

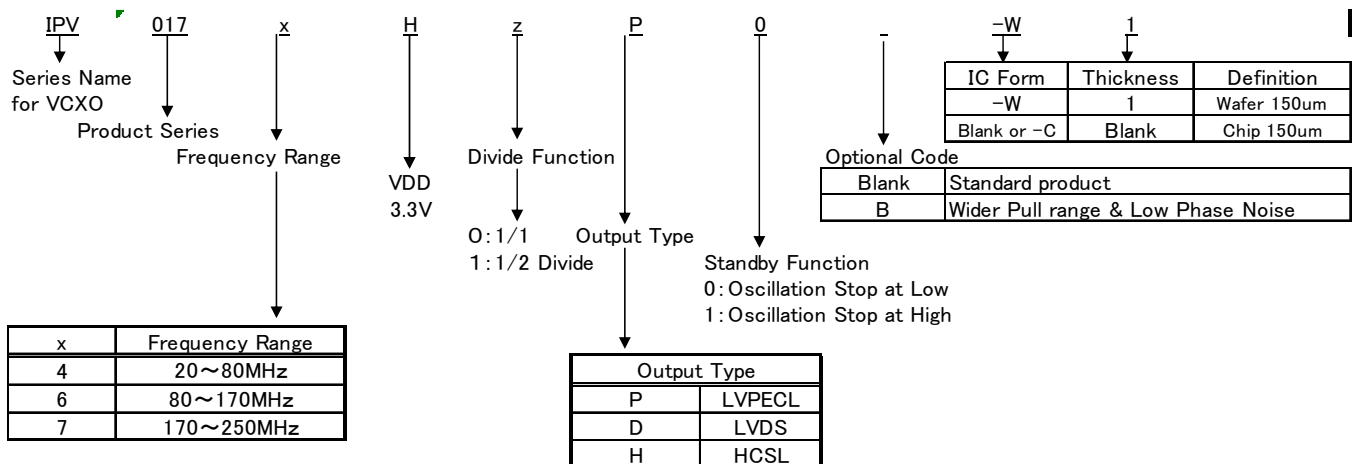
■ Description

IPV017 Series IC is a single chip VCXO IC for High Frequency and Differential output. This product has the features of the stable output against voltage fluctuation by the built-in original voltage variable capacitor and high precision constant voltage circuit. This IC covers not only PECL and LVDS but also HCSL. In addition, Active High or Active Low for oscillation stop mode is selectable by mask option. This product satisfies various requirements for differential output type VCXO.

■ Features

- Output : LVPECL, LVDS and HCSL
- Crystal frequency : 40~250MHz
- Standby function : Oscillation stop Active High / Low Mask option
- Operation temperature : 85°C (Please contact us about 105°C usage.)
- Power supply voltage : 2.97~3.63V
- Vc Input impedance : 5MΩ
- Divide function : 1/2
- Small chip size : 0.70mm × 0.75mm
- Wide pulling range : ±100ppm minimum / Vc=1.65±1.65V
- Duty cycle : Within 50±5%

1. Part number rule



2. Series

Part Number	Output Frequency (MHz)		Divide	Output Type	Standby Function	Status
	Min.	Max.				
IPV017 4 H 0 P 0	40.00	80.00	1/1	LVPECL	CE=Low: Oscillation Stop	
IPV017 4 H 0 P 1	40.00	80.00	1/1		CE=High: Oscillation Stop	
IPV017 4 H 1 P 0	20.00	40.00	1/2		CE=Low: Oscillation Stop	
IPV017 6 H 0 P 0 B	80.00	170.00	1/1		CE=Low: Oscillation Stop	
IPV017 6 H 0 P 1	80.00	170.00	1/1		CE=High: Oscillation Stop	
IPV017 7 H 0 P 0 B	170.00	250.00	1/1		CE=Low: Oscillation Stop	
IPV017 4 H 0 D 0	40.00	80.00	1/1	LVDS	CE=Low: Oscillation Stop	
IPV017 6 H 0 D 0	80.00	170.00	1/1		CE=Low: Oscillation Stop	
IPV017 6 H 0 D 0 B	80.00	170.00	1/1		CE=Low: Oscillation Stop	
IPV017 6 H 0 D 1	80.00	170.00	1/1		CE=High: Oscillation Stop	
IPV017 7 H 0 D 0 B	170.00	250.00	1/1		CE=Low: Oscillation Stop	
IPV017 6 H 0 H 0	80.00	170.00	1/1	HCSSL	CE=Low: Oscillation Stop	

3. Absolute Maximum Ratings

Parameter	Symbol	Condition	Ratings		
			Min	Max	Unit
Supply Voltage	V _{DD}		V _{SS} -0.5	5	V
Input Voltage	V _{IN}	All Input Pin	V _{SS} -0.5	V _{DD} +0.5	V
Output Voltage	V _{OUT}		V _{SS} -0.5	V _{DD} +0.5	V
Input Current	I _{IN}	CE Pin		50	μA
Output Current	I _{OUT}			25	mA
Junction Temperature	T _j		-55	150	°C
Storage Temperature	T _{stg}		-55	125	°C

4. Recommended Operating Condition
 $V_{SS}=0V$, $T_a=-40\sim 85^{\circ}C$ (Please contact us about $105^{\circ}C$ usage.)

Parameter	Symbol	Condition	Min	Typ	Max	Unit	Note
Supply Voltage	V_{DD}		2.97	3.3	3.63	V	V_{DD}
“H” Input Voltage	V_{IH}		$V_{DD}\times 0.7$			V	CE
“L” Input Voltage	V_{IL}				$V_{DD}\times 0.3$	V	
Input Voltage	V_{IN}		V_{SS}		V_{DD}	V	CE
Output Load Resistance	R_L	LVPECL	49.5	50	50.5	Ω	OUT / OUTN
			Supply $V_{DD}-2V$ to end point				
		LVDS	99	100	101		
			R1+R1 between OUT-OUTN				
HCSL	49.5	50	50.5	to GND			
Ambient Temperature	T_{opT}		-40		85	$^{\circ}C$	

5. Electrical Specification
5-1 IPV017xP (LVPECL output)
5-1-1 DC Characteristics Except IPV0176H0P0B and IPV0177H0P0B

 Unless otherwise stated, $V_{DD}=2.97\sim 3.63V$, $V_{SS}=0V$, $T_a=-40\sim 85^{\circ}C$ (Please contact us about $105^{\circ}C$ usage.)

Parameter	Symbol	Condition	Specification			Unit
			Min	Typ	Max	
Out put Leak current	I_z	$CE\leq 0.3V$, OUT / OUTN			10	μA
“L” input current	I_{IL}	CE pad, $CE\leq 0.3V$		-10		μA
		CE pad, $CE\geq V_{DD}-0.3V$		30		μA
“H” output voltage	V_{OH}	$RL=50\Omega$ to $(V_{DD}-2V)$, $CE\geq$	$V_{DD}-1.025$	$V_{DD}-0.95$	$V_{DD}-0.88$	V
“L” output voltage	V_{OL}	$V_{DD}-0.3V$, OUT/OUTN	$V_{DD}-1.810$	$V_{DD}-1.70$	$V_{DD}-1.62$	V
Current consumption	I_{DD}	170MHz, $VC=0V$, $CE\geq V_{DD}-0.3V$		38	56	mA
Current consumption at oscillation disable	I_{DDD}	$CE\leq 0.3V$			60	μA

5-1-2 Switching Characteristics Except IPV0176H0P0B and IPV0177H0P0B

 Unless otherwise stated, $V_{DD}=2.97\sim 3.63V$, $V_{SS}=0V$, $T_a=-40\sim 85^{\circ}C$ (Please contact us about $105^{\circ}C$ usage.)

