

SW8112Q

6-9GHz Ultra Wide Band(UWB) RF Front-End Module

Description

The SW8112Q is a Front-End Module (FEM) with a fully-integrated Power Amplifier (PA), Low-Noise-Amplifier (LNA) and Filter to reject out-of-band spurious. The SW8112Q requires no external matching component, reduces assembly complexity and the PCB area, enabling a cost-effective solution. The SW8112Q achieves high transmitting power, Low transmit/receive switching loss. All these features make SW8112Q an excellent choice for UWB FEM as it improves sensitivity with low noise figure and better distance with high output power, meanwhile it reduces the overall cost of the UWB transceiver.

Features

- Fully-Integrated PA/LNA/Pre-RX FILTER/Bypass Switch
- Tx output Saturated Power= +17.0 dBm@6.5GHz
- Tx Power Gain
 - 16.4 dB@6.5GHz
 - 12.0 dB@8.0GHz
- Rx Noise Figure
 - 2.9 dB@6.5GHz
 - 3.5 dB@8.0GHz
- Rx Power Gain
 - 14.7 dB@6.5GHz
 - 10.7 dB@8.0GHz
- RX Filter Rejection
 - >10dBc Rejection @DC~2.4GHz bands
- Bypass Insertion loss
 - 2.4 dB@6.5GHz
 - 4.7 dB@8.0GHz
- Slim QFN-16L package:3.0 mm X 3.0 mm X 0.55 mm

Applications

- Transceivers with IEEE 802.15.4-2011 UWB compliant

PIN Configuration and Marking

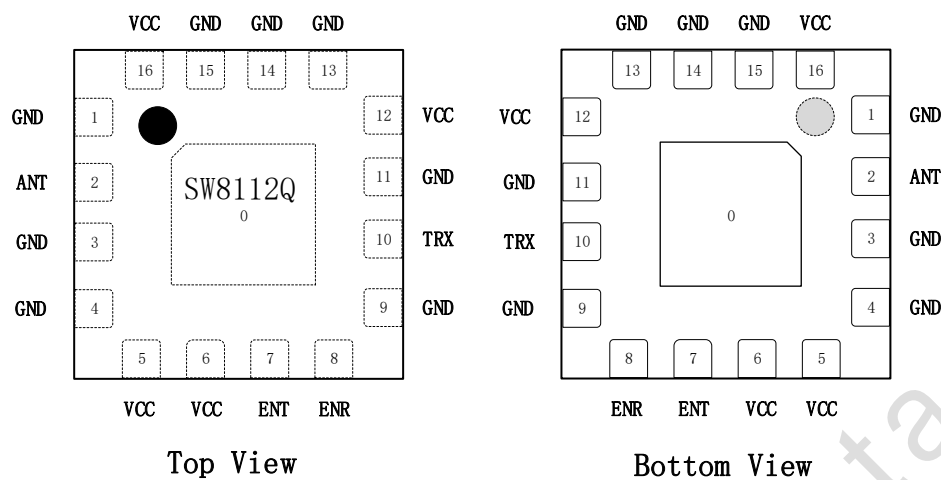


Figure 1. SW8112Q Pin Configuration and Marking

PIN Names and Signal Descriptions

Table1. PIN name and Description

Pin Num.	Name	Description
0	GND	GND pad
1	GND	GND pad
2	ANT	ANT pad
3	GND	GND pad
4	GND	GND pad
5	VCC	3.3V supply
6	VCC	3.3V supply
7	ENT	Enable of TX
8	ENR	Enable of RX
9	GND	Ground
10	TRX	TRX pad
11	GND	Ground
12	VCC	3.3V supply
13	GND	Ground
14	GND	Ground
15	GND	Ground
16	VCC	3.3V supply

Order Information

Table 2. Order Information

Part Number	Temperature	Package	RoHS	Mark	SPQ
SW8112Q	-40°C ~ 85°C	3.0mm*3.0mmQFN-16L	Yes	8112Q	Tape and Reel 3000 pcs/Reel

