VMC-R-X-2 Optical SMPTE 292M/297M/259M/305M/310M Video BNC to "ST" Media Converter (Simplex Receiver)

SIMPLEX RECEIVER ORDERING INFORMATION

VMC - R - X - 2

WAVELENGTH
2 = 1310nm FP (Single Mode)

PROTOCOL
S = SMPTE 259M/297M/305M/310M (19.4/143/177/270/360/540Mbps)
H = SMPTE 292M/297M/259M/305M/310M (19.4/143/177/270/360/540/1485Mbps)

MODULE CONFIGURATION
R = Simplex Receiver

STRATOS
optical technologies
7444 West Wilson Avenue • Chicago, IL 60656
(708) 867-9600 • (800) 323-6858 • Fax: (708) 867-0996
email:optoinfo@stratoslightwave.com
http://www.stratoslightwave.com

FEATURES:

- SMPTE 292M/297M/259M/305M compliant (VMC-R-H-2)
- SMPTE 259M/297M/305M compliant (VMC-R-S-2)
- DVB/ASI compliant (VMC-R-H-2 and VMC-R-S-2)
- ATSC/SMPTE 310M compliant; 19.4 to 38.8Mbps (VMC-R-H-2 and VMC-R-S-2)
- Rugged die cast/over molded construction
- Digital Diagnostics Monitoring Interface
- Unit to unit pitch (Port Density) of 0.75"
- Rugged "ST" simplex optical interface
- Re-Clocked/Line Driven 75Ω BNC (male) simplex electrical interface
- Error free pathological pattern operation
- Typical wall plug or 12V battery supply (+4.5V to +16V)
- LED indicator (See Table below)
- LED legend code on unit
- Accessories available
- Blue overmold to distinguish from Transmitter (Red) unit
- "ST" Dust cover included (not shown)
- Class 1 Laser Safety compliant

PRODUCT OVERVIEW

The VMC-R-X-2 media converter receiver module is a high performance integrated data link for uni-directional communication over single mode fiber. The VMC-R-S-2 is designed to be used in SMPTE 259M/297M/305M/310M applications with data transfer rate up to 540Mbps. The VMC-R-H-2 is designed to be used in multi-protocol video applications with data transfer rate up to 1.485Gbps (SMPTE 292M/297M/259M/305M/310M). The media converter module is designed to connect to electrical high speed serial digital video links that require extended distance performance. It permits replacement of copper cable with optical fiber to provide a solution for systems requiring increased media interconnect distance.

DIGITAL DIAGNOSTICS MONITORING INTERFACE

The VMC-R-X-2 is offered with Digital Diagnostics Monitoring Interface (DDMI) which allows real-time access to device operating parameters such as module temperature, received optical power and module supply voltage. It also defines a system of alarm flags, which alert end-users when particular operating parameters are outside of a factory set normal range.

LED INDICATOR:

STATUS	CONDITION
Green	Normal Operation
Red	No Optical Input Signal
Orange	Re-Clocker Not Locked
Blinking Red	DDMI Alarm
Blinking Orange	DDMI Warning
Blinking Green	Optical Power out of range

VMC-R-X-2 Optical SMPTE 292M/297M/259M/305M/310M Video BNC to "ST" Media Converter (Simplex Receiver)

RECOMMENDED OPERATING CONDITIONS

PARAMETER	SYMBOL	MIN	MAX	UNITS	NOTES
Operating Case Temperature	Tc	-30	+70	°C	
Supply Voltage	Vcc	+4.5	+16	VDC	Typical Wall plug/ 12V battery -- 16V charging level
Power Dissipation			1.8	W	
Baud Rate	Brate	19.4	540	Mbps	VMC-R-S-2; 19.4/143/177/270/360/540Mbps
		19.4	1485		VMC-R-H-2; 19.4/143/177/270/360/540/1485Mbps

