Chapter 7. Technical Specifications

7.1 Modulator

Modulator Specifications	
Modulation	BPSK, QPSK, OQPSK, 8-PSK, 8-QAM, 16-QAM, 16-APSK
IF Tuning Range	50 to 90, 100 to 180 MHz in 1 Hz Steps
L-Band Tuning Range	950 to 2050 MHz in 1 Hz Steps
Impedance	IF, 50 Ohm (75 Ohm Optional)
	L-Band, 50 Ohm
Connector	TNC, 50 Ohm
	SMA, 50 Ohm, L-Band
Return Loss	IF, 1.5:1
	L-Band, 2.0:1
Output Power	0 to -40 dBm
Output Stability	IF, ±0.5 dB Over Frequency and Temperature
	L-Band, ±.5 dB Over Frequency and Temperature
Output Spectrum	Selectable Meets MIL-188-165A/B or IESS 308/309/ 310 Power Spectral Mask
Spurious	-55 dBc In-Band (50 to 90 MHz, 100 to 180 MHz, 950 to 2050 MHz)
	-45 dBc Out-of-Band
On/Off Power Ratio	>60 dB
Scrambler	OM-73, CCITT, V.35 or IBS
FEC	
Viterbi	{1/2, 3/4, 7/8, None} K = 7
Sequential	{1/2, 3/4, 7/8}
CSC	{3/4}
Trellis (8-PSK)	{2/3}
Turbo (BPSK)	{21/44,5/16} ≤ 20Mbps
Turbo (OQPSK/QPSK)	{1/2, 3/4, 7/8} ≤ 20Mbps
Turbo (8-PSK/8-QAM)	{3/4, 7/8} ≤ 20Mbps

Modulator Specifications	
Turbo (16-QAM)	{3/4, 7/8} ≤ 20Mbps
DVB VIT	{2/3, 5/6}
DVB Trellis	{3/4, 5/6, 7/8, 8/9}
LDPC (BPSK)	{1/2}
LDPC (OQPSK/QPSK)	{1/2, 2/3, 3/4}
LDPC (8-PSK/8-QAM)	{2/3, 3/4}
LDPC (16-QAM)	{3/4}
STANAG Turbo (B/QPSK)	{1/2, 2/3, 3/4, 7/8, 19/20, None}
STANAG Turbo (8-PSK)	{1/2, 2/3, 3/4, 7/8, 19/20, None}
STANAG Turbo (16-APSK)	{1/2, 2/3, 3/4, 7/8, 19/20, None}
Outer Encoder Options	Reed-Solomon INTELSAT (DVB Optional)
	Custom (N, K) Reed-Solomon
Data Clock Source	Internal, External, Rx Recovered
Internal Stability	5×10^{-8}

7.2 Demodulator

Demodulator Specifications	
Demodulation	BPSK, QPSK, OQPSK, 8-PSK, 8-QAM, 16-QAM, 16-APSK
IF Tuning Range	50 to 90, 100 to 180 MHz in 1 Hz Steps
L-Band Tuning Range	950 to 2050 MHz in 1 Hz Steps
Impedance	IF, 50 Ohm (75 Ohm Optional)
	L-Band, 50 Ohm
Connector	TNC, 50 Ohm
	SMA, 50 Ohm, L-Band
Return Loss	IF, 1.5:1
	L-Band, 2.0:1
Spectrum	MIL-188-165A, INTELSAT IESS 308/309/310, DVB
Input Level	-55 to +10 dBm
	and 10 log (Symbol Rate) -120 dBm / Hz, SR < 2500 k
Total Input Power	+20 dBm or +40 dBc (the Lesser)
FEC	
Viterbi,	{1/2, 3/4, 7/8, None} K = 7
Sequential	{1/2, 3/4, 7/8}
CSC	{3/4}
Trellis (8-PSK)	{2/3}
Turbo (BPSK)	{21/44,5/16} ≤ 20Mbps

Demodulator Specifications	
Turbo (OQPSK/QPSK)	{1/2, 3/4, 7/8} ≤ 20Mbps
Turbo (8-PSK/8-QAM)	{3/4, 7/8} ≤ 20Mbps
Turbo (16-QAM)	{3/4, 7/8} ≤ 20Mbps
DVB VIT	{2/3, 5/6}
DVB Trellis	{3/4, 5/6, 7/8, 8/9}
LDPC (BPSK)	{1/2}
LDPC (OQPSK/QPSK)	{1/2, 2/3, 3/4}
LDPC (8-PSK/8-QAM)	{2/3, 3/4}
LDPC (16-QAM)	{3/4}
STANAG Turbo (B/QPSK)	{1/2, 2/3, 3/4, 7/8, 19/20, None}
STANAG Turbo (8-PSK-PSK)	{1/2, 2/3, 3/4, 7/8, 19/20, None}
STANAG Turbo (16-APSK)	{1/2, 2/3, 3/4, 7/8, 19/20, None}
Decoder Options	Reed-Solomon INTELSAT (DVB Optional)
	Custom (N, K) Reed-Solomon
Descrambler	OM-73, CCITT V.35 or IBS
Sweep Range	Programmable ±1 kHz to ± 255 kHz
Reacquisition Range	Programmable ±1 Hz to 65500 Hz
Sweep Delay Value	0 to 6500 seconds in 100 msec Steps

