Comprehensive Red Laser Diode System Data Survey

This extensive data survey provides a systematic compilation of red diode laser system specifications, technical standards, and valuable data sources with direct download links.

Executive Summary

The survey has catalogued **75+ sources** across multiple categories, documenting complete specifications for red laser diodes from 635nm to 685nm wavelengths with power outputs ranging from 5mW to 210mW. The compilation includes manufacturer datasheets, industry standards, calibration procedures, and safety requirements from leading semiconductor companies and standards organizations.

Comprehensive Specifications Database

Key Technical Parameters Identified

Wavelength Coverage: 635nm - 685nm (red spectrum)
Power Range: 5mW - 210mW continuous wave (CW)
Package Types: 3.8mm, 5.6mm, 9mm TO-can packages
Operating Current: 20mA - 320mA
Operating Voltage: 1.8V - 3.2V
Threshold Current: 11mA - 90mA

Major Manufacturers Represented

- **ROHM Semiconductor**: RLD65MZT7, RLD63NPC series, RLD65NZN5[1][2]
- **Ushio**: HL63133DG (170mW), HL63653TG (210mW)[3][4]
- **World Star Tech**: WLD-100-685 (100mW, high efficiency)[5]
- **US Lasers**: D6505I (650nm), D6355I (635nm)[6][7]
- **Sharp**: GH0652AA2G series[8]
- **Mitsubishi**: ML562G84, ML562H84 series[9]

Direct Download Links - Manufacturer Datasheets

Primary Technical Datasheets

- **US Lasers 650nm 5mW**: https://soldered.com/productdata/2015/02/Soldered_D6505I_datasheet.pdf[6]

- **US Lasers 635nm 5mW**: https://media.digikey.com/pdf/data sheets/us lasers pdfs/d6355i.pdf[7]
- **World Star Tech 685nm 100mW**: https://worldstartech.com/wp-content/uploads/2022/12/wld-100-685.pdf[5]
- **Ushio HL63133DG 638nm 170mW**: https://www.ushio.co.jp/en/products/product_file/file/UIE_DS_HL63133DG.pdf[3]
- **Ushio HL63653TG 640nm 210mW**: https://www.ushio.co.jp/en/products/product_file/file/UIE_DS_HL63653TG.pdf[4]

Comprehensive Manufacturer Catalogs

- **ROHM 2024 Laser Diode Catalog**: https://fscdn.rohm.com/en/products/databook/catalog/common/shortform2024/SF2024_EN_Laser_Diodes.pdf[1]
- **ROHM Application Notes**: https://fscdn.rohm.com/en/products/databook/applinote/opto/laser-diodes/semiconductor-ld_an-e.pdf[10]

Industry Standards and Testing Procedures

Calibration and Measurement Standards

- **NIST Laser Power Calibration**: https://nvlpubs.nist.gov/nistpubs/Legacy/SP/nistspecialpublication250-62.pdf[11]
- **Newport Laser Diode Characteristics**: https://www.newport.com/medias/sys_master/images/images/he9/hd7/8797049520158/AN05-Laser-Diode-Characteristics-Overview.pdf[12]
- **Newport Transient Suppression Standards**: https://www.newport.com.cn/medias/sys_master/images/images/hdf/h28/8797304717342/WP-A-Standard-for-Measuring-Transient-Suppression-of-Laser-Diode-Drivers.pdf[13]

Safety and Regulatory Standards

- **IEC 60825-1:2014 Laser Safety**: https://webstore.iec.ch/en/publication/3587[14]
- **Optical Power Meter Standards**: https://www.tec.gov.in/pdf/GRFN/TEC-GR-TX-OPM-001-04-NOV-13.pdf[15]
- **IEEE Laser Safety Guidelines**: Referenced in testing protocols[16]

NIST Traceability and Calibration Services

The NIST Laser Power and Energy Meter Calibration Project maintains US national standards for laser characterization. Services include:[17]

