



Low-current Consumption Crystal Oscillator Module ICs

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OVERVIEW

The CF5012 series are low-current consumption 3rd-harmonic crystal oscillator module ICs. Internal circuit optimization means these devices have reduced current consumption in comparison with our existing 3rd-harmonic oscillator devices. The crystal oscillator circuit has a built-in thin-film feedback resistor with good temperature characteristics and built-in capacitors with excellent frequency response, resulting in a stable 3rd-order overtone oscillator with only the connection of a crystal element.

FEATURES

- 3rd-harmonic oscillation
- 2.7 to 3.6V operating supply voltage range
- 30 to 45MHz recommended operating frequency range
- Inverter amplifier feedback resistor built-in
- Oscillator capacitors C_G, C_D built-in
- Output three-state function (high impedance in standby mode)

- f_O output frequency (oscillator frequency)
- 8mA output drive capability $(V_{DD} = 2.7V)$
- 6.5mA (typ) low current consumption $(V_{DD} = 3V, C_L = 15pF, f = 40MHz)$
- CMOS output duty level
- Chip form (CF5012×××)

SERIES CONFIGURATION

Venden	Recommended	gm ratio	Built-in capa	D III-O1	
Version	operating frequency [MHz]		C _G	C _D	$R_f[k\Omega]$
CF5012ANB	30 to 45	1.0	8	15	3.1

Note: Recommended operating frequency is not the guaranteed value but is measured using NPC's standard crystal.

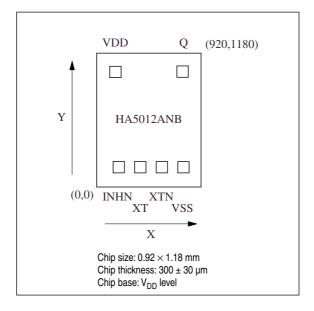
ORDERING INFORMATION

Device	Package
CF5012×××-1	Chip form

PAD LAYOUT

 $(Unit: \mu m)$

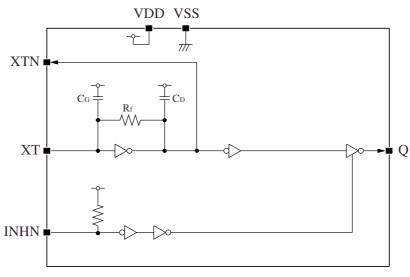
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PIN DESCRIPTION and PAD DIMENSIONS

Name	1/0	Description			Pad dimensions [µm]		
Ivaille	1/0		Description		Y		
INHN	I	Output state control input. High impedance when LOW. Pull-up resistor built in		195	174.4		
XT	I	Amplifier input	Crystal oscillator connection pins.	385	174.4		
XTN	0	Amplifier output	Crystal oscillator connected between XT and XTN	575	174.4		
VSS	-	Ground		765	174.4		
Q	0	Output. Output frequency. High impedance in standby mode		757.6	1017.6		
VDD	-	Supply voltage		165.4	1014.6		

BLOCK DIAGRAM



Substrate potential: $V_{\rm DD}$

SPECIFICATIONS

Absolute Maximum Ratings

$$V_{SS} = 0V$$
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Parameter Symbol Condition Rating Unit Supply voltage range $\rm V_{\rm DD}$ -0.5 to +7.0٧ Input voltage range -0.5 to V_{DD} + 0.5٧ V_{IN} ٧ Output voltage range V_{OUT} -0.5 to $V_{DD} + 0.5$ Operating temperature range $\mathsf{T}_{\mathsf{opr}}$ -40 to +85 $^{\circ}\text{C}$ Storage temperature range -65 to +150 °C T_{stg} 25 Output current I_{OUT}

Recommended Operating Conditions

 $V_{SS} = 0V$, $f \le 45MHz$, $C_L = 15pF$ unless otherwise noted.

Parameter	Cumbal	Condition		Unit		
Parameter	Symbol Condition		min	typ	max	Oilit
Supply voltage	V _{DD}		2.7	-	3.6	V
Input voltage	V _{IN}		V _{SS}	-	V_{DD}	V
Operating temperature	T _{OPR}		-20	-	+80	°C

Electrical Characteristics

 V_{DD} = 2.7 to 3.6V, V_{SS} = 0V, Ta = -20 to +80°C unless otherwise noted.

