WP300TX01-I/ML01

300 Watt Wireless Power Transmitter Controller IC

Operating Conditions

- 3.0V to 3.6V, -40°C to +85°C
- Up to 300 Watts of Wireless Transfer

Key Features

- Controller for 300 Watt Wireless Power Transmitter
- Three Outputs for General Purpose LEDs
- Five Inputs for Switches Interface
- UART and SPI Serial Communication Channels
- Supports a Wide Range of Input Voltage (11~37V) when Used in the Microchip Recommended Hardware Configuration
- Enables System Efficiency of Up to 90%
- Implements Reliable Foreign Object Detection (FOD) Scheme
- Simplifies Wireless Power Transfer System Design
- 300W Wireless Power Transfer Reference Design Available for Purchase from:
  www.microchipdirect.com
- Refer to the *"300W Wireless Power Transfer Reference Design User's Guide"* for Setup Details

Wireless Power Transfer (WPT) System Protection Features

- Overvoltage Protection (OVP)
- Undervoltage Protection (UVP)
- Overcurrent Protection (OCP)
- Overpower Protection (OPP)
- Overtemperature Protection

Qualification

- AEC-Q100 REVG Grade 3 (-40°C to +85°C)

Introduction

The WP300TX01 is a Fixed Function Device (FFD) designed to perform the Wireless Power Transfer Transmit function. This chip is paired with the WP300RX01 as a Wireless Power Receiver function. 300 Watts is the maximum power that can be transferred using the digital controller function.

Microchip recommends using the schematic and layout as provided in the *"300 Watts Wireless Power Transfer Reference Design User's Guide"*.
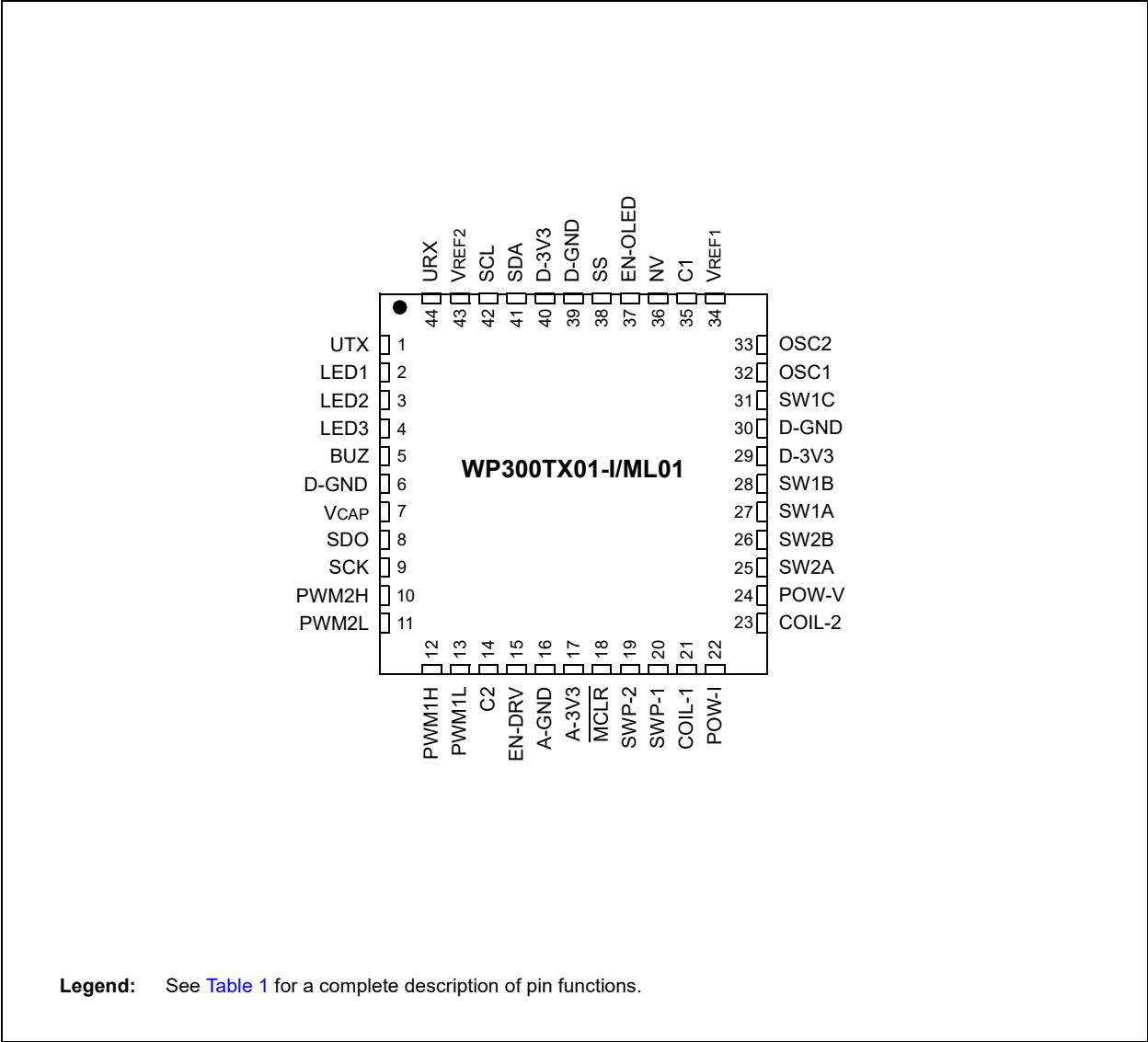
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Pin Diagram