Typical Application

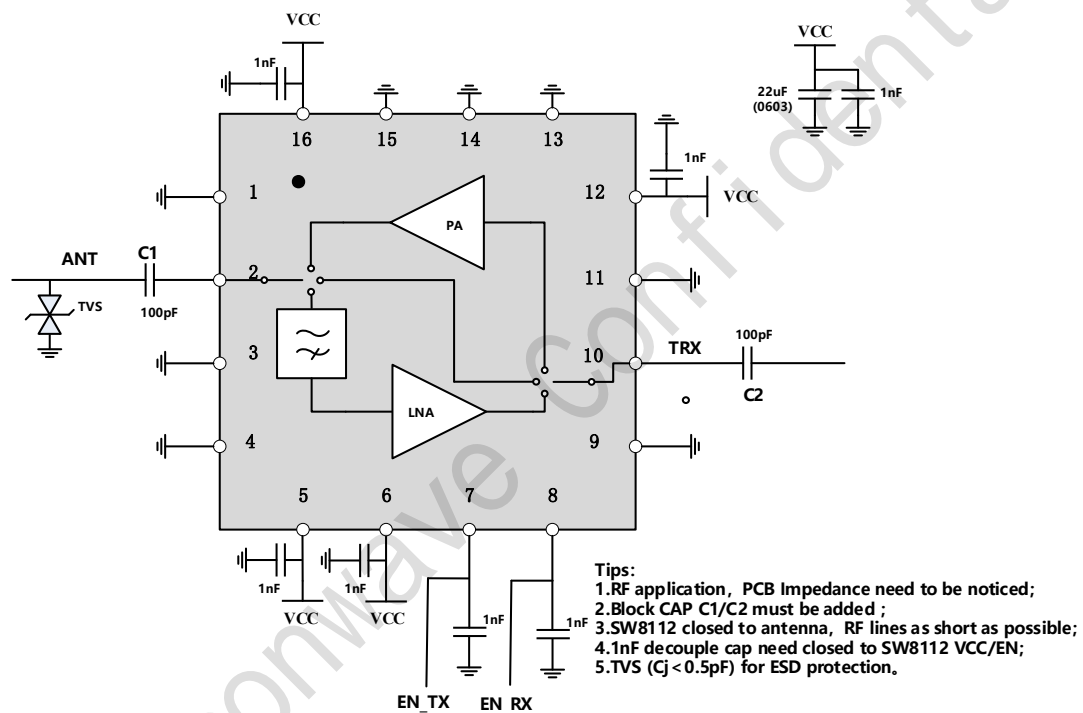


Figure 2. Typical Application Circuit

Absolute Maximum Ratings

Table 3. Limiting Values

Parameter	Symbol	Values			Unit
		Min.	Typ.	Max.	
Supply Voltage at Pin VCC	V _{CC}	-0.3	-	5.5	V
Voltage at Pin EN	V _{EN}	-0.3	-	5.5	V

Current into Pin VCC	I _{CC}	-	-	300	mA
RF input Power	P _{IN}	-	-	10	dBm
Package Thermal Resistance	θ _{JA}	-	TBD		°C/W
Junction Temperature	T _J	-	-	150	°C
Storage Temperature Range	T _{STG}	-65	-	150	°C
Ambient Temperature Range	T _{amb}	-40	-	85	°C
Solder Temperature(10s)		-	260	-	°C

Electrical Characteristics

(SW8112Q EVB¹⁾; V_{CC}=2.8 to 3.6V, T_A=-40~+85°C, f=6000MHz to 8500MHz; Typical values are at V_{CC}=3.3V and T_{amb}=+25°C, f=6500MHz, unless otherwise noted.)

