

FIGURE 1

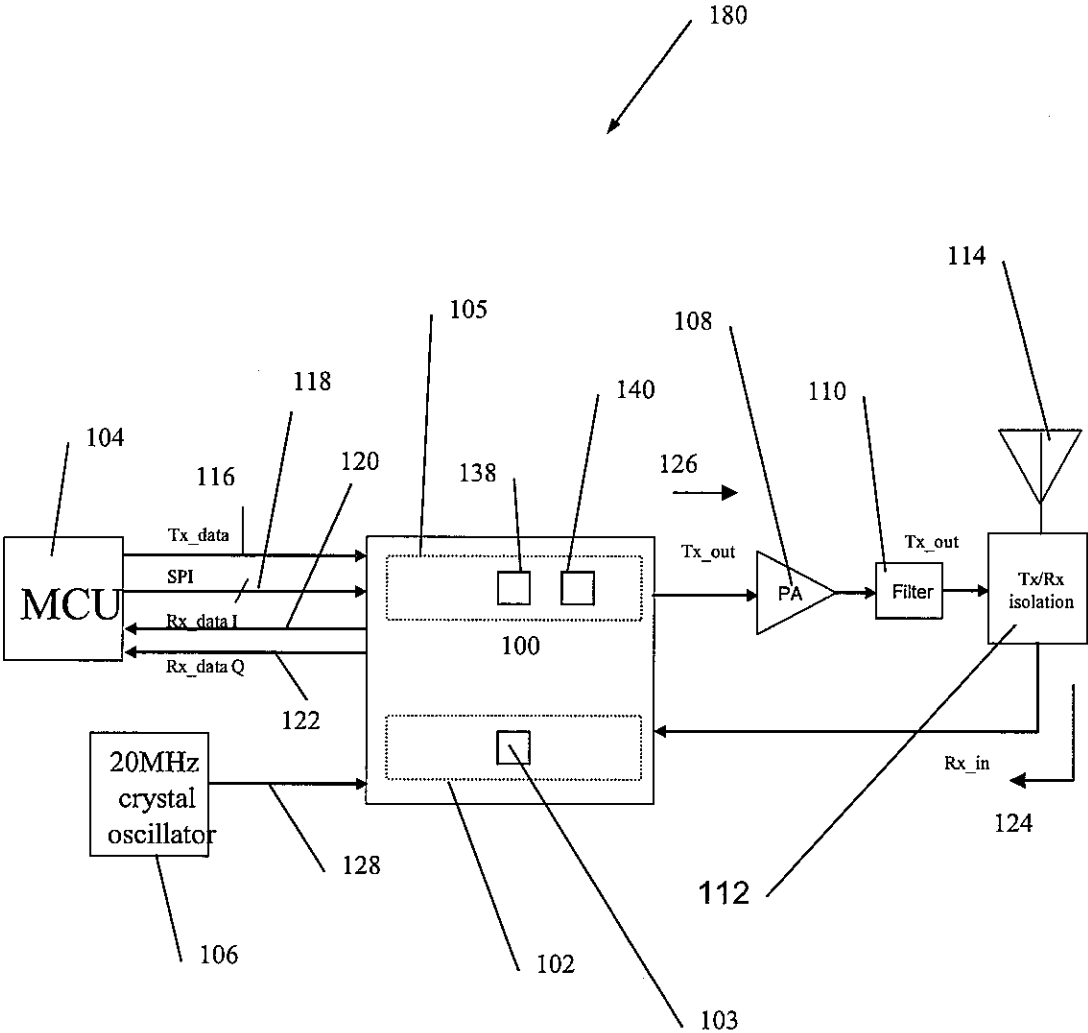


FIGURE 2

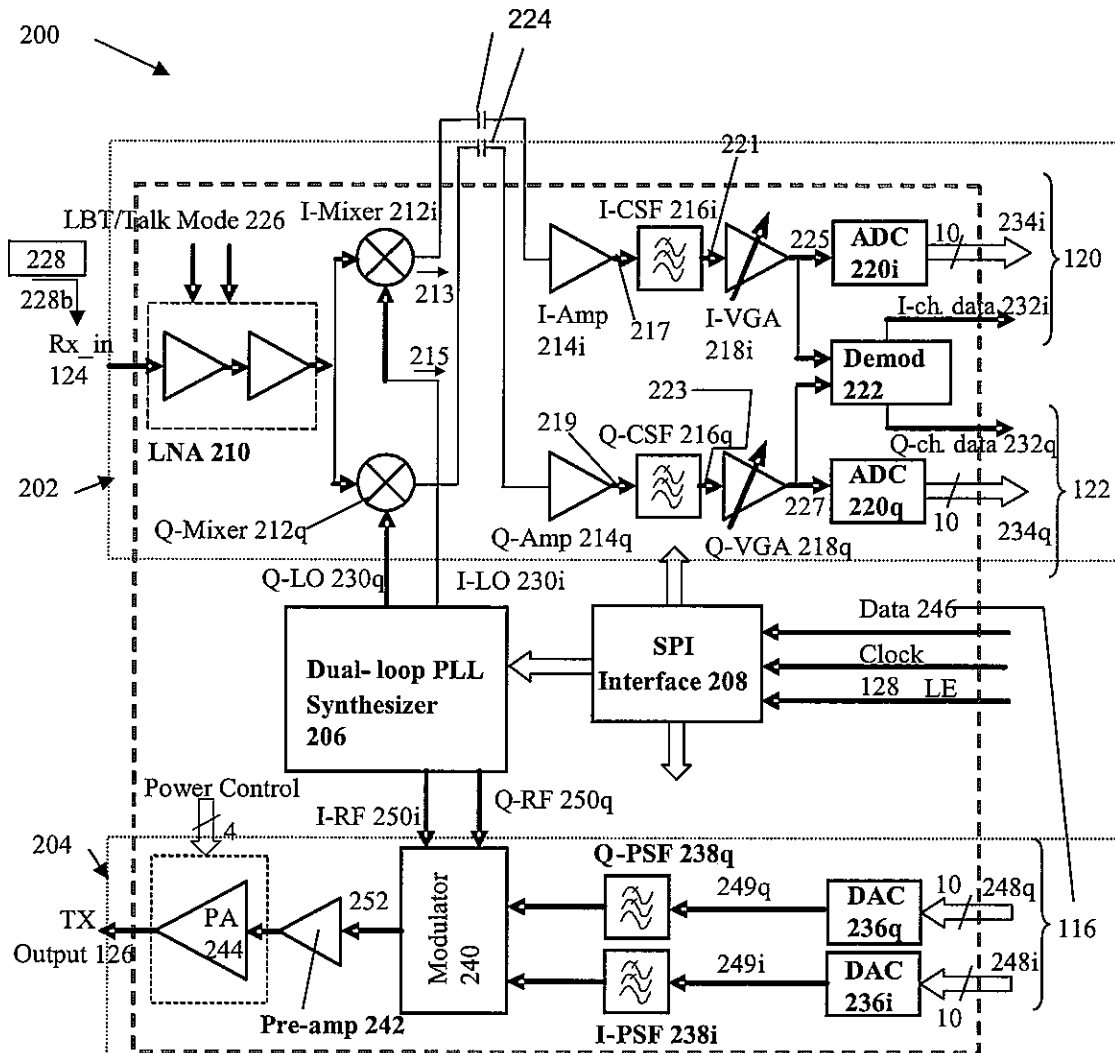


FIGURE 2A

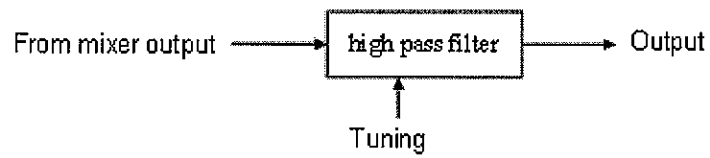
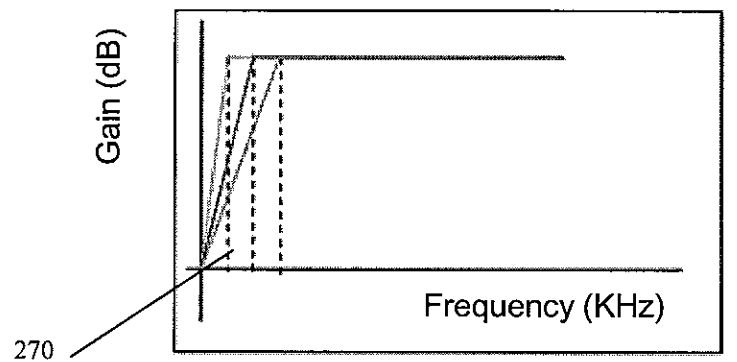


