



International Association for Radio, Telecommunications and Electromagnetics, Inc.
840 Queen Street – New Bern, NC 28560 - 1-800-89-NARTE - Fax 1-252-672-0111 - www.narte.org

EMC Design Engineer & Senior EMC Design Engineer Certification Application Package

---A Joint Development of iNARTE and KEC---

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About iNARTE/KEC EMC Design Engineer Certification

NARTE was established by industry leaders in 1982 in response to the FCC's deregulation and encouragement of industry certified personnel. NARTE developed an evaluation process based not only on examination, but real world skills and work experience.

Early in 1987, it was determined that a credential certification process for EMC engineers and technicians was needed to help improve the quality of direct technical support to the Naval Air Systems Command (NAVAIR) and eventually to the U.S. Navy. In addition to improving the technical quality of support, certification, as a recognized standard, provides a demonstrable benchmark to differentiate qualified EMC/EMI personnel. In 1998 NARTE and KEC Electronic Industry Development Center, Japan, (KEC), signed an Agreement for cooperation in the certification of EMC engineers and technicians in Japan based upon similar sets of credentials. In 2010 KEC and US industry representatives requested iNARTE to develop a credentialing program specifically for engineers tasked with incorporating EMC principles in designing electronic circuits, components and systems. The purpose of the EMC Design Engineer Certification Program is to foster technical "excellence" in EMC compliance design as compared to EMC test and mitigating engineering. This approach establishes technical competency criteria for EMC compliance design and enforces these criteria for technical personnel performing electronic design work. The program benefits the individual engineer and the EMC community as a whole by establishing a standard of excellence in EMC design engineering that will endure and extend across the boundaries of private and government agencies around the globe. The EMC Design Engineer certification program has been developed in equal partnership with KEC, who represents the interests of 214 Japanese Corporations.

EMC Design Engineer Certification is a four-step process based on education, work experience, peer endorsement and examination. Educational requirements for engineers include graduation from an accredited curriculum in engineering. A number of years of direct work experience in the field is required. Peer and supervisory endorsements are used to substantiate the credibility of the candidate.

Examinations are confined to the area of EMC design essentials. The target of the examination is to establish that a candidate has a broad knowledge in EMC design principles. Detailed information regarding the EMC Design Engineer and Senior EMC Design Engineer examinations are available on Pages 3 and 4 of this package. Submission of the application form implies agreement to adhere to the **iNARTE Code of Ethics**, available from iNARTE HQ or online at <http://www.narte.org/h/codeofethics.asp>



EMC DESIGN ENGINEER Certification Criteria

1. Complete the EMC Design Engineer Application Form (Page 7) and submit a **non-refundable** test or application fee, available at <http://www.narte.org/h/fees.asp>. Submission of the application form implies agreement to adhere to the iNARTE Code of Ethics. Available at: <http://www.narte.org/h/codeofethics.asp>
2. Provide a specific record of education and electronic design work experience. Provide an up-to-date resume or complete the EMC Design Engineering Work History Form (Pages 8-9).
 - a) Graduation from an iNARTE-approved bachelor degree engineering curriculum, (e.g. BSEE), shall be considered as sufficient required experience.
 - b) Graduation in a physical science curriculum other than engineering, combined with related work experience, will be evaluated by iNARTE.
 - c) Graduation from a college with a BSET in Engineering Technology (BSET) shall be considered depending upon the course curriculum completed
 - d) Graduation in a curriculum other than engineering or physical science, combined with related work experience, will be evaluated by iNARTE.
 - e) The completion of five (5) years of EMC design work experience shall be considered as sufficient work experience without regard to educational achievements.
 - f) Undergraduates may attempt the examination and if successful will be awarded an Associate Certification pending final graduation.
3. Provide evidence of education and training.

Official school transcripts are required. Photocopies of applicable training certificates may be submitted.
4. References: Using the iNARTE reference forms (Pages 10-11), submit a minimum of 1 academic, (faculty member), reference or 1 supervisory reference supporting character and competency as an EMC Design Engineer. Reference forms must be signed and forwarded directly to iNARTE.
5. Compose 2 multiple choice questions with correct answers and supporting references. Original questions submitted prior to examination will be evaluated and suitable questions will be awarded 1 point credit toward the final examination score. Questions submitted after the examination will not be credited with examination points.
6. Pass the EMC Design Engineer examination with an average 70% grade.

