Omega2S Module
Datasheet

Version 1.0

1. Description

The Omega2 is a highly integrated module designed by Onion Corporation. It utilizes the Mediatek MT7688AN System on a Chip (SoC) device which is based on the MIPs 24K CPU processor core. The SoC includes 802.11b/g/n Wi-Fi, making the Omega2 ideal for Internet of Things (IoT) applications and projects. In addition to the SoC, the module includes DDR2 DRAM, Flash memory, and all of the components necessary to allow this product to be a fully functional and complete device.

For high volume commercial applications, Onion has developed the Omega2S, a surface-mount packaged version of the Omega2/Omega2P through-holed devices. General technical details and documentation for the Omega2 modules can be found on the Onion website at Omega2 and Onion Docs. The differences between the through-holed Omega2/Omega2+ and the Omega2S/Omega2S+ are summarized as:

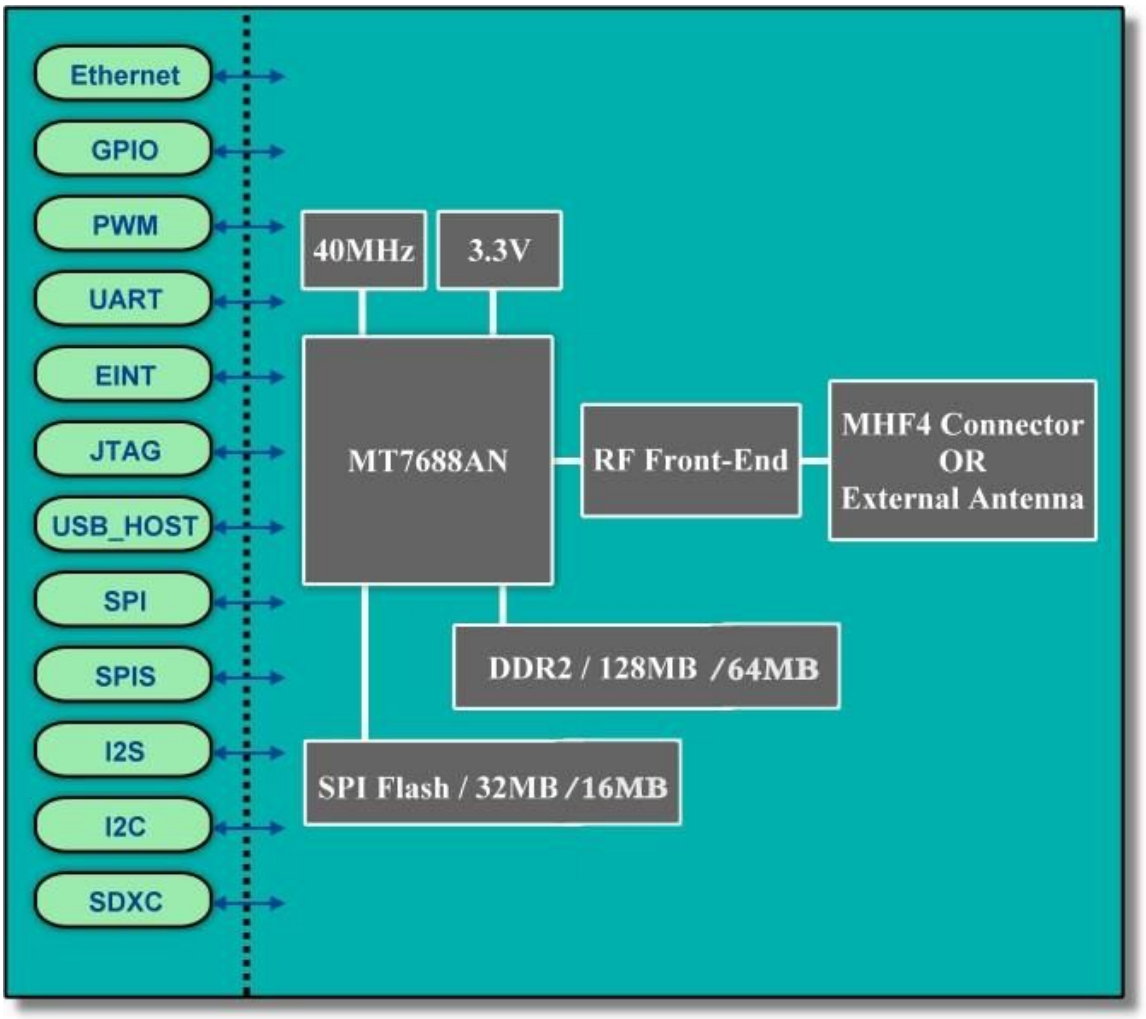
- Mechanical dimensions and footprint: The Omega2S is 20mm x 34mm, 2.8mm high
- Greater quantity of I/O signals available to the user. The Omega2S has 42 I/O.
- No SD Card slot on the bottom of the Omega2S.
- No Wifi chip antenna in the Omega2S. An external antenna must be connected.

