

Precision Frequency Standard



2111 Comprehensive Drive

Aurora, Illinois 60505

Phone: 630-851-4722

Fax: 630-851-5040

www.conwin.com

US Headquarters

630-851-4722:

European Headquarters:

+353-61-472221



**14 Pin DIP Package
OCXO Series**

Description

The Connor-Winfield 14 Pin DIP Oven Stabilized Crystal Controlled Oscillators (OCXO) series and Voltage Controlled Oven Stabilized Crystal Controlled Oscillators (VCOCXO) series are designed for use in applications requiring stabilities of +/-0.05ppm to +/-0.25ppm.

Features

Frequency Range: 6.4 MHz to 40 MHz
OCXO - Fixed Frequency
VCOCXO - Voltage Controlled
3.3V or 5.0V Operation
LVCMOS or HCMOS Output Logic
Frequency Stabilities Available:

PF150xx Series: ±0.05ppm

PF151xx / PF161xx Series: ±0.10ppm

PF152xx / PF162xx Series: ±0.15ppm

PF153xx / PF163xx Series: ±0.20ppm

PF154xx / PF164xx Series: ±0.25ppm

Temperature Ranges Available:

PF15xxx Series: 0 to 70°C

PF16xxx Series: -40 to 85°C

Low Jitter < 1pS RMS

14 Pin DIP Package

RoHS Compliant / Lead Free



**14x20mm Surface Mount Package
OCXO Series**

Description

The Connor-Winfield 14x20mm Oven Stabilized Crystal Controlled Oscillators (OCXO series) and Voltage Controlled Oven Stabilized Crystal Controlled Oscillators (VCOCXO series) are designed for use in applications requiring stabilities of +/-0.05ppm to +/-0.25ppm.

Features

Frequency Range: 6.4 to 40 MHz
OCXO - Fixed Frequency
VCOCXO - Voltage Controlled
3.3V or 5.0V Operation
LVCMOS or HCMOS Output Logic
Frequency Stabilities Available:

PF250xx Series: ±0.05ppm

PF251xx / PF261xx Series: ±0.10ppm

PF252xx / PF262xx Series: ±0.15ppm

PF253xx / PF263xx Series: ±0.20ppm

PF254xx / PF264xx Series: ±0.25ppm

Temperature Ranges Available:

PF25xxx Series: 0 to 70°C

PF26xxx Series: -40 to 85°C

Low Jitter < 1pS RMS

Surface Mount Package

Tape and Reel Packing

RoHS Compliant / Lead Free

Standard Frequencies: (Additional Frequencies are Available)

6.4 MHz, 8.192MHz, 9.72 MHz, 10.0 MHz, 12.8 MHz, 16.384 Hz, 19.44 MHz, 20.0 MHz 40.0 MHz

Ordering Information

PF	1	5	1	L	F	-	010.0M
Type: Precision Frequency Standard OCXO VCOCXO	Package Type: 1 = 14 Pin DIP 2 = SMT 20x14mm	Temperature Range: 5 = 0 to 70° C 6 = -40 to 85° C	Frequency Stability: 0 = +/-0.05ppm 1 = +/-0.10ppm 2 = +/-0.15ppm 3 = +/-0.20ppm 4 = +/-0.25ppm	Supply Voltage / Output: L = 3.3Vdc / LVCMOS H = 5.0Vdc / HCMOS	Output: F = Fixed Frequency V = Voltage Controlled		Output Frequency: M = MHz xxx.xxM



Bulletin	Cx123
Page	1 of 4
Revision	01
Date	25 Jun 2008



PF15xxx / PF16xxx - Series



PF25xxx / PF26xxx - Series



DIP Package Model Number	PF150LF	PF150HF	PF150LV	PF150HV	Note:
SM Package Model Number	PF250LF	PF250HF	PF250LV	PF250HV	
Frequency Range	6.4 to 40 MHz				1.2
Frequency Stability	±0.05ppm				
Temperature Range	0 to 70°C				
Supply Voltage	3.3 Vdc	5.0 Vdc	3.3 Vdc	5.0 Vdc	
OCXO / VCOCXO	OCXO	OCXO	VCOCXO	VCOCXO	

