

ENHANCED VHF RADIO - EVR 750

EVR750-04-0200A

**Declaration of Design and Performance
(DDP)**

Établi / Prepared Service / Department Date Signature	B. BOURCIER	Approuvé / Approved Service / Department Date Signature
Vérifié / Checked Service / Department Date Signature	S. GROISIL	Approuvé / Approved Service / Department Date Signature
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REVISIONS			
REV	RAISON DE L'ÉVOLUTION / <i>CHANGE REASON</i>	DATE AAAA-MM-JJ	ÉTABLI <i>AUTHOR</i>
- -	Creation : <i>DRAFT</i> Final version	2002-12-15 2003-02-15	B. BOURCIER
- A	§.6 - Change in vibrations levels: "Cat.S, curves M & B". §.5 : QTR issue (environmental part) is updated.	2003-06-10	B. BOURCIER

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AIRCRAFT TYPES : AIRBUS - BOEING

CERTIFICATION CATEGORY : 2

1. NAME AND ADDRESS OF SUPPLIER

THALES-COMMUNICATIONS
160, Boulevard de Valmy - B.P. 82
92704 - COLOMBES Cedex FRANCE

2. REFERENCES

TYPE : Enhanced VHF Radio Transceiver (EVR 750)

PART-NUMBER : EVR750-04-0200A

MODIFICATION STANDARD : MODS 1 - 2

SOFTWARE RECORD REFERENCE : 61227067AA

SHORT DESCRIPTION : The EVR transceiver ensures, on board Air transport Aircraft, the transmission and reception of voice and data, in the aeronautical VHF band (118 to 137MHz).
The EVR750 version operates according to the voice and data modes defined by ARINC 716 and ARINC 750.
Voice modes : AM/DSB with 25kHz or 8.33kHz channel spacing.
Data modes : ACARS, MODE A, MODE 2.

WEIGHT : 4450 g (±3%)

OVERALL DIMENSIONS : (200 x 94 x 387.5)mm (max.)
"3 MCU"

CLASSIFICATION OF THE EQUIPMENT : Essential

SOTWARE LEVEL : Software includes :
- CSCI MAIN 750 Software according to DO-178B/Level C
- CSCI DPS 750 Software according to DO-178B/Level C
- CSCI Boeing Maintenance Software according to DO178-B/Level D
- CSCI Airbus Maintenance Software according to DO178-B/Level D

CMM REFERENCE : 23-12-30
Ref: 36708021-AC

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3. APPLICABLE SPECIFICATION REFERENCE

Specification Reference :

- [1] JTSO-2C37e / JTSO-2C38e / JTSO-2C128
- [2] TSO C37d - Class 3 & 5
- [3] TSO C38d - Class C & E
- [4] RTCA DO-160D / EUROCAE ED-14D
- [5] RTCA DO-186A / EUROCAE ED-23B
- [6] RTCA DO-207 / EUROCAE ED-67
- [7] RTCA DO-178B / EUROCAE ED-12B
- [8] EUROCAE ED-92
- [9] ARINC Characteristic 716-9
- [10] ARINC Characteristic 750-3 + Draft 2 of Supplement 4
- [11] AIRBUS Specifications n°515.2108/97 (issue 1)
- [12] BOEING Specifications n°D6-54745-1-D
n°D200Z001-E

Quality Assurance Manual :

THC/QPO,MQ/001E/D/02

Specification Agreement QAC :

MOP n° F.G.050

4. RATED PERFORMANCE OF THE ARTICLE

Technical Specifications (SSS/SSDD) :

n° 4689708A305 (AE)

Acceptance Test Procedure (ATP) :

n° 4689708A090 (-A)

Failure Modes & Effects Analysis (FMEA) :

n° 4689708A530 (-)

5. REFERENCE TO QUALIFICATION TESTS REPORTS AND SOFTWARE ACCOMPLISHMENT SUMMARY

Qualification Test Report (Functional Part) :

n° 61224830-279 (--)

Qualification Test Report (Environmental Part) :

n° 61224831-279 (-A)

Software Accomplishment Summary :

n° 56156087AA55 (--)

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6. STATEMENT OF CONFORMANCE WITH APPROPRIATE SPECIFICATIONS AND REQUIREMENTS

