THP9330 High Efficiency Wireless Power Receiver for 20W Applications

Features

- Supports up to 20W
- Maximum current output up to 1A
- 95% AC to DC efficiency
- WPC-1.2.4 BPP/EPP compliant
- Integrated high efficiency full bridge synchronous rectifier and LDO
- Output programmable range from 5V to 16V with 200mV step
- Integrated assistant aiming circuit
- Over-voltage, over-temperature, and over-current protection
- Supports I2C interface
- Supports Foreign Object Detection (FOD)
- WLCSP package（2.5mm×3.8mm）

Typical Applications

- Mobile phones
- Tablet
- Wearable devices
- Smart devices

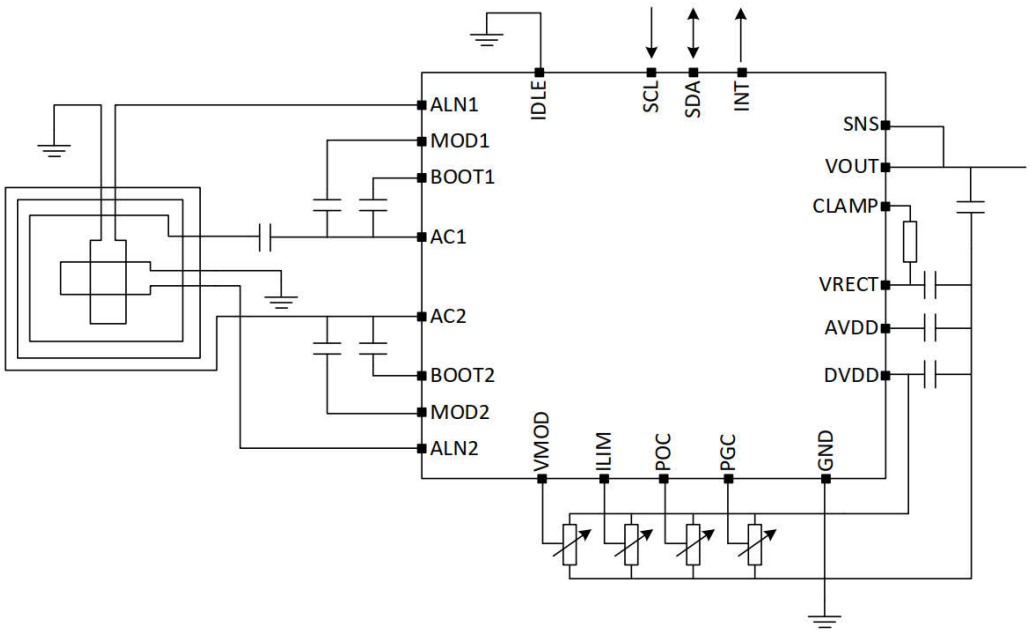
Description

THP9330 is a high-efficient, QI compliant wireless power receiver IC. The receiver integrated full bridge synchronous rectifier supporting application up to 20W, making it ideal for fast charging devices.

THP9330 features 5V to 15.6V programmable output to target different applications with high efficiency charging solutions. THP9330 integrated assistant aiming circuit to align transmit and receive coil to reach highest charging efficiency. THP9330 has multiple protection mechanism including over-current protection, over-voltage protection, over-temperature protection to optimize security and stability of the design.

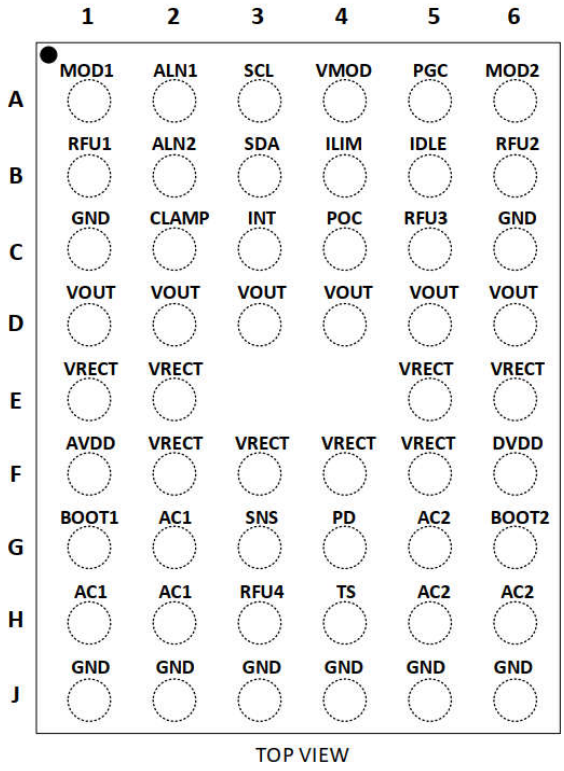
THP9330 require only minimized external components to achieve the advanced and high-efficient solution for wireless charging applications.

