

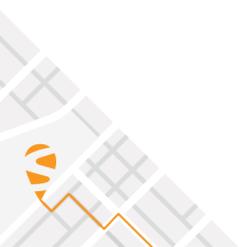


# Application Note: mosaic Ethernet PHY

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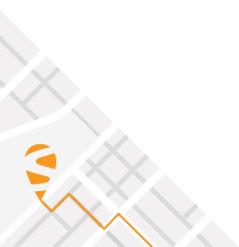
Version 2.0

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## Document Change Log

Version	Date	Affected	Change
1.0	20211125	All	Creation
2.0	20240213	All	Updating supported PHYs

# 1. Introduction

This document describes which Ethernet PHY's are supported by mosaic modules and how to connect them.

The module supports full duplex 10/100 Base-T Ethernet communication. The Ethernet PHY and magnetics are to be implemented on the host board. The Hardware Manual provides an application circuit using the KSZ8041NL(I) PHY from Microchip, but other PHY's can be used.

## 2. Requirements

When selecting the external PHY, the following rules should be followed:

- The interface is RMII, if applicable the PHY needs to be configured by config pin strapping to use RMII.
- The module will not reconfigure the PHY through PHY registers, the PHY can only be used in its default configuration or in a configuration that can be set with pin strapping.
- The RMII REF\_CLK is 50 MHz
- By default, the module (MAC) will not generate the 50 MHz REF\_CLK and expects an RMII clock from the PHY, unless if it detects a KSZ8041NL(I) PHY. If the receiver detects a KSZ8041NL(I), it will generate the RMII clock itself.

It is however possible to use a non-KSZ8041NL(I) PHY which expects a clock from the MAC. This can be done by upgrading the module with the **rmiiclck\_from\_mac.suf** file found in the **Ethernet PHYs** folder of the firmware package. This persistently enables the REF\_CLK, overruling the default behavior.

Reverting to the default behavior is always possible by upgrading with the **rmiiclck\_default.suf** file.

The lif, identification user command will reflect which file has been loaded. E.g. when the RMII clock comes from MAC the identification will be as such:

```
<hwplatform product="mosaic-X5"  
...  
    <rmiiclck clock="from_mac"/>  
</hwplatform>
```

- The PHY address is 001.

### 3. Supported Ethernet PHY's

The supported Ethernet PHY's can be found in the following table. The support is conditional to the firmware version and specifically:

- mosaic-X5 and mosaic-T should be running firmware 4.10.0 or higher.
- mosaic-H should be running firmware 4.9.1 or higher.

If a PHY is not listed in the table, it is not supported.

Component	Supported Suffix	REF_CLK direction	rmiiclk_from _mac needed	Comment
KSZ8001	L, LI, S, SI	MAC to PHY	Yes	Connect MAC/REF_CLK to PHY/REF_CLK
KSZ8021	RNL, RNLI	MAC to PHY	Yes	Connect MAC/REF_CLK to PHY/REF_CLK
KSZ8031	RNL, RNLI	PHY to MAC	No	Connect MAC/REF_CLK to PHY/REF_CLK, Note: PHY also needs 25 MHz on PHY/XI
KSZ8041	NLI, NLU, NLAM	MAC to PHY	No	Connect MAC/REF_CLK to PHY/REF_CLK
	RNL, RNLI, RNLAM	PHY to MAC	No	Connect MAC/REF_CLK to PHY/REF_CLK, Note: PHY also needs 25 MHz on PHY/XI
	LL, LLI, TL, TLI	MAC to PHY	Yes	Connect MAC/REF_CLK to PHY/REF_CLK
KSZ8051	RNLU, RNLUB, RNLV	PHY to MAC	No	Connect MAC/REF_CLK to PHY/REF_CLK, Note: PHY also needs 25 MHz on PHY/XI
KSZ8061	RNBI, RNBV, RNBW	PHY to MAC	No	Connect MAC/REF_CLK to PHY/REF_CLK, Note: PHY also needs 25 MHz on PHY/XI
	RNDI, RNDV, RNDW	MAC to PHY	Yes	Connect MAC/REF_CLK to PHY/XI
KSZ8081	RNDCA, RNDIA	MAC to PHY	Yes	Connect MAC/REF_CLK to PHY/XI
KSZ8091	RNBICA, RNBIA	PHY to MAC	No	Connect MAC/REF_CLK to PHY/REF_CLK, Note: PHY also needs 25 MHz on PHY/XI
	RNACA, RNAIA	PHY to MAC	No	Connect MAC/REF_CLK to PHY/REF_CLK, Note: PHY also needs 25 MHz on PHY/XI

	RNDCA, RNDIA	MAC to PHY	Yes	Connect MAC/REF_CLK to PHY/XI
KSZ8721	CL	MAC to PHY	Yes	Connect MAC/REF_CLK to PHY/REF_CLK
	BL, BLI, SL, SLI	MAC to PHY	Yes	Connect MAC/REF_CLK to PHY/REF_CLK
	B, BT, BI	MAC to PHY	Yes	Connect MAC/REF_CLK to PHY/REF_CLK
KSZ8863	RRL, RRLI	MAC to PHY	Yes	Connect MAC/REF_CLK to PHY/X1 and/or PHY/REFCLKI_3 (configured with pin strapping)
		PHY to MAC	No	Connect MAC/REF_CLK to PHY/REFCLKO_3 (configured with pin strapping)
KSZ8864	RMNC, RMNI	MAC to PHY	Yes	Not documented here, contact us
	RMNUB	PHY to MAC	No	Not documented here, contact us
KSZ8873	RLL, RLLI	MAC to PHY	Yes	Connect MAC/REF_CLK to PHY/X1 and/or PHY/REFCLKI_3 (configured with pin strapping)
	RLLU, RLLAM	PHY to MAC	No	Connect MAC/REF_CLK to PHY/REFCLKO_3 (configured with pin strapping)
TJA1100		MAC to PHY	Yes	Connect MAC/REF_CLK to PHY/REFCLKO (configured with pin strapping)
		PHY to MAC	No	Connect MAC/REF_CLK to PHY/REF_CLK, Note: PHY also needs 25 MHz on PHY/XI (configured with pin strapping)
TJA1101	B	MAC to PHY	Yes	Connect MAC/REF_CLK to PHY/REFCLKO (configured with pin strapping)
		PHY to MAC	No	Connect MAC/REF_CLK to PHY/REF_CLK, Note: PHY also needs 25 MHz on PHY/XI (configured with pin strapping)

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