

Integra-X

Dual Transceiver XPIC Capable Full-Outdoor Radio

Features

- Up to 2.2 Gbps capacity in each direction, uncompressed
- Two transceivers and modem chains
- Full XPIC solution in a single radio
- Up to 112 MHz channel on each transceiver
- 4QAM to 4096QAM modulations
- High radio performance due to the Adaptive Digital Pre-Distortion (ADPD) algorithm
- Built-in OMT to provide both carriers on single antenna interface
- SAF2 antenna interface on all frequencies, compatible with other Integra products in 15 ... 38 GHz bands
- 10 Gbps SFP+ Ethernet interfaces



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Integra-X datasheet, v1.13, October 2021. All data are subject to change without prior notice.



Technical specification

Integra-X		
General		
Concept / form factor	FODU with direct-mount antenna	
Frequency bands	6, 7, 8, 11, 13, 15, 18 and 23 GHz. All licensed bands up to 38 GHz*	
Duplex spacing	Any applicable	
Frequency stability	± 10 ppm	
Capacity	Up to 2.2 Gbps at 2x 112 MHz 4096QAM	
Max modulation	4096QAM	
Configurations	1+0, 2+0 XPIC, 2+0 ACAP	
ATPC	Yes	
ACM	Adaptive Code Modulation, Hitless. Variable Tx power mode supported.	
Channel bandwidth	5 to 112 MHz	
Ports		
Ethernet	2 x SFP+	For Fiber Optics up to 10 Gbps (1, 2.5 and 10 Gbps speed supported)
	1 x RJ-45	Gigabit Ethernet (auto 10/100/1000 Mbps) electrical port with built-in PoE splitter and surge arrestor
Power	DC port	Screw type terminal block, pluggable, 2 pin, centerline 5.08mm / 0.2 inches
Service ports	3.5 mm	Audible alignment and RSSI
	USB B	RS232 serial over USB B-Type
	LED	Power On, RSL
Antenna	SAF2	Circular waveguide flange
Ethernet		
Ethernet	Built-in Carrier Ethernet 10 Gigabit Switch with 50 Gbps switching capacity	
VLAN	802.1Q 4096 VLANs, QinQ (Double Tagging), VLAN Rate	
Quality of Service	8 level VLAN 802.1p, 64 level IPv4/6 DSCP, CoS, 8 level MPLS-TP exp bit, Port-based priority. Per port egress schedulers: SP, RR, WRR, DWRR.	
Spanning Tree Prot.	802.1d-1998 STP*, 802.1d-2004 RSTP*	
LSP	Link State Propagation with Backup path switching	
Synchronization	SyncE	
Carrier Ethernet	Header compression, Packet fragmentation	
Jumbo frames	Yes, 12288 bytes	
Encryption	AES256*	
Management	SNMP v1/2c/3, SSH, Telnet, HTTPS, Serial, RADIUS, Network Time Protocol	
	In-band Management over the same ETH port.	
	Out-band Management is configurable using VLANs.	
Performance monitoring	Performance graphs, constellation diagram, alarms, detailed counters	
Electrical		
Power consumption	Up to 100 W depending on frequency band and operating mode, see table below.	
Voltage range	38...57 V DC	
Surge protection	DC power port conforms to IEC EN 61000-4-5 Class 3, up to 2KV surge	
* In development. Inquire SAF representative for more information		



Mechanical specification

Mechanical & Environmental	
Stationary use	Conforms to ETSI EN 300 019 Class 4.1, IP66, NEMA 4X
Temperature range	-33...+55 °C / -28...+130 °F
Size	280 x 437 x 100 mm / 11.02" x 17.2" x 3.9"
Weight	Up to 8.5 kg / 18.7 lbs
Mount	Mount on antenna
Antenna	External antenna, direct-mount with SAF2 adaptation

Power consumption and rated current at 36 – 57 V DC

Frequency band	6, 7 and 8 GHz	11, 13 and 15 GHz	18 and 23 GHz
Power [W] @ 38–57V DC	100	95	85
Current [A] @ 38 V DC	2.8	2.6	2.4
Current [A] @ 48 V DC	2.1	2.0	1.8
Current [A] @ 57 V DC	1.8	1.7	1.5

