

XPRESSO[®]

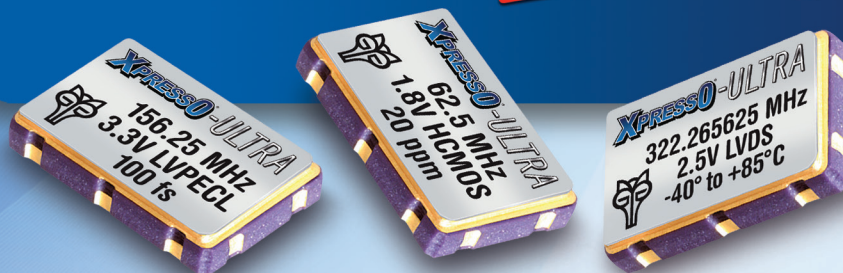


- Low jitter/noise
- Low cost
- ULTRA-precision performance
- Custom frequencies with the lowest lead times in the industry

World's broadest line of configurable oscillators.

Introducing

XPRESSO[®]-ULTRA



Jitter and phase noise reduced to a *Whisper!*
As low as 100 fs phase jitter (yes, femtoseconds!)

Changing the game in frequency control... *Again!*

In the evolution of mature component technology, significant breakthroughs rarely happen. But it did for Fox Electronics in 2007 when we unveiled our revolutionary XpressO configurable oscillator line.

Not satisfied with a product line that had already sold more than 40 million units, our engineers dug deeper. They put in thousands of hours of intensive research and development, creative experimentation and quality assurance checking and double-checking. The result: yet another frequency control device masterpiece...XpressO-ULTRA...a technology upgrade so significant that it truly qualifies as an entire new generation of configurable oscillators.

Built on the solid bedrock of unrivaled performance, reliability, deliverability and cost-efficiency that has characterized XpressO oscillators now in use in demanding timing applications throughout the world, the new XpressO-ULTRA line takes a major step further on all performance fronts.

ULTRA-Precision Oscillator Performance

Perhaps the most telling technological advancement of XpressO-ULTRA is the reduction in jitter and phase noise. Remarkably, typical phase jitter is as low as 100 fs...placing

XpressO-ULTRA a quantum leap ahead of the competition in precision oscillator performance.

XpressO-ULTRA does not replace our original XpressO line... it gives users a tremendous new choice, one in which all application parameters – frequency, phase jitter, package size, voltage options, outputs, cost and delivery – can be matched perfectly to application needs with all considerations fully optimized...no trade-offs needed!

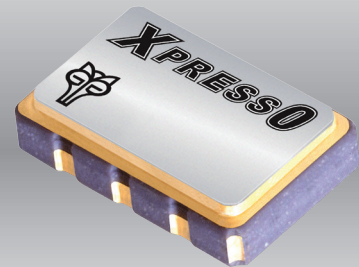
This brochure details the key technical aspects and advantages of our two unique configurable oscillator lines. Additional technical data is provided on our website at www.foxonline.com. And if you have any doubts about which XpressO line is best suited to your requirements, just call any of our highly skilled application engineers. They'll walk you through the selection process so you fully understand which product is best for you...and why.

Breakthrough technologies occur rarely. But at Fox, with massive resources applied to our configurable oscillator development programs, they have occurred twice...each with huge technological implications. No question... XpressO-ULTRA has changed the game...again! And not just in terms of ULTRA-precision oscillator performance, but in how it enhances your business, as well.

XPRESSO[®]-ULTRA



XPRESSO[®]



Products	XOs, VCXOs	XOs, VCXOs, TCXOs
Package Options	5 x 3.2 and 7 x 5 mm	3.2 x 2.5, 5 x 3.2 and 7 x 5 mm
Voltage Options	1.8 V, 2.5 V, 3.3 V	2.5 V, 3.3 V
Phase Jitter	As low as 100 fs	<1 ps
Outputs	LVPECL, LVDS or HCMOS	LVPECL, LVDS or HCMOS
Frequency Range	0.016 MHz to 1500 MHz	0.75 MHz to 1350 MHz
Delivery	Samples: 1 week or less Production: 10 days	Samples: Next day Production: 5 days

XpressO or XpressO-ULTRA: The Choice Is Yours!

