D8105 Data Sheet

Qi Compliant

Wireless Power Transfer Controller

March, 2019 (V1.0.0)

Table of Contents

Revision History

The following table shows the revision history for this document.

Version	Date	Revise
1.0.0	March, 2019	

1. Features

- Digital Controller Compatible with Wireless Power Consortium v1.2.4 A11/A28 Specifi-cation
- Suitable for WPC and Proprietary 5V Wireless Power Transmitters
- Supports Received Power Up to 5W
- Two Chip Solution Enables High Efficiency Up to 79%
- Dynamic Power Lock (DPL) Enable Operation from Inputs Sources with Limited Power
- LC Resonance Voltage Peak Shutdown
- Digital Demodulation Reduces Components
- Supports Foreign Object Detection(FOD)
- Over Current Protection
  Over Temperature Protection
- System LED Indication of Charging State and Fault Status
- QFN20 Package (3mm x 3mm)

2. Applications
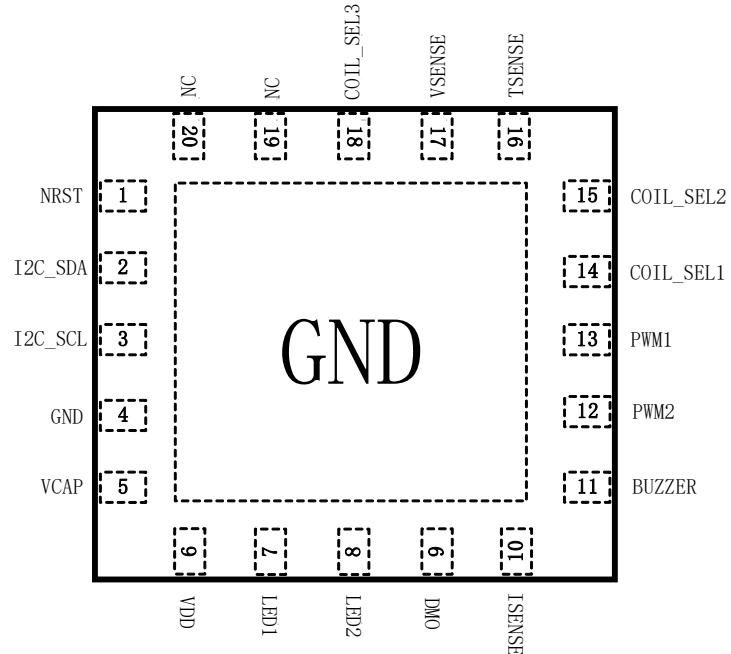
- WPC Compliant Wireless Chargers for Smart Phones and Wearable Applications
- Proprietary Wireless Chargers
  Medical and Industrial Applications
- Car and Other Vehicle Accessories

3. Description

The D8105 is a wireless power transmitter controller, integrates all controlling required to create a Qi-compliant or proprietary 5V transmitter. The D8105 and D9005 together provide a compact wireless charger solution. The D8105 supports multiple Qi specified Type A Power Transmitter designs including A11/A28. To maximize flexibility in wireless power control applications, Dynamic Power Lock (DPL) is featured on the D8105. DPL enhances user experience by seamlessly optimizing the usage of power available from limited input supplies. The system supports Foreign Object Detection (FOD) by continuously monitoring the efficiency of the established power transfer, protecting from power lost due to metal objects misplaced in the wireless power transfer field. Should any abnormal condition develop during power transfer, the D8105 handles the condition and provides indication outputs. Comprehensive status and fault monitoring features enable a low cost yet robust Qi-certified wireless power system design. The D8105 is available in a thermally enhanced 3 mm x 3 mm, 20-pin QFN package.

4. Pin Configuration and Functions

Package 20-Pin QFN
Top View

5. Pin Functions

PIN		I/O	DESCRIPTION
NO.	NAME		
1	NRST	I	Device reset. Use a 100nF bypass capacitors as close to the part as possible
2	I2C_SDA	I/O	NC or Connect to SDA pin of power bank chip
3	I2C_SCL	I/O	NC or Connect to SCL pin of power bank chip
4	GND	I	Ground
5	VCAP	I	Be sure to decouple with bypass capacitors as close to the part as possible
6	VDD	I	Analog 3.3-V Supply.Be sure to decouple with bypass capacitors as close to the part as possible
7	LED1	O	Connect to an LED via a resistor for status indication.
8	LED2	O	Connect to an LED via a resistor for status indication.
9	DMO	I	Demodulation signal input
10	ISENSE	I	Transmitter input current
11	BUZZER	O	NC
12	PWM2	O	PWM Output 2
13	PWM1	O	PWM Output 1
14	COIL-SEL1	O	Select first coil
15	COIL-SEL2	O	Select second coil
16	TSENSE	I	NTC Temperature Sensor Input.
17	VSENSE	I	Transmitter input voltage, used for efficiency calculations. Use 100-kΩ to 10-kΩ divider to minimize quiescent current.
18	COIL-SEL3	O	Select third coil
19	NC	I/O	NC
20	NC	I/O	NC

