

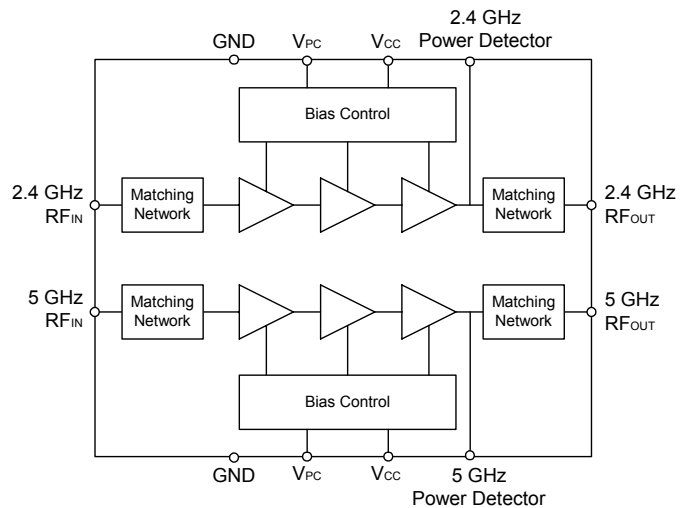
FEATURES

- 3.0% EVM @ Pout = +20 dBm with IEEE 802.11a 64 QAM OFDM at 54 Mbps
- 3.0% EVM @ Pout = +20 dBm with IEEE 802.11g 64 QAM OFDM at 54 Mbps
- -44 dBc 1st Sidelobe / -58 dBc 2nd Sidelobe at +22 dBm with IEEE 802.11b CCK/DSSS Root Cosine Filtering at 1 Mbps
- 32 dB of Linear Power Gain at 2.4 GHz
- 30 dB of Linear Power Gain at 5 GHz
- Single +3.3 V Supply
- Dual Temperature-Compensated Linear Power Detectors
- 50Ω-Matched RF Ports
- Leadfree and RoHS Compliant
- 1KV ESD Rating (HBM)

APPLICATIONS

- 802.11a/b/g/n WLAN

FUNCTIONAL BLOCK DIAGRAM



PRODUCT DESCRIPTION

The ANADIGICS AWL6951 dual band power amplifier is a high performance InGaP HBT power amplifier module designed for transmit applications in the 2.4-2.5 and 4.9-5.9 GHz bands. Matched to 50 Ohms at all RF inputs and outputs, the part requires no additional RF matching components off-chip, making the AWL6951 the world's simplest dual band PA module implementation available. The PA exhibits unparalleled linearity and efficiency for IEEE 802.11g, 802.11b and 802.11a WLAN systems under the toughest signal configurations within these standards.

The power detectors are temperature compensated on chip, enabling separate single-ended output voltages for each band with excellent accuracy over a wide range of operating temperatures. The PA is biased by a single +3.3V supply and consumes ultra-low current in the OFF mode.

The AWL6951 is manufactured using advanced InGaP HBT technology that offers state-of-the-art reliability, temperature stability and ruggedness.

OPERATING RANGES

	Min	Typ	Max	Unit	Comments
Operating Frequency Ranges	2400 4900		2500 5900	MHz	802.11b/g 802.11a
Supply Voltage (V_{CC})	+3.0	+3.3	+4.4	V	With RF applied
Control Voltage (PA_{ON})	+2.0 0	+3.3	+4.4 +0.8	V	PA "on" PA "shut down"
Case Temperature	-40		+85	°C	

ELECTRICAL CHARACTERISTICS

2.4 GHz Continuous Wave Electrical Specifications

($T_C=+25^{\circ}\text{C}$, $V_{CC}=+3.3\text{V}$, $PA_{ON}=+3.3\text{V}$)

Parameter	Min	Typ	Max	Unit	Comments
P1dB		26		dBm	
Shutdown Current		13		μA	2.4 GHz Bias = 0 V
Quiescent Current		55		mA	$PA_{ON} \Rightarrow 2.0\text{V} / V_{CC}=3.3\text{V} / \text{RF}=\text{off}$
Input Return Loss		-14		dB	
Output Return Loss		-7		dB	
Reverse Isolation	40			dB	
Stability (Spurious)		-65		dBc	6:1 VSWR, $P_{out} = +23\text{ dBm}$; -5°C
T_{ON} Settling Time			1	μS	Settles within +/- 0.5 dB

5 GHz Continuous Wave Electrical Specifications

($T_C=+25^{\circ}\text{C}$, $V_{CC}=+3.3\text{V}$, $PA_{ON}=+3.3\text{V}$)

Parameter	Min	Typ	Max	Unit	Comments
P1dB		26		dBm	
Shutdown Current		13		μA	5 GHz Bias = 0 V
Quiescent Current		75		mA	$PA_{ON} \Rightarrow 2.0\text{V} / V_{CC}=3.3\text{V} / \text{RF}=\text{off}$
Input Return Loss		-17		dB	
Output Return Loss		-14		dB	
Reverse Isolation	40			dB	
Stability (Spurious)		-65		dBc	6:1 VSWR, $P_{out} = +22\text{ dBm}$; -5°C
T_{ON} Settling Time			1	μS	Settles within +/- 0.5 dB

802.11g Electrical Specifications

(T_c = +25°C, V_{cc} = +3.3V, PA_{ON} = +3.3V, 64 QAM OFDM 54 Mbps)

Parameter	Min	Typ	Max	Unit	Comments
Operating Frequency	2400		2500	MHz	
Power Gain		32		dB	
Gain Flatness		+/-0.5		dB	Across 100 MHz band
Error Vector Magnitude (EVM)		3.0		%	802.11g 54 Mbps data rate
		-30.5		dB	Pout = +20 dBm
Current Consumption		140		mA	Pout = +18 dBm
		170		mA	Pout = +20 dBm
2 nd Harmonic (2fo)		-50		dBm	Pout = +22 dBm
3 rd Harmonic (3fo)		-45		dBm	Pout = +22 dBm
Power Detector Voltage		1.10		V	Pout = +20 dBm
Power Detector Output Load Impedance	2			kΩ	

802.11b Electrical Specifications

(T_c = +25°C, V_{cc} = +3.3V, PA_{ON} = +3.3V, CCK/DSSS 1 Mbps, Root Cosine Baseband Filtering)

Parameter	Min	Typ	Max	Unit	Comments
Operating Frequency	2400		2500	MHz	
Power Gain		32		dB	
Gain Ripple		+/-0.5		dB	Across 100 MHz band
Adjacent Channel Power (ACPR) 1 st Sidelobe (+/- 11 MHz Offset)		-44		dBc	1 Mbps, Root Cosine Baseband filtering; Pout = +22 dBm
Adjacent Channel Power (ACPR) 2 nd Sidelobe (+/- 22 MHz Offset)		-58		dBc	1 Mbps, Root Cosine Baseband filtering; Pout = +22 dBm
Current Consumption		210		mA	Pout = +22 dBm
2 nd Harmonic (2fo)		-50		dBm	Pout = +22 dBm
3 rd Harmonic (3fo)		-45		dBm	Pout = +22 dBm
Power Detector Voltage		1.35		V	Pout = +22 dBm
Power Detector Output Load Impedance	2			kΩ	



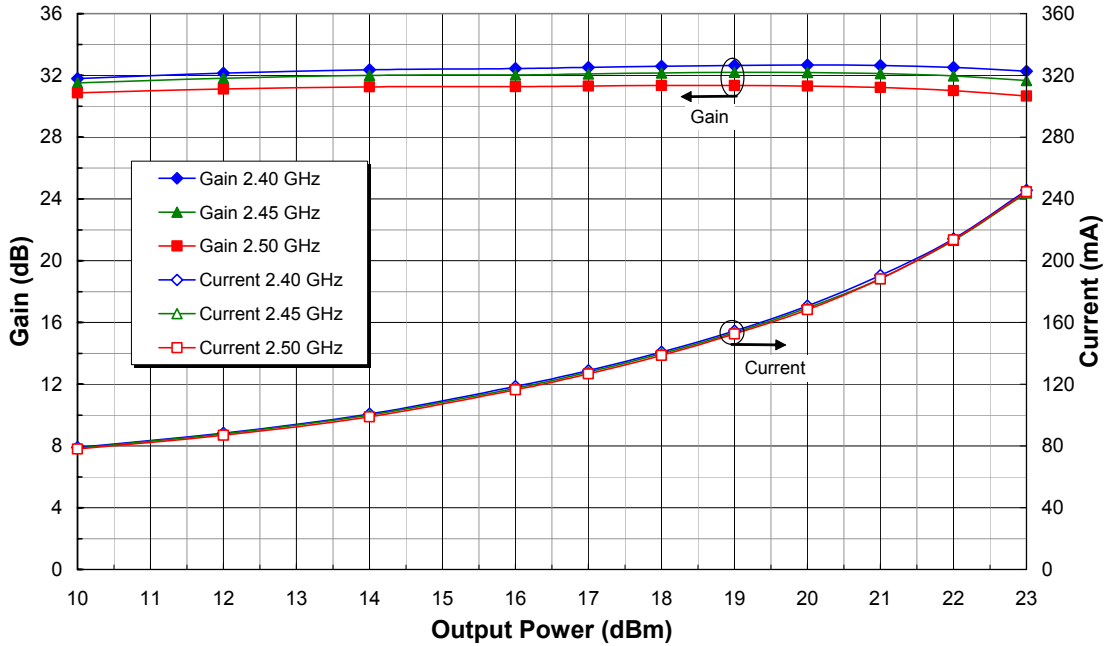
802.11a Electrical Specifications

(T_c = +25°C, V_{CC} = +3.3V, P_{AON} = +3.3V, 64 QAM OFDM 54 Mbps)

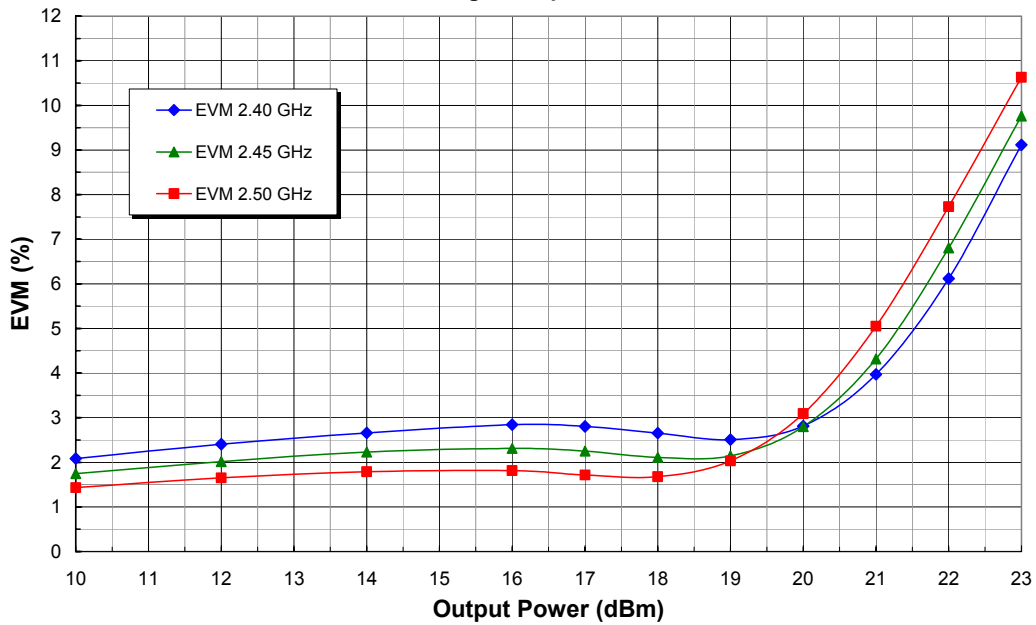
Parameter	Min	Typ	Max	Unit	Comments
Operating Frequency	4900		5900	MHz	
Power Gain		30		dB	4.9-5.85 GHz
Gain Ripple		+/-0.5		dB	Across any 100 MHz band
Error Vector Magnitude (EVM)		3.0		%	Pout = +20 dBm, 4.9–5.85 GHz
		-30.5		dB	802.11a 54 Mbps data rate
Current Consumption		175		mA	Pout = +18 dBm
		210		mA	Pout = +20 dBm
2 nd Harmonic (2fo)		-30		dBm	
3 rd Harmonic (3fo)		-50		dBm	
Power Detector Voltage		1.30		V	Pout = +20 dBm
Power Detector Output Load Impedance	2			kΩ	