Parameter	Symbol	Condition	Specification			Unit
			Min	Typ	Max	
Oscillation start up time	T_{start}				2	ms
Oscillation Disable Time	T_{pd}				0.2	μs
Oscillation Enable Time	T_{pe}				2	ms
Rise time	T_r	20~80% of Output Swing		0.25	0.5	ns
Fall time	T_f	20~80% of Output Swing		0.25	0.5	ns
Output Duty Ratio	Duty	1/2V _{Opp} Point	45		55	%
Pull Range	$F_{c\text{nt}r}$	$V_c=1.65\pm 1.65V$, Crystal ^{*1})	± 110			ppm
Output Swing	V_{opp}		400			mV
Frequency V_{DD} deviation	F_{vst}	$V_{DD}=2.97\sim 3.63V$			± 2	ppm
Modulation Band Width	F_c	$V_c=1.35\sin\omega t+1.65V$, -3dB	15	20		KHz

 Crystal ^{*1} ; Equivalent Parameter of Crystal is $\gamma=C_0/C_1<300$

5-1-3 DC Characteristics IPV0176H0P0B and IPV0177H0P0B

 Unless otherwise stated, $V_{DD} = 2.97 \sim 3.63V$, $V_{SS} = 0V$, $T_a = -40 \sim 85^\circ C$ (Please contact us about $105^\circ C$ usage.)

Parameter	Symbol	Condition	Specification			Unit
			Min	Typ	Max	
Out put Leak current	I_Z	$CE \leq 0.3V$, OUT / OUTN			10	μA
“L” input current	I_{IL}	$V_{IN} = V_{SS}$	-60			μA
“H” output voltage	V_{OH}	$R_L = 50\Omega$ to $(V_{DD} - 2V)$, $CE \geq V_{DD} - 0.3V$, OUT/OUTN	$V_{DD} - 1.025$	$V_{DD} - 0.95$	$V_{DD} - 0.88$	V
“L” output voltage	V_{OL}		$V_{DD} - 1.810$	$V_{DD} - 1.70$	$V_{DD} - 1.62$	V
Current consumption	I_{DD}	170MHz, $V_C = 0V$, $CE \geq V_{DD} - 0.3V$			56	mA
Current consumption at oscillation disable	I_{DDD}	$CE \leq 0.3V$			60	μA

5-1-4 Switching Characteristics IPV0176H0P0B and IPV0177H0P0B

 Unless otherwise stated, $V_{DD} = 2.97 \sim 3.63V$, $V_{SS} = 0V$, $T_a = -40 \sim 85^\circ C$ (Please contact us about $105^\circ C$ usage.)

Parameter	Symbol	Condition	Specification			Unit
			Min	Typ	Max	
Oscillation start up time	T_{start}				2	ms
Oscillation Disable Time	T_{pd}				0.2	μs
Oscillation Enable Time	T_{pe}				2	ms
Rise time	T_r	20~80% of Output Swing			0.5	ns
Fall time	T_f	20~80% of Output Swing			0.5	ns
Output Duty Ratio	Duty	1/2V _{Opp} Point	45		55	%
Pull Range	IPV0176	F_{centr}	$V_c = 1.65 \pm 1.65V$, Crystal ^{*1})	± 130		ppm
	IPV0177	F_{centr}	$V_c = 1.65 \pm 1.65V$, Crystal ^{*1})	± 110		ppm
Output Swing	V_{opp}		400			mV
Frequency V_{DD} deviation	F_{vst}	$V_{DD} = 2.97 \sim 3.63V$			± 2	ppm
Modulation Band Width	F_c	$V_c = 1.35 \sin \omega t + 1.65V$, -3dB	15	20		KHz

 Crystal ^{*1} ; Equivalent Parameter of Crystal is $\gamma = C_0/C_1 < 300$

5-2 IPV017xD (LVDS output)
5-2-1 DC Characteristics Except IPV0176H0D0B and IPV0177H0D0B

Unless otherwise stated, $V_{DD} = 2.97 \sim 3.63V$, $V_{SS} = 0V$, $T_a = -40 \sim 85^\circ C$
(Please contact us about $105^\circ C$ usage.)

Parameter	Symbol	Condition	Specification			Unit
			Min	Typ	Max	
Out put Leak current	I_z	$CE \leq 0.3V$, OUT / OUTN			10	μA
“L” input current	I_{IL}	CE pad, $CE \leq 0.3V$		-10		μA
		CE pad, $CE \geq V_{DD} - 0.3V$		30		μA
“H” output voltage	V_{OH}	$R_L = 100\Omega$, OUT/OUTN		1.43	1.6	V
“L” output voltage	V_{OL}	$CE \geq V_{DD} - 0.3V$,	0.9	1.1		V
Differential Voltage	$V_{OD}/V_{OD'}$	$R_L = 100\Omega$, $CE \geq V_{DD} - 0.3V$,	247	330	454	mV
Diff. Vol. Deviation	ΔV_{OD}	OUT/OUTN differential			50	
Offset voltage	V_{OS}	$R_1 = 50\Omega$, $CE \geq V_{DD} - 0.3V$,	1.125	1.25	1.375	V
Offset deviation	ΔV_{OS}	OUT/OUTN middle point			50	mV
Current consumption	I_{DD}	170MHz, $V_C = 0V$, $CE \geq V_{DD} - 0.3V$		16	24	mA
Current consumption at oscillation disable	I_{DD}	$CE \leq 0.3V$			30	μA

5-2-2 Switching Characteristics Except IPV0176H0D0B and IPV0177H0D0B

Unless otherwise stated, $V_{DD} = 2.97 \sim 3.63V$, $V_{SS} = 0V$, $T_a = -40 \sim 85^\circ C$
(Please contact us about $105^\circ C$ usage.)

Parameter	Symbol	Condition	Specification			Unit
			Min	Typ	Max	
Oscillation start up time	T_{start}				2	ms
Oscillation Disable Time	T_{pd}				0.2	μs
Oscillation Enable Time	T_{pe}				2	ms
Rise time	T_r	20~80% of Output Swing		0.15	0.4	ns
Fall time	T_f	20~80% of Output Swing		0.15	0.4	ns
Output Duty Ratio	Duty	OUT/OUTN cross point	45		55	%
Pull Range	F_{centr}	$V_c = 1.65 \pm 1.65V$, 170MHz*1)	± 100			ppm
Output Swing	V_{opp}	OUT/OUTN Peak to Peak $V_{DD} = 3.3V$	0.35			V
Frequency V_{DD} deviation	F_{vst}	$V_{DD} = 2.97 \sim 3.63V$			± 2	ppm
Modulation Band Width	F_c	$V_c = 1.35 \sin \omega t + 1.65V$, -3dB	15	20		KHz

Crystal *1 ; Equivalent Parameter of Crystal is $\gamma = C_0/C_1 < 300$

5-2-3 DC Characteristics IPV0176H0D0B and IPV0177H0D0B

 Unless otherwise stated, $V_{DD} = 2.97 \sim 3.63V$, $V_{SS} = 0V$, $T_a = -40 \sim 85^\circ C$

 (Please contact us about $105^\circ C$ usage.)

