

<b>JDI</b>	<b>TECHNICAL DESCRIPTION</b>		
<b>Project Name:</b>	<b>915 MHz Spray Commander</b>	<b>Rev:</b>	<b>A</b>
<b>Project Num</b>	<b>336</b>	<b>Doc No:</b>	<b>RS-336-04045A</b>
<b>TO:</b>		<b>PAGE:</b>	<b>OF</b>
<b>CC:</b>			

## 1, The product

This is a radio frequency based remote control design around radio frequency IC from Himark. The devices are designed for compliance to regulatory requirements as intended transmitter in following standards.

US FCC Part 15.249(900MHz)

SPECIFICATION: 915MHZ TRANSMITTER

FEATURE	VALUE	NOTES
Frequency	915.03	+/-25ppm
RF Power	+9dBm	Comply with US FCC Part 15.249 and Canadian TRS RSS210 with 50 OHM ANTENNA
Modulation	FSK	
Derivation	+/-50KHz	
Data rate	20kbit/s	
TX sequence	Preamble Address Key code	Code will be repeated for about 600ms to reach a wakeup time slot of the receiver (50ms)
Buttons	3	Synapses on bottom layer
Battery	6 volts	
Transmission Distance with RS	>80m	
Current Drain		
Active	40mA	
Standby	<10uA	

## 2. USE OF THE TRANSMITTER

There's altogether three buttons on the transmitter, The one close to the battery is Button3, the middle one is Button 2, the third button is button1.

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<i>Date:</i> 03APR05.	<i>Date:</i>	<i>Date:</i>

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<b>TO:</b>		<b>PAGE:</b>	OF
<b>CC:</b>			

Button1 – When pressed, it will send a signal and address code out. The right receiver with right address will recognize the transmission and turn on the buzzer in the Receiver for a short pattern.

Button 2- When pressed, it will send a signal and address code out. The right receiver with right address will recognize the transmission and turn on a solenoid in the Receiver for a short spray.

Button 3- When pressed, it will send a signal and address code out. The right receiver with right address will recognize the transmission and turn on a solenoid in the Receiver for a long spray.

The unit will go into qc mode when button1&button3 pressed then power on. In the mode, if button1 pressed, the MCU will turn on the RF and send the carry wave unless power off, in the mode, if button3 pressed, the MCU will turn on the RF and send signal unless power off.

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<b>TO:</b>		<b>PAGE:</b>	<b>OF</b>
<b>CC:</b>			

The transmitter unit employs RF IC of TX4930, it is intended as a phase-locked frequency source as the local oscillator. The TX4930 have integrated VCO with multi-modulus/64/65/128/129prescaler, phase/frequency detector, and reference oscillator forming complete phase-locked loop. In accompany to the reference oscillator of 14.2968MHz crystal, with select integrated VCO with 64prescaler. The RF signal at the expected level is then obtained.

The SAW filter and PI-type filter be added between TX out of RF IC with antenna, the filter is designed for 50ohm loads, and the component values have been tuned to compensate for layout parasitic, then filter reduce the harmonics and spurious.

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<i>Date:</i> 27DEC04.	<i>Date:</i>	<i>Date:</i>



## TX4930 Low Power ISM-band FM/FSK Transmitter IC

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### 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.