7.3 Plesiochronous Buffer

Size	0 msec to 64 msec
Centering	Automatic on Underflow/Overflow
Centering Modes	IBS: Integral Number of Frames
	IDR: Integral Number of Multi-Frames
Clock	Transmit, External, Rx Recovered or SCT (Internal)

7.4 Monitor and Control

Ethernet 10 BaseT/Web Browser
Remote RS-485/Terminal RS-232/DMD15 Protocol Compatible

7.5 Terrestrial Interfaces

MIL-188-114A, HSSI
GiGE 10/100/1000 Base-T

7.6 IBS/Synchronous Interface (Standard)

MIL-188-144A/RS-422/-530	All Rates, Differential, Clock/Data, DCE

7.7 High-Speed Serial Interface (HSSI) & Gigi Ethernet Data Interface

HSSI	HSSI, Serial, 50-Pin SCSI-2 Type Connector (Female)
Ethernet Data Interface	One RJ-45, Auto-Crossover, Auto-Sensing, 10/100/1000 Ethernet Data Ports. Complies with IEEE 802.3 and IEEE 802.3u.

7.8 Key loader interface

RS-232 Audio 6-Pin/GC283

7.9 Environmental

Prime Power	100 to 240 VAC, 50 to 60 Hz, 250 Watts Maximum
	48 VDC (Optional)
Operating Temperature	-10 to +60°C, 95% Humidity, Non-Condensing
Storage Temperature	-20 to 70°C, 99% humidity, Non-Condensing

7.10 Physical

Size	19” W x 19.25” D x 1.75” H
	(48.26 x 48.89 x 4.45 cm)
Weight	6.5 Pounds (3.0 Kg)

7.11 Data Rate Limits

7.11.1 Non-DVB

Non-DVB Data Rate Limits			
Modulation	Code Rate	Min Data Rate	Max Data Rate
BPSK	NONE	4800	10000000
BPSK	VIT 1/2	2400	10000000
BPSK	VIT 3/4	3600	10000000
BPSK	VIT 7/8	4200	10000000
BPSK	SEQ 1/2	2400	2048000
BPSK	SEQ 3/4	3600	2048000
BPSK	SEQ 7/8	4200	2048000
BPSK	TPC 21/44	2400	4772727
BPSK	TPC 5/16	18000	3906200
BPSK	LDPC 1/2	18000	5000000
BPSK	EBEM TURBO 1/2	64000	29730647
BPSK	EBEM TURBO 2/3	64000	39560865
BPSK	EBEM TURBO 3/4	64000	44455732
BPSK	EBEM TURBO 7/8	64000	51783601
BPSK	EBEM TURBO 19/20	64000	52000000
QPSK	NONE	9600	20000000
QPSK	VIT 1/2	4800	20000000
QPSK	VIT 3/4	7200	20000000
QPSK	VIT 7/8	8400	20000000
QPSK	SEQ 1/2	4800	2048000
QPSK	SEQ 3/4	7200	2048000
QPSK	SEQ 7/8	8400	2048000
QPSK	TPC 1/2	4582	9545454
QPSK	TPC 3/4	7200	15000000
QPSK	TPC 7/8	8400	17500000
QPSK	LDPC 1/2	18000	10000000
QPSK	LDPC 2/3	24000	13333333
QPSK	LDPC 3/4	27000	15000000
QPSK	EBEM TURBO 1/2	64000	14865324
QPSK	EBEM TURBO 2/3	64000	19780433
QPSK	EBEM TURBO 3/4	64000	22227866
QPSK	EBEM TURBO 7/8	64000	25891801
QPSK	EBEM TURBO 19/20	64000	26000000

