

AES-MS-MT3620-M-G Azure Sphere MT3620 module (with chip antenna)

Features

- Microsoft Azure Sphere SoC based module solution for advanced end-to-end IOT security
- Based on MT3620AN Wi-Fi SoC
 - 1x 500MHz Arm Cortex A7 application processor with 4MB SRAM
 - 2x 200MHz Arm Cortex M4F cores, each with 64KB SRAM
 - 4MB embedded RAM (shared)
 - 16MB QSPI flash memory
 - Dual-band 2.4/5GHz 802.11 a/b/g/n Wi-Fi
- Module I/O peripheral support
 - 3x ISU interfaces, pre-configured for UART, SPI, I2C
 - ADC/GPIO: 3x 12-bit ADC inputs (or GPIOs)
 - PWM/GPIO: 9x PWM outputs (or up to 24 GPIOs)
 - RTC (requires VBAT supply)
 - Programming & recovery interface
- Microsoft Visual Studio IDE for accelerated application software development & debug
- OTA authentication & updates (device lifetime)
- Dimensions: 33mm x 22mm x 3.5mm
- Onboard dual-band 2.4/5GHz chip antenna
 - (Pulse W3006)
- Operating temperature:
 - -35C to +85°C
 - (Note: For industrial temperature range, please use the U.FL version module)
- Certifications:
 - FCC, IC, CE, RoHS (MIC is pending)

Applications

- IoT edge devices
- Smart home appliances / security
- Smart retail
- Remote access
- Building automation
- Factory automation

For more info on Azure Sphere MT3620 modules, visit: <http://avnet.me/mt3620-modules>

For the summarized Product Brief, visit: <http://avnet.me/mt3620-module-pb>

To purchase an Azure Sphere MT3620 Starter Kit visit: <http://avnet.me/mt3620-kit>

Note: Support for some MT3620 features is still pending. To check latest status, visit:

<https://docs.microsoft.com/en-us/azure-sphere/hardware/mt3620-product-status>

Document Control

Document Version: 1.3
Document Date: 08/05/2019
Document Author: Peter Fenn
Document Classification: Public
Document Distribution: Public

Version History

Version	Date	Comment
1.0	05/07/2019	Initial release, new document scope, photos, pinout detail and content
1.1	05/07/2019	Added FCC Module Statement (USA)
1.2	05/09/2019	Link to Sphere status added. FTDI adaptor cable detail updated
1.3	08/05/2019	Corrections

Ordering Information

Part Number	Description
AES-MS-MT3620-M-G	Azure Sphere MT3620 Module (chip antenna) Product Page: http://avnet.me/mt3620-modules
AES-MS-MT3620-SK-G	Azure Sphere MT3620 Starter Kit Product Page: http://avnet.me/mt3620-kit

Contents

Features.....	1
Applications.....	1
Document Control	2
Ordering Information	2
Overview	6
Module Block Diagram	7
Module Application Development and Programming	8
Development Computer Software Installation.....	8
Module Interfaces with the Development Computer	8
Module Integration onto an OEM Board.....	9
Module Power Interfaces	9
Wi-Fi Network Settings.....	9
Wi-Fi Subsystem	10
Wi-Fi Antenna.....	10
A7 Application Processor	10
M4F IO Processors	10
Flash Memory.....	10
Pluton Security Subsystem	10
Real Time Clock (RTC)	10
Peripheral Serial Interfaces.....	10
Other I/O Interfaces.....	10
MT3620 Bootstrap Pins.....	11
Module Placement and Ground plane requirements	12
Module Pinout Locations	13
Module Pinout Table	14
Electrical Specifications	16
Absolute Maximum Ratings	16
Recommended Operating Conditions.....	16
DC Characteristics	16
Current Consumption	17
RF Characteristics	18
Wi-Fi 2.4GHz Band RF Receiver Specifications	18
Wi-Fi 2.4GHz Band RF Transmitter Specifications.....	20
Wi-Fi 5GHz Band RF Receiver Specifications.....	21
Wi-Fi 5GHz Band RF Transmitter Specifications.....	22

Wi-Fi RF Receiver Blocking Specifications	23
Mechanical Specifications	24
Module Dimension Details	24
Tape and Reel Packaging	25
Soldering and Cleaning Recommendations	26
Optimum Soldering Reflow Profile	26
Cleaning	26
Certifications and Compliance	27
RoHS Compliance.....	27
Regulatory Compliance	27
FCC and ISED Regulatory Notices (USA and Canada)	27
Modification statement	27
Interference statement	27
RF Radiation Exposure Statement.....	27
FCC Class B Digital Device Notice (USA)	28
FCC Module Statement (USA)	28
CAN ICES-003 (B)	28
Labeling Requirements for the OEM Host Board.....	28
FCC Requirements for User Manual of the OEM Host Board:	29
IC Requirements for User Manual of the OEM Host Board:	30
FCC Host 15B and 15C Compliance Statement (USA)	30
CE Statement (Europe)	30
CE Labeling Requirements (Europe)	30
OEM Instructions.....	31
Shipping, Handling and Storage	32
Shipping	32
Handling	32
Moisture Sensitivity (MSL)	32
Storage.....	32
Contact Information.....	33
Legal Information	34
Limitations	34
Avnet Module License and Product Warranty.....	34

Table of Figures

Figure 1 – Simplified MT3620 SoC Block Diagram.....	6
Figure 2 – AES-MS-MT3620-M-G Module Block Diagram	7
Figure 3 – Module with dual-band Chip Antenna	10
Figure 4 – OEM board Footprint for AES-MS-MT3620-M-G Module.....	12
Figure 5 – AES-MS-MT3620-M-G Module Pinout	13
Figure 6 – AES-MS-MT3620-M-G Module Mechanical Details	24
Figure 7 – Tape and Reel Details	26
Figure 8 – Recommended Soldering Profile for Lead-Free Solder.....	26

Overview

The AES-MS-MT3620-M-G is a small form-factor, tri-core Wi-Fi SoC module, intended for use as a secure Wi-Fi client, in internet-connected IoT applications. Avnet’s production-ready, certified module comes fitted with a single dual-band chip antenna, for cost-optimized application in 2.4 GHz or 5GHz Wi-Fi networks

Based on the MT3620AN SoC, this is a new class of connected SoC IoT device that facilitates “end-to-end security”. User applications can target it’s 500 MHz ARM Cortex-A7 core as well as two general purpose 200 MHz ARM Cortex-M4F I/O subsystem cores designed to support real-time requirements. The on-chip peripherals (GPIO, UART, I2C, SPI, I2S, PWM and ADC) can be mapped to any of these three user-accessible processor cores.

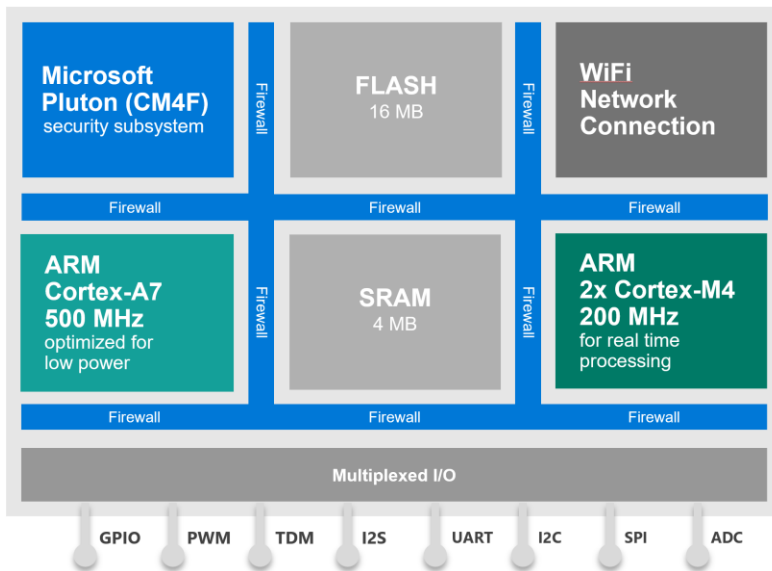


Figure 1 – Simplified MT3620 SoC Block Diagram

Further differentiators of the MT3620 device are its built-in Pluton security subsystem (with dedicated CM4F core) for secure boot and secure system operation, its dual-band 802.11 a/b/g/n Wi-Fi connectivity, as well as integration of on-chip PMU, RTC plus FLASH and SRAM memory. Wi-Fi based OTA firmware and user application updates (using certificate-based authentication) are hosted by Microsoft for the device lifetime

The Cortex-A7 application processor runs Microsoft’s Azure Sphere Secure OS. Custom user applications are developed in C using Microsoft’s Visual Studio IDE, which includes user-friendly debugging features such as single-step execution, breakpoints and watch-points (supported via a dedicated service UART)

The module allows easy design migration and end-product enhancements. By integrating all necessary support and RF front end circuitry onto a small 33 mm x 22 mm module, Avnet has reduced the design time for implementing Sphere-based solutions. Developers can leverage the module’s wireless regulatory certifications (pending) for their end product, saving considerable certification costs and testing time.

