BM1380

Bitcoin Hash ASIC Datasheet

BitMain Technologies Inc.

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Revision History

Revision Number	Author	Date	Description
1.0	Zhan	2013.11	Initial

1Overview

BM1380 is a kind of high performance and low power bitcoin hash ASIC.

1.1 Features

- Typical hash rate and power

Voltage(V)	Hash Rate(GHz)	Current(A)	Total power(W)	W/GHz
0.75	1.60	1.423	1.067	0.681
0.85	2.00	1.993	1.694	0.847
1.00	2.50	2.821	2.821	1.128
1.10	2.80	3.359	3.695	1.320

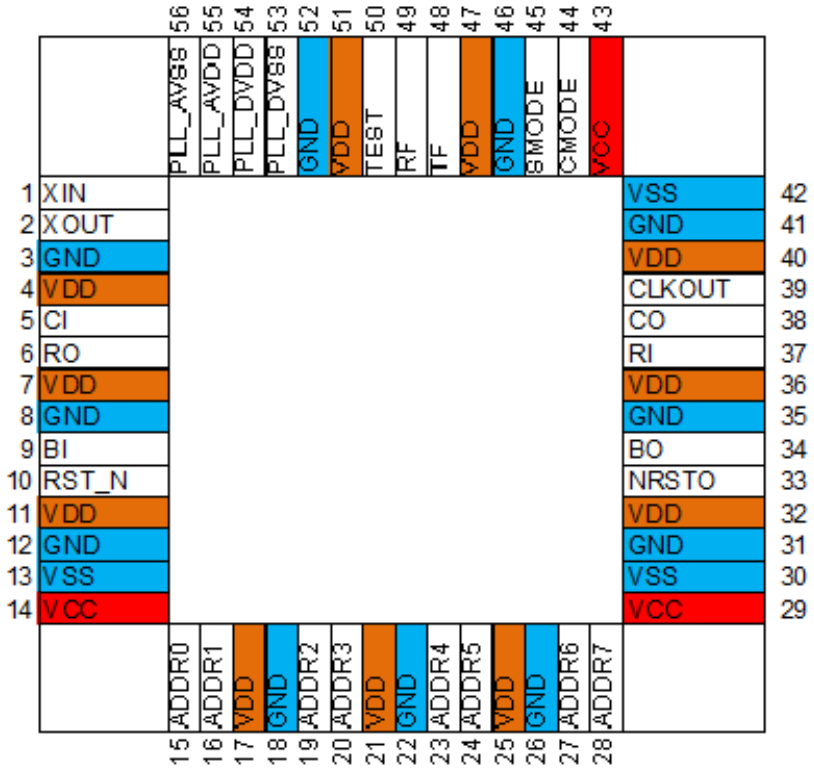
- QFN56 package
- Support asynchronous UART and synchronous UART interface
- Support single chain mode and multiple chain mode
- Max 256 chips per chain
- Support hardware addressing and software addressing

1.2 Applications

- Bitcoin mining

2Pin description

2.1 Pin diagram



2.2 Signal description

Name	I/O	Active Level	Description
XIN	I	N/A	Oscillator input
XOUT	O	N/A	Oscillator output
RST_N	I	L	Reset signal
TEST	I	N/A	Internal pull down. 0: Normal mode 1: Test mode
CMODE	I	N/A	Chain Mode. Internal pull up 0: Single Chain Mode. 1: Multiple Chain Mode.
SMODE	I	N/A	Serial Mode. Internal pull up. 0: Asynchronous UART mode.

Name	I/O	Active Level	Description
			1: Synchronous UART mode.
CLKOUT	O	N/A	Clock output
NRSTO	O	L	Reset output
CI	I	N/A	Command Input
CO	O	N/A	Command Output
RI	O	N/A	Respond Input
RO	O	N/A	Respond Output
BI	I	H	Respond Busy Input
BO	O	H	Respond Busy Output
ADDR[7:0]			Address Input. internal pullup.
RF	O		Command Rx Flag
TF	O		Respond Tx Flag
PLL_AVDD			PLL analog power
PLL_AVSS			PLL analog ground
PLL_DVDD			PLL digital power
PLL_DVSS			PLL digital ground

