DATASHEET

MDA Series

MDA340, MDA500

Low-profile isolated **DC/DC converters**

Description

Low-profile isolated DC/DC converters for pulse current load are optimized for using in decentralized power systems such as transceiver modules and other similar power supply systems with pulse load, for example in radar and lidar applications.

The compact module's size allows to install it as close as possible to the point of load and reduce the dynamic voltage instability. Galvanically isolated differential sinchronization input allows to synchronize switching frequency and to provide reliable hardware or software filtering of EMI.

The modules have the remote on/off function, output voltage ajustment, the power good signal, overcurrent protection, short circuit protection, overvoltage protection. Polymer potting sealing protects modules from different factors: vibration, dirt, moisture and salt fog.

Engineered in accordance with

- MIL-STD-810G
- MIL-STD-461F (CE102)
- MIL-STD-1275
- MIL-STD-704
- EN60950-1

Description of MDA Series on the manufacturer's website
eng.aedon.ru/catalog/dcdc/series/18

Features

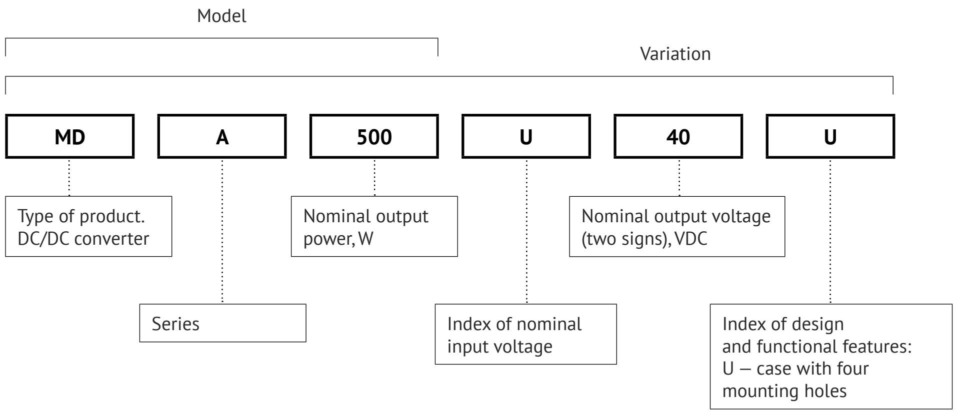
- 5 year warranty
- Output current up to 30 A
- Input voltage ranges 22...33 VDC; 44...66 VDC; 270...330 VDC
- Switching frequency 470...530 kHz, external synchronization
- Power good signal
- Output voltage ajustment
- Low-profile design
- Typical efficiency 90...92%
- Case operating temperature −60...+125°C
- Minimum load not required

Order registration
+7 473 300-300-5, Global Operations Team

Technical support
techsup@aedon.ru

Reliability test
eng.aedon.ru/downloads/documentation/Reliability-Test_ENG.pdf

Ordering information



For more information please contact our Global Operations Team

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Output power and current

Model	MDA340							MDA500			
Output power, W	225*	270*	340					500			
Output voltage, VDC	7,5	9	12,5	28	36	40	50	28	36	40	50
Maximal output current, A	30	30	27,2	12,1	9,4	8,5	6,8	17,8	13,9	12,5	10

* The output power is limited by the current of 30A.

Index of nominal input voltage

Parameter	Index "U"	Index "J"	Index "F"
Nominal input voltage, VDC	28	60	300
Input voltage range, VDC	22...33	44...66	270...330

Specifications

All specifications valid for all acceptable climatic conditions, Uin. nom, Iout. nom, unless otherwise stated. It is important to note that the information herein is not full.

Output specifications

Parameter		Value
Minimum load		no minimum load required
Output voltage adjustment		±5% Uout. nom
Regulation	Line and load variation (Umin...Umax)	<2% Uout. nom
	Total regulation (Uin, load, t °C, time)	<4% Uout. nom
Ripple and noise (p-p)		<2% Uout. nom
Maximum capacitive of load	7,5 up to 12,5 V above 12,5 up to 28 V above 28 V	8000 uF 2500 uF 500 uF
Start up time (remote)		<0,2 s
Remote on/off	switch off	2,4...5,5 VDC to pin "ON" ref. pin "–OUT". I "ON" ≤1 mA
	switch on	0...0,4 VDC to pin "ON" ref. pin "–OUT" or keeping pin "ON" open
Power good signal	(0,945...1,045)×Unom	High level ref. pin "–OUT" (2,4...3,3 VDC for sourse current up to 1 mA)
	≤0,855×Uout. or ≥1,155×Uout.	Low level ref. pin "–OUT" (0...0,4 VDC for sink current up to 1 mA)
Frequency synchronization	Internal switching frequency	450...470 kHz
	Synchronization frequency	470...530 kHz
	Synchronization off-duty factor	0,3...0,7
	Synchronization amplitude	2,4...5,5 V

Protections*

Parameter	Value
Overload protection level / method	115...150 % Iout.nom / decrease of Uout.
Short circuit protection / method	yes / hiccup, auto recovery
Overvoltage protection	<1,5 Uout. nom, forced restriction
Thermal protection level	+118...+130 °C
Vibration proof	1...2000 Hz, 200 (20) m/s² (g), 0,3 mm
Dust proof	yes
Salt fog resistant	yes
Moisture proof (Tamb.=25°C)	98%

* Parameters are stated for the information purposes and could not be used at long term work, exceeding maximum output current, at work outside of a range of operating temperatures.

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Specifications (cont.)

General specifications

Parameter			Value
Operating case temperature			−60…+125 °C
Operating ambient temperature (on condition the case temperature is maintained)			−60…+120 °C
Storage temperature			−60…+125 °C
Input capacitance (10 kHz), external	Index «U»	340 W 500 W	200 uF tantalum + 10 uF ceramic 470 uF tantalum + 22 uF ceramic
	Index «J»	340 W 500 W	100 uF tantalum + 4,7 uF ceramic 200 uF tantalum + 10 uF ceramic
	Index «F»	340 W 500 W	220 uF electrolytic + 0,47 uF ceramic 470 uF electrolytic + 1 uF film or ceramic
Isolation voltage (60 s)	input/output input/case input/sync output/case output/sync		500 VDC
Isolation resistance @ 500 VDC	input/output input/case output/case		20 MOhm min
Thermal impedance			6,4 °C/W
Typical MTBF			1 737 900 hrs
Warranty			5 years

Physical specifications

Parameter	Value
Case material	copper alloy with nickel electroplating coating
Potting	epoxy
Pin material	phosphor bronze, SnPb plated
Weight	max 190 g
Soldering temperature	max 260 °C @ 5 s
Dimensions	max 120,9×38×12,85 mm without pinouts

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Design topology

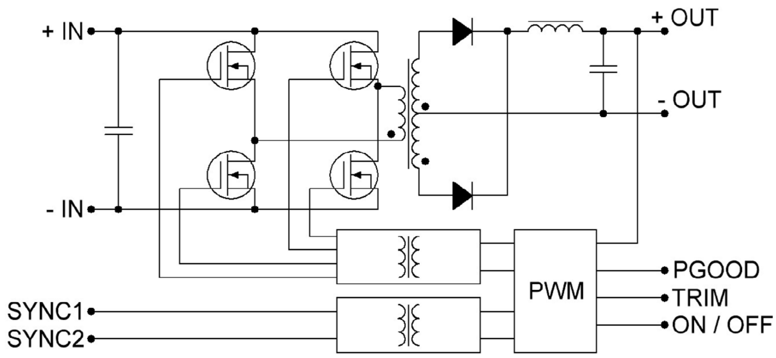

Figure 1. Single channel design topology.

Typical connection

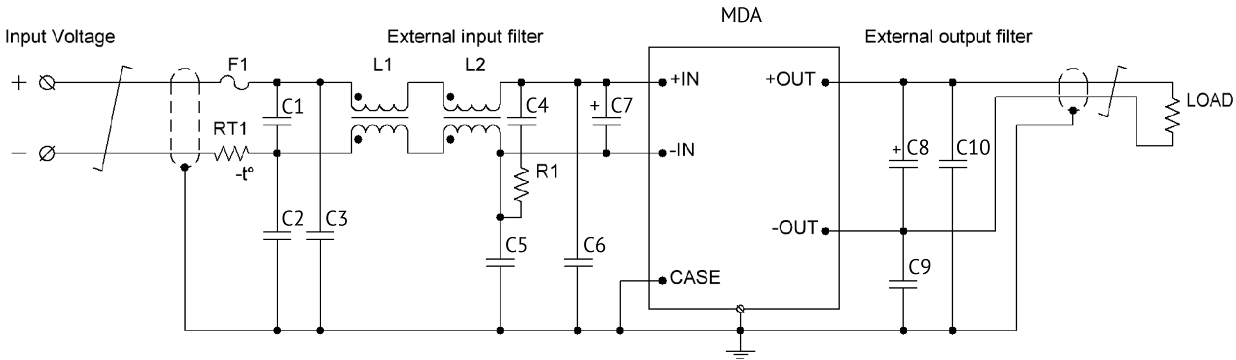

Figure 2. Connection diagram MDA Series with filtration unit.

				340 W	500 W
C1, C4	ceramic capacitor	Input voltage	28 VDC 60 VDC 300 VDC	10 uF 4,7 uF 0,47 uF	22 uF 10 uF 1 uF
C7	tantalum capacitor	Input voltage	28 VDC 60 VDC	200 uF 100 uF	470 uF 200 uF
	electrolytic capacitor	Input voltage	300 VDC	220 uF	470 uF
C8	tantalum capacitor	Output voltage	7,5...12,5 VDC	400 uF	800 uF
	electrolytic capacitor	Output voltage	above 28 VDC	100 uF	200 uF
C2, C3, C5, C6, C9, C10	ceramic capacitor			100...4700 pF 500 VDC min	
R1				0–10 Ohm	
L1	common mode choke with split winding			4–12 mH	
L2	common mode choke with bifilar winding			0,4–2 mH	

Tablet 1. Components of typical connecting circuit.

Typical connection (cont.)

