SST12LP25

2.4 GHz WLAN 11b/g/n/ac, High-Efficiency Power Amplifier

Features

- High Gain:
  - Typically 27 dB gain across 2.4–2.5 GHz, <1.5 dB variation over temperature -20°C to +85°C
- Linear output power:
  - >24 dBm P1dB
    - Please refer to "Absolute Maximum Stress Ratings" on page 5
  - Meets 802.11g OFDM spectrum mask requirement up to 22 dBm
  - Typically 18.5 dBm with <3% EVM, 802.11g, 54 Mbps
  - Typically 18 dBm with <2.5% EVM, 802.11n, MCS7-HT40, 50% duty cycle
  - Meets 802.11b, 1 Mbps, ACPR requirement up to 22 dBm
- High-speed power-up/down
  - Turn on/off time (10%-90%) <100 ns
- 10:1 VSWR survivability (unconditionally stable up to 22 dBm)
- On-chip power detection
  - >20 dB, dB-wise line linear, dynamic range
  - VSWR- and temperature-insensitive
- Simple input/output matching
- Packages available
  - 16-contact UQFN (3mm x 3mm)
    - Pin-to-pin compatible with SST12LP15A
- All non-Pb (lead-free) devices are RoHS compliant

Applications

- WLAN (IEEE 802.11b/g/n)
- WLAN 256 QAM
- AP router
- WiMax (IEEE 802.16e)
- Cordless phones
- 2.4 GHz ISM wireless equipment
- Bluetooth[®]

1.0 PRODUCT DESCRIPTION

SST12LP25 power amplifier (PA) is based on the highly-reliable InGaP/GaAs HBT technology.

This PA can be easily configured for high-power applications with high power-added efficiency while operating over the 2.4-2.5 GHz frequency band. It typically provides 27 dB gain with greater than 36% power-added efficiency @ P_{OUT} = 22 dBm for 802.11g.

SST12LP25 has excellent linearity, typically 18.5 dBm at 3% EVM with 54 Mbps 802.11g operation while meeting 802.11g spectrum mask at 22 dBm. The PA also provides typically 18 dBm at 2.5% EVM with MCS7-HT40 modulation.

The power amplifier IC also features easy board-level usage, high-speed power-up/-down control, and a single-ended power detector which lowers the users' cost for power control.

SST12LP25 is offered in 16-contact UQFN package. See Figure 3-1 for pin assignments and Table 3-1 for pin descriptions.

SST12LP25

TO OUR VALUED CUSTOMERS

It is our intention to provide our valued customers with the best documentation possible to ensure successful use of your Microchip products. To this end, we will continue to improve our publications to better suit your needs. Our publications will be refined and enhanced as new volumes and updates are introduced.

If you have any questions or comments regarding this publication, please contact the Marketing Communications Department via E-mail at **docerrors@microchip.com**. We welcome your feedback.

Most Current Data Sheet

To obtain the most up-to-date version of this data sheet, please register at our Worldwide Web site at:

> **http://www.microchip.com**

You can determine the version of a data sheet by examining its literature number found on the bottom outside corner of any page. The last character of the literature number is the version number, (e.g., DS30000000A is version A of document DS30000000).

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.

To determine if an errata sheet exists for a particular device, please check with one of the following:

- Microchip's Worldwide Web site; **http://www.microchip.com**
- Your local Microchip sales office (see last page)

When contacting a sales office, please specify which device, revision of silicon and data sheet (include literature number) you are using.

Customer Notification System

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

2.0   FUNCTIONAL BLOCKS

FIGURE 2-1:   **FUNCTIONAL BLOCK DIAGRAM**
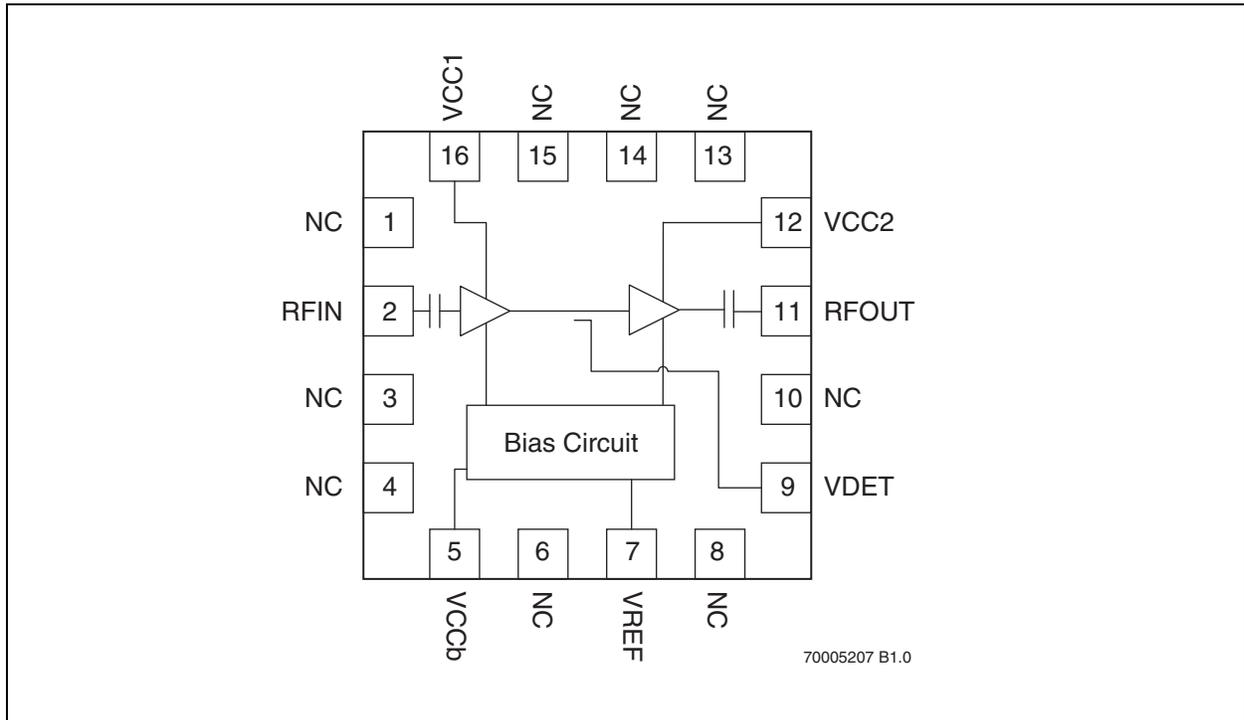
SST12LP25

