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Contact us

Tel: +86-755-8981 8866 Fax: +86-755-8427 6832

Email & Skype: info@chipsmall.com Web: www.chipsmall.com

Address: A1208, Overseas Decoration Building, #122 Zhenhua RD., Futian, Shenzhen, China



MEDIATEK

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MT7688 DATASHEET

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Overview

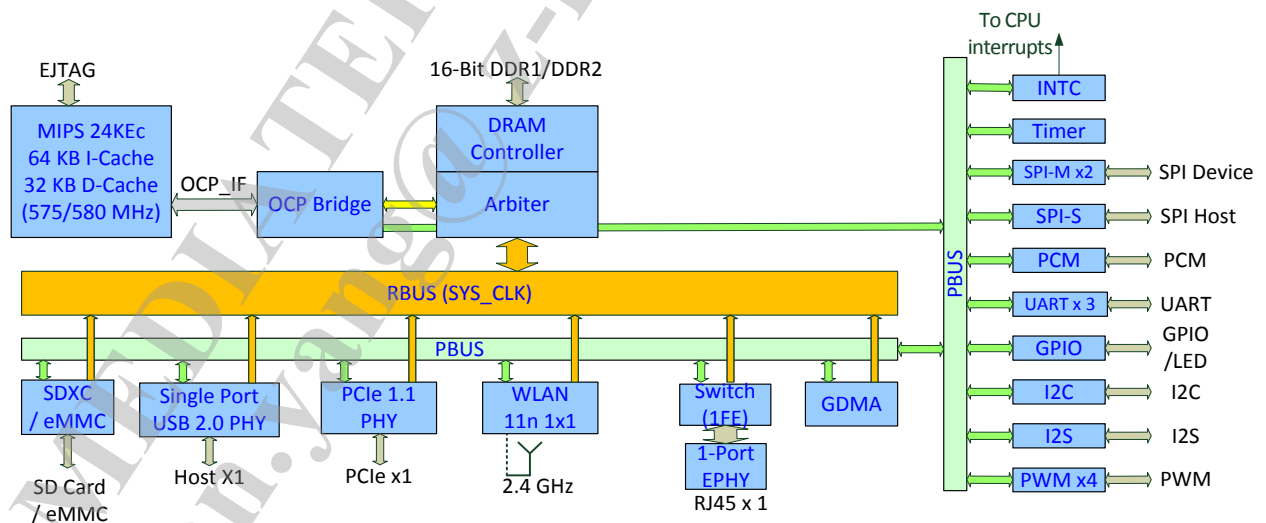
MT7688 family integrates a 1T1R 802.11n Wi-Fi radio, a 580MHz MIPS® 24KEc™ CPU, 1-port fast Ethernet PHY, USB2.0 host, PCIe, SD-XC, I2S/PCM and multiple slow IOs. MT7688 provides two operation modes – IoT gateway mode and IoT device mode. In IoT gateway mode, the PCI Express interface can connect to 802.11ac chipset for 11ac dual-band concurrent gateway. The high performance USB 2.0 allows MT7688 to add 3G/LTE modem support or add a H.264 ISP for wireless IP camera. For the IoT device mode, MT7688 supports eMMC, SD-XC and USB 2.0. MT7688 can support the WiFi high quality audio via 192Kbps/24bits I2S interface and VoIP application through PCM. In IoT device mode, it further supports PWM, SPI slave, 3rd UART and more GPIOs. For IoT gateway, it can connect to touch panel and BLE, Zigbee/Z-Wave and sub-1G RF for smart home control.

Features

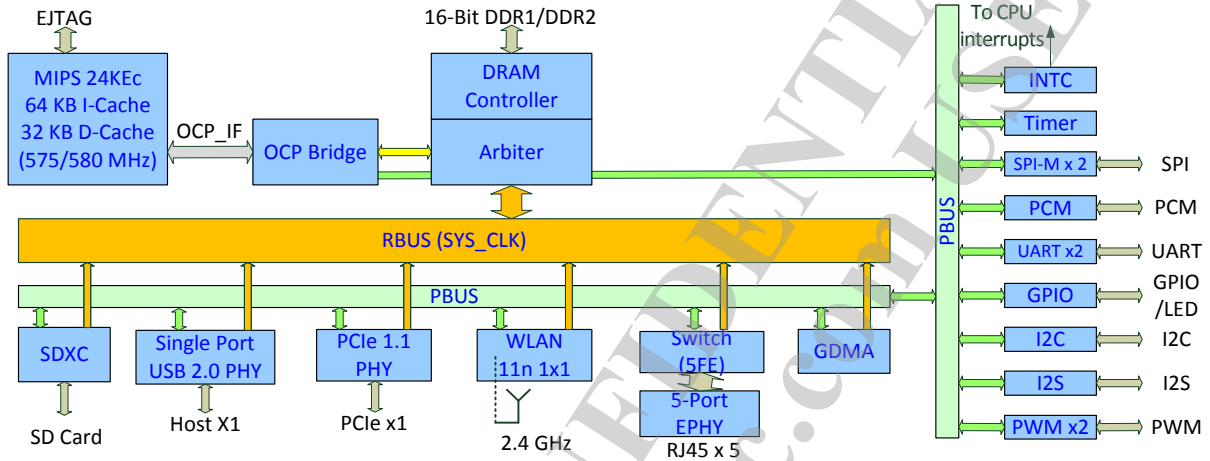
- Embedded MIPS24KEc (575/580 MHz) with 64 KB I-Cache and 32 KB D-Cache
- 1T1R 2.4 GHz with 150 Mbps PHY data rate
- Legacy 802.11b/g and HT 802.11n modes
- 20/40 MHz channel bandwidth
- 802.11v
- Space Time Block Coding (STBC)
- 16-bit DDR1/2 up to 128/256 Mbytes
- x1 USB 2.0 Host, x1 PCIe Root Complex
- 1-port 10/100 FE PHY
- SD-XC, eMMC, I2C, PCM, I2S(192K/24bits), PWM, SPI master/slave, UART lite, JTAG, GPIO
- Internet Of Thing
- Embedded PMU
- Green AP/STA
 - Intelligent Clock Scaling (exclusive)
 - DDRII: ODT off, Self-refresh mode
- QoS: WMM, WMM-PS
- 16 Multiple BSSID
- iPA/iLNA and ePA/eLNA
- 24 STA-Proxy
- AES128/256-CBC
- WEP64/128, TKIP, AES, WPA, WPA2, WAPI
- WPS: PBC, PIN
- AP/STA Firmware: Linux 2.6.36 SDK, OpenWrt 3.10 SDK, eCOS with IPv6

Functional Block Diagram

IoT Device Mode



IoT Gateway Mode



Ordering Information

Part Number	Package (Green/RoHS Compliant)
MT7688AN	DR-QFN 156 pin (12 mm x 12 mm)
MT7688KN	DR-QFN 120 pin (10 mm x 10 mm)

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1. Main Features

The following table covers the main features offered by the MT7688KN and MT7688AN. Overall, the MT7688KN supports the requirements of an entry-level AP/router, while the more advanced MT7688AN supports a number of interfaces together with a large maximum RAM capacity.

