2.4 GHz High-Power and High-Gain Power Amplifier

SST12CP11

Data Sheet

SST12CP11 is a high-power and high-gain power amplifier (PA) based on the highly-reliable InGaP/GaAs HBT technology.This PA can be easily configured for high-power applications with good power-added efficiency while operating over the 2.4-2.5 GHz frequency band. It can also be configured to operate at 1.8 GHz for Pico Cell applications. SST12CP11 typically provides 33 dB gain and has excellent linearity, typically ~3% EVM at 25 dBm output power at 54 Mbps 802.11g operation while meeting 802.11g spectrum mask at 28.5 dBm. The power amplifier IC includes an output power detector that has a wide dynamic range and is VSWR-insensitive. SST12CP11 features easy board-level usage along with high-speed power-up/-down control and is offered in 16-contact VQFN package.

Features

- **High Gain:**
  - Typically 33 dB gain across 2.4–2.5 GHz over temperature -40°C to +85°C
- **High linear output power:**
  - >30 dBm P1dB
    - Please refer to “Absolute Maximum Stress Ratings” on page 5
  - Meets 802.11g OFDM spectrum mask requirement up to 28.5 dBm
  - EVM~3% up to 25 dBm for 54 Mbps 802.11g signal
  - 2.5% EVM up to 23.5 dBm, 802.11n, HT40
  - 1.75% EVM up to 21.5 dBm, 802.11ac MCS8
  - Meets 802.11b ACPR requirement up to 28.5 dBm
- **High-speed power-up/down**
  - Turn on/off time (10%-90%) <100 ns
- **10:1 VSWR survivability (unconditionally stable up to 28.5 dBm)**
- **On-chip power detection**
  - 20 dB dynamic range
  - VSWR- and temperature-insensitive
- **Simple input/output matching**
- **Packages available**
  - 16-contact VQFN (3mm x 3mm)
- **All non-Pb (lead-free) devices are RoHS compliant**

Applications

- **WLAN (IEEE 802.11b/g/n)**
- **AP router**
- **WiMax (IEEE 802.16e)**
- **Home RF**
- **Cordless phones**
- **2.4 GHz ISM wireless equipment**
- **1.8 GHz Pico Cell**

©2013 Silicon Storage Technology, Inc.

Microchip Proprietary Information

Product Description

SST12CP11 is a high-power and high-gain power amplifier (PA) 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 33 dB gain with 15% power-added efficiency @ P_{OUT} = 25 dBm for 802.11g.

SST12CP11 has excellent linearity, typically 3% added EVM at 25 dBm output power with 54 Mbps 802.11g operation while meeting 802.11g spectrum mask at 28.5 dBm. SST12CP11 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.

SST12CP11 is offered in 16-contact VQFN package. See Figure 2 for pin assignments and Table 1 for pin descriptions.

©2013 Silicon Storage Technology, Inc.

Microchip Proprietary Information

Functional Blocks

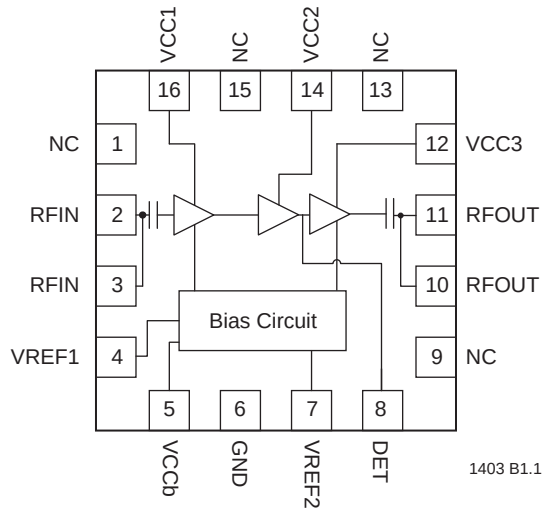


Figure 1: Functional Block Diagram

Microchip Proprietary Information

Pin Assignments

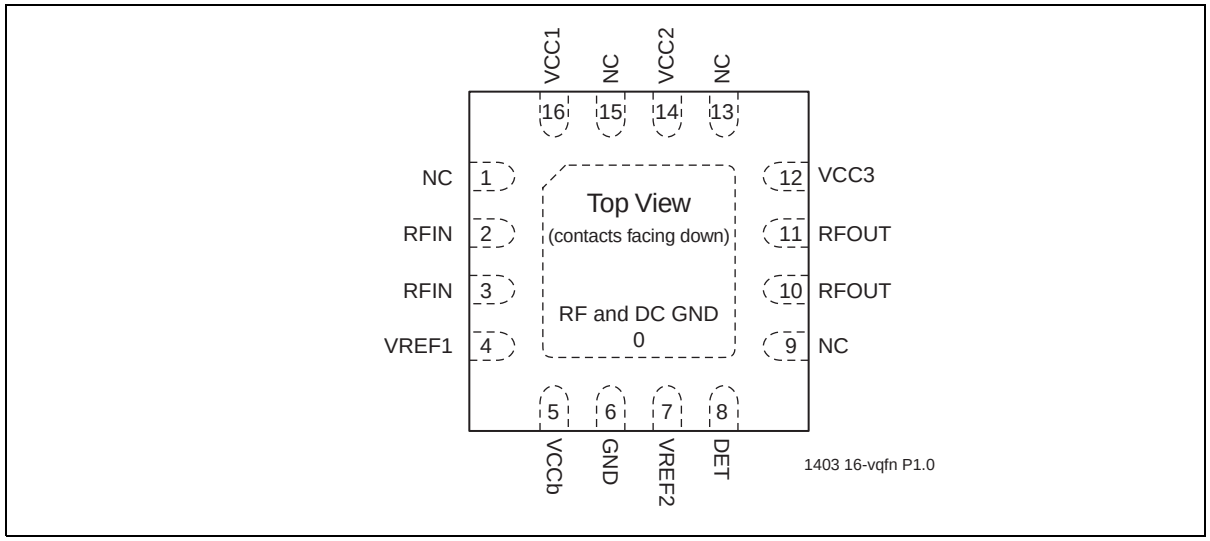


Figure 2: Pin Assignments for 16-contact VQFN

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
VREF1	4	Power Supply	PWR	1st stage, idle-current control
VCCb	5	Power Supply	PWR	Supply voltage for bias circuit
GND	6	Ground		
VREF2	7	Power supply	PWR	2nd and 3rd stage, idle-current control
Det	8		O	On-chip power detector
NC	9	No Connection		Unconnected pins.
RFOUT	10		O	RF output
RFOUT	11		O	RF output
VCC3	12	Power Supply	PWR	Power supply, 3rd stage
NC	13	No Connection		Unconnected pins.
VCC2	14	Power Supply	PWR	Power supply, 2nd stage
NC	15	No Connection		Unconnected pins.
VCC1	16	Power Supply	PWR	Power supply, 1st stage

T1.0 75054

1. I=Input, O=Output

Microchip Proprietary Information

Electrical Specifications

The AC and DC specifications for the power amplifier interface signals. Refer to Table 3 for the DC voltage and current specifications. Refer to Figures 3 through 21 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}) . . . . . -3 dBm
Supply Voltage at pins 5, 12, 14, 16 (V_{CC}) . . . . . +5.5V
Reference voltage to pins 4 (V_{REF1}) and pin 7 (V_{REF2}) . . . . . +3.1V
DC supply current (I_{CC}) . . . . . 650 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 2: Operating Range

Range	Ambient Temp	V_{CC}
Industrial	-40°C to +85°C	5.0V

T2.1 75054

Table 3: DC Electrical Characteristics at 25ºC

Symbol	Parameter	Min.	Typ	Max.	Unit
V_{CC}	Supply Voltage at pins 5, 12, 14, 16	4.0	5.0	5.25	V
I_{CC}	Average Current				
	for 802.11g, 28.5 dBm		570		mA
	for 802.11b, 28.5 dBm		575		mA
I_{CQ}	Idle current for 802.11g to meet EVM<3% @24.5 dBm		230		mA
V_{REG}	1st reference voltage with 56Ω resistor and 2nd / 3rd reference voltage with 6.2Ω resistor	2.85	2.9	3.0	V

T3.1 75054

Microchip Proprietary Information

Table 4: AC Electrical Characteristics for Configuration at 25ºC

Symbol	Parameter	Min.	Typ	Max.	Unit
F_{L-U}	Frequency range in 802.11b/g applications (see Figure 22)	2400		2500	MHz
P_{OUT}	Output power at 3% EVM with 802.11g OFDM at 54 Mbps		25		dBm
	Output power at 2.5% EVM with 802.11n HT40		23.5		dBm
	Output power at 1.75% EVM with 802.11ac MCS8		21.5		dBm
	Output power meeting 802.11g spectral mask		28		dBm
	Output power meeting 802.11n HT40 spectral mask		24.5		dBm
	Output power meeting 802.11ac spectral mask		24		dBm
	Output power meeting 802.11b spectral mask		28.5		dBm
G	Power gain for 802.11b/g	32	34		dB
	Power gain for 802.11n		33		dB
	Power Gain for 802.11ac		30		dB
G_{VAR}	Gain variation over each band (2500 MHz)			±0.5	dB
2f	Harmonics at 28 dBm, 802.11b mask compliance		-21		dBm/MHz
2f	Harmonics at 24.5 dBm		-38		dBm/MHz

T4.2 75054

©2013 Silicon Storage Technology, Inc.

