

1. Product Description

VG4455 is a low-power, high-performance 315MHz/433MHz short-distance wireless communication transmitter circuit that supports ASK modulation. All of its tuning can be done automatically in the chip. PLL and power amplifier circuits are integrated in the chip. VG4455 has the characteristics of low power consumption, wide operating voltage, and high output power.

The VG4455 integrates PLL and power amplifier, where PLL provides carrier signal for the transmitter. The operating frequency of the PLL in the VG4455 is relatively low (433MHz and 315MHz), and the local oscillator signal provided by the ring oscillator is used. The fixed frequency division circuit is used in the loop, and the loop filter is built in. The overall power consumption is controlled below 1mA. The power amplifier amplifies the input signal, uses an open-drain output, and an external choke inductor structure. When applied, a π -type narrowband matching network is used to improve harmonic suppression and ensure that the output signal power is greater than 10dBm. VG4455 uses SOT23-6 package. Figure 1 shows the system structure.

1.1 Features

Operating voltage range: DC+1.8V~5.0V

Operating frequency range: 250MHz~450MHz

Operating current:

17Ma/12dBm(433MHz), 18Ma/12dBm(315MHz)

Output power: $\leq 12\text{dBm}$

Current consumption in shutdown mode: $< 100\text{nA}$

Operating temperature range: $-40^{\circ}\text{C} \sim +120^{\circ}\text{C}$

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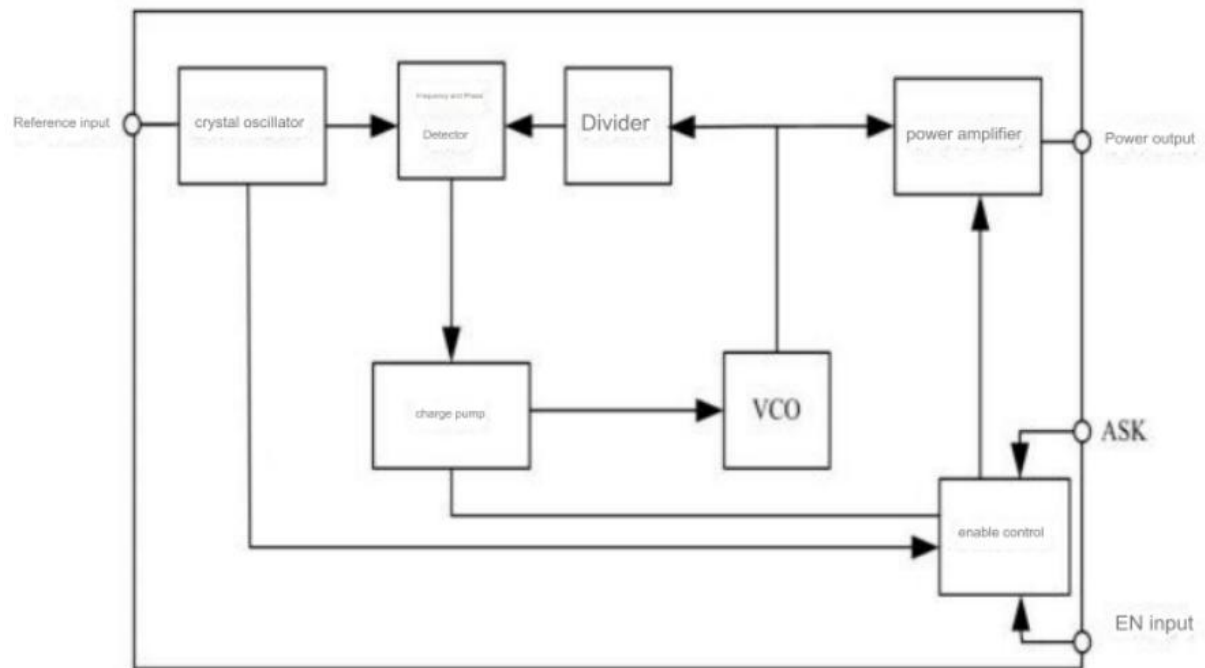
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1.2 Application Scope

