

## GD1000-SFP-RJS

## GD1000-SFP-RJS(WT)

**10/100/1000BASE-T Copper SFP Transceiver  
with SGMII interface  
RoHS6 Compliant**



### Features

- ◆ Support 10/100/1000BASE-T Operation in Host Systems with SGMII interface
- ◆ Support Rx\_LOS as link indication function
- ◆ 100m transmission over Cat 5 UTP Cable
- ◆ Hot-Pluggable SFP Footprint
- ◆ Fully metallic enclosure for low EMI
- ◆ Low power dissipation (1.05 W typical)
- ◆ Compact RJ-45 connector assembly
- ◆ Access to physical layer IC via 2-wire serial bus
- ◆ Detailed product information in EEPROM
- ◆ Operating Case Temperature Standard : 0°C  
~70°C Industrial : -40°C~85°C

### Applications

- ◆ LAN 10/100/1000Base-T
- ◆ Gigabit Ethernet over Cat 5 Cable
- ◆ Switch to Switch Interface
- ◆ Router/Server Interface

### Order Information

Part No.	Data Rate	Link type	Distance	Connector	Temp.
GD1000-SFP-RJS* Note1	10/100/1000Mbps enable the auto-negotiation, preferred master	Cat5	100m	RJ45	Standard
GD1000-SFP-RJS(WT)	10/100/1000Mbps enable the auto-negotiation, preferred master	Cat5	100m	RJ45	Industrial

Note1: Standard version

## Regulatory Compliance

Product Certificate	Certificate Number	Applicable Standard
TUV	R50135086	EN 60950-1:2006+A11+A1+A12
		EN 60825-1:2007
		EN 60825-2:2004+A1+A2
UL	E317337	UL 60950-1
		CSA C22.2 No. 60950-1-07
EMC CE	AE 50135430 0001	EN 55022:2006
		EN 55024:1998+A1+A2
CB	JPTUV-024038-M1	IEC 60825-2
		IEC 60950-1
FCC	WTF13F0503735E	47 CFR PART 15 OCT., 2010
	WTF13F0503732E	47 CFR PART 15 OCT., 2010
FDA	1230816-000	CDRH 1040.10
ROHS	RLSZF00163462	2011/65/EU

## Product Description

Data Control Inc.'s GD1000-SFP-RJS are 10/100/1000BASE-T Copper Small Form Pluggable (SFP), which is based on the SFP Multi Source Agreement (MSA). It is compliant with the Gigabit Ethernet standard as specified in IEEE STD 802.3 and can fully satisfy the 10/100/1000BASE-T application.

## Absolute Maximum Ratings

Parameter	Symbol	Min	Typ	Max
Maximum Supply Voltage	V <sub>cc</sub>	-0.5		4.0
Storage Temperature	T <sub>s</sub>	-40		85

## Normal operating condition

Parameter	Symbol	Min	Typ	Max	Units	Ref.
Operating Case Temperature	T <sub>c</sub>	0		70	°C	Standard
		-40		85		Industrial
Supply Voltage	V <sub>cc</sub>	3.15	3.3	3.45	V	
Date Rate		10		1000	Mbps	*Note2

\*Note2: 10/100/1000 BASE-T operation requires an SGMII interface with no clocks in the host system, and the module will operate as 1000BASE-T when the host system uses SERDES interface. It depends on the module PHY configuration.

**Electrical Characteristics**

Parameter	Symbol	Min	Typ	Max	Units	Notes/Conditions
<b>+3.3 Volt Electrical Power Interface</b>						
Supply Current	I <sub>cc</sub>		300	350	mA	
Input Voltage	V <sub>cc</sub>	3.15	3.3	3.45	V	
Surge Current	I <sub>surge</sub>			30	mA	
<b>Low-Speed Signals, Electronic Characteristics</b>						
SFP Output LOW	V <sub>OL</sub>	0		0.5	V	4.7k to 10k pull-up to host_Vcc, measured at host side of connector
SFP Output HIGH	V <sub>OH</sub>	host_Vcc-0.5		host_Vcc+0.3	V	4.7k to 10k pull-up to host_Vcc, measured at host side of connector
SFP Input LOW	V <sub>IL</sub>	0		0.8	V	4.7k to 10k pull-up to Vcc, measured at SFP side of connector
SFP Input HIGH	V <sub>IH</sub>	2		Vcc + 0.3	V	4.7k to 10k pull-up to Vcc, measured at SFP side of connector
<b>High-Speed Electrical Interface, Transmission Line-SFP</b>						
Line Baud Rates	f <sub>L</sub>		1250		MHz	5-level encoding, per IEEE 802.3
TX Output impedance	Z <sub>out, TX</sub>		150		Ohm	Differential, for all frequencies between 1MHz and 1250MHz
RX Input Impedance	Z <sub>in, RX</sub>		150		Ohm	Differential, for all frequencies between 1MHz and 1250MHz
<b>High-Speed Electrical Interface, Host-SFP</b>						
Single ended data input swing	V <sub>in</sub>	250		1200	mV	Single ended
Single ended data output Swing	V <sub>out</sub>	350		800	mV	Single ended
Rise/Fall Time	Tr, Tf		175		psec	20%-80%
TX Input Impedance	Z <sub>in</sub>		50		Ohm	Single ended
RX Output Impedance	Z <sub>out</sub>		50		Ohm	Single ended

**General specifications**

Parameter	Symbol	Min	Typ	Max	Units	Notes/Conditions
Data rate		10		1000	Mbps	
Distance				100	m	Category 5 UTP. BER <10 <sup>-12</sup>

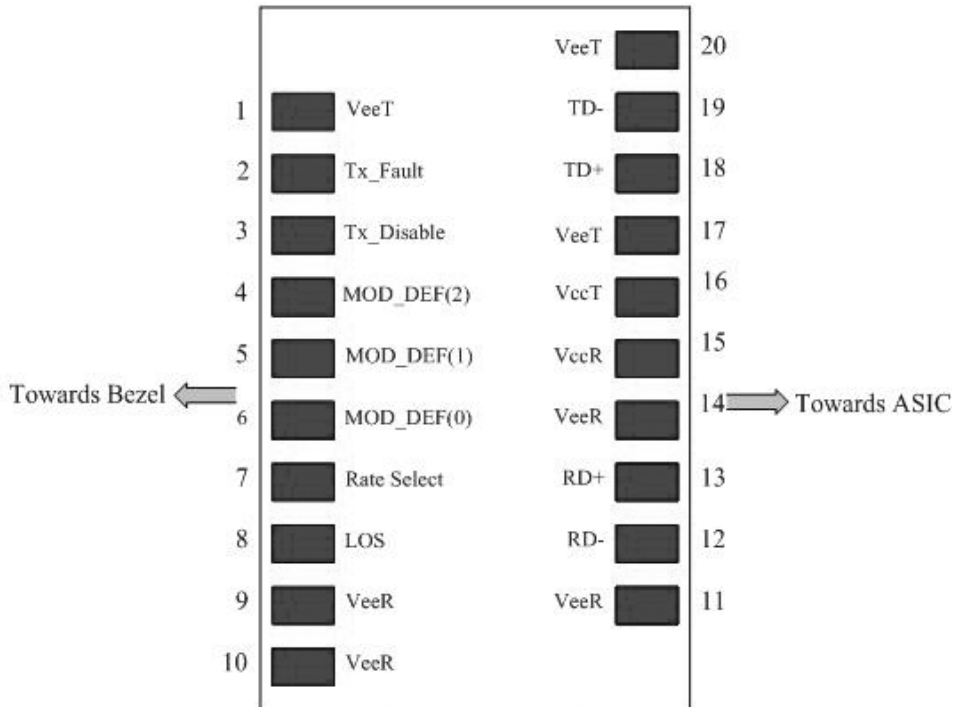
**Pin Descriptions**

Pin No.	Name	Function	Plug Seq.	Notes
1	VeeT	Transmitter Ground	1	
2	TX Fault	Transmitter Fault Indication	3	Not used
3	TX Disable	Transmitter Disable	3	1
4	MOD-DEF2	Module Definition 2	3	2
5	MOD-DEF1	Module Definition 1	3	2
6	MOD-DEF0	Module Definition 0	3	2
7	Rate Select	Not Connected	3	
8	LOS	Loss of Signal	3	3
9	VeeR	Receiver Ground	1	
10	VeeR	Receiver Ground	1	
11	VeeR	Receiver Ground	1	
12	RD-	Inv. Received Data Out	3	
13	RD+	Received Data Out	3	
14	VeeR	Receiver Ground	1	
15	VccR	Receiver Power	2	
16	VccT	Transmitter Power	2	
17	VeeT	Transmitter Ground	1	
18	TD+	Transmit Data In	3	
19	TD-	Inv. Transmit Data In	3	
20	VeeT	Transmitter Ground	1	

**Notes:**

- PHY disabled on T<sub>DIS</sub> > 2.0V or open, enabled on T<sub>DIS</sub> < 0.8V, used to reset the module.
- Should be pulled up with 4.7k – 10k ohm on host board to a voltage between 2.0 V and 3.6 V.  
MOD\_DEF (0) pulls line low to indicate module is plugged in.
- Only valid when the copper operates at 1000Mbps.

