DESCRIPTION

The SW7125D is a Low Noise Amplifier designed for Global Navigation Satellite Systems (GNSS) as GPS, GLONASS, Galileo and Compass. The SW7125D requires only one external input matching inductor, reduces assembly complexity and the PCB area, enabling a cost-effective solution.

The SW7125D achieves ultra-low noise figure, high gain, over a wide range of supply voltages from 1.5V up to 3.6V. All these features make SW7125D an excellent choice for GNSS LNA as it improves sensitivity with low noise figure and high gain, provide better immunity against out-of-band jammer signals with high linearity, reduces filtering requirement of preceding stage and hence reduces the overall cost of the GNSS receiver.

The SW7125D is available in a small lead-free, RoHS-Compliant, 1.5mm x 1.0mm x 0.75mm 6-pin DFN package。

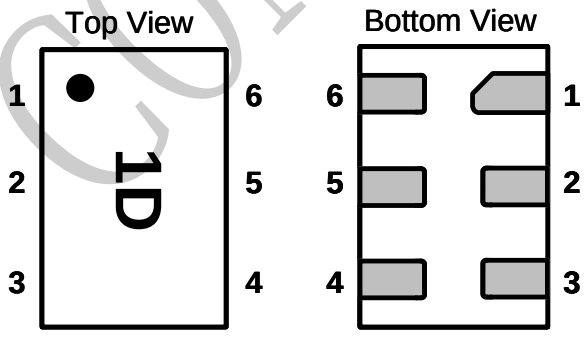
FEATURES

- **Ultra-low noise figure(NF)=0.65dB;**
- **High power gain=18.0dB;**
- **Low supply current: 6.9mA;**
- **High input 1dB-compression point= -8dBm;**
- **Requires only one input matching inductor;**
- RF output internally matched to 50 ohms;
- Supply voltage: 1.5V to 3.6V;
- Operating frequencies: 1550~1615MHz;
- DFN-6L package: 1.5mmX1.0mmX0.75mm;
- 3kV HBM ESD protection (including RFIN and RFOUT pin).

APPLICATIONS

- Smart phones, Tablet PCs;
- Personal Navigation Devices;
- Complete GPS/BDS chipset modules;
- Theft protection (laptop, ATM);
- Smart watch and other mobile devices.

PIN CONFIGURATION AND MARKING



Pin No.	Pin Name
1	GND
2	GND
3	RFIN
4	VCC
5	EN
6	RFOUT

Figure 2. SW7125D Pin Configuration and Marking

TYPICAL APPLICATION

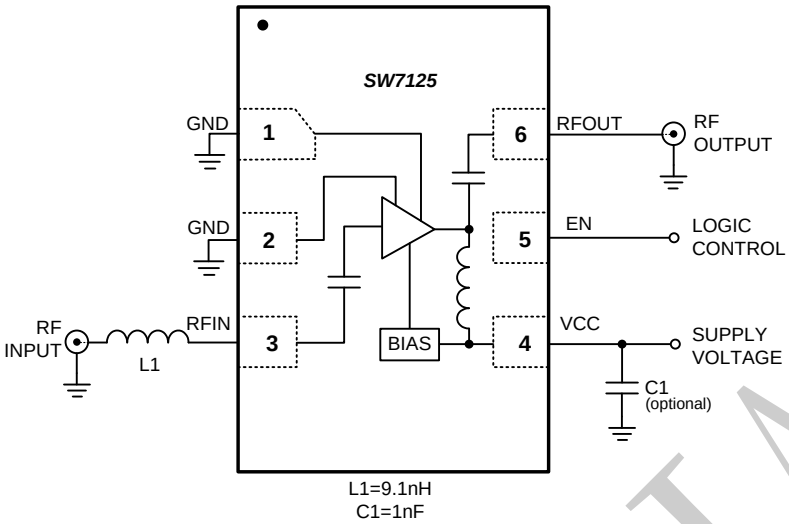


Figure 3. Application Schematic SW7125D

For a list of components see *Table4* and *Table5*

ORDER INFORMATION

Table 1. Order Information

Part Number	Temperature	Package	RoHS	Mark	SPQ
SW7125D	-40℃~85℃	1.5mm x 1.0 mm x 0.75mm DFN-6L	Yes	1D	Tape and Reel 3000 pcs/Reel

