TX4930 Low Power ISM-band FM/FSK Transmitter IC

Description

The TX4930 is a low-power 433/868/915 MHz FM/FSK transmitter IC suitable for use in the North American 915 MHz and European 433 and 868 MHz ISM bands. The TX4930 is intended as a phase-locked frequency source in local oscillator or transmitter applications.

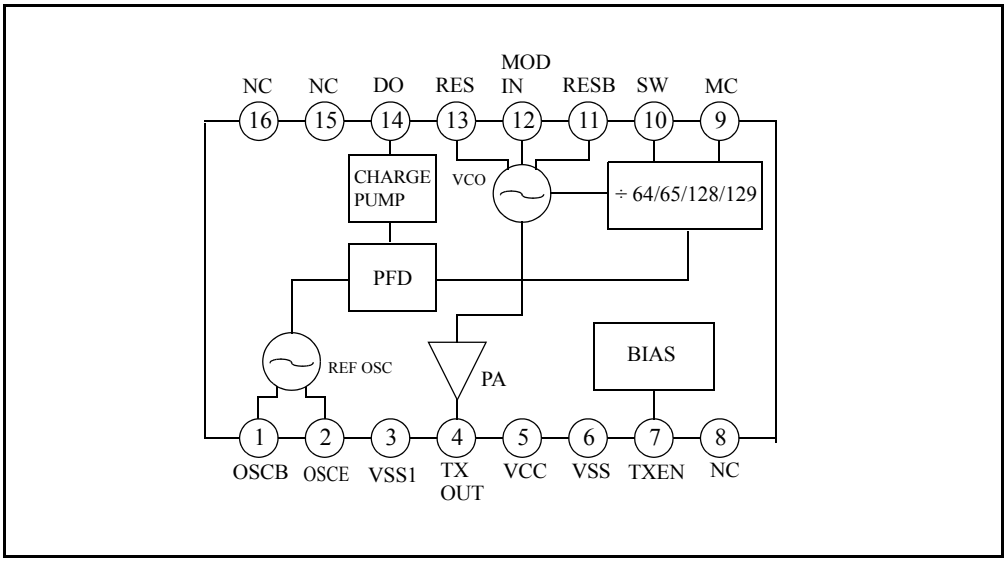
Features

- Integrated VCO with multi-modulus ÷ 64/65/128/129 prescaler, phase/frequency detector, and reference oscillator forming complete phase-locked loop
- Transmitter enable pin for power saving
- 2.4V to 5V supply voltage
- On-chip varactor diode for narrowband modulation
- SSOP-16 package (0.64mm pitch)