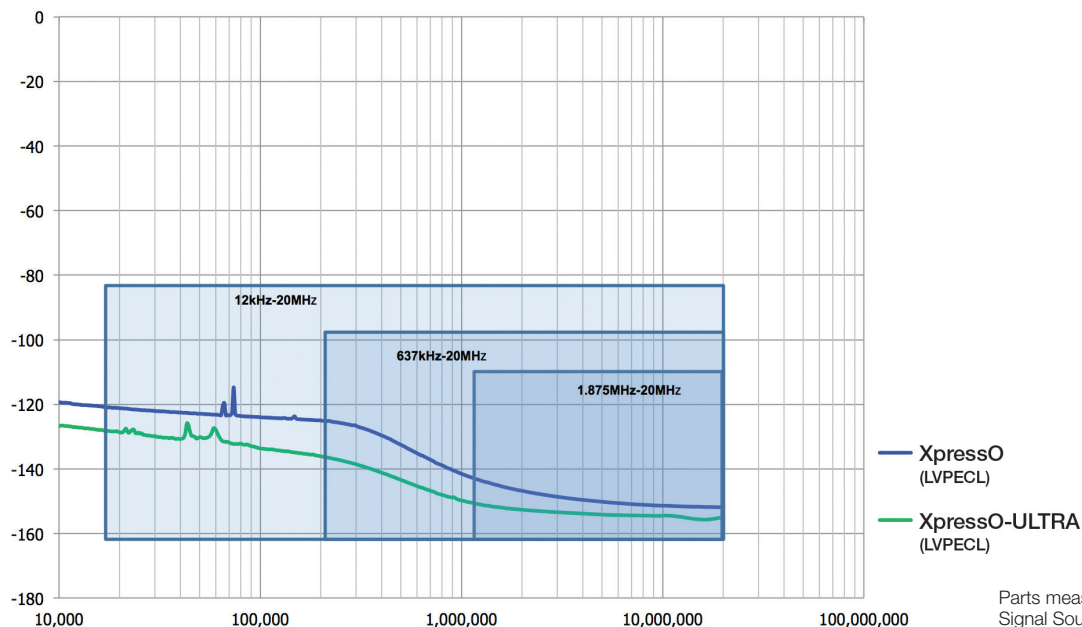
Data throughput needs continue to rise for serial IO technologies. As these speeds increase, jitter requirements have become more stringent, while bandwidth has narrowed. Traditionally, phase jitter has been measured over 12 kHz to 20 MHz – a direct result of optical communications requirements. However, this is not applicable for most of today's applications, other than being used as a direct comparison between different reference clocks.

XpressO and XpressO-ULTRA – Jitter Comparison

The chart below cites examples of XpressO and XpressO-ULTRA oscillator performance over many commonly used bandwidths. While the chart is not all inclusive, it provides a good comparison to help determine which XpressO product family is right for you.

Application	Data Rate	Bandwidth	XpressO-ULTRA Typical Phase Jitter	XpressO Typical Phase Jitter
10/100 MB Ethernet	125 Mbps	20 kHz - 20 MHz	250 fs	700 fs
Gb Ethernet	1.25 Gbps	637 kHz - 10 MHz	100 fs	250 fs
10G Ethernet	10.3225 Gbps	637 kHz - 20 MHz	125 fs	275 fs
100G Ethernet	4x25 Gbps	1.875 - 20 MHz	100 fs	225 fs
XAUI	3.125 Gbps	1.875 - 10 MHz	85 fs	175 fs
Fibre Channel	1.0625 Gbps	637 kHz - 10 MHz	100 fs	250 fs
Fibre Channel	2.125 Gbps	1.275 - 10 MHz	90 fs	200 fs
Fibre Channel	4.25 Gbps	2.55 - 10 MHz	75 fs	160 fs
SAS/SATA	6 Gbps	600 kHz - 20 MHz	125 fs	280 fs
SONET OC-3	155 Mbps	12 kHz - 20 MHz	275 fs	750 fs
SONET OC-12	622 Mbps	12 kHz - 20 MHz	275 fs	750 fs
SONET OC-48	2.48 Gbps	12 kHz - 20 MHz	275 fs	750 fs

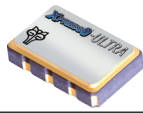
XpressO and XpressO-ULTRA – Phase Noise Comparison @ 125 MHz



Parts measured on an Agilent 5052A
Signal Source Analyzer.

