

QuickSwitch® Pulsed Laser Diode QS-905 Series

Description

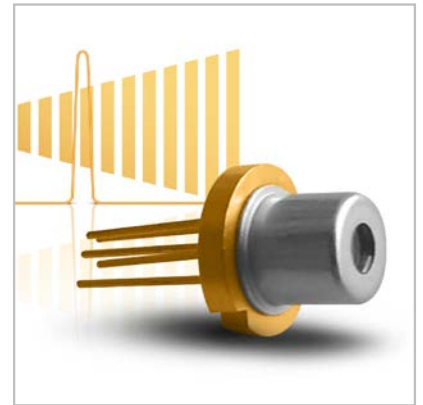
Ultra-compact module containing a high current switch, charge storage capacitor and pulsed laser diode inside a small hermetic package. The high current loop is all internal to the package which provides EMI shielding when the switch is active. The package has an independent ground pin from the signal and supply returns.

Features

- Hermetic TO-56 package (5 pins)
- 905nm triple junction laser diode, 3 mil, 6 mil & 9 mil stripe
- Pulse width of 2.5 ns typical, enables high resolution ranging applications
- Low voltage charge storage: 1.5 V to 80 V DC
- Pulse frequency: up to 200 KHz
- Evaluation board available
- Available for mass production

Applications

- High resolution range finding for consumers
- Laser scanning / LIDAR
- Drones
- Optical trigger
- Automotive
- Robotics
- Military
- Industrial



Optical Characteristics at $T_{case} = 21^{\circ}C$

| | Min | Typ | Max | Units |
|-------------------------------------|-----|----------|-----|-----------------|
| λ of peak radiant intensity | 895 | 905 | 915 | nm |
| Spectral FWHM | | 8 | | nm |
| $\delta\lambda/\delta t^{\circ}$ | | 0.27 | | nm/ $^{\circ}C$ |
| Divergence FWHM | | | | |
| Parallel to junction plane | | 12 | | Degrees |
| ⊥ Perpendicular to junction plane | | 20 | | Degrees |
| Emitting Area | | | | |
| 1S3J09 | | 10 x 235 | | μm |
| 1S3J06 | | 10 x 160 | | |
| 1S3J03 | | 10 x 85 | | |

Typical Product Characteristics

Conditions are $T_{case} = 21^{\circ}C$, Trig = 40 ns, Rep. Rate = 10 kHz, $R_{HV} = 400 \Omega$, HV = 65 V

| Parameter | QS905D1S3J09U | QS905D1S3J06U | QS905D1S3J03U | Units |
|--|---------------|---------------|---------------|---------------------|
| I_{HV} | | | | |
| - at 10 kHz, 65 V | 1 | 1 | 1 | mA |
| - at 100 kHz, 65 V | 10 | 10 | 10 | mA |
| P_o | | | | |
| - at 65 V | 80 | 72 | 65 | W |
| - at 80 V | 90 | 81 | 72 | W |
| Pulse width (FWHM) | 2.4 | 2.4 | 2.4 | ns |
| Rise time | 1.1 | 1.1 | 1.1 | ns |
| Power dissipation factor ⁽¹⁾ (PDF) | 0.66 E-9 | 0.83 E-9 | 0.99 E-9 | W/Hz/V ² |
| Thermal resistance ⁽²⁾ (R_{th}) | 32.5 | 32.5 | 32.5 | $^{\circ}C/W$ |

⁽¹⁾ The power dissipation is calculated as follows:

$P_{diss} = PDF \times f \times (HV - 4.5)^2$, where f is the repetition rate.

$T_{junction} = T_{case} + P_{diss} \times R_{th}$, where $T_{junction}$ is the junction temperature of the laser and T_{case} is the case temperature.

⁽²⁾ The thermal resistance is measured on a heat sink and $T_{case} = 21^{\circ}C$.

