

# SUNWAVE



CROSSFIRE

## M2RU

MID POWER

4T4R Digital Radios  
37dBm Output Power  
Support 5GNR  
Outdoor Rated



## Revision History

Revision Number	Revision Date	Summary of Changes	Author
1.0.0	29 <sup>th</sup> April 2020	Initial Version	Allen Chu
1.0.1	4 <sup>th</sup> Aug 2020	Add ordering information	Allen Chu
1.0.2	10 <sup>th</sup> Aug 2021	Add ordering information	Allen Chu

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This is NOT a CONSUMER device. It is designed for installation by FCC LICENSEES and QUALIFIED INSTALLERS. You MUST have an FCC LICENSE or express consent of an FCC License to operate this device.

NOTE: Only authorized person can enter the area where the antenna is installed. And the person is fully aware of the potential for exposure and can exercise control over his or her exposure by leaving the area or by some other appropriate means.

Awareness of the potential for RF exposure in a workplace or similar environment can be provided through specific training as part of a RF safety program.

For pluggable equipment, the socket-outlet shall be easily accessible.

### Overview

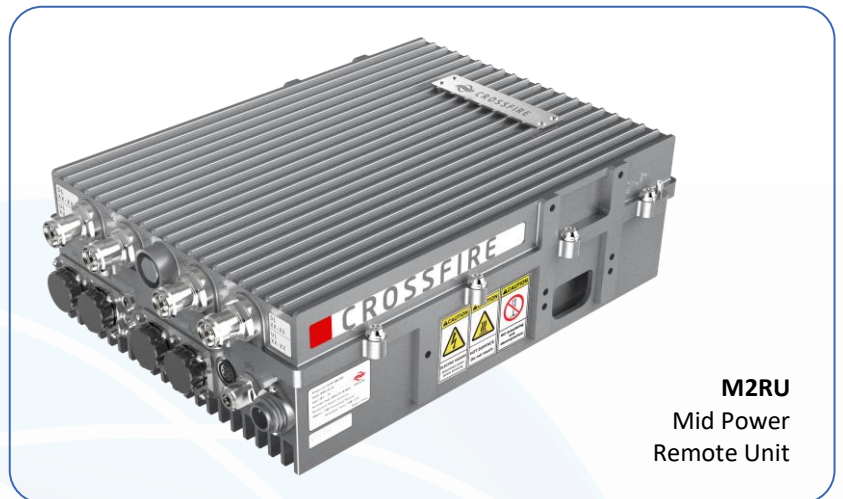
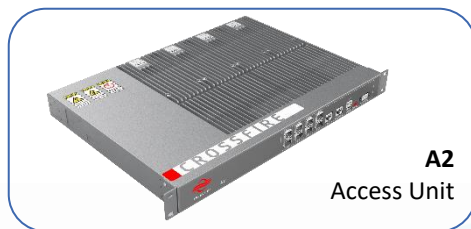
CrossFire M2RU is a digital transport platform supporting cellular and wideband public safety technologies on fibre optic cable using the CPRI protocol. The power amplifier technology adopts Digital Pre-Distortion, allowing for a significant improvement in power consumption compared with analogue technology. This platform is ideal for multi-operator multi-band deployments of cellular services into underground tunnels & outdoor coverage areas.

### Key Features

- Single Band 4T4R
- Dual Bands 2T2R
- Supports TDD & FDD
- Supports Sub-6GHz

- Up to 37dBm Output Power
- Supports External Alarm
- Up to 100MHz IBW
- 5GNR Compliant