Typical Application Circuit



1 Pin Assignments

1.1 Pin Assignments



TOP VIEW

1.2 Pin Descriptions

Pin	Name	Type	Description
A1	MOD1	Analog output	Signal modulation output. Connect 47nF capacitor to AC1.
B1	RFU1	Analog output	Reserved for internal use.
C1, C6, J1, J2, J3, J4, J5, J6	GND	GND	Ground.
D1, D2, D3, D4, D5, D6	VOUT	Analog output	LDO output. Connect 20uF capacitor to GND.
E1, E2, F2, F3, F4, F5, E5, E6	VRECT	Analog output	Regulated output voltage pin. Connect 30uF capacitor to GND.
F1	AVDD	Analog output	Internal 5V LDO output. Connect 1uF connector to GND.
G1	BOOT1	Analog output	Boost capacitor for internal rectifier. Connect 15uF capacitor to AC1.
H1, G2, H2	AC1	Analog input	AC input. Connect to the Rx coil.
A2	ALN1	Analog input	Input pin for coil alignment

B2	ALN2	Analog input	Input pin for coil alignment
C2	CLAMP	Analog output	Clamping circuit. Connect 36Ω resistor to VRECT.
A3	SCL	Digital input	Serial clock line.
B3	SDA	Digital I/O	Serial data line.
C3	INT	Digital output	Interrupt flag pin. Open-drain output. Pulling this pin to logic Low to activate.
G3	SNS	Analog input	Connect to VOUT.
H3	RFU4	Analog output	Reserved for internal use.
A4	VMOD	Analog input	Programming pin to control default output voltage and Q factor.
B4	ILIM	Analog input	Programmable over-current limit pin.
C4	POC	Analog input	Packet offset calibration pin used for Foreign Object Detection.
G4	PD	Analog output	Low level output when idle.
H4	TS	Analog input	Temperature sensor input pin. The chip shutdown when TS is lower than 0.2V.
A5	PGC	Analog input	Packet gain calibration pin used for Foreign Object Detection.
B5	IDLE	Analog input	Pulling this pin to logic high to turn receiver to idle mode. Set low to enable the chip.
C5	RFU3	Analog output	Reserved for internal use.
G5, H5, H6	AC2	Analog input	AC input. Connect to the Rx coil.
A6	MOD2	Analog output	Signal modulation pin. Connect 47nF capacitor to AC2
B6	RFU2	Analog output	Reserved for internal use.
F6	DVDD	Analog output	Internal 1.8V LDO output. Connect 1uF capacitor to GND.
G6	BOOT2	Analog output	Boost capacitor for internal rectifier. Connect 15uF capacitor to AC2.

2 Reliability Characteristic

It may permanently damage the THP9330 if exceed the maximum rating in below table.

Pin	Minimum	Maximum	Unit
AC1, AC2, MOD1, MOD2	-0.3	20	V
CLAMP, VRECT, IDLE, PD	-0.3	24	V
DVDD	-0.3	2	V
ILIM, PGC, POC, SCL, SDA, INT, TS, AVDD	-0.3	6	V
BOOT1, BOOT2	-0.3	AC1+5, AC2+5	V
VOUT, SNS	-0.3	17	V
CLAMP	-	1	A
AC1, AC2	-	2.5	A

