

Standard Telemetry Products

Emhiser Research, Inc. designs and manufactures a complete line of airborne and ground-based telemetry equipment designed specifically for harsh military applications. Our tested and proven products are qualified on numerous high profile defense programs.

This catalog contains technical bulletins of many of our more common products. If these products do not meet your exact specifications, give us a call to discuss your requirements.

- Wideband DC Coupled Transmitters and Receivers
- Digital Transmitters and Receivers
- Video Transmitters and Receivers
- Telemetry Transmitters and Receivers
- FSK Transmitters and Receivers



EMHISER RESEARCH, INC.

2705 Old Highway 40 West
P.O. Box 189
Verdi, Nevada 89439-0189

Phone: (775) 345-2705

Fax: (775) 345-2484

E-mail: info@emhiser.com

Web: www.emhiser.com

Ultra High Efficiency Transmitters

In efforts to improve designs to better serve customer needs, Emhiser's design efforts have resulted in an ultra high efficiency (UHE) line of telemetry transmitters with previously unattainable DC-RF conversion efficiency. UHE transmitters are available in miniaturized airborne packages with a variety of power levels, frequency bands, and supply voltage requirements. All Emhiser transmitters are designed for harsh military environments.

Emhiser's ultra high efficiency (UHE) technology enhances the design of our miniature airborne transmitters. For a required output power, our UHE technology decreases current draw and dissipated power requiring fewer, smaller, and lighter batteries and heat sinks. In applications requiring additional link margin or increased data rates, replacing a convention transmitter with an UHE transmitter with twice the output power actually decreases current draw and power dissipation.

If one of our standard UHE products does not meet your specifications, please call us to discuss your requirements.

- S-Band Single Frequency or Channelized
- 5 Watt Output Power
- Digital, Telemetry, or Video Modulation
- AC or DC Modulation Coupling
- +28 $\pm$ 4 Vdc Supply Voltage



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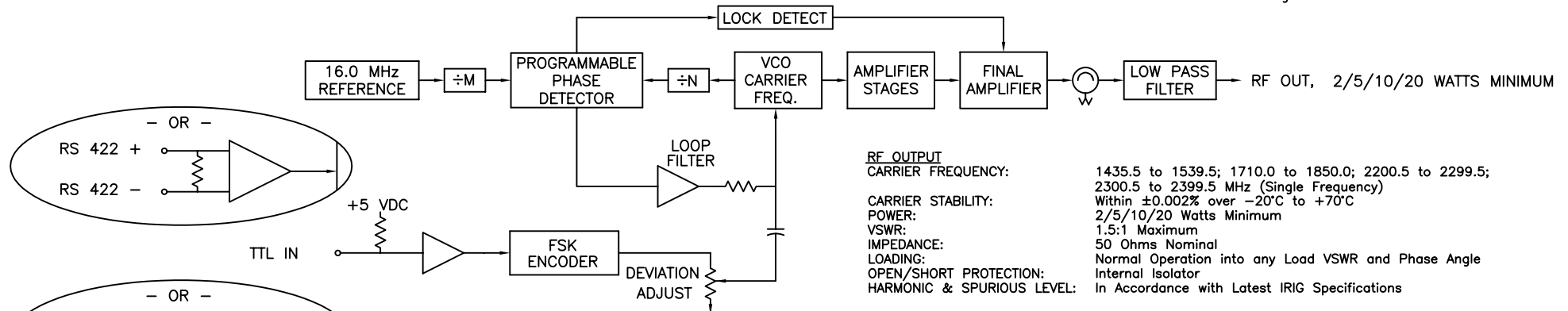
Phone: (775) 345-2705
Fax: (775) 345-2484
E-mail: info@emhiser.com
Web: www.emhiser.com

FSK Transmitter Model EFT-09DED Series

9 Cubic Inches 2, 5, 10 or 20 Watts

DC Coupled Single Frequency 28 VDC

Protected by One or More of the following Patents:
 US: 5,091,706, 5,097,230, 5,311,152, 5,497,509, 5,802,462, 6,404,292, 6,411,237,
 6,417,738, 6,650,180, 6,683,499, 6,690,238, 6,747,517, and 6,771,133.
 Canadian: 2,033,861, 2,033,878, 2,080,013, 2,097,042, 2,235,091, and 2,308,209.
 Other US and Canadian Patents Pending.



RF OUTPUT

CARRIER FREQUENCY:
 CARRIER STABILITY:
 POWER:
 VSWR:
 IMPEDANCE:
 LOADING:
 OPEN/SHORT PROTECTION:
 HARMONIC & SPURIOUS LEVEL:

1435.5 to 1539.5; 1710.0 to 1850.0; 2200.5 to 2299.5;
 2300.5 to 2399.5 MHz (Single Frequency)
 Within $\pm 0.002\%$ over -20°C to $+70^{\circ}\text{C}$
 2/5/10/20 Watts Minimum
 1.5:1 Maximum
 50 Ohms Nominal
 Normal Operation into any Load VSWR and Phase Angle
 Internal Isolator
 In Accordance with Latest IRIG Specifications

DIGITAL INPUT

LEVELS:
 BIT RATE:
 DEVIATION:
 INCIDENTAL AM:
 INCIDENTAL FM:
 INPUT IMPEDANCE:

TTL, RS232, or RS422 Compatible
 DC to 57.6 KBits/Sec Maximum
 Factory Set to ± 75 KHz
 5% Maximum
 10 KHz RMS Maximum
 TTL: 10 KOhms to $+5$ VDC
 RS232: 10 KOhms to Ground
 RS422: 120 Ohms Differential

