

ID	Requirement Description	Test	Passed	Learnings
R001	The design shall have at least one optical laser diode on each module.	Visual inspection, documentation of part numbers and functionality check that the device operates with the laser diodes	Yes	Passed. The design meets the stakeholder expectation of FSO of the system, by the use of two-way laser and photodiodes pairings transmitting data optically over a range < 2 m.
R002	The design shall limit the current supplied to the laser diode to only.	Use analytical model to deduce if laser diode meets class 1M, as specified in AS/NZS IEC 60825.1	Yes	Passed. The requirement was met, tested via an analytical model and current delivery model. However, this would be more appropriately tested via oscilloscope measurements of the input trace to the laser diode via test pads on the PCB, to confirm implementation matched analytical model.
R003	The design shall have a testable prototype by 13/10/2025	Assemble and functionally test the prototype, performing visual inspection and end-to-end functional test	No	This requirement was failed as no testable prototype arrived in time for our team-set testing date. A revised and progress checks and reports is encouraged to account for manufacturing or lead-time delays.
R004	The system shall support USB low-speed mode at 1.5Mbps	Connect USB mouse, keyboard and data stick, verify operation and device recognition	Yes	Open-Source software is readily available with clear documentation that can be easily integrated into any project.
R005	The device shall use only open-source software	All software stored in public repository, confirmation that software implemented is open source	Yes	
R006	The design shall not include any lense or optical elements that would increase the laser classification above Class 1M	Physical inspection of prototype to ensure no optics present	Yes	Passed. Inspection revealed the lack of optical elements that would increase the laser, hence complies with Class 1M safety limits. This reinforce that a bare-emitter arrangement is adequate for safe optical transmission without increasing power density of beam hazard

R007	The design shall have a standalone power supply for the module connected to the USB peripheral	Provide power to the transmitting module at the design's required operating voltage solely from its rechargeable battery, documentation of battery specifications	Yes	Passed. Stakeholder expectations are met by incorporating a 5V power supply in the form of a power bank to power one of the modules.
R008	The design shall not involve an MCU development kit	Visual inspection and documentation to confirm MCU module is implemented on PCB and no devkit is present	Yes	Passed. Stakeholder expectations are met as we utilised an optical link for FSO communication.
R009	The design shall have a minimum of one USB-A port on both modules	Visual inspection, documentation of used ports and functionality of data transfer via USB-A	Yes	Passed. Two USB-A ports were incorporated within the PCB design for both the receiving and transmitting circuits.
R010	The photodiodes used shall be sensitive enough to detect the correct signal bit transmitted by the other module from 2 meters away	Modulate one laser at operating frequency at 2m, measure/observing the signal generated at the receiving photodiode	No	This requirement was failed as required components for the amplification circuit did not arrive in time for our team-set testing date. Adjusting the design approach to focus on procurement is advised.
R011	The design shall include at least one photodiode on each module	Visual inspection, documentation of part numbers.	Yes	Passed. A photodiode was incorporated within the PCB design for each module.
R012	The design shall not use a commercial laser diode driver	Review design documentation and PCB to confirm no use of commercial driver	Yes	Passed. The laser diode driver was independently designed and incorporated within the PCB design.
R013	The design shall operate at latency of 10ms for operation mouse, keyboard and USB data stick	Measure end-to-end latency using oscilloscope	Yes	For the operation of Mouse and Keyboard latency is very noticeable, significantly less than 10ms is desired if no observable latency is desired. In future requirements this should be set to a lower latency requirement
R014	Each module's operation shall not be impacted by reflections of its own light source	Transmit known data sequence in expected environment/conditions, verify sent and received data match	Yes	Passed. The system housing design accounted for the reflections of its own light source by designing tight fit holes for the laser.

R015	The design shall not require users to download drivers onto their PC	Connect to PC with typical OS (windows/macOS/Linux) and verify automatic enumeration and correct function without any additional installations	Yes	The use of standard USB packages allowed seamless integration with the USB protocol, resulting in a design that required no additional drivers to be installed.
R016	The design shall operate for at least 30 minutes on average without any device disconnection errors when the devices are any distance less than a maximum of 2m apart	Operate device continuously over a 30-minute period with consistent power delivery for successful operation	No	Failed. Testable prototype did not arrive in scheduled time for testing. A key takeaway is to prepare an alternative breadboard testable module during the design process.
R017	The design shall be transparent to the device user; it behaves like any ordinary connected device	Connect device to a PC and transfer HID data. Verify behaviour is the same as a directly connected, wired USB device	Yes	The use of standard USB packages allowed seamless integration with the USB protocol, resulting in a design that could be completely transparent to the user.
R018	The design shall cost less than \$500	At completion, review recorded expenditures at project cost total	Yes	The project was under budget. While the requirement and therefor stakeholder expectation was met, further cost optimisation strategies in design could be applied to further reduce production costs.
R019	The design shall have error correction capabilities to reduce data corruption	Transmit known data sequences, inject errors and verify correction of a single bit within 255-bit sequences	Yes	The error correction used was Hamming (7,4), which is the simplest error correction. More technical requirements should be developed in future projects to specify BER requirements and noise conditions.
R020	The design shall abide by the IPC standards for temperature	Measure component and enclosed ambient temperature after prolonged operation period	No	It is imperative to incorporate a detailed approach to the thermal management of the design as early as possible to ensure adherence to standards. Without an available prototype to thoroughly test thermal performance, temperature of components most susceptible to heat implications could still be observed and logged in an

				enclosure artificially generating expected inputs.
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