Applications

- DSSS 2.4GHz WLAN (IEEE802.11b)
- OFDM 2.4GHz WLAN (IEEE802.11g)
- Access Points, PCMCIA, PC Cards
- 2.4GHz Cordless Telephones

Features

- High output power amplifier
- +23dBm P_{1dB} at 3.3V
- +25dBm P_{sat} at 3.3V
- Integrated Power Detector
- Integrated control for output power and DC current
- Single supply voltage: 2.7 to 3.6 V
- Pin compatible with SiGe Semiconductor's SE2522L
- Exceptional temperature stability <1dB output power variation from –40 to +85°C
- Small outline plastic package

Ordering Information

Type	Package	Remark
SE2522BL	3mm x 2mm 8 Pin QFN	Samples

Product Description

The SE2522BL is a 2.4GHz power amplifier. The device is designed for use in the 2.4GHz ISM band for wireless LAN and cordless telephone applications. It incorporates a power detector for closed loop monitoring of output power.

For wireless LAN applications, the device meets the requirements of IEEE802.11b and delivers approximately +23dBm @ ACPR = -30dBc. In IEEE802.11g applications the PA delivers approximately 16dBm.

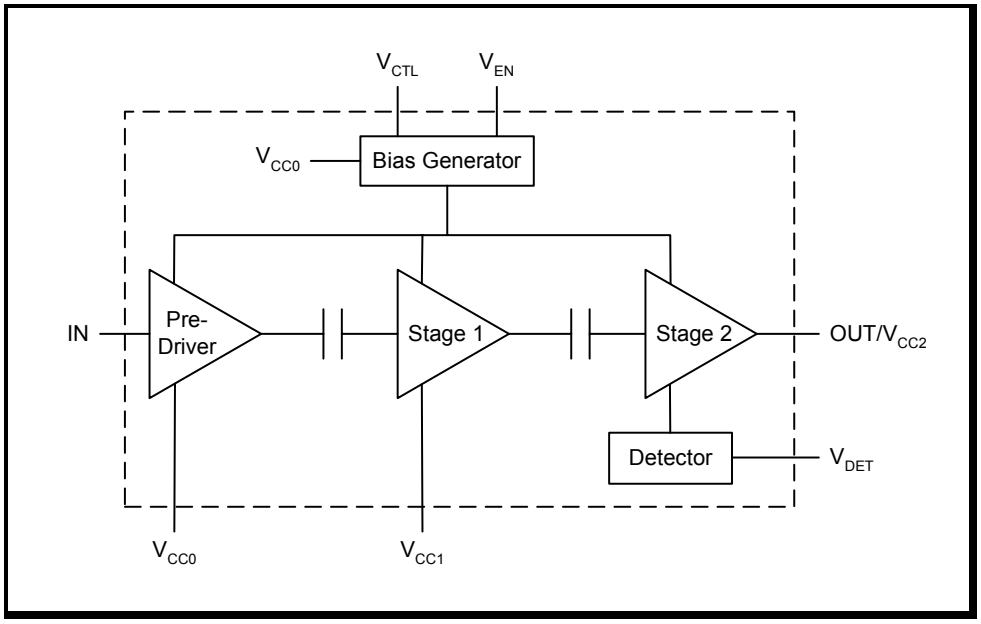
For cordless telephone applications, the SE2522BL delivers up to +25dBm saturated output power at 3.3V.

The SE2522BL includes a linear analog control (0.1 to 1.6V) for minimizing DC current consumption and maximizing PAE.

The SE2522BL contains a digital enable for device on/off control, ramping is typical 1 µsec.

