High-performance FSK Wireless Transmitter Module

SPECIFICATION

Model No.: DL-TXC2119A/B

Version: V2.0

Before using this module, please read this document carefully, and pay attention to the following important matters:

This module is an electrostatic sensitive product. Please operate it on an anti-static workbench during installation and testing.

The module uses an external antenna by default. The antenna can be a wire antenna or a standard UHF antenna. You can choose a specific antenna according to the actual situation. If the terminal product uses a metal shell, be sure to install the antenna outside the metal shell. Otherwise, the RF signal will be seriously attenuated, which will affect the effective distance.

Metal objects and wires should be kept away from the antenna as much as possible.

When installing the module, nearby objects should be kept at a sufficient safety distance from the module to prevent short circuit damage.

This module should be used in a dry environment. Please do not make any liquid substance come into this module.

Please use an independent voltage regulator circuit to supply power to this module, and avoid sharing with other circuits. The tolerance of the power supply should not be less than 5%.

Limitations:

This module is intended to be embedded in the customer's terminal product application, and does not provide a casing itself. It is not recommended that the customer directly resell this module as a final product without permission.

This series of modules are in accordance with commonly used international standards. If there is any special certification needed, we can adjust certain indicators according to your needs.

This module cannot be applied to life rescue, life-support systems, or any occasion where personal injury or life threatening may cause by equipment failure. Any organization or individual carrying out the above-mentioned applications shall bear all risks at their own.

We will not be responsible for any direct or indirect damage, injury or loss of profits caused by products that use this module.

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	**PN**	Phase Noise
	Memory	**RCLK**	Reference Clock
ESD	Electro-Static Discharge	**RF**	Radio Frequency
ESR	Equivalent Series Resistance	**RFPDK**	RF Product Development Kit
ETSI	European Telecommunications Standards	**RoHS**	Restriction of Hazardous Substances
	Institute	**Rx**	Receiving, Receiver
FCC	Federal Communications Commission	**SOT**	Small-Outline Transistor
FSK	Frequency Shift Keying	**SR**	Symbol Rate
GFSK	Gauss Frequency Shift Keying	**TWI**	Two-wire Interface
Max	Maximum	**Tx**	Transmission, Transmitter
MCU	Microcontroller Unit	**Typ**	Typical
Min	Minimum	**USB**	Universal Serial Bus
MOQ	Minimum Order Quantity	**XO/XOSC**	Crystal Oscillator
NP0	Negative-Positive-Zero	**XTAL**	Crystal
OBW	Occupied Bandwidth	**PA**	Power Amplifier
OOK	On-Off Keying		

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.

DL-TXC2119A/B transmitter together with the DL-RXC2219A/B receiver enables a powerful RF link.

1. Features:

- Embedded EEPROM, FCC/ETSI Compliant, RoHS Compliant
- Very Easy Development with RFPDK. All Features Programmable
- Frequency: 868 MHz FSK, GFSK and OOK Demodulation 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 & EEPROM Programming
- Output Power: -10 to +13 dBm
- Supply Voltage: 1.8 to 3.6 V
- Sleep Current: < 20 nA
- Module Size: 12.0*15.0*3.0mm

2. Applications:

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

3. Electrical Characteristics

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

3.1 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	℃
Supply Voltage Slew Rate			1			mV/us

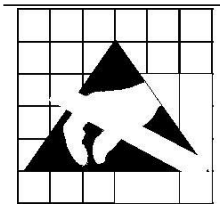
3.2 Absolute Maximum Ratings

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	℃
Storage Temperature	T_{STG}		-50	150	℃
Soldering Temperature	T_{SDR}	Lasts at least 30 seconds		255	℃
ESD Rating		Human Body Model (HBM)	-2	2	kV
Latch-up Current		@ 85 ℃	-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.

