

Features

- ϕ 4000 μm active area
- High QE for $\lambda = 850\text{-}1064$ nm
- Low noise
- TEC for temperature control

Description

Circular active area APD chip with IR enhanced sensitivity. Low dark current due to guard ring diode in hermetic TO type metal can including peltier element.

Application

- Pulsed 1064 nm laser detection
- Laser range finding
- Fluorescence detection

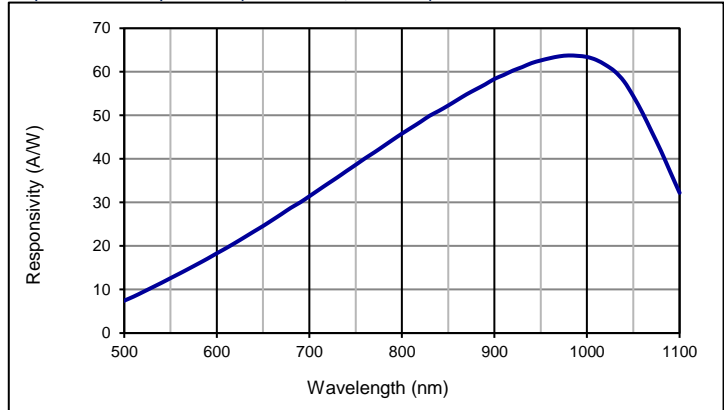
RoHS

2011/65/EU

Absolute maximum ratings

| Symbol | Parameter | Min | Max | Unit |
|------------|-------------------------|------|------|--------------------|
| T_{STG} | Storage temp | -55 | 125 | $^{\circ}\text{C}$ |
| T_{OP} | Operating temp | -40* | 100 | $^{\circ}\text{C}$ |
| M_{max} | Gain ($I_{PO} = 1$ nA) | 1000 | | |
| I_{PEAK} | Peak DC current | | 0.25 | mA |
| V_{TEC} | TEC voltage | | 3.9 | V |
| I_{TEC} | TEC current | | 1.9 | A |

Spectral response ($M = 100$; 23°C)

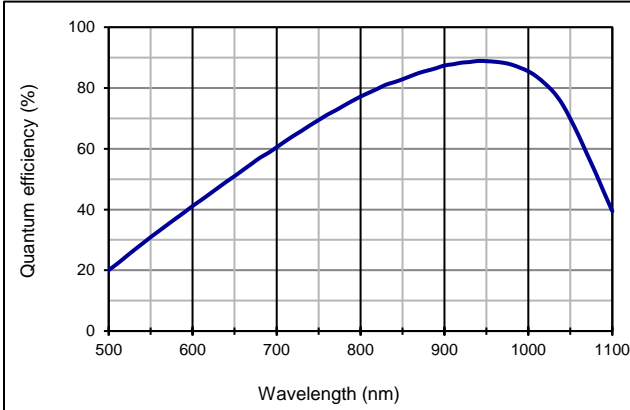


Electro-optical characteristics @ 23°C

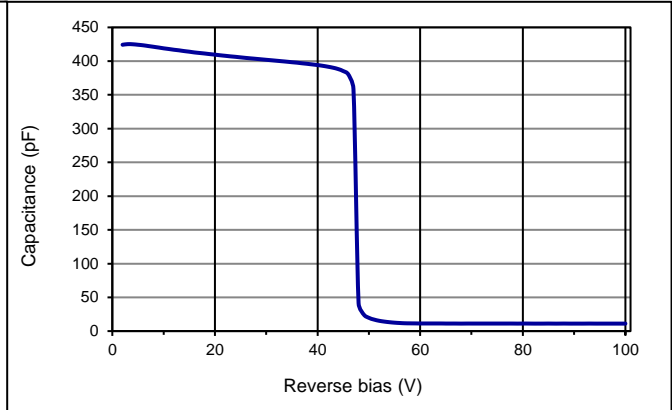
| Symbol | Characteristic | Test Condition | Min | Typ | Max | Unit |
|----------|-------------------------|--|------|-------------|-------|---------------|
| | Active area | | | ϕ 4000 | | μm |
| | Active area | | | 12.56 | | mm^2 |
| I_D | Dark current | $M = 100$ | | 50 | 500 | nA |
| C | Capacitance | $M = 100$ | | 15 | | pF |
| | Responsivity | $M = 100$; $\lambda = 905$ nm | | 59 | | A/W |
| | Responsivity | $M = 100$; $\lambda = 1064$ nm | | 49 | | A/W |
| t_R | Rise time | $M = 100$; $\lambda = 1064$ nm; $R_L = 50$ Ω | | 6 | | ns |
| t_R | Cut-off frequency | -3dB | | 70 | | MHz |
| V_{BR} | Breakdown voltage | $I_R = 2$ μA | 220 | 300 | 600 | V |
| | Temperature coefficient | | | 3.3 | | V/K |
| | Temp. sensor resistance | Thermistor (NTC), Beta($25^{\circ}\text{C}/50^{\circ}\text{C}$) = 3930 K | 9900 | 10000 | 10100 | Ω |
| | Heat transported by TEC | Performance under standard conditions | | | 4.6 | W |

* please note that depending on operation voltage APD operation at temperatures below -15°C may require sophisticated control circuit.

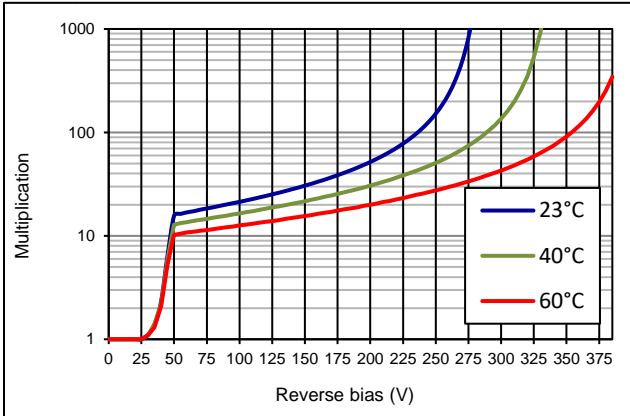
Quantum efficiency (23 °C)



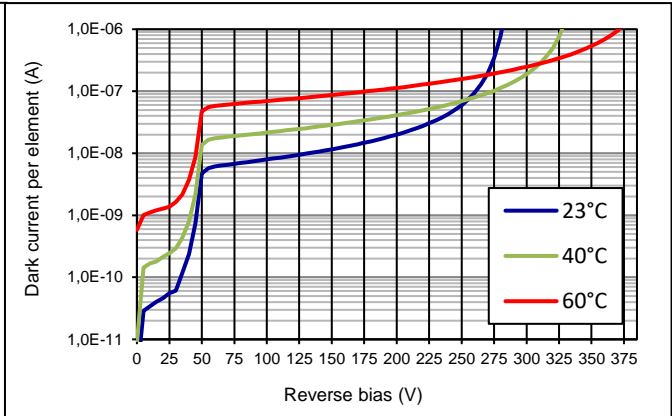
Capacitance as fct of reverse bias (23 °C)



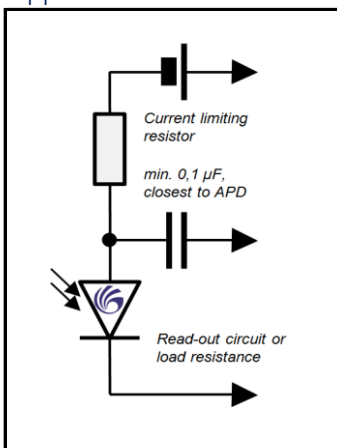
Multiplication as fct of reverse bias



Dark current as fct of reverse bias



Application hints:

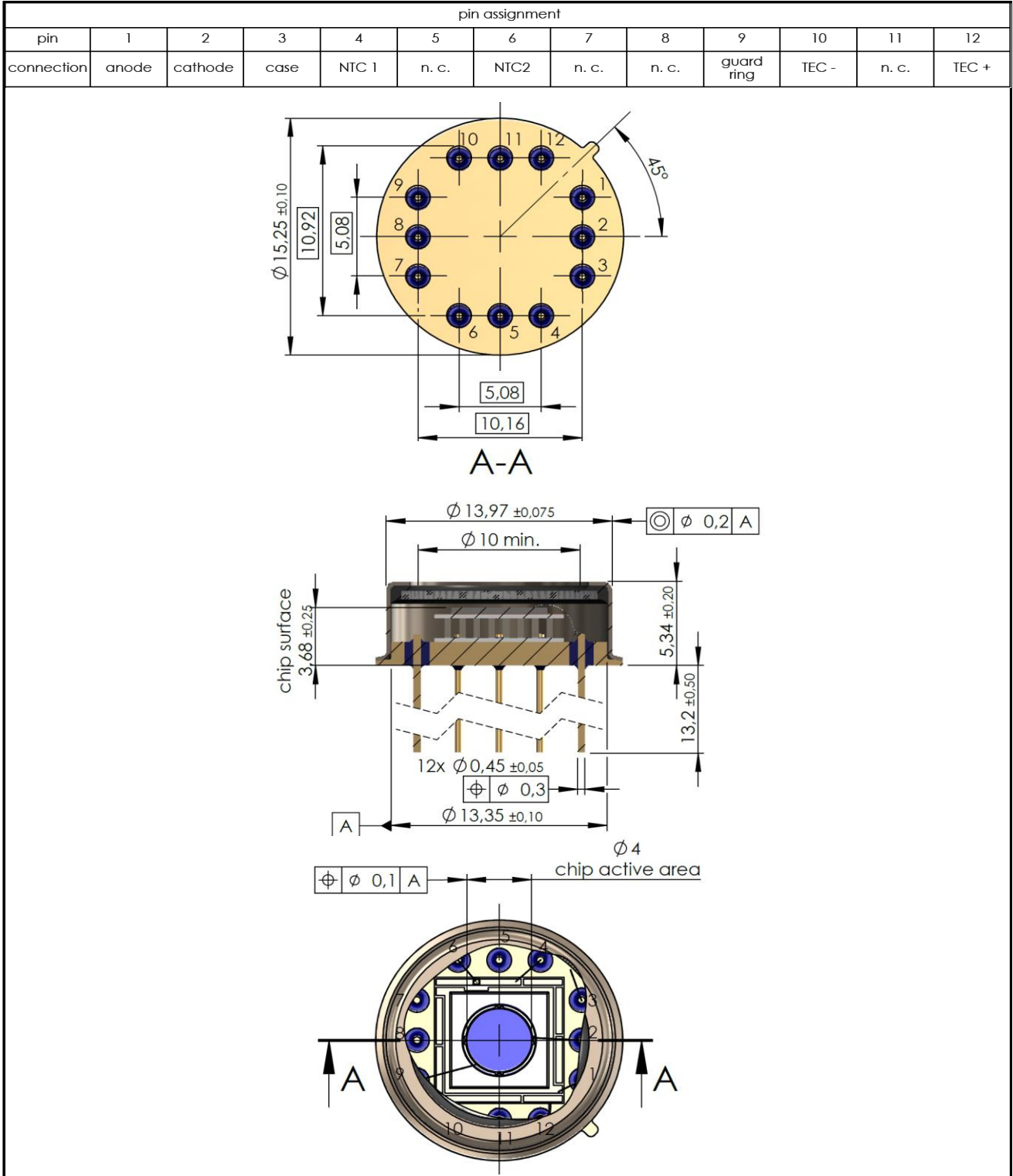


- Current should be limited by a protecting resistor or current limiting - IC inside the power supply
- Guard ring should be connected to ground
- For low light level applications blocking of ambient light should be used
- For high gain applications bias voltage should be temperature compensated
- Please consider basic ESD protection while handling
- Use low noise read-out - IC
- For further questions please refer to document "Instructions for handling and processing" and application notes for APDs and APD-Arrays

Package dimension

Small quantities: Chips on foam pad, boxed (12 cm x 16.5 cm)

