WDD20U SERIES

DC - DC CONVERTER
20W SINGLE & DUAL OUTPUT

FEATURES

- EFFICIENCY UP TO 89%
- 2:1 WIDE INPUT RANGE
- I/O ISOLATION
- INPUT Pi FILTER
- SHORT CIRCUIT PROTECTION
- HIGH PERFORMANCE
- 2 YEARS WARRANTY

TÜV Rheinland Product Safety | BAUART GEPRÜFT TYPE APPROVED — EN 60950-1
c UL us — UL 60950-1
CE

MODEL LIST

MODEL NO.	INPUT VOLTAGE	INPUT CURRENT (typ.)	INPUT CURRENT (max.)	OUTPUT WATTAGE	OUTPUT VOLTAGE	OUTPUT CURRENT	EFF. (min.)	EFF. (typ.)	CAPACITOR LOAD (max.)
Single Output Models									
WDD20 - 03S1U	9~18 VDC	2.04 A	2.83 A	20 WATTS	+3.3 VDC	6000 mA	79%	81%	7000 μF
WDD20 - 05S1U	9~18 VDC	1.98 A	2.72 A	20 WATTS	+ 5 VDC	4000 mA	83%	85%	7000 μF
WDD20 - 12S1U	9~18 VDC	1.97 A	2.75 A	20 WATTS	+ 12 VDC	1670 mA	82%	84%	1000 μF
WDD20 - 15S1U	9~18 VDC	1.96 A	2.72 A	20 WATTS	+ 15 VDC	1330 mA	83%	85%	470 μF
WDD20 - 03S2U	18~36 VDC	1.0 A	1.4 A	20 WATTS	+3.3 VDC	6000 mA	80%	82%	7000 μF
WDD20 - 05S2U	18~36 VDC	0.97 A	1.4 A	20 WATTS	+ 5 VDC	4000 mA	84%	86%	7000 μF
WDD20 - 12S2U	18~36 VDC	0.96 A	1.32 A	20 WATTS	+ 12 VDC	1670 mA	86%	88%	1000 μF
WDD20 - 15S2U	18~36 VDC	0.95 A	1.32 A	20 WATTS	+ 15 VDC	1330 mA	87%	89%	470 μF
WDD20 - 03S3U	35~75 VDC	0.5 A	0.71 A	20 WATTS	+3.3 VDC	6000 mA	81%	83%	7000 μF
WDD20 - 05S3U	35~75 VDC	0.49 A	0.71 A	20 WATTS	+ 5 VDC	4000 mA	82%	84%	7000 μF
WDD20 - 12S3U	35~75 VDC	0.48 A	0.7 A	20 WATTS	+ 12 VDC	1670 mA	86%	88%	1000 μF
WDD20 - 15S3U	35~75 VDC	0.47 A	0.7 A	20 WATTS	+ 15 VDC	1330 mA	87%	89%	470 μF
Dual Output Models									
WDD20 - 05D1U	9~18 VDC	2.0 A	2.75 A	20 WATTS	± 5 VDC	± 2000 mA	82%	84%	±1000 μF
WDD20 - 12D1U	9~18 VDC	1.93 A	2.72 A	20 WATTS	± 12 VDC	± 830 mA	83%	85%	± 470 μF
WDD20 - 15D1U	9~18 VDC	1.93 A	2.72 A	20 WATTS	± 15 VDC	± 670 mA	84%	86%	± 470 μF
WDD20 - 05D2U	18~36 VDC	0.98 A	1.4 A	20 WATTS	± 5 VDC	± 2000 mA	83%	85%	±1000 μF
WDD20 - 12D2U	18~36 VDC	0.96 A	1.32 A	20 WATTS	± 12 VDC	± 830 mA	86%	88%	± 470 μF
WDD20 - 15D2U	18~36 VDC	0.95 A	1.32 A	20 WATTS	± 15 VDC	± 670 mA	87%	89%	± 470 μF
WDD20 - 05D3U	35~75 VDC	0.49 A	0.7 A	20 WATTS	± 5 VDC	± 2000 mA	83%	85%	±1000 μF
WDD20 - 12D3U	35~75 VDC	0.48 A	0.7 A	20 WATTS	± 12 VDC	± 830 mA	86%	88%	± 470 μF
WDD20 - 15D3U	35~75 VDC	0.48 A	0.7 A	20 WATTS	± 15 VDC	± 670 mA	87%	89%	± 470 μF

