



Theia

TECHNOLOGIES

TL410 family 4K Resolution Day/Night lenses up to 1/1.7" sensors

- ✓ **Ultra high resolution for 4K cameras**, up to 12.4 megapixel
- ✓ Available in DC **auto-iris**, **P-iris**, and **manual iris** versions
- ✓ **Fully motorized versions**, or combinations with zoom, focus, iris, IR cut, limit switch; non-motorized versions also available
- ✓ IR corrected for true **Day/Night** cameras
- ✓ **Compact design** to fit into domes as small as 4" mini-dome size
- ✓ **CS-mount** and smooth **D25 board mount** options, as well as **C-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)

SL/TL410 lens family specifications

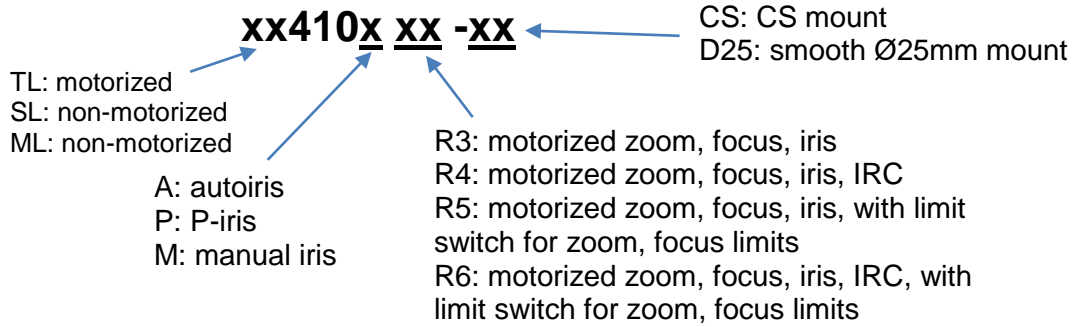
Focal length	4-10mm
Image circle	Ø9.4mm
Resolution	12.4 megapixel
F/#	F/1.4 @ 4mm – F/2.4 @ 10mm to close
Focus Range	0.5m to infinity
IR Correction	Day/Night
Lens length	< 64mm TTL
Back focal length	BFL 8.4mm (in air)
CRA	< 7°
Distortion	< 61% at 4mm, < 8% at 10mm
Relative illumination	>45%
Lens transmission	>80%
Weight	TBD
Temperature range	-20°C to 50°C

Field of view for sensor sizes

Sensor size	1/1.7"	1/1.8"	1/1.8" 4K*	1/2"	1/2.3"	1/2.5"
Horizontal	112° - 44°	110° - 43°	110° - 43°	93° - 37°	90° - 36°	83° - 33°
Vertical	81° - 33°	71° - 29°	52° - 21°	68° - 28°	67° - 27°	60° - 25°
Diagonal	149° - 55°	139° - 52°	126° - 48°	120° - 46°	117° - 45°	106° - 42°

