

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



SIMPLEX TRANSMITTER ORDERING INFORMATION

VMC - T - 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

T = Simplex Transmitter

STRATOS

optical technologies

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FEATURES:

- SMPTE 292M/297M/259M/305M compliant (VMC-T-H-2)
- SMPTE 259M/297M/305M compliant (VMC-T-S-2)
- DVB/ASI compliant (VMC-T-H-2 and VMC-T-S-2)
- ATSC/SMPTE 310M compliant; 19.4 to 38.8Mbps (VMC-T-H-2 and VMC-T-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
- Line Equalized 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
- Red overmold to distinguish from receiver (blue) unit
- Accessories available
- "ST" Dust cover included (Not shown)
- Class 1 Laser Safety compliant

PRODUCT OVERVIEW

The VMC-T-X-2 media converter transmitter module is a high performance integrated data link for uni-directional communication over single mode fiber. The VMC-T-S-2 is designed to be used in SMPTE 259M/297M/305M/310M applications with data rate up to 540Mbps. The VMC-T-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-T-X-2 is offered with Digital Diagnostics Monitoring Interface (DDMI) which allows real-time access to device operating parameters such as module temperature, laser bias current, transmitted 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	Transmit Fault
Blinking Green	No Cable Connected
Blinking Red	DDMI Alarm
Blinking Orange	DDMI Warning

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RECOMMENDED OPERATING CONDITIONS

PARAMETER	SYMBOL	MIN	MAX	UNITS	NOTES
Operating Case Temperature	T _c	-30	+70	°C	
Supply Voltage	V _{cc}	+4.5	+16	VDC	Typical Wall plug/ 12V battery -- 16V charging level
Power Dissipation			1.0	W	
Baud Rate	Brate	19.4	540	Mbps	VMC-T-S-2; 19.4/143/177/270/360/540Mbps
		19.4	1485		VMC-T-H-2; 19.4/143/177/270/360/540/1485Mbps

ELECTRICAL SPECIFICATIONS

PARAMETER	SYMBOL	MIN	TYP	MAX	UNITS	NOTES
Input Signal		SMPTE 259M/297M/292M			mVpp	
Input Impedance	Z _{IN}		75		Ohms	Male BNC (note 1)
Return Loss		15			dB	
Propagation Delay				1.5	ns	

VMC-T-X-2 OPTICAL SPECIFICATION --- 1310nm FP Singlemode Laser

-30°C<T_c<+70°C

PARAMETER	SYMBOL	MIN	TYP	MAX	UNITS	NOTES
LINK DISTANCES						
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
TRANSMITTER						
Optical Center	λ	1290	1310	1330	nm	
Optical Transmit Power	P _{opt}	-12		-7.5	dBm	Average @ 1310nm
Extinction Ratio	ER	5	10		dB	P1/P0
Spectral Width	Δλ			4	nm	RMS
Total Jitter	T _J			135	ps	Measured with Color Bar Test Signal @1.485Gbps)
				740	ps	Measured with Color Bar Test Signal @143/177/270/360/540Mbps)
Output Rise/Fall Time	t _R , t _F			270	ps	20%-80%; Measured unfiltered @1.485Gbps)
		0.4		1.5	ns	20%-80%; Measured unfiltered @143/177/270/360/540Mbps)

Note 1: Equalized for 140m Beldon 1694A @ 1.485Gb/s and 350m Beldon 1694A @ 270Mb/s

Note 2: Assumes minimum transmitter output power of -12dBm with minimum extinction ratio of 9dB 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 receiver video media converter) with color bar test signal. The minimum link distances will be reduced with SDI test matrix.

VMC-T-X-2 Optical SMPTE 292M/297M/259M/305M/310M

Video BNC to "ST" Media Converter (Simplex Transmitter)

DIGITAL DIAGNOSTIC MONITORING INTERFACE ---- Simplex Transmitter

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, laser bias current, transmitted 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-T-X-2 Digital Diagnostics Monitorint Interface (DDMI) memory map is shown in figure 1 below.

