



OVERVIEW

The 5026 series are miniature crystal oscillator module ICs. They feature a damping resistor R_D matched to the crystal's characteristics to reduce crystal current. They support fundamental oscillation and 3rd overtone oscillation modes. The 5026 series can be used to correspond to wide range of applications.

FEATURES

- Miniature-crystal matched oscillator characteristics
- Operating supply voltage range
 - 2.5V operation: 2.25 to 2.75V
 - 3.0V operation: 2.7 to 3.6V
- Recommended operating frequency range
 - · For fundamental oscillator
 - 5026AL×: 20MHz to 50MHz
 - 5026BL1: 20MHz to 100MHz
 - For 3rd overtone oscillator
 - 5026ML×: 70MHz to 133MHz
- -40 to 85°C operating temperature range
- Oscillator capacitor with excellent frequency characteristics built-in
- Oscillator circuit with damping resistor R_D builtin for reduced crystal current

- Standby function
 - High impedance in standby mode, oscillator stops
- Low standby current
 - Power-saving pull-up resistor built-in
- Oscillation detector function
- Frequency divider built-in (5026AL×)
 - Varies with version: f_O, f_O/2, f_O/4, f_O/8, f_O/16, f_O/32
- CMOS output duty level (1/2VDD)
- $50 \pm 5\%$ output duty @ 1/2VDD
- 30pF output load
- Molybdenum-gate CMOS process
- Chip form (CF5026×L×)

SERIES CONFIGURATION

	Onevetina		Recommended	Output			Standb	y mode
Version	Operating supply voltage range [V]	Oscillation mode	operating frequency range (fundamental oscillation)*1 [MHz]	current (V _{DD} = 2.5V) [mA]	Output frequency	Output duty level	Oscillator stop function	Output state
CF5026AL1					f _O			
CF5026AL2					f _O /2		Yes	Hi-Z
CF5026AL3	2.25 to 3.6	Fundamental	20 to 50	4	f _O /4	CMOS		
CF5026AL4	2.25 10 3.6	runuamemai	20 10 30	,	f _O /8	_ CIVICO		
CF5026AL5					f _O /16			
CF5026AL6					f _O /32			
CF5026BL1*2	2.25 to 3.6	Fundamental	20 to 100	8	f _O	CMOS	Yes	Hi-Z
CF5026MLA			70 to 80					
CF5026MLB	2.25 to 3.6	3rd overtone	80 to 100	8	f _O	CMOS	Yes	Hi-Z
CF5026MLC			90 to 133					

^{*1.} The recommended operating frequency is a yardstick value derived from the crystal used for NPC characteristics authentication. However, the oscillator frequency band is not guaranteed. Specifically, the characteristics can vary greatly due to crystal characteristics and mounting conditions, so the oscillation characteristics of components must be carefully evaluated.

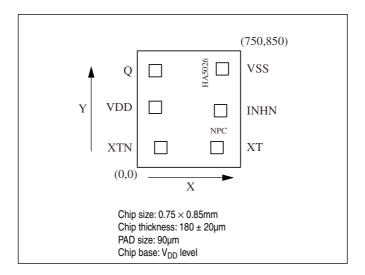
ORDERING INFORMATION

Device	Package
CF5026×L×-3	Chip form

^{*2.} The CF5026BL1 has a higher maximum operating frequency, hence the negative resistance is also larger than in the CF5026AL× devices.

PAD LAYOUT

(Unit: µm)

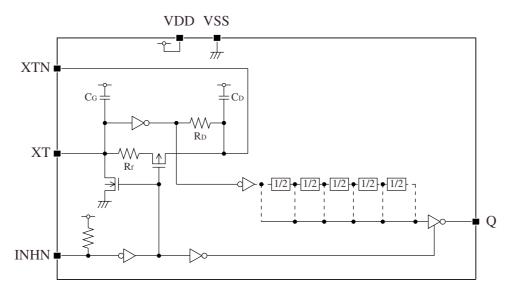


PIN DESCRIPTION and PAD DIMENSIONS

Nome	1/0		Description	Pad dimensions [µı		
Name	I/O		Description	Х	Υ	
INHN	I	Output state control input Power-saving pull-up resi	. High impedance when LOW (oscillator stops). stor built-in.	605	413	
XT	I	Amplifier input	Crystal connection pins.	579	144	
XTN	0	Amplifier output	Crystal is connected between XT and XTN.	171	144	
VDD	-	Supply voltage		131	438	
Q	0		at frequency determined by internal circuit to one of f_0 , $f_0/2$, $f_0/4$, $f_0/8$, $f_0/16$, apedance in standby mode		705	
VSS	-	Ground		618	718	

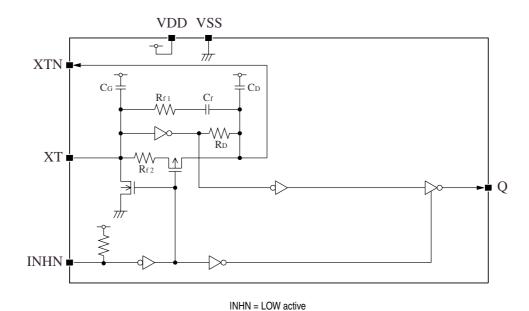
BLOCK DIAGRAM

For Fundamental Oscillator (5026AL×, 5026BL1)



INHN = LOW active

For 3rd Overtone Oscillator (5026ML×)



SPECIFICATIONS

Absolute Maximum Ratings

$$V_{SS} = 0V$$

Parameter	Symbol	Condition	Rating	Unit
Supply voltage range	V _{DD}		-0.5 to +7.0	V
Input voltage range	V _{IN}		-0.5 to V _{DD} + 0.5	V
Output voltage range	V _{OUT}		-0.5 to V _{DD} + 0.5	V
Operating temperature range	T _{opr}		-40 to +85	°C
Storage temperature range	T _{STG}		-65 to +150	°C
Output current	I _{OUT}		20	mA

Recommended Operating Conditions

$$V_{SS} = 0V$$

Parameter	Complete		Condition		Rating			
Parameter	Symbol				typ	max	Unit	
		5026AL×	CL ≤ 30pF	2.25	-	3.6	٧	
Operating supply voltage		5026BL1	CL ≤ 30pF	2.25	-	3.6	٧	
	V	5026MLA	f ≤ 80MHz, CL ≤ 30pF	2.25	-	3.6	٧	
	V _{DD}	5026MLB	f ≤ 100MHz, CL ≤ 30pF	2.25	-	3.6	٧	
		5026MLC	f ≤ 100MHz, CL ≤ 30pF	2.25	-	3.6	٧	
			f ≤ 133MHz, CL ≤ 15pF	2.25	-	3.6	٧	
Input voltage	V _{IN}			V _{SS}	-	V _{DD}	٧	
Operating temperature	T _{OPR}			-40	-	+85	°C	
		5026AL×	5026AL×		-	50	MHz	
		5026BL1*2		20	-	100	MHz	
Operating frequency*1	f _O	5026MLA	5026MLA		-	80	MHz	
		5026MLB*2	5026MLB ^{*2}		-	100	MHz	
		5026MLC*2		90	-	133	MHz	

^{*1.} The operating frequency is a yardstick value derived from the crystal used for NPC characteristics authentication. However, the oscillator frequency band is not guaranteed. Specifically, the characteristics can vary greatly due to crystal characteristics and mounting conditions, so the oscillation characteristics of components must be carefully evaluated.

*2. When 2.5V operation, the ratings of switching characteristics are difference by the frequency or output load. Refer to "Switching Characteristics".

Electrical Characteristics

5026AL× (2.5V operation)

Parameter	Symbol	Condition			Rating		Unit
Parameter	Syllibol	Condition		min	typ	max	UIIIL
HIGH-level output voltage	V _{OH}	Q: Measurement cct 1, V _{DD} = 2.25V, I ₀	_{OH} = 4mA	1.65	1.95	-	V
LOW-level output voltage	V _{OL}	Q: Measurement cct 2, V _{DD} = 2.25V, I _Q	_{OL} = 4mA	-	0.3	0.4	V
HIGH-level input voltage	V _{IH}	INHN		0.7V _{DD}	-	-	V
LOW-level input voltage	V _{IL}	INHN		-	-	0.3V _{DD}	V
Output leakage current		Q: Measurement cct 2, INHN = LOW	$V_{OH} = V_{DD}$	-	-	10	μA
Output leakage current	I _Z	Q. Measurement cct 2, INFIN = LOW	V _{OL} = V _{SS}	_	-	10	μA
			5026AL1	-	7	14	mA
		Measurement cct 3, load cct 1, INHN = open, C _L = 30pF, f = 50MHz	5026AL2	-	4.5	9	mA
	I _{DD2}		5026AL3	_	3.5	7	mA
Current consumption			5026AL4	-	2.9	5.8	mA
			5026AL5	_	2.5	5.0	mA
			5026AL6	_	2.4	4.8	mA
Standby current	I _{ST}	Measurement cct 3, INHN = LOW	1	-	-	3	μΑ
INTERNATIONAL CONTRACTOR	R _{UP1}	Management		2	6	12	MΩ
INHN pull-up resistance	R _{UP2}	Measurement cct 4		20	100	200	kΩ
Feedback resistance	R _f	Measurement cct 5		50	-	150	kΩ
Oscillator amplifier output resistance	R _D	Design value. A monitor pattern on a v	vafer is tested.	340	400	460	Ω
Duilt in conscitones	C _G	Design value A monitor notters as a	uafar ia taatad	6.8	8	9.2	pF
Built-in capacitance	C _D	Design value. A monitor pattern on a v	valer is tested.	8.5	10	11.5	pF

5026 series

5026AL× (3.0V operation)

Parameter	Cumhal	Condition			Rating		Unit
Parameter	Symbol	Condition		min	typ	max	Unit
HIGH-level output voltage	V _{OH}	Q: Measurement cct 1, V _{DD} = 2.7V, I _O	_H = 4mA	2.3	2.4	-	٧
LOW-level output voltage	V _{OL}	Q: Measurement cct 2, V _{DD} = 2.7V, I _O	L = 4mA	_	0.3	0.4	٧
HIGH-level input voltage	V _{IH}	INHN		0.7V _{DD}	-	-	٧
LOW-level input voltage	V _{IL}	INHN		-	-	0.3V _{DD}	٧
Outrot leeleese suurent		O: Massurament eet 2 INIHN - LOW	$V_{OH} = V_{DD}$	_	-	10	μA
Output leakage current	IZ	Q: Measurement cct 2, INHN = LOW	V _{OL} = V _{SS}	-	-	10	μA
			5026AL1	-	8.5	17	mA
		Measurement cct 3, load cct 1, INHN = open, C _L = 30pF, f = 50MHz	5026AL2	-	5.5	11	mA
	I _{DD2}		5026AL3	_	4	8	mA
Current consumption			5026AL4	_	3.3	6.6	mA
			5026AL5	-	2.9	5.8	mA
			5026AL6	_	2.7	5.4	mA
Standby current	I _{ST}	Measurement cct 3, INHN = LOW	1	_	-	5	μA
	R _{UP1}			2	4	8	MΩ
INHN pull-up resistance	R _{UP2}	Measurement cct 4		15	75	150	kΩ
Feedback resistance	R _f	Measurement cct 5		50	-	150	kΩ
Oscillator amplifier output resistance	R _D	Design value. A monitor pattern on a v	vafer is tested.	340	400	460	Ω
Duilt in conseitance	C _G	Design usly A magnitum and any	form in the stand	6.8	8	9.2	pF
Built-in capacitance	C _D	Design value. A monitor pattern on a v	vater is tested.	8.5	10	11.5	pF

5026BL1 (2.5V operation)

 $V_{\rm DD}$ = 2.25 to 2.75V, $V_{\rm SS}$ = 0V, Ta = -40 to +85°C unless otherwise noted.

Parameter	Cymhal	ol Condition				Unit	
Parameter	Symbol	Condition		min	typ	max	Unit
HIGH-level output voltage	V _{OH}	Q: Measurement cct 1, V _{DD} = 2.25V, I _C	_{DH} = 8mA	1.65	1.95	-	V
LOW-level output voltage	V _{OL}	Q: Measurement cct 2, V _{DD} = 2.25V, I _C	_{DL} = 8mA	-	0.3	0.4	V
HIGH-level input voltage	V _{IH}	NHN		0.7V _{DD}	-	-	V
LOW-level input voltage	V _{IL}	NHN		-	-	0.3V _{DD}	٧
Outrot lealers a surrent	put leakage current I _Z C	Q: Measurement cct 2, INHN = LOW	$V_{OH} = V_{DD}$	-	-	10	μΑ
uipui leakage current 1 _Z	l IZ	Q. Measurement cct 2, INT IN = LOW	V _{OL} = V _{SS}	-	-	10	μΑ
Current consumption	I _{DD2}	Measurement cct 3, load cct 1, INHN = open, C _L = 30pF, i = 100MHz		-	14	28	mA
Standby current	I _{ST}	Measurement cct 3, INHN = LOW		-	-	3	μA
INITIAL and the second state of the second sta	R _{UP1}	Management		2	6	12	MΩ
INHN pull-up resistance	R _{UP2}	Measurement cct 4		20	100	28	kΩ
Feedback resistance	R _f	Measurement cct 5		50	-	150	kΩ
Oscillator amplifier output resistance	R _D	Design value. A monitor pattern on a v	Design value. A monitor pattern on a wafer is tested.		200	230	Ω
D. W. in	C _G		6.8	8	9.2	pF	
Built-in capacitance	C _D	Design value. A monitor pattern on a v	vaier is tested.	8.5	10	11.5	pF