DIP Package Model Number	PF151LF	PF151HF	PF151LV	PF151HV	Note:
SM Package Model Number	PF251LF	PF251HF	PF251LV	PF251HV	
Frequency Range	6.4 to 40 MHz				1.2
Frequency Stability	±0.10ppm				
Temperature Range	0 to 70°C				
Supply Voltage	3.3 Vdc	5.0 Vdc	3.3 Vdc	5.0 Vdc	
OCXO / VCOCXO	OCXO	OCXO	VCOCXO	VCOCXO	

DIP Package Model Number	PF161LF	PF161HF	PF161LV	PF161HV	Note:
SM Package Model Number	PF261LF	PF261HF	PF261LV	PF261HV	
Frequency Range	6.4 to 40 MHz				1.2
Frequency Stability	±0.10ppm				
Temperature Range	-40 to 85°C				
Supply Voltage	3.3 Vdc	5.0 Vdc	3.3 Vdc	5.0 Vdc	
OCXO / VCOCXO	OCXO	OCXO	VCOCXO	VCOCXO	

DIP Package Model Number	PF152LF	PF152HF	PF152LV	PF152HV	Note:
SM Package Model Number	PF252LF	PF252HF	PF252LV	PF252HV	
Frequency Range	6.4 to 40 MHz				1.2
Frequency Stability	±0.15ppm				
Temperature Range	0 to 70°C				
Supply Voltage	3.3 Vdc	5.0 Vdc	3.3 Vdc	5.0 Vdc	
OCXO / VCOCXO	OCXO	OCXO	VCOCXO	VCOCXO	

DIP Package Model Number	PF162LF	PF162HF	PF162LV	PF162HV	Note:
SM Package Model Number	PF262LF	PF262HF	PF262LV	PF262HV	
Frequency Range	6.4 to 40 MHz				1.2
Frequency Stability	±0.15ppm				
Temperature Range	-40 to 85°C				
Supply Voltage	3.3 Vdc	5.0 Vdc	3.3 Vdc	5.0 Vdc	
OCXO / VCOCXO	OCXO	OCXO	VCOCXO	VCOCXO	

DIP Package Model Number	PF153LF	PF153HF	PF153LV	PF153HV	Note:
SM Package Model Number	PF253LF	PF253HF	PF253LV	PF253HV	
Frequency Range	6.4 to 40 MHz				1.2
Frequency Stability	±0.20ppm				
Temperature Range	0 to 70°C				
Supply Voltage	3.3 Vdc	5.0 Vdc	3.3 Vdc	5.0 Vdc	
OCXO / VCOCXO	OCXO	OCXO	VCOCXO	VCOCXO	

DIP Package Model Number	PF163LF	PF163HF	PF163LV	PF163HV	Note:
SM Package Model Number	PF263LF	PF263HF	PF263LV	PF263HV	
Frequency Range	6.4 to 40 MHz				1.2
Frequency Stability	±0.20ppm				
Temperature Range	-40 to 85°C				
Supply Voltage	3.3 Vdc	5.0 Vdc	3.3 Vdc	5.0 Vdc	
OCXO / VCOCXO	OCXO	OCXO	VCOCXO	VCOCXO	

DIP Package Model Number	PF154LF	PF154HF	PF154LV	PF154HV	Note:
SM Package Model Number	PF254LF	PF254HF	PF254LV	PF254HV	
Frequency Range	6.4 to 40 MHz				1.2
Frequency Stability	±0.25ppm				
Temperature Range	0 to 70°C				
Supply Voltage	3.3 Vdc	5.0 Vdc	3.3 Vdc	5.0 Vdc	
OCXO / VCOCXO	OCXO	OCXO	VCOCXO	VCOCXO	

DIP Package Model Number	PF164LF	PF164HF	PF164LV	PF164HV	Note:
SM Package Model Number	PF264LF	PF264HF	PF264LV	PF264HV	
Frequency Range	6.4 to 40 MHz				1.2
Frequency Stability	±0.25ppm				
Temperature Range	-40 to 85°C				
Supply Voltage	3.3 Vdc	5.0 Vdc	3.3 Vdc	5.0 Vdc	
OCXO / VCOCXO	OCXO	OCXO	VCOCXO	VCOCXO	

Note:
1.2) Frequency stability vs. change in temperature.

