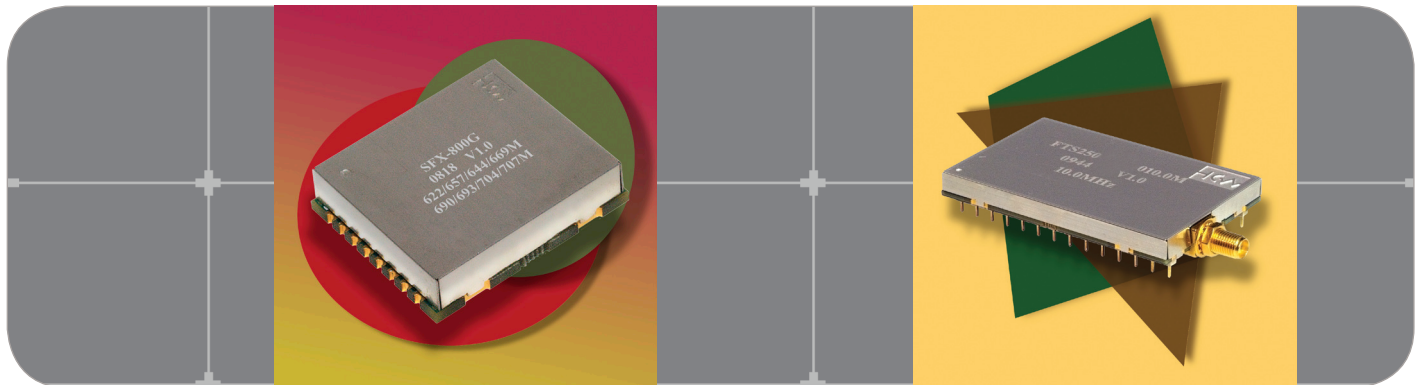
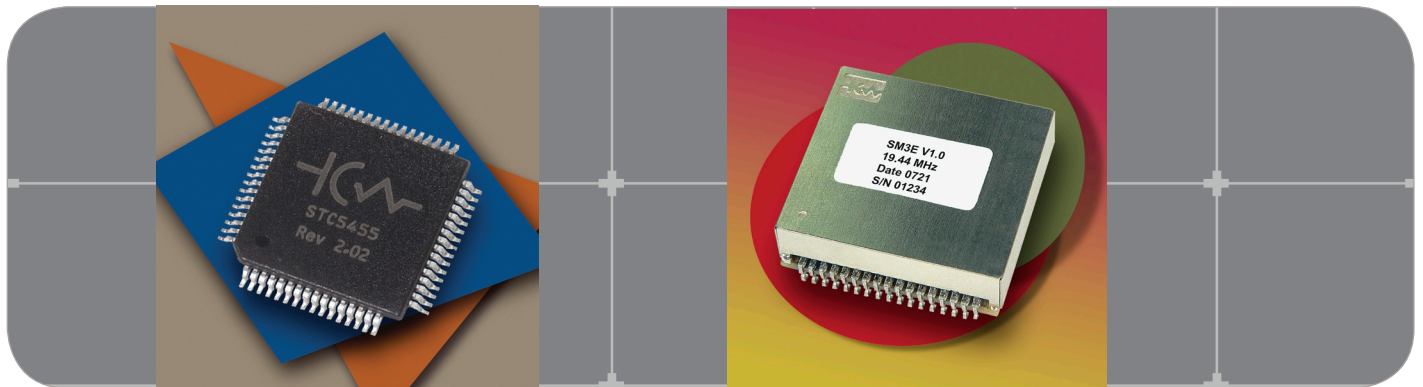


# TIMING SOLUTIONS PRODUCT GUIDE

THE CONNOR-WINFIELD CORPORATION



**CONNOR  
WINFIELD**

**Global Timing Solutions  
for 50 Years**



# CONNOR WINFIELD



**At Connor-Winfield we take exceptional pride in providing solutions to your frequency control design requirements. Our ongoing goal is to always supply you with the right solution for *your* product.**