2. Key features

- Embedded MIPS24KEc (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
- Green AP/STA - Intelligent Clock Scaling (exclusive) - DDRII: ODT off, Self-refresh mode
- 1-port 10/100 FE PHY
- x1 USB 2.0 Host
- SPI/SD-XC/eMMC
- SPI, I2C, I2S, PWM, PCIe, UART, GPIO
- An optimized PMU
- WEP64/128, AES, WPA, WPA2, WAPI
- LEDE Linux Operating System

Additional specifications and operating details for the microprocessor in the Omega2S can be found in the Mediatek datasheet, which can be downloaded from the following site:
Mediatek MT7688 Datasheet

3. Block diagram



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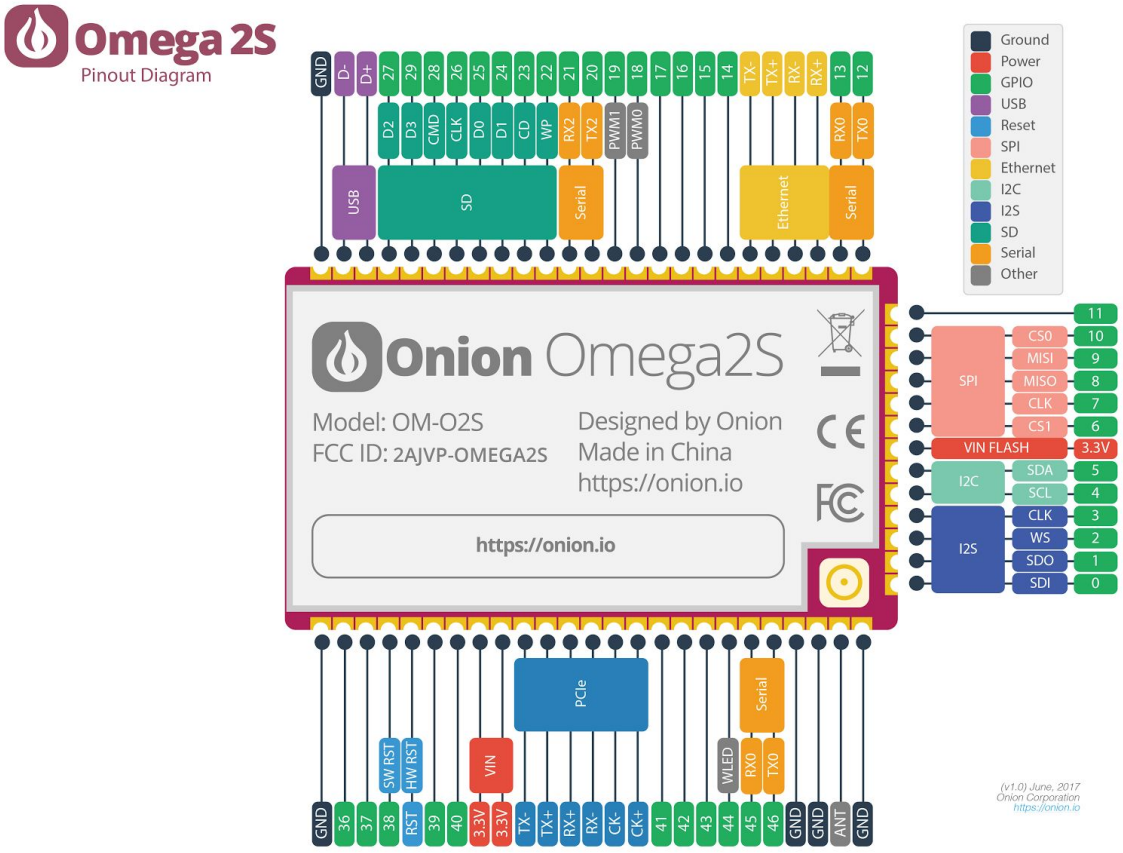
3.1 Specifications

