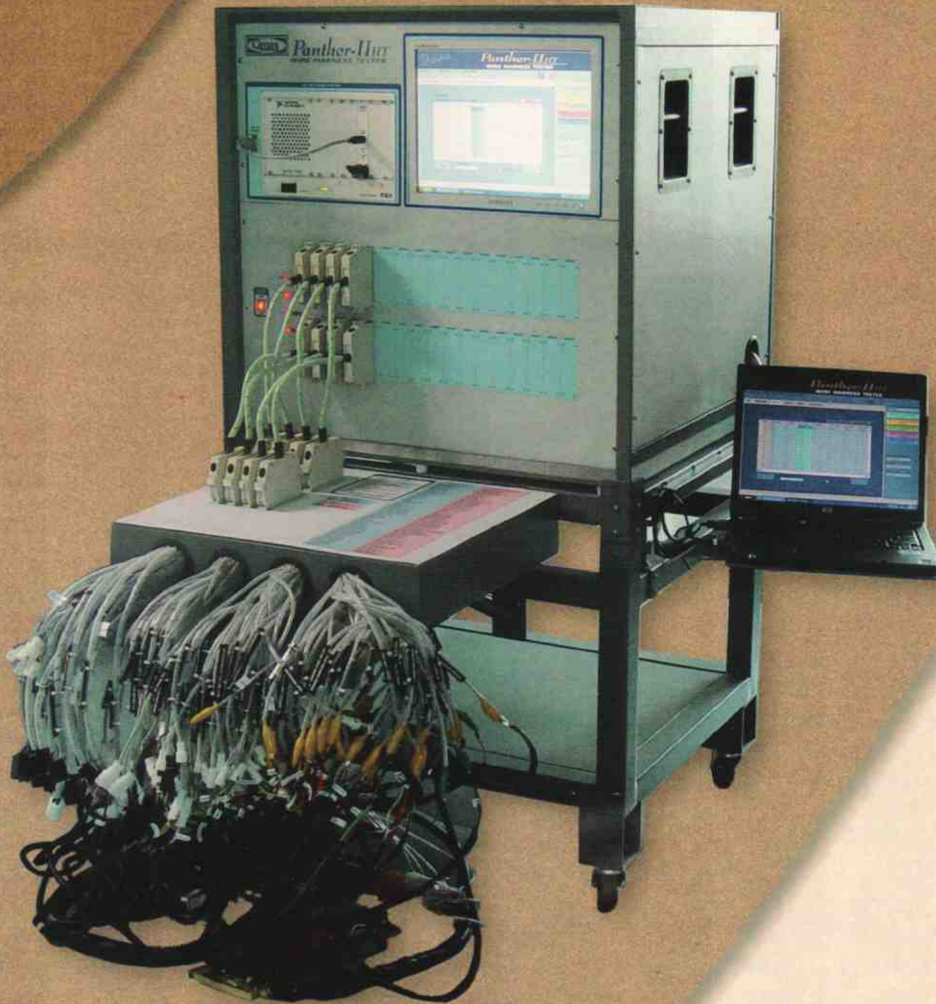
# Panther-2K HT

## Wire Harness Tester




- Up to 2048 Channels
- High Speed Open / Shorts measurement
- Resistance measurement from 100 Micro-Ohms to 200 Ohms
- Windows based user-friendly software
- Test Jigs / adaptor unit to connect various types of cables
- Most useful in automotive / aviation / defence applications
- Insulation resistance measurement (high voltage test) *(Optional)*

The Panther II Harness Tester is designed for testing of wire harnesses and back plane assemblies, that needs testing with whole new fleet of features that make the task reliable, complete and fast. It uses Force Current – Measure voltage to test the impedance values. It can be interfaced to any type of fixtures as required. It uses the **Learn** and **Compare** technique for finding out opens or shorts as well as measure resistance in Milli-ohm range. The learnt open / short combination from a Good Assembly is taken as reference and compared with the Assembly under Test for any mismatch. This reduces the time required in generating tedious test program sets for such applications. Its fast test time of few microseconds per pin combination is fastest in industry and helps increase the test yield and productivity.

