

Voidless Hermetically Sealed Surface Mount Bidirectional Transient Voltage Suppressors Data Sheet

1N6103AUS-1N6137AUS



Product Overview

This surface mount series of industry-recognized voidless, hermetically sealed, bidirectional Transient Voltage Suppressors (TVS) designs is military qualified per MIL-PRF-19500/516 and is ideal for high-reliability applications where a failure cannot be tolerated. They provide a Working Peak "Standoff" Voltage selection from 5.7 V to 152 V with a 500 W rating for a 10/1000 μ s pulse. They are very robust in hard-glass construction and internal "Category 1" metallurgical bonds. These are also available as both a non-suffix part and an "A" version providing different voltage tolerances as described in the nomenclature section. These devices are also available in axial-leaded packages for through-hole mounting.

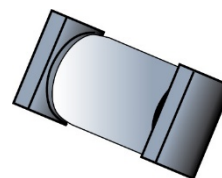
Features

- High surge current and peak pulse power provides transient voltage protection for sensitive circuits.
- Double-layer passivation
- Internal "Category 1" metallurgical bonds
- Voidless hermetically sealed glass package
- JAN, JANTX, and JANTXV, JANS qualified versions are available per MIL-PRF-19500/516. (See [Part Nomenclature](#) for all available options).
- RoHS compliant versions available (commercial grade only)

Applications

- Military and other high-reliability applications
- Extremely robust construction
- Extensive range in working peak "standoff" voltage (V_{WM}) from 5.7 V to 152 V
- 500 W peak pulse power (P_{PP}) for a 10/1000 μ s pulse
- ESD and EFT protection per IEC6100-4-2 and IEC61000-4-4 respectively
- Protection from the secondary effects of lightning per select levels in IEC61000-4-5
- Square-end-cap terminals for easy placement
- Non-sensitive to ESD per MIL-STD-750 method 1020
- Inherently radiation hard as described in [MicroNote 050](#).

Figure 1. "B" or SQ-MELF Package



1. Maximum Ratings

Maximum ratings are taken at $T_A = 25\text{ }^{\circ}\text{C}$ unless otherwise noted.

Parameters/Test Conditions	Symbol	Value	Unit
Junction and storage temperature	T_J and T_{STG}	-55 to +175	$^{\circ}\text{C}$
Thermal resistance junction-to-end cap	$R_{\theta JEC}$	8.3	$^{\circ}\text{C}/\text{W}$
Peak pulse power at $25\text{ }^{\circ}\text{C}$ (10/1000 μs)	P_{PP}	500	W
Steady-state power up to $T_{EC} = 150\text{ }^{\circ}\text{C}^1$	P_D	3.0	W
Steady-state power at $T_A = 25\text{ }^{\circ}\text{C}^2$	P_D	2.0	W
Impulse repetition rate	df	0.01	%
Solder temperature at 10 seconds	T_{SP}	260	$^{\circ}\text{C}$

Notes:

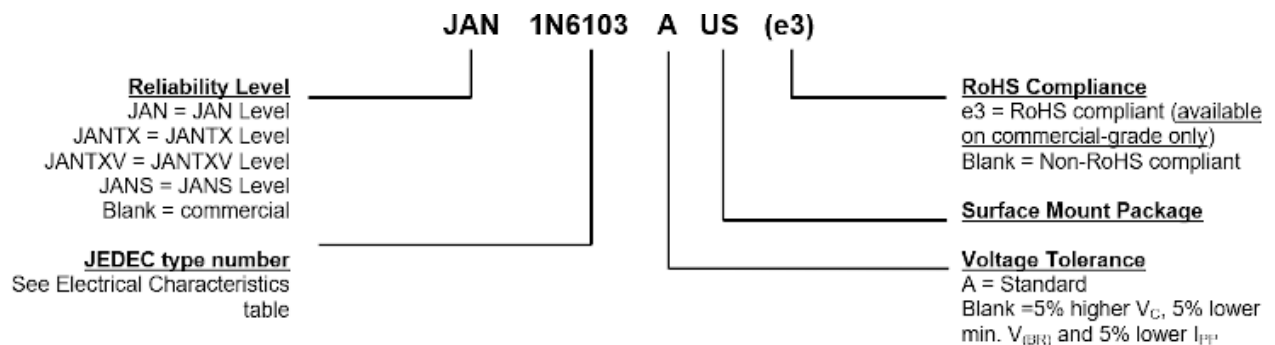
1. Linearly derate above $T_{EC} = 150\text{ }^{\circ}\text{C}$ to zero at $T_{EC} = 175\text{ }^{\circ}\text{C}$.
2. Steady-state power ratings with reference to ambient are for PC boards where thermal resistance from mounting point to ambient is sufficiently controlled where maximum rated T_J is not exceeded (also see [Figure 3-4](#)).

