VANGO TECHNOLOGIES, INC.

V9265

Datasheet

The V9265 is a single-phase calibration-free electric energy metering chip designed for the fields of on-device metering and smart power consumption. The chip has a built-in current sampling resistor, truly achieving self-calibration of user-level errors. Among them, the isolated version of the chip internally realizes the isolation between the strong and weak electrical power and communication, and can be directly integrated with the main control board to form a system. This chip can avoid the problem of strong-weak electrical isolation caused by the integration of the metering function in the system and reduce the technical threshold of metering in the user's product development.

Application scenarios: Smart power consumption, smart furniture, smart lighting, smart home appliances, on-device metering, etc.

Function

- Power Supply: 3.0 to 3.3V.
- Power Consumption: less than 10 mA.
- Metering Characteristics:
  - 2 independent oversampling ∑/Δ ADCs: 1 for voltage and 1 for current.
  - Built-in current sampling resistor.
  - Metering Accuracy:
    Meets the requirements of IEC 62053-21:2020, IEC 62053-22:2020, and IEC 62053-23:2020.
    Within a dynamic range of 1000:1, the full-wave active energy metering error is less than 1%.
    Within a dynamic range of 500:1, the full-wave voltage RMS value error is less than 1%.
    Within a dynamic range of 500:1, the full-wave current RMS value error is less than 1%.
  - Provide various measurement data:
    Full-wave voltage/current RMS value measurement.
    Full-wave active and reactive power measurement.
    Frequency measurement.
    The maximum metering current is 20A.
- The isolated version supports power isolation and communication isolation, and the isolation voltage is ≥ 4000Vrms.
- Built-in CF counter.
- Independent CF output, with a pulse constant of 4000 imp/kWh.
- 50Hz/60Hz self-adaptive.
- The zero-crossing voltage signal is synchronized with data upload.
- Upload metering data every 4 cycles.
- Single-wire UART interface, with a baud rate of 9600bps, odd parity, 8 data bits, and 1 stop

bit.

- Crystal oscillator-free design.
- Operating Temperature: -40~85℃.
- Storage Temperature: -55~+150°C.
- Package: Wide-body SOP16

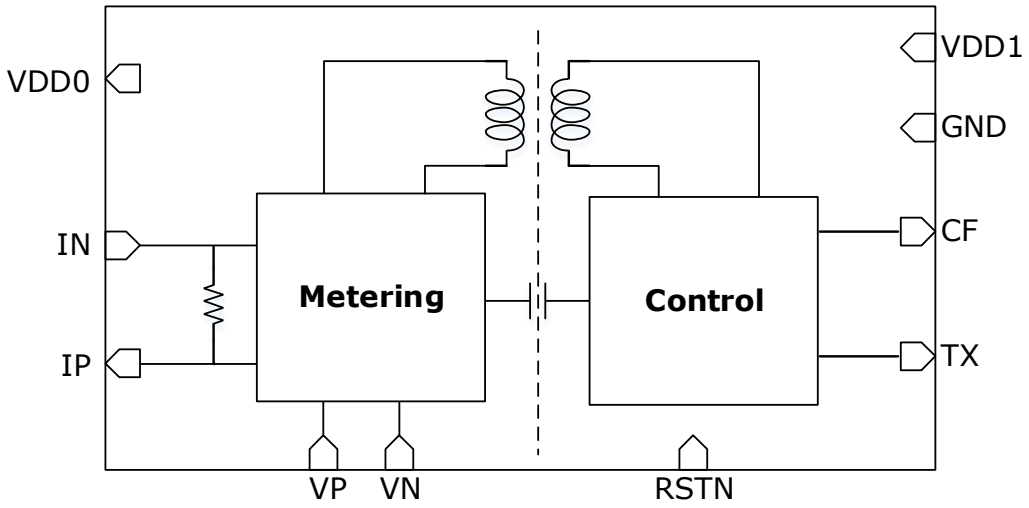
Revision History

Table1. Document Version History

Date	Revision	Description
2024.12.21	V1.0	Initial Version;
2025.03.26	V1.1	Modify the application circuit; Modify the description of the RSTN pin; Correct the constant value of the CF pulse;
2025.12.04	V1.2	Correct the input voltage range