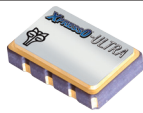
Crystal Oscillators (XO)

HCMOS – XO



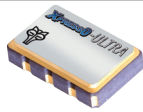
Package Size	5 x 3.2, 7 x 5 mm
Supply Voltage	1.8 V, 2.5 V, 3.3 V
Model	FXU-HC Series
Frequency Range	0.016 MHz - 200 MHz
Frequency Stability	± 20, 25, 50, 100 PPM
Temperature Range	-20°C ~ +70°C R = -40°C ~ +85°C

LVDS – XO



Package Size	5 x 3.2, 7 x 5 mm
Supply Voltage	1.8 V, 2.5 V, 3.3 V
Model	FXU-LC Series
Frequency Range	0.016 MHz - 1500 MHz
Frequency Stability	± 20, 25, 50, 100 PPM
Temperature Range	-20°C ~ +70°C R = -40°C ~ +85°C

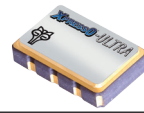
LVPECL – XO



Package Size	5 x 3.2, 7 x 5 mm
Supply Voltage	1.8 V, 2.5 V, 3.3 V
Model	FXU-PC Series
Frequency Range	0.016 MHz - 670 MHz
Frequency Stability	± 20, 25, 50, 100 PPM
Temperature Range	-20°C ~ +70°C R = -40°C ~ +85°C

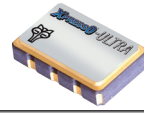
VCXOs (Preliminary)

HCMOS – VCXO



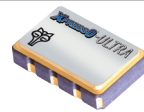
Package Size	5 x 3.2, 7 x 5 mm
Supply Voltage	2.5 V, 3.3 V
Model	FVXU-HC Series
Frequency Range	0.016 MHz - 200 MHz
Pullability (APR)	B = ± 50 PPM
Temperature Range	-20°C ~ +70°C R = -40°C ~ +85°C

LVDS – VCXO



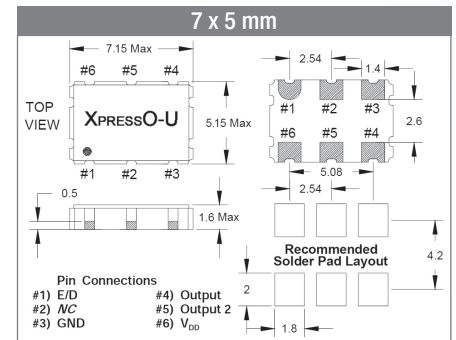
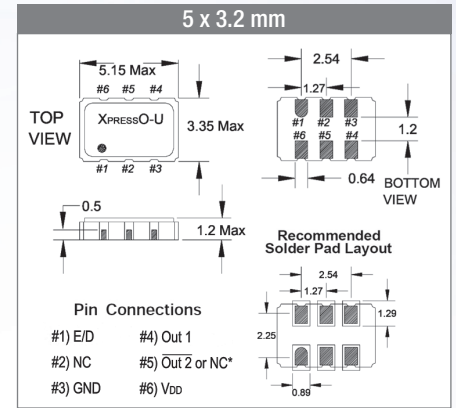
Package Size	5 x 3.2, 7 x 5 mm
Supply Voltage	2.5 V, 3.3 V
Model	FVXU-LC Series
Frequency Range	0.016 MHz - 1500 MHz
Pullability (APR)	B = ± 50 PPM
Temperature Range	-20°C ~ +70°C R = -40°C ~ +85°C