POWER REQUIREMENTS

INPUT VOLTAGE:
 INPUT CURRENT (MAXIMUM):

$+28 \pm 4$ VDC: Reverse Polarity Protected

Power	Current
2 Watts	650 Milliamps
5 Watts	1.2 Amps
10 Watts	2.0 Amps
20 Watts	4.0 Amps

ENVIRONMENTAL SPECIFICATIONS

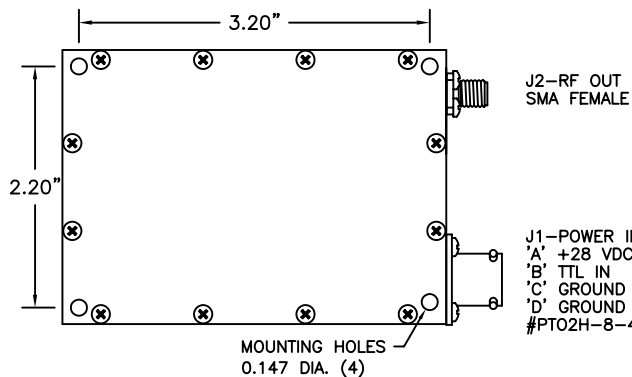
TEMPERATURE:
 VIBRATION:
 SHOCK:
 ACCELERATION:
 ALTITUDE:
 HUMIDITY:

Operating: -20°C to $+70^{\circ}\text{C}$; Storage: -54°C to $+125^{\circ}\text{C}$
 14 G's, Random, Standard Haystack, 20 Hz to 2 KHz, 3 Axes
 1/2 Sine, 100 G's Pk, 11 mS, 3 Axes
 100 G's, 3 Axes
 Unlimited
 To 95% at any Temperature forming Frost or Condensation

PHYSICAL CHARACTERISTICS

DIMENSIONS:
 WEIGHT:

Per Outline Drawing
 12 oz. Maximum



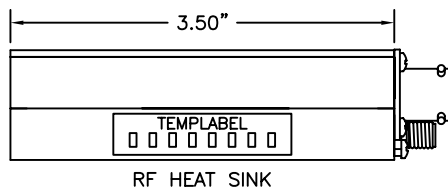
J2-RF OUT
 SMA FEMALE

J1-POWER INPUT
 'A' $+28$ VDC
 'B' TTL IN
 'C' GROUND
 'D' GROUND
 #PT02H-8-4P

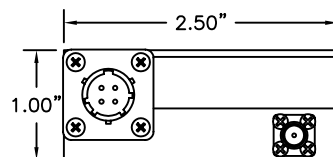
J1-POWER INPUT
 'A' $+28$ VDC
 'B' RS422+
 'C' RS422-
 'D' GROUND
 #PT02H-8-4P

J1-POWER INPUT
 'A' $+28$ VDC
 'B' RS232 IN
 'C' GROUND
 'D' GROUND
 #PT02H-8-4P

MOUNTING HOLES
 0.147 DIA. (4)



RF HEAT SINK



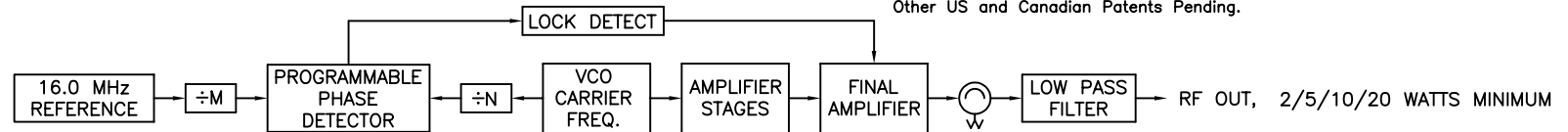
DATE	05 07 10	 EMHISER RESEARCH, INC. 2705 OLD HIGHWAY 40 WEST TEL: 775-345-2705 P.O. BOX 189 VERDI, NEVADA FAX: 775-345-2484 89439-0189 U.S.A. EMAIL: INFO@EMHISER.COM
DWN	L3	
APVD		
QC		
CAGE CODE IDENT NO. 60666		FSK TRANSMITTER, 2/5/10/20 WATTS SINGLE FREQUENCY, DC COUPLED 1435.5 TO 2399.5 MHZ (4 BANDS)
MODEL NO. EFT-09DED SERIES		

FSK Transmitter Model EFT-11DED Series

11 Cubic Inches 2, 5, 10 or 20 Watts

DC Coupled Single Frequency 28 VDC

Protected by One or More of the following Patents:
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 Other US and Canadian Patents Pending.



RF OUTPUT

CARRIER FREQUENCY:
 CARRIER STABILITY:
 POWER:
 VSWR:
 IMPEDANCE:
 LOADING:
 OPEN/SHORT PROTECTION:
 HARMONIC & SPURIOUS LEVEL:

1435.5 to 1539.5; 1710.0 to 1850.0; 2200.5 to 2299.5;
 2300.5 to 2399.5 MHz Single Frequency
 Within $\pm 0.002\%$ over -20°C to $+70^{\circ}\text{C}$
 2/5/10/20 Watts Minimum
 1.5:1 Maximum
 50 Ohms Nominal
 Normal Operation into any Load VSWR and Phase Angle
 Internal Isolator
 In Accordance with Latest IRIG Specifications

DIGITAL INPUT

LEVELS:
 BIT RATE:
 DEVIATION:
 INCIDENTAL AM:
 INCIDENTAL FM:
 INPUT IMPEDANCE:

TTL, RS232, or RS422 Compatible
 DC to 57.6 KBits/Sec Maximum
 Factory Set to ± 75 KHz
 5% Maximum
 10 KHz RMS Maximum
 TTL: 10 KOhms to +5 VDC
 RS232: 10 KOhms to Ground
 RS422: 120 Ohms Differential

POWER REQUIREMENTS

INPUT VOLTAGE:
 INPUT CURRENT (MAXIMUM):

+28 ± 4 VDC: Reverse Polarity Protected

Power	Current
2 Watts	650 Milliamps
5 Watts	1.2 Amps
10 Watts	2.0 Amps
20 Watts	4.0 Amps

ENVIRONMENTAL SPECIFICATIONS

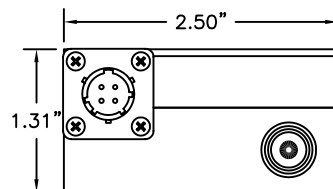
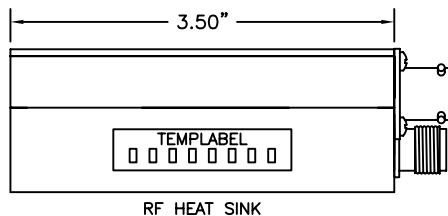
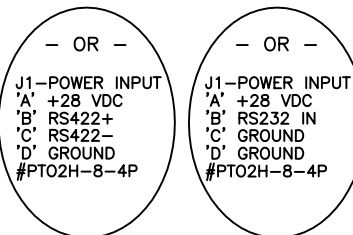
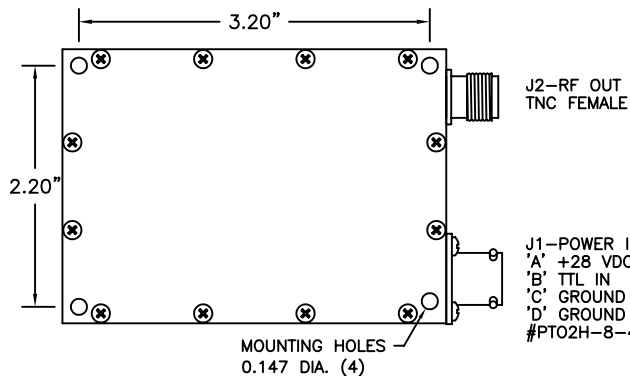
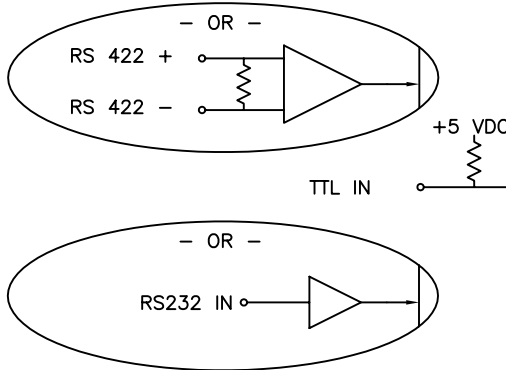
TEMPERATURE:
 VIBRATION:
 SHOCK:
 ACCELERATION:
 ALTITUDE:
 HUMIDITY:

Operating: -20°C to $+70^{\circ}\text{C}$; Storage: -54°C to $+125^{\circ}\text{C}$
 14 G's, Random, Standard Haystack, 20 Hz to 2 KHz, 3 Axes
 1/2 Sine, 100 G's Pk, 11 mS, 3 Axes
 100 G's, 3 Axes
 Unlimited
 To 95% at any Temperature forming Frost or Condensation

PHYSICAL CHARACTERISTICS

DIMENSIONS:
 WEIGHT:

Per Outline Drawing
 14 oz. Maximum



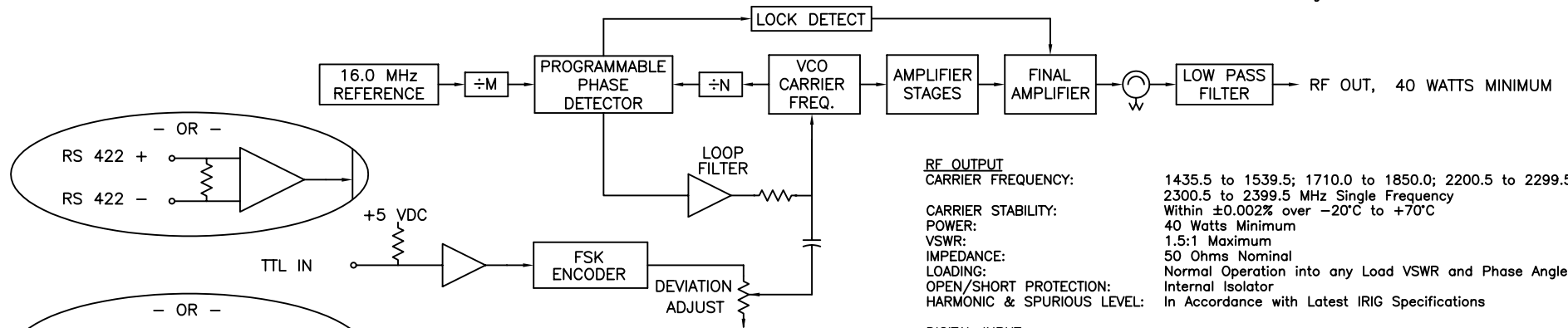
DATE	05 07 10	 EMHISER RESEARCH, INC. 2705 OLD HIGHWAY 40 WEST TEL: 775-345-2705 P.O. BOX 189 VERDI, NEVADA FAX: 775-345-2484 89439-0189 U.S.A. EMAIL: INFO@EMHISER.COM
DWN	L3	
APVD		
QC		
CAGE CODE IDENT NO.	60666	FSK TRANSMITTER, 2/5/10/20 WATTS SINGLE FREQUENCY, DC COUPLED 1435.5 TO 2399.5 MHZ (4 BANDS)
MODEL NO. EFT-11DED SERIES		