SPECIFICATION

All Specifications Typical At Nominal Line, Full Load, 25°C Unless Otherwise Noticed

GENERAL

Characteristics	Conditions		min.	typ.	max.	unit
Switching frequency	Vi nom, Io nom			250		KHz
Isolation voltage	Input - Output		1500			VDC
Isolation resistance	Input - Output, @ 500VDC		100			MΩ
Isolation capacitance	100KHz / 1V				1000	PF
Ambient temperature	Vi nom, Io nom	3.3V & 5V output models	-40		+61	°C
		12V, 15V & dual output models	-40		+71	°C
Case temperature	Operating at Vi nom, Io nom				+100	°C
Derating	Vi nom			See derating curve		
Storage temperature	Non operational		-40		+100	°C
Relative humidity	Vi nom, Io nom		20		95	% RH
Temperature coefficient	Vi nom, Io min				± 0.02	% / °C
Dimension				L50.8 x W40.64 x H10.16		mm
MTBF	Bellcore issue 6@40°C, GB			958000		Hours
Cooling	Free air convection					

INPUT SPECIFICATIONS

Characteristics	Conditions		min.	typ.	max.	unit
Input voltage range	Ta min ...Ta max, Io nom		9	12	18	VDC
			18	24	36	VDC
			35	48	75	VDC
No load input current	Vi nom, Io=0	12V models			25	mA
		24V models			20	mA
		48V models			15	mA
Input voltage w/o damage	Io nom	12V models			20	VDC
		24V models			40	VDC
		48V models			80	VDC
Startup voltage	Io nom	12V models		8.5		VDC
		24V models		16		VDC
		48V models		33		VDC
Input filter	Pi type					

OUTPUT SPECIFICATIONS

Characteristics	Conditions		min.	typ.	max.	unit
Output voltage accuracy	Vi nom, Io nom				± 2	%
Minimum load	Vi nom	single output models	0			%
		dual output models (each output)	10			%
Line regulation	Io nom, Vi min ...Vi max				± 1	%
Load regulation	Vi nom, Io 0 ... Io nom, single output models				± 2	%
	Vi nom, Io min ... Io nom, dual output models				± 5	%
Cross regulation (Dual model)	Aymmetrical load 10% - 100% FL				± 5	%
Startup time	Vi nom, Io nom				30	ms
Transient recovery time	Vi nom, 1~0.5 Io nom				500	μs
Ripple & noise	Vi nom, Io nom, BW = 20MHz	3.3V & 5V models			100	mV
		12V, 15V & dual			150	mV
Voltage trim range 1)	Vi nom	3.3V model		± 5		%
		5V, 12V, 15V & dual		±10		%
Efficiency	Vi nom, Io nom, Po / Pi			Up to 89%, See model list and efficiency curve		

NOTE 1 : Pls refer to Fig 1 & Table 1 for connection and resistance recommended.

SPECIFICATION

All Specifications Typical At Nominal Line, Full Load, 25°C Unless Otherwise Noticed

CONTROL AND PROTECTION

Remote ON / OFF	ON : opened or 8 ~ 10VDC applied, reference to input GND OFF : -0.3 ~ 2VDC applied, reference to input GND
Input reversed	Shunt diode built in, external fuse recommended (12Vin : 3A, 24Vin : 1.5A, 48Vin : 1A)
Output short circuit	Current limited (Auto-recovery)
Rated over load protection	110%min....140%max

APPROVALS AND STANDARD

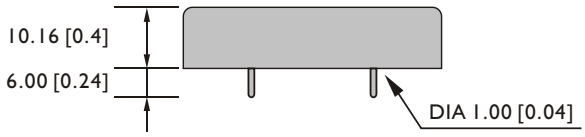
UL/cUL	UL 60950-1 Recognized
TUV	EN 60950-1, CB scheme
CE	EN 61204-3, EN 55022, Class A, EN 61000-4-2, EN61000-4-3, EN61000-4-4, EN61000-4-6
Vibration	meet IEC 60068-2-6 (10-500 Hz, 2G, along X, Y, Z each Axis, 60 min for each Axis)

