Another EMC resource
from EMC Standards

Getting started with practical EMC and EM Engineering some useful resources

Helping you solve your EMC problems

1 Brassey Road, Old Potts Way, Shrewsbury, SY3 7FA T:+44 (0) 1785 660 247 E:info@emcstandards.co.uk

emc4a v1.1

Getting started with practical EMC and EM Engineering – some useful resources –

(most of them free, on-line, links checked/updated 13 May 2021)

Keith Armstrong CEng, FIEE/IET, Senior MIEEE, ACGI, EurIng (Gp1)
phone/fax: +44 (0)1785 660 247
keith.armstrong@cherryclough.com, www.cherryclough.com, www.emcstandards.co.uk

More training courses and textbooks on-line: https://www.emcstandards.co.uk/online-training
Keith's Blog: https://www.emcstandards.co.uk/blog
Linked In: https://www.linkedin.com/in/keith-armstrong-449801172/

1 of 16

emc4a v1.1

Contents

Note: no change record for this updated version, because too many changes

2 of 16

emc4a v1.1

Classic EM Authors (ones that help you understand EM concepts well) (1)

- ***EMC for Product Designers, 5th edition***, Tim Williams, Newnes, 2017, ISBN 978-0-08-101016-7, https://www.emcstandards.co.uk/emc-for-product-designers
- ***Design Techniques for EMC***, Keith Armstrong, EMC Compliance Journal, 1999 and 2006 versions, Keith Armstrong, ISBN 978-0-9555118-4-4, https://www.emcstandards.co.uk/emc-design-techniques
- ***EMC for Systems and Installations,*** Tim Williams and Keith Armstrong, Newnes 2000, ISBN 0-7506-4167-3, https://www.emcstandards.co.uk/emc-for-systems-and-installations2
- ***EMI Troubleshooting Cookbook for Product Designers***, André and Wyatt, SciTech, 2014, The IET, ISBN 978-1-61353-019-1, https://digital-library.theiet.org/content/books/ew/sbew510e
- ***Pocket Guides***, by Kenneth Wyatt: www.amazon.com/Kenneth-Wyatt/e/B00SNQ1LJ2/ref=dp_byline_cont_book_2
- ***Publications by Kenneth Wyatt***, https://interferencetechnology.com/author/kennethwyatt/
- ***Electromagnetic Compatibility Engineering***, Henry Ott, Wiley, 2009, Print ISBN:9780470189306, Online ISBN:9780470508510, https://onlinelibrary.wiley.com/doi/book/10.1002/9780470508510
- ***EMC Made Simple***, Mark Montrose, ISBN 978-0-9891032-0-6, https://montrosecompliance.com/publications/emc-books/
- ***The First 500 Banana Skins***, five hundred stories of real-life EMI incidents, compiled by Keith Armstrong, https://www.emcstandards.co.uk/the-first-500-banana-skins-compiled-by-keith-ar

3 of 16

emc4a v1.1

Classic EM Authors (ones that help you understand EM concepts well) (2)

- ***High Frequency Measurements and Noise in Electronic Circuits***, Douglas C Smith, ISBN 0-442-00636-5, Kluwer Academic Publishers, 1993, https://emcesd.com/hfmbook.htm
- ***Robust Electronic Design Reference Book, Volumes I and II***, John R Barnes, Kluwer Academic Publishers, 2004, ISBN: 1-4020-7739-4 (has chapters on EMC design plus a lot more that is useful for electronic designers – it is costly, but 3 inches thick of wonderful information), https://www.springer.com/gp/book/9781402078309, https://www.amazon.co.uk/Robust-Electronic-Design-Reference-Book/dp/1402077394
- ***Fundamentals of Electromagnetic Compatibility, 2nd Edition***, Berend Danker, Bicon Laboratories, https://www.bicon.nl/emc-book.html
- ***Designing Electronic Systems for EMC***, William G Duff, Scitech Publishing, Inc., 2001, ISBN: 978-1-891121-42-5, https://www.amazon.co.uk/Designing-Electronic-Systems-Electromagnetics-Radar/dp/1891121421
- ***The Electromagnetic Compatibility Handbook***, Dr Kenneth L Kaiser, CRC Press 2005, ISBN 0 8493 2087 9, a compilation of approximations, guidelines, models and rules-of-thumb used in EMC analyses, with their sources and limitations, delivered in a Q and A format, https://www.amazon.co.uk/Electromagnetic-Compatibility-Handbook-Circuits-Signals/dp/0849320879
- ***EMC Analysis Methods and Computational Models***, F M Tesche, M V Ianoz and T Karlsson, Wiley 1997, ISBN 0-471-15573-X, all the equations you ever wanted! https://www.amazon.com/EMC-Analysis-Methods-Computational-Models/dp/047115573X

