

Crystal Oscillator Module ICs

OVERVIEW

The WF5025 series are miniature crystal oscillator module ICs. They feature a damping resistor R_D matched to the crystal's characteristics to reduce crystal current. The pad layout is arranged for flip chip mounting, which gives the pattern design more flexibility, even for mounting ultra-miniature crystal oscillators that provide almost no space for wiring patterns. They support fundamental oscillation and 3rd overtone oscillation modes. The WF5025 series can be used to correspond to wide range of applications.

FEATURES

- Pad layout optimized for flip chip mounting
- 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
 - WF5025AL×: 20MHz to 50MHz
 - WF5025BL1: 20MHz to 100MHz
 - For 3rd overtone oscillator
 - WF5025ML×: 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 (WF5025AL×)
 - 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

SERIES CONFIGURATION

	Onesetina		Recommended	Output			Standb	y mode
Version	Operating supply voltage [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
WF5025AL1					f _O			
WF5025AL2					f _O /2			
WF5025AL3	2.25 to 3.6	Fundamental	00 to 50	4	f _O /4	CMOS	Yes	Hi-Z
WF5025AL4	2.20 10 3.0	rundamentai	20 to 50	4	f _O /8	CIVIOS		ΠΙ-Ζ
WF5025AL5					f _O /16	1		
WF5025AL6					f _O /32			
WF5025BL1*2	2.25 to 3.6	Fundamental	20 to 100	8	f _O	CMOS	Yes	Hi-Z
WF5025MLA			70 to 80					
(WF5025MLB)	2.25 to 3.6	3rd overtone	80 to 100	8	f _O	CMOS	Yes	Hi-Z
WF5025MLC	1		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.

Note. These versions in parentheses () are under development. Please ask our Sales & Marketing section for further detail.

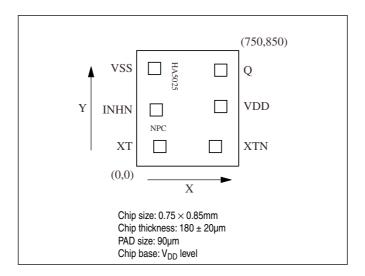
ORDERING INFORMATION

Device	Package
WF5025×××-3	Wafer form

^{*2.} The WF5025BL1 has a higher maximum operating frequency, hence the negative resistance is also larger than in the WF5025AL× devices.

PAD LAYOUT

(Unit: µm)



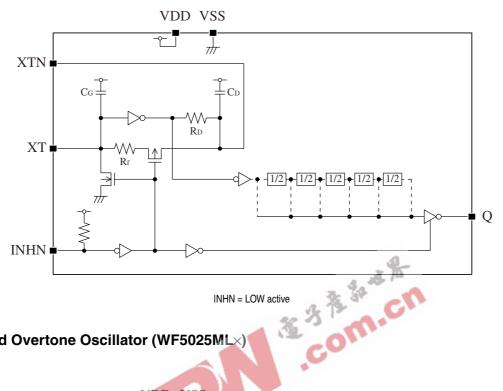
PIN DESCRIPTION and PAD DIMENSIONS

Name	I/O	Description 4	Pad dimensions [µm]		
Ivaille	1/0	Description	Х	Y	
INHN	I	Output state control input. High impedance when LOW (oscillator stops). Power-saving pull-up resistor built-in.	144.6	413.4	
XT	I	Amplifier input Crystal connection pins.	171.0	144.6	
XTN	0	Amplifier output Crystal is connected between XT and XTN.	579.0	144.6	
VDD	-	Supply voltage	618.2	438.6	
Q	0	Output. Output frequency determined by internal circuit to one of f_O , $f_O/2$, $f_O/4$, $f_O/8$, $f_O/16$, $f_O/32$. High impedance in standby mode	618.2	705.4	
VSS	-	Ground	131.8	718.2	

3...

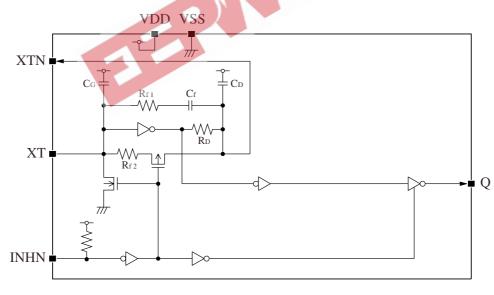
BLOCK DIAGRAM

For Fundamental Oscillator (WF5025AL×, WF5025BL1)



INHN = LOW active

For 3rd Overtone Oscillator (WF5025MLX)



INHN = LOW active

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	l _{out}		20	mA

Recommended Operating Conditions

$$V_{SS} = 0V$$

Parameter	Symbol	Condition				Unit	
Parameter	Syllibol		Condition	min	typ	max	Oill
		WF5025AL×	CL ≤ 30pF	2.25	J. //h_	3.6	V
		WF5025BL1	CL ≤ 30pF	2.25	City	3.6	V
Operating supply voltage	V	WF5025MLA	f ≤ 80MHz, CL ≤ 30pF	2.25	-	3.6	V
	V _{DD}	WF5025MLB	f ≤ 100MHz, CL ≤ 30pF	(2 .25)	-	(3.6)	V
		WF5025MLC	f ≤ 100MHz, CL ≤ 30pF	2.25	-	3.6	V
		WF3025WILC	f ≤ 133MHz, CL ≤ 15pF	2.25	-	3.6	V
Input voltage	V _{IN}			V _{SS}	-	V _{DD}	V
Operating temperature	T _{OPR}			-40	_	+85	°C
		WF5025AL×		20	-	50	MHz
		WF5025BL1*3		20	-	100	MHz
Operating frequency*2	f _O	WF5025MLA		70	-	80	MHz
		WF5025MLB*3		(80)	-	(100)	MHz
		WF5025MLC*3	1	90	-	133	MHz

^{*1.} Values in parentheses () are provisional only.

^{*2.} 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.

^{*3.} When 2.5V operation, the ratings of switching characteristics are difference by the frequency or output load. Refer to "Switching Characteristics".

Electrical Characteristics

WF5025AL× (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	Unit
HIGH-level output voltage	V _{OH}	Q: Measurement cct 1, V _{DD} = 2.25V, I _C	_{OH} = 4mA	1.65	1.95	-	V
LOW-level output voltage	V _{OL}	Q: Measurement cct 2, V _{DD} = 2.25V, I _C	_{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	μΑ
Output leakage current	l _Z	Q: Measurement cct 2, INFIN = LOW	V _{OL} = V _{SS}	-	-	10	μΑ
			WF5025AL1	-	7	14	mA
		Measurement cct 3, load cct 1, INHN = open, C _L = 30pF, f = 50MHz	WF5025AL2	-	4.5	9	mA
	I _{DD2}		WF5025AL3	-	3.5	7	mA
Current consumption			WF5025AL4		2.9	5.8	mA
			WF5025AL5	、点》	2.5	5	mA
			WF5025AL6	3° -	- 7 14 - 4.5 9 - 3.5 7 - 2.9 5.8 - 2.5 5 - 2.4 4.8 - - 3 2 6 12	mA	
Standby current	I _{ST}	Measurement cct 3, INHN = LOW	25	-N-10	_	3	μΑ
INII INI mulli un registance	R _{UP1}	Measurement cct 4	131 -O	2	6	12	MΩ
INHN pull-up resistance	R _{UP2}	weasurement cct 4	.00	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 Amenitor nettern an au	vafor in tootod	6.8	8	9.2	pF
Built-in capacitance	CD	Design value. A monitor pattern on a v	valer is rested.	8.5	10	11.5	pF

WF5025AL× (3.0V operation)

 $V_{\rm DD}$ = 2.7 to 3.6V, $V_{\rm SS}$ = 0V, Ta = -40 to +85°C unless otherwise noted.

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 _{OI}	_H = 4mA	2.3	2.4	-	V
LOW-level output voltage	V _{OL}	Q: Measurement cct 2, V _{DD} = 2.7V, I _{OI}	= 4mA	-	0.3	0.4	V
HIGH-level input voltage	V _{IH}	INHN	IHN		-	_	V
LOW-level input voltage	V _{IL}	INHN	IHN			0.3V _{DD}	V
Output lookage current		Q: Measurement cct 2, INHN = LOW	$V_{OH} = V_{DD}$	-	-	10	μA
Output leakage current	l _Z	Q. Measurement cct 2, INFIN = LOW	V _{OL} = V _{SS}	-	-	10	μΑ
			WF5025AL1	-	8.5	17	mA
		Measurement cct 3, load cct 1, INHN = open, C _L = 30pF, f = 50MHz	WF5025AL2	-	5.5	11	mA
	I _{DD2}		WF5025AL3	-	4	8	mA
Current consumption			WF5025AL4	-	3.3	6.6	mA
			WF5025AL5	-	2.9	5.8	mA
			WF5025AL6	- 4	2.7	5.4	mA
Standby current	I _{ST}	Measurement cct 3, INHN = LOW	250	-	<u>~</u>	5	μΑ
INI IN pull up registence	R _{UP1}	Measurement cct 4	29	2	4	8	MΩ
INHN pull-up resistance	R _{UP2}	weasurement cct 4	130	15	75	150	kΩ
Feedback resistance	R _f	Measurement cct 5	C	50	-	150	kΩ
Oscillator amplifier output resistance	R _D	Design value. A monitor pattern on a v	vafer is tested.	340	400	460	Ω
Puilt in conscitones	C _G	Design value A manitor nottern an au	vafor in tooted	6.8	8	9.2	pF
Built-in capacitance	C _D	Design value. A monitor pattern on a v	valei is iesied.	8.5	10	11.5	pF

WF5025BL1 (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	Symbol Condition			Rating		Unit	
Parameter	Symbol	Condition		min	typ	max		
HIGH-level output voltage	V _{OH}	Q: Measurement cct 1, V _{DD} = 2.25V, I ₀	_{OH} = 8mA	1.65	1.95	-	٧	
LOW-level output voltage	V _{OL}	Q: Measurement cct 2, V _{DD} = 2.25V, I ₀	_{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	IZ	1	V _{OL} = V _{SS}	_	-	10	μA	
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		14	28	mA	
Standby current	I _{ST}	Measurement cct 3, INHN = LOW		-	-	3	μA	
INITIAL and the second state of the	R _{UP1}	Management		2	6	12	$M\Omega$	
INHN pull-up resistance	R _{UP2}	Measurement cct 4		20	100	- 0.3V _{DD} 10 10 28 3	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	
Duilt in conscitones	C _G	Design value A monitor notters as a	3, 13		8	9.2	pF	
Built-in capacitance	C _D	Design value. A monitor pattern on a v	valer is lested.	8.5	10	11.5	pF	

WF5025BL1 (3.0V operation)

 $V_{DD} = 2.7$ to 3.6V, $V_{SS} = 0$ V, Ta = -40 to +85°C unless otherwise noted.

Parameter	Symbol	Condition		Unit			
Parameter	Symbol	Condition		min	typ	max	Unit
HIGH-level output voltage	V _{OH}	Q: Measurement cct 1, V _{DD} = 2.7V, I _{OI}	H = 8mA	2.3	2.4	-	٧
LOW-level output voltage	V _{OL}	Q: Measurement cct 2, V _{DD} = 2.7V, I _{OI}	Q: Measurement cct 2, V _{DD} = 2.7V, I _{OL} = 8mA		0.3	0.4	٧
HIGH-level input voltage	V _{IH}	INHN	NHN		-	-	٧
LOW-level input voltage	V _{IL}	INHN	HN		-	0.3V _{DD}	٧
Output leakage current	I_	O. Massurament est O. INLIN. J. OW.	$V_{OH} = V_{DD}$	-	-	10	μΑ
	l _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	μΑ
INILINI null un registence	R _{UP1}	Measurement cct 4		2	4	8	MΩ
INHN pull-up resistance	R _{UP2}	weasurement cct 4		15	75	- 0.4 - 0.3V _{DD} 10 10 38 5	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
Duilt in conseitance	C_{G}	Design value A monitor nottern on a v	vofor in to stand	6.8	8	9.2	pF
Built-in capacitance	C _D	Design value. A monitor pattern on a v	valer is lested.	8.5	10	11.5	pF

WF5025ML× (2.5V operation)

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

Dovometer	Cumbal	Condi	tion.			Rating*1		Unit
Parameter	Symbol	Condi	uon		min	typ	max	Unit
HIGH-level output voltage	V _{OH}	Q: Measurement cct 1, V _{DD} = 2.2	25V, I _{OH} = 8mA	1	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 looks as surrent		O. Massurement act O. INILIN.	OW	$V_{OH} = V_{DD}$	-	-	10	μA
Output leakage current	I _Z	Q: Measurement cct 2, INHN = L	.OW	V _{OL} = V _{SS}	-	-	10	μΑ
		Measurement cct 3, load cct 1,	f = 100MHz	WF5025MLB	-	TBD	TBD	mA
	I _{DD1}	INHN = open, C _L = 15pF	f = 133MHz	WF5025MLC	-	15	30	mA
Current consumption			f = 72MHz	WF5025MLA	-	11	22	mA
	I _{DD2}	Measurement cct 3, load cct 1, INHN = open, C ₁ = 30pF	f = 100MHz	WF5025MLB	-	TBD	TBD	mA
		span, s <u>L</u> ssp.	f = 100MHz	WF5025MLC	-	15	30	mA
Standby current	I _{ST}	Measurement cct 3, INHN = LOV	easurement cct 3, INHN = LOW			-	3	μΑ
INII INI mulli um vanistamas	R _{UP1}	Management and 4	3.		2	6	12	MΩ
INHN pull-up resistance	R _{UP2}	Measurement cct 4		及養勢	20	100	200	kΩ
	R _{f1}	Docion value A monitor nattern on a wafer is		WF5025MLA	3.99	4.7	5.41	kΩ
AC feedback resistance				WF5025MLB	TBD	TBD	TBD	kΩ
			WF5025MLC		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	on a wafer is te	ested.	85	100	115	Ω
AC feedback capacitance	C _f	Design value. A monitor pattern	on a wafer is te	sted.	8.5	10	11.5	pF
				WF5025MLA	1.70	2	2.30	pF
	C _G	Design value. A monitor pattern tested.	on a wafer is	WF5025MLB	(1.70)	(2)	(2.30)	pF
Puilt in conscitores				WF5025MLC	0.85	1	1.15	pF
Built-in capacitance				WF5025MLA	3.40	4	4.60	pF
	C _D	Design value. A monitor pattern on a wafer is tested.		WF5025MLB	(3.40)	(4)	(4.60)	pF
				WF5025MLC	3.40	4	4.60	pF

^{*1.} Values in parentheses () are provisional only.

WF5025ML× (3.0V operation)

 $V_{\rm DD}$ = 2.7 to 3.6V, $V_{\rm SS}$ = 0V, Ta = -40 to +85°C unless otherwise noted.