Maximum Tx Power [dBm] for Integra-X

Modulation	6, 7, 8, 11 and 18 GHz	13 and 23 GHz	15 GHz
4 QAM	+31	+29	+32
16 QAM	+30	+28	+31
32 QAM	+30	+28	+31
64 QAM	+29	+27	+30
128 QAM	+29	+27	+30
256 QAM	+28	+26	+29
512 QAM	+28	+26	+29
1024 QAM	+27	+25	+28
2048 QAM	+26	+24	+27
4096 QAM	+26	+24	+27
4096 QAM Weak FEC	+26	+24	+27

RSL Thresholds and Capacity for Integra-X

BW, MHz	Modulation	Guaranteed RSL Threshold, dBm								Capacity, Mbps	
		6 GHz	7 GHz	8 GHz	11 GHz	13 GHz	15 GHz	18 GHz	23 GHz**	Single Channel Mode	2+0 XPIC Mode
5 FCC	4QAM StrongFEC	-95	-95.5	-96.5	-95.5	-94.5	-95	-93.5	-94.0	7	14
	16QAM StrongFEC	-90.5	-91.5	-92	-92.5	-90.5	-89.5	-88	-91.0	12	24
	32QAM StrongFEC	-87	-87.5	-88	-88.5	-87.5	-86.5	-84.5	-87.0	15	30
	64QAM StrongFEC	-84	-84.5	-85	-85.0	-84.5	-84	-83.5	-83.0	20	40
	128QAM StrongFEC	-82	-81.5	-82	-82	-81.5	-80.5	-79.5	-80.5	24	48
	256QAM StrongFEC	-78.5	-78	-79	-79	-77.5	-77.5	-77.5	-76.5	28	56
	512QAM StrongFEC	-74	-76	-76	-76	-75.5	-73.5	-74.5	-72.5	32	64
	1024QAM StrongFEC	-72.5	-72	-73	-73	-71.5	-71	-71.5	-70.0	36	72
	2048QAM StrongFEC	-68	-69	-69	-69.5	-68.5	-67.5	-68	-65.0	39	78
	4096QAM StrongFEC	-65	-65	-66	-65	-64.5	-63	-64	-	43	86
7 ETSI	4096QAM WeakFEC	-63	-63	-64	-64	-62.5	-60	-62	-	45	90
	4QAM StrongFEC	-93.5	-94	-95	-93	-93.5	-93	-91	-92.0	10	20
	16QAM StrongFEC	-89.5	-89.5	-90	-89	-87.5	-87.5	-86.5	-89.0	17	34
	32QAM StrongFEC	-85.5	-86.5	-86	-85.5	-84.5	-84.5	-83	-85.0	22	44
	64QAM StrongFEC	-82.5	-83.5	-83	-82.5	-81.5	-82	-80	-82.0	29	58
	128QAM StrongFEC	-80.5	-80.5	-80	-79.5	-78.5	-78.5	-77	-78.5	35	70
	256QAM StrongFEC	-77.5	-76.5	-77	-76.5	-75.5	-75	-74	-75.0	41	82
	512QAM StrongFEC	-73	-74.5	-74	-73.5	-72.5	-72	-71	-72.0	47	94