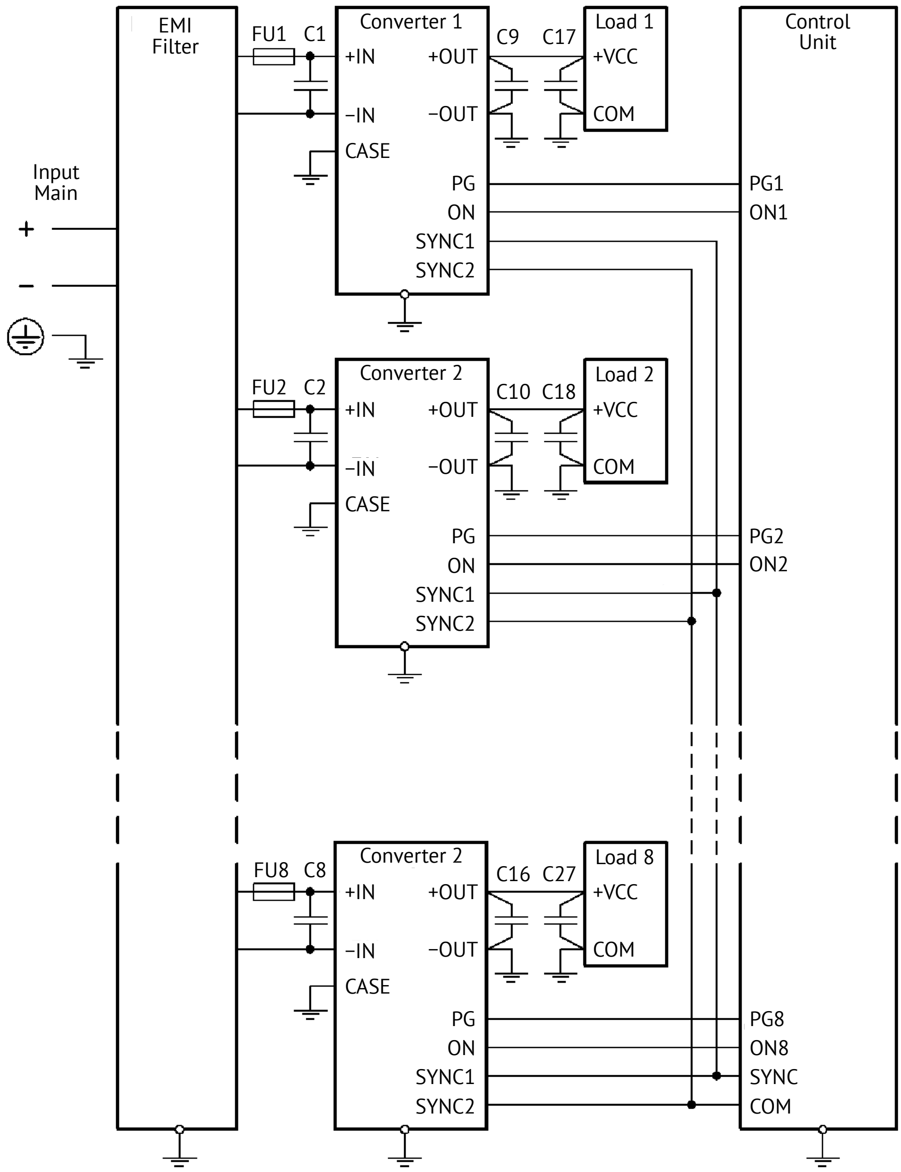

Figure 3. Example of decentralized power supply with galvannically connected output voltages.

Service functions

Adjustment

Adjustment of output voltage of a power supply unit within the range of at least ±5% can be done by connecting "ADJ" pin through R1 to "–OUT" output for increase output voltage, or through R1 to "+OUT" output for decrease the output voltage.

In case of using variable resistor Rvar it is possible to fulfill the adjustment both to increase and decrease the output voltage.

If you need to control the output voltage using a signal from external source of current or voltage, e.g. in micro-controller automated control systems using DAC, the external current or voltage signal should be supplied to the adjustment pin relating to "–OUT" output, as shown in the drawings (e) and (d).

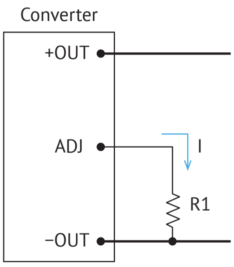

Figure 4 (a). Output voltage increase.

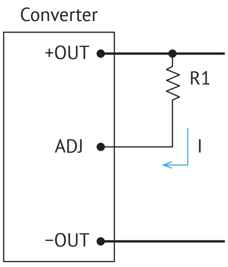

Figure 4 (b). Output voltage decrease.

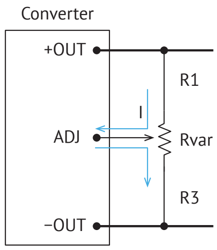

Figure 4 (c). Adjustment by resistive divider.

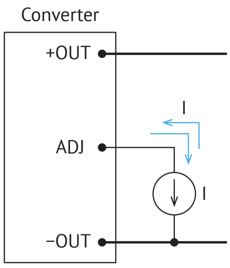

Figure 4 (e). Adjustment by current sourse.

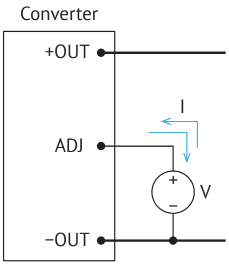

Figure 4 (d). Adjustment by voltage sourse.

Service functions (cont.)

Output voltage VS resistor rating of MDA340

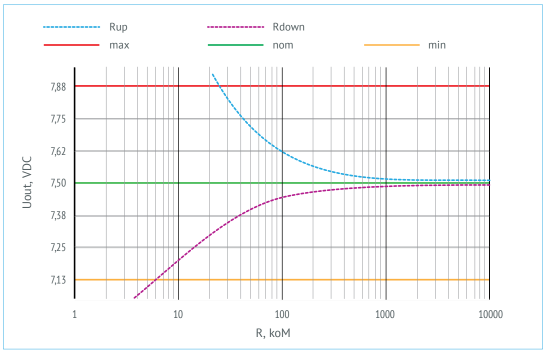

Figure 5 (a). Resistance values for adjustment of Uout.=7,5 VDC.

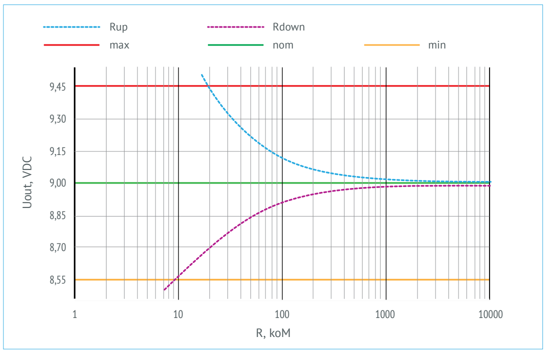

Figure 5 (b). Resistance values for adjustment of Uout.=9 VDC.

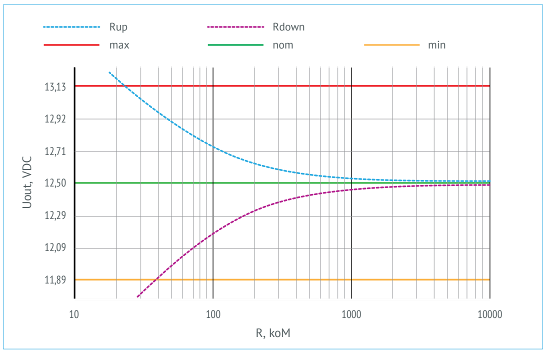

Figure 5 (c). Resistance values for adjustment of Uout.=12,5 VDC.

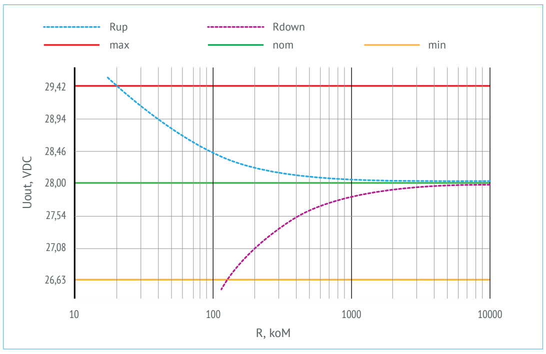

Figure 5 (d). Resistance values for adjustment of Uout.=28 VDC.

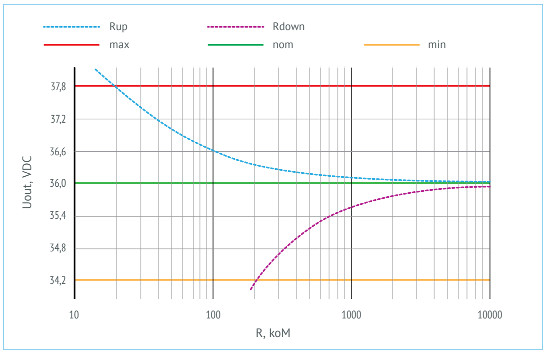

Figure 5 (e). Resistance values for adjustment of Uout.=36 VDC.

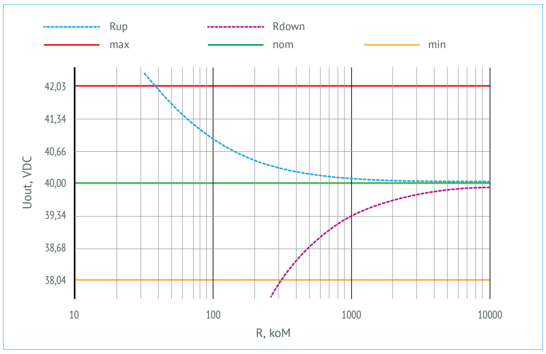

Figure 5 (f). Resistance values for adjustment of Uout.=40 VDC.

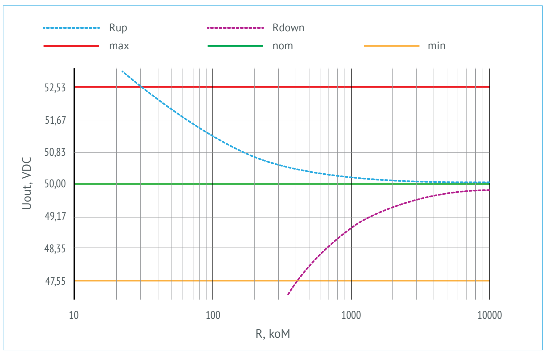

Figure 5 (g). Resistance values for adjustment of Uout.=50 VDC.

Service functions (cont.)

Output voltage VS resistor rating of MDA500

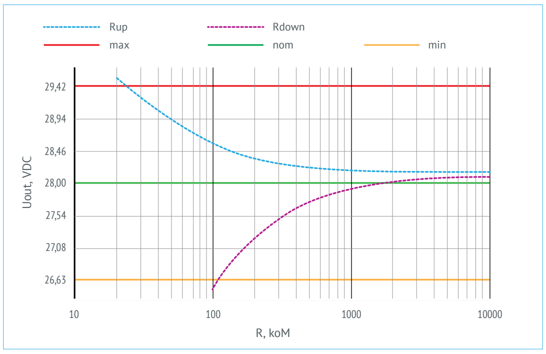

Figure 6 (a). Resistance values for adjustment of Uout.=28 VDC.

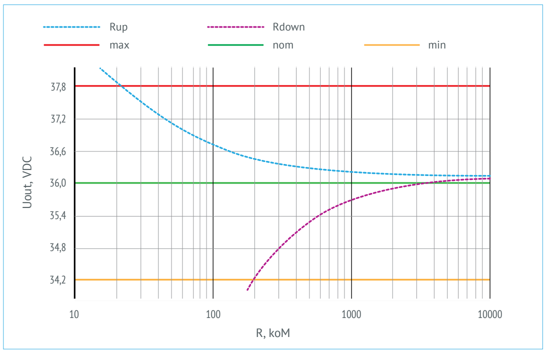

Figure 6 (b). Resistance values for adjustment of Uout.=36 VDC.

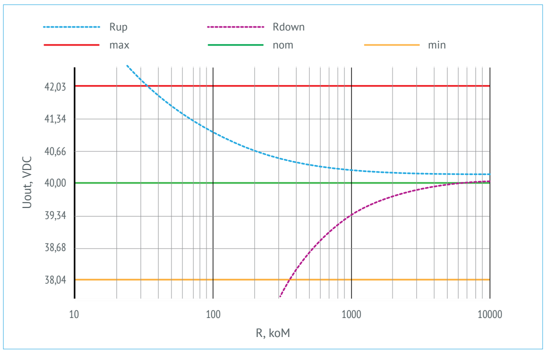

Figure 6 (c). Resistance values for adjustment of Uout.=40 VDC.

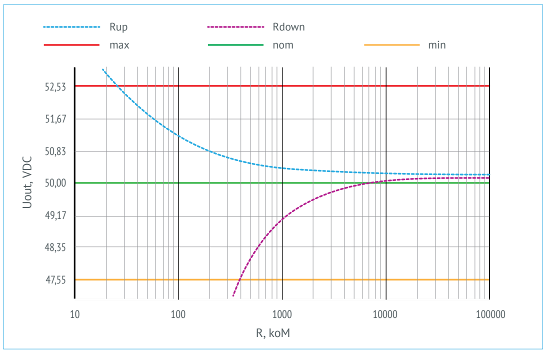

Figure 6 (d). Resistance values for adjustment of Uout.=50 VDC.