ELECTRICAL SPECIFICATIONS

-30ºC<Tc<+70ºC

PARAMETER	SYMBOL	MIN	TYP	MAX	UNITS	NOTES
Output Voltage level		SMPTE 259M/297M/292M			mVpp	
Output Impedance	Z_{OUT}		75		Ohms	Male BNC
Re-Clocked Output Rates		143, 177(1), 270, 360, & 540			Mbps	VMC-R-S-2
		143, 177(1), 270, 360, 540, 1483.5, & 1485				VMC-R-H-2
Jitter	TJ			135	ps	Measured with Color Bar Test Signal @1.485Gbps
				740	ps	Measured with Color Bar Test Signal @143/177/270/360/540Mbps
Return Loss		15			dB	
Propagation Delay				40	ns	Re-Clocker OFF
				50	ns	Re-Clocker ON

VMC-R-X-2 OPTICAL SPECIFICATION --- 1310nm Singlemode Receiver

-30ºC<Tc<+70ºC

PARAMETER	SYMBOL	MIN	TYP	MAX	UNITS	NOTES
LINK DISTANCE						
9.0µm Core Diameter SMF (Note 2)		12	24		km	BER<1E-10 @ 360/540/1485Mbps
		15	30		km	BER<1E-10 @ 143/177/270Mbps
RECEIVER						
Optical Input Wavelength	λ	1270		1610	nm	
Optical Input Power	Popt	-20		-1	dBm	VMC-R-H-2 (note 3)
		-25		-1	dBm	VMC-R-S-2 (note 4)
Optical Return Loss	ORL	29			dB	

Note 1: The VMC-R-X-2 is factory set to re-clock at 270Mbps, to accomodate DVB/ASI, and will not re-clock at 177Mbps. Therefore, when operating the VMC-R-X-2 at 177Mbps, the receiver may generate bit errors. Contact factory for more information.

Note 2: Assumes minimum transmitter output power of -12dBm with minimum extinction ratio of 9dB (VMC-T-X-2 simplex transmitter video media converter) over 9/125µm Single Mode Fiber (SMF) at 140/177/270/360/540/1485Mbps. The minimum link distances are based on worst case receiver sensitivity (VMC-R-X-2 simplex reveiver video media converter) with color bar test signal. The minimum link distances will be reduced with SDI test matrix.

Note 3: Minimum receiver input power is defined for line BER < 1 x 10^{-10} running PRBS 2^{23} - 1 at 1.485Gbps

Note 4: Minimum receiver input power is defined for line BER < 1 x 10^{-10} running PRBS 2^{23} - 1 at 140/177/270/360/540Mbps

DIGITAL DIAGNOSTIC MONITORING INTERFACE ---- Simplex Receiver

The media converter modules are provided with internally calibrated digital diagnostic monitoring interface which allows real-time access to device operating parameters such as module temperature, received optical power and module supply voltage. It also defines a system of alarm flags, which alerts end-users when particular operating parameters are outside of a factory set normal range.

The VMC-R-X-2 Digital Diagnostics Monitorint Interface (DDMI) memory map is shown in figure 1 below.