PHYSICAL CHARACTERISTICS

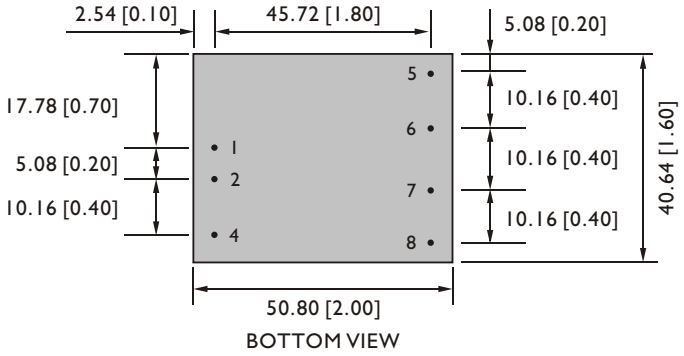
Case size	50.8 x 40.64 x 10.16 mm (2 x 1.6 x 0.4 inches)
Case material	Plastic base / Metal case
Weight	60 g
Patting material	Silicone

MECHANISM & PIN CONFIGURATION

mm [inch]



GENERAL TOLERANCE	
0.00[0.00] - 30.00[1.18]	±0.30[0.01]
30.00[1.18] - 120.00[4.72]	±0.50[0.02]



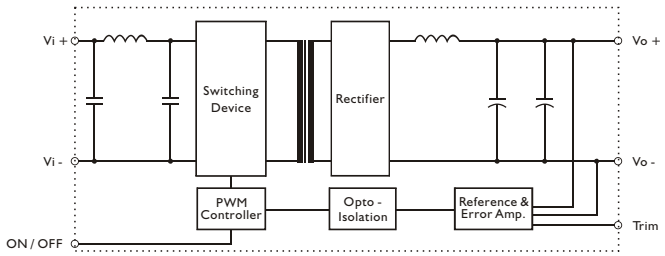
PIN ASSIGNMENT

GENERAL

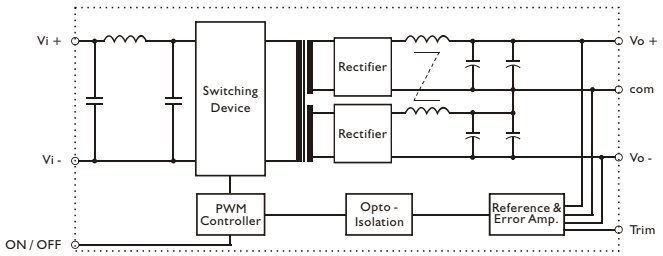
PIN NO.	1	2	4	5	6	7	8
SINGLE	Vi+	Vi -	ON / OFF	NO PIN	Vo +	Vo -	Trim
DUAL	Vi+	Vi -	ON / OFF	Vo +	com	Vo -	Trim

CIRCUIT SCHEMATIC

• Block diagram for WDD20U series with single output

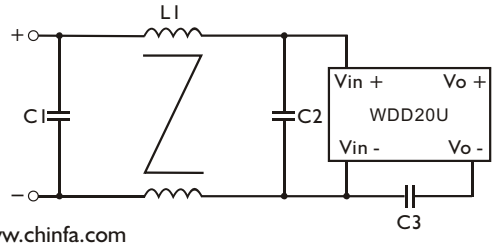


• Block diagram for WDD20U series with dual output

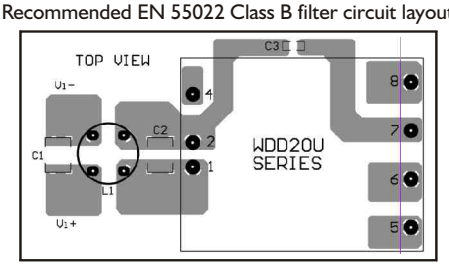


RECOMMENDED CIRCUIT

• Recommended filter for EN55022 Class B compliance



• Recommended EN 55022 Class B filter circuit layout.



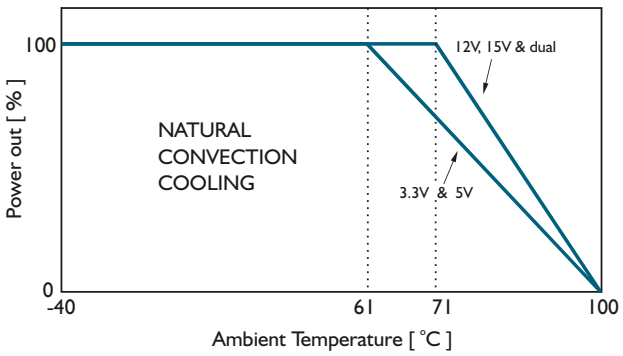
RECOMMENDED CIRCUIT

・The commponents used in the above figure, together with the manufacturer part numbers for these components, are as follows.

