

Features

Embedded EEPROM

☑ Very Easy Development with RFPDK

☑ All Features Programmable

Frequency: 868 MHz FSK, GFSK
and OOK Modulation Symbol
Rate:

0.5 to 100 ksps (FSK/GFSK)
to 30 ksps (OOK)

Deviation: 1.0 to 200 kHz

Two-wire Interface for Registers Accessing
and EEPROM Programming

Output Power: -10 to +13 dBm

Supply Voltage: 1.8 to 3.6 V

Sleep Current: < 20 nA

FCC/ETSI Compliant

RoHS Compliant

Module Size: 12.0*15.0*3.0mm



DL-TXC2119A/B

Descriptions

The DL-TXC2119A/B is a high performance, highly flexible, low-cost, single-chip (G)FSK/OOK transmitter, 868 MHz, which includes a complete line of transmitters, receivers and transceivers. The DL-TXC2119A/B provides the simplest way to control the data transmission. The transmission is started when an effective level turnover is detected on the DATA pin, while the transmission action will stop after the DATA pin holding level low for a defined time window, or after a two-wire interface (TWI) command is issued. The chip features can be configured in two different ways: setting the configuration registers through the TWI, or programming the embedded RFPDK. The device operates from a supply voltage of 1.8 V to 3.6 V, consumes 27.6 mA (FSK @ 868.35 MHz) when transmitting +10 dBm output power, and only leak 20 nA when it is in sleep state.

Applications

Low-Cost Consumer Electronics Applications
Home and Building Automation
Remote Fan Controllers
Infrared Transmitter Replacements
Industrial Monitoring and Controls
Remote Lighting Control
Wireless Alarm and Security Systems
Remote Keyless Entry (RKE)

Abbreviations

Abbreviations used in this data sheet are described below

AN	Application Notes	PA	Power Amplifier
BOM	Bill of Materials	PC	Personal Computer
BSC	Basic Spacing between Centers	PCB	Printed Circuit Board
EEPROM	Electrically Erasable Programmable Read-Only Memory	PN	Phase Noise
ESD	Electro-Static Discharge	RCLK	Reference Clock
ESR	Equivalent Series Resistance	RF	Radio Frequency
ETSI	European Telecommunications Standards Institute	RFPDK	RF Product Development Kit
FCC	Federal Communications Commission	RoHS	Restriction of Hazardous Substances
FSK	Frequency Shift Keying	Rx	Receiving, Receiver
GFSK	Gauss Frequency Shift Keying	SOT	Small-Outline Transistor
Max	Maximum	SR	Symbol Rate
MCU	Microcontroller Unit	TWI	Two-wire Interface
Min	Minimum	Tx	Transmission, Transmitter
MOQ	Minimum Order Quantity	Typ	Typical
NPO	Negative-Positive-Zero	USB	Universal Serial Bus
OBW	Occupied Bandwidth	XO/XOSC	Crystal Oscillator
OOK	On-Off Keying	XTAL	Crystal
		PA	Power Amplifier

1. Electrical Characteristics

$V_{DD} = 3.3\text{ V}$, $T_{OP} = 25\text{ }^{\circ}\text{C}$, $F_{RF} = 868.35\text{ MHz}$, FSK modulation, output power is +10 dBm terminated in a matched 50 Ω impedance, unless otherwise noted.

1.1 Recommended Operating Conditions

Table 2. Recommended Operation Conditions

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Operation Voltage Supply	V_{DD}		1.8		3.6	V
Operation Temperature	T_{OP}		-40		85	$^{\circ}\text{C}$
Supply Voltage Slew Rate			1			mV/us

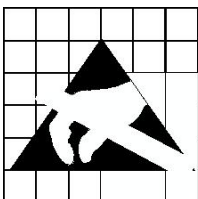
1.2 Absolute Maximum Ratings

Table 3. Absolute Maximum Ratings^[1]

Parameter	Symbol	Conditions	Min	Max	Unit
Supply Voltage	V_{DD}		-0.3	3.6	V
Interface Voltage	V_{IN}		-0.3	$V_{DD} + 0.3$	V
Junction Temperature	T_J		-40	125	$^{\circ}\text{C}$
Storage Temperature	T_{STG}		-50	150	$^{\circ}\text{C}$
Soldering Temperature	T_{SDR}	Lasts at least 30 seconds		255	$^{\circ}\text{C}$
ESD Rating		Human Body Model (HBM)	-2	2	kV
Latch-up Current		@ 85 $^{\circ}\text{C}$	-100	100	mA

Note:

[1]. Stresses above those listed as “absolute maximum ratings” may cause permanent damage to the device. This is a stress rating only and functional operation of the device under these conditions is not implied. Exposure to maximum rating conditions for extended periods may affect device reliability.



