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Issued by(Last revised)	Reviewed by	Approved by	Document Administrator

WM-L400RJE

Version 1.0

目 次

➢ Revision History

All revisions made to this document are listed below;

Version	Date	Description	Issued by
1.0	2019-11-28	初版	

1. 製品概要

IoTモデムWM-L400RJEはMDM9207を適用してLTE Cat.4をサポートするデータ通信モデムとして、内部/外部のホストデバイスと接続できるインタフェースを持ち、Woori-NetのPM-L400S LTE Cat.4モジュールが内蔵されている。
本マニュアルはこのモジュールを使用して製品を開発する顧客のために、モジュールの要求事項と情報を含めてモジュールの特性及び規格を提供する。

1.1. 概要及び機能

1) モデル名 :WM-L400RJE (LTE Cat.4)
2) Target User：IoT を使う顧客
3) Network：
   - Data通信専用モデム
   - LTE BAND3サポート(TX Frequency 1710~1785MHz / RX Frequency 1805~1880MHz)
   - GPSサポート(1574.4~1605.9MHz)
4) RF Power：Power Class IIIに対応

2. 製品規格及び特性

2.1. HW /筐体仕様

項目	仕様	備考
Main Chipset	MDM9207	
Memory (MCP)	4Gb NAND Flash / 2Gb DDR2	
USIM Interface	PIN OUT Type	
Connectivity	UART / USB 2.0 / GPIO / JTAG	Kyocera社, NGFF (24 6411 067 101 829 B)
Air Interface	LTE : BAND3	
Antenna	外部Antenna接続用Connector	GIGALANE製のCMJ-S01-501
Power consumption (Max. current)	約 600 mA @ Tx Max Power 23dBm	@ LTE B3

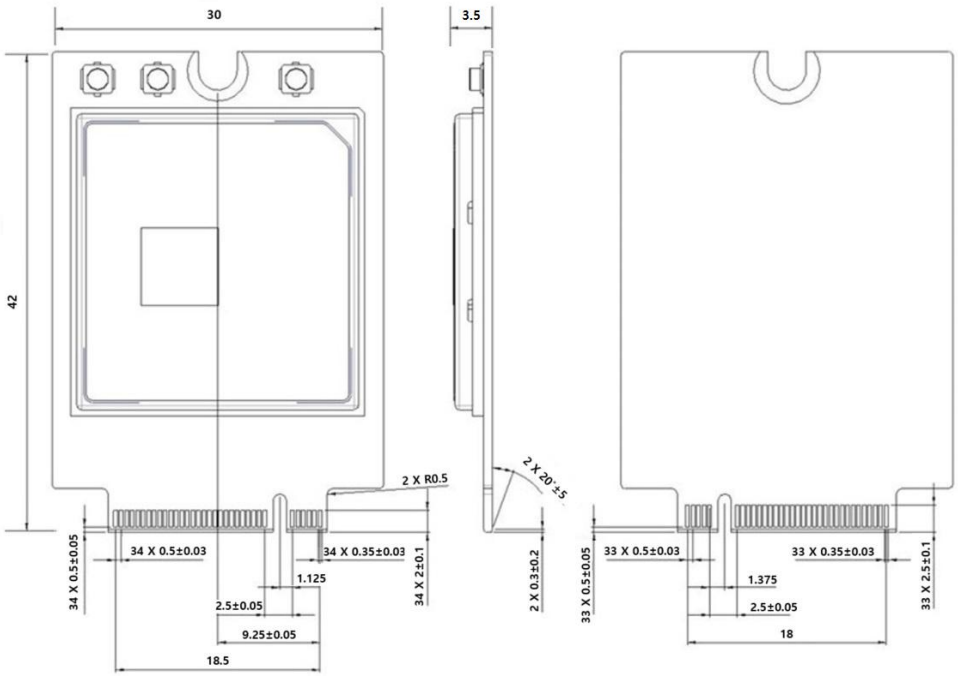
Operating Voltage	+3.3 Vdc ~ +4.2 Vdc	
SIZE / 重さ	30.0 x 42 X 3.5 (mm) (約 8.8g)	
Operating Temperature & Humidity	-20℃ ~ +60℃ / 95% (@+60℃)	

2.2. 外観写真

< TOP >

< BOTTOM >

2.3. 外観図面



2.4. 製品特性

2.4.1. 一般規格

項目	規格	備考
Air Interface	LTE	
Frequency Range(MHz)	1710~1785MHz(UL) , 1805~1880MHz(DL)	LTE Band 3

