



**ETL Systems**

New technologies  
in RF distribution

Model Number:  
ALT-C345-5U / ALT-C346-5U /  
ALT-C347-5U Chassis

# Alto series Quad 4+1 Redundant

## Amplifier super compact chassis with 16 active amplifier modules, variable gain & variable slope compensation

The Alto series of amplifiers provide excellent RF performance with a wide range of functionality, in a compact chassis. They are designed with hot swap amplifier modules to enhance resilience and flexibility.

### Typical applications:

- Compensation for passive splitters/combiners and cable loss
- General satcoms – teleports, video head-ends, TVRO
- Limited rack space installations

### Chassis



**Super compact** 16 active amplifiers in 5U chassis



**Redundancy configuration** 4 blocks of 4+1  
Redundancy with auto switchover (hot/cold standby module)



**Resilience** from dual redundant hot-swap power supplies, hot-swap amplifier modules & dual redundant hot-swap CPU modules



**Dual Operational Mode** Tracking and non-tracking modes, customer selectable



**Remote control & monitoring** via RJ45 Ethernet port with SNMP & web browser interface



**Local control & monitoring** via front panel push buttons & display



**Temperature triggered cooling** with hot-swap convection cooling fan modules



**Impedance & RF connector options** 50Ω chassis, 75Ω chassis & mixed impedance chassis available

### Amplifier Module Options



**Extended L-band** (850 - 2850MHz) operating frequency range options



**Variable gain & slope compensation** to balance input signals



**Low Noise options** for prime signal quality



**High Linearity options** ensures overall RF gain signal performance is optimised



**Variable attenuation** to balance output signals

V0.9 E&OE

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Chassis - Specification						
Model Number	ALT-C345-5U		ALT-C346-5U		ALT-C347-5U	
Impedance & RF Connectors	50 Ω SMA / BNC		50 Ω & 75Ω SMA / BNC All inputs all have to be the same and all outputs all have to be the same.		75Ω SMA / BNC	
Dimensions	5U high x 600mm deep x 19" wide					
Capacity	16 active + 4 standby amplifiers (Quad 4 +1 redundancy)					
Weight / Front Panel Colour	Weight: 20kg max (excludes amplifier modules)			Colour: RAL9003 White (semi-matte)		
Redundancy	Amplifiers: 4 off 4+1 redundancy / Cooling fans: dual, hot-swap / PSUs: Dual, hot-swap / CPUs: Main & Standby					
PSU Power	85-264Vac 50/60 Hz. 2 x T 6.3A fuses in the IEC mains inlets					
PSU	Hot-swap, dual redundant, Diode OR. Each PSU Individually monitored & reported					
AC Consumption	< 400W steady state, all modules fitted. Total AC input.					
Local control & monitoring	Via front panel LCD and Keypad					
Remote control & monitoring	RS232/485 Serial & RJ45 Ethernet, 10BaseT/100BaseTx, ETL TCP/IP protocol, SNMP & web browser interface					
Monitoring	Amplifier bias voltages	Voltage to each amplifier stage within the amplifier modules is continuously monitored				
	Amplifier Supply Voltages	Supply from PSU to each amp is continuously monitored				
	Temperature Monitoring	On each amplifier & CPU module				
	PSU Status:	Each PSU individually monitored and reported				
Operating Modes	Amplifier Tracking ON	Amplifier gain & slope control is common to all modules in each block of 4				
	Amplifier Tracking OFF	Each amplifier can be independently controlled				
	Redundancy	Redundant amplifier can be set as hot or cold standby amplifier auto switch over triggered by amplifier bias				
	Cooling	Convection cooling with forced air if threshold is exceeded		ON at 70±1°C	OFF at 65±1°C	
MTBF (typical)	Chassis: >250,000 hours	Amplifier modules: >250,000 hours	PSUs: >135,000 hours	CPUs: >110,000 hours	Fan modules: >100,000 hours	
Temperature	Operating: 0 to 45 °C			Storage: -20 to +75 °C Indoor use only		
Humidity	20% to 90% non-condensing			Relative humidity		



