TELEDYNE PARADISE DATACOM
Everywhereyoulook™

STEP ELECTRONICS
A Division of Av-Comm

DVB S2X®

Q-Lite™ Half-width Satellite Modem

OVERVIEW

The **Q-Lite™** half-width compact satellite modem is provided in 9.5-inch & 10.5-inch chasses.

Two 9.5-inch chasses can be fitted side-by-side in a standard 19-inch rack, saving on air-conditioned hub space. Its small size and low power consumption also make it ideal for portable communications and comms-on-the-move.

Advanced Bandwidth-Efficient Features

The **Q-Lite™** is small in size but big on features!

Paired Carrier+™ is our enhanced carrier overlap technology that allows transmit and receive carriers to occupy the same space segment.

DVB-S2X, is between 20% and 60% more bandwidth efficient than its predecessor, DVB-S2.

Bandwidth-saving IP features include ACM, acceleration and header and payload compression.

FEATURES

- Data rates to 345Mbps bidirectional
- Extended L-band operation to 2450MHz
- Paired Carrier+™ enhanced carrier overlay
- **XStream IP™** advanced IP optimization suite including TCP Acceleration, header & payload compression, traffic shaping & ACM
- Optimized spectral roll-offs, including 5%
- **DVB-S2/S2X**, **FastLink™** LDPC & TPC
- 9.5-inch & 10.5-inch chasses options (convertible using just different L-brackets)
- Fit two chasses side-by-side in 19-inch rack
- Software Defined Network support: vendor-independent network device control using standard commands (supports OpenFlow)
- 25 to 33 Watt power consumption
- AC, 24V DC & 48V DC input PSU options
- **LinkGuard™** signal-under-carrier interference detection
- **Q-NET™ Navigator** network M&C application included as standard

Markets and Applications

- Comms-on-the-move
- Oil & gas
- Broadcast
- Disaster relief
- Maritime
- Satellite news gathering
- Compact, low-power satellite terminals

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Main Specifications

Frequency	**L-band:** 950 to 2450MHz (resolution 1Hz) (TNC connector) **IF:** 50 to 180MHz (resolution 100Hz) (TNC connector)
Data Rate	**Operation to 2,048kbps provided as standard** **Extension options:** 5Mbps, 10Mbps, 25Mbps, 60Mbps, 100Mbps, 200Mbps and 345Mbps
Data Rate Limits	**DVB-S2/S2X:** 50kbps to 345Mbps **FastLink™ LDPC:** 18kbps to 100Mbps **TPC:** 2.4kbps to 60Mbps **DVB-S/DSNG:** 100kbps to 50Mbps 1bps resolution
Symbol Rate Limits	**DVB-S2/S2X:** 100ksps to 70Msps **FastLink™ LDPC:** 18ksps to 40Msps **TPC:** 2.4ksps to 40Msps **DVB-S/DSNG:** 100ksps to 40Msps
Operating Modes	**DVB-S2/S2X** (EN 302 307-1 & EN 302 307-2) **Closed Network (+ ESC)** (IESS-315) **DVB-S/DSNG** (EN 300 421 & EN 301 210)
Impedance	50Ω
Return Loss	**L-band:** >15dB; **IF:** >18dB
Redundancy	1:1 or up to 1:16 redundancy

Traffic Interfaces

Standard:
4-port Gigabit Ethernet switch (RJ45 connectors; used for IP traffic and M&C)
Options:
EIA-530 (RS422, X.21, V.35 and RS232 on 25-pin D-type female)
Quad ASI (75Ω BNC female)
Please contact us regarding support for other interfaces

Modulator

Output Power	**IF:** 0 to –25dBm (0.1dB steps) **L-band:** +5 to –40dBm (950 to 1950MHz) 0 to –40dBm (1950 to 2150MHz) 0 to –30dBm (2150 to 2450MHz) (0.1dB steps)
Output Power Stability/Accuracy	**Stability:** ±1.0dB, 0ºC to 50ºC **Accuracy:** ±0.375dBm
Transmit Filter Roll-off	5%, 10%, 15%, 20%, 25%, 35%
Phase Accuracy	±2º maximum
Amplitude Accuracy	±0.2dB maximum
Carrier Suppression	-30dBc minimum
Output Phase Noise	As EN 302 307, EN 300 421, IESS-308 & EN 301 210; minimum 16dB better than IESS-308/309
Harmonics & Spurious	Better than –55dBc/ 4kHz in-band (at 0dBm to –30dBm output)
Transmit On/Off Ratio	-65dB minimum
BUC PSU Option	24V or 48V DC via IFL cable, 200W
BUC 10MHz Reference	Via IFL cable; 10MHz ± 0.01 ppm; 2dBm ± 2dBm
FSK Control	Allows monitor & control of a compatible L-band BUC from the modem via the Tx IFL cable