SW7125□□□

R： Tape&Reel
DN: DFN

ABSOLUTE MAXIMUM RATINGS

Table 2. Limiting Values

Parameter	Symbol	Values			Unit
		Min.	Typ.	Max.	
Supply Voltage at pin VCC	V_{CC}	-0.3	-	5.0	V
Voltage at pin EN	V_{EN}	-0.3	-	5.0	V
Current into pin VCC	I_{CC}	-	-	30	mA
RF input power	P_{IN}	-	-	10	dBm
Package thermal resistance	θ_{JA}	-	148.2		℃/W
Junction temperature	T_J	-	-	150	℃
Storage temperature range	T_{STG}	-65	-	150	℃
Ambient temperature range	T_{amb}	-40	-	85	℃
Solder temperature(10s)		-	260	-	℃
ESD range					
HBM[1)]			±3000		V
MM[2)]			±250		V
Latch-up					
Standard: JEDEC STANDARD NO.78DNOVEMBER 2011			+IT: +400 -IT: -400		mA mA

***Note 1**: HBM standard:MIL-STD-883H Method 3015.8.*

***Note 2**: MM standard: JEDEC EIA/JESD22-A115.*

ELECTRICAL CHARACTERISTICS

(SW7125D EVB[1)]; V_{CC}=1.5 to 3.6V, T_A=-40~+85℃, f=1550MHz to 1615MHz; Typical values are at V_{CC}=2.8V and T_{amb}=+25℃, f=1575.42MHz, unless otherwise noted.)

Table 3. Electrical Characteristics

PARAMETER		CONDITIONS	MIN	TYP	MAX	UNITS
DC ELECTRICAL CHARACTERISTICS						
V_{CC}	Supply Voltage		1.5	-	3.6	V
I_{SD}	Shut-Down Current	EN=Low			1.0	μA
I_{CC}Supply Current		EN=High		6.9		mA
V_{EN}	Digital Input-Logic High		0.80			V
V_{EN}	Digital Input-Logic Low				0.45	V
AC ELECTRICAL CHARACTERISTICS						
Gp	Power Gain			18.0		dB
RL_{in}	Input Return Loss			9.3		dB
ISL	Reverse Isolation			28.5		dB
RL_{out}	Output Return Loss			14.2		dB
NF	Noise Figure	Zs=50 ohm; No jammer		0.65		dB
Kf	Stability factor	f=20MHz...10GHz	1.0			
NF_j	Noise Figure with jammer	Pjam=-20dBm; fjam=850MHz		TBD		dB
		Pjam=-20dBm; fjam= 1850MHz		TBD		dB
IP_{1dB}	Inband input 1dB-compression point	f=1575.42MHz;		-7.8		dBm

$IIP3_{oob}$	Out-of-band input 3rd-order intercept point	f1= 1712.7MHz;
		f2=1850MHz;
		Pin=-20dBm
				TBD		dBm

$IIP3_{oob}$	Out-of-band input 3rd-order intercept point	f1= 1712.7MHz;
		f2=1850MHz;
		Pin=-30dBm
				TBD		dBm

H2-input referred	LTE band-13 2nd Harmonic	f=787.76MHz; Pin=-25dBm; f_{H2}=1575.52MHz		TBD		dBm
t_{on}	Turn-on time			2.2		μs
t_{off}	Turn-off time			1.7		μs

Note1: *input matched to 50 ohms using a high quality-factor 9.1nH inductor.*

APPLICATION INFORMATIONS

1.1 EN control

The SW7125D includes an internal switch to turn off the entire chip: apply logic high to EN to turn on, and a logic low to shut down.

1.2 List of components

1. The SW7125D requires only one external inductor for input matching. If the device/phone manufacturers implement very good power supply filtering on their boards, the bypass capacitor mentioned in this application circuit may be optional. With the capacitor, we can get better performance like a little higher gain etc. The value is optimized for the best gain, noise figure, return loss performance. Typical value of inductor is 9.1nH, capacitor is 1nF. For schematics see *Figure2.*
2. The output of SW7125D is internally matched to 50 ohms and a DC blocking capacitor is integrated on-chip, thus no external component is required at the output.
3. The SW7125D should be placed close to the GPS antenna with the input-matching inductor. Use 50- ohm micro-strip lines to connect RF INPUT and RF OUTPUT. Bypass capacitor should be located close to the device. For long Vcc lines, it may be necessary to add more decoupling capacitors. Proper grounding of the GND pins is very important.

