MICROCHIP

SST12LP22

2.4 GHz High-Linearity, High-Efficiency Power Amplifier

Features

- High Gain:
  - Typically 27.5 dB gain across 2.4–2.5 GHz
  - Stable gain over temperature -40°C to +85°C
- Linear output power:
  - Meets 802.11g OFDM spectrum mask requirement up to 22 dBm
  - Typically 19 dBm with <3% EVM, 802.11g, 54 Mbps, 110 mA current
  - Typically 17.5 dBm with <2.5% EVM, 802.11n, MCS7-HT20, 50% duty cycle
  - Typically 16.5 dBm with <1.75% EVM, MCS9-HT40, 50% duty cycle
  - Meets 802.11b ACPR requirement up to 22 dBm with 33% power-added efficiency
- High-speed power-up/down
  - Turn on/off time (10%-90%) <100 ns
- 10:1 VSWR survivability (unconditionally stable up to 25 dBm)
- On-chip power detection
  - >20 dB dynamic range
  - VSWR- and temperature-insensitive
- Simple input/output matching
- Packages available
  - 16-contact UQFN (3mm x 3mm)
- All non-Pb (lead-free) devices are RoHS compliant

Applications

- WLAN (IEEE 802.11b/g/n)
- WLAN 256 QAM
- Cordless phones
- 2.4 GHz ISM wireless equipment
- Bluetooth[®]

1.0   PRODUCT DESCRIPTION

SST12LP22 power amplifier (PA) is based on the highly-reliable InGaP/GaAs HBT technology.

This PA can be easily configured for power applications that require high power-added efficiency while operating over the 2.4-2.5 GHz frequency band. It typically provides 27.5 dB gain with 33% power-added efficiency @ P_{OUT} = 22 dBm for 802.11b/g.

SST12LP22 has excellent linearity, typically 19 dBm at 3% EVM with 54 Mbps 802.11g operation; with MCS9, 256 QAM modulation it provides 16.5 dBm at 1.75% EVM. SST12LP22 also has a single-ended power detector which lowers the users' cost for power control.

The power amplifier IC also features easy board-level usage along with high-speed power-up/-down control.

SST12LP22 is offered in 16-contact UQFN package and is pin-to-pin compatible to the SST12CP21 high-power amplifier. See Figure 3-1 for pin assignments and Table 3-1 for pin descriptions.

SST12LP22

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Errata

An errata sheet, describing minor operational differences from the data sheet and recommended workarounds, may exist for current devices. As device/documentation issues become known to us, we will publish an errata sheet. The errata will specify the revision of silicon and revision of document to which it applies.

