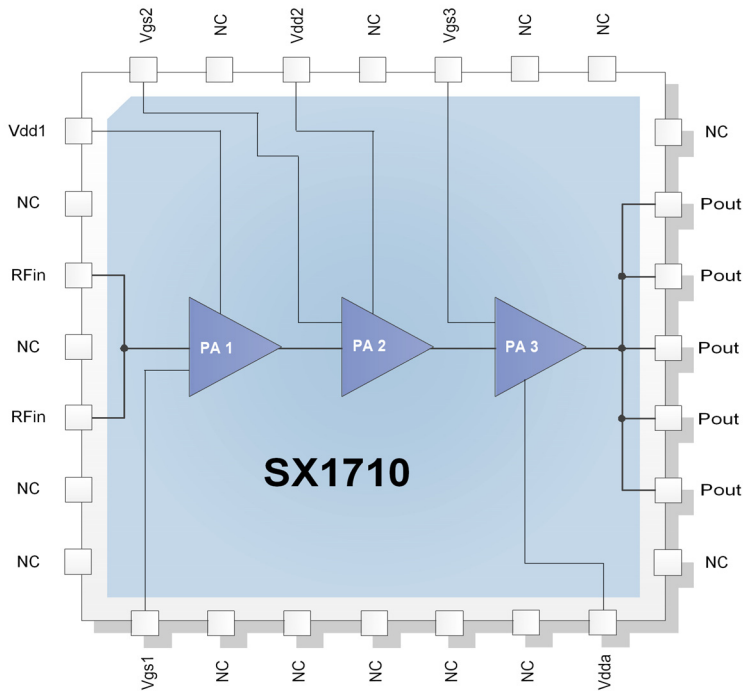
Broadband High Efficiency RF Power Amplifier
100 MHz to 1 GHz



GENERAL DESCRIPTION

The SX1710 is a high-gain / highly efficient power amplifier offering high performances and broad band operation. This power amplifier is intended to be used with constant envelop signal in VHF and UHF frequency bands. This is the ideal part for RFID and other FM, FSK, ASK applications in a frequency range from 100 MHz to 1 GHz. The chip is fabricated on a silicon process. The chip is assembled in a low thermal resistance 5x5 mm^2 QFN28 package.

KEY PRODUCT FEATURES

- Wide operation frequency range from 100MHz to 1 GHz.
- High power gain up to 35dB.
- High output power up to 34.5dBm (2.8W).
- High power added efficiency up to 55%.
- 5x5 mm2 plastic QFN28 with 0.5mm pitch.

APPLICATIONS

- Wireless data communication (FSK, ASK / OOK, GFSK, MSK).
- RFID reader/writers.
- Automatic meter reading (AMR).
- Wireless sensor network and Ad Hoc application.
- Remote control and sensing systems.
- Commercial and consumer electronics.

ORDERING INFORMATION

Part Number	Temperature Range	Package	MOQ
SX1710IMLTRT	-40 °C to +85 °C	Lead Free QFN-28	3000 pieces on reels

- RoHS/WEEE compliant product

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FIGURES

TABLES

1. General Description

SX1710 is a three-stage wide-band power amplifier device with high gain. An input power of -5 dBm is required to achieve its fully saturate output power.

In normal application for signal with constant envelope, the first and second stages of the amplifier operate in class-A and class-AB mode, respectively. The third stage of the amplifier operates in class-C mode. Its DC current will be increased with RF input signal.

1.1. Package Marking

Figure 1. Package Marking

Note: yyww: Date Code
xxxxx: Lot No.

1.2. Pin Description

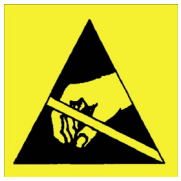
The description of the pins of the circuit is given in Table 1 below.