*4K format = 4000 x 2000 pixels

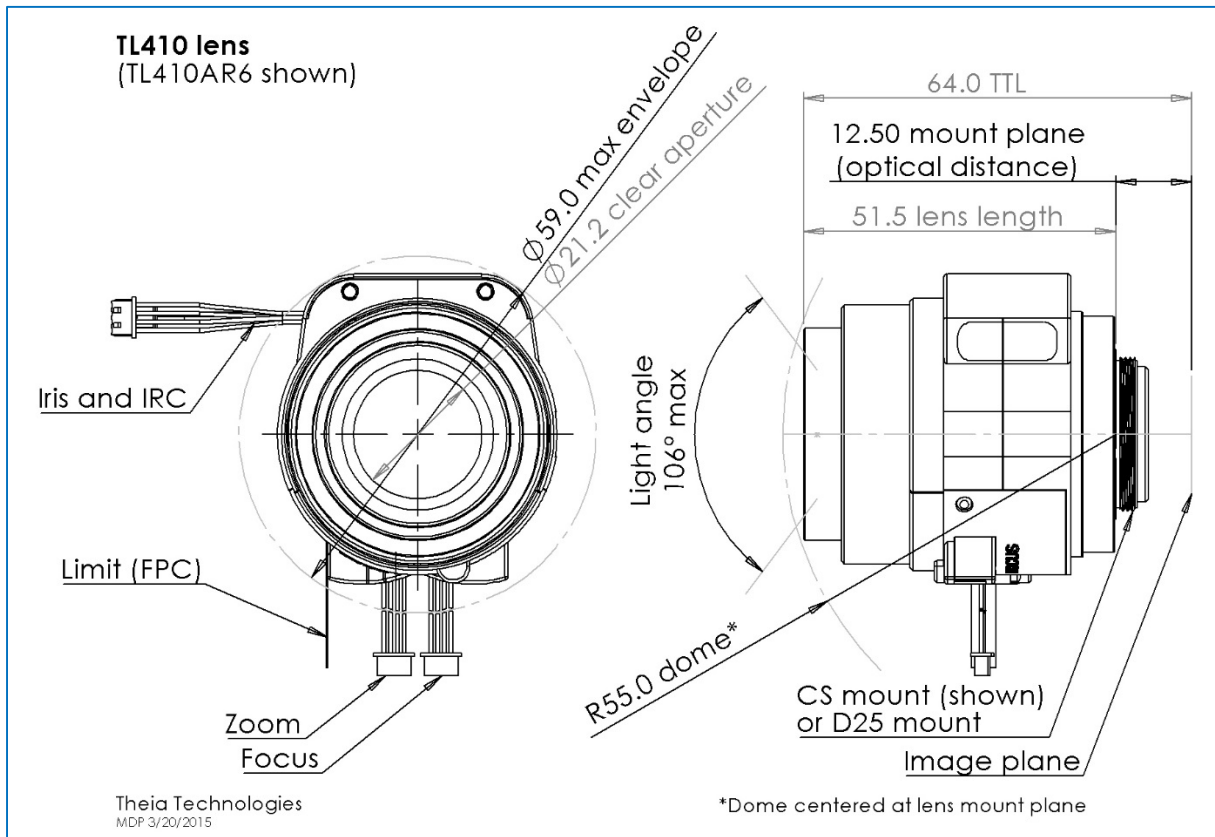
Lens designation



Production versions:

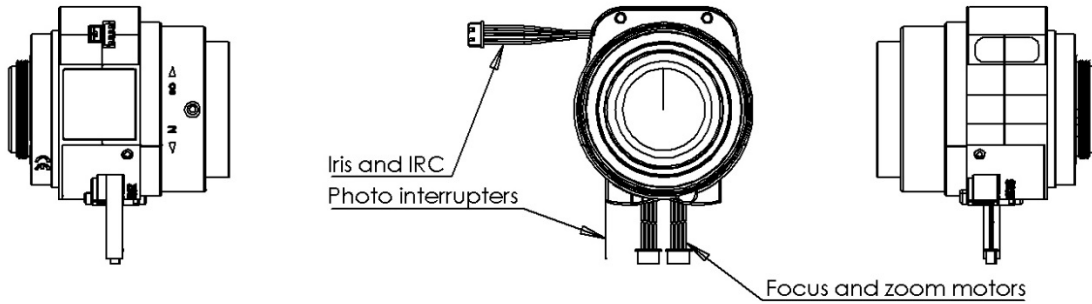
SL410M (manual lens, manual iris, CS mount)
 SL410A (manual lens, DC autoiris, CS mount)
 SL410P (manual lens, P-iris, CS mount)
 ML410M (manual lens, manual iris, C mount)
 TL410AR4-CS (fully motorized, DC autoiris lens)
 TL410PR4-CS (fully motorized, P-iris lens)

