

# Model 3644 Mini-Tx 1.2 GHz, 1550 nm L-EML™ CATV Transmitter Subassembly



## Applications

- Video Signal Distribution to HFC CATV, RFoG and RF overlay for FTTH

## Features

- Advanced Linear EML Laser
- Long Distance Link up to 100 km
- Optimized RF Integration of Predistorter, Amplifiers, and Laser
- Complete, Efficient Laser Bias and TEC Control Circuitry
- "Plug and Play" Assembly Reduces Manufacturing Costs
- Compact Shape Fits Into a Variety of Transmitter Platforms
- Shorter Time-To-Market Due to Modular Design
- Digital Monitoring and Control

Ortel's Model 3644 transmitter card is a linear externally-modulated 1550 nm transmitter subassembly that is optimized for the 190CW channel plan with an operation bandwidth to 1.2 GHz. The source laser utilizes Ortel's industry leading 1550 nm, high-power, low-noise, narrow linewidth Linear Externally Modulated Laser (L-EML™). The transmitter card is designed to support traditional Hybrid Fiber Coax (HFC) applications, RFoG and RF overlay for Fiber-To-The-Premise (FTTP) supporting links from 0 to 100 km.

The 75 ohm RF video input supports frequencies up to 1218 MHz. Integrated within the design is Ortel's patented predistortion technology to provide outstanding noise and distortion performance. There is an RF test port on board with monitor and control via an RS-232 interface. The board is offered in a compact form factor.

## Performance Highlights

Property	Min	Typ	Max	Units
Operating Temperature Range	0	25	50	°C
Wavelength (Multiple Options)	1528	-	1563	nm
Optical Power	11	11.5	-	dBm
Frequency Response (75 Ω Port)	47	-	1218	MHz
CNR (Note1)	47.5	-	-	dB
CSO (Note1)	-	-	-55	dBc
CTB (Note1)	-	-	-60	dBc
MER (noise corrected) (Note2)	44			dB
BER (Pre-FEC, Annex B) (Note2)			1E-9	
Optical Return Loss	40	-	-	dB
SBS threshold	12 (Note3) 14 (Note4) 15 (Note5) 16 (Note6)	-	-	dBm

Note1: CNR, CSO, CTB performance above assumes 190 CW channel loading, 0 dBm received optical power, 40km.

Note2: BER&MER are tested with 190 channels, 256-QAM channel loading (Pre-FEC, Annex B), 0 dBm received optical power, 40km. Based on system MER > 57dB

Note3: Start Channel Frequency is 45MHz; Corning SMF-28, single mode fiber

Note4: Start Channel Frequency is 85MHz; Corning SMF-28, single mode fiber

Note5: Start Channel Frequency is 112MHz; Corning SMF-28, single mode fiber

Note6: Start Channel Frequency is 200MHz; Corning SMF-28, single mode fiber

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## 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
Laser Heat Sink Temperature (power on)	$T_{LHS}$	-40	75	°C
RF Amp Heat Sink Temperature (power on) <sup>1</sup>	$T_{AHS}$	-40	75	°C
75 Ω RF Input Level	-	-	+3	dBm
Relative Humidity, non-condensing	-	0	95	%
DC Power Input <sup>2</sup>	$V_{cc}$	-	28	V

1. RF amplifier temperature reference point is at the center of the flat surface of the heat sink (away from amplifier)

## Operating Conditions

Unless noted otherwise, the following operating conditions are necessary to achieve specified performance.