802.11g Performance Data at Vcc = +3.3V

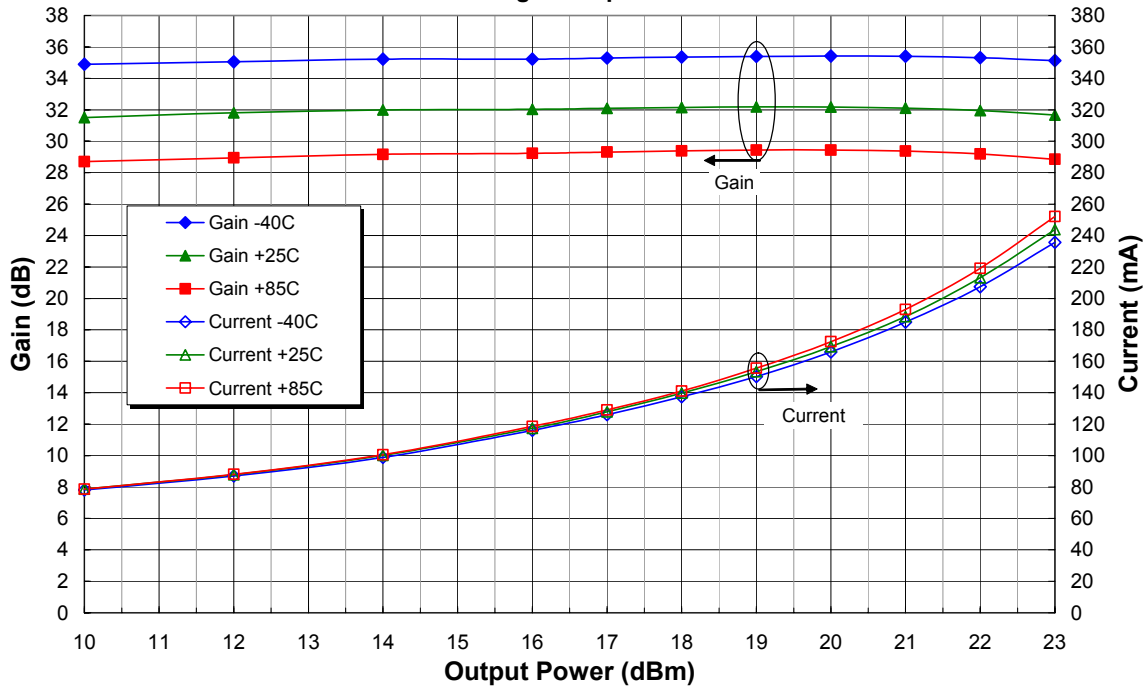
Gain and Icc vs. Output Power Across Frequency
Voltage = 3.3V, Temperature = 25 degC
802.11g 54 Mbps OFDM



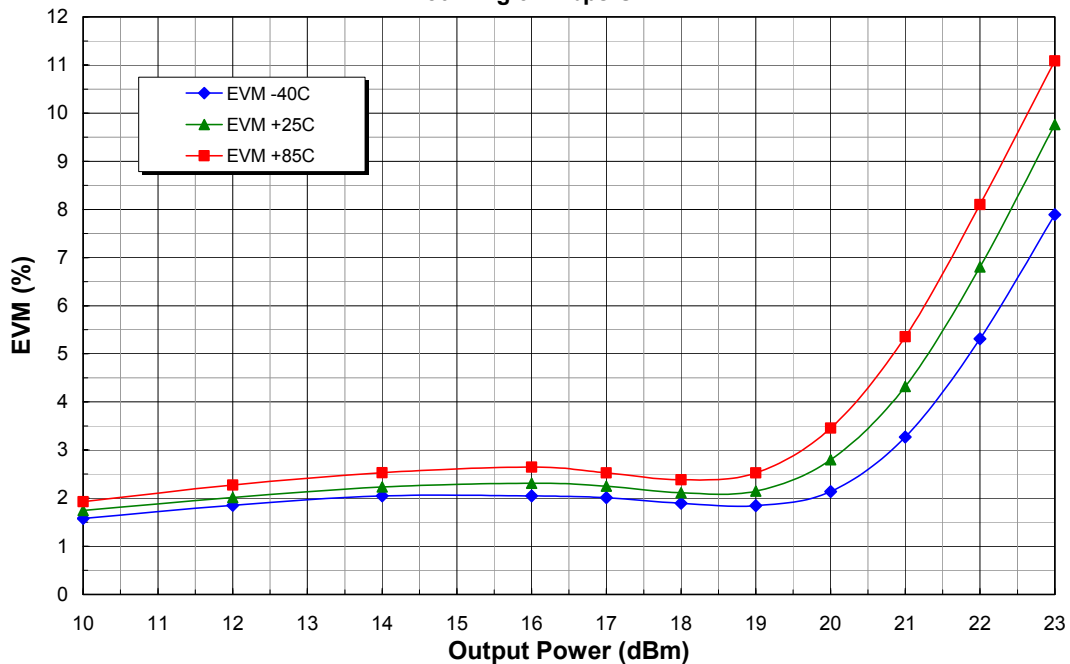
EVM vs. Output Power Across Frequency
Voltage = 3.3V, Temperature = 25 degC
802.11g 54 Mbps OFDM



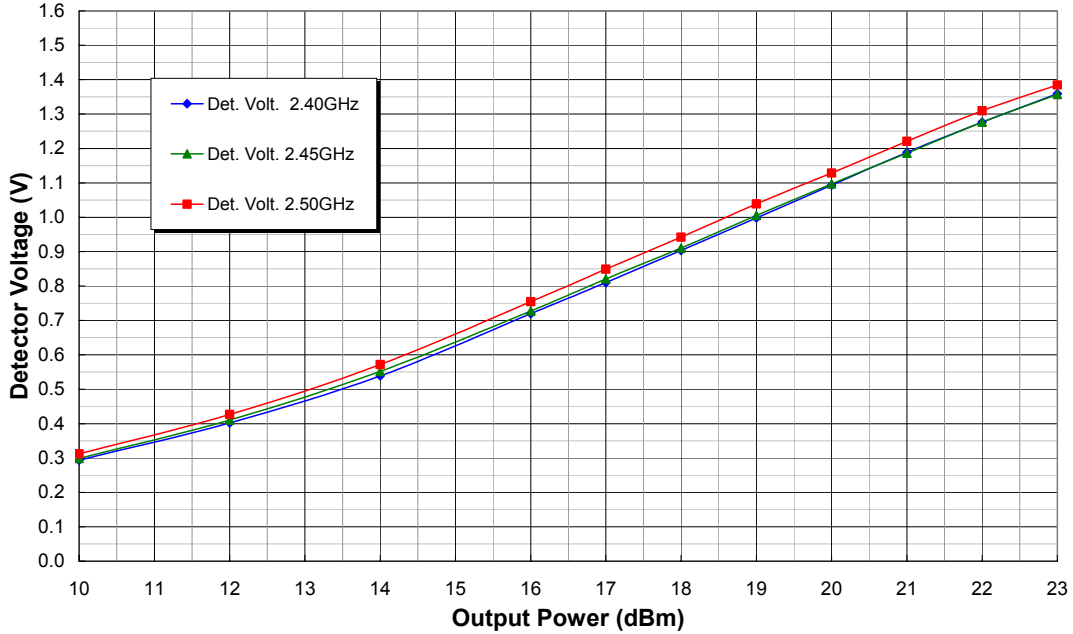
Gain and Icc vs. Output Power Across Temperature
Frequency = 2.45 GHz, Voltage = 3.3V
802.11g 54 Mbps OFDM



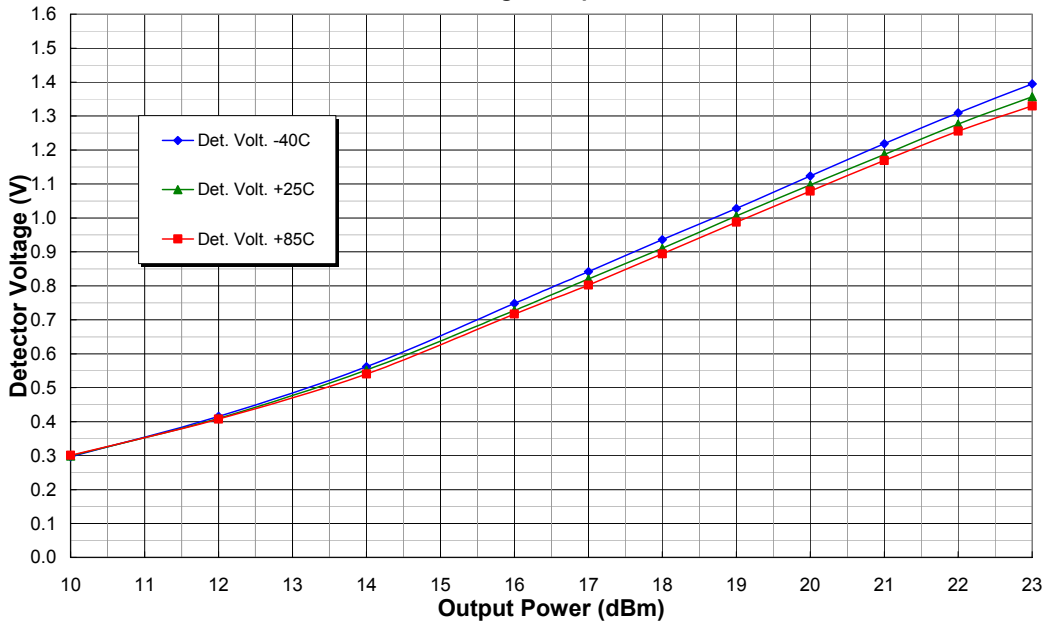
EVM vs. Output Power Across Temperature
Frequency = 2.45 GHz, Voltage = 3.3V
802.11g 54 Mbps OFDM



Detector Voltage vs. Output Power Across Frequency
 Temperature = 25C, Voltage = 3.3V
 802.11g 54 Mbps OFDM

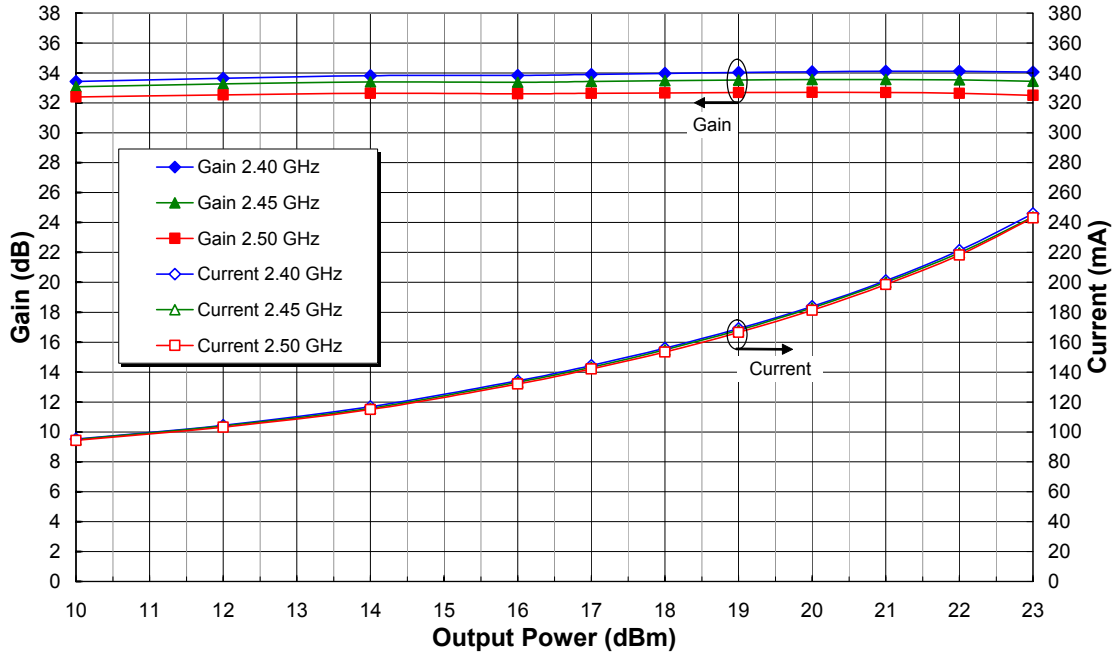


Detector Voltage vs. Output Power Across Temperature
 Frequency = 2.45 GHz, Voltage = 3.3V
 802.11g 54 Mbps OFDM

