PC CARD STANDARD

Volume 3

Physical Specification

PCMCIA
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Document No. 0299-03-2000

First Printing, February 1999

CONTENTS

FIGURES

TABLES

1. INTRODUCTION

This section of the specification defines the PC Card's physical outline dimensions, connector system and qualification test parameters for 5 volt, low voltage, Small PC Card, and CardBus PC Card applications. The tests specified in the Connector Reliability Section, Connector Durability, and PC Card Environmental Sections are the minimum parameters which must be met. Note that these tests apply to all PC Cards, including Small PC Card, unless a different test is specified for a specific card.

Each manufacturer is responsible for qualification of their own products to this specification.

The CardBus PC Card interface requires the use of a grounded shroud CardBus PC Card connector or PCMCIA/JEIDA approved equivalent for all CardBus PC Card applications.

2. RELATED DOCUMENTS

The following documents which comprise the ***PC Card Standard***:

PC Card Standard Release 7.0 (February 1999), PCMCIA/JEIDA
- Volume 1. ***Overview and Glossary***
- Volume 2. ***Electrical Specification***
- Volume 3. ***Physical Specification***
- Volume 4. ***Metaformat Specification***
- Volume 5. ***Card Services Specification***
- Volume 6. ***Socket Services Specification***
- Volume 7. ***Media Storage Formats Specification***
- Volume 8. ***PC Card ATA Specification***
- Volume 9. ***XIP Specification***
- Volume 10. ***Guidelines***
- Volume 11. ***PC Card Host Systems Specification***

MIL-STD-202F, Military Standard, ***Test Methods for Electronic and Electrical Component Parts***, U.S. Department of Defense

MIL-STD-1344A, Military Standard, ***Test Methods for Electrical Connectors***, U.S. Department of Defense

ANSI/UL 94-1979, ***Standard for Tests for Flammability of Plastic Materials for Parts in Devices and Appliances***, November, 1979

EIA-364-B, ***Electrical/Socket Test Procedures Including Environmental Classifications***, August, 1990, Electronic Industries Association

3. CARD DIMENSIONS

There are six types of PC Cards in this specification. Three types of full-size PC Cards: Type I, Type II, and Type III, and three types of Small PC Cards: also Type I, Type II, and Type III.

Connector location and pin numbers for Type I, Type II, and Type III full-size PC Cards are shown in ***Figure 11-2: TYPE I PC Card Package Dimensions***, ***Figure 11-3: TYPE II PC Card Package Dimensions***, and ***Figure 11-4: Type III PC Card Package Dimensions***. Connector location and pin numbers for Type I, Type II, and Type III Small PC Cards are shown in ***Figure 11-5: Small PC Card Type I Package Dimensions***, ***Figure 11-6: Small PC Card Type II Package Dimensions***, and ***Figure 11-7: Small PC Card Type III Package Dimensions***.

PC Card polarization technique and dimensions are also shown in ***Figure 11-2***, ***Figure 11-3***, and ***Figure 11-4*** for full-size PC Cards, and in ***Figure 11-5***, ***Figure 11-6***, and ***Figure 11-7*** for Small PC Cards.

PC Cards must be opaque (non see-through).

UNLESS OTHERWISE SPECIFIED, ALL DIMENSIONS ARE IN MILLIMETERS (MM). DIMENSIONS SHOWN DO NOT INCLUDE WARPAGE ALLOWANCES.

3.1 Write Protect Switch (WPS)

The WPS, if installed, shall be located at the locations shown in ***Figure 11-2***, ***Figure 11-3***, ***Figure 11-5*** and ***Figure 11-6***.

The write-protected position of the WPS shall be the far-right position, and shall be indicated by an arrow and the words “Write Protect” or “Protect” or “WP”. The arrow and indication may be on the end of the PC Card, as shown in ***Figure 11-2***, ***Figure 11-3***, ***Figure 11-5***, and ***Figure 11-6*** or on the bottom cover, or on both the end and bottom cover.

If a WPS is used, it is recommended that it pass all requirements, as applicable, in PC Card Environmental. It is also recommended the WPS perform as specified for a minimum of 100 (Write Protect/Write Enable) cycles.

3.2 Battery Location

The battery, if installed, shall be located at the locations shown in ***Figure 11-2***, ***Figure 11-3***, ***Figure 11-5*** and ***Figure 11-6***. The battery holder, if installed, shall be designed so that the positive (+) side of the battery faces Surface A.

3.3 Labeling (Marking)

The thickness of labeling, if used, shall not cause the PC Card to exceed the thickness specified in ***Figure 11-2***, ***Figure 11-3***, ***Figure 11-4***, ***Figure 11-5***, ***Figure 11-6***, or ***Figure 11-7***.

The label, if used, must withstand all environmental test specified the PC Card Environmental Section.

The PC Card logo may be displayed by member company manufacturers as authorized.

4. CONNECTOR

The specified PC Card interconnect system shall be a 68-position, 2-piece pin-and-socket. The socket contacts shall be within the PC Card connector.

4.1 Card Connector

The socket contacts are located on the full-size PC Card as shown in ***Figure 11-2: TYPE I PC Card Package Dimensions***, ***Figure 11-3: TYPE II PC Card Package Dimensions***, ***Figure 11-4: Type III PC Card Package Dimensions***, ***Figure 11-8: Type I PC Card (3D)***, ***Figure 11-9: Type II PC Card (3D)***, and ***Figure 11-10: Type III PC Card (3D)***. The socket contacts for Small PC Card are located on the Small PC Card as shown in ***Figure 11-5: Small PC Card Type I Package Dimensions***, ***Figure 11-6: Small PC Card Type II Package Dimensions***, and ***Figure 11-7: Small PC Card Type III Package Dimensions***.

The PC Card connector socket shall be configured as shown in ***Figure 11-11: Full-size PC Card*** Connector Socket or ***Figure 11-12: Small PC Card Connector Socket***.

The PC Card connector socket layout shall match the host pin-connector layout as shown in ***Figure 11-15: Full-size PC*** Card Pin Connector or ***Figure 11-16: Small PC Card Pin Connector***.

The CardBus PC Card connector (or PCMCIA/JEIDA approved equivalent) shall contain a top side planar, electrically conductive, ground plate (***Figure 11-40: CardBus PC Card Recommended Connector Grounding Interface Dimensions***) with eight (8) raised dimples 0.5 mm in height. This ground plate is connected to the PC Card electrical system ground (***Figure 11-41: CardBus PC Card Recommended PCB Footprint***), must be isolated from chassis ground, and shall meet Electrostatic Discharge requirements as specified in the Electrostatic Discharge Section.

4.2 Host Connector

The full-size PC Card host pin connector shall be a 68-pin connector with opening, polarization, keying, and pin location as shown in ***Figure 11-15: Full-size PC*** Card Pin Connector. The host connector-pin configuration is shown in ***Figure 11-17: Full-size PC Card Host*** Connector, Pin Contacts, and the host-pin lengths are shown in ***Figure 11-13: Full-size PC Card Pin/Socket Contact*** Length with Wipe and ***Figure 11-17*** and pin type, length, and number in ***Table 4-1: Host Connector Pin Configuration***.

The Small PC Card host pin connector shall be a 68-pin connector with opening, polarization, keying, and pin location as shown in ***Figure 11-16: Small PC Card Pin Connector***. The host connector-pin configuration is shown in ***Figure 11-18: Small PC Card Host Connector, Pin Contacts***, and the host-pin lengths are shown in ***Figure 11-14: Small PC Card Pin/Socket Contact Length with Wipe*** and ***Figure 11-18***, and pin type, length, and number in ***Table 4-1: Host Connector Pin Configuration***.

Table 4-1: Host Connector Pin Configuration

Pin Type	Pin Length (L) ±.0.10 mm	Pin Number
Detect	3.50	36, 67
General	4.25	All Other Pins
Power/Ground	5.00	1, 17, 34, 35, 51, 68

The outermost plating of socket and pin contact area shall be gold or other plated materials compatible with gold and shall meet the requirements specified in the Connector Reliability and Connector Durability Sections.

The host pin connector for CardBus PC Card applications (or PCMCIA/JEIDA approved equivalent) shall contain a top side planar electrically conductive, ground shroud (***Figure 11-42: CardBus PC Card Recommended Host Connector Grounding Interface Dimensions***) with eight (8) fingers having an effective minimum contact wipe length of 3.6 mm when mating with the CardBus PC Card Connector (***Figure 11-45: CardBus PC Card Reference Shrouded Connector*** and ***Figure 11-46: CardBus PC Card Reference Shrouded Connector (Stacked Connector)***). These eight (8) fingers shall be recessed within the host pin connector protective dielectric shroud providing a 0.254 mm minimum air gap when mating with 16-bit PC Cards.

The recommended host connector PCB footprints for: the right angle connector (***Figure 11-19: Recommended Right Angle Connector PCB Footprint***), the straight connector (***Figure 11-20: Recommended Straight Connector PCB Footprint***), two row surface mount connector (***Figure 11-21: Recommended Two Row Surface Mount Connector PCB Footprint***), and one row surface mount connector (***Figure 11-22: Recommended One Row Surface Mount Connector PCB Footprint***) are shown without mounting or hardware hole locations.

The recommended CardBus PC Card host connector PCB footprints for the right angle connector (***Figure 11-43: CardBus PC Card Recommended Right Angle PCB Footprint*** and ***Figure 11-44: CardBus PC Card Recommended Right Angle PCB Footprint (Stacked)***) is shown with mounting hole locations. The host connector ground shroud is connected to host system electrical ground signals and must be isolated from chassis ground.

The interconnect system shall pass all requirements of the Connector Reliability Section and the Connector Durability Section.

If a connector ejector mechanism is used, it is recommended the ejector mechanism pass all requirements for reliability and durability, as applicable, in Section ***7 Connector Reliability*** and Section ***8 Connector Durability***.

5. PC CARD GUIDANCE

The PC Card shall be guided by the host connector for a minimum distance of 10.0 mm before the socket connector bottoms on the host (pin) connector (see ***Figure 11-23: Full-size PC Card Guide*** Guidance or ***Figure 11-24: Small PC Card Guide Guidance***).

To ensure alignment of the PC Card to connectors, the full-size PC Card shall be guided for a minimum distance of 40.0 mm before engagement, and the Small PC Card shall be guided for a minimum distance of 27.0 mm before engagement.

NOTE ***Figure 11-24*** is a reference for the design of the guide. To ensure alignment of the Small PC Card to the connectors, the guide shall be designed with G2 as large as possible and W2 as small as possible.

6. GROUNDING/EMI CLIPS

PC Card manufacturers may use frame mounted grounding/EMI Clips to reduce the Electromagnetic Emissions of PC Cards. The clips create a path of least resistance to ground so that the external connection (e.g. RJ11 cable) through an I/O connector will not act like an antenna. With the clips, the card's emissions are directed back through the card and into the system to either the Battery or AC input, instead of out the card into the surrounding area.

Grounding/EMI clips can be included on memory cards as well if needed.

Material(s) selected for the mating surfaces of the grounding clips must be compatible to prevent corrosion resulting from galvanic action. The base alloy material(s) and mating surfaces for the grounding clip(s) in host systems and on the mating surface(s) on the card must be compatible with gold. The interface must not wear, after life cycle testing, to a level that is no longer suitable for the application.

The recommendation is for the material, dimensions and location of the grounding/EMI clip. The process of attaching the clip to the frame, cover or card PWB is left to the card designer.

The location of the grounding/EMI clip on different types of PC Cards is detailed in ***Figure 11-2: TYPE I PC Card Package Dimensions***, ***Figure 11-3: TYPE II PC Card Package Dimensions***, ***Figure 11-4: Type III PC Card Package Dimensions***, ***Figure 11-8: Type I PC Card (3D)***, ***Figure 11-9: Type II PC Card (3D)***, ***Figure 11-10: Type III PC Card (3D)***, ***Figure 11-5: Small PC Card Type I Package Dimensions***, ***Figure 11-6: Small PC Card Type II Package Dimensions***, and ***Figure 11-7: Small PC Card Type III Package Dimensions***.

SEE PCMCIA GRANT OF IMMUNITY AND SUBLICENSE FOR EMI GROUND CLIP SUB-LICENSE AGREEMENT, OR CONTACT PCMCIA OFFICE FOR ADDITIONAL INFORMATION.

6.1 Card/Ground Clip Contact Resistance Measurement Procedure

The contact resistance between a PC Card ground clip and the host socket chassis attachment point shall not degrade after life cycle testing (in both the harsh and office environments) by more than 20 mΩ from its initial resistance measurement.

The resistance of the PC Card ground clip to host interface shall be measured in accordance with EIA 364-B, test procedure 23 with the following test conditions:

a) open circuit voltage equals 20 mV;

b) test current equals 100 mA maximum.

Refer to ***Figure 11-1: Grounding/EMI Clips Contact Resistance Measurement*** for lead connection.

6.1.1 Office Environment

Record the contact resistance of the ground clip interface then subject the card to life cycle testing (10,000 insertion/extraction cycles). The ground clip to host contact resistance shall be measured

using the same procedure outlined above. The contact interface is acceptable if the resistance has increased by no more than 20 mΩ from the initial value.

6.1.2 Harsh Environment

Record the contact resistance of the ground clip interface then subject the card to the harsh environment test specification. The ground clip to host contact resistance shall be measured using the contact resistance measurement procedure. The contact interface is acceptable if the resistance has increased by no more than 20 mΩ from the initial value.

6.1.3 Material Compatibility

The material selected for the mating surfaces of the ground clip must be compatible to prevent corrosion due to galvanic action. The material specification for the ground clip in the host and the mating surface on the card must be compatible with gold. The interface must not wear to a point where the metal contacts, after the life cycle testing, present a contact interface that is no longer suitable for the application. A suitable mating interface is one that has a contact potential difference of 0.3 Vdc or less.

7. CONNECTOR RELIABILITY

The interconnect system as specified in the Connector Section shall meet or exceed all reliability test requirements of this subsection. Unless otherwise specified, all test and measurements shall be made at:

Temperature	15°C to 35°C
Air pressure	86 to 106 kPa
Relative humidity	25% to 85%

If conditions must be closely controlled in order to obtain reproducible results, the parameters shall be:

Temperature	23°C ± 1°C
Air pressure	86 to 106 kPa
Relative humidity	50% ± 2%

See ***Section 7.5 Approved Test Procedures*** for approved test procedures.

7.1 Mechanical Performance

The interconnect system mechanical performance is specified in the following sections.

7.1.1 Office Environment

STANDARD	TESTING
Guaranteed number of insertions/ejections =10,000 minimum	See ***Office Environment*** Section, EIA 364-B Class 1.1

7.1.2 Harsh Environment

STANDARD	TESTING
Guaranteed number of insertions/ejections = 5,000 minimum	See ***Harsh Environment*** Section, EIA 364-B Class 1.3

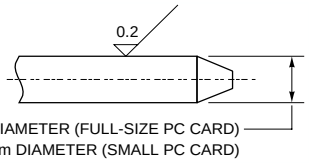
7.1.3 Total Insertion Force

STANDARD	TESTING
39.2 N maximum	Insert at speed of 25 mm/minute

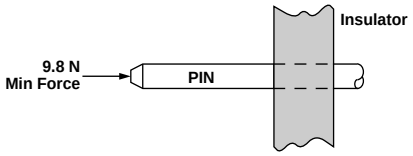
7.1.4 Total Pulling Force

STANDARD	TESTING
6.67 N minimum and 39.2 N maximum	Extract at speed of 25 mm/minute

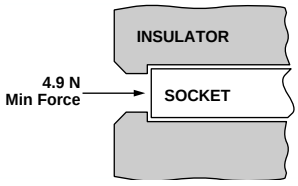
7.1.5 Single Pin Pulling Force

STANDARD	TESTING
0.098 N minimum initial value  Gauge: Material - Tool making steel Hardness - HRC = 50 to 55	Pull the gauge pin shown to left at speed of 25 mm/minute Gauge pin's surface must be wiped clean of dirt and lubrication oil

7.1.6 Single Pin Holding Force

STANDARD	TESTING
Pin shall not push out of the insulator when 9.8 N minimum force is applied to the pin	Push pin on the axis at speed of 25 mm/minute with 9.8 N minimum force while holding insulator rigid. 

7.1.7 Single Socket Holding Force

STANDARD	TESTING
Socket shall not be dislodged or damaged when 4.9 N minimum force is applied to the socket	Push socket on the axis with 4.9 N minimum force at a speed of 25 mm/minute while holding insulator rigid 

7.1.8 Vibration and High Frequency

STANDARD	TESTING
a. No mechanical damage shall occur on the parts b. Must not cause current interruption greater than 100 ns	147 m/s⁻ (15G) peak amplitude, 10 Hz to 2000 Hz, 20 minute sweep, 12 cycles per axis, 3 axis. See ***Figure 11-25: Connector Shock & Vibration Test Fixture***

7.1.9 Shock

STANDARD	TESTING
a. No mechanical damage shall occur on the parts b. Must not cause current interruption greater than 100 ns	Acceleration 490 m/s– (50G) Standard holding time 11 ms, Semi-sine wave Velocity change 3.44 m/s (11.3 ft/s) See ***Figure 11-25: Connector Shock & Vibration Test Fixture***

7.1.10 Pin Connector Inverse Insertion

STANDARD	TESTING
Measurements shall be made by putting aside a gauge card to a guide portion of two different pin connectors and right side measurement at another.	Maximum insertion force: 58.8 N or more Travel after contact to key of pin connector: 5 mm or less Since this requirement is for a single pin connector, inverse insertion test method in Section ***9.3.11 Card Inverse Insertion*** is applied to test the performance at actual use.

7.2 Electrical Performance

The interconnect system electrical performance is specified as follows.

