Datasheet

Gigabit Ethernet Switch (GES) NXT-16

Part Number: AE103692-001

The Aeronix Gigabit Ethernet Switch (GES) NXT-16 is a fully manageable, MIL-Qualified 16-Port Ethernet Switch/ Router equipped with sixteen 1Gbps BASE-T ports. It is designed for use in highly rugged commercial, industrial, and military applications that require very-high data transfer rates in a self-contained ruggedized package resistant to environmental effects.

The GES-NXT-16 is certified for harsh military environments making it ready to use for nearly any application. The unit has very low radiated emissions, surpassing all vehicle EMI/EMC requirements, particularly important to avoid interference with radio communications such as SINGCARS. The rugged design requires no forced air or conductive cooling, operating in a broad range of harsh environments including uninhabited aircraft bays.

The NXT-16 supports vehicle-location-based, customer-specific configurations stored in non-volatile memory and loaded at startup to fulfill application specific requirements. All configurations are authenticated at start-up, and if tampered with, the unit is placed in a fail-safe mode.

Enhanced Features	• Boot Time < 90s
	• Tri-Color Power/status
	  ‣ LED Red (Error), Yellow (Booting), Green (Operational) Can be turned off in startup-config
	• Rescue account via time-sensitive, cryptographic exchange
	• Enhanced Built-In Test (Startup, Periodic, Initiated)
	  ‣ PHY veriphy using Time-Domain Reflectometry
	  ‣ MAC Bouncing (spoofing) detection
	• Port Mirroring, Flow Mirroring, Jumbo frames
	• Store and Forward (default), Cut-through
	• Monitoring alarms through SNMP or JSON-RPC

Ethernet Ports	• 16 10/100/1000 BASE-T Copper Ports
Networking	• Auto-negotiation with automatic downshifting, Auto MDIX • IGMP v2/v3 Snooping, MLD v1/v2 Snooping, GARP (802.1ak) • VLANs (802.1Q) up to 4K groups, Trunking, and Native VLAN movement supported • VLAN Q-in-Q double-tagging (bridging) & PVLANs supported • L3 Static Routing in Hardware, RIP v2, OSPF v2/v3 • Link Aggregation (802.3AD) • IPv4 and IPv6 support • DHCP

The information in this document is subject to change without notice. Contact Aeronix for latest details.



FEATURES

Configurations	• 8 possible based on strapping pins • Human-readable
Management Interfaces	• In-band HMI: SSHv2 CLI, Telnet CLI, HTTP/S Web • In-band MMI: SNMPv1/v2/v3, HTTP/S JSON-RPC • Out-of-band HMI: RS232 CLI • All interfaces can be individually disabled via startup-configuration.
QoS	• Muti-Layer Classifier, Strict Queues, Fair Queues, ToS/DSCP supported • Broadcasting and Storm Control • Loop Guard and Ethernet Ring Protection Switching (802.1Q) 50ms ring recovery • Spanning Tree (802.1d), RSTP (802.1w), MSTP (802.15) for VLAN-aware fast loop recovery • PTPv2.0 IEEE-1588 and 802.1as Can support up to 3 time-domains Grandmaster (GM) capable via internal and external GPS, Phase lock to GM in less than 20 seconds, Jitter from GM less than 100 nanoseconds • Time-Sensitive Networking (TSN) Low latency, Highest QoS, Assured bandwidth 802.1AS,802.1Qbv, 802.1CB, 802.1Qci, 802.1Qcc*, 802.1Qbu, 802.3br, 802.1Qch, 802.1CM/D2.2, 802.1Qav
Security and Access Control	• Authentication required on all management interfaces, Encryption on SSH, JSON-RPC and Web • User accounts and permission levels, Minimum password complexity, timeouts • Hardware-enforced Secure Boot (HRoT) • AAA, 802.1X, RADIUS, TACACS+ • Firewall, ACLs • Port MAC Security, Sticky MACs • ARP Inspection, IP Source Guard, DHCP Snooping • BPDU Guard, Root Guard • Syslog and audit trail to both UDP and TCP servers • Traffic data never stored in non-volatile memory • Fail-safe to port switching blocked • Backup Image and recovery • NTPsec
Anti-Tamper	• Secure Boot, Secure Update, Secure Config Hardware ASIC-enforced using asymmetric ECDSA P384 • Hardware signal Zeroize Flushes RAM and Resets to factory default condition

Aeronix GES-NXT-16 Qualifications

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Standards, Compliance, & Compatibility

