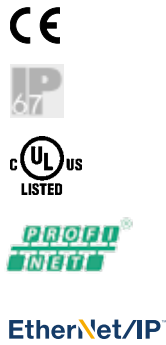# VISOR® V20 Solar sensor

Advanced vision sensor for wafer and cell inspection, 12 mm

CE
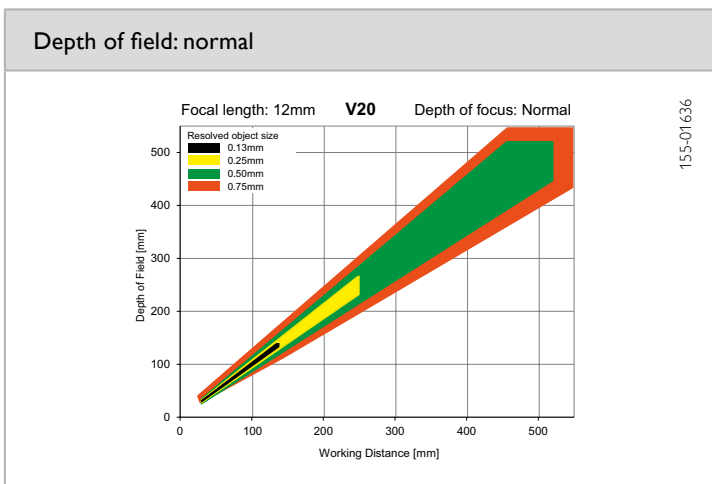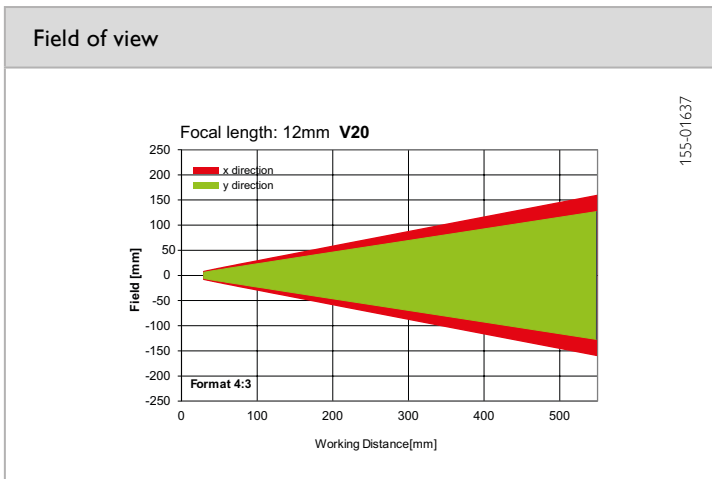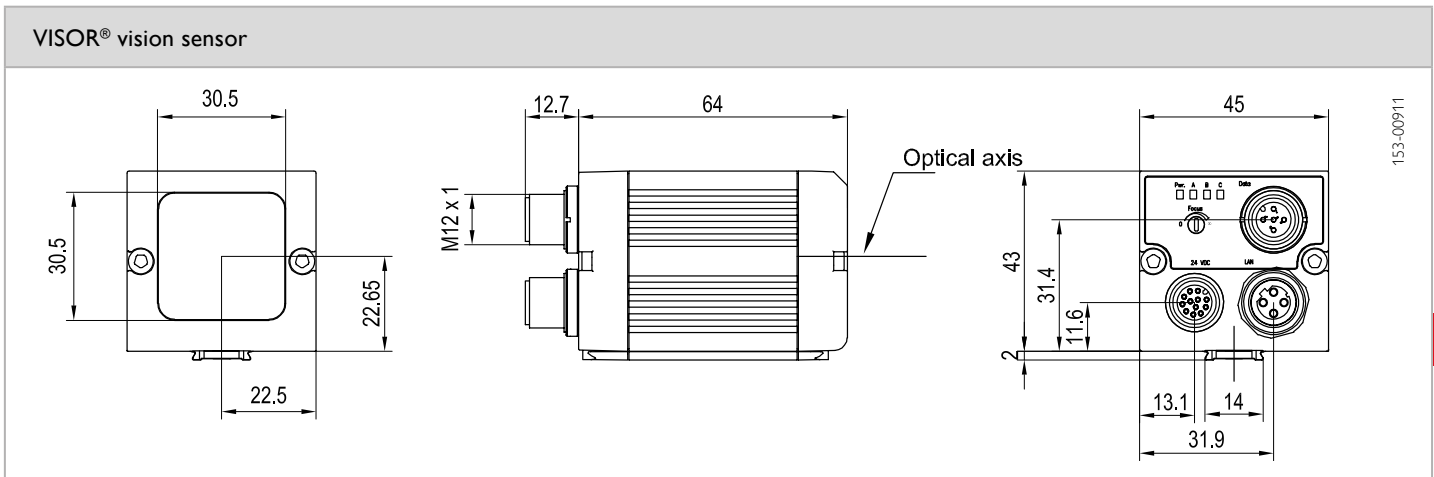
IP 67

