



The ALLIANCE Release 6 platform is SOLiD’s multi-operator, neutral host Distributed Antenna System (DAS) that efficiently delivers wireless RF signals into any indoor or outdoor location difficult to cover with traditional macro networks.

The High-power Remote Optic Unit (HROU) can support up to four commercial bands, each delivering 20W of output power (or 40W for select bands). An add-on remote unit (HARU) is supported for additional RF services.

The 20W High-power Remote Optic Unit features:

- Built-in combiners can support one, two or four antenna ports
- Mix 20W and 40W amplifiers in the same chassis
- Embedded PIM indicator simplifies system optimization
- THOR™ amplifier design for power savings
- Rugged construction: IP66 and NEMA 4 certified.
- Indoor / outdoor. Wall / pole / rack mounting

Operation

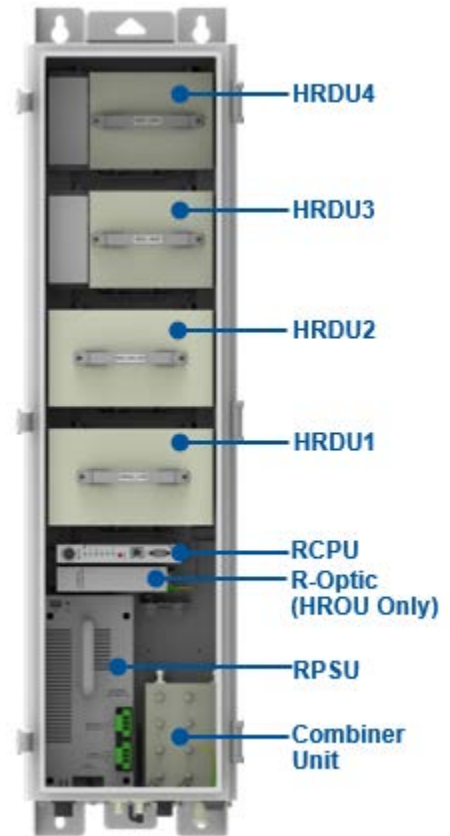
SOLID's 20W High-Power Remote Optic Unit (HROU) is designed for the ALLIANCE Release 6 DAS and can be mixed with other REL6 remote units (1W, 2W and 5W) in a single system all driven by a common head end.

This highly efficient, small footprint unit can support up to eight frequency bands: four in the main unit and four in the High-power Add-on Remote Unit (HARU).

The HROU features THOR™ amplifier design to reduce power consumption. Both 20W (+43 dBm) and 40W (+46 dBm) amplifier modules are available, allowing the operator to deploy a standalone 20W or 40W remote unit or mix 20W / 40W modules in the same chassis.

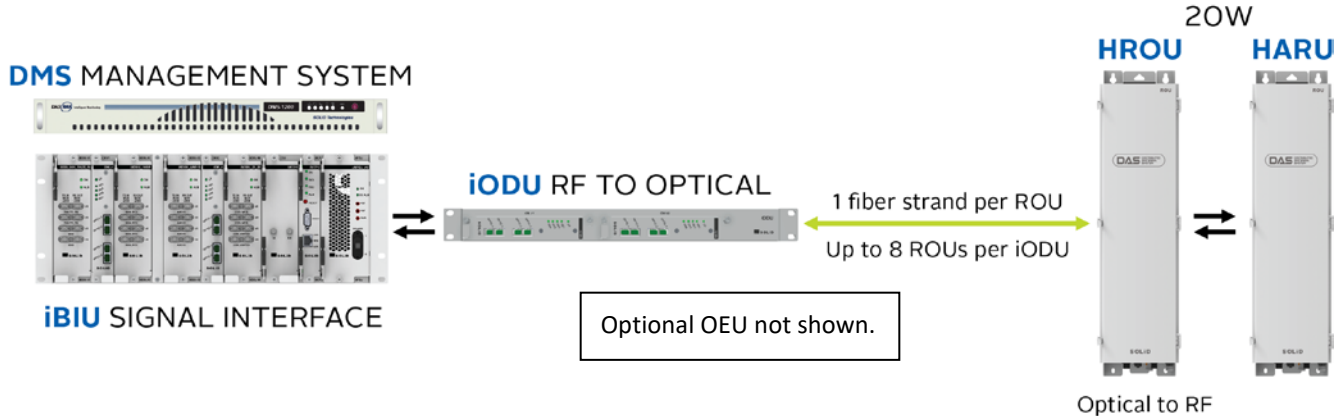
Built-in combiners support single or dual (high-band/low-band) port antenna configurations. Output from 20W and 40W modules can be combined using the same combiner units. An external combiner is available to combine the HROU/HARU output.