Demodulator

Input Range (dBm)	**IF minimum:** -130 + 10 log (symbol rate) **L-band minimum:** -140 + 10 log (symbol rate) **IF/L-band maximum:** -68 + 10 log (symbol rate)
Maximum Composite	+10dBm
Wanted-to-composite	-102 + 10 log (symbol rate)
Frequency Sweep Width	±1kHz to ±255kHz (1kHz steps)
Acquisition Time	Dependent on FEC, data rate and sweep width
Receive Filter Roll-off	5%, 10%, 15%, 20%, 25%, 35%
Antenna Pointing Output	Scalable 0 to 10V DC output signal of the wanted Rx power level, composite Rx signal level, demodulator AGC level or Eb/No level for antenna peaking/pointing
LNB 10MHz Reference	Via IFL cable; 10MHz ± 0.01 ppm; 2dBm ± 2dBm
LNB Voltage	Selectable 13V, 15V, 18V, 20V or 24V DC to LNB via IFL cable; maximum 0.5A

ClearLinQ™ Adaptive Tx Predistorter

Corrects for linear & non-linear distortion in the RF chain (i.e. amplifier and transponder). Applicable to all FECs and modulations. Maximises amplifier linear output power; minimises required back-off. Up to 2dB performance gain

DVB-S2/S2X Rx Adaptive Equaliser

Corrects for slope on the carrier and group delay (typically found at transponder edges, causing inter-symbol interference). The 9-tap Rx equaliser is provided as standard; automatically switched on above 10Msps

DVB Carrier ID Option (ETSI TS 103 129)

Supports the identification of interfering carriers. Allows identification of individual modem carriers by superimposing a low-power CID waveform onto the carrier with negligible degradation. **Supported for all carriers.** The CID waveform contains a unique Carrier ID and other identity information. A carrier monitoring system is required to decode CID waveforms

Utilities Card (fitted as standard)

Add-on card with:
9-way D type for 1:1 and 1:N redundancy (compatible with Q-NET PDQS Redundancy Switch)
15-way D type for alarms (4 independent Form C relays for unit, Tx, Rx and deferred alarms), Tx Inhibit signal and scalable DC voltage output for antenna pointing
USB connector for software upgrades, etc.
Second fan
FSK signalling

Paired Carrier+™ Option

Paired Carrier+™ *(25kHz to 72MHz occupied bandwidth)*	Transmit and receive carriers are overlaid in the same space segment. Echo cancellation techniques are used to cancel the unwanted transmit carrier, leaving the wanted receive carrier
Paired Carrier+™ data rate options	256kbps, 512kbps, 1024kbps, 2.5Mbps, 5Mbps, 10Mbps, 15Mbps, 20Mbps, 25Mbps, 30Mbps, 40Mbps, 50Mbps, 60Mbps, 80Mbps, 100Mbps, 200Mbps and 345Mbps traffic rate
Carrier Asymmetry	**Power:** -10dB to +10dB **Symbol rate:** Up to 10:1
Eb/No Degradation	Typically less than 0.1dB
Delay Range	0 to 330ms
Mobile Operation	Uses GPS data to continually recalculate position relative to satellite, allowing uninterrupted operation in mobile environments anywhere in satellite footprint

Test Facilities and Alarm Outputs

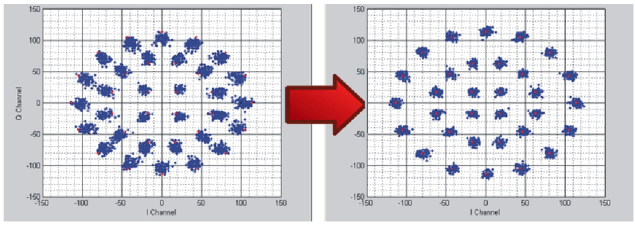
Built-in Test Tools	As part of built-in web server: Rx constellation monitor; Rx spectrum analyser; **LinkGuard™** Signal-Under-Carrier interference detection; beacon receiver function that provides automatic detection of satellite beacon transmissions; time graphs for key performance indicators (IP throughput, Eb/No, etc.)
BER Tester	Bit error rate tester operates over main traffic or ESC channel, allowing BER monitoring while on traffic. Not available in DVB-S2/S2X modes. Supports various test patterns compatible with common BER testers
Other test modes	Transmit CW Transmit alternate 1-0 pattern Simulated satellite delay for TCP/IP packets
Alarm Relays	4 independent Form C relays for unit, Tx, Rx and deferred alarms