### System Elements



### Block Diagram

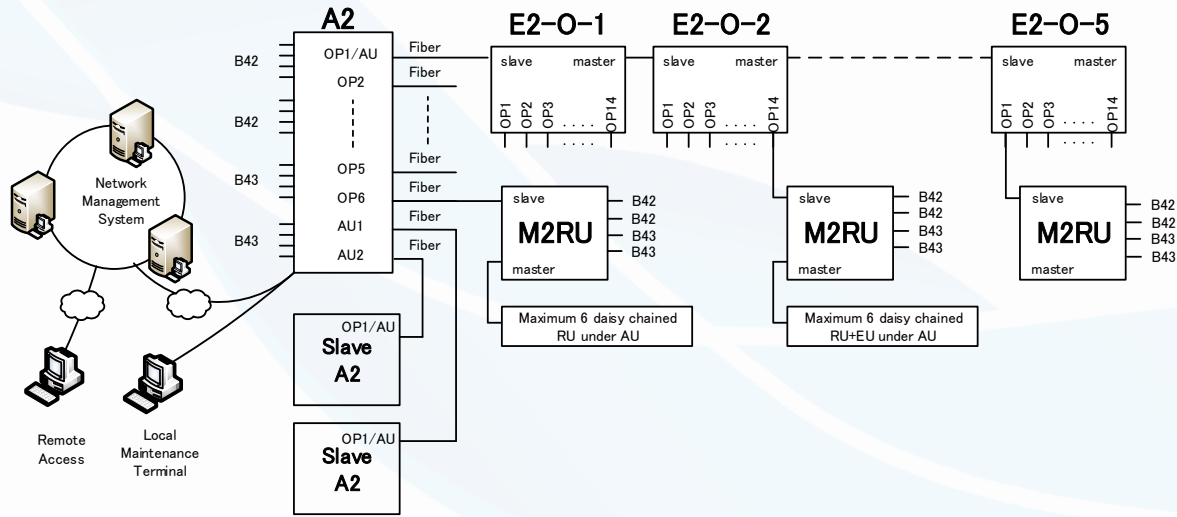


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## Technical Specifications

### System

Maximum RF Bands per Access Unit	4
Maximum RF Channels per Remote Unit	4
Maximum Access Units per System	3 (1 x Master A2 / 2 x Slaves A2)
Maximum E2s per Master A2	8
Maximum E2s cascaded	5
Maximum RUs cascaded	6
Frequency Range (Non-Contiguous)	600MHz – 6000MHz
Bandwidth per Channel (Downlink & Uplink)	≤100MHz (Contiguous)
Digital Bandwidth per Channel (Downlink & Uplink)	20 / 30 / 40 / 50 / 60 / 80 / 100MHz
Bandwidth per System (Downlink & Uplink)	≤400MHz (in each direction)
System Delay Adjustment	Up to 80.00µs @ 1us step, manual & auto, Band based.
Redundancy	Fiber Loopback
VSWR	1.5

### Forward Path (Downlink)

Number of Carriers	1	2	4	8	16
Output Power per Carrier(dBm)	37	34	31	28	25
Maximum Gain	37 ± 2dB				
Maximum Input Power	+15dBm (with AGC operating) / 0dBm (without AGC operating)				
EVM	<3.5% @ 256 QAM				
Ripple	4dB Typical				
Manual Attenuation Control	40dB @ 1dB/step (A2: 25dB, RU: 15dB)				
System Delay (A2+E2+RU)	12µs				

### Reverse Path (Uplink)

Maximum Output Power per Band	-13dBm
Maximum Gain	37 ± 2dB
Maximum Input Power	-35dBm

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# MID POWER

37dBm Output Power  
5GNR Compliant

Ripple	4dB Typical
Manual Gain Control	40dB @ 1dB/step (AU: 25dB, RU: 15dB)
System Delay (A2+E2+RU)	8µs
Noise Figure	4dB Typical @ Maximum Gain

## Interfaces

Antenna Interface (All bands)	4.3-10 Female
Access Unit RF Interface	QMA Female
Optical Connector Type	SFP+, Standard LC
Optical Transmission Rate	10.1376Gb/s
Optical Fibre Length	1.4km / 10km / 30km 0.87mi / 6.21mi / 18.64mi
Dry Contact	AU: 4 Inputs & 4 Outputs, NO and NC Mode RU: 2 Inputs & 2 Outputs, NO and NC Mode
Maintenance Interface	Ethernet RJ45

