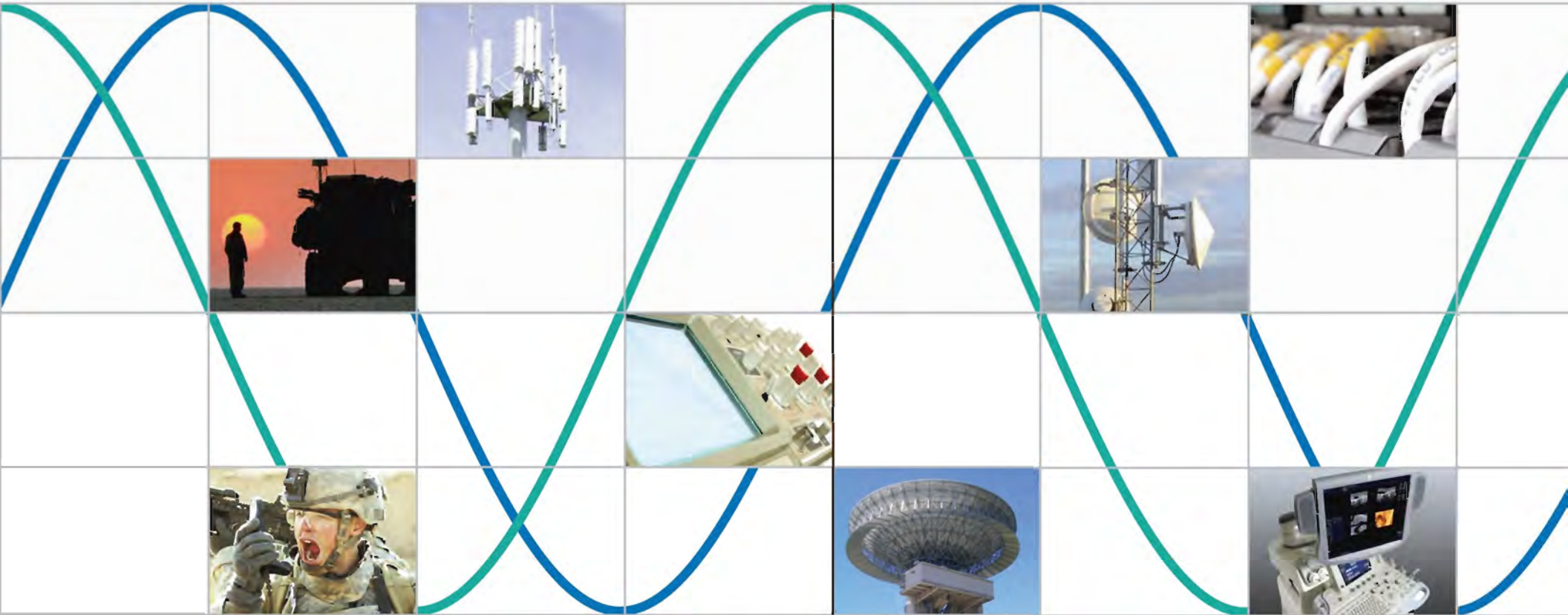


PRODUCT SELECTION GUIDE

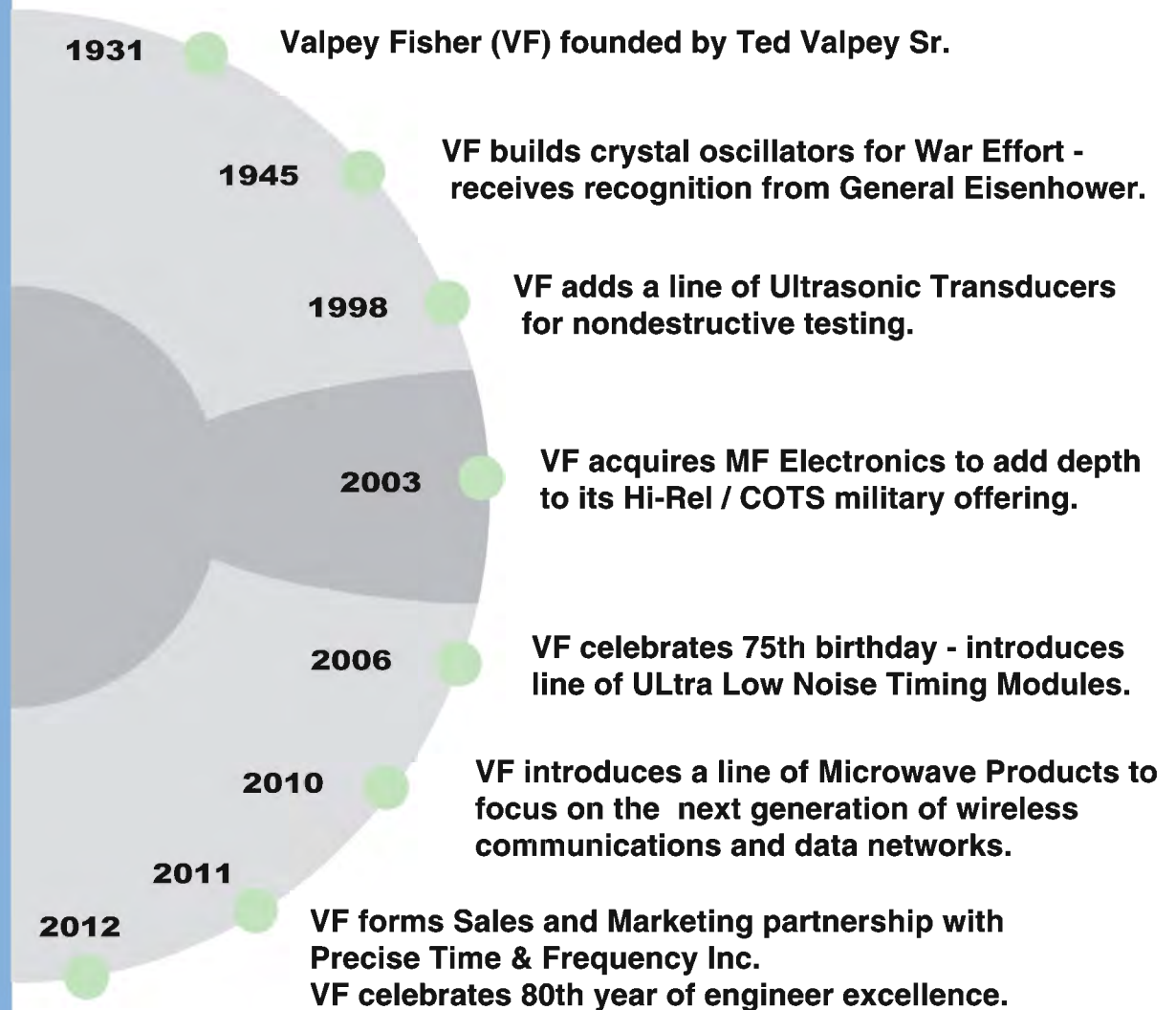


CTS Valpey Corporation is a global leader in the design, development, and manufacture of high-accuracy subsystems integrated into digital and optical telecommunications systems in use throughout the world of voice, data, and military communications. CTS Valpey is the preferred supplier of the electronic components and subsystems that drives many high-tech businesses.

Companies pick CTS Valpey for its long history of technology innovation, its high-quality precision products, and its top-to-bottom commitment to customers to provide and support custom solutions that meet their evolving needs. CTS Valpey's products enable communications system vendors to increase network data capacity and improve voice and video quality.

Through its broad range of timing, control and measurement solutions that deliver high performance, uncompromised precision, and consistent reliability – CTS Valpey partners with customers to help them succeed in the markets they compete in including wireless and wireline infrastructure, microwave radio, military communications, instrumentation, imaging and industrial applications.

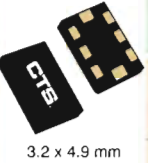
CTS Valpey Corporation is a subsidiary of the parent company, CTS Corporation (NYSE: CTS).



VF is acquired by CTS Corporation.

PRODUCT SELECTION GUIDE



	PART NUMBER	FREQUENCY RANGE							CONTROL VOLTAGE	ATTENUATION RANGE	IIP3
		500MHz	1.0GHz	1.5GHz	2.0GHz	2.5GHz	3.0GHz	3.5GHz			