7.2.1 Contact Resistance (low level)

STANDARD	TESTING
a. Initially 40 mΩ maximum b. After test 20 mΩ maximum change	Open voltage 20 mV Test current 1 mA a. Measure and record the initial resistance (Ri) of the separate connector contact interface. See ***Figure 11-47: Contact Resistance Measurement*** $Ri \leq 40\ m\Omega$ b. Measure and record resistance after test (Rf) of the connector system. Resistance value after test: $Rf = Ri \pm 20\ m\Omega$

7.2.2 Withstanding Voltage

STANDARD	
a. No shorting or other damages when 500 Vrms AC is applied for 1 minute b. Current leakage 1 mA maximum	

7.2.3 Insulation Resistance

STANDARD	TESTING
a. Initially 1000 MΩ minimum b. After test 100 MΩ minimum	Measure within 1 minute after applying 500V DC

7.2.4 Current Capacity

STANDARD	TESTING
0.5 A per contact	Based upon 30°C rise above ambient temperature

7.2.5 Insulation Material

STANDARD	
Flame retardant material will not burn nor support combustion	

7.2.6 Ground Return Inductance

Note: This requirement applies to CardBus PC Card applications.

STANDARD	TESTING
18.0 nH maximum Inductance @ 1 MHz applies to both single and stacked configurations	Low level inductance

7.3 Environmental Performance

7.3.1 Operating Environment

STANDARD
Operating Temperature: -20°C to +60°C
Relative humidity: 95% maximum (non-condensing)

7.3.2 Storage Environment

STANDARD
Storage Temperature: -40°C to +70°C
Relative humidity: 95% maximum (non-condensing)

7.4 Environmental Resistance

7.4.1 Moisture Resistance

STANDARD	TESTING
Per ***Contact Resistance (low level)*** Section, Part b Per ***Insulation Resistance*** Section, Part b	Temperature Cycling (excluding vibration); 10 cycles (1 cycle = 24 hours) with connectors engaged

7.4.2 Thermal Shock

STANDARD	TESTING
No physical damage shall occur during testing Per ***Contact Resistance (low level)*** Section, Part b Per ***Insulation Resistance*** Section, Part b	-55°C to +85°C 5 minute transition time (max) 5 cycles (1 cycle = 1 hour) with connectors engaged

7.4.3 Durability (High Temperature)

STANDARD	TESTING
Per ***Contact Resistance (low level)*** Section, Part b	85°C, 250 hours with connectors engaged Exclude load and insulation resistance measurements

7.4.4 Cold Resistance

STANDARD	TESTING
Per ***Contact Resistance (low level)*** Section, Part b	-55°C, 96 hours with connectors engaged

7.4.5 Humidity (Normal Condition)

STANDARD	TESTING
Per ***Contact Resistance (low level)*** Section, Part b Per ***Insulation Resistance*** Section, Part b	Steady State40°C, 90 to 95% RH 96 hours with connectors engaged

7.4.6 Hydrogen Sulfide

STANDARD	TESTING
Per Contact Resistance (low level) Section, Part b	3 PPM hydrogen sulfide 40°C, approx. 80% RH 96 hours, with connectors engaged

7.5 Approved Test Procedures

Section	Test	Mil Std	EIA TP	IEC 512	Other
7.1.8	Vibration and High Frequency	202, Method 204	364-28	4-6d	
7.1.9	Shock	202, Method 213	364-27	4-6c	
7.2.1	Contact Resistance (low level)	1344, Method 3002.1	364-23	2-2a	
7.2.2	Withstanding Voltage	202, Method 301	364-20	2-4a	
7.2.3	Insulation Resistance	202, Method 302	364-21	2-3a	
7.2.5	Insulation Material				UL 94V-0
7.2.6	Ground Return Inductance		364-69		
7.4.1	Moisture Resistance	202, Method 106	364-31		
7.4.2	Thermal Shock	202, Method 107	364-32	6-11d	
7.4.3	Durability (High Temperature)	202, Method 108	364-17	5-9b	
7.4.4	Cold Resistance		364-59	6-11j	JISC 0020[1]
7.4.5	Humidity (Normal Condition)	202, Method 103	364-31	6-11c	
7.4.6	Hydrogen Sulfide				JEIDA 38[2]

1. JIS = Japanese Industrial Standard
2. JEIDA = Japanese Electronic Industry Development Association

8. CONNECTOR DURABILITY

The interconnect system as specified in Connector Section shall meet or exceed all durability requirements of this subsection.

Test conditions for the mate/unmate cycles are:

Cycle Rate	400-600 cycles per hour
Temperature	15°C to 35°C
Relative Humidity	25% to 85%
Air Pressure	86 to 106 kPa

8.1 Office Environment

The office environment is defined in EIA-364-B Class 1.1 - year round air conditioning (non-filtered) with humidity control.

Test Sequence:

Contact resistance per Contact Resistance (low level) Section, Part a
Mate and unmate the connector for a total of 10,000 cycles
Contact resistance per Contact Resistance (low level) Section, Part b

8.2 Harsh Environment

The harsh environment is defined in EIA-364-B Class 1.3—no air conditioning, no humidity control with normal heating and ventilation:

Contact resistance per Contact Resistance (low level) Section, Part a	
Mate and unmate the connector 1,000 cycles	TOTAL CYCLES = 1,000
Humidity per Humidity (Normal Condition) Section	
Mate and unmate the connector 1,000 cycles	TOTAL CYCLES = 2,000
Humidity per Humidity (Normal Condition) Section	
Mate and unmate the connector 3,000 cycles	TOTAL CYCLES = 5,000
Humidity per Humidity (Normal Condition) Section	
Hydrogen sulfide per Hydrogen Sulfide Section	
Contact resistance per Contact Resistance (low level) Section, Part b	

Note: Connector durability utilizing Moisture Resistance in lieu of Humidity is acceptable.

9. PC CARD ENVIRONMENTAL

The PC Card as specified in this Standard shall meet or exceed all environmental tests of the Environmental Resistance Section. The Small PC Card shall meet or exceed all of the same environmental tests in the Environmental Resistance Section with the exception of the following tests, for which tests specific to Small PC Card have been developed:

- Bend Test
- Torque Test

The battery, if part of the PC Card, shall be installed for all tests. Unless otherwise specified, all test and measurements shall be made at:

Temperature	15°C to 35°C
Air Pressure	86 to 106 kPa
Relative Humidity	25% to 85%

If conditions must be closely controlled in order to obtain reproducible results, the parameters shall be:

Temperature	23°C ± 1°C
Air Pressure	86 to 106 kPa
Relative Humidity	50% ± 2%

See Section ***9.4 Approved Test Procedures*** for approved test procedures.

9.1 Reference Standards

1. Electrical performance: Electrical performance must conform to these requirements after testing.
2. Form: The form and dimensions, including warpage, must conform to the physical use requirements after testing. Scratches, color and other appearance items shall depend on the specifications of the manufacturer for each card and are not a basis for evaluation here.

   Note: Evaluation standards are limited and evaluations are to be within the reliability of the connectors, if the connectors are used in the test.

9.2 Environmental Performance

The PC Card storage and operating environment are specified in this subsection. The storage and operating environment test parameters are specified in

Environmental Resistance Section.

9.2.1 Operating Environment

Ambient temperature 0°C to 55°C
Relative humidity 95% maximum (non condensing)
SRAM data retention per Section ***9.3.20 SRAM Data Retention***

9.2.2 Storage Environment

Storage temperature -20°C to 65°C
Relative humidity 95% maximum (non condensing)
SRAM data retention per Section ***9.3.20 SRAM Data Retention***

9.3 Environmental Resistance

The PC Card shall be tested per the Environmental Resistance specifications listed below. The manufacturer shall ensure adequate testing in order to ensure the PC Card conforms to this specification.

9.3.1 High Storage Temperature

STANDARD	TESTING
PC Card to function as specified after test and all non-volatile memory to retain the data stored prior to test Data retention of SRAM and other battery powered solid state memory per section ***9.3.20 SRAM Data Retention*** The form and dimensions, including warpage, must conform to the physical use requirements of these specifications after testing Scratches, color and other appearance items shall depend on the specifications of the manufacturer for each card and are not a basis for evaluation here	Test Condition 65°C and 90-95% RH for 96 hours minimum, Vcc = 0

9.3.2 Low Storage Temperature

STANDARD	TESTING
PC Card to function as specified after test and all non- volatile memory to retain the data stored prior to test Data retention of SRAM and other battery powered solid state memory per section ***9.3.20 SRAM Data Retention*** The form and dimensions, including warpage, must conform to the physical use requirements of these specifications after testing Scratches, color and other appearance items shall depend on the specifications of the manufacturer for each card and are not a basis for evaluation here	Test Condition -20°C for 96 hours minimum, Vcc = 0

9.3.3 High Operating Temperature

STANDARD	TESTING
PC Card to function as specified after test and all non-volatile memory to retain the data stored prior to test The form and dimensions, including warpage, must conform to the physical use requirements of these specifications after testing Scratches, color and other appearance items shall depend on the specifications of the manufacturer for each card and are not a basis for evaluation here	Test Condition 55°C for 96 hours minimum Vcc = manufacturer specified

9.3.4 Low Operating Temperature

STANDARD	TESTING
PC Card to function as specified after test and all non-volatile memory to retain the data stored prior to test. The form and dimensions, including warpage, must conform to the physical use requirements of these specifications after testing Scratches, color and other appearance items shall depend on the specifications of the manufacturer for each card and are not a basis for evaluation here	Test Condition 0°C for 96 hours minimum Vcc = manufacturer specified

9.3.5 Thermal Shock

STANDARD	TESTING
PC Card to function as specified after test and all non- volatile memory to retain the data stored prior to test Data retention of SRAM and other battery powered solid state memory per section ***9.3.20 SRAM Data Retention***	<table><tr><th>TEST</th><th>TEMP (°C)</th><th>TIME†</th></tr><tr><td>1</td><td>-20</td><td>30</td></tr><tr><td>2</td><td>25</td><td><05</td></tr><tr><td>3</td><td>65</td><td>30</td></tr><tr><td>4</td><td>25</td><td><05</td></tr></table>
The form and dimensions, including warpage, must conform to the physical use requirements of these specifications after testing	Repeat for 100 cycles Vcc = 0 Card Connector disengaged
Scratches, color and other appearance shall depend on the specifications of the manufacturer for each card and are not a basis for evaluation here	† Time in minutes.

9.3.6 Moisture Resistance

STANDARD	TESTING
PC Card to function as specified after test and all non-volatile memory to retain the data stored prior to test The form and dimensions, including warpage, must conform to the physical use requirements of these specifications after testing Scratches, color and other appearance items shall depend on the specifications of the manufacturer for each card and are not a basis for evaluation here	Maximum Temperature 55 °C. Minimum temperature 0 °C Steps 7a and 7b deleted from Method 106E MIL-STD 202. Repeat test for 10 cycles (excluding vibration) Vcc = manufacturer specified, Card connector disengaged.

9.3.7 Electrostatic Discharge

STANDARD	TESTING
PC Card to function as specified after test 1 and 2 and all non-volatile memory to retain the data stored prior to test TEST 1 and TEST 2 should not be done as a series test	TEST 1: Discharge two (2) times on Surface A Repeat test on Surface B Total discharge cycles = 4 (See ***Figure 11-26: Electrostatic Discharge Test-1 Fixture***) TEST 2: Discharge total twelve (12) times each side as indicated in ***Figure 11-27: Electromechanical Discharge Test-2 Fixture*** Turn PC Card over and repeat test Total discharge cycles = 24

9.3.8 X-ray Exposure

STANDARD	TESTING
PC Card to function as specified after test and all non-volatile memory to retain the data stored prior to test	140 kV @ 5 mA Intensity 0.1Gy minimum or 10 Roentgen minimum for 1 hour minimum

9.3.9 Ultraviolet Light Exposure

STANDARD	TESTING
PC Card to function as specified after test and all non- volatile memory to retain the data stored prior to test	Wavelength 254 nm Intensity 15000 $\mu W/cm^2$ Exposure time 20 minutes

9.3.10 Electromagnetic Field Interference

STANDARD	TESTING
PC Card to function as specified after test and all non- volatile memory to retain the data stored prior to test	Place PC Card in uniform magnetic field of 1,000 Oersted Exposure time 10 seconds For rotating media cards, the magnetic field is 100 Oersted Exposure time 10 seconds

9.3.11 Card Inverse Insertion

STANDARD	TESTING
No electrical contact between the card and connector during the test except for Vcc and GND pins Note: Host connector has pin (male) contacts.	Provide a grooved metal block as shown in ***Figure 11-38: Card Inverse Insertion Test Fixture*** and fix it to a load tester Align the center of host connector and pushing block as shown in ***Figure 11-39: Card Inverse Insertion Push Block*** Manually insert a sample card into the pin connector until the front end of card key slightly touches it Press the pushing block in the X direction at a speed of 25 mm/minute until the pushing load reaches 58.8 N Hold the status for 1 minute Repeat the above test 5 times Temperature: room temperature (15°C–35°C)

9.3.12 Vibration and High Frequency

STANDARD	TESTING
PC Card to function as specified after test and all to retain the data stored prior to test	147 m/s^2 (15G) peak amplitude 10 to 2,000 Hz, 20 minute sweep, 12 cycles per axis, 36 cycles for 3 axes (12 hr) Vcc = 0 With battery installed (***Figure 11-28: PC Card Shock and Vibration Test Fixture***)

9.3.13 Shock

STANDARD	TESTING
PC Card to function as specified after test and to retain the data stored prior to test	Acceleration 490 m/s^2 (50G) Duration 11ms Semi-sine wave, velocity change: 3.44 m/s (11.3 ft/s) (***Figure 11-28: PC Card Shock and Vibration Test Fixture)***

9.3.14 Full-size PC Card Bend Test

STANDARD	TESTING
PC Card to function as specified after test and to retain the data stored prior to test The dimensions must conform to the use requirements of these specifications after testing Scratches, color and other appearance items shall depend on the specifications of the manufacturer for each card and are not a basis for evaluation here	Test 1: Clamp the connector end of the PC Card with surface A facing upward. Apply 19.6 N to the unclamped end using the force bar as shown in ***Figure 11-29: Full-size PC Card Bend Test Fixture***. Time ≥ 1 minute Test 2: Clamp the non-connector end of the PC Card with surface A facing upward. Apply 19.6 N to the unclamped end using the force bar as shown in ***Figure 11-29: Full-size PC Card Bend Test Fixture***. Time ≥ 1 minute Test 3 and 4: Repeat test 1 and 2 with surface B facing upward Total test must include all four procedures

9.3.15 Small PC Card Bend Test

STANDARD	TESTING
PC Card to function as specified after test and to retain the data stored prior to test The dimensions must conform to the use requirements of these specifications after testing Scratches, color and other appearance items shall depend on the specifications of the manufacturer for each card and are not a basis for evaluation here	Test 1: Clamp the connector end of the Small PC Card with surface A facing upward. Apply 19.6N to the unclamped end using the force bar as shown in ***Figure 11-30: Small PC Card Bend Test Fixture***. Time >= 1 minute Test 2: Clamp the non-connector end of the Small PC Card with surface A facing upward. Apply 19.6N to the unclamped end using the force bar as shown in ***Figure 11-30***. Time >= 1 minute Test 3 and Test 4: Repeat test 1 and 2 with surface B facing upward. Total test must include all four procedures.

9.3.16 Drop Test

STANDARD	TESTING
PC Card to function as specified after test and to retain the data stored prior to test The PC Card must conform to the use requirements of these specifications after testing Scratches, color and other appearance items shall depend on the specifications of the manufacturer for each card and are not a basis for evaluation here	Drop PC Card two(2) times in three(3) mutually exclusive axes from a height of 75 cm onto a non-cushioning, vinyl-tile surface For rotating media cards: Drop PC Card (in a protective pouch) two(2) times in three (3) mutually exclusive axes from a height of 75 cm onto a non-cushioning vinyl-tile surface Drop PC Card (in a protective pouch) two(2) times in three (3) mutually exclusive axes from a height of 75 cm onto a 0.635 cm nap industrial carpeted surface

9.3.17 Full-size PC Card Torque Test

STANDARD	TESTING
PC Card to function as specified after test and to retain the data stored prior to test The dimensions must conform to the use requirements of these specifications after testing Scratches, color and other appearance items shall depend on the specifications of the manufacturer for each card and are not a basis for evaluation here	Apply clockwise torque to the unsupported end of the PC Card (torque = 1.236 N-m maximum or angle = 10° maximum, whichever occurs first) Time = 5 minutes Repeat test applying counter-clockwise torque Repeat test five (5) times in each direction See ***Figure 11-31: Full-size PC Card Torque Test Fixture***

9.3.18 Small PC Card Torque Test

STANDARD	TESTING
PC Card to function as specified after test and to retain the data stored prior to test The dimensions must conform to the use requirements of these specifications after testing Scratches, color and other appearance items shall depend on the specifications of the manufacturer for each card and are not a basis for evaluation here	ISO 7816-1 Apply clockwise torque to the unsupported end of the Small PC Card (torque = 1.236 N-m maximum and/or angle = 10° maximum, whichever occurs first) Time = 5 minutes Repeat test applying counter-clockwise torque Repeat test five (5) times in each direction See ***Figure 11-32: Small PC Card Torque Test Fixture***.

9.3.19 PC Card Warpage

STANDARD	TESTING
PC Card to function as specified after test and retain the data stored prior to the test The dimensions must conform to the use requirements of these specification after testing	Measure the PC Card (Type I or II) interconnect and substrate thicknesses Then place the PC Card (Type I or II) on a flat plate and measure the maximum warpage ***Figure 11-33: Warpage Measurement A–Interconnect Area***, ***Figure 11-34: Warpage Measurement A–Substrate Area***, ***Figure 11-35: Warpage Measurement B–Thickness Measurements***, ***Figure 11-36: Warpage Measurement B–Measurements***, and ***Figure 11-37: Warpage Measurement B–Measurement Positions***

9.3.19.1 Card Warpage

Card warpage dimensions are an important element in assuring that the connector engages. It is recommended that warpage dimensions be controlled as follows at the time of manufacturer shipment. This applies only to Type I and Type II PC Cards.

9.3.19.2 Method of Measuring Warpage

Measurement methods A and B are prescribed for measuring warpage. When measuring warpage, avoid using a large load that would damage the card.

