FEATURES

- **Industrial Standard 1" x 1" Package**
- **Wide 2:1 Input Voltage Range**
- **Fully Regulated Output Voltage**
- **I/O Isolation 1500VDC**
- **Operating Temp. Range -40°C to +90°C**
- **Low No Load Power Consumption**
- **No Min. Load Requirement**
- **Overload/Voltage and Short Circuit Protection**
- **Remote On/Off Control, Output Voltage Trim**
- **Shielded Metal Case with Insulated Baseplate**
- **Conducted EMI meets EN55022 Class A & FCC Level A**
- **UL/cUL/IEC/EN 60950-1 Safety Approval(Pending)**

NEW

RoHS Compliant

3 YEAR WARRANTY

PRODUCT OVERVIEW

The MINMAX MJW15 series is a new range of cost-optimized 15W isolated dc-dc converter within an encapsulated 1"x1" industrial standard package. There are 21 models available for 12, 24, 48VDC with wide 2:1 input voltage range and tight output voltage regulation. The MJW15 series come in a shielded metal package and internal EMI filter to meets EN55022 & FCC Part15 Class A without external components.
By state-of-the-art circuit topology and 91% high efficiency could be achieved allowing an operating temperature of -40℃ to +90℃ as well as low standby power comsumption. Further features include remote ON/OFF, over current and over voltage protection, short circuit protection and no min. load requirement as well. These DC/DC converters offer an economical solution for many cost critical applications in battery-powered equipment, instrumentation, distributed power architectures in communication, industrial electronics, energy facilities and many other critical space applications.

Model Selection Guide

Model Number	Input Voltage (Range)	Output Voltage	Output Current	Input Current		Reflected Ripple Current	OVP	Max. capacitive Load	Efficiency (typ.)
			Max.	@Max. Load	@No Load		Trip-Point		@Max. Load
	VDC	VDC	mA	mA(typ.)	mA(typ.)	mA (typ.)	VDC	μF	%
MJW15-12S033	12 (9 ~ 18)	3.3	3400	1087	160	80	3.9	5800	86
MJW15-12S05		5	3000	1420	180		6.2	5100	88
MJW15-12S12		12	1250	1404	80		15	870	89
MJW15-12S15		15	1000	1420	80		18	560	88
MJW15-12S24		24	625	1389	80		30	220	90
MJW15-12D12		±12	±625	1404	80		±15	440#	89
MJW15-12D15		±15	±500	1389	80		±18	280#	90
MJW15-24S033	24 (18 ~ 36)	3.3	3400	537	80	50	3.9	5800	87
MJW15-24S05		5	3000	710	90		6.2	5100	88
MJW15-24S12		12	1250	694	40		15	870	90
MJW15-24S15		15	1000	694	40		18	560	90
MJW15-24S24		24	625	687	40		30	220	91
MJW15-24D12		±12	±625	694	40		±15	440#	90
MJW15-24D15		±15	±500	687	40		±18	280#	91
MJW15-48S033	48 (36 ~ 75)	3.3	3400	269	40	30	3.9	5800	87
MJW15-48S05		5	3000	355	45		6.2	5100	88
MJW15-48S12		12	1250	347	25		15	870	90
MJW15-48S15		15	1000	351	25		18	560	89
MJW15-48S24		24	625	343	25		30	220	91
MJW15-48D12		±12	±625	355	25		±15	440#	88
MJW15-48D15		±15	±500	347	25		±18	280#	90

For each output

Input Specifications

Parameter		Model	Min.	Typ.	Max.	Unit
Input Surge Voltage (100 ms max.)		12V Input Models	-0.7	---	25	VDC
		24V Input Models	-0.7	---	50	
		48V Input Models	-0.7	---	100	
Start-Up Threshold Voltage		12V Input Models	---	---	9	
		24V Input Models	---	---	18	
		48V Input Models	---	---	36	
Under Voltage Shutdown		12V Input Models	---	7.5	---	
		24V Input Models	---	16	---	
		48V Input Models	---	34	---	
Start Up Time	Power Up	Nominal Vin and Constant Resistive Load	---	---	30	ms
	Remote On/Off		---	---	30	ms
Input Filter		All Models	Internal LC Type			
Short Circuit Current		--- (Hiccup Mode, 0.7 Hz typ.)				