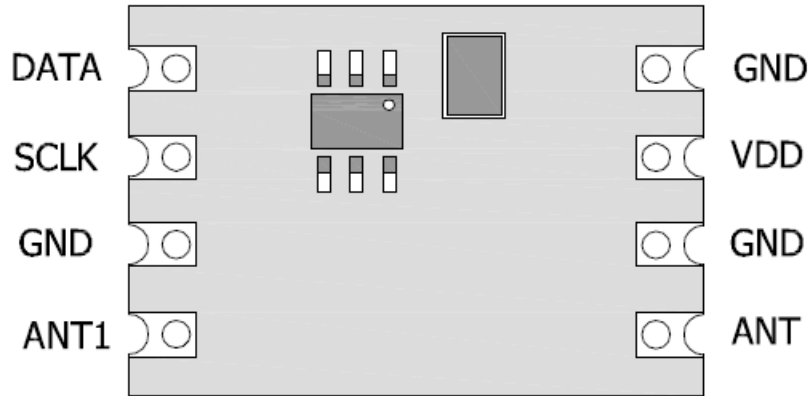
Caution! ESD sensitive device. Precaution should be used when handling the device in order to prevent permanent damage.

1.3 Transmitter Specifications

Table 4. Transmitter Specifications

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Frequency Range ^[1]	F_{RF}		240		960	MHz
Synthesizer Frequency Resolution	F_{RES}	$F_{RF} \leq 480$ MHz		198		Hz
		$F_{RF} > 480$ MHz		397		Hz
Symbol Rate	SR	FSK/GFSK	0.5		100	ksps
		OOK	0.5		30	ksps
(G)FSK Modulation Deviation Range	F_{DEV}		1		200	kHz
Bandwidth-Time Product	BT	GFSK modulation	-	0.5	-	-
Maximum Output Power	$P_{OUT(Max)}$			+13		dBm
Minimum Output Power	$P_{OUT(Min)}$			-10		dBm
Output Power Step Size	P_{STEP}			1		dB
OOK PA Ramping Time ^[2]	t_{RAMP}		0		1024	us
Current Consumption @ 433.92 MHz	$I_{DD-433.92}$	OOK, 0 dBm, 50% duty cycle		6.7		mA
		OOK, +10 dBm, 50% duty cycle		13.4		mA
		OOK, +13 dBm, 50% duty cycle		17.4		mA
		FSK, 0 dBm, 9.6 ksps		10.5		mA
		FSK, +10 dBm, 9.6 ksps		23.5		mA
		FSK, +13 dBm, 9.6 ksps		32.5		mA
Current Consumption @ 868.35 MHz	$I_{DD-868.35}$	OOK, 0 dBm, 50% duty cycle		8.0		mA
		OOK, +10 dBm, 50% duty cycle		15.5		mA
		OOK, +13 dBm, 50% duty cycle		19.9		mA
		FSK, 0 dBm, 9.6 ksps		12.3		mA
		FSK, +10 dBm, 9.6 ksps		27.6		mA
		FSK, +13 dBm, 9.6 ksps		36.1		mA
Sleep Current	I_{SLEEP}			20		nA
Frequency Tune Time	t_{TUNE}			370		us
Phase Noise @ 433.92 MHz	$PN_{433.92}$	100 kHz offset from F_{RF}		-80		dBc/Hz
		600 kHz offset from F_{RF}		-98		dBc/Hz
		1.2 MHz offset from F_{RF}		-107		dBc/Hz
Phase Noise @ 868.35 MHz	$PN_{868.35}$	100 kHz offset from F_{RF}		-74		dBc/Hz
		600 kHz offset from F_{RF}		-92		dBc/Hz
		1.2 MHz offset from F_{RF}		-101		dBc/Hz
Harmonics Output for 433.92 MHz ^[3]	H2 _{433.92}	2 nd harm @ 867.84 MHz, +13 dBm P_{OUT}		-52		dBm
	H3 _{433.92}	3 rd harm @ 1301.76 MHz, +13 dBm P_{OUT}		-60		dBm
Harmonics Output for 868.35 MHz ^[3]	H2 _{868.35}	2 nd harm @ 1736.7 MHz, +13 dBm P_{OUT}		-67		dBm
	H3 _{868.35}	3 rd harm @ 2605.05 MHz, +13 dBm P_{OUT}		-55		dBm
OOK Extinction Ration				60		dB
Notes:						
[1]. The frequency range is continuous over the specified range.						
[2]. 0 and 2 ⁿ us, n = 0 to 10, when set to "0", the PA output power will ramp to its configured value in the shortest possible time.						
[3]. The harmonics output is measured with the application shown as Figure 10.						

