

Product Overview

This NPN ceramic surface mount device is RAD hard qualified for high-reliability applications per MIL-PRF-19500/391. Microchip also offers numerous other products to meet higher and lower power voltage regulation applications.

Qualified Levels

- JANSE
- JANSK
- JANSU
- JANSM
- JANS D
- JANSP
- JANS L
- JANSR

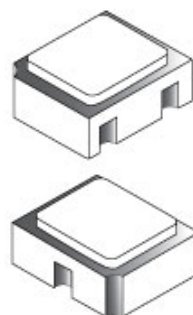
Features

- Surface mount equivalent to JEDEC registered 2N3700
- RHA level JAN qualifications per MIL-PRF-19500/391 ([Part Nomenclature](#) for all options)

Applications/Benefits

- Ceramic UB surface mount package
- Lightweight
- Low power
- Military and other high-reliability applications

Figure 1. UB Package



Also available in:

TO-18 (TO-206AA)

(leaded)

[JANS_2N3700](#)

TO-39 (TO-205AD)

(leaded)

[JANS_2N3019, 2N3019S](#)

TO-46 (TO-206AB)

(leaded)

[JANS_2N3057A](#)

Table of Contents

Product Overview.....	1
1. Maximum Ratings.....	3
1.1. Mechanical Packaging.....	3
2. Part Nomenclature.....	4
2.1. Symbols and Definitions.....	4
3. Electrical Characteristics.....	5
4. Graphs.....	8
5. Package Dimensions.....	9
6. Revision History.....	10
Microchip Information.....	11
The Microchip Website.....	11
Product Change Notification Service.....	11
Customer Support.....	11
Microchip Devices Code Protection Feature.....	11
Legal Notice.....	11
Trademarks.....	12
Quality Management System.....	13
Worldwide Sales and Service.....	14

1. Maximum Ratings

Table 1-1. Maximum Ratings at 25 °C Unless Otherwise Noted

Parameters/Test Conditions	Symbol	Value	Unit
Junction and storage temperature	T_J and T_{STG}	-65 to +200	°C
Thermal impedance junction-to-ambient	$R_{\theta JA}$	325	°C/W
Thermal impedance junction-to-case	$R_{\theta JSP}$	90	°C/W
Collector-Emitter voltage	V_{CEO}	80	V
Collector-Base voltage	V_{CBO}	140	V
Emitter-Base voltage	V_{EBO}	7.0	V
Collector current	I_C	1.0	A
Total power dissipation: at $T_A = +25\text{ °C}^1$	P_D	0.5	W

Note:

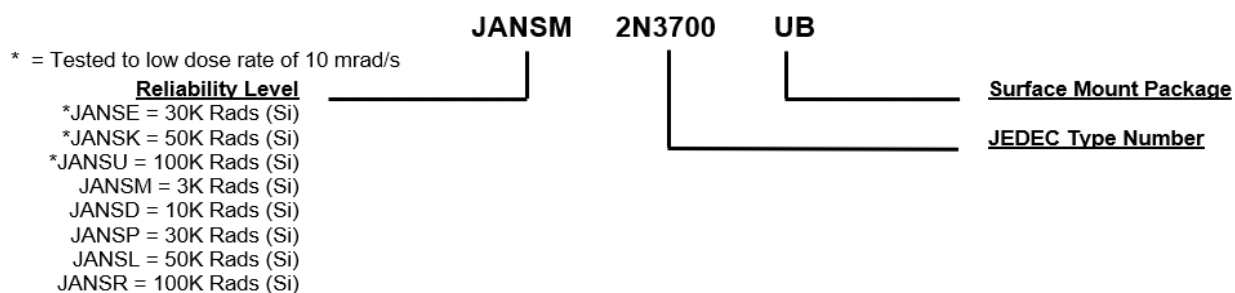
1. Derate linearly 6.6 mW/°C for $T_A \geq +25\text{ °C}$.

1.1 Mechanical Packaging

- Case: Ceramic
- Terminals: Gold plating over nickel under plate
- Marking: Part number, date code, manufacturer's ID, and serial number
- Tape and reel option: Standard per EIA-418D. Consult factory for quantities.
- Weight: < 0.04 grams
- See [Package Dimensions](#).