Features	MT7688KN	MT7688AN
CPU	MIPS24KEc (580 MHz)	MIPS24KEc (580 MHz)
Total DMIPs	580 x 1.6 DMIPs	580 x 1.6 DMIPs
I-Cache, D-Cache	64 KB, 32 KB	64 KB, 32 KB
L2 Cache	n/a	n/a
Memory		
DRAM Device width support	16 bits	16 bits
DDR1	64 Mb (MCM), 193 MHz	2 Gb, 193 MHz
DDR2	n/a	2 Gb, 193 MHz
SPI Flash	3B addr mode (max 128Mbit) 4B addr mode (max 512Mbit)	3B addr mode (max 128Mbit) 4B addr mode (max 512Mbit)
SD	n/a	SD-XC (class 10)
RF	1T1R 802.11n 2.4 GHz	1T1R 802.11n 2.4 GHz
PCIe	1	1
USB 2.0	1	1
Switch	5p FE SW	5p FE SW
I2S	1	1
PCM	1	1
I2C	1	1
UART	2 (Lite)	2 (Lite)
JTAG	1	1
Package	DR-QFN120- 10 mm x 10 mm	DR-QFN156- 12 mm x 12 mm

Table 1-1 Main Features

2. Pins

2.1 MT7688AN DR-QFN (12 mm x 12 mm) 156-Pin Package Diagram

2.1.1 Up-left side

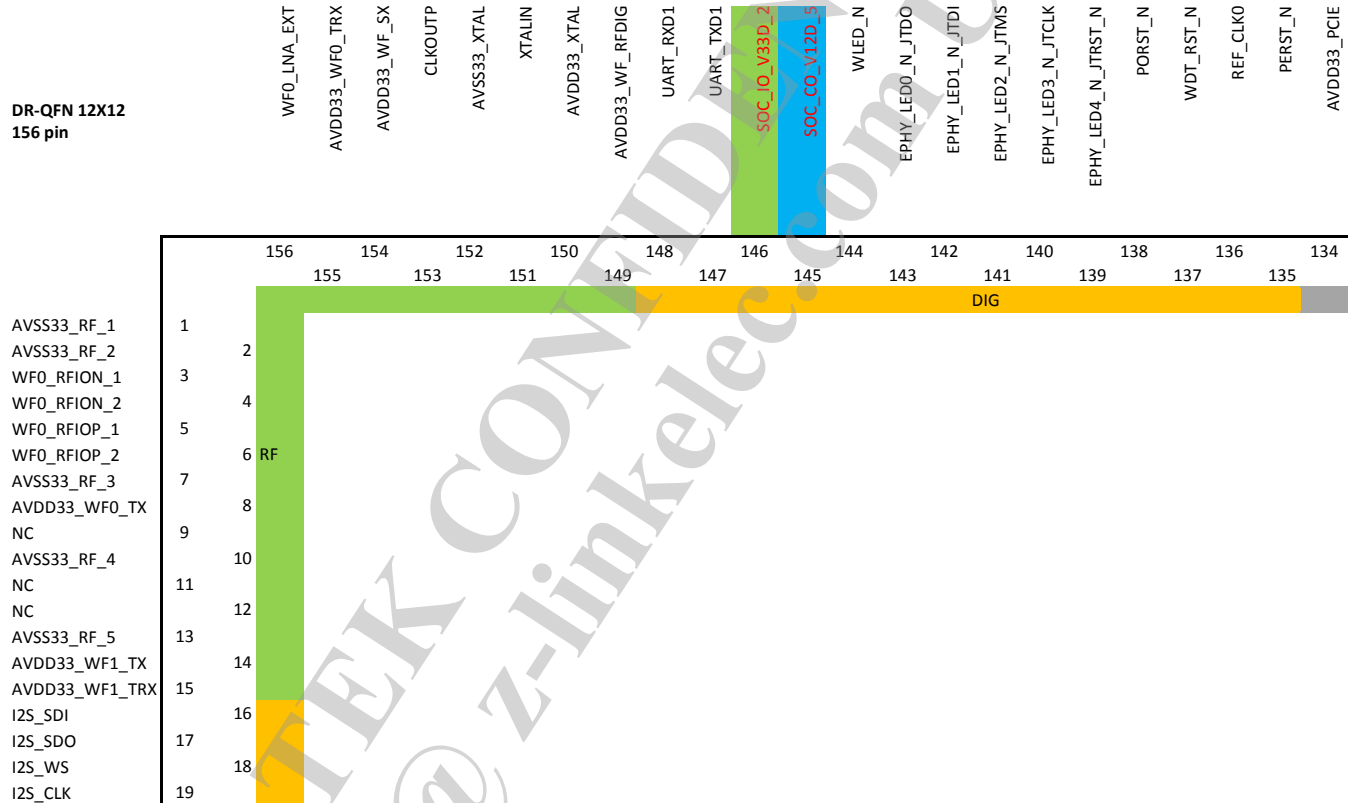


Figure 2-1 MT7688AN DR-QFN Pin Diagram (up-left view)