Table 4 .Electrical Characteristics

Parameter		Conditions	Min.	Typ.	Max.	Units
DC ELECTRICAL CHARACTERISTICS						
V _{CC}	Supply Voltage		2.8	3.3	3.6	V
V _{EN}	Digital logic High		2.8	3.3		V
V _{EN}	Digital logic LOW				0.45	V
I _{CC}	TX Supply Current	ENT=High; ENR=Low		64		mA
I _{CC}	RX Supply Current	ENT=Low; ENR=High		33.0		mA
I _{SD}	Bypass Current	ENT=Low; ENR=Low		1.0		uA
I _{EN}	EN Supply Current			1.2		mA
TRANSMIT MODE AC ELECTRICAL CHARACTERISTICS						
f _{re}	Frequency		6.0	6.5	8.5	GHz
G _{pTX}	TX Power Gain	RF=-35dBm		16.4		dB
P _{1dB, TX}	TX Output 1dB Compression Point	f=7000MHz; TX mode		+14.5		dBm
P _{sat, TX}	TX Output saturation point	f=7000MHz; TX mode		+17.0		dBm
I _{CC-Psat}	TX current @P _{out} =+18dBm	f=7000MHz; TX mode		100		mA

HARM	Harmonics	2f ₀ ,3f ₀			-40	dBm
ISO	Forward Isolation	ENR=Low; ENT=High		45.0		dB
RECEIVE MODE AC ELECTRICAL CHARACTERISTICS						
Fre	Frequency		6.0	6.5	8.5	GHz
NF _{RX}	RX Noise Figure			2.9		dB
RL _{in}	Input Return Loss			10.0		dB
PG	Power Gain			14.7		dB
RL _{out}	Output Return Loss			8.8		dB
P _{1dB,RX}	RX Output 1dB Compression Point			+2.5		dBm
REJ	Out-Of-Band Rejection	DC-2.4GHz		10		dBc
BYPASS MODE AC ELECTRICAL CHARACTERISTICS						
Fre	Frequency		6.0	7.0	8.5	GHz
IL	Insertion Loss			2.4		dB
RECEIVE MODE AC ELECTRICAL CHARACTERISTICS						
T _{power on}	Power-on Time	Supply from low to high		5		μs
t _{on}	Turn-on Time	TX to RX		0.5		μs
t _{off}	Turn-off Time	RX to TX		0.5		μs