LTE	VFVA500-200	600 - 900MHz							5.0V	23 dB	45 dBm
GSM / WCDMA	VFVA501-200	0.7 - 1.1GHz							5.0V	23 dB	45 dBm
PCS, DCS, UMTS, AWS 	VFVA502-200	1.5 - 2.2GHz							5.0V	23 dB	45 dBm
	VFVA503-200	1.8 - 2.4GHz							5.0V	23 dB	45 dBm
LTE / WiMax	VFVA504-200	2 - 3GHz							5.0V	23 dB	45 dBm
	VFVA505-200	3 - 4GHz							5.0V	23 dB	45 dBm

PRODUCT SELECTION GUIDE



	PART NUMBER	FREQUENCY RANGE								INSERTION LOSS	ISOLATION	VSWR
		500MHz	1.0GHz	1.5GHz	2.0GHz	2.5GHz	3.0GHz	3.5GHz	4.0GHz			
LTE	VFHY100-010	650 - 850MHz								0.30 dB	30 dB	1.1 : 1
GSM / WCDMA	VFHY101-010	750 - 950MHz								0.30 dB	30 dB	1.1 : 1
	VFHY102-010	0.8 - 1GHz								0.30 dB	30 dB	1.1 : 1
PCS, DCS, UMTS, AWS	VFHY103-010	1.6 - 2GHz								0.30 dB	30 dB	1.1 : 1
	VFHY104-010	1.7 - 2.2GHz								0.30 dB	30 dB	1.1 : 1
	VFHY105-010	1.9 - 2.4GHz								0.35 dB	30 dB	1.1 : 1
LTE / WiMax	VFHY106-010	2.2 - 2.9GHz								0.35 dB	30 dB	1.1 : 1
	VFHY107-010	3 - 4GHz								0.35 dB	30 dB	1.1 : 1



CTS
1.5 x 2.0 mm

PRODUCT SELECTION GUIDE



	PART NUMBER	FREQUENCY RANGE							INSERTION LOSS	ISOLATION	VSWR INPUT/OUTPUT
		500MHz	1.0GHz	1.5GHz	2.0GHz	2.5GHz	3.0GHz	3.5GHz			
LTE	VFPD200-010	698 - 798MHz							0.35 dB	23 dB	1.15 / 1.15
GPS/GSM/WCDMA	VFPD201-010	820 - 960MHz							0.35 dB	23 dB	1.15 / 1.15
PCS, DCS, UMTS, AWS	VFPD202-010	1.4 - 1.7GHz							0.4 dB	20 dB	1.15 / 1.15
	VFPD203-010	1.7 - 2GHz							0.4 dB	20 dB	1.20 / 1.15
LTE / WiMax	VFPD204-010	2 - 2.3GHz							0.4 dB	20 dB	1.15 / 1.15
	VFPD205-010	2.4 - 2.7GHz							0.4 dB	20 dB	1.15 / 1.15
	VFPD206-010	3.3 - 3.8GHz							0.45 dB	16 dB	1.50 / 1.30



