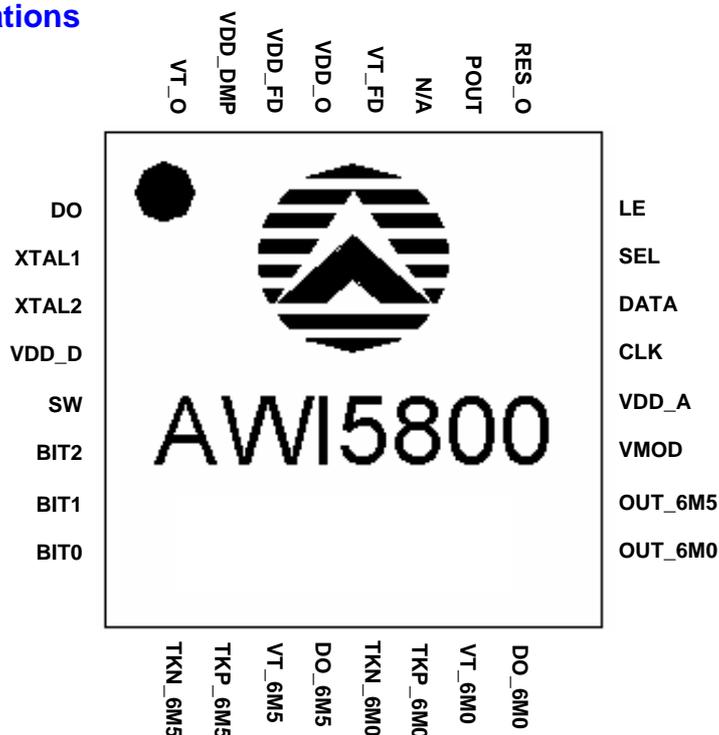## Product Description

The AWI5800 is an integrated single chip transmitter designed for analog A/V sender and wideband digital FSK transmitter operating in the 5.8GHz ISM band. The transmitter consists of a fully integrated frequency synthesizer, a power amplifier, a crystal oscillator and a stereo audio modulator. The IC is provided in 32-lead QFN5X5 package and is designed to provide a fully functional FM/FSK transmitter.