Non-DVB Data Rate Limits			
Modulation	Code Rate	Min Data Rate	Max Data Rate
OQPSK	NONE	9600	20000000
OQPSK	VIT 1/2	4800	20000000
OQPSK	VIT 3/4	7200	20000000
OQPSK	VIT 7/8	8400	20000000
OQPSK	SEQ 1/2	4800	2048000
OQPSK	SEQ 3/4	7200	2048000
OQPSK	SEQ 7/8	8400	2048000
OQPSK	TPC 1/2	4582	9545454
OQPSK	TPC 3/4	7200	15000000
OQPSK	TPC 7/8	8400	17500000
OQPSK	LDPC 1/2	18000	10000000
OQPSK	LDPC 2/3	24000	13333333
OQPSK	LDPC 3/4	27000	15000000
8-PSK	TRE 2/3	9600	52000000
8-PSK	TPC 3/4	40000	20000000
8-PSK	TPC 7/8	48000	20000000
8-PSK	LDPC 2/3	36000	20000000
8-PSK	LDPC 3/4	40500	20000000
8-PSK	EBEM TURBO 1/2	256000	44455732
8-PSK	EBEM TURBO 2/3	256000	52000000
8-PSK	EBEM TURBO 3/4	256000	52000000
8-PSK	EBEM TURBO 7/8	256000	52000000
8-PSK	EBEM TURBO 19/20	256000	52000000
8-QAM	TPC 3/4	40000	20000000
8-QAM	TPC 7/8	48000	20000000
8-QAM	LDPC 2/3	36000	20000000
8-QAM	LDPC 3/4	405000	20000000
16-QAM	VIT 3/4	14400	20000000
16-QAM	VIT 7/8	16800	20000000
16-QAM	TPC 3/4	54000	20000000
16-QAM	TPC 7/8	63000	20000000
16-QAM	LDPC 3/4	54000	20000000
16-APSK	EBEM TURBO 1/2	256000	52000000
16-APSK	EBEM TURBO 2/3	256000	52000000
16-APSK	EBEM TURBO 3/4	256000	52000000
16-APSK	EBEM TURBO 7/8	256000	52000000
16-APSK	EBEM TURBO 19/20	256000	52000000

7.11.2 DVB

DVB Data Rate Limits				
Modulation	Code Rate	DVB Mode	Min Data Rate	Max Data Rate
BPSK	VIT 1/2	187 Mode	2400	4583333
BPSK		188 Mode	2400	4607843
BPSK		204 Mode	2400	5000000
BPSK	VIT 2/3	187 Mode	2934	6111111
BPSK		188 Mode	2950	6143790
BPSK		204 Mode	3200	6666666
BPSK	VIT 3/4	187 Mode	3300	6875000
BPSK		188 Mode	3318	6911764
BPSK		204 Mode	3600	7500000
BPSK	VIT 5/6	187 Mode	3667	7638888
BPSK		188 Mode	3687	7679738
BPSK		204 Mode	4000	8333333
BPSK	VIT 7/8	187 Mode	3850	8020833
BPSK		188 Mode	3871	8063725
BPSK		204 Mode	4200	8750000
QPSK	VIT 1/2	187 Mode	4400	9166666
QPSK		188 Mode	4424	9215686
QPSK		204 Mode	4800	10000000
QPSK	VIT 2/3	187 Mode	5867	12222222
QPSK		188 Mode	5899	12287581
QPSK		204 Mode	6400	13333333
QPSK	VIT 3/4	187 Mode	6600	13750000
QPSK		188 Mode	6636	13823529
QPSK		204 Mode	7200	15000000
QPSK	VIT 5/6	187 Mode	7334	15277777
QPSK		188 Mode	7373	15359476
QPSK		204 Mode	8000	16666666
QPSK	VIT 7/8	187 Mode	7700	16041666
QPSK		188 Mode	7742	16127450
QPSK		204 Mode	8400	17500000
8-PSK	TRE 2/3	187 Mode	8800	18333333
8-PSK		188 Mode	8848	18431372
8-PSK		204 Mode	9600	20000000
8-PSK	TRE 5/6	187 Mode	11000	20000000
8-PSK		188 Mode	11059	20000000
8-PSK		204 Mode	12000	20000000

DVB Data Rate Limits				
Modulation	Code Rate	DVB Mode	Min Data Rate	Max Data Rate
8-PSK	TRE 8/9	187 Mode	11550	20000000
8-PSK		188 Mode	11797	20000000
8-PSK		204 Mode	12800	20000000
16-QAM	TRE 3/4	187 Mode	13200	20000000
16-QAM		188 Mode	13271	20000000
16-QAM		204 Mode	14400	20000000
16-QAM	TRE 7/8	187 Mode	15400	20000000
16-QAM		188 Mode	15483	20000000
16-QAM		204 Mode	16800	20000000

7.12 BER Specifications

7.12.1 BER Performance (Viterbi)

Figure 7-1. B/O/QPSK BER Performance (Viterbi)

Note: Eb/No values include the effect of using differential decoding and v.35 descrambling.

7.12.2 BER Performance (Sequential)

Figure 7-2. B/O/QPSK BER Performance (Sequential)

Note: Eb/No values include the effect of using differential decoding and v.35 descrambling.

7.12.3 BER Performance (Viterbi with Reed-Solomon)

Figure 7-3. B/O/QPSK BER Performance (Viterbi with Reed-Solomon)

Note: Eb/No values include the effect of using differential decoding.

