RF2442

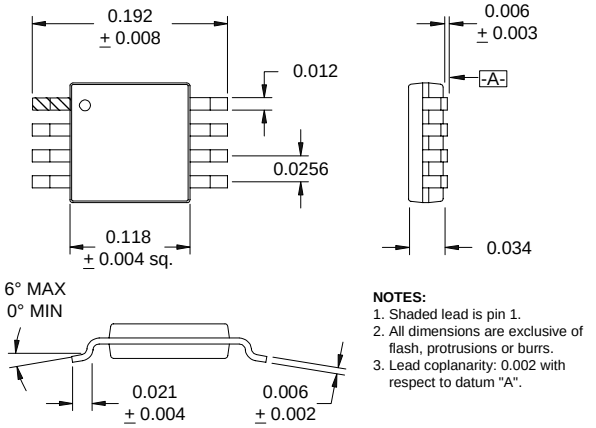
HIGH-LINEARITY LOW NOISE AMPLIFIER

Typical Applications

- TDMA/CDMA/FM Cellular Rx LNA
- TDMA/CDMA PCS Rx LNA
- Low Noise Transmit Driver Amplifier
- ISM Band LNA/Driver
- General Purpose Amplification
- Commercial and Consumer Systems

Product Description

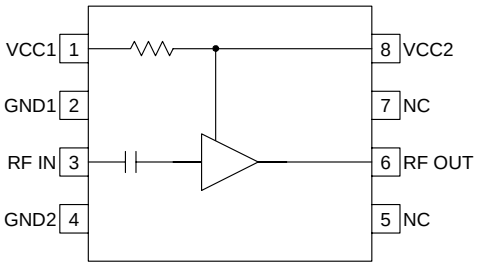
The RF2442 is a low noise amplifier with a very high dynamic range designed for the receive front end of digital cellular applications at 900MHz, 1900MHz, and 2400MHz. It is designed to amplify low level signals with minimum noise contribution while operating in the harsh, interference-rich environments of newly deployed digital subscriber units. The device also functions as an outstanding PA driver amplifier in the transmit chain of digital subscriber units where low transmit noise power is a concern. The device supports trade-offs between linearity and current drain. The designer has control of these trade-offs with the choice of an external bias resistor. The IC is featured in a standard miniature 8-lead plastic MSOP package.



Package Style: MSOP-8

Optimum Technology Matching® Applied

- ☐ Si BJT
- ☑ GaAs HBT
- ☐ GaAs MESFET
- ☐ Si Bi-CMOS
- ☐ SiGe HBT
- ☐ Si CMOS



Functional Block Diagram

Features

- Low Noise and High Intercept Point
- External Bias Control
- Single 2.5V to 5.0V Power Supply
- 500MHz to 2500MHz Operation
- Extremely Small MSOP-8 Package

Ordering Information

RF2442	High-Linearity Low Noise Amplifier
RF2442 PCBA-L	Fully Assembled Evaluation Board (~900MHz)
RF2442 PCBA-M	Fully Assembled Evaluation Board (~1900MHz)
RF2442 PCBA-H	Fully Assembled Evaluation Board (~2400MHz)

RF Micro Devices, Inc.
7628 Thorndike Road
Greensboro, NC 27409, USA
Tel (336) 664 1233
Fax (336) 664 0454
http://www.rfmd.com

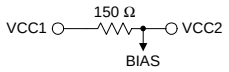
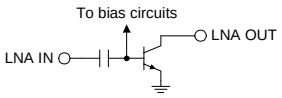
Absolute Maximum Ratings

Parameter	Rating	Unit
Supply Voltage	-0.5 to +6.0	V_{DC}
Input RF Level	+10	dBm
Operating Ambient Temperature	-40 to +85	°C
Storage Temperature	-40 to +150	°C

Caution! ESD sensitive device.