3.0   PIN ASSIGNMENTS

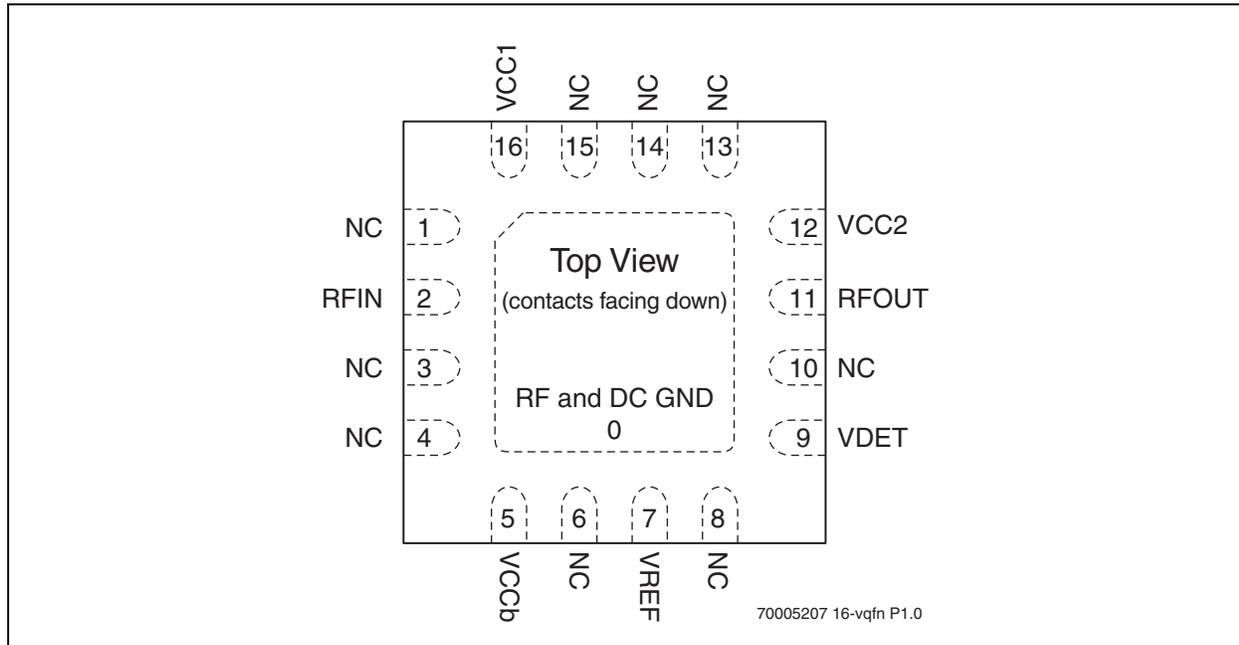**FIGURE 3-1:   PIN ASSIGNMENTS FOR 16-CONTACT UQFN**

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 with several low inductance, low resistance vias.
NC	1	No Connection		Unconnected pin
RFIN	2		I	RF input, DC decoupled
NC	3	No Connection		Unconnected pin
NC	4	No Connection		Unconnected pin
VCCb	5	Power Supply	PWR	Supply voltage for bias circuit
NC	6	No Connection		
VREF	7	Power supply	PWR	Idle-current control
NC	8	No Connection		Unconnected pin
VDET	9			On-chip power detector
NC	10	No Connection		Unconnected pin
RFOUT	11		O	RF output
VCC2	12	Power Supply	PWR	Power supply, 2nd stage
NC	13	No Connection		Unconnected pin
NC	14	No Connection		Unconnected pin
NC	15	No Connection		Unconnected pin
VCC1	16	Power Supply	PWR	Power supply, 1st stage

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 2 (P_{IN}) . . . . +5 dBm
Supply voltage at pins 5,12,and 16 (V_{CC}) . . . .+6 V
Reference voltage to pin 7 (V_{REF}) . . . . +3.2 V
DC supply current (I_{CC}) . . . . 250 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

TABLE 4-1: OPERATING RANGE

Range	Ambient Temp	V_{CC}
Industrial	-20°C to +85°C	5.0V

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		125		mA
	for 802.11b, 22 dBm		125		mA
I_{CQ}	Idle Current for 802.11g to meet EVM<3% @18.5 dBm		52		mA
V_{REG}	Reference Voltage see Figure 5-7 on page 10		2.85	3.0	V
I_{REG}	Reference Current		1		mA

SST12LP25

TABLE 4-3: AC ELECTRICAL CHARACTERISTICS FOR CONFIGURATION AT V_{CC} = 3.3V, V_{REF} = 2.85V, 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		18.5		dBm
	Output power at 2.5% EVM with 802.11n MCS7 HT20		18		dBm
	Output power meeting 802.11g spectral mask		22		dBm
	Output power meeting 802.11n HT40 spectral mask		19.5		dBm
	Output power meeting 802.11b, 1 Mbps spectral mask		22		dBm
G	Power gain for 802.11b/g/n/256 QAM	24.5	27		dB
G_{VAR}	Gain variation over band			±0.5	dB
2f	Second Harmonic at 22 dBm, 802.11b mask compliance		-25		dBm/MHz
	Second Harmonic at 22 dBm[1]		-50		dBm/MHz
3f	Third Harmonic at 22 dBm, 802.11b mask compliance		-35		dBm/MHz
	Third Harmonic at 22 dBm[1]		-50		dBm/MHz