Item	parameter
Chipset	MT7688AN
Core	MIPS24KEc
Clock Speed	580MHz
Memory	
Flash	16MB or 32MB
DDR2 DRAM	64MB or 128MB
WIFI Protocol and Interface Standard	
WiFi protocol	IEEE 802.11 b/g/n
Ethernet	1 10M/100M
USB 2.0 Host	1
SDIO/eMMC	1
SPI	1
I2C	1
I2S	1
PCIe	1
UART	3
PWM	4
GPIO	Up to 30
Power Supply Requirement	
DC Input	3.3V
No-load Running Current	200±40mA
Supply Current Requirement	More than 800mA
Operation Conditions	
Ambient Temperature	-10°C ~ 55 °C
Storage Temperature	-20°C ~ 80° C
Operating Humidity	10%-95%RH (Non-Condensing)
Storage Humidity	5%-95%RH (Non-Condensing)
Dimension	
Size	34*20*2.8mm

4. Pin-Out Information

4.1 PinOut Diagram



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4.2 Pin Definitions

No	PIN Name	Description
A1	GPIO_0/I2S_SDI	General Purpose I/O / I2S Data Input
A2	GPIO_1/I2S_SDO	General Purpose I/O / I2S Data Output
A3	GPIO_2/I2S_WS	General Purpose I/O / I2S word select
A4	GPIO_3/I2S_CLK	General Purpose I/O / I2S clock
A5	GPIO_4/I2C_SCLK	General Purpose I/O / I2C clock
A6	GPIO_5/I2C_SD	General Purpose I/O / I2C Data
A7	VDD_FLASH	3.3V FLASH Power Supply
A8	SPI_CS1	SPI chip select1
A9	SPI_CLK	SPI clock
A10	SPI_MISO	SPI Master input/Slave output
A11	SPI_MOSI	SPI Master output/Slave input
A12	SPI_CS0	SPI chip select 0
A13	GPIO_11	General Purpose I/O
B1	GPIO_12 /UART_TXD0	General Purpose I/O / UART0 Lite TXD
B2	GPIO_13 /UART_RXD0	General Purpose I/O / UART0 Lite RXD
B3	RXI_P0	10/100 PHY Port #0 RXP
B4	RXI_N0	10/100 PHY Port #0 RXN
B5	TXO_P0	10/100 PHY Port #0 TXP
B6	TXO_N0	10/100 PHY Port #0 TXN
B7	GPIO_14	General Purpose I/O
B8	GPIO_15	General Purpose I/O
B9	GPIO_16	General Purpose I/O
B10	GPIO_17	General Purpose I/O
B11	GPIO_18/PWM_CH0	General Purpose I/O / PWM Channel 0
B12	GPIO_19/PWM_CH1	General Purpose I/O / PWM Channel 1

B13	GPIO_20/PWM_CH2/UART_TXD2	General Purpose I/O / PWM Channel 2/UART2 Lite TXD
B14	GPIO_21/PWM_CH3/UART_RXD2	General Purpose I/O / PWM Channel 3/UART2 Lite RXD
B15	SD_WP	SD Write-protect，1：yes，0：no
B16	SD_CD	Card Detection，1：No card；0：Has a card
B17	SD_D1	SDIO Data 1
B18	SD_D0	SDIO Data 0
B19	SD_CLK	SDIO Clock
B20	SD_CMD	SDIO Command
B21	SD_D3	SDIO Data 3
B22	SD_D2	SDIO Data 2
B23	USB_DP	USB Port0 data pin Data+
B24	USB_DM	USB Port0 data pin Data-
B25	GND	Ground pin
C1	GND	Ground pin
C2	WIFI_RF	RF output
C3	GND	Ground pin
C4	GND	Ground pin
C5	GPIO_46/UART_RXD1	General Purpose I/O / UART1 Lite RXD
C6	GPIO_45/UART_TXD1	General Purpose I/O / UART1 Lite TXD
C7	WLED_N	WLAN Activity LED
C8	GPIO_43	General Purpose I/O
C9	GPIO_42	General Purpose I/O
C10	GPIO_41	General Purpose I/O
C11	PCIE_CKP0	External reference clock output (positive)
C12	PCIE_CKN0	External reference clock output (negative)
C13	PCIE_RXN0	PCIe0 differential receiver RX -
C14	PCIE_RXP0	PCIe0 differential receiver RX +