Legend: See Table 1 for a complete description of pin functions.

TABLE 1:   PIN FUNCTION DESCRIPTIONS

Pin	Name	Function	Description
1	UTX	Digital Output	UART Transmit Interface
2	LED1	Digital Output	LED to Display System Status
3	LED2	Digital Output	LED to Display System Status
4	LED3	Digital Output	LED to Display System Status
5	BUZ	Digital Output	Buzzer Driver Signal
6	D-GND	Power	Digital Ground, V_{SS}
7	VCAP	Power	CPU 1.8V Supply Filter Capacitor, 10 µF Typical
8	SDO	Digital Output	SPI Communication, Serial Data Output to OLED
9	SCK	Digital Output	SPI Communication, Serial Clock Output to OLED
10	PWM2H	Digital Output	PWM2H Output to NFC Coil
11	PWM2L	Digital Output	PWM2L Output to NFC Coil
12	PWM1H	Digital Output	PWM1H Output to Gate Driver IC U4
13	PWM1L	Digital Output	PWM1L Output to Gate Driver IC U5
14	C2	Digital Output	Internal Comparator Output 2
15	EN-DRV	Digital Output	Enable Gate Drive
16	A-GND	Power	Analog Power Ground, AV_{SS}
17	A-3V3	Power	Analog Power Supply, AV_{DD}
18	$\overline{MCLR}$	Digital Input	Master Clear Pin External Reset
19	SWP-2	Analog Input	IC U5 Phase Node Voltage Measurement
20	SWP-1	Analog Input	IC U4 Phase Node Voltage Measurement
21	COIL-1	Analog Input	Transmitter Coil – 1 Voltage Measurement
22	POW-I	Analog Input	DC Input Current Measurement (U3 analog output signal)
23	COIL-2	Analog Input	Transmitter Coil – 2 Voltage Measurement
24	POW-V	Analog Input	DC Input Voltage Measurement
25	SW2A	Digital Input	Key Detection Input 2A, from OLED Board
26	SW2B	Digital Input	Key Detection Input 2B, from OLED Board
27	SW1A	Digital Input	Key Detection Input 1A, from OLED Board
28	SW1B	Digital Input	Key Detection Input 1B, from OLED Board
29	D-3V3	Power	Digital Power Supply, V_{DD}
30	D-GND	Power	Digital Power Ground, V_{SS}
31	SW1C	Digital Input	Key Detection Input 1C, from OLED Board
32	OSC1	Oscillator	Oscillator (X1) Pin 1
33	OSC2	Oscillator	Oscillator (X1) Pin 2
34	VREF1	Analog Output	Signal Processing Reference Voltage Output
35	C1	Digital Output	Internal Comparator Output 1
36	NV	Analog Input	NFC Coil Signal Detection Input
37	EN-OLED	Digital Output	Enable OLED Display Panel
38	SS	Digital Output	SPI Communication Client Select to OLED Board
39	D-GND	Power	Digital Ground, V_{SS}
40	D-3V3	Power	Digital Power Supply, V_{DD}
41	SDA	Digital Output	I²C Data
42	SCL	Digital Output	I²C Clock
43	VREF2	Analog Input	Signal Processing Reference Voltage Input
44	URX	Digital Input	UART Receive Interface

Note: Refer to the *"300W Wireless Power Transfer Reference Design User's Guide"*.

WP300TX01-I/ML01

ELECTRICAL CHARACTERISTICS

Absolute maximum ratings for the WP300TX01-I/ML01 are listed below. Exposure to these maximum rating conditions for extended periods may affect device reliability. Functional operation of the device at these, or any other conditions above the parameters indicated in the operation listings of this specification, is not implied.

