LVA series of 4-quadrant amplifiers

AUTOMOTIVE SUPPLY SIMULATION AT IT'S BEST

4-quadrant amplifier LVA 1000

- ✓ Easy to use amplifier
- ✓ High stability, drives unlimited capacitive loads
- ✓ Extremely low harmonic distortion - even under very non-linear load conditions
- ✓ Very fast rise time ≤ 1 µs and slew rate > 40 V/µs
- ✓ Large signal bandwidth (-3 dB) from DC up to 100 kHz
- ✓ Small signal bandwidth (-3 dB) up to 300 kHz
- ✓ Sense wiring to compensate harness of EUT
- ✓ High short-term overload characteristic (for 30 s)
- ✓ Very high peak-load ability (up to 200 ms)
- ✓ Programmable internal resistance: 0 … 500 mΩ
- ✓ Sink operation mode included
- ✓ Internal oscilloscope and arbitrary generator
- ✓ Amplifier control via webinterface and interface commands
- ✓ Test and evaluation software available

The relating standards:*
ISO 7637-2
ISO 7637-3
ISO 16750-2
ISO 21848
LV124
VDA320 (LV148)
BMW GS 95002
BMW GS 95002-2
BMW GS 95003-2
BMW GS 95024-2-2
BMW GS 95026
FCA CS.00054
Fiat 9.90111-01
Ford FMC1278
GMW 3097
GMW 3172
JLR EMC-CSv1.0A4
MAN M 3285
MBN LV 124-1
MBN 10567
Mitsubishi ES-X82114
Mitsubishi EX-X82115
Nissan 28401NDS02
PSA B21 7110
Renault 36-00-808/--M,N
SAE J 1113-11
Volvo 31822854
Volvo 31850329
VW 80000
VW 82148
VW TL 81000
Magnetic field test

***** *The LVA series of amplifiers can be used for certain tests within these standards. Additional equipment might be required. For detailed information, please contact sales@spitzenberger.de.*

REFERENCE SOURCE FOR AUTOMOTIVE APPLICATIONS

TOUCHSCREEN USER INTERFACE

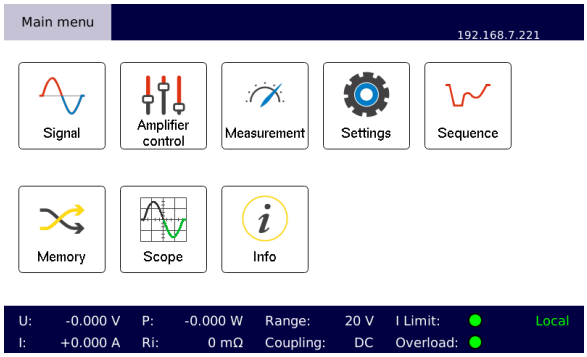


Fig. 1: Main menu

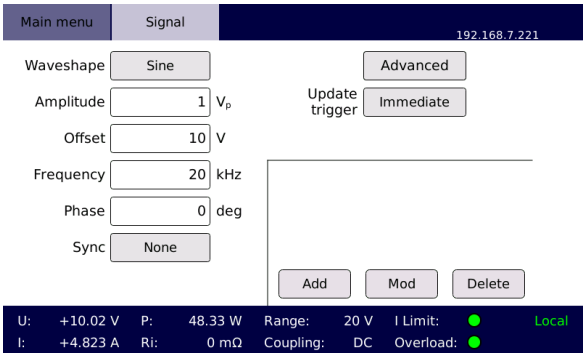


Fig. 2: Signal setting

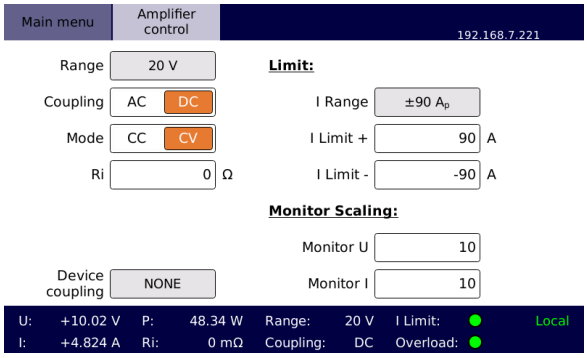


Fig. 3: Amplifier control

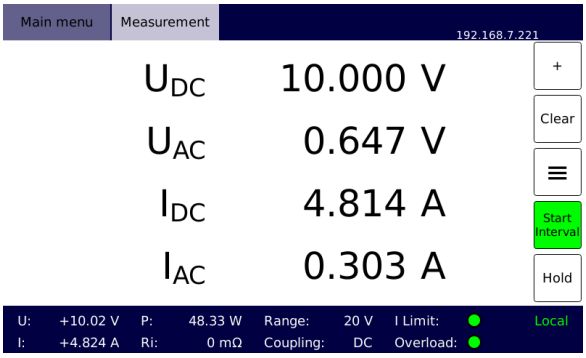


Fig. 4: Measurement

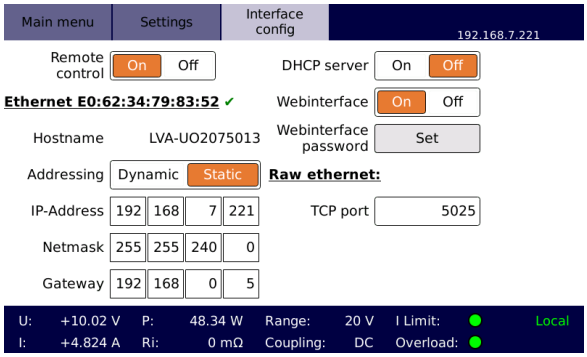


Fig. 5: Interface configuration

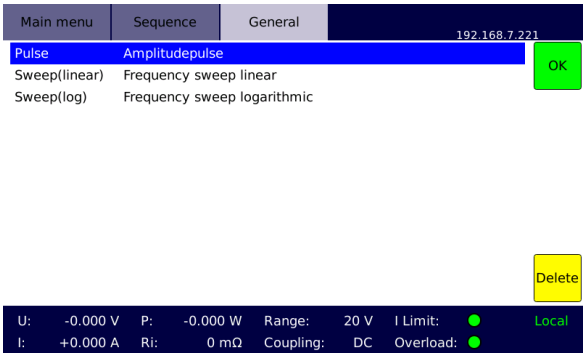


Fig. 6: Sequence menu

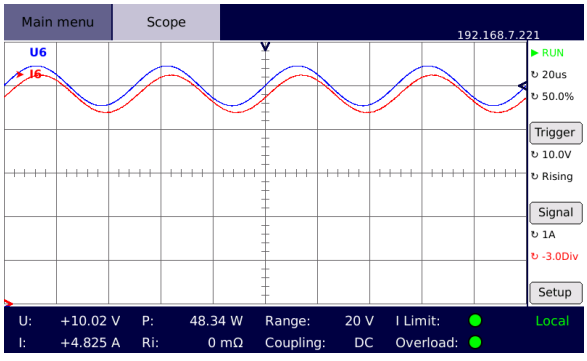


Fig. 7: Internal scope

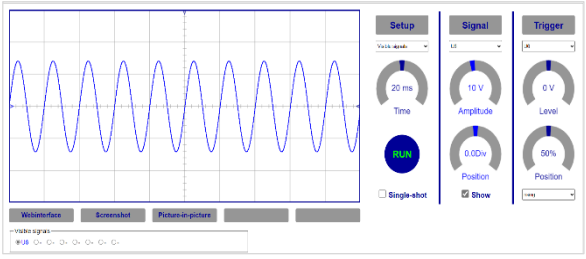


Fig. 8: Web oscilloscope

SOFTWARE CONTROL

SPS TestManager

- ✓ Test and evaluation software for fully compliant emission and immunity tests
- ✓ Automated test run of various IEC and automotive standards

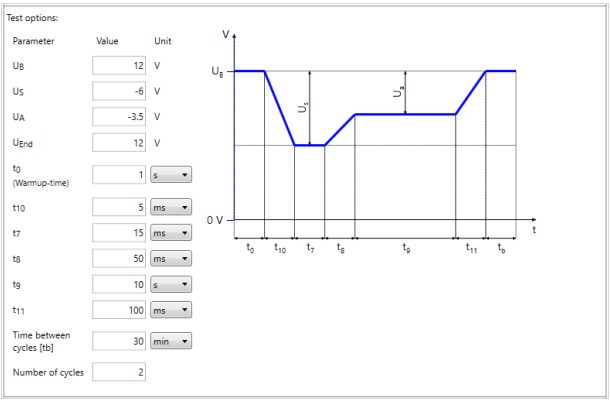


Fig. 9: SPS TestManager software

SPS SystemControl

- ✓ Simulation and control software for arbitrary waveforms, voltage and frequency variations
- ✓ Generation of user defined sequences
- ✓ Sequence preview graph

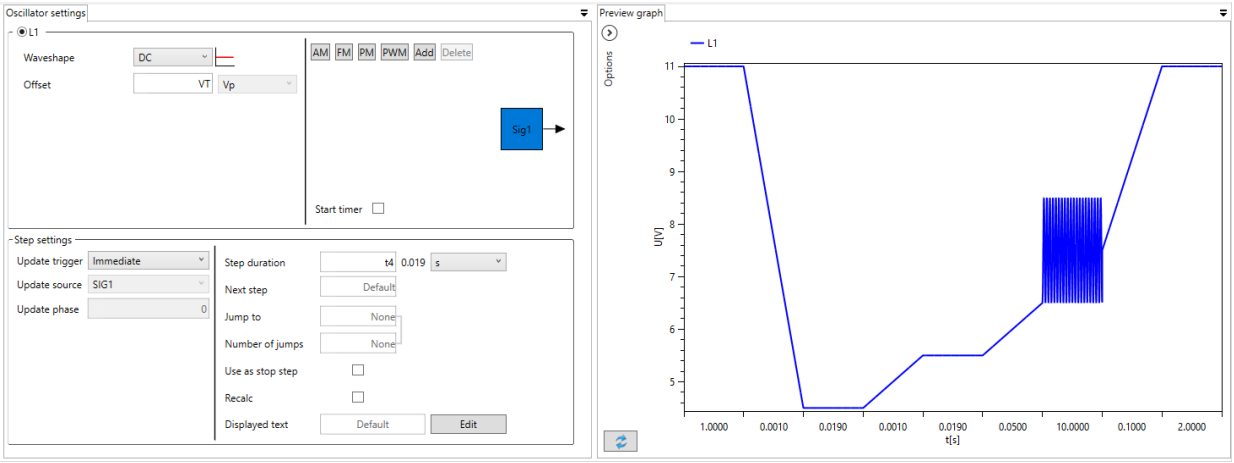


Fig. 10: SPS SystemControl software

Command interface

- ✓ Easily integrate the device into your own software applications
- ✓ Remote control commands are based on the SCPI standard

Webinterface

- ✓ Monitor and control the connected device via a web browser
- ✓ Oscilloscope function

TECHNICAL DATA – LVA100

		LVA 100
Nominal voltage range *(DC)* *(LVA 100 is a single-range amplifier, available in four versions)*		±20 V ±36 V ±54 V ±70 V
Continuous and short-time output current capability		see diagrams
Max. peak current capability *(up to 50 ms)*		20 A
Frequency bandwidth		large signal: DC … 50 kHz (-3 dB) small signal: DC … 250 kHz (-3 dB)
Slew rate *(at resistive load = 50 Ω)*		> 10 V/µs
Rise time *(at resistive load = 50 Ω)*		< 2 µs
Load regulation: 0 … nominal load		max. 0.2 %, typ. < 0.1 %
Noise at output *(RMS)*		< 20 mV (< 20 MHz)
Protection circuits		overload / short circuit / overtemperature
Source resistance *(optional)*		Ri programmable: 0 … 500 mΩ
Floating output		max. voltage between earth and the amplifier's ground output: < 300 V (RMS)
Internal oscillator unit		
	Type	4-channel synthesiser
	Wave forms	DC, sine, square, triangle, ramp, arbitrary
	Amplitude resolution	17 Bit
	Frequency range	DC … 1 MHz
	Frequency resolution	1 µHz
	Frequency accuracy	25 ppm
	Phase range	0° … 360°
	Phase resolution	0.001°
	Memory depth	1 MSample
	Synthesiser functions	ADD, AM, FM, PM, PWM
	Sequence memory	1024 steps
Internal control unit		
	Display	7.0" touchscreen (17.8 cm, resolution 800 x 480)
	Sequencer	integrated sequences: amplitude pulse, frequency pulse (lin/log) user defined sequence memory
	User interface	touchscreen / front panel button / incremental encoder webinterface
	Digital I/O	2 digital DC inputs: +5 V … +24 V 2 digital DC outputs: +5 V (internal U_{cc}), I_L = 40 mA (external DC input U_{cc}: +5 V … +24 V, I_L = 250 mA)
Measurement		
	DC voltage measurement ranges	20/40/80 V
	Peak current measurement range	20 A
	Voltage accuracy	DC: ±(0.5 % of measured value + 0.1 % of range value)
	Current accuracy	DC: ±(0.5 % of measured value + 0.1 % of range value)

Interface		Ethernet 100 Mbit/s (HiSLIP SCPI) USB 2.0 Host
Synchronisation bus *(multiple devices)*		device synchronisation and internal communication optical fibre, LC duplex: - synchronised sequence start - parallel operation - only one ethernet connection required
Insulation resistance		> 1 MΩ
Peak withstand voltage *(max. 10 s, output to earth)*		> 2000 V
Cooling		temperature-controlled air forced cooling
Ambient temperature		+10 °C up to +40 °C
Storage temperature		-25 °C up to +60 °C
Relative humidity		non condensing, max. 80 % for temperature < 31 °C, decreasing linearly to 50 % at 40 °C
System of protection		IP20
Power supply *(±10 %, 50/60 Hz)*		230 V
Line protection, connection		T4A micro fuse, Schuko
Housing		desktop unit or plug-in, colour light grey (RAL 7035)
	Amplifier	1/2 19", 4 U
	approx. dimension (H x W x D)	178 x 222 x 450 mm
Weight	*Amplifier (approx.)*	13 kg

TECHNICAL DATA - GENERAL (LVA1000, LVA2500, LVA5000, LVA7500)

