SST11CP22

5.1-5.9 GHz High-Power 11ac WLAN Power Amplifier

Features

- Small package size
  - 20-contact UQFN (4mm x 4mm x 0.6 mm max)
- 50Ω input and output match including DC blocks
- Integrated harmonic filter
- Operating voltage
  - V_{CC} = 5.0V
- Operating frequency: 5.1 to 5.9 GHz
- High linear output power, typical performance:
  - 802.11a OFDM Spectrum mask compliant up to 24 dBm
  - 802.11n HT40 OFDM Spectrum mask compliant up to 23.5 dBm
  - 3% EVM up to 20.5 dBm for 802.11a, 54 Mbps signal
  - 2.5% EVM up to 20 dBm for 802.11n, HT40
  - 1.8% EVM up to 19 dBm for 802.11ac, MCS9, 80 MHz BW (bandwidth) signal
- High power-added efficiency/low operating current for 54 Mbps 802.11a applications
  - ~11% @ P_{OUT} = 24 dBm for 802.11a OFDM
- Gain:
  - Typically 31 dB gain across 5.1–5.9 GHz
- Idle current
  - ~290 mA I_{CQ}
- High-speed power-up/down
  - Turn on/off time (10%-90%) <100 ns
- Shut-down current (~2 µA)
- On-chip power detection
  - 20 dB linear dynamic range
  - VSWR insensitive
- All devices are RoHS compliant

Applications

- WLAN (IEEE 802.11a/n/ac)
- HyperLAN2
- Multimedia

Product Description

SST11CP22 is a 50Ω, RF-matched power amplifier module (PAM) with a FCC-compliant harmonic filter that is based on the highly-reliable InGaP/GaAs HBT technology.

Operating over the 5.1–5.9 GHz frequency band, SST11CP22 meets 802.11a spectrum mask requirements up to 24 dBm and 802.11n HT40 spectrum mask at 23.5 dBm. With 802.11a modulation, this PA typically provides up to 20.5 dBm with 3% EVM, and provides 19 dBM with less tan 1.8% dynamic EVM using 802.11ac modulation, MCS9, 80 MHz bandwidth.

This power amplifier module also features easy board-level operation, with a simple application circuit requiring only four external components. With its high-speed power-up/-down control and low enable control current of less than 3 mA, SST11CP22 is controllable directly from the baseband chip.

SST11CP22 also features a wide dynamic-range, linear power detector that is temperature-stable and VSWR-insensitive.

SST11CP22 is offered in 20-contact QFN package. See Figure 2-1 for pin assignments and Table 2-1 for pin descriptions.

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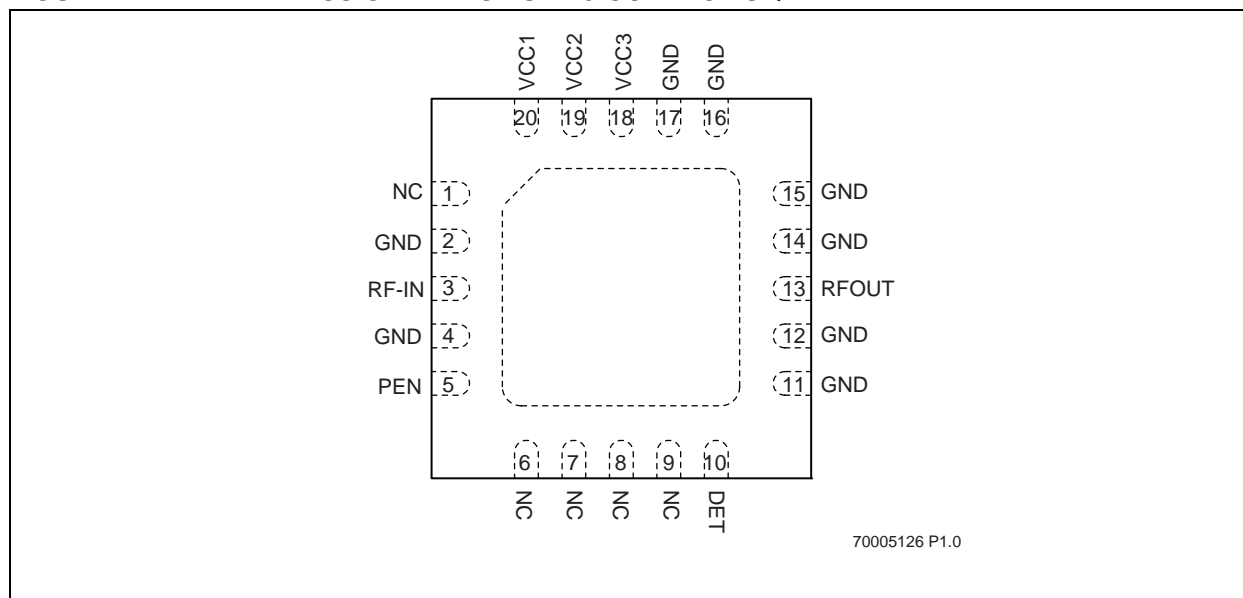Register on our web site at **www.microchip.com** to receive the most current information on all of our products.