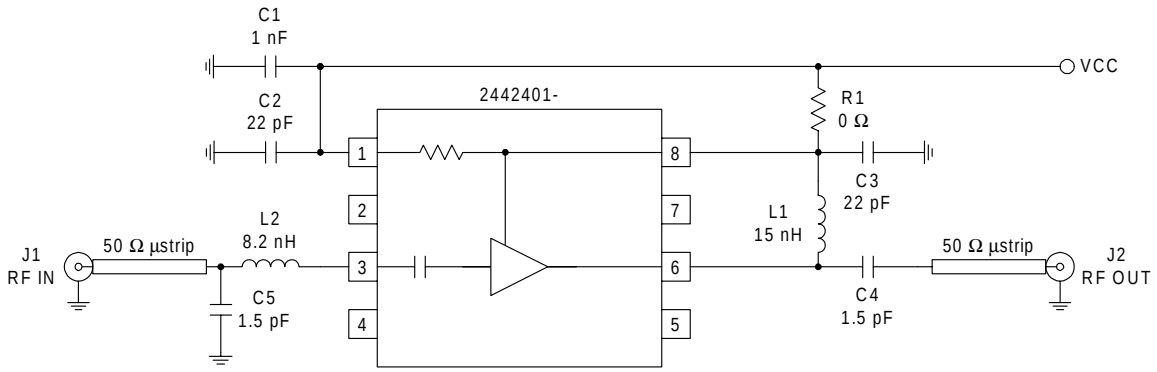
Parameter	Specification			Unit	Condition
	Min.	Typ.	Max.		
Overall					
RF Frequency Range		500 to 2500		MHz	Requires input tuning inductor below 1GHz
881MHz Performance					Schematic Evaluation Board L (R_C=0), T=25°C, RF=881MHz
Gain	18	20	22	dB	V_{CC}=3.6V
	17	19	21	dB	V_{CC}=3.0V
	16	18	20	dB	V_{CC}=2.5V
Output P1dB		+13		dBm	V_{CC}=3.6V
		+11		dBm	V_{CC}=3.0V
Output IP3	+21	+27		dBm	V_{CC}=3.6V
	+16	+22		dBm	V_{CC}=3.0V
	+10	+16		dBm	V_{CC}=2.5V
Noise Figure		1.6	2.5	dB	V_{CC}=3.6V
		1.5	2.5	dB	V_{CC}=3.0V
		1.4	2.5	dB	V_{CC}=2.5V
Reverse Isolation	22	24		dB	V_{CC}=3.6V
	22	24		dB	V_{CC}=3.0V
	21	23		dB	V_{CC}=2.5V
1960MHz Performance					Schematic Evaluation Board M (R_C=0), T=25°C, RF=1960MHz
Gain	10	12	14	dB	V_{CC}=3.6V
	10	12	14	dB	V_{CC}=3.0V
	10	12	14	dB	V_{CC}=2.5V
Output P1dB		+16		dBm	V_{CC}=3.6V
		+13		dBm	V_{CC}=3.0V
Output IP3	+20	+26		dBm	V_{CC}=3.6V
	+15	+21		dBm	V_{CC}=3.0V
	+9	+15		dBm	V_{CC}=2.5V
Noise Figure		1.6	2.3	dB	V_{CC}=3.6V
		1.5	2.1	dB	V_{CC}=3.0V
		1.4	2.0	dB	V_{CC}=2.5V
Reverse Isolation	18	20		dB	V_{CC}=3.6V
	17	19		dB	V_{CC}=3.0V
	17	19		dB	V_{CC}=2.5V

Parameter	Specification			Unit	Condition
	Min.	Typ.	Max.		
2400MHz Performance					Schematic Evaluation Board H (R_C=0), T=25°C, RF=2400MHz
Gain	7	9	11	dB	V_{CC}=3.6V
	7	9	11	dB	V_{CC}=3.0V
	6	8	10	dB	V_{CC}=2.5V
Output IP3	+20	+26		dBm	V_{CC}=3.6V
	+15	+21		dBm	V_{CC}=3.0V
	+9	+15		dBm	V_{CC}=2.5V
Noise Figure		1.6	2.5	dB	V_{CC}=3.6V
		1.5	2.3	dB	V_{CC}=3.0V
		1.4	2.1	dB	V_{CC}=2.5V
Reverse Isolation	16	17		dB	V_{CC}=3.6V
	16	17		dB	V_{CC}=3.0V
	16	17		dB	V_{CC}=2.5V
Power Supply					T=25°C
Voltage		2.5 to 5.0		V	
Current Consumption	17	19	30	mA	V_{CC}=3.6V
	10	12	23	mA	V_{CC}=3.0V
	7	9	20	mA	V_{CC}=2.5V