Note 1: EVB matched to 50Ω,0.8dB PCB losses are subtracted

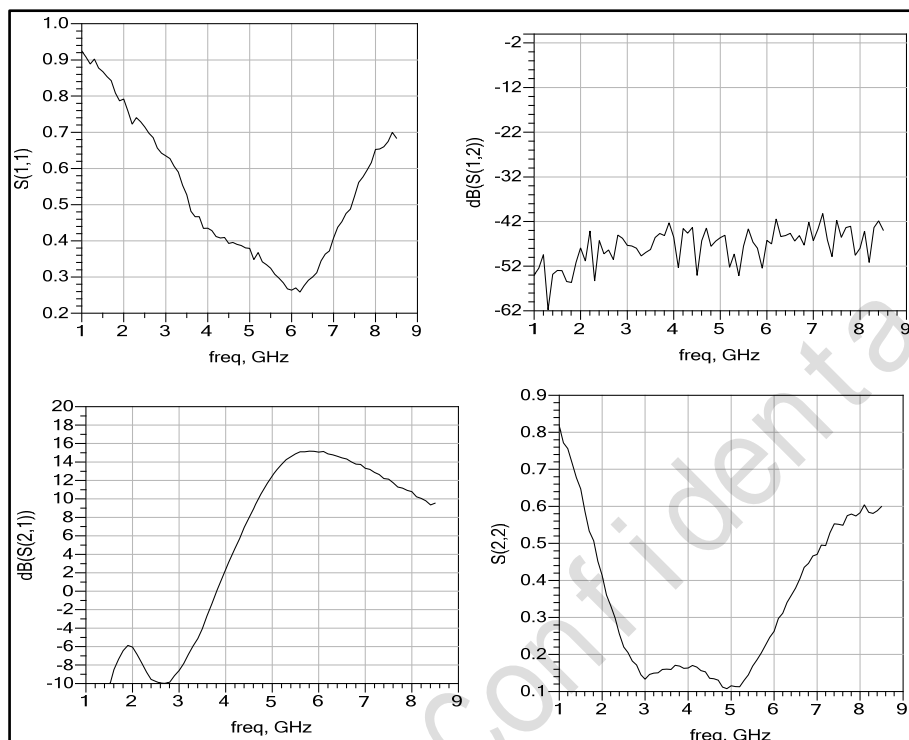
Enable Control Table

Table 5. EN control table

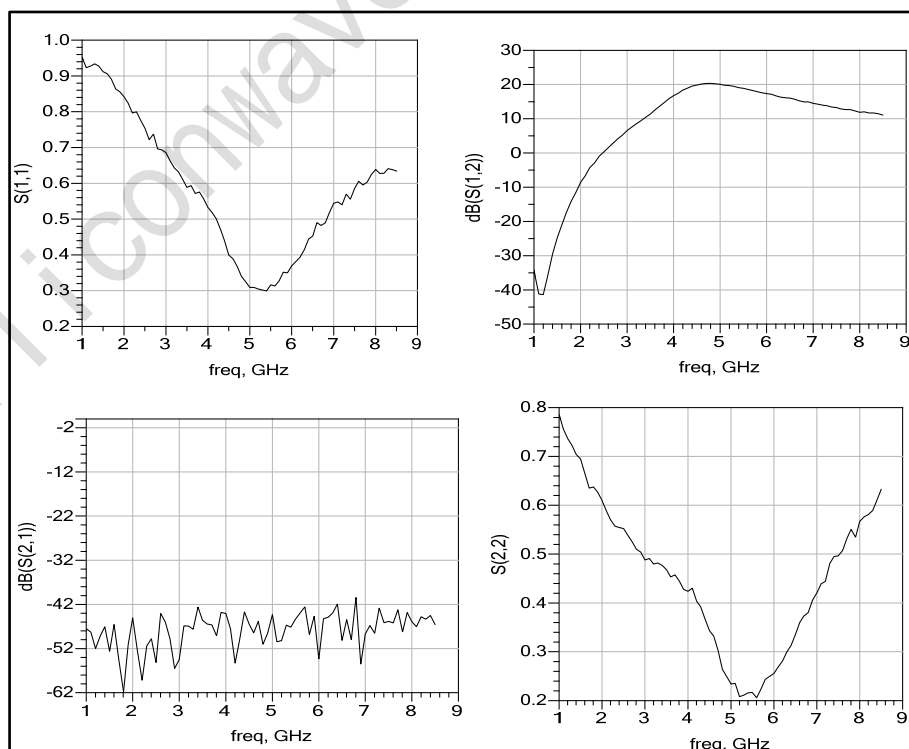
ENT	ENR	STATUS
HIGH	LOW	TX Mode
LOW	HIGH	RX Mode
LOW	LOW	Bypass Mode
HIGH	HIGH	FORBIDDEN