SENIOR EMC DESIGN ENGINEER Certification Criteria

1. Complete the Senior EMC Design Engineer Application Form (Page 7) and submit a **non-refundable** test or application fee, available at <http://www.narte.org/h/fees.asp>. Submission of the application form implies agreement to adhere to the iNARTE Code of Ethics. Available at: <http://www.narte.org/h/codeofethics.asp>.
2. Provide a specific record of education and electronic design work experience employing EMC principles. Provide an up-to-date resume or complete the EMC Design Engineer Work History Form (Pages 8-9).
 - a) Completion of a minimum of three (3) years practical design engineering work after having been certified as an iNARTE/KEC EMC Design Engineer
 - b) Graduation from an iNARTE-approved bachelor degree engineering curriculum, (e.g. BSEE), followed by four (4) years practical design engineering work experience
 - c) Graduation in a physical science curriculum other than engineering, followed by four (4) years practical design engineering work experience will be evaluated by iNARTE.
 - d) Teaching: EMC design engineering teaching of a character satisfactory to iNARTE may be considered as a maximum of two years experience.
3. Provide evidence of education and training.

Official school transcripts are required. Photocopies of applicable training certificates may be submitted.
4. References: Using the iNARTE reference forms (Pages 10-11), submit a minimum of 1 supervisory reference and 2 additional peer references each supporting character and competency as an EMC Design Engineer. Reference forms must be signed and forwarded directly to iNARTE.
5. Compose 5 multiple choice questions with correct answers and supporting references. Original questions submitted prior to examination will be evaluated and suitable questions will be awarded 1 point credit toward the final examination score. Questions submitted after the examination will not be credited with examination points.
6. Pass the Senior EMC Design Engineer examination with an average 70% grade..



Preparing for the iNARTE/KEC EMC Design Engineer and Senior EMC Design Engineer Examinations

Coordination & Procedures

How?

Applicants can approach iNARTE/KEC certification as an EMC Design Engineer or Senior EMC Design Engineer as a one stage or two stage process. The one stage process involves the payment of a single fee to cover both examination and file preparation for registration and certification. The two stage process allows applicants to attempt the examination before proceeding to certification. Applicants who select the two stage process will not have the option of examination credit for original questions submitted prior to examination.

Where?

iNARTE has testing centers at over 180 locations in the US and at authorized facilities worldwide. iNARTE also administers the certification at the IEEE EMC Society Symposium annually. If no testing location is near you, iNARTE will coordinate an examination session at your workplace. Contact iNARTE at 1-800-89-NARTE for locations or see the test center listing online at <http://www.narte.org/h/testcenters.asp>

When?

Most test locations will coordinate an appointment upon request. Indicate your preferred testing dates on your application form. Once your (Senior) EMC Design Engineer Certification application fee (or testing fee) is received, iNARTE will effect the necessary coordination and arrangements for a date, time, location and point of contact.

What?

The examination for EMC Design Engineers or Senior EMC Design Engineers is six hours duration in two three hour sessions. Examinations are closed book (see exam strategy below). Examinations are graded at iNARTE Headquarters and the applicant will be advised of a pass/fail within 10 working days. Passing score is 70%. Should a candidate fail the examination, a retake is permissible following a 90 day period. Examinations may be retaken any number of times, however, an examination processing fee is required each time the exam is taken, (see <http://www.narte.org/h/fees.asp>).

Basic Exam Strategy

The iNARTE/KEC (Senior) EMC Design Engineer examination is closed book. Study/reference materials or laptop computers are not allowed in the examination room. Applicants may bring a self made letter or A4 size notebook of approximately 1cm thickness and a scientific calculator only.

The EMC Design Engineer Exams consists of two parts. Part 1 contains 30 questions that should all be attempted. Part 2 consists of 40 questions, 30 of which should be attempted. Review all questions in Part 2, then answer those you are most sure of first.

You will be graded on the first 30 questions you answer in Part 2. For example: if you answer all questions, numbered 1 through 40, you will be graded on questions 1 through 30 only.

Examination Subjects

Category	EMC Design Engineer Level	Senior EMC Design Engineer Level
EMC Countermeasures & Components	Application	Expertise
EMC Design & Design Review	Expertise	Expertise
EMC Simulation & Rule Check	Application	Expertise
Signal Integrity & Power Integrity	Application/Basic	Expertise
Electronics Circuits & Power Electronics	Basic	Expertise/Application
Basic EMC Knowledge	Expertise	Expertise
Terminology	Expertise	Expertise
Mathematics	Basic	Basic
Electromagnetics & Shielding	Application	Expertise
Electrical Circuit Theory	Application	Expertise
Measurement & Analysis	Basic	Application
Specifications and Standards	Basic	Basic



Suggested EMC Design Engineer Reference Titles and Study Materials

NOTE: This list is suggested but not all inclusive. **Bold titles** indicate primary reference materials.