FIGURE 2B



The low cut off frequency changes according to the data rate

FIGURE 2C

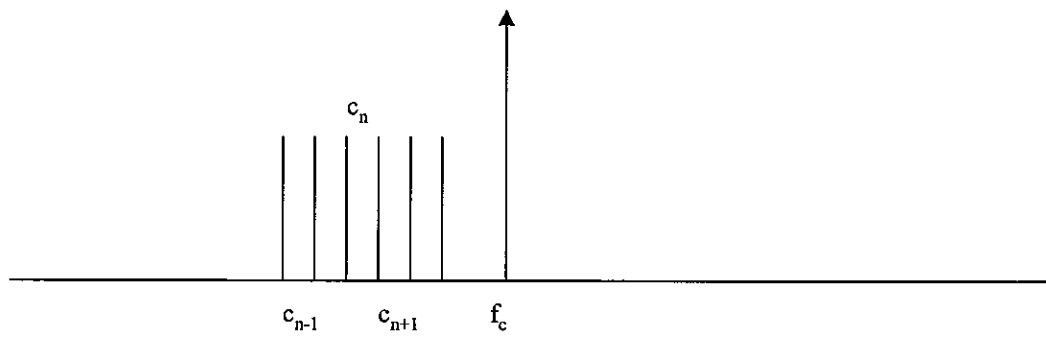


FIGURE 3

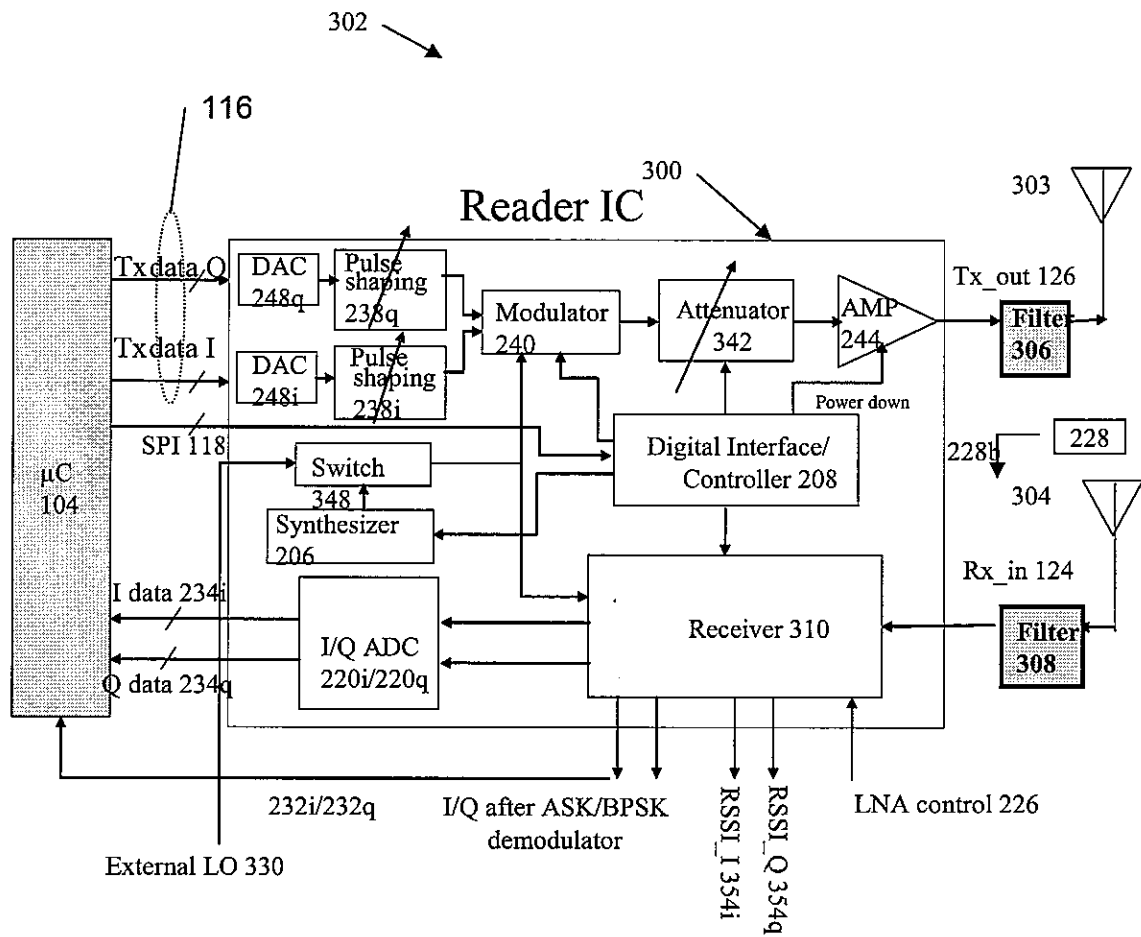


FIGURE 4

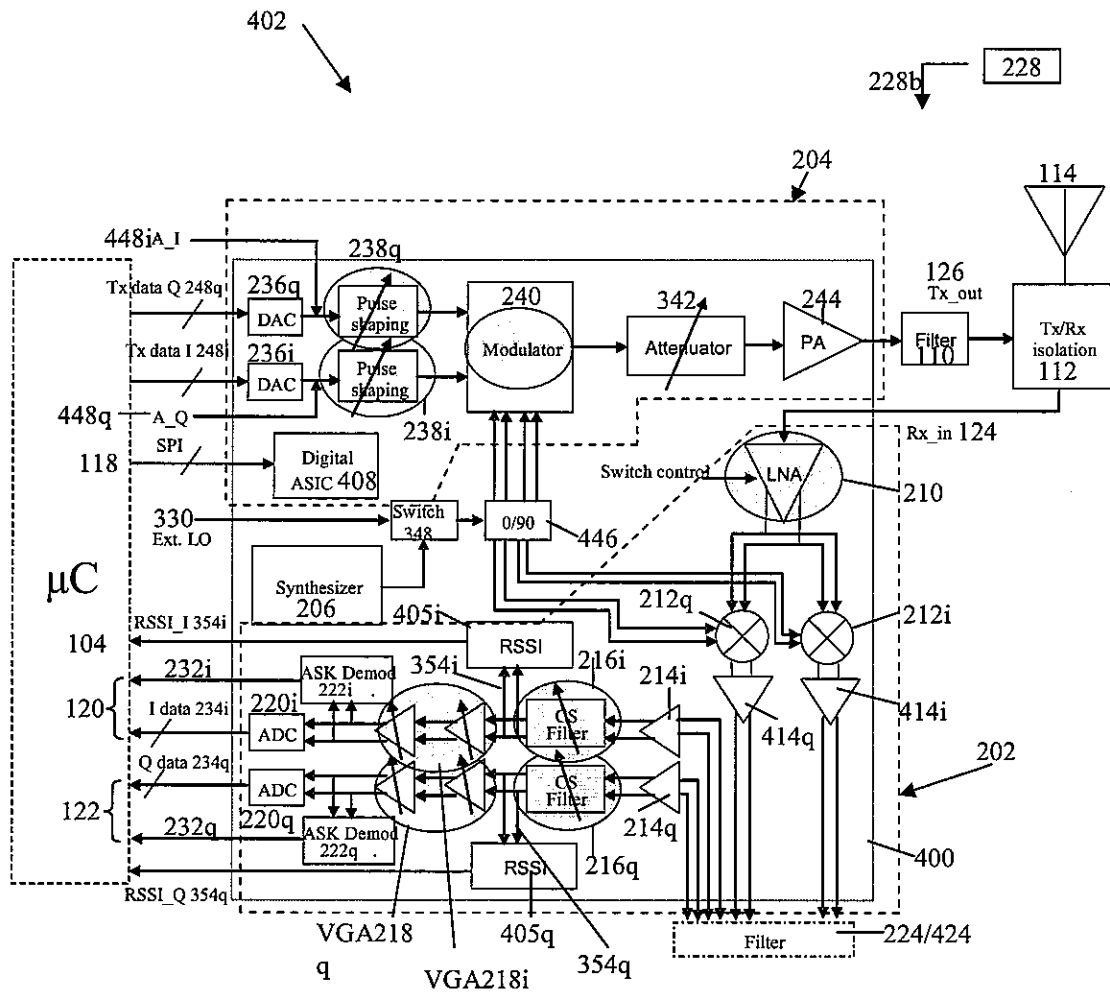


FIGURE 5

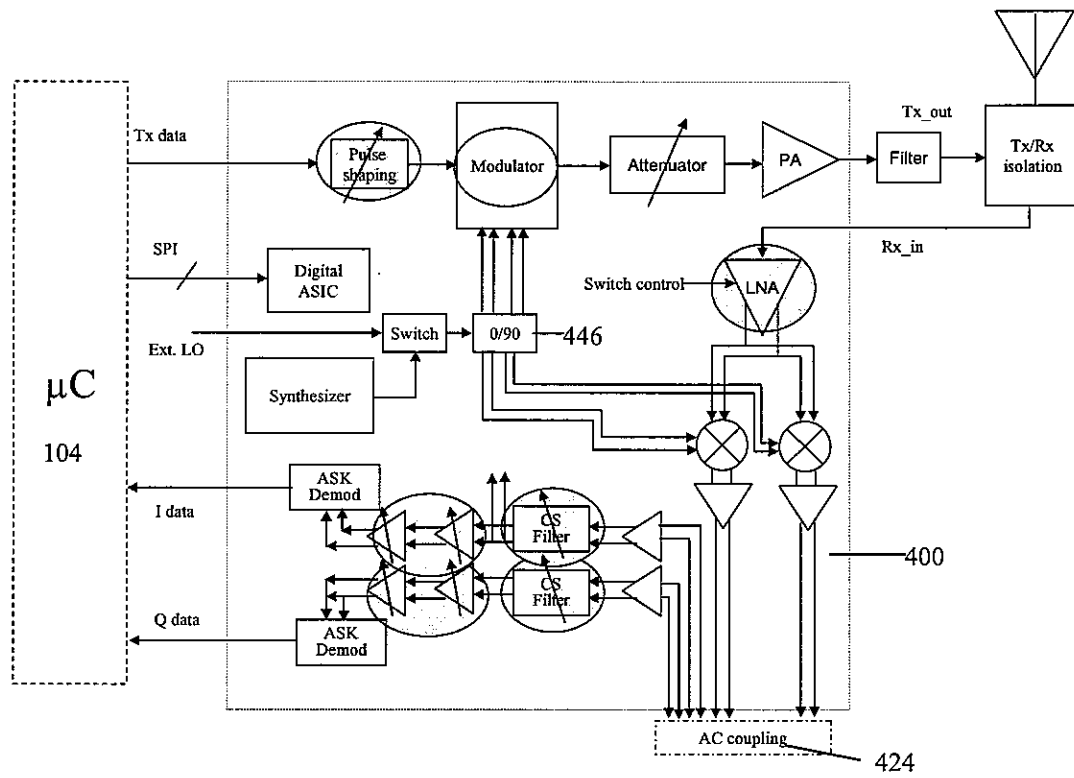


FIGURE 6

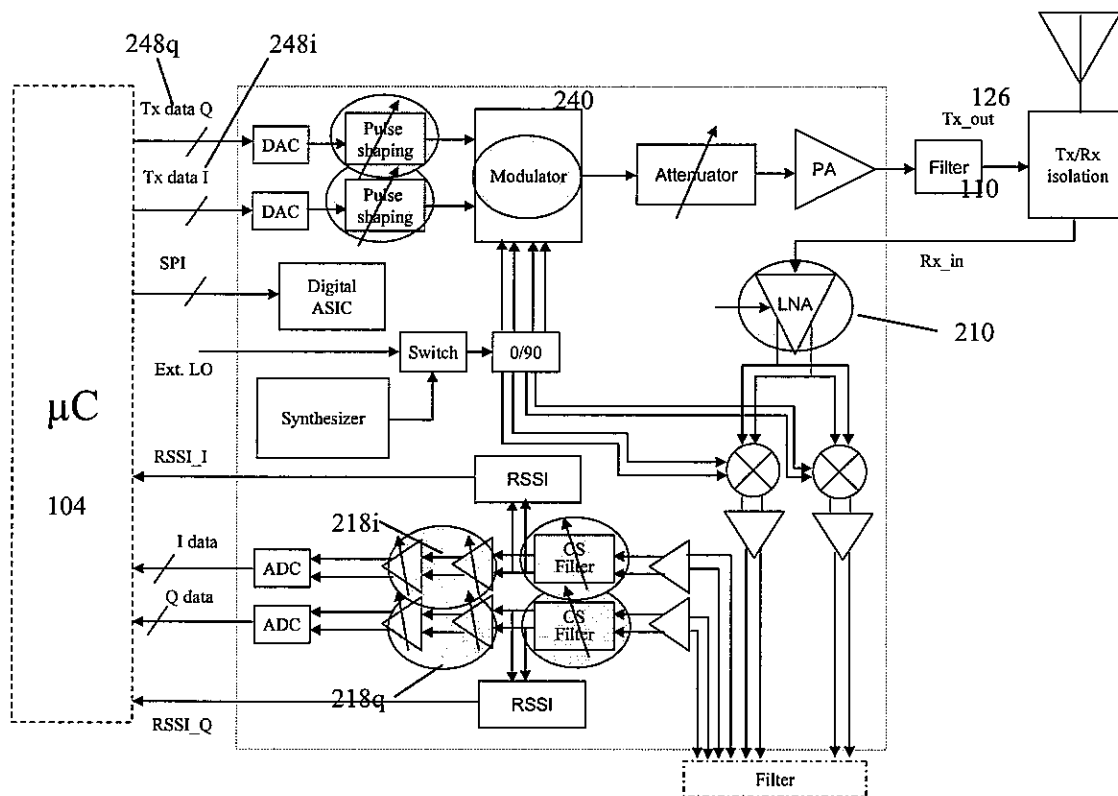


FIGURE 7

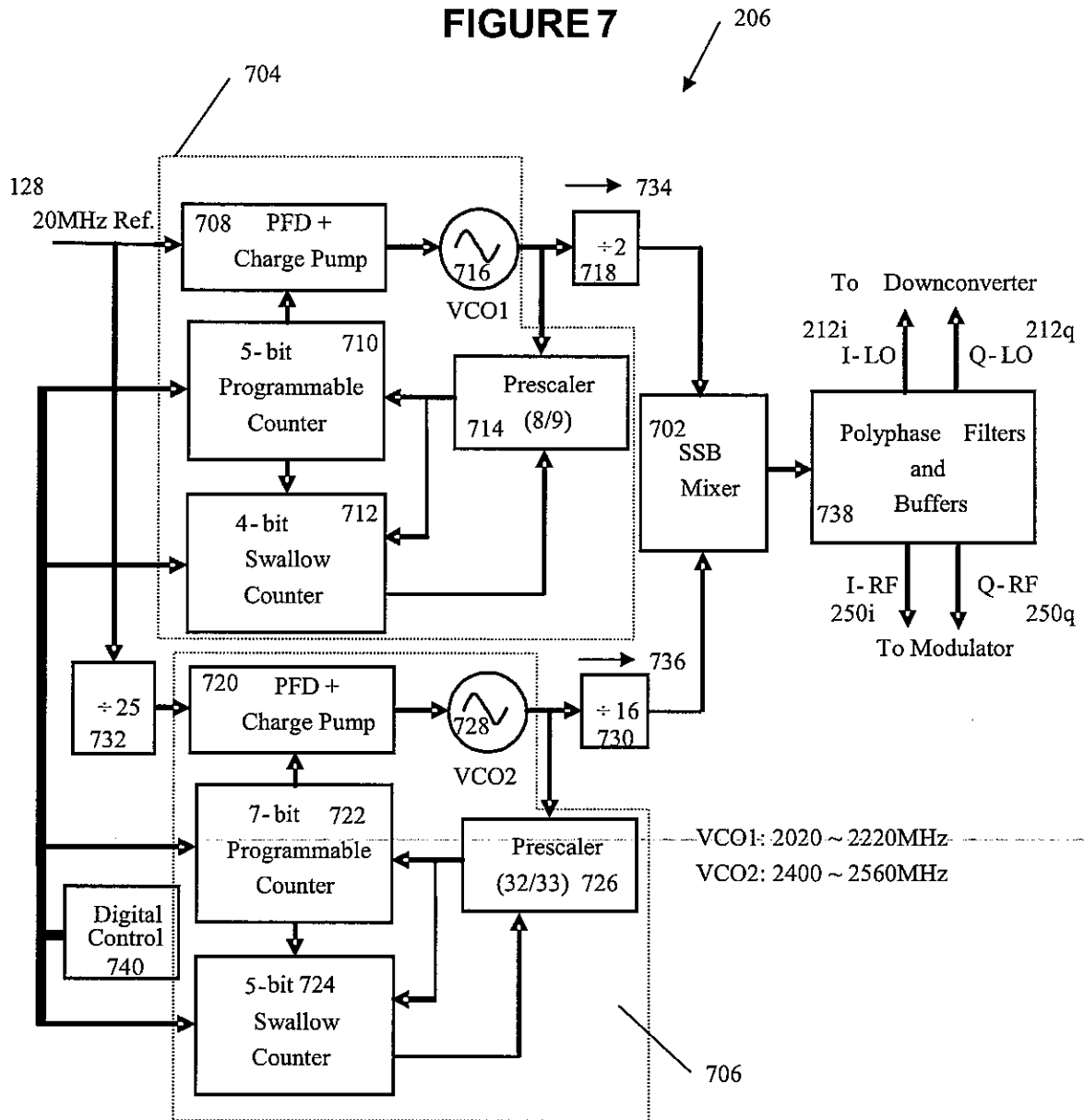


FIGURE 8