FSK Transmitter Model EFT-36DED Series

36 Cubic Inches 40 Watts

DC Coupled Single Frequency 28 VDC

Protected by One or More of the following Patents:
 US: 5,091,706, 5,097,230, 5,311,152, 5,497,509, 5,802,462, 6,404,292, 6,411,237,
 6,417,738, 6,650,180, 6,683,499, 6,690,238, 6,747,517, and 6,771,133.
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 Other US and Canadian Patents Pending.



RF OUTPUT

CARRIER FREQUENCY:
 CARRIER STABILITY:
 POWER:
 VSWR:
 IMPEDANCE:
 LOADING:
 OPEN/SHORT PROTECTION:
 HARMONIC & SPURIOUS LEVEL:

1435.5 to 1539.5; 1710.0 to 1850.0; 2200.5 to 2299.5;
 2300.5 to 2399.5 MHz Single Frequency
 Within $\pm 0.002\%$ over -20°C to $+70^{\circ}\text{C}$
 40 Watts Minimum
 1.5:1 Maximum
 50 Ohms Nominal
 Normal Operation into any Load VSWR and Phase Angle
 Internal Isolator
 In Accordance with Latest IRIG Specifications

DIGITAL INPUT

LEVELS:
 BIT RATE:
 DEVIATION:
 INCIDENTAL AM:
 INCIDENTAL FM:
 INPUT IMPEDANCE:

TTL, RS232, or RS422 Compatible
 DC to 57.6 KBits/Sec Maximum
 Factory Set to ± 75 KHz
 5% Maximum
 10 KHz RMS Maximum
 TTL: 10 KOhms to +5 VDC
 RS232: 10 KOhms to Ground
 RS422: 120 Ohms Differential

POWER REQUIREMENTS

INPUT VOLTAGE:
 INPUT CURRENT (MAXIMUM):

+28 ± 4 VDC: Reverse Polarity Protected

Band	Current
1435.5 to 1539.5 MHz	7.5 A
1710.0 to 1850.0 MHz	7.5 A
2200.5 to 2299.5 MHz	8.0 A
2300.5 to 2399.5 MHz	8.0 A

ENVIRONMENTAL SPECIFICATIONS

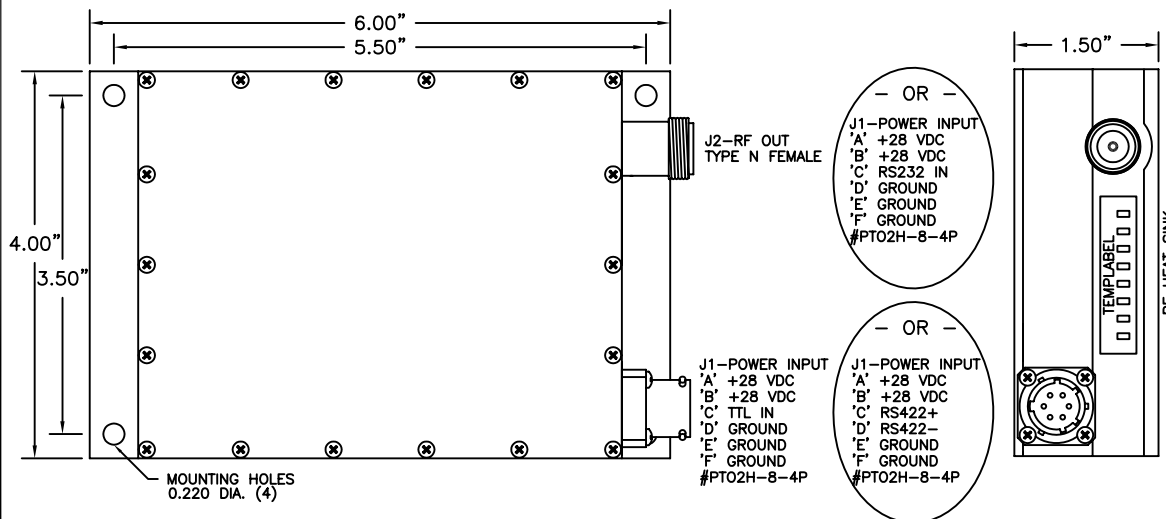
TEMPERATURE:
 VIBRATION:
 SHOCK:
 ACCELERATION:
 ALTITUDE:
 HUMIDITY:

Operating: -20°C to $+70^{\circ}\text{C}$; Storage: -54°C to $+125^{\circ}\text{C}$
 14 G's, Random, Standard Haystack, 20 Hz to 2 KHz, 3 Axes
 1/2 Sine, 100 G's Pk, 11 ms, 3 Axes
 100 G's, 3 Axes
 Unlimited
 To 95% at any Temperature forming Frost or Condensation

PHYSICAL CHARACTERISTICS

DIMENSIONS:
 WEIGHT:

Per Outline Drawing
 28 oz. Maximum



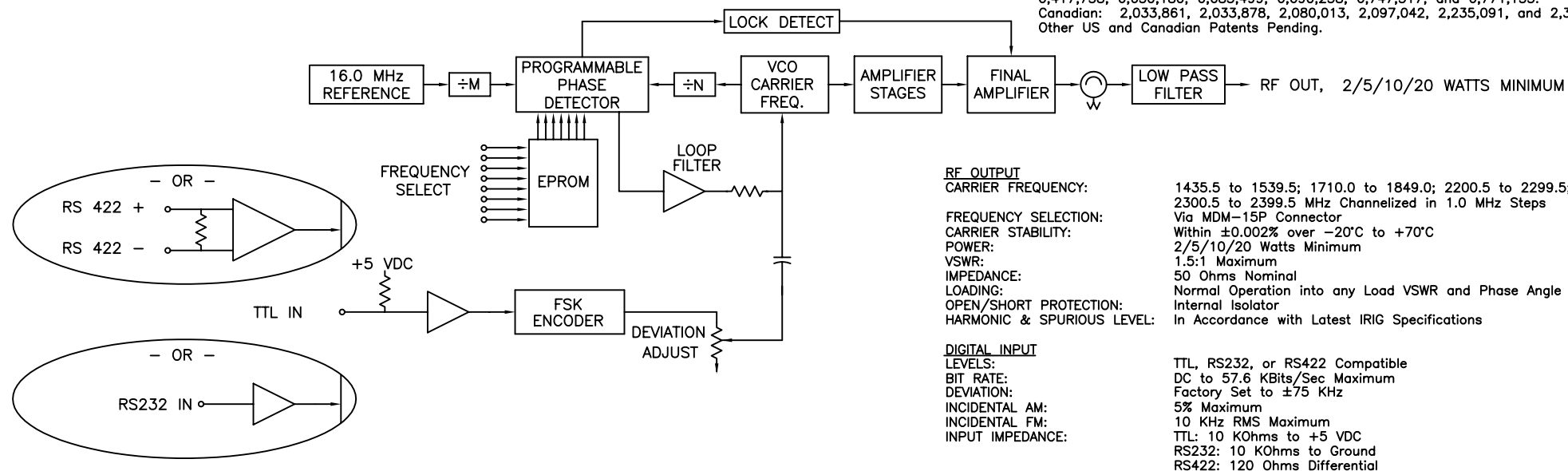
DATE	06 03 08	 EMHISER RESEARCH, INC. 2705 OLD HIGHWAY 40 WEST TEL: 775-345-2705 P.O. BOX 189 VERDI, NEVADA FAX: 775-345-2484 89439-0189 U.S.A. EMAIL: INFO@EMHISER.COM
DWN	L3	
APVD		
QC		
CAGE CODE IDENT NO.	60666	FSK TRANSMITTER, 40 WATTS SINGLE FREQUENCY, DC COUPLED 1435.5 TO 2399.5 MHZ (4 BANDS)
		MODEL NO. EFT-36DED SERIES

FSK Transmitter Model EFTC-09DED Series

9 Cubic Inches 2, 5, 10 or 20 Watts

DC Coupled Channelized 28 VDC

Protected by One or More of the following Patents:
 US: 5,091,706, 5,097,230, 5,311,152, 5,497,509, 5,802,462, 6,404,292, 6,411,237,
 6,417,738, 6,650,180, 6,683,499, 6,690,238, 6,747,517, and 6,771,133.
 Canadian: 2,033,861, 2,033,878, 2,080,013, 2,097,042, 2,235,091, and 2,308,209.
 Other US and Canadian Patents Pending.



RF OUTPUT

CARRIER FREQUENCY: 1435.5 to 1539.5; 1710.0 to 1849.0; 2200.5 to 2299.5;
 2300.5 to 2399.5 MHz Channelized in 1.0 MHz Steps
 Via MDM-15P Connector
 FREQUENCY SELECTION: Within $\pm 0.002\%$ over -20°C to $+70^{\circ}\text{C}$
 CARRIER STABILITY: $\pm 0.002\%$ over -20°C to $+70^{\circ}\text{C}$
 POWER: 2/5/10/20 Watts Minimum
 VSWR: 1.5:1 Maximum
 IMPEDANCE: 50 Ohms Nominal
 LOADING: Normal Operation into any Load VSWR and Phase Angle
 OPEN/SHORT PROTECTION: Internal Isolator
 HARMONIC & SPURIOUS LEVEL: In Accordance with Latest IRIG Specifications

DIGITAL INPUT

LEVELS: TTL, RS232, or RS422 Compatible
 BIT RATE: DC to 57.6 KBits/Sec Maximum
 DEVIATION: Factory Set to ± 75 KHz
 INCIDENTAL AM: 5% Maximum
 INCIDENTAL FM: 10 KHz RMS Maximum
 INPUT IMPEDANCE: TTL: 10 KOhms to +5 VDC
 RS232: 10 KOhms to Ground
 RS422: 120 Ohms Differential

POWER REQUIREMENTS

INPUT VOLTAGE: +28 ± 4 VDC: Reverse Polarity Protected
 INPUT CURRENT (MAXIMUM):

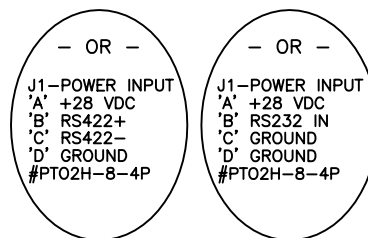
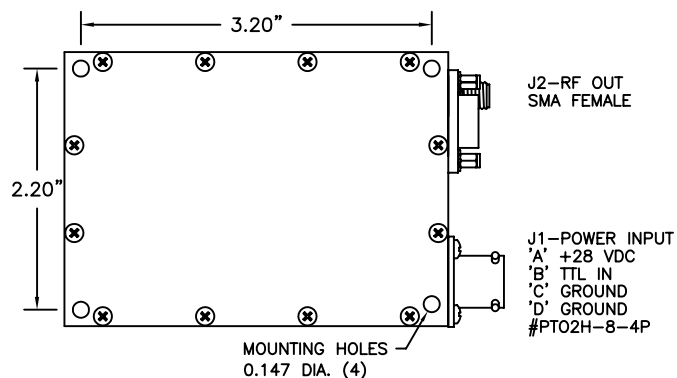
Power	Current
2 Watts	650 Milliamps
5 Watts	1.2 Amps
10 Watts	2.0 Amps
20 Watts	4.0 Amps

