

MICROSAR Ethernet Transceiver Driver

Technical Reference

NXP Tja1100/Tja1101/Tja1102

Version 2.1.0

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Status	Released

1 Document Information

1.1 History

Author	Date	Version	Remarks
David Feßler	2015-01-29	1.00.00	Creation of document
David Feßler	2015-03-30	1.01.00	ESCAN00081256: FEAT-705: Ethernet wakeup based on Activation Line [AR4-1006]
David Röder	2016-12-15	1.02.00	ESCAN00093315: Added option to configure reduced Mii Driver output strength
David Röder	2017-04-13	1.03.00	ESCAN00094795: Removed all transceiver driver general aspects
David Röder	2017-04-28	1.03.01	ESCAN00094696: Link startup delay shall be configurable
David Röder	2017-09-25	1.04.00	STORYC-2620: Add derivative Tja1101 to supported derivatives
David Röder	2018-01-31	2.00.00	STORYC-582: SafeBSW for EthTrcv_Tja1100 (ASIL B)
David Röder	2018-07-17	2.00.01	Review Integration
David Röder	2018-11-08	2.01.00	Update to DrvTrans__coreEthAsr v. 3.02.xx

Table 1-1 History of the document

1.2 Reference Documents

No.	Title	Version
[1]	TechnicalReference_EthTrcv_Core	See delivery
[2]	AH1310 TJA1100 Automotive Ethernet PHY Application Hints	Rev. 01.20 – 21 July 2016

Table 1-2 Reference documents

1.3 Scope of the Document

This complement to the technical reference [1] describes the derivative dependent aspects of the Ethernet Transceiver Driver basis software. Please refer to your Release Notes to get a detailed description of the platform (host, compiler, and transceiver) your Vector Ethernet Bundle has been configured for.



Please note

We have configured the programs in accordance with your specifications in the questionnaire. Whereas the programs do support other configurations than the one specified in your questionnaire, Vector's release of the programs delivered to your company is expressly restricted to the configuration you have specified in the questionnaire.



Note

This document describes aspects that apply for Ethernet Transceiver Driver modules provided by Vector, which are only used for NXP Tja1100, Tja1101 and Tja1102 transceivers. For this reason the corresponding infixes of APIs, macros, parameters etc. are replaced by Tja1100 or, if only uppercase is used, TJA1100. The derivative independent aspects of the Ethernet Transceiver Driver are discussed in [1], where the above mentioned infix is replaced by the markers <Driver> and <DRIVER>.

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Component History

Component Version	New Features
01.00.00	created
02.00.xx	MICROSAR 4 Release 14
03.00.xx	MICROSAR 4 Release 17
04.00.xx	Ethernet Transceiver Driver Core introduced
04.01.xx	FEAT-2234: Ethernet Link Quality Monitoring
05.00.xx	FEAT-2877S648 [SAFE] SafeBSW for EthTrcv(Tja1100) (ASIL B)
05.01.xx	STORYC-6944 Provide IEEE 802.3 clause 22 access as public interface on DrvTrans_Tja1100EthAsr

Table 1-3 Component history

2 Introduction

This document describes the functionality, API and configuration of the Ethernet Transceiver Driver.

Supported Release*:	AUTOSAR	4	
Supported Variants:	Configuration	pre-compile	
Vendor ID:		ETHTRCV_30_TJA1100_VENDOR_ID	30 decimal (=Vector-Informatik, according to HIS)
Module ID:		ETHTRCV_30_TJA1100_MODULE_ID	73 decimal

* For the precise AUTOSAR Release 4.x please see the release specific documentation.

The Ethernet Transceiver Driver provides hardware independent access to control connected transceivers in a generic way. It offers the functionality to control the mode of operation of connected transceivers as well as to determine their current state, e.g. if events like link status change or bus errors happened.

The transceiver itself is a hardware device, which mainly transforms the logical I/O signals of the Ethernet Controller to the bus compliant electrical levels, currents and timings.

The transceiver driver considered in this technical reference is designed to operate with TJA1100, TJA1101 and TJA1102 transceivers. This documentation however only covers the special aspects of the driver software covering this kind of transceivers, while all general aspects are covered by the complementary document [1].

3 Hardware Overview

Table 3-1 summarizes the supported derivatives and settings this Ethernet Transceiver Driver can be used on. It also provides information on the documentation used during the development of the driver for detailed reference to hardware specific information.

