AN4041

3-Lead Contact Package Usage

Introduction

Authors: Jim Boomer, Randy Yach – Microchip Technology Inc.

The Microchip CryptoAuthentication™ devices are often used in product accessory or product ecosystem management in a wide variety of markets. These include battery authentication, disposable cartridge authentication or similar applications. When used in these applications, the only electronic device that is required on the cartridge is often the authentication device. For this reason, the 3-lead Contact package was developed to eliminate the need for a PCB board. The package itself is mounted by attaching the backside of the package to the item being authenticated with the exposed pads facing outward. Connection to the electrical contacts of the authentication device is made using mechanical pressure against the compression connectors or pogo pins (i.e., unsoldered connections).

Introducing an electronic device into a manufacturing environment that previously did not have one, will, in all probability, create new challenges. More specifically, appropriate electrostatic discharge (ESD) control measures will need to be applied to the manufacturing flow. The second portion of this application note is focused on understanding the basics of ESD and ESD control measures. This application note must be viewed as a primer to ESD controls. It is recommended that a customer lacking the expertise in ESD control work with an expert to develop a robust solution that minimizes the potential of damage to the electronic device.

This application note provides general usage guidelines for the 3-lead Contact package option that is available with symmetric and asymmetric CryptoAuthentication products.[1]

Table 1. 3-Lead Contact Package for CryptoAuthentication Products

Device Name	Description	Status
ATSHA204A	General purpose symmetric key-based cryptographic device with secure key storage and cryptographic acceleration	In Production
ATECC608B	General purpose asymmetric key-based cryptographic device with secure key storage and cryptographic acceleration	In Production

CAUTION **Notice:** Check with Microchip for additional products that may be packaged using the 3-lead Contact package.

[1] The ATECC108A and ATECC508A devices are also provided in a 3-lead Contact package, but these devices are no longer recommended for new designs.

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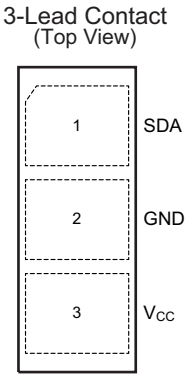
1. 3-Lead Contact Package

The 3-lead Contact package is a relatively unique concept for integrated circuit packages. Typically, package contacts are soldered down to a PCB board. This is not the case for the 3-lead Contact package. For this package, the contacts are left open for connection via a compression or a pogo-pin connector and the backside of the package is glued to an assembly. Detailed information on the package dimension can be found in 4. Appendix A – Package Drawings.

Standard Usage

- Intended for use with removable or disposable accessories, modules or components.
- Electrical contact between the IC and the host system is accomplished with mechanical pressure contacts to allow accessory removal and replacement.
- Used with common compression or pogo-pin connectors with a 2 mm pitch.

Figure 1-1. Contact Package Pinout



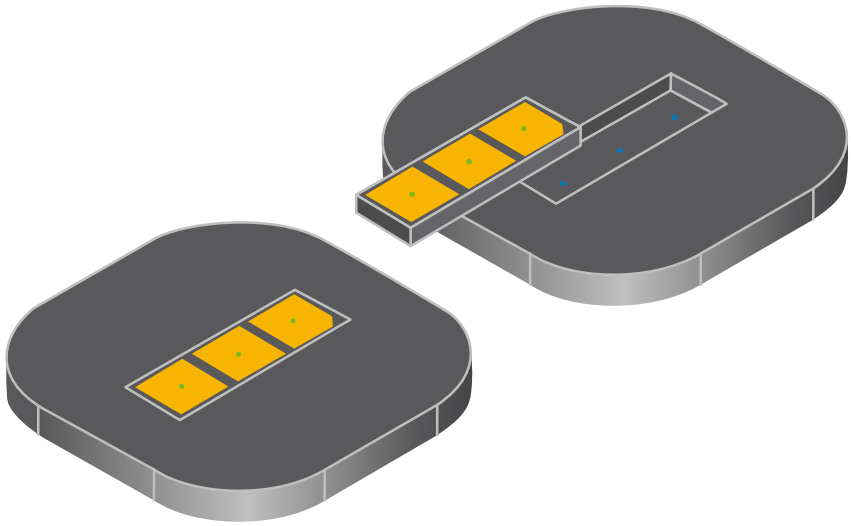
Important: The pinout shown is common for all currently existing CryptoAuthentication devices that are available in a 3-lead Contact package. It is recommended to always validate the package pinout via the device data sheet.

1.1 Package Substrate Support

The 3-lead Contact package is intended to be permanently attached to a base substrate (circuit board, frame, system enclosure, etc.) to provide mechanical support for the IC, as pressure is applied to make the electrical contact.

The embossed/recessed IC receptacle shown in Figure 1-2 is an example, not a required configuration, but it illustrates the need for proper mechanical support for the IC to ensure reliable long-term operation under repeated pressure connection cycles.

