CY27020

Spread Spectrum Clock Generator

Features

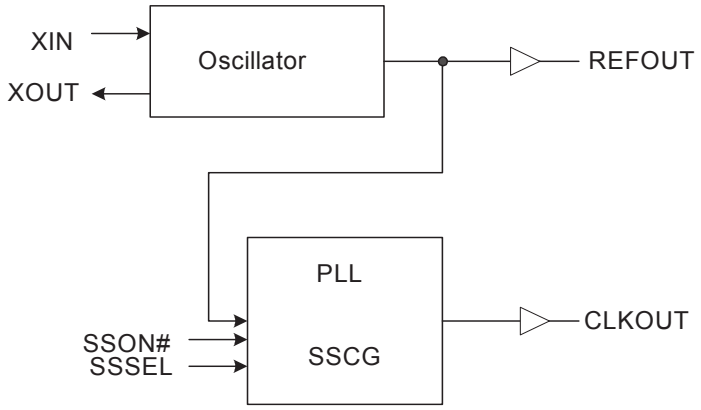
- Supports clock requirements for printers
- 48-MHz spread spectrum clock output
- 48-MHz reference clock output
- Two selectable spread percentages: –1% and –3%
- Integrated loop filter
- 48-MHz crystal or external clock input
- 3.3-V supply operation (2.5-V functional)
- 8-pin small outline integrated circuit (SOIC) package

Functional Description

The CY27020 clock generator provides a low EMI clock output for printers. It features spread spectrum technology, a modulation technique designed specifically for reducing EMI at the fundamental frequency and its harmonics.

For a complete list of related documentation, click here.

Logic Block Diagram

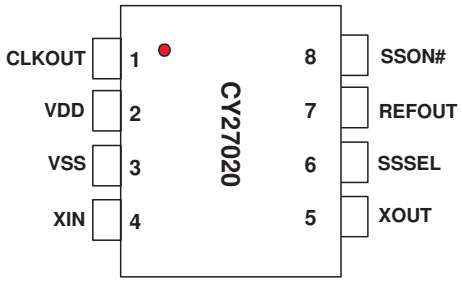


Frequency Table

XIN	SSON#	SSSEL	REFOUT	CLKOUT
48.00 MHz	0	0	48.00 MHz	48.00 MHz at –1%
48.00 MHz	0	1	48.00 MHz	48.00 MHz at –3%
48.00 MHz	1	0	48.00 MHz	48.00 MHz (No Spread)
48.00 MHz	1	1	48.00 MHz	48.00 MHz (No Spread)

Pin Configuration

Figure 1. 8-pin SOIC pinout



Pin Description

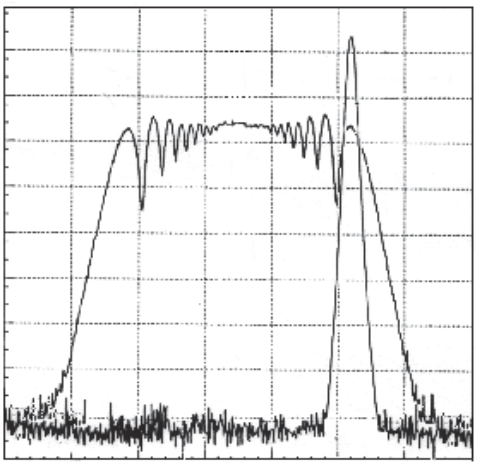
Pin	Name	I/o	Type [1]	Description
1	CLKOUT	O		Fixed frequency 48.00 MHz spread spectrum clock output. See Table on page 1 for frequency selections
2	VDD	PWR		3.3-V power supply
3	VSS	PWR		Ground
4	XIN	I		Oscillator buffer input. Connect to an external parallel resonant crystal (nominally 48.00 MHz) or externally generated 48 MHz reference clock.
5	XOUT	O		Oscillator buffer output. Connect to an external parallel resonant crystal. Do not connect when an externally generated reference clock is applied at XIN.
6	SSSEL	I	PU	Spread spectrum percentage select input. See Table on page 1 for details.
7	REFOUT	O	–	Buffered output of XIN.
8	SSON#	I	PD	Spread spectrum enable input. When asserted LOW, spread spectrum is enabled.