Absolute Maximum Ratings[1]

Ambient temperature under bias ....-40°C to +85°C
Storage temperature .... -65°C to +150°C
Voltage on V_{DD} with respect to V_{SS} .... -0.3V to +4.0V
Voltage on any pin... -0.3V to (V_{DD} + 0.3V)
Maximum current out of V_{SS} pin ....300 mA
Maximum current into V_{DD} pin ....300 mA
Maximum current sunk by all ports...200 mA

> **Note 1:** 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 operation listings of this specification, is not implied. Exposure to maximum rating conditions for extended periods may affect device reliability.

TABLE 2: THERMAL OPERATING CONDITIONS

Rating	Symbol	Min.	Typ.	Max.	Unit
Industrial Temperature Devices					
Operating Junction Temperature Range	T_J	-40	—	+125	°C
Operating Ambient Temperature Range	T_A	-40	—	+85	°C

TABLE 3: THERMAL PACKAGING CHARACTERISTICS

Characteristic	Symbol	Typ.	Max.	Unit	Notes
Package Thermal Resistance, 44-Pin QFN 8x8 mm	θ_{JA}	29.0	—	°C/W	1

Note 1: Junction to ambient thermal resistance, Theta-$_{JA}$ (θ_{JA}) numbers are achieved by package simulations.

### TABLE 4: DC TEMPERATURE AND VOLTAGE SPECIFICATIONS

DC CHARACTERISTICS		Standard Operating Conditions: 3.0V to 3.6V (unless otherwise stated) Operating temperature -40°C ≤ T_A ≤ +85°C for Industrial				
Symbol	Characteristic	Min.	Typ.	Max.	Units	Conditions
Operating Voltage						
V_{DD}	**Supply Voltage**	3.0	—	3.6	V	Supply to V_{DD} and AV_{DD} pins
V_{POR}	**V_{DD} Start Voltage** to Ensure Internal Power-on Reset Signal	—	—	V_{SS}	V	
S_{VDD}	**V_{DD} Rise Rate** to Ensure Internal Power-on Reset Signal	1.0	—	—	V/ms	0V-3V in 3 ms
C_{EFC}	**External Filter Capacitor Value[1]**	4.7	10	—	µF	Capacitor must have a low-series resistance (<1 ohm)

Note 1: Typical V_{CAP} Voltage = 1.8 volts when V_{DD} ≥ V_{DDMIN}.

PACKAGING INFORMATION

Package Marking Information

44-Lead QFN (8x8x0.9 mm)

Example

PIN 1

XXXXX
XXXX
YYWWNNN

PIN 1

WP300
TX01
2110017
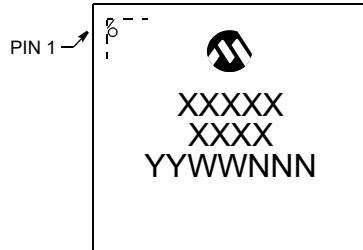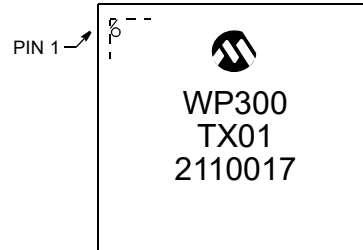
Legend:	XX...X	Customer-specific information
	YY	Year code (last 2 digits of calendar year)
	WW	Week code (week of January 1 is week '01')
	NNN	Alphanumeric traceability code

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 Details

The following sections give the technical details of the packages.

44-Lead Plastic Quad Flat, No Lead Package (ML) - 8x8 mm Body [QFN or VQFN]