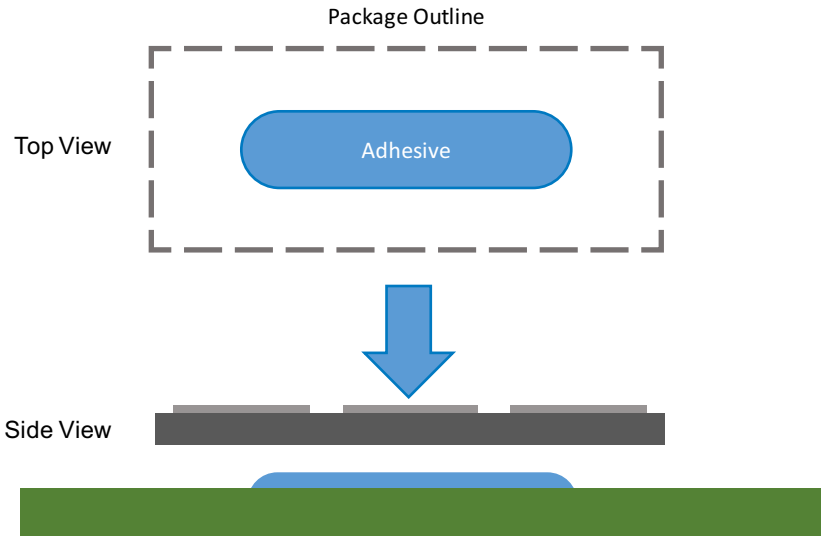
Figure 1-2. Embossed/Recessed IC Receptacle Example



1.2 Attachment of Package to Substrate

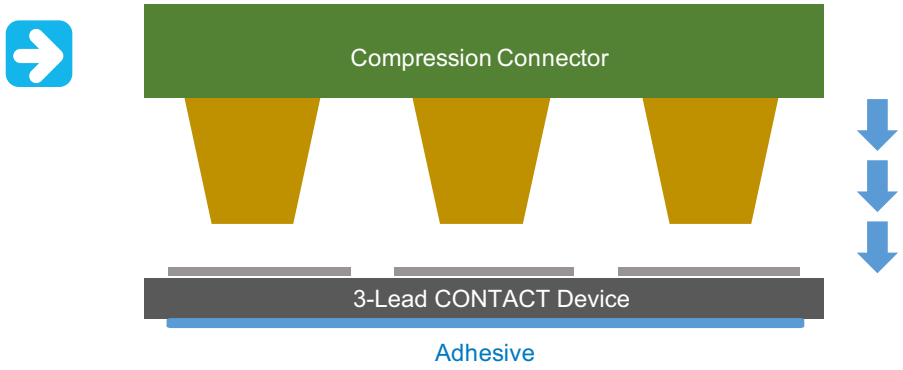
The attachment of the IC to the substrate itself can be accomplished with the most standard epoxies or adhesives, depending on the mechanical and environmental requirements of the system where it is used. The adhesive must be applied in a pattern that spreads evenly along the package surface and does not leave large voids. The figure below shows an approximate example.

Figure 1-3. Adhesive Attachment



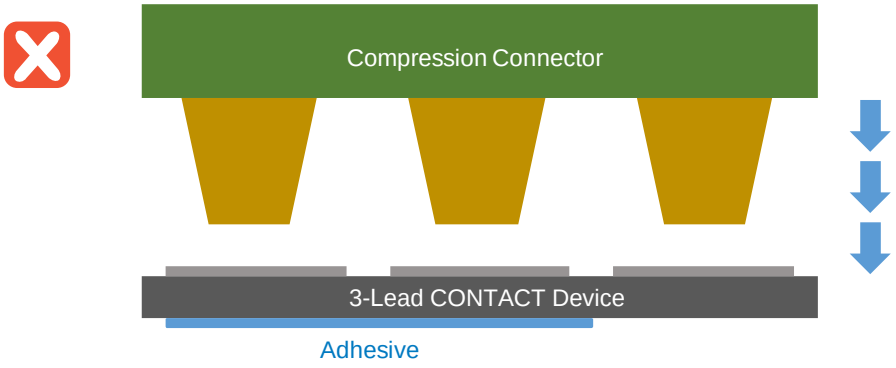
The amount of adhesive deposited depends upon the properties of the adhesive used, and the relevant application notes of the adhesive supplier must be referenced. To provide even coverage of the rear surface of the package to a uniform depth of 0.2 mm requires the application of ~3 mm^3 of adhesive. Proper deposition of adhesive may produce even distribution beneath the package with no voids, as illustrated below:

Figure 1-4. Correct – Even Adhesive Coverage



If the deposition profile/pattern does not produce an even spread of adhesive, voids in the adhesive can result in stress on the package when under pressure with the compression connector. The following figure illustrates an example:

Figure 1-5. Incorrect – Uneven Adhesive Coverage Causing Voids



Adhesive Selection

The choice of an adhesive is dependent upon many factors including the materials to be bonded, the environmental conditions which the assembly will be stored and operated in, environmental regulations and the actual characteristics of the adhesive. For this reason, a general recommendation of what adhesive can be used for a given application cannot be made. See 5. Appendix B - Adhesives for an example of an adhesive that may be acceptable for this application.

1.3 Connectors

The 3-lead Contact package can be used with either compression or pogo-pin connectors. The choice depends on the overall solution of how the device must come into contact with the connector. The choice may also be different in an end application vs. a manufacturing environment.

Compression Connectors

The 3-lead Contact package is intended to be used with 2 mm pitch compression connectors. They can be standard off-the-shelf connectors or a custom connector can be created for a given application. The standard connectors listed below, or those with similar dimensions and mechanical characteristics, can be used with this package:

- AVX Corporation 9155-800
- Molex® 1050400001

Appendix C provides more details on these compression connectors.

