
High Speed Translator Buffer to LVDS

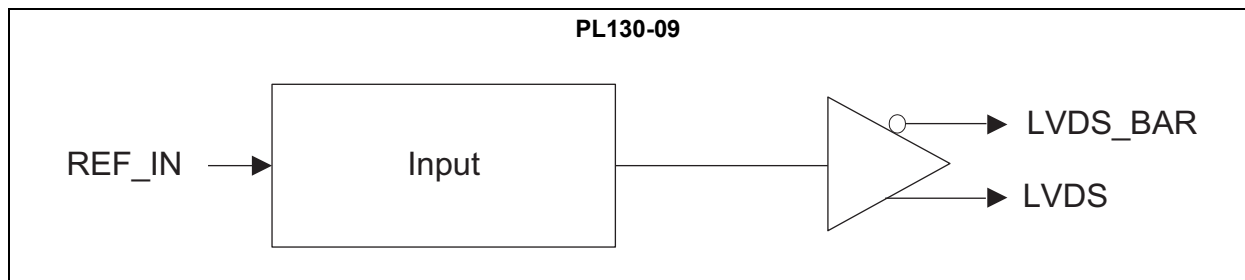
Features

- Differential LVDS Output
- Single AC-Coupled Input (Min. 100 mV Swing)
- Accepts LVCMOS or Sine Wave Inputs
- Input Range from 10 MHz to 1.0 GHz
- 2.5V to 3.3V Operation
- Available in 8-Pin SOIC or 3 mm x 3 mm QFN GREEN/RoHS Compliant Packaging

General Description

The PL130-09 is a low cost, high performance, high speed, buffer that reproduces any input frequency from 10 MHz to 1.0 GHz. It provides a pair of differential LVDS output. Any input signal with at least 100 mV swing can be used as reference signal. This chip is ideal for conversion from sine wave, TTL, CMOS, or PECL to LVDS.

Block Diagram



PL130-09

1.0 ELECTRICAL CHARACTERISTICS

Absolute Maximum Ratings †

Supply Voltage (V_{DD})	+4.6V
Input Voltage (DC).....	-0.5V to $V_{DD} + 0.5V$
Output Voltage (DC).....	-0.5V to $V_{DD} + 0.5V$
HBM ESD Rating.....	2 kV

† **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.

GENERAL ELECTRICAL CHARACTERISTICS

Parameters	Symbol	Min.	Typ.	Max.	Units	Conditions
Supply Current, No Load	I_{DD}	—	25	30	mA	$F_{OUT} = 200 \text{ MHz}$, LVDS
Operating Voltage	V_{DD}	2.25		3.63	V	—
Output Clock Duty Cycle	—	±5% of input			%	@ 1.25V (LVDS)

AC ELECTRICAL CHARACTERISTICS

Parameters	Symbol	Min.	Typ.	Max.	Units	Conditions
Input Frequency	—	10	—	1000	MHz	—
Input Signal Swing	—	100	—	—	mV	REF_IN input
Output Frequency	—	10	—	1000	MHz	—

LVDS ELECTRICAL CHARACTERISTICS

Parameters	Symbol	Min.	Typ.	Max.	Units	Conditions
Output Differential Voltage	V_{OD}	247	355	454	mV	$R_L = 100\Omega$ See Figure 3-1
VDD Magnitude Change	ΔV_{OD}	-50	—	50	mV	
Output High Voltage	V_{OH}	—	1.4	1.6	V	
Output Low Voltage	V_{OL}	0.9	1.1	—	V	
Offset Voltage	V_{OS}	1.125	1.2	1.375	V	
Offset Magnitude Change	ΔV_{OS}	0	3	25	mV	
Power-Off Leakage	I_{OXD}	—	±1	±10	μA	$V_{OUT} = V_{DD}$ or GND, $V_{DD} = 0V$
Output Short Circuit Current	I_{OSD}	—	-5.7	-8	mA	—

LVDS SWITCHING CHARACTERISTICS

Parameters	Symbol	Min.	Typ.	Max.	Units	Conditions
Differential Clock Rise Time	t_r	0.2	0.7	1.0	ns	$R_L = 100\Omega$, $C_L = 10 \text{ pF}$ See Figure 3-2
Differential Clock Fall Time	t_f	0.2	0.7	1.0	ns	