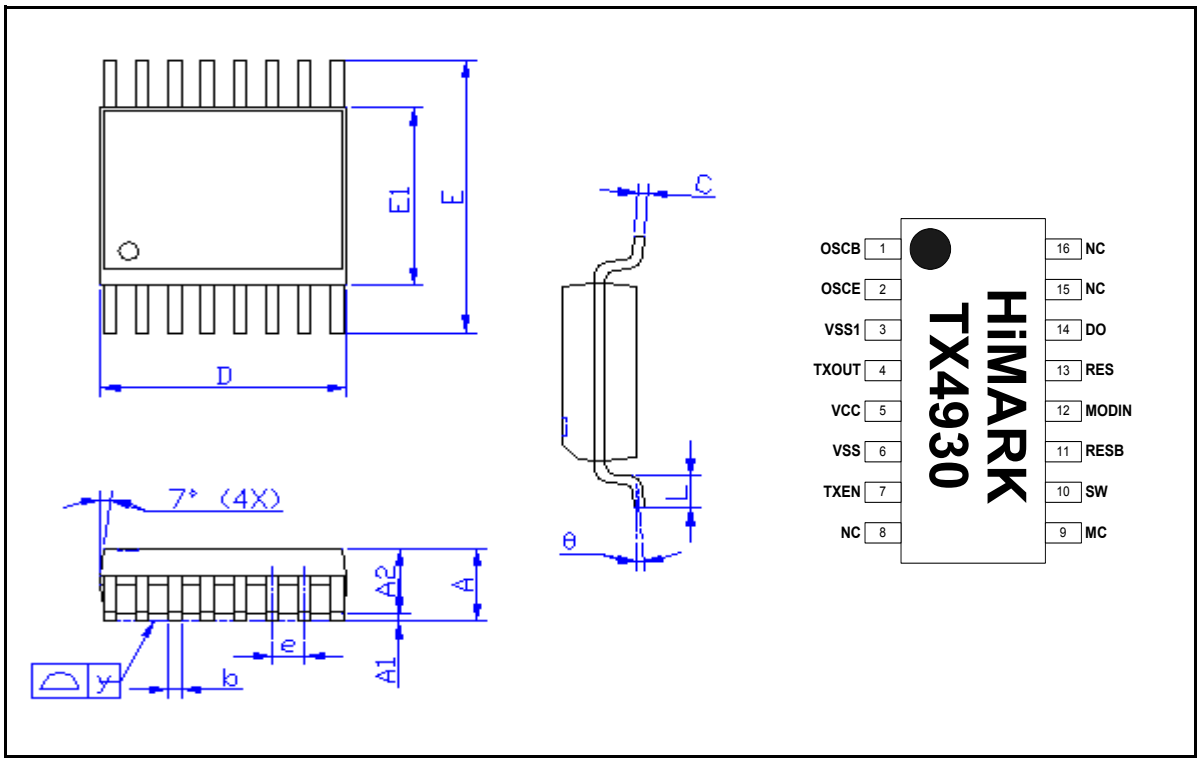
Applications

- Wireless mouse
- Wireless amplifier/ speaker/ headphone/ microphone
- Wireless car alarm system

Block Diagram



Package and Pin Assignment: SSOP-16



Symbols	Dimensions in mm			Dimensions in inch		
	min.	nom.	max.	min.	nom.	max.
A	1.35	1.60	1.75	0.053	0.064	0.069
A1	0.10	—	0.25	0.004	—	0.010
A2	—	1.45	—	—	0.057	—
b	0.20	0.25	0.30	0.008	0.010	0.012
C	0.19	—	0.25	0.007	—	0.010
D	4.80	—	5.00	0.189	—	0.197
E	5.80	—	6.20	0.228	—	0.244
E1	3.80	—	4.00	0.150	—	0.157
e	—	0.64	—	—	0.025	—
L	0.40	—	1.27	0.016	—	0.050
y	—	—	0.10	—	—	0.004
θ	0°	—	8°	0°	—	8°

Pin Descriptions

Number	Name	I/O	Description
1	OSCB	I	Connected directly to the base of the reference oscillator transistor.
2	OSCE	O	Connected directly to the emitter of the reference oscillator transistor.
3	VSS1	GND	Ground connection for the TXOUT.
4	TXOUT	O	Buffered output of the VCO.
5	VCC	POWER	DC power supply.
6	VSS	GND	Ground connection.
7	TXEN	I	Power-down control for all circuits. When this pin is a logic “low”, all circuits are turned off.
8	NC	NC	Not internally connected.
9	MC	I	Mode control. A logic “high” selects 64 or 128 for the prescaler divisor. A logic “low” selects 65 or 129 for the divisor.
10	SW	I	Prescaler divisor control. A logic “high” selects the 64/65 divisor. A logic “low” selects the 128/129 divisor.
11	RESB	I/O	Supply DC voltage to the VCO, as well as to tune the central frequency of the VCO.
12	MODIN	I	FM analog or digital modulation can be imparted to the VCO through this pin.
13	RES	I/O	See Pin 11.
14	DO	O	Output of the charge pump. An RC network from this pin to ground is used to establish the PLL bandwidth.
15	NC	NC	Not internally connected.
16	NC	NC	Not internally connected.