ENVIRONMENTAL SPECIFICATIONS

TEMPERATURE: Operating: -20°C to $+70^{\circ}\text{C}$; Storage: -54°C to $+125^{\circ}\text{C}$
 VIBRATION: 14 G's, Random, Standard Haystack, 20 Hz to 2 KHz, 3 Axes
 SHOCK: 1/2 Sine, 100 G's Pk, 11 ms, 3 Axes
 ACCELERATION: 100 G's, 3 Axes
 ALTITUDE: Unlimited
 HUMIDITY: To 95% at any Temperature forming Frost or Condensation

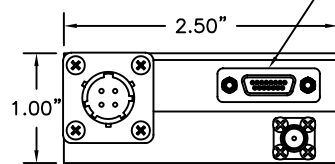
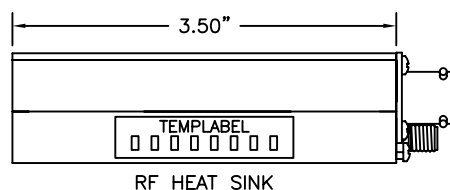
PHYSICAL CHARACTERISTICS

DIMENSIONS: Per Outline Drawing
 WEIGHT: 12 oz. Maximum



J3-FREQUENCY SELECT
MDM-15P

PIN #	
1:	GND
2:	N/C
3:	N/C
4:	BCD 100
5:	BCD 80
6:	BCD 40
7:	BCD 20
8:	BCD 10
9:	BCD 8
10:	BCD 4
11:	BCD 2
12:	BCD 1
13:	N/C
14:	GND
15:	GND



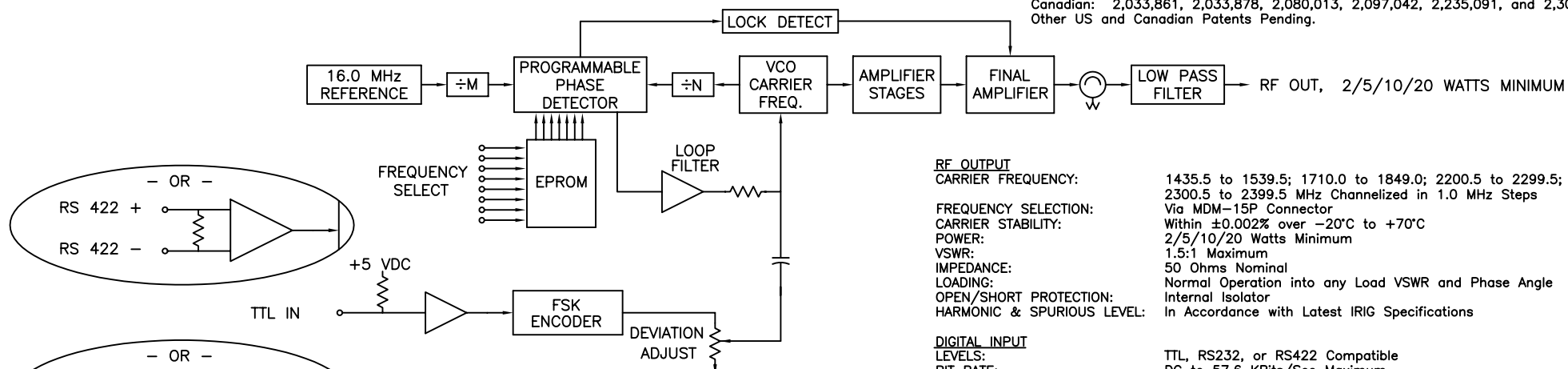
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DWN	L3	
APVD		
QC		
CAGE CODE IDENT NO. 60666		FSK TRANSMITTER, 2/5/10/20 WATTS CHANNELIZED, DC COUPLED 1435.5 TO 2399.5 MHZ (4 BANDS)
MODEL NO. EFTC-09 SERIES		

FSK Transmitter Model EFTC-11DED Series

11 Cubic Inches 2, 5, 10 or 20 Watts

DC Coupled Channelized 28 VDC

Protected by One or More of the following Patents:
 US: 5,091,706, 5,097,230, 5,311,152, 5,497,509, 5,802,462, 6,404,292, 6,411,237,
 6,417,738, 6,650,180, 6,683,499, 6,690,238, 6,747,517, and 6,771,133.
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 Other US and Canadian Patents Pending.