FEATURES

OCXO - Fixed Frequency
 VCOCXO - Voltage Controlled
 Frequency Range: 6.4 to 40 MHz
 3.3V or 5.0V Operation
 LVCMS / HCMOS Output Logic
 PF15xxx / PF16xxx Series -14 Pin DIP Package
 PF25xxx / PF26xxx Series -Surface Mount Package

Frequency Stabilities Available:
 PF150xx Series: ±0.05ppm
 PF151xx / PF161xx Series: ±0.10ppm
 PF251xx / PF261xx Series: ±0.10ppm
 PF152xx / PF162xx Series: ±0.15ppm
 PF252xx / PF262xx Series: ±0.15ppm
 PF153xx / PF163xx Series: ±0.20ppm
 PF253xx / PF263xx Series: ±0.20ppm
 PF154xx / PF164xx Series: ±0.25ppm
 PF254xx / PF264xx Series: ±0.25ppm
 Temperature Ranges Available:
 PF15xxx: 0 to 70°C
 PF16xxx: -40 to 85°C
 Low Jitter < 1ps RMS
 Tape and Reel Packaging
 RoHS Compliant / Lead Free

PIN CONNECTIONS

Pin	Function
1	OCXO - N/C
7	VCOCXO - Voltage Control
8	Ground (Case)
14	Output
14	Vcc

ORDERING INFORMATION

PF151LF - 010.0 M
 OCXO SERIES CENTER FREQUENCY

US Headquarters:
 630-851-4722
 European Headquarters:
 + 353-61-472221

Bulletin	Cx123
Page	2 of 4
Revision	01
Date	25 Jun 2008

3.3V LVC MOS Model Specifications

ABSOLUTE MAXIMUM RATINGS

PARAMETER	UNITS	MINIMUM	NOMINAL	MAXIMUM	UNITS	NOTE
Storage Temperature		-55	-	125	°C	
Supply Voltage	(Vcc)	-0.5	-	4.5	Vdc	
Control Voltage	(Vc)	-0.5	-	4.5	Vdc	

TABLE 1.3

OPERATING SPECIFICATIONS

PARAMETER	MINIMUM	NOMINAL	MAXIMUM	UNITS	NOTE
Frequency Calibration	-1.0		1.0	ppm	1.3, 4.3
Frequency Stability		See Page 2		ppm	2.3
Frequency vs. Change in Supply Voltage	-0.05	-	0.05	ppm	3.3
Aging (Daily)	-30	-	30	ppb	4.3
Aging (1st year)	-1.0	-	1.0	ppm	
Total Frequency Tolerance (20 years)	-4.6	-	4.6	ppm	5.3
Supply Voltage	(Vcc)	3.13	3.3	3.47	Vdc
Supply Power (0 to 70°C)	-	-	1.5	Watts	
Supply Power (-40 to 85°C)	-	-	2.7	Watts	
Phase Jitter (BW =10Hz to Fo/2)	-	-	3	pS RMS	
Phase Jitter (BW =10KHz to Fo/2)	-	-	1	pS RMS	
Period Jitter	-	-	1	pS RMS	
Allan Variance (1 Second)	-	1.00 E-10	-		
SSB Phase Noise at 10Hz offset	-	-90	-	dBc/Hz	6.3
SSB Phase Noise at 100Hz offset	-	-120	-	dBc/Hz	6.3
SSB Phase Noise at 1KHz offset	-	-140	-	dBc/Hz	6.3
SSB Phase Noise at 10KHz offset	-	-150	-	dBc/Hz	6.3
Start-Up Time: Oscillator	-	-	35	ms	
Warm Up Time	-	-	5	Minutes	7.3

TABLE 2.3

VCOCXO CHARACTERISTICS

PARAMETER	MINIMUM	NOMINAL	MAXIMUM	UNITS	NOTE
Control Voltage Range	(Vc)	0.3	1.5	3.0	Vdc
Frequency at Vc=0.3 Vdc	-	-7	-5	ppm	8.3
Frequency at Vc=3.0 Vdc	5	7	-	ppm	8.3
Slope of Frequency Adjust	3.7	-	-	ppm/V	
Input Impedance	100k	-	-	Ohm	

TABLE 3.3

LVC MOS OUTPUT CHARACTERISTICS

PARAMETER	MINIMUM	NOMINAL	MAXIMUM	UNITS	NOTE
LOAD	-	15	-	pF	
Voltage (High)	(Voh)	2.6	-	Vdc	
Voltage (Low)	(Vol)	-	0.4	Vdc	
Current (High)	(Ioh)	-4	-	mA	
Current (Low)	(Iol)	-	4	mA	
Duty Cycle at 50% of Vcc	45	50	55	%	
Rise / Fall Time 10% to 90%	-	-	6	nS	

