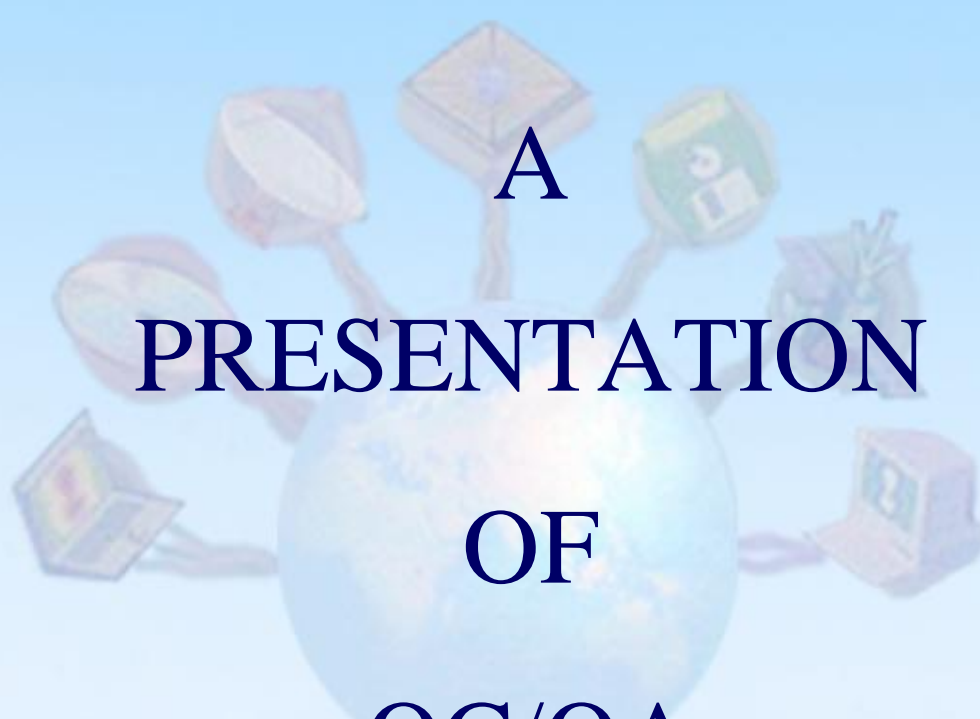


PowerSilicon, Inc.



A
PRESENTATION
OF
QC/QA
DEPARTMENT



PowerSilicon, Inc.



QUALITY
ASSURANCE



PowerSilicon, Inc.

QA PHILOSOPHY

CONTINUOUS ENHANCEMENT OF
PRODUCT QUALITY AND
RELIABILITY LEVEL ABOVE AND
BEYOND TODAY'S INDUSTRY
STANDARD AND STILL CAN
ACHIEVE GOOD ASSEMBLY YIELD
WITH COST EFFECTIVE PROCESS.



PowerSilicon, Inc.

PSI QUALITY ASSURANCE SYSTEM (ISO 9002)

