

## µP-PROGRAMMABLE PRECISION CLOCK MULTIPLIER

### Features

- Not recommended for new designs. For alternatives, see the Si533x family of products.
- Generates frequencies from 2 kHz to 945 MHz and select frequencies to 1.4 GHz from an input frequency of 10 to 710 MHz
- Low jitter clock outputs with jitter generation as low as 0.5 ps rms (12 kHz–20 MHz)
- Integrated loop filter with selectable loop bandwidth (150 kHz to 2 MHz)
- Dual clock inputs w/manual or automatically controlled switching
- Dual clock outputs with selectable signal format (LVPECL, LVDS, CML, CMOS)
- Support for ITU G.709 and custom FEC ratios (255/238, 255/237, 255/236)
- LOS, FOS alarm outputs
- I<sup>2</sup>C or SPI programmable
- On-chip voltage regulator for 1.8 ±5%, 2.5 or 3.3 V ±10% operation
- Small size: 6 x 6 mm 36-lead QFN
- Pb-free, ROHS compliant

### Applications

- SONET/SDH OC-48/STM-16 and OC-192/STM-64 line cards
- GbE/10GbE, 1/2/4/8/10GFC line cards
- ITU G.709 and custom FEC line cards
- Optical modules
- Wireless basestations
- Data converter clocking
- xDSL
- SONET/SDH + PDH clock synthesis
- Test and measurement

### Description

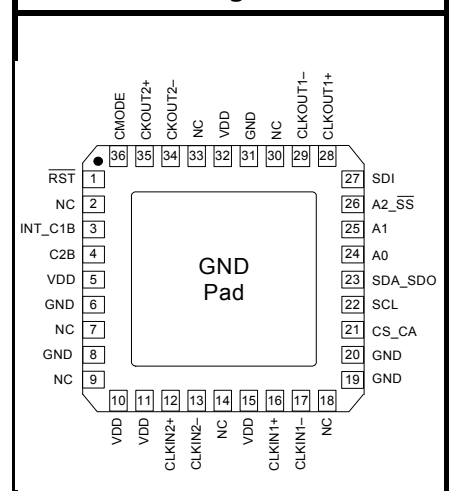
The Si5325 is a low jitter, precision clock multiplier for applications requiring clock multiplication without jitter attenuation. The Si5325 accepts dual clock inputs ranging from 10 to 710 MHz and generates two clock outputs ranging from 2 kHz to 945 MHz and select frequencies to 1.4 GHz. The two outputs are divided down separately from a common source. The device provides frequency translation combinations across this operating range. The Si5325 input clock frequency and clock multiplication ratio are programmable through an I<sup>2</sup>C or SPI interface. The Si5325 is based on Silicon Laboratories' 3rd-generation DSPLL<sup>®</sup> technology, which provides frequency synthesis in a highly integrated PLL solution that eliminates the need for external VCXO and loop filter components. The DSPLL loop bandwidth is digitally programmable. Operating from a single 1.8, 2.5, or 3.3 V supply, the Si5325 is ideal for providing clock multiplication in high performance timing applications.



### Ordering Information:

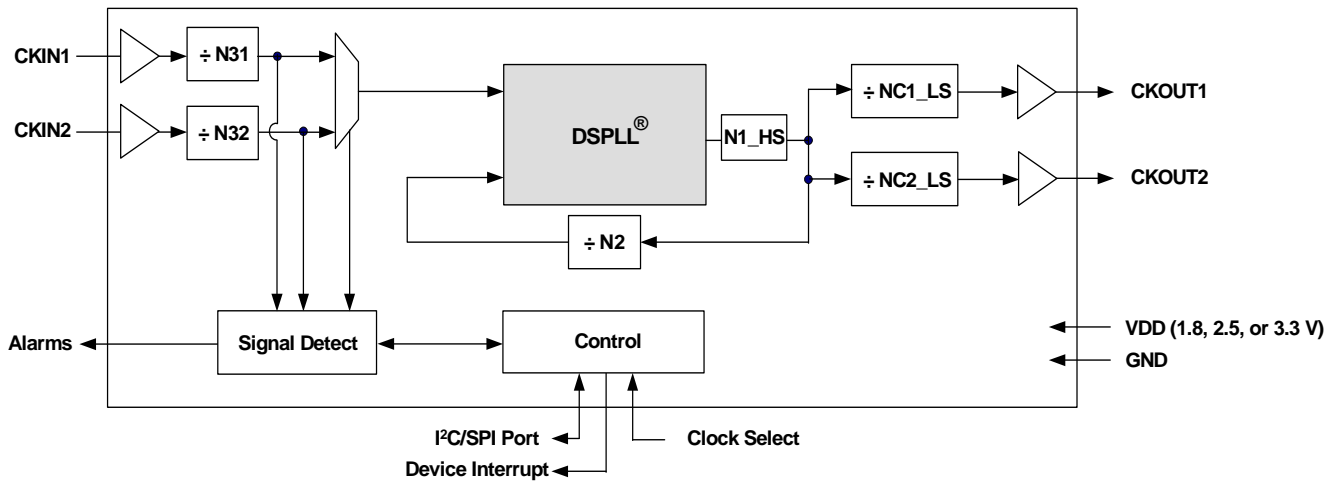
See page 56.

### Pin Assignments



# Si5325

## Functional Block Diagram



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**TABLE OF CONTENTS**

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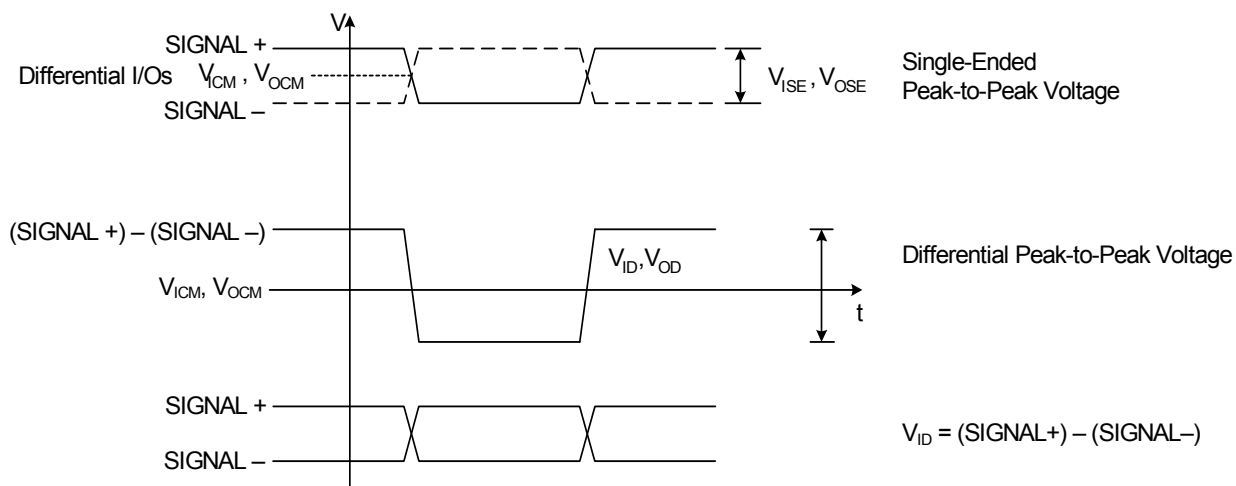
<b><u>Section</u></b>	<b><u>Page</u></b>
<b>1. Electrical Specifications</b> .....	<b>4</b>
<b>2. Functional Description</b> .....	<b>16</b>
2.1. Further Documentation .....	16
<b>3. Register Map</b> .....	<b>17</b>
<b>4. Register Descriptions</b> .....	<b>19</b>
<b>5. Pin Descriptions: Si5325</b> .....	<b>52</b>
<b>6. Ordering Guide</b> .....	<b>56</b>
<b>7. Package Outline: 36-Pin QFN</b> .....	<b>57</b>
<b>8. Land Pattern: 36-Pin QFN</b> .....	<b>58</b>
<b>9. Top Marking</b> .....	<b>60</b>
9.1. Si5325 Top Marking (QFN) .....	60
9.2. Top Marking Explanation .....	60
<b>Document Change List</b> .....	<b>61</b>
<b>Contact Information</b> .....	<b>62</b>

## 1. Electrical Specifications

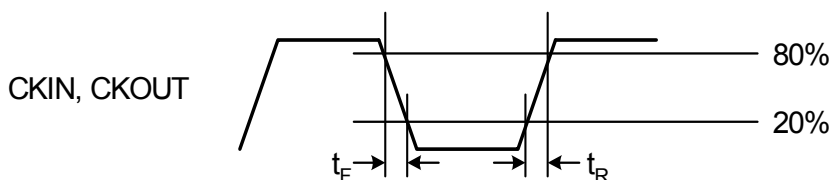
**Table 1. Recommended Operating Conditions**

Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
Ambient Temperature	$T_A$		-40	25	85	C
Supply Voltage during Normal Operation	$V_{DD}$	3.3 V Nominal	2.97	3.3	3.63	V
		2.5 V Nominal	2.25	2.5	2.75	V
		1.8 V Nominal	1.71	1.8	1.89	V

**Note:** All minimum and maximum specifications are guaranteed and apply across the recommended operating conditions. Typical values apply at nominal supply voltages and an operating temperature of 25 °C unless otherwise stated.



**Figure 1. Differential Voltage Characteristics**



**Figure 2. Rise/Fall Time Characteristics**

**Table 2. DC Characteristics** $(V_{DD} = 1.8 \pm 5\%, 2.5 \pm 10\%, \text{ or } 3.3 \text{ V} \pm 10\%, T_A = -40 \text{ to } 85 \text{ }^\circ\text{C})$ 

Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
Supply Current <sup>1</sup>	$I_{DD}$	LVPECL Format 622.08 MHz Out Both CKOUTs Enabled	—	251	279	mA
		LVPECL Format 622.08 MHz Out 1 CKOUT Enabled	—	217	243	mA
		CMOS Format 19.44 MHz Out Both CKOUTs Enabled	—	204	234	mA
		CMOS Format 19.44 MHz Out 1 CKOUT Enabled	—	194	220	mA
		Disable Mode	—	165	—	mA
<b>CKINn Input Pins<sup>2</sup></b>						
Input Common Mode Voltage (Input Threshold Voltage)	$V_{ICM}$	1.8 V $\pm$ 5%	0.9	—	1.4	V
		2.5 V $\pm$ 10%	1	—	1.7	V
		3.3 V $\pm$ 10%	1.1	—	1.95	V
Input Resistance	$CKN_{RIN}$	Single-ended	20	40	60	k $\Omega$
Single-Ended Input Voltage Swing (See Absolute Specs)	$V_{ISE}$	$f_{CKIN} < 212.5 \text{ MHz}$ See Figure 1.	0.2	—	—	$V_{PP}$
		$f_{CKIN} > 212.5 \text{ MHz}$ See Figure 1.	0.25	—	—	$V_{PP}$
Differential Input Voltage Swing (See Absolute Specs)	$V_{ID}$	$f_{CKIN} < 212.5 \text{ MHz}$ See Figure 1.	0.2	—	—	$V_{PP}$
		$f_{CKIN} > 212.5 \text{ MHz}$ See Figure 1.	0.25	—	—	$V_{PP}$
<b>Notes:</b>						
1. Current draw is independent of supply voltage						
2. No under- or overshoot is allowed.						
3. LVPECL outputs require nominal VDD $\geq$ 2.5 V.						
4. This is the amount of leakage that the 3-Level inputs can tolerate from an external driver. See Si53xx Family Reference Manual for more details.						
5. LVPECL, CML, LVDS and low-swing LVDS measured with $F_o = 622.08 \text{ MHz}$ .						

