



**Features**

- Wide 2 : 1 Input Voltage Range(9~18V,18~36V,36~75V)
- Input / Output Isolation Voltage: 1.5kVDC
- High Efficiency
- High Power Density
- Extended Operating Temperature Range: -55°C to+95°C
- Output Short Circuit Protection:  
Continuous & Auto Recovery
- Over Voltage Protection: Clamp Mode
- Fixed Switching Frequency
- Input/ Output Isolation 1.5 KVdc
- Shielded Metal Case with Insulated Baseplate
- Lead Free Design, RoHS Compliant
- Industry Standard Pinout
- Customer Design Available
- Safety Standard / Approval : IEC / EN 60950-1



**Description**

The MUA15 Series are isolated 15W DC/DC converters. Designed with highly efficiency, allow the operating temperature range of these units to be -55°C to +95°C in a DIP package with industry-standard footprint. Further features include wide 2 : 1 input voltage range, remote on/off control, short-circuit protection and over voltage protection.

**Applications**

These converters are well suitable for battery operated equipment, measurement equipment, telecom, wireless network, Industry control system, everywhere where isolated, tightly regulated voltages and compact size are required.

**Technical Specification** All specifications are typical at nominal input, full load and 25°C unless otherwise stated.

Model Number	Input Voltage Range	Output Voltage (V)	Output Current (mA)		Input Current (mA)		Eff. (2) (%)	Capacitive Load, max. (3) (uF)
			Min. Load (1)	Full. Load	No Load	Full Load		
MUA15-12S1	9~18V Nominal:12V	5	0	3000	16	1624	81	3300
MUA15-12S2		12	40	1250	20	1525	86	1000
MUA15-12D3		±15	0	±500	26	1525	86	68
MUA15-24S1	18~36V Nominal:24V	5	0	3000	9	801	82	3300
MUA15-24S2		12	0	1250	10	753	87	1000
MUA15-24D3		±15	0	±500	18	762	86	100
MUA15-48S1	36~75V Nominal:48V	5	0	3000	5	396	83	3300
MUA15-48S2		12	0	1250	6	377	87	680
MUA15-48D3		±15	0	±500	9	382	86	100



Input Specifications			
Input Voltage	12V nominal input		9-18V
	24V nominal input		18-36V
	48V nominal input		36-75V
Input filter			Pi Type
Input surge voltage (100ms max.)	12V nominal input		25Vdc
	24V nominal input		50Vdc
	48V nominal input		100Vdc
Input reflected ripple current	Nominal Vin and full load		250mA <sub>p-p</sub> typ.
Start up time	Nominal Vin and constant resistive load		400ms typ.
Sourcing current of remote control pin	Nominal Vin		< 0.2 mA
Idle input current (at Remote OFF state)	Nominal Vin		< 3 mA
Reverse voltage protection			1.0A max
Environmental Specifications			
Operating ambient temperature			-55°C to +95°C (with derating)
Maximum case temperature			+100°C
Storage temperature range			-55°C to +125°C
Relative humidity			5% to 95% RH
Temperature coefficient			±0.02% / °C max.
Output Specifications			
Output power			15 Watts max.
Voltage accuracy	Full load and nominal Vin		±1%
Minimum load			See table
Line regulation	LL to HL at full load		±0.8%
Load Regulation	25% load to full load	Single	±1.0%
	Balanced load	Dual	±1.0%
	Unbalanced load 25% to 100% full load		±5%
Ripple and Noise	20MHz bandwidth		75mV <sub>p-p</sub> max.
Over voltage protection (Zener Diode Clamp)	5V <sub>out</sub> models		6.2V
	12V <sub>out</sub> models		15V
	15V <sub>out</sub> models		18V
Capacitive load			See table
Over load protection	% of full load at nominal input		150% typ.
Short circuit protection			Continuous, automatic recovery
Transient response settling time	50% load step change		1400us typ.
Transient response over shoot	di/dt=0.8A/μs		≤ ±5% of V <sub>o</sub>



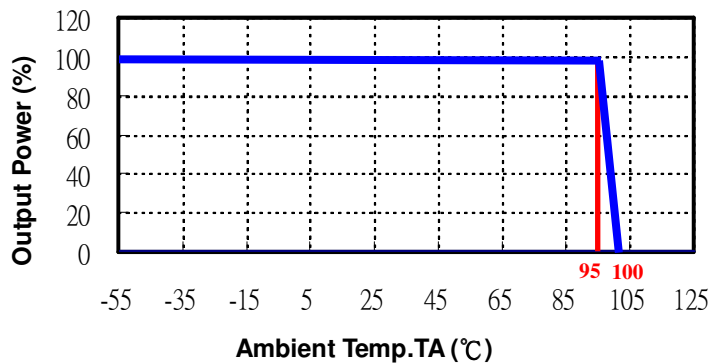
**General Specifications**

Efficiency	Nominal input	See table
Isolation voltage	Input to output	1500VDC
Isolation resistance	500VDC	10 <sup>9</sup> Ohms min.
Isolation capacitance		580pF typ.
Switching frequency		300kHz typ.
Reliability, calculated MTBF		1.96 × 10 <sup>6</sup> Hrs