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Preliminary

2.0   FUNCTIONAL BLOCKS

FIGURE 2-1:   FUNCTIONAL BLOCK DIAGRAM

70005206 B1.0
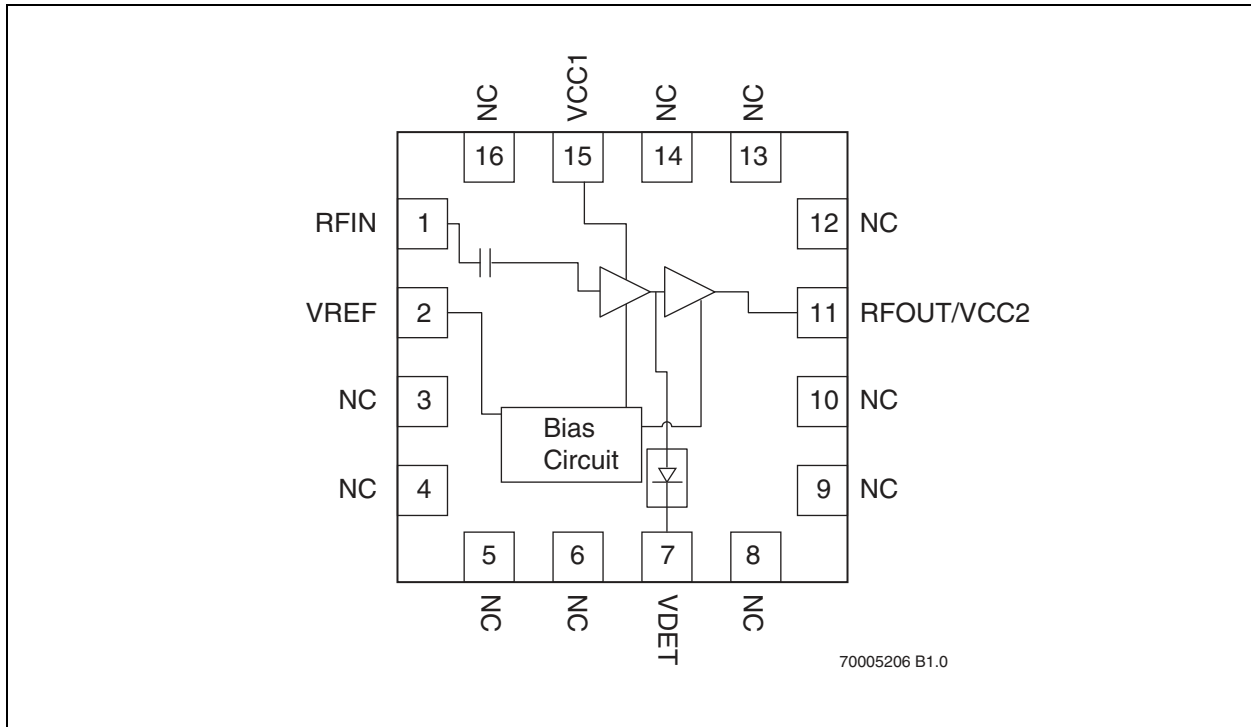
SST12LP22

3.0   PIN ASSIGNMENTS

FIGURE 3-1:   **PIN ASSIGNMENTS FOR 16-CONTACT UQFN**

70005206 P1.0
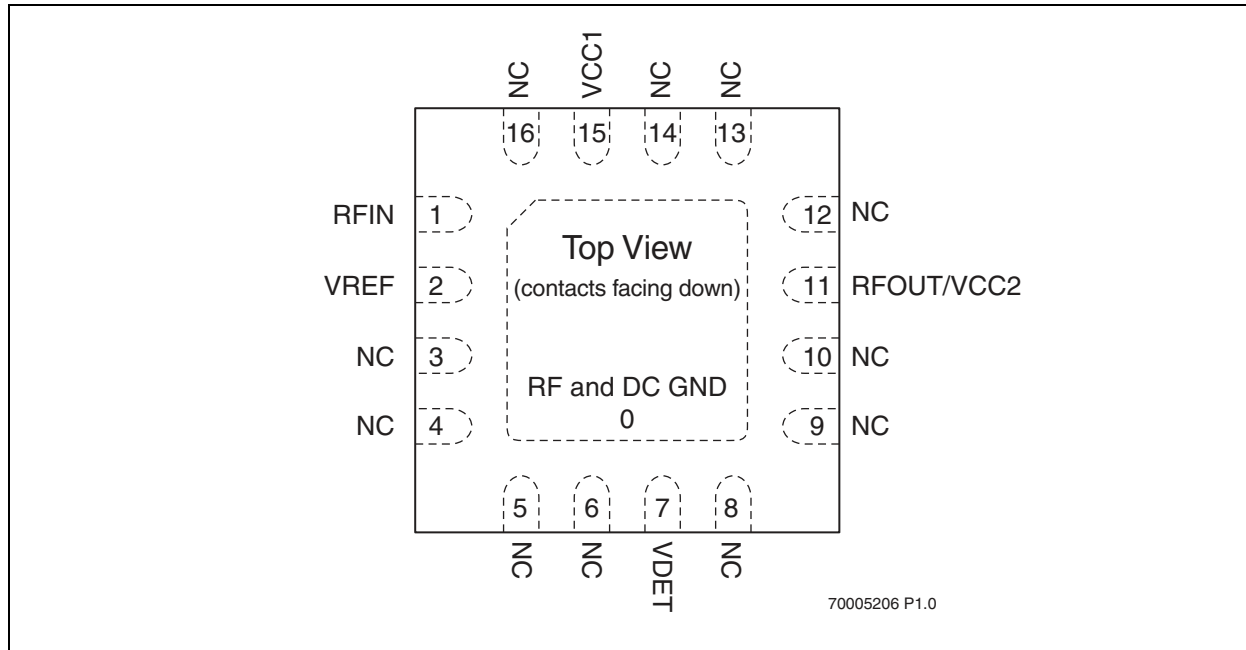
TABLE 3-1:   **PIN DESCRIPTION**

Symbol	Pin No.	Pin Name	Type[1]	Function
GND	0	Ground		The center pad should be connected to RF ground
RFIN	1	RF_{IN}	I	RF input, DC decoupled
VREF	2	V_{REF}	PWR	PA enable and idle-current control
NC	3	No Connection		No Internal Connection
NC	4	No connection		No Internal Connection
NC	5	No Connection		No Internal Connection
NC	6	No Connection		No Internal Connection
VDET	7	V_{DET}	O	On-chip power detector
NC	8	No Connection		No Internal Connection
NC	9	No Connection		No Internal Connection
NC	10	No Connection		No Internal Connection
RFOUT	11	RF_{OUT}	O	RF output
NC	12	No Connection		No Internal Connection
NC	13	No Connection		No Internal Connection
NC	14	NC		No Internal Connection
VCC1	15	V_{CC1}`	PWR	PWR power supply, 1st stage
NC	16	No Connection		No Internal Connection

1. I=Input, O=Output

4.0   ELECTRICAL SPECIFICATIONS

The DC and RF specifications for the power amplifier are specified below. Refer to Table 4-2 for the DC voltage and current specifications.

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.)

Input power to pin 1 (P_{IN})[1] . . . . +12 dBm

Supply voltage at pins 4, 10, 11, 13 and 15 (V_{CC}) . . . . +4.2 V

Reference voltage to pin 2 (V_{REF1}) . . . . +3.2 V

DC supply current (I_{CC}) . . . . 180 mA

Operating Temperature (T_A). . . . . -40ºC to +85ºC

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

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

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

1. Maximum input power for V_{CC} = 5V with 50% duty cycle, 802.11g 54 Mbps, with maximum output VSWR = 10:1. At V_{CC} = 5V, a 10Ω resistor must be included on V_{CC1}, as shown in Figures 5-8 and 5-9.