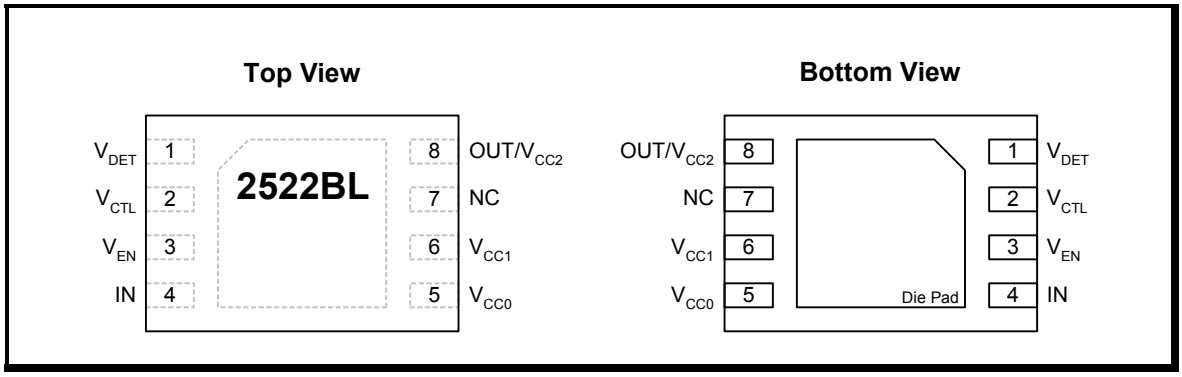
The SE2522BL contains an integrated power detector with an input power range of 15dB, and an accuracy of ± 1.0dB. An accurate automatic level control function can easily be implemented using this detector circuit.

Functional Block Diagram



Pin Out Diagram

Note: Pads and die pad shown are at the bottom of package.



Pin Out Description

Pin No.	Name	Description
1	V_{DET}	Analog power detector output
2	V_{CTL}	Controls the RF output power and DC current level of the power amplifier. An analog control signal between 0.1V and 1.6V varies the PA output power between Min. and Max. values.
3	V_{EN}	Power Amplifier Enable pin. A digital control signal with logic high (power up) and logic low (power down) is used to turn the device on and off.
4	IN	Power amplifier RF input, external input matching network with DC blocking is required.
5	V_{CC0}	Bias block and Pre-driver collector supply voltage.
6	V_{CC1}	Stage 1 collector supply voltage, an external inter-stage matching network is required
7	NC	No Connect
8	OUT/V_{CC2}	PA Output and Stage 2 collector supply voltage, external output matching network with DC blocking is required.
Die Pad	GND	Heat-slug Die Pad is thermal and electrical ground

Absolute Maximum Ratings

These are stress ratings only. Exposure to stresses beyond these maximum ratings 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	Parameter	Min.	Max.	Unit
V_{CC}	Supply Voltage on pins V_{CC0}, V_{CC1}, V_{CC2}	-0.3	+3.6	V
V_{CTL}	Analog Control Voltage	-0.3	V_{CC}	V
V_{EN}	Ramping Voltage	-0.3	V_{CC}	V
P_{IN}	RF Input Power		+8	dBm
T_A	Operating Temperature Range	-40	+85	°C
T_{STG}	Storage Temperature Range	-40	+150	°C
T_j	Maximum Junction Temperature		+150	°C

DC Electrical Characteristics

Conditions: $V_{CC} = V_{EN} = 3.3V$, $V_{CTL} \geq 1.6V$, $T_A = 25°C$, unless otherwise noted.

Symbol	Parameter	Min.	Typ.	Max.	Unit
V_{CC}	Supply Voltage	2.7	3.3	3.6	V
I_{CC-1DB}	Supply Current at P_{1DBH}		250		mA
I_{CC-SAT}	Supply Current at P_{SAT} , $V_{CC} = 3.3V$		325		mA
ΔIcc_{TEMP}	Supply Current variation over temperature from $T_A = 25°C$ ($-40°C < T_A < +85°C$)		25		%
V_{CTL}	Recommended PA Gain and Bias Control Voltage Range	0.1		1.6	V
I_{CTL}	V_{CTL} current requirement			275	µA
V_{ENH}	Logic High Voltage	1.0			V
V_{ENL}	Logic Low Voltage			0.5	V
I_{OFF}	Leakage Current when $V_{EN} = 0V$.		1	10	µA

AC Electrical Characteristics

Conditions: V_{CC} = V_{EN} = 3.3V, V_{CTL} ≥ 1.6V, P_{IN} < -8dBm, T_A = 25°C, f = 2.45 GHz, input and output externally matched to 50Ω, unless otherwise noted.