Pogo-Pin Connectors

Pogo-pin connectors can be used instead of compression connectors. Pogo pins are spring-loaded connectors. Pins can come in different lengths and widths, and can have a different stroke length. Individual pogo pins can be implemented in a design, or a connector of three pins can be implemented. The pogo pins must be placed on the 2 mm center for optimal placement.

- Mill-Max Mfg. Corporation 3-pin Through Hole Connector: 836-22-003-10-001101
- Preci-Dip 3-pin Surface Mount Connector: 821-S1-003-30-015101 has more details on these compression connectors

Appendix D provides more details on these pogo-pin connectors.

Pogo pins, depending on the connector, can sometimes be readily replaced; so in a manufacturing environment, this may be a preferred solution. Pogo-pin connectors, where the length of each pin can be different, provide some additional flexibility in the manufacturing environment to minimize ESD damage (see 2.4 ESD System Design Considerations).

2. Manufacturing ESD Controls

Contact packages offer a unique ESD challenge because they are not attached to a PCB board, but can be exposed to some challenging ESD stresses, starting with the manufacturing phase all the way through delivery to and use by the customer. The following subsections provide some guidance on the various challenges that may be faced and potential mitigation approaches.

2.1 ESD Basics

ESD events are a result of charge building up on a device, then discharging through some sort of conductive path. The goal of ESD mitigation procedures is to try to minimize the build-up of charge and to control and direct the discharge path.

Charge can build up and become trapped on an insulator or isolated conductor through normal handling and movement of devices through any environment. The build-up of charge can happen in one of two ways: triboelectrification or electrostatic induction.

Triboelectrification
Triboelectric charging occurs when two materials of differing electron affinities come into close contact, resulting in a transfer of electrons from one material to the other. When these two materials come into contact, a weak bond is formed and when the materials are, then, separated, electrons from one material will transfer to the other material, leaving one object positively charged and the other negatively charged. The material that retains electrons and becomes negatively charged is said to have a higher electron affinity. A ranking of different materials with respect to their electron affinities can be found in a triboelectric series table (AlphaLab Inc. TriboElectric Series Table)

The total amount of charge stored on an object depends on the size of the object and its electron affinity in relation to the other object.

Electrostatic Induction
Transfer of charge through electrostatic induction occurs when a charged object comes near a conductor. The electric field induced from the proximity of the charged object causes a charge imbalance in the conductor.

If a metal object touches the conductor while in this state, there is a static discharge. If the charged object is, then, taken away, it will, again, leave a charge imbalance in the conductor, leaving it charged in the opposite polarity state and susceptible to another static discharge.

Electrostatic Discharge
An electrostatic discharge occurs when two objects, charged at different potentials, come into contact. ESD events are very short events, on the order of less than 500 ns. Transients longer than this are typically classified as electrical overstress (EOS). A charged object may not require direct contact but only needs to be in close enough proximity to cause an arc to occur. An example of this is when walking across a room and touching a doorknob and feeling or seeing an electric shock or spark.

2.2 ESD Models

Several models are often cited when specifying the ESD protection level for integrated circuits. The two most prominent of these models are the Human Body Model (HBM) and the Charged Device Model (CDM). The purpose of these models is to standardize a testing methodology that quantifies how susceptible a device is to damage from an ESD event. The ratings are typically provided as a ± voltage value. The magnitude of the voltage indicates the passing voltage where no observed damage has occurred on a set of characterization samples. For any given device, the higher the voltage magnitude, the lower the susceptibility to damage.

Human Body Model (HBM)
The HBM is the most commonly used model for characterizing an IC's susceptibility to ESD damage. The model seeks to emulate the discharge that will occur when a charged human touches an electronic contact of an IC.

The HBM model and test procedures are overseen by the ESDA[2] Association and JEDEC®[3]. The governing standard is JS-001-2017: ESDA/JEDEC Joint Standard for Electrostitic Discharge Sensitivity Testing – Human Body Model (HBM) – Component Level.

Charged Device Model (CDM)

The CDM is an alternative to HBM and is more applicable to a manufacturing environment where contact is most likely between an electronic device and production equipment, such as handlers and a tester. CDM events are common in a manufacturing environment where metal to metal contact is possible. The CDM test procedures and models, like HBM, are overseen by JEDEC. The governing standard is JS-002-2018: ESDA/JEDEC Joint Standard for Electrostatic Discharge Sensitivity Testing – Charged Device Model (CDM) – Device Level.

2.3 ESD Mitigation During Manufacturing

The two primary ways to reduce ESD events during the manufacturing flow and handling are charge mitigation and discharge prevention. Charge build-up is commonly controlled through the use of ionizers and static dissipative work surfaces at key points in the manufacturing flow. Unwanted discharge events can be controlled by using ESD safe tools and gloves.

The Contact package allows the simple attachment of an electronic device to a disposable in an environment that is not otherwise concerned about ESD precautions. It may feel like a daunting task to adapt a manufacturing environment previously unconcerned with ESD controls to one that must support them, but when you weigh the additional manufacturing costs against protecting the ecosystem from counterfeiting and cloning, the value of the additional measures can readily be determined.

