

TOSHIBA

**2:1 Mux/1:2 De-Mux
TDS4B212MX
Evaluation Board
Through Path Board
User's Guide**

2024-07-16

2:1 Mux/1:2 De-Mux TDS4B212MX General

➤ General

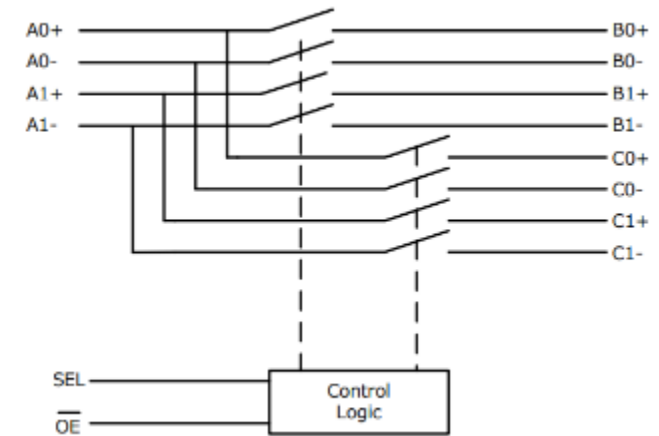
- 1-32Gbps 1-Lane Tow Differential Channel, 2:1 Mux/1:2 De-Mux
- This Switch can be used for high-speed differential interface such as PCIe®5.0, USB4®Version2, Thunderbolt™4, DisplayPort™.

➤ High frequency characteristics ($V_{CC} = 1.6 \sim 3.6 \text{ V}$)

Item	Symbol	Condition	Typ.	Unit
-3dB Bandwidth	BW	$R_T = 50\Omega$	27.5	GHz
Insertion loss	DDIL	$f=10 \text{ GHz}$ $R_L = 50\Omega$	-0.9	dB
Return loss	DDRL	$f=10 \text{ GHz}$ $R_L = 50\Omega$	-20	dB
OFF isolation	DDOIRR	$f=10 \text{ GHz}$ $R_L = 50\Omega$	-16	dB
Crosstalk	DDXT	$f=10 \text{ GHz}$ $R_L = 50\Omega$	-44	dB

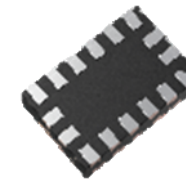
These items can be evaluated on this board.

➤ Block Diagram

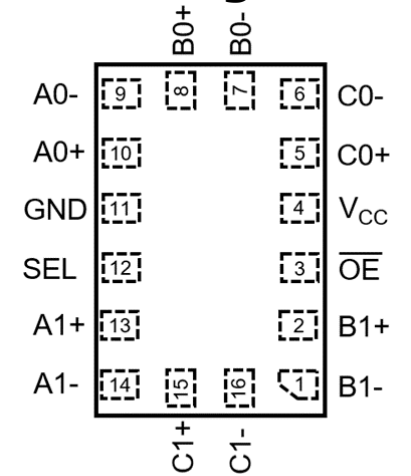


➤ Package

XQFN 1.6×2.4 mm



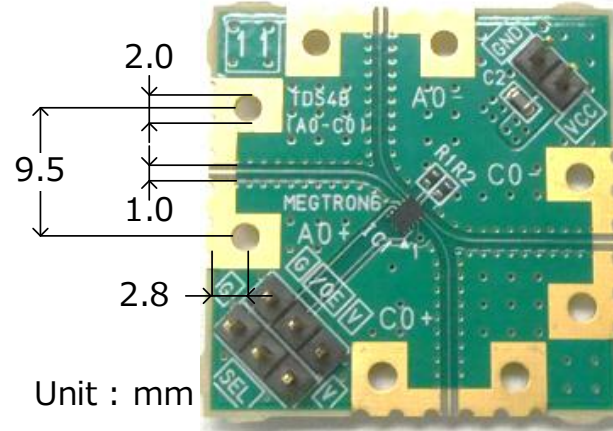
➤ Pin assignment



(Top view)

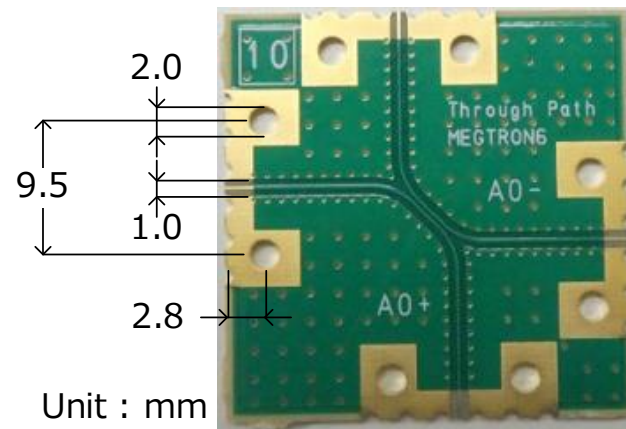
TDS4B212MX Evaluation board Basic information