2.1.2 Down-left side

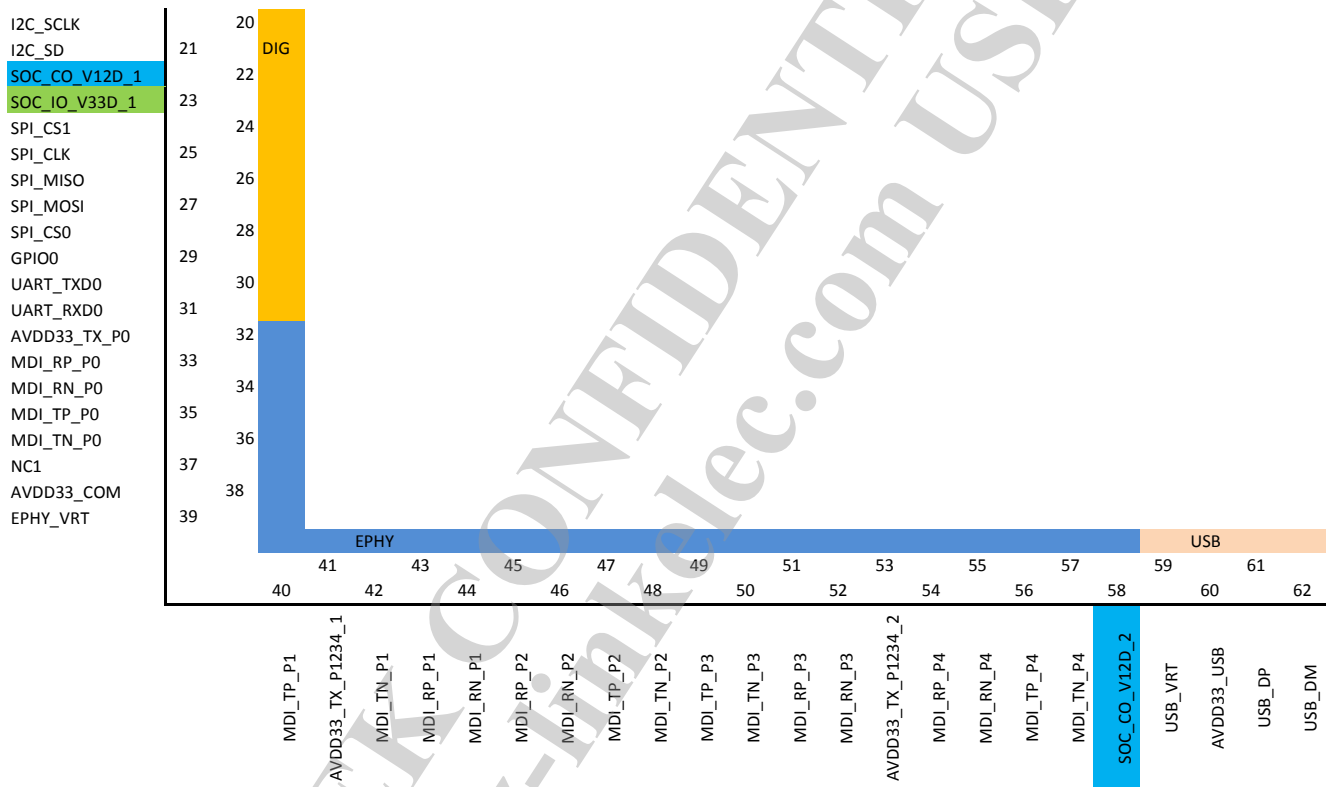


Figure 2-2 MT7688AN DR-QFN Pin Diagram (down-left view)

2.1.3 Down-right side

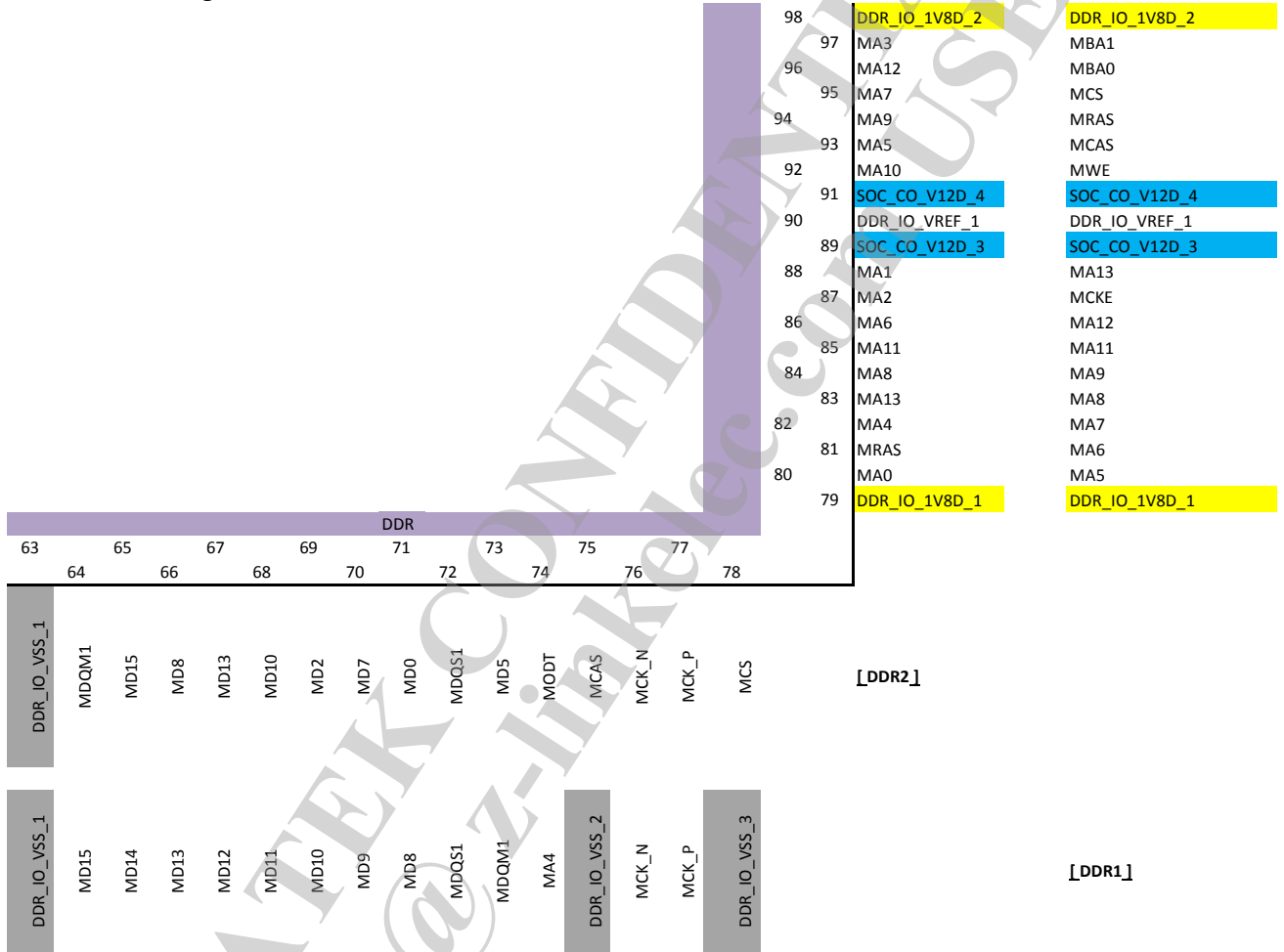


Figure 2-3 MT7688AN DR-QFN Pin Diagram (down-right view)

Note: DR-QFN support DDR1 and DDR2 pin shuffle depend on the bootstrap.