Technical Drawing, Package: TO8S TEC



Temperature Sensor (NTC)

| Temp | | Resistance [kΩ] | | |
|------|-----|-----------------|-------|--------|
| [°C] | [K] | min | typ | max |
| -20 | 253 | 93,98 | 97,18 | 100,50 |
| -19 | 254 | 88,83 | 91,80 | 94,86 |
| -18 | 255 | 83,99 | 86,75 | 89,58 |
| -17 | 256 | 79,44 | 81,99 | 84,62 |
| -16 | 257 | 75,15 | 77,52 | 79,96 |
| -15 | 258 | 71,11 | 73,31 | 75,57 |
| -14 | 259 | 67,30 | 69,35 | 71,44 |
| -13 | 260 | 63,72 | 65,62 | 67,56 |
| -12 | 261 | 60,34 | 62,10 | 63,91 |
| -11 | 262 | 57,16 | 58,80 | 60,47 |
| -10 | 263 | 54,16 | 55,68 | 57,23 |
| -9 | 264 | 51,33 | 52,73 | 54,17 |
| -8 | 265 | 48,66 | 49,96 | 51,30 |
| -7 | 266 | 46,14 | 47,35 | 48,59 |
| -6 | 267 | 43,77 | 44,89 | 46,04 |
| -5 | 268 | 41,53 | 42,57 | 43,64 |
| -4 | 269 | 39,42 | 40,39 | 41,37 |
| -3 | 270 | 37,43 | 38,33 | 39,24 |
| -2 | 271 | 35,55 | 36,38 | 37,23 |
| -1 | 272 | 33,77 | 34,55 | 35,33 |
| 0 | 273 | 32,10 | 32,82 | 33,55 |
| 1 | 274 | 30,51 | 31,18 | 31,86 |
| 2 | 275 | 29,02 | 29,64 | 30,26 |
| 3 | 276 | 27,60 | 28,18 | 28,76 |
| 4 | 277 | 26,27 | 26,80 | 27,34 |
| 5 | 278 | 25,00 | 25,49 | 25,99 |
| 6 | 279 | 23,80 | 24,26 | 24,72 |
| 7 | 280 | 22,67 | 23,09 | 23,52 |
| 8 | 281 | 21,60 | 21,99 | 22,39 |
| 9 | 282 | 20,58 | 20,95 | 21,31 |
| 10 | 283 | 19,62 | 19,96 | 20,30 |
| 11 | 284 | 18,71 | 19,02 | 19,34 |
| 12 | 285 | 17,84 | 18,13 | 18,42 |
| 13 | 286 | 17,02 | 17,29 | 17,56 |
| 14 | 287 | 16,25 | 16,49 | 16,74 |
| 15 | 288 | 15,51 | 15,74 | 15,97 |
| 16 | 289 | 14,81 | 15,02 | 15,23 |
| 17 | 290 | 14,15 | 14,34 | 14,54 |
| 18 | 291 | 13,52 | 13,70 | 13,88 |
| 19 | 292 | 12,92 | 13,08 | 13,25 |

