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## Appendix 實作，沒有 LO 訊號產生器的雙頻帶威福-哈特利鏡像消除降頻器 (SiGe $0.35 \mu\text{m}$ )

### A.1 電路設計

電路和 2.4 節中的實作一樣，並將 LO 訊號產生器拿掉，如圖 A.1 所示。

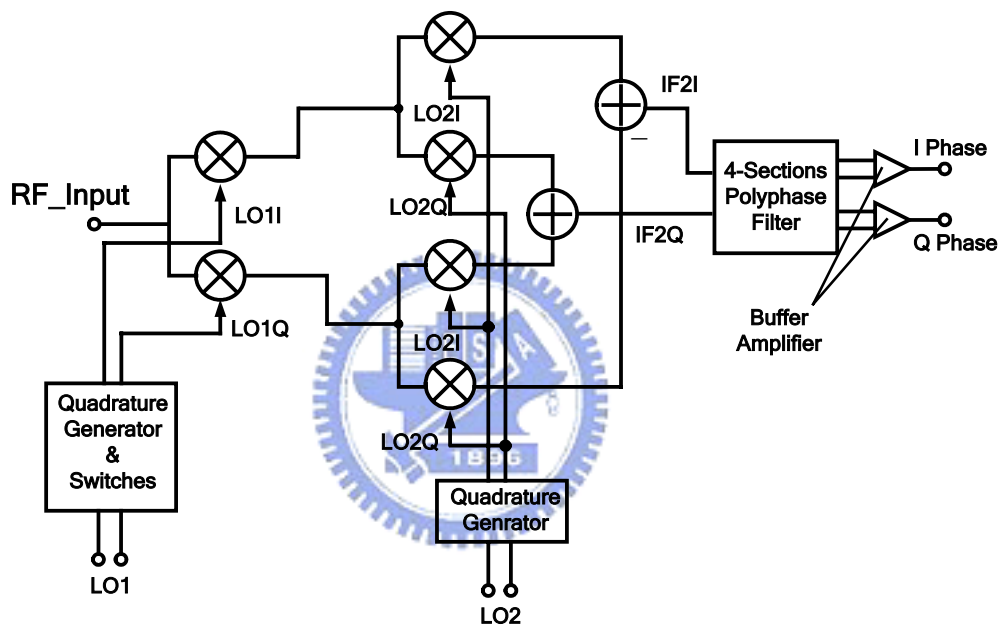
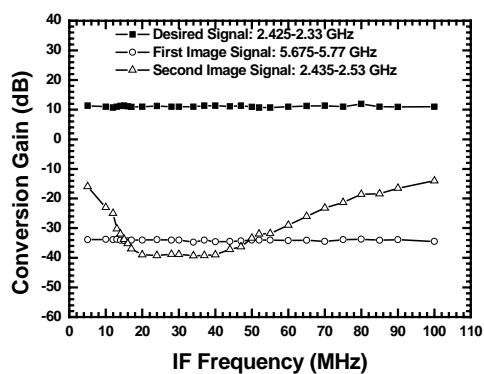


圖 A.1 雙頻帶威福-哈特利降頻器系統

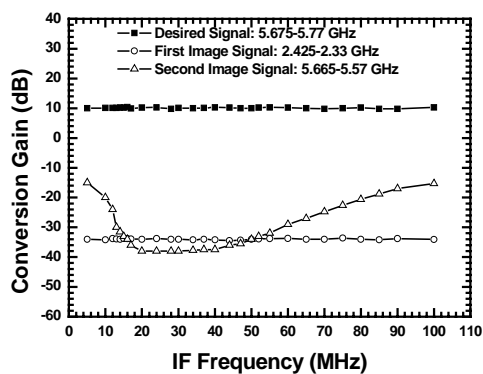
## A.2 量測結果

VCC1=3.3V (52mA) , VCC2=3.3V (46mA)