- G.8032 v1/v2 Ring Protection
- IEEE 802.3 Ethernet, IEEE 802.1AB MAC Discovery, IEEE 802.1D MAC learning, aging, static
- IEEE 8021.Q VLAN, PVLAN, Port Isolation, Trunking, Native VLAN, GVRP, GARP, MRP, MVRP
- IEEE 801.2ad Native or Translated VLAN
- IEEE 802.1p QoS
- IEEE 802.1s MSTP, IEEE 802.1w RSTP
- IEEE 802.1ad Link Aggregation
- IEEE 802.1X Port Based Network Access Control
- IEEE 1588 v2 PTP, IEEE 802.1AS Improved PTP timing
- IEEE 802.1AB-2005 Link layer discovery
- SNMP MIBs: VLAN, RMON, Traps, Bridge, IP Forwarding, IP, Multicast Group, RADIUS, Ethernet, SMI v2, MAU, Entity, Link OAM, SNMP Framework, User-based, Viewbased, SMON, MSTP, LLDP, LACP, PAE, Private MIBs

ENVIRONMENTAL

Test	Detail	Military Specification	Comment/Tailoring
Low Pressure (Altitude)	Storage Operational Explosive - Decomp	MIL-STD-810G Method 500.5 Procedure I MIL-STD-810G Method 500.5 Procedure II MIL-STD-810G Method 500.5 Procedure IV	Procedure I: -57°C @ 50,000 feet Procedure II: -40°C @ 40,000 feet Procedure IV: 8,000 ft to 40,000 ft in not more than 0.1Sec
High Temperature	Storage Operational	MIL-STD-810G Method 501.5 Procedure I MIL-STD-810G Method 501.5 Procedure II	Procedure I: +95°C Procedure II: Cyclic = +71°C Constant = +71°C
Low Temperature	Storage Operational	MIL-STD-810G Method 502.5 Procedure I MIL-STD-810G Method 502.5 Procedure II	Procedure I: -57°C Procedure II: Cyclic = -40°C
Temperature	Shock	MIL-STD-810G Method 503.5 Procedure I-B	Procedure I-B: from Constant = -40°C to +71°C at 111°C/ Minute
Comb Temp Alt/Humidity	Operational	MIL-STD-810G Method 520.3 Procedure III	Procedure III: -40°C to +71°C Sea level to 60,000ft
Rain	Drip	MIL-STD-810G Method 506.5 Procedure III	7 gal/ft²/hr for 15 minutes, connector face exposed
Humidity	Exposure	MIL-STD-810F Method 507.5 Procedure II	Operating & non-operating effects, 95% ± 4% Humidity +30°C to 60°C, 10 Cycles
Fungus	Non-Operational	MIL-STD-810G Method 508.6	28-day growth
Salt Fog	Exposure	MIL-STD-810G Method 509.5	Operating and non-operating exposure to salt-sea atmo-sphere – Four 24hr wet/dry cycles
Sand & Dust	Blowing	MIL-STD-810G Method 510.5 Procedure I & II	<150um dust, 150um to 850um sand (18m/s) at +71°C
Explosive Atmosphere	Operational	MIL-STD-810G Method 511.5 Procedure I	At sea level and 40,000ft
Acceleration	Structural Operational Crash Hazard	MIL-STD-810F Method 513.6 Procedure I MIL-STD-810F Method 513.6 Procedure II MIL-STD-810F Method 513.6 Procedure III	Structurally withstand ±27.0g applied indiv along all 3 axes Remain operational at ±18.0g applied indiv along all 3 axes Remain captive, 40g fwd, 20g aft & dwn, 18g left/right, 10g up
Operational Acceleration	Operational	MIL-STD-810F Method 513.6 Procedure II	Operational at ±18g applied individually along all 3 axis
Crash Hazard Acceleration	Non-Operational	MIL-STD-810F Method 513.6 Procedure III	Remain captive, 40g fwd, 20g aft & dwn, 10g up, 18g left/right
Vibration	Operational Non-Operational Operational	MIL-STD-810G Method 514.6 Pro. I Cat 12, Annex D MIL-STD-810G Method 514.6 Pro. I Cat 12, Annex D MIL-STD-810G Method 519.6 Pro. III: Gunfire Shock	514.6D-I; 30 mins, 0.02 g2/Hz to 0.04 g2/Hz, 15 - 2000 Hz, Overall 7.4Grms 514.6D-I; 60 mins, 0.04 g2/Hz to 0.06 g2/Hz, 15 - 2000 Hz, Overall 9.2Grms Four sine components @ 4g 100+/10Hz, 200+/-20Hz, 300+/-30Hz, 410+/-30Hz, 5s on/5s off, added to stationary random vibra. 100-1000Hz, Sweep 0.5 Oct/Min, 1 hr per axis
Acoustic Noise	Operational	MIL-STD-810G Method 515.6 Procedure I	30 mins, 145 dB overall, 50 to 10000 Hz
Shock	Functional Crash Hazard Bench Handling	MIL-STD-810G Method 516.6 Procedure I MIL-STD-810G Method 516.6 Procedure V MIL-STD-810G Method 516.6 Procedure VI	20g, 11ms nominal, 3 blows each direction, each axis (18 total), TPS 40g, 11ms nominal, 2 blows each direction, each axis (12 total) 4" drop, 1 drop per edge per face (24 total)

