

Microprocessor Reset Circuits

Features

- Precision Voltage Monitor for 3V, 3.3V, or 5V Power Supplies
- /RESET Remains Valid with V_{CC} as Low as 1V
- 5 μ A Typical Supply Current
- 140 ms Minimum Reset Pulse Width Available
- Manual Reset Input
- Available in 4-Lead SOT-143 Package

Applications

- Portable Equipment
- Intelligent Instruments
- Critical Microprocessor Power Monitoring
- Printers/Computers
- Controllers

General Description

The MIC811 and MIC812 are inexpensive microprocessor supervisory circuits that monitor power supplies in microprocessor based systems.

The function of this device is to assert a reset if either the power supply drops below a designated reset threshold level or /MR is forced low. Several different reset threshold levels are available to accommodate 3V, 3.3V, or 5V powered systems.

The MIC811 has an active-low /RESET output, while the MIC812 offers an active-high RESET output. The reset output remains asserted for a minimum of 140 ms after V_{CC} has risen above the designed reset threshold level. Having a push-pull output stage, the MIC811/812 do not require a pull-up resistor at the output. The MIC811 and MIC812 come in a 4-lead SOT-143 package.

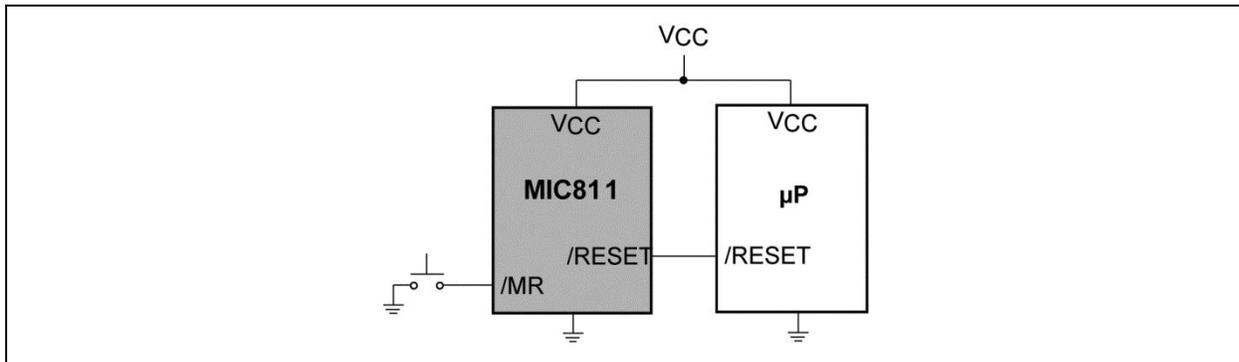
If a microprocessor voltage supervisor with an open-drain output stage is needed, see MIC6315.

Package Types

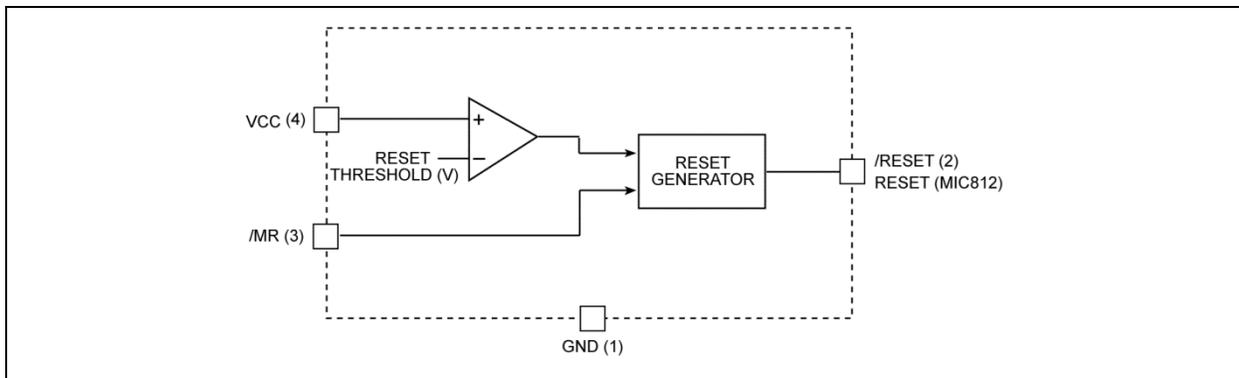


MIC811/MIC812

Typical Application Circuit



Functional Block Diagram



1.0 ELECTRICAL CHARACTERISTICS

Absolute Maximum Ratings †

Terminal Voltage (VCC).....	-0.3V to +6.0V
Input Current (VCC, /MR).....	20 mA
Output Current (/RESET, RESET).....	20 mA
Rate of Rise (VCC).....	100V/μs
ESD Rating (Note 1).....	3 kV