Output Specifications

Parameter	Conditions			Min.	Typ.	Max.	Unit
Output Voltage Setting Accuracy				---	---	±1.0	%Vnom.
Output Voltage Balance	Dual Output, Balanced Loads			---	---	±2.0	%
Line Regulation	Vin=Min. to Max. @Full Load	Single Output		---	---	±0.2	%
		Dual Output		---	---	±0.5	%
Load Regulation	Min. Load to Full Load	Single Output	3.3V & 5V	---	---	±0.5	%
			12V,15V & 24V	---	---	±0.2	%
		Dual Output		---	---	±1.0	%
Load Cross Regulation (Dual Output)	Asymmetrical Load 25%/100% Full Load			---	---	±5.0	%
Ripple & Noise	0-20 MHz Bandwidth	3.3V & 5V Models		---	---	75	mV_{P-P}
		12V, 15V & Dual Output Models		---	---	100	mV_{P-P}
		24V Models		---	---	150	mV_{P-P}
Transient Recovery Time	25% Load Step Change			---	300	---	µsec
Transient Response Deviation				---	±3	±5	%
Temperature Coefficient				---	---	±0.02	%/℃
Overshoot				---	---	5	%
Minimum Load	No minimum Load Requirement						
Over Current Protection	Current Limitation at 150% typ. of Iout max., Hiccup						
Short Circuit Protection	Hiccup Automatic Recovery						
Over Voltage Protection	For Shutdown Voltage see Model Selection Guide						

General Specifications

Parameter	Conditions	Min.	Typ.	Max.	Unit
I/O Isolation Voltage	60 Seconds	1500	---	---	VDC
I/O Isolation Resistance	500 VDC	1000	---	---	MΩ
I/O Isolation Capacitance	100KHz, 1V	---	---	1500	pF
Switching Frequency		---	330	---	KHz
MTBF(calculated)	MIL-HDBK-217F@25°C, Ground Benign	TBD			Hours
Safety Approvals (pending)	UL/cUL 60950-1 recognition(CSA certificate), IEC/EN 60950-1(CB-report)				

Remote On/Off Control

Parameter	Conditions	Min.	Typ.	Max.	Unit
Converter On	3.5V ~ 12V or Open Circuit				
Converter Off	0V ~ 1.2V or Short Circuit				
Control Input Current (on)	Vctrl = 5.0V	---	---	0.5	mA
Control Input Current (off)	Vctrl = 0V	---	---	-0.5	mA
Control Common	Referenced to Negative Input				
Standby Input Current	Supply Off & Nominal Vin	---	3	---	mA

Output Voltage Trim

Parameter	Conditions	Min.	Typ.	Max.	Unit
Trim Up / Down Range	% of nominal output voltage	±10	---	---	%

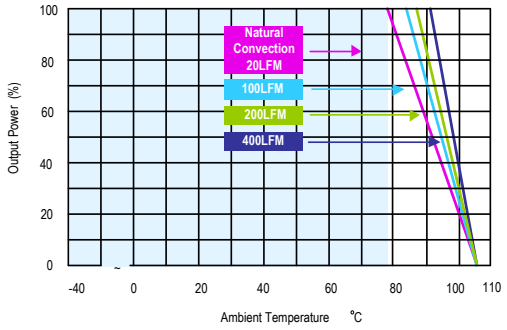
Environmental Specifications

Parameter	Conditions/Model	Min.	Max.		Unit
			without Heatsink	with Heatsink	
Operating Temperature Range Natural Convection (8) Nominal Vin, Load 100% Inom. (for Power Derating see relative Derating Curves)	MJW15-24S24, MJW15-24D15, MJW15-48S24	-40	+78	+82	℃
	MJW15-12S24, MJW15-12D15, MJW15-24S15 MJW15-24S12, MJW15-24D12, MJW15-48S12 MJW15-48D15		+75	+80	
	MJW15-12S12, MJW15-12D12, MJW15-48S15		+71	+77	
	MJW15-12S05, MJW15-12S15, MJW15-24S05 MJW15-48S05, MJW15-48D12		+68	+74	
	MJW15-24S033, MJW15-48S033		+74	+79	
	MJW15-12S033		+72	+77	
Thermal Impedance	20LFM Convection without Heatsink	18.2	---		℃/W
	20LFM Convection with Heatsink	15.3	---		℃/W
	100LFM Convection without Heatsink	13.9	---		℃/W
	100LFM Convection with Heatsink	8.8	---		℃/W
	200LFM Convection without Heatsink	12.1	---		℃/W
	200LFM Convection with Heatsink	6.8	---		℃/W
	400LFM Convection without Heatsink	9.1	---		℃/W
	400LFM Convection with Heatsink	4.6	---		℃/W
Case Temperature		---	+105		℃
Storage Temperature Range		-50	+125		℃
Humidity (non condensing)		---	95		% rel. H
Cooling	Free-Air convection				
RFI	Six-Sided Shielded, Metal Case				
Lead Temperature (1.5mm from case for 10Sec.)		---	260		℃