	C1	C2	C3	L1
WDD20-XXX1U	3.3μF / 50V MLCC	3.3μF / 50V MLCC	InF / 2KV MLCC	1.5mH Common Choke
WDD20-XXX2U	1μF / 50V MLCC	1μF / 50V MLCC	InF / 2KV MLCC	1.5mH Common Choke
WDD20-XXX3U	3.3μF / 100V MLCC	3.3μF / 100V MLCC	InF / 2KV MLCC	0.5mH Common Choke

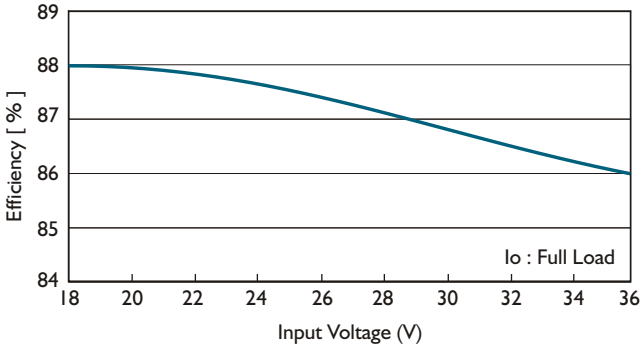
DERATING AND EFFICIENCY CURVE

Temperature derating curve



DERATING AND EFFICIENCY CURVE

Efficiency Vs Input Voltage
WDD20-05S2U



Efficiency Vs Output Load
WDD20-05S2U

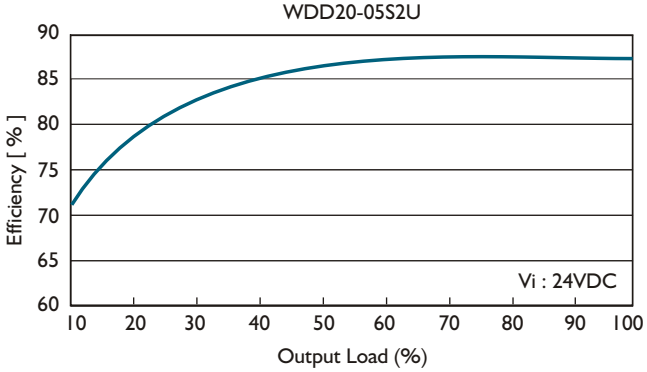
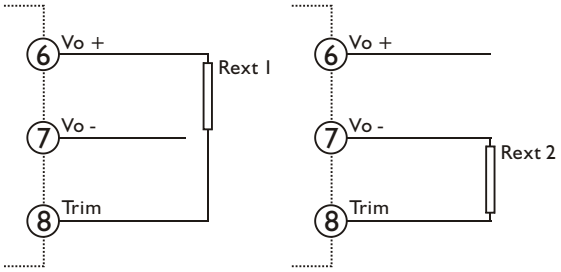


Fig. 1 Trim connection

(For Single output)



(For Dual output)

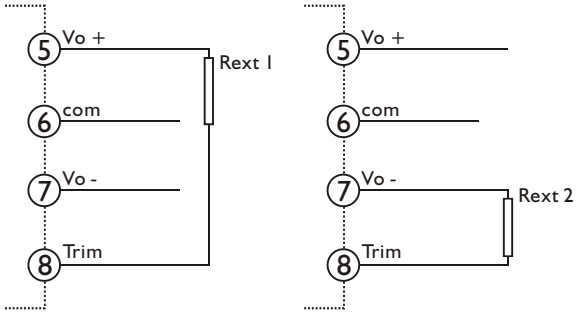


Table 1 Typical resistor values for various output voltage adjustment settings

Type	Rext 1		Rext 2	
	Vo nom -2.5%	Vo nom -5%	Vo nom +2.5%	Vo nom +5%
WDD20-03SXU	820Ω	0Ω	7.5KΩ	3KΩ
Type	Vo nom -5%	Vo nom -10%	Vo nom +5%	Vo nom +10%
WDD20-05SXU	3.9KΩ	0Ω	4.7KΩ	0Ω
WDD20-12SXU	130KΩ	18KΩ	10KΩ	1KΩ
WDD20-15SXU	130KΩ	20KΩ	20KΩ	3.9KΩ
WDD20-05DXU	33KΩ	12KΩ	10KΩ	3KΩ
WDD20-12DXU	120KΩ	56KΩ	12KΩ	2KΩ
WDD20-15DXU	180KΩ	75KΩ	10KΩ	1.2KΩ