1.0 Quality System and Organization

1.1 Quality Policy

1.1.1 Corporate Mission

1.1.2 Corporate Quality Policy

1.2 Organization

1.2.1 Responsibility, Authority,
Verification, Resource and
Personnel

2.0 Contract Review

3.0 Document Control

3.1 Document and Data Approval and Issuance

3.2 Document and Data Changes and Modification

4.0 Purchasing

5.0 Control of Customer Supplied Product

6.0 Product Identification and Traceability

7.0 Process Control and Monitoring

8.0 Inspection and Testing

9.0 Control of Inspection, Measuring and Test Equipment

10.0 Inspection and Test Status

11.0 Control of Nonconforming Products

12.0 Corrective and Preventive Action

13.0 Handling, Storage, Packaging, Preservation and Delivery

14.0 Control of Quality Records

15.0 Internal Quality Audit Procedure

16.0 PSI Training Procedure

17.0 Customer Service

18.0 Statistical Techniques





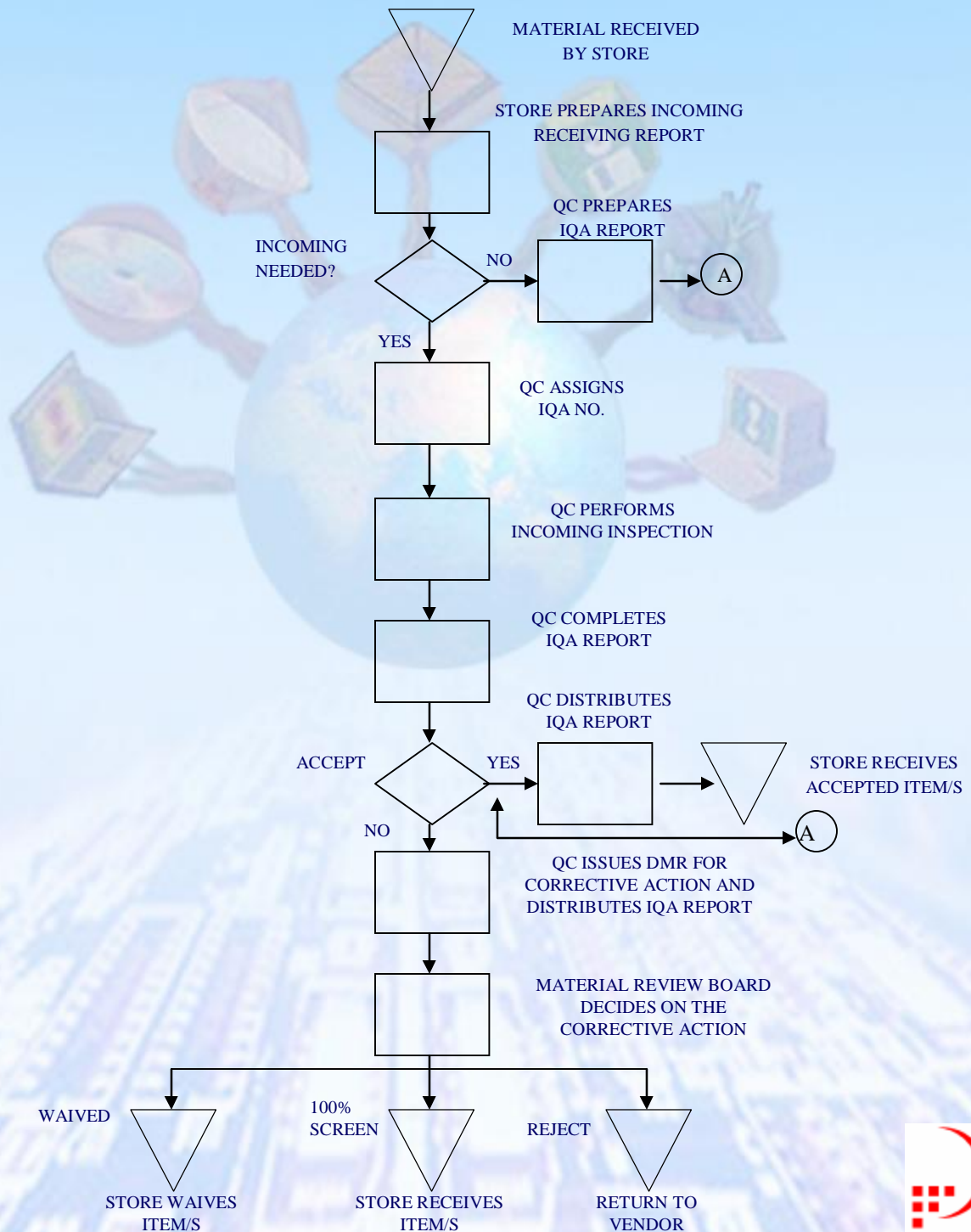
PowerSilicon, Inc.

