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This Application Note provides a list of possible oscillators for Microsemi timing devices which include the PDH, SONET/SDH, and SyncE (Synchronous Ethernet). This list has been categorized based on applicable standards.

Where noted below, the oscillators have been tested by Microsemi and found to be suitable for use with Microsemi's digital PLL's. However, as changes in system hardware or software or configuration may affect the overall performance of the oscillator in any

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customer system. Designers should consult with their oscillator suppliers to satisfy themselves that the oscillator they select will be suitable for their requirements and follow supplier recommendations for support components and layout.

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## 1.0 GR1244-Core Stratum 3E

GR1244-Core Stratum 3E requirements relevant for crystal oscillators are:

- Long Term Accuracy (20 years):  $\pm 4.6$  ppm
- Short Term Stability (24 hours): 10 ppb(pk-pk)
- Frequency Drift Rate:  $\pm 1.16 \times 10^{-14}$  (+/-1ppb/day @ constant temperature)

20MHz Oscillators			
Crystal Oscillator Manufacturer	Part Number	Type	Comment
CTS (www.ctscorp.com)	1180026-xxx	OCXO	Note 2,Note 3
	1190100-xxx	OCXO	Note 2
	1380100-xxx	OCXO	Note 2
Rakon <a href="http://www.rakon.com/Products/ChipsetReferences/Pages/Telecom.aspx">http://www.rakon.com/Products/ChipsetReferences/Pages/Telecom.aspx</a>	STP2629LF	OCXO	Note 2,Note 1
	STP2885LF	OCXO	Note 2
	STP2876LF	OCXO	Note 2
	STP2846LF	OCXO	Note 2
	STP2875LF	OCXO	Note 2
MtronPTI	XO5184-014SR	OCXO	Note 2
Vectron ( <a href="http://www.vectron.com/products/1588/index.htm">www.vectron.com/products/1588/index.htm</a> )	OX-402	OCXO	Note 2
	OX-202 (formerly C4550A2)	OCXO	Note 2
	OX-222	OCXO	Note 2

Note 1: This oscillators has been tested in the lab by Microsemi.

Note 2: Consult Manufacturer's datasheet for details on temperature range and oscillator performance parameters

Note 3: This oscillators has been tested in the lab by Microsemi (1180026-018 version).

## 2.0 GR1244-Core & GR-253-Core Stratum 3

GR1244-Core Stratum 3 requirements relevant for crystal oscillators are:

- Long Term Accuracy (20 years):  $\pm 4.6$  ppm
- Short Term Stability (24 hours):  $\pm 0.300$  ppm
- Frequency Drift Rate:  $\pm 4.63 \times 10^{-13}$

20MHz Oscillators				
Crystal Oscillator Manufacturer	Part Number	Type	Temperature Range [°C]	Comment
Rakon	E3179	TCXO	-5 to +80	Note 1
	E3199	TCXO	-40 to +85	Note 1
	E2889	TCXO	-5 to +80	
Micro-Crystal (www.microcrystal.com)	OXCOWT-BV3	OEXO	-20 to +70	Note 1
NDK (ndk.com)	NT7050BC 20M ENA3863A	TCXO	-5 to +80	
	NT7050BC 20M ENA3864A	TCXO	-40 to +85	Note 1
CTS (www.ctscorp.com)	03-42126-008	OEXO	-40 to +85	Note 1
	03-42126-007	OEXO	0 to +70	Note 1
	1370100-004	OEXO	-40 to +85	
MtronPTI (www.mtronpti.com)	M6101S006	TCXO	-40 to +85	Note 2
Vectron (www.vectron.com)	C2260A1-0233	TCXO	-40 to +85	
	TX-700-0012	TCXO	-5 to +80	Note 2
	TX-7040-EAE-2872-20M000000	TCXO	-40 to +85	
Kyocera	KT7050A20000KAW33T AD	TCXO	-40 to +85	Note 2
24.576MHz Oscillators				
Crystal Oscillator Manufacturer	Part Number	Type	Temperature Range [°C]	Comment
NDK (ndk.com)	NT7050BC 24M576 NEA3708A	TCXO	-40 to +85	Note 1
Vectron	TX-502-0034-24M576	TCXO	-40 to +85	
Rakon	E5781LF TCXO-24M576	TCXO	-40 to +85	
CTS	1370300-004	OEXO	-40 to +85	
Kyocera	KT7050A24576KAW33T AD	TCXO	-40 to +85	Note 2

Note 1: These oscillators have been tested in the lab by Microsemi.