**With this ever-prevailing philosophy, we will work with your design team to assure complete compatibility with your final product design — even if that product does not currently exist. By participating at the front end of your design cycle, we will recommend the exact product you need...or co-develop to match your exact and precise design requirements.**

**This Timing Product Guide is intended to as an overview of the full line of Connor-Winfield timing products. Please visit our website for a more comprehensive look at our product offering.**

[www.conwin.com](http://www.conwin.com)

**Celebrating  
50 Years  
of Timing  
Excellence**

## Network Timing Products

Since 1963, Connor-Winfield has been a leader serving the OEM oscillator and crystal marketplace. Total timing system design is the natural evolution of Connor-Winfield's experience and expertise. Incorporating proven crystal, VCXO, TCXO and OCXO technologies, we provide complete subsystems for network timing, frequency regeneration and timing signal generation. Choosing Connor-Winfield timing subsystems eliminates the need for dedicated timing expertise and the need to engineer and test individual filters, clocks and control functions; dramatically reducing design time and accelerating time to market. You get a system level solution, complete and ready to perform within the precise parameters of network timing requirements and your system communications/control specifications. All Connor-Winfield network timing products are designed to meet and exceed Telcordia/ITU standards including GR-1244 and GR-253, as well as G.812, G.813, G.8262 and G.8263 specifications.

## GPS Network Timing Products

GPS Disciplined Oscillators (GPSDOs) are designed specifically for precision timing and synchronization of wireless networks. Wireless systems need precise timing to optimize use of their assigned radio spectrums across extensive geographic areas. Connor-Winfield's GPS models combine a GPS receiver with high-quality oscillators, for integrated low-cost GPS timing modules.

Connor-Winfield, a pioneer in timing and synchronization products, continues to provide advanced technology to meet the shifting needs of the wireless market. Our products have a strong history of reliability in applications from CDMA base stations to paging towers to e-commerce. In the ever-evolving wireless world, Connor-Winfield's timing and synchronization solutions stand apart in offering unsurpassed, reliable and quality performance. You can depend on Connor-Winfield to continue to lead the way for your GPS timing needs.

## Reference Design

After a discussion to understand the architecture of your network element, Connor-Winfield engineers can recommend a timing solution that exactly matches your requirements. The reference design will then include an ASIC and Connor-Winfield software, along with a functional block diagram and recommendations for external components. This allows the OEM to lay the design out on their board and manage all aspects of the material supply of the components.

**All Connor-Winfield network timing products meet Telcordia/ITU standards including GR-1244, GR-253, G.812, G.813, as well as G.8282 and G.8263 specifications.**

# SOLUTIONS

## Stratum 3 Timing ICs: Sync Card and Line Card Solutions

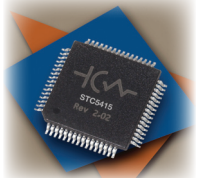
Connor-Winfield's Timing ICs are single chip solutions for timing solutions and line card operations in SDH, SONET, and Synchronous Ethernet applications. All ICs have freerun, holdover and reference switching capabilities.

Control monitoring is done through an SPI bus. STC54xx series conform to GR-1244-CORE, GR-253-CORE, G.812 (Type IV), G.8262 (Option 1 & 2), G.812 and G.813 (Option 1 & 2). STC3800 conforms to G.812 (Type III) and G.8263. These modules address all reference monitoring, selection, filtering, synthesis and control.

**STC5420**



**STC5415**



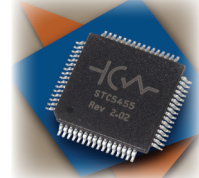
**STC5423**



**STC5425**



**STC5455**



The RoHS compliant **STC54xx Series** accepts up to 12 clock reference inputs and generates up to 10 synchronized clock outputs. Synchronized outputs may be programmed for a wide variety frequencies including Nx8kHz, OC-N, Ethernet frequencies and framing pulse clocks. Reference inputs are individually monitored for activity and quality.