1. With filter match. Figure 5-8 on page 11

5.0   TYPICAL PERFORMANCE CHARACTERISTICS

Test Conditions: V_{CC} = 3.3V, V_{REG} = 2.85V, T_A = 25°C, IEEE 802.11g, 54 Mbps, 50% duty cycle, unless otherwise specified

FIGURE 5-1:   S-PARAMETERS

70005207 F1.0
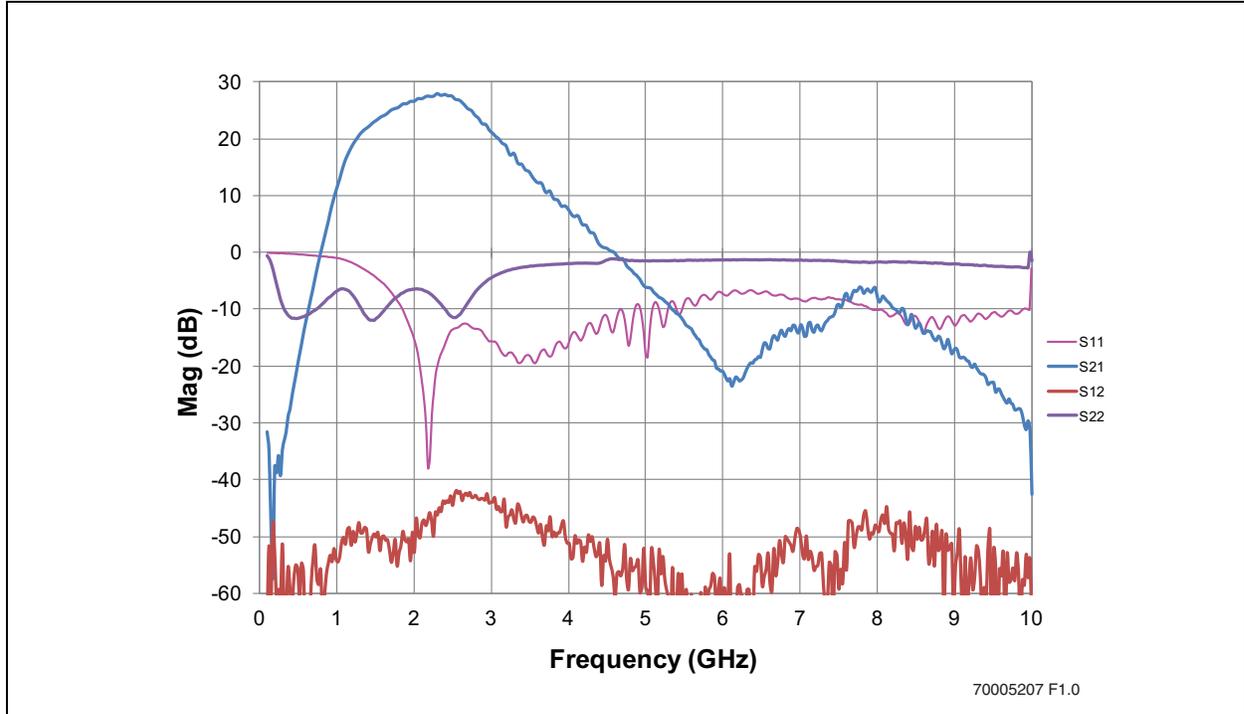