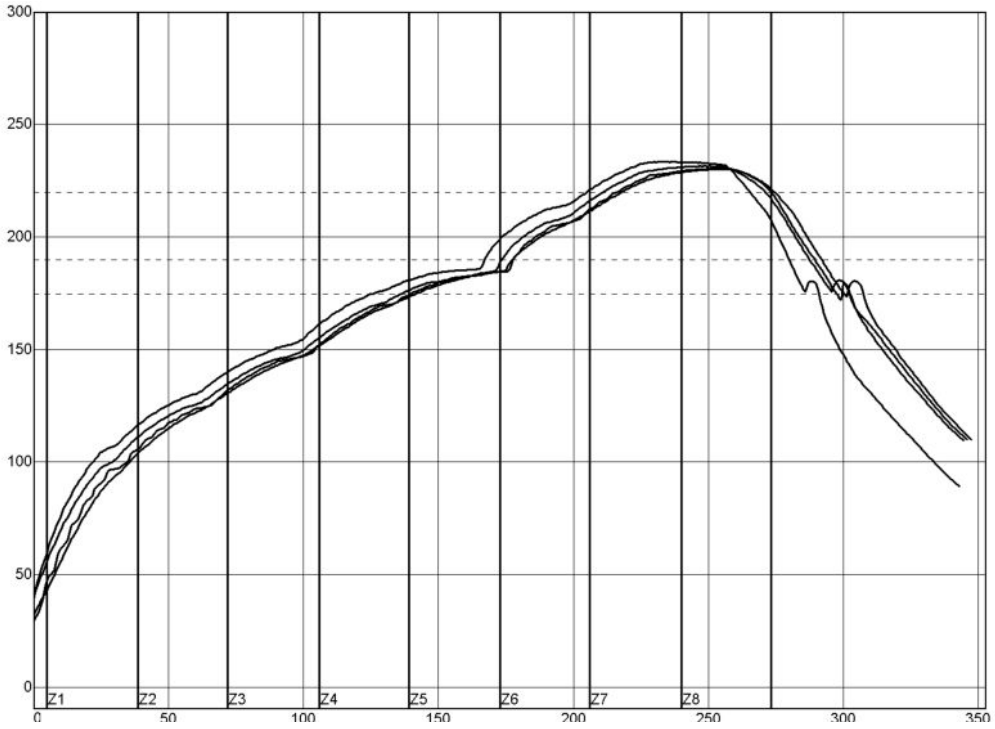
C15	PCIE_TXP0	PCIe0 differential transmit TX +
C16	PCIE_TXN0	PCIe0 differential transmit TX -
C17	3.3V	3.3V Power Supply
C18	3.3V	3.3V Power Supply
C19	GPIO_40/LINK3	General Purpose I/O
C20	GPIO_39/LINK4	General Purpose I/O
C21	CPURST_N	Power on reset
C22	GPIO_38/WPS_RST_PBC	General Purpose I/O / Default User Button
C23	GPIO_37/REFCLK	General Purpose I/O / Reference Clock Output
C24	GPIO_36/PERST_N	General Purpose I/O / PCIe device reset
C25	GND	Ground

Note：

Red：These pins can affect the system start, and cannot be Pull up or Pull down.

5. Recommended Reflow Profile

Reflow Profile for SIP on board Assembly

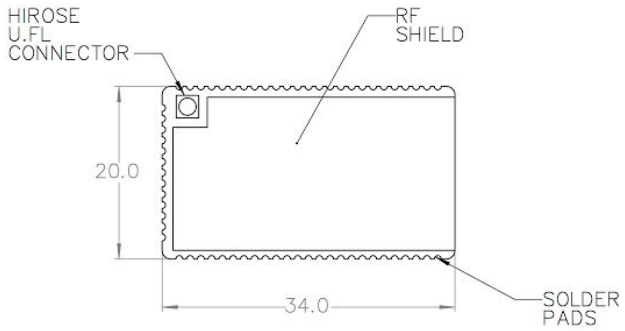


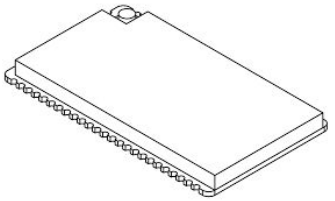
Preheat time	150℃~200℃ : 90+5/-10 Sec
Dwell time	Over 220℃ : 70+5/-10 Sec
Peak Temp	240 +5/-10℃
Ramp Up/Down Rate	Up : 3 +0/-2℃ /Sec Down : 2 +0/-1℃ /Sec