1.0   FUNCTIONAL BLOCKS

FIGURE 1-1:   FUNCTIONAL BLOCK DIAGRAM

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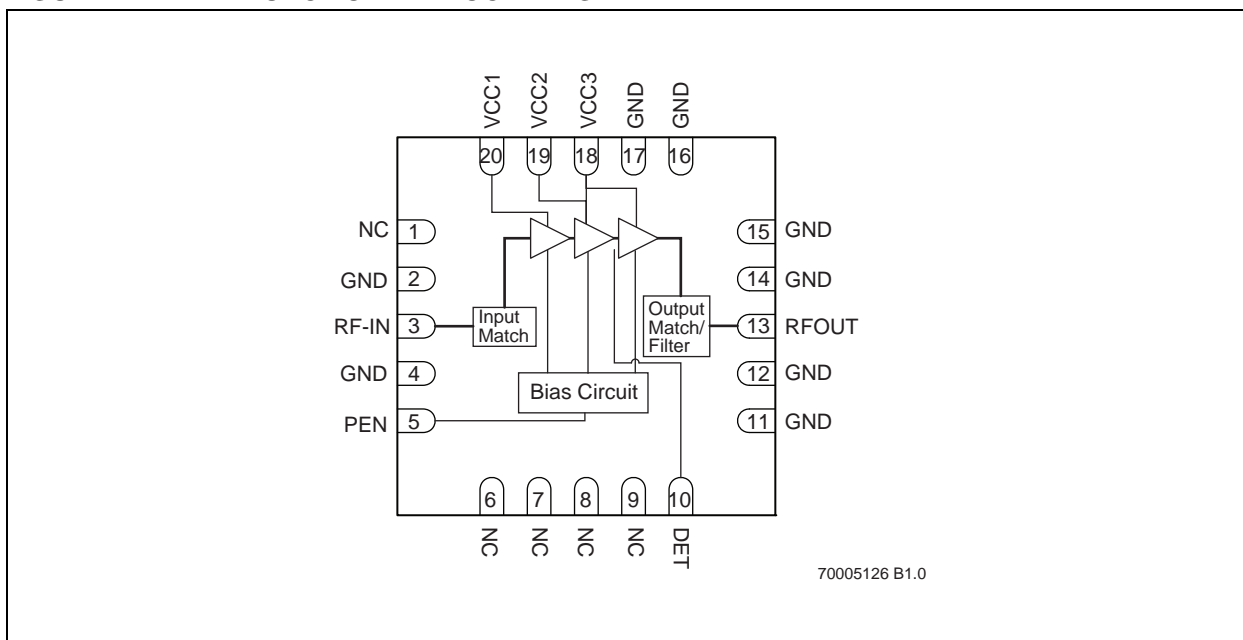
2.0   PIN ASSIGNMENTS

FIGURE 2-1:   PIN ASSIGNMENTS FOR 20-CONTACT UQFN

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TABLE 2-1:   PIN DESCRIPTION

Symbol	Pin No.	Pin Name	Function
GND	0	Center ground contact	The center pad should be connected to RF ground with several low inductance, low resistance vias.
NC	1	No Connection	Unconnected, no internal connection
GND	2	Ground	
RFIN	3	RF input	RF input port
GND	4	Ground	
PEN	5	PA enable	PA enable control input
NC	6	No Connection	Unconnected, no internal connection
NC	7	No Connection	Unconnected, no internal connection
NC	8	No Connection	Unconnected, no internal connection
NC	9	No Connection	Unconnected, no internal connection
DET	10	TX detector output	TX detector output
GND	11	Ground	
GND	12	Ground	
RF OUT	13	RF Out	RF Output port
GND	14	Ground	
GND	15	Ground	
GND	16	Ground	
GND	17	Ground	
VCC3	18	PA supply	PA Supply
VCC2	19	PA supply	PA Supply
VCC1	20	PA supply	PA Supply

3.0   ELECTRICAL SPECIFICATIONS

The AC and DC specifications for the power amplifier interface signals. Refer to Table 3-2 for the DC voltage and current specifications. Refer to Figures 4-1 through 4-8 for the RF performance.

Absolute Maximum Stress Ratings (Applied conditions greater than those listed under "Absolute Maximum Stress Ratings" may cause permanent damage to the device. This is a stress rating only and functional operation of the device at these conditions or conditions greater than those defined in the operational sections of this data sheet is not implied. Exposure to absolute maximum stress rating conditions may affect device reliability.)

Supply Voltage at pins 18, 19, and 20 (V_{CC}) . . . . -0.3V to +6.5V

Supply voltage to pins 5, 6, and 7 (V_{PEN}) . . . . -0.3V to +3.6V

DC supply current (I_{CC}) . . . . 600 mA

Operating Temperature (T_A) . . . . -20ºC to +85ºC

Storage Temperature (T_{STG}) . . . . -40ºC to +120ºC

Maximum Junction Temperature (T_J) . . . . +150ºC

Maximum Output Power. . . . . 26 dBm

Surface Mount Solder Reflow Temperature . . . . 260°C for 10 seconds

TABLE 3-1:   OPERATING RANGE

Range	Ambient Temp	V_{CC}
Industrial	-10°C to +85°C	5.0V-6.0V

TABLE 3-2:   DC ELECTRICAL CHARACTERISTICS

Symbol	Parameter	Min.	Typ	Max.	Unit
V_{CC}	Supply Voltage		5.0	6.0	V
I_{CC}	Supply Current @ P_{OUT} = 20 dBm		370		mA
I_{CQ}	V_{CC} Quiescent Current		290		mA
I_{OFF}	Shutdown Current		2		µA
V_{PEN}	Recommended Enable Voltage		2.95		V
I_{PEN}	Total Enable Current		2		mA
V_{DET}	RF Power Detector Voltage Output Range	0.4		1.5	V
	Voltage at 19 dBm		1.0		V