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

TOP VIEW

SIDE VIEW

BOTTOM VIEW
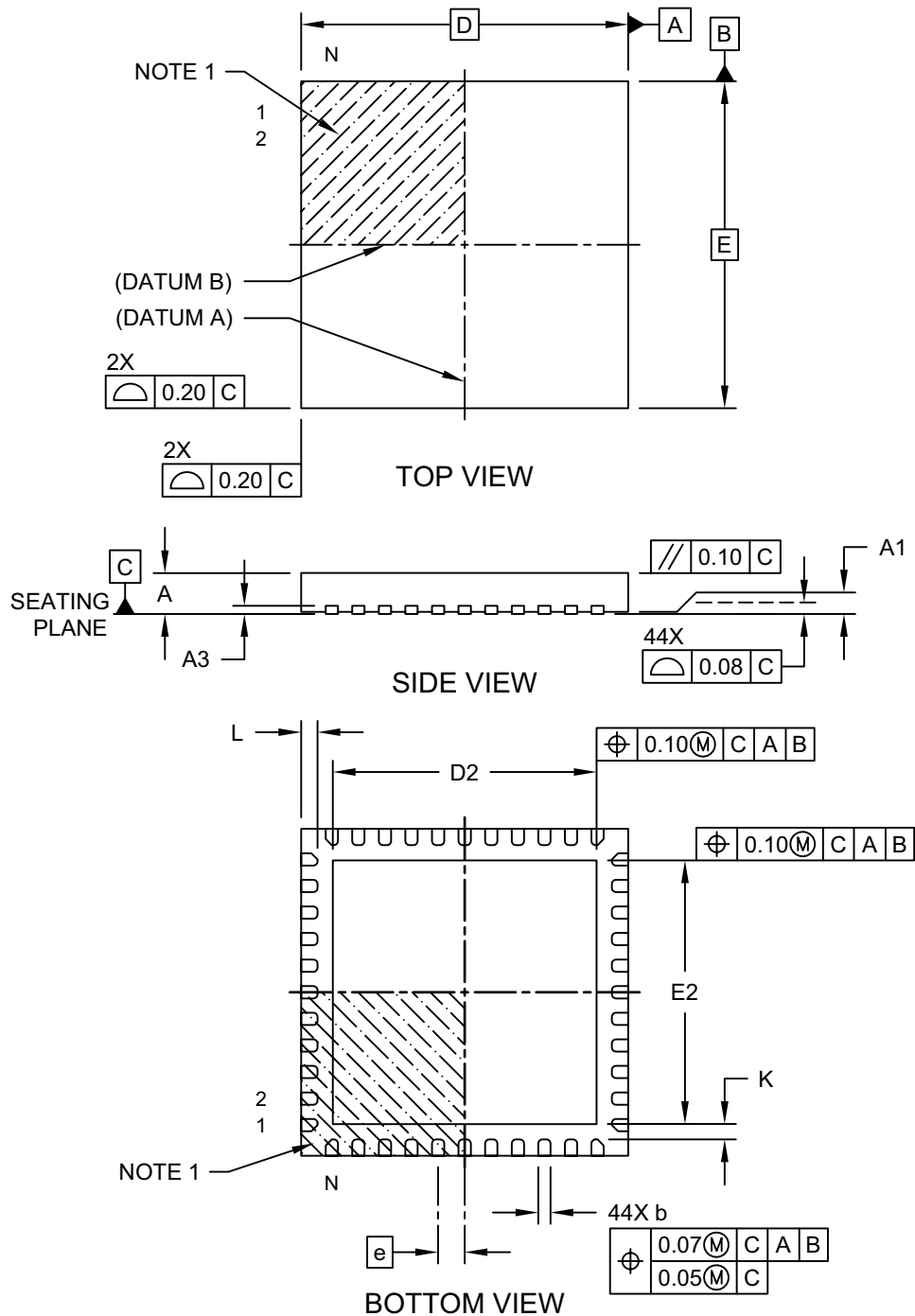
Microchip Technology Drawing C04-103D Sheet 1 of 2

44-Lead Plastic Quad Flat, No Lead Package (ML) - 8x8 mm Body [QFN or VQFN]

> **Note:** For the most current package drawings, please see the Microchip Packaging Specification located at http://www.microchip.com/packaging
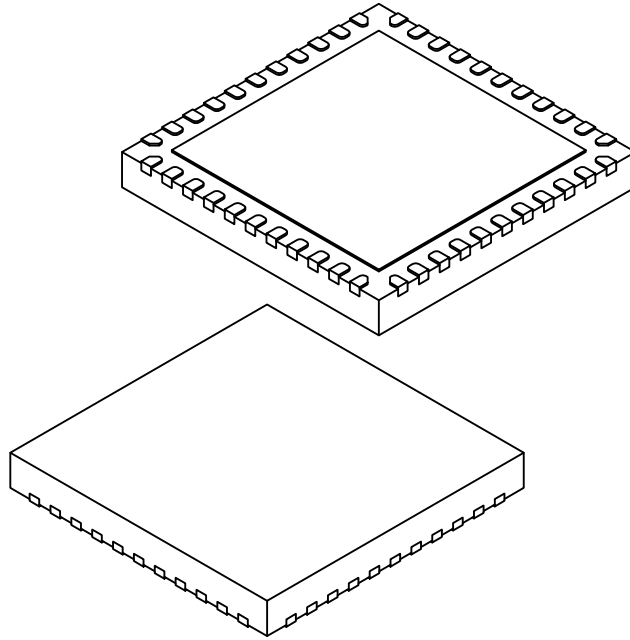
	Units	MILLIMETERS		
Dimension Limits		MIN	NOM	MAX
Number of Pins	N		44	
Pitch	e		0.65 BSC	
Overall Height	A	0.80	0.90	1.00
Standoff	A1	0.00	0.02	0.05
Terminal Thickness	A3		0.20 REF	
Overall Width	E		8.00 BSC	
Exposed Pad Width	E2	6.25	6.45	6.60
Overall Length	D		8.00 BSC	
Exposed Pad Length	D2	6.25	6.45	6.60
Terminal Width	b	0.20	0.30	0.35
Terminal Length	L	0.30	0.40	0.50
Terminal-to-Exposed-Pad	K	0.20	-	-