**Table 2. DC Characteristics (Continued)**(V<sub>DD</sub> = 1.8 ± 5%, 2.5 ± 10%, or 3.3 V ± 10%, T<sub>A</sub> = -40 to 85 °C)

Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
<b>Output Clocks (CKOUTn)<sup>3</sup></b>						
Common Mode	CKO <sub>VCM</sub>	LVPECL 100 Ω load line-to-line	V <sub>DD</sub> -1.42	—	V <sub>DD</sub> -1.25	V
Differential Output Swing <sup>5</sup>	CKO <sub>VD</sub>	LVPECL 100 Ω load line-to-line	1.1	—	1.9	V <sub>PP</sub>
Single-Ended Output Swing <sup>5</sup>	CKO <sub>VSE</sub>	LVPECL 100 Ω load line-to-line	0.5	—	0.93	V <sub>PP</sub>
Differential Output Voltage	CKO <sub>VD</sub>	CML 100 Ω load line-to-line	350	425	500	mV <sub>PP</sub>
Common Mode Output Voltage	CKO <sub>VCM</sub>	CML 100 Ω load line-to-line	—	V <sub>DD</sub> -0.36	—	V
Differential Output Voltage	CKO <sub>VD</sub>	LVDS 100 Ω load line-to-line	500	700	900	mV <sub>PP</sub>
		Low Swing LVDS 100 Ω load line-to-line	350	425	500	mV <sub>PP</sub>
Common Mode Output Voltage	CKO <sub>VCM</sub>	LVDS 100 Ω load line-to-line	1.125	1.2	1.275	V
Differential Output Resistance	CKO <sub>RD</sub>	CML, LVPECL, LVDS	—	200	—	Ω
Output Voltage Low	CKO <sub>VOLLH</sub>	CMOS	—	—	0.4	V
Output Voltage High	CKO <sub>VOHLH</sub>	V <sub>DD</sub> = 1.71 V CMOS	0.8 x V <sub>DD</sub>	—	—	V
<b>Notes:</b>						
1. Current draw is independent of supply voltage						
2. No under- or overshoot is allowed.						
3. LVPECL outputs require nominal V <sub>DD</sub> ≥ 2.5 V.						
4. This is the amount of leakage that the 3-Level inputs can tolerate from an external driver. See Si53xx Family Reference Manual for more details.						
5. LVPECL, CML, LVDS and low-swing LVDS measured with F <sub>o</sub> = 622.08 MHz.						

**Table 2. DC Characteristics (Continued)** $(V_{DD} = 1.8 \pm 5\%, 2.5 \pm 10\%, \text{ or } 3.3 \text{ V} \pm 10\%, T_A = -40 \text{ to } 85 \text{ }^\circ\text{C})$ 

Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
Output Drive Current (CMOS driving into $CKO_{VOL}$ for output low or $CKO_{VOH}$ for output high. $CKOUT+$ and $CKOUT-$ shorted externally)	$CKO_{IO}$	$ICMOS[1:0] = 11$ $V_{DD} = 1.8 \text{ V}$	—	7.5	—	mA
		$ICMOS[1:0] = 10$ $V_{DD} = 1.8 \text{ V}$	—	5.5	—	mA
		$ICMOS[1:0] = 01$ $V_{DD} = 1.8 \text{ V}$	—	3.5	—	mA
		$ICMOS[1:0] = 00$ $V_{DD} = 1.8 \text{ V}$	—	1.75	—	mA
		$ICMOS[1:0] = 11$ $V_{DD} = 3.3 \text{ V}$	—	32	—	mA
		$ICMOS[1:0] = 10$ $V_{DD} = 3.3 \text{ V}$	—	24	—	mA
		$ICMOS[1:0] = 01$ $V_{DD} = 3.3 \text{ V}$	—	16	—	mA
		$ICMOS[1:0] = 00$ $V_{DD} = 3.3 \text{ V}$	—	8	—	mA
<b>2-Level LVCMOS Input Pins</b>						
Input Voltage Low	$V_{IL}$	$V_{DD} = 1.71 \text{ V}$	—	—	0.5	V
		$V_{DD} = 2.25 \text{ V}$	—	—	0.7	V
		$V_{DD} = 2.97 \text{ V}$	—	—	0.8	V
Input Voltage High	$V_{IH}$	$V_{DD} = 1.89 \text{ V}$	1.4	—	—	V
		$V_{DD} = 2.25 \text{ V}$	1.8	—	—	V
		$V_{DD} = 3.63 \text{ V}$	2.5	—	—	V
<b>Notes:</b>						
1. Current draw is independent of supply voltage						
2. No under- or overshoot is allowed.						
3. LVPECL outputs require nominal $V_{DD} \geq 2.5 \text{ V}$ .						
4. This is the amount of leakage that the 3-Level inputs can tolerate from an external driver. See Si53xx Family Reference Manual for more details.						
5. LVPECL, CML, LVDS and low-swing LVDS measured with $F_o = 622.08 \text{ MHz}$ .						

**Table 2. DC Characteristics (Continued)**

( $V_{DD} = 1.8 \pm 5\%$ ,  $2.5 \pm 10\%$ , or  $3.3 \text{ V} \pm 10\%$ ,  $T_A = -40$  to  $85 \text{ }^\circ\text{C}$ )

Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
<b>3-Level Input Pins<sup>4</sup></b>						
Input Voltage Low	$V_{ILL}$		—	—	$0.15 \times V_{DD}$	V
Input Voltage Mid	$V_{IMM}$		$0.45 \times V_{DD}$	—	$0.55 \times V_{DD}$	V
Input Voltage High	$V_{IHH}$		$0.85 \times V_{DD}$	—	—	V
Input Low Current	$I_{ILL}$	See Note 4	-20	—	—	$\mu\text{A}$
Input Mid Current	$I_{IMM}$	See Note 4	-2	—	+2	$\mu\text{A}$
Input High Current	$I_{IHH}$	See Note 4	—	—	20	$\mu\text{A}$
<b>LVC MOS Output Pins</b>						
Output Voltage Low	$V_{OL}$	$I_O = 2 \text{ mA}$ $V_{DD} = 1.71 \text{ V}$	—	—	0.4	V
Output Voltage Low		$I_O = 2 \text{ mA}$ $V_{DD} = 2.97 \text{ V}$	—	—	0.4	V
Output Voltage High	$V_{OH}$	$I_O = -2 \text{ mA}$ $V_{DD} = 1.71 \text{ V}$	$V_{DD} - 0.4$	—	—	V
Output Voltage High		$I_O = -2 \text{ mA}$ $V_{DD} = 2.97 \text{ V}$	$V_{DD} - 0.4$	—	—	V
Disabled Leakage Current	$I_{OZ}$	RSTb = 0	-100	—	100	$\mu\text{A}$
<b>Notes:</b>						
<ol style="list-style-type: none"> <li>1. Current draw is independent of supply voltage</li> <li>2. No under- or overshoot is allowed.</li> <li>3. LVPECL outputs require nominal <math>V_{DD} \geq 2.5 \text{ V}</math>.</li> <li>4. This is the amount of leakage that the 3-Level inputs can tolerate from an external driver. See Si53xx Family Reference Manual for more details.</li> <li>5. LVPECL, CML, LVDS and low-swing LVDS measured with <math>F_o = 622.08 \text{ MHz}</math>.</li> </ol>						



**Table 3. AC Characteristics** $(V_{DD} = 1.8 \pm 5\%, 2.5 \pm 10\%, \text{ or } 3.3 \text{ V} \pm 10\%, T_A = -40 \text{ to } 85 \text{ }^\circ\text{C})$ 

Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
<b>CKINn Input Pins</b>						
Input Frequency	$CKN_F$		10	—	710	MHz
Input Duty Cycle (Minimum Pulse Width)	$CKN_{DC}$	Whichever is smaller (i.e., the 40% / 60% limitation applies only to high frequency clocks)	40	—	60	%
			2	—	—	ns
Input Capacitance	$CKN_{CIN}$		—	—	3	pF
Input Rise/Fall Time	$CKN_{TRF}$	20–80% See Figure 2	—	—	11	ns
<b>CKOUTn Output Pins</b>						
(See ordering section for speed grade vs frequency limits)						
Output Frequency (Output not config- ured for CMOS or Disabled)	$CKO_F$	$N1 \geq 6$	0.002	—	945	MHz
		$N1 = 5$	970	—	1134	MHz
		$N1 = 4$	1.213	—	1.4	GHz
Maximum Output Frequency in CMOS Format	$CKO_F$		—	—	212.5	MHz
Output Rise/Fall (20–80 %) @ 622.08 MHz output	$CKO_{TRF}$	Output not configured for CMOS or Disabled See Figure 2	—	230	350	ps
Output Rise/Fall (20–80%) @ 212.5 MHz output	$CKO_{TRF}$	CMOS Output $V_{DD} = 1.71$ $C_{LOAD} = 5 \text{ pF}$	—	—	8	ns
Output Rise/Fall (20–80%) @ 212.5 MHz output	$CKO_{TRF}$	CMOS Output $V_{DD} = 2.97$ $C_{LOAD} = 5 \text{ pF}$	—	—	2	ns
Output Duty Cycle Uncertainty @ 622.08 MHz	$CKO_{DC}$	100 $\Omega$ Load Line-to-Line Measured at 50% Point (Not for CMOS)	—	—	+/-40	ps

**Table 3. AC Characteristics (Continued)**(V<sub>DD</sub> = 1.8 ± 5%, 2.5 ± 10%, or 3.3 V ± 10%, T<sub>A</sub> = -40 to 85 °C)

Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
<b>LVC MOS Input Pins</b>						
Minimum Reset Pulse Width	t <sub>RSTMN</sub>		1	—	—	μs
Reset to Microprocessor Access Ready	t <sub>READY</sub>		—	—	10	ms
Input Capacitance	C <sub>in</sub>		—	—	3	pF
<b>LVC MOS Output Pins</b>						
Rise/Fall Times	t <sub>RF</sub>	C <sub>LOAD</sub> = 20 pF See Figure 2	—	25	—	ns
LOS <sub>n</sub> Trigger Window	LOS <sub>TRIG</sub>	From last CKIN <sub>n</sub> ↑ to ↓ Internal detection of LOS <sub>n</sub> N3 ≠ 1	—	—	4.5 x N3	T <sub>CKIN</sub>
Time to Clear LOL after LOS Cleared	t <sub>CLRLOL</sub>	↓LOS to ↓LOL Fold = Fnew Stable Xa/XB reference	—	10	—	ms
<b>Device Skew</b>						
Output Clock Skew	t <sub>SKEW</sub>	↑ of CKOUT <sub>n</sub> to ↑ of CKOUT <sub>m</sub> , CKOUT <sub>n</sub> and CKOUT <sub>m</sub> at same frequency and signal format <u>PHASEOFFSET</u> = 0 <u>CKOUT_ALWAYS_ON</u> = 1 <u>SQ_ICAL</u> = 1	—	—	100	ps
Phase Change due to Temperature Variation	t <sub>TEMP</sub>	Max phase changes from -40 to +85 °C	—	300	500	ps

**Table 3. AC Characteristics (Continued)** $(V_{DD} = 1.8 \pm 5\%, 2.5 \pm 10\%, \text{ or } 3.3 \text{ V} \pm 10\%, T_A = -40 \text{ to } 85 \text{ }^\circ\text{C})$ 

Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
<b>PLL Performance</b> ( $f_{in} = f_{out} = 622.08 \text{ MHz}$ ; $BW = 120 \text{ Hz}$ ; LVPECL)						
Lock Time	$t_{LOCKMP}$	Start of ICAL to $\downarrow$ of LOL	—	35	1200	ms
Closed Loop Jitter Peaking	$J_{PK}$		—	0.05	0.1	dB
Jitter Tolerance	$J_{TOL}$	Jitter Frequency $\geq$ Loop Bandwidth	5000/BW	—	—	ns pk-pk
Phase Noise $f_{out} = 622.08 \text{ MHz}$	$CKO_{PN}$	1 kHz Offset	—	-90	—	dBc/Hz
		10 kHz Offset	—	-113	—	dBc/Hz
		100 kHz Offset	—	-118	—	dBc/Hz
		1 MHz Offset	—	-132	—	dBc/Hz
Subharmonic Noise	$SP_{SUBH}$	Phase Noise @ 100 kHz Offset	—	-88	—	dBc
Spurious Noise	$SP_{SPUR}$	Max spur @ $n \times F3$ ( $n \geq 1, n \times F3 < 100 \text{ MHz}$ )	—	-93	—	dBc

**Table 4. Microprocessor Control** $(V_{DD} = 1.8 \pm 5\%, 2.5 \pm 10\%, \text{ or } 3.3 \text{ V} \pm 10\%, T_A = -40 \text{ to } 85 \text{ }^\circ\text{C})$ 

Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
<b>I<sup>2</sup>C Bus Lines (SDA, SCL)</b>						
Input Voltage Low	$V_{IL_{I2C}}$		—	—	$0.25 \times V_{DD}$	V
Input Voltage High	$V_{IH_{I2C}}$		$0.7 \times V_{DD}$	—	$V_{DD}$	V
Hysteresis of Schmitt trigger inputs	$V_{HYS_{I2C}}$	$V_{DD} = 1.8\text{V}$	$0.1 \times V_{DD}$	—	—	V
		$V_{DD} = 2.5 \text{ or } 3.3 \text{ V}$	$0.05 \times V_{DD}$	—	—	V
Output Voltage Low	$V_{OL_{I2C}}$	$V_{DD} = 1.8 \text{ V}$ $IO = 3 \text{ mA}$	—	—	$0.2 \times V_{DD}$	V
		$V_{DD} = 2.5 \text{ or } 3.3 \text{ V}$ $IO = 3 \text{ mA}$	—	—	0.4	V