2. Part Nomenclature

Figure 2-1. Part Nomenclature



2.1 Symbols and Definitions

Table 2-1. Symbols and Definitions

Symbol	Definition
f	Frequency
I _B	Base current (DC)
I _E	Emitter current (DC)
T _A	Ambient temperature
T _C	Case temperature
V _{CB}	Collector to base voltage (DC)
V _{CE}	Collector to emitter voltage (DC)
V _{EB}	Emitter to base voltage (DC)

3. Electrical Characteristics

Table 3-1. Electrical Characteristics at 25 °C Unless Otherwise Stated

Parameters / Test Conditions	Symbol	Min.	Max.	Unit
Off Characteristics				
Collector-Emitter breakdown current $I_C = 30 \text{ mA}$	$V_{(BR)CEO}$	80	—	V
Collector-Base cutoff current $V_{CB} = 140\text{V}$	I_{CBO}	—	10	μA
Emitter-Base cutoff current $V_{EB} = 7\text{V}$	I_{EBO1}	—	10	μA
Collector-Emitter cutoff current $V_{CE} = 90\text{V}$	I_{CES}	—	10	ηA
Emitter-Base cutoff current $V_{EB} = 5.0\text{V}$	I_{EBO2}	—	10	ηA
On Characteristics¹				
Forward-Current transfer ratio $I_C = 150 \text{ mA}, V_{CE} = 10\text{V}$ $I_C = 0.1 \text{ mA}, V_{CE} = 10\text{V}$ $I_C = 10 \text{ mA}, V_{CE} = 10\text{V}$ $I_C = 500 \text{ mA}, V_{CE} = 10\text{V}$ $I_C = 1.0\text{A}, V_{CE} = 10\text{V}$	h_{FE}	100 50 90 50 15	300 300 — 300 —	—
Collector-Emitter saturation voltage $I_C = 150 \text{ mA}, I_B = 15 \text{ mA}$ $I_C = 500 \text{ mA}, I_B = 50 \text{ mA}$	$V_{CE(sat)}$	—	0.2 0.5	V
Base-Emitter saturation voltage $I_C = 150 \text{ mA}, I_B = 15 \text{ mA}$	$V_{BE(sat)}$	—	1.1	V

Note:

1. Pulse Test: pulse width = 300 μs , duty cycle $\leq 2.0\%$.

Table 3-2. Dynamic Characteristics

Parameters / Test Conditions	Symbol	Min.	Max.	Unit
Small-Signal short-circuit forward current transfer ratio $I_C = 1.0 \text{ mA}, V_{CE} = 5.0\text{V}, f = 1.0 \text{ kHz}$	h_{fe}	80	400	—
Magnitude of small-signal short-circuit forward current Transfer Ratio $I_C = 50 \text{ mA}, V_{CE} = 10\text{V}, f = 20 \text{ MHz}$	$ h_{fe} $	5.0	20	—
Output capacitance $V_{CB} = 10\text{V}, I_E = 0, 100 \text{ kHz} \leq f \leq 1.0 \text{ MHz}$	C_{obo}	—	12	pF
Input capacitance $V_{EB} = 0.5\text{V}, I_C = 0, 100 \text{ kHz} \leq f \leq 1.0 \text{ MHz}$	C_{ibo}	—	60	pF

Table 3-3. Safe Operation Area (See the following SOA graph and [MIL-STD-750, Method 3053](#))

DC Tests	
$T_C = 25\text{ }^{\circ}\text{C}$, 1 cycle, $t = 10\text{ ms}$	
Test 1 2N3700UB	$V_{CE} = 10\text{V}$ $I_C = 180\text{ mA}$
Test 2 2N3700UB	$V_{CE} = 40\text{V}$ $I_C = 45\text{ mA}$
Test 3 2N3700UB	$V_{CE} = 80\text{V}$ $I_C = 22.5\text{ mA}$