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Aeronix GES-NXT-16 Qualifications

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CHARACTERISTICS

Ports	16 x 10/100/1000Mbps IEEE 802.3ab compatible
Dimensions	8.34"L x 5.25"W x 2.04"H
Power Draw	20W Max Continuous
Connectors	1 x TV07RW-13-35P (Power), and 1x TV07RW-23-151P
Cooling	No forced air or conduction cooling req'd
Mounting Hardware	4 x 10-32 captive screws or #10 or M8 clearance holes
Coating	CARC-compliant, scratch resistant
Weight	3 lbs (1.36 kg)
Processor	Microchip VSC7552TSN
MTBF	44.943 hrs @ +70°C Airborne Uninhabited Fighter Environment

POWER QUALIFICATIONS

Test	Detail	Military Specification	Comment/Tailoring
Power Input	Operational	Military Specification	+22 Vdc to +32 Vdc range
Startup	Operational	MIL-STD-704F Chg1, MIL-HDBK-704-8 LDC-102	+22 Vdc to +29 Vdc, Tests A, B, C
Voltage Distortion	Operational	MIL-STD-704F Chg1 Fig 15, MIL-HDBK-704-8 LDC-103	Tests A thru K
Total Ripple	Operational	MIL-STD-704F Chg1 Fig 15, MIL-HDBK-704-8 LDC-104	Table LDC104-II
Spikes and Surges	Operational	MIL-STD-704F Chg1 Fig 13, MIL-HDBK-704-8 LDC-105	Tests AA thru RR ,18 Vdc to 29Vdc
Power Interrupt	Operational	MIL-STD-704A, MIL-HDBK-704-8 LDC-201	Transfer Interrupt, 50 ms, 24 Vdc to 29 Vdc
Steady State Limits	Abnormal Emergency	MIL-STD-704F Chg1 MIL-HDBK-704-8 LDC-102 MIL-STD-704F Chg1, MIL-HDBK-704-8 LDC-401	22 Vdc to 29 Vdc Tests A, B, C 18 Vdc to 29 Vdc
Abnormal Transients	Operational	MIL-STD-704A, MIL-HDBK-704-8 LDC-302	Tests A thru V, 6 V to 80 V
Auto-Recovery	Operational	MIL-STD-704F Chg1, MIL-HDBK-704-8 LDC-601	Tests A thru D, Power failure, from 100ms to 7 seconds
Power Failure	Operational	MIL-STD-704F Chg1, MIL-HDBK-704-8 LDC-602	Phase reversal protection/prevention