Tools and Techniques for Removing or Minimizing Charge

Grounding of Equipment	Any manufacturing equipment that the devices may come in close proximity or contact with must have their surfaces appropriately and properly grounded through static dissipative means.
Grounding of Personnel	Workers that handle the equipment or the devices must be connected to ground through an ESD grounding strap. Furthermore, the workers must make sure they are grounded and discharged before touching the disposable unit. Straps are typically worn on the wrist.
Humidity Controls	It is recommended that the humidity level be kept between 40% and 60%. Charge build-up is more prone to happen when the air is very dry and the humidity is low. Low humidity levels provide a scenario where you can have a strong ESD discharge, which may damage the device. If the humidity level is high, you may have to worry about condensation issues in the manufacturing environment.
Ionizers	Ionizers are the only way to remove charge build-up from insulating surfaces. The ionizer will force ionized air containing both positive and negative ions over the surface, thus causing any charge build-up to be neutralized. It is very important that ionizers be monitored, calibrated and maintained on a regular basis. Care must be taken to ensure the proper placement of ionizers to make sure they provide a verified benefit.

Tools for Measuring

As with any manufacturing environment, the appropriate tools must be utilized to measure the effectiveness of the measures taken to ensure ESD controls. It is recommended that these tools be deployed initially to measure the existing manufacturing environment characteristics. These tools can, then, be used to monitor and help mitigate issues within the environment after the appropriate ESD controls are implemented.

[2] ESD Association – A professional voluntary association dedicated to advancing the understanding of EOS and the theory and practice of ESD avoidance.

[3] Joint Electron Device Engineering Council (JEDEC) is a world wide body responsible for many electronic device standards.

ESD Event Detectors

ESD event detectors are used to quantify and locate ESD events in a manufacturing environment. ESD event detectors are actually radio receivers that are sensitive to the characteristic RF energy transmitted when an ESD event occurs.

Tip: If you listen to the radio during a thunderstorm or sometimes when passing under high-voltage power lines, you may hear static on your radio. This is an example of the RF energy interfering with the primary signal. The ESD event detector essentially detects the same type of phenomenon.

ESD Voltage Meters

ESD voltage meters and electric field meters are used to measure the static voltage or electric field strength from charge build-up on surfaces.

Surface Resistivity and Resistance Checker

This measures the resistance of a surface and the resistance between a surface and ground. These meters can be used to verify the resistance of a surface to ensure that they remain in a static dissipative range. They can also be used to verify that grounding straps are working appropriately.

Humidity Meters

A given humidity level must be maintained; therefore, it is important that this be monitored across the manufacturing floor. One or more humidity meters may need to be deployed in a manufacturing environment.

2.4 ESD System Design Considerations

The following concepts are considered relative to an environment where the Contact package is the lone electronic device being attached to a disposable item. There is no PCB that can help to provide ESD protection; therefore, the Contact package alone must be considered.

ESD Protection Circuitry within the IC

ESD circuitry is built into the vast majority of integrated circuits. This circuitry provides some sort of clamping mechanism from the signal pins to ground or to the supply. Often there is also a clamping mechanism from the supply to ground. This circuitry is typically designed to achieve at least 2 kV HBM ESD protection but can often be designed for 4 kV or 8 kV HBM direct contact. This circuitry is designed to safely dissipate high-voltage discharge events and prevent damage to the device. The ESD circuitry is strategically placed on the die to shunt the high voltage directly to ground before it can reach and damage the more sensitive internal circuitry.

CAUTION **Notice:** The high-voltage value may actually be a large negative or positive voltage value. The ESD circuitry is designed to prevent damage against either polarity.

System Design Considerations

The goal of ESD protection is to always try to dissipate charge to ground before it can do any damage to the device. Additionally, preventing unwanted metal-to-metal contacts with the device pins will reduce possible ESD events. The pins of the device, when mounted to a disposable product, may ideally be protected from inadvertent contact. Contact may be from either an operator handling the device or machines, such as handlers and testers. When actual contact to the pins of the device is made, the contact discharge must be controlled.

Important: These recommendations are above and beyond the manufacturing recommendations already provided and must not be considered as an alternative method of protection.

All instances where the contacting of the pins may occur must be considered. This includes:

- During initial manufacturing where the device may be tested or programmed prior to attaching to the disposable.
- During testing or programming after the device is attached to the disposable.
- During final usage after the disposable unit is connected to the host system.

Recessing the Mounted Device	By providing a small shroud around the outline of the device, a degree of protection can be provided from inadvertent contact. This may be done by hollowing out an area in the plastic casing that the device is mounted to, which allows the device to be slightly countersunk into the casing. Alternately, a small amount of plastic may be added around the device providing a small shroud around the device.
Controlled Pin Contact Order	The goal is to always dissipate the charge to ground; therefore, it logically makes sense that the ground pin is the first to get connected to the system. This can be done by using pogo pins of staggered lengths. Ideally, the ground signal would be the first to make contact, followed by the supply pin and, lastly, the signal pin. If only two pin lengths are used, the ground pin must be contacted first, followed by the supply and signal pin.

Product Packaging Considerations

ESD concerns carry over to the actual packaging and shipment of the disposable module with the device attached. Also, there may be several shipping stages. The first stage may consist of shipping many modules in a given package to the final packaging house, where they are broken out into single or small multipacks for final shipment to the user. Each of these stages needs to be considered. The following recommendations must be considered:

ESD Bags	An ideal option to protect the device on the module is to ship the entire module in an ESD dissipative bag. This may not be cost effective or may not work well with a given module.
Covering the Mounted Device	If the actual device is recessed, it may be feasible to place a small piece of plastic over the enclosure to protect the contact pins. This would protect the device through the shipping process with this plastic only being removed by the end consumer.
Conductive Packaging Material	To help in removing any charge build-up, conductive packaging material may be used to reduce the charge near the modules. This may be some type of ESD dissipative foam or some material that is treated to reduce charge build-up.
ESD Coatings and Sprays	An alternative to conductive packaging materials is to use more standard packaging materials that are treated with special ESD coatings and sprays. These coatings are used to reduce charge build-up.