FIGURE 5-2:   DYNAMIC EVM VERSUS OUTPUT POWER

70005207 F2.0

FIGURE 5-3: **DYNAMIC EVM VERSUS OUTPUT POWER, WITH MSCS7-40 MHz**

70005207 F3.0
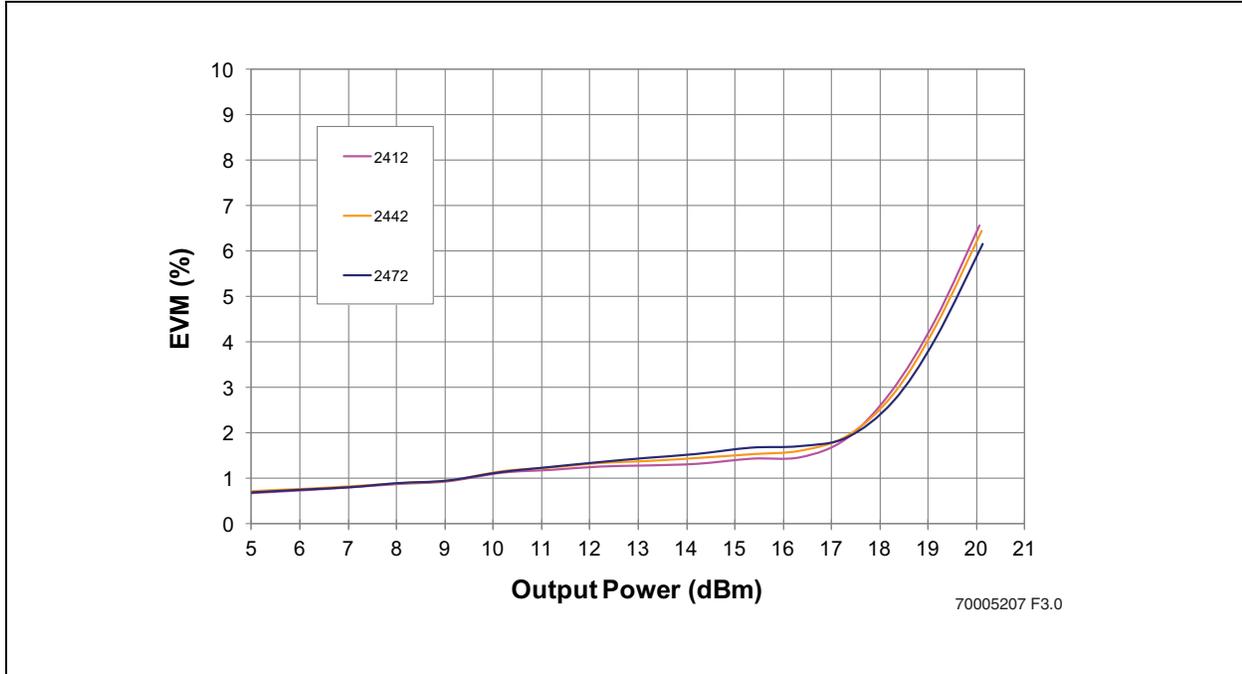
FIGURE 5-4: **POWER GAIN VERSUS OUTPUT POWER**

70005207 F4.0
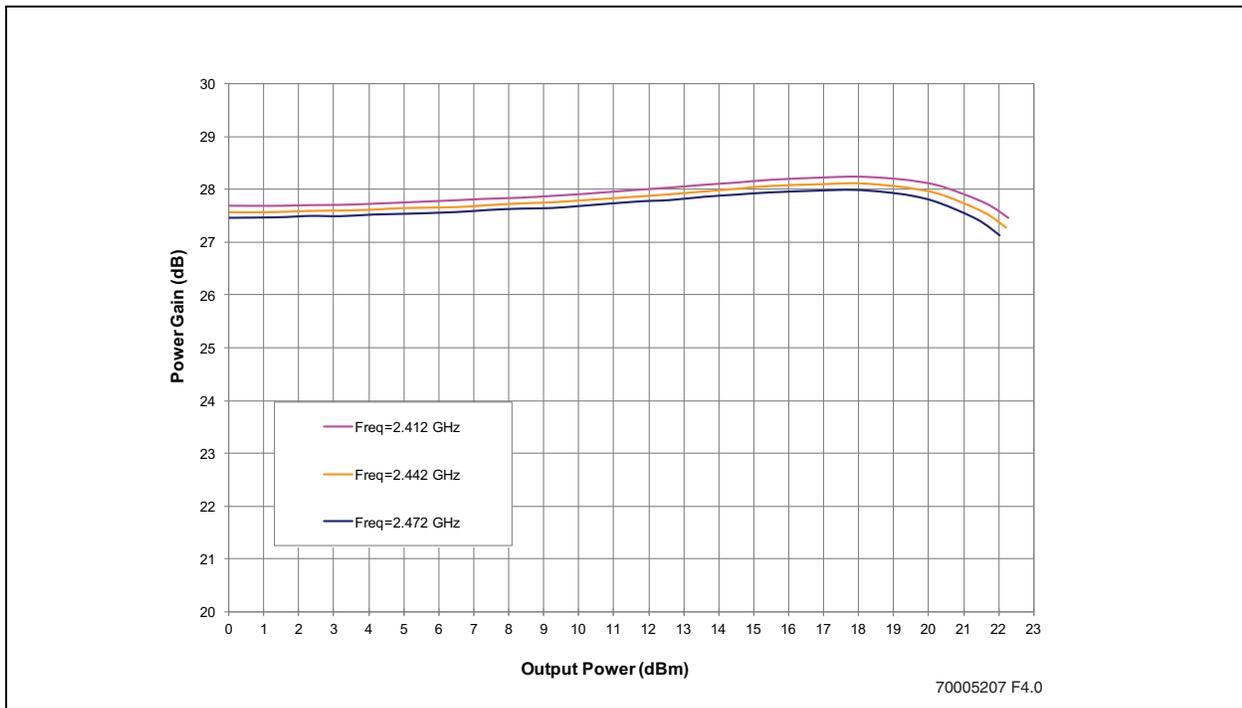