TABLE 3-3: AC ELECTRICAL CHARACTERISTICS FOR CONFIGURATION V_{CC} = 5.0V, V_{PEN}=2.95V

Symbol	Parameter	Min.	Typ	Max.	Unit
F_{L-U}	Frequency range	5.1		5.9	GHz
Linear Power	Output power at 3% EVM at 54 Mbps OFDM signal, 802.11a		20.5		dBm
	Output power at 2.5% dynamic EVM 802.11n HT40		20		dBm
	Output power 1.8% dynamic EVM MCS9 80 MHz BW		19		dBm
	$ACPR_A$ output power level with 802.11a mask compliance @ 6Mbps OFDM		24		dBm
	$ACPR_{N40}$ output power level with 802.11n HT40 mask compliance		23.5		dBm
G	Power gain from 5.18-5.9 GHz		31		dB
RF Input Return Loss	Small signal		10		dB
$2f_0$ Second Harmonic Power Density	Harmonics at 24 dBm		-45		dBm/MHz
$3f_0$ Third Harmonic Power Density	Harmonics at 24 dBm		-50		dBm/MHz

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4.0   TYPICAL PERFORMANCE CHARACTERISTICS

Test Conditions: V_{CC} = 5.0V, T_A = 25°C, V_{PEN} = 2.95V, 802.11a 54 Mbps OFDM Modulation Unless otherwise specified

