



TL936 Motorized Telephoto Day/Night 4K Compatible Megapixel Lens



9mm



36mm

- ✓ Compatible with 4K cameras (1/2.3" Sony IMX172 for example) with **5+ megapixel resolution** for demanding applications
- ✓ **Fully motorized versions**, or combinations with zoom, focus, iris, IR cut, and limit switch
- ✓ **4x zoom**: 9-36mm for long reach and field of view optimization
- ✓ Available in DC **auto-iris** and **P-iris** versions
- ✓ IR corrected for true **Day/Night** cameras
- ✓ **Compact** design (< 50mm TTL) to fit into domes as small as 4" mini-dome size
- ✓ CS-mount and smooth D25 board mount options
- ✓ For 1/3", 1/2.7" HD, 1/2.5" and 1/2.3" 4K* sensors

TL936 lens family specifications

Focal length	9-36mm
Resolution	5+ megapixel
F/#	F/1.5 to close
IR Correction	Day/Night
Lens length	<50mm
Focus range	2.5m - infinity
Temperature range	-10C to 60C (<70% humidity, non-condensing)
CS mount slip range	320°

Field of view for sensor sizes

Sensor size	1/3"	1/2.7" HD	1/2.5"	1/2.3" 4K*
Field of view (H)	30° - 7.1°	37° - 8.6°	36° - 8.5°	39° - 10°
Field of view (V)	22° - 5.3°	20° - 4.8°	27° - 6.3°	19° - 5.0°
Field of view (D)	38° - 8.8°	42° - 9.9°	46° - 10.6°	44° - 11°

*4K format 4000x2000 pixels

Lens designation

TL936x xx -xx

blank: CS mount

D25: smooth Ø25mm mount

A: autoiris

P: P-iris

R3: motorized zoom, focus, iris

R4: motorized zoom, focus, iris, IRC

R5: motorized zoom, focus, iris, with limit switch for zoom, focus limits

R6: motorized zoom, focus, iris, IRC, with limit switch for zoom, focus limits

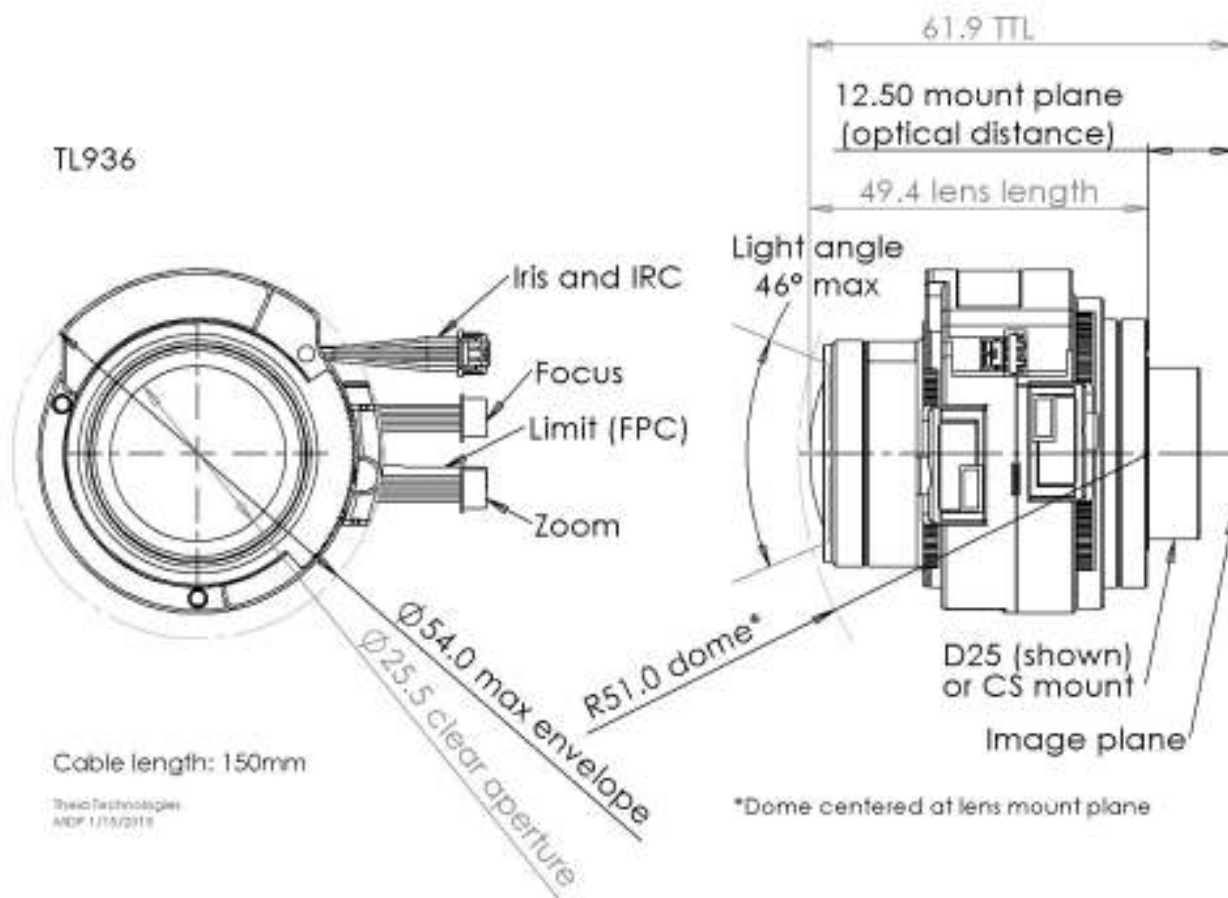
Production versions (as of 7/1/2015):