| Temp | | Resistance [kΩ] | | |
|------|-----|-----------------|-------|-------|
| [°C] | [K] | min | typ | max |
| 20 | 293 | 12,35 | 12,50 | 12,66 |
| 21 | 294 | 11,81 | 11,95 | 12,09 |
| 22 | 295 | 11,29 | 11,42 | 11,55 |
| 23 | 296 | 10,81 | 10,93 | 11,04 |
| 24 | 297 | 10,34 | 10,45 | 10,56 |
| 25 | 298 | 9,90 | 10,00 | 10,10 |
| 26 | 299 | 9,47 | 9,57 | 9,67 |
| 27 | 300 | 9,06 | 9,16 | 9,26 |
| 28 | 301 | 8,68 | 8,78 | 8,87 |
| 29 | 302 | 8,31 | 8,41 | 8,50 |
| 30 | 303 | 7,96 | 8,05 | 8,15 |
| 31 | 304 | 7,62 | 7,72 | 7,82 |
| 32 | 305 | 7,30 | 7,40 | 7,50 |
| 33 | 306 | 7,00 | 7,09 | 7,19 |
| 34 | 307 | 6,71 | 6,80 | 6,90 |
| 35 | 308 | 6,44 | 6,53 | 6,62 |
| 36 | 309 | 6,17 | 6,26 | 6,36 |
| 37 | 310 | 5,92 | 6,01 | 6,10 |
| 38 | 311 | 5,68 | 5,77 | 5,86 |
| 39 | 312 | 5,46 | 5,54 | 5,63 |
| 40 | 313 | 5,24 | 5,33 | 5,41 |
| 41 | 314 | 5,03 | 5,12 | 5,20 |
| 42 | 315 | 4,83 | 4,92 | 5,00 |
| 43 | 316 | 4,64 | 4,73 | 4,81 |
| 44 | 317 | 4,46 | 4,54 | 4,63 |
| 45 | 318 | 4,29 | 4,37 | 4,45 |
| 46 | 319 | 4,13 | 4,20 | 4,28 |
| 47 | 320 | 3,97 | 4,04 | 4,12 |
| 48 | 321 | 3,82 | 3,89 | 3,97 |
| 49 | 322 | 3,67 | 3,75 | 3,82 |
| 50 | 323 | 3,54 | 3,61 | 3,68 |
| 51 | 324 | 3,40 | 3,47 | 3,55 |
| 52 | 325 | 3,28 | 3,35 | 3,42 |
| 53 | 326 | 3,16 | 3,22 | 3,29 |
| 54 | 327 | 3,04 | 3,11 | 3,18 |
| 55 | 328 | 2,93 | 3,00 | 3,06 |
| 56 | 329 | 2,82 | 2,89 | 2,95 |
| 57 | 330 | 2,72 | 2,78 | 2,85 |
| 58 | 331 | 2,62 | 2,69 | 2,75 |
| 59 | 332 | 2,53 | 2,59 | 2,65 |

R(T_N)

Technical Drawing, Package: TO8S TEC

| Temp | | Resistance [kΩ] | | |
|------|-----|-----------------|------|------|
| [°C] | [K] | min | typ | max |
| 60 | 333 | 2,44 | 2,50 | 2,56 |
| 61 | 334 | 2,36 | 2,41 | 2,47 |
| 62 | 335 | 2,27 | 2,33 | 2,39 |
| 63 | 336 | 2,19 | 2,25 | 2,31 |
| 64 | 337 | 2,12 | 2,17 | 2,23 |
| 65 | 338 | 2,05 | 2,10 | 2,15 |
| 66 | 339 | 1,98 | 2,03 | 2,08 |
| 67 | 340 | 1,91 | 1,96 | 2,01 |
| 68 | 341 | 1,84 | 1,89 | 1,95 |
| 69 | 342 | 1,78 | 1,83 | 1,88 |
| 70 | 343 | 1,72 | 1,77 | 1,82 |
| 71 | 344 | 1,67 | 1,71 | 1,76 |
| 72 | 345 | 1,61 | 1,66 | 1,70 |
| 73 | 346 | 1,56 | 1,60 | 1,65 |
| 74 | 347 | 1,51 | 1,55 | 1,60 |
| 75 | 348 | 1,46 | 1,50 | 1,54 |
| 76 | 349 | 1,41 | 1,45 | 1,50 |

| Temp | | Resistance [kΩ] | | |
|------|-----|-----------------|------|------|
| [°C] | [K] | min | typ | max |
| 77 | 350 | 1,37 | 1,41 | 1,45 |
| 78 | 351 | 1,32 | 1,36 | 1,40 |
| 79 | 352 | 1,28 | 1,32 | 1,36 |
| 80 | 353 | 1,24 | 1,28 | 1,32 |
| 81 | 354 | 1,20 | 1,24 | 1,28 |
| 82 | 355 | 1,16 | 1,20 | 1,24 |
| 83 | 356 | 1,13 | 1,16 | 1,20 |
| 84 | 357 | 1,09 | 1,13 | 1,16 |
| 85 | 358 | 1,06 | 1,09 | 1,13 |

| | | | |
|--------------------------|--------|------|--------|
| B [K] | 3890,7 | 3930 | 3969,3 |
| T_N [K] | 298 | | |

$$T = \frac{B \cdot T_N}{B + \ln\left(\frac{R_T}{R_N}\right) \cdot T_N}$$

Disclaimer: Due to our strive for continuous improvement, specifications are subject to change within our PCN policy according to JESD46C.