PRODUCT SELECTION GUIDE



PART NUMBER	FREQUENCY	ATTENUATION VALUE (dB) ±5%	FLATNESS	VSWR
VFAT003-010	DC - 8GHz	3 dB	0.2 dB	1.15 : 1
VFAT006-010	DC - 8GHz	6 dB	0.2 dB	1.2 : 1
VFAT010-010	DC - 8GHz	10 dB	0.3 dB	1.2 : 1
VFAT020-010	DC - 8GHz	20 dB	0.4 dB	1.2 : 1



CTS


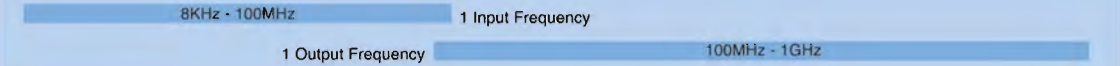

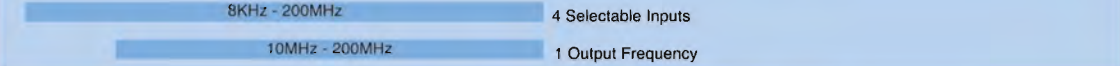
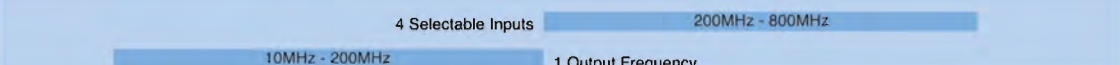

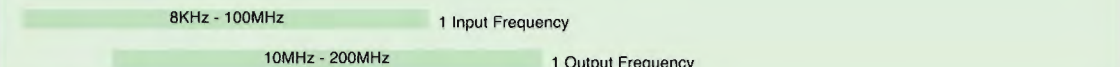

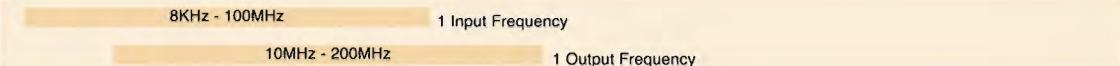

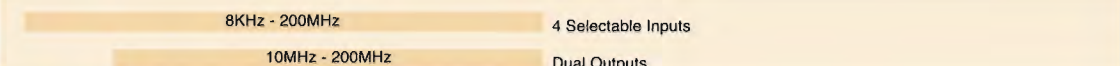
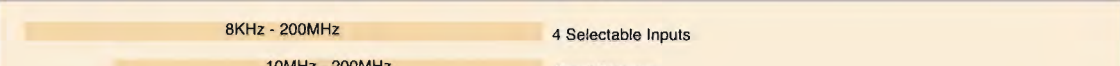

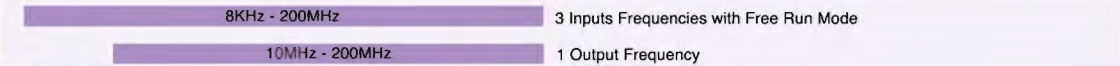

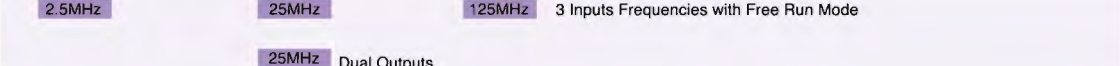
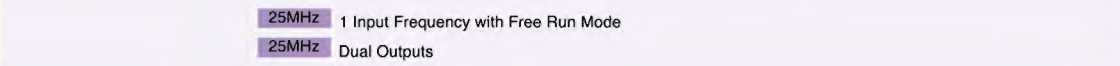
1.5 x 2.0 mm

