



## GENERAL



Frequency range <sup>1</sup>		<b>Frequency range</b>	<b>Reference</b>	<b>Tx-Rx Offset</b>
		1350 – 1517 MHz	CEPT T/R 13-01 A ITU-R F.1242 p1	142 MHz
		1375 – 1452 MHz	CEPT T/R 13-01 B	52 MHz
		1427 – 1517 MHz	ITU-R F.1242 p2	65 MHz
		1425 – 1535 MHz	ITU-R F.746-2	65.5 MHz
		1427 – 1518 MHz	IC SRSP-301.4	66.5 MHz
		1427 – 1535 MHz	Australia FX3	60.5 MHz
		1427 – 1535 MHz	Mexico	54.5 MHz
		1427 – 1525 MHz	India, Plan No-7	49 MHz
		300 – 520 MHz	<i>Custom design</i> <sup>1</sup>	9.45 to 36 MHz
		<b>Channel bandwidth</b>		<b>Capacity range</b> <sup>2</sup>
Channel bandwidth	Narrow version	0.25, 0.5, 0.75, 1, 1.25, 1.75, 2, 3.5, 4 MHz		0.2 – 20 Mbps
	Wide version	1, 1.5, 1.75, 2, 3, 3.5, 4, 5, 7, 8 MHz		0.8 – 43 Mbps
Modulation		4QAM / 16QAM / 32QAM / 64QAM / 128QAM		
Guaranteed max power			<b>Marathon II</b>	<b>Marathon II HP</b>
		4QAM	+30 dBm	+36 dBm
		16QAM	+29 dBm	+35 dBm
		32QAM	+28 dBm	+34 dBm
		64QAM	+26 dBm	+32 dBm
		128QAM	+26 dBm	+32 dBm

## PERFORMANCE



Configuration	1+0, 1+1 (HSB, SD, FD) Ring/Mesh (with RSTP) 2+0, 3+0, 4+0 (built-in Ethernet aggregation)
ACM and ATPC	Hitless
Protection switching	Hot Stand-by (<50ms), Space/Frequency diversity (hitless, errorless)

## ETHERNET



Switch type	Managed Gigabit Ethernet Layer 2
Max frame size	1536 bytes
MAC table	4K entries; automatic learning and aging
Packet buffer	128KB; non-blocking store & forward
Flow Control	802.3x
VLAN support	802.1Q (up to 4K VLAN entries)
QinQ (Double Tagging)	Yes
QoS	64 level DiffServ (DSCP) or 8 level 802.1p mapped in 4 prioritization queues with VLAN support
QoS queuing	Fixed or weighted (configurable ratio)
Spanning Tree Protocol	802.1D-2004 RSTP, 802.1Q-2005 MSTP

<sup>1</sup> CFIP Marathon II supports various channel plan arrangements in the frequency range from 1350MHz to 1535MHz, from 300MHz to 520MHz and other bands. Please contact SAF Tehnika to verify specific channel plan

<sup>2</sup> Total capacity is shared between Ethernet traffic, E1, service channels and other software configurable options



# Marathon II

## Microwave Radio System



### PORTS



RF Output (to antenna)	1x N-type Female
Ethernet	4x RJ-45 (data traffic, management port) 10/100/1000 Base-T
	<b>Marathon II, Marathon II HP</b>
E1/T1	4x E1 (4x RJ-45) +8x E1 (8x RJ-45), 12xE1 version only <sup>3</sup>
E1 port mode	4x E1 ports are unframed (unstructured) G.703 1x E1 with fractional E1 G.704 support, 1-32 Time slots switchable
Serial interface port for traffic	+2x DB-25, V.24/V.28 serial version only <sup>3</sup>
RSSI port for RSL	2mm test jack, output V vs RSL: 0 to 2V vs -120 to -20dBm
Serial port for management	1x DB-9
Alarm	4 digital inputs, 4 relay outputs (26 pin hi-density D-SUB)
EOW port	2x 3.5mm, headset and mic, 64 Kbps
1+1 Protection port	1x RJ-45, 1xPower protection port <sup>3</sup>
DC power connector	1x 2ESDV-02 with screw locks

### MANAGEMENT



Management ports	Ethernet VLAN or Separate Ethernet (RJ45)
SNMP	Yes, SNMP traps, MIB, SNMP v1/v2c
Element Management System	Web based HTTP, Telnet, FTP, Serial ASCII
Performance graphs	Rx level, Tx level, Radial MSE, LDPC decoder stress, System temperature, Modem temperature, Input voltage, Power consumption, Equalizer graph, Uptime (counter only)
Ethernet performance	Per port Ethernet counters, Enhanced radio Ethernet statistics
Loopbacks	E1, modem, RF loopback

### ENVIRONMENTAL REQUIREMENTS



Stationary use	Climatic Class 3.1E compliant (ETSI ETS 300 019-1-3); IP 20; weather protected locations
Temperature range	-5° to +55°C
Humidity	5% to 95%
Air pressure	70 to 106 kPa

