



**MINMAX<sup>®</sup>**

MDW08 Series

Electric Characteristic Note

## MDW08 Series EC Note

DC-DC CONVERTER 8W, Regulated Output, DIP Package

### Features

- ▶ Smallest Encapsulated 8W Converter
- ▶ Industrial Standard DIP-16 Package
- ▶ Wide 2:1 Input Voltage Range
- ▶ Fully Regulated Output Voltage
- ▶ I/O Isolation 1500 VDC
- ▶ Operating Ambient Temp. Range -40°C to +80°C
- ▶ Low No Load Power Consumption
- ▶ No Min. Load Requirement
- ▶ Under-voltage, Overload and Short Circuit Protection
- ▶ Shielded Metal Case with Insulated Baseplate
- ▶ Conducted EMI EN 55032 Class A Approved
- ▶ UL/cUL/IEC/EN 62368-1(60950-1) Safety Approval & CE Marking



### Applications

- ▶ Distributed power architectures
- ▶ Workstations
- ▶ Computer equipment
- ▶ Communications equipment

### Product Overview

The MINMAX MDW08 series is a generation of high power density in DC-DC converter modules. The product offers a full 8W isolated DC-DC converter within an encapsulated DIP-16 package which occupies only 0.5 in<sup>2</sup> of PCB space. There are 21 models available for 12, 24, 48VDC with wide 2:1 input voltage range. Further features include under-voltage protection, overload protection, short circuit protection and no min. load requirement as well. An high efficiency allows operating temperatures range of -40°C to +80°C. These DC-DC converters offer a better solution for critical space applications like battery-powered equipment, instrumentation, distributed power architectures in communication, industrial electronics, energy facilities and others.

### Table of contents

Model Selection Guide .....	P2	Recommended Pad Layout for Single & Dual Output Converter .....	P25
Input Specifications .....	P2	Test Setup .....	P26
Output Specifications .....	P2	Technical Notes .....	P26
General Specifications .....	P3	Packaging Information for Tube .....	P27
EMC Specifications .....	P3	Wave Soldering Considerations .....	P27
Environmental Specifications .....	P3	Hand Welding Parameter .....	P27
Characteristic Curves .....	P4	Part Number Structure .....	P28
Package Specifications .....	P25	MTBF and Reliability .....	P28

**Model Selection Guide**

Model Number	Input Voltage (Range)	Output Voltage	Output Current	Input Current		Max. capacitive Load	Efficiency (typ.)
				@Max. Load	@No Load		
	VDC	VDC	mA	mA(typ.)	mA(typ.)	μF	%
MDW08-12S033	12 (9 ~ 18)	3.3	1600	564	10	680	78
MDW08-12S05		5	1600	823		680	81
MDW08-12S12		12	665	792		330	84
MDW08-12S15		15	535	796		330	84
MDW08-12S24		24	335	788		150	85
MDW08-12D12		±12	±335	788		150#	85
MDW08-12D15		±15	±265	789		150#	84
MDW08-24S033	24 (18 ~ 36)	3.3	1600	282	10	680	78
MDW08-24S05		5	1600	407		680	82
MDW08-24S12		12	665	391		330	85
MDW08-24S15		15	535	393		330	85
MDW08-24S24		24	335	390		150	86
MDW08-24D12		±12	±335	394		150#	85
MDW08-24D15		±15	±265	385		150#	86
MDW08-48S033	48 (36 ~ 75)	3.3	1600	141	8	680	78
MDW08-48S05		5	1600	206		680	81
MDW08-48S12		12	665	196		330	85
MDW08-48S15		15	535	197		330	85
MDW08-48S24		24	335	195		150	86
MDW08-48D12		±12	±335	195		150#	86
MDW08-48D15		±15	±265	193		150#	86

# For each output

**Input Specifications**

Parameter	Model	Min.	Typ.	Max.	Unit
Input Surge Voltage (1 sec. 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	---	8	---	
	24V Input Models	---	16	---	
	48V Input Models	---	34	---	
Input Filter	All Models	Internal Pi Type			

**Output Specifications**

Parameter	Conditions	Min.	Typ.	Max.	Unit
Output Voltage Setting Accuracy		---	---	±2.0	%Vom.
Output Voltage Balance	Dual Output, Balanced Loads	---	±1.0	±2.0	%
Line Regulation	Vin=Min. to Max. @Full Load	---	±0.2	±0.8	%
Load Regulation	Io=0% to 100%	---	±0.5	±1.0	%
Minimum Load	No minimum Load Requirement				
Ripple & Noise	0-20 MHz Bandwidth	---	---	55	mV <sub>P-P</sub>
Transient Recovery Time	25% Load Step Change	---	---	500	μsec
Transient Response Deviation		---	±3	±5	%
Temperature Coefficient		---	±0.01	±0.02	%/°C
Over Load Protection	Hiccup	---	150	---	%
Short Circuit Protection	Continuous, Automatic Recovery (Hiccup Mode 0.3Hz typ.)				

General Specifications						
Parameter	Conditions	Min.	Typ.	Max.	Unit	
I/O Isolation Voltage	60 Seconds	1500	---	---	VDC	
	1 Second	1800	---	---	VDC	
I/O Isolation Resistance	500 VDC	1000	---	---	MΩ	
I/O Isolation Capacitance	100kHz, 1V	---	500	---	pF	
Switching Frequency		---	370	---	kHz	
MTBF (calculated)	MIL-HDBK-217F@25°C, Ground Benign	1,062,864	---	---	Hours	
Safety Approvals	UL/cUL 60950-1 recognition (UL certificate), IEC/EN 60950-1 (CB-report)					
	UL/cUL 62368-1 recognition (UL certificate), IEC/EN 62368-1 (CB-report)					

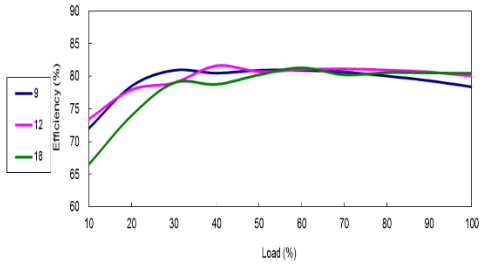
EMC Specifications				
Parameter	Standards & Level			Performance
EMI <sub>(5)</sub>	Conduction	EN 55032	Without external components	
	Radiation		With external components	
EMS <sub>(5)</sub>	EN 55024			
	ESD	EN 61000-4-2 Air ± 8kV , Contact ± 6kV		A
	Radiated immunity	EN 61000-4-3 20V/m		A
	Fast transient	EN 61000-4-4 ±2kV		A
	Surge	EN 61000-4-5 ±1kV		A
	Conducted immunity	EN 61000-4-6 10Vrms		A
	PFMF	EN 61000-4-8 100A/m		A

Environmental Specifications				
Parameter	Min.	Max.	Unit	
Operating Ambient Temperature Range (See Power Derating Curve)	-40	+80	°C	
Case Temperature	---	+105	°C	
Storage Temperature Range	-50	+125	°C	
Humidity (non condensing)	---	95	% rel. H	
Lead Temperature (1.5mm from case for 10Sec.)	---	260	°C	

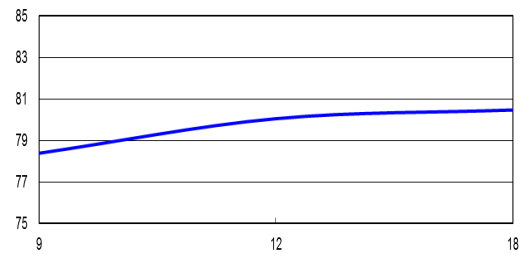
Notes	
1	Specifications typical at Ta=+25°C, resistive load, nominal input voltage and rated output current unless otherwise noted.
2	Transient recovery time is measured to within 1% error band for a step change in output load of 75% to 100%.
3	We recommend to protect the converter by a slow blow fuse in the input supply line.
4	Other input and output voltage may be available, please contact MINMAX.
5	The external components might be required to meet EMI/EMS standard for some of test items. Please contact MINMAX for the solution in detail.
6	Specifications are subject to change without notice.

**Characteristic Curves**

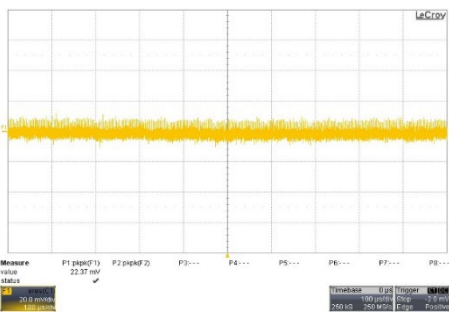
All test conditions are at 25°C The figures are identical for MDW08-12S033



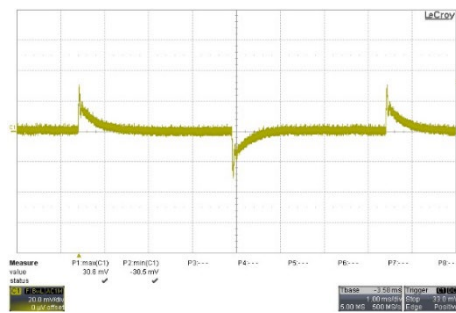
Efficiency Versus Output Current



Efficiency Versus Input Voltage Full Load



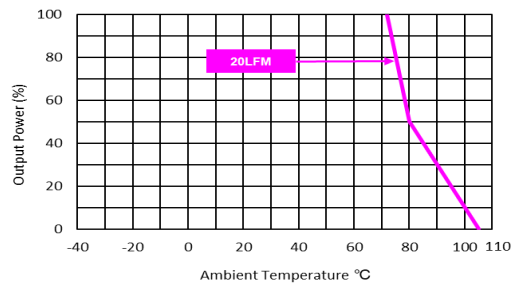
Typical Output Ripple and Noise  
 $V_{in}=V_{in\ nom}$  ; Full Load



Transient Response to Dynamic Load Change  
from 100% to 75% of Full Load ;  $V_{in}=V_{in\ nom}$



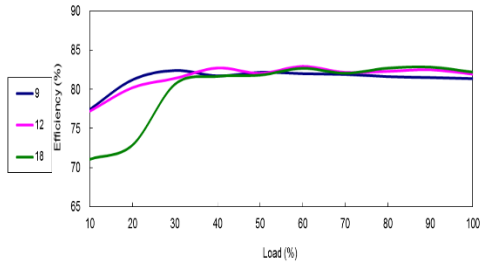
Typical Input Start-Up and Output Rise Characteristic  
 $V_{in}=V_{in\ nom}$  ; Full Load



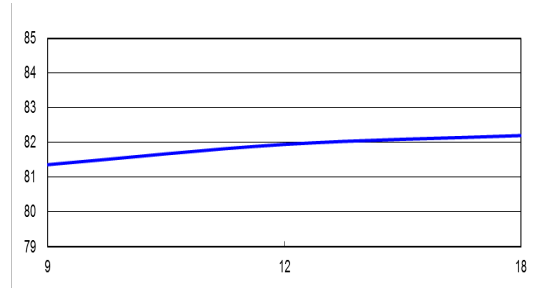
Derating Output Power Versus Ambient Temperature  
 $V_{in}=V_{in\ nom}$