FIGURE 5-5: **SUPPLY CURRENT VERSUS OUTPUT POWER**

70005207 F5.0
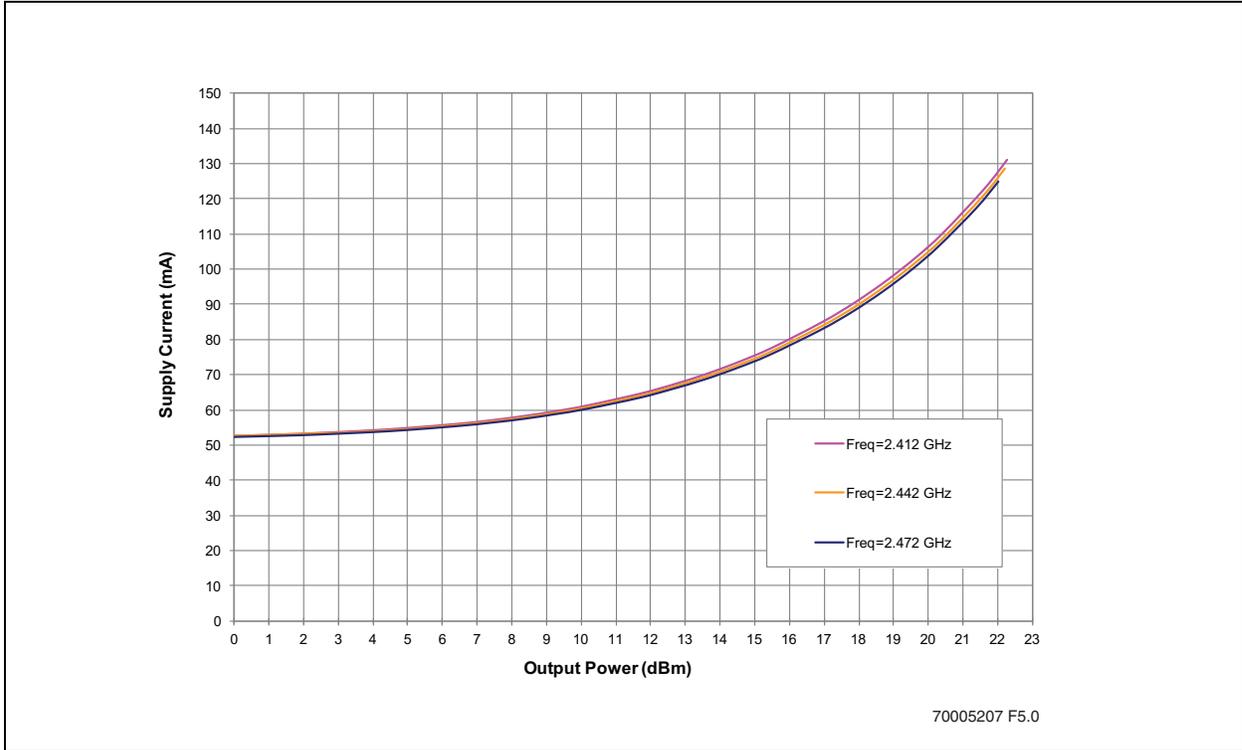
FIGURE 5-6: **DETECTOR CHARACTERISTIC VERSUS OUTPUT POWER**

70005207 F6.0
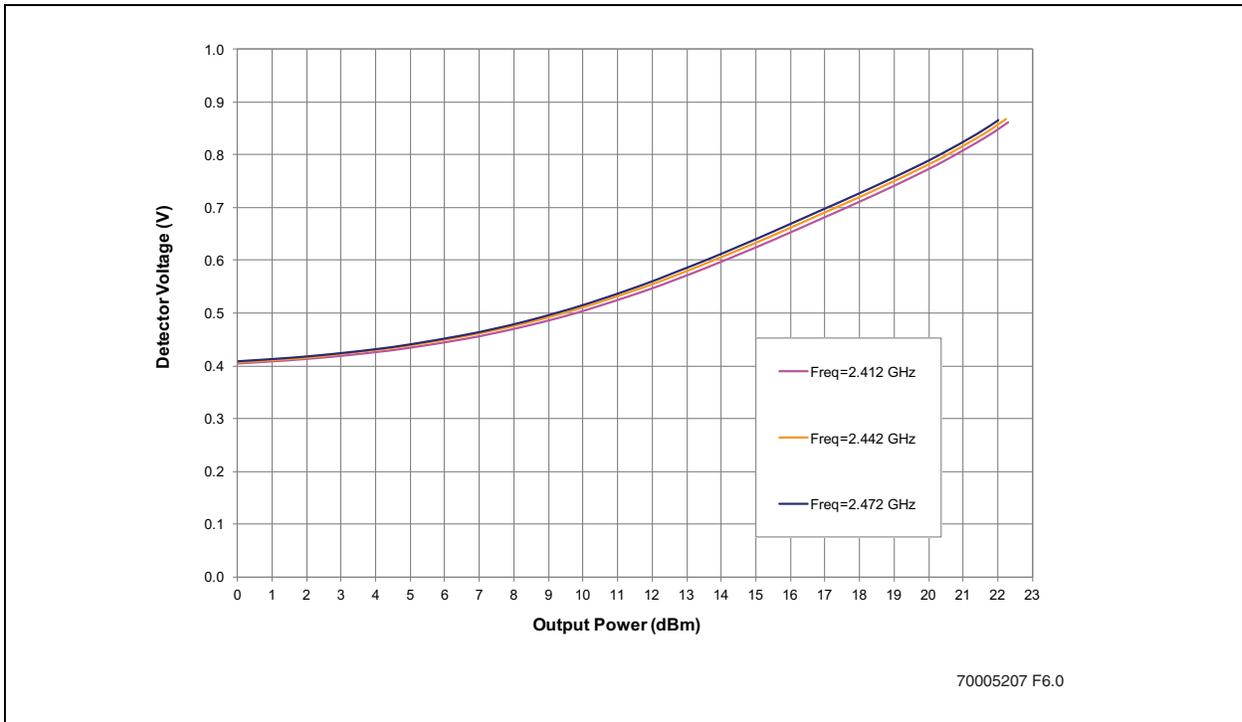
SST12LP25

FIGURE 5-7: **TYPICAL SCHEMATIC**

Suggested operation conditions:

