



## Product Change Notification / SYST-07KOTG694

---

**Date:**

09-Jul-2021

**Product Category:**

Ethernet PHYs

**PCN Type:**

Document Change

**Notification Subject:**

ERRATA - LAN8670/1/2 10BASE-T1S Ethernet PHY Transceiver Silicon Errata and Data Sheet Clarifications Revision

**Affected CPNs:**

[SYST-07KOTG694\\_Affected\\_CPN\\_07092021.pdf](#)

[SYST-07KOTG694\\_Affected\\_CPN\\_07092021.csv](#)

**Notification Text:**

SYST-07KOTG694

Microchip has released a new Product Documents for the LAN8670/1/2 10BASE-T1S Ethernet PHY Transceiver Silicon Errata and Data Sheet Clarifications of devices. If you are using one of these devices please read the document located at [LAN8670/ 1/ 2 10BASE-T1S Ethernet PHY Transceiver Silicon Errata and Data Sheet Clarifications](#).

**Notification Status:** Final

**Description of Change:** Initial Release of Data Sheet DS60001573C

**Impacts to Data Sheet:** None

**Reason for Change:** To Improve Productivity

**Change Implementation Status:** Complete

**Date Document Changes Effective:** 09 Jul 2021

**NOTE:** Please be advised that this is a change to the document only the product has not been changed.

**Markings to Distinguish Revised from Unrevised Devices:** N/A

## **Attachments:**

[LAN8670/ 1/ 2 10BASE-T1S Ethernet PHY Transceiver Silicon Errata and Data Sheet Clarifications](#)

Please contact your local [Microchip sales office](#) with questions or concerns regarding this notification.

## **Terms and Conditions:**

If you wish to receive Microchip PCNs via email please register for our PCN email service at our [PCN home page](#) select register then fill in the required fields. You will find instructions about registering for Microchips PCN email service in the [PCN FAQ](#) section.

If you wish to change your PCN profile, including opt out, please go to the [PCN home page](#) select login and sign into your myMicrochip account. Select a profile option from the left navigation bar and make the applicable selections.

Affected Catalog Part Numbers (CPN)

LAN8670B1-E/LMX  
LAN8672B1-E/LNX  
LAN8671B1-E/U3B  
LAN8670B1T-E/LMX  
LAN8672B1T-E/LNX  
LAN8671B1T-E/U3B

## 10BASE-T1S Ethernet PHY Transceiver Silicon Errata and Data Sheet Clarifications

The LAN8670/1/2 devices that you have received conform functionally to the current Device Data Sheet (DS60001573C), except for the anomalies described in this document.

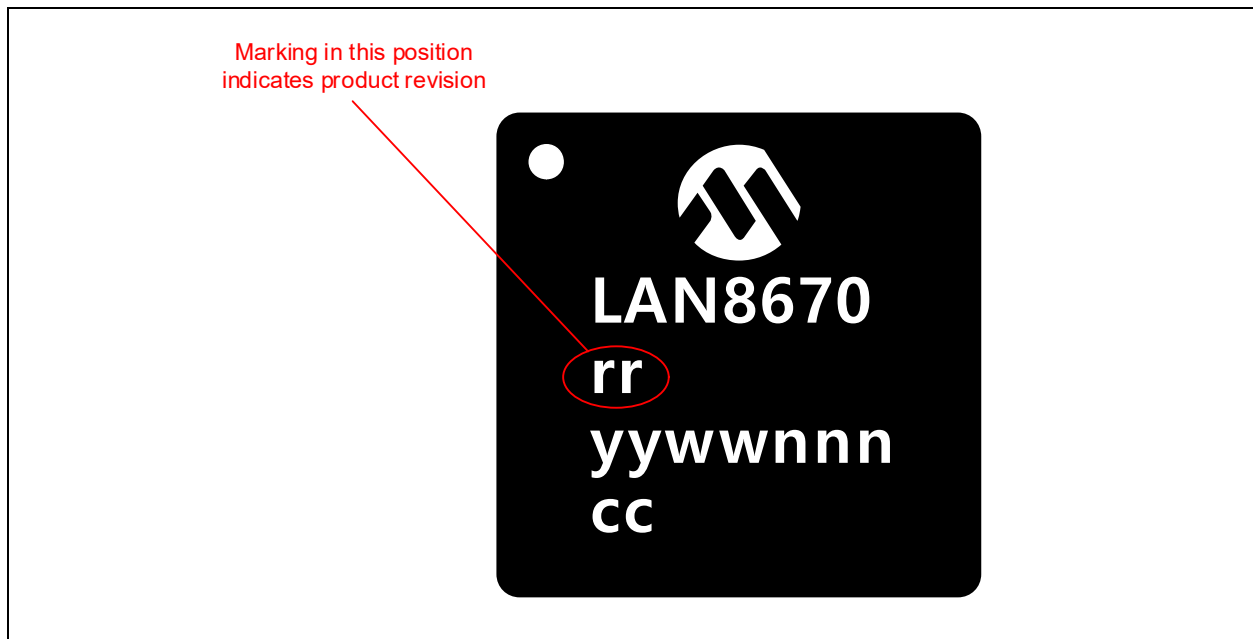
The issues discussed in the following pages are for hardware revisions listed in [Table 1](#). The silicon issues are summarized in [Table 2](#). Item relating to data sheet changes are summarized in the Data Sheet Clarifications section.