Figure 3-1. Maximum Safe Operating Area

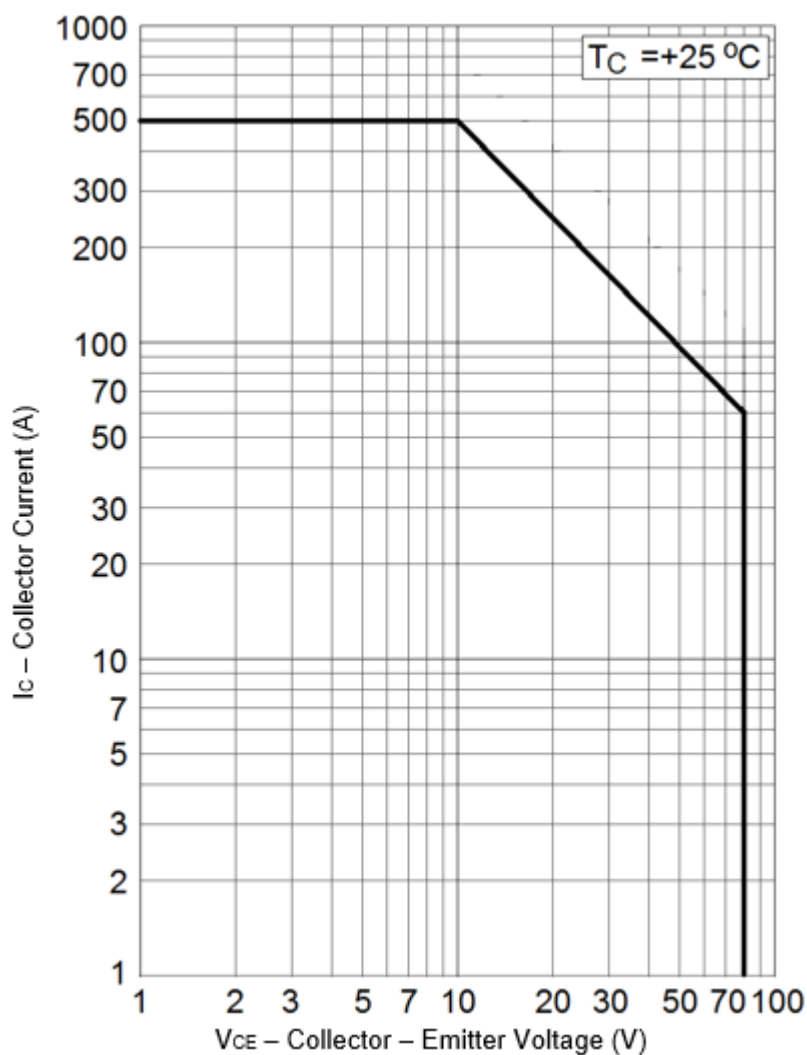


Table 3-4. Post Radiation Electrical Characteristics

Parameters / Test Conditions	Symbol	Min.	Max.	Unit
Collector to base cutoff current $V_{CB} = 140V$	I_{CBO}	—	20	μA
Emitter to base cutoff current $V_{EB} = 7V$	I_{EBO}	—	20	μA
Collector to emitter breakdown voltage $I_C = 30\text{ mA}$	$V_{(BR)CEO}$	80	—	V
Collector-Emitter cutoff current $V_{CE} = 90V$	I_{CES}	—	20	ηA
Emitter-Base cutoff current $V_{EB} = 5.0V$	I_{EBO}	—	20	ηA
Forward-Current transfer ratio ¹ $I_C = 150\text{ mA}, V_{CE} = 10V$ $I_C = 0.1\text{ mA}, V_{CE} = 10V$ $I_C = 10\text{ mA}, V_{CE} = 10V$ $I_C = 500\text{ mA}, V_{CE} = 10V$ $I_C = 1A, V_{CE} = 10V$	$[h_{FE}]$	[50] [25] [45] [25] [7.5]	300 300 — 300 —	—
Collector-Emitter saturation voltage $I_C = 150\text{ mA}, I_B = 15\text{ mA}$ $I_C = 500\text{ mA}, I_B = 50\text{ mA}$	$V_{CE(sat)}$	—	0.23 0.58	V
Base-Emitter saturation voltage $I_C = 150\text{ mA}, I_B = 15\text{ mA}$	$V_{BE(sat)}$	—	1.27	V

Note:

- See method 1019 of MIL-STD-750 for how to determine $[h_{FE}]$ by first calculating the delta ($1/h_{FE}$) from the pre- and post-radiation h_{FE} . Notice the $[h_{FE}]$ is not the same as h_{FE} and cannot be measured directly. The $[h_{FE}]$ value can never exceed the pre-radiation minimum h_{FE} that it is based upon.

