



PIC24HJ64GPX06A/X08A/X10A and PIC24HJ128GPX06A/X08A/X10A

PIC24HJ64GPX06A/X08A/X10A and PIC24HJ128GPX06A/X08A/X10A Family Silicon Errata and Data Sheet Clarification

The PIC24HJ64GPX06A/X08A/X10A and PIC24HJ128GPX06A/X08A/X10A family devices that you have received conform functionally to the current Device Data Sheet (DS70592B), except for the anomalies described in this document.

The silicon issues discussed in the following pages are for silicon revisions with the Device and Revision IDs listed in [Table 1](#). The silicon issues are summarized in [Table 2](#).

The errata described in this document will be addressed in future revisions of the PIC24HJ64GPX06A/X08A/X10A and PIC24HJ128GPX06A/X08A/X10A silicon.

Note: This document summarizes all silicon errata issues from all revisions of silicon, previous as well as current. Only the issues indicated in the last column of [Table 2](#) apply to the current silicon revision (**A4**).

Data Sheet clarifications and corrections start on page 7, following the discussion of silicon issues.

The silicon revision level can be identified using the current version of MPLAB® IDE and Microchip's programmers, debuggers and emulation tools, which are available at the Microchip corporate web site (www.microchip.com).

For example, to identify the silicon revision level using MPLAB IDE in conjunction with MPLAB ICD 2 or PICKit™ 3:

1. Using the appropriate interface, connect the device to the MPLAB ICD 2 programmer/debugger or PICKit 3.
2. From the main menu in MPLAB IDE, select *Configure>Select Device*, and then select the target part number in the dialog box.
3. Select the MPLAB hardware tool (*Debugger>Select Tool*).
4. Perform a "Connect" operation to the device (*Debugger>Connect*). Depending on the development tool used, the part number *and* Device Revision ID value appear in the **Output** window.

Note: If you are unable to extract the silicon revision level, please contact your local Microchip sales office for assistance.

The Device and Revision ID values for the various PIC24HJ64GPX06A/X08A/X10A and PIC24HJ128GPX06A/X08A/X10A silicon revisions are shown in [Table 1](#).

TABLE 1: SILICON DEVREV VALUES

Part Number	Device ID ⁽¹⁾	Revision ID for Silicon Revision ⁽²⁾	
		A3	A4
PIC24HJ64GP206A	0x0041	0x3009	0x300A
PIC24HJ64GP210A	0x0047		
PIC24HJ64GP506A	0x0049		
PIC24HJ64GP510A	0x004B		
PIC24HJ128GP206A	0x005D		
PIC24HJ128GP210A	0x005F		
PIC24HJ128GP306A	0x0065		
PIC24HJ128GP310A	0x0067		
PIC24HJ128GP506A	0x0061		
PIC24HJ128GP510A	0x0063		

- Note 1:** The Device and Revision IDs (DEVID and DEVREV) are located at the last two implemented addresses in program memory.
- 2:** Refer to the "*dsPIC33F/PIC24H Flash Programming Specification*" (DS70152) for detailed information on Device and Revision IDs for your specific device.