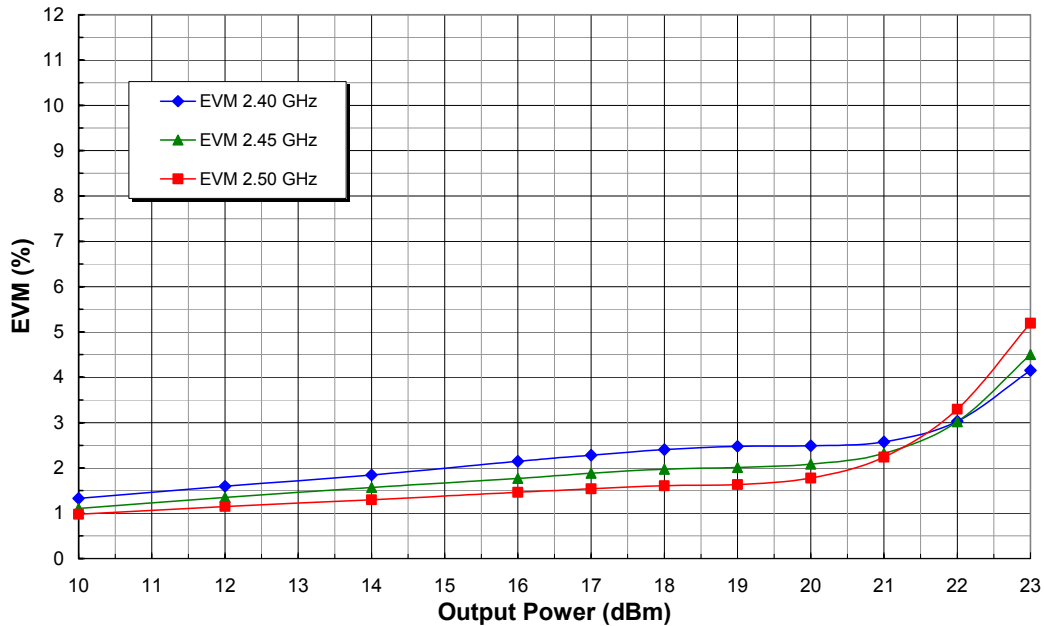


802.11g Performance Data at Vcc = +4.2V

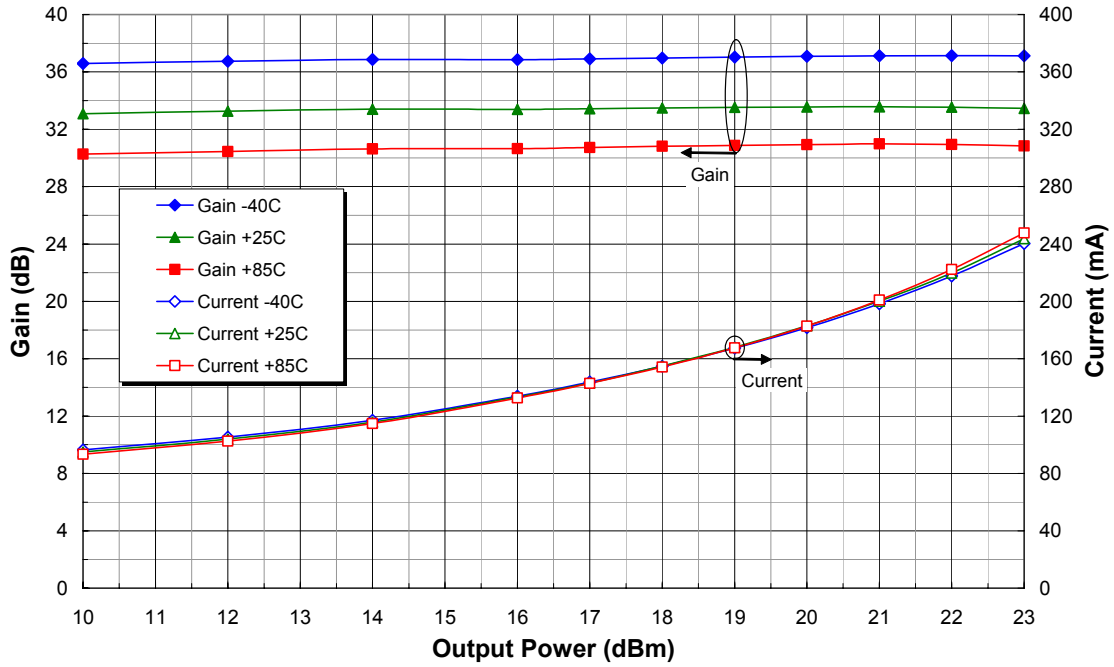
Gain and Icc vs. Output Power Across Frequency
Voltage = 4.2V, Temperature = 25 degC
802.11g 54 Mbps OFDM



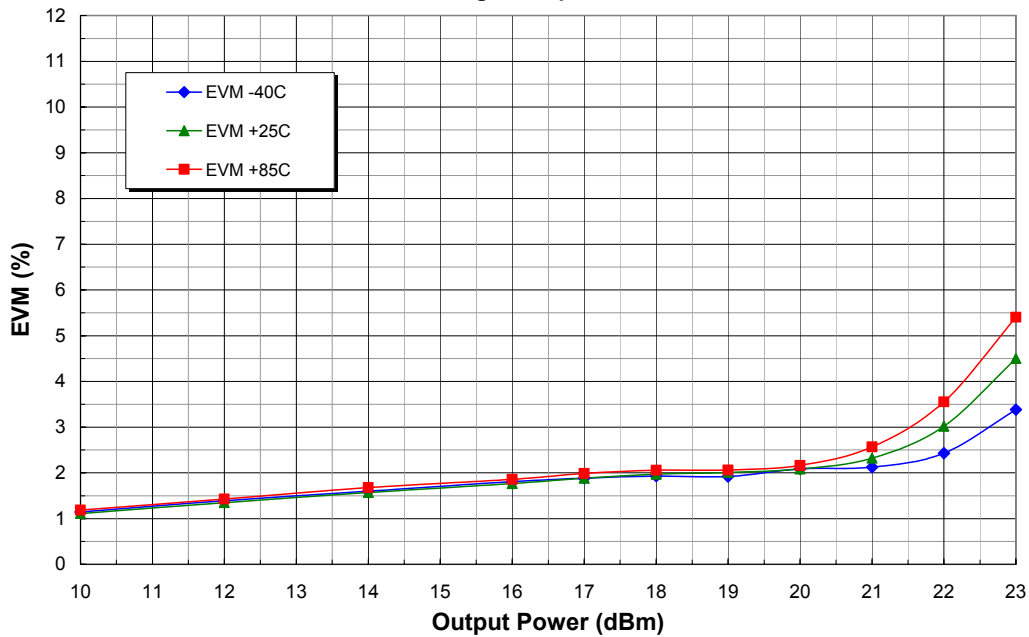
EVM vs. Output Power Across Frequency
Voltage = 4.2V, Temperature = 25 degC
802.11g 54 Mbps OFDM



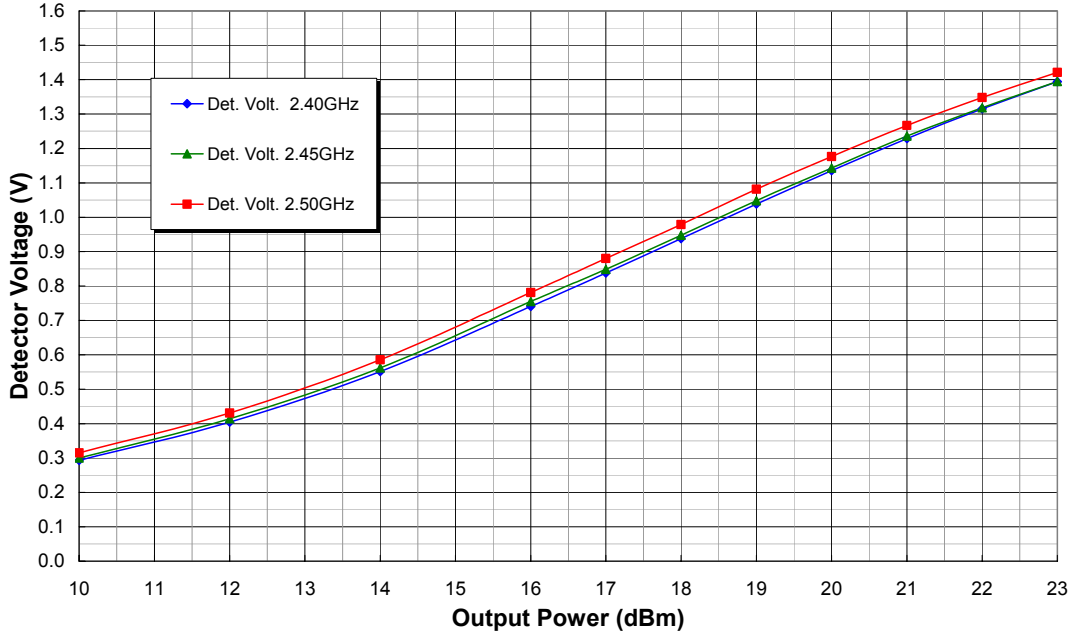
Gain and Icc vs. Output Power Across Temperature
Frequency = 2.45 GHz, Voltage = 4.2V
802.11g 54 Mbps OFDM



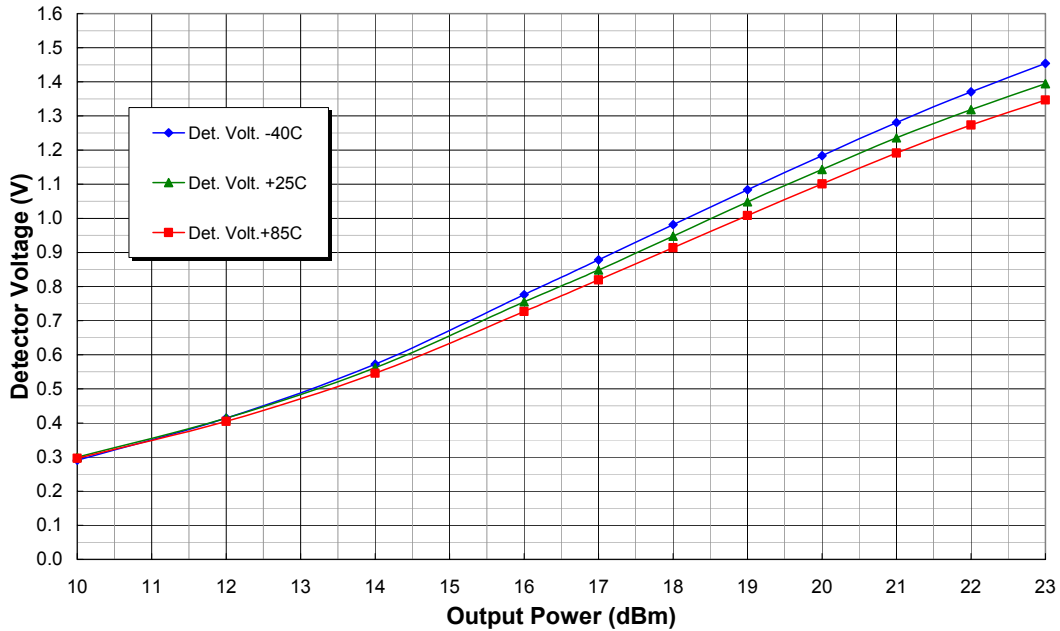
EVM vs. Output Power Across Temperature
Frequency = 2.45 GHz, Voltage = 4.2V
802.11g 54 Mbps OFDM



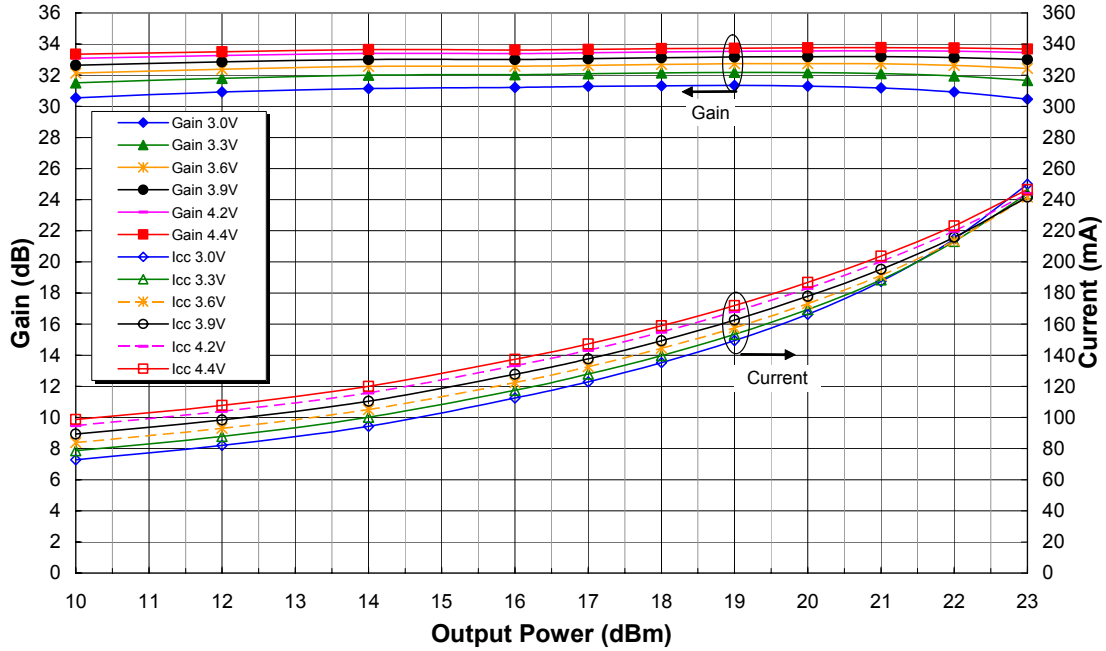
Detector Voltage vs. Output Power Across Frequency
 Temperature = 25C, Voltage = 4.2V
 802.11g 54 Mbps OFDM