5026BL1 (3.0V operation)

Parameter	Cumbal	Condition				Unit	
Parameter	Symbol	Condition		min	typ	max	Ullit
HIGH-level output voltage	V _{OH}	Q: Measurement cct 1, V _{DD} = 2.7V, I _O	H = 8mA	2.3	2.4	-	٧
LOW-level output voltage	V _{OL}	Q: Measurement cct 2, V _{DD} = 2.7V, I _{OL} = 8mA		_	0.3	0.4	٧
HIGH-level input voltage	V _{IH}	INHN	INHN		-	-	٧
LOW-level input voltage	V _{IL}	INHN	-	-	0.3V _{DD}	٧	
Output leakage current		O Marriage and a INIIIN LOW	$V_{OH} = V_{DD}$	_	_	10	μA
	l I _Z	Q: Measurement cct 2, INHN = LOW	V _{OL} = V _{SS}	-	-	10	μΑ
Current consumption	I _{DD2}	Measurement cct 3, load cct 1, INHN = f = 100MHz	Measurement cct 3, load cct 1, INHN = open, C _L = 30pF, f = 100MHz		19	38	mA
Standby current	I _{ST}	Measurement cct 3, INHN = LOW		-	-	5	μA
INITIAL and an are determined	R _{UP1}	Management		2	4	8	MΩ
INHN pull-up resistance	R _{UP2}	Measurement cct 4		15	75	150	kΩ
Feedback resistance	R _f	Measurement cct 5		50	-	150	kΩ
Oscillator amplifier output resistance	R _D	Design value. A monitor pattern on a wafer is tested.		170	200	230	Ω
Duits in conseitance	C _G	Design value. A monitor pattern on a wafer is tested.		6.8	8	9.2	pF
Built-in capacitance	C _D			8.5	10	11.5	pF

5026ML× (2.5V operation)

 $V_{\rm DD}$ = 2.25 to 2.75V, $V_{\rm SS}$ = 0V, Ta = -40 to +85°C unless otherwise noted.

Dawanatan	Complete	Condition				Unit		
Parameter	Symbol	Condit	ion		min	typ	max	Unit
HIGH-level output voltage	V _{OH}	Q: Measurement cct 1, V _{DD} = 2.2	25V, I _{OH} = 8mA		1.65	1.95	-	٧
LOW-level output voltage	V _{OL}	Q: Measurement cct 2, V _{DD} = 2.2	25V, I _{OL} = 8mA		-	0.3	0.4	٧
HIGH-level input voltage	V _{IH}	INHN			0.7V _{DD}	-	-	٧
LOW-level input voltage	V _{IL}	INHN			-	-	0.3V _{DD}	٧
Output lookage ourrent		O: Macaurament act 2 INIHN - I	OW	$V_{OH} = V_{DD}$	-	-	10	μΑ
Output leakage current	l _Z	Q: Measurement cct 2, INHN = L	OVV	V _{OL} = V _{SS}	-	-	10	μΑ
	I _{DD1}	Measurement cct 3, load cct 1, INHN = open, C _L = 15pF	f = 133MHz	5026MLC	-	15	30	mA
Current consumption			f = 72MHz	5026MLA	-	11	22	mA
·	I _{DD2}	Measurement cct 3, load cct 1, INHN = open, C ₁ = 30pF	f = 100MHz	5026MLB	-	15	30	mA
		Sps, o_ sop.	f = 100MHz	5026MLC	-	15	30	mA
Standby current	I _{ST}	Measurement cct 3, INHN = LOV	easurement cct 3, INHN = LOW			-	3	μΑ
INITIAL and the second state of a	R _{UP1}					6	12	MΩ
INHN pull-up resistance	R _{UP2}	Measurement cct 4			20	100	200	kΩ
	R _{f1}	Design value. A monitor pattern on a wafer is tested. 5026MLA 5026MLB		3.99	4.7	5.41	kΩ	
AC feedback resistance				2.29	2.70	3.11	kΩ	
		,	5026MLC		2.97	3.5	4.03	kΩ
DC feedback resistance	R _{f2}	Measurement cct 5			50	-	150	kΩ
Oscillator amplifier output resistance	R _D	Design value. A monitor pattern of	on a wafer is tes	sted.	85	100	115	Ω
AC feedback capacitance	C _f	Design value. A monitor pattern of	on a wafer is tes	sted.	8.5	10	11.5	pF
				5026MLA	1.70	2	2.30	pF
	C _G	Design value. A monitor pattern on a wafer is to	ested.	5026MLB	1.70	2	2.30	pF
Duilt in conscitones		, p		5026MLC	0.85	1	1.15	pF
Built-in capacitance				5026MLA	3.40	4	4.60	pF
	C _D	Design value. A monitor pattern on a wafer is tested. 5026MLi		5026MLB	3.40	4	4.60	pF
		,	50		3.40	4	4.60	pF