Operating Ratings ‡

Power Dissipation (T _A = +70°C).....	320 mW
-------------------------------------------------	--------

† **Notice:** Stresses above those listed under “Absolute Maximum Ratings” may cause permanent damage to the device. This is a stress rating only and functional operation of the device at those or any other conditions above those indicated in the operational sections of this specification is not intended. Exposure to maximum rating conditions for extended periods may affect device reliability.

‡ **Notice:** The device is not guaranteed to function outside its operating rating.

Note 1: Devices are ESD sensitive. Handling precautions are recommended. Human body model, 1.5 kΩ in series with 100 pF.

ELECTRICAL CHARACTERISTICS

Electrical Characteristics: For typical values, V_{CC} = 5V for MIC81_L/M/J, V_{CC} = 3.3V for MIC81_S/T, V_{CC} = 3V for MIC81_R; T_A = +25°C, bold values indicate -40°C to ≤ T_A ≤ +85°C; unless noted. (Note 1)

Parameter	Symbol	Min.	Typ.	Max.	Units	Conditions
Operating Voltage Range	V _{CC}	1	—	5.5	V	T _A = -40°C to +85°C
Supply Current	I _{VCC}	—	5	15	μA	MIC811L/M/J, MIC812L/M/J: V _{CC} = 5.0V, no load
		—	5	10		MIC811S/T, MIC812S/T: V _{CC} = 3.3V, no load
		—	5	10		MIC811R, MIC812R: V _{CC} = 3.0V, no load
Reset Voltage Threshold	V _{TH}	4.50	4.63	4.75	V	MIC811L, MIC812L
		4.25	4.38	4.50		MIC811M, MIC812M
		3.89	4.00	4.10		MIC811J, MIC812J
		3.00	3.08	3.15		MIC811T, MIC812T
		2.85	2.93	3.00		MIC811S, MIC812S
		2.55	2.63	2.70		MIC811R, MIC812R
Reset Timeout Period	t _{RST}	140	240	560	ms	—
/RESET Output Voltage	V _{OH}	V_{CC} - 1.5V	—	—	V	I _{SOURCE} = 800 μA, MIC811L/M/J
		0.8 x V_{CC}	—	—		I _{SOURCE} = 500 μA, MIC811R/S/T

Note 1: Specification for packaged product only.

MIC811/MIC812

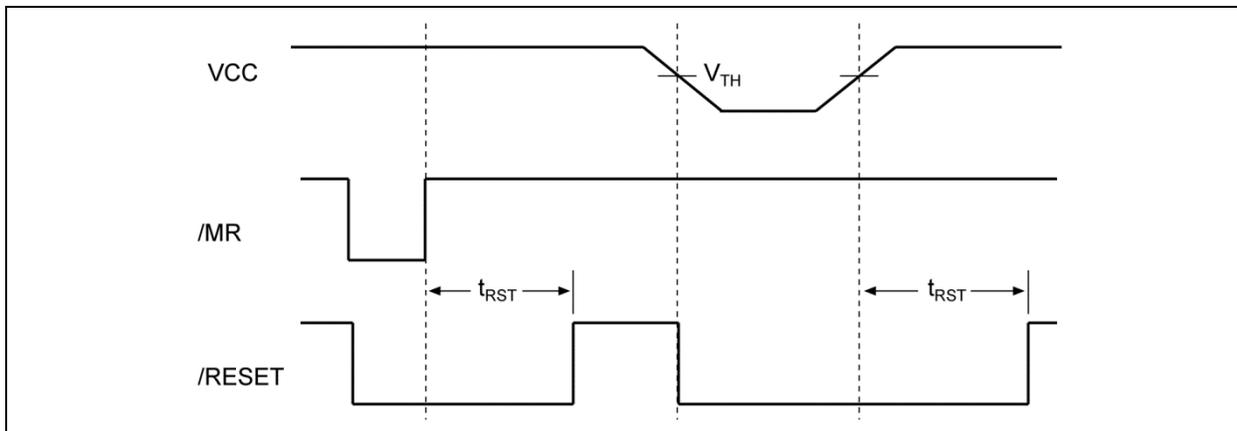
ELECTRICAL CHARACTERISTICS (CONTINUED)