The Avnet Azure Sphere MT3620 chip module has a 33mm x 22mm form-factor, with 66 pad castellated “stamp-hole” footprints. It has an on board chip antenna (Pulse W3006) with a 26MHz crystal oscillator.

Microsoft Visual Studio IDE is used for software development of applications that target this Azure Sphere MT3620 Module. Instructions for installing this Integrated Development Environment, as well as it’s Azure Sphere SDK companion application and necessary drivers, are detailed (with examples) in the User Guide for Avnet’s Azure MT3620 Sphere Starter Kit

Online authentication and firmware updates are supported for the MT3620 device lifetime.

Module Block Diagram

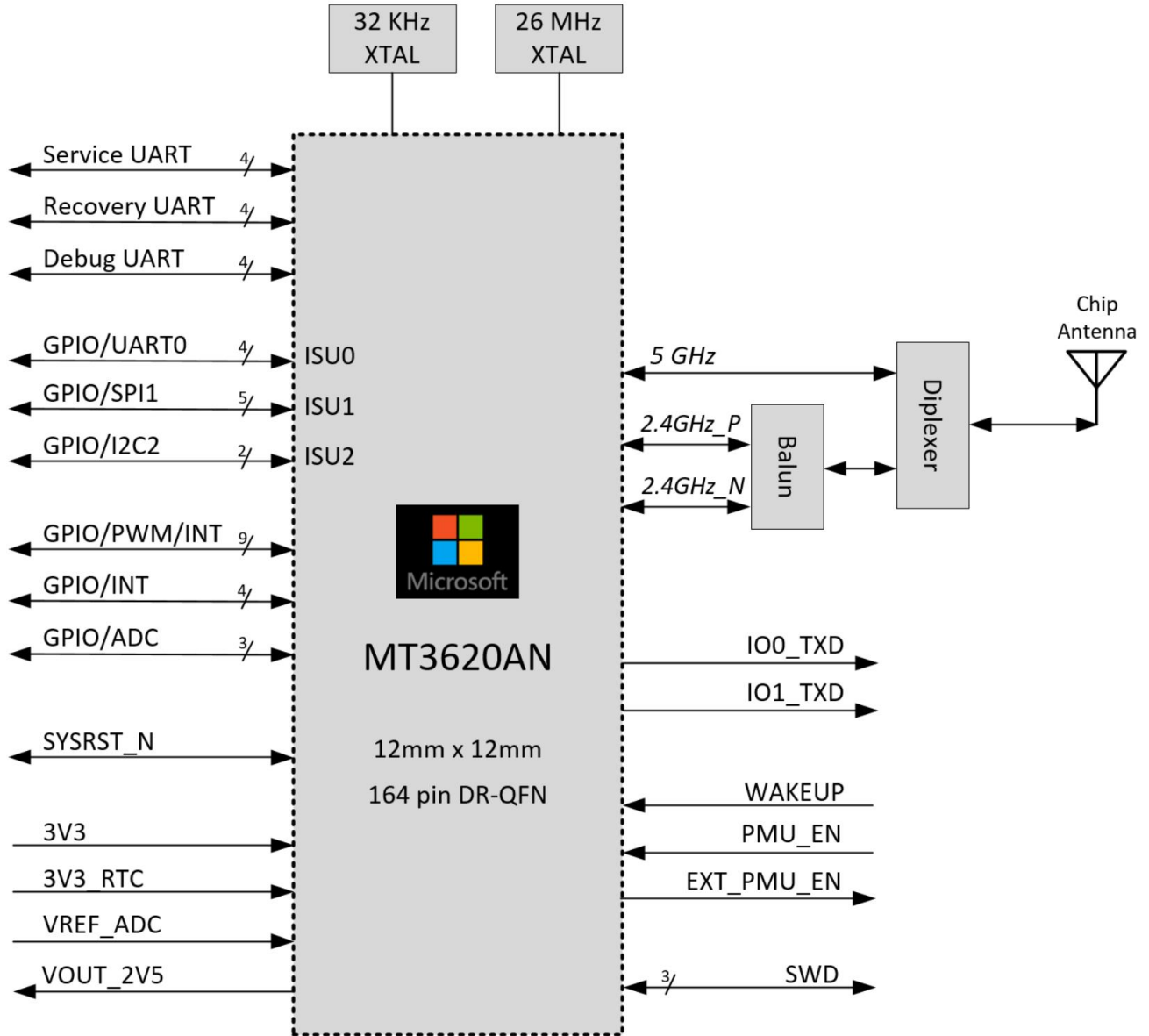


Figure 2 – AES-MS-MT3620-M-G Module Block Diagram

Module Application Development and Programming

Development Computer Software Installation

In depth instructions are provided at the Microsoft **Getting started with Azure Sphere** webpage:
<https://aka.ms/AzureSphereSDK>

Microsoft's **Getting Started with Azure Sphere** page details the download & install of two software items:

- 1) [Azure Sphere SDK Preview for Visual Studio](#) from the Visual Studio Marketplace
- 2) [Visual Studio 2017 version 15.7 or later](#) (free Community edition is sufficient)

as well as USB driver installation for a wired interface between a development computer and the module

Microsoft's **Azure Sphere SDK** provides the following:

- The azsphere command-line utility for managing devices, images, and deployments
- Libraries for application development
- Visual Studio extensions to support Azure Sphere development, debug and flash programming

Microsoft's **Visual Studio IDE** provides a sophisticated development environment for editing, building and debugging custom embedded C applications (a GCC cross-compiler and GDB debugger provide the underlying build and debug tools)

For application development targeting this module, it is recommended that hardware and software prototyping be done using the Avnet **Azure Sphere MT3620 Starter Kit** (<http://avnet.me/mt3620-kit>)

Module Interfaces with the Development Computer

The module is designed to support up to four wired interfaces with the development computer.

- Three 4-wire UART interfaces (SERVICE, RECOVERY and DEBUG) dedicated for connection with the host development computer are pinned-out, each with hardware flow-control.
- A 3-wire SWD interface is also pinned-out
- RESET and RECOVERY (via DEBUG_RTS during boot) signals determine the module operating mode

Module Integration onto an OEM Board

Module Power Interfaces

To power this module, the OEM board must be able to supply a maximum of 2.5 Watts at 3.3V.

Prior to power-up of the module, the following interfaces need to be attended to:

Interface Pins	Description	Notes
3V3	Main input voltage to the module. 3.3V (+/- 10%)	Powered by an external PMU or DC/DC convertor
3V3_RTC	Real Time Clock power input to module	Powered by external battery, or connect this to the 3V3 rail
VREF_ADC	Reference voltage for on-chip A/D convertor	Powered by external reference voltage, or connect to the MT3620 2.5V LDO output
EXT_PMU_EN	MT3630 output to enable / disable external PMU or DC/DC convertor	May be left unconnected
PMU_EN	MT3630 input to enable / disable the internal PMU	May be left unconnected
WAKEUP	MT3630 input to wake-up the A7 processor from power-saving sleep mode	May be left unconnected

Wi-Fi Network Settings

For Wi-Fi connected user applications, the module's Wi-Fi network settings need to be configured by one of the following methods:

- a) In application software (#define statements), that is factory-programmed into module by the OEM
- b) Via a companion BLE device integrated onto the OEM's end-product board (Microsoft provides an example based on the Nordic nRF52840 device)
- c) Via the SERVICE UART interface with a Windows-10 development computer running the azsphere command-line utility (See separate App Note that details suggested PCB footprint to support temporary attachment of an FTDI FT4232HQ based USB to serial adaptor)

Upon power-up and connection to the designated Wi-Fi network, the module will communicate with the Microsoft Azure Sphere Security Service, which authenticates and manages one or more of the following downloads/uploads with the module:

- Push of Azure Sphere OS firmware updates to the module
- Deployment of custom application software to the module
- Reporting of Sphere OS and application versions plus error information to the Azure Sphere Server

The Microsoft Azure Sphere Security Service will also authenticate data transfers between the custom user application executing on the module and Microsoft Azure (or other) cloud services

Wi-Fi Subsystem

- Dual-band 2.4/5GHz 802.11 a/b/g/n Wi-Fi (20 MHz channels only)
- Has an N968 Andes 32bit MCU
- Uses an external 26 MHz crystal oscillator on the module
- Has an integrated 5GHz Balun
- Uses external 2.4GHz Balun and Diplexer devices on the module

Wi-Fi Antenna

- The module is fitted with an on-board dual-band chip antenna for 2.4GHz and 5GHz operation (Pulse Electronics antenna p/n: W3006)
- An inline switched RF probe connector is provided to facilitated RF conducted measurements

A7 Application Processor

- 1x 500MHz Arm Cortex A7 application processor core, with 4MB SRAM (shared)

M4F IO Processors

- 2x 200MHz Arm Cortex M4F IO processor cores, each with 64KB SRAM
- The module pins-out the IO0_TXD and IO1_TXD pins from their dedicated UARTs
- SWD interface based debug and programming of M4F IO MCU cores may at later date be enabled

Flash Memory

- 16MB 100MHz (on-die) QSPI flash memory

Pluton Security Subsystem

- 1x Cortex M4F MCU, dedicated RAM, ROM and GP timers, system control outputs

Real Time Clock (RTC)

- Low-power RTC with timer/time of day control over system power (32KHz crystal oscillator)

Peripheral Serial Interfaces

Three ISU serial interfaces are pinned-out. Their accessible pins are limited to that needed for support of:

- ISU0: UART, max rate=3Mbps (4-wire)
- ISU1: SPI, max rate=40 MHz (5-wire)
- ISU2: I2C, max rate=1MHz (2-wire)

Other I/O Interfaces

All pinned-out I/O pins (including ISU interfaces listed above) can be individually configured as GPIO pins. A subset of these can be configured as:

- PWM outputs
- ADC inputs
- EXT INT inputs

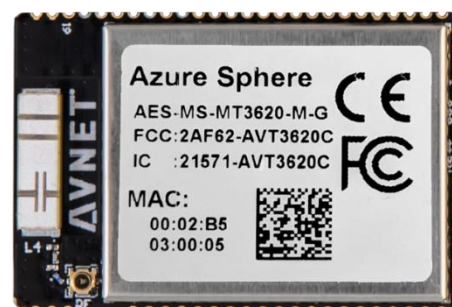


Figure 3 – Module with dual-band Chip Antenna

MT3620 Bootstrap Pins

Note! Six of the seven bootstrap pins are already strapped on the module.