TABLE 4-1:   OPERATING RANGE

Range	Ambient Temp	V_{CC}
Industrial	-40°C to +85°C	3.3V

TABLE 4-2:   DC ELECTRICAL CHARACTERISTICS AT 25ºC

Symbol	Parameter	Min.	Typ	Max.	Unit
V_{CC}	Supply Voltage	3.0	3.3	3.6	V
I_{CC}	DC Current for 802.11g, 22 dBm		135		mA
I_{CQ}	Idle Current		65		mA
V_{REG}	Reference Voltage see Figure 5-8 on page 10	2.9	2.95	3.2	V
I_{REG}	Reference Current		3		mA

SST12LP22

TABLE 4-3: **AC ELECTRICAL CHARACTERISTICS FOR CONFIGURATION AT V_{CC} = 3.3V, V_{REF} = 2.95V, 25ºC, 50% DUTY CYCLE**

Symbol	Parameter	Min.	Typ	Max.	Unit
F_{L-U}	Frequency range in 802.11b/g applications	2400		2500	MHz
P_{OUT}	Output power at 3% EVM with 802.11g OFDM at 54 Mbps		19		dBm
	Output power at 2.5% EVM with 802.11n MCS7 HT20		17.5		dBm
	Output power at 1.75% EVM with 256 QAM MCS9 HT40		16.5		dBm
	Output power meeting 802.11g spectral mask, 6 Mbps		22		dBm
	Output power meeting 802.11n HT20 spectral mask		20		dBm
	Output power meeting MCS9-HT40 spectral mask		20		dBm
	Output power meeting 802.11b spectral mask with 1 Mbps		22		dBm
	Output power meeting Bluetooth ACPR		18		dBm
G	Power gain for 802.11b/g/n/256 QAM	26	27.5		dB
G_{VAR}	Gain variation over band			±0.5	dB
2f	Second Harmonic at 22 dBm, 802.11b, 1 Mbps[1]		-50		dBm/MHz
3f	Third Harmonic at 29 dBm, 802.11b, 1 Mbps[1]		-50		dBm/MHz

1. See Figure 5-9

Preliminary

5.0   TYPICAL PERFORMANCE CHARACTERISTICS

Test Conditions: V_{CC} = 3.3V, V_{REG} = 2.95V, T_A = 25°C, IEEE 802.11g, 54 Mbps, 50% duty cycle unless otherwise specified

FIGURE 5-1:   S-PARAMETER

70005206 s-param 1.0
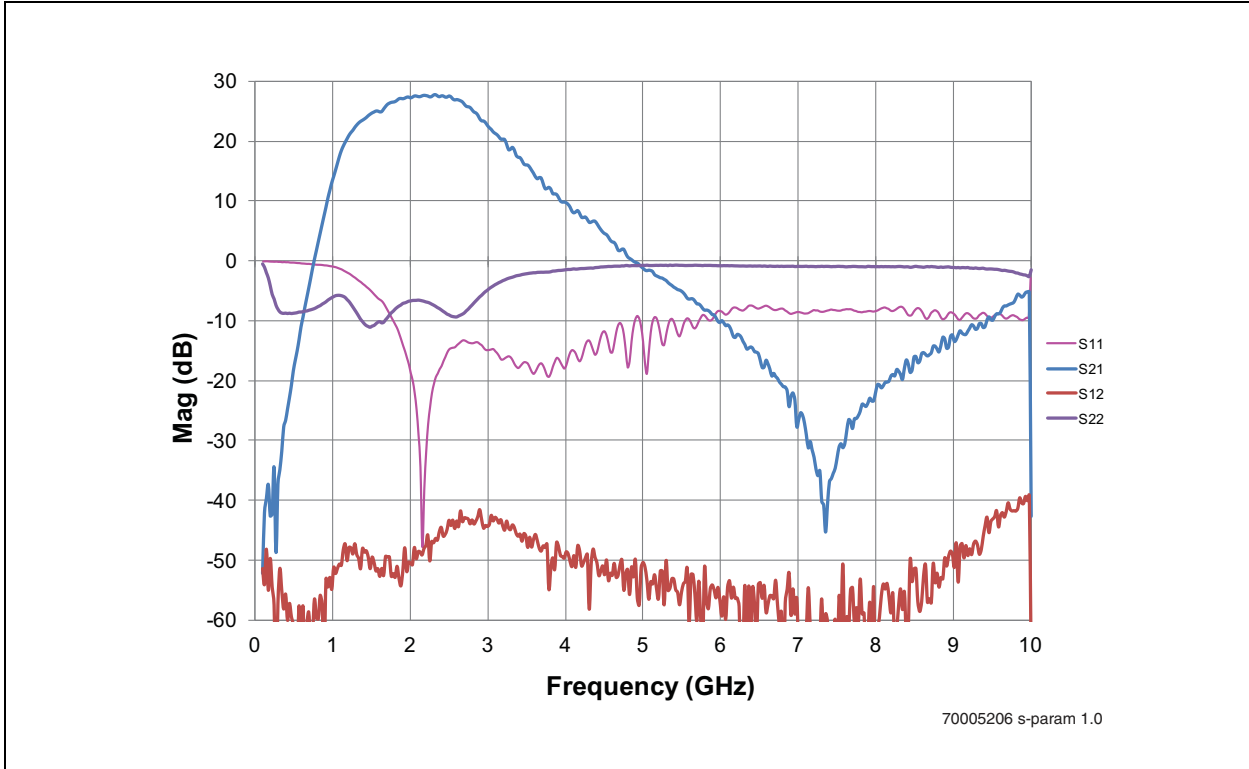
FIGURE 5-2:   DYNAMIC EVM VERSUS OUTPUT POWER