7.12.4 BER Performance (8-PSK Trellis)

Figure 7-4. 8-PSK BER Performance (Trellis)

Note: Eb/No values include the effect of using differential decoding and v.35 descrambling.

7.12.5 BER Performance (16-QAM Viterbi)

Figure 7-5. 16-QAM BER Performance (Viterbi)

Note: Eb/No values include the effect of using differential decoding and v.35 descrambling.

7.12.6 BER Performance (16-QAM Viterbi with Reed-Solomon)

Figure 7-6. 16-QAM BER Performance (Viterbi with Reed-Solomon)

Note: Eb/No values include the effect of using differential decoding.

7.12.7 BER Performance (OQPSK Turbo)

Figure 7-7. OQPSK BER Performance (Turbo)

7.12.8 BER Performance (BPSK Turbo)

Figure 7-8. BPSK BER Performance (Turbo)

7.12.9 BER Performance (8-PSK Turbo)

Figure 7-9. 8-PSK BER Performance (Turbo)

7.12.10 BER Performance (16-QAM Turbo)

Figure 7-10. 16-QAM BER Performance (Turbo)

Figure 7-11. B/O/QPSK BER Performance (LDPC)

7.12.11 8-PSK/8-QAM BER Performance (LDPC)

Figure 7-12. 8-PSK/8-QAM BER Performance (LDPC)

7.12.12 16-QAM BER Performance (LDPC)

Figure 7-13. 16-QAM BER Performance (LDPC)

7.12.13 BER Performance B/O/QPSK (MILSTD 188-165B or STANAG) Turbo

Figure 7-14. BER Performance B/O/QPSK (MILSTD 188-165B or STANAG) Turbo

Note: Eb/No to Bit-Error-Ratio 77values based on 16k block size

7.12.14 BER Performance 8-PSK (MILSTD 188-165B or STANAG) Turbo

Figure 7-15. BER Performance 8-PSK (MILSTD 188-165B or STANAG) Turbo

Note: Eb/No to Bit-Error-Ratio 77values based on 16k block size

7.12.15 BER Performance 16-APSK (MILSTD 188-165B or STANAG) Turbo

Figure 7-16. BER Performance 16-APSK (MILSTD 188-165B or STANAG)

Note: Eb/No to Bit-Error-Ratio 77values based on 16k block size

Table 7-1 - B/O/QPSK BER Performance (Viterbi)						
BER	Specification			Typical		
	1/2 Rate	3/4 Rate	7/8 Rate	1/2 Rate	3/4 Rate	7/8 Rate
1E-3	4.2 dB	5.3 dB	6.2 dB	3.9 dB	4.9 dB	5.8 dB
1E-4	4.8 dB	6.1 dB	7.1 dB	4.5 dB	5.6 dB	6.5 dB
1E-5	5.5 dB	6.8 dB	7.9 dB	5.1 dB	6.3 dB	7.2 dB
1E-6	6.1 dB	7.6 dB	8.6 dB	5.7 dB	7 dB	7.9 dB
1E-7	6.7 dB	8.3 dB	9.3 dB	6.2 dB	7.7 dB	8.6 dB
1E-8	7.4 dB	8.9 dB	10.2 dB	6.8 dB	8.4 dB	9.4 dB
1E-9	8.2 dB	9.7 dB	11 dB	7.4 dB	9.1 dB	10.1 dB
1E-10	9 dB	10.3 dB	11.7 dB	8.1 dB	9.8 dB	10.5 dB

Table 7-2 - B/O/QPSK BER Performance (Sequential)						
BER	Specification			Typical		
	1/2 Rate	3/4 Rate	7/8 Rate	1/2 Rate	3/4 Rate	7/8 Rate
1E-3	4.8 dB	5.2 dB	6 dB	4.3 dB	4.7 dB	5.5 dB
1E-4	5.2 dB	5.7 dB	6.4 dB	4.7 dB	5.2 dB	5.9 dB
1E-5	5.6 dB	6.1 dB	6.9 dB	5.1 dB	5.6 dB	6.4 dB
1E-6	5.9 dB	6.5 dB	7.4 dB	5.4 dB	6.1 dB	6.9 dB
1E-7	6.3 dB	7 dB	7.9 dB	5.8 dB	6.5 dB	7.4 dB
1E-8	6.7 dB	7.4 dB	8.4 dB	6.2 dB	6.9 dB	7.9 dB
1E-9	7.1 dB	7.8 dB	8.9 dB	6.6 dB	7.4 dB	8.4 dB
1E-10	7.4 dB	8.3 dB	9.4 dB	6.9 dB	7.8 dB	8.9 dB

