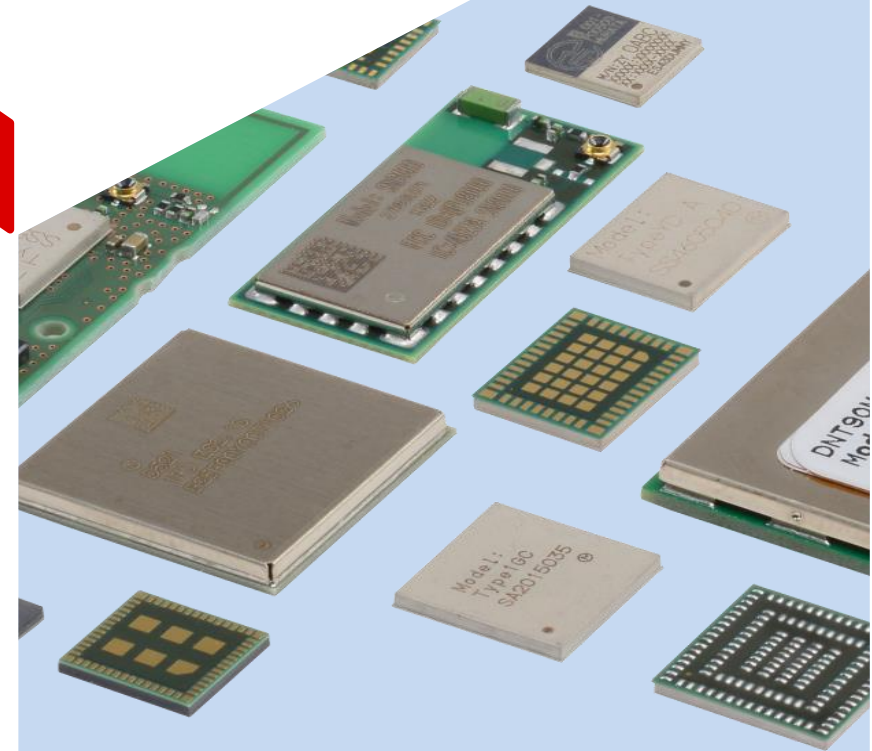


Murata & Embedded Artists Wireless IOT Solution

April 2019



Improving Wi-Fi/BT Solutions for IOT on i.MX

Murata has done a “reset” on current Wi-Fi/BT IOT solutions for i.MX (Linux and FreeRTOS). By strategically partnering with Embedded Artists, Murata is now able to provide a better overall solution on various fronts.

- Focus on reference-certified modules with resin shield.
- Embedded Artists' 1DX/1MW/1LV/1CX/1VA M.2 EVB's.
- i.MX 6/RT Solution: Murata uSD-M.2 Adapter with Embedded Artists' M.2 EVB's.
- Embedded Artists' i.MX 6/7/8 Dev Kit: enhanced i.MX Linux Platform.
- Embedded Artists' i.MX RT Dev Kit: enhanced i.MX RT (FreeRTOS) Platform.

Murata (Cypress-based) Modules for i.MX

Type 1FX

PN: LBWA1KL1FX-875
CYW43364 Chipset



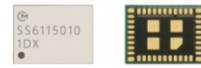
6.95 x 5.15 x 1.1mm



802.11 b/g/n

Type 1DX/1LN

PN: LBEE5KL1DX-883
LBEE5KL1LN-081
CYW4343W Chipset



6.95 x 5.15 x 1.1mm



802.11 b/g/n + Bluetooth® 4.2

Type 1MW

PN: LBEH5HY1MW-230
CYW43455 Chipset



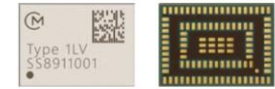
7.9 x 7.3 x 1.1mm



802.11 a/b/g/n/ac + Bluetooth® 5.0

Type 1LV

PN: LBEE59B1LV-278
CYW43012 Chipset

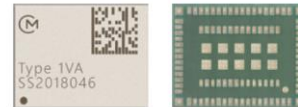


10.0 x 7.2 x 1.4mm

802.11 a/b/g/n/ac + Bluetooth® 5.0
(20MHz Channel BW Only)

Type 1VA

PN: LBEE5XV1VA
CYW88359 Chipset



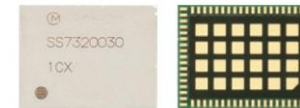
11.4 x 8.9 x 1.3mm

▪ MIMO

802.11 a/b/g/n/ac (2 x2 MIMO)
+ Bluetooth® 4.2

Type 1CX

PN: LBEH5UL1CX-887
CYW4356 Chipset



11.5 x 8.8 x 1.0mm

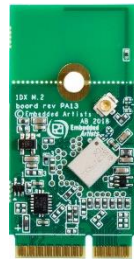
▪ MIMO

802.11 a/b/g/n/ac (2 x2 MIMO)
+ Bluetooth® 5.0

New Disti-Oriented “Foundation”: Embedded Artists’ Wi-Fi/BT M.2 Modules



M.2 boards



1DX M.2



1MW M.2



1LV M.2



1CX M.2



1VA M.2

Cypress chipset	CYW4343W	CYW43455	CYW43012	CYW4356	CYW88359
WLAN/BT support	802.11 b/g/n BT/BLE 4.2	802.11 a/b/g/n/ac BT/BLE 5.0	802.11 a/b/g/n (ac friendly) BT/BLE 5.0	802.11 a/b/g/n/ac (2x2 MIMO) BT/BLE 5.0	802.11 a/b/g/n/ac (2x2 MIMO, RSDB) BT/BLE 5.0
WLAN interface	SDIO 2.0 (SDR25@50MHz)	SDIO 3.0 (SDR104@200MHz)	SDIO 3.0 (SDR40@80MHz)	PCIe	PCIe or SDIO 3.0 (SDR104@200MHz)
Operating temperature	-30 to +70 °C	-25 to +75 °C	-20 to +70 °C	-20 to +75 °C	-30 to +85 °C
M.2 Module size	44 x 22 mm	44 x 22 mm	44 x 22 mm	30 x 22 mm	30 x 22 mm