Spread Spectrum Clock Generation (SSCG)

Spread spectrum clock generation (SSCG) is a frequency modulation technique used to reduce electromagnetic interference radiation generated by repetitive digital signals, mainly clocks. A clock accumulates electromagnetic energy at its center frequency and its harmonics. Spread spectrum distributes this energy over a small frequency band and decreases the peak value of radiated energy over the spectrum. This technique is achieved by modulating the clock around or below the center of its nominal frequency by a certain percentage (which also determines the energy distribution band).

The SSCG function is enabled when SSON# pin is asserted low, resulting in a spread bandwidth that is down spread by either –1% or –3%, selected by SSSEL (see Table on page 1).

Figure 2. No Spread vs Down Spread Example



Note
1. PU = Internal pull-up resistor, PD = Internal pull-down resistor.

Absolute Maximum Conditions

Exceeding maximum ratings may shorten the useful life of the device. User guidelines are not tested.[2]

Minimum input voltage relative to V_{SS}: ..... V_{SS} – 0.3 V

Maximum input voltage relative to V_{DD}: ..... V_{DD} + 0.3 V

Storage temperature: ..... –65 °C to 150 °C

Operating temperature: ..... 0 °C to 70 °C

Maximum electrostatic discharge (ESD) protection: ..... 2 kV

Maximum power supply: ..... 5.5 V

Operating voltage: ..... 2.5 V–3.6 V

This device contains circuitry to protect the inputs against damage due to high static voltages or electric field; however, care should be taken to avoid application of any voltage higher than the maximum rated voltages to this circuit. For proper operation, the I/O pins should be constrained to the range:

$V_{SS} < I/O < V_{DD}$

Unused inputs must always be tied to an appropriate logic voltage level (either V_{SS} or V_{DD}).

DC Electrical Specifications

(V_{DD} = 3.3 V ± 10%, T_A = 0 °C to 70 °C) [3]

Parameter	Description	Conditions	Min	Typ	Max	Unit
V_{IL}	Input low voltage	SSON#, SSSEL	–	–	0.8	V
V_{IH}	Input high voltage		2.2	–	–	V
V_{thXIN}	XIN threshold voltage		0.3 × V_{DD}	0.5 × V_{DD}	0.7 × V_{DD}	V
I_{IL1}	Input low current	SSON# = V_{SS}	–5	0	5	µA
I_{IH1}	Input high current	SSON# = V_{DD}	3	8	20	µA
I_{IL2}	Input low current	SSEL = V_{SS}	–36	–16.5	–7.4	µA
I_{IH2}	Input high current	SSEL = V_{DD}	–5	0	5	µA
$I_{DD3.3V}$	Dynamic supply current	No output load	–	20	25	mA
V_{OL}	Output low voltage	I_{OL} = 4.0 mA	–	–	0.4	V
V_{OH}	Output high voltage	I_{OH} = –4.0 mA	2.4	–	–	V
Cin	Input capacitance	Pins 6 and 8	–	3	5	pF
Cx	XIN, XOUT capacitance	Pins 4 and 5	–	3	5	pF
PU/PD	Pull-up/pull-down resistance	SSON#, SSSEL	100	200	400	kΩ

Notes

2. Multiple Supplies: The Voltage on any input or I/O pin cannot exceed the power pin during power-up. Power supply sequencing is NOT required.
3. In applications where a crystal is used for the input reference clock, refer to the crystal manufacturer's specifications for the required crystal load capacitor value.

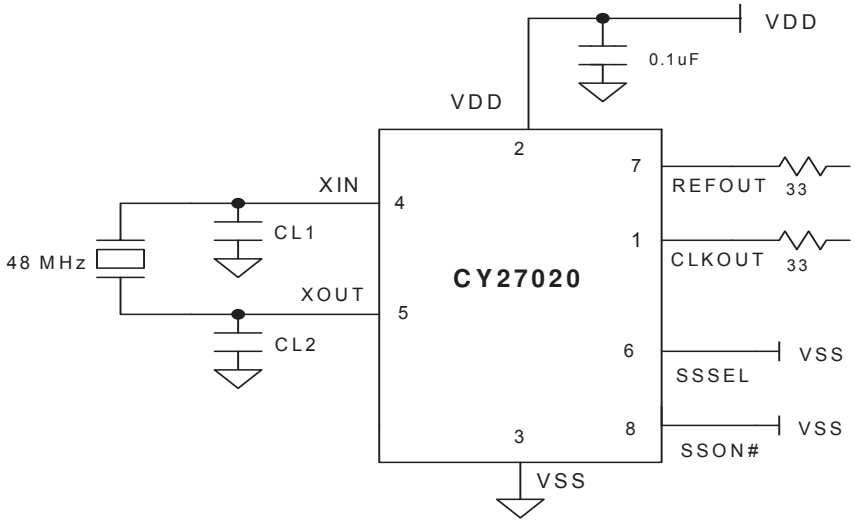
AC Electrical Specifications

(V_{DD} = 3.3 V ± 10%, T_A = 0 °C to 70 °C)

