2.4 GHz High-Linearity Power Amplifier

SST12LP10

Preliminary Specifications

FEATURES:

- **High Gain:**
  - >26 dB gain across 2.4~2.5 GHz over temperature 0°C to +80°C
- **High linear output power:**
  - ~27 dBm P1dB
  - Meets 802.11g OFDM ACPR requirement up to 23 dBm
  - Over 20 dBm linear output with total system EVM<5% for 54 Mbps 802.11g signal
  - Meets 802.11b ACPR requirement up to 24 dBm
- **High power-added efficiency/Low operating current for both 802.11g/b applications**
  - ~19% @ P_{OUT} = 20 dBm for 802.11g
  - ~30% @ P_{OUT} = 24 dBm for 802.11b
- **Ultra-low Reference Current**
  - ~3 mA Total I_{REF}
- **Low idle current**
  - ~60 mA I_{CQ}
- **High-speed power-up/down**
  - Turn on/off time (10%~90%) <100 ns
  - Typical power-up/down delay with driver delay included <200 ns
- **High temperature stability**
  - ~1 dB gain/power variation between 0°C to +80°C
- **Low shut-down current (< 0.1 µA)**
- **Simple input/output matching**
- **Packages available**
  - 16-contact VQFN (3mm x 3mm)
  - Non-Pb (lead-free) packages available

APPLICATIONS:

- **WLAN (IEEE 802.11g/b)**
- **Home RF**
- **Cordless phones**
- **2.4 GHz ISM wireless equipment**

PRODUCT DESCRIPTION

The SST12LP10 is a high-performance power amplifier based on the highly-reliable InGaP/GaAs HBT technology.

The SST12LP10 can be easily configured for high-power, high-efficiency applications with superb power-added efficiency while operating over the 2.4~2.5 GHz frequency band. It provides over 26 dB gain with 19% power-added efficiency @ POUT = 20 dBm for 802.11g and 30% power-added efficiency @ POUT = 24 dBm for 802.11b.

The SST12LP10 has excellent linearity (over 20 dBm linear output with total system EVM<5%) which is essential for 54 Mbps 802.11g operation.

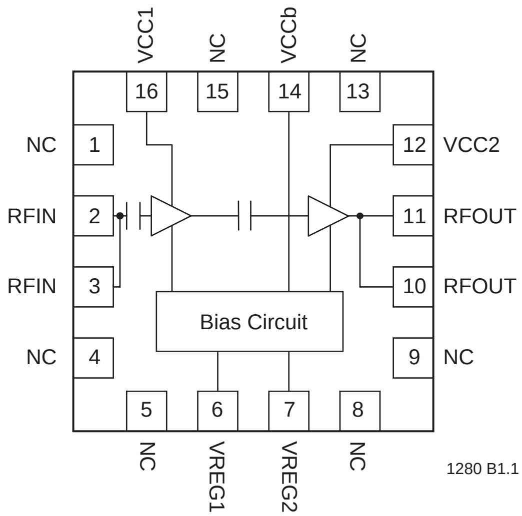
The power amplifier IC also features easy board-level usage along with high-speed power-up/down control and ultra-low reference current (~3 mA). These features coupled with low operating current make the SST12LP10 ideal for the final stage power amplification in battery-powered 802.11g/b WLAN transmitter applications.

The SST12LP10 is offered in 16-contact VQFN package. See Figure 1 for pin assignments and Table 1 for pin descriptions.