Derivatives	<ul style="list-style-type: none"> • TJA1100 • TJA1101 • TJA1102
Compiler	No known incompatibility to any compiler.
Hardware manuals	<ul style="list-style-type: none"> • NXP TJA1100 100BASE-T1 PHY for Automotive Ethernet Product data sheet Rev.3 - 23 May 2017 Preliminary Data Sheet • NXP AH1310 TJA1100 Automotive Ethernet PHY Application hints Rev. 01.40 -14 July 2017 • NXP TJA1101 100BASE-T1 PHY for automotive Ethernet Preliminary data sheet Rev. 0.1 - 14 September 2017 • NXP TJA1102 100BASE-T1 Dual PHY for automotive Ethernet Objective data sheet Rev. 0.6 - 24 February 2017 • NXP AH1508 TJA1102 Automotive Dual-port Ethernet PHY Application hints Rev. 00.02 - 11 March 2015
Safety Manuals	<ul style="list-style-type: none"> • NXP TJA1101 Functional Safety Manual Safety_manual_TJA1101 Rev. 1.0 - 8 Mar 2018
Errata sheets	-
Specifics	-
Used registers	Control- and status registers with offsets 0x00 to 0x1B For details, see EthTrcv_30_Tja1100_LL_Regs.h
Hardware features related to independence or partitioning	none
Access mechanism	Management interface provided by Eth or EthSwt accessing the SMI
Hardware diagnostics	<ul style="list-style-type: none"> • 6 PHY Test modes • Loopback-modes • Cable diagnostics • Signal quality measurement

Table 3-1 Hardware Overview

4 Derivative Specific Functional Description

4.1 Main Function



Please note

This Ethernet Transceiver Driver requires a main function:


```
EthTrcv_30_Tja1100_MainFunction()
```















It is mandatory to call this function with a period smaller or equal than 20ms!

According to [2], the Tja1100/Tja1101/Tja1102 requires a delay (2 ms) between setting the transceiver to normal mode and enabling the link start up by setting the LINK_CONTROL bit. Additionally, the stability of the link shall be checked after another waiting time (100 ms) after the LINK_CONTROL has been set. In order to integrate this behaviour into the concept of the AUTOSAR Ethernet Transceiver Driver, the

`EthTrcv_30_Tja1100_MainFunctionLinkHandling()` is needed, which has to be called periodically. The period can be configured with the parameter `/EthTrcvGeneral/EthTrcvMainFunctionLinkHandlingPeriod`. The 100ms waiting time after which the link state is considered to be stable by the Ethernet Transceiver Driver can be enabled or disabled with the parameter `EthTrcvConfig/EthTrcvExtendedLinkStateCheckEnabled`.

4.2 Overview

The general functional description of the transceiver driver is part of the general technical reference [1]. This section gives an overview over which of the features are supported by the specific transceiver driver considered in this document and to what extent. The features marked with  in Table 4-1 are available for the Ethernet transceiver driver for Tja1100/Tja1101/Tja1102 transceivers.

Supported AUTOSAR Standard Conform Features	
Initialization of the Ethernet Transceiver	
Setting and getting the Transceiver Mode	
Transceiver wakeup	
Restart auto negotiation	
Get link state	
Get baud rate	
Get duplex mode	
Set test mode	
Set loopback mode	
Get signal quality	
Set TX mode	
Get cable diagnostics result	
Get PHY identifier	
Retrieve version info	