Table 1 Pin Description

Number	Name	Type	Description
1	Vdd1	Power Supply	Power Supply for first stage
2	NC	Floating	No Connection
3	RFin	RF Input	RF Input and off chip DC blocking capacitor required
4	NC	Floating	No Connection
5	RFin	RF Input	Same as Pin 3
6	NC	Floating	No Connection
7	NC		
8	Vgs1	Analog Input	Bias Input for first stage
9	GND	Ground	Ground
10	GND		
11	NC	Floating	No Connection
12	NC		
13	NC		
14	Vdda	Power Supply	Power Supply for ESD
15	NC		No Connection
16	RFout	RF Output	Power Supply and RF Output for the output stage
17	RFout		
18	RFout		
19	RFout		
20	RFout		
21	NC	Floating	No Connection
22	NC		
23	NC		
24	Vgs3	Analog Input	Bias Input for Output Stage
25	NC	Floating	No Connection
26	Vdd2	Power Supply	Power Supply for Second Stage
27	NC	Floating	No Connection
28	Vgs2	Analog Input	Bias Input for Second Stage
Snug	GND	Ground	Ground and Thermal Dissipation

2. Electrical Characteristics

2.1. ESD Notice



The SX1710 is an RF Power Amplifier device which satisfies the ff:

- Class 1A of the JEDEC standard JESD22-A114 (Human Body Model) on all pins
- Class I of the JEDEC standard JESD22-C101 (Charge Device Model) on all pins

CAUTION: ESD sensitive device!
It should thus be handled with all the necessary ESD precautions to avoid any permanent damage!

2.2. Absolute Maximum Ratings

Stresses above the values listed below may cause permanent device failure. Exposure to absolute maximum ratings for extended periods may affect device reliability.

Table 2 Absolute Maximum Ratings

Symbol	Description	Min.	Max.	Unit
Vdsmr	Drain to source voltage (transient)	-0.5	5.0	V
Idsmr	Total supply current	-	2.2	A
Vgsmr	Gate to source voltage	-0.5	2.0	V
Ovswrmr	Output load VSWR	-	10:1	-
Irfmr	Input level	-	15	dBm
Tsoldmr	Soldering temperature (lead)	-	260	°C
Tmr	Storage temperature	-40	125	°C

2.3. Operating Range

Conditions: VDD must be powered up before or in parallel with VGG (Vbias)

Table 3 Operating Range

Symbol	Description	Min.	Max.	Unit
VDD	Supply Voltage	2.5	5.0	V
VGG (Vbias)	Bias Main Supply	2.5	4.0	V
VGS	Bias Control Voltage per stage	0.7	1.7	V
Tja	Thermal Resistance: junction-to-ambient	30.21	-	°C/W
Trop	Temperature	-40	85	°C

2.4. Specifications

Nominal conditions: Measurements performed on the basis of the general application circuitry.

Temp = 25 °C, VDD = 4.0V, Vbias= 3.3V, RF frequency = 465 MHz, Pin = 0 dBm CW, unless otherwise specified.

Table 4 Specifications

Description	Conditions	Min.	Typ.	Max.	Unit
Frequency Range	Nominal	100	-	1000	MHz
Supply Current	VDD = 4.0 V, Pout = 33 dBm	-	1.23	-	A
Maximum Output Power (Pmax)	Nominal	-	33	-	dBm
Power Added Efficiency	VDD = 4.0 V, Pout = 33 dBm	-	41	-	%
Input Power for Pmax	Nominal	-	0	-	dBm
Reverse Isolation	Nominal	-	-60	-	dB
Second Harmonic Level	Nominal	-	-42	-	dBc
Third Harmonic Level	Nominal	-	-50	-	dBc
Fourth Harmonic Level	Nominal	-	-33	-	dBc
Input Return Loss	Externally connected to 50Ω	-	6.2:1	-	-
Output Return Loss	Externally connected to 50Ω	-	10:1	-	-

3. Application Information

3.1. General Application Schematic

The typical test and application schematics including harmonics filtering for 450MHz operation is shown in Figure 2.

