

R&S® Series 4200 Software Defined Radios VHF Radio Family Specifications



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Data without tolerance limits is not binding.

Technical specifications of the R&S®Series4200 for VHF

General data for all R&S®Series4200 VHF radios

Frequency accuracy with TCXO (standard)		
Temperature		±1.0 ppm, from –20 °C to +55 °C
Aging (typical)		< 1.0 ppm/year, at +40 °C
Frequency accuracy with OCXO (optional, not for R&S EU4200C)		
Temperature		< 0.3 ppm, from –20 °C to +55 °C
Aging	after 10 days of uninterrupted operation	< 0.1 ppm, 1st year, < 1.5 ppm per 15 years
Warm-up time	to < 0.5 ppm at +25 °C	max. 10 min

Modulation schemes		
AM-DSB for voice	25 kHz channel spacing	6K80A3EJN
	8.33 kHz channel spacing	5K00A3EJN
D8PSK 31.5 kbit/s		14K0G1DE
AM-MSK for ACARS data 2.4 kbit/s		13K0A2D

MTBF (MIL-HDBK217F, +21 °C GB)	R&S XU4200	22000 h
	R&S SU4200	29000 h
	R&S EU4200C	45000 h
MTTR (all, change of equipment)		15 min

Electrical safety		in line with EN 60950-1, in line with UL Std No 60950-1, CAN/CSA C22.2 No. 60950-1-03
Electromagnetic compatibility		in line with: <ul style="list-style-type: none"> • ETSI EN 301489-1/-22 • ETSI EN 300113-1 • ETSI EN 300676-1 • ETSI EN 300676-2 • EN 55022 class B

Transmitter data (R&S®XU4200/SU4200)

Graceful output power degradation		
Low voltage	24 V to 28 V DC	≤ 1 dB
	19 V to 24 V DC	> 1 dB
	< 19 V DC	switch-off
Overtemperature	PA heat sink temperature > +80 °C	reduction
	PA heat sink temperature > +90 °C	switch-off
VSWR ≤ 2.0		≤ 1 dB
		automatic resuming of full output power after return to nominal conditions

VSWR mismatch without damage		VSWR infinite (open/short circuit), all phases
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Frequency range	8.33 kHz spacing	112 MHz to 155.975 MHz
	25 kHz spacing	112 MHz to 155.975 MHz
	VDL mode2 operation	118 MHz to 136.975 MHz
Channel spacing		25 kHz, 8.33 kHz

Output power		
Carrier power, AM		50 W (0/+1 dB)
Peak power, AM	at m = 95 %	190 W
Configurable range with step size		1 W, from 5 W to 50 W

Duty cycle	up to +40 °C ambient temperature at 50 W output power	100 %
	up to +55 °C ambient temperature at 15 W output power	100 %
	up to +55 °C ambient temperature at 50 W output power	50 % (30 s transmit, 30 s receive)
Offset operation	25 kHz spacing	2/3/4/5 carriers
Two-carrier offset operation		±5 kHz
Three-carrier offset operation		0/±7.3 kHz
Four-carrier offset operation		±2.5/±7.5 kHz
Five-carrier offset operation		0/±4 kHz/±8 kHz
	8.33 kHz spacing	2 carriers
Two-carrier offset operation		±2.5 kHz
RF power		in line with ETSI EN 300676-1
Attack time, voice		≤ 10 ms
Attack time, ACARS data mode		≤ 10 ms
Release time, voice		≤ 10 ms
Release time, ACARS data mode		≤ 5 ms
Modulation depth		configurable between 30 % and 90 %, limiter at 95 %
Amplitude modulation distortion		in line with ETSI EN 300676-1, ≤ 5%
Transmitter keying (PTT)	contact to ground	sink current 3 mA to 4 mA at 28V internal pull-up
	voltage controlled keying	±12 V to ±57 V, sink current 2 mA to 12 mA
	in band tone keying	2040 Hz, 2300 Hz, 2970 Hz, 3100 Hz
PTT time-out		configurable between 3 s and 300 s, can be deactivated
Spurious emissions, harmonic		≤ -93 dBc (at full output power)
Spurious emission, non harmonic		in line with ETSI EN 300676-1
	Δf ≤ 1 MHz	≤ -83 dBc
	Δf > 1 MHz	≤ -93 dBc
Adjacent channel power		in line with ETSI EN 300676-1
	at 25 kHz spacing	≤ -70 dB
	at 8.33 kHz spacing	≤ -60 dB