**Physical Specifications**

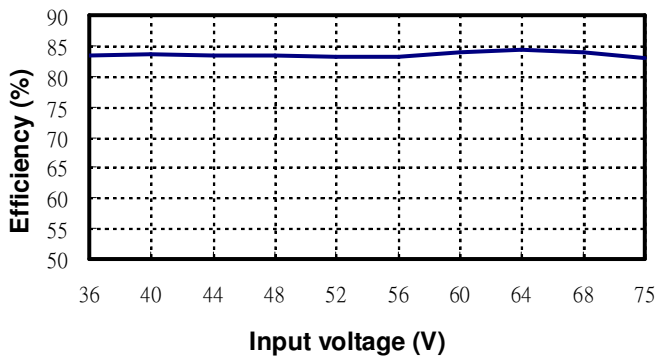
Case material	Nickel-coated copper
Base material	Non-conductive black plastic
Potting material	Silicon rubber (UL94V-0)
Dimensions	2.0 × 1.0 × 0.4 Inch (50.8 × 25.4 × 10.2 mm)
Weight	30g (1.06oz) typ.

**Power Derating Curve**



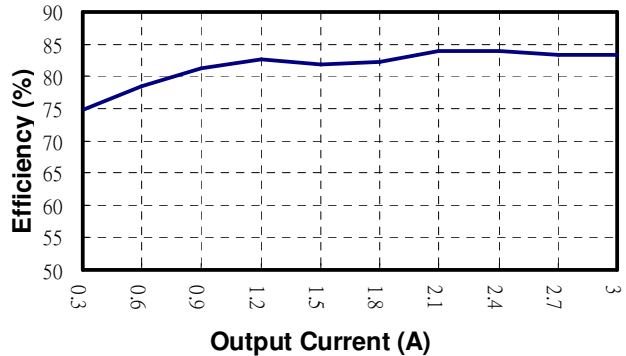
**MUA15-48S1**

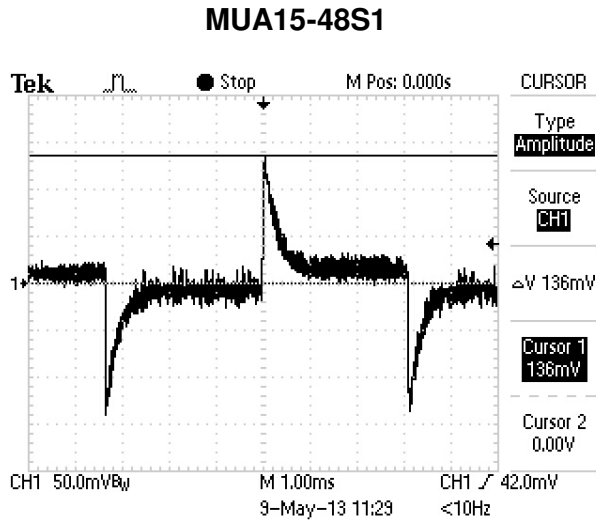
**Input voltage vs. Efficiency**



**MUA15-48S1**

**Output Current vs. Efficiency**

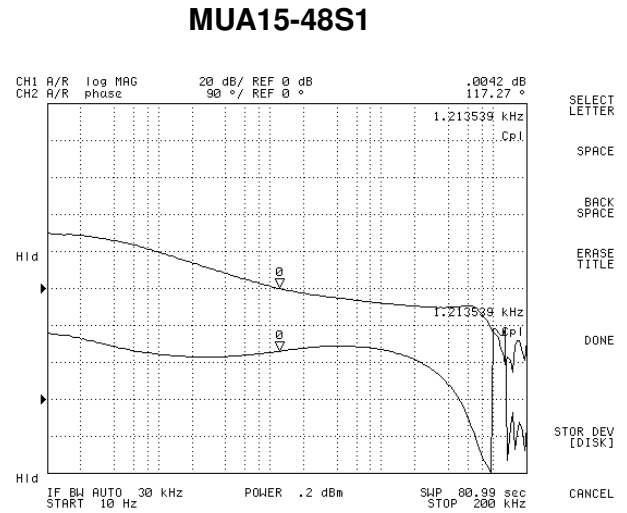




**Transient Response at 50%~100% Max Load**

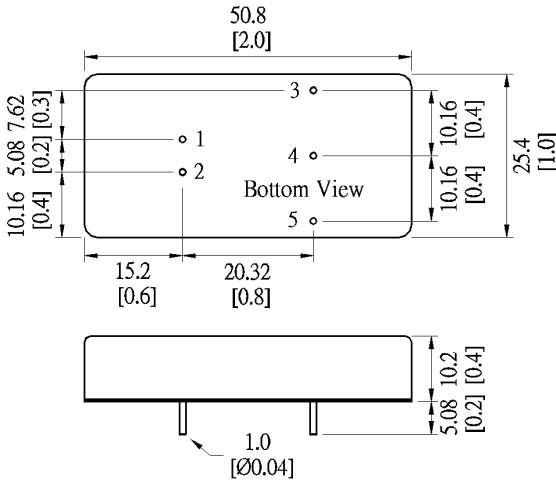
**Note**

1. Io below this value will not damage these converters, however, they may not meet all listed specifications.
2. Typical value, tested at nominal input and full load.
3. For each output.



**Loop Gain & Phase at Vi=48V, Full Load**

**Mechanical Dimensions**



Unit: mm [inch]  
Tolerance: ±0.5 [0.02]

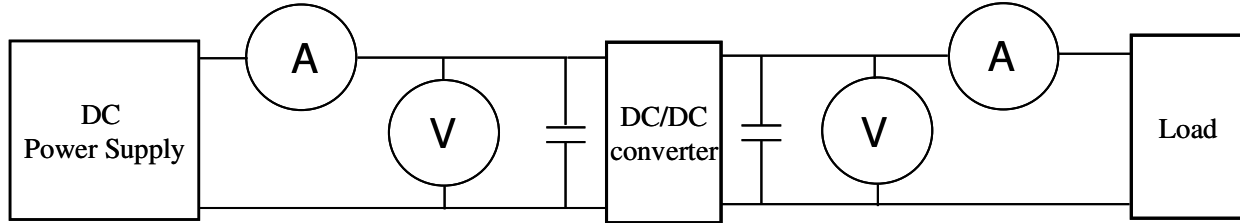
Pin Assignment		
Pin	Single	Dual
1	+Vin	+Vin
2	-Vin	-Vin
3	+Vout	+Vout
4	No pin	Common
5	-Vout	-Vout

Specifications subject to change without notice.



**Test Configurations**

All specifications are typical at nominal input, full load and 25 °C unless otherwise stated.



- ⊙DC Power Supply: It offers a wide voltage and current range precisely.
- ⊙Current meter (A): Accuracy → 200μA ~ 200mA 4 ranges ±(0.2% rdg + 2 digits)  
2000mA ~ 20A 2 ranges ±(0.3% rdg + 2 digits).