	1024QAM StrongFEC	-71	-70.5	-70.5	-71	-69.5	-69	-67.5	-69.0	52	104
	2048QAM StrongFEC	-67	-67.5	-68	-67.5	-66.5	-65.5	-64	-65.0	58	116
10 FCC	4096QAM StrongFEC	-63.5	-63.5	-64	-63.5	-62.5	-62	-60	-	63	126
	4096QAM WeakFEC	-61.5	-61.5	-62	-61.5	-60.5	-59	-57.5	-	65	130
	4QAM StrongFEC	-91.5	-92.5	-93.5	-92	-92.5	-91	-89.5	-90.0	14	28
	16QAM StrongFEC	-87.5	-88.5	-88	-88	-86.5	-86.5	-85.5	-87.0	25	50
	32QAM StrongFEC	-84.5	-84.5	-84.5	-85	-83.5	-82.5	-81.5	-83.0	31	62
	64QAM StrongFEC	-81.5	-82.5	-82	-82	-80.5	-80	-79.5	-81.0	41	82
	128QAM StrongFEC	-78.5	-79.5	-79	-78.5	-77.5	-76.5	-75.5	-77.5	50	98
	256QAM StrongFEC	-75	-75.5	-75.5	-75.5	-74.5	-73.5	-73	-73.5	58	116
	512QAM StrongFEC	-71.5	-72.5	-72.5	-72.5	-71.5	-70.5	-70.5	-70.5	66	132
	1024QAM StrongFEC	-69.5	-69.5	-69	-69	-68.5	-68	-66.5	-67.0	74	148
14 ETSI	2048QAM StrongFEC	-65.5	-66.5	-66	-66	-64.5	-64	-63.5	-64.0	82	162
	4096QAM StrongFEC	-62.5	-62.5	-63	-62	-60.5	-60	-59.5	-	89	176
	4096QAM WeakFEC	-59.5	-60.5	-60	-60.5	-58.5	-57.5	-57.5	-	93	186
	4QAM StrongFEC	-90.5	-91.5	-92.5	-90.5	-90.5	-89	-88.5	-89.0	20	40
	16QAM StrongFEC	-86.5	-87.5	-87	-86	-85.5	-84.5	-83.5	-85.0	34	68
	32QAM StrongFEC	-82.5	-83.5	-83	-82.5	-81.5	-81.5	-80.5	-80.5	43	86
	64QAM StrongFEC	-79.5	-80.5	-80	-80	-78.5	-79	-77.5	-78.0	58	116
	128QAM StrongFEC	-77.5	-77.5	-77	-77.5	-76.5	-75.5	-74.5	-76.0	69	138
	256QAM StrongFEC	-74.5	-73.5	-74	-74	-72.5	-72	-71.5	-72.5	81	162
	512QAM StrongFEC	-70.5	-71.5	-71	-71	-69.5	-69	-67.5	-68.5	92	184
20 FCC	1024QAM StrongFEC	-68.5	-68.5	-67.5	-67.5	-66.5	-67	-65.5	-65.0	104	208
	2048QAM StrongFEC	-64.5	-64.5	-65	-64	-63.5	-62.5	-61.5	-61.0	115	230