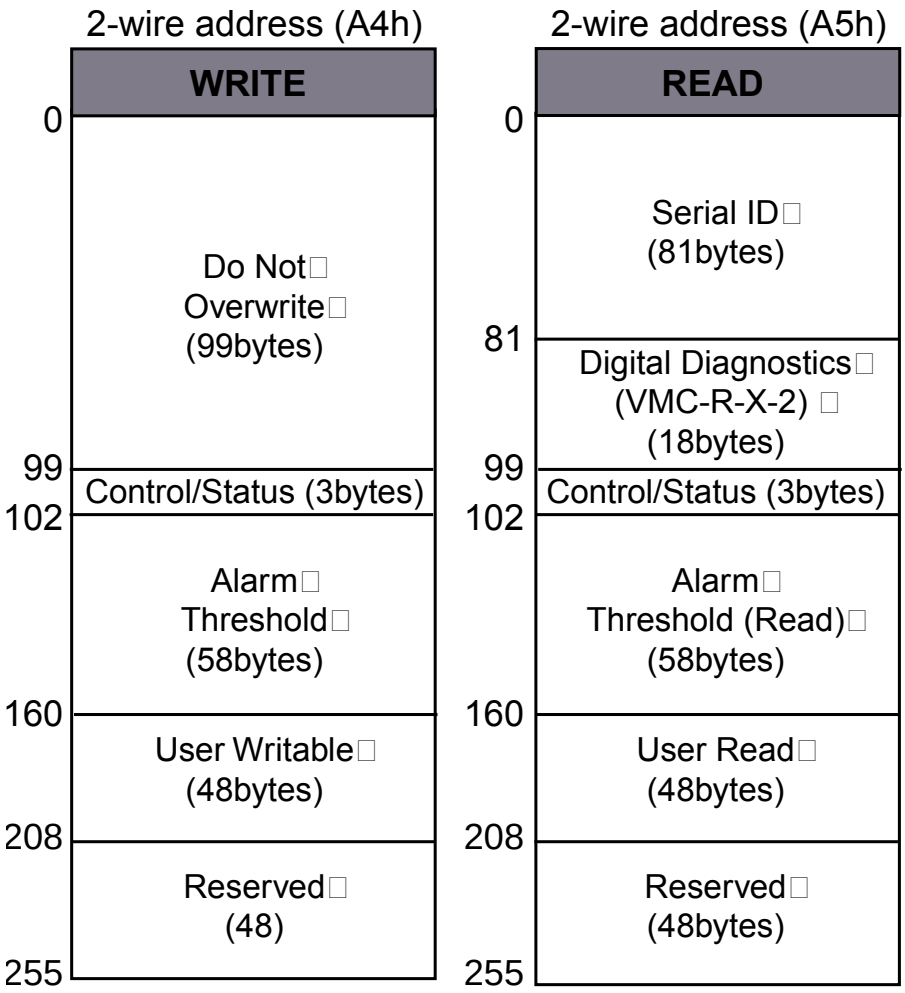


Figure 1: Simplex Reciever Media Converter DDMI Memory Map

2-WIRE SERIAL INTERFACE CHARACTERISTICS

Table below describes the requirements for devices connected to the 2-wire serial bus.

SYMBOL	PARAMETER	MIN	MAX	UNITS
V_{IL}	Input Low-Voltage	-0.5	1.0	V
V_{IH}	Input High-Voltage	2.3	3.8	V
V_{HYS}	Hysteresis of Schmitt Trigger Inputs	0.165	-	V
V_{OL}	Output Low-Voltage	0	0.4	V
t_F	Rise Time for both SDA and SCL	-	300	ns
t_{OF}	Output Fall time from V_{IHmin} to V_{ILmax}	-	250	ns
t_{SP}	Spikes suppressed by input filter	0	50	ns
I_i	Input current each I/O pin	-10	10	µA
C_i	Capacitance for each I/O pin	-	15	pF
f_{SCL}	SCL Clock Frequency	0	100	KHz
R_P	Value of Pull-Up resistor	-	10	KΩ
$t_{HD;STA}$	Hold Time (repeated) START Condition	4.0	-	µs
t_{LOW}	Low Period of SCL Clock	4.7	-	µs
t_{HIGH}	High Period of SCL Clock	4.0	-	µs
$t_{SU;STA}$	Set-Up time for a repeated Start Condition	4.7	-	µs
$t_{HD;DAT}$	Data hold time	0	3.45	µs
$t_{SU;DAT}$	Data set-up time	250	-	ns
$t_{SU;STO}$	Setup time for STOP condition	4.0	-	µs
t_{BUF}	Bus free time between a STOP and START condition	4.7	-	µs

SERIAL IDENTIFICATION (2-wire address A5h) Continue:

The VMC-R-X-2 media converter receiver module provides access to sophisticated identification information that describes its capabilities, manufacturer and other information. The serial interface uses the 2-wire serial CMOS E2PROM. The memories are organized as a series of 8-bit data words that can be addressed individually or sequentially.