Preliminary Specifications

FUNCTIONAL BLOCKS

FUNCTIONAL BLOCK DIAGRAM



PIN ASSIGNMENTS

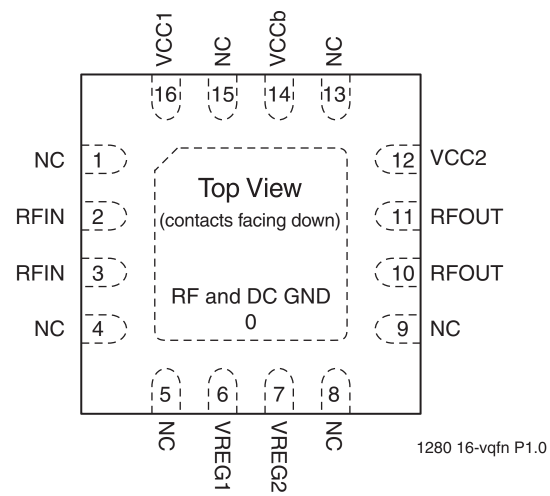


FIGURE 1: PIN ASSIGNMENTS FOR 16-CONTACT VQFN

PIN DESCRIPTIONS

TABLE 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 pins.
RFIN	2		I	RF input, DC decoupled
RFIN	3		I	RF input, DC decoupled
NC	4	No Connection		Unconnected pins.
NC	5	No Connection		Unconnected pins.
VREG1	6		PWR	1st stage idle current control
VREG2	7		PWR	2nd stage idle current control
NC	8	No Connection		Unconnected pins.
NC	9	No Connection		Unconnected pins.
RFOUT	10		O	RF output
RFOUT	11		O	RF output
VCC2	12	Power Supply	PWR	Power supply, 2nd stage
NC	13	No Connection		Unconnected pins.
VCCb	14	Power Supply	PWR	Supply voltage for bias circuit
NC	15	No Connection		Unconnected pins.
VCC1	16	Power Supply	PWR	Power supply, 1st stage

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1. I=Input, O=Output

Preliminary Specifications

ELECTRICAL SPECIFICATIONS

The AC and DC specifications for the power amplifier interface signals. Refer to Table 2 for the DC voltage and current specifications. Refer to Figures 2 through 11 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.)

Input power to pins 2 and 3 (P_{IN}) . . . . +5 dBm
Average output power (P_{OUT}) . . . . +28 dBm
Supply Voltage at pins 12, 14, 16 (V_{CC}) . . . . -0.3V to +4.6V
Reference voltage to pins 6 (V_{REF1}) and pin 7 (V_{REF2}) . . . . -0.3V to +3.6V
DC supply current (I_{CC}) . . . . 500 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: . . . . “with-Pb” units[1]: 240°C for 3 seconds
. . . . “non-Pb” units: 260°C for 3 seconds

1. Certain “with-Pb” package types are capable of 260°C for 3 seconds; please consult the factory for the latest information.

OPERATING RANGE

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

TABLE 2: DC ELECTRICAL CHARACTERISTICS

Symbol	Parameter	Min.	Typ	Max.	Unit	Test Conditions
V_{CC}	Supply Voltage at pins 12, 14, 16	3.0	3.3	4.2	V	
I_{CC}	Supply Current					
	for 802.11g, 20 dBm		160		mA	
	for 802.11g, 23 dBm		230		mA	
	for 802.11b, 24 dBm		270		mA	
I_{CQ}	Idle Current					
	for both 802.11b/g to meet EVM @ 20.5 dBm		70		mA	
	for only 802.11b to meet ACPR @ 22 dBm		50		mA	
I_{OFF}	Shut down current		<0.1		µA	
V_{REG1}	Reference Voltage for 1st Stage, without drop resistor		2.70		V	
V_{REG2}	Reference Voltage for 2nd Stage, without drop resistor		2.70		V	

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TABLE 3: AC ELECTRICAL CHARACTERISTICS FOR CONFIGURATION

Symbol	Parameter	Min.	Typ	Max.	Unit
f_{L-U}	Frequency range	2400		2500	MHz
P_{OUT}	Output power				
	@ PIN = -4 dBm 11b signals	22			dBm
	@ PIN = -2 dBm 11b signals	24			dBm
	@ PIN = -8 dBm 11g signals	18			dBm
	@ PIN = -6 dBm 11g signals	20			dBm
G	Small signal gain	26			dB
G_{VAR1}	Gain variation over band (2400~2485 MHz)			1	dB
G_{VAR2}	Gain ripple over channel (20 MHz)		0.2		dB
ACPR	Meet 11b spectrum mask		24		dBm
	Meet 11g OFDM 54 MBPS spectrum mask		23		dBm
Added EVM	@ 20.5 dBm output with 11g OFDM 54 MBPS signal		3	3.5	%
2f, 3f, 4f, 5f	Harmonics at 22 dBm, without trapping capacitors			<-40	dBc