WDD20U SERIES

DC - DC CONVERTER
20W SINGLE & DUAL OUTPUT

FEATURES

- EFFICIENCY UP TO 84%
- 4:1 WIDE INPUT RANGE
- I/O ISOLATION
- INPUT Pi FILTER
- SHORT CIRCUIT PROTECTION
- HIGH PERFORMANCE
- 2 YEARS WARRANTY

TÜV Rheinland Product Safety | BAUART GEPRÜFT | TYPE APPROVED — EN 60950-1
c UL us — UL 60950-1
CE

MODEL LIST

MODEL NO.	INPUT VOLTAGE	INPUT CURRENT (typ.)	INPUT CURRENT (max.)	OUTPUT WATTAGE	OUTPUT VOLTAGE	OUTPUT CURRENT	EFF. (min.)	EFF. (typ.)	CAPACITOR LOAD (max.)
Single Output Models									
WDD20 - 03S4U	9~36 VDC	1.06 A	2.88 A	20 WATTS	+3.3 VDC	6000 mA	77%	79%	7000 μF
WDD20 - 05S4U	9~36 VDC	1.06 A	2.88 A	20 WATTS	+ 5 VDC	4000 mA	78%	80%	3500 μF
WDD20 - 12S4U	9~36 VDC	1.03 A	2.8 A	20 WATTS	+ 12 VDC	1670 mA	80%	82%	470 μF
WDD20 - 15S4U	9~36 VDC	1.02 A	2.8 A	20 WATTS	+ 15 VDC	1330 mA	81%	83%	220 μF
WDD20 - 03S5U	18~75 VDC	0.53 A	1.45 A	20 WATTS	+3.3 VDC	6000 mA	77%	79%	7000 μF
WDD20 - 05S5U	18~75 VDC	0.51 A	1.45 A	20 WATTS	+ 5 VDC	4000 mA	79%	81%	3500 μF
WDD20 - 12S5U	18~75 VDC	0.5 A	1.4 A	20 WATTS	+ 12 VDC	1670 mA	82%	84%	3500 μF
WDD20 - 15S5U	18~75 VDC	0.5 A	1.4 A	20 WATTS	+ 15 VDC	1330 mA	82%	84%	1000 μF
Dual Output Models									
WDD20 - 05D4U	9~36 VDC	1.06 A	2.88 A	20 WATTS	± 5 VDC	± 2000 mA	78%	80%	±1000 μF
WDD20 - 12D4U	9~36 VDC	1.02 A	2.8 A	20 WATTS	± 12 VDC	± 830 mA	81%	83%	± 470 μF
WDD20 - 15D4U	9~36 VDC	1.0 A	2.8 A	20 WATTS	± 15 VDC	± 670 mA	82%	84%	± 470 μF
WDD20 - 05D5U	18~75 VDC	0.52 A	1.4 A	20 WATTS	± 5 VDC	± 2000 mA	80%	82%	±1000 μF
WDD20 - 12D5U	18~75 VDC	0.49 A	1.4 A	20 WATTS	± 12 VDC	± 830 mA	82%	84%	± 470 μF
WDD20 - 15D5U	18~75 VDC	0.5 A	1.4 A	20 WATTS	± 15 VDC	± 670 mA	82%	84%	± 470 μF

SPECIFICATION

All Specifications Typical At Nominal Line, Full Load, 25°C Unless Otherwise Noticed

GENERAL

Characteristics	Conditions		min.	typ.	max.	unit
Switching frequency	Vi nom, Io nom			250		KHz
Isolation voltage	Input - Output		1500			VDC
Isolation resistance	Input - Output, @ 500VDC		100			MΩ
Isolation capacitance	100KHz / 1V				1000	PF
Ambient temperature	Vi nom, Io nom	3.3V & 5V output models	-40		+ 61	°C
		12V, 15V & dual output models	-40		+ 71	°C
Case temperature	Operating at Vi nom, Io nom				+100	°C
Derating	Vi nom			See derating curve		
Storage temperature	Non operational		-40		+100	°C
Relative humidity	Vi nom, Io nom		20		95	% RH
Temperature coefficient	Vi nom, Io min				± 0.02	% / °C
Dimension				L50.8 x W40.64 x H10.16		mm
MTBF	Bellcore issue 6@40°C, GB			960000		Hours
Cooling	Free air convection					