Addr. (Dec)	Description	Specification	Data (hex)	Specification	Data (hex)
		VMC-R-H-2 (HD)		VMC-R-S-2 (SD)	
0	Identifier	VMC Fiber to BNC receiver	02	VMC Fiber to BNC receiver	02
1	Host Connector	Male BNC	01	Male BNC	01
2	Transport Connector	ST	01	ST	01
3	SMPTE Data Rates	143,177,270,360,540,1485Mb/s	FC	143,177,270,360,540Mb/s	F8
4	SD Reach		00	Intra-Facility	01
5	Laser	InGs PD (1270-1610nm)	30	InGs PD (1270-1610nm)	30
6	BR in 10Mbps	149	95	27	1B
7	Wavelength MSB		00		00
8	Wavelength LSB		00		00
9	Encoding	SMPTE Scramble	01	SMPTE Scramble	01
10	Length(9µ) * km	12	0C	15	0F
11	Length(50µm) * 10m	0	00	0	00
12	Length(62.5µm) * 10m	0	00	0	00
13	Length (copper) * 1m	0	00	0	00
14	Vendor Name	S	53	S	53
15		t	74	t	74
16		r	72	r	72
17		a	61	a	61
18		t	74	t	74
19		o	6F	o	6F
20		s	73	s	73
21		Space	20	Space	20
22		Space	20	Space	20
23		Space	20	Space	20
24		Space	20	Space	20
25		Space	20	Space	20
26		Space	20	Space	20
27		Space	20	Space	20
28		Space	20	Space	20
29		Space	20	Space	20
30		Space	20	Space	20
31	Vendor Part Number	V	56	V	56
32		M	4D	M	4D
33		C	43	C	43
34		-	2D	-	2D
35		R	52	R	52
36		-	2D	-	2D
37		H	48	S	53
38		-	2D	-	2D
39		2	32	2	32
40		Space	20	Space	20

Table D.1a (1 of 2): Serial ID Data Fields (2-wire Address A5h)

SERIAL IDENTIFICATION (2-wire address A5h) Continue:

Addr (Dec)	Description	Specification	Data (hex)	Specification	Data (hex)
		VMC-R-H-2 (HD)		VMC-R-S-2	
41	Vendor Part Number	Space	20	Space	20
42		Space	20	Space	20
43		Space	20	Space	20
44		Space	20	Space	20
45		Space	20	Space	20
46		Space	20	Space	20
47		Space	20	Space	20
48	Vendor Rev.		20		20
49	Reserved		00		00
50	Reserved		00		00
51	Reserved		00		00
52	Reserved		00		00
53	TX Options	Not Applicable	00	Not Applicable	00
54	RX Options	Mute,SD/HDInd,DVB,Bypass,LD,Auto/Man, RateDet,LOS	FF	Mute,SD/HDInd,DVB,Bypass,LD,Auto/Man, RateDet,LOS	FF
55	Vendor Serial Number		XX		XX
56			XX		XX
57			XX		XX
58			XX		XX
59			XX		XX
60			XX		XX
61			XX		XX
62			XX		XX
63			XX		XX
64			XX		XX
65			XX		XX
66			XX		XX
67			XX		XX
68			XX		XX
69			XX		XX
70			XX		XX
71	Date Code		XX		XX
72			XX		XX
73			XX		XX
74			XX		XX
75			XX		XX
76			XX		XX
77			XX		XX
78			XX		XX
79	CC_Serial ID		XX		XX
80	Reserved		00		00
"XX" denotes hex value which varies with each module.					

Table D.1b (2 of 2): Serial ID Data Fields (2-wire Address A5h)

DIGITAL DIAGNOSTIC (2-wire address A5h)

This portion of the memory map contains real-time measurements of VMC-R-X-2 module temperature, received optical power, and module supply voltage. The real-time diagnostics registers are shown in table D.2 below. The VMC-R-X-2 media converter modules are internally calibrated which means that the modules directly reports calibrated values in units of current, power, etc.

