

1 CONTENTS

1	Contents.....	3
2	Foreword	6
3	Brief introduction to electromagnetism	7
3.1	<i>Electrical Charge</i>	7
3.2	<i>Electrostatic field</i>	8
3.3	<i>Electric potential and voltage</i>	9
3.4	<i>Electric current.....</i>	11
3.4.1	How the electric current is generated.....	12
3.4.2	Effects of electric current	14
3.4.3	Current density.....	15
3.5	<i>Magnetic field</i>	16
3.5.1	Magnetic field around conductor.....	18
3.6	<i>Quasi stationary electromagnetic field.....</i>	19
3.6.1	Faraday's law of induction.....	20
3.6.2	Displacement current	21
3.7	<i>Electromagnetic waves</i>	23
3.7.1	Electromagnetic waves in non-conductive isotropic environment	23
4	Electromagnetic compatibility.....	29
4.1	<i>Sub-disciplines.....</i>	30
4.2	<i>Electromagnetic interference.....</i>	32
4.3	<i>Electromagnetic susceptibility</i>	33
4.4	<i>Limits and Functional criteria</i>	34
4.5	<i>Standards and legislation</i>	36
4.5.1	National and International Standardization bodies	37
4.5.2	Legally defined requirements.....	39

4.5.3	Hierarchy of standards	42
4.5.4	Military and other special standards	44
5	Conditions in EMC Labs.....	46
5.1	<i>Open area test site</i>	46
5.2	<i>Electromagnetically shielded rooms</i>	49
5.3	<i>Anechoic and semi anechoic rooms</i>	52
5.4	<i>Electromagnetic reverberation rooms</i>	59
5.5	<i>Attenuation of the measurement site</i>	59
5.6	<i>EMC labs instrumentation.....</i>	61
5.6.1	Interference meters.....	61
5.6.2	Interference generators.....	68
5.6.3	Antennas.....	73
5.6.4	Near field probes	80
5.6.5	Tools for measurement of conducted interferences.....	81
6	Tests on electromagnetic interferences	89
6.1	<i>Radiated interferences of commercial devices.....</i>	89
6.2	<i>Conducted emissions of commercial devices</i>	92
6.3	<i>EMI tests on other than commercial devices</i>	96
7	Tests on electromagnetic susceptibility	97
7.1	<i>Electrostatic discharge immunity test.....</i>	97
7.2	<i>Radiated radio-frequency electromagnetic field.....</i>	100
7.3	<i>Electrical fast transients.....</i>	102
7.4	<i>Surge wave.....</i>	105
7.5	<i>Conducted radio-frequency interferences</i>	106
7.6	<i>Power supply errors</i>	107
7.6.1	Voltage dips	107
7.6.2	Short interruption.....	107