3.3 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]	$H2_{433.92}$	2nd harm @ 867.84 MHz, +13 dBm P_{OUT}		-52		dBm
	$H3_{433.92}$	3rd harm @ 1301.76 MHz, +13 dBm P_{OUT}		-60		dBm
Harmonics Output for 868.35 MHz[3]	$H2_{868.35}$	2nd harm @ 1736.7 MHz, +13 dBm P_{OUT}		-67		dBm
	$H3_{868.35}$	3rd harm @ 2605.05 MHz, +13 dBm P_{OUT}		-55		dBm
OOK Extinction Ration				60		dB

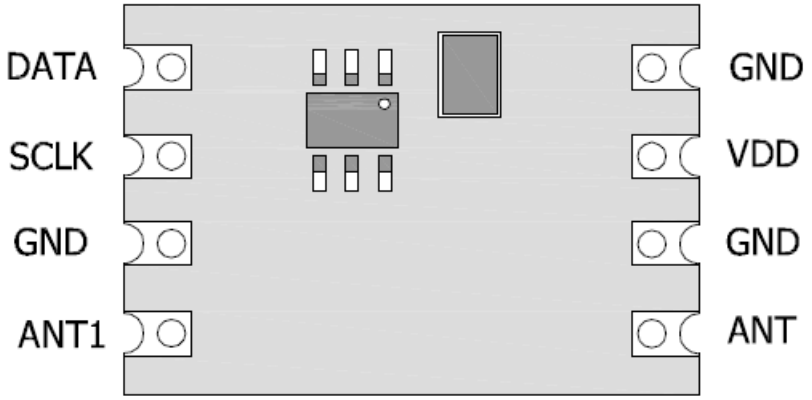
Notes:

[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.