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Preliminary Specifications

TYPICAL PERFORMANCE CHARACTERISTICS
TEST CONDITIONS: V_{CC} = 3.3V, T_A = 25°C

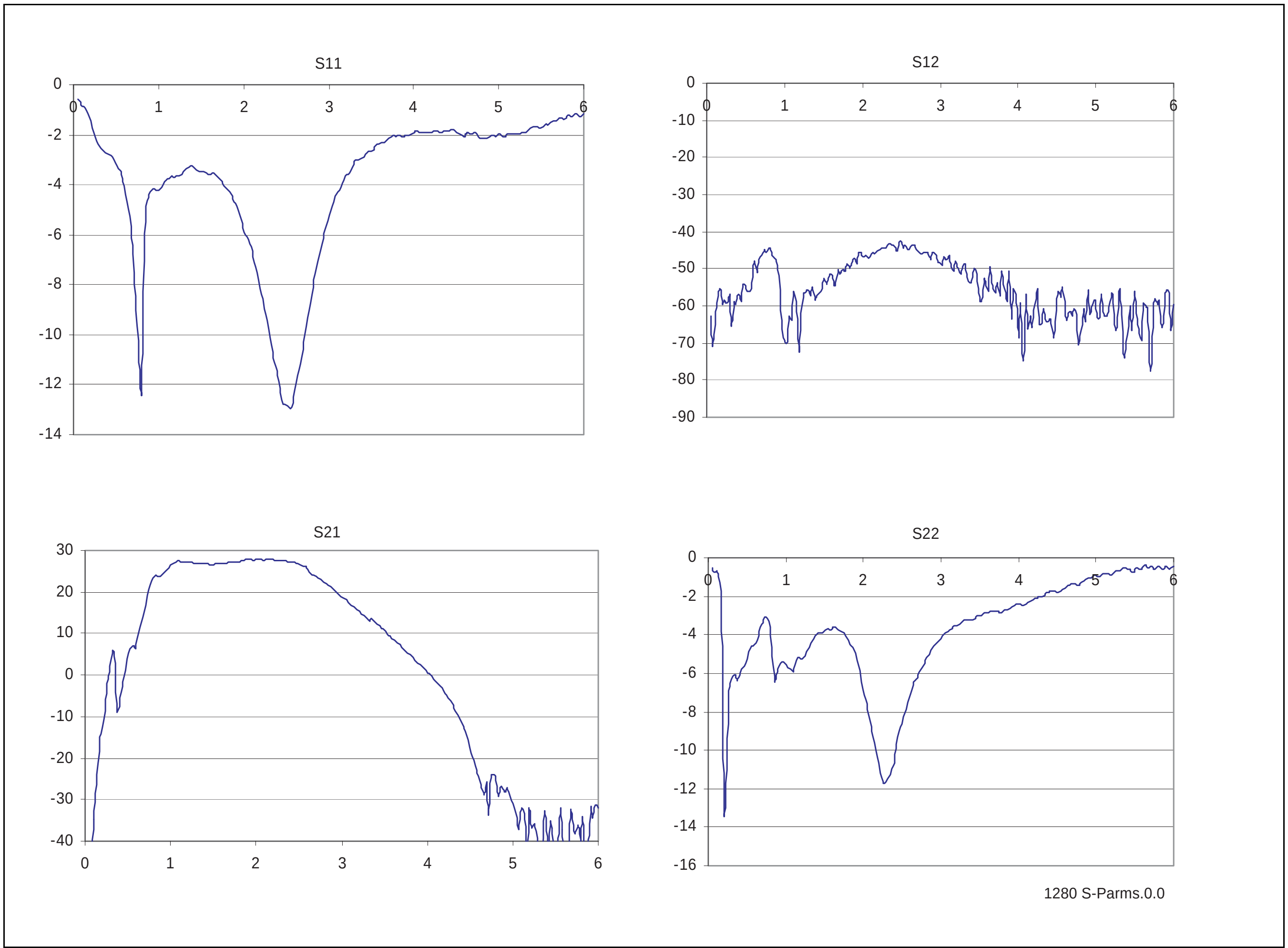


FIGURE 2: S-PARAMETERS

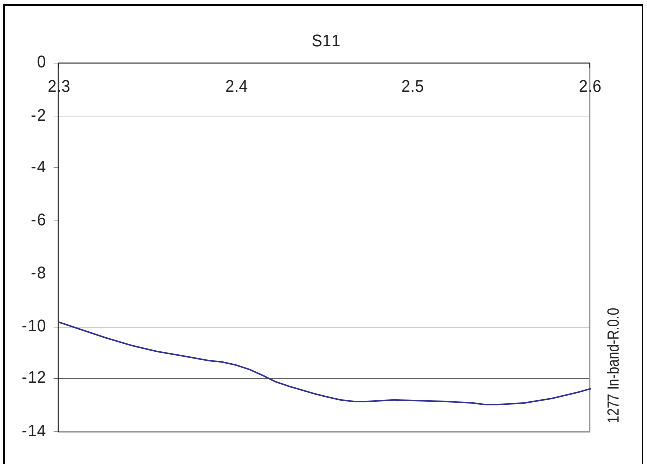