RF OUTPUT

CARRIER FREQUENCY: 1435.5 to 1539.5; 1710.0 to 1849.0; 2200.5 to 2299.5;
 2300.5 to 2399.5 MHz Channelized in 1.0 MHz Steps
 Via MDM-15P Connector
 FREQUENCY SELECTION: Within $\pm 0.002\%$ over -20°C to $+70^{\circ}\text{C}$
 CARRIER STABILITY: 2/5/10/20 Watts Minimum
 POWER: 1.5:1 Maximum
 VSWR: 50 Ohms Nominal
 IMPEDANCE: Normal Operation into any Load VSWR and Phase Angle
 LOADING: Internal Isolator
 OPEN/SHORT PROTECTION: In Accordance with Latest IRIG Specifications
 HARMONIC & SPURIOUS LEVEL:

DIGITAL INPUT

LEVELS: TTL, RS232, or RS422 Compatible
 BIT RATE: DC to 57.6 KBits/Sec Maximum
 DEVIATION: Factory Set to ± 75 KHz
 INCIDENTAL AM: 5% Maximum
 INCIDENTAL FM: 10 KHz RMS Maximum
 INPUT IMPEDANCE: TTL: 10 KOhms to $+5$ VDC
 RS232: 10 KOhms to Ground
 RS422: 120 Ohms Differential

POWER REQUIREMENTS

INPUT VOLTAGE: $+28 \pm 4$ VDC: Reverse Polarity Protected
 INPUT CURRENT (MAXIMUM):

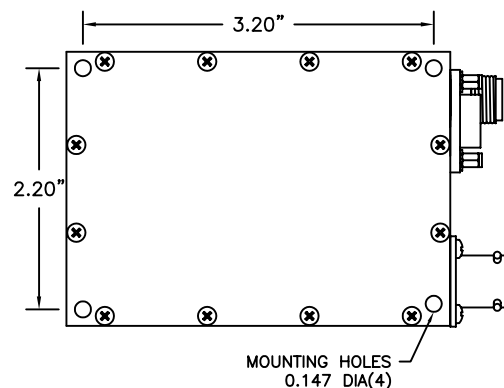
Power	Current
2 Watts	650 Milliamps
5 Watts	1.2 Amps
10 Watts	2.0 Amps
20 Watts	4.0 Amps

ENVIRONMENTAL SPECIFICATIONS

TEMPERATURE: Operating: -20°C to $+70^{\circ}\text{C}$; Storage: -54°C to $+125^{\circ}\text{C}$
 VIBRATION: 14 G's, Random, Standard Haystack, 20 Hz to 2 KHz, 3 Axes
 SHOCK: 1/2 Sine, 100 G's Pk, 11 ms, 3 Axes
 ACCELERATION: 100 G's, 3 Axes
 ALTITUDE: Unlimited
 HUMIDITY: To 95% at any Temperature forming Frost or Condensation

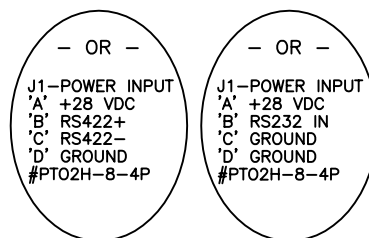
PHYSICAL CHARACTERISTICS

DIMENSIONS: Per Outline Drawing
 WEIGHT: 14 oz. Maximum



J2-RF OUT
TNC FEMALE

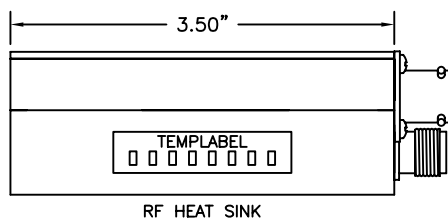
J1-POWER INPUT
'A' $+28$ VDC
'B' TTL IN
'C' GROUND
'D' GROUND
#PT02H-8-4P



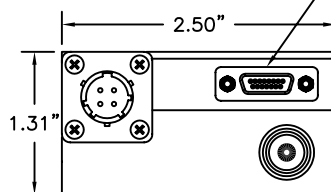
J3-FREQUENCY SELECT

MDM-15P
 PIN #

1: GND	80
2: N/C	40
3: N/C	20
4: N/C	10
5: BCD	8
6: BCD	4
7: BCD	2
8: BCD	1
9: BCD	
10: BCD	
11: BCD	
12: BCD	
13: N/C	
14: GND	
15: GND	



RF HEAT SINK



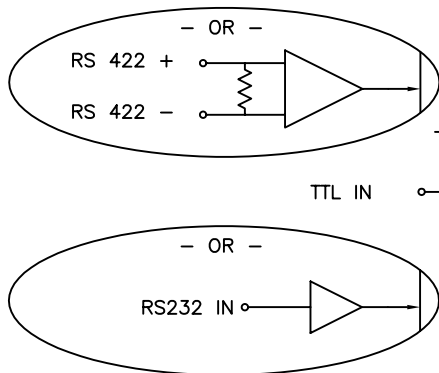
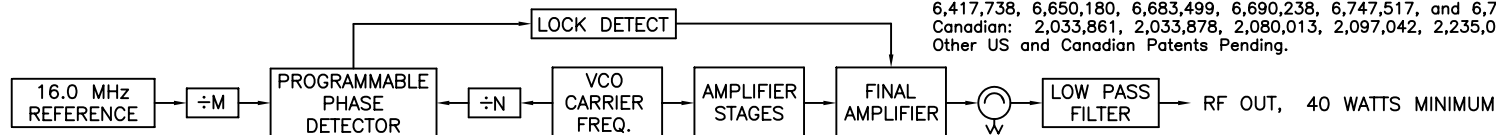
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DWN	L3	
APVD		
QC		
CAGE CODE IDENT NO. 60666		FSK TRANSMITTER, 2/5/10/20 WATTS CHANNELIZED, DC COUPLED 1435.5 TO 2399.5 MHZ (4 BANDS)
MODEL NO. EFTC-11DED SERIES		

FSK Transmitter Model EFTC-36DED Series

36 Cubic Inches 40 Watts

DC Coupled Channelized 28 VDC

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 6,417,738, 6,650,180, 6,683,499, 6,690,238, 6,747,517, and 6,771,133.
 Canadian: 2,033,861, 2,033,878, 2,080,013, 2,097,042, 2,235,091, and 2,308,209.
 Other US and Canadian Patents Pending.