Remote control access control system
Tire pressure monitoring equipment
Remote control of fans and lighting switches
Wireless sensor data transmission

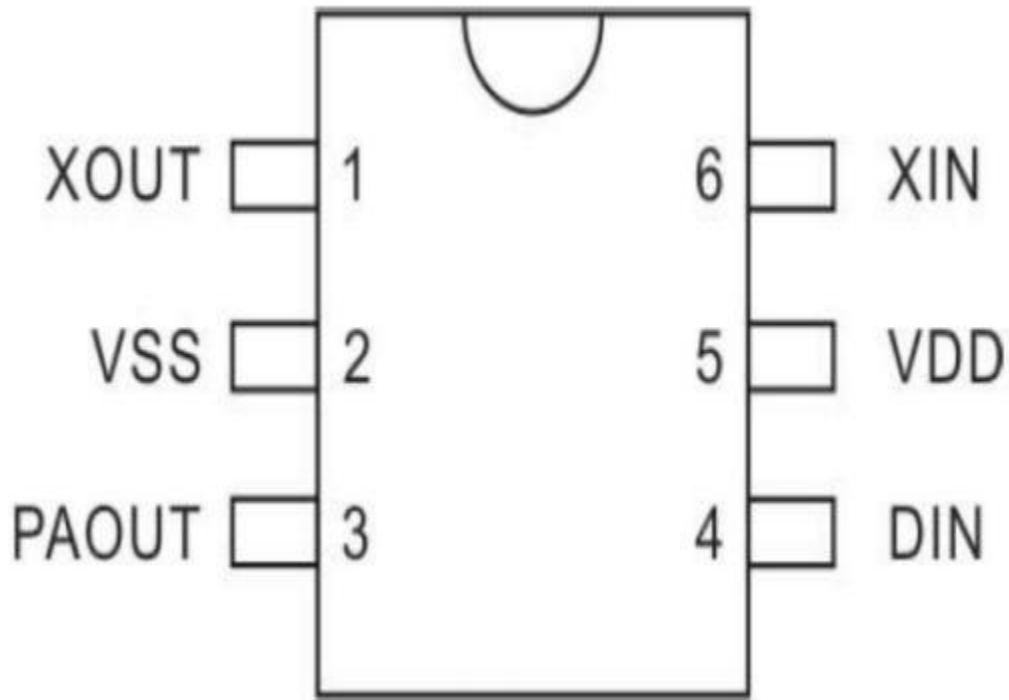
2.Functional Block Diagram



VG4455 System Block Diagram

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3. Pin Definition



Pin number	symbol	Input and output	Function
1	XOUT	0	Reference output
2	VSS	Ground	land
3	PAOUT	0	Amplifier output
4	DIN	I	Data input terminal
5	VDD	I	power supply
6	XIN	I	Reference input

4. Absolute Maximum Ratings

parameter	Minimum	Maximum	unit
Supply voltage	0	6.0	V
Storage temperature	-65	160	°C

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5. Recommended operating conditions

parameter	Minimum	Maximum	unit
Supply voltage	1.8	5	V
Recommended operating conditions	-40	120	°C

6. Electrical properties (Unless otherwise specified, $V_d = 3.3V$, $T_{em} = 25^\circ C$)

parameter	symbol	condition	Minimum	Typical Value	Maximum	unit
General Features						
Supply voltage	VDD		1.8	3.3	5	V
Working current	I _{ss}	Freq=433MHz pout=12dBm		17		mA
		Freq=315MHz pout=12dBm		18		mA
SDT Power Consumption	I _{SDT}	DIN=0; Tdelay>40ms			0.1	
RF Characteristics						
Supported rate	D _{DATA}		0.5	10		Kbps
Frequency range	Freq		250		450	MHz
Output Power	pout	Freq=433MHz		12		dBm
		Freq=315MHz		12		dBm
RF Power Switching Ratio	Pon/Off	DIN =1 hour power		60		dB
		DIN =Power at 0				
Phase Noise	Freq=433MHz	10KHz		-90		dBc/Hz
		100KHz		-91		dBc/Hz
		400KHz		-90		dBc/Hz
		1MHz		-87		dBc/Hz
Harmonic suppression	Second Harmonic	Freq=433MHz pout=12dBm		-51		dBm
	Third Harmonic	Freq=433MHz pout=12dBm		-60		dBm
	Second Harmonic	Freq=315MHz pout=12dBm		-55		dBm
	Third Harmonic	Freq=315MHz pout=12dBm		-55		dBm
Crystal Oscillator Characteristics						
Crystal frequency	F _{ITAL}	Freq=433MHz		13.56		MHz
		Freq=315MHz		9.84375		MHz
Load Capacitance	C _{LOAD}			30		pF
Startup time	T _{on}	No load capacitance		2.3		ms
Close Delay	T _{DELA}		40			ms