ESD information

Test Model	Pins	Ratings	Unit
HBM	All	2	kV
CDM	All	500	V

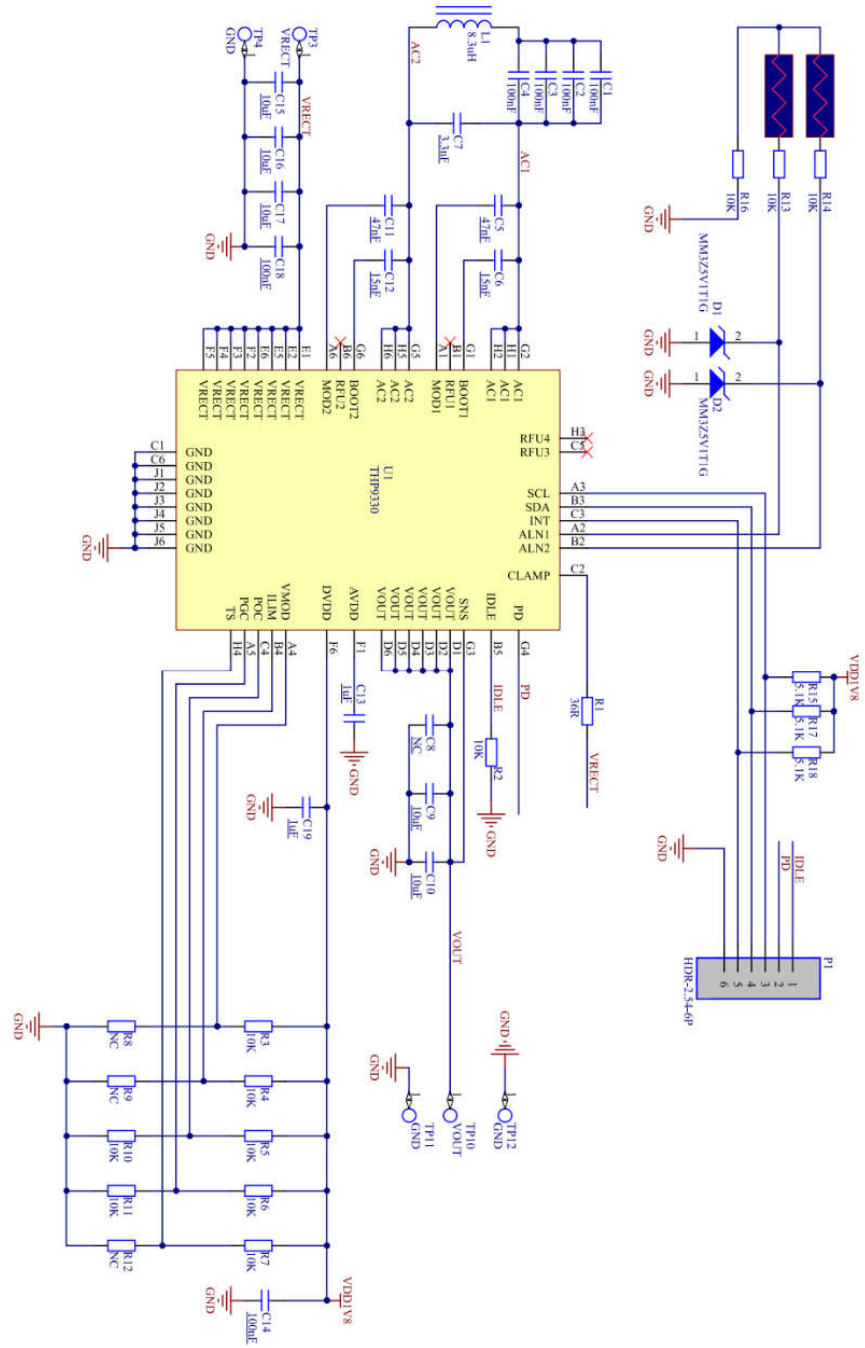
Temperature information

Parameters	Minimum	Maximum	Unit
Operating temperature	-5	105	℃
Storage temperature	-40	150	℃