4 of 16

emc4a v1.1

Classic EM Authors (ones that help you understand EM concepts well) (3)

- ***Controlling Radiated Emissions by Design, 3rd Edition***, M Mardiguian, Springer, 2014, ISBN 978-3-319-04771-3, https://www.springer.com/gp/book/9783319047706
- ***Electromagnetic Fields in Electrical Engineering: Understanding Basic Concepts***, P.C.T. van der Laan, Shaker, 2005, ISBN-10: 9042302712, ISBN-13: 978-9042302716, https://www.amazon.co.uk/Electromagnetic-Fields-Electrical-Engineering-Understanding/dp/9042302712
- ***Electromagnetic Compatibility, 2nd Edition***, Mart Coenen & Jasper Goedbloed, Mybusinessmedia, 2010, ISBN 9085720346 and 978908572034, https://books.google.co.uk/books/about/Electromagnetic_Compatibility.html?id=QYeHtgAACAAJ&redir_esc=y
- ***Electromagnetic Compatibility of Integrated Circuits***, Sonia Ben Dhia, Mohamed Ramdani, Etienne Sicard, Springer 2006, ISBN 0-387-26600-3, https://www.springer.com/gp/book/9780387266008
- ***Design of Shielded Enclosures: Cost-Effective Methods to Prevent EMI***, Louis T. Gnecco, Newnes, 2000, ISBN: 978-0-7506-7270-2, https://www.elsevier.com/books/design-of-shielded-enclosures/gnecco/978-0-08-050396-7
- ***EMI Troubleshooting Techniques***, M. Mardiguian, McGraw Hill, 2000, ISBN: 978-0-07134-418-0, https://www.amazon.com/EMI-Troubleshooting-Techniques-Circuit-Solutions-ebook/dp/B002KCFIBC
- ***Trilogy of Magnetics***, a design guide for EMC filters, Switch-Mode Power Supplies and RF Circuits (using magnetic components manufactured by Wurth Elektronik), https://www.we-online.com/web/en/electronic_components/produkte_pb/fachbuecher/Trilogie.php

5 of 16

emc4a v1.1

Theory into practice (conferences and symposia)

- ***IEEE EMC Society virtual and on-line events***, https://www.emcs.org/conferences.html
- ***IEEE International EMC+SIPI Annual Symposia***, https://www.emcs.org/ieee-symposia-schedule.html
- ***IEEE EMC Society Young Professionals events***: https://www.emcs.org/young-professional-events.html
- ***IEEE EMC EMC Chapter Colloquium and Exhibition "Table-Top Shows"***, https://www.emcs.org/exhibitions-and-table-top-shows.html
- ***IEEE EMC Society, Training & Education***, https://www.emcs.org/training.html
- ***EMC Europe Symposium***, http://www.emceurope.org/
- ***EMV Symposium*** (Germany), https://emv.mesago.com/stuttgart/en.html
- ***Asia-Pacific EMC Symposium (APEMC)***, www.apemc2021.org
- ***EMC & Compliance International***, https://www.emcuk.co.uk/
- ***The SUMMA Foundation***, organisers of bi-annual conferences on high-power electromagnetics, HPEM, which includes lightning, HIRF, NEMP, HEMP, Intentional EMI, etc. http://ece-research.unm.edu/summa/

6 of 16

emc4a v1.1

On-line Resources (1)