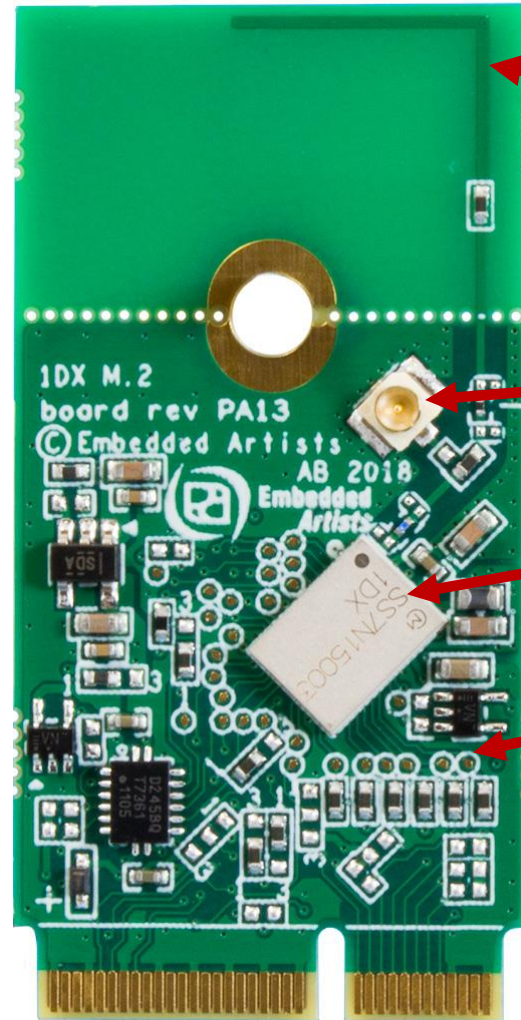
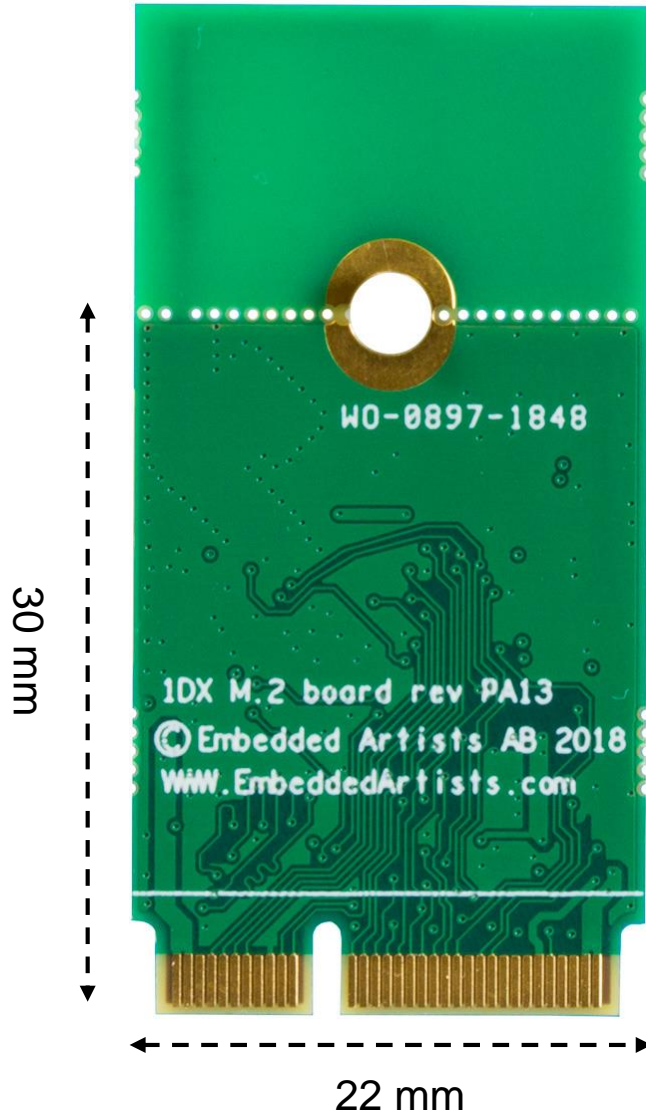


Embedded Artists is a proud
Proven Partner to NXP, delivering
stable and proven i.MX platforms.

Developed in close cooperation with:



In Detail: EA's Type 1DX (CYW4343W) M.2 Module



Reference Certified PCB Trace Antenna

Snap-off option for customers needing to adhere to MAX 30mm length (UFL connector used)

UFL Connector for external antenna or conducted testing

Murata Type 1DX Module
CYW4343W = 802.11 b/g/n + BT/BLE 4.2
Interfaces = WLAN SDIO 2.0; BT UART/PCM

Comprehensive Test Points



<https://www.embeddedartists.com/products/1dx-m-2-module/>

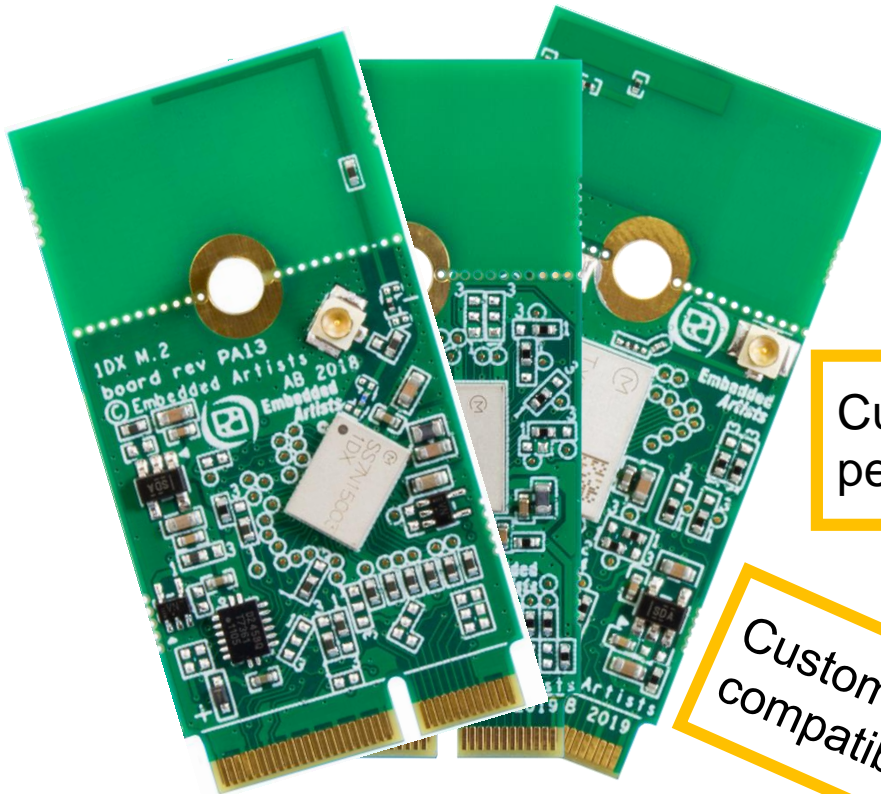
EA's New M.2 Module: EVB and Product!