Timing Modules

JITTER ATTENUATORS

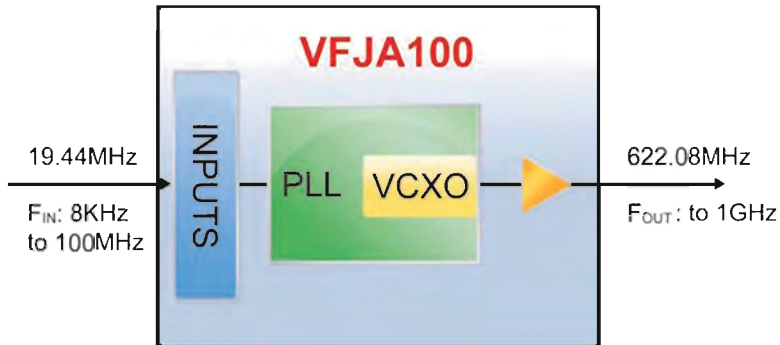
PRODUCT SELECTION GUIDE



	PRODUCT SERIES	OUTPUT	SUPPLY VOLTAGE	FREQUENCY RANGE										JITTER RMS 12KHz to 20MHz
				1KHz	10MHz	20MHz	50MHz	100MHz	200MHz	300MHz	400MHz	600MHz	800MHz	
PECL / LVPECL	 VFJA100	PECL 25.4 x 22.0	5.0V 3.3V											<0.2ps
	 VFJA400	LVPECL 19.5 x 15.5	3.3V											<0.2ps
	VFJA401	LVPECL 19.5 x 15.5	3.3V											<0.2ps
SINE	 VFJA120	SINE 25.4 x 22.0	5.0V 3.3V											<0.15ps
CMOS	 VFJA130	CMOS 25.4 x 22.0	5.0V 3.3V											<0.18ps
	 VFJA432	CMOS 19.5 x 15.5	3.3V											<0.18ps
	VFJA434	CMOS 19.5 x 15.5	3.3V											<0.18ps
SYNC-E	 VFJA402	LVPECL 19.5 x 15.5	3.3V											<0.2ps
	 VFJA905	LVC MOS 19.5 x 15.5	3.3V											<0.25ps
	VFJA910	LVC MOS 15.0 x 13.0	3.3V											<0.25ps

Featured product offering shown. Please visit www.ctsvalpey.com for our full line of Jitter Attenuators.

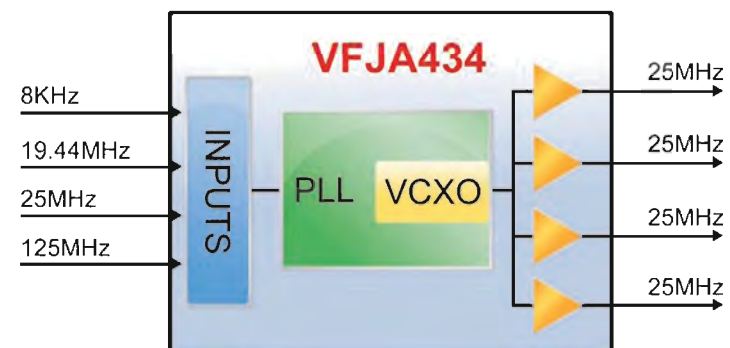
Jitter Attenuator



- Lowest jitter available (<0.2ps)
- Output synchronized to input
- VCXO (crystal) output
- Lock detect available
- Customer defined loop bandwidth

- Up to 4 user selectable inputs
- Inputs can be independent frequencies
- Up to 4 outputs (CMOS and Sine)
- Up to two outputs LVPECL or LVDS

Quad Output Jitter Attenuator



Timing Modules

FREQUENCY TRANSLATORS/ CLOCK GENERATORS

PRODUCT SELECTION GUIDE



FREQUENCY TRANSLATORS

	PRODUCT SERIES	OUTPUT	SUPPLY VOLTAGE	FREQUENCY RANGE (MHz)											JITTER RMS 12KHz to 20MHz	
				1KHz	10MHz	20MHz	50MHz	100MHz	200MHz	300MHz	400MHz	600MHz	800MHz	1.0GHz		1.5GHz
PECL / LVPECL		VFFT100	PECL 25.4 X 22.0	5.0V 3.3V	8KHz – 250MHz 1 Input Frequency 1 Output Frequency 50MHz – 1GHz											<0.3ps
		VFFT110	LVPECL 19.5 x 17.0	3.3V	10KHz – 800MHz 1 Input Frequency 4 Selectable Outputs 300MHz – 1.5GHz											<1.0ps
		VFFT200	LVPECL 19.5 x 20.5	3.3V	8KHz – 200MHz 1 Input Frequency 50MHz – 200MHz 1 Output Frequency w/10ppm Holdover											<1.0ps
		VFFT400	LVPECL 19.5 x 17.0	3.3V	8KHz – 200MHz 4 Input Frequencies 50MHz – 400MHz 4 Output Frequencies 50MHz Range											<2.0ps
	VFFT401	LVPECL 19.5 x 17.0	3.3V	100MHz – 800MHz 4 Input Frequencies 4 Output Frequencies 100MHz Range 400MHz – 1.5GHz											<1.0ps	
SINE		VFFT120	SINE 25.4 x 22.0	5.0V 3.3V	8KHz – 180MHz 1 Input Frequency 10MHz – 200MHz 1 Output Frequency											<0.15ps
CMOS		VFFT130	CMOS 25.4 x 22.0	5.0V 3.3V	8KHz – 180MHz 1 Input Frequency 10MHz – 200MHz 1 Output Frequency											<0.15ps

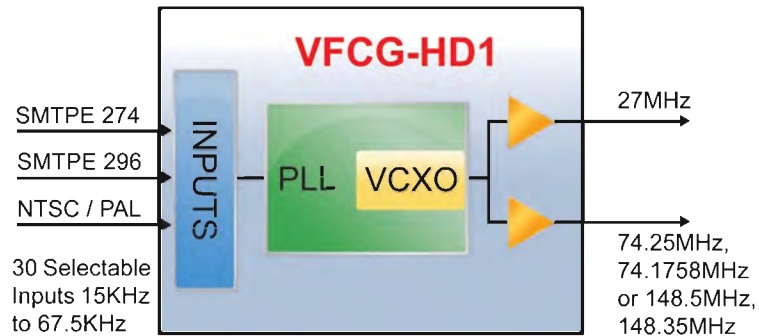
CLOCK GENERATORS

	PRODUCT SERIES	OUTPUT	SUPPLY VOLTAGE	FREQUENCY RANGE (MHz)											JITTER RMS 12KHz to 20MHz	
				1KHz	10MHz	20MHz	50MHz	100MHz	200MHz	300MHz	400MHz	600MHz	800MHz	1.0GHz		1.5GHz
		VFCG100	LVPECL 19.5 x 17.0	3.3V	4 Selectable Output Frequencies 300MHz – 1.5GHz											<1.0ps
		VFCG-HD1	HCMOS 22 x 22	3.3V	15KHz – 67.5KHz 30 Selectable Inputs 27MHz – 148.35MHz Outputs 27MHz and either 74.25MHz or 74.175MHz											<2.0ps