		LVA series
Nominal voltage ranges *(DC)*		U1: -15 V … 20 V U2: -15 V … 36 V U3: -15 V … 54 V U4: -15 V … 70 V
Nominal voltage ranges, symmetric *(DC)*		U1: ±20 V U2: ±36 V U3: ±54 V U4: ±70 V
Load regulation: 0 … nominal load		max. 0.2 %, typ. < 0.1 %
Adjustable current limitation		accuracy, see current measurement unit response time < 20 µs
Protection circuits		overload / short circuit / overtemperature
Source resistance *(optional)*		Ri programmable: 0 … 500 mΩ
Floating output		max. voltage between earth and the amplifier's ground output: < 300 V (RMS)
External input *(optional)*	*Max. peak voltage*	0 … U_{ExtMax} (U_{ExtMax} is adjustable between ±2 V … ±25 V)
	Input impedance	approx. 10 kΩ
	Delay time	signal delay between amplifier's external input and amplifier's output < 5 µs
Internal oscillator unit		
	Type	4-channel synthesiser
	Wave forms	DC, sine, square, triangle, ramp, arbitrary
	Amplitude resolution	17 Bit
	Frequency range	DC … 1 MHz
	Frequency resolution	1 µHz
	Frequency accuracy	25 ppm
	Phase range	0° … 360°
	Phase resolution	0.001°
	Memory depth	1 MSample
	Synthesiser functions	ADD, AM, FM, PM, PWM
	Sequence memory	1024 steps
Internal control unit		
	Display	7.0" touchscreen (17.8 cm, resolution 800 x 480)
	Sequencer	integrated sequences: amplitude pulse, frequency pulse (lin/log) user defined sequences memory
	User interface	touchscreen / front panel button / incremental encoder webinterface
	Digital I/O	8 digital DC inputs: +5 V … +24 V 8 digital DC outputs: +5 V (internal U_{CC}), I_L = 40 mA (external DC input U_{CC}: +5 V … +24 V, I_L = 250 mA)

Monitoring unit *(optional)*		voltage	current
	Max. peak output	±10 V	
	Scaling factor 'sf' (adjustable)	sf: 0.2 … 1000	sf: 0.1 … 1000
	Bandwidth	300 kHz	200 kHz
	Monitoring accuracy	±(% of measured value + % of measurement range value + error(sf))	
	Frequency	DC	
	Voltage monitor accuracy	0.12 + 0.02 + 2 mV * sf	
	Current monitor accuracy	0.22 + 0.04 + 2 mA * sf	
	Noise of ADC measurement (RMS)	< 20 mV (DC … 300 kHz)	< 1.5 mA (DC … 300 kHz)
	Noise DAC output (RMS)	< 0.2 mV (DC … 300 kHz)	
	Delay time	< 1 µs	
	Output impedance	47 Ω	
	Isolation	earth / remaining electronics / each other	
	Protection	short circuit	
Interface		Ethernet 100 Mbit/s (HiSLIP SCPI) USB 2.0 Host	
Synchronisation bus *(multiple devices)*		device synchronisation and internal communication optical fibre, LC duplex: - synchronised sequence start - parallel operation - only one ethernet connection required	
Insulation resistance		> 1 MΩ	
Peak withstand voltage *(max. 10 s, output to earth)*		> 2000 V	
Cooling		temperature-controlled air forced cooling	
Ambient temperature		+10 °C up to +40 °C	
Storage temperature		-25 °C up to +60 °C	
Relative humidity		non condensing, max. 80 % for temperature < 31 °C, decreasing linearly to 50 % at 40 °C	
System of protection		IP20	

TECHNICAL DATA – LVA 1000 / 2500

		LVA 1000	LVA 2500
Max. peak current capability *(up to 200 ms)*		100 A	300 A
Continuous and short-time output current capability		range depending (see diagrams)	
Frequency bandwidth		large signal: DC … 50 kHz (-3 dB)	large signal: DC … 100 kHz (-3 dB)
		small signal (10 %): DC … 300 kHz (-3 dB)	
Slew rate *(at resistive load = 10 Ω)*		> 20 V/µs	> 40 V/µs
Rise time *(at resistive load = 10 Ω)*		≤ 2 µs (0 … 20 V)	≤ 1 µs (0 … 20 V)
Noise at output *(RMS)*		< 20 mV (< 20 MHz)	
Measurement			
	Voltage measurement ranges (DC)	autoranging (20/40/80 V ranges)	
	Voltage accuracy	DC: ±(0.1 % of measured value + 0.02 % of range value)	
	Current measurement ranges	12.5 A / 25 A / 50 A / 100 A	37.5 A / 75 A / 150 A / 300 A
	Current accuracy	DC: ±(0.2 % of measured value + 0.04 % of range value)	
Power supply *(±10 %, 50/60 Hz)*		230 V	230 V / 400 V
Line protection, connection		10 A, Schuko	16 A, CEE
Housing		plug-in unit, colour light grey (RAL 7035)	
	Amplifier	19", 5 U	19", 5 U
	approx. dimensions (HxWxD)	222 x 483 x 700 mm	267 x 483 x 700 mm
	Power supply	included	19", 6 U
	approx. dimensions (HxWxD)	-	267 x 483 x 700 mm
Weight	*Amplifier (approx.)*	70 kg	40 kg
	Power supply (approx.)	-	120 kg

TECHNICAL DATA – LVA 5000 / 7500

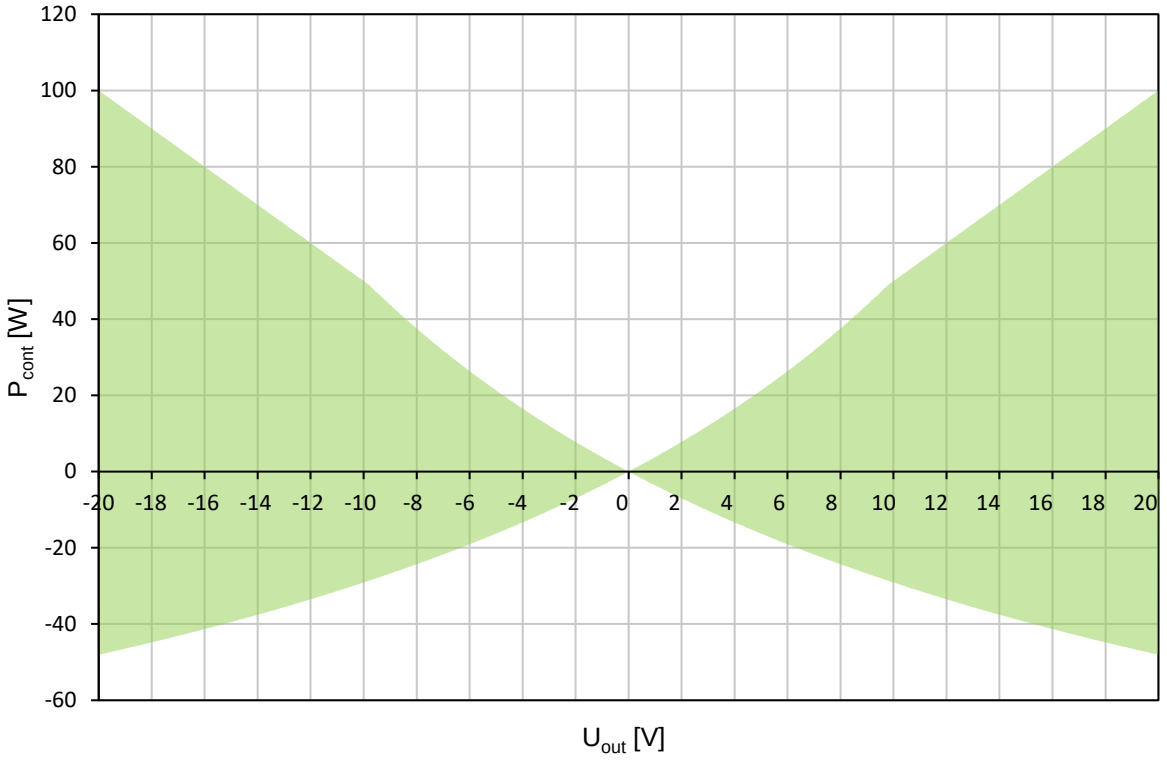
		LVA 5000	LVA 7500
Max. peak current capability *(up to 200 ms)*		600 A	900 A
Continuous and short-time output current capability		range depending (see diagrams)	
Frequency bandwidth		large signal: DC … 100 kHz (-3 dB)	
		small signal (10 %): DC … 300 kHz (-3 dB)	
Slew rate *(at resistive load = 10 Ω)*		> 40 V/µs	
Rise time *(at resistive load = 10 Ω)*		≤ 1 µs (0 … 20 V)	
Noise at output *(RMS)*		< 20 mV (< 20 MHz)	
Measurement			
	Voltage measurement ranges (DC)	autoranging (20/40/80 V ranges)	
	Voltage accuracy	DC: ±(0.1 % of measured value + 0.02 % of range value)	
	Current measurement ranges	75 A / 150 A / 300 A / 600 A	125 A / 250 A / 500 A / 1000 A
	Current accuracy	DC: ±(0.2 % of measured value + 0.04 % of range value)	
Power supply *(±10 %, 50/60 Hz)*		230 V / 400 V	
Line protection, connection		32 A, CEE	32 A, CEE
Housing		rack, colour light grey (RAL 7035)	
	Amplifier + power supply in rack, integrated	19", 20 U	19", 23 U
	Dimensions of rack (H x W x D), minimum	19", 24 U 1320 x 600 x 1050 mm	19", 24 U 1320 x 600 x 1050 mm
Weight	*Amplifier + power supply in rack (approx.)*	400 kg	460 kg

OPTIONS AND ACCESSORIES

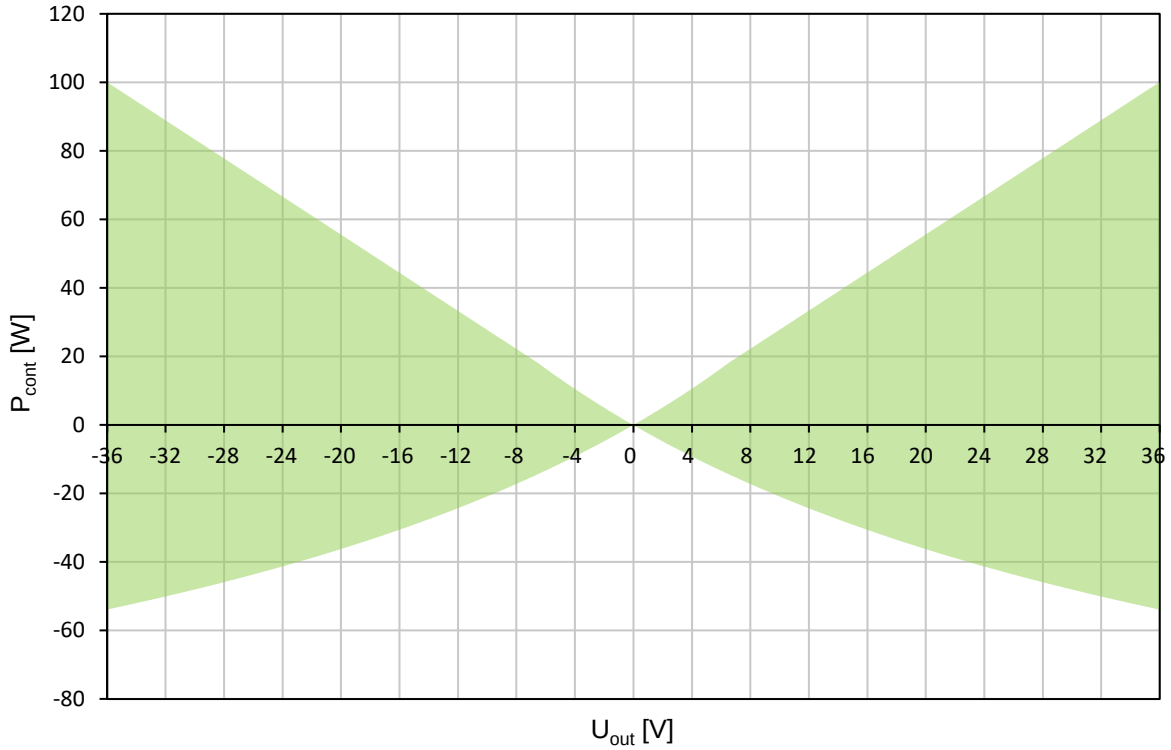
Options		
OPT.01	IEEE488	Not in combination with OPT.02
OPT.02	RS232	Not in combination with OPT.01
OPT.05	U/I monitor	Galvanically isolated voltage and current measurement outputs accessible via BNC sockets (includes OPT.14)
NT.11.70S	Additional voltage range	Symmetrical DC voltage range (e.g., for magnetic field tests) U: 0 … ±70 V
OPT.14	External input	0 … $U_{Ext\ max}$ $U_{Ext\ max}$ peak is adjustable between ±2 V … ±25 V OPT.14 includes a digital low pass input filter Type Bessel or Butterworth, order 1 … 6 (adjustable) Filter frequency selectable 100 Hz … 10 MHz
OPT.24	Programmable internal resistance	Programmable internal resistance R: 0 mΩ … 500 mΩ / accuracy: ±2 mΩ
OPT.25	Constant current mode	
OPT.30	Optical link	Optical interface to real time simulator LC duplex interface / Aurora 8B/10B protocol / 2 Gb/s data rate
OPT.70	Blocking of sink mode operation	
OPD	Overvoltage protection device	

SYMMETRIC AMPLIFIER CHARACTERISTIC – OUTPUT POWER CAPABILITY[1)]