INPUT SPECIFICATIONS

Characteristics	Conditions		min.	typ.	max.	unit
Input voltage range	Ta min ...Ta max, Io nom		9	24	36	VDC
			18	48	75	VDC
No load input current	Vi nom, Io=0	24V models			20	mA
		48V models			15	mA
Input voltage w/o damage	Io nom	24V models			40	VDC
		48V models			80	VDC
Startup voltage	Io nom	24V models		8.5		VDC
		48V models		16		VDC
Input filter	Pi type					

OUTPUT SPECIFICATIONS

Characteristics	Conditions		min.	typ.	max.	unit
Output voltage accuracy	Vi nom, Io nom				± 2	%
Minimum load	Vi nom	single output models	0			%
		dual output models (each output)	10			%
Line regulation	Io nom, Vi min ...Vi max				± 1	%
Load regulation	Vi nom, Io 0 ... Io nom, single output models				± 2	%
	Vi nom, Io min ... Io nom, dual output models				± 5	%
Cross regulation (Dual model)	Aymmetrical load 10% - 100% FL				± 5	%
Startup time	Vi nom, Io nom				30	ms
Transient recovery time	Vi nom, 1~0.5 Io nom				500	μs
Ripple & noise	Vi nom, Io nom, BW = 20MHz	3.3V & 5V models			100	mV
		12V, 15V & dual			150	mV
Voltage trim range 1)	Vi nom	3.3V model		± 5		%
		5V, 12V, 15V & dual		±10		%
Efficiency	Vi nom, Io nom, Po / Pi			Up to 84%, See model list and efficiency curve		

NOTE 1 : Pls refer to Fig 1 & Table 1 for connection and resistance recommended.

CONTROL AND PROTECTION

Remote ON / OFF	ON : opened or 8 ~ 10VDC applied, reference to input GND
	OFF : -0.3 ~ 2VDC applied, reference to input GND
Input reversed	Shunt diode built in, external fuse recommended (24Vin : 3A, 48Vin : 1.5A)
Output short circuit	Current limited (Auto-recovery)
Rated over load protection	110%min....140%max

SPECIFICATION

All Specifications Typical At Nominal Line, Full Load, 25°C Unless Otherwise Noticed

APPROVALS AND STANDARD

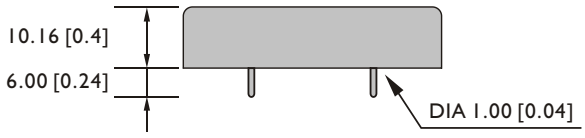
UL/cUL	UL 60950-1 Recognized
TUV	EN 60950-1, CB scheme
CE	EN 61204-3, EN 55022, Class A, EN 61000-4-2, EN61000-4-3, EN61000-4-4, EN61000-4-6
Vibration	meet IEC 60068-2-6 (10-500 Hz, 2G, along X, Y, Z each Axis, 60 min for each Axis)

PHYSICAL CHARACTERISTICS

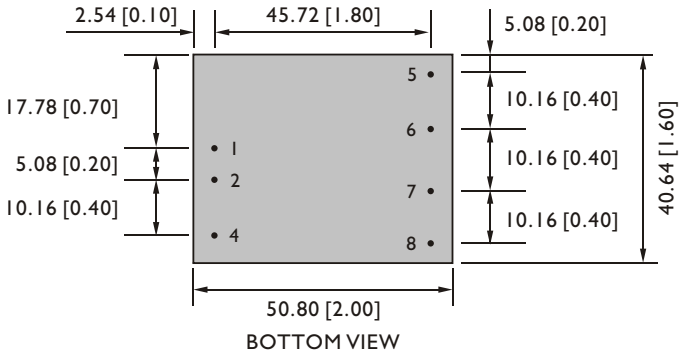
Case size	50.8 x 40.64 x 10.16 mm (2 x 1.6 x 0.4 inches)
Case material	Plastic base / Metal case
Weight	60 g
Patting material	Silicone