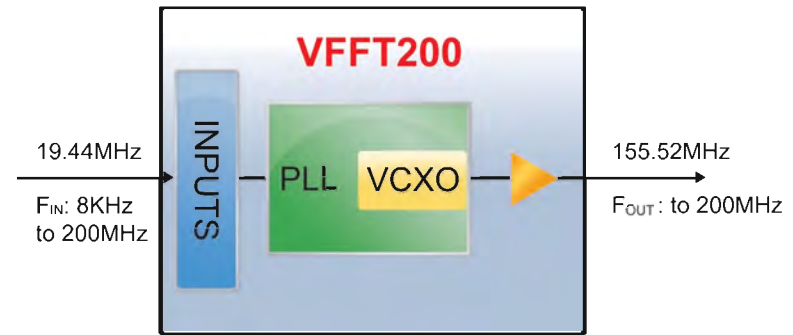
Featured product offering shown. Please visit www.ctsvalpey.com for our full line of Timing Modules.

PRODUCT SELECTION GUIDE

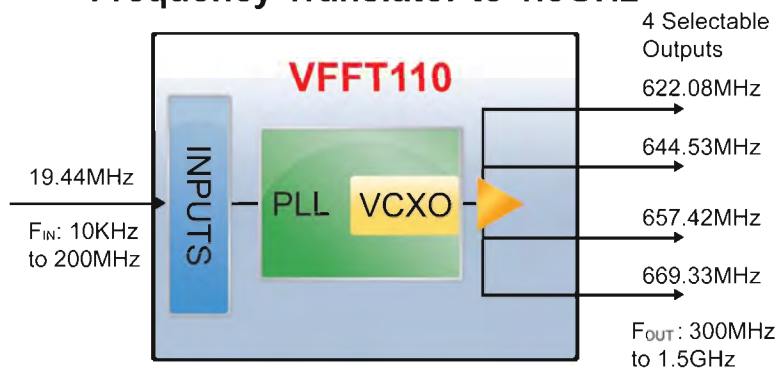
Synchronous Clock Generator for Standard & High Definition Video Broadcast



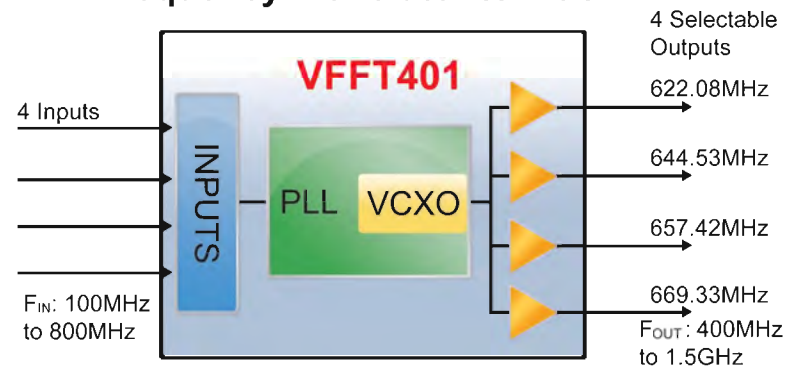
SONET Frequency Translator with 10ppm Automatic Holdover