Power Amplifier						
Symbol	**Parameter**	**Note**	**Min.**	**Typ.**	**Max.**	**Unit**
f_{L-U}	Frequency Range		2400		2485	MHz
P_{1dBH}	High Gain 1dB Compressed Output Power, V_{CTL} ≥ 1.6V	1	21.0	23	25.0	dBm
P_{1dBL}	Low Gain 1dB Compressed Output Power, V_{CTL} = 0.1V	1		-5		dBm
P_{SAT}	Saturated Output Power, P_{IN} = 0dBm, V_{CTL} ≥ 1.6V, V_{CC} = .3V	2		25		dBm
G	Small Signal Gain			35		dB
G_{VAR}	Gain Variation over band (2400-2485 MHz)			1.0	2.0	dB
2f,3f,4f,5f	Harmonics	3			< -30	dBm/100kHz
$S21_{OFF}$	Forward Gain when PA is "OFF" State, P_{IN} ≤ 0dBm, V_{EN} = 0V			-30		dB
S12	Reverse Gain			-42	-32	dB
T_R	Rise and Fall Time	4			1.2	µs
STAB	Stability (P_{IN} ≤ 0dBm, Load VSWR = 6:1)		All non-harmonically related outputs less than -50 dBc/100kHz			

Notes: (1) Matching networks optimized for linear output power performance.
(2) With matching networks optimized for saturated output power performance.
(3) Harmonic levels and ACPR are greatly affected by topology of external matching networks.
(4) Rise and Fall Time is defined between 10% and 90% final output power level.

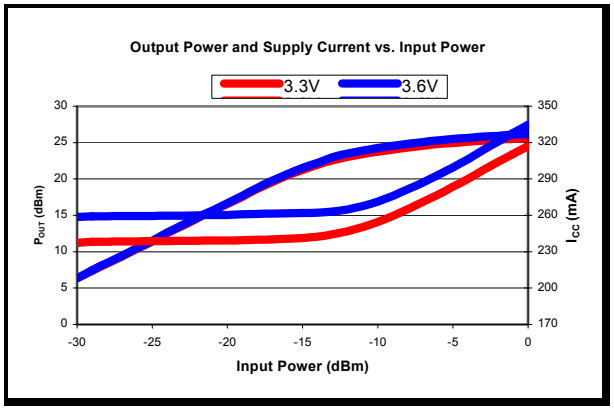
Conditions: V_{CC} = 3.3V, f = 2.4-2.5Ghz, T_A = 25°C, PA Output externally matched to 50Ω, unless otherwise noted.

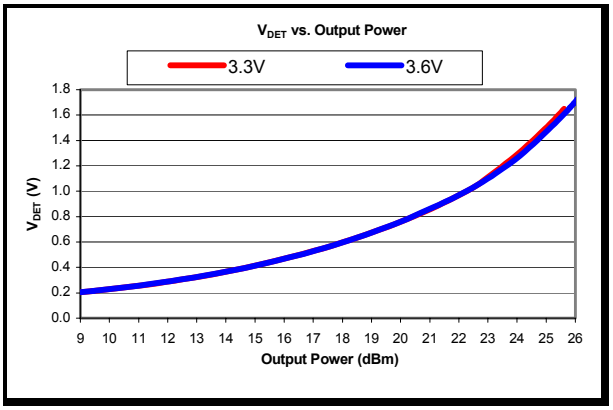
Power Detector						
Symbol	**Parameter**	**Note**	**Min.**	**Typ.**	**Max.**	**Unit**
PDR	Power detect range, peak power		6		25	dBm
PDT	PA power detect, response time, 5pF load			0.1	0.8	µsec
PDS	PA power detect, slope, 10 to 23dBm peak.	1,2	12	14	17	dB/V
PDV_{max}	PA power detect, output voltage maximum, load > 5kΩ	1,2		1.7		V
PDV_{min}	PA power detect, output voltage minimum, load > 5kΩ	1,2		0.1		V
PDV_{p23}	PA power detect output voltage, P_{OUT} = 23dBm peak	4		1.1		V
$PDVA_{p23}$	PA power detect output voltage accuracy, P_{OUT} = 23dBm			±35		mV