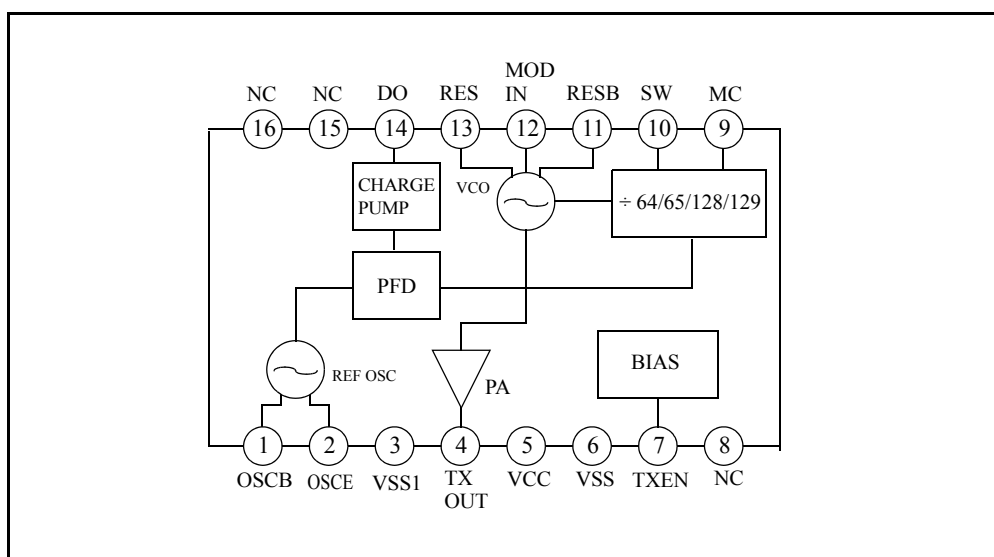
### Features

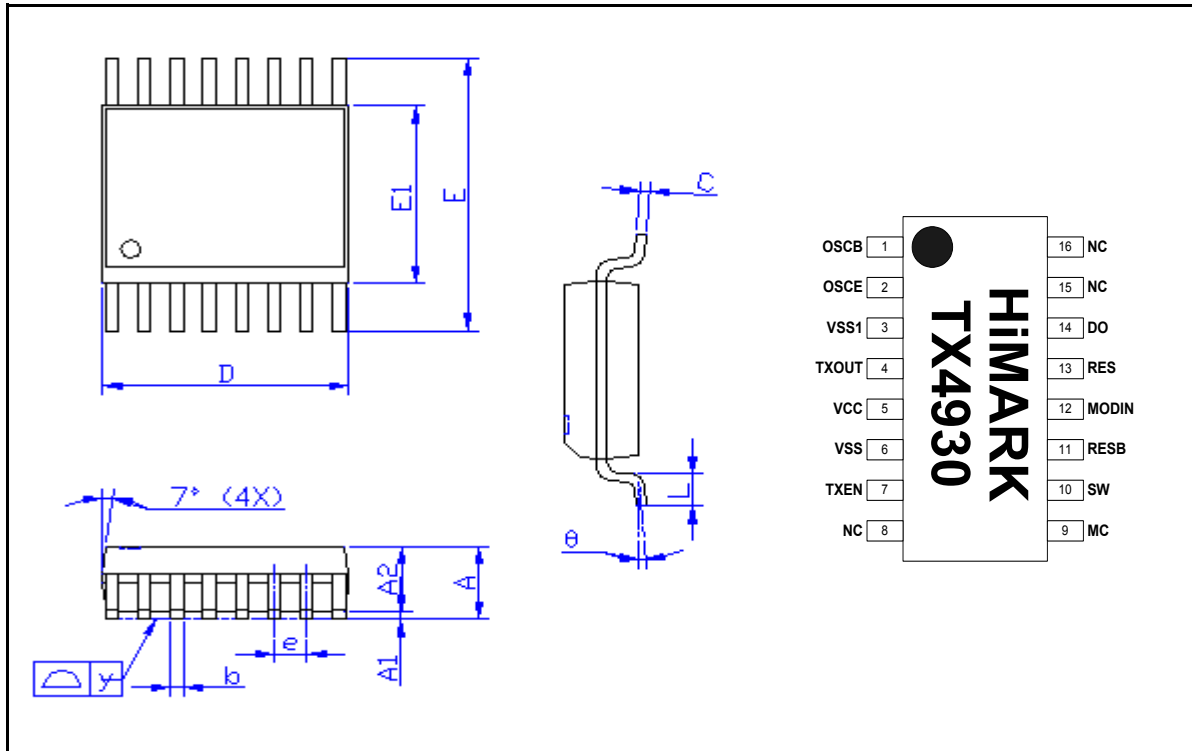
- ◆ Integrated VCO with multi-modulus  $\div 64/65/128/129$  prescaler, phase/frequency detector, and reference oscillator forming complete phase-locked loop
- ◆ Transmitter enable pin for power saving
- ◆ 2.4V to 5V supply voltage
- ◆ On-chip varactor diode for narrowband modulation
- ◆ SSOP-16 package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