1. V_{CC} = 3.3V
2. Center slug to RF ground
3. VREG=2.85V

70005207 Schematic 1.2
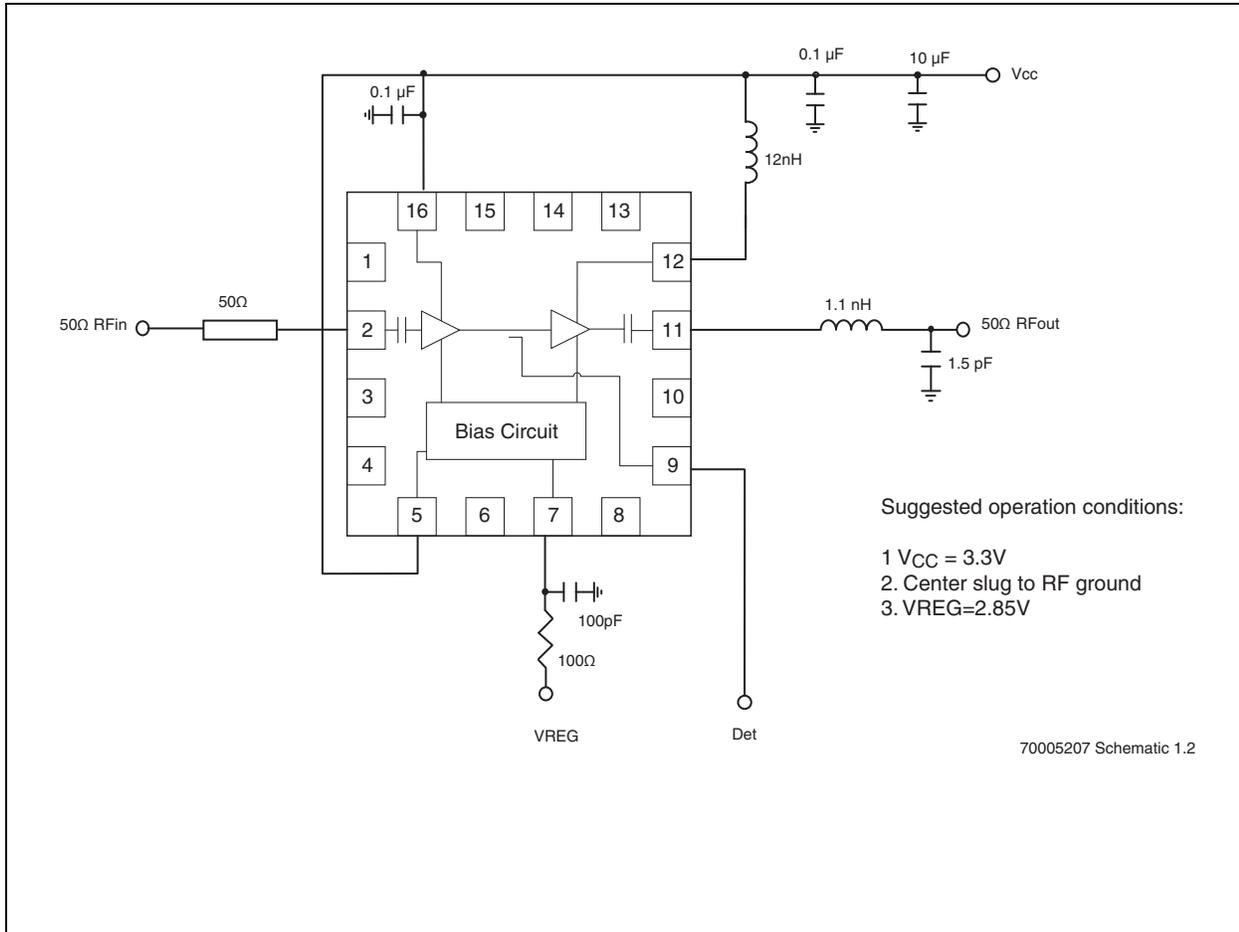
FIGURE 5-8: **TYPICAL SCHEMATIC WITH FILTER MATCH**

Suggested operation conditions:

