



## Applications

- High Power Distribution Networks
- Redundant Ring Architectures
- FTTx Networks
- RFOG Applications
- SAT-IF Transport

## Features

- Dual Redundant Power Supplies
- SNMP Network Interface
- Dual RF Inputs for CATV and SAT-IF
- Available on 100 GHz Spaced ITU DWDM C-band Channels
- Optimized RF Integration of Predistorter, Amplifiers, and EMCORE Laser
- Advanced SBS Suppression Technology
- Fiber Length Selectable Via Front Panel Control
- RoHS Compliant

## Direct-Modulation, DWDM, Low Distortion, Wideband

EMCORE's Medallion 8000 is a directly-modulated DWDM optical transmitter specifically designed for wideband applications that require both CATV and DBS signals to be transmitted over up to a 30 km length of fiber. This facilitates network designs that use a single transmitter to carry multiple signals.

The Medallion 8000 supports full 79-channel NTSC analog signal and/or a combination of QAM, DBS with reduced channel analog CATV. The Medallion 8000 can be selected as a fixed fiber length option to support a fixed length from 0 – 10 km, 5 – 15 km, 10 – 20 km and 15 – 25 km with 18 dBm SBS suppression maximum, or it can be ordered as a fiber length selectable option. This option allows the user to set the Medallion 8000 for best optimized CSO at any fiber length from 0 – 30 km with 1 km increments. At the selected fiber length, the unit can perform within specification with a fiber length of  $\pm 3$  km. The selectable fiber length option has a maximum SBS suppression of 20 dBm.

The Medallion 8000 family of transmitter products is designed to support various CATV transmitter applications with a common platform. A 75 $\Omega$  CATV RF video input supports frequencies up to 1002 MHz. Integrated within the transmitter design are EMCORE'S low chirp control, noise suppression circuitry, and patented predistortion technology to provide outstanding performance with any of EMCORE'S wide range of cooled broadband lasers. A second 75 $\Omega$  RF input supports frequencies up to 2700 MHz for FTTP, SAT-IF, and wireless applications.

## Performance Highlights

Parameters	Min	Typ	Max	Units
Operating Temperature Range	0	25	50	°C
Wavelength (100 GHz ITU Options)	1530	-	1560	nm
Optical Power (Fixed fiber length option)	7	-	-	dBm
Frequency Response (75 $\Omega$ CATV Port)	47	-	1002	MHz
(7 $\Omega$ SAT-IF Port)	950	-	2700	
CNR (79 ch, NTSC, 10 – 20 km)	50.5	-	-	dB
CSO (79 ch, NTSC)	-	-	-58	dBc
CTB (79 ch, NTSC)	-	-	-65	dBc
C/I (3 <sup>rd</sup> order, 950 – 2600 MHz)	-	-	-60	dBc

### Absolute Maximum Ratings

Stresses in excess of the absolute maximum ratings can cause permanent damage to the device. These are absolute stress ratings only. Functional operation of the device is not implied at these or any other conditions in excess of those given in the operational sections of the data sheet. Exposure to absolute maximum ratings for extended periods can adversely affect device reliability.

Parameter	Symbol	Min	Max	Unit
Storage Temperature (power off)	$T_{stg}$	-40	85	°C
75ohm CATV RF Input Level	Manual Mode	-	-10	dBm
	AGC Mode	-	-5	
L-Band RF Input Level	-	-	+5	dBm
AC Input Range	$V_{AC}$	90	265	$V_{AC}$
AC Input Frequency Range	$f_{AC}$	50	60	Hz
Power Consumption	P	-	50	W

### Optical Characteristics

Parameter	Condition	Min	Typ	Max	Unit
Optical Output Power	8000 with selectable fiber length (8000-U-SEL)	10	-	-	dBm
	8000 with fixed fiber length option	7	-	-	
SBS Threshold	8000 with fixed fiber length option	-	-	18	dBm
	8000 with selectable fiber length option (8000-U-SEL)	-	-	20	
Wavelength	-	ITU Channel			nm
Side Mode Suppression Ratio	-	30	-	-	dB
Optical Return Loss <sup>1</sup>	APC style connector	40	-	-	dB

1. In order to prevent reflection-induced distortion, the laser must be connected to an optical cable having a return loss of at least 55 dB for discrete reflections and 30 dB for distributed reflections.