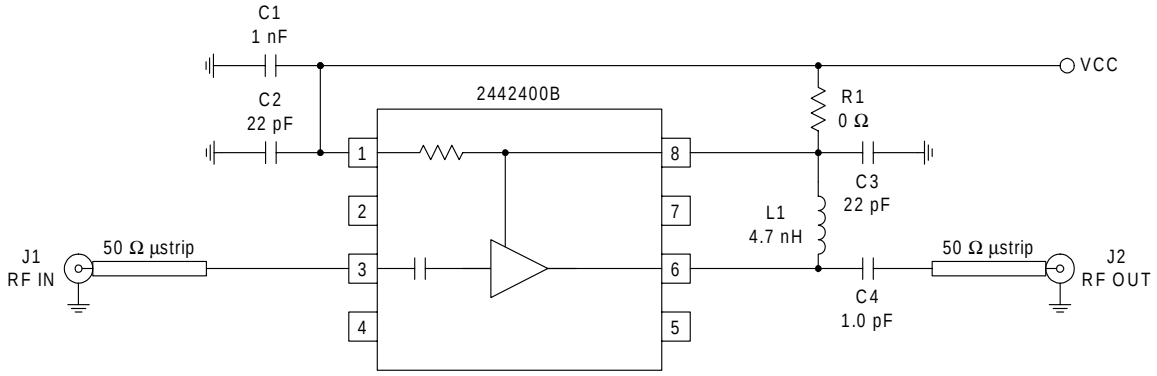
Pin	Function	Description	Interface Schematic
1	VCC1	Supply voltage for the LNA. External RF and IF bypassing is required. The trace length between the pin and the bypass capacitors should be minimized. The ground side of the bypass capacitors should connect immediately to ground plane. This pin connects to pin 8 through a 150Ω resistor. This allows for simple biasing of the collector at pin 6. Refer to Application Schematics 1 and 3.	
2	GND1	Ground connection. For best performance, keep traces physically short and connect immediately to ground plane.	
3	RF IN	RF input pin. This pin is internally DC-blocked and matched to 50Ω for frequencies above 1GHz. When using below 1GHz, it is recommended that this pin be matched with series inductance to series-resonate out the internal blocking capacitor. Refer to Application Schematics 1 and 2.	
4	GND2	Ground connection. For best performance, keep traces physically short and connect immediately to ground plane.	
5	NC	No connection. This pin is typically left unconnected or grounded.	
6	RF OUT	LNA Output pin. This pin is an open-collector output. It must be biased to either V_{CC} or pin 8 through a choke or matching inductor. This pin is typically matched to 50Ω with a shunt bias/matching inductor and series blocking/matching capacitor. Refer to application schematics.	See pin 3.
7	NC	No connection. This pin is typically left unconnected or grounded.	
8	VCC2	Optional power supply connection for biasing pin 6. This pin connects to pin 1 through a 150Ω resistor. This allows for simple biasing of the collector at pin 6. When used, this pin should be RF bypassed. Refer to Application Schematics 1 and 3.	See pin 1.

Evaluation Board Schematic (L board) ~900 MHz

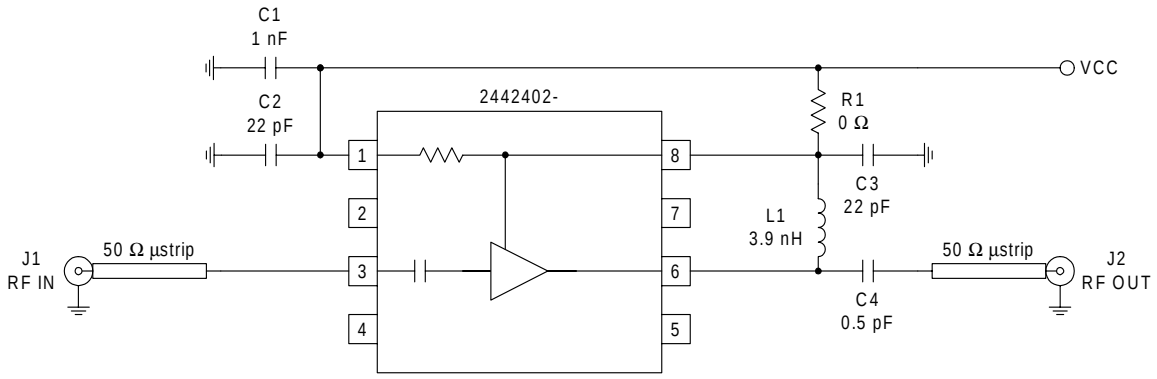
(Download Bill of Materials from www.rfmd.com.)



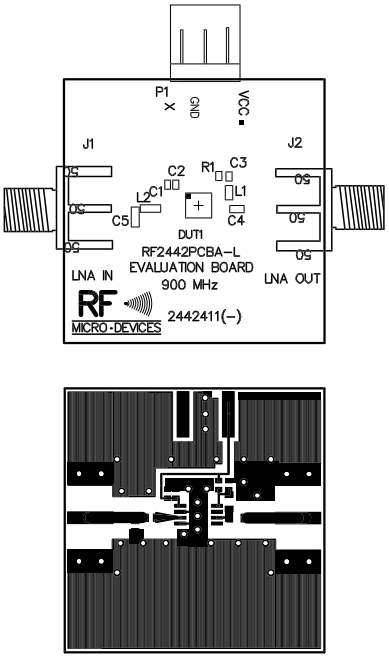
Evaluation Board Schematic (M board) ~1900 MHz



