

Integra-E2

SAF Tehnika with over 20 years of microwave point-to-point radio design and manufacturing experience is pleased to introduce the newest member of the Integra family of radios. The Integra-E2: Having the same Integra family characteristics of high-reliability, carrier grade features and performance, and 5-year warranty extends the Integra family into the E-band frequencies, delivering 10 Gbps capacity.

The Integra-E2 supports Adaptive Code Modulation and Bandwidth (ACMB) in which the coding rate, modulation and bandwidth changes are set in real time based on the link's conditions. This feature enables significant increase in payload capacity and link availability. ACMB switching is hitless, that is, the link stays locked, and data is transmitted without errors.

In most countries E-band radios are easy to deploy with no or minimal licensing requirements. Reducing time to deployment and reducing Total Cost of Ownership (TCO).



Pic 1. The exterior of Integra-E2 with antenna flange up

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Technical specification

		Integra-E2
General		
Concept / form factor	FODU with direct-mount antenna	
Frequency band	71 - 76 GHz paired with 81 - 86 GHz	
Duplex shift	10 GHz	
Frequency stability	± 10 ppm	
Capacity	Up to 10 Gbps at 2000 MHz 128QAM	
Max modulation	1024QAM	
Configurations	1+0	
ATPC	Yes	
ACMB	Adaptive Code Modulation and Bandwidth (ACMB), Hitless	
Channel bandwidth	62.5, 125, 250, 500, 1000, and 2000 MHz	
FEC	LDPC FEC by default. R&S available for backwards compatibility.	
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 electrical port with built-in PoE splitter and surge arrestor
Power	DC port	Screw type terminal block, pluggable, 2 pin, centerline 3.81 mm / 0.15 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 Ø 3.18 mm
Ethernet		
Ethernet	Built-in Carrier Ethernet 10 Gigabit Switch	
VLAN	802.1Q 4096 VLANs, QinQ (Provider Bridging), VLAN Rate	
Synchronization	SyncE, IEEE-1588 v2 PTP transparent clock (TC) mode	
Quality of Service	8 level 802.1p, 64 level 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	
Jumbo frames	Yes, 12288 bytes	
Protection	LSP (Link State propagation) with Backup link switching, each Ethernet port separately configurable.	
Encryption	AES256*	
Management	SNMP v1/2c/3, SSH, Telnet, HTTPS, Serial, RADIUS, Network Time Protocol In-band Management over same ETH port. Out-band Management is configurable using VLANS.	
Performance monitoring	Performance graphs, constellation diagram, alarms, detailed counters	
Electrical		
Power consumption	Up to 50 W	
Voltage range	36...57 V DC	
Surge protection.	DC power port conforms to IEC EN 61000-4-5 Class 3, up to 2KV surge	
* Inquire SAF representative for more information		

Mechanical specification

Mechanical & Environmental	
Stationary use	Conforms to ETSI EN 300 019 Class 4.1, IP67, NEMA 6
Temperature range	-33...+55 °C / -28...+130 °F
Size	280 x 400 x 70 mm / 11.02" x 15.8" x 2.8" (including cable gland)
Weight	7.1 kg / 15.7 lbs
Mount	Mount on antenna
Antenna	External antenna, direct-mount (slip-fit) with SAF2 adaptation

* Inquire SAF representative for more information



Pic 2. The exterior of Integra-E2 with rear side up

Tx Power Ranges for Integra-E2

Modulation	Tx power, dBm
BPSK/4	-2 ... +19
BPSK/2	-2 ... +19
BPSK	-2 ... +19
4QAM	-2 ... +19
16 QAM	-2 ... +18
32 QAM	-2 ... +17
64 QAM	-2 ... +16
128 QAM	-2 ... +15

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256 QAM	-2 ... +14**
512 QAM	-2 ... +13
1024 QAM	-2 ... +12

** +13 dBm in backwards compatibility mode with R&S FEC

Guaranteed RSL Thresholds and Capacity for Integra-E2^{1, 2}

Forward Error Correction		LDPC (default, recommended)		R&S (for backwards compatibility)	
Bandwidth, MHz	Modulation	RSL Threshold, dBm	Capacity, Mbps	RSL Threshold, dBm	Capacity, Mbps
62.5	BPSK /2	-	-	-90.5	9
	BPSK	-86.5	34	-87.5	19
	4QAM	-84.5	68	-81.5	65
	16QAM	-77	136	-74	131
	32QAM	-72.5	170	-71	164
	64QAM	-71	205	-68	197
	128QAM	-68	239	-64.5	230
	256QAM	-65	273	-61.5	263
	512QAM	-62	307	-	-
	1024QAM	-59	341	-	-
125	BPSK /4	-	-	-90	11
	BPSK /2	-	-	-86.5	23
	BPSK	-82.5	79	-83	46
	4QAM	-80	158	-77.5	156
	16QAM	-73	317	-70	313
	32QAM	-70	396	-67	392
	64QAM	-67	476	-64	471
	128QAM	-64.5	555	-61	549
	256QAM	-61.5	634	-58	628
	512QAM	-58.5	714	-	-
1024QAM	-55.5	793	-	-	
250	BPSK /4	-	-	-86.5	30
	BPSK /2	-84	82	-83.5	60
	BPSK	-78.5	173	-80	120
	4QAM	-76.5	364	-74	363
	16QAM	-69.5	728	-67	727
	32QAM	-66	910	-64	909
	64QAM	-63.5	1092	-61	1091
	128QAM	-60.5	1275	-57.5	1273
	256QAM	-58	1457	-54.5	1455
	512QAM	-55	1639	-	-
1024QAM	-52	1821	-	-	
500	BPSK /4	-82	105	-83	67
	BPSK /2	-79.5	169	-80	134
	BPSK	-76	337	-76	268
	4QAM	-73	720	-71	719
	16QAM	-66	1440	-64	1440
	32QAM	-63	1800	-61	1800
	64QAM	-60	2160	-57.5	2160
	128QAM	-57	2520	-54.5	2520
	256QAM	-54.5	2881	-52	2881
	512QAM	-51.5	3241	-	-
1024QAM	-48.5	3601	-	-	
1000	BPSK /4	-79.5	172	-79.5	134
	BPSK /2	-76	331	-76.5	269
	BPSK	-72.5	661	-73	538
	4QAM	-69.5	1433	-67.5	1431
	16QAM	-62.5	2867	-60.5	2864
	32QAM	-59.5	3584	-57.5	3581
	64QAM	-56.5	4300	-54	4297
	128QAM	-53.5	5017	-51.5	5014
	256QAM	-50.5	5734	-48.5	5730
	512QAM	-47.5	6451	-	-
1024QAM	-44	7167	-	-	
2000	BPSK /4	-76	325	-76	286
	BPSK /2	-72.5	649	-73	571
	BPSK	-69.5	1298	-69.5	1143
	4QAM	-65.5	2857	-64	2855
	16QAM	-58.5	5714	-57	5713
	32QAM	-55	7143	-54	7142
	64QAM	-52.5	8572	-51	8570
	128QAM	-49	10000	-48	9999

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- 1** The LDPC Forward Error Correction mode is the default one and recommended for all modulation schemes. Reed-Solomon Forward Error Correction is available for backwards compatibility.
- 2** BPSK /2 means BPSK operation with a half of bandwidth, BPSK /4 means BPSK operation with a quarter of bandwidth.

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