Parameter	Symbol	Min	Typ	Max	Unit
Bandwidth	-	47	-	1218	MHz
Total 75 Ω RF Input Level <sup>1</sup>	-	-12.5	-12	-11.5	dBm
75 Ω RF Test Point Level <sup>1</sup>	-	-	78	-	dBuV/ch
Ambient Temperature	$T_{amb}$	0	-	50	°C
Laser Case Temperature	$T_{LHS}$	0	-	60	°C
RF Amp Case Temperature <sup>2</sup>	$T_{AHS}$	0	-	60	°C

1. 42 channel CENELEC loading at -12dBm composite, 4.5% OMI/ch

2. RF amplifier temperature reference point is at the center of the flat surface of the heat sink (away from amplifier).

## DC Characteristics

Parameter	Symbol	Min	Typ	Max	Unit
Total Power Dissipation	$P_{dis,total}$	-	-	8	W
DC Supply Voltage	$V_{DC}$	11.4	12	25.2	V
DC Input Power Ripple (below 20 MHz)	-	0	-	100	mV p-p

## RF Characteristics

Parameter	Condition	Min	Typ	Max	Unit
Bandwidth	-	47	-	1218	MHz
Frequency Response	Peak to Valley, 47 - 1218 MHz	-	-	1.5	dB <sub>p-p</sub>
Input Impedance	47 - 1218 MHz RF Input	-	75	-	Ohms
75 Ω Video Input Return Loss	47 to 1218 MHz	16	-	-	dB
75 Ω Test Port Input Return Loss	47 to 1218 MHz	16	-	-	dB

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## Optical Characteristics

Parameter	Condition	Min	Typ	Max	Unit
Optical Output Power	-	11	-	-	dBm
Side Mode Suppression Ratio	-	40	-	-	dB
Optical Return Loss	APC style connector	40	-	-	dB
Fiber Length	May include splice	1	1.3	1.4	m
Fiber Buffer	-	-	900	-	μm
Fiber Core/Cladding	-	-	9/125	-	μm

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.

## DC & Analog Signals Connector, J3

10 pin(2x5) male connector, Samtec FTSH-105-01-L-DV-K-A

Pin	Name	Description <sup>1,2</sup>
1	RX_RS-232	Communication
2	TX_RS-232	Communication
3	GND	Ground
4	GND	Ground
5	Vcc	DC power
6	Vcc	DC power
7	GND	Ground
8	GND	Ground
9	ALARM	ALARM Summary
10	RESET	RESET Internal MCU

1. See Absolute Maximum, Operating Conditions, and DC Characteristics sections for appropriate voltages and currents.
2. TTL voltages

## Alarm Summary

Alarm Summary	Alarm Low	Warning Low	Warning High	Alarm High	Unit
Module Temp	-10	NA	NA	85	degC
TEC Current	-1000	NA	NA	1000	mA
Laser Temp	Nom-5.0	Nom-3.0	Nom+3.0	Nom-5.0	degC
Optical Power	Nom-3.0	NA	NA	Nom+3.0	mW
RF Input	NA	NA	+1.0	+3.0	dBm