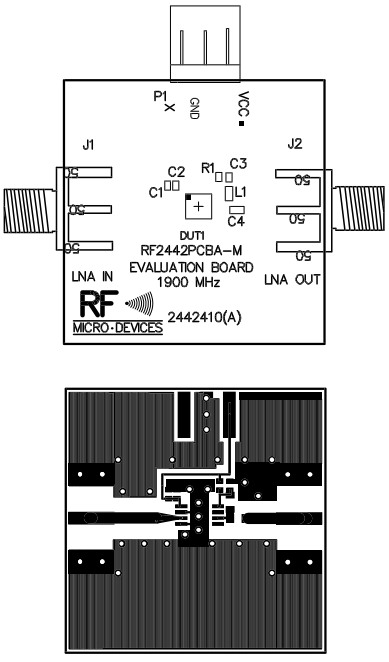
Evaluation Board Schematic (H board) ~2400 MHz



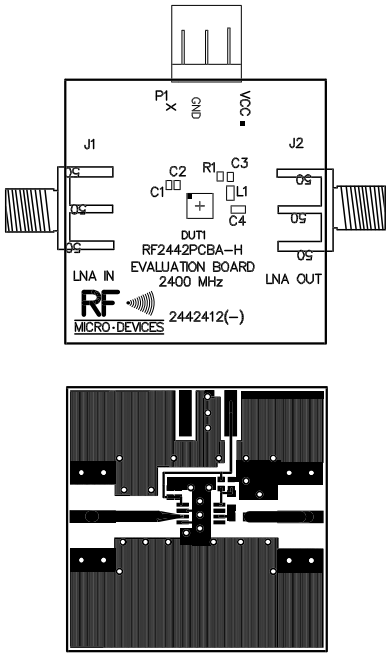
Evaluation Board Layout 900MHz
Board Size 1.150" x 1.165"



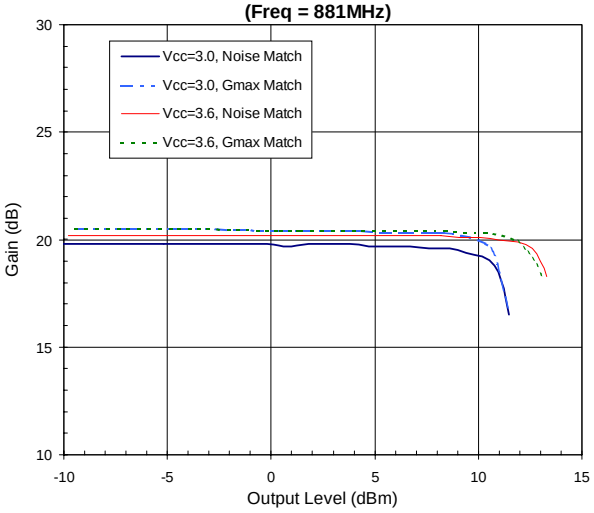
Evaluation Board Layout 1900MHz
Board Size 1.150" x 1.165"



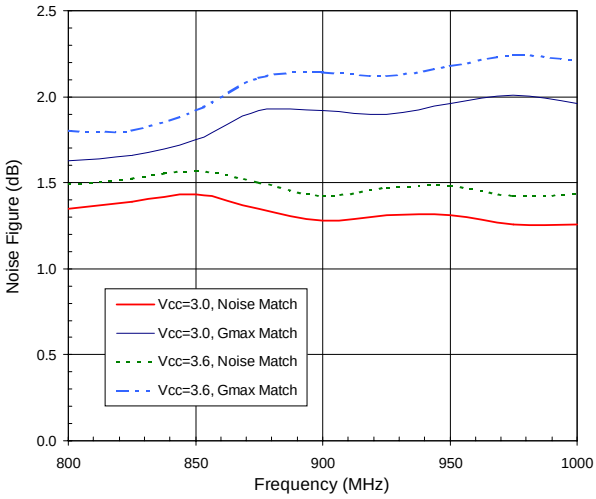
Evaluation Board Layout 2400MHz
Board Size 1.150" x 1.165"



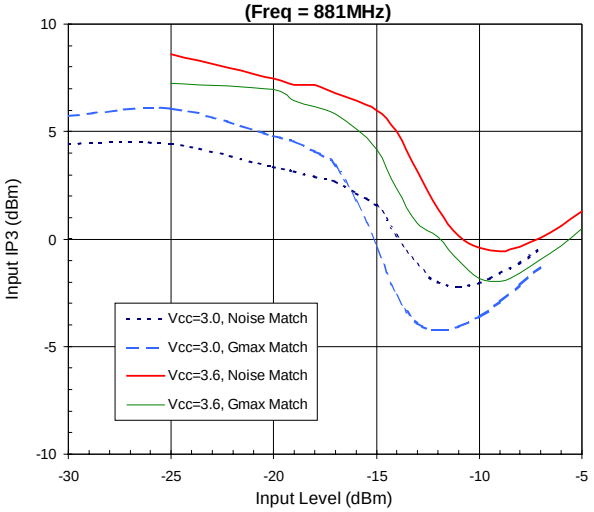
Gain vs. Output Level (Freq = 881MHz)