(1) Warpage Measurement Method A

a) Measuring warpage at interconnect area

Place a parallel plate against the interconnect area. The interconnect area warpage measurement is the maximum open space dimension (W) measured by a projector.

See ***Figure 11-33: Warpage Measurement A–Interconnect Area***.

b) Measuring substrate area warpage

Place a parallel plate against the entire substrate area. Measure the thickness of the card (T) including warpage. This is the control value.

See ***Figure 11-34: Warpage Measurement A–Substrate Area***.

(2) Warpage Measurement Method B

Measure the interconnect area's thickness T(i) and substrate area's thickness T(s) within the ranges shown.

See ***Figure 11-35: Warpage Measurement B–Thickness Measurements***.

Next, use a dial gauge, micrometer or other measuring instrument which can measure the height from the horizontal plane, and slide the card or the measuring instrument to measure the height.

a) Measuring warpage at interconnect area

Read the maximum value T(MAX) measuring after sliding.

Warpage dimension = T(MAX)-T(i).

See ***Figure 11-36: Warpage Measurement B–Measurements***.

b) Measuring substrate area warpage

Read the maximum value T(MAX) measured after sliding. When measuring, slide in the long-side direction, and measure at least 3 locations, in the center and at both sides. Warpage dimension equals T(MAX)-T(s).

See ***Figure 11-36: Warpage Measurement B–Measurements***.

Recommended positions for warpage measurement are indicated in ***Figure 11-37: Warpage Measurement B–Measurement Positions***.

9.3.19.3 Recommended Value of Warpage Dimensions

(1) Interconnect area:

Width (short side) 0.15 mm maximum

Length (long side) 0.35 mm maximum

(2) Substrate area (card thickness including warpage):

a) For warpage measurement method A:

Type I: 3.80 mm maximum

Type II: 5.35 mm maximum

Type III: To be defined

b) For warpage measurement method B

Type I: 0.50 mm maximum

Type II: 0.50 mm maximum

Type III: To be defined

9.3.20 SRAM Data Retention

STANDARD	TESTING
SRAM PC Card to retain all data after each test (1 and 2)	Test 1: Test condition 55°C for 24 hours minimum Vcc = 0 Test 2: Test condition 0°C for 24 hours minimum Vcc = 0

9.4 Approved Test Procedures

Section	Test	Mil Std	EIA TP	IEC 512	Other
9.3.1	High Storage Temperature	202, Method 103	364-31	6-11c	
9.3.2	Low Storage Temperature		364-59	6-11j	JIS C 0020[1]
9.3.3	High Operating Temperature	202, Method 108	364-17	5-9b	
9.3.4	Low Operating Temperature		364-59	6-11j	JIS C 0020[1]
9.3.5	Thermal Shock	202, Method 107	364-32	6-11d	
9.3.6	Moisture Resistance	202, Method 106	364-31		
9.3.7	Electrostatic Discharge				ISO 7816-1
9.3.8	X-ray Exposure				ISO 7816-1
9.3.9	Ultraviolet Light Exposure				ISO 7816-1
9.3.10	Electromagnetic Field Interference				ISO 7816-1
9.3.12	Vibration and High Frequency	202, Method 204	364-28	4-6d	
9.3.13	Shock	202, Method 213	364-27	4-6c	
9.3.17	Full-size PC Card Torque Test				ISO 7816-1

1. JIS = Japanese Industrial Standard

10. PC CARD THERMAL RATING

10.1 Determination Using a Temperature Rise Method

Like the host system, the PC Card must also have a thermal rating. The following is a low cost optional method to determine the thermal rating derived from the temperature gradient produced by the operating card. This temperature rise is then converted to the PC Card's thermal rating. In a balanced system, the heat energy above 65°C generated by the PC Card is removed by the host system thus maintaining the PC Card at a temperature at or below 65°C. This method shall be made in a draft free environment under the following conditions:

Temperature	24°C ± 1°C
Air Pressure	86 to 106 kPa
Relative Humidity	50% ± 10%

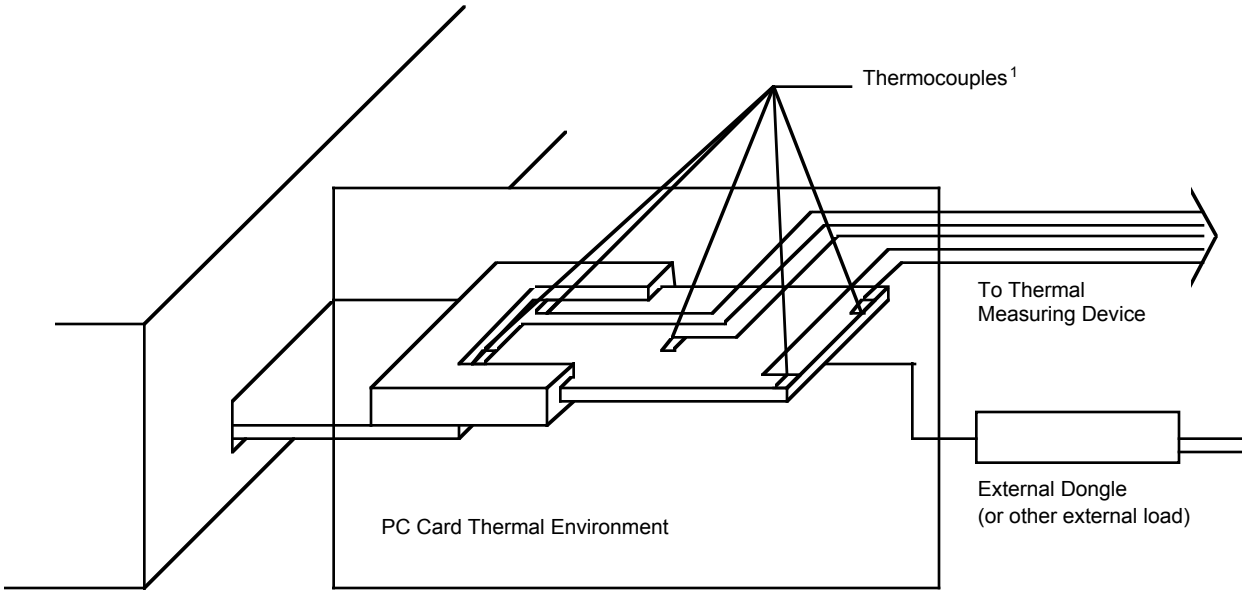
Note that alternative methods, such as an electrical summation of all power dissipated within the PC Card, if performed correctly, will yield acceptable results.

10.1.1 Measuring the PC Card Temperature

It is important when measuring the PC Card temperature to ensure that only heat generated within the PC Card physical space is determined. Any heat generated external to the PC Card envelope must not influence the PC Card temperature measurement. Any heat generated by external input must be accounted for.

10.1.2 Procedure

The PC Card shall be removed from the host test system using a card type specific extender (PC Card 16 or CardBus PC Card type extender) and any external heat loads produced by the PC Card in order to isolate external influence of the measurement as in ***Figure 10-1: PC Card Thermal Environment Measurement Method***. The PC Card shall be free of external influences for a quartersphere of 304.8 millimeters and 25.4 - 38.1 millimeters above a dielectric (non-conductive) table surface as indicated in ***Figure 10-2: Free Area Around Card Being Rated***. The card shall be in a free air environment on both sides. Place five thermocouples or similar temperature measuring devices on each side of the PC Card as indicated by the template in ***Figure 10-3: Location of Thermocouples - 5 Each Side*** or ***Figure 10-4: Location of Thermocouples for Small PC Card - 5 Each Side***.



1. See Figure 10-3: Location of Thermocouples - 5 Each Side

Figure 10-1: PC Card Thermal Environment Measurement Method

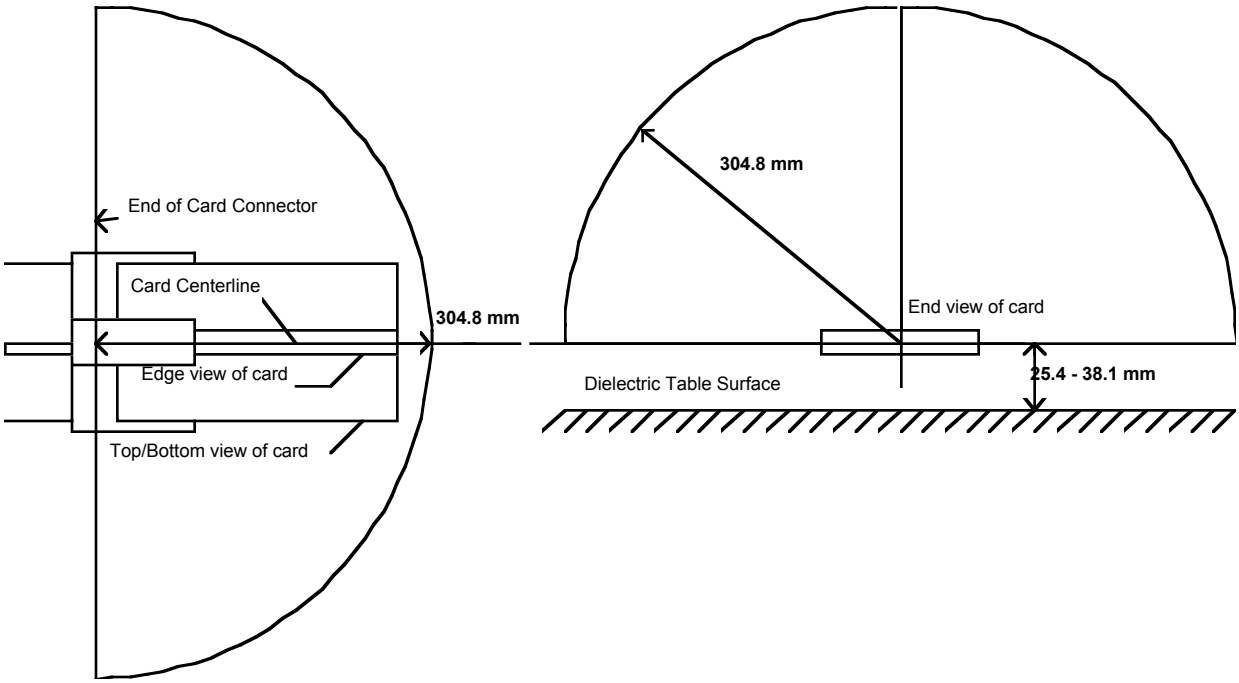
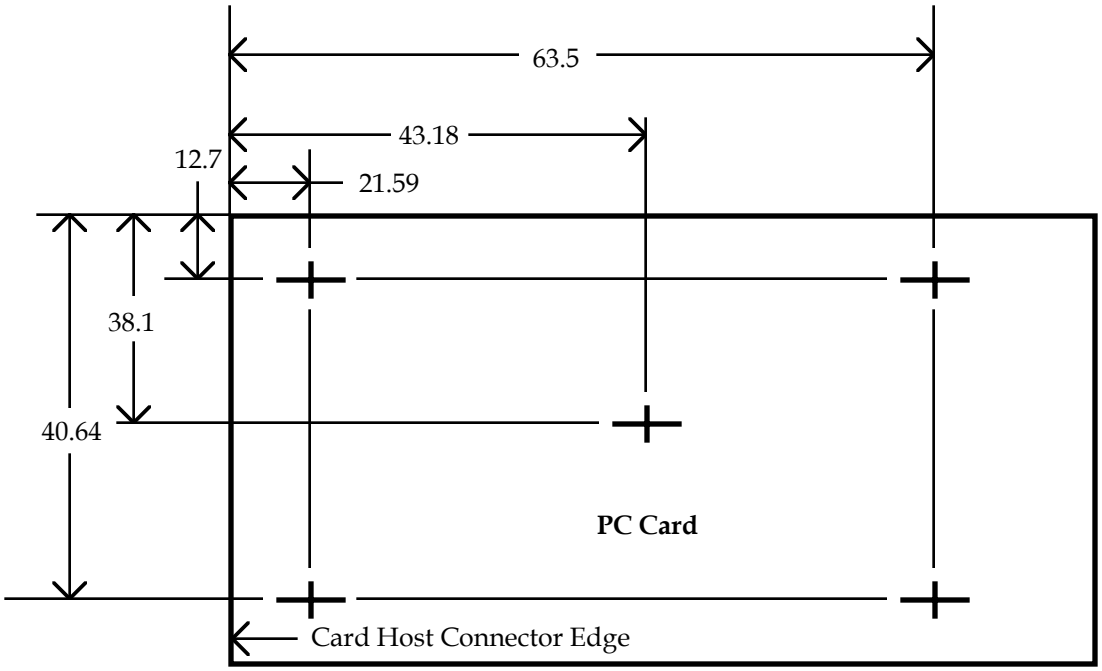
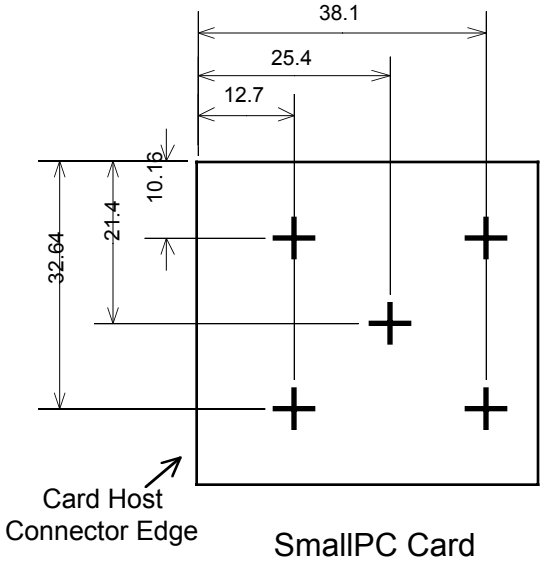


Figure 10-2: Free Area Around Card Being Rated



Note: All dimensions in millimeters
Tolerance = ±2.54 mm

Figure 10-3: Location of Thermocouples - 5 Each Side



Note: All dimensions in millimeters
Tolerance = ±1.27 mm

Figure 10-4: Location of Thermocouples for Small PC Card - 5 Each Side

From a host system, a program must be run in order to realistically exercise the card at its extremes. When the temperature of the PC Card's surface is stable within ± 1°C over thirty minutes, the card has reached its thermal rating.

Determine the average temperature rise from the total number of thermocouples or similar temperature measuring devices. Obtain the PC Card's Thermal Rating by using the averaged temperature rise and ***Figure 10-5: Thermal Rating vs. Temperature Rise***. The Thermal Rating is characterized by the equation Thermal Rating (X.Y) = $0.05\Delta T^{1.26} + 1.1E^{-7}\Delta T^{4}$. This is the value that is recorded in the PC Card's CIS thermal entry (see TPCE_MI: Miscellaneous Features Field in the ***Metaformat Specification***).

Below is the list of items used to determine this Thermal Rating curve and equation:

- T30-2-506 Thermocouple Wire (30 Gauge, Type T)
- Hot Spot TC Welder (welded thermocouples)
- Fluke Hydra Data Acquisition Unit (2620A Module)
- 3M Copper Electrical Tape, 25.4 mm, H813441E181R, 12.7 mm 3M 230 Drafting Tape

  Used to match the IR emissivities of the card surface to the thermocouple wire mounting area. The copper tape's optical properties do not match, because it is a conductor and not a dielectric. The copper tape provides a good stiff bond of the wire to the card and it provides a good thermal interface of the card to the wire. When married to the drafting tape as an overlay, we achieved very good agreement between the IR image and the thermocouple readouts. This implies minimal test-induced error.