Absolute Maximum Ratings

| Maximum Ratings Parameter | QS-905 Series | Units |
|---------------------------------------|---------------|--------------------|
| HV | 80 | V |
| Minimum HV series resistance R_{HV} | 100 | Ω |
| V_{Trig} Max | 6 | V |
| Temperature | | |
| - Storage | - 55 to 100 | $^{\circ}\text{C}$ |
| - Operating LD junction | - 40 to 100 | $^{\circ}\text{C}$ |

Lead soldering 5 seconds max at 200 $^{\circ}\text{C}$

Recommended Operating Conditions

| Parameter | QS-905 Series | Units |
|--|---------------|-------|
| HV with 400 Ω series resistor | | |
| - Intermittent operation (up to 4E11 shots) | 80 | V |
| - Continuous operation | 65 | V |
| V_{Trig} | 5 | V |
| Rise time less than 2 ns to achieve peak power | | |

Figure 1: Peak Power vs HV, $T_{case} = 21^{\circ}\text{C}$,
 $f = 10\text{ kHz}$

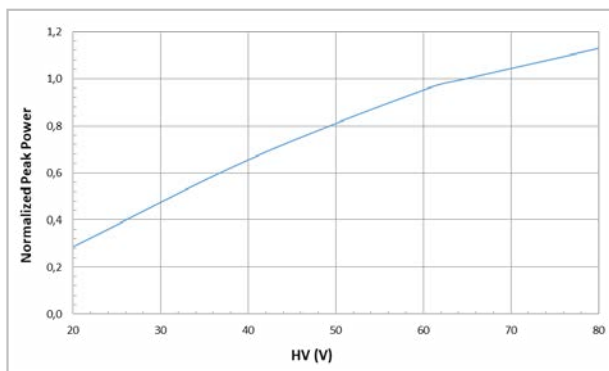


Figure 2: Peak Power vs T_{case} , HV = 65 V,
 $f = 10\text{ kHz}$

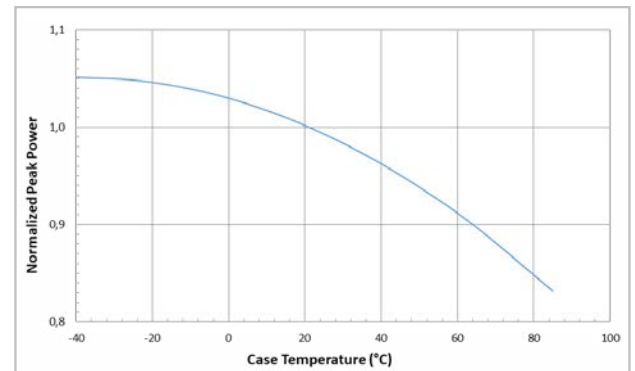


Figure 3: Peak Power vs Junction Temperature, HV = 80 V, f = 200 kHz

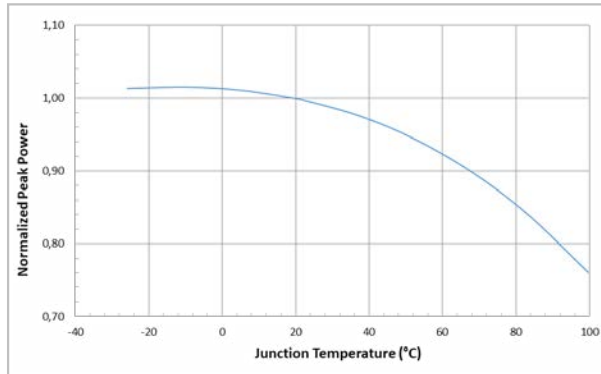


Figure 4: Peak Power vs Frequency, $T_{case} = 21\text{ °C}$, HV = 65 V

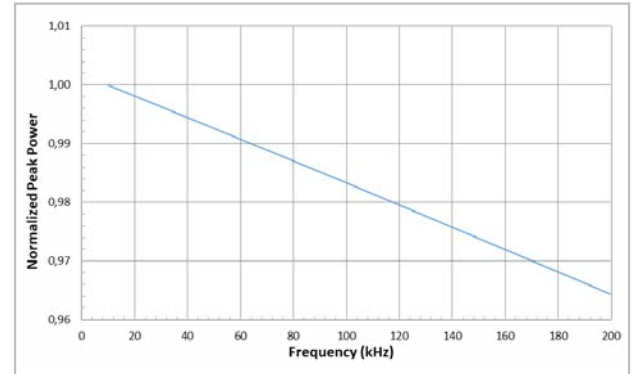