TL936A R6

TL936P R6

TL936A R5

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

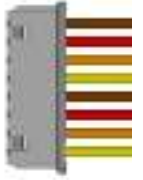


Zoom/Focus motor specifications

Drive	Stepper motor 2 phase bipolar drive
Operation voltage	3.3V (operating range 2.6~4.8V)
Continuous operation	<10s at 3V (at 60°C ambient) <3s at 5V (at 60°C ambient)
Coil resistance	28.5Ω ±7%
Gear ratio	1:2308
Zoom speed	3 sec (@1000pps)
Zoom cam rotation	57°
Focus speed	8.5 sec (@600pps)
Focus cam rotation	100°
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

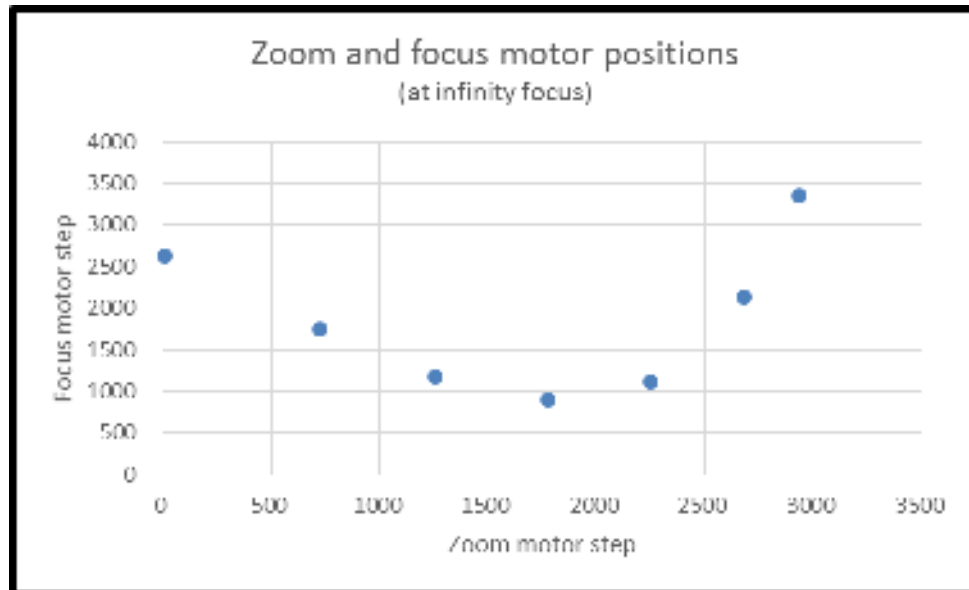
Pin	Color	Function	Motor
1	Brown	A+	Focus
2	Red	A-	Focus
3	Gray	B+	Focus
4	Yellow	B-	Focus
5	Brown	A+	Zoom
6	Red	A-	Zoom
7	Gray	B+	Zoom
8	Yellow	B-	Zoom