10.1.2.1 Thermal Rating vs. Temperature Rise

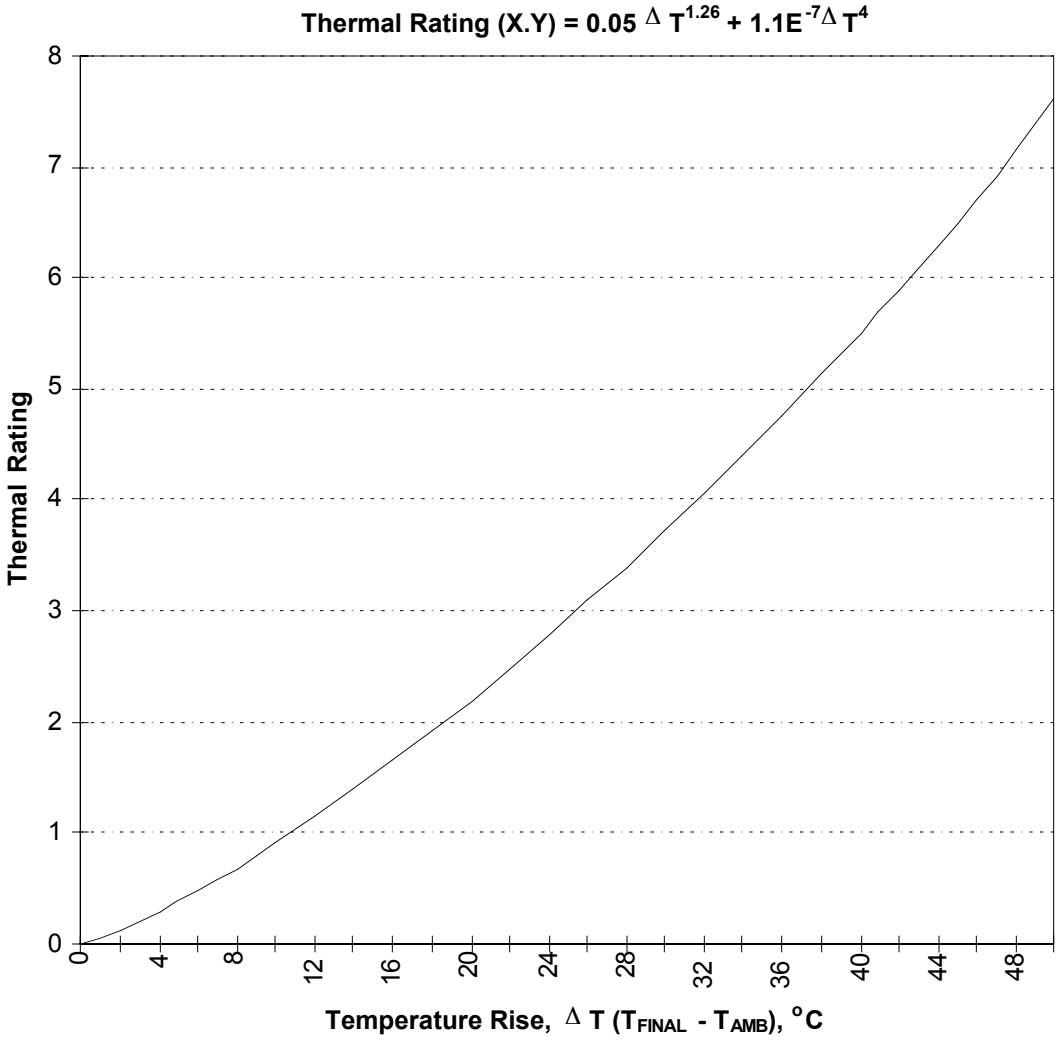


Figure 10-5: Thermal Rating vs. Temperature Rise

11. FIGURES

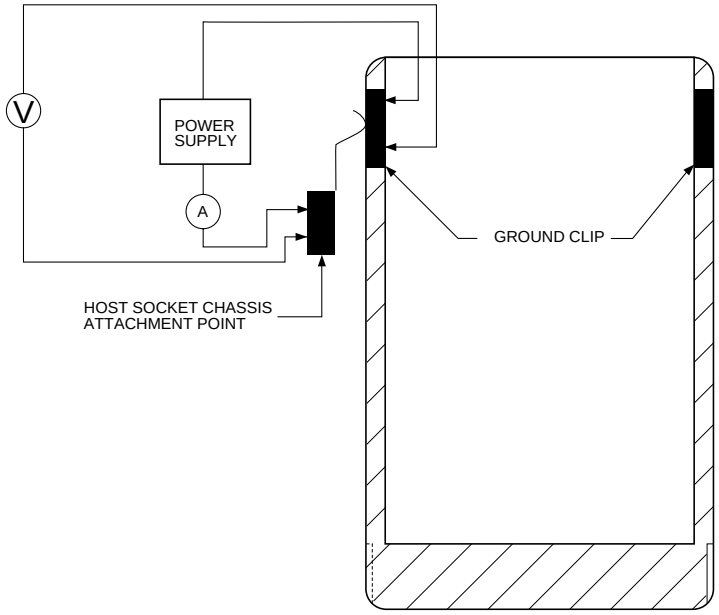
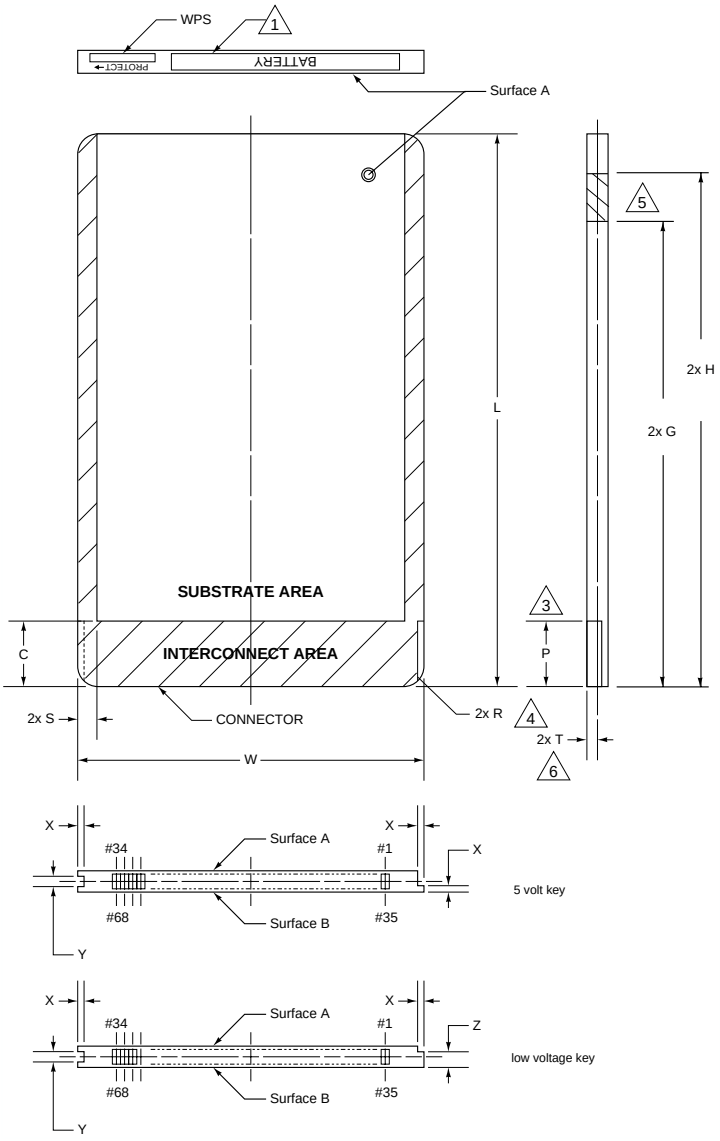


Figure 11-1: Grounding/EMI Clips Contact Resistance Measurement



C MIN	L ± 0.20	P MIN 3	R ± 0.10 4	S MIN	T 6	W ± 0.10	X ± 0.05	Y ± 0.05	Z ± 0.05	G ± 0.60	H ± 0.60
10.0	85.60	10.0	0.60	3.0	1.65	54.00	1.00	1.60	2.10	65.60	79.60

1 RECOMMENDED BATTERY LOCATION. THE BATTERY HOLDER SHOULD BE DESIGNED SO THAT THE POSITIVE SIDE OF THE BATTERY IS UP (TOWARD SURFACE A)

2 THE PC CARD SHALL BE OPAQUE (NON SEE THRU)

3 POLARIZATION KEY LENGTH

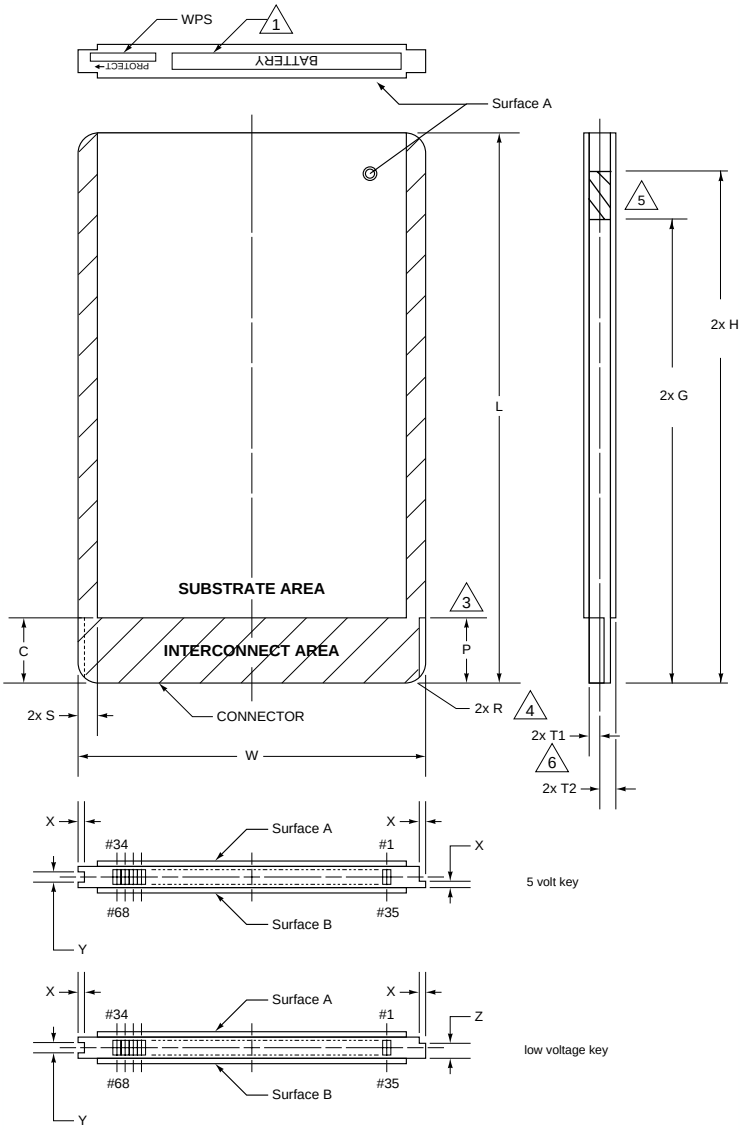
4 DIMENSION R CORNER RADIUS

5 GROUND CLIP LOCATION

6 FOR CARDBUS PC CARDS DIMENSION T IS INCREASED BY 0.50 ± 0.05 mm OVER DIMPLES

(REFER TO ***Figure 11-40: CardBus PC Card Recommended Connector Grounding Interface Dimensions***)
INTERCONNECT AREA TOLERANCE = ± 0.05 mm
SUBSTRATE AREA TOLERANCE = ± 0.10 mm

Figure 11-2: TYPE I PC Card Package Dimensions



C MIN	L ± 0.20	P MIN 3	R ± 0.10 4	S MIN	T1 ± 0.05 6	T2 MAX	W ± 0.10	X ± 0.05	Y ± 0.05	Z ± 0.05	G ± 0.60	H ± 0.60
10.0	85.60	10.0	0.60	3.0	1.65	2.50	54.00	1.00	1.60	2.10	65.60	79.60

1 RECOMMENDED BATTERY LOCATION. THE BATTERY HOLDER SHOULD BE DESIGNED SO THAT THE POSITIVE SIDE OF THE BATTERY IS UP (TOWARD SURFACE A)

2 THE PC CARD SHALL BE OPAQUE (NON SEE THRU)

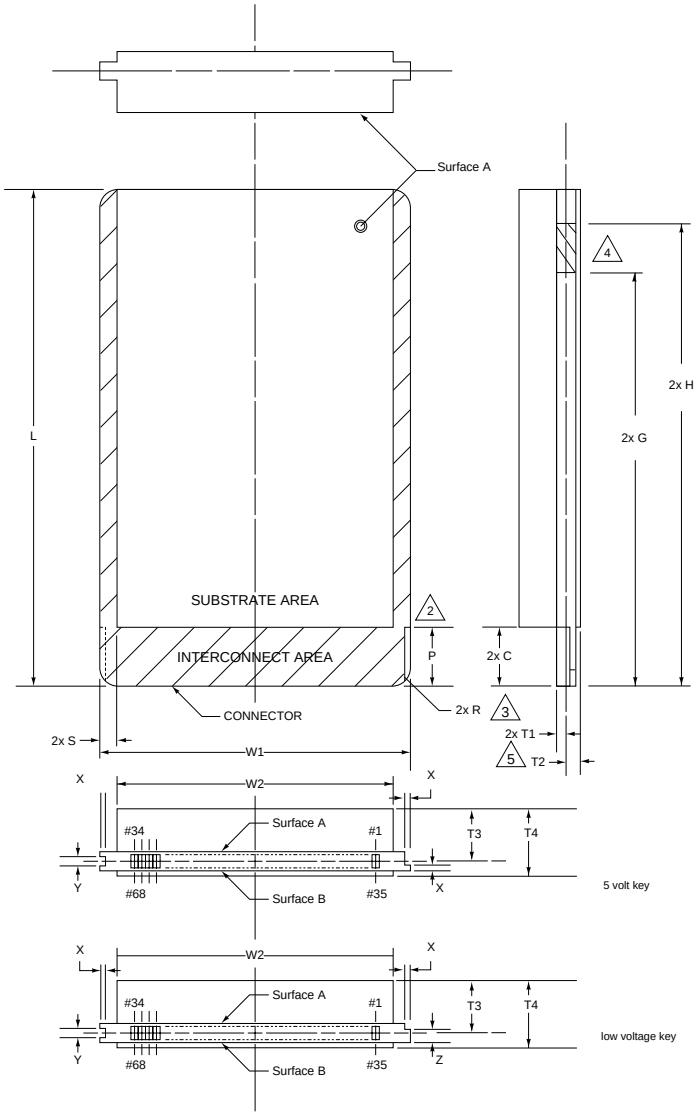
3 POLARIZATION KEY LENGTH

4 DIMENSION R CORNER RADIUS

5 GROUND CLIP LOCATION

6 FOR CARDBUS PC CARDS DIMENSION T1 IS INCREASED BY 0.50 ± 0.05 mm OVER DIMPLES (REFER TO ***Figure 11-40: CardBus PC Card Recommended Connector Grounding Interface Dimensions***)

Figure 11-3: TYPE II PC Card Package Dimensions



C MIN	L ± 0.20	P MIN 2	T1 ± 0.05 5	T2 MAX	T3 MAX	T4 REF	G ± 0.60
10.0	85.60	10.0	1.65	2.50	8.00	10.50	65.60
W1 ± 0.10	W2 MAX	X ± 0.05	Y ± 0.05	Z ± 0.05	R ± 0.10 3	S MIN	H ± 0.60
54.00	51.0	1.00	1.60	2.10	0.60	1.50	79.60

1 THE PC CARD SHALL BE OPAQUE (NON SEE THRU)

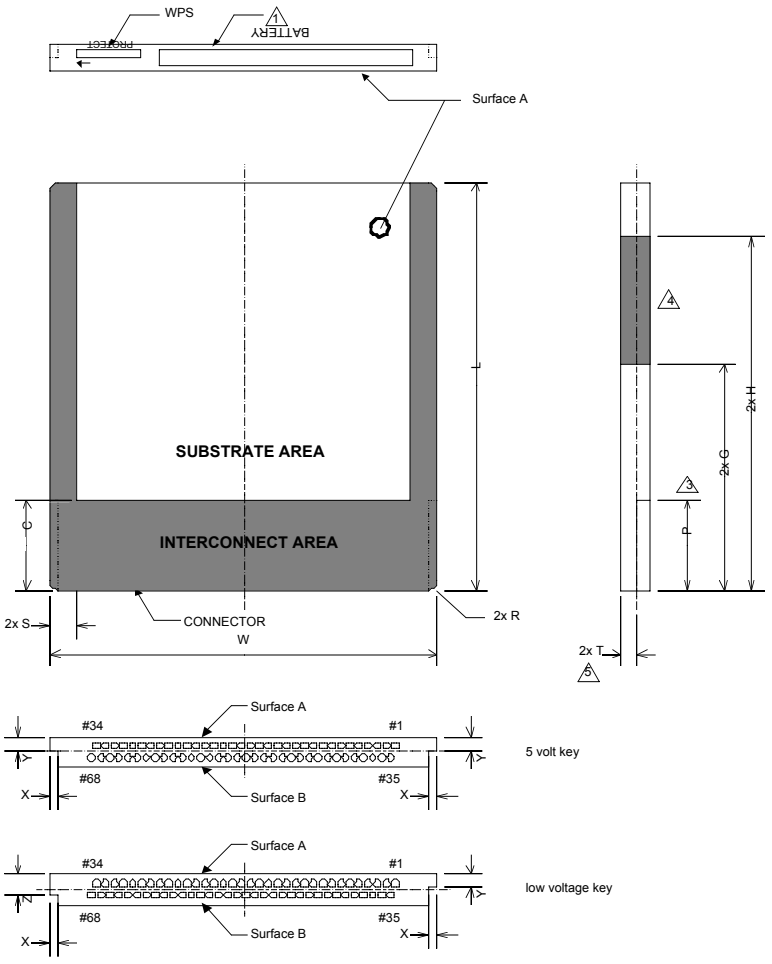
2 POLARIZATION KEY LENGTH

3 DIMENSION R CORNER RADIUS

4 GROUND CLIP LOCATION

5 FOR CARDBUS PC CARDS DIMENSION T1 IS INCREASED BY 0.50 ± 0.05 mm OVER DIMPLES
(REFER TO ***Figure 11-40: CardBus PC Card Recommended Connector Grounding Interface Dimensions***)

Figure 11-4: Type III PC Card Package Dimensions



C MIN	L ± 0.2	P MIN	R ± 0.10	S MIN	T △5	W △6	X ± 0.05	Y ± 0.05	Z ± 0.05	G ± 0.60	H ± 0.60
10.0	45.00	10.0	0.60	3.0	1.65	42.80	1.00	1.55	2.40	25.00	39.00

△1 RECOMMENDED BATTERY LOCATION. THE BATTERY HOLDER SHOULD BE DESIGNED SO THAT THE POSITIVE SIDE OF THE BATTERY IS UP (TOWARD SURFACE A)