Mechanical/Environmental

Size	440mm x 215mm (480mm x 250mm when fitted with TNC to N type converters and L-mounting brackets)
Weight	1.5kg
Power Supply	90 to 264VAC, 1A @100V, 0.5A @ 240V, 47 to 63Hz Fused IEC connector (live and neutral fused); 24V and 48V DC options
Compliances	FCC, CE and RoHS compliant
Safety Standards	EN60950-1:2006
Emissions & Immunity	**Emissions:** EN55022:2010 Class B **Immunity:** EN55024:2010
Operating Temperature	0 to 50ºC (storage: -20ºC to 70ºC)
Humidity	95% relative humidity, non-condensing

Interference Mitigation: ClearLinQ™

'Before and after' constellations showing **ClearLinQ™** *Adaptive Tx Predistorter compensating for severe non-linear signal distortion to a 32APSK carrier.*



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Ethernet: Standard Features

Bridging and Static Routing	**Trunking mode:** Hardware Layer 2 switch supporting 345Mbps bi-directional traffic at up to 200,000 packets per second; zero jitter **Layer 2 bridge & Layer 3 router:** Software processing capability of up to 150,000 packets per second
IPv4/IPv6	Dual IPv4/IPv6 TCP/IP supporting IPv4/IPv6 bridging and routing
VLAN Support	IEEE 802.1q VLAN support IEEE 802.1p packet prioritisation using strict priority or fair weighting queuing
Software Defined Network Support	OpenFlow and other WA-SDN protocols provide support for network virtualisation; see Q-NET Satellite Network Solution whitepaper for more details
DHCP	DHCP client for automatic allocation of M&C IP address; DHCP server allocates IP addresses to network devices
NAT	NAT firewall; allows all network devices to share a single IP address when viewed from other end of satellite link
SNMP	SNMP v1, v2c & v3
Access Control Lists	Separate IP and MAC address black/white user access control lists
Network Time Protocol (NTP)	NTP client synchronises modem time & date to NTP server; provides millisecond accuracy
Web Server	Modem web server M&C interface (including built-in tools listed under Test Facilities)
AAA RADIUS Secure User Login	Authentication, Authorisation & Accounting. Greater access control & accountability. Replaces standard modem login with user's personal network login credentials
IP Metrics	Tx, Rx throughput (bps, pps) graphs; dropped, errored packet counts
sFlow Performance Metrics	sFlow is the industry standard for network monitoring, giving full modem performance visibility to sFlow compatible network management devices
Active Queue Management (AQM)	Implements CoDel (controlled delay) which overcomes buffer bloat by maintaining a constant delay through the modem for all IP packets
MPEG over IP	Supports the efficient transfer of SMPTE 2002-2 MPEG2 transport streams over satellite
OpenAMIP Protocol Support	Controls modem interaction with compliant antenna control units to support antenna deployment/pointing/tracking
Virtual Routing & Forwarding	VRF supports multiple modem routing tables, allowing inter-VLAN routing
Packet Generator/ Analyser	Generates & analyses TCP & UDP packet streams, allowing modem-to-modem IP testing without any PCs
Ethernet MTU Size	10k bytes

Ethernet: XStream IP™ Option

XStream IP™ is an integrated set of IP optimization and traffic management features designed for maximum reliability and bandwidth efficiency. The maximum throughput depends on features enabled & traffic format

Traffic Shaping	Provides guaranteed throughput for priority traffic; supports Committed and Burst Information Rates. Stream classification by VLAN ID, IP address, IEEE 802.1p priority, Diffserv DSCP, PID & MPLS EXP
Header Compression	Robust Header Compression (RFC 3095). Reduces Ethernet/IP/UDP/TCP/RTP header sizes typically by 90%. 1-way packet processing limit: 60,000 pps; 2-way limit: 45,000 pps. Includes Ethernet header compression (compresses 14-byte Ethernet frame to typically one byte)
Payload Compression	Uses Deflate algorithm (RFC 1951) to compress TCP & UDP packets; typical payload compression of 50%
Dynamic Routing	RIP V1, V2; OSPF V2, V3; BGP V4
TCP Acceleration	Typical throughput level of 90% of link capacity. Supports 4,400 concurrent accelerated TCP connections (plus at least 40,000 unaccelerated TCP connections) up to 100Mbps
AES-256 Encryption	*Supported on **Q-LiteE**™ model only. The Q-LiteE™ is identical to the Q-Lite™ in every other respect*