MECHANISM & PIN CONFIGURATION

mm [inch]



GENERAL TOLERANCE	
0.00[0.00] - 30.00[1.18]	±0.30[0.01]
30.00[1.18] - 120.00[4.72]	±0.50[0.02]



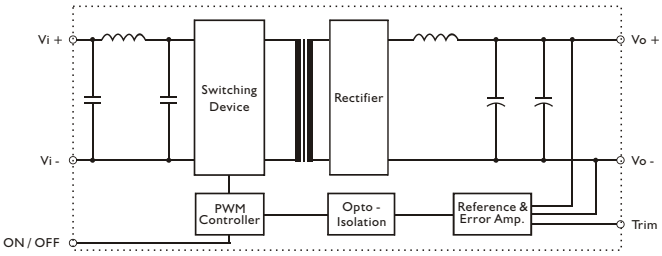
PIN ASSIGNMENT

GENERAL

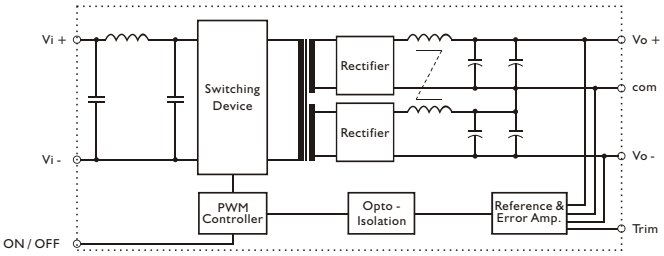
PIN NO.	1	2	4	5	6	7	8
SINGLE	Vi+	Vi -	ON / OFF	NO PIN	Vo +	Vo -	Trim
DUAL	Vi+	Vi -	ON / OFF	Vo +	com	Vo -	Trim

CIRCUIT SCHEMATIC

• Block diagram for WDD20U series with single output

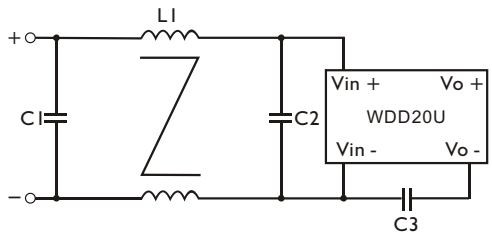


• Block diagram for WDD20U series with dual output

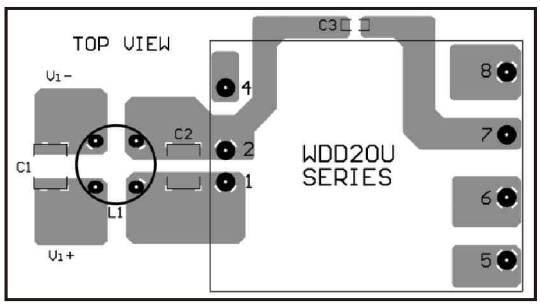


RECOMMENDED CIRCUIT

• Recommended filter for EN55022 Class B compliance



• Recommended EN 55022 Class B filter circuit layout.

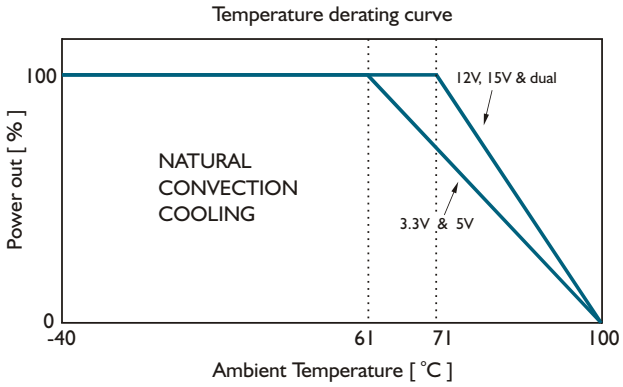


RECOMMENDED CIRCUIT

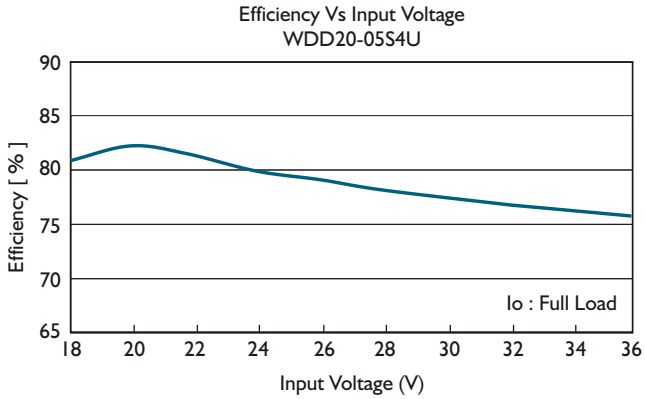
· The commponents used in the above figure, together with the manufacturer part numbers for these components, are as follows.