The STC54xx Series are clocked by either a TCXO or OCXO 12.8MHz external oscillator. A well-chosen external oscillator, such as T502-12.8M or an OH300-012.8M from Connor Winfield, will allow you to meet all synchronization requirements

STC54xx IC Models	Package	CMOS	Inputs		Ext_Sync 2k/8kHz	Outputs		Frame Clocks
			LVPECL/LVDS	LVCMOS		LVPECL/LVDS		
STC5420	TQFP100	10, 11 or 12	2, 1, or 0		1	6	2	2k/8k
STC5415	TQFP64	3, 4 or 5	2, 1 or 0		1	1	1	2k/8k
STC5423	TQFP100	2	0		0	5	2	2k/8k
STC5425	TQFP64	3, 4 or 5	2, 1 or 0		3	1	1	2k/8k
STC5455	TQFP64	3, 4 or 5	2, 1 or 0		3	1	1	2k/8k

STC54xx IC Models	Timing Generators	PLL BW (Hz)	M/S Xref	Application	Compatible Cross Ref	Future
STC5420	T0/T4	0.1 - 103	Yes	Timing Card Redundant Master/Slave	ACS8520 ACS8523 IDT82V3380	1 PPS
STC5415	T0	13 - 103	No	Protection Switching		AD9577 AD9558
STC5423	T0/T4	0.1 - 103	No	Timing Card		
STC5425	T0	13 - 103	No	Protection Switching	ACS8525 ACS8525A	
STC5455	T0/T4	0.1 - 103	No	Timing Card		



**STC3800**

Made for Stratum 3E, The STC3800 supports the Master or Slave mode of operation for redundant designs. In master mode, the device operates in Free Run, locked or Hold Over. In slave mode, the output clocks are locked to the master's primary Sync\_Clk or 8 kHz

synchronous clock output and are phase offset adjustable.

- Input reference frequency are automatically detected
- Supports hardwire pins to select active reference
- Four output signals: one selectable up to 155.52 MHz, one fixed at 8 kHz, one multi frame sync fixed at 2 kHz, and 1.544 MHz or 2.048 MHz BITS output
- Hit-less reference switching
- Better than 1 ppb Holdover accuracy
- Configurable bandwidth filter for Stratum 3 or 3E
- Supports SPI

**STC5420 Block Diagram**

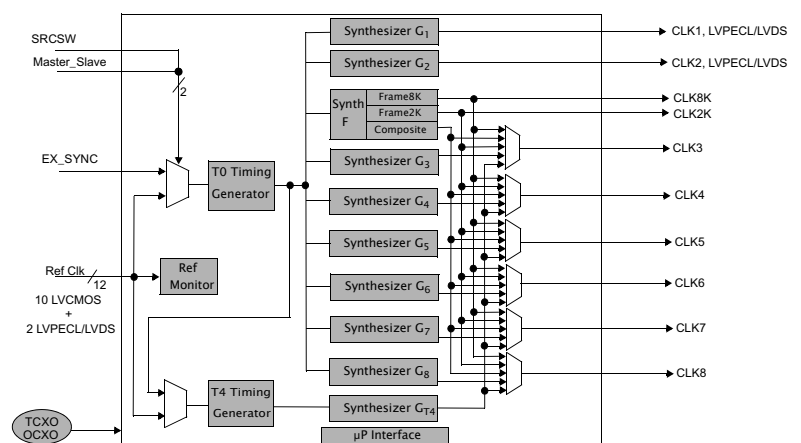


Figure 1: Functional Block Diagram

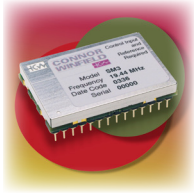
# T I M I N G P R O D U C T S

## Timing Modules – Sync Card

Connor-Winfield's self contained modules for sync card timing solutions are complete system clock modules for Stratum 3 and Stratum 3E timing applications. See individual units for Synchronous Ethernet requirements.

All modules have freerun, holdover, hitless reference switching, adjustable filter bandwidths, input reference qualification, LOL/LOS alarm indication and master/slave operation. Control and monitoring is done through a SPI bus or stateful pin indicators. Main output is VCXO derived and very low jitter <1 ps rms jitter (12 kHz -20 MHz).