Typical Operating Graphics

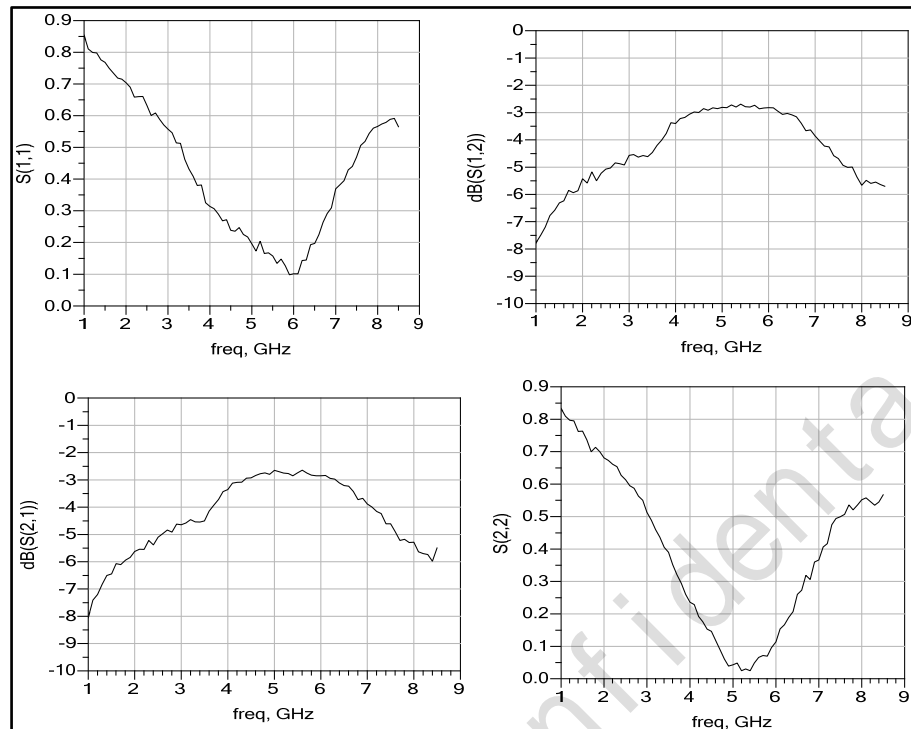
RX S-PARA VCC=3.3V ENR=3.3V SWEEP POWER=-35DBM



TX S-PARA VCC=3.3V ENT=3.3V SWEEP POWER=-35DBM



Bypass S-PARA VCC=3.3V ENT=0V SWEEP POWER=-35DBM



Application Informations

1. The SW8112Q requires no external capacitor/inductor for input matching. Optional supply decoupling capacitor is 1nF.
2. The SW8112Q should be placed close to the antenna. Use 50-ohm micro-strip lines to connect RF INPUT and RF OUTPUT. Bypass capacitor should be located close to the device. For long supply lines, it may be necessary to add more decoupling capacitors. Proper grounding of the GND pins is very important.