Microchip Proprietary Information

Typical Performance Characteristics

Test Conditions: V_{CC} = 5.0V, V_{REG} = 2.9V, T_A = 25°C Unless otherwise specified

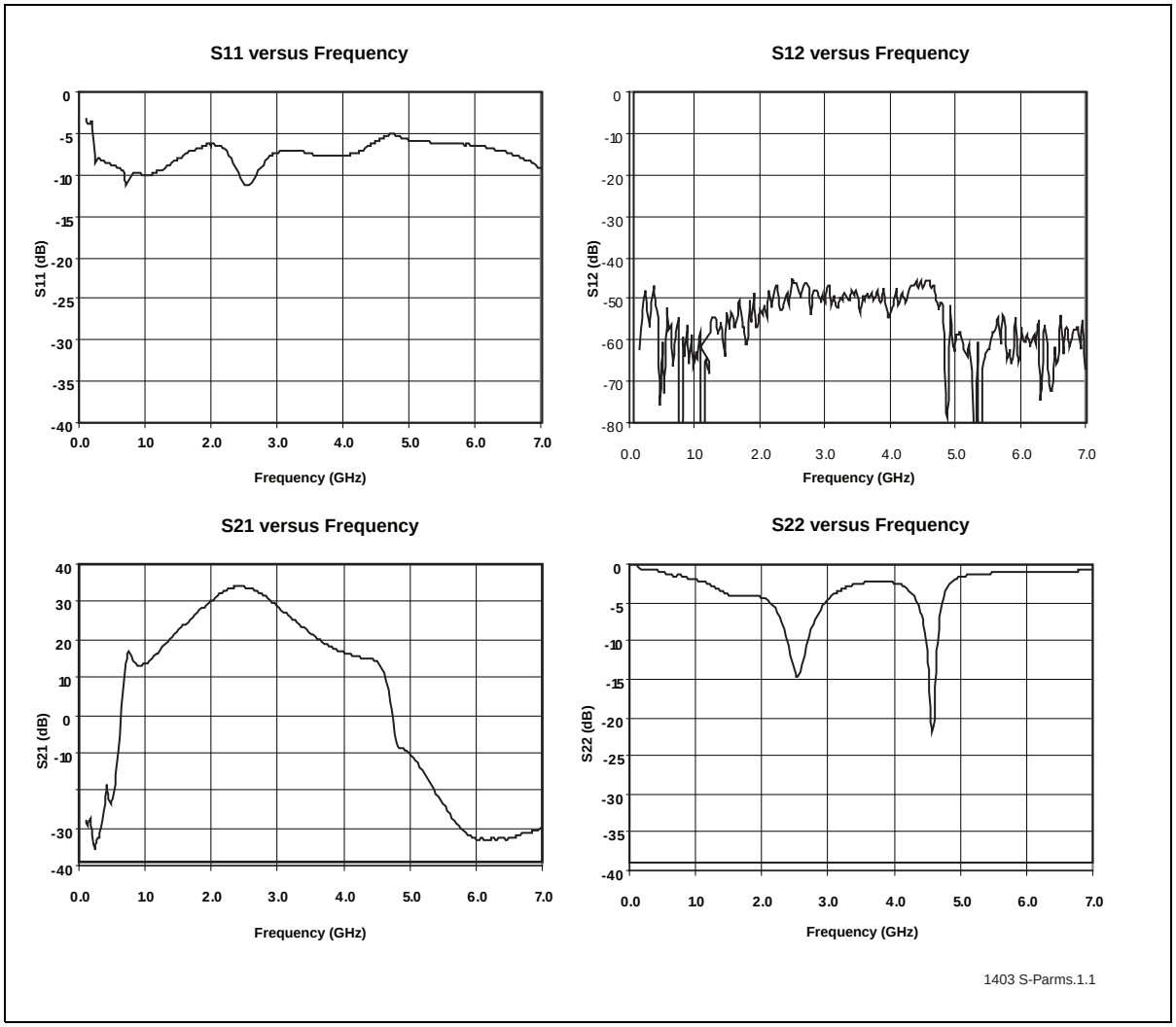


Figure 3: S-Parameters

Microchip Proprietary Information

802.11ac Applications

Typical Performance Characteristics

Test Conditions: V_{CC} = 5.0V, V_{REG} = 3.20V, T_A = 25°C, MCS8 signal, unless otherwise specified

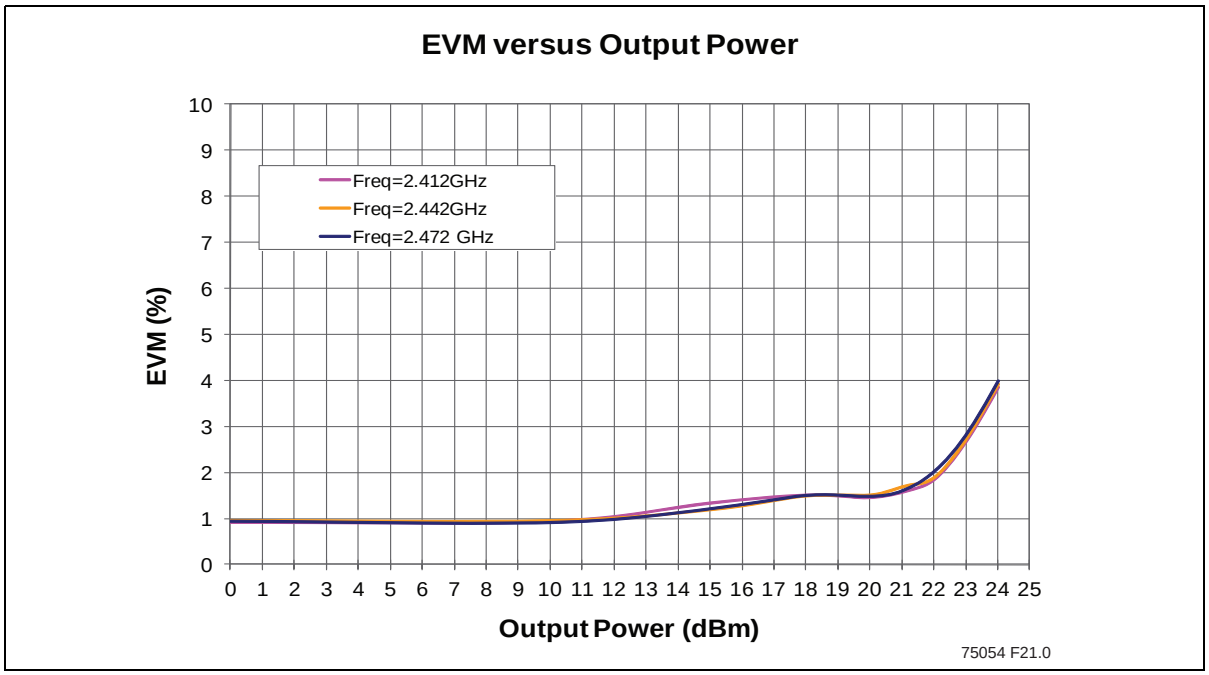


Figure 4: EVM versus Output Power

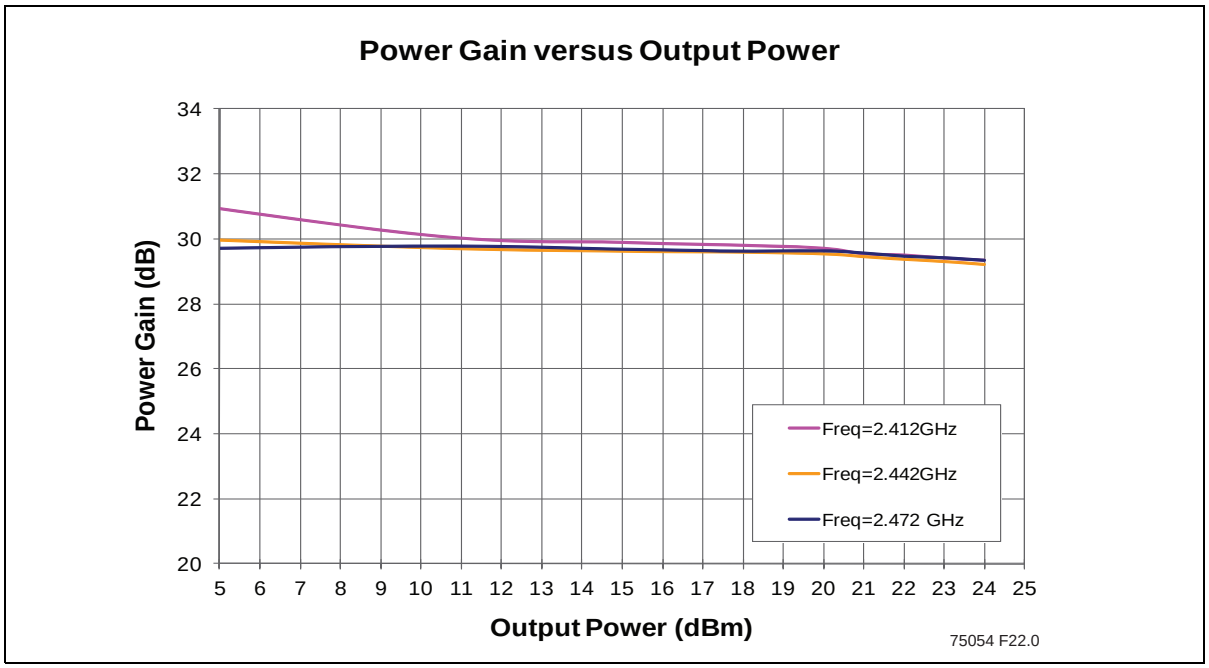


Figure 5: Power Gain versus Output Power

Microchip Proprietary Information

802.11ac Applications (continued)