Dovometer	Cumbal	Condi	tion			Rating*1		Unit
Parameter	Symbol	Condi	uon		min	typ	max	Unit
HIGH-level output voltage	V _{OH}	Q: Measurement cct 1, V _{DD} = 2.	7V, I _{OH} = 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			0.7V _{DD}	-	-	٧
LOW-level input voltage	V _{IL}	INHN			-	-	0.3V _{DD}	٧
Output looks as surrent		O. Magaziramant act 0 INIIIN I	OW	$V_{OH} = V_{DD}$	-	-	10	μA
Output leakage current	I _Z	Q: Measurement cct 2, INHN = L	LOW	V _{OL} = V _{SS}	-	-	10	μΑ
		Measurement cct 3, load cct 1,	f = 100MHz	WF5025MLB	-	TBD	TBD	mA
	I _{DD1}	INHN = open, C _L = 15pF	f = 133MHz	WF5025MLC	-	20	40	mA
Current consumption			f = 72MHz	WF5025MLA	-	15	30	mA
	I _{DD2}	Measurement cct 3, load cct 1, INHN = open, C ₁ = 30pF	f = 100MHz	WF5025MLB	-	TBD	TBD	mA
		. = .	f = 100MHz	WF5025MLC	-	20	40	mA
Standby current	I _{ST}	Measurement cct 3, INHN = LOV	easurement cct 3, INHN = LOW			-	5	μΑ
INII INI mulli um vanistamas	R _{UP1}	Management and 4			2	4	8	MΩ
INHN pull-up resistance	R _{UP2}	Measurement cct 4		及海郭	15	75	150	kΩ
		Decign value A monitor nattern on a wafer is		WF5025MLA	3.99	4.7	5.41	kΩ
AC feedback resistance	R _{f1}			WF5025MLB	TBD	TBD	TBD	kΩ
			WF5025MLC		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	on a wafer is te	ested.	85	100	115	Ω
AC feedback capacitance	Cf	Design value. A monitor pattern	on a wafer is te	ested.	8.5	10	11.5	pF
				WF5025MLA	1.70	2	2.30	pF
	C _G	Design value. A monitor pattern tested.	on a wafer is	WF5025MLB	(1.70)	(2)	(2.30)	pF
Ruilt in conscitores				WF5025MLC	0.85	1	1.15	pF
Built-in capacitance				WF5025MLA	3.40	4	4.60	pF
	C _D	Design value. A monitor pattern on a wafer is tested.		WF5025MLB	(3.40)	(4)	(4.60)	pF
				WF5025MLC	3.40	4	4.60	pF

^{*1.} Values in parentheses () are provisional only.

Switching Characteristics

WF5025AL× (2.5V operation)

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

Parameter	Cumbal	Symbol Condition			Rating			
Farameter	Syllibol	Condition	min	typ	max	Unit		
Output via a time	t _{r1}	Measurement cct 3, load cct 1,	C _L = 15pF	_	3	6	ns	
Output rise time	t _{r2} 0.1V _{DD} to 0.9V _{DD}	0.1V _{DD} to 0.9V _{DD}	C _L = 30pF	_	5	10	ns	
Output fall time	t _{f1}	Measurement cct 3, load cct 1,	C _L = 15pF	_	3	6	ns	
Output tall time	t _{f2}	0.9V _{DD} to 0.1V _{DD}	C _L = 30pF	_	5	10 6 10 55	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.

*2. Oscillator stop function is to oscillator start-up time has		n INHN goes LOW, normal output stops	· ·			ot resumed (until after the
WF5025AL × (3.0V over $V_{DD} = 2.7 \text{ to } 3.6 \text{V}, V_{S}$	-	(a) $a = -40$ to $+85$ °C unless oth	erwise noted.	m.C	, In		
Parameter	Cumbal	Condition	C		Rating		Unit
Parameter	Symbol	Collation		min		max	Unit
Output rise time	t _{r1}	Measurement cct 3, load cct 1,	C _L = 15pF	-	2.5	5	ns
Output rise time	t _{r2}	0.1V _{DD} to 0.9V _{DD}	asurement out 5, load out 1,		4.5	9	ns
Output fall time	t _{f1}	Measurement cct 3, load cct 1,	C _L = 15pF	-	2.5	5	ns
Output fall time	t _{f2}	0.9V _{DD} to 0.1V _{DD}	C _L = 30pF	-	4.5	9	ns
Output duty quala*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 = 50MHz	C _L = 30pF	45	_	55	%
Output disable delay time*2	ay 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

^{*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.

WF5025BL1 (2.5V operation)

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

Davamatav	Cumbal	Condition		Rating			Unit
Parameter	Symbol	Condition		min	typ	max	Unit
	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}	Neasurement cot 3, load cot 1,	C _L = 15pF	-	2	4	ns
	t _{f2}		C _L = 30pF	-	3	6	ns
	t _{f3} Measurement cct 3, load cct 1, $C_L = 30pF$	-	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	次多	C	_	100	ns

WF5025BL1 (3.0V operation)

 V_{DD} = 2.7 to 3.6V, V_{SS} = 0V, Ta = -40 to +85°C unless otherwise noted.