1 Block Diagram

1.1 Block Diagram of V9265



2 Pinouts and pin descriptions

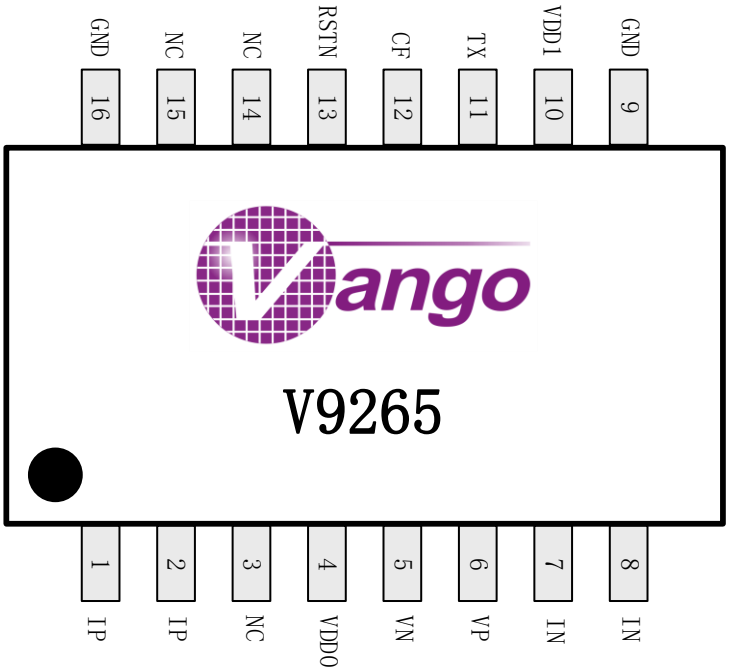


Table2. Pin definitions

V9265	Pin name	Description
1,2	IP	Current Output
3	NC	-
4	VDD0	Isolated Power Supply Output. An external parallel circuit consisting of a ≥4.7μF decoupling capacitor and a 0.1μF decoupling capacitor should be connected to this pin, and then grounded.
5	VN	Negative Terminal of the Voltage Channel
6	VP	Positive Terminal of the Voltage Channel
7,8	IN	Current Input, also serves as the chip's reference ground
9	GND	Low-voltage Side Power Supply Ground
10	VDD1	Low-voltage Side 3.3V Power Supply Output. An external 0.1μF decoupling capacitor should be connected to this pin and grounded.
11	TX	Active Upload of Metering Data, default high level
12	CF	Energy Bucket Pulse, default high level
13	RSTN	External Reset, active low, ≥60ms. An external 4.7μF decoupling capacitor should be connected to this pin and grounded. It is recommended that the MCU perform a low-level reset operation on this pin during power-on.
14	NC	-
15	NC	-
16	GND	Low-voltage Side Ground

3 Electrical Characteristics

Unless otherwise specified, the data are test results based on TA = 25°C and VDD1 = 3.3V.

Parameter	Min	Typ	Max	Unit	Description
Full-wave Active Energy Error	-	1	-	%	Dynamic range 1000:1 @25°C, ±5% frequency deviation.
Active Energy Bandwidth	-	800	-	Hz	-
Reactive Energy Error	-	1	-	%	Dynamic range 500:1 @25°C, ±5% frequency deviation.
Reactive Energy Bandwidth	-	800	-	Hz	-
RMS Voltage Error	-	1	-	%	Dynamic range 500:1 @25°C, ±5% frequency deviation.
RMS Voltage Bandwidth	-	800	-	Hz	-
RMS Current Error	-	1	-	%	Dynamic range 500:1 @25°C, ±5% frequency deviation.
RMS Current Bandwidth	-	800	-	Hz	-
Frequency Measurement					
Range	45	-	65	Hz	-
Resolution	-	0.01	-	Hz	-
Error	-	0.5	-	Hz	-
Analog Input					
Voltage Input Range	-200	-	200	mV	Ensure calibration-free accuracy by following reference design.
Current Input Range	-	-	20	A	-
Power Supply	3.0		3.3	V	±3%
Digital I/O					
Drive Capability	-	4	-	mA	-
Output High (V_{OH})	2.4	-	VDD	V	-
Output Low (V_{OL})	0	-	0.4	V	-
Input High (V_{INH})	2.0	-	VDD+0.3	V	-
Input Low (V_{INL})	-0.3	-	0.8	V	-
Input Current (I_{IN})	-	-	1	μA	-
Input Capacitance (C_{IN})	-	-	10	pF	-
UART Baud Rate	-	9600	-	bps	±3% tolerance.