Ethernet: XStream IP™ DVB-S2X

Provided as standard as part of DVB-S2/S2X

ACM	Dynamically varies modcod with varying link conditions, maximises throughput at all times by converting unused link margin into additional throughput; 100% link availability
VCM	Supports transmission/reception of two ASI streams or, one ASI stream with one IP stream, each with its own modcod for optimal throughput
IP-over-DVB Encapsulation	Supports the transmission of IP packets with/without Ethernet frames over DVB-S2/S2X; encapsulates & decapsulates using GSE (see below), MPE (EN 301 192), ULE (RFC 4326) or Paradise XStream Encapsulation
GSE Encapsulation	Highly efficient encapsulation of IP packets or Ethernet frames; compatible with EN 302 307-2 standard, for use with DVB-S2 and DVB-S2X

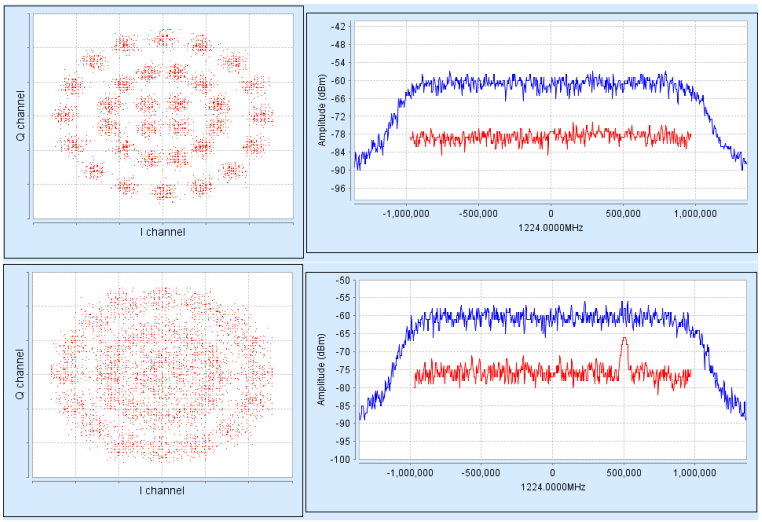
Network Control

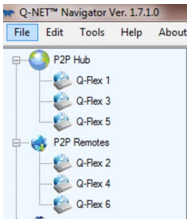
Web browser user interface support is provided as standard. SNMP and command line interfaces support the development of third-party user interfaces. In addition, the following network control application options are available

Q-NET™ Navigator	Allows all modems and third-party network devices to be fully controlled through a single application. It provides an easy-to-navigate site map, summary status reporting, etc. Provided as standard, free of charge

LINKGUARD™

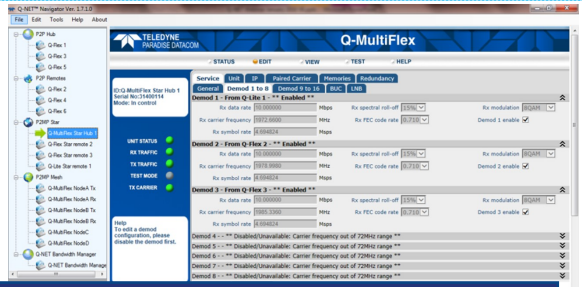
*Built-in Spectrum Analyser showing **LinkGuard™** Signal-Under-Carrier interference detection without/with interferer present.*





Network Control: Q-NET™ Navigator

Q-NET™ Navigator *supports monitor and control of all Paradise modems and third-party network devices from a single application. Includes easy-to-use navigation, support for multiple operator roles/access levels, continuous status/alarm polling and full access to all modem features.* **Q-NET™ Navigator** *is included as standard, free of charge.*