1 V_{CC} = 3.3V
2. Center slug to RF ground
3. VREG=2.85V

70005207 Schematic 2.1
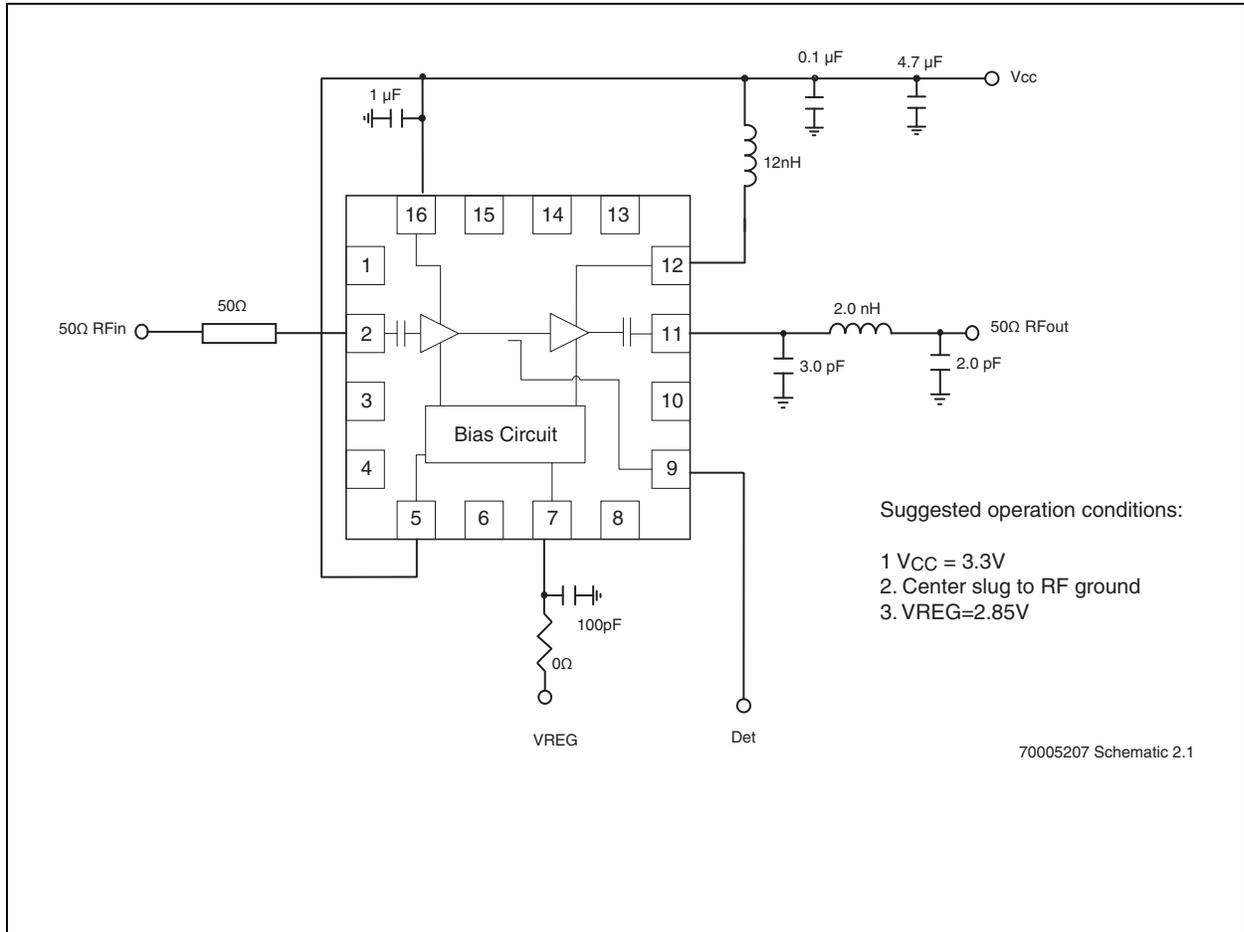
SST12LP25

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
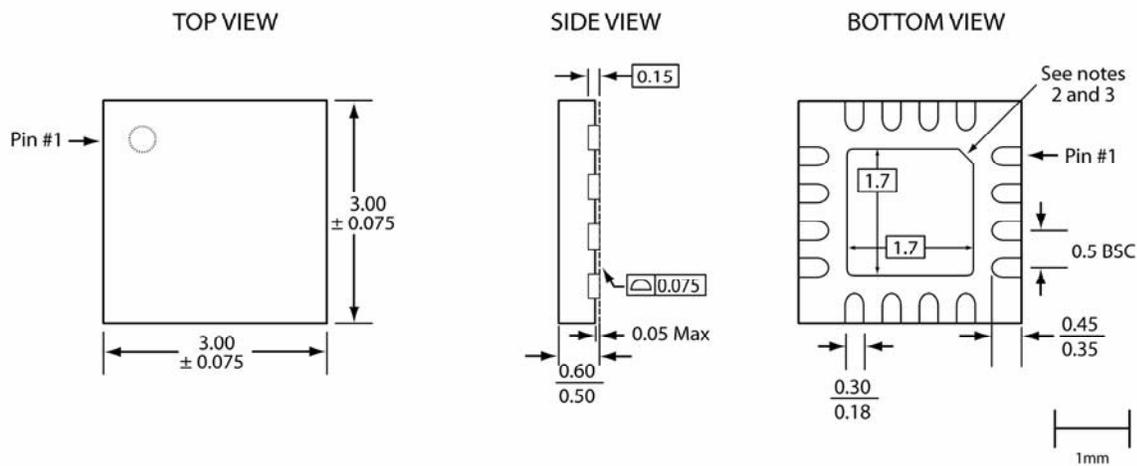
16-uqfn-3x3-QUC-0.0

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

TABLE 6-1:   REVISION HISTORY

Revision	Description	Date
A	• Initial release of data sheet	Jan 2015

HV9910C

THE MICROCHIP WEB SITE

Microchip provides online support via our WWW site at www.microchip.com. This web site is used as a means to make files and information easily available to customers. Accessible by using your favorite Internet browser, the web site contains the following information:

- **Product Support** – Data sheets and errata, application notes and sample programs, design resources, user's guides and hardware support documents, latest software releases and archived software
- **General Technical Support** – Frequently Asked Questions (FAQ), technical support requests, online discussion groups, Microchip consultant program member listing
- **Business of Microchip** – Product selector and ordering guides, latest Microchip press releases, listing of seminars and events, listings of Microchip sales offices, distributors and factory representatives

CUSTOMER CHANGE NOTIFICATION SERVICE

Microchip's customer notification service helps keep customers current on Microchip products. Subscribers will receive e-mail notification whenever there are changes, updates, revisions or errata related to a specified product family or development tool of interest.

To register, access the Microchip web site at www.microchip.com. Under "Support", click on "Customer Change Notification" and follow the registration instructions.

CUSTOMER SUPPORT

Users of Microchip products can receive assistance through several channels:

- Distributor or Representative
- Local Sales Office
- Field Application Engineer (FAE)
- Technical Support

Customers should contact their distributor, representative or Field Application Engineer (FAE) for support. Local sales offices are also available to help customers. A listing of sales offices and locations is included in the back of this document.

Technical support is available through the web site at: http://microchip.com/support

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:	SST12LP25	= 2.4 GHz Power Amplifier
Package:	QUCE	= UQFN (3mm x 3mm), 0.6 max thickness 16-contact
Evaluation Kit Flag	K	= Evaluation Kit

Valid Combinations:

SST12LP25-QUCE
SST12LP25-QUCE-K

Note the following details of the code protection feature on Microchip devices:

• Microchip products meet the specification contained in their particular Microchip Data Sheet.

• Microchip believes that its family of products is one of the most secure families of its kind on the market today, when used in the intended manner and under normal conditions.

• There are dishonest and possibly illegal methods used to breach the code protection feature. All of these methods, to our knowledge, require using the Microchip products in a manner outside the operating specifications contained in Microchip's Data Sheets. Most likely, the person doing so is engaged in theft of intellectual property.

• Microchip is willing to work with the customer who is concerned about the integrity of their code.

• Neither Microchip nor any other semiconductor manufacturer can guarantee the security of their code. Code protection does not mean that we are guaranteeing the product as "unbreakable."