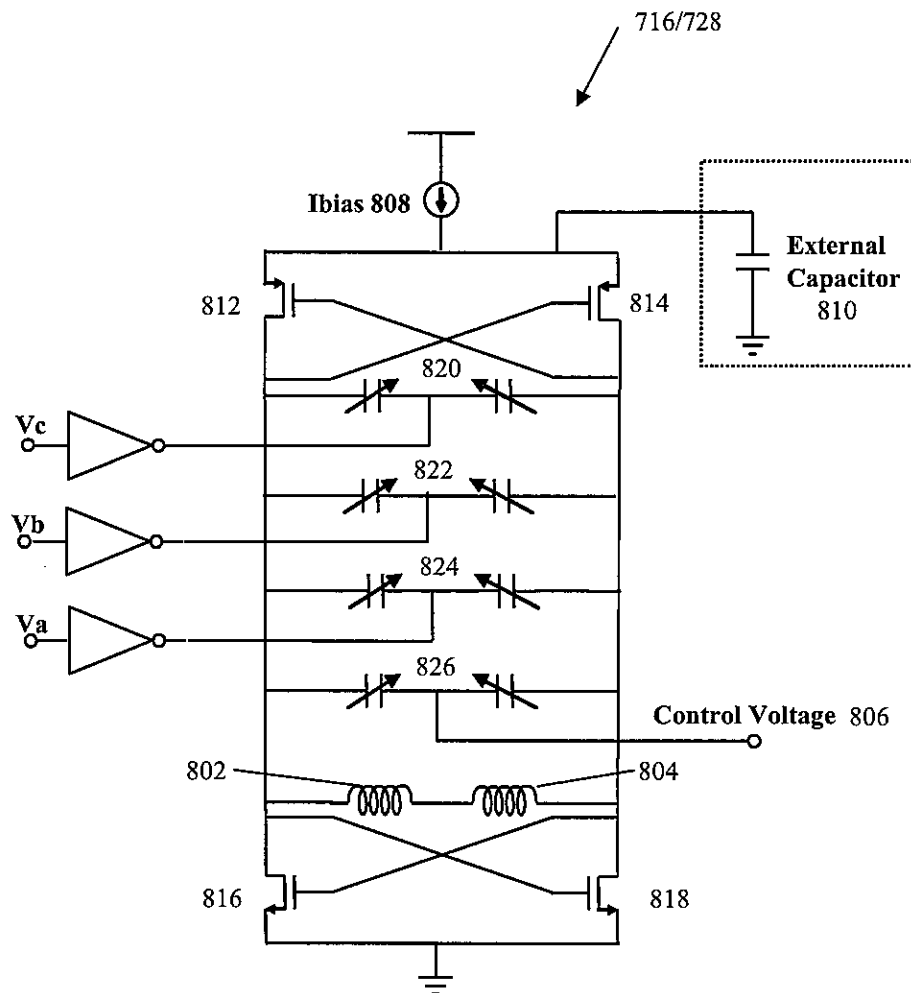


FIGURE 9

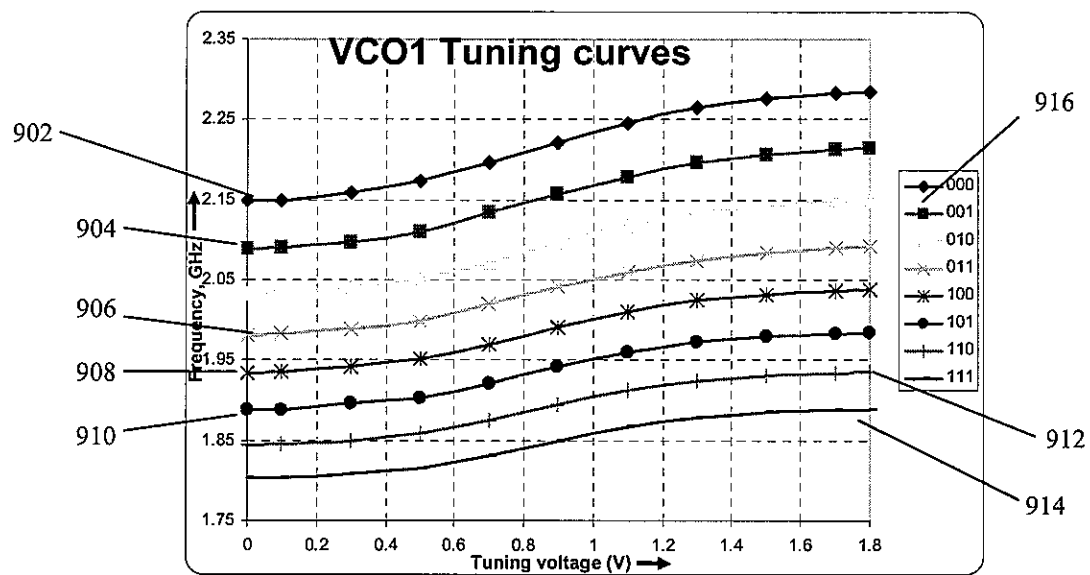


FIGURE 10

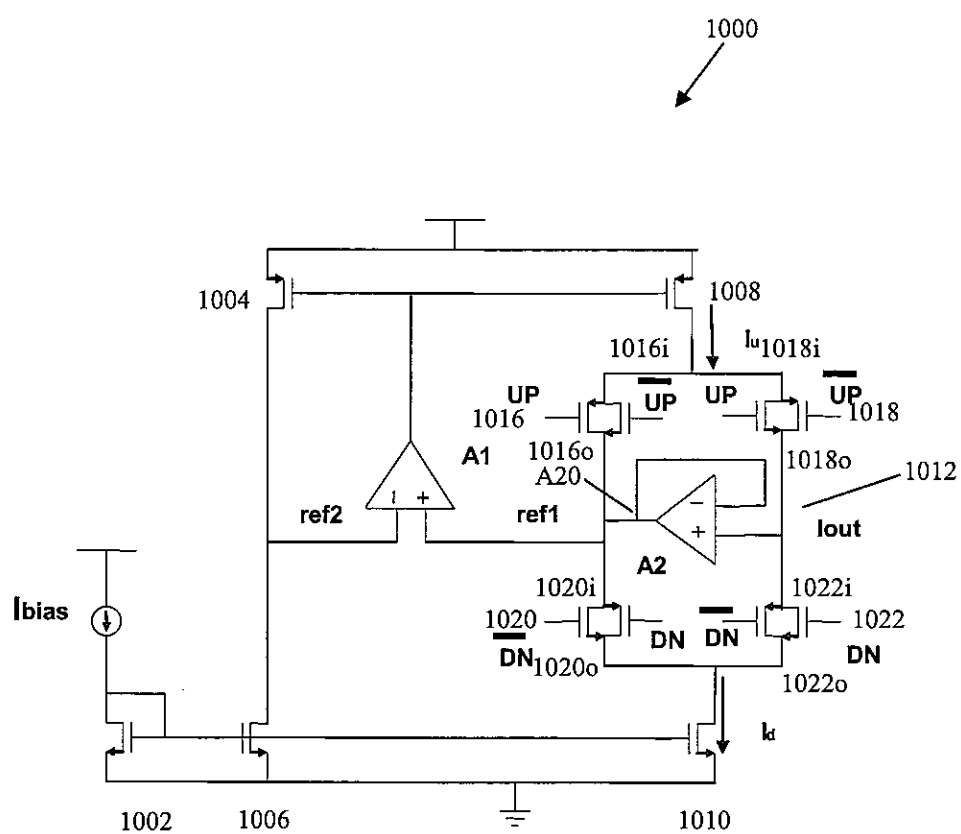


FIGURE 11

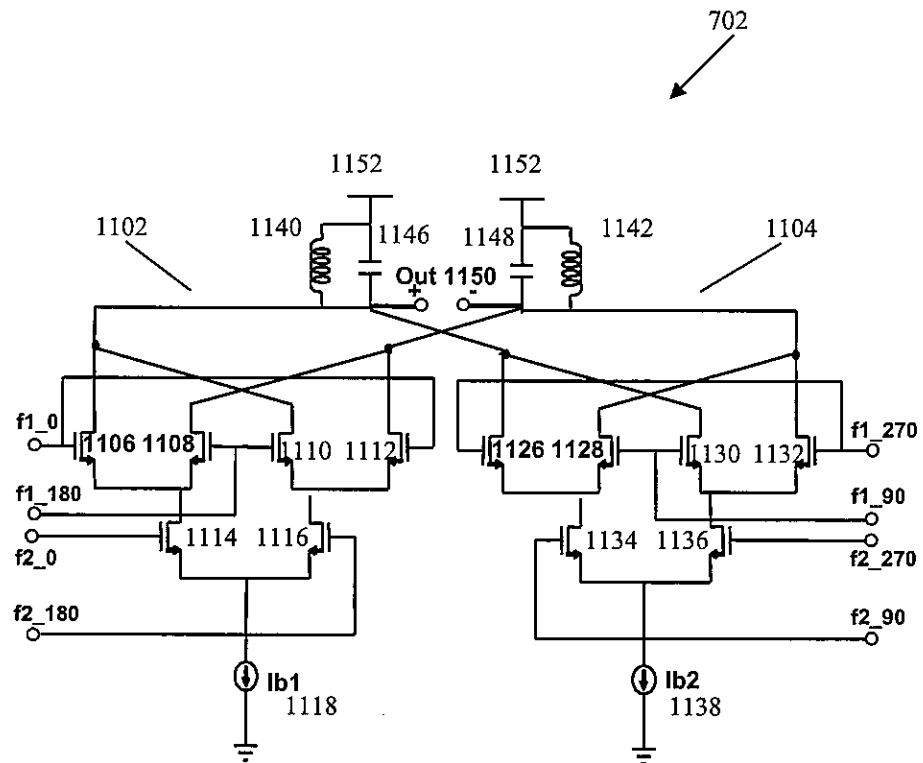


FIGURE 12

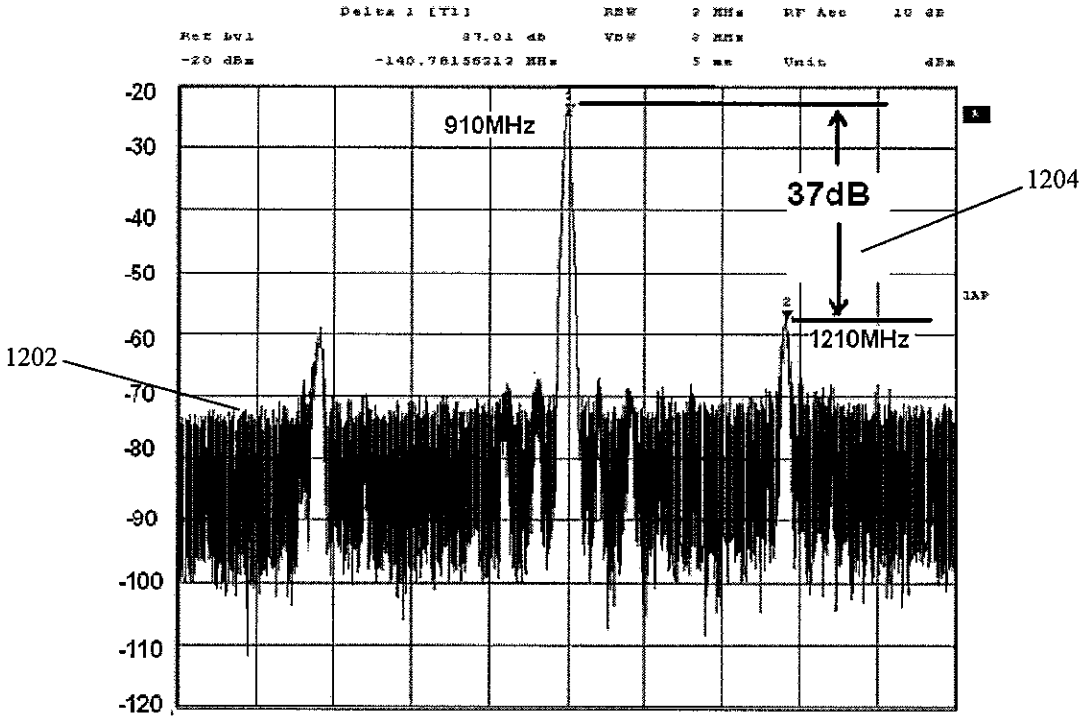


FIGURE 13A

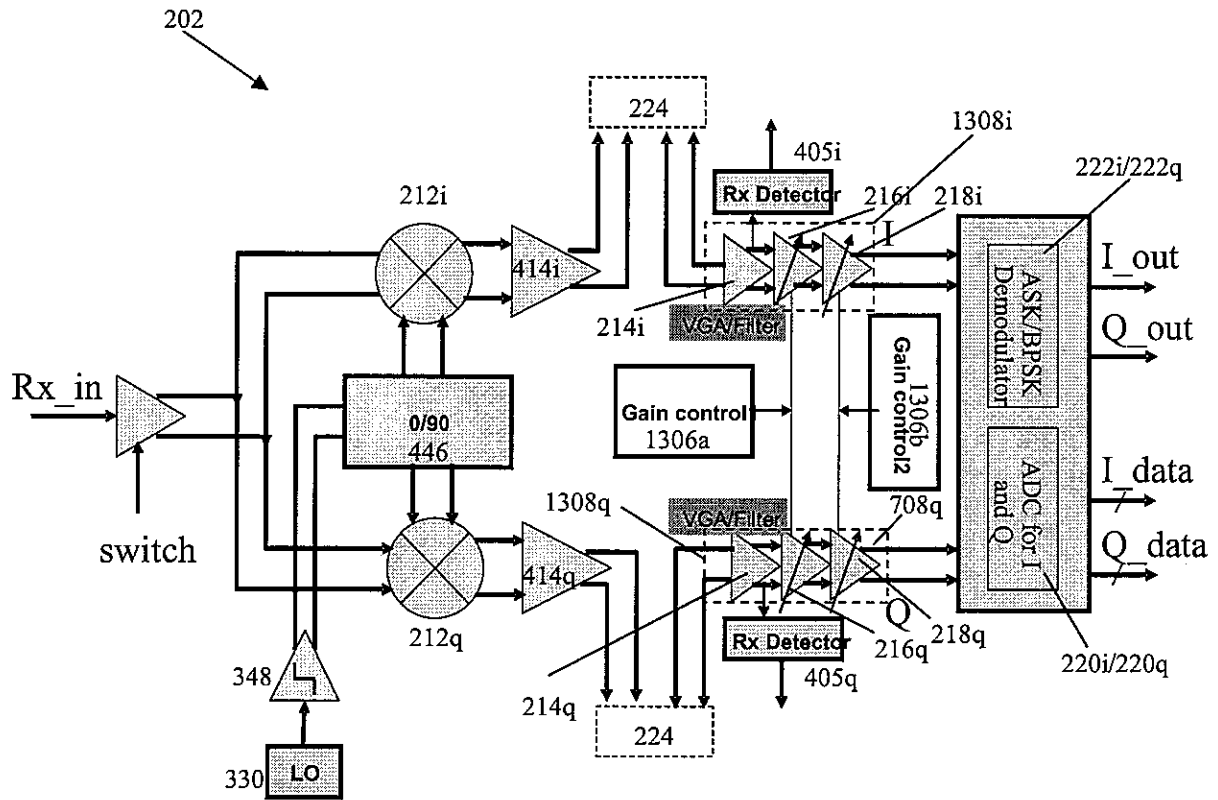


FIGURE 13B

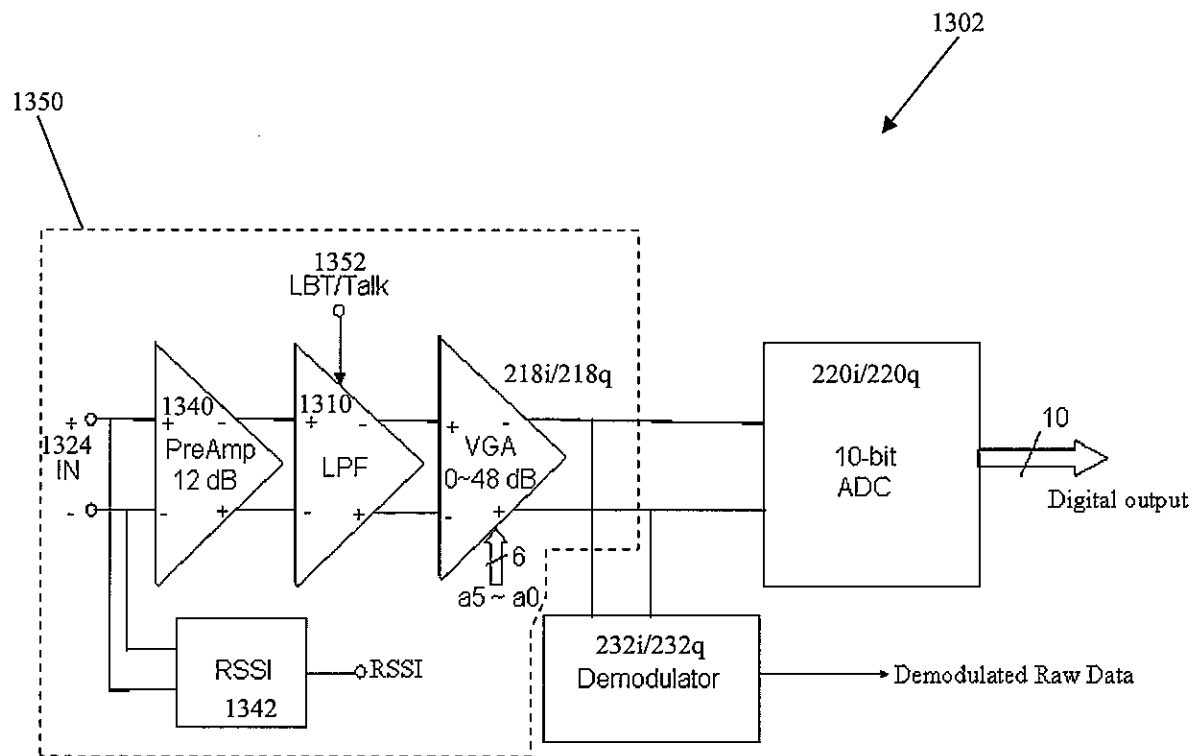


FIGURE 13C