**Table 4. Microprocessor Control (Continued)**

( $V_{DD} = 1.8 \pm 5\%$ ,  $2.5 \pm 10\%$ , or  $3.3 V \pm 10\%$ ,  $T_A = -40$  to  $85\text{ }^\circ\text{C}$ )

Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
<b>SPI Specifications</b>						
Duty Cycle, SCLK	$t_{DC}$	SCLK = 10 MHz	40	—	60	%
Cycle Time, SCLK	$t_c$		100	—	—	ns
Rise Time, SCLK	$t_r$	20–80%	—	—	25	ns
Fall Time, SCLK	$t_f$	20–80%	—	—	25	ns
Low Time, SCLK	$t_{lsc}$	20–20%	30	—	—	ns
High Time, SCLK	$t_{hsc}$	80–80%	30	—	—	ns
Delay Time, SCLK Fall to SDO Active	$t_{d1}$		—	—	25	ns
Delay Time, SCLK Fall to SDO Transition	$t_{d2}$		—	—	25	ns
Delay Time, SS Rise to SDO Tri-state	$t_{d3}$		—	—	25	ns
Setup Time, SS to SCLK Fall	$t_{su1}$		25	—	—	ns
Hold Time, SS to SCLK Rise	$t_{h1}$		20	—	—	ns
Setup Time, SDI to SCLK Rise	$t_{su2}$		25	—	—	ns
Hold Time, SDI to SCLK Rise	$t_{h2}$		20	—	—	ns
Delay Time between Slave Selects	$t_{cs}$		25	—	—	ns

Table 5. Jitter Generation

Parameter	Symbol	Test Condition*	Min	Typ	Max	Unit
		Measurement Filter				
Jitter Gen OC-192	JGEN	0.02–80 MHz	—	.49	—	ps <sub>rms</sub>
		4–80 MHz	—	.23	—	ps <sub>rms</sub>
		0.05–80 MHz	—	.47	—	ps <sub>rms</sub>
Jitter Gen OC-48	JGEN	0.12–20 MHz	—	.48	—	ps <sub>rms</sub>

**\*Note:** Test conditions:  
1.  $f_{IN} = f_{OUT} = 622.08$  MHz  
2. Clock input: LVPECL  
3. Clock output: LVPECL  
4. PLL bandwidth: 877 kHz  
5.  $V_{DD} = 2.5$  V  
6.  $T_A = 85$  °C

Table 6. Thermal Characteristics

( $V_{DD} = 1.8 \pm 5\%$ ,  $2.5 \pm 10\%$ , or  $3.3$  V  $\pm 10\%$ ,  $T_A = -40$  to  $85$  °C)

Parameter	Symbol	Test Condition	Value	Unit
Thermal Resistance Junction to Ambient	$\theta_{JA}$	Still Air	32	°C/W
Thermal Resistance Junction to Case	$\theta_{JC}$	Still Air	14	°C/W

Table 7. Absolute Maximum Ratings

Parameter	Symbol	Value	Unit
DC Supply Voltage	$V_{DD}$	-0.5 to 3.8	V
LVC MOS Input Voltage	$V_{DIG}$	-0.3 to ( $V_{DD} + 0.3$ )	V
CKINn Voltage Level Limits	$CKN_{VIN}$	0 to $V_{DD}$	V
XA/XB Voltage Level Limits	$XA_{VIN}$	0 to 1.2	V
Operating Junction Temperature	$T_{JCT}$	-55 to 150	C
Storage Temperature Range	$T_{STG}$	-55 to 150	C
ESD HBM Tolerance (100 pF, 1.5 k $\Omega$ ); All pins except CKIN+/CKIN-		2	kV
ESD MM Tolerance; All pins except CKIN+/CKIN-		150	V
ESD HBM Tolerance (100 pF, 1.5 k $\Omega$ ); CKIN+/CKIN-		750	V
ESD MM Tolerance; CKIN+/CKIN-		100	V
Latch-Up Tolerance		JESD78 Compliant	

**Note:** Permanent device damage may occur if the Absolute Maximum Ratings are exceeded. Functional operation should be restricted to the conditions as specified in the operation sections of this data sheet. Exposure to absolute maximum rating conditions for extended periods of time may affect device reliability.

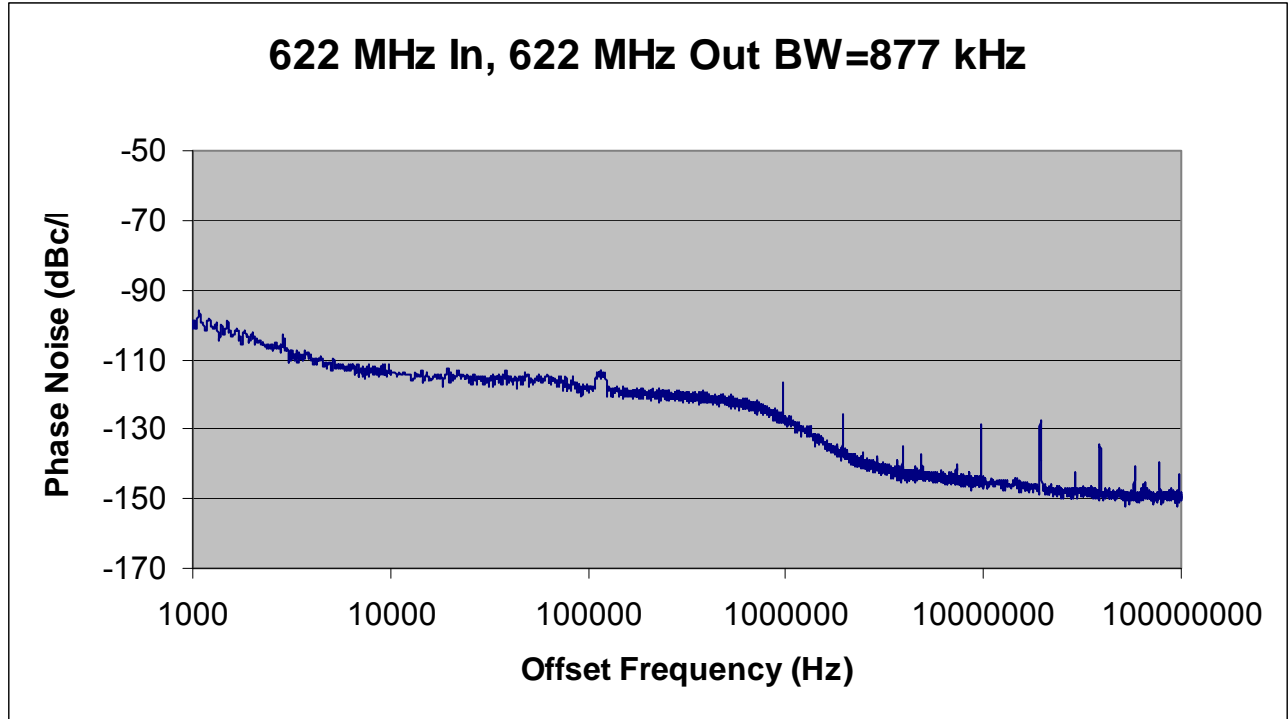


Figure 3. Typical Phase Noise Plot

Table 8. Typical RMS Jitter Values

Jitter Bandwidth	RMS Jitter (fs)
OC-48, 12 kHz to 20 MHz	374
OC-192, 20 kHz to 80 MHz	388
OC-192, 4 MHz to 80 MHz	181
OC-192, 50 kHz to 80 MHz	377
Broadband, 800 Hz to 80 MHz	420

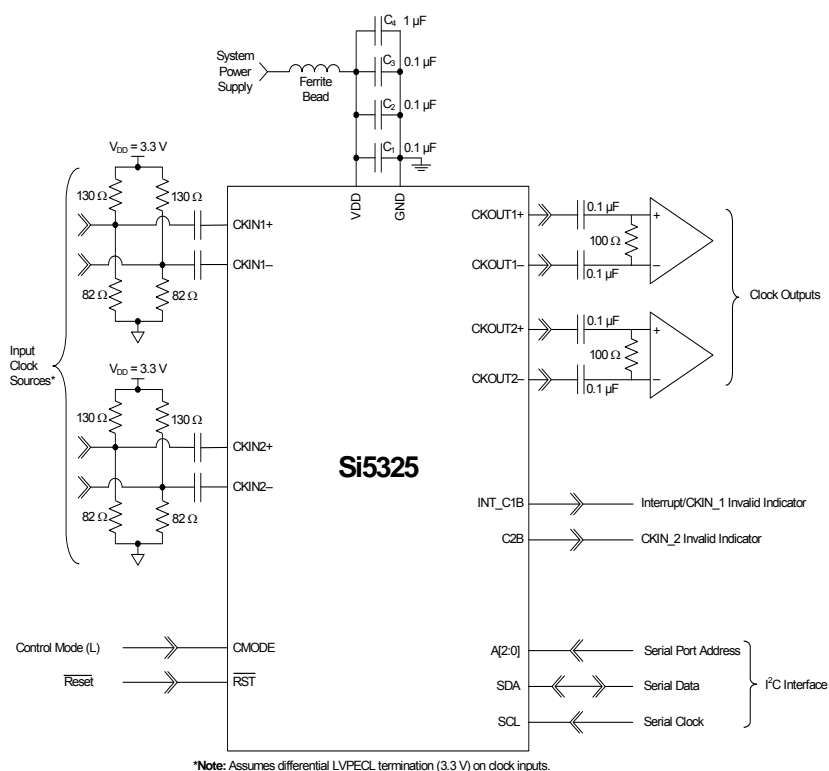
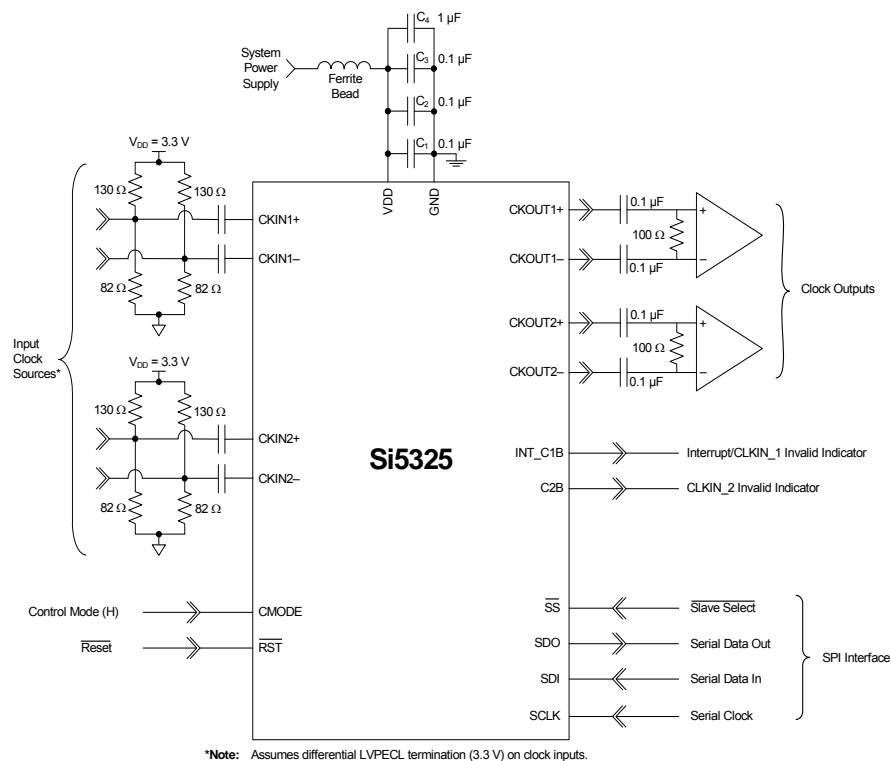
Figure 4. Si5325 Typical Application Circuit (I<sup>2</sup>C Control Mode)

Figure 5. Si5325 Typical Application Circuit (SPI Control Mode)

## 2. Functional Description

The Si5325 is a low jitter, precision clock multiplier for applications requiring clock multiplication without jitter attenuation. The Si5325 accepts dual clock inputs ranging from 10 to 710 MHz and generates two synchronous clock outputs ranging from 2 kHz to 945 MHz and select frequencies to 1.4 GHz. The device provides frequency translation across this operating range. Independent dividers are available for each input clock and output clock, so the Si5325 can accept input clocks at different frequencies and it can generate output clocks at different frequencies. The Si5325 input clock frequency and clock multiplication ratio are programmable through an I<sup>2</sup>C or SPI interface. Silicon Laboratories offers a PC-based software utility, *DSPLLsim*, that can be used to determine the optimum PLL divider settings for a given input frequency/clock multiplication ratio combination that minimizes phase noise and power consumption. This utility can be downloaded from <http://www.silabs.com/timing> (click on Documentation).