2.4.2. 電気的規格

Parameter	Description	Min.	Typ.	Max.	Units
V_Batt	Supply Voltage	3.3	4.0	4.2	V
Iv_batt	Supply Current			600	mA
Traffic current	Average of RX/TX			600	mA
Power off current	Average of power off current		4	10	uA
VIH	High-level Input Voltage, CMOS	1.17	1.8	2.1	V
VIL	Low-level Input Voltage, CMOS	-0.3	0	0.63	V
VOH	High-level Output Voltage, CMOS	1.35		1.8	V
VOL	Low-level Output Voltage, CMOS	0		0.45	V

2.4.3. 環境規格

項目	規格
Storage Temperature	-40℃ to + 85℃
Operating Temperature	-20℃ to + 60℃
Humidity (Operating)	95%(60℃) relative humidity (non-condensing)
Vibration (Operating)	10 Hz to 100 Hz sinusoidal, 1.0G
Drop	No damages after 75cm drop over concrete floor

2.4.4. RF 特性

ITEM	Specification
Maximum Output Power	+23 dBm ±2dB
Minimum Transmit Power	< -40 dBm
Reference Sens. Level (QPSK)	< -94 dBm/10MHz @ Band 3
Maximum Input Level	> -25 dBm

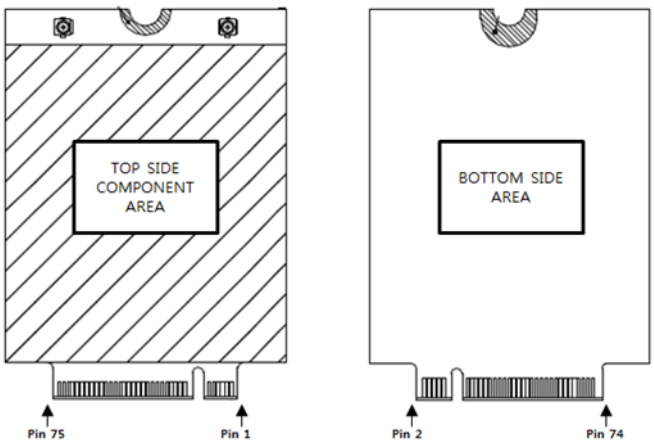
その他、RF 性能は 3GPP TS36.521 を満足する。

2.5. PIN Assignment

VPH-PWR	74	75	CONFIG_2
VPH-PWR	72	73	GND
VPH-PWR	70	71	GND
NC	68	69	CONFIG
RESERVED(*1)	66	67	RESET#
USB_DISABLE	64	65	RESERVED(*1)
RF_ACT	62	63	RESERVED(*1)
NC	60	61	RESERVED(*1)
UART_DTR	58	59	RESERVED(*1)
RESERVED(*1)	56	57	GND
RESERVED(*1)	54	55	RESERVED(*1)
RESERVED(*1)	52	53	RESERVED(*1)
UART_DSR	50	51	GND
UART_CTS	48	49	RESERVED(*1)
RESERVED(*1)	46	47	RESERVED(*1)
RESERVED(*1)	44	45	GND
RESERVED(*1)	42	43	RESERVED(*1)
RESERVED(*1)	40	41	RESERVED(*1)
UART_RI	38	39	GND
UIM POWER	36	37	NC
UIM DATA	34	35	NC
UIM CLK	32	33	GND
UIM RESET	30	31	NC

UART_DCD	28	29	NC
RESERVED(*1)	26	27	GND
UART_RX	24	25	RESERVED(*1)
UART_TX	22	23	WAKE_ON_WWAN#
UART_RTS	20	21	CONFIG
Connector Key(*2)	18	19	Connector Key(*2)
Connector Key(*2)	16	17	Connector Key(*2)
Connector Key(*2)	14	15	Connector Key(*2)
Connector Key(*2)	12	13	Connector Key(*2)
		11	GND
RESERVED(*1)	10	9	MDM_USB_D-
RESERVED(*1)	8	7	MDM_USB_D+
POWER ON	6	5	GND
VPH_PWR	4	3	GND
VPH_PWR	2	1	CONFIG

*Note(*1) Reserved pins are connected in the WM-L400RJE module. Each pin has a defined function. So, to use reserved pins, Must have a check to Woori-net.*
*Note*2) Connector Keys are Notch. Notch is required by PCIe M.2 Spec.*



[PCIe M.2 NGFF standard pin assignment]

