# CLOCK DEVICES FOR SERVERS

Intel Corporation
Data Center Platform Application Engineering
August 2020
Reference Number: 620306
Revision Number: 1.3

Greenthread Ex. 2004, p. 1
Semiconductor v. Greenthread
IPR2023-01242

# Legal Disclaimer

www.intel.com/design/literature.htm.

Greenthread Ex. 2004, p. 2
Semiconductor v. Greenthread
IPR2023-01242

# Clocking Devices

## This document lists some of the clocking devices used in server platforms:

- All the suppliers listed have been equally considered.
- There is no particular preference from Intel's point of view.
- Intel does not give any particular recommendation in this document.
- The data is as accurate as the release date of the document. For up-to-date information on schedules, performance, pricing and other, contact the vendor directly.

Greenthread Ex. 2004, p. 3
Semiconductor v. Greenthread
IPR2023-01242


Intel and the Intel logo are trademarks of Intel Corporation in the U. S. and/or other countries.
*Other names and brands may be claimed as the property of others. Copyright © 2020, Intel Corporation.

# Revision History

| Revision | Description | Date |
|---|---|---|
| 1.3 | ▪ Updated supplier part numbers | August 2020 |
| 1.2 | ▪ Added CK440Q part list<br>▪ Updated Supplier Contact Information | June 2020 |
| 1.1 | ▪ Hyperlinks to e-mails corrected. | March 2020 |
| 1.0 | ▪ Initial release | March 2020 |

Greenthread Ex. 2004, p. 4
Semiconductor v. Greenthread
IPR2023-01242


Intel and the Intel logo are trademarks of Intel Corporation in the U. S. and/or other countries.
*Other names and brands may be claimed as the property of others. Copyright © 2020, Intel Corporation.

# Index of Contents


- Crystals
- Crystal Oscillators
- DBx00H
- DB800ZL
- DB1200Z/ZL
- DB1900Z
- DB2000Q/QL
- CK420BQ
- CK440Q
- CK-MNG/CK-MNG+
- $I^2C$ Clock
- Supplier Contact Information



Greenthread Ex. 2004, p. 5
Semiconductor v. Greenthread
IPR2023-01242




Intel and the Intel logo are trademarks of Intel Corporation in the U. S. and/or other countries.
*Other names and brands may be claimed as the property of others. Copyright © 2020, Intel Corporation.

# Crystals

| Device | Manufacturer | MPN | IPN |
|---|---|---|---|
| 32.768 kHz | EPSON* | X1A000141000300 | C13544-021 |
| | Nihon Dempa Kogyo (NDK)* | NX3215SA32KEXS00A-MU00503 | C13544-023 |
| | TXC* | 9H03220009 | |
| | HOSONIC* | ETST32.768W125BMPF | |
| 24 MHz | TXC* | 7M24070064 | D71700-116 |
| | Diodes* Incorporated | FL2400135 | D71700-052 |

Greenthread Ex. 2004, p. 6
Semiconductor v. Greenthread
IPR2023-01242


Intel and the Intel logo are trademarks of Intel Corporation in the U. S. and/or other countries.
*Other names and brands may be claimed as the property of others. Copyright © 2020, Intel Corporation.

# Crystals continued

| Device | Manufacturer | MPN | IPN |
|---|---|---|---|
| 25 MHz | Nihon Dempa Kogyo (NDK)* | EXS00A-CS11692 | D71700-115 |
| | Diodes* Incorporated | FL2500187 | D71700-033 |
| | Nihon Dempa Kogyo (NDK)* | EXS00A-CS09866 | D71700-008 |
| | TXC* | 7M25020001 | |
| 48 MHz | Diodes* Incorporated | FL4800057 | D71700-058 |
| | TXC* | 7M48020003 | |
| | Diodes* Incorporated | FL4800057 | |

Greenthread Ex. 2004, p. 7
Semiconductor v. Greenthread
IPR2023-01242


Intel and the Intel logo are trademarks of Intel Corporation in the U. S. and/or other countries.
*Other names and brands may be claimed as the property of others. Copyright © 2020, Intel Corporation.

# Crystal Oscillators

| Device | Manufacturer | MPN | IPN |
|---|---|---|---|
| 32.768 kHz CMOS 3.3V | Diodes* Incorporated | KM3270004 | G34258-008 |
| 10 MHz CMOS 3.3V | TXC* | 7X10020001 | D34520-031 |
| 25 MHz CMOS 3.3V | HOSONIC* | D2SX25E000003E | E45031-024 |
| 25 MHz CMOS 2.5V | Silicon Laboratories Inc.* | 510GBA25M0000BAGR | A78486-026 |
| 25 MHz CMOS 1.0V | Diodes* Incorporated | FK2500061 | D34520-017 |
| | TXC* | 7X25020004 | |
| 50 MHz CMOS 3.3V | Silicon Laboratories Inc.* | 510CBA50M0000BAG | A78486-027 |
| 125 MHz CMOS 1.8V | Silicon Laboratories Inc.* | 510KBA125M000BAGR | A78486-025 |

Greenthread Ex. 2004, p. 8
Semiconductor v. Greenthread
IPR2023-01242


Intel and the Intel logo are trademarks of Intel Corporation in the U. S. and/or other countries.
*Other names and brands may be claimed as the property of others. Copyright © 2020, Intel Corporation.