3. Summary

The 3-lead Contact package is a unique package for security devices targeted towards applications where electronics are not typically included. Disposable and consumable products with this type of security device attached can be authenticated and identified as from the original equipment manufacturer. This allows a corporation to protect the ecosystem from clones and knock-off products.

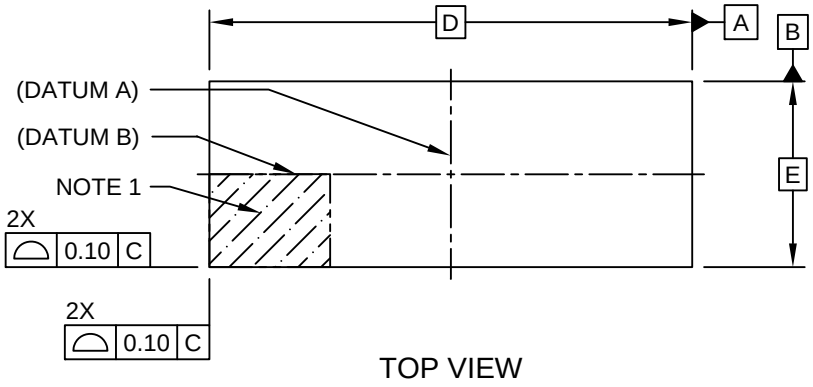
Introducing this type of capability into a manufacturing flow that typically does not have sensitive electronics creates some new manufacturing challenges in handling ESD events. This document provides a brief overview to indicate where these challenges may occur in the manufacturing flow with suggestions on how to overcome them.

4. Appendix A – Package Drawings

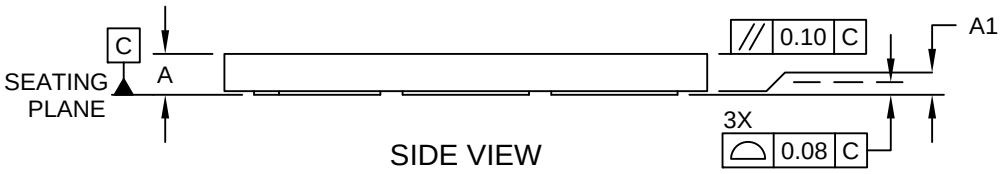
Figure 4-1. 3-Lead Contact Package

3-Lead Contact Package (LAB) - 6.54x2.5 mm Body [Contact]
Atmel Legacy Global Package Code RHB

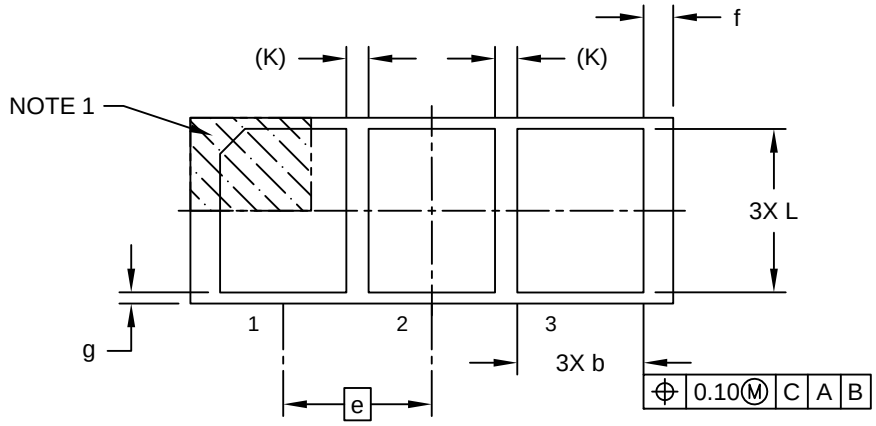
Note:	For the most current package drawings, please see the Microchip Packaging Specification located at http://www.microchip.com/packaging



TOP VIEW



SIDE VIEW

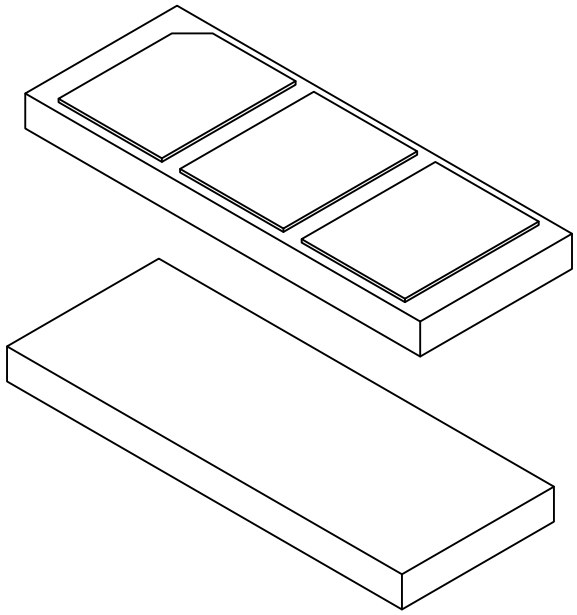


BOTTOM VIEW

Microchip Technology Drawing C04-21303 Rev A Sheet 1 of 2

3-Lead Contact Package (LAB) - 6.54x2.5 mm Body [Contact]
Atmel Legacy Global Package Code RHB

