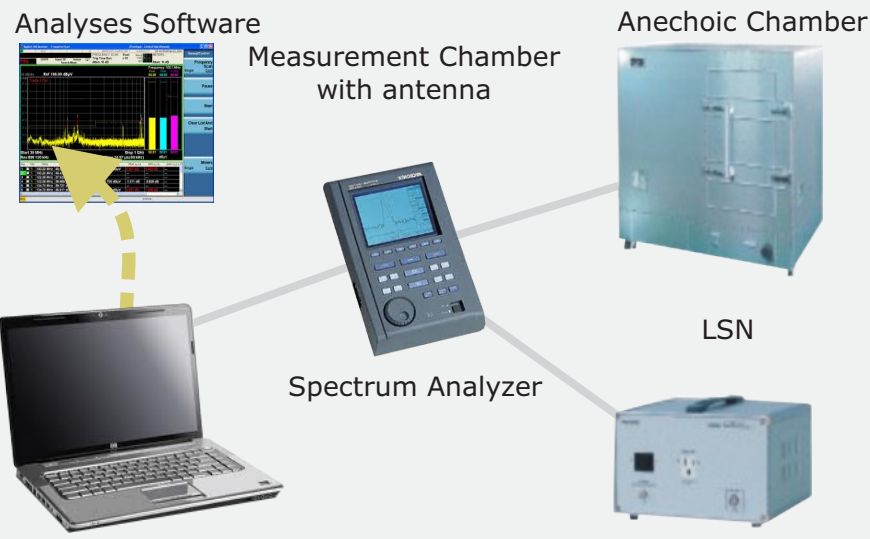


## What is EMI ?

Electromagnetic interference or EMI is an unwanted disturbance that affects an electrical circuit due to electromagnetic radiation emitted from an external source. The disturbance may interrupt, obstruct, or otherwise degrade or limit the effective performance of the circuit. The source may be any object, artificial or natural, that carries rapidly changing electrical currents, such as an electrical circuit, the Sun or the Northern Lights. EMI is everywhere and it affects our equipment, business atmospheres, and even our health. As power densities and communication speeds increase in new system. EMI is created in normally compatible situations.



## Measurement of EMI



## What is EMC?

Electromagnetic Compatibility is related to the design of a product which will not get affected by external Electromagnetic radiation and it will also not affect any other product due to its own electromagnetic effects.

EMC pursues two issues

Electromagnetic Interference (EMI)    Electromagnetic Susceptibility (EMS)

**EMI Test:** It is evaluated whether the radiated emission or the conducted emission discharged from the EUT (Equipment Under Test) exceeds the limit value set beforehand.

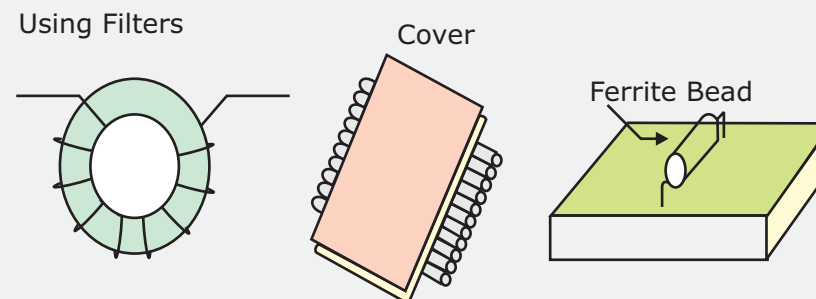
**EMS Test:** It evaluates whether EUT causes the malfunction by a peripheral electromagnetic radiation.

Interference Source	Three Factor EMI/EMC Path	Sensitive Device
Electronics	Conducted (Electric Current) Inductively coupled (magnetic field) Capacitively coupled (Electric Field) Radiated (Electromagnetic field)	Transistor
Grounding		Cell Phone
Cell Phone		Diode
Power Line		Antenna
Connector		People
Lightening		
Antenna		

## Effects of EMI

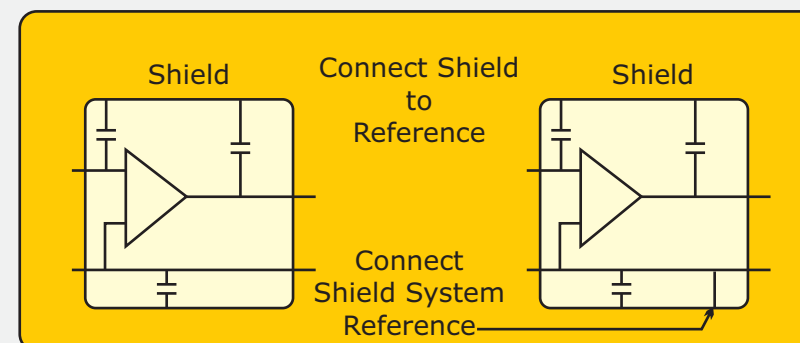
- ! A disturbing sound when talking on land line and your cell phone rings.
- ! A shaky computer screen when your cell phone rings
- ! Your system reboot's when you change the speed of overhead fan with electronic regulator.
- ! A passing airplane causing disturbance in radio or television transmission.
- ! Computer interfering with FM radio reception
- ! Operating vacuum cleaner causing 'snow' on TV.
- ! A buzzing car radio when you driver below a high power line.