2.3 Numerical Pin List

Pin#	Name	Type	Active Level	Output Drive	Description
1	XIN	In	N/A	-	Oscillator input
2	XOUT	Out	N/A	-	Oscillator output
3	GND	-		-	Ground
4	VDD	-		-	Core power
5	CI	In	N/A	-	Command Input
6	RO	Out	N/A	8mA	Respond Output
7	VDD			-	Core power
8	GND			-	Ground
9	BI	In	H	-	Respond Busy Input
10	RST_N	In	L	-	Reset signal
11	VDD			-	Core power
12	GND			-	Ground
13	VSS			-	Ground
14	VCC			-	IO power
15	ADDR0			-	Address0
16	ADDR1			-	Address1
17	VDD			-	Core power
18	GND			-	Ground
19	ADDR2			-	Address2

Pin#	Name	Type	Active Level	Output Drive	Description
20	ADDR3			-	Address3
21	VDD			-	Core power
22	GND			-	Ground
23	ADDR4			-	Address4
24	ADDR5			-	Address5
25	VDD			-	Core power
26	GND			-	Ground
27	ADDR6			-	Address6
28	ADDR7			-	Address7
29	VCC			-	IO power
30	VSS			-	Ground
31	GND			-	Ground
32	VDD			-	Core power
33	NRSTO	Out	N/A	8mA	Rest output
34	BO	Out	H	8mA	Respond Busy Output
35	GND			-	Ground
36	VDD			-	Core power
37	RI	Out	N/A	-	Respond Input
38	CO	Out	N/A	8mA	Command Output
39	CLKOUT	Out	N/A	16mA	Clock output
40	VDD			-	Core power
41	GND			-	Ground
42	VSS			-	Ground
43	VCC			-	IO power
44	CMODE	In	N/A	-	Chain Mode
45	SMODE	In	N/A	-	Serial Mode
46	GND			-	Ground
47	VDD			-	Core power
48	TF	Out		4mA	Respond Tx Flag
49	RF	Out		4mA	Command Rx Flag
50	TEST	In	N/A	-	Internal pull down. 0: Normal mode 1: Test mode
51	VDD			-	Core power
52	GND			-	Ground
53	PLL_DVSS	-		-	PLL digital ground
54	PLL_DVDD	-		-	PLL digital 1.0V
55	PLL_AVDD	-		-	PLL analog 1.0V
56	PLL_AVSS	-		-	PLL analog ground

3Electrical Character

3.1 Absolute Maximum Rating

Symbol	Parameter	Max value	Unit
VDD	Core Voltage	1.2	V
VCC	IO Voltage	3.6	V
PLL_DVDD	PLL Digital power	1.1	V
PLL_AVDD	PLL analog Power	1.1	V
T_{STG}	Storage Temperature	-65~150	℃

3.2 Recommended Operation Conditions

Symbol	Parameter	Min.	Typ.	Max.	Unit
VDD	Core Voltage	0.75	0.8	1.1	V
VCC	IO Voltage	3.0	3.3	3.6	V
PLL_DVDD	PLL Digital power	0.9	1.0	1.1	V
PLL_AVDD	PLL analog Power	0.9	1.0	1.1	V
T_{OPT}	Operation Temperature	0	25	125	℃

3.3 DC Characters

Symbol	Parameter	Min.	Typ.	Max.	Unit
V_{IL}	Input Low Voltage	-0.3		0.8	V
V_{IH}	Input High Voltage	2		3.6	V
V_{OL}	Output Low Voltage			0.4	V
V_{OH}	Output High Voltage	2.4			V
I_L	Input Leakage Current			±10	uA
V_T	I/O threshold point	1.36	1.43	1.51	V
V_{T+}	Schmitt input low to high threshold pint	1.61	1.69	1.77	V
V_{T-}	Schmitt input high to low threshold pint	1.18	1.27	1.35	V
R_{PU}	I/O internal pull-up resistor	28K	39K	60K	Ω
R_{PD}	I/O internal pull-down resistor	30K	44K	76K	Ω
I_{CC}(VCC)	Supply current of VCC		10		mA
I_{CC}(PLL)	Supply current of PLL_DVDD and PLL_AVDD		1		mA