FIGURE 3: IN-BAND RETURN LOSS

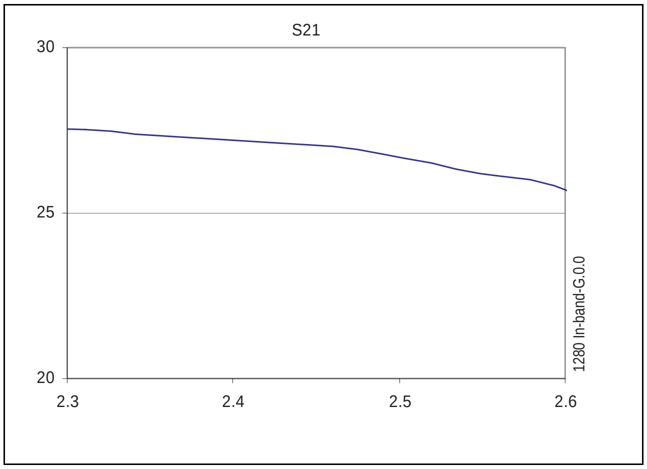


FIGURE 4: IN-BAND GAIN FLATNESS

TWO-TONE MEASUREMENTS

TEST CONDITIONS: V_{CC} = 3.3V, T_A = 25°C, F1 = 2.45 GHz, F2 = 2.451 GHz

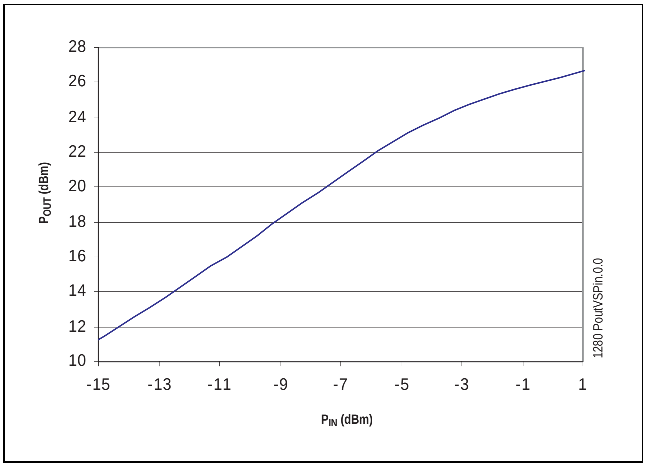


FIGURE 5: RF OUTPUT POWER

