



Another EMC resource  
from EMC Standards

## Analogue design techniques for S/N (SNR) and immunity to EMI

*Helping you solve your EMC problems*

# Analogue design techniques for S/N (SNR) and immunity to EMI



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# Good Electromagnetic (EM) Engineering...

- is cost-effective SI, PI and EMC engineering: well-proven to save time & money in all lifecycle stages, helping to increase profits & reduce financial risks...
- for PCBs, modules, sub-assemblies, devices, products, equipment, vehicles, sub-systems, systems, installations, etc., etc.; of any size, in all applications
- *see Module 1 especially 1.15 (also in Webinar 1c) and 1.16 (also in Webinar 1d)*

■ **This Module contains many EM Engineering guidelines that should *also* be used as an initial design checklist: *any that can't or won't be followed identify a project risk!* *see Module 1, section 1.16 (also in Webinar 1d)***

- to adapt any  $\lambda$ -based design guidelines to different EMC standards, *see Module 1, section 1.18 (also in Webinar 1d)*

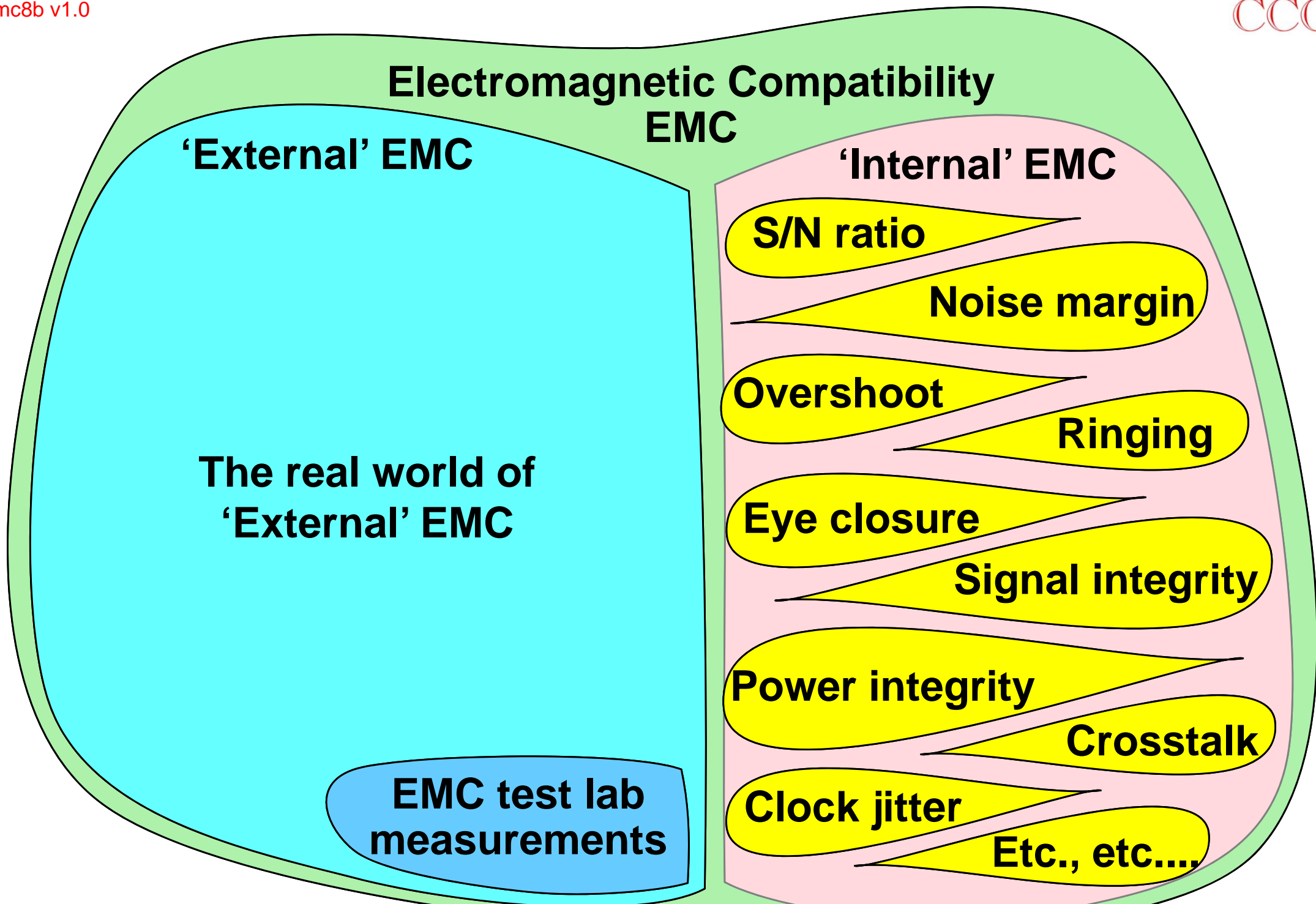
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# Introduction: S/N, SNR and immunity to EMI

# Introduction

- **Good S/N ratio (or SNR) and good EMI immunity has always been a problem for analogue circuits...**
  - especially if regulatory compliance requires immunity tests
- **These techniques work on both ‘internal EMC’ and ‘external EMC’ (see later) to solve both problems quickly, with least cost...**
  - so should be used even where EM immunity compliance is not a mandatory requirement...
  - to save time and money overall; reduce financial risks; increase competitiveness, and improve functional performance to please customers



# An example of real-life benefits

- **These design techniques mostly began as methods for improving SNR in mixed-technology products...**
  - **and were found to improve resistance to EMI, so recently have mostly been used for good EMC immunity design...**
    - **a highly-respected 30+ year UK maker of custom Pro-Audio analogue mixing desks started to use these design techniques when they began using microprocessors...**
    - **they found that even with one micro per channel their SNR was 10dB lower than their best-ever pure analogue desk...**
    - **testing/installation times were both cut by more than half...**
    - **they were able to improve their product spec *and* double sales on the same site with the same number of staff, with very many fewer complaints under warranty**



# The focus is on circuit design...

- but controlling analogue SNR and EMI problems also requires the use of other good EMC design techniques:
  - PCB design and layout
  - Cabling
  - Filtering
  - etc...
  - Power decoupling
  - Shielding
  - ESD and surge protection
- and most products will also need the emissions and immunity of its digital, control, display and switch-mode power converter circuits dealing with too
- **These are not described here (in any great detail)...**
  - but they are comprehensively described in our other course modules, articles and textbooks