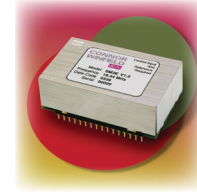
**SM3, SM38RG5,  
SM3-ITG, SM3G**



**SM34**



**SM3E**



Model	Freerun	Holdover	Switching Protection	Reference Quaification	"Master - Slave	Auto Input Frequency Select	SPI Control
All SM3	4.6 ppm	"S3 - 0.32 ppm S3E - 012 ppm	Yes - Hitless	Yes - via setting	Yes	8 Frequencies	Yes Bi-directional

Model	Outputs	Output Frequencies	Ref Inputs	Ref Input Frequencies	Temp Range	Indications	Manual / Autonomous
SM3	3	8k, E1/T1, 19.44 MHz	4	8k to 77.76 MHz	0° to 70°C	Ref Qual, Locked	Yes - Selectable
SM38R	3	8k, E1/T1, 19.44 MHz	8	8k to 77.76 MHz	0° to 70°C	Ref Qual, Locked	Yes - Selectable
SM3-IT	3	8k, E1/T1, 19.44 MHz	4	8k to 77.76 MHz	-40° to 85°C	Ref Qual, Locked	Yes - Selectable
SM34	3	8k, E1/T1, 19.44 MHz	8	8k to 77.76 MHz	0° to 70°C	Ref Qual, Locked	Yes - Selectable
SM3E	3	8k, E1/T1, 19.44 MHz	8	8k to 77.76 MHz	0° to 70°C	Ref Qual, Locked	Yes - Selectable

Model	Package	Ht. Inches	Size (L x W) Inches
SM3	TH	0.25	1.45 x 1.00
SM3-8R	TH	0.515	2.05 x 1.25
SM3-IT	TH	0.535	1.45 x 1.00
SM34	SM	0.35	1.025 x 1.015
SM3E	TH	0.75	2.05 x 1.25

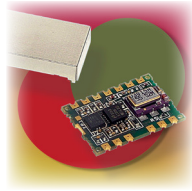
# S O L U T I O N S

## Timing Modules – Line Card Timing Solutions

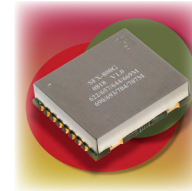
### Frequency Translators – Complete timing systems with little or no external components required.

Frequency Translators convert up to four selectable input frequencies from 8 kHz to 170 MHz on one input to one or more output frequencies up to 1 GHz (e.g. 25 MHz to 155.52 MHz or 19.44 MHz to 156.25 MHz). Input levels can be either CMOS or LVPECL. Output levels are CMOS or LVPECL depending on the model. Outputs are very low jitter (0.3 Ps RMS 12 kHz-20 MHz). Input frequency tracking ranges cover SONET to Ethernet requirements. Lock alarm indication is standard. Common applications for frequency translator modules include clock multiplication, clock jitter attenuation and regeneration, cross frequency domain translation and distribution of backplane/midplane distributed NE base rate clocks. All frequency translators are complete timing systems with little or no external components required.

SFX-424G, 524G



SFX-200, 400G, 800



Model	Volt	Number of Inputs	Select Input Frequencies	Number of Outputs	Select Output Frequencies	Free Run	Output Type
SFX-524 Series	3.3	1	1	1	1	No	LVPECL
SFX-424 Series	3.3	1	4	1	1	No	LVPECL
SFX-200 Series	3.3	1	2	1	2	No	LVPECL
SFX-400 Series	3.3	1	2	1	4	No	LVPECL
SFX-800 Series	3.3	1	1	1	8	No	LVPECL