Parameter	Symbol	Condition	Specification			Unit
			Min	Typ	Max	
Out put Leak current	I_Z	$CE \leq 0.3V$, OUT / OUTN			10	μA
“L” input current	I_{IL}	CE pad, $V_{IN} = V_{SS}$	-60			μA
“H” output voltage	V_{OH}	$RL = 100\Omega$ (OUT - OUTN) $CE = OPEN$, OUT/OUTN		1.43	1.6	V
“L” output voltage	V_{OL}		0.9	1.1		V
Differential Voltage	$V_{OD}/V_{OD'}$	$RL = 100\Omega$ (OUT - OUTN) $CE = OPEN$, OUT/OUTN	247	330	454	mV
Diff. Vol. Deviation	ΔV_{OD}				50	
Offset voltage	V_{OS}	$RL = 100\Omega$ $CE = OPEN$ OUT/OUTN middle point	1.125	1.25	1.375	V
Offset deviation	ΔV_{OS}				50	mV
Current consumption	I_{DD}	$V_{DD} = 3.3V$, 170MHz, $V_C = 0V$, $CE \geq V_{DD} - 0.3V$			25	mA
Current consumption at oscillation disable	I_{DD}	$CE \leq 0.3V$			60	μA

5-2-4 Switching Characteristics IPV0176H0D0B and IPV0177H0D0B

 Unless otherwise stated, $V_{DD} = 2.97 \sim 3.63V$, $V_{SS} = 0V$, $T_a = -40 \sim 85^\circ C$

 (Please contact us about $105^\circ C$ usage.)

Parameter	Symbol	Condition	Specification			Unit
			Min	Typ	Max	
Oscillation start up time	T_{start}				2	ms
Oscillation Disable Time	T_{pd}				0.2	μs
Oscillation Enable Time	T_{pe}				2	ms
Rise time	T_r	20~80% of Output Swing			0.5	ns
Fall time	T_f	20~80% of Output Swing			0.5	ns
Output Duty Ratio	Duty	1/2 V_{Opp} Point	45		55	%
Pull Range	IPV0176	$F_{c\text{entr}}$	$V_c = 1.65 \pm 1.65V$, Crystal ^{*1)}	± 130		ppm
	IPV0177	$F_{c\text{entr}}$	$V_c = 1.65 \pm 1.65V$, Crystal ^{*1)}	± 110		ppm
Output Swing	V_{opp}		250			mV
Frequency V_{DD} deviation	F_{vst}	$V_{DD} = 2.97 \sim 3.63V$			± 2	ppm
Modulation Band Width	F_c	$V_c = 1.35\sin\omega t + 1.65V$, -3dB	15	20		KHz

 Crystal ^{*1} ; Equivalent Parameter of Crystal is $\gamma = C_0/C_1 < 300$

5-3 IPV017xH (HCSL output)
5-3-1 DC Characteristics

Unless otherwise stated, $V_{DD} = 2.97 \sim 3.63V$, $V_{SS} = 0V$, $T_a = -40 \sim 85^\circ C$
 (Please contact us about $105^\circ C$ usage.)

Parameter	Symbol	Condition	Specification			Unit
			Min	Typ	Max	
Out put Leak current	I_z	$CE \leq 0.3V$, OUT / OUTN			10	μA
“L” input current	I_{IL}	$CE \text{ pad, } CE \leq 0.3V$		-10		μA
		$CE \text{ pad, } CE \geq V_{DD} - 0.3V$		30		μA
“H” output voltage	V_{OH}	$R_s = 0\Omega$, $R_T = 50\Omega$ to(GND), $CE \geq V_{DD} - 0.3V$, OUT/OUTN	600	740	850	mV
“L” output voltage	V_{OL}		-150	0	150	mV
Current consumption	I_{DD}	170MHz, $V_C = 0V$, $CE \geq V_{DD} - 0.3V$		28	42	mA
Current consumption at oscillation disable	I_{DDD}	$CE \leq 0.3V$			30	μA

5-3-2 Switching Characteristics

Unless otherwise stated, $V_{DD} = 2.97 \sim 3.63V$, $V_{SS} = 0V$, $T_a = -40 \sim 85^\circ C$
 (Please contact us about $105^\circ C$ usage.)

Parameter	Symbol	Condition	Specification			Unit
			Min	Typ	Max	
Oscillation start up time	T_{start}				2	ms
Oscillation Disable Time	T_{pd}				0.2	μs
Oscillation Enable Time	T_{pe}				2	ms
Rise time	T_r	20~80% of Output Swing		0.25	0.5	ns
Fall time	T_f	20~80% of Output Swing		0.25	0.5	ns
Output Duty Ratio	Duty	OUT/OUTN cross point	45		55	%
Pull Range	IPV0176	$V_c = 1.65 \pm 1.65V$, 170MHz*1)	± 110			ppm
	0176H0P0B		± 130			
Output Swing	V_{opp}		400			mV
Frequency V_{DD} deviation	F_{vst}	$V_{DD} = 2.97 \sim 3.63V$			± 2	ppm
Modulation Band Width	F_c	$V_c = 1.35\sin\omega t + 1.65V$, -3dB	15	20		KHz

Crystal *1 ; Equivalent Parameter of Crystal is $\gamma = C_0/C_1 < 300$

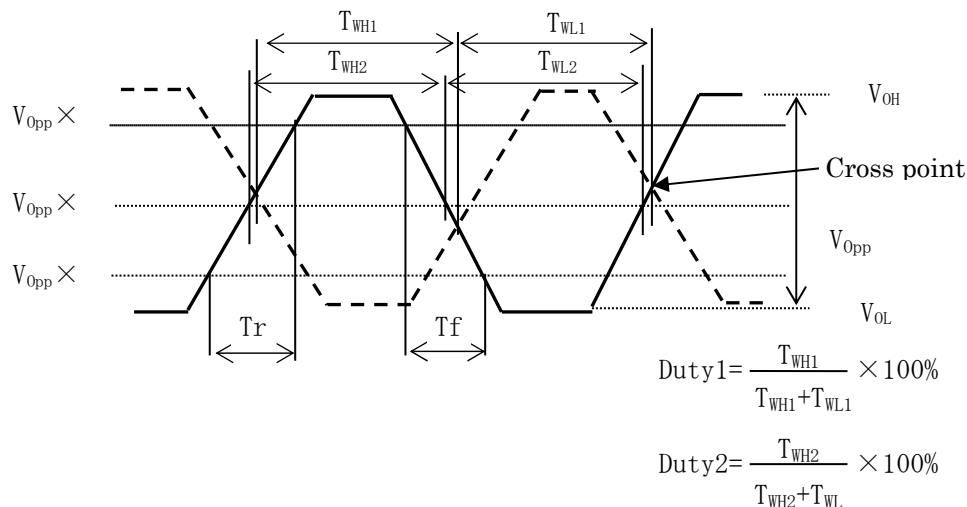


Fig. 5-1 Output Wave Form of LVPECL (Duty, T_r , T_f , V_{OH} , V_{OL} , V_{Opp})