2 THE PC CARD SHALL BE OPAQUE (NON SEE THRU)

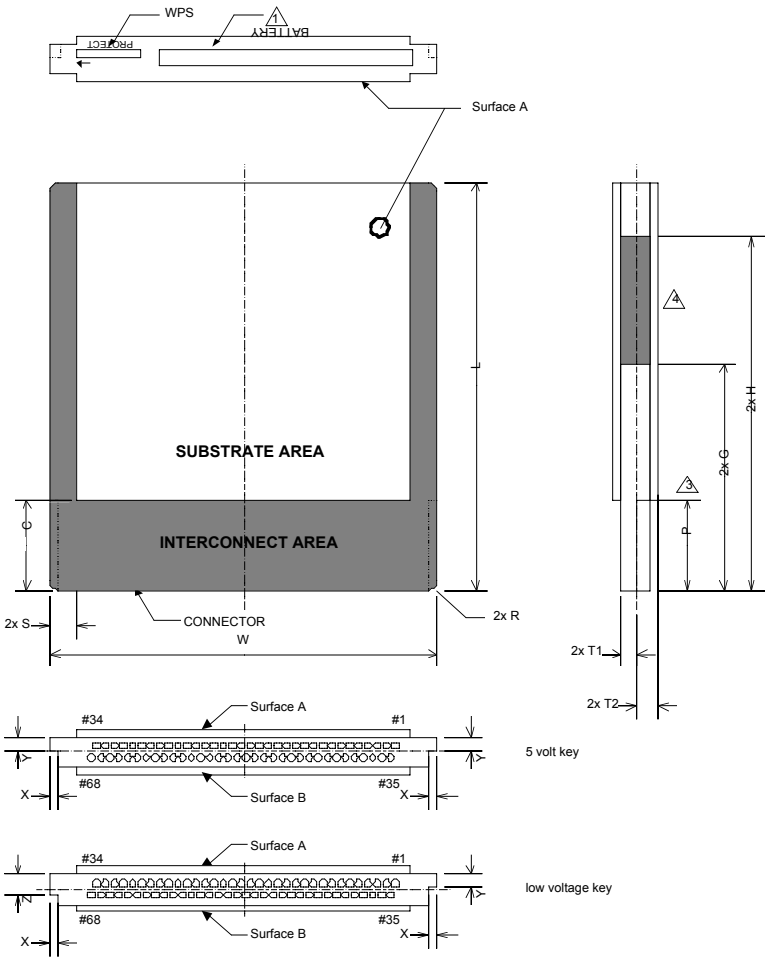
△3 POLARIZATION KEY LENGTH

△4 GROUND CLIP LOCATION

△5 INTERCONNECT AREA TOLERANCE = ± 0.05 mm
SUBSTRATE AREA TOLERANCE = ± 0.10 mm

△6 TOLERANCE OF ENGAGEMENT AREA C = +0.10/-0.05 mm
TOLERANCE OF OTHER AREA = ± 0.10 mm

Figure 11-5: Small PC Card Type I Package Dimensions



C MIN	L ± 0.20	P MIN	R ± 0.10	S MIN	T1 ± 0.05	T2 MAX	W 5	X ± 0.05	Y ± 0.05	Z ± 0.05	G ± 0.60	H ± 0.60
10.0	45.00	10.0	0.60	3.0	1.65	2.50	42.80	1.00	1.55	2.40	25.00	39.00

1 RECOMMENDED BATTERY LOCATION. THE BATTERY HOLDER SHOULD BE DESIGNED SO THAT THE POSITIVE SIDE OF THE BATTERY IS UP(TOWARD SURFACE A)

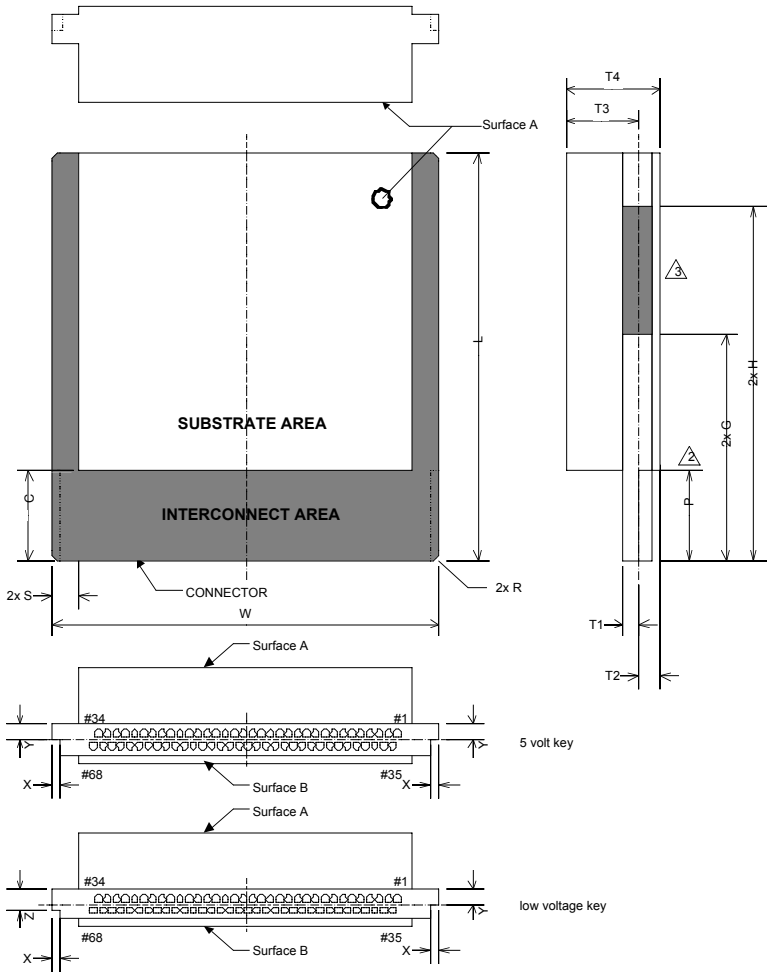
2 THE PC CARD SHALL BE OPAQUE(NON SEE THRU)

3 POLARIZATION KEY LENGTH

4 GROUND CLIP LOCATION

5 TOLERANCE OF ENGAGEMENT AREA C = +0.10/-0.05 mm
TOLERANCE OF OTHER AREA = ± 0.10 mm

Figure 11-6: Small PC Card Type II Package Dimensions



C MIN	L ± 0.20	P MIN	R ± 0.10	S MIN	T1 ± 0.05	T2 MAX	T3 MAX	T4 REF
10.0	45.00	10.0	0.60	3.0	1.65	2.50	8.00	10.50
W△4	X ± 0.05	Y ± 0.05	Z ± 0.05	G ± 0.60	H ± 0.60			
42.80	1.00	1.55	2.40	25.00	39.00			

1 THE PC CARD SHALL BE OPAQUE(NON SEE THRU)

△2 POLARIZATION KEY LENGTH

△3 GROUND CLIP LOCATION

△4 TOLERANCE OF ENGAGEMENT AREA C = +0.10/-0.05 mm
TOLERANCE OF OTHER AREA = ± 0.10 mm

Figure 11-7: Small PC Card Type III Package Dimensions

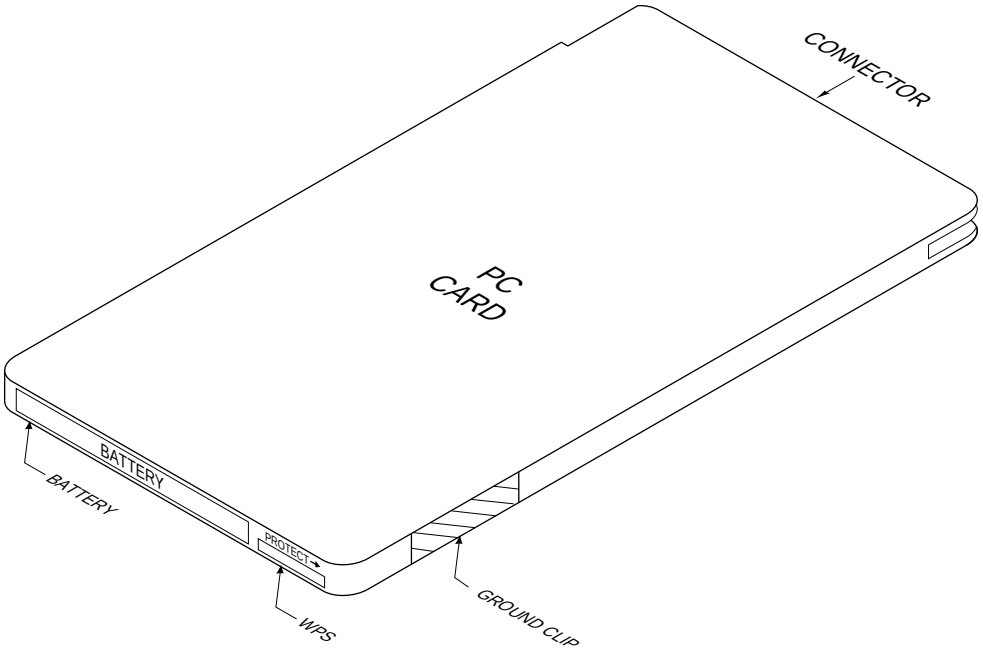


Figure 11-8: Type I PC Card (3D)

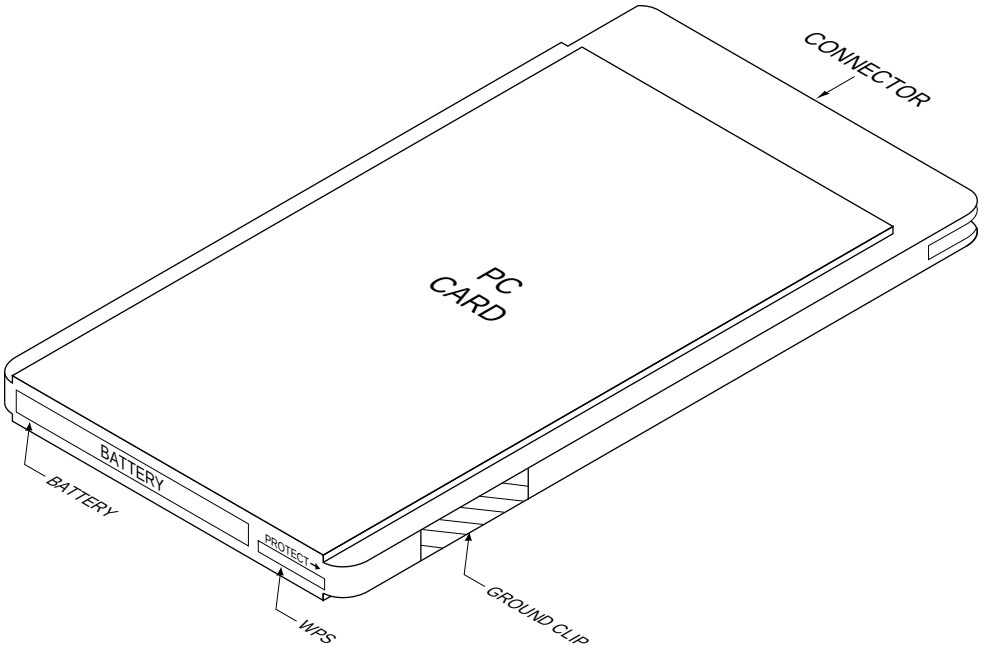


Figure 11-9: Type II PC Card (3D)

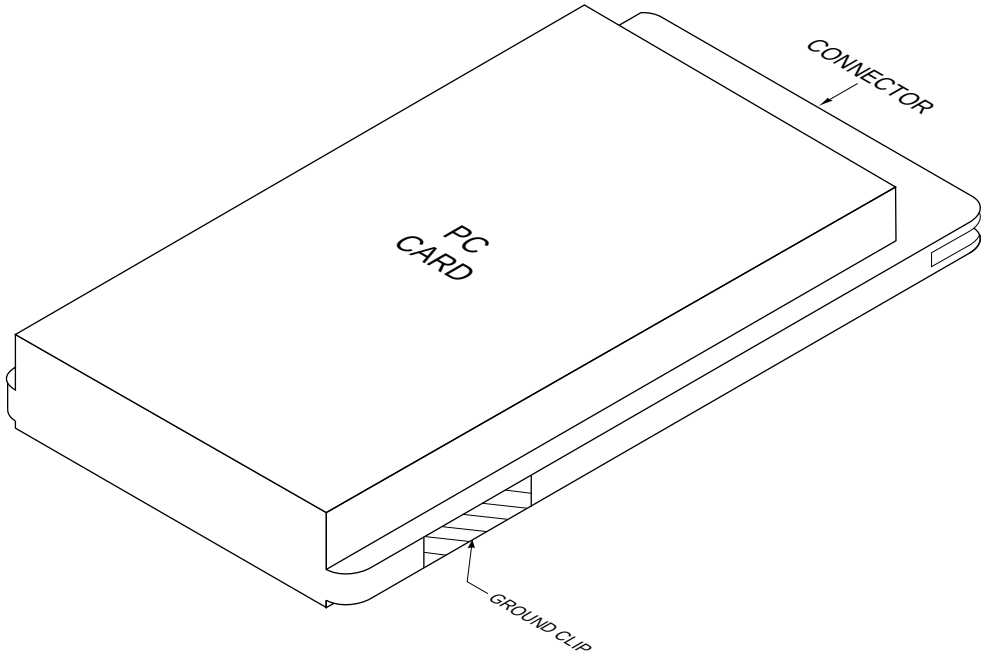


Figure 11-10: Type III PC Card (3D)

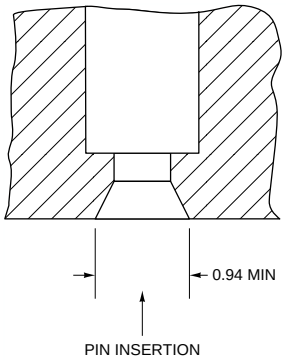


Figure 11-11: Full-size PC Card Connector Socket

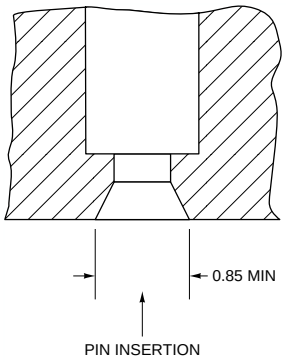
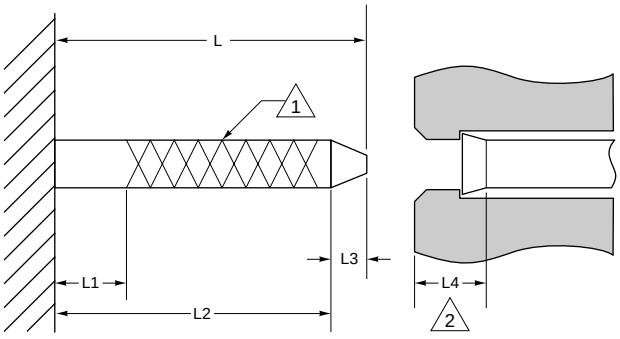


Figure 11-12: Small PC Card Connector Socket

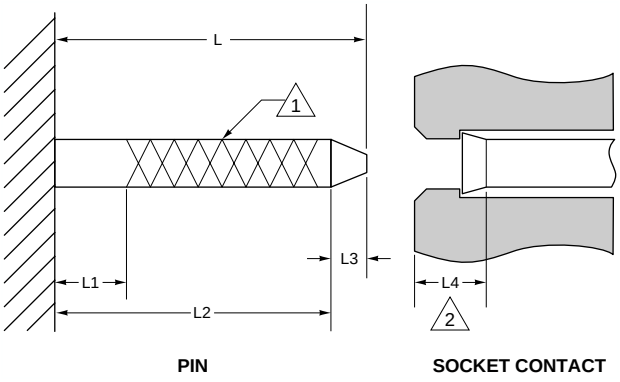


1 PIN/SOCKET CONTACT AREA

2 L4 IS THE POINT OF FIRST ENGAGEMENT FOR MATING WITH THE SOCKET CONTACTS/HOUSING MOUNTED WITHIN THE CARD

	L ± 0.1	L1 MAX	L2 REF	L3 ± 0.10	L4
POWER	5.00	0.50	4.50	0.50	0.50 ~ 2.50
GENERAL	4.25	0.50	3.75	0.50	0.50 ~ 2.50
DETECT	3.50	0.50	3.00	0.50	0.50 ~ 2.50

Figure 11-13: Full-size PC Card Pin/Socket Contact Length with Wipe

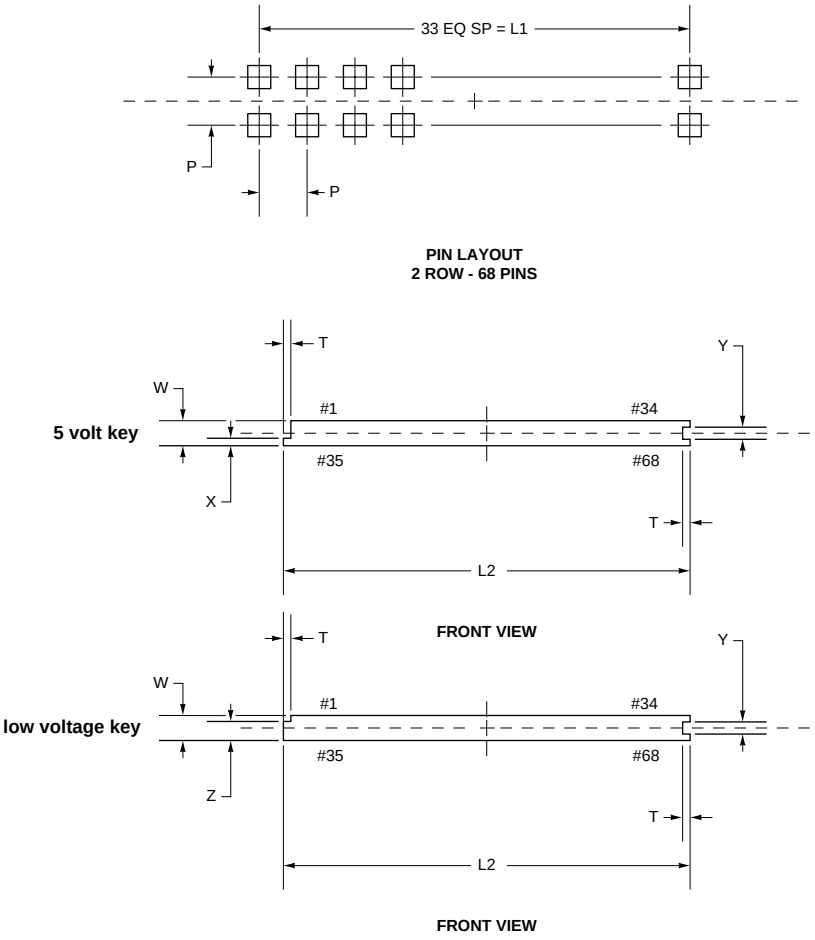


1 PIN/SOCKET CONTACT AREA

2 L4 IS THE POINT OF FIRST ENGAGEMENT FOR MATING WITH THE SOCKET CONTACTS/HOUSING MOUNTED WITHIN THE CARD

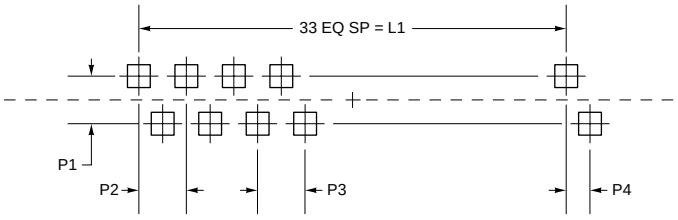
	L ± 0.1	L1 MAX	L2 REF	L3 (+0.15/-0.10)	L4
POWER	5.00	0.50	4.60	0.40	0.50 ~ 2.50
GENERAL	4.25	0.50	3.85	0.40	0.50 ~ 2.50
DETECT	3.50	0.50	3.10	0.40	0.50 ~ 2.50