TEMPERATURE SPECIFICATIONS (Note 1)

Parameters	Symbol	Min.	Typ.	Max.	Units	Conditions
Temperature Ranges						
Storage Temperature Range	T_S	-65	—	+150	°C	—
Ambient Operating Temperature	T_A	-40	—	+85	°C	Note 2
Junction Temperature	T_J	—	—	+125	°C	—
Lead Temperature	—	—	—	+260	°C	Soldering, 10 seconds

- 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 +125°C rating. Sustained junction temperatures above +125°C can impact the device reliability.
- 2:** Operating Temperature is guaranteed by design for all parts (COMMERCIAL and INDUSTRIAL), but tested for COMMERCIAL grade only.

2.0 PIN DESCRIPTIONS

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

Pin Configurations

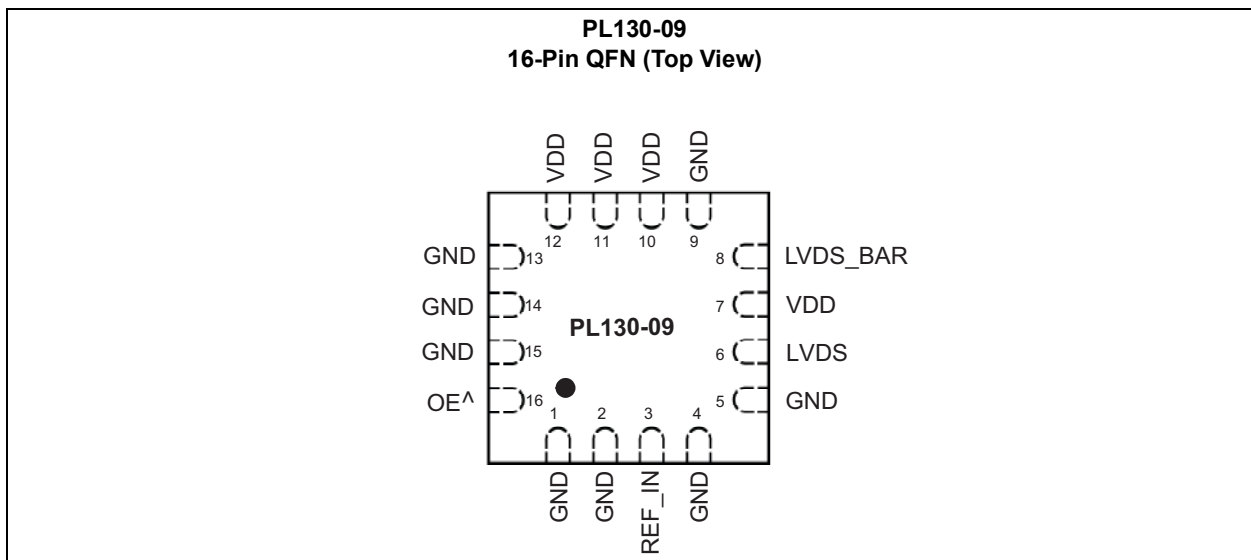
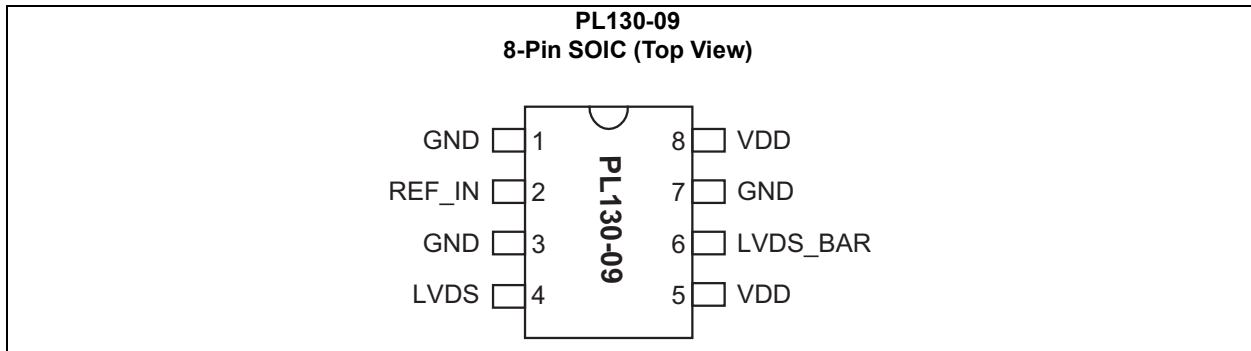