Transmitter noise	at ± 300 kHz from carrier	in line with ETSI EN 300676-1, ≤ -140 dBc (1 Hz) (at full output power)
	at ± 1 % from carrier	≤ -155 dBc (1 Hz) (at full output power)

Intermodulation attenuation	back door third-order intermodulation	in line with ETSI EN 300676-1
	interferer at $\pm 150/\pm 200$ kHz from carrier	≤ -45 dBc

AF response		in line with ETSI EN 300676-1
	at 25 kHz spacing	300 Hz to 3400 Hz (+1/-3 dB (1 kHz)), 100 Hz \geq 15 dB, 5 kHz \geq 25 dB
	at 8.33 kHz spacing	350 Hz to 2500 Hz (+1/-3 dB (1 kHz)), 100 Hz \geq 15 dB, 3.2 kHz \geq 25 dB
Group delay variation (ACARS data mode)		in line with ETSI EN 300676-1, \leq 60 μ s

ALC (automatic level control, VOGAD)		
AF level variation	$\Delta m \leq 3 \%$	± 15 dB
Attack time		20 ms
Decay time		500 ms

Monitoring output (integrated demodulator)		0 dBm at 90 % modulation, 600 Ω
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Digital audio interface (R&S SU4200 only, interface on receiver used for R&S XU4200), [®] Software option		
E1 in line with ITU-T G.703 ff		
Data rate		2.048 Mbit/s
Impedance		120 Ω nominal, balanced
Audio codec		in line with ITU-T G.711, A-law

Digital audio interface voice over IP (VoIP), software option		
VoIP in line with EUROCAE ED137A part1		
Session control		SIP in line with EUROCAE ED137A part1
Audio stream		RTP in line with EUROCAE ED137A part1
Audio codec		in line with ITU-T G.711

VDL2 operation		
Frequency range		118 MHz to 136.975 MHz
Modulation VDL2		D8PSK, $\alpha = 0.6$
Symbol rate		10500 symbol/s
Tolerance of symbol rate VDL2		in line with ETSI EN 301841-1, \leq 50 ppm
Symbol constellation error VDL2		$< 6 \%$ peak EVM (error vector magnitude), $< 2 \%$ RMS
Adjacent channel power VDL2		in line with ETSI EN 301841-1, ICAO annex 10, volume III, chapter 6
	1st adjacent channel, BW = 25 kHz	in line with ICAO annex 10, volume III, chapter 6, ≤ 0 dBm
	1st adjacent channel, BW = 16 kHz	in line with ETSI EN 301841-1, ≤ -18 dBm
	2nd adjacent channel	≤ -28 dBm
	4th adjacent channel	≤ -38 dBm
RF power attack/release		in line with ETSI EN 301841-1
	rise time	$\leq 190 \mu$ s
	release time	$\leq 300 \mu$ s
Broadband noise VDL2	at ± 800 kHz from carrier	≤ -144 dBc (1 Hz) (at full output power)
Phase acceleration during VDL burst		in line with ARINC 750-4, < 150 Hz/s

AF input impedance		600 Ω \pm 15 %
AF input level	nominal	0 dBm \pm 1.5 dB
	configurable range	-30 dBm to +10 dBm in 1 dB steps
AF in band tones (PTT)	configurable range	-40 dB to 0 dB below audio setting

Transmitter noise	$\Delta f = 200$ kHz, BW = 25 kHz	in line with ETSI EN 301841-1, ≤ -43 dBm
	$\Delta f = 400$ kHz, BW = 25 kHz	in line with ETSI EN 301841-1, ≤ -48 dBm
	$\Delta f = 800$ kHz, BW = 25 kHz	in line with ETSI EN 301841-1, ≤ -53 dBm
Spurious emissions harmonic		in line with ETSI EN 301841-1, < -36 dBm (at full output power)
Spurious emission non harmonic	150 kHz to 1 GHz, BW = 10 kHz	in line with ETSI EN 301841-1, < -46 dBm active, < -57 dBm idle
	1 GHz to 4 GHz, BW = 10 kHz	in line with ETSI EN 301841-1, < -40 dBm active, < -47 dBm idle