Data Address	Bit	Name	Description
81	All	Temperature MSB	Internally measured module temperature
82	All	Temperature LSB	
83	All	Vcc MSB	Internally measured supply voltage in simplex receiver module
84	All	Vcc LSB	
85	All	TX Bias MSB	Not programmed in simplex receiver module
86	All	TX Bias LSB	
87	All	TX Power MSB	Not programmed in simplex receiver module
88	All	TX Power LSB	
89	All	RX Power MSB	Measured RX input power
90	All	RX Power LSB	
91	All	CLI MSB	Cable Length Indicator. Not applicable for Simplex Receiver Module
92	All	CLI LSB	
93-94	All	Reserved	Reserved

Table D.2: Real-time diagnostic registers (2-wire address A5h)

Measurements are calibrated over vendor specified operating temperature and voltage and should be interpreted as defined below. Alarm and warning threshold values should be interpreted in the same manner as real time 16 bit data.

1) Internally measured simplex receiver temperature: Represented as a 16 bit signed twos complement value in increments of 1/256 degrees Celsius, yielding a total range of -128C to +128C. Temperature accuracy is better than ±3 degrees Celsius over specified operating temperature and voltage. The temperature in degrees Celsius is given by the signed twos complement value with LSB equal to 1/256 C. See Tables D.3a and D.3b for examples of temperature format.

2) Internally measured simplex receiver supply voltage: Represented as a 16 bit unsigned integer with the voltage defined as the full 16 bit value (0 – 65535) with LSB equal to 100 µVolt, yielding a total range of 0 to +6.55 Volts. Accuracy is better than ±3% of the nominal value over specified operating temperature and voltage.

3) Measured RX received optical power in mW: Represented as a 16 bit unsigned integer with the power defined as the full 16 bit value (0 – 65535) with LSB equal to 0.1 µW, yielding a total range of 0 to 6.5535 mW (~ -40 to +8.2 dBm). The accuracy is better than ±3dB over specified temperature and voltage. This accuracy is maintained for input power levels up to the lesser of maximum transmitted or maximum received optical power.

DIGITAL DIAGNOSTICS (2-Wire address A5h) -- Continue

TEMPERATURE REPORTING:

Tables D.3a and D.3b illustrate the 16 bit signed two complement format used for temperature reporting. The most significant bit (D7) represents the sign, which is zero for positive number and one for negative number.

Most Significant Byte (								Data Address							
D7	D6	D5	D4	D3	D2	D1	D0	D7	D6	D5	D4	D3	D2	D1	D0
Sign	64	32	16	8	4	2	1	1/2	1/4	1/8	1/16	1/32	1/64	1/128	1/256

Table D.3A: Bit weights (ºC) for temperature reporting registers

Temperature		Binary		Hexadecimal	
Decimal	Fraction	HIGH byte	LOW byte	HIGH byte	LOW byte
+127.996	+127 255/256	01111111	11111111	7F	FF
+125.000	+125	01111101	00000000	7D	00
+25.000	+25	00011001	00000000	19	00
+1.004	+1 1/256	00000001	00000001	01	01
+1.000	+1	00000001	00000000	01	00
+.996	+255/256	00000000	11111111	00	FF
+0.004	+1/256	00000000	00000001	00	01
0.000	0	00000000	00000000	00	00
-0.004	-1/256	11111111	11111111	FF	FF
-1.000	-1	11111111	00000000	FF	00
-25.000	-25	11100111	00000001	E7	00
-40.000	-40	11011000	00000002	D8	00
-127.996	-127 255/256	10000000	00000001	80	01
-128.000	-128	10000000	00000000	80	00

Table D.3B: Digital temperature format

DIGITAL DIAGNOSTICS (2-Wire address A5h) --- Continue

ALARM and WARNING FLAGS:

Data address 95-98 (Table D.4) contain an optional set of alarms and warnings. The alarm/warning flags are not latched. It is recommended that the detection of an asserted flag bit should be verified by a second read of the flag at least 100msec later. For users who do not wish to set their own threshold values (address 102-159 at 2-wire address A4h) or read the values (address 102-159 at 2-wire address A5h), the flags alone can be monitored.