Parameter	Symbol	Condition	Rating			Unit	
raiailletei	Symbol	Condition	min		typ	max	Oilit
Output rise 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
Outside fall for a	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 cycle*1	Duty1	Measurement cct 3, load cct 1, V _{DD} = 3.0V, Ta = 25°C, f = 100MHz	C _L = 15pF	45	-	55	%
	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.

^{*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.

WF5025ML× (2.5V operation)

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

Parameter	Cumbal	Condition			Rating*1			Unit	
Parameter	Symbol		onaition		min	min typ max			
Output rise time	t _{r1}	Measurement cct 3, load	leasurement 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 fail 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,	f = 72MHz	WF5025MLA	45	-	55	%	
			f = 100MHz	WF5025MLB	(45)	-	(55)	%	
Output duty cycle*2		Ta = 25°C, C_L = 15pF	f = 133MHz	WF5025MLC	45	-	55	%	
Output duty cycle		Measurement cct 3,	f = 72MHz	WF5025MLA	45	-	55	%	
	Duty2	load cct 1, V _{DD} = 2.5V,	f = 100MHz	WF5025MLB	(40)	-	(60)	%	
		Ta = 25°C, $C_L = 30pF$	$a = 25^{\circ}C, C_{L} = 30pF$ $f = 100MHz$	WF5025MLC	40	-	60	%	
Output disable delay time*3	t _{PLZ}	Measurement cct 6, load cct 1, V _{DD} = 2.5V, Ta = 25°C,			-	-	100	ns	
Output enable delay time*3	t _{PZL}	C _L = 15pF	55			-	100	ns	

^{*1.} Values in parentheses () are provisional only.

WF5025ML× (3.0V operation)

 $V_{DD} = 2.7$ to 3.6V, $V_{SS} = 0$ V, Ta = -40 to +85°C unless otherwise noted.

Parameter	Symbol	Condition			Rating*1			Unit
raiailletei	Symbol	Co	ilultion		min typ max		Jiii.	
Output rice time	t _{r1}	Measurement cct 3, load cc	Measurement cct 3, load cct 1, C _L = 15p			1.5	3	ns
Output rise time	t _{r2}	0.1V _{DD} to 0.9V _{DD}		C _L = 30pF	ı	2.5	5	ns
Output fall time	t _{f1}	Measurement cct 3, load cc	Measurement cct 3, load cct 1, C _L = 1		-	1.5	3	ns
Output fail time	t _{f2}	0.9V _{DD} to 0.1V _{DD}		C _L = 30pF	-	2.5	5	ns
		Measurement cct 3, Duty1 load cct 1, V _{DD} = 3.0V,	f = 72MHz	WF5025MLA	45	-	55	%
	Duty1		f = 100MHz	WF5025MLB	(45)	-	(55)	%
		Ta = 25°C, $C_L = 15pF$	f = 133MHz	WF5025MLC	45	-	55	%
Output duty cycle*2		Measurement cct 3,	f = 72MHz	WF5025MLA	45	-	55	%
	Duty2	load cct 1, V _{DD} = 3.0V, Ta = 25°C, C _L = 30pF	f = 100MHz	WF5025MLB	(45)	-	(55)	%
		Measurement cct 3, load cct 1, V_{DD} = 3.3 Ta = 25°C, C_L = 30pF, f = 100MHz		WF5025MLC	45	-	55	%
Output disable delay time*3	t _{PLZ}	Measurement cct 6, load cct 1, V _{DD} = 3.0V, Ta = 25°C,		-	-	100	ns	
Output enable delay time*3	t _{PZL}	C _L = 15pF			-	-	100	ns

^{*1.} Values in parentheses () are provisional only.

^{*2.} The duty cycle characteristic is checked the sample chips of each production lot.

^{*3.} 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.} The duty cycle characteristic is checked the sample chips of each production lot.

^{*3.} 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.