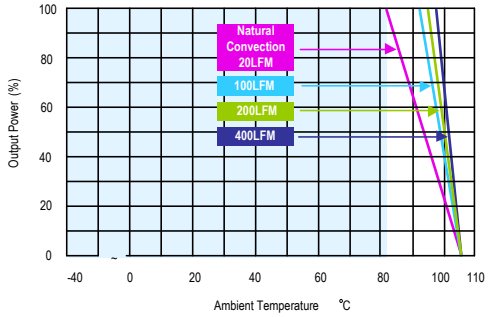
EMC Specifications

Parameter	Standards & Level		Performance
EMI	Conduction	EN55022, FCC part 15	Class A (See Page 6)
EMS	EN55024		
	ESD	EN61000-4-2 air ± 8kV , Contact ± 6kV	A
	Radiated immunity	EN61000-4-3 10V/m	A
	Fast transient (6)	EN61000-4-4 ± 2kV	A
	Surge (6)	EN61000-4-5 ±1kV	A
	Conducted immunity	EN61000-4-6 10V/rms	A

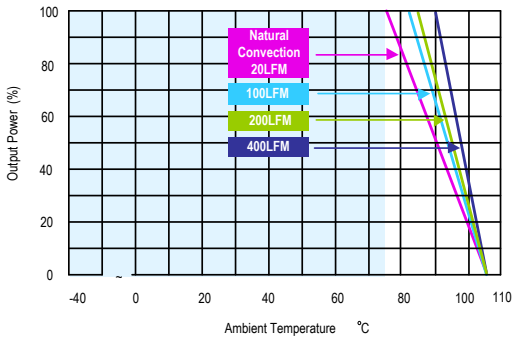
Power Derating Curve



MJW15-24S24, MJW15-24D15, MJW15-48S24
Derating Curve without Heatsink



MJW15-24S24, MJW15-24D15, MJW15-48S24
Derating Curve with Heatsink



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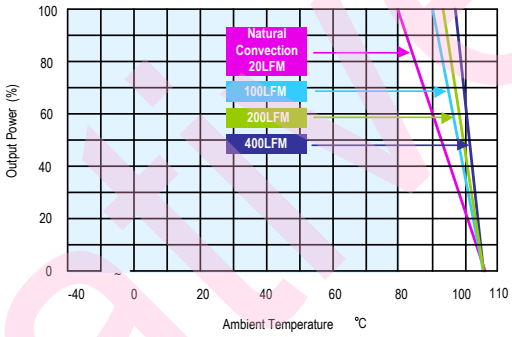
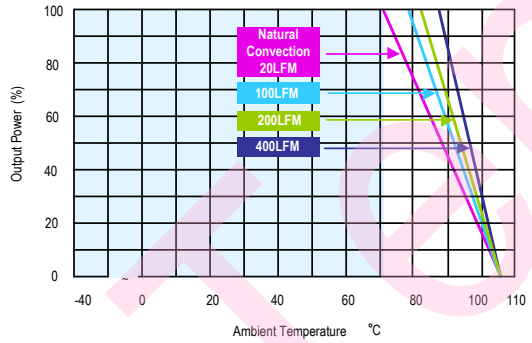
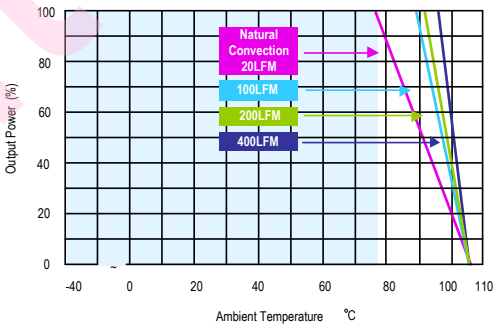
MJW15-24D12, MJW15-48S12, MJW15-48D15
Derating Curve without Heatsink