Alarm/warning flags are associated with simplex receiver module temperature, supply voltage, and RX Input power. Alarm/warning flags indicate conditions likely to be associated with an in-operational link and cause for immediate action.

Data Addr.	Bits	Name	Description	Value	
				VMC-R-H-2 (HD)	VMC-R-S-2 (SD)
95	7	Temp High Alarm	Set when internal temperature exceed high alarm level	+95ºC	
	6	Temp Low Alarm	Set when internal temperature is below low alarm level	-30ºC	
	5	Temp High Warning	Set when internal temperature exceed high warning level	+90ºC	
	4	Temp Low Warning	Set when internal temperature is below low warning level	-25ºC	
	7	Voltage High Alarm	Set when internal supply Voltage exceed high alarm level	+3.7V	
	6	Voltage Low Alarm	Set when internal supply Voltage is below low alarm level	+209V	
	5	Voltage High Warning	Set when internal supply Voltage exceed high warning level	+3.65V	
	4	Voltage Low Warning	Set when internal supply Voltage is below low warning level	+3.00V	
96	7	TX_BIAS High Alarm	Not programmed in Simplex Receiver Module		
	6	TX_BIAS Low Alarm	Not programmed in Simplex Receiver Module		
	5	TX_BIAS High Warning	Not programmed in Simplex Receiver Module		
	4	TX_BIAS Low Warning	Not programmed in Simplex Receiver Module		
	3	TX_PWR High Alarm	Not programmed in Simplex Receiver Module		
	2	TX_PWR Low Alarm	Not programmed in Simplex Receiver Module		
	1	TX_PWR High Warning	Not programmed in Simplex Receiver Module		
	0	TX_PWR Low Warning	Not programmed in Simplex Receiver Module		
97	7	RX_PWR High Alarm	Set when internal RX input power exceed high alarm level	-1dBm	-1dBm
	6	RX_PWR Low Alarm	Set when internal RX input power is below low alarm level	-23dBm	-28dBm
	5	RX_PWR High Warning	Set when internal RX input power exceed high warning level	-1dBm	-1dBm
	4	RX_PWR Low Warning	Set when internal RX input power is below low warning level	-20dBm	-25dBm
	3-0	Reserved	Reserved		
98	7-0	Reserved	Reserved		

Table D.4: Alarm and Warning Thresholds (2-wire Address A5h)

CONTROL/STATUS BITS (2-wire address A5h)

Data Address	Bits	Name	Description
99	7	TX_Disable State	Not Applicable for Simplex Receiver module
	6	Soft TX_Disable	Not Applicable for Simplex Receiver module
	5	Cable Equalizer Bypass State	Not Applicable for Simplex Receiver module
	4	Soft Cable Equalizer Bypass	Not Applicable for Simplex Receiver module
	3	TX_FAULT	Not Applicable for Simplex Receiver module
	2	Cable Detect	Not Applicable for Simplex Receiver module
	1-0	Reserved	Read
100	7	RX Mute state	Read
	6	Soft RX mute	Read/Write
	5	SD/HD Indication	Read
	4	DVB/ASI Reclocker State	Read
	3	Soft DVB/ASI Reclocker	Read/Write
	2	Reclock Bypass state	Read
	1	Soft Reclock Bypass	Read/Write
	0	Reclock Lock Det.	Read
101	7	Auto/Manual Reclock State	Read
	6	Soft Auto/Manual Reclock	Read/Write
	5	2 Reclock Rate Det	Read/Write
	4	1 Reclock Rate Det	Read/Write
	3	0 Reclock Rate Det	Read/Write
	2	LOS	Read
	1	Reserved	
	0	Data Ready Bar	Read
116-120	All	Reserved	

Table D.5: Control/Status Bits (2-wire Address A5h)

ALARM/WARNING THRESHOLDS (2-wire address A5h)

Each A/D quantity has a corresponding high alarm/warning and low alarm/warning threshold. These factory preset values allow the user to determine when a particular value is outside of “normal” limits as determined by the transceiver manufacturer.