The **DEBUG_RTS** signal **must** however be strapped on the OEM board with a 2K2 pull-down resistor, to ensure that RECOVERY mode remains disabled (This signal gets driven high to select RECOVERY via an FTDI device based interface with the development computer when a Debug-Programmer cable is attached)

Function	Pin Name	Strapping	Recommendation
Normal/Test mode	DEBUG_TXD	Pull-Down	Pull-down resistor is on module Mode = Normal
Recovery mode	DEBUG_RTS	Pull-Down	Pull-down resistor <u>required</u> on OEM board! Controlled via PC interface, - if present
RTC mode	RECOVERY_TXD	Pull-Up	Pull-up resistor is on module RTC oscillator = 32 kHz crystal
26MHz	IO0_RTS	Pull-Up	MT3620 internal pull-up on module Oscillator frequency = 26 MHz
26MHz	IO0_TXD	Pull-Down	Pull-down resistor is on module Oscillator frequency = 26 MHz
N9 JTAG	IO1_TXD	Pull-Down	Pull-down resistor is on module N9 JTAG = OFF
A7 JTAG	RECOVERY_RTS	Pull-Down	Pull-down resistor is on module A7 JTAG = OFF

See the **MT3620 Product Brief** at the following webpage for more detail on the **MT3620AN** SoC device...
<https://www.mediatek.com/products/azureSphere/mt3620>

Module Placement and Ground plane requirements

- For optimum antenna performance the Ground plane of the OEM board (on which the module is fitted) needs to be maximized
- The GND pads in the antenna area of the module must be connected to this Ground plane
- Placement of the module should be 6 mm or more from any corner of the OEM carrier board
- A PCB cutout is recommended in the host carrier board beneath the chip antenna (17mm x 7mm)

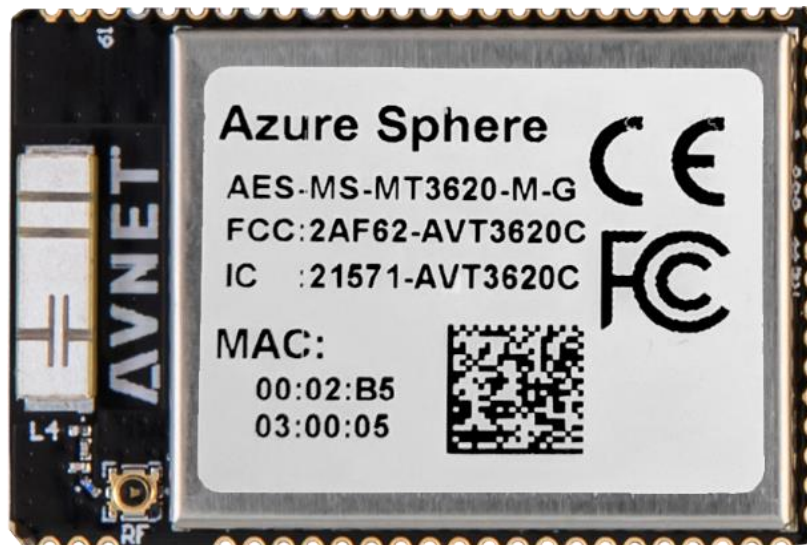
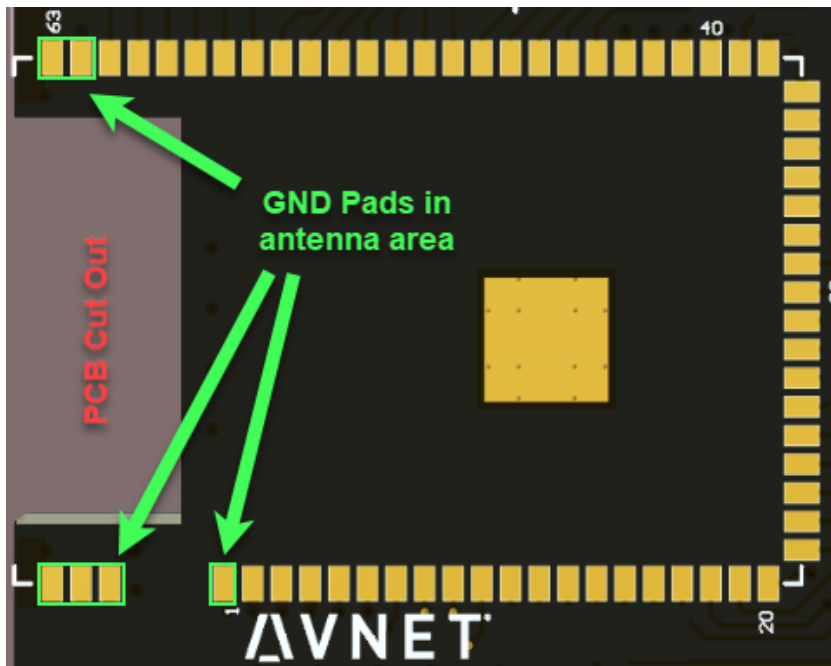


Figure 4 – OEM board Footprint for AES-MS-MT3620-M-G Module

Module Pinout Table

Module Pad	MT3620 Pad	MT3620 Net Name	I/O	Pin Function	Pre-Assigned Starter Kit Function=BLUE
1		GND	GND		
2	2,3	3V3	Power		
3	2,3	3V3	Power		
4			GND		
5	13	GPIO0_PWM0	I/O	GPIO / INT in / PWM out	PWM CLICK1
6	14	GPIO1_PWM1	I/O	GPIO / INT in / PWM out	PWM CLICK2
7	15	GPIO2_PWM2	I/O	GPIO / INT in / PWM out	INT_CLICK
8	17	GPIO4_PWM4	I/O	GPIO / INT in / PWM out	GPIO4_LED_APP
9	18	GPIO5_PWM5	I/O	GPIO / INT in / PWM out	GPIO5_LED_WIFI
10	19	GPIO6_PWM6	I/O	GPIO / INT in / PWM out	INT_LSM6DSO
11	21	GPIO8_PWM8	I/O	GPIO / INT in / PWM out	GPIO8_LED_USER_RED
12	22	GPIO9_PWM9	I/O	GPIO / INT in / PWM out	GPIO9_LED_USER_GRN
13	25	GPIO10_PWM10	I/O	GPIO / INT in / PWM out	GPIO10_LED_USER_BLU
14	27	GPIO12	I/O	GPIO / INT in	GPIO12_SW_A
15	28	GPIO13	I/O	GPIO / INT in	GPIO13_SW_B
16	31	GPIO16	I/O	GPIO / INT in	RST_CLICK1
17	32	GPIO17	I/O	GPIO / INT in	RST_CLICK2
18	39	GPIO26_SCLK0_TXD0	I/O	GPIO / ISU0	UART_TXD
19	40	GPIO27_MOSI0_RTS0_SCL0	I/O	GPIO / ISU0	UART_RTS / I2C0
20	42	GPIO28_MISO0_RXD0_SDA0	I/O	GPIO / ISU0	UART_RXD / I2C0
21	43	GPIO29_CSA0_CTS0	I/O	GPIO / ISU0	UART_CTS
22	46	GPIO31_SCLK1_TXD1	I/O	GPIO / ISU1	SPI_SCLK / UART1
23	47	GPIO32_MOSI1_RTS1_SCL1	I/O	GPIO / ISU1	SPI_MOSI / UART1 / I2C1
24	48	GPIO33_MISO1_RXD1_SDA1	I/O	GPIO / ISU1	SPI_MISO / UART1 / I2C1
25	49	GPIO34_CSA1_CTS1	I/O	GPIO / ISU1	SPI_CS #1 / UART1
26	50	GPIO35_CSB1	I/O	GPIO / ISU1	SPI_CS #2
27	52	GPIO37_MOSI2_RTS2_SCL2	I/O	GPIO / ISU2	I2C
28	53	GPIO38_MISO2_RXD2_SDA2	I/O	GPIO / ISU2	I2C
29	58	GPIO41_ADC0	I/O	GPIO / ADC in	AMBIENT LIGHT SENSOR
30	59	GPIO42_ADC1	I/O	GPIO / ADC in	AN_CLICK1
31	60	GPIO43_ADC2	I/O	GPIO / ADC in	AN_CLICK2
32	66	VOUT_2V5	AO		
33	67	VREF_ADC	AI		min 1.8V, max 2.5V
34	81	PMU_EN	I		pull-up on module
35	70	WAKEUP	I	Ext. Wakeup Input	pull-up on module
36	69	EXT_PMU_EN	O	Ext. 3V3 regulator enable	
37		GND	GND		