Notes:

1. Pin 1 visual index feature may vary, but must be located within the hatched area.
2. Package is saw singulated
3. Dimensioning and tolerancing per ASME Y14.5M

    BSC: Basic Dimension. Theoretically exact value shown without tolerances.

    REF: Reference Dimension, usually without tolerance, for information purposes only.

Microchip Technology Drawing C04-103D Sheet 2 of 2

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44-Lead Plastic Quad Flat, No Lead Package (ML) - 8x8 mm Body [QFN or VQFN]

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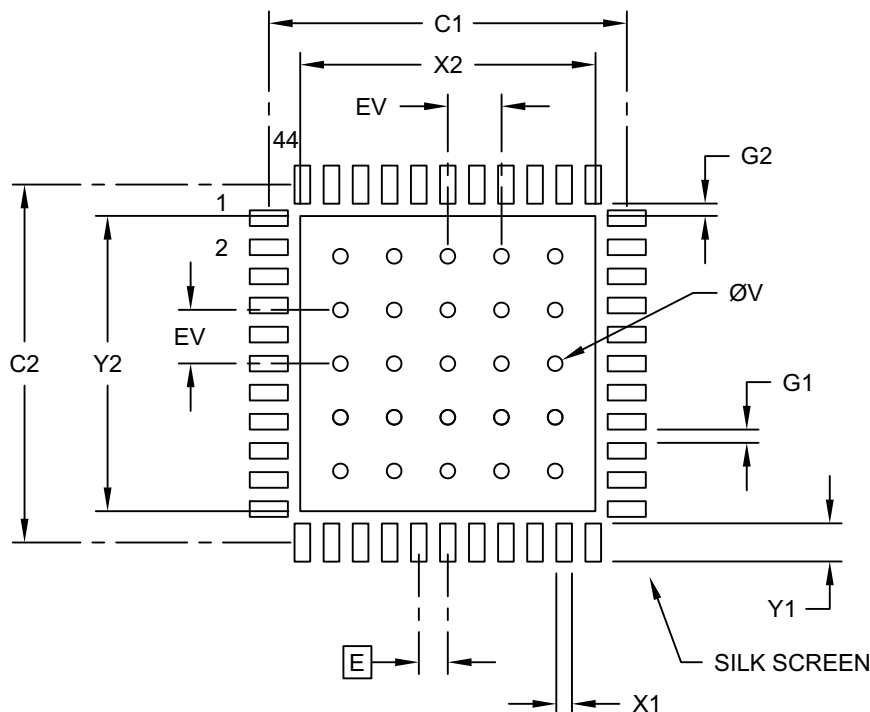
RECOMMENDED LAND PATTERN

	Units	MILLIMETERS		
Dimension Limits		MIN	NOM	MAX
Contact Pitch	E		0.65 BSC	
Optional Center Pad Width	X2			6.60
Optional Center Pad Length	Y2			6.60
Contact Pad Spacing	C1		8.00	
Contact Pad Spacing	C2		8.00	
Contact Pad Width (X44)	X1			0.35
Contact Pad Length (X44)	Y1			0.85
Contact Pad to Contact Pad (X40)	G1	0.30		
Contact Pad to Center Pad (X44)	G2	0.28		
Thermal Via Diameter	V		0.33	
Thermal Via Pitch	EV		1.20	

Notes:

1. Dimensioning and tolerancing per ASME Y14.5M

    BSC: Basic Dimension. Theoretically exact value shown without tolerances.

2. For best soldering results, thermal vias, if used, should be filled or tented to avoid solder loss during reflow process

Microchip Technology Drawing No. C04-2103C

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PRODUCT IDENTIFICATION SYSTEM

To order or obtain information, e.g., on pricing or delivery, refer to the factory or the listed sales office.

Transmitter Controller Part Number: **WP 300 TX 01 I/ML 01 C00**

Wireless Power

300 Watt

Transmitter

Denotes silicon variant

Industrial temperature/package type

Software update made by Microchip.
Not marked on package, but used for tracking

Used to track customer specific software version

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.

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