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Efficiency

VS load for MDA340 (Index “U”)

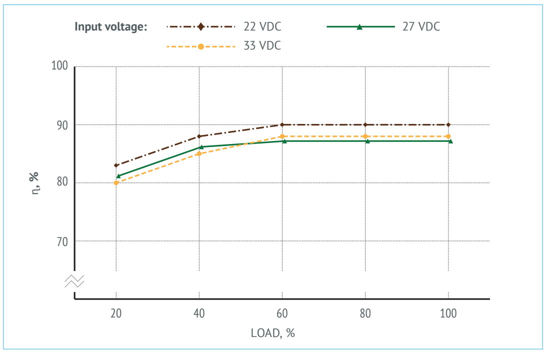

Figure 7 (a). Efficiency of MDA340U7,5.

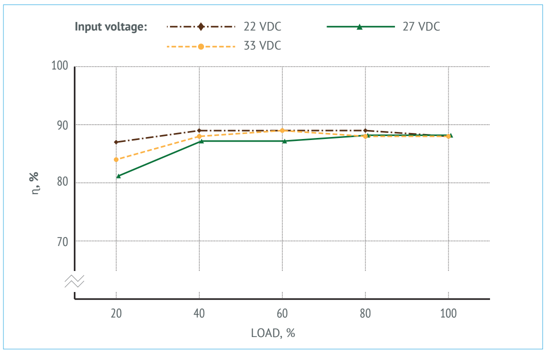

Figure 7 (b). Efficiency of MDA340U09.

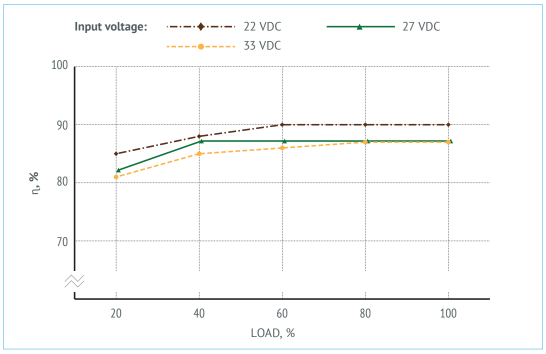

Figure 7 (c). Efficiency of MDA340U28.

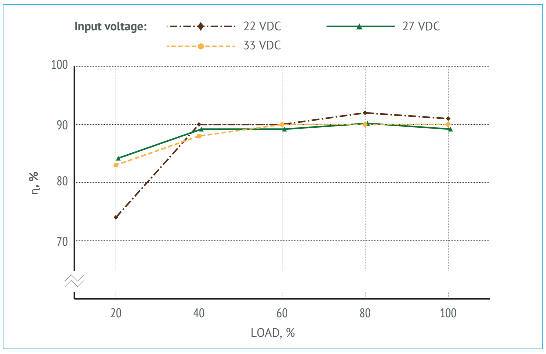

Figure 7 (d). Efficiency of MDA340U36.

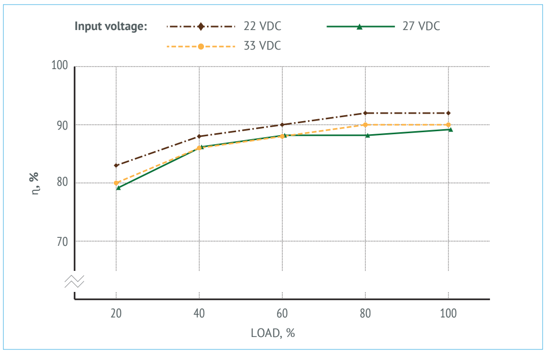

Figure 7 (e). Efficiency of MDA340U40.

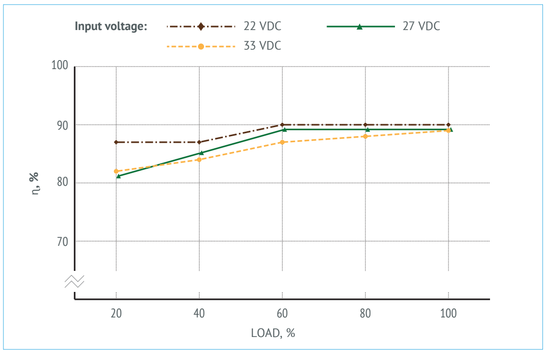

Figure 7 (f). Efficiency of MDA340U50.

Efficiency

VS load for MDA340 (Index “J”)

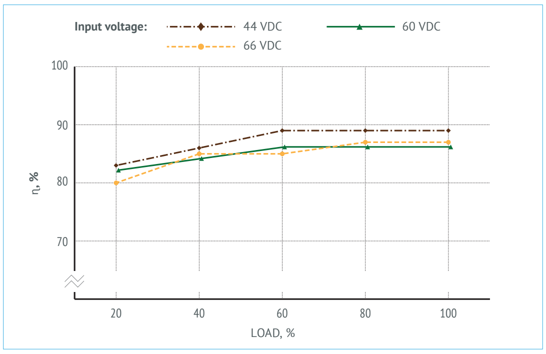

Figure 7 (g). Efficiency of MDA340J7,5.

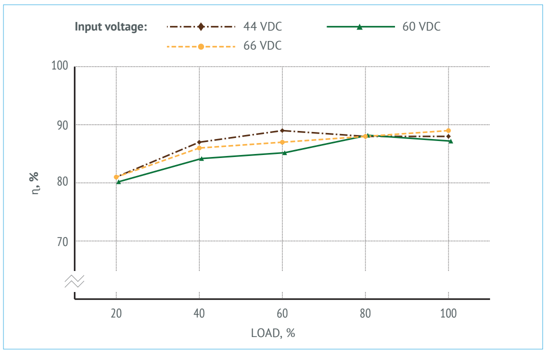

Figure 7 (h). Efficiency of MDA340J09.

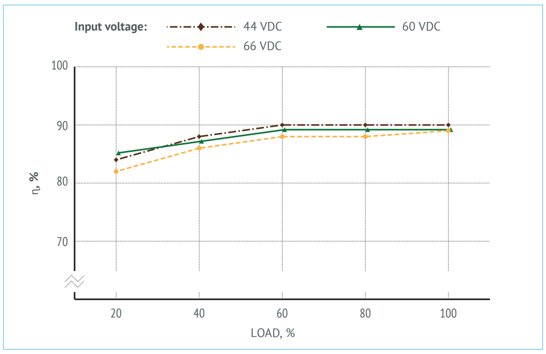

Figure 7 (i). Efficiency of MDA340J28.

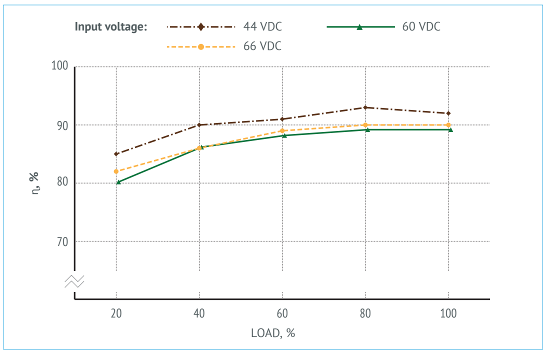

Figure 7 (j). Efficiency of MDA340J36.

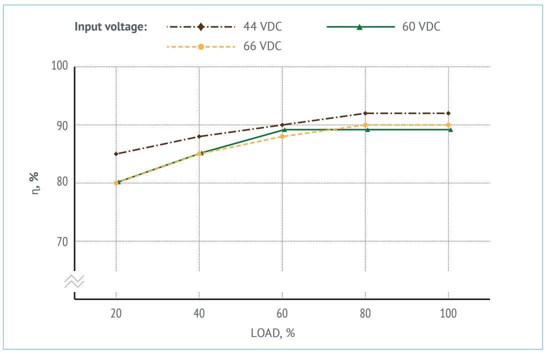

Figure 7 (k). Efficiency of MDA340J50.

Efficiency

VS load for MDA340 (Index “F”)

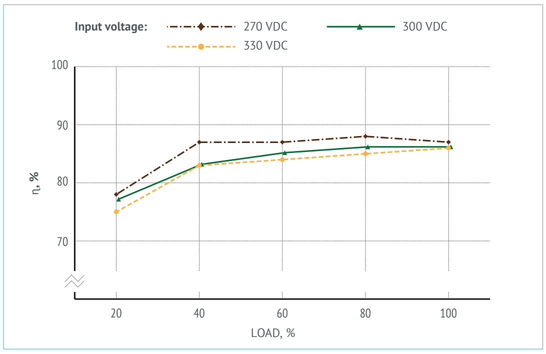

Figure 7 (l). Efficiency of MDA340F7,5.

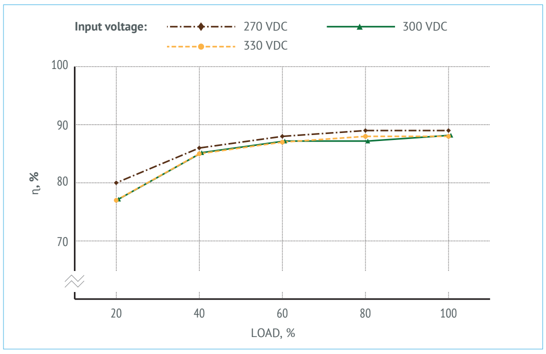

Figure 7 (m). Efficiency of MDA340F09.

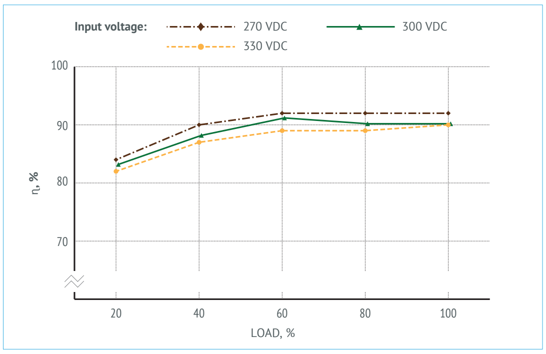

Figure 7 (n). Efficiency of MDA340F28.

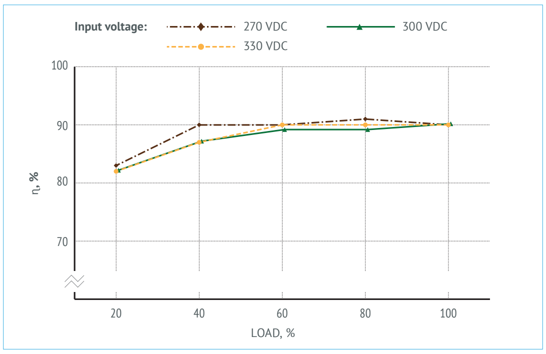

Figure 7 (o). Efficiency of MDA340F36.

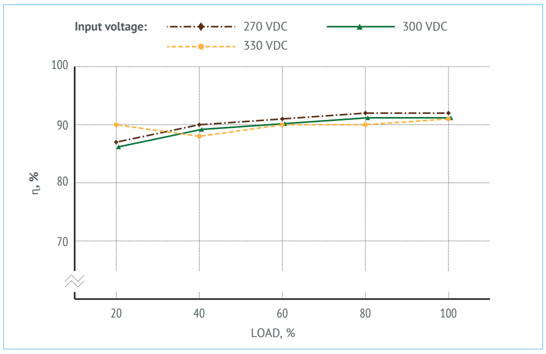

Figure 7 (p). Efficiency of MDA340F40.