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 Terminals	N		3	
Pitch	e		2.00 BSC	
Overall Height	A	0.45	0.50	0.55
Standoff	A1	0.00	0.02	0.05
Overall Length	D		6.50 BSC	
Overall Width	E		2.50 BSC	
Terminal Width	b	1.60	1.70	1.80
Terminal Length	L	2.10	2.20	2.30
Terminal-to-Terminal Spacing	K		0.30 REF	
Package Edge to Terminal Edge	f	0.30	0.40	0.50
Package Edge to Terminal Edge	g	0.05	0.15	0.25

Notes:

1. Pin 1 visual index feature may vary, but must be located within the hatched area.
2. 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 C04-21303 Rev A Sheet 2 of 2

5. Appendix B - Adhesives

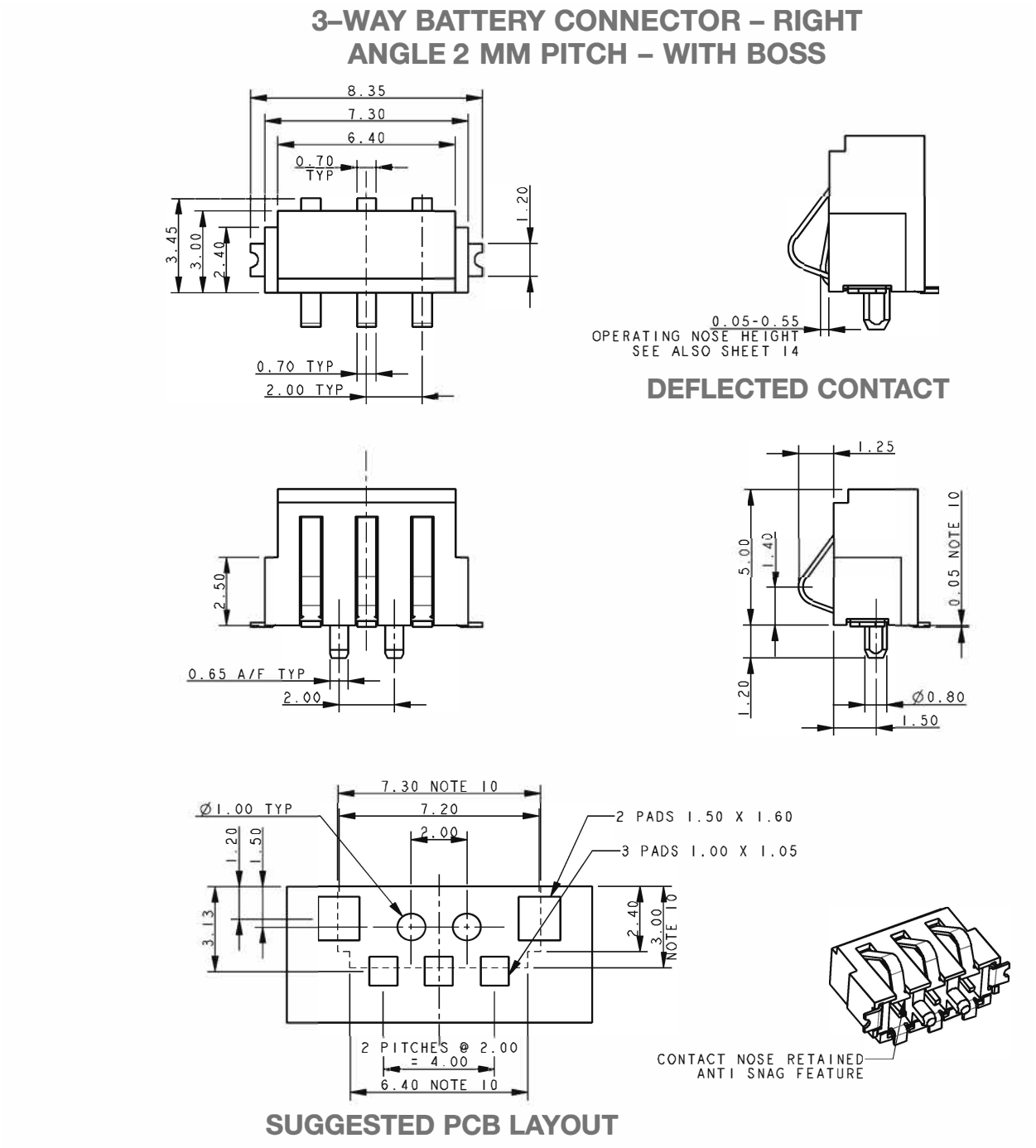
The following adhesive is an example of the type of adhesive that may be suitable for this application. More information can be found on the product's website: 3M Scotch Weld ™ Structural Plastic Adhesive DP8005.

Important: It is recommended that you contact the adhesive manufacturer to discuss the applicability of any adhesive prior to use.