Receiver data (R&S®XU4200/EU4200C)

Receive sensitivity	118 MHz to 143.975 MHz, low noise mode	
	at 10 dB S+N/N ITU-T weighted, 1 kHz, m = 30 %	≤ -107 dBm
	at 12 dB SINAD ITU-T weighted, 1 kHz, m = 30 %	in line with ETSI EN 300676-1, ≤ -107 dBm
	112 MHz to 117.975 MHz, 144 MHz to 155.975 MHz, low noise mode	
	at 10 dB S+N/N ITU-T weighted, 1 kHz, m = 30 %	≤ -105 dBm
	118 MHz to 143.975 MHz, low distortion mode	
	at 10 dB S+N/N ITU-T weighted, 1 kHz, m = 30 %	≤ -101 dBm
	at 12 dB SINAD ITU-T weighted, 1 kHz, m = 30 %	≤ -101 dBm
112 MHz to 117.975 MHz, 144 MHz to 155.975 MHz, low distortion mode	at 10 dB S+N/N ITU-T weighted, 1 kHz, m = 30 %	≤ -99 dBm
Maximum input level without damage		+30 dBm (1 W, 7.5 V (V_{RMS}) into 50 Ω)
Oscillator reradiation		≤ -100 dBm
Spurious response rejection		in line with ETSI EN 300676-1, ≥ 80 dB
Cross modulation rejection		in line with ETSI EN 300676-1, ≥ 95 dB
Image frequency rejection		≥ 100 dB
Intermediate frequency rejection		≥ 90 dB at 35.25 MHz
Conducted spurious emissions	in line with ETSI EN 300676-1	
	112 MHz to 155.975 MHz	≤ -81 dBm
	9 kHz to 1 GHz	≤ -67 dBm
Adjacent channel rejection	1 GHz to 4 GHz	≤ -57 dBm
	in line with ETSI EN 300676-1	
	at 25 kHz spacing	≥ 75 dB
Desensitization rejection (blocking)	at 8.33 kHz spacing	≥ 65 dB
	at $\Delta f \geq 100$ kHz S+N/N = 10 dB, ITU-T, wanted signal = -97 dBm, m = 60 %, AF = 1 kHz	≥ 84 dB
	at $\Delta f \geq 3$ MHz S+N/N = 10 dB, ITU-T, wanted signal = -93 dBm, m = 60 %, AF = 1 kHz	≥ 95 dB
	at $\Delta f \geq 1$ MHz	in line with ETSI EN 300676-1, ≥ 95 dB

Third-order intermodulation distortion (IM3)	at $\Delta f \geq 100/200$ kHz	in line with ETSI EN 300676-1, ≥ 80 dB
Third-order intercept point (IP3)		typ. +10 dBm
IF bandwidth (selectivity)	at 25 kHz spacing	± 11 kHz/6 dB, ± 25 kHz/80 dB
	at 8.33 kHz spacing	± 3.5 kHz/6 dB, ± 8.33 kHz/70 dB, ± 25 kHz/80 dB

AF response		in line with ETSI EN 300676-1
	at 25 kHz spacing	300 Hz to 3400 Hz (+1/-3 dB (1 kHz)), 150 Hz > 15 dB, 5 kHz \geq 30 dB
	at 8.33 kHz spacing	350 Hz to 2500 Hz (+1/-3 dB (1 kHz)), 150 Hz > 15 dB, 3.2 kHz \geq 25 dB
AF output impedance		600 $\Omega \pm 15$ %

AGC variation		
For AF AGC		in line with ETSI EN 300676-1
	at 30 % $\leq m \leq$ 90 %	≤ 1 dB
Attack time (for voice)		typ. 90 ms
Decay time (for voice)		typ. 500 ms
For RF AGC	at RF -107 dBm to +7 dBm, m = 60 %, AF = 1 kHz	≤ 3 dB
Attack time (for voice)		typ. 30 ms
Decay time (for voice)		typ. 200 ms
Attack time (for ACARS)		in line with ETSI EN 300676-1, < 40 ms
Decay time (for ACARS)		in line with ETSI EN 300676-1, < 50 ms