2.1.4 Up-right side

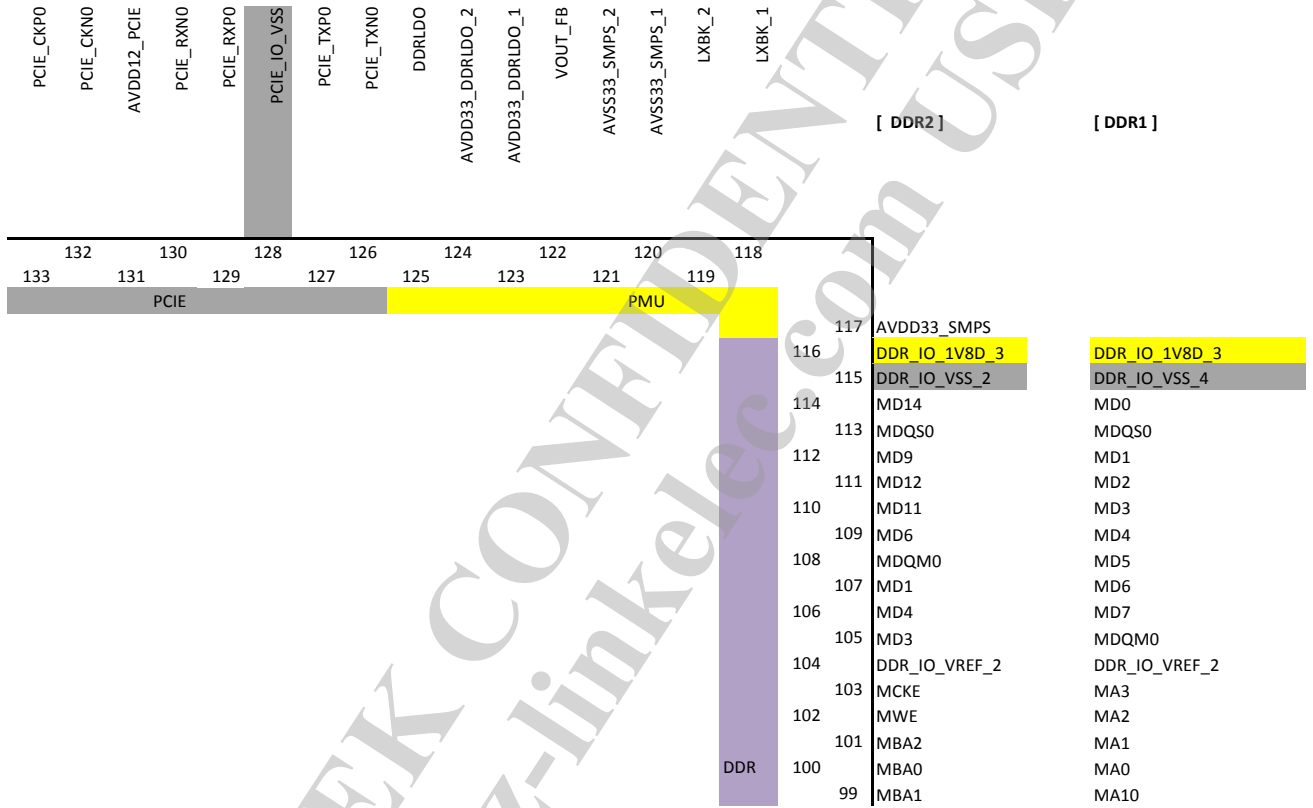


Figure 2-4 MT7688AN DR-QFN Pin Diagram (up-right view)

2.1.5 Pin Description

Pins	Name	Type	Driv.	Description
RF				
3,4	WF0_RFION_1 WF0_RFION_2	A		WF0 main path RF I/O
5,6	WF0_RFIOP_1 WF0_RFIOP_2	A		WF0 main path RF I/O
11	NC			
12	NC			
9	NC			
156	WF0_LNA_EXT	A		WF0 aux. path LNA input
151	XTALIN	I		Crystal oscillator input
153	CLKOUTP	O		XO reference clock output
152	AVDD33_XTAL	P		3.3V XTAL Power Supply Pin
150	AVSS33_XTAL	G		3.3V XTAL Ground Pin
8	AVDD33_WF0_TX	P		3.3V RF Channel 0 Supply Power
14	AVDD33_WF1_TX	P		3.3V RF Channel 1 Supply Power
15	AVDD33_WF1_TRX	P		1.65V to 3.3V RF Channel 1 Supply Power
149	AVDD33_WF_RFDIG	P		1.65V to 3.3V RF DIG and AFE Supply Power
154	AVDD33_WF_SX	P		1.65V to 3.3V RF Supply Power
155	AVDD33_WF0_TRX	P		1.65V to 3.3V RF Channel 0 Supply Power
1,2 7,13	AVSS33_RF	G		3.3V RF Shielding Ground Pin
WLAN LED				
144	WLED_N	O	4 mA	WLAN Activity LED
UART0 Lite				
31	RXD0	I	4 mA	UART0 Lite RXD
30	TXD0	O, IPD	4 mA	UART0 Lite TXD
UART1 Lite				
147	TXD1	O, IPU	4 mA	UART1 Lite TXD
148	RXD1	I	4 mA	UART1 Lite RXD
I2S				
16	I2S_SDI	O	4 mA	I2S data input
17	I2S_SDO	I/O, IPD	4 mA	I2S data output
18	I2S_WS	O	4 mA	I2S word select
19	I2S_CLK	I/O	4 mA	I2S clock
I2C				
21	I2C_SD		4 mA	I2C Data

Pins	Name	Type	Driv.	Description
20	I2C_SCLK	I/O	4 mA	I2C Clock
SPI				
26	SPI_MISO	I/O	4 mA	SPI Master input/Slave output
27	SPI_MOSI	I/O, IPD	4 mA	SPI Master output/Slave input
25	SPI_CLK	O, IPU	4 mA	SPI clock
28	SPI_CS0	O	4 mA	SPI chip select0
24	SPI_CS1	O, IPD	4 mA	SPI chip select1
GPIO				
29	GPIO0	I/O, IPD	4 mA	General Purpose I/O
5-Port EPHY				
143	EPHY_LED0_N_JTDO	I/O	4 mA	10/100 PHY Port #0 activity LED, JTAG_TDO
142	EPHY_LED1_N_JTDI	I/O	4 mA	10/100 PHY Port #1 activity LED, JTAG_TDI
141	EPHY_LED2_N_JTMS	I/O	4 mA	10/100 PHY Port #2 activity LED, JTAG_TMS
140	EPHY_LED3_N_JTCLK	I/O	4 mA	10/100 PHY Port #3 activity LED, JTAG_CLK
139	EPHY_LED4_N_JTRST_N	I/O,	4 mA	10/100 PHY Port #4 activity LED, JTAG_TRST_N
39	EPHY_VRT	A		Connect to an external resistor to provide accurate bias current
33	MDI_RP_P0	A		10/100 PHY Port #0 RXP
34	MDI_RN_P0	A		10/100 PHY Port #0 RXN
35	MDI_TP_P0	A		10/100 PHY Port #0 TXP
36	MDI_TN_P0	A		10/100 PHY Port #0 TXN
40	MDI_TP_P1	A		General purpose IO (SD-XC, eMMC...etc)
42	MDI_TN_P1	A		General purpose IO (SD-XC, eMMC...etc)
43	MDI_RP_P1	A		General purpose IO (SD-XC, eMMC...etc)
44	MDI_RN_P1	A		General purpose IO (SD-XC, eMMC...etc)
45	MDI_RP_P2	A		General purpose IO (SD-XC, eMMC...etc)
46	MDI_RN_P2	A		General purpose IO (SD-XC, eMMC...etc)
47	MDI_TP_P2	A		General purpose IO (SD-XC, eMMC...etc)
48	MDI_TN_P2	A		General purpose IO (SD-XC, eMMC...etc)
49	MDI_TP_P3	A		General purpose IO (SD-XC, eMMC...etc)
50	MDI_TN_P3	A		General purpose IO (SD-XC, eMMC...etc)
51	MDI_RP_P3	A		General purpose IO (SD-XC, eMMC...etc)
52	MDI_RN_P3	A		General purpose IO (SD-XC, eMMC...etc)
54	MDI_RP_P4	A		General purpose IO (SD-XC, eMMC...etc)
55	MDI_RN_P4	A		General purpose IO (SD-XC, eMMC...etc)
56	MDI_TP_P4	A		General purpose IO (SD-XC, eMMC...etc)