**Characteristic Curves**

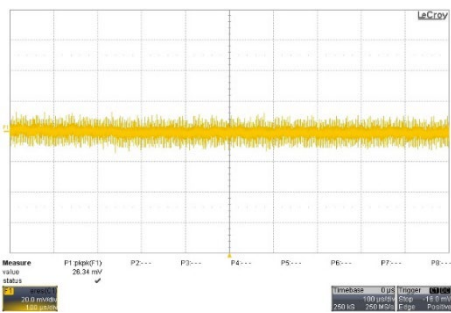
All test conditions are at 25°C The figures are identical for MDW08-12S05



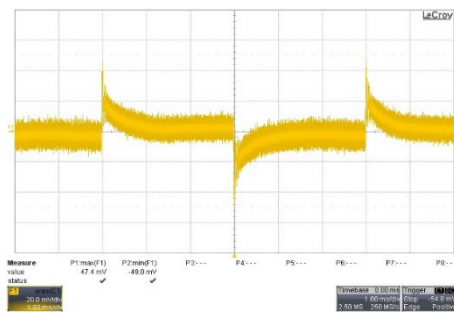
Efficiency Versus Output Current



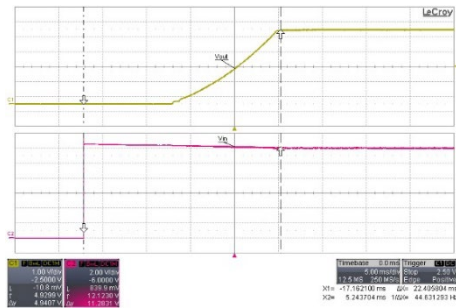
Efficiency Versus Input Voltage Full Load



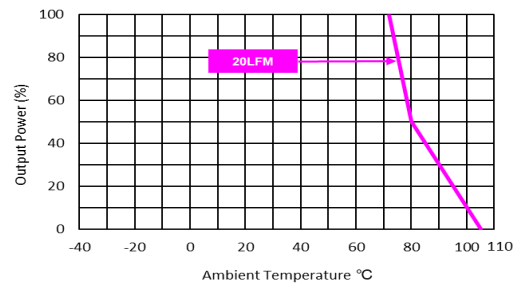
Typical Output Ripple and Noise  
 $V_{in}=V_{in\ nom}$  ; Full Load



Transient Response to Dynamic Load Change  
from 100% to 75% of Full Load ;  $V_{in}=V_{in\ nom}$



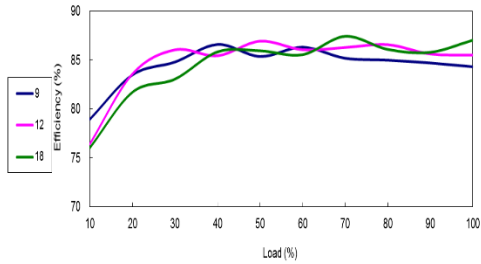
Typical Input Start-Up and Output Rise Characteristic  
 $V_{in}=V_{in\ nom}$  ; Full Load



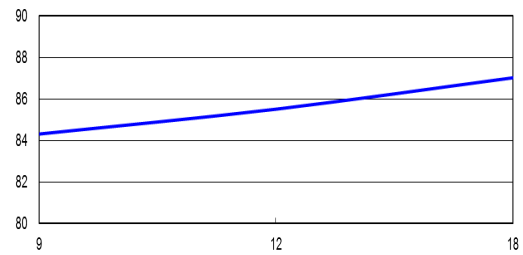
Derating Output Power Versus Ambient Temperature  
 $V_{in}=V_{in\ nom}$

**Characteristic Curves**

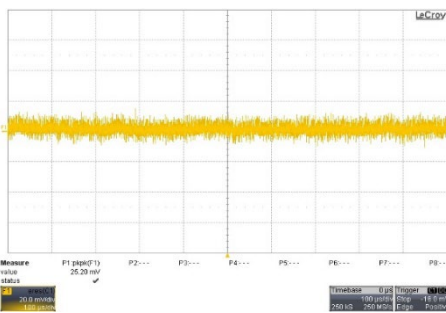
All test conditions are at 25°C The figures are identical for MDW08-12S12



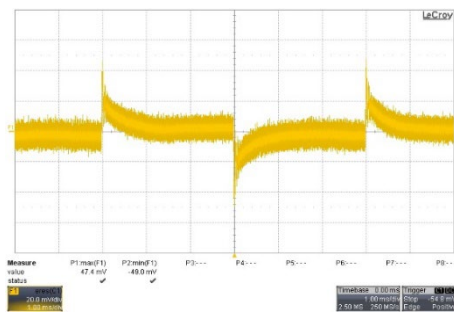
Efficiency Versus Output Current



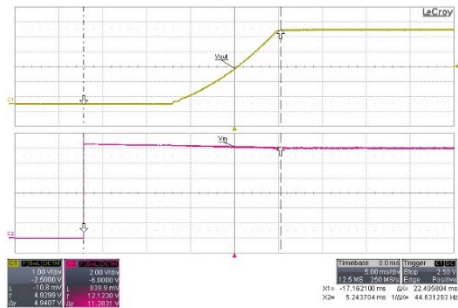
Efficiency Versus Input Voltage  
Full Load



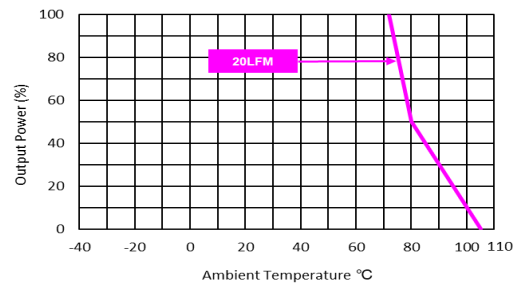
Typical Output Ripple and Noise  
 $V_{in}=V_{in\ nom}$  ; Full Load



Transient Response to Dynamic Load Change  
from 100% to 75% of Full Load ;  $V_{in}=V_{in\ nom}$



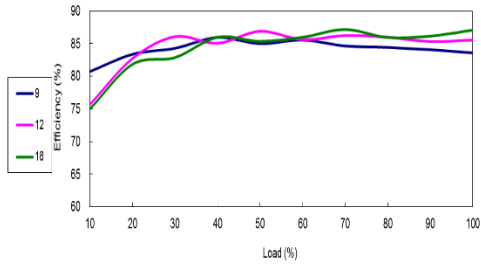
Typical Input Start-Up and Output Rise Characteristic  
 $V_{in}=V_{in\ nom}$  ; Full Load



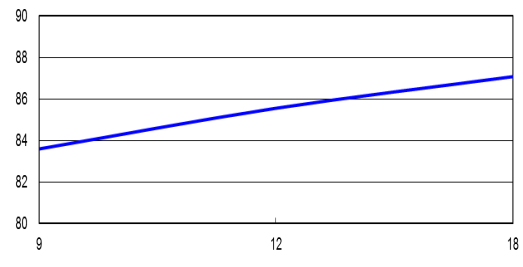
Derating Output Power Versus Ambient Temperature  
 $V_{in}=V_{in\ nom}$

**Characteristic Curves**

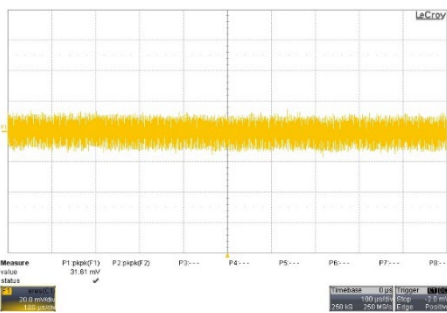
All test conditions are at 25°C The figures are identical for MDW08-12S15



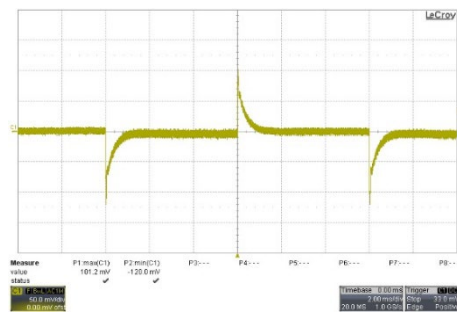
Efficiency Versus Output Current



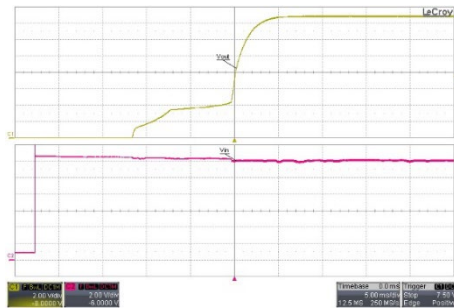
Efficiency Versus Input Voltage  
Full Load



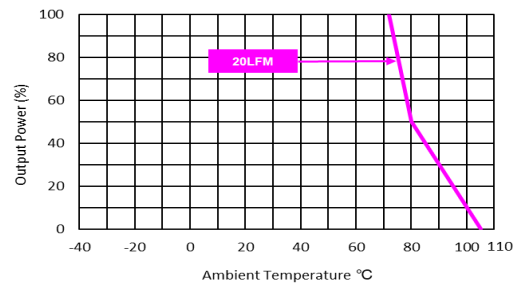
Typical Output Ripple and Noise  
 $V_{in}=V_{in\ nom}$ ; Full Load



Transient Response to Dynamic Load Change  
from 100% to 75% of Full Load ;  $V_{in}=V_{in\ nom}$



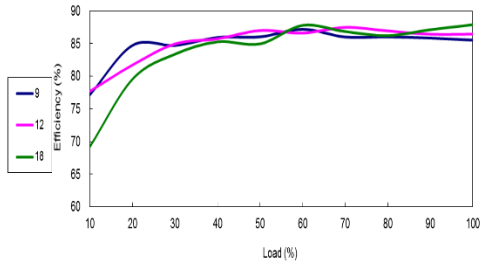
Typical Input Start-Up and Output Rise Characteristic  
 $V_{in}=V_{in\ nom}$ ; Full Load



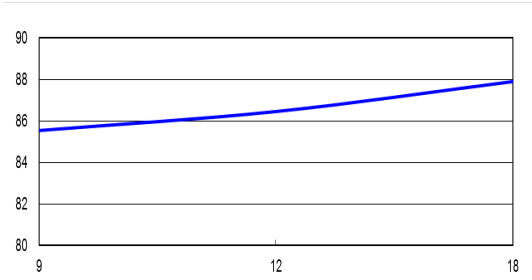
Derating Output Power Versus Ambient Temperature  
 $V_{in}=V_{in\ nom}$

**Characteristic Curves**

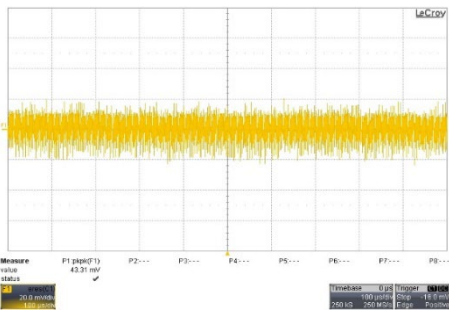
All test conditions are at 25°C The figures are identical for MDW08-12S24



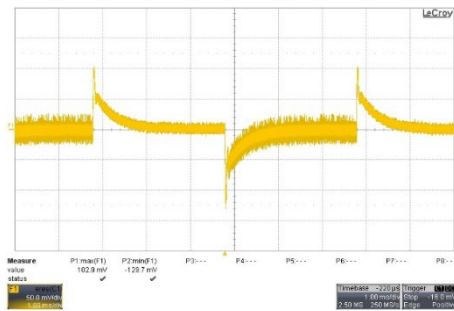
Efficiency Versus Output Current



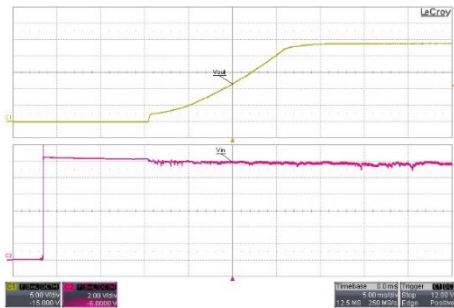
Efficiency Versus Input Voltage  
Full Load