**TABLE 1: SILICON PART ID AND HARDWARE REVISION VALUES**

Part Number	Part ID <sup>1</sup>	Hardware Revision <sup>1</sup>	Package Marking
LAN8670	010110	0010	B1
LAN8671	010110	0010	B1
LAN8672	010110	0010	B1

**Note 1:** The Part ID and Hardware Revision are located in the PHY\_ID1 register Model Number and Revision Number fields, respectively.

**FIGURE 1: TOP MARKING FOR LAN8670 DEVICE**



# LAN8670/1/2

FIGURE 2: TOP MARKING FOR LAN8671 DEVICE

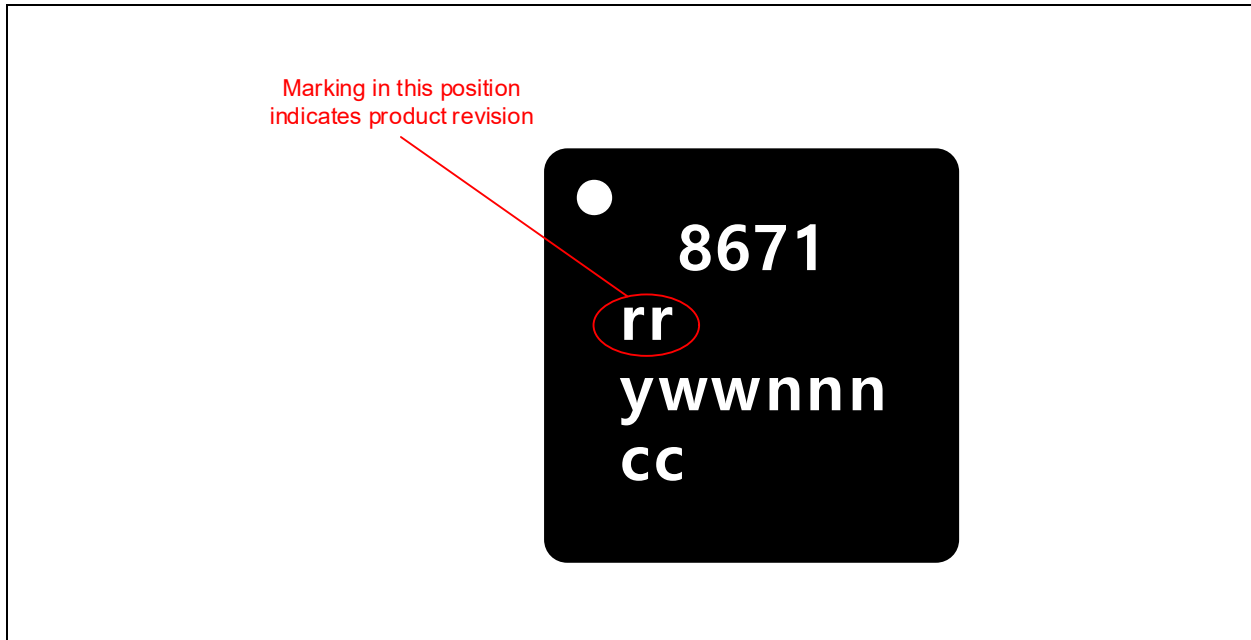
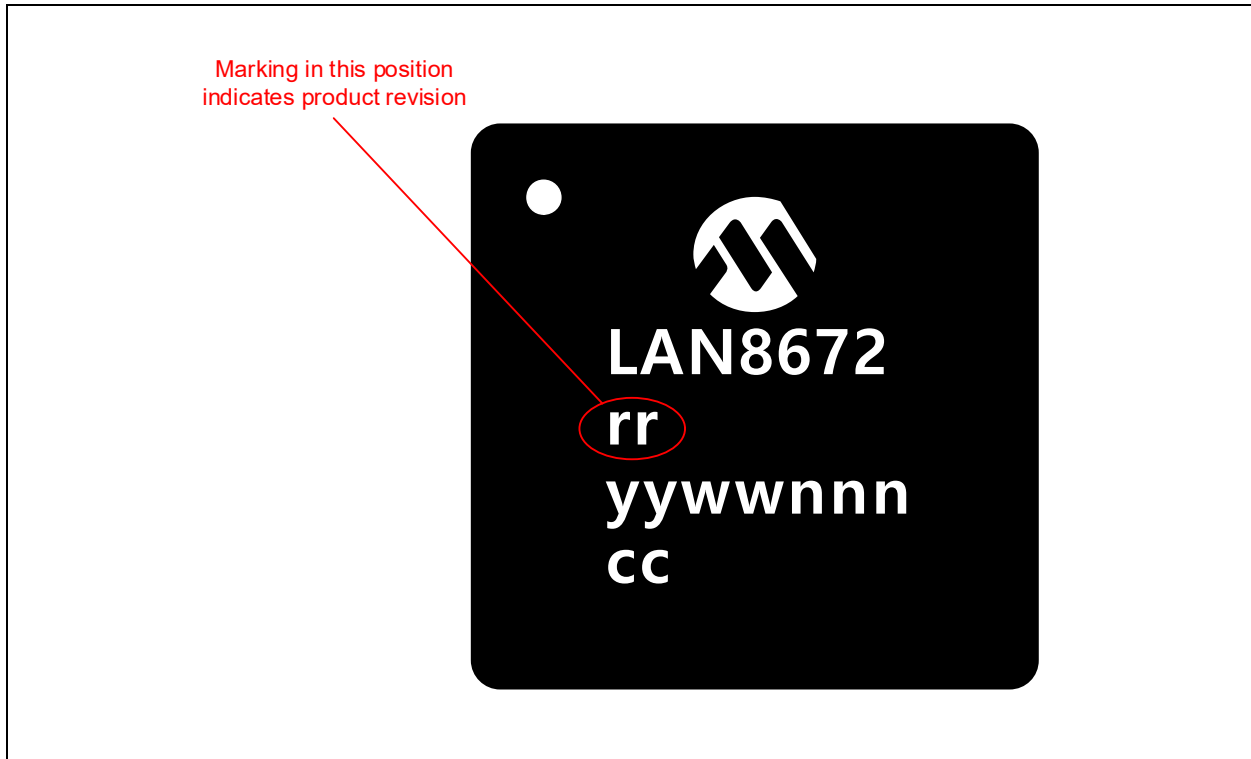


FIGURE 3: TOP MARKING FOR LAN8672 DEVICE



**TABLE 2: SILICON ISSUE SUMMARY**

Item Number	Issue Summary	Affected Devices		
		LAN8670	LAN8671	LAN8672
		Rev B1	Rev B1	Rev B1
s1.	Media interface mode (RMII) identification	-	X	-
s2.	Package Type identification	-	X	-
s3.	RMII CSMA/CD operation in mixed PLCA segments	X	X	-
s4.	Incorrect reset indication on IRQ_N	X	X	X
s5.	Multi-coordinator PLCA action	X	X	X
s6.	Transmission of collision fragments with PLCA and RMII	X	X	-
s7.	Detection of late collisions with PLCA and RMII	X	X	-
s8.	Revert to CSMA/CD when PLCA Beacons are missing	X	X	X

Legend

- Erratum is not applicable.
- X Erratum is applicable.