Main Features

- 3.3V power Supply
- 7 channel operation for analog A/V sender and digital FSK transmission applications
- Channel select by use of either a DIP switch or a tact switch for a set of pre-defined frequencies
- Programmable user-defined channel frequencies by use of the 3-wire serial interface
- Two audio sub-carriers generated with PLL for high frequency accuracy and stability
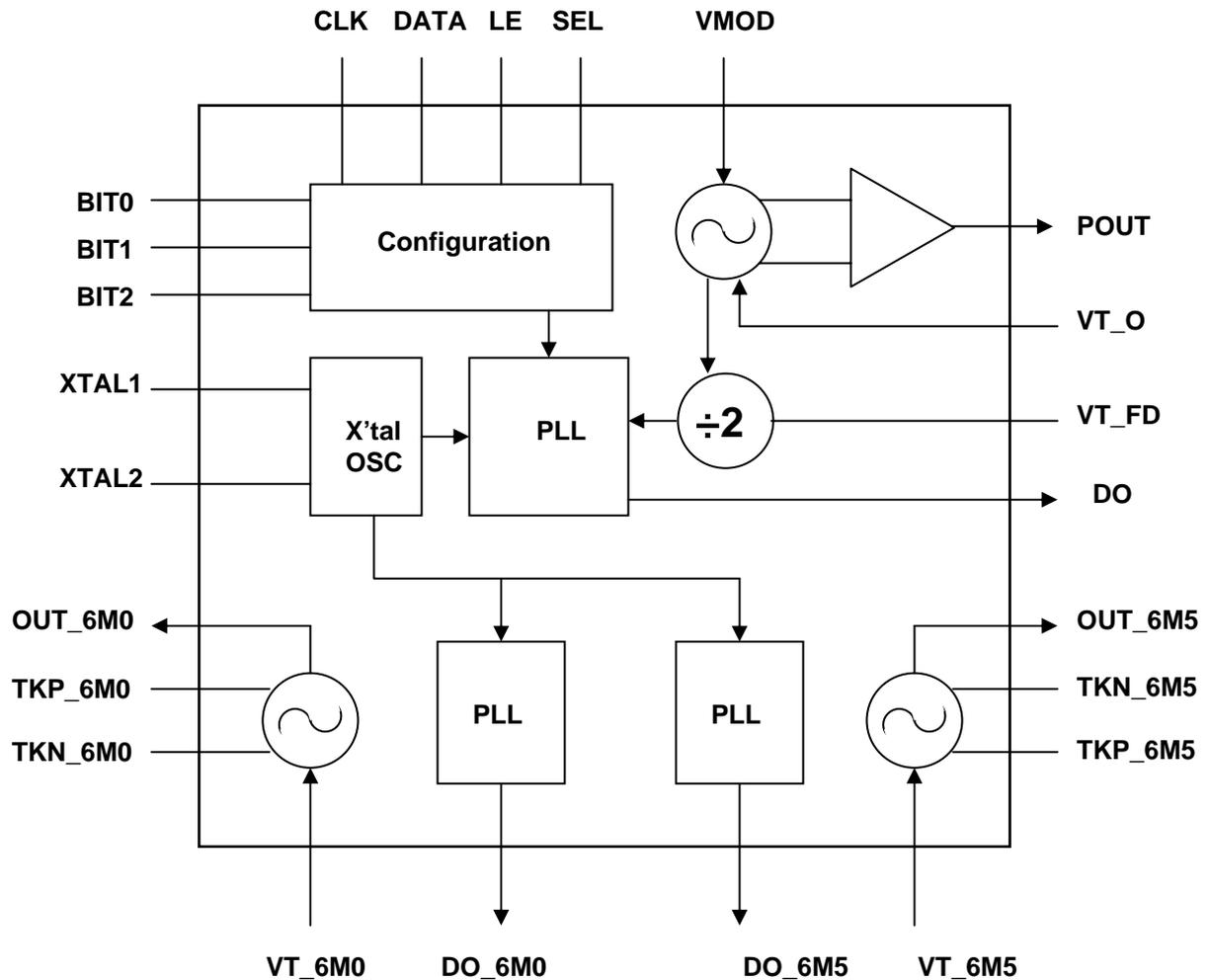
Pin Configurations

Top pins (left to right): VT_O, VDD_DMP, VDD_FD, VDD_O, VT_FD, N/A, POUT, RES_O

Left pins (top to bottom): DO, XTAL1, XTAL2, VDD_D, SW, BIT2, BIT1, BIT0

Right pins (top to bottom): LE, SEL, DATA, CLK, VDD_A, VMOD, OUT_6M5, OUT_6M0

Bottom pins (left to right): TKN_6M5, TKP_6M5, VT_6M5, DO_6M5, TKN_6M0, TKP_6M0, VT_6M0, DO_6M0

Transmitter Block Diagram

CLK DATA LE SEL VMOD

BIT0
BIT1
BIT2

Configuration

XTAL1

X'tal OSC

PLL

XTAL2

POUT

VT_O

÷2

VT_FD

DO

OUT_6M0
TKP_6M0
TKN_6M0

PLL

PLL

OUT_6M5
TKN_6M5
TKP_6M5

VT_6M0 DO_6M0 DO_6M5 VT_6M5

Pin Descriptions

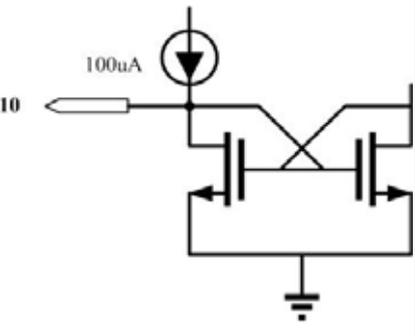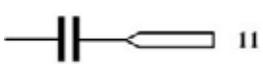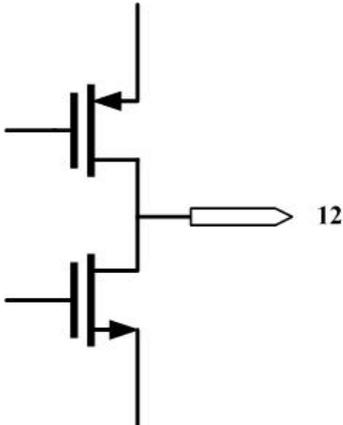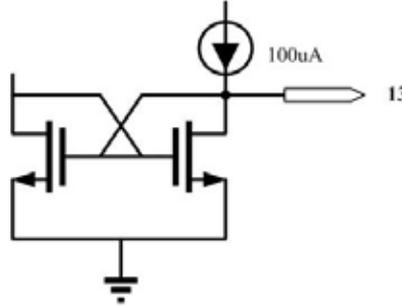| Pin No.	Name	Description	Equivalent Schematic
1	**DO**	PLL Charge Pump Output	
2	**XTAL1**	One of the two connection pins of external crystal See Note1	
3	**XTAL2**	One of the two connection pins of external crystal See Note1	