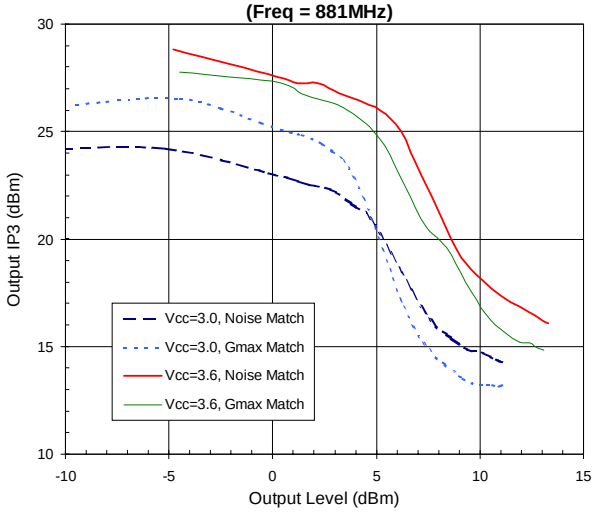
Noise Figure vs. Frequency



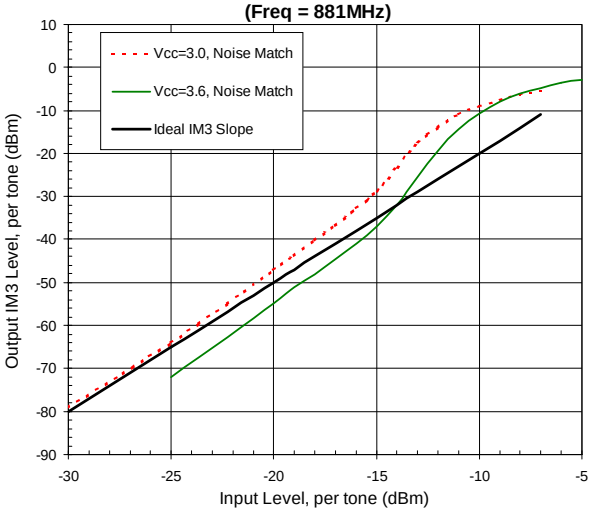
Input IP3 vs. Input Level (Freq = 881MHz)



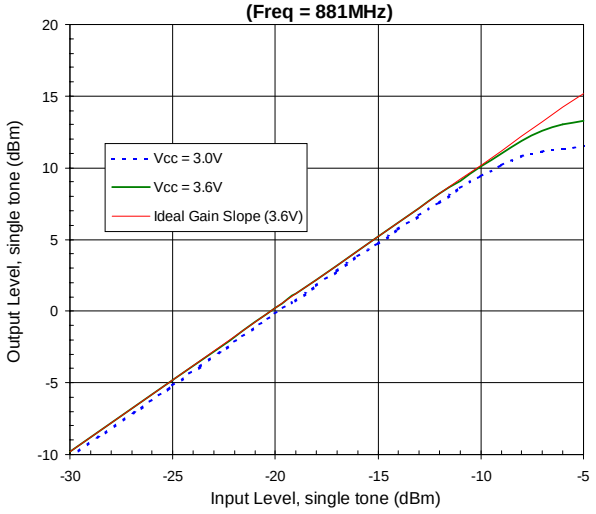
Output IP3 vs. Output Level (Freq = 881MHz)



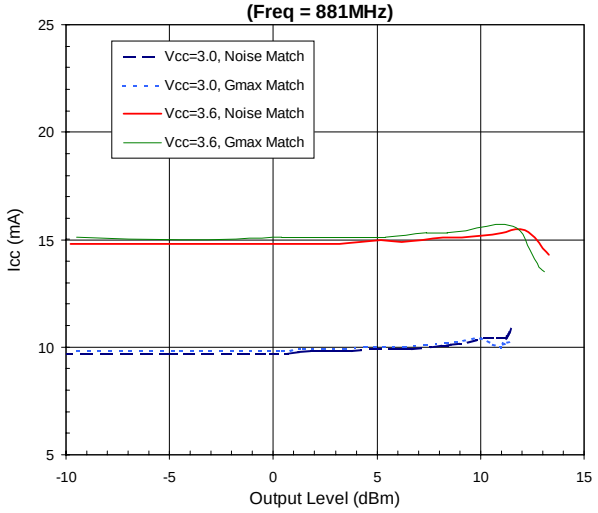
Output IM3 Level vs. Input Level (Freq = 881MHz)