LO1 Power=13dBm , LO2 Power=5dBm

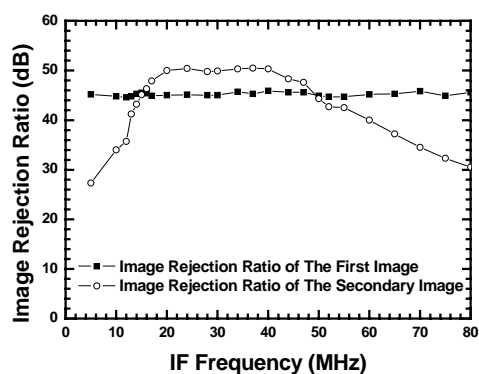


(a)

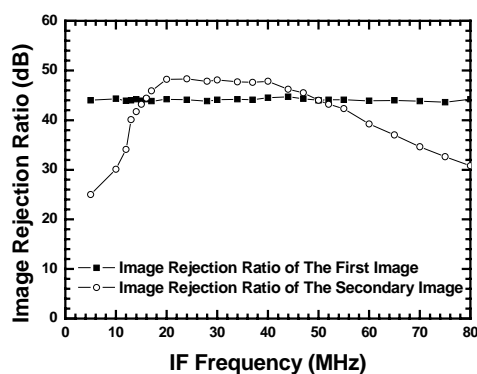


(b)

圖 A.2 轉換增益對 IF 頻率 (a)射頻中心頻率:2.4GHz (b)射頻中心頻率:5.7GHz

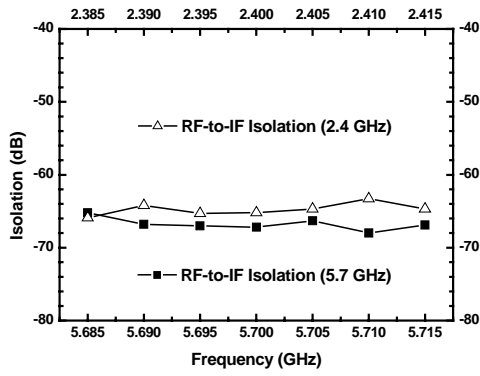


(a)

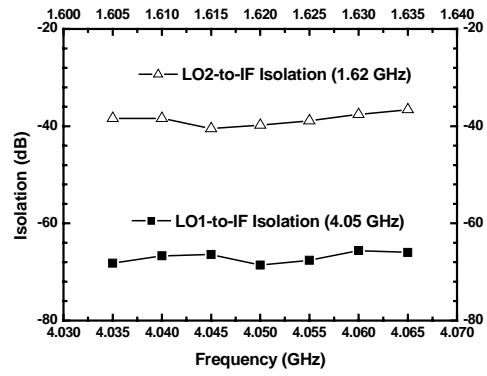


(b)

圖 A.3 鏡像消除比值對 IF 頻率 (a)射頻中心頻率:2.4GHz (b)射頻中心頻率:5.7GHz



(a)



(b)