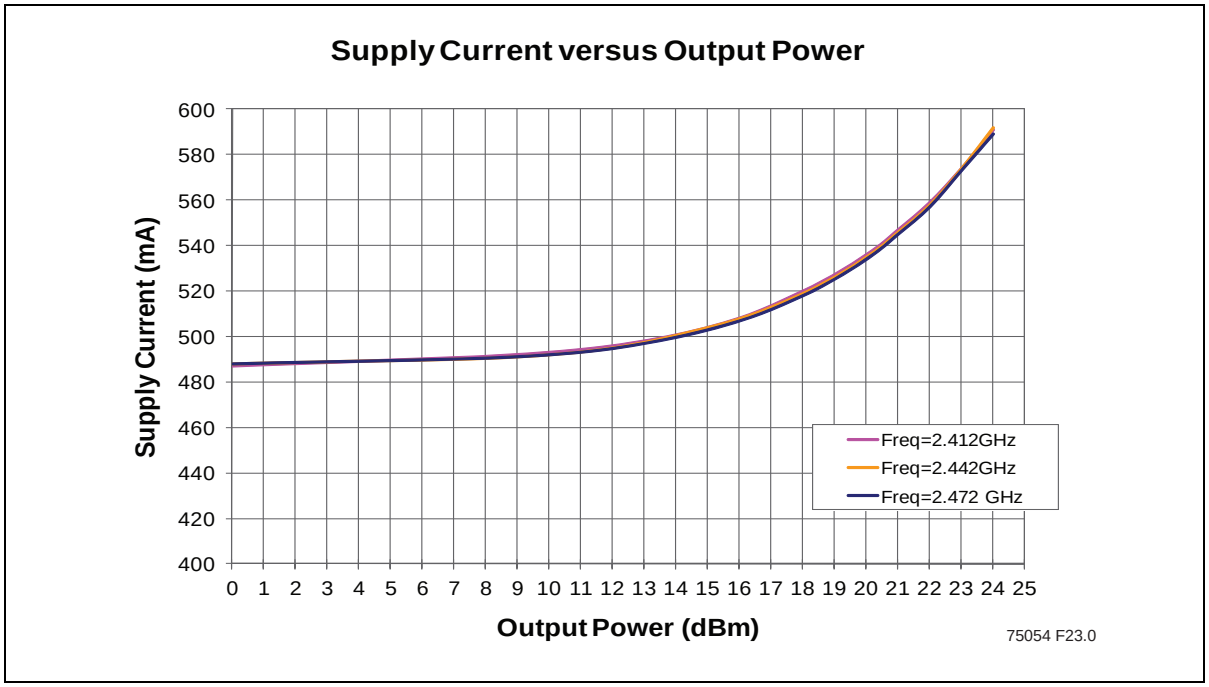


Figure 6: Supply Current versus Output Power

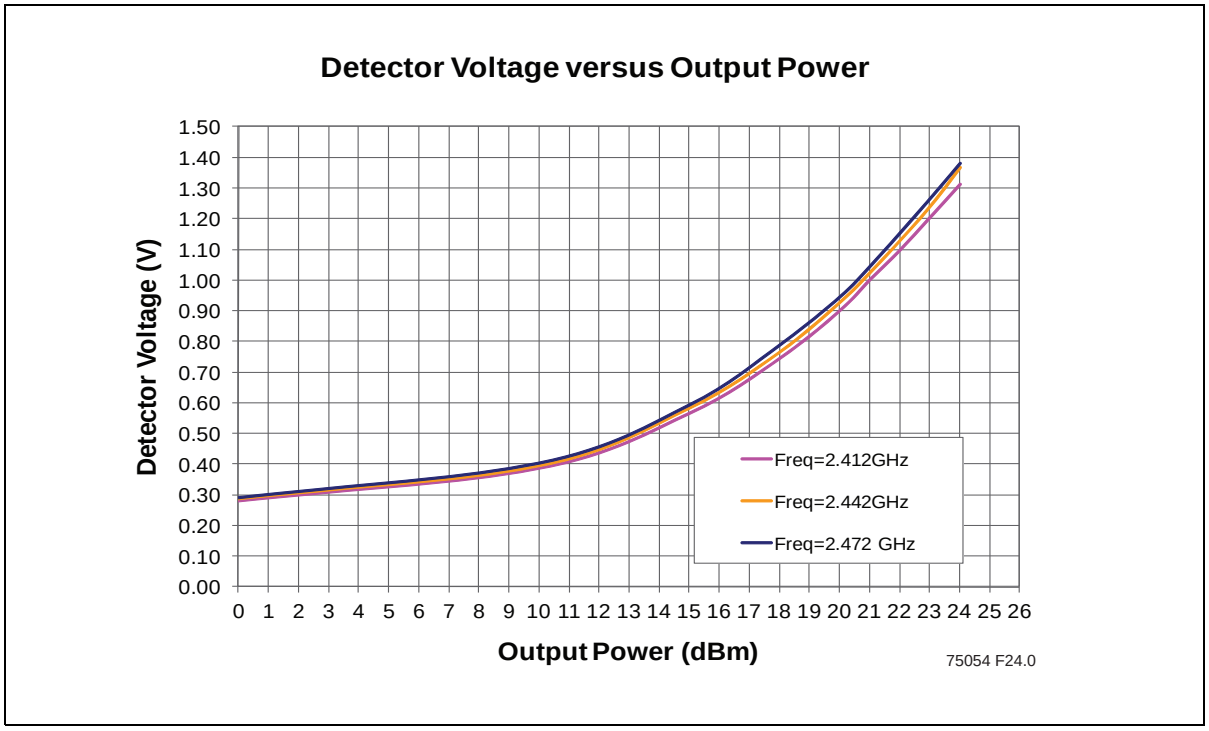


Figure 7: Detector Characteristic versus Output Power

Microchip Proprietary Information

802.11ac Applications (continued)

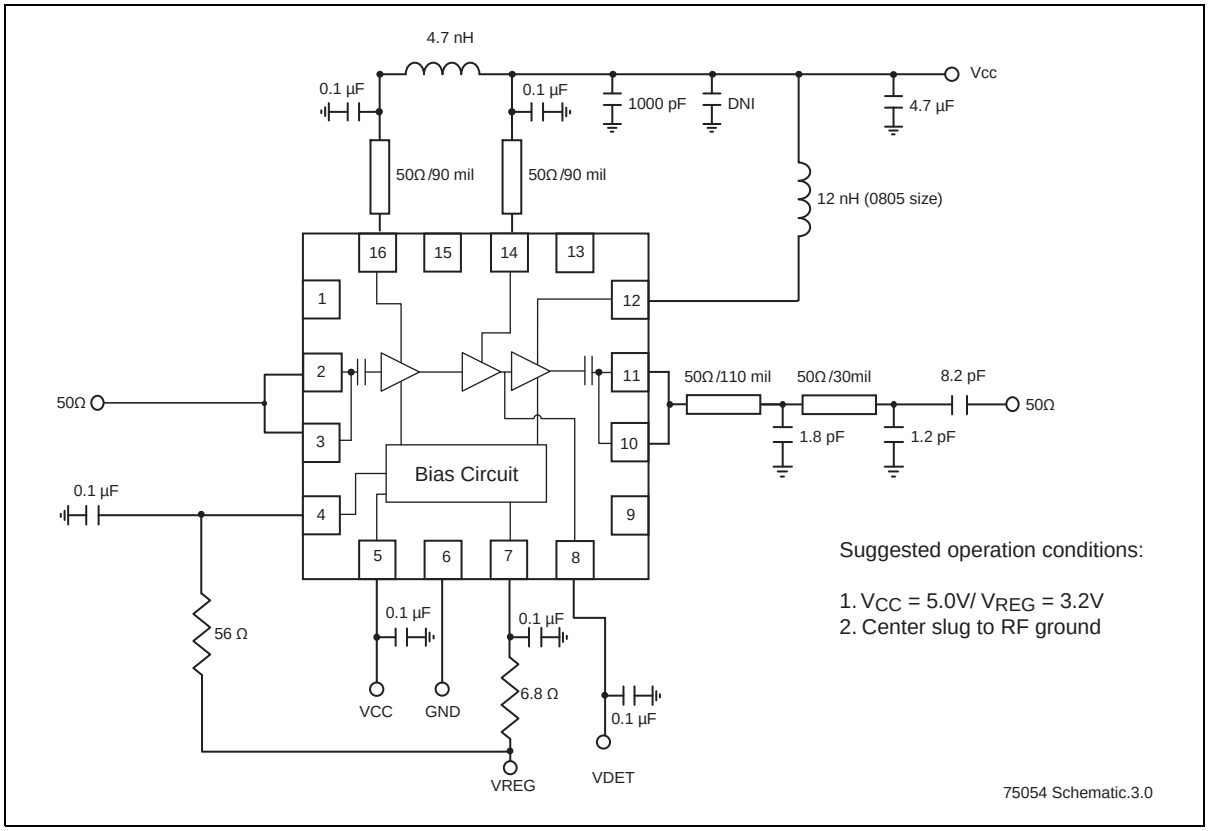


Figure 8: Typical Schematic for 802.11ac Applications

Microchip Proprietary Information

802.11n Applications

Typical Performance Characteristics

Test Conditions: V_{CC} = 5.0V, V_{REG} = 2.95V, T_A = 25°C, HT40 signal, unless otherwise specified