Figure 5-1. 3M Scotch Weld DP8005 Adhesive

6. Appendix C – Compression Connector Examples

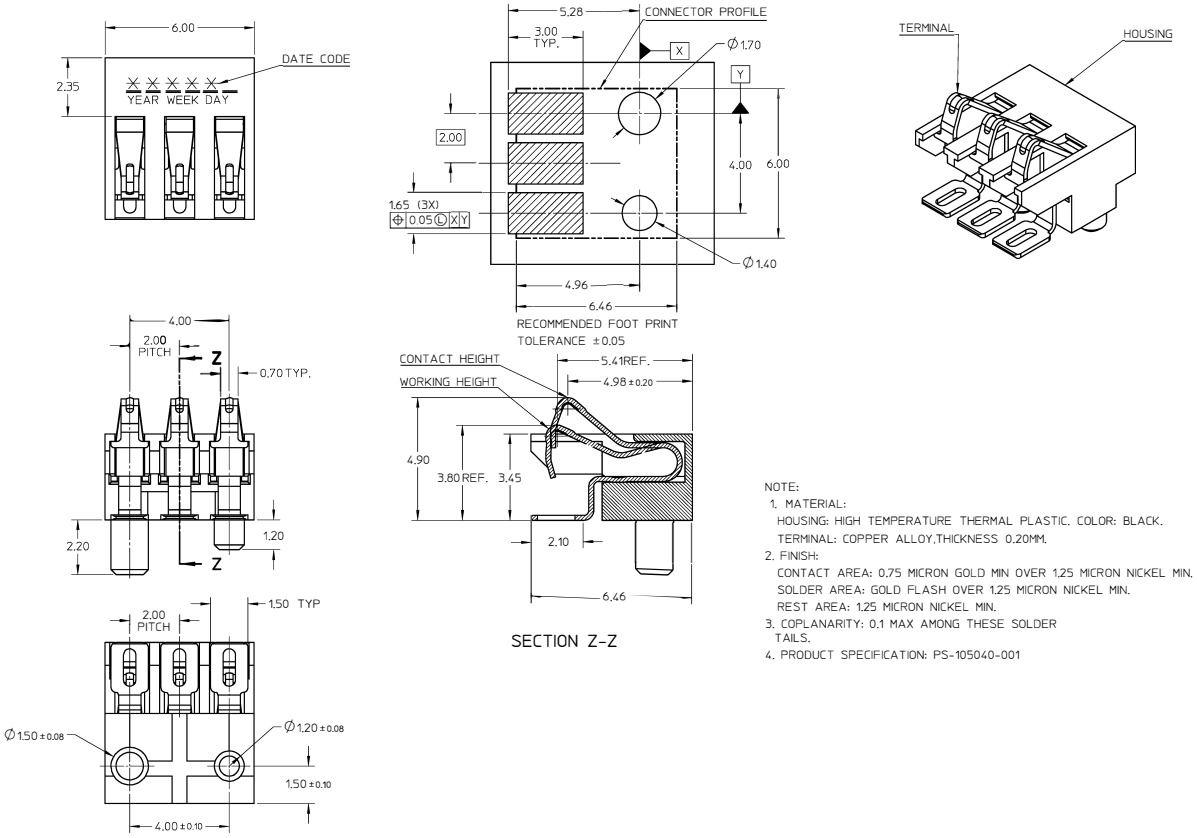
Figure 6-1. AVX Corporation 9155-800



NOTES:

1. GENERAL TOLERANCE ±0.20 UNLESS STATED.
2. FOR FULL PRODUCT DETAILS REFER TO SPECIFICATION 201-01-2014.
   FOR APPLICATION DATA REFER TO SPECIFICATION 201-01-205.
3. FOR MATING PAD DETAILS REFER TO PAGE 44.
4. FOR PACKING DETAILS REFER TO PAGE 43
5. INSULATION MATERIAL: GLASS FILLED NYLON 46, UL94 V-O, COLOR BLACK.
6. CONTACT MATERIAL: BERYLLIUM COPPER.
7. CONTACT PLATING: SELECTIVE GOLD OVER NICKEL, PURE TIN ON TAILS.
8. BRACKET MATERIAL: TIN PLATED PHOSPHOR BRONZE.
9. CONNECTOR OUTLINE.
10. COPLANARITY ON ALL CONTACT TAILS AND PADS 0.12 MM MAXIMUM.