FIGURE 4-1:   **S-PARAMETERS**
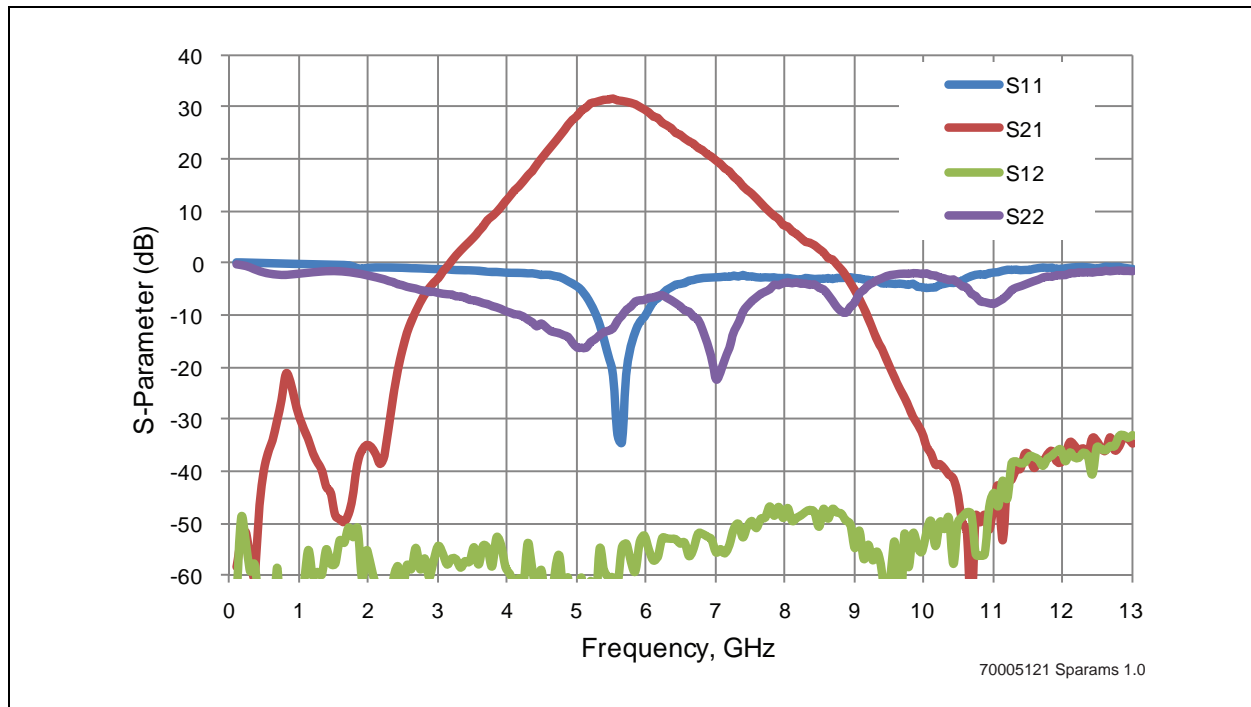
FIGURE 4-2:   **EVM VERSUS OUTPUT POWER, 802.11a 54 Mbps, 100% DUTY CYCLE MEASURED WITH EQUALIZER CHANNEL ESTIMATION SET TO "SEQUENCE ONLY", V_{PEN}=2.95V**
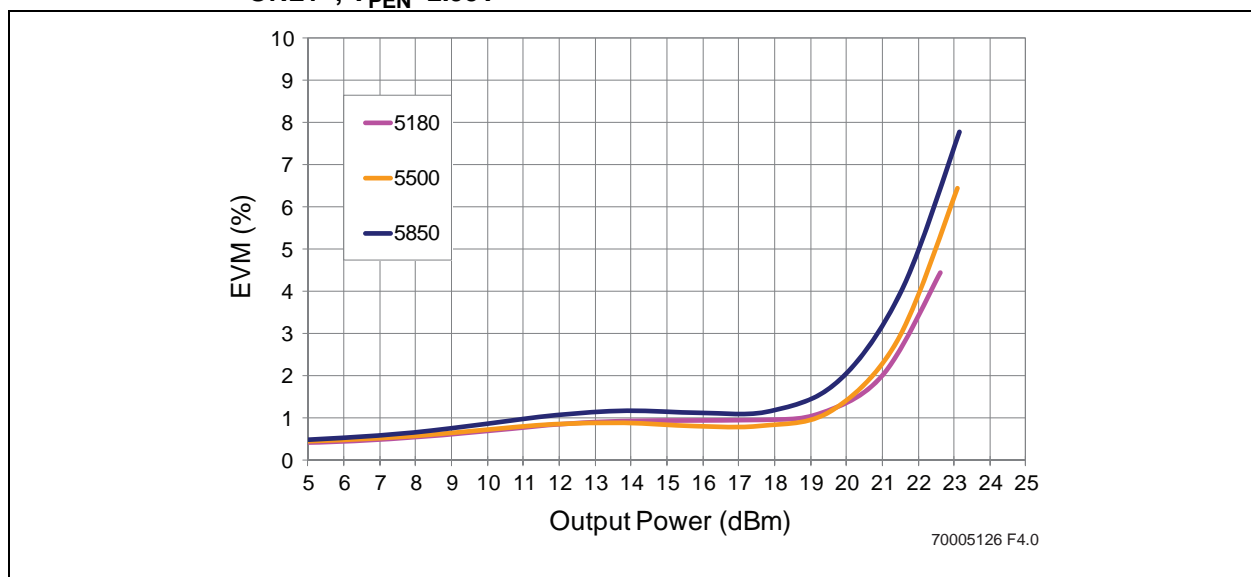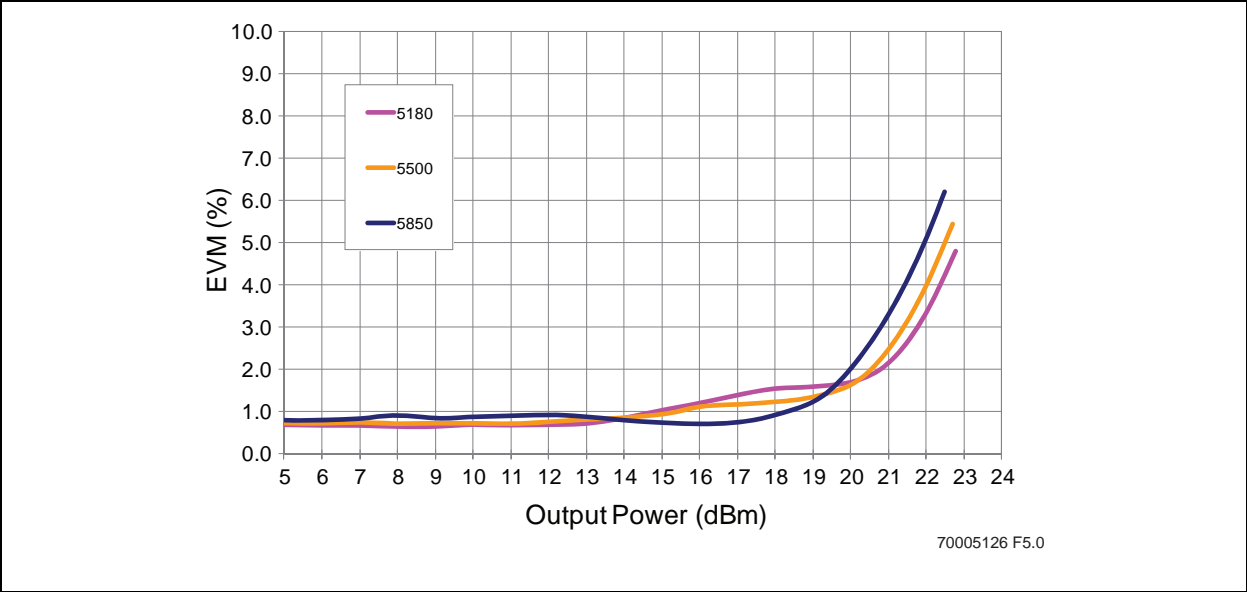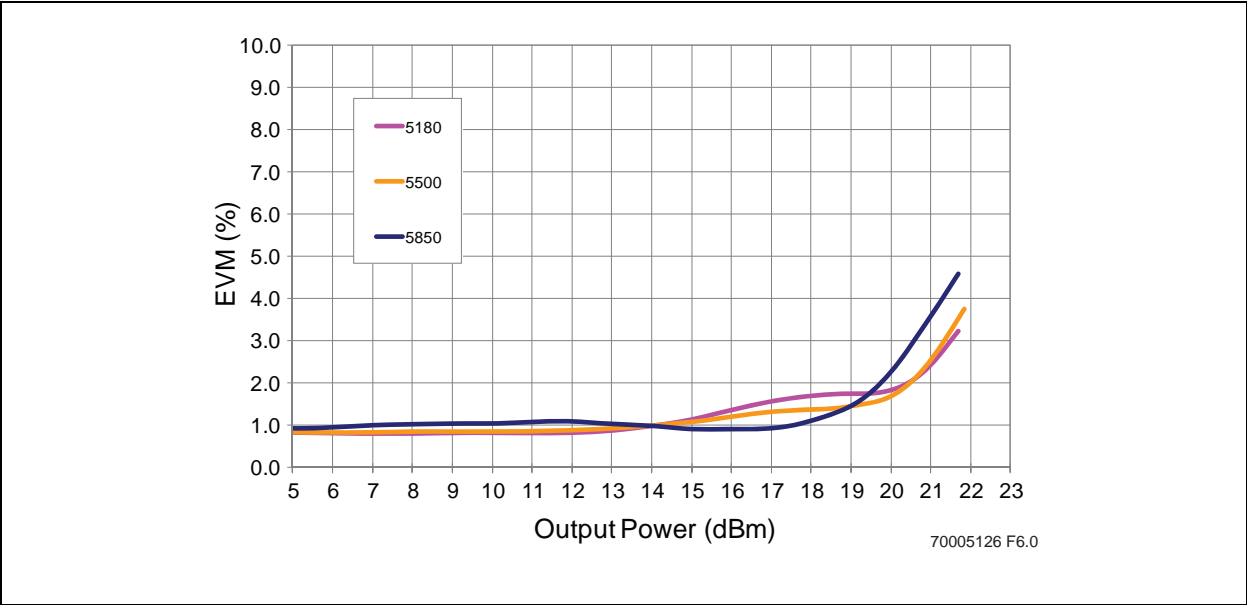
FIGURE 4-3: DYNAMIC EVM VERSUS OUTPUT POWER, 802.11n HT40, 50% DUTY CYCLE MEASURED WITH EQUALIZER CHANNEL ESTIMATION SET TO "SEQUENCE ONLY", $V_{PEN}=2.95V$