RF OUTPUT
 CARRIER FREQUENCY: 1435.5 to 1539.5; 1710.0 to 1849.0; 2200.5 to 2299.5;
 2300.5 to 2399.5 MHz Channelized in 1.0 MHz Steps
 Via MDM-15P Connector
FREQUENCY SELECTION: Within $\pm 0.002\%$ over -20°C to $+70^{\circ}\text{C}$
POWER: 40 Watts Minimum
VSWR: 1.5:1 Maximum
IMPEDANCE: 50 Ohms Nominal
LOADING: Normal Operation into any Load VSWR and Phase Angle
OPEN/SHORT PROTECTION: Internal Isolator
HARMONIC & SPURIOUS LEVEL: In Accordance with Latest IRIG Specifications

DIGITAL INPUT
LEVELS: TTL, RS232, or RS422 Compatible
BIT RATE: DC to 57.6 KBits/Sec Maximum
DEVIATION: Factory Set to ± 75 KHz
INCIDENTAL AM: 5% Maximum
INCIDENTAL FM: 10 KHz RMS Maximum
INPUT IMPEDANCE: TTL: 10 KOhms to +5 VDC
 RS232: 10 KOhms to Ground
 RS422: 120 Ohms Differential

POWER REQUIREMENTS
INPUT VOLTAGE: +28 ± 4 VDC: Reverse Polarity Protected
INPUT CURRENT (MAXIMUM):

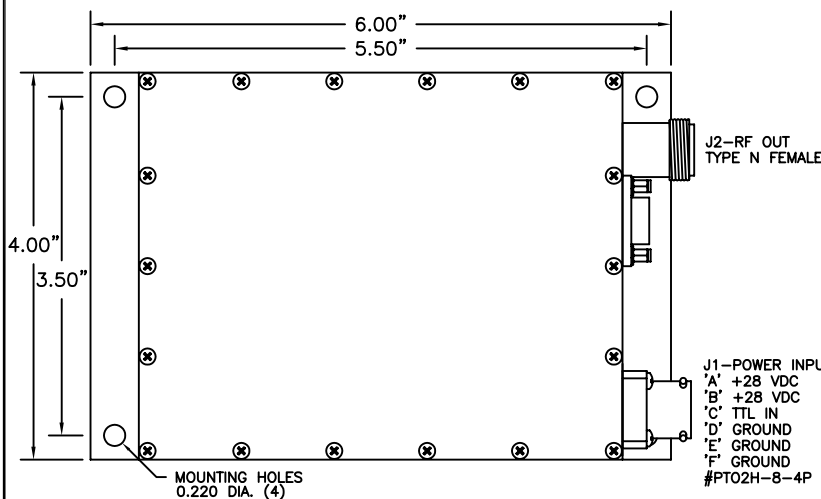
Band	Current
1435.5 to 1539.5 MHz	7.5 A
1710.0 to 1849.0 MHz	7.5 A
2200.0 to 2299.0 MHz	8.0 A
2300.5 to 2399.5 MHz	8.0 A

ENVIRONMENTAL SPECIFICATIONS
TEMPERATURE: Operating: -20°C to $+70^{\circ}\text{C}$; Storage: -54°C to $+125^{\circ}\text{C}$
VIBRATION: 14 G's, Random, Standard Haystack, 20 Hz to 2 KHz, 3 Axes
SHOCK: 1/2 Sine, 100 G's Pk, 11 mS, 3 Axes
ACCELERATION: 100 G's, 3 Axes
ALTITUDE: Unlimited
HUMIDITY: To 95% at any Temperature forming Frost or Condensation

PHYSICAL CHARACTERISTICS
DIMENSIONS: Per Outline Drawing
WEIGHT: 28 oz. Maximum

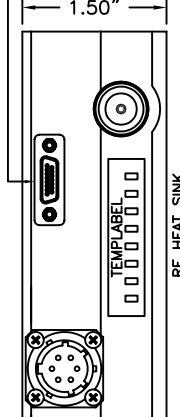
J3-FREQUENCY SELECT
 MDM-15P
 PIN#

1: GND	
2: GND	
3: N/C	
4: GND	OR 100
5: BCD	80
6: BCD	40
7: BCD	20
8: BCD	10
9: BCD	8
10: BCD	4
11: BCD	2
12: BCD	1
13: N/C	
14: GND	
15: GND	



J1-POWER INPUT
 'A' +28 VDC
 'B' +28 VDC
 'C' RS232 IN
 'D' GROUND
 'E' GROUND
 'F' GROUND
 #PT02H-8-4P

J1-POWER INPUT
 'A' +28 VDC
 'B' +28 VDC
 'C' RS422+
 'D' RS422-
 'E' GROUND
 'F' GROUND
 #PT02H-8-4P



DATE	06 03 08	 EMHISER RESEARCH, INC. 2705 OLD HIGHWAY 40 WEST TEL: 775-345-2705 P.O. BOX 189 VERDI, NEVADA FAX: 775-345-2484 89439-0189 U.S.A. EMAIL: INFO@EMHISER.COM
DWN	L3	
APVD		
QC		FSK TRANSMITTER, 40 WATTS CHANNELIZED, DC COUPLED 1435.5 TO 2399.5 MHZ (4 BANDS)
CAGE CODE IDENT NO.	60666	MODEL NO. EFTC-36DED SERIES