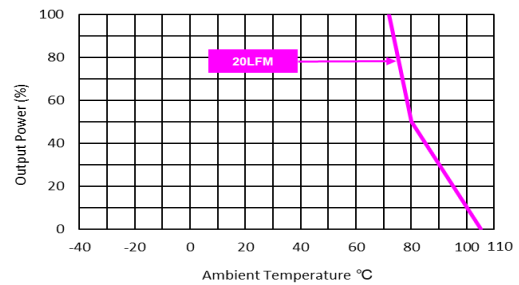
Typical Output Ripple and Noise  
 $V_{in}=V_{in\ nom}$  ; Full Load



Transient Response to Dynamic Load Change  
from 100% to 75% of Full Load ;  $V_{in}=V_{in\ nom}$



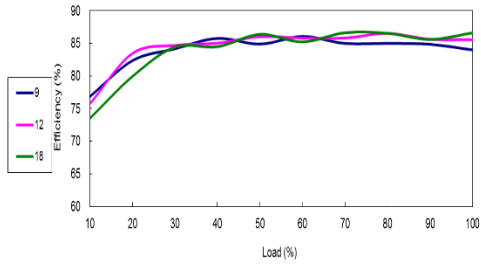
Typical Input Start-Up and Output Rise Characteristic  
 $V_{in}=V_{in\ nom}$  ; Full Load



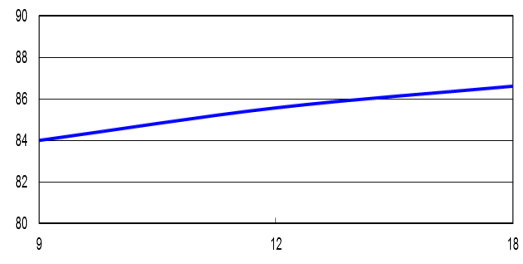
Derating Output Power Versus Ambient Temperature  
 $V_{in}=V_{in\ nom}$

**Characteristic Curves**

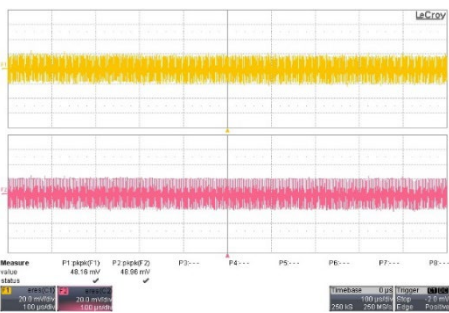
All test conditions are at 25°C The figures are identical for MDW08-12D12



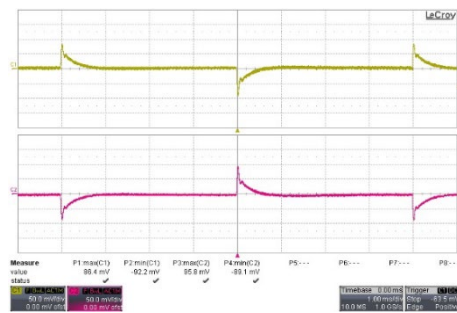
Efficiency Versus Output Current



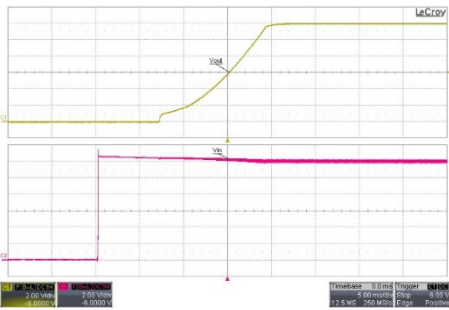
Efficiency Versus Input Voltage Full Load



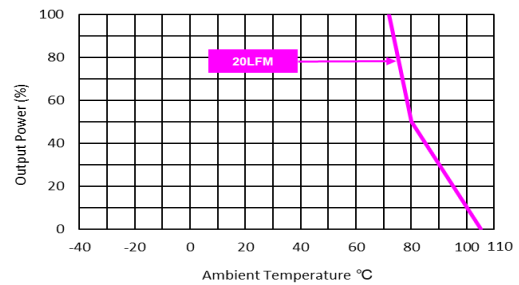
Typical Output Ripple and Noise  
 $V_{in}=V_{in\ nom}$ ; Full Load



Transient Response to Dynamic Load Change  
from 100% to 75% of Full Load ;  $V_{in}=V_{in\ nom}$



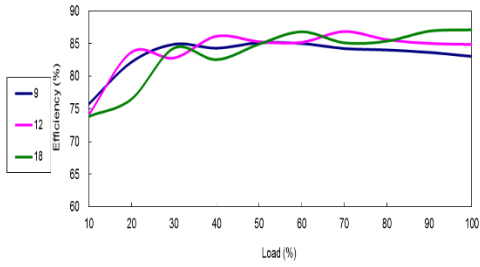
Typical Input Start-Up and Output Rise Characteristic  
 $V_{in}=V_{in\ nom}$ ; Full Load



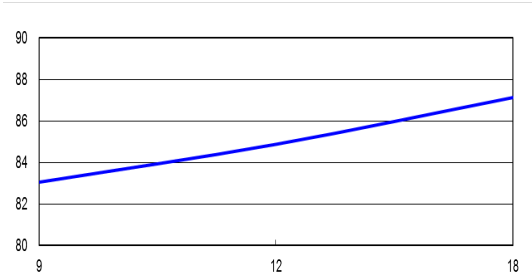
Derating Output Power Versus Ambient Temperature  
 $V_{in}=V_{in\ nom}$

**Characteristic Curves**

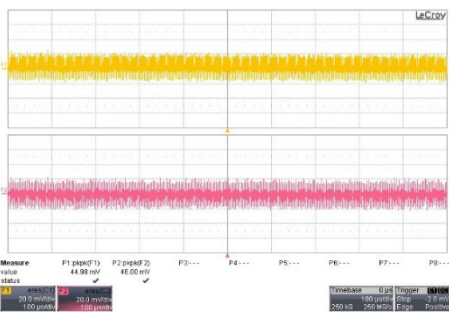
All test conditions are at 25°C The figures are identical for MDW08-12D15



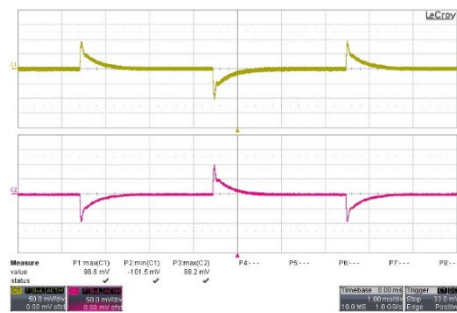
Efficiency Versus Output Current



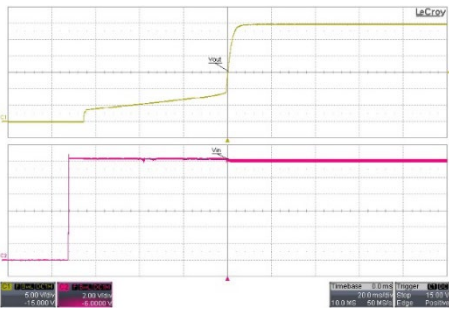
Efficiency Versus Input Voltage Full Load



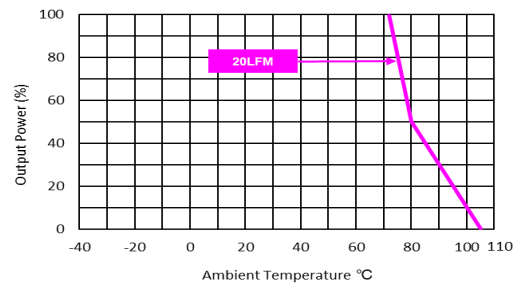
Typical Output Ripple and Noise  
 $V_{in}=V_{in\ nom}$  ; Full Load



Transient Response to Dynamic Load Change  
from 100% to 75% of Full Load ;  $V_{in}=V_{in\ nom}$



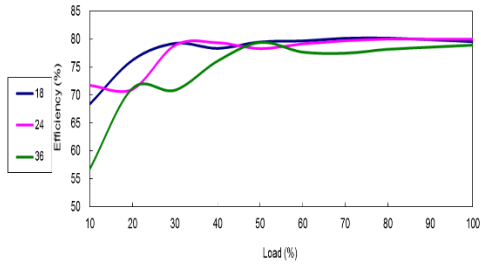
Typical Input Start-Up and Output Rise Characteristic  
 $V_{in}=V_{in\ nom}$  ; Full Load



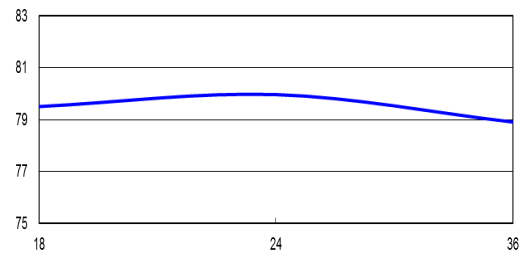
Derating Output Power Versus Ambient Temperature  
 $V_{in}=V_{in\ nom}$

**Characteristic Curves**

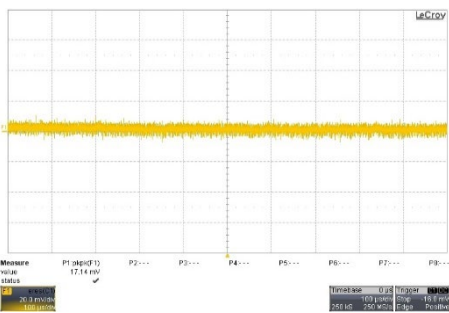
All test conditions are at 25°C The figures are identical for MDW08-24S033



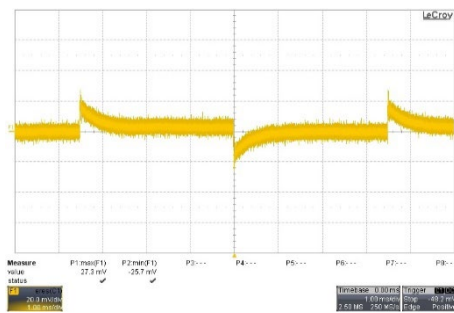
Efficiency Versus Output Current



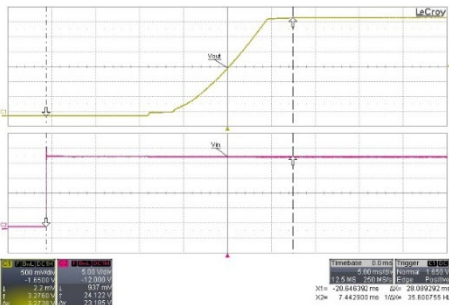
Efficiency Versus Input Voltage  
Full Load