- This board can measure $A0+ \Leftrightarrow C0+$ path, $A0- \Leftrightarrow C0-$ path.
- The differential line on this board is minimized to measure RF signals, but the measurement results include the influence of the board.
Therefore, a through-path board should be used to remove the board's influence from the measurement results. (See P.5)



➤ TDS4B212MX Evaluation board* (See P.3 P.4)

- Size : 30.00 × 30.00 mm**
- Material : MEGTRON6(Materials for high-frequency signal transmission)
- Evaluated path : $A0+ \Leftrightarrow C0+$ path, $A0- \Leftrightarrow C0-$ path
- Evaluated Characteristics : Insetion loss (-3db Bandwidth) , Return loss, OFF isolation



➤ Through Path Board (See P.5)

- Size : 28.97 × 28.97 mm**
- Material : MEGTRON6(Materials for high-frequency signal transmission)

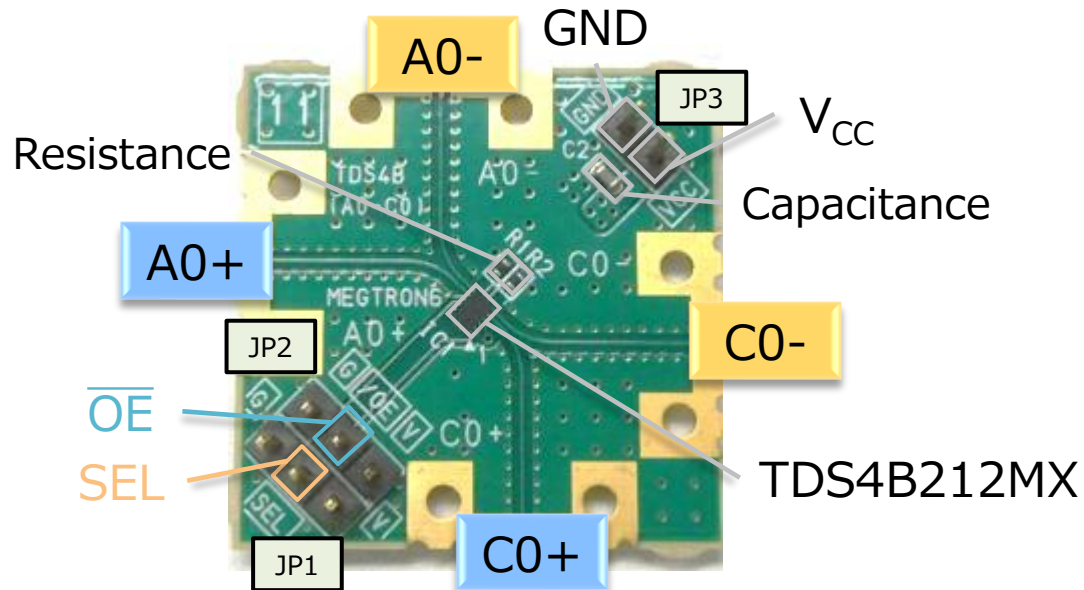
*Mounted components are already mounted, but the high-frequency connectors for measurement are not installed.(See P.6)

**Size TDS4A212MX Evaluation board and Through Path Board are different to align the length of line including chip.

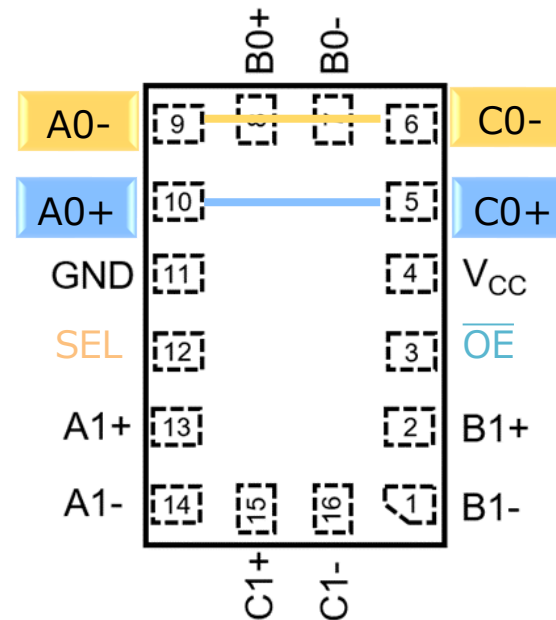
TDS4B212MX Evaluation board General

- This board can measure $A0+ \leftrightarrow C0+$, $A0- \leftrightarrow C0-$ as a representative path.