# Crystal Oscillators continued

| Device | Manufacturer | MPN | IPN |
|---|---|---|---|
| 156.25 MHz | Diodes* Incorporated | UX54F62001 | G63831-004 |
| | Nihon Dempa Kogyo (NDK)* | NP5032SC 156.25M ENA4172A | |
| | Microchip* | SPN92001 | H81196-001 |
| 322.265625 MHz | Microchip* | MX574BBD322M265 TR | H77101-001 |
| | Texas Instruments* | LMK60K2-322M26SIAR | |
| | Texas Instruments* | LMK61I2-322M26 | J53062-001 |
| 644.531250 MHz | Renesas* | XUL536644.531250I | G63831-021 |

Greenthread Ex. 2004, p. 9
Semiconductor v. Greenthread
IPR2023-01242


Intel and the Intel logo are trademarks of Intel Corporation in the U. S. and/or other countries.
*Other names and brands may be claimed as the property of others. Copyright © 2020, Intel Corporation.

# DBx00H

| Device | Manufacturer | MPN | IPN |
|---|---|---|---|
| DB200H | On Semiconductor* | NB3L202KMNTXG | J24311-001 |
| DB400H | On Semiconductor* | NB3L204KMNTXG | J24310-001 |
| DB800H | On Semiconductor* | NB3L208KMNTXG | H70432-001 |




Intel and the Intel logo are trademarks of Intel Corporation in the U. S. and/or other countries.
*Other names and brands may be claimed as the property of others. Copyright © 2020, Intel Corporation.

# DB800ZL

| Device | Manufacturer | MPN | IPN |
|---|---|---|---|
| DB800ZL | Renesas* | IDT6INT61041 | H24295-001 |
| | Silicon Laboratories Inc.* | Si53108-A01AGMR | H54506-001 |
| | On Semiconductor* | NB3W800LMNTXG | H87486-001 |
| | Renesas* | 9ZXL0451EKILFT | K20599-006 |
| | Renesas* | 9ZXL0851EKILFT | K63830-001 |

Greenthread Ex. 2004, p. 11
Semiconductor v. Greenthread
IPR2023-01242


Intel and the Intel logo are trademarks of Intel Corporation in the U. S. and/or other countries.
*Other names and brands may be claimed as the property of others. Copyright © 2020, Intel Corporation.

# DB1200Z/ZL

| Device | Manufacturer | MPN | IPN |
|---|---|---|---|
| DB1200Z | Renesas* | 9ZX21201BKLFT | H54829-001 |
| | On Semiconductor* | NB3N1200KMNTXG | H13587-001 |
| DB1200ZL | Renesas* | 9ZXL1251EKLFT | K20599-015 |
| | On Semiconductor* | NB3W1200LMNTXG | H13585-001 |
| | Silicon Laboratories Inc.* | SI53112-A00AGMR | |

Greenthread Ex. 2004, p. 12
Semiconductor v. Greenthread
IPR2023-01242


Intel and the Intel logo are trademarks of Intel Corporation in the U. S. and/or other countries.
*Other names and brands may be claimed as the property of others. Copyright © 2020, Intel Corporation.

# DB1900Z

| Device | Manufacturer | MPN | IPN |
|---|---|---|---|
| DB1900Z Rev 1.6 | Renesas* | 9ZX21901CKLFT | E66519-002 |
| | Microchip* | MDB1900ZBQUMYR01 | G20746-002 |
| | On Semiconductor* | NB3N1900KMNTXG | H55392-001 |
| DB1900Z Rev 1.7 | Renesas* | 9ZX21901DKLFT | J49998-001 |

Greenthread Ex. 2004, p. 13
Semiconductor v. Greenthread
IPR2023-01242


Intel and the Intel logo are trademarks of Intel Corporation in the U. S. and/or other countries.
*Other names and brands may be claimed as the property of others. Copyright © 2020, Intel Corporation.

# DB2000Q/QL

| Device | Manufacturer | MPN | IPN |
|---|---|---|---|
| DB2000Q | Renesas* | 9QXL2000BNLGI8 | K20599-002 |
| | Diodes* Incorporated | PI6CB332000ZDIEX | |
| | Microchip* | ZL40292LDF1 | |
| DB2000QL | Renesas* | 9QXL2001BNHGI8 | K20599-009 |
| | Microchip* | ZL40294 | |
| | Texas Instruments* | CDCDB2000 | |
| | Diodes* Incorporated | PI6CB332001ZBIEX | |

Greenthread Ex. 2004, p. 14
Semiconductor v. Greenthread
IPR2023-01242


Intel and the Intel logo are trademarks of Intel Corporation in the U. S. and/or other countries.
*Other names and brands may be claimed as the property of others. Copyright © 2020, Intel Corporation.