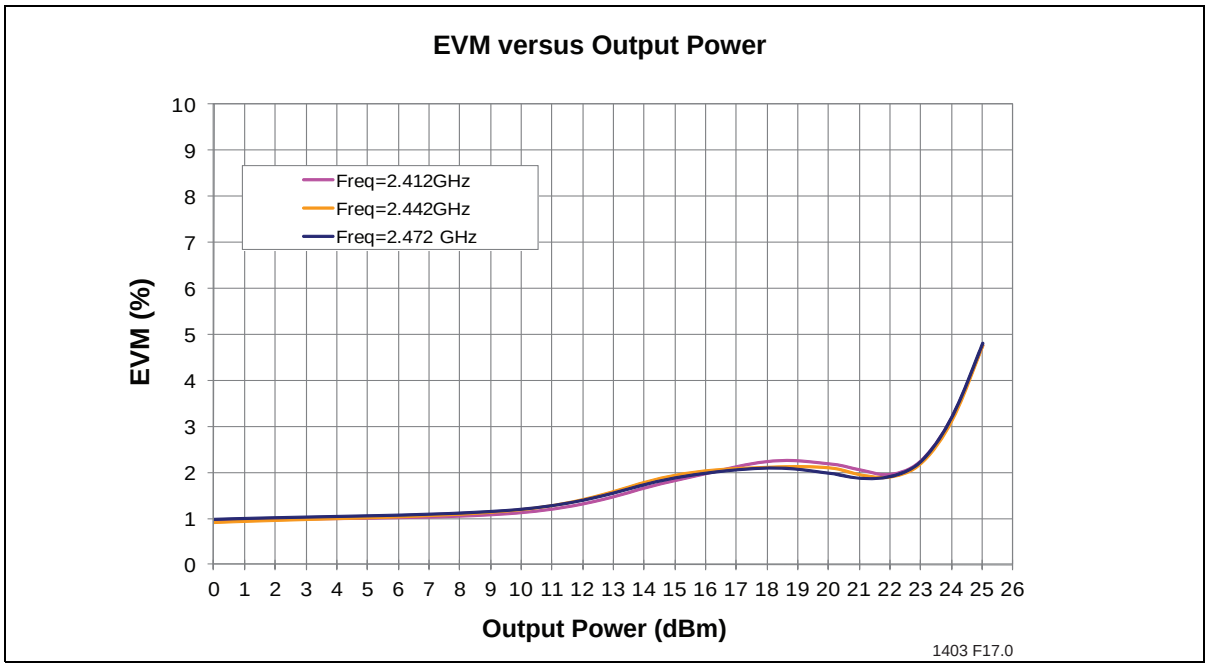


Figure 9: EVM versus Output Power

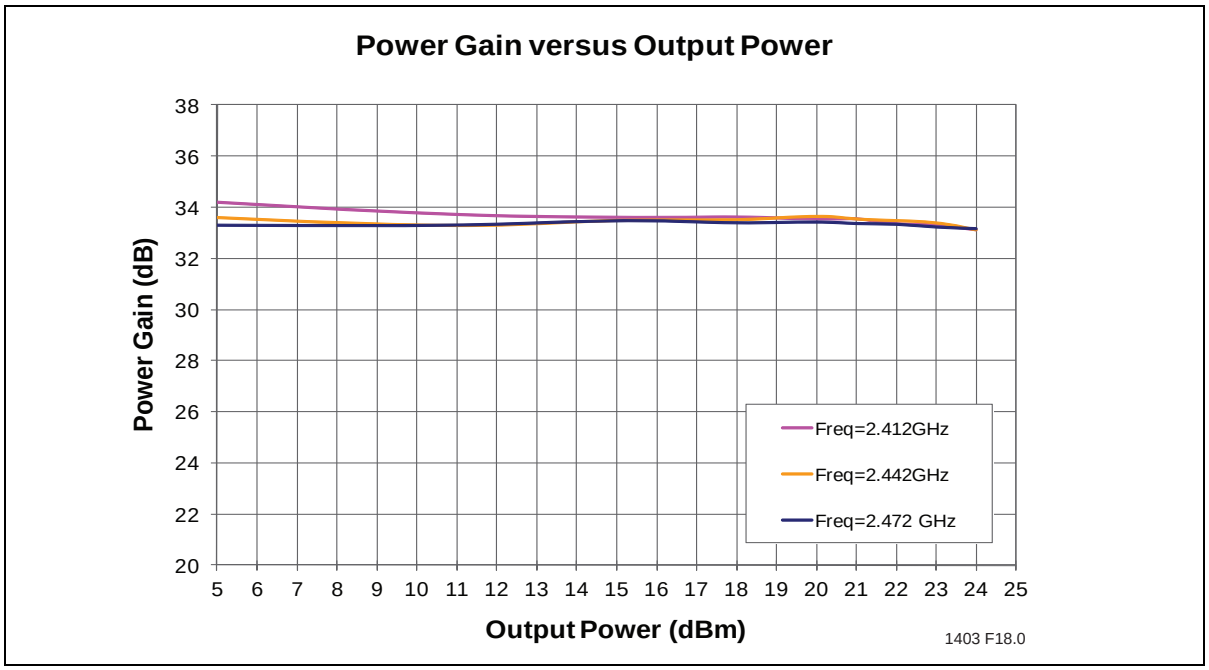


Figure 10: Power Gain versus Output Power

Microchip Proprietary Information

802.11n Applications (continued)

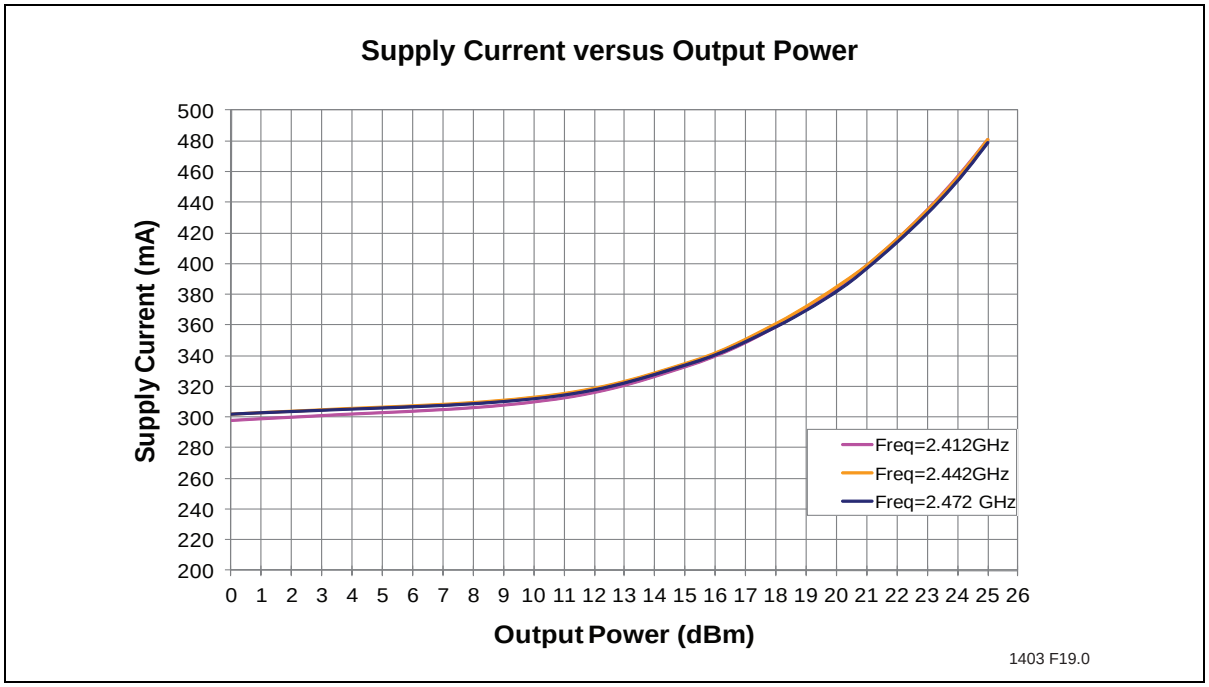


Figure 11: Supply Current versus Output Power

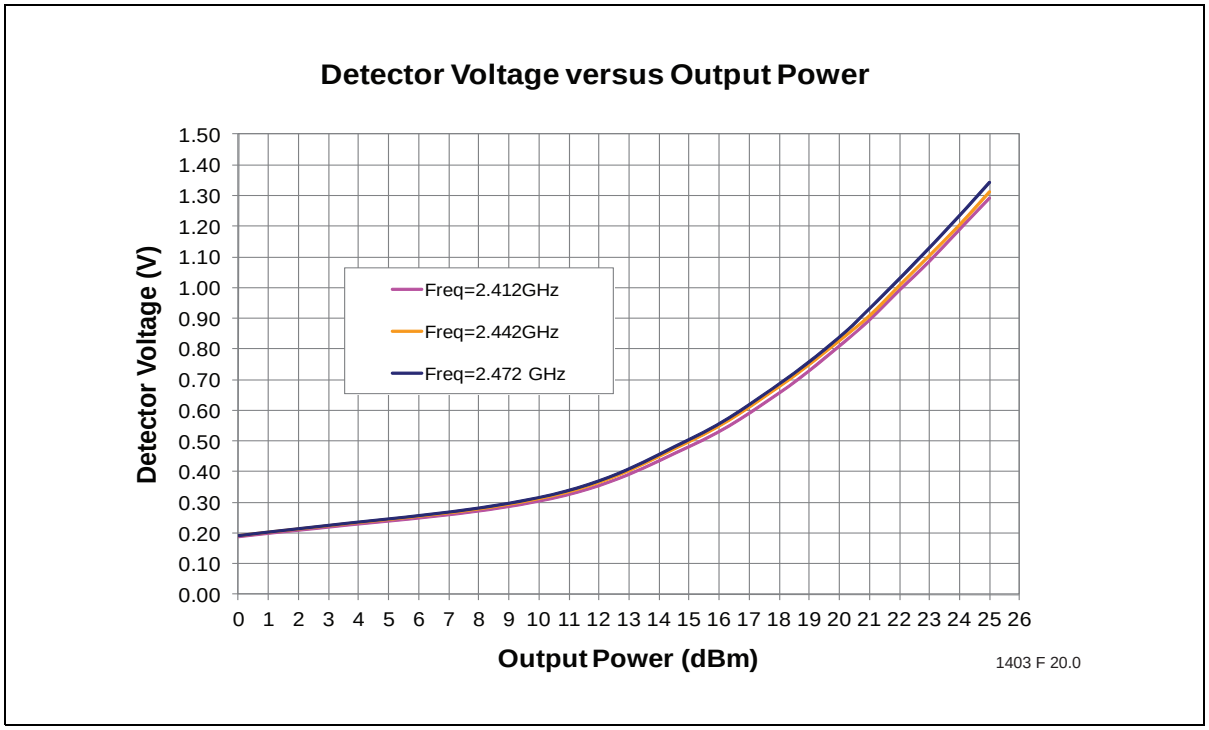


Figure 12: Detector Characteristic versus Output Power

Microchip Proprietary Information

802.11n Applications (continued)