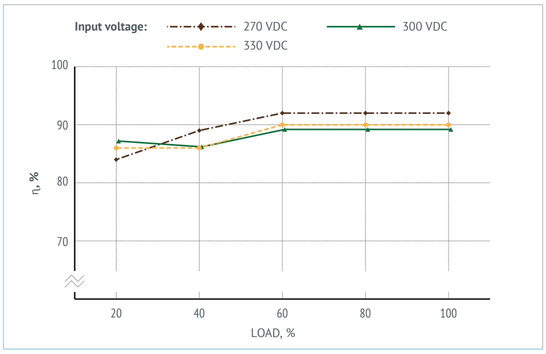

Figure 7 (q). Efficiency of MDA340F50.

Efficiency

VS load for MDA500 (Index "U")

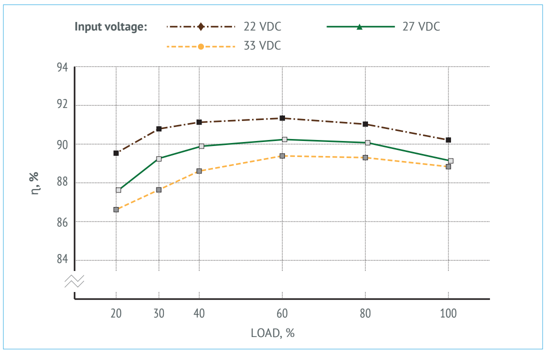

Figure 8 (a). Efficiency of MDA500U28.

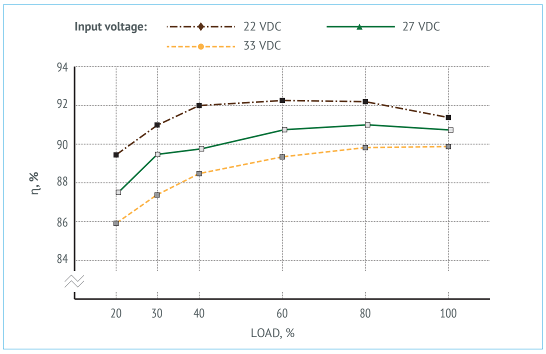

Figure 8 (b). Efficiency of MDA500U36.

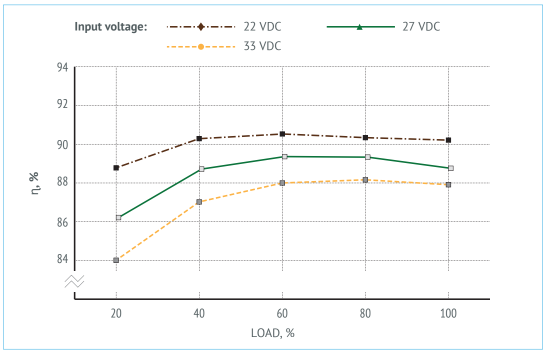

Figure 8 (c). Efficiency of MDA500U50.

VS load for MDA500 (Index "J")

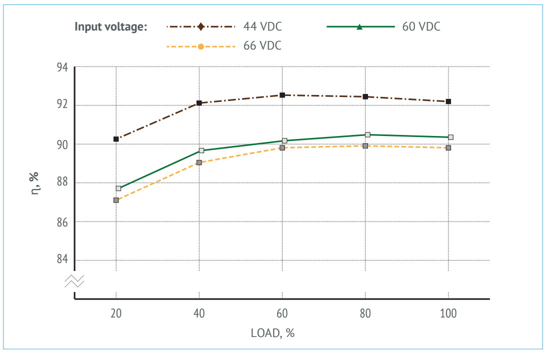

Figure 8 (d). Efficiency of MDA500J28.

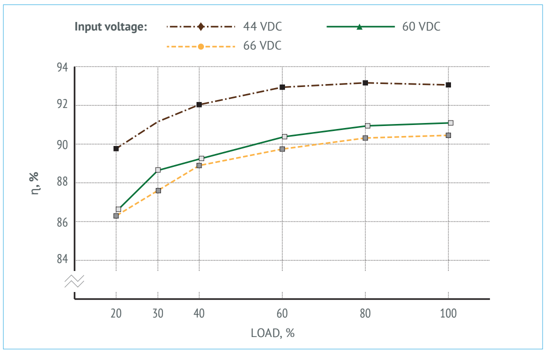

Figure 8 (e). Efficiency of MDA500J36.

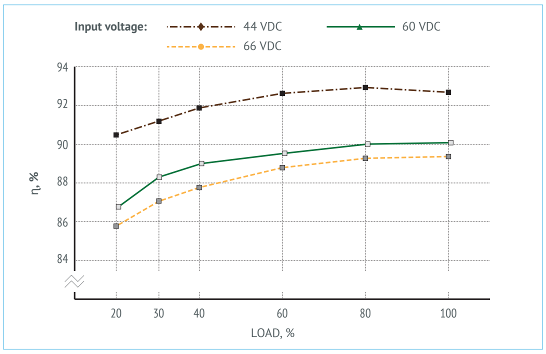

Figure 8 (f). Efficiency of MDA500J40.

Efficiency

VS load for MDA500 (Index “F”)

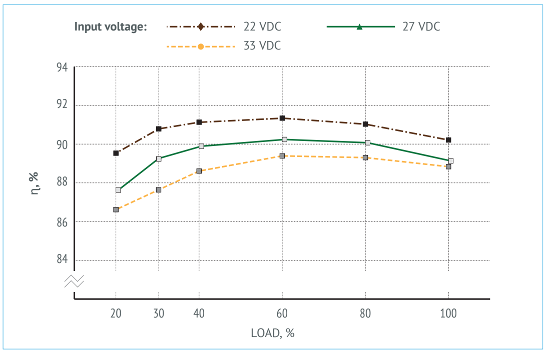

Figure 8 (g). Efficiency of MDA500U28.

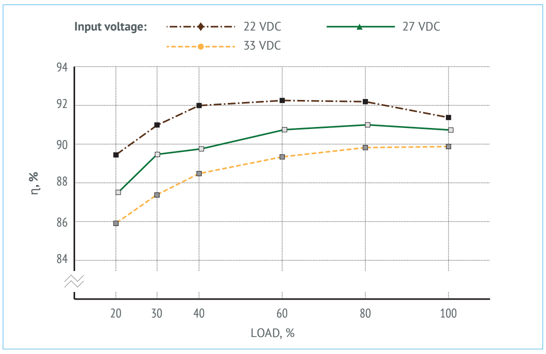

Figure 8 (h). Efficiency of MDA500U36.

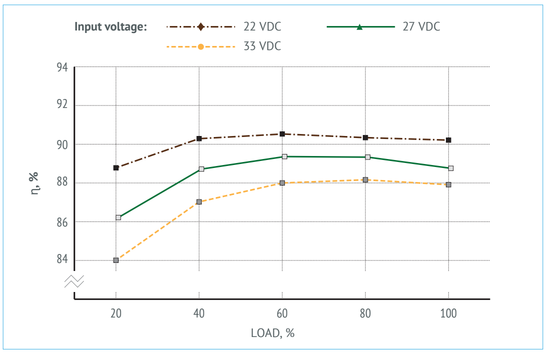

Figure 8 (i). Efficiency of MDA500U50.

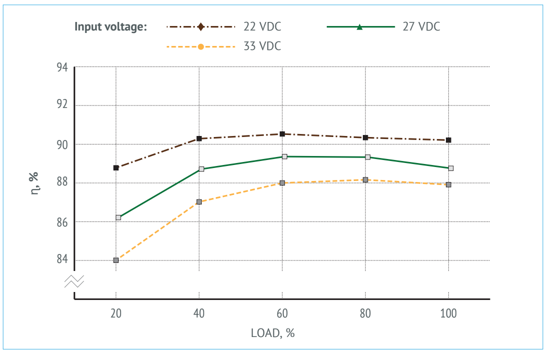

Figure 8 (j). Efficiency of MDA500U50.

Power derating

VS ambient temperature and baseplate temperature

The PSU is able to operate with 100% load within the complete range of case operating temperature (–60...+125 °C). On condition the case temperature is kept from –60°C to 125 °C the PSU will operate without derating regardless of the ambient temperature.

Thermal Management section of the Application Notes shows the resulting heatsink area, as well as baseplate-vs-ambient thermal resistance, the min thickness of the heatsink, and the max PSU output power without heatsink.

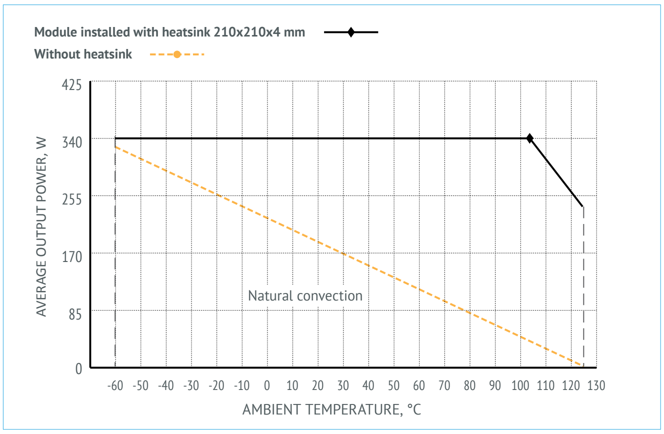

Figure 9 (a). Power derating of MDA340.

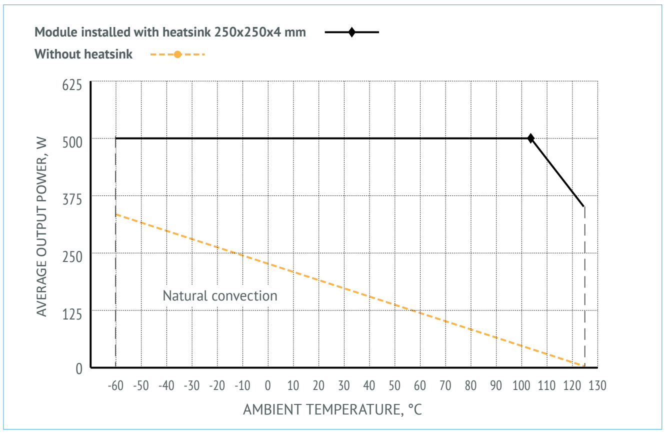

Figure 9 (b). Power derating of MDA500.

VS temperature of the heat conducting surface

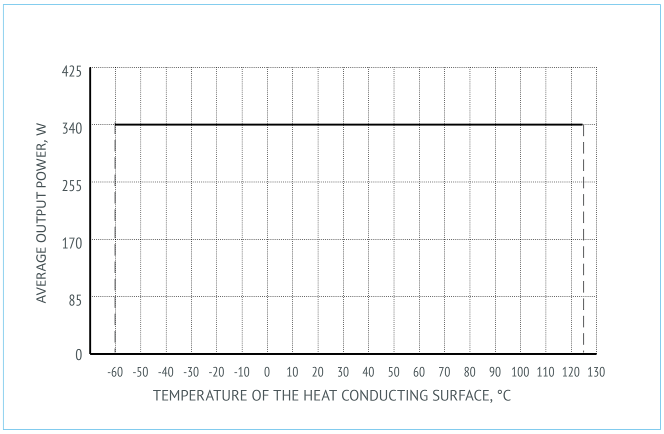

Figure 9 (c). Power derating of MDA340.