6. Specifications

6.1 Absolute Maximum Ratings

	MIN	MAX	UNIT
VDD	-0.3	3.6	V
Any PINs	-0.3	3.6	V
Operating Temperature	-40	85	℃
Storage Temperature	-50	125	℃
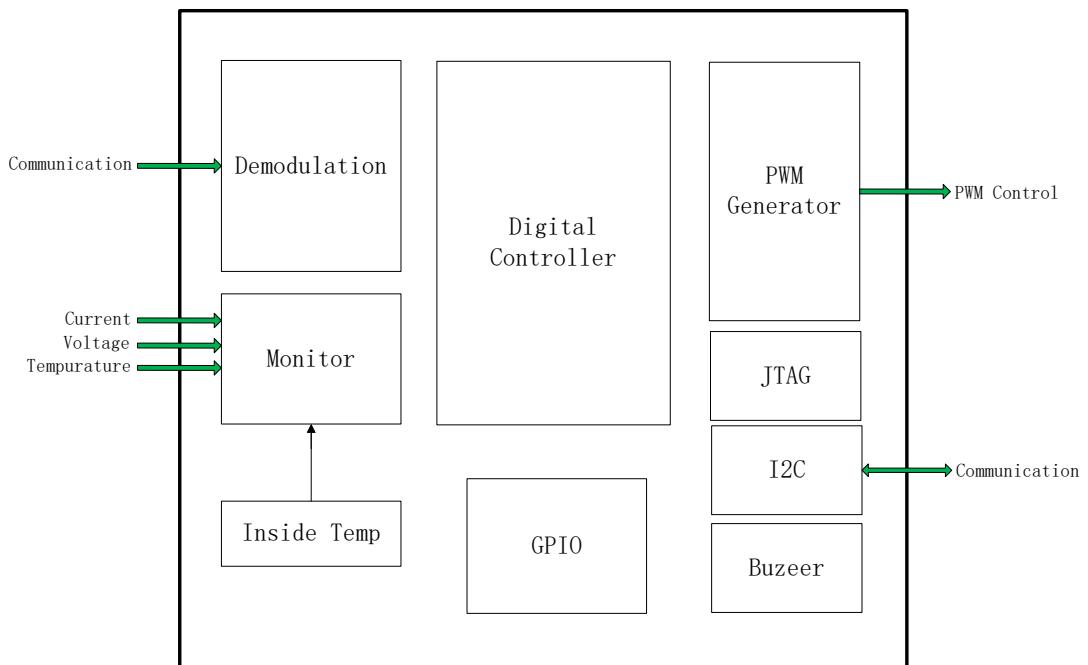
6.2 ESD absolute maximum ratings

Symbol	Ratings	Conditions	Class	Maximum value	Unit
VESD(HBM)	Electrostatic discharge voltage (human body model)	TA = +25 °C, conforming to JESD22-A114	2	2000	V
VESD(CDM)	Electrostatic discharge voltage (charge device model)	TA = +25 °C, conforming to ANSI/ESD STM5.3.1	C3	250	V

6.3 Electrical Characteristics

PARAMETERS		TEST CONDITIONS	MIN	TYP	MAX	UNIT
SUPPLY CURRENT						
I_{VDD}		V33A = 3.3 V	10.7	15.9	21.1	mA
VLVD		Input low voltage detection		4		V
DRIVERS Output						
I_{LED}	LED1 and LED2 sink current				5	mA
VIN, IIN and NTC INPUTS						
V_{ADI}		Input voltage range	0		3.6	V
V_{T_SENSE}		NTC trigger threshold		2		V

7. Block Diagram

8. Application Information

Coils and Matching Capacitors

The coil and matching capacitor selection for the transmitter has been established by WPC standard. These values are fixed and cannot be changed on the transmitter side.

Table1. WPC Type Capacitor List

WPC Type	Input Voltage	Capacitor
A11	5V	368nF/50V/C0G
A28	5V	368nF/50V/C0G

Dynamic Power Lock

For a 5V input system, in order to allow operation from a 5V input supply with a limited current capability such as USB ports, a scheme called Dynamic Power Lock is implemented in D8105. When input voltage drops under 4.0V, DPL activates to sustain the input voltage above 4.3V by limiting the transferring power.