Figure 6-2. Molex® 1050400001



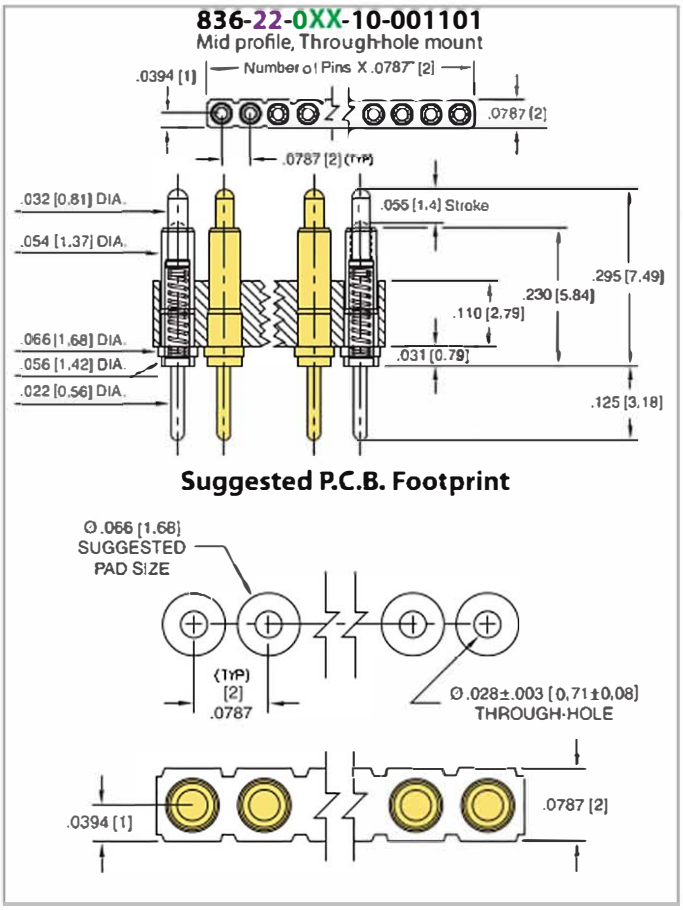
NOTE:
1. MATERIAL:
   HOUSING: HIGH TEMPERATURE THERMAL PLASTIC. COLOR: BLACK.
   TERMINAL: COPPER ALLOY,THICKNESS 0.20MM.
2. FINISH:
   CONTACT AREA: 0.75 MICRON GOLD MIN OVER 1.25 MICRON NICKEL MIN.
   SOLDER AREA: GOLD FLASH OVER 1.25 MICRON NICKEL MIN.
   REST AREA: 1.25 MICRON NICKEL MIN.
3. COPLANARITY: 0.1 MAX AMONG THESE SOLDER TAILS.
4. PRODUCT SPECIFICATION: PS-105040-001

7. Appendix D – Pogo-Pin Connector Examples

3-Pin Through Hole Pogo-Pin Connector
Full Data Sheet: www.mill-max.com/products/datasheet/sockets/836-22-003-10-001101

Figure 7-1. Mill-Max Mfg. Corporation 36-22-003-10-001101

PRODUCT NUMBER: 836-22-003-10-001101



DESCRIPTION

Spring-Loaded Pogo Pin Header Strip
PCB Mount Spring-Loaded Header Vertical Mount Through-Hole
Rows: Single Row (1)
Pitch: .079" (2.007 mm)
Stroke: .055" (1.397 mm)
Clip Grid: 10
Pin Window Pattern 001
Plating Code: 22
Shell: 20µ" Gold over 100µ" Nickel
Inner Contact: (Spring) 10µ" Gold
Insulator Pin Clip Type: 101
Initial Height: .295" (7.493 mm) **Mounting Type:** Through Hole Solder Mount **Insulator Information:**
Nylon 46 High Temperature

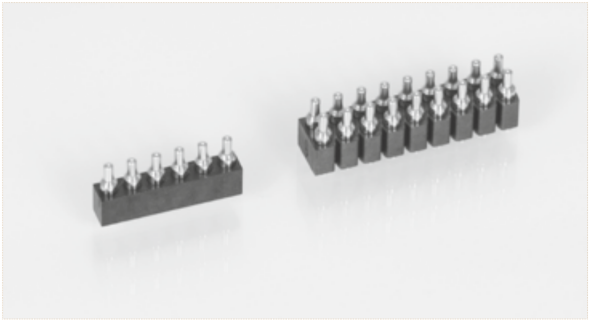
3-Pin Surface Mount Pogo-Pin Connector

Figure 7-2. Preci-Dip 821-S1-003-30-015101

Basic modular connectors with spring-loaded contacts (SLC), surface mount. Contacts with hollow piston design for low profile.

TECHNICAL SPECIFICATIONS (FOR GENERAL SPECS, SEE PAGE 31)

INSULATOR	Black glass filled polyester PCT-GF30-FR	
FLAMMABILITY	UL 94V-0	
PISTON AND BARREL	Brass CuZn36Pb3 (C36000)	
SPRING	Stainless steel X12 CrNi177, DIN 17224	
MAX. STROKE	1.4 mm	
FORCES	0.3 N initial	0.85 N at 1/2 stroke
MECHANICAL LIFE	50'000 cycles	
OPERATING CURRENT	Max. 3.5 A	
CONTACT RESISTANCE	10 mΩ (static measurement, halfway position)	
COPLANARITY SMD TERMINATIONS	Max. 0.1 mm (measured on 25 mm long connectors)	



ORDERING INFORMATION ROHS COMPLIANT PARTS

PLATING CODE	BARREL	PISTON
S1	0.25 µm gold	0.5 µm gold

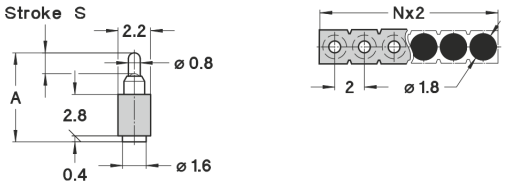
See page 178 for plating specs.
NNN number of poles. Replace **NNN** with the requested number of poles, e.g. 821-SS-**NNN**-30-012101 for a single row version with 16 pins becomes 821-SS-0**16**-30-012101.

821-SS-**NNN**-30-**XXX**101

Surface mount SLC connector, low profile, single row

AVAILABILITY FROM	2 to 10 contacts (standard number of contacts: 10)

See page 31
T & R Packaging



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 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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Quality Management System

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

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