70005206 F2.0
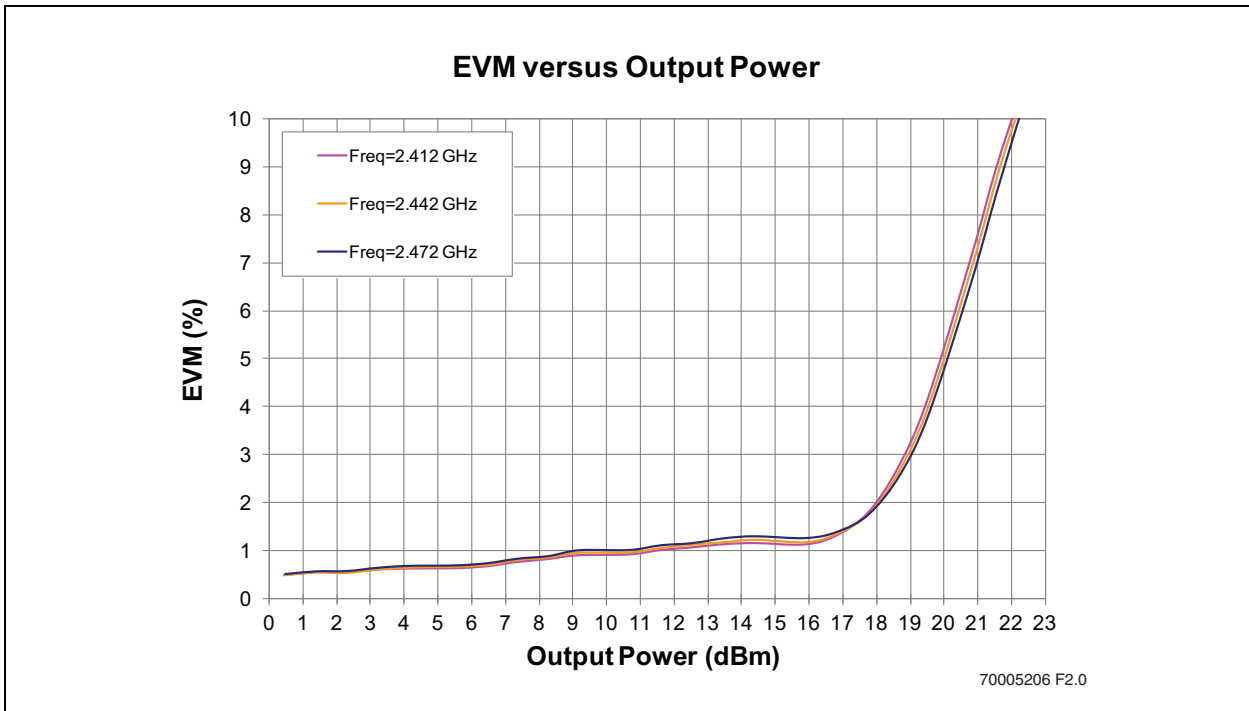
SST12LP22

FIGURE 5-3: **DYNAMIC EVM VERSUS OUTPUT POWER 256 QAM, MCS9-HT40, 50% DUTY CYCLE**

Dynamic EVM versus Output Power

70005206 F3.0
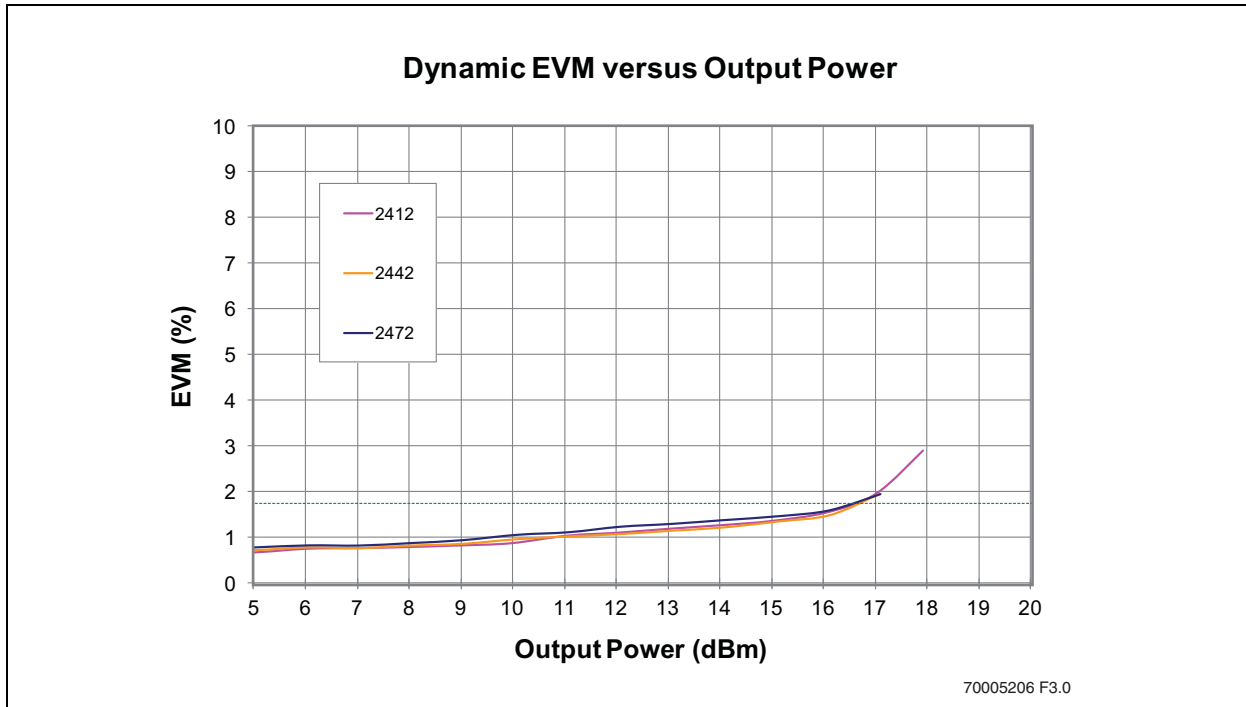
FIGURE 5-4: **POWER GAIN VERSUS OUTPUT POWER**