1.1 Mechanical and Packaging

- Case: Hermetically sealed, voidless hard glass with tungsten slugs
- Terminals: Tin/lead plate over copper. RoHS compliant matte-tin is available on commercial grade only.
- Marking: None
- Polarity: No polarity marking for these bidirectional TVSs
- Tape and reel option: Standard per EIA-481-B. Consult factory for quantities.
- Weight: Approximately 539 mg
- See [Package Dimensions](#).

1.2 Part Nomenclature

Applicable to entire series:



2. Symbols and Definitions

Symbol	Definition
$\alpha_{V(BR)}$	Temperature coefficient of minimum breakdown voltage: The change in breakdown voltage divided by the change in temperature that caused it expressed in %/°C or mV/°C.
$V_{(BR)}$	Minimum breakdown voltage: The minimum voltage the device will exhibit at a specified current.
V_{WM}	Working peak voltage: The maximum peak voltage that can be applied over the operating temperature range. This is also referred to as Standoff Voltage.
I_D	Maximum standby current: The maximum current that will flow at the specified voltage and temperature.
V_C	Maximum clamping voltage at specified I_{PP} (Peak Pulse Current) at the specified pulse conditions.
P_{PP}	Peak pulse power: The peak power dissipation resulting from the peak impulse current I_{PP} .

2.1 Electrical Characteristics

Industry Type Number ¹	Minimum Breakdown Voltage ¹ $V_{(BR)}$ at $I_{(BR)}$		Rated Standoff Voltage V_{WM}	Maximum Standby Current I_D at V_{WM}	Maximum Clamping Voltage ¹ V_C at I_{PP}	Maximum Peak Pulse Current ¹ I_{PP}	Maximum Temp. Coef. of $V_{(BR)}$ $\alpha_{V(BR)}$
	V	mA	V	μA	V	A	%/°C
1N6103AUS ²	7.13	175	5.7	50	11.2	44.6	0.06
1N6104AUS ²	7.79	150	6.2	20	12.1	41.3	0.06
1N6105AUS ²	8.65	150	6.9	20	13.4	37.3	0.06
1N6106AUS ²	9.50	125	7.6	20	14.5	34.5	0.07
1N6107AUS ²	10.45	125	8.4	20	15.6	32.0	0.07
1N6108AUS ²	11.40	100	9.1	20	16.9	29.6	0.07
1N6109AUS ²	12.35	100	9.9	20	18.2	27.5	0.08
1N6110AUS ²	14.25	75	11.4	20	21.0	23.8	0.08
1N6111AUS ²	15.20	75	12.2	20	22.3	22.4	0.08
1N6112AUS ²	17.10	65	13.7	1	25.1	19.9	0.085
1N6113AUS ²	19.0	65	15.2	1	27.7	18.0	0.085
1N6114AUS ²	20.9	50	16.7	1	30.5	16.4	0.085
1N6115AUS ²	22.8	50	18.2	1	33.3	15.0	0.09
1N6116AUS ²	25.7	50	20.6	1	37.4	13.4	0.09
1N6117AUS ²	28.5	40	22.8	1	41.6	12.0	0.09
1N6118AUS ²	31.4	40	25.1	1	45.7	10.9	0.095
1N6119AUS	34.2	30	27.4	1	49.9	10.0	0.095
1N6120AUS	37.1	30	29.7	1	53.6	9.3	0.095
1N6121AUS	40.9	30	32.7	1	59.1	8.5	0.095
1N6122AUS	44.7	25	35.8	1	64.6	7.7	0.095
1N6123AUS	48.5	25	38.8	1	70.1	7.1	0.095
1N6124AUS	53.2	20	42.6	1	77.0	6.5	0.095
1N6125AUS	58.9	20	47.1	1	85.3	5.9	0.100