Quad Selectable Output Frequency Translator to 1.5GHz









Quad Selectable Output Frequency Translator to 1.5GHz



PRODUCT SELECTION GUIDE



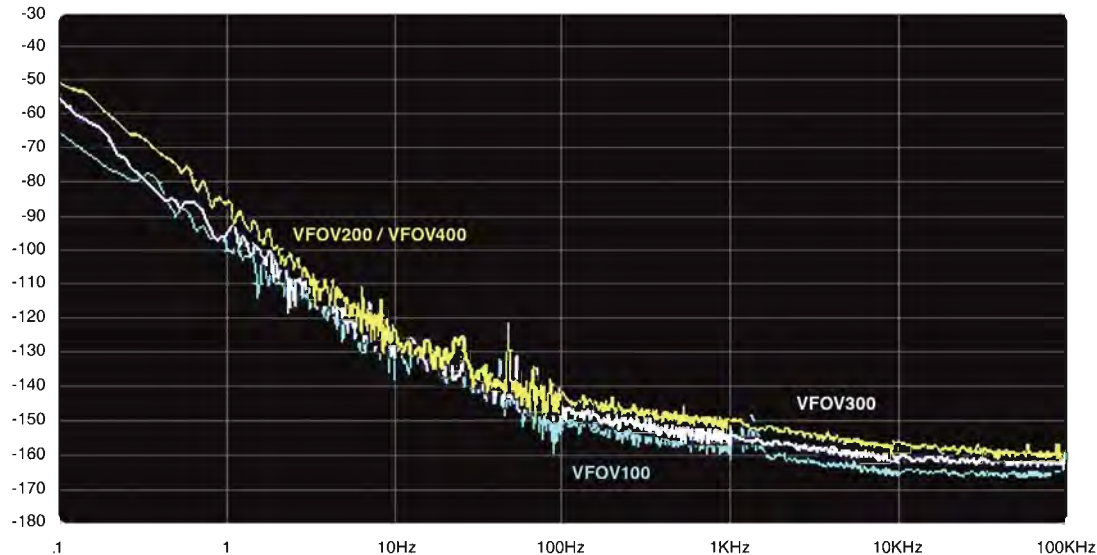
	PRODUCT SERIES	OUTPUT	SUPPLY VOLTAGE	FREQUENCY RANGE (MHz)					POWER (25°C)	MAXIMUM STABILITY**	MAXIMUM OPERATING TEMPERATURE**	PHASE NOISE FLOOR (dBc/Hz)
				10MHz	20	50	100	200MHz				
Ultra Stable OCXOs	 25.4mm x 22.0mm	VFOV100	3.3V 5.0V 12.0V	5MHz - 120MHz					1.0W	±10ppb	-40°C to +85°C	-168
		VFOV110	5.0V 12.0V	25MHz - 135MHz					1.2W	±200ppb	-40°C to +85°C	-174
	 36.1mm x 27.2mm Europack	VFOV200	3.3V 5.0V 12.0V	5MHz - 250MHz					1.0W	±2ppb	-40°C to +85°C	-160
		VFOV300	5.0V 12.0V	8MHz - 100MHz					1.25W	±0.5ppb	-30°C to +70°C	-165
Micro-Miniature, Ultra Low Power OCXOs	 15.1mm x 15.1mm	VFOV400	CMOS/SINE 3.3V 5.0V	5MHz - 250MHz					0.12W	±5ppb	-40°C to +85°C	-165
	 20.5mm x 14.0mm	VFOV500	CMOS/TTL 3.3V 5.0V	30MHz - 120MHz					0.12W	±20ppb	-40°C to +85°C	-160
Small Low Power OCXO	 DIL-14	NEW VFOV650	HCMOS 3.3V 5.0V	10MHz - 100MHz					0.6W	±10ppb	-40°C to +85°C	-165
	 9.0mm x 14.0mm	NEW DFO S1	HCMOS 3.3V	10MHz - 50MHz					0.3W	±20ppb	-40°C to +85°C	-150

Featured product offering shown. Please visit www.ctsvalpey.com for our full line of OCXOs.

**Not all stabilities available with all temperature ranges.

PRODUCT SELECTION GUIDE

OCXO Phase Noise Comparison at 10MHz



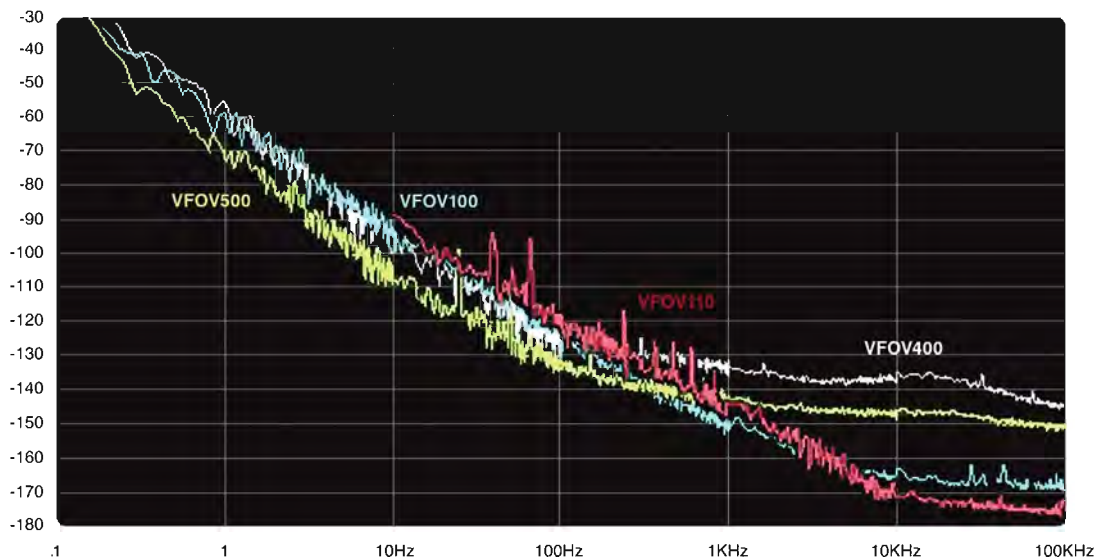
VFOV100 Ultra low noise performance is provided by using High Q fundamental SC cut crystals. Available up to 120MHz. For 100MHz see below.

VFOV200 is the industry's standard low noise SC cut OCXO. Available in very high frequencies incorporating an analog multiplier.

VFOV300 double oven is Stratum II compliant and is a suitable low cost replacement for Rubidium clocks and an excellent choice for GPS hold-over circuits. Ruggedized version available.

VFOV400 is the world's smallest, fastest warm up OCXO (<30sec.) and lowest power consumption (typ. 120mW). Available in very high frequencies incorporating an analog multiplier. For 100MHz see below.











OCXO Phase Noise Comparison at 100MHz



VFOV110 uses proprietary technology to achieve a superior noise floor at 10KHz matching the worlds best performance in a smaller 0.8"x1" SMD package and is very competitively priced. Applications include Wireless Point to point, ADC reference, RADAR and SATCOM.

VFOV500 is the world's smallest, fastest warm up OCXO (<30sec.) and lowest power consumption (typ. 120mW). Applications include SARSAT and portable test equipment. Very low phase noise fundamental mode crystal.

