Data Controls

GB1510-SFP-SC.S80

GB1570-SFP-SC.S80

GB1510-SFP-SC.S120

GB1570-SFP-SC.S120

Single-Mode 100Mbps to1.25Gbps FE/GBE

SC Single-Fiber SFP Transceiver

RoHS6 Compliant

Features

◆ Up to 1.25Gbps Data Links

◆ 24/34dB power budget

◆ Tx/Rx Wavelength are compliant with ITU-T G.694.2, with wavelength spacing more than 60nm

◆ Single 3.3V Power supply and TTL Logic Interface

◆ Hot-Pluggable SFP Footprint Simplex SC Connector Interface

◆ Class 1 FDA and IEC60825-1 laser safety compliant

◆ Operating Case Temperature

Standard: 0℃~+70℃ Industrial: -20℃~+85℃

◆ Compliant with SFP MSA

◆ Compliant with SFF-8472

Applications

◆ Fiber Channel Links

◆ Gigabit Ethernet

◆ Fast Ethernet

◆ WDM Gigabit Ethernet Links

◆ Other Optical Links

Ordering information

Part No.	Data Rate	Power budget	Interface	Temp.	DDMI
GB1510-SFP-SC.S80 GB1570-SFP-SC.S80	125~1250Mbps	≥24dB	SC	Standard	YES
GB1510-SFP-SC.S80(WT) GB1570-SFP-SC.S80(WT)	125~1250Mbps	≥24dB	SC	Industrial	YES
GB1510-SFP-SC.S120 GB1570-SFP-SC.S120	125~1250Mbps	≥34dB	SC	Standard	YES
GB1510-SFP-SC.S120(WT) GB1570-SFP-SC.S120(WT)	125~1250Mbps	≥34dB	SC	Industrial	YES

Typical Tx/Rx Combinations and Wavelength

Standard Version PN	Tx	Rx
GB1510-SFP-SC.Sxx	1510nm	1570nm
GB1570-SFP-SC.Sxx	1570nm	1510nm

Regulatory Compliance*[Note2]

Product Certificate	Certificate Number	Applicable Standard
TUV	R50135086	EN 60950-1:2006+A11+A1+A12+A2
		EN 60825-1:2014
		EN 60825-2:2004+A1+A2
UL	E317337	UL 60950-1
		CSA C22.2 No. 60950-1-07
EMC CE	AE 50285865 0001	EN 55022:2010
		EN 55024:2010
FCC	WTF14F0514417E	47 CFR PART 15 OCT., 2013
FDA	/	CDRH 1040.10
ROHS	/	2011/65/EU

Note2: The above certificate number updated to June 2014, because some certificate will be updated every year, such as FDA and ROHS. For the latest certification information, please check with Data Controls Inc..

Product Description

The GB1510/1570-SFP-SC.Sxx Series is small form factor pluggable module for GBE/FC single fiber communications. It is with the SFP 20-pin connector to allow hot plug capability. The GB1510/1570-SFP-SC.Sxx series are designed to be compliant with SFF-8472.

Absolute Maximum Ratings

Parameter	Symbol	Min.	Max.	Unit
Storage Temperature	T_S	-40	+85	°C
Supply Voltage	V_{CC}	-0.5	3.6	V
Operating Relative Humidity		-	95	%

*Exceeding any one of these values may destroy the device immediately.

Recommended Operating Conditions

Parameter		Symbol		Min.	Typical	Max.	Unit
Operating Case Temperature		T_c	GB1510/1570-SFP-SC.Sxx	0		+70	°C
			GB1510/1570-SFP-SC.Sxx(WT)	-20		+85	
Power Supply Voltage		V_{CC}		3.15	3.3	3.45	V
Power Supply Current		I_{CC}				300	mA
Date Rate	FE					100	Mbps
	FC					1.063	Gbps
	GBE					1.25	Gbps

Performance Specifications - Electrical

Parameter		Symbol	Min.	Typ.	Max	Unit	Notes
Transmitter							
LVPECL Inputs(Differential)		Vin	400		2000	mVpp	AC coupled inputs*[note5]
Input Impedance (Differential)		Zin	85	100	115	ohms	Rin > 100 kohms @ DC
Tx_Dis	Disable		2		Vcc	V	
	Enable		0		0.8		
Tx_FAULT	Fault		2		Vcc+0.3	V	
	normal		0		0.5		
Receiver							
LVPECL Outputs (Differential)		Vout	370		2000	mVpp	AC coupled outputs*[note5]
Output Impedance (Differential)		Zout	85	100	115	ohms	
Rx_LOS	LOS		2		Vcc+0.3	V	
	normal		0		0.8	V	
MOD_DEF (0:2)	VoH	2.5				V	With Serial ID
	VoL	0			0.5	V	

Performance Specifications - Optical

LOS Hysteresis*[note8]			0.5		dB

GB1510-SFP-SC.S80 / GB1570-SFP-SC.S80

Parameter	Symbol	Min.	Typical	Max.	Unit
Power budget		24			dB
Data Rate		100		1250	Mbps
Transmitter					
Channel Centre Wavelength*[note9]		λ_C-6	λ_C	λ_C+7.5	nm
Spectral Width (-20dB)	$\Delta\lambda$			1	nm
Side Mode Suppression Ratio	SMSR	30			dB
Average Output Power*[note3]	Pout	0		+5	dBm
Extinction Ratio*[note4]	ER	9			dB
Rise/Fall Time(20%~80%)	tr/tf			2	ns
Output Optical Eye*[note4]	Compliant with IEEE 802.3ah-2004*[note7]				
TX_Disable Assert Time	t_off			10	Us
Receiver					
Channel Centre Wavelength*[note9]		λ-20	λ	λ+20	nm
Receiver Sensitivity*[note6]	Pmin			-24	dBm
Receiver Overload	Pmaxa	-3			dBm
Return Loss		12			dB
Optical Path Penalty				1	dB
LOS De-Assert	LOSD			-25	dBm
LOS Assert	LOSA	-35			dBm
LOS Hysteresis*[note8]		0.5			dB

GB1510-SFP-SC.S120 / GB1570-SFP-SC.S120

Parameter	Symbol	Min.	Typical	Max.	Unit
Power budget		34			dB
Data Rate		100		1250	Mbps
Transmitter					
Channel Centre Wavelength*[note9]		λ_C-6	λ_C	λ_C+7.5	nm
Spectral Width (-20dB)	$\Delta\lambda$			1	nm
Side Mode Suppression Ratio	SMSR	30			dB
Average Output Power*[note3]	Pout	+1		+5	dBm
Extinction Ratio*[note4]	ER	9			dB
Rise/Fall Time(20%~80%)	tr/tf			2	ns
Output Optical Eye*[note4]	I Compliant with IEEE 802.3ah-2004*[note7]				
TX_Disable Assert Time	t_off			10	Us
Receiver					
Channel Centre Wavelength*[note9]		λ-20	λ	λ+20	nm
Receiver Sensitivity*[note6]	Pmin			-33	dBm
Receiver Overload	Pmax	-8			dBm
Return Loss		12			dB
Optical Path Penalty				1	dB
LOS De-Assert	LOSD			-34	dBm
LOS Assert	LOSA	-45			dBm
LOS Hysteresis*[note8]		0.5			dB

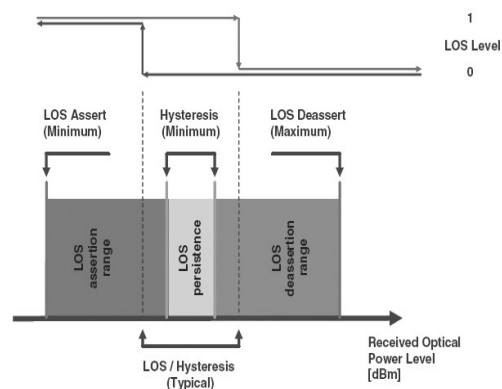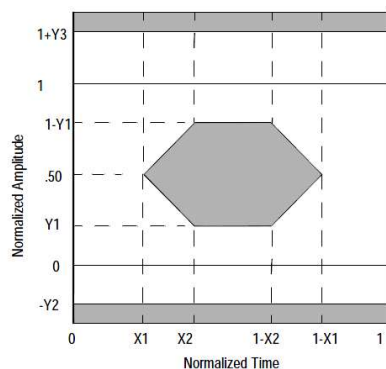Note3: Output is coupled into a 9/125μm single-mode fiber.

Note4: Filtered, measured with a PRBS 2^7-1 test pattern @1250Mbps.

Note5: LVPECL logic, internally AC coupled.

Note6: Measured at all data rates specified in Data Rate table with ER=9 dB, 2^7-1 PRBS data pattern, BER <1E-12.
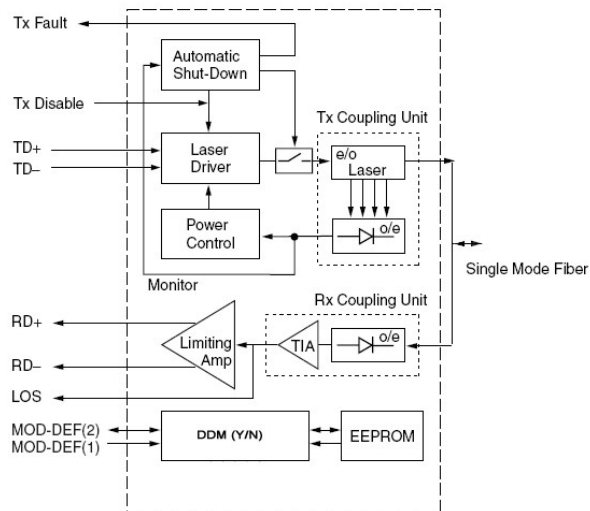
Note7: Eye pattern mask   Note8: LOS Hysteresis
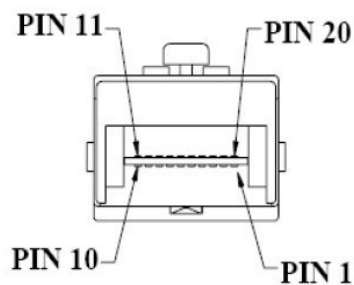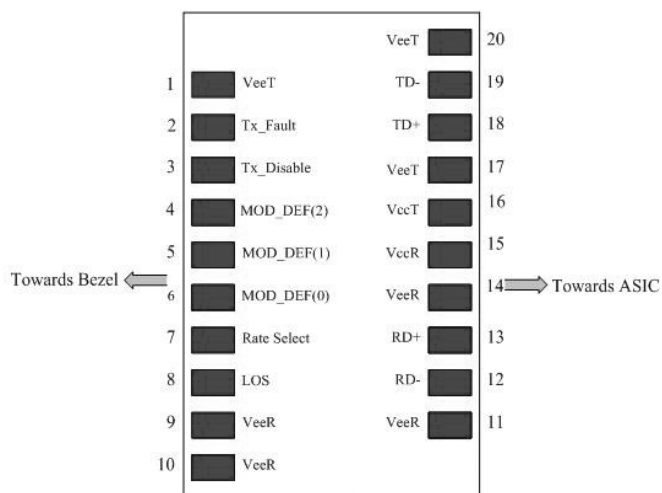

Note9: The channel center wavelength of transmitter side is compliant with table <CWDM* Wavelength (0~70C)>, and the channel center wavelength of receiver side is the typical wavelength of CWDM channel ±20nm

Functional Description of Transceiver

SFP Transceiver Electrical Pad Layout

Pin Function Definitions

Pin Num.	Name	FUNCTION	Plug Seq.	Notes
1	VeeT	Transmitter Ground	1	5)
2	TX Fault	Transmitter Fault Indication	3	1)
3	TX Disable	Transmitter Disable	3	2), Module disables on high or open
4	MOD-DEF2	Module Definition 2	3	3) 2 wire serial ID interface.
5	MOD-DEF1	Module Definition 1	3	3) 2 wire serial ID interface.
6	MOD-DEF0	Module Definition 0	3	3), Grounded within the module.
7	Rate Select	Not Connect	3	Function not available
8	LOS	Loss of Signal	3	4)
9	VeeR	Receiver Ground	1	5)
10	VeeR	Receiver Ground	1	5)
11	VeeR	Receiver Ground	1	5)
12	RD-	Inv. Received Data Out	3	6)
13	RD+	Received Data Out	3	7)
14	VeeR	Receiver Ground	1	5)
15	VccR	Receiver Power	2	3.3 ± 5%, 7)
16	VccT	Transmitter Power	2	3.3 ± 5%, 7)
17	VeeT	Transmitter Ground	1	5)
18	TD+	Transmit Data In	3	8)
19	TD-	Inv. Transmit Data In	3	8)
20	VeeT	Transmitter Ground	1	5)

Notes:

1) TX Fault is an open collector/drain output, which should be pulled up with a 4.7K – 10KΩ resistor on the host board. Pull up voltage between 2.0V and VccT, R+0.3V. When high, output indicates a laser fault of some kind. Low indicates normal operation. In the low state, the output will be pulled to < 0.8V.

2) TX disable is an input that is used to shut down the transmitter optical output. It is pulled up within the module with a 4.7 – 10 K Ω resistor. Its states are:
Low (0 – 0.8V): Transmitter on (>0.8, <
2.0V): Undefined
High (2.0 – 3.465V): Transmitter Disabled
Open: Transmitter Disabled

3) Mod-Def 0,1,2. These are the module definition pins. They should be pulled up with a 4.7K – 10KΩ resistor on the host board. The pull-up voltage shall be VccT or VccR. Mod-Def 0 is grounded by the module to indicate that the module is present Mod-Def 1 is the clock line of two wire serial interface for serial ID Mod-Def 2 is the data line of two wire serial interface for serial ID

4) LOS (Loss of Signal) is an open collector/drain output, which should be pulled up with a 4.7K –

10KΩ resistor. Pull up voltage between 2.0V and VccT, R+0.3V. When high, this output indicates the received optical power is below the worst-case receiver sensitivity (as defined by the standard in use). Low indicates normal operation. In the low state, the output will be pulled to < 0.8V.

5) VeeR and VeeT may be internally connected within the SFP module.

6) RD-/+: These are the differential receiver outputs. They are AC coupled 100Ω differential lines which should be terminated with 100Ω (differential) at the user SERDES. The AC coupling is done inside the module and is thus not required on the host board. The voltage swing on these lines will be between 370 and 2000 mV differential (185 –1000 mV single ended) when properly terminated.
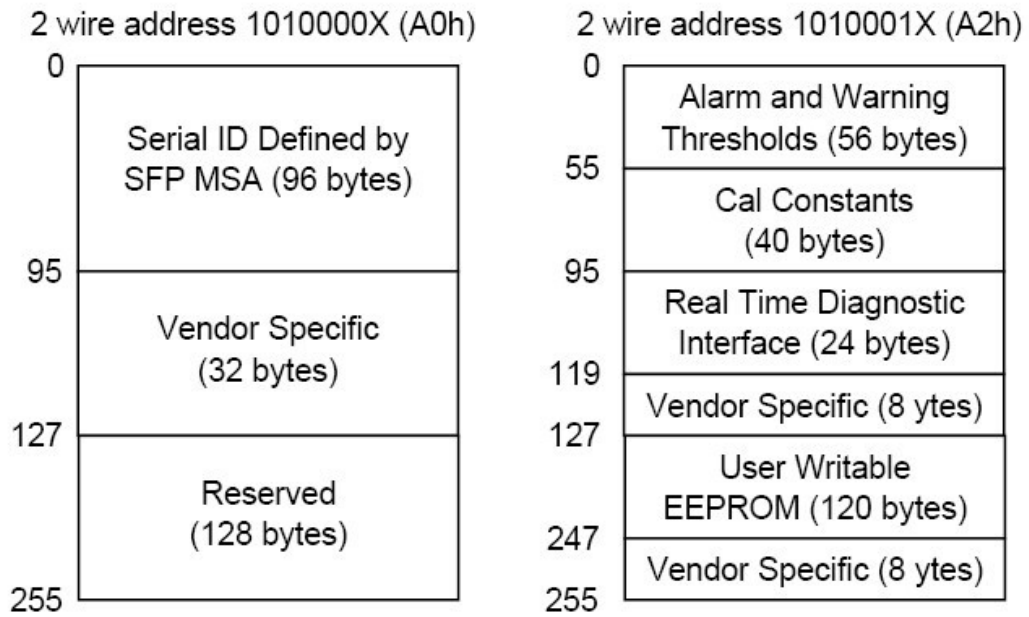
7) VccR and VccT are the receiver and transmitter power supplies. They are defined as 3.3V ±5% at the SFP connector pin. Maximum supply current is 300mA. Recommended host board power supply filtering is shown below. Inductors with DC resistance of less than 1 ohm should be used in order to maintain the required voltage at the SFP input pin with 3.3V supply voltage. When the recommended supply-filtering network is used, hot plugging of the SFP transceiver module will result in an inrush current of no more than 30mA greater than the steady state value. VccR and VccT may be internally connected within the SFP transceiver module.

8) TD-/+: These are the differential transmitter inputs. They are AC-coupled, differential lines with 100Ω differential termination inside the module. The AC coupling is done inside the module and is thus not required on the host board. The inputs will accept differential swings of 400 – 2000 Mv (250 – 1200Mv single-ended), though it is recommended that values between 500 and 1200 Mv differential (250 – 600Mv single-ended) be used for best EMI performance.
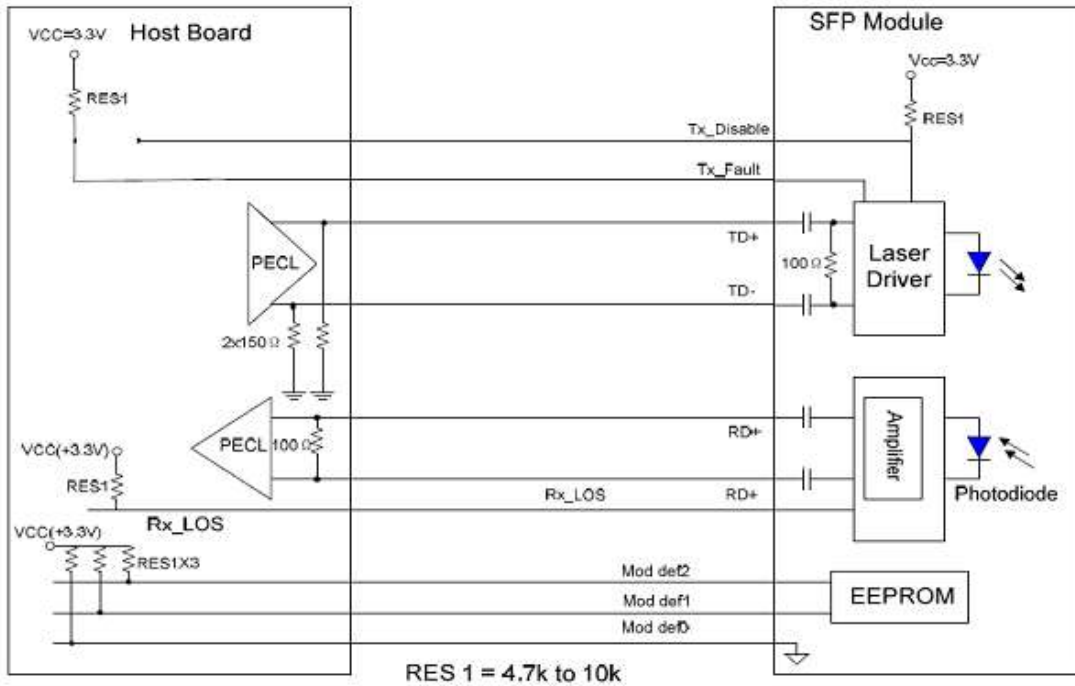
EEPROM