.....continued

Industry Type Number ¹	Minimum Breakdown Voltage ¹ $V_{(BR)}$ at $I_{(BR)}$		Rated Standoff Voltage V_{WM}	Maximum Standby Current I_D at V_{WM}	Maximum Clamping Voltage ¹ V_C at I_{PP}	Maximum Peak Pulse Current ¹ I_{PP}	Maximum Temp. Coef. of $V_{(BR)}$ $\alpha_{V(BR)}$
	V	mA	V	μA	V	A	%/°C
1N6126AUS	64.6	20	51.7	1	97.1	5.1	0.100
1N6127AUS	71.3	20	56.0	1	103.1	4.8	0.100
1N6128AUS	77.9	15	62.2	1	112.8	4.4	0.100
1N6129AUS	86.5	15	69.2	1	125.1	4.0	0.100
1N6130AUS	95.0	12	76.0	1	137.6	3.6	0.100
1N6131AUS	104.5	12	86.6	1	151.3	3.3	0.100
1N6132AUS	114.0	10	91.2	1	165.1	3.0	0.100
1N6133AUS	123.5	10	98.8	1	178.8	2.8	0.105
1N6134AUS	142.5	8	114.0	1	206.3	2.4	0.105
1N6135AUS	152.0	8	121.6	1	218.4	2.3	0.105
1N6136AUS	171.0	5	136.8	1	245.7	2.0	0.110
1N6137AUS	190.0	5	152.0	1	273.0	1.8	0.110

Notes:

1. Part number without the "A" suffix has 5% higher V_C , 5% lower minimum $V_{(BR)}$, and 5% lower I_{PP} .
2. Also available in JANS qualification per MIL-PRF-19500/516.

3. Performance Curves

Figure 3-1. Peak Pulse Power vs. Pulse Time

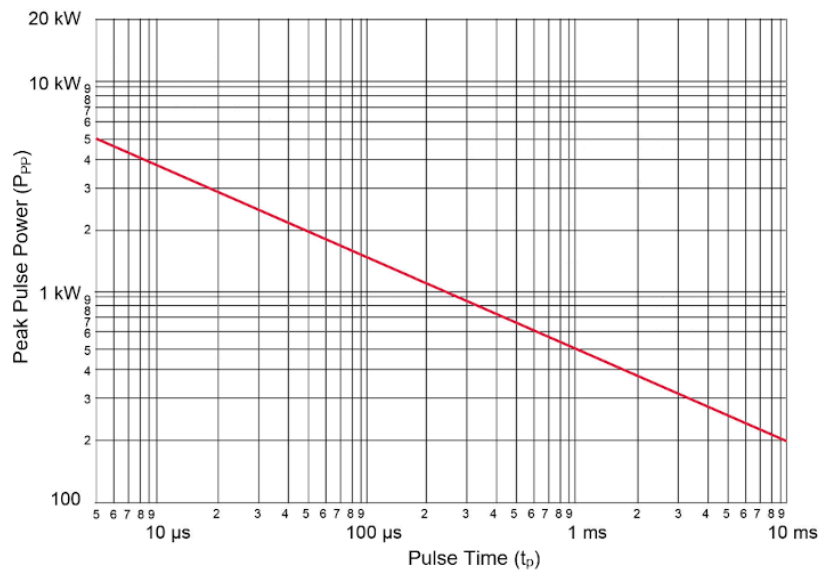


Figure 3-2. Pulse Derating Curve (Not Applicable to JANHC/JANKC Die)