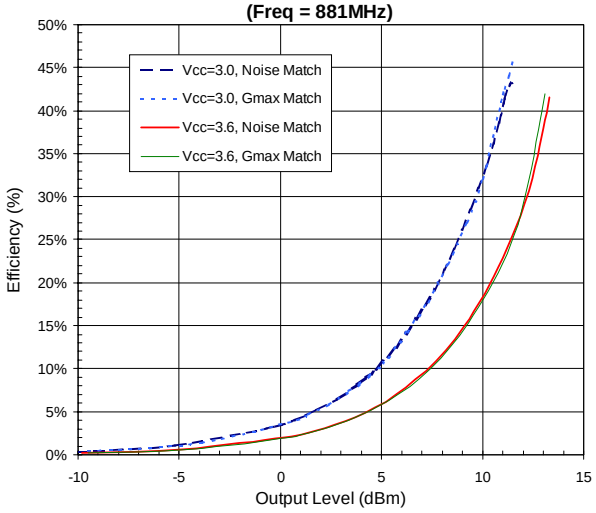
Power Out vs. Power In (Freq = 881MHz)



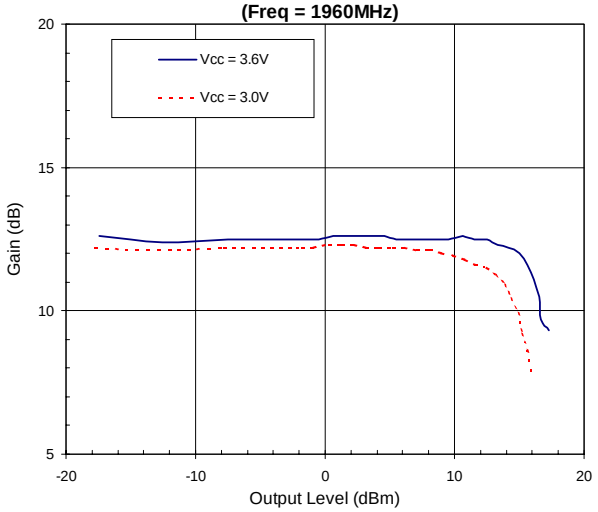
Icc vs. Output Level (Freq = 881MHz)



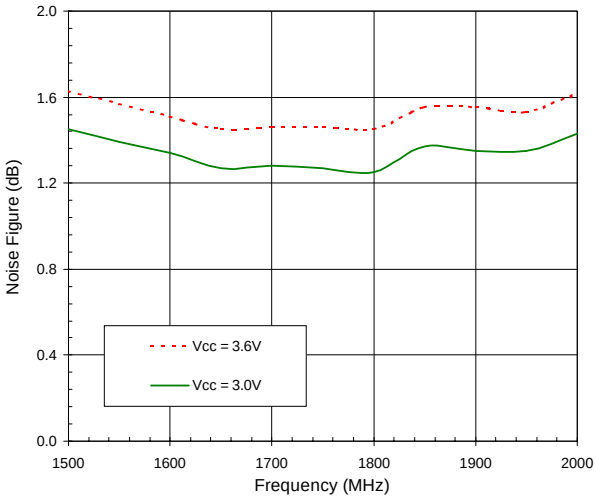
Efficiency vs. Output Level (Freq = 881MHz)



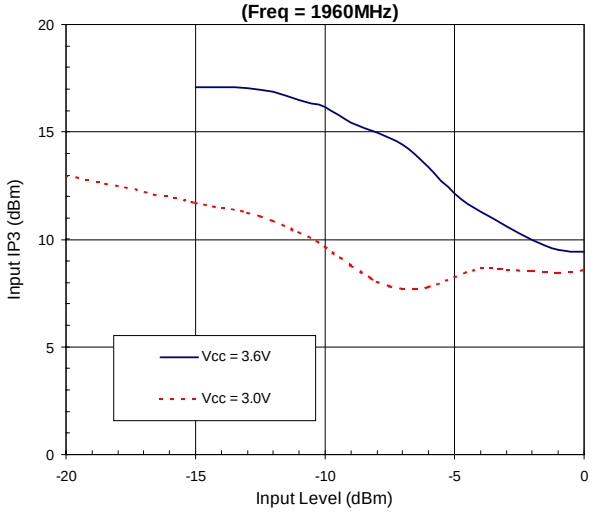
Gain vs. Output Level (Freq = 1960MHz)