1. **Reference Data for Engineers: Radio, Electronics, Computer and Communications**, Howard W. Sams Co., Inc., Indianapolis/Kansas City/New York, Seventh Edition, 1988.
2. **ANSI/IEEE STD 100: IEEE Standard Dictionary of Electrical and Electronic Terms**, IEEE, 1984.
3. Paul, Clayton R., **Introduction to Electromagnetic Compatibility**, New York, John Wiley & Sons, Inc.,
4. Kraus, John D., **Electromagnetics**, McGraw Hill, 1986
5. Kraus, John D., **Antennas**, McGraw-Hill Book Co., Inc., New York, NY
6. Howard W. Johnson & Martin Graham, **High-Speed Digital Design** – A Handbook of Black Magic, Prentice Hall
7. V. Prasad Kodali, **Engineering Electromagnetic Compatibility**, 2nd Edition, IEEE Press, NY
8. Mark I. Montrose, **Printed Circuit Board Design Techniques for EMC Compliance** 2nd Edition, IEEE Press, 2000
9. ELEC*MIL-STD-463 - DEFINITIONS AND SYSTEM OF UNITS, ELECTROMAGNETIC INTERFERENCE AND TROMAGNETIC COMPATIBILITY.
10. *MIL-STD-1310H, SHIPBOARD BONDING, GROUNDING, AND OTHER TECHNIQUES FOR ELECTROMAGNETIC COMPATIBILITY AND SAFETY
11. *MIL-HDBK-237 Rev D - ELECTROMAGNETIC COMPATIBILITY MANAGEMENT GUIDE FOR PLATFORMS, SYSTEMS AND EQUIPMENT.
12. *MIL-HDBK-419A - GROUNDING, BONDING AND SHIELDING FOR ELECTRONIC EQUIPMENT AND FACILITIES
13. NAVAIR AD 1115, *EMC Design Guide for Avionics and Related Ground Support Equipment*.
14. EMC, Telecom and Computer Encyclopedia Handbook, emf-emi contol, Inc., Warrenton, VA 20187, 1999.
15. Gnecco, Louis T, MSEE, *Problems and Solutions in Wireless Communications and Electromagnetic Compatibility*, Tempest, Inc., Herndon, VA, February 1999. See order form, Page 5



Application Instructions

- 1. APPLICATION (Page 6):** Complete the application form and submit to iNARTE with the non-refundable certification application fee or non-refundable examination only application fee, (<http://www.narte.org/h/fees.asp>). When application and fees are received, iNARTE will begin to compile the application file and/or schedule testing. **Upon signing the application form, you agree to abide by the iNARTE Code of Ethics as printed in the iNARTE Membership Handbook and online at <http://www.narte.org/h/codeofethics.asp>**
- 2. TESTING:** iNARTE will coordinate the necessary arrangements for a testing date and time at the location chosen by applicant. Authorized Test Center listings are available from iNARTE HQ or online at <http://www.narte.org/h/testcenters.asp>. Examinations are graded at iNARTE Headquarters and the applicant will be advised of a pass/fail within 10 working days by mail or they may call Headquarters for their results. Passing score is 70%. Should a candidate fail the examination, a retake is permissible following a **90 day** period. Examinations may be retaken any number of times, however, an examination processing fee is required each time the exam is taken.
- 3. DETAILED WORK HISTORY FORM (Pages 7-8):** Provide detailed evidence of education and experience in the appropriate field using a current resume, or the iNARTE Detailed Work History Form. College education/degrees requirements will be based on review of official transcripts.
- 4. REFERENCES (Reference Form Pages 9-10):** Initiate action with those individuals who will serve as references. Using the reference form provided (**Pages 9-10**), these individuals must attest to the applicant's competency at the certification level requested and also serve as character references. For Senior EMC Design Engineers, one Reference must be from a supervisor. Reference forms should be sent directly to iNARTE.
- 5. EVIDENCE OF EDUCATION & TRAINING:** Evidence of completing courses of study or training programs in related areas as offered by educational institutions and/or through internal corporate training programs are given consideration as part of certification. Official school transcripts may be required for experience credit. Photocopies of applicable training certificates may be submitted.
- 7. QUESTIONS (Page 11):** Submit original multiple choice questions with correct answers and supporting references. Questions which relate to real world workplace engineering situations are preferred. Questions must conform to the format outlined on the iNARTE question form (**Page 11**).