Absolute Maximum Ratings

$V_{SS} = V_{SS1} = 0$ V

Parameter	Symbol	Rating	Unit
Supply Voltage	V_{CC}	2.2 to 6	V
Operating Temperature Range	T_{OPR}	–40 to 85	°C
Storage Temperature Range	T_{STG}	–40 to 150	°C
Soldering Temperature Range	T_{SLD}	255	°C
Soldering Time Range	t_{SLD}	10	s

Recommended Operating Conditions

$V_{SS} = V_{SS1} = 0$ V

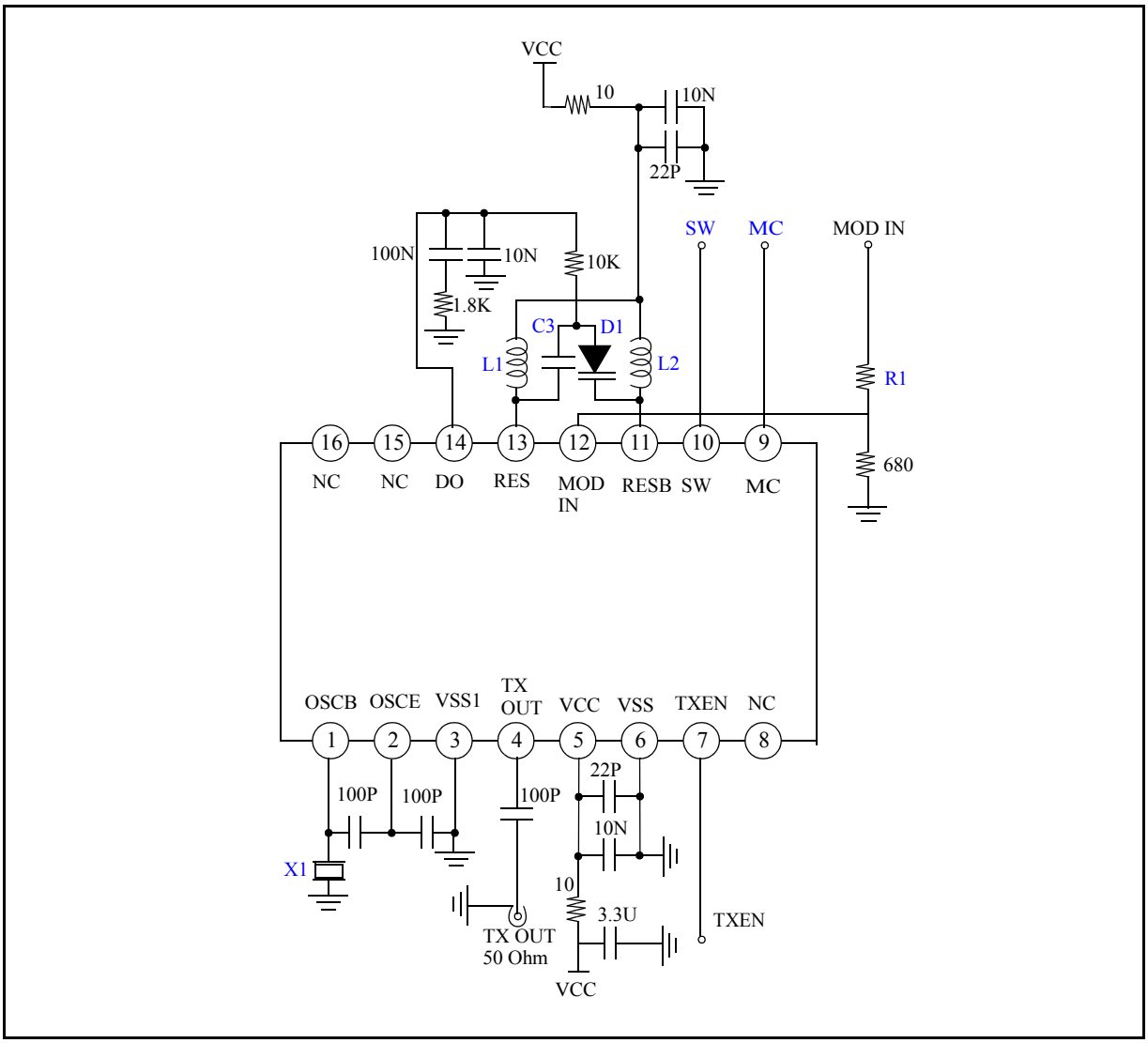
Parameter	Symbol	Value			Unit
		min.	typ.	max.	
Supply Voltage Range	V_{CC}	2.4	3	5.0	V
Operating Temperature	T_A	–10	25	60	°C