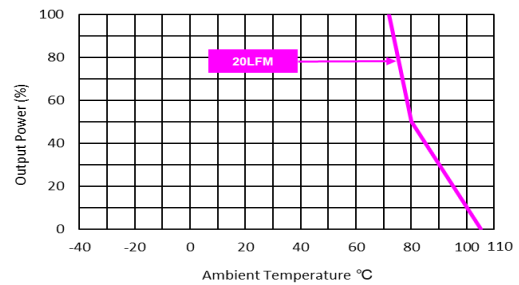
Typical Output Ripple and Noise  
 $V_{in}=V_{in\ nom}$  ; Full Load



Transient Response to Dynamic Load Change  
from 100% to 75% of Full Load ;  $V_{in}=V_{in\ nom}$



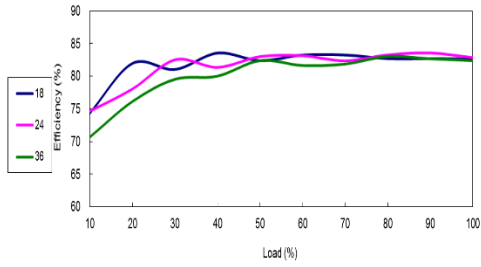
Typical Input Start-Up and Output Rise Characteristic  
 $V_{in}=V_{in\ nom}$  ; Full Load



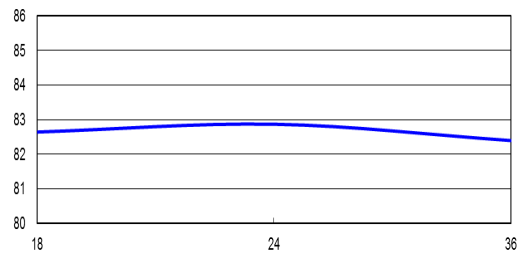
Derating Output Power Versus Ambient Temperature  
 $V_{in}=V_{in\ nom}$

**Characteristic Curves**

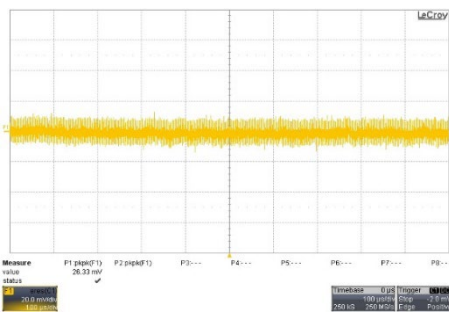
All test conditions are at 25°C The figures are identical for MDW08-24S05



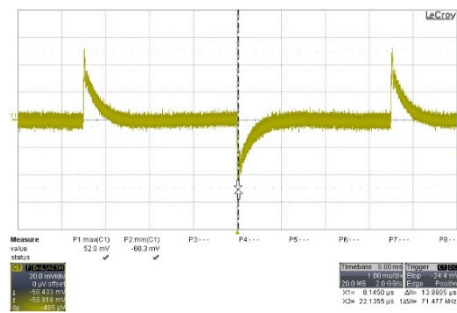
Efficiency Versus Output Current



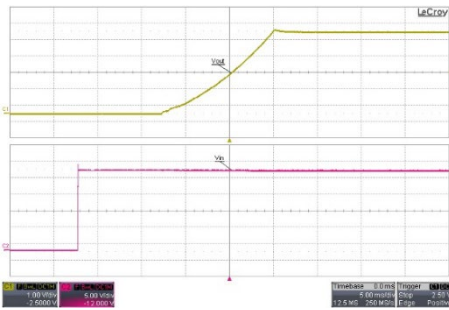
Efficiency Versus Input Voltage Full Load



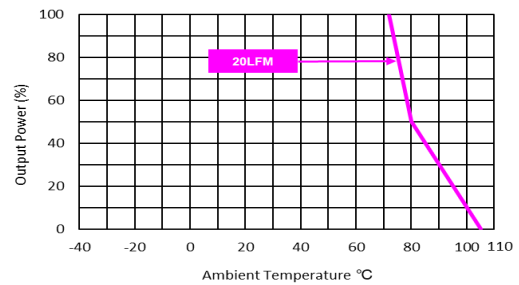
Typical Output Ripple and Noise  
 $V_{in}=V_{in\ nom}$ ; Full Load



Transient Response to Dynamic Load Change  
from 100% to 75% of Full Load ;  $V_{in}=V_{in\ nom}$



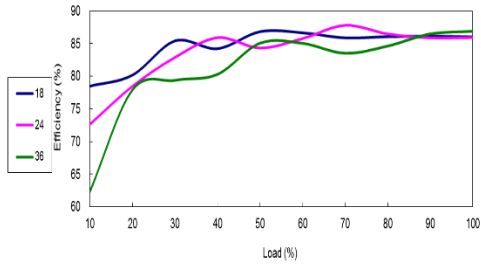
Typical Input Start-Up and Output Rise Characteristic  
 $V_{in}=V_{in\ nom}$ ; Full Load



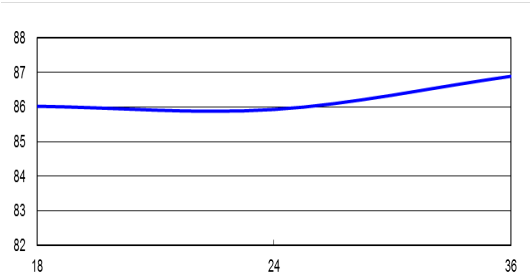
Derating Output Power Versus Ambient Temperature  
 $V_{in}=V_{in\ nom}$

**Characteristic Curves**

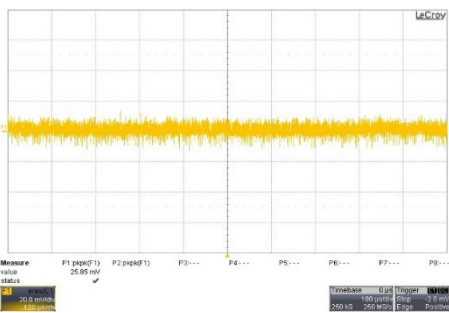
All test conditions are at 25°C The figures are identical for MDW08-24S12



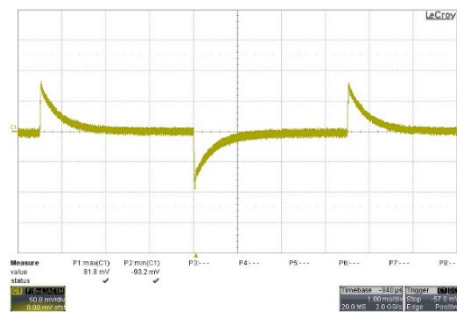
Efficiency Versus Output Current



Efficiency Versus Input Voltage Full Load



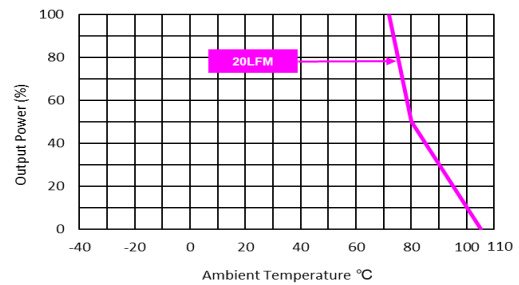
Typical Output Ripple and Noise  
 $V_{in}=V_{in\ nom}$ ; Full Load



Transient Response to Dynamic Load Change  
from 100% to 75% of Full Load ;  $V_{in}=V_{in\ nom}$



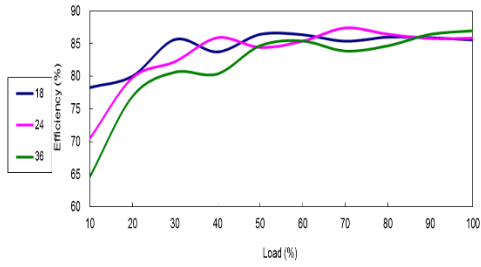
Typical Input Start-Up and Output Rise Characteristic  
 $V_{in}=V_{in\ nom}$ ; Full Load



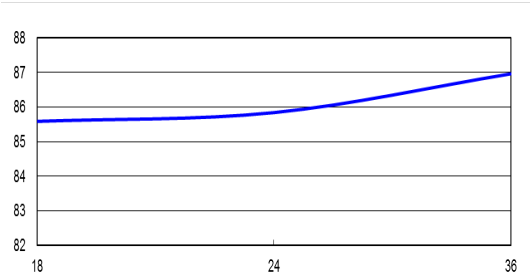
Derating Output Power Versus Ambient Temperature  
 $V_{in}=V_{in\ nom}$

**Characteristic Curves**

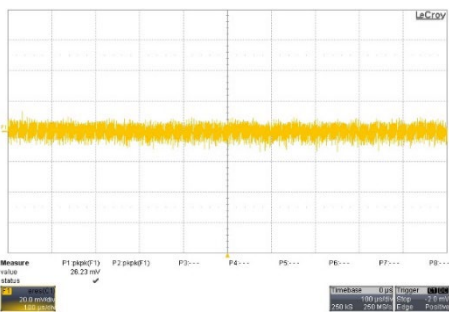
All test conditions are at 25°C The figures are identical for MDW08-24S15



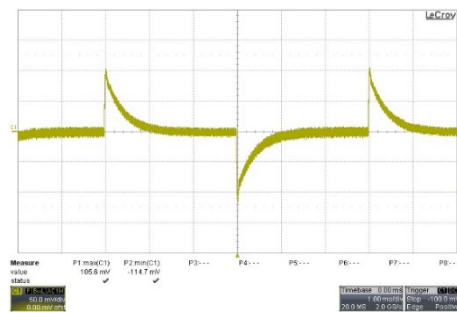
Efficiency Versus Output Current



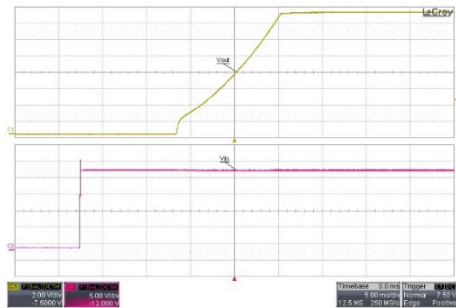
Efficiency Versus Input Voltage Full Load



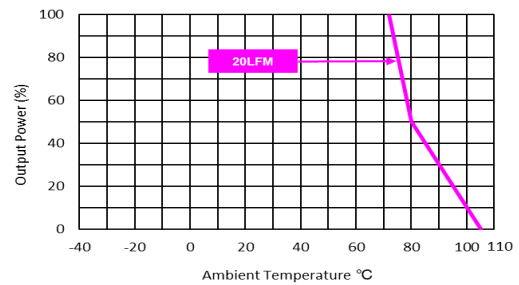
Typical Output Ripple and Noise  
 $V_{in}=V_{in\ nom}$  ; Full Load



Transient Response to Dynamic Load Change from 100% to 75% of Full Load ;  $V_{in}=V_{in\ nom}$



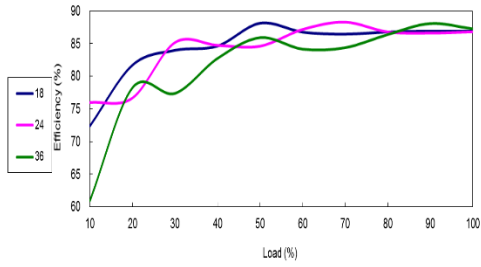
Typical Input Start-Up and Output Rise Characteristic  
 $V_{in}=V_{in\ nom}$  ; Full Load