Model	Input Ref	Output Osc.	Ht. mm	Size (L x W) mm
SFX-524 Series	8kHz - 300 MHz	8 to 800 MHz	6	14 x 12
SFX-424 Series	8 kHz - 170 MHz	26 to 666 MHz	6	20 x 14
SFX-200 Series	8 kHz to 100.00 MHz	to 778 MHz	8	31 x 26
SFX-400 Series	8 kHz to 100.00 MHz	to 945 MHz	8	31 x 26
SFX-800 Series	8 kHz to 250 MHz	to 1125 MHz	8	31 x 26



# T I M I N G P R O D U C T S

## Timing Modules – Line Card Timing

**Synchronous Clock Generators - All are complete timing systems with little or no external components required**

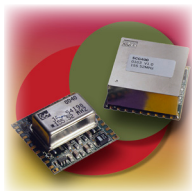
Connor-Winfield's HCMOS surface-mountable Synchronous Clock Generators are designed to be reference clock sources which lock to one or two backplane references from the Timing/Sync Cards. CMOS reference inputs are typically 8 kHz to 25 MHz and have single or multiple outputs with levels of CMOS, LVPECL or both. Output frequencies go as high as 670 MHz. Dual reference inputs are designed to switch hitlessly using select pins. Locked bandwidths range from 3 Hz to 74 Hz to achieve excellent jitter attenuation. A Loss-of-Lock alarm is available with manual or automatic 20 ppm Freerun operation. All Synchronous Clock Generators are complete timing systems with little or no external components required.

All SCG products are well suited for use in line cards, service termination cards and similar functions to provide reliable reference, phase locked synchronization for TDM, PHD, SONET, SDH and Synchronous Ethernet network equipment.

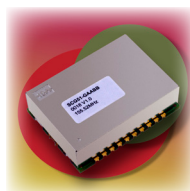
**SCG2000, 2500**



**SCG4000, 4500**



**SCG51, 52**



**SCG2230G**



Model	Volt	Input Ref Freq.	Reference Inputs	Output Osc. Freq.	Number of Outputs	Output Type	Free Run
SCG2000	3.3	8 kHz - 19.44 MHz	1	1.544-125.0 MHz	2	CMOS	Yes
SCG2500	3.3	8 kHz - 25 MHz	2	1.544-125.0 MHz	2	CMOS	Yes
SCG4000	3.3	8 kHz - 19.44 MHz	1	125.0 MHz, 155.52 MHz	1 1	PECL CMOS	Yes
SCG4500	3.3	8 kHz - 19.44 MHz	2	77.76 MHz, 125 MHz, 155.52 MHz, 163.84 MHz	1	LVPECL	Yes
SCG51	3.3	8 kHz to 155.52 MHz	1	to 170 MHz	3	LVPECL	Yes
SCG52	3.3	8 kHz to 155.52 MHz	2	to 170 MHz	3	LVPECL	Yes
SCG2230G	3.3	8 kHz to 19.44 MHz	1	to 170 MHz	1 2	PECL CMOS	Yes

Model	Ht. mm	Size (L x W) mm"
SCG2000	9	21 x 20
SCG2500	9	21 x 20
SCG4000	12	26 x 26
SCG4500	12	26 x 26
SCG51	11	35 x 26
SCG52	11	35 x 26
SCG2230	9	26 x 20

# S O L U T I O N S

## Series 125 Series Timing and Synchronization Solutions

GPS Disciplined Oscillators (GPSDOs) were created specifically for all precision timing and synchronization applications requiring higher end, cost sensitive solutions. By combining our uniquely designed GPS timing receivers with our high-quality oscillators, Connor-Winfield is able to offer a wide variety of superior, cost-effective GPS timing solutions. The 125 Series modules provide customer applications with the precise timing capabilities needed to optimize critical system performance.

**FTS Series Modules** — The FTS Series Frequency and Time Standard modules are GPS driven with a mixed-signal phase lock loop. The series provides a 1PPS CMOS output from a Connor-Winfield GPS timing receiver and generates a 10MHz CMOS and a 10MHz SINE output from an intrinsically low jitter voltage controlled crystal oscillator.