The Si5325 is based on Silicon Laboratories' third-generation DSPLL<sup>®</sup> technology, which provides frequency synthesis in a highly integrated PLL solution that eliminates the need for external VCXO and loop filter components. The Si5325 PLL loop bandwidth is digitally programmable and supports a range from 150 kHz to 1.3 MHz. The *DSPLLsim* software utility can be used to calculate valid loop bandwidth settings for a given input clock frequency/clock multiplication ratio.

In the case when the input clocks enter alarm conditions, the PLL will freeze the DCO output frequency near its last value to maintain operation with an internal state close to the last valid operating state.

The Si5325 has two differential clock outputs. The electrical format of each clock output is independently programmable to support LVPECL, LVDS, CML, or CMOS loads. If not required, the second clock output can be powered down to minimize power consumption.

For system-level debugging, a bypass mode is available which drives the output clock directly from the input clock, bypassing the internal DSPLL. The device is powered by a single 1.8, 2.5, or 3.3 V supply.

## 2.1. Further Documentation

Consult the Silicon Laboratories Any-Frequency Precision Clock Family Reference Manual (FRM) for detailed information about the Si5325. Additional design support is available from Silicon Laboratories through your distributor.

Silicon Laboratories has developed a PC-based software utility called *DSPLLsim* to simplify device configuration, including frequency planning and loop bandwidth selection. The FRM and this utility can be downloaded from <http://www.silabs.com/timing>; click on Documentation.



### 3. Register Map

All register bits that are not defined in this map should always be written with the specified Reset Values. The writing to these bits of values other than the specified Reset Values may result in undefined device behavior. Registers not listed, such as Register 64, should never be written to.

Register	D7	D6	D5	D4	D3	D2	D1	D0
0			CKOUT_ALWAYS_ON				BYPASS_REG	
1					CK_PRIOR2[1:0]		CK_PRIOR[1:0]	
2	BWSEL_REG[3:0]							
3	CKSEL_REG[1:0]			SQ_ICAL				
4	AUTOSEL_REG[1:0]							
5	ICMOS[1:0]							
6			SFOUT2_REG[2:0]			SFOUT1_REG[2:0]		
7						FOSREFSEL[2:0]		
8	HLOG_2[1:0]		HLOG_1[1:0]					
10					DSBL2_REG	DSBL1_REG		
11							PD_CK2	PD_CK1
19	FOS_EN	FOS_THR[1:0]		VALTIME[1:0]				
20					CK2_BAD_PIN	CK1_BAD_PIN		INT_PIN
21							CK1_ACTV_PIN	CKSEL_PIN
22					CK_ACTV_POL	CK_BAD_POL		INT_POL
23						LOS2_MSK	LOS1_MSK	
24						FOS2_MSK	FOS1_MSK	
25	N1_HS[2:0]							
31					NC1_LS[19:16]			
32	NC1_LS[15:8]							
33	NC1_LS[7:0]							
34					NC2_LS[19:16]			
35	NC2_LS[15:8]							
36	NC2_LS[7:0]							
40					N2_LS[19:16]			
41	N2_LS[15:8]							
42	N2_LS[7:0]							
43					N31[18:16]			
44	N31[15:8]							
45	N31[7:0]							
46					N32[18:16]			
47	N32[15:8]							
48	N32[7:0]							
55			CLKIN2RATE[2:0]			CLKIN1RATE[2:0]		
128							CK2_ACTV_REG	CK1_ACTV_REG

# Si5325

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Register	D7	D6	D5	D4	D3	D2	D1	D0
129						LOS2_INT	LOS1_INT	
130						FOS2_INT	FOS1_INT	
131						LOS2_FLG	LOS1_FLG	
132					FOS2_FLG	FOS1_FLG		
134	PARTNUM_RO[11:4]							
135	PARTNUM_RO[3:0]				REVID_RO[3:0]			
136	RST_REG	ICAL						
138							LOS2_EN [1:1]	LOS1_EN [1:1]
139			LOS2_EN[0:0]	LOS1_EN[0:0]			FOS2_EN	FOS1_EN
142	INDEPENDENTSKEW1[7:0]							
143	INDEPENDENTSKEW2[7:0]							

## 4. Register Descriptions

### Register 0.

Bit	D7	D6	D5	D4	D3	D2	D1	D0
Name			CKOUT_ALWAYS_ON				BYPASS_REG	
Type	R	R	R/W	R	R	R	R/W	R

Reset value = 0001 0100

Bit	Name	Function
7:6	Reserved	
5	CKOUT_ALWAYS_ON	<p><b>CKOUT Always On.</b> This will bypass the SQ_ICAL function. Output will be available even if SQ_ICAL is on and ICAL is not complete or successful. See Table 9 on page 51. 0: Squelch output until part is calibrated (ICAL). 1: Provide an output. Note: The frequency may be significantly off until the part is calibrated.</p>
4:2	Reserved	
1	BYPASS_REG	<p><b>Bypass Register.</b> This bit enables or disables the PLL bypass mode. Use only when the device is in VCO freeze or before the first ICAL. Bypass mode is not supported for CMOS output clocks. 0: Normal operation 1: Bypass mode. Selected input clock is connected to CKOUT buffers, bypassing PLL. Bypass mode is not supported for CMOS outputs.</p>
0	Reserved	

## Register 1.

Bit	D7	D6	D5	D4	D3	D2	D1	D0
Name					CK_PRIOR2 [1:0]		CK_PRIOR1 [1:0]	
Type	R	R	R	R	R/W		R/W	

Reset value = 1110 0100

Bit	Name	Function
7:4	Reserved	
3:2	CK_PRIOR2 [1:0]	<b>CK_PRIOR 2.</b> Selects which of the input clocks will be 2nd priority in the autoselection state machine. 00: CKIN1 is 2nd priority. 01: CKIN2 is 2nd priority. 10: Reserved 11: Reserved
1:0	CK_PRIOR1 [1:0]	<b>CK_PRIOR 1.</b> Selects which of the input clocks will be 1st priority in the autoselection state machine. 00: CKIN1 is 1st priority. 01: CKIN2 is 1st priority. 10: Reserved 11: Reserved

## Register 2.

Bit	D7	D6	D5	D4	D3	D2	D1	D0
Name	BWSEL_REG [3:0]							
Type	R/W				R	R	R	R

Reset value = 0100 0010

Bit	Name	Function
7:4	BWSEL_REG [3:0]	<b>BWSEL_REG.</b> Selects nominal f3dB bandwidth for PLL. See the DSPLLsim for settings. After BWSEL_REG is written with a new value, an ICAL is required for the change to take effect.
3:0	Reserved	

**Register 3.**

Bit	D7	D6	D5	D4	D3	D2	D1	D0
<b>Name</b>	CKSEL_REG [1:0]			SQ_ICAL				
<b>Type</b>	R/W		R	R/W	R	R	R	R

Reset value = 0000 0101

Bit	Name	Function
7:6	CKSEL_REG [1:0]	<p><b>CKSEL_REG.</b></p> <p>If the device is operating in register-based manual clock selection mode (AUTOSEL_REG = 00), and CKSEL_PIN = 0, then these bits select which input clock will be the active input clock. If CKSEL_PIN = 1 and AUTOSEL_REG = 00, the CS_CA input pin continues to control clock selection and CKSEL_REG is of no consequence.</p> <p>00: CKIN_1 selected. 01: CKIN_2 selected. 10: Reserved 11: Reserved</p>
5	Reserved	
4	SQ_ICAL	<p><b>SQ_ICAL.</b></p> <p>This bit determines if the output clocks will remain enabled or be squelched (disabled) during an internal calibration. See Table 9 on page 51.</p> <p>0: Output clocks enabled during ICAL. 1: Output clocks disabled during ICAL.</p>
3:0	Reserved	

## Register 4.

Bit	D7	D6	D5	D4	D3	D2	D1	D0
Name	AUTOSEL_REG [1:0]							
Type	R/W		R	R	R	R	R	R

Reset value = 0001 0010

Bit	Name	Function
7:6	AUTOSEL_REG [1:0]	<b>AUTOSEL_REG [1:0].</b> Selects method of input clock selection to be used. 00: Manual (either register or pin controlled, see CKSEL_PIN) 01: Automatic Non-Revertive 10: Automatic Revertive 11: Reserved
5:0	Reserved	

## Register 5.

Bit	D7	D6	D5	D4	D3	D2	D1	D0
Name	ICMOS [1:0]							
Type	R/W		R	R	R	R	R	R

Reset value = 1110 1101

Bit	Name	Function
7:6	ICMOS [1:0]	<b>ICMOS [1:0].</b> When the output buffer is set to CMOS mode, these bits determine the output buffer drive strength. The first number below refers to 3.3 V operation; the second to 1.8 V operation. These values assume CKOUT+ is tied to CKOUT-. 00: 8 mA/2 mA. 01: 16 mA/4 mA 10: 24 mA/6 mA 11: 32 mA/8 mA
5:0	Reserved	

**Register 6.**

Bit	D7	D6	D5	D4	D3	D2	D1	D0
<b>Name</b>			SFOUT2_REG [2:0]			SFOUT1_REG [2:0]		
<b>Type</b>	R	R	R/W			R/W		

Reset value = 0010 1101

Bit	Name	Function
7:6	Reserved	
5:3	SFOUT2_REG [2:0]	<p><b>SFOUT2_REG [2:0].</b> Controls output signal format and disable for CKOUT2 output buffer. Bypass mode is not supported for CMOS output clocks.</p> <p>000: Reserved 001: Disable 010: CMOS (Bypass mode is not supported for CMOS outputs) 011: Low swing LVDS 100: Reserved 101: LVPECL 110: CML 111: LVDS</p>
2:0	SFOUT1_REG [2:0]	<p><b>SFOUT1_REG [2:0].</b> Controls output signal format and disable for CKOUT1 output buffer. Bypass mode is not supported for CMOS output clocks.</p> <p>000: Reserved 001: Disable 010: CMOS (Bypass mode is not supported for CMOS outputs) 011: Low swing LVDS 100: Reserved 101: LVPECL 110: CML 111: LVDS</p>

## Register 7.

Bit	D7	D6	D5	D4	D3	D2	D1	D0
Name						FOSREFSEL [2:0]		
Type	R	R	R	R	R	R/W		

Reset value = 0010 1010

Bit	Name	Function
7:3	Reserved	
2:0	FOSREFSEL [2:0]	<b>FOSREFSEL [2:0].</b> Selects which input clock is used as the reference frequency for Frequency Off-Set (FOS) alarms. 000: XA/XB (External reference) 001: CKIN1 010: CKIN2 011: Reserved 100: Reserved 101: Reserved 110: Reserved 111: Reserved



**Register 8.**

Bit	D7	D6	D5	D4	D3	D2	D1	D0
<b>Name</b>	HLOG_2[1:0]		HLOG_1[1:0]					
<b>Type</b>	R/W		R/W		R	R	R	R

Reset value = 0000 0000

Bit	Name	Function
7:6	HLOG_2 [1:0]	<b>HLOG_2 [1:0].</b> 00: Normal operation 01: Holds CKOUT2 output at static logic 0. Entrance and exit from this state will occur without glitches or runt pulses. 10: Holds CKOUT2 output at static logic 1. Entrance and exit from this state will occur without glitches or runt pulses. 11: Reserved
5:4		<b>HLOG_1 [1:0].</b> 00: Normal operation 01: Holds CKOUT1 output at static logic 0. Entrance and exit from this state will occur without glitches or runt pulses. 10: Holds CKOUT1 output at static logic 1. Entrance and exit from this state will occur without glitches or runt pulses. 11: Reserved
3:0	Reserved	

## Register 10.

Bit	D7	D6	D5	D4	D3	D2	D1	D0
Name					DSBL2_REG	DSBL1_REG	Reserved	Reserved
Type	R	R	R	R	R/W	R/W	R	R