PIC24HJ64GPX06A/X08A/X10A and PIC24HJ128GPX06A/X08A/X10A

TABLE 2: SILICON ISSUE SUMMARY

Module	Feature	Item Number	Issue Summary	Affected Revisions ⁽¹⁾	
				A3	A4
ECAN	Sleep Mode	1.	The WAKIF bit in the CxINTF register cannot be cleared by software instruction after the device is interrupted from Sleep due to activity on the CAN bus.	X	X
UART	IR Mode	2.	The 16x baud clock signal on the BCLK pin is present only when the module is transmitting.	X	X
UART	High-Speed Mode	3.	When the UART is in 4x mode (BRGH = 1) and using two Stop bits (STSEL = 1), it may sample the first Stop bit instead of the second one.	X	X
UART	Interrupts	4.	The UART error interrupt may not occur, or may occur at an incorrect time, if multiple errors occur during a short period of time.	X	X
I ² C™	10-bit Addressing Mode	5.	When the I ² C module is configured for 10-bit addressing using the same address bits (A10 and A9) as other I ² C devices, the A10 and A9 bits may not work as expected.	X	X
I ² C	—	6.	After the ACKSTAT bit is set when receiving a NACK, it may be cleared by the reception of a Start or Stop bit.	X	X
I ² C	10-bit Addressing Mode	7.	The 10-bit slave does not set the RBF flag or load the I2CxRCV register on address match if the Least Significant bits (LSBs) of the address are the same as the 7-bit reserved addresses.	X	X
I ² C	10-bit Addressing Mode	8.	When the I ² C module is configured as a 10-bit slave with an address of 0x102, the I2CxRCV register content for the lower address byte is 0x01 rather than 0x02.	X	X
SPI	Frame Mode	9.	In framed SPI mode, when the FRMDLY bit (SPIxCON2<1>) is cleared and SMP bit (SPIxCON1<9>) is cleared, frame sync pulses do not get generated.	X	X
Internal Voltage Regulator	IPD	10.	When the VREGS bit (RCON<8>) is set to a logic '0', device may Reset and higher sleep current may be observed.	X	X
PSV Operations	—	11.	An address error trap occurs in certain addressing modes when accessing the first four bytes of any PSV page.	X	X
CPU	EXCH Instruction	12.	The EXCH instruction does not execute correctly.	X	X
SPI	Transmit Operation	13.	Writing to the SPIxBUF register as soon as TBF bit is cleared will cause SPI module to ignore written data.	X	X
ECAN	Transmission Queuing	14.	ECAN module may not transmit Buffer 0 data if Buffer 1 data is queued for transmission first.	X	X
UART	Break Character Generation	15.	The UART module will not generate back-to-back Break characters.	X	X
I/O	SDO1 Pin	16.	SDO1 pin may toggle while device is being programmed via PGECx/PGEDx pin pairs.	X	X
ADC	Current Consumption in Sleep Mode	17.	If the ADC module is in an enabled state when the device enters Sleep Mode, the power-down current (IPD) of the device may exceed the device data sheet specifications.	X	X
All	150°C Operation	18.	These revisions of silicon only support 140°C operation instead of 150°C for Hi-Temp operating temperature.	X	X

Note 1: Only those issues indicated in the last column apply to the current silicon revision.

Silicon Errata Issues

Note: This document summarizes all silicon errata issues from all revisions of silicon, previous as well as current. Only the issues indicated by the shaded column in the following tables apply to the current silicon revision (A4).

1. Module: ECAN

The WAKIF bit in the CxINTF register cannot be cleared by software instruction after the device is interrupted from Sleep due to activity on the CAN bus.

When the device wakes up from Sleep due to CAN bus activity, the ECAN module is placed in operational mode. The ECAN Event interrupt occurs due to the WAKIF flag. Trying to clear the flag in the Interrupt Service Routine (ISR) may not clear the flag. The WAKIF bit being set will not cause repetitive Interrupt Service Routine execution.

Work around

Although the WAKIF bit does not clear, the device Sleep and ECAN Wake function continue to work as expected. If the ECAN event is enabled, the CPU will enter the Interrupt Service Routine due to the WAKIF flag getting set. The application can maintain a secondary flag, which tracks the device Sleep and Wake events.

Affected Silicon Revisions

A3	A4						
X	X						

2. Module: UART

When the UART is configured for IR interface operations (UxMODE<9:8> = 11), the 16x baud clock signal on the BCLK pin is present only when the module is transmitting. The pin is idle at all other times.

Work around

Configure one of the output compare modules to generate the required baud clock signal when the UART is receiving data or in an Idle state.

Affected Silicon Revisions

A3	A4						
X	X						

3. Module: UART

When the UART is in 4x mode (BRGH = 1) and using two Stop bits (STSEL = 1), it may sample the first Stop bit instead of the second one.

This issue does not affect the other UART configurations.

Work around

Use the 16x baud rate option (BRGH = 0) and adjust the baud rate accordingly.

Affected Silicon Revisions

A3	A4						
X	X						

4. Module: UART

The UART error interrupt may not occur, or may occur at an incorrect time, if multiple errors occur during a short period of time.

Work around

Read the error flags in the UxSTA register whenever a byte is received to verify the error status. In most cases, these bits will be correct, even if the UART error interrupt fails to occur.

Affected Silicon Revisions

A3	A4						
X	X						

5. Module: I²C

If there are two I²C devices on the bus, one of them is acting as the Master receiver and the other as the Slave transmitter. If both devices are configured for 10-bit addressing mode, and have the same value in the A10 and A9 bits of their addresses, then when the Slave select address is sent from the Master, both the Master and Slave acknowledge it. When the Master sends out the read operation, both the Master and the Slave enter into Read mode and both of them transmit the data. The resultant data will be the ANDing of the two transmissions.