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## RF Characteristic

The following specifications are reference at 25°C. The CATV test receiver is the EMCORE receiver, model 7820A, with responsivity of 0.95 A/W (at 1550 nm). Test fiber is single mode, Corning SMF-28 (or equivalent) with 0.25 dB/km maximum loss (at 1550 nm). In order to prevent reflection-induced distortion, the transmitter subassembly must be connected to an optical cable with discrete reflections < -55 dB and distributed reflections < -30 dB.

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Operating Temperature Range	T <sub>op</sub>	<b>Note 1</b>	0	-	50	°C
CATV Response Flatness	S <sub>21-CATV</sub>	47 MHz – 1002 MHz, Peak to Valley	-	-	1.5	dB
CATV Test Port Response Flatness	S <sub>21-TP-CATV</sub>	Relative to CATV Input 47 MHz – 1002 MHz, 75 Ω	-1	-	1	dB
CATV Input Return Loss	S <sub>11-CATV</sub>	47 MHz – 1002 MHz, 75 Ω	16	-	-	dB
CATV Test Port Return Loss	S <sub>11-TP-CATV</sub>	47 MHz – 1002 MHz, 75 Ω	16	-	-	dB
CATV Input RF Level	P <sub>in-CATV</sub>	See CATV 75 ohm Input Option Table				dBmV/ch
CATV RF Test Point Level	P <sub>out-TP-CATV</sub>	Relative to CATV Input, 75 Ω	-21	-20	-19	dBm
AGC Range	-	Perform to specification	-3	-	+3	dB
CATV Input Power Detection Range	-	<b>Note 1</b> Relative to nominal CATV input power level	-5	-	+5	dB
L-Band Input RF Level Composite	P <sub>in-Lband</sub>	36 ch BSCS-IF at 83.2 dBuV/ch	-	-	-10	dBm
L-Band Input Power Detection Range	-	<b>Note 2</b> Relative to nominal L-Band input power level	-5	-	+5	dB
L-Band Response Flatness	S <sub>21-Lband</sub>	950 MHz – 2700 MHz, Peak to valley, 75 Ω	-	-	3.5	dB
L-Band RF Test Port Response Flatness	S <sub>21-TP-Lband</sub>	Relative to L-Band Input 950 MHz – 2700 MHz, 75 Ω	-2	-	+2	dB
L-Band Return Loss	S <sub>11-Lband</sub>	950 MHz – 2700 MHz, 75 Ω	10	-	-	dB
L-Band Test Port Return Loss	S <sub>11-TP-Lband</sub>	950 MHz – 2700 MHz, 75 Ω	10	-	-	dB
L-Band Test Port Level	P <sub>out-TP-Lband</sub>	Relative to L-Band Input, 75 Ω	-21	-20	-19	dBm
L-Band Input C/I (3 <sup>rd</sup> Order)	C/I <sub>Lband</sub>	F1=2000 MHz, F2=2000.5 MHz 2-tone @ -13 dBm/line Rx Opt Power = 0 dBm CATV Input with Loading specified in CATV 75 Ω Input Option	-	-	-60	dBc
Relative Intensity Noise	RIN	Opt RL > 40 dB <b>Note 3</b>	-	-	-155	dB/Hz

1. Detects and display RF power of CATV input port. The total input power is defined in section 3.10 and 3.11.
2. Detects and display RF power of the L-Band input port.
3. Guaranteed by design.

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## Noise and Distortion Characteristics for CATV Input

