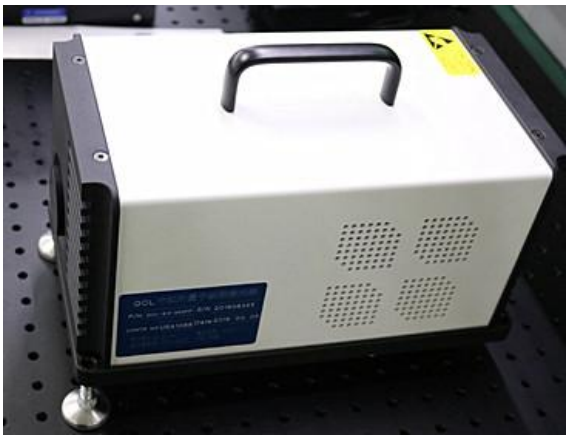
# 4.6um High Power Benchtop FP-QCL Mid-Infrared Quantum Cascade Laser 400mW (Benchtop Light Source)



## Product Description

The QCL4600FP-4.6um high-power desktop FP-QCL mid-infrared quantum cascade laser is a mid-infrared testing laser developed by Idealphotonics in the first half of 2019. Its low-loss atmospheric window is beneficial for space optical communication testing and research. Our desktop light source offers high power and does not require ITAR certification, making it an excellent choice for commercial mid-infrared testing light sources. With a tunable range of over 200nm and an output power of more than 400mW, it meets industrial testing needs. The laser incorporates a ZnSe collimation output, providing stable output power and high temperature-wavelength stability, far surpassing the stability of traditional high-power quantum cascade lasers by several orders of magnitude

## Part Number

LDC-MIR-QCL-W4600-1-FP-0400

## Product features

High power、 Compact structure、 Software intelligent control、 Built-in FPGA

## Application area

Mid-infrared test light source、 Mid-infrared device analysis

## Parameters

Parameters

| Technical Parameters | Unit | Technical Specification | | |
|---|---|---|---|---|
| | | Min. | Typ. | Max. |
| PN# | | | QCL4600 | |
| Output Power (1) | mW | 350 | - | 500 |
| Peak Operating Wavelength (2) | um | 4.47 | 4.6 | 4.63 |
| Spectral Width (FWHM) | nm | - | 3 | - |
| Output Side-Mode Suppression Ratio (SMSR) | dB | 30 | - | - |
| $M^2$ Factor | | | ＜1.2 | |
| Output Beam Divergence Angle | Mrad | | ＜2 | |
| Output Isolation (3) | dB | - | 30 | - |
| Wavelength Temperature Coefficient | nm/℃ | | 0.6 | |
| Wavelength Current Coefficient | nm/mA | | 0.2 | |
| Output Power Stability (15 minutes) (4) | % | - | ±0.5 | ±1.0 |
| Output Power Stability (8 hours) (4) | % | - | ±1.0 | ±2.0 |
| Output Power Adjustable Range | % | 0 | - | 100 |
| Output Power Adjustment Mode | | software control | | |

| | | | | |
|---|---|---|---|---|
| TEC Stability | ℃ | - | ±0.1 | ±0.2 |
| TEC Operating Range | ℃ | 0 | 30 | 50 |
| Operating Voltage | VAC | 100 | 220 | 240 |
| Electrical Power Consumption (5) | W | - | - | 2 |
| Operating Temperature | ℃ | 0 | - | 55 |
| Storage Temperature | ℃ | -20 | - | 65 |
| Dimensions | mm | 343(L)×193(W)×180(H) Benchtop | | |

Technical Specifications Explanation

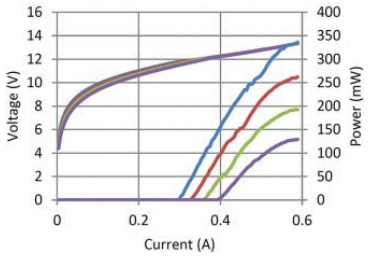
1.Output power is selectable.

2.Peak operating wavelength is selectable.

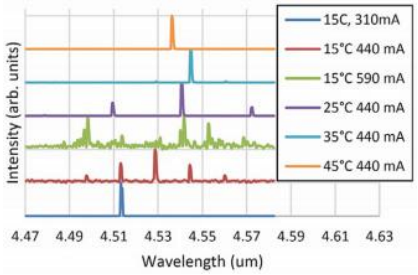
3.Output power stability test conditions are at 25°C, with a 30-minute warm-up after power-on.

4.Maximum power consumption refers to the overall power consumption under extreme operating conditions.

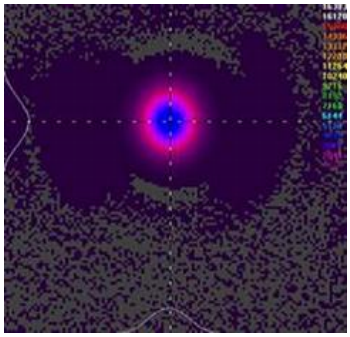

QCL laser characteristic curve (4.6um typical wavelength as an example) output power characteristic curve.



