

OBJECTIVE

The objective of this Report is to provide customers with a brief description of ANADIGICS' Environmental Management System (EMS), including key initiatives currently underway. It also provides general information on material composition of ANADIGICS' products and their accompanying packing & shipping items as it relates to controlled, restricted and materials of interest.

INTRODUCTION

ANADIGICS' EMS encompasses a broad spectrum of environmental areas, including social responsibility, Federal, State and Local regulatory obligations, and compliance to worldwide product composition and manufacturing guidelines.

Increasingly, customers are showing interest in the materials that are contained in the components they purchase from ANADIGICS for subsequent incorporation into their products. Throughout the past year, ANADIGICS has received numerous customer inquiries on this topic and, in an effort to ensure consistency in response rather than supplying essentially the same information in different formats, this Report has been proactively prepared as a consolidated response to customer questions.

In order to ensure its chosen approach is in line with industry-wide trends, ANADIGICS has actively embarked on a cooperative effort in the USA on Materials Declaration standardization sponsored by the IPC – Association Connecting Electronics Industries (www.ipc.org). IPC's initiative is synergistic with a global joint effort currently being carried out by EIA – Electronic Industries Alliance (www.eia.org), EICTA – European Information, Communications and Consumer Electronics Technology Industry Associations (www.eicta.org), and JGPSSI – Japanese Green Procurement Survey Standardization Initiative, a workgroup of the Japanese Electronics and Information Technology Industries Association – JEITA (www.jeita.or.jp).

ANADIGICS' ENVIRONMENTAL AND QUALITY MANAGEMENT SYSTEMS

ANADIGICS' environmental commitment is the main driver for implementing, improving and assuring adequate EMS performance. This commitment represents the social responsibility of the company's top management, who reviews on a regular basis the organization's performance against its environmental objectives, as well as redirects programs, if necessary, to meet changing conditions.

ANADIGICS' EMS requires the participation of the entire organization and it includes critical inputs from various segments of the company. The EMS elements, such as compliance to Federal, State and Local regulations, management of media specific environmental treatment systems, management of product composition, and meeting the targets of pollution prevention initiatives, are conducted in a systematic manner by respective segments of the organization under the direction of the Environmental, Health & Safety function (EHS).

The EHS function and a team of support personnel conduct internal audits of the system on a periodic basis to ensure performance, set objectives and to identify opportunities for continuous improvement.

Currently, ANADIGICS is focusing on several key improvement projects. Please note that the future tracking mechanism of these and other initiatives will be our ISO 14001 communication program. The initiatives are summarized below:

- **RoHS Compliance**

RoHS (Restriction of Hazardous Substances) compliance relates to Europe's DIRECTIVE 2002/95/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL, which outlines the restriction of the use of certain hazardous substances in electrical and electronic equipment.

Environmental Management System

The RoHS directive is a law that is scheduled to go into effect in July 1st 2006 across at least 15 countries. Because of the wide acceptance of RoHS in Europe, and parts of Asia, ANADIGICS has taken the initiative to ensure compliance to this directive and its timelines.

In general, RoHS restricts the use of the following materials at the noted concentration thresholds:

RoHS Compliant

Products containing less than 1,000 ppm of the following materials:

- Lead
- Mercury
- Cadmium (<100 ppm level)
- Hexavalent Chromium (Cr+6)
- Polybrominated Biphenyls (PBBs)
- Polybrominated Diphenylethers (PBDEs)

For more detailed information about ANADIGICS' RoHS compliance program please refer to the document entitled "Restriction of Hazardous Substances – Compliant Product Conversion" (<http://www.anadigics.com/quality/index.html>).

• Pollution Prevention/Waste Minimization

ANADIGICS has targeted a propanol reclamation program for 2004. The goal is to achieve 80% reuse of this waste stream. The intention is to conserve natural resources while simultaneously reducing operating costs.

A reduction program for N-Methyl - 2- Pyrrolidone (NMP) will also be implemented which will result in quarterly use reductions and compliance with regulations that require this pollution prevention activity.

• Wastewater Treatment System Improvements

ANADIGICS maintains state-of-the-art wastewater treatments systems in order to achieve compliance to US Clean water Act NPDES limits. Several improvement projects are planned for this year and are anticipated to improve system performance and reduce operating costs.

• ISO Registrations

While ANADIGICS is aggressively pursuing third-party registration of its EMS to the international standard ISO14001 in 2004, several requirements of that standard have already been integrated with its mature Quality Management System (QMS).