20 V Range continuous power P_{cont}: LVA 100

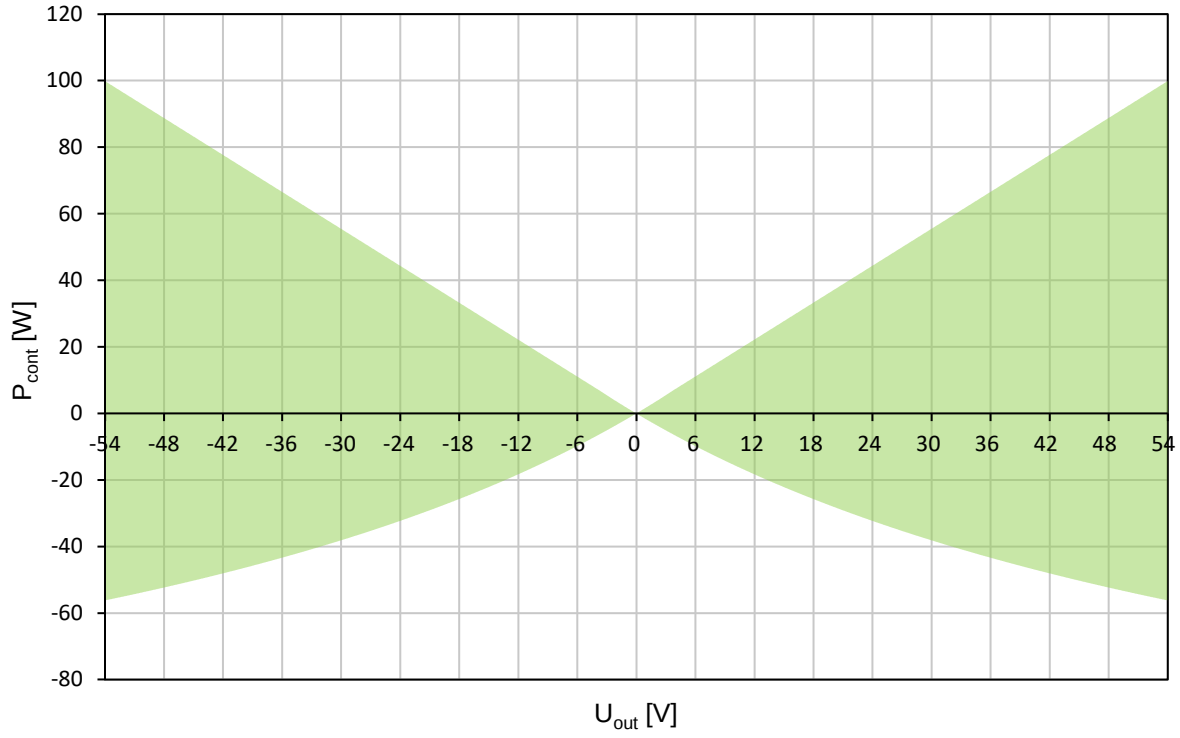


36 V Range continuous power P_{cont}: LVA 100

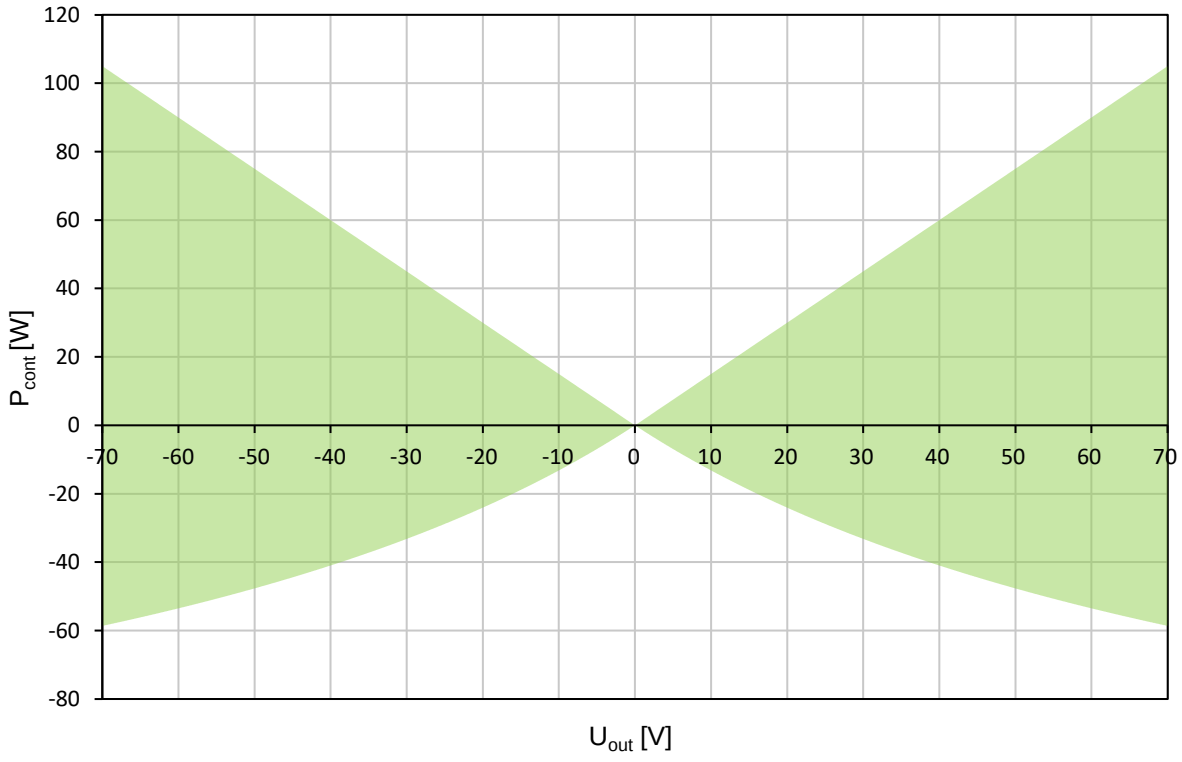


SYMMETRIC AMPLIFIER CHARACTERISTIC – OUTPUT POWER CAPABILITY[1)]

54 V Range continuous power P_{cont}: LVA 100

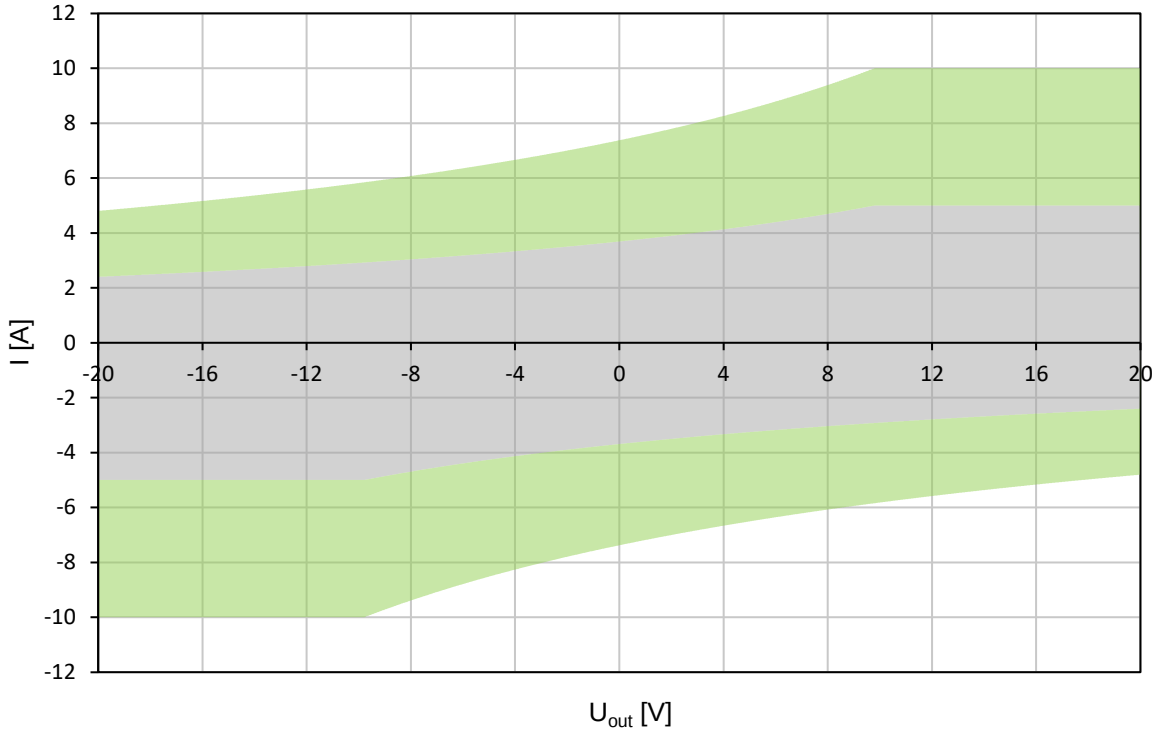


70 V Range continuous power P_{cont}: LVA 100

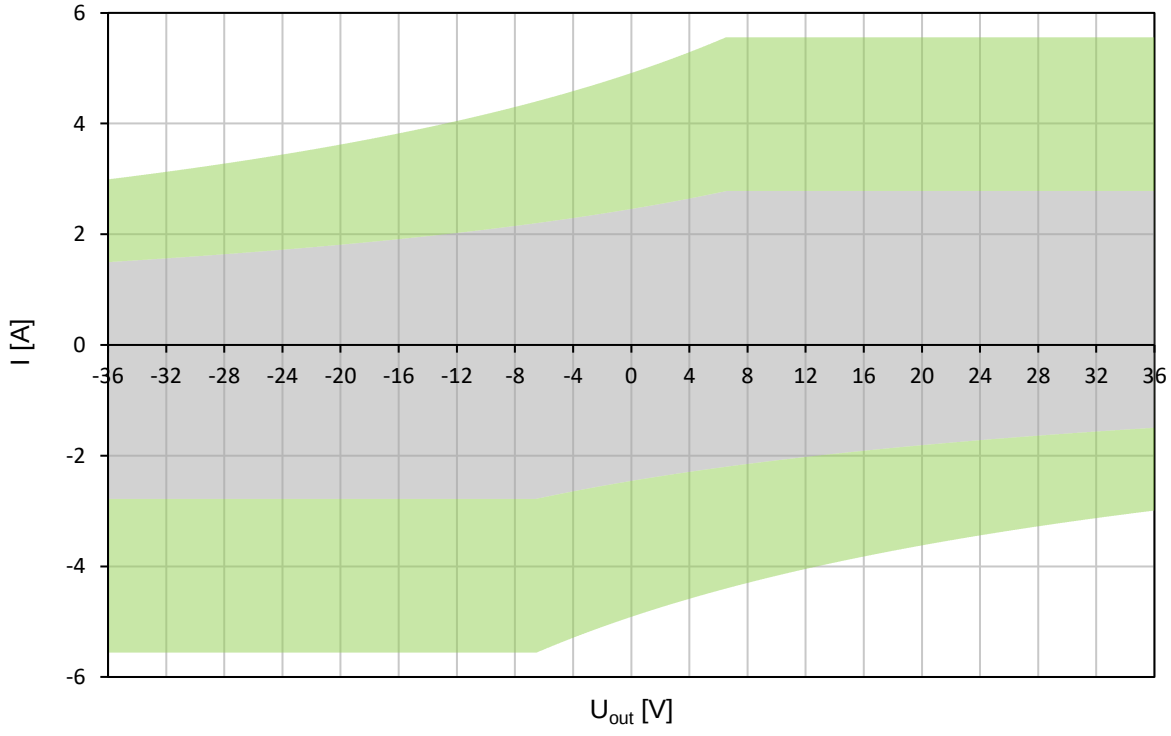


SYMMETRIC AMPLIFIER CHARACTERISTIC – OUTPUT CURRENT CAPABILITY[1)]

20 V Range continuous current I_{cont}: LVA 100
20 V Range short-time current I_{short}: LVA 100

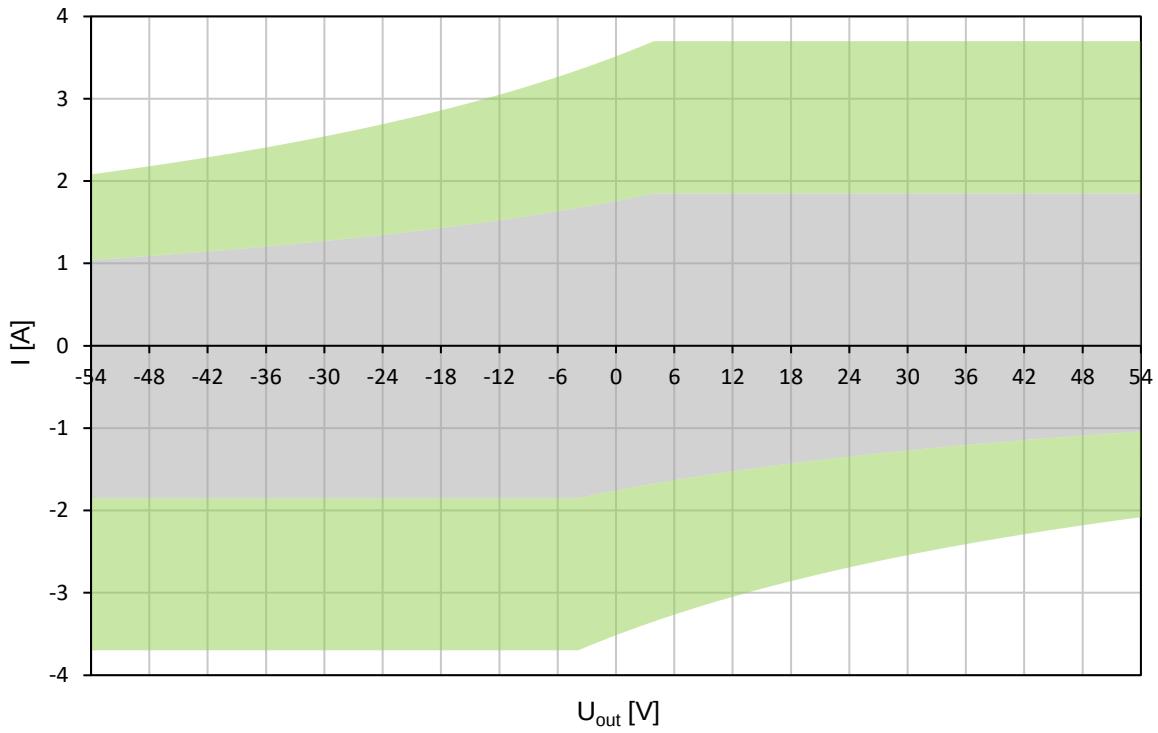


36 V Range continuous current I_{cont}: LVA 100
36 V Range short-time current I_{short}: LVA 100

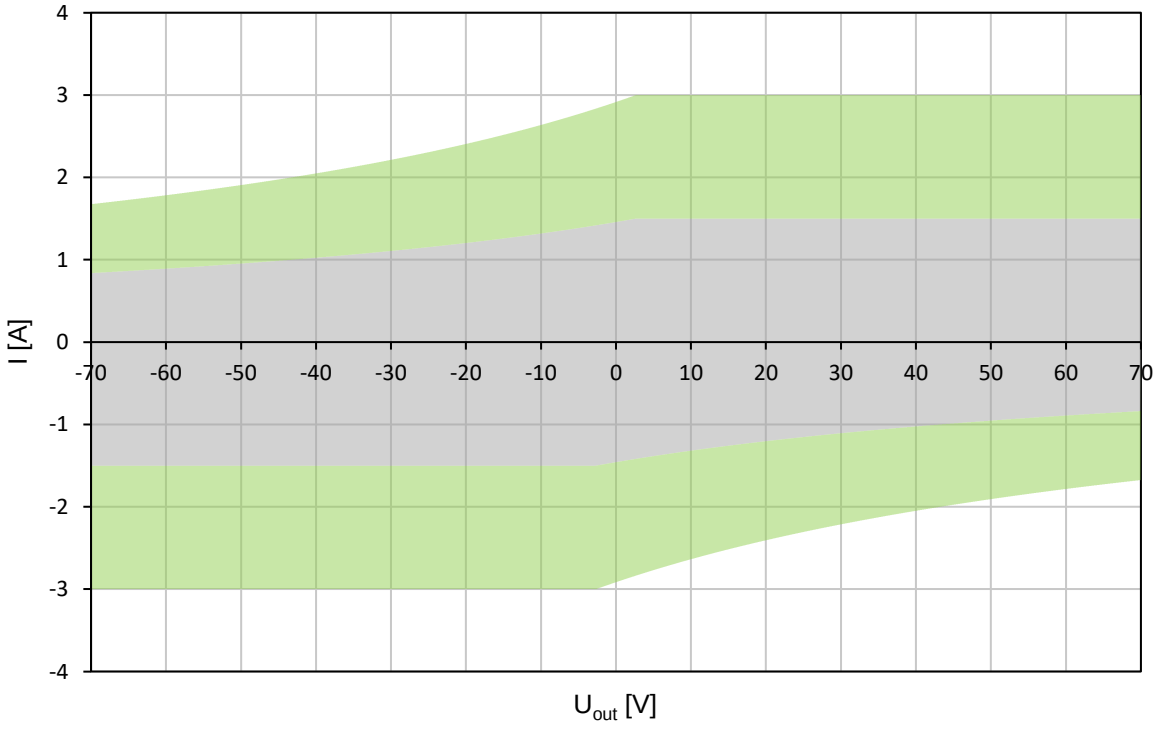


SYMMETRIC AMPLIFIER CHARACTERISTIC – OUTPUT CURRENT CAPABILITY[1)]