Reset value = 0000 0000

Bit	Name	Function
7:4	Reserved	
3	DSBL2_REG	<b>DSBL2_REG.</b> This bit controls the powerdown of the CKOUT2 output buffer. If disable mode is selected, the NC2 output divider is also powered down. 0: CKOUT2 enabled 1: CKOUT2 disabled
2	DSBL1_REG	<b>DSBL1_REG.</b> This bit controls the powerdown of the CKOUT1 output buffer. If disable mode is selected, the NC1 output divider is also powered down. 0: CKOUT1 enabled 1: CKOUT1 disabled
1:0	Reserved	

## Register 11.

Bit	D7	D6	D5	D4	D3	D2	D1	D0
Name							PD_CK2	PD_CK1
Type	R	R	R	R	R	R	R/W	R/W

Reset value = 0100 0000

Bit	Name	Function
7:2	Reserved	
1	PD_CK2	<b>PD_CK2.</b> This bit controls the powerdown of the CKIN2 input buffer. 0: CKIN2 enabled 1: CKIN2 disabled
0	PD_CK1	<b>PD_CK1.</b> This bit controls the powerdown of the CKIN1 input buffer. 0: CKIN1 enabled 1: CKIN1 disabled

## Register 19.

Bit	D7	D6	D5	D4	D3	D2	D1	D0
Name	FOS_EN	FOS_THR [1:0]		VALTIME [1:0]				
Type	R/W	R/W		R/W		R	R	R

Reset value = 0010 1100

Bit	Name	Function
7:5	FOS_EN	<b>FOS_EN.</b> Frequency Offset Enable globally disables FOS. See the individual FOS enables (FOSX_EN, register 139). 0: FOS disable 1: FOS enabled by FOSx_EN
6:5	FOS_THR [1:0]	<b>FOS_THR [1:0].</b> Frequency Offset at which FOS is declared: 00: $\pm 11$ to 12 ppm (Stratum 3/3E compliant, with a Stratum 3/3E used for REFCLK) 01: $\pm 48$ to 49 ppm (SMC) 10: $\pm 30$ ppm (SONET Minimum Clock (SMC), with a Stratum 3/3E used for REFCLK. 11: $\pm 200$ ppm
4:3	VALTIME [1:0]	<b>VALTIME [1:0].</b> Sets amount of time for input clock to be valid before the associated alarm is removed. 00: 2 ms 01: 100 ms 10: 200 ms 11: 13 seconds
2:0	Reserved	

## Register 20.

Bit	D7	D6	D5	D4	D3	D2	D1	D0
Name					CK2_BAD_PIN	CK1_BAD_PIN		INT_PIN
Type	R	R	R	R	R/W	R/W	R	R/W

Reset value = 0011 1110

Bit	Name	Function
7:4	Reserved	
3	CK2_BAD_PIN	<b>CK2_BAD_PIN.</b> The CK2_BAD status can be reflected on the C2B output pin. 0: C2B output pin tristated 1: C2B status reflected to output pin
2	CK1_BAD_PIN	<b>CK1_BAD_PIN.</b> The CK1_BAD status can be reflected on the C1B output pin. 0: C1B output pin tristated 1: C1B status reflected to output pin
1	Reserved	
0	INT_PIN	<b>INT_PIN.</b> Reflects the interrupt status on the INT_C1B output pin. 0: Interrupt status not displayed on INT_C1B output pin. If CK1_BAD_PIN = 0, INT_C1B output pin is tristated. 1: Interrupt status reflected to output pin. Instead, the INT_C1B pin indicates when CKIN1 is bad.

## Register 21.

Bit	D7	D6	D5	D4	D3	D2	D1	D0
Name							CK1_ACTV_PIN	CKSEL_PIN
Type	R	Force 1	R	R	R	R	R/W	R/W

Reset value = 1111 1111

Bit	Name	Function
7:2	Reserved	
1	CK1_ACTV_PIN	<p><b>CK1_ACTV_PIN.</b></p> <p>The CK1_ACTV_REG status bit can be reflected to the CS_CA output pin using the CK1_ACTV_PIN enable function. CK1_ACTV_PIN is of consequence only when pin controlled clock selection is not being used.</p> <p>0: CS_CA output pin tristated.</p> <p>1: Clock Active status reflected to output pin.</p>
0	CKSEL_PIN	<p><b>CKSEL_PIN.</b></p> <p>If manual clock selection is being used, clock selection can be controlled via the CKSEL_REG[1:0] register bits or the CS_CA input pin. This bit is only active when AUTOSEL_REG = Manual.</p> <p>0: CS_CA pin is ignored. CKSEL_REG[1:0] register bits control clock selection.</p> <p>1: CS_CA input pin controls clock selection.</p>

## Register 22.

Bit	D7	D6	D5	D4	D3	D2	D1	D0
Name					CK_ACTV_POL	CK_BAD_POL		INT_POL
Type	R	R	R	R	R/W	R/W	R	R/W

Reset value = 1101 1111

Bit	Name	Function
7:4	Reserved	
3	CK_ACTV_POL	<b>CK_ACTV_POL.</b> Sets the active polarity for the CS_CA signals when reflected on an output pin. 0: Active low 1: Active high
2	CK_BAD_POL	<b>CK_BAD_POL.</b> Sets the active polarity for the INT_C1B and C2B signals when reflected on output pins. 0: Active low 1: Active high
1	Reserved	
0	INT_POL	<b>INT_POL.</b> Sets the active polarity for the interrupt status when reflected on the INT_C1B output pin. 0: Active low 1: Active high

## Register 23.

Bit	D7	D6	D5	D4	D3	D2	D1	D0
Name						LOS2_MSK	LOS1_MSK	Reserved
Type	R	R	R	R	R	R/W	R/W	R

Reset value = 0001 1111

Bit	Name	Function
7:3	Reserved	
2	LOS2_MSK	<b>LOS2_MSK.</b> Determines if a LOS on CKIN2 (LOS2_FLG) is used in the generation of an interrupt. Writes to this register do not change the value held in the LOS2_FLG register. 0: LOS2 alarm triggers active interrupt on INT_C1B output (if INT_PIN=1). 1: LOS2_FLG ignored in generating interrupt output.
1	LOS1_MSK	<b>LOS1_MSK.</b> Determines if a LOS on CKIN1 (LOS1_FLG) is used in the generation of an interrupt. Writes to this register do not change the value held in the LOS1_FLG register. 0: LOS1 alarm triggers active interrupt on INT_C1B output (if INT_PIN=1). 1: LOS1_FLG ignored in generating interrupt output.
0	Reserved	

## Register 24.

Bit	D7	D6	D5	D4	D3	D2	D1	D0
Name						FOS2_MSK	FOS1_MSK	
Type	R	R	R	R	R	R/W	R/W	R

Reset value = 0011 1111

Bit	Name	Function
7:3	Reserved	
2	FOS2_MSK	<p><b>FOS2_MSK.</b>            Determines if the FOS2_FLG is used to in the generation of an interrupt. Writes to this register do not change the value held in the FOS2_FLG register.            0: FOS2 alarm triggers active interrupt on INT_C1B output (if INT_PIN=1).            1: FOS2_FLG ignored in generating interrupt output.</p>
1	FOS1_MSK	<p><b>FOS1_MSK.</b>            Determines if the FOS1_FLG is used in the generation of an interrupt. Writes to this register do not change the value held in the FOS1_FLG register.            0: FOS1 alarm triggers active interrupt on INT_C1B output (if INT_PIN=1).            1: FOS1_FLG ignored in generating interrupt output.</p>
0	Reserved	



**Register 25.**

Bit	D7	D6	D5	D4	D3	D2	D1	D0
<b>Name</b>	N1_HS [2:0]							
<b>Type</b>	R/W			R	R	R	R	R

Reset value = 0010 0000

Bit	Name	Function
7:5	N1_HS [2:0]	<b>N1_HS [2:0].</b> Sets value for N1 high speed divider which drives NCn_LS (n = 1 to 2) low-speed divider. 000: N1 = 4 Note: Changing the coarse skew via the INC pin is disabled for this value. 001: N1 = 5 010: N1 = 6 011: N1 = 7 100: N1 = 8 101: N1 = 9 110: N1 = 10 111: N1 = 11
4:0	Reserved	

**Register 31.**

Bit	D7	D6	D5	D4	D3	D2	D1	D0
<b>Name</b>					NC1_LS [19:16]			
<b>Type</b>	R	R	R	R	R/W			

Reset value = 0000 0000

Bit	Name	Function
7:4	Reserved	
3:0	NC1_LS [19:16]	<b>NC1_LS [19:16].</b> Sets value for NC1 low-speed divider, which drives CKOUT1 output. Must be 0 or odd. 00000000000000000000 = 1 00000000000000000001 = 2 00000000000000000011 = 4 00000000000000000101 = 6 ... 11111111111111111111 = $2^{20}$ Valid divider values = [1, 2, 4, 6, ..., $2^{20}$ ]

## Register 32.

Bit	D7	D6	D5	D4	D3	D2	D1	D0
<b>Name</b>	NC1_LS [15:8]							
<b>Type</b>	R/W							

Reset value = 0000 0000

Bit	Name	Function
7:0	NC1_LS [15:8]	<p><b>NC1_LS [15:8].</b>  Sets value for NC1 low-speed divider, which drives CKOUT1 output. Must be 0 or odd.  00000000000000000000 = 1  00000000000000000001 = 2  00000000000000000011 = 4  00000000000000000101 = 6  ...  11111111111111111111 = <math>2^{20}</math>  Valid divider values = [1, 2, 4, 6, ..., <math>2^{20}</math>]</p>

## Register 33.

Bit	D7	D6	D5	D4	D3	D2	D1	D0
<b>Name</b>	NC1_LS [7:0]							
<b>Type</b>	R/W							

Reset value = 0011 0001

Bit	Name	Function
7:0	NC1_LS [19:0]	<p><b>NC1_LS [7:0].</b>  Sets value for NC1 low-speed divider, which drives CKOUT1 output. Must be 0 or odd.  00000000000000000000 = 1  00000000000000000001 = 2  00000000000000000011 = 4  00000000000000000101 = 6  ...  11111111111111111111 = <math>2^{20}</math>  Valid divider values = [1, 2, 4, 6, ..., <math>2^{20}</math>]</p>

**Register 34.**

Bit	D7	D6	D5	D4	D3	D2	D1	D0
<b>Name</b>					NC2_LS [19:16]			
<b>Type</b>	R	R	R	R	R/W			

Reset value = 0000 0000

Bit	Name	Function
7:4	Reserved	
3:0	NC2_LS [19:16]	<p><b>NC2_LS [19:16].</b> Sets value for NC2 low-speed divider, which drives CKOUT2 output. Must be 0 or odd.</p> <p>00000000000000000000 = 1  00000000000000000001 = 2  00000000000000000011 = 4  00000000000000000101 = 6  ...  11111111111111111111 = <math>2^{20}</math>  Valid divider values = [1, 2, 4, 6, ..., <math>2^{20}</math>]</p>

**Register 35.**

Bit	D7	D6	D5	D4	D3	D2	D1	D0
<b>Name</b>	NC2_LS [15:8]							
<b>Type</b>	R/W							

Reset value = 0000 0000

Bit	Name	Function
7:0	NC2_LS [15:8]	<p><b>NC2_LS [15:8].</b> Sets value for NC2 low-speed divider, which drives CKOUT2 output. Must be 0 or odd.</p> <p>00000000000000000000 = 1  00000000000000000001 = 2  00000000000000000011 = 4  00000000000000000101 = 6  ...  11111111111111111111 = <math>2^{20}</math>  Valid divider values = [1, 2, 4, 6, ..., <math>2^{20}</math>]</p>

## Register 36.

Bit	D7	D6	D5	D4	D3	D2	D1	D0
Name	NC2_LS [7:0]							
Type	R/W							

Reset value = 0011 0001

Bit	Name	Function
7:0	NC2_LS [7:0]	<p><b>NC2_LS [7:0].</b>  Sets value for NC2 low-speed divider, which drives CKOUT2 output. Must be 0 or odd.  00000000000000000000 = 1  00000000000000000001 = 2  00000000000000000011 = 4  00000000000000000101 = 6  ...  11111111111111111111 = <math>2^{20}</math>  Valid divider values = [1, 2, 4, 6, ..., <math>2^{20}</math>]</p>

## Register 40.

Bit	D7	D6	D5	D4	D3	D2	D1	D0
Name					N2_LS [19:16]			
Type	R				R/W			

Reset value = 1100 0000

Bit	Name	Function
7:4	Reserved	
3:0	N2_LS [19:16]	<p><b>N2_LS [19:16].</b>  Sets the value for the N2 low-speed divider, which drives the phase detector. Must be an even number ranging from 32 to 512 (inclusive).  0000000000000000100000 = 32  0000000000000000100010 = 34  0000000000000000100100 = 36  ...  00000000001000000000 = 512  Valid divider values = [32, 34, 36...512]</p>