4. Graphs

Figure 4-1. Temperature-Power Derating ($R_{\Theta JA}$)

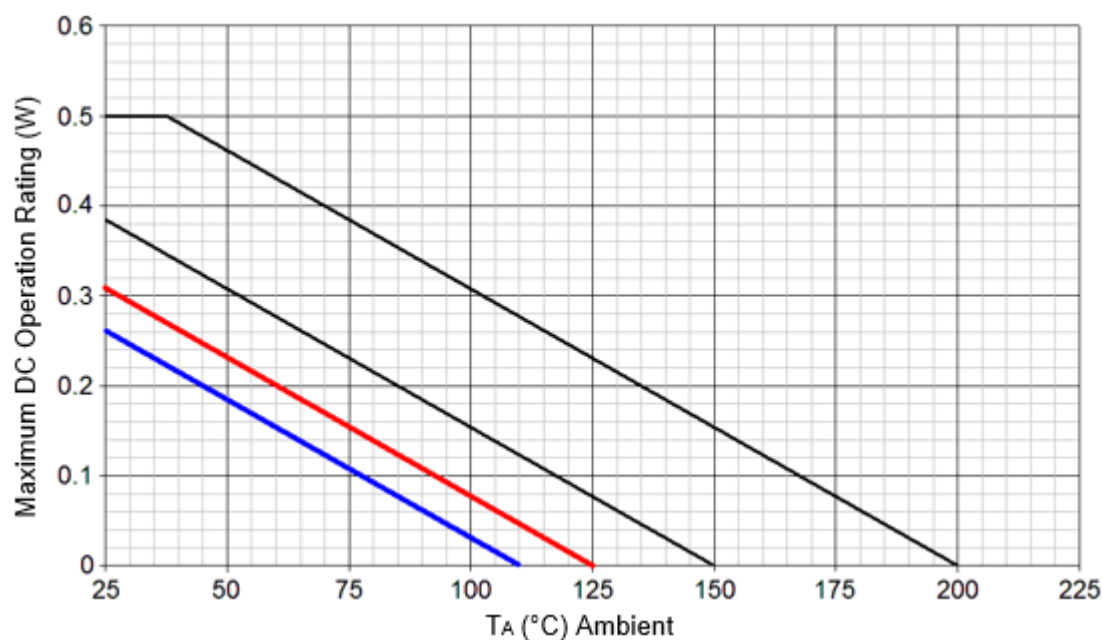
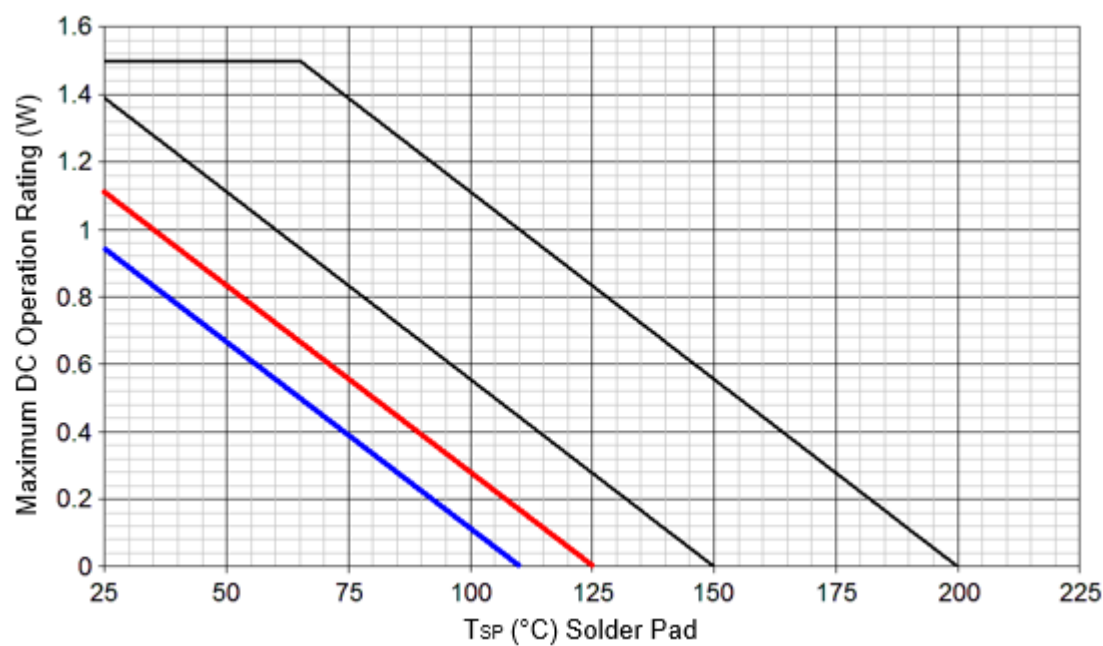
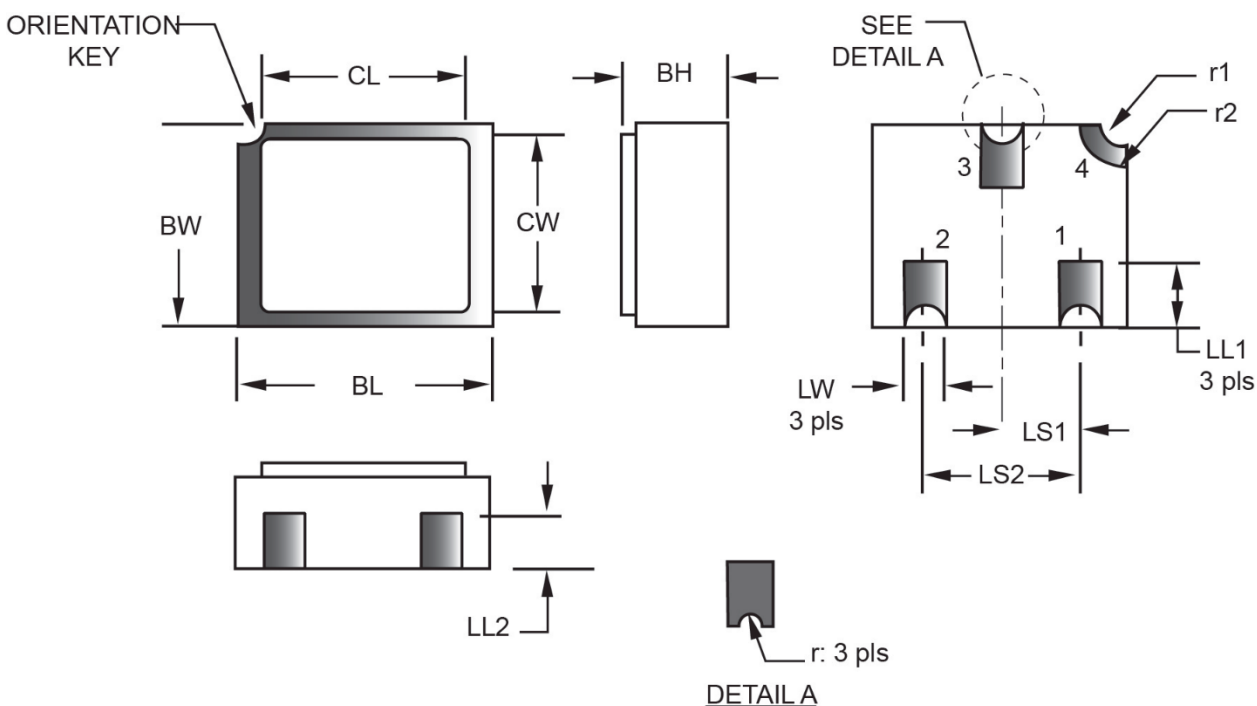