54 V Range continuous current I_{cont}: LVA 100
54 V Range short-time current I_{short}: LVA 100

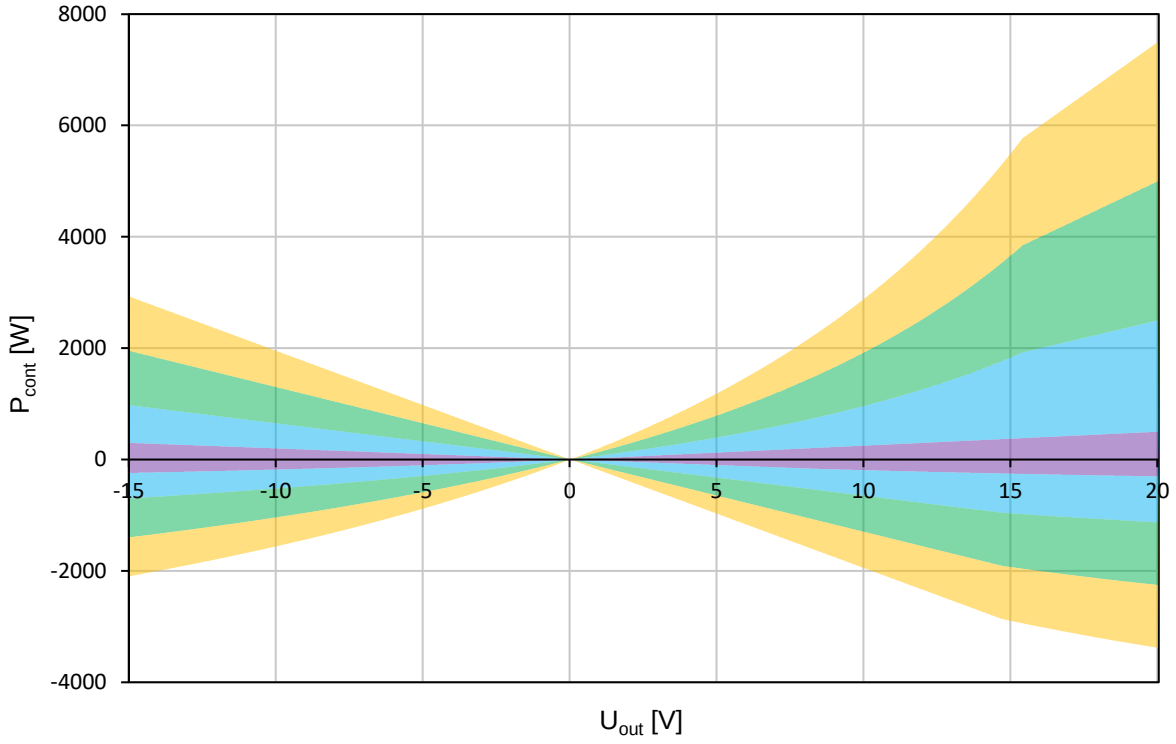


70 V Range continuous current I_{cont}: LVA 100
70 V Range short-time current I_{short}: LVA 100

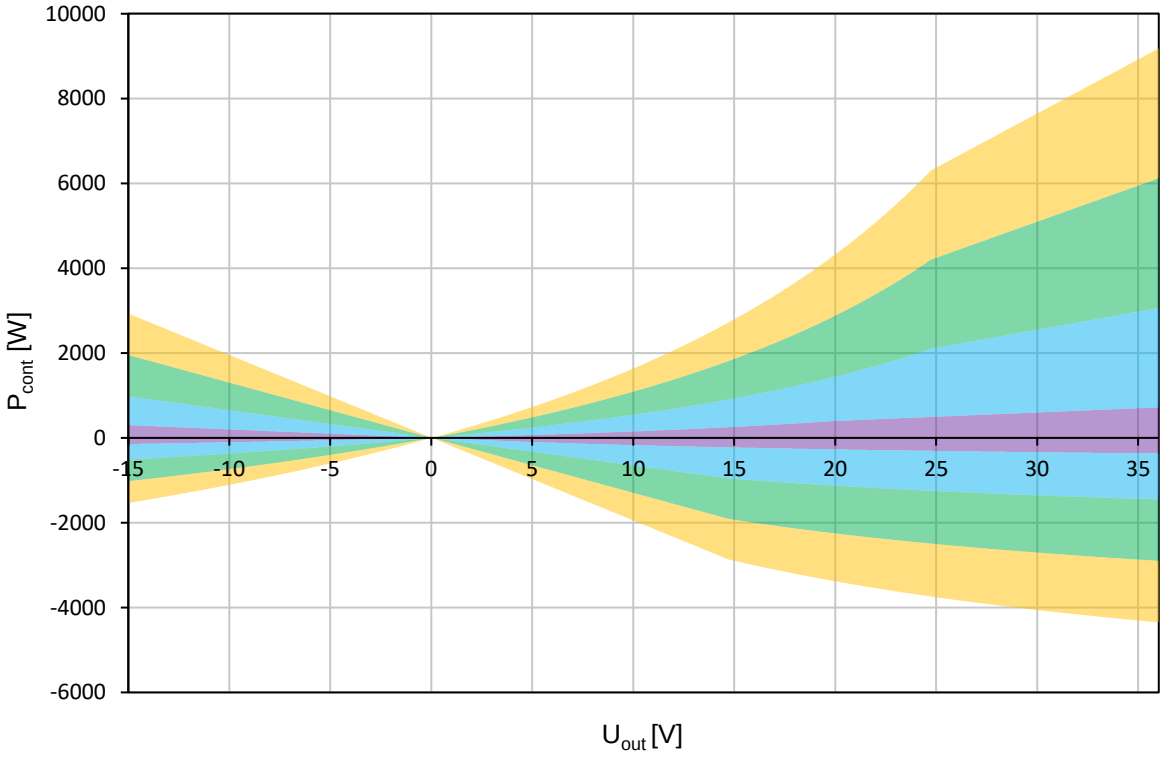


AMPLIFIER CHARACTERISTIC – OUTPUT POWER CAPABILITY[1)]

20 V Range continuous power P_{cont}: LVA1000 - LVA2500 – LVA5000 – LVA7500

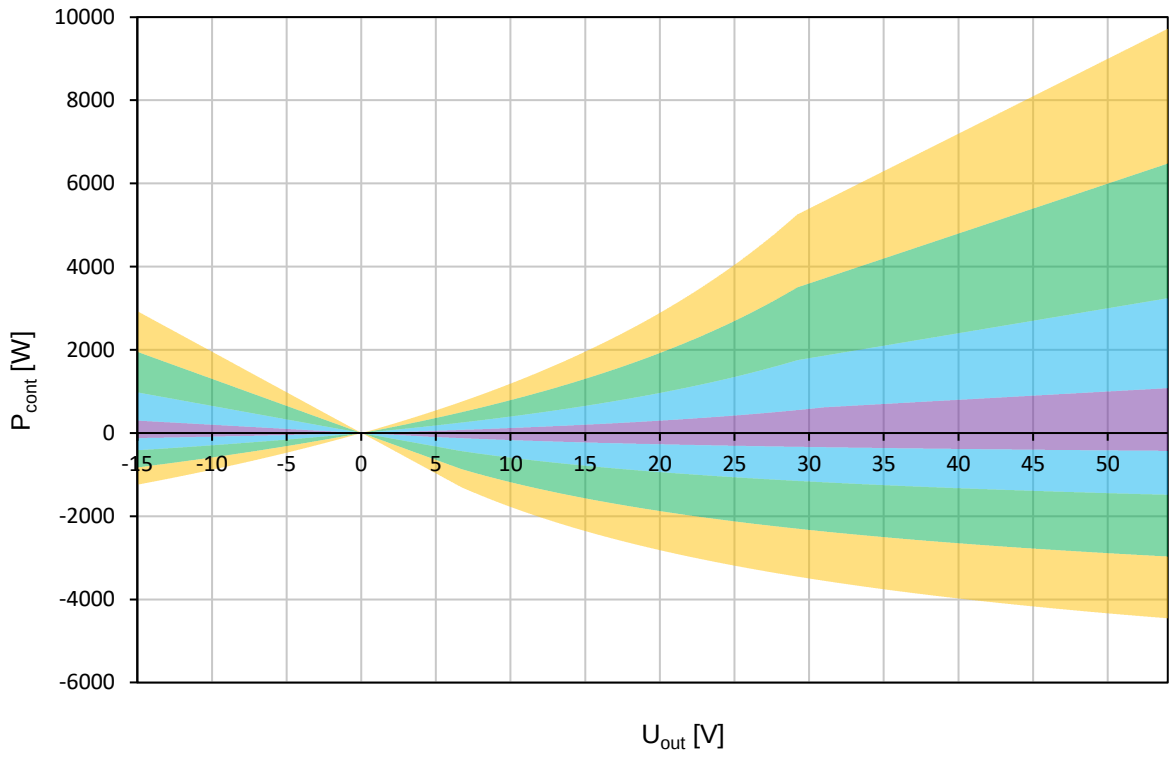


36 V Range continuous power P_{cont}: LVA1000 - LVA2500 – LVA5000 – LVA7500

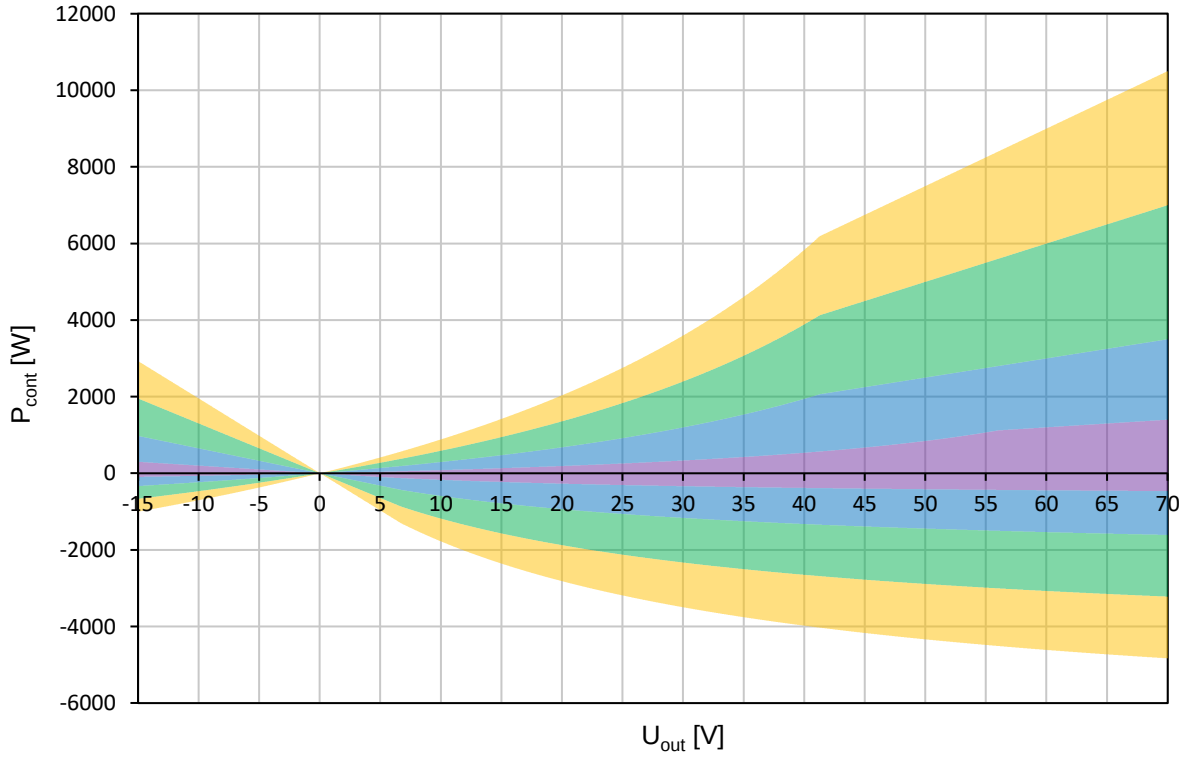


AMPLIFIER CHARACTERISTIC – OUTPUT POWER CAPABILITY[1)]