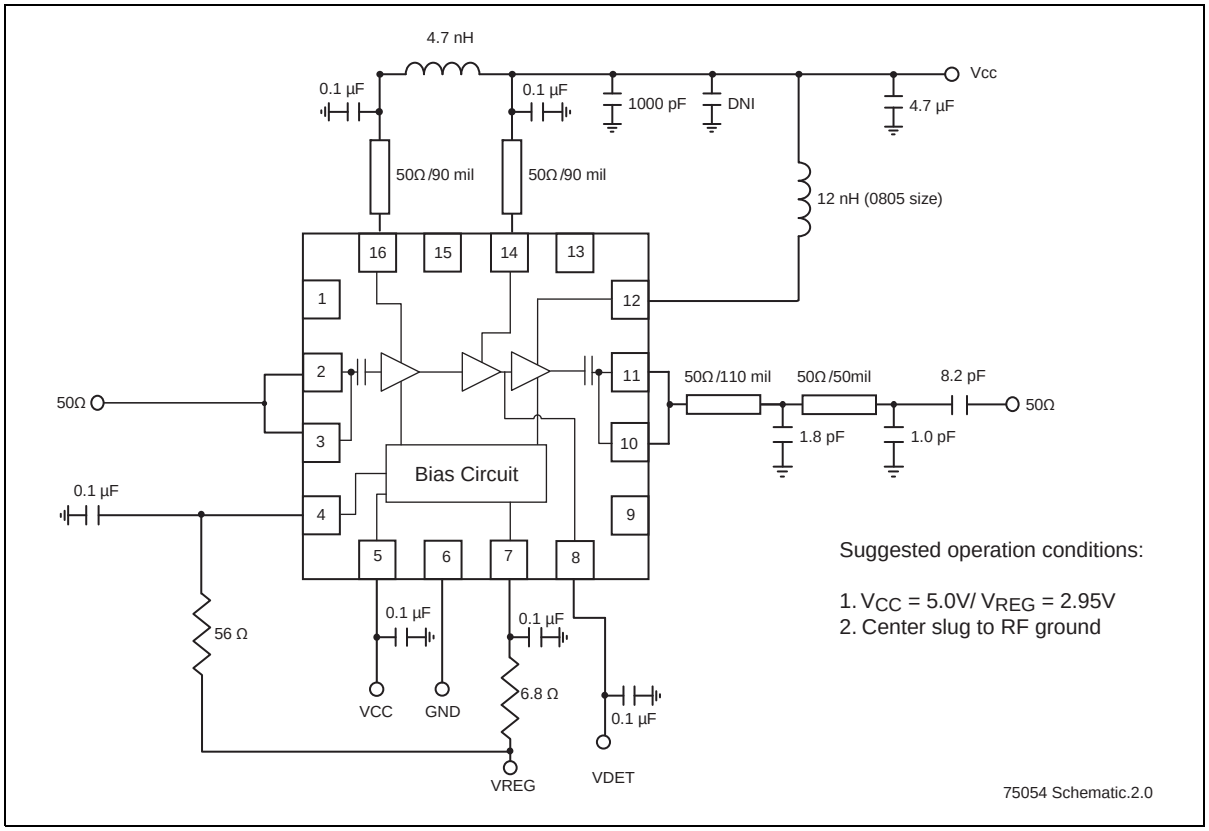


Figure 13: Typical Schematic for 802.11n Applications

Microchip Proprietary Information

802.11b/g Applications

Typical Performance Characteristics

Test Conditions: V_{CC} = 5.0V, V_{REG} = 2.9V, T_A = 25°C, unless otherwise specified
54 Mbps 802.11g OFDM Signal

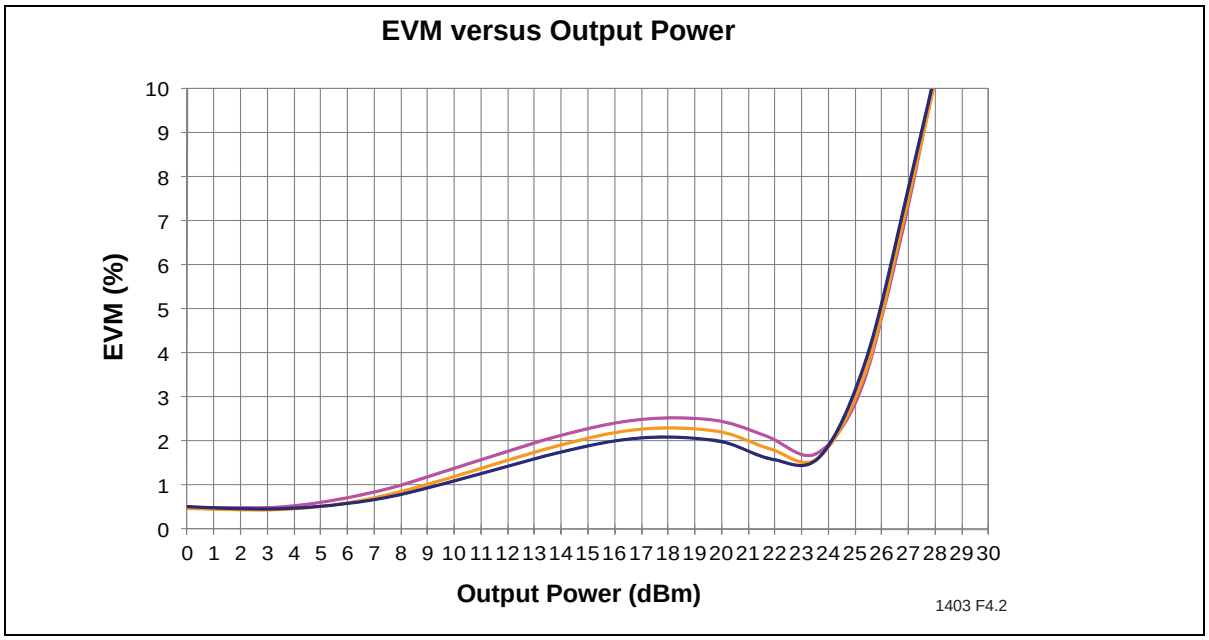


Figure 14: EVM versus Output Power

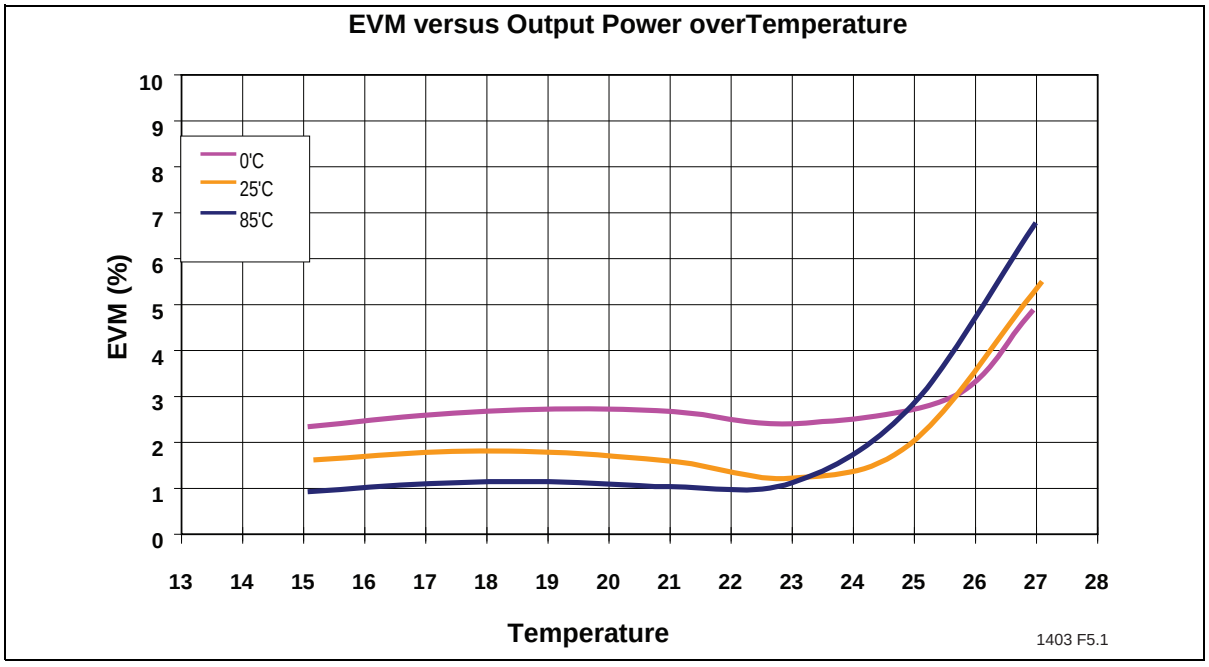


Figure 15: EVM versus Output Power over Temperature, V_{CC}= 5, V_{REG} = 2.9

Microchip Proprietary Information

802.11b/g Applications (continued)

Test Conditions: V_{CC} = 5.0V, V_{REG} = 2.9V, T_A = 25°C, 54 Mbps 802.11g OFDM Signal

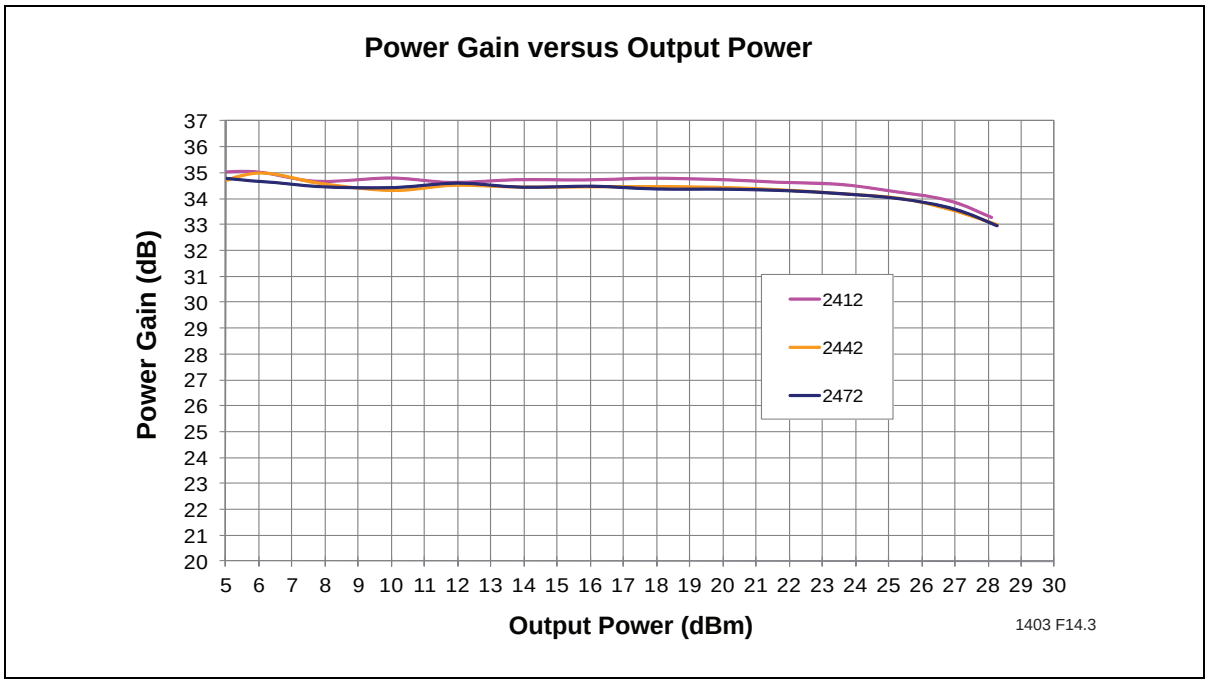


Figure 16: Power Gain versus Output Power, measured with sequence only, see Figure 22