Code protection is constantly evolving. We at Microchip are committed to continuously improving the code protection features of our products. Attempts to break Microchip's code protection feature may be a violation of the Digital Millennium Copyright Act. If such acts allow unauthorized access to your software or other copyrighted work, you may have a right to sue for relief under that Act.

Trademarks

QUALITY MANAGEMENT SYSTEM
CERTIFIED BY DNV
═ ISO/TS 16949 ═

Worldwide Sales and Service

AMERICAS

Corporate Office
2355 West Chandler Blvd.
Chandler, AZ 85224-6199
Tel: 480-792-7200
Fax: 480-792-7277
Technical Support:
http://www.microchip.com/support
Web Address:
www.microchip.com

Atlanta
Duluth, GA
Tel: 678-957-9614
Fax: 678-957-1455

Austin, TX
Tel: 512-257-3370

Boston
Westborough, MA
Tel: 774-760-0087
Fax: 774-760-0088

Chicago
Itasca, IL
Tel: 630-285-0071
Fax: 630-285-0075

Cleveland
Independence, OH
Tel: 216-447-0464
Fax: 216-447-0643

Dallas
Addison, TX
Tel: 972-818-7423
Fax: 972-818-2924

Detroit
Novi, MI
Tel: 248-848-4000

Houston, TX
Tel: 281-894-5983

Indianapolis
Noblesville, IN
Tel: 317-773-8323
Fax: 317-773-5453

Los Angeles
Mission Viejo, CA
Tel: 949-462-9523
Fax: 949-462-9608

New York, NY
Tel: 631-435-6000

San Jose, CA
Tel: 408-735-9110

Canada - Toronto
Tel: 905-673-0699
Fax: 905-673-6509

ASIA/PACIFIC

Asia Pacific Office
Suites 3707-14, 37th Floor
Tower 6, The Gateway
Harbour City, Kowloon
Hong Kong
Tel: 852-2401-1200
Fax: 852-2401-3431

Australia - Sydney
Tel: 61-2-9868-6733
Fax: 61-2-9868-6755

China - Beijing
Tel: 86-10-8569-7000
Fax: 86-10-8528-2104

China - Chengdu
Tel: 86-28-8665-5511
Fax: 86-28-8665-7889

China - Chongqing
Tel: 86-23-8980-9588
Fax: 86-23-8980-9500

China - Hangzhou
Tel: 86-571-8792-8115
Fax: 86-571-8792-8116

China - Hong Kong SAR
Tel: 852-2943-5100
Fax: 852-2401-3431

China - Nanjing
Tel: 86-25-8473-2460
Fax: 86-25-8473-2470

China - Qingdao
Tel: 86-532-8502-7355
Fax: 86-532-8502-7205

China - Shanghai
Tel: 86-21-5407-5533
Fax: 86-21-5407-5066

China - Shenyang
Tel: 86-24-2334-2829
Fax: 86-24-2334-2393

China - Shenzhen
Tel: 86-755-8864-2200
Fax: 86-755-8203-1760

China - Wuhan
Tel: 86-27-5980-5300
Fax: 86-27-5980-5118

China - Xian
Tel: 86-29-8833-7252
Fax: 86-29-8833-7256

China - Xiamen
Tel: 86-592-2388138
Fax: 86-592-2388130

China - Zhuhai
Tel: 86-756-3210040
Fax: 86-756-3210049

ASIA/PACIFIC

India - Bangalore
Tel: 91-80-3090-4444
Fax: 91-80-3090-4123

India - New Delhi
Tel: 91-11-4160-8631
Fax: 91-11-4160-8632

India - Pune
Tel: 91-20-3019-1500

Japan - Osaka
Tel: 81-6-6152-7160
Fax: 81-6-6152-9310

Japan - Tokyo
Tel: 81-3-6880- 3770
Fax: 81-3-6880-3771

Korea - Daegu
Tel: 82-53-744-4301
Fax: 82-53-744-4302

Korea - Seoul
Tel: 82-2-554-7200
Fax: 82-2-558-5932 or
82-2-558-5934

Malaysia - Kuala Lumpur
Tel: 60-3-6201-9857
Fax: 60-3-6201-9859

Malaysia - Penang
Tel: 60-4-227-8870
Fax: 60-4-227-4068

Philippines - Manila
Tel: 63-2-634-9065
Fax: 63-2-634-9069

Singapore
Tel: 65-6334-8870
Fax: 65-6334-8850

Taiwan - Hsin Chu
Tel: 886-3-5778-366
Fax: 886-3-5770-955

Taiwan - Kaohsiung
Tel: 886-7-213-7830

Taiwan - Taipei
Tel: 886-2-2508-8600
Fax: 886-2-2508-0102

Thailand - Bangkok
Tel: 66-2-694-1351
Fax: 66-2-694-1350

EUROPE

Austria - Wels
Tel: 43-7242-2244-39
Fax: 43-7242-2244-393

Denmark - Copenhagen
Tel: 45-4450-2828
Fax: 45-4485-2829

France - Paris
Tel: 33-1-69-53-63-20
Fax: 33-1-69-30-90-79

Germany - Dusseldorf
Tel: 49-2129-3766400

Germany - Munich
Tel: 49-89-627-144-0
Fax: 49-89-627-144-44

Germany - Pforzheim
Tel: 49-7231-424750

Italy - Milan
Tel: 39-0331-742611
Fax: 39-0331-466781

Italy - Venice
Tel: 39-049-7625286

Netherlands - Drunen
Tel: 31-416-690399
Fax: 31-416-690340

Poland - Warsaw
Tel: 48-22-3325737

Spain - Madrid
Tel: 34-91-708-08-90
Fax: 34-91-708-08-91

Sweden - Stockholm
Tel: 46-8-5090-4654

UK - Wokingham
Tel: 44-118-921-5800
Fax: 44-118-921-5820

03/13/14