**Register 41.**

Bit	D7	D6	D5	D4	D3	D2	D1	D0
<b>Name</b>	N2_LS [15:8]							
<b>Type</b>	R/W							

Reset value = 0000 0000

Bit	Name	Function
7:0	N2_LS [15:8]	<p><b>N2_LS [15:8].</b> Sets the value for the N2 low-speed divider, which drives the phase detector. Must be an even number ranging from 32 to 512 (inclusive).</p> <p>0000000000000000100000 = 32 0000000000000000100010 = 34 0000000000000000100100 = 36 ... 00000000001000000000 = 512</p> <p>Valid divider values = [32, 34, 36...512]</p>

**Register 42.**

Bit	D7	D6	D5	D4	D3	D2	D1	D0
<b>Name</b>	N2_LS [7:0]							
<b>Type</b>	R/W							

Reset value = 1111 1001

Bit	Name	Function
7:0	N2_LS [7:0]	<p><b>N2_LS [7:0].</b> Sets the value for the N2 low-speed divider, which drives the phase detector. Must be an even number ranging from 32 to 512 (inclusive).</p> <p>0000000000000000100000 = 32 0000000000000000100010 = 34 0000000000000000100100 = 36 ... 00000000001000000000 = 512</p> <p>Valid divider values = [32, 34, 36...512]</p>

## Register 43.

Bit	D7	D6	D5	D4	D3	D2	D1	D0
Name						N31 [18:16]		
Type	R	R	R	R	R	R/W		

Reset value = 0000 0000

Bit	Name	Function
7:3	Reserved	
2:0	N31 [18:16]	<b>N31 [18:16].</b> Sets value for input divider for CKIN1. 00000000000000000000 = 1 00000000000000000001 = 2 00000000000000000010 = 3 ... 11111111111111111111 = $2^{19}$ Valid divider values = [1, 2, 3, ..., $2^{19}$ ]

## Register 44.

Bit	D7	D6	D5	D4	D3	D2	D1	D0
Name	N31_[15:8]							
Type	R/W							

Reset value = 0000 0000

Bit	Name	Function
7:0	N31_[15:8]	<b>N31_[15:8].</b> Sets value for input divider for CKIN1. 00000000000000000000 = 1 00000000000000000001 = 2 00000000000000000010 = 3 ... 11111111111111111111 = $2^{19}$ Valid divider values = [1, 2, 3, ..., $2^{19}$ ]

**Register 45.**

Bit	D7	D6	D5	D4	D3	D2	D1	D0
<b>Name</b>	N31_[7:0]							
<b>Type</b>	R/W							

Reset value = 0000 1001

Bit	Name	Function
7:0	N31_[7:0]	<p><b>N31_[7:0].</b> Sets value for input divider for CKIN1. 00000000000000000000 = 1 00000000000000000001 = 2 00000000000000000010 = 3 ... 11111111111111111111 = <math>2^{19}</math> Valid divider values=[1, 2, 3, ..., <math>2^{19}</math>]</p>

**Register 46.**

Bit	D7	D6	D5	D4	D3	D2	D1	D0
<b>Name</b>							N32_[18:16]	
<b>Type</b>	R	R	R	R	R		R/W	

Reset value = 0000 0000

Bit	Name	Function
7:3	Reserved	
2:0	N32_[18:16]	<p><b>N32_[18:16].</b> Sets value for input divider for CKIN2. 00000000000000000000 = 1 00000000000000000001 = 2 00000000000000000010 = 3 ... 11111111111111111111 = <math>2^{19}</math> Valid divider values = [1, 2, 3, ..., <math>2^{19}</math>]</p>

## Register 47.

Bit	D7	D6	D5	D4	D3	D2	D1	D0
<b>Name</b>	N32_[15:8]							
<b>Type</b>	R/W							

Reset value = 0000 0000

Bit	Name	Function
7:0	N32_[15:8]	<b>N32_[15:8].</b> Sets value for input divider for CKIN2. 00000000000000000000 = 1 00000000000000000001 = 2 00000000000000000010 = 3 ... 11111111111111111111 = $2^{19}$ Valid divider values=[1, 2, 3, ..., $2^{19}$ ]

## Register 48.

Bit	D7	D6	D5	D4	D3	D2	D1	D0
<b>Name</b>	N32_[7:0]							
<b>Type</b>	R/W							

Reset value = 0000 1001

Bit	Name	Function
7:0	N32_[7:0]	<b>N32_[7:0].</b> Sets value for input divider for CKIN2. 00000000000000000000 = 1 00000000000000000001 = 2 00000000000000000010 = 3 ... 11111111111111111111 = $2^{19}$ Valid divider values = [1, 2, 3, ..., $2^{19}$ ]



## Register 55h.

Bit	D7	D6	D5	D4	D3	D2	D1	D0
Name			CLKIN2RATE_[2:0]			CLKIN1RATE[2:0]		
Type	R	R	R/W			R/W		

Reset value = 0000 0000

Bit	Name	Function
7:6	Reserved	
5:3	CLKIN2RATE[2:0]	<b>CLKIN2RATE[2:0].</b> CKINn frequency selection for FOS alarm monitoring. 000: 10–27 MHz 001: 25–54 MHz 002: 50–105 MHz 003: 95–215 MHz 004: 190–435 MHz 005: 375–710 MHz 006: Reserved 007: Reserved
2:0	CLKIN1RATE [2:0]	<b>CLKIN1RATE[2:0].</b> CKINn frequency selection for FOS alarm monitoring. 000: 10–27 MHz 001: 25–54 MHz 002: 50–105 MHz 003: 95–215 MHz 004: 190–435 MHz 005: 375–710 MHz 006: Reserved 007: Reserved

## Register 128.

Bit	D7	D6	D5	D4	D3	D2	D1	D0
Name							CK2_ACTV_REG	CK1_ACTV_REG
Type	R	R	R	R	R	R	R	R

Reset value = 0010 0000

Bit	Name	Function
7:2	Reserved	
1	CK2_ACTV_REG	<b>CK2_ACTV_REG.</b> Indicates if CKIN2 is currently the active clock for the PLL input. 0: CKIN2 is not the active input clock. Either it is not selected or LOS2_INT is 1. 1: CKIN2 is the active input clock.
0	CK1_ACTV_REG	<b>CK1_ACTV_REG.</b> Indicates if CKIN1 is currently the active clock for the PLL input. 0: CKIN1 is not the active input clock. Either it is not selected or LOS1_INT is 1. 1: CKIN1 is the active input clock.

## Register 129.

Bit	D7	D6	D5	D4	D3	D2	D1	D0
Name						LOS2_INT	LOS1_INT	
Type	R	R	R	R	R	R	R	R

Reset value = 0000 0110

Bit	Name	Function
7:3	Reserved	
2	LOS2_INT	<b>LOS2_INT.</b> Indicates the LOS status on CKIN2. 0: Normal operation. 1: Internal loss-of-signal alarm on CKIN2 input.
1	LOS1_INT	<b>LOS1_INT.</b> Indicates the LOS status on CKIN1. 0: Normal operation. 1: Internal loss-of-signal alarm on CKIN1 input.
0	Reserved	

## Register 130.

Bit	D7	D6	D5	D4	D3	D2	D1	D0
Name						FOS2_INT	FOS1_INT	
Type	R	R	R	R	R	R	R	R

Reset value = 0000 0001

Bit	Name	Function
7:3	Reserved	
2	FOS2_INT	<b>CKIN2 Frequency Offset Status.</b> 0: Normal operation. 1: Internal frequency offset alarm on CKIN2 input.
1	FOS1_INT	<b>CKIN1 Frequency Offset Status.</b> 0: Normal operation. 1: Internal frequency offset alarm on CKIN1 input.
0	Reserved	

## Register 131.

Bit	D7	D6	D5	D4	D3	D2	D1	D0
Name						LOS2_FLG	LOS1_FLG	
Type	R	R	R	R	R	R/W	R/W	R

Reset value = 0001 1111

Bit	Name	Function
7:3	Reserved	
2	LOS2_FLG	<b>CKIN2 Loss-of-Signal Flag.</b> 0: Normal operation. 1: Held version of LOS2_INT. Generates active output interrupt if output interrupt pin is enabled (INT_PIN = 1) and if not masked by LOS2_MSK bit. Flag cleared by writing 0 to this bit.
1	LOS1_FLG	<b>CKIN1 Loss-of-Signal Flag.</b> 0: Normal operation 1: Held version of LOS1_INT. Generates active output interrupt if output interrupt pin is enabled (INT_PIN = 1) and if not masked by LOS1_MSK bit. Flag cleared by writing 0 to this bit.
0	Reserved	

## Register 132.

Bit	D7	D6	D5	D4	D3	D2	D1	D0
Name					FOS2_FLG	FOS1_FLG		
Type	R	R	R	R	R/W	R/W	R	R

Reset value = 0000 0010

Bit	Name	Function
7:4, 0	Reserved	
3	FOS2_FLG	<b>CLKIN_2 Frequency Offset Flag.</b> 0: Normal operation. 1: Held version of FOS2_INT. Generates active output interrupt if output interrupt pin is enabled (INT_PIN = 1) and if not masked by FOS2_MSK bit. Flag cleared by writing 0 to this bit.
2	FOS1_FLG	<b>CLKIN_1 Frequency Offset Flag.</b> 0: Normal operation 1: Held version of FOS1_INT. Generates active output interrupt if output interrupt pin is enabled (INT_PIN = 1) and if not masked by FOS1_MSK bit. Flag cleared by writing 0 to this bit.
1	Reserved	

# Si5325

## Register 134.

Bit	D7	D6	D5	D4	D3	D2	D1	D0
Name	PARTNUM_RO [11:4]							
Type	R							

Reset value = 0000 0001

Bit	Name	Function
7:0	PARTNUM_RO [11:0]	<b>Device ID (1 of 2).</b> 0000 0001 1001: Si5325

## Register 135.

Bit	D7	D6	D5	D4	D3	D2	D1	D0
Name	PARTNUM_RO [3:0]				REVID_RO [3:0]			
Type	R				R			

Reset value = 1010 0010

Bit	Name	Function
7:4	PARTNUM_RO [11:0]	<b>Device ID (2 of 2).</b> 0000 0001 1001: Si5325
3:0	REVID_RO [3:0]	<b>Indicates Revision Number of Device.</b> 0000: Revision A 0001: Revision B 0010: Revision C Others: Reserved

**Register 136.**

Bit	D7	D6	D5	D4	D3	D2	D1	D0
<b>Name</b>	RST_REG	ICAL						
<b>Type</b>	R/W	R/W	R	R	R	R	R	R

Reset value = 0000 0000

Bit	Name	Function
7	RST_REG	<p><b>Internal Reset (Same as Pin Reset).</b></p> <p><b>Note:</b> The I2C (or SPI) port may not be accessed until 10 ms after RST_REG is asserted.</p> <p>0: Normal operation.</p> <p>1: Reset of all internal logic. Outputs disabled or tristated during reset.</p>
6	ICAL	<p><b>Start an Internal Calibration Sequence.</b></p> <p>For proper operation, the device must go through an internal calibration sequence. ICAL is a self-clearing bit. Writing a one to this location initiates an ICAL. The calibration is complete once the LOL alarm goes low. A valid stable clock (within 100 ppm) must be present to begin ICAL.</p> <p>Note: Any divider, CLKINn_RATE or BWSEL_REG changes require an ICAL to take effect.</p> <p>0: Normal operation.</p> <p>1: Writing a "1" initiates internal self-calibration. Upon completion of internal self-calibration, LOL will go low.</p>
5:0	Reserved	

## Register 138.

Bit	D7	D6	D5	D4	D3	D2	D1	D0
Name							LOS2_EN [1:1]	LOS1_EN [1:1]
Type	R	R	R	R	R	R	R/W	R/W

Reset value = 0000 1111

Bit	Name	Function
7:2	Reserved	
1	LOS2_EN [1:0]	<p><b>Enable CKIN2 LOS Monitoring on the Specified Input (2 of 2).</b></p> <p><b>Note:</b> LOS2_EN is split between two registers.</p> <p>00: Disable LOS monitoring.                      01: Reserved.                      10: Enable LOSA monitoring.                      11: Enable LOS monitoring.</p> <p>LOSA is a slower and less sensitive version of LOS. See the Family Reference Manual for details.</p>
0	LOS1_EN [1:0]	<p><b>Enable CKIN1 LOS Monitoring on the Specified Input (1 of 2).</b></p> <p><b>Note:</b> LOS1_EN is split between two registers.</p> <p>00: Disable LOS monitoring.                      01: Reserved.                      10: Enable LOSA monitoring.                      11: Enable LOS monitoring.</p> <p>LOSA is a slower and less sensitive version of LOS. See the Family Reference Manual for details.</p>



