NIPPON PRECISION CIRCUITS INC.

CF5034 series

350MHz PECL-output Oscillator ICs

OVERVIEW

The CF5034 series are differential LVPECL output oscillator ICs. They are made using a BiCMOS process which allows high-frequency oscillator circuits and differential LVPECL output circuits to be fabricated on a single chip. Two oscillator modes are supported—350MHz maximum fundamental oscillation mode, and 80MHz to 160MHz 3rd overtone oscillation mode.

The CF5034 series devices require only the connection of a crystal to realize a differential LVPECL output oscillator circuit.

FEATURES

- 3.3 ± 0.3V operating supply voltage
- Oscillator frequency range
  - 80MHz to 350MHz fundamental oscillation mode
  - 80MHz to 160MHz 3rd overtone oscillation mode
- 40MHz to 350MHz output frequency range
- Differential LVPECL output
- f_O (oscillator frequency) or $f_O/2$ output frequency, determined by internal connection
- 50 ± 5% output duty (measured at output crossing point)
- Standby function: outputs are high impedance when OE is LOW.
- Power-saving pull-up resistor built-in (pin OE)
- Chip form (CF5034××)

SERIES LINEUP

Version	Oscillation mode	Recommended oscillator frequency [MHz][1]	Output frequency
CF5034AA	Fundamental	250 to 350	f_O
CF5034AB			$f_O/2$
CF5034BA		160 to 250	f_O
CF5034BB			$f_O/2$
CF5034DA	–	80 to 350 (external capacitors required)	f_O
CF5034DB			$f_O/2$
CF5034LA	Fundamental or 3rd overtone	125 to 160	f_O
CF5034LB			$f_O/2$
CF5034MA		80 to 125	f_O
CF5034MB			$f_O/2$

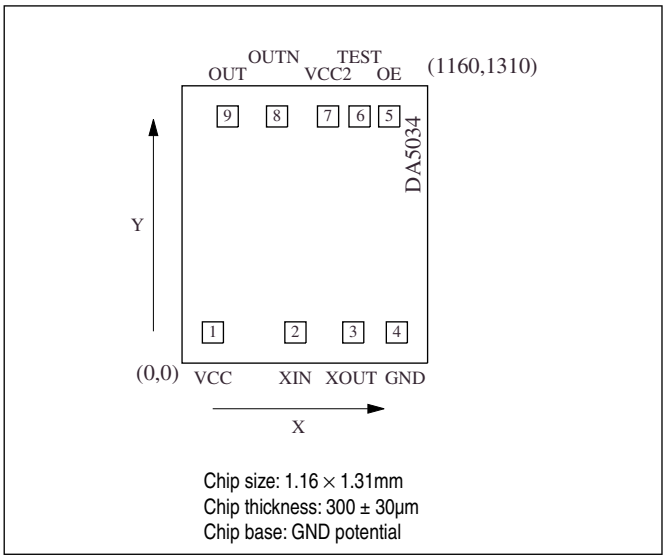
1. The recommended oscillator frequency criteria is based on the negative resistance characteristics and cutoff frequency. Note that this may change depending on the crystal characteristics, thus sufficient allowance should be made.

ORDERING INFORMATION

Device	Package
CF5034××–1	Chip form

PAD LAYOUT

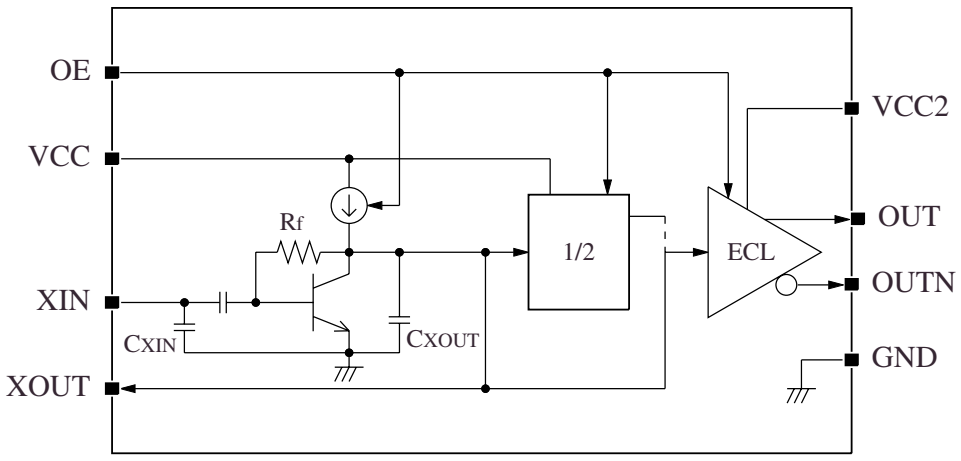
(Unit: µm)