- ⊙Voltage meter (V): Accuracy → ±(0.03% rdg + 4 digits).
- ⊙Load: At full load.
- ⊙Wires: The resistance of the wires must be small.

1. Input voltage range: Narrow input voltage range (±10%) · wide input voltage range (2:1 and 4:1) ·

EX: Narrow input voltage range (±10%)

- 5V nominal input → 4.5~5.5V
- 12V nominal input → 10.8~13.2V
- 24V nominal input → 21.6~26.4V

Wide input voltage range 2:1

- 5V nominal input → 4.5~9V
- 12V nominal input → 9~18V
- 24V nominal input → 18~36V
- 48V nominal input → 36~75V

Wide input voltage range 4:1 (W)

- 24V nominal input → 9~36V
- 48V nominal input → 18~75V

2. Input power :

$$P_{in} = V_{in} \times I_{in}$$

V<sub>in</sub> : Input voltage

I<sub>in</sub> : Input current

3. Output power :

$$P_{out} = V_{out} \times I_{out}$$

V<sub>out</sub> : Output voltage

I<sub>out</sub> : Output current

4. Efficiency :

$$\text{Efficiency} = \frac{P_{out}}{P_{in}} \times 100\%$$

P<sub>out</sub>: Output power

P<sub>in</sub>: Input power

5. Voltage accuracy:

$$\frac{|V_{out} - V_{out(nominal)}|}{V_{out}} \times 100\%$$

V<sub>out</sub> : Output voltage

V<sub>out(nominal)</sub> : Nominal output voltage



6. Line regulation: (1) Wide input voltage range and regulated output voltage series.

$$\frac{|V_{out(LL)} - V_{out(HL)}|}{V_{out(LL)}} \times 100\%$$

LL: Low Line input voltage  
HL: High Line input voltage

(2) Narrow input voltage range ( $\pm 10\%$ ) and unregulated output voltage series.