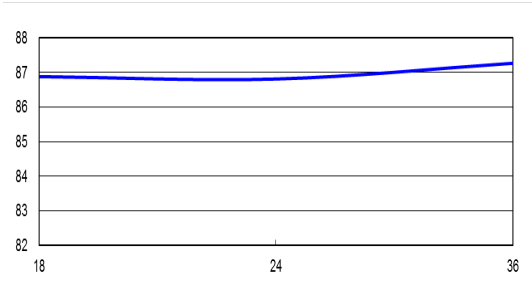
Derating Output Power Versus Ambient Temperature  
 $V_{in}=V_{in\ nom}$

**Characteristic Curves**

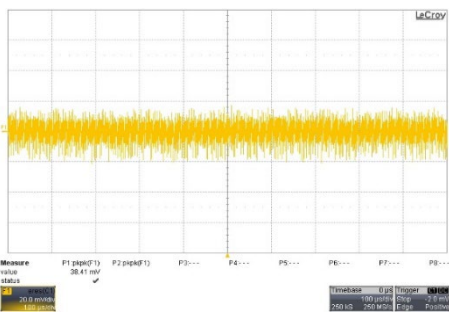
All test conditions are at 25°C The figures are identical for MDW08-24S24



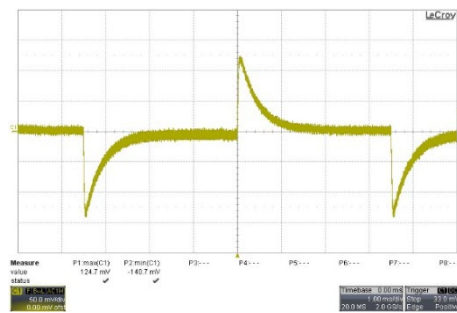
Efficiency Versus Output Current



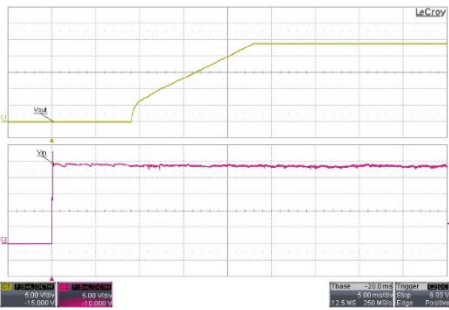
Efficiency Versus Input Voltage  
Full Load



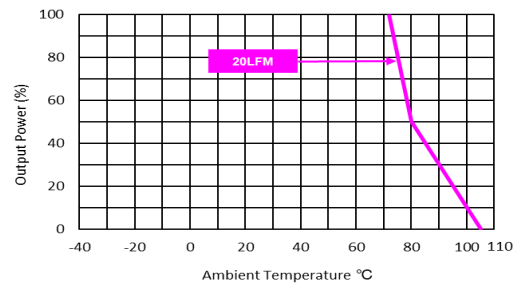
Typical Output Ripple and Noise  
 $V_{in}=V_{in\ nom}$  ; Full Load



Transient Response to Dynamic Load Change  
from 100% to 75% of Full Load ;  $V_{in}=V_{in\ nom}$



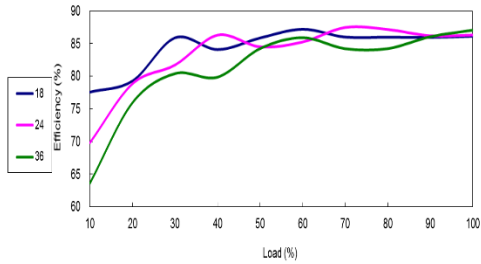
Typical Input Start-Up and Output Rise Characteristic  
 $V_{in}=V_{in\ nom}$  ; Full Load



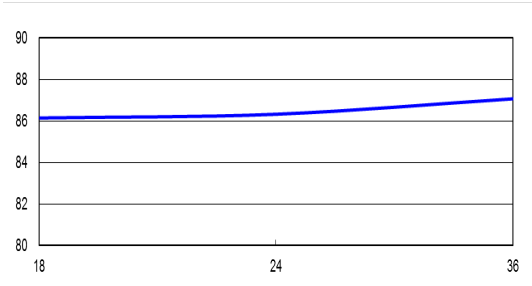
Derating Output Power Versus Ambient Temperature  
 $V_{in}=V_{in\ nom}$

**Characteristic Curves**

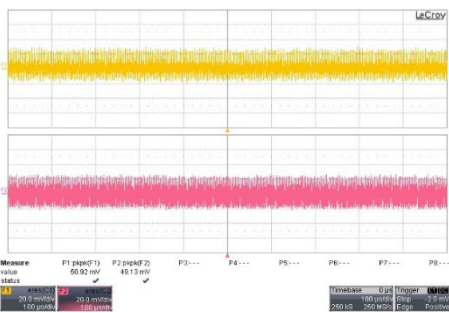
All test conditions are at 25°C The figures are identical for MDW08-24D12



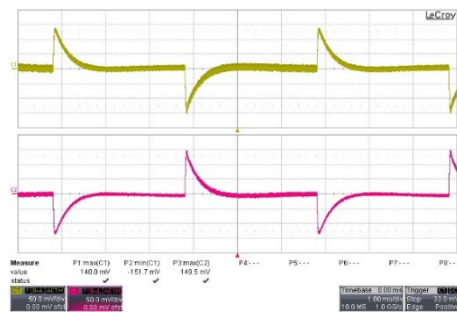
Efficiency Versus Output Current



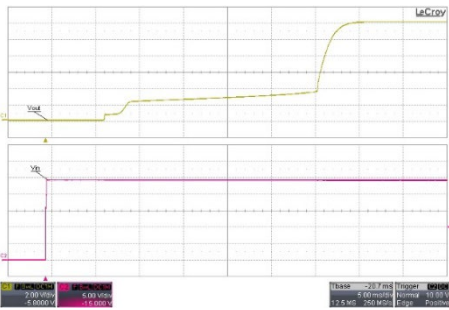
Efficiency Versus Input Voltage Full Load



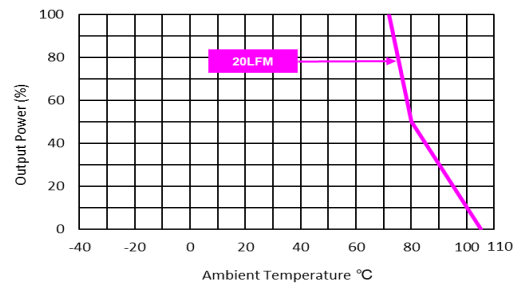
Typical Output Ripple and Noise  
 $V_{in}=V_{in\ nom}$  ; Full Load



Transient Response to Dynamic Load Change  
from 100% to 75% of Full Load ;  $V_{in}=V_{in\ nom}$



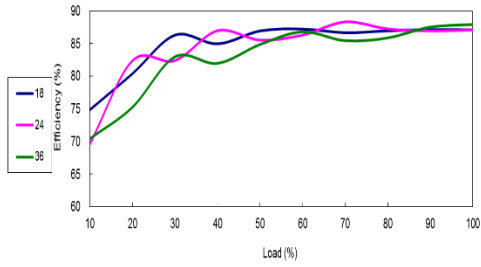
Typical Input Start-Up and Output Rise Characteristic  
 $V_{in}=V_{in\ nom}$  ; Full Load



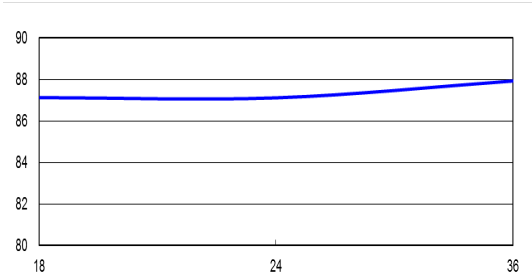
Derating Output Power Versus Ambient Temperature  
 $V_{in}=V_{in\ nom}$

**Characteristic Curves**

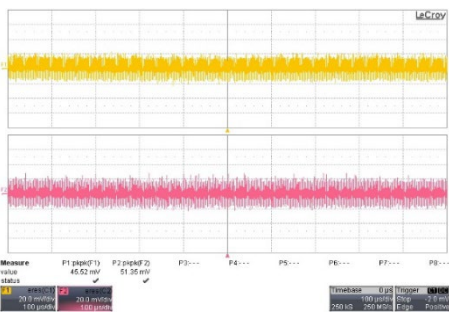
All test conditions are at 25°C The figures are identical for MDW08-24D15



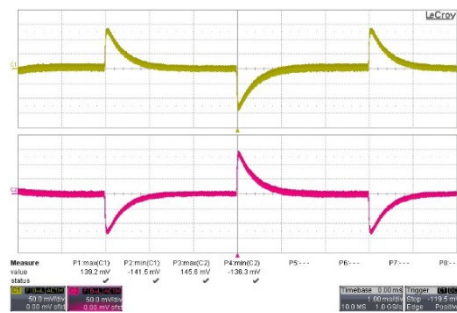
Efficiency Versus Output Current



Efficiency Versus Input Voltage  
Full Load



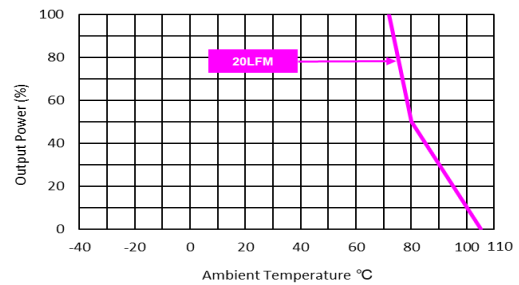
Typical Output Ripple and Noise  
 $V_{in}=V_{in\ nom}$ ; Full Load



Transient Response to Dynamic Load Change  
from 100% to 75% of Full Load ;  $V_{in}=V_{in\ nom}$



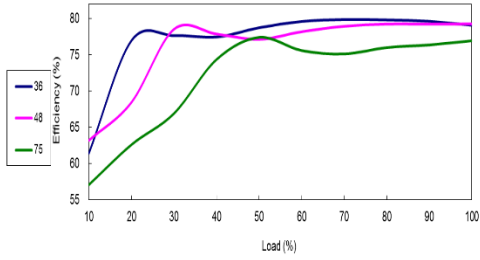
Typical Input Start-Up and Output Rise Characteristic  
 $V_{in}=V_{in\ nom}$ ; Full Load



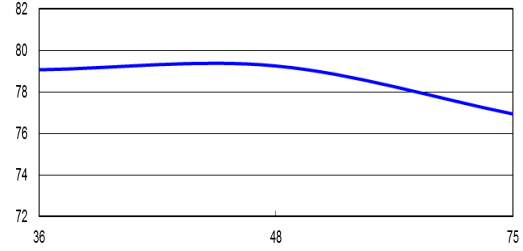
Derating Output Power Versus Ambient Temperature  
 $V_{in}=V_{in\ nom}$

**Characteristic Curves**

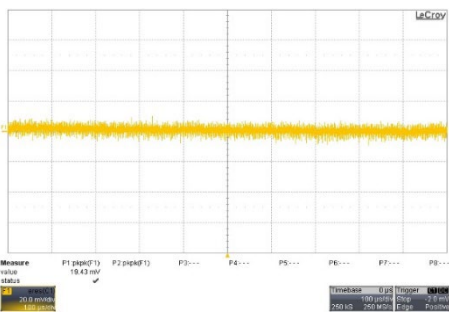
All test conditions are at 25°C The figures are identical for MDW08-48S033