Power Gain versus Output Power

70005206 F4.0

Preliminary
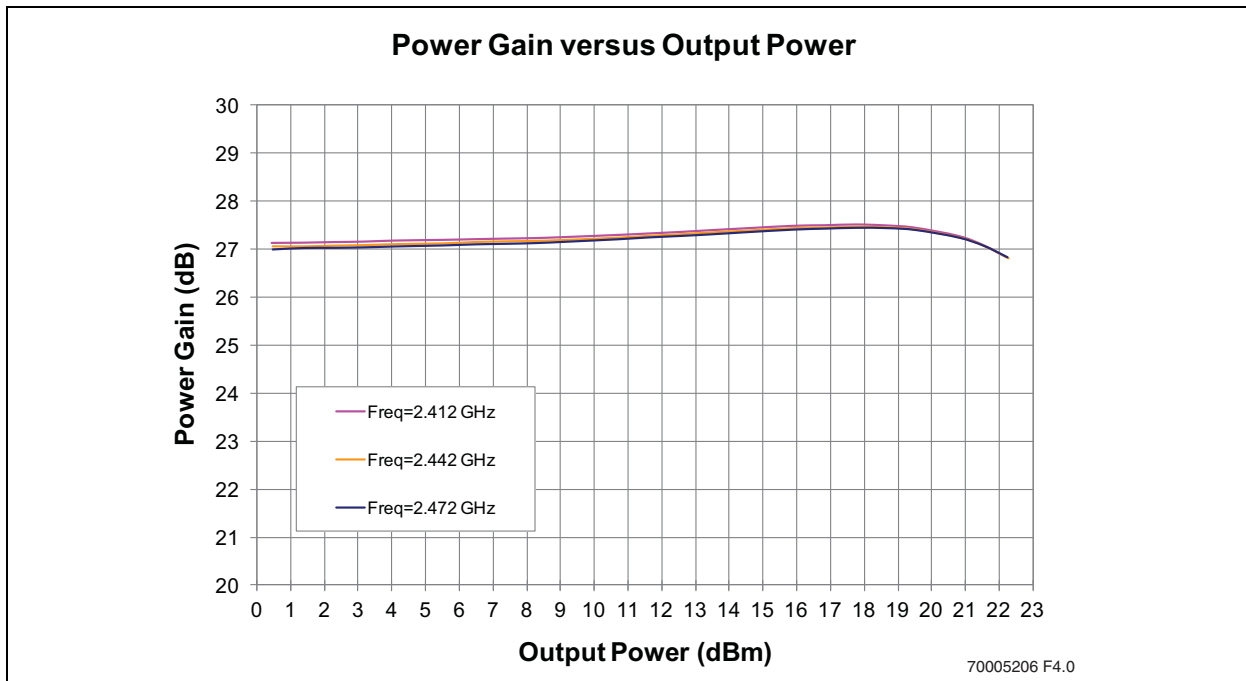
FIGURE 5-5: DC CURRENT VERSUS OUTPUT POWER

Supply Current versus Output Power
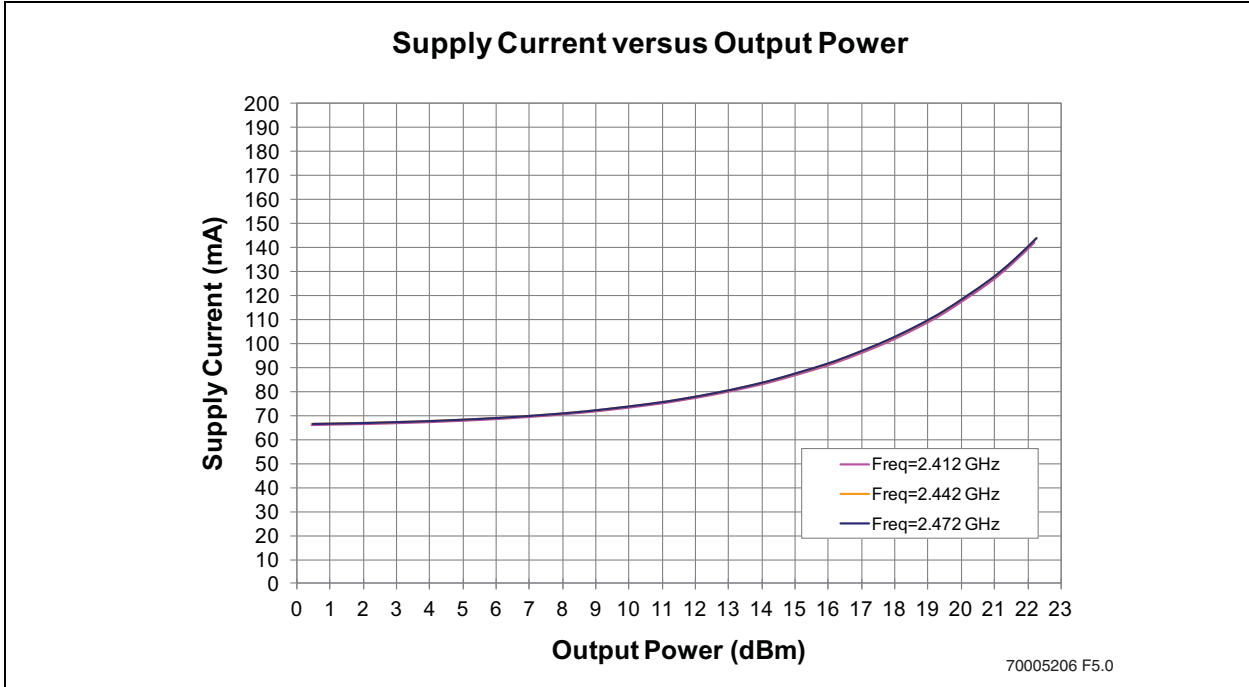
FIGURE 5-6: DETECTOR OUTPUT VOLTAGE VERSUS OUTPUT POWER