Registered to the international standard ISO9001 since 1993 – the first Gallium Arsenide (GaAs) integrated circuit company to achieve such certification, ANADIGICS has established proactive measures regarding environmental issues in the areas of technology & product development, supply chain management, and control of incoming purchased materials.

• Other Initiatives

ANADIGICS is also implementing a use reduction program for water and energy. This program will include an initial baseline study and a subsequent utility use reduction program. The program will conserve natural resources and result in lower operating costs.

Lastly, a community outreach program is slated for 2004. The focus will be local activities that can benefit the schools or other local organizations in need.

ANADIGICS' FEDERAL, STATE AND LOCAL REGULATORY PROGRAMS

The following summarizes ANADIGICS' EMS main initiatives regarding regulatory programs:

• RCRA Large Quantity Generator Hazardous Waste Programs

Similar to most electronics manufacturers, ANADIGICS' operations necessitate compliance with *Resource Conservation and Recovery Act* (RCRA) Large Quantity Generator Requirements. ANADIGICS complies with the associated manifesting/tracking, record keeping, EPA ID permit, accumulation, labeling, reporting, treatment, disposal, emergency response, training and other related requirements.

• EPCRA Reporting Programs

ANADIGICS complies with the *Federal Emergency Planning and Community Right to Know Act* (EPCRA) in addition to the applicable State and Local elements. This program includes compliance to all appropriate reporting requirements specified under Sections 302, 304, and 312, emergency response requirements of section 303, Tier 1 and Tier 2 chemical inventory filings requirements of section 311 and Toxic Release Inventory (TRI) requirements of section 313.

• Air Quality/Permitting and Abatement Programs

ANADIGICS fulfills its *Clean Air Act* responsibilities and related State rules through a comprehen-

sive program that includes appropriate permitting, tracking, sampling, annual reporting, and maintaining a solvent abatement system. The solvent system treats emissions of certain solvents into the atmosphere through activated carbon. The system is carefully maintained and monitored. The air compliance program exceeds applicable requirements.

- **National Pollution Discharge Elimination (NPDES) Permitting and Abatement Programs**

ANADIGICS complies with NPDES through New Jersey's Pollution Discharge Elimination System (NJPDDES) requirements that exceed all Federal rules. Due to flow volumes, the facility is considered a State Significant Indirect User (SIU), and, as such has obtained the appropriate SIU permit. Under the permit, all facility industrial wastewater is subject to stringent treatment prior to discharge to the Publicly Owned Treatment Works (POTW). Specifically, state-of-the-art ion exchange technologies coupled with ultra-filtration, centrifugation, and neutralization are utilized to meet the stringent SIU wastewater limits.

- **Pollution Prevention and Waste Minimization Programs**

ANADIGICS complies with National and State Pollution Prevention initiatives by making it a high level priority to continually strive to reduce hazardous waste generation through product substitution, and a wide array of recycling, reusing, process upgrade and treatment techniques. All required pollution prevention filings are submitted to appropriate agencies on a yearly basis.

- **Resource Conservation and Recovery Act (RCRA)**

As a large quantity generator, ANADIGICS maintains the applicable EPA registration and complies with its requirements. Specifically, all manifesting, tracking and record keeping is performed on a routine basis, annual training is conducted, accumulation and storage requirements are adhered to and biannual reports are properly filed. In addition, ANADIGICS strives for waste reduction, recycling, and reuse, where appropriate.

- **Emergency Response and Fire Prevention Systems**

A qualified team of ANADIGICS employees participates in an Emergency Response Team (ERT) at the main manufacturing facility. In the event of an

emergency, these highly trained team members are capable of participating in chemical spill cleanup, fire/gas evacuation procedures and first aid/CPR. The ERT is an active unit within the company that meets regularly to conduct drills and to continually improve procedures. The facility maintains state-of-the-art emergency gas and fire detection equipment. The fire prevention system is equipped with smoke and heat detectors throughout the building and manufacturing areas, and in HVAC ductwork. This system is tied to an automated central station monitoring system for Police and Fire department notification, with automatic sprinkler systems installed in the entire building.

ANADIGICS Wafer Fabrication area has additional life safety systems, including the following:

1. Toxic gas monitoring system configured for the detection of Hydride, Mineral Acid, Chlorine and other gases. The system utilizes sample tubing installed in and around the area these gases are used. Building alarms and strobes are activated once the detection limit is exceeded.
2. High sensitivity smoke detection system installed in all return air chases of the Wafer Fabrication area. Smoke detection activates building fire system alarms and strobes. Central station dispatches Fire and police departments.
3. CO₂ fire suppression - All wet chemical benches and wet chemical processing equipment are protected with a central CO₂ fire suppression system. Activation of the system is through manual and automatic methods. Manual activation is through the use of local pull stations. Automatic activation is through the use of dual wavelength infrared detectors and heat sensors installed in each tool or system above and below work surfaces. Activation of the system triggers building fire system alarms and strobes. Central station monitors dispatch Fire and Police departments.