QA MONITORING ACTIVITIES

| ACTIVITIES | FREQUENCY | SAMPLE PLAN |
|--------------------------------|-----------------|------------------|
| QA GROUNDSTRAP MONITORING | PER WORKWEEK | N=22 |
| QA APPAREL MONITORING | PER WORKWEEK | N=22 |
| QA WORKBENCH MONITORING | PER WORKWEEK | N=100% |
| QA PARTICLE COUNT MONITORING | PER WORKWEEK | N=5 AREAS |
| SELF AUDIT | PER QA SCHEDULE | ISO 9002 CLAUSE |
| RELIABILITY TESTING (IC) | PER MONTH | N=5 DEVICES |
| PARTICULATE/ BACTERIA COUNT | PER WORKWEEK | DI WATER OUTLETS |
| DEW POINT MONITORING | PER WORKWEEK | N2/CDA OUTLETS |

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Incoming Inspection Flowchart



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Incoming Quality Control

- . PowerSilicon, Inc.-purchased parts undergo visual, dimensional, and functional tests.
- . For customer consigned materials the incoming inspection being performed shall depend on the customer requirements.
- . All materials (whether purchased or consigned), will bear an IQA number before it can be used in the line. This is for traceability purposes.



PowerSilicon, Inc.



PowerSilicon, Inc.

QUALITY CREDO

OUR PURPOSE IS TO SATISFY AND EXCEED THE CUSTOMER'S EXPECTATION FOR QUALITY. WE AIM FOR SUPERIORITY AND QUALITY IN OUR PRODUCTS AND SERVICES. WE SET STANDARDS TO MEET TODAY'S CHALLENGE BUT WILL NOT LIMIT OURSELVES TO THAT. MOREOVER, WE SET OURSELVES TO MEET THE STANDARDS THAT OUR CUSTOMERS WILL DESIRE FOR TOMORROW, TODAY. QUALITY ARE VALUES WE INSTILL SO WE CAN BUILD AND PROVIDE CONFIDENCE THAT THE PRODUCTS AND SERVICES WE DELIVER CAN SATISFY THE MARKET DRIVEN QUALITY STANDARD.





PowerSilicon, Inc.

FAILURE ANALYSIS CAPABILITY

| FAILURE ANALYSIS | EQUIPMENT |
|--|---|
| .FAILURE VERIFICATION FAULT ISOLATION | ELECTRICAL TESTING |
| .RADIOGRAPHIC | REAL TIME X-RAY IMAGING SYSTEM |
| .HERMETICITY TEST | FINE LEAK TESTER GROSS LEAK TESTER |
| .OPTICAL ANALYSIS | MICROSCOPE LOW/HIGH MAGNIFICATION TOOL MAKER'S MICROSCOPE |
| .MECHANICAL ANALYSIS | DIE SHEAR TESTER BOND PULL TESTER BALL SHEAR TESTER STUD PULL TESTER LID TORQUE TESTER LEAD INTEGRITY TESTER PIN D TESTER |
| .CHEMICAL ANALYSIS | ETCHING (DECAPSULATION MACHINE) DYE PENETRANT TEST MARK PERMANENCY TEST |
| .METALLURGICAL ANALYSIS | X-RAY FLOURESCENCE SOLDERABILITY TEST |
| .SURFACE ANALYSIS (OUTSIDE/LAB SUPPORT) | EDX SEM |



PowerSilicon, Inc.