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FIGURE 4-4: DYNAMIC EVM VERSUS OUTPUT POWER, 802.11ac MCS9, 80 MHz, 60 μS PULSE, 50% DUTY CYCLE, MEASURED WITH EQUALIZER CHANNEL ESTIMATION SET TO SEQUENCE ONLY, $V_{PEN}=2.95V$

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FIGURE 4-5: POWER SUPPLY CURRENT VERSUS OUTPUT POWER, V_{CC} = 5.0V, 802.11a 54 Mbps, 100% DUTY CYCLE, V_{PEN}=2.95V
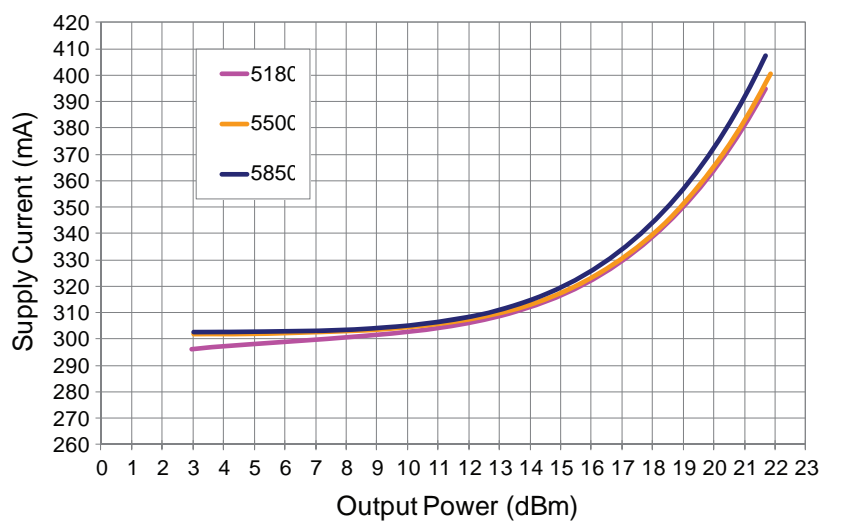
FIGURE 4-6: INSTANTANEOUS POWER SUPPLY CURRENT VERSUS OUTPUT POWER, V_{CC}=5.0V, 802.11ac MCS9, 80 MHz, 60 µs PULSE, 50% DUTY CYCLE V_{PEN}=2.95V