## Silicon Errata Issues:

### s1. Module: Media interface mode (RMII) identification

#### DESCRIPTION

The Media Interface Type (MITYP) field of the Strap Control 0 (STRAP\_CTRL0) register does not properly indicate that RMII is active on the LAN8671. When reading the Media Interface Type field, the LAN8671 will return a random value.

#### END USER IMPLICATIONS

The station management entity cannot read the Media Interface Type field of the LAN8671 to determine the operating mode of the media interface.

#### Work Around

The LAN8671 only supports RMII operation. The station management entity should read the Package Type (PKGTYP) field of the Strap Control 0 register to determine the specific device that is used and assume RMII operation for the LAN8671.

#### PLAN

This erratum will be corrected in a future revision.

# LAN8670/1/2

---

## s2. Module: Package Type identification

### DESCRIPTION

The Package Type (PKGTYP) field of the Strap Control 0 (STRAP\_CTRL0) register does not always return the correct value for the LAN8671. When reading the Package Type field, the LAN8671 will return a value of 00b or 10b.

### END USER IMPLICATIONS

The station management entity cannot reliably read the Package Type field to determine the device.

#### **Work Around**

The station management entity should interpret Package Type values of 00b or 10b as the LAN8671.

### PLAN

This erratum will be corrected in a future revision.

## s3. Module: RMII CSMA/CD operation in mixed PLCA segments

### DESCRIPTION

The LAN8670/1 RMII cannot be operated with PLCA disabled on a network with other PLCA-enabled nodes. When the device is configured for CSMA/CD operation (i.e., PLCA is disabled), then the reception of PLCA BEACON and COMMIT symbols from the network will be improperly transferred via the RMII to the MAC resulting in undefined behavior including dropped packets.

The LAN8672 does not support RMII operation.

### END USER IMPLICATIONS

The RMII may only be used with PLCA disabled when all other nodes on the mixing segment are also configured for pure CSMA/CD operation.

#### **Work Around**

None.

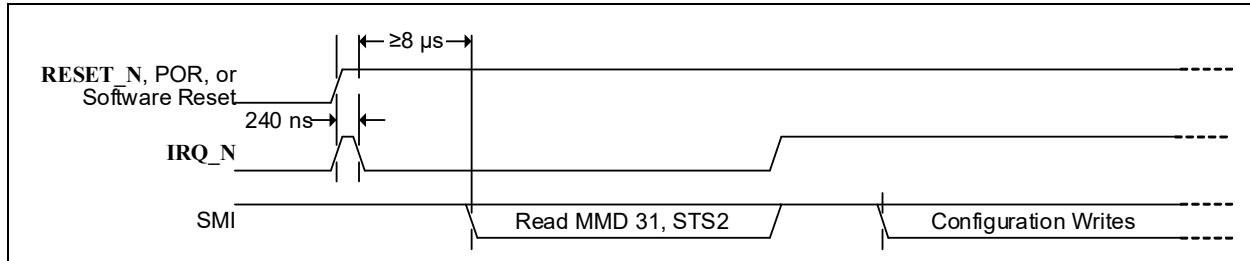
### PLAN

This erratum will be corrected in a future revision.

## s4. Module: Incorrect reset indication on IRQ\_N

### DESCRIPTION

The device does not properly assert the IRQ\_N pin to interrupt the station management entity once it has been reset. The device should allow the IRQ\_N pin to be pulled high when it is in reset and only assert IRQ\_N low once it is ready for initialization by the station management entity. However, the device will assert IRQ\_N low during reset. Once the device reset is deasserted, the IRQ\_N pin will become deasserted for about 240 ns. The station management entity can only attempt communication with the device 8  $\mu$ s following reset.



### END USER IMPLICATIONS

When the device has been reset, the station management entity cannot immediately communicate with the device. The station management entity will receive a false interrupt indication on IRQ\_N when the device is reset. This may result in a failure to communicate with the device.