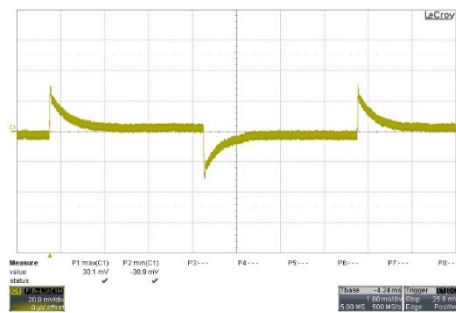
Efficiency Versus Output Current



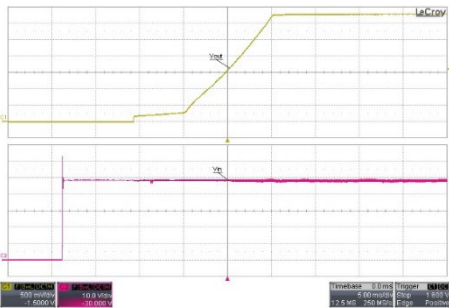
Efficiency Versus Input Voltage Full Load



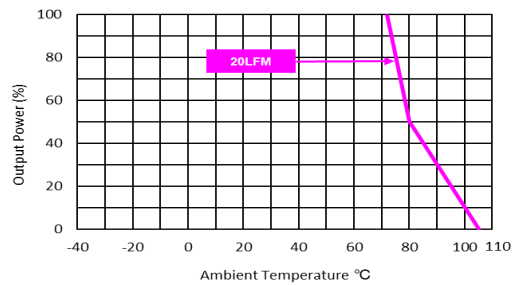
Typical Output Ripple and Noise  
 $V_{in}=V_{in\ nom}$  ; Full Load



Transient Response to Dynamic Load Change  
from 100% to 75% of Full Load ;  $V_{in}=V_{in\ nom}$



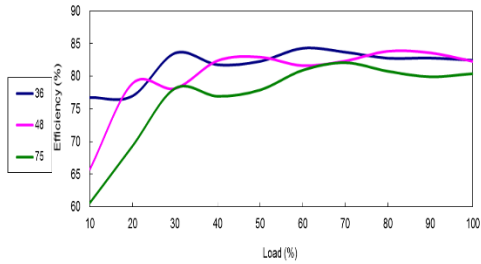
Typical Input Start-Up and Output Rise Characteristic  
 $V_{in}=V_{in\ nom}$  ; Full Load



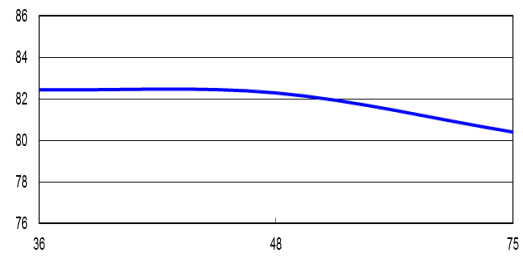
Derating Output Power Versus Ambient Temperature  
 $V_{in}=V_{in\ nom}$

**Characteristic Curves**

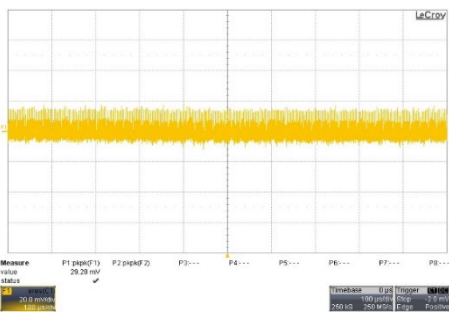
All test conditions are at 25°C The figures are identical for MDW08-48S05



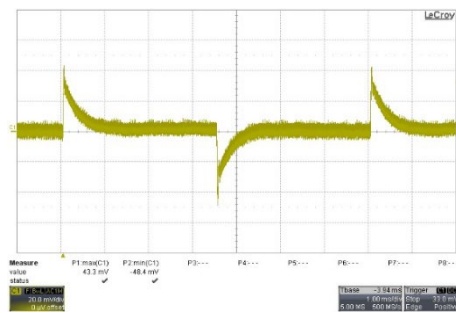
Efficiency Versus Output Current



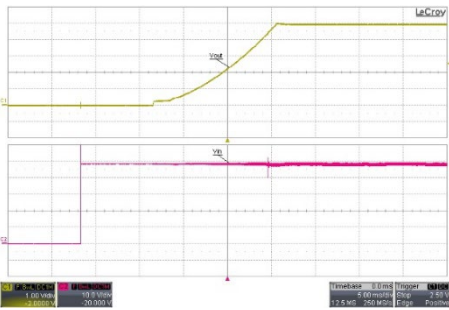
Efficiency Versus Input Voltage Full Load



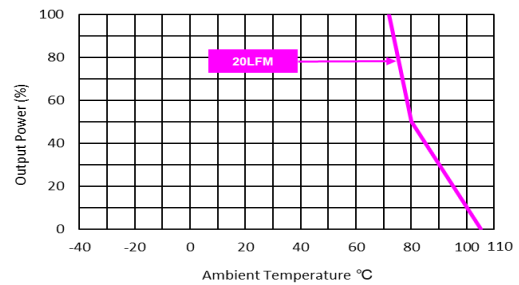
Typical Output Ripple and Noise  
 $V_{in}=V_{in\ nom}$ ; Full Load



Transient Response to Dynamic Load Change  
from 100% to 75% of Full Load ;  $V_{in}=V_{in\ nom}$



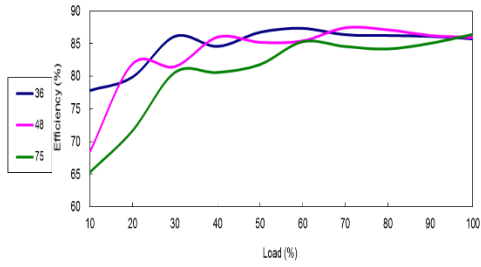
Typical Input Start-Up and Output Rise Characteristic  
 $V_{in}=V_{in\ nom}$ ; Full Load



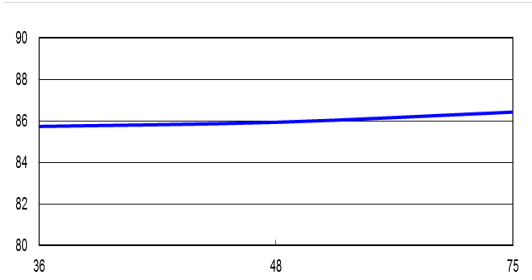
Derating Output Power Versus Ambient Temperature  
 $V_{in}=V_{in\ nom}$

**Characteristic Curves**

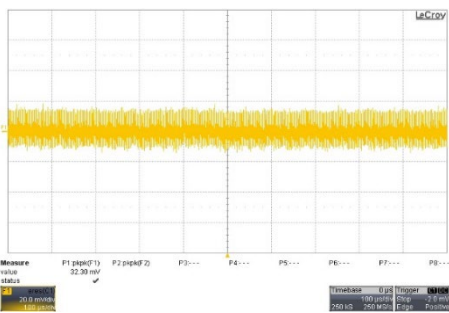
All test conditions are at 25°C The figures are identical for MDW08-48S12



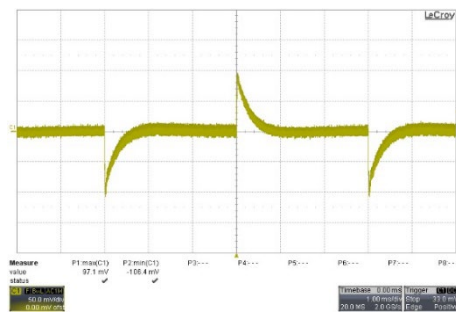
Efficiency Versus Output Current



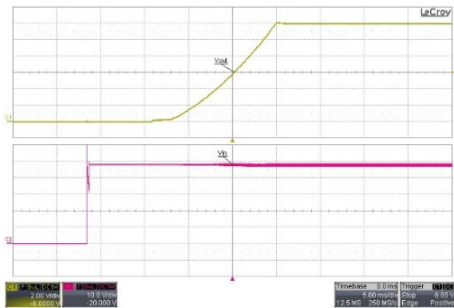
Efficiency Versus Input Voltage Full Load



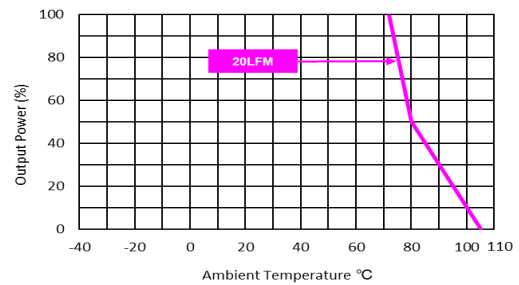
Typical Output Ripple and Noise  
 $V_{in}=V_{in\ nom}$  ; Full Load



Transient Response to Dynamic Load Change  
from 100% to 75% of Full Load ;  $V_{in}=V_{in\ nom}$



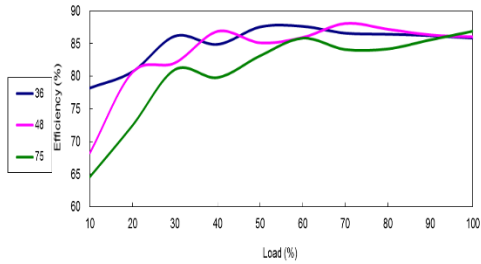
Typical Input Start-Up and Output Rise Characteristic  
 $V_{in}=V_{in\ nom}$  ; Full Load



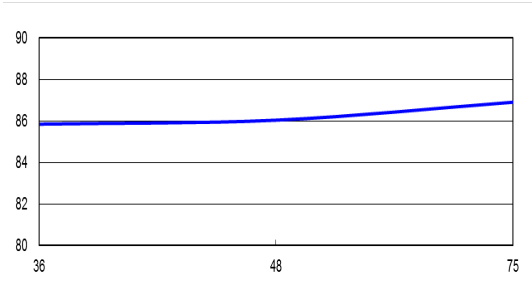
Derating Output Power Versus Ambient Temperature  
 $V_{in}=V_{in\ nom}$

**Characteristic Curves**

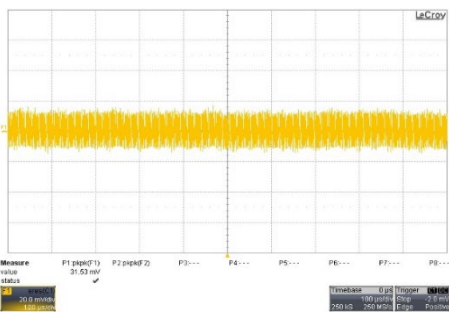
All test conditions are at 25°C The figures are identical for MDW08-48S15



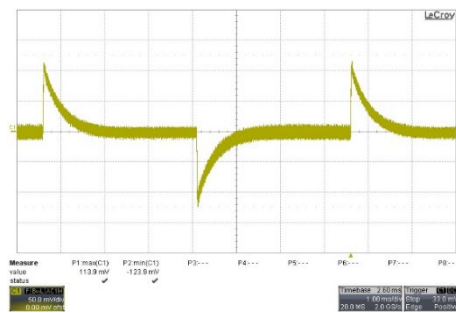
Efficiency Versus Output Current



Efficiency Versus Input Voltage  
Full Load



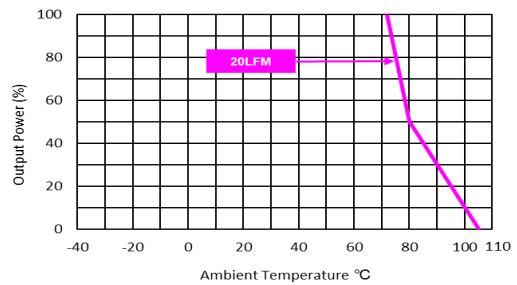
Typical Output Ripple and Noise  
 $V_{in}=V_{in\ nom}$  ; Full Load