5026ML× (3.0V operation)

Downston	Complete	Condition				Unit		
Parameter	Symbol	Condit	ion		min	typ	max	Unit
HIGH-level output voltage	V _{OH}	Q: Measurement cct 1, V _{DD} = 2.7	'V, I _{OH} = 8mA		2.3	2.4	-	٧
LOW-level output voltage	V _{OL}	Q: Measurement cct 2, V _{DD} = 2.7	'V, I _{OL} = 8mA		-	0.3	0.4	٧
HIGH-level input voltage	V _{IH}	INHN			0.7V _{DD}	-	-	٧
LOW-level input voltage	V _{IL}	INHN			-	-	0.3V _{DD}	٧
Outrot lealings assument		O. Management and O. INIJIN. J.	OW/	$V_{OH} = V_{DD}$	-	-	10	μΑ
Output leakage current	l _Z	Q: Measurement cct 2, INHN = L	OW	V _{OL} = V _{SS}	-	-	10	μΑ
	I _{DD1}	Measurement cct 3, load cct 1, INHN = open, C _L = 15pF	f = 133MHz	5026MLC	-	20	40	mA
Current consumption			f = 72MHz	5026MLA	-	15	30	mA
·	I _{DD2}	Measurement cct 3, load cct 1, INHN = open, C ₁ = 30pF	f = 100MHz	5026MLB	-	20	40	mA
		opon, ot - oop	f = 100MHz	5026MLC	-	20	40	mA
Standby current	I _{ST}	Measurement cct 3, INHN = LOV	easurement cct 3, INHN = LOW			-	5	μA
	R _{UP1}					4	8	MΩ
INHN pull-up resistance	R _{UP2}	Measurement cct 4			15	75	150	kΩ
	R _{f1}	Design value. A monitor pattern on a wafer is tested. 5026MLB 5026MLC		3.99	4.7	5.41	kΩ	
AC feedback resistance				2.29	2.70	3.11	kΩ	
				2.97	3.5	4.03	kΩ	
DC feedback resistance	R _{f2}	Measurement cct 5		•	50	-	150	kΩ
Oscillator amplifier output resistance	R _D	Design value. A monitor pattern of	on a wafer is tes	sted.	85	100	115	Ω
AC feedback capacitance	C _f	Design value. A monitor pattern of	on a wafer is tes	sted.	8.5	10	11.5	pF
				5026MLA	1.70	2	2.30	pF
	C _G	Design value. A monitor pattern on a wafer is to	ested	5026MLB	1.70	2	2.30	pF
D 30 1		, and the second of a second of		5026MLC	0.85	1	1.15	pF
Built-in capacitance				5026MLA	3.40	4	4.60	pF
	C _D	Design value. A monitor pattern on a wafer is tested.		5026MLB	3.40	4	4.60	pF
			50		3.40	4	4.60	pF

Switching Characteristics

5026AL× (2.5V operation)

 $V_{DD} = 2.25$ to 2.75V, $V_{SS} = 0$ V, Ta = -40 to +85°C unless otherwise noted.