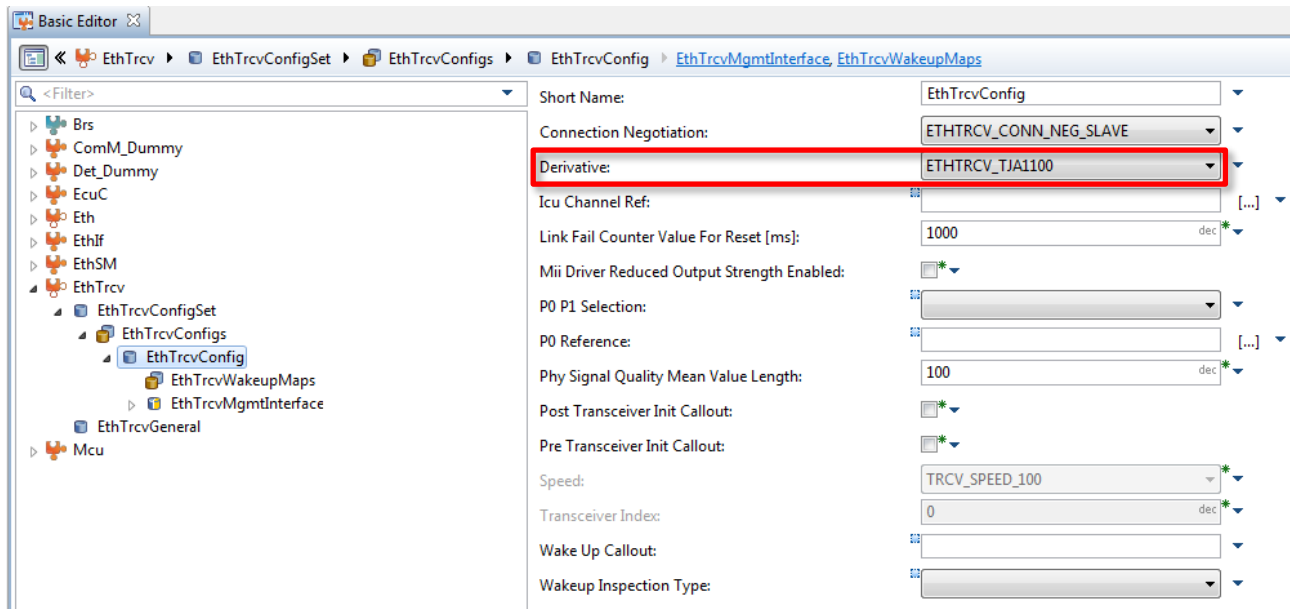
Supported AUTOSAR Standard Conform Features	
Report development errors to DET	
Report production errors to DEM	

Table 4-1 Supported AUTOSAR Standard Conform Features

5 Derivative Specific Configuration

5.1 Derivative

The derivative can be chosen to be either Tja1100, Tja1101 or Tja1102



5.2 Link Fail Counter

The Ethernet Transceiver Driver for Tja1100, Tja1101 and Tja1102 transceivers implements a workaround to perform software reset after a certain time in which no active link was established. The parameter Link Fail Counter Value For Reset, which is marked in Figure 5-1, makes it possible to configure the amount of time after which the reset occurs.