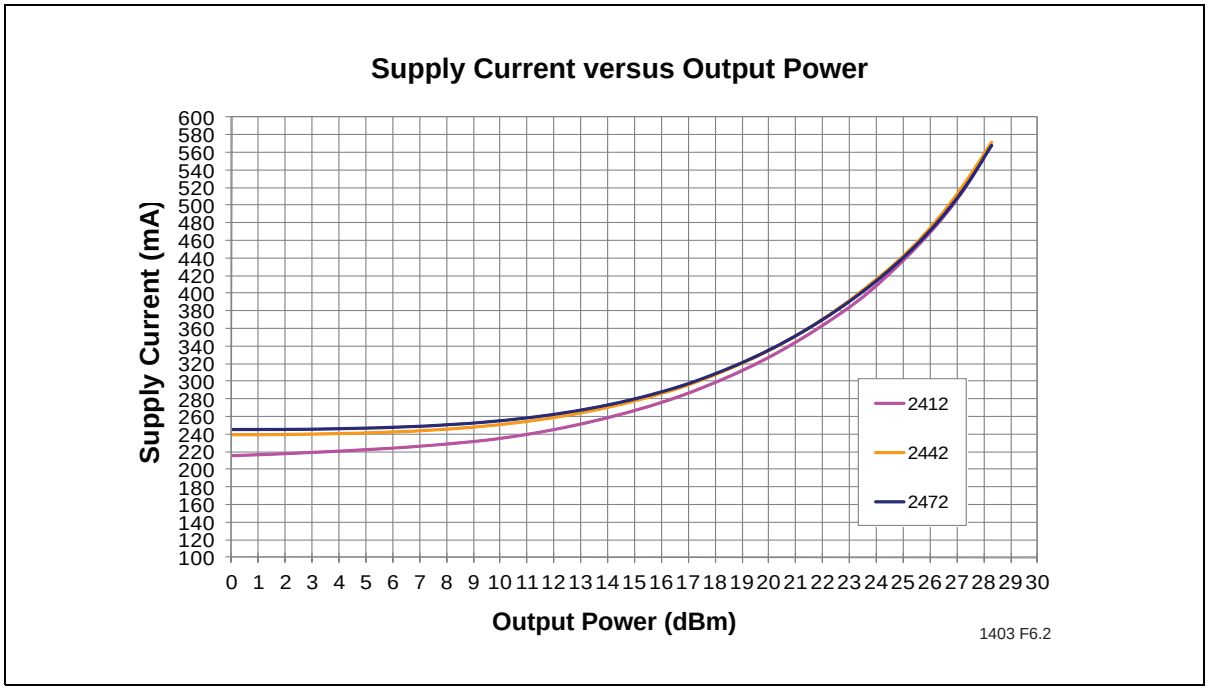


Figure 17: Total Current Consumption versus Output Power, see Figure 22

©2013 Silicon Storage Technology, Inc.

Microchip Proprietary Information

802.11b/g Applications (continued)

Test Conditions: V_{CC} = 5.0V, V_{REG} = 2.9V, T_A = 25°C, 54 Mbps 802.11g OFDM Signal

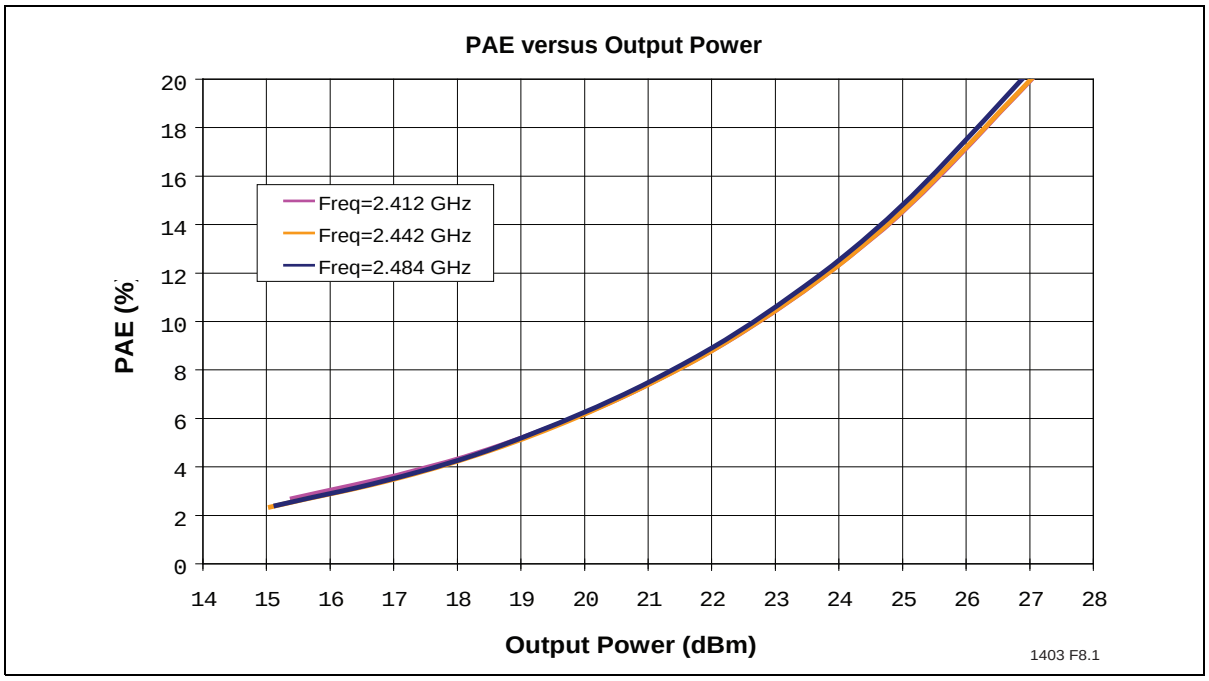


Figure 18: PAE versus Output Power

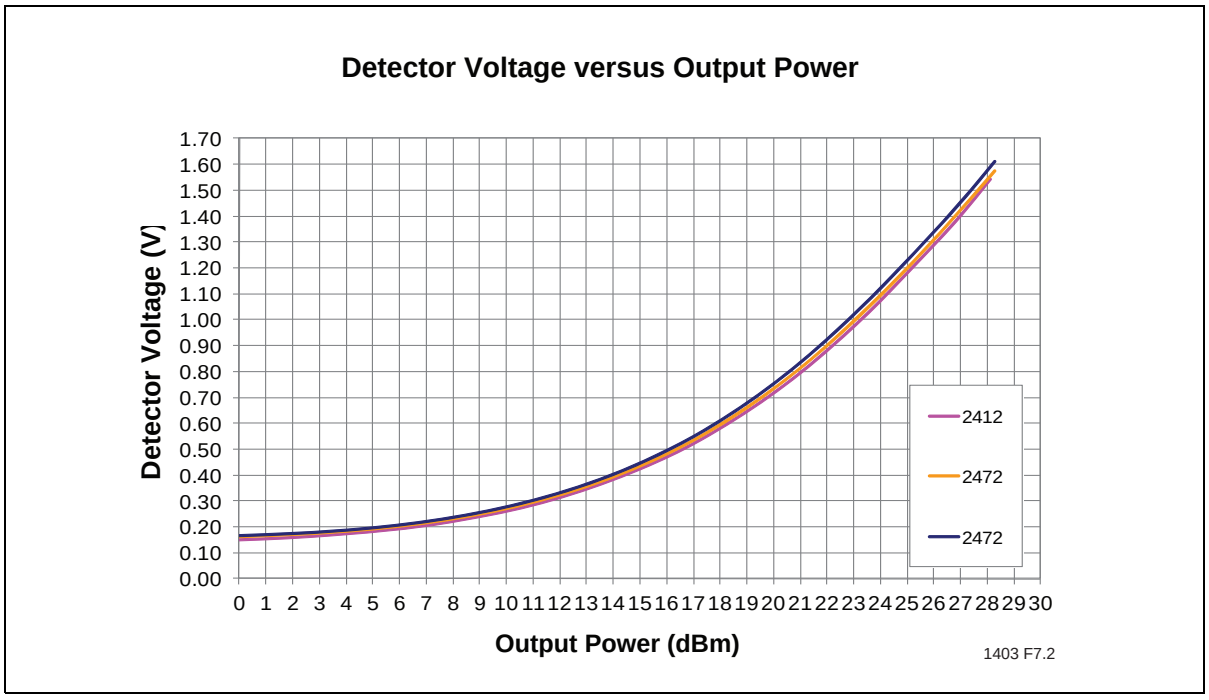


Figure 19: Detector Characteristic versus Output Power

Microchip Proprietary Information

802.11b/g Applications (continued)

Test Conditions: V_{CC} = 5.0V, V_{REG} = 2.9V, T_A = 25°C, 54 Mbps 802.11g OFDM Signal