6. Mechanical Drawing and Specifications

Mechanical drawings for the Omega2S are found on the following 4 pages:

Rev	Description	Date
A	ORIGINAL	2017/01/19
B	RELEASE	2017/06/23





OVERVIEW

DIMENSION IN MM UNLESS NOTED	
TOLERANCES	.X ±0.1 .XX ±0.06 .XXX ±0.010 ANG. MACH ±0.5° BEND ±1°
MATERIAL	
DO NOT SCALE DRAWING	
NEXT ASSY	USED ON

AUTHOR	GO	DATE 2017/01/19
CHECKED		DATE
APPROVED		DATE
PROJECTION TYPE		
TITLE	OMEGA2S	
PART NO.	OM-02S	REV. B
SCALE 2:1	SIZE B	SHEET 1 OF 4

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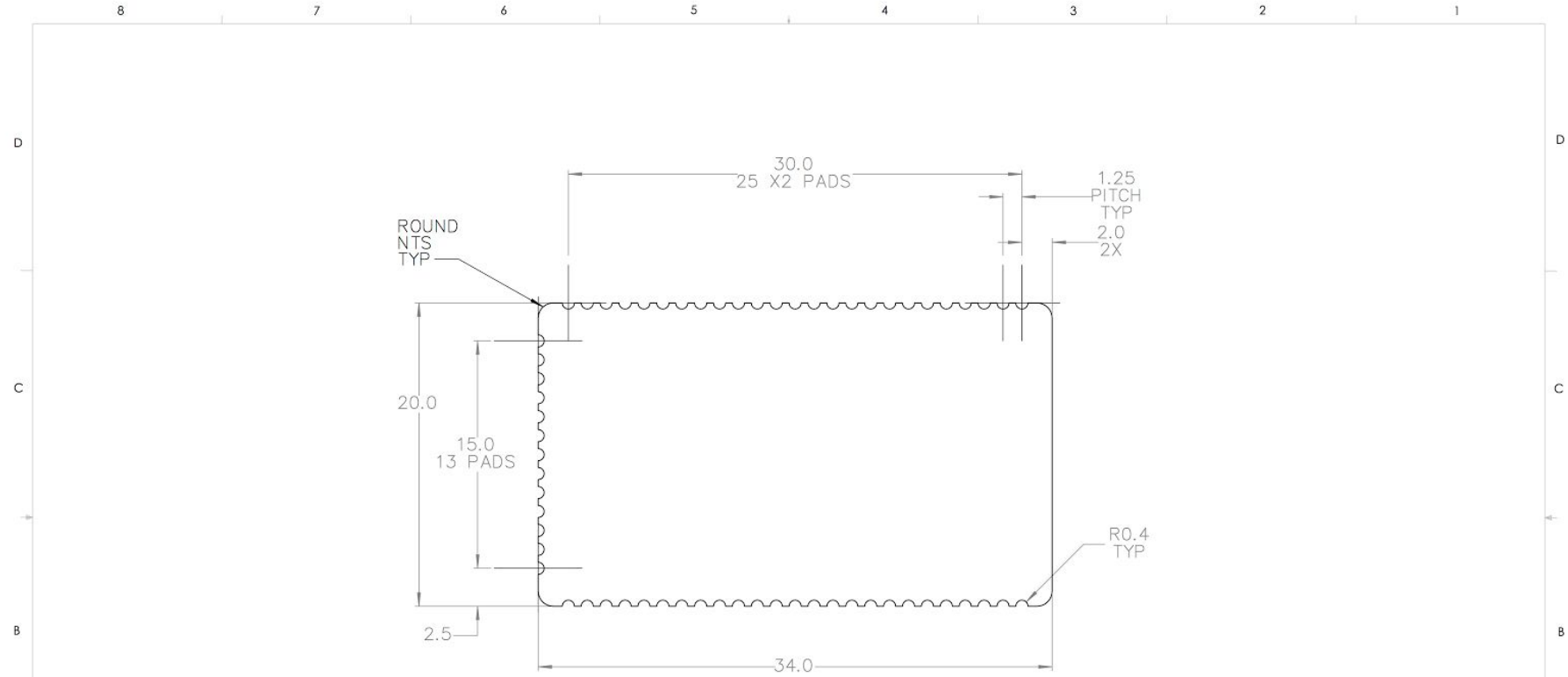
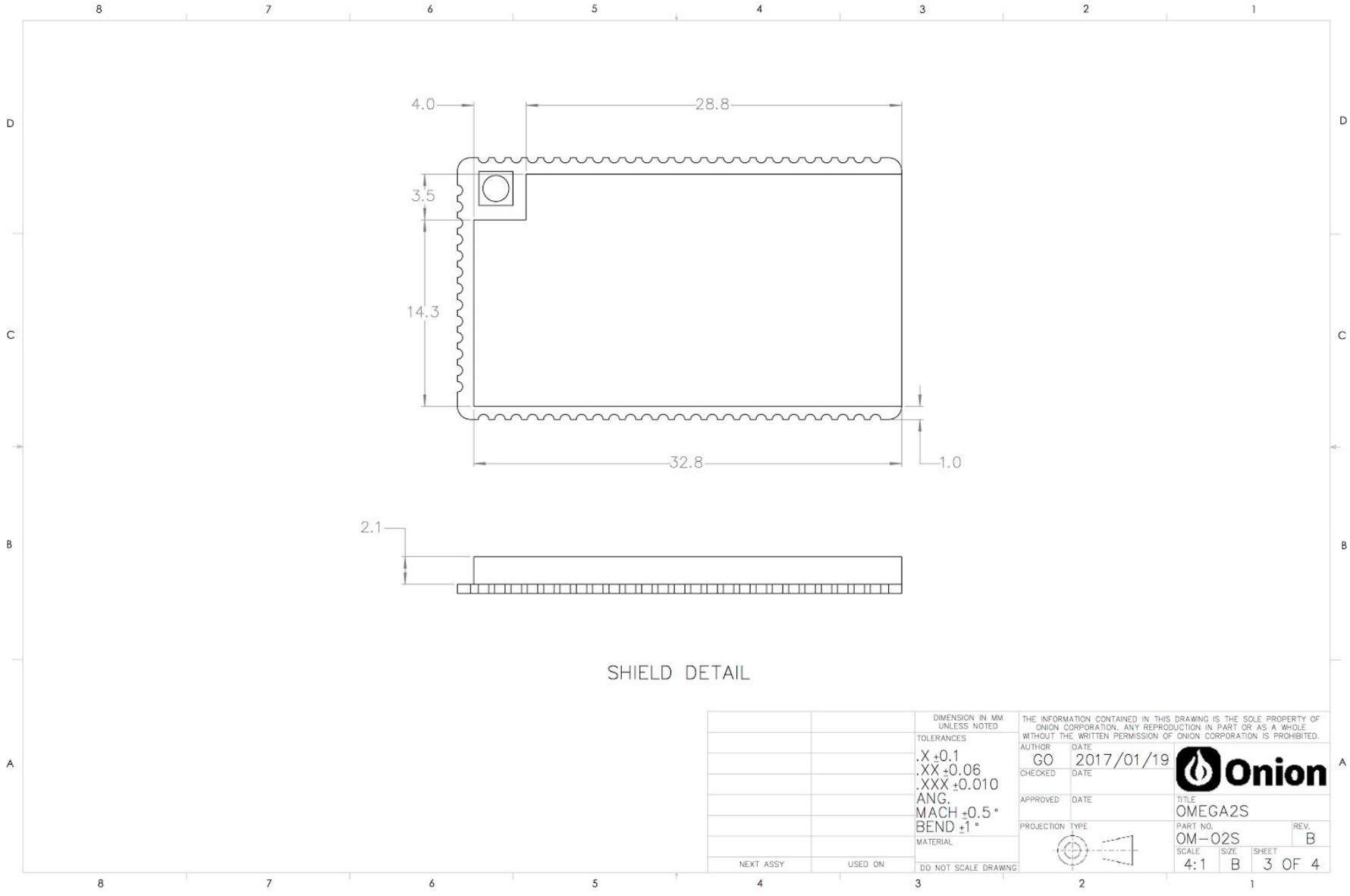