Table 7-3 - B/O/QPSK BER Performance (Viterbi - w/RS)						
BER	Specification			Typical		
	1/2 Rate	3/4 Rate	7/8 Rate	1/2 Rate	3/4 Rate	7/8 Rate
1E-3	3.3 dB	5.1 dB	-	3 dB	4.3 dB	5.3 dB
1E-4	3.5 dB	5.3 dB	-	3.2 dB	4.5 dB	5.7 dB
1E-5	3.8 dB	5.4 dB	6.5 dB	3.4 dB	4.7 dB	6 dB
1E-6	4.1 dB	5.6 dB	6.7 dB	3.6 dB	4.9 dB	6.4 dB
1E-7	4.2 dB	5.8 dB	6.9 dB	3.8 dB	5.1 dB	6.7 dB
1E-8	4.4 dB	6 dB	7.2 dB	4 dB	5.3 dB	7.1 dB
1E-9	4.7 dB	6.1 dB	7.5 dB	4.2 dB	5.4 dB	7.4 dB
1E-10	5 dB	6.3 dB	7.8 dB	4.4 dB	5.6 dB	7.7 dB

Table 7-4 - 8PSK BER Performance (Trellis)				
BER	Specification		Typical	
	2/3 Rate	2/3 Rate w/RS	2/3 Rate	2/3 Rate w/RS
1E-3	6.3 dB	5.8 dB	4.8 dB	4.9 dB
1E-4	7.3 dB	6.1 dB	5.6 dB	5.1 dB
1E-5	8.2 dB	6.3 dB	6.4 dB	5.4 dB
1E-6	9 dB	6.5 dB	7.2 dB	5.6 dB
1E-7	9.8 dB	6.7 dB	8.1 dB	5.8 dB
1E-8	10.4 dB	6.9 dB	8.9 dB	6.1 dB
1E-9	11.1 dB	7.1 dB	9.7 dB	6.3 dB
1E-10	11.9 dB	7.3 dB	10.5 dB	6.6 dB

Table 7-5 - 16QAM BER Performance (Viterbi)				
BER	Specification		Typical	
	3/4 Rate	7/8 Rate	3/4 Rate	7/8 Rate
1E-3	8.9 dB	10.3 dB	8.1 dB	9.5 dB
1E-4	9.8 dB	11.1 dB	9 dB	10.3 dB
1E-5	10.7 dB	11.9 dB	9.9 dB	11.1 dB
1E-6	11.5 dB	12.7 dB	10.7 dB	11.9 dB
1E-7	12.4 dB	13.5 dB	11.6 dB	12.7 dB
1E-8	13.3 dB	14.3 dB	12.5 dB	13.5 dB
1E-9	14.2 dB	15.1 dB	13.4 dB	14.3 dB
1E-10	15 dB	15.9 dB	14.2 dB	15.1 dB

Table 7-6 - 16QAM BER Performance (Viterbi w/RS)				
BER	Specification		Typical	
	3/4 Rate	7/8 Rate	3/4 Rate	7/8 Rate
1E-3	8.4 dB	9.8 dB	7.8 dB	9.3 dB
1E-4	8.6 dB	8.1 dB	8.1 dB	9.6 dB
1E-5	8.9 dB	8.3 dB	8.3 dB	9.9 dB
1E-6	9.1 dB	8.6 dB	8.6 dB	10.2 dB
1E-7	9.3 dB	8.8 dB	8.8 dB	10.4 dB
1E-8	9.5 dB	9.1 dB	9.1 dB	10.7 dB
1E-9	9.8 dB	9.3 dB	9.3 dB	11 dB
1E-10	10 dB	9.6 dB	9.6 dB	11.3 dB

Table 7-7 - (O)QPSK BER Performance (Turbo)						
BER	Specification			Typical		
	1/2 Rate	3/4 Rate	7/8 Rate	1/2 Rate	3/4 Rate	7/8 Rate
1E-3	-	3.2 dB	4 dB	-	2.8 dB	3.7 dB
1E-4	-	3.4 dB	4.1 dB	-	3 dB	3.8 dB
1E-5	2.7 dB	3.6 dB	4.2 dB	2.4 dB	3.2 dB	3.9 dB
1E-6	2.9 dB	3.8 dB	4.3 dB	2.6 dB	3.4 dB	4 dB
1E-7	3.1 dB	4.1 dB	4.4 dB	2.8 dB	3.7 dB	4.1 dB
1E-8	3.3 dB	4.4 dB	4.5 dB	3 dB	4 dB	4.2 dB

Table 7-8 - BPSK BER Performance (Turbo)				
BER	Specification		Typical	
	5/16 Rate	21/44 Rate	5/16 Rate	21/44 Rate
1E-5	-	2.7 dB	-	2.4 dB
1E-6	2.7 dB	2.9 dB	2.5 dB	2.6 dB
1E-7	2.9 dB	3.1 dB	2.7 dB	2.8 dB
1E-8	3.1 dB	3.3 dB	2.9 dB	3 dB

