



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

V0.6 E&OE

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Model Number:
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Chassis - Specification

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		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 & Stnadby						
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		



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Model Number:
ALT-C345-5U

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	33.00	±1.5	23.00	±1.50	41.00	±2.00	41.00	±2.00
	Minimum	3.00	±1.5	0.00	±1.50	11.00	±2.00	11.00	±2.00
Gain Flatness (dB) pk-pk	Full band	±	1.00	±	1.25	±	1.25	±	1.50
	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		4.80	
	Maximum	14.00		15.00		14.00		6.80	
1dB GCP (dBm) @ max gain	Typical	14.0		20.0		16.00		21.0	
	Minimum	12.5		18.50		14.50		19.5	
OIP3 (dBm) @ max gain	Typical	27.0		33.00		36.00		34.0	
	Minimum	24.5		30.50		33.50		31.5	
OIP2 (dBm) @ max gain	Typical	41.0		51.00		47.00		39.0	
	Minimum	37.5		47.50		43.50		35.5	
Isolation (dB)	Typical	60.00		60.00		60.00		60.00	
	Minimum	50.00		50.00		50.00		50.00	
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	41.00	±2.00	41.00	±2.00	41.00	±2.00	41.00	±2.00	33.00	±2.00	39.00	±2.00
	Minimum	11.00	±2.00	11.00	±2.00	-9.00	±2.00	11.00	±2.00	0.00	±2.00	5.00	±2.00
Gain Flatness (dB) pk-pk	full band	±	1.25	±	1.50	±	1.50	±	1.50	±	1.50	±	1.50
	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		18.00	
	Minimum	12.00		10.00		12.00		12.00		14.00		14.00	
Output Return Loss (dB)	Typical	16.00		16.00		16.00		16.00		16.00		18.00	
	Minimum	12.00		10.00		12.00		12.00		12.00		14.00	
Slope Control (dB)	Range	0 to 5.00		0 to 5.00		N/A		N/A		0 to 7.00		0 to 5.00	
	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	7.50		8.00		5.50		5.50		6.00		5.50	
	Maximum	9.50		10.00		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		35.0		35.0		32.0		35.0	
	Minimum	32.00		32.00		32.5		32.5		29.5		30.5	
OIP2 (dBm) @ max gain	Typical	46.00		46.00		37.0		37.0		38.0		40.0	
	Minimum	40.00		40.00		33.5		33.5		35.5		35.5	
Isolation (dB)	Typical	60.00		60.00		60.00		60.00		60.00		50.00	
	Minimum	50.00		50.00		50.00		50.00		50.00		45.00	
Max total RF i/p power (dBm) damage level, not operational		20.00		18.00		20.00		20.00		20.00		20.00	

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Model Number:
ALT-C346-5U

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		5.80	
	Maximum	15.00		16.00		15.00		7.80	
1dB GCP (dBm) @ max gain	Typical	13.0		19.0		15.00		20.0	
	Minimum	11.5		17.50		13.50		18.5	
OIP3 (dBm) @ max gain	Typical	26.0		32.00		35.00		33.0	
	Minimum	23.5		29.50		32.50		30.5	
OIP2 (dBm) @ max gain	Typical	40.0		50.00		46.00		38.0	
	Minimum	36.5		46.50		42.50		34.5	
Isolation (dB)	Typical	60.00		60.00		60.00		60.00	
	Minimum	50.00		50.00		50.00		50.00	
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	±2.00	39.00	±2.00	39.00	±2.00	39.00	±2.00	31.00	±2.00	37.00	±2.00
	Minimum	9.00	±2.00	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	±	2.00
	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	11.00		9.00		11.00		11.00		13.00		13.00	
Output Return Loss (dB)	Typical	15.00		15.00		15.00		15.00		15.00		17.00	
	Minimum	11.00		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 5.00	
	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		9.00		6.50		6.50		7.00		6.50	
	Maximum	10.50		11.00		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		34.0		34.0		31.0		34.0	
	Minimum	32.00		32.00		31.5		31.5		28.5		29.5	
OIP2 (dBm) @ max gain	Typical	46.00		46.00		36.0		36.0		37.0		39.0	
	Minimum	40.00		40.00		32.5		32.5		34.5		34.5	
Isolation (dB)	Typical	60.00		60.00		60.00		60.00		60.00		50.00	
	Minimum	50.00		50.00		50.00		50.00		50.00		45.00	
Max total RF i/p power (dBm) damage level, not operational		20.00		18.00		20.00		20.00		20.00		20.00	

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Model Number:
ALT-C347-5U

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		5.80	
	Maximum	15.00		16.00		15.00		7.80	
1dB GCP (dBm) @ max gain	Typical	13.0		19.0		15.00		20.0	
	Minimum	11.5		17.50		13.50		18.5	
OIP3 (dBm) @ max gain	Typical	26.0		32.00		35.00		33.0	
	Minimum	23.5		29.50		32.50		30.5	
OIP2 (dBm) @ max gain	Typical	40.0		50.00		46.00		38.0	
	Minimum	36.5		46.50		42.50		34.5	
Isolation (dB)	Typical	60.00		60.00		60.00		60.00	
	Minimum	50.00		50.00		50.00		50.00	
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	±2.00	39.00	±2.00	39.00	±2.00	39.00	±2.00	31.00	±2.00	37.00	±2.00
	Minimum	9.00	±2.00	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	±	2.00
	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	11.00		9.00		11.00		11.00		13.00		13.00	
Output Return Loss (dB)	Typical	15.00		15.00		15.00		15.00		15.00		17.00	
	Minimum	11.00		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 5.00	
	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		9.00		6.50		6.50		7.00		6.50	
	Maximum	10.50		11.00		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		34.0		34.0		31.0		34.0	
	Minimum	32.00		32.00		31.5		31.5		28.5		29.5	
OIP2 (dBm) @ max gain	Typical	46.00		46.00		36.0		36.0		37.0		39.0	
	Minimum	40.00		40.00		32.5		32.5		34.5		34.5	
Isolation (dB)	Typical	60.00		60.00		60.00		60.00		60.00		50.00	
	Minimum	50.00		50.00		50.00		50.00		50.00		45.00	
Max total RF i/p power (dBm) damage level, not operational		20.00		18.00		20.00		20.00		20.00		20.00	

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