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## TL1250 lens family 4K Resolution Day/Night lens for 1/1.7" sensors

Ultra high resolution for 4K cameras, up to 12.4 megapixel

Available with DC autoiris or P-iris for precise aperture control

Fully motorized with zoom, focus, iris. Some models also have IR cut and limit switches  
Optional motor control board available for easy integration

IR corrected for true Day/Night cameras

Compact design to fit into domes as small as 4" mini-dome size

CS-mount or D25 smooth mount

Used for sensor sizes 1/2.5", 1/2.3", 1/2" 1/1.8", and up to 1/1.7" (Sony IMX178, Sony IMX226 for example)

TL1250 lens specifications

|                         |   |
|-------------------------|---|
| Focal length (FL)       | 12-50mm                                     |
| Image circle            | Ø9.4mm at FL 12mm                           |
| Resolution              | 12.4 megapixel                              |
| F/#                     | F/1.8 @ 12mm - F/2.4 @ 50mm to close        |
| IR Correction           | 440nm – 950nm (Day/Night)                   |
| Focus Range             | 2.0m - infinity                             |
| Lens length (TTL)       | < 64mm TTL                                  |
| Back focal length (BFL) | 8.2mm (in air)                              |
| Chief ray angle (CRA)   | < 7°  |
| Geometric distortion    | < 10% at 12mm, < 2% at 50mm                 |
| Relative illumination   | >40%  |
| Lens transmission       | >80%  |
| Weight                  | 70g depending on model                      |
| Operating temperature   | -20C to 60C (<70% humidity, non-condensing) |
| Storage temperature     | -30C to 70C (<90% humidity, non-condensing) |

Field of view for sensor sizes (12mm – 50mm)

| Sensor size | 1/1.7"     | 1/1.8" 1/1.8" |            |            |            | 1/2.5"     |
|-------------|------------|---------------|------------|------------|------------|------------|
| Horizontal  | 36° - 8.6° | 36° - 8.6°    | 35° - 8.5° | 30° - 7.4° | 30° - 7.2° | 27° - 6.7° |
| Vertical    | 26° - 6.5° | 23° - 5.8°    | 17° - 4.3° | 23° - 5.6° | 22° - 5.5° | 20° - 5.0° |
| Diagonal    | 46° - 11°  | 44° - 10°     | 40° - 9.5° | 39° - 9.2° | 38° - 9°   | 34° - 8.3° |

\*4K format = 4000 x 2000 pixels

## Motor specifications

### Zoom, Focus motors for “-R#” versions

|                            |  |
|----------------------------|--|
| Drive                      | Stepper motor<br>2 phase bipolar drive   |
| Operation voltage          | 3.3V (range 2.6-4.8V)                    |
| Maximum motor temperature* | Do not let motor temperature exceed 92°C |
| Coil resistance            | 28.5Ω (±7%)                              |
| Zoom number of steps       | 3256 steps between hard stops            |
| Zoom speed range**         | 600-1000pps                              |
| Zoom cam rotation          | 75°                                      |
| Focus number of steps      | 8467 steps between hard stops            |
| Focus speed range**        | 600-1000pps                              |
| Focus cam rotation         | 195°                                     |

### Iris motor (p-iris)

|                        |  |
|------------------------|--|
| Drive                  | Stepper motor<br>2 phase bipolar drive |
| Operating voltage      | 4V (+/-1)                              |
| Number of steps        | 75 (open to closed)                    |
| Maximum response freq. | 200pps                                 |
| Coil resistance        | 30Ω                                    |

### Iris motor (DC autoiris)

|                         |               |
|-------------------------|---------------|
| Drive                   | DC            |
| Operation voltage       | 3V (2.5~5.0V) |
| Max current consumption | 22mA          |
| Drive coil resistance   | 190Ω          |
| Damper coil resistance  | 855Ω          |

### IR cut (on some models)

|                       |   |
|-----------------------|---|
| Drive                 | DC  |
| Operating voltage     | 4.0V  |
| Drive coil resistance | 130Ω  |
| Connector type        | Housing: Molex 51021-0200<br>Terminal: Molex 50058-8000 |

### IR cut optical versions

The IR cut will switch between two filters. Most lenses use visible bandpass (405-650nm) and clear glass (405-1100nm). There are some models that include filters for 940nm (long pass >880nm) with either visible or clear glass alternate filter.

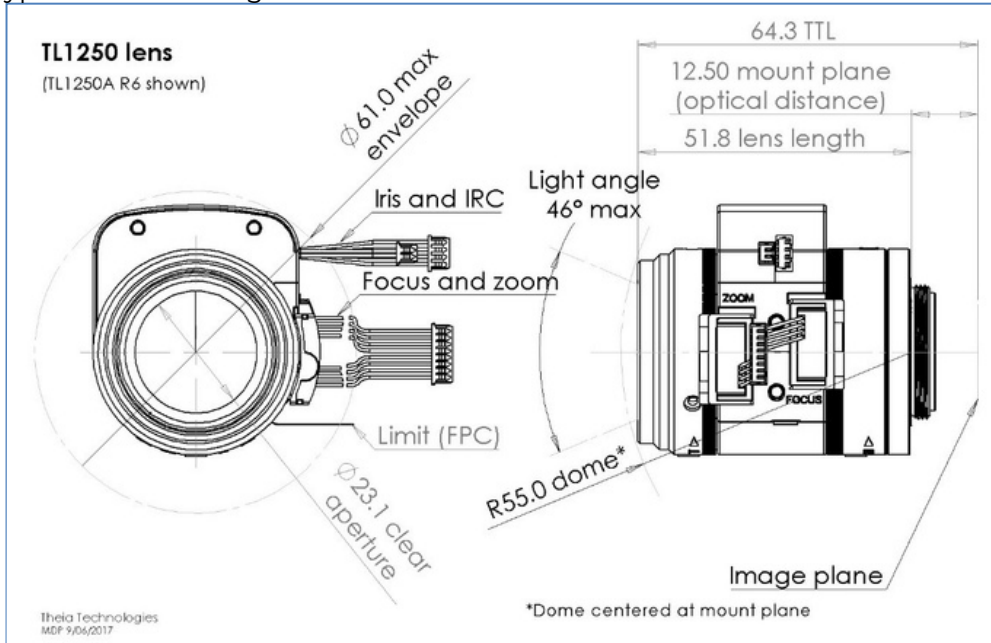
### Type

#### Limit switches (on some models)

|                   |   |
|-------------------|---|
| Part model        | Photo interrupter<br>Phototransistor (open emitter) |
| Operating voltage | Sharp GP1S396HCPSF                                  |
| Output level      | 3.3V  |
| Connector type    | >2.2V HIGH<br><0.6V LOW                             |
|                   | FPC cable   |

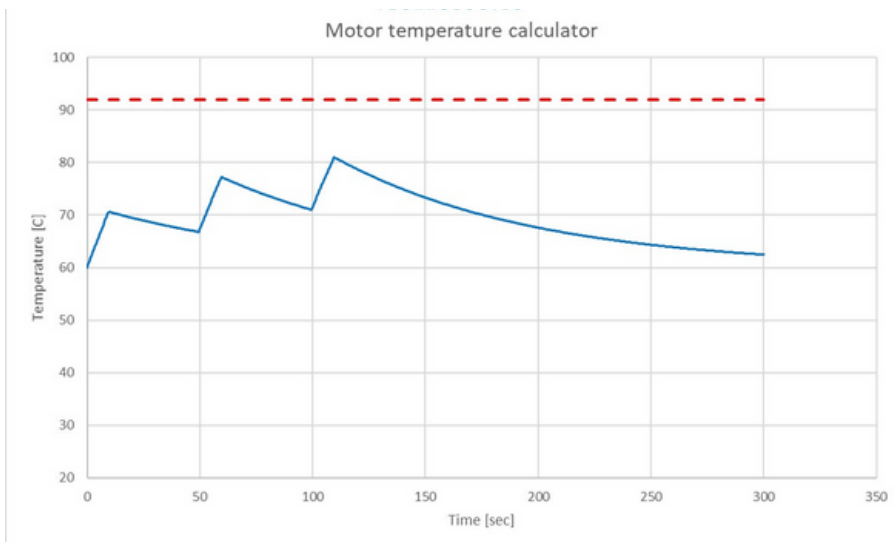
Limit switches allow the driver to find the home position without driving the motor against the hard stop. From this home position, the motor steps can be monitored to prevent the motor from hitting the hard stop on the opposite side.

## Typical lens drawing



## Motor temperature model

The example below shows 60C ambient temperature and 4.0V motor. The motor is driven for 10 seconds (which would generally be longer than normal) with 40 seconds cool down between moves. After 3 moves, the motor is allowed to cool down which takes about 3 minutes.



Lens models

The options listed in the table below may or may not be available. More detailed specifications can be found on Theia's website for the available lens models. [Theia's website](#)

TL1250x-###x Rx -xx

| Lens   | Iris type                   | IR wavelength   | Alternate filter type configuration   | Motor Mount type     |
|--------|-----------------------------|---|---|----------------------|
| TL1250 | A: DC autoiris<br>P: P-iris | (blank): visible + clear glass IRC<br>850: notch filter<br>940: long wave pass filter | V: IR blocking, visible transmitting<br>C: clear glass, visible and IR transmitting | R3<br>R4<br>R5<br>R6 |

| Theia® PN       | Varifocal Mount type | Mount slip ring | Iris type | CCTV iris con. | Molex iris con. | IR corrected (day/night) | Filter switch (vis/clear) | Filter switch (vis/940nm) | Filter switch (clear/940nm) | Zoom motor | Focus motor | PI limits | Focal length | MP rating | f/#   | Image circle | Biggest sensor format | MOD [m] | Lens Length (to mount) | Lens Length (TTL) | Weight [g] |
|-----------------|----------------------|-----------------|-----------|----------------|-----------------|--------------------------|---------------------------|---------------------------|-----------------------------|------------|-------------|-----------|--------------|-----------|-------|--------------|-----------------------|---------|------------------------|-------------------|------------|
| TL1250A R6      | CS                   |                 | A         |                |                 |                          |                           |                           |                             |            |             | P         |              |           |       |              |                       |         |                        |                   | 7          |
| TL1250A R5      | CS                   |                 | A         |                |                 |                          |                           |                           |                             |            |             | I         |              |           |       |              |                       |         |                        |                   | 2          |
| TL1250A R4      | CS                   |                 | A         |                |                 |                          |                           |                           |                             |            |             | P         |              |           |       |              |                       |         |                        |                   | 7          |
| TL1250P R6      | CS                   |                 | P         |                |                 |                          |                           |                           |                             |            |             | b         |              |           |       |              |                       |         |                        |                   | 5          |
| TL1250P R6 25   | D25                  |                 | P         |                |                 |                          |                           |                           |                             |            |             | I         |              |           |       |              |                       |         |                        |                   | 7          |
| TL1250P R5      | CS                   |                 | P         |                |                 |                          |                           |                           |                             |            |             | P         | 12-50        | 12 (4K)   | F/1.8 | 9.4          | 1/1.7"                | 2       | 52                     | 64.5              | 1          |
| TL1250P R4      | CS                   |                 | P         |                |                 |                          |                           |                           |                             |            |             | I         |              |           |       |              |                       |         |                        |                   | 6          |
| TL1250A-940V R6 | CS                   |                 | A         |                |                 |                          |                           |                           |                             |            |             | b         |              |           |       |              |                       |         |                        |                   | 8          |
| TL1250P-940V R6 | CS                   |                 | P         |                |                 |                          |                           |                           |                             |            |             | I         |              |           |       |              |                       |         |                        |                   | 7          |
| TL1250P-940C R6 | CS                   |                 | P         |                |                 |                          |                           |                           |                             |            |             | P         |              |           |       |              |                       |         |                        |                   | 0          |

Related versions without motorized zoom and focus

|         |   |  |   |  |  |  |  |  |  |  |  |   |       |         |       |     |        |   |    |      |    |
|---------|---|--|---|--|--|--|--|--|--|--|--|---|-------|---------|-------|-----|--------|---|----|------|----|
| SL1250M | c |  | M |  |  |  |  |  |  |  |  | P |       |         |       |     |        |   |    |      | 16 |
| SL1250P | s |  | P |  |  |  |  |  |  |  |  | I | 12-50 | 12 (4K) | F/1.8 | 9.4 | 1/1.7" | 2 | 52 | 64.5 | 5  |
| SL1250A | c |  | A |  |  |  |  |  |  |  |  |   |       |         |       |     |        |   |    |      | 6  |
|         | s |  |   |  |  |  |  |  |  |  |  |   |       |         |       |     |        |   |    |      | 7  |
|         | c |  |   |  |  |  |  |  |  |  |  |   |       |         |       |     |        |   |    |      | 9  |
|         | s |  |   |  |  |  |  |  |  |  |  |   |       |         |       |     |        |   |    |      | 2  |
|         |   |  |   |  |  |  |  |  |  |  |  |   |       |         |       |     |        |   |    |      | 7  |
|         |   |  |   |  |  |  |  |  |  |  |  |   |       |         |       |     |        |   |    |      | 0  |
|         |   |  |   |  |  |  |  |  |  |  |  |   |       |         |       |     |        |   |    |      | 2  |
|         |   |  |   |  |  |  |  |  |  |  |  |   |       |         |       |     |        |   |    |      | 7  |
|         |   |  |   |  |  |  |  |  |  |  |  |   |       |         |       |     |        |   |    |      | 2  |

Revisions:

| Version | Change               | Reason  |
|---------|----------------------|---|
| 220510  | Templated spec sheet | Family spec sheet can be reduced for each lens model to simplify spec sheet |
| 220516  | Lens model names     | Corrected missing motor configurations                                      |
|         |                      |   |
|         |                      |   |
|         |                      |   |