- Kenneth Wyatt specialises in EMC troubleshooting, near-field and pre-compliance testing, and practical EMC design, and provides many very excellent resources on these topics at: http://emc-seminars.com/
- Many of Tim William's publications on EMC are free from: http://elmac.co.uk/Papers.html
- Most of Keith Armstrong's publications on EMC are free from: www.emcstandards.co.uk
- Keith Armstrong's EMC training courses can be purchased online as PDF coursenotes from: https://www.emcstandards.co.uk/online-training
- Free webinars by Keith Armstrong and others are available from: www.interferencetechnology.com/webinar-series/ or from www.youtube.com/user/InterferenceTech1 including:
  Cost-effective EMC Design by Working with the Laws of Physics ("Your product is trying to help you pass EMC")
  Understanding EMC Basics (i.e. "The Physics of EMC" as a 3 part series)
- ***890 EMI Stories*** ("Banana Skins"), https://www.emcstandards.co.uk/emi-stories
- ***EMC-Related Formulae***, from Robert Richards, http://emc.toprudder.com/formulas2.pdf
- ***Estimating the Overall Emissions from Combinations of Equipment,*** https://www.emcstandards.co.uk/estimating-the-overall-emissions-of-combined-it
- https://www.emcstandards.co.uk/emc-testing
- https://www.emcstandards.co.uk/complying-with-the-emc-directive1

7 of 16

emc4a v1.1

On-line Resources (2)

- ***EMC Standards,*** https://www.emcstandards.co.uk/additional-resources
- ***EMC Testing***, by Tim Williams and Keith Armstrong, EMC Compliance Journal, 2001-2002: https://www.emcstandards.co.uk/diy-emc-testing-series-2001
  this series has 7 parts, Parts 1 and 2 are especially relevant to close-field probing
- ***EMI Pre-Compliance Testing***, Ken Wyatt, Interference Technology magazine, Jan 16, 2020, https://interferencetechnology.com/emi-pre-compliance-testing/
- ***How to Build Your Own EMI Troubleshooting and Pre-Compliance Kit***, Dylan Stinson,March 2, 2020 https://interferencetechnology.com/how-to-build-your-own-emi-troubleshooting-and-pre-compliance-kit/
- ***Clemson University Vehicular Electronics Laboratory, EMC Resources*** (including on-line calculators): https://cecas.clemson.edu/cvel/emc/
- ***Missouri University of Science and Technology, Scholar's Mine***: https://scholarsmine.mst.edu/emc_facwork/
- ***EMI Analyst's 'Toolbox' of EMC Resources*** (including on-line calculators) www.emisoftware.com/toolbox/
- ***RF Café*** a unique portal of RF, microwave, wireless, and other engineering resources, http://www.rfcafe.com/
- **EEWeb, a** suite of free design, verification, and analysis tools https://www.eeweb.com/tools
  Plus, EEweb is the home for experienced and novice designers alike
  to share tips and to ask and answer questions via our forums, https://www.eeweb.com

8 of 16

emc4a v1.1

On-line Resources (3)

- ***Saturn PCB Design Toolkit Version 8.01:*** calculators for: Microstrips; Striplines; Differential pairs; Via currents; PCB trace currents; Planar inductors; Padstacks; Crosstalk; Ohm's Law; XC XL Reactances; BGA Lands; Er Effective; Wavelengths; PPMs, http://saturnpcb.com/pcb_toolkit/
- ***IEEE Xplore digital library***, https://ieeexplore.ieee.org/Xplore/guesthome.jsp
- ***EMC Test Lab Guide,*** https://emcfastpass.com/emc-testing-beginners-guide/emc-test-lab-guide/
- ***Real Time Spectrum-Analyzer Mini Guide***, Interference Technology magazine, 2016, edited by Kenneth Wyatt, https://interferencetechnology.com/wp-content/uploads/2016/10/2016-IT-Real-Time-Spectrum-Analyzer-Guide.pdf
- ***Conducted and Radiated Emissions Testing Application Note,*** https://info.tek.com/www-conducted-radiated-emissions-testing-app-note.html?_ga=2.7789618.1818033532.1565629341-217846865.1564189683
- ***Texas Instruments Power Design Center***, https://tipowerfundamentals.com/
- ***Laird, shielding resources***, https://www.laird.com/resources
- ***International Amateur Radio Union, EMC Resources,*** https://www.iaru-r1.org/about-us/committees-and-working-groups/emc-committee-c7/links-to-emc-resources/
- ***Amateur Radio, ARRL, Organizations Developing Standards and Policies Related to EMC,*** http://www.arrl.org/organizations-working-with-emc-rfi
- ***The SUMMA Foundation***, research notes on high-power electromagnetics (inc. lightning, HPEM, and IEMI), http://ece-research.unm.edu/summa/notes/index.html