PAD DESCRIPTION AND DIMENSIONS

Pad No.	Name	I/O	Function	Pad dimensions [µm]	
				X	Y
1	VCC	–	Supply pin	146	145
2	XIN	I	Oscillator input pin	536	145
3	XOUT	O	Oscillator output pin	809	145
4	GND	–	Ground pin	1015	145
5	OE	I	Output enable pin. Outputs are high impedance when LOW (oscillator stopped). Power-saving pull-up resistor built-in.	979	1165
6	TEST	I	IC test pin. Leave open circuit for normal operation.	839	1165
7	VCC2	–	Output buffer supply pin	690	1165
8	OUTN	O	Output pin (complementary)	449	1165
9	OUT	O	Output pin (true)	216	1165

BLOCK DIAGRAM



ABSOLUTE MAXIMUM RATINGS

Parameter	Symbol	Conditions	Rating	Unit
Supply voltage range	V_{CC}		–0.5 to 7.0	V
Input voltage range	V_{IN}		GND – 0.5 to V_{CC} + 0.5	V
Output voltage range	V_{OUT}		GND – 0.5 to V_{CC} + 0.5	V
Storage temperature range	T_{STG}		–65 to 150	°C

RECOMMENDED OPERATING CONDITIONS

Parameter	Symbol	Conditions	Rating			Unit
			Min	Typ	Max	
Operating supply voltage	V_{CC}		3.0	3.3	3.6	V
Input voltage	V_{IN}		GND	–	V_{CC}	V
Operating temperature	T_{OPR}		–40	25	85	°C
Output load	RL	Terminated to V_{CC} – 2V	–	50	–	Ω
Output frequency	f_{OUT}		40	–	350	MHz

ELECTRICAL CHARACTERISTICS

DC Characteristics

Recommended operating conditions unless otherwise noted.

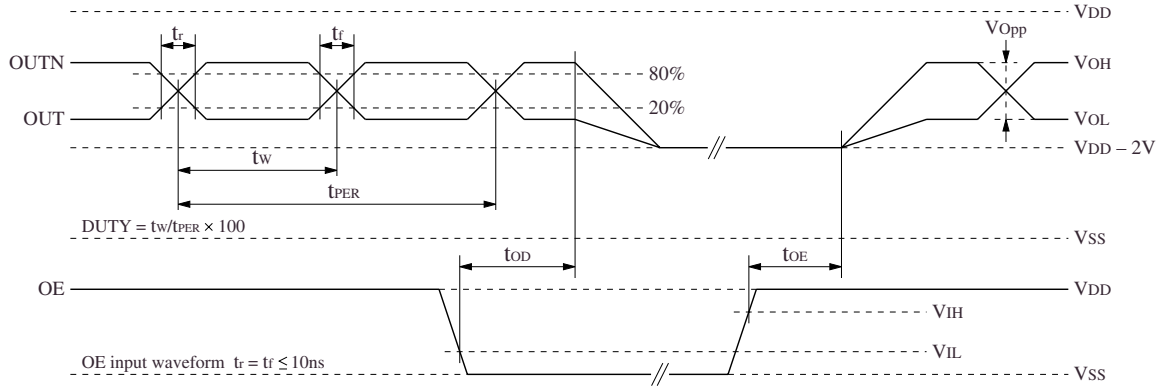
Parameter	Symbol	Conditions		Rating			Unit
				Min	Typ	Max	
Current consumption 1	I_{EE1}	Measurement cct. 1, OE = open		–	55	88	mA
Current consumption 2	I_{EE2}	Measurement cct. 1, OE = LOW		–	–	30	µA
OUT/OUTN HIGH-level output voltage	V_{OH}	Measurement cct. 4, V_{CC} = 3.3V, OE = open	Ta = 0 to 85°C	2.275	2.350	2.420	V
			Ta = – 40°C	2.215	2.295	2.420	V
OUT/OUTN LOW-level output voltage	V_{OL}		Ta = 0 to 85°C	1.490	1.600	1.680	V
			Ta = – 40°C	1.470	1.605	1.745	V
OUT/OUTN output leakage current	I_Z	Measurement cct. 2, OE = LOW		–	–	10	µA
OE HIGH-level input voltage	V_{IH}	Measurement cct. 1		0.7V_{CC}	–	–	V
OE LOW-level input voltage	V_{IL}	Measurement cct. 1		–	–	0.3V_{CC}	V
OE LOW-level input current 1	I_{IL1}	Measurement cct. 2, V_{IL} = 0V		–2	–	–20	µA
OE LOW-level input current 2	I_{IL2}	Measurement cct. 2, V_{IL} = 0.7V_{CC}		–20	–	–200	µA

AC Characteristics

Recommended operating conditions unless otherwise noted.