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Forward Error Correction

DVB-S2X (EN 302 307-2) *Includes support for DVB-S2*	**Normal Frame:** **QPSK** 13/45, 9/20, 11/20 **8PSK** 23/36, 25/36, 13/18 **8APSK-L** 5/9, 26/45 **16APSK** 26/45, 3/5, 28/45, 23/36, 25/36, 13/18, 7/9, 77/90 **16APSK-L** 5/9, 8/15, 1/2, 3/5, 2/3 **32APSK** 32/45, 11/15, 7/9 **32APSK-L** 2/3 **64APSK** 11/15, 7/9, 4/5, 5/6 **64APSK-L** 32/45 **Short Frame:** **QPSK** 11/45, 4/15, 14/45, 7/15, 8/15, 32/45 **8PSK** 7/15, 8/15, 26/45, 32/45 **16APSK** 7/15, 8/15, 26/45, 3/5, 32/45 **32APSK** 2/3, 32/45
DVB-S2 (EN 302 307-1)	**QPSK** 1/4, 1/3, 2/5, 1/2, 3/5, 2/3, 3/4, 4/5, 5/6, 8/9, 9/10 **8PSK** 3/5, 2/3, 3/4, 5/6, 8/9, 9/10 **16APSK** 2/3, 3/4, 4/5, 5/6, 8/9, 9/10 **32APSK** 3/4, 4/5, 5/6, 8/9, 9/10
FastLink™ Low-Latency LDPC	**BPSK** 0.499 **(O)QPSK** 0.532, 0.639, 0.710, 0.798 **8PSK/8QAM** 0.639, 0.710, 0.778 **16APSK/16QAM** 0.726, 0.778, 0.828, 0.851 **32APSK** 0.778, 0.828, 0.886, 0.938 **64QAM** 0.828, 0.886, 0.938, 0.960
TPC	**BPSK** 5/16, 21/44, 3/4, 7/8 **(O)QPSK** 5/16, 21/44, 3/4, 7/8, 0.93 **8PSK** 3/4, 7/8, 0.93 **8QAM** 3/4, 7/8, 0.93 **16QAM** 3/4, 7/8, 0.93
DVB-S/DSNG	**DVB-S:** QPSK 1/2, 2/3, 3/4, 5/6, 7/8 **DVB-DSNG:** 8PSK 2/3, 5/6, 8/9; 16QAM 3/4, 7/8 (ETSI EN 300421/ 301210 compliant)

TPC Performance
Eb/No (dB) at BER 5E-8

	Rate 1/2	Rate 3/4	Rate 7/8	Rate 0.93	
BPSK, (O)QPSK	3.0	4.2	4.2	6.5	
8PSK		6.3	6.8	9.6	
8QAM		6.7	6.8	10.1	
16QAM		7.6	7.9	10.4	

DVB-S/DSNG Performance
Eb/No (dB) at QEF

	Rate 1/2	Rate 2/3	Rate 3/4	Rate 5/6	Rate 7/8	Rate 8/9
QPSK	3.9	4.6	4.0	4.6	5.3	
8PSK		6.9		8.9		9.4
16QAM			9.0		10.7	

DVB-S2 Performance
QEF (PER 10e-7)
Normal frames, Pilots off

	Spectral Efficiency	Eb/No (dB) & Es/No (dB)
QPSK 1/4	0.490243	1.1 (-2.0)
QPSK 1/3	0.656448	0.7 (-1.1)
QPSK 2/5	0.789412	0.7 (-0.3)
QPSK 1/2	0.988858	1.1 (1.1)
QPSK 3/5	1.188304	1.7 (2.4)
QPSK 2/3	1.322253	2.0 (3.2)
QPSK 3/4	1.487473	2.4 (4.1)
QPSK 4/5	1.587196	2.6 (4.6)
QPSK 5/6	1.654663	3.0 (5.2)
QPSK 8/9	1.766451	3.7 (6.2)
QPSK 9/10	1.788612	3.9 (6.4)
8PSK 3/5	1.779991	3.5 (6.0)
8PSK 2/3	1.980636	4.0 (7.0)
8PSK 3/4	2.228124	4.6 (8.1)
8PSK 5/6	2.478562	5.6 (9.5)
8PSK 8/9	2.646012	6.6 (10.8)
8PSK 9/10	2.679207	6.9 (11.2)
16APSK 2/3	2.637201	5.2 (9.4)
16APSK 3/4	2.966728	5.8 (10.5)
16APSK 4/5	3.165623	6.2 (11.2)
16APSK 5/6	3.300184	6.6 (11.8)
16APSK 8/9	3.523143	7.5 (13.0)
16APSK 9/10	3.567342	7.8 (13.3)
32APSK 3/4	3.703295	7.3 (13.0)
32APSK 4/5	3.951571	7.8 (13.8)
32APSK 5/6	4.119540	8.4 (14.5)
32APSK 8/9	4.397854	9.4 (15.8)
32APSK 9/10	4.453027	9.6 (16.1)