Electrical Characteristics: For typical values, $V_{CC} = 5V$ for MIC81_L/M/J, $V_{CC} = 3.3V$ for MIC81_S/T, $V_{CC} = 3V$ for MIC81_R; $T_A = +25^\circ C$, bold values indicate $-40^\circ C \leq T_A \leq +85^\circ C$; unless noted. (Note 1)

Parameter	Symbol	Min.	Typ.	Max.	Units	Conditions
/RESET Output Voltage	V_{OL}	—	—	0.4	V	$V_{CC} = V_{TH \text{ min.}}$, $I_{SINK} = 3.2 \text{ mA}$, MIC811L/M/J
		—	—	0.3		$V_{CC} = V_{TH \text{ min.}}$, $I_{SINK} = 1.2 \text{ mA}$, MIC811R/S/T
		—	—	0.3		$V_{CC} > 1V$, $I_{SINK} = 50 \mu A$, $T_A = -40^\circ C$ to $+85^\circ C$
RESET Output Voltage	V_{OH}	$0.8 \times V_{CC}$	—	—	V	$1.8V < V_{CC} < V_{TH \text{ min.}}$, $I_{SOURCE} = 150 \mu A$
RESET Output Voltage	V_{OL}	—	—	0.4	V	$I_{SINK} = 3.2 \text{ mA}$, MIC812L/M/J
		—	—	0.3		$I_{SINK} = 1.2 \text{ mA}$, MIC812R/S/T
/MR Minimum Pulse Width	—	10	—	—	μs	—
/MR to Reset Delay	—	—	0.5	—	μs	—
/MR Input Threshold	V_{IH}	2.3	—	—	V	$V_{CC} > V_{TH \text{ max.}}$, MIC81_L/M/J
		$0.7 \times V_{CC}$	—	—		MIC81_R/S/T
/MR Input Threshold	V_{IL}	—	—	0.8	V	$V_{CC} > V_{TH \text{ max.}}$, MIC81_L/M/J
		—	—	$0.25 \times V_{CC}$		MIC81_R/S/T
/MR Pull-Up Resistance	—	10	20	30	$k\Omega$	—
/MR Glitch Immunity	—	—	100	—	ns	—

Note 1: Specification for packaged product only.

Reset Timing Diagram



TEMPERATURE SPECIFICATIONS

Parameters	Sym.	Min.	Typ.	Max.	Units	Conditions
Temperature Ranges						
Operating Temperature Range	T_A	-40	—	+85	°C	—
Storage Temperature Range	T_S	+5	—	+150	°C	—
Lead Temperature	—	—	—	+300	°C	Soldering, 10 sec.
Package Thermal Resistance						
Thermal Resistance, SOT-143, 4-Ld	θ_{JA}	—	265	—	°C/W	—

Note 1: The maximum allowable power dissipation is a function of ambient temperature, the maximum allowable junction temperature and the thermal resistance from junction to air (i.e., T_A , T_J , θ_{JA}). Exceeding the maximum allowable power dissipation will cause the device operating junction temperature to exceed the maximum +85°C rating. Sustained junction temperatures above +85°C can impact the device reliability.

MIC811/MIC812

2.0 PIN DESCRIPTIONS

The descriptions of the pins are listed in [Table 2-1](#).

TABLE 2-1: PIN FUNCTION TABLE

Pin Number MIC811	Pin Number MIC812	Pin Name	Description
1	1	GND	IC Ground Pin.
2	N/A	/RESET	/RESET goes low if V_{CC} falls below the reset threshold and remains asserted for one reset timeout period (140 ms min.) after V_{CC} exceeds the reset threshold.
N/A	2	RESET	RESET goes high if V_{CC} falls below the reset threshold and remains asserted for one reset timeout period (140 ms min.) after V_{CC} exceeds the reset threshold.
3	3	/MR	Manual Reset Input. A logic low on /MR will force a reset. The reset will remain asserted as long as /MR is held low and for one reset timeout period (140 ms min.) after /MR goes high. This input can be shorted to ground via a switch or driven from CMOS or TTL logic. Float if unused.
4	4	VCC	Power Supply Input.