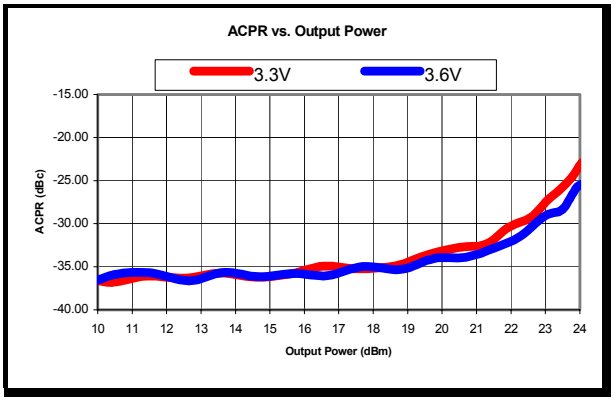
Notes: (1) Matching networks optimized for linear output power performance.
(2) PD response is dependant on PA output matching, above specifications are valid for SiGe recommended matching networks.

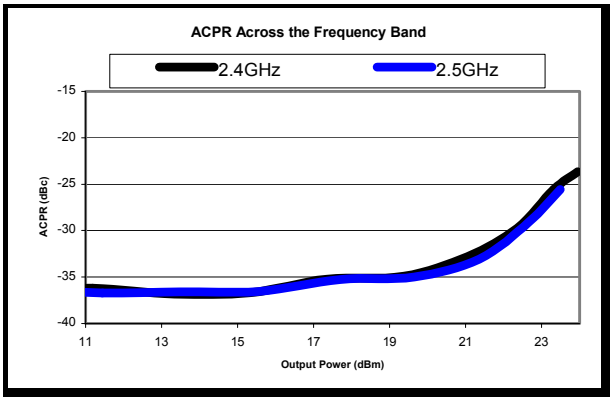
Typical Performance Characteristics

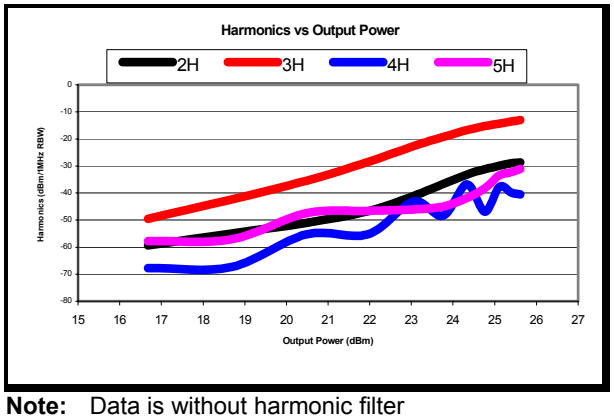
Conditions: V_{CC} = 3.3V, V_{CTL} = 1.6V, V_{EN} = 3.3V, F = 2.45GHz, P_{IN} = -12dBm, using IEEE802.11b modulation, and matching networks optimized for linear output power performance. Performance graphs are based on preliminary evaluation information and may differ from the AC and DC electrical specifications.