Package Information

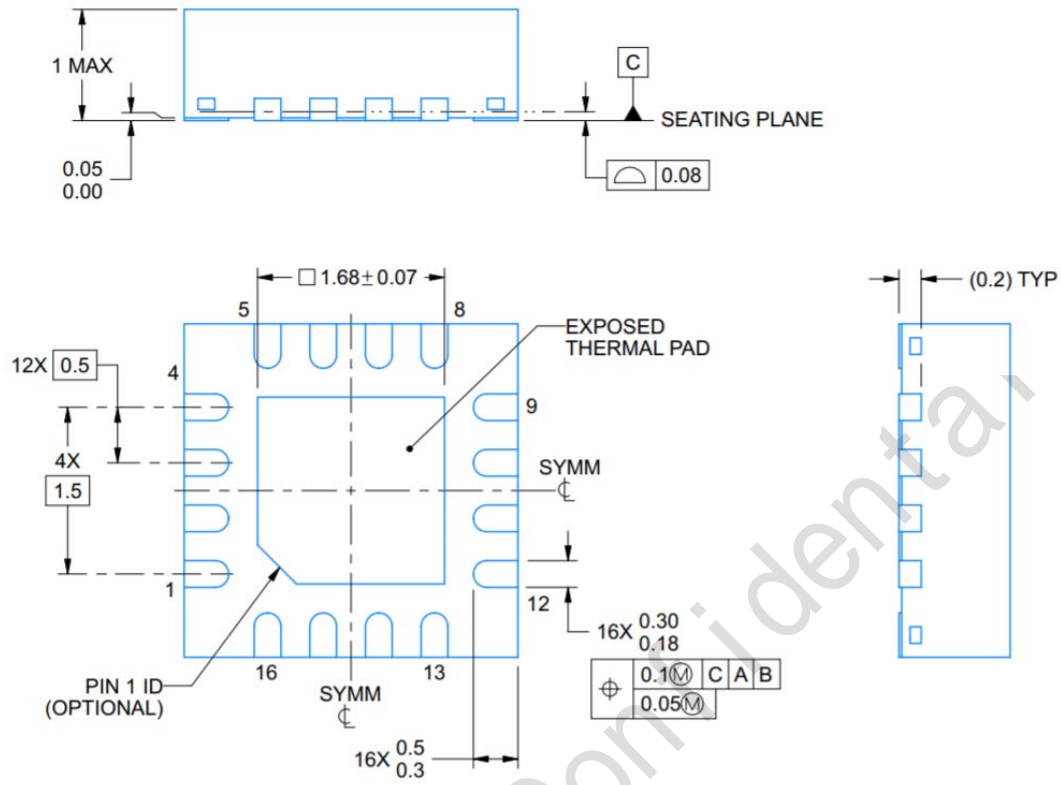


Figure 3. Package Outline

Recommended Solder Temperature

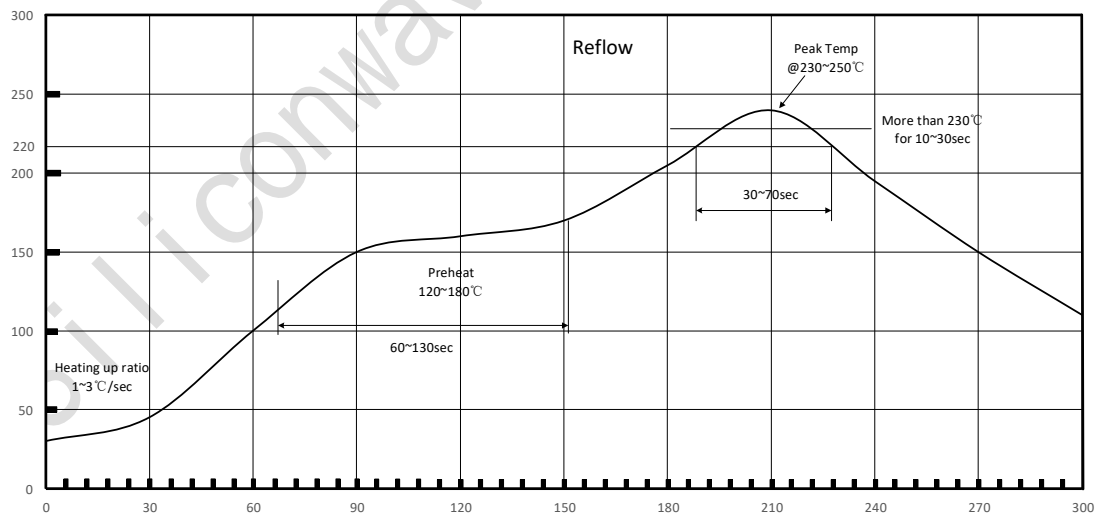


Figure 4. Recommended Solder Temperature

RoHS Compliant

The product does not contain lead, mercury, cadmium, hexavalent chromium, polybrominated biphenyls(PBB) or polybrominated diphenyl ethers(PBDE), and are therefore considered RoHS compliant.

Revision History

Document ID	Release Date	Change Record
V0.95	2020.07	Beta
V1.0	2020.08	Officially released
V1.1	2021.10.22	Correct VCC match and change logo
V1.2	2021.11.17	Correct VCC match
V1.3	2023.02.21	Add Bypass Mode

Important Notes

- All data or information contained herein are subject to change without prior notice. Please contact SILICONWAVE for further details of product specification.
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