2.6. PIN Description

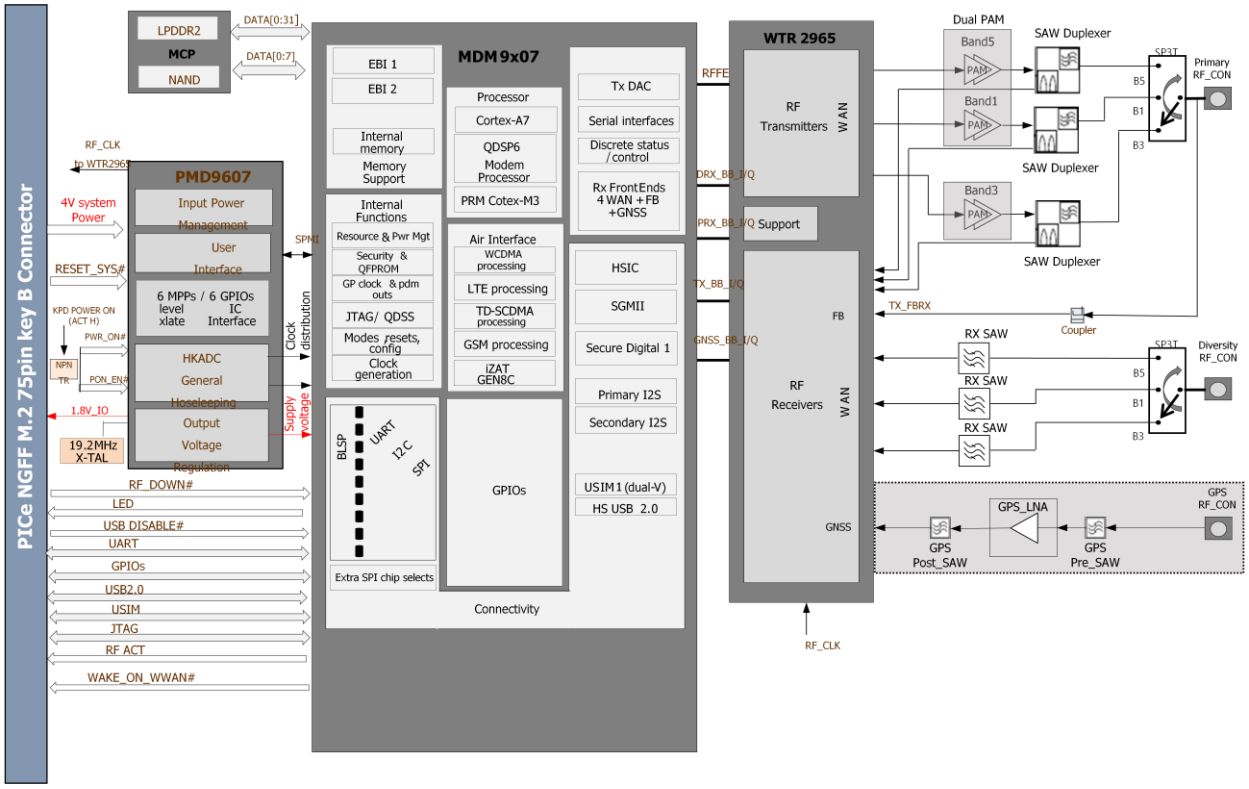
PIN Number	PIN Name	TYPE	Description
1	CONFIG_3	GND	Ground
2	VPH_PWR	PO	Main Power supply input
3	GND	GND	Ground
4	VPH_PWR	PO	Main Power supply input
5	GND	GND	Ground
6	POWER_KEY		Power on/off control, active high
7	USB_DP	I/O	USB DATA (+)
8	Reserved	NC	Disable RF operation
9	USB_DM	I/O	USB DATA (-)
10	Reserved	NC	LED control
11	GND	GND	Ground
20	UART_RTS	DI	UART ready for receive pin
21	CONFIG_0	NC	Not connected in the module
22	UART_TX	DI	UART transmit data output
23	WAKE_ON_WWAN_N	DO	Wake host. Active low
24	UART_RX	DO	UART receive data input
25	NC	NC	Not connected in the module
26	NC	NC	Not connected in the module
27	GND	GND	Ground
28	UART_DCD	DO	UART data carrier detect
29	NC	NC	Not connected in the module
30	UIM_RESET	DO	UIM reset
31	NC	NC	Not connected in the module
32	UIM_CLK	DO	UIM Clock
33	GND	GND	Ground
34	UIM_DATA	I/O	UIM Data
35	NC	NC	Not connected in the module
36	UIM_PWR	PO	UIM Power
37	NC	NC	Not connected in the module
38	UART_RI	DO	UART ring indicator
39	GND	GND	Ground
40	NC	NC	Not connected in the module