DVB-S2X Performance
QEF (PER 10e-7)
Normal frames, Pilots off

	Spectral Efficiency	Eb/No (dB) & Es/No (dB)
QPSK 13/45	0.567805	0.5 (-2.0)
QPSK 9/20	0.889135	0.9 (0.4)
QPSK 11/20	1.088581	1.1 (1.5)
8APSK-L 5/9	1.647211	3.1 (5.3)
8APSK-L 26/45	1.713601	3.2 (5.5)
8PSK 23/36	1.896173	3.6 (6.4)
8PSK 25/36	2.062148	4.1 (7.2)
8PSK 13/18	2.145136	4.3 (7.6)
16APSK-L 1/2	1.972253	3.4 (6.3)
16APSK-L 8/15	2.104850	3.5 (6.7)
16APSK-L 5/9	2.193247	3.6 (7.0)
16APSK-L 3/5	2.370043	3.9 (7.6)
16APSK-L 2/3	2.635236	4.4 (8.6)
16APSK 26/45	2.281645	4.2 (7.8)
16APSK 3/5	2.370043	4.4 (8.1)
16APSK 28/45	2.458441	4.2 (8.1)
16APSK 23/36	2.524739	4.6 (8.6)
16APSK 25/36	2.745734	5.2 (9.6)
16APSK 13/18	2.856231	5.4 (10.0)
16APSK 7/9	3.077225	6.0 (10.9)
16APSK 77/90	3.386618	7.0 (12.3)
32APSK-L 2/3	3.289502	6.5 (11.7)
32APSK 32/45	3.510192	6.5 (12.0)
32APSK 11/15	3.620536	6.7 (12.3)
32APSK 7/9	3.841226	7.5 (13.3)
64APSK-L 32/45	4.206428	8.4 (14.6)
64APSK 11/15	4.338659	8.9 (15.3)
64APSK 7/9	4.603122	9.3 (15.9)
64APSK 4/5	4.735354	9.5 (16.3)
64APSK 5/6	4.933701	10.3 (17.2)

FastLink™ Performance at BER 5E-8
(Note: * denotes BER of 5E-12)

	FEC Rate	Spectral Efficiency	Low BER Eb/No & Es/No	Balanced Eb/No & Es/No	Low Latency Eb/No & Es/No
BPSK	0.499	0.499	2.1 (-0.9)	2.9 (-0.1)	3.4 (0.4)
(O)QPSK	0.532	1.064	2.1 (2.4)	2.6 (2.9)	2.9 (3.2)
(O)QPSK	0.639	1.278	2.4 (3.5)	2.8 (3.8)	3.2 (4.3)
(O)QPSK	0.710	1.42	2.7 (4.2)	3.2 (4.7)	3.7 (5.2)
(O)QPSK	0.798	1.596	3.1 (5.1)	3.9 (6.0)	4.2 (6.2)
8PSK	0.639	1.917	5.4* (8.2)	5.9* (8.7)	6.3* (9.1)
8PSK	0.710	2.13	5.6* (8.9)	5.5 (8.8)	5.8 (9.1)
8PSK	0.778	2.334	5.6 (9.3)	6.1 (9.7)	6.4 (10.1)
8QAM	0.639	1.917	4.4 (7.2)	4.8 (7.6)	5.0 (7.8)
8QAM	0.710	2.13	5.0 (8.3)	5.3 (8.6)	5.5 (8.8)
8QAM	0.778	2.334	5.5 (9.2)	5.9 (9.6)	6.1 (9.8)
16APSK	0.726	2.904	7.6* (12.2)	7.5* (12.1)	7.5 (12.1)
16APSK	0.778	3.112	7.8* (12.7)	7.1 (12.0)	7.5 (12.4)
16APSK	0.828	3.312	7.4 (12.6)	8.1 (13.3)	8.4 (13.6)
16APSK	0.851	3.404	7.9 (13.2)	8.3 (13.6)	8.8 (14.1)
16QAM	0.726	2.904	7.2* (11.8)	6.6 (11.2)	6.8 (11.4)
16QAM	0.778	3.112	6.7 (11.6)	7.1 (12.0)	7.4 (12.3)
16QAM	0.828	3.312	7.2 (12.4)	7.7 (12.9)	8.0 (13.2)
16QAM	0.851	3.404	7.5 (12.8)	8.0 (13.3)	8.4 (13.7)
32APSK	0.778	3.89	9.8* (15.7)	9.6 (15.5)	10.0 (15.9)
32APSK	0.828	4.14	9.8 (16.0)	10.6 (16.8)	10.9 (17.1)
32APSK	0.886	4.43	10.8 (17.3)	11.4 (17.9)	11.9 (18.4)
32APSK	0.938	4.69	12.6 (19.3)	13.2 (19.9)	13.9 (20.6)