Figure 11-14: Small PC Card Pin/Socket Contact Length with Wipe

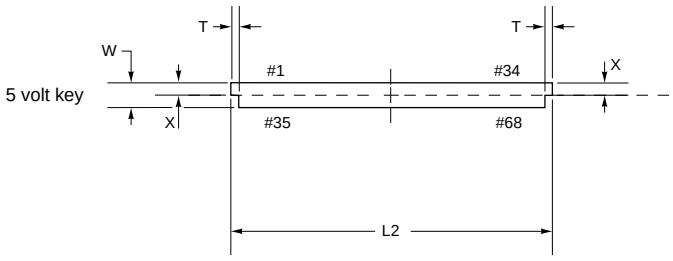


L1 ± 0.15	L2 ± 0.08	P ± 0.10	T ± 0.05	W ± 0.08	X ± 0.05	Y ± 0.05	Z ± 0.05
41.91	54.20	1.27	0.90	3.50	1.20	1.40	2.30

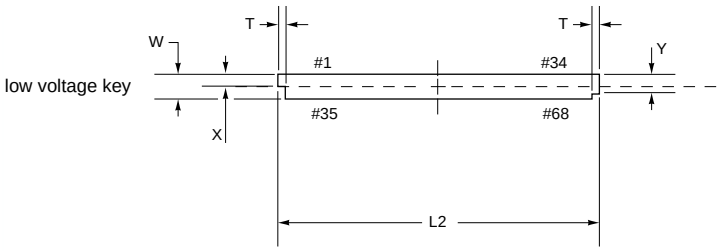
Figure 11-15: Full-size PC Card Pin Connector



PIN LAYOUT
2 ROW - 68 PINS



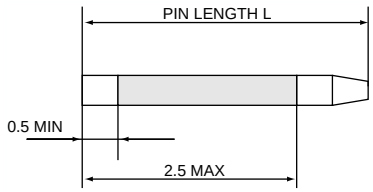
FRONT VIEW



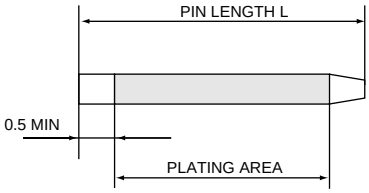
FRONT VIEW

L1 ± 0.15	L2 ± 0.08	P1 ± 0.10	P2 ± 0.10	P3 ± 0.10	P4 ± 0.10	T ± 0.05	W ± 0.07	X ± 0.05	Y ± 0.05
33.00	43.00	1.27	1.00	1.00	0.50	0.90	3.50	1.75	2.60

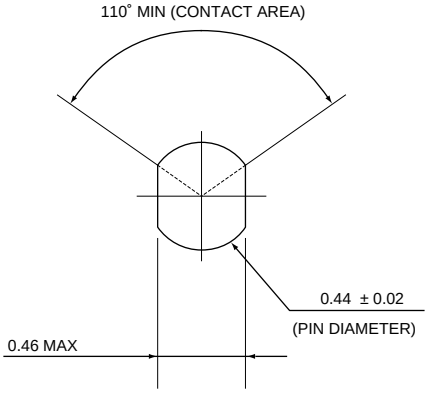
Figure 11-16: Small PC Card Pin Connector



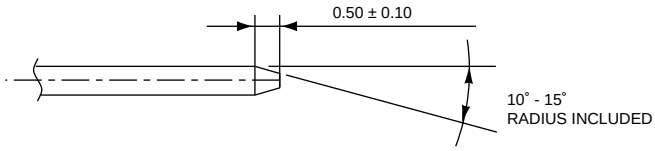
MATED CONTACT ENGAGEMENT AREA:
THE SOCKET-CONNECTOR PIN CONTACT POSITION MUST BE WITHIN THE SHADED AREA WHEN THE PIN AND SOCKET CONNECTORS ARE FULLY MATED.



MINIMUM PLATING AREA:
FOR THE PIN CONNECTOR, THE EFFECTIVE CONTACT AREA (SHADED AREA) IS SHOWN ABOVE.

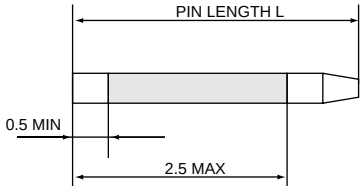


PIN-CONNECTOR PIN CROSS-SECTION FORM AND DIMENSIONS

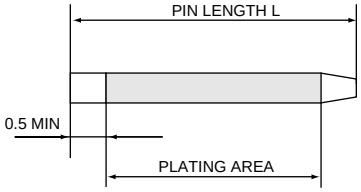


PIN-CONNECTOR PIN-TIP FORM AND DIMENSIONS

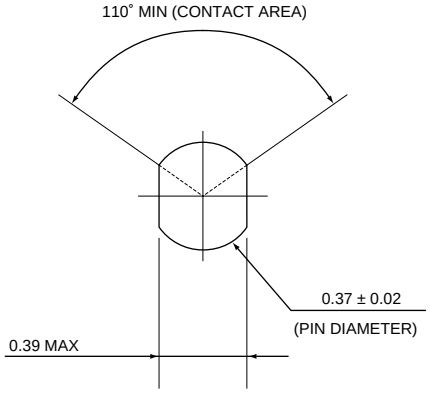
Figure 11-17: Full-size PC Card Host Connector, Pin Contacts



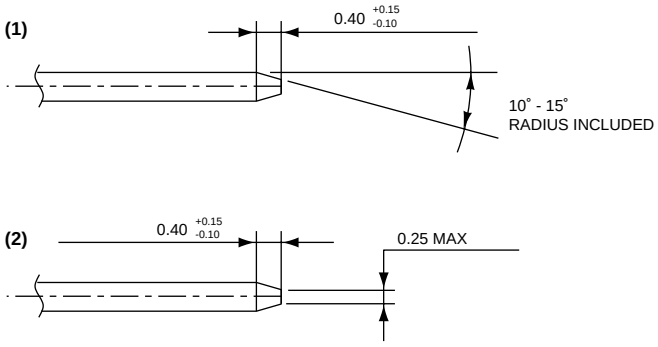
MATED CONTACT ENGAGEMENT AREA:
THE SOCKET-CONNECTOR PIN CONTACT POSITION MUST BE WITHIN THE SHADED AREA WHEN THE PIN AND SOCKET CONNECTORS ARE FULLY MATED.



MINIMUM PLATING AREA:
FOR THE PIN CONNECTOR, THE EFFECTIVE CONTACT AREA (SHADED AREA) IS SHOWN ABOVE.

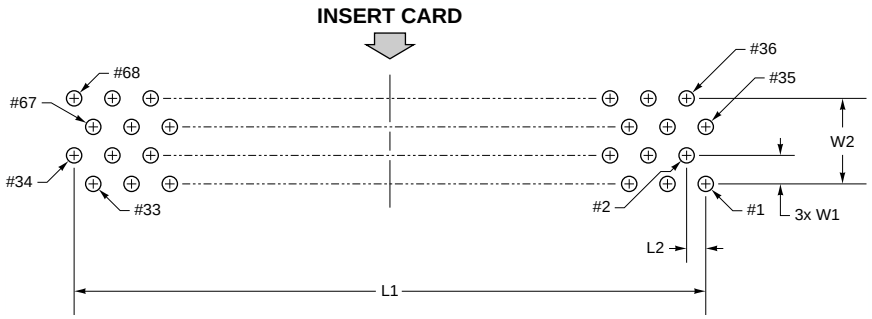


PIN-CONNECTOR PIN CROSS-SECTION FORM AND DIMENSIONS



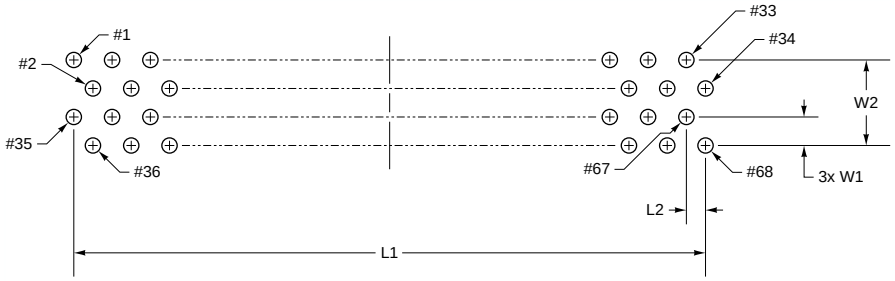
PIN-CONNECTOR PIN-TIP FORM AND DIMENSIONS ((1) or (2))

Figure 11-18: Small PC Card Host Connector, Pin Contacts



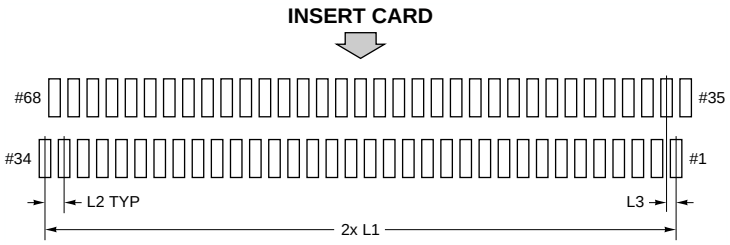
L1 ± 0.08	L2 ± 0.05	W1 ± 0.05	W2 REF
41.91	1.27	1.91	5.72

Figure 11-19: Recommended Right Angle Connector PCB Footprint



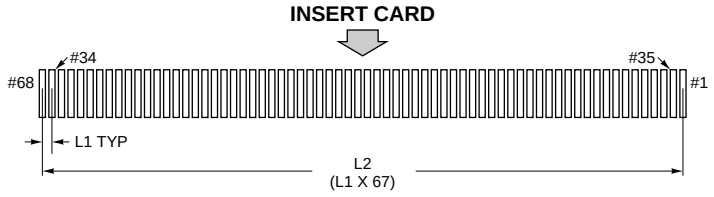
L1 ± 0.08	L2 ± 0.05	W1 ± 0.05	W2 REF
41.91	1.27	1.91	5.72

Figure 11-20: Recommended Straight Connector PCB Footprint



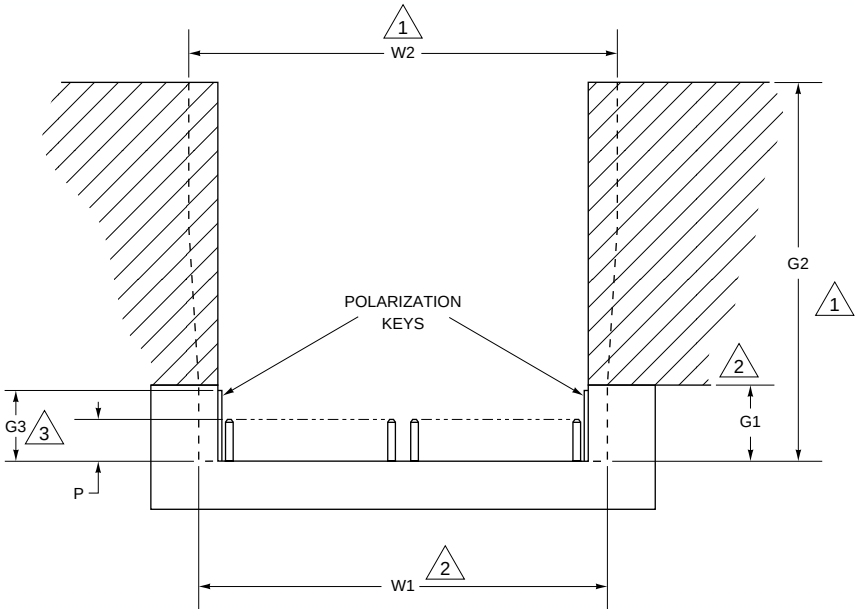
L1 ± 0.10	L2 ± 0.05	L3 REF
41.91	1.27	0.64

Figure 11-21: Recommended Two Row Surface Mount Connector PCB Footprint



L1 ± 0.050	L2 ± 0.080
0.635	42.545

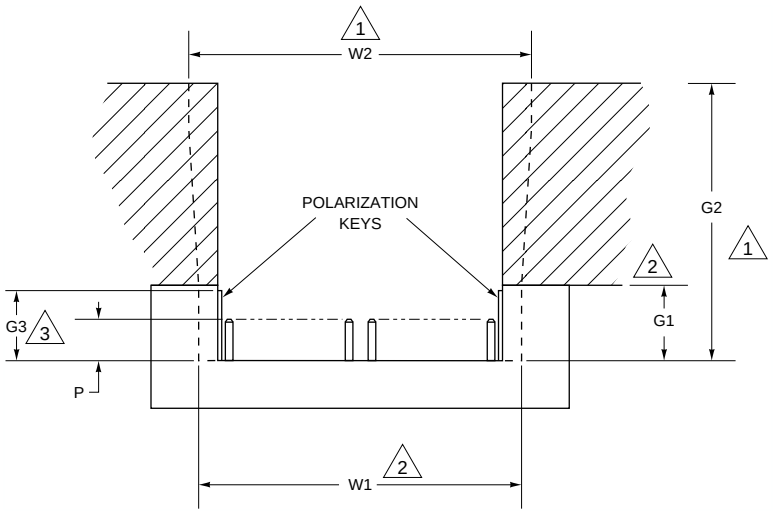
Figure 11-22: Recommended One Row Surface Mount Connector PCB Footprint



G1 MIN	G2 MIN	G3 ± 0.30	P MAX	W1 ± 0.08	W2 ± 1.4
10.0	40.0	9.70	5.10	54.20	55.6

1. THE PC CARD SHOULD BE GUIDED FOR A MINIMUM DISTANCE OF 40.0 mm
2. THE CONNECTOR SHALL GUIDE THE PC CARD FOR A MINIMUM DISTANCE OF 5.0 mm BEFORE ENGAGEMENT
3. THE CONNECTOR POLARIZATION KEYS ARE DEFINED IN ***Figure 11-15: Full-size PC Card Pin Connector***

Figure 11-23: Full-size PC Card Guide Guidance



G1 MIN	G2 MIN	G3 ± 0.3	P MAX	W1 ± 0.08	W2 ± 0.6
10.0	27.0	9.70	5.10	43.00	43.6

1 THE SMALL PC CARD SHOULD BE GUIDED FOR A MINIMUM DISTANCE OF 27.0 mm

2 THE CONNECTOR SHALL GUIDE THE SMALL PC CARD FOR A MINIMUM DISTANCE OF 5.0 mm BEFORE ENGAGEMENT

3 THE CONNECTOR POLARIZATION KEYS ARE DEFINED IN ***Figure 11-16: Small PC Card Pin Connector***

Figure 11-24: Small PC Card Guide Guidance

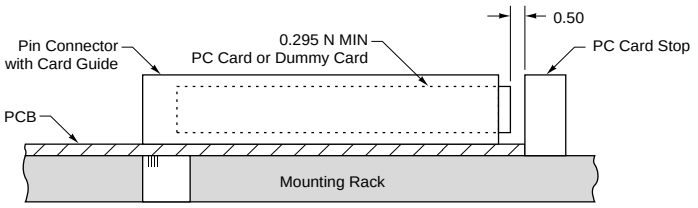


Figure 11-25: Connector Shock & Vibration Test Fixture

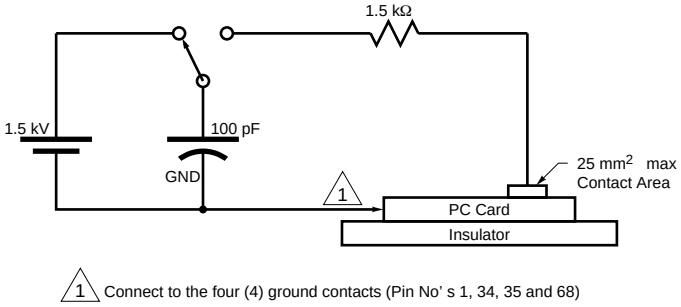
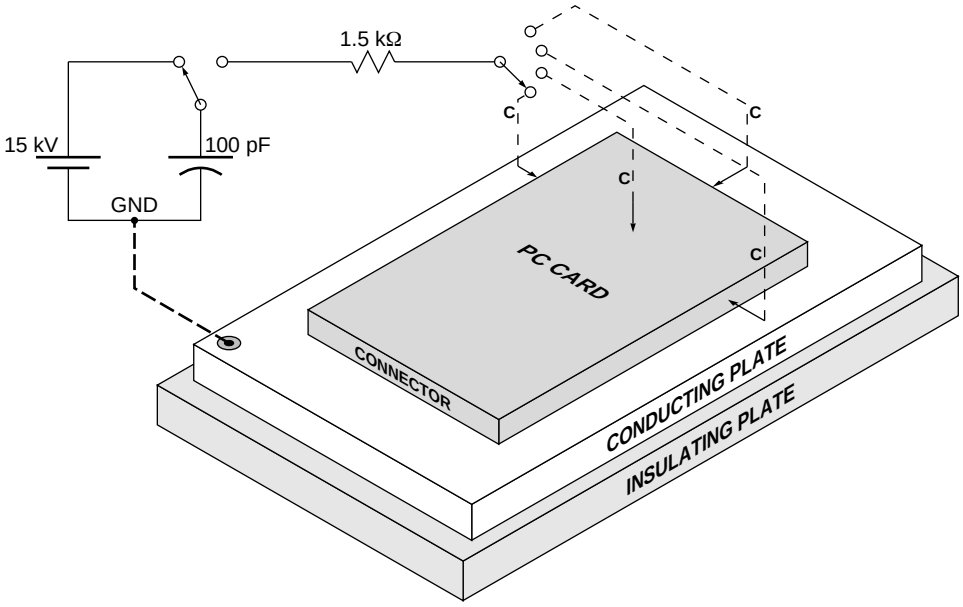


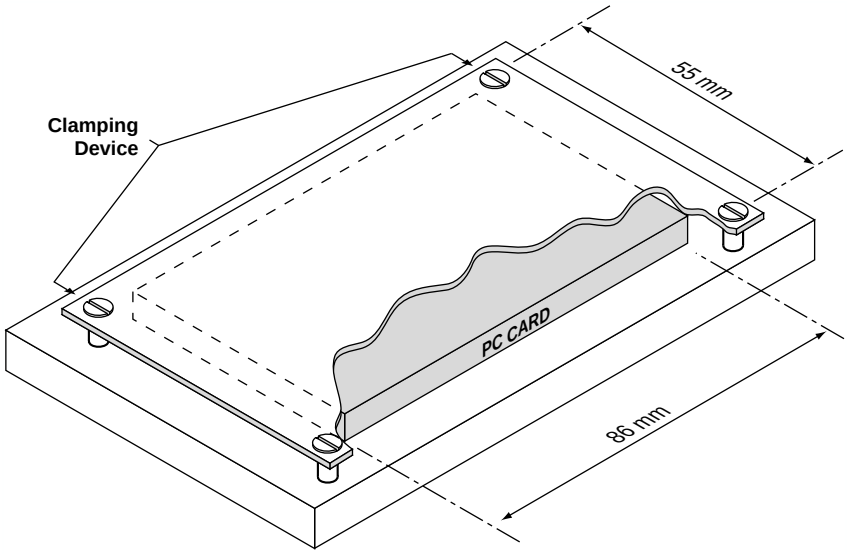
Figure 11-26: Electrostatic Discharge Test-1 Fixture



Notes: 1. PC Card to make contact with the conducting plate. Discharge to top cover, left side, non-connector end and right side three times each. Total discharge cycles = 12 on each side.