Parameter	Symbol	Conditions	Rating			Unit
			Min	Typ	Max	
Output duty cycle 1	Duty 1	Measurement cct. 3, measured at output crossing point, Ta = 25°C, V_{CC} = 3.3V	45	–	55	%
Output duty cycle 2	Duty 2	Measurement cct. 3, measured at 50% output swing, Ta = 25°C, V_{CC} = 3.3V	45	–	55	%
Output swing[1]	V_{Opp}	Measurement cct. 1, Ta = T_{OPR}, f = 350MHz, Peak to peak of output waveform	0.4	–	–	V
Output rise time	t_r	Measurement cct. 3, 20 to 80% output swing	–	0.5	1	ns
Output fall time	t_f	Measurement cct. 3, 80 to 20% output swing	–	0.5	1	ns
Output enable time[2]	t_{OE}	Measurement cct. 1, Ta = 25°C	–	–	200	ns
Output disable time[2]	t_{OD}	Measurement cct. 1, Ta = 25°C	–	–	200	ns

1. The said values are measured by using the NPC standard jig.
2. The built-in oscillator stop function does not operate with normal output immediately when OE goes HIGH. Instead, normal output occurs after the oscillator startup time has elapsed.



Timing chart

FUNCTIONAL DESCRIPTION

Standby Function

When OE goes LOW, the oscillator stops and the output pins (OUT, OUTN) become high impedance.

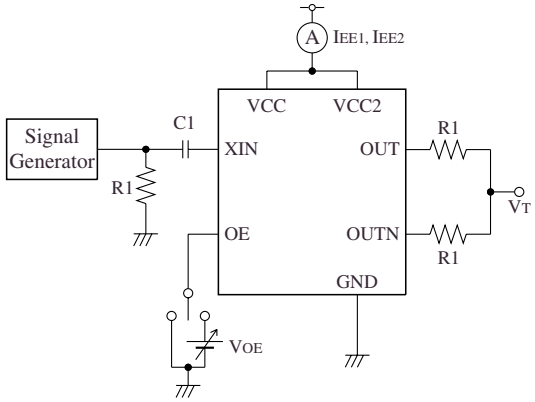
OE	OUT, OUTN	Oscillator
HIGH (or open)	Either f_O or $f_O/2$	Normal operation
LOW	High impedance	Stopped

Power-saving Pull-up Resistor

The OE pin pull-up resistance changes in value in response to the input level (HIGH or LOW). When OE is LOW (standby state), the pull-up resistance increases, thereby decreasing the current consumption.

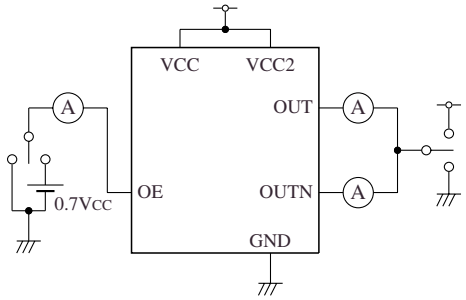
MEASUREMENT CIRCUITS

Measurement Circuit 1

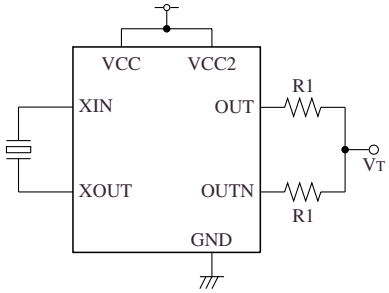


XIN input signal 500mVp-p, sine wave
C1: 0.001µF
R1: 50Ω
V_T: V_{CC} – 2V
V_{OE}: V_{CC}, V_{IH}, V_{IL}

Measurement Circuit 2

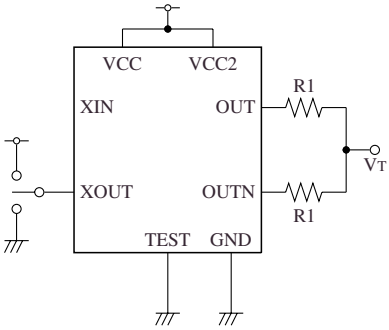


Measurement Circuit 3



R1: 50Ω, V_T: V_{CC} – 2V

Measurement Circuit 4



R1: 50Ω, V_T: V_{CC} – 2V
XOUT = HIGH: OUT pin is fixed HIGH (V_{OH}).
OUTN pin is fixed LOW (V_{OL}).
XOUT = LOW: OUT pin is fixed LOW (V_{OL}).
OUTN pin is fixed HIGH (V_{OH}).

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