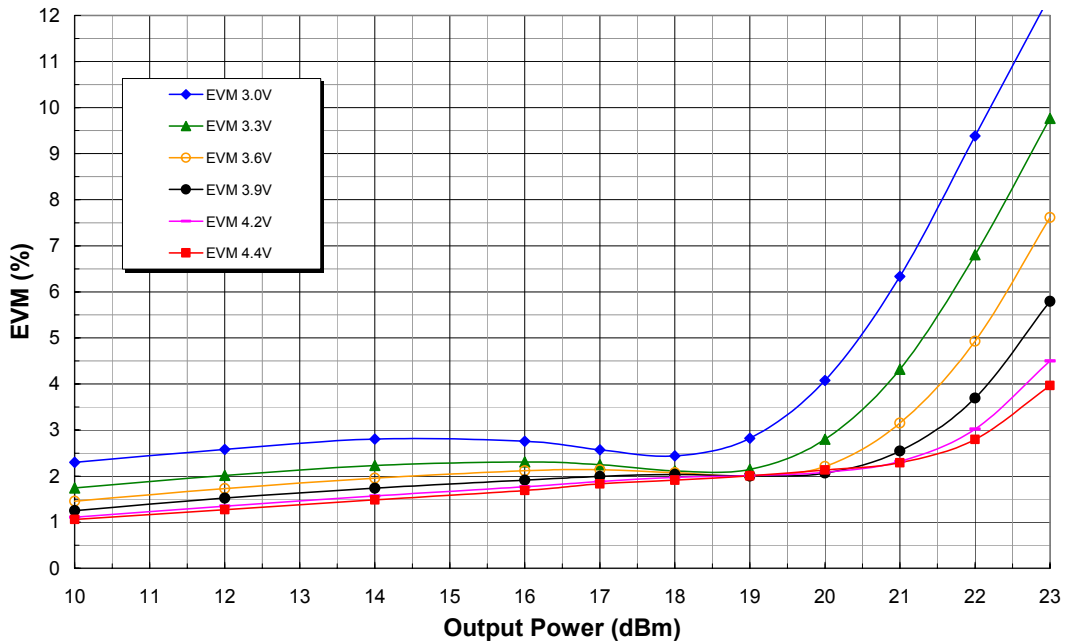
Detector Voltage vs. Output Power Across Temperature
 Frequency = 2.45 GHz, Voltage = 4.2V
 802.11g 54 Mbps OFDM



Gain and Icc vs. Output Power Across Power Supply Voltage
Frequency = 2.45 GHz, Temperature = 25 degC
802.11g 54 Mbps OFDM

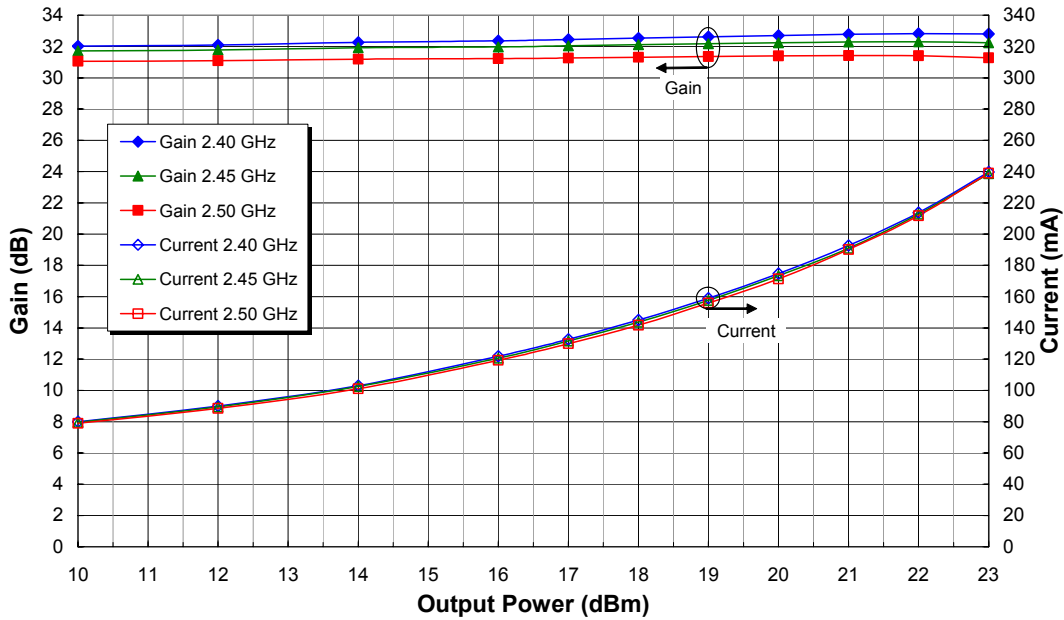


EVM vs. Output Power Across Power Supply Voltage
Frequency = 2.45 GHz, Temperature = 25 degC
802.11g 54 Mbps OFDM

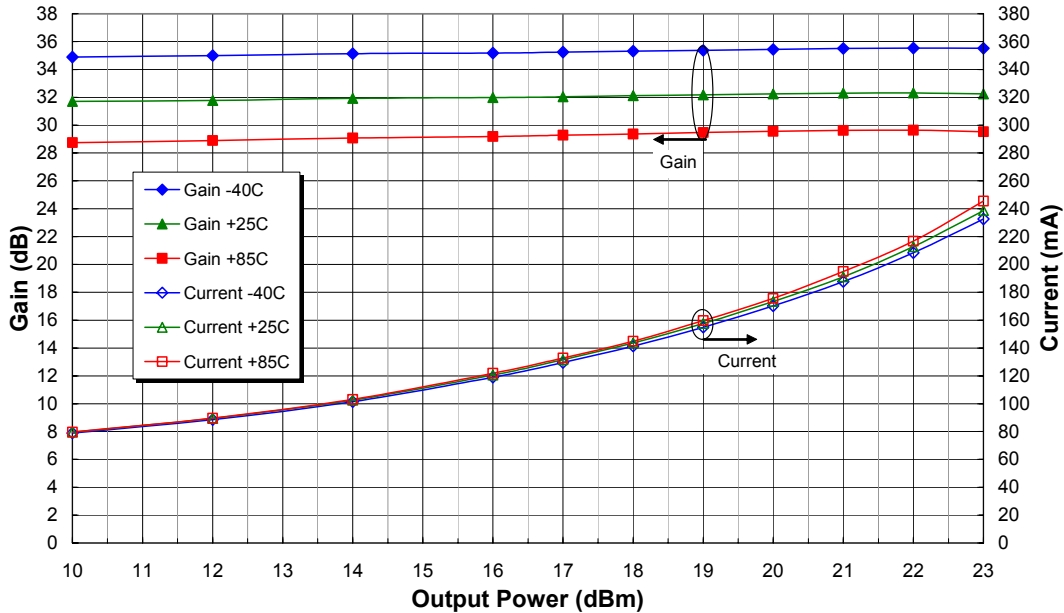


802.11b Performance Data at Vcc = +3.3V

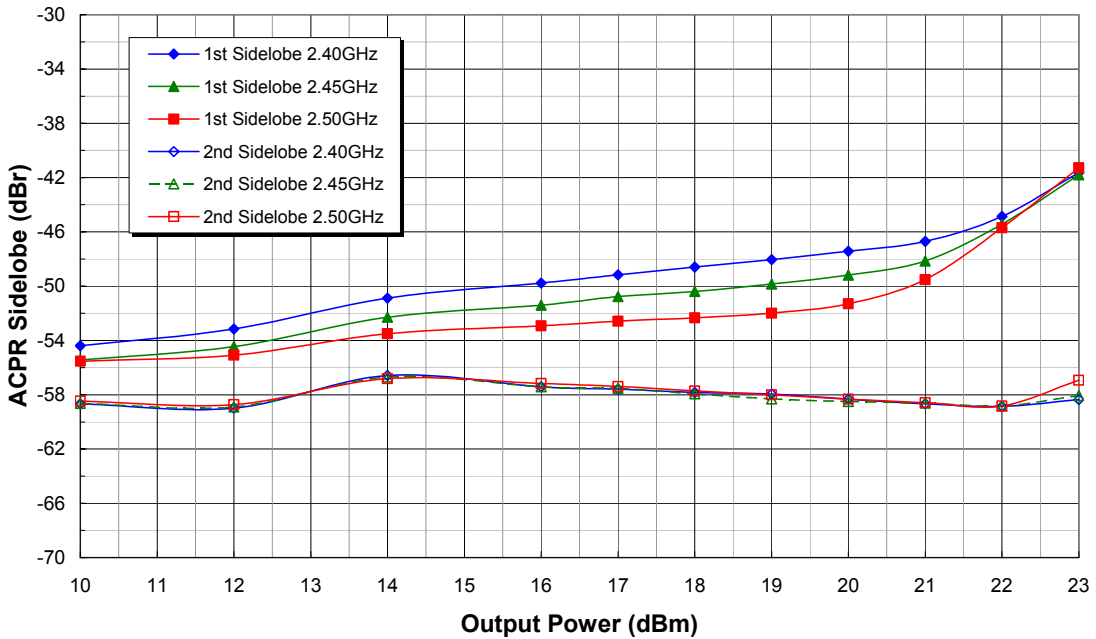
Gain and Icc vs. Output Power Across Frequency
Voltage = 3.3V, Temperature = 25 degC
802.11b Root Cosine Filtering (alpha = 0.35), 1 Mbps



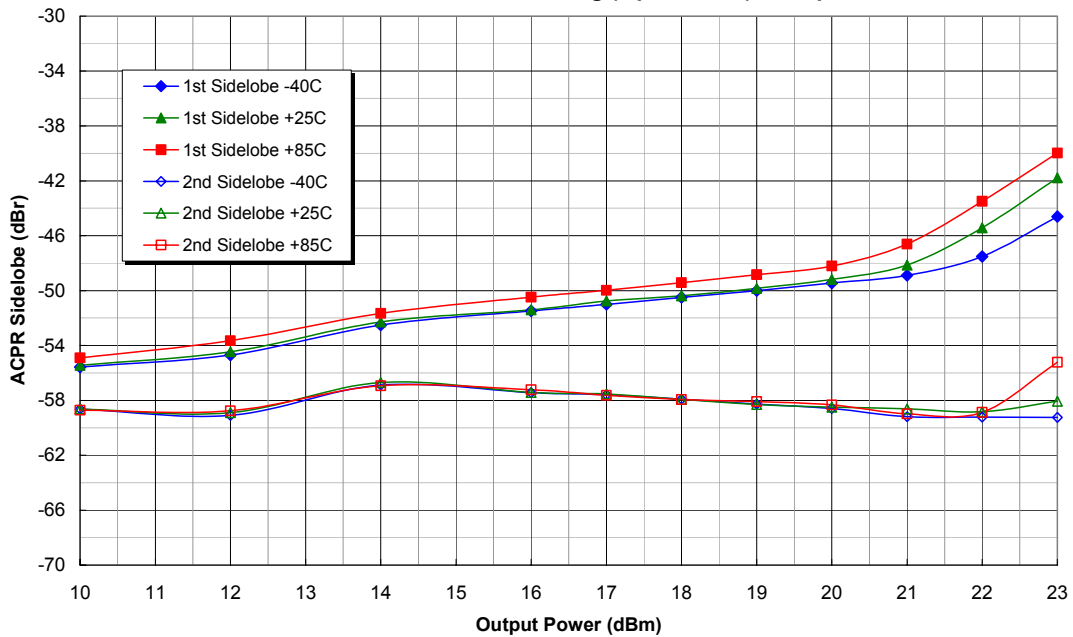
Gain and Icc vs. Output Power Across Temperature
Frequency = 2.45 GHz, Voltage = 3.3V
802.11b Root Cosine Filtering (alpha = 0.35), 1 Mbps