## Register 139.

Bit	D7	D6	D5	D4	D3	D2	D1	D0
Name			LOS2_EN [0:0]	LOS1_EN [0:0]			FOS2_EN	FOS1_EN
Type	R	R	R/W	R/W	R	R	R/W	R/W

Reset value = 1111 1111

Bit	Name	Function
7:6, 3:2	Reserved	
5	LOS2_EN [1:0]	<p><b>Enable CKIN2 LOS Monitoring on the Specified Input (2 of 2).</b></p> <p><b>Note:</b> LOS2_EN is split between two registers.            00: Disable LOS monitoring.            01: Reserved.            10: Enable LOSA monitoring.            11: Enable LOS monitoring.            LOSA is a slower and less sensitive version of LOS. See the family reference manual for details</p>
4	LOS1_EN [1:0]	<p><b>Enable CKIN1 LOS Monitoring on the Specified Input (1 of 2).</b></p> <p><b>Note:</b> LOS1_EN is split between two registers.            00: Disable LOS monitoring.            01: Reserved.            10: Enable LOSA monitoring.            11: Enable LOS monitoring.            LOSA is a slower and less sensitive version of LOS. See the family reference manual for details.</p>
1	FOS2_EN	<p><b>Enables FOS on a Per Channel Basis.</b></p> <p>0: Disable FOS monitoring.            1: Enable FOS monitoring.</p>
0	FOS1_EN	<p><b>Enables FOS on a Per Channel Basis.</b></p> <p>0: Disable FOS monitoring.            1: Enable FOS monitoring.</p>

---

**Register 142.**

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Bit	D7	D6	D5	D4	D3	D2	D1	D0
<b>Name</b>	INDEPENDENTSKEW1 [7:0]							
<b>Type</b>	R/W							

Reset value = 0000 0000

Bit	Name	Function
7:0	INDEPENDENTSKEW1 [7:0]	<b>INDEPENDENTSKEW1.</b> 8 bit field that represents a twos complement of the phase offset in terms of clocks from the high speed output divider. Default = 0.

---

**Register 143.**

---

Bit	D7	D6	D5	D4	D3	D2	D1	D0
<b>Name</b>	INDEPENDENTSKEW2 [7:0]							
<b>Type</b>	R/W							

Reset value = 0000 0000

Bit	Name	Function
7:0	INDEPEND-ENTSKEW2 [7:0]	<b>INDEPENDENTSKEW2.</b> 8 bit field that represents a twos complement of the phase offset in terms of clocks from the high speed output divider. Default = 0.

Table 9. CKOUT\_ALWAYS\_ON and SQICAL Truth Table

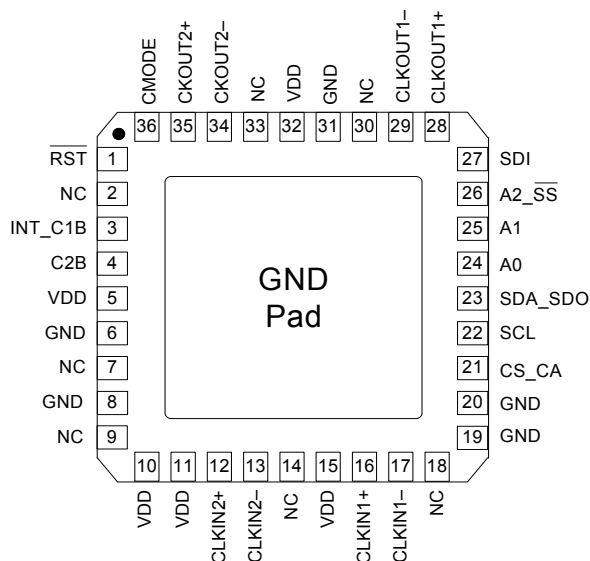
CKOUT_ALWAYS_ON	SQICAL	Results	Output to Output Skew Preserved?
0	0	CKOUT OFF until after the first ICAL	N
0	1	CKOUT OFF until after the first successful ICAL (i.e., when LOL is low)	Y
1	0	CKOUT always ON, including during an ICAL	N
1	1	CKOUT always ON, including during an ICAL	Y

Table 10 lists all of the register locations that should be followed by an ICAL after their contents are changed.

Table 10. Register Locations Requiring ICAL

Addr	Register
0	BYPASS_REG
0	CKOUT_ALWAYS_ON
1	CK_PRIOR2
1	CK_PRIOR1
2	BWSEL_REG
4	HIST_DEL
5	ICMOS
7	FOSREFSEL
9	HIST_AVG
10	DSBL2_REG
10	DSBL1_REG
11	PD_CK2
11	PD_CK1
19	FOS_EN
19	FOS_THR
19	VALTIME
19	LOCKT
25	N1_HS
31	NC1_LS
34	NC2_LS
40	N2_HS
40	N2_LS
43	N31
46	N32
55	CLKIN2RATE
55	CLKIN1RATE

## 5. Pin Descriptions: Si5325



**Table 11. Si5325 Pin Descriptions**

Pin #	Pin Name	I/O	Signal Level	Description
1	$\overline{\text{RST}}$	I	LVC MOS	<b>External Reset.</b> Active low input that performs external hardware reset of device. Resets all internal logic to a known state and forces the device registers to their default value. Clock outputs are tristated during reset. The part must be programmed after a reset or power-on to get a clock output. See Family Reference Manual for details. This pin has a weak pull-up.
2, 7, 9, 14, 18, 30, 33	NC			<b>No Connect.</b> This pin must be left unconnected for normal operation.
3	INT_C1B	O	LVC MOS	<b>Interrupt/CKIN1 Invalid Indicator.</b> This pin functions as a device interrupt output or an alarm output for CKIN1. If used as an interrupt output, <i>INT_PIN</i> must be set to 1. The pin functions as a maskable interrupt output with active polarity controlled by the <i>INT_POL</i> register bit. If used as an alarm output, the pin functions as a LOS (and optionally FOS) alarm indicator for CKIN1. Set <i>CK1_BAD_PIN</i> = 1 and <i>INT_PIN</i> = 0. 0 = CKIN1 present. 1 = LOS (FOS) on CKIN1. The active polarity is controlled by <i>CK_BAD_POL</i> . If no function is selected, the pin tristates.
<b>Note:</b> Internal register names are indicated by underlined italics, e.g., <i>INT_PIN</i> . See Si5325 Register Map.				

Table 11. Si5325 Pin Descriptions (Continued)

Pin #	Pin Name	I/O	Signal Level	Description
4	C2B	O	LVC MOS	<b>CKIN2 Invalid Indicator.</b> This pin functions as a LOS (and optionally FOS) alarm indicator for CKIN2 if <i>CK2_BAD_PIN</i> = 1. 0 = CKIN2 present. 1 = LOS (FOS) on CKIN2. The active polarity can be changed by <i>CK_BAD_POL</i> . If <i>CK2_BAD_PIN</i> = 0, the pin tristates.
5, 10, 11, 15, 32	V <sub>DD</sub>	V <sub>DD</sub>	Supply	<b>Supply.</b> The device operates from a 1.8, 2.5, or 3.3 V supply. Bypass capacitors should be associated with the following VDD pins: 5                   0.1 μF 10                   0.1 μF 32                   0.1 μF A 1.0 μF should also be placed as close to device as is practical.
6, 8, 19, 20 31	GND	GND	Supply	<b>Ground.</b> Must be connected to system ground. Minimize the ground path impedance for optimal performance of this device.
12 13	CKIN2+ CKIN2–	I	Multi	<b>Clock Input 2.</b> Differential input clock. This input can also be driven with a single-ended signal. Input frequency range is 10 to 710 MHz.
16 17	CKIN1+ CKIN1–	I	Multi	<b>Clock Input 1.</b> Differential input clock. This input can also be driven with a single-ended signal. Input frequency range is 10 to 710 MHz.
<b>Note:</b> Internal register names are indicated by underlined italics, e.g., <i>INT_PIN</i> . See Si5325 Register Map.				

Table 11. Si5325 Pin Descriptions (Continued)

Pin #	Pin Name	I/O	Signal Level	Description
21	CS_CA	I/O	LVC MOS	<p><b>Input Clock Select/Active Clock Indicator.</b></p> <p><b>Input:</b> In manual clock selection mode, this pin functions as the manual input clock selector if the <i>CKSEL_PIN</i> is set to 1.  0 = Select CKIN1.  1 = Select CKIN2.  If <i>CKSEL_PIN</i> = 0, the <i>CKSEL_REG</i> register bit controls this function. If configured as input, must be set high or low.</p> <p><b>Output:</b> In automatic clock selection mode, this pin indicates which of the two input clocks is currently the active clock. If alarms exist on both clocks, CA will indicate the last active clock that was used before entering the VCO freeze state. The <i>CK_ACTV_PIN</i> register bit must be set to 1 to reflect the active clock status to the CA output pin.  0 = CKIN1 active input clock.  1 = CKIN2 active input clock.  If <i>CK_ACTV_PIN</i> = 0, this pin will tristate. The CA status will always be reflected in the <i>CK_ACTV_REG</i> read only register bit.</p>
22	SCL	I	LVC MOS	<p><b>Serial Clock/Serial Clock.</b></p> <p>This pin functions as the serial clock input for both SPI and I<sup>2</sup>C modes.  This pin has a weak pulldown.</p>
23	SDA_SDO	I/O	LVC MOS	<p><b>Serial Data.</b></p> <p>In I<sup>2</sup>C control mode (CMODE = 0), this pin functions as the bidirectional serial data port.  In SPI control mode (CMODE = 1), this pin functions as the serial data output.</p>
25 24	A1 A0	I	LVC MOS	<p><b>Serial Port Address.</b></p> <p>In I<sup>2</sup>C control mode (CMODE = 0), these pins function as hardware controlled address bits. The I<sup>2</sup>C address is 1101 [A2] [A1] [A0].  In SPI control mode (CMODE = 1), these pins are ignored.  This pin has a weak pulldown.</p>
26	A2 $\overline{SS}$	I	LVC MOS	<p><b>Serial Port Address/Slave Select.</b></p> <p>In I<sup>2</sup>C control mode (CMODE = 0), this pin functions as a hardware controlled address bit [A2].  In SPI control mode (CMODE = 1), this pin functions as the slave select input.  This pin has a weak pulldown.</p>
<p><b>Note:</b> Internal register names are indicated by underlined italics, e.g., <i>INT_PIN</i>. See Si5325 Register Map.</p>				

Table 11. Si5325 Pin Descriptions (Continued)

Pin #	Pin Name	I/O	Signal Level	Description
27	SDI	I	LVC MOS	<b>Serial Data In.</b> In I <sup>2</sup> C control mode (CMODE = 0), this pin is ignored. In SPI control mode (CMODE = 1), this pin functions as the serial data input. This pin has a weak pulldown.
29 28	CKOUT1– CKOUT1+	O	Multi	<b>Output Clock 1.</b> Differential output clock with a frequency range of 10 MHz to 1.4175 GHz. Output signal format is selected by <i>SFOUT1_REG</i> register bits. Output is differential for LVPECL, LVDS, and CML compatible modes. For CMOS format, both output pins drive identical single-ended clock outputs.
34 35	CKOUT2– CKOUT2+	O	Multi	<b>Output Clock 2.</b> Differential output clock with a frequency range of 10 MHz to 1.4175 GHz. Output signal format is selected by <i>SFOUT2_REG</i> register bits. Output is differential for LVPECL, LVDS, and CML compatible modes. For CMOS format, both output pins drive identical single-ended clock outputs.
36	CMODE	I	LVC MOS	<b>Control Mode.</b> Selects I <sup>2</sup> C or SPI control mode for the Si5325. 0 = I <sup>2</sup> C Control Mode. 1 = SPI Control Mode. Must not float.
GND PAD	GND	GND	Supply	<b>Ground Pad.</b> The ground pad must provide a low thermal and electrical impedance to a ground plane.
<b>Note:</b> Internal register names are indicated by underlined italics, e.g., <i>INT_PIN</i> . See Si5325 Register Map.				