Pins	Name	Type	Driv.	Description
57	MDI_TN_P4	A		General purpose IO (SD-XC, eMMC...etc)
32	AVDD33_TX_P0	P		3.3V Supply Power for P0
38	AVDD33_COM	P		3.3V Supply Power for EPHY COM
41	AVDD33_TX_P1234_1 AVDD33_TX_P1234_2	P		3.3V Supply Power for P1 ~ P4
Misc.				
136	REF_CLKO	O, IPD	4 mA	Reference Clock Ouptut
138	PORST_N	I, IPU	4 mA	Power on reset
137	WDT_RST_N	O	4 mA	Watchdog timeout reset
USB PHY				
129	AVDD33_USB	P		3.3 V USB PHY analog power supply
130	USB_VRT	I/O		Connect to an external 5.1 kΩ resistor for band-gap reference circuit
62	USB_DM	I/O		USB Port0 data pin Data-
61	USB_DP	I/O		USB Port0 data pin Data+
PCIe PHY				
135	PERST_N	O, IPD	4mA	PCIe device reset
134	AVDD12_PCIE	P		1.2 V PCIe PHY digital power supply
129	AVDD33_PCIE	P		3.3 V USB PHY analog power supply
128	PCIE_IO_VSS	P		PCIE PHY Ground Pin
133	PCIE_CKPO	I/O		External reference clock output (positive)
132	PCIE_CKN0	I/O		External reference clock output (negative)
127	PCIE_TXP0	I/O		PCIe0 differential transmit TX -
126	PCIE_TXN0	I/O		PCIe0 differential transmit TX -
129	PCIE_TXP0	I/O		PCIe0 differential receiver RX -
130	PCIE_TXN0	I/O		PCIe0 differential receiver RX -
DDR2				
65	MD15	I/O	8 mA	DDR2 Data bit #15
114	MD14	I/O	8 mA	DDR2 Data bit #14
67	MD13	I/O	8 mA	DDR2 Data bit #13
111	MD12	I/O	8 mA	DDR2 Data bit #12
110	MD11	I/O	8 mA	DDR2 Data bit #11
68	MD10	I/O	8 mA	DDR2 Data bit #10
112	MD9	I/O	8 mA	DDR2 Data bit #9
66	MD8	I/O	8 mA	DDR2 Data bit #8
70	MD7	I/O	8 mA	DDR2 Data bit #7
109	MD6	I/O	8 mA	DDR2 Data bit #6

Pins	Name	Type	Driv.	Description
73	MD5	I/O	8 mA	DDR2 Data bit #5
106	MD4	I/O	8 mA	DDR2 Data bit #4
105	MD3	I/O	8 mA	DDR2 Data bit #3
69	MD2	I/O	8 mA	DDR2 Data bit #2
107	MD1	I/O	8 mA	DDR2 Data bit #1
71	MD0	I/O	8 mA	DDR2 Data bit #0
83	MA13	O	8 mA	DDR2 Address bit #13
96	MA12	O	8 mA	DDR2 Address bit #12
85	MA11	O	8 mA	DDR2 Address bit #11
92	MA10	O	8 mA	DDR2 Address bit #10
94	MA9	O	8 mA	DDR2 Address bit #9
84	MA8	O	8 mA	DDR2 Address bit #8
95	MA7	O	8 mA	DDR2 Address bit #7
86	MA6	O	8 mA	DDR2 Address bit #6
93	MA5	O	8 mA	DDR2 Address bit #5
82	MA4	O	8 mA	DDR2 Address bit #4
97	MA3	O	8 mA	DDR2 Address bit #3
87	MA2	O	8 mA	DDR2 Address bit #2
88	MA1	O	8 mA	DDR2 Address bit #1
80	MA0	O	8 mA	DDR2 Address bit #0
101	MBA2	O	8 mA	DDR2 MBA #2
99	MBA1	O	8 mA	DDR2 MBA #1
100	MBA0	O	8 mA	DDR2 MBA #0
74	MODT	O	8 mA	DDR2 ODT
81	MRAS	O	8 mA	DDR2 MRAS_N
75	MCAS	O	8 mA	DDR2 MCAS_N
102	MWE	O	8 mA	DDR2 MWE_N
77	MCK_P	O	8 mA	DDR2 MCK_P
76	MCK_N	O	8 mA	DDR2 MCK_N
64	MDQM1	O	8 mA	DDR2 MDQM#1
108	MDQM0	O	8 mA	DDR2 MDQM#0
78	MCS	O	8 mA	DDR2 MCS
72	MDQS1	I/O	8 mA	DDR2 MDQS#1
113	MDQS0	I/O	8 mA	DDR2 MDQS#0
103	MCKE	O	8 mA	DDR2 MCKE
63	DDR_IO_VSS_1	G		DDR IO Ground pins
115	DDR_IO_VSS_2			

Pins	Name	Type	Driv.	Description
79	DDR_IO_1V8D_1	P		DDR io Supply power
98	DDR_IO_1V8D_2			
116	DDR_IO_1V8D_3			
90	DDR_IO_VREF_1	A		DDR reference voltage
104	DDR_IO_VREF_2			
DDR1				
64	MD15	I/O	8 mA	DDR1 Data bit #15
65	MD14	I/O	8 mA	DDR1 Data bit #14
66	MD13	I/O	8 mA	DDR1 Data bit #13
67	MD12	I/O	8 mA	DDR1 Data bit #12
68	MD11	I/O	8 mA	DDR1 Data bit #11
69	MD10	I/O	8 mA	DDR1 Data bit #10
70	MD9	I/O	8 mA	DDR1 Data bit #9
71	MD8	I/O	8 mA	DDR1 Data bit #8
106	MD7	I/O	8 mA	DDR1 Data bit #7
107	MD6	I/O	8 mA	DDR1 Data bit #6
108	MD5	I/O	8 mA	DDR1 Data bit #5
109	MD4	I/O	8 mA	DDR1 Data bit #4
110	MD3	I/O	8 mA	DDR1 Data bit #3
111	MD2	I/O	8 mA	DDR1 Data bit #2
112	MD1	I/O	8 mA	DDR1 Data bit #1
114	MD0	I/O	8 mA	DDR1 Data bit #0
88	MA13	O	8 mA	DDR1 Address bit #13
86	MA12	O	8 mA	DDR1 Address bit #12
85	MA11	O	8 mA	DDR1 Address bit #11
99	MA10	O	8 mA	DDR1 Address bit #10
84	MA9	O	8 mA	DDR1 Address bit #9
83	MA8	O	8 mA	DDR1 Address bit #8
82	MA7	O	8 mA	DDR1 Address bit #7
81	MA6	O	8 mA	DDR1 Address bit #6
80	MA5	O	8 mA	DDR1 Address bit #5
74	MA4	O	8 mA	DDR1 Address bit #4
103	MA3	O	8 mA	DDR1 Address bit #3
102	MA2	O	8 mA	DDR1 Address bit #2
101	MA1	O	8 mA	DDR1 Address bit #1
100	MA0	O	8 mA	DDR1 Address bit #0
97	MBA1	O	8 mA	DDR1 MBA #1