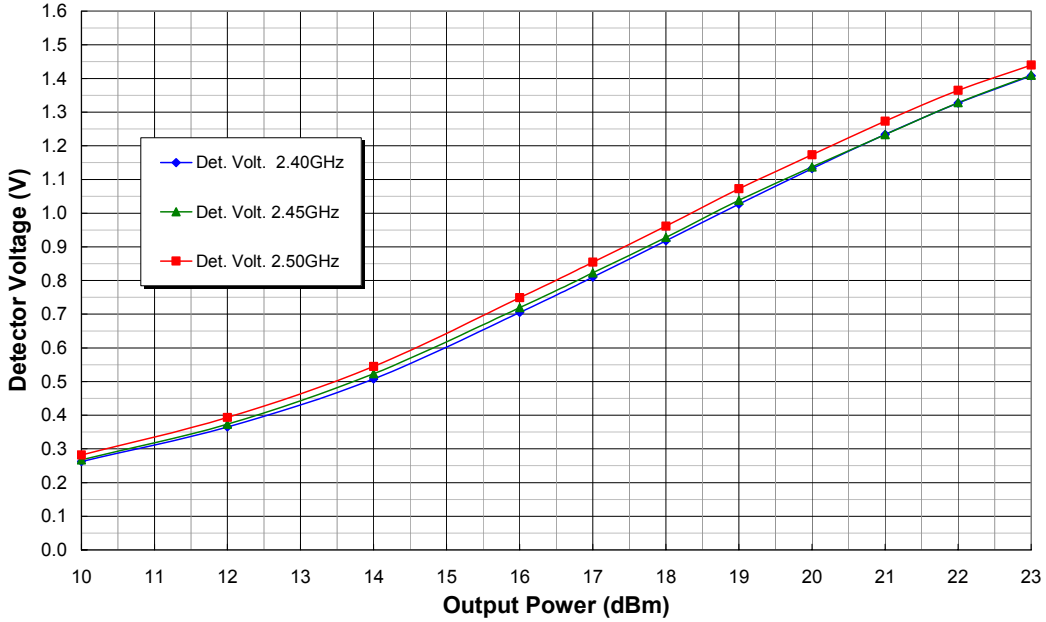
ACPR 1st & 2nd Sidelobes vs. Output Power Across Frequency
Temperature = 25C, Voltage = 3.3V
802.11b Root Cosine Filtering (alpha = 0.35), 1 Mbps



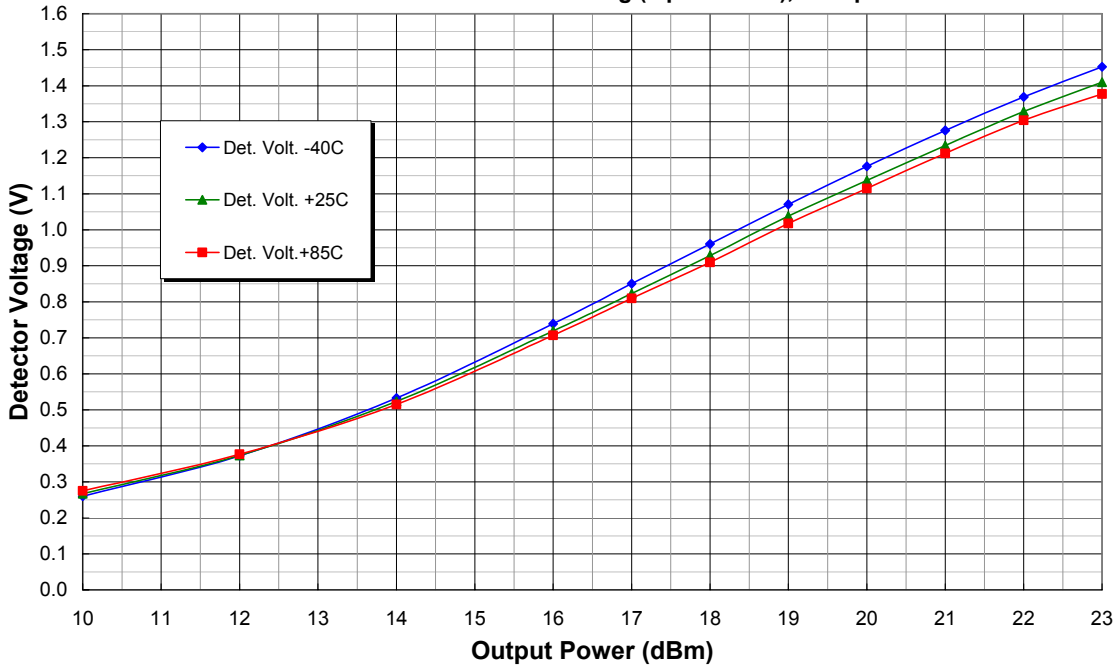
ACPR 1st & 2nd Sidelobes vs. Output Power Across Temperature
Frequency = 2.45 GHz, Voltage = 3.3V
802.11b Root Cosine Filtering (alpha = 0.35), 1 Mbps



Detector Voltage vs. Output Power Across Frequency
 Temperature = 25C, Voltage = 3.3V
 802.11b Root Cosine Filtering (alpha = 0.35), 1 Mbps

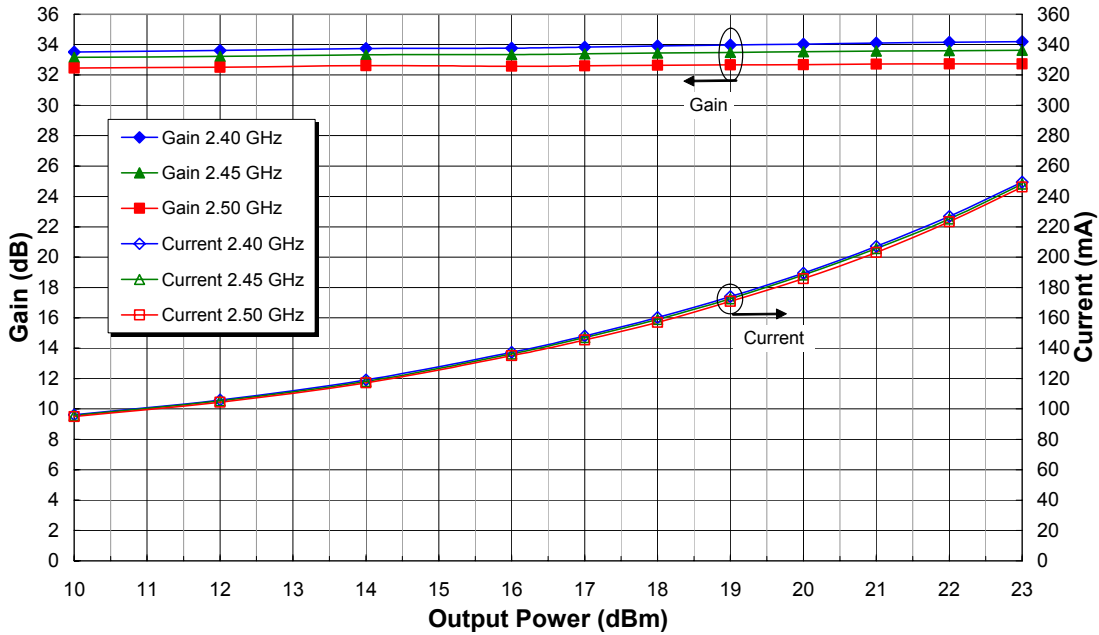


Detector Voltage vs. Output Power Across Temperature
 Frequency = 2.45 GHz, Voltage = 3.3V
 802.11b Root Cosine Filtering (alpha = 0.35), 1 Mbps

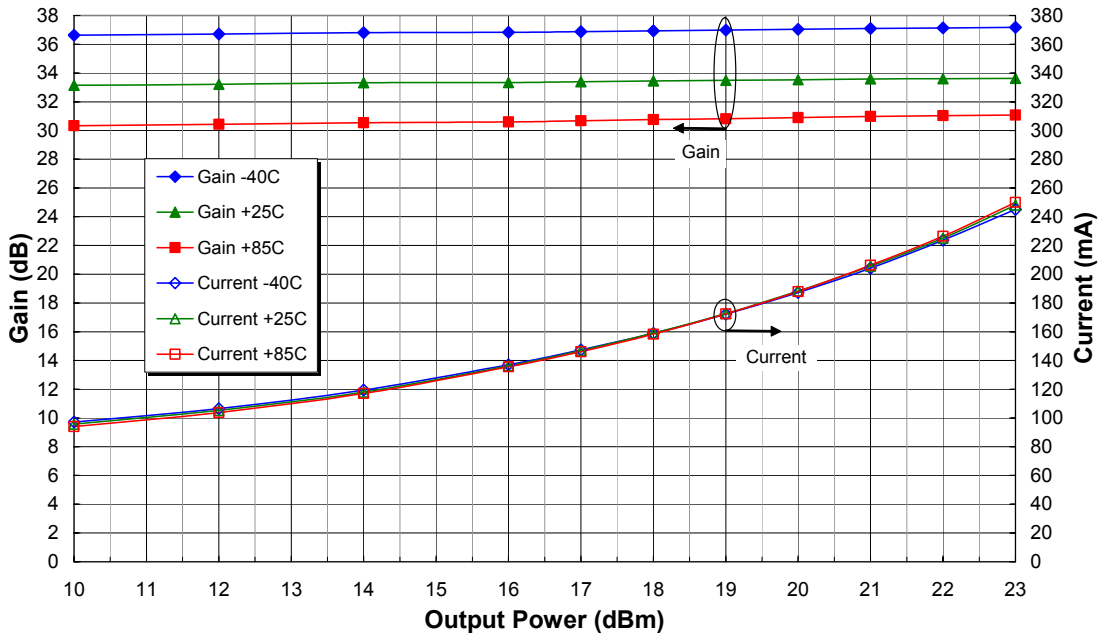


802.11b Performance Data at Vcc = +4.2V

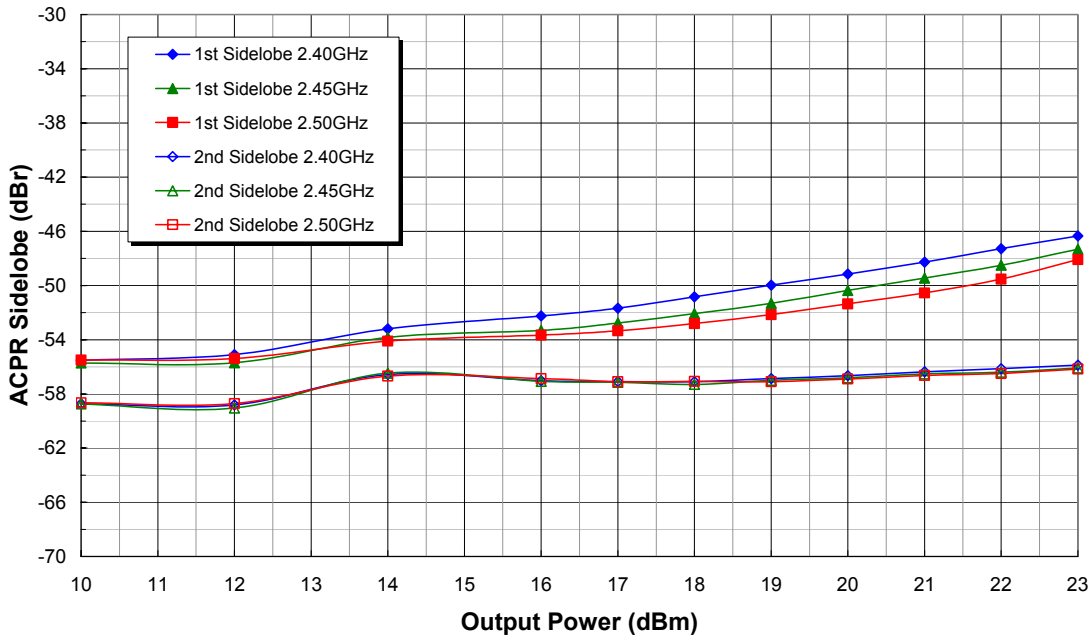
Gain and Icc vs. Output Power Across Frequency
Voltage = 4.2V, Temperature = 25 degC
802.11b Root Cosine Filtering (alpha = 0.35), 1 Mbps



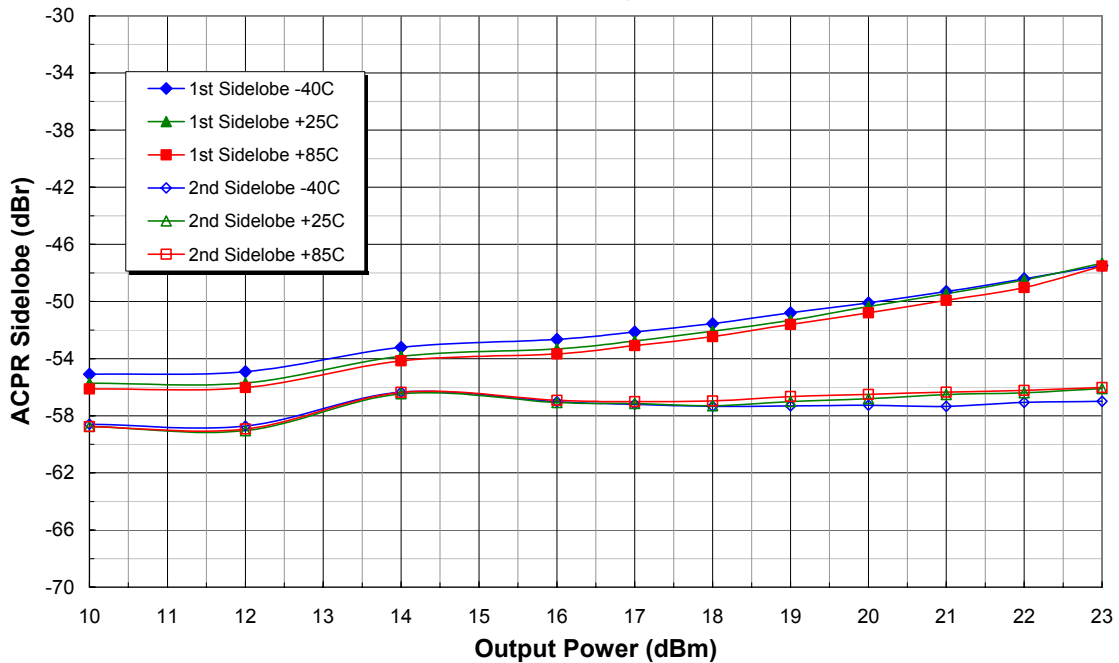
Gain and Icc vs. Output Power Across Temperature
Frequency = 2.45 GHz, Voltage = 4.2V
802.11b Root Cosine Filtering (alpha = 0.35), 1 Mbps