## Specifications for modules housed in ALT-C345-5U 50Ω chassis

### Amplifier Module Options - RF Parameters

Amp Module Model Numbers		ALT-R-L1-006		ALT-R-L1-008		ALT-R-L1-012		ALT-R-L1-023	
Frequency Range (MHz)		850-2150		850-2150		850-2150		850-2150	
Gain (dB)	Maximum	32.00	±1.5	22.00	±1.50	40.00	±2.00	40.00	±2.00
	Minimum	2.00	±1.5	-1.00	±1.50	10.00	±2.00	10.00	±2.00
Gain	Full band	±	1.00	±	1.25	±	1.25	±	1.50
Gain Flatness (dB) pk-pk	36 MHz	±	0.25	±	0.25	±	0.25	±	0.25
Gain Steps (dB)		0.50	±0.1	0.50	±0.10	1.00	±0.15	0.20	±0.1
Input Return Loss (dB)	Typical	13.00		16.00		16.00		16.00	
	Minimum	9.00		11.00		10.00		12.00	
Output Return Loss (dB)	Typical	13.00		13.00		16.00		16.00	
	Minimum	9.00		9.00		10.00		12.00	
Slope Control (dB)	Range	0 to 5.00		0 to 5.00		0 to 5.00		N/A	
	Steps	1.00 to ±0.25		1.00 ±0.25		1.00 ±0.25		N/A	
Noise Figure (dB) @ max gain	Typical	12.00		13.00		12.00		5.00	
	Maximum	14.00		15.00		14.00		7.00	
1dB GCP (dBm) @ max gain	Typical	14.0		20.0		16.0		19.0	
	Minimum	12.5		18.5		14.5		17.5	
OIP3 (dBm) @ max gain	Typical	25.0		33.0		36.0		27.0	
	Minimum	22.5		30.5		33.5		22.5	
OIP2 (dBm) @ max gain	Typical	41.0		43.0		47.0		37.0	
	Minimum	37.5		39.50		43.5		33.5	
Isolation (dB)	Typical	60.00		60.00		60.00		50.00	
	Minimum	50.00		50.00		50.00		45.00	
Max total RF i/p power (dBm)		20.00		20.00		20.00		20.00	

Amp Module Model Numbers		ALT-R-L1-032		ALT-R-L1-038		ALT-R-L1-087		ALT-R-L1-097		ALT-R-S2-076		ALT-R-S3-092	
Frequency Range (MHz)		850-2150		850-2150		850-2150		850-2150		850-2850		850-2450	
Gain (dB)	Maximum	40.00	±1.50	40.00	±2.00	40.00	±2.00	40.00	±2.00	32.00	±2.00	38.00	±2.00
	Minimum	10.00	±1.50	10.00	±2.00	-10.00	±2.00	10.00	±2.00	-1.00	±2.00	4.00	±2.00
Gain Flatness (dB) pk-pk	full band	±	1.25	±	1.50	±	1.50	±	1.50	±	1.50	±	1.25
	36 MHz	±	0.35	±	0.20	±	0.20	±	0.20	±	0.35	±	0.20
Gain Steps (dB)		1.00	±0.15	0.50	±0.10	0.20	±0.10	0.20	±0.10	0.50	±0.25	0.25	±0.25
Input Return Loss (dB)	Typical	16.00		16.00		16.00		16.00		18.00		16.00	
	Minimum	10.00		10.00		12.00		12.00		14.00		12.00	
Output Return Loss (dB)	Typical	13.00		16.00		16.00		16.00		16.00		16.00	
	Minimum	10.00		10.00		12.00		12.00		12.00		12.00	
Slope Control (dB)	Range	0 to 5.00		0 to 5.00		N/A		N/A		0 to 7.00		0 to 6.00	
	Steps	1.00 ±0.5		1.00 ±0.25		N/A		N/A		1.00 ± 0.5		1.00 ± 0.5	
Noise Figure (dB) @ max gain	Typical	7.50		8.50		5.50		5.50		6.00		5.50	
	Maximum	9.50		10.50		7.50		7.50		8.00		7.50	
1dB GCP (dBm) @ max gain	Typical	23.00		23.00		20.0		20.0		20.0		22.0	
	Minimum	21.00		21.00		17.5		17.5		17.5		19.5	
OIP3 (dBm) @ max gain	Typical	36.00		36.00		32.0		32.0		32.0		35.0	
	Minimum	32.00		32.00		29.5		29.5		29.5		30.5	
OIP2 (dBm) @ max gain	Typical	46.00		46.00		37.0		37.0		38.0		57.0	
	Minimum	40.00		40.00		33.5		33.5		35.5		47.5	
Isolation (dB)	Typical	60.00		60.00		50.00		50.00		60.00		50.00	
	Minimum	50.00		50.00		45.00		45.00		50.00		45.00	
Max total RF i/p power (dBm) damage level, not operational		20.00		16.00		20.00		20.00		20.00		20.00	