DVB-S2 Performance
QEF (PER 10e-7)
Short frames, Pilots off

	Spectral Efficiency	Eb/No (dB) & Es/No (dB)
QPSK 1/4	0.365324	2.2 (-2.2)
QPSK 1/3	0.629060	1.3 (-0.7)
QPSK 2/5	0.760928	1.1 (-0.1)
QPSK 1/2	0.848840	1.6 (0.9)
QPSK 3/5	1.156532	2.1 (2.7)
QPSK 2/3	1.288400	2.3 (3.4)
QPSK 3/4	1.420269	2.9 (4.4)
QPSK 4/5	1.508181	3.1 (4.9)
QPSK 5/6	1.596093	3.5 (5.5)
QPSK 8/9	1.727961	4.0 (6.4)
8PSK 3/5	1.725319	4.0 (6.4)
8PSK 2/3	1.922040	4.5 (7.3)
8PSK 3/4	2.118761	5.1 (8.4)
8PSK 5/6	2.381056	6.0 (9.8)
8PSK 8/9	2.577777	7.0 (11.1)
16APSK 2/3	2.548792	5.6 (9.7)
16APSK 3/4	2.809662	6.2 (10.7)
16APSK 4/5	2.983575	6.7 (11.4)
16APSK 5/6	3.157488	7.1 (12.1)
16APSK 8/9	3.418357	8.1 (13.4)
32APSK 3/4	3.493093	8.1 (13.5)
32APSK 4/5	3.709309	8.7 (14.4)
32APSK 5/6	3.925526	9.0 (14.9)
32APSK 8/9	4.249850	10.2 (16.5)

DVB-S2X Performance
QEF (PER 10e-7)
Short frames, Pilots off

	Spectral Efficiency	Eb/No (dB) & Es/No (dB)
QPSK 11/45	0.453236	1.4 (-2.0)
QPSK 4/15	0.497192	1.3 (-1.7)
QPSK 14/45	0.585104	1.1 (-1.2)
QPSK 7/15	0.892796	1.4 (0.9)
QPSK 8/15	1.024664	1.7 (1.8)
QPSK 32/45	1.376313	2.6 (4.0)
8PSK 7/15	1.331876	3.1 (4.3)
8PSK 8/15	1.528597	3.4 (5.2)
8PSK 26/45	1.659745	3.8 (6.0)
8PSK 32/45	2.053188	4.8 (7.9)
16APSK 7/15	1.766184	4.0 (6.5)
16APSK 8/15	2.027053	4.4 (7.5)
16APSK 26/45	2.200966	4.8 (8.2)
16APSK 3/5	2.287923	5.0 (8.6)
16APSK 32/45	2.722705	5.8 (10.2)
32APSK 2/3	3.168769	6.8 (11.8)
32APSK 32/45	3.384985	7.3 (12.6)

PER v BER

Note: A PER of 10e-7 is equivalent to a BER of 6.6 x 10e-11.

Side-by-side chasses, suitable for 19-inch rack mounting

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Q-Lite™
Half-width Satellite Modem

TELEDYNE PARADISE DATACOM
Everywhereyoulook™

STEP ELECTRONICS
A Division of Av-Comm

	Option	Description **Fully configurable - pay only for what you need!**
Base Modem	✓	**Q-Lite™ mounted in 9.5-inch chassis** (supplied with additional L-brackets that allow easy conversion to 10.5-inch chassis) **Front-panel keypad and LCD display** **4.8kbps to 2.048Mbps Closed Network (+ ESC) modem with 4-port Gigabit Ethernet switch for M&C and traffic** **IF operation 50 to 180MHz; L-band operation 950 to 2450MHz**; high-stability 10MHz reference **TPC:** BPSK, QPSK, OQPSK, 8PSK, 8QAM and 16QAM; to 60Mbps subject to prevailing modem data rate **AUPC:** Automatic Uplink Power Control **All features described under Ethernet Standard Features** **All features described under Test Facilities** **Utilities Card as described** **AC mains input**
Tx-only		Transmit functions only
Rx-only		Receive functions only
Data Rate		**5Mbps data rate:** Extends base operation to 5Mbps
		10Mbps data rate: Extends 5Mbps operation to 10Mbps
		25Mbps data rate: Extends 10Mbps operation to 25Mbps
		60Mbps data rate: Extends 25Mbps operation to 60Mbps
		100Mbps data rate: Extends 60Mbps operation to 100Mbps (FastLink™, DVB-S2 & DVB-S2X only)
		200Mbps data rate: Extends 100Mbps operation to 200Mbps (DVB-S2 & DVB-S2X only)
		345Mbps data rate: Extends 200Mbps operation to 345Mbps (DVB-S2 & DVB-S2X only)
XStream IP™		**Xstream IP Bundle,** includes all of the features listed below:
		Traffic Shaping: Supports CIR/BIR/priority settings for IP streams classified by IP address, Diffserv class, IEEE 802.1p priority tag, MPLS EXP field, VLAN ID and MPEG2 transport stream PID
		Header Compression: IP/UDP/TCP/RTP packet header compression (RFC 3095) plus Ethernet header compression
		Payload Compression: TCP/UDP packet payload compression using the Deflate algorithm (RFC 1951)
		Dynamic Routing: RIP, OSPF and BGP
		TCP Acceleration: Up to 4,400 concurrent accelerated TCP connections to 100Mbps subject to prevailing data rate
DVB-S2X *To 345Mbps subject to prevailing modem data rate limits*		**DVB-S2/S2X CCM Tx:** DVB-S2 QPSK, 8PSK, 16APSK & 32APSK Tx operation per EN 302 307-1. DVB-S2X QPSK, 8PSK, 8APSK, 16APSK, 32APSK & 64APSK Tx operation per EN 302 307-2. Includes 5%, 10%, 15%, 20%, 25% & 35% spectral roll-offs. Includes XStream IP™ DVB-S2X, which comprises ACM, VCM and IP-over-DVB encapsulation
		DVB-S2/S2X CCM Rx: Add-on card supporting DVB-S2 QPSK, 8PSK, 16APSK & 32APSK Rx operation per EN 302 307-1. DVB-S2X QPSK, 8PSK, 8APSK, 16APSK, 32APSK & 64APSK Rx operation per EN 302 307-2. Includes 5%, 10%, 15%, 20%, 25% & 35% spectral roll-offs. Includes XStream IP™ DVB-S2X, which comprises ACM, VCM and IP-over-DVB decapsulation