Pin No.	Name	Description	Equivalent Schematic
4	VDD_D	Digital CKT Power Supply: Suggestion value of bypass capacitor C26 is 0.1uF.	
5	SW	If PIN23(SEL) is unconnected (Internal pull high), the channel can be selected by either PIN5(SW) or the settings of BIT0, BIT1, BIT2 (when PIN5 is grounded) from a set of pre-defined channel frequencies. PIN5(SW) is normal high and each pull low will advance one channel in the pre-defined channel sequence (CH1, CH2 …, CH7, CH1 …) (See Note2)	
6	BIT2	MSB of the 3 Bits CH Selection PIN. If PIN5(SW) is grounded, PIN6 is normal high and enabled when pull low. If use PIN5(SW) to select channel, PIN6 outputs the selected channel status according to the operation of PIN5(SW). A series resistor R21 of 47K and a shunt capacitor C25 of 39pF are recommended. (See Note2)	

Pin No.	Name	Description	Equivalent Schematic
7	**BIT1**	One of the 3 Bits CH Selection PIN. If PIN5(SW) is grounded, PIN7 is normal high and enabled when pull low. If use PIN5(SW) to select channel, PIN7 outputs the selected channel status according to the operation of PIN5(SW). A series resistor R24 of 47K　and a shunt capacitor C34 of 20pF are recommended. (See Note2)	
8	**BIT0**	LSB of the 3 Bits CH Selection PIN. If PIN5(SW) is grounded, PIN8 is normal high and enabled when pull low. If use PIN5(SW) to select channel, PIN8 outputs the selected channel status according to the operation of PIN5(SW). A series resistor R32 of 47K　and no shunt capacitor are recommended. (See Note2)	
9	**TKN_6M5**	One of the two connection pins for external Tank components of 6.5MHz VCO. Shorter traces for the interconnection of L and C are recommended. Suggestion values of L2 and C41 are 33uH and 6.8pF.	
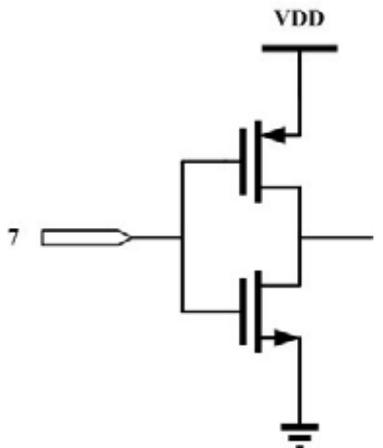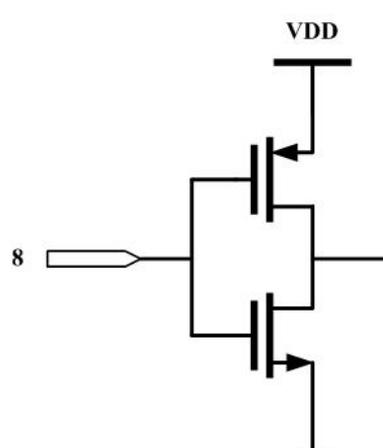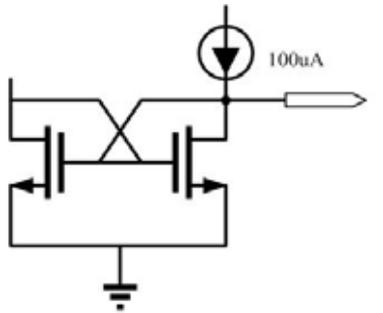
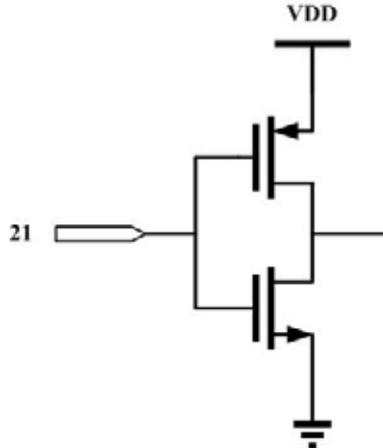| Pin No.	Name	Description	Equivalent Schematic
10	TKP_6M5	One of the two connection pins for external Tank components of 6.5MHz VCO. Shorter traces for the interconnection of L and C are recommended. Suggestion values of L2 and C41 are 33uH and 6.8pF.	
11	VT_6M5	6.5MHz VCO Tuning Voltage Control Input : Typical range of Vt is 1.1 ~ 1.5V.	
12	DO_6M5	6.5MHz PLL Charge Pump Output	

