

Applications

- DSSS 2.4 GHz WLAN (IEEE802.11b)
- OFDM 2.4 GHz WLAN (IEEE802.11g)
- Portable and Battery WLAN Applications
- Access Points, PCMCIA, PC cards

Features

- Single 3.3 V Supply Operation
- 18.5 dBm, EVM = 3 %, 802.11g, OFDM 54 Mbps
- 23 dBm, ACPR < -32 dBc, 802.11b
- 32 dB Gain
- Selectable Power Detector Slope for use with multiple chipsets (Negative and Positive)
- Integrated power amplifier enable pin (V_{EN})
- Lead Free and RoHS Compliant
- Ultra thin package: 0.5 mm
- Small package, 16 pin 3 mm x 3 mm x 0.5 mm QFN

Product Description

The SE2523BU is a 2.4 GHz power amplifier designed for use in the 2.4 GHz ISM band for wireless LAN applications. The device incorporates two selectable power detectors for closed loop monitoring of the output power.

The SE2523BU includes a digital enable control for device on/off control.

The SE2523BU temperature compensated power detector has two selectable power detectors slopes, positive and negative. This allows easy use with multiple chipsets. The detector is also highly immune to mismatch at its output with less than 1.5 dB of variation with a 2:1 mismatch.

Ordering Information

Part Number	Package	Remark
SE2523BU	16 Pin QFN	Samples
SE2523BU-R	16 Pin QFN	Tape and Reel
SE2523BU-EK1	Evaluation Kit	Standard