Figure 4-2. Temperature-Power Derating ($R_{\Theta JSP}$)



5. Package Dimensions

Figure 5-1. Package Dimensions¹⁻⁵



Symbol	Dimensions				Symbol	Dimensions			
	Inch		Millimeters			Inch		Millimeters	
	Min.	Max.	Min.	Max.		Min.	Max.	Min.	Max.
BH	0.046	0.056	1.17	1.42	LS ₁	0.036	0.040	0.091	1.02
BL	0.115	0.128	2.92	3.25	LS ₂	0.071	0.079	1.81	2.01
BW	0.085	0.108	2.16	2.74	LW	0.016	0.024	0.41	0.61
CL	—	0.128	—	3.25	r	—	0.008	—	0.203
CW	—	0.108	—	2.74	r ₁	—	0.012	—	0.305
LL ₁	0.022	0.038	0.56	0.96	r ₂	—	0.022	—	0.559
LL ₂	0.017	0.035	0.43	0.89					

Notes:

1. Dimensions are in inches.
2. Millimeters are given for general information only.
3. Hatched areas on package denote metallized areas.
4. Pad 1 = Base, Pad 2 = Emitter, Pad 3 = Collector, Pad 4 = Shielding connected to the lid.
5. In accordance with ASME Y14.5M, diameters are equivalent to Φ x symbology.