	4096QAM StrongFEC	-60.5	-61.5	-61	-60.5	-59.5	-59	-58	-56.0	125	250
	4096QAM WeakFEC	-58.5	-59.5	-59	-58.5	-57.5	-56.5	-56	-52.5	131	262
	4QAM StrongFEC	-88.5	-89.5	-90.5	-89	-88.5	-88	-86.5	-87.0	29	58
	16QAM StrongFEC	-84.5	-85.5	-85	-84.5	-83.5	-83.5	-82.5	-83.0	50	100
	32QAM StrongFEC	-81.5	-81.5	-81.5	-81	-80.5	-79.5	-78.5	-78.5	62	124
	64QAM StrongFEC	-78.5	-78.5	-78	-78	-77.5	-77	-75.5	-76.0	83	166
	128QAM StrongFEC	-75.5	-76.5	-75.5	-75.5	-74.5	-73.5	-73.5	-73.5	100	200
	256QAM StrongFEC	-72.5	-72	-72	-72	-70.5	-70.5	-70	-70.5	117	234
20 ETSI	512QAM StrongFEC	-68.5	-69.5	-69	-69.5	-67.5	-67.5	-66.5	-66.5	133	266
	1024QAM StrongFEC	-66.5	-65.5	-66	-66	-64.5	-65	-63.5	-63.0	150	300
	2048QAM StrongFEC	-62.5	-63.5	-63	-63	-61.5	-60.5	-60.5	-59.0	166	322
	4096QAM StrongFEC	-59.5	-59.5	-60	-59	-57.5	-58	-56.5	-54.0	181	362
	4096QAM WeakFEC	-57.5	-57.5	-58	-57	-55.5	-55	-54	-51.5	190	380
	4QAM StrongFEC	-88.5	-89.5	-90.5	-89	-88.5	-88	-86.5	-87.0	30	60
	16QAM StrongFEC	-84.5	-85.5	-85	-84.5	-83.5	-83.5	-82.5	-83.0	51	102
	32QAM StrongFEC	-81.5	-81.5	-81.5	-80.5	-80.5	-79.5	-78.5	-78.5	64	128
	64QAM StrongFEC	-78.5	-78.5	-78	-78	-77.5	-77	-75.5	-76.0	85	170
	128QAM StrongFEC	-75.5	-76.5	-75.5	-75	-74.5	-73.5	-73.5	-73.5	102	204
	256QAM StrongFEC	-72.5	-72	-72	-72	-70.5	-70.5	-70	-70.5	119	238
20 ETSI	512QAM StrongFEC	-68.5	-69.5	-69	-69	-67.5	-67.5	-66.5	-66.5	136	272
	1024QAM StrongFEC	-66.5	-65.5	-66	-65.5	-64.5	-65	-63.5	-63.0	154	308
	2048QAM StrongFEC	-62.5	-63.5	-63	-62.5	-61.5	-60.5	-60.5	-59.0	170	340
	4096QAM StrongFEC	-59.5	-59.5	-60	-59	-57.5	-58	-56.5	-54.0	186	372
	4096QAM WeakFEC	-57.5	-57.5	-58	-57	-55.5	-55	-54	-51.5	194	388