54 V Range continuous power P_{cont}: LVA1000 - LVA2500 – LVA5000 – LVA7500

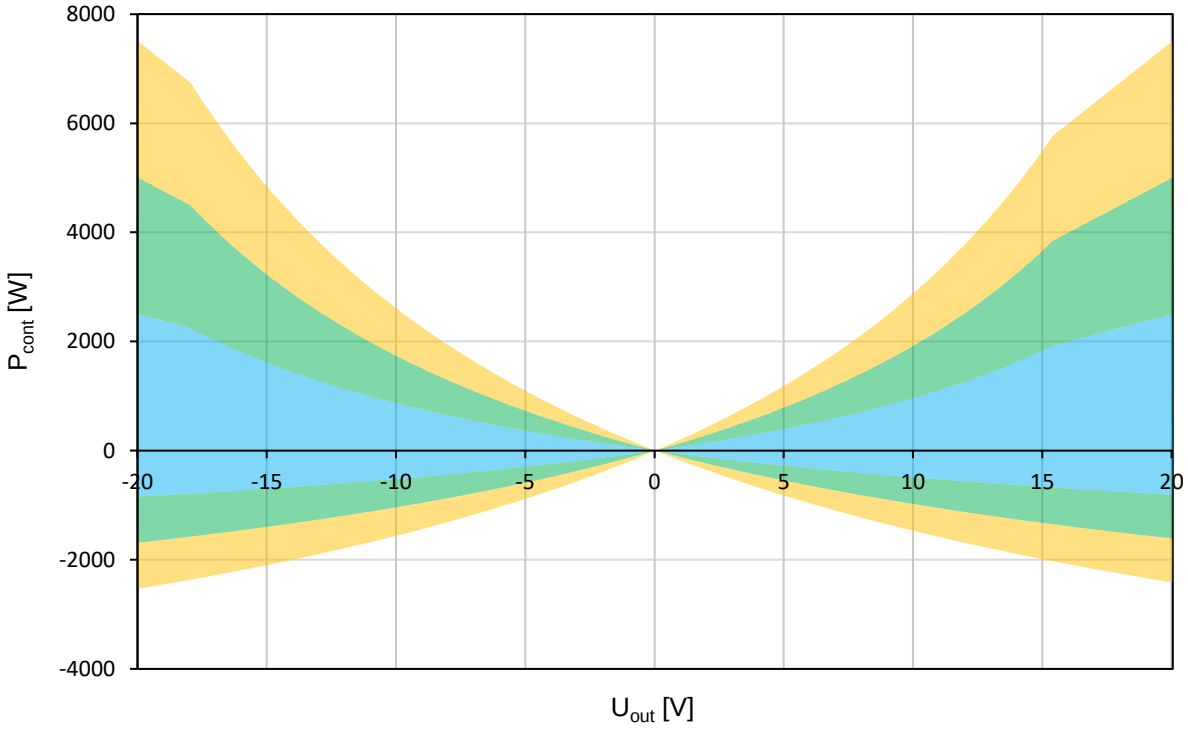


70 V Range continuous power P_{cont}: LVA1000 - LVA2500 – LVA5000 – LVA7500

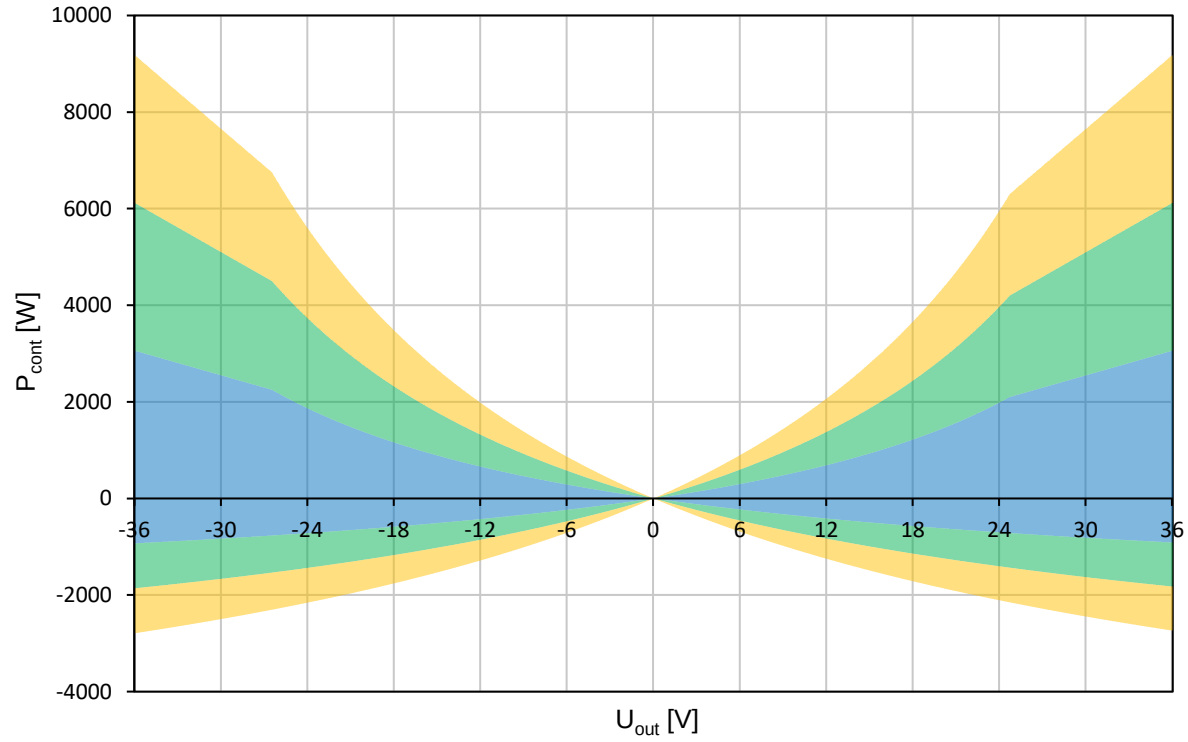


SYMMETRIC AMPLIFIER CHARACTERISTIC – OUTPUT POWER CAPABILITY[1)]

20 V Range continuous power P_{cont}: LVA2500/SYM – LVA5000/SYM – LVA7500/SYM

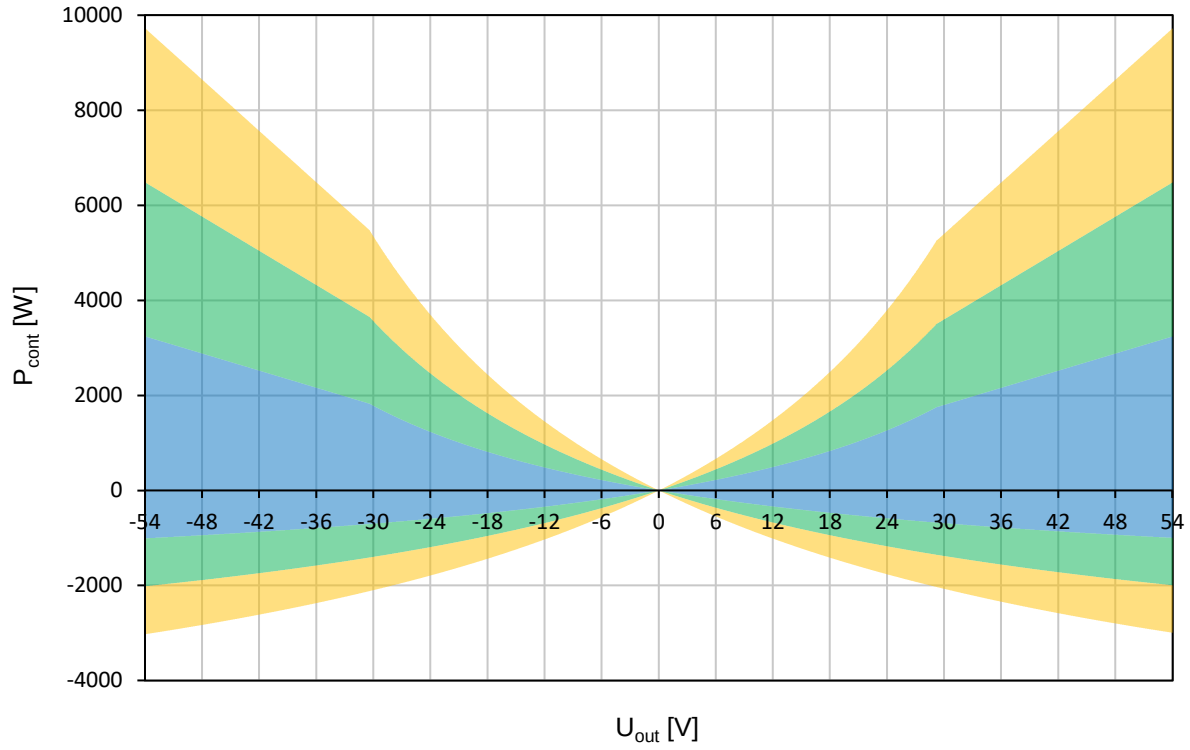


36 V Range continuous power P_{cont}: LVA2500/SYM – LVA5000/SYM – LVA7500/SYM

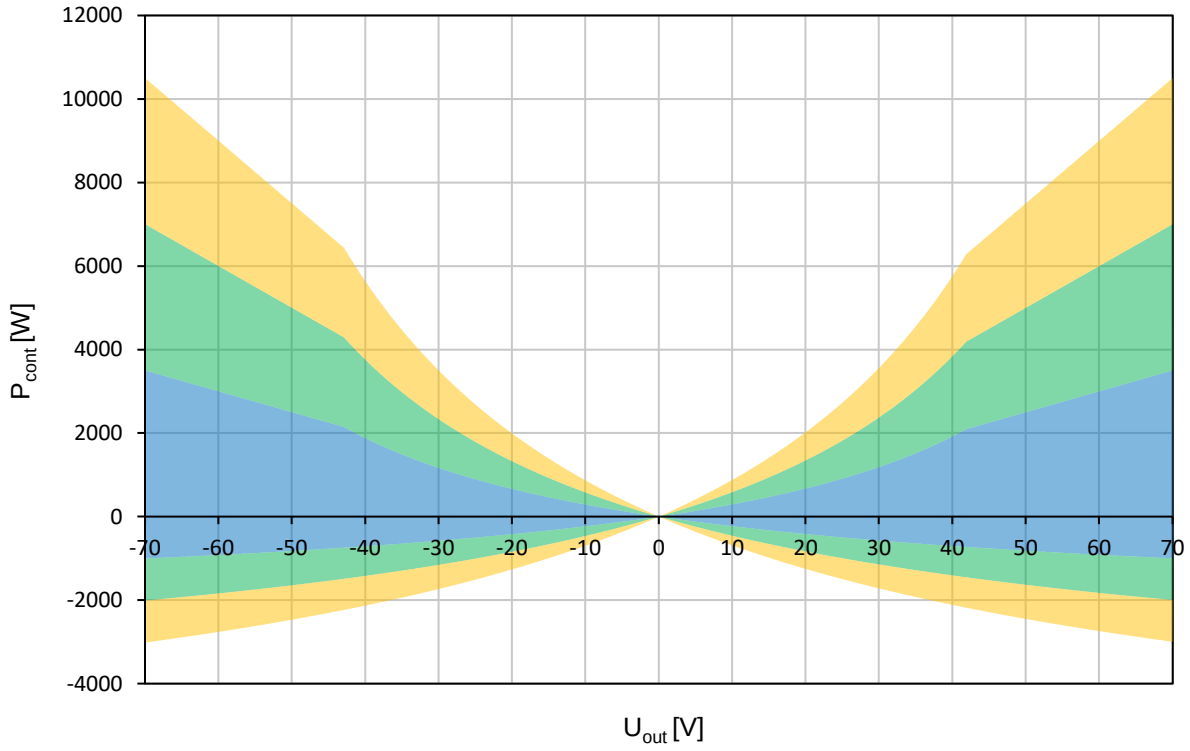


SYMMETRIC AMPLIFIER CHARACTERISTIC – OUTPUT POWER CAPABILITY[1)]