AF output level (transformer-coupled)	nominal, at m = 60 %	0 dBm ± 1.5 dB
	configurable range	-30 dBm to +10 dBm, in 1 dB steps
AGC output (RSSI)	analog 0 V to 5 V DC	-120 dBm to +10 dBm, linear
	LAN interface	-120 dBm to +10 dBm, in 1 dB steps
	inband tones	3180 Hz (no signal), 3210 Hz (bad quality), 3300 Hz (middle quality), 3390 Hz (good quality)
AF inband tones (SQ)	configurable tones	1225 Hz, 2040 Hz, 2440 Hz, 2970 Hz, 3300 Hz
	configurable level	-40 dB to 0 dB below audio setting

Squelch		
Mute attenuation		in line with ETSI EN 300676-1, ≥ 70 dB
Setting range (S+N)/N		6 dB to 20 dB
Setting range RSSI		1 μ V/-107 dBm to 50 μ V/-73 dBm
Carrier override	can be disabled	in line with ETSI EN 300676-1, ≥ -85 dBm
Hysteresis (backlash)		1 dB to 6 dB, typ. 3 dB
Response time	at 25 kHz spacing	≤ 20 ms
	at 8.33 kHz spacing	≤ 30 ms

Audio (S+N)/N		in line with ETSI EN 300676-1, ≥ 50 dB
Audio distortion		in line with ETSI EN 300676-1
	at -87 dBm to +1 dBm with m = 30 %, AF = 1 kHz	≤ 2%
	at -87 dBm to -13 dBm with m = 90 %, AF = 1 kHz	≤ 2%

Digital audio interface (R&S EU4200C and R&S XU4200), software option		
E1 in line with ITU-T G.703 ff		
Data rate		2.048 Mbit/s
Impedance		120 Ω nominal, balanced
Audio codec		in line with ITU-T G.711, A-law

Digital audio interface voice over IP (VoIP), software option		
VoIP in line with EUROCAE ED137A part1		
Session control		SIP in line with EUROCAE ED137A part1
Audio stream		RTP in line with EUROCAE ED137A part1
Audio codec		in line with ITU-T G.711

VDL2 operation		
Frequency range		118 MHz to 136.975 MHz
Modulation VDL2		D8PSK 31.5 kbit/s, α = 0.6
Sensitivity VDL 2	BER < 10 ⁻³	in line with ETSI EN 301841-1, -98 dBm
RF AGC attack/decay VDL2 mode		< 250 μs (2.5 symbol)
Signal dynamic VDL2	BER < 10 ⁻³	in line with ETSI EN301841-1, -98 dBm to +10 dBm
Capture range VDL2		in line with ETSI EN 301841-1
Carrier offset	BER < 10 ⁻³	≥ ±830 Hz
Symbol rate	BER < 10 ⁻³	≥ ±50 ppm
Doppler rate	BER < 10 ⁻³	> 500 Hz/s
Channel sensing (CSMA)	idle to busy detection	in line with DO224B and ICAO annex 10; volume III, part 1, chapter 6 < 1 ms at -98 dBm
	busy to idle detection	in line with DO224B and ICAO annex 10; volume III, part 1, chapter 6 < 1.5 ms at -100 dBm
	adjustment of threshold level	-5 dBm to +20 dBm
Rejection of signal outside VHF aeronautical band	wanted signal with -87 dBm, BER = 10 ⁻³	in line with ETSI EN 301841-1
	108 MHz to 117 MHz and 137.025 MHz to 156 MHz	≥ -33 dBm
	50 kHz to 87.5 MHz and 156 MHz to 1215 MHz	≥ -7 dBm
	87.5 MHz to 107.9 MHz	≥ -5 dBm
Desensitization VDL2		
At 2nd adjacent channel	wanted signal with -87 dBm, BER = 10 ⁻³	in line with ETSI EN 301841-1, ≥ -33 dBm
At 4th adjacent channel	wanted signal with -87 dBm, BER = 10 ⁻³	in line with ETSI EN 301841-1, ≥ -27 dBm
Intermodulation response rejection (3rd order) VDL2	at ±1/2 MHz, two interferers, wanted signal -75 dBm, BER = 10 ⁻³	in line with ETSI EN 301841-1, ≥ -32 dBm
FM immunity blocking VDL2	f = 87.5 MHz to 107.9 MHz, signal A = -87 dBm, signal B = -5 dBm unmodulated, BER = 10 ⁻³	in line with ETSI EN 301841-1, ≥ -5 dBm
Co-channel interference VDL2	BER = 10 ⁻³	in line with ETSI EN 301841-1, ≤ -20 dB
Adjacent channel rejection VDL2	BER = 10 ⁻³	in line with ETSI EN 301841-1, ≥ 44 dB
TX/RX turnaround time		1.5 ms