Functional Block Diagram

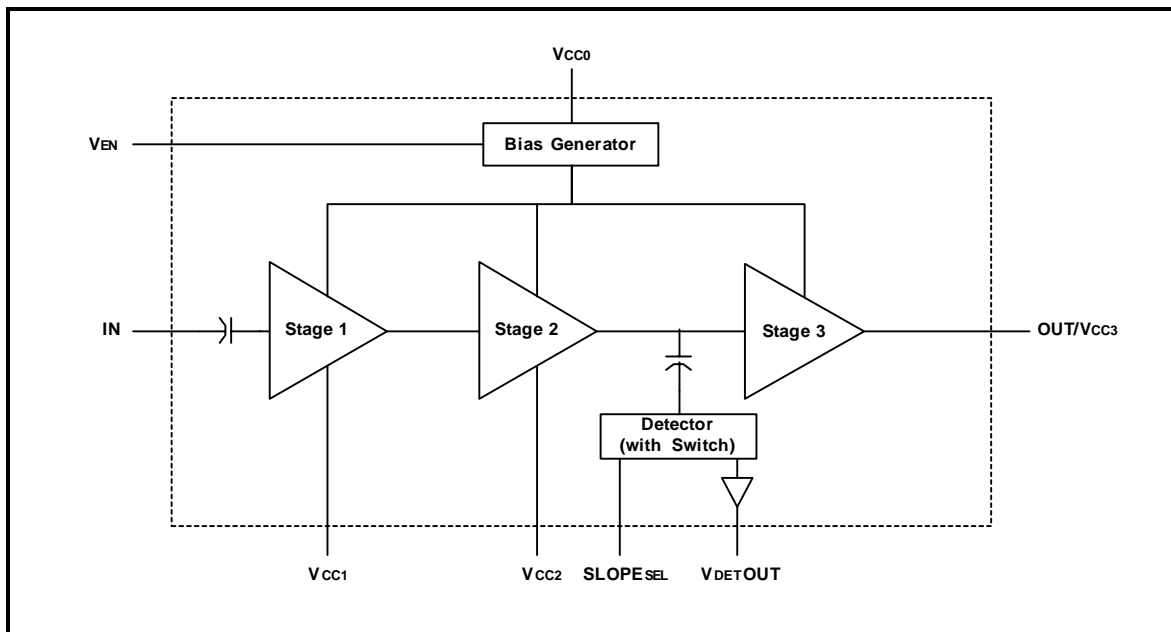


Figure 1: Functional Block Diagram

Pin Out Diagram

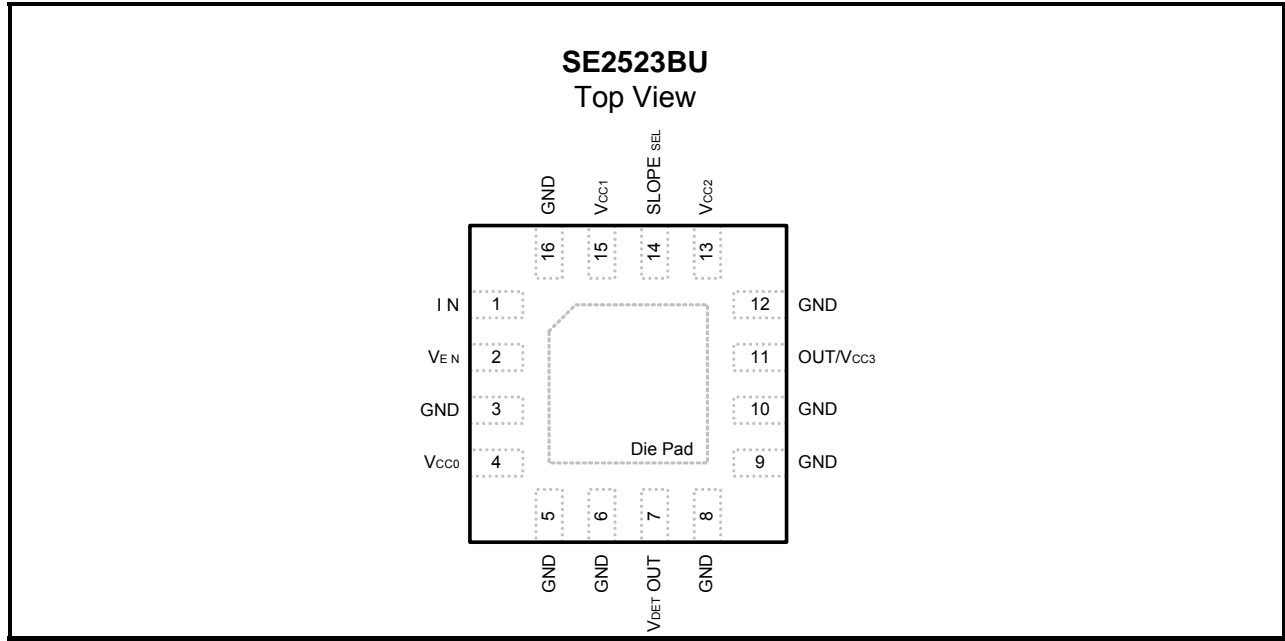


Figure 2: SE2523BU Pin-Out Diagram

Pin Out Description

Pin No.	Name	Description
1	IN	Power amplifier RF input; DC block required
2	V _{EN}	Digital pin used to power up and power down the IC
3	GND	Ground
4	V _{CC0}	Bias/control circuit supply voltage
5	GND	Ground
6	GND	Ground
7	V _{DET} OUT	Analog power detector output
8	GND	Ground
9 -10	GND	Ground
11	OUT/ V _{CC3}	Power Amplifier RF output and Stage 3 collector supply voltage
12	GND	Ground
13	V _{CC2}	Stage 2 collector supply
14	SLOPE _{SEL}	Slope Select (N/C = Positive, GND = Negative)
15	V _{CC1}	Stage 1 collector supply
16	GND	Ground
Die Pad	GND	Exposed die pad; electrical and thermal ground

Absolute Maximum Ratings

These are stress ratings only. Exposure to stresses beyond these maximum ratings for a long period of time may cause permanent damage to, or affect the reliability of the device. Avoid operating the device outside the recommended operating conditions defined below. This device is ESD sensitive. Handling and assembly of this device should be at ESD protected workstations.

Symbol	Definition	Min.	Max.	Unit
V _{CC}	Supply Voltage on pins V _{CC0} , V _{CC1} , V _{CC2} and V _{CC3}	-0.3	4	V
V _{EN}	Power Amplifier Enable	-0.3	V _{CC0} + 0.3	V
IN	RF Input Power	-	-3	dBm
T _{STG}	Storage Temperature Range	-40	150	°C
T _j	Maximum Junction Temperature	-	150	°C

Recommended Operating Conditions

Symbol	Parameter	Min.	Max.	Unit
V _{CC}	Supply Voltage on pins V _{CC0} , V _{CC1} , V _{CC2} and V _{CC3}	2.9	3.6	V
T _A	Ambient Temperature	-20	85	°C

DC Electrical Characteristics

Conditions: V_{CC} = V_{EN} = 3.3 V, T_A = 25 °C, as measured on SiGe Semiconductor's SE2523BU-EV1 evaluation board, unless otherwise noted.

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
I _{CC-802.11g}	Supply Current (Sum of V _{CC0} , V _{CC1} , V _{CC2} , V _{CC3})	P _{OUT} = 18.5 dBm, 54 Mbps OFDM signal, 64 QAM	-	130	165	mA
I _{CC-802.11b}	Supply Current (Sum of V _{CC0} , V _{CC1} , V _{CC2} , V _{CC3})	P _{OUT} = 23 dBm, 11 Mbps CCK signal, BT = 0.45	-	210	245	mA
I _{OFF}	Supply Current	V _{EN} = 0 V, No RF	-	1	10	μA
I _Q	Quiescent Current	No RF	-	60	-	mA
V _{ENH}	Logic High Voltage	-	1.5	-	V _{CC}	V
V _{ENL}	Logic Low Voltage	-	0	-	0.5	V

AC Electrical Characteristics

802.11b/g AC Electrical Characteristics

Conditions: $V_{CC} = V_{EN} = 3.3\text{ V}$, $f = 2.45\text{ GHz}$, $T_A = 25\text{ }^\circ\text{C}$, as measured on SiGe Semiconductor's SE2523BU-EV1 evaluation board, unless otherwise noted