Pin No.	Name	Description	Equivalent Schematic
13	TKN_6M0	One of the two connection pins for external Tank components of 6.0MHz VCO. Shorter traces for the interconnection of L and C are recommended. Suggestion values of L2 and C35 are 33uH and 10pF.	
14	TKP_6M0	One of the two connection pins for external Tank components of 6.0MHz VCO. Shorter traces for the interconnection of L and C are recommended. Suggestion values of L2 and C35 are 33uH and 10pF.	
15	VT_6M0	6.0MHz VCO Tuning Voltage Control Input : Typical range of Vt is 1.1 ~ 1.5V.	
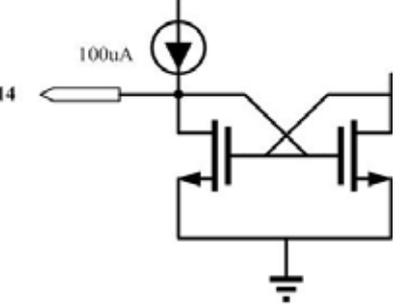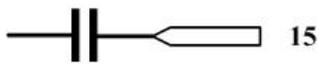
Pin No.	Name	Description	Equivalent Schematic
16	**DO_6M0**	6.0MHz PLL Charge Pump Output	
17	**OUT_6M0**	6.0MHz Audio Modulator Output	
18	**OUT_6M5**	6.5MHz Audio Modulator Output	

Pin No.	Name	Description	Equivalent Schematic
19	VMOD	FM/FSK modulation signal input of 5.8GHz VCO	
20	VDD_A	Analog Power Supply : Suggestion value of bypass capacitor C27 is 1uF.	
21	CLK	CLOCK Input of 3-wire Series Interface PIN21 is enabled when SEL (PIN23) is connected to ground See Note2	
22	DATA	DATA Input of 3-wire Series Interface PIN22 is enabled when SEL (PIN23) is connected to ground See Note2 .	

Pin No.	Name	Description	Equivalent Schematic
23	SEL	If PIN23 is open (Internal pull high), the channel can be selected by either PIN5(SW) or the settings of BIT0, BIT1, BIT2 (when PIN5 is grounded) from a set of pre-defined channel frequencies. If PIN23 is grounded, the channel frequencies can be programmed by an external MCU via the 3-wire serial interface, LE, DATA and CLK. See Note2	
24	LE	Load Enable Input of 3-wire Series Interface PIN24 is enabled when SEL (PIN23) is connected to ground See Note2	
25	RES_O	External Bias Resistor for setting 2.4GHz VCO bias current For optimal phase noise performance, a suggestion value of R10 is 8.2K .	