## Suppression of EMI



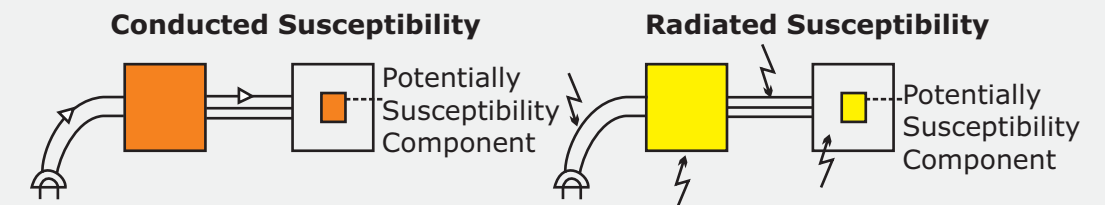
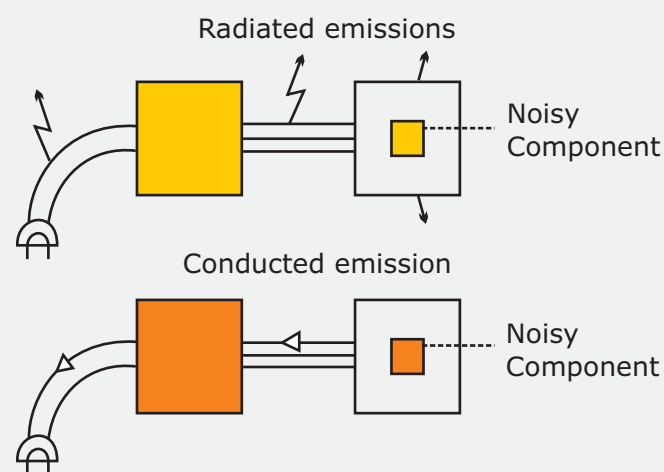
## Using Shielding

- ! Use a low impedance over
  - ! Make good connections between different parts of cover
  - ! Make may smaller holes instead of one big
  - ! Use conductive foil with a plastic cover
- No Paint Low 2
- Use smaller holes

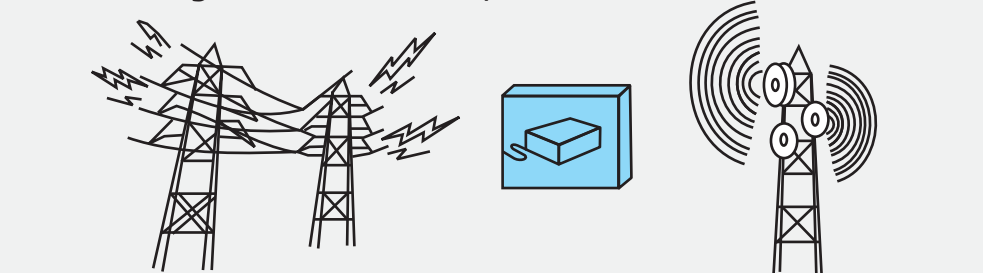


## Classification of EMI

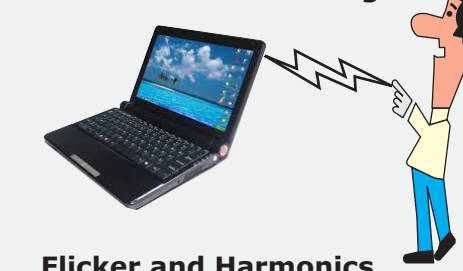
- ! Narrow band
- ! Broadband
- ! Intentional
- ! Unintentional
- ! Conducted
- ! Radiated
- ! Inter-system
- ! Intra System
- ! Natural
- ! Man made



## Protect against Radio Waves, Microwaves & Power Lines



## Electrostatic Discharge



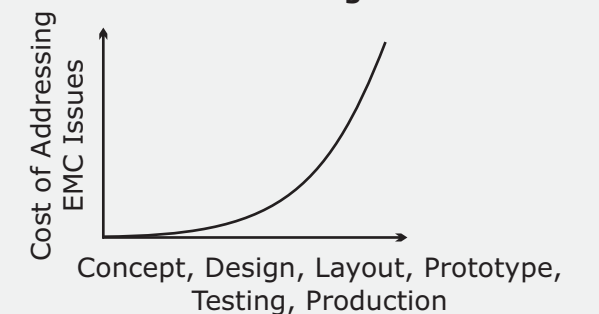
## Power Disturbance



## Flicker and Harmonics

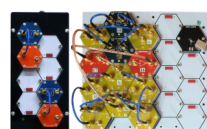


## Cost of Addressing EMC



## Regulations

**FCC**-Federal Communications Commission  
**IEC**-Internationa Electrotechnical Commision  
 Military, Medical, Vehicular, Other



10209A  
RF Prototyping & Education Platform



10401  
Klystron Microwave Test Bench



10411  
Microwave Integrated Circuits Trainer



10412  
Wave & Propagation Trainer



46507  
Three Phase Induction Motor Trainer



46624A  
Fire Alarm Trainer



46609A  
Power Distribution Trainer



46800  
Electrical Machine Trainer