

User Manual

100Base-T1 – SFP Module

Version 0.5
05. March 2018



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1 Feature List

The Technica Engineering 100Base-T1 SFP module fits into a standard Small Form-factor Pluggable slot.

®

It uses the SGMII and generates 100 Mbit/s full-duplex BroadR-Reach .

After PowerUp it self-configures to Automotive BroadR-Reach ® .

Registers of the integrated transceiver are accessible via I2C interface for diagnosis and re-configuration.

One Link LED shows link status.

Power requirement: 3.3 Volt DC +/- 0.03 Volt

Power dissipation: 0.5709 W

Size: 68 x 14 x 14 mm

Wight: 0,1 Kg

International Protection IP 2 0

Operating Temperature 0 to +70 °Celsius

"BroadR-Reach is a trademark of Broadcom Limited"

2 Warranty and Safety Information



Before operating the device, read this manual thoroughly and retain it for your reference.



Use the device only as described in this manual.
Use only in dry conditions.
Do not apply power to a damaged device.



Do not open the device. Otherwise warranty will be lost.



This device is designed for engineering purpose only.
Special care has to be taken for operation.
Do not use this device in a series production car.
As this device is likely to be used under rough conditions, warranty is limited to 1 year.
Manufacturer liability for damage caused by using the device is excluded.

EG-Konformitätserklärung

**gemäß der EG-Richtlinie 2004/108/EG (elektromagnetische Verträglichkeit)
vom 15. Dezember 2004**

Hiermit erklären wir, dass das nachstehend bezeichnete Gerät in seiner Konzeption und Bauart sowie in der von uns in Verkehr gebrachten Ausführung den grundlegenden Sicherheits- und Gesundheitsanforderungen der EG-Richtlinie 2004/108/EG entspricht. Bei einer mit uns nicht abgestimmten Änderung des Gerätes verliert diese Erklärung ihre Gültigkeit.

Hersteller: Technica Engineering
Leopoldstr. 236
80807 München

Bevollmächtigter: Joseba Rodriguez

Beschreibung des Gerätes:
BR_SFP_Modul

Datum der Erklärung: 04.08.2017

Name des Unterzeichners: Joseba Rodriguez

Unterschrift: 

3 Pinning

The BroadR-Reach[®] line is connected by a Molex connector.

Hardware Version 2.4 and above use:

- Molex 0533250260 Header 2.0mm
- Molex 510900200 Housing
- Molex 50212-8000 Crimp Contact



Pin	Function	Pin	Function
1	BroadR-Reach [®] Plus	2	BroadR-Reach [®] Minus

SFP Socket connector:

Pin	Function	Pin	Function
1	GND	20	GND
2	Tx_Faul – Connected to GND	19	SGMII_TXD_N
3	n.c.	18	SGMII_TXD_P
4	I2C_DAT	17	GND
5	I2C_CLK	16	3.3 Volt
6	GND	15	3.3 Volt
7	n.c.	14	GND
8	Rx_Los – Connected to GND	13	SGMII_RXD_P
9	n.c.	12	SGMII_RXD_N
10	GND	11	GND

4 Startup and Configuration

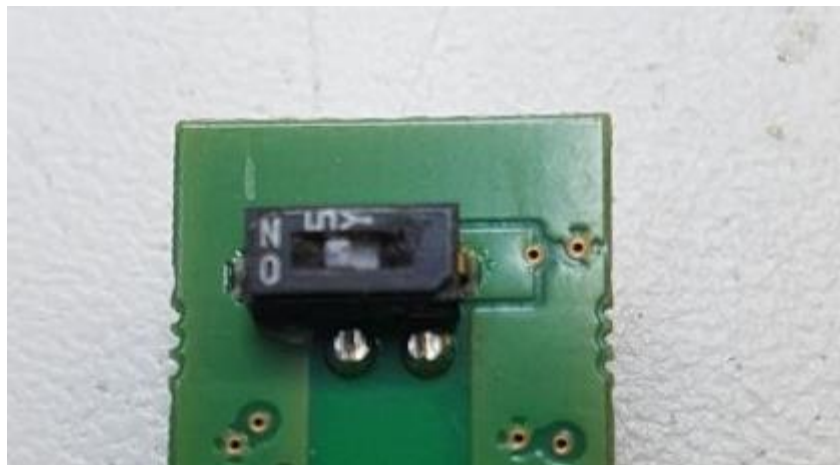
4.1 Startup

After 3.3 Volt power is applied, the SFP module starts up and self-configures the BCM54811S transceiver by I2C interface. This lasts 100ms. In the first 100ms the processor on the module acts as I2C master. Do not apply any master activity on the bus during this time!

4.2 Self-Configuration

The SFP Module configures itself to Automotive BroadR-Reach[®] after power up. Master / Slave Configuration is done according to the DIP switch on the bottom of the device. To reconfigure the DIP switch the lock has to be opened (see picture).

ON/left = Master
OFF/right = Slave



5 I2C Interface

5.1 I2C configuration

I2C can be used 100ms after the power up of the module.

The module operates with f_{SCL} up to 100kHz without requiring clock stretching. The module may clock stretch with f_{SCL} greater than 100kHz and up to 400 kHz.