Over current and Over Temperature Protections

If an over-current or over-temperature situation is detected, D8105 will stop power transfer to ensure safety.

Integrated Digital Demodulations

D8105 has an integrated high performance digital demodulation circuit. Built-in programmable gain pre-amplifier and filter for communication robust.
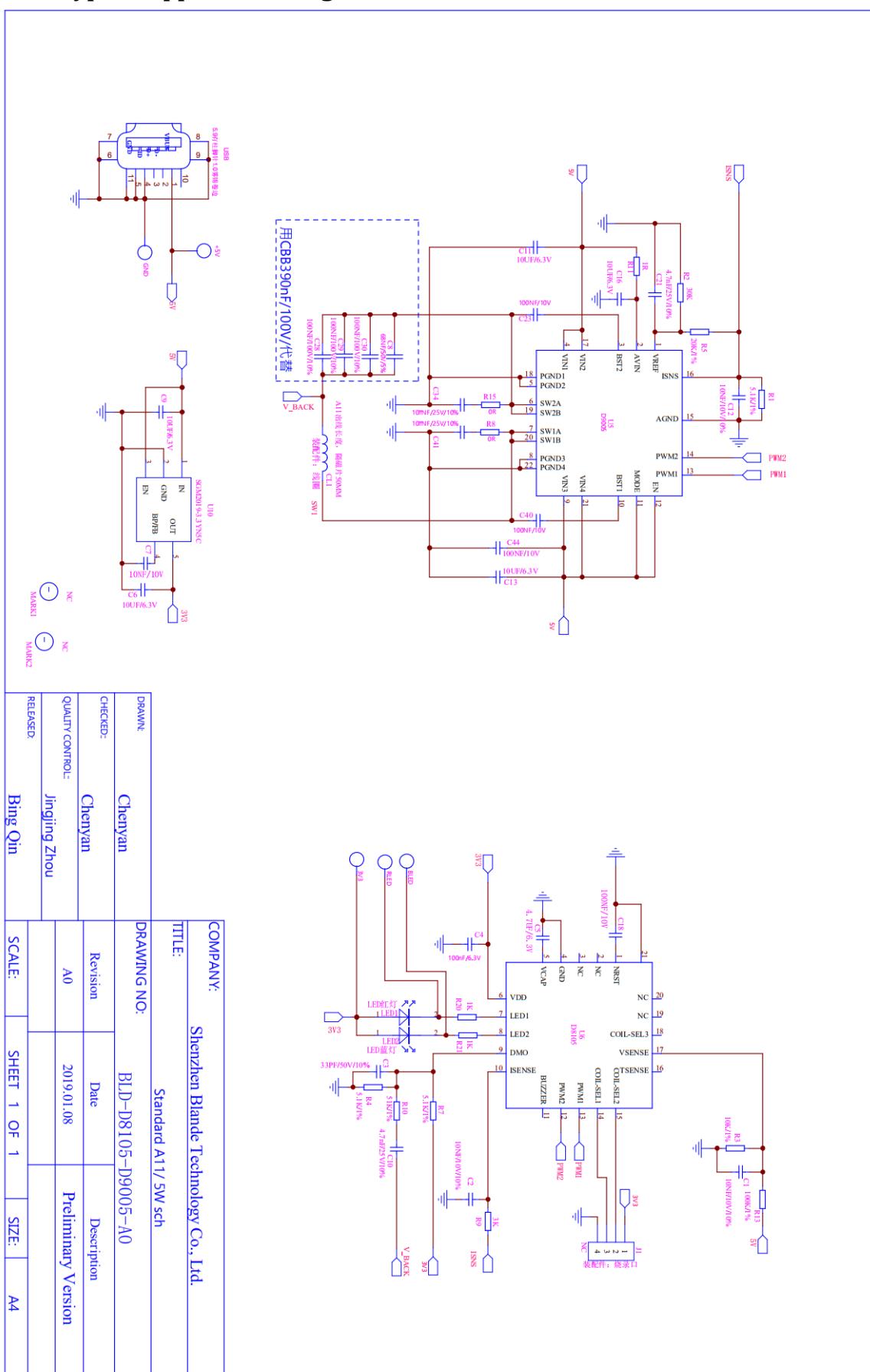
Foreign Object Detection

Foreign Objects typically are parasitic metals such as coins, keys, paperclips, etc. To prevent the temperature of such a foreign object from rising to an unacceptable level due to eddy current, D8105 is capable of detecting a foreign object and aborting the power transfer.