Module Pinout Table (continued)

Module Pad	MT3620 Pad	MT3620 Net Name	I/O	Pin Function	Pre-Assigned Starter Kit Function=BLUE
38		GND	GND		
39	71	3V3_RTC	Power		min 2.50 V, max 3.63V
40		GND	GND		
41		GND	GND		
42	88,89	3V3	Power		
43	88,89	3V3	Power		
44	94	DEBUG_RXD	I	Debug UART	DEBUG_RXD
45	96	DEBUG_RTS	O	Debug UART (pulled-down / FTDI controlled strapping state on Starter Kit)	DEBUG_RTS
46	95	DEBUG_TXD	O	Debug UART (pulled-down on module)	DEBUG_TXD
47	97	DEBUG_CTS	I	Debug UART	DEBUG_CTS
48	98	SWD_DIO	I/O	CM4F SWD	SWD_DIO
49	99	SWD_CLK	I	CM4F SWD	SWD_CLK
50	100	SWO	O	CM4F SWD	SWO
51	125	SYSRST_N	I		SYSRST_N
52	127	SERVICE_TXD	O	Service UART	SERVICE_TXD
53	129	SERVICE_RXD	I	Service UART	SERVICE_RXD
54	128	SERVICE_RTS	O	Service UART	SERVICE_RTS
55	130	SERVICE_CTS	I	Service UART	SERVICE_CTS
56	134	RECOVERY_RXD	I	Recovery UART	RECOVERY_RXD
57	135	RECOVERY_TXD	O	Recovery UART (PU on module)	RECOVERY_TXD
58	136	RECOVERY_RTS	O	Recovery UART (pulled-down on module)	RECOVERY_RTS
59	137	RECOVERY_CTS	I	Recovery UART	RECOVERY_CTS
60	139	IO0_GPIO86/IO0_TXD	O	IO0_GPIO / IO0_TXD (pulled-down on module)	IO0_TXD
61	143	IO1_GPIO90/IO1_TXD	O	IO1_GPIO / IO1_TXD (pulled-down on module)	IO1_TXD
62 - 66		GND	GND	GND pour	
67		PADGND	GND	Thermal pad for MT3620	

Note! Azure Sphere OS support for some MT3620 features is still to be released by Microsoft. eg. GPIO, UART, I2C and SPI peripherals are now supported, but support for the ARM Cortex-M4F cores, ADC and PWM and functions is at this time still pending.

Electrical Specifications

Note! The electrical characteristics documented here are for the MT3620AN SoC device only, as defined in the MT3620AN Datasheet and Product Brief documents

Absolute Maximum Ratings

Symbol	Parameter	Max	Unit
3V3	3.3V Supply Voltage	-0.3 to 3.63	V
T_{STG}	Storage Temperature	-40 to +125	°C
V_{ESD}	ESD protection (human body model)	2000	V

Recommended Operating Conditions

Symbol	Rating	Min	Typ	Max	Unit
3V3	3.3V supply	2.97	3.3	3.63	V
3V3_RTC	RTC supply	2.5	3.3	3.63	V
T_{AMBIENT}	Ambient Temperature	-35	-	+85	°C

DC Characteristics

Symbol	Parameter	Conditions	Min	Max	Unit
V_{IL}	Input Low Voltage	LVTTL	-0.28	0.8	V
V_{IH}	Input High Voltage		2.0	3.63	V
V_{OL}	Output Low Voltage	IOL = 4 to 16 mA	-0.28	0.4	V
V_{OH}	Output High Voltage	IOH = 4 to 16 mA	2.4	VDD33+0.33	V
R_{PU}	Input Pull-Up Resistance	PU=high, PD=low	40	190	kΩ
R_{PD}	Input Pull-Down Resistance	PU=low, PD=high	40	190	kΩ

Current Consumption

Power mode	Description	Details		Typical current consumption	Hardware wake-up latency
		Subsystem	Power State		
RTC mode	Only RTC domain is on. Memory is not retained. Requires a cold boot to resume	Pluton CM4 subsystem	Off	0.01mA or 0.02mA (*1)	24ms (crystal and PLL lock, PMU time)
		CA7 subsystem	Off		
		CM4F I/O subsystems	Off		
		Wi-Fi subsystem	Off		
		Buses/peripherals	Off		
Worst case power consumption no Wi-Fi	All subsystems apart from Wi-Fi running at full speed	Pluton CM4 subsystem	On	220mA Worst case 380mA (*2)	N/A, 650us WiFi subsystem resume latency
		CA7 subsystem	On		
		IO 0/1 CM4 subsystems	On		
		Wi-Fi subsystem	Light sleep		
		Buses/peripherals (*3)	On		
Worst case power consumption with Wi-Fi (*2)	All subsystems running at full speed, Wi-Fi very active	Pluton CM4 subsystem	On	520mA (*4) Worst case 750mA (*2)	N/A
		CA7 subsystem	On		
		IO 0/1 CM4 subsystems	On		
		Wi-Fi subsystem	On		
		Buses/peripherals (*3)	On		
		RF (A or G Band)	On		
		Flash (*5)	On		

Note *1: 0.01mA/0.02mA with/without external 3.3v source PMIC control switch respectively.

Note *2: The current values are measured under typical case (TT silicon and 25C/1.15V) and the TDP (max thermal design power) includes simulation worst case condition (TT/125C/1.15V/MC99 ,MC99 is PTPX power simulation library).

Note *3: It depends on how busy the peripherals are and how they are configured.

Note *4: This data is based on 100% Wi-Fi transmission on the 5GHz band at 14dBm.

Note *5: It depends on the I/O loading and flash power consumption.

RF Characteristics

Wi-Fi 2.4GHz Band RF Receiver Specifications

The specification in table below is measured at the antenna port, which includes the front-end loss.

Parameter	Description	Performance				Unit
		Min	Typical		Max	
			Main	Aux		
Frequency range	Center channel frequency	2412			2484	MHz
RX sensitivity	DBPSF, 1 Mbps DSSS	-	-94.6	-97.1	-90.0	dBm
	DQPSF, 2 Mbps DSSS	-	-91.6	-94.1	-87.0	dBm
	DQPSF, 5.5 Mbps CCK	-	-89.6	-92.1	-85.0	dBm
	DQPSF, 11 Mbps CCK	-	-86.6	-89.1	-82.0	dBm
	BPSK rate 1/2, 6 Mbps OFDM	-	-91.6	-94.1	-87.0	dBm
	BPSK rate 3/4, 9 Mbps OFDM	-	-89.3	-91.8	-86.0	dBm
	QPSK rate 1/2, 12 Mbps OFDM	-	-88.5	-91.0	-84.0	dBm
	QPSK rate 3/4, 18 Mbps OFDM	-	-86.1	-88.6	-82.0	dBm
	16QAM rate 1/2, 24 Mbps OFDM	-	-82.8	-85.3	-81.0	dBm
	16QAM rate 3/4, 36 Mbps OFDM	-	-79.4	-81.9	-78.0	dBm
	64QAM rate 1/2, 48 Mbps OFDM	-	-75.2	-77.7	-73.0	dBm
	64QAM rate 3/4, 54 Mbps OFDM	-	-73.9	-76.4	-71.0	dBm
RX sensitivity BW=20MHz, Mixed mode 800ns guard interval, Non-STBC	MCS 0, BPSK rate 1/2	-	-90.9	-93.4	-87.0	dBm
Maximum Receive Level	MCS 1, QPSK rate 1/2	-	-87.7	-90.2	-86.0	dBm
	MCS 2, QPSK rate 3/4	-	-85.3	-87.8	-84.0	dBm
	MCS 3, 16QAM rate 1/2	-	-82.3	-84.8	-81.0	dBm
	MCS 4, 16QAM rate 3/4	-	-78.8	-81.3	-77.0	dBm
	MCS 5, 64QAM rate 2/3	-	-74.4	-76.9	-74.0	dBm
	MCS 6, 64QAM rate 3/4	-	-73.0	-75.5	-71.0	dBm
	MCS 7, 64QAM rate 5/6	-	-71.8	-74.3	-69.0	dBm
	1 Mbps DSSS	-20	-10	-	dBm	
	11 Mbps CCK	-20	-10	-	dBm	
	6 Mbps OFDM	-20	-10	-	dBm	
	54 Mbps OFDM	-20	-10	-	dBm	
	HT20 MCS0	-20	-10	-	dBm	
	HT20 MCS7	-20	-20	-	dBm	