The tests are configured first based on each type of harness. Once the tests are configured, the tests can be conducted at operator level easily with display of results.

## Features

### Stimulus

Uses several stimulus modes.

- Fast Force Current – Measure Voltage (Standard)
- Force Current – Measure Voltage using PMU for extended range (optional)
- Force Voltage – Measure current (optional)
- AC Stimulus for Contact less testing (optional)
- Measure resistance in Micro Ohm range as an option using PXI cards.
- Measure any other parameter as an option in the integrated PXI instrument

While simple open / diode / short can be detected with Fast FCMV chip, additional PMU functions for extend range measurements and AC stimulus for contact less testing possible.

### Test Methods

Mode 1: **Serial Shift Method**

In this mode, one pin at a time is connected to a current source and all other pins are connected to GND. No. of Test combinations in this mode is the same as the number of pins on the Assembly. For a 2000 pin assembly, no. of tests are 2000. Five band comparator with 4 bit result code classifies Short / Diode (0.3V) or high leakage / Diode (0.6V) or Medium leakage / Diode (1.2V) or low leakage / Open in a single operation.

Mode 2: **Fixed Reference Method**

In this mode, any pin can be made as fixed reference pin and all other pins are tested. Thus for a 1000 pin assembly, 999 test will be carried out keeping any one of the 1000 pin as a reference. Same pin as reference pin and test pin combination is skipped. The no. of combinations in this mode for 2048 pins are 2047 combinations.

Mode 3:**Half QSM Method – n*(n-1)/2 combinations**

In this mode, all combinations of pins are tested as pair by pair excluding reverse combinations. Same pin as reference pin and test pin combination is skipped. Example, Pin 1 as ref and pin 2 to n are test pins, then pin 2 as ref, pins 3 to n as test pins. The no. of test combinations for this method with 2048 channels are 2 Mega combinations. The current source can be programmed to source or sink or DC / AC Stimulus applied.

Mode 4: **Full QSM Method – n*(n-1) combinations**

In this mode, all combinations of pins are tested as pair by pair including the reverse combinations. Example, Pin 1 as ref and pin 1 to n are test pins, then pin 2 as ref and pins 1 to n as test pins (Same pin as reference pin and test pin combination is skipped). Thus in this mode both normal and reverse polarity combinations are tested automatically. No. of test combinations for 2048 channels will be 4 Mega combinations

Mode 5: **RAM Based select sequences (Optional)**

The designed capacities for RAM based sequences are 1 MEGA combinations and are expandable by additional memory modules.

### No.of Channels

Each Mux card holds 256 channels with 4-wire measurement capability.

The standard configuration uses 512 channels. It can be upgraded to a maximum of 2048 channels, using 8 cards (each of 256 channels) maximum.

### Measurement Method

Wire Harness Tester uses 4-wire measurement using fast analog switches for accurate voltage measurements and improves accuracy.

### Voltage Clamp

Programmable voltage clamp with 14-bit accuracy within 0 to 7.5V.

Facilitating accurate voltage clamps as required by user.

### Time Base

Test Time is programmable from 1us to 256 µs in 256 steps (1,2,3,4.. 256).

More accurate and flexible test time selection.

### Wait States

Programmable Wait States from zero to 255 wait states for each test.

Device pins / fixture wiring with varying capacitance may require either to slow down the test time or selectively insert wait states for those pins only. Slowing down the test time, common for all pins will greatly reduce the tester throughput and increased overall test time. Wire Harness Tester offers RAM based on the fly insertion of wait states for those pin combinations that are capacitive and thus increasing the overall test speed of the system.

### Compare Threshold

Have four independently programmable compare threshold

## Compare RAM

Has 4 bit compare RAM for every test combination (4meg x 4 for 2048 channels) and the test results are computed by internal hardware to get instant *Pass / Fail* result.