Parameter	Symbol	Condition		Unit			
Farameter	Syllibol	Condition	min	typ	max	Oilit	
Output via a time	t _{r1}	Measurement cct 3, load cct 1, 0.1V _{DD} to 0.9V _{DD}	C _L = 15pF	_	3	6	ns
Output rise time	t _{r2}		C _L = 30pF	_	5	10	ns
Output fall time	t _{f1}	Measurement cct 3, load cct 1,	C _L = 15pF	_	3	6	ns
	t _{f2}	0.9V _{DD} to 0.1V _{DD}	C _L = 30pF	_	5	10	ns
Outrot duty avala*1	Duty1	Measurement cct 3, load cct 1,	C _L = 15pF	45	-	55	%
Output duty cycle*1	Duty2	$V_{DD} = 2.5V$, Ta = 25°C, f = 50MHz	C _L = 30pF	45 – 55	%		
Output disable delay time*2	t _{PLZ}	Measurement cct 6, load cct 1, V _{DD} =	2.5V, Ta = 25°C,	_	-	100	ns
Output enable delay time*2	t _{PZL}	C _L = 15pF		-	-	100	ns

^{*1.} The duty cycle characteristic is checked the sample chips of each production lot.

5026AL× (3.0V operation)

Parameter	Symbol	Condition	Rating			Unit		
Parameter	Symbol	Condition		min	typ	max	Oille	
Output rise time	t _{r1}	Measurement cct 3, load cct 1,	C _L = 15pF	-	2.5	5	ns	
Output rise tillle	t _{r2}	0.1V _{DD} to 0.9V _{DD}	C _L = 30pF	-	4.5	9	ns	
Output fall time	t _{f1}	Measurement cct 3, load cct 1,	C _L = 15pF	_	2.5	5	ns	
Output fail time	t _{f2}	0.9V _{DD} to 0.1V _{DD}	C _L = 30pF	-	4.5	9	ns	
Output duty cycle*1	Duty1	Measurement cct 3, load cct 1, V _{DD} = 3.0V, Ta = 25°C, f = 50MHz	C _L = 15pF	45	-	55	%	
Output duty cycle	Duty2		C _L = 30pF	45	-	55	%	
Output disable delay time*2	t _{PLZ}	Measurement cct 6, load cct 1, V _{DD} =	3.0V, Ta = 25°C,	_	_	100	ns	
Output enable delay time*2	t _{PZL}	C _L = 15pF		-	-	100	ns	

^{*1.} The duty cycle characteristic is checked the sample chips of each production lot.

^{*2.} Oscillator stop function is built-in. When INHN goes LOW, normal output stops. When INHN goes HIGH, normal output is not resumed until after the oscillator start-up time has elapsed.

^{*2.} Oscillator stop function is built-in. When INHN goes LOW, normal output stops. When INHN goes HIGH, normal output is not resumed until after the oscillator start-up time has elapsed.

5026BL1 (2.5V operation)

 $V_{\rm DD}$ = 2.25 to 2.75V, $V_{\rm SS}$ = 0V, Ta = -40 to +85°C unless otherwise noted.

Parameter	Cumbal	Condition		Rating			Unit
Parameter	Symbol Condition			min	typ	max	UIIIL
	t _{r1}	Measurement cct 3, load cct 1,	C _L = 15pF	-	2	4	ns
Output rise time	t _{r2}	0.1V _{DD} to 0.9V _{DD}	C _L = 30pF	-	3	6	ns
	t _{r3}	Measurement cct 3, load cct 1, 0.2V _{DD} to 0.8V _{DD}	C _L = 30pF	-	2.5	5	ns
Output fall time	t _{f1}	Measurement cct 3, load cct 1,	C _L = 15pF	-	2	4	ns
	t _{f2}	0.9V _{DD} to 0.1V _{DD}	C _L = 30pF	-	3	6	ns
	t _{f3}	Measurement cct 3, load cct 1, 0.8V _{DD} to 0.2V _{DD}	C _L = 30pF	-	2.5	5	ns
Output duty cycle*1	Duty1		C _L = 15pF f = 100MHz	45	-	55	%
	Duty2	Measurement cct 3, load cct 1, V _{DD} = 2.5V, Ta = 25°C	C _L = 30pF f = 80MHz	45	-	55	%
	Duty3		C _L = 30pF f = 100MHz	40	-	60	%
Output disable delay time*2	t _{PLZ}	Measurement cct 6, load cct 1, V _{DD} = 2.5V, Ta = 25°C,		_	_	100	ns
Output enable delay time*2	t _{PZL}	C _L = 15pF	-	-	100	ns	

^{*1.} The duty cycle characteristic is checked the sample chips of each production lot.