### Fix Fiber Length Option:

CATV 75Ω Input Option	RF Level/ch (dBmV)	Composite (dBm)	BER <sup>(5)</sup>	CNR <sup>(1,2)</sup> (dB)	CSO <sup>(1,3,6)</sup> (dBc)	CTB <sup>(1,3,6)</sup> (dBc)
79 ch NTSC <sup>(4)</sup> 0-10 km, 5-15 km, 10-20 km 15-25 km	15	-14.77	-	50.5 50	-58	-65
79 ch NTSC + 75ch QAM @ -6 dB <sup>(4)</sup> 0-10 km, 5-15 km, 10-20 km 15-25 km	79 ch = 15 75 ch QAM = 9	-13.84	10 <sup>-5</sup>	50 49	-58	-65
42 ch CENELEC <sup>(4)</sup> 0-10 km, 5-15 km, 10-20 km 15-25 km	17.75	-14.77	-	50.5 50	-58	-65
60 ch PAL <sup>(4)</sup> 0-10 km, 5-15 km, 10-20 km 15-25 km	16.2	-14.77	-	50.5 50	-58	-65
JCTEA: 57 ch Analog + 40 ch QAM @ -10 dB <sup>(7)</sup> 0-10 km, 5-15 km, 10-20 km 15-25 km	57 ch = 16.2 40 ch QAM = 6.2	-14.70	-	46 45	-58	-65
JCTEA: 11 ch Analog + 80 ch QAM @ -10 dB <sup>(8)</sup> 0-10 km, 5-15 km, 10-20 km 15-25 km	11 ch = 21.2 80 ch QAM = 11.2	-14.76	-	46 45	-58	-65

1. Test fiber length is based on the model. For example: 20 km option is tested with 3 m, 10 km and 20 km of SMF28 fiber; 25 km option is tested with 3 m, 15 km and 25 km of SMF28 fiber.

2. CNR may degrade **up** to 0.5 dB over the operating temperature range.

3. CSO and CTB may degrade up to 1.5 dB over the temperature range.

4. Test with EDFA, **-0 dBm** received optical power.

5. QAM format = 256-QAM, ITU-T J.83 Annex C, Analog channels are modulated.

6. L-band input is injected with 2 tones, F1 = 2000 MHz, F2 = 2000.5 MHz with -13 dBm/tone.

7. Test with EDFA, **-6 dBm** received optical power, QAM format = 64-QAM. 2 tones, F1 = 2000 MHz, F2 = 2000.5 MHz, applied to L-Band port with -13 dB/tone.

8. Test with EDFA, **-8 dBm** received optical power, QAM format = 64-QAM. 2 tones, F1 = 2000 MHz, F2 = 2000.5 MHz, applied to L-Band port with -13 dB/tone.

### Selectable Fiber Length Option (8000-U-SEL):

CATV 75 Ω Input Option	RF Level/ch (dBmV)	Composite (dBm)	BER <sup>(5)</sup>	CSO <sup>(1,3,6)</sup> (dBc)	CTB <sup>(1,3,6)</sup> (dBc)
79 ch NTSC <sup>(4)</sup>	15	-14.77	-	-58	-65
79 ch NTSC + 75 ch QAM @ -6 dB <sup>(4)</sup>	79 ch = 15 75 ch QAM = 9	-13.84	10 <sup>-5</sup>	-58	-65
42 ch CENELEC <sup>(4)</sup>	17.75	-14.77	-	-58	-65

### Selectable Fiber Length Option (8000-U-SEL) continued:

CATV 75 Ω Input Option	RF Level/ch (dBmV)	Composite (dBm)	BER <sup>(5)</sup>	CSO <sup>(1,3,6)</sup> (dBc)	CTB <sup>(1,3,6)</sup> (dBc)
60 ch PAL <sup>(4)</sup>	16.2	-14.77	-	-58	-65
JCTEA: 57 ch Analog + 40 ch QAM @ -10 dB <sup>(7)</sup>	57 ch = 16.2 40 ch QAM = 6.2	-14.70	-	-58	-65
JCTEA: 11 ch Analog + 80 ch QAM @ -10 dB <sup>(8)</sup>	11 ch = 21.2 80 ch QAM = 11.2	-14.76	-	-58	-65

1. Test fiber length is from 0 – 30 km of SMF28 fiber.
2. CNR may degrade **up** to 0.5 dB over the operating temperature range.
3. CSO and CTB may degrade up to 1.5 dB over the temperature range.
4. Test with EDFA, **-0 dBm** received optical power.
5. QAM format = 256-QAM, ITU-T J.83 Annex C, Analog channels are modulated.
6. L-band input is injected with 2 tones, F1 = 2000 MHz, F2 = 2000.5 MHz with -13 dBm/tone.
7. Test with EDFA, **-6 dBm** received optical power, QAM format = 64-QAM. 2 tones, F1 = 2000 MHz, F2 = 2000.5 MHz, applied to L-Band port with -13d B/tone.
8. Test with EDFA, **-8 dBm** received optical power, QAM format = 64-QAM. 2 tones, F1 = 2000 MHz, F2 = 2000.5 MHz, applied to L-Band port with -13 dB/tone.