Pin No.	Name	Description	Equivalent Schematic
26	POUT	5.8GHz RF Amplifier Output. Typical output power range is −11.5dBm ~ -7dBm. :	
27	N/A		
28	VT_FD	5.8GHz Injection Locked Frequency Divider Tuning Voltage Typical Vt range is 0.4~1.4V	
29	VDD_O	5.8GHz VCO Power Supply : Suggestion value of bypass capacitor C14 is 10pF.	
30	VDD_FD	5.8GHz Injection Locked Frequency Divider Power Supply : Suggestion value of bypass capacitor C12 is 10pF.	
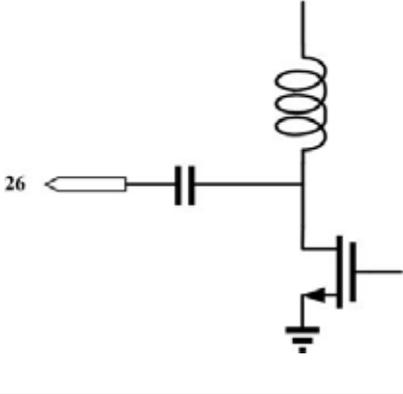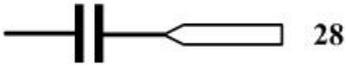
Pin No.	Name	Description	Equivalent Schematic
31	VDD_DMP	Prescaler Power Supply : Suggestion value of bypass capacitor C13 is 0.1uF.	
32	VT_O	5.8GHz VCO Tuning Voltage Control Input Typical Vt range is 0.6~1.8V	
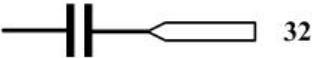
Maximum Rating

Parameter	Maximum Rating	Units
Supply Voltage (VDD)	5	V
Storage Temperature	-20 ~ +70	

Note : This device is ESD sensitive. Handling and assembly of this device
should only be done at proper ESD protection environment.
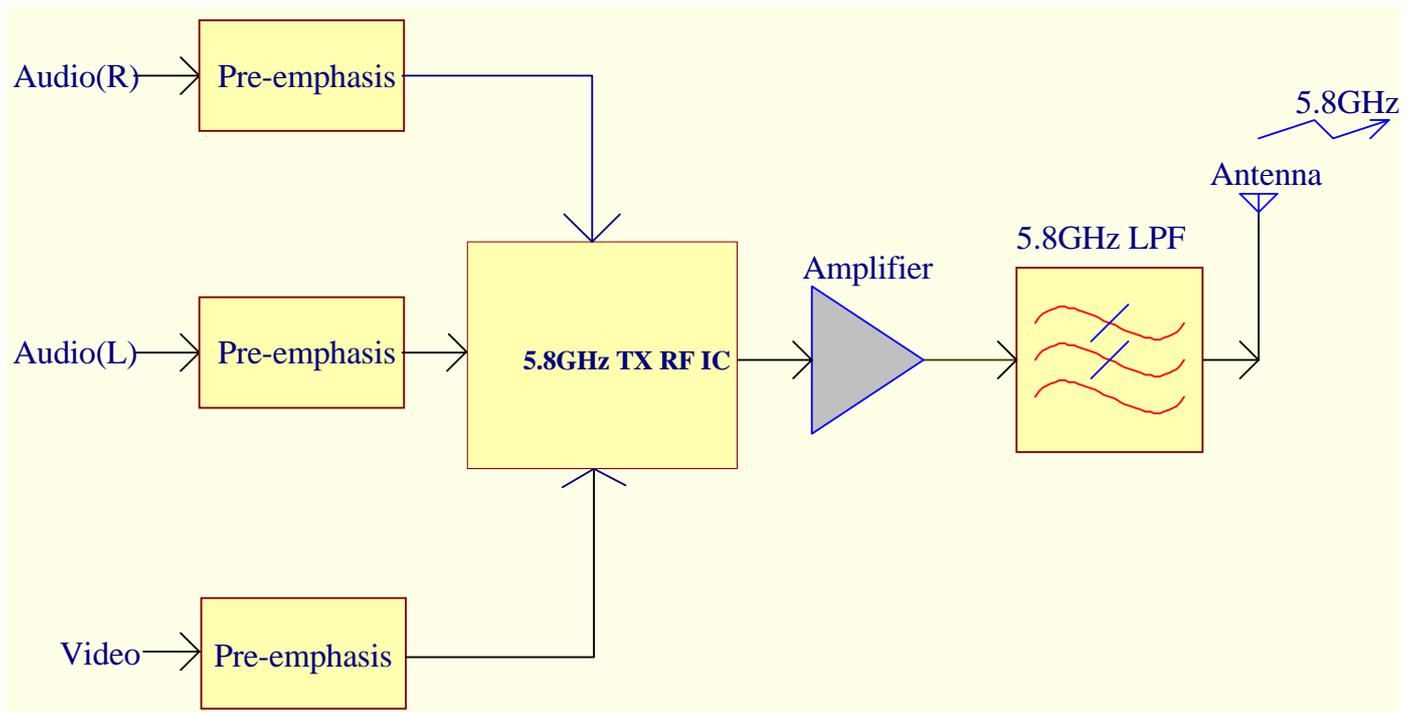
Electrical Characteristics