➤ Board Top View



➤ TDS4B212MX Top View



➤ Pin Connections

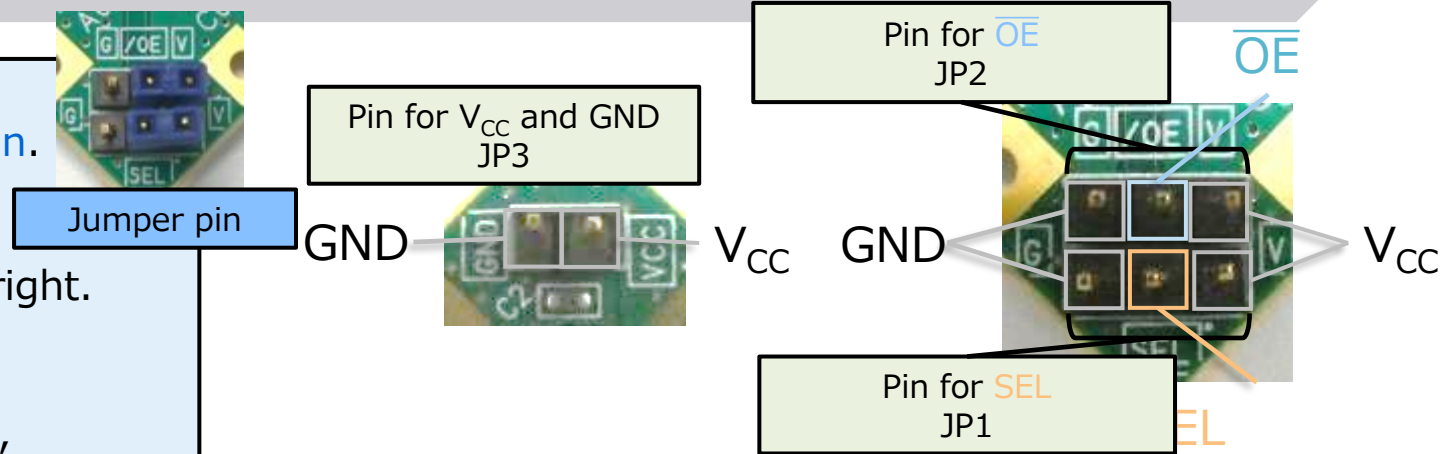
TDS4B212MX		Board
Pin No.	Pin Name	Connection
1	B1-	OPEN
2	B1+	OPEN
3	\overline{OE}	JP2
4	V_{CC}	JP3
5	C0+	Connector
6	C0-	Connector
7	B0-	50 Ω
8	B0+	50 Ω
9	A0-	Connector
10	A0+	Connector
11	GND	GND
12	SEL	JP1
13	A1+	OPEN
14	A1-	OPEN
15	C1+	OPEN
16	C1-	OPEN

✓ Instructions for use are explained on the next page.

TDS4B212MX Evaluation board Instructions for use

- Measure with a network analyzer.
- Connect control input to H or L with a **jumper pin**.
- Supply V_{CC} after control input is connected.
- Supply V_{CC} and GND from JP3.
- For connections, refer to the truth table on the right.

- ① Measure insertion loss (-3dB Bandwidth)**
 With \overline{OE} connected to GND and the switch active, connect **SEL** to V_{CC} and A Port to C Port.
 →You can measurement insertion loss from the signal power.
- ② Measure return loss**
 The port connection method is the same as ①.
 →You can measure return loss from return power.
- ③ Measure OFF isolation**
 With \overline{OE} connected to GND and the switch active, connect **SEL** to GND and disconnect A Port to C Port.
 →You can measurement OFF isolation from the signal power.
- ④ Disconnect the switch**
 Connect \overline{OE} to V_{CC} , the switch is disconnected.
 →the ports are disconnected.



➤ **Truth table** H : V_{CC} , L : GND, X : Don't Care

Item	Control Input \overline{OE}	Control Input SEL	Function	View
① ②	L	H	An+ Port = Cn+ Port An- Port = Cn- Port	
③	L	L	An+ Port = Bn+ Port An- Port = Bn- Port	
④	H	X (Connect to H or L)	Disconnect	

Through Path Board Instructions for use

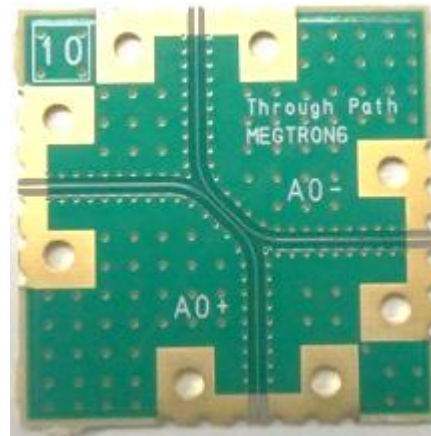
➤ Through Path Board General

- The TDS4B212MX evaluation board measurement results include the influence of the board.
→ Measure only evaluation board to remove the influence of the board.
- Measure Through Path Board.
- As shown in the image below, subtract the Through Path Board measurement results from the TDS4B212MX evaluation board measurement results to get TDS4B212MX measurement results.

