MINMAX®

MKWI80 Series

Electric Characteristic Note

MKWI80 Series EC Note

DC-DC CONVERTER 80W, Highest Power Density

Features

- ►**Smallest Encapsulated 80W Converter**
- ►**Ultra-compact 2"×1" Package**
- ►**Ultra-high Power Density 93W/in³**
- ►**Excellent Efficiency up to 92%**
- ►**Ultra-wide 4:1 Input Voltage Range**
- ►**Fully Regulated Output Voltage**
- ►**I/O Isolation 1500 VDC**
- ►**Wide Operating Ambient Temp. Range**
- ►**No Min. Load Requirement**
- ►**Very Low No Load Power Consumption**
- ►**Under-voltage, Overload/Temperature and Short Circuit Protection**
- ►**Remote On/Off Control, Output Voltage Trim**
- ►**Shielded Metal Case with Insulated Baseplate**
- ►**UL/cUL/IEC/EN 62368-1 Safety Approval & CE Marking (Pending)**

Applications

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

Product Overview

The MKWI80 series is a cutting-edge 80W encapsulated isolated DC-DC converter in a compact 2"×1" package. With an impressive power density of 93W/in³ and efficiency up to 92%, it is tailored for space-sensitive applications without compromising on performance. The series features an ultra-wide 4:1 input voltage range, fully regulated outputs, and 1500 VDC I/O isolation, ensuring dependable operation in diverse and challenging environments.
In addition, the MKWI80 series offers a wide operating temperature range, remote On/Off control, and output voltage trim functionality. Its ultra-low no-load power consumption and comprehensive protections—including under-voltage, overload, temperature, and short circuit safeguards—ensure reliable and energy-efficient operation.
Certified to UL/cUL/IEC/EN 62368-1 standards and CE marked, the MKWI80 series meets stringent global safety requirements. Available output voltage options include 5V, 12V, 15V, 24V, 48V, 54V, ±12V, and ±15V, making it an excellent choice for industrial, telecom, and other mission-critical applications demanding compact size and exceptional power performance.

Table of contents

Model Selection Guide

Model Number	Input Voltage (Range)	Output Voltage	Output Current	Input Current		Max. capacitive Load	Efficiency (typ.)
			Max.	@Max. Load	@No Load		@Max. Load
	VDC	VDC	mA	mA(typ.)	mA(typ.)	μF	%
MKWI80-24S05	24 (9 ~ 36)	5	16000	3663	45	28600	91
MKWI80-24S12		12	6600	3587		4950	92
MKWI80-24S15		15	5300	3601		3150	92
MKWI80-24S24		24	3300	3587		1250	92
MKWI80-24S48		48	1670	3630		330	92
MKWI80-24S54		54	1480	3620		250	92
MKWI80-24D12		±12	±3300	3587		2500#	92
MKWI80-24D15		±15	±2660	3614		1600#	92
MKWI80-48S05	48 (18 ~ 75)	5	16000	1832	35	28600	91
MKWI80-48S12		12	6600	1793		4950	92
MKWI80-48S15		15	5300	1800		3150	92
MKWI80-48S24		24	3300	1793		1250	92
MKWI80-48S48		48	1670	1815		330	92
MKWI80-48S54		54	1480	1810		250	92
MKWI80-48D12		±12	±3300	1793		2500#	92
MKWI80-48D15		±15	±2660	1807		1600#	92

For each output

Input Specifications

Parameter		Conditions / Model	Min.	Typ.	Max.	Unit
Input Surge Voltage (100ms. max)		24V Input Models	-0.7	---	50	VDC
		48V Input Models	-0.7	---	100	
Start-Up Threshold Voltage		24V Input Models	---	---	9	
		48V Input Models	---	---	18	
Under Voltage Lockout		24V Input Models	---	7.8	---	
		48V Input Models	---	16	---	
Start Up Time	Power Up	Nominal Vin and Constant Resistive Load	---	50	---	ms
	Remote On/Off		---	50	---	ms

Remote On/Off Control

Parameter		Conditions	Min.	Typ.	Max.	Unit
Positive logic (Standard)	Converter On	3.5V ~ 12V or Open Circuit				
	Converter Off	0V ~ 1.2V or Short Circuit				
Negative logic (Option)	Converter On	0V ~ 1.2V or Short Circuit				
	Converter Off	3.5V ~ 12V or Open Circuit				
Positive logic Control Input Current (on)		Vctrl = 5.0V	---	0.5	---	mA
Positive logic Control Input Current (off)		Vctrl = 0V	---	-0.5	---	mA
Negative logic Control Input Current (on)		Vctrl = 0V	---	-0.5	---	mA
Negative logic Control Input Current (off)		Vctrl = 5.0V	---	0.5	---	mA
Control Common		Referenced to Negative Input				
Standby Input Current			---	---	8	mA

Output Specifications

Parameter	Conditions / Model				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				---	---	±0.2	%
Load Regulation	Io=0% to 100%				---	---	±0.3	%
Cross Regulation (Dual)	Asymmetrical Load 25% / 100% FL				---	---	±5.0	%
Minimum Load	No minimum Load Requirement							
Ripple & Noise	0-20 MHz Bandwidth	5Vo	Measured with a 22μF MLCC		---	75	100	mV P-P
		12Vo,15Vo ±12Vo, ±15Vo			---	100	125	mV P-P
		24Vo			---	150	200	mV P-P
		48Vo			---	250	300	mV P-P
		54Vo			---	280	330	mV P-P
Transient Recovery Time	25% Load Step Change(2)				---	---	500	μs
Temperature Coefficient					---	---	±0.02	%/℃
Trim Up / Down Range (See Page 22)	% of Nominal Output Voltage		Other Models		---	---	±10	%
			54Vo Output		---	---	+5 / -15	%
Over Load Protection	Hiccup				110	---	160	%
Overshoot					---	---	5	%
Short Circuit Protection	Continuous, Automatic Recovery (Hiccup Mode 0.33Hz typ.)							

General Specifications

Parameter	Conditions	Min.	Typ.	Max.	Unit
I/O Isolation Voltage	60 Seconds	1500	---	---	VDC
	1 Second	1800	---	---	VDC
Isolation Voltage Input/Output to case	60 Seconds	1000	---	---	VDC
I/O Isolation Resistance	500 VDC	1000	---	---	MΩ
I/O Isolation Capacitