

DM780x- Series

G.hn Wave-2 SFP Module

Short-Form Datasheet

KEY FEATURES:

- SFF 8432 and INF-8074i SFP MSA Compliant
- Functions as a G.hn Wave-2/Ethernet SGMII bridge
- Net data rates up to 1.7Gbps
- 1.9W power dissipation
- Configurable downstream/upstream ratio
- Compact design, the smallest in the industry
- 2-Wire interface for Serial ID
- Supports VectorBoost™ technology for broadband access
- Based on GigaWire specification and multi-vendor interoperable
- Incorporates AES-128 encryption
- K.21 protection for lightning surge voltage
- Robust die cast housing
- Bail latch style ejector mechanism with option for push button
- Configurable as a domain master or end-point



Product Overview:

The DM780x product family is a high performance G.hn Wave-2 Ethernet bridge for broadband services delivery using either existing phone line twisted pair cables or coax. It integrates a Wave-2 G.hn digital baseband processor along with a corresponding analog front-end, system power supplies and surge protection circuitry into a compact small form-factor pluggable (SFP) module

Product Family:

Family	Part Number	Description
DM780x	DM7809	SISO G.hn Wave 2 with RJ11 interface for phone line access applications
	DM7808	G.hn Wave 2 with F-type interface for point-to-multi-point over coax
	DM7806	G.hn Wave 2 with RJ11 interface for power line home networking

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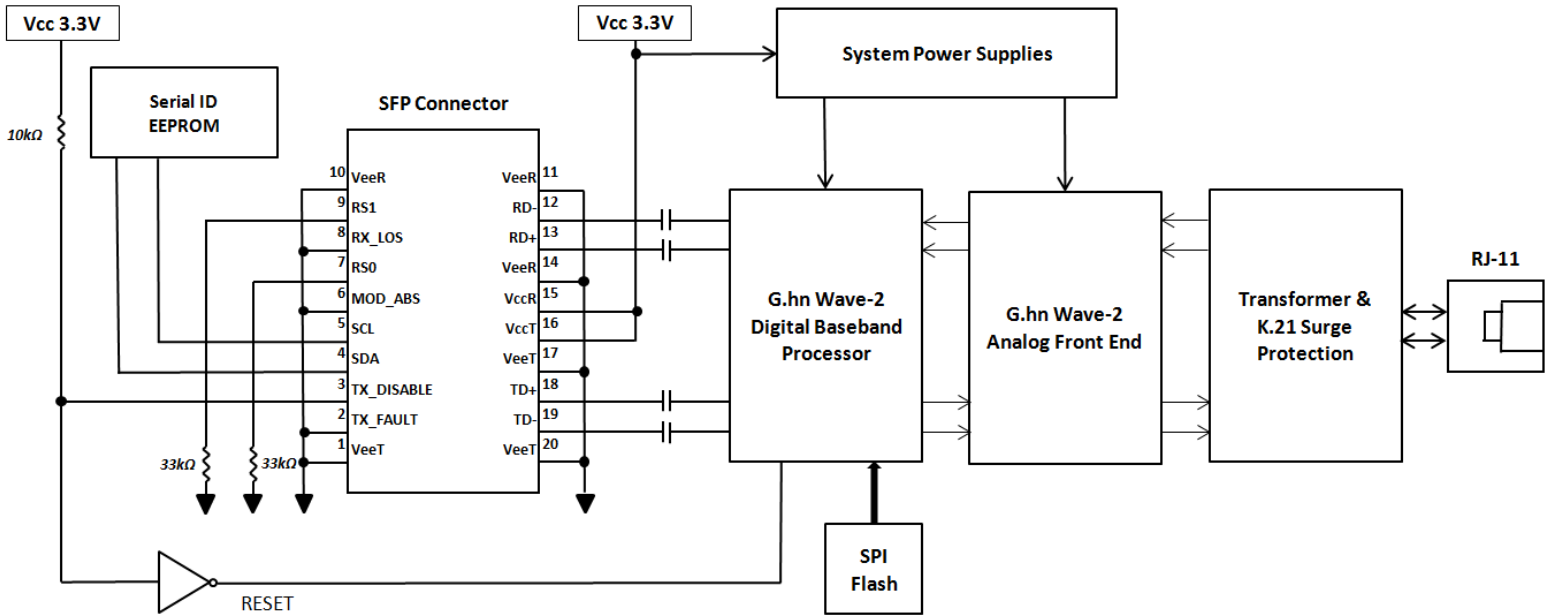


Figure 1: SISO Implementation Block Diagram

Note: DM7808 for use with coax cable implemented using an F-type connector in place of the RJ-11 and a Balun instead of transformer

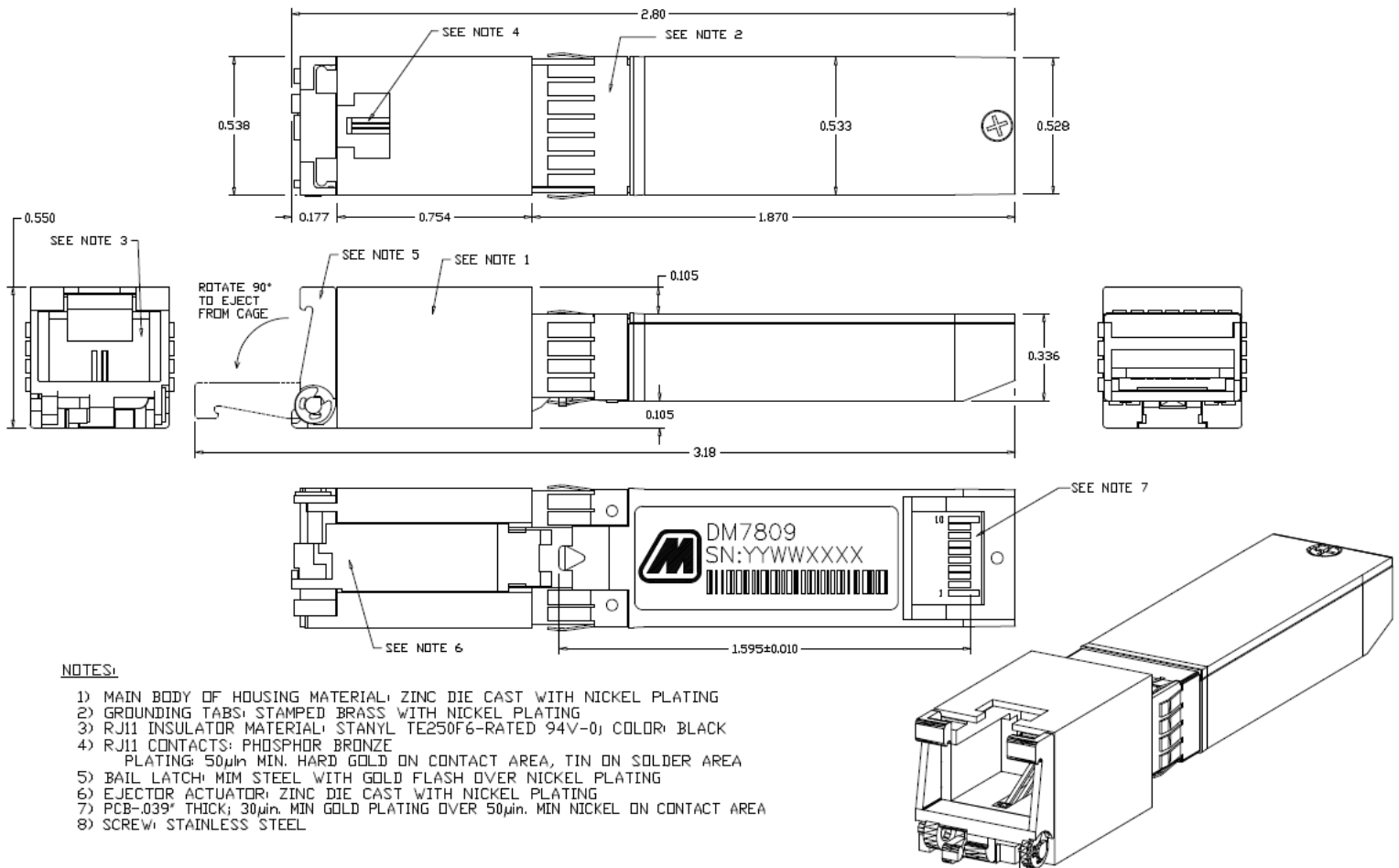


Figure 2: Mechanical Dimensions

Pin	Logic	Symbol	Name/Description	Plug Sequence	Note
1		VeeT	Transmitter Ground	1	1
2	LVTTL-O	Tx_Fault	Transmitter Fault	3	
3	LVTTL-I	Tx_Disable	Transmitter Disable	3	
4	LVTTL-I/O	SDA	2-wire Serial Interface Data Line	3	
5	LVTTL-I/O	SCL	2-wire Serial Interface Clock	3	
6		Mod_ABS	Module Absent, connect to VeeT or VeeR in the module	3	
7	LVTTL-I	RS0	Rate Select 0	3	
8	LVTTL-O	Rx_LOS	Receiver Loss of Signal Indication	3	
9	LVTTL-I	RS1	Rate Select 1	3	
10		VeeR	Receiver Ground	1	1
11		VeeR	Receiver Ground	1	1
12	CML-O	RD-	Receiver Inverted Data Output (Downstream traffic)	3	
13	CML-O	RD+	Receiver Non-Inverted Data Output (Downstream traffic)	3	
14		VeeR	Receiver Ground	1	1
15		VccR	Receiver 3.3V Supply	2	
16		VccT	Transmitter 3.3V Supply	2	
17		VeeT	Transmitter Ground	1	1
18	CML-I	TD+	Transmitter Non-Inverted Data Input (Upstream traffic)	3	
19	CML-I	TD-	Transmitter Inverted Data Input (Upstream traffic)	3	
20		VeeT	Module Transmitter Ground	1	1

Note 1: The module signal grounds should be isolated from the module case.

Table 1: DM780x G.hn SFP Module Electrical Pin Definition

Mating of SFP Transceiver to SFP Host Board Connector

The pads on the PCB of the SFP transceiver shall be designed for a sequenced mating as follows:

First mate: Ground contacts
 Second mate: Power contacts
 Third mate: Signal contacts

The SFP MSA specification for a typical contact pad plating for the PCB is 0.38 micrometers minimum hard gold over 1.27 micrometers minimum thick nickel. To ensure the long term reliability performance after a minimum of 50 insertion removal cycles, the contact plating of the transceiver is 0.762 micron (30 micro-inches) over 3.81 micron (150 micro-inches) of Ni on Cu contact pads.

RJ-11 Connector

RJ-11 connector shall support unshielded phone liner cables. Also the connector is mechanically robust enough and designed to prevent loss of link when the cable is positioned or moved at different angles. The connector shall pass the "wiggler" RJ-11 connector operational stress test. After the cable is inserted, it is moved in a circle to cover all 360 degrees in the vertical plane while the data traffic is on. There shall be no link or data loss.



Latch Requirements

The SFP transceiver latch mechanism is mechanically robust and designed to prevent unintentional unlatching during insertion or extraction of the transceiver cable. The transceiver is designed with a "Bail" type ejector latch mechanism that allows the SFP module to be easily released from the cage, however an optional push-button latch actuator version is also available. The latch also passes the "wiggle" RJ-11 connector stress test.

Measurement	Minimum	Maximum	Units	Comments
SFP transceiver insertion	N/A	18	Newtons	Measure without the force from any cage kick out springs. Module to be inserted into nominal cage.
SFP transceiver extraction	N/A	12.5	Newtons	Measure without the force from any cage kick out springs. Module to be inserted into nominal cage.
SFP transceiver retention	90	170	Newtons	No functional damage to module below 90N..
Insertion/removal cycles, SFP transceiver	50	N/A	Cycles	No functional damage to module, cage or connector

Table 2 Insertion, Extraction and Retention Forces for SFP Transceivers

Regulatory Requirements

Unless otherwise specified, the DM780x G.hn SFP transceiver module shall meet the current version, at the time of manufacturing, of the applicable EMI/EMC specifications for telecommunication network and information technology/multimedia equipment.

Radiated Emission (RE)

The DM780x G.hn SFP transceiver meets the applicable FCC Part 15 emission requirements.

(10.0 KHz – 18.0 GHz is recommended frequency range for radiated emission testing.)

Electrostatic Discharge (ESD)

The DM780x G.hn SFP module does not show susceptibility to conducted immunity when applied to the interface cable per the requirements of IEC 6100-4-2:

- Contact ESD only to the accessible portions of the module (i.e. front panel connector receptacle). 8 kV - Air Discharge and 4 kV – Contact discharge.

- Criteria B (see paragraph 6.7 for Criteria's definition) should be used as a measurable effect from ESD applied (25 discharges by polarity – both air/contact) to the system used with CuSFP modules

ID337 Certification

The DM780x G.hn SFP module shall be compliant to the G.hn certification requirements of ID-337.

Flammability

The PCB of the G.hn SFP module is min. V-0 UL flame rated. Applicable standards: UL/CSA 60950 and IEC 60950.

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Environmental and Quality Requirements

Accelerated Aging

The G.hn SFP transceiver module shall be subjected to an accelerated aging test that exposes the module to 85C case temperature while being powered at 3.3V for 2000 hours.

Failure criteria: The product is considered to have failed this test if any of the following occurred:

1. Failure of test unit to perform ping or traffic test;
2. Excessive corrosion of components.

Relative Humidity (Non-Operational)

The G.hn SFP transceiver module shall be subjected to the temperature and humidity profile as per MIL STD 202G Method 103B,

- Test description: The module shall be subjected to the temperature and humidity profile of 85C/85% RH for 1000 hours. The product shall be non-operational during this entire period.

- Failure criteria: The product is considered to have failed this test if any of the following occurred:

1. Failure of test unit to perform ping or traffic test;
2. Excessive corrosion of components.

Shock and Vibration

- Mechanical shock test
The mechanical shock test shall use the following specification:
A half-sine wave shock shall be applied on the DUT, 5 times per direction for 6 directions.
Peak acceleration of the input 1500G. Pulse width of half-sine wave 0.5ms.
- Vibration test
The vibration test shall use the following specification:
A random vibration input for a period of 4 min per cycle, 4 cycle per axis.
The input acceleration level shall be 20G over the frequency band of 20 to 2000 Hz.
- Failure criteria: The product is considered to have failed this test if any of the following occurred:
 1. Failure of test unit to perform ping or traffic test;
 2. Excessive corrosion of components.

Temperature Cycling

Thirty-two Modules shall be placed in a temperature cycling chamber (16 operational and 16 non-operational). The temperature extremes shall be -5°C to +85°C. The dwell time at each temperature extreme shall be 10 minutes. The transition time between each temperature extreme shall be 8 minutes. 100 thermal cycles shall be complete. There shall be no evidence of any electrical or physical degradation to the samples, as a result of the thermal cycling.



Parameter	Symbol	Min	Max	Units	Notes
Storage Temperature	Ts	-40	85	°C	
Relative Humidity	RH	5	95	%	
Supply Voltage (3.3V)	Vcc		3.6	VDC	
Low Speed Input Voltage		-0.5	Vcc+0.3	V	
Two-Wire Interface Input Voltage		-0.3	Vcc+0.5	V	

Table 3: Module Specifications: Absolute Maximum Operating Conditions

Parameter	Symbol	Min	Typ	Max	Units	Notes
Operating Case Temperature	Tc	-40		85	°C	
Supply Voltage (3.3V)	Vcc	3.135	3.3	3.465	VDC	
Power (100m @ 25C ambient)				2.0	W	CW1420 phone line

Table 4: Module Specifications: Recommended Operating Conditions

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Serial Identification

The module identification is located in the EEPROM, which is accessed over the 2-wire serial management interface. The address of the EEPROM is 0xA0 (1010000X). The following table shows the SFP EEPROM memory map and the actual data.

Data Address	Field Size	Field Name	Field Description	Field Value	Value Description
BASE ID FIELDS					
0	1	Identifier	Type of transceiver	03	SFP TRANSCEIVER
1	1	Ext. Identifier	Extended identifier of type of serial transceiver	04	WITH SERIAL ID
2	1	Connector	Code for connector type	TBD	RJ-11 Connector
3-10	8	Transceiver	Code for electronic or optical compatibility	00,00,00,00, 00,00,00,00	Wave-2 G.hn is Undefined in SFF- 8472
11	1	Encoding	Code for serial encoding algorithm	00	UNSPECIFIED
12	1	BR, Nominal	Nominal signaling rate, units of 100Mbits/sec	TBD	Bit Rate
13	1	Rate Identifier	Type of rate select functionality	00	UNSPECIFIED
14	1	Length (SMF, km)	Link length supported for single mode fiber, units of km	00	NA
15	1	Length (SMF)	Link length supported for single mode fiber, units of 100m	00	NA
16	1	Length (50µm)	Link length supported for 50µm OM2 fiber, units of 10m	00	NA
17	1	Length (62.5µm)	Link length supported for 62.5µm OM1 fiber, units of 10m	00	NA
18	1	Length (cable)	Link length supported for copper or direct attach cable, units of m	1E	30
19	1	Length (OM3)	Link length supported for 50µm OM3 fiber, units of 10m	00	RESERVED
20-35	16	Vendor name	SFP vendor name (ASCII)	4D,65,74,68, 6F,64,65,20, 45,6C,65,63, 2E,20,20,20	Methode Elec (ASCII)
36	1	Transceiver	Code for electronic or optical compatibility	01	UNALLOCATED
37-39	3	Vendor OUI	SFP transceiver vendor IEEE company ID	00,17,05	Methode OUI
40-55	16	Vendor PN	Part number provided by SFP transceiver vendor (ASCII)	TBD	DM780x (ASCII)
56-59	4	Vendor rev	Revision level for part number provided by vendor (ASCII)	TBD	
60-61	2	Wavelength	Laser wavelength (Passive/Active Cable Specification Compliance)	00,00	RESERVED
62	1	Unallocated		00	RESERVED
63	1	CC_BASE	Check code for Base ID Fields (addresses 0 to 62)	VARIABLES	
EXTENDED ID FIELDS					
64-65	2	Options	Indicates which optional SFP signals are implemented	00,00	
66	1	BR, max	Upper bit rate margin, units of %	00	
67	1	BR, min	Lower bit rate margin, units of %	00	
68-83	16	Vendor SN	Serial number provided by vendor (ASCII)	VARIABLES	(ASCII)
84-91	8	Date code	Vendor's manufacturing date code	VARIABLES	YY-MM-DD-LOT#
92	1	Diagnostic Monitoring Type	Indicates which type of diagnostic monitoring is implemented (if any)	00	None included
93	1	Enhanced Options	Indicates which optional enhanced features are implemented (if any)	00	None included
94	1	SFF-8472 Compliance	Indicates which revision of SFF-8472 the transceiver complies with	00	None included
95	1	CC_EXT	Check code for the Extended ID Fields (addr. 64 to 94)	VARIABLES	
VENDOR SPECIFIC ID FIELDS					
96-127	32	Vendor Specific	Vendor Specific EEPROM		
128-255	128	Reserved	Reserved		

Table 5: SFP MSA Serial ID Data

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