RSL Thresholds and Capacity for Integra-X

BW, MHz	Modulation	Guaranteed RSL Threshold, dBm								Capacity, Mbps	
		6 GHz	7 GHz	8 GHz	11 GHz	13 GHz	15 GHz	18 GHz	23 GHz**	Single Channel Mode	2+0 XPIC Mode
25 FCC	4QAM StrongFEC	-86.5	-88.5	-89.5	-89	-87.5	-87	-85.5	-86.0	37	74
	16QAM StrongFEC	-84	-84	-84	-84.5	-83.5	-82.5	-81.5	-82.0	63	126
	32QAM StrongFEC	-80.5	-80.5	-80.5	-80.5	-79.5	-78.5	-77.5	-77.5	79	158
	64QAM StrongFEC	-77.5	-77.5	-77	-78	-76.5	-76	-74.5	-75.0	105	210
	128QAM StrongFEC	-74.5	-75	-75	-74.5	-73.5	-72.5	-72.5	-73.5	126	252
	256QAM StrongFEC	-71.5	-71.5	-71	-71.5	-69.5	-69.5	-69	-70.0	147	294
	512QAM StrongFEC	-68.5	-68.5	-68	-68.5	-67.5	-66.5	-65.5	-65.5	168	336
	1024QAM StrongFEC	-65.5	-65	-65	-65	-63.5	-64	-62.5	-62.0	189	378
	2048QAM StrongFEC	-61.5	-61.5	-62	-62	-60.5	-60	-59.5	-59.0	209	418
	4096QAM StrongFEC	-58.5	-58.5	-59	-58.5	-56.5	-57	-55.5	-54.0	229	458
28 ETSI	4096QAM WeakFEC	-56.5	-56	-57	-56.5	-54.5	-54	-53.5	-51.5	239	478
	4QAM StrongFEC	-87.5	-88.5	-88.5	-88.5	-86.5	-87	-85.5	-84.0	40	80
	16QAM StrongFEC	-83.5	-83.5	-84	-84	-82.5	-81.5	-81	-82.0	69	138
	32QAM StrongFEC	-79.5	-80.5	-80	-80	-78.5	-78.5	-77.5	-77.5	87	174
	64QAM StrongFEC	-76.5	-77	-77	-77.5	-76.5	-76	-74.5	-75.0	116	232
	128QAM StrongFEC	-74.5	-74	-74	-74	-72.5	-72.5	-71.5	-72.5	139	278
	256QAM StrongFEC	-71.5	-70.5	-71	-71	-69.5	-69.5	-68.5	-69.5	162	324
	512QAM StrongFEC	-67.5	-68.5	-68	-68	-66.5	-66.5	-65.5	-64.5	185	370
	1024QAM StrongFEC	-64.5	-64.5	-65	-65	-63.5	-63	-62.5	-61.0	208	416
	2048QAM StrongFEC	-61.5	-61	-61.5	-61.5	-60.5	-59.5	-58.5	-58.0	230	460
30 FCC	4096QAM StrongFEC	-57.5	-58	-58	-58	-56.5	-56	-55	-54.0	250	500
	4096QAM WeakFEC	-56	-56.5	-56.5	-56	-54.5	-53.5	-53	-51.5	262	524
	4QAM StrongFEC	-87.5	-87	-88.5	-88.5	-86.5	-86	-84.5	-84.0	43	86
	16QAM StrongFEC	-82.5	-83.5	-83	-83.5	-82.5	-81.5	-80.5	-81.0	75.3	150
	32QAM StrongFEC	-79.5	-80	-80	-79.5	-78.5	-77.5	-76.5	-76.5	94	188
	64QAM StrongFEC	-75.5	-77	-77	-77	-75.5	-75	-74.5	-75.0	125	250
	128QAM StrongFEC	-73.5	-74	-74	-74	-72.5	-71.5	-71.5	-73.0	150	300
	256QAM StrongFEC	-71.5	-69.5	-70.5	-71	-69.5	-68.5	-68.5	-68.5	175	350
	512QAM StrongFEC	-67.5	-67.5	-67.5	-67.5	-66.5	-66	-65	-64.5	200	400
	1024QAM StrongFEC	-64.5	-64	-64	-64.5	-62.5	-63	-61.5	-62.0	225	450
40 FCC	2048QAM StrongFEC	-60.5	-61	-61	-61.5	-59.5	-59.5	-58.5	-58.0	248	496