Other versions are available by special request and may be added to regular production

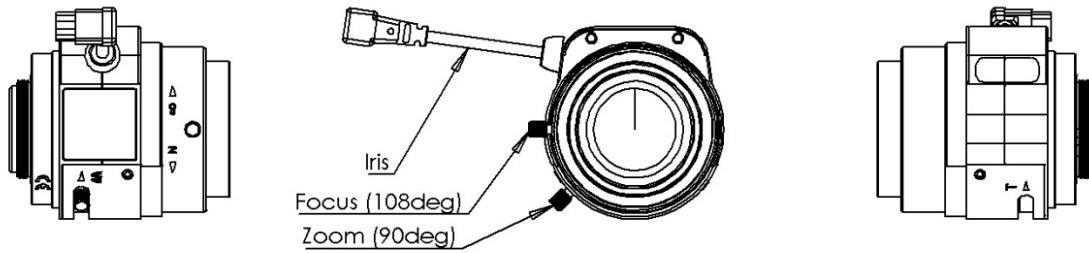


Drawings of several of the potential versions of the TL410 family.

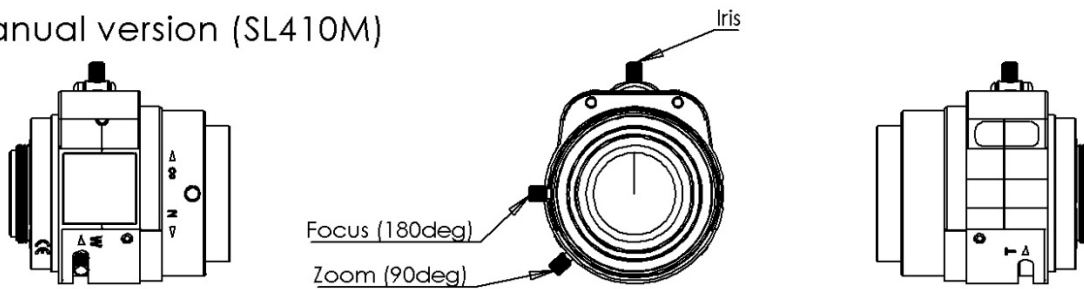
Fully motorized (TL410AR5, -AR6, -PR5, -PR6)



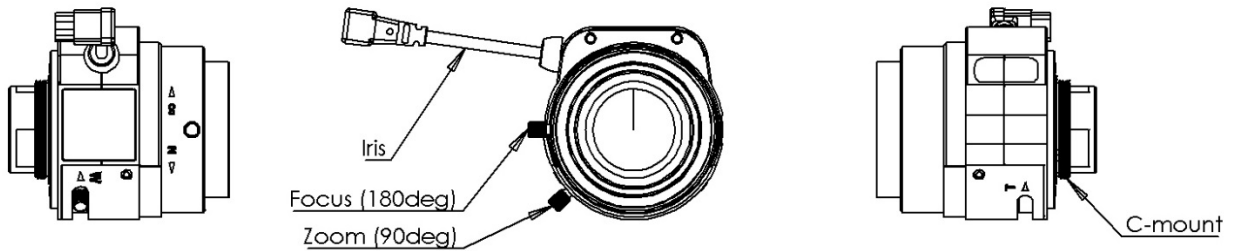
Autoiris/ P-iris (SL410A, SL410P)



Manual version (SL410M)



Autoiris/ P-iris, C-mount (ML410A, ML410P)

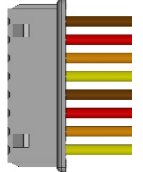


Zoom/Focus motor specifications

Drive	Stepper motor 2 phase bipolar drive
Operation voltage	3.3V (operating range 2.6~4.8V)
Coil resistance	28.5Ω (±7%)
Gear ratio	1:2025
Zoom speed	4.6 sec (@1000pps)
Zoom cam rotation	85°
Focus speed	7.7 sec (@600pps)
Focus cam rotation	75°
Focus/zoom connectors	Housing: Molex 51021-0800 Terminal: Molex 50058-8000
Cable length	150mm