## Technical Specifications

### Supported Bands

Band	3GPP Band	Downlink	Uplink	Max Bandwidth
3500MHz	42	3400-3600	3400-3600	100
3500MHz	42*	3450-3650	3450-3650	100
3600MHz	48	3550-3700	3550-3700	100
3700MHz	43	3600-3800	3600-3800	100
2500MHz TDD	41	2496-2690	2496-2690	100
2300MHz TDD	40	2300-2400	2300-2400	100
1800MHz	3	1805-1880	1710-1785	75
1900MHz	25	1930-1995	1850-1915	65
2100MHz	1	2110-2170	1920-1980	60
2100MHz AWS	66E	2110-2200	1710-1780	90
2600MHz	7	2620-2690	2500-2570	70

### Electrical

Complies with	3GPP TS36.106   3GPP TS25.106
EMC	EN 301489-1 / -50, EN 50121-4, EN 55032, EN 61000-4 series
Safety	EN 60950-1, EN 60950-22, EN 62368-1, EN 50385
Maximum Power Consumption (A2/E2/RU)	80W / 50W / 150W
Power Supply	100-240V AC, 50/60Hz   48VDC ± 20%

### Environmental

Mean Time Between Failure (MTBF)	>100,000 hours
Operating Temperature (A2/E2)	-10°C to +50°C / 14°F to +122°F
Operating Temperature (RU)	-40°C to +55°C / -40°F to +131°F
Humidity	5% to 100% (Non-Condensing)
Cooling	Passive
Installation	A2/E2: Wall or 19" Rack   RU: Wall or Pole
Ingress Protection Rating	A2/E2: IP30 (Indoor)   RU: IP67 (Outdoor)

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Complies with	EN 300019-1-1, EN 300019-1-2, EN 300019-1-4
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## Mechanical

A2 (Width / Height / Depth / Weight)	440mm / 44mm / 329mm / 8.0kg (17.32in / 1.73in / 12.95in / 17.64lb)
E2-O (Width / Height / Depth / Weight)	440mm / 44mm / 220mm / 5.0kg (17.32in / 1.73in / 8.66in / 11.02lb)
RU (Width / Height / Depth / Weight)	360mm / 115mm / 260mm / 11.0kg (14.17in / 4.53in / 10.24in / 24.25lb)

## Element Management

OMT (Operations and Maintenance Terminal)	RJ45. Access via A2, E2 or RU (Web Based)
LMS (Local Management System)	Yes (Ordered separately)
Remote Alarming	SNMP V2C & V3, Dry Contact (NO or NC mode)