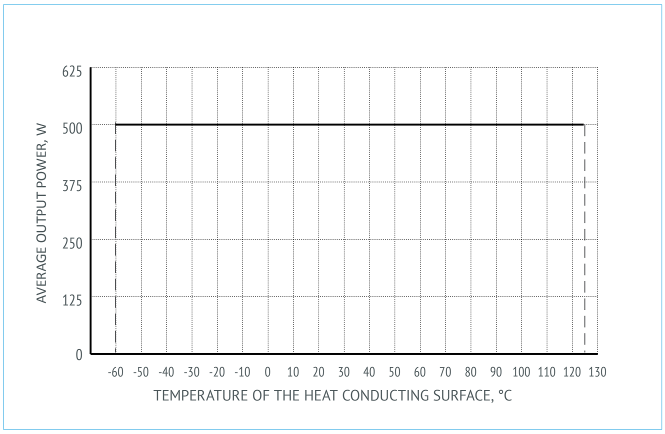

Figure 9 (d). Power derating of MDA500.

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Oscillograph charts

Charts of MDA340F40

Testing conditions Uin.=300 VDC, Iout.=8,5 A, Tamb.=25°C, Uout.=40 VDC, Cout.=100 uF

The database of regulated parameters of the maunfactured products is available. Pls. contact your personal manager or customer support service to get necessary information.

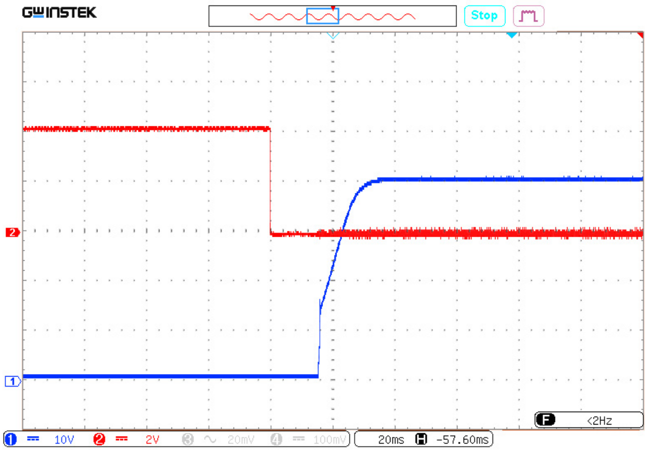

Figure 10 (a). Oscillograph chart of setting output voltage after supplying remote control signal to ON-input.

Ray 1 (blue) – output voltage. Scale 10 V/div.

Ray 2 (red) – voltage at ON-input. Scale 2 V/div.

Time scale 20 ms/div.

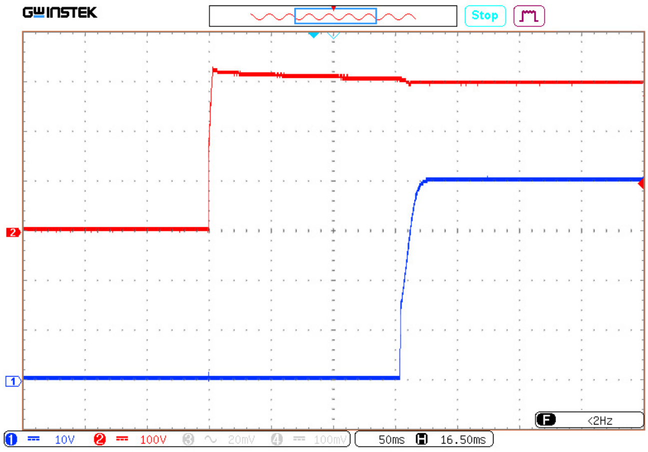

Figure 10 (b). Oscilliograph chart of output voltage after supplying the input voltage.

Ray 1 (blue) – output voltage. Scale 10 V/div.

Ray 2 (red) – input voltage. Scale 100 V/div.

Time scale 50 ms/div.

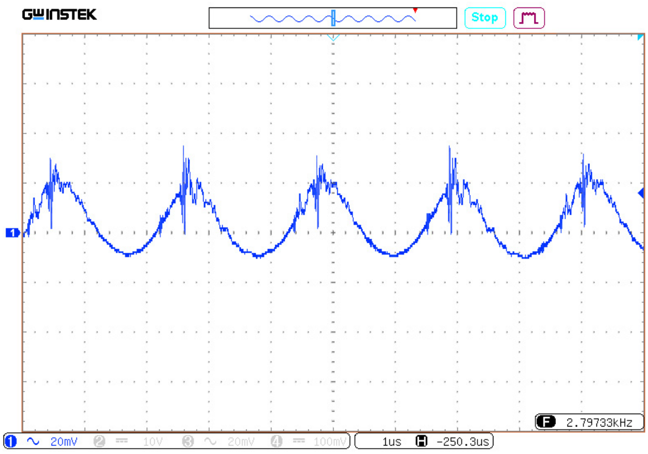

Figure 10 (c). Oscillograph chart of output voltage ripple.

Ripple of output voltage. Scale 20 mV/div. Time scale 1 us/div.

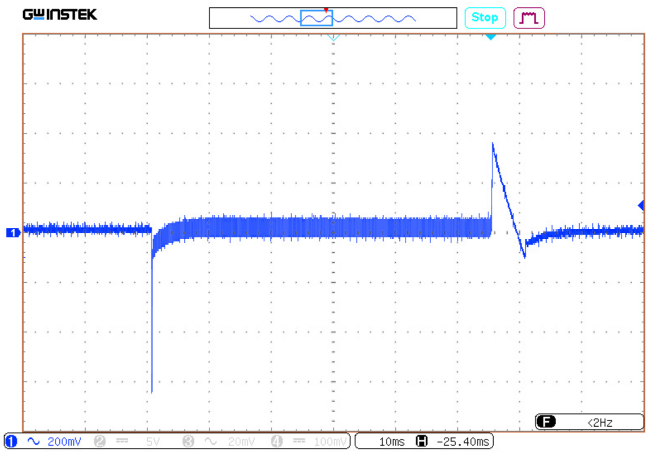

Figure 10 (d). Oscillograph chart of voltage transient deviation during load “drop/rise” 0...100 %.

Ray 1 (blue) – output voltage. Scale 200 mV/div. Time scale 10 ms/div.

Oscillograph charts

Charts of MDA340F50

Testing conditions Uin.=300 VDC, Iout.=6,8 A, Tamb.=25°C, Uout.=50 VDC, Cout.=100 uF

The database of regulated parameters of the maunfactured products is available. Pls. contact your personal manager or customer support service to get necessary information.

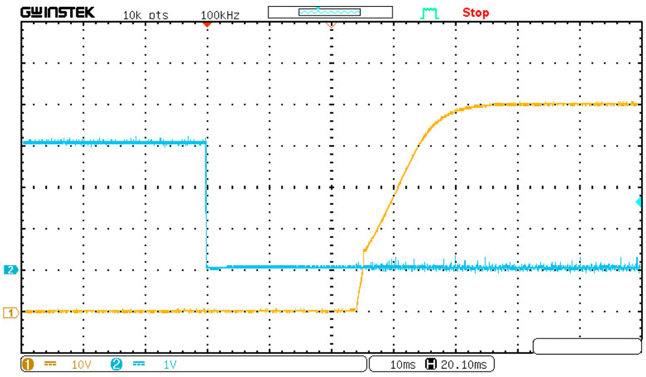

Figure 11 (a). Oscillograph chart of setting output voltage after supplying remote control signal to ON-input.

Ray 1 (yellow) – output voltage. Scale 10 V/div.

Ray 2 (blue) – voltage at ON-input. Scale 1 V/div. Time scale 10 ms/div.

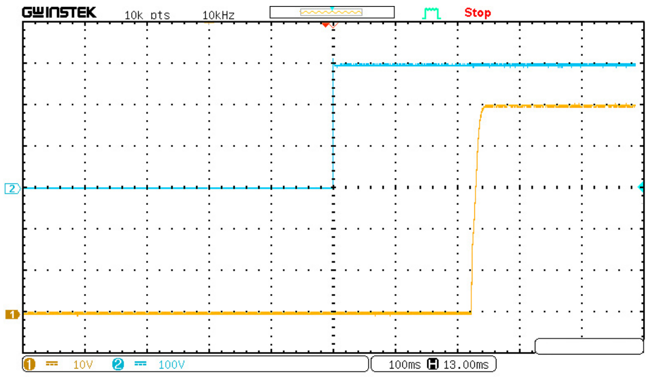

Figure 11 (b). Oscilliograph chart of output voltage after supplying the input voltage.

Ray 1 (yellow) – output voltage. Scale 10 V/div.

Ray 2 (blue) – input voltage. Scale 100 V/div.

Time scale 100 ms/div.

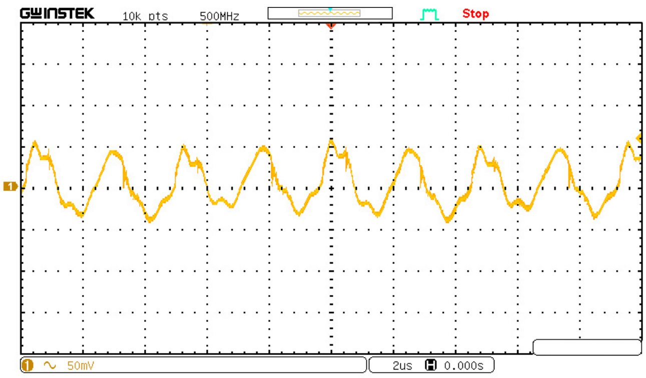

Figure 11 (c). Oscillograph chart of output voltage ripple.

Ripple of output voltage. Scale 50 mV/div. Time scale 2 us/div.

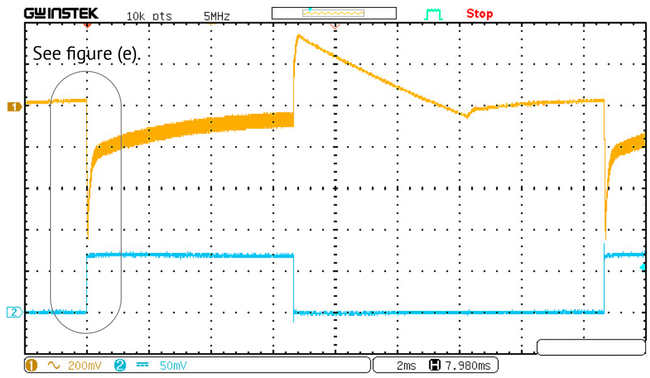

Figure 11 (d). Oscillograph chart of voltage transient deviation during load “drop/rise” 0…100 %.

Ray 1 (yellow) – output voltage. Scale 200 mV/div. Time scale 2 ms/div.

Ray 2 (blue) – output current. Scale 5 A/div.

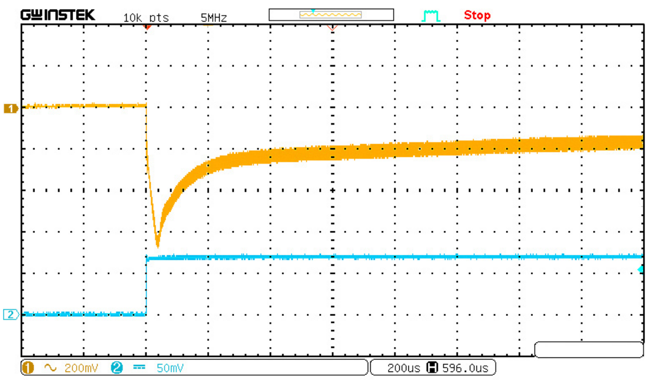

Figure 11 (e). Oscillograph chart of voltage transient deviation during load “rise” 0…100 %.

Ray 1 (yellow) – output voltage. Scale 200 mV/div. Time scale 200 us/div.

Ray 2 (blue) – output current. Scale 5 A/div.

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Oscillograph charts

Charts of MDA340U7,5

Testing conditions Uin.=28 VDC, Iout.=30 A, Tamb.=25°C, Uout.=7,5 VDC, Cout.=400 uF

The database of regulated parameters of the maunfactured products is available. Pls. contact your personal manager or customer support service to get necessary information.