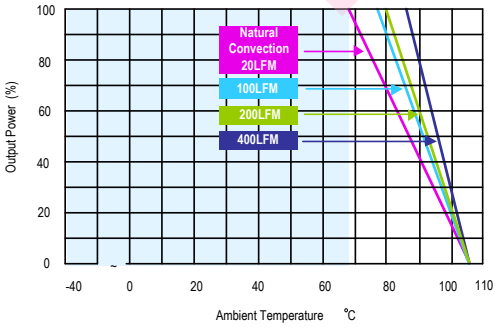
MJW15-12S24, MJW15-12D15, MJW15-24S12, MJW15-24S15
MJW15-24D12, MJW15-48S12, MJW15-48D15
Derating Curve with Heatsink



MJW15-12S12, MJW15-12D12, MJW15-48S15
Derating Curve without Heatsink



MJW15-12S12, MJW15-12D12, MJW15-48S15
Derating Curve with Heatsink



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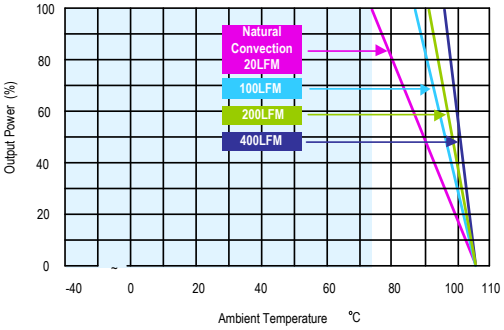
MJW15-48D12
Derating Curve without Heatsink



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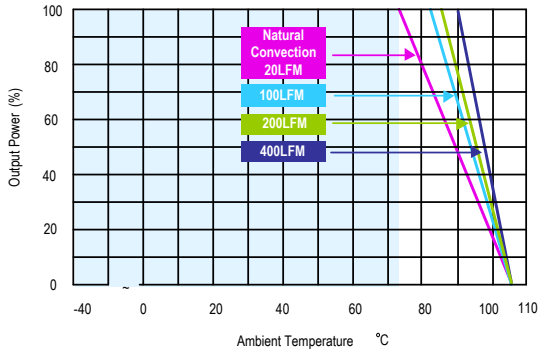
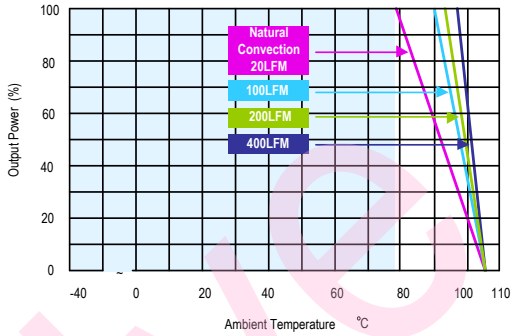
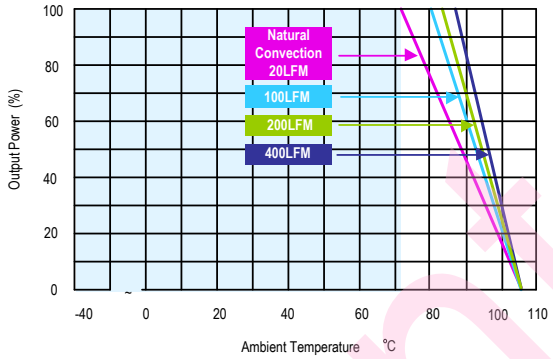
MJW15-48D12
Derating Curve with Heatsink



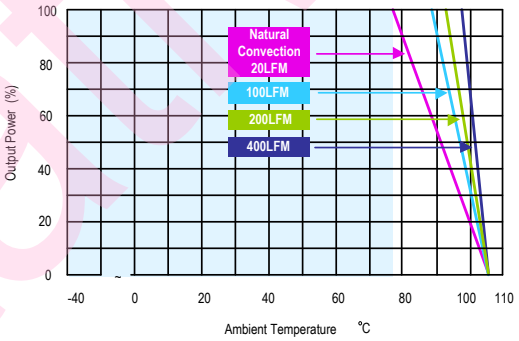
MJW15-24S033, MJW15-48S033
Derating Curve without Heatsink