Specifications for modules housed in ALT-C346-5U 50Ω & 75Ω chassis

Amplifier Module Options - RF Parameters																	
Amp Module Model Numbers		ALT-R-L1-006				ALT-R-L1-008				ALT-R-L1-012				ALT-R-L1-023			
Frequency Range (MHz)		850-2150				850-2150				850-2150				850-2150			
Gain (dB)	Maximum	31.00	±1.5			21.00	±1.50			39.00	±2.00			39.00	±2.00		
	Minimum	1.00	±1.5			-2.00	±1.50			9.00	±2.00			9.00	±2.00		
Gain Flatness (dB) pk-pk	Full band	±	1.50			±	1.75			±	1.75			±	2.00		
	36 MHz	±	0.35			±	0.25			±	0.25			±	0.25		
Gain Steps (dB)		0.50	±0.1			0.50	±0.10			1.00	±0.15			0.20	±0.1		
Input Return Loss (dB)	Typical	12.00				15.00				15.00				15.00			
	Minimum	8.00				10.00				9.00				11.00			
Output Return Loss (dB)	Typical	12.00				12.00				15.00				15.00			
	Minimum	8.00				8.00				9.00				11.00			
Slope Control (dB)	Range	0 to 5.00				0 to 5.00				0 to 5.00				N/A			
	Steps	1.00 to ±0.25				1.00 ±0.25				1.00 ±0.25				N/A			
Noise Figure (dB) @ max gain	Typical	13.00				14.00				13.00				6.00			
	Maximum	15.00				16.00				15.00				8.00			
1dB GCP (dBm) @ max gain	Typical	13.0				19.0				15.0				18.0			
	Minimum	11.5				17.50				13.5				16.5			
OIP3 (dBm) @ max gain	Typical	24.0				32.00				35.0				26.0			
	Minimum	21.5				29.50				32.5				21.5			
OIP2 (dBm) @ max gain	Typical	40.0				42.00				46.0				36.0			
	Minimum	36.5				38.50				42.5				32.5			
Isolation (dB)	Typical	60.00				60.00				60.00				50.00			
	Minimum	50.00				50.00				50.00				45.00			
Max total RF i/p power (dBm)		20.00				20.00				20.00				20.00			

  

Amp Module Model Numbers		ALT-R-L1-032				ALT-R-L1-038				ALT-R-L1-087				ALT-R-L1-097				ALT-R-S2-076				ALT-R-S3-092			
Frequency Range (MHz)		850-2150				850-2150				850-2150				850-2150				850-2850				850-2450			
Gain (dB)	Maximum	39.00	±1.50			39.00	±2.00			39.00	±2.00			39.00	±2.00			31.00	±2.00			37.00	±2.00		
	Minimum	9.00	±1.50			9.00	±2.00			-11.00	±2.00			9.00	±2.00			-2.00	±2.00			3.00	±2.00		
Gain Flatness (dB) pk-pk	full band	±	1.75			±	2.00			±	2.00			±	2.00			±	2.00			±	1.75		
	36 MHz	±	0.35			±	0.20			±	0.20			±	0.20			±	0.35			±	0.20		
Gain Steps (dB)		1.00	±0.15			0.50	±0.10			0.20	±0.10			0.20	±0.10			0.50	±0.25			0.25	±0.25		
Input Return Loss (dB)	Typical	15.00				15.00				15.00				15.00				17.00				17.00			
	Minimum	9.00				9.00				11.00				11.00				13.00				13.00			
Output Return Loss (dB)	Typical	12.00				15.00				15.00				15.00				15.00				17.00			
	Minimum	9.00				9.00				11.00				11.00				11.00				13.00			
Slope Control (dB)	Range	0 to 5.00				0 to 5.00				N/A				N/A				0 to 7.00				0 to 6.00			
	Steps	1.00 ±0.5				1.00 ±0.25				N/A				N/A				1.00 ± 0.5				1.00 ± 0.5			
Noise Figure (dB) @ max gain	Typical	8.50				9.50				6.50				6.50				7.00				6.50			
	Maximum	10.50				11.50				8.50				8.50				9.00				8.50			
1dB GCP (dBm) @ max gain	Typical	23.00				23.00				19.0				19.0				19.0				21.0			
	Minimum	21.00				21.00				16.5				16.5				16.5				18.5			
OIP3 (dBm) @ max gain	Typical	36.00				36.00				31.0				31.0				31.0				34.0			
	Minimum	32.00				32.00				28.5				28.5				28.5				29.5			
OIP2 (dBm) @ max gain	Typical	46.00				46.00				36.0				36.0				37.0				59.0			
	Minimum	40.00				40.00				32.5				32.5				34.5				46.5			
Isolation (dB)	Typical	60.00				60.00				50.00				50.00				60.00				50.00			
	Minimum	50.00				50.00				45.00				45.00				50.00				45.00			
Max total RF i/p power (dBm) damage level, not operational		20.00				16.00				20.00				20.00				20.00				20.00			