5026BL1 (3.0V operation)

Parameter	Cymphal	Symbol Condition			Rating		
rarameter	Syllibol				typ	max	Unit
Output rice time	t _{r1}	Measurement cct 3, load cct 1,	C _L = 15pF	-	1.5	3	ns
Output rise time	t _{r2}	0.1V _{DD} to 0.9V _{DD}	C _L = 30pF	-	2.5	5	ns
Outrat fall the	t _{f1}	Measurement cct 3, load cct 1,	C _L = 15pF	-	1.5	3	ns
Output fall time	t _{f2}	0.9V _{DD} to 0.1V _{DD}	C _L = 30pF	-	2.5	5	ns
Output duty avala*1	Duty1	Measurement cct 3, load cct 1,	C _L = 15pF	45	_	55	%
Output duty cycle*1	Duty2	$V_{DD} = 3.0V$, Ta = 25°C, f = 100MHz	C _L = 30pF	45	_	55	%
Output disable delay time*2	t _{PLZ}	Measurement cct 6, load cct 1, V _{DD} =	3.0V, Ta = 25°C,	-	-	100	ns
Output enable delay time*2	t _{PZL}	C _L = 15pF		-	_	100	ns

^{*1.} The duty cycle characteristic is checked the sample chips of each production lot.

^{*2.} Oscillator stop function is built-in. When INHN goes LOW, normal output stops. When INHN goes HIGH, normal output is not resumed until after the oscillator start-up time has elapsed.

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5026ML× (2.5V operation)

 $V_{\rm DD}$ = 2.25 to 2.75V, $V_{\rm SS}$ = 0V, Ta = -40 to +85°C unless otherwise noted.

Parameter	Cumbal	Condition				Rating		
Parameter	Symbol					typ	max	Unit
Output rise time	t _{r1}	Measurement cct 3, load cct 1,		C _L = 15pF	_	2	4	ns
Output rise time	t _{r2}	0.1V _{DD} to 0.9V _{DD}		C _L = 30pF	-	3	6	ns
Output fall time	t _{f1}	Measurement cct 3, load cct 1,		C _L = 15pF	-	2	4	ns
Output fall time	t _{f2}	0.9V _{DD} to 0.1V _{DD}		C _L = 30pF	-	3	6	ns
	Duty1	Measurement cct 3, load cct 1, V _{DD} = 2.5V, Ta = 25°C,	f = 72MHz	5026MLA	45	-	55	%
			f = 100MHz	5026MLB	45	-	55	%
Output duty cycle ^{*1}		$C_L = 15pF$	f = 133MHz	5026MLC	45	-	55	%
Output duty cycle		Measurement cct 3, load cct 1,	f = 72MHz	5026MLA	45	-	55	%
	Duty2	$V_{DD} = 2.5V$, $Ta = 25^{\circ}C$,	f = 100MHz	5026MLB	40	-	60	%
			f = 100MHz	5026MLC	40	-	60	%
Output disable delay time*2	t _{PLZ}	Measurement cct 6, load cct 1, V_{DD} = 2.5V, Ta = 25°C, C_L = 15pF			-	-	100	ns
Output enable delay time*2	t _{PZL}				-	-	100	ns

5026ML× (3.0V operation)

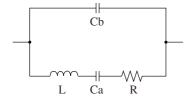
Parameter	Cumbal	Conditi	Rating			Unit		
rarameter	Symbol	I Condition			min	typ	max	
Output rice time	t _{r1}	Measurement cct 3, load cct 1,		C _L = 15pF	-	1.5	3	ns
Output rise time	t _{r2}	0.1V _{DD} to 0.9V _{DD}		C _L = 30pF	-	2.5	5	ns
Output fall time	t _{f1}	Measurement cct 3, load cct 1,		C _L = 15pF	-	1.5	3	ns
Output fall time	t _{f2}	0.9V _{DD} to 0.1V _{DD}		C _L = 30pF	-	2.5	5	ns
	Duty1	Measurement cct 3, load cct 1, $V_{DD} = 3.0V$, $Ta = 25$ °C, $C_L = 15$ pF	f = 72MHz	5026MLA	45	-	55	%
			f = 100MHz	5026MLB	45	-	55	%
			f = 133MHz	5026MLC	45	-	55	%
Output duty cycle*1	$\begin{array}{c} \text{Duty2} & \text{V}_{\text{DD}} = 3.0\text{V}, \text{Ta} = \\ \text{C}_{\text{L}} = 30\text{pF} & \\ \hline \text{Measurement co} \end{array}$	Measurement cct 3, load cct 1, V_{DD} = 3.0V, Ta = 25°C, C_L = 30pF	f = 72MHz	5026MLA	45	-	55	%
			f = 100MHz	5026MLB	45	-	55	%
		Measurement cct 3, load cct 1, V Ta = 25 $^{\circ}$ C, C _L = 30pF, f = 100MH	ment cct 3, load cct 1, V _{DD} = 3.3V, C, C _L = 30pF, f = 100MHz		45	-	55	%
Output disable delay time*2	t _{PLZ}	Measurement cct 6, load cct 1, V _{DD} = 3.0V, Ta = 25°C,			-	-	100	ns
Output enable delay time*2	t _{PZL}	C _L = 15pF	55			-	100	ns