$$\text{Line regulation} = \left| \frac{\Delta V_{out}}{\Delta V_{in}} \right|$$

$$\Delta V_{out} = \frac{V_{out(+10\%)} - V_{out(-10\%)}}{V_{out}} \times 100\%$$

$V_{out(+10\%)}$  : Output voltage at  $V_{in} = 1.1 \times V_{in}(\text{nominal})$  & full load

$V_{out(-10\%)}$  : Output voltage at  $V_{in} = 0.9 \times V_{in}(\text{nominal})$  & full load

$V_{out}$  : Output voltage at  $V_{in} = V_{in}(\text{nominal})$  & full load

$$\Delta V_{in} = \frac{V_{in(+10\%)} - V_{in(-10\%)}}{V_{in}(\text{nominal})} \times 100\%$$

$V_{in(+10\%)}$  : Input voltage =  $1.1 \times V_{in}(\text{nominal})$

$V_{in(-10\%)}$  : Input voltage =  $0.9 \times V_{in}(\text{nominal})$

$V_{in}(\text{nominal})$  : Nominal Input voltage

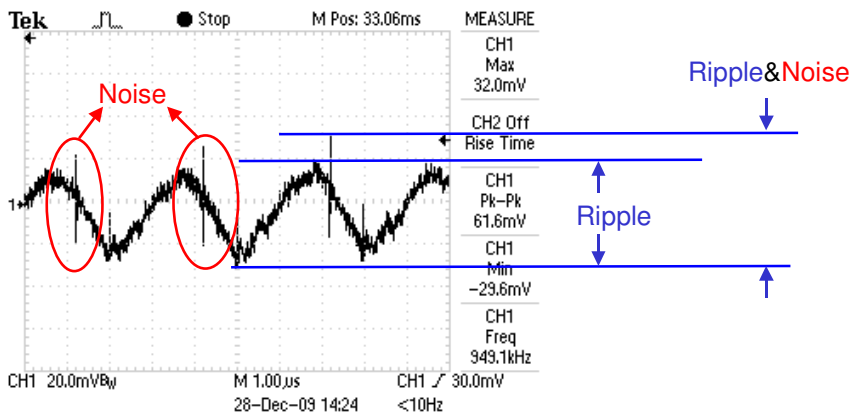
7. Load regulation :

$$\frac{|V_{out(FL)} - V_{out(NL)}|}{V_{out(FL)}} \times 100\%$$

$V_{out(FL)}$ : Output voltage at full load

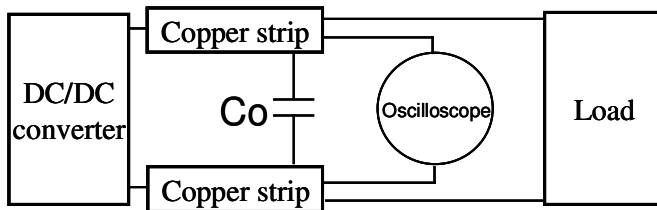
$V_{out(NL)}$ : Output voltage at 25% full load or 10% full load

8. Ripple and Noise: as shown below. The bandwidth is 0-20MHz.



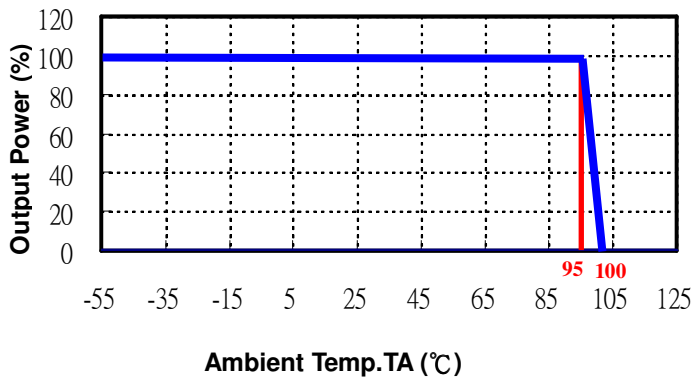


Output Ripple&Noise measurement test circuit: as shown below.



Co: usually 0.47uF.

9. Temperature derating curve: The DC-DC converter will operate over a wider temperature range if less power is drawn from the output and the device is already running. The temperature derating curve shows the operating power-temperature range. As shown below.



10. Switching frequency: The nominal operating frequency of the DC-DC converters.
11. Input to output isolation: The dielectric breakdown strength test between input and output circuits. This is the isolation voltage the device is capable of withstanding for a specified time, usually 1 second or 1 minute.