圖 A.4 (a) RF 埠到 IF 埠隔離度(b)LO 埠到 RF 埠隔離度

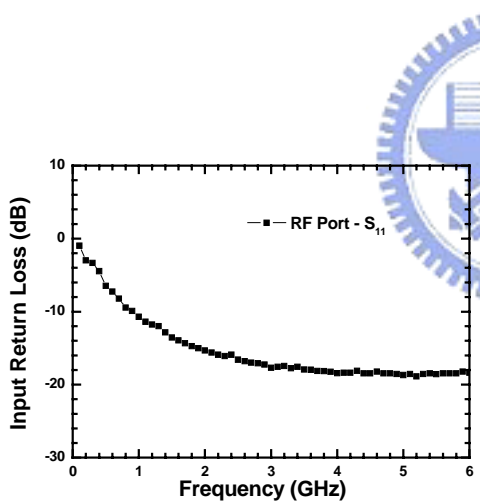


圖 A.5 RF 埠輸入返回損耗

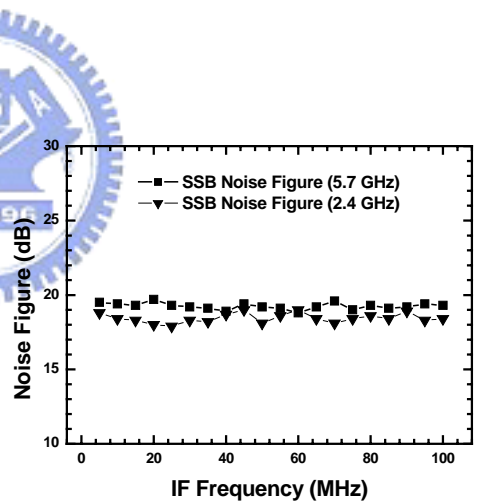


圖 A.6 雜訊指數

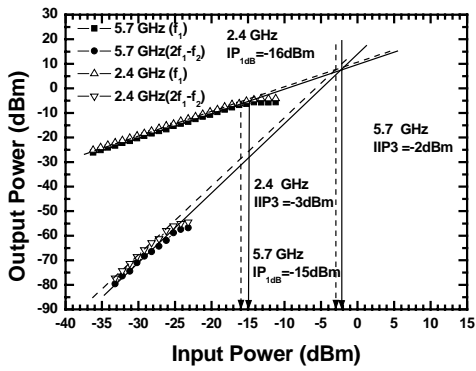


圖 A.7 IP1dB 與 IIP3 量測結果

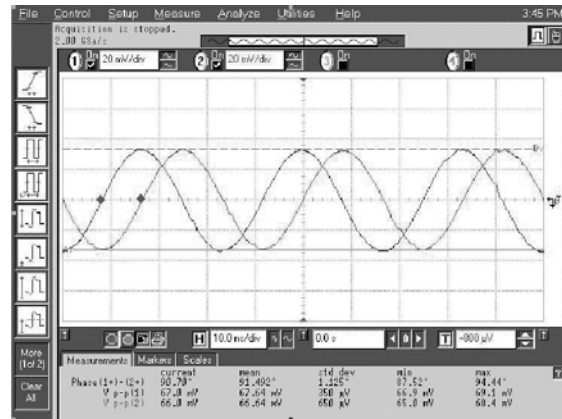


圖 A.8 I、Q 通道輸出波形

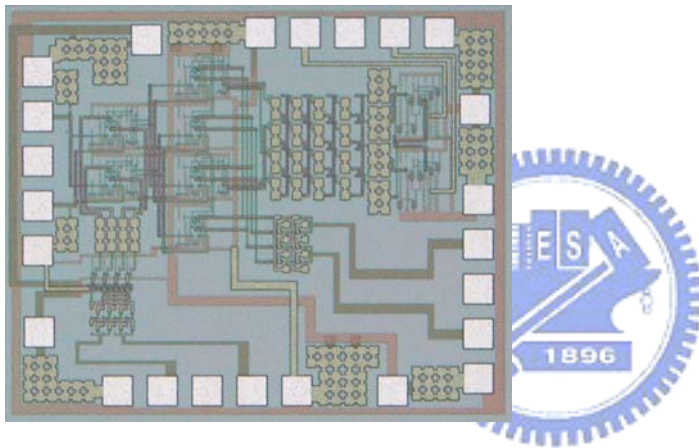


圖 A.9 Die Photo

表 A.1 Summary

Item	2.4 GHz	5.7 GHz
Conversion Gain (dB)	11	10
Image Rejection Ratio of the First Image (dB)	45	44
Image Rejection Ratio of the Secondary Image (dB)	50	48
IP <sub>1dB</sub> (dBm)	-16	-15
IIP <sub>3</sub> (dBm)	-3	-2
Input S <sub>11</sub> (dB)	-16	-18.5
Double Sideband Noise Figure (dB)	19	18