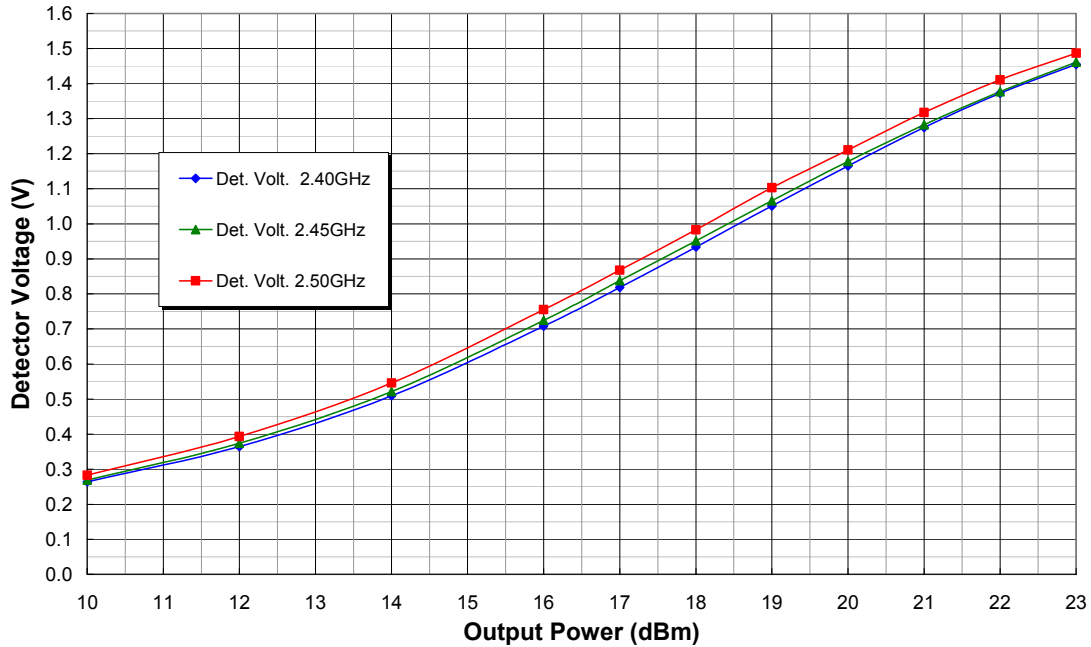
ACPR 1st & 2nd Sidelobes vs. Output Power Across Frequency
Temperature = 25C, Voltage = 4.2V
802.11b Root Cosine Filtering (alpha = 0.35), 1 Mbps



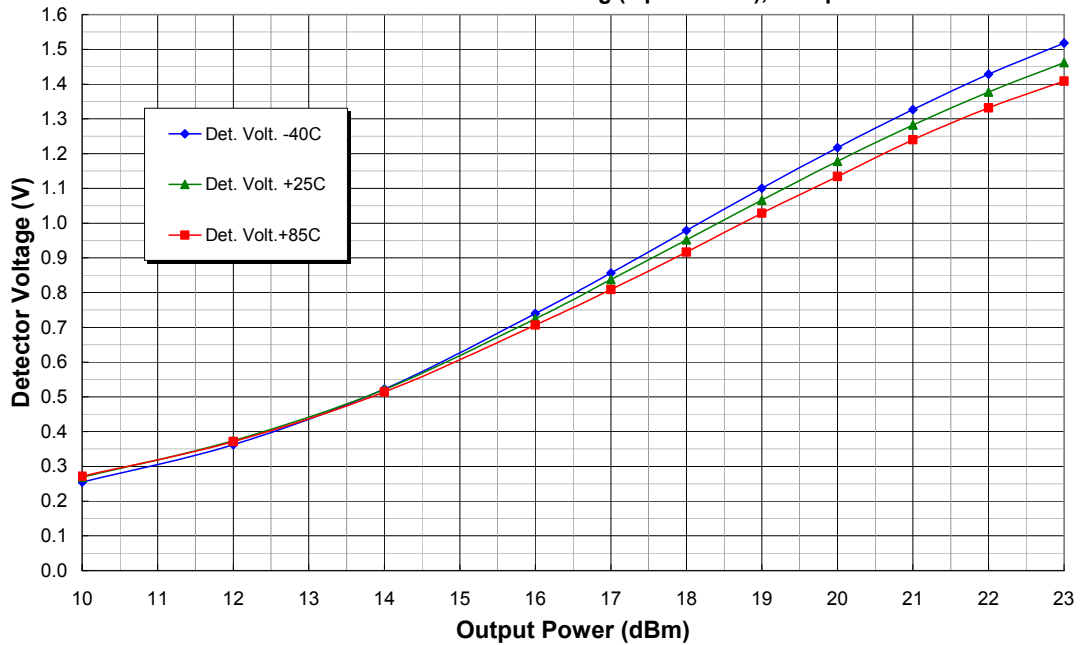
ACPR 1st & 2nd Sidelobes vs. Output Power Across Temperature
Frequency = 2.45 GHz, Voltage = 4.2V
802.11b Root Cosine Filtering (alpha = 0.35), 1 Mbps



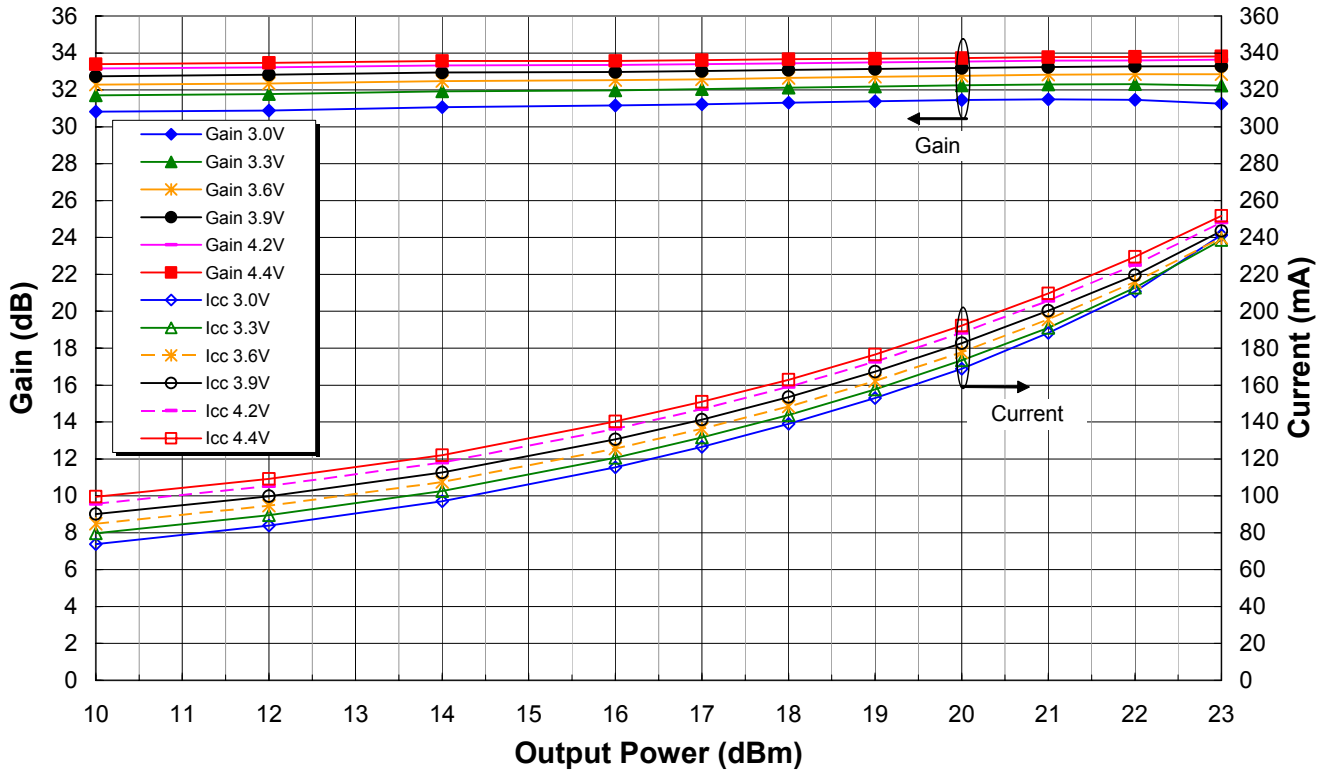
Detector Voltage vs. Output Power Across Frequency
Temperature = 25C, Voltage = 4.2V
802.11b Root Cosine Filtering (alpha = 0.35), 1 Mbps



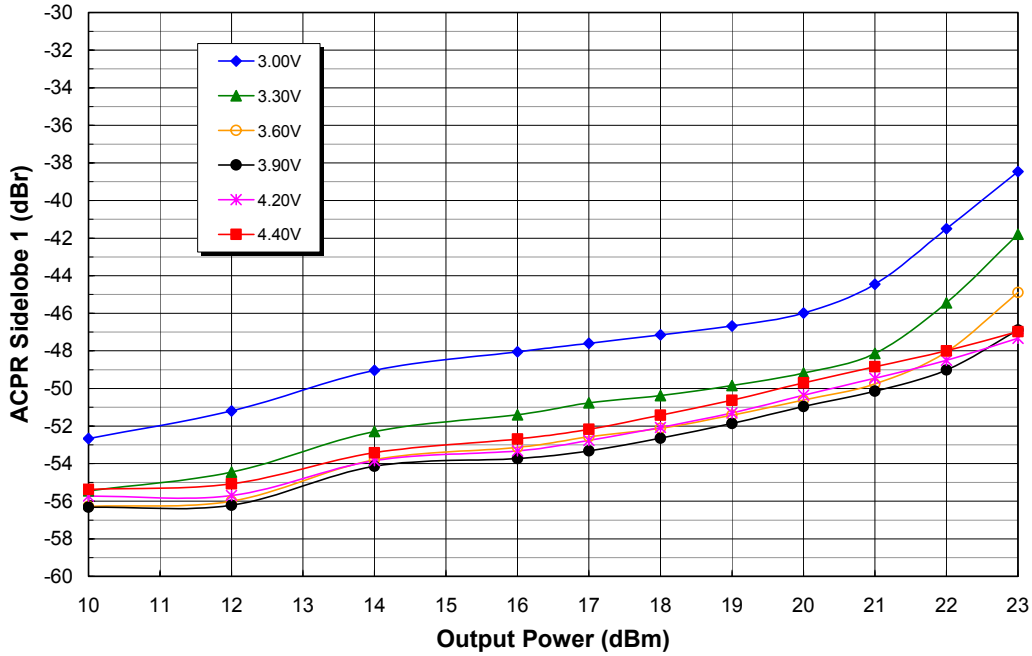
Detector Voltage vs. Output Power Across Temperature
Frequency = 2.45 GHz, Voltage = 4.2V
802.11b Root Cosine Filtering (alpha = 0.35), 1 Mbps