3.0 APPLICATION INFORMATION

3.1 Microprocessor Reset

The /RESET (or RESET) pin is asserted whenever V_{CC} falls below the reset threshold voltage. The /RESET pin remains asserted for a period of 140 ms after V_{CC} has risen above the reset threshold voltage. The reset function ensures that the microprocessor is properly reset and powers up in a known condition after a power failure. /RESET will remain valid with V_{CC} as low as 1V.

3.2 VCC Transients

The MIC811/812 are relatively immune to negative-going V_{CC} glitches below the reset threshold. Typically, a negative-going transient 125 mV below the reset threshold with a duration of 20 μ s or less will not cause a reset.

3.3 Interfacing to Bidirectional Reset Pins

The MIC811/812 can interface with microprocessors with bidirectional reset pins by connecting a 4.7 k Ω resistor in series with the MIC811/812 output and the microprocessor reset pin.

3.4 /RESET Valid at Low Voltage

A resistor can be added from the /RESET pin to ground to ensure the /RESET output remains low with V_{CC} down to 0V. A 100 k Ω resistor connected from the /RESET to ground is recommended. The value of the resistor should be large enough not to load the output excessively and small enough to pull-down any stray leakage currents.

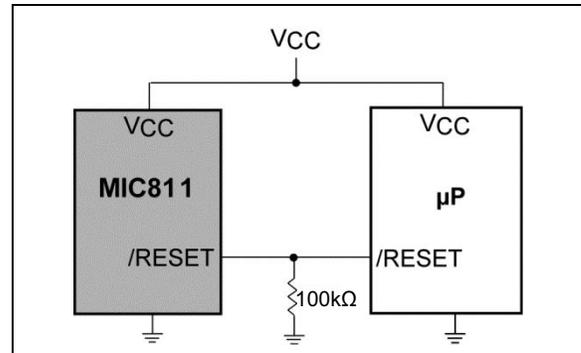


FIGURE 3-1: Reset Valid to $V_{CC} = 0V$.

MIC811/MIC812

4.0 PACKAGING INFORMATION

4.1 Package Marking Information

4-Lead SOT-143*
(Front)

XX

Example

KM

4-Lead SOT-143*
(Back)

MNNN

Example

95H4

Legend:	XX...X	Product code or customer-specific information
	Y	Year code (last digit of calendar year)
	YY	Year code (last 2 digits of calendar year)
	WW	Week code (week of January 1 is week '01')
	NNN	Alphanumeric traceability code
	(e3)	Pb-free JEDEC® designator for Matte Tin (Sn)
	*	This package is Pb-free. The Pb-free JEDEC designator (e3) can be found on the outer packaging for this package.
	•, ▲, ▼	Pin one index is identified by a dot, delta up, or delta down (triangle mark).
Note:	In the event the full Microchip part number cannot be marked on one line, it will be carried over to the next line, thus limiting the number of available characters for customer-specific information. Package may or may not include the corporate logo.	
	Underbar (<u> </u>) and/or Overbar (<u> </u>) symbol may not be to scale.	