Electrical Characteristics

(V_{CC} = 3V, V_{SS} = V_{SS1} = 0V, TXEN = high, T_A = 25°C, f_{RF} = 916MHz unless otherwise noted)

Parameter	Symbol	Condition	Value			Unit
			min.	typ.	max.	
Frequency Range				300 to 1000		MHz
Modulation				FM/ FSK		
VCC Supply Voltage	V_{CC}		2.4	3	5	V
Total Consumption Current	I_{CC}	Vcc = 3	9	10.5	12	mA
Power-down I_{CC}					1	µA
Output Power	P_{OUT}	Vcc = 3		–4		dBm
VCO Gain	K_{VCO}	433MHz, 3V		11		MHz/V
		868MHz, 3V		45		MHz/V
PLL Phase Noise		Offset 10KHz, 5KHz loop BW		–76		dBc/Hz
		Offset 100KHz, 5KHz loop BW		–96		dBc/Hz
Harmonics		without filtering		–17		dBc
Crystal Frequency Spurs		5KHz loop BW	–60	–50	–45	dBc
Charge Pump Current			–40		40	µA

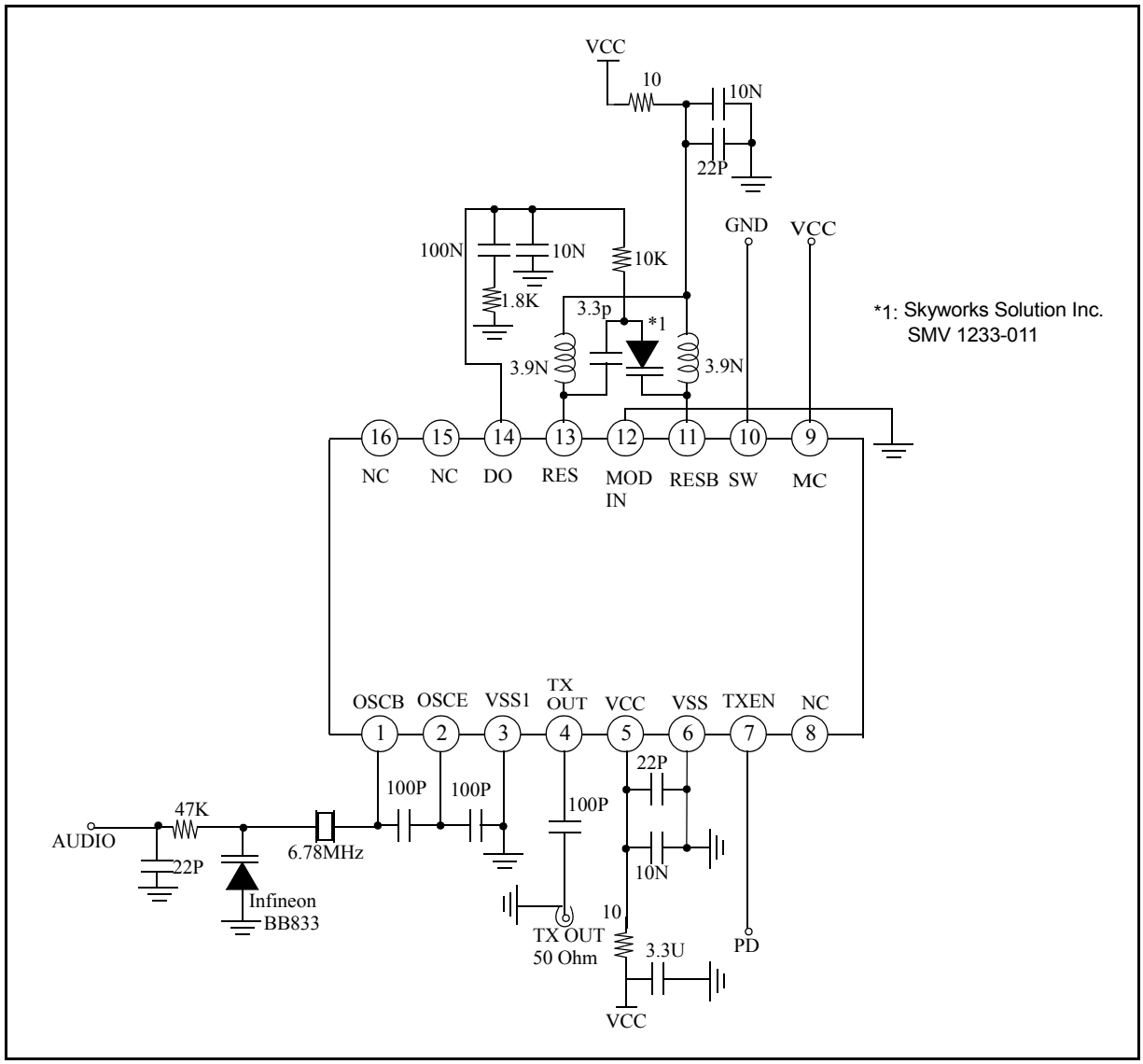
Application Circuit (FM/FSK Transmitter)

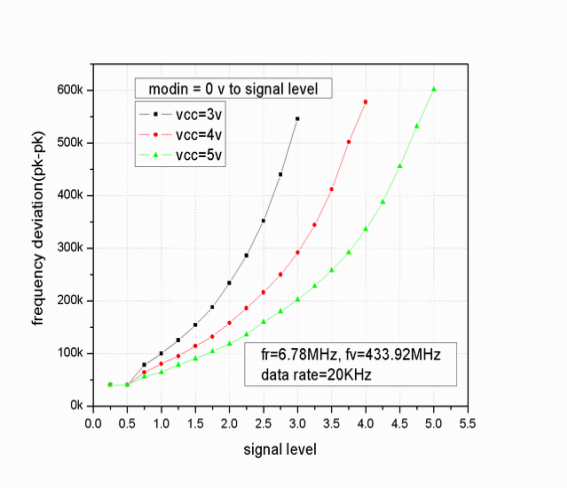


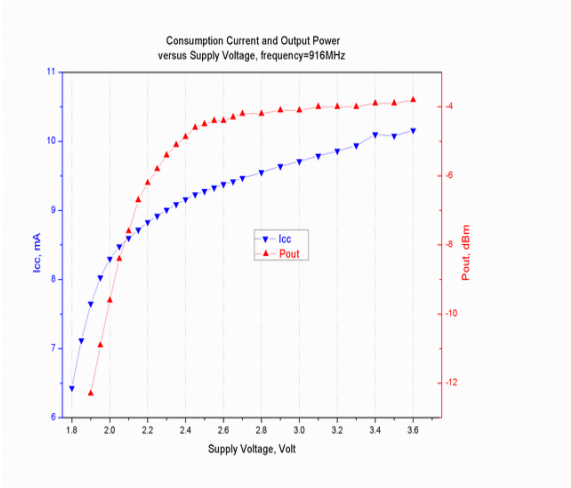
Suggestion Value for different frequency	LC Tank			SW, MC and Crystal Frequency			MOD IN
	L1,L2	C3	D1	SW	MC	X1	R1
315MHz	27nH	5.6pF	BB833	VCC	VCC	4.921MHz	470Ω
433MHz	18nH	8.2pF	SMV1233	VCC	VCC	6.78MHz	100Ω
868MHz	3.9nH	3.3pF	SMV1233	VCC	VCC	13.577MHz	820Ω
916MHz	3.9nH	2.7pF	SMV1233	GND	VCC	7.157MHz	820Ω