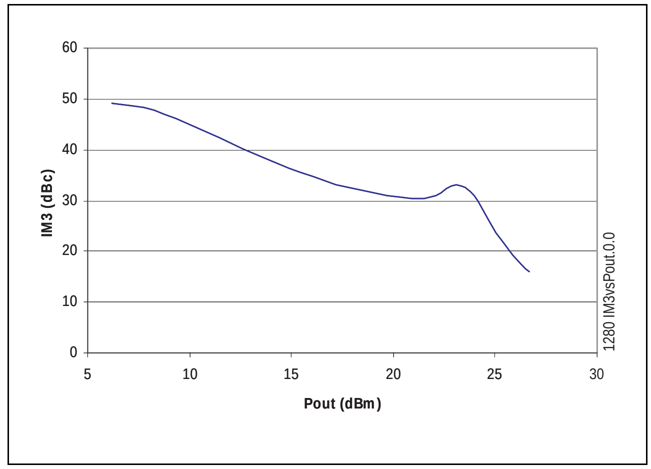


FIGURE 8: IM3 VS P_{OUT}

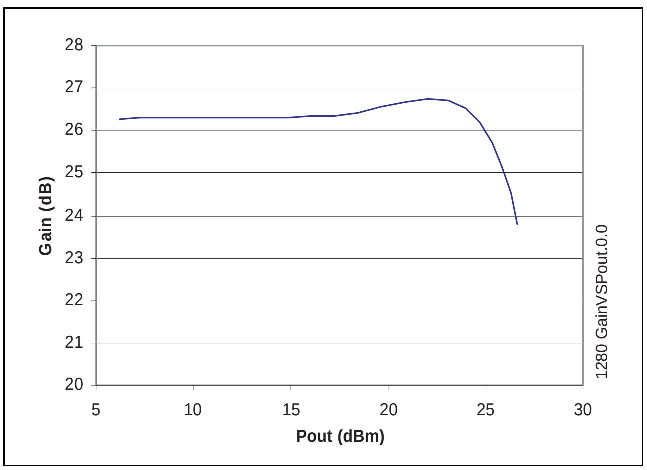


FIGURE 6: GAIN VS P_{OUT}

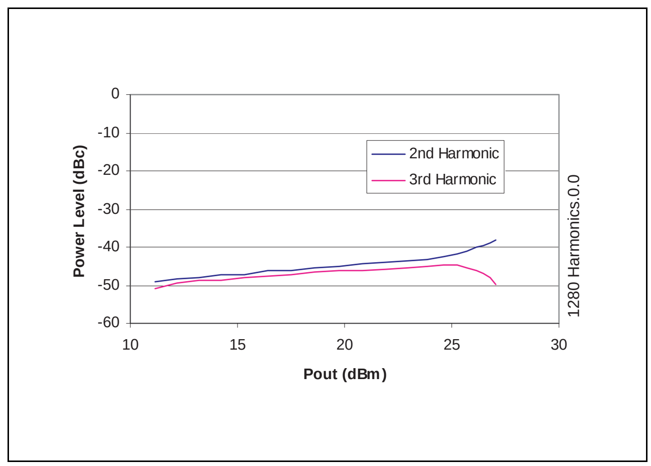


FIGURE 9: HARMONICS

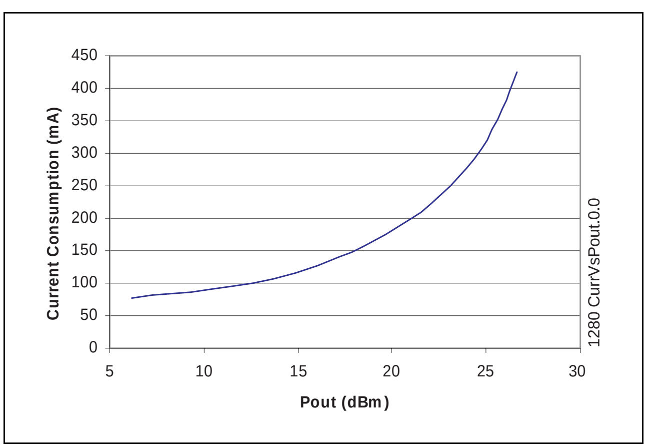
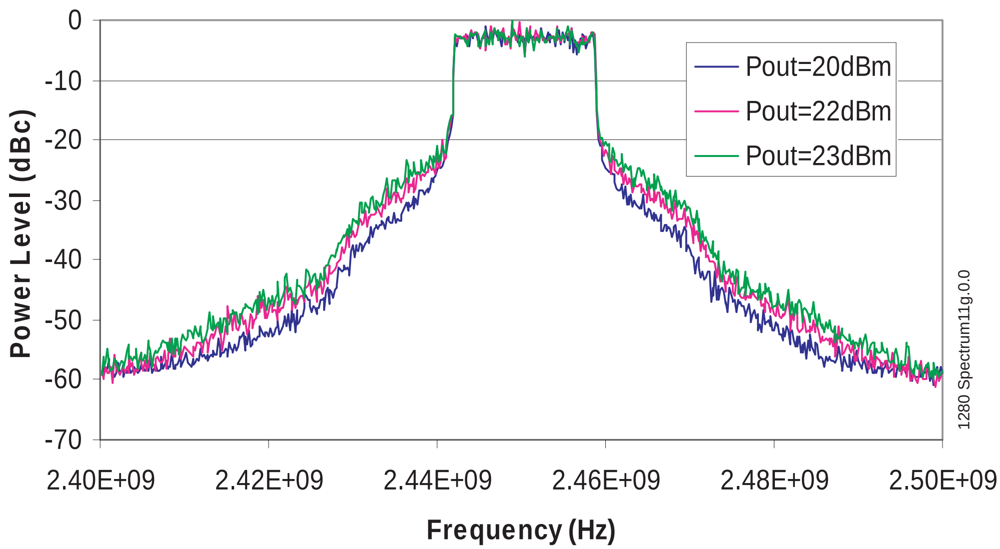


