NuWaves
RF Solutions

VAMPIRE

MIL STD 1553 Anomaly Detection & Data Recording

P/N: NW-1553-ML-VA01

GSA Contract #: 47QSWA24D000V

Vampire Anomaly Detection and Data Recording module is an AFRL/RYWA created device for the MIL-STD 1553 avionics bus.

The Vampire MIL STD 1553 Anomaly Detection and Data recording module records all of the energy on the MIL STD 1553 bus to an internal SD Card* to allow for post flight and test analysis, along with playback of the recorded MIL STD 1553 traffic (using AFRL's Transfusion product). Vampire also has the capability to convert the MIL STD 1553 bus traffic to Ethernet UDP packets. It allows for real-time anomaly detection and is an additional method of recording bus traffic (external laptop needed). The module comes in a 30 in^3 / 2 lb package offering 400 mA at 28 VDC.

*SD card not provided with Vampire module • 1 terabyte (TB) SD card available as optional accessory.

Protect your vital information by using Vampire from NuWaves RF Solutions.

Features

- Decodes incoming 1553 traffic
- Creates timestamp for bus controller (BC) command message at 5 ns
- Measures remote terminal (RT) response time to 5 ns
- Packetizes 8 BC and RT responses into a UDP packet for transfer efficiency
- Sends all decode data in UDP format out of Ethernet port
- Does not disturb data on the bus

Benefits

- Alternative to Untrusted Monitors
- Predictive Maintenance
- Reverse Engineering
- Anomaly Detection
- Real Time Secondary Display
- Commercial 1553 over Ethernet

Applications

- Can be used with commercial-off-the-shelf (COTS) Ethernet tools
- Bus maintenance monitors and alerts
- Anomaly detection of bus traffic
- Statistical analysis of bus health during flight
- Deep dive post forensics analysis of MIL STD 1553 traffic (ICD verification, predictive maintenance, etc.)

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Specifications

Parameter		Rating	Unit
Max Device Voltage		36	V
Max Device Current	@ 10 VDC	1.40	A
	@ 28 VDC	0.50	A
	@ 36 VDC	0.39	A
Max Operating Temperature (baseplate)		85	℃
Max Storage Temperature		85	℃

Export Classification
EAR99

Electrical Specifications

Parameter	Symbol	Min	Typ	Max	Unit	Condition
Operating Voltage	VDC	10	28	36	V	
Operating Current	I_{DD}		0.4[1]	0.5	A	@28VDC
Bus Controller (BC) Resolution			5		ns	
Remote Terminal (RT) Resolution			5		ns	
Ethernet Speed				1	GBit/Sec	

[1]Current draw is dependent on the number of busses being connected to the device and the traffic loading on the busses

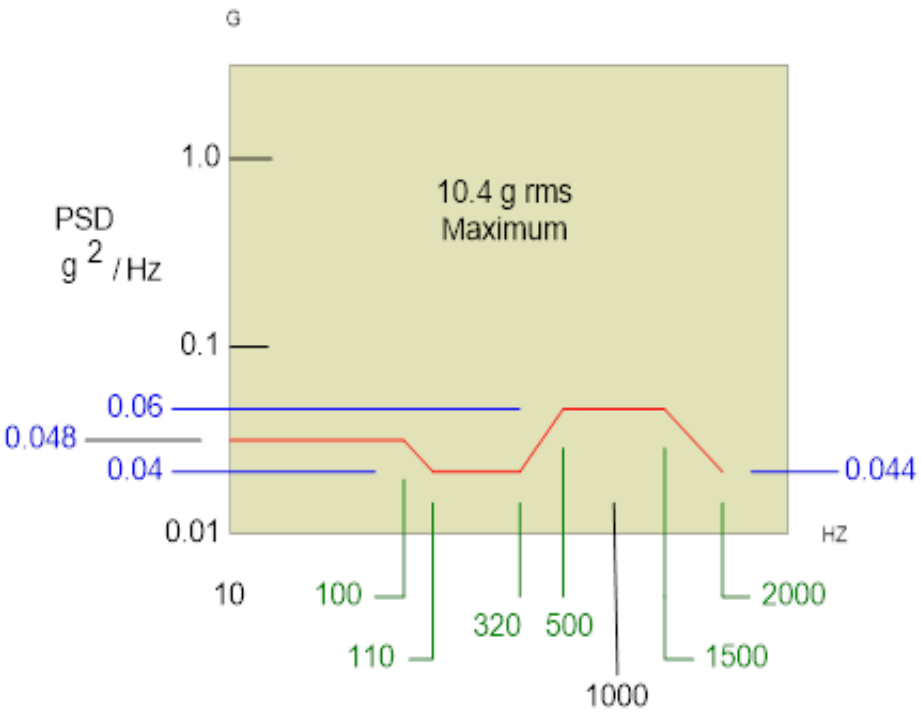
Mechanical Specifications

Parameter	Value	Unit	Limits
Dimensions (L x W x H)	5.05 x 3.85x 1.75	in	Max
Weight	32	oz	
Interface Connector	31 Pin Micro D		