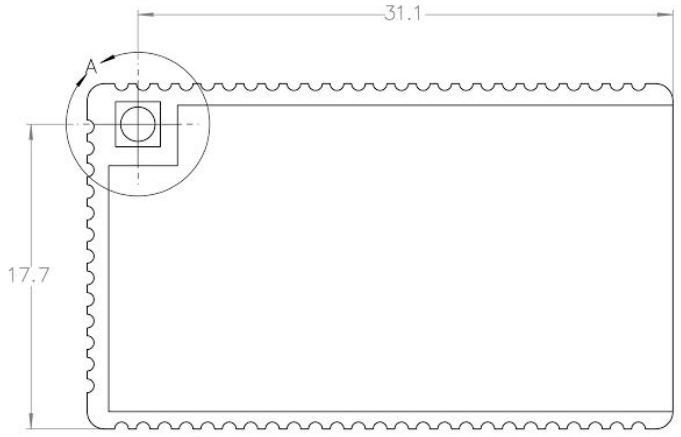
BOARD DETAIL

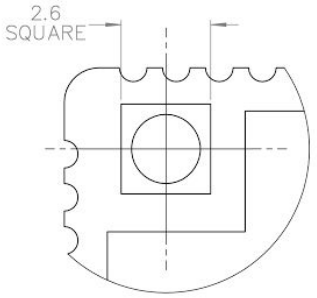
		DIMENSION IN MM UNLESS NOTED	THE INFORMATION CONTAINED IN THIS DRAWING IS THE SOLE PROPERTY OF ONION CORPORATION. ANY REPRODUCTION IN PART OR AS A WHOLE WITHOUT THE WRITTEN PERMISSION OF ONION CORPORATION IS PROHIBITED.
		TOLERANCES .X ±0.1 .XX ±0.06 .XXX ±0.010 ANG. MACH ±0.5° BEND ±1°	AUTHOR: GO — DATE: 2017/01/19 CHECKED — DATE APPROVED — DATE TITLE: OMEGA2S
		MATERIAL	PROJECTION TYPE PART NO.: OM-02S — REV.: B
NEXT ASSY	USED ON	DO NOT SCALE DRAWING	SCALE: 4:1 — SIZE: B — SHEET: 2 OF 4



SHIELD DETAIL

DIMENSION IN MM UNLESS NOTED	THE INFORMATION CONTAINED IN THIS DRAWING IS THE SOLE PROPERTY OF ONION CORPORATION. ANY REPRODUCTION IN PART OR AS A WHOLE WITHOUT THE WRITTEN PERMISSION OF ONION CORPORATION IS PROHIBITED.
TOLERANCES .X ±0.1 .XX ±0.06 .XXX ±0.010 ANG. MACH ±0.5° BEND ±1°	AUTHOR GO DATE 2017/01/19 CHECKED DATE APPROVED DATE
MATERIAL	PROJECTION TYPE
DO NOT SCALE DRAWING	TITLE OMEGA2S PART NO. OM-02S REV. B SCALE 4:1 SIZE B SHEET 3 OF 4
NEXT ASSY / USED ON	





DETAIL A
SCALE 8 : 1

COMPONENT DETAIL

		DIMENSION IN MM UNLESS NOTED	THE INFORMATION CONTAINED IN THIS DRAWING IS THE SOLE PROPERTY OF ONION CORPORATION. ANY REPRODUCTION IN PART OR AS A WHOLE WITHOUT THE WRITTEN PERMISSION OF ONION CORPORATION IS PROHIBITED.
		TOLERANCES .X ±0.1 .XX ±0.06 .XXX ±0.010 ANG. MACH ±0.5° BEND ±1°	AUTHOR GO DATE 2017/01/19 CHECKED DATE APPROVED DATE TITLE OMEGA2S
		MATERIAL	PROJECTION TYPE PART NO. OM-02S REV. B
NEXT ASSY	USED ON	DO NOT SCALE DRAWING	SCALE 4:1 SIZE B SHEET 4 OF 4

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