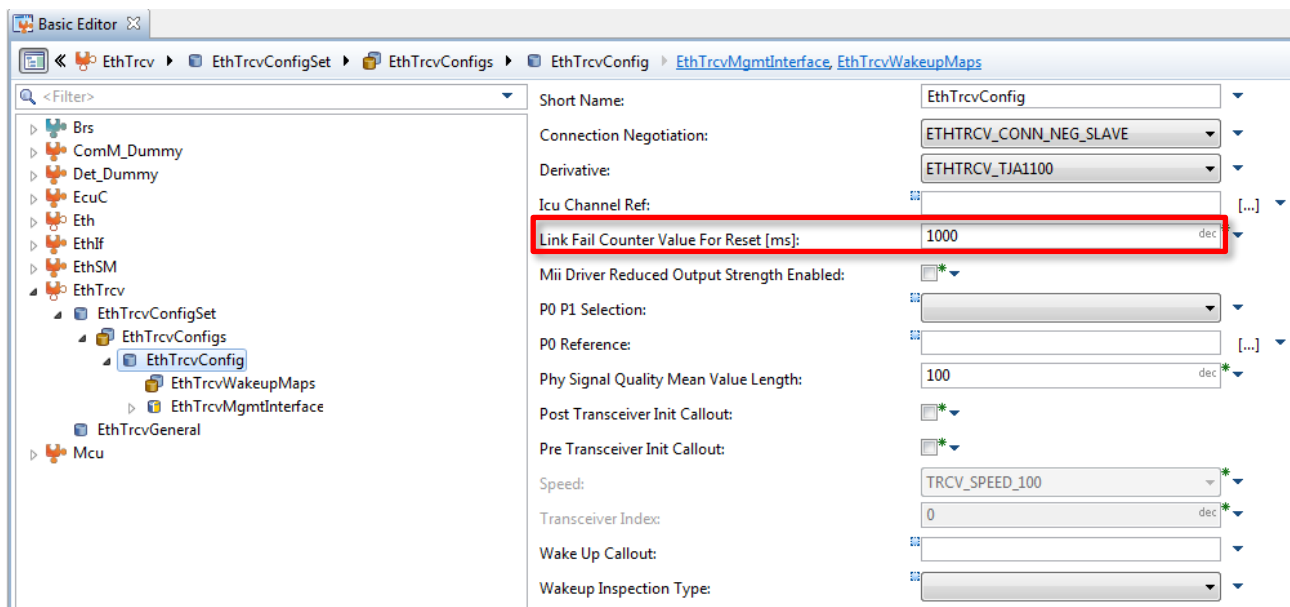


Figure 5-1 Link Fail Counter For Reset

5.3 Link Startup Delay

As mentioned in section 4.1, the Tja1100/Tja1101/Tja1102 transceivers do require a link startup delay after being set to active mode. The delay time can be configured but it is dependent on the configuration of the link handling main function's period. Both parameters can be seen in Figure 5-2 and Figure 5-3.

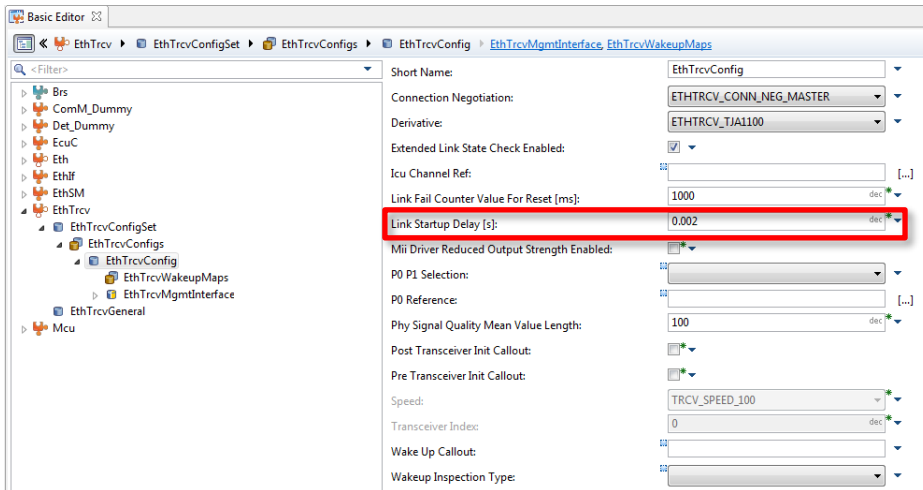


Figure 5-2 Link Startup delay

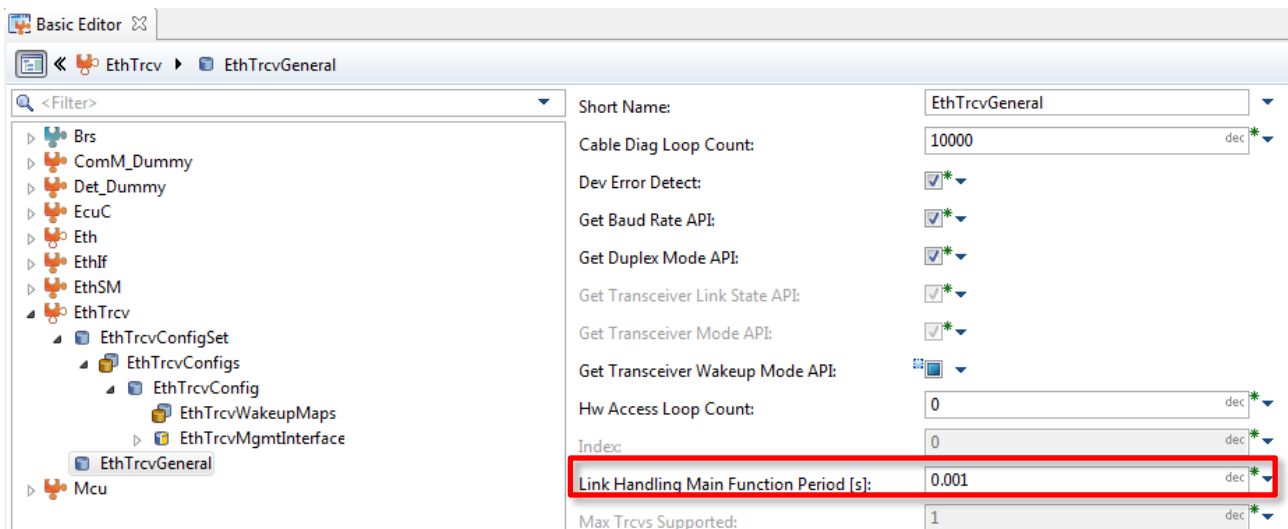


Figure 5-3 Link handling main function period

The configured value for the link handling main function period can be between 1 to 20 milliseconds. The link startup delay can be configured in milliseconds, but internally it is realized as an integer multiple of the link handling main function's period. It is therefore not possible to realize smaller link startup delays than at least one link handling main function period.