41	Reserved	NC	JTAG_PSHOLD
42	NC	NC	Not connected in the module
43	Reserved	NC	JTAG_TRST_N
44	NC	NC	Not connected in the module
45	GND	GND	Ground
46	NC	NC	Not connected in the module
47	Reserved	NC	JTAG_TMS
48	UART_CTS	DO	UART clear to send
49	Reserved	NC	JTAG_TDI
50	UART_DSR	DO	UART data set ready
51	GND	GND	Ground
52	NC	NC	Not connected in the module
53	Reserved	NC	JTAG_TCK
54	NC	NC	Not connected in the module
55	Reserved	NC	JTAG_SRST_N
56	Reserved	NC	1.8V output
57	GND	GND	Ground
58	UART_DTR	DI	UART data terminal ready
59	Reserved	NC	Emergency download gpio
60	NC	NC	Not connected in the module
61	NC	NC	Not connected in the module
62	READY	DO	Boot-up complete. Active high
63	Reserved	NC	Debug UART TX
64	USB_Disable	DI	Disable USB operation. Active low
65	Reserved	NC	Debug UART RX
66	NC	NC	Not connected in the module
67	RESET_N	DI	Module reset. Active low
68	NC	NC	Not connected in the module
69	CONFIG_1	NC	Not connected in the module
70	VPH_PWR	PO	Main Power supply input
71	GND	GND	Ground
72	VPH_PWR	PO	Main Power supply input
73	GND	GND	Ground
74	VPH_PWR	PO	Main Power supply input

75	CONFIG_2	NC	Not connected in the module

3. Block Diagram

3.1. Application & System Block diagram



4. System Interface

4.1. Module の電源供給

PIN No.	Signal Name	Type	Voltage (min.)	Voltage(Typ.)	Voltage (max.)	Description
2,4,70,72,74	VPH_PWR	PI	3.3V	4.0V	4.2V	External Power supply
3,5,11,27,33,39 45,51,57,71,73	GND	GND				Ground

4.2. Modem Power control (power on/off)

PIN No.	Signal Name	Functional description
6	POWER_KEY	Power on/off control, active high

モデムのPower onは6番PINにHigh signalを0.5sec.以上供給することにより行い、power onの状態で6番PINにhigh signalを4sec.以上供給するとpower offになる。

4.3. UART Interface

PIN No.	Signal Name	I/O	Voltage	Functional description
20	UART_RTS	DI	1.8V	UART ready for receive pin
22	UART_TX	DI	1.8V	UART transmit data output
24	UART_RX	DO	1.8V	UART receive data input
28	UART_DCD	DO	1.8V	UART data carrier detect
38	UART_RI	DO	1.8V	UART ring indicator
48	UART_CTS	DO	1.8V	UART clear to send
50	UART_DSR	DO	1.8V	UART data set ready
58	UART_DTR	DI	1.8V	UART data set ready

4.4. USIM Interface

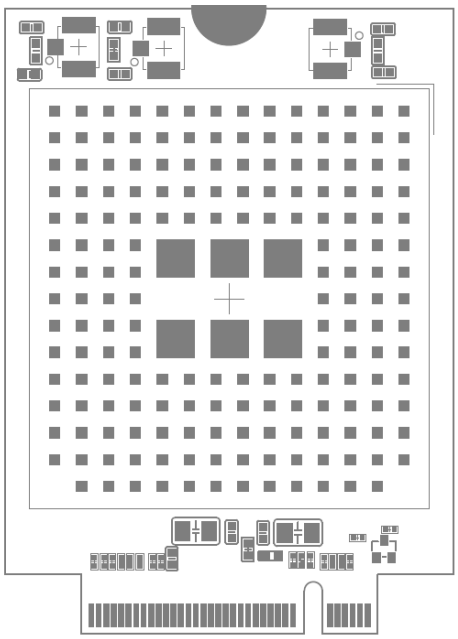
PIN No.	Signal Name	I/O	Voltage	Functional description
30	UIM_RESET	DO	2.85V/1.8V	UIM_reset
32	UIM_CLK	DO	2.85V/1.8V	UIM_clock
34	UIM_DATA	I/O	2.85V/1.8V	UIM_data
36	UIM_PWR	PO	2.85V/1.8V	UIM_power