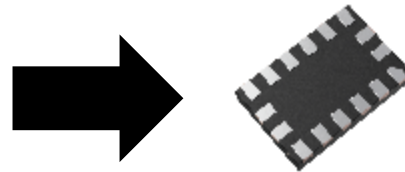
➤ Image of measure



TDS4B212MX
evaluation board
measurement results

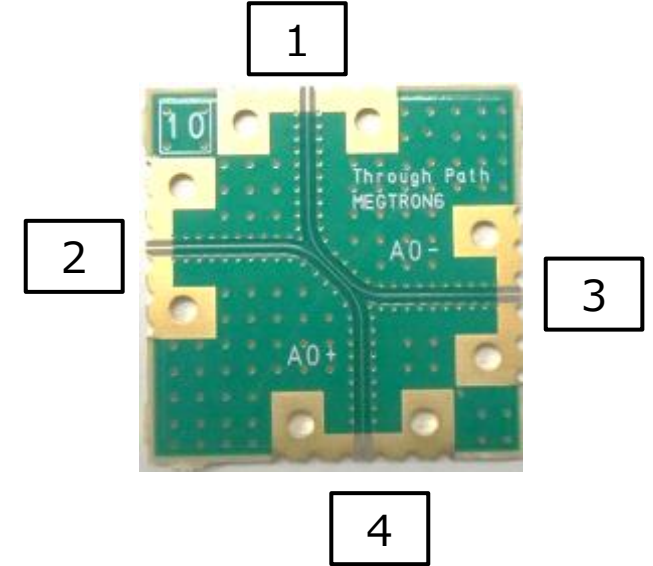


Through Path Board
measurement
results

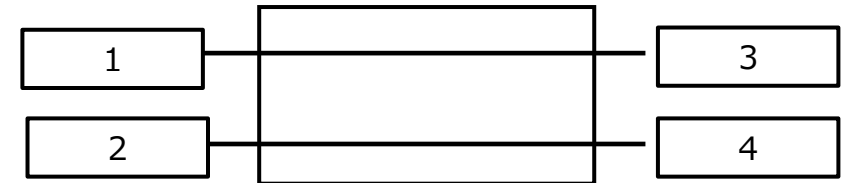


TDS4B212MX
Measurement
results

➤ Board Top View



➤ Board circuit



Connector we recommend(End launch connector)

➤ End launch connector Genral

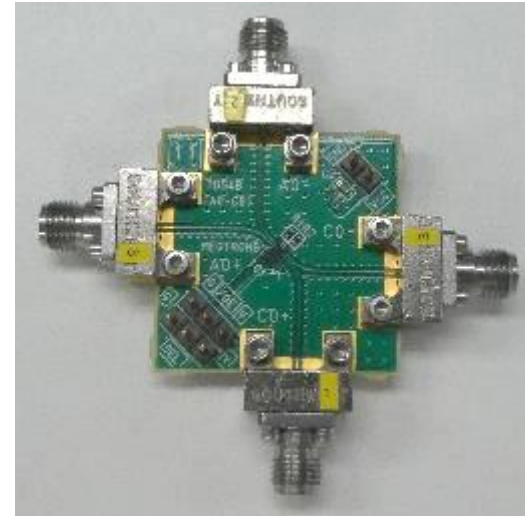
Model : 1092-04A-6

Manufacturer : Southwest Microwave

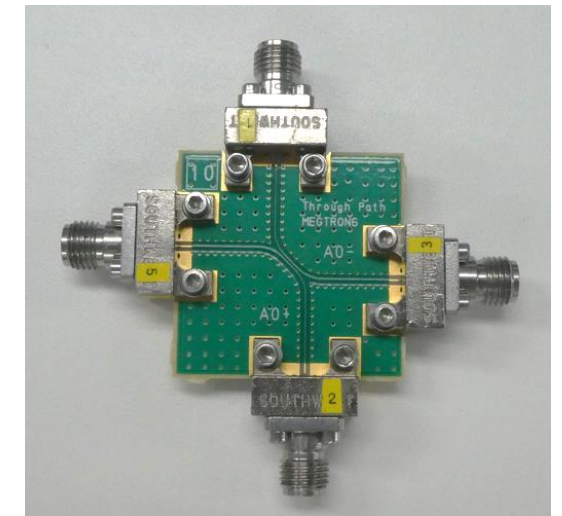
Frequency : 18, 27, 36, 40 GHz

Style : 2.92mm End Launch (K)

➤ Image



TDS4B212MX
Evaluation board



Through Path Board

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