Work around

In all I²C devices, the addresses as well as bits A10 and A9 should be different.

Affected Silicon Revisions

A3	A4						
X	X						

6. Module: I²C

When the I²C module is operating in either Master or Slave mode, after the ACKSTAT bit is set when receiving a NACK, it may be cleared by the reception of a Start or Stop bit.

Work around

Store the value of the ACKSTAT bit immediately after receiving a NACK.

Affected Silicon Revisions

A3	A4						
X	X						

7. Module: I²C

In 10-bit Addressing mode, some address matches do not set the RBF flag or load the receive register I2CxRCV if the lower address byte matches the reserved addresses. In particular, these include all addresses with the form XX0000XXXX and XX1111XXXX, with the following exceptions:

- 001111000X
- 011111001X
- 101111010X
- 111111011X

Work around

Ensure that the lower address byte in 10-bit Addressing mode does not match any 7-bit reserved addresses.

Affected Silicon Revisions

A3	A4						
X	X						

8. Module: I²C

When the I²C module is configured as a 10-bit slave with an address of 0x102, the I2CxRCV register content for the lower address byte is 0x01 rather than 0x02; however, the module acknowledges both address bytes.

Work around

None.

Affected Silicon Revisions

A3	A4						
X	X						

9. Module: SPI

In framed SPI mode, when the FRMDLY bit (SPIxCON2<1>) is cleared and the SMP bit (SPIxCON1<9>) is cleared, frame sync pulses do not get generated.

Work around

None.

Affected Silicon Revisions

A3	A4						
X	X						

10. Module: Internal Voltage Regulator

When the VREGS bit (RCON<8>) is set to a logic '0', the device may Reset and a higher sleep current may be observed.

Work around

Ensure VREGS bit (RCON<8>) is set to a logic '1' for device Sleep mode operation.

Affected Silicon Revisions

A3	A4						
X	X						

11. Module: PSV Operations

An address error trap occurs in certain addressing modes when accessing the first four bytes of an PSV page. This only occurs when using the following addressing modes:

- MOV.D
- Register Indirect Addressing (word or byte mode) with pre/post-decrement

Work around

Do not perform PSV accesses to any of the first four bytes using the above addressing modes. For applications using the C language, MPLAB C30 version 3.11 or higher, provides the following command-line switch that implements a work around for the erratum.

`-merrata=psv_trap`

Refer to the `readme.txt` file in the MPLAB C30 v3.11 tool suite for further details.

Affected Silicon Revisions

A3	A4						
X	X						

12. Module: CPU

The EXCH instruction does not execute correctly.

Work around

If writing source code in assembly, the recommended work around is to replace:

```
EXCH Wsource, Wdestination
with:
```

```
PUSH Wdestination
MOV Wsource, Wdestination
POP Wsource
```

If using the MPLAB C30 C compiler, specify the compiler option: `-merrata=exch` (*Project > Build Options > Projects > MPLAB C30 > Use Alternate Settings*).

Affected Silicon Revisions

A3	A4						
X	X						

13. Module: SPI

Writing to the SPIxBUF register as soon as the TBF bit is cleared will cause the SPI module to ignore the written data. Applications which use SPI with DMA will not be affected by this erratum.

Work around

After the TBF bit is cleared, wait for a minimum duration of one SPI Clock before writing to the SPIxBUF register.

Alternatively, do one of the following:

1. Poll the RBF bit and wait for it to get set before writing to the SPIxBUF register.
2. Poll the SPI Interrupt flag and wait for it to get set before writing to the SPIxBUF register.
3. Use an SPI Interrupt Service Routine.
4. Use DMA.

Affected Silicon Revisions

A3	A4						
X	X						

14. Module: ECAN

ECAN module may not transmit Buffer 0 data if Buffer 1 data is queued for transmission first. This problem is specific to transmit Buffers 0 and 1 only.

Work around

The issue can be fixed by setting reserved bit 11 in CiCTRL1 register to 1. Note that the module reset value for this bit is zero.

Affected Silicon Revisions

A3	A4						
X	X						

15. Module: UART

The UART module will not generate consecutive break characters. Trying to perform a back-to-back Break character transmission will cause the UART module to transmit the dummy character used to generate the first Break character instead of transmitting the second Break character. Break characters are generated correctly if they are followed by non-Break character transmission.

Work around

None.

Affected Silicon Revisions

A3	A4						
X	X						

16. Module: I/O

While device is being programmed via PGECx/ PGEDx pin pair, device pin with SDO1 functionality may start toggling.