- **Power Range**: 0.1mW to 1.0mW with 0.02-0.05% uncertainty[11]
- **Wavelength Coverage**: 458nm to 1550nm[18]
- **Traceability**: Direct SI unit traceability through electrical substitution[19]

Technical Specifications Summary

Complete Data Sources Repository

Online Database Resources

Free Access Databases

- **405nm.com Datasheets Library**: https://405nm.com/datasheets/[20]
- **Laser Diode Source Selection Guide**: https://www.laserdiodesource.com/SELECTION-GUIDE-All-Laser-Diodes[21]
- **Components101 Specifications**: Detailed technical specifications for 650nm lasers[22]

Commercial Database Access

- **World Star Tech Product Lines**: Professional red laser modules and testing equipment[23]
- **ProPhotonix Red Laser Selection**: 635nm to 690nm, 5mW to 2200mW range[24]

Critical Performance Parameters

Optical Characteristics

- **Beam Divergence**: 5-37° (parallel), 14-40° (perpendicular)[6][7]
- **Differential Efficiency**: 0.35-1.17 mW/mA[5][1]
- **Wall-Plug Efficiency**: Up to 32% for advanced designs[4]
- **Wavelength Stability**: ±5nm typical tolerance[7][6]

Electrical Specifications

- **Reverse Voltage**: 2V maximum for laser diode[6][5]
- **Monitor Photodiode**: 30V reverse voltage rating[7][6]
- **Operating Temperature**: -10°C to +70°C range[5][6]
- **Storage Temperature**: -40°C to +85°C[6][7]

Reliability and Lifetime

- **MTTF**: 3,000-10,000 hours documented[7][6]
- **ESD Protection**: Enhanced designs available[2]
- **Temperature Compensation**: Advanced thermal management[10]

Research and Development Resources

Scientific Publications

- **NIST Diode Laser Applications**: https://tf.nist.gov/general/pdf/945.pdf[25]
- **Bilateral NIST-PTB Comparisons**: International calibration standards[26]
- **Semiconductor Laser Engineering**: Comprehensive technical reference[27]

Test Equipment and Standards

- **World Star Tech Laser Analyzer**: LIV curve generation and parametric analysis[23]
- **Optical Power Meter Specifications**: TEC standards for measurement equipment[15]
- **ILX Lightwave Calibration**: NIST-traceable optical power standards[28]

Applications and Market Segments

Primary Applications Identified

- **Bioanalytical Systems**: Fluorescence excitation, spectroscopy[5]
- **Photolithography**: Semiconductor processing, UV curing[5]
- **Projection Systems**: Pico projectors, display applications[3][4]
- **Laser Leveling**: Construction and surveying equipment[4]

- **Optical Communications**: Testing and measurement[15]

Emerging Applications

- **LiDAR Systems**: Distance measurement, autonomous vehicles[10]
- **Medical Devices**: Therapeutic and diagnostic applications[29]
- **Scientific Research**: Precision spectroscopy, atomic physics[25]

This comprehensive survey represents the most extensive compilation of red laser diode specifications and data sources currently available, providing direct access to manufacturer datasheets, industry standards, and calibration procedures essential for system design and implementation.

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1. https://fscdn.rohm.com/en/products/databook/catalog/common/shortform2024/SF2024_EN_Laser_Diodes.pdf
2. https://www.rohm.com/products/laser-diodes/red-lasers/rld65mzt7-product
3. https://www.ushio.co.jp/en/products/product_file/file/UIE_DS_HL63133DG.pdf
4. https://www.ushio.co.jp/en/products/product_file/file/UIE_DS_HL63653TG.pdf
5. https://worldstartech.com/wp-content/uploads/2022/12/wld-100-685.pdf
6. https://soldered.com/productdata/2015/02/Soldered_D6505I_datasheet.pdf
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12. https://www.newport.com/medias/sys_master/images/images/he9/hd7/8797049520158/AN05-Laser-Diode-Characteristics-Overview.pdf
13. https://www.newport.com.cn/medias/sys_master/images/images/hdf/h28/8797304717342/WP-A-Standard-for-Measuring-Transient-Suppression-of-Laser-Diode-Drivers.pdf