TABLE 4-1: MARKING CODES

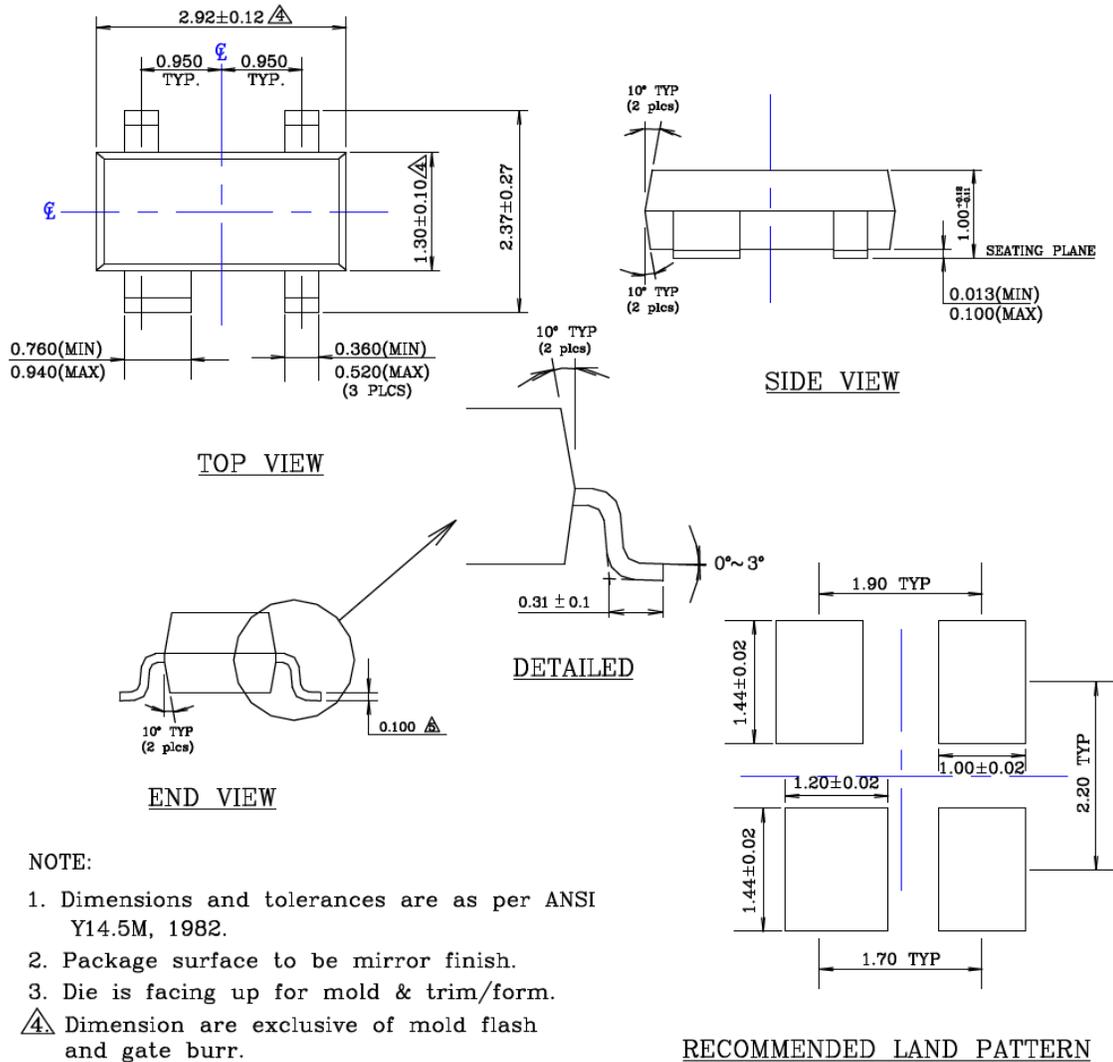
Part Number	Marking Code	Threshold Voltage
MIC811LUY	<u>KL</u>	4.63V
MIC811MUJ	<u>KM</u>	4.38V
MIC811JUY	<u>KJ</u>	4.00V
MIC811TUY	<u>KI</u>	3.08V
MIC811SUJ	<u>KS</u>	2.93V
MIC811RUJ	<u>KR</u>	2.63V
MIC812LUY	<u>LL</u>	4.63V
MIC812MUJ	<u>LM</u>	4.38V
MIC812JUY	<u>LJ</u>	4.00V
MIC812TUY	<u>LI</u>	3.08V
MIC812SUJ	<u>LS</u>	2.93V
MIC812RUJ	<u>LR</u>	2.63V

4-Lead SOT-143 Package Outline and Recommended Land Pattern

TITLE

4 LEAD SOT143 PACKAGE OUTLINE & RECOMMENDED LAND PATTERN

DRAWING #	SOT143-4LD-PL-1	UNIT	MM
------------------	-----------------	-------------	----



NOTE:

1. Dimensions and tolerances are as per ANSI Y14.5M, 1982.
2. Package surface to be mirror finish.
3. Die is facing up for mold & trim/form.
4. Dimension are exclusive of mold flash and gate burr.
5. Dimension are exclusive of solder plating.