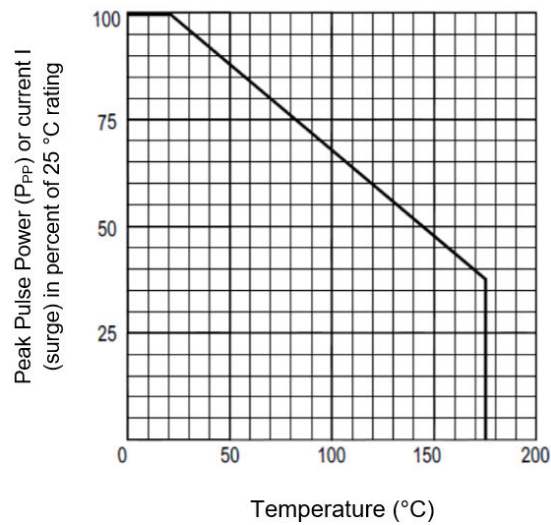


Figure 3-3. Pulse Waveform

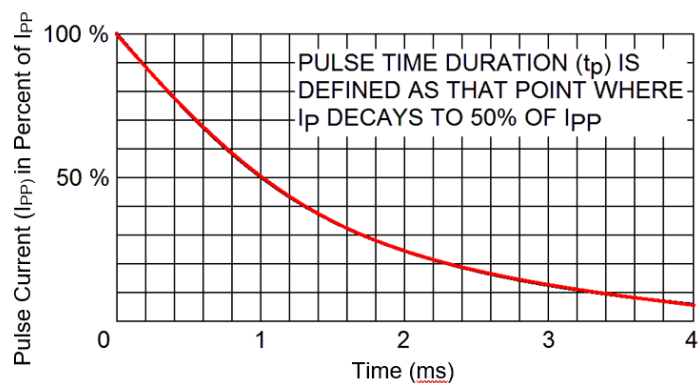
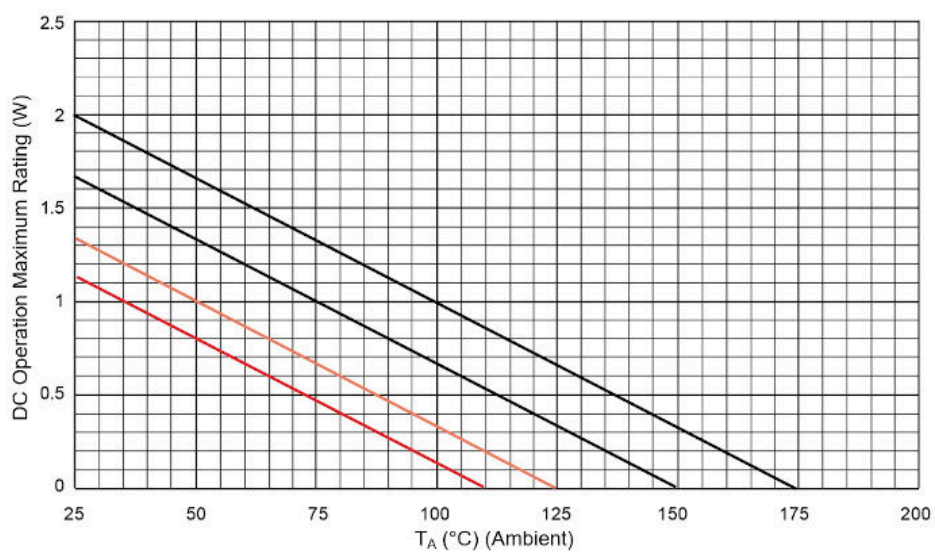
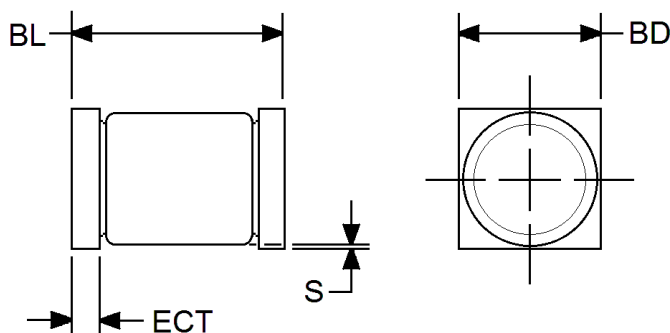


Figure 3-4. Temperature-Power Derating Curve



4. Package Dimensions

Dimensions are in inches. Millimeters are given for general information only. Minimum clearance of glass body to mounting surface on all orientations.

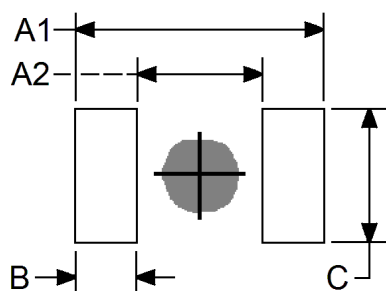


Ltr	Inch		Millimeters		Notes
	Min	Max	Min	Max	
BD	0.137	0.148	3.48	3.76	
BL	0.200	0.225	5.08	5.72	
ECT	0.019	0.028	0.48	0.71	
S	0.003	-	0.08	-	1

Note:

1. In accordance with ASME Y14.5M, diameters are equivalent to Φ x symbology.

4.1 Pad Layout



Dim	Inch	Millimeters
A1	0.288	7.32
A2	0.144	3.66
B	0.070	1.78
C	0.155	3.94

If mounting requires adhesive separate from the solder, an additional 0.080 inch (2.03 mm) diameter contact may be placed in the center between the pads as an optional spot for cement.

5. 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	06/2023	Converted document to Microchip template.

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, APT, 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, Temux, TimeCesium, TimeHub, TimePictra, TimeProvider, TrueTime, 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, GridTime, IdealBridge, In-Circuit Serial Programming, ICSP, INICnet, Intelligent Paralleling, IntelliMOS, Inter-Chip Connectivity, JitterBlocker, Knob-on-Display, KoD, 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, SmartHLS, SMART-I.S., storClad, SQL, SuperSwitcher, SuperSwitcher II, Switchtec, SynchroPHY, Total Endurance, Trusted Time, 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.

© 2023, Microchip Technology Incorporated and its subsidiaries. All Rights Reserved.

ISBN: 978-1-6683-2584-1

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 - 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: 47-72884388 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