

Short overview of the EMC test facility at DLR Bremen

## Overview of available tests

The EMC laboratory of the DLR Institute of Space Systems is equipped for testing according to ECSS-E-ST-20-07C and MIL-STD-461E/F/G. The following tests can be performed:

Test	Details	Note	ECSS <sup>1</sup>	MIL <sup>2</sup>
Isolation				
Bonding, Grounding				
Conducted emission	30 Hz - 200 MHz		5.4.2/5.4.3 <sup>3</sup>	CE101/102
In-rush current		I/dt, I <sub>PEAK</sub> , C	5.4.4	
Radiated emissions E-field	9 kHz - 40 GHz	H/V	5.4.6 <sup>3</sup>	RE102
Radiated emissions H-field	30 Hz - 100 kHz			RE101
Conducted susceptibility	30 Hz - 200 MHz	DM/CM/BCI	5.4.7 <sup>3</sup> /5.4.8 <sup>3</sup>	CS101/CS114
Conducted susceptibility transients	0.15µs, 10µs		5.4.9	
Radiated susceptibility E-field <sup>4</sup>	30 MHz - 40 GHz	H/V, CW/PM	5.4.11 <sup>3</sup>	RS103
Radiated susceptibility H-field	30 Hz - 100 kHz		5.4.10	RS101
ESD wire-coupled		Pulse 30A/25ns	5.4.12	
ESD into chassis / personnel		Up to 15kV	5.4.14	CS118
Conducted emission, power, time domain		Ripple/spikes	5.4.15	

<sup>1</sup>ECSS-E-ST-20-07C

<sup>2</sup>MIL-STD-461E/F/G

<sup>3</sup>accredited according to ISO 17025

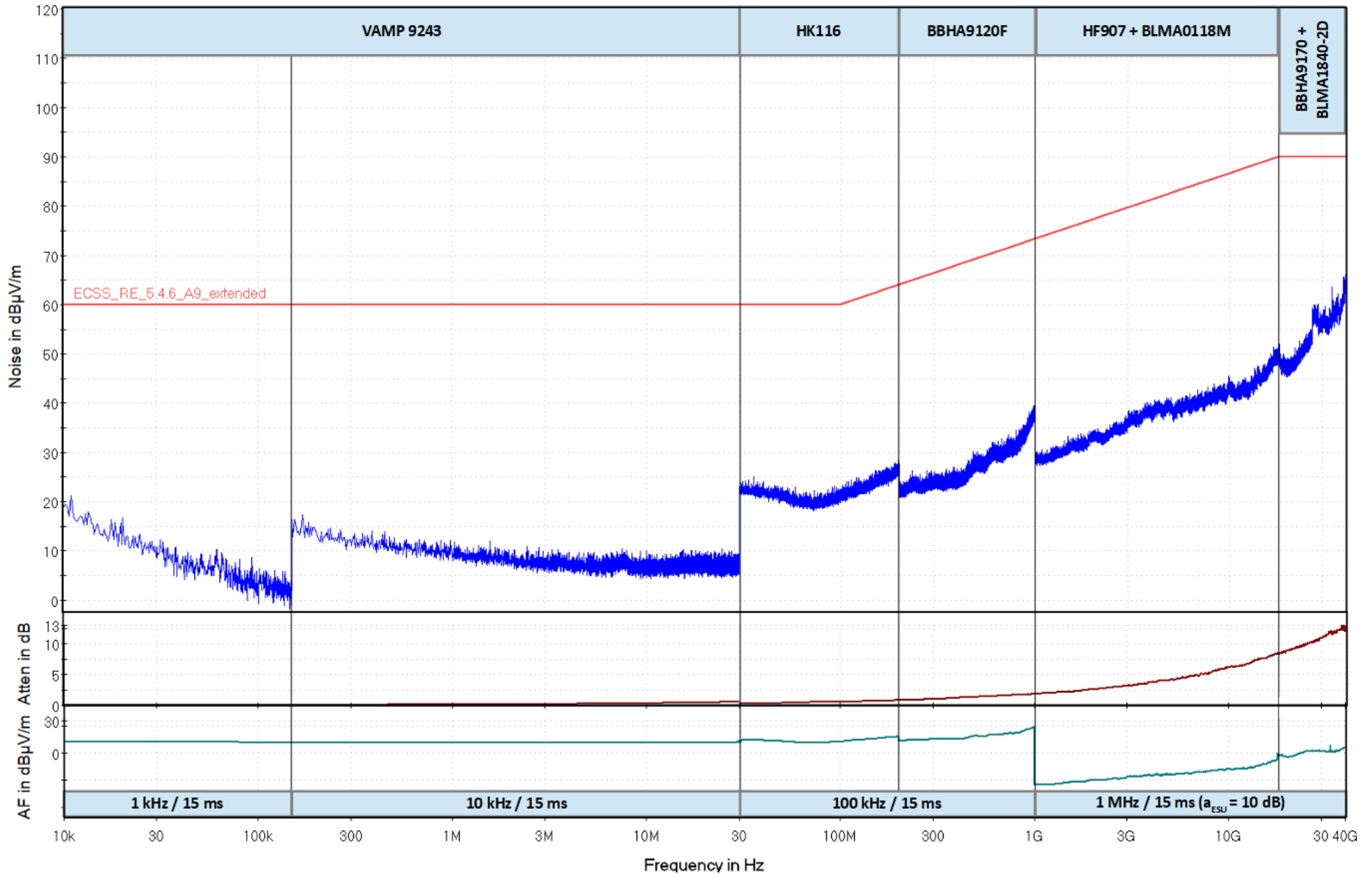
<sup>4</sup>from 18 GHz with rentable Amplifier