4. 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

5. Typical Performance Characteristics

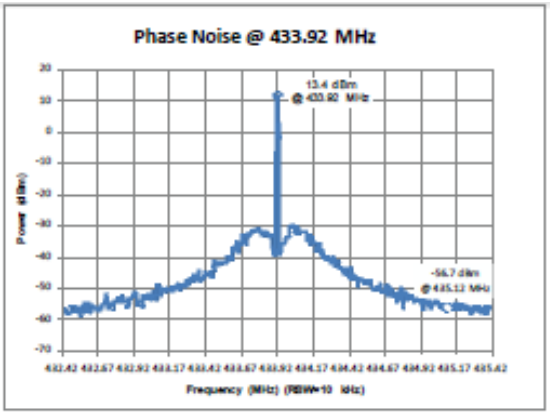


Figure 3. Phase Noise, F_{RF} = 433.92 MHz, P_{OUT} = +13 dBm, Unmodulated

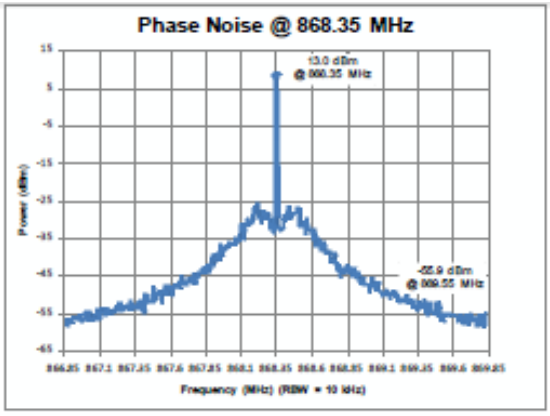


Figure 4. Phase Noise, F_{RF} = 868.35 MHz, P_{OUT} = +13 dBm, Unmodulated

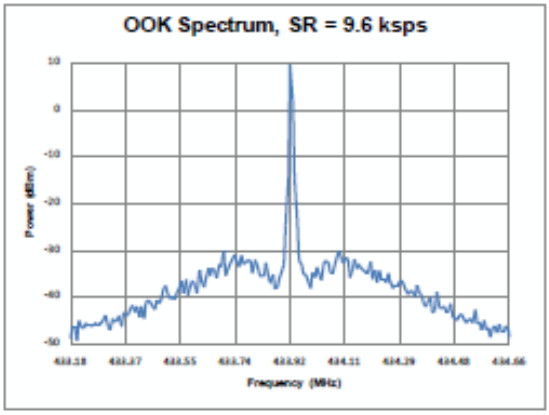


Figure 5. OOK Spectrum, SR = 9.6 ksps, P_{OUT} = +10 dBm, t_{RAMP} = 32 us

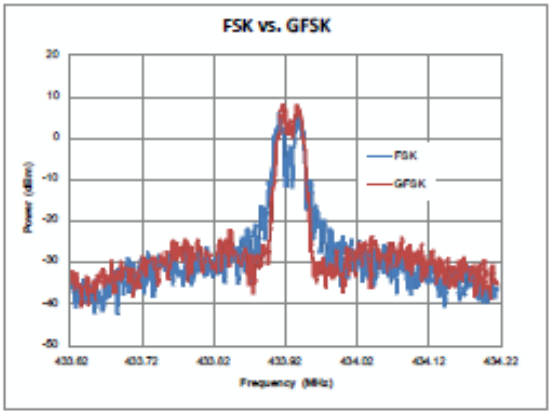


Figure 6. FSK/GFSK Spectrum, SR = 9.6 ksps, F_{DEV} = 15 kHz

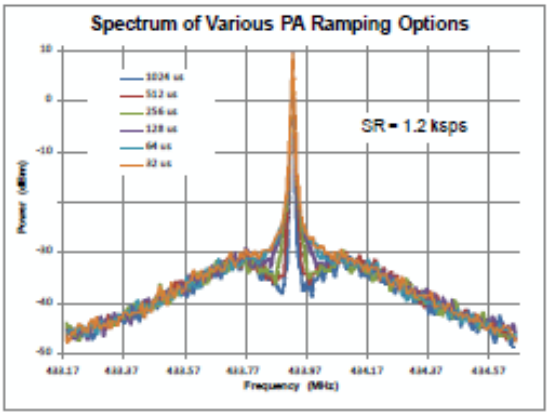


Figure 7. Spectrum of PA Ramping, SR = 1.2 ksps, P_{OUT} = +10 dBm

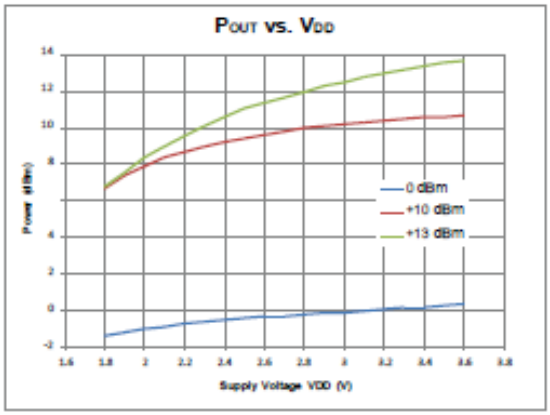
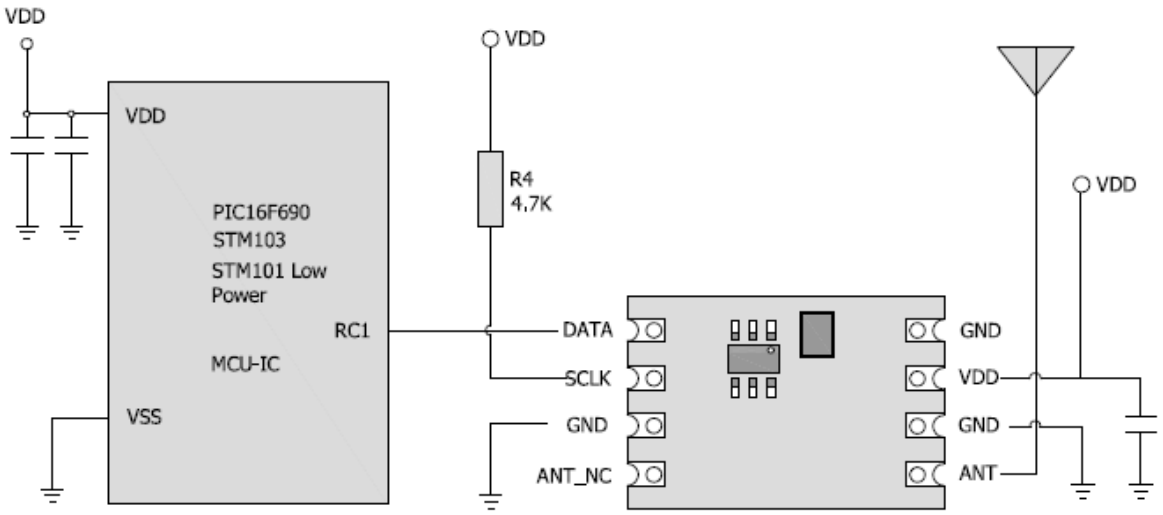