Parameter	Description	Conditions	Min	Typ	Max	Unit
IFR	Input frequency range		44	48	52	MHz
t_r	Rise time [4, 5]		–	1	2	ns
t_f	Fall time [4, 5]		–	1	2	ns
SS%	Spread spectrum percentage	SSON# = 0, SSSEL = 0	–	–1	–	%
		SSON# = 0, SSSEL = 1	–	–3	–	%
t_{PU}	Power-up to stable output[6]	All output clocks	–	–	3	ms
t_{DC}	Clock duty cycle [4, 6]	CL = 15 pF	45	50	55	%
t_{CCJ}	REFOUT cycle-to-cycle jitter [4, 6]	CL = 15 pF	–	–	350	ps
	CLKOUT cycle-to-cycle jitter [4, 6]		–	100	250	ps

Application Schematic Example

Figure 3. Application Schematic Example [7, 8]

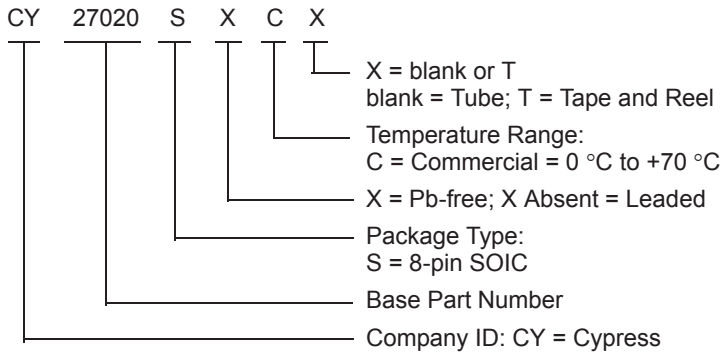


Notes
4. Parameters are guaranteed by design and characterization. Not 100% tested in production. All parameters specified with fully loaded outputs. All outputs loaded with 15 pF.
5. Measured between 0.1 x V_{DD} and 0.9 x V_{DD} volts.
6. Triggering is done at 1.5 V.
7. The circuit shows -1.0% spread. Refer to Frequency Table on page 1 for details.
8. Use the crystal manufacturer's recommended values for CL1 and CL2 load capacitors.