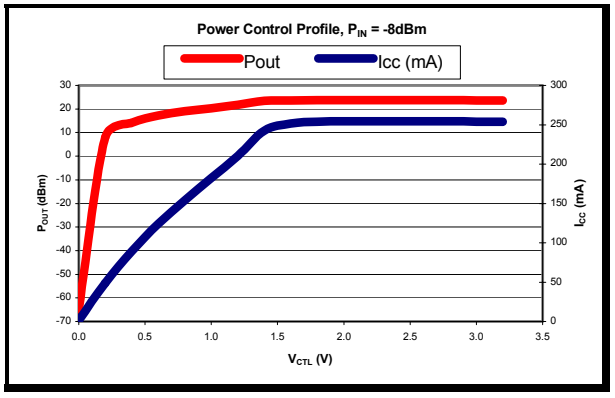






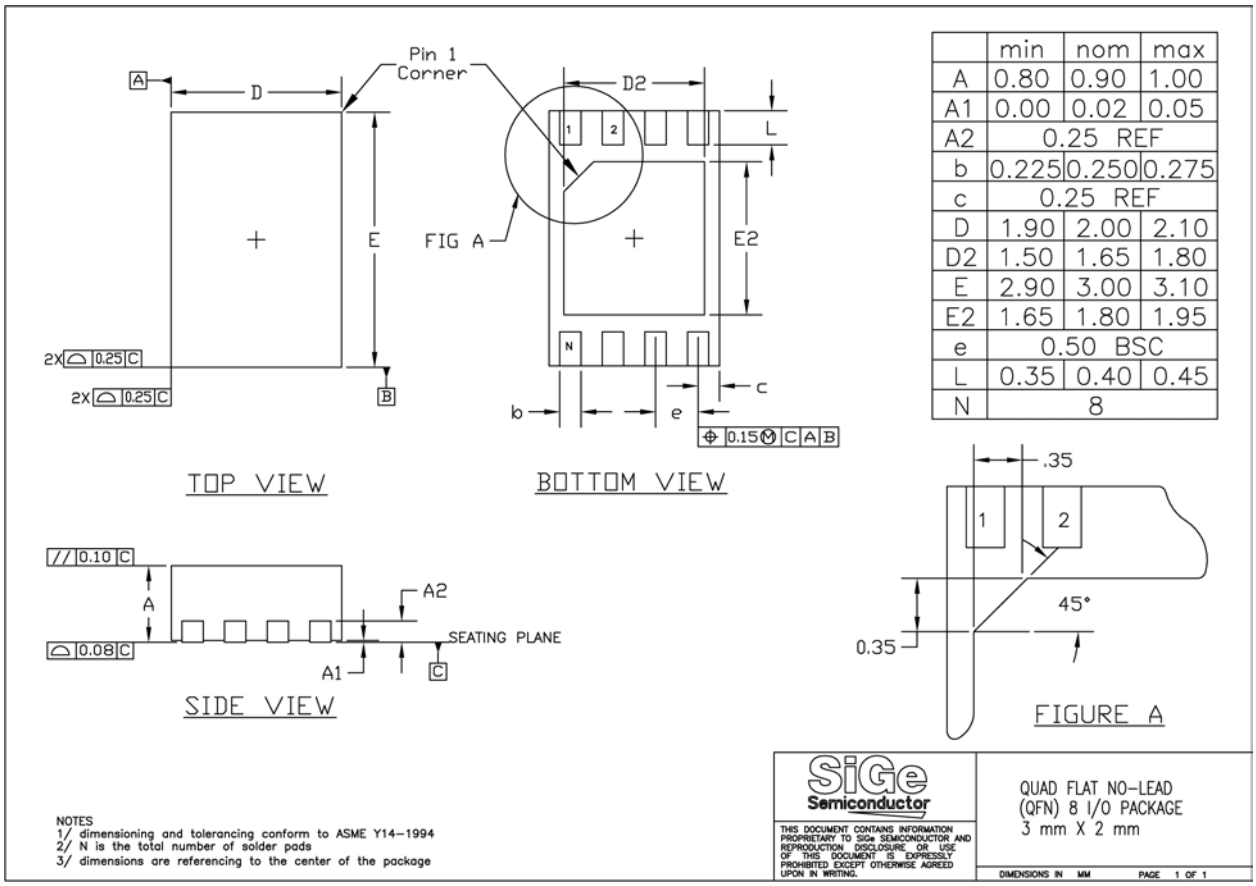






Note: Data is without harmonic filter

Package Description



	min	nom	max
A	0.80	0.90	1.00
A1	0.00	0.02	0.05
A2		0.25 REF	
b	0.225	0.250	0.275
c		0.25 REF	
D	1.90	2.00	2.10
D2	1.50	1.65	1.80
E	2.90	3.00	3.10
E2	1.65	1.80	1.95
e		0.50 BSC	
L	0.35	0.40	0.45
N		8	

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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.

Final
The datasheet contains information from the final product specification. SiGe Semiconductor Inc. reserves the right to change information at any time without notification. Production testing may not include testing of all parameters.