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	0	0.0	0
9.27	Wide end	0.2	10	51.3	2631
	PI trigger*	0.7	36		
12.19		14.10	723	34.0	1743
15.3		24.50	1256	23.1	1186
19.47		34.60	1774	17.5	898
24.56		43.80	2246	21.8	1117
30.86		52.30	2682	41.7	2138
	PI trigger*	56.70	2908		
35.45	Tele end	57.20	2933	65.4	3353
	Mechanical stop	57.40	2994	101.0	5180

*PI: photo interrupter trigger point for applicable models TL936A R5, TL936P R5, TL936A R6, TL936P R6



DC autoiris motor specifications

Applicable models: TL936Axx

Drive	DC
Operation voltage	3V (2.5~5.0V)
Max current consumption	26mA
Drive coil resistance	190Ω ±10%
Damper coil resistance	588Ω ±7%

Applicable models: TL936A R4, TL936A R6

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 -



Applicable models: TL936A R3, TL936A R5

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: TL936Pxx

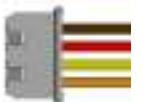
Drive	Stepper motor 2 phase bipolar drive
Operating voltage	4V (2.7~5.0V)
Number of steps	Step 1: stop Step 2: Full open Step 72: Full close Step 75: stop
Basic step angle	18°
Maximum response freq.	1000pps
Coil resistance	30Ω ±10% (each phase)

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

Applicable models: TL936P R4, TL936P R6

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-



Applicable models: TL936P R3, TL936P R5

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 [mm2]	F/#
1	95.0	1.54
5	90.8	1.54
10	82.1	1.61
15	72.8	1.71
20	63.4	1.83
25	54.0	1.98
30	44.9	2.17
35	36.0	2.42

Step	Aperture Size [mm2]	F/#
40	27.7	2.76
45	20.0	3.24
50	13.2	3.98
55	7.5	5.30
60	3.1	8.20
65	0.8	15.71
70	0.1	56.29
72	0.0	Closed

IR Cut specifications

Applicable models: TL936AR4, TL936AR6, TL936PR4, TL936PR6

Electrical specifications	
Drive	DC
Operating voltage	4.0V
Drive coil resistance	130Ω ±10%
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	<5% max 700-1000nm <10% ave 1000-1100nm
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: TL936AR5, TL936AR6, TL936PR5, TL936PR6

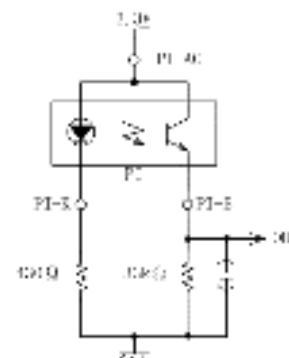
Type	Photo interrupter phototransistor
Part model	Sharp GP1S396HCPSF
Operating voltage	3.3V
Output level	>2.2V HIGH <0.6V LOW
Connector type	FPC cable
Board-side mating connector type (not supplied)	Molex 52746-0671 Molex 52745-0697 Molex 52559-0652
Cable length	90mm

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



*cable side pin designation matches Molex 52746-0697 connector (contacts on top)

Recommended circuit for each photo interrupter



For more information contact

Theia Technologies
info@TheiaTech.com
www.TheiaTech.com
+1-503-570-3296