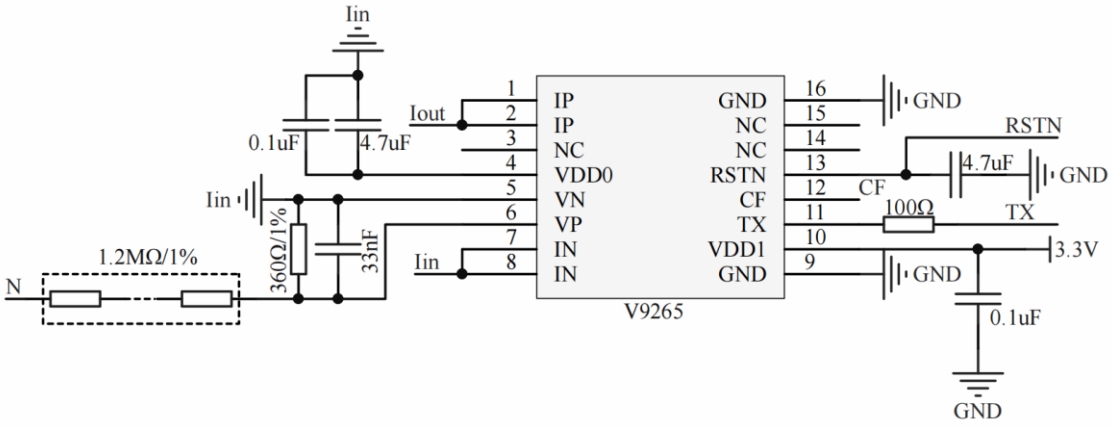
4 Data Transmission

Data is transmitted at zero-crossing points. Encoding format:

Byte(s)	Description
HEADER	Packet header (0x7D)
Byte 0	Bit7: Overtemperature warning Bits[6:0]: Reserved
Byte 1~2	16-bit unsigned RMS voltage
Byte 3~5	24-bit unsigned RMS current
Byte 6~9	32-bit signed active power Bit31: sign
Byte 10~13	32-bit signed reactive power Bit31: sign
Byte 14~15	16-bit unsigned frequency.
Byte 16~17	16-bit unsigned CF counter. Automatically clears after overflow.
CKSUM	Checksum Calculation method: Sum the HEADER and the 18 target data bytes (Byte 0 to Byte 17) as bytes, invert the sum (bitwise NOT), then add 0x33. The formula is as follows: CKSUM = 0x33 + ~(HEADER + Byte 0 + Byte 1 + Byte 2 + ... + Byte 15 + Byte 16 + Byte 17)

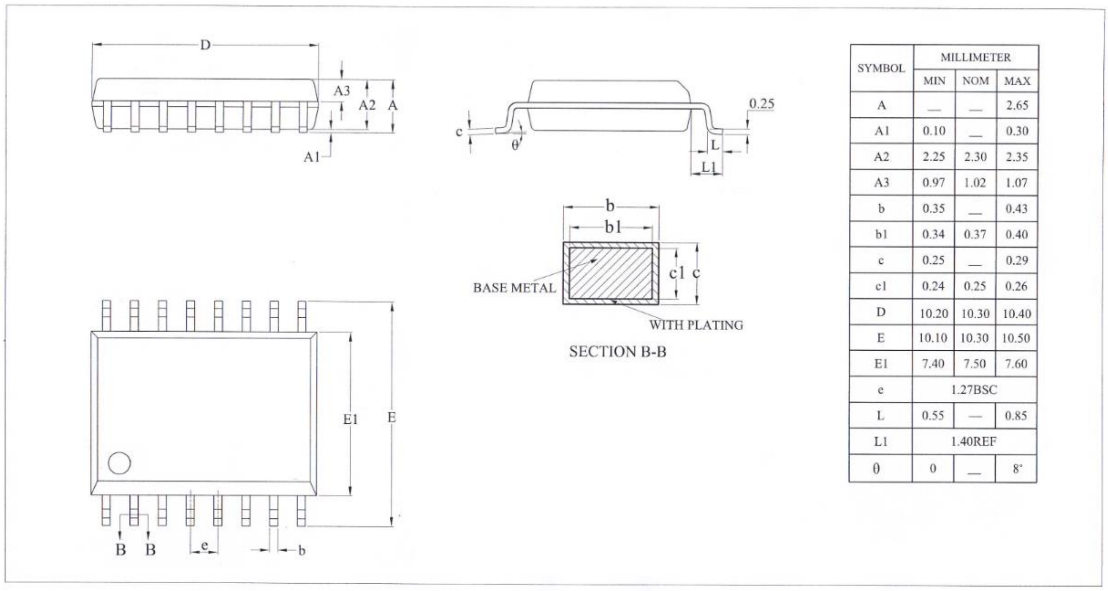
5 Application Circuits

Figure1. V9265 Typical Application Circuit



6 Package Dimensions

6.1 V9265 Package



SYMBOL	MILLIMETER		
	MIN	NOM	MAX
A	—	—	2.65
A1	0.10	—	0.30
A2	2.25	2.30	2.35
A3	0.97	1.02	1.07
b	0.35	—	0.43
b1	0.34	0.37	0.40
c	0.25	—	0.29
c1	0.24	0.25	0.26
D	10.20	10.30	10.40
E	10.10	10.30	10.50
E1	7.40	7.50	7.60
e	1.27BSC		
L	0.55	—	0.85
L1	1.40REF		
θ	0	—	8°

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