PRODUCT SELECTION GUIDE







	PRODUCT SERIES	PACKAGE SIZE (mm)	SUPPLY VOLTAGE	FREQUENCY RANGE (MHz)							TEMP. STABILITY* (MAX)	OPERATING TEMPERATURE**
				5	20	100	200	400	600	800		
CLIPPED SINE	  VFTX250	2.5 x 2.0	2.8V 2.5V	10MHz – 52MHz							±0.5ppm	-40°C to +85°C
	 VFTX300	3.2 x 2.5	3.0V 5.0V	10MHz – 40MHz							±0.5ppm	-40°C to +85°C
	 VFTX301	5.0 x 3.2	3.0V 5.0V	10MHz – 40MHz							±0.5ppm	-40°C to +85°C
	 VFTX302	5 x 7	3.3V 5.0V	10MHz – 40MHz							±0.5ppm	-40°C to +85°C
CMOS	 VFTX332 STRATUM III	5 x 7	3.3V 5.0V	10MHz – 26MHz							±0.28ppm	-40°C to +85°C
	 VFTX160 STRATUM III	25.4 x 22.0	3.3V	10MHz – 200MHz							±0.28ppm	0°C to +70°C
	VFTX130			30MHz – 180MHz							±0.5ppm	-40°C to +85°C
SINE	 VFTX120	25.4 x 22.0	3.3V	30MHz – 180MHz							±0.5ppm	0°C to +70°C
	VFTX150 STRATUM III			10MHz – 200MHz							±0.28ppm	0°C to +70°C
	 VFTX110	35.4 x 26.7	5.0V	50MHz – 1000MHz							±0.5ppm	-40°C to +85°C
LVPECL	 VFTX140 STRATUM III	25.4 x 22.0	3.3V	200MHz – 1000MHz							±0.28ppm	0°C to +70°C
	VFTX100		3.3V 5.0V	200MHz – 1000MHz							±0.5ppm	-40°C to +85°C

Featured product offering shown. Please visit www.ctsvalpey.com for our full line of TCXOs.

, - Other stability and operating temperature ranges available.

PRODUCT SELECTION GUIDE









	PRODUCT SERIES	PACKAGE SIZE (mm)	SUPPLY VOLTAGE	FREQUENCY RANGE (MHz)							JITTER RMS (12KHz ~ 20MHz)	APR (MINIMUM)
				1	50	100	200	300	400	600		
CMOS	 VF194/VF294	5 x 7	3.3V	1.5MHz - 160MHz							<0.4ps typical	±50ppm
	5.0V											
	R3306	3.3V	1.8MHz - 80MHz							<0.15ps typical	±100ppm	
	 VF594 JLEAD	9 x 14	3.3V	1.5MHz - 160MHz							<0.5ps typical	±50ppm
 VFVX130	5.0V		19MHz - 200MHz							<0.2ps typical	±35ppm	
LVPECL / LVDS	 VFVX301	5 x 7	2.5V	38MHz - 680MHz							<0.4ps typical	±150ppm
	3.3V											
	VFVX321		60MHz - 800MHz							<0.1ps typical	±100ppm	
PECL/LVPECL	 VF596 JLEAD	9 x 14	3.3V 5.0V	19.44MHz - 200MHz							<0.5ps typical	±50ppm
	VFVX100			200MHz - 1000MHz							<0.2ps typical	±35ppm
	VFVX110			200MHz - 1000MHz							<0.2ps typical	±50ppm
	 VFVX120			19MHz - 200MHz							<0.2ps typical	±35ppm

Featured product offering shown. Please visit www.ctsvalpey.com for our full line of VCXOs.

PRODUCT SELECTION GUIDE



	PRODUCT SERIES	PACKAGE SIZE (mm)	SUPPLY VOLTAGE	FREQUENCY RANGE (MHz)								TEMP. STABILITY (TYP)*	OPERATING TEMPERATURE**	JITTER RMS (12KHz-20MHz)
				500KHz	50MHz	100	200	300	400	600	800			
CMOS	 VFXO203	3.2 x 2.5	1.8V	800KHz - 110MHz								±20ppm	-40°C to +85°C	<20ps
	 VFXO202	5.0 x 3.2	2.5V 3.3V	1MHz - 220MHz								±20ppm	-40°C to +85°C	<1ps
	 VF3	5 x 7	3.3V	1.8MHz - 160MHz								±20ppm	-40°C to +85°C	<0.5ps
	 VF540	9 x 14	3.3V	2MHz - 130MHz								± 20ppm	-55°C to +125°C	<1ps
PECL/LVDS	 VFXO301	5 x 7	3.3V 5.0V	38MHz - 680MHz								±20ppm	-40°C to +85°C	<0.4ps
	VFXO321			60MHz - 800MHz								±20ppm	-40°C to +85°C	<0.1ps
	VFXO401			15MHz - 320MHz								±20ppm	-40°C to +85°C	<0.7ps
PECL/LVDS/SINE	 VFXO100	9 x 14	3.3V	180MHz - 1000MHz								±20ppm	-40°C to +85°C	<0.2ps
	VFXO110			19MHz - 200MHz								±20ppm	-40°C to +85°C	<0.4ps

Featured product offering shown. Please visit www.ctsvalpey.com for our full line of XOs.

* - Other stability and operating temperature ranges available.