Note 2: These oscillators have been tested in the lab by the vendor and reviewed by Microsemi

### 3.0 ITU G.813 Option 1/ ITU G.8262 EEC-Option 1

ITU G.813 Option 1/ G.8262EEC-Option 1 requirements relevant for crystal oscillators are:

- Long Term Accuracy (20 years):  $\pm 4.6$  ppm and Short Term Stability (24 hours):  $\pm 4.53$  ms

20MHz Oscillators				
Crystal Oscillator Manufacturer	Part Number	Type	Temperature Range [°C]	Comment
Vectron (www.vectron.com)	TX-500 (formerly C2310)	TCXO	0 to +50	
	C2260A1-0233	TCXO	-40 to +85	
	TX-700-0012	TCXO	-20 to +85	Note 2
	TX-7040-EAE-2872-20M000000	TCXO	-40 to +85	
Fordahl (www.fordah.com)	DFA S1-LHZ-AS1001	TCXO	0 to +70	Note 1
Rakon <a href="http://www.rakon.com/Product%20s/ChipsetReferences/Pages/T%20elecom.aspx">http://www.rakon.com/Product s/ChipsetReferences/Pages/T elecom.aspx</a>	E3179	TCXO	-5 to +80	Note 1
	E2791	TCXO	-20 to +70	
	E2889	TCXO	-5 to +80	
	E3199	TCXO	-40 to +85	Note 1
NDK (ndk.com)	NT7050BC 20M ENA3863A	TCXO	-5 to +80	
	NT7050BC 20M ENA3864A	TCXO	-40 to +85	Note 1
Micro-Crystal (www.microcrystal.com)	OCXOWT-BV3	OCXO	-20 to +70	Note 1
CTS (www.ctscorp.com)	03-42126-008	OCXO	-40 to +85	Note 1
	03-42126-007	OCXO	0 to +70	Note 1
	1370100-004	OCXO	-40 to +85	
MtronPTI (www.mtronpti.com)	M6101S006	TCXO	-40 to +85	Note 2
Kyocera	KT7050A20000KAW33T AD	TCXO	-40 to +85	Note 2
24.576MHz Oscillators				
Crystal Oscillator Manufacturer	Part Number	Type	Temperature Range [°C]	Comment
NDK (ndk.com)	NT7050BC 24M576 NEA3708A	TCXO	-40 to +85	Note 1
Vectron	TX-502-0034-24M576	TCXO	-40 to +85	
Rakon	E5781LF TCXO-24M576	TCXO	-40 to +85	
CTS	1370300-004	OCXO	-40 to +85	
Kyocera	KT7050A24576KAW33T AD	TCXO	-40 to +85	Note 2

Note 1: These oscillators have been tested in the lab by Microsemi.

Note 2: These oscillators have been tested in the lab by the vendor and reviewed by Microsemi

#### 4.0 ITU G.813 Option 2 / ITU G.8262 EEC-Option 2 and GR-253-Core SMC (SONET minimum clock)

- Long Term Accuracy (20 years):  $\pm 20$  ppm;
- Short Term Stability (24 hours):  $\pm 4.6$  ppm;
- Frequency Drift Rate:  $\pm 5.8 \times 10^{-12}$