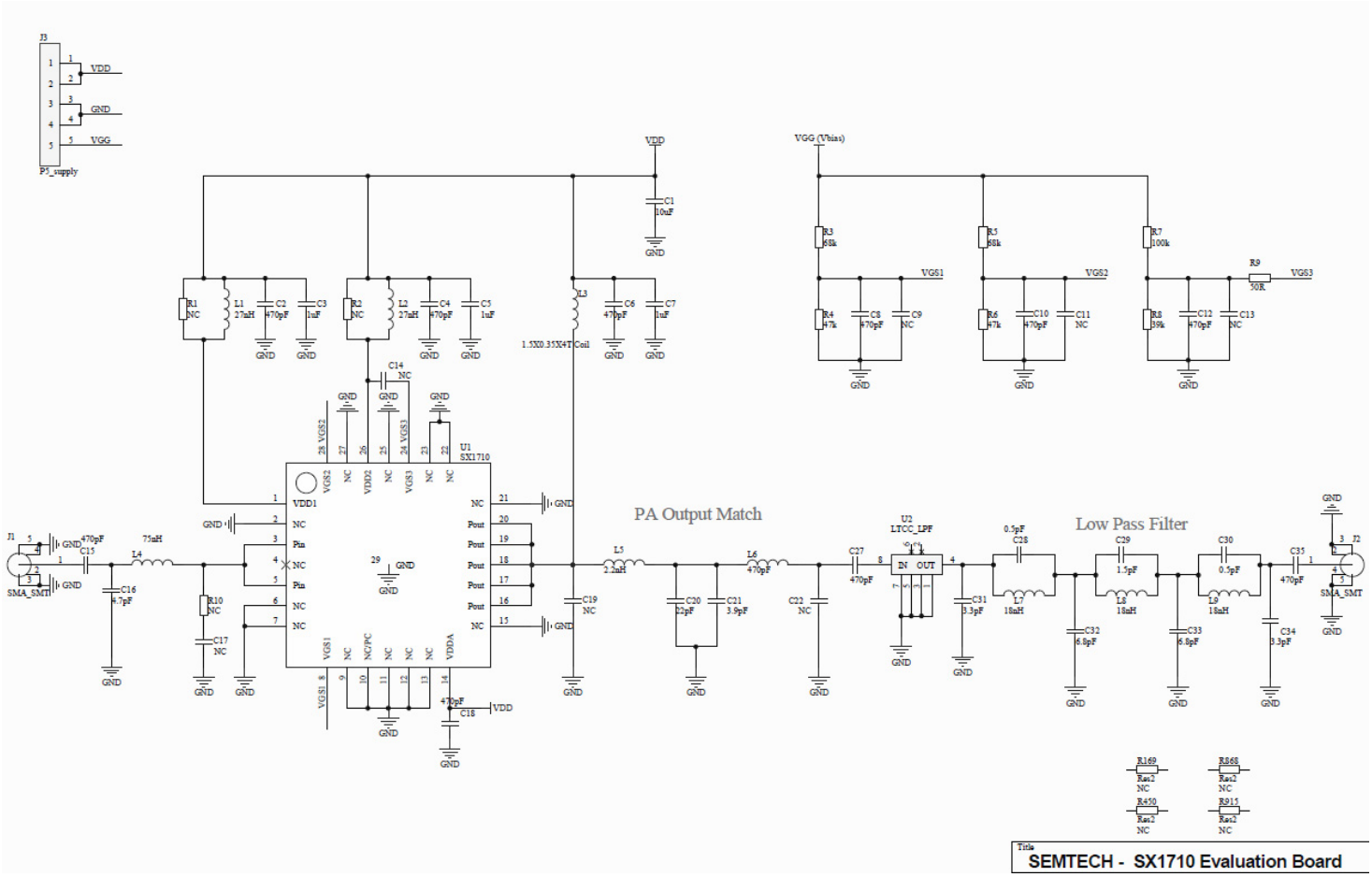


Figure 2. SX1710 test and application circuit for 450MHz Applications

3.2. General Application Layout

The typical test and application layout including harmonics filtering for VHF and UHF operation is shown in figure 3