In addition, state-of-the-art fire suppression automatically provides fire protection based on the sensing equipment.

- **Environmental Exposure**

Recently, ANADIGICS moved from the original building where manufacturing operations began in 1988 to a 150,000 square foot, state-of-the-art

Environmental Management System

manufacturing facility. Certain State regulations require environmental investigation upon decommissioning a manufacturing facility. As such, ANADIGICS has performed all appropriate investigations and remediation and has received clean status from the New Jersey Department of Environmental Protection (NJDEP) with respect to the former operating facility.

MATERIAL COMPOSITION DECLARATION

ANADIGICS is currently participating in an IPC Material Declaration Committee to develop standardized industry guidelines for analytical and reporting purposes. The IPC initiative is utilizing the Joint Industry Material Composition Declaration Guide (EIA/EICTA/JGPSSI) as the primary reference with respect to reporting, with the objective of publishing its findings and associated guidelines in Q3'04. The draft Joint Industry Guide can be found at www.eia.org/resources/2003-09-19_10.pdf.

According to the Joint Industry Guide, materials that require disclosure from manufacturers are classified into two categories, as follows:

- **Level A Materials:**

These are subject to currently enacted legislation that prohibits, restricts or requires reporting of their use. Material specific thresholds range from 75 ppm for Cadmium/Cadmium Compounds to 1,000 ppm (e.g., Hexavalent Chromium, Lead, Mercury, Polybrominated Biphenyls, Polybrominated Diphenylethers). Other listed compounds must be reported if intentionally added at any concentration (e.g., PCBs, Radioactive Substances)

- **Level B Materials:**

These are materials and substances that the industry has determined relevant because they meet one of the following criteria: they are precious metals, significant with respect to EHS interest, would trigger hazardous waste management requirements or could have end of life management issues. The threshold for reporting Level B Materials is 1,000 ppm. Please note that ANADIGICS and many other organizations may not fully agree with the criteria used for the Level B list, specifically as it relates to the need to report precious metals. This

portion of the list is still in draft form for this reason.

ANADIGICS' MATERIAL COMPOSITION DECLARATION APPROACH

ANADIGICS has addressed the Material Composition Declaration issues from three distinct perspectives, as follows:

1. PRODUCTS

The sub-components comprising the basic product construction may include Gallium Arsenide (GaAs) and/or Silicon (Si) die, die attach epoxy, copper leadframe, plastic mold compound, leadframe plating, laminate-based rigid printed boards, and surface mount devices, depending on the type of package (for example: plastic Vs. laminate-based module). For a description of the methodology applied by ANADIGICS to determine its products' material composition, please see APPENDIX 1.

Regarding materials listed in the Joint Industry Guide - and to the best of ANADIGICS' current knowledge, the material composition for its products is:

- **Level A Materials:**

Based on *calculated* data and a representative amount of quantitative analysis (hereon referred to as *measured*), ANADIGICS is aware of only one Level A material (Lead) in its products at or above the noted thresholds. In the majority of the pre-RoHS parts, Lead is present above the 1,000 ppm threshold. The sub-material where Lead is found is the interconnect solder at 80% Sn 20% Pb ratio, as summarized in Table 1.

- **Level B Materials:**

See Table 2.

Table 1: Level A Materials in ANADIGICS' Products ⁽¹⁾

Level A Materials (intentionally added and greater than 1,000 ppm or other threshold value)	Description of Use	Location In Product	Range of Anticipated Concentrations in Pre-RoHS Parts (in ppm)
Lead ⁽²⁾	Interconnect solder in 80% Sn 20% Pb ratio	May be found in lead terminal plating & solder	204 - 5,030

Notes:

(1) If necessary, contact ANADIGICS for more detailed data for a specific part.

(2) When available, RoHS compliant parts will contain negligible amounts of lead (<10 ppm).