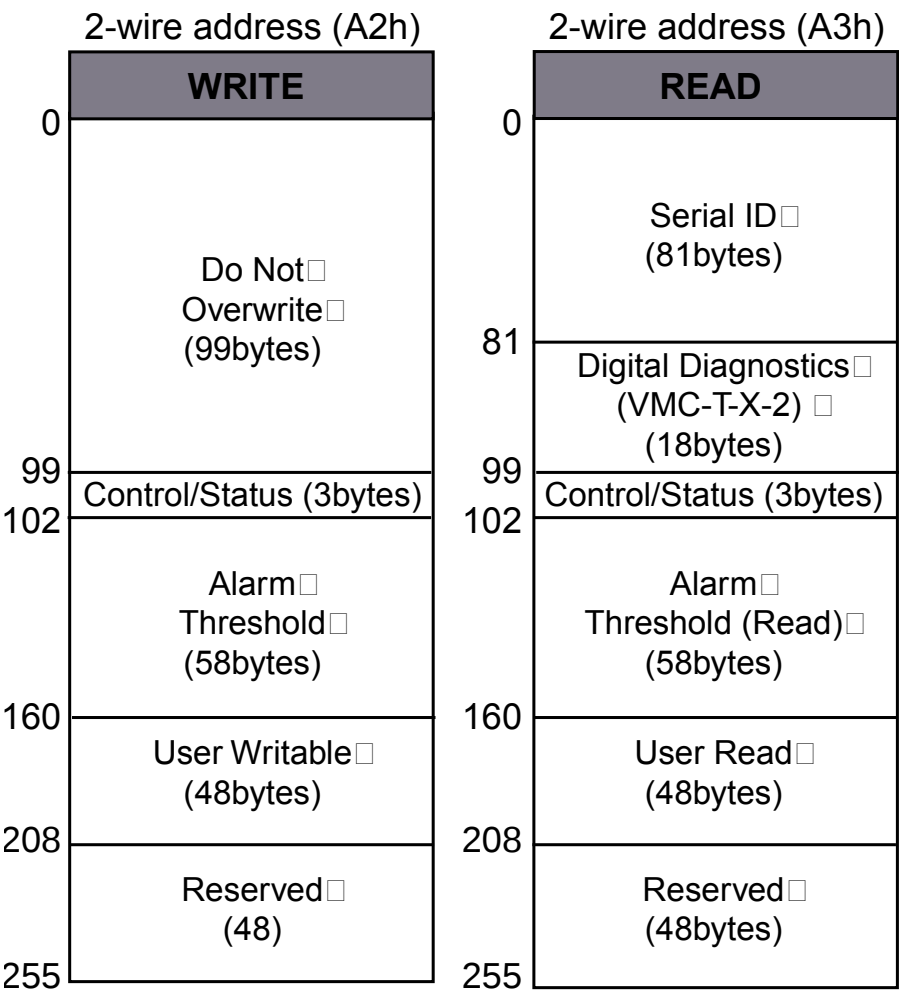


Figure 1: Simplex Transmitter Media Converter DDMI Memory Map

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

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	$K\Omega$
$t_{HD;STA}$	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

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

SERIAL IDENTIFICATION (2-wire address A3h)

The VMC-T-X-2 media converter transmitter 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-T-H-2 (HD)				VMC-T-S-2 (SD)	
0	Identifier	VMC BNC-to-Fiber Transmitter	01	VMC BNC-to-Fiber Transmitter	01
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	Laser 1310nm	02	Laser 1310nm	02
6	BR in 10Mbps	149	95	27	1B
7	Wavelength MSB	1310nm	05	1310nm	05
8	Wavelength LSB		1E		1E
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		T	54	T	54
36		-	2D	-	2D
37		H	48	S	53
38		-	2D	-	2D
39		2	32	2	32
40		Space	20	Space	20