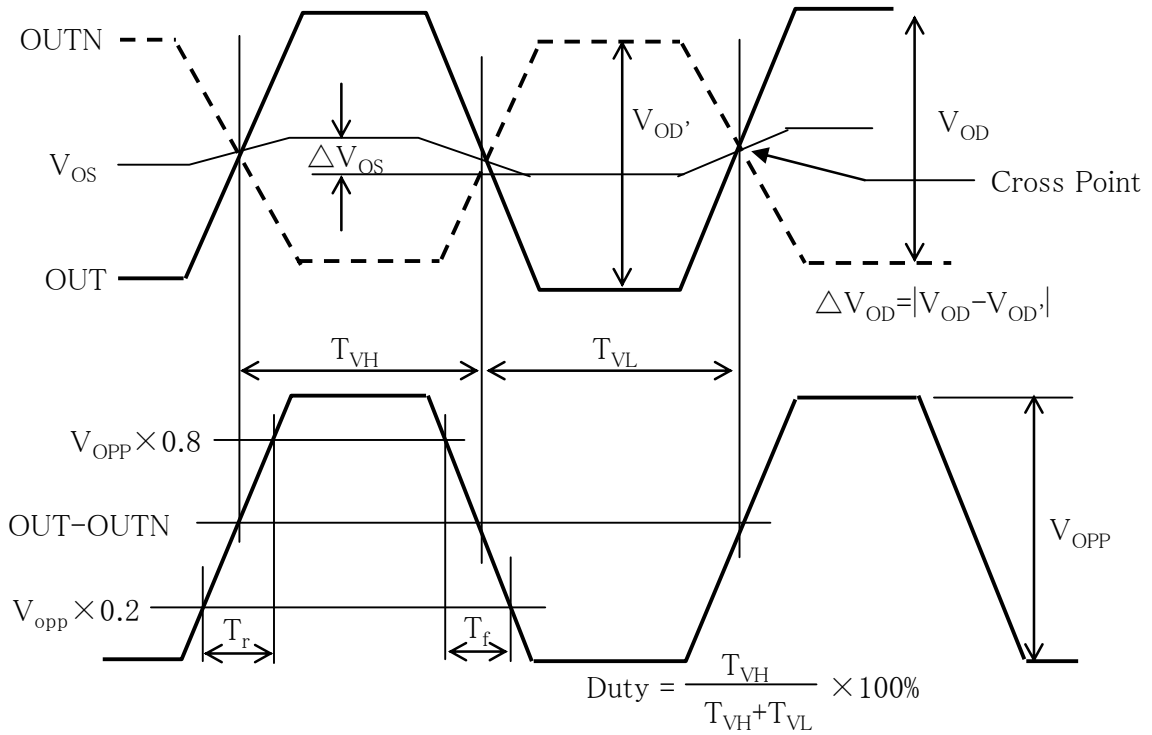


Fig. 5-2 Output Wave Form of LVDS (Duty, Tr, Tf, V_{OD}, V_{OPP})

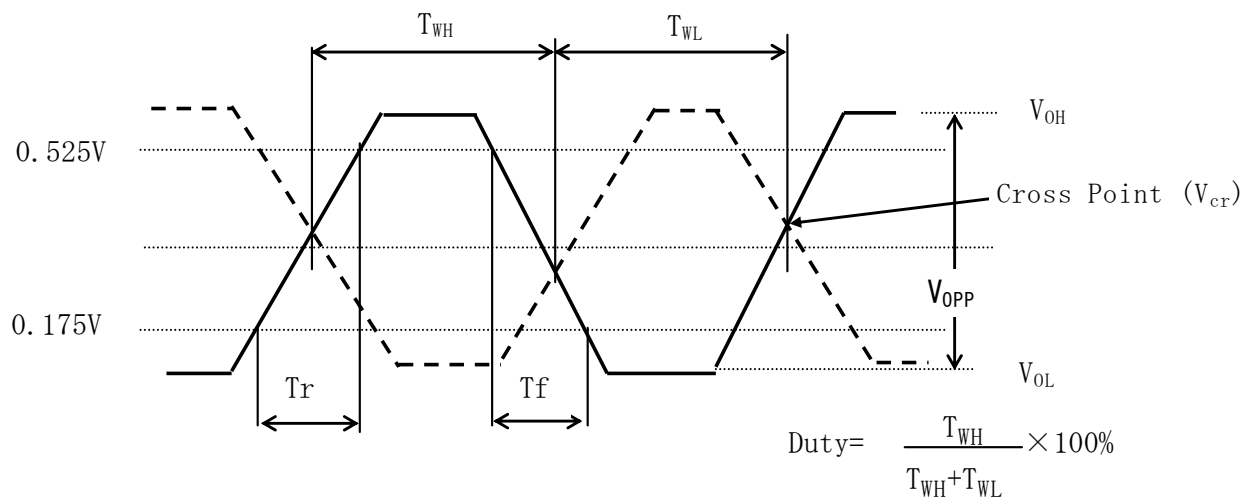
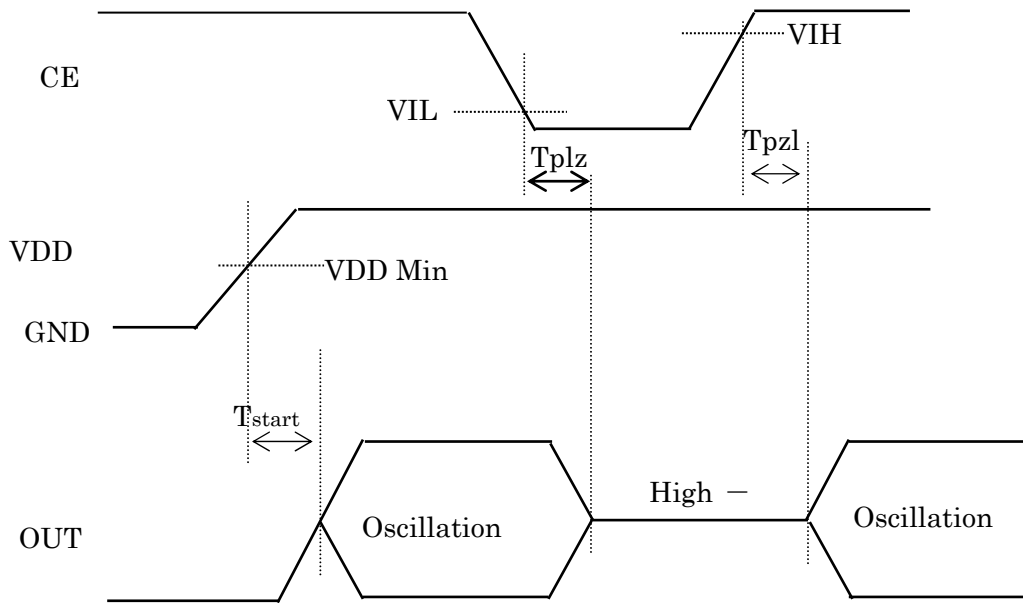
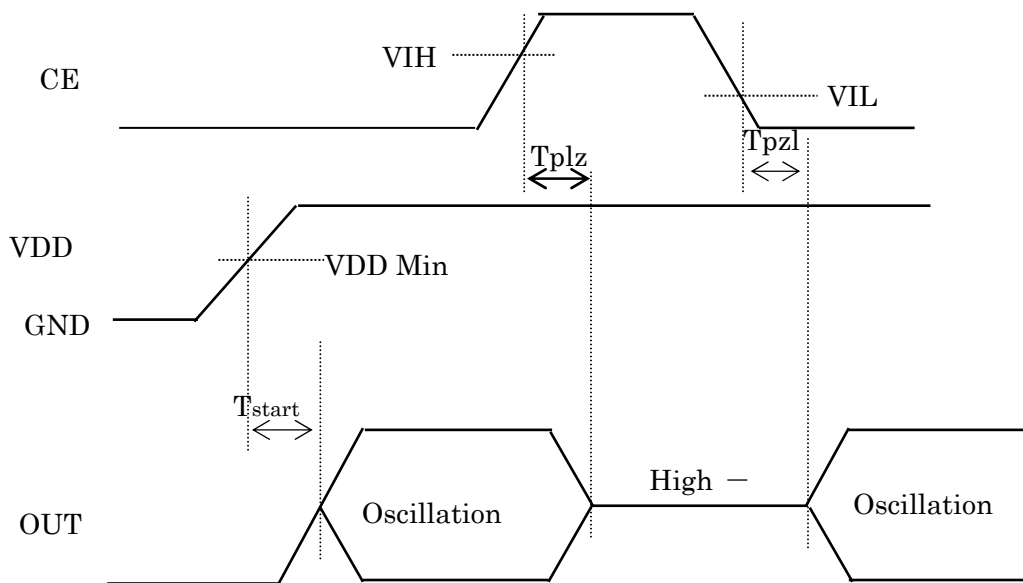