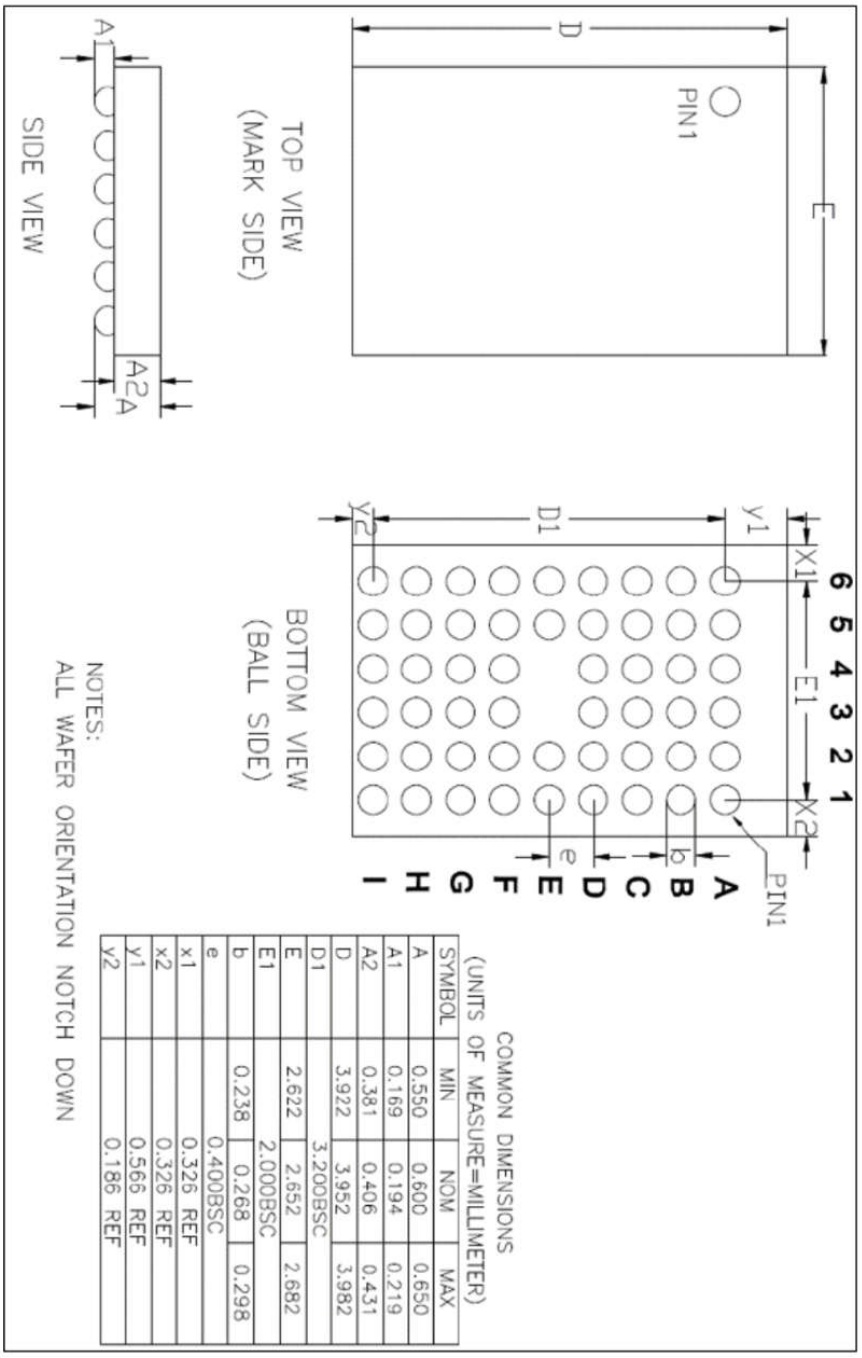
3 Electrical Characteristic

Symbol	Description	Conditions	Min	Typ	Max	Unit
Under-voltage Lock-out (UVLO)						
V_{UVLO}	UVLO Rising	Rising voltage on VRECT		3		V
V_{UVLO_HYS}	UVLO Hysteresis	VRECT failing		150		mV
Over-voltage protection (OVP)						
V_{OVP}	DC Over-Voltage Protection			17		V
$V_{OVP-HYS}$	Over-Voltage Hysteresis	Falling voltage on VRECT		1		V
Quiescent current						
I_{active}	Active Quiescent Current	IDLE = Low or no load; VRECT = 12.3V		3		mA
I_{sd}	Shut Down Current	IDLE = high; VRECT = 12.3V			100	uA
VDD voltage						
V_{DVDD}	DVDD Voltage	IDVDD=10mA ,CDVDD=1uF	1.62	1.8	1.98	V
V_{AVDD}	AVDD Voltage	IAVDD=10mA ,CAVDD=1uF	4.5	5	5.5	V
LDO						
I_{OUT_MAX}	Maximum Output Current			1.3		A
V_{OUT_MAX}	Maximum Output Voltage			15.6		v
ADC						
N	Resolution			12		Bit
f_S	Sampling Rate			67.5		kSa/s
Channel	Number of Channels			8		
V_{in-fs}	Full-Scale Input Voltage			2.1		V
IDLE PIN						
V_{IH}	Input Threshold High		2			V
V_{IL}	Input Threshold Low				0.25	V
I2C interface						
f_{scl}	Clock Frequency			400		kHz
Thermal shutdown						
T_{SD}	Thermal shutdown			140		℃
T_{SD-HYS}	Thermal Hysteresis shutdown			20		℃

4 Typical application



5 Package



COMMON DIMENSIONS
(UNITS OF MEASURE=MILLIMETER)

SYMBOL	MIN	NOM	MAX
A	0.550	0.600	0.650
A1	0.169	0.194	0.219
A2	0.381	0.406	0.431
D	3.922	3.952	3.982
D1		3.200BSC	
E	2.622	2.652	2.682
E1		2.000BSC	
b	0.238	0.268	0.298
e		0.400BSC	
x1		0.326 REF	
x2		0.326 REF	
y1		0.566 REF	
y2		0.186 REF	

NOTES:
ALL WAFER ORIENTATION NOTCH DOWN

6 Distributor contact

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