Table D.1a (1of 2): Serial ID Data Fields (2-wire Address A3h)

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

SERIAL IDENTIFICATION (2-wire address A3h) Continue:

Addr (Dec)	Description	Specification	Data (hex)	Specification	Data (hex)
		VMC-T-H-2 (HD)		VMC-T-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	Disable, Fault, EqBypass, Cable Det	E8	Disable, Fault, EqBypass, Cable Det	E8
54	RX Options	Not Applicable	00	Not Applicable	00
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 (2of 2): Serial ID Data Fields (2-wire Address A3h)

VMC-T-X-2 Optical SMPTE 292M/297M/259M/305M/310M

Video BNC to "ST" Media Converter (Simplex Transmitter)

DIGITAL DIAGNOSTIC (2-wire address A3h)

This portion of the memory map contains real-time measurements of VMC-T-X-2 module temperature, laser bias current, transmitted optical power, and module supply voltage. The real-time diagnostics registers are shown in table D.2 below. The VMC-T-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 transmitter module
84	All	Vcc LSB	
85	All	TX Bias MSB	Internally measured TX_Bias current
86	All	TX Bias LSB	
87	All	TX Power MSB	Measured TX output power
88	All	TX Power LSB	
89	All	RX Power MSB	Not programmed in Simplex Transmitter Module.
90	All	RX Power LSB	
91	All	CLI MSB	Cable Length Indicator
92	All	CLI LSB	
93-94	All	Reserved	Reserved

Table D.2: Real-time diagnostic registers (2-wire address A3h)

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 transmitter 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 transmitter 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 μ Volt, yielding a total range of 0 to +6.55 Volts. Accuracy is better than $\pm 3\%$ of the nominal value over specified operating temperature and voltage.

3) Measured TX bias current in μ A. Represented as a 16 bit unsigned integer with the current defined as the full 16 bit value (0 – 65535) with LSB equal to 2 μ A, yielding a total range of 0 to 131 mA. Accuracy is better than $\pm 10\%$ of the nominal value over specified operating temperature and voltage.

4) Measured TX output 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 μ W, yielding a total range of 0 to 6.5535 mW (~ -40 to +8.2 dBm). Data is assumed to be based on measurement of laser monitor photodiode current. It is factory calibrated to absolute units using the most representative fiber output type. Accuracy is better than ± 3 dB over specified temperature and voltage. Data is not valid when the transmitter is disabled.

VMC-T-X-2 Optical SMPTE 292M/297M/259M/305M/310M

Video BNC to "ST" Media Converter (Simplex Transmitter)

DIGITAL DIAGNOSTIC (2-wire address A3h) -- 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 (°C) 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
+0.996	+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

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

DIGITAL DIAGNOSTICS Continue (2-wire address A3h)

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 A2h) or read the values (address 102-159 at 2-wire address A3h), the flags alone can be monitored.

Alarm/warning flags which are associated with simplex transmitter modules are temperature, supply voltage, TX bias, TX output power, and Cable Length indicator (CLI). Alarm/warning flags indicate conditions likely to be associated with an in-operational link and cause for immediate action.

Data Address	Bits	Name	Description	Value (VMC-T-H-2/ VMC-T-S-2)
95	7	Temp High Alarm	Set when internal temperature exceed high alarm level	+95°C
	6	Temp Low Alarm	Set when internal temperature is below low alarm level	-30°C
	5	Temp High Warning	Set when internal temperature exceed high warning level	+90°C
	4	Temp Low Warning	Set when internal temperature is below low warning level	-25°C
	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	+2.9V
	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	Set when internal TX_Bias current exceed high alarm level	35mA
	6	TX_BIAS Low Alarm	Set when internal TX_Bias current is below low alarm level	0mA
	5	TX_BIAS High Warning	Set when internal TX_Bias current exceed high warning level	30mA
	4	TX_BIAS Low Warning	Set when internal TX_Bias current is below low warning level	0.3mA
	3	TX_PWR High Alarm	Set when internal TX output power exceed high alarm level	-7.5dBm
	2	TX_PWR Low Alarm	Set when internal TX output power is below low alarm level	-12dBm
	1	TX_PWR High Warning	Set when internal TX output power exceed high warning level	-7.7dBm
	0	TX_PWR Low Warning	Set when internal TX output power is below low warning level	-11.8dBm
97	7	RX_PWR High Alarm	Not programmed in Simplex Transmitter Module	
	6	RX_PWR Low Alarm	Not programmed in Simplex Transmitter Module	
	5	RX_PWR High Warning	Not programmed in Simplex Transmitter Module	
	4	RX_PWR Low Warning	Not programmed in Simplex Transmitter Module	
	3-0	Reserved	Reserved	
98	7-0	Reserved	Reserved	