Note: For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>.

MIC811/MIC812

NOTES:

APPENDIX A: REVISION HISTORY

Revision A (May 2022)

- Converted Micrel document MIC811/MIC812 to Microchip data sheet template DS20006526A.
- Minor grammatical text changes throughout.

MIC811/MIC812

NOTES:

PRODUCT IDENTIFICATION SYSTEM

To order or obtain information, e.g., on pricing or delivery, contact your local Microchip representative or sales office.

<u>Device</u>	<u>X</u>	<u>X</u>	<u>X</u>	<u>-XX</u>	
Part No.	Threshold Voltage	Package	Temp. Range	Media Type	
Device:	MIC811:	Microprocessor Reset Circuits with Active-Low /RESET			
	MIC812:	Microprocessor Reset Circuits with Active-High RESET			
Threshold Voltage:	R =	2.63V			
	S =	2.93V			
	T =	3.08V			
	J =	4.00V			
	M =	4.38V			
	L =	4.63V			
Package:	U =	4-Lead SOT-143			
Temperature Range:	Y =	-40°C to +85°C			
Media Type:	TR =	3,000/Reel			
					Examples:
					a) MIC811RUY-TR: MIC811, 2.63V Threshold Voltage, 4-Lead SOT-143, -40°C to +85°C Temp. Range, 3,000/Reel
					b) MIC811JUY-TR: MIC811, 4.00V Threshold Voltage, 4-Lead SOT-143, -40°C to +85°C Temp. Range, 3,000/Reel
					c) MIC811TUY-TR: MIC811, 3.08V Threshold Voltage, 4-Lead SOT-143, -40°C to +85°C Temp. Range, 3,000/Reel
					d) MIC812SUY-TR: MIC812, 2.93V Threshold Voltage, 4-Lead SOT-143, -40°C to +85°C Temp. Range, 3,000/Reel
					e) MIC812LUY-TR: MIC812, 4.63V Threshold Voltage, 4-Lead SOT-143, -40°C to +85°C Temp. Range, 3,000/Reel
					f) MIC812MUY-TR: MIC812, 4.38V Threshold Voltage, 4-Lead SOT-143, -40°C to +85°C Temp. Range, 3,000/Reel
					Note 1: Tape and Reel identifier only appears in the catalog part number description. This identifier is used for ordering purposes and is not printed on the device package. Check with your Microchip Sales Office for package availability with the Tape and Reel option.

MIC811/MIC812

NOTES:

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

- 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, within operating specifications, and under normal conditions.
- Microchip values and aggressively protects its intellectual property rights. Attempts to breach the code protection features of Microchip product is strictly prohibited and may violate the Digital Millennium Copyright Act.
- 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. Microchip is committed to continuously improving the code protection features of our products.

This publication and the information herein may be used only with Microchip products, including to design, test, and integrate Microchip products with your application. Use of this information in any other manner violates these terms. Information regarding device applications 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. Contact your local Microchip sales office for additional support or, obtain additional support at <https://www.microchip.com/en-us/support/design-help/client-support-services>.

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.

Trademarks

The Microchip name and logo, the Microchip logo, Adaptec, AnyRate, AVR, AVR logo, AVR Freaks, BesTime, BitCloud, CryptoMemory, CryptoRF, dsPIC, flexPWR, HELDO, IGLOO, JukeBlox, KeeLoq, Kleer, LANCheck, LinkMD, maXStylus, maXTouch, MediaLB, megaAVR, Microsemi, Microsemi logo, MOST, MOST logo, MPLAB, OptoLyzer, 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, TrueTime, 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, GridTime, IdealBridge, In-Circuit Serial Programming, ICSP, INICnet, Intelligent Paralleling, Inter-Chip Connectivity, JitterBlocker, Knob-on-Display, maxCrypto, maxView, memBrain, Mindi, MiWi, MPASM, MPF, MPLAB Certified logo, MPLIB, MPLINK, MultiTRAK, NetDetach, NVM Express, NVMe, 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, SmartHLS, SMART-I.S., storClad, SQI, 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, Symmcom, and Trusted Time 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.

© 2022, Microchip Technology Incorporated and its subsidiaries.

All Rights Reserved.

ISBN: 978-1-6683-0390-0



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://www.microchip.com/support>
Web Address:
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