MJW15-24S033, MJW15-48S033
Derating Curve with Heatsink



MJW15-12S033
Derating Curve without Heatsink



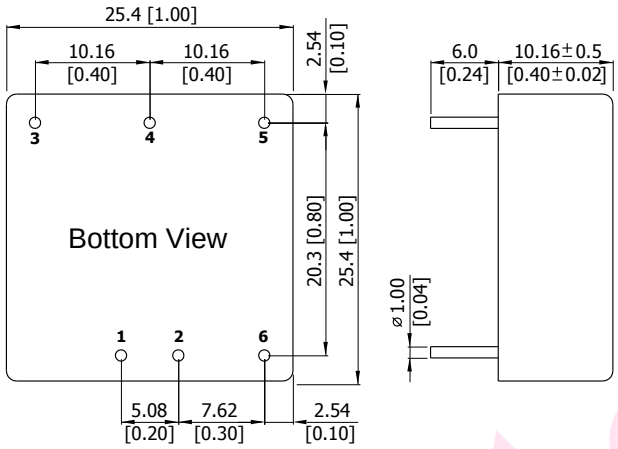
MJW15-12S033
Derating Curve with Heatsink

Notes

1 Specifications typical at Ta=+25℃, resistive load, nominal input voltage and rated output current unless otherwise noted.
2 Transient recovery time is measured to within 1% error band for a step change in output load of 75% to 100%.
3 Ripple & Noise measured with a 1μF MLCC.
4 We recommend to protect the converter by a slow blow fuse in the input supply line.
5 Other input and output voltage may be available, please contact factory.
6 To meet EN61000-4-4 & EN61000-4-5 an external capacitor across the input pins is required. Suggested capacitor:TBD
7 To order the converter with heatsink, please add a **suffix -HS** (e.g. MJW15-24S05-HS) to order code.
8 That "natural convection" is about 20LFM but is not equal to still air (0 LFM).
9 Specifications are subject to change without notice.

Package Specifications

Mechanical Dimensions



Pin Connections

Pin	Single Output	Dual Output
1	+Vin	+Vin
2	-Vin	-Vin
3	+Vout	+Vout
4	Trim	Common
5	-Vout	-Vout
6	Remote On/Off	Remote On/Off

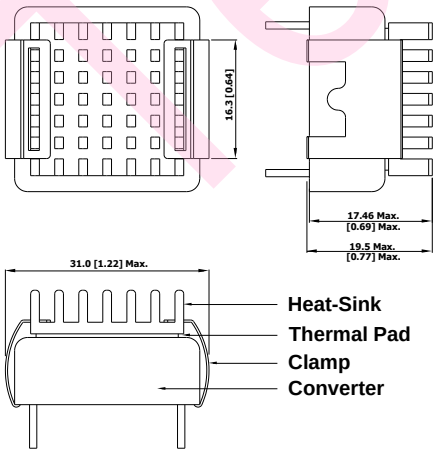
- All dimensions in mm (inches)
- Tolerance: X.X±0.5 (X.XX±0.02)
  X.XX±0.25 (X.XXX±0.01)
- Pin diameter ∅ 1.0 ±0.05 (0.04±0.002)

Physical Characteristics

Case Size	:	25.4x25.4x10.16mm (1.0x1.0x0.4 inches)
Case Material	:	Aluminium Alloy, Black Anodized Coating
Base Material	:	FR4 PCB (flammability to UL 94V-0 rated)
Pin Material	:	Tinned Copper
Weight	:	TBD

Heatsink (Option –HS)

Mechanical Dimensions



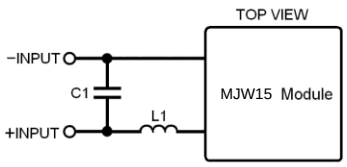
Heatsink Material: Aluminum
Finish: Anodic treatment (black)
Weight: 2g

- The advantages of adding a heatsink are:

1. To improve heat dissipation and increase the stability and reliability of the DC/DC converters at high operating temperatures.

2. To increase operating temperature of the DC/DC converter, please refer to Derating Curve.

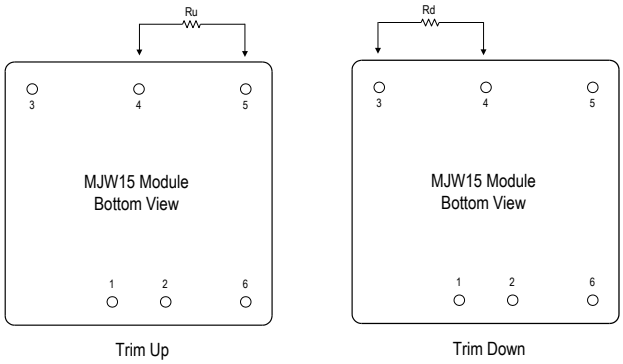
EMI Filter meets Conducted EMI EN55022 class A; FCC part 15 level A