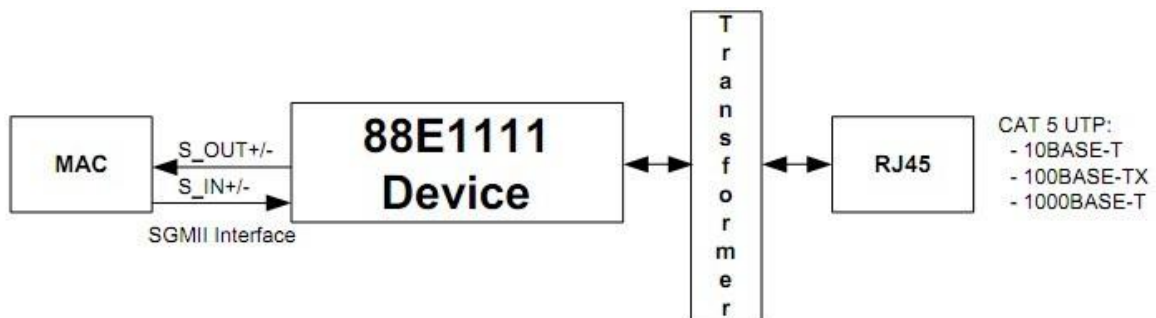
The following is the Diagram of host board connector pin numbers and names



### Serial Communication Protocol

Data Control Inc. Copper SFP support the 2-wire serial communication protocol defined in the SFP MSA. These SFP use a 128 byte EEPROM with an address of A0H. The 10/100/1000BASE-T physical layer IC can also be accessed via the 2-wire serial bus at address ACH.

### SGMII To Copper Modes



## EEPROM Serial ID Memory Contents

Accessing Serial ID Memory uses the 2 wire address 1010000X (A0H). Memory Contents of Serial ID are shown in Table 1.

**Table 1 Serial ID Memory Contents**

Addr.	Size (Bytes)	Name of Field	Hex	Description
<b>BASE ID FIELDS</b>				
0	1	Identifier	03	SFP
1	1	Ext. Identifier	04	SFP function is defined by serial ID only
2	1	Connector	22	RJ-45
3-10	8	Transceiver	00 00 00 08 00 00 0000	Transceiver Code
11	1	Encoding	01	
12	1	BR, Nominal	0D	
13	1	Reserved	00	
14	1	Length (9µm)km	00	Transceiver transmit distance
15	1	Length(9µm)100m	00	
16	1	Length (50µm) 10m	00	
17	1	Length(62.5µm)10m	00	
18	1	Length (Copper)	64	100m
19	1	Reserved	00	
20-35	16	Vendor name	XX XX XX XX XX XX XX XX <sup>(Note2)</sup> 20 20 20 20 20 20 20 20	Vendor name (ASCII)
36	1	Reserved	00	
37-39	3	Vendor OUI	XX XX XX <sup>(Note3)</sup>	
40-55	16	Vendor PN	XX XX XX XX XX XX XX XX XX XX XX XX XX XX XX XX <sup>(Note2)</sup>	Transceiver part number
56-59	4	Vendor rev	XX XX XX XX <sup>(Note3)</sup>	
60-61	2	Wavelength	00	
62	1	Reserved	00	
63	1	CC_BASE	Check Sum (Variable)	Check code for Base ID Fields
<b>EXTENDED ID FIELDS</b>				
64-65	2	Options	00 00	TX_DISABLE, TX_FAULT and Loss of Signal implemented.
66	1	BR,max	00	
67	1	BR,min	00	
68-83	16	Vendor SN	XX XX XX XX XX XX XX XX 20 20 20 20 20 20 20 20 <sup>(Note3)</sup>	Serial Number of transceiver (ASCII). For example "B000822".

