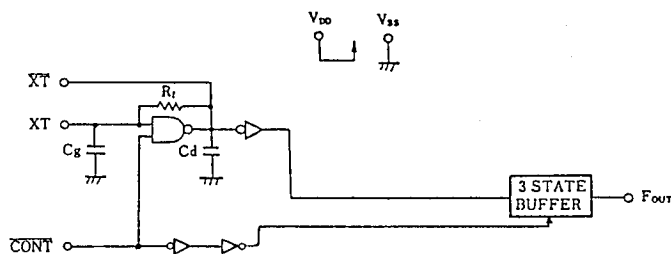
**PAD LOCATION/PIN CONFIGURATION**

**LINE-UP TABLE**

Type No.	Recommended Osc. Freq.	Output Freq.	Cg/Cd
NJU6391A	20~35MHz	f <sub>0</sub>	27pF
6391B	35~50MHz		19pF
6391C	45~75MHz		12/14pF

**COORDINATES**

 Unit:  $\mu m$ 

No.	PAD	X	Y
1	CONT	-408	248
2	XT	-408	81
3	XT	-408	-86
4	VSS	-408	-248
5	FOUT	464	-248
8	VDD	464	248

**BLOCK DIAGRAM**


Chip Size : 1.29 X 0.8mm  
 Chip Center : X=0  $\mu m$ , Y=0  $\mu m$   
 Chip Thickness : 400  $\mu m \pm 30 \mu m$   
 (Note) No.6 and 7 terminals are only for package type information. There are no PAD on the chip.

**■ TERMINAL DESCRIPTION**

NO.	SYMBOL	F U N C T I O N	
1	CONT	3-State Output Control	
		CONT	Output ( $F_{OUT}$ )
		H	Output Frequency $f_o$
		L	Output High Impedance
2	XT	Quartz Crystal Connecting Terminals	
3	XT		
4	$V_{SS}$	GND	
5	$F_{OUT}$	Output frequency $f_o$	
8	$V_{DD}$	+ 3V	

(Note) It isn't the pull-up resistance on CONT terminal.

**■ ABSOLUTE MAXIMUM RATINGS**

 (  $T_a=25^\circ\text{C}$  )

P A R A M E T E R	SYMBOL	R A T I N G S	UNIT
Supply Voltage	$V_{DD}$	-0.5 ~ +7.0	V
Input Voltage	$V_{IN}$	$V_{SS}-0.5 \sim V_{DD}+0.5$	V
Output Voltage	$V_o$	-0.5 ~ $V_{DD}+0.5$	V
Input Current	$I_{IN}$	$\pm 10$	mA
Output Current	$I_o$	$\pm 25$	mA
Power Dissipation	$P_D$	200 (EMP)	mW
Operating Temperature Range	$T_{opr}$	-40 ~ +85	$^\circ\text{C}$
Storage Temperature Range	$T_{stg}$	-55 ~ +125	$^\circ\text{C}$

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

**■ ELECTRICAL CHARACTERISTICS**

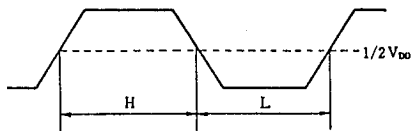
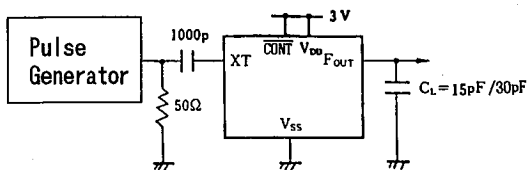
 (  $T_a=25^\circ\text{C}$ ,  $V_{DD}=3\text{V}$  )

P A R A M E T E R	SYMBOL	C O N D I T I O N S	MIN	TYP	MAX	UNIT
Operating Voltage	$V_{DD}$		2.4		3.6	V
Operating Current	$I_{DD1}$	A Version $f_{OSC}=24\text{MHz}$ , No Load		6	15	mA
	$I_{DD2}$	B Version $f_{OSC}=48\text{MHz}$ , No Load		9	20	
	$I_{DD3}$	C Version $f_{OSC}=48\text{MHz}$ , No Load		9	25	
Stand-by Current	$I_{st}$	CONT, XT= $V_{SS}$ , No Load (Note)			1	$\mu\text{A}$
Input Voltage	$V_{IH}$		2.4		3.0	V
	$V_{IL}$		0		0.6	
Output Current	$I_{OH}$	$V_{DD}=5\text{V}$ , $V_{OH}=4.5\text{V}$	8			mA
	$I_{OL}$	$V_{DD}=5\text{V}$ , $V_{OL}=0.5\text{V}$	8			
Input Current	$I_{IN}$	CONT Terminal, CONT= $V_{SS}$			1	$\mu\text{A}$
3-St Off-leakage Current	$I_{oz}$	CONT= $V_{SS}$ , $F_{OUT}=V_{SS}$ or $V_{DD}$			$\pm 0.1$	$\mu\text{A}$
Internal Capacitor	$C_g/C_d$	A Version		27		pF
		B Version		19		
		C Version		12/14		
Max. Oscillation Freq.	$f_{MAX}$	A Version	35			MHz
		B Version	50			
		C Version	75			
Output Signal Symmetry	SYM	$C_L=15\text{pF}$ at 1.5V $C_L=30\text{pF}$ at 1.5V	45	50	55	%
Output Signal Rise Time	$t_{r1}$	$C_L=15\text{pF}$ , 10~90%		2	4	ns
		$C_L=30\text{pF}$ , 10~90%			6	
Output Signal Fall Time	$t_{f1}$	$C_L=15\text{pF}$ , 90~10%		2	4	ns
		$C_L=30\text{pF}$ , 90~10%			6	

(Note) Excluding input current on CONT terminal.

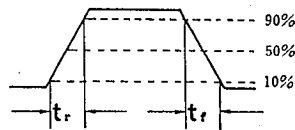
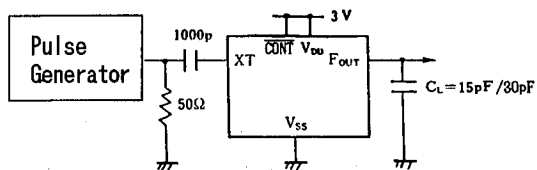
■ MEASUREMENT CIRCUITS

(1) Output Signal Symmetry



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(2) Output Signal Rise / Fall Time



# NJU6391 Series

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MEMO

**[CAUTION]**

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