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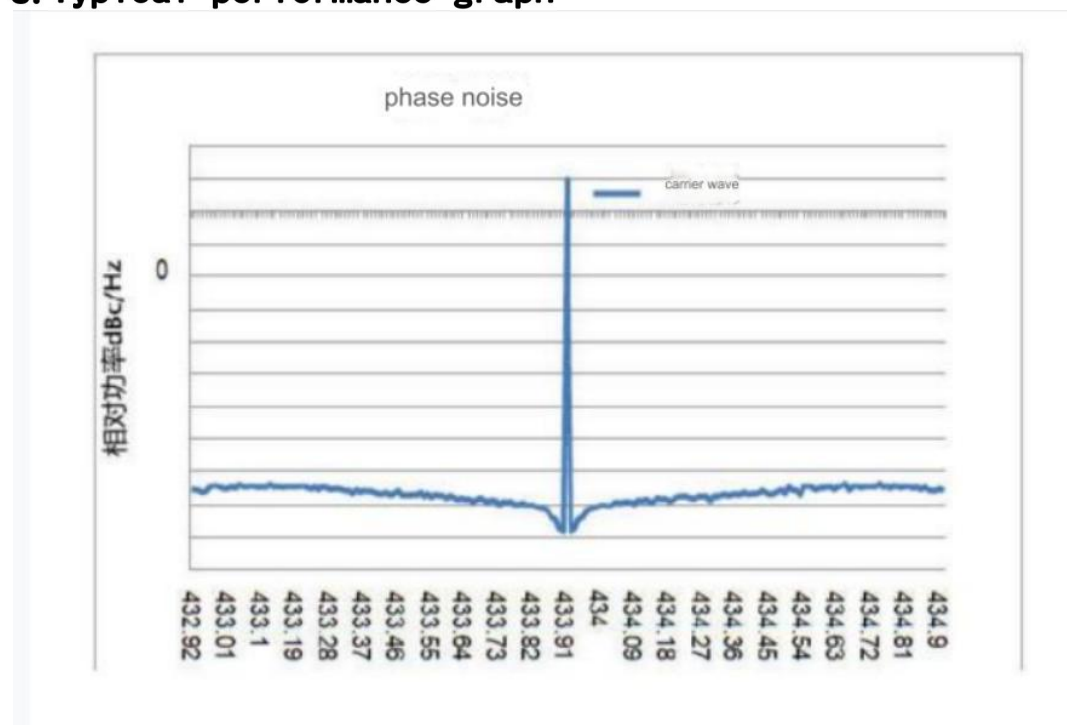
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7. Functional Description

The VG4455 short-distance wireless communication transmitter is used in the 315MHz~433MHz low-power, low-cost short-distance transceiver front end, supports ASK modulation, and is composed of a frequency synthesizer (PLL) and a power amplifier. The chip has high integration and low power consumption, and the transmission power reaches 12dBm. The VG4455 contains an enable control circuit. When D_{in}=1, the PLL and PA are in working state. When D_{in}=0, the PA is immediately turned off, and the PLL is delayed after about 40ms.