Mechanical and electrical data for all R&S®Series4200 VHF radios

Mechanical data		
Dimensions (W × H × D) of the R&S SU4200/R&S XU4200		19"/2, 3 height units
	without handles and rear protectors	210 mm × 132 mm × 325 mm (8.3 in × 5.2 in × 12.8 in), connectors excluded
	with handles and without rear protectors	220 mm × 132 mm × 370 mm (8.7 in × 5.2 in × 14.6 in), connectors excluded
Dimensions (W × H × D) of the R&S EU4200C		19"/4, 3 height units
	without handles and rear protectors	111 mm × 132 mm × 325 mm (4.4 in × 5.2 in × 12.8 in), connectors excluded
	with handles and without rear protectors	111 mm × 132 mm × 363 mm (4.4 in × 5.2 in × 14.3 in), connectors excluded
Weight	R&S XU4200	≤ 8 kg (≤ 17.6 lb)
	R&S SU4200	≤ 7 kg (≤ 15.4 lb)
	R&S EU4200C	≤ 4 kg (≤ 8.8 lb)
Antenna connector	for R&S XU4200	N female, 50 Ω, common TX/RX antenna, separate RX and TX antenna possible (RX: BNC female, 50 Ω) decoupling of TX/RX switch ≥ 50 dB
	for R&S SU4200	N female, 50 Ω
	for R&S EU4200C	BNC female, 50 Ω

Mechanical resistance		
Vibration		
Sinusoidal		in line with EN 60068-2-6, 5 Hz to 55 Hz, 0.15 mm amplitude, 55 Hz to 150 Hz, 0.5 g constant
Random		in line with EN 60068-2-64, 10 Hz to 300 Hz, 0.003 g ² /Hz
Shock		in line with EN 60068-2-27, 45 Hz to 2000 Hz, ≤ 40 g

Environmental data		
Temperature range		in line with EN 60068-2-1, EN 60068-2-2
Operating temperature range		-20 °C to +55 °C
Storage temperature range		-30 °C to +70 °C
Humidity		in line with EN 60068-2-30, ≤ 95 % at +40 °C
Altitude		in line with EN 60068-2-13, MIL-STD-810F proc. 500.4
Operation		3500 m asl
Transport		10000 m asl
Cooling		sensor-controlled forced air cooling by integrated fans for power supply and RF modules; air flow from front to back