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Q-Lite™
Half-width Satellite Modem

TELEDYNE PARADISE DATACOM
Everywhereyoulook™

STEP ELECTRONICS
A Division of Av-Comm

	Option	Description **Fully configurable - pay only for what you need!**
ClearLinQ™		**Adaptive Tx Predistorter:** Corrects for linear & non-linear distortion in the RF chain (amplifier & transponder). Applicable to all FECs and modulations including DVB-S2/S2X, FastLink™ & TPC
FastLink™ Low-latency LDPC		Add-on card; includes BPSK, QPSK, OQPSK, 8PSK, 8QAM, 16APSK, 16QAM, 32APSK & 64QAM; to 100Mbps subject to prevailing modem data rate limits
Paired Carrier+™ *Subject to prevailing modem data rate limits.* *Occupied band-width: minimum 25kHz; maximum 72MHz* Paired Carrier+™ *is also available as a low-cost 90-day license for light users (the license counts down only when* Paired Carri-er+™ *is being ac-tively used) - please contact Sales for details*		**Paired Carrier+™ add-on card** (requires one or more options below)
		Paired Carrier+™ up to **256kbps** (requires Paired Carrier+™ add-on card)
		Extends Paired Carrier+™ up to **512kbps**
		Extends Paired Carrier+™ up to **1.024Mbps**
		Extends Paired Carrier+™ up to **2.5Mbps**
		Extends Paired Carrier+™ up to **5Mbps**
		Extends Paired Carrier+™ up to **10Mbps**
		Extends Paired Carrier+™ up to **15Mbps**
		Extends Paired Carrier+™ up to **20Mbps**
		Extends Paired Carrier+™ up to **25Mbps**
		Extends Paired Carrier+™ up to **30Mbps**
		Extends Paired Carrier+™ up to **40Mbps**
		Extends Paired Carrier+™ up to **50Mbps**
		Extends Paired Carrier+™ up to **60Mbps**
		Extends Paired Carrier+™ up to **80Mbps**
		Extends Paired Carrier+™ up to **100Mbps**
		Extends Paired Carrier+™ up to **200Mbps**
		Extends Paired Carrier+™ up to **345Mbps**
Terrestrial Interfaces *(Please choose up to one option)*		**EIA-530:** D25 DCE supporting RS422/X.21/V.35/RS232
		Quad ASI: 4xBNC 75Ω sockets; includes DVB-S/DSNG FEC (which can also be used with the IP terrestrial interface)
Optimised Spectral Roll-off		Extends the standard FastLink™, TPC & DVB-S/DSNG 35%, 25% and 20% roll-off factors to include 5%, 10% and 15% roll-offs
DVB-CID		**DVB Carrier ID:** Tx carrier identification per ETSI 103 129
DC Input		24V & 48V DC: **K3025** 24V & 48V DC primary power input (in place of 100 to 240V AC input)
BUC PSU		**AC In & 24V Out: P3563** AC input, 24V 200W DC to Tx BUC
		AC In & 48V Out: P3564 AC input, 48V 200W DC to Tx BUC
		48V In & 24V Out: P3565 Floating 48V DC input; +24V 200W DC to Tx BUC
		48V In & 48V Out: P3566 Floating 48V DC input; +48V 200W DC to Tx BUC

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