RELIABILITY TEST PLAN

| TEST TYPE | CONDITIONS FREQUENCY | SAMPLE SIZE | FACILITIES | EQUIPMENT |
|---|--|------------------------------|------------|---|
| PRESSURE POT TESTER | 21 C, 15 PSIG 24 HRS./336 HRS. | N=5 1X/MONTH | PSI | HIRAYAMA PRESSURE POT |
| DIE PENETRANT TEST | 24 HRS 1X/MONTH | N=5/PKG TYPE | PSI | ZYGLO SOLUTION |
| LEAD FATIGUE TEST | MIL.STD 883 METHOD 2004 | N=31/PKG TYPE 5 PKG/MONTH | PSI | LEAD FATIGUE TESTER |
| SOLDERABILITY TEST | MIL.STD 883 METHOD 2003 | N=10.8 HRS. 5 PKG/MONTH | PSI | SOLDER POT MACHINE |
| RESISTANCE TO SOLVENT TEST | MIL.STD 883 METHOD 2015 | N=3/SOLN. 5 PKG/MONTH | PSI | MARKING PERMANENCY |
| BOND STRENGTH TEST | MIL.STD 883 METHOD 2011 | N=10W/UNIT 5 PKG/MONTH | PSI | TEST SOLUTION UNITEK WIRE PULL TESTER |
| X-RAY EVALUATION | AI APECS #420-011 | N=10 UNITS 5 PKG/MONTH | PSI | NICOLET 1410I X-RAY MACHINE |
| SALT ATMOSPHERE TEST | MIL-STD 883 | 5 PKG/MONTH | PSI | SALT ATMOSPHERE TESTER |
| BALL SHEAR TEST | AI SPECS #420-011 | N=2/MACHINE 5 PKG/MONTH | PSI | BALL SHEAR TESTER |
| DIE SHER TEST | MIL-STD 883 METHOD 2019 | N-5, 5 PKG/ MONTH | PSI | DIE SHEAR TESTER |
| SCANNING ACOUSTIC MICROSCOPE (SAM) | MOLD/DIE INTERFACE MOLD/PAD INTERFACE | N=1 UNIT When applicable | PSI | SEM MACHINE (Outside Lab. Test) |



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QC GATE ACCEPTANCE

| OPERATION | FREQUENCY | SAMPLE PLAN | SPECS # |
|-----------------------------------|----------------|-------------|---------|
| SECOND OPTICAL | | | |
| | PER WAFER | 0.65% AQL | 430-001 |
| COMMERCIAL MILITARY | PER WAFER | 0.40% AQL | 430-001 |
| THIRD OPTICAL | | | |
| | PER TRAVEL LOT | 0.40% AQL | 430-002 |
| COMMERCIAL MILITARY | PER TRAVEL LOT | 0.40% AQL | 430-002 |
| FINAL VISUAK | | | |
| | PER TRAVEL LOT | 0.40% AQL | 430-003 |
| FIRST SUBMISSION RE-SUBMISSION | PER TRAVEL LOT | 0.40% AQL | 430-003 |
| QA OUTGOING INSPECTION | PER TRAVEL LOT | 0.40% AQL | 430-008 |

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IN PROCESS MONITOR

| TASK | SPECS | MONITOR FREQUENCY | SAMPLE PLAN |
|---|---|--|--|
| .WAFER SAW VISUAL | 420-001 | 2X/SHIFT | 5 CUTS X/Y |
| . WAFER BREAK VISUAL | 420-001 | 2X/SHIFT | 5 DICE |
| .DIE ATTACH VISUAL | 420-001 | PLASTIC=SETUP+4X/SHIFT HERMETICS=SETUP+4X/SHIFT | 1 STRIP 5 UNITS |
| DIE SHEAR | 420-002 | PLASTIC=SETUP+4X/SHIFT HERMETICS=SETUP+1X/SHIFT | 1 UNIT 1 UNIT |
| .WIREBOND VISUAL | 420-006 | PLASTIC=SETUP+4X/SHIFT | 2 UNITS (SET UP) 1 STRIP 1 UNIT |
| WIREPULL | 420-006 | HERMETICS=SETUP+4X/SHIFT PLASTIC=SETUP+4X/SHIFT | 1 UNIT=10 OR 20 WIRES 1 UNITS=10 OR 20 WIRES |
| CRATER TEST | 420-004 | HERMETICS=SETUP+1X/SHIFT | 1 UNITS |
| .MOLD PRE-MOLD INSP VISUAL X-RAY | 420-008 420-008 420-008 | PLASTIC=EVERY SUBLOT PLASTIC=SETUP+4X/SHIFT PLASTIC=SETUP=2X/SHIFT/MACHINE | 22 UNITS 1 SHOT 1 SHOT |
| .DEFLASH/TRIM VISUAL | 420-010 | PLASTIC=SETUP+4X/SHIFT HERMETICS=SETUP+2X/SHIFT | 1 STRIP 10 UNITS |
| .FORM VISUAL LEAD SPREAD COPLANARITY LEAD FATIGUE | 420-010 420-010 420-020 420-010 420-010 | PLASTIC=SETUP+4X/SHIFT PLASTIC=SETUP+4X/SHIFT HERMETICS=SETUP+2X/SHIFT PLASTIC=SETUP+4X/SHIFT PLASTIC=SETUP+2X/SHIFT | 1 STRIP 1 STRIP 10 UNITS 1 STRIP 1 UNITS - 3 LEADS |
| .SOLDER DIP VISUAL SOLDERABILITY NO AGING 8 HRS. THICKNESS | 420-012 430-005 | EVERY SUBLOT EVERY SUBLOT 1X/SHIFT EVERY SUBLOT | 22 UNITS 1 UNIT 2 UNITS 5 UNITS |
| .TIN/SOLDER PASTE VISUAL SOLDERABILITY NO AGING 8 HRS.THICKNESS | 420-012 430-005 | EVERY SUBLOT EVERY SUBLOT 1X/SHIFT EVERY SUBLOT | 22 UNITS 1 UNIT 2 UNITS 5 UNITS |
| .MARKING VISUAL MPT | 420-011 430-006 | SETUP +8X/SHIFT PER TRAVEL LOT | 10 UNITS 6 UNITS |