Fig. 5-3 Output Wave Form of HCSL (Duty, Tr, Tf, V_{OH}, V_{OL}, V_{OPP})



V_{IH} : Threshold voltage for Oscillation Start
 V_{IL} : Threshold voltage for Oscillation Stop

a) High Active



V_{IH} : Threshold voltage for Oscillation Stop
 V_{IL} : Threshold voltage for Oscillation Start

b) Low Active

Fig. 5-4 Input output signal timing

6. Circuit Parameters of Oscillator (Reference Data for Circuit Design)

Parameter	Symbol	Condition	Min	Typ	Max	Unit	
Input Resistor	Rvc1			20		KΩ	
VC Input impedance	Rvc	VC terminal to GND	5			MΩ	
Equivalent series (Loading) Capacitance	IPV0174	CLxtal	Vc=0V		6.14		pF
			Vc=1.65V		4.19		
			Vc=3.3V		2.83		
			Vc=0V		6.67		
			Vc=1.65V		4.10		
			Vc=3.3V		2.80		
	IPV0176H0P0B IPV0176H0D0B	Vc=0V		6.30			
		Vc=1.65V		3.65			
		Vc=3.3V		2.40			
	Other IPV0176	Vc=0V		6.42			
		Vc=1.65V		4.20			
		Vc=3.3V		3.14			
Drive Level	DL	Vc=0V		340		μW	
		Vc=1.65V		240			
		Vc=3.3V		140			

*The above values are the design values and are not guaranteed by test.

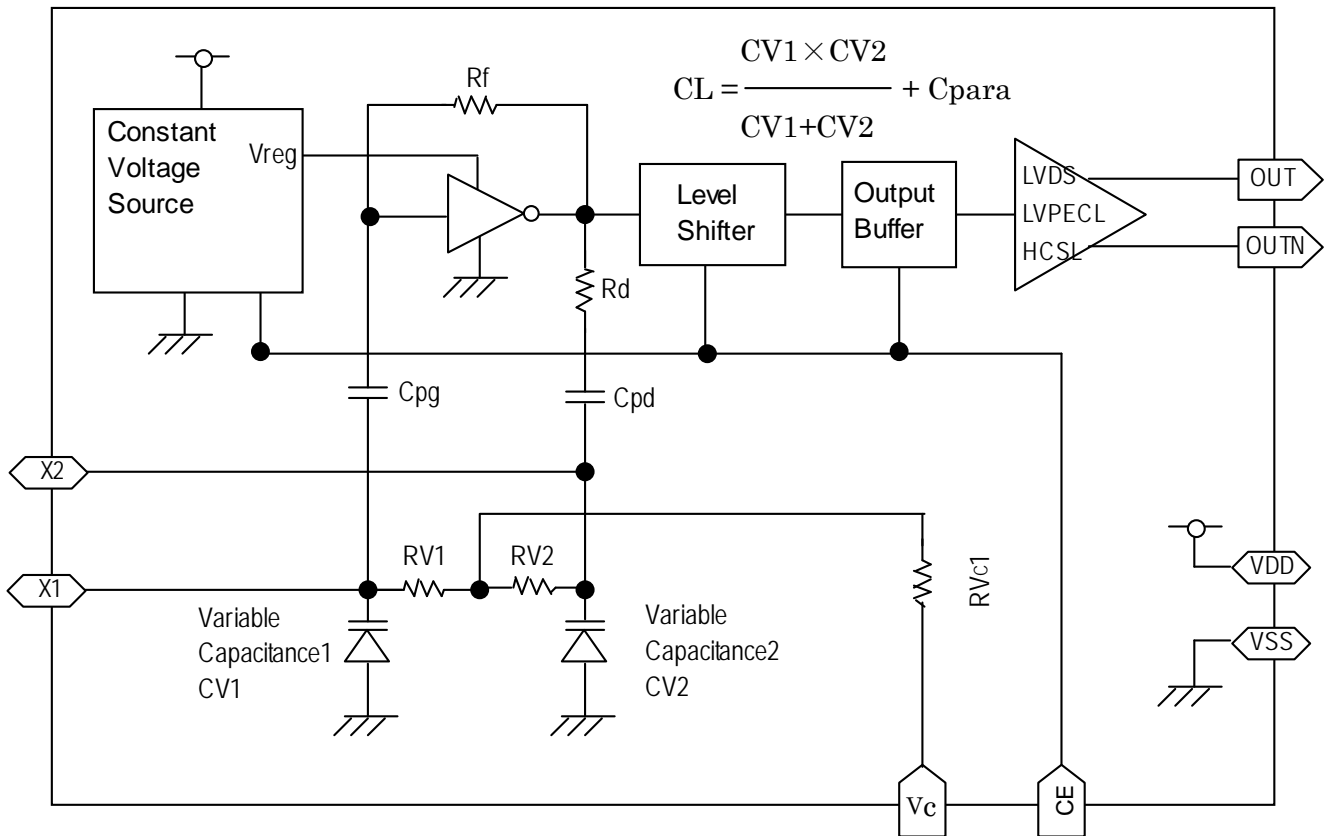
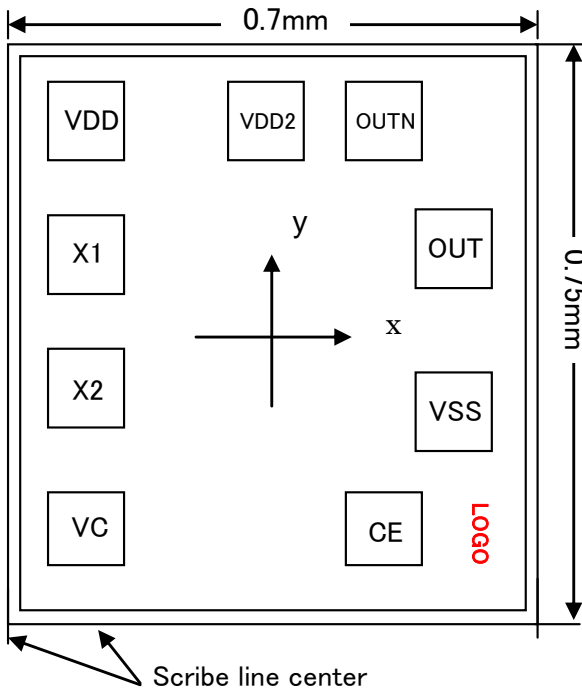
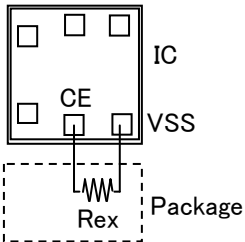