5.4 Extended Link State Check

The Ethernet Transceiver Driver for Tja1100/Tja1101/Tja1102 transceivers also offers the possibility to enable an extended link state check to verify that the link is stable before communication is started. This check is performed at least 100 milliseconds after the link has been set up by the Ethernet Transceiver Driver software and after the retrieved result is positive, the communication can be started. Please be aware that the link startup is delayed by at least 100 milliseconds if this feature is enabled but it enables the recommended startup procedure for the Tja1100/Tja1101/Tja1102, according to [2]. On Figure 5-4 it can be seen how the extended link state check can be enabled.

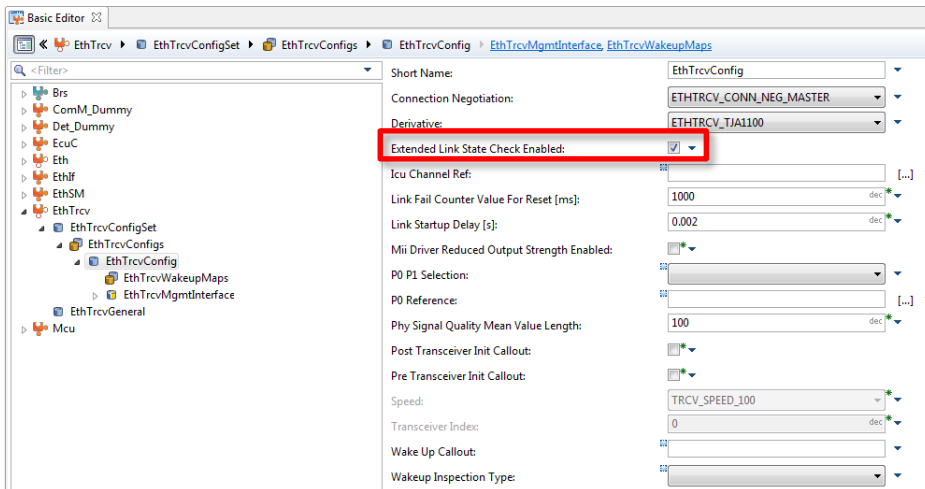


Figure 5-4 Extended Link State Check Enabled

5.5 Mii Driver Reduced Output Strength

In order to reduce electromagnetic emission, the output strength of the MII driver can be reduced by selecting the corresponding parameter as shown in Figure 5-5.