Zoom: Wide -> Tele				
Focus: Near -> ∞				
Step	A+	A-	B+	B-
0	H	L	H	L
1	L	H	H	L
2	L	H	L	H
3	H	L	L	H

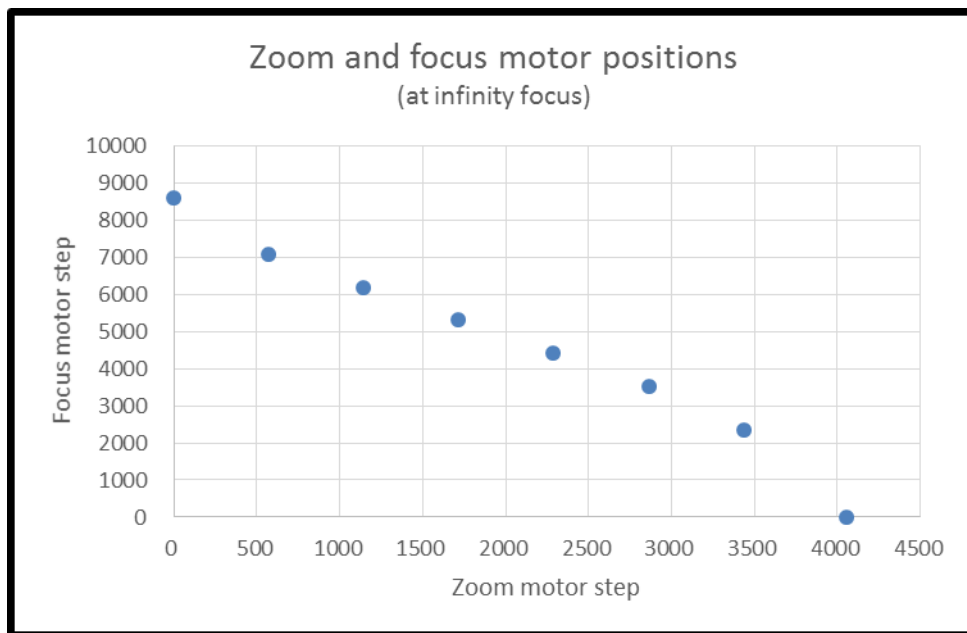
Pin	Color	Function	Motor
1	Brown	A+	Focus
2	Red	A-	Focus
3	Orange	B+	Focus
4	Yellow	B-	Focus
5	Brown	A+	Zoom
6	Red	A-	Zoom
7	Orange	B+	Zoom
8	Yellow	B-	Zoom



Zoom/Focus motor map for focus at infinity

Focal length	Zoom motor note	Zoom ring rotation	Zoom motor step number	Focus ring rotation	Focus motor step number
[mm]		[deg]	[#]	[deg]	[#]
	Mechanical stop	0	0	184.80	8812
4.15	Wide end	0	0	180.00	8583
4.32	PI trigger	2.5	119		
4.97		12.00	572	148.14	7064
5.78		24.00	1144	129.62	6181
6.59		36.00	1717	111.09	5297
7.40		48.00	2289	92.57	4414
8.22		60.00	2861	74.04	3531
9.03		72.00	3433	49.05	2339
	PI trigger			2.50	119
9.90	Tele end	85.00	4053	0.00	0
	Mechanical stop	85.00	4053	-11.60	-553

*PI: photo interrupter trigger point for applicable models TL410AR5, -PR5, -AR6, -PR6



DC autoiris motor specifications

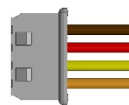
Applicable models: SL410A, TL410Axx

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

Connector type 1 (Molex)

Connector type	Housing: Molex 51021-0400 Terminal: Molex 50058-8000
Cable length	150mm