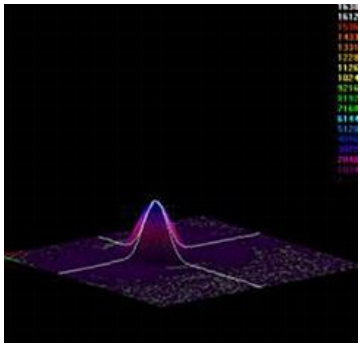

Laser spectrum (continuous)




Spot analysis



2-D Beam Profile at 1778 mm (70.0 in)



3-D Beam Profile at 1778 mm (70.0 in)

PN#/Ordering info
MIR-QCL- W□□□□ -☆-△-XX
W□□□□: Wavelength
4000: 4000nm 4600: 4600nm 9000: 9000nm

☆ ： Collimated output

1: With
0: Without

△： Laser type

FP: QCL-FP
DFB: QCL-DFB
XX: Output power
001=1mw
010=10mw
400=400mw
1000=1000mw

CW Distributed Feedback (DFB) Quantum Cascade Laser
* Center wavelength measured at T = 15°C under continuous wave

* Center wavelength tuning range: +/- 0.03 um
* Other center wavelengths are listed in the table +/- 100 nm We can provide screening services
* Other center wavelengths can be customized, minimum order quantity: 5 pieces

The wavelengths we can currently provide are as follows*

| Wavelength(μm) | Wave number(cm-1) | Output power(mW) | Wavelength( μ m) | Wave number(cm-1) | Output power(mW) | Wavelength( μ m) | Wave number(cm-1) | Output power(mW) |
|---|---|---|---|---|---|---|---|---|
| 4.22 | 2370 | > 50 | 6.25 | 1600 | > 100 | 9.38 | 1066 | > 100 |
| 4.28 | 2336 | > 50 | 7.15 | 1399 | > 100 | 9.47 | 1056 | > 150 |
| 4.32 | 2315 | > 50 | 7.26 | 1377 | > 100 | 9.49 | 1054 | > 150 |
| 4.34 | 2304 | > 50 | 7.32 | 1366 | > 100 | 9.52 | 1050 | > 200 |
| 4.45 | 2247 | > 80 | 7.37 | 1357 | > 100 | 9.56 | 1046 | > 200 |
| 4.48 | 2232 | > 80 | 7.43 | 1346 | > 150 | 9.63 | 1038 | > 150 |
| 4.53 | 2208 | > 150 | 7.57 | 1321 | > 150 | 9.66 | 1035 | > 100 |
| 4.56 | 2193 | > 150 | 7.61 | 1314 | > 150 | 9.68 | 1033 | > 100 |
| 4.59 | 2179 | > 150 | 7.75 | 1290 | > 300 | 9.72 | 1029 | > 100 |
| 4.61 | 2169 | > 100 | 7.78 | 1285 | > 300 | 9.95 | 1005 | > 100 |
| 4.72 | 2119 | > 100 | 7.80 | 1282 | > 300 | 10.24 | 977 | > 150 |
| 5.18 | 1931 | > 150 | 7.82 | 1279 | > 300 | 10.26 | 975 | > 150 |
| 5.26 | 1901 | > 150 | 7.85 | 1274 | > 300 | 10.28 | 973 | > 150 |
| 5.66 | 1767 | > 300 | 8.01 | 1248 | > 100 | 10.32 | 969 | > 150 |
| 5.73 | 1745 | > 150 | 8.28 | 1208 | > 200 | 10.36 | 965 | > 150 |
| 6.13 | 1631 | > 150 | 9.02 | 1109 | > 100 | 10.54 | 949 | > 100 |
| 6.15 | 1626 | > 150 | 9.05 | 1105 | > 100 | 10.60 | 943 | > 80 |
| 6.18 | 1618 | > 100 | 9.26 | 1080 | > 100 | 10.63 | 941 | > 80 |