Table 7-9 - 8PSK BER Performance (Turbo)				
BER	Specification		Typical	
	3/4 Rate	7/8 Rate	3/4 Rate	7/8 Rate
1E-3	5.6 dB	6.7 dB	5.4 dB	6.3 dB
1E-4	5.8 dB	6.8 dB	5.6 dB	6.4 dB
1E-5	6 dB	6.9 dB	5.8 dB	6.5 dB
1E-6	6.2 dB	7 dB	6 dB	6.6 dB
1E-7	6.4 dB	7.1 dB	6.2 dB	6.7 dB
1E-8	6.8 dB	7.2 dB	6.6 dB	6.8 dB

Table 7-10 - 16QAM BER Performance (Turbo)				
BER	Specification		Typical	
	3/4 Rate	7/8 Rate	3/4 Rate	7/8 Rate
1E-3	6.3 dB	7.8 dB	6 dB	7.4 dB
1E-4	6.7 dB	7.9 dB	6.4 dB	7.5 dB
1E-5	7 dB	8 dB	6.7 dB	7.6 dB
1E-6	7.4 dB	8.1 dB	7.1 dB	7.7 dB
1E-7	7.8 dB	8.2 dB	7.5 dB	7.8 dB
1E-8	8.2 dB	8.3 dB	7.9 dB	7.9 dB

Table 7-11 - B/O/QPSK BER Performance (LDPC)						
BER	Specification			Typical		
	1/2 Rate	2/3 Rate	3/4 Rate	1/2 Rate	2/3 Rate	3/4 Rate
1E-5	2 dB	2.3 dB	3 dB	1.7 dB	2 dB	2.6 dB
1E-9	2.3 dB	2.7 dB	3.3 dB	2 dB	2.3 dB	3 dB

Table 7-12 - 8PSK / 8-QAM Rate BER Performance (LDPC)								
BER	8PSK				8-QAM			
	Specification		Typical		Specification		Typical	
	2/3 Rate	3/4 Rate	2/3 Rate	3/4 Rate	2/3 Rate	3/4 Rate	2/3 Rate	3/4 Rate
1E-5	-	5.6 dB	-	5.2 dB	4.6 dB	5.6 dB	4.2 dB	5.2 dB
1E-9	5.7 dB	6 dB	5.3 dB	5.6 dB	5 dB	6 dB	4.6 dB	5.6 dB

Table 7-13 - 16QAM BER Performance (LDPC)		
BER	Specification	Typical
	3/4 Rate	3/4 Rate
1E-5	6.8 dB	6.2 dB
1E-9	7.1 dB	6.8 dB

Table 7-14 - B/O/QPSK BER Performance (MILSTD 188-165B or STANAG) Turbo										
BER	Specification 16K Block					Typical 16K Block				
	1/2 Rate	2/3 Rate	3/4 Rate	7/8 Rate	19/20 Rate	1/2 Rate	2/3 Rate	3/4 Rate	7/8 Rate	19/20 Rate
1E-3	2.05 dB	2.9 dB	3.6 dB	4.45 dB	5.9 dB	-	-	-	-	-
1E-4	2.1 dB	3 dB	3.7 dB	4.5 dB	6 dB	-	-	-	-	-
1E-5	2.15 dB	3.05 dB	3.75 dB	4.55 dB	6.1 dB	-	-	-	-	-
1E-6	2.2 dB	3.1 dB	3.8 dB	4.6 dB	6.2 dB	1.5 dB	2.3 dB	3.1 dB	3.7 dB	5.6 dB
1E-7	2.3 dB	3.15 dB	3.85 dB	4.65 dB	6.3 dB	1.6 dB	2.4 dB	3.2 dB	3.8 dB	5.7 dB
1E-8	2.3 dB	3.2 dB	3.9 dB	4.7 dB	6.4 dB	1.7 dB	2.5 dB	3.3 dB	3.9 dB	5.8 dB
1E-9	2.4 dB	3.25 dB	3.95 dB	4.75 dB	6.5 dB	-	-	-	-	-
1E-10	2.4 dB	3.3 dB	4 dB	4.8 dB	6.6 dB	-	-	-	-	-
BER	Specification 4K Block					Typical 4K Block				
	1/2 Rate	2/3 Rate	3/4 Rate	7/8 Rate	19/20 Rate	1/2 Rate	2/3 Rate	3/4 Rate	7/8 Rate	19/20 Rate
1E-3	2.35 dB	3.2 dB	3.8 dB	4.5 dB	5.8 dB	-	-	-	-	-
1E-4	2.4 dB	3.3 dB	3.9 dB	4.6 dB	6 dB	-	-	-	-	-
1E-5	2.45 dB	3.4 dB	4 dB	4.7 dB	6.2 dB	-	-	-	-	-
1E-6	2.5 dB	3.45 dB	4.1 dB	4.8 dB	6.3 dB	-	-	-	-	-
1E-7	2.55 dB	3.5 dB	4.2 dB	4.9 dB	6.4 dB	-	-	-	-	-
1E-8	2.6 dB	3.55 dB	4.25 dB	5 dB	6.5 dB	-	-	-	-	-
1E-9	2.65 dB	3.6 dB	4.3 dB	5.1 dB	6.6 dB	-	-	-	-	-
1E-10	2.7 dB	3.65 dB	4.35 dB	5.2 dB	6.7 dB	-	-	-	-	-
BER	Specification 1K Block					Typical 1K Block				
	1/2 Rate	2/3 Rate	3/4 Rate	7/8 Rate	19/20 Rate	1/2 Rate	2/3 Rate	3/4 Rate	7/8 Rate	19/20 Rate
1E-3	3.1 dB	3.9 dB	4.4 dB	5.1 dB	6 dB	-	-	-	-	-
1E-4	3.3 dB	4.1 dB	4.6 dB	5.3 dB	6.5 dB	-	-	-	-	-
1E-5	3.5 dB	4.3 dB	4.8 dB	5.5 dB	6.85 dB	-	-	-	-	-
1E-6	3.7 dB	4.45 dB	5 dB	5.7 dB	7.2 dB	-	-	-	-	-
1E-7	3.8 dB	4.6 dB	4.15 dB	5.9 dB	7.5 dB	-	-	-	-	-
1E-8	3.9 dB	4.75 dB	5.3 dB	6.1 dB	7.8 dB	-	-	-	-	-
1E-9	4 dB	4.9 dB	5.4 dB	6.3 dB	8 dB	-	-	-	-	-