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**STATISTICAL
PROCESS
CONTROL**



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PSI SPC PROGRAM

- PSI'S SPC PROGRAM IS DIVIDED INTO TWO PHASES OF APPLICATION.
- PHASE I DEALS WITH THE PRODUCT CHARACTERIZATION UTILIZING ELEMENTARY SPC TOOLS IN WHICH THE ENTIRE LABOR FORCE WERE TRAINED TO TACKLE IMPROVEMENT ACTION TEAM .
- PHASE II DEALS WITH PROCESS CHARACTERIZATION USING DIFFERENT TECHNIQUES OF PERFORMING DESIGN OF EXPERIMENTS (DOE).



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PSI SPC PHILOSOPHY

- LOWERING PPM DEFECTIVE IS NOT THE END GOAL BUT RATHER MOVING TO A HIGHER LEVEL OF QUALITY...

“PREVENTION VS DETECTION”

- OPTIMIZING PROCESS CAPABILITY THRU SPC TO SURPASS DICTATED SPECIFICATION LIMITS AND STANDARDS.



PowerSilicon, Inc.

SPC APPLICATION

Second Optical Inspection

PPM/LRR

Die Attach Monitoring

PPM/LRR

D/A Visual Inspection

Die Shear Test

Computation of Control

Stud Pull Test

Limits and Cpk for the
analysis of the data

Wirebond Monitoring

PPM/LRR

W/B Visual Inspection

Wirepull Test

Computation of control

Ball Shear Test

Limits and Cpk for the
analysis of the data



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SPC APPLICATION

Third Optical Inspection

PPM/LRR

Mold Monitoring

PPM/LRR

Mold Visual Inspection

Marking Monitoring

PPM/LRR

Marking Visual Inspection

Deflash/Trimming/Forming
Monitoring

PPM/LRR

DTF Visual Inspection



PowerSilicon, Inc.

ISO 9002 CERTIFICATION HISTORY

CERTIFICATION BODY:
NATIONAL STANDARD AUTHORITY OF IRELAND (NSAI)