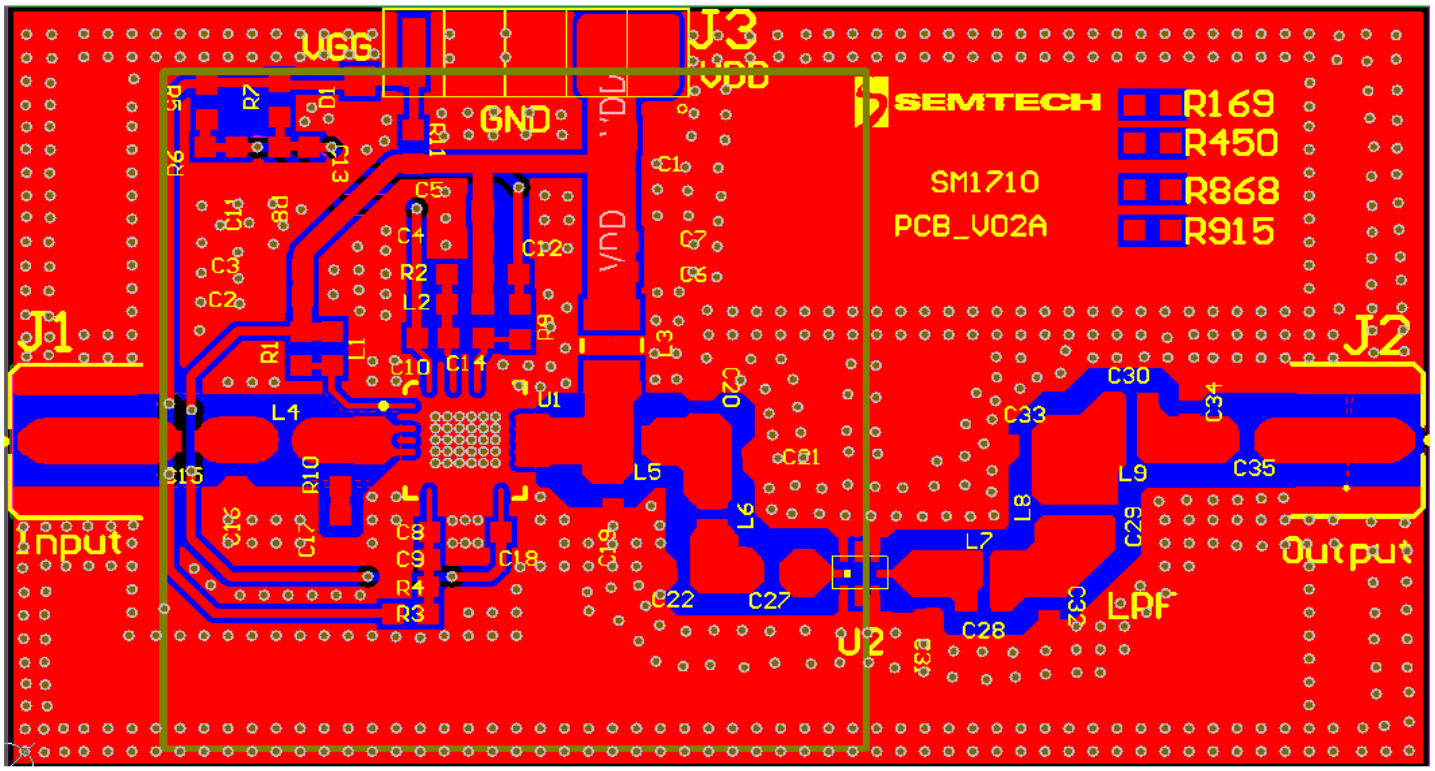


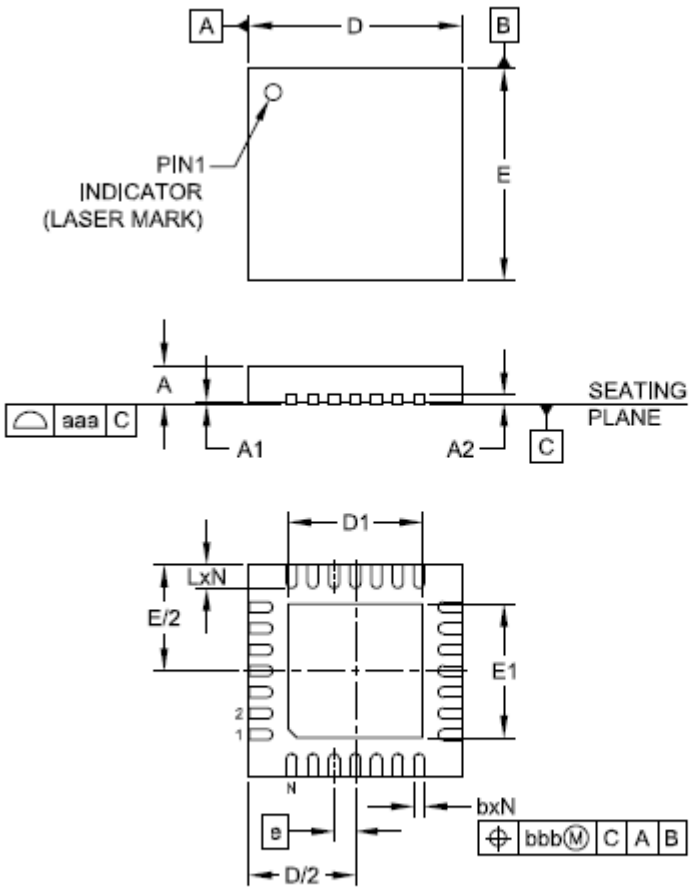
Figure 3. SX1710 Test and Application Layout for VHF and UHF Operations (59.18mm by 33mm)