	C1	C2	C3	L1
WDD20-XXX4U	1 μF / 50V MLCC	1 μF / 50V MLCC	InF / 2KV MLCC	1.5mH Common Choke
WDD20-XXX5U	3.3 μF / 100V MLCC	3.3 μF / 100V MLCC	InF / 2KV MLCC	0.5mH Common Choke

DERATING AND EFFICIENCY CURVE



DERATING AND EFFICIENCY CURVE



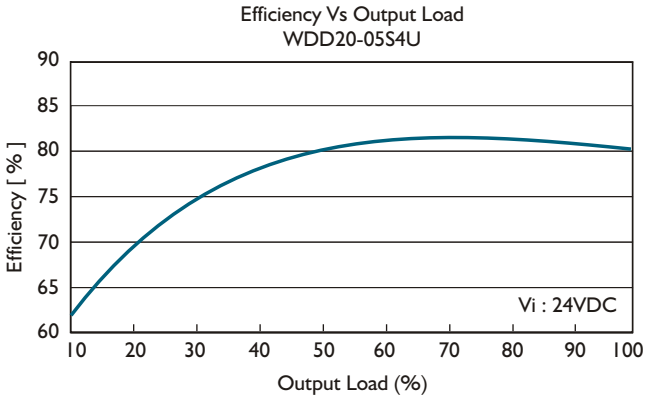


Fig. 1 Trim connection

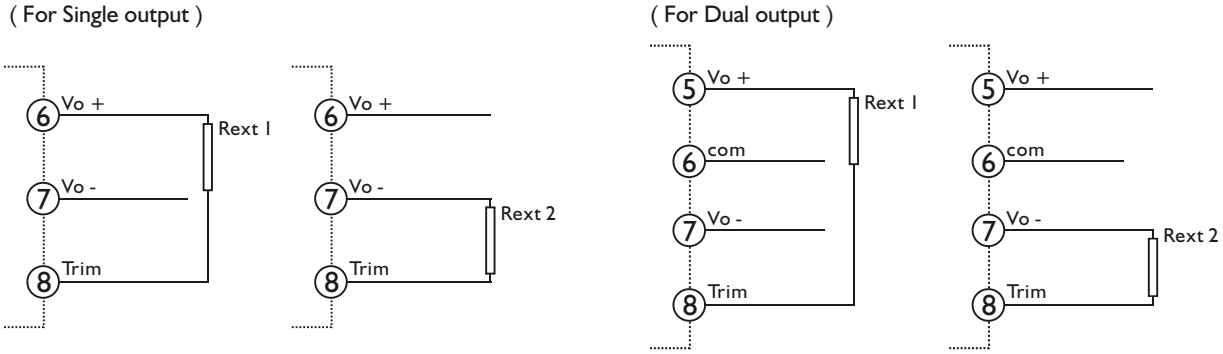


Table 1 Typical resistor values for various output voltage adjustment settings

Type	Rext 1		Rext 2	
	Vo nom -2.5%	Vo nom -5%	Vo nom +2.5%	Vo nom +5%
WDD20-03SXU	820Ω	0Ω	7.5KΩ	3KΩ
Type	Vo nom -5%	Vo nom -10%	Vo nom +5%	Vo nom +10%
WDD20-05SXU	3.9KΩ	0Ω	4.7KΩ	0Ω
WDD20-12SXU	130KΩ	18KΩ	10KΩ	1KΩ
WDD20-15SXU	130KΩ	20KΩ	20KΩ	3.9KΩ
WDD20-05DXU	33KΩ	12KΩ	10KΩ	3KΩ
WDD20-12DXU	120KΩ	56KΩ	12KΩ	2KΩ
WDD20-15DXU	180KΩ	75KΩ	10KΩ	1.2KΩ