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
f _{L-U}	Frequency Range	-	2400	-	2500	MHz
P _{1dB}	Output 1dB compression point	No modulation	23.5	26.5	-	dBm
S ₂₁	Small Signal Gain	P _{IN} = -25 dBm	29	32	35	dB
ΔS ₂₁	Gain Variation over band	P _{IN} = -25 dBm, f _{IN} = 2400 to 2500 MHz	-	1	-	dB
ACPR	Adjacent Channel Power Ratio ±11 MHz offsets from carrier ±22 MHz offsets from carrier	P _{OUT} = 23 dBm, 11 Mbps CCK signal, BT = 0.45	- -	-35 -52	- -	dBc
2f	Harmonic	P _{OUT} = 23 dBm, 802.11b, 1 Mbps, CCK signal	-	-60	-	dBm/MHz
3f			-	-57	-	dBm/MHz
EVM	Error Vector Magnitude	P _{OUT} = 18.5 dBm, 54 Mbps OFDM signal, 64 QAM	-	2.5	-	%
t _r , t _f	Rise and Fall Time	-	-	0.5	-	μSec
STAB	Stability	P _{OUT} = 23 dBm, CW, VSWR = 4:1 All Phases	All non-harmonically related outputs less than -50 dBc/100 kHz			
VSWR	Tolerance to output load mismatching	P _{OUT} = 23 dBm, CW, VSWR = 6:1 All Phases	No damage			

Power Detector

Detector Slope Selection

Conditions: $V_{CC} = V_{EN} = 3.3\text{ V}$, $T_A = 25\text{ }^\circ\text{C}$, as measured on SiGe Semiconductor's SE2523BU-EV1 evaluation board, unless otherwise noted

SLOPE _{SEL}	Detector Slope
Open Circuit	Positive
Ground	Negative

Positive Slope

Conditions: $V_{CC} = V_{EN} = 3.3\text{ V}$, $f = 2.45\text{ GHz}$, SLOPE_{SEL} = Open Circuit, $T_A = 25\text{ }^\circ\text{C}$, as measured on SiGe Semiconductor's SE2523BU-EV1 evaluation board, unless otherwise noted

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
PDR	P _{OUT} detect range		0	-	P _{1dB}	dBm
VDET	Detector voltage	P _{OUT} = 23 dBm	0.98	1.10	1.22	V
VDET	Detector voltage	P _{OUT} = 18.5 dBm	0.64	0.75	0.86	V
VDET	Detector voltage	P _{OUT} = NO RF	0.25	0.30	0.35	V

Negative Slope

Conditions: $V_{CC} = V_{EN} = 3.3\text{ V}$, $f = 2.45\text{ GHz}$, SLOPE_{SEL} = GND, $T_A = 25\text{ }^\circ\text{C}$, as measured on SiGe Semiconductor's SE2523BU-EV1 evaluation board, unless otherwise noted

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
PDR	P _{OUT} detect range		0	-	P _{1dB}	dBm
VDET	Detector voltage	P _{OUT} = 23 dBm	0.08	0.20	0.32	V
VDET	Detector voltage	P _{OUT} = 18.5 dBm	0.43	0.55	0.67	V
VDET	Detector voltage	P _{OUT} = NO RF	0.89	0.94	1.00	V

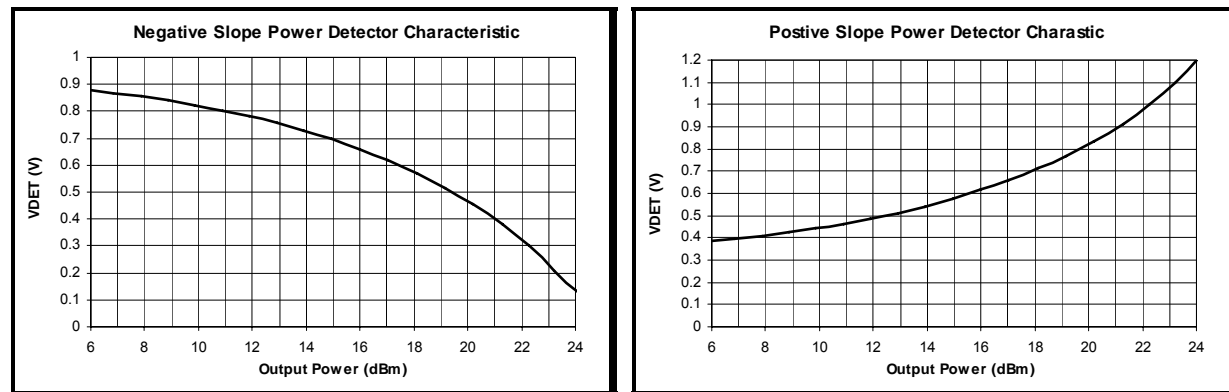


Figure 3: SE2523BU Internal Coupled Power Detector Characteristic

Typical Performance

Conditions: $V_{CC} = V_{EN} = 3.3\text{ V}$, $f = 2.45\text{ GHz}$, $SLOPE_{SEL} = \text{Open Circuit}$, $T_A = 25\text{ }^\circ\text{C}$, as measured on SiGe Semiconductor's SE2523BU-EV1 evaluation board, unless otherwise noted