	4096QAM StrongFEC	-57.5	-57.5	-58	-57.5	-56.5	-56	-54.5	-54.0	272	544
	4096QAM WeakFEC	-55.5	-55	-56	-56	-54.5	-53.5	-52.5	-51.5	284	568
	4QAM StrongFEC	-84.5	-86	-87	-85.5	-85.5	-85	-83.5	-84.0	60	120
	16QAM StrongFEC	-81.5	-82	-82	-82	-80.5	-80.5	-79.5	-80.0	103	206
	32QAM StrongFEC	-78.5	-78.5	-78.5	-78.5	-77.5	-76.5	-75.5	-75.5	129	258
	64QAM StrongFEC	-74.5	-75.5	-75	-75.5	-74.5	-74	-73	-73.0	172	344
	128QAM StrongFEC	-72.5	-72.5	-73	-72.5	-71.5	-70.5	-70	-70.5	206	412
	256QAM StrongFEC	-69.5	-67.5	-69	-69.5	-67.5	-67.5	-66.5	-67.5	241	482
	512QAM StrongFEC	-64.5	-66	-66	-66	-65.5	-64.5	-63.5	-62.5	275	550
40 ETSI	1024QAM StrongFEC	-63.5	-61.5	-63	-63	-61.5	-61	-60.5	-60.0	310	620
	2048QAM StrongFEC	-59.5	-60	-60	-59.5	-58.5	-58	-57	-56.0	342	684
	4096QAM StrongFEC	-56.5	-56	-57	-56	-54.5	-55	-53.5	-52.0	374	748
	4096QAM WeakFEC	-54.5	-54	-55	-54.5	-52.5	-52.5	-50.5	-49.5	391	782
	4QAM StrongFEC	-84.5	-86	-87	-87	-85.5	-85	-83.5	-84.0	58	116
	16QAM StrongFEC	-81.5	-82	-82	-82	-80.5	-80.5	-79.5	-80.0	100	200
	32QAM StrongFEC	-78.5	-78.5	-78.5	-78.5	-77.5	-76.5	-75.5	-75.5	125	250
	64QAM StrongFEC	-74.5	-75.5	-75	-75.5	-74.5	-74	-73	-73.0	167	334
	128QAM StrongFEC	-72.5	-72.5	-73	-72.5	-71.5	-70.5	-70	-70.5	201	402
	256QAM StrongFEC	-69.5	-67.5	-69	-69	-67.5	-67.5	-66.5	-67.5	234	468
50 FCC	512QAM StrongFEC	-64.5	-66	-66	-66.5	-65.5	-64.5	-63.5	-62.5	267	534
	1024QAM StrongFEC	-63.5	-61.5	-63	-63	-61.5	-61	-60.5	-60.0	301	602
	2048QAM StrongFEC	-59.5	-60	-60	-60	-58.5	-58	-57	-56.0	332	664
	4096QAM StrongFEC	-56.5	-56	-57	-56	-54.5	-55	-53.5	-52.0	363	726
	4096QAM WeakFEC	-54.5	-54	-55	-54.5	-52.5	-52.5	-50.5	-49.5	380	760
	4QAM StrongFEC	-85.5	-85.5	-86	-86	-84.5	-83	-82.5	-83.0	75	150
	16QAM StrongFEC	-80.5	-81.5	-81	-81.5	-79.5	-79.5	-78	-79.0	129	258
	32QAM StrongFEC	-77.5	-77.5	-77	-77.5	-75.5	-75.5	-74	-74.5	162	324
	64QAM StrongFEC	-73.5	-75.5	-75	-74.5	-73.5	-73	-72	-72.0	216	432
	128QAM StrongFEC	-71.5	-71.5	-72	-71.5	-70.5	-69.5	-68.5	-69.5	259	518
50 ETSI	256QAM StrongFEC	-68.5	-67.5	-68	-68.5	-67.5	-66.5	-65.5	-66.5	302	604
	512QAM StrongFEC	-63.5	-65.5	-65.5	-65.5	-64.5	-63.5	-62.5	-62.5	345	690
	1024QAM StrongFEC	-62.5	-60.5	-62	-62	-60.5	-60	-58.5	-60.0	388	776
	2048QAM StrongFEC	-58.5	-59.5	-59	-59	-57.5	-56.5	-56	-55.0	429	858
	4096QAM StrongFEC	-55.5	-55.5	-55	-55	-53.5	-54	-52	-52.0	469	938
	4096QAM WeakFEC	-53.5	-53.5	-54	-53.5	-51.5	-51.5	-50.5	-48.5	491	982

