Project Leto Modules
Test Outline

Power Supply

Apply power
Measure regulated voltage stability

Reduce supplied voltage from nominal
Increase supplied voltage to maximum
Evaluate hysteresis behavior

Shutdown signal

Power on with signal high – module stays off
Power on with signal low – normal power up
Raise signal after power on – module powers off
Lower signal after power on – stays off then powers on
Evaluate behavior

Programming

Connect programming cable
Establish communication
Upload program
Verify program
Remove power and reapply power
Observe expected behavior

Test programming/updates over USB

Software Debugging

Connect debugging cable
Establish communication
Observe expected debug messages

Communications

Change input signals
Evaluate communications in HyperTAC
Alternatively view and decode messages on the backplane or in the debugging port.
All expected message types should be tested. Verify proper function.

- 0 – Master Query Message
- 1 – Digital Status Query
- 2 – Reset
- 3 – Digital Status Update
- 4 – Analog Status Query
- 5 – Quick Analog Status Query

6 – Analog Status Update
I – New Status Query
o – Control Point Armed
y – StatusChange
x – No Status Change
w – Digital Status
o – Control Point Armed Ack
z – Ack
r – Version Response
p – New Status Response

LED Functions

Analog Input and Output LEDs

Point< 1.5mA - off
Point > 1.5mA, i < 2.5mA - red
Point > 2.5mA, i < 12mA - green
Point > 12mA, i < 20mA - yellow(red + green)
Point > 20mA - red flashing (over maximum)

Digital Input and Output LEDs

Point On – Green
Point Off – unlit

PWR – green when power is available. Slow blink in sleep mode
TX - blink green when transmitting a message
RX - bling green when receiving a message
STAT – Red – On until program starts. Blinks off if reset. May flask a number of times if multiple error codes are available.

Environment

With some repeating type of stimulus on the I/O circuits, test modules at maximum temperature expected INSIDE THE RTU BOX for at least 24 hours.

Test again at the minimum temperature expected inside the RTU box for at least 24 hours.

Test with temperature swinging between minimum and maximum temperatures for several days.

Telemetry of expected I/O status should remain uninterrupted.

The MOSFETs in the DO circuits should be instrumented with a thermocouple and loaded with the maximum current while testing at maximum temperature. The result should be compared with the maximum case temperature in the parts specification. 1.0 amp, 1.5 amp and 2.0 amp DC loads should be tested.

Pulse Inputs

Test to specification on all digital inputs. With AC and DC inputs and at temperature extremes.

Minimum Pulse Width - 20 ms

Maximum Burst Frequency - 25 PPS
Maximum Continuous Frequency - 8 PPS

Noisy relays should be employed.

Digital Inputs

Test at maximum electrical specifications with AC and DC, clean and noisy sources and at temperature extremes.
Inputs must withstand constant maximum voltages +10% and withstand reverse wiring at nominal voltage.

Digital Outputs

Test at maximum electrical specifications.With AC and DC, resistive and inductive loads and at temperature extremes.
Outputs must withstand constant maximum current +10% and withstand reverse wiring at nominal voltage.
Noisy relays coils should be employed.

Analog Inputs

Characterize performance with signals of different amplitude and frequency.
Test at temperature extremes.
Withstand reverse wiring at nominal voltage.
Test near EMI and RFI noise sources.

Analog Outputs

Test output at varying frequency and amplitude.
Drive load at minimum and maximum impedance.
Withstand reverse wiring at nominal voltage
Test at temperature extremes.
Test near EMI and RFI noise sources.

Surge Testing

Test each input, output, TAC II bus signal and power in accordance with IEC-61000-4.