Both the HROU and HARU enclosures incorporate a rugged, but compact NEMA 4 design. Units can be rack or wall mounted, indoors or outdoors. A dual fan unit, mounted on the outside of the bottom panel, can be activated in high-temp deployments.



Unit Name	Description
20W High-power Remote Optic Unit (HROU)	Enclosure including RCPU, RPSU_AC or DC, Multiplexer, R-Optic
20W High-power Remote Optic Add-On Unit	An optional add-on enclosure (not shown in figure above), AC or DC power
Remote Power Supply Unit (RPSU)	AC: 100 to 240V DC: -42 to -56V
Remote Central Processor Unit (RCPU)	Controls and monitors signal of each unit RS-232 port for connecting management PC
High-power Remote Drive Unit (HRDU)	Filters and amplifies downlink / uplink signals Both HROU and HARU support up to 4 HRDUs The HROU can also support 40W HRDUs for select bands
Remote Optic Module (R-Optic)	Converts downlink optical signals to RF and uplink RF signals to optical. Compensates for optical loss (HROU only, not included in HARU)
Integrated Combiner	Combines TX signals from RDUs and sends to single or dual antenna port(s). Can also be configured without combiner to support up to 4 antenna ports
Dual Fan Unit	Turns on/off automatically based on operator-defined temperature settings

For the downlink signal path, the HROU receives optical signals from the optic modules (either iOMs or DOUs) and converts them to RF signals in the Remote Optic (R-Optic) module. The signals move to the Remote Drive Units (HRDUs) in either the HROU or HARU where they are amplified and filtered to remove out-of-band signals. Combiners in the remote units combine RF signals from multiple RDUs and then deliver them to the antenna port(s). The process is reversed for the uplink path. With the DMS-1200, the technician can monitor and control the operation of each HROU.



Integrated Combiner Options

SOLiD offers several different combiner units for the HROU and HARU. These combiners are installed in the HROU / HARU at the SOLiD facility prior to shipping based on the configuration requested by the operator. These can also be changed in the field as necessary.

For applications that don't require a combiner, a 4-port bottom plate (Part Number HROU_CU5) is available from SOLiD. All outputs from the HRDU amplifiers (up to four) will connect directly to individual bulkhead DIN connectors on the plate. When the remote unit has only one HRDU amplifier installed, a 1-port bottom plate (Part Number HROU_CU6) can be used. An external combiner (Part Number HROU_ECU1) is also available to combine output from the main remote HROU with the add-on remote HARU.

When ordering the 20W HROU and HARU, the default configuration does NOT include a combiner. Make sure to order the correct combiner or bottom plate option. These options are summarized in the following table.

Part Number	Antenna Ports	Description
HROU_CU1_AWS13	1	Combiner: Ant 1: 700LTE, 850IC, 1900, 2100AWS13
HROU_CU2_AWS13	2	Combiner: Ant 1: 700LTE, 850IC. Ant 2: 1900, 2100AWS13
HROU_CU3	1	Combiner Unit: Ant 1: 800/1900/2500
HROU_CU4_AWS13	1	Combiner: Ant 1: 700LTE (or 850IC), 1900, 2100AWS13, 2500 (or 2600)
HROU_CU5	4	Bottom Plate: No Combiner. Includes 4 Bulkhead DIN connectors for use with external combiners.
HROU_CU6	1	Bottom Plate: No Combiner. Includes 1 Bulkhead DIN connector for use when only one HRDU installed.
HROU_CU7	1	Combiner: Ant 1: 2300, 2500 (or 2600). HARU only
HROU_ECU1	1	External Combiner: HROU: 698-960, AWS13, PCS + HARU: 2300-2700
NOTE: All combiner options can be used with 40W HRDU modules.		

Specifications

All specifications apply to both 20W and 40W modules unless otherwise noted.

Frequency Band	Downlink (TX)		Uplink (RX)	
	Freq (MHz)	BW (MHz)	Freq (MHz)	BW (MHz)
700LTE Full Band	729-756	27	699-716 / 777-787	18 / 10
700LTE Full Band+FirstNet	729-768	39	699-716 / 777-798	17 / 21
800 Sprint / 850C	862-894	32	817-849	32
1900PCS	1930-1995	65	1850-1915	65
2100 AWS 1+3	2110-2180	70	1710-1780	70
2300 WCS	2350-2360	10	2305-2315	10
2500TDD	2496.8-2690	Lower Band: 71.2 Middle Band: 37.8 Upper Band: 71.2	2496.8-2690	Lower Band: 71.2 Middle Band: 37.8 Upper Band: 71.2
2600FDD	2620-2690	70	2500-2570	70

NOTES: For 2500TDD services, the operator sets the sub-band using management software.