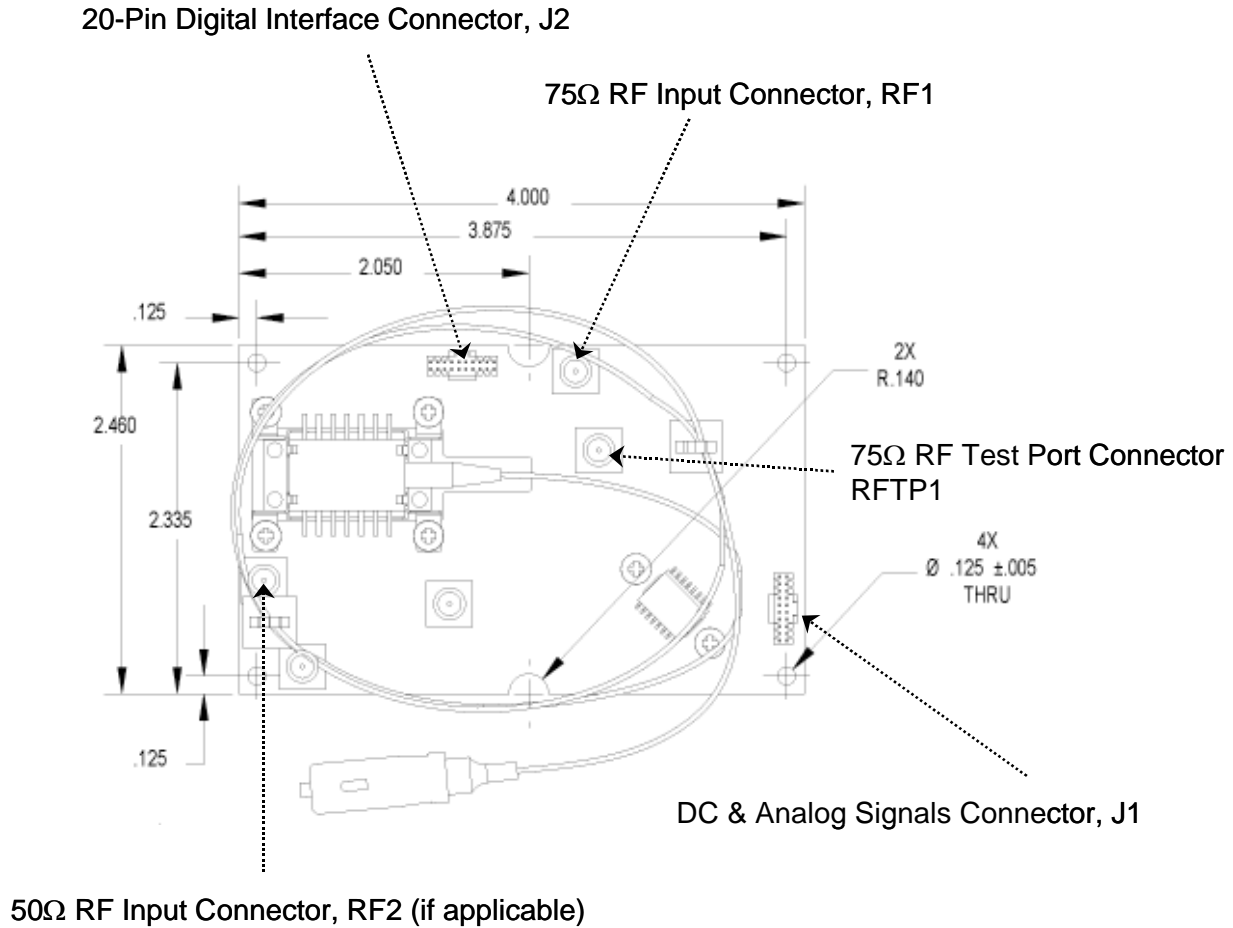
Note: when meet Alarm conditions, the alarm pin 9 will be “high”

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## Outline Drawing (Dimensions are in Inches)