### Package Characteristics

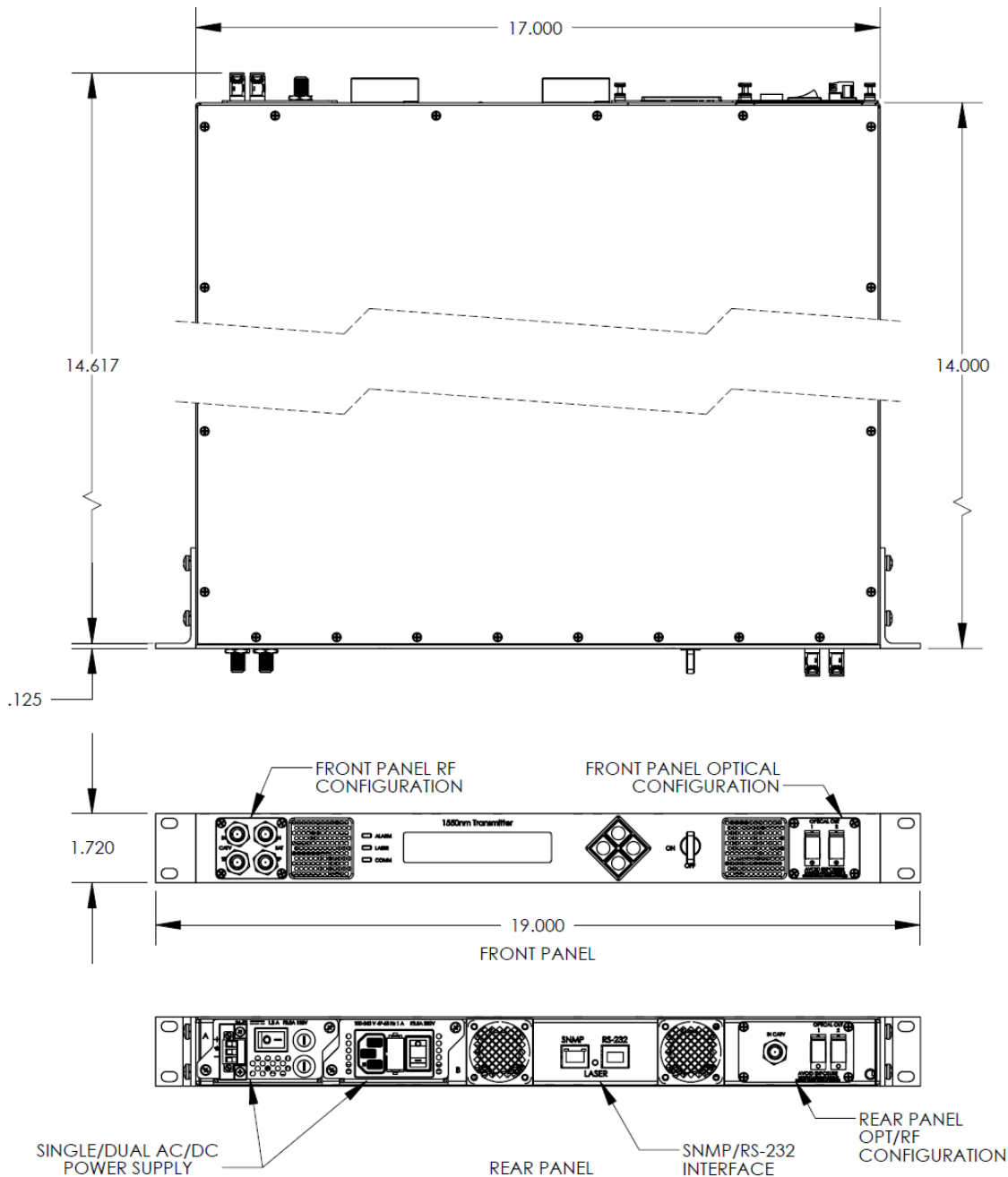
Parameter	Dimension	Unit
Height	1.72, 1RU	Inch
Width	19	Inch
Depth	14.617 with fans and connectors	Inch
Weight	8.5	lbs