8. Typical performance graph



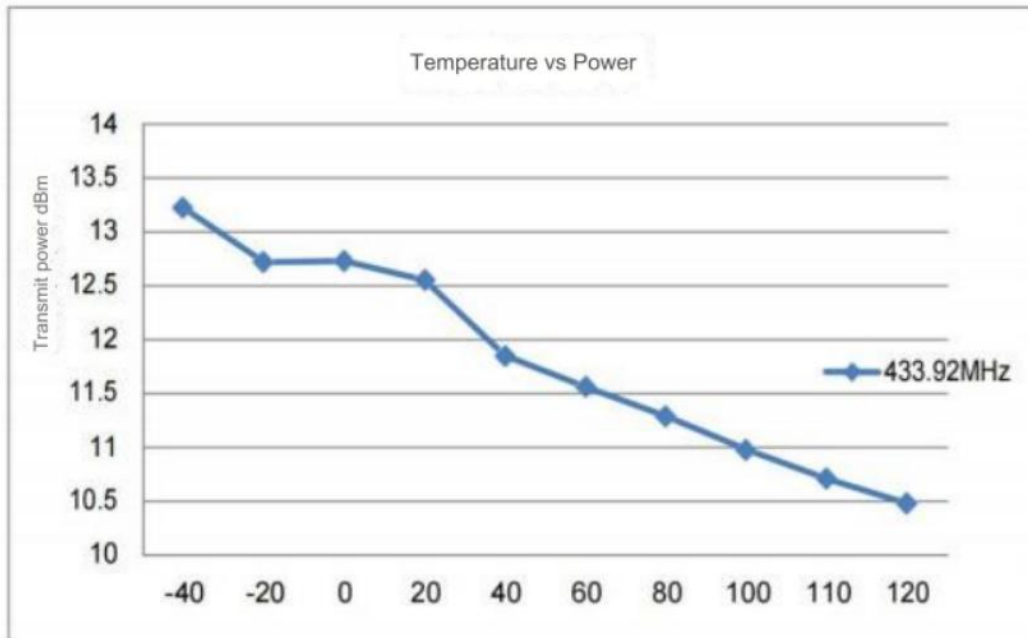
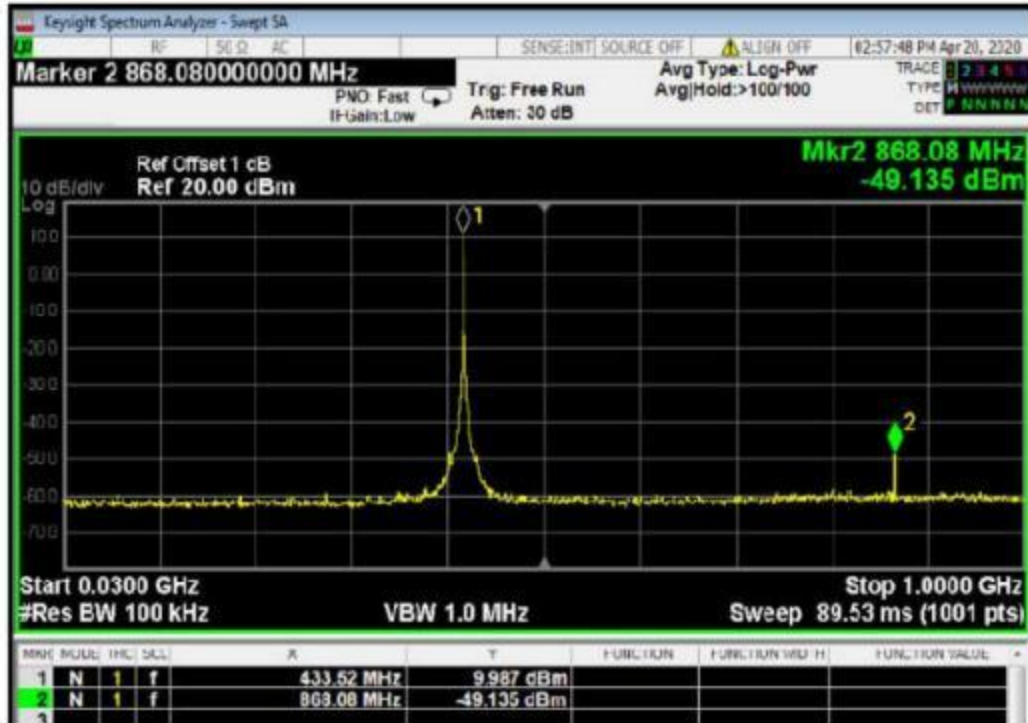
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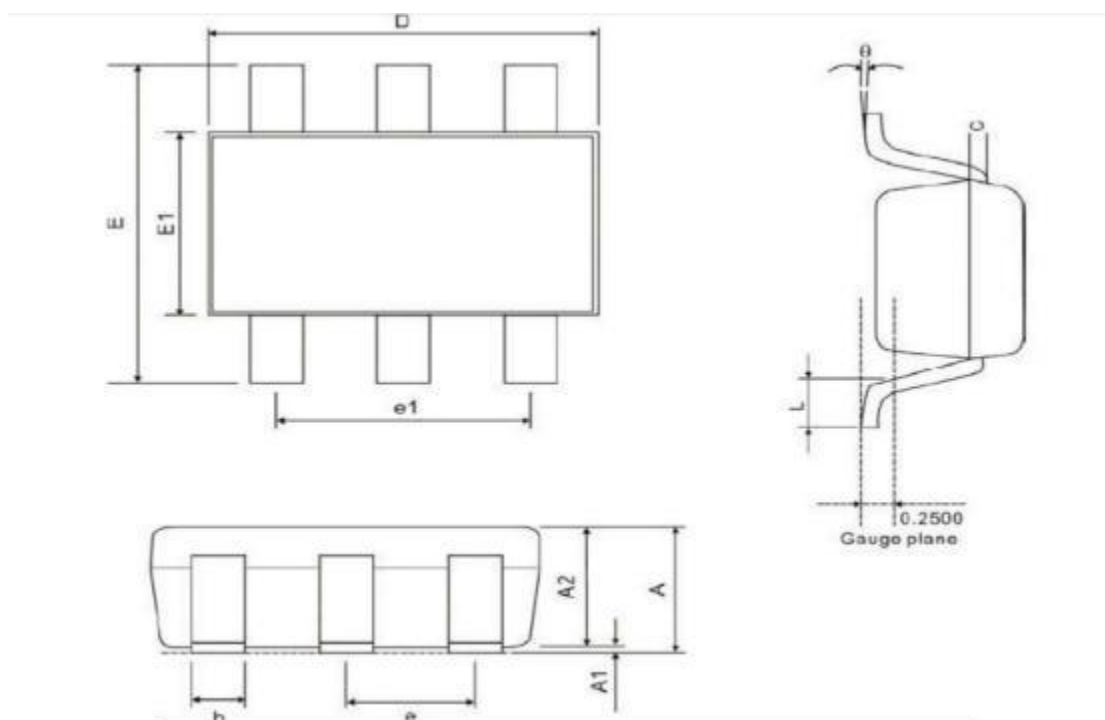
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10 .Package Outline



Symbol	Min.	Nom.	Max
A	-	-	1.45
A1	0.00	-	0.15
A2	0.90	1.15	1.30
b	0.30	-	0.50
c	0.080	0.130	0.200
D	2.90 BSC		
E	2.80 BSC		
E1	1.60 BSC		
e	0.95 BSC		
e1	1.90 BSC		
θ	0°	-	8°
L	0.30	0.45	0.60

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11 .Precautions

This device is an electrostatically sensitive device. Anti-static measures must be taken during transportation and use.

Use the device according to the recommended typical applications

VG4455 is a semi-analog device, and the lowest operating voltage that can actually be achieved is 1.8V.

When the bias voltage is lower than 2.5V, the RF transmission power will be significantly weakened.

Storage conditions required

The product is stored in sealed packaging: up to 12 months at a temperature less than 30° C and a humidity less than 90%.

After the packaging bag is opened, the components will be subjected to reflow soldering or other high-temperature processes.

When used, they must meet the following requirements:

- a) be completed within 72 hours and the factory environment is less than $30^{\circ}\text{C} \leq 60\% \text{RH}$;
- b) be stored in a 10%RH environment;
- c) be baked at 125°C for 24h to remove internal moisture before use.

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