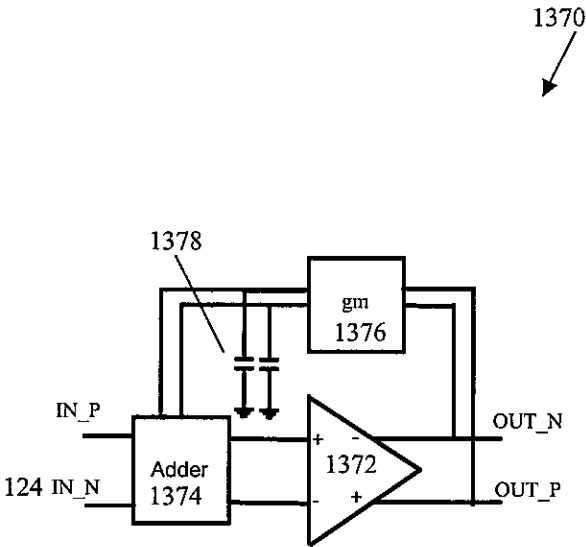


FIGURE 14

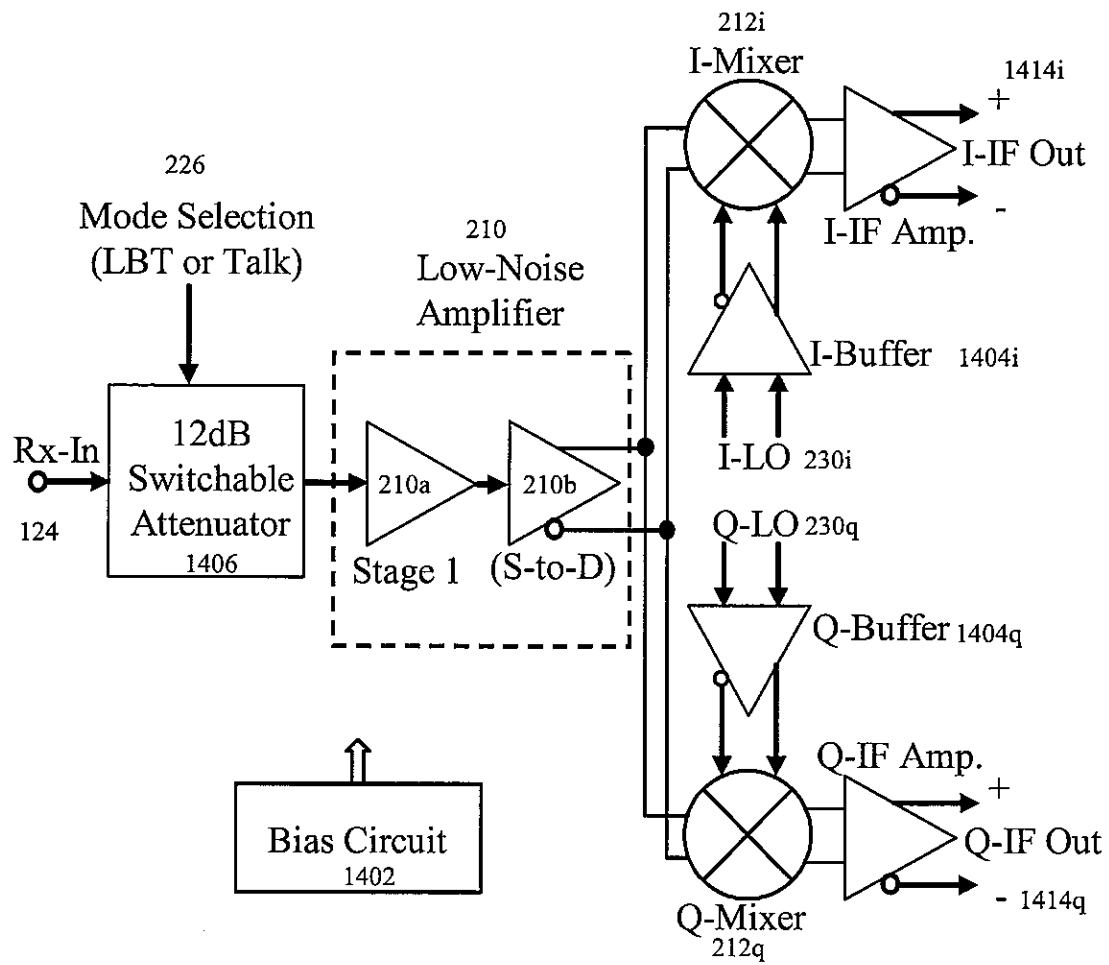


FIGURE 15

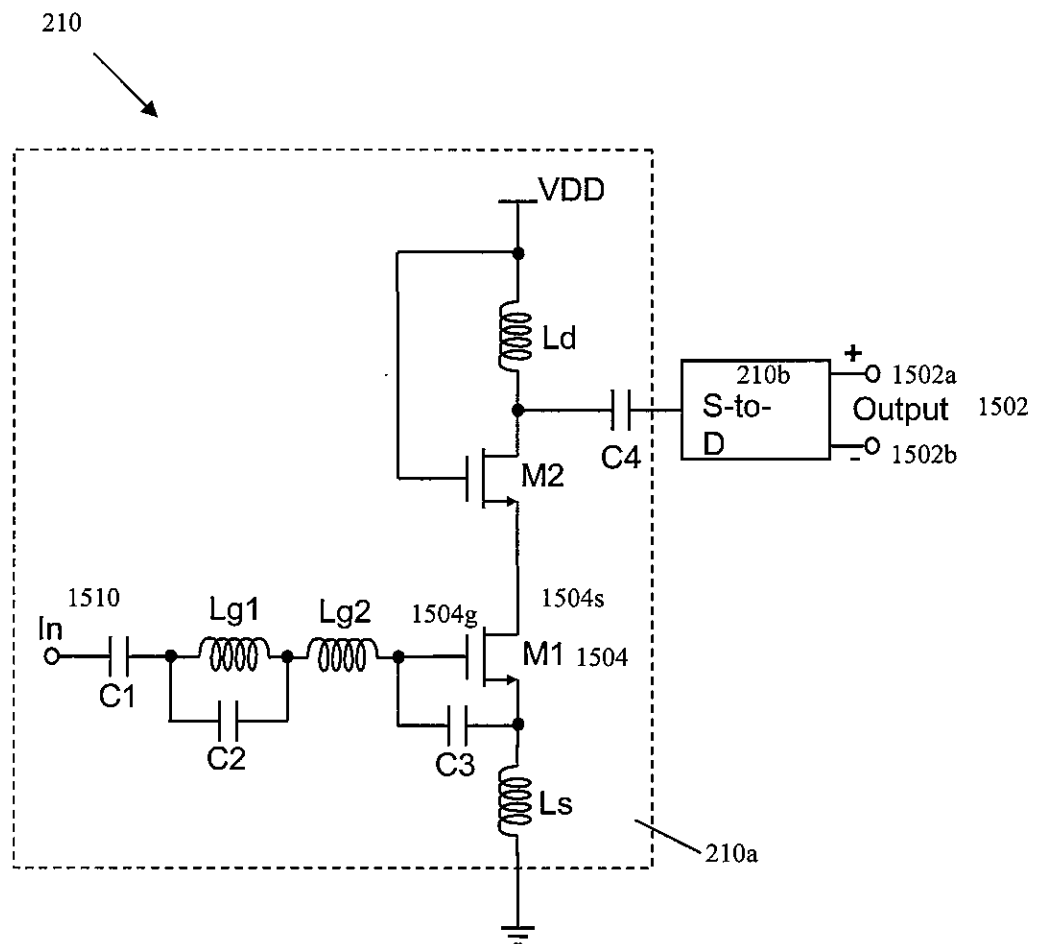
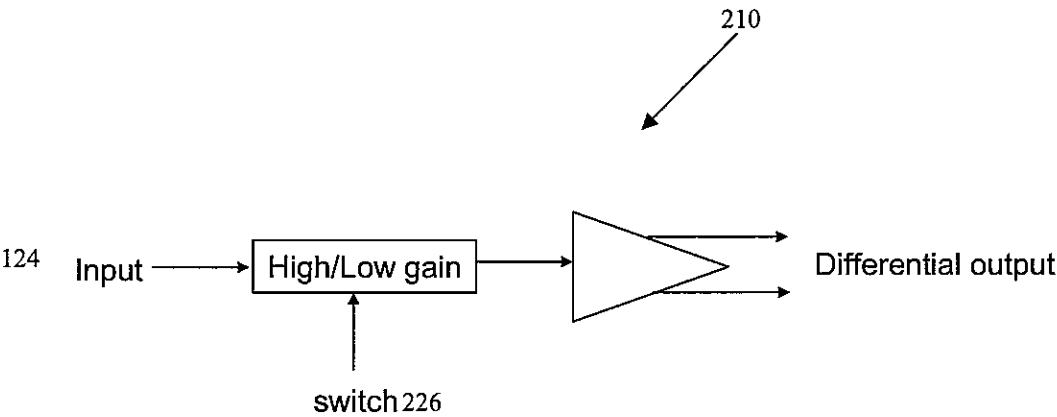


FIGURE 16



Switch	LNA Gain	Mode
0	High gain - default	Listen mode
1	Low gain	Talk mode

FIGURE 17

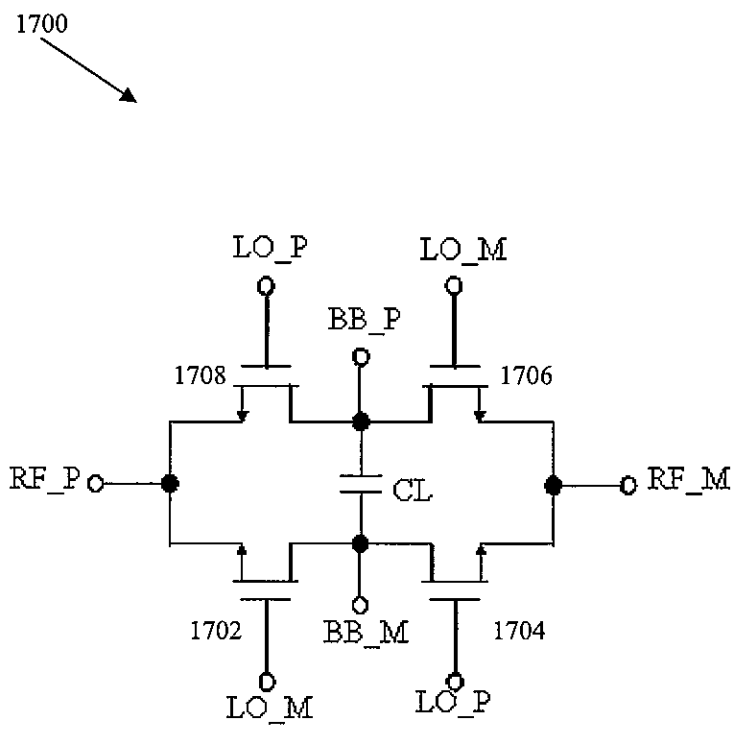
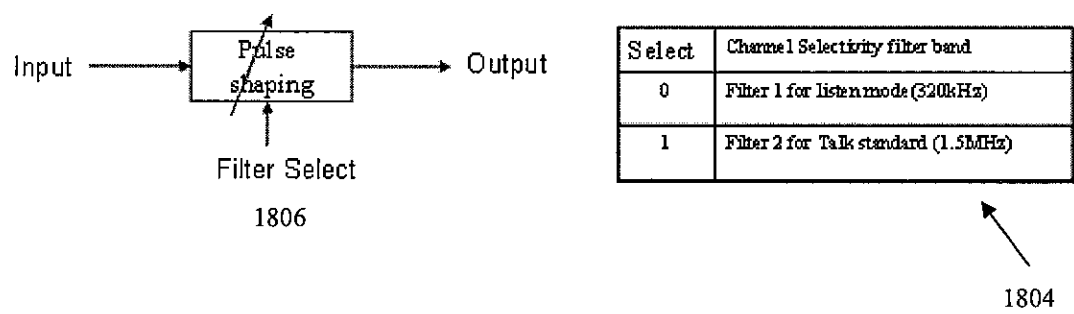
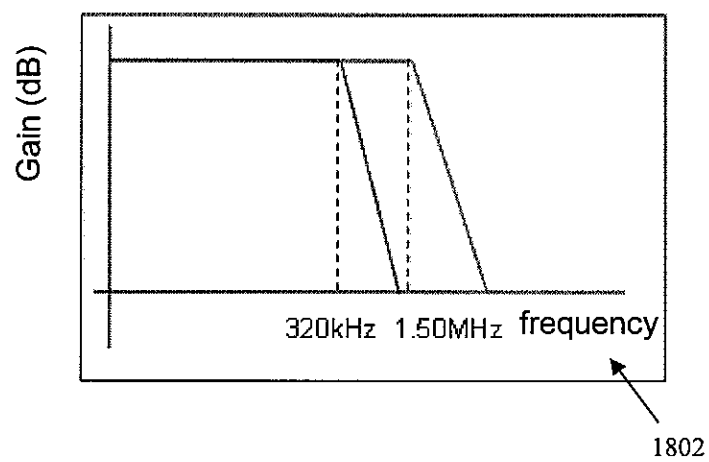