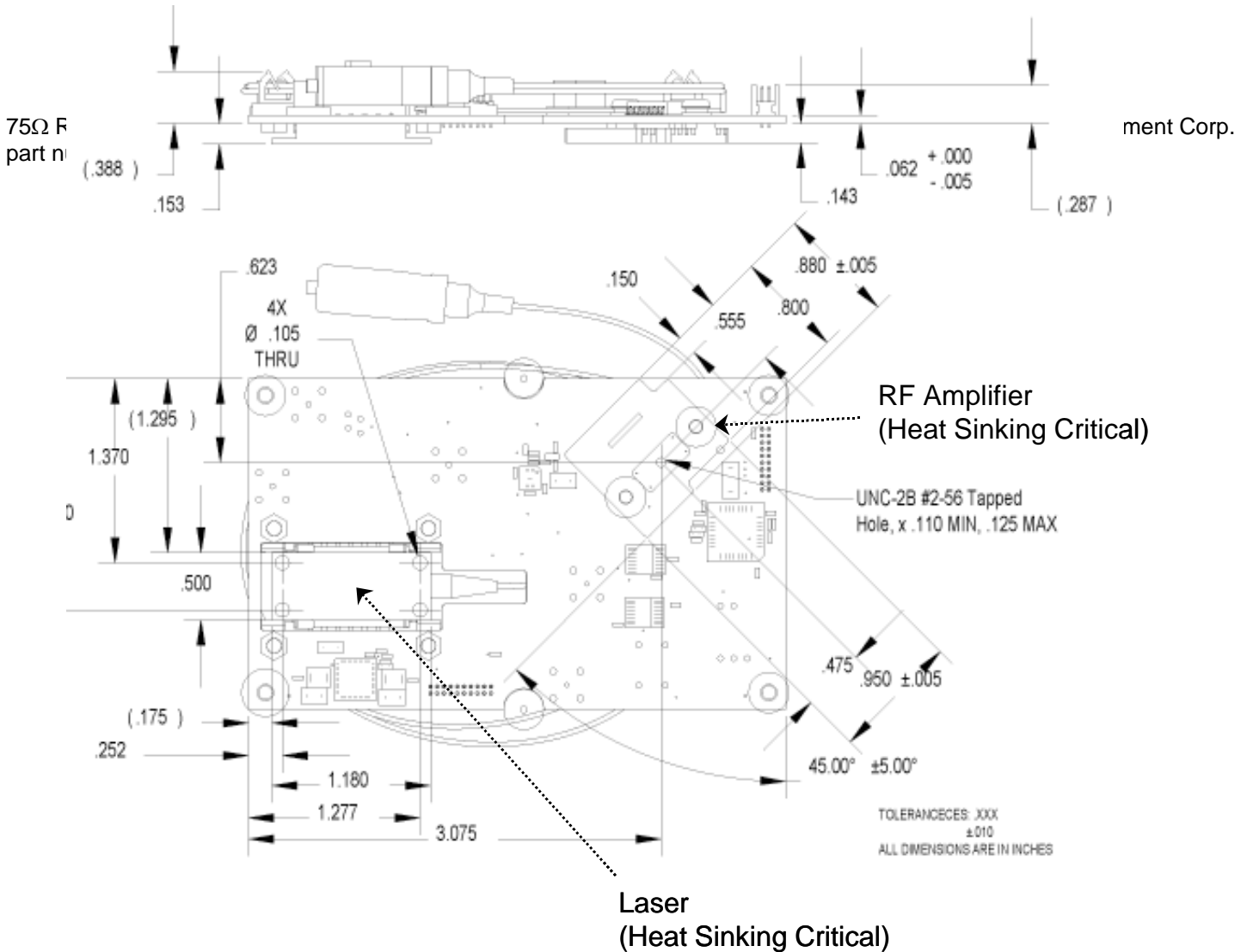


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## Outline Drawing (continued)



75Ω RF connector – MCX connector, straight jack receptacle, Koaxis part number 253-5700, or General Instrument Corp. part number 404576-001-99.

## Mounting Information

1. Install the appropriate thermal pads (shipped along with the unit) to bottom of laser and bottom of RF amplifier heat sink.
2. Locate 4 standoffs to use underneath PC board assembly.
3. Insert 4 screws through PC board assembly and into standoffs. Torque screws to 6 in-lbs.
4. Insert 4 screws through the laser mounting holes and into the base plate. Torque screws to 6 in-lbs.
5. Insert 1 screw (#2-56) through the bottom of the base plate and into the RF amplifier heat sink.

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## Ordering Information – Model Number Options

**3644–001-xx**

**ITU Channel**  
xx = 18 to 62

## ITU Grid Channel Numbering

Channel	Wavelength (nm)	Channel	Wavelength (nm)	Channel	Wavelength (nm)
62	1527.99	48	1538.98	26	1556.56
61	1528.77	44	1542.14	24	1558.17
60	1529.55	39	1546.12	22	1559.79
57	1531.92	36	1548.51	21	1560.61
54	1534.25	33	1550.92		
52	1535.82	28	1554.94		

Note: other ITUs are available. Contact your EMCORE sales representative for details