#### **Work Around**

The station management entity must wait at least 8  $\mu$ s following reset to communicate with the device.

### PLAN

This erratum will be corrected in a future revision.

## s5. Module: Multi-coordinator PLCA action

### DESCRIPTION

When operating as a PLCA Coordinator, if the PHY receives an unexpected BEACON from an additional coordinator on the segment, it will set the Unexpected BEACON Received (UNEXPB) bit in the Status 1 (STS1) register. The PHY will then enter a recovery state in which it can receive packets but will transmit neither packets nor BEACONS for the next two PLCA bus cycles. Should the duplicate Coordinator continue sending periodic BEACONS, then the PHY will remain in the recovery state unable to transmit to avoid collisions with the duplicate Coordinator in Transmit Opportunity 0.

Clause 148 of the IEEE 802.3cg-2019™ specification describes that when this condition occurs, the PHY should avoid transmitting in its transmit opportunity until the end of the current bus cycle when the PHY will again transmit its BEACON to the segment.

### END USER IMPLICATIONS

The PHY will halt transmitting packets and BEACONS to the network when configured as a PLCA Coordinator and an unexpected BEACON is detected. This results in the node becoming an inactive Coordinator.

#### **Work Around**

The station management entity should monitor the Unexpected BEACON Received bit and configure the PHY as a PLCA Follower.

### PLAN

This erratum will be corrected in a future revision.



# LAN8670/1/2

---

## s6. Module: Transmission of collision fragments with PLCA and RMII

### DESCRIPTION

Clause 4 of the IEEE Std 802.3-2018™ specifies the MAC shall implement an Inter-Packet Gap (IPG) delay of 96 bit times (BT) between packets. This IPG is split into two parts. The first part, IPG part 1, requires that no carrier be sensed. If carrier is sensed during IPG part 1, then the timer is restarted. Once IPG part 1 is complete, the MAC may transmit following IPG part 2. The IPG part 1 is nominally 64 BT, but may be less, including zero. The IPG part 2 timing is nominally 32 BT, but is always equal to the full IPG duration minus the IPG part 1.

Some MACs implement an IPG part 1 of very small duration. If the IPG part 1 time is too small, then the MAC may attempt to transmit after the PHY has asserted carrier indication with CRSDV. The result is that the MAC will quickly detect a collision and send a collision fragment to the PHY. When PLCA is enabled, the PHY, not expecting the MAC to transmit after carrier was indicated, will not detect the collision and end up transmitting the collision fragment to the network.

### END USER IMPLICATIONS

Use of a MAC with an IPG part 1 time of less than 18 bits will result in the transmission of short 10.4 μs packets onto the network.

#### Work Around

While the transmission of the collision fragments to the network are benign, they may be eliminated by reducing the size of the PLCA delay line buffer with the register configuration provided below. This will cause the PHY detecting a normal logical collision preventing the transmission of the collision fragment. Additionally, the PHY will capture the next transmit opportunity guaranteeing the MAC the ability to transmit according to the PLCA algorithm.

<b>Access</b>	<b>MMD</b>	<b>Address</b>	<b>Data</b>	<b>Mask</b>
RMW	0x1F	0x008F	0x00D0	0x07F0

#### Legend:

R - Read

W - Write

RMW - Read-Modified Write

### PLAN

This erratum will be corrected in a future revision.

## s7. Module: Detection of late collisions with PLCA and RMII

### DESCRIPTION

Clause 4 of the IEEE Std 802.3-2018 specifies the MAC shall implement an Inter-Packet Gap (IPG) delay of 96 bit times (BT) between packets. This IPG is split into two parts. The first part, IPG part 1, requires that no carrier be sensed. If carrier is sensed during IPG part 1, then the timer is restarted. Once IPG part 1 is complete, the MAC may transmit following IPG part 2. The IPG part 1 is nominally 64 BT, but may be less, including zero. The IPG part 2 timing is nominally 32 BT, but is always equal to the full IPG duration minus the IPG part 1.