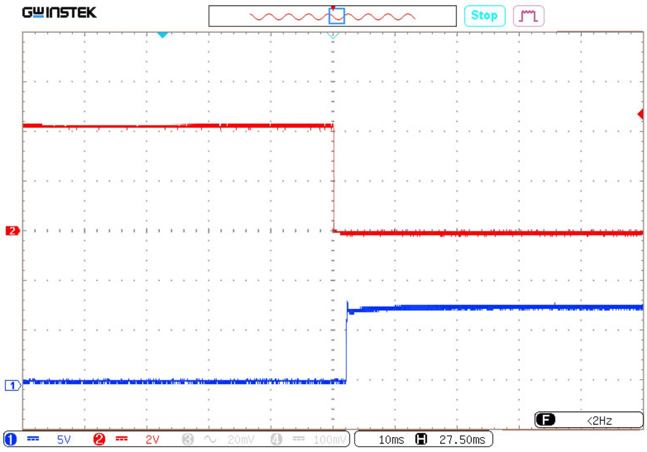

Figure 12 (a). Oscillograph chart of setting output voltage after supplying remote control signal to ON-input.

Ray 1 (blue) – output voltage. Scale 5 V/div.

Ray 2 (red) – voltage at ON-input. Scale 2 V/div.

Time scale 10 ms/div.

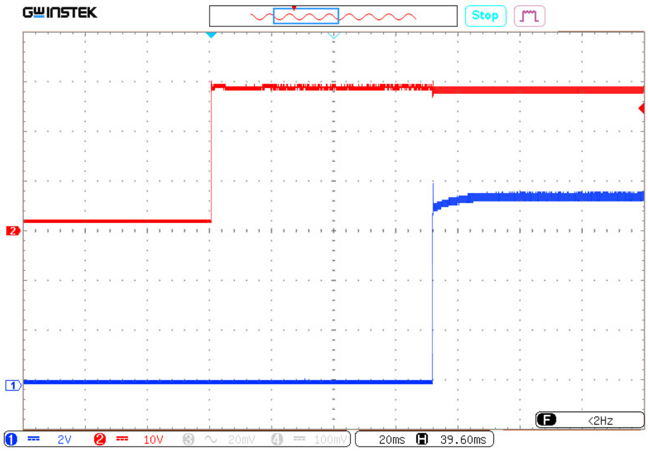

Figure 12 (b). Oscilliograph chart of output voltage after supplying the input voltage.

Ray 1 (blue) – output voltage. Scale 2 V/div.

Ray 2 (red) – input voltage. Scale 10 V/div.

Time scale 20 ms/div.

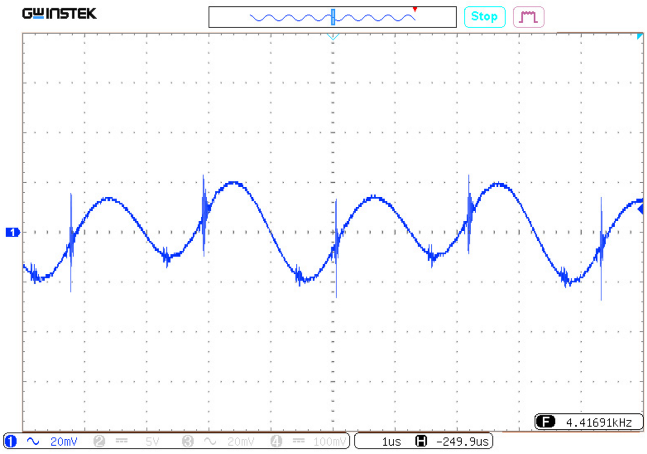

Figure 12 (c). Oscillograph chart of output voltage ripple.

Ripple of output voltage. Scale 20 V/div. Time scale 1 us/div.

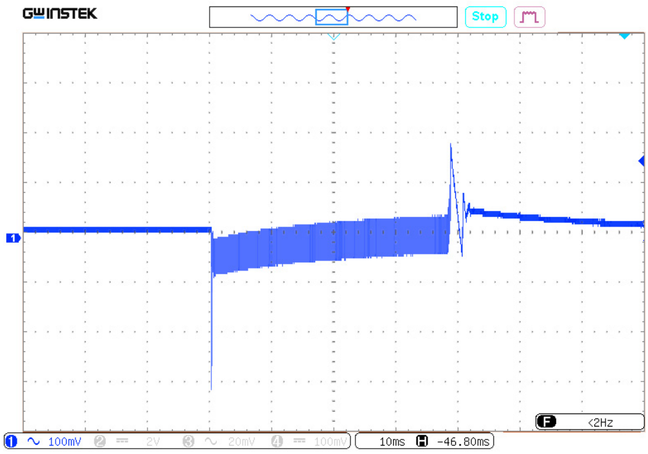

Figure 12 (d). Oscillograph chart of voltage transient deviation during load "drop/rise" 0...100 %.

Ray 1 (blue) – output voltage. Scale 100 mV/div. Time scale 10 ms/div.

Oscillograph charts

Charts of MDA340J09

Testing conditions Uin.=60 VDC, Iout.=30 A, Tamb.=25°C, Uout.=9 VDC, Cout.=400 uF

The database of regulated parameters of the maunfactured products is available. Pls. contact your personal manager or customer support service to get necessary information.

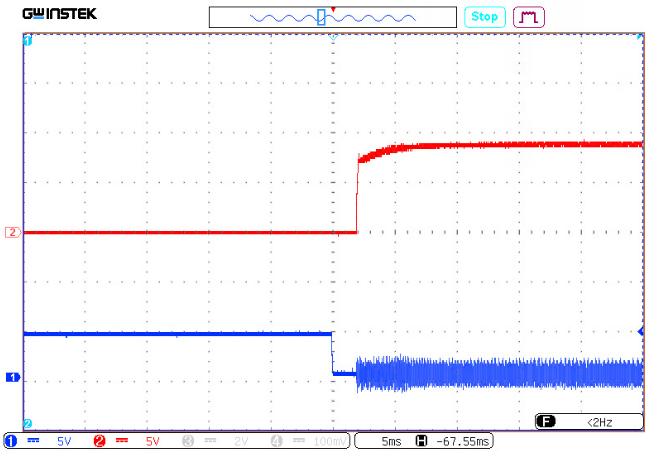

Figure 13 (a). Oscillograph chart of setting output voltage after supplying remote control signal to ON-input.

Ray 1 (blue) – voltage at ON-input. Scale 5 V/div.

Ray 2 (red) – output voltage. Scale 5 V/div.

Time scale 5 ms/div.

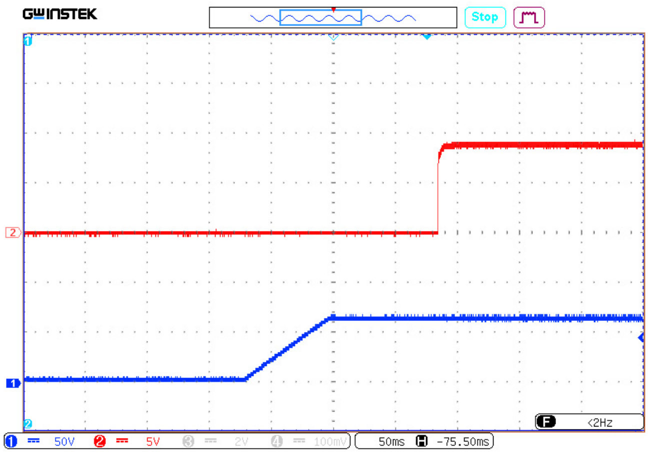

Figure 13 (b). Oscilliograph chart of output voltage after supplying the input voltage.

Ray 1 (blue) – input voltage. Scale 50 V/div.

Ray 2 (red) – output voltage. Scale 5 V/div.

Time scale 50 ms/div.

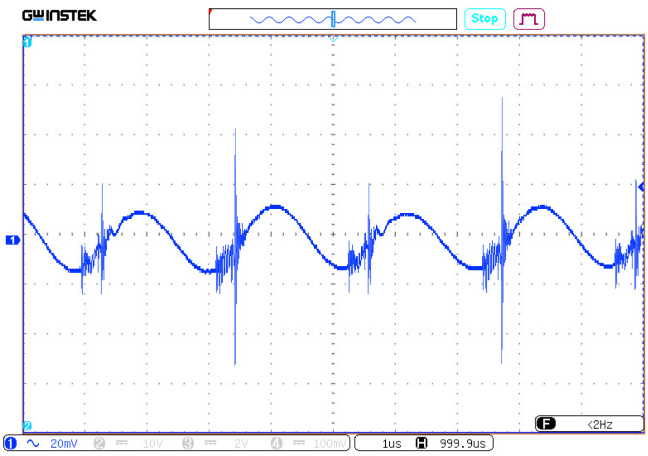

Figure 13 (c). Oscillograph chart of output voltage ripple.

Ripple of output voltage. Scale 20 mV/div. Time scale 1 us/div.

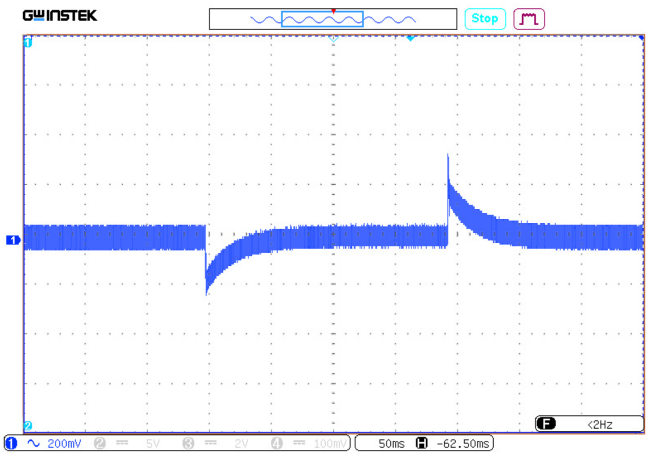

Figure 13 (d). Oscillograph chart of voltage transient deviation during load "drop/rise" 0...100 %.

Ray 1 (blue) – output voltage. Scale 200 mV/div. Time scale 50 ms/div.

Oscillograph charts

Charts of MDA500F50

Testing conditions Uin.=300 VDC, Iout.=10 A, Tamb.=25 °C, Uout.=50 VDC, Cout.=200 uF

The database of regulated parameters of the maunfactured products is available. Pls. contact your personal manager or customer support service to get necessary information.

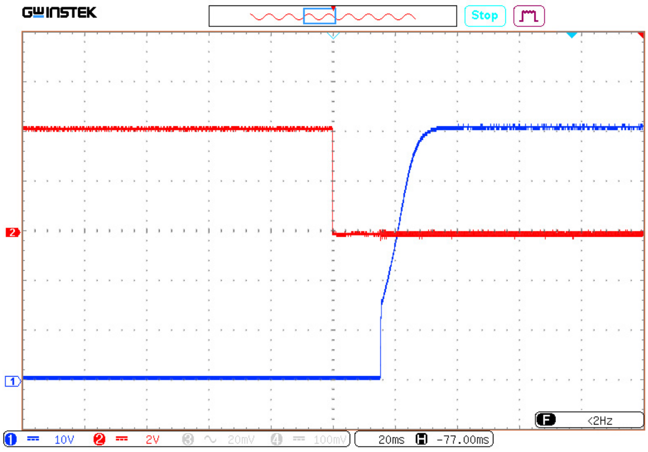

Figure 14 (a). Oscillograph chart of setting output voltage after supplying remote control signal to ON-input.

Ray 1 (blue) – output voltage. Scale 10 V/div.