20MHz Oscillators				
Crystal Oscillator Manufacturer	Part Number	Type	Temperature Range [°C]	Comment
Rakon <a href="http://www.rakon.com/Products/ChipsetReferences/Pages/Telecom.aspx">http://www.rakon.com/Products/ChipsetReferences/Pages/Telecom.aspx</a>	E3179	TCXO	-5 to +80	Note 1
	E3199	TCXO	-40 to +85	Note 1
	E2889	TCXO	-5 to +80	
	E2791	TCXO	-20 to +70	
NDK ( <a href="http://ndk.com">ndk.com</a> )	NT7050BC 20M ENA3864A	TCXO	-40 to +85	Note 1
Micro-Crystal ( <a href="http://www.microcrystal.com">www.microcrystal.com</a> )	OCXOWT-BV3	OCXO	-20 to +70	Note 1
Fordahl ( <a href="http://www.fordahl.com">www.fordahl.com</a> )	DFA S1-LHZ-AS1001	TCXO	0 to +70	
CTS ( <a href="http://www.ctscorp.com">www.ctscorp.com</a> )	03-42126-008	OCXO	-40 to +85	Note 1
	03-42126-007	OCXO	0 to +70	Note 1
	1370100-004	OCXO	-40 to +85	
MtronPTI ( <a href="http://www.mtronpti.com">www.mtronpti.com</a> )	M6101S006	TCXO	-40 to +85	
Vectron ( <a href="http://www.vectron.com">www.vectron.com</a> )	C2260A1-0233	TCXO	-40 to +85	
	TX-700-0012	TCXO	-5 to +85	Note 2
	TX-7040-EAE-2872-20M000000	TCXO	-40 to +85	
Kyocera	KT7050A20000KAW33TAD	TCXO	-40 to +85	Note 2

Note 1: These oscillators have been tested in the lab by Microsemi.

Note 2: These oscillators have been tested in the lab by the vendor and reviewed by Microsemi

<b>24.576MHz Oscillators</b>				
<b>Crystal Oscillator Manufacturer</b>	<b>Part Number</b>	<b>Type</b>	<b>Temperature Range [°C]</b>	<b>Comment</b>
NDK (ndk.com)	NT7050BC 24M576 NEA3708A	TCXO	-40 to +85	Note 1
Vectron	TX502-0034-24M576	TCXO	-20 to +85	
Rakon	E5781LF TCXO-24M576	TCXO	-40 to +85	
CTS	1370300-004	OCXO	-40 to +85	
Kyocera	KT7050A24576KAW33TA D	TCXO	-40 to +85	Note 2

Note 1: These oscillators have been tested in the lab by Microsemi.

Note 2: These oscillators have been tested in the lab by the vendor and reviewed by Microsemi

## 5.0 GR1244-Core Stratum 4 and Stratum 4E/ Linecard XOs and Crystals

GR1244-Core Stratum 4 and 4E requirements relevant for crystal oscillators are:

- Long Term Accuracy (20 years):  $\pm 32$  ppm

The list below does not contain temperature compensated oscillators such as TCXO-s and OCXO-s. Although these parts meet Stratum 4, they have being excluded from the list due to the higher cost.

20MHz Oscillators				
Crystal Oscillator Manufacturer	Part Number	Type	Temperature Range [°C]	Comment
CTS	405I33C20M0000	XO	-40 to +85	
Micro Crystal (www.microcrystal.com)	MCS02V-B	XO	-40 to +85	Note 1
Fordahl (www.fordahl.com)	DFN S2-LHZ20XB20C	XO	0 to +70	Note 1
	DFN S1-LHZ20XB32D	XO	0 to +70	
	DFN S2-LHZ20XB32D	XO	0 to +70	
	DFN S1-LHZXE32D	XO	-40 to +85	
	DFN S2-LHZXE32D	XO	-40 to +85	
Vectron (www.vectron.com)	VCC1-B3F-20MO	XO		
24.576MHz Oscillators				
Crystal Oscillator Manufacturer	Part Number	Type	Temperature Range [°C]	Comment
CTS	406C35B24M57600	Crystal	-20 to +70	Note 1
CTS	636L3C024M57600	XO	-20 to +70	
Vectron	VCC4-B3D-24M5760000	XO	-40 to +85	Note 1
NDK (ndk.com)	NZ25020SEA- NSA3415E	XO	-40 to +85	
	NZ25020SD-NEA3728A	XO	-40 to +85	
Epson	FA-238V-24576MB-C	Crystal	-40 to +85	

Note 1: These oscillators have been tested in the lab by Microsemi.

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