Table 4 lists the recommended inductor types and values;

Table 4: list of inductor

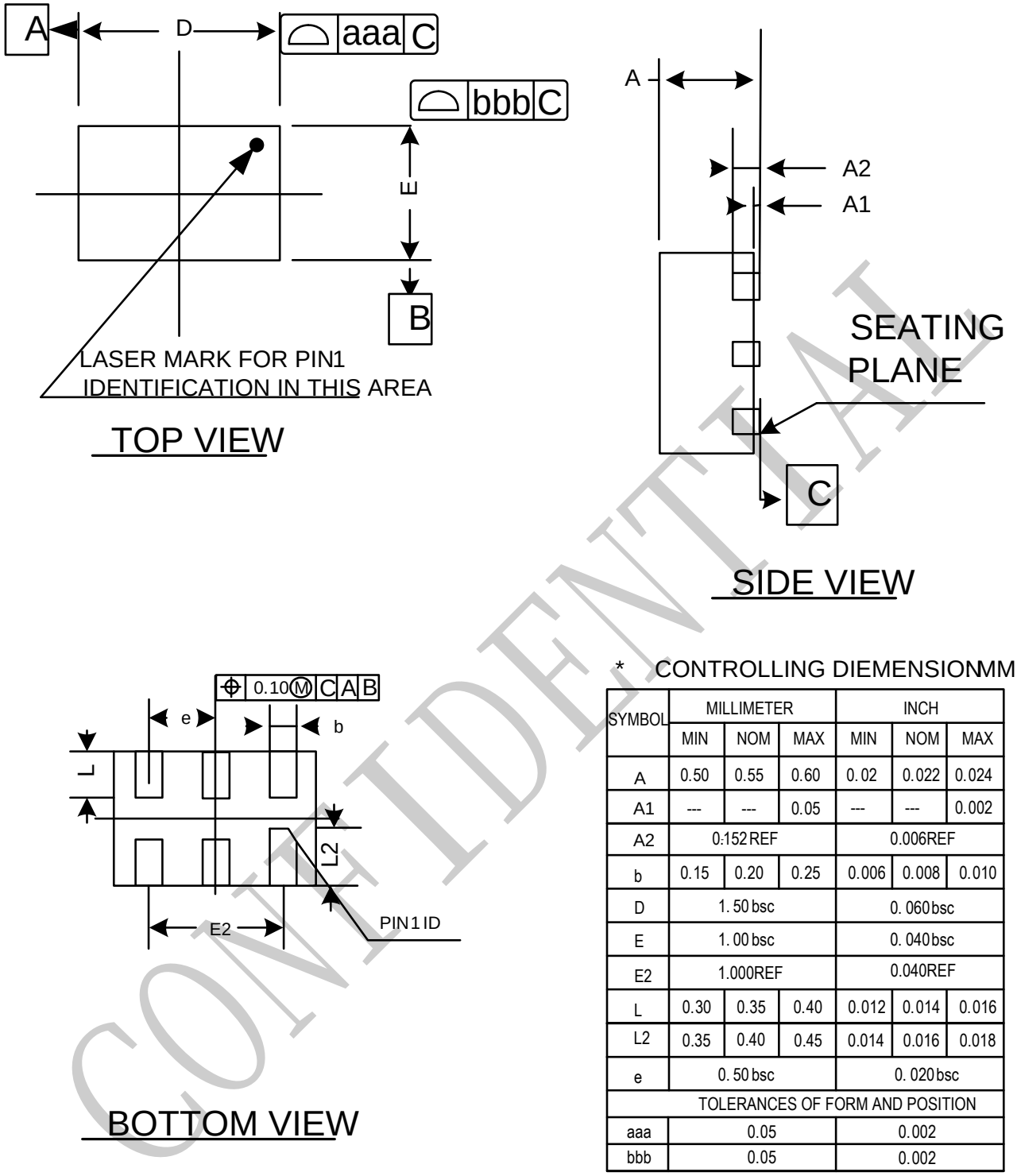
Part Number	Inductance	Q(min)	Q Test Frequency	Supplier	Size
Units	**nH**		**MHz**		
LQW15A	9.1	25	250	Murata	0402
SDWL1005C	9.1	24	250	Sunlord	0402
HQ1005C	9.1	22	250	Sunlord	0402

Table 5 lists the recommended capacitor types and values.