TABLE 4.3

PACKAGE CHARACTERISTICS

PACKAGE CHARACTERISTICS	TABLE 5.3
PF1xxxx-Series DIP Package	14 pin DIP, hermetically sealed, grounded, welded package.
PF2xxxx-Series Surface Mount Package	Surface Mount, Non-hermetic package consisting of an FR4 substrate with grounded metal cover.

TABLE 5.3

Notes:

- Initial calibration @ 25C. VCOCXO model Vc = 1.50 Vdc.
- Frequency stability vs. Change in temperature, referenced to 25C.
- Frequency stability per 5% change in supply voltage.
- At the time of shipment after 48 hours of operation.
- Inclusive of calibration, operating temperature range, supply voltage change, shock and vibration 20 years aging, VCOCXO models Vc=1.5V.
- Typical phase noise, results will vary depending on center frequency. The phase noise shown are typical for 20 MHz.
- Measured @ 25C, within 5 minutes, the unit will be within +/-0.1ppm of its reference frequency, measured after 30 minutes of continuous operation at a stable 25C.
- VCOCXO models pullability referenced to Fo @ 25°C, Positive Transfer Characteristic.

5.0V HCMOS Model Specifications

ABSOLUTE MAXIMUM RATINGS

PARAMETER	UNITS	MINIMUM	NOMINAL	MAXIMUM	UNITS	NOTE
Storage Temperature		-55	-	125	°C	
Supply Voltage	(Vcc)	-0.5	-	4.5	Vdc	
Control Voltage	(Vc)	-0.5	-	4.5	Vdc	

TABLE 6.3

OPERATING SPECIFICATIONS

PARAMETER	MINIMUM	NOMINAL	MAXIMUM	UNITS	NOTE
Frequency Calibration	-1.0		1.0	ppm	9.3, 12.3
Frequency Stability		See Page 2		ppm	10.3
Frequency vs. Change in Supply Voltage	-0.05	-	0.05	ppm	11.3
Aging (Daily)	-30	-	30	ppb	123
Aging (1st year)	-1.0	-	1.0	ppm	
Total Frequency Tolerance (20 years)	-4.6	-	4.6	ppm	13.3
Supply Voltage	(Vcc)	4.75	5.0	5.25	Vdc
Supply Power (0 to 70°C)	-	-	1.5	Watts	
Supply Power (-40 to 85°C)	-	-	2.7	Watts	
Phase Jitter (BW =10Hz to Fo/2)	-	-	3	pS RMS	
Phase Jitter (BW =10KHz to Fo/2)	-	-	1	pS RMS	
Period Jitter	-	-	1	pS RMS	
Allan Variance (1 Second)	-	1.00 E-10	-		
SSB Phase Noise at 10Hz offset	-	-90	-	dBc/Hz	14.3
SSB Phase Noise at 100Hz offset	-	-120	-	dBc/Hz	14.3
SSB Phase Noise at 1KHz offset	-	-140	-	dBc/Hz	14.3
SSB Phase Noise at 10KHz offset	-	-150	-	dBc/Hz	14.3
Start-Up Time: Oscillator	-	-	35	ms	
Warm Up Time	-	-	5	Minutes	15.3

TABLE 7.3

VCOCXO CHARACTERISTICS

PARAMETER	MINIMUM	NOMINAL	MAXIMUM	UNITS	NOTE
Control Voltage Range	(Vc)	0.5	2.0	4.1	Vdc
Frequency at Vc=0.5 Vdc	-	-7	-5	ppm	16.3
Frequency at Vc=4.1 Vdc	5	7	-	ppm	16.3
Slope of Frequency Adjust	3.7	-	-	ppm/V	
Input Impedance	100k	-	-	Ohm	

TABLE 8.3

HCMOS OUTPUT CHARACTERISTICS

PARAMETER	MINIMUM	NOMINAL	MAXIMUM	UNITS	NOTE
LOAD	-	15	-	pF	
Voltage (High)	(Voh)	Vcc-0.5	-	Vdc	
Voltage (Low)	(Vol)	-	0.4	Vdc	
Current (High)	(Ioh)	-4	-	mA	
Current (Low)	(Iol)	-	4	mA	
Duty Cycle at 50% of Vcc	45	50	55	%	
Rise / Fall Time 10% to 90%	-	-	6	nS	