Environmental Specifications

Parameter	Symbol	Min	Typ	Max	Unit
Operating Temperature (ambient)	T_A	-55		+71	℃
Operating Temperature (baseplate)	T_C	-40		+85	℃
Storage Temperature	T_{STG}	-55		+85	℃
Relative Humidity (non-condensing)	RH			95	%
Altitude MIL-STD-810F - Method 500.4	ALT			30,000	ft

Vibration Profile



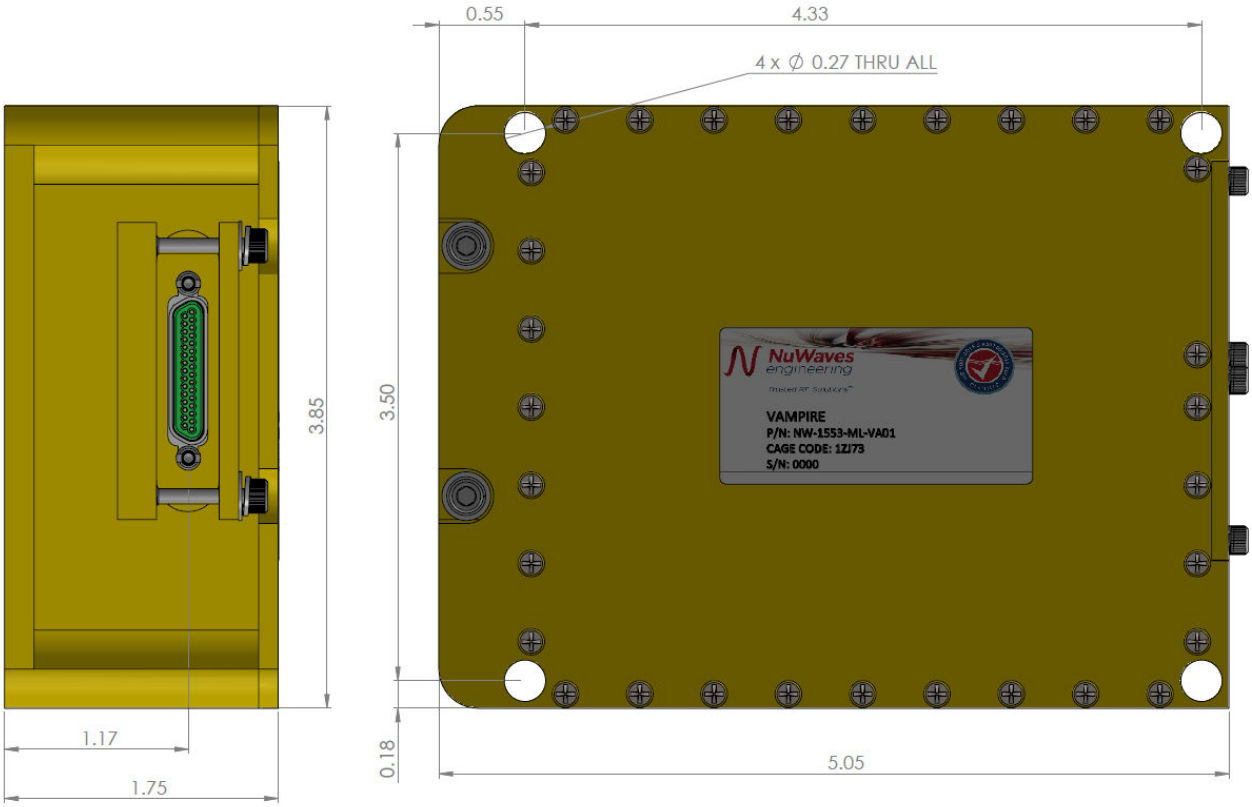
SD Card Table

Recording Time

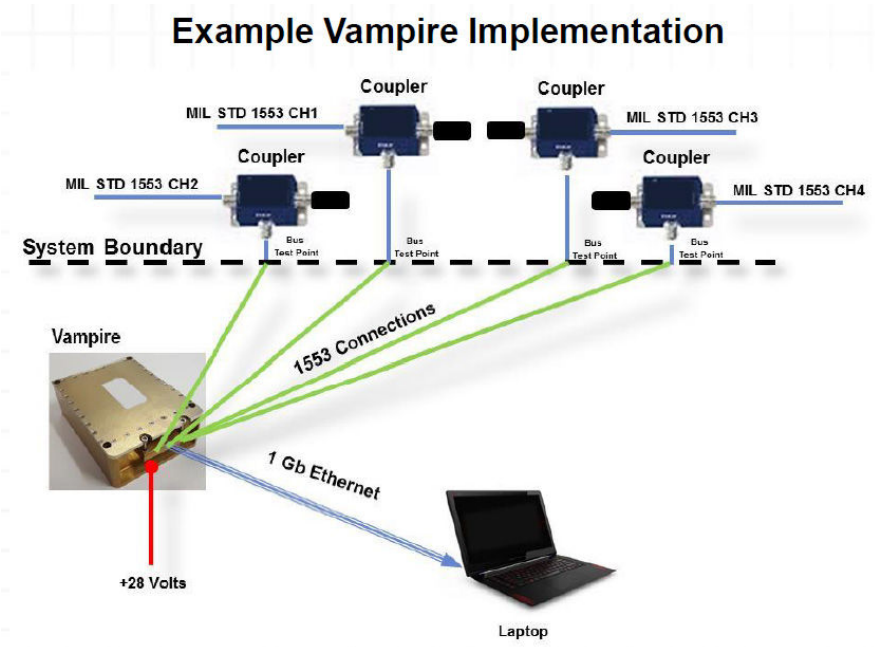
256 GB	10 Hours
1 TB	40 Hours
2 TB	80 Hours