Model	Component	Value
MJW15-12XXX	C1	TBD
	L1	TBD
MJW15-24XXX	C1	TBD
	L1	TBD
MJW15-48XXX	C1	TBD
	L1	TBD

External Output Trimming

Output can be externally trimmed by using the method shown below



MJW15-XXS033 Trim Table

Trim down	1	2	3	4	5	6	7	8	9	10	%
Vout=	Vox0.99	Vox0.98	Vox0.97	Vox0.96	Vox0.95	Vox0.94	Vox0.93	Vox0.92	Vox0.91	Vox0.90	Volts
Rd=	72.61	32.55	19.20	12.52	8.51	5.84	3.94	2.51	1.39	0.50	KOhms
Trim up	1	2	3	4	5	6	7	8	9	10	%
Vout=	Vox1.01	Vox1.02	Vox1.03	Vox1.04	Vox1.05	Vox1.06	Vox1.07	Vox1.08	Vox1.09	Vox1.10	Volts
Ru=	60.84	27.40	16.25	10.68	7.34	5.11	3.51	2.32	1.39	0.65	KOhms

MJW15-XXS05 Trim Table

Trim down	1	2	3	4	5	6	7	8	9	10	%
Vout=	Vox0.99	Vox0.98	Vox0.97	Vox0.96	Vox0.95	Vox0.94	Vox0.93	Vox0.92	Vox0.91	Vox0.90	Volts
Rd=	138.88	62.41	36.92	24.18	16.53	11.44	7.79	5.06	2.94	1.24	KOhms
Trim up	1	2	3	4	5	6	7	8	9	10	%
Vout=	Vox1.01	Vox1.02	Vox1.03	Vox1.04	Vox1.05	Vox1.06	Vox1.07	Vox1.08	Vox1.09	Vox1.10	Volts
Ru=	106.87	47.76	28.06	18.21	12.30	8.36	5.55	3.44	1.79	0.48	KOhms

MJW15-XXS12 Trim Table

Trim down	1	2	3	4	5	6	7	8	9	10	%
Vout=	Vox0.99	Vox0.98	Vox0.97	Vox0.96	Vox0.95	Vox0.94	Vox0.93	Vox0.92	Vox0.91	Vox0.90	Volts
Rd=	413.55	184.55	108.22	70.05	47.15	31.88	20.98	12.80	6.44	1.35	KOhms
Trim up	1	2	3	4	5	6	7	8	9	10	%
Vout=	Vox1.01	Vox1.02	Vox1.03	Vox1.04	Vox1.05	Vox1.06	Vox1.07	Vox1.08	Vox1.09	Vox1.10	Volts
Ru=	351.00	157.50	93.00	60.75	41.40	28.50	19.29	12.37	7.00	2.70	KOhms

MJW15-XXS15 Trim Table

Trim down	1	2	3	4	5	6	7	8	9	10	%
Vout=	Vox0.99	Vox0.98	Vox0.97	Vox0.96	Vox0.95	Vox0.94	Vox0.93	Vox0.92	Vox0.91	Vox0.90	Volts
Rd=	530.73	238.61	141.24	92.56	63.35	43.87	29.96	19.53	11.41	4.92	KOhms
Trim up	1	2	3	4	5	6	7	8	9	10	%
Vout=	Vox1.01	Vox1.02	Vox1.03	Vox1.04	Vox1.05	Vox1.06	Vox1.07	Vox1.08	Vox1.09	Vox1.10	Volts
Ru=	422.77	189.89	112.26	73.44	50.15	34.63	23.54	15.22	8.75	3.58	KOhms

MJW15-XXS24 Trim Table

Trim down	1	2	3	4	5	6	7	8	9	10	%
Vout=	Vox0.99	Vox0.98	Vox0.97	Vox0.96	Vox0.95	Vox0.94	Vox0.93	Vox0.92	Vox0.91	Vox0.90	Volts
Rd=	598.66	267.78	157.49	102.34	69.25	47.19	31.44	19.62	10.43	3.08	KOhms
Trim up	1	2	3	4	5	6	7	8	9	10	%
Vout=	Vox1.01	Vox1.02	Vox1.03	Vox1.04	Vox1.05	Vox1.06	Vox1.07	Vox1.08	Vox1.09	Vox1.10	Volts
Ru=	487.14	218.02	128.31	83.46	56.55	38.61	25.79	16.18	8.70	2.72	KOhms