Table 5: list of capacitor

Part Number	Capacitance	Rated Voltage	Supplier	Size
Units	**pF**	**V**		
GRM155	1000	50	Murata	0402

PACKAGE INFORMATION

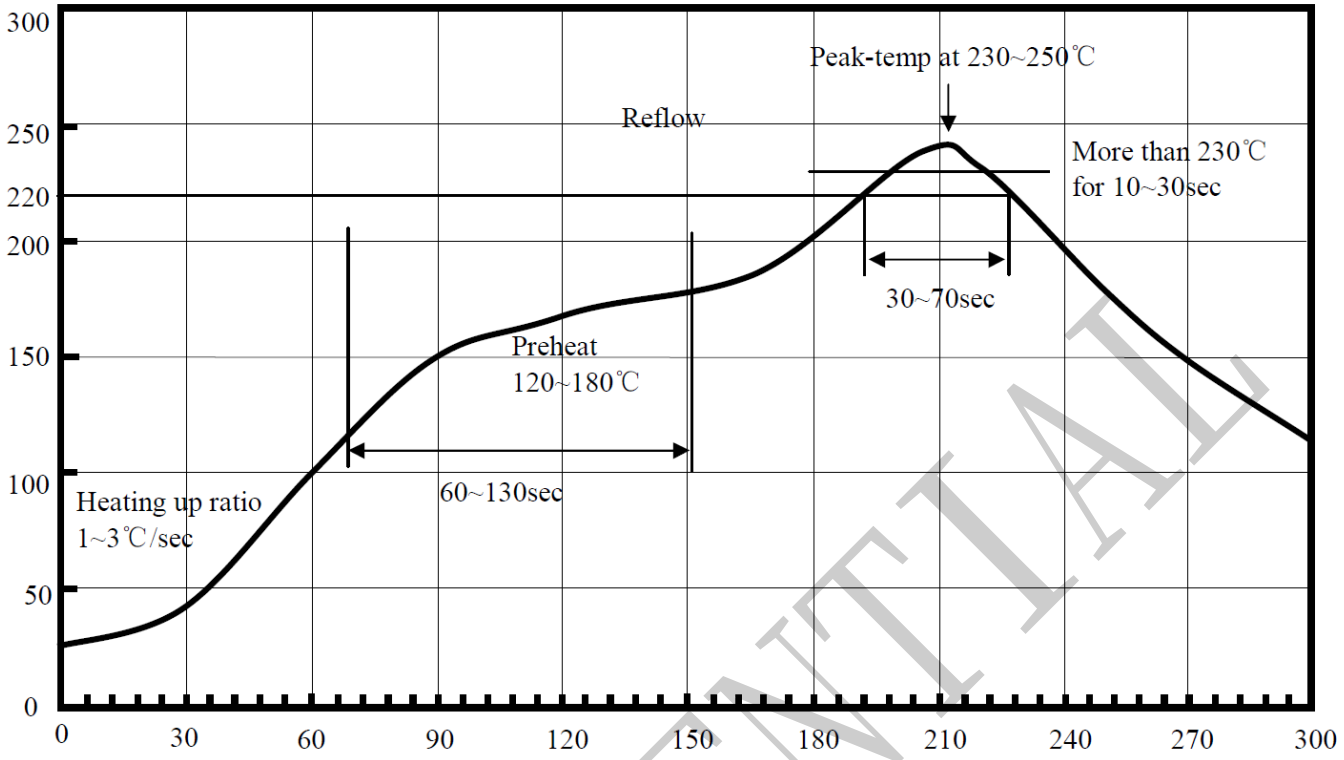


* CONTROLLING DIEMENSIONMM

SYMBOL	MILLIMETER			INCH		
	MIN	NOM	MAX	MIN	NOM	MAX
A	0.50	0.55	0.60	0.02	0.022	0.024
A1	---	---	0.05	---	---	0.002
A2	0.152 REF			0.006REF		
b	0.15	0.20	0.25	0.006	0.008	0.010
D	1.50 bsc			0.060 bsc		
E	1.00 bsc			0.040 bsc		
E2	1.000REF			0.040REF		
L	0.30	0.35	0.40	0.012	0.014	0.016
L2	0.35	0.40	0.45	0.014	0.016	0.018
e	0.50 bsc			0.020 bsc		
TOLERANCES OF FORM AND POSITION						
aaa	0.05			0.002		
bbb	0.05			0.002		

Figure 4. Package Outline

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.