Fig. 6-1 Block Diagram

7. Pad Layout


- Die Size: 0.75mm × 0.7mm
- Pad Size: 80um □
- Thickness: 150±20um
- IC Backside: Gnd or Open
- Swapping of OUT/OUTN with wire bond is acceptable

Pad Name	Function	Location (μm)	
		x	y
VDD	(+)Power Supply	-250.55	275.55
X1	Crystal Feedback	-250.55	86.35
X2	Crystal Drive	-250.55	-94.35
VC	Frequency Control Input	-250.55	-275.55
CE	Oscillation stop	170.55	-275.55
VSS	(-)Ground	250.55	-80.05
OUT	Output (True)	250.55	94.35
OUTN	Output (Complementary)	170.55	275.55
VDD2	NC is acceptable	-1.2	275.55
Chip Center		0	0


IMPORTANT Notice for CE function

- * Rex should be over 10MΩ in case of CE = Open usage.
 - * Oscillation will not be activated when CE = Open after CE = Low if Rex is below 10MΩ.
 - * There is no such issue in case of CE = VDD usage.
- Rex : External resistance value between CE and VSS of package.

8. IC Part # Identification

Part #	LOGO
IPV0174H0P0	IPV0174H0P0
IPV0174H0P1	IPV0174H0P1
IPV0174H1P0	IPV0174H1P0
IPV0176H0P0B	IPV0176H0P0B
IPV0176H0P1	IPV0176H0P1
IPV0177H0P0B	IPV0177H0P0B

Part #	LOGO
IPV0174H0D0	IPV0174H0D0
IPV0176H0D0	IPV0176H0D0
IPV0176H0D0B	IPV0176H0D0B
IPV0176H0D1	IPV0176H0D1
IPV0177H0D0B	IPV0177H0D0B
IPV0176H0H0	IPV0176H0H0

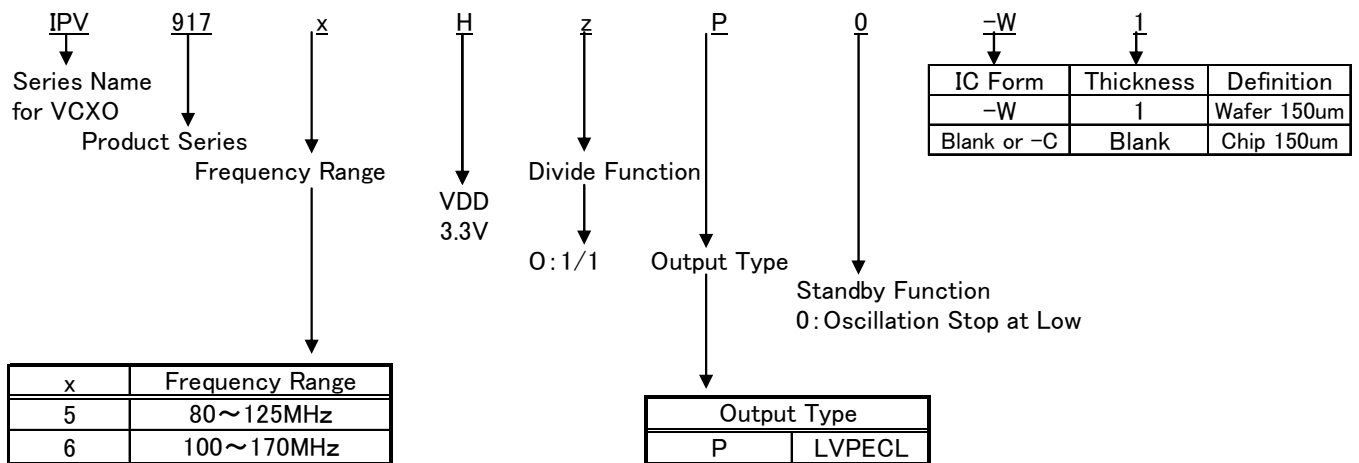
■ Description

IPV917 Series IC is a single chip Low Phase Noise VCXO IC for High Frequency and Differential output. This product has the features of the stable output against voltage fluctuation by the built-in original voltage variable capacitor and high precision constant voltage circuit. IPV9175H0P0 is the dedicated IC for LTE application.

■ Features

- Output : LVPECL
- Crystal frequency : 80~170MHz
- Standby function : Oscillation stop Active High
- Operation temperature : 85°C
- Power supply voltage : 2.97~3.63V
- Vc Input impedance : 5MΩ
- Divide function : None
- Small chip size : 0.70mm × 0.75mm
- Wide pulling range : ±100ppm minimum / Vc=1.65±1.65V
- Duty cycle : Within 50±5%

1. Part number rule



2. Series

Part Number	Output Frequency (MHz)		Divide	Output Type	Standby Function	Status
	Min.	Max.				
IPV917 5 H 0 P 0	80.00	125.00	1/1	LVPECL	CE=Low: Oscillation Stop	
IPV917 6 H 0 P 0	100.00	170.00	1/1		CE=Low: Oscillation Stop	

3. Absolute Maximum Ratings

Parameter	Symbol	Condition	Ratings		
			Min	Max	Unit
Supply Voltage	V _{DD}	V _{SS} =0V	V _{SS} -0.5	5	V
Input Voltage	V _{IN}	All Input Pin	V _{SS} -0.5	V _{DD} +0.5	V
Output Voltage	V _{OUT}		V _{SS} -0.5	V _{DD} +0.5	V
Input Current	I _{IN}	CE Pin		50	μA
Output Current	I _{OUT}	OUT		25	mA
Junction Temperature	T _j		-55	150	°C
Storage Temperature	T _{stg}		-55	125	°C

4. Recommended Operating Condition

V_{SS}=0V, T_a=-40~85°C

Parameter	Symbol	Condition	Min	Typ	Max	Unit	Note
Supply Voltage	V _{DD}		2.97	3.3	3.63	V	V _{DD}
“H” Input Voltage	V _{IH}		V _{DD} × 0.7			V	CE
“L” Input Voltage	V _{IL}				V _{DD} × 0.3	V	
Input Voltage	V _{IN}		V _{SS}		V _{DD}	V	CE
Output Load Resistance *1)	R _L	LVPECL	49.5	50	50.5	Ω	OUT / OUTN
			Supply V _{DD} -2V to end point				
Ambient Temperature	T _{opT}		-40		85	°C	

*1) Since the Product has a current drive type output buffer based on C-MOS technology, the following conditions are requested to keep Output Waveform, Output Logic Level and Output swing within a standard values.

- A) The stray capacitance on OUT and OUTN line of the circuit board is less than 2pF respectively and less than 1pF mutually.
- B) Please set the pure resistance element of the synthetic impedance seen from the terminal OUT and OUTN within about 50Ω±5%. The current reduction technique by a high resistance load cannot be applied.