4.5. USB Interface

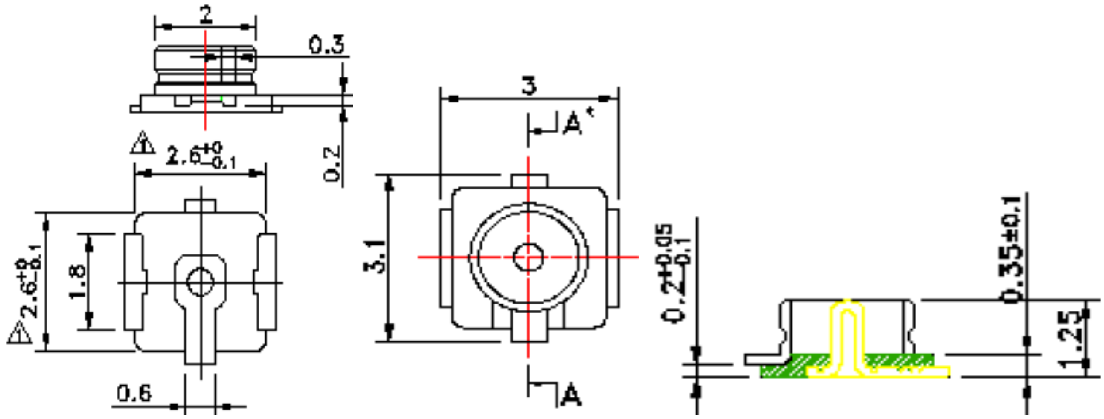
PIN No.	Signal Name	I/O	Voltage	Functional description
7	USB_DP	I/O		USB data (+)
9	USB_DM	I/O		USB data (-)
64	USB_Disable	DI	1.8V	Disable USB operation. Active low

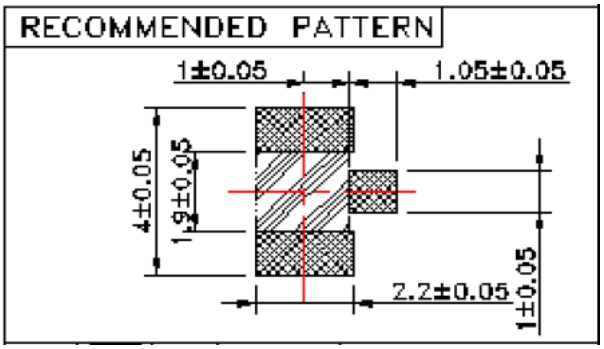
5. PCB Layout Guide

5.1. PCB Layout



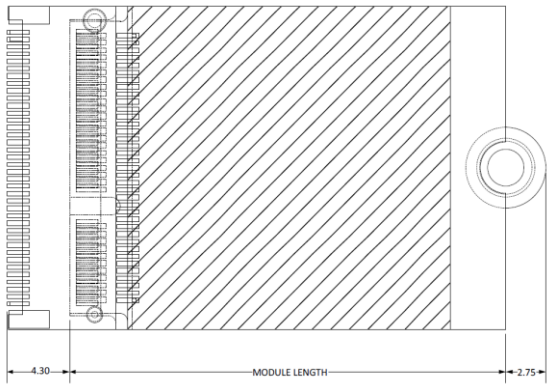
5.2. CMJ Connector 仕様：GIGALANE 製の CMJ-S01-501