TABLE 2-1: PIN FUNCTION TABLE

Pin Name	SOIC-8L	QFN-16L	Type	Description
GND	1, 3, 7	1, 2, 4, 5, 9, 13, 14, 15	P	Ground.
VDD	5, 8	7, 10, 11, 12	P	Power supply.
REF_IN	2	3	I	Reference input signal. The frequency of this signal will be reproduced at the output (after translation to LVDS level).
LVDS	6	6	O	LVDS true output.
LVDS_BAR	4	8	O	LVDS complementary output.
OE	N/A	16	I	Output enable ('1' for enable). Internal pull -up (default is '1').

3.0 TEST CIRCUITS AND WAVEFORM

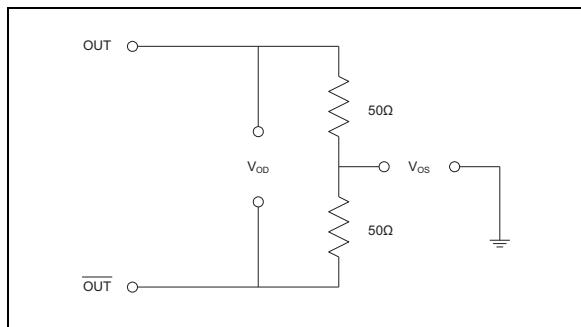


FIGURE 3-1: LVDS Levels Test Circuit.

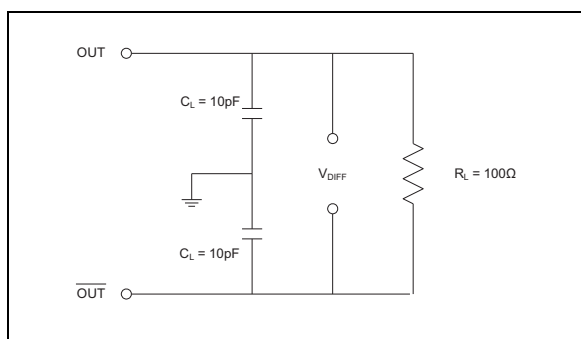


FIGURE 3-2: LVDS Switching Test Circuit.

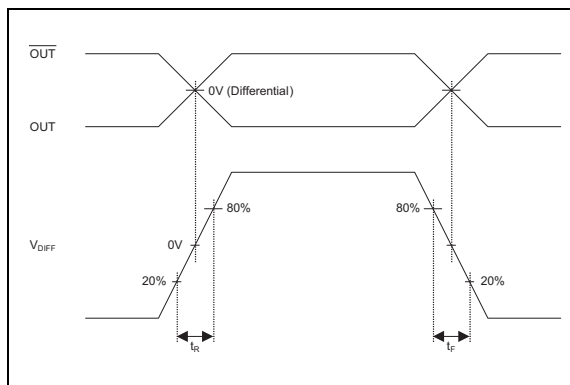
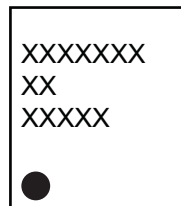


FIGURE 3-3: LVDS Transition Time Waveform.

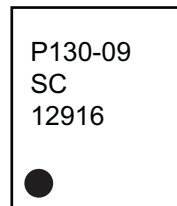
4.0 PACKAGING INFORMATION

4.1 Package Marking Information

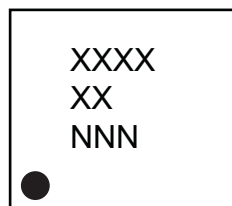
8-Lead SOIC*



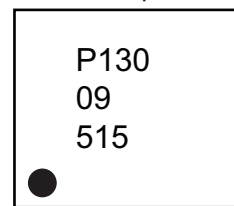
Example



16-Lead QFN*



Example



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 (_) and/or Overbar (¯) symbol may not be to scale.	