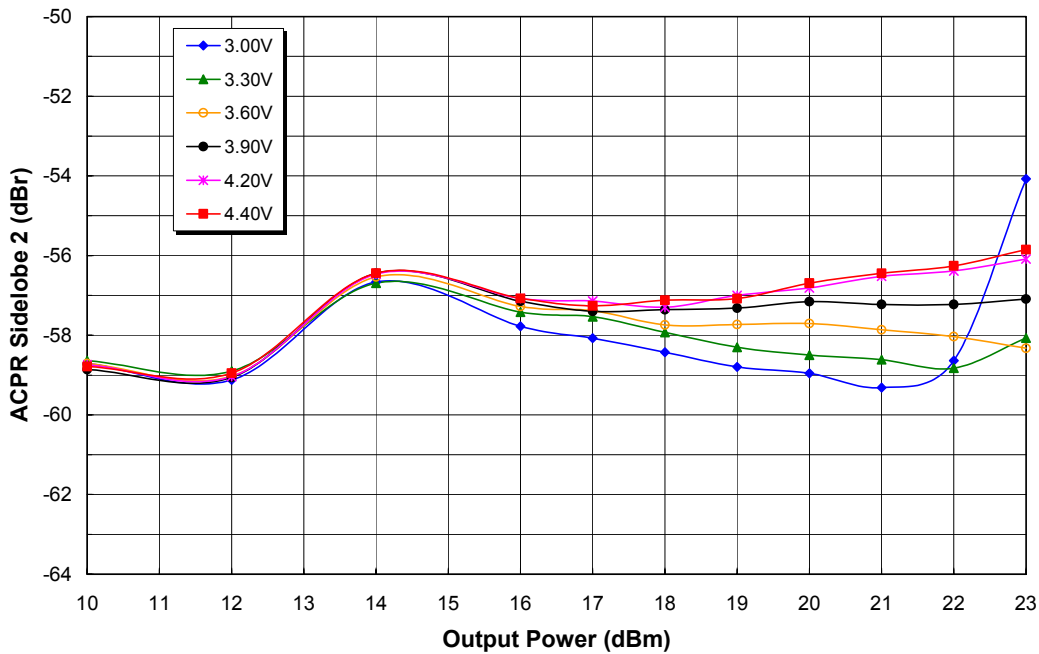
Gain and Icc vs. Output Power Across Power Supply Voltage
Frequency = 2.45 GHz, Temperature = 25 degC
802.11b Root Cosine Filtering (alpha = 0.35), 1 Mbps



ACPR Sidelobe 1 vs. Output Power Across Power Supply Voltage
Frequency = 2.45 GHz, Temperature = 25 degC
802.11b Root Cosine Filtering (alpha = 0.35), 1 Mbps

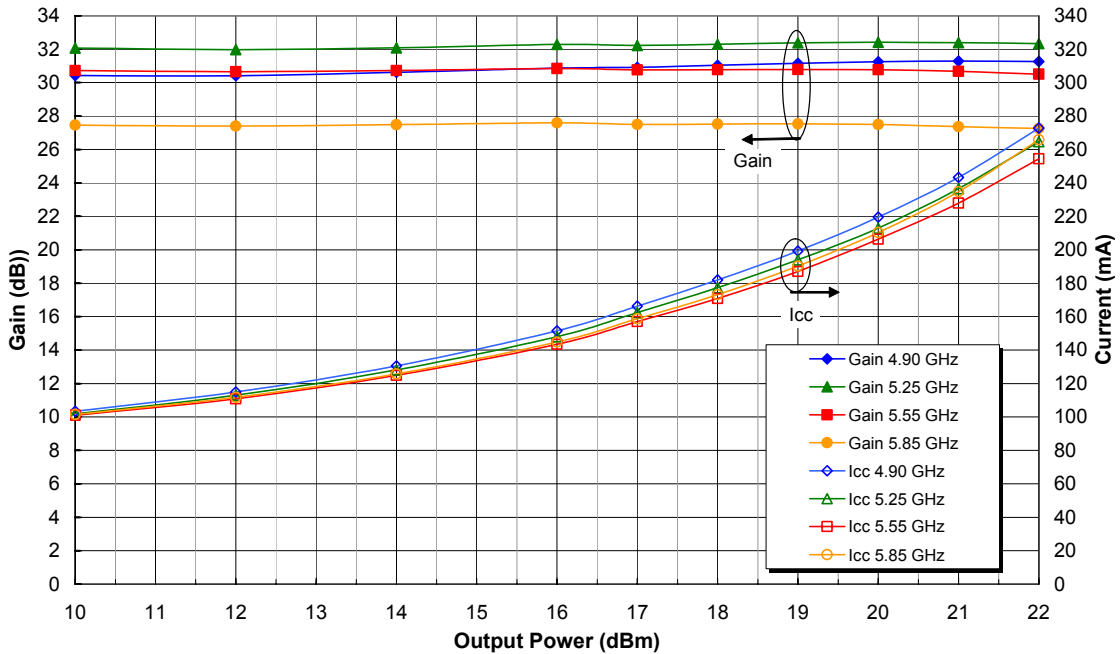


ACPR Sidelobe 2 vs. Output Power Across Power Supply Voltage
Frequency = 2.45 GHz, Temperature = 25 degC
802.11b Root Cosine Filtering (alpha = 0.35), 1 Mbps

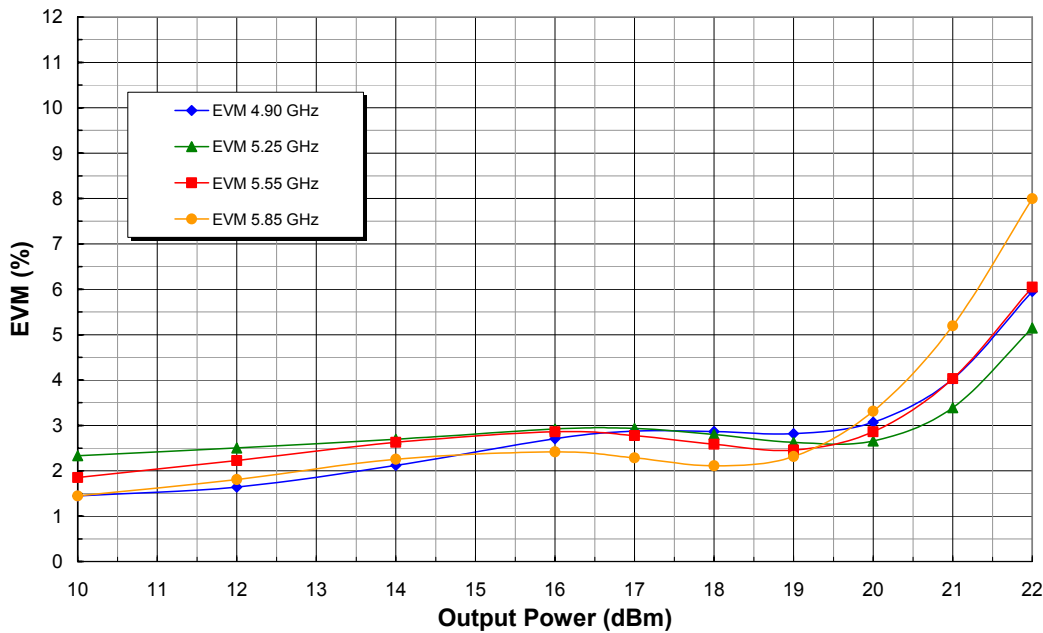


802.11a Performance Data at Vcc = +3.3V

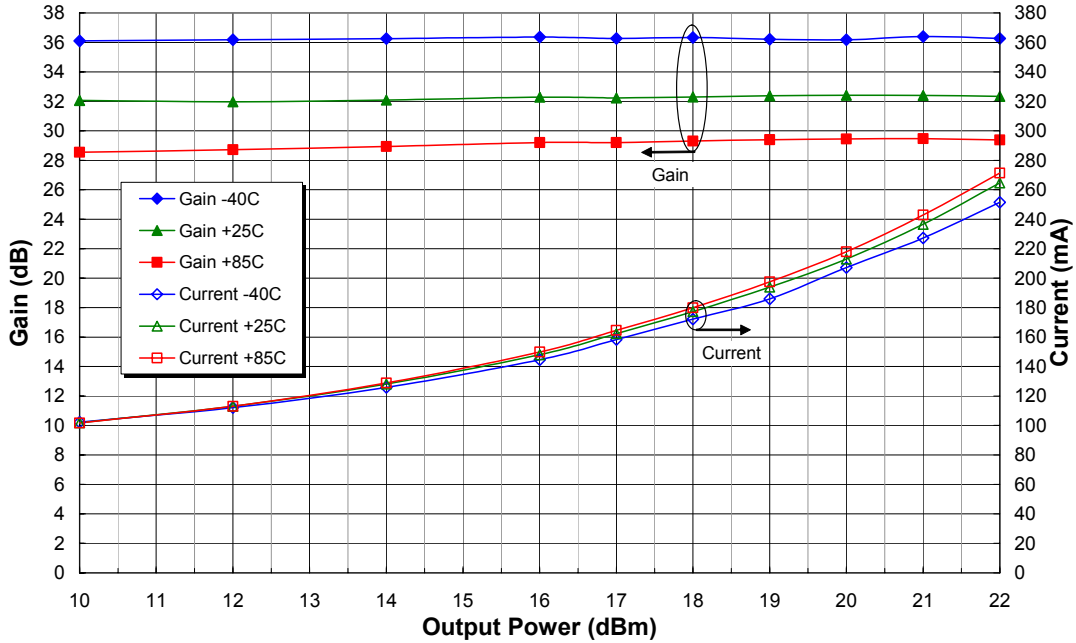
Gain and Icc vs. Output Power Across Frequency
Voltage = 3.3V, Temperature = 25 degC
802.11a 54 Mbps OFDM



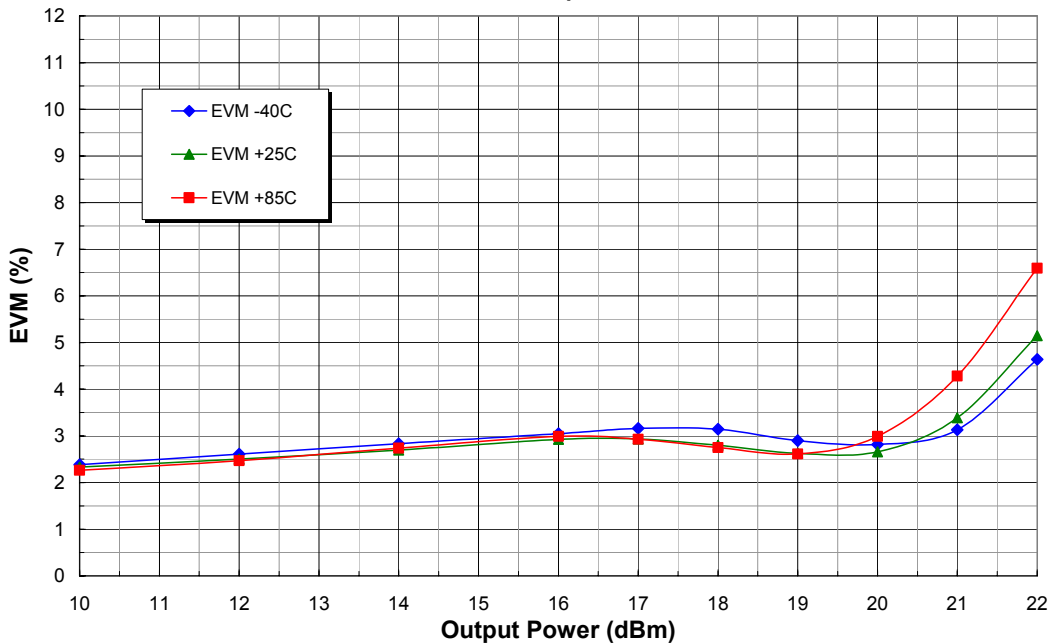
EVM vs. Output Power Across Frequency
Voltage = 3.3V, Temperature = 25 degC
802.11a 54 Mbps OFDM



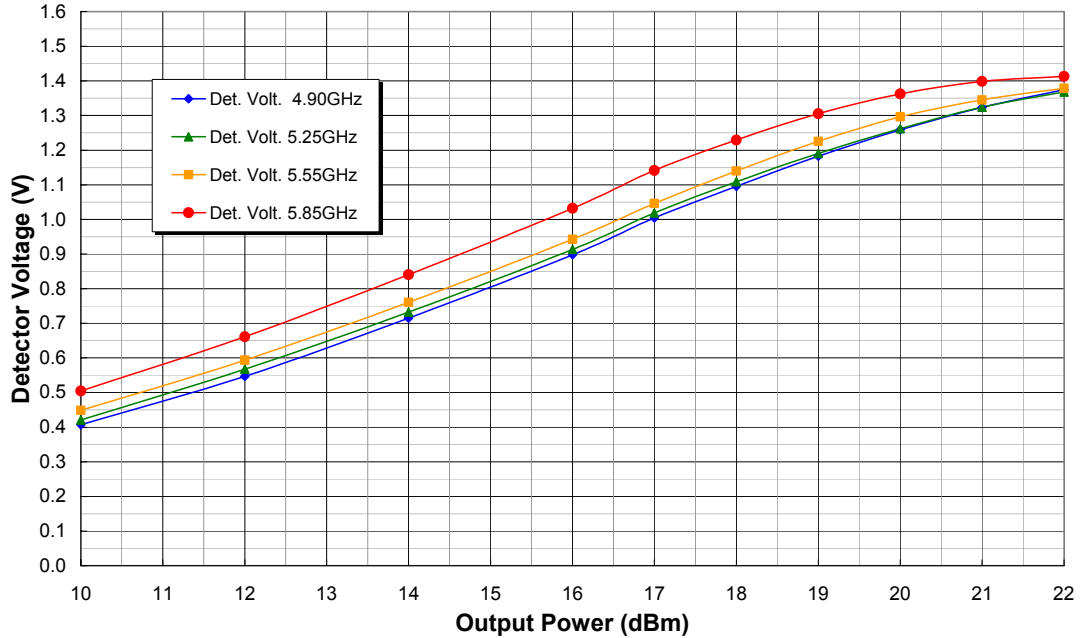
Gain and Icc vs. Output Power Across Temperature
Frequency = 5.25 GHz, Voltage = 3.3V
802.11a 54 Mbps OFDM