802.11g Performance (OFDM, 54 Mbps)

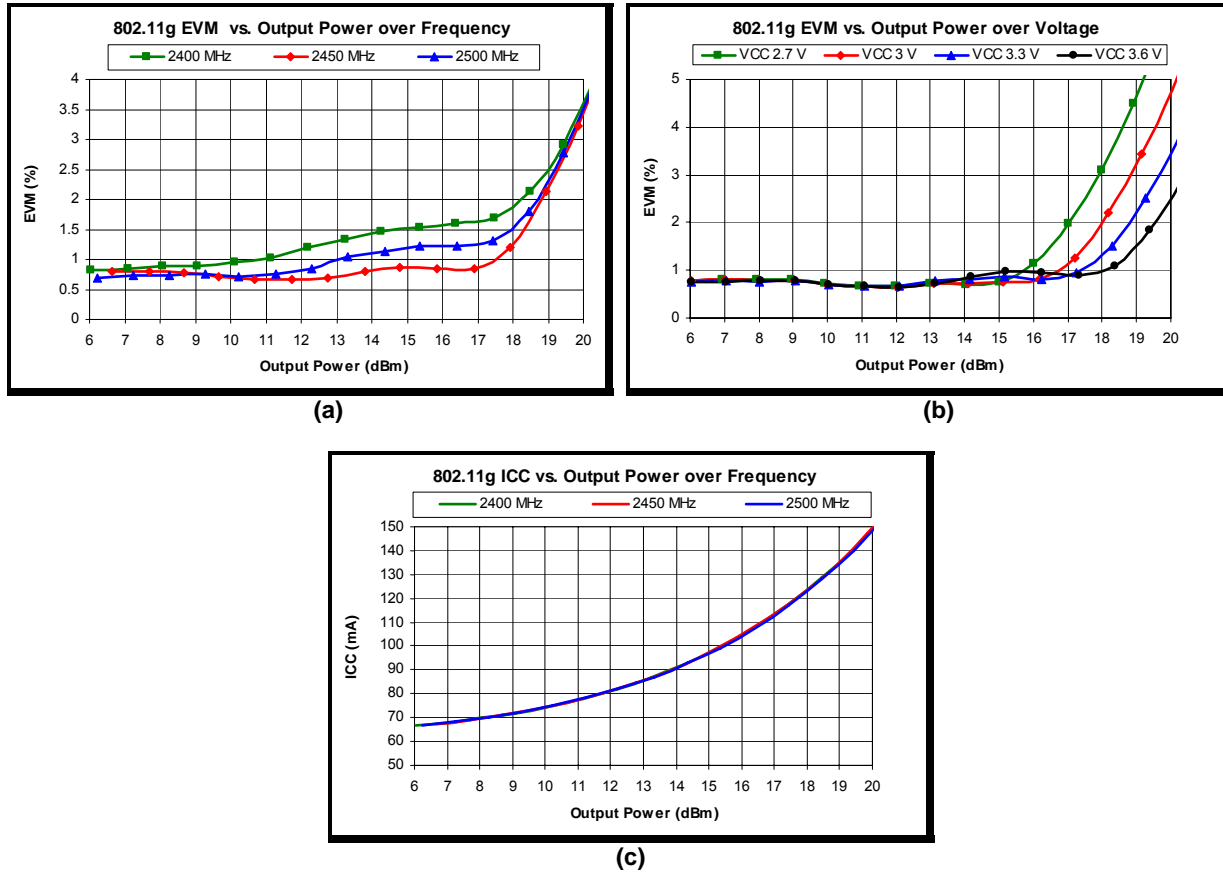


Figure 4: SE2523BU 802.11g Typical Performance: (a) EVM vs. Output Power over Frequency, (b) EVM vs. Output Power over Voltage, (c) ICC vs. Output Power over Frequency