PL130-09

5.0 PACKAGING INFORMATION

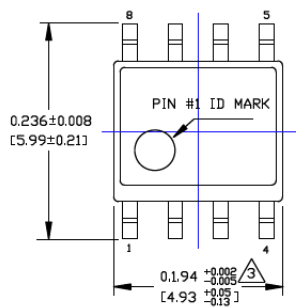
8-Lead SOIC Package Outline and Recommended Land Pattern

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

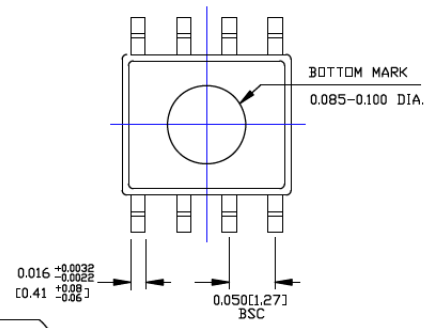
TITLE

8 LEAD SOICN PACKAGE OUTLINE & RECOMMENDED LAND PATTERN

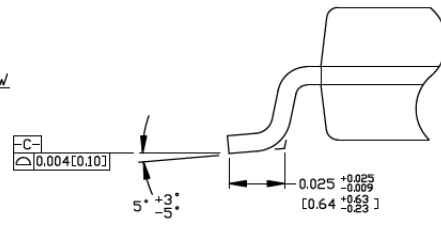
DRAWING #	SOICN-8LD-PL-1	UNIT	INCH [MM]
-----------	----------------	------	-----------



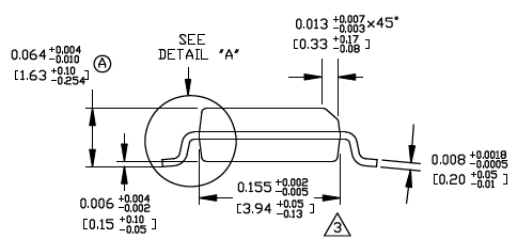
TOP VIEW



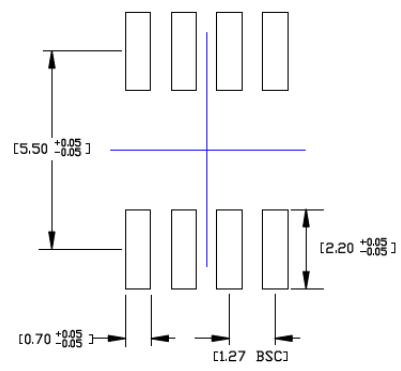
BOTTOM VIEW



DETAIL "A"



END VIEW



RECOMMENDED LAND PATTERN

NOTES:

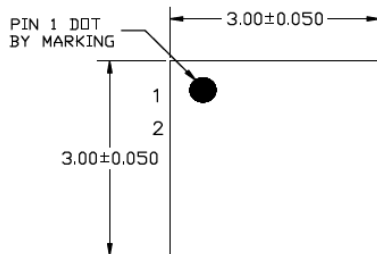
1. DIMENSIONS ARE IN INCHES[MM].
2. CONTROLLING DIMENSION: INCHES.
3. DIMENSION DOES NOT INCLUDE MOLD FLASH OR PROTRUSIONS, EITHER OF WHICH SHALL NOT EXCEED 0.010[0.25] PER SIDE.

16-Lead QFN 3 mm x 3 mm Package Outline and Recommended Land Pattern

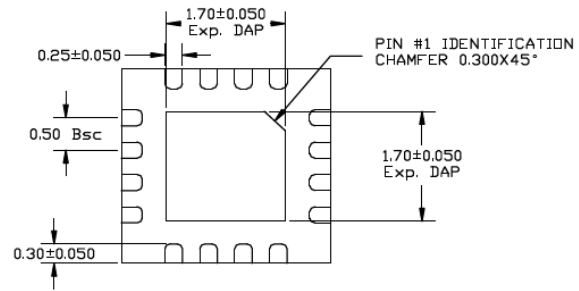
TITLE

16 LEAD QFN 3x3mm PACKAGE OUTLINE & RECOMMENDED LAND PATTERN

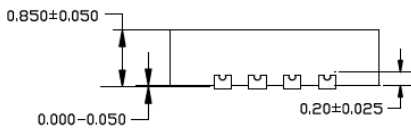
DRAWING #	QFN33-16LD-PL-3	UNIT	MM
Lead Frame	NiPdAu	Lead Finish	NiPdAu