FIGURE 18



A



B

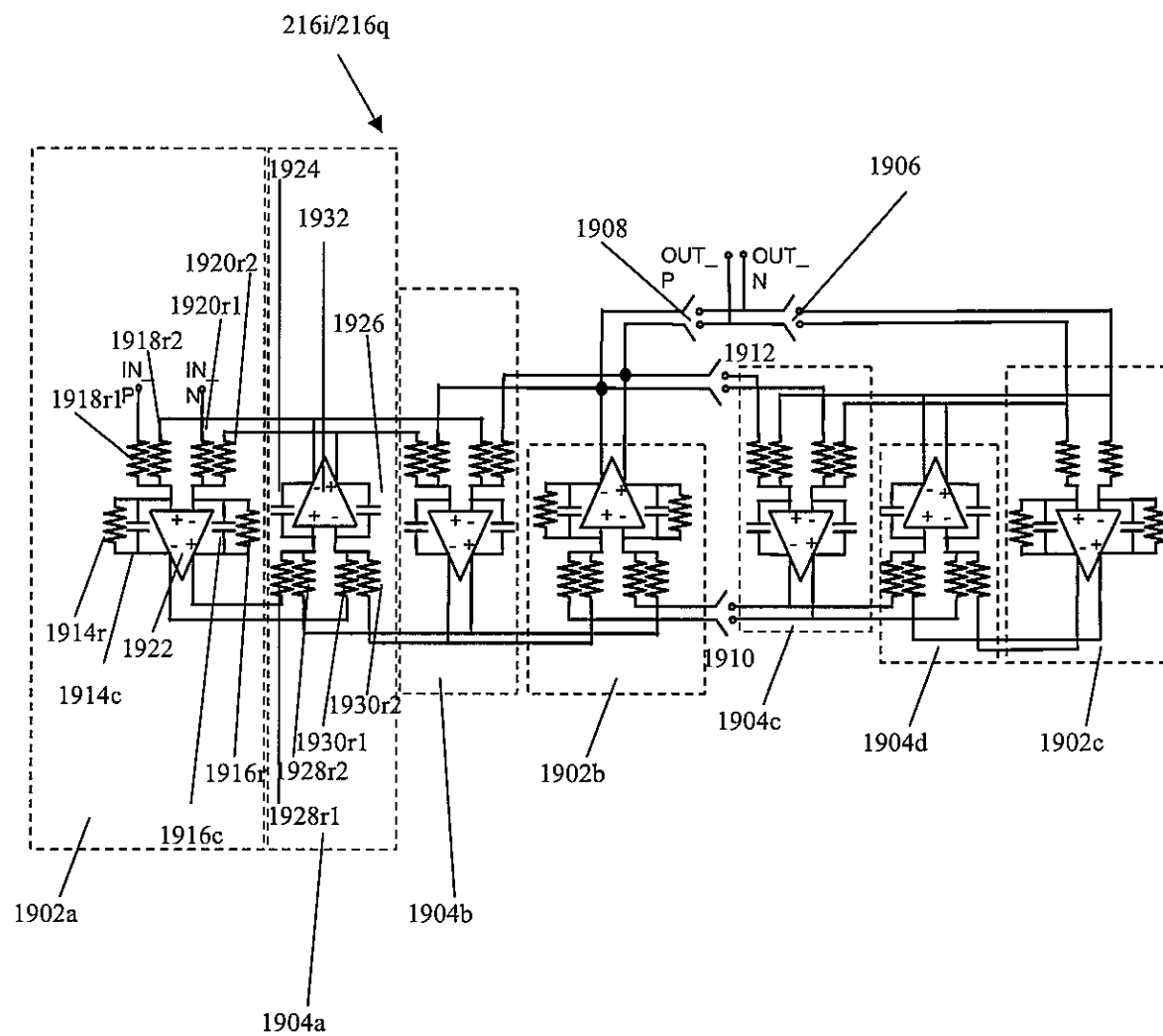
FIGURE 19

FIGURE 20

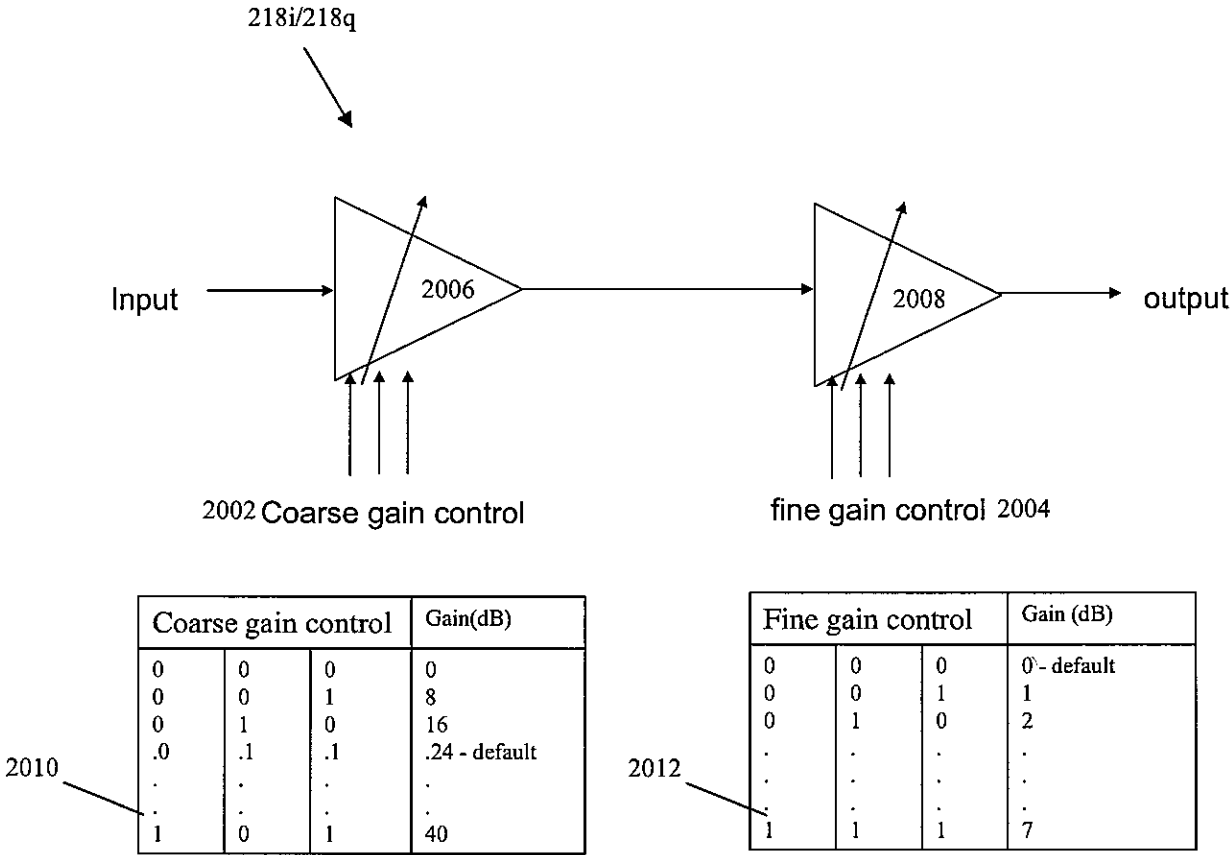


FIGURE 21

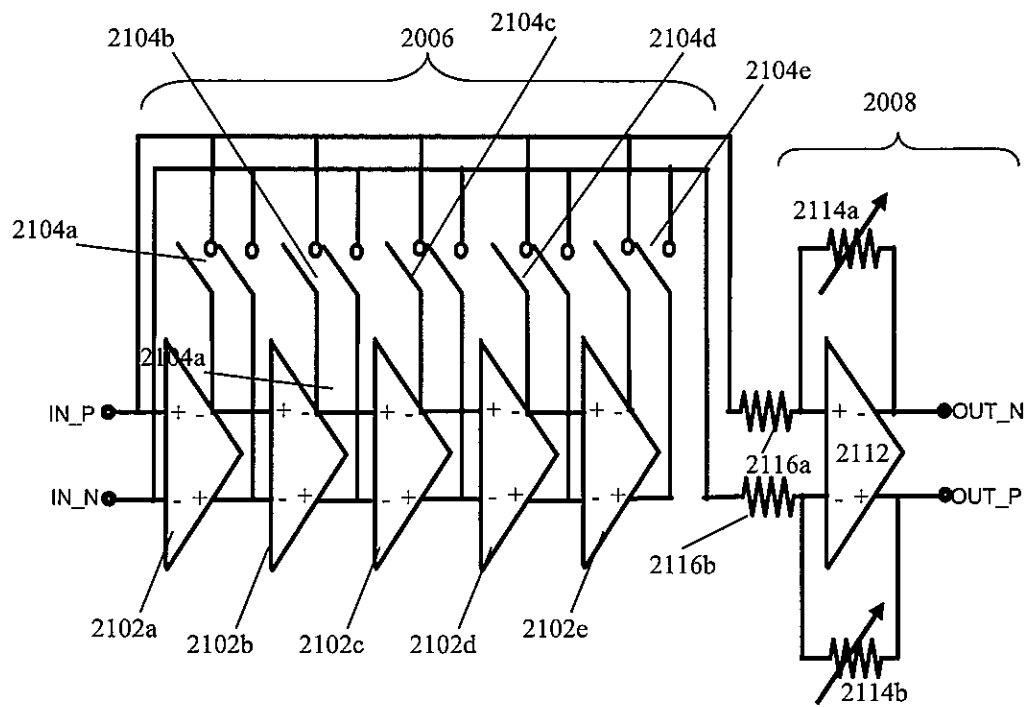


FIGURE 22

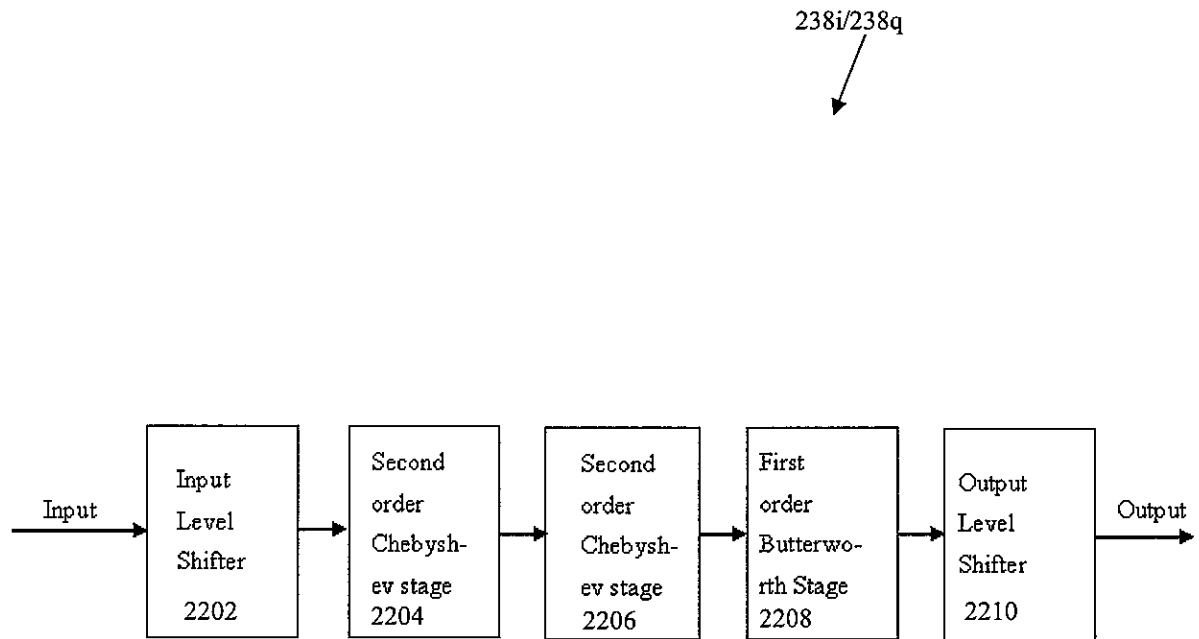
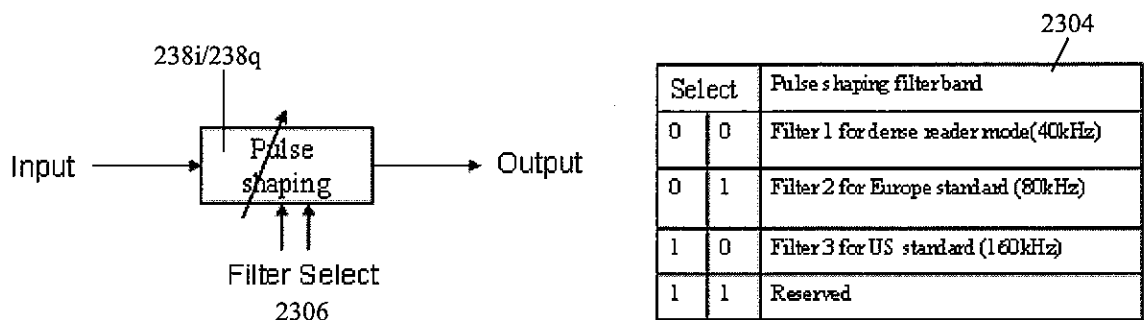
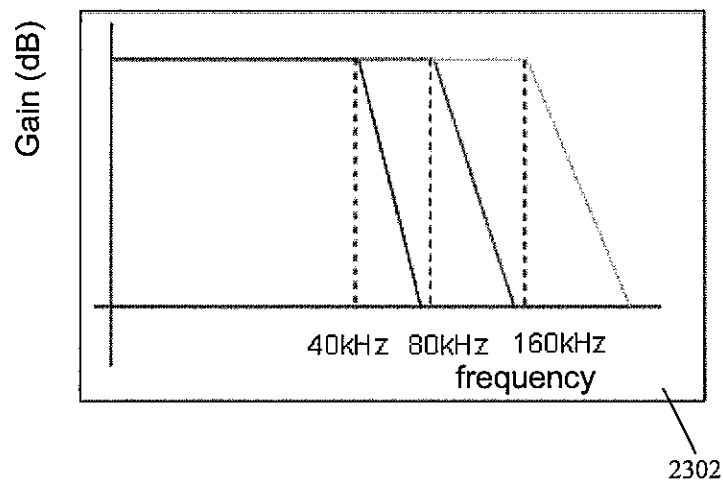