RSL Thresholds and Capacity for Integra-X

BW, MHz	Modulation	Guaranteed RSL Threshold, dBm								Capacity, Mbps	
		6 GHz	7 GHz	8 GHz	11 GHz	13 GHz	15 GHz	18 GHz	23 GHz**	Single Channel Mode	2+0 XPIC Mode
56 ETSI	4QAM StrongFEC	-84.5	-84.5	-85.5	-85.5	-83.5	-83	-82	-81.0	85	170
	16QAM StrongFEC	-80.5	-80.5	-81	-80.5	-79.5	-78.5	-77.5	-78.0	145	290
	32QAM StrongFEC	-76.5	-77.5	-77	-77	-75.5	-74.5	-74	-74.5	182	364
	64QAM StrongFEC	-73.5	-74.5	-74	-74	-72.5	-73	-71.5	-73.0	242	484
	128QAM StrongFEC	-70.5	-71.5	-71	-71	-69.5	-69.5	-68.5	-69.5	291	582
	256QAM StrongFEC	-68.5	-66.5	-68	-68	-66.5	-66.5	-65	-65.5	339	678
	512QAM StrongFEC	-64.5	-64.5	-65	-64.5	-63.5	-62.5	-62	-61.5	388	776
	1024QAM StrongFEC	-61.5	-59.5	-62	-61.5	-60.5	-60	-58	-59.0	436	872
	2048QAM StrongFEC	-57.5	-58.5	-58.5	-58	-56.5	-56.5	-55.5	-55.0	482	964
	4096QAM StrongFEC	-54.5	-55.5	-55	-55	-53.5	-53	-51.5	-51.0	527	1054
60 FCC	4096QAM WeakFEC	-52.5	-53.5	-53	-53	-51.5	-50.5	-49.5	-48.5	551	1102
	4QAM StrongFEC	-84.5	-84.5	-85.5	-85.5	-83.5	-83	-81.5	-81.0	88	176
	16QAM StrongFEC	-80.5	-80.5	-80	-80.5	-78.5	-78.5	-77.5	-78.0	151	302
	32QAM StrongFEC	-76.5	-77.5	-76.5	-77	-75.5	-74.5	-73.5	-73.5	189	378
	64QAM StrongFEC	-73.5	-74.5	-74	-74	-72.5	-72	-71.5	-72.0	252	504
	128QAM StrongFEC	-70.5	-71.5	-71	-71	-69.5	-69.5	-68.5	-69.5	302	604
	256QAM StrongFEC	-67.5	-66.5	-67.5	-67.5	-66.5	-65.5	-65	-65.5	353	706
	512QAM StrongFEC	-63.5	-64.5	-65	-64.5	-63.5	-62.5	-62	-61.5	403	806
	1024QAM StrongFEC	-61.5	-59.5	-61	-61	-59.5	-60	-58.5	-58.0	454	908
	2048QAM StrongFEC	-58.5	-58.5	-58.5	-58	-55.5	-56	-55.5	-55.0	501	1002
60 ETSI	4096QAM StrongFEC	-54.5	-54.5	-55	-54.5	-52.5	-53	-51.5	-51.0	548	1096
	4096QAM WeakFEC	-52.5	-53.5	-53	-52.5	-50.5	-50.5	-49.5	-47.5	573	1146
	4QAM StrongFEC	-84.5	-84.5	-85.5	-85.5	-83.5	-83	-81.5	-81.0	85	170
	16QAM StrongFEC	-80.5	-80.5	-80	-80.5	-78.5	-78.5	-77.5	-78.0	145	290
	32QAM StrongFEC	-76.5	-77.5	-76.5	-77	-75.5	-74.5	-73.5	-73.5	182	364
	64QAM StrongFEC	-73.5	-74.5	-74	-74	-72.5	-72	-71.5	-72.0	242	484
	128QAM StrongFEC	-70.5	-71.5	-71	-71	-69.5	-69.5	-68.5	-69.5	291	582
	256QAM StrongFEC	-67.5	-66.5	-67.5	-68	-66.5	-65.5	-65	-65.5	338	678
	512QAM StrongFEC	-63.5	-64.5	-65	-64.5	-63.5	-62.5	-62	-61.5	388	776
	1024QAM StrongFEC	-61.5	-59.5	-61	-61	-59.5	-60	-58.5	-58.0	436	872
80 FCC	2048QAM StrongFEC	-58.5	-58.5	-58.5	-58	-55.5	-56	-55.5	-55.0	482	964
	4096QAM StrongFEC	-54.5	-54.5	-55	-55	-52.5	-53	-51.5	-51.0	527	1054