Parameter	Cumbal	Condition			Unit		
Parameter	Parameter Symbol Condition			min	typ	max	Offic
HIGH-level output voltage	V _{OH}	Q: Measurement cct 1, V _{DD} = 2.7V, I _{OH} = 8	BmA	2.2	2.4	-	V
LOW-level output voltage	V _{OL}	Q: Measurement cct 2, V _{DD} = 2.7V, I _{OL} = 8	mA	_	0.3	0.4	V
Output lookogo gurrant	I _Z	Q: Measurement cct 2, INHN = LOW, V _{DD} = 3.6V	$V_{OH} = V_{DD}$	_	-	10	μΑ
Output leakage current			$V_{OL} = V_{SS}$	_	-	10	μΑ
HIGH-level input voltage	V _{IH}	INHN		0.7V _{DD}	-	-	V
LOW-level input voltage	V _{IL}	INHN		_	-	0.3V _{DD}	V
Current consumption	I _{DD}	Measurement cct 3, load cct 1, INHN = open, C _L = 15pF, f = 40MHz		_	6.5	13	mA
INHN pull-up resistance	R _{UP}	Measurement cct 4		40	100	250	kΩ
Feedback resistance	R _f	Measurement cct 5		2.63	3.1	3.57	kΩ
Dotte to a section	C _G	Design value, determined by the internal wafer pattern		7	8	9	pF
Built-in capacitance	C _D			13	15	17	pF

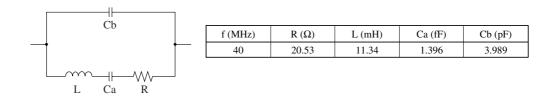
Switching Characteristics

 $V_{\rm DD}$ = 2.7 to 3.6V, $V_{\rm SS}$ = 0V, Ta = -20 to +80°C unless otherwise noted.

www.datash	www.datasheet4u.com Parameter		Condition	Rating			Unit
			Condition	min	typ	max	Oilit
	Output rise time	t _r	Measurement cct 3, load cct 1, $0.1V_{DD}$ to $0.9V_{DD}$, C_L = 15pF	-	2.0	4.0	ns
	Output fall time	t _f	Measurement cct 3, load cct 1, $0.9V_{DD}$ to $0.1V_{DD}$, C_{L} = 15pF	-	2.0	4.0	ns
	Output duty cycle ¹	Duty	Measurement cct 3, load cct 1, Ta = 25°C, V_{DD} = 3.0V, C_L = 15pF, f = 40MHz	40	-	60	%
	Output disable delay time	t _{PLZ}	Measurement cct 3, load cct 1, Ta = 25°C, V _{DD} = 3.0V,	-	-	100	ns
	Output enable delay time	t _{PZL}	C _L = 15pF	-	-	100	ns

^{1.} Monitored in sample lots.

Current consumption and Output waveform with NPC's standard crystal



FUNCTIONAL DESCRIPTION

Standby Function

When INHN goes LOW, the oscillator output on Q goes high impedance.

INHN	Q	Oscillator
HIGH (or open)	f _O output frequency	Normal operation
LOW	High impedance	Normal operation

MEASUREMENT CIRCUITS

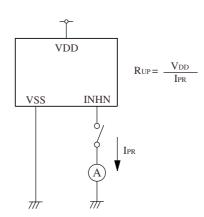
Measurement cct 1

Www.datasheet4u.com C1 VDD XT VSS R2 Von Q output Von OV

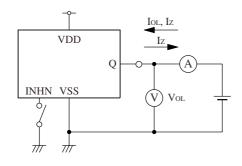
 $2.0V_{P-P}$, 10MHz sine wave input signal C1 : $0.001\mu F$

C1 : 0.001μ R1 : 50Ω R2 : 275Ω

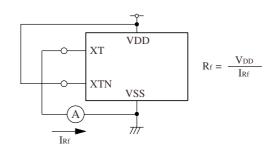
Measurement cct 4



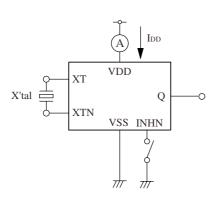
Measurement cct 2



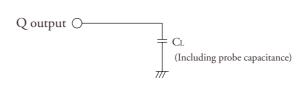
Measurement cct 5



Measurement cct 3



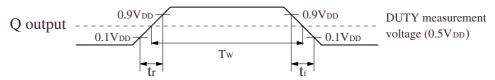
Load cct 1



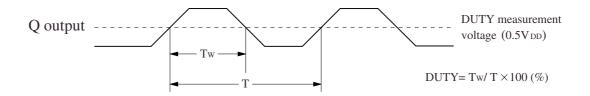
Switching Time Measurement Waveform

T_r , T_f , Duty

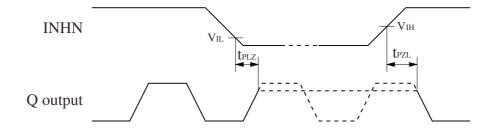
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Output duty cycle



Output Enable/Disable Delay



INHN input waveform $tr = tf \le 10$ ns

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