9 of 16

emc4a v1.1

On-line Resources (4)

- https://incompliancemag.com/category/standards/
- https://incompliancemag.com/category/resources/
- https://incompliancemag.com/category/fundamentals/
- https://incompliancemag.com/category/testing/
- https://incompliancemag.com/category/design/
- https://incompliancemag.com/magazine/past-issues/
- https://learn.interferencetechnology.com/2020-emc-testing-guide/
- https://learn.interferencetechnology.com/2020-medical-emc-guide/
- https://learn.interferencetechnology.com/2020-iot-wireless-5g-emc-guide/
- https://learn.interferencetechnology.com/2020-emc-fundamentals-guide/
- https://learn.interferencetechnology.com/2019-directory-and-design-guide/
- https://learn.interferencetechnology.com/2020-military-and-aerospace-emc-guide/
- https://learn.interferencetechnology.com/2021-automotive-emc-guide/
- https://learn.interferencetechnology.com/2019-components-and-materials-guide/

10 of 16

emc4a v1.1

On-line Resources (5) – EMC Magazines

- ***The IEEE EMC Society's EMC Magazine***: https://www.emcs.org/emc-magazine.html
- ***Interference Technology magazine***: https://interferencetechnology.com/
  Archive of Guides: https://interferencetechnology.com/digital-publications/
- ***SAFETY & EMC magazine*** (in Chinese): http://www.safetyandemc.com/
- ***Journal of Electromagnetic Waves and Applications***, https://www.tandfonline.com/loi/tewa20
- ***In Compliance magazine***: https://incompliancemag.com/
  Archive of past editions: https://incompliancemag.com/magazine/past-issues/, also…
  https://incompliancemag.com/category/standards/
  https://incompliancemag.com/category/resources/
  https://incompliancemag.com/category/fundamentals/
  https://incompliancemag.com/category/testing/
  https://incompliancemag.com/category/design/
  https://incompliancemag.com/magazine/past-issues/
- ***Signal Integrity Journal***, (includes Power Integrity and EMC), https://www.signalintegrityjournal.com/
- ***Electro Magnetic Applications***, https://www.ema3d.com/webinars/
  (scroll to foot of page to register for their Newsletter)
- ***Microwaves & RF magazine***, www.mwrf.com

11 of 16

emc4a v1.1

On-line Resources (6) – Pre-Compliance Testing

- ***EMI Pre-Compliance Testing***, Ken Wyatt, Interference Technology magazine, Jan 16, 2020, https://interferencetechnology.com/emi-pre-compliance-testing/
- ***How to Build Your Own EMI Troubleshooting and Pre-Compliance Kit***, March 2, 2020 Dylan Stinson, https://interferencetechnology.com/how-to-build-your-own-emi-troubleshooting-and-pre-compliance-kit/
- ***A Simple Method for Estimating Radiated Emissions***, in www.emcstandards.co.uk/cost-effective-uses-of-close-field-probing1
- ***DIY EMC Testing***, a six-part series in 2001, https://www.emcstandards.co.uk/diy-emc-testing-series-2001
- ***The Financial Case for an EMI/EMC Pre-Compliance Test Solution***, https://www.tek.com/blog/financial-case-emi-emc-pre-compliance-test-solution,
- ***Low-cost EMI Pre-compliance Testing using a Spectrum Analyzer,*** https://www.tek.com/document/application-note/low-cost-emi-pre-compliance-testing-using-spectrum-analyzer
- ***EMI Pre-Compliance Testing and Troubleshooting with Tektronix EMCVu,***
  https://www.tek.com/document/application-note/emi-pre-compliance-testing-and-troubleshooting-tektronix-emcvu
- ***Practical EMI Troubleshooting***,
  https://www.tek.com/document/application-note/emi-pre-compliance-testing-and-troubleshooting-tektronix-emcvu

12 of 16

emc4a v1.1

EMC Test Equipment Suppliers (1)

Many of these post useful articles and white papers on EMC Testing on their websites