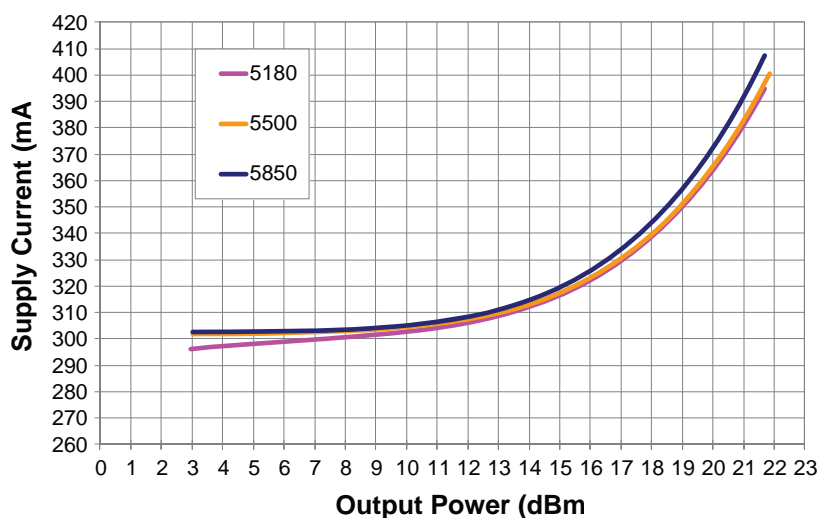
FIGURE 4-7: **POWER GAIN VERSUS OUTPUT POWER**
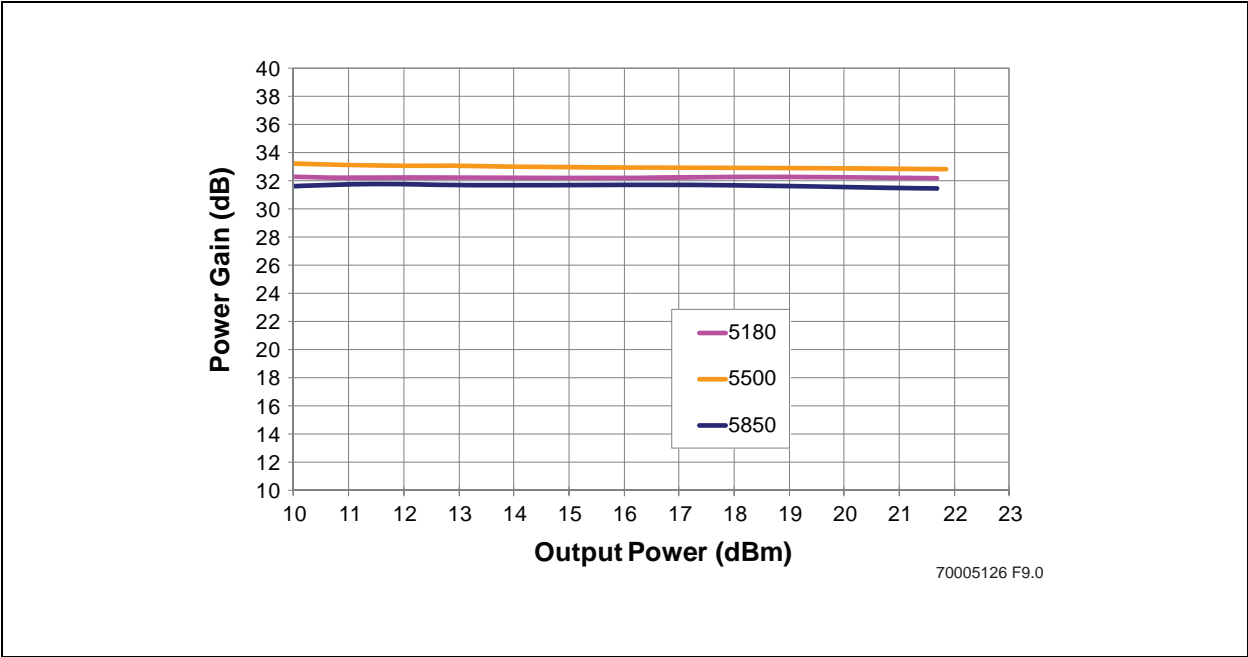
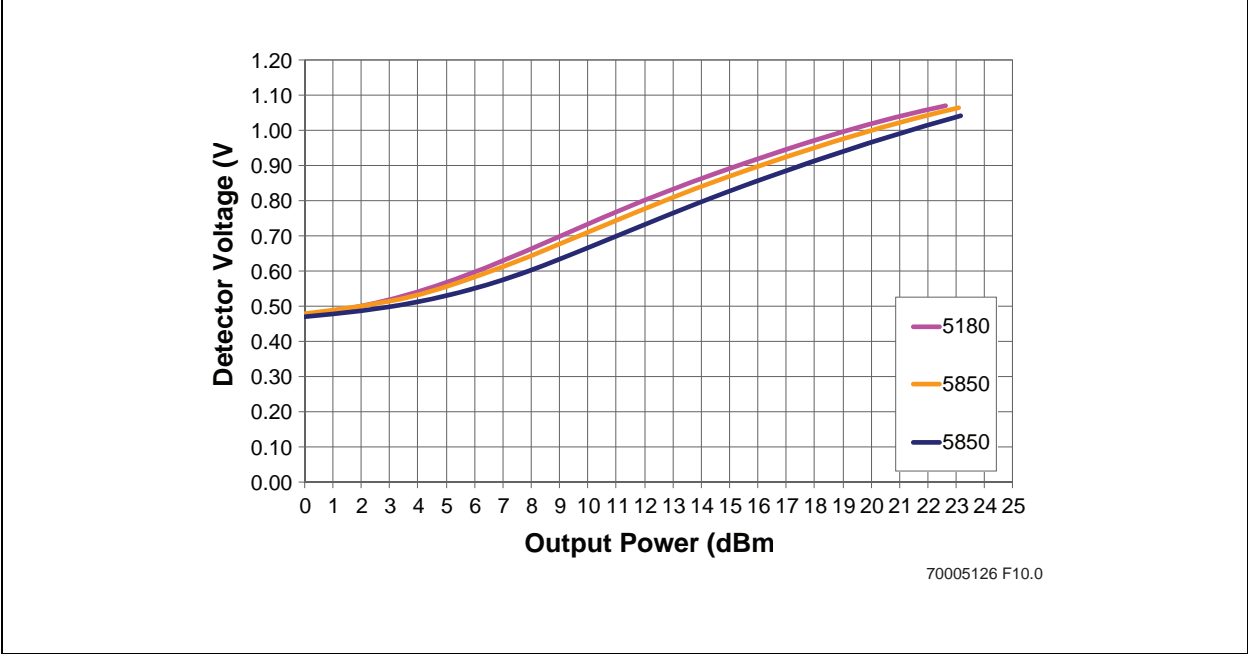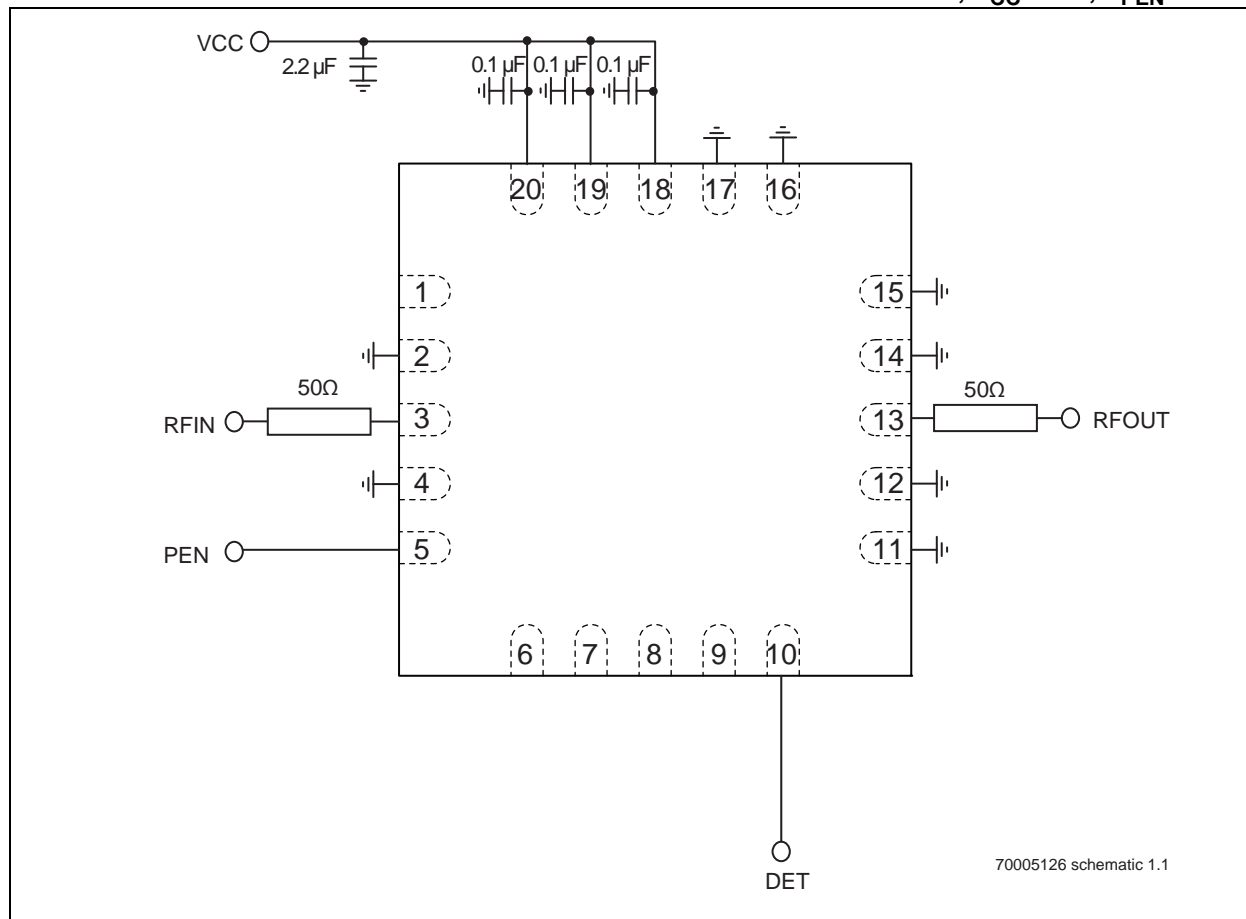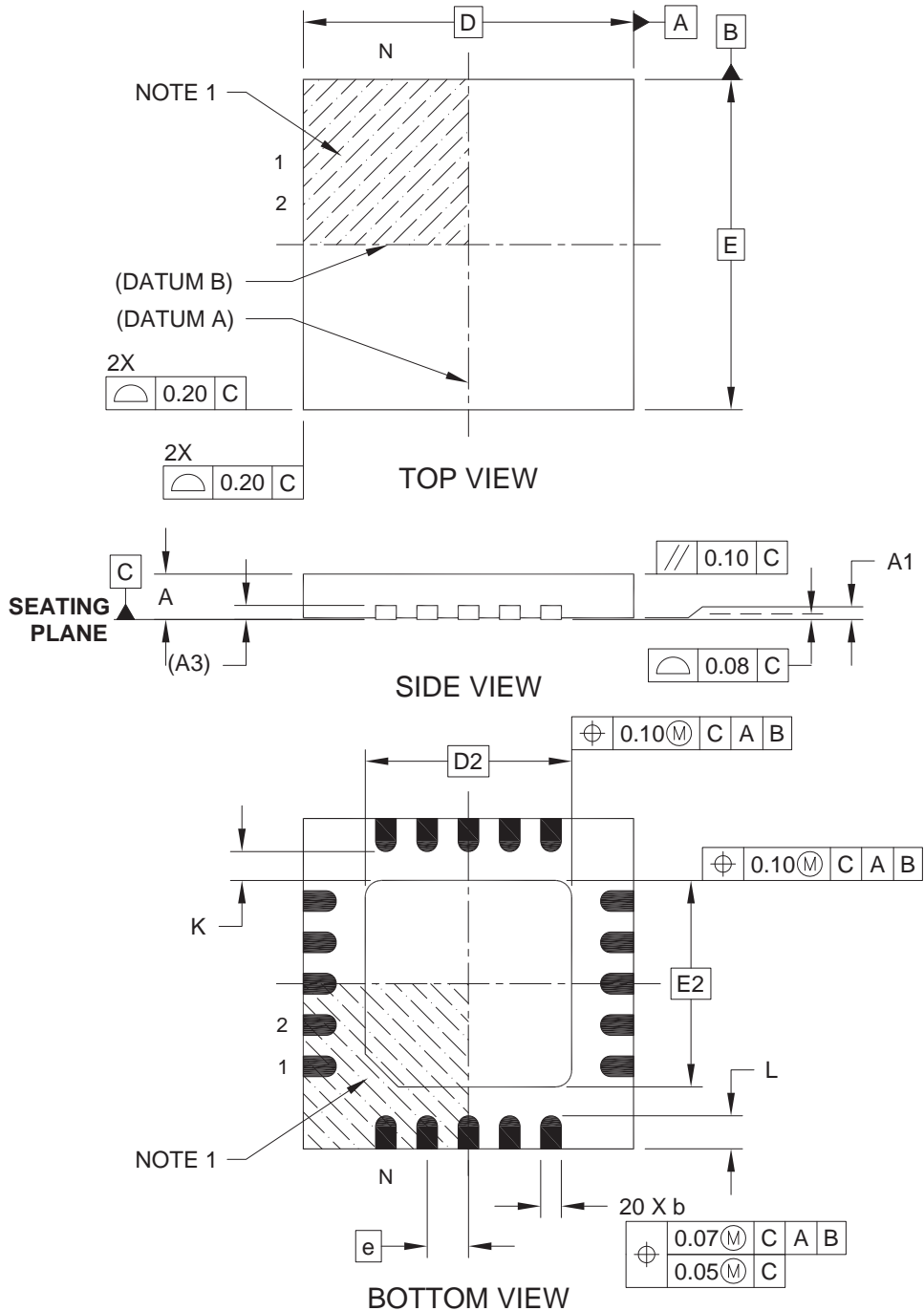**FIGURE 4-8:** **DETECTOR VOLTAGE VERSUS OUTPUT POWER, V$_{PEN}$=2.95V**