The serial interface uses the 2-wire serial CMOS EEPROM protocol defined for the ATMEL AT24C02/04 family of components. When the serial protocol is activated, the host generates the serial clock signal (SCL). The positive edge clocks data into those segments of the EEPROM that are not write protected within the SFP transceiver. The negative edge clocks data from the SFP transceiver. The serial data signal (SDA) is bi-directional for serial data transfer. The host uses SDA in conjunction with SCL to mark the start and end of serial protocol activation. The memories are organized as a series of 8-bit data words that can be addressed individually or sequentially.
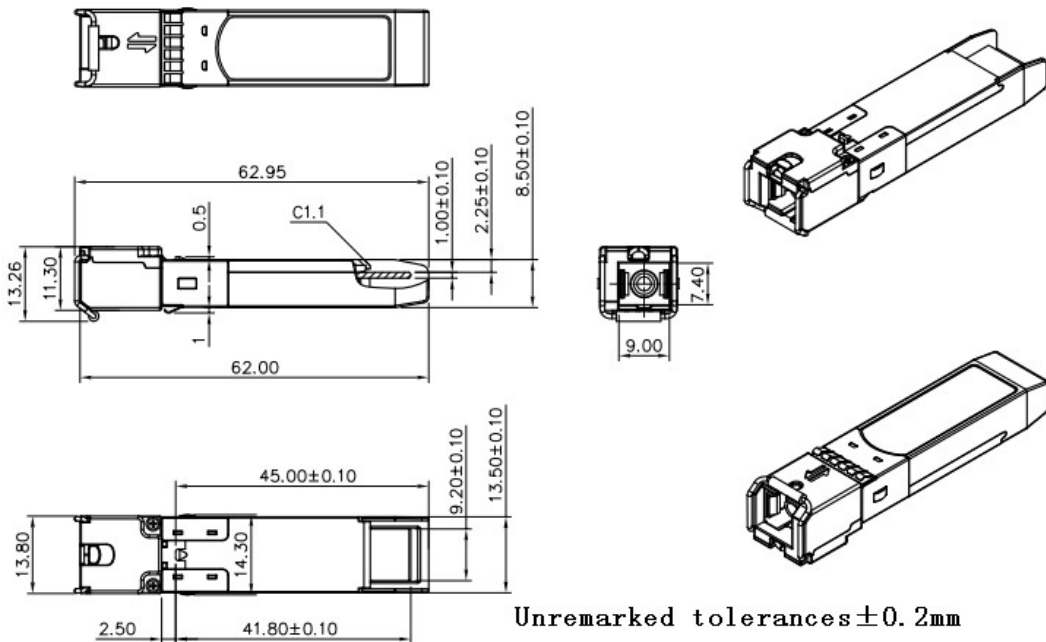
The Module provides diagnostic information about the present operating conditions. The transceiver generates this diagnostic data by digitization of internal analog signals. Calibration and alarm/warning threshold data is written during device manufacture. Received power monitoring, transmitted power monitoring, bias current monitoring, supply voltage monitoring and temperature monitoring all are implemented. The diagnostic data are raw A/D values and must be converted to real world units using calibration constants stored in EEPROM locations 56 – 95 at wire serial bus address A2h. The digital diagnostic memory map specific data field define as following .For detail EEPROM information, please refer to the related document of SFF 8472 Rev 9.3.

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2 wire address 1010000X (A0h)

```
0   ┌──────────────────────┐
    │                      │
    │  Serial ID Defined by │
    │  SFP MSA (96 bytes)   │
    │                      │
95  ├──────────────────────┤
    │                      │
    │  Vendor Specific      │
    │  (32 bytes)           │
127 ├──────────────────────┤
    │                      │
    │  Reserved             │
    │  (128 bytes)          │
    │                      │
255 └──────────────────────┘
```

2 wire address 1010001X (A2h)

```
0   ┌──────────────────────┐
    │  Alarm and Warning    │
    │  Thresholds (56 bytes)│
55  ├──────────────────────┤
    │  Cal Constants        │
    │  (40 bytes)           │
95  ├──────────────────────┤
    │  Real Time Diagnostic │
    │  Interface (24 bytes) │
119 ├──────────────────────┤
    │  Vendor Specific (8 ytes)│
127 ├──────────────────────┤
    │  User Writable        │
    │  EEPROM (120 bytes)   │
247 ├──────────────────────┤
    │  Vendor Specific (8 ytes)│
255 └──────────────────────┘
```
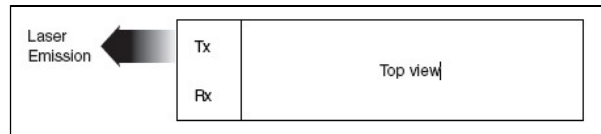
Recommend Circuit Schematic

Mechanical Specifications

SC

*This 2D drawing only for reference, please check with Data Controls Inc. before ordering.

Laser Emission

Obtaining Document

You can visit our website:http://www.dci.jp
Or contact Data Controls Inc.. Listed at the end of the documentation to get the latest documents.

Revision History

Revision	Revision History	Date
V1.2	Released.	Nov. 2010
V2a	Update power budget, Update pin definition notes Update the regulatory compliance, LOSA, optical output eye pattern mask and the 2D drawing.	Mar. 2018

Notice:

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