Detector Voltage versus Output Power
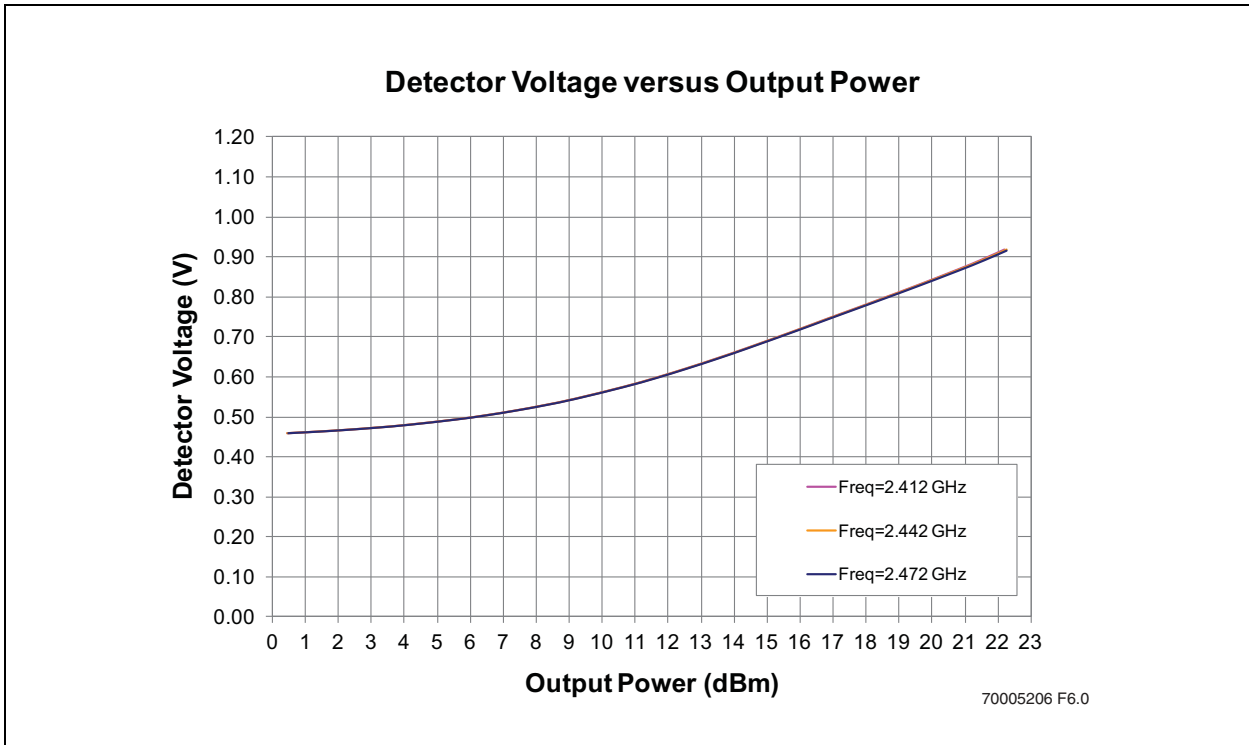
SST12LP22