	4096QAM WeakFEC	-52.5	-53.5	-53	-53	-50.5	-50.5	-49.5	-47.5	551	1102
	4QAM StrongFEC	-83.5	-83.5	-84	-84.5	-82.5	-82	-80.5	-80.0	118	236
	16QAM StrongFEC	-79.5	-79.5	-79	-79.5	-77.5	-77.5	-76.5	-77.0	203	406
	32QAM StrongFEC	-75.5	-75.5	-75.5	-76	-74.5	-73.5	-72.5	-72.5	254	508
	64QAM StrongFEC	-71.5	-72.5	-73	-73	-71.5	-71	-69.5	-71.0	338	676
	128QAM StrongFEC	-69.5	-69.5	-70	-70	-68.5	-67.5	-66.5	-68.5	406	812
	256QAM StrongFEC	-66.5	-65.5	-66	-66.5	-65.5	-64.5	-63.5	-64.5	473	946
	512QAM StrongFEC	-61.5	-63.5	-63.5	-63.5	-62.5	-61.5	-60.5	-60.5	541	1082
100 FCC	1024QAM StrongFEC	-59.5	-58.5	-60	-60.5	-58.5	-58	-57.5	-57.0	608	1216
	2048QAM StrongFEC	-56.5	-57.5	-57	-57	-54.5	-54.5	-54.5	-54.0	672	1344
	4096QAM StrongFEC	-53.5	-53.5	-54	-53.5	-51.5	-52	-50.5	-50.0	735	1470
	4096QAM WeakFEC	-51.5	-51.5	-52	-51.5	-49.5	-49	-48.5	-46.5	769	1538
	4QAM StrongFEC	-81.5	-81.5	-83	-83.5	-78.5	-78	-79.5	-79.0	148	296
	16QAM StrongFEC	-78.5	-78.5	-78	-78.5	-76.5	-76.5	-75.5	-76.0	254	508
	32QAM StrongFEC	-74.5	-74.5	-74	-74.5	-73.5	-72.5	-71.5	-72.5	318	636
	64QAM StrongFEC	-70.5	-71.5	-71	-72	-70.5	-70	-68.5	-69.0	423	846
	128QAM StrongFEC	-68.5	-68.5	-68.5	-68.5	-67.5	-67	-65.5	-66.5	508	1016
	256QAM StrongFEC	-65.5	-65.5	-65	-65.5	-63.5	-63.5	-62.5	-63.5	592	1184
112 ETSI	512QAM StrongFEC	-60.5	-62.5	-62	-62.5	-60.5	-60.5	-59.5	-58.5	677	1354
	1024QAM StrongFEC	-58.5	-59.5	-59	-59.5	-57.5	-58	-56.5	-56.0	761	1522
	2048QAM StrongFEC	-54.5	-55.5	-56	-56	-52.5	-53.5	-53.5	-52.0	841	1682
	4096QAM StrongFEC	-52.5	-52.5	-53	-52.5	-50.5	-51	-49.5	-49.0	920	1840
	4096QAM WeakFEC	-50.5	-50.5	-51	-50.5	-48.5	-48	-47.5	-44.5	962	1924
	4QAM StrongFEC	-80.5	-82.5	-82.5	-82.5	-80.5	-79	-78.5	-77.0	170	340
	16QAM StrongFEC	-77.5	-77.5	-77	-78	-75.5	-75.5	-74.5	-75.0	291	582
	32QAM StrongFEC	-73.5	-74.5	-74	-74	-72.5	-71.5	-71.5	-70.5	364	728
	64QAM StrongFEC	-69.5	-70.5	-71	-71	-69.5	-70	-68.5	-69.0	486	972
	128QAM StrongFEC	-67.5	-68.5	-68	-68	-66.5	-66.5	-64.5	-66.5	583	1166
112 ETSI	256QAM StrongFEC	-64.5	-64.5	-64.5	-65	-63.5	-62.5	-61.5	-63.5	680	1360
	512QAM StrongFEC	-59.5	-61.5	-62	-62	-60.5	-59.5	-58.5	-58.5	777	1554
	1024QAM StrongFEC	-58.5	-57.5	-58.5	-58.5	-56.5	-57	-55.5	-55.0	874	1748
	2048QAM StrongFEC	-55.5	-55.5	-55	-55	-53.5	-52.5	-52.5	-52.0	965	1930
	4096QAM StrongFEC	-51.5	-52.5	-52	-51.5	-49.5	-50	-48.5	-48.0	1055	2110
	4096QAM WeakFEC	-49.5	-49.5	-50	-49.5	-48.5	-47.5	-46.5	-44.5	1104	2208

** Modes, marked with hyphen do not have guaranteed RSL values.