2. Pin Descriptions



DL-TXC2119A/B. Pin Diagram

Table 6. DL-TXC2119A/B Pin Descriptions

Pin Number	Name	I/O	Descriptions
1	ANT	O	Transmitter RF Output
2	GND	I	Ground
3	VDD	I	Power Supply 1.8V to 3.6V
4	GND	I	Ground
5	DATA	I/O	Data input to be transmitted or
			Data pin to access the embedded EEPROM
6	SCLK	I	Clock pin to access the embedded EEPROM
7	GND	I	Ground
8	ANT1	---	NC

3. Typical Performance Characteristics

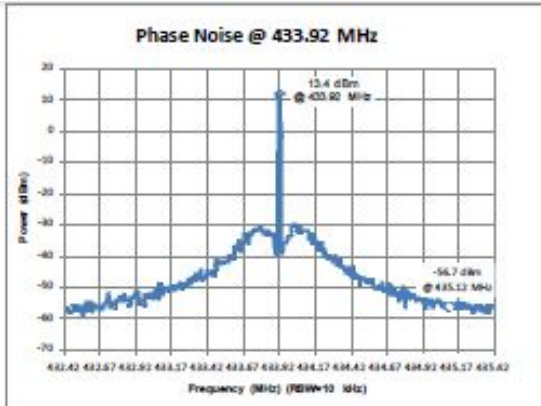


Figure 3. Phase Noise, $F_{RF} = 433.92$ MHz, $P_{OUT} = +13$ dBm, Unmodulated

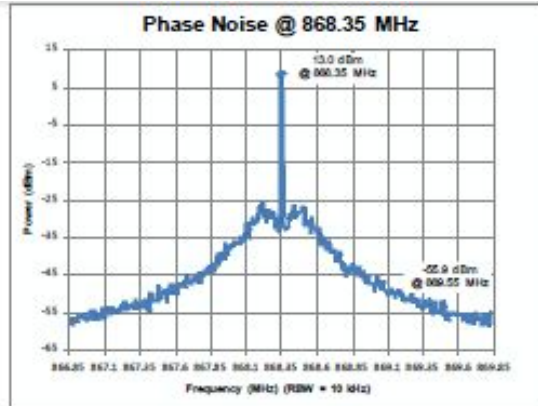


Figure 4. Phase Noise, $F_{RF} = 868.35$ MHz, $P_{OUT} = +13$ dBm, Unmodulated

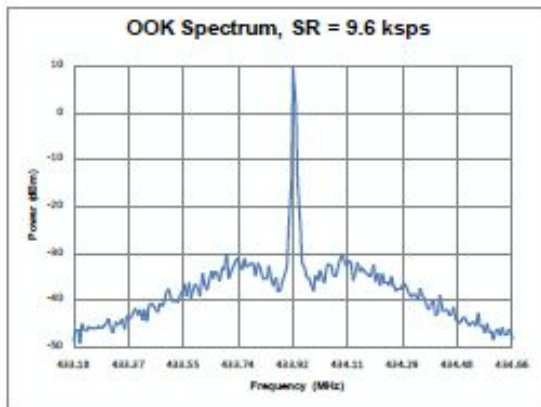


Figure 5. OOK Spectrum, SR = 9.6 kbps, $P_{OUT} = +10$ dBm, $t_{RAMP} = 32$ μ s

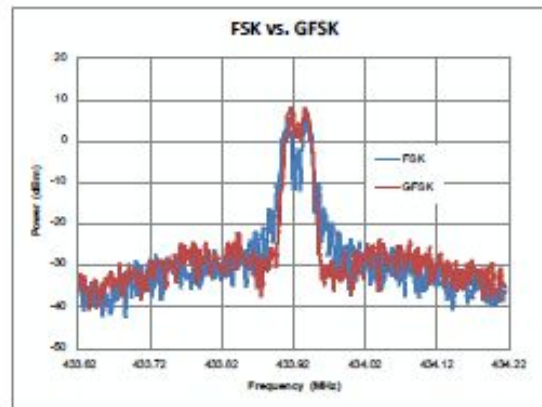


Figure 6. FSK/GFSK Spectrum, SR = 9.6 kbps, $F_{DEV} = 15$ kHz

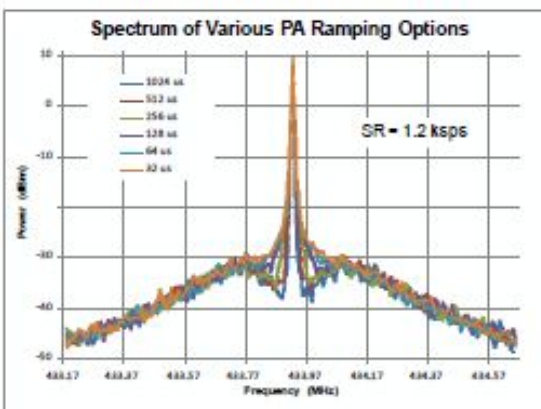


Figure 7. Spectrum of PA Ramping, SR = 1.2 kbps, $P_{OUT} = +10$ dBm

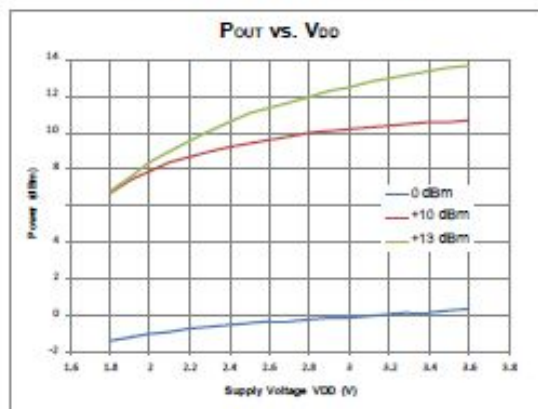
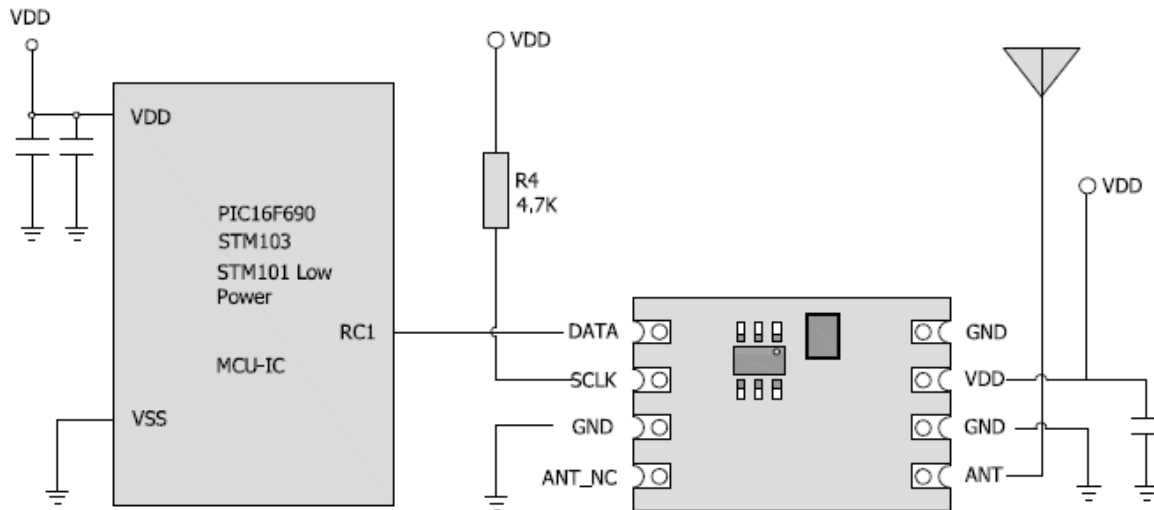


Figure 8. Output Power vs. Supply Voltages, $F_{RF} = 433.92$ MHz

4. Typical Application Schematics



5. Functional Descriptions

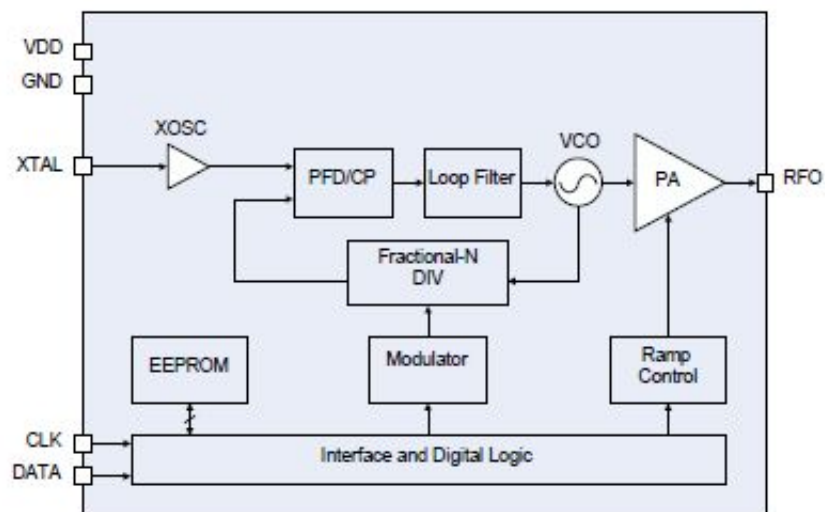


Figure 11. DL-TXC2119A/B Functional Block Diagram

6. Package Outline