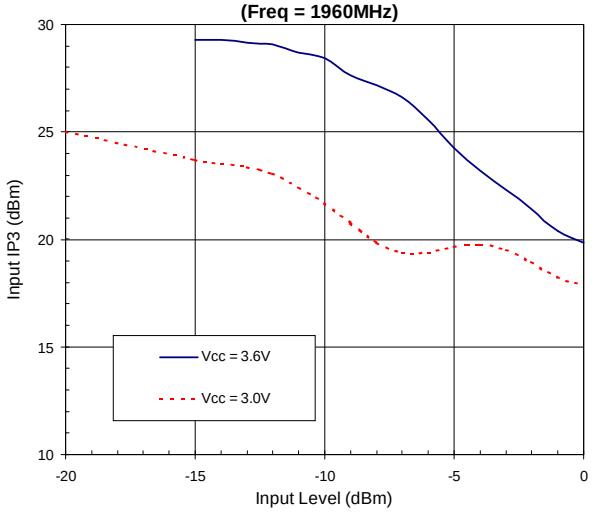
Noise Figure vs. Frequency



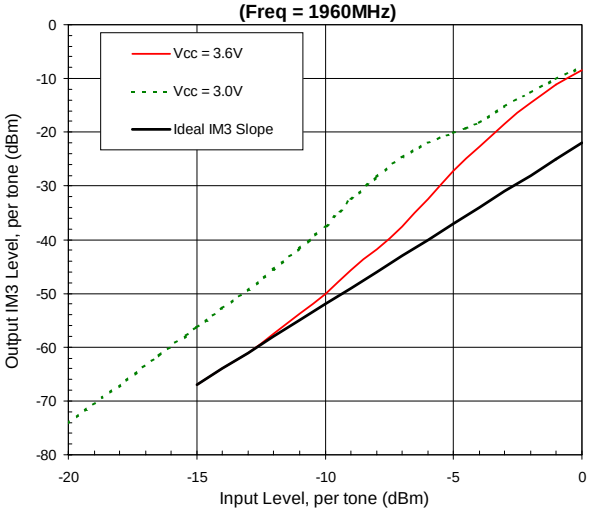
Input IP3 vs. Input Level (Freq = 1960MHz)



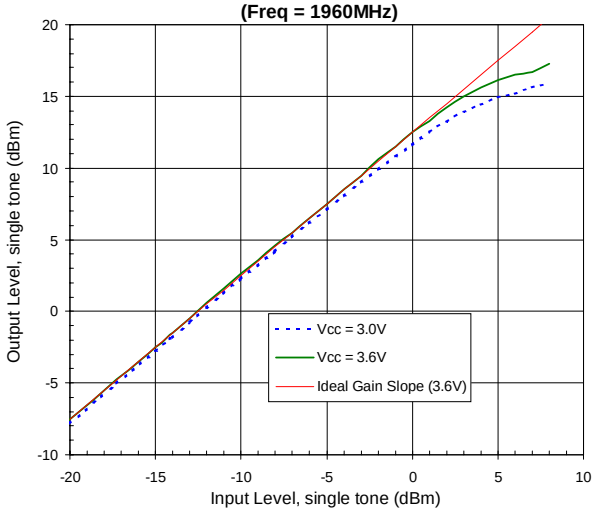
Output IP3 vs. Input Level (Freq = 1960MHz)



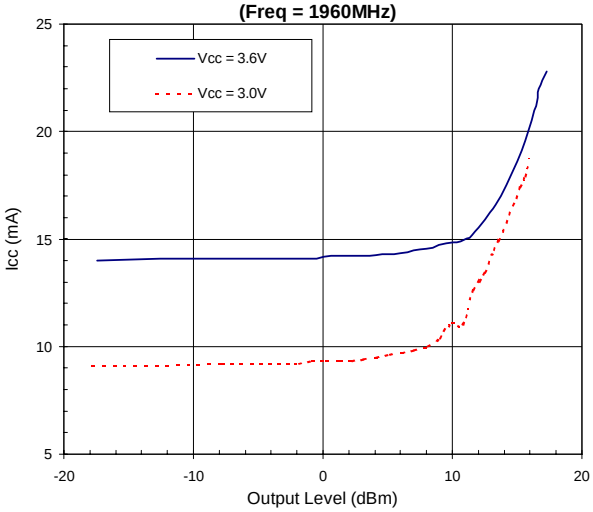
Output IM3 Level vs. Input Level (Freq = 1960MHz)



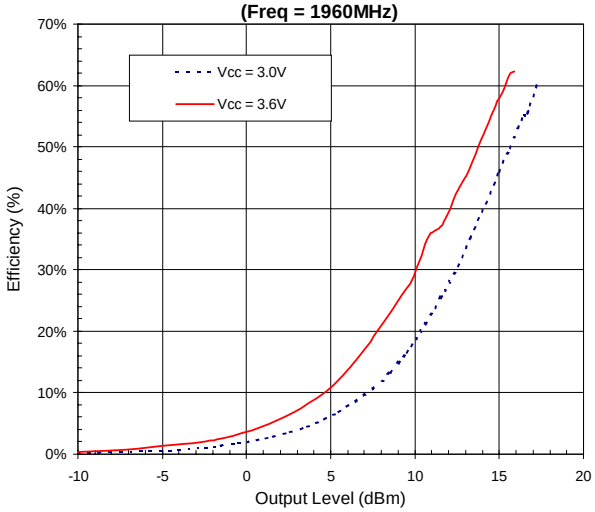
Power Out vs. Power In (Freq = 1960MHz)