The module processor listens as slave on the 7-bit address 0x50.

Note: b1010 000X = 0xA0

Read access beyond address 95 will return 0x00.

The BCM54811S transceiver can be accessed at I2C slave 7-bit address 0x40. **Note:** b1000 000X = 0x80

Read access to register 0x02 will always return 0x03, 0x62 (Device ID).

Write access to register 0x00 with value 0x02, 0x00 will configure the module to BR Slave.

Write access to register 0x00 with value 0x02, 0x08 will configure the module to BR Master.

For a complete register map please have a look at the BCM54811S datasheet (Broadcom NDA required).

5.2 I2C map register

Memory Map (read only registers):

Data Bytes	Byte Number	Comment
0x03,	0	Identifier SFP
0x04,	1	Ext. Identifier
0x80,	2	Connector
0x00, 0x00, 0x00, 0x00,	3-6	Transceiver high
0x00, 0x00, 0x00, 0x00,	7-10	Transceiver low
0x00,	11	Encoding
0x01,	12	Bitrate Nominal in 100 MBit
0x00,	13	Reserved
0x00,	14	Link Length Fiber
0x00,	15	Link Length Fiber
0x00,	16	Link Length Fiber
0x00,	17	Link Length Fiber
0x0A,	18	Link Length Copper in meter
0x00,	19	Reserved
'T', 'e', 'c', 'h', 'n', 'i', 'c', 'a', ' ', 'E', 'n', 'g', '.', ' ', ' ', ' ', ' ', ' ',	20-35	Vendor Name
0x00,	36	Reserved
0x00, 0x00, 0x00,	37-39	Vendor ID
'1', '0', '0', 'B', 'A', 'S', 'E', '-', 'T', '1', ' ', ' ', ' ', ' ', ' ', ' ', ' ', ' ', ' ',	40-55	PartNumber
0x00, 0x00, 0x00, 0x00,	56-59	Revision Number
0x00, 0x00, 0x00,	60-62	Reserved
0xBC,	63	Check Code for Field 0-62
0x00, 0x00,	64-65	Options
0x00,	66	Bitrate max
0x00,	67	Bitrate min
0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00,	68-83	Serial Number String
0x00, 0x00, 0x00, 0x00,	84-87	Date Code high
0x00, 0x00, 0x00, 0x00,	88-91	Date Code low
0x00, 0x00, 0x00,	92-94	Reserved
0x42	95	Check Code Extended for Field 64-94

5.3 I2C Device addressing and operation

5.3.1 I2C Current address read

The current read operation only requires the device address read word to be sent. When the acknowledge is received from the SFP module, the current address data word is serially clocked out.

Example: Read the current address of the SFP module (b1010000X)

		<-I2C_device ->																							
H O S T	S T A R T	M S B						L S B	R E A D														N A C K	S T O P	
		1	0	1	0	0	0	0	1	0	X	X	X	X	X	X	X	X	X	X	X	X	1		
S F P										A C K	M S B											L S B			
											<- DATA WORD ->														

5.3.2 Random address read

The random address read requires two operations to perform the read.

Example: Read a random address of the SFP module (b1010000X)

First a write operation to specify the address desired to read:

		<-I2C_device ->									<-I2C Memory address ->												
H O S T	S T A R T	M S B						L S B	W R I T E		M S B												L S B
		1	0	1	0	0	0	0	0	0	X	X	X	X	X	X	X	X	X	X	X	X	0
S F P										A C K													A C K

Example: Byte write operation into the SFP module (b1010000X)

		<-I2C_device ->								<-MEMORY ADDRESS->								<-DATA WORD->								
H O S T	S T A R T	M S B					L S B	W R I T E		M S B						L S B		M S B						L S B		S T O P
		1	0	1	0	0	0	0	0	X	X	X	X	X	X	X	0	X	X	X	X	X	X	X	0	
S P F								A C K								A C K									A C K	

5.3.5 Sequential write

The sequential write is started in the same way as a single byte write, but the host master does not send a stop condition after the first word is clocked in.

		<-I2C_device ->								<-MEMORY ADDRESS->								<-DATA WORD 1->								<-DATA WORD 2->								
H O S T	S T A R T	M S B					L S B	W R I T E		M S B					L S B		M S B						L S B		M S B				L S B		S T O P			
		1	0	1	0	0	0	0	0	X	X	X	X	X	X	X	0	X	X	X	X	X	X	X	0	X	X	X	X	X	X	X	0	
S P F								A C K							A C K									A C K						A C K				

6 Frequently Asked Questions – FAQ

Q: What is the maximum BroadR-Reach[®] cable length?

A: The BroadR-Reach[®] Port is optimized for automotive UseCase. The maximum line length for each BroadR-Reach[®] segment is limited to 10 meters.

Q: The BR Link LED is lit but I have no valid BR Link. What is going wrong?

A: There is a bug in the used BroadR-Reach PHY. When the BR Plus and Minus lines are swapped and the MediaConverter Port is set to BR Slave then the Link LED is lit, but there is no data transmission possible. So please connect the BR lines correctly.

7 Contact

If you have any questions regarding this product please feel free to contact us:

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