^{*1.} The duty cycle characteristic is checked the sample chips of each production lot.

^{*1.} The duty cycle characteristic is checked the sample chips of each production lot.
*2. Oscillator stop function is built-in. When INHN goes LOW, normal output stops. When INHN goes HIGH, normal output is not resumed until after the oscillator start-up time has elapsed.

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Current consumption and Output waveform with NPC's standard crystal



f [MHz]	R [Ω]	L [mH]	Ca [fF]	Cb [pF]
50	16.12	6.88	1.48	1.18
72	_	-	-	_
100	_	_	_	_

Note. The 72MHz and 100MHz crystal parameters are confidential.

FUNCTIONAL DESCRIPTION

Standby Function

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

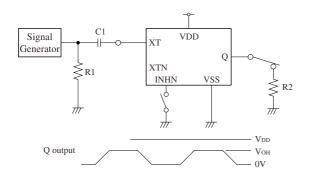
Version	INHN	Q	Oscillator	
5026AL×	HIGH (or open)	Any f _O , f _O /2, f _O /4, f _O /8, f _O /16 or f _O /32 output frequency	Normal operation	
5026BL1, ML×	Tildir (or open)	f _O	- Normal operation	
5026AL×, BL1, ML×	LOW	High impedance	Stopped	

Power-saving Pull-up Resistor

The INHN pull-up resistance changes in response to the input level (HIGH or LOW). When INHN goes LOW (standby state), the pull-up resistance becomes large to reduce the current consumption during standby.

MEASUREMENT CIRCUITS

Measurement cct 1



2Vp-p, 10MHz sine wave input signal

C1: 0.001µF

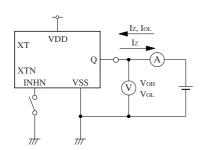
R1: 50Ω

R2: 5026AL× : 412 Ω (2.5V operation) 575 Ω (3.0V operation)

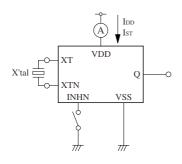
5026BL1, ML \times : 206 Ω (2.5V operation)

287Ω (3.0V operation)

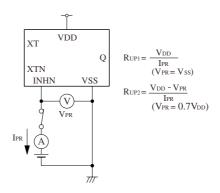
Measurement cct 2



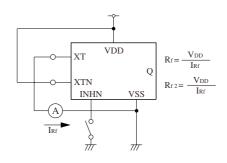
Measurement cct 3



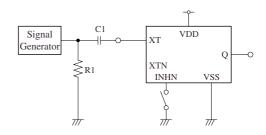
Measurement cct 4



Measurement cct 5



Measurement cct 6

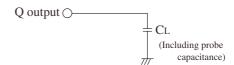


2Vp-p, 10MHz sine wave input signal

C1: 0.001µF

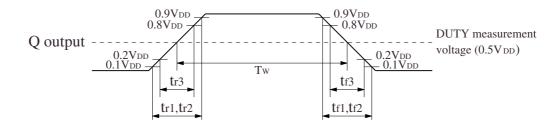
R1: 50Ω

Load cct 1

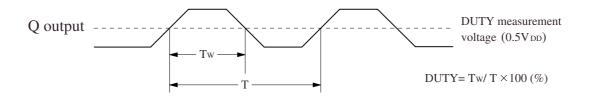


Switching Time Measurement Waveform

Output duty level, t_r, t_f

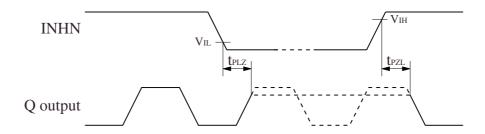


Output duty cycle



Output Enable/Disable Delay

when the device is in standby, the oscillator stops. When standby is released, the oscillator starts and stable oscillator output occurs after a short delay.



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

Please pay your attention to the following points at time of using the products shown in this document.

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