Some MACs implement an IPG part 2 duration of longer than 32BT. In this case the MAC may attempt to transmit longer after carrier indication than the PHY has expected. This results in an incorrect carrier sense indication to the MAC which, if the MAC attempts to transmit again, may lead to a late collision.

### END USER IMPLICATIONS

Use of a MAC with an IPG part 2 time of greater than 32 bits may result in the PHY asserting a late collision to the MAC.

#### **Work Around**

Please contact your Microchip support with details of the MAC being used and its Inter-Packet Gap timing for details on resolving this issue.

### PLAN

This erratum will be corrected in a future revision.

## s8. Module: Revert to CSMA/CD when PLCA Beacons are missing

### DESCRIPTION

Clause 148 of IEEE 802.3cg-2019 specifies the behavior of PLCA Follower nodes when the BEACONS from the Coordinator are no longer regularly received. If BEACONS are not received by the device it will continue incrementing its transmit opportunity counter. When the transmit opportunity counter reaches the maximum count of 255, it will then stop incrementing and a 13 ms timer started. If no BEACON is received after the timer expires, the PLCA Status bit will be cleared. When the PLCA Status bit is zero, the device will revert to CSMA/CD operation with PLCA deactivated.

The device does not properly revert to CSMA/CD operation in this condition. It will indicate the lack of received BEACONS by asserting the PLCA Status (PST) bit in the PLCA Status (PLCA\_STS) register, however, it will not deactivate PLCA and revert to CSMA/CD operation.

### END USER IMPLICATIONS

When BEACONS from the PLCA coordinator are no longer regularly received, the PHY will not properly revert to CSMA/CD operation, as specified, and will no longer transmit packets to the network.

#### **Work Around**

The station management entity (STA) should monitor the PLCA Status (PST) bit in the PLCA Status (PLCA\_STS) register. When the PST bit is set, the STA should disable PLCA to manually revert to CSMA/CD operation. While in CSMA/CD operation, the STA should monitor the PLCA Symbols Detected (PLCASYM) bit in the Status 1 (STS1) register. When PLCASYM is set, it indicates the detection of PLCA BEACON symbols received when PLCA is disabled. The STA may then re-enable PLCA.

### PLAN

This erratum will be corrected in a future revision.

# LAN8670/1/2

---

## Data Sheet Clarifications:

The following typographic corrections and clarifications are to be noted for the current data sheet (DS60001573C):

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

**None**

## APPENDIX A: DOCUMENT REVISION HISTORY

Revision Level & Date	Section/Figure/Entry	Correction
DS80000962A (07-2021)	All	Initial Release of Data Sheet DS60001573C

# LAN8670/1/2

---

NOTES:

---

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

- Microchip products meet the specifications contained in their particular Microchip Data Sheet.
- Microchip believes that its family of products is secure when used in the intended manner and under normal conditions.
- There are dishonest and possibly illegal methods being used in attempts to breach the code protection features of the Microchip devices. We believe that these methods require using the Microchip products in a manner outside the operating specifications contained in Microchip's Data Sheets. Attempts to breach these code protection features, most likely, cannot be accomplished without violating intellectual property rights.
- Microchip is willing to work with any customer who is concerned about the integrity of its code.

Neither Microchip nor any other semiconductor manufacturer can guarantee the security of its code. Code protection does not mean that we are guaranteeing the product is "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 is provided for the sole purpose of designing with and using Microchip products. Information 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.

THIS INFORMATION IS PROVIDED BY MICROCHIP "AS IS". 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 ANY IMPLIED WARRANTIES OF NON-INFRINGEMENT, MERCHANTABILITY, AND FITNESS FOR A PARTICULAR PURPOSE OR WARRANTIES RELATED TO ITS CONDITION, QUALITY, OR PERFORMANCE.