Ordering Information

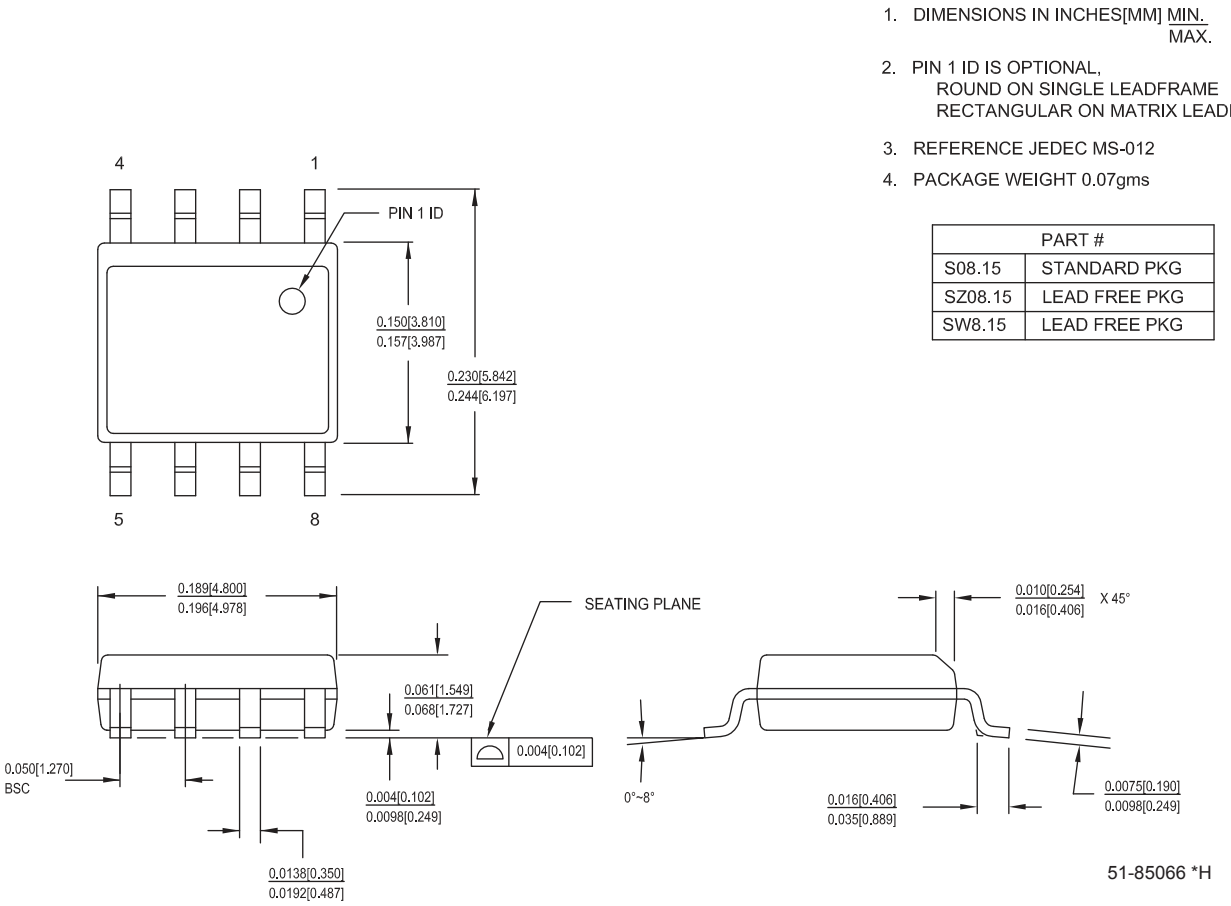
Part Number	Package Type	Production Flow
Pb-free		
CY27020SXC	8-pin SOIC	Commercial, 0 °C to 70 °C
CY27020SXCT	8-pin SOIC - Tape and Reel	Commercial, 0 °C to 70 °C

Ordering Code Definitions



Package Drawing and Dimension

Figure 4. 8-pin SOIC (150 Mils) S0815/SZ815/SW815 Package Outline, 51-85066



Acronyms

Table 1. Acronyms Used in this Document

Acronym	Description
CLKOUT	Reference Clock Out
EMI	Electromagnetic Interference
ESD	Electrostatic Discharge
PD	Power Down
PLL	Phase Locked Loop
PPM	Parts Per Million
SS	Spread Spectrum
SSC	Spread Spectrum Clock
SSCG	Spread Spectrum Clock Generation
SSON	Spread Spectrum ON

Document Conventions

Units of Measure

Table 2. Units of Measure

Symbol	Unit of Measure
°C	degree Celsius
kΩ	kilohm
MHz	megahertz
µA	microampere
µs	microsecond
mA	milliampere
ms	millisecond
mW	milliwatt
ns	nanosecond
Ω	ohm
pF	picofarad
ps	picosecond
V	volt
W	watt

Document History Page

Document Title: CY27020, Spread Spectrum Clock Generator Document Number: 38-07273				
Rev.	**ECN No.**	**Submission Date**	**Orig. of Change**	**Description of Change**
**	110661	02/19/02	XHT	New data sheet.
*A	122868	12/21/02	RBI	Add power up requirements to maximum rating information
*B	279429	See ECN	RGL	Added Lead-free Devices
*C	2759365	09/02/2009	TSAI	Updated template. Post to external web.
*D	2899304	03/25/2010	CXQ	Removed inactive parts from Ordering Information Updated Package Drawing and Dimension.
*E	3041840	09/29/2010	CXQ	Removed “IC” from end of document title. Fixed various formatting and typographical errors. Change all SSON pin references to SSON#. Added row to Table 1 for explicit select pin functional explanation. Removed references to Cera-lock input. Removed redundant Note 3.
*F	4162220	10/16/2013	CINM	Updated Package Drawing and Dimension: spec 51-85066 – Changed revision from *D to *F. Updated in new template. Completing Sunset Review.
*G	4587350	12/05/2014	AJU	Added related documentation hyperlink in page 1.
*H	5507104	11/02/2016	PAWK	Updated the template.

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