Figure 5: λ_0 vs HV, $T_{case} = 21\text{ °C}$

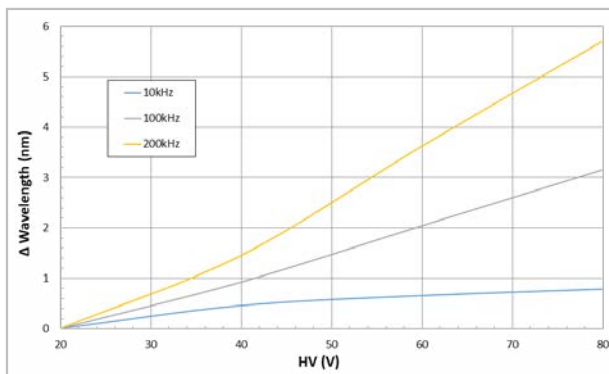


Figure 6: Δ Pulse Width vs HV, $T_{case} = 21\text{ °C}$

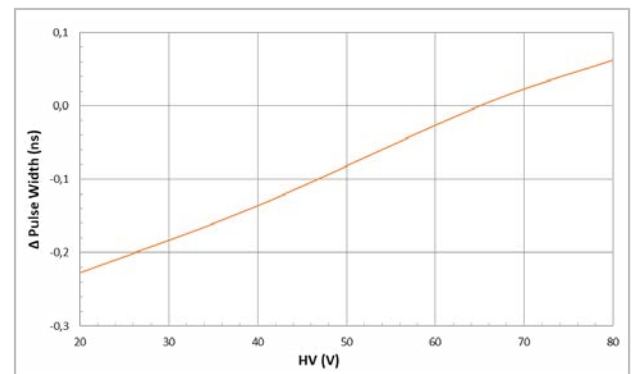


Figure 7: Δ Rise Time vs HV, $T_{case} = 21\text{ °C}$

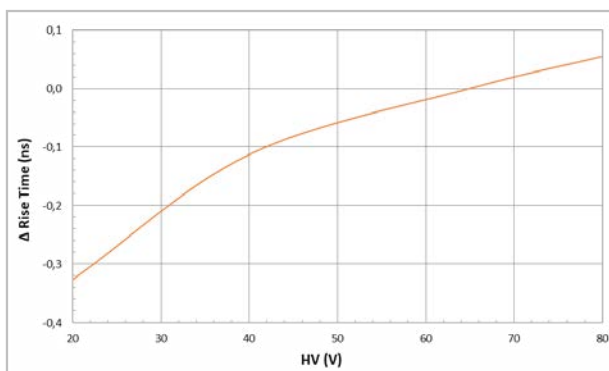


Figure 8: Spectral Intensity Distribution

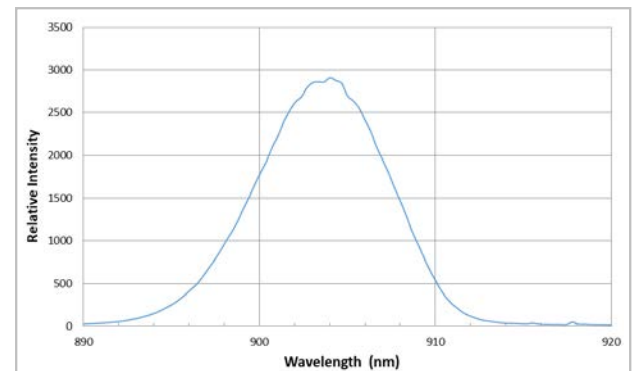


Figure 9: Relative Divergence Fast Axis

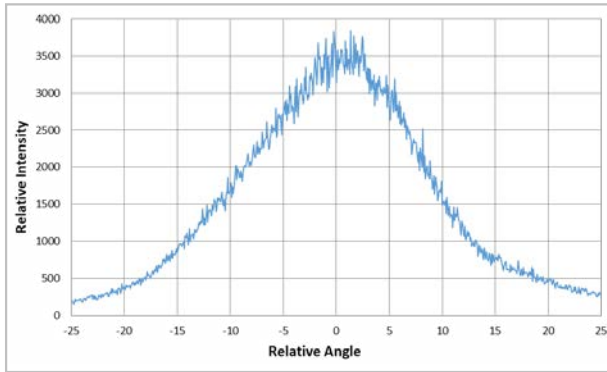


Figure 10: Relative Divergence Slow Axis

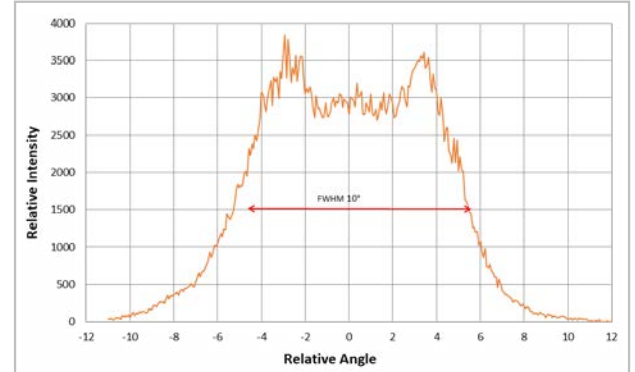
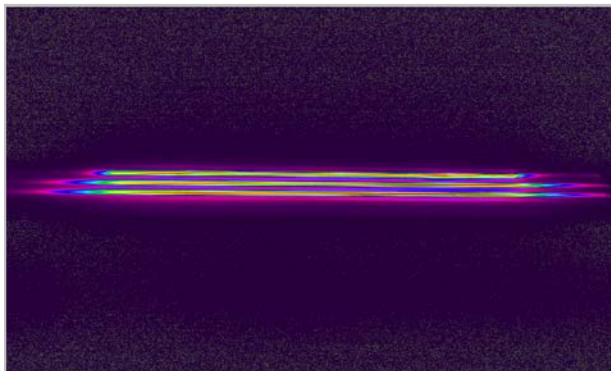
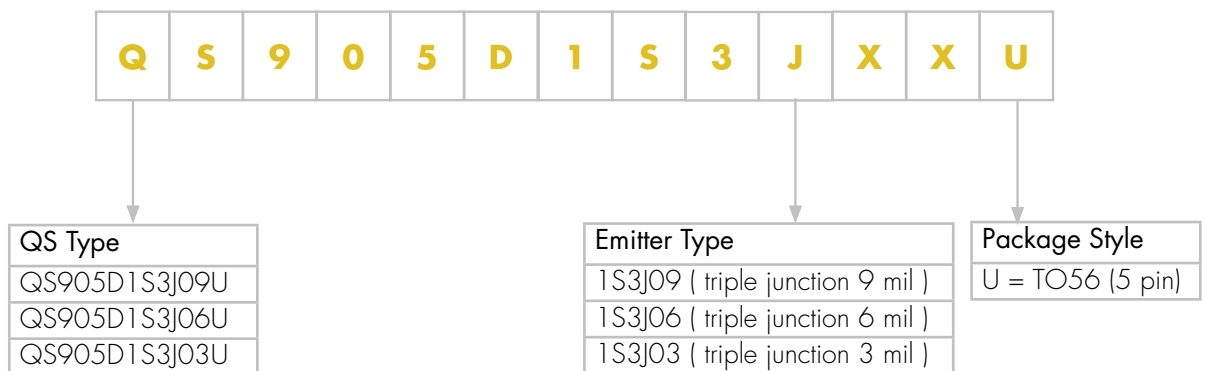


Figure 11: Near Field

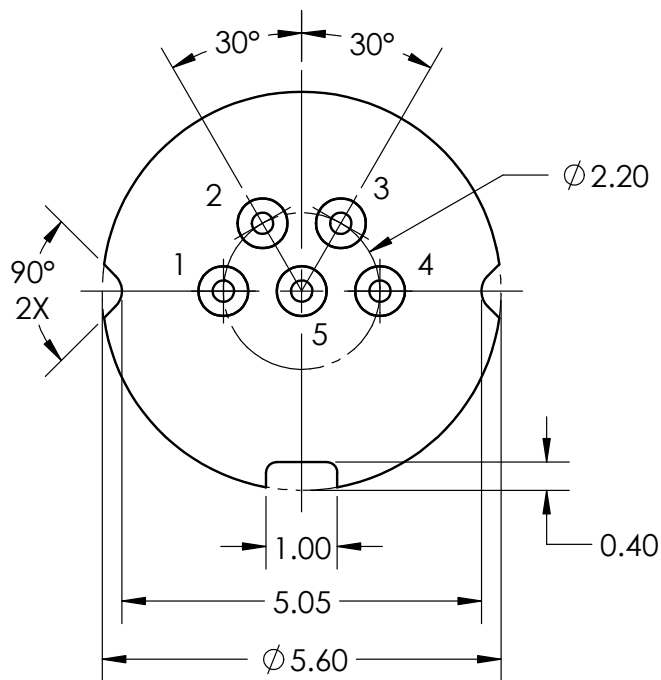


Product Number Designations



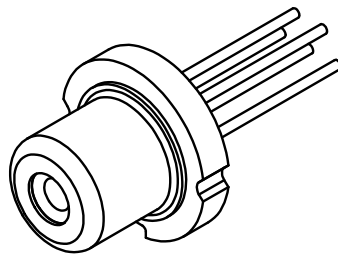
Package Drawing

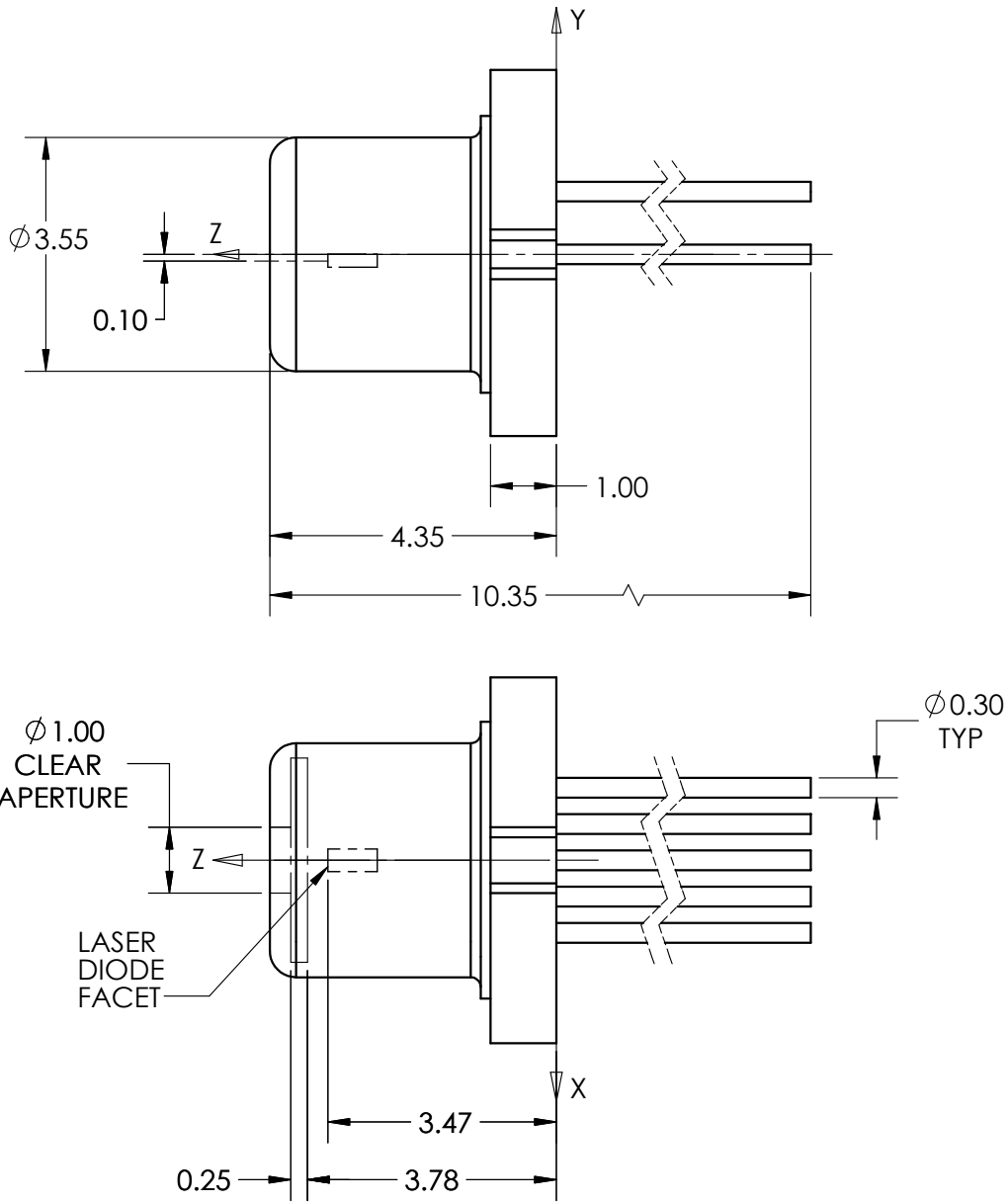
Package QS



Pin Out

- 1: TRIGGER
- 2: N.C. (GND)
- 3: HV (High Voltage)
- 4: GND (Ground)
- 5: CASE





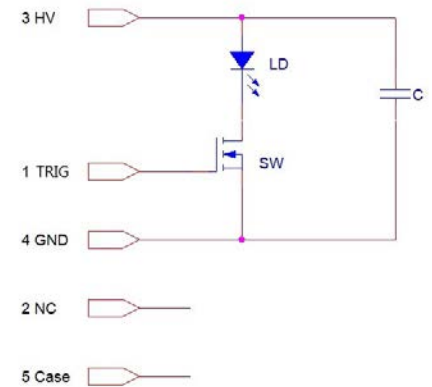
Tolerance of Laser Position

| Direction | Tolerance | Units |
|-------------------------------------|-----------------|-------|
| X (Parallel to laser junction) | 0 ± 0.1 | mm |
| Y (Perpendicular to laser junction) | 0.1 ± 0.05 | mm |
| Z (From laser facet to window) | 0.31 ± 0.15 | mm |

PIN Configuration

| Pin | Function | Comment |
|-----|----------|--|
| 1 | TRIGGER | 0V OFF, ON 5 V Tr to be < 2 ns to meet |
| 2 | N.C. | Unused, GND recommended. |
| 3 | HV | 20 V / 80 DC (see Fig. 1 – 5) |
| 4 | GND | GND (HV and GATE return) |
| 5 | CASE | Connect to GND for case to as an EMI shield. |

Electrical Schematic



Evaluation Board & Driver: QS-EVAL DRIVER 2

25 mm x 51 mm evaluation board and QuickSwitch® driver is available upon request.

Product Changes

LASER COMPONENTS reserves the right to make change to the product information contained herein without notice. No liability is assumed as a result of their use or application.

Ordering Information

Products can be ordered directly from LASER COMPONENTS or its representatives. For a complete listing of representatives, visit our website at www.lasercomponents.com