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

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

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

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

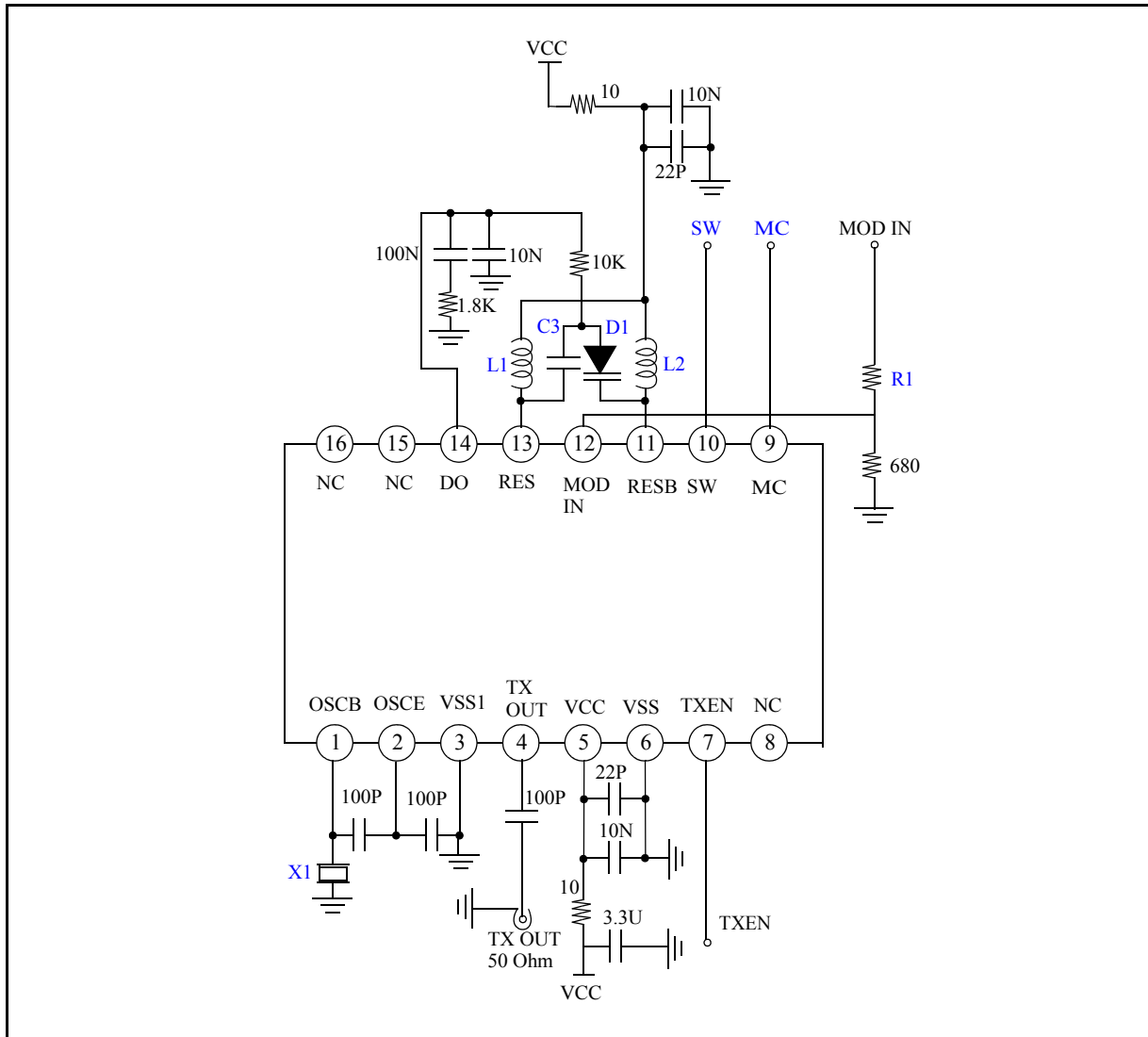
## Electrical Characteristics

( $V_{CC} = 3V$ ,  $V_{SS} = V_{SS1} = 0V$ , TXEN = high,  $T_A = 25^\circ C$ ,  $f_{RF} = 916MHz$  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	$I_{CC}$	$V_{CC} = 3$	9	10.5	12	mA
Power-down $I_{CC}$					1	$\mu A$
Output Power	$P_{OUT}$	$V_{CC} = 3$		-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	$\mu A$



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)