FIGURE 23



A



B

FIGURE 24

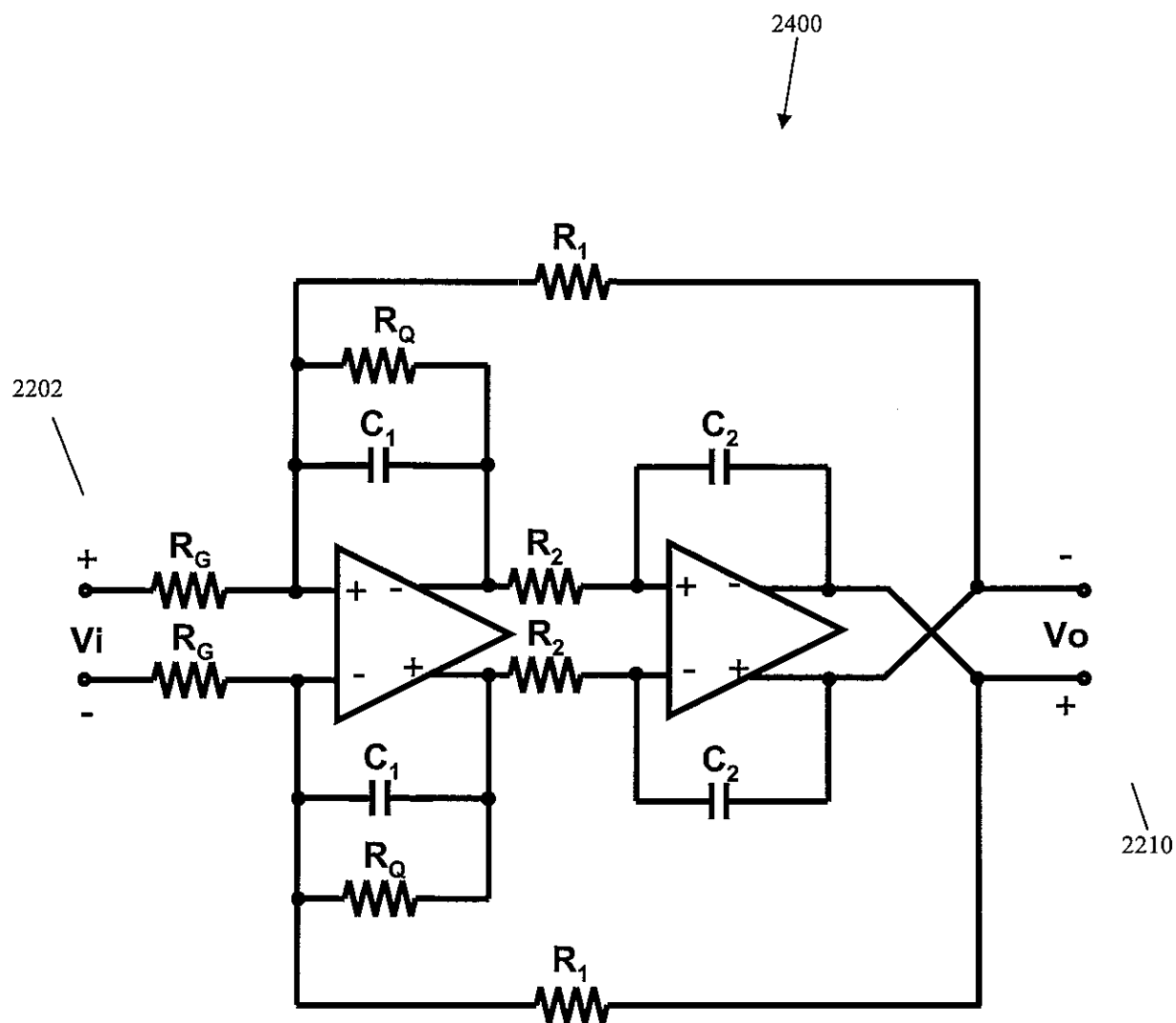


FIGURE 25

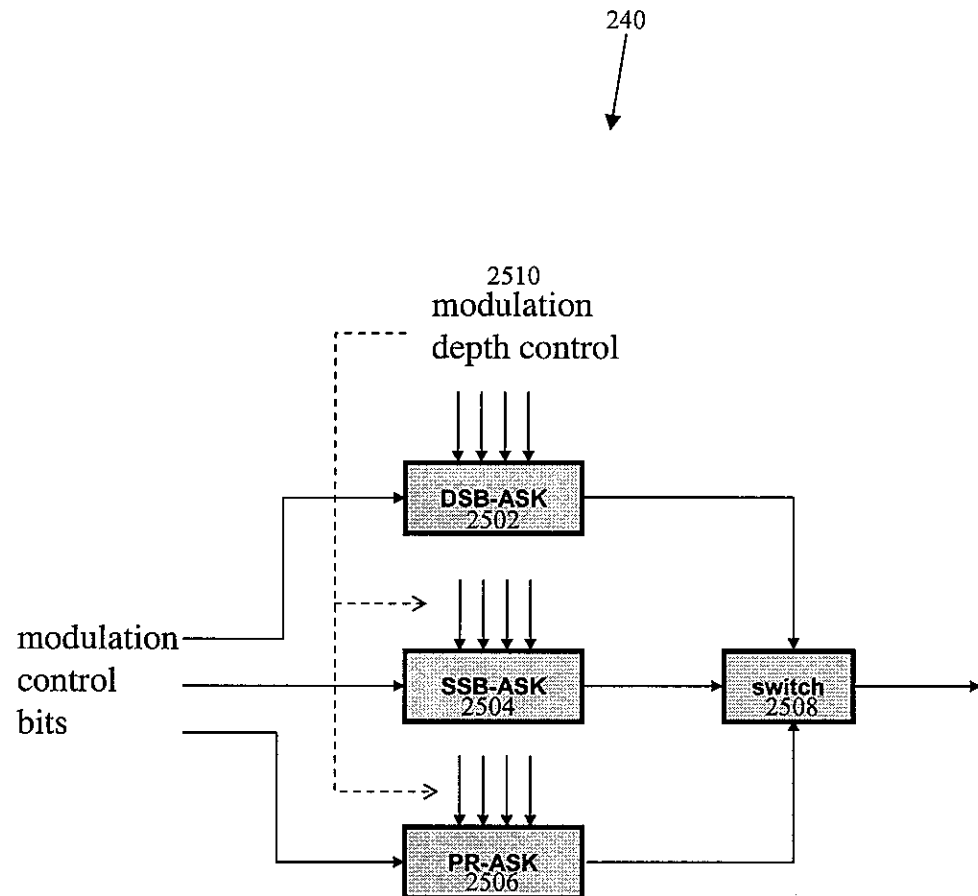


FIGURE 26

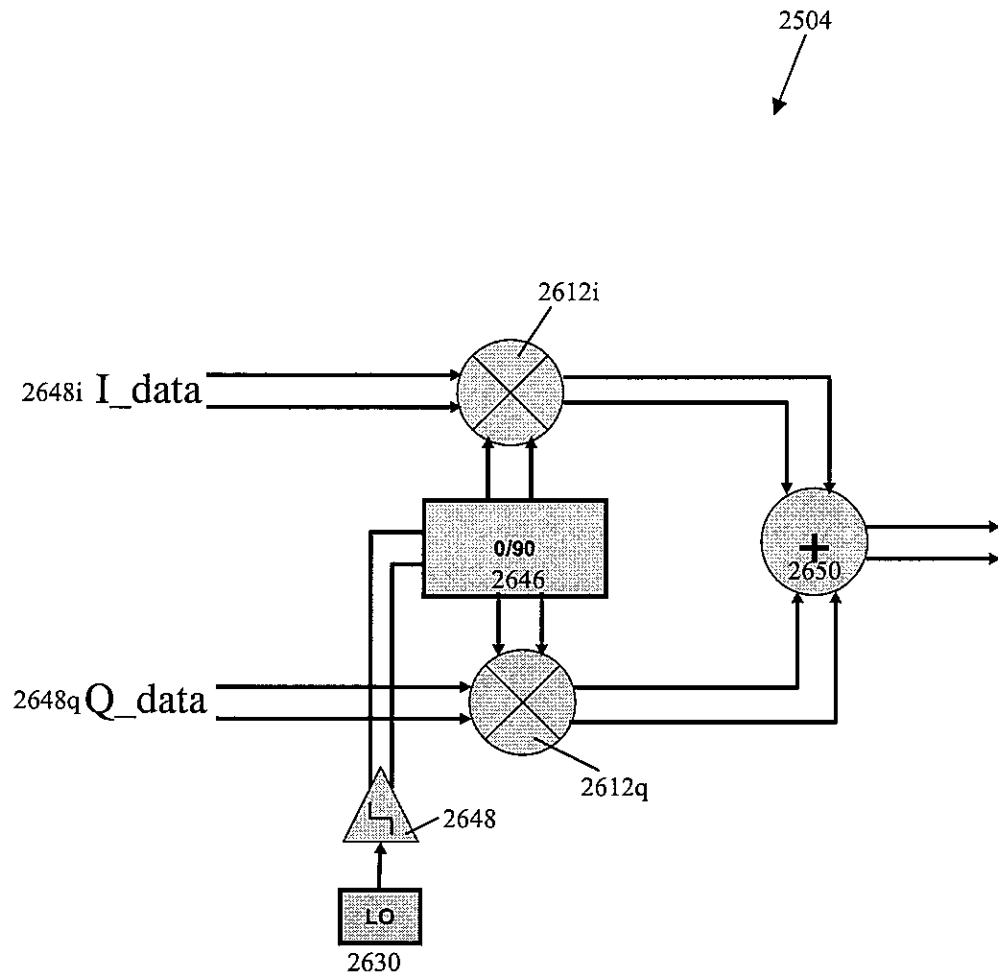


FIGURE 27

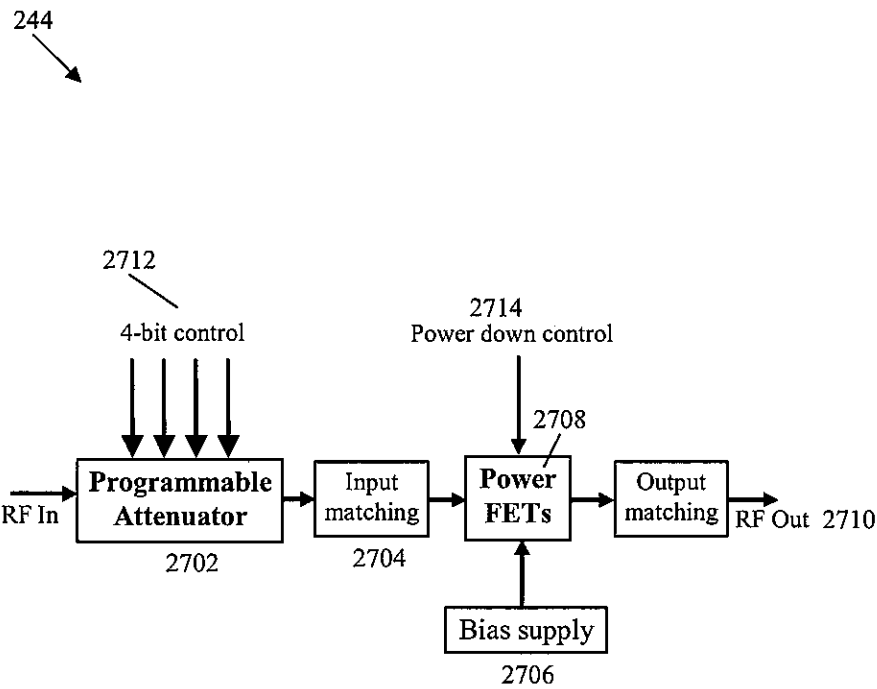


FIGURE 28

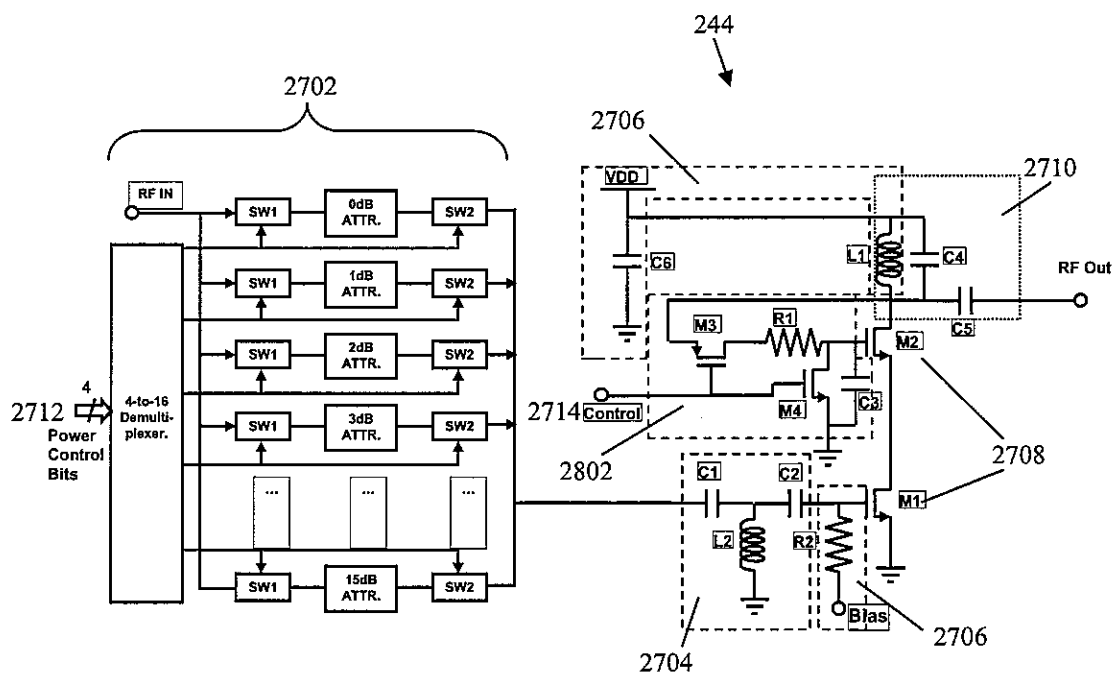


FIGURE 29

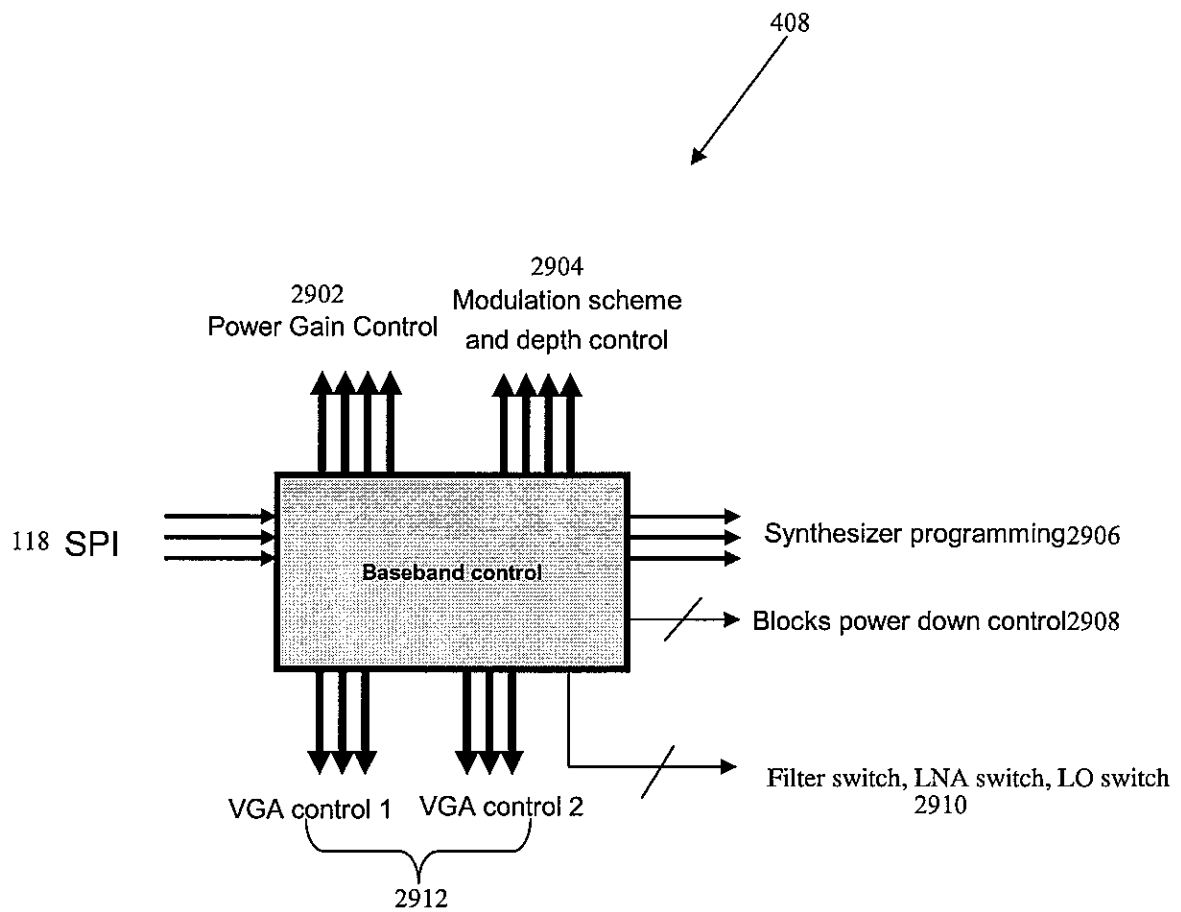


FIGURE 30

D5	D4	Description
0	0	Talk mode: All On
0	1	Listen mode: Tx On (PA, PLL, Modulator, DAC, PSF) Rx Off (LNA, Mixer, VGA, Demodulator, ADC)
1	0	Rx On (LNA, Mixer, PLL, VGA, Demodulator, ADC) Tx Off (PA, Modulator, DAC, PSF)
1	1	All OFF

3002

3004

Power Control Register																
Power On/Off control for individual blocks															Op. Code	
D19	D18	D17	D16	D15	D14	D13	D12	D11	D10	D9	D8	D7	D6	D5	D4	D3
C16	C15	C14	C13	C12	C11	C10	C9	C8	C7	C6	C5	C4	C3	C2	C1	D0

Bits	Value	Power down control (0 – ON; 1 – OFF)
C1	0/1	Reset – all off
C2	0/1	DAC ON/OFF
C3	0/1	Pulse shaping filter ON/OFF
C4	0/1	Modulator ON/OFF
C5	0/1	PA ON/OFF
C6	0/1	LNA ON/OFF
C7	0/1	Mixer ON/OFF
C8	0/1	VGA ON/OFF
C9	0/1	ADC ON/OFF
C10	0/1	Demodulator ON/OFF
C11	0/1	PLL1 ON/OFF
C12	0/1	PLL2 ON/OFF
C13	0/1	PLL1 BUFFER ON/OFF
C14	0/1	PLL2 BUFFER ON/OFF