Wi-Fi 2.4GHz Band RF Receiver Specifications (continued)

Parameter	Description	Performance				
		Min	Typical		Max	Unit
			Main	Aux		
Receive adjacent channel rejection	BPSK rate 1/2, 6 Mbps OFDM	16	34		-	dBm
	BPSK rate 3/4, 9 Mbps OFDM	15	31		-	dBm
	QPSK rate 1/2, 12 Mbps OFDM	13	30		-	dBm
	QPSK rate 3/4, 18 Mbps OFDM	11	27		-	dBm
	16QAM rate 1/2, 24 Mbps OFDM	8	25		-	dBm
	16QAM rate 3/4, 36 Mbps OFDM	4	23		-	dBm
	64QAM rate 1/2, 48 Mbps OFDM	0	22		-	dBm
	64QAM rate 3/4, 54 Mbps OFDM	-1	22		-	dBm
	MCS 0, BPSK rate 1/2	16	33		-	dBm
	MCS 1, QPSK rate 1/2	13	29		-	dBm
	MCS 2, QPSK rate 3/4	11	26		-	dBm
	MCS 3, 16QAM rate 1/2	8	24		-	dBm
	MCS 4, 16QAM rate 3/4	4	20		-	dBm
	MCS 5, 64QAM rate 2/3	0	18		-	dBm
	MCS 6, 64QAM rate 3/4	-1	17		-	dBm
MCS 7, 64QAM rate 5/6	-2	15		-	dBm	
Receiver residual PER	All rates, -50dBm input power	-	-		0.005	%

Wi-Fi 2.4GHz Band RF Transmitter Specifications

The specification in table below is measured at the antenna port, which includes the front-end loss.

Parameter	Description	Performance			
		Min	Typical	Max	Unit
Frequency range	Center channel frequency	2412	-	2484	MHz
Output power with spectral mask and EVM compliance	1 Mbps DSSS	- x	16(1)	-	dBm
	11 Mbps CCK	-	16(1)	-	dBm
	6 Mbps OFDM	-	16(1)	-	dBm
	54 Mbps OFDM	-	16(1)	-	dBm
	HT20 MCS 0	-	16(1)	-	dBm
	HT20 MCS 7	-	16(1)	-	dBm
Output power with spectral mask and EVM compliance (at -40°C and 85°C)	1 Mbps DSSS	-	15(1)	-	dBm
	11 Mbps CCK	-	15(1)	-	dBm
	6 Mbps OFDM	-	15(1)	-	dBm
	54 Mbps OFDM	-	15(1)	-	dBm
	HT20 MCS 0	-	15(1)	-	dBm
	HT20 MCS 7	-	15(1)	-	dBm
TX EVM	1 Mbps DSSS	-	-	-10	dB
	11 Mbps CCK	-	-	-10	dB
	6 Mbps OFDM	-	-	-5	dB
	54 Mbps OFDM	-	-	-25	dB
	HT20 MCS 0	-	-	-5	dB
	HT20 MCS 7	-	-	-28	dB
Output power variation(2)	TSSI closed-loop control across all temperature range and channels and VSWR \leq 1.5:1.	-1.5	-	1.5	dB
Carrier suppression	-	-	-	-30	dBc
Harmonic output power	2nd Harmonic	-	-45	-43	dBm/MHz
	3rd Harmonic	-	-45	-43	dBm/MHz

Note 1: Low power PA.

Note 2: VDD33 voltage is within $\pm 5\%$ of typical value.

Wi-Fi 5GHz Band RF Receiver Specifications

Specifications in the table below are measured at the antenna port, which includes the front-end loss.

Parameter	Description	Performance				Unit
		Min	Typical		Max	
			Main	Aux		
Frequency range	Center channel frequency	5180	-		5825	MHz
RX sensitivity	BPSK rate 1/2, 6 Mbps OFDM	-	-90.0	-91.5	-86.0	dBm
	BPSK rate 3/4, 9 Mbps OFDM	-	-87.7	-89.2	-85.0	dBm
	QPSK rate 1/2, 12 Mbps OFDM	-	-87.0	-88.5	-83.0	dBm
	QPSK rate 3/4, 18 Mbps OFDM	-	-84.5	-86.0	-81.0	dBm
	16QAM rate 1/2, 24 Mbps OFDM	-	-81.3	-82.8	-75.0	dBm
	16QAM rate 3/4, 36 Mbps OFDM	-	-78.0	-79.5	-72.0	dBm
	64QAM rate 1/2, 48 Mbps OFDM	-	-73.6	-75.1	-70.0	dBm
	64QAM rate 3/4, 54 Mbps OFDM	-	-72.2	-73.7	-68.0	dBm
RX sensitivity BW=20MHz HT Mixed mode 800ns guard interval non-STBC	MCS 0, BPSK rate 1/2	-	-89.3	-90.8	-86.0	dBm
	MCS 1, QPSK rate 1/2	-	-86.3	-87.8	-84.0	dBm
	MCS 2, QPSK rate 3/4	-	-83.8	-85.3	-82.0	dBm
	MCS 3, 16QAM rate 1/2	-	-80.8	-82.3	-76.0	dBm
	MCS 4, 16QAM rate 3/4	-	-77.3	-78.8	-74.0	dBm
	MCS 5, 64QAM rate 2/3	-	-72.8	-74.3	-72.0	dBm
	MCS 6, 64QAM rate 3/4	-	-71.4	-72.9	-70.0	dBm
	MCS 7, 64QAM rate 5/6	-	-70.2	-71.7	-66.0	dBm
Maximum receive level	6 Mbps OFDM	-30	-10		-	dBm
	54 Mbps OFDM	-30	-20		-	dBm
	MCS0	-30	-15		-	dBm
	MCS7	-30	-20		-	dBm
Receive adjacent channel rejection	BPSK rate 1/2, 6 Mbps OFDM	16	24		-	dBm
	BPSK rate 3/4, 9 Mbps OFDM	15	23		-	dBm
	QPSK rate 1/2, 12 Mbps OFDM	13	21		-	dBm
	QPSK rate 3/4, 18 Mbps OFDM	11	19		-	dBm
	16QAM rate 1/2, 24 Mbps OFDM	8	15		-	dBm
	16QAM rate 3/4, 36 Mbps OFDM	4	10		-	dBm
	64QAM rate 1/2, 48 Mbps OFDM	0	5		-	dBm
	64QAM rate 3/4, 54 Mbps OFDM	-1	3		-	dBm
	MCS 0, BPSK rate 1/2	16	24		-	dBm
	MCS 1, QPSK rate 1/2	13	21		-	dBm
	MCS 2, QPSK rate 3/4	11	19		-	dBm
	MCS 3, 16QAM rate 1/2	8	16		-	dBm

Wi-Fi 2.4GHz Band RF Receiver Specifications (continued)

Parameter	Description	Performance				
		Min	Typical		Max	Unit
			Main	Aux		
	MCS 4, 16QAM rate 3/4	4	12		-	dBm
	MCS 5, 64QAM rate 2/3	0	7		-	dBm
	MCS 6, 64QAM rate 3/4	-1	5		-	dBm
Receiver residual PER	MCS 7, 64QAM rate 5/6	-2	3		-	dBm

Wi-Fi 5GHz Band RF Transmitter Specifications

The specification in table below is measured at the antenna port, which includes the front-end loss.

Parameter	Description	Performance			
		Min	Typical	Max	Unit
Frequency range	Center channel frequency	5180	-	5825	MHz
Output power with spectral mask and EVM compliance	6 Mbps OFDM	-	14(1)	-	dBm
	54 Mbps OFDM	-	14(1)	-	dBm
	HT20 MCS 0	-	14(1)	-	dBm
	HT20 MCS 7	-	14(1)	-	dBm
Output power with spectral mask and EVM compliance (at -40°C and 85°C)	6 Mbps OFDM	-	13(1)	-	dBm
	54 Mbps OFDM	-	13(1)	-	dBm
	HT20 MCS 0	-	13(1)	-	dBm
	HT20 MCS 7	-	13(1)	-	dBm
TX EVM	6 Mbps OFDM	-	-	-5	dB
	54 Mbps OFDM	-	-	-25	dB
	HT20 MCS 0	-	-	-5	dB
	HT20 MCS 7	-	-	-28	dB
Output power variation(2)	TSSI closed-loop control across all temperature range and channels and VSWR \leq 1.5:1.	-1.5	-	1.5	dB
Carrier suppression		-	-	-30	dBc
Harmonic output power	2nd Harmonic	-	-45	-43	dBm/MHz
	3rd Harmonic	-	-45	-43	dBm/MHz

Note 1: Low power PA

Note2: VDD33 voltage is within \pm 5% of typical value.

Wi-Fi RF Receiver Blocking Specifications

The specifications in table below are measured at the antenna port, which includes the front-end loss.