RF Parameters		700LTE Full Band	800 Sprint /850 Cellular	1900 PCS	2100 AWS 1+3
Input Power	TX	LPOI: -10 to +20 dBm. HPOI: +15 to +43 dBm each port			
	RX	HROU: -50 dBm max			
Output Power	TX	+43 dBm (+46 dBm for 40W modules, 1900P and 2100AWS1+3)			
	RX	-3 dBm ± 0.5 dB			
System Gain	TX	63 dB max (66 dB for 40W modules, 1900P and 2100AWS1+3)			
	RX	50 dB max			
Spurious Emissions		Maximum Intermodulation Distortion. TX: ≤ -13 dBm @ 9kHz to 5GHz			
ACLR (LTE 64QAM)		Adjacent Channel Leakage Ratio: Uplink (RX): ≤ 40 dB @ F _{edge} ± 2MHz offset (< 45 dB for 40W modules, 1900P and 2100AWS1+3)			
VSWR		1.8:1 max at each band In / Out ports			
EVM (TX) max		1.6%	1.5%	1.9%	1.8%
Nominal Impedance		50 ohm			
Noise Figure (RX) max		5 dB	3.9 dB	4.7 dB	3.6 dB
System Ripple		< 5 dB			
Out of Band Attenuation		≤ 45 dB @ F _{edge} ± 1MHz offset			

RF Parameters		2300WCS	2500TDD	2600FDD
Input Power	TX	LPOI: -10 to +20 dBm. HPOI: +15 to +43 dBm each port		
	RX	HROU: -50 dBm max		
Output Power	TX	+43 dBm		
	RX	-3 dBm ± 0.5 dB	-23 dBm ± 1 dB	
System Gain	TX	63 dB max (66 dB for 40W modules, 1900P and 2100AWS1+3)		
	RX	50 dB max	30 dB max	
Spurious Emissions		Maximum Intermodulation Distortion. TX: ≤ -13 dBm @ 9kHz to 5GHz		
ACLR (LTE 64QAM)		Adjacent Channel Leakage Ratio: Uplink (RX): ≤ 40 dB @ F_edge ± 2MHz offset (< 45 dB for 40W modules, 1900P and 2100AWS1+3)		
VSWR		1.8:1 max at each band In / Out ports		
EVM (TX) max		0.8%	5.3%	6.0%
Nominal Impedance		50 ohm		
Noise Figure (RX) max		4.6 dB	4.6 dB	6.0 dB
System Ripple		< 5 dB		
Out of Band Attenuation		≤ 45 dB @ F-edge ± 1MHz offset		
<p>NOTES: TX Input power refers to the DAS headend. TX Output power is measured at the antenna port. Output power for 40W HRDUs = 46 dBm (currently available for 1900P and 2100AWS1+3).</p>				

Mechanical	Specification
Mounting Type	Wall, pole or rack mounting (fits standard 19" rack with bracket), indoor or outdoor
RF Connectors	RF Antenna: DIN-Type female
Craft Port	Serial interface RS-232 9-pin D-sub Male
External Alarm Interface	5-Pin connector on bottom panel
Optical Connector	1 SC/APC to eODU Optical Ports: SC / APC, Step Ferrule, Waterproof, (Single Mode Fiber). (The HARU does not provide an optical port. Instead it receives optical signals through connection to the main cabinet HROU.)
Monitoring Port	-40 dB (±3 dB) (SMA Female)
Power Consumption	HROU 630W including four 20W bands: 700/800/850/1900/2100. Total power consumption will vary depending on band configuration and mix of 20W / 40W HRDUs. HARU 325W including two 20W bands: 2300 and 2500 (or 2600). (See "Configuration Options" section below.)
Dimensions (WxHxD)	12.6 x 45.9 x 10.2 inches (320 x 1165 x 260 mm) (Dimensions include wall mount bracket, which can be removed as needed.)
Weight	130 lbs (59 kg) Fully Loaded

Environmental	Specification
Ingress Protection	IP66, NEMA 4
Operating Environment	Temp: -13 to 131°F / -25 to +55°C. Humidity: 0% to 90% Non-condensing

Optical	Specification
Optic	SC / APC Step Ferrule, Waterproof
Laser Diode / Photo Diode	1550 nm (Coaxial Type) / 1310 nm
Optic Loss	Max 5 dBo (4-port optic module); Max 10 dBo (1-port optic module)
Regulatory Compliance	Specification
UL (North America)	This equipment complies with UL and CUL 1950-1 Standard for safety for information technology equipment, including electrical business equipment.
FCC (North America)	Title 47 CFR Parts 15, 22, 24, 27 and 90 (Class B)
IC (Canada)	RSS-131 (ISSUE 2), ICES-003
Emissions (North America)	FCC Part15 Subpart B, Class A
MTBF (Telcordia SR-332 Issue2)	Failure Rate = 11,823 MTBF = 9.65 Years (For HROU and HARU)
FDA/CDRH	This equipment uses a Class 1 LASER according to FDA/CDRH Rules. This product conforms to all applicable standards of 21 CFR Chapter 1, Subchapter J, Part 1040.