Parameter	Description	Min.	Typ.	Max.	Unit
Operation Temperature		-10		60	
Supply Voltage			3.3		V
Current Consumption			50		mA
Output Power			-3		dBm
Harmonics Output			-25		dBm
Reference Frequency			8		MHz
Crystal Accruacy			30		ppm
Operation Frequency (SEL : High)		5740,5760,5780,5800,5820,5840,5860			MHz
6.0MHz Audio Modulator Output Level		2.0		3	Vpp
6.5MHz Audio Modulator Output Level		2.0		3	Vpp

Application Circuit: 680TX Block Diagram

```
Audio(R) →  Pre-emphasis ┐
                         │
                         ↓
Audio(L) →  Pre-emphasis → 5.8GHz TX RF IC → Amplifier → 5.8GHz LPF → Antenna → 5.8GHz
                         ↑
                         │
Video    →  Pre-emphasis ┘
```

Application Circuit: 680TX
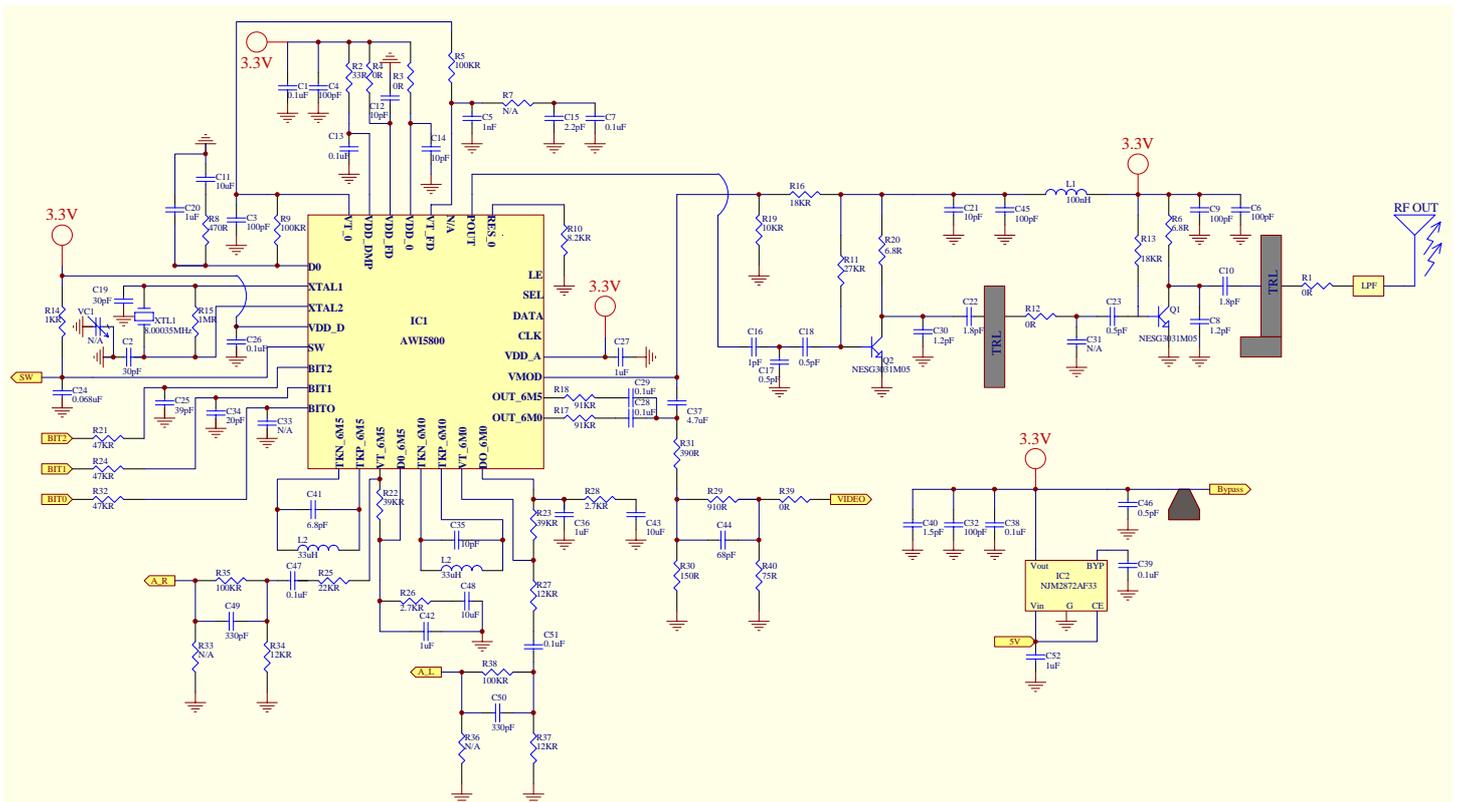
Note:

1. XTAL1 (PIN2) and XTAL2 (PIN3)

Figure.1 shows the recommended crystal oscillator circuit diagram.The resistor R_f is connected in parallel with the crystal and between the input and output of the inverter to provide a negative DC feedback. Usually, the range of its resistance value is 500K ~ 2M .

The capacitors C_1 and C_2 provide the necessary load capacitance for resonating the crystal. Their values can be determined by the following equation:

$$C_L = \frac{C_1 * C_2}{C_1 + C_2} + C_S$$

where C_L is the load capacitance of the crystal whose value can be obtained from the data sheet provided by the crystal manufacturer and C_S is the stray capacitance on the printed circuit board. A typically value of C_S is 0.3~0.6pF. Larger values of C_1 and C_2 increases frequency stability but decreases loop gain. Suggestion values of C_1, C_2 and R_f are 30pF, 30pF and 1M , respectively.
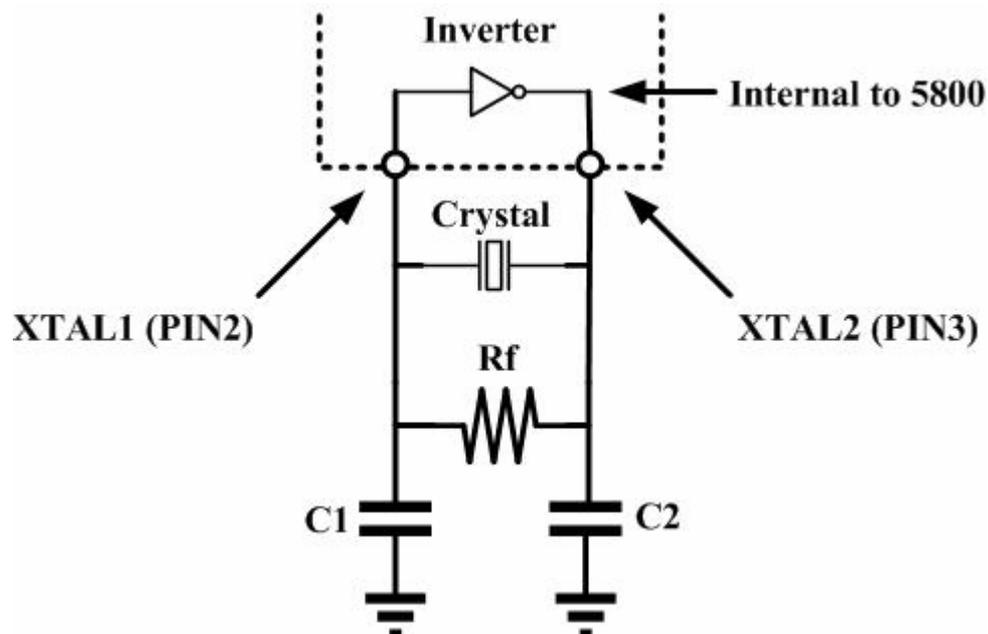

Figure1

Note:

2. Channel Selection : SW, BIT0, BIT1, BIT2 (PIN5, PIN8, PIN7, PIN6)

When **SEL**(PIN23) is unconnected, the RF channel can be selected by the following two ways:

MODE1: Use a Tact switch to select RF channel

    SW(PIN5) is normally high and connected to a Tact switch. Each push on the tact switch (pull low) will advance one channel in the pre-defined channel sequence, CH1, CH2, CH3, CH4, CH5, CH6, CH7, CH1 …. A shunt capacitor C24 of 0.068uF and a pull high resistor R14 of 1K   (for VDD = 3.3V) are recommended to connect to PIN5.