- 1DX, 1MW, 1LV and (upcoming 1VA) modules are all reference certified.
- EA's 1DX/1MW/1LV Modules allow customers to fully-evaluate the reference certified PCB trace antenna.
- Reference certification provides cost-optimized option for customers who can copy Murata's antenna solution on their own product; thereby fully leveraging the Wi-Fi/BT regulatory certification: FCC/IC/CE(conducted only)/Japan.
- Alternatively customers whose form factor permits M.2 connector, can buy EA's 1DX/1MW/1LV/1VA M.2 Module and simply plug it into their product:
 - For 1DX/1MW/1LV, customers use PCB trace antenna version of M.2 Module and re-use Murata's FCC certifications.
 - For 1VA, customers can utilize cost-optimized UFL-connected patch antennas and re-use Murata's FCC certifications.
 - For higher volume customers (5K~10K), Embedded Artists will initiate cost-optimized M.2 re-design (no test points; reduced component options; fewer layers).

Type 1DX/1MW/1LV Options



Difficulty Goes Up



Customer who needs specific antenna solution

Customer re-uses Murata's FCC conducted testing; then applies for Class II permissive change after finishing radiated testing.

Customer with form factor permitting trace antenna

Customer copies Reference PCB trace antenna, and re-uses Murata's FCC regulatory certifications.

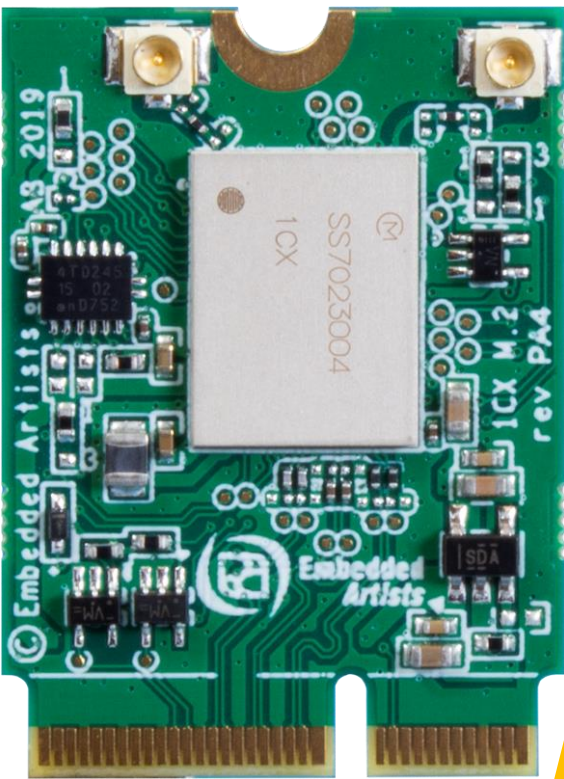
Customer with M.2 compatible form factor

Lower volume customer can already buy 100 packs of EA M.2 EVB; or request quote for 1000+ pieces. Higher volume (5K~10K) customer(s) will initiate cost-optimized M.2 re-design (no test points, reduced component options, and reduced layers). Customer re-uses Murata's FCC regulatory certifications.

Starting Point: Customer Evaluates EA's 1DX/1MW/1LV with reference certified PCB Trace Antenna

Type 1VA Options

Difficulty Goes Up



Customer who needs specific antenna solution

Customer re-uses Murata's FCC conducted testing; then applies for Class II permissive change after finishing radiated testing.

Customers who can re-use Murata's pre-certified UFL-connected patch antennas

Customer re-uses Murata's FCC regulatory certifications.

Customer with M.2-compatible form factor and can re-use Murata's pre-certified UFL-connected patch antennas

Lower volume customer can already buy 100 packs of EA M.2 EVB; or request quote for 1000+ pieces. Higher volume (5K~10K) customer(s) will initiate cost-optimized M.2 re-design (no test points, reduced component options, and reduced layers). Customer re-uses Murata's FCC regulatory certifications.

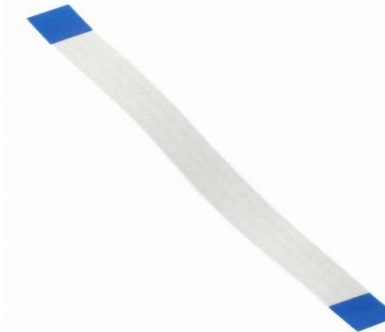
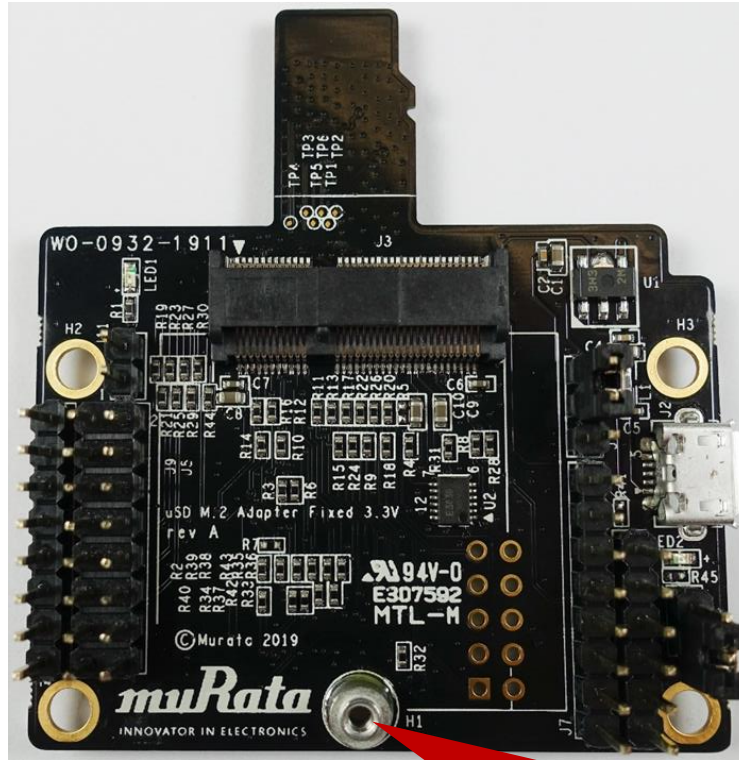
Starting Point: Customer Evaluates EA's 1VA with reference certified UFL-connected patch antennas. **NOTE:** 1CX is pictured for illustrative purposes.