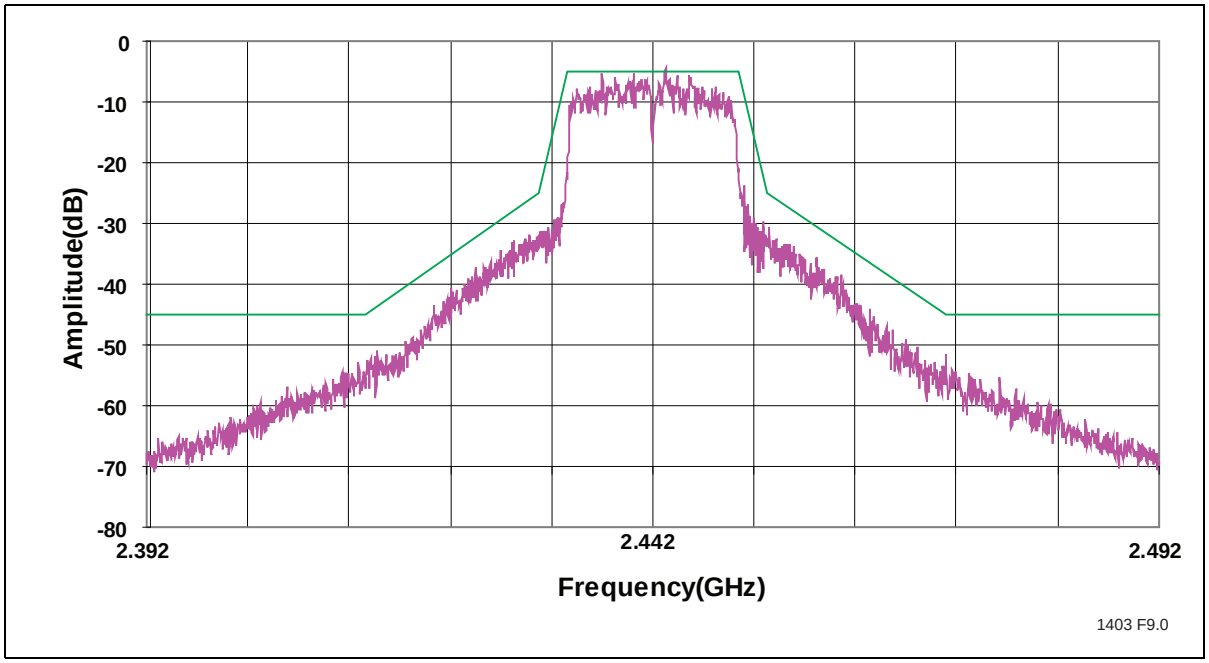


Figure 20:802.11g Spectrum Mask at 28 dBm

Test Conditions: V_{CC} = 5.0V, V_{REG} = 2.9V, T_A=25°C, 1 Mbps 802.11b CCK signal

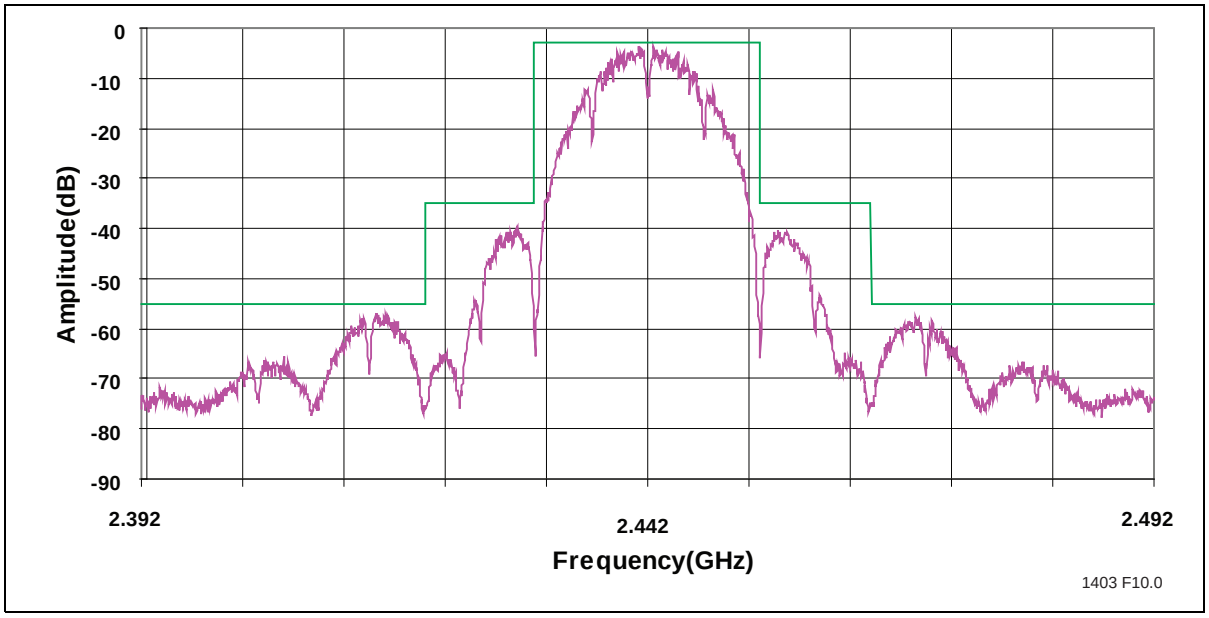


Figure 21:802.11b Spectrum Mask at 28 dBm

©2013 Silicon Storage Technology, Inc.

Microchip Proprietary Information

802.11b/g Applications (continued)

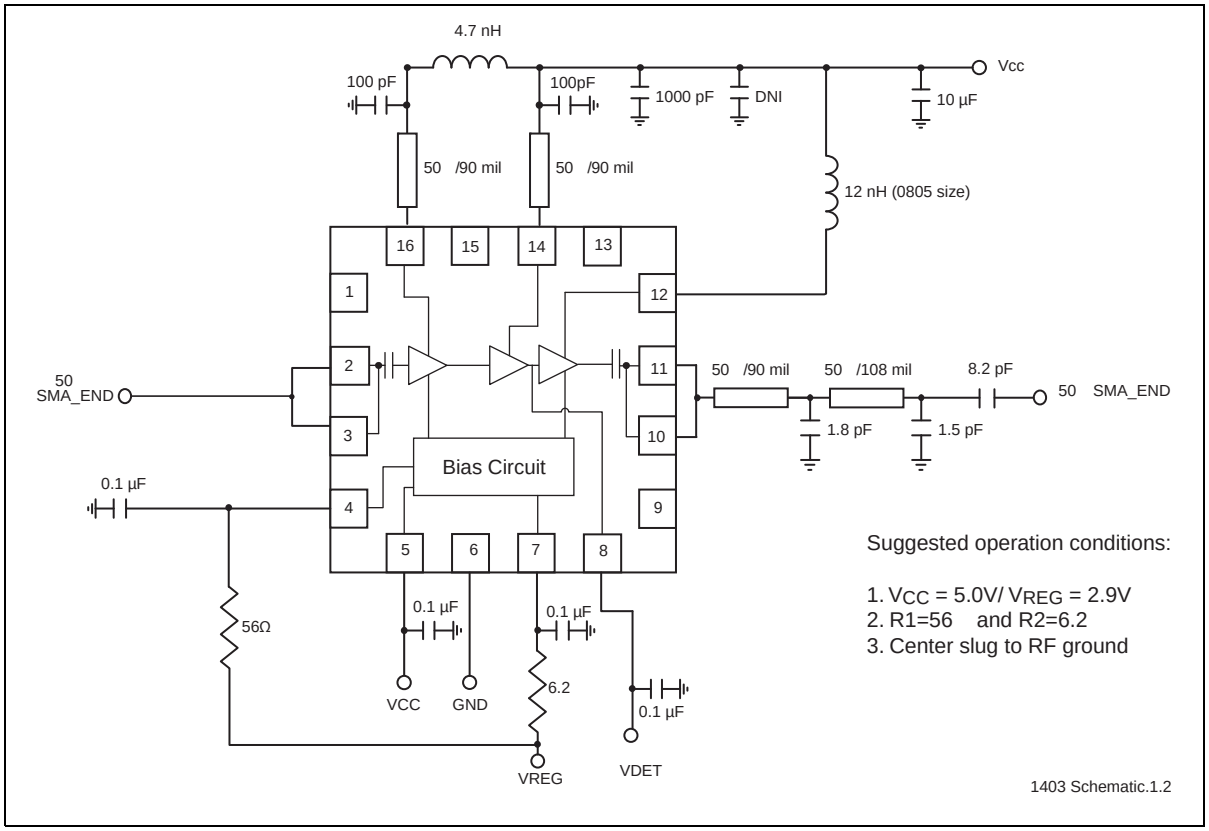


Figure 22: Typical Schematic for High-Power 802.11b/g Applications

Microchip Proprietary Information

1.8 GHz Applications

Typical Performance Characteristics
Test Conditions: V_{CC} = 5.0V, V_{REG} = 2.95V, T_A = 25°C, 54 Mbps 802.11g OFDM signal, unless otherwise specified

Table 5: AC Electrical Characteristics for Pico Cell Applications

Symbol	Parameter	Min.	Typ	Max.	Unit
FL-U	Frequency range	1800		2000	MHz
G	Gain		31		dB
P	Power at 3% EVM		24		dBm
P_{SAT}	Output Power at 1 dB compression		27		dBm
I_{CC}	Current at 24 dBm		400		mA
PAE	Power Added Efficiency at 27 dBm		20		%