54 V Range continuous power P_{cont}: LVA2500/SYM – LVA5000/SYM – LVA7500/SYM

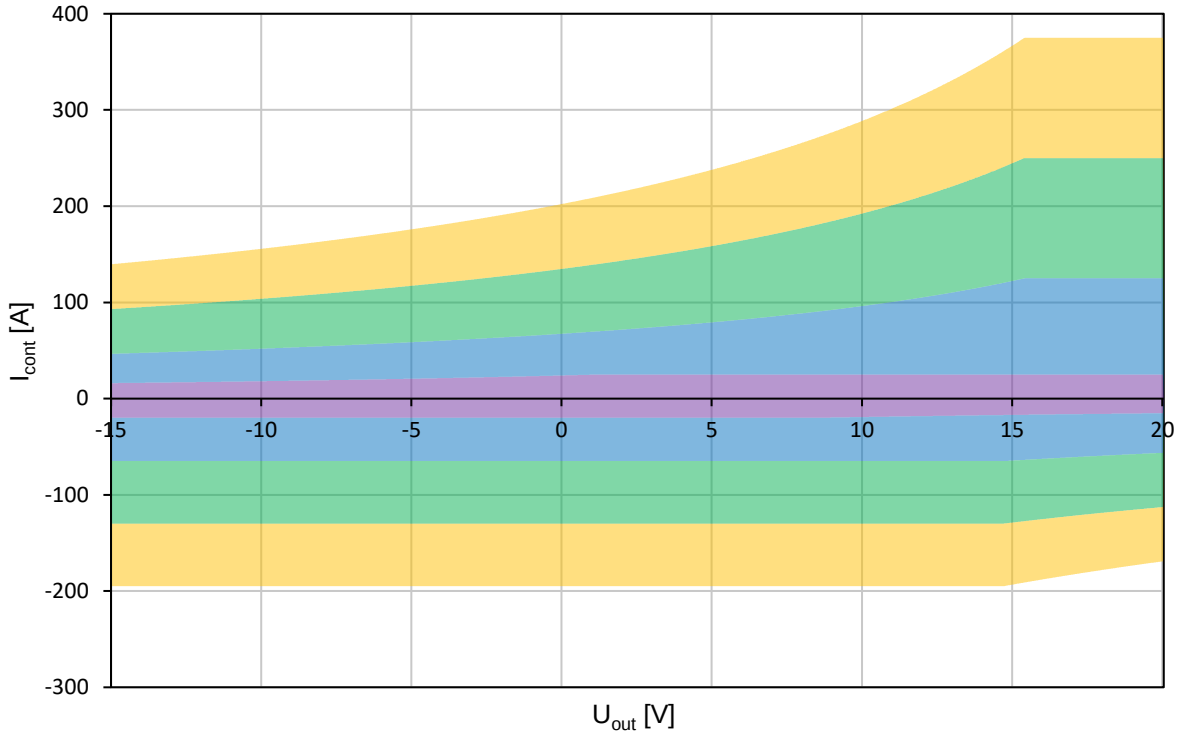


70 V Range continuous power P_{cont}: LVA2500/SYM – LVA5000/SYM – LVA7500/SYM

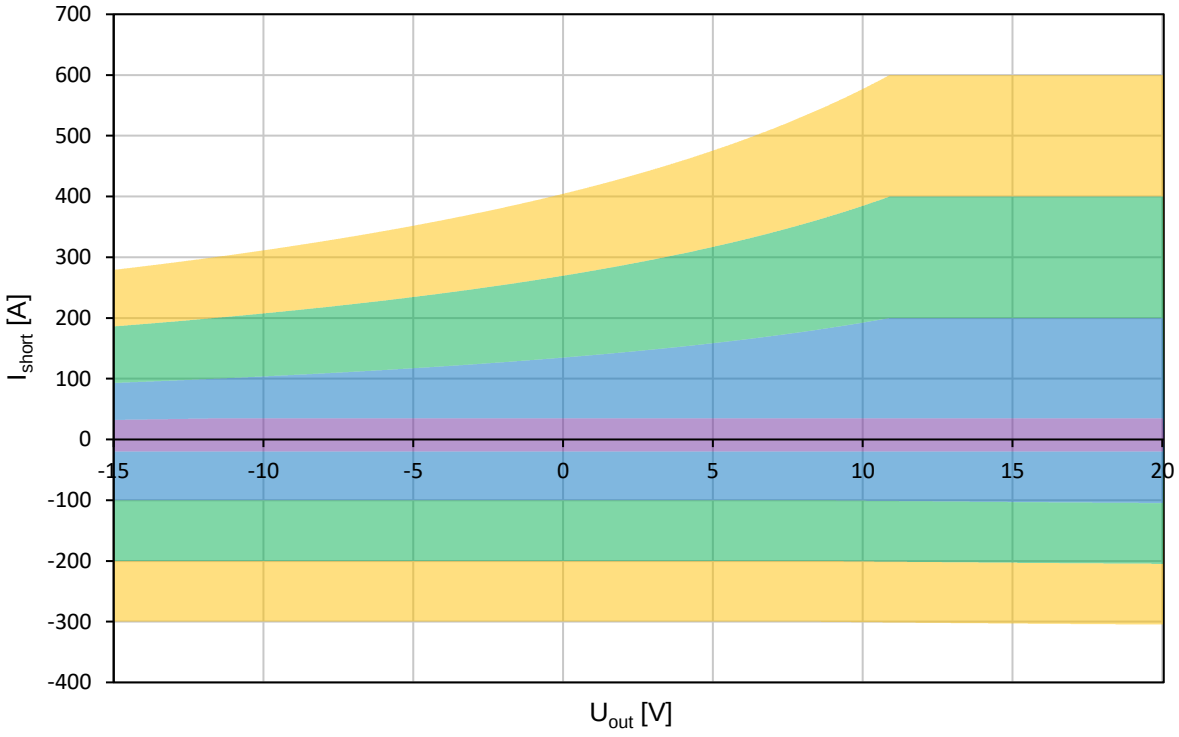


AMPLIFIER CHARACTERISTIC – OUTPUT CURRENT CAPABILITY[1)]

20 V Range continuous current I_{cont}: LVA1000 - LVA2500 – LVA5000 – LVA7500

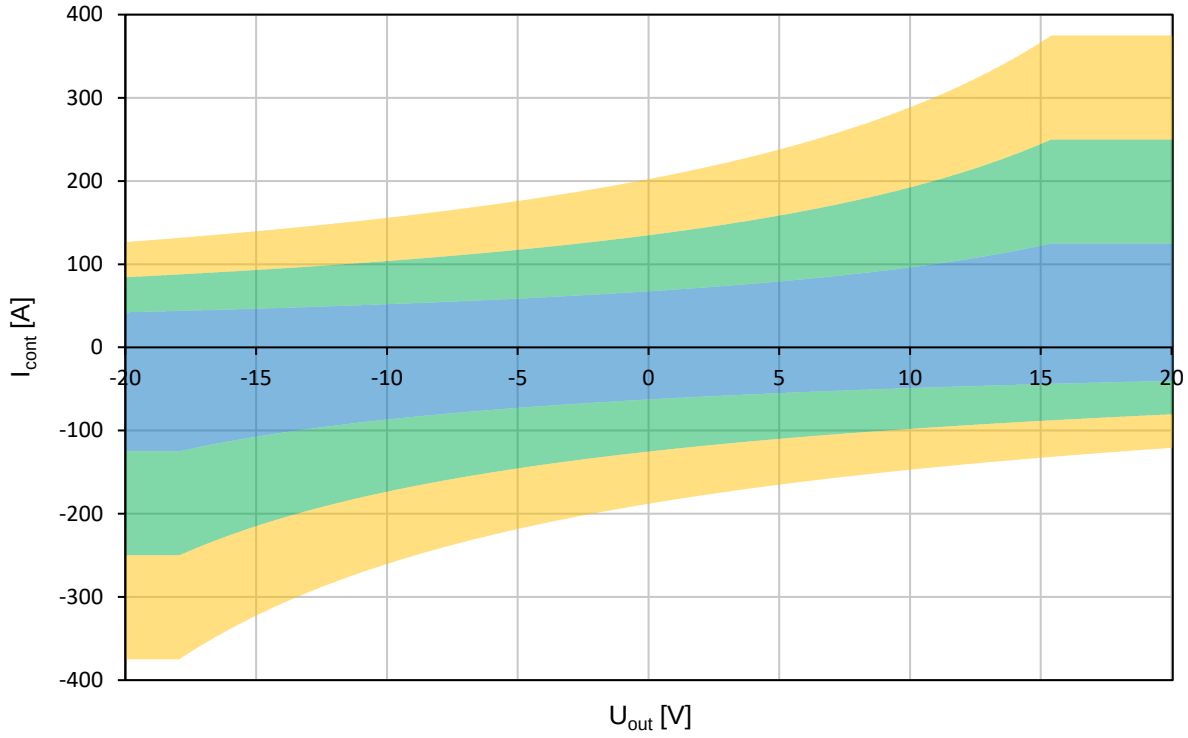


20 V Range short-time current I_{short}: LVA1000 - LVA2500 – LVA5000 – LVA7500

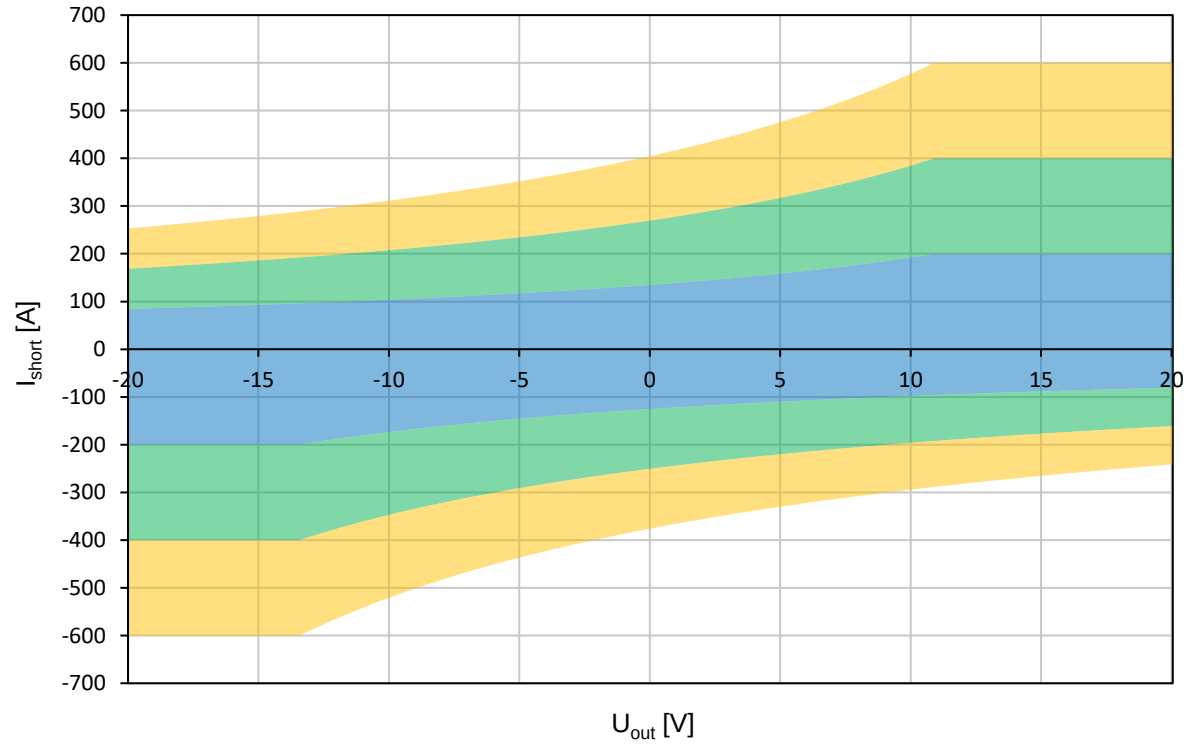


SYMMETRIC AMPLIFIER CHARACTERISTIC – OUTPUT CURRENT CAPABILITY[1)]

20 V Range continuous current I_{cont}: LVA2500/SYM – LVA5000/SYM – LVA7500/SYM

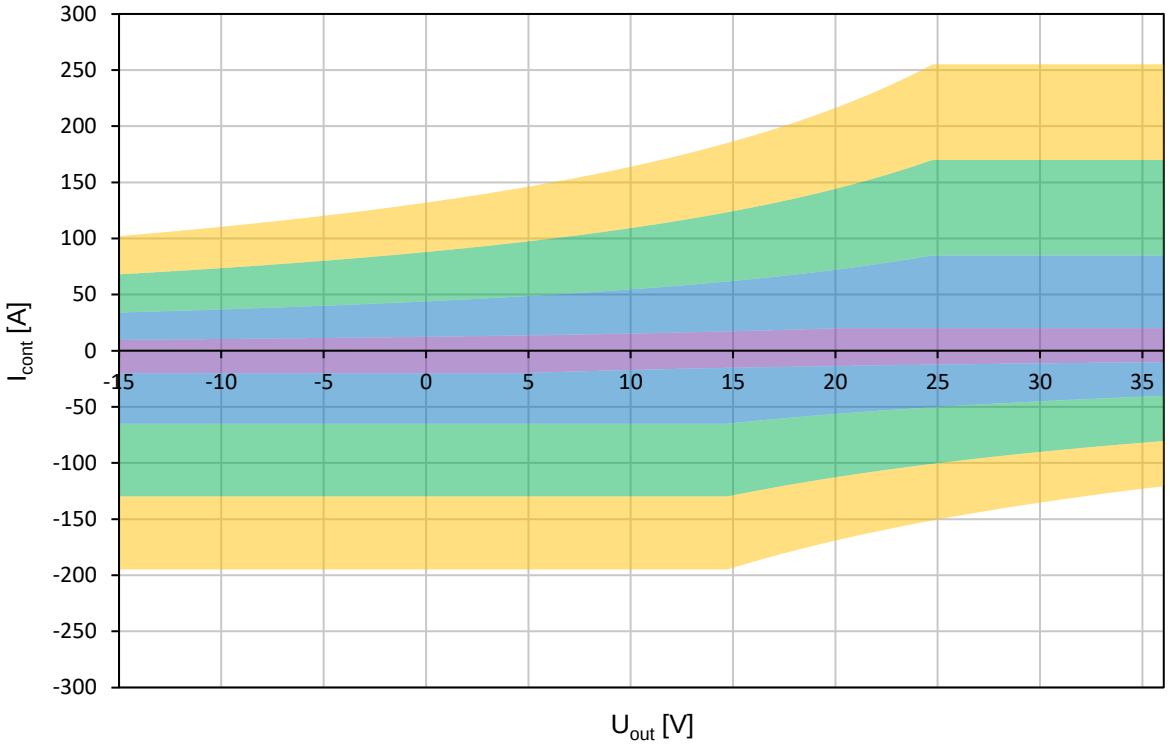


20 V Range short-time current I_{short}: LVA2500/SYM – LVA5000/SYM – LVA7500/SYM

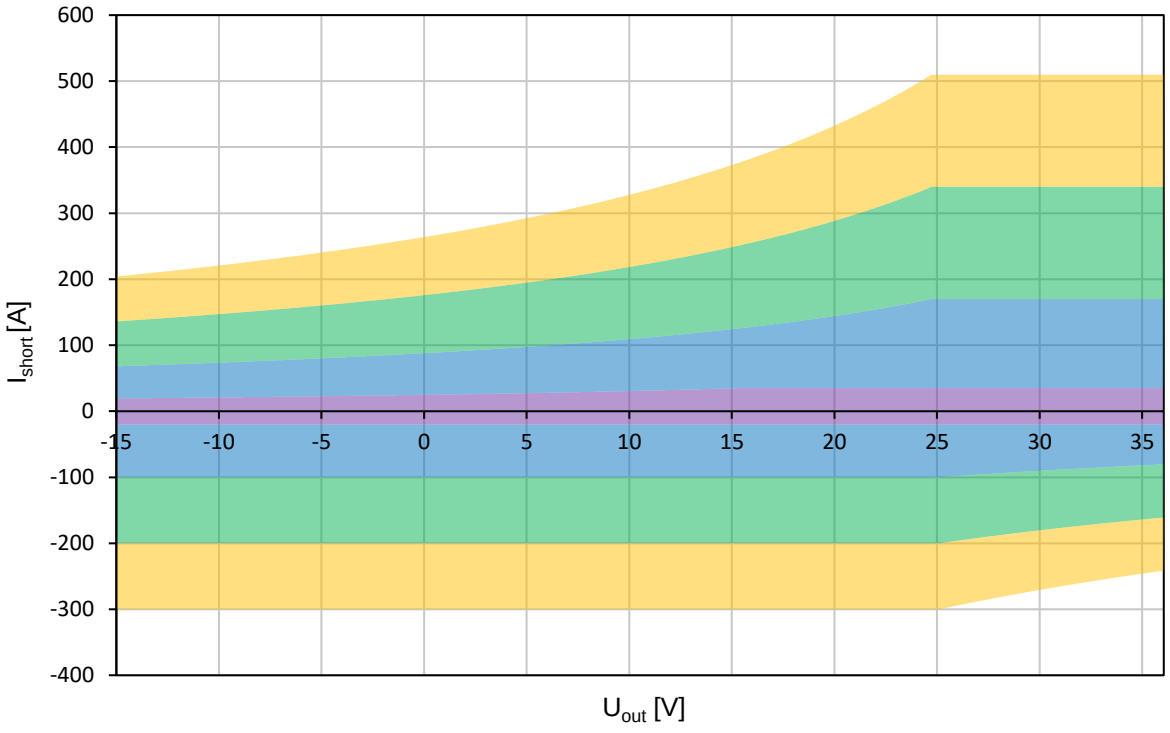


AMPLIFIER CHARACTERISTIC – OUTPUT CURRENT CAPABILITY[1)]