## Test details

Test category	Test domain	Test purpose	Mode	Measurement range		Transducers	Main instrumentation
Resistance & capacitance		Insulation		5 GΩ @ 25 V 10 GΩ @ 50 V 20 GΩ @ 100V	Test voltage 10 ... 100 V in 1 V steps	Multimeter tips	Chauvin Arnoux C.A 6536
		Capacitance					
		Grounding & bonding		30 mΩ @ 1 A 300 mΩ @ 0.1 A 3 Ω @ 0.1 A ...	< 0.1 mΩ ... 3 MΩ	4 wire test lead GTL-108A	Gwinstek GOM 802
Conducted emission	Time	Inrush current on power leads	DM			Testec TT-SI9101 Diff. Probe Tektronix TCPA300/TCP305A current probe	LeCroy WR 8404M
		Voltage ripples and spikes on power leads	DM				
	Frequency	Power leads	DM	30 Hz ... 150 kHz		Current probe FCC F10.1 / Solar 9105	Receiver R&S ESU40, EMC32
		Power and signal leads	CM/DM	50 kHz ... 200 MHz		Current probe Teseq CSP9160A	
Radiated emission	Frequency	Electric field	V	9 kHz ... 30 MHz		Schwarzbeck VAMP9242	Receiver R&S ESU40, EMC32
			H/V	30 MHz ... 200 MHz		R&S HK116	
				200 MHz ... 1 GHz		Schwarzbeck BBHA9120F	
				1 GHz ... 18 GHz		R&S HF907 & Bonn BLMA0118M	
				18 GHz ... 40 GHz		Schwarzbeck BBHA9170 & Bonn BLMA1840-3G	
	Magnetic field	X, Y, Z	30 Hz ... 100 kHz		Schwarzbeck FESP5133-7/41	Receiver R&S ESU40, EMC32	
Conducted susceptibility	Frequency	Power leads	DM	30 Hz ... 150 kHz	CW	Transformer Solar 6220-2 Diff. probe Keysight N2790A Current probe FCC F10.1	Receiver R&S ESU40, EMC32, Keysight DSOX3024T, Amplifier Hubert A1110-16E
			CM/DM	10 kHz ... 200 MHz	PM/AM	Diff. probe Keysight N2790A Current probe Teseq CSP9160A Injection probe Teseq CIP9136A	Receiver R&S ESU40, EMC32, Signal generator R&S SMB100A 1.1GHz Amplifier R&S BBA100
		Bulk cable injection on power and signal leads	CM	10 kHz ... 200 MHz	PM	Current probe Teseq CSP9160A Injection probe Teseq CIP9136A	Receiver R&S ESU40, EMC32, Signal generator R&S SMB100A 1.1GHz Amplifier R&S BBA100
	Time	Transients on power leads	Serial/parallel	150 ns, 10 μs 5 V ... 600 V		Diff. Probe Testec TT-SI9101 Current probe Tektronix TCPA300/TCP305A	LeCroy WR 8404M
Radiated Susceptibility	Frequency	Electric field	V/H	30 MHz ... 80 MHz	10 V/m PM	Schwarzbeck VHDB 9134	Signal generator R&S SMB100A 1.1GHz Amplifier R&S BBA100, EMC32
				80 MHz ... 1 GHz	20 V/m PM	R&S HL049	
				1 GHz ... 2 GHz	40 V/m PM	Schwarzbeck BBHA9120E	Signal generator R&S SMB100A 40GHz Amplifier EA 2107DB-3, EMC32
				2 GHz ... 4 GHz	60 V/m PM	Schwarzbeck HA9251-24	
				4 GHz ... 8.5 GHz	100 V/m PM	Schwarzbeck HA9251-48	
				8.5 GHz ... 18 GHz	60 V/m PM	Schwarzbeck HWRD750	
				18 GHz ... 40 GHz		Schwarzbeck BBHA9170	
	Magnetic field	X, Y, Z	30 Hz ... 100 kHz	Max. 180 dBμT @ 30 ... 50 Hz	Radiating loop Schwarzbeck FESP32 Monitor loop Schwarzbeck FESP5134-40	Rental amplifier Receiver R&S ESU40, EMC32, Generator Tektronix AFG3101C Amplifier Hubert A1110-16E	

Short overview of the EMC test facility at DLR Bremen

## Noise of radiated emission measurement system for ECSS-E-ST-20-07C and MIL-STD-641



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## Noise of conducted emission measurement system for ECSS-E-ST-20-07C