T5.1 75054

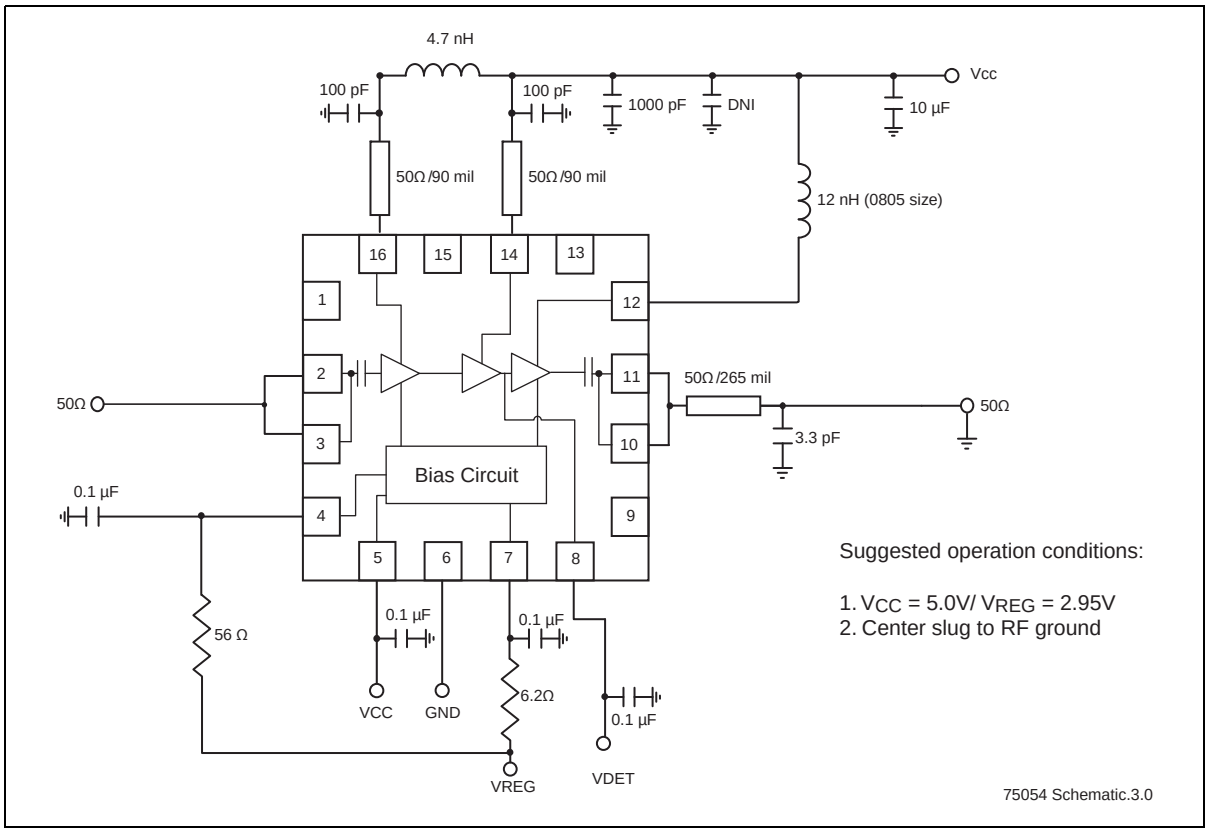
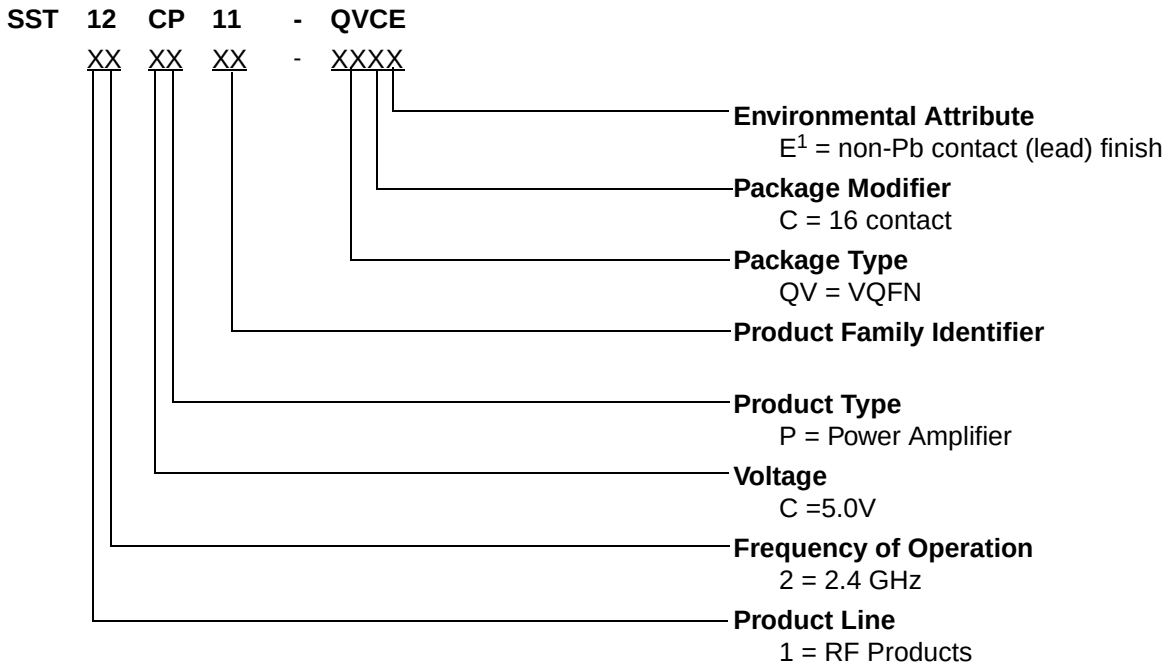


Figure 23: Typical Schematic for Pico Cell Applications

Microchip Proprietary Information

Product Ordering Information



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

Valid combinations for SST12CP11

SST12CP11-QVCE

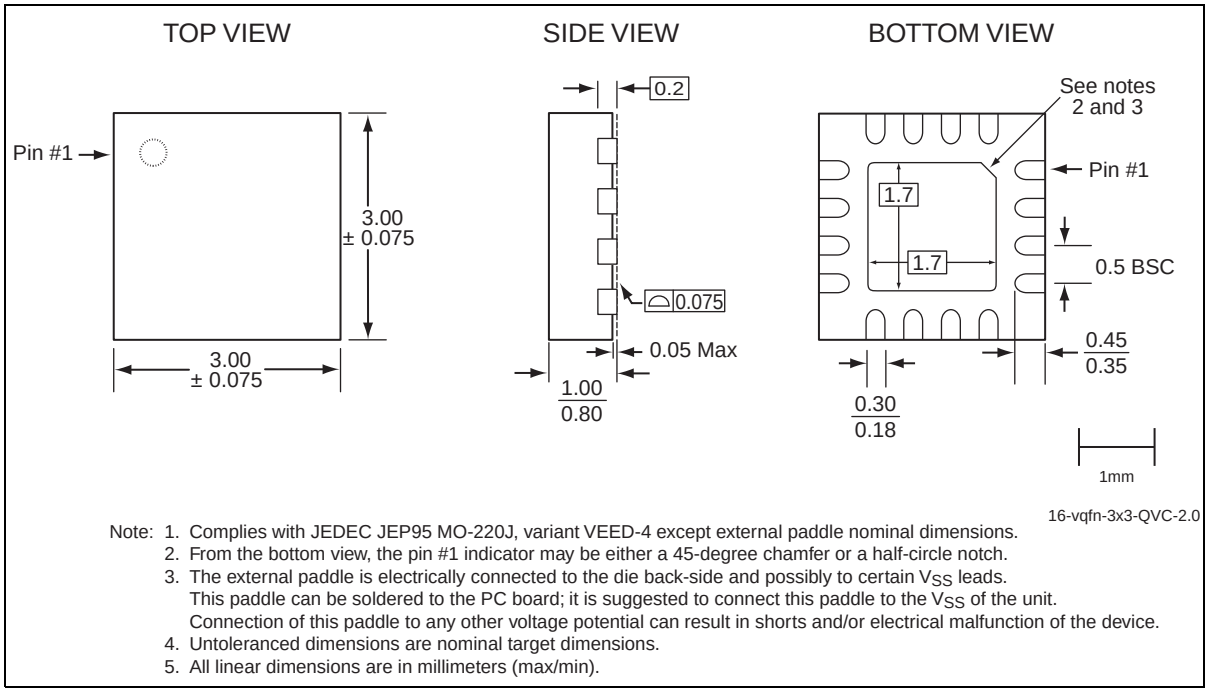
SST12CP11 Evaluation Kits

SST12CP11-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.

Microchip Proprietary Information

Packaging Diagrams



Note:
1. Complies with JEDEC JEP95 MO-220J, variant VEED-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 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).

Figure 24: 16-contact Very-thin Quad Flat No-lead (VQFN)
SST Package Code: QVC

Microchip Proprietary Information

Table 6: Revision History

Revision	Description	Date
00	• Initial release of data sheet	Mar 2009
01	• Added low-power linearity improvement. Updated Features, “Electrical Specifications”, and Figures 3, 14, 15, 16, 17, 18, 19, and 22.	Oct 2009
A	• Applied new document format • Released document under letter revision system • Updated Spec number from S71403 to DS75054 • Added Figures 4-13 and 23 • Updated Figures 14, 16-17 • Revised order in which information was presented	Jan 2013

ISBN:978-1-62076-906-5

© 2013 Silicon Storage Technology, Inc–a Microchip Technology Company. All rights reserved.

SST, Silicon Storage Technology, the SST logo, SuperFlash, MTP, and FlashFlex are registered trademarks of Silicon Storage Technology, Inc. MPF, SQI, Serial Quad I/O, and Z-Scale are trademarks of Silicon Storage Technology, Inc. All other trademarks and registered trademarks mentioned herein are the property of their respective owners.

Specifications are subject to change without notice. Refer to www.microchip.com for the most recent documentation. For the most current package drawings, please see the Packaging Specification located at http://www.microchip.com/packaging.

Memory sizes denote raw storage capacity; actual usable capacity may be less.

SST makes no warranty for the use of its products other than those expressly contained in the Standard Terms and Conditions of Sale.

For sales office locations and information, please see www.microchip.com.

Silicon Storage Technology, Inc.
A Microchip Technology Company
www.microchip.com

Microchip Proprietary Information

X-ON Electronics

Largest Supplier of Electrical and Electronic Components

Click to view similar products for RF Amplifier ***category:***

Click to view products by Microchip ***manufacturer:***

Other Similar products are found below :

A82-1 BGA622H6820XTSA1 BGA 728L7 E6327 BGB719N7ESDE6327XTMA1 HMC397-SX HMC405 HMC561-SX HMC8120-SX HMC8121-SX HMC-ALH382-SX HMC-ALH476-SX SE2433T-R SMA3101-TL-E SMA39 A66-1 A66-3 A67-1 LX5535LQ LX5540LL MAAM02350 HMC3653LP3BETR HMC549MS8GETR HMC-ALH435-SX SMA101 SMA32 SMA411 SMA531 SST12LP17E-XX8E SST12LP19E-QX6E WPM0510A HMC5929LS6TR HMC5879LS7TR HMC1126 HMC1087F10 HMC1086 HMC1016 SMA1212 MAX2689EWS+T MAAMSS0041TR MAAM37000-A1G LTC6430AIUF-15#PBF CHA5115-QDG SMA70-2 SMA4011 A231 HMC-AUH232 LX5511LQ LX5511LQ-TR HMC7441-SX HMC-ALH310