FIGURE 4-9: **TYPICAL SCHEMATIC FOR 802.11a/n/ac APPLICATIONS, V$_{CC}$=5.0V, V$_{PEN}$=2.95V**

70005126 schematic 1.1

5.0   PACKAGE INFORMATION

20-Lead Ultra Thin Quad Flat Pack, No Lead (GN) - 4x4x0.55 mm Body (UQFN)

Note: For the most current package drawings, please see the Microchip Packaging Specification located at http://www.microchip.com/packaging

TOP VIEW

SIDE VIEW

BOTTOM VIEW

Microchip Technology Drawing C04-252A Sheet 1 of 2

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20-Lead Ultra Thin Quad Flat Pack, No Lead (GN) - 4x4x0.55 mm Body (UQFN)

Note:	For the most current package drawings, please see the Microchip Packaging Specification located at http://www.microchip.com/packaging
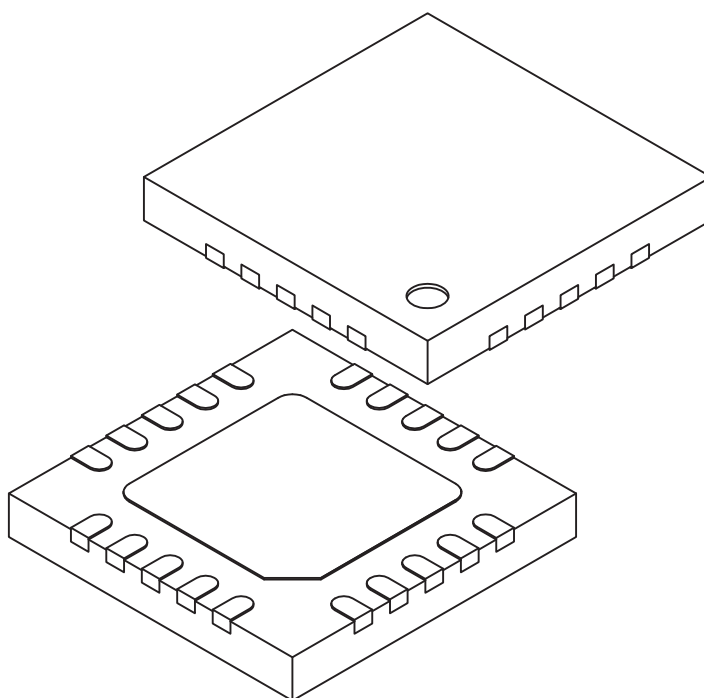
	Units	MILLIMETERS		
	Dimension Limits	MIN	NOM	MAX
Number of Pins	N		20	
Pitch	e		0.50 BSC	
Overall Height	A	0.50	0.55	0.60
Standoff	A1	0.00	0.02	0.05
Terminal Thickness	(A3)		0.15 REF	
Overall Width	E		4.00 BSC	
Exposed Pad Width	E2	2.45	2.50	2.55
Overall Length	D		4.00 BSC	
Exposed Pad Length	D2	2.45	2.50	2.55
Terminal Width	b	0.20	0.25	0.30
Terminal Length	L	0.35	0.40	0.45
Terminal-to-Exposed-Pad	K	0.20	-	-

Notes:

1. Pin 1 visual index feature may vary, but must be located within the hatched area.
2. Package is saw singulated
3. Dimensioning and tolerancing per ASME Y14.5M
    BSC: Basic Dimension. Theoretically exact value shown without tolerances.
    REF: Reference Dimension, usually without tolerance, for information purposes only.

Microchip Technology Drawing C04-252A Sheet 2 of 2

TABLE 5-1: **REVISION HISTORY**

Revision	Description	Date
A	• Initial release of data sheet	Jul 2013

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6.0   PRODUCT IDENTIFICATION SYSTEM

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<u>PART NO.</u>   <u>XXX</u>

Device   **Package**

Device:	SST11CP22	= 51.-5.9 GHz Power Amplifier
Package:	GN	= UQFN (4mm x 4mm), 0.6 max thickness 20-contact
Evaluation Kit Flag	K	= Evaluation Kit

Valid Combinations:

SST11CP22-GN
SST11CP22-GN-K

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