FIGURE 5-7: DYNAMIC EVM VERSUS OUTPUT POWER (WITH HARMONIC FILTER IN Figure 5-9)
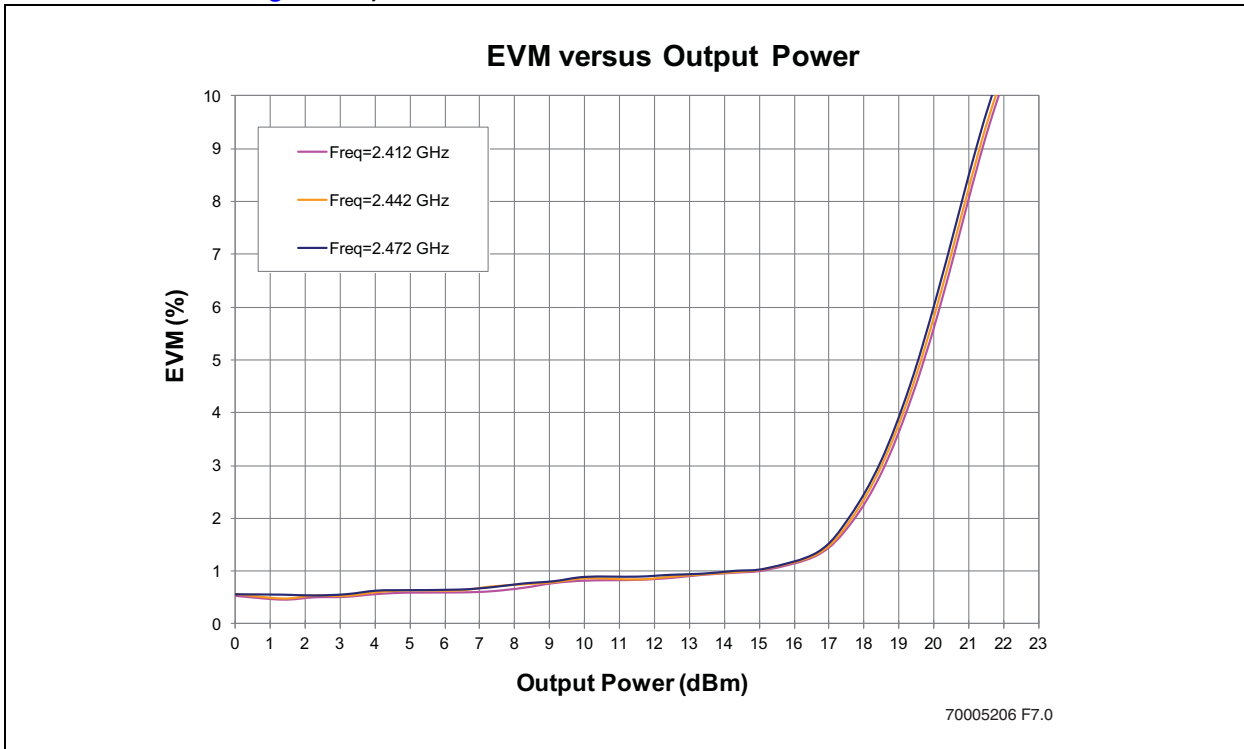
FIGURE 5-8: TYPICAL SCHEMATIC FOR 256 QAM APPLICATIONS
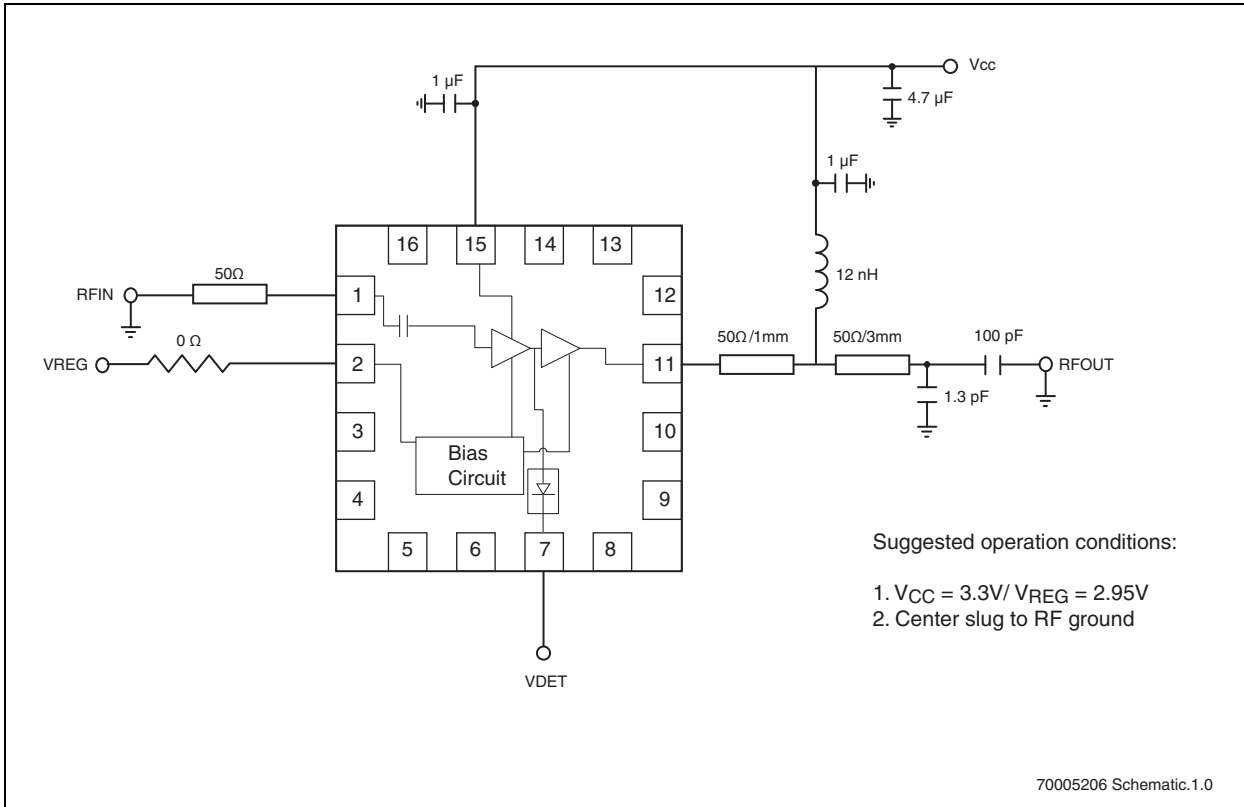
FIGURE 5-9: **SCHEMATIC WITH HARMONIC FILTER FOR 256 QAM APPLICATIONS**

Suggested operation conditions:

1. V_{CC} = 3.3V/ V_{REG} = 2.95V
2. Center slug to RF ground

70005206 Schematic.2.0
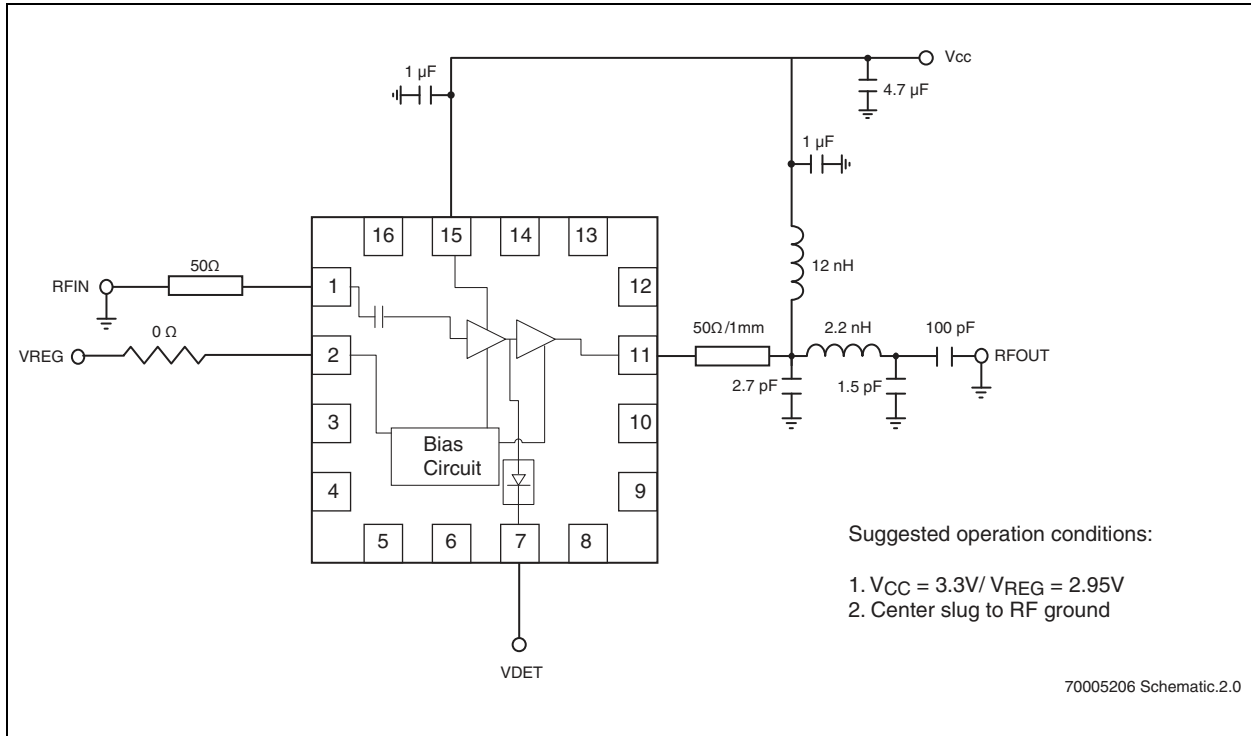
SST12LP22

6.0 PACKAGING DIAGRAMS

16-Lead Ultra Thin Quad Flatpack No-Leads (QUCE/F) - 3x3 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

Pin #1 →

3.00 ± 0.075

3.00 ± 0.075

SIDE VIEW

0.15

0.075

0.05 Max

0.60 / 0.50

BOTTOM VIEW

See notes 2 and 3

1.7

1.7

Pin #1

0.5 BSC

0.45 / 0.35

0.30 / 0.18

1mm
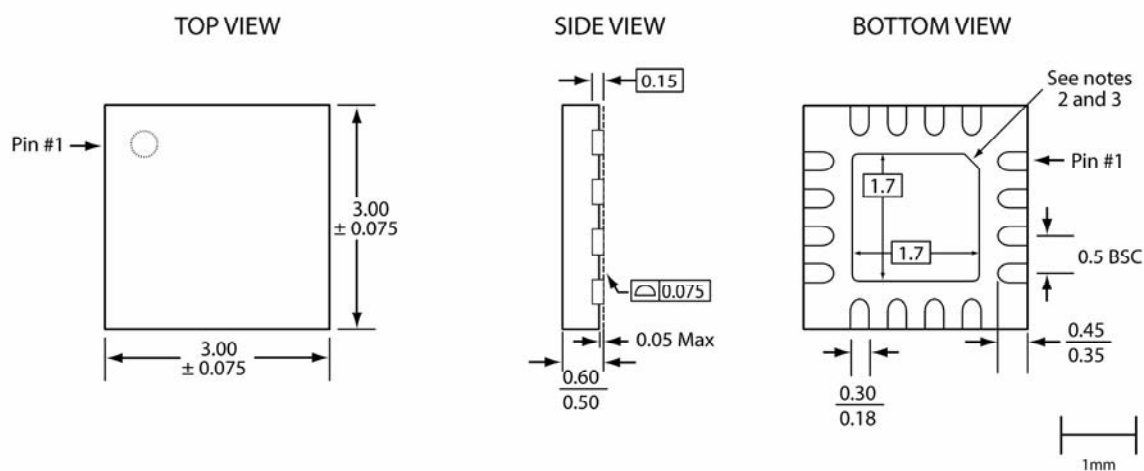
16-uqfn-3x3-QUC-0.0

Note:
1. Complies with JEDEC JEP95 MO-248D, variant UEED-4 except external paddle nominal dimensions.
2. From the bottom view, the pin #1 indicator may be either a 45-degree chamfer or a half-circle notch.
3. The external paddle is electrically connected to the die back-side and possibly to certain VSS leads.
   This paddle can be soldered to the PC board; it is suggested to connect this paddle to the VSS of the unit.
   Connection of this paddle to any other voltage potential can result in shorts and/or electrical malfunction of the device
4. Untoleranced dimensions are nominal target dimensions.
5. All linear dimensions are in millimeters (max/min).

Microchip Technology Drawing C04-14014A Sheet 1 of 1

Preliminary

TABLE 6-1: **REVISION HISTORY**

Revision	Description	Date
A	• Initial release of data sheet	Oct 2014

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7.0   PRODUCT IDENTIFICATION SYSTEM

To order or obtain information, e.g., on pricing or delivery, refer to the factory or the listed sales office.

PART NO.   **XXX**

Device   Package

Device:	SST12LP22	= 2.4 GHz High-Gain, High-Efficiency Power Amplifier
Package:	QUCE	= UQFN (3mm x 3mm), 0.6 max thickness 16-contact
Evaluation Kit Flag	K	= Evaluation Kit

Valid Combinations:

SST12LP22-QUCE
SST12LP22-QUCE-K

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