### ITU Channel Numbering

Channel	Wavelength	Channel	Wavelength	Channel	Wavelength
62	1527.99	47	1539.77	32	1551.72
61	1528.77	46	1540.56	31	1552.52
60	1529.55	45	1541.35	30	1553.33
59	1530.33	44	1542.14	29	1554.13
58	1531.12	43	1542.94	28	1554.94
57	1531.90	42	1543.73	27	1555.75
56	1532.68	41	1544.53	26	1556.56
55	1533.47	40	1545.32	25	1557.36
54	1534.25	39	1546.12	24	1558.17
53	1535.04	38	1546.92	23	1558.98
52	1535.82	37	1547.72	22	1559.79
51	1536.61	36	1548.51	21	1560.61
50	1537.40	35	1549.32	20	1561.42
49	1538.19	34	1550.12	19	1562.23
48	1538.98	33	1550.92	18	1563.05

# Medallion 8000 Series 1550 nm Directly-Modulated Transmitter

## Outline Drawing (dimensions are in inches)



## Ordering Information – Model Number Options

### 8000-U-vvv-www-xxx-yy-zzz-aa-pp

#### Fiber Length

vvv = 010, 0 – 10 km, fixed fiber length, CSO is optimized at 5 km  
vvv = 015, 5 – 15 km, fixed fiber length, CSO is optimized at 10 km  
vvv = 020, 10 – 20 km, fixed fiber length, CSO is optimized at 15 km  
vvv = 025, 15 – 25 km, fixed fiber length, CSO is optimized at 20 km  
vvv = SEL, Selectable fiber length, CSO is optimized at the selected fiber length

#### CATV Channel Plan

www = 079, 79 ch NTSC  
www = 79Q, 79 ch NTSC + 75 ch QAM (256QAM format)  
www = 042, 42 ch CENELEC  
www = 060, 60 ch PAL  
www = 11J, JCTEA, 11 ch Analog + 80 ch QAM (64QAM format)  
www = 57J, JCTEA, 57 ch Analog + 40 ch QAM (64QAM format)

#### Input Option

xxx = C75, CATV input only.  
xxx = L75, CATV input + 75  $\Omega$  L-band input

#### ITU Grid Wavelength (Contact factory for available ITU channels)

See **Appendix 1.0** for the standard list of wavelengths.

yy = 00, Non-ITU grid  
yy = 21, Channel 21, 1560.61 nm  
.....  
yy = 40, Channel 40, 1545.32 nm

#### Optical Output Option

zzz = 110: Single Optical Output, 10 dBm (10 mW) – Only for 8000-U-SEL option  
zzz = 107: Single Optical Output, 7 dBm (5 mW)

#### Optical Connector

aa = FA, FC/APC  
aa = SA, SC/APC  
aa = E2, E2000/APC

#### Power Supply

pp = AA: Dual AC Power Supply  
zz = AD: One AC and One DC Power Supply  
zz = DD: Dual DC Power Supply

#### Example:

**8000-U-010-079-L75-21-107-SA-AA**, 1550 nm DFB direct-modulation transmitter, 0 to 10 km, 79 ch NTSC, CATV input + 75 ohm L-band input, ITU ch21, single output 7 dBm, SC/APC connector, dual AC power supply

# Medallion 8000 Series 1550 nm Directly-Modulated Transmitter

## Laser Safety Information

This product meets the appropriate standard in Title 21 of the Code of Federal Regulations (CFR). FDA/CDRH Class IIIb laser product. A supplemental FDA application has been filed and it is anticipated that the accession number for this product will be 0220309 since this accession number is from a similar product family.

Single-mode fiber pigtail with SC/APC connectors (standard).

Wavelength = 1.5  $\mu\text{m}$ .

Maximum power = 30 mW.

**Caution:** Use of controls, adjustments and procedures other than those specified herein may result in hazardous laser radiation exposure.