Parameter	Description	Performance			
		Min	Typical	Max	Unit
Receiver in-band blocking(1) CW and BT interferers	2.4 GHz CW and BT interfering signal @ ± 20 MHz offset	-47	-	-	dBm
	2.4 GHz CW and BT interfering signal @ ± 25 MHz offset	-40	-	-	dBm
	5 GHz CW interfering signal @ ± 20 MHz offset	-35	-	-	dBm
Receiver out-band blocking(1) CW interferer	$25 \leq f < 2300$ MHz	-28	-	-	dBm
	$2300 \leq f < 2395$ MHz	-40	-	-	dBm
	$2483.5 < f \leq 2583.5$ MHz	-45	-	-	dBm
Receiver out-band blocking(1) CDMA, GSM, DCS and PCS interferers(2)	CDMA UL: 824 – 849 MHz	-20	-	-	dBm
	CDMA DL: 869 – 894 MHz	-10	-	-	dBm
	GSM UL: 880 – 915 MHz	-10	-	-	dBm
	GSM DL: 925 – 960 MHz	-10	-	-	dBm
	DCS UL: 1710 – 1785 MHz	-13	-	-	dBm
	DCS DL: 1805 – 1880 MHz	-20	-	-	dBm
	PCS UL: 1850 – 1910 MHz	-20	-	-	dBm
PCS DL: 1930 – 1990 MHz	-20	-	-	dBm	
Receiver out-band blocking(1) WiFi interferers	5G receiver only, interfering signal: $2400 < f \leq 2483.5$ MHz	-20	-	-	dBm
	2G receiver only, interfering signal: $5125 < f \leq 5850$ MHz	-20	-	-	dBm

Note 1: The desired signal's strength is 3 dB above the Maximum RX sensitivity. **PER \leq 10%**.

Note 2: Except harmonic mixing.

Tape and Reel Packaging

[Preliminary – This information is likely to change]

AES-MS-MT3620 Azure Sphere Modules are available in tape and reel packaging at quantities of 600 units. The reel dimensions are 13 inches (reel diameter) x 56 mm (tape-width). The 56 mm tape-width conforms to the Electronic Components Association Standard EIA-481-D.

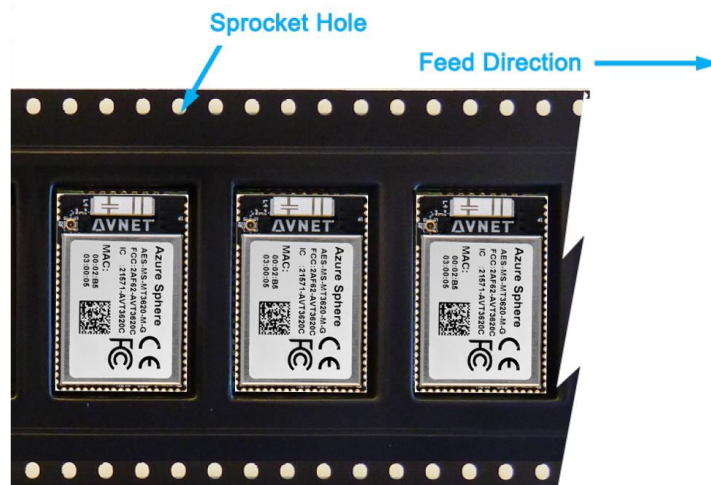
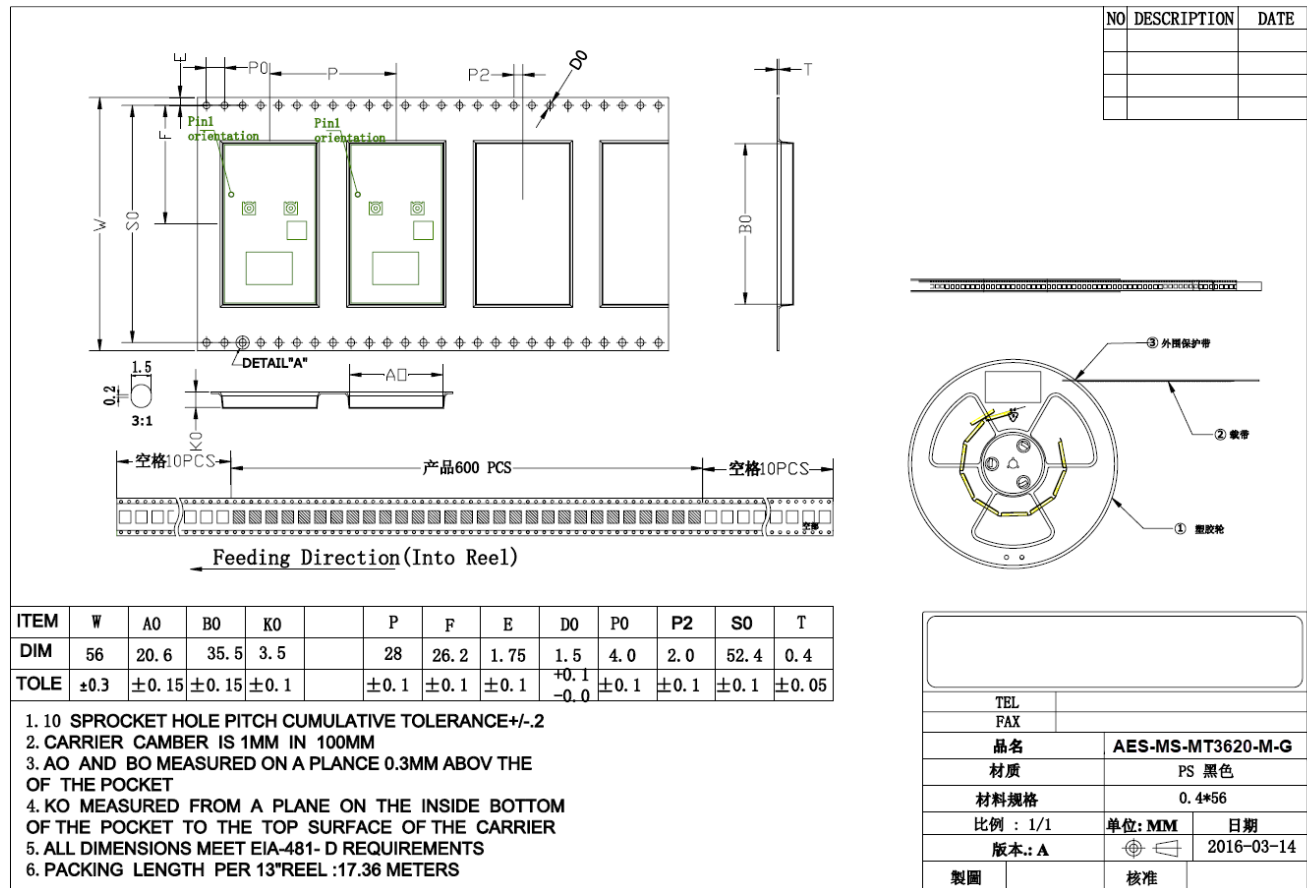


Figure 7 – Tape and Reel Details

Soldering and Cleaning Recommendations

[Preliminary – This information is likely to change]

Optimum Soldering Reflow Profile

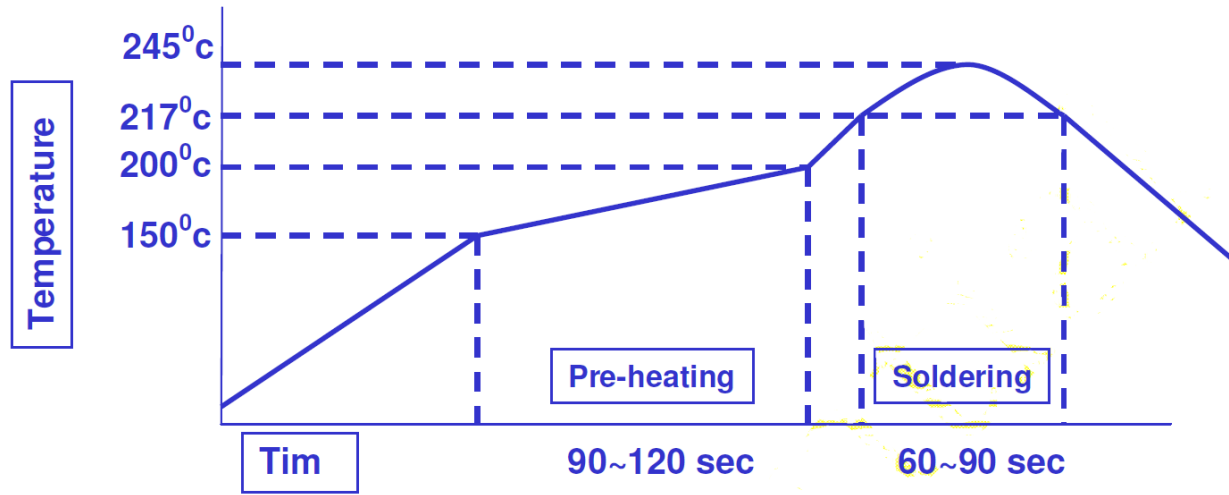


Figure 8 – Recommended Soldering Profile for Lead-Free Solder

- Solder joint quality between the AES-MS-MT3620 Azure Sphere Module's surface mount pads and their bonding with the host board should meet the appropriate IPC Specification. (See *IPC-A-610-D Acceptability of Electronic Assemblies*, section 8.2.1 "Bottom Only Terminations")
- It is recommended that only a single reflow soldering process be permitted for the host board
- Any attempts at reworking the module will invalidate warranty coverage and regulatory certifications

Cleaning

- Cleaning of the populated module is not recommended!
- Residuals under the module cannot be easily removed by any cleaning process (Water / Solvents / Ultrasonic)

Certifications and Compliance

RoHS Compliance

AES-MS-MT3620 Azure Sphere Modules are lead-free and RoHS compliant.