3006

FIGURE 31

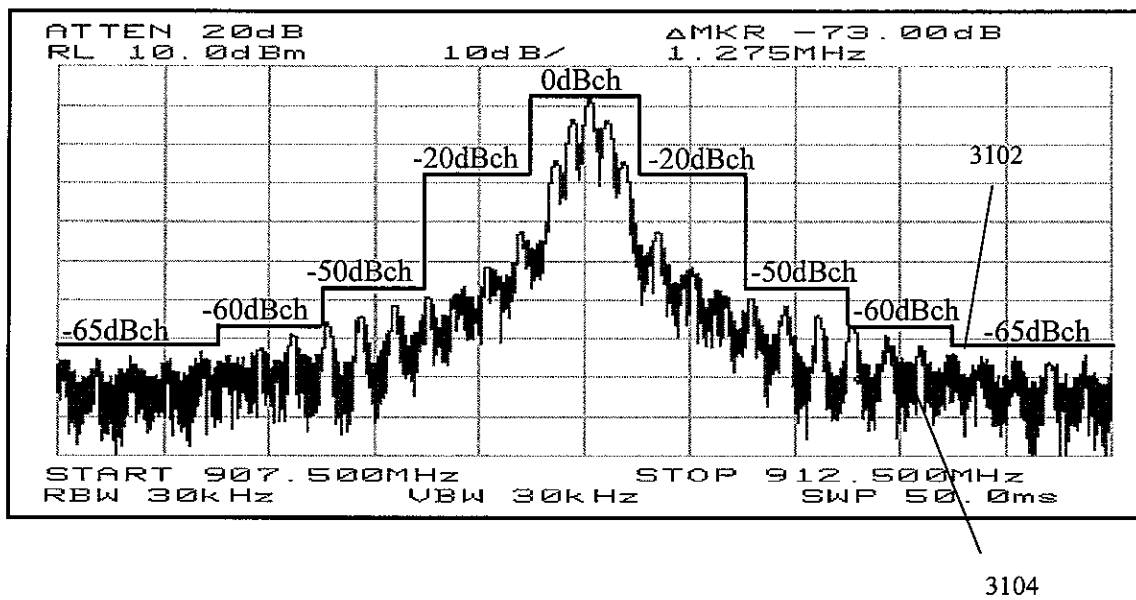


FIGURE 32

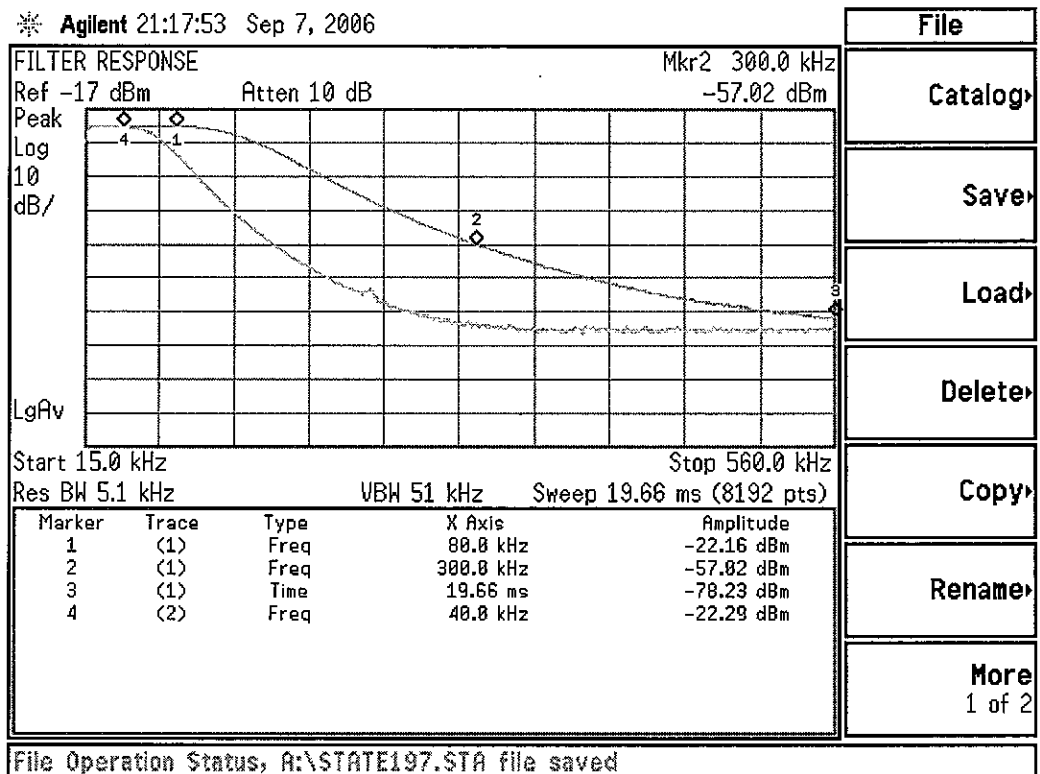


FIGURE 33

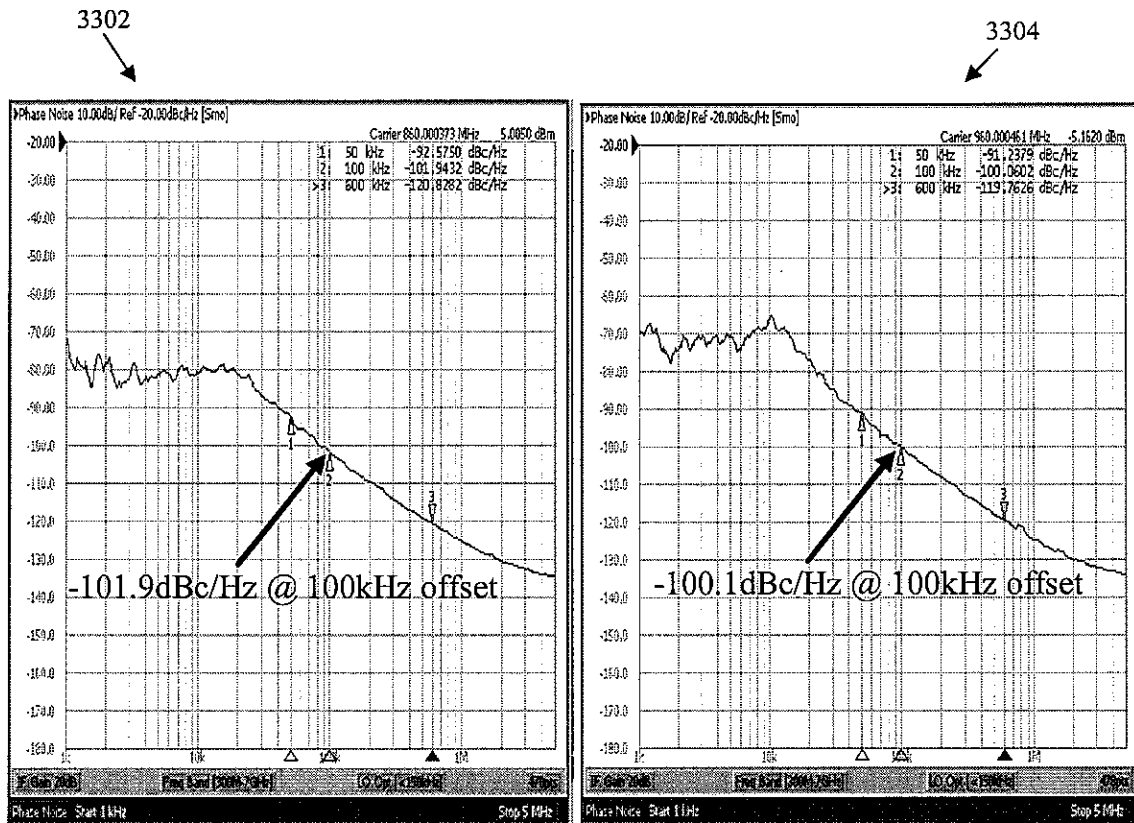
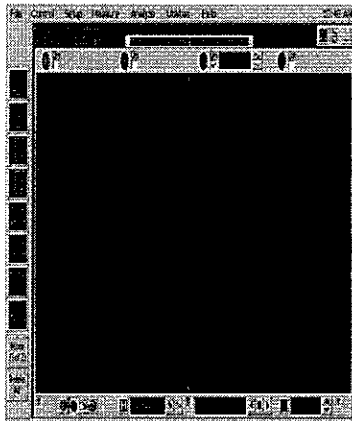
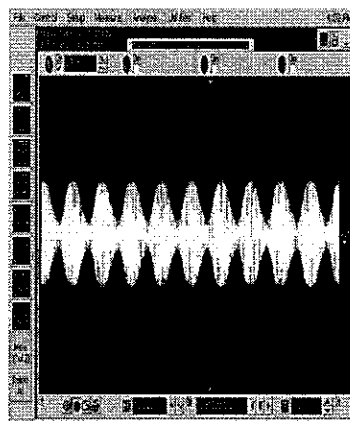