Ray 2 (red) – voltage at ON-input. Scale 2 V/div.

Time scale 20 ms/div.

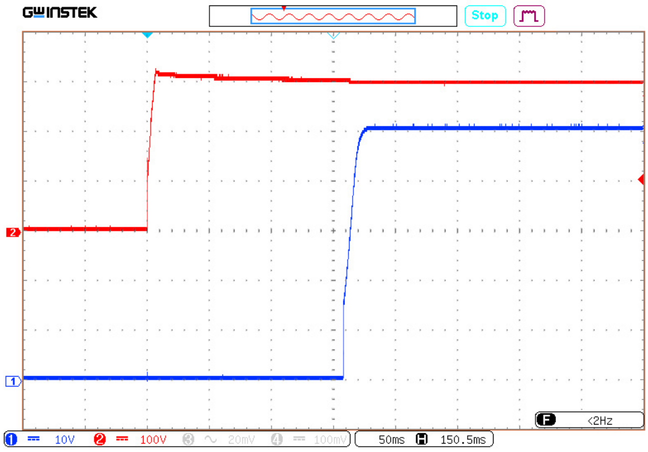

Figure 14 (b). Oscilliograph chart of output voltage after supplying the input voltage.

Ray 1 (blue) – output voltage. Scale 10 V/div.

Ray 2 (red) – input voltage. Scale 100 V/div.

Time scale 50 ms/div.

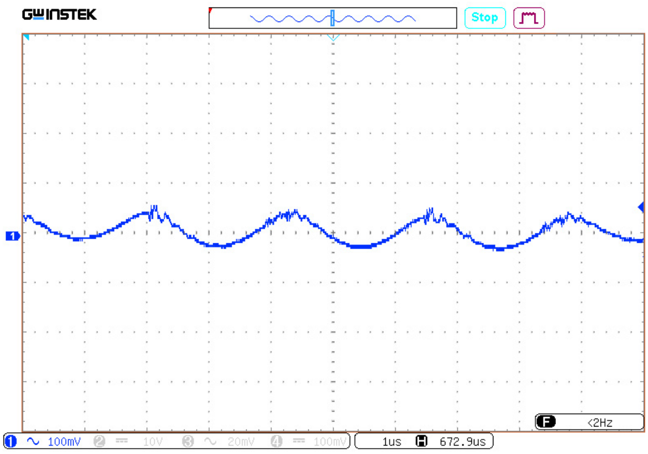

Figure 14 (c). Oscillograph chart of output voltage ripple.

Ripple of output voltage. Scale 100 mV/div. Time scale 1 us/div.

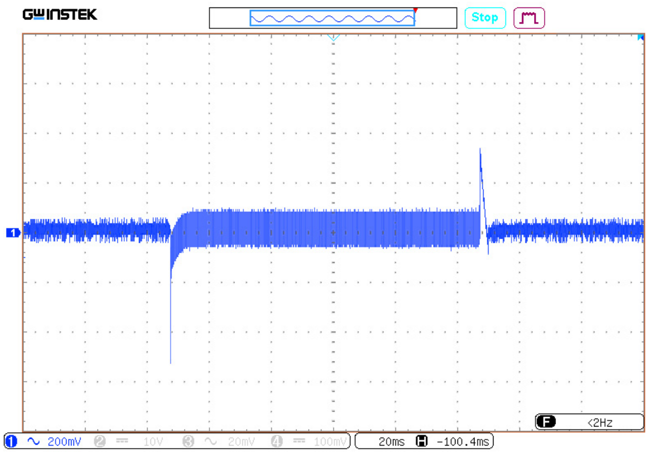

Figure 14 (d). Oscillograph chart of voltage transient deviation during load “drop/rise” 0…100 %.

Ray 1 (yellow) – output voltage. Scale 200 mV/div. Time scale 20 ms/div.

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Oscillograph charts

Charts of MDA500U50

Testing conditions Uin.=28 VDC, Iout.=10 A, Tamb.=25°C, Uout.=50 VDC, Cout.=200 uF

The database of regulated parameters of the maunfactured products is available. Pls. contact your personal manager or customer support service to get necessary information.

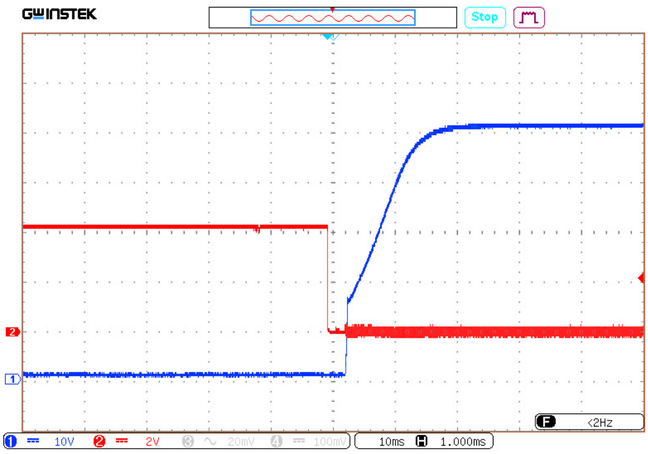

Figure 15 (a). Oscillograph chart of setting output voltage after supplying remote control signal to ON-input.

Ray 1 (blue) – output voltage. Scale 10 V/div.

Ray 2 (red) – voltage at ON-input. Scale 2 V/div.

Time scale 10 ms/div.

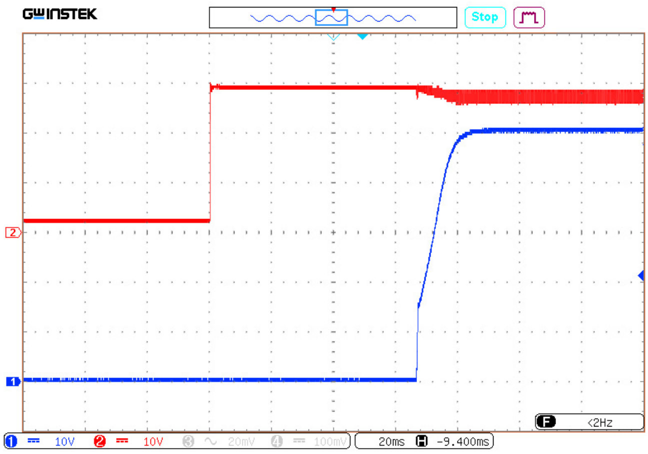

Figure 15 (b). Oscilliograph chart of output voltage after supplying the input voltage.

Ray 1 (blue) – output voltage. Scale 10 V/div.

Ray 2 (red) – input voltage. Scale 10 V/div.

Time scale 20 ms/div.

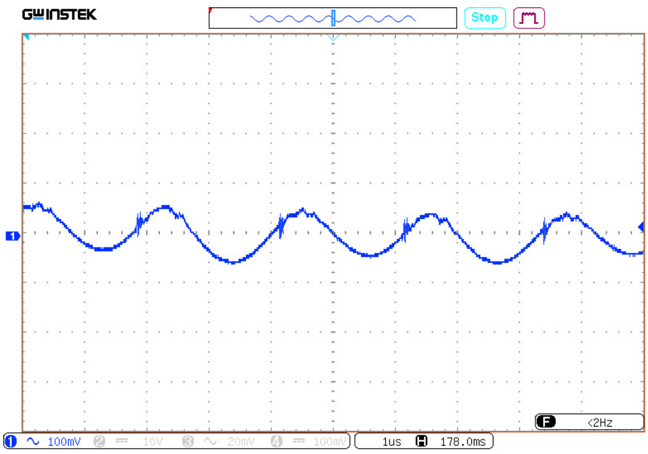

Figure 15 (c). Oscillograph chart of output voltage ripple.

Ripple of output voltage. Scale 100 mV/div. Time scale 1 us/div.

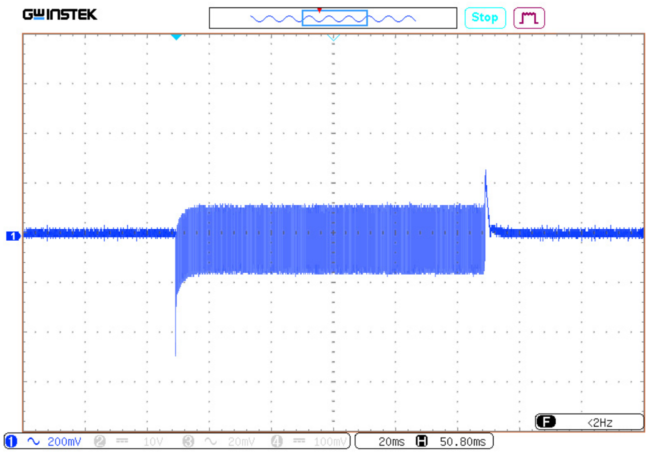

Figure 15 (d). Oscillograph chart of voltage transient deviation during load "drop/rise" 0...100 %.

Ray 1 (blue) – output voltage. Scale 200 mV/div. Time scale 20 ms/div.

Noise spectrogram

Spectrogram of MDA340U7,5 with typical connection diagram

Testing according to MIL-STD-461F CE102. (Tcase=25°C, Vin.=+28 V, full load, unless otherwise specified)

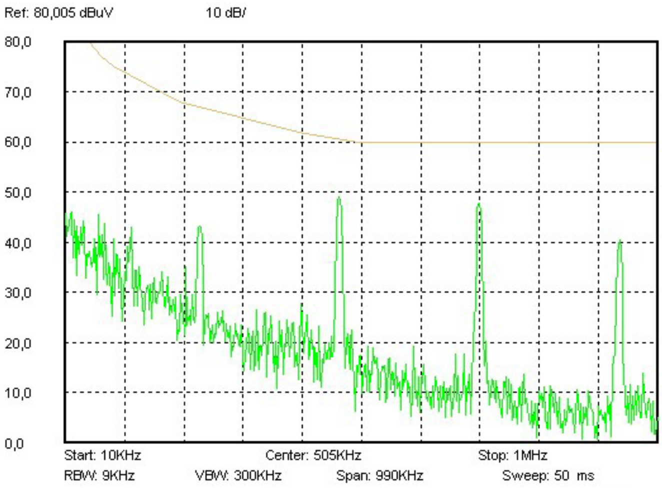

Figure 16 (a). Spectrogram 0,01–1 MHz.

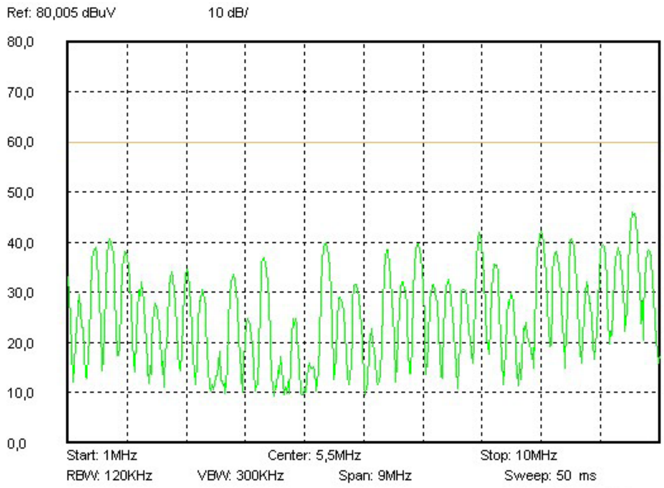

Figure 16 (b). Spectrogram 1–10 MHz.

