# Thermal II Exposure Head
# 2400/2540 DPI Performance Specification

## Product Description

The Thermal II exposure head is a compact multi-channel imaging head with 18.5W of available laser power.

## Physical

| | |
|---|---|
| Size & Mounting details: | See mechanical interface document 72-0030A[1] |

## Imaging

| | |
|---|---|
| Resolution: | **2400 dpi** or **2540 dpi** |
| Write Laser: | 830nm, 40W laser diode bar |
| Laser power at media: | 5 - 18.5W |
| Contrast Ratio:[2] | < 8% |
| Leakage homogeneity:[3] | < 30% |
| Line Width:[4] | 1.6 – 2.5 μm |

## Data

| | |
|---|---|
| Max. Switching capability:[5] | 150 Mbit/sec |
| Data Rate:[6] | 212 Mbit/sec |
| Number of channels: | 224 channels[7] |

## Pre-image time [8]

| | |
|---|---|
| Laser ready time:[9] | <10 sec |
| Focus learn time:[10] | <12 drum revolutions |
| Edge detect time:[11] | Engine specific |
| Beam calibration time:[12] | Typically <60 sec |
| Write power servo time:[13] | 0.5 mSec[14] |

## Auto focus system

| | |
|---|---|
| Focus laser: | 650 – 690 nm, ≤35 mW |
| Range of travel: | ± 150 μm |
| Focus dynamic range: | See graph in footnotes[15] |
| Focus tracking accuracy[16]: | ± 5 μm |
| Focus sensor sensitivity: | Depends on media characteristics[17] |
| Range finder range | ±175 μm with valid magnitude or error<br>±500 μm with valid signal and direction of error, but clamped error magnitude |

## Environment

| | |
|---|---|
| Ambient Temperature: | 15°C - 40°C |
| Ambient Humidity: | 5% to 90% RH |
| Coolant supply: | See mechanical interface document 72-0030A |
| Air supply:[18] | See mechanical interface document 72-0030A |

## Power Supplies[19]

| | |
|---|---|
| Switched supply: | 48V ± 10%, 305 W @ 48V Nominal |
| Un-switched supply: | 48V ± 10%, 371W + 137 x (Rate Factor)[20] |
| Electrical Interface: | See electrical interface document 72-3480A |

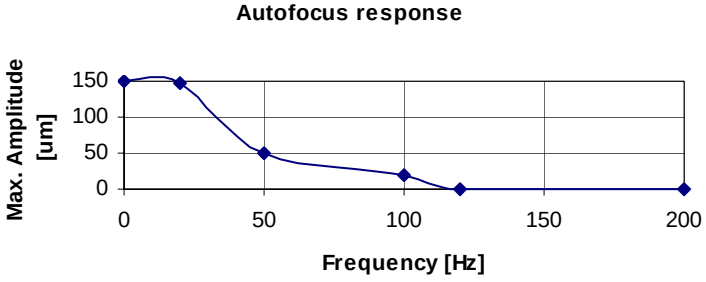
## Regulatory Approvals[21]

| | |
|---|---|
| Electrical safety: | IEC 950 |
| Mechanical safety: | IEC 204-1 |
| EMC: | FCC Part 15 Class A/B |
| Laser safety:[22] | Write laser: CDRH / IEC825-1 Class 4.<br>Focus laser: CDRH / IEC825-1 Class 3B |
| Enclosure sealing: | IP 64 |

[1] The mechanical interface document describes in detail the mounting, connection and operating requirements for the exposure head. It should be read in conjunction with this specification.
[2] Even when all channels are switched off there will be some leakage of laser light to the media. The contrast ratio is defined as follows:

$$CR = \frac{P_{Leakage}}{P_{Spot_full}}.100\ \%$$

[3] The leakage light will not be perfectly distributed channel to channel – this specifies the maximum variation of the leakage light per channel.
[4] FWHM as measured by Creo.
[5] At worst case drive conditions and worst case plot pattern (1x1 pixel checkerboard). This is a thermal limit – switching at a higher rate will put the driver electronics at risk.
[6] Under certain limits of pattern feature size the electronics will support a higher data rate of up to 240 Mbit/sec. Please consult Creo for more information.
[7] Should an application require either a fixed number of channels and/or a minimum number of channels this should be explicitly indicated. In these cases heads could possibly be selected to meet the required criteria.
[8] Pre-image functions are media and application dependent. In some cases these functions can be done in parallel or even omitted.
[9] The time taken for the laser to stabilize sufficiently in order to be ready to image after a “laser on” command.
[10] The time for the focus system to initialize at the beginning of an image.
[11] This function is largely engine dependent but it does become part of the pre-image time. Typically if everything is set up correctly edge detection will complete in less than 6 seconds.
[12] The time taken for the head to calibrate all channels to the same power. This calibration is only performed at a fixed interval, typically every 9 hours.
[13] This servo operation occurs during the dead time between swath lines. All channels will be switched off during this time.
[14] Requires Thermal II head firmware V0.30 or later. For older firmware the time will be around 1.7 mSec.
[15] The graph below shows tracking response of auto-focus servo to bumps in the media surface.



[16] The accuracy quoted is typical for common media but can degrade on media with highly specular reflectivity or very low reflectivity.
[17] The auto-focus system uses the reflected focus laser light from the media surface to operate thus placing some requirements on the media for surface finish and reflectivity at a 670 nm. The specification of the minimum surface quality is a complex function of media reflectivity and surface quality – please consult Creo for more information.
[18] An air supply is needed to run the active drier that protects the head from condensation build-up. An air supply may also be needed to feed the whisker jet, which aids in clearing smoke and or debris from the writing plane.
[19] Do not use electrical power supply specifications to determine cooling requirements for the product. Please consult mechanical interface document.
[20] For laser safety reasons there is a switched supply that can be cut to remove the laser diode drive, and an un-switched supply that supplies all other power requirements. The un-switched supply capacity cannot be specified without knowledge of the maximum stroke rate for the application.

$$StrokeRate[kHz] = \frac{\pi.dpi.d.rpm}{1{,}524{,}000}$$

where *d* is the drum diameter in mm, then

$$RateFactor = \frac{StrokeRate[kHz]}{650.Feature_Size[pel]}$$

where *Feature_Size* = 1 for 1x1 pixel pattern, 2 for 2x2 pixel pattern etc

[21] Approvals are usually certified through the platform the head is installed on and not for the head as a component with the exception of the enclosure sealing to IP64.
[22] Typically all platforms utilizing this exposure head will be compliant to CDRH / IEC825-1 Class 1