5. Electrical Specification
5-1 IPV917xP (LVPECL output)
5-1-1 DC Characteristics Unless otherwise stated, $V_{DD} = 2.97 \sim 3.63V$, $V_{SS} = 0V$, $T_a = -40 \sim 85^\circ C$

Parameter		Symbol	Condition	Specification			Unit
				Min	Typ	Max	
Current consumption	IPV9175	I_{DD}	122MHz, VC=0V, CE \geq VDD-0.3V		33	50	mA
	IPV9176		155MHz, VC=0V, CE \geq VDD-0.3V		36	55	mA
Stand by Current	IPV9175	I_{DDD}	CE \leq 0.3V			50	μA
	IPV9176		CE \leq 0.3V			800	μA
“H” output voltage		V_{OH}	RL=50 Ω to (VDD-2V), CE \geq VDD-0.3V, OUT/OUTN	$V_{DD}-1.025$	$V_{DD}-0.95$	$V_{DD}-0.88$	V
“L” output voltage		V_{OL}		$V_{DD}-1.810$	$V_{DD}-1.70$	$V_{DD}-1.62$	V
“H” input voltage		V_{IH}	CE pad	0.7V _{DD}			V
“L” input voltage		V_{IL}				0.3V _{DD}	V
“L” input current		I_{IL}	$V_{IL}=0.0V$ CE pad		-10		μA
Out put Leak current		I_z	CE \leq 0.3V, OUT / OUTN			10	μA
Out put Resistance		R_{out}	CE \geq VDD-0.3V	90			Ω

5-1-2 Switching Characteristics Unless otherwise stated, $V_{DD} = 2.97 \sim 3.63V$, $V_{SS} = 0V$, $T_a = -40 \sim 85^\circ C$

Parameter		Symbol	Condition	Specification			Unit
				Min	Typ	Max	
Oscillation start up time		T_{start}				2	ms
Output Duty Ratio	Duty1		OUT/OUTN cross point	45		55	%
	Duty2		50% of V _{opp}	45		55	%
Output Swing		V_{opp}	Peak to peak single output	400			mV
Rise time		T_r	20~80% of Output Swing		0.25	0.5	ns
Fall time		T_f	20~80% of Output Swing		0.25	0.5	ns
Oscillation Disable Time		T_{plz}				0.2	μs
Oscillation Enable Time		T_{pzl}				2	ms
Pull Range		F_{centr}	V _c =1.65 \pm 1.65V, Crystal ^{*1)}	± 120			ppm
Frequency V _{DD} deviation		F_{vst}	V _{DD} =2.97~3.63V			± 2	ppm
Modulation Band Width		F_c	V _c =1.35sin ωt +1.65V, -3dB	15	20		KHz

 Crystal ^{*1} ; Equivalent Parameter of Crystal is $\gamma = C_0/C_1 < 300$

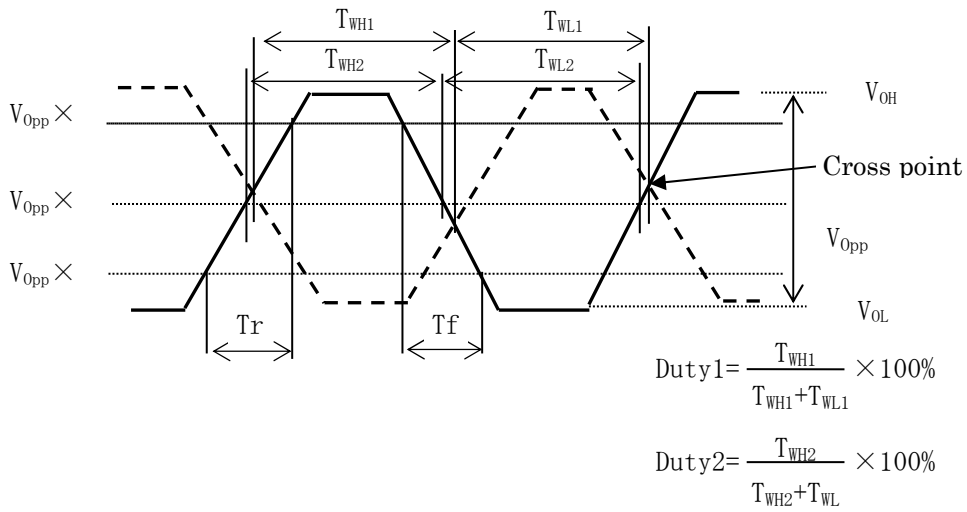


Fig. 5-1 Output Wave Form of LVPECL (Duty, T_r , T_f , V_{OH} , V_{OL} , V_{Opp})

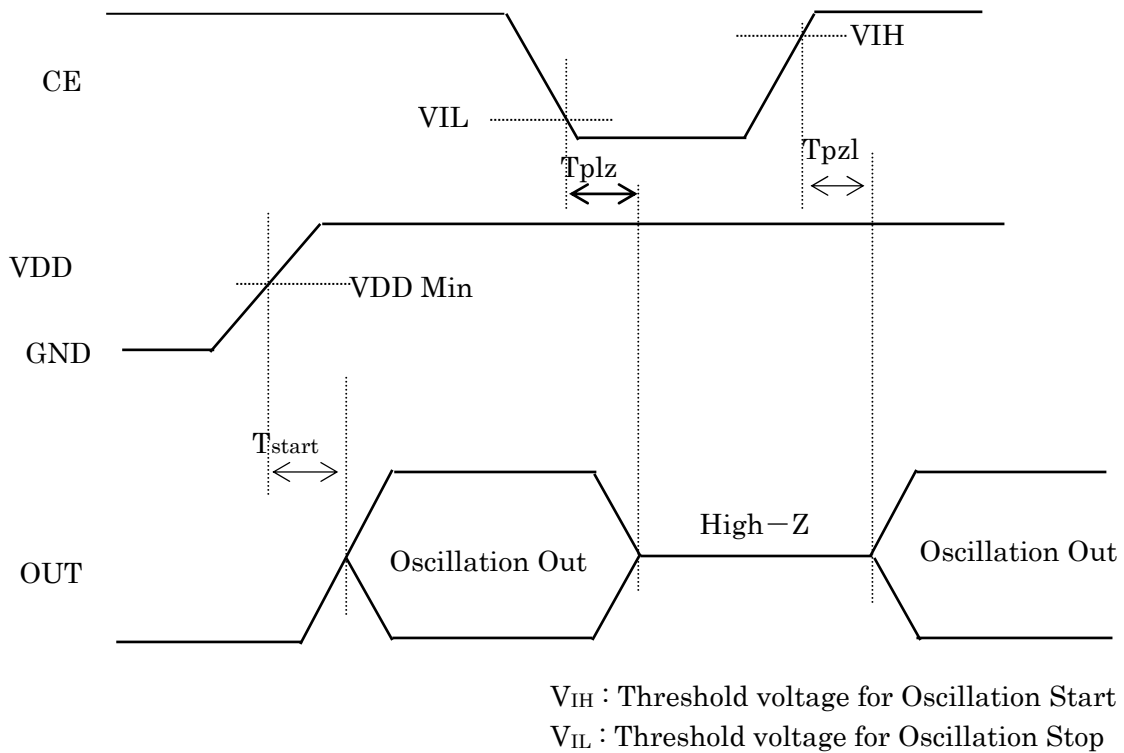


Fig. 5-2 Input output signal timing

6. Circuit Parameters of Oscillator (Reference Data for Circuit Design)

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Input Resistor	R _{Vc1}		18	20	22	KΩ
VC Input Impedance	R _{vc}	VC terminal to GND	5			MΩ
Feedback register	R _f		90	100	110	KΩ
Driving register	IPV9175	R _d	180	200	220	Ω
	IPV9176		360	400	440	Ω
Bias register	R _{v1}		250	280	310	KΩ
	R _{v2}		85	95	105	KΩ
DC cut capacitor	C _{pg}		15	17	19	pF
	C _{pd}		36	40	44	pF
Pull-up resistor of CE	R _{CE}	The pull-up resistor between CE pin & VDD is consist of paralleled two type of MOS Tr that are a high ON resistance and a low ON resistance. When CE is High level or open, both Trs turn ON and total resistance become low enough to connect CE to VDD("H"). When CE is Low level, only a low ON resistance Tr is turned Off and the level of CE is kept Low. This reduces the leak current between VDD and GND.				