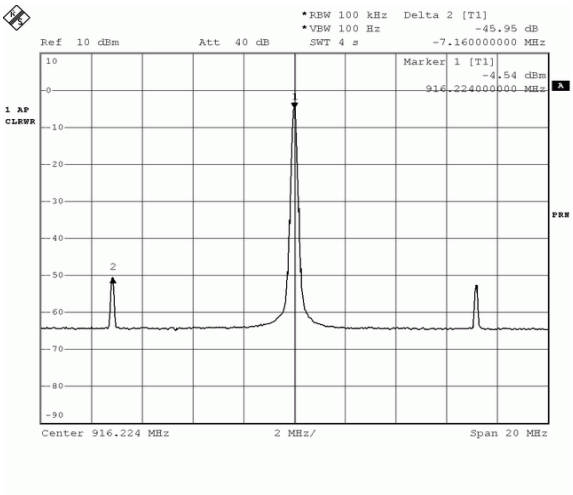
Application Circuit (868 MHz)

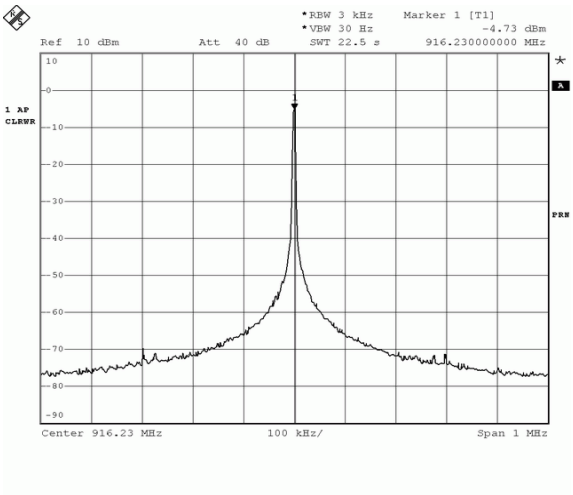
(Audio Transmitter)




modin = 0 v to signal level
vcc=3v
vcc=4v
vcc=5v
fr=6.78MHz, fv=433.92MHz
data rate=20KHz
frequency deviation(pk-pk)
signal level
600k
500k
400k
300k
200k
100k
0k
0.0 0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0 4.5 5.0 5.5


Consumption Current and Output Power
versus Supply Voltage, frequency=916MHz
Icc
Pout
Icc, mA
Pout, dBm
Supply Voltage, Volt
11
10
9
8
7
6
-4
-6
-8
-10
-12
1.8 2.0 2.2 2.4 2.6 2.8 3.0 3.2 3.4 3.6


*RBW 100 kHz
Delta 2 [T1]
*VBW 100 Hz
-45.95 dB
Ref 10 dBm
Att 40 dB
SWT 4 s
-7.160000000 MHz
Marker 1 [T1]
-4.54 dBm
916.224000000 MHz
1 AP
CLRWR
PRN
Center 916.224 MHz
2 MHz/
Span 20 MHz


*RBW 3 kHz
Marker 1 [T1]
*VBW 30 Hz
-4.73 dBm
Ref 10 dBm
Att 40 dB
SWT 22.5 s
916.230000000 MHz
1 AP
CLRWR
PRN
Center 916.23 MHz
100 kHz/
Span 1 MHz