IN NO EVENT WILL MICROCHIP BE LIABLE FOR ANY INDIRECT, SPECIAL, PUNITIVE, INCIDENTAL OR CONSEQUENTIAL LOSS, DAMAGE, COST OR EXPENSE OF ANY KIND WHATSOEVER RELATED TO THE INFORMATION OR ITS USE, HOWEVER CAUSED, EVEN IF MICROCHIP HAS BEEN ADVISED OF THE POSSIBILITY OR THE DAMAGES ARE FORESEEABLE. TO THE FULLEST EXTENT ALLOWED BY LAW, MICROCHIP'S TOTAL LIABILITY ON ALL CLAIMS IN ANY WAY RELATED TO THE INFORMATION OR ITS USE WILL NOT EXCEED THE AMOUNT OF FEES, IF ANY, THAT YOU HAVE PAID DIRECTLY TO MICROCHIP FOR THE INFORMATION. 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 unless otherwise stated.

For information regarding Microchip's Quality Management Systems, please visit [www.microchip.com/quality](http://www.microchip.com/quality).

**Trademarks**

The Microchip name and logo, the Microchip logo, Adaptec, AnyRate, AVR, AVR logo, AVR Freaks, BesTime, BitCloud, chipKIT, chipKIT logo, CryptoMemory, CryptoRF, dsPIC, FlashFlex, flexPWR, HELDO, IGLoo, JukeBlox, KeeLoq, Klear, LANCheck, LinkMD, maXStylus, maXTouch, MediaLB, megaAVR, Microsemi, Microsemi logo, MOST, MOST logo, MPLAB, OptoLyzer, PackeTime, PIC, picoPower, PICSTART, PIC32 logo, PolarFire, Prochip Designer, QTouch, SAM-BA, SenGenuity, SpyNIC, SST, SST Logo, SuperFlash, Symmetricom, SyncServer, Tachyon, TimeSource, tinyAVR, UNI/O, Vectron, and XMEGA are registered trademarks of Microchip Technology Incorporated in the U.S.A. and other countries.

AgileSwitch, APT, ClockWorks, The Embedded Control Solutions Company, EtherSynch, FlashTec, Hyper Speed Control, HyperLight Load, IntelliMOS, Libero, motorBench, mTouch, Powermite 3, Precision Edge, ProASIC, ProASIC Plus, ProASIC Plus logo, QuietWire, SmartFusion, SyncWorld, Temux, TimeCesium, TimeHub, TimePictra, TimeProvider, WinPath, and ZL are registered trademarks of Microchip Technology Incorporated in the U.S.A.

Adjacent Key Suppression, AKS, Analog-for-the-Digital Age, Any Capacitor, AnyIn, AnyOut, Augmented Switching, BlueSky, BodyCom, CodeGuard, CryptoAuthentication, CryptoAutomotive, CryptoCompanion, CryptoController, dsPICDEM, dsPICDEM.net, Dynamic Average Matching, DAM, ECAN, Espresso T1S, EtherGREEN, IdealBridge, In-Circuit Serial Programming, ICSP, INICnet, Intelligent Paralleling, Inter-Chip Connectivity, JitterBlocker, maxCrypto, maxView, memBrain, Mindi, MiWi, MPASM, MPF, MPLAB Certified logo, MPLIB, MPLINK, MultiTRAK, NetDetach, Omniscient Code Generation, PICDEM, PICDEM.net, PICkit, PICtail, PowerSmart, PureSilicon, QMatrix, REAL ICE, Ripple Blocker, RTAX, RTG4, SAM-ICE, Serial Quad I/O, simpleMAP, SimpliPHY, SmartBuffer, SMART-I.S., storClad, SSI, SuperSwitcher, SuperSwitcher II, Switchtec, SynchroPHY, Total Endurance, TSHARC, USBCheck, VariSense, VectorBlox, VeriPHY, ViewSpan, WiperLock, XpressConnect, 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.

The Adaptec logo, Frequency on Demand, Silicon Storage Technology, and Symmcom are registered trademarks of Microchip Technology Inc. in other countries.

GestIC is a registered trademark of Microchip Technology Germany II GmbH & Co. KG, a subsidiary of Microchip Technology Inc., in other countries.

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

© 2021, Microchip Technology Incorporated, All Rights Reserved.