A special care must be taken care for the multi via layout of the PCB. 10 mil hole size is recommended and via must be trough top layer to bottom layer. If transmit duty cycle is high, a good thermal dissipation is necessary and a heat sink must be required.

Please contact Semtech support, specific reference designs are available to fit your application.

4. Packaging Information

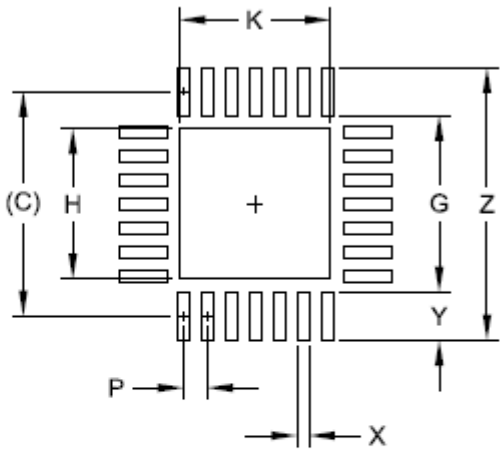
SX1710 is available in a 28-lead QFN package as shown in Figure 4 below.



DIMENSIONS			
DIM	MILLIMETERS		
	MIN	NOM	MAX
A	0.80	—	1.00
A1	0.00	—	0.05
A2		(0,20)	
b	0,18	0,25	0,30
D	4.90	5.00	5.10
D1	3.00	3.15	3.25
E	4,90	5,00	5,10
E1	3.00	3.15	3.25
e		0.50 BSC	
L	0,45	0,55	0,65
N		28	
aaa		0.08	
bbb		0.10	

NOTES:
1. CONTROLLING DIMENSIONS ARE IN MILLIMETERS (ANGLES IN DEGREES).
2. COPLANARITY APPLIES TO THE EXPOSED PAD AS WELL AS THE TERMINALS.

Figure 4. Description of the SX1710 Package



DIMENSIONS	
DIM	MILLIMETERS
C	(4.70)
G	3.70
H	3.15
K	3.15
P	0.50
X	0.25
Y	1.00
Z	5.70

NOTES:

1. CONTROLLING DIMENSIONS ARE IN MILLIMETERS (ANGLES IN DEGREES).
2. THIS LAND PATTERN IS FOR REFERENCE PURPOSE ONLY. CONSULT YOUR MANUFACTURING GROUP TO ENSURE YOUR COMPANY'S MANUFACTURING GUIDELINES ARE MET.
3. THERMAL VIAS IN THE LAND PATTERN OF THE EXPOSED PAD SHALL BE CONNECTED TO A SYSTEM GROUND PLANE. FAILURE TO DO SO MAY COMPROMISE THE THERMAL AND/OR FUNCTIONAL PERFORMANCE OF THE DEVICE.
4. SQUARE PACKAGE - DIMENSIONS APPLY IN BOTH " X " AND " Y " DIRECTIONS.

Figure 5. Land Pattern

5. Revision History

Table 5 Revision History

Revision	Date	Comment
1	May 2013	Preliminary Datasheet
2	November 2014	Specification and Application board changes

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