36 V Range continuous current I_{cont}: LVA1000 - LVA2500 – LVA5000 – LVA7500

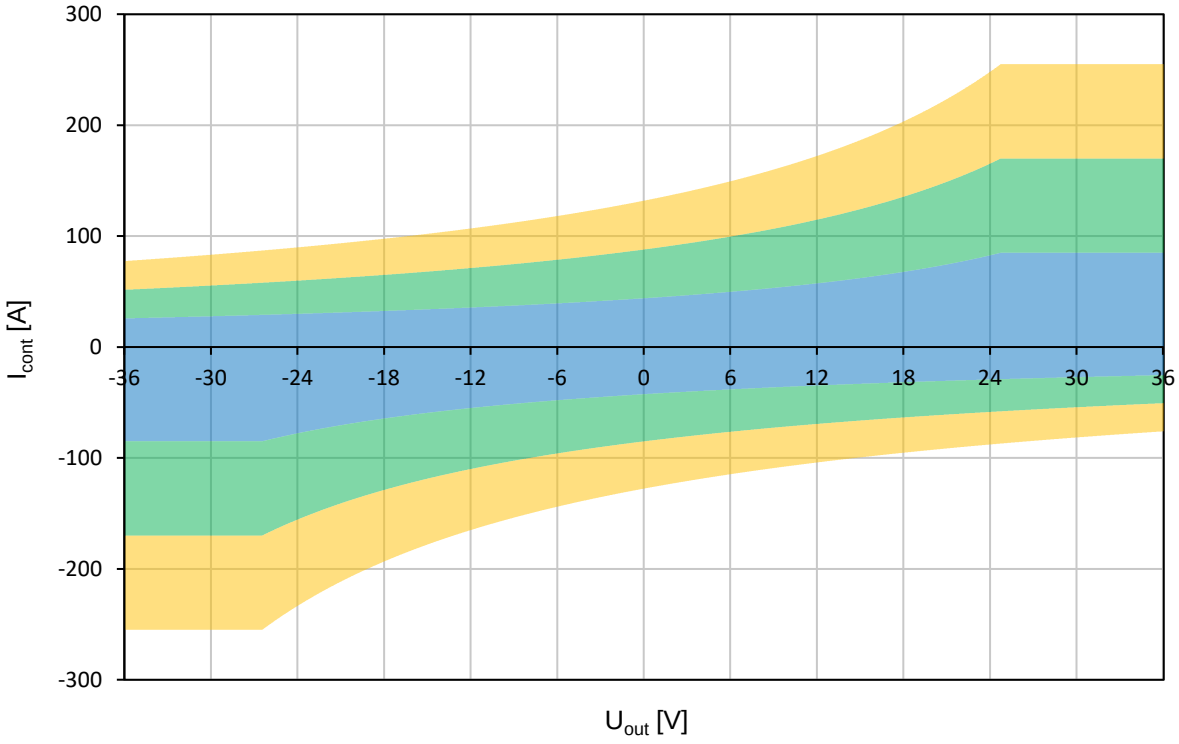


36 V Range short-time current I_{short}: LVA1000 - LVA2500 – LVA5000 – LVA7500

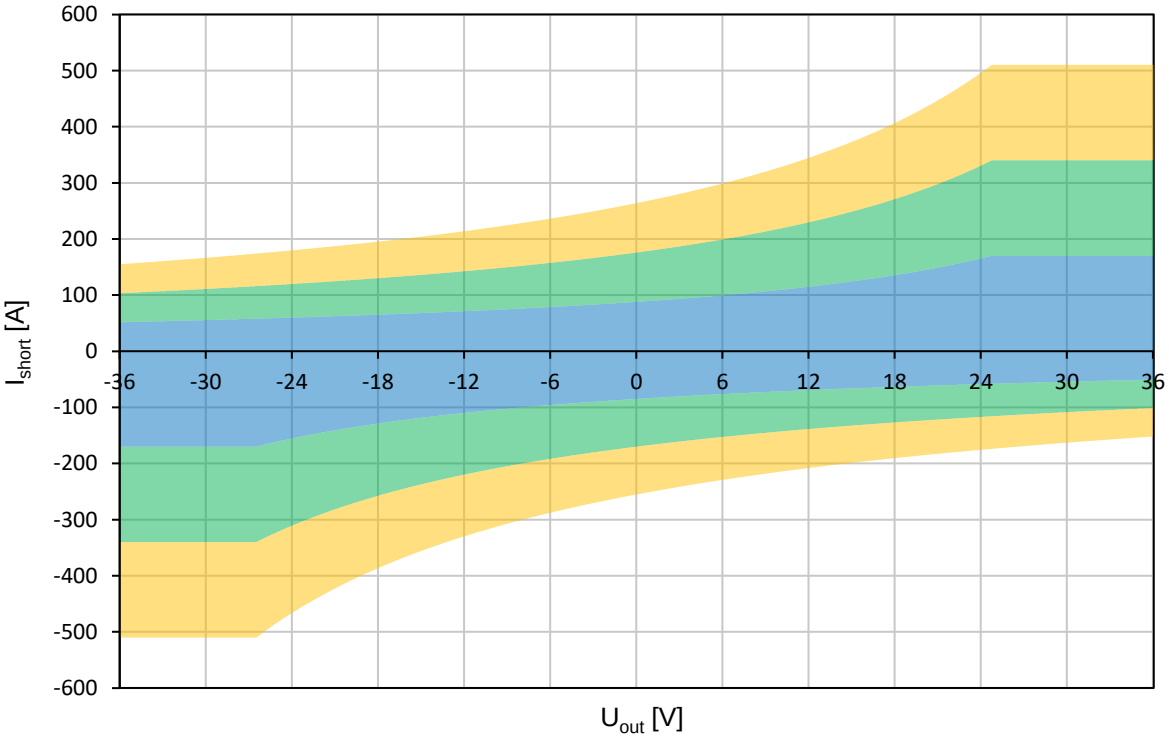


SYMMETRIC AMPLIFIER CHARACTERISTIC – OUTPUT CURRENT CAPABILITY[1)]

36 V Range continuous current I_{cont}: LVA2500/SYM – LVA5000/SYM – LVA7500/SYM

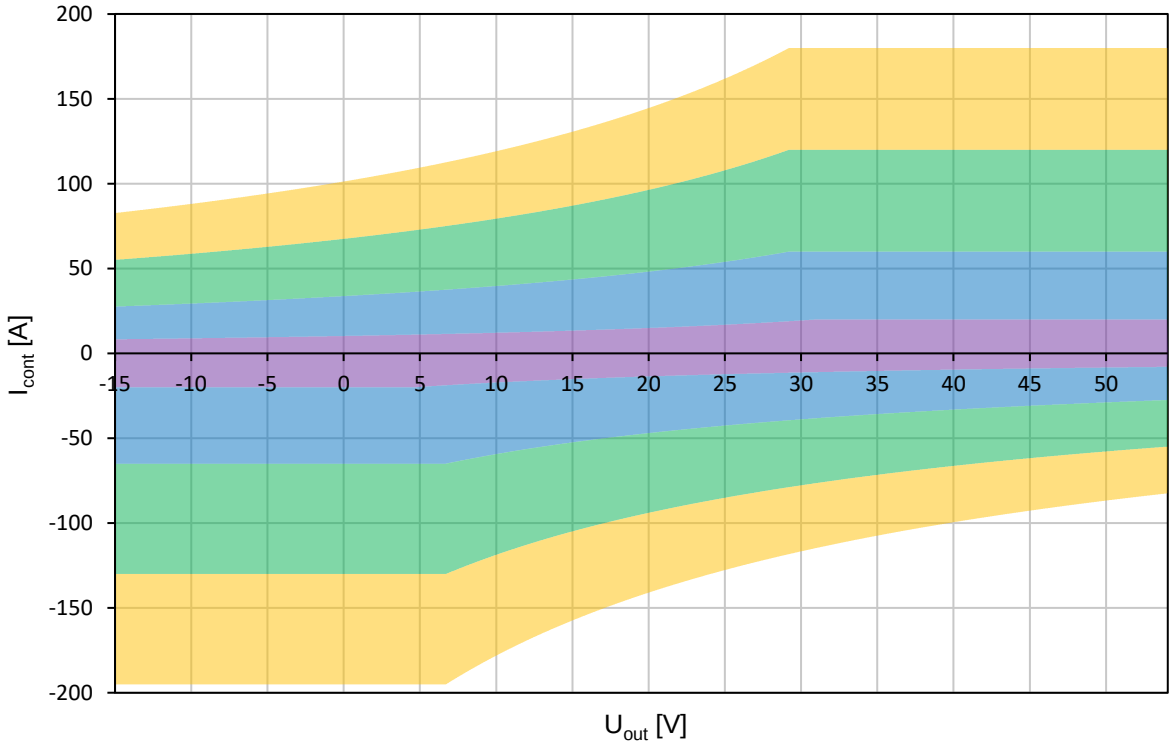


36 V Range short-time current I_{short}: LVA2500/SYM – LVA5000/SYM – LVA7500/SYM

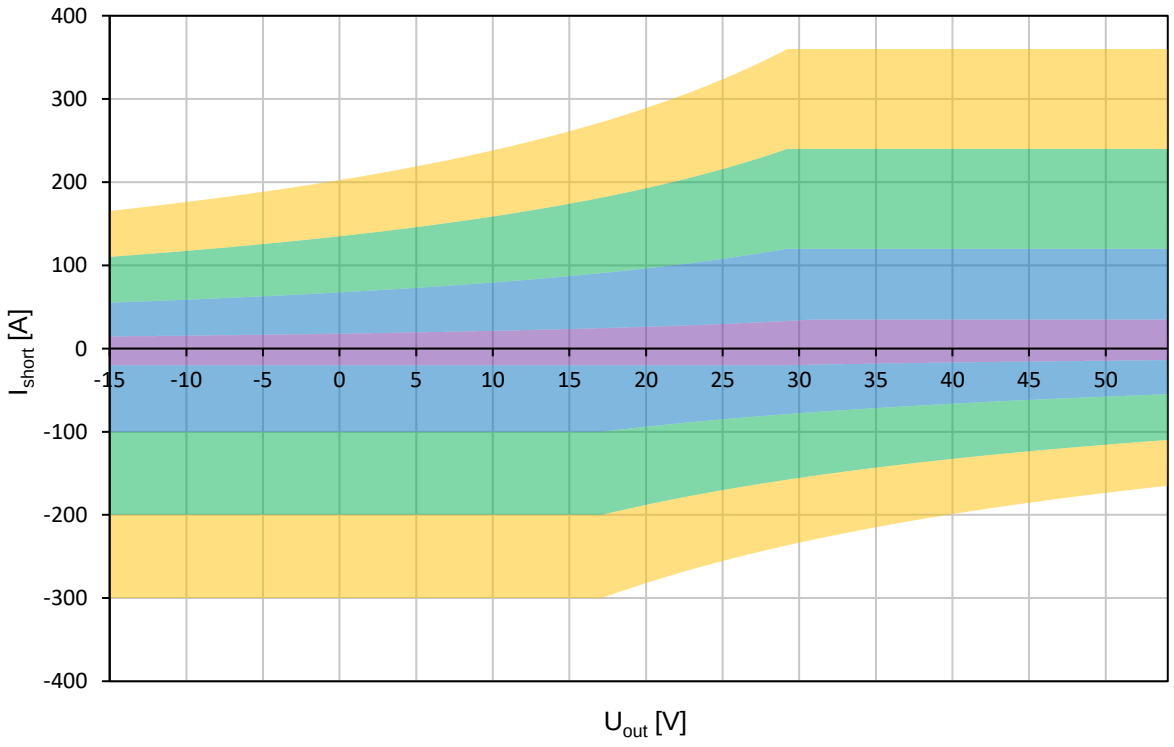


AMPLIFIER CHARACTERISTIC – OUTPUT CURRENT CAPABILITY[1)]