## Ordering Information

Part Code	Part Description
<b>Access Unit Chassis (2<sup>nd</sup> Generation)</b>	
A2-4-AC	Access Unit Chassis, 4 Bands, 360 - 3800MHz supported, 100-240v AC Powered
A2-4-DC	Access Unit Chassis, 4 Bands, 360 - 3800MHz supported, ±48v DC Powered
<b>Access Unit Modules</b>	
AU-AC-M1800	Access Unit Module, 4 Way Active Combiner 1800MHz (UL 1710-1785 / DL 1805-1880)
AU-AC-M1900	Access Unit Module, 4 Way Active Combiner 1900MHz (UL 1850-1915 / DL 1930-1995)
AU-AC-M2100E	Access Unit Module, 4 Way Active Combiner 2100MHz AWS (UL 1710-1780 / DL 2110-2200)
AU-AC-M2100	Access Unit Module, 4 Way Active Combiner 2100MHz (UL 1920-1980 / DL 2110-2170)
AU-AC-M2300T	Access Unit Module, 4 Way Active Combiner 2300MHz TDD (2300-2400)
AU-AC-M2500T	Access Unit Module, 4 Way Active Combiner 2500MHz TDD (2496-2690)
AU-AC-M2600	Access Unit Module, 4 Way Active Combiner 2600MHz (UL 2500-2570 / DL 2620-2690)
AU-AC-M3500T	Access Unit Module, 2 Way Active Combiner 3500MHz TDD (3400-3600)
AU-AC-M3550T	Access Unit Module, 2 Way Active Combiner 3500MHz TDD (3450-3650)
AU-AC-M3600T	Access Unit Module, 2 Way Active Combiner 3600MHz TDD (3550-3700)
AU-AC-M3700T	Access Unit Module, 2 Way Active Combiner 3700MHz TDD (3600-3800)
AU/RU-NC	Blanking Card to suit AU or Indoor Low Power RU
<b>Expansion Units</b>	
E2-O-14-AC	Expansion Unit Supports up to 14 x Optical Outputs, AC Powered
E2-O-14-DC	Expansion Unit Supports up to 14 x Optical Outputs, DC Powered
<b>Remote Unit Chassis</b>	
M2RU-OD-4-DC	Outdoor Mid Power Remote Unit, Sub6GHz, Dual Band 2T2R or Single Bands 4T4R, DC Powered
<b>Remote Unit Modules</b>	
M2RU-OD-M1800	Outdoor Mid Power Remote Unit PA Module, 1800MHz (UL 1710-1785 / DL 1805-1880), 2T2R
M2RU-OD-M1900	Outdoor Mid Power Remote Unit PA Module, 1900MHz (UL 1850-1915 / DL 1930-1995), 2T2R
M2RU-OD-M2100E	Outdoor Mid Power Remote Unit PA Module, 2100MHz AWS (UL 1710-1780 / DL 2110-2200), 2T2R
M2RU-OD-M2100	Outdoor Mid Power Remote Unit PA Module, 2100MHz (UL 1920-1980/ DL 2100-2170), 2T2R
M2RU-OD-M2300T	Outdoor Mid Power Remote Unit PA Module, 2300MHz TDD (2300-2400), 2T2R
M2RU-OD-M2500T	Outdoor Mid Power Remote Unit PA Module, 2500MHz TDD (2496-2690), 2T2R
M2RU-OD-M2600	Outdoor Mid Power Remote Unit PA Module, 2600MHz (UL 2500-2570 / DL 2620-2690), 2T2R
M2RU-OD-M3500T	Outdoor Mid Power Remote Unit PA Module, 3500MHz TDD (3400-3600), 2T2R
M2RU-OD-M3550T	Outdoor Mid Power Remote Unit PA Module, 3550MHz TDD (3450-3650), 2T2R
M2RU-OD-M3600T	Outdoor Mid Power Remote Unit PA Module, 3600MHz TDD CBRS (3550-3700), 2T2R
M2RU-OD-M3700T	Outdoor Mid Power Remote Unit PA Module, 3700MHz TDD (3600-3800), 2T2R
<b>Other Items</b>	
FAN-1U-AC	AC Fan Unit to support AU & LPRU Chassis, 1U Rack Unit Height, 100-240v AC Powered
FAN-1U-DC	DC Fan Unit to support AU & LPRU Chassis, 1U Rack Unit Height, ±48v DC Powered
M2RU-PSU48S	AC Power Supply Unit to support M2RU, 110-240v AC, Support Lightning Protection, 20kA
M2RU-EXL	IP65 Cable Accessories for External Alarm Port

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FCC Warning:

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

- (1) This device may not cause harmful interference, and
- (2) This device must accept any interference received, including interference that may cause undesired operation.

Part20 Warning :

**WARNING.** This is **NOT** a **CONSUMER** device. It is designed for installation by **FCC LICENSEES** and **QUALIFIED INSTALLERS**. You **MUST** have an **FCC LICENSE** or express consent of an FCC Licensee to operate this device. Unauthorized use may result in significant forfeiture penalties, including penalties in excess of \$100,000 for each continuing violation.

FCC Warning:

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

- (1) This device may not cause harmful interference, and
- (2) This device must accept any interference received, including interference that may cause undesired operation.

Part20 Warning :

Note: This product has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This product generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this product does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

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