Table D.4: Alarm and Warning Flag Bits (2-wire Address A3h)

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

CONTROL/STATUS BITS (2-wire address A3h)

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

Table D.5: Control/Status Bits (2-wire Address A3h)

VMC-T-X-2 Optical SMPTE 292M/297M/259M/305M/310M

Video BNC to "ST" Media Converter (Simplex Transmitter)

ALARM/WARNING THRESHOLDS (2-wire address A3h)

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 A2h).

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	MSB at Low Address
120-121	2	Bias Low Alarm	MSB at Low Address
122-123	2	Bias High Warning	MSB at Low Address
124-125	2	Bias Low Warning	MSB at Low Address
126-127	2	TX Power High Alarm	MSB at Low Address
128-129	2	TX Power Low Alarm	MSB at Low Address
130-131	2	TX Power High Warning	MSB at Low Address
132-133	2	TX Power Low Warning	MSB at Low Address
134-135	2	RX Power High Alarm	Not Applicable for simplex transmitter module
136-137	2	RX Power Low Alarm	Not Applicable for simplex transmitter module
138-139	2	RX Power High Warning	Not Applicable for simplex transmitter module
140-141	2	RX Power Low Warning	Not Applicable for simplex transmitter module
142-159	18	Reserved	Reserved

Table D.6: Alarm and Warning Thresholds (2-wire address A3h)

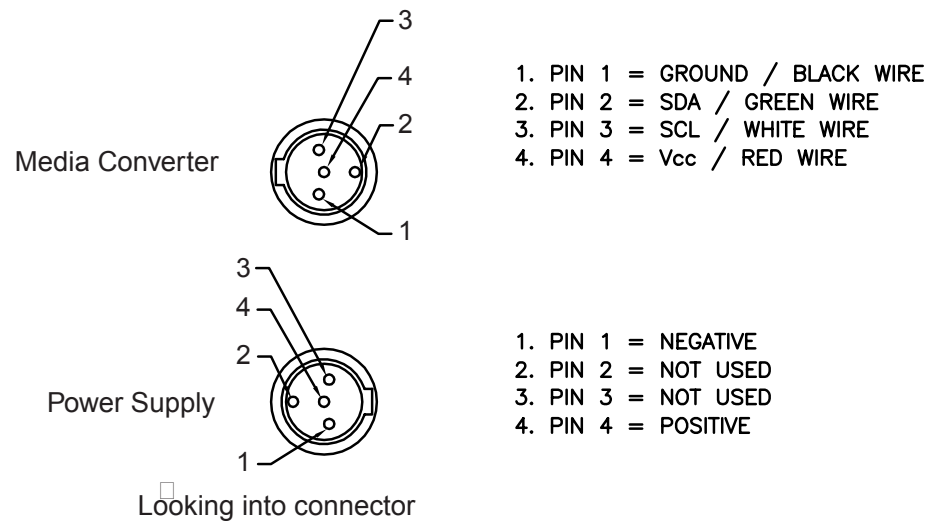
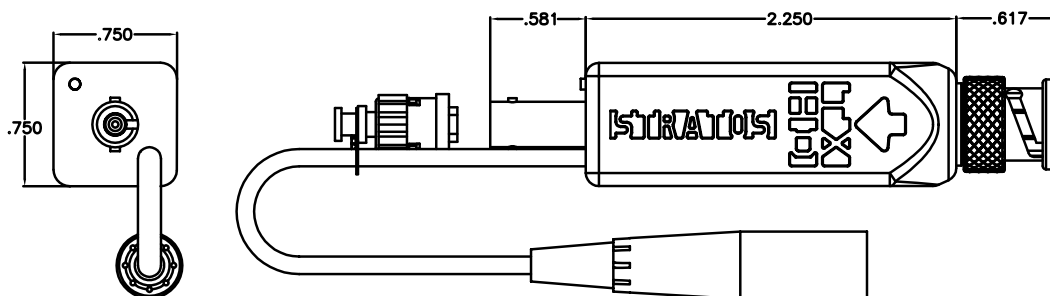
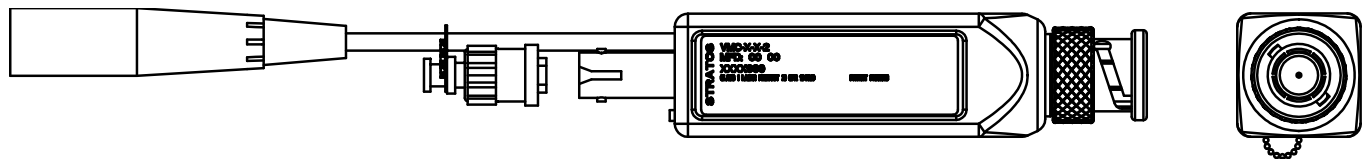
USER WRITABLE MEMORY:

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

Table D.7: User Accessible EEPROM (2-wire Address A2h)

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

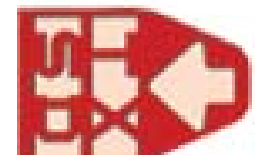
Mechanical Dimensions (inches) ---- Weight: 2.5oz.



OVERMOLD IDENTIFIERS



HI-DEF TRANSMITTER



STD-DEF TRANSMITTER

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

ACCESSORIES AVAILABLE:

(1) Wall Plug with Mini-XLR

Ordering information:

VMC-PS-X

D = Domestic

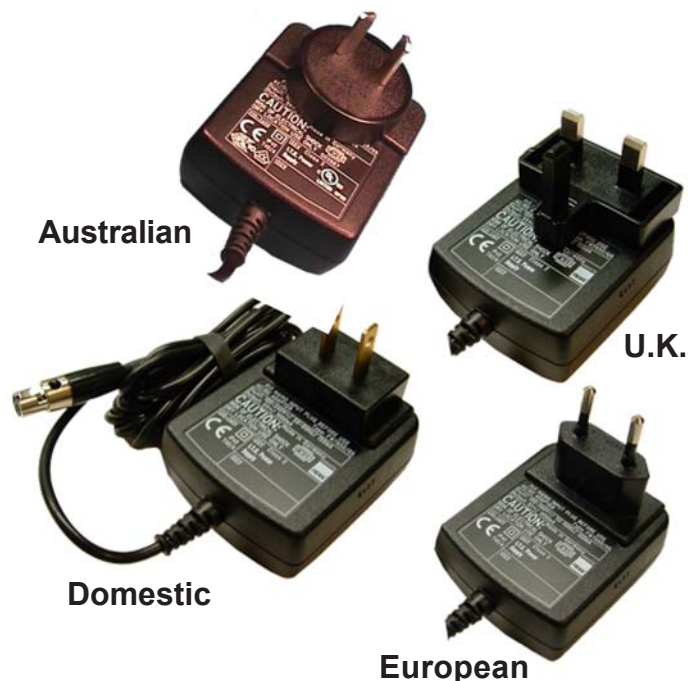
E = European

U = U.K.

A = Australia

Wall Plug Specification:

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



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