Spectrogram of MDA340F36 with typical connection diagram

Testing according to MIL-STD-461F CE102. (Tcase=25°C, Vin.=+300 V, full load, unless otherwise specified)

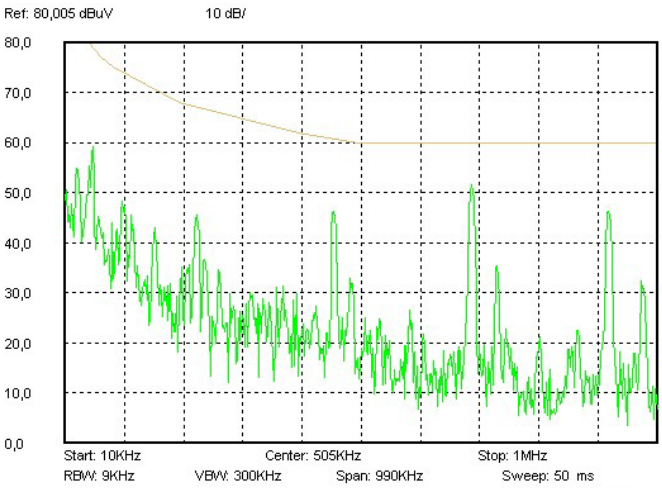

Figure 17 (a). Spectrogram 0,01–1 MHz.

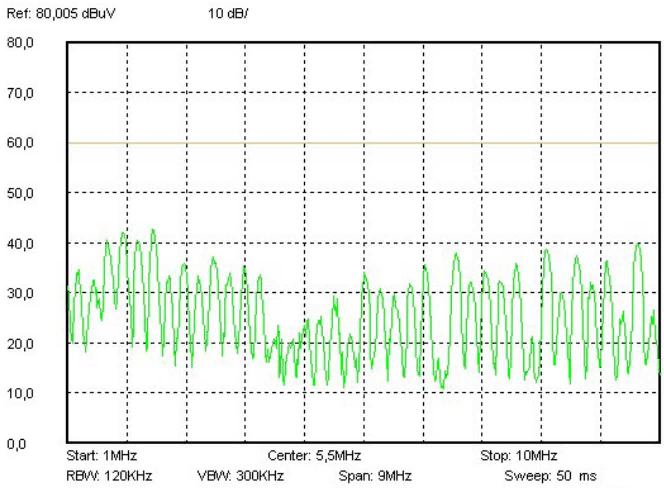

Figure 17 (b). Spectrogram 1–10 MHz.

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Noise spectrogram

Spectrogram of MDA340J09 with typical connection diagram

Testing according to MIL-STD-461F CE102. (Tcase=25°C, Vin.=+60 V, full load, unless otherwise specified)

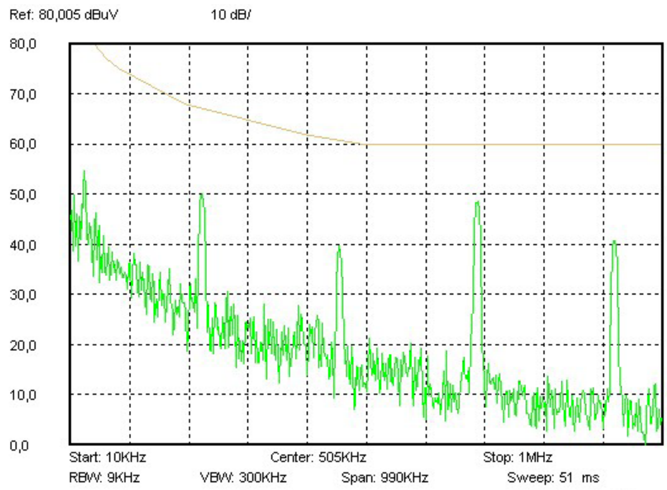

Figure 18 (a). Spectrogram 0,01–1 MHz.

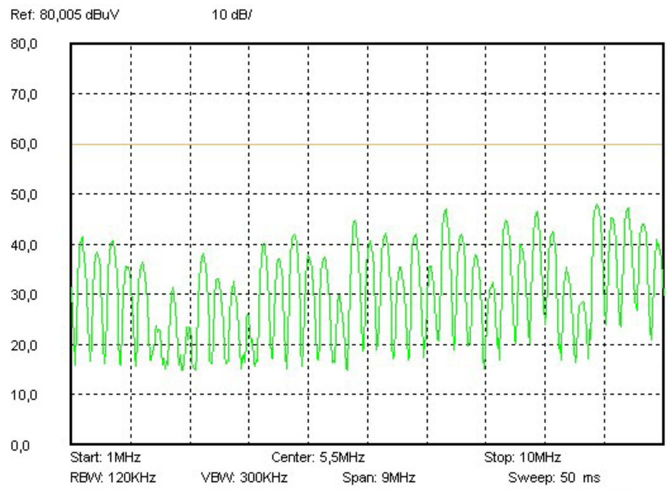

Figure 18 (b). Spectrogram 1–10 MHz.

Spectrogram of MDA500U50 with typical connection diagram

Testing according to MIL-STD-461F CE102. (Tcase=25°C, Vin.=+28 V, full load, unless otherwise specified)

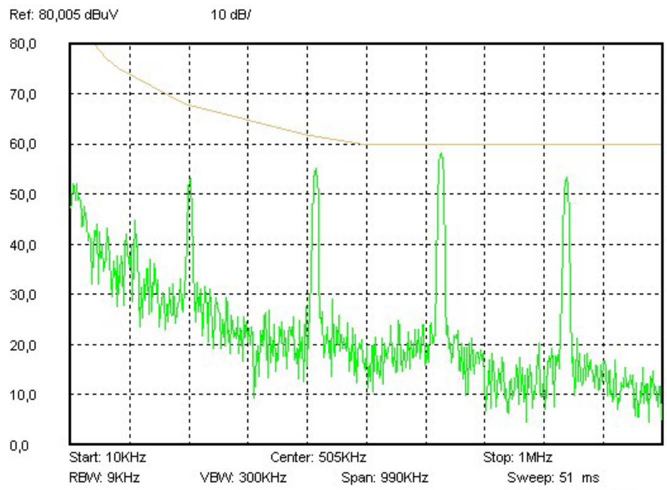

Figure 19 (a). Spectrogram 0,01–1 MHz.

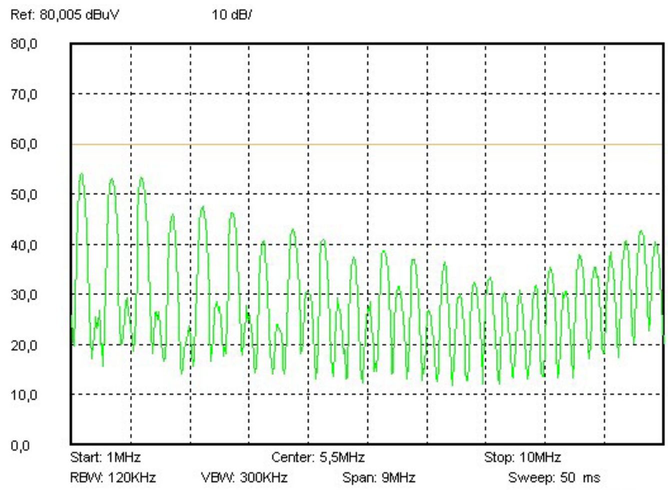

Figure 19 (b). Spectrogram 1–10 MHz.

Noise spectrogram

Spectrogram of MDA340J09 with typical connection diagram

Testing according to MIL-STD-461F CE102. (Tcase=25°C, Vin.=+300 V, full load, unless otherwise specified)

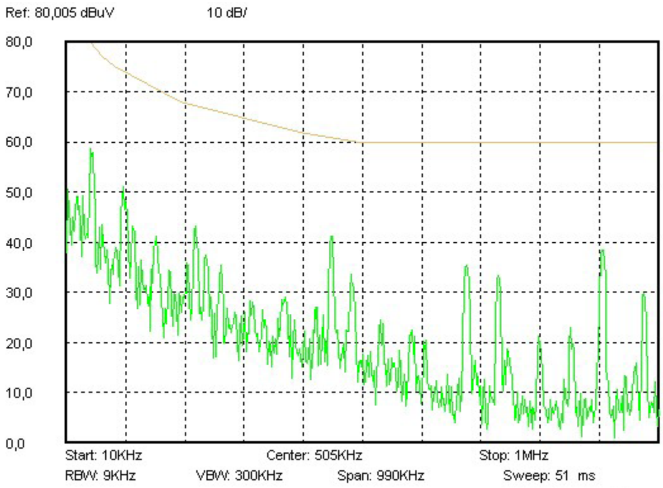

Figure 20 (a). Spectrogram 0,01–1 MHz.

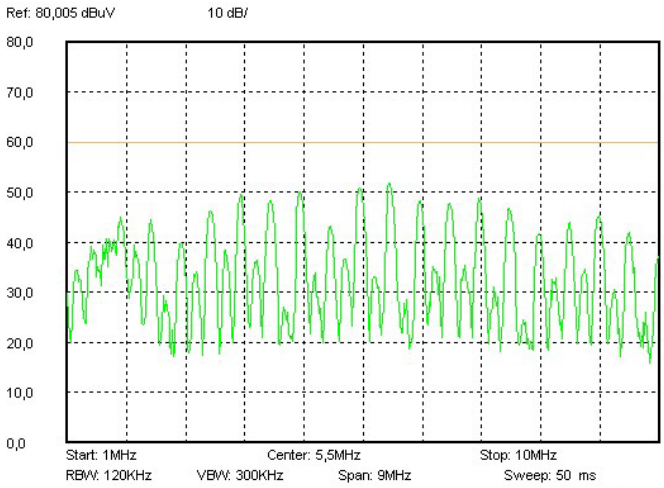

Figure 20 (b). Spectrogram 1–10 MHz.

Outline dimensions

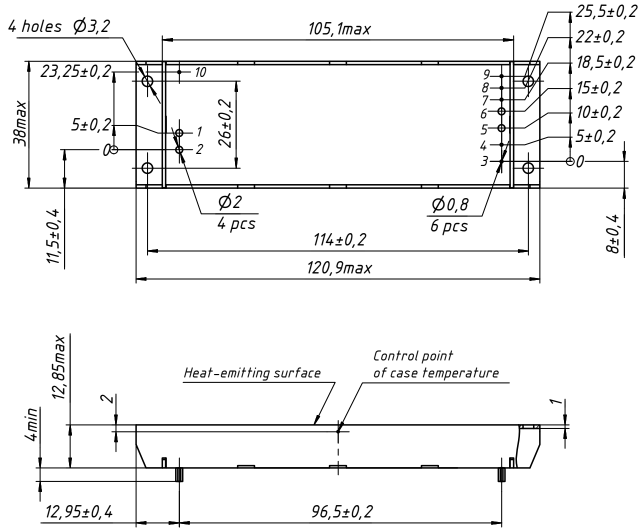

Figure 21. Module with vertical pin out, case with flanges “U” type.

Pin out

Pin #	1	2	3	4	5	6	7	8	9	10
Functions	–IN	+IN	SYNC2	SYNC1	+OUT	–OUT	PGOOD	ON	TRIM	CASE

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129626. Russia
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This datasheet is valid for the following units: MDA340U7.5U; MDA340U09U; MDA340U12.5U; MDA340U28U; MDA340U36U; MDA340U40U; MDA340U50U; MDA500U28U; MDA500U36U; MDA500U40U; MDA500U50U; MDA340J7.5U; MDA340J09U; MDA340J12.5U; MDA340J28U; MDA340J36U; MDA340J40U; MDA340J50U; MDA500J28U; MDA500J36U; MDA500J40U; MDA500J50U; MDA340F7.5U; MDA340F09U; MDA340F12.5U; MDA340F28U; MDA340F36U; MDA340F40U; MDA340F50U; MDA500F28U; MDA500F36U; MDA500F40U; MDA500F50U.