Work around

None.

Affected Silicon Revisions

A3	A4						
X	X						

17. Module: ADC

If the ADC module is in an enabled state when the device enters Sleep mode as a result of executing a `PWRSVAV #0` instruction, the device power-down current (IPD) may exceed the specifications listed in the device data sheet. This may happen even if the ADC module is disabled by clearing the ADON bit prior to entering Sleep mode.

Work around 1:

In order to remain within the IPD specifications listed in the device data sheet, the user software must completely disable the ADC module by setting the ADC Module Disable bit in the corresponding Peripheral Module Disable register (PMDx), prior to executing a `PWRSVAV #0` instruction.

Note: The ADC module must be reinitialized by the user application before resuming ADC operation.

Work around 2:

If the ADC module was previously initialized and enabled, before entering Sleep, execute the lines of code provided in [Example 1](#).

Note: Unlike **Work around 1**, the user application does not need to reinitialize the ADC module; however, it is necessary to re-enable the ADC module by setting the ADON bit after waking from Sleep.

Affected Silicon Revisions

A3	A4						
X	X						

EXAMPLE 1:

```
AD1CON1bits.ADON = 0;           //Disable the ADC module
__asm__ volatile ("REPEAT #50"); //Wait 50 Tcy
__asm__ volatile ("NOP");       //Repeat NOP 51 times
Sleep();                        // Execute PWRSVAV #0 and go to Sleep
```

18. Module: All

The affected silicon revisions listed below are not warranted for operation at 150°C.

Work around

Only use the affected revisions of silicon for Hi-Temp operating range from -40°C to +140°C.

Affected Silicon Revisions

A3	A4						
X	X						

Data Sheet Clarifications

The following typographic corrections and clarifications are to be noted for the latest version of the device data sheet (DS70592B):

Note: Corrections are shown in **bold**. Where possible, the original bold text formatting has been removed for clarity.

1. Module: DC Characteristics: I/O Pin Input Specifications

The maximum value for parameter DI19 (V_{IL} specifications for SDA_x and SCL_x pins) was stated incorrectly in Table 24-9 of the current device data sheet. Also, parameters DI28 and DI29 (V_{IH} specifications for SDA_x and SCL_x pins) were not stated. The correct values are shown in bold type in [Table 3](#).

TABLE 3: DC CHARACTERISTICS: I/O PIN INPUT SPECIFICATIONS

DC CHARACTERISTICS			Standard Operating Conditions: 3.0V to 3.6V (unless otherwise stated) Operating temperature -40°C ≤T _A ≤+85°C for Industrial -40°C ≤T _A ≤+125°C for Extended				
Param No.	Symbol	Characteristic	Min	Typ	Max	Units	Conditions
DI18	V _{IL}	Input Low Voltage SDA_x, SCL_x	V _{SS}	—	0.3 V _{DD}	V	SMBus disabled
DI19		SDA_x, SCL_x	V _{SS}	—	0.8	V	SMBus enabled
DI28	V _{IH}	Input High Voltage SDA_x, SCL_x	0.7 V_{DD}	—	5.5	V	SMBus disabled
DI29		SDA_x, SCL_x	2.1	—	5.5	V	SMBus enabled

APPENDIX A: REVISION HISTORY

Rev A Document (4/2009)

Initial release of this document; issued for revision A3 and A4 silicon.

Includes silicon issues 1 ([ECAN](#)), 2-4 ([UART](#)), 5-8 ([I²C](#)), 9 ([SPI](#)), 10 ([Internal Voltage Regulator](#)), 11 ([PSV Operations](#)), 12 ([CPU](#)), 13 ([SPI](#)) and 14 ([ECAN](#)).

Rev B Document (8/2009)

Added silicon issues 15 ([UART](#)) and 16 ([I/O](#)).

Rev C Document (6/2010)

Updated silicon issue 12 ([CPU](#)).

Added silicon issue 17 ([ADC](#)) and data sheet clarification 1 ([DC Characteristics: I/O Pin Input Specifications](#)).

Rev D Document (10/2010)

Updated the work around in silicon issue 17 ([ADC](#)).

Added silicon issue 18 ([All](#)).