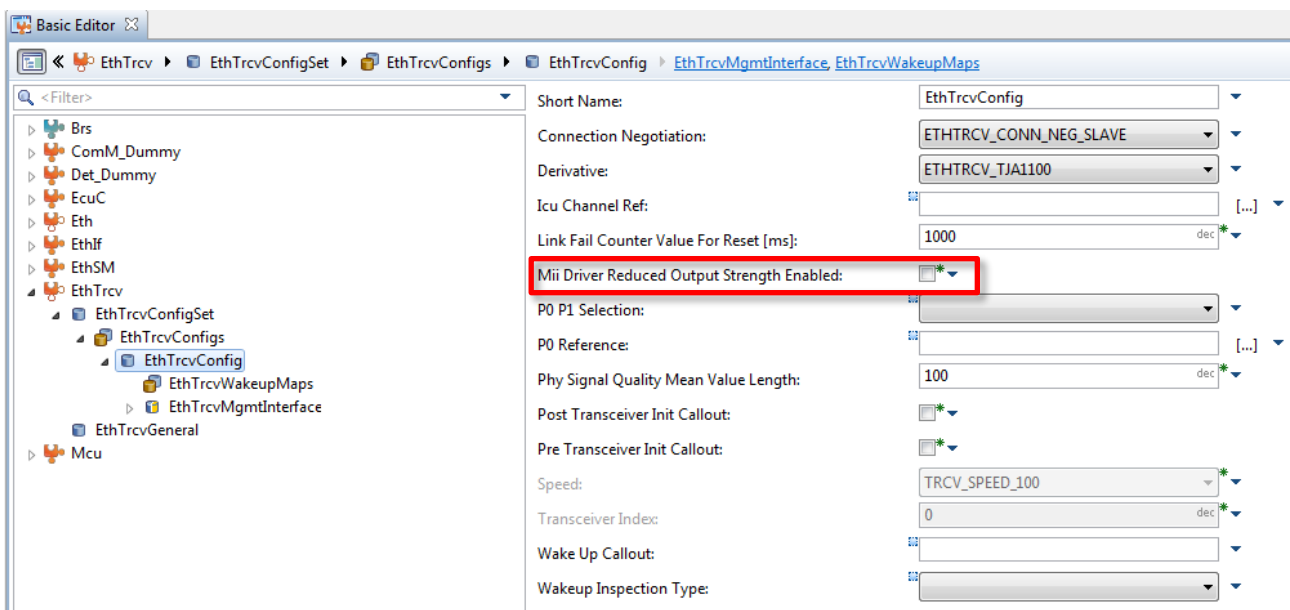


Figure 5-5 Mii Driver Reduced Output Strength

5.6 Tja1101/Tja1102 specific configuration

The Ethernet Transceiver Driver for Tja1100 transceivers is also compatible to the Tja1101 and Tja1102 derivatives. The Tja1102 contains two PHYs in one package: P0 and P1. Thus each instance needs its own EthTrcvConfig container which has to be created for both PHYs. The Tja1101 transceiver however is a single PHY and is configured like the P0 PHY of the Tja1102.

Most of the management registers are available for both PHYs, therefore the distinction can be performed with the MII-Address. Some settings which are performed by the driver software however are done in common registers for both PHYs, which is why the parameters “P0 P1 Selection” and “P0 Reference” have to be configured additionally. The first parameter is used for the mapping between the “EthTrcvConfig”-Container and the PHY to-be-configured (P0 or P1 can be chosen). The “P0 Reference” is used to select the “EthTrcvConfig”-Container of the specific PHY that is used for the common register access. Figure 5-6 shows an example configuration for the P0 PHY of the Tja1102 and Figure 5-7 for the P1 PHY, with a reference to the P0.

If for the parameter “Derivative” a Tja1101 is chosen, only the selection “ETHTRCV_P0” is valid for the parameter “P0 P1 Selection” and the parameter P0 reference has to be deleted!