LVPECL – VCXO

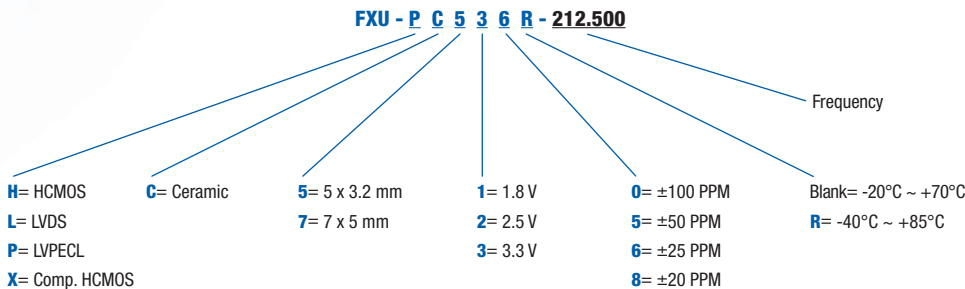


Package Size	5 x 3.2, 7 x 5 mm
Supply Voltage	2.5 V, 3.3 V
Model	FVXU-PC Series
Frequency Range	0.016 MHz - 670 MHz
Pullability (APR)	B = ± 50 PPM
Temperature Range	-20°C ~ +70°C R = -40°C ~ +85°C

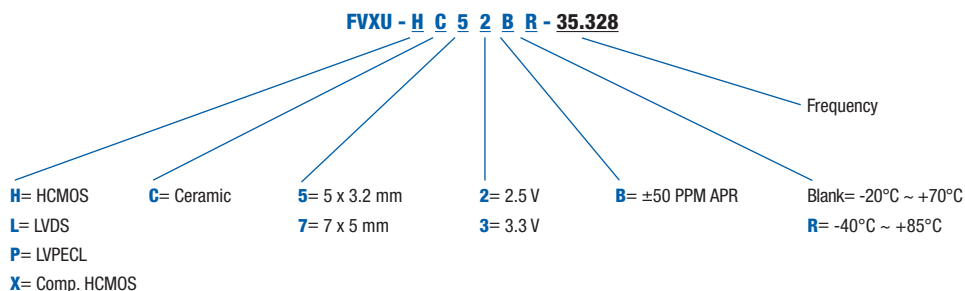
Package Dimensions



XpressO-ULTRA XO Model Description Guide



XpressO-ULTRA VCXO Model Description Guide

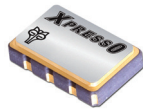


Typical Phase Jitter

Bandwidth	XpressO-ULTRA	XpressO
20 kHz - 20 MHz	250 fs	700 fs
637 kHz - 10 MHz	100 fs	250 fs
637 kHz - 20 MHz	125 fs	275 fs
1.875 - 20 MHz	100 fs	225 fs
1.875 - 10 MHz	85 fs	175 fs
637 kHz - 10 MHz	100 fs	250 fs
1.275 - 10 MHz	90 fs	200 fs
2.55 - 10 MHz	75 fs	160 fs
600 kHz - 20 MHz	125 fs	280 fs
12 kHz - 20 MHz	275 fs	750 fs
12 kHz - 20 MHz	275 fs	750 fs
12 kHz - 20 MHz	275 fs	750 fs

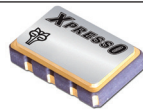
Crystal Oscillators (XO)

HCMOS – XO



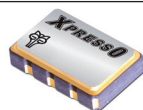
Package Size	3.2 x 2.5, 5 x 3.2, 7 x 5 mm
Supply Voltage	2.5 V, 3.3 V
Model	FXO-HC Series
Frequency Range	0.750 MHz ~ 250 MHz
Frequency Stability	± 20, 25, 50, 100 PPM
Temperature Range	-20°C ~ +70°C R = -40°C ~ +85°C

LVDS – XO



Package Size	3.2 x 2.5, 5 x 3.2, 7 x 5 mm
Supply Voltage	2.5 V, 3.3 V
Model	FXO-LC Series
Frequency Range	0.750 MHz ~ 1350 MHz
Frequency Stability	± 20, 25, 50, 100 PPM
Temperature Range	-20°C ~ +70°C R = -40°C ~ +85°C