802.11b Performance

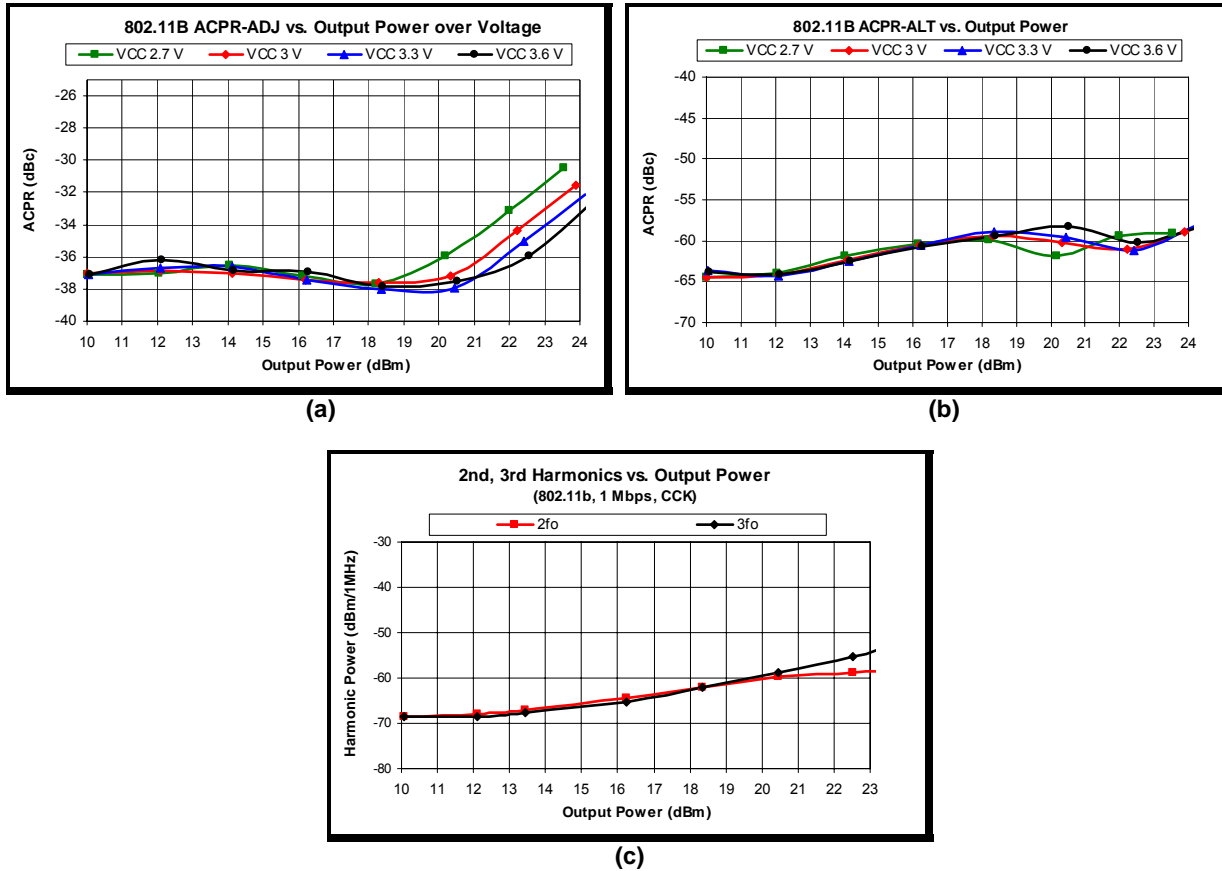


Figure 5: SE2523BU 802.11b Typical Performance: (a) ACPR-ADJ vs. Output Power over Voltage, (b) ACPR-ALT vs. Output Power over Voltage, (c) Harmonics vs. Output Power

Negative Slope Power Detector Performance

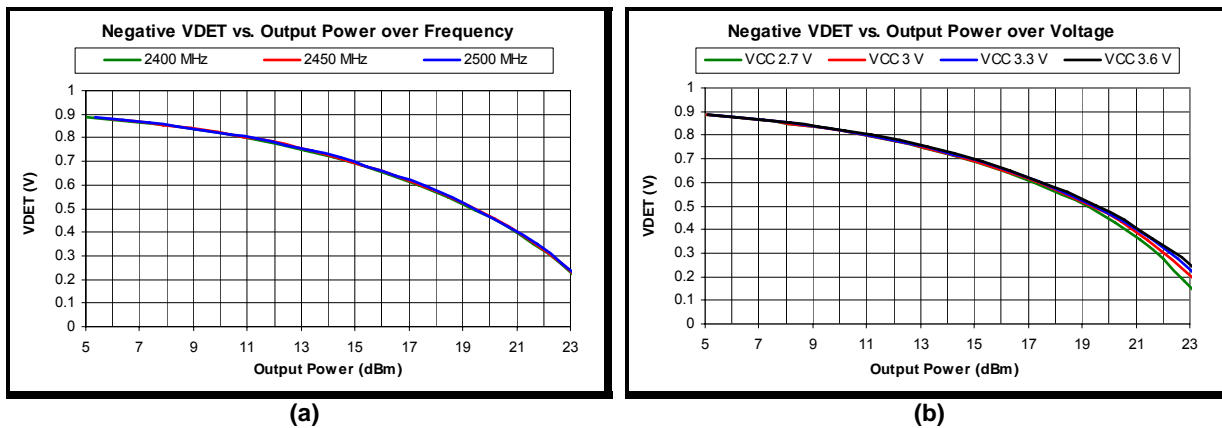


Figure 6: SE2523BU Negative Slope Power Detector Typical Performance: (a) VDET vs. Output Power over Frequency, (b) VDET vs. Output Power over Voltage