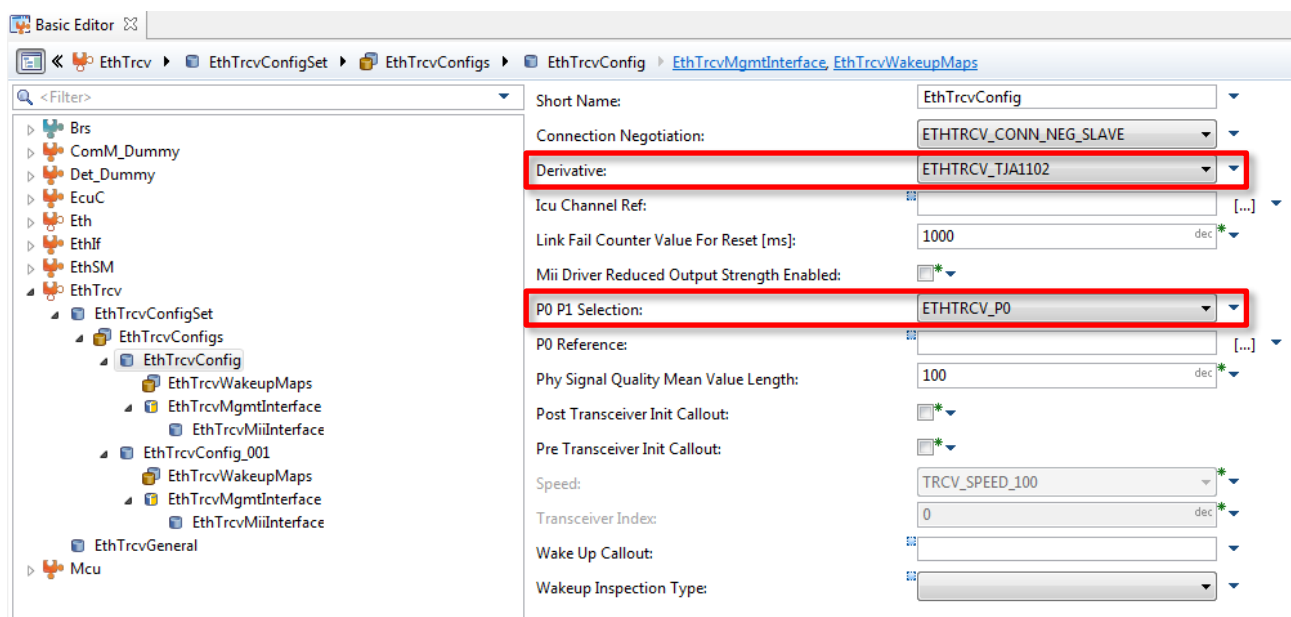


Figure 5-6 Tja1102 configuration: P0

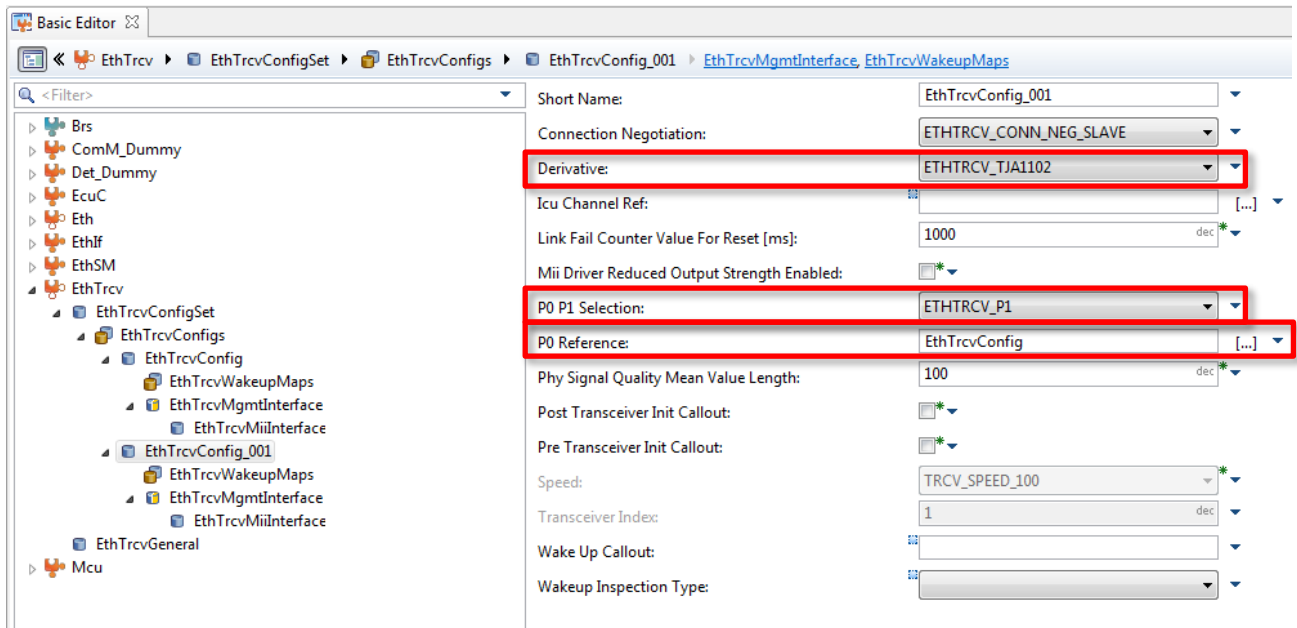


Figure 5-7 Tja1102 configuration: P1

6 Abbreviations

Abbreviation	Description
API	Application Programming Interface
AUTOSAR	Automotive Open System Architecture
BSW	Basis Software
DEM	Diagnostic Event Manager
DET	Development Error Tracer
Eth	Ethernet Controller Driver
EthIf	Ethernet Interface
EthTrcv	Ethernet Transceiver Driver
HIS	Hersteller Initiative Software
ICU	Input Capture Unit
MICROSAR	Microcontroller Open System Architecture (the Vector AUTOSAR solution)
MII	Media Independent Interface
SMI	Serial Management Interface
SWS	Software Specification

Table 6-1 Abbreviations

7 Contact

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