Electrical data		
Power supply, AC		115/230 V, – 10 %/+ 15 % at 47 Hz to 63 Hz
Power supply, DC		+19 V to +32 V, nominal +28 V
Power consumption, standby		
AC	R&S EU4200C	typ. 6 W
	R&S SU4200	typ. 6 W
	R&S XU4200	typ. 6 W
DC	R&S EU4200C	typ. 1 W
	R&S SU4200	typ. 1 W
	R&S XU4200	typ. 1 W
Power consumption, RX mode		
AC	R&S EU4200C	typ. 35 W
	R&S XU4200	typ. 60 W
DC	R&S EU4200C	typ. 30 W
	R&S XU4200	typ. 45 W
Power consumption, TX mode		
AC	R&S SU4200	typ. 360 W, max. 480 W
	R&S XU4200	typ. 360 W, max. 480 W
DC	R&S SU4200	typ. 330 W, max. 390 W
	R&S XU4200	typ. 330 W, max. 390 W
AC/DC operation		primary power on AC, automatic switchover to DC in case of AC supply failure
Front-panel HMI		
Built-in loudspeaker	R&S XU4200/R&S SU4200	1 W/8 Ω, 500 mW output power, volume control by knob
	R&S EU4200C	0.3 W/25 Ω (peak 0.8 W), volume control by keys
ON/OFF switch	not on R&S EU4200C	push button
USB connector (device) for service PC		V1.1 full speed
Mini-DIN connector	not on R&S EU4200C	
Headset		0 V to 1 V (RMS) into 150 Ω load, volume control by knob
Microphone (dynamic)		1 mV ± 20 dB, input impedance 200 Ω, automatic level control (ALC)
Microphone (electret)		100 mV ± 20 dB, input impedance 330 Ω, DC 8 V ± 10 %, automatic level control (ALC)
PTT		against ground
3.5 mm mini-jack for headset	R&S EU4200C	0 V to 1 V (RMS) into 150 Ω load, volume control by keys
Keypad		19 keys (10 × numeric, 4 × cursor, SQ, ESC, LOC, ENTER, MENU)
LED		8 LEDs (4 green, 4 yellow) for indicating AC, DC, VOP, GO, CARR, VSWR, SQ, MOD
	R&S EU4200C	5 LEDs (4 green, 1 yellow) for indicating AC, DC, VOP, GO, SQ
Alphanumeric display		8 lines/21 rows
Backlight		white
TX carrier test (via menu)	voice mode: unmodulated	
	voice mode: modulated	1 kHz test tone
	ACARS mode: modulated	1200 Hz, 2400 Hz test tones
Electronic inventory		available on front-panel display
Preset pages		200

Ordering information

Designation	Type	Order No.
R&S Series4200 VHF Multichannel Radiocommunications System		
VHF Transceiver		
50 W, 112 MHz to 156 MHz	R&S XU4200	6144.7300.12
VHF Transmitter		
50 W, 112 MHz to 156 MHz	R&S SU4200	6144.7500.12
VHF Receiver, Compact		
112 MHz to 156 MHz	R&S EU4200C	6144.7800.12
Software options (option keys)		
Option key OCXO for R&S XU4200	R&S GS4201-XU	6162.4409.02
Option key OCXO for R&S SU4200	R&S GS4201-SU	6162.4421.02
Option key E1 interface for R&S XU4200	R&S GS4202-XU	6162.4480.02
Option key E1 interface for R&S SU4200	R&S GS4202-SU	6162.4509.02
Option key E1 interface for R&S EU4200C	R&S GS4202-EU	6162.4521.02
Option key VoIP interface for R&S XU4200	R&S GS4203-XU	6162.4609.02
Option key VoIP interface for R&S SU4200	R&S GS4203-SU	6162.4621.02
Option key VoIP interface for R&S EU4200C	R&S GS4203-EU	6162.4644.02
Accessories (external options)		
Service and Maintenance Tool	R&S ZS4200	6133.8722.10
Headset, with dynamic microphone	R&S GA4200	6133.8780.00
Microphone, with mini-DIN connector	R&S GA016H1	0583.5568.03
Adapter for standard headset	R&S GA4220	6137.1274.00
Headset Sennheiser PC20	R&S GA4210	6137.1245.00
Mating connector set for R&S XU4200	R&S ZF4200	6137.1568.02
Mating connector set for R&S SU4200/R&S SD4200	R&S ZF4200	6137.1568.03
Mating connector set for R&S EU4200/R&S ED4200	R&S ZF4200	6137.1568.04
Mating connector set for R&S XD4200	R&S ZF4200	6137.1568.05
Filler plate 19"/2	R&S BP4201	6130.2269.02
Filler plate 19"/4	R&S BP4202	6130.1616.02

For product brochure, see PD 5213.5700.12 and www.rohde-schwarz.com

Service you can rely on

Worldwide
Local and personalized
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Uncompromising quality
Long-term dependability

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Rohde & Schwarz is an independent group of companies specializing in electronics. It is a leading supplier of solutions in the fields of test and measurement, broadcasting, radiomonitoring and radiolocation, as well as secure communications. Established more than 75 years ago, Rohde & Schwarz has a global presence and a dedicated service network in over 70 countries. Company headquarters are in Munich, Germany.

Environmental commitment

Energy-efficient products

Continuous improvement in environmental sustainability

ISO 14001-certified environmental management system

Certified Quality System

ISO 9001

Certified Quality System

EN 9100

Certified Quality System

AQAP-2110

Certified Quality System

EN 9110

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Subject to change

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