EMI/EMC

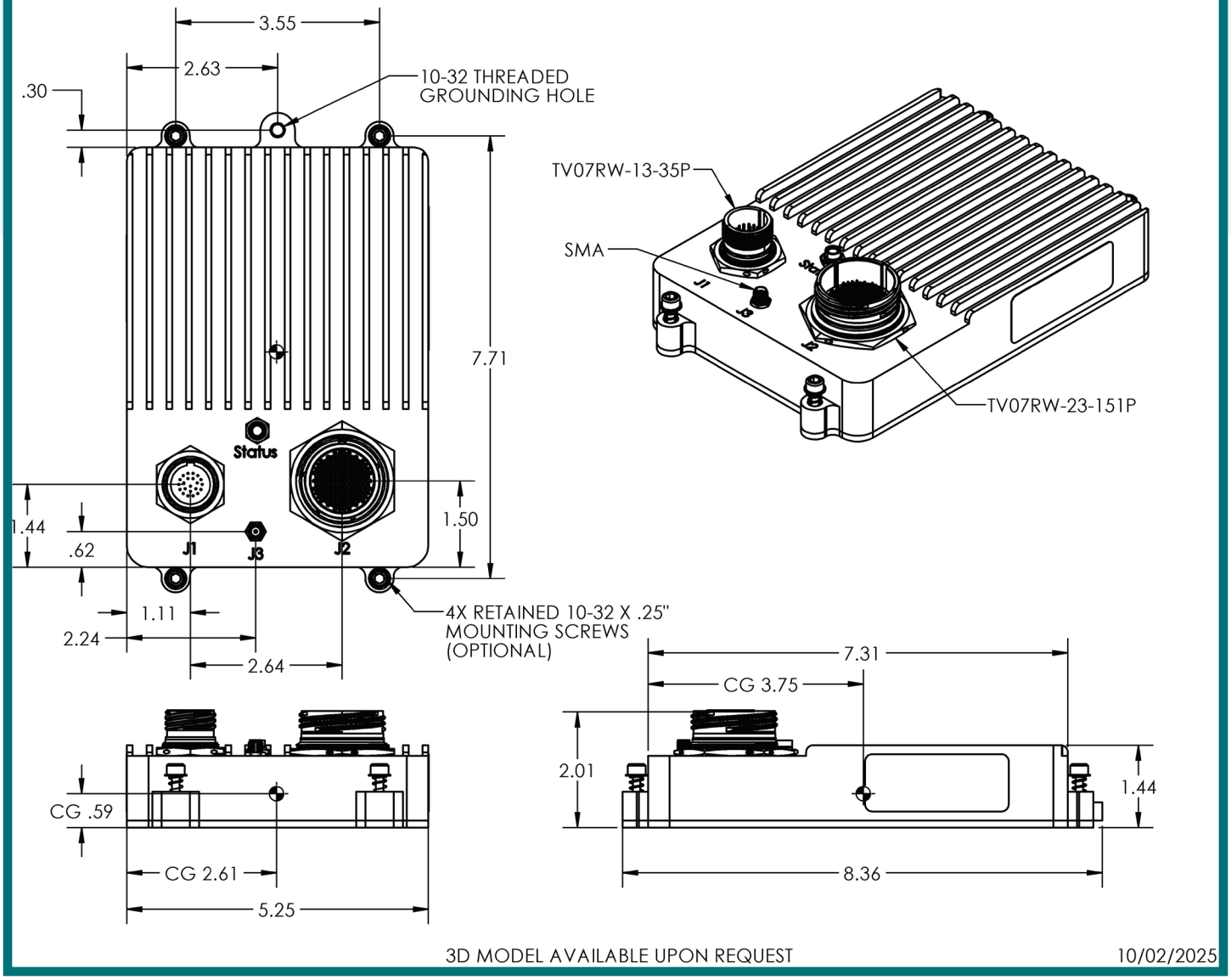
Test	Detail	Military Specification	Comment/Tailoring
Conducted Emissions	Operational	MIL-STD-461G CE101 Par 5.4, CE101-4 Curve #2 MIL-STD-461G CE102 Par 5.5, CE102-1 Basic Curve	Power Leads, 30 Hz to 10 kHz Power Leads, 10 kHz to 10MHz
Conducted Susceptibility	Operational	MIL-STD-461G CS101 Par 5.7, CS101-1 Curve #2 MIL-STD-461G CS114 Par 5.12, CS114-1 Curve #5 MIL-STD-461G CS115 Par 5.13, CS115-1 MIL-STD-461G CS116 Par 5.14, CS116-1 & CS116-2 MIL-STD-461G CS118 Level 4	Power leads, 30Hz to 150 kHz Bulk cable injection, 10 kHz to 200MHz Bulk cable injection, impulse excitation, 30Hz for one minute Damped sinusoidal transients, cables, & power leads, 10kHz to 100MHz, 5 mins Personnel borne ESD, Level 4, 5 positive, 5 negative discharges, 3 test points
Radiated Emissions	Operational	MIL-STD-461G RE101 Par 5.17, RE101-1 & RE101-2 MIL-STD-461G RE102 Par 5.18, RE102-3	Magnetic field, 30Hz to 100kHz Fixed wing external and Fixed wing internal < 25m; Electric field, 10kHz to 18GHz
Radiated Susceptibility	Operational	MIL-STD-461G RS101 Par 5.20 RS101-2, Army MIL-STD-461G RS103 Par 5.21, Table XI	Magnetic field, 30 Hz to 100 kHz Aircraft Internal AirForce; Electric field, 2 MHz to 18 GHz

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ORDERING INFORMATION

Part Number	Descrption
AE103692-001	GES-NXT-16, Military Rugged Ethernet Switch/Router, Airborne and Ground Qualified, 16x 10/100/1000 BASE-T ports. Note: GES-NXT-16 HW ICD is document# AE303604-001.

ACCESSORIES (INTENDED FOR LAB USE ONLY)

Part Number	Descrption
AE103557-001	Lab Breakout Box J1 to Power and Signaling for GES-NXT-16
AE103852-001	Lab Breakout Box J2 to RJ45 for GES-NXT-16

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