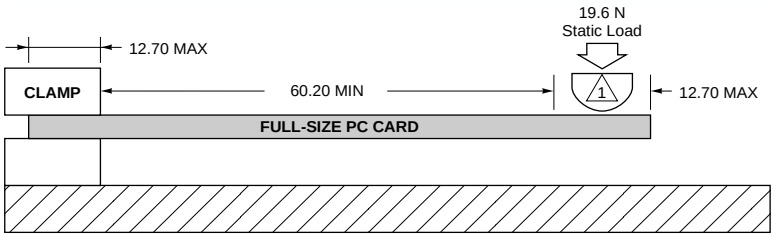
2. The PC Card cover facing the conducting plate, should make mechanical contact with the conducting plate during test.

Figure 11-27: Electromechanical Discharge Test-2 Fixture



1. The PC Card shock and vibration test fixture shall entrap the PC Card such that all shock and vibration shall be transmitted into the sample card

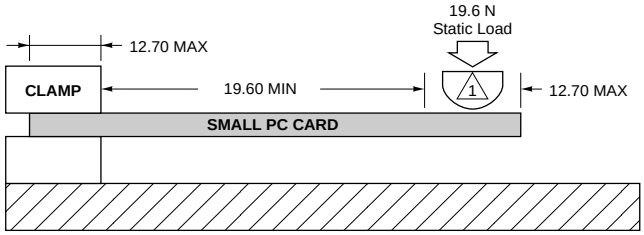
Figure 11-28: PC Card Shock and Vibration Test Fixture



1 THE CONTACT RADIUS FORCE BAR IS 5.0° ± 1.0°

2 THE FORCE BAR SHALL APPLY A UNIFORM FORCE ACROSS THE END OF THE PC CARD

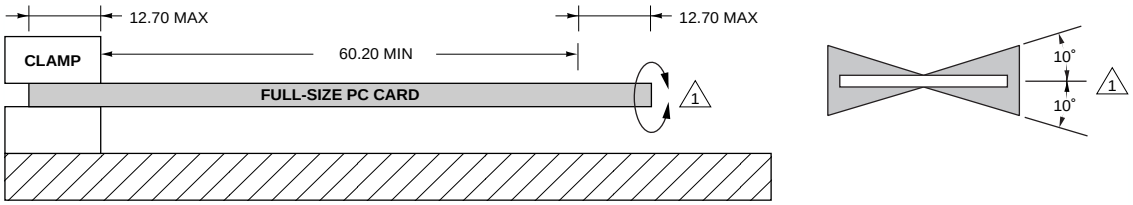
Figure 11-29: Full-size PC Card Bend Test Fixture



1 THE CONTACT RADIUS FORCE BAR IS 5.0° ± 1.0°

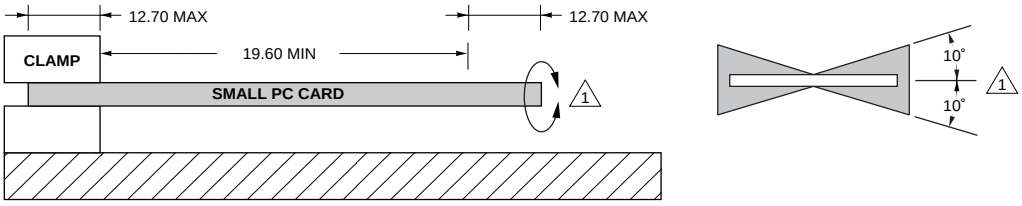
2 THE FORCE BAR SHALL APPLY A UNIFORM FORCE ACROSS THE END OF THE SMALL PC CARD

Figure 11-30: Small PC Card Bend Test Fixture



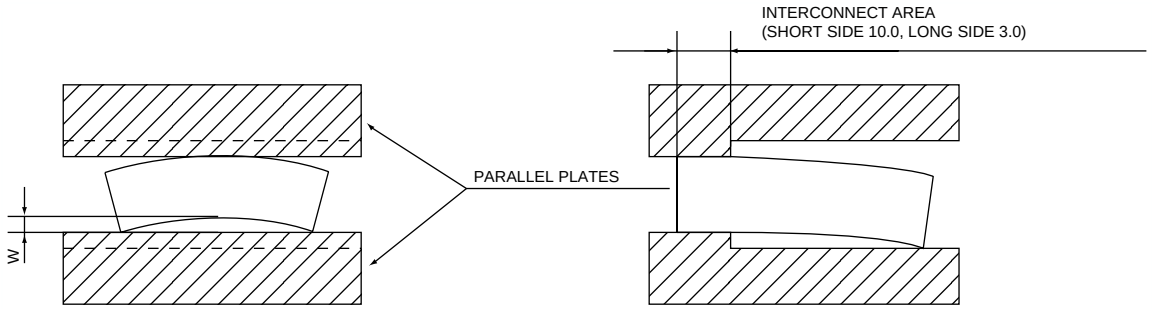
1 APPLY TORQUE TO UNCLAMPED END OF PC CARD. THE TORQUE AND ANGLE MAX ARE:
TORQUE 1.236 Nm OR 10°, WHICHEVER OCCURS FIRST

Figure 11-31: Full-size PC Card Torque Test Fixture



1 APPLY TORQUE TO UNCLAMPED END OF SMALL PC CARD. THE TORQUE AND ANGLE MAX ARE:
TORQUE 1.236 Nm OR 10°, WHICHEVER OCCURS FIRST

Figure 11-32: Small PC Card Torque Test Fixture



NOTE: CARD ENLARGED FOR ILLUSTRATIVE PURPOSES

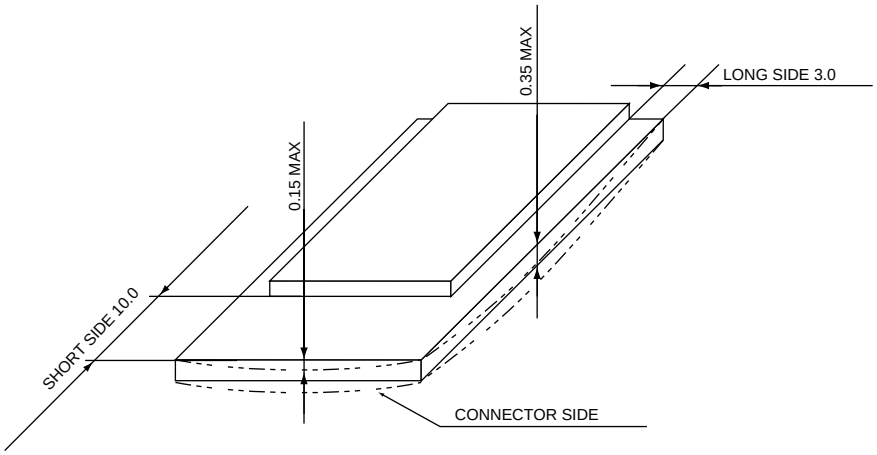
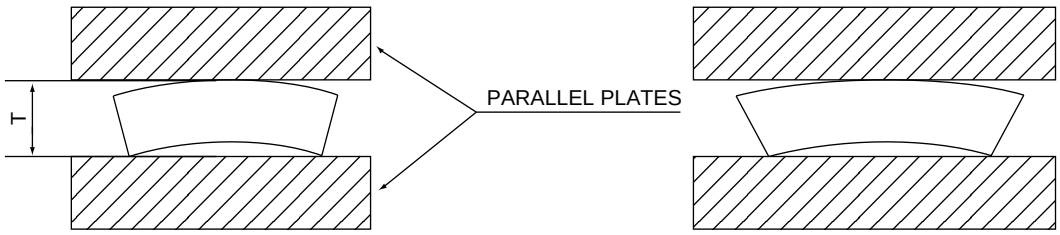