Positive Slope Power Detector Performance

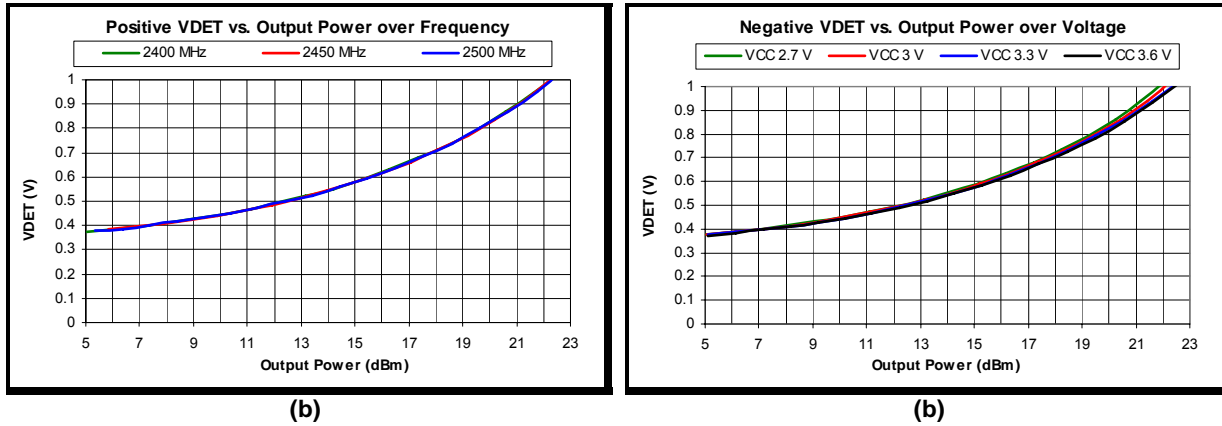


Figure 7: SE2523BU Positive Slope Power Detector Typical Performance: (a) VDET vs. Output Power over Frequency, (b) VDET vs. Output Power over Voltage

CW Performance

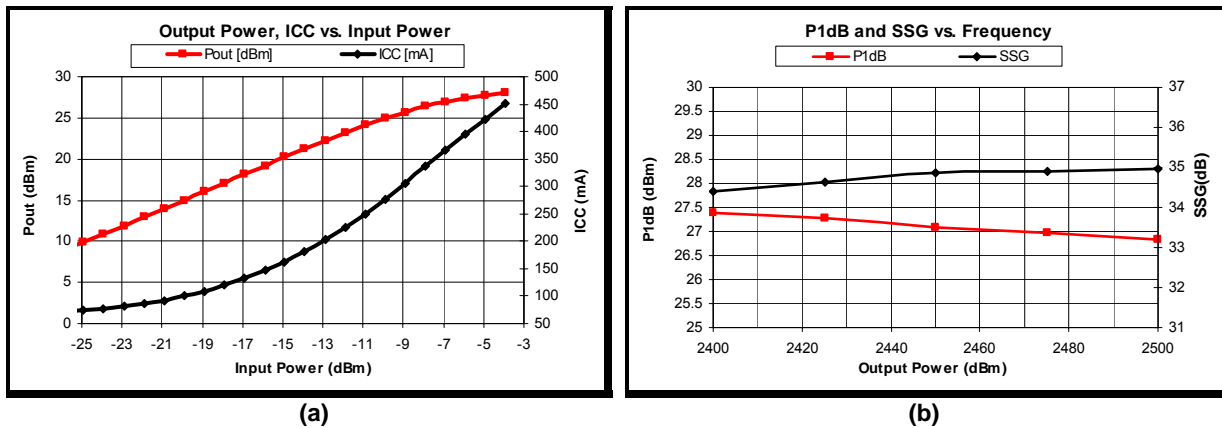


Figure 8: SE2523BU CW Typical Performance: (a) Pout, ICC vs. Input Power (b) P1dB, Small Signal Gain vs. Frequency

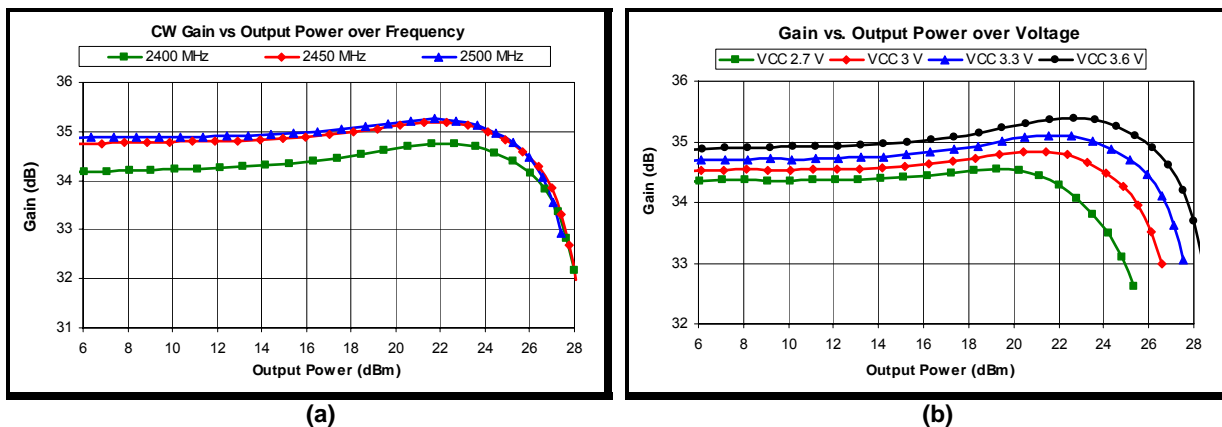


Figure 9: SE2523BU CW Typical Performance: (a) Gain vs. Output Power over Frequency (b) Gain vs. Output Power over Voltage