PRODUCT SELECTION GUIDE



	PRODUCT SERIES	PACKAGE SIZE (mm)	SUPPLY VOLTAGE	FREQUENCY RANGE (MHz)								STABILITY	OPERATING TEMPERATURE		
				500KHz	1MHz	20	50	100	200	400	800			1000MHz	
Hi-Rel	 NEW VFH3225	3.2 x 2.5	1.8V 2.5V 3.3V									25MHz - 160MHz	±50ppm	-55°C to 125°C	
	 VFH240C	5x7	2.5V 3.3V									38MHz - 640MHz	±75ppm	-55°C to 125°C	
Hi-Rel		5x7	VFH2321	1.8V								850KHz - 165MHz	±50ppm	-55°C to 125°C	
			VFH2121	3.3V 5.0V									500KHz - 125MHz	±50ppm	-55°C to 125°C
			T5321/T5421	3.3V									1MHz - 100MHz	±25ppm	-55°C to 125°C
			T5621/T5721	5.0V									16MHz - 150MHz	±25ppm	-55°C to 125°C
COTS		DIP14	M5500									1Hz - 125MHz	±50ppm	-55°C to 125°C	
			M6306 VCXO	5.0V									1MHz - 35MHz	±50ppm	-55°C to 125°C
			M1254/M3254										20KHz - 150MHz	±75ppm	-55°C to 200°C
COTS		5x7	T1250/T3250	5.0V								20KHz - 100MHz	±75ppm	-55°C to 200°C	
			T7250/T9250	3.3V									20KHz - 100MHz	±75ppm	-55°C to 200°C

Featured product offering shown. Please visit www.ctsvalpey.com for our full line of Hi-Rel/COTS.

PRODUCT SELECTION GUIDE



	PRODUCT FAMILIES	FREQUENCY RANGE									SIZE (inches)
		1KHz	1MHz	2MHz	5MHz	10MHz	20MHz	50MHz	100MHz	120MHz	
CONTACT	Standard	0.5MHz, 1MHz, 2.25MHz, 3.5MHz, 5MHz									0.5", 0.75", 1.0", 1.125", 1.25"
	Fingertip	1MHz, 2.25MHz, 3.5MHz, 5MHz, 7MHz, 10MHz									0.25", 0.375", 0.5", 0.75", 1.0"
	Protective Face	0.5MHz, 1MHz, 2.25MHz, 3.5MHz, 5MHz									0.5", 0.75", 1.0", 1.125"
DELAY LINE	Removable	2.25MHz, 3.5MHz, 5MHz, 7MHz, 10MHz, 15MHz, 20MHz, 25MHz									0.5", 0.75", 0.125", 0.375"
	Permanent	2.25MHz, 3.5MHz, 5MHz, 7MHz, 10MHz, 15MHz, 20MHz, 25MHz									0.5", 0.75", 0.125", 0.375"
ANGLE BEAM	Standard	0.5MHz, 1MHz, 2.25MHz, 3.5MHz, 5MHz									0.5 x 0.5", 0.5 x 1.0", 1.0 x 1.0"
	AWS	2.25MHz									0.625 x 0.625", 0.625 x 0.75", 0.75 x 0.75"
	Potted Angle	2.25MHz, 5MHz, 10MHz									0.187 x 0.187", 0.25 x 0.25", 0.375 x 0.375", 0.5 x 0.5"
	Threaded	1MHz, 2.25MHz, 3.5MHz, 5MHz, 7MHz, 10MHz									0.25", 0.375", 0.5"
IMMERSION	Standard	0.5MHz, 1MHz, 2.25MHz, 3.5MHz, 5MHz, 7MHz, 10MHz, 15MHz, 20MHz, 25MHz									0.25", 0.375", 0.5"
	Large	0.5MHz, 1MHz, 2.25MHz, 3.5MHz, 5MHz, 7MHz, 10MHz									0.75", 1.0", 1.125", 1.25", 1.5"
	Pencil	1MHz, 2.25MHz, 3.5MHz, 5MHz, 7MHz, 10MHz, 15MHz, 20MHz, 25MHz									0.125", 0.25"
	Paint Brush	2.25MHz, 3.5MHz, 5MHz, 7MHz, 10MHz									1.50" x 0.25" 2.0" x 0.25" 3.0" x 0.25"
HIGH FREQUENCY	Standard	20MHz, 30MHz, 50MHz, 75MHz, 100MHz									0.25"
	Large	50MHz, 75MHz, 90MHz, 100MHz, 125MHz, 150MHz									0.125", 0.25"
	Contact	20MHz, 30MHz, 50MHz, 75MHz, 100MHz, 125MHz, 150MHz									0.125", 0.25"
DUAL ELEMENT	Potted Fingertip	1MHz, 2.25MHz, 3.5MHz, 5MHz, 10MHz									0.25", 0.375", 0.5", 0.75"
	Removable Fingertip	1MHz, 2.25MHz, 3.5MHz, 5MHz, 10MHz									0.25", 0.375", 0.5", 0.75"
	Wide Scan	1MHz, 2.25MHz, 3.5MHz, 5MHz, 10MHz									0.5" x 0.5", 0.5" x 1.0"
SHEAR WAVE	Standard	50KHz, 0.1MHz, 0.25MHz, 0.5MHz, 1MHz, 5MHz									0.5", 1.0"
	Fingertip	1MHz, 2.25MHz, 5MHz									0.125", 0.25", 0.5"
	Delay Line	5MHz, 10MHz, 15MHz, 20MHz, 25MHz									0.25"
PINDUCERS	Standard	10KHz - 10MHz									0.04", 0.053"