Status LEDs

There are two LED pins on D8105 which are used as system status indicators, such as idle, charging, error, etc. The following table lists the LED functions used in reference design.
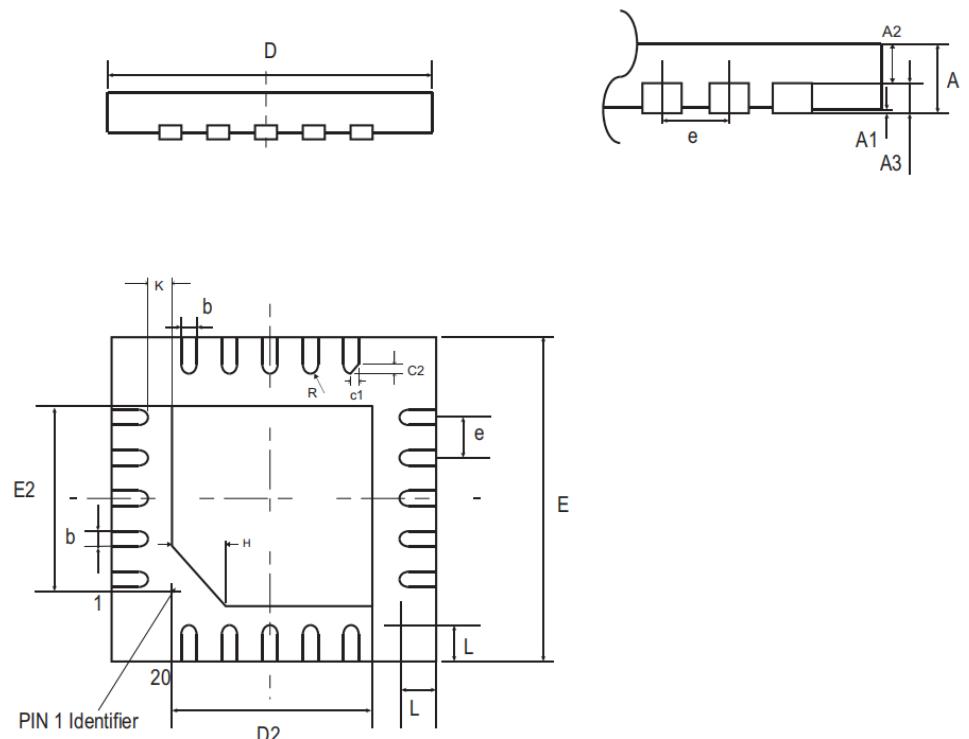
9. Typical Application Diagram

10. Bill of Materials

Count	Designator	Value	Description	Size	MFR
1	U6	D8105	Transmitter Manager	QFN20	
1	U5	D9005	Power State	QFN16	
1	U10	SGM2019-3.3YN5C	LDO	SOT-23-5	
1	LED1	LED 红灯	LED	LED0603	
1	LED2	LED 蓝灯	LED	LED0603	
1	USB	MICRO-USB	MICRO-USB	MICRO-USB	
4	C18 C23 C40 C44	100NF/10V	Capacitor	0402	
1	C4	100NF/6.3V		0402	
1	C7	10NF/10V		0402	
3	C1-2 C12	10NF/10V/10%	Capacitor	0402	
2	C34 C41	10NF/25V/10%	Capacitor	0402	
5	C6 C9 C11 C13 C16	10UF/6.3V	Capacitor	0402	
1	C3	33PF/50V/10%	Capacitor	0402	
2	C5	4.7UF/6.3V	Capacitor	0402	
2	C10 C21	4.7nF/25V/10%	Capacitor	0402	
3	C28-30	100NF/100V/10%	Capacitor	1206	
1	C8	68NF/100V/10%	Capacitor	1206	
2	R8 R15	0R		0402	
1	R13	100K/1%	Resister	0402	
1	R3	10K/1%	Resister	0402	
2	R20-21	1K	Resister	0402	
1	R11	1R	Resister	0402	
1	R5	20K/1%	Resister	0402	
1	R2	30K	Resister	0402	
1	R9	3K	Resister	0402	
3	R1 R4 R7	5.1K/1%	Resister	0402	
1	R10	51K/1%	Resister	0402	
1	CL1	TYPE-A11	A11 Transmitter Coil	L-SIP2	

11. Package-QFN20

Symbol	millimeters		
	Min	Type	Max
A	0.70	0.75	0.80
A1	0.00	0.02	0.05
A2	0.50	0.55	0.60
A3		0.20REF	
b	0.15	0.20	0.25
D	2.90	3.00	3.10
E	2.90	3.00	3.10
D2	1.40	1.50	1.60
E2	1.40	1.50	1.60
e	0.30	0.40	0.50
H		0.35REF	
K		0.35REF	
L	0.35	0.40	0.45
R	0.085		
C1		0.07	

C2		0.07	
N	Pin number		