Pins	Name	Type	Driv.	Description
96	MBA0	O	8 mA	DDR1 MBA #0
94	MRAS	O	8 mA	DDR1 MRAS_N
93	MCAS	O	8 mA	DDR1 MCAS_N
92	MWE	O	8 mA	DDR1 MWE_N
77	MCK_P	O	8 mA	DDR1 MCK_P
76	MCK_N	O	8 mA	DDR1 MCK_N
73	MDQM1	O	8 mA	DDR1 MDQM#1
105	MDQM0	O	8 mA	DDR1 MDQM#0
95	MCS	O	8 mA	DDR1 MCS
72	MDQS1	I/O	8 mA	DDR1 MDQS#1
113	MDQS0	I/O	8 mA	DDR1 MDQS#0
87	MCKE	O	8 mA	DDR1 MCKE
63	DDR_IO_VSS_1	G		DDR IO Ground pins
75	DDR_IO_VSS_2			
78	DDR_IO_VSS_3			
115	DDR_IO_VSS_4			
79	DDR_IO_1V8D_1	P		DDR IO Supply power
98	DDR_IO_1V8D_2			
116	DDR_IO_1V8D_3			
90	DDR_IO_VREF_1	A		DDR reference voltage
104	DDR_IO_VREF_2			
PMU				
118	LXBK_1	O		Buck Switching node
119	LXBK_2			
122	VOUT_FB	A		Buck vout feedback pin
59	AVDD33_SMPS	P		Buck 3.3V Supply power
120	AVSS33_SMPS_1	G		Buck Gound pin
121	AVSS33_SMPS_2			
123	AVDD33_DDRLDO_1	G		DDRLDO 3.3V Supply power
124	AVDD33_DDRLDO_2			
56	DDRLDO	O		DDRLDO 1.8V/2.5V output voltage
Power				
23	SOC_IO_V33D_1	P		3.3 V digital I/O power supply
146	SOC_IO_V33D_2			
22	SOC_CO_V12D_1	P		1.2 V digital core power supply
58	SOC_CO_V12D_2			
89	SOC_CO_V12D_3			
91	SOC_CO_V12D_4			
145	SOC_CO_V12D_5			
EPAD	GND	G		Ground pin

Pins	Name	Type	Driv.	Description
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Total: 156 pins

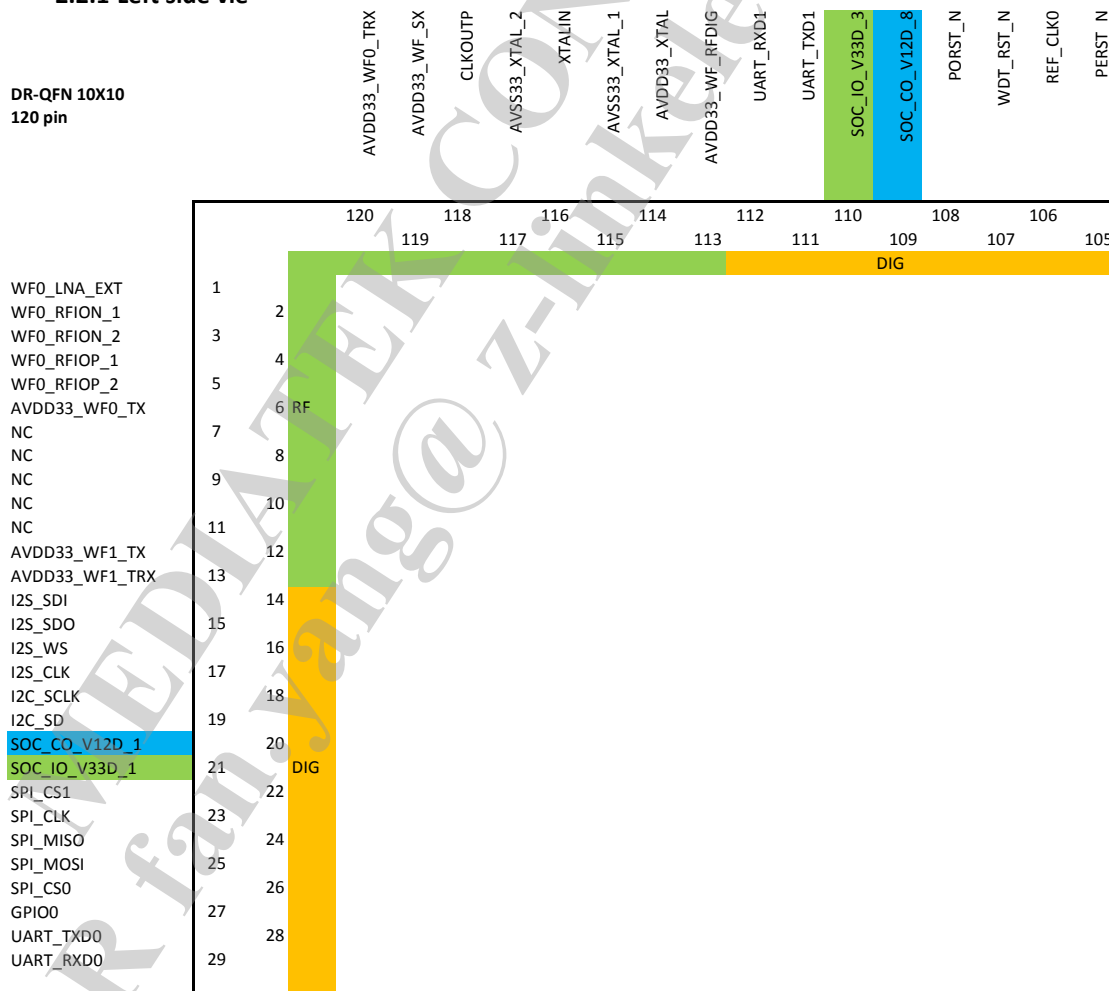
Note:

- IPD : Internal pull-down
- IPU : Internal pull-up
- I : Input
- O : Output
- IO : Bi-directional
- P : Power
- G : Ground
- NC : Not connected

2.2 MT7688KN DR-QFN (10 mm x 10 mm) 120-Pin Package Diagram

2.2.1 Left side vie

DR-QFN 10X10
120 pin



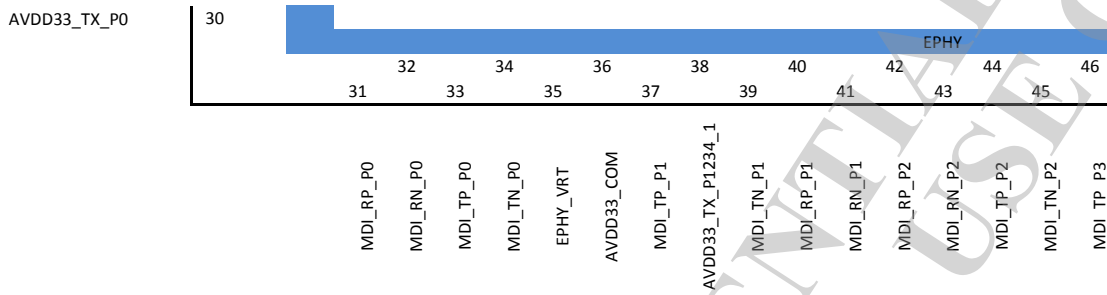


Figure 2-5 MT7688KN DR-QFN Pin Diagram (left view)