Figure 11-33: Warpage Measurement A–Interconnect Area



NOTE: CARD ENLARGED FOR ILLUSTRATIVE PURPOSES

Figure 11-34: Warpage Measurement A–Substrate Area

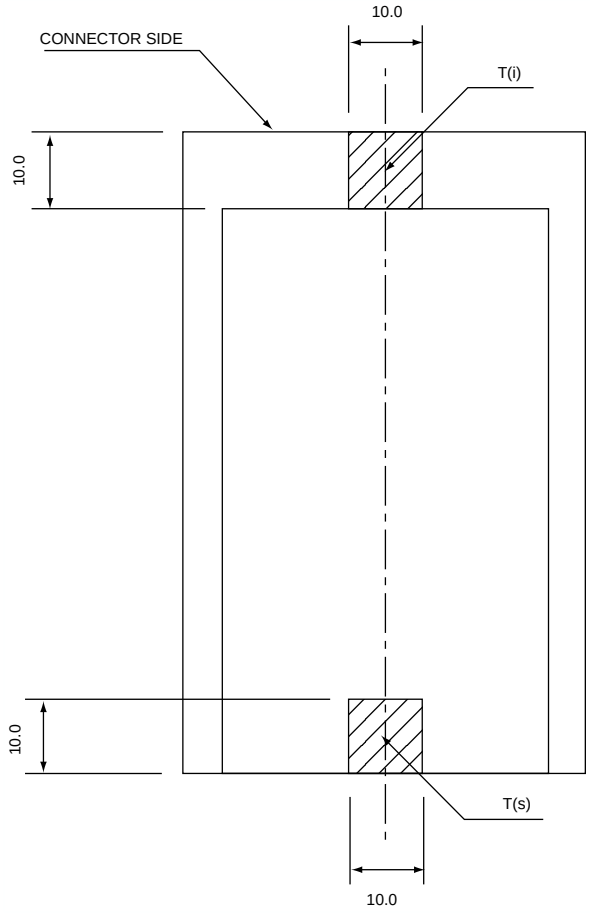


Figure 11-35: Warpage Measurement B–Thickness Measurements

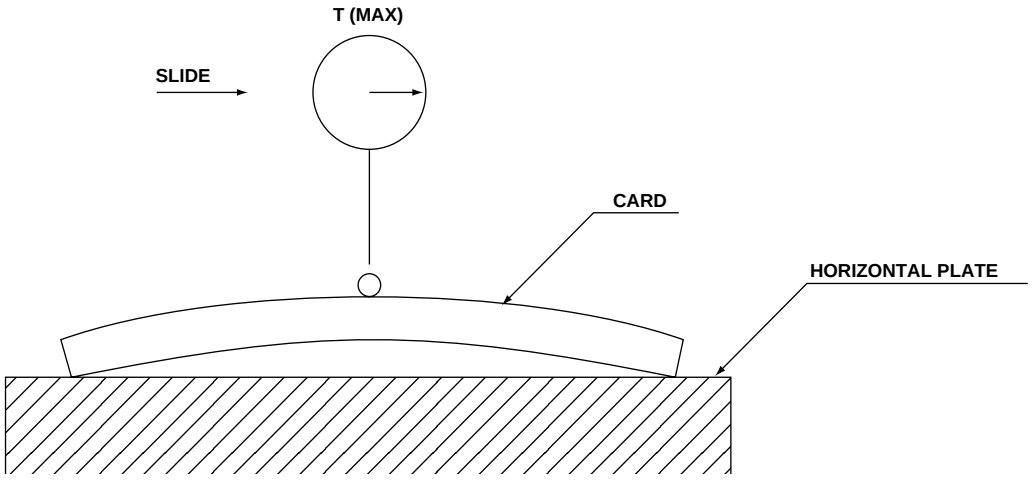


Figure 11-36: Warpage Measurement B–Measurements

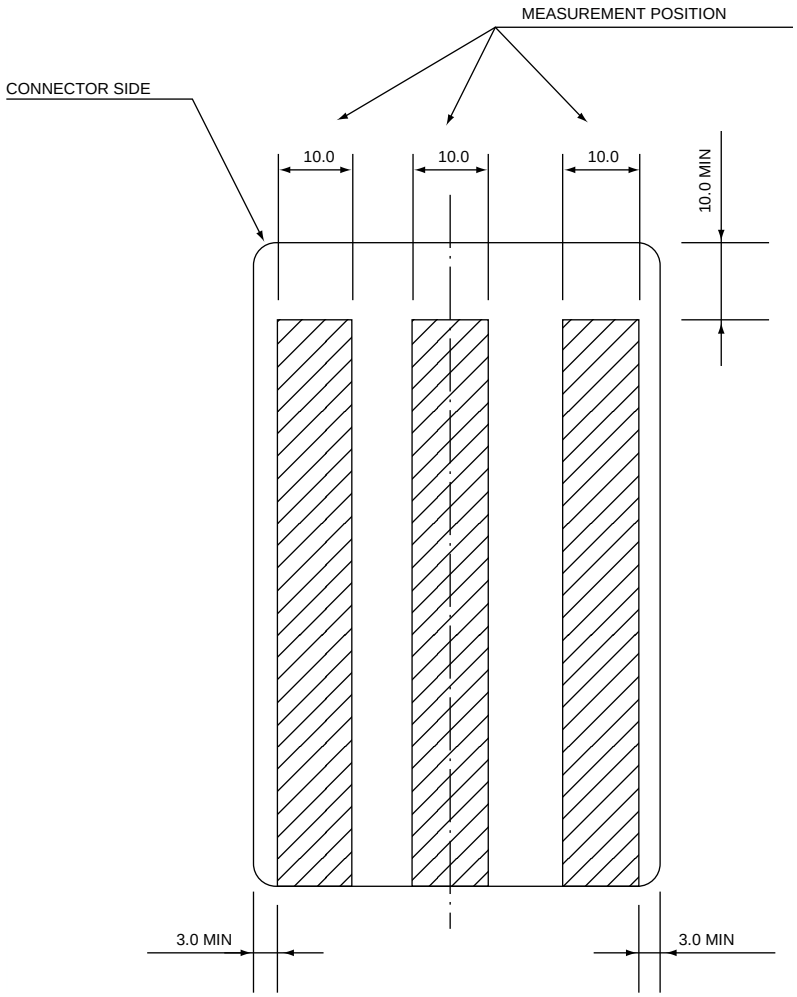


Figure 11-37: Warpage Measurement B–Measurement Positions

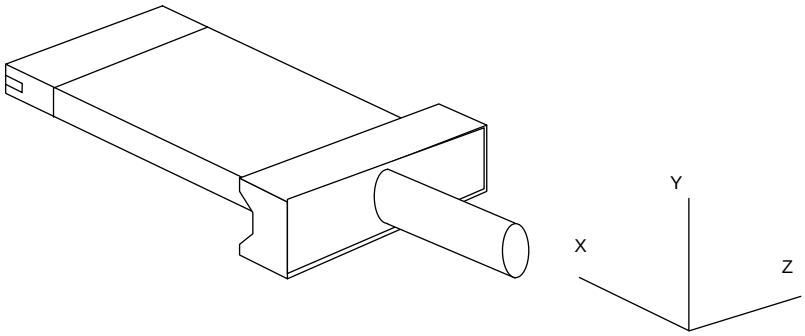


Figure 11-38: Card Inverse Insertion Test Fixture

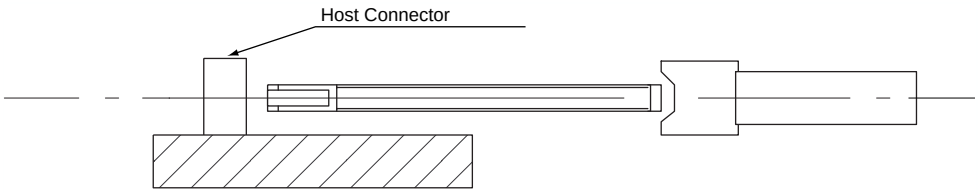


Figure 11-39: Card Inverse Insertion Push Block

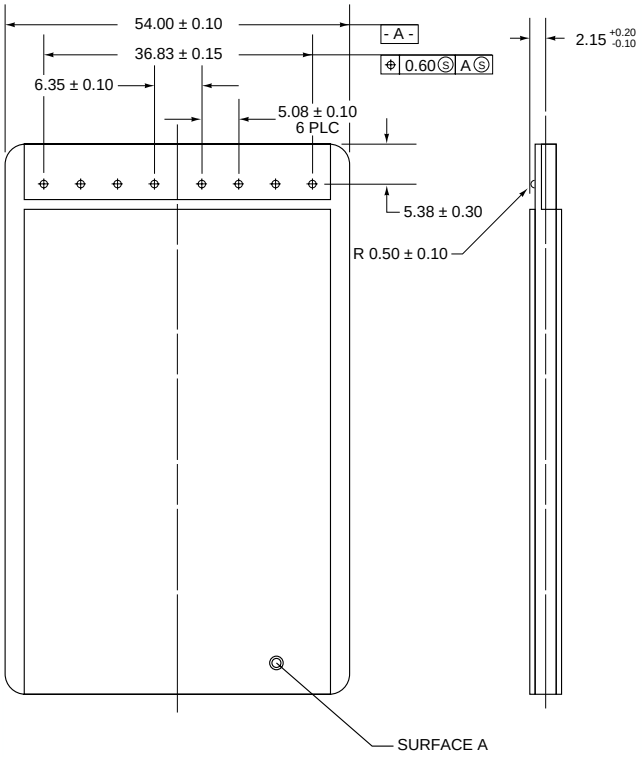
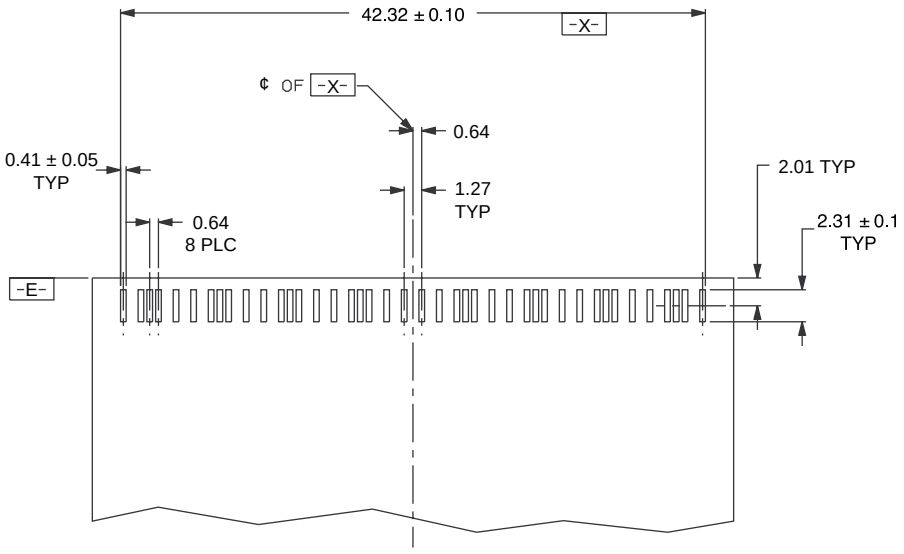
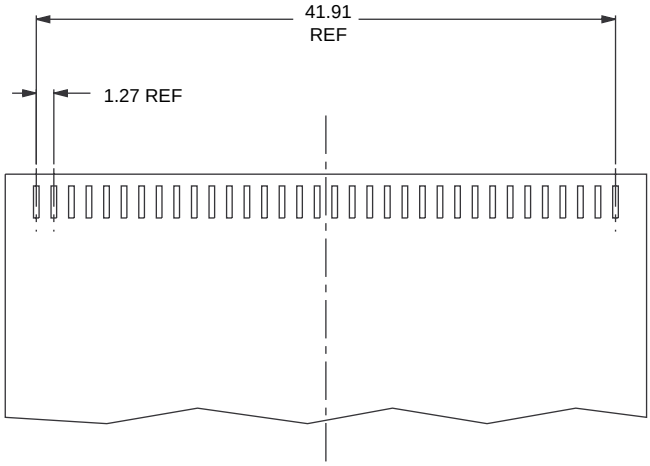


Figure 11-40: CardBus PC Card Recommended Connector Grounding Interface Dimensions

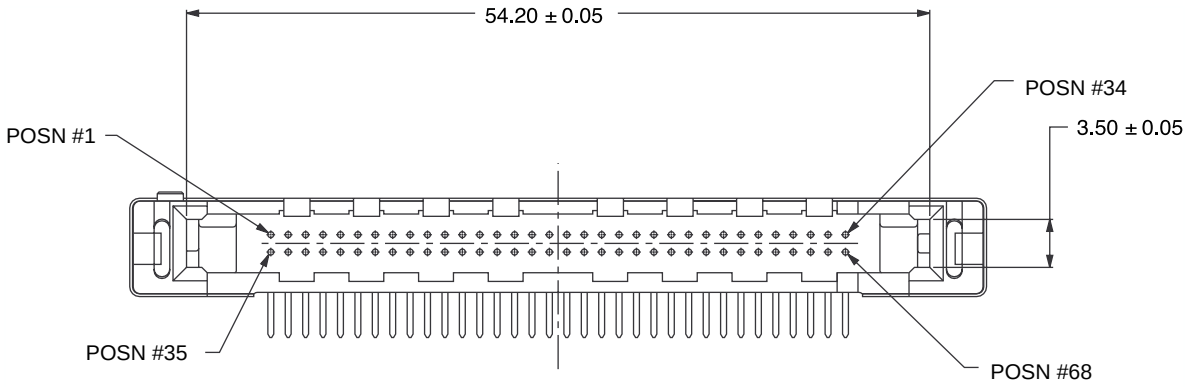


TOP SURFACE



BOTTOM SURFACE

Figure 11-41: CardBus PC Card Recommended PCB Footprint



1. ASSEMBLY KEYED FOR LOW VOLT CARDS (3.3V)

Figure 11-42: CardBus PC Card Recommended Host Connector Grounding Interface Dimensions

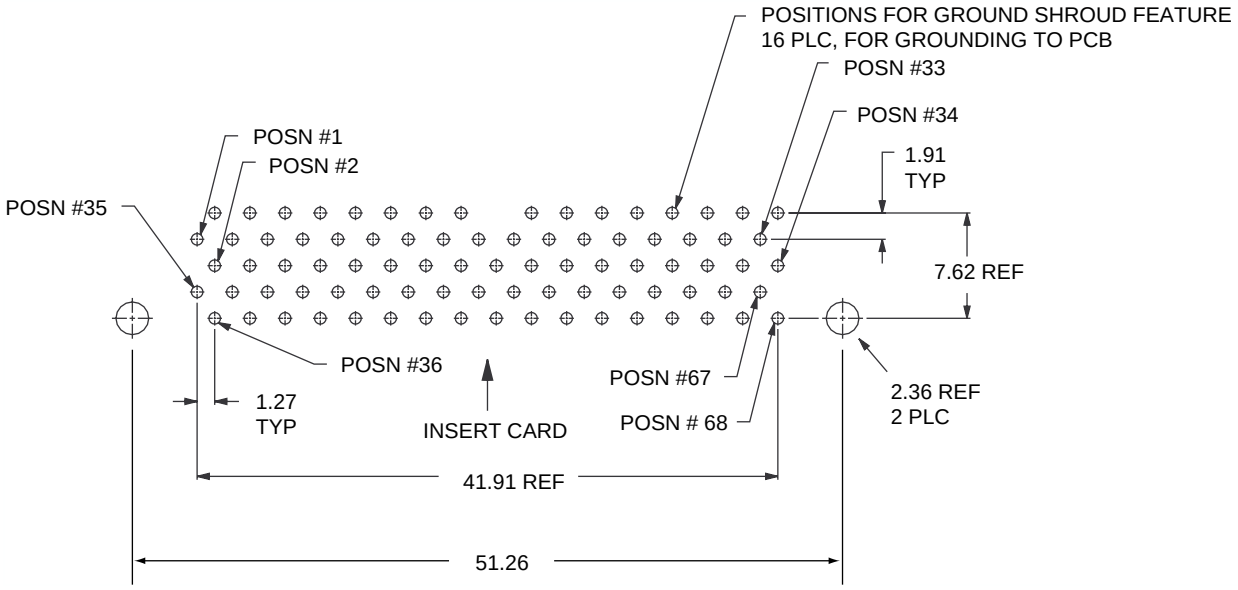


Figure 11-43: CardBus PC Card Recommended Right Angle PCB Footprint

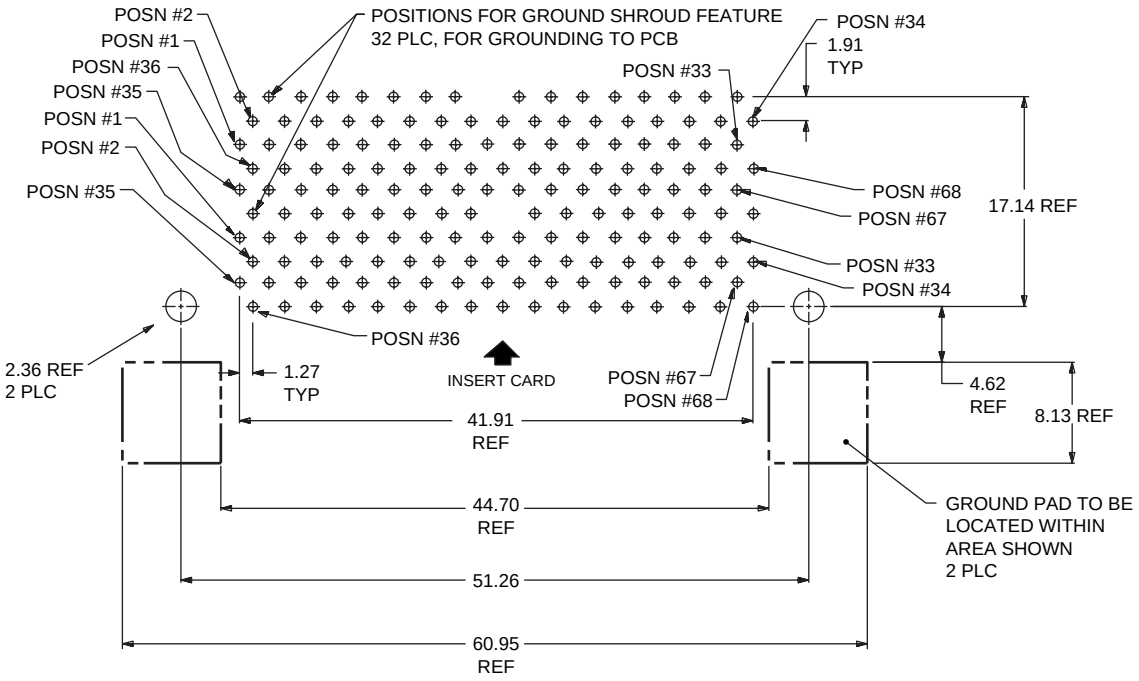
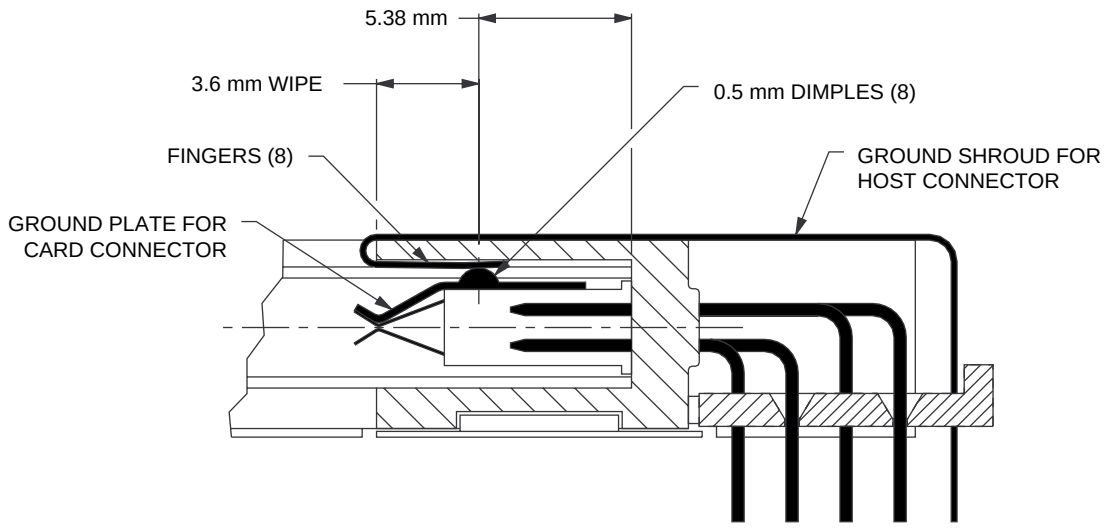
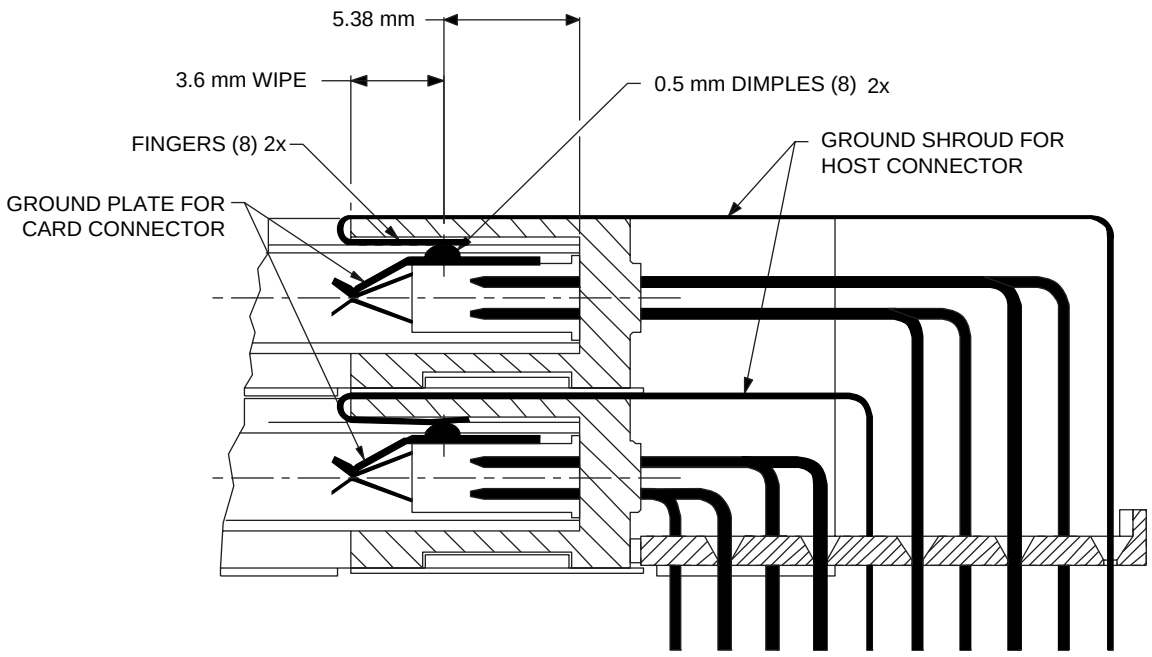


Figure 11-44: CardBus PC Card Recommended Right Angle PCB Footprint (Stacked)



FOR REFERENCE ONLY

Figure 11-45: CardBus PC Card Reference Shrouded Connector



FOR REFERENCE ONLY

Figure 11-46: CardBus PC Card Reference Shrouded Connector (Stacked Connector)

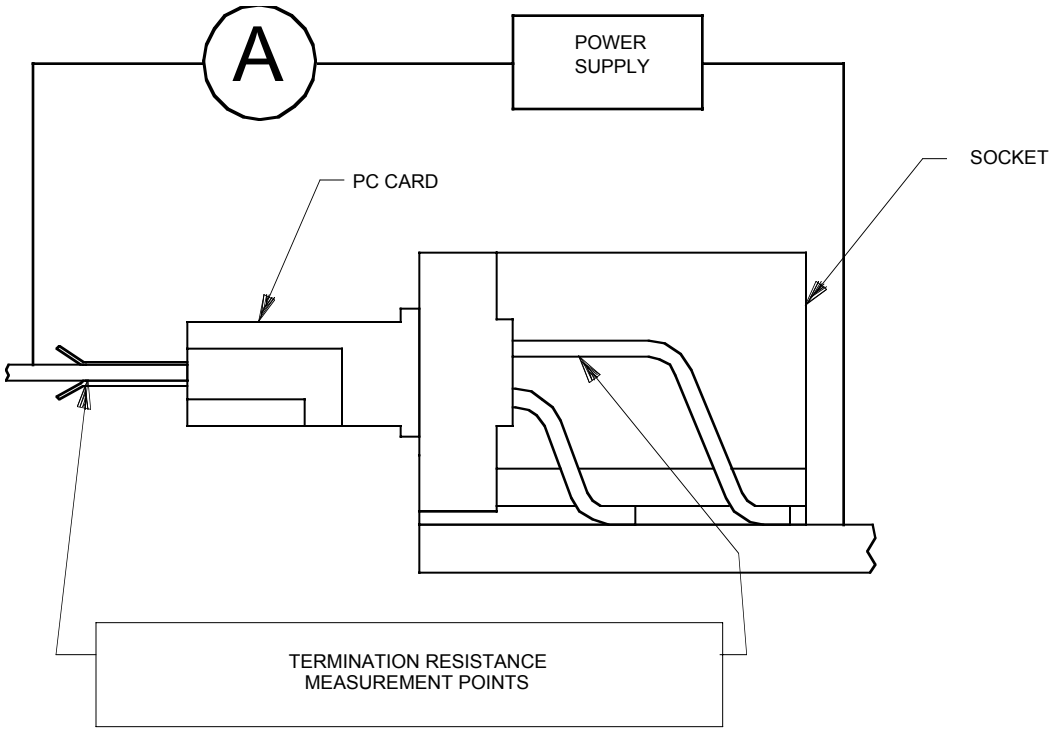


Figure 11-47: Contact Resistance Measurement