CHARACTERISTICS	SPECIFICATION
GENERAL	
Operational modes	Voice AM/DSB/25kHz (0A) Voice AM/DSB/8.33kHz (0B) Data AM/MSK (1A) (with external modem) (ACARS) Data AM/MSK (1C) (with internal modem) (Mode A) Data D8PSK (Mode 2)
Equipment classes (ED-23B/DO-186A)	- Reception: Class C and Class E - Transmission: Class 3 and Class 5
Power Requirements	28VDC
Power Consumption (28V)	< 180W (Transmission) < 36W (Reception)
Power drop-out transparency	> 200ms (Reception)
Form Factor	3MCU, ARINC Specification 600
Operating Temperature	-25°C to +70°C
Storage Temperature	-55°C to +85°C
Frequency control	Serial Digital in accordance with ARINC 429
Frequency range	118 MHz to 136.992 MHz
Channel spacing	25 kHz and 8.33 kHz
Frequency stability	< ± 5 ppm
Duty cycle	Continuous transmission (with ARINC 600 cooling system). Duty cycle of 20% (1mn/4mn) with natural convection.
Channel Switching time	Less than 60ms
Transmit to Receive switching time in voice mode	Less than 50ms
Receive to transmit switching time in voice mode	Less than 50ms
Rx to Tx turn-around time in Mode 2	< 1 ms
Tx to Rx turn-around time in Mode 2	< 1.5 ms

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CHARACTERISTICS		SPECIFICATION
VOICE & DATA AM-MSK RECEIVER		
Sensitivity (modes 0A & 0B)		For a wanted signal of -106dBm, modulated 1kHz/30%, (S+N)/N* is greater than 6dB (Nominal). (*): CCITT weighted.
Selectivity (mode 0A/1A/1C)		>± 9kHz at 6dB bandwidth <±17kHz at 60dB bandwidth <±25kHz at 70dB bandwidth
Selectivity (mode 0B)		>±2.78kHz at 6dB bandwidth <±7.37kHz at 60dB bandwidth
Cross Modulation		Unwanted signal level (1kHz/50%) to obtain -10dB referred to a wanted signal of -87dBm (1kHz/50%): - at ± 25kHz: > -20 dBm - at ± 50kHz: > -15 dBm - at ± 100kHz: > -10 dBm
AGC regulation		Within 3dB (-93dBm to -13dBm input); not more than 6dB (-101dBm to +1dBm).
Audio output LEVEL		10mW (adjustable up to 40mW) into (600±20%) ohms resistive load for -53dBm signal modulated 85% at 1000Hz.
Audio output frequency response		Within 6dB from 300 to 2500Hz more than 20dB at 3750Hz.
Audio output harmonic distortion		Not to exceed 3% for -53dBm signal modulated 30% at 1000Hz.
Undesired responses		> 80dB.
Intermodulation (FM immunity)		as per ARINC 716 section 3.6.7.5.
Selcal/Data Output	Level	0.5 Vrms (min.) into (600±20%) ohms resistive load
	Frequency response	Selcal (mode 0A): <3dB from 312Hz to 1200Hz AM-MSK (mode 1A): <±6dB from 300Hz to 6600Hz
	Distortion	< 3% for a wanted signal of -53dBm, modulated 30% at 1000Hz
VOICE & DATA AM-MSK TRANSMITTER		
Output power		> 25W as specified in [5]
Harmonics		H ₂ < -16 dBm H _n < -26 dBm
Audio Frequency response		Within 6dB from 300Hz to 2500Hz
Modulation level		> 85% for 0.25Vrms at 1000Hz.
Spectrum mask (mode 0B)		For an audio frequency from 300Hz to 10kHz and an audio level attenuated by 10dB/octave from 800Hz to 10kHz, referred to 70% modulation level: < -45 dBc from ±3.2kHz to ±5kHz < -60 dBc from ±5kHz to ±7kHz < -70 dBc for frequency shift greater than ±7kHz
Data Input	Modulation ratio	>80% for a frequency of 1000Hz at -10dBm
	Frequency response	Within 6dB from 600Hz to 6600Hz.
	Distortion	< 10% for 80% modulation ratio over frequency range from 600Hz to 6600Hz