Requires Class 10 type XC card

Mechanical Outline



Vampire Implementation



MIL STD Test Compliance

MIL-STD-810G.

500.5 – Low Pressure (Altitude) report

501.5 – High Temperature report

502.5 – Low Temperature report

507.5 – Humidity report

511.5 - Explosive Atmosphere

514.6 – Vibration report

516.6 Procedure 1 – Functional Shock report

516.6 Procedure 5 – Crash Hazard Shock report

MIL-STD-461G.

CE101 – Conducted emissions report

CE102 – Conducted emissions report

CS101 – Conducted susceptibility report

CS114 curve 5 – Conducted susceptibility report

CS115 – Bulk Cable Injection, Impulse Excitation report

CS116 - Conducted Susceptibility, Damped Sinusoidal Transients report

CS118 – Personnel Borne Electrostatic Discharge (ESD) report

RE101 – Radiated emissions report

RE102 – Radiated emissions report

MIL-STD-704F.

LDC101 - Load Measurement report

LDC102 - Steady State Limits for Voltage report

LDC103 - Voltage Distortion Spectrum report

LDC105 - Normal Voltage Transients report

LDC201 - Power Interrupt report

LDC301 - Abnormal Steady State Limits for Voltage report

LDC302 - Abnormal Voltage Transients (Over/Under voltage) report

LDC401 - Emergency Limits for Voltage report

LDC501 - Starting Voltage Transients report

LDC601 - Power Failure report

* Module has tested compliant to each test identified. Certified test results can be acquired per request based on unique implementation requirements.

Accessory Part Numbers - Sold Separately

Part Number	Description
CYB-CBL-01-F	EMI-Hardened Flight-Qualified Vampire External Interface Cable
CYB-CBL-08-F	Flying Lead Cable
CYB-CRL-08-B	Banana Plug Cable
1 TB SD Card	1 TB SD Card

Connector Pinout

Pin Number	Pin Name	I/O	Description
1	+28 VDC	I	DC Supply Voltage, +28 Volts
2	28 VDC Ret	I	DC Supply Voltage Return
3	USB D-	I/O	USB Data (Negative)
4	USB D+	I/O	USB Data (Positive)
5	USB VCC	I	USB Voltage
6,8,16,19,21,23,24,25,27,29	GND	I	DC Ground
7	BI_DD-	I/O	Ethernet, Bidirectional Data Bus D (Negative)
9	BI_DD+	I/O	Ethernet, Bidirectional Data Bus D (Positive)
10	BI_DC-	I/O	Ethernet, Bidirectional Data Bus C (Negative)
11	BI_DC+	I/O	Ethernet, Bidirectional Data Bus C (Positive)
12	BI_DA+	I/O	Ethernet, Bidirectional Data Bus A (Positive)
13	BI_DA-	I/O	Ethernet, Bidirectional Data Bus A (Negative)
14	BI_DB-	I/O	Ethernet, Bidirectional Data Bus B (Negative)
15	BI_DB+	I/O	Ethernet, Bidirectional Data Bus B (Positive)
17	CH1_H	I/O	MIL-STD 1553 Channel 1 (Positive)
18	CH1_L	I/O	MIL-STD 1553 Channel 1 (Negative)
20	CH2_L	I/O	MIL-STD 1553 Channel 2 (Negative)
22	CH2_H	I/O	MIL-STD 1553 Channel 2 (Positive)
26	CH3_L	I/O	MIL-STD 1553 Channel 3 (Negative)
28	CH3_H	I/O	MIL-STD 1553 Channel 3 (Positive)
30	CH4_L	I/O	MIL-STD 1553 Channel 4 (Negative)
31	CH4_H	I/O	MIL-STD 1553 Channel 4 (Positive)

For information on product disposal (end-of-life), please refer to this document:
https://nuwaves.com/wp-content/uploads/Product-Disposal-End-of-Life.pdf

Contact NuWaves

AS9100D CERTIFIED

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