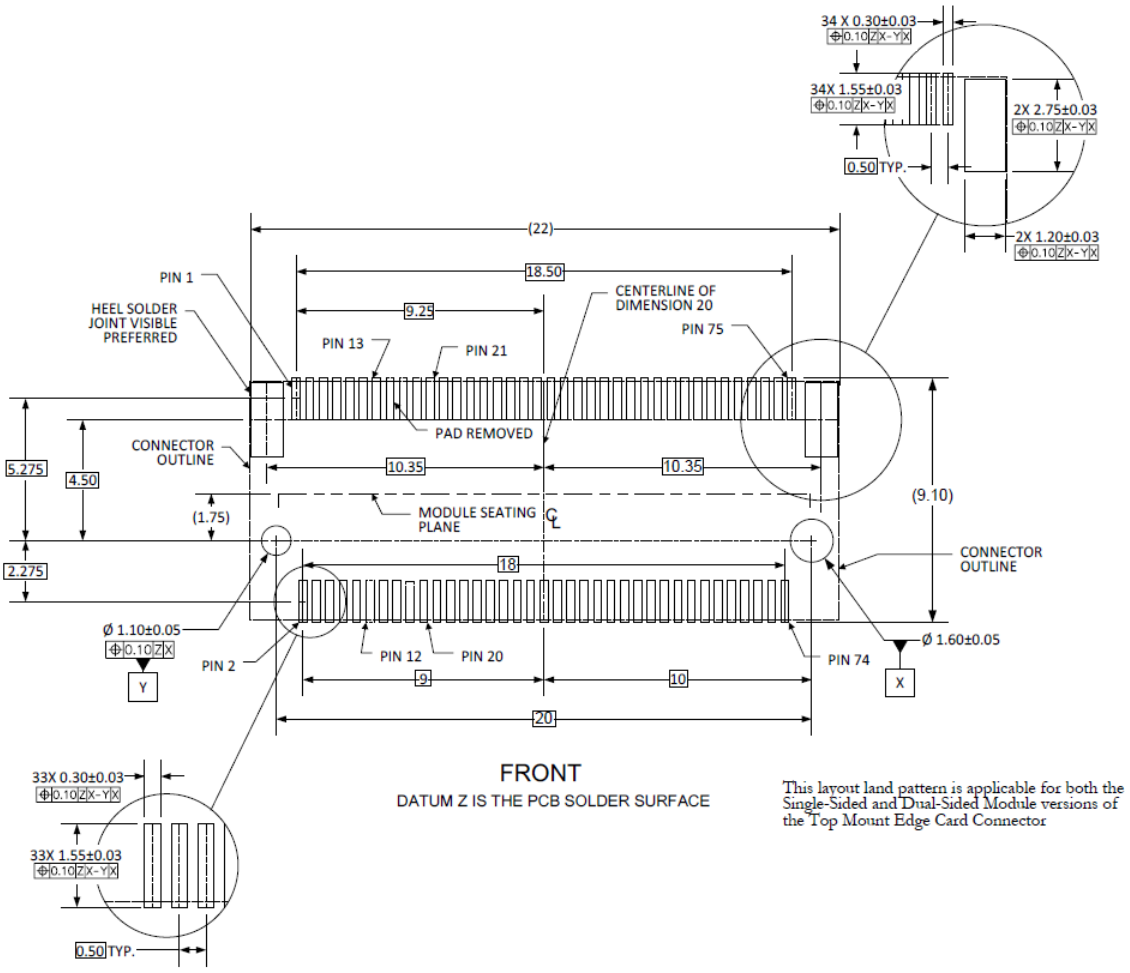
5.3. Mechanical Design Guide(PICe M.2 3042 key B)

5.3.1. PCB design Guide

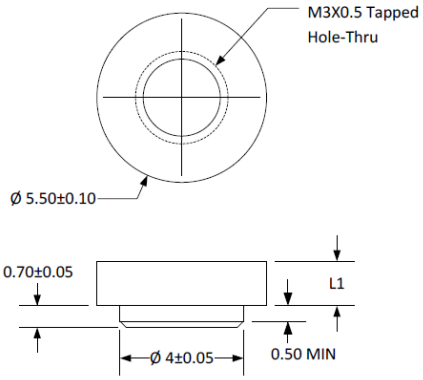


Module Length=4.2mm

5.3.2. Top side connector layout pattern



5.3.3. Stand- off Guide

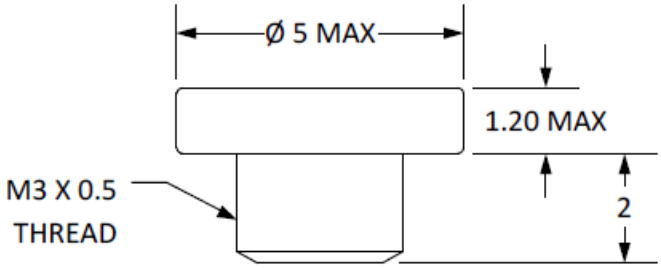


Connector Height Descriptor	L1	L2
H2.3	0.35 ± 0.03	
H2.5	0.55 ± 0.03	
H2.8	0.80 ± 0.03	0.80 ± 0.03
H3.2	1.45 ± 0.03	1.45 ± 0.03
H4.2	2.45 ± 0.03	2.45 ± 0.03

Notes:

- Polymide patch required for vacuum pick-up
- Minimum thermal conductivity of 50 W/(mK) or greater
- Material = Steel
- Finish = Matte tin, 1.2 microns minimum average
- Tape and reel

5.3.4. Screw Selection Guide



M3 SCREW-PHILLIPS DRIVE
WAFER HEAD STYLE