FIGURE 7: I_{CC} VS P_{OUT}

Preliminary Specifications

TYPICAL PERFORMANCE CHARACTERISTICS

TEST CONDITIONS: V_{CC} = 3.3V, T_A = 25°C, F = 2.45 GHZ WHEN NOT SPECIFIED



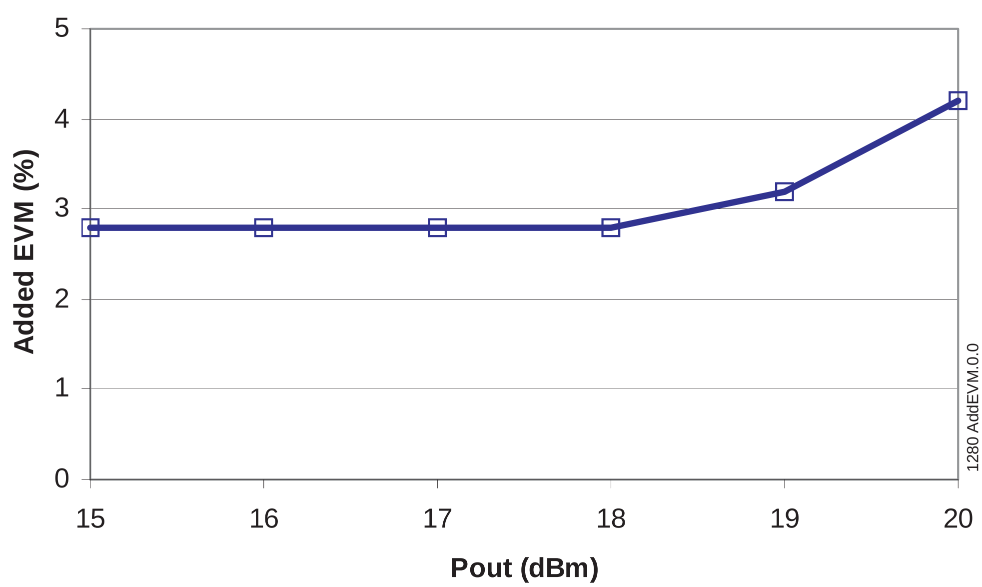


FIGURE 10: 802.11G SPECTRUM AT 20/22/23 DBM, ADDED EVM @ 2.45 GHZ

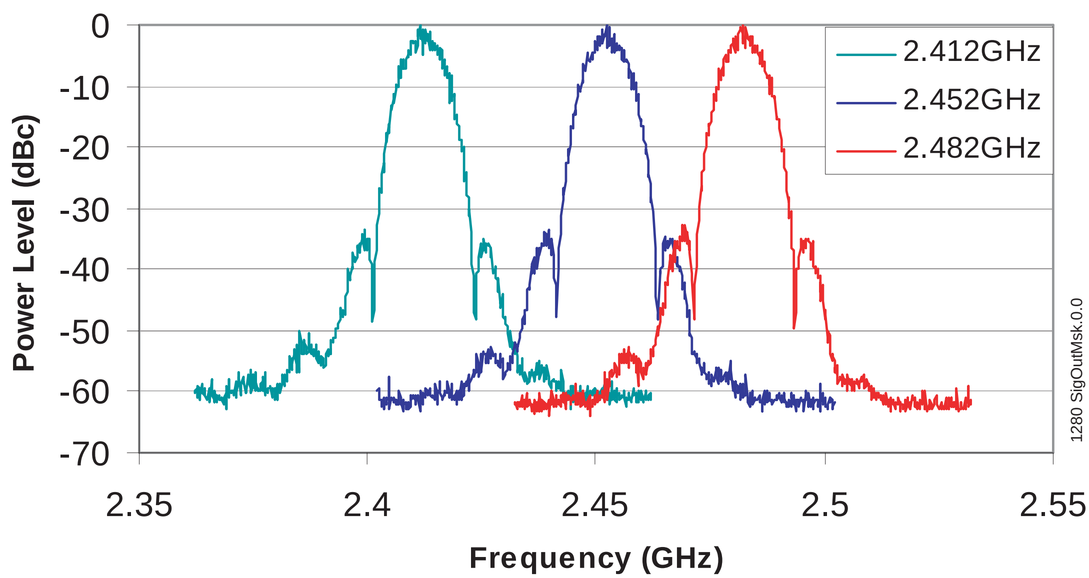


FIGURE 11: 802.11B SIGNAL OUTPUT MASK AT 24 DBM

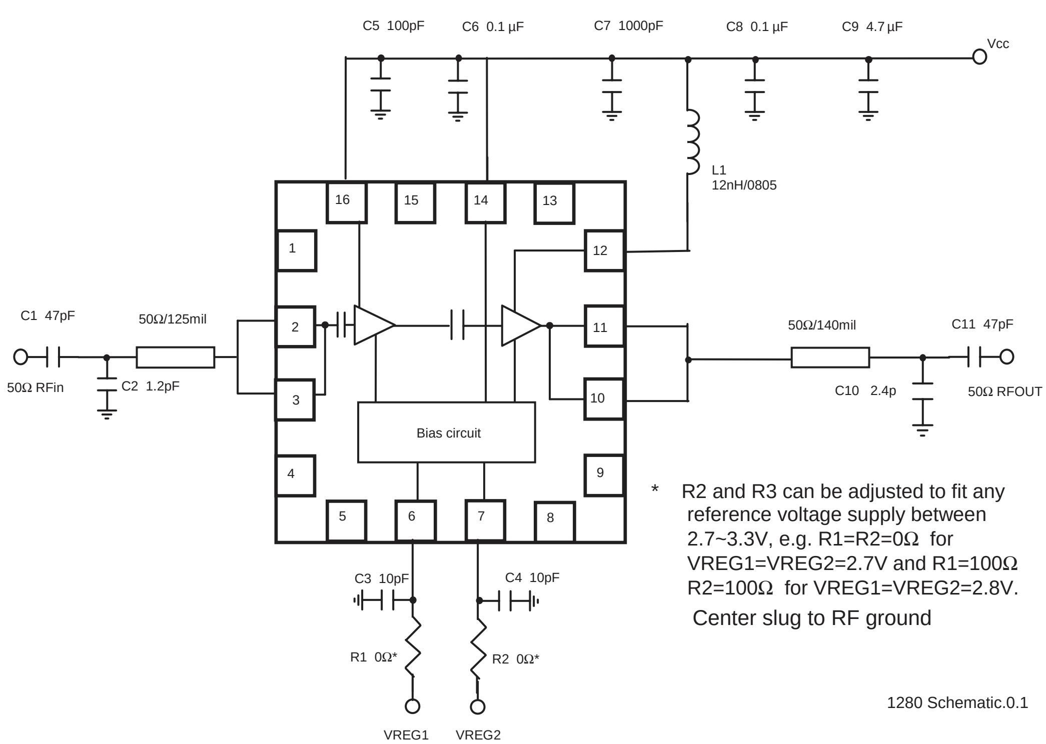


FIGURE 12: TYPICAL SCHEMATIC FOR HIGH-POWER, HIGH-EFFICIENCY 802.11B/G APPLICATIONS

Preliminary Specifications

PRODUCT ORDERING INFORMATION

SST12LP 10 - QVC E
SSTxxLP xx - XXX X

Environmental Attribute