Wire Harness Tester offers hardware comparison of learnt and test data by the use of compare RAM. This feature makes the Test very fast and the test time is just the drive time without software comparison overheads.

## Mask Bits

Masking comparison for each of the 4 comparators.

4-bit mask helps add test tolerance. e.g. if a test produces a compare output voltage that is just at a compare threshold, the result may be intermittent. Wire Harness Tester provide for masking that comparator to provide a stable and repeatable test results.

## Acquisition RAM

Has 4-bit acquisition RAM (4MB x 4 bits for 2048 channels) to store the 4 bit bar code test results for each test combination.

Acquisition RAM is useful in reading back all the learnt/Test data for FA.

## First 1024 Error RAM

Has 1024 RAM by 26 bits to store the reference channel address, test channel address and the 4 bit error code for each failure that occurred while in test mode.

Once the Test over, the system gives instant result as All Test PASSED / Some Test PASSED / All Test FAILED. In addition the system stores up to 1024 first errors in the RAM. If the errors are more than 1024, it flags an overflow bit. This 1024 first errors are normally more than adequate for FA. In case if the user needs all the failure details he can get it from the Acquisition RAM, which is 4 meg deep.

If all the test data of all the nodes are matching with learnt data, then there will be no display of any channel information. Only *Test Pass* message will be displayed in Green color at the right bottom of the screen.

Whenever a test fails, the *Learn Data* and *Test Data* (in color zones) for failed nodes alone will be displayed in the screen. *Test Fail* message will be displayed in red color at the right bottom of the screen. The difference in color ranges for the *Learnt* and *Test* data will help to know the difference between the *Learn* and *Test* data.

If *Measure and compare* option is selected, the tester will compare the node resistance (zone) with learnt (zone) values. If the *Learn* and *Test* data comparison passes, then QT25 PXI instrument will measure the resistance of those nodes within the zone 1(short) range and compare it with the limit values set in the learnt screen and display the resistance values along with *Learn measure* values. If the nodes pass this second comparison, then test result is declared as ***Pass***.

If any node resistance value is beyond the limit values, the test result is declared as ***Fail.***

The user can select the *Test without measure* option if required.

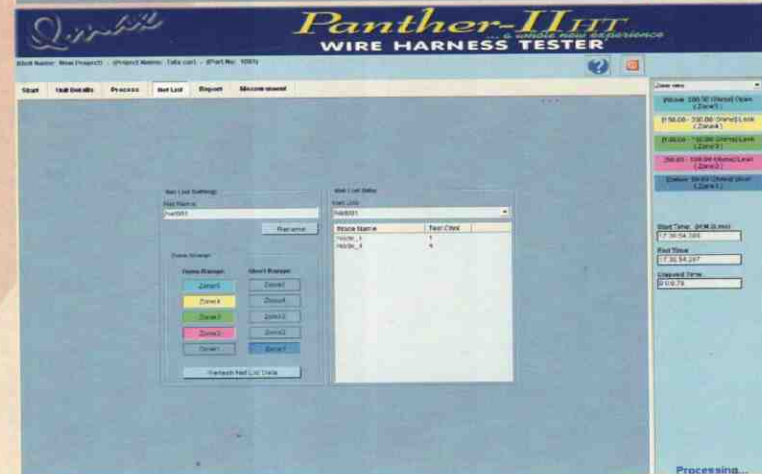
The Net List is generated based on the Test results.