Transient Response to Dynamic Load Change  
from 100% to 75% of Full Load ;  $V_{in}=V_{in\ nom}$



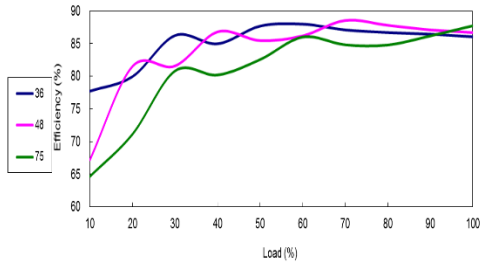
Typical Input Start-Up and Output Rise Characteristic  
 $V_{in}=V_{in\ nom}$  ; Full Load



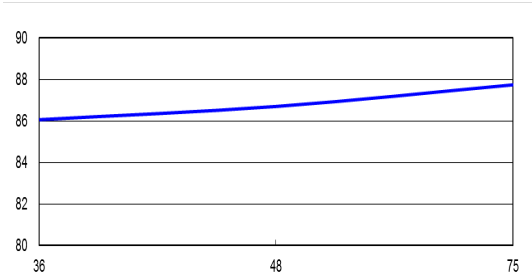
Derating Output Power Versus Ambient Temperature  
 $V_{in}=V_{in\ nom}$

**Characteristic Curves**

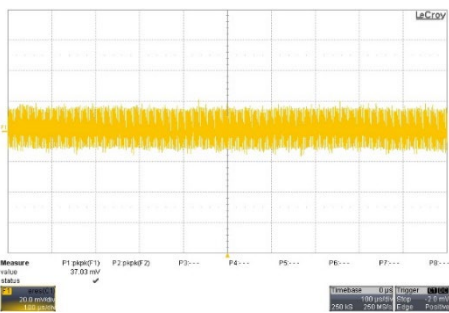
All test conditions are at 25°C The figures are identical for MDW08-48S24



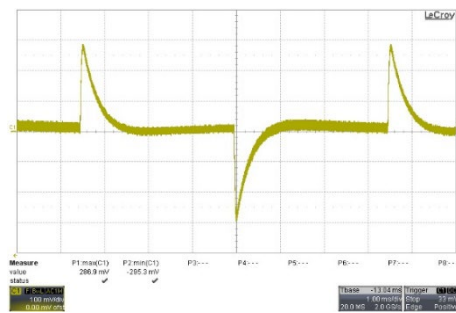
Efficiency Versus Output Current



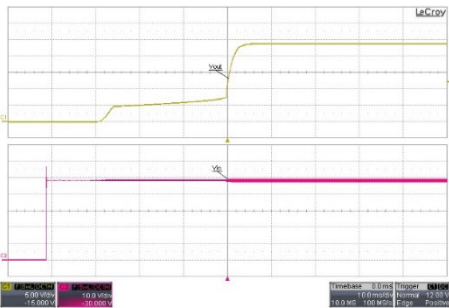
Efficiency Versus Input Voltage Full Load



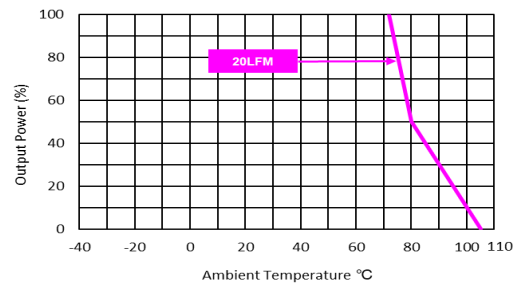
Typical Output Ripple and Noise  
 $V_{in}=V_{in\ nom}$  ; Full Load



Transient Response to Dynamic Load Change  
from 100% to 75% of Full Load ;  $V_{in}=V_{in\ nom}$



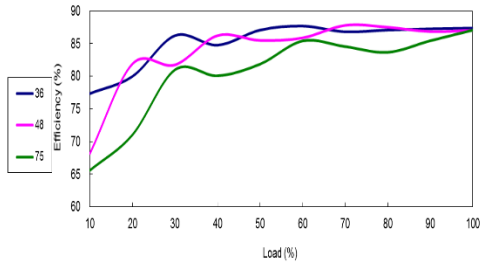
Typical Input Start-Up and Output Rise Characteristic  
 $V_{in}=V_{in\ nom}$  ; Full Load



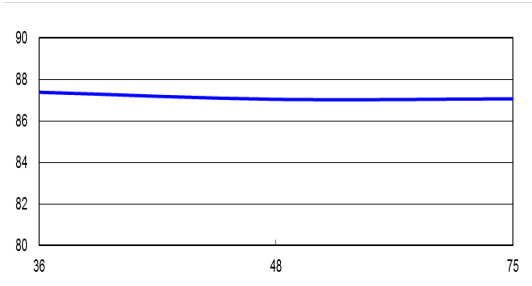
Derating Output Power Versus Ambient Temperature  
 $V_{in}=V_{in\ nom}$

**Characteristic Curves**

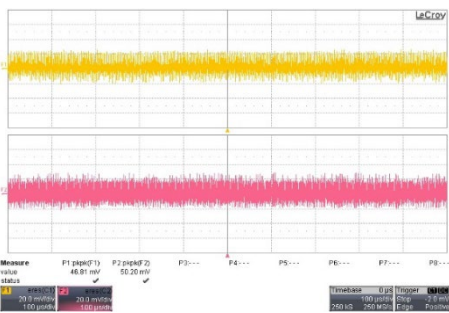
All test conditions are at 25°C The figures are identical for MDW08-48D12



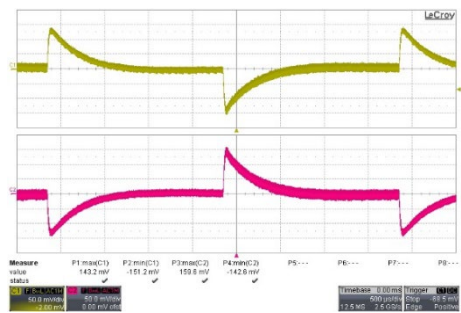
Efficiency Versus Output Current



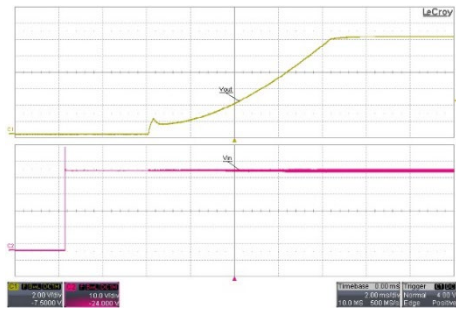
Efficiency Versus Input Voltage Full Load



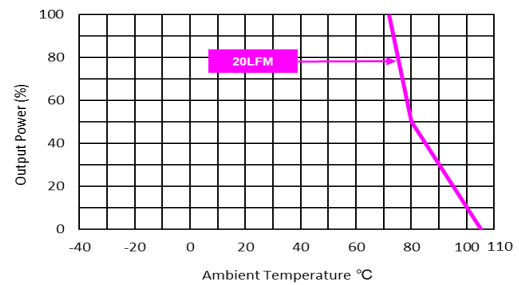
Typical Output Ripple and Noise  
 $V_{in}=V_{in\ nom}$  ; Full Load



Transient Response to Dynamic Load Change  
from 100% to 75% of Full Load ;  $V_{in}=V_{in\ nom}$



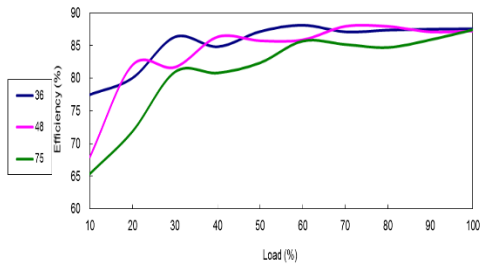
Typical Input Start-Up and Output Rise Characteristic  
 $V_{in}=V_{in\ nom}$  ; Full Load



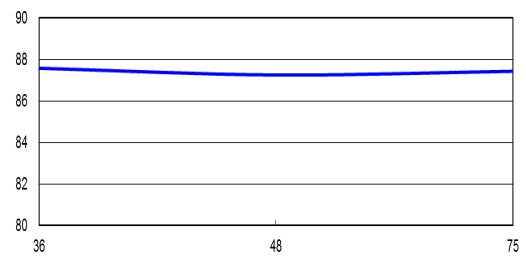
Derating Output Power Versus Ambient Temperature  
 $V_{in}=V_{in\ nom}$

**Characteristic Curves**

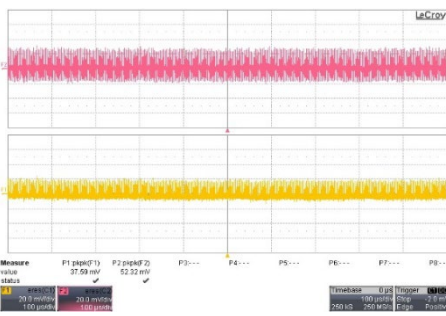
All test conditions are at 25°C The figures are identical for MDW08-48D15



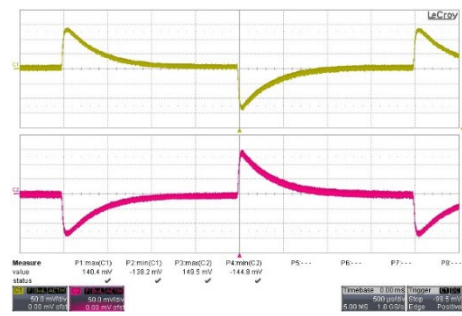
Efficiency Versus Output Current



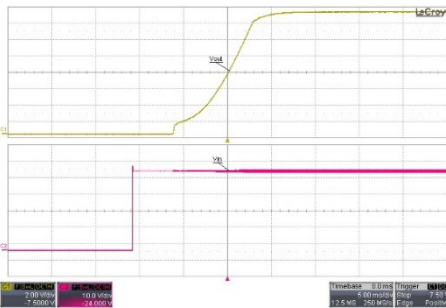
Efficiency Versus Input Voltage Full Load



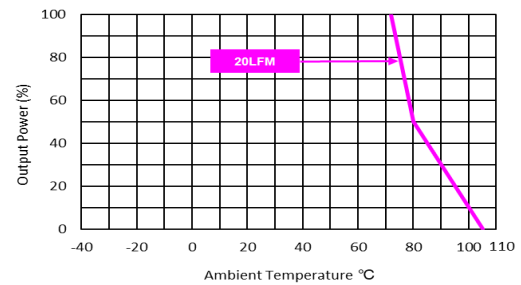
Typical Output Ripple and Noise  
 $V_{in}=V_{in\ nom}$  ; Full Load



Transient Response to Dynamic Load Change  
from 100% to 75% of Full Load ;  $V_{in}=V_{in\ nom}$