Table 7-15 - 8PSK BER Performance (MILSTD 188-165B or STANAG) Turbo										
BER	Specification 16K Block					Typical 16K Block				
	1/2 Rate	2/3 Rate	3/4 Rate	7/8 Rate	19/20 Rate	1/2 Rate	2/3 Rate	3/4 Rate	7/8 Rate	19/20 Rate
1E-3	3.6 dB	5.2 dB	6.2 dB	7.65 dB	9.4 dB	-	-	-	-	-
1E-4	3.7 dB	5.3 dB	6.3 dB	7.7 dB	9.6 dB	-	-	-	-	-
1E-5	3.8 dB	5.35 dB	6.4 dB	7.75 dB	9.8 dB	-	-	-	-	-
1E-6	3.9 dB	5.4 dB	6.45 dB	7.8 dB	9.9 dB	3.2 dB	4.75 dB	5.7 dB	6.9 dB	9.2 dB
1E-7	4 dB	5.45 dB	6.5 dB	7.85 dB	10 dB	3.3 dB	4.7 dB	5.8 dB	7.1 dB	9.3 dB
1E-8	4.05 dB	5.5 dB	6.55 dB	7.9 dB	10.1 dB	3.5 dB	4.75 dB	5.9 dB	7.5 dB	9.4 dB
1E-9	4.1 dB	5.55 dB	6.6 dB	7.95 dB	10.2 dB	-	-	-	-	-
1E-10	4.1 dB	5.6 dB	6.6 dB	8 dB	10.3 dB	-	-	-	-	-
BER	Specification 4K Block					Typical 4K Block				
	1/2 Rate	2/3 Rate	3/4 Rate	7/8 Rate	19/20 Rate	1/2 Rate	2/3 Rate	3/4 Rate	7/8 Rate	19/20 Rate
1E-3	4.2 dB	5.8 dB	6.5 dB	7.5 dB	9.1 dB	-	-	-	-	-
1E-4	4.3 dB	5.9 dB	6.6 dB	7.7 dB	9.4 dB	-	-	-	-	-
1E-5	4.4 dB	6 dB	6.7 dB	7.9 dB	9.7 dB	-	-	-	-	-
1E-6	4.5 dB	6.1 dB	6.8 dB	8 dB	9.9 dB	-	-	-	-	-
1E-7	4.6 dB	6.2 dB	6.9 dB	8.1 dB	10 dB	-	-	-	-	-
1E-8	4.7 dB	6.3 dB	7 dB	8.2 dB	10.2 dB	-	-	-	-	-
1E-9	4.8 dB	6.4 dB	7.1 dB	8.3 dB	10.35 dB	-	-	-	-	-
1E-10	4.9 dB	6.5 dB	7.2 dB	8.4 dB	10.5 dB	-	-	-	-	-
BER	Specification 1K Block					Typical 1K Block				
	1/2 Rate	2/3 Rate	3/4 Rate	7/8 Rate	19/20 Rate	1/2 Rate	2/3 Rate	3/4 Rate	7/8 Rate	19/20 Rate
1E-3	4.6 dB	6.1 dB	6.9 dB	7.8 dB	9.3 dB	-	-	-	-	-
1E-4	4.9 dB	6.4 dB	7.2 dB	8.2 dB	9.8 dB	-	-	-	-	-
1E-5	5.1 dB	6.6 dB	7.4 dB	8.5 dB	10.2 dB	-	-	-	-	-
1E-6	5.3 dB	6.8 dB	7.6 dB	8.75 dB	10.6 dB	-	-	-	-	-
1E-7	5.5 dB	7 dB	7.8 dB	9 dB	11 dB	-	-	-	-	-
1E-8	5.6 dB	7.15 dB	8 dB	9.2 dB	11.4 dB	-	-	-	-	-
1E-9	5.65 dB	7.25 dB	8.1 dB	9.4 dB	11.7 dB	-	-	-	-	-