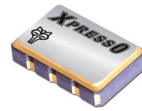
LVPECL – XO



Package Size	5 x 3.2, 7 x 5 mm
Supply Voltage	2.5 V, 3.3 V
Model	FXO-PC Series
Frequency Range	0.750 MHz ~ 1350 MHz
Frequency Stability	± 20, 25, 50, 100 PPM
Temperature Range	-20°C ~ +70°C R = -40°C ~ +85°C

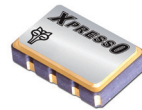
VCXOs

HCMOS – VCXO



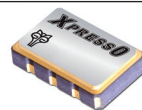
Package Size	5 x 3.2, 7 x 5 mm
Supply Voltage	2.5 V, 3.3 V
Model	FVXO-HC Series
Frequency Range	0.750 MHz ~ 250 MHz
Pullability (APR)	B = ± 50 PPM
Temperature Range	-20°C ~ +70°C R = -40°C ~ +85°C

LVDS – VCXO



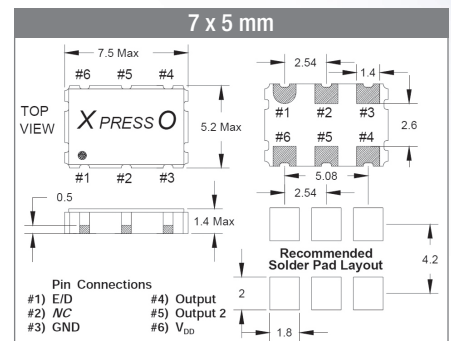
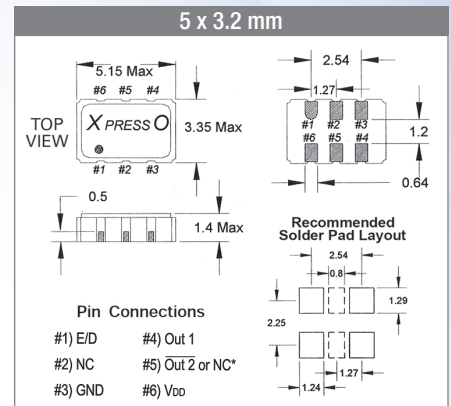
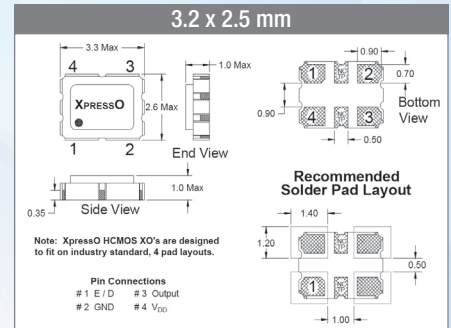
Package Size	5 x 3.2, 7 x 5 mm
Supply Voltage	2.5 V, 3.3 V
Model	FVXO-LC Series
Frequency Range	0.750 MHz ~ 1350 MHz
Pullability (APR)	B = ± 50 PPM
Temperature Range	-20°C ~ +70°C R = -40°C ~ +85°C

LVPECL – VCXO



Package Size	5 x 3.2, 7 x 5 mm
Supply Voltage	2.5 V, 3.3 V
Model	FVXO-PC Series
Frequency Range	0.750 MHz ~ 1350 MHz
Pullability (APR)	B = ± 50 PPM
Temperature Range	-20°C ~ +70°C R = -40°C ~ +85°C

Package Dimensions



XpressO XO Model Description Guide

FXO - P C 5 3 6 R - 212.500

H = HCMOS	C = Ceramic	3 = 3.2 x 2.5 mm	2 = 2.5 V	0 = ±100 PPM	Blank = -20°C ~ +70°C
L = LVDS		5 = 5 x 3.2 mm	3 = 3.3 V	5 = ±50 PPM	R = -40°C ~ +85°C
P = LVPECL		7 = 7 x 5 mm		6 = ±25 PPM	
X = Comp. HCMOS				8 = ±20 PPM	