Notes about the Application Process

- Once any component of your application package is received, NARTE will begin to compile your file.
- You will receive updates on the progress of your application by mail every 6 weeks, or you may contact us to check on the status of your file at **1-800-89-NARTE**.

Application Checklist

- Application
- Fee (non-refundable)
- Detailed Work History
- 1 Academic reference
or
- 1 Supervisor reference
- 2 Peer references
- 2 Questions
Or
- 5 Question
- Transcripts/certificates

- Once the application form and fees are received, iNARTE will initiate examination scheduling.
- Reference forms should be sent *directly* to iNARTE from the reference provider by mail or **fax at 1-252-672-0111**.

All application materials should be sent to **iNARTE, 840 Queen Street, New Bern, NC 28560**

Forms may be faxed to 252-672-0111, Contact iNARTE with any questions at 1-800-89-NARTE

This program was developed in equal partnership with KEC, Japan





APPLICATION for (Senior) EMC DESIGN ENGINEERING CERTIFICATION
**INTERNATIONAL ASSOCIATION FOR RADIO
 TELECOMMUNICATIONS AND ELECTROMAGNETICS, INC.**
 840 Queen Street, New Bern, NC 28560 1-800-89-NARTE or (252) 672-0200

FOR OFFICE USE ONLY	
Certification Number: _____	Date: _____
Test Type: _____	Score: _____

Name _____
(First) (Middle Initial) (Last)

Name _____
(As to be shown on Certificate)

Address _____

City _____ State _____ Zip _____ Citizen of _____

Phone (Work): _____ (Home) _____

Date of Birth _____ Sex M F Email: _____

Requested Test Center: _____ Test Month/Date Requested: _____
See listing at <http://www.narte.org/h/testcenters.asp>

I hereby make application for iNARTE/KEC certification as an EMC Design Engineer, or
 Senior EMC Design Engineer

I hereby authorize iNARTE, in accordance with iNARTE's privacy policy www.narte.org/h/privacy.htm to publish my name, city, state, country and any certification it may issue to me in all of its directories or registries. In addition, iNARTE is authorized to confirm my certification to inquiries on my behalf. I have read and agree to abide by the iNARTE Code of Ethics as published at www.narte.org/h/codeofethics.asp.

 Signature of Applicant Date _____

References

	Name	Telephone Number
1.	_____	_____
2.	_____	_____
3.	_____	_____

Payment Non-refundable application or examination fee, (see <http://www.narte.org/h/fees.asp>).

Check enclosed Charge: _____

MC VISA AMEX CVV # Exp. Date

 Signature



Additional Contributions: Include title and dates of any published papers; recognized contributions to the Scientific or Engineering profession; contributions to technical or engineering courses in a "school of recognized standing".

TECHNICAL/PROFESSIONAL AWARDS

TECHNICAL/PROFESSIONAL LICENSES

PROFESSIONAL SOCIETY AFFILIATIONS & GRADES OF MEMBERSHIP

Applicant's Signature

Date





INTERNATIONAL ASSOCIATION FOR RADIO TELECOMMUNICATIONS AND ELECTROMAGNETICS, INC. 840 Queen Street, New Bern, NC 28560 Phone: (252) 672-0200. Fax (252) 672-0111

Applicant's Name _____

Address: _____

Date: _____

Dear _____ (Name of Reference)

I have applied for certification in the field of EMC Design Engineering, and request that you serve as one of the references on my application. If you are willing to do so, please provide the information requested on this form and return the form to iNARTE at 840 Queen Street, New Bern, NC 28560. The certification requirements for EMC Design Engineer and Senior EMC Design Engineer are quoted below and I have enclosed a copy of my education and work experience.

Thank you for your help. Please send the completed forms to iNARTE at your earliest convenience. iNARTE will not process my application until all references submit their forms.

Signature of Applicant _____ Date of Application to iNARTE _____

REQUIREMENTS FOR CERTIFICATION AS AN EMC DESIGN ENGINEER

- Graduation from a Bachelor Degree curriculum in an appropriate engineering discipline, or: Graduation from a Bachelor Degree curriculum in any other discipline approved by iNARTE, or: Completion of five (5) years of work experience using EMC principles in Design Engineering
• Satisfactory performance on a written exam in EMC Design Engineering fundamentals as administered by iNARTE.

REQUIREMENTS FOR CERTIFICATION AS A SENIOR EMC DESIGN ENGINEER

- 3 years of EMC Design Engineering experience following certification as an EMC Design Engineer, or: 4 years of EMC Design Engineering experience following graduation from an iNARTE approved Bachelor Degree curriculum
• Satisfactory performance on a written exam in EMC Design Engineering fundamentals administered by iNARTE.