c(UL)us LISTED

PROFI NET®

EtherNet/IP™

PRODUCT HIGHLIGHTS

- Automatic detection of wafer and cell geometry
- Suitable for frontlit and backlit applications
- Simple sensor optimisation regarding evaluation speed and test precision (sub-pixel process)
- Detection of holes/cracks and breakouts
- Distortion correction
- Examination and position detection of busbars

Optical data

Resolution	1280 × 1024 pixels
CMOS	1/1.8'', monochrome
Integrated lens, focal length	12 mm, adjustable focal position
Adjustment range	30 mm to infinity
Integrated illumination	White, red, infrared LEDs
Minimum field of view, X × Y	16 × 13 mm²

Functions

Number of jobs / detectors	max. 255 / max. 255
Detectors	Wafers, pattern comparison, contrast, brightness, grey level, calliper
Properties	Position tracking; Wafers incl. busbars: localisation of wafers or busbars and examination of wafers; Calliper: distance between edges; Pattern comparison: teach-in and detection of patterns grey threshold, brightness: evaluation of brightness; contrast: evaluation of contrast
Typical cycle times²	Typ. 100 ms wafer Typ. 8 ms calliper Typ. 20 ms pattern comparison Typ. 2 ms brightness Typ. 2 ms contrast Typ. 2 ms grey threshold

Electrical data

Operating voltage, $+U_B$	18 … 26.4 V DC[1]
Current consumption (without illumination and I/O)	≤ 120 mA
Current consumption (without I/O)	≤ 200 mA
Protective circuits	Reverse-polarity protection, U_B / short-circuit protection of all outputs
Power On Delay	Ca. 13 s after Power on
Outputs	PNP / NPN (switchable)
Max. output current (per output)	50 mA, 100 mA (pin 12)
Inputs	PNP/NPN High > U_B-1 V, Low < 3 V
Input resistance	> 20 kOhm
Encoder input	High > 4 V
Interfaces	Ethernet (LAN), RS422, RS232, EtherNet/IP, PROFINET, SensoWeb
Inputs/outputs	2 inputs, 4 outputs, 4 selectable inputs/outputs

Mechanical data

Dimensions	65 × 45 × 45 mm (without plug)
Enclosure rating	IP 67
Material, housing	Aluminium, plastic
Material, front screen	Plastic
Ambient temperature: operation	0 … +50° C[3]
Ambient temperature: storage	-20 … +60° C[3]
Weight	Ca. 160 g
Plug connections	Supply and I/O M12, 12-pin Ethernet M12, 4-pin Data M12, 5-pin
Vibration and impact resistance	EN 60947-5-2

[1] Max. ripple < 5 V_{SS} [2] with VGA-resolution (640 × 480 pixels)   [3] 80 % air humidity, non-condensing

Illumination	Part number	Article number
White	V20-SO-A2-W12	536-91028
Red	V20-SO-A2-R12	536-91029
Infrared	V20-SO-A2-I12	536-91030

Version: 07/2016. Subject to changes; diagrams similar

VISOR® vision sensor

30.5

30.5

22.65

22.5

M12 x 1

12.7   64

Optical axis

153-00911

45

43

31.4

11.6

2

Par. A B C   Data

Focus

24 VDC   LAN

13.1   14

31.9

4

Field of view

155-01637

Focal length: 12mm **V20**

x direction
y direction

Field [mm]

250
200
150
100
50
0
-50
-100
-150
-200
-250

Format 4:3

0   100   200   300   400   500

Working Distance[mm]

Depth of field: normal

155-01636

Focal length: 12mm **V20**   Depth of focus: Normal

Resolved object size
0.13mm
0.25mm
0.50mm
0.75mm

Depth of Field [mm]

500

400

300

200

100

0

0   100   200   300   400   500

Working Distance [mm]

Accessories

Connection cables	From Page A-38
Illumination	From Page A-30
Brackets	From Page A-14
Interface accessories	From Page A-42