84-91	8	Date code	XX XX XX XX XX XX XX XX <sup>(Note3)</sup>	Manufacture date code. For example "080405".
92	1	Diagnostic Monitoring Type	XX <sup>(Note3)</sup>	Digital diagnostic monitoring implemented
93	1	Enhanced Options	XX <sup>(Note3)</sup>	Optional flags
94	1	SFF_8472 Compliance	XX <sup>(Note3)</sup>	01 for diagnostics (Rev9.3 SFF-8472).
95	1	CC_EXT	Check Sum (Variable)	Check sum for Extended ID Field.
<b>VENDOR SPECIFIC ID FIELDS</b>				
96-127	32	Vendor Specific	Read only	Depends on customer information
128-255	128	Reserved	Read only	

Note3: The "XX" byte should be filled in according to practical case. For more information, please refer to the related document of SFP Multi-Source Agreement (MSA).

## Recommended Software configuration

### How to enable GD1000-SFP-RJS work at 1000BASE-T

GD1000-SFP-RJS support 10/100/1000Mbps full duplex SGMII interface default. But it also can operate with 1000Mbps of SERDES operation.

Please refer the following steps to configure:

Step 1: Access the PHY at 0xAC via two-wire serial interface. Step 2: Configure 0xAC as below table

PHY Address: 0xAC		
Register Address	Write data	Description
0x16	0x0001	Select page 1
0x1B	0x9088	Enable SerDes mode
0x00	0x9140	Software reset to allow changes to take effect
0x16	0x0000	Select page 0

### How to disable Auto-negotiation on GD1000-SFP-RJS

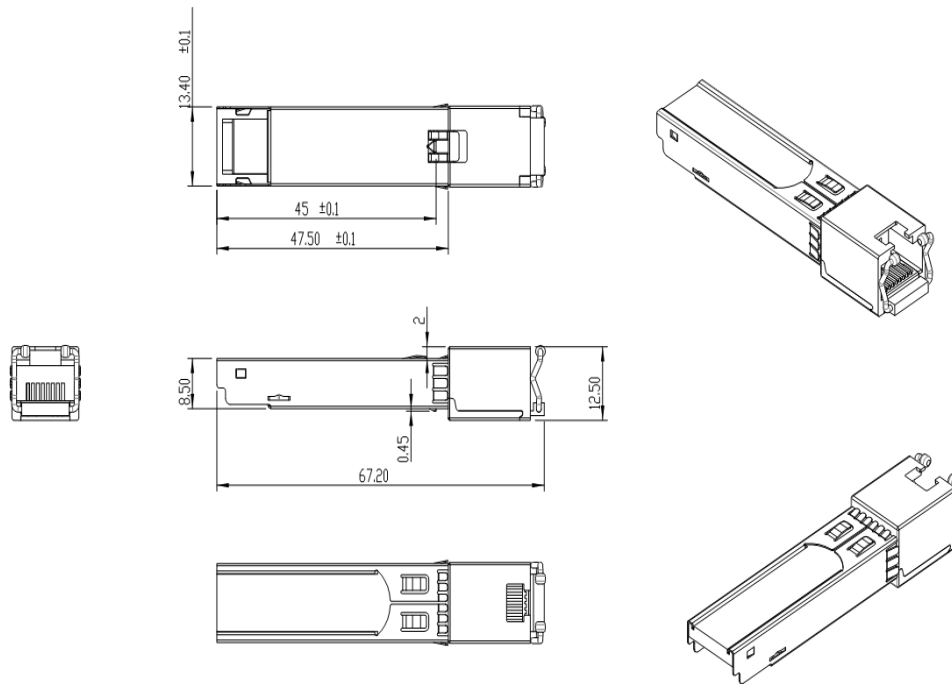
GD1000-SFP-RJS operates at mode of "Auto-negotiation enable" default. But it also can operate with "Auto-negotiation disable". Please refer the following steps to configure:

Step 1: Access the PHY at 0xAC via two-wire serial interface. Step 2: Configure 0xAC as below table

PHY Address: 0xAC		
Register Address	Write data	Description
0x16h	0x0001h	Select page 1
x00h	0x8140h	Disable Auto-negotiation
0x16h	0x0000h	Select page 0

### Mechanical Specifications

Data Control Inc.'s Copper SFP transceivers are compliant with the dimensions defined by the SFP Multi-Sourcing Agreement (MSA).



### Obtaining Document

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### Revision History

Revision	DCN	Release Date
V1.a	Released.	Jan 30, 2013
V1.b	Update regulatory compliance and add industrial PN.	Jun 26, 2014

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