# CK420BQ

| Device | Manufacturer | MPN | IPN |
|---|---|---|---|
| CK420BQ | Renesas* | 932SQ420DGLFT | E65470-003 |

Greenthread Ex. 2004, p. 15
Semiconductor v. Greenthread
IPR2023-01242


Intel and the Intel logo are trademarks of Intel Corporation in the U. S. and/or other countries.
*Other names and brands may be claimed as the property of others. Copyright © 2020, Intel Corporation.

# CK440Q

| Device | Manufacturer | MPN | IPN |
|---|---|---|---|
| CK440Q | Renesas* | 9SQ440NQQI8<br>9SQ440NQQI | K21260-026 |

Greenthread Ex. 2004, p. 16
Semiconductor v. Greenthread
IPR2023-01242


Intel and the Intel logo are trademarks of Intel Corporation in the U. S. and/or other countries.
*Other names and brands may be claimed as the property of others. Copyright © 2020, Intel Corporation.

# CK-MNG/CK-MNG+

| Device | Manufacturer | MPN | IPN |
|---|---|---|---|
| CK-MNG | Renesas* | 9FGP202AKLF | D24031-003 |
| CK-MNG+ | Renesas* | 9FGP204BKLFT | E95226-001 |




Intel and the Intel logo are trademarks of Intel Corporation in the U. S. and/or other countries.
*Other names and brands may be claimed as the property of others. Copyright © 2020, Intel Corporation.

# I²C Clock

| Device | Manufacturer | MPN | IPN |
|---|---|---|---|
| I²C Quad Clock Generator | Silicon Labs* | SI5338M-B09714-GMR | K21260-006 |
| I²C Real-Time Clock | Maxim Integrated* | DS3231MZ+ | K30581-001 |

Greenthread Ex. 2004, p. 18
Semiconductor v. Greenthread
IPR2023-01242


Intel and the Intel logo are trademarks of Intel Corporation in the U. S. and/or other countries.
*Other names and brands may be claimed as the property of others. Copyright © 2020, Intel Corporation.

# SUPPLIER CONTACT INFORMATION

Greenthread Ex. 2004, p. 19
Semiconductor v. Greenthread
IPR2023-01242

Intel and the Intel logo are trademarks of Intel Corporation in the U. S. and/or other countries.
*Other names and brands may be claimed as the property of others. Copyright © 2020, Intel Corporation.

# Supplier Contact Information

Diodes* Incorporated
Alenka Zoric
+1 408-656-2522
Alenka_Zoric@diodes.com
www.diodes.com

Hosonic* Electronics Co. Ltd.
Mike Zhang
+86-13606623369
mike@hosonic.com
http://www.hosonic.com/en/

Microchip*
Jarrod Thorne
+1 613-270-7239
jarrod.thorne@microchip.com
https://www.microchip.com/

EPSON*
Michael Arkin
+1 408-576-4341
Michael.Arkin@ea.epson.com
https://www5.epsondevice.com/en/

Maxim Integrated*
Rod Goldhammer
Rod.Goldhammer@maximintegrated.com
https://www.maximintegrated.com/en.html

Nihon Dempa Kogyo (NDK)*
Lionel Kwong
+1 408-209-1994
lkwong@NDKXTAL.com
https://www.ndk.com/en/




Intel and the Intel logo are trademarks of Intel Corporation in the U. S. and/or other countries.
*Other names and brands may be claimed as the property of others. Copyright © 2020, Intel Corporation.

# Supplier Contact Information continued

On Semiconductor*
Beth Layton
+1 602-326-5481
Beth.Layton@onsemi.com
https://www.onsemi.com/

Renesas*
Chris Glowacki
+1 503-954-1749
chris.glowacki.uf@renesas.com
https://www.renesas.com/us/en/

TXC*
Seprina Chen
+886 3-469-8121 Ext. 2191
seprinachen@txc.com.tw
http://www.txccorp.com/index_en.php

Silicon Laboratories Inc.*
Kyle Beckmeyer
+1 408-702-1244
Kyle.beckmeyer@silabs.com
https://www.silabs.com/

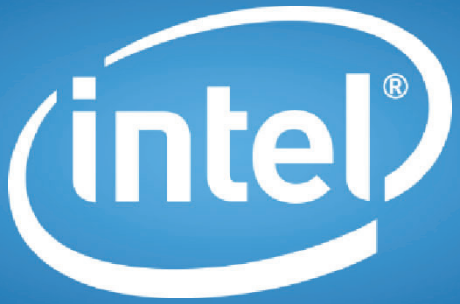
Texas Instruments Incorporated*
Robert Rodrigues
+1 253-719-1012
robert.rodrigues@ti.com

Brent Gao
+1 669-721-3389
Brent.Gao@ti.com

http://www.ti.com/

Greenthread Ex. 2004, p. 21
Semiconductor v. Greenthread
IPR2023-01242


Intel and the Intel logo are trademarks of Intel Corporation in the U. S. and/or other countries.
*Other names and brands may be claimed as the property of others. Copyright © 2020, Intel Corporation.


intel