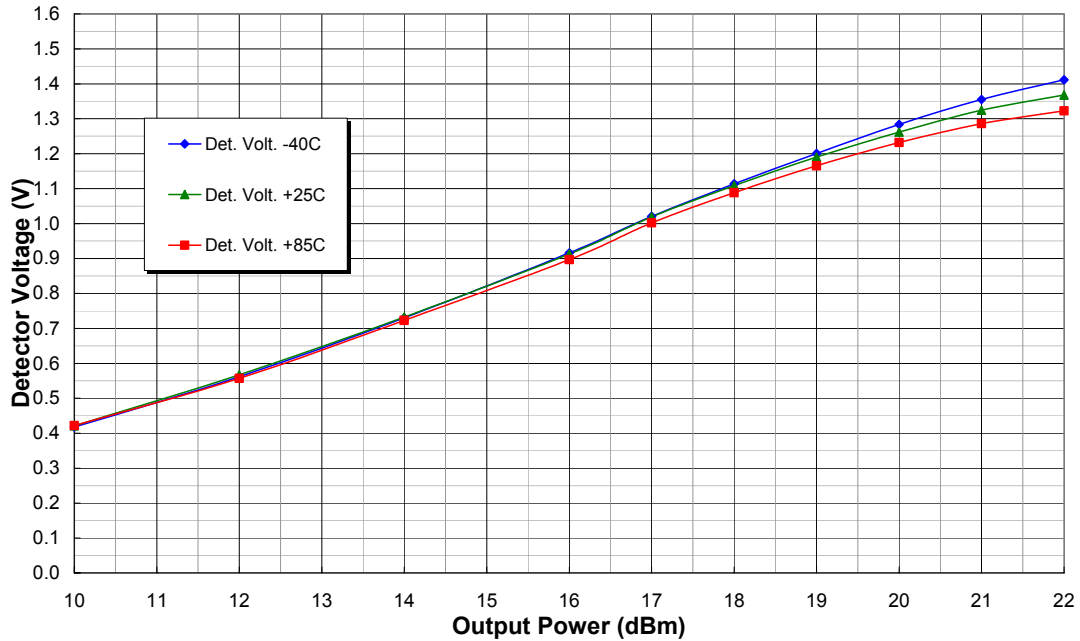
EVM vs. Output Power Across Temperature
Frequency = 5.25 GHz, Voltage = 3.3V
802.11a 54 Mbps OFDM



Detector Voltage vs. Output Power Across Frequency
 Temperature = 25C, Voltage = 3.3V
 802.11a 54 Mbps OFDM

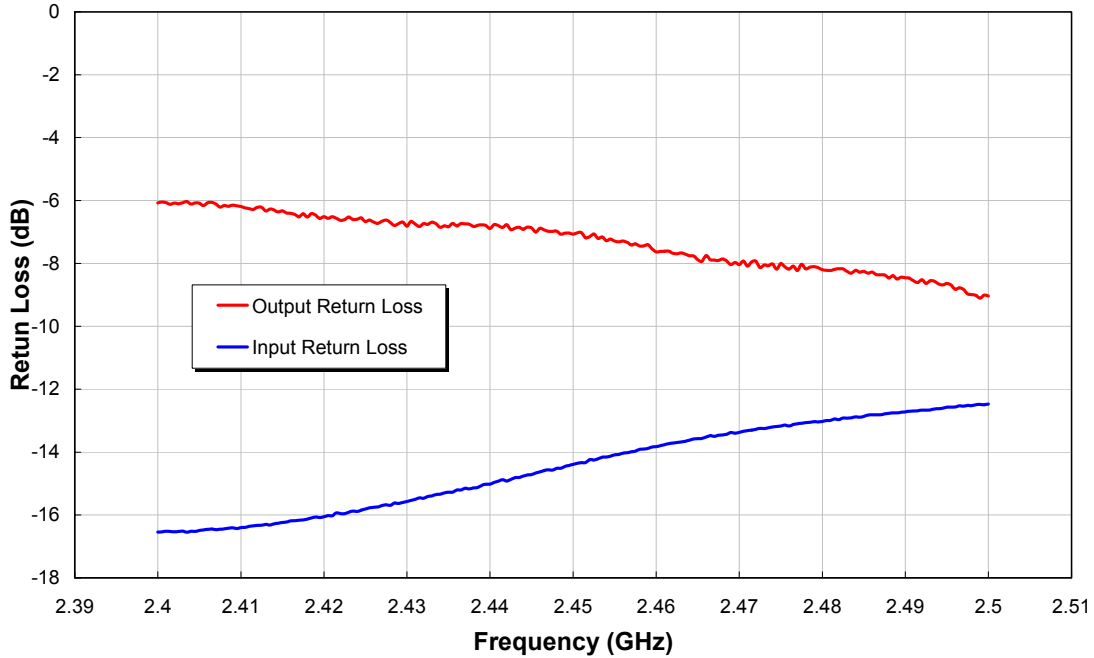


Detector Voltage vs. Output Power Across Temperature
 Frequency = 5.25 GHz, Voltage = 3.3V
 802.11a 54 Mbps OFDM

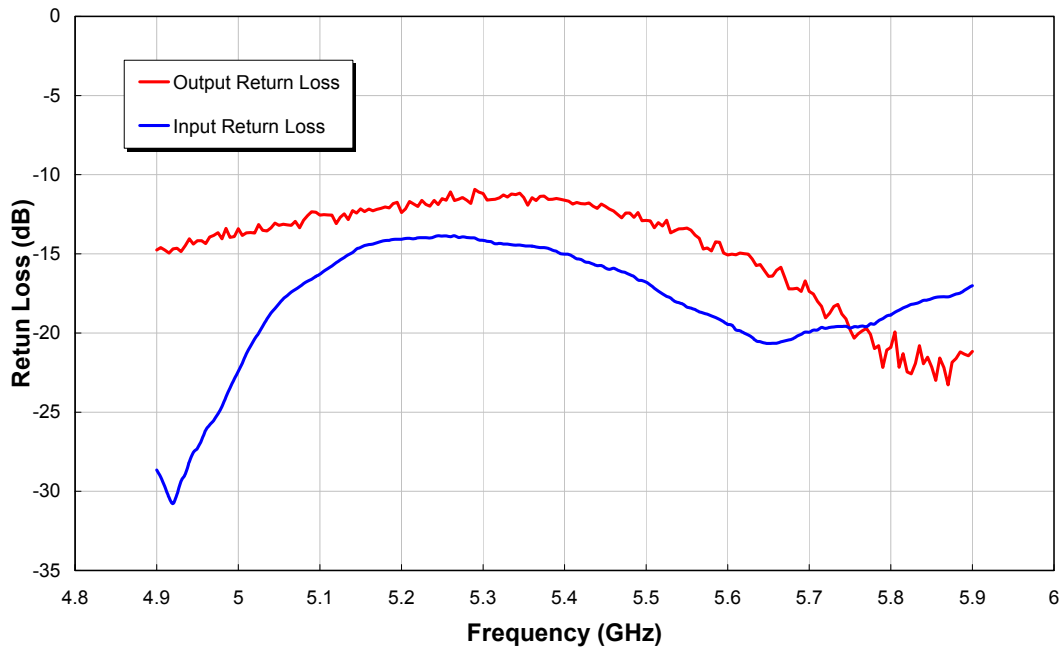


S-Parameter Performance Data at Vcc = +3.3V

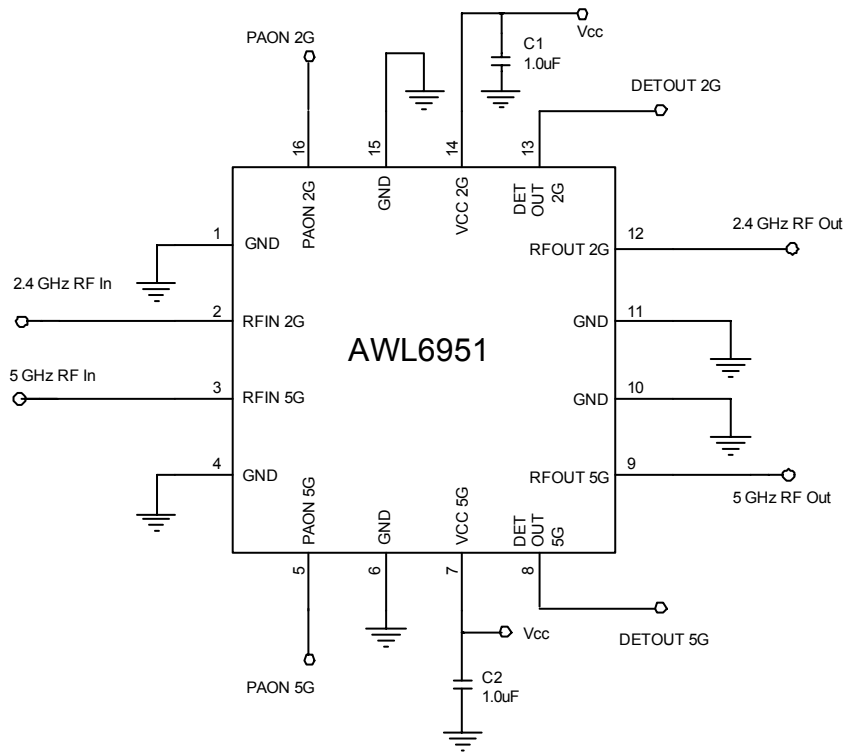
2.4 GHz Return Loss across Frequency
Voltage = 3.3V, Temperature = 25 C



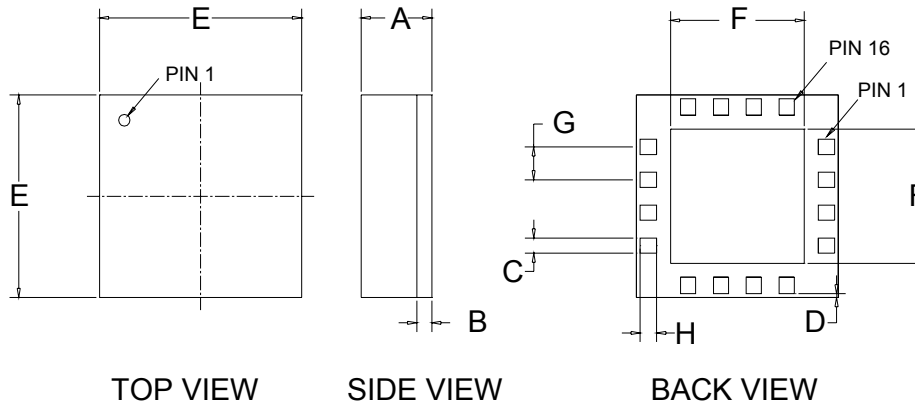
5 GHz Return Loss Across Frequency
Voltage = 3.3V, Temperature = 25 C



AWL6951 APPLICATION CIRCUIT



AWL6951 PACKAGE OUTLINE



DIMENSION	MILLIMETERS		
	MIN	TYP	MAX
A	--	1.30	1.40
B	--	0.30	--
C	0.287	0.30	0.313
D	--	0.075	--
E	3.88	4.00	4.12
F	2.62	2.65	2.68
G	--	0.65	--
H	0.337	0.35	0.363

AWL6951 BRANDING DIAGRAM

Top Brand



Notes

NOTES:

- ANADIGICS LOGO SIZE: 0.45 MM HIGH
- PART NUMBER (LINE 1): AWL6951
- WAFER LOT NUMBER: LLLL = FOUR DIGIT LOT NUMBER
(LINE 2) NNN = THREE DIGIT WAFER NUMBER
- PIN 1 INDICATOR: LASER DOT
- ASSEMBLY INFO (LINE 3): A = REV A
WW = WORK WEEK, YY = TWO DIGIT YEAR
COUNTRY CODE:
CC = TH -for- THAILAND, TW -for- TAIWAN,
PH -for- PHILIPPINES, CH -for- CHINA,
ID -for- INDONESIA, HK -for- HONG KONG
- TYPE : ARIAL
SIZE : 1.5-POINT
COLOR : LASER



DUAL BAND AWL6951 Product Brief
802.11a/b/g WLAN Power Amplifier
2400 – 2500, 4900 – 5900 MHz
Rev 1.2

Notes:

IMPORTANT NOTICE

ANADIGICS, Inc. reserves the right to make changes to its products or to discontinue any product at any time without notice. The product specifications contained herein are subject to change prior to the product's formal introduction. ANADIGICS assumes no responsibility for inaccuracies, and strongly urges customers to verify that the information they are using is current before placing orders.

WARNING

ANADIGICS products are not intended for use in life support appliances, devices or systems. Use of an ANADIGICS product in any such application without written consent is prohibited.

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