ISBN: 978-1-5224-8462-2



## 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://www.microchip.com/support>  
Web Address:  
[www.microchip.com](http://www.microchip.com)

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

**Austin, TX**  
Tel: 512-257-3370

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

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

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

**Detroit**  
Novi, MI  
Tel: 248-848-4000

**Houston, TX**  
Tel: 281-894-5983

**Indianapolis**  
Noblesville, IN  
Tel: 317-773-8323  
Fax: 317-773-5453  
Tel: 317-536-2380

**Los Angeles**  
Mission Viejo, CA  
Tel: 949-462-9523  
Fax: 949-462-9608  
Tel: 951-273-7800

**Raleigh, NC**  
Tel: 919-844-7510

**New York, NY**  
Tel: 631-435-6000

**San Jose, CA**  
Tel: 408-735-9110  
Tel: 408-436-4270

**Canada - Toronto**  
Tel: 905-695-1980  
Fax: 905-695-2078

### ASIA/PACIFIC

**Australia - Sydney**  
Tel: 61-2-9868-6733

**China - Beijing**  
Tel: 86-10-8569-7000

**China - Chengdu**  
Tel: 86-28-8665-5511

**China - Chongqing**  
Tel: 86-23-8980-9588

**China - Dongguan**  
Tel: 86-769-8702-9880

**China - Guangzhou**  
Tel: 86-20-8755-8029

**China - Hangzhou**  
Tel: 86-571-8792-8115

**China - Hong Kong SAR**  
Tel: 852-2943-5100

**China - Nanjing**  
Tel: 86-25-8473-2460

**China - Qingdao**  
Tel: 86-532-8502-7355

**China - Shanghai**  
Tel: 86-21-3326-8000

**China - Shenyang**  
Tel: 86-24-2334-2829

**China - Shenzhen**  
Tel: 86-755-8864-2200

**China - Suzhou**  
Tel: 86-186-6233-1526

**China - Wuhan**  
Tel: 86-27-5980-5300

**China - Xian**  
Tel: 86-29-8833-7252

**China - Xiamen**  
Tel: 86-592-2388138

**China - Zhuhai**  
Tel: 86-756-3210040

### ASIA/PACIFIC

**India - Bangalore**  
Tel: 91-80-3090-4444

**India - New Delhi**  
Tel: 91-11-4160-8631

**India - Pune**  
Tel: 91-20-4121-0141

**Japan - Osaka**  
Tel: 81-6-6152-7160

**Japan - Tokyo**  
Tel: 81-3-6880-3770

**Korea - Daegu**  
Tel: 82-53-744-4301

**Korea - Seoul**  
Tel: 82-2-554-7200

**Malaysia - Kuala Lumpur**  
Tel: 60-3-7651-7906

**Malaysia - Penang**  
Tel: 60-4-227-8870

**Philippines - Manila**  
Tel: 63-2-634-9065

**Singapore**  
Tel: 65-6334-8870

**Taiwan - Hsin Chu**  
Tel: 886-3-577-8366

**Taiwan - Kaohsiung**  
Tel: 886-7-213-7830

**Taiwan - Taipei**  
Tel: 886-2-2508-8600

**Thailand - Bangkok**  
Tel: 66-2-694-1351

**Vietnam - Ho Chi Minh**  
Tel: 84-28-5448-2100

### EUROPE

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

**Denmark - Copenhagen**  
Tel: 45-4485-5910  
Fax: 45-4485-2829

**Finland - Espoo**  
Tel: 358-9-4520-820

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

**Germany - Garching**  
Tel: 49-8931-9700

**Germany - Haan**  
Tel: 49-2129-3766400

**Germany - Heilbronn**  
Tel: 49-7131-72400

**Germany - Karlsruhe**  
Tel: 49-721-625370

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

**Germany - Rosenheim**  
Tel: 49-8031-354-560

**Israel - Ra'anana**  
Tel: 972-9-744-7705

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

**Italy - Padova**  
Tel: 39-049-7625286

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

**Norway - Trondheim**  
Tel: 47-7288-4388

**Poland - Warsaw**  
Tel: 48-22-3325737

**Romania - Bucharest**  
Tel: 40-21-407-87-50

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

**Sweden - Gothenberg**  
Tel: 46-31-704-60-40

**Sweden - Stockholm**  
Tel: 46-8-5090-4654

**UK - Wokingham**  
Tel: 44-118-921-5800  
Fax: 44-118-921-5820