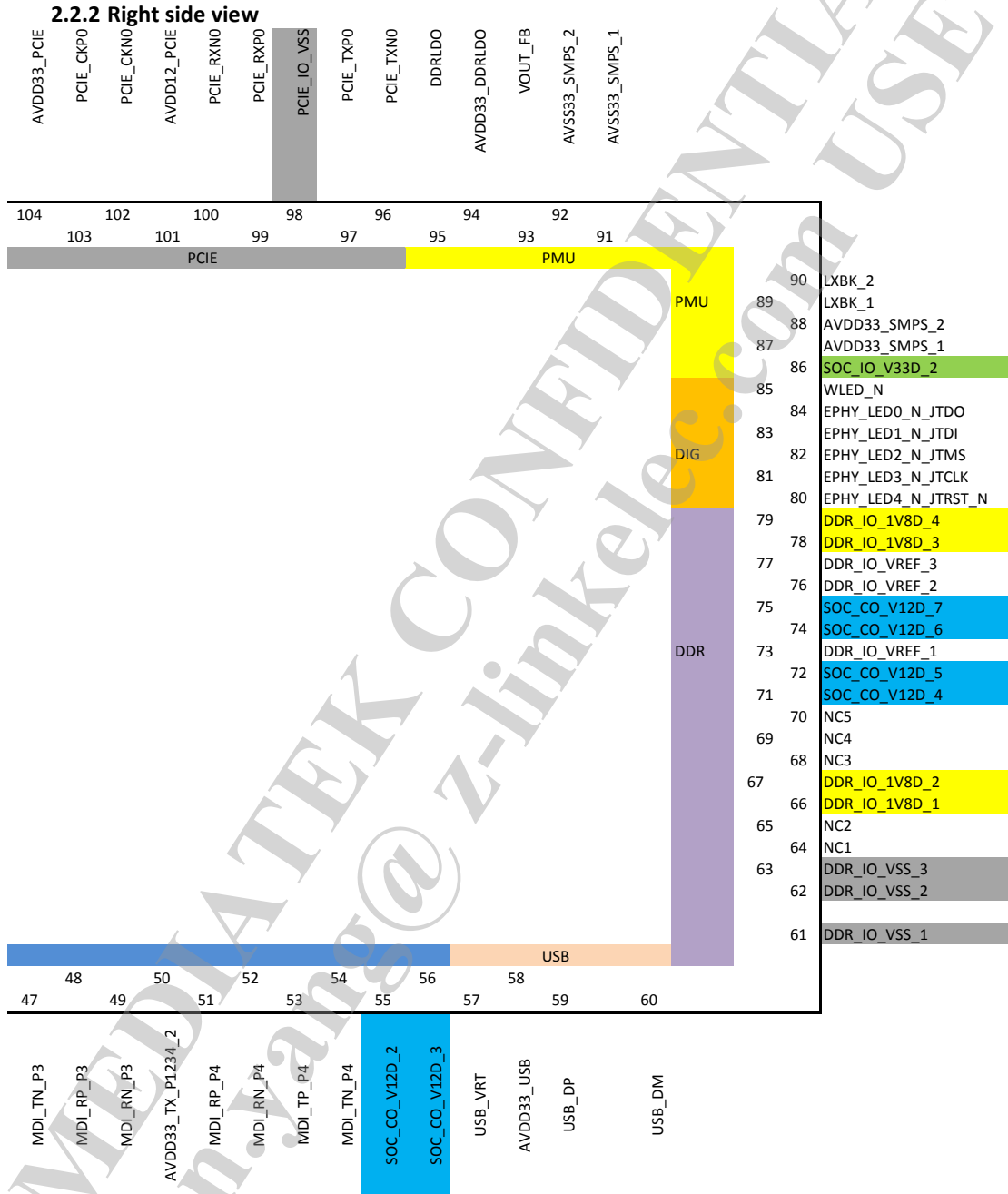


Figure 2-6 MT7688KN DR-QFN Pin Diagram (right side view)

2.2.3 Pin Description

Pins	Name	Type	Driv.	Description
RF				
2	WF0_RFION_1	A		WF0 main path RF I/O
3	WF0_RFION_2			
4	WF0_RFIOP_1	A		WF0 main path RF I/O
5	WF0_RFIOP_2			
8	NC			
9	NC			
10	NC			
11	NC			
7	NC			
1	WF0_LNA_EXT	A		WF0 aux. path LNA input
116	XTALIN	I		Crystal oscillator input
118	CLKOUTP	O		XO reference clock output
114	AVDD33_XTAL	P		3.3V XTAL Power Supply Pin
115	AVS33_XTAL_1	G		3.3V XTAL Ground Pin
117	AVS33_XTAL_2			
6	AVDD33_WF0_TX	P		3.3V RF Channel 0 Supply Power
12	AVDD33_WF1_TX	P		3.3V RF Channel 1 Supply Power
13	AVDD33_WF1_TRX	P		1.65V to 3.3V RF Channel 1 Supply Power
113	AVDD33_WF_RFDIG	P		1.65V to 3.3V RF DIG and AFE Supply Power
119	AVDD33_WF_SX	P		1.65V to 3.3V RF Supply Power
120	AVDD33_WF0_TRX	P		1.65V to 3.3V RF Channel 0 Supply Power
WLAN LED				
85	WLED_N	O	4 mA	WLAN Activity LED
UART0 Lite				
28	TXD0	O, IPD	4 mA	UART0 Lite TXD
29	RXD0	I		UART0 Lite RXD
UART1 Lite				
111	TXD1	O, IPU	4 mA	UART1 Lite TXD
112	RXD1	I		UART1 Lite RXD
I2S				
14	I2S_SDI	I/O	4 mA	I2S data input
15	I2S_SDO	O, IPD	4 mA	I2S data output
16	I2S_WS	O	4 mA	I2S word select
17	I2S_CLK	I/O	4 mA	I2S clock
I2C				
19	I2C_SD	I/O	4 mA	I2C Data

Pins	Name	Type	Driv.	Description
18	I2C_SCLK	I/O	4 mA	I2C Clock
SPI				
24	SPI_MISO	I/O	4 mA	SPI Master input/Slave output
25	SPI_MOSI	I/O, IPD	4 mA	SPI Master output/Slave input
22	SPI_CLK	O, IPU	4 mA	SPI clock
26	SPI_CS0	O	4 mA	SPI chip select0
22	SPI_CS1	O, IPD	4 mA	SPI chip select1
GPIO				
27	GPIO0	I/O, IPD	4 mA	General Purpose I/O
5-Port EPHY				
84	EPHY_LED0_N_JTDO	I/O	4 mA	10/100 PHY Port #0 activity LED, JTAG_TDO
83	EPHY_LED1_N_JTDI	I/O	4 mA	10/100 PHY Port #1 activity LED, JTAG_TDI
82	EPHY_LED2_N_JTMS	I/O	4 mA	10/100 PHY Port #2 activity LED, JTAG_TMS
81	EPHY_LED3_N_JTCLK	I/O	4 mA	10/100 PHY Port #3 activity LED, JTAG_CLK
80	EPHY_LED4_N_JTRST_N	I/O,	4 mA	10/100 PHY Port #4 activity LED, JTAG_TRST_N
35	EPHY_VRT	A		Connect to an external resistor to provide accurate bias current
31	MDI_RP_P0	A		10/100 PHY Port #0 RXP
32	MDI_RN_P0	A		10/100 PHY Port #0 RXN
33	MDI_TP_P0	A		10/100 PHY Port #0 TXP
34	MDI_TN_P0	A		10/100 PHY Port #0 TXN
37	MDI_TP_P1	A		General purpose IO (SD-XC, eMMC...etc)
39	MDI_TN_P1	A		General purpose IO (SD-XC, eMMC...etc)
40	MDI_RP_P1	A		General purpose IO (SD-XC, eMMC...etc)
41	MDI_RN_P1	A		General purpose IO (SD-XC, eMMC...etc)
42	MDI_RP_P2	A		General purpose IO (SD-XC, eMMC...etc)
43	MDI_RN_P2	A		General purpose IO (SD-XC, eMMC...etc)
44	MDI_TP_P2	A		General purpose IO (SD-XC, eMMC...etc)
45	MDI_TN_P2	A		General purpose IO (SD-XC, eMMC...etc)
46	MDI_TP_P3	A		General purpose IO (SD-XC, eMMC...etc)
47	MDI_TN_P3	A		General purpose IO (SD-XC, eMMC...etc)
48	MDI_RP_P3	A		General purpose IO (SD-XC, eMMC...etc)
49	MDI_RN_P3	A		General purpose IO (SD-XC, eMMC...etc)
51	MDI_RP_P4	A		General purpose IO (SD-XC, eMMC...etc)
52	MDI_RN_P4	A		General purpose IO (SD-XC, eMMC...etc)
53	MDI_TP_P4	A		General purpose IO (SD-XC, eMMC...etc)