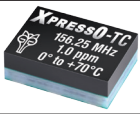
XpressO VCXO Model Description Guide

FVXO - H C 7 3 B R - 155.520

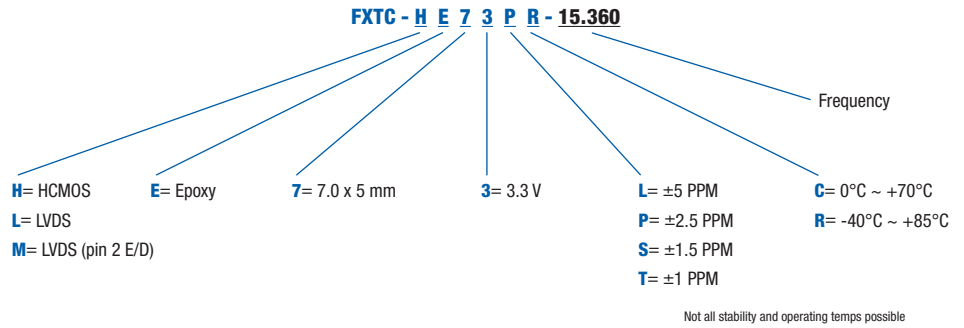
H = HCMOS	C = Ceramic	5 = 5 x 3.2 mm	2 = 2.5 V	B = ±50 PPM APR	Blank = -20°C ~ +70°C
L = LVDS		7 = 7 x 5 mm	3 = 3.3 V		R = -40°C ~ +85°C
P = LVPECL					
X = Comp. HCMOS					

XpressO TCXO Selection & Description Guide

TCXOs

HCMOS – TCXO	
Package Size	7 x 5 mm
Supply Voltage	3.3 V
Model	FXTC-HE73
Frequency Range	0.750 MHz ~ 250 MHz
Frequency Stability	± 1, 1.5, 2.5, 5 PPM
Temperature	C = 0°C ~ +70°C
Range	R = -40°C ~ +85°C

XpressO TCXO Model Description Guide

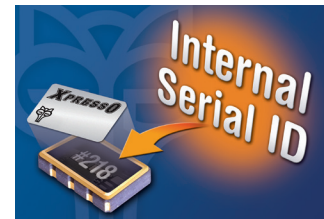


XpressO Package Identification, Marking & Labeling

Serial ID

The Serial ID is the individualized information about each particular XpressO part configuration. The Serial ID is stored on internal memory and is unique for each XPRESSO part – here's the information that is available:

- Configuration equipment
- Raw material used to configure the part
- Raw material traceability back to the foundry's manufacturing lot
- Configuration date and time
- Optimized electrical parameters based on customer specifications
- Completed part electrical testing
- Person that monitored part configuration



Product Marking

Typical XpressO marking configurations are illustrated at right. Note that in all cases, Pin 1 is designated by either the Fox Head or a dot.

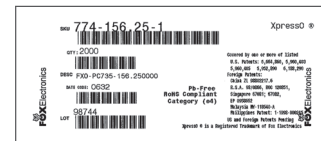


Pin 1 Designator (FOX Head or Dot)

The above illustration shows the actual part marking for all XPRESSO models.

Product Labeling

To help minimize both cost and lead times, XpressO packages are supplied with a separate label containing necessary product and production information, as shown at right.



Learn More About The New XpressO Family of Oscillators...

To learn more about the performance and business advantages of Fox XpressO oscillators, call us today at 888-GET-2-FOX (888-438-2369). Or visit us on line at www.foxonline.com for complete specifications and the industry's most comprehensive range of frequency control solutions.



World Leader for Frequency Control Solutions
An Integrated Device Technology, Inc. company

Corporate Headquarters

5570 Enterprise Parkway Fort Myers, FL 33905
Tel: 888-GET-2-FOX (888-438-2369)
Fax: 1.239.693.1554

Outside U.S.: +1.239.693.0099
email: www.foxonline.com/email.htm