The VMC memory is read/writable as the write protect feature is not enabled. Thus, the host can change the factory set alarm threshold values (address 102-159 at 2-wire address A4h).

Data Address	# Bytes	Name	Description
102-103	2	Temp High Alarm	MSB at Low Address
104-105	2	Temp Low Alarm	MSB at Low Address
106-107	2	Temp High Warning	MSB at Low Address
108-109	2	Temp Low Warning	MSB at Low Address
110-111	2	Voltage High Alarm	MSB at Low Address
112-113	2	Voltage Low Alarm	MSB at Low Address
114-115	2	Voltage High Warning	MSB at Low Address
116-117	2	Voltage Low Warning	MSB at Low Address
118-119	2	Bias High Alarm	Not Applicable for simplex receiver module
120-121	2	Bias Low Alarm	Not Applicable for simplex receiver module
122-123	2	Bias High Warning	Not Applicable for simplex receiver module
124-125	2	Bias Low Warning	Not Applicable for simplex receiver module
126-127	2	TX Power High Alarm	Not Applicable for simplex receiver module
128-129	2	TX Power Low Alarm	Not Applicable for simplex receiver module
130-131	2	TX Power High Warning	Not Applicable for simplex receiver module
132-133	2	TX Power Low Warning	Not Applicable for simplex receiver module
134-135	2	RX Power High Alarm	MSB at Low Address
136-137	2	RX Power Low Alarm	MSB at Low Address
138-139	2	RX Power High Warning	MSB at Low Address
140-141	2	RX Power Low Warning	MSB at Low Address
142-159	18	Reserved	Reserved

Table D.6: Alarm and Warning Thresholds (2-wire address A5h)

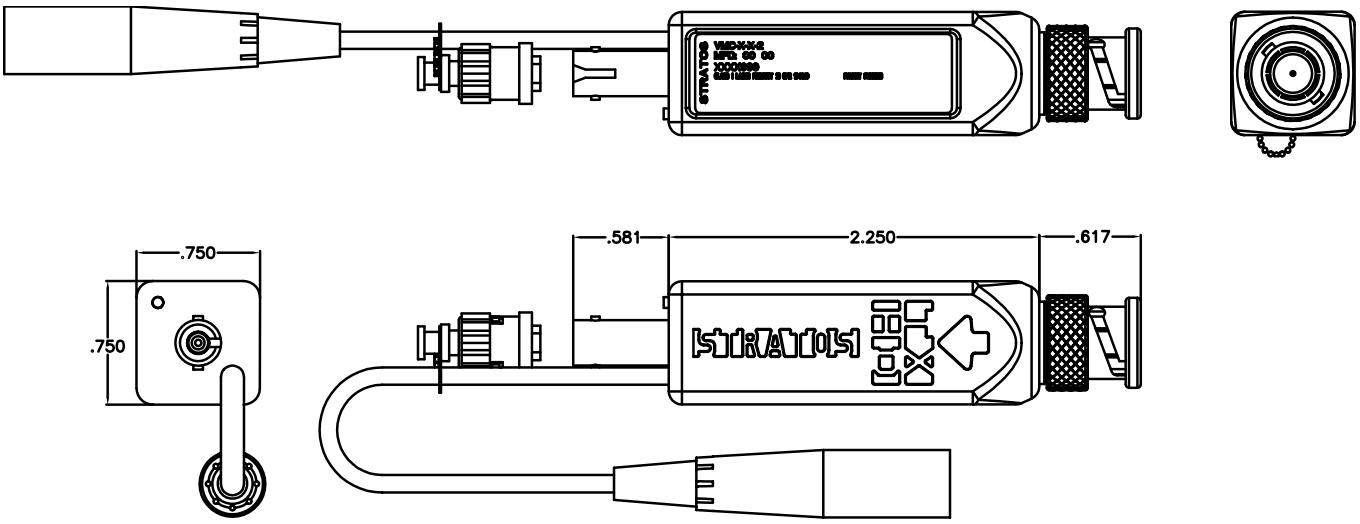
USER WRITABLE MEMORY:

Data Address	# Bytes	Name	Description
160-207	48	User EEPROM	User Writable EEPROM

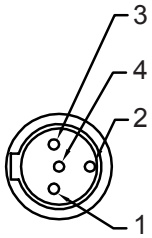
Table D.7: User Accessible EEPROM (2-wire Address A4h)

VMC-R-X-2 Optical SMPTE 292M/297M/259M/305M/310M Video BNC to "ST" Media Converter (Simplex Receiver)

Mechanical Dimensions (inches) ---- Weight: 2.5oz.

