

LIST OF FIGURES

Figure 2.1 (a) Side view, (b) Top view of high impedance surface [6]	7
Figure 2.2 Flush-mounted dipole on a high-impedance ground plane [6]	8
Figure 2.3 The process of propagation of electromagnetic waves [14]	8
Figure 2.5 Single-layer absorber [15]	10
Figure 2.6 Infinite patch arrangement boundary [17]	10
Figure 3.1 Experiment Flowchart.	18
Figure 3.2 S-parameter relationship with two port network [22].....	19
Figure 3.3 View of proposed one unit cell of square split ring resonator combined with multilayered air gap and top layer with square patch	22
Figure 3.4 Parameter of Square unit cell.....	23
Figure 3.5 Stacked-patch microstrip array for broadband operations [20]	27
Figure 3.6 Construction of Sierpinski Carpet iteration stage [23]	28
Figure 3.7 Simulated first iteration on Sierpinski Carpet	28
Figure 3.8 S11 Parameter Curve's of simulated first iteration on Sierpinski Carpet	29
Figure 3.9 Simulated second iteration on Sierpinski Carpet.....	29
Figure 3.10 S11 Parameter Curve's of simulated second iteration on Sierpinski Carpet	29
Figure 3.11 Simulated array of 2x1 metamaterial unit cells with resistor	30
Figure 3.12 S11 Parameter Curve's of simulated 2x1 array on Sierpinski Carpet with resistor.....	30
Figure 3.13 Unit cell of Modified Octagonal Split Ring	31
Figure 3.14 S11 Parameter Curve's of Simulated Modification on width Octagonal Ring.....	31
Figure 3.15 S11 Parameter Curve's of simulated octagonal ring	32
Figure 3.16 Shape of Square unit cell	32
Figure 3.17 Curve of S11 parameter value of square unit cell variations with various size.....	33
Figure 3.18 Curve of S11 parameter value of square unit cell variations with various size.....	34
Figure 3.19 Shape of square ring	35
Figure 3.20 The curve of S11 parameter value of square first ring at 2 GHz	35

Figure 3.21 The curve of S11 parameter value of variation modification on dimension size	36
Figure 3.22 Front view of square ring with split gap at the top	37
Figure 3.23 The curve of S11 parameter value of the effect of split gap width square ring	37
Figure 3.24 The S11 parameter curve value after decreasing split gap width at the top of square ring	38
Figure 3.25 Front view of square ring with split gap at the top and left side	38
Figure 3.26 The curve of S11 parameter value after increasing split gap at the left side part width square ring	39
Figure 3.28 (a) Front view of top layer with square patch (b) Side view of unit cell with air gap between upper and bottom layer and (c) Bottom layer part with square split ring	41
Figure 3.29 Curve of S11 parameter after various experiment on increasing air gap width.....	41
Figure 3.30 Curve of S11 parameter in high frequency part after various experiment on increasing air gap width	42
Figure 3.31 Curve of S11 parameter unit cell in multilayer structure.	43
Figure 3.32 (a) Front view of top layer with square patch (b) Side view of unit cell with air gap between upper and bottom layer, and (c) Botom view layer with square split ring.	44
Figure 3.33 Curve of S11 parameter simulation in 2x2 array condition.....	44
Figure 3.34 Modified double square split ring resonator [26]	45
Figure 3.34 Curve of S11 parameter on magnitude region [26]	45
Figure 3.34 Curve of S11 parameter on magnitude region [26]	45
Figure 4.1 Flowchart Process of Absorber Laboratorium Test.....	47
Figure 4.2 Single port measurement configuration setup [21].....	48
Figure 4.3 (a) Top layer metamaterial absorber, (b) Bottom layer metamaterial absorber.....	49
Figure 4.4 Measurement set up for single port measurement	50
Figure 4.5 Curve Measurement Result of S11 Parameter.....	50
Figure 4.6 Curve Measurement Result of Absorptivity rate	51