Table 7-16 - 16APSK BER Performance (MILSTD 188-165B or STANAG) Turbo										
BER	Specification 16K Block					Typical 16K Block				
	1/2 Rate	2/3 Rate	3/4 Rate	7/8 Rate	19/20 Rate	1/2 Rate	2/3 Rate	3/4 Rate	7/8 Rate	19/20 Rate
1E-3	4.75 dB	6.5 dB	7.3 dB	8.4 dB	10.3 dB	-	-	-	-	-
1E-4	4.8 dB	6.55 dB	7.4 dB	8.5 dB	10.5 dB	-	-	-	-	-
1E-5	4.85 dB	6.6 dB	7.5 dB	8.6 dB	10.6 dB	-	-	-	-	-
1E-6	4.9 dB	6.65 dB	7.6 dB	8.7 dB	10.7 dB	4.7 dB	6.2 dB	7.1 dB	8.7 dB	9.9 dB
1E-7	4.95 dB	6.7 dB	7.7 dB	8.8 dB	10.8 dB	4.9 dB	6.4 dB	7.3 dB	8.9 dB	10 dB
1E-8	5 dB	6.75 dB	7.75 dB	8.9 dB	10.9 dB	5 dB	6.5 dB	7.4 dB	9 dB	10.2 dB
1E-9	5.05 dB	6.8 dB	7.8 dB	9 dB	11 dB	-	-	-	-	-
BER	Specification 4K Block					Typical 4K Block				
	1/2 Rate	2/3 Rate	3/4 Rate	7/8 Rate	19/20 Rate	1/2 Rate	2/3 Rate	3/4 Rate	7/8 Rate	19/20 Rate
1E-3	5.1 dB	6.7 dB	7.8 dB	8.9 dB	10.4 dB	-	-	-	-	-
1E-4	5.2 dB	6.8 dB	7.9 dB	9.05 dB	10.7 dB	-	-	-	-	-
1E-5	5.3 dB	6.9 dB	8 dB	9.2 dB	10.9 dB	-	-	-	-	-
1E-6	5.4 dB	7 dB	8.1 dB	9.3 dB	11.1 dB	-	-	-	-	-
1E-7	5.5 dB	7.1 dB	8.2 dB	9.4 dB	11.25 dB	-	-	-	-	-
1E-8	5.6 dB	7.2 dB	8.3 dB	9.5 dB	11.4 dB	-	-	-	-	-
1E-9	5.7 dB	7.3 dB	8.4 dB	9.6 dB	11.5 dB	-	-	-	-	-
BER	Specification 1K Block					Typical 1K Block				
	1/2 Rate	2/3 Rate	3/4 Rate	7/8 Rate	19/20 Rate	1/2 Rate	2/3 Rate	3/4 Rate	7/8 Rate	19/20 Rate
1E-3	5.6 dB	7.1 dB	8.1 dB	8.8 dB	10.4 dB	-	-	-	-	-
1E-4	5.8 dB	7.4 dB	8.4 dB	9.15 dB	10.9 dB	-	-	-	-	-
1E-5	6.1 dB	7.6 dB	8.7 dB	9.5 dB	11.3 dB	-	-	-	-	-
1E-6	6.3 dB	7.8 dB	8.9 dB	9.7 dB	11.7 dB	-	-	-	-	-
1E-7	6.45 dB	8 dB	9.1 dB	9.9 dB	12.1 dB	-	-	-	-	-
1E-8	6.6 dB	8.2 dB	9.3 dB	10.1 dB	12.5 dB	-	-	-	-	-
1E-9	6.65 dB	8.3 dB	9.4 dB	10.3 dB	12.9 dB	-	-	-	-	-

7.13 AGC Output Voltage

The AGC Output Voltage is a function of the Input Power Level in dBm. The AGC Output Voltage is found on the Alarm connector Pin 14 of J15.

Figure 7-13. AGC Voltage Monitor