Stacking up Against LairdTech (LSR)



Category	Murata	LairdTech
Cypress-based Certified Modules (Linux)	Four (4): 1DX (4343W), 1MW(43455), 1LV (43012), 1VA*(88359)	Two (2): Sterling-LWB (4343W), Sterling-LWB5 (43353 – legacy chipset)
Cypress-based Certified Modules (FreeRTOS i.MX RT)	Three (3): 1DX (4343W), 1MW (43455), 1LV (43012)	One (1): Sterling-LWB (4343W)
Linux Software: Ease of Use	<p>(i) Automated Build Script for NXP i.MX: download script from Github and run (for all major i.MX platforms), later flash to SD card. Typically <u>2~4 hours</u> with user-friendly steps. Posted documents here.</p> <p>(ii) Download, flash & run: on Embedded Artists i.MX 6/7/8 Dev Kit. Software available here. Typically <u>10~15 minutes</u> depending on internet speeds.</p>	<p>(i) Detailed instructions (54) pages on preparing/configuring software for NXP i.MX 6UL EVK (only). Laird advises <u>one business day</u> to complete with <i>very complicated</i> build steps.</p>
Customized Hardware Solutions	<p>(i) Murata collaborates directly with NXP to design in modules soldered-down on NXP platforms: i.MX 7Dual SDB, (WaRP7), and others (under development).</p> <p>(ii) Embedded Artists collaborated closely with Murata and Cypress to arrive at enhanced i.MX 6/7/8 solution (i.MX 8MQuad Example).</p> <p>(iii) Murata sells/supports custom uSD-M.2 Adapter which supports both Linux i.MX 6 and FreeRTOS i.MX RT solutions. uSD-M.2 Adapter's initial high-level design arrived at with NXP Engineering Team feedback.</p>	<p>(i) Custom Sterling-LWB and Sterling-LWB5 SD Card Development Boards. Provide limited interconnect and no easy uSD option for i.MX RT Dev Kits.</p>

New i.MX 6/RT Solution: Murata uSD-M.2 and Embedded Artists' Wi-Fi/BT M.2 EVB



Arduino Header Cables and 20-pin Flex cable

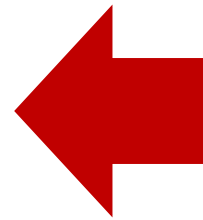
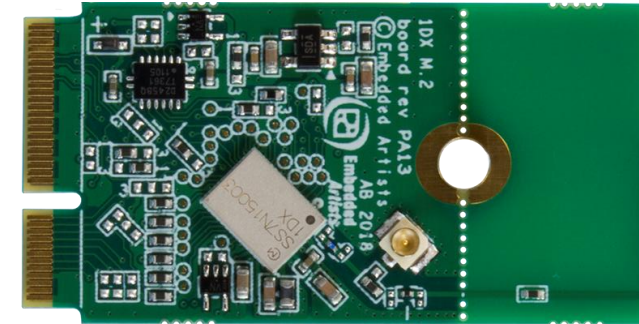
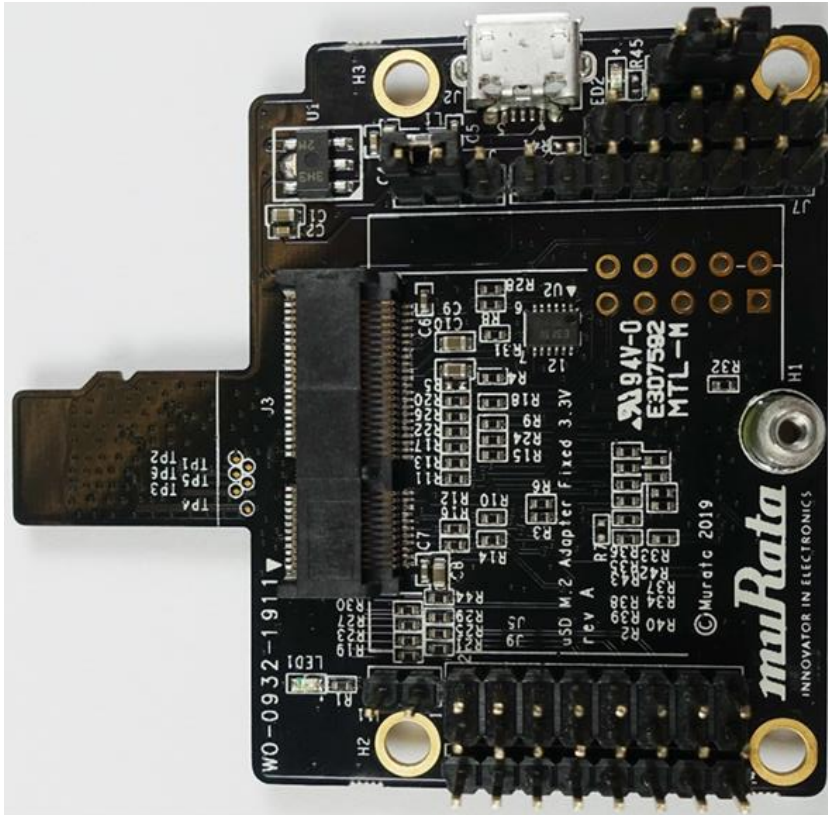


microSD-to-SD Adapter

Embedded Artists' Type 1MW (CYW43455) M.2 EVB

Murata uSD-M.2 Adapter (designed, manufactured, and packaged by Embedded Artists) → Supported in Distri Channel by Murata

uSD-M.2 Adapter & Type 1DX M.2 EVB

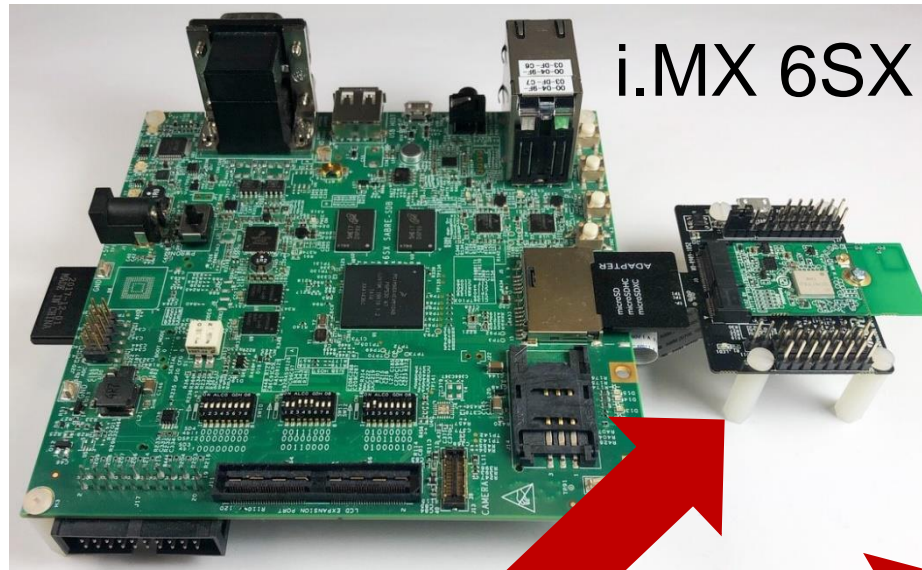


Embedded Artists

Murata's uSD-M.2 Adapter: Enabling NXP i.MX 6

Supported i.MX 6:

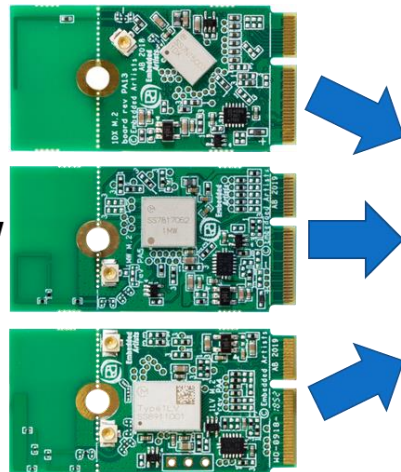
- 6UL/6ULL/6ULZ
- 6SL/6SLL
- 6SoloX
- 6DL/6Q/6QP



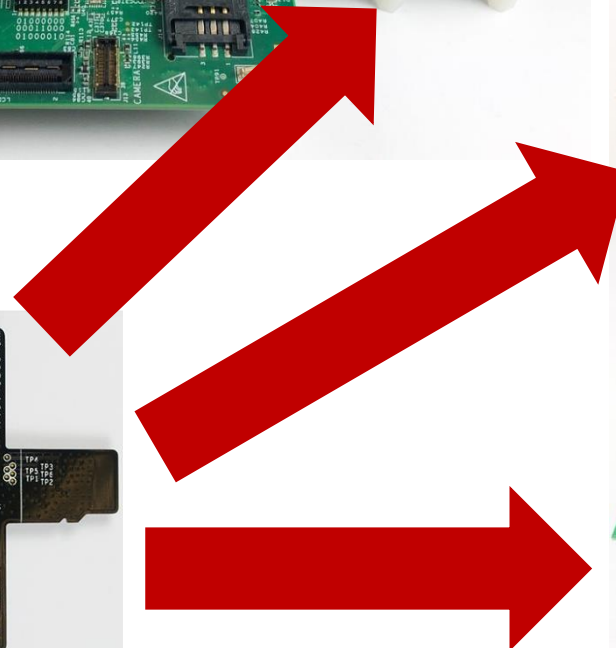
1DX

1MW

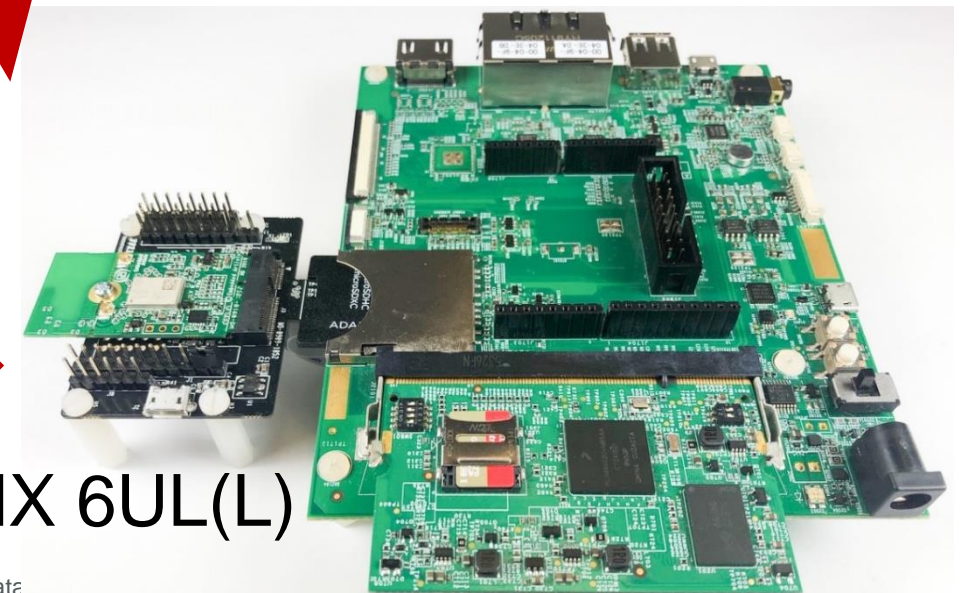
1LV



uSD-M.2 Adapter

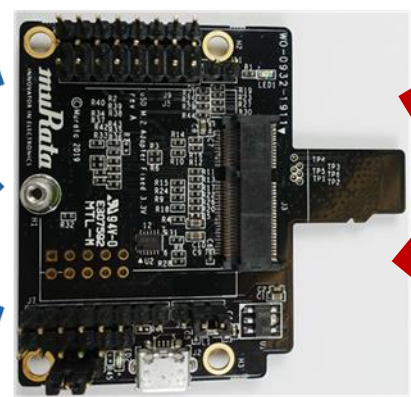


i.MX 6UL(L)



Murata's uSD-M.2 Adapter: Enabling NXP i.MX RT

1DX
1MW
1LV



uSD-M.2 Adapter

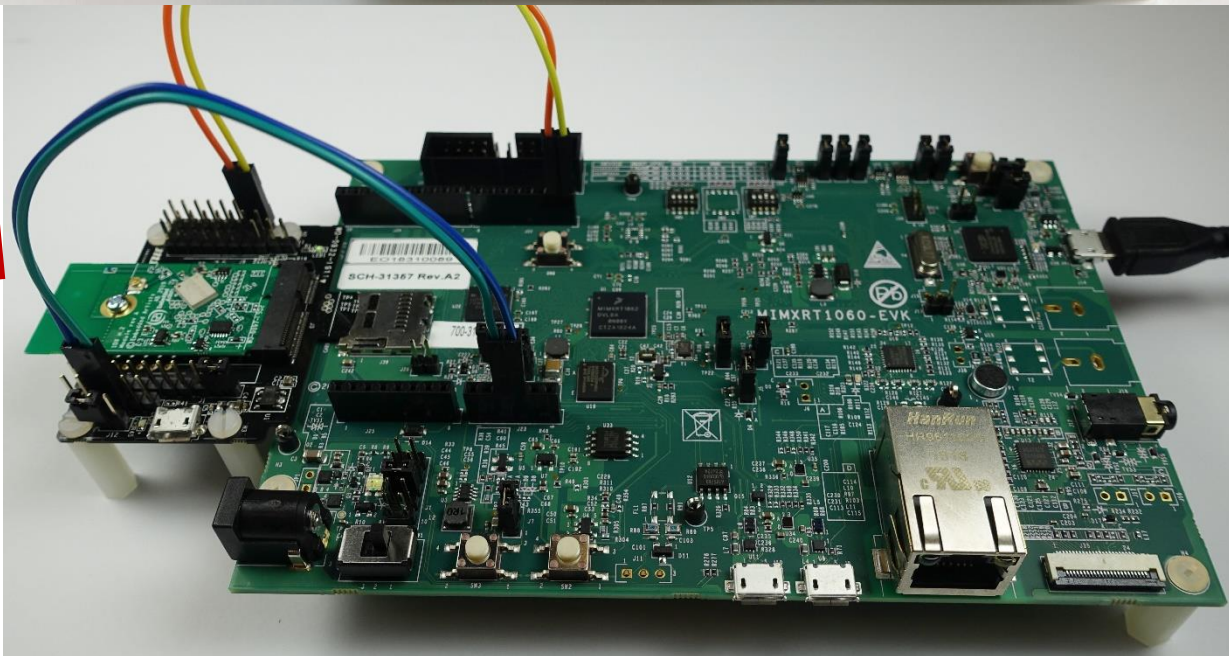
i.MX RT 1050



Supported i.MX RT:

- 1020 RT
- 1050 RT
- 1060 RT
- 1064 RT





i.MX RT 1060

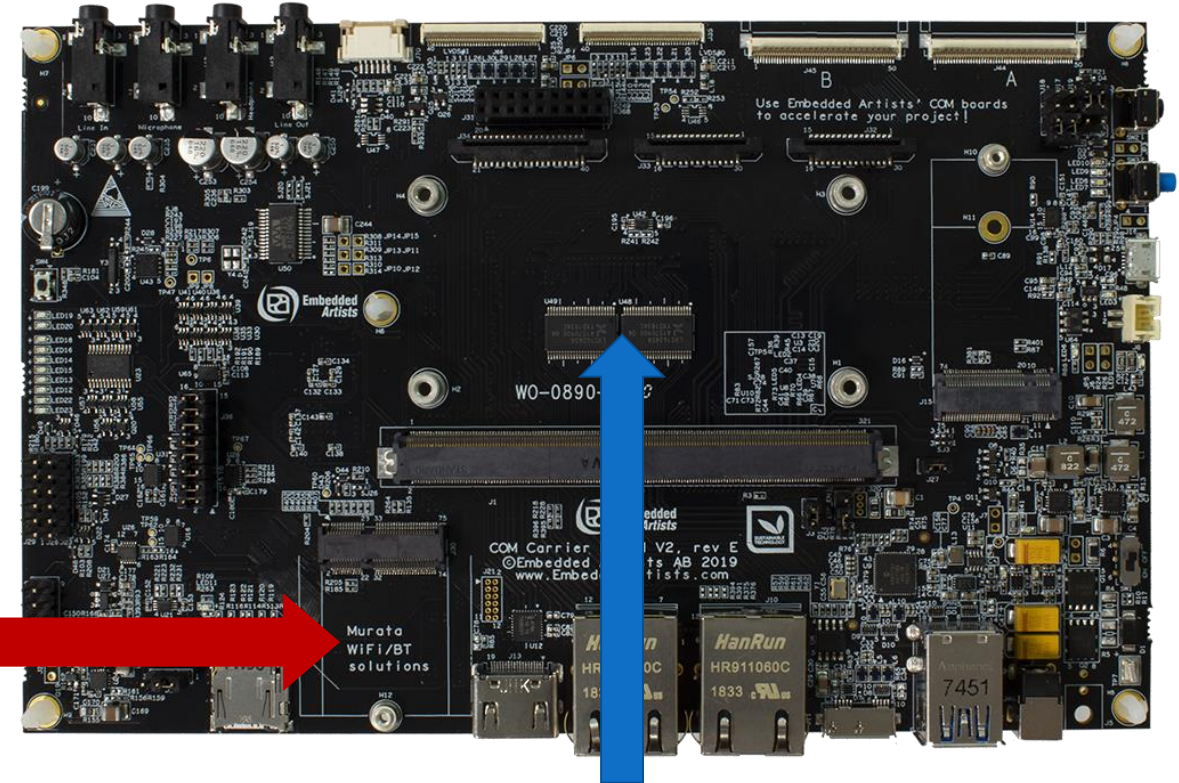









Embedded Artists' i.MX 6/7/8 Dev Kit: "Swiss Army Knife"



→ Combine i.MX COM with Wi-Fi/BT M.2 EVB

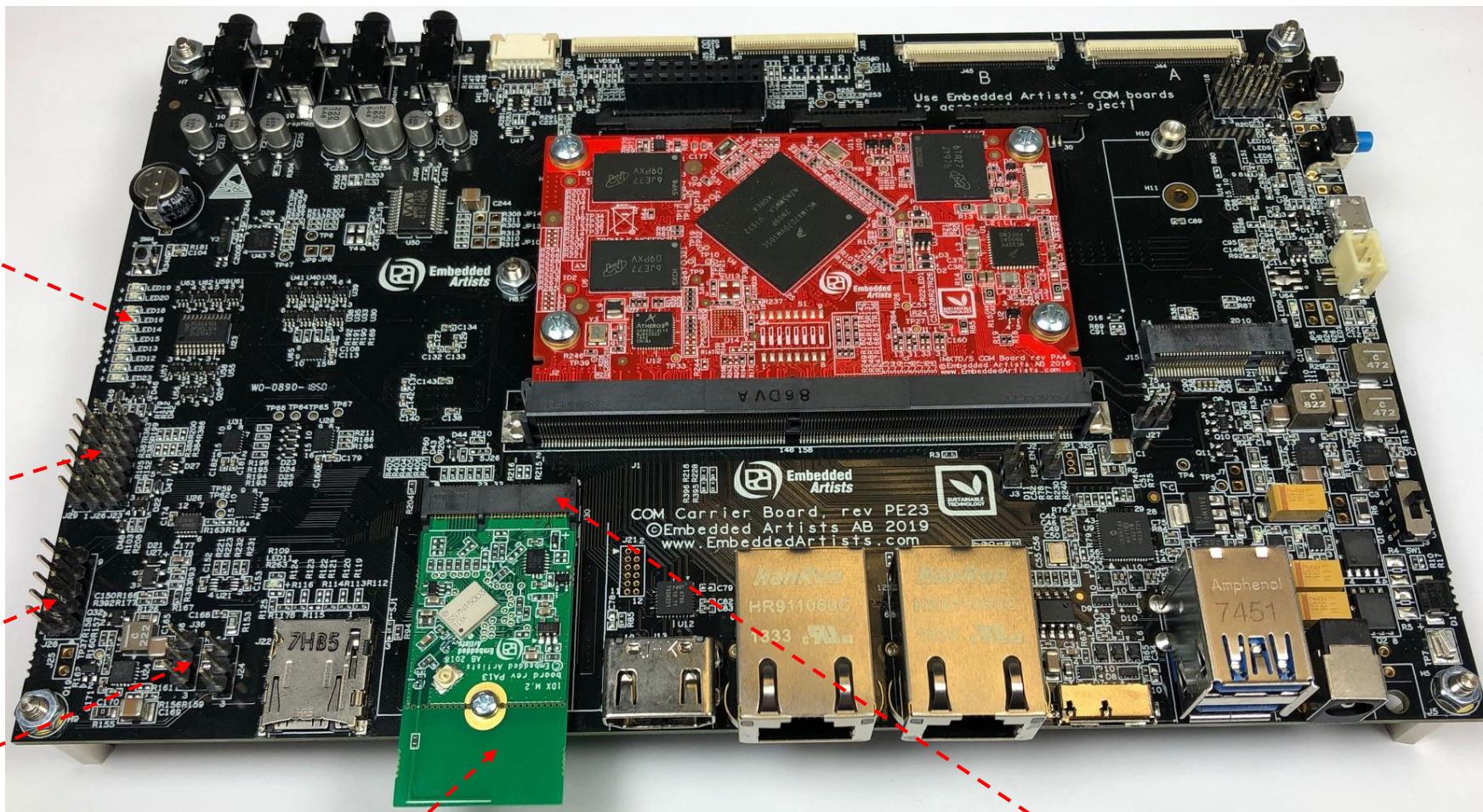
1DX	1MW	1LV	1CX	1VA
CYW 4343W	CYW 43455	CYW 43012	CYW 4356	CYW 88359
				<i>Avail Q2/2019</i>