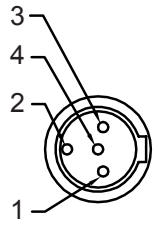


Media Converter



1. PIN 1 = GROUND / BLACK WIRE
2. PIN 2 = SDA / GREEN WIRE
3. PIN 3 = SCL / WHITE WIRE
4. PIN 4 = Vcc / RED WIRE

Power Supply

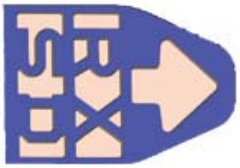


1. PIN 1 = NEGATIVE
2. PIN 2 = NOT USED
3. PIN 3 = NOT USED
4. PIN 4 = POSITIVE

Looking into connector

OVERMOLD IDENTIFIERS

HI-DEF RECEIVER



STD-DEF RECEIVER

REGULATORY COMPLIANCE:

STANDARD	COMMENTS
TUV	EN/IEC 60825 and EN/IEC 60950
CDRH	FDA, CFR 21 Subchapter J
UL/CSA	UL1950
FCC	Subpart 15, Class A

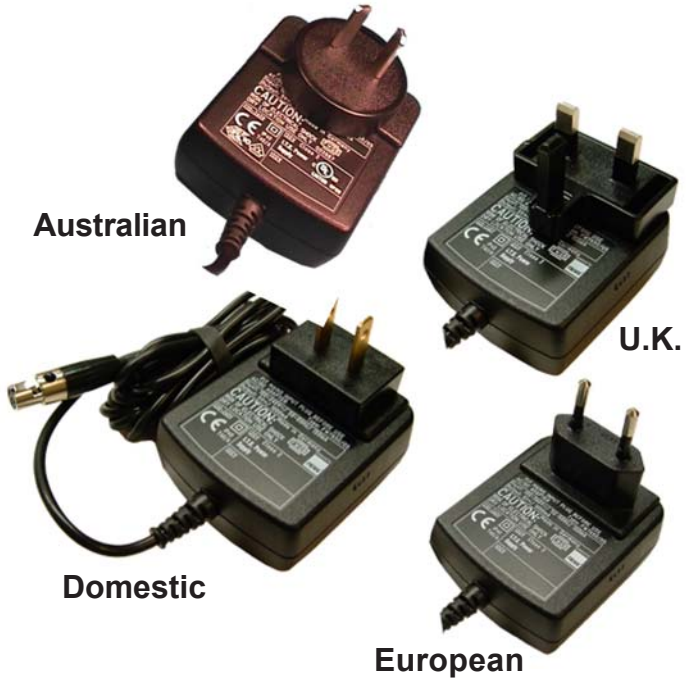
VMC-R-X-2 Optical SMPTE 292M/297M/259M/305M/310M Video BNC to "ST" Media Converter (Simplex Receiver)

ACCESSORIES AVAILABLE:

(1) Wall Plug with Mini-XLR

Ordering information:
VMC-PS-X

- **D = Domestic**
- **E = European**
- **U = U.K.**
- **A = Australia**



Wall Plug Specification:

PARAMETER	Min	Max
Input Voltage	100V	240V
Output Voltage (DC)	+5V @ 1000mA	

STRATOS
optical technologies
7444 West Wilson Avenue • Chicago, IL 60656
(708) 867-9600 • (800) 323-6858 • Fax: (708) 867-0996
email:optoinfo@stratoslightwave.com
http://www.stratoslightwave.com