Regulatory Compliance

FCC, IC and CE certifications are currently pending
(Once the certification process has been concluded, this note will be removed from the datasheet)

AES-MS-MT3620 Azure Sphere Module certification applies to operation in various regulatory domains. This section outlines certification information specific to the following countries and regions:

Region	Regulatory Body	Status
United States	FCC	2AF62-AVT3620U (Pending) 2AF62-AVT3620C (Pending)
Canada	ISED (IC)	21571-AVT3620U (Pending) 21571-AVT3620C (Pending)
Europe	CE	EN 60950-1, EN 300 328, EN 301 489 (Pending)
Japan	MIC	Still to be submitted
All	RoHS	Compliant

Should regulatory certification be required in a specific country or region not already covered, please contact your local Avnet sales office or create a support request at <http://avnet.me/mt3620-forums>

FCC and ISED Regulatory Notices (USA and Canada)

Modification statement

Avnet has not approved any changes or modifications to this device by the user.
Any changes or modifications could void the user's authority to operate the equipment!

Interference statement

This device complies with Part 15 of the FCC Rules and Industry Canada's license-exempt RSS standards. Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.

RF Radiation Exposure Statement

This equipment complies with FCC and ISED radiation exposure limits set forth for an uncontrolled environment. The antenna should be installed and operated with minimum distance of 20 cm between the radiator and your body. This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

FCC Class B Digital Device Notice (USA)

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

FCC Module Statement (USA)

The single-modular transmitter is a self-contained, physically delineated, component for which compliance can be demonstrated independent of the host operating conditions, and which complies with all eight requirements of § 15.212(a)(1) as summarized below.

- 1) The radio elements have the radio frequency circuitry shielded.
- 2) The module has buffered modulation/data inputs to ensure that the device will comply with Part 15 requirements with any type of input signal.
- 3) The module contains power supply regulation on the module.
- 4) The module contains a permanently attached antenna.
- 5) The module demonstrates compliance in a stand-alone configuration.
- 6) The module is labelled with its permanently affixed FCC ID label
- 7) The module complies with all specific rules applicable to the transmitter, including all the conditions provided in the integration instructions by the grantee.
- 8) The module complies with RF exposure requirements.

CAN ICES-003 (B)

This Class B digital apparatus complies with Canadian standard ICES-003.

Labeling Requirements for the OEM Host Board

The host device shall be properly labelled to identify the modules within the host device. The certification label of the module shall be clearly visible at all times when installed in the host device, otherwise the host device must be labelled to display the FCC ID and IC of the module, preceded by the words "Contains transmitter module", or the word "Contains", or similar wording expressing the same meaning, as follows:

Contains FCC ID: 2AF62-AVT3620C
Contains IC: 21571-AVT3620C

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:
(1) This device may not cause harmful interference, and
(2) This device must accept any interference received, including interference that may cause undesired operation.

FCC Requirements for User Manual of the OEM Host Board:

The OEM integrator may not provide any information to the end user on how to install or remove this RF module or change RF related parameters in the user manual of the end product.

The following statement must be included as a CAUTION statement in manuals for the OEM products, to alert users of FCC RF exposure compliance:

“WARNING: To satisfy FCC RF exposure requirements for mobile transmitting devices, a separation distance of 20cm or more should be maintained between the antenna of this device and persons during operation. To ensure compliance, operations at closer distances than this are not recommended”

The user manual for the final end product should include the following statement:

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:
(1) This device may not cause harmful interference, and
(2) This device must accept any interference received, including interference that may cause undesired operation.

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

IC Requirements for User Manual of the OEM Host Board:

The user manual for the final end product shall display the following Industry Canada notices in a conspicuous location:

Industry Canada Statements

This Device complies with Industry Canada License-exempt RSS standard(s). Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes: (1) l'appareil ne doit pas produire de brouillage, et (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

FCC Host 15B and 15C Compliance Statement (USA)

The OEM integrator is responsible for testing their end-product for any additional compliance requirements needed with this module installed (eg. digital device emissions, PC peripheral requirements, etc). Additionally, investigative measurements and spot checking are strongly recommended to verify that full system compliance is maintained when the module is integrated, in accordance with the "Host Product Testing Guidance" in FCC's [KDB 996369 D04 Module Integration Guide V01](#)

CE Statement (Europe)

Avnet AES-MS-MT3620 Azure Sphere Modules have been tested and certified for use in the European Union.

Summary of European Compliance Tests:

Certification	Standard	Report Number	Test Lab
Safety	EN 60950-1:2006, A11:2009, A1:2010, A12:2011, A2:2013	Pending	F2 Labs, Middlefield OH, USA
EMF	EN 62311:2008 EN 62479:2010	Pending	F2 Labs, Middlefield OH, USA
EMC	EN 301 489-1 V1.9.2 EN 301 489-17 V2.2.1	Pending	F2 Labs, Middlefield OH, USA
Radio	EN 300 328 V1.9.1	Pending	F2 Labs, Middlefield OH, USA

When integrating this module into an end product, the OEM has responsibility to verify compliance of the final product to the EU standards.

A Declaration of Conformity (DOC) must be issued and kept on file as described in Annex II of the Radio and Telecommunications Terminal Equipment (R&TTE) Directive.

CE Labeling Requirements (Europe)

The 'CE' mark must be placed on the OEM product per the labelling requirements of the R&TTE Directive.

OEM Instructions

This module is certified for installation into OEM end-products under the following conditions:

- 1) The intended use of this AES-MS-MT3620-M-G module is for **indoor locations**. If the end product using this module is able to operate in the band 5150-5250 MHz within Canada, it is **only** allowed to be used indoors (to reduce potential harmful interference to co-channel mobile satellite systems) The label of the end product in this case **must** include the text “**For indoor use only**”
- 2) It's intended use is as a **Wi-Fi client** only (not a Wi-Fi access point or used in point-to-point mode)
- 3) The AES-MS-MT3620-M-G module is for (OEM) installation only.
- 4) It is the express **responsibility of the OEM host board manufacturer** to complete the following two steps, **prior to distribution** of their final end-product:
 - a) The OEM must set the **region code** in the MT3620 eFuses (eg. to US / EU / JP) to restrict the available Wi-Fi channels and transmit power according to the **region where it will be used**
<https://docs.microsoft.com/en-us/azure-sphere/hardware/factory-floor-tasks#verify-rf-configuration>
 - b) The OEM must set the **device manufacturing state** to “**AllComplete**” to permanently disable any future access to the RF Test Mode and the MT3620 eFuse programming
<https://docs.microsoft.com/en-us/azure-sphere/hardware/factory-floor-tasks#set-the-device-manufacturing-state-to-manufacturing-complete>

The requirement for software security of UNII devices, is fully met by Microsoft Azure Sphere's advanced security. Software updates require certificate-based authentication using hardware-based root of trust.

Shipping, Handling and Storage

Shipping

Bulk orders of Avnet AES-MS-MT3620 Azure Sphere Modules are delivered in reels of 600.

(See detail under the section on Tape & Reel Packaging)

Handling

AES-MS-MT3620 Azure Sphere Modules contain sensitive electronic circuitry that require proper ESD protection when handling. Failure to follow these ESD procedures may result in permanent damage to the module.

The module should not be subjected to excessive mechanical shock.

Moisture Sensitivity (MSL)

Modules that have been exposed to moisture and environmental conditions exceeding the prescribed packaging and storage conditions detailed in J-STD-020 (eg. not continuously in a sealed bag with a desiccant pack) **MUST** be baked before mounting! (Failure to meet the packaging and storage conditions described, will result in irreparable damage to modules during solder reflow soldering).

For devices that are packaged in a Moisture Barrier Bag with a desiccant pack and HIC (Humidity Indicator Card), the HIC card should be referenced and J-STD-033 consulted to determine if baking is required prior to reflow soldering.

In cases where baking is required, refer to J-STD-033 for details of the bake procedure.

“Broken reel” module quantities (under 600 units) typically require baking before reflow soldering

Storage

Per J-STD-033, the shelf life of devices in a Moisture Barrier Bag is 12 months at <40°C and <90% room humidity (RH).

Do not store in salty air or an environment where there is a high concentration of corrosive gas, such as Cl₂, H₂S, NH₃, SO₂, or NO_x.

Do not store in direct sunlight.