| | | |
|--|---|-----------------------|
| <i>AI Certification</i> | : | <i>MARCH 1994</i> |
| <i>1st Follow-up Audit</i> | : | <i>JULY 1994</i> |
| <i>1st Surveillance Audit</i> | : | <i>APRIL 1995</i> |
| <i>2nd Surveillance Audit</i> | : | <i>APRIL 1996</i> |
| <i>3rd Surveillance Audit</i> | : | <i>DECEMBER 1996</i> |
| <i>4th Surveillance Audit</i> | : | <i>SEPTEMBER 1997</i> |
| <i>5th Surveillance Audit</i> | : | <i>APRIL 1998</i> |
| <i>6th Surveillance Audit</i> | : | <i>JUNE 1999</i> |
| <i>7th Surveillance Audit</i> | : | <i>NOVEMBER 1999</i> |
| <i>8th Surveillance Audit</i> | : | <i>JUNE 2000</i> |
| <i>9th Surveillance/ QS 9000 Certification</i> | : | <i>MAY 2001</i> |
| <i>QS 9000 Surveillance Audit</i> | : | <i>JUNE 2002</i> |



PowerSilicon, Inc.

SPC APPLICATION

Solder Dip Monitoring PPM/LRR

Solder Dip Thickness Computation of Control Limits and Cpk for the analysis of the data.

Solder Plate Monitoring PPM/LRR

Plating Visual Inspection

Plating Thickness Computation of Control Limits and Cpk for the analysis of the data.

Fourth Optical Inspection PPM/LRR

OQA PPM/LRR



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SPC APPLICATION

Solder Dip Monitoring

PPM/LRR

Solder Dip Thickness

Computation of Control Limits and Cpk for the analysis of the data.

Solder Plate Monitoring

PPM/LRR

Plating Visual Inspection

Plating Thickness

Computation of Control Limits and Cpk for the analysis of the data.

Fourth Optical Inspection

PPM/LRR

OQA

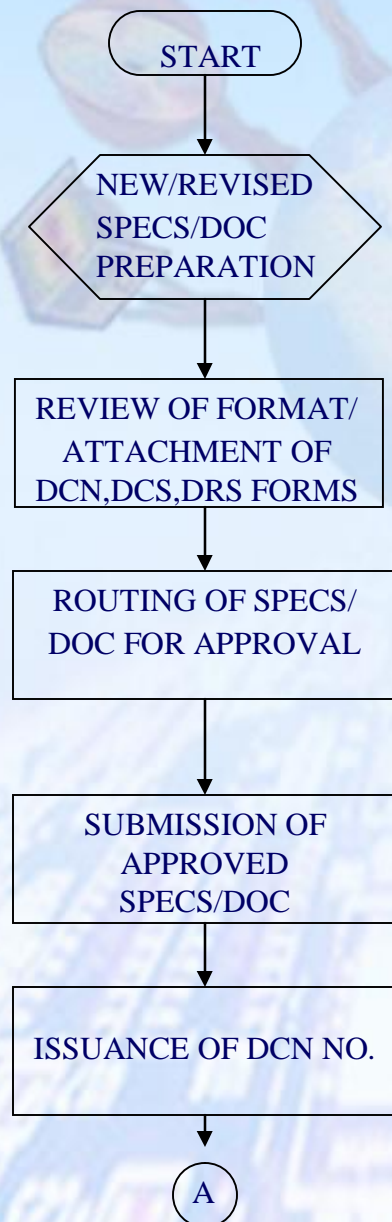
PPM/LRR





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GENERAL DCC PROCEDURE



ORIGINATOR TO PREPARE SPECS FOLLOWING PRESCRIBED FORMAT AND FORM USING STANDARD SOFTWARE.

DCC TO PREPARE AND ATTACH DCN, SPECS COVER PAGE AND REVIEW SHEET CHECK IF DOC IS IN CORRECT FORMAT AND FORM. DCC TO ISSUE SPEC NO. TO NEW SPECS AND FORMS.

ORIGINATOR TO ROUTE SPECS FOR APPROVAL AND CONSIDER ALL COMMENTS UNTIL APPROVAL ARE GRANTED.