*The above values are the design values and are not guaranteed by test.

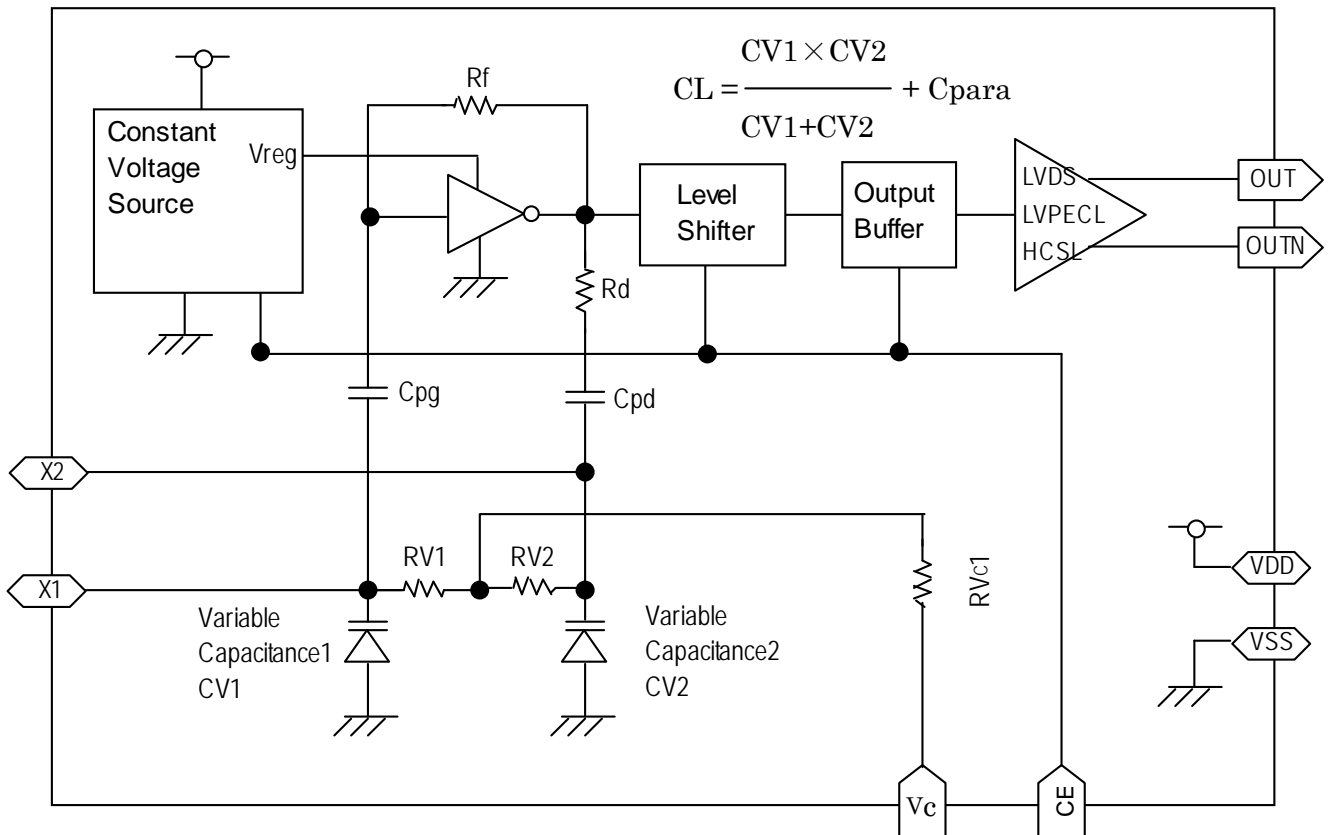
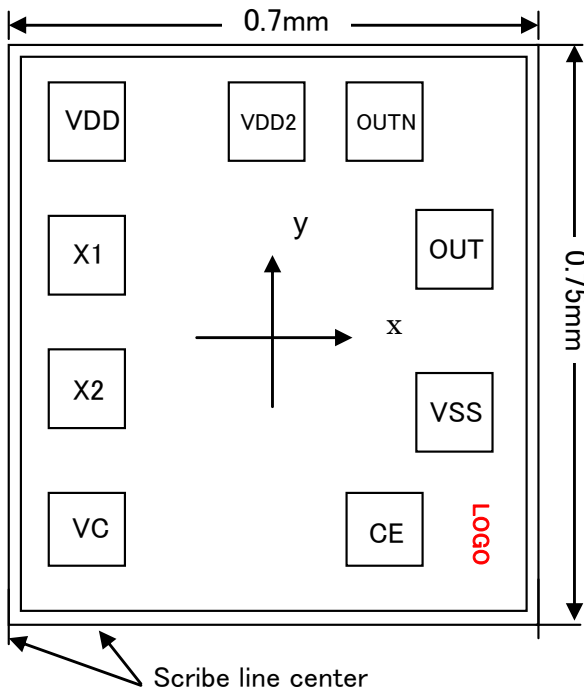
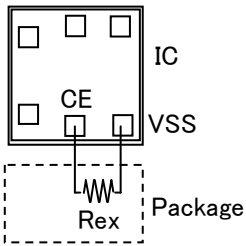


Fig. 6-1 Block Diagram

7. Pad Layout


- Die Size: 0.75mm × 0.7mm
- Pad Size: 80um □
- Thickness: 150±20um
- IC Backside: Gnd or Open
- Swapping of OUT/OUTN with wire bond is acceptable

Pad Name	Function	Location (μm)	
		x	y
VDD	(+)Power Supply	-250.55	275.55
X1	Crystal Feedback	-250.55	86.35
X2	Crystal Drive	-250.55	-94.35
VC	Frequency Control Input	-250.55	-275.55
CE	Oscillation stop	170.55	-275.55
VSS	(-)Ground	250.55	-80.05
OUT	Output (True)	250.55	94.35
OUTN	Output (Complementary)	170.55	275.55
VDD2	NC is acceptable	-1.2	275.55
Chip Center		0	0


IMPORTANT Notice for CE function

- * Rex should be over 10MΩ in case of CE = Open usage.
 - * Oscillation will not be activated when CE = Open after CE = Low if Rex is below 10MΩ.
 - * There is no such issue in case of CE = VDD usage.
- Rex : External resistance value between CE and VSS of package.

8. IC Part # Identification

Part #	LOGO
IPV9175H0P0	IPV9175H0P0
IPV9176H0P0	IPV9176H0P0