Note the following details of the code protection feature on Microchip devices:

- Microchip products meet the specification contained in their particular Microchip Data Sheet.
- Microchip believes that its family of products is one of the most secure families of its kind on the market today, when used in the intended manner and under normal conditions.
- There are dishonest and possibly illegal methods used to breach the code protection feature. All of these methods, to our knowledge, require using the Microchip products in a manner outside the operating specifications contained in Microchip's Data Sheets. Most likely, the person doing so is engaged in theft of intellectual property.
- Microchip is willing to work with the customer who is concerned about the integrity of their code.
- Neither Microchip nor any other semiconductor manufacturer can guarantee the security of their code. Code protection does not mean that we are guaranteeing the product as “unbreakable.”

Code protection is constantly evolving. We at Microchip are committed to continuously improving the code protection features of our products. Attempts to break Microchip's code protection feature may be a violation of the Digital Millennium Copyright Act. If such acts allow unauthorized access to your software or other copyrighted work, you may have a right to sue for relief under that Act.

Information contained in this publication regarding device applications and the like is provided only for your convenience and may be superseded by updates. It is your responsibility to ensure that your application meets with your specifications. MICROCHIP MAKES NO REPRESENTATIONS OR WARRANTIES OF ANY KIND WHETHER EXPRESS OR IMPLIED, WRITTEN OR ORAL, STATUTORY OR OTHERWISE, RELATED TO THE INFORMATION, INCLUDING BUT NOT LIMITED TO ITS CONDITION, QUALITY, PERFORMANCE, MERCHANTABILITY OR FITNESS FOR PURPOSE. Microchip disclaims all liability arising from this information and its use. Use of Microchip devices in life support and/or safety applications is entirely at the buyer's risk, and the buyer agrees to defend, indemnify and hold harmless Microchip from any and all damages, claims, suits, or expenses resulting from such use. No licenses are conveyed, implicitly or otherwise, under any Microchip intellectual property rights.

Trademarks

The Microchip name and logo, the Microchip logo, dsPIC, KEELOQ, KEELOQ logo, MPLAB, PIC, PICmicro, PICSTART, PIC³² logo, rPIC and UNI/O are registered trademarks of Microchip Technology Incorporated in the U.S.A. and other countries.


FilterLab, Hampshire, HI-TECH C, Linear Active Thermistor, MXDEV, MXLAB, SEEVAL and The Embedded Control Solutions Company are registered trademarks of Microchip Technology Incorporated in the U.S.A.

Analog-for-the-Digital Age, Application Maestro, CodeGuard, dsPICDEM, dsPICDEM.net, dsPICworks, dsSPEAK, ECAN, ECONOMONITOR, FanSense, HI-TIDE, In-Circuit Serial Programming, ICSP, Mindi, MiWi, MPASM, MPLAB Certified logo, MPLIB, MPLINK, mTouch, Omniscent Code Generation, PICC, PICC-18, PICDEM, PICDEM.net, PICkit, PICTail, REAL ICE, rLAB, Select Mode, Total Endurance, TSHARC, UniWinDriver, WiperLock and ZENA are trademarks of Microchip Technology Incorporated in the U.S.A. and other countries.

SQTP is a service mark of Microchip Technology Incorporated in the U.S.A.

All other trademarks mentioned herein are property of their respective companies.

© 2010, Microchip Technology Incorporated, Printed in the U.S.A., All Rights Reserved.

 Printed on recycled paper.

ISBN: 978-1-60932-590-9

Microchip received ISO/TS-16949:2002 certification for its worldwide headquarters, design and wafer fabrication facilities in Chandler and Tempe, Arizona; Gresham, Oregon and design centers in California and India. The Company's quality system processes and procedures are for its PIC[®] MCUs and dsPIC[®] DSCs, KEELOQ[®] code hopping devices, Serial EEPROMs, microperipherals, nonvolatile memory and analog products. In addition, Microchip's quality system for the design and manufacture of development systems is ISO 9001:2000 certified.

**QUALITY MANAGEMENT SYSTEM
CERTIFIED BY DNV
== ISO/TS 16949:2002 ==**



MICROCHIP

Worldwide Sales and Service

AMERICAS

Corporate Office
2355 West Chandler Blvd.
Chandler, AZ 85224-6199
Tel: 480-792-7200
Fax: 480-792-7277
Technical Support:
<http://support.microchip.com>
Web Address:
www.microchip.com