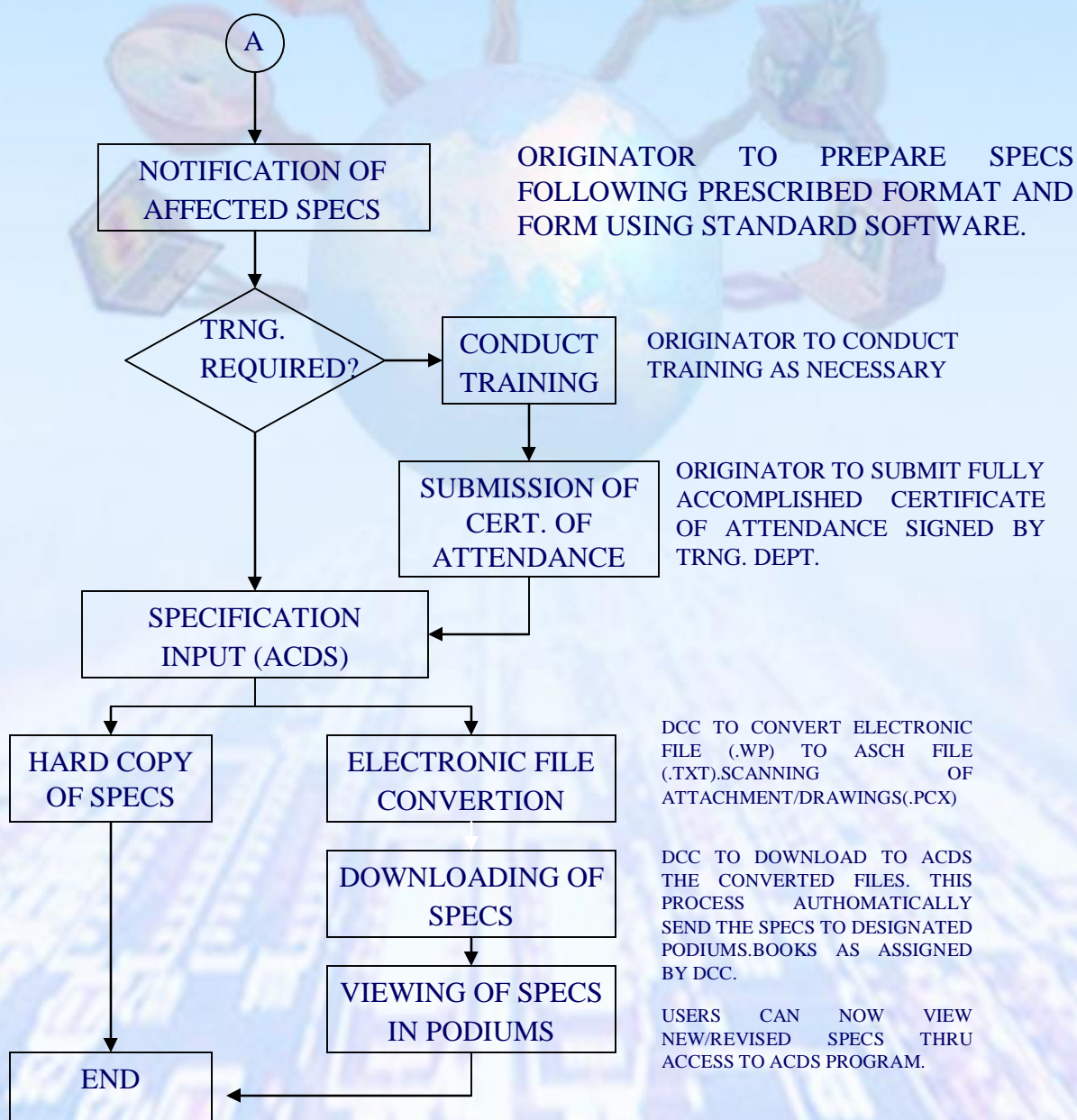
DCC ACCEPTS NEWLY APPROVED DOCUMENT WITH DISKETTE IN STD SOFTWARE AND ATTACHMENTS SAMPLE.

DCC TO ISSUE DCN NO. TO ALL APPROVED NEW/REVISED SPECS.



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GENERAL DCC PROCEDURE



PowerSilicon, Inc.

PSI TRAINING PROCESS