# Si5325

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## 6. Ordering Guide

Ordering Part Number	Output Clock Frequency Range	Package	ROHS6, Pb-Free	Temperature Range
Si5325A-C-GM*	.002–945 MHz 970–1134 MHz 1.213–1.4 GHz	36-Lead 6 x 6 mm QFN	Yes	–40 to 85 °C
Si5325B-C-GM*	.002–808 MHz	36-Lead 6 x 6 mm QFN	Yes	–40 to 85 °C
Si5325C-C-GM*	.002–346 MHz	36-Lead 6 x 6 mm QFN	Yes	–40 to 85 °C

**\*Note:** Not recommended for new designs. For alternatives, see the Si533x family.



## 7. Package Outline: 36-Pin QFN

Figure 6 illustrates the package details for the Si5325. Table 12 lists the values for the dimensions shown in the illustration.

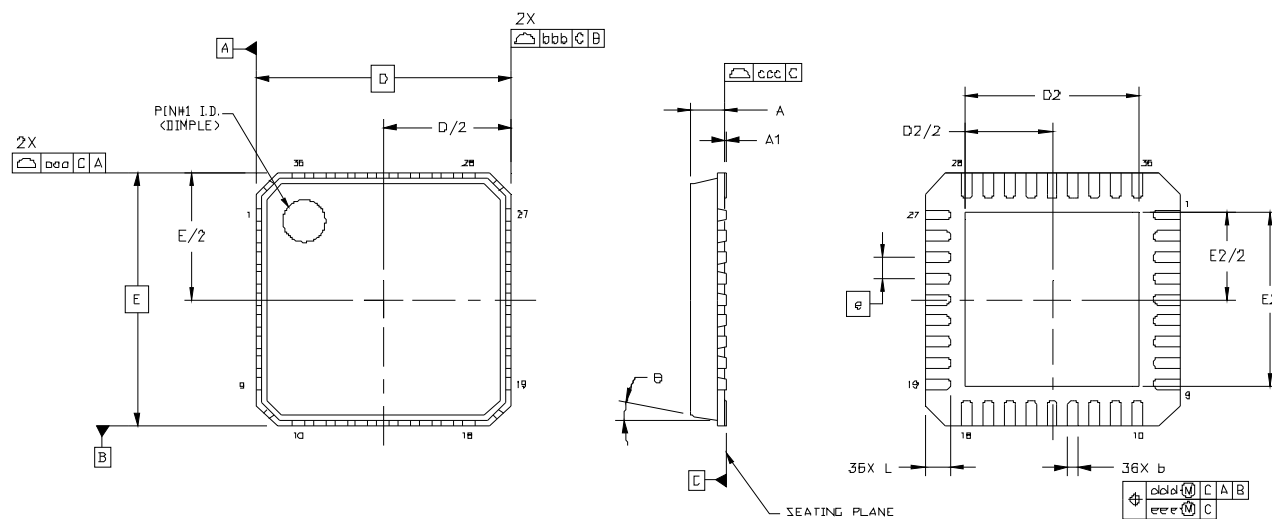


Figure 6. 36-Pin Quad Flat No-lead (QFN)

Table 12. Package Dimensions

Symbol	Millimeters			Symbol	Millimeters		
	Min	Nom	Max		Min	Nom	Max
A	0.80	0.85	0.90	L	0.50	0.60	0.70
A1	0.00	0.02	0.05	$\theta$	—	—	12°
b	0.18	0.25	0.30	aaa	—	—	0.10
D	6.00 BSC			bbb	—	—	0.10
D2	3.95	4.10	4.25	ccc	—	—	0.08
e	0.50 BSC			ddd	—	—	0.10
E	6.00 BSC			eee	—	—	0.05
E2	3.95	4.10	4.25				

**Notes:**

1. All dimensions shown are in millimeters (mm) unless otherwise noted.
2. Dimensioning and Tolerancing per ANSI Y14.5M-1994.
3. This drawing conforms to JEDEC outline MO-220, variation VJJD.
4. Recommended card reflow profile is per the JEDEC/IPC J-STD-020 specification for Small Body Components.

## 8. Land Pattern: 36-Pin QFN

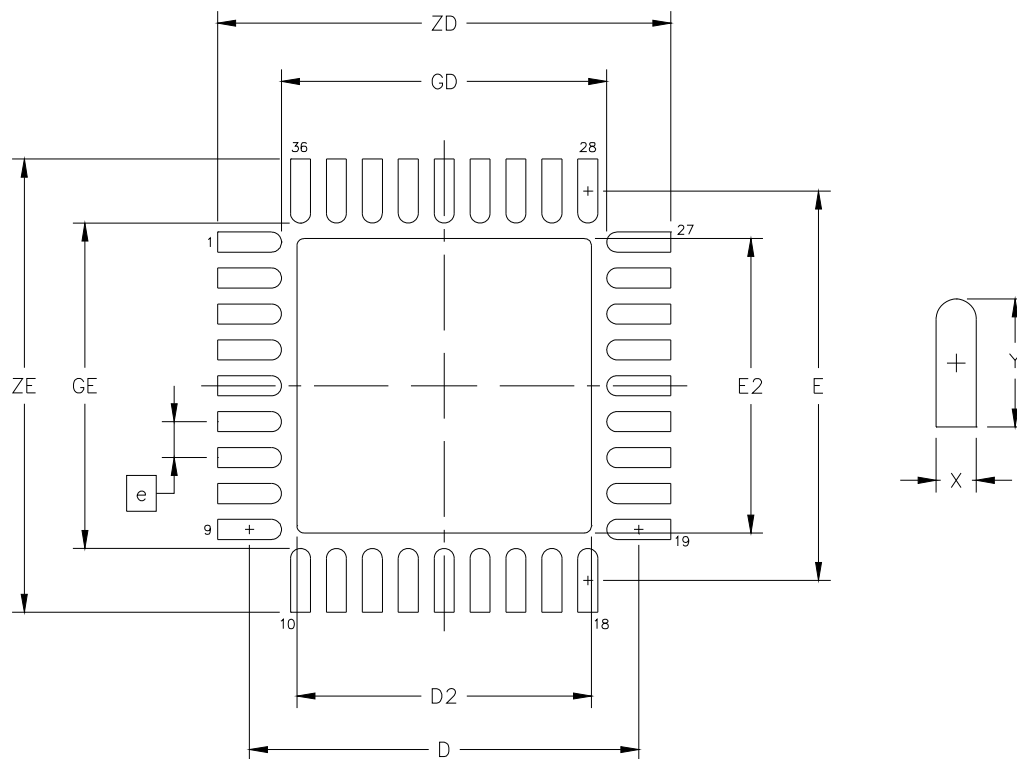


Figure 7. 36-Pin QFN Land Pattern

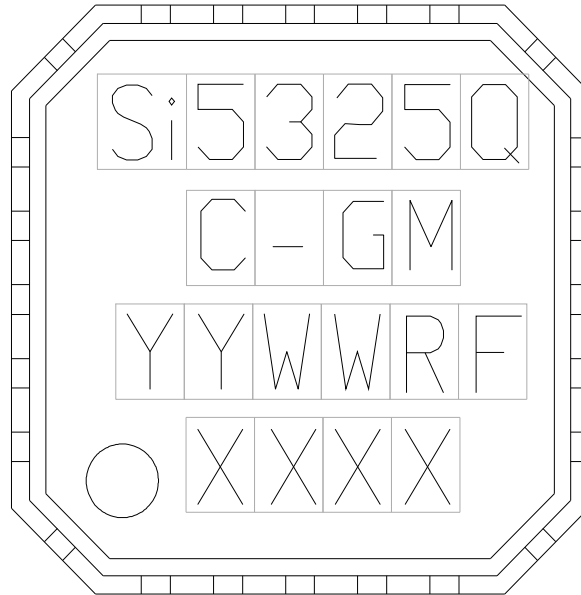
Table 13. PCB Land Pattern Dimensions

Dimension	MIN	MAX
e	0.50 BSC.	
E	5.42 REF.	
D	5.42 REF.	
E2	4.00	4.20
D2	4.00	4.20
GE	4.53	—
GD	4.53	—
X	—	0.28
Y	0.89 REF.	
ZE	—	6.31
ZD	—	6.31
<b>Notes:</b> <b>General</b> <ol style="list-style-type: none"> <li>All dimensions shown are in millimeters (mm) unless otherwise noted.</li> <li>Dimensioning and Tolerancing is per the ANSI Y14.5M-1994 specification.</li> <li>This Land Pattern Design is based on IPC-SM-782 guidelines.</li> <li>All dimensions shown are at Maximum Material Condition (MMC). Least Material Condition (LMC) is calculated based on a Fabrication Allowance of 0.05 mm.</li> </ol> <b>Solder Mask Design</b> <ol style="list-style-type: none"> <li>All metal pads are to be non-solder mask defined (NSMD). Clearance between the solder mask and the metal pad is to be 60 <math>\mu</math>m minimum, all the way around the pad.</li> </ol> <b>Stencil Design</b> <ol style="list-style-type: none"> <li>A stainless steel, laser-cut and electro-polished stencil with trapezoidal walls should be used to assure good solder paste release.</li> <li>The stencil thickness should be 0.125 mm (5 mils).</li> <li>The ratio of stencil aperture to land pad size should be 1:1 for the perimeter pads.</li> <li>A 4 x 4 array of 0.80 mm square openings on 1.05 mm pitch should be used for the center ground pad.</li> </ol> <b>Card Assembly</b> <ol style="list-style-type: none"> <li>A No-Clean, Type-3 solder paste is recommended.</li> <li>The recommended card reflow profile is per the JEDEC/IPC J-STD-020 specification for Small Body Components.</li> </ol>		

# Si5325

## 9. Top Marking

### 9.1. Si5325 Top Marking (QFN)



### 9.2. Top Marking Explanation

<b>Mark Method:</b>	Laser	
<b>Font Size:</b>	0.80 mm Right-Justified	
<b>Line 1 Marking:</b>	Si5325Q	Customer Part Number Q = Speed Code: A, B, C See Ordering Guide for options.
<b>Line 2 Marking:</b>	C-GM	C = Product Revision G = Temperature Range -40 to 85 °C (RoHS6) M = QFN Package
<b>Line 3 Marking:</b>	YYWWRF	YY = Year WW = Work Week R = Die Revision F = Internal code Assigned by the Assembly House. Corresponds to the year and work week of the mold date.
<b>Line 4 Marking:</b>	Pin 1 Identifier	Circle = 0.75 mm Diameter Lower-Left Justified
	XXXX	Internal Code

## DOCUMENT CHANGE LIST

### Revision 0.23 to Revision 0.24

- Clarified that the two outputs have a common, higher frequency source on page 1.
- Changed LVTTTL to LVCMOS in Table 2, "Absolute Maximum Ratings," on page 5.
- Added Figure 1, "Typical Phase Noise Plot," on page 4.
- Updated "5. Pin Descriptions: Si5325".
  - Removed references to latency control, INC, and DEC.
  - Changed font for register names to underlined italics.
- Updated "6. Ordering Guide" on page 56.
- Added "8. Land Pattern: 36-Pin QFN".

### Revision 0.24 to Revision 0.25

- Updated Section "5. Pin Descriptions: Si5325" on page 52.

### Revision 0.25 to Revision 0.26

- Removed Figure 1. "Typical Phase Noise Plot."
- Changed pins 11 and 15 from NC to VDD in "5. Pin Descriptions: Si5325".

### Revision 0.26 to Revision 0.3

- Changed 1.8 V operating range to  $\pm 5\%$ .
- Updated Table 1 on page 4.
- Updated Table 2 on page 5.
- Added page 14.
- Updated "2. Functional Description" on page 16.
- Clarified "5. Pin Descriptions: Si5325" on page 52 including pull-up/pull-down.

### Revision 0.3 to Revision 0.4

- Added register map
- Lowered minimum CKOUT frequency
- Updated spec tables
  - ESD tolerance, Table 2 on page 5
  - Minimum input and output clock frequencies, Table 1 on page 4
  - Absolute maximum VDD voltage, Table 2 on page 5
- Added to spec table
  - CKIN voltage limits, Table 2 on page 5
  - Typical jitter and phase noise values, Table 1 on page 4
- No bypass mode with CMOS outputs

### Revision 0.4 to Revision 0.5

- Expanded electrical specification tables 1 through 7.
- Removed support for CMOS outputs in Bypass mode.
- Corrected minor errors in register map section.
- Updated "Features" on page 1".
  - Added "not recommended for new designs" language.
- Updated Table 5 on page 52.
- Updated "6. Ordering Guide" on page 56.
- Removed note from "5. Pin Descriptions: Si5325" on page 52.

### Revision 0.5 to Revision 1.0

- Updated logo.
- Transitioned to full production.

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