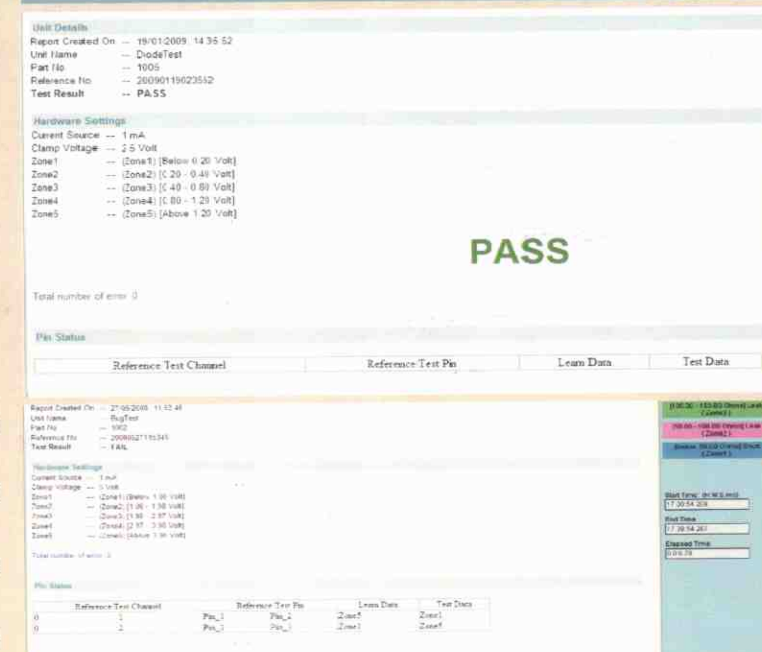
This screen displays the nodes in a particular net classification, say Net 001. When the nodes are large in number, the Net list is helpful in viewing the nodes in each category.

The Test Comparison Result displays the Unit details like *Unit name*, *Part number*, *Serial Number*

and the Hardware settings like Current, Clamp voltage and Zone setting values

Whenever a test fails, the test summary gives the error details like



## Specifications:

| | |
|---|---|
| **Max Channels** | : 2048 (8 Mux Cards of 256 channels each) |
| **Channels per Mux Board** | : 256 channels standard 64 channel Relay Mux for High Voltage test is optional. |
| **Clamp Voltage** | : +/- 5V in 1.2 milli volts step |
| **Current Source** | : +/- 5mA in 0.6µA step<br>+/- 16mA in 1.9µA step<br>+/- 50mA in 6µA step |
| **Measurement method** | : 4 -Wire Kelvin |
| **Voltage Source** | : 4 Ranges. +/- 0.2V, +/- 0.5V, +/- 5V, +/- 13V Full Scale<br>Wave shape depends on RAM contents (100 samples per cycle) (optional). |
| **Number of Comparators** | : 4 |
| **Compare Threshold** | : Four Independent Thresholds<br>Each threshold can be set between 0 to 5V in 0.6 milli volts step |
| **Basic Drive RAM** | : 24 bits X 1 Meg – used only in RAM Sequence Test.<br>8 bits X 1 Meg for 8 bit wait states<br>4 bits X 1 Meg Compare RAM<br>4 bits X 1 Meg Compare Mask bit |
| **Expandable Drive RAM** | : up to 4 Meg. |
| **Acquisition RAM** | : 4M X 8 (4 bit acquisition and 4 bits reserved). |
| **Test Result RAM** | : 1024 X 28 bits (24 bit address and 4 bit fail code) |
| **Interface** | : USB 2.0 |
| **Test Modes** | : Five Modes |
| **Time Base** | : From 1 ms to 256 ms in steps of 1 ms. |
| **Wait States** | : From zero to 255 wait states programmable for each test combination independently. (No. of wait states+1) X Time base Time base unit gives the actual test time for each test combination. |
| **High Voltage Test (Optional)** | : High Voltage : 500 V DC<br>Current Limit : 5mA<br>Current Range 1 nA to 5 mA<br>Insulation Resistance : Up to 500 GOhms |

## Optional QT-PXI-25 Specification:

When there is a need to measure impedance of required nodes with precision, optional QT-PXI-25 can be used.

- 3U PCI / PXI Platform for rugged Environment
- Hot Swap (Live Insertion / removal)
- 4 wire resistance measurement
- Measurement range: 200 Ω, +/- 0.1 Ω resolution<br>2 Ω, +/- 1 mΩ resolution<br>200mΩ, +/- 100 µΩ resolution
- Complementing modulated audio tone (optional).
- Auto offset capability up to 200 Ω (optional).

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