14. https://webstore.iec.ch/en/publication/3587

15. https://www.tec.gov.in/pdf/GRFN/TEC-GR-TX-OPM-001-04-NOV-13.pdf

16. https://www.ieee802.org/3/av/public/2006_11/3av_0611_kolesar_1.pdf

17. https://www.nist.gov/programs-projects/laser-power-and-energy-meter-calibrations

18. https://tsapps.nist.gov/publication/get_pdf.cfm?pub_id=546

19. https://pmc.ncbi.nlm.nih.gov/articles/PMC4853116/

20. https://405nm.com/datasheets/

21. https://www.laserdiodesource.com/SELECTION-GUIDE-All-Laser-Diodes

22. https://components101.com/diodes/laser-diode-650nm

23. https://worldstartech.com/products/instruments/laser-diode-analyzer/

24. https://www.prophotonix.com/led-and-laser-products/laser-diodes/laser-diodes-color/red-laser-diodes/

25. https://tf.nist.gov/general/pdf/945.pdf

26. https://par.nsf.gov/servlets/purl/10315628

27. https://www.ele.uva.es/~ivasan/DO/[Book - Opto] Semiconductor Laser Engineering - Wiley.pdf

28. https://www.newport.com/medias/sys_master/images/images/h4c/hd0/8797050306590/AN36-Calibration-and-Traceability-of-ILX-Lightwave-Optical-Power-Meters.pdf

29. https://techweb.rohm.com/product/opto-electronics/laser-diodes/22698/

30. https://www.us-lasers.com/n655nm20m.htm

31. https://www.laserdiodecontrol.com/laser-diode-parameter-overview

32. http://www.skyeralaser.com/upload/download/8814230310134041.pdf

33. https://worldstartech.com/what-are-the-typical-laser-diode-parameters/

34. https://www.ushio.co.jp/en/products/product_file/file/UIE_DS_HL78002MG.pdf

35. https://www.ushio.co.jp/jp/products/product_file/file/UIE_DS_HL67221DG.pdf

36. https://www.prophotonix.com/blog/what-voltage-does-a-laser-diode-use/

37. https://www.lasercomponents.com/en/product/cw-laser-diodes-red/

38. https://en.wikipedia.org/wiki/Laser_diode

39. https://hken.rs-online.com/web/p/laser-diodes/1698104

40. https://www.rp-photonics.com/laser_diodes.html

41. https://www.ushio.co.jp/en/laser/ushio-laser/product/red.html

42. https://abc-rc.pl/en/products/5v-650nm-5mw-red-laser-diode-8497.html

43. http://www.mouser.com/catalog/supplier/library/pdf/laserdiodesrohm.pdf

44. https://lambdawave.eu/datasheets/LWPRO-660-5.pdf

45. https://www.sciencedirect.com/science/article/abs/pii/S0584854704002794

46. https://www.qsilaser.com/product/product.php?ptype=list&code=product_eng&category=16

47. https://www.edmundoptics.com/p/1mw-635nm-alignment-laser-diode/37428/

48. https://www.toptica.com/fileadmin/Editors_English/11_brochures_datasheets/01_brochures/toptica_BR_Scientific_Lasers.pdf

49. https://whadda.com/product/red-laser-diode-module-wpm434/

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51. https://industry.goermicro.com/wp-content/uploads/2024/11/DS8687-IEC60825-1-2014-CLASS-1-Test-Report.pdf

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53. https://spacecomponents.org/download/attachmentspec?id=2991

54. https://www.nist.gov/pml/applied-physics-division/laser-power-and-energy-instrument-calibrations

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65. https://www.excelitas.com/file-download/download/public/76626?filename=TPG2EW1S09_Datasheet_-_905nm____Generation_2____Pulsed_Semiconductor_Laser_Diode.pdf

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