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CHARACTERISTICS	SPECIFICATION
VDL2 RECEIVER	
Sensitivity	$\leq -98\text{dBm}$ for BER= 1.10^{-3}
Adjacent channel rejection	$\geq 44\text{ dB}$ for -87dbm
Strong signals in the VHF range	$\geq -33\text{ dBm}$ for 2 nd and 3 rd adjacent channels $\geq -27\text{ dBm}$ for other channels
Strong signals outside the VHF range	$\geq -33\text{ dBm}$ in 108-156MHz range (except 118-137MHz) $\geq -7\text{ dBm}$ in 50kHz-1215MHz range (except 88-156MHz) $\geq -5\text{ dBm}$ in 87.5-107.9MHz range
Desired dynamic range	-98dBm to -7dBm
Symbol capture range	Symbol rate offset of $\pm 50\text{ ppm}$
Frequency capture range	Frequency offset of $\pm 967\text{Hz}$
Doppler rate	Carrier frequency change rate of $\pm 18\text{Hz/s}$ (in the range of doppler frequencies $\pm 282\text{Hz}$)
Co-channel interference ratio	$< 20\text{ dB}$
Conducted spurious emission	$< -64\text{ dBm}$ in 108MHz-137MHz $< -57\text{dBm}$ in 50kHz-1215MHz
FM broadcast intermodulation	Two signals in the range 87.5 to 107.9MHz with a level at -5dBm
In-band intermodulation	Two unwanted signals at -32dBm (at $\pm 1\text{MHz}$ and $\pm 2\text{MHz}$ from F0) for a wanted signal at -75dBm
VDL2 TRANSMITTER	
Output power	$> 15\text{ Watts}$ as specified in [8]
RF Power rise time	90% of the nominal output power in less than 190 μs
RF Power release time	Output power reduced at -20dB in less than 190 μs
Symbol constellation error	EVM $< 6\%$ (measured over 100 symbols)
Adjacent channel power : 1st adj. channel in 16kHz 2nd adj. channel in 25kHz 4th adj. channel in 25kHz	$< -18\text{ dBm}$ $< -28\text{ dBm}$ $< -38\text{ dBm}$
Wide-band noise : in 25kHz with a shift $> \pm 0.8\text{ MHz}$	$< -53\text{ dBm}$

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ENVIRONMENTAL CHARACTERISTICS

ENVIRONMENTAL CONDITIONS	DO-160D		AIRBUS Conformance	BOEING Conformance
	Section	Category		
Temperature and altitude	4	A2D1	DO-160D cat.A2 + AS515.2108/97(ed.1)	same as DO-160D
In-flight loss of cooling	4	Y	DO-160D cat.Z + AS515.2108/97(ed.1)	same as DO-160D
Temperature Variation	5	B	same as DO-160D	same as DO-160D
Humidity	6	A	same as DO-160D	same as DO-160D
Operational Shocks	7	B & E Oper:6g/11ms-20ms	same as DO-160D	same as DO-160D
Crash Safety Shocks	7	15 g - 11 ms 12 g - 3 s	same as DO-160D + ABD0007-F (§.3-11.2)	same as DO-160D
Vibration	8	Cat.S curves M & B	DO-160D cat.B + 513.5115/01 ed.02	DO-160D + D200Z001-E (§.3.3.1.8)
Explosion Proofness	9	X	same as DO-160D	same as DO-160D
Waterproofness	10	X	same as DO-160D	same as DO-160D
Fluids Susceptibility	11	X	same as DO-160D	same as DO-160D
Sand and Dust	12	X	same as DO-160D	same as DO-160D
Fungus Resistance	13	X	same as DO-160D	same as DO-160D
Salt Spray	14	X	same as DO-160D	same as DO-160D
Magnetic Effect	15	A	same as DO-160D	same as DO-160D
Power Input	16	A	DO-160D + ABD0013-D (section 6)	DO-160D + D200Z001-E (§.3.2.2.3)
Voltage Spikes	17	A	DO-160D cat.A + AS515.2108/97(ed.1)	same as DO-160D
Audio Frequency Conducted Susceptibility	18	Z	same as DO-160D	DO-160D + D200Z001-E (§.12.7.2.1)
Induced Signal Susceptibility	19	Z	same as DO-160D	Same as DO-160D
Radio Frequency Susceptibility	20	U	DO-160D +483.0156/95-Ed.4 (Class C)	DO-160D + D200Z001-E (§.12.7.3)
Emission of Radio Frequency Energy	21	Z	same as DO-160D	DO-160D + D200Z001-E (§.12.8.4)
Lightning Induced Transient Susceptibility	22	A2E2	DO-160D + AS515.2108/97(ed.1)	DO-160D + D200Z001-E (§.12.7.4)
Lightning Direct Effects	23	X	NA	NA
Icing	24	X	NA	NA
Electrostatic Discharge	25	A	same as DO-160D	same as DO-160D

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Dominique BOURDARIAS

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THALES-COMMUNICATIONS promise to issue any new editions of this document whenever this item of equipment is the subject of a minor or major change, and to apply, when relevant, the software quality assurance plan and configuration management plan.

Date

Dominique BOURDARIAS
Product Technical Manager
THALES-COMMUNICATIONS

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