## Specifications for modules housed in ALT-C347-5U 75Ω chassis

Amplifier Module Options - RF Parameters																	
Amp Module Model Numbers		ALT-R-L1-006				ALT-R-L1-008				ALT-R-L1-012				ALT-R-L1-023			
Frequency Range (MHz)		850-2150				850-2150				850-2150				850-2150			
Gain (dB)	Maximum	31.00	±1.5			21.00	±1.50			39.00	±2.00			39.00	±2.00		
	Minimum	1.00	±1.5			-2.00	±1.50			9.00	±2.00			9.00	±2.00		
Gain Flatness (dB) pk-pk	Full band	±	1.50			±	1.75			±	1.75			±	2.00		
	36 MHz	±	0.35			±	0.25			±	0.25			±	0.25		
Gain Steps (dB)		0.50	±0.1			0.50	±0.10			1.00	±0.15			0.20	±0.1		
Input Return Loss (dB)	Typical	12.00				15.00				15.00				15.00			
	Minimum	8.00				10.00				9.00				11.00			
Output Return Loss (dB)	Typical	12.00				12.00				15.00				15.00			
	Minimum	8.00				8.00				9.00				11.00			
Slope Control (dB)	Range	0 to 5.00				0 to 5.00				0 to 5.00				N/A			
	Steps	1.00 to ±0.25				1.00 ±0.25				1.00 ±0.25				N/A			
Noise Figure (dB) @ max gain	Typical	13.00				14.00				13.00				6.00			
	Maximum	15.00				16.00				15.00				8.00			
1dB GCP (dBm) @ max gain	Typical	13.0				19.0				15.0				18.0			
	Minimum	11.5				17.50				13.5				16.5			
OIP3 (dBm) @ max gain	Typical	24.0				32.00				35.0				26.0			
	Minimum	21.5				29.50				32.5				21.5			
OIP2 (dBm) @ max gain	Typical	40.0				42.00				46.0				36.0			
	Minimum	36.5				38.50				42.5				32.5			
Isolation (dB)	Typical	60.00				60.00				60.00				50.00			
	Minimum	50.00				50.00				50.00				45.00			
Max total RF i/p power (dBm)		20.00				20.00				20.00				20.00			

  

Amp Module Model Numbers		ALT-R-L1-032				ALT-R-L1-038				ALT-R-L1-087				ALT-R-L1-097				ALT-R-S2-076				ALT-R-S3-092			
Frequency Range (MHz)		850-2150				850-2150				850-2150				850-2150				850-2850				850-2450			
Gain (dB)	Maximum	39.00	±1.50			39.00	±2.00			39.00	±2.00			39.00	±2.00			31.00	±2.00			37.00	±2.00		
	Minimum	9.00	±1.50			9.00	±2.00			-11.00	±2.00			9.00	±2.00			-2.00	±2.00			3.00	±2.00		
Gain Flatness (dB) pk-pk	full band	±	1.75			±	2.00			±	2.00			±	2.00			±	2.00			±	1.75		
	36 MHz	±	0.35			±	0.20			±	0.20			±	0.20			±	0.35			±	0.20		
Gain Steps (dB)		1.00	±0.15			0.50	±0.10			0.20	±0.10			0.20	±0.10			0.50	±0.25			0.25	±0.25		
Input Return Loss (dB)	Typical	15.00				15.00				15.00				15.00				17.00				17.00			
	Minimum	9.00				9.00				11.00				11.00				13.00				13.00			
Output Return Loss (dB)	Typical	12.00				15.00				15.00				15.00				15.00				17.00			
	Minimum	9.00				9.00				11.00				11.00				11.00				13.00			
Slope Control (dB)	Range	0 to 5.00				0 to 5.00				N/A				N/A				0 to 7.00				0 to 6.00			
	Steps	1.00 ±0.25				1.00 ±0.25				N/A				N/A				1.00 ± 0.5				1.00 ± 0.5			
Noise Figure (dB) @ max gain	Typical	8.50				9.50				6.50				6.50				7.00				6.50			
	Maximum	10.50				11.50				8.50				8.50				9.00				8.50			
1dB GCP (dBm) @ max gain	Typical	23.0				23.0				19.0				19.0				19.0				21.0			
	Minimum	21.0				21.0				16.5				16.5				16.5				18.5			
OIP3 (dBm) @ max gain	Typical	36.0				36.0				31.0				31.0				31.0				34.0			
	Minimum	32.0				32.0				28.5				28.5				28.5				29.5			
OIP2 (dBm) @ max gain	Typical	46.0				46.0				36.0				36.0				37.0				56.0			
	Minimum	40.0				40.0				32.5				32.5				34.5				46.5			
Isolation (dB)	Typical	60.00				60.00				50.00				50.00				60.00				50.00			
	Minimum	50.00				50.00				45.00				45.00				50.00				45.00			
Max total RF i/p power (dBm) damage level, not operational		20.00				16.00				20.00				20.00				20.00				20.00			