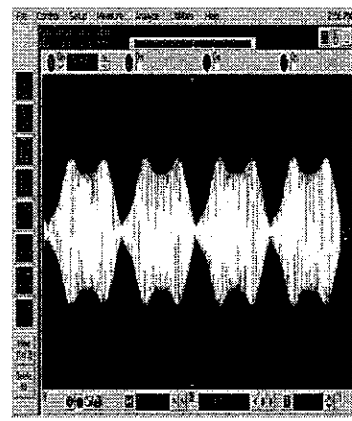
FIGURE 34



A

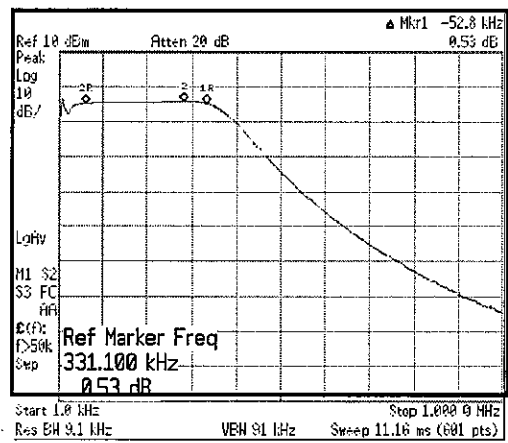


B

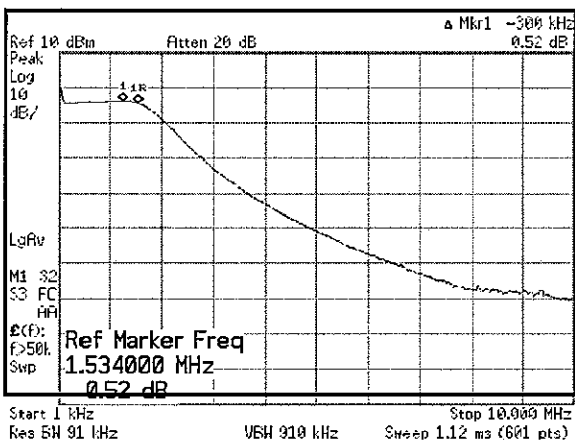


C

FIGURE 35



A



B

FIGURE 36

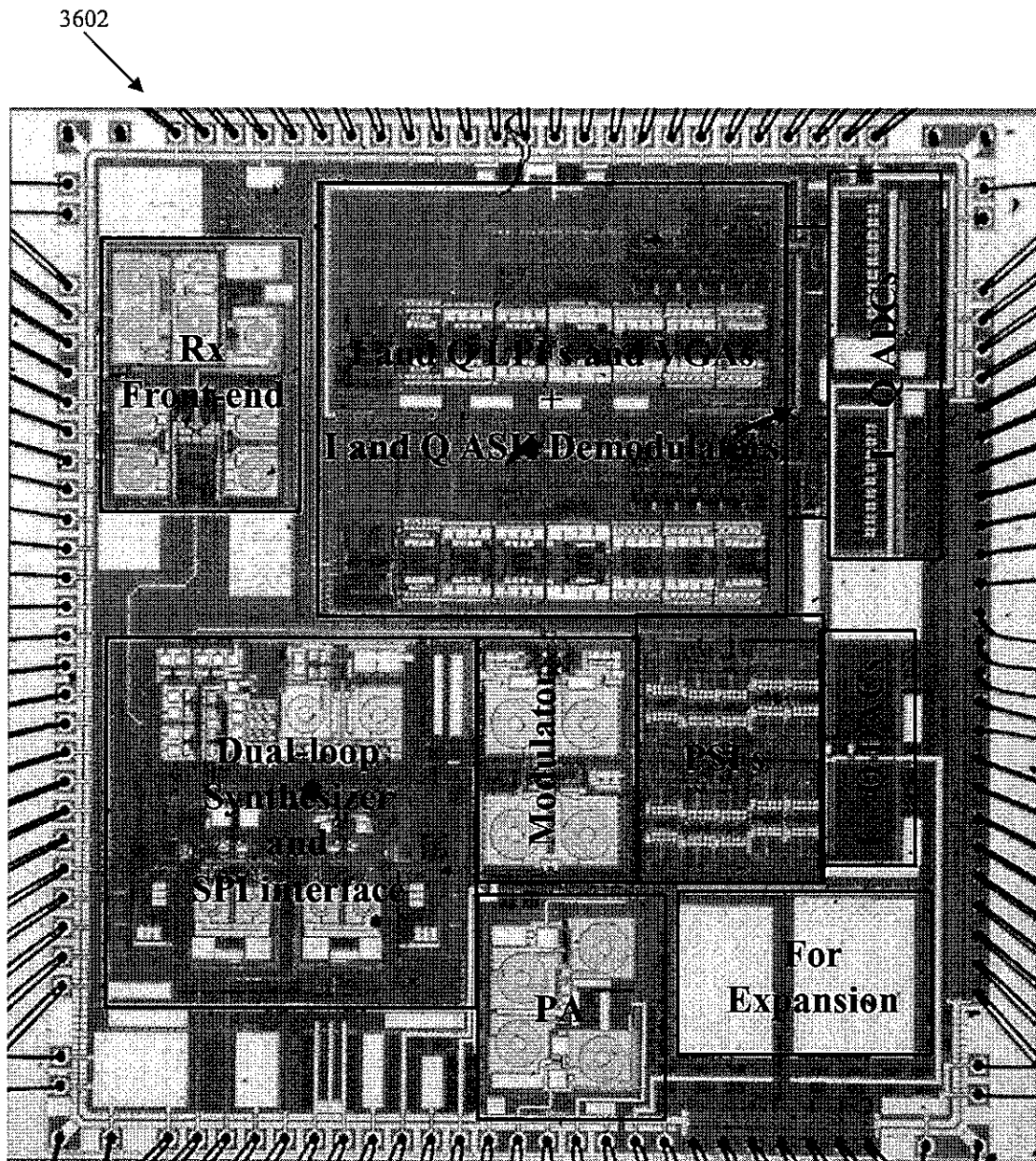


FIGURE 37

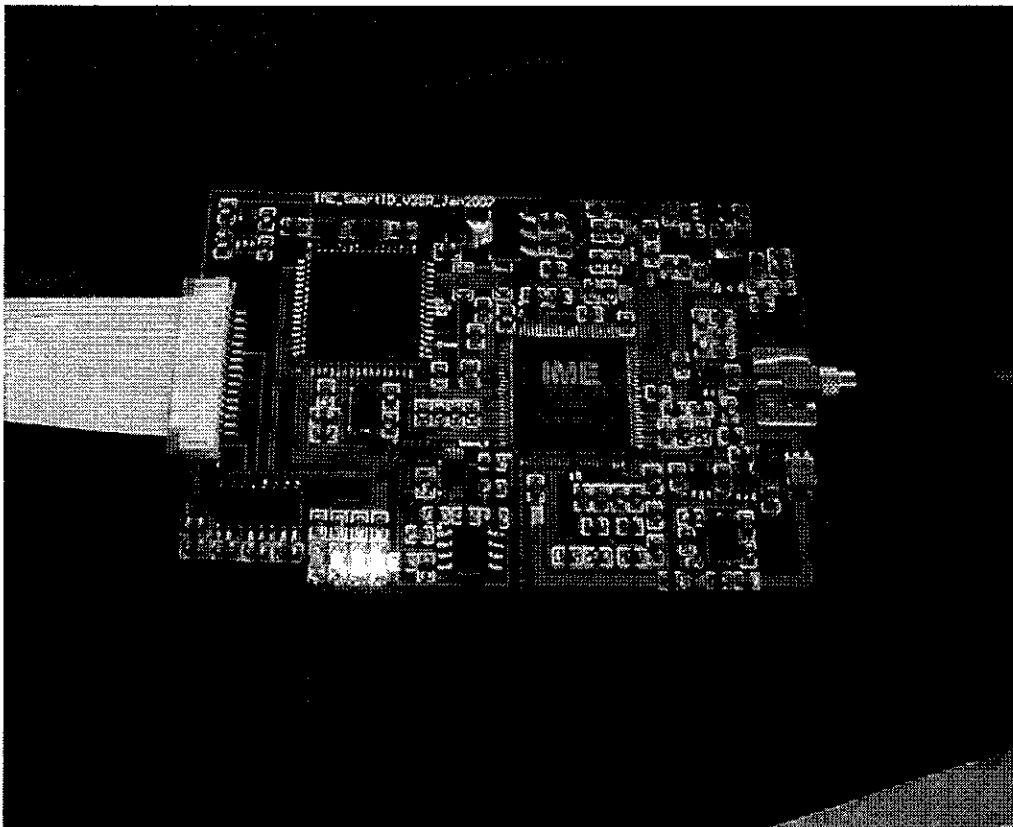


FIGURE 38

Parameter	Measured Results	
Operating Frequency	860 ~ 960MHz	
Transmit power	+10dBm with power control of 16dB in 1dB step	
Receiver Sensitivity	-96dbm – LBT Mode	
	-85dBm – Talk mode	
IIP3	-10dBm – LBT Mode	
	0dBm – Talk mode	
Synthesizer performance	Lock range: 860 ~ 960MHz	
	Frequency step: 50kHz	
	Phase noise	
	@ 100kHz Offset	-101dBc/Hz
	@ 50kHz Offset	-92dBc/Hz
ADCs	10-bit resolution; SFDR=59dB; INL: 1.3 (LSB); DNL: 0.55 (LSB)	
DACs	10-bit resolution	
Channel-select filters – Selectable Cutoff Frequency	LBT mode: 330kHz	
	Talk mode: 1.53MHz	
Pulse-shaping filters – Selectable Cutoff Frequency	40kHz	
	80kHz	
	160kHz	
Modulation	DSB-ASK/PR-ASK/SSB-ASK	
On-chip demodulator	ASK (up to 640kbps)	
Power consumption	300mA from 1.8V supply – when all the blocks are ON	
Operating voltage	1.8V $\pm$ 10%	
Operating temperature	-25° C to +75° C	
Die size	6mm X 6mm	
Package	TQFP100	

FIGURE 39

Transponder Type	Fully-discrete reader	Using the Reader IC presented in this Paper
EPC Gen 2 (ISO 18000-6C)	1.6m	1.5m
Philips HSL (ISO 18000-6B)	1.8m	1.5m
EM4122	1.2m	1.0m

FIGURE 40

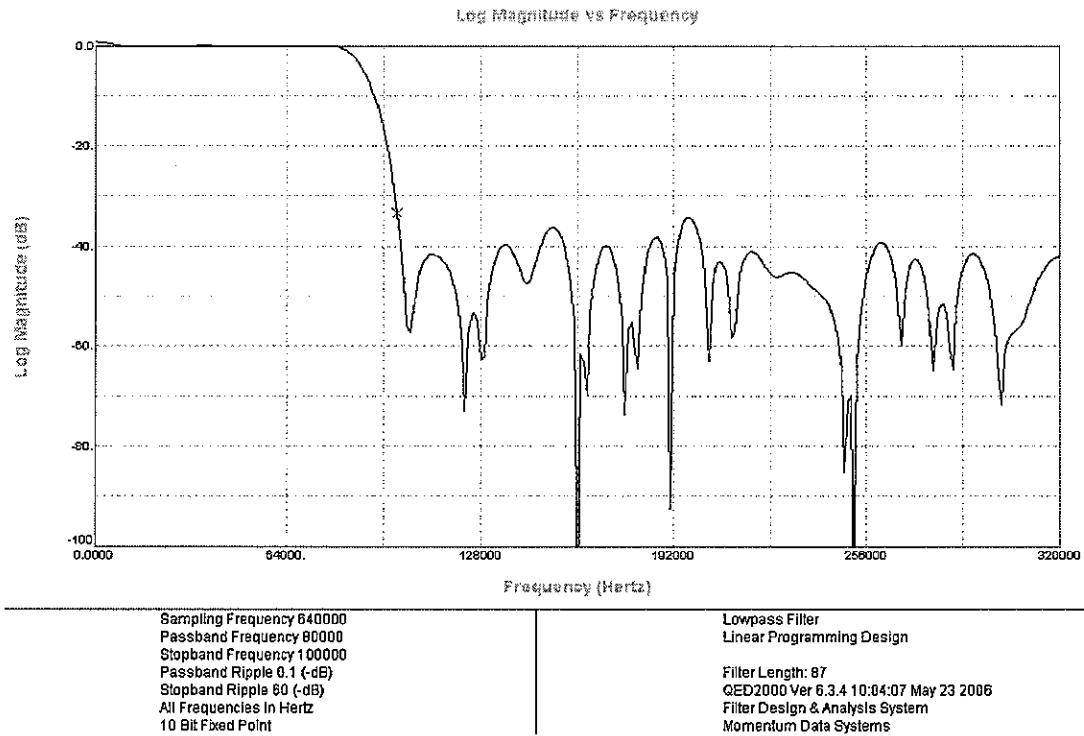


FIGURE 41

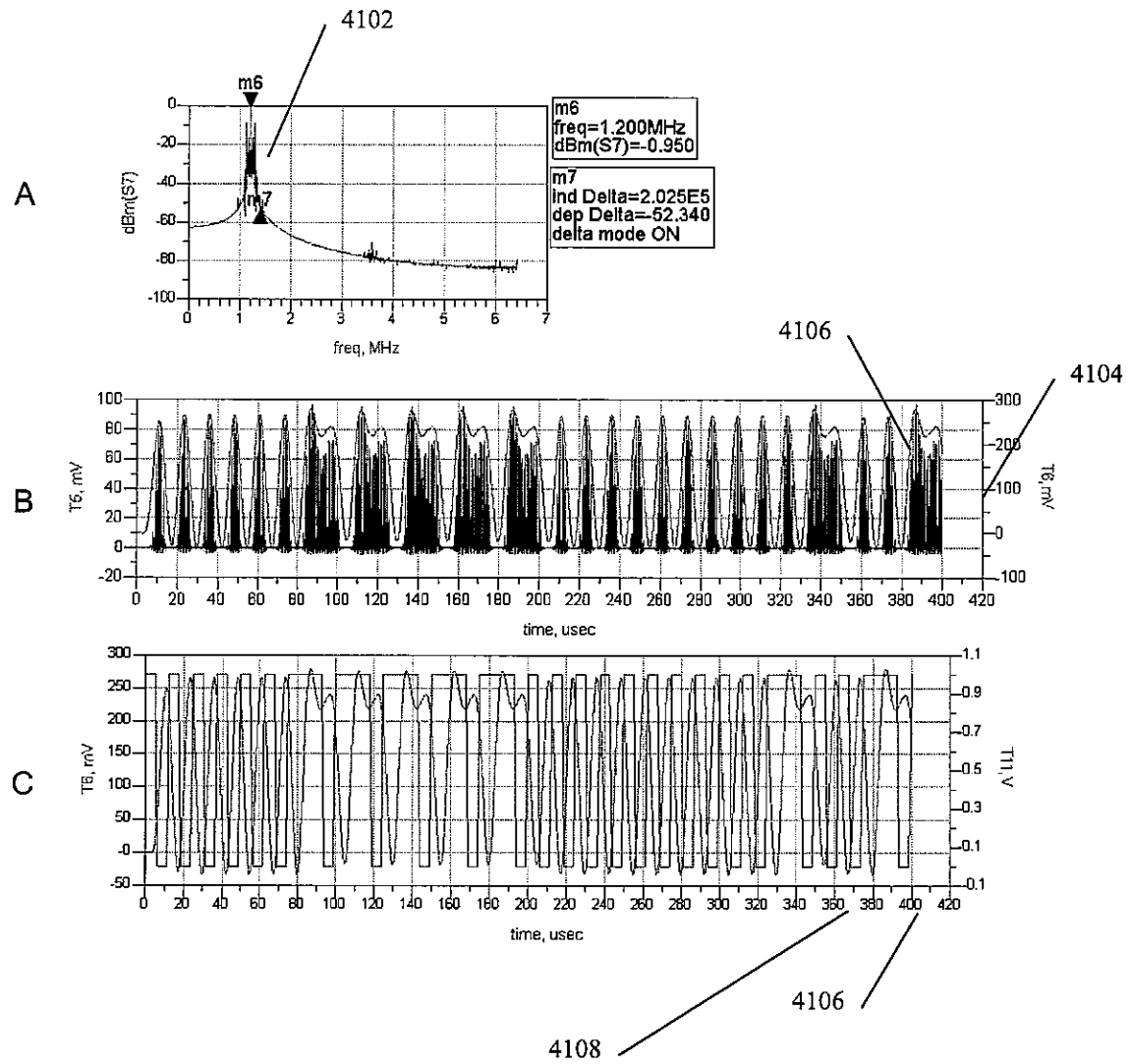


FIGURE 42

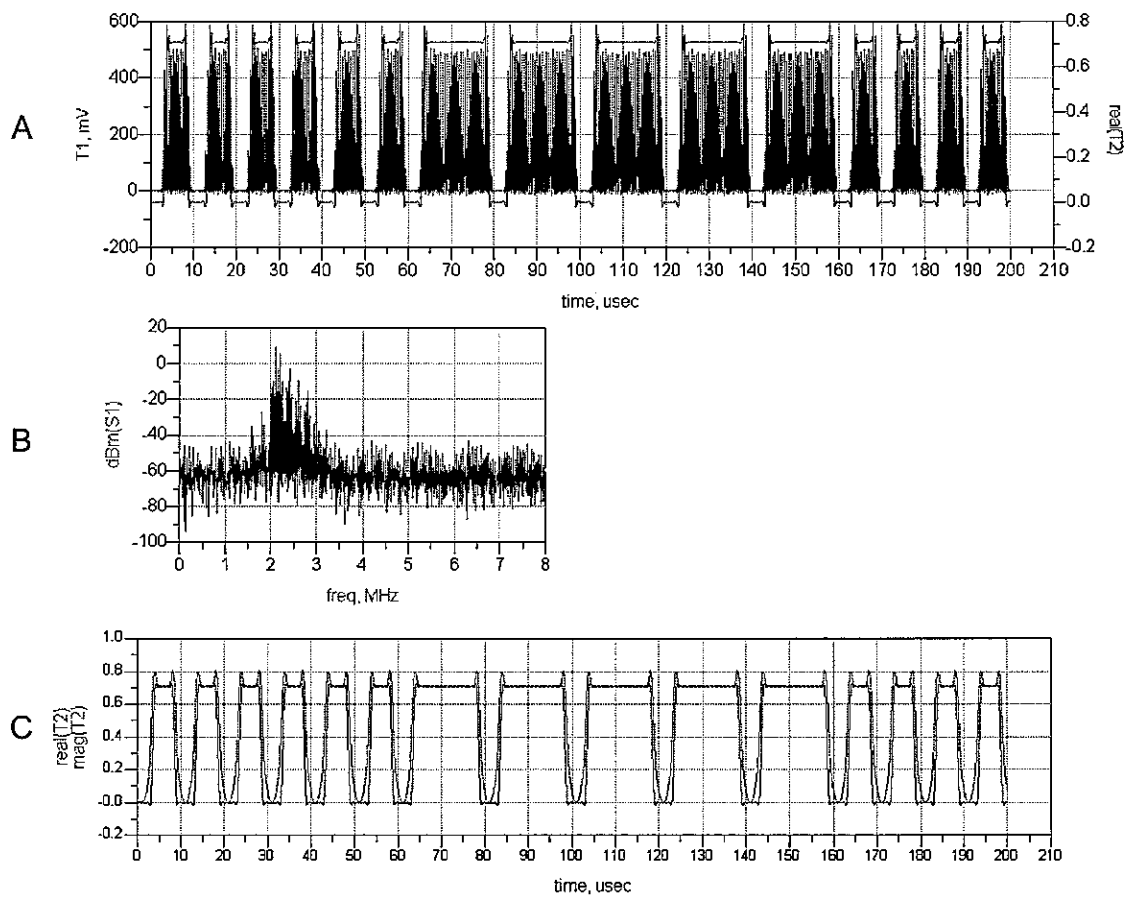
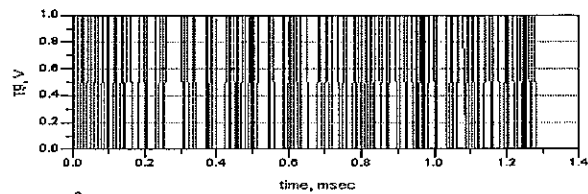
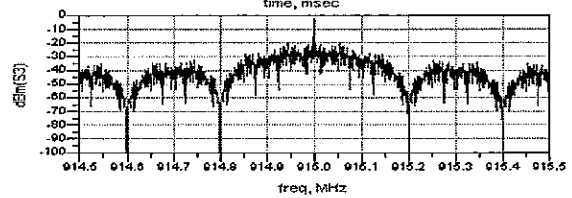


FIGURE 43

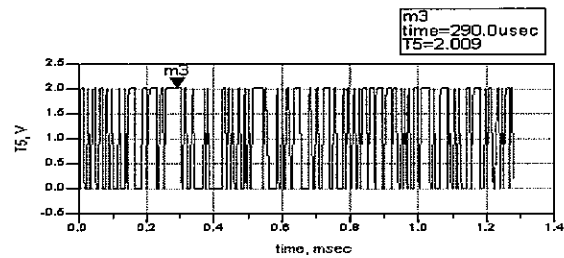
Tx data:



ASK modulated signal spectrum:



Demodulated signal:



BER versus Es/N0:

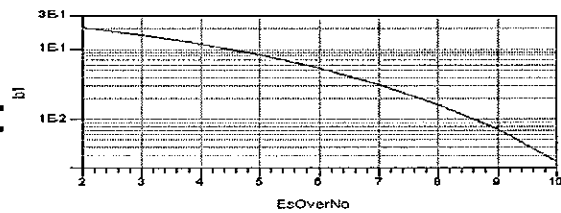


FIGURE 44