Contact Information

For further details, contact your local Avnet representative or e-mail us at:

Region	Organization	Email	Address & Phone
North America	Avnet Americas	eval.kits@avnet.com	AVNET - Americas 2211 South 47th Street Phoenix, AZ 85034 USA Phone: 1-800-585-1602
Europe	Avnet Silica	Microsoft@silica.com	Avnet Silica Gruber Str. 60c 85586 Poing, Germany Phone: +49-8121-77702

Legal Information

Limitations

This product is not intended for use in safety-critical applications (such as life support or automotive) where a failure of the Avnet product could be expected to cause severe personal injury or death. Please refer to the final section of this document for additional restrictions to Avnet's legal liability

Avnet Module License and Product Warranty

THIS AVNET MODULE (OR "PRODUCT") AND ANY SUPPORTING DOCUMENTATION IS SUBJECT TO THIS LICENSE AGREEMENT. USE OF THIS PRODUCT OR DOCUMENTATION SIGNIFIES ACCEPTANCE OF THE TERMS AND CONDITIONS OF THIS LICENSE.

THE TERMS OF THIS LICENSE AGREEMENT ARE IN ADDITION TO THE AVNET CUSTOMER TERMS AND CONDITIONS, WHICH CAN BE VIEWED AT www.em.avnet.com
THE TERMS OF THIS LICENSE AGREEMENT WILL CONTROL IN THE EVENT OF A CONFLICT

1. Limited License. Avnet grants You, the Customer, ("You" "Your" or "Customer") a limited, non-exclusive, non-transferable, license to: (a) use the Product for Your own internal testing, evaluation and design efforts at a single Customer site; (c) make, use and sell the Product in a single production unit. No other rights are granted and Avnet and any other Product licensor reserves all rights not specifically granted in this License Agreement. Except as expressly permitted in this License, neither the Module, Documentation, nor any portion may be reverse engineered, disassembled, decompiled, sold, donated, shared, leased, assigned, sublicensed or otherwise transferred by Customer. The term of this License is in effect until terminated. Customer may terminate this license at any time by destroying the Product and all copies of the Product Documentation.

2. Changes. Avnet may make changes to the Product or Product Documentation at any time without notice. Avnet makes no commitment to update or upgrade the Product or Product Documentation and Avnet reserves the right to discontinue the Product or Product Documentation at any time without notice.

3. Product Documentation. Product Documentation is provided by Avnet on an "AS-IS" basis and does not form a part of the properties of the Product. All Product Documentation is subject to change without notice. Avnet makes no representation as to the accuracy or completeness of the Product Documentation, and DISCLAIMS ALL REPRESENTATIONS, WARRANTIES AND LIABILITIES UNDER ANY THEORY WITH RESPECT TO PRODUCT INFORMATION.

4. Limited Product Warranty. AVNET WARRANTS THAT AT THE TIME OF DELIVERY, THE PRODUCTS SHALL MEET THE SPECIFICATIONS STATED IN AVNET DOCUMENTATION FOR SIXTY (60) DAYS FROM DELIVERY OF PRODUCTS. IF THE CUSTOMER CAN PROVIDE PROOF THAT THE QUALIFIED AVNET PRODUCT WAS PURCHASED FOR THE PURPOSE OF AND DEPLOYED AS A COMPONENT IN THE CUSTOMER'S COMMERCIALY AVAILABLE PRODUCT THE WARRANTY WILL BE EXTENDED TO TWELVE (12) MONTHS FROM THE DATE OF PURCHASE. TO THE EXTENT PERMITTED BY LAW, AVNET MAKES NO OTHER WARRANTY, EXPRESS OR IMPLIED, SUCH AS WARRANTY OF MERCHANTABILITY, FITNESS FOR PURPOSE OR NON-INFRINGEMENT. YOUR SOLE AND EXCLUSIVE REMEDY FOR BREACH OF AVNET'S WARRANTY IS, AT AVNET'S CHOICE: (i) REPAIR THE PRODUCTS; (ii) REPLACE THE PRODUCTS AT NO COST TO YOU; OR (iii) REFUND YOU THE PURCHASE PRICE OF PRODUCTS.

5. LIMITATIONS OF LIABILITY. CUSTOMER SHALL NOT BE ENTITLED TO AND AVNET WILL NOT BE LIABLE FOR ANY INDIRECT, SPECIAL, INCIDENTAL OR CONSEQUENTIAL DAMAGES OF ANY KIND OR NATURE, INCLUDING, WITHOUT LIMITATION, BUSINESS INTERRUPTION COSTS, LOSS OF PROFIT OR REVENUE, LOSS OF DATA, PROMOTIONAL OR MANUFACTURING EXPENSES, OVERHEAD, COSTS OR EXPENSES ASSOCIATED WITH WARRANTY OR INTELLECTUAL PROPERTY INFRINGEMENT CLAIMS, INJURY TO REPUTATION OR LOSS OF CUSTOMERS, EVEN IF AVNET HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES. THE PRODUCTS AND DOCUMENTATION ARE NOT DESIGNED, AUTHORIZED OR WARRANTED TO BE SUITABLE FOR USE IN MEDICAL, MILITARY, AIR CRAFT, SPACE

OR LIFE SUPPORT EQUIPMENT NOR IN APPLICATIONS WHERE FAILURE OR MALFUNCTION OF THE PRODUCTS CAN REASONABLY BE EXPECTED TO RESULT IN A PERSONAL INJURY, DEATH OR SEVERE PROPERTY OR ENVIRONMENTAL DAMAGE. INCLUSION OR USE OF PRODUCTS IN SUCH EQUIPMENT OR APPLICATIONS, WITHOUT PRIOR AUTHORIZATION IN WRITING OF AVNET, IS NOT PERMITTED AND IS AT CUSTOMER'S OWN RISK. CUSTOMER AGREES TO FULLY INDEMNIFY AVNET FOR ANY DAMAGES RESULTING FROM SUCH INCLUSION OR USE.

6. LIMITATION OF DAMAGES. CUSTOMER'S RECOVERY FROM AVNET FOR ANY CLAIM SHALL NOT EXCEED CUSTOMER'S PURCHASE PRICE FOR THE PRODUCT GIVING RISE TO SUCH CLAIM IRRESPECTIVE OF THE NATURE OF THE CLAIM, WHETHER IN CONTRACT, TORT, WARRANTY, OR OTHERWISE.

7. INDEMNIFICATION. AVNET SHALL NOT BE LIABLE FOR AND CUSTOMER SHALL INDEMNIFY, DEFEND AND HOLD AVNET HARMLESS FROM ANY CLAIMS BASED ON AVNET'S COMPLIANCE WITH CUSTOMER'S DESIGNS, SPECIFICATIONS OR INSTRUCTIONS, OR MODIFICATION OF ANY PRODUCT BY PARTIES OTHER THAN AVNET, OR USE IN COMBINATION WITH OTHER PRODUCTS.

8. U.S. Government Restricted Rights. The Product and Product Documentation are provided with "RESTRICTED RIGHTS." If the Product and Product Documentation and related technology or documentation are provided to or made available to the United States Government, any use, duplication, or disclosure by the United States Government is subject to restrictions applicable to proprietary commercial computer software as set forth in FAR 52.227-14 and DFAR 252.227-7013, et seq., its successor and other applicable laws and regulations. Use of the Product by the United States Government constitutes acknowledgment of the proprietary rights of Avnet and any third parties. No other governments are authorized to use the Product without written agreement of Avnet and applicable third parties.

9. Ownership. Licensee acknowledges and agrees that Avnet or Avnet's licensors are the sole and exclusive owner of all Intellectual Property Rights in the Licensed Materials, and Licensee shall acquire no right, title, or interest in the Licensed Materials, other than any rights expressly granted in this Agreement.

10. Intellectual Property. All trademarks, service marks, logos, slogans, domain names and trade names (collectively "Marks") are the properties of their respective owners. Avnet disclaims any proprietary interest in Marks other than its own. Avnet and AV design logos are registered trademarks and service marks of Avnet, Inc. Avnet's Marks may be used only with the prior written permission of Avnet, Inc.

11. General. The terms and conditions set forth in the License Agreement or at www.em.avnet.com will apply notwithstanding any conflicting, contrary or additional terms and conditions in any purchase order, sales acknowledgement confirmation or other document. If there is any conflict, the terms of this License Agreement will control. This License may not be assigned by Customer, by operation of law, merger or otherwise, without the prior written consent of Avnet and any attempted or purported assignment shall be void. Licensee understands that portions of the Licensed Materials may have been licensed to Avnet from third parties and that such third parties are intended beneficiaries of the provisions of this Agreement. In the event any of the provisions of this Agreement are for any reason determined to be void or unenforceable, the remaining provisions will remain in full effect. This constitutes the entire agreement between the parties with respect to the use of this Product, and supersedes all prior or contemporaneous understandings or agreements, written or oral, regarding such subject matter. No waiver or modification is effective unless agreed to in writing and signed by authorized representatives of both parties. The obligations, rights, terms and conditions shall be binding on the parties and their respective successors and assigns. The License Agreement is governed by and construed in accordance with the laws of the State of Arizona excluding any law or principle, which would apply the law of any other jurisdiction. The United Nations Convention for the International Sale of Goods shall not apply.

Copyright © 2019, Avnet, Inc. All rights reserved. Published by Avnet Electronics Marketing, a group of Avnet, Inc. Avnet, Inc. disclaims any proprietary interest or right in any trademarks, service marks, logos, domain names, company names, brands, product names, or other form of intellectual property other than its own. AVNET and the AV logos are registered trademarks of Avnet, Inc.