Acceptability for study at schools approved by iNARTE are based on the schedule below.

Table with 3 columns: Education, Curriculum, and Acceptability. Rows include various education levels like 1-4 years undergraduate, BS, BSET, BS/BA, Postgraduate study, Teaching and their corresponding curriculum and acceptability status.

*Experience records will be reviewed by iNARTE. The mere execution of work designated by an EMC Engineer or the supervision of such work is not considered to be the practice of engineering.



**iNARTE/KEC EMC DESIGN ENGINEER & SENIOR EMC DESIGN ENGINEER CERTIFICATION
REFERENCE FORM Page 2– This Form May Be Duplicated**

Name of Applicant _____

Do you know the applicant well? _____ Casually? _____ How Long? _____

What is your professional/academic relationship to the applicant? _____

Is the applicant an undergraduate following a curriculum suitable for an EMC Design Engineer: Yes No

Is the applicant a graduate from a Bachelor Degree curriculum suitable for an EMC Design Engineer: Yes No

Has the applicant been engaged as an EMC Design Engineer for one year prior to “Date of Application”? (Candidate may be eligible for certification even if they are not currently practicing their craft.)

Check the areas for which this applicant qualifies:

_____ EMC Design Engineer _____ Senior EMC Design Engineer

Please evaluate the applicant in the space below:

ENG	Sr. ENG	
_____	_____	Exceptionally well qualified
_____	_____	Well qualified
_____	_____	Marginally qualified
_____	_____	Unqualified (explain below)
_____	_____	Number of year's practical experience (Based on your personal knowledge)

Engineer or Senior Engineer? The EMC Design Engineer credential is a basic level validation of an applicant’s ability to apply EMC principles to their design engineering tasks. Design Engineers may be recent graduates or new recruits to industry.

Senior EMC Design Engineers will have a minimum of three years practical work experience with design engineering responsibility, in which they routinely apply EMC design for compliance principles.

Additional comments:

Your name (print) _____

Your business or affiliation _____

Your street address _____

Signature

Date





**INTERNATIONAL ASSOCIATION FOR RADIO
TELECOMMUNICATIONS AND ELECTROMAGNETICS, INC.**

840 Queen Street, New Bern, NC 28560 Phone: (252) 672-0200. Fax (252) 672-0111

EMC DESIGN ENGINEER CERTIFICATION QUESTION SUBMISSION FORM

The following format must be used. Questions must be submitted as "Word" compatible documents.

SAMPLE QUESTION

(Try to avoid any possible misinterpretations of the question. If question is negative, i.e., "Which item does **NOT** include the following?, the **NOT** should be bolded and capitalized.)

1. **Question:** The power dissipated on a resistor of 100 Ω connected across 10 V is _____.

2. **Answers:** (Only 4 answers) {Include all calculations if the answer is calculated}

- A. 1 W
- B. 30 dBmW
- C. 0 dBW
- D. All of the above

3. **Correct Answer:** D

4. **Applicability** Design Engineer Sr. Design Engineer Both

5. **Time required answering the question:** 3 Minutes

6. **Reference(s)** Ohm's Law and mathematics

7. **Category** (From list below) Electrical Circuit Theory

CATEGORIES OF EMC DESIGN ENGINEER QUESTIONS

In order of preference

EMC Design
EMC Countermeasures
EMC Basic Knowledge
Terminology
Countermeasure Components
EMC Simulation
EMC Rule Check
Design Review
Signal Integrity

Power Integrity
Power Electronics
Electronics Circuitry
Electrical Circuit Theory
Electromagnetics
Shielding
Measurement and Analysis
Specifications & Standards
Mathematics

Notes on Question Content

- The questions you submit must be in your own words.
- Questions which relate to real-life work situations or problems are desirable (see example above).
- Questions should be challenging, yet answerable by a knowledgeable and experienced EMC Design Engineer.
- Your questions should be geared toward the certification type for which you are applying, (Engineer or Senior Engineer).

USE THE FOLLOWING PAGE AS YOUR TEMPLATE



Name:

1. Question # :

2. Answers:

- A.
- B.
- C.
- D.

3. Correct Answer:

4. Applicability: Design Engineer Senior Design Engineer Both

5. Time required to answer the question: Minutes

6. Reference(s) (Detailed Calculations, if any, must be shown here)

7. Category:

For TC and Office use only

TC Member's Name & Review Date:

Question Accepted, (Y/N):

Comments:

