

List of Figures

Fig.1-1 The proposed 77 GHz RF frond end system.....	2
Fig.2-1 The waveform of LO pump current and conductance.....	5
Fig.2-2 Voltage and current flow chart of antiparallel diode pair.....	6
Fig.2-3(a) Single diode mixer.....	7
Fig.2-3(b) Antiparallel diode pair mixer.....	8
Fig.2-4 Schematic of antiparallel diode pair subharmonic mixer.....	11
Fig.2-5(a) The simulated result of FCPW short stub.....	12
Fig.2-5(b) The simulated result of FCPW open stub.....	13
Fig.2-6(a) Layout of bandpass filter.....	14
Fig.2-6(b) Simulated results of bandpass filter.....	14
Fig.2-7(a) ring mixer architecture.....	16
Fig.2-7(b) voltage and current flow chart.....	16
Fig.2-9(a) The photograph of a antiparallel diode subharmonic mixer.....	18
Fig.2-9(b) The photograph of a ring subharmonic mixer.....	15
Fig.2-10 The measured conversion loss of antiparallel diode subharmonic mixer using	
(a) M/ACOM MA4E2037.....	24
(b) Agilent HSCS9101.....	24
Fig.2-11 The measured conversion loss of ring mixer using	
(b) M/ACOM MA4E2037.....	25
(b) Agilent HSCS9101.....	25
Fig.3-1 The simplified model of a resistive diode frequency doubler.....	28
Fig.3-2 Voltage and current waveforms in the single diode doubler.....	28
Fig.3-3 Resistive doubler with single series-mounted diode.....	31
Fig.3-4(a) Simulated results of FCPW short stub.....	33

Fig.3-4(b) Simulated results of FCPW open stub.....	33
Fig.3-5 Voltage and current waveform in the ideal FET.....	35
Fig.3-6 Harmonic drain current components.....	36
Fig.3-7 The schematic of the frequency doubler circuit.....	38
Fig.3-8(a) Simulated results of 38.5GHz filter.....	40
Fig.3-8(a) Simulated results of 77 GHz filter.....	41
Fig.3-9 Simulated result of conversion loss (dB) V.S output frequency.....	42
Fig.3-10 Output power simulation of fundamental, 2nd and 3rd harmonic.....	42
Fig.3-11 Simulation of conversion loss and output power V.S. input power.....	43
Fig.3-12(a) Photograph of single diode frequency doubler.....	45
Fig.3-12(b) Photograph of HEMT frequency doubler.....	45
Fig.3-13 The measured conversion loss of single diode frequency doubler.....	47
Fig.3-14 The measured output power (dBm), conversion loss (dB), and fundamental leakage power (dBm) versus output frequency	48
Fig.3-15 The measured output power (dBm) and conversion loss (dB) versus input power at 77GHz.....	48