FUNCTIONAL DESCRIPTION

Standby Function

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

Version	INHN	Q	Oscillator	
WF5025AL×	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	
WF5025BL1, ML×	nidh (oi open)	f _O		
WF5025AL×, BL1, ML×	LOW	High impedance	Stopped	

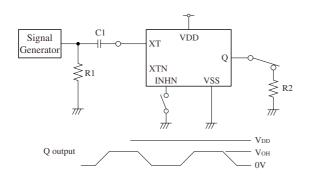
Power-save Pull-up Resistor

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



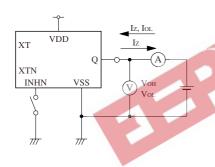
2Vp-p, 10MHz sine wave input signal

C1: 0.001µF R1: 50Ω

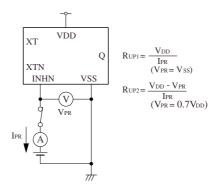
R2: 5025AL× : 412Ω (2.5V operation) 575Ω (3.0V operation) 5025BL1, ML× : 206Ω (2.5V operation)

 287Ω (3.0V operation)

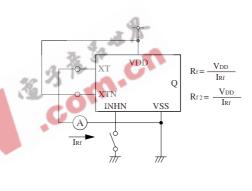
Measurement cct 2



Measurement cct 4

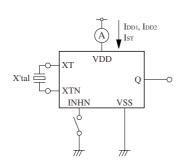


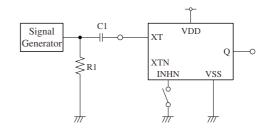
Measurement cct 5



Measurement cct 6

Measurement cct 3



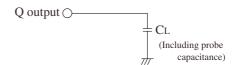


2Vp-p, 10MHz sine wave input signal

C1: 0.001µF

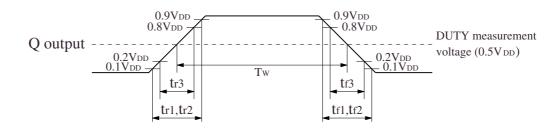
R1: 50Ω

Load cct 1

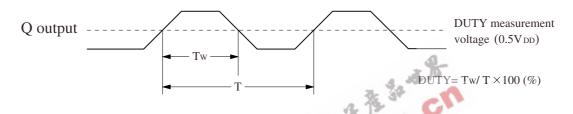


Switching Time Measurement Waveform

Output duty level, tr, tf

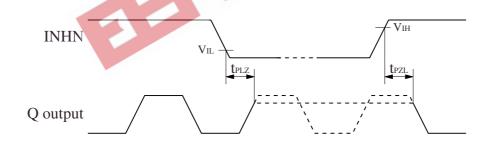


Output duty cycle



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.

The products shown in this document (hereinafter "Products") are not intended to be used for the apparatus that exerts harmful influence on human lives due to the defects, failure or malfunction of the Products. Customers are requested to obtain prior written agreement for such use from NIPPON PRECISION CIRCUITS INC. (hereinafter "NPC"). Customers shall be solely responsible for, and indemnify and hold NPC free and harmless from, any and all claims, damages, losses, expenses or lawsuits, due to such use without such agreement. NPC reserves the right to change the specifications of the Products in order to improve the characteristic or reliability thereof. NPC makes no claim or warranty that the contents described in this document dose not infringe any intellectual property right or other similar right owned by third parties. Therefore, NPC shall not be responsible for such problems, even if the use is in accordance with the descriptions provided in this document. Any descriptions including applications, circuits, and the parameters of the Products in this document are for reference to use the Products, and shall not be guaranteed free from defect, inapplicability to the design for the mass-production products without further testing or modification. Customers are requested not to export or re-export, directly or indirectly, the Products to any country or any entity not in compliance with or in violation of the national export administration laws, treaties, orders and regulations. Customers are requested appropriately take steps to obtain required permissions or approvals from appropriate government agencies.



NIPPON PRECISION CIRCUITS INC.

15-6, Nihombashi-kabutocho, Chuo-ku, Tokyo 103-0026, Japan Telephone: +81-3-6667-6601 Facsimile: +81-3-6667-6611 http://www.npc.co.jp/ Email: sales@npc.co.jp

NC0315CE 2005.11