							<i>Avail June 2019</i>	<i>Avail June 2019</i>
6Quad COM	6Dual COM	6SoloX COM	7Dual COM	6UL COM	7Dual uCOM*	8MQuad COM	7ULP uCOM*	8M Mini uCOM

*7Dual, 7ULP, and 8M Mini uCom uses Interposer COM board.

Embedded Artists' i.MX 6/7/8 Platform: Advanced Features



Operational LED's: indicate current mode (VBAT/VDDIO/WLAN-PCIe or WLAN-SDIO/etc.)

BT-UART and WLAN/BT TX/RX
Debug UART pinout: use
FTDI TTL-232R USB-to-UART
Cable

JTAG/EXT COEX

VBAT/VDDIO Jumpers: allow precise power (voltage/current) measurement

Type 1DX M.2 EVB




M.2 Interface supports WLAN-PCIe/SDIO, BT-UART/PCM/I2S, WLAN/BT/Coexist control lines, and debug pinouts.

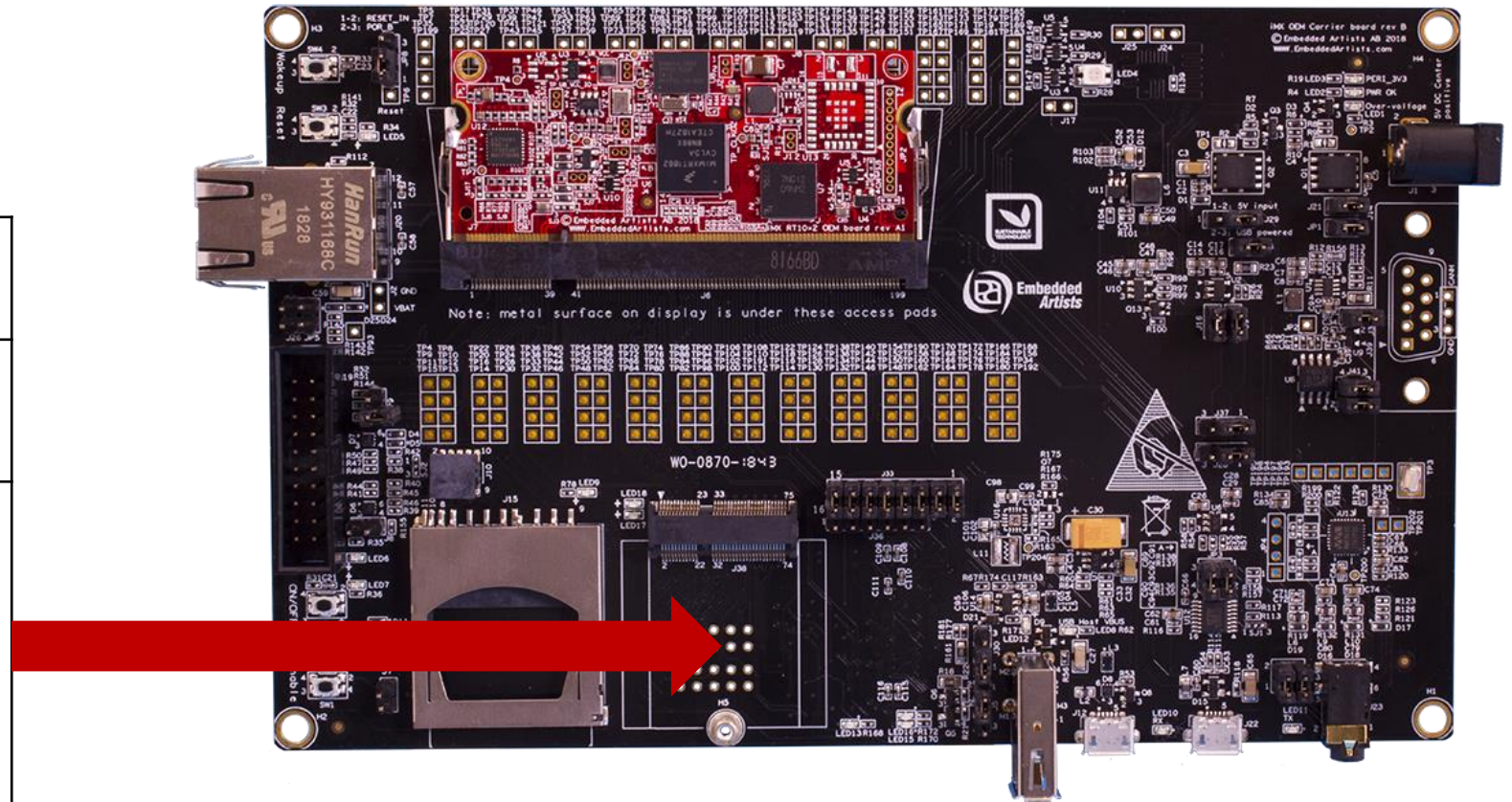
Optional HW Dev Platform: EA's i.MX RT 1062 Dev Kit *muRata*



- Embedded Artists' i.MX RT 1062 Dev Kit is already shipping.
- Provides comprehensive hardware interface with all options (debug pins, PCM, etc.).
- Solid interconnect: secure M.2 EVB – no adapter.
- EA provides drop-in patch on top of NXP i.MX RT SDK release.