- ***Aaronia AG***: www.aaronia.com
- ***AirSpy,*** Software-Defined Radio (can be configured as very low-cost spectrum analyser): www.airspy.com
- ***Amplifier Research:*** www.arworld.us
- ***Anritsu:*** https://www.anritsu.com/en-US
- ***Berkeley Nucleonics***: www.berkeleynucleonics.com
- ***B&K Precision:*** www.bkprecision.com/products/rf-test-instruments.html
- ***COM-POWER Corporation:*** https://com-power.com
- ***EM Test***: www.emtest.com/home.php
- ***EMC Partner***: www.emc-partner.com
- ***ETS-Lindgren,*** www.ets-lindgren.com
- ***Eurofins York***, comparison noise emitters, compact antenna: www.yorkemc.com/products/
- ***Frankonia:*** https://frankonia-solutions.com
- ***Gauss Instruments***: https://gauss-instruments.com
- ***Haefley AG:*** *https://www.pfiffner-group.com/about-pfiffner-group/haefely*
- ***Kent Electronics*** (small antennas): www.wa5vjb.com
- ***Keysight Technologies***: www.keysight.com
- ***Langer EMV-Technik:*** www.langer-emv.de/en/index
- ***Laplace Instruments Ltd***: www.laplace.co.uk

13 of 16

emc4a v1.1

EMC Test Equipment Suppliers (2)

Many of these post useful articles and white papers on EMC Testing on their websites

- ***MDL Technologies:*** www.mdltechnologies.co.uk
- ***Microwave Vision Group:*** www.mvg-world.com
- ***Mini-Circuits***: www.minicircuits.com
- ***Noiseken***: www.noiseken.com
- ***Rohde & Schwarz***: www.rohde-schwarz.com
- ***Rigol Technologies***: www.rigolna.com
- ***Siglent Technologies***: www.siglentna.com
- ***Signal Hound***: www.signalhound.com
- ***TekBox Technologies***: https://www.tekbox.com
- ***Tektronix***: www.tek.com
- ***Teseq***: www.teseq.com/en/index.php
- ***Thurlby Thandar***: www.aimtti.com
- ***Thermofisher Scientific*** *(was Keytek) (Electrostatic Discharge (ESD) & Transmission Line Pulse (TLP) Systems)*: www.thermofisher.com
- ***TPI products*** (e.g. USB-powered signal generators): www.rf-consultant.com
- ***Triarchy Technologies CORP.***, USB dongle spectrum analyzers, www.triarchytech.com
- ***Windfreak Technologies***: www.windfreaktech.com
- Distributors for Rigol, Siglent, TekBox:
  Saelig Electronics (USA): www.saelig.com, ***Telonic Instruments*** (UK): www.telonic.co.uk

14 of 16

emc4a v1.1

CCC

Standards

- https://interferencetechnology.com/category/standards/
- ***Interference Technology Engineer's Master (ITEM) 2021***, an an exhaustive guide full of invaluable EMC directories, standards, formulas, calculators, lists, and "how-to" articles, compiled in easy-to-find formats: https://learn.interferencetechnology.com/item-2021/
- ***In Compliance magazine's Standards Library***: https://incompliancemag.com/standards-library/
- ***In Compliance magazine's Standards Updates***: https://incompliancemag.com/topics/standards/standards-updates/
- ***American National Standards Institute (ANSI),*** https://www.ansi.org/
- ***CSA Group***, https://www.csagroup.org/
- ***European Telecommunications Standards Institute (ETSI),*** https://www.etsi.org/
- ***International Electrotechnical Commission (IEC),*** https://www.iec.ch/
- ***International Organization for Standardization (ISO),*** https://www.iso.org/home.html
- ***National Institute of Standards and Technology (NIST),*** https://www.nist.gov/
- ***RTCA***, aviation standards, https://www.rtca.org/
- **USA Military Standards from 'Every Spec',** http://everyspec.com/MIL-STD/MIL-STD-0300-0499/?page=6

15 of 16

emc4a v1.1

CCC

Getting started with practical EMC and EM Engineering:

– some useful resources –

(most of them free, on-line, links checked/updated 13 May 2021**)**

the end

Keith Armstrong CEng, FIEE/IET, Senior MIEEE, ACGI, EurIng (Gp1)
phone/fax: +44 (0)1785 660 247
keith.armstrong@cherryclough.com, www.cherryclough.com, www.emcstandards.co.uk

More training courses and textbooks on-line: https://www.emcstandards.co.uk/online-training
Keith's Blog: https://www.emcstandards.co.uk/blog
Linked In: https://www.linkedin.com/in/keith-armstrong-449801172/

16 of 16