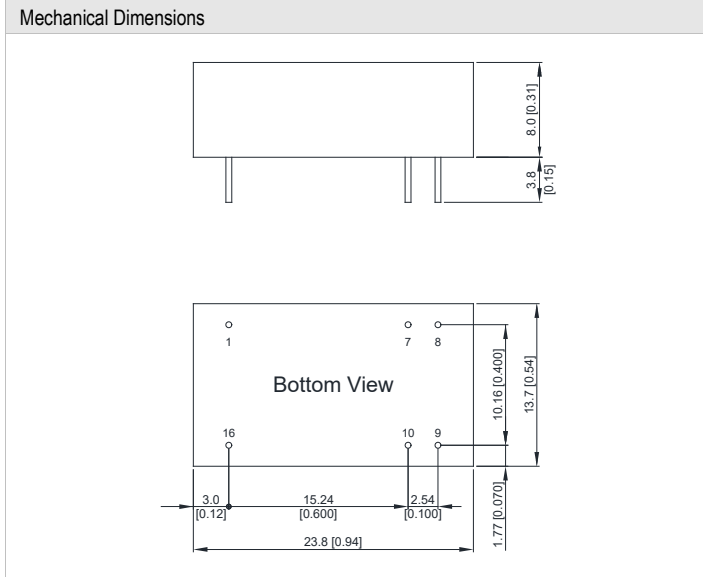


Typical Input Start-Up and Output Rise Characteristic  
 $V_{in}=V_{in\ nom}$  ; Full Load



Derating Output Power Versus Ambient Temperature  
 $V_{in}=V_{in\ nom}$

### Package Specifications



**Pin Connections**

Pin	Single Output	Dual Output	Diameter mm (inches)
1	-Vin	-Vin	∅ 0.5 [0.02]
7	NC	NC	∅ 0.5 [0.02]
8	NC	Common	∅ 0.5 [0.02]
9	+Vout	+Vout	∅ 0.5 [0.02]
10	-Vout	-Vout	∅ 0.5 [0.02]
16	+Vin	+Vin	∅ 0.5 [0.02]

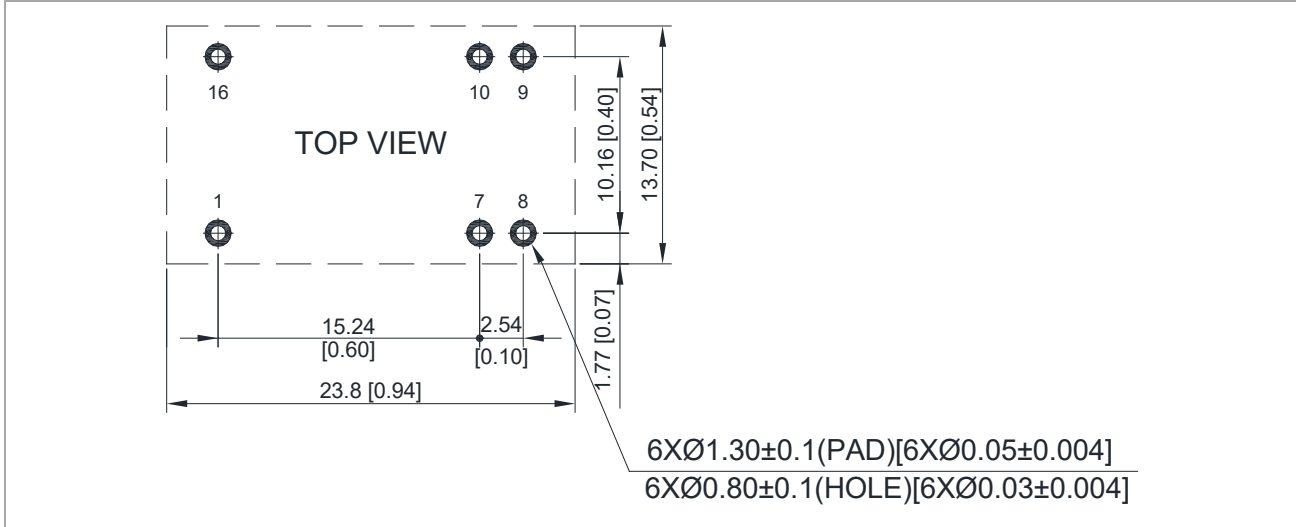
NC: No Connection

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

### Physical Characteristics

Case Size	: 23.8x13.7x8.0 mm (0.94x0.54x0.31 inches)
Case Material	: Metal With Non-Conductive Baseplate
Pin Material	: Copper Alloy
Weight	: 6.1g

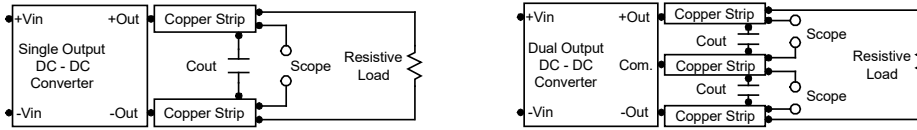
### Recommended Pad Layout for Single & Dual Output Converter



### Test Setup

#### Peak-to-Peak Output Noise Measurement Test

Use a  $C_{out}$  0.47 $\mu$ F ceramic capacitor. Scope measurement should be made by using a BNC socket, measurement bandwidth is 0-20 MHz. Position the load between 50 mm and 75 mm from the DC-DC Converter.



### Technical Notes

#### Overload Protection

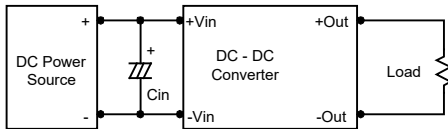
To provide protection in a fault (output overload) condition, the unit is equipped with internal current limiting circuitry and can endure current limiting for an unlimited duration. At the point of current-limit inception, the unit shifts from voltage control to current control. The unit operates normally once the output current is brought back into its specified range.

#### Input Source Impedance

The power module should be connected to a low ac-impedance input source. Highly inductive source impedances can affect the stability of the power module.

In applications where power is supplied over long lines and output loading is high, it may be necessary to use a capacitor at the input to ensure startup.

Capacitor mounted close to the power module helps ensure stability of the unit, it is recommended to use a good quality low Equivalent Series Resistance (ESR < 1.0 $\Omega$  at 100 kHz) capacitor of a 3.3 $\mu$ F for the 12V input devices and a 2.2 $\mu$ F for the 24V and 48V devices.



#### Output Ripple Reduction

A good quality low ESR capacitor placed as close as practicable across the load will give the best ripple and noise performance. To reduce output ripple, it is recommended to use 3.3 $\mu$ F capacitors at the output.



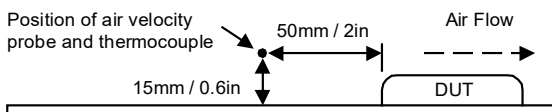
#### Maximum Capacitive Load

The MDW08 series has limitation of maximum connected capacitance at the output. The power module may be operated in current limiting mode during start-up, affecting the ramp-up and the startup time. The maximum capacitance can be found in the data sheet.

#### Thermal Considerations

Many conditions affect the thermal performance of the power module, such as orientation, airflow over the module and board spacing. To avoid exceeding the maximum temperature rating of the components inside the power module, the case temperature must be kept below 105°C.

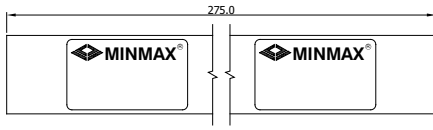
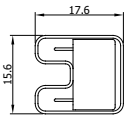
The derating curves are determined from measurements obtained in a test setup.



**Packaging Information for Tube**

Tube

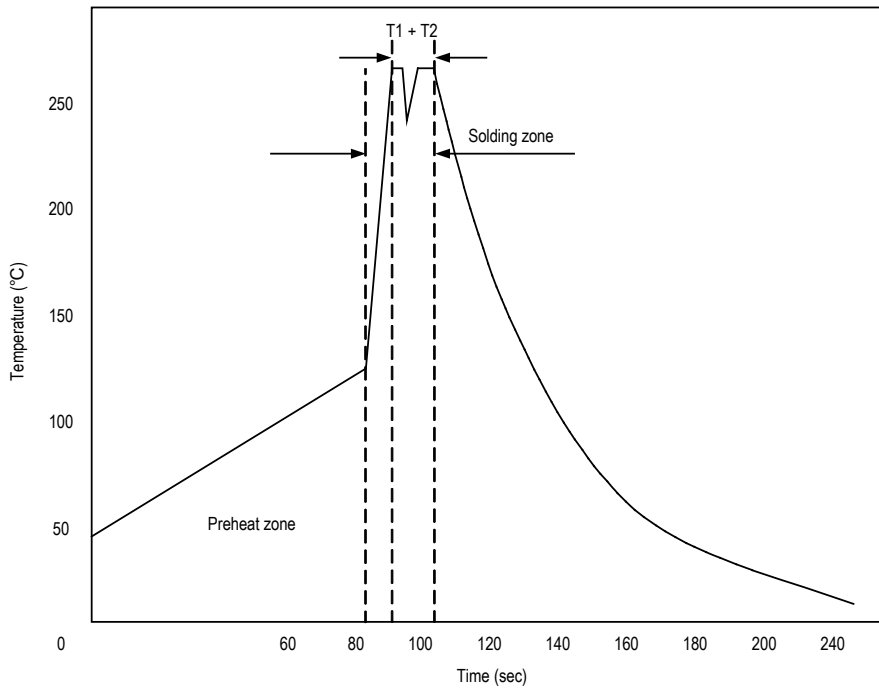
Plug



Unit: mm  
10 PCS per TUBE

**Wave Soldering Considerations**

Lead free wave solder profile



Zone	Reference Parameter
Preheat	Rise temp. speed : 3°C/sec max.
zone	Preheat temp. : 100~130°C
Actual	Peak temp. : 250~260°C
heating	Peak time(T1+T2) : 4~6 sec

**Hand Welding Parameter**

Reference Solder: Sn-Ag-Cu : Sn-Cu : Sn-Ag

Hand Welding: Soldering iron : Power 60W

Welding Time: 2~4 sec

Temp.: 380~400°C

**Part Number Structure**

<b>M</b>	<b>D</b>	<b>W</b>	<b>08</b>	-	<b>12</b>	<b>S</b>	<b>033</b>
<b>Package Type</b> DIP-16	<b>Wide 2:1</b> <b>Input Voltage Range</b>	<b>Output Power</b> 8 Watt	<b>Input Voltage Range</b>			<b>Output Quantity</b> S: Single D: Dual	<b>Output Voltage</b>
			12: 9 ~ 18 VDC			033: 3.3 VDC	
			24: 18 ~ 36 VDC			05: 5 VDC	
			48: 36 ~ 75 VDC			12: 12 VDC	
						15: 15 VDC	
						24: 24 VDC	

**MTBF and Reliability**

The MTBF of MDW08 series of DC-DC converters has been calculated using

MIL-HDBK 217F NOTICE2, Operating Temperature 25°C, Ground Benign.

Model	MTBF	Unit
MDW08-12S033	2,978,998	Hours
MDW08-12S05	2,086,679	
MDW08-12S12	2,934,195	
MDW08-12S15	2,917,639	
MDW08-12S24	3,079,766	
MDW08-12D12	3,017,274	
MDW08-12D15	2,911,573	
MDW08-24S033	2,982,206	
MDW08-24S05	2,103,958	
MDW08-24S12	3,104,663	
MDW08-24S15	3,026,233	
MDW08-24S24	3,213,210	
MDW08-24D12	3,151,681	
MDW08-24D15	3,123,088	
MDW08-48S033	2,861,835	
MDW08-48S05	2,109,995	
MDW08-48S12	3,280,703	
MDW08-48S15	3,221,562	
MDW08-48S24	3,424,041	
MDW08-48D12	3,289,403	
MDW08-48D15	3,281,566	