→ Combine i.MX RT with Wi-Fi/BT M.2 EVB

1DX	1MW	1LV
CYW 4343W	CYW 43455	CYW 43012
		



Embedded Artists' i.MX RT Platform: Advanced Features

Operational LED's: indicate power applied to M.2 EVB

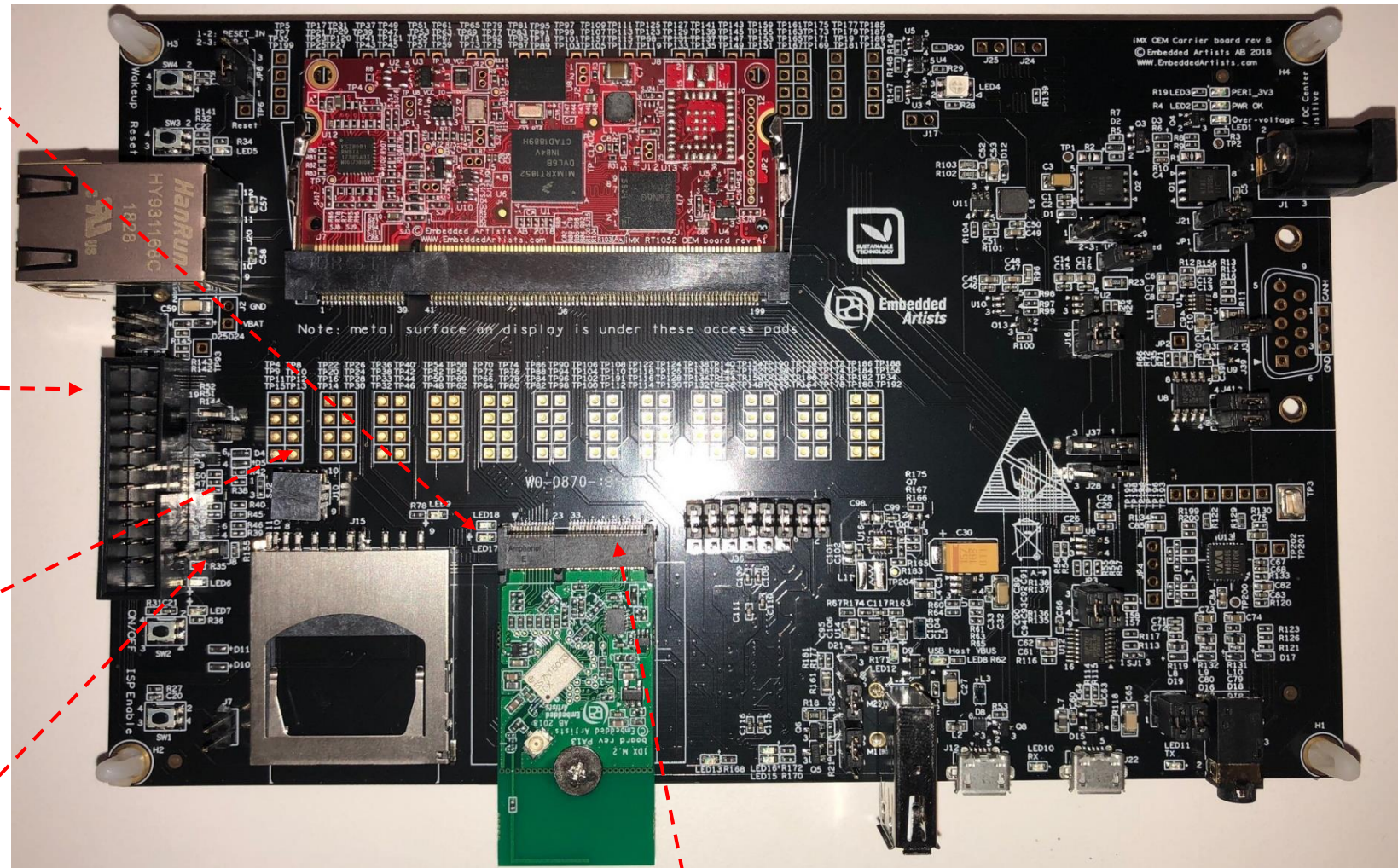
Debug Connections include:

- 1) BT-UART
- 2) WLAN/BT TX/RX Debug UART
- 3) JTAG/EXT COEX

All interface pins from i.MX RT brought out except high-speed SDIO: can be probed on M.2 EVB directly.

VBAT/VDDIO Jumpers: allow precise power (voltage/current) measurement

M.2 Interface supports WLAN-SDIO, BT-UART/PCM/I2S, WLAN/BT/Coexist control lines, and debug pinouts.



Summary: i.MX InterConnect

NXP i.MX Baseline

Murata Module	CYW Chipset	RT 1020 RT 1050 RT 1060 RT 1064	6UL	6ULL	6SL (WLAN Only)	6SLL	6SoloX	6DL/Solo	6Q	6QP	8MQ
1DX	43364	uSD-M.2	uSD-M.2	uSD-M.2	uSD-M.2	uSD-M.2	uSD-M.2	uSD-M.2	uSD-M.2	uSD-M.2	
1MW	43455	uSD-M.2	uSD-M.2	uSD-M.2	uSD-M.2	uSD-M.2	uSD-M.2	uSD-M.2	uSD-M.2	uSD-M.2	
1LV	43012	uSD-M.2	uSD-M.2	uSD-M.2	uSD-M.2	uSD-M.2					
1CX	4356										M.2
1VA*	88359		uSD-M.2	uSD-M.2	uSD-M.2	uSD-M.2	uSD-M.2	uSD-M.2	uSD-M.2	uSD-M.2	M.2

M.2 = Only EA M.2 EVB required;
uSD-M.2 = Murata uSD-M.2 Adapter + EA M.2 EVB required

Embedded Artists' i.MX

Murata Module	CYW Chipset	RT 1052 RT 1062	6UL	6SoloX	6DualLite	6Quad	7Dual	8MQuad	8M Mini*	7ULP*
1DX	43364	M.2	M.2	M.2	M.2	M.2	M.2	M.2	M.2	M.2
1MW	43455	M.2	M.2	M.2	M.2	M.2	M.2	M.2	M.2	M.2
1LV	43012	M.2	M.2	M.2	M.2	M.2	M.2	M.2	M.2	M.2
1CX	4356			M.2	M.2	M.2	M.2	M.2	M.2	
1VA*	88359		M.2	M.2	M.2	M.2	M.2	M.2	M.2	M.2

M.2 = Only EA M.2 EVB required

Hardware & Associated SW Available!

- Embedded Artists' Wi-Fi/BT M.2 EVB's (1DX/1MW/1LV/1CX) are available: <https://www.embeddedartists.com/m2/>
- Murata uSD-M.2 Adapter will be in Murata Warehouses around April 24th.
- EA i.MX RT 1062 Developer Kit is available: <https://www.embeddedartists.com/products/imx-rt1062-developers-kit/>
- EA i.MX 6/7/8 Developer Kits are available (instance of 7Dual): <https://www.embeddedartists.com/products/imx7-dual-developers-kit/>
- NXP has posted MCUXpresso SDK (1050/1060 support) – i.MX RT 1050 Link [here](#). EA has already pushed their patch (for i.MX RT 1062 Dev Kit) on [this webpage](#).
- Software to support i.MX RT 1020/1064 and 1LV M.2 EVB on i.MX RT is under development.

Question & Answer