Atlanta
Duluth, GA
Tel: 678-957-9614
Fax: 678-957-1455

Boston
Westborough, MA
Tel: 774-760-0087
Fax: 774-760-0088

Chicago
Itasca, IL
Tel: 630-285-0071
Fax: 630-285-0075

Cleveland
Independence, OH
Tel: 216-447-0464
Fax: 216-447-0643

Dallas
Addison, TX
Tel: 972-818-7423
Fax: 972-818-2924

Detroit
Farmington Hills, MI
Tel: 248-538-2250
Fax: 248-538-2260

Kokomo
Kokomo, IN
Tel: 765-864-8360
Fax: 765-864-8387

Los Angeles
Mission Viejo, CA
Tel: 949-462-9523
Fax: 949-462-9608

Santa Clara
Santa Clara, CA
Tel: 408-961-6444
Fax: 408-961-6445

Toronto
Mississauga, Ontario,
Canada
Tel: 905-673-0699
Fax: 905-673-6509

ASIA/PACIFIC

Asia Pacific Office
Suites 3707-14, 37th Floor
Tower 6, The Gateway
Harbour City, Kowloon
Hong Kong
Tel: 852-2401-1200
Fax: 852-2401-3431

Australia - Sydney
Tel: 61-2-9868-6733
Fax: 61-2-9868-6755

China - Beijing
Tel: 86-10-8528-2100
Fax: 86-10-8528-2104

China - Chengdu
Tel: 86-28-8665-5511
Fax: 86-28-8665-7889

China - Chongqing
Tel: 86-23-8980-9588
Fax: 86-23-8980-9500

China - Hong Kong SAR
Tel: 852-2401-1200
Fax: 852-2401-3431

China - Nanjing
Tel: 86-25-8473-2460
Fax: 86-25-8473-2470

China - Qingdao
Tel: 86-532-8502-7355
Fax: 86-532-8502-7205

China - Shanghai
Tel: 86-21-5407-5533
Fax: 86-21-5407-5066

China - Shenyang
Tel: 86-24-2334-2829
Fax: 86-24-2334-2393

China - Shenzhen
Tel: 86-755-8203-2660
Fax: 86-755-8203-1760

China - Wuhan
Tel: 86-27-5980-5300
Fax: 86-27-5980-5118

China - Xian
Tel: 86-29-8833-7252
Fax: 86-29-8833-7256

China - Xiamen
Tel: 86-592-2388138
Fax: 86-592-2388130

China - Zhuhai
Tel: 86-756-3210040
Fax: 86-756-3210049

ASIA/PACIFIC

India - Bangalore
Tel: 91-80-3090-4444
Fax: 91-80-3090-4123

India - New Delhi
Tel: 91-11-4160-8631
Fax: 91-11-4160-8632

India - Pune
Tel: 91-20-2566-1512
Fax: 91-20-2566-1513

Japan - Yokohama
Tel: 81-45-471- 6166
Fax: 81-45-471-6122

Korea - Daegu
Tel: 82-53-744-4301
Fax: 82-53-744-4302

Korea - Seoul
Tel: 82-2-554-7200
Fax: 82-2-558-5932 or
82-2-558-5934

Malaysia - Kuala Lumpur
Tel: 60-3-6201-9857
Fax: 60-3-6201-9859

Malaysia - Penang
Tel: 60-4-227-8870
Fax: 60-4-227-4068

Philippines - Manila
Tel: 63-2-634-9065
Fax: 63-2-634-9069

Singapore
Tel: 65-6334-8870
Fax: 65-6334-8850

Taiwan - Hsin Chu
Tel: 886-3-6578-300
Fax: 886-3-6578-370

Taiwan - Kaohsiung
Tel: 886-7-213-7830
Fax: 886-7-330-9305

Taiwan - Taipei
Tel: 886-2-2500-6610
Fax: 886-2-2508-0102

Thailand - Bangkok
Tel: 66-2-694-1351
Fax: 66-2-694-1350

EUROPE

Austria - Wels
Tel: 43-7242-2244-39
Fax: 43-7242-2244-393

Denmark - Copenhagen
Tel: 45-4450-2828
Fax: 45-4485-2829

France - Paris
Tel: 33-1-69-53-63-20
Fax: 33-1-69-30-90-79

Germany - Munich
Tel: 49-89-627-144-0
Fax: 49-89-627-144-44

Italy - Milan
Tel: 39-0331-742611
Fax: 39-0331-466781

Netherlands - Drunen
Tel: 31-416-690399
Fax: 31-416-690340

Spain - Madrid
Tel: 34-91-708-08-90
Fax: 34-91-708-08-91

UK - Wokingham
Tel: 44-118-921-5869
Fax: 44-118-921-5820

08/04/10