Figure 8. Output Power vs. Supply Voltages, F_{RF} = 433.92 MHz

6. Typical Application Schematics



7. Functional Descriptions

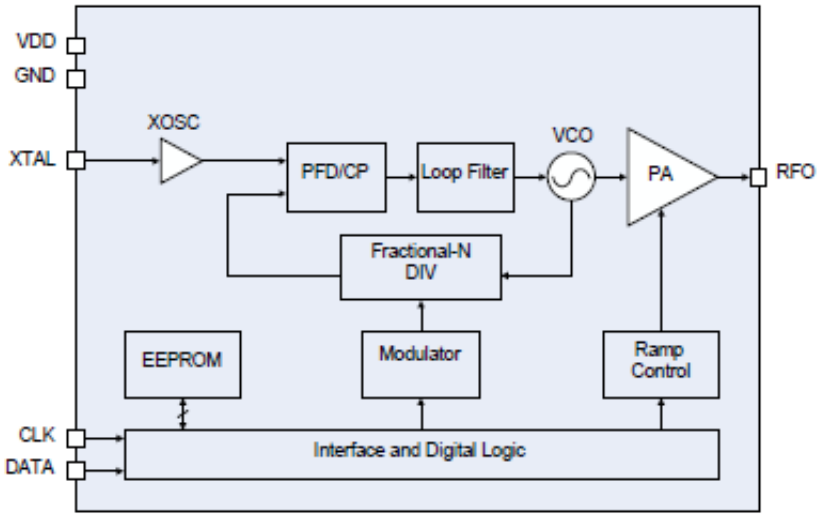
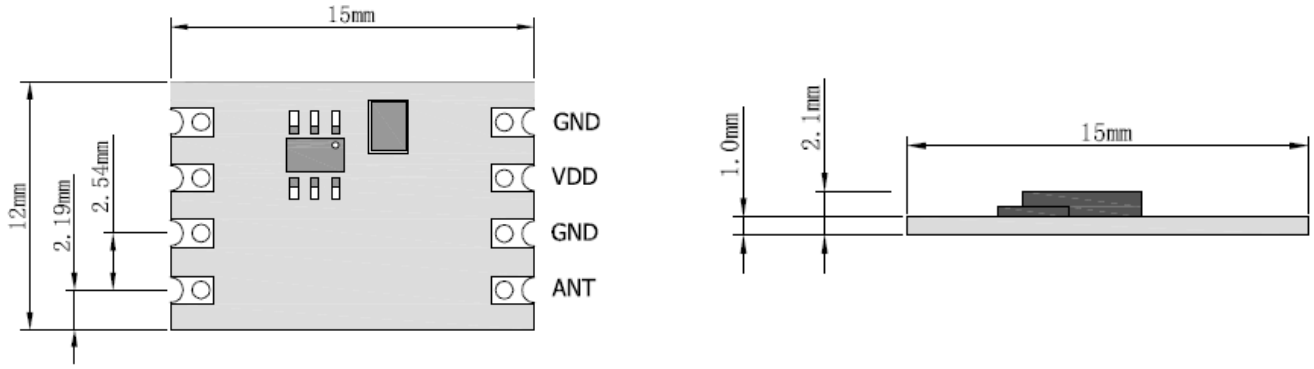


Figure 11. DL-TXC2119A/B Functional Block Diagram

8. Package Outline



9. Problems in module application

Considering the complexity of data transmission over the air, the radio frequency modulation method of the data, and some inherent characteristics of electromagnetic waves, the following issues should be considered during the application process.

1. The electromagnetic interference of the application environment will affect the actual distance of the remote control. Electromagnetic wave interference is divided into mainboard power supply interference, TFT screen data cable interference, Flash data exchange interference; and airborne carrier frequency interference, noise interference, high-power signal source interference, etc.
2. Factors such as product size, internal space, and coating of the shell will cause the attenuation of the wireless signal, which will affect the remote-control distance. Usually the narrow internal space of the product is not conducive to the extension of the antenna. The outer shell should avoid metal or metal plating as much as possible.
3. To choose a proper antenna is very important. The antenna is an important part of the communication system, and its performance directly affects the indicators of the communication system. We must pay attention to its performance (antenna type, antenna electrical performance) when selecting the antenna. Please feel free to contact us for consultation or recommendation, if you need.

10. Contact us

Shenzhen DreamLnk Technology Co., Ltd

★ Data collection, Smart home, Internet of Things applications, Wireless remote control technology, Remote active RFID, Antennas ★

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