54 V Range continuous current I_{cont}: LVA1000 - LVA2500 – LVA5000 – LVA7500

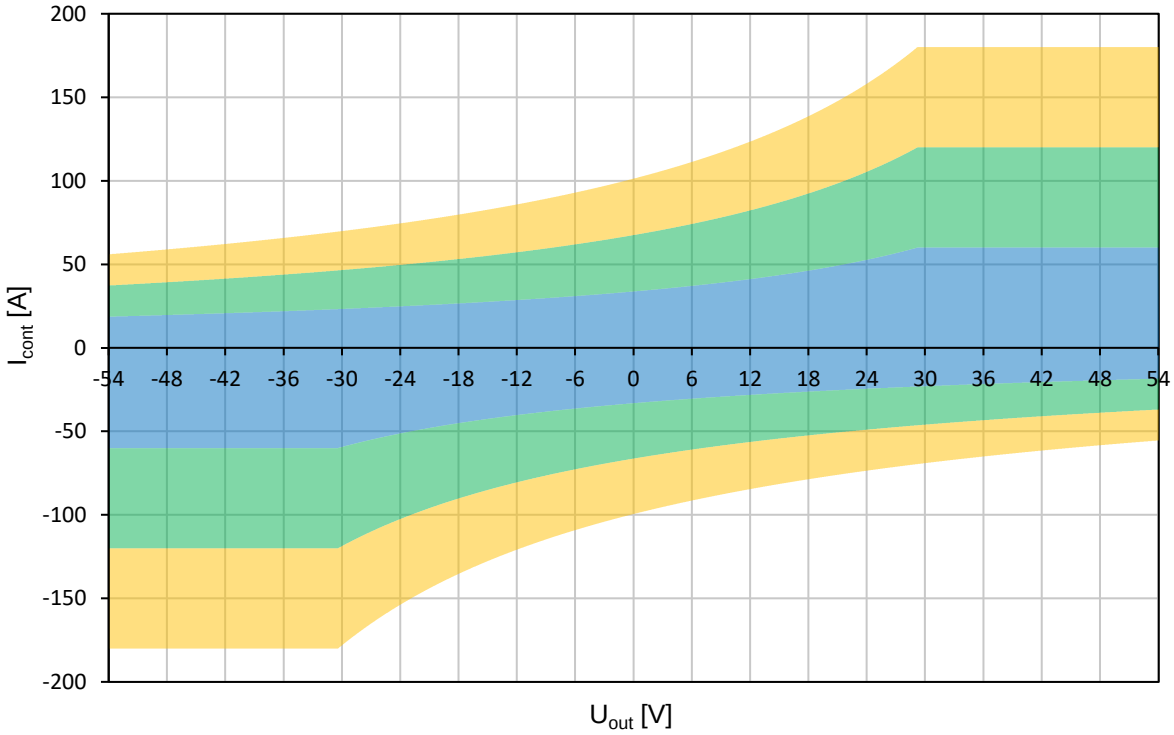


54 V Range short-time current I_{short}: LVA1000 - LVA2500 – LVA5000 – LVA7500

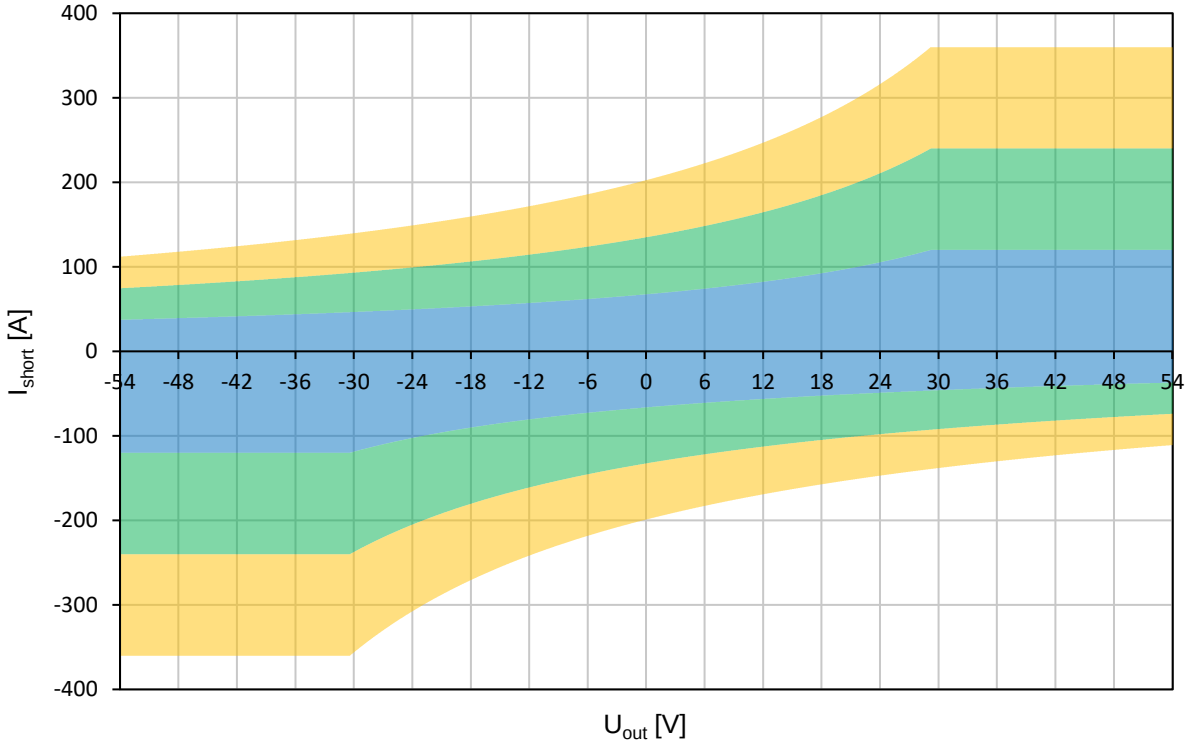


SYMMETRIC AMPLIFIER CHARACTERISTIC – OUTPUT CURRENT CAPABILITY[1)]

54 V Range continuous current I_{cont}: LVA2500/SYM – LVA5000/SYM – LVA7500/SYM

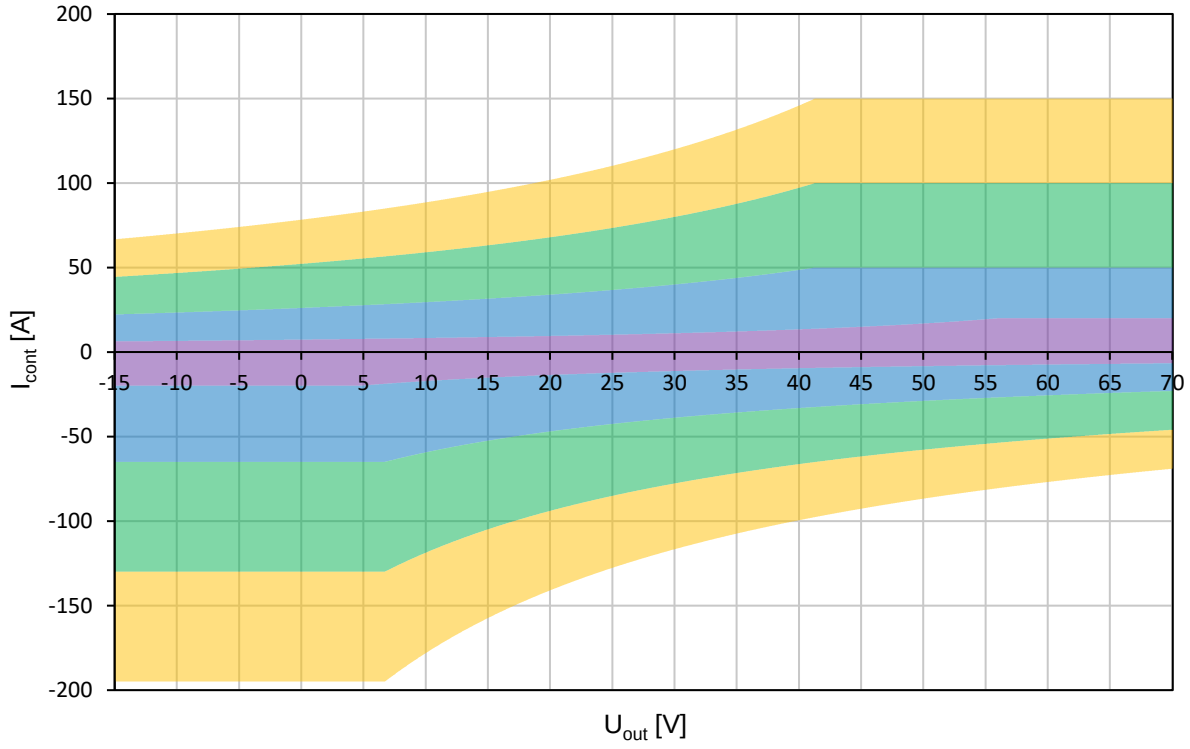


54 V Range short-time current I_{short}: LVA2500/SYM – LVA5000/SYM – LVA7500/SYM

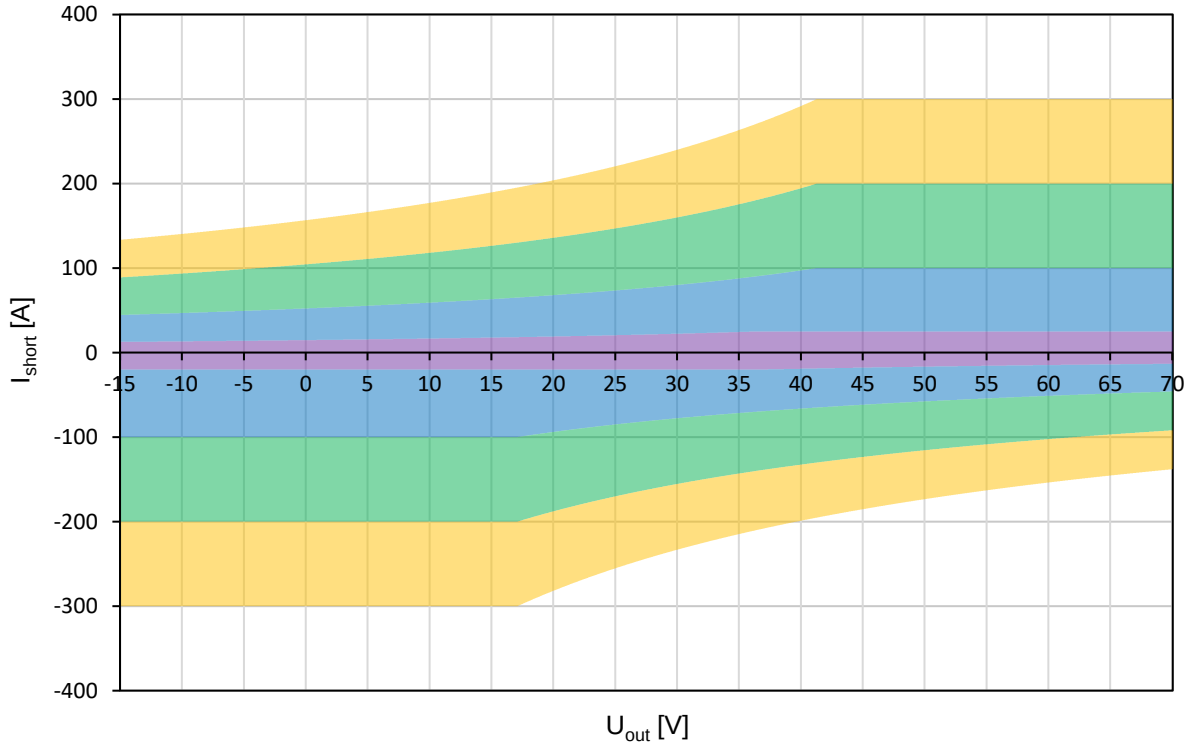


AMPLIFIER CHARACTERISTIC – OUTPUT CURRENT CAPABILITY[1)]

70 V Range continuous current I_{cont}: LVA1000 - LVA2500 – LVA5000 – LVA7500

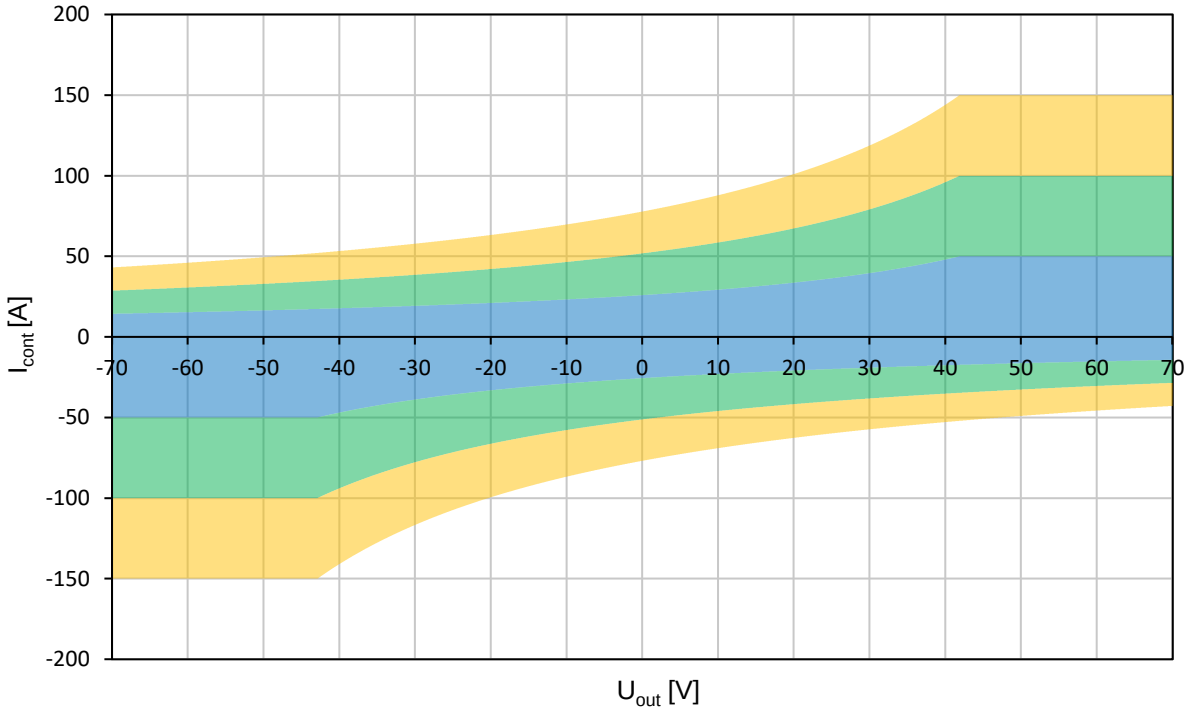


70 V Range short-time current I_{short}: LVA1000 - LVA2500 – LVA5000 – LVA7500

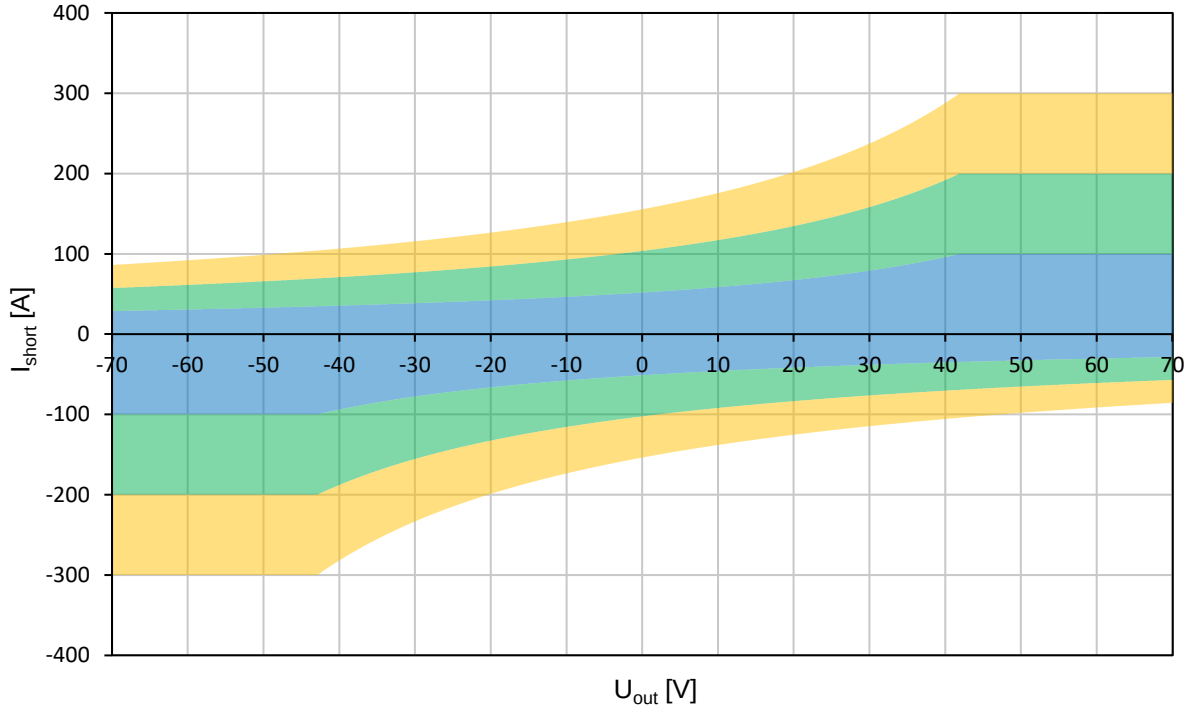


SYMMETRIC AMPLIFIER CHARACTERISTIC – OUTPUT CURRENT CAPABILITY[1)]

70 V Range continuous current I_{cont}: LVA2500/SYM – LVA5000/SYM – LVA7500/SYM



70 V Range short-time current I_{short}: LVA2500/SYM – LVA5000/SYM – LVA7500/SYM



Remarks:

1) Diagrams refer to a supply voltage of 230 V and 23 °C ambient temperature