Application Circuit

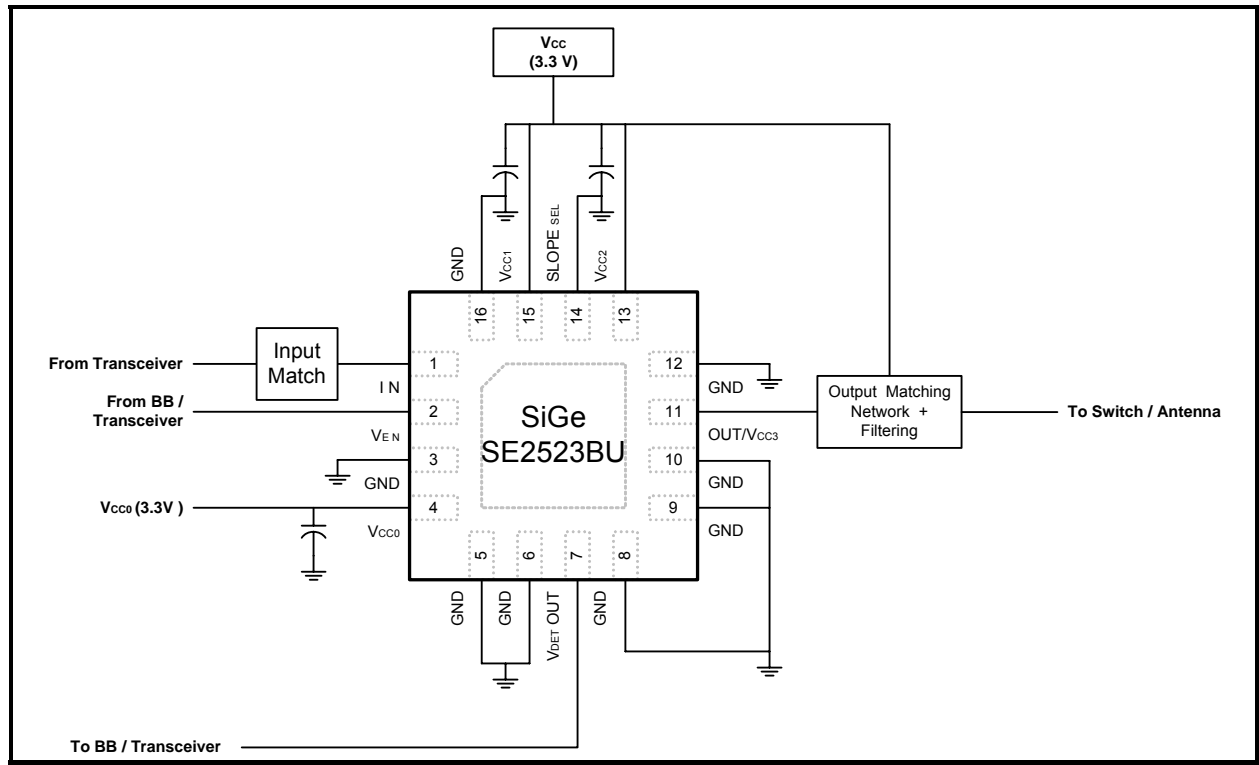


Figure 10: SE2523BU Application Circuit

Branding Information

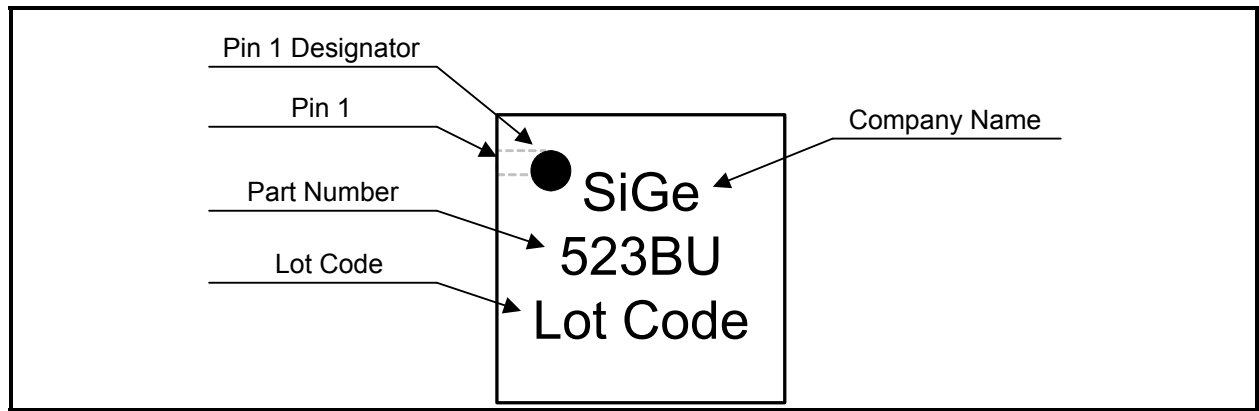


Figure 11: SE2523BU Branding Information

Tape and Reel Information

Parameter	Value
Devices Per Reel	3000
Reel Diameter	13 inches
Tape Width	12 millimeters

Table 1: SE2523BU-R Tape and Reel Information

Package Information

This package is lead free.

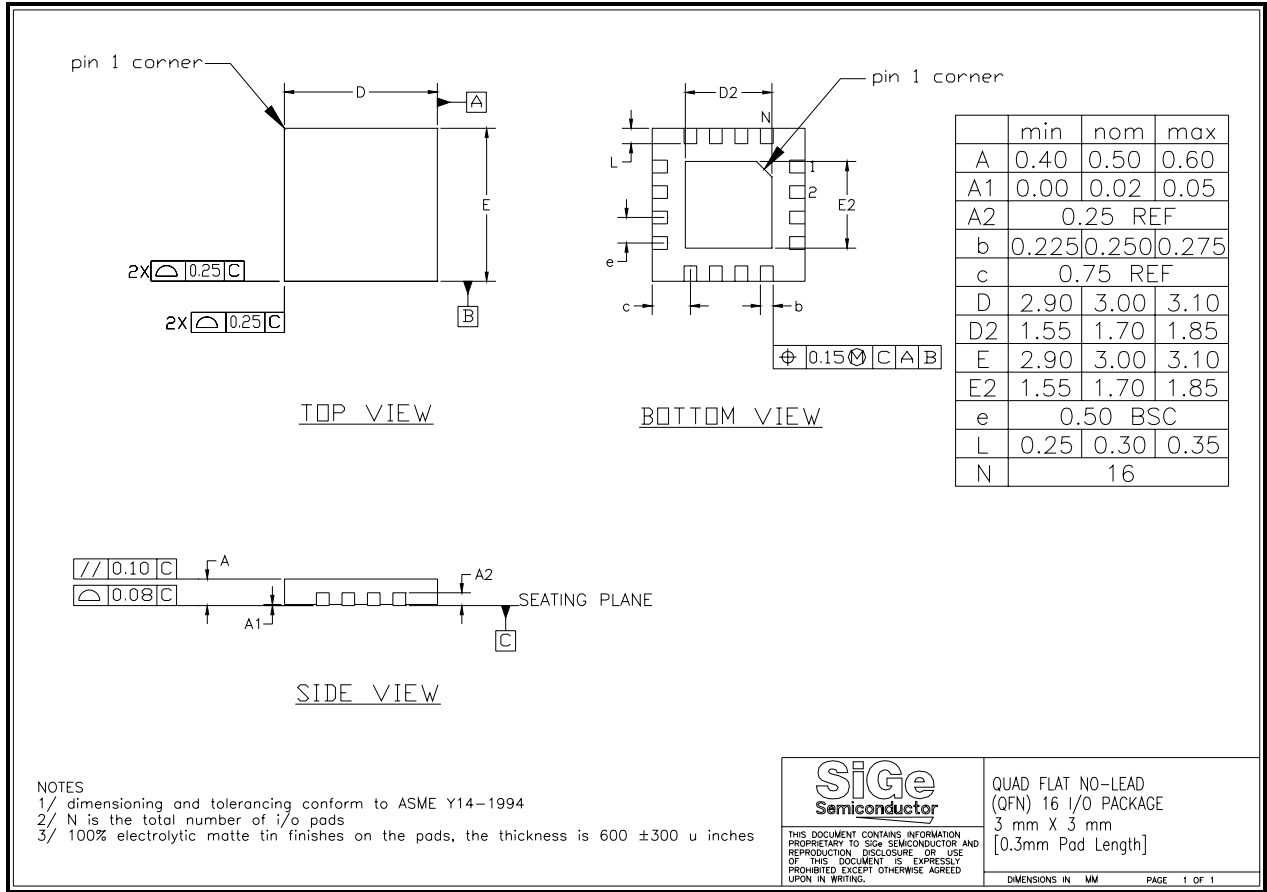


Figure 12: SE2523BU Package Drawing

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Product Preview

The datasheet contains information from the product concept specification. SiGe Semiconductor, Inc. reserves the right to change information at any time without notification.

Preliminary Information

The datasheet contains information from the design target specification. SiGe Semiconductor, Inc. reserves the right to change information at any time without notification.

Production testing may not include testing of all parameters.

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