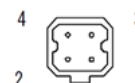
Pin	Color	Function
1	Brown	Control -
2	Red	Control +
3	Yellow	Drive +
4	Orange	Drive -



Connector type 2 (CCTV)

Connector type	Housing: EYC 221
Cable length	300mm

Pin	Function
1	Control -
2	Control +
3	Drive +
4	Drive -



P-iris motor specifications

Applicable models: SL410P, TL410Pxx

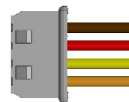
Drive	Stepper motor 2 phase bipolar drive
Operating voltage	4V (+/-1)
Number of steps	72 (open to closed)
Basic step angle	18°
Maximum response freq.	1000pps
Coil resistance	30Ω

P-iris: open->close				
Step	A+	A-	B+	B-
0	H	L	H	L
1	L	H	H	L
2	L	H	L	H
3	H	L	L	H

Connector type 1 (Molex)

Connector type	Housing: Molex 51021-0400 Terminal: Molex 50058-8000
Cable length	150mm

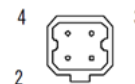
Pin	Color	Function
1	Brown	B+
2	Red	B-
3	Yellow	A+
4	Orange	A-



Connector type 2 (CCTV)

Connector type	Housing: EYC 221
Cable length	300mm

Pin	Function
1	B+
2	A+
3	A-
4	B-



P-iris motor map

Step	Aperture Size [mm ²]	F/#
1	65.0	1.43
5	65.0	1.43
10	65.0	1.43
15	65.0	1.43
20	63.4	1.50
25	54.0	1.63
30	44.9	1.78
35	36.0	1.98

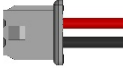
Step	Aperture Size [mm ²]	F/#
40	27.7	2.26
45	20.0	2.65
50	13.2	3.26
55	7.5	4.34
60	3.1	6.71
65	0.8	12.86
70	0.1	46.06
72	0.0	Closed

IR Cut specifications

Applicable models: TL410AR4, TL410PR4, TL410AR6, TL410PR6

Electrical specifications	
Drive	DC
Operating voltage	3.5V
Drive coil resistance	130Ω
Connector type	Housing: Molex 51021-0200 Terminal: Molex 50058-8000
Cable length	150mm
Optical specifications for IR filter (Day)	
Cut-on wavelength	405nm ±10nm
Visible transmission	430-610nm
Cut-off wavelength	650nm ±10nm
IR transmission	<1% max 695-800nm <3% max 800-1050nm
Optical specifications for clear filter (Night)	
Visible transmission	400-1050nm

Mode	Color	Pin 1	Pin 2
Day (IR filter)	Red	H	L
Night (clear filter)	Black	L	H

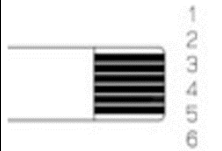


Zoom/Focus limit switch

Applicable models: TL410AR5, TL410PR5, TL410AR6, TL410PR6

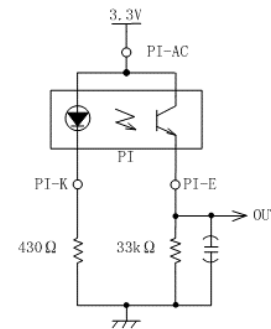
Type	Photo interrupter phototransistor
Part model	Sharp GP1S396HCPSF
Operating voltage	3.3V
Output level	>2.2V HIGH <0.6V LOW
Connector type	FPC cable
Board-side mating connector type (not supplied)	Molex 52746-0671 Molex 52745-0697 Molex 52559-0652
Cable length	150mm

Pin*	Function	Motor
1	Cathode	Zoom
2	Anode/Collector	Zoom
3	Emitter	Zoom
4	Cathode	Focus
5	Anode/Collector	Focus
6	Emitter	Focus



*cable side pin designation matches Molex 52746-0697 connector

Recommended circuit for each photo interrupter



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