Note: **BIT2**, **BIT1**, **BIT0** pins will output the selected channel status according to the definition of Table 1. Each pin has to connect a 47K   series resistor before it is connected to a 22K   pull high resistor (for VDD = 5V.)

MODE2: Use a DIP switch to select RF channel

    If **SW**(PIN5) is grounded then directly connect **BIT0**, **BIT1**, **BIT2** to a 3-bit DIP switch to select the channel according to Table1.
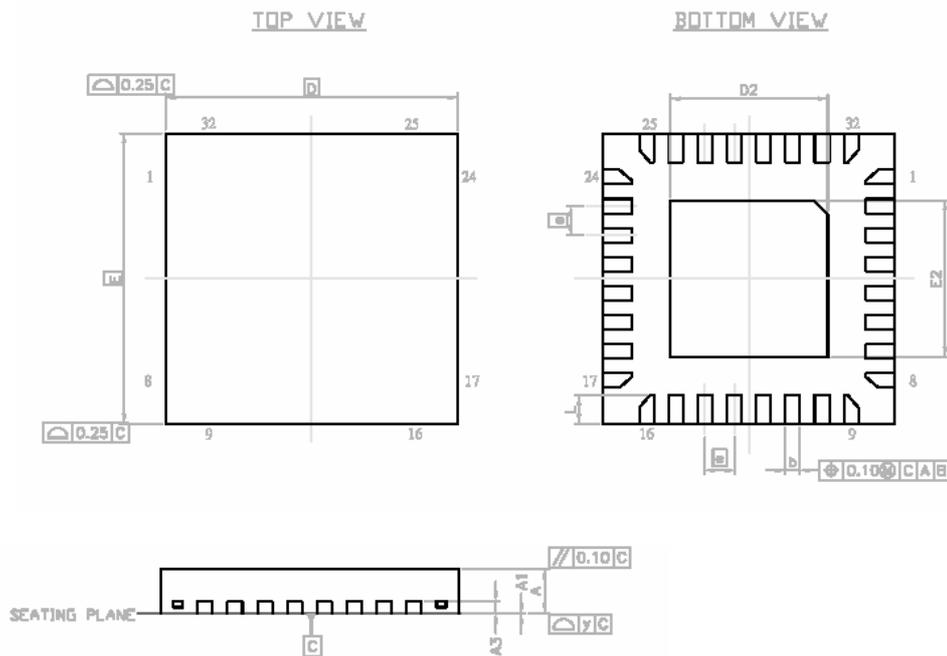
Note: **BIT2**, **BIT1**, **BIT0** are normally pulled high by 2.2K   load resistors connected to a 5V supply and are enabled when connected to ground.

CH	Frequency	BIT2	BIT1	BIT0
1	5740MHz	1	1	1
2	5760MHz	1	1	0
3	5780MHz	1	0	1
4	5800MHz	1	0	0
5	5820MHz	O	1	1
6	5840MHz	O	1	O
7	5860MHz	O	O	1
7	5860MHz	O	O	O

Table1

Package Information

QFN 32 Outline Dimensions

SYMBOL	DIMENSION (MM)			DIMENSION (MIL)		
	MIN.	NOM.	MAX.	MIN.	NOM.	MAX.
A	0.70	0.75	0.80	27.6	29.5	31.5
A1	0	0.02	0.05	0	0.8	2.0
A3	0.20 REF			9.8 REF		
b	0.18	0.25	0.30	7.1	9.8	11.8
D	5.00 BSC			196.9 BSC		
D2	2.60	2.70	2.80	102.4	106.3	110.2
E	5.00 BSC			196.9 BSC		
E2	2.60	2.70	2.80	102.4	106.3	110.2
e	0.50 BSC			19.7 BSC		
L	0.30	0.40	0.50	11.8	15.7	19.7
y	0.10			3.9		