E[1] = non-Pb contact (lead) finish

Package Modifier
C = 16 contact

Package Type
QV = VQFN

Product Family Identifier

Product Type
P = Power Amplifier

Voltage
L = 3.0-3.6V

Frequency of Operation
2 = 2.4 GHz

Product Line
1 = SST Communications

1. Environmental suffix “E” denotes non-Pb solder.
SST non-Pb solder devices are “RoHS Compliant”.

Valid combinations for SST12LP10

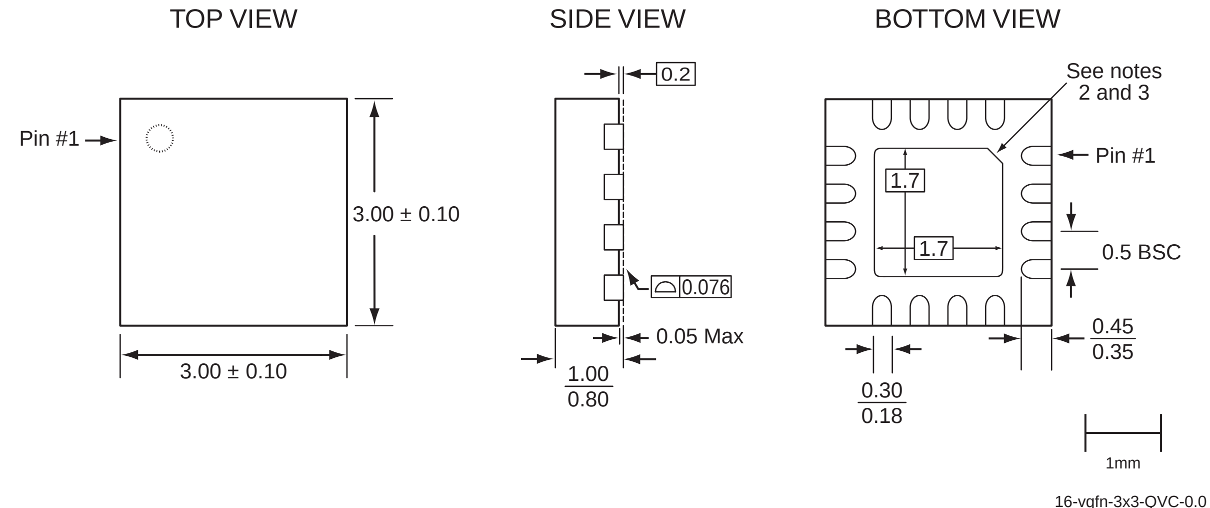
SST12LP10-QVC
SST12LP10-QVCE

SST12LP10 Evaluation Kits

SST12LP10-QVC-K
SST12LP10-QVCE-K

Note: Valid combinations are those products in mass production or will be in mass production. Consult your SST sales representative to confirm availability of valid combinations and to determine availability of new combinations.

PACKAGING DIAGRAMS



Note: 1. Complies with JEDEC JEP95 MO-220I, variant VEED 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 V_{SS} leads. This paddle can be soldered to the PC board; it is suggested to connect this paddle to the V_{SS} 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).

16-CONTACT VERY-THIN QUAD FLAT NO-LEAD (VQFN)
SST PACKAGE CODE: QVC

TABLE 4: REVISION HISTORY

Revision	Description	Date
00	• S71280: SST conversion of data sheet GP1210	Jan 2005

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