TABLE 9.3

PACKAGE CHARACTERISTICS

PACKAGE CHARACTERISTICS	TABLE 10.3
PF1xxxx-Series DIP Package	14 pin DIP, hermetically sealed, grounded, welded package.
PF2xxxx-Series Surface Mount Package	Surface Mount, Non-hermetic package consisting of an FR4 substrate with grounded metal cover.

TABLE 10.3

Notes:

- Initial calibration @ 25C. VCOCXO model Vc = 2.0 Vdc.
- Frequency stability vs. Change in temperature, referenced to 25C.
- Frequency stability per 5% change in supply voltage.
- At the time of shipment after 48 hours of operation.
- Inclusive of calibration, operating temperature range, supply voltage change, shock and vibration 20 years aging, VCOCXO models Vc=2.0V.
- Typical phase noise, results will vary depending on center frequency. The phase noise shown are typical for 20 MHz.
- Measured @ 25C, within 5 minutes, the unit will be within +/-0.1ppm of its reference frequency, measured after 30 minutes of continuous operation at a stable 25C.
- VCOCXO models pullability referenced to Fo @ 25°C, Positive Transfer Characteristic.

US Headquarters:
630-851-4722
European Headquarters:
+ 353-61-472221

Bulletin	Cx123
Page	3 of 4
Revision	01
Date	25 Jun 2008

14 Pin DIP Package Environmental Characteristics

ENVIRONMENTAL CHARACTERISTICS

Temperature Cycle: Per MIL-STD-883, Method 1010, Condition B. -55°C to 125°C, 300 cycles, 10 minute dwell, 1minute transition.

Gross Leak Test: Per MIL-STD-202, Method 112, Condition D. No Bubbles in flourinert (FC-43) at 125°C ±5°C for 20 seconds.

SOLDERING

Pin Solderability: Per MIL-STD-883, Method 2003. 8 hour steam age prior to 254°C ±5°C Solder pot dip, 95% Coverage.

Resistance to Solder Heat: Per MIL-STD-202, Method 210, Condition C. Wave: Topside board-mount product, 260°C ±5°C for 20 seconds.

MECHANICAL CHARACTERISTICS

Vibration: Per MIL-STD-202, Method 204, Condition A. 10G's peak, 10Hz to 500Hz, 15 minute cycles 12 times each perpendicular axis.

Shock: Per MIL-STD-202, Method 213, Condition F. 1500G's, 0.5ms, half sine, 3 shocks per direction.

Moisture Resistance: Per MIL-STD-202, Method 106. 95% RH @ 65°C, 10 cycles 10°C to 65°C.

Surface Mount Package Environmental Characteristics

ENVIRONMENTAL CHARACTERISTICS

Temperature Cycle: Per MIL-STD-883, Method 1010, Condition B. -55°C to 125°C, 300 cycles, 10 minute dwell, 1minute transition.

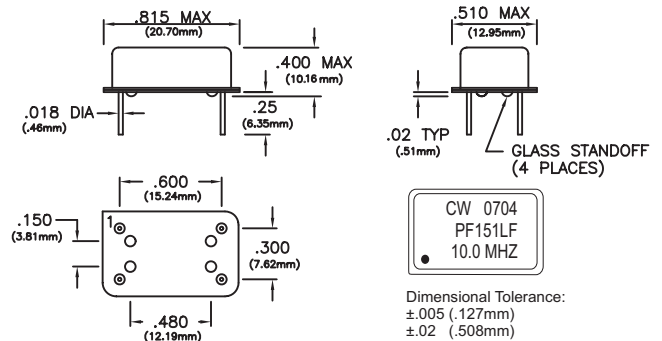
MECHANICAL CHARACTERISTICS

Vibration: Per MIL-STD-202, Method 204, Condition A. 10G's peak, 10Hz to 500Hz, 15 minute cycles 12 times each perpendicular axis.