6. Revision History

The revision history describes the changes that were implemented in the document. The changes are listed by revision, starting with the most current publication.

Revision	Date	Description
A	06/2024	Document was converted to Microchip template. Previous Microsemi literature number T4-LDS-0263-1 was replaced with DS00005461A.

Microchip Information

The Microchip Website

Microchip provides online support via our website at www.microchip.com/. This website is used to make files and information easily available to customers. Some of the content available includes:

- **Product Support** – Data sheets and errata, application notes and sample programs, design resources, user's guides and hardware support documents, latest software releases and archived software
- **General Technical Support** – Frequently Asked Questions (FAQs), technical support requests, online discussion groups, Microchip design partner program member listing
- **Business of Microchip** – Product selector and ordering guides, latest Microchip press releases, listing of seminars and events, listings of Microchip sales offices, distributors and factory representatives

Product Change Notification Service

Microchip's product change notification service helps keep customers current on Microchip products. Subscribers will receive email notification whenever there are changes, updates, revisions or errata related to a specified product family or development tool of interest.

To register, go to www.microchip.com/pcn and follow the registration instructions.

Customer Support

Users of Microchip products can receive assistance through several channels:

- Distributor or Representative
- Local Sales Office
- Embedded Solutions Engineer (ESE)
- Technical Support

Customers should contact their distributor, representative or ESE for support. Local sales offices are also available to help customers. A listing of sales offices and locations is included in this document.

Technical support is available through the website at: www.microchip.com/support

Microchip Devices Code Protection Feature

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.

Legal Notice

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 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.

Trademarks

The Microchip name and logo, the Microchip logo, Adaptec, 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, ClockWorks, The Embedded Control Solutions Company, EtherSynch, Flashtec, Hyper Speed Control, HyperLight Load, Libero, motorBench, mTouch, Powermite 3, Precision Edge, ProASIC, ProASIC Plus, ProASIC Plus logo, Quiet-Wire, SmartFusion, SyncWorld, TimeCesium, TimeHub, TimePictra, TimeProvider, 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, Clockstudio, CodeGuard, CryptoAuthentication, CryptoAutomotive, CryptoCompanion, CryptoController, dsPICDEM, dsPICDEM.net, Dynamic Average Matching, DAM, ECAN, Espresso T1S, EtherGREEN, EyeOpen, GridTime, IdealBridge, IGaT, In-Circuit Serial Programming, ICSP, INICnet, Intelligent Paralleling, IntelliMOS, Inter-Chip Connectivity, JitterBlocker, Knob-on-Display, MarginLink, maxCrypto, maxView, memBrain, Mindi, MiWi, MPASM, MPF, MPLAB Certified logo, MPLIB, MPLINK, mSiC, MultiTRAK, NetDetach, Omniscient Code Generation, PICDEM, PICDEM.net, PICKit, PICtail, Power MOS IV, Power MOS 7, PowerSmart, PureSilicon, QMatrix, REAL ICE, Ripple Blocker, RTAX, RTG4, SAM-ICE, Serial Quad I/O, simpleMAP, SimpliPHY, SmartBuffer, SmartHLS, SMART-I.S., storClad, SQL, SuperSwitcher, SuperSwitcher II, Switchtec, SynchroPHY, Total Endurance, Trusted Time, TSHARC, Turing, 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.

© 2012–2024, Microchip Technology Incorporated and its subsidiaries. All Rights Reserved.

ISBN: 978-1-6683-4764-5

Quality Management System

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

Worldwide Sales and Service

AMERICAS	ASIA/PACIFIC	ASIA/PACIFIC	EUROPE
Corporate Office 2355 West Chandler Blvd. Chandler, AZ 85224-6199 Tel: 480-792-7200 Fax: 480-792-7277 Technical Support: www.microchip.com/support Web Address: www.microchip.com	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	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	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 - Hod Hasharon Tel: 972-9-775-5100 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: 47-72884388 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