The FTS Series can lock to the on-board GPS receiver or an external 10MHz reference or to an external 1PPS reference. Alarms are provided to indicate Loss-of-Lock, Holdover, and Antenna Fault. The on-board GPS receiver requires an outdoor mounted GPS antenna for the best stability and consistent performance.

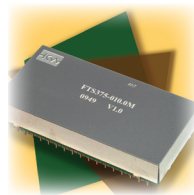
The mode control inputs are used to manually switch between references and/or holdover. The user application should monitor the alarm outputs and manually switch modes as needed.

Serial I/O lines provide access to the NMEA messages from the GPS receiver (referenced in the Connor-Winfield's 125 User Manual. (Contact Connor-Winfield Sales for a copy). The serial I/O lines can be used to access GPS timestamp information, or to verify that the receiver has recovered from an alarm condition. The reset is used to reset the GPS receiver (if needed)

**FTS125**



**FTS250**



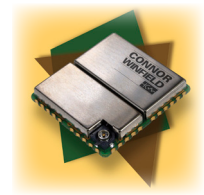
**FTS375**



**FTS500 Xenith**



**Wi125**



Model Series	1 PPS Output	1PPS Output Alignment Sync	GTC/UTC Time/Scale Timing	One Satellite	MTIE	Vcc
All GPS Models	Y	Y	25 ns RMS typ	Y	ITU-T-G.811	3.3V* * exc FTS500

Model Series	Outputs	Output Freq.	Ref Inputs	Ref Input Frequencies	Holdover Accuracy	Alarms
FTS125	PPS, CMOS, SINE	10 MHz	2	1 pps to 10 MHz	0.5 to .020 ppm	LOL, HO, AF
FTS250	PPS, CMOS, SINE	10 MHz	2	1 pps to 10 MHz	0.32 ppm	LOL, HO, AF
FTS375	PPS, CMOS, SINE	10 MHz	2	1 pps to 10 MHz	0.5 to .020 ppm	LOL, HO, AF
FTS500	PPS & SINE	10 MHz	0	1 pps to 10 MHz	.020 ppm	LOL*, HO*, AF* * LED only
Wi125	PPS & CMOS	10 Hz to 80 MHz	0	N/A	0.5 ppm	LOL

Model Series	UARTS @ 10 Hz	Phase Noise Range	Temp	Wander Generation	Package	Ht. mm	Size (L x W)mm
FTS125 FTS125-CTV	3	-105 dBc/Hz (COO)	0° to 70°C	ETSI-PRC ITU-T G.811	TH	18	107 x 84
FTS250	1	-99 dBc/Hz	-40° to 85°C	ITU-T G.811	TH	10	71 x 44
FTS375	2	-115 dBc/Hz	0° to 70°C	ETSI-PRC	TH	18	100 x 50
FTS500	1	-115 dBc/Hz	0° to 70°C	ETSI-PRC	Al housing	56	125 x 106
Wi125	3	NCO	-30° to 80°C	N/A	SM	4	25 x 27

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For specific product data, performance specifications, dimensions and ordering information, please refer to our website at [www.conwin.com](http://www.conwin.com)



## The Connor-Winfield Corporation

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### ISO 9001:2000 Certification

Connor-Winfield has been ISO 9001 certified since 1995, and is currently certified under ISO's newest ISO 9001:2000 standard which ensures superior quality and repeatability in the manufacturing process.



We believe that quality begins well before our product is ever assembled. By maintaining our ISO 9001:2000 Quality System certification, continuous improvement to our processes is a commitment we make to constantly go beyond the expectations of our customers. For us, quality is not just a technique or system. It is an all encompassing and uncompromising philosophy to produce products that not only precisely meet our customers' quality requirements, but also surpass them in every way.



Headquarters, 2111 Comprehensive Dr, Aurora, IL



Manufacturing Facility, 2359 Diehl Rd, Aurora, IL

### Our Partnership Philosophy

Connor-Winfield talks about partnerships, but how do we follow through?

From design to delivery, we are committed to providing the right product when you need it to get your product to market. But the process is circular. We also track emerging developments in our customers' markets to ensure that we have the tools and data required to support your next product development effort