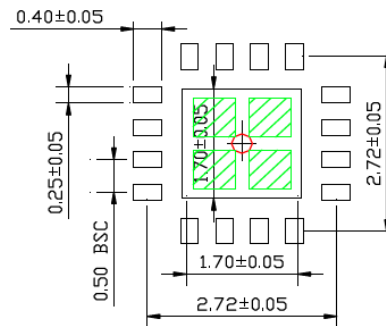
TOP VIEW
NOTE: 1, 2, 3



BOTTOM VIEW
NOTE: 1, 2, 3



SIDE VIEW
NOTE: 1, 2, 3



RECOMMENDED LAND PATTERN
NOTE: 4, 5

NOTE:

1. MAX PACKAGE WARPAGE IS 0.05mm.
2. MAX ALLOWABLE BURR IS 0.076mm IN ALL DIRECTIONS
3. PIN #1 IS ON TOP WILL BE LASER MARKED.
4. RED CIRCLE IN LAND PATTERN INDICATES THERMAL VIA. SIZE SHOULD BE 0.30-0.35mm IN DIAMETER AND SHOULD BE CONNECTED TO GND FOR MAX THERMAL PERFORMANCE.
5. GREEN RECTANGLES (SHADED AREA) INDICATE SOLDER STENCIL OPENING ON EXPOSED PAD AREA. SIZE SHOULD BE 0.60x0.60mm IN SIZE, 0.20mm SPACING.

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

PL130-09

NOTES:

APPENDIX A: REVISION HISTORY

Revision A (October 2020)

- Converted Micrel document PL130-09 to Microchip data sheet DS20006427A.
- Minor text changes throughout.

NOTES:

PRODUCT IDENTIFICATION SYSTEM

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

<u>PART NO.</u>	X	X	X	X
Device	OE State	Package Type	Temperature	Media Type
Device:	PL130-09:	High Speed Translator	Buffer to LVDS	
OE State:	(blank) =	High Enable		
Package Type:	S =	SOIC-8L		
	Q =	QFN-16L		
Temperature	C =	Commercial Temperature Range		
	I =	Industrial Temperature Range		
Media Type	(blank) =	100/Tube		
	(blank) =	20/Bag		

Examples:	
a) PL130-09SC:	High Speed Translator Inverting Buffer to LVDS, High Enable, SOIC-8L, Commercial Temp. Range, 100/Tube
b) PL130-09QC:	High Speed Translator Inverting Buffer to LVDS, High Enable, QFN-16L, Commercial Temp. Range, 20/Bag
c) PL130-09SI:	High Speed Translator Inverting Buffer to LVDS, High Enable, SOIC-8L, Industrial Temp. Range, 100/Tube
d) PL130-09QI:	High Speed Translator Buffer to LVDS, High Enable, QFN-16L, Industrial Temp. Range, 20/Bag

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 Microchip's 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.

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, PackTime, PIC, picoPower, PICSTART, PIC32 logo, PolarFire, Prochip Designer, QTouch, SAM-BA, SenGenuity, SpyNIC, SST, SST Logo, SuperFlash, Symmetricom, SyncServer, Tachyon, TempTrackr, TimeSource, tinyAVR, UNI/O, Vectron, and XMEGA are registered trademarks of Microchip Technology Incorporated in the U.S.A. and other countries.

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, Quiet-Wire, SmartFusion, SyncWorld, Temux, TimeCesium, TimeHub, TimePictra, TimeProvider, Vite, 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, BlueSky, BodyCom, CodeGuard, CryptoAuthentication, CryptoAutomotive, CryptoCompanion, CryptoController, dsPICDEM, dsPICDEM.net, Dynamic Average Matching, DAM, ECAN, EtherGREEN, In-Circuit Serial Programming, ICSP, INICnet, Inter-Chip Connectivity, JitterBlocker, KlearNet, KlearNet logo, 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, SAM-ICE, Serial Quad I/O, SMART-I.S., SQR, SuperSwitcher, SuperSwitcher II, Total Endurance, TSHARC, USBCheck, VariSense, ViewSpan, WiperLock, Wireless DNA, 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.

© 2020, Microchip Technology Incorporated, All Rights Reserved.

ISBN: 978-1-5224-6896-7

For information regarding Microchip's Quality Management Systems, please visit www.microchip.com/quality.



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