### MECHANICAL & TECHNICAL DATA



	Marathon II	Marathon II HP
Dimensions: HxWxD	44.9x428x230mm, 1U 19" Rack	88.9x428x230mm, 2U 19" Rack
Weight	3.8kg	5.2kg
DC port	-40.5V to -57V DC (conforms to ETSI EN 300 132-2)	
Built-in DC and antenna port surge protection	Conforms to ETSI EN 301 489-1; EN 61000-4-5; IEC 61000-4-5	
Max. Power consumption	Up to 30W	Up to 45W

<sup>3</sup> Optional





# Marathon II

Microwave Radio System



**Marathon II with Power protection port**



**Marathon II HP with 12x E1 Ports**



**Marathon II HP with 2x DB-25 V.24/V.28 Serial interface ports**



RECEIVED SENSITIVITY LEVEL (RSL) AT BER 10<sup>-6</sup> AND ETHERNET THROUGHPUT FOR STANDARD VERSION



Channel Bandwidth		0.25 MHz		0.5 MHz		0.75 MHz		1 MHz		1.25 MHz		1.75 MHz		2 MHz		3.5 MHz		4 MHz	
Modulation	FEC	RSL	Bit rate	RSL	Bit rate	RSL	Bit rate	RSL	Bit rate	RSL	Bit rate	RSL	Bit rate	RSL	Bit rate	RSL	Bit rate	RSL	Bit rate
		dBm	Kbps	dBm	Kbps	dBm	Kbps	dBm	Kbps	dBm	Kbps	dBm	Kbps	dBm	Kbps	dBm	Kbps	dBm	Kbps
4QAM	Strong	-106.5	180	-104.5	440	-103	660	-102.5	860	-101	1160	-99.5	1760	-98.5	2260	-96.5	3860	-95.5	4560
16QAM	Strong	-100.5	440	-97.5	960	-97	1360	-96.5	1860	-95	2360	-93.5	3560	-92.5	4660	-90.5	7960	-89.5	9260
32QAM	Strong	-96.5	580	-93.5	1230	-93	1760	-91.5	2360	-91	3060	-88.5	4460	-88.5	5860	-86.0	9860	-85.0	11460
64 QAM	Strong	-94.5	800	-90.5	1670	-90	2460	-89.5	3260	-88	4060	-86.5	5960	-86.0	7460	-83.5	13260	-83.0	15460
128 QAM	Strong	-90.5	980	-87.5	2020	-87	2960	-86.0	3960	-85	4960	-83.5	7160	-83.0	8860	-80.0	15860	-79.0	18460
	Weak	-87.5	1070	-85.5	2200	-84	3160	-83.0	4260	-82	5360	-80.5	7760	-80.0	9660	-77.5	17160	-77.0	20060

RECEIVED SENSITIVITY LEVEL (RSL) AT BER 10<sup>-6</sup> AND ETHERNET THROUGHPUT FOR WIDE VERSION



Channel Bandwidth		1 MHz		1.5 MHz		1.75 MHz		2 MHz		2.5 MHz		3 MHz		3.5 MHz		4 MHz		5 MHz		7 MHz		8 MHz	
Modulation	FEC	RSL	Bit rate	RSL	Bit rate	RSL	Bit rate	RSL	Bit rate	RSL	Bit rate	RSL	Bit rate	RSL	Bit rate	RSL	Bit rate	RSL	Bit rate	RSL	Bit rate	RSL	Bit rate
		dBm	Kbps	dBm	Kbps	dBm	Kbps	dBm	Kbps	dBm	Kbps	dBm	Kbps	dBm	Kbps	dBm	Kbps	dBm	Kbps	dBm	Kbps	dBm	Kbps
4QAM	Strong	-102.5	860	-100.5	1460	-99.5	1760	-98.5	2260	-97.5	2960	-97.0	3360	-96.5	3860	-95.5	4560	-94.5	5760	-93.0	8660	-92.5	9960
16QAM	Strong	-96.5	1860	-94.5	2960	-93.5	3560	-92.5	4660	-91.5	5860	-90.0	6960	-90.5	7960	-89.5	9260	-88.5	11560	-87.5	17260	-87.0	19860
32QAM	Strong	-91.5	2360	-89.5	3760	-88.5	4460	-88.5	5860	-87.5	7360	-87.0	8660	-86.0	9860	-85.0	11460	-84.5	14360	-83.5	21560	-83.0	24660
64 QAM	Strong	-89.5	3260	-87.5	5060	-86.5	5960	-86.0	7460	-85.5	9260	-84.5	11660	-83.5	13260	-83.0	15460	-82.5	19260	-81.5	28660	-80.5	32860
128 QAM	Strong	-86.0	3960	-84.5	6160	-83.5	7160	-83.0	8860	-82.5	11160	-81.5	13960	-80.0	15860	-79.0	18460	-78.5	23160	-77.5	34460	-77.0	39460
	Weak	-83.0	4260	-81.5	6660	-80.5	7760	-80.0	9660	-79.5	12060	-78.5	15060	-77.5	17160	-77.0	20060	-75.5	25060	-74.5	37660	-73.5	43160

**Notes:** Bit rates are specified by disabled service channels EOW and 1+1. Enabling service channels reduces capacity by 160 kbps (80 kbps each).  
 Disabling of the management channel can add up to 100 kbps of capacity (custom design for extremely narrow bandwidths).  
 Forward Error Correction (FEC) can be optimized either for sensitivity (Strong FEC) or capacity (Weak FEC).

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