Pulsed Distributed Feedback (DFB) Quantum cascade lasers

| Wavelength(μm) | Wave number(cm-1) | Output power(mW) | Wavelength( μ m) | Wave number(cm-1) | Output power(mW) | Wavelength( μ m) | Wave number(cm-1) | Output power(mW) | Wavelength( μ m) | Wave number(cm-1) | Output power(mW) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 3.399 | 2942 | 4.453 | 2245 | 5.193 | 1925 | 6.135 | 1629 | 7.788 | 1284 | 9.489 | 1053 |
| 3.402 | 2939 | 4.457 | 2243 | 5.214 | 1917 | 6.143 | 1627 | 7.795 | 1282 | 9.509 | 1051 |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 3.45 | 2898 | 4.461 | 2241 | 5.224 | 1914 | 6.153 | 1625 | 7.809 | 1280 | 9.529 | 1049 |
| 3.451 | 2897 | 4.465 | 2239 | 5.233 | 1910 | 6.156 | 1624 | 7.819 | 1278 | 9.544 | 1047 |
| 3.477 | 2876 | 4.471 | 2236 | 5.24 | 1908 | 6.17 | 1620 | 7.831 | 1276 | 9.586 | 1043 |
| 3.48 | 2873 | 4.475 | 2234 | 5.244 | 1906 | 6.177 | 1618 | 7.857 | 1272 | 9.598 | 1041 |
| 3.497 | 2859 | 4.479 | 2232 | 5.25 | 1904 | 6.214 | 1609 | 7.869 | 1270 | 9.623 | 1039 |
| 3.519 | 2841 | 4.483 | 2230 | 5.255 | 1902 | 6.225 | 1606 | 7.887 | 1267 | 9.634 | 1037 |
| 3.536 | 2828 | 4.485 | 2229 | 5.261 | 1900 | 6.228 | 1605 | 7.906 | 1264 | 9.655 | 1035 |
| 3.538 | 2826 | 4.489 | 2227 | 5.264 | 1899 | 6.242 | 1602 | 7.933 | 1260 | 9.672 | 1033 |
| 3.546 | 2820 | 4.492 | 2226 | 5.266 | 1898 | 6.243 | 1601 | 7.986 | 1252 | 9.692 | 1031 |
| 3.549 | 2817 | 4.498 | 2223 | 5.272 | 1896 | 6.258 | 1597 | 7.998 | 1250 | 9.72 | 1028 |
| 3.566 | 2804 | 4.501 | 2221 | 5.279 | 1894 | 6.262 | 1596 | 8.016 | 1247 | 9.744 | 1026 |
| 3.568 | 2802 | 4.506 | 2219 | 5.289 | 1890 | 7.148 | 1398 | 8.026 | 1245 | 9.903 | 1009 |
| 3.605 | 2773 | 4.509 | 2217 | 5.294 | 1888 | 7.164 | 1395 | 8.054 | 1241 | 9.921 | 1007 |
| 3.607 | 2772 | 4.513 | 2215 | 5.304 | 1885 | 7.176 | 1393 | 8.101 | 1234 | 9.943 | 1005 |
| 3.655 | 2735 | 4.517 | 2213 | 5.306 | 1884 | 7.185 | 1391 | 8.163 | 1225 | 9.964 | 1003 |
| 3.724 | 2685 | 4.521 | 2211 | 5.452 | 1834 | 7.195 | 1389 | 8.22 | 1216 | 9.983 | 1001 |
| 4.184 | 2390 | 4.525 | 2209 | 5.486 | 1822 | 7.205 | 1387 | 8.242 | 1213 | 10.001 | 999 |
| 4.185 | 2389 | 4.529 | 2207 | 5.523 | 1810 | 7.217 | 1385 | 8.252 | 1211 | 10.029 | 997 |
| 4.188 | 2387 | 4.534 | 2205 | 5.557 | 1799 | 7.229 | 1383 | 8.265 | 1209 | 10.042 | 995 |
| 4.194 | 2384 | 4.538 | 2203 | 5.592 | 1788 | 7.258 | 1377 | 8.282 | 1207 | 10.063 | 993 |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 4.197 | 2382 | 4.543 | 2201 | 5.612 | 1781 | 7.268 | 1375 | 8.292 | 1205 | 10.19 | 981 |
| 4.2 | 2380 | 4.545 | 2200 | 5.626 | 1777 | 7.285 | 1372 | 8.301 | 1204 | 10.206 | 979 |
| 4.204 | 2378 | 4.55 | 2197 | 5.632 | 1775 | 7.289 | 1371 | 8.326 | 1201 | 10.238 | 976 |
| 4.207 | 2376 | 4.554 | 2195 | 5.639 | 1773 | 7.327 | 1364 | 8.335 | 1199 | 10.259 | 974 |
| 4.215 | 2372 | 4.56 | 2192 | 5.646 | 1771 | 7.337 | 1362 | 8.352 | 1197 | 10.289 | 971 |
| 4.219 | 2370 | 4.565 | 2190 | 5.651 | 1769 | 7.348 | 1360 | 8.386 | 1192 | 10.327 | 968 |
| 4.221 | 2369 | 4.569 | 2188 | 5.657 | 1767 | 7.354 | 1359 | 8.902 | 1123 | 10.342 | 966 |
| 4.226 | 2366 | 4.574 | 2186 | 5.665 | 1765 | 7.367 | 1357 | 8.948 | 1117 | 10.377 | 963 |
| 4.231 | 2363 | 4.577 | 2184 | 5.669 | 1763 | 7.373 | 1356 | 9.004 | 1110 | 10.396 | 961 |