Configuration Options

Recommended configurations have been tested for thermal and RF performance. As a rule, higher frequencies should go toward the bottom of the cabinet closest to the combiner to minimize cable loss.

The 2500 module can be installed in the main cabinet (HROU), which requires combiner CU4, or in the add-on unit (HARU), which requires CU7. The 2300 module is typically installed in the add-on (HARU), but can be installed in the main cabinet (HROU) if the configuration does not require an internal combiner.

Slot	HROU Main Cabinet	HARU Add-on Cabinet
HRDU1 (Bottom most)	2500, 2600, or 2100AWS13 (20W or 40W)	2500 or 2600
HRDU2	1900P (20W or 40W)	2300
HRDU3	800Sprint/850C	Future expansion
HRDU4 (Top most)	700LTE	Future expansion

40W Configurations

The HROU will accept the following configurations when mixing 20W and 40W remote drive units in the same chassis. Configurations have been tested for thermal and RF performance. When using 40W RDUs for AWS13 and 1900PCS, these units must be installed in slots #1 and #2, respectively.

Option	Slot	Band	Output Power	Power Consumption (W)
1	4	<1GHz	20W	630
	3	<1GHz	20W	
	2	>1GHz	20W	
	1	>1GHz	20W	
2	4	<1GHz	20W	730
	3	<1GHz	20W	
	2	>1GHz	40W	
	1	>1GHz	40W	

NOTES: Total maximum power consumption may vary +/- 20W based on band configuration. Power consumption for 40W modules (HRDU_1900P_40 and HRDU_AWS13_40) is ~200W each.

Part Numbers

20W Remote Units	Part Number
20 WATT Remote Optical Unit Chassis - AC Power	HROU_C_AC
20 WATT Remote Optical Unit Chassis - DC Power	HROU_C_DC
20 WATT Add-on Unit Chassis - AC Power -No Combiner	HARU_C_AC
20 WATT Add-on Unit Chassis - DC Power -No Combiner	HARU_C_DC
20 WATT Blank Module	HROU_B
20 WATT 700MHz Full Band LTE Module	HRDU_700LTEF
20 WATT 700MHz Amplifier Module (Includes FirstNet)	HRDU_700LTE_FN
20 WATT 800MHz (Sprint Only) and 850MHz Module	HRDU_800I_850C
20 WATT 1900MHz Amplifier Module	HRDU_1900P
20 WATT 2100MHz Amplifier Module (AWS1+3)	HRDU_AWS13
20 WATT 2300 MHz WCS Amp Module	HRDU_2300_WCS
20 WATT 2500 MHz TDD Amp Module; 60MHz contiguous bandwidth	HRDU_2500_60TDD
20 WATT 2600 MHz FDD Amp Module	HRDU_2600_FDD
40 WATT 1900MHz Amplifier Module	HRDU_1900P_40
40 WATT 2100MHz Amplifier Module (AWS1+3)	HRDU_AWS13_40
20 WATT Combiner Unit, 1 Antenna port, 700LTE, 800/850, 1900, AWS13	HROU_CU1_AWS13
20 WATT Combiner Unit, 2 Ant. ports, Ant 1: 700LTE, 800/850, Ant 2: 1900, AWS13	HROU_CU2_AWS13
20 WATT Combiner Unit, 1 Antenna port. Combines 800/1900/2500	HROU_CU3
20 WATT Combiner Unit: 1 Antenna port. 700LTE or 850IC /1900 /AWS13/2500	HROU_CU4_AWS13
20 WATT 4-Port Bottom Plate, includes 4 bulkhead connectors, 7/16 DIN	HROU_CU5
20 WATT 1-Port Bottom Plate, includes 1 bulkhead connector, 7/16 DIN	HROU_CU6
20 WATT Combiner Unit: 1 Antenna port. Combines 2300 WCS & 2500TDD	HROU_CU7
20 WATT External Combiner: HROU 700/850IC/PCS/AWS13 with HARU 2300/2500	HROU_ECU1
20 WATT Alarm Cable with External Alarm Input and Summary Alarm output	CBL_HROU_ALM
External Fan assembly for Alliance and Alliance-TR 20 Watt Remote Units	TR_HROU_FAN

For More Information

Additional information is available in the following documents, available from [SOLiD Support](#).

SOLiD Application Note - ALLIANCE 20W HROU Remote Unit

SOLiD Application Note - ALLIANCE 20W HARU Remote Unit

SOLiD Application Note - 20W Combiner Options



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