CB_{IN}	Input pin capacitance		10		pF
CB_{OUT}	Output pin capacitance		10		pF

3.4 VDD power and hash rate

Voltage(V)	Hash Rate(GHz)	Current(A)	Total power(W)	W/GHz
0.75	1.60	1.423	1.067	0.681
0.85	2.00	1.993	1.694	0.847
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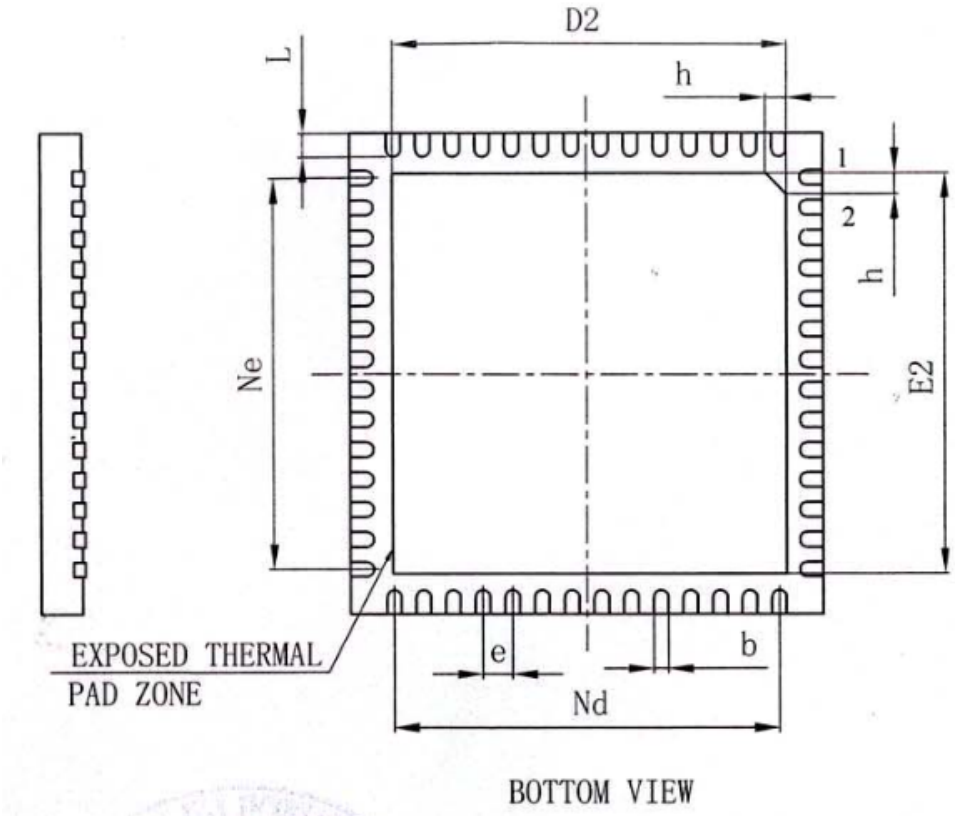
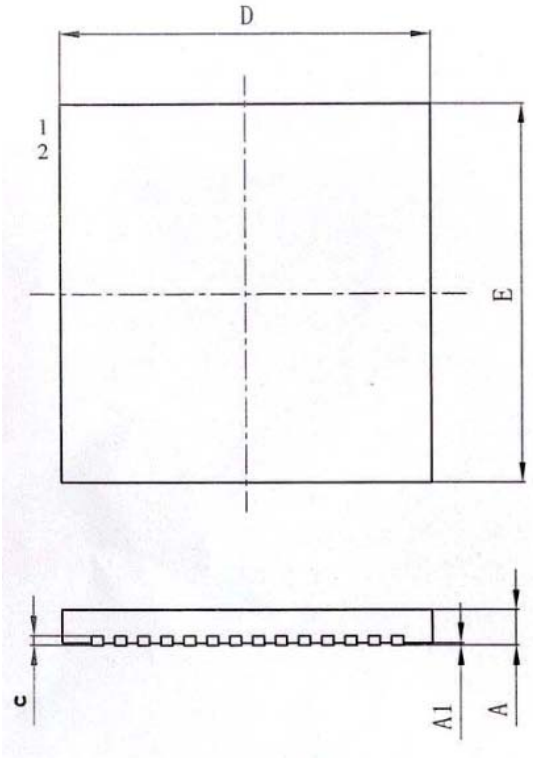
4Package Outline





SYMBOL	MILLIMETER		
	MIN	NOM	MAX
A	0.70	0.75	0.80
A1	—	0.02	0.05
b	0.18	0.25	0.30
c	0.18	0.20	0.25
D	7.90	8.00	8.10
D2	6.50	6.65	6.80
e	0.50BSC		
Ne	6.50BSC		
Nd	6.50BSC		
E	7.90	8.00	8.10
E2	6.50	6.65	6.80
L	0.35	0.40	0.45
h	0.30	0.35	0.40
载体尺寸 (mil)	270X270		