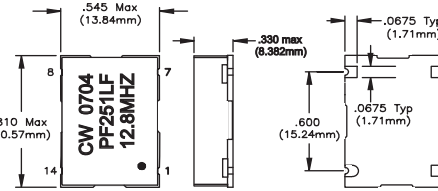
Shock: Per MIL-STD-202, Method 213, Condition F. 1500G's, 0.5ms, half sine, 3 shocks per direction.

Moisture Resistance: Per MIL-STD-202, Method 106. 95% RH @ 65°C, 10 cycles 10°C to 65°C.

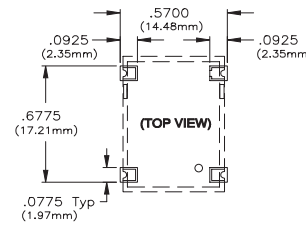
14 Pin DIP Package Outline



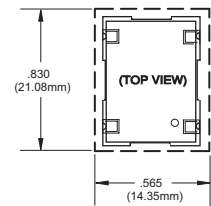
Surface Mount Package Outline



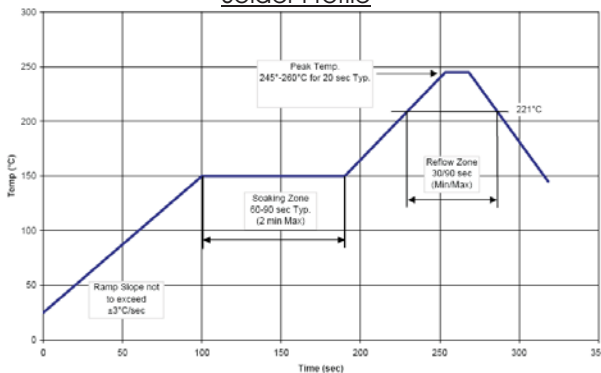
Suggested Pad Layout



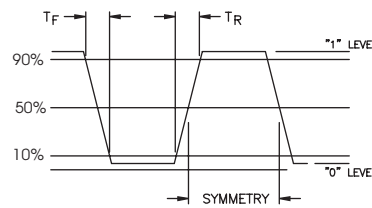
Keep Out Area



Solder Profile



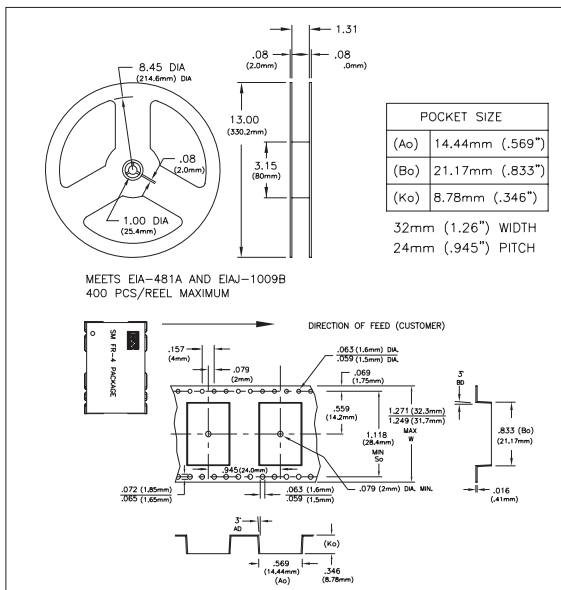
Output Waveform



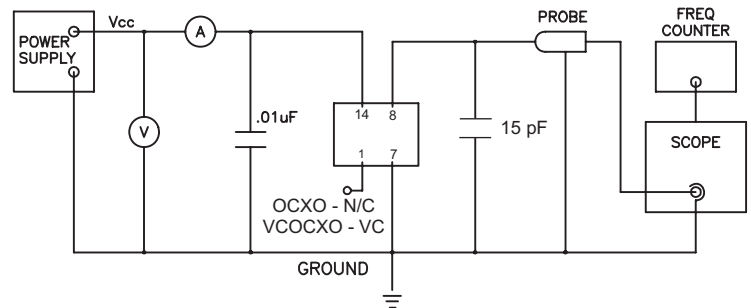
Pin Connections

Pin	Function
1	OCXO - N/C
7	VCOCXO - Voltage Control
8	Ground (Case)
14	Vcc

Tape and Reel Information



Test Circuit



US Headquarters:
630-851-4722
Europe Headquarters:
+ 353-61-47221

Bulletin	Cx123
Page	4 of 4
Revision	01
Date	25 Jun 2008