Icc vs. Output Level (Freq = 1960MHz)



Efficiency vs. Output Level (Freq = 1960MHz)



射 频 和 天 线 设 计 培 训 课 程 推 荐

易迪拓培训(www.edatop.com)由数名来自于研发第一线的资深工程师发起成立，致力并专注于微波、射频、天线设计研发人才的培养；我们于 2006 年整合合并微波 EDA 网(www.mweda.com)，现已发展成为国内最大的微波射频和天线设计人才培养基地，成功推出多套微波射频以及天线设计经典培训课程和 ADS、HFSS 等专业软件使用培训课程，广受客户好评；并先后与人民邮电出版社、电子工业出版社合作出版了多本专业图书，帮助数万名工程师提升了专业技术能力。客户遍布中兴通讯、研通高频、埃威航电、国人通信等多家国内知名公司，以及台湾工业技术研究院、永业科技、全一电子等多家台湾地区企业。

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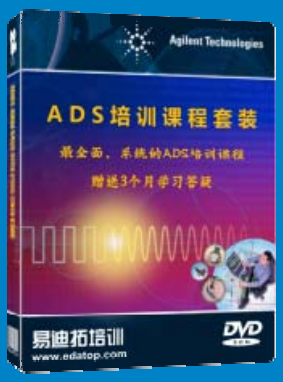
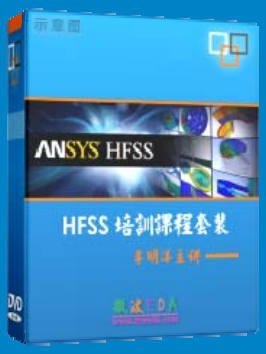
课程网址：http://www.edatop.com/peixun/rfe/110.html

ADS 学习培训课程套装



该套装是迄今国内最全面、最权威的 ADS 培训教程，共包含 10 门 ADS 学习培训课程。课程是由具有多年 ADS 使用经验的微波射频与通信系统设计领域资深专家讲解，并多结合设计实例，由浅入深、详细而又全面地讲解了 ADS 在微波射频电路设计、通信系统设计和电磁仿真设计方面的内容。能让您在最短的时间内学会使用 ADS，迅速提升个人技术能力，把 ADS 真正应用到实际研发工作中去，成为 ADS 设计专家...

课程网址： http://www.edatop.com/peixun/ads/13.html



HFSS 学习培训课程套装

该套课程套装包含了本站全部 HFSS 培训课程，是迄今国内最全面、最专业的 HFSS 培训教程套装，可以帮助您从零开始，全面深入学习 HFSS 的各项功能和在多个方面的工程应用。购买套装，更可超值赠送 3 个月免费学习答疑，随时解答您学习过程中遇到的棘手问题，让您的 HFSS 学习更加轻松顺畅…

课程网址：http://www.edatop.com/peixun/hfss/11.html

CST 学习培训课程套装

该培训套装由易迪拓培训联合微波 EDA 网共同推出，是最全面、系统、专业的 CST 微波工作室培训课程套装，所有课程都由经验丰富的专家授课，视频教学，可以帮助您从零开始，全面系统地学习 CST 微波工作的各项功能及其在微波射频、天线设计等领域的设计应用。且购买该套装，还可超值赠送 3 个月免费学习答疑…

课程网址：http://www.edatop.com/peixun/cst/24.html

HFSS 天线设计培训课程套装

套装包含 6 门视频课程和 1 本图书，课程从基础讲起，内容由浅入深，理论介绍和实际操作讲解相结合，全面系统的讲解了 HFSS 天线设计的全过程。是国内最全面、最专业的 HFSS 天线设计课程，可以帮助您快速学习掌握如何使用 HFSS 设计天线，让天线设计不再难…

课程网址：http://www.edatop.com/peixun/hfss/122.html

13.56MHz NFC/RFID 线圈天线设计培训课程套装

套装包含 4 门视频培训课程，培训将 13.56MHz 线圈天线设计原理和仿真设计实践相结合，全面系统地讲解了 13.56MHz 线圈天线的工作原理、设计方法、设计考量以及使用 HFSS 和 CST 仿真分析线圈天线的具体操作，同时还介绍了 13.56MHz 线圈天线匹配电路的设计和调试。通过该套课程的学习，可以帮助您快速学习掌握 13.56MHz 线圈天线及其匹配电路的原理、设计和调试…

详情浏览：http://www.edatop.com/peixun/antenna/116.html

我们的课程优势：

※ 成立于 2004 年，10 多年丰富的行业经验，

※ 一直致力并专注于微波射频和天线设计工程师的培养，更了解该行业对人才的要求

※ 经验丰富的一线资深工程师讲授，结合实际工程案例，直观、实用、易学

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