Table 2: Level B Materials in ANADIGICS' Products ⁽¹⁾

Level B Materials (intentionally added and greater than 1,000 ppm or other threshold value)	Description of Use	Location In Product	Range of Anticipated Concentrations in Pre-RoHS Parts (in ppm)
Antimony	Heat resistant additive in some epoxy mold compounds	May be found in mold compounds	387 - 32,000
Arsenic	Gallium Arsenide semiconductor substrate	May be found in die substrates	5,000 - 16,900
Gold	Internal bond wires	May be found in bond wire material	1,770 - 6,300
Copper	Electrical interconnects	May be found in lead-frame structure	8,233 - 362,000
Silver	Solder	May be found in lead terminal plating & solder	770 - 8,015

Notes:

(1) If necessary, contact ANADIGICS for more detailed data for a specific part.

Environmental Management System

2. MANUFACTURING PROCESSES

ANADIGICS' products are manufactured in the USA and/or overseas, including wafer fabrication and assembly processes, at operations owned by the company or through subcontracting partnerships.

For manufacturing processes carried out at ANADIGICS' owned operations, the material composition regarding materials listed in the Joint Industry Guide - and to the best of ANADIGICS current knowledge, is as follows:

Level A Materials:

With the exception of Lead, no other intentionally added listed controlled materials are used during the manufacture of ANADIGICS' products.

For manufacturing processes carried out through subcontracting partnerships, ANADIGICS is currently surveying its partners to benchmark their manufacturing processes against the Joint Industry Guide. Should any Controlled Materials be identified, ANADIGICS and its partner(s) will endeavor to develop plan(s) to meet the standards as set forth in the Joint Industry Guide and/or any other applicable industry-standards/guidelines.

3. PACKING/SHIPPING MATERIAL

ANADIGICS uses packing/shipping items comprised of environmentally compatible materials, portions of which can be recycled, easily disposed of, or reused. Applicable elements of EU Directive 94/62/EC on Packaging are adhered.

CONTACT INFORMATION

For additional information on this report and its subsequent Revision(s), please contact ANADIGICS Sales (www.anadigics.com/sales-contact.html).

NOTICE

The information in this report is deemed reliable, but not guaranteed; it may be amended or updated by ANADIGICS without prior notice. ANADIGICS strongly recommends that customers confirm that the information is current and accurate.

APPENDIX 1

PRODUCT MATERIAL COMPOSITION DETERMINATION

In order to obtain the necessary material composition data for its parts, ANADIGICS implemented the methodology described next. Initially, a complete part matrix was developed. The parts were then categorized (i.e., 4mm X 4mm laminate-based modules with a certain die size, SOIC plastic parts, etc.) based on materials used, known weights, design characteristics and overall size. Next, the parts that represent a worst-case scenario for a given category were selected as the "parent parts". Parent Parts represent the worst-case concentrations for the associated parts in a given category. For each Parent Part, a calculated material composition sheet was prepared. Selected Parent Parts were subjected to quantitative analysis for confirmation purposes.

The analytical process was carried out by an independent lab and included three basic steps:

1. Grinding
2. Extraction/digestion
3. Analysis.

To allow for digestion or extraction of the targeted compound, the part is ground and sieved to a fine

sand-sized particle (approximately 0.25mm). The grinding procedure is in alignment with the ICP - Material Declaration Team's recommendations for analysis. The ICP document is in draft form at the writing of this Report.

Following grinding, the prepared sample is subjected to digestion/extraction and analyzed for each of the RoHS specified materials in addition to selected level B materials which could potentially be in the part.

The extraction/digestion and analytical techniques applied includes EPA recommended methods or other accepted industry standards. Method detection limits are designed to be sufficient to confirm absence of targeted compound or that the compound exists only as a background constituent. The combined calculated/measured data was used to make sound material declarations. Moving forward, ANADIGICS plans to deploy a similar approach for determining the material composition of RoHS compliant parts, as they become available.



ANADIGICS, Inc.

141 Mount Bethel Road
Warren, New Jersey 07059, U.S.A.
Tel: +1 (908) 668-5000
Fax: +1 (908) 668-5132

URL: <http://www.anadigics.com>
E-mail: Mktg@anadigics.com

IMPORTANT NOTICE

ANADIGICS, Inc. reserves the right to make changes to its products or to discontinue any product at any time without notice. The product specifications contained in Advanced Product Information sheets and Preliminary Data Sheets are subject to change prior to a product's formal introduction. Information in Data Sheets have been carefully checked and are assumed to be reliable; however, ANADIGICS assumes no responsibilities for inaccuracies. ANADIGICS strongly urges customers to verify that the information they are using is current before placing orders.

WARNING

ANADIGICS products are not intended for use in life support appliances, devices or systems. Use of an ANADIGICS product in any such application without written consent is prohibited.