Pins	Name	Type	Driv.	Description
54	MDI_TN_P4	A		General purpose IO (SD-XC, eMMC...etc)
30	AVDD33_TX_P0	P		3.3V Supply Power for P0
36	AVDD33_COM	P		3.3V Supply Power for EPHY COM
38	AVDD33_TX_P1234_1	P		3.3V Supply Power for P1 ~ P4
50	AVDD33_TX_P1234_2	P		3.3V Supply Power for P1 ~ P4
Misc.				
106	REF_CLKO	O, IPD	4 mA	Reference Clock Ouptut
108	PORST_N	I		Power on reset
107	WDT_RST_N	O	4 mA	Watchdog Reset
USB PHY				
58	AVDD33_USB	P		3.3 V USB PHY analog power supply
57	USB_VRT	A		Connect to an external 5.1 kΩ resistor for band-gap reference circuit
60	USB_DM	I/O		USB Port0 data pin Data-
59	USB_DP	I/O		USB Port0 data pin Data+
PCIe PHY				
105	PERST_N	O, IPD	4mA	PCIe device reset
98	PCIE_IO_VSS	G		PCIe Ground pin
101	AVDD12_PCIE	P		1.2 V PCIe PHY digital power supply
104	AVDD33_PCIE	P		3.3 V USB PHY analog power supply
103	PCIE_CKPO	O		External reference clock output (positive)
102	PCIE_CKN0	O		External reference clock output (negative)
97	PCIE_TXP0	I/O		PCIe0 differential transmit TX -
96	PCIE_TXN0	I/O		PCIe0 differential transmit TX -
99	PCIE_RXP0	I/O		PCIe0 differential receiver RX -
100	PCIE_RXN0	I/O		PCIe0 differential receiver RX -
PMU				
89	LXBK_1	O		Buck Switching node
90	LXBK_2	O		Buck Switching node
93	VOUT_FB	A		Buck vout feedback pin
87	AVDD33_SMPS_1	P		Buck 3.3V Supply power
88	AVDD33_SMPS_2	P		Buck 3.3V Supply power
91	AVSS33_SMPS_1	G		Buck Gound pin
92	AVSS33_SMPS_2	G		Buck Gound pin
94	AVDD33_DDRLDO	P		DDRLDO 3.3V Supply power
95	DDRLDO	O		DDRLDO 1.8V/2.5V output voltage
Power				

Pins	Name	Type	Driv.	Description
21	SOC_IO_V33D_1	P		3.3 V digital I/O power supply
86	SOC_IO_V33D_2			
110	SOC_IO_V33D_3			
20	SOC_CO_V12D_1	P		1.2 V digital core power supply
55	SOC_CO_V12D_2			
56	SOC_CO_V12D_3			
71	SOC_CO_V12D_4			
72	SOC_CO_V12D_5			
74	SOC_CO_V12D_6			
75	SOC_CO_V12D_7			
109	SOC_CO_V12D_8			
EPAD	GND	G		Ground pin

Total: 120 pins

Note:

- IPD : Internal pull-down
- IPU : Internal pull-up
- I : Input
- O : Output
- IO : Bi-directional
- P : Power
- G : Ground
- NC : Not connected

2.3 Pin Sharing Schemes

Some pins are shared with GPIO to provide maximum flexibility for system designers. The MT7688 provides up to 41 GPIO pins. Users can configure GPIO1_MODE and GPIO2_MODE registers in the System Control block to specify the pin function, or they can use the registers specified below. For more information, see the Programmer's Guide. Unless specified explicitly, all the GPIO pins are in input mode after reset.

2.3.1 GPIO pin share scheme

I/O Pad Group	Normal Mode	GPIO Mode
UART1	UART_RXD1	GPIO#46
	UART_TXD1	GPIO#45
WLED_AN	WLED_N (7688AN)	GPIO#44
P0_LED_AN	EPHY_LED0_N_JTDO (7688AN)	GPIO#43
P1_LED_AN	EPHY_LED1_N_JTDI (7688AN)	GPIO#42
P2_LED_AN	EPHY_LED2_N_JTMS (7688AN)	GPIO#41
P3_LED_AN	EPHY_LED3_N_JTCLK (7688AN)	GPIO#40
P4_LED_AN	EPHY_LED4_N_JTRST_N (7688AN)	GPO#39
WDT	WDT_RST_N	GPO#38
REFCLK	REF_CLKO	GPIO#37

I/O Pad Group	Normal Mode	GPIO Mode	
PERST	PERST_N	GPIO#36	
WLED_KN	WLED_N (7688KN)	GPIO#35	
P0_LED_KN	EPHY_LED0_N_JTDO (7688KN)	GPIO#34	
P1_LED_KN	EPHY_LED1_N_JTDI (7688KN)	GPIO#33	
P2_LED_KN	EPHY_LED2_N_JTMS (7688KN)	GPIO#32	
P3_LED_KN	EPHY_LED3_N_JTCLK (7688KN)	GPIO#31	
P4_LED_KN	EPHY_LED4_N_JTRST_N (7688KN)	GPIO#30	
SD / eMMC	MDI_TN_P4	GPIO#29	
	MDI_TP_P4	GPIO#28	
	MDI_RN_P4	GPIO#27	
	MDI_RP_P4	GPIO#26	
	MDI_RN_P3	GPIO#25	
	MDI_RP_P3	GPIO#24	
	MDI_TN_P3	GPIO#23	
	MDI_TP_P3	GPIO#22	
	UART2 / eMMC	MDI_TN_P2	GPIO#21
		MDI_TP_P2	GPIO#20
PWM1 / eMMC	MDI_RN_P2	GPO#19	
PWM0 / eMMC	MDI_RP_P2	GPO#18	
SPIS	MDI_RN_P1	GPIO#17	
	MDI_RP_P1	GPIO#16	
	MDI_TN_P1	GPO#15	
	MDI_TP_P1	GPIO#14	
UART0	UART_RXD0	GPIO#13	
	UART_TXD0	GPIO#12	
GPIO	GPIO0	GPIO#11	
SPI	SPI_CS0	GPIO#10	
	SPI_MISO	GPIO#9	
	SPI_MOSI	GPIO#8	
	SPI_CLK	GPIO#7	
SPI_CS1	SPI_CS1	GPIO#6	
I2C	I2C_SD	GPO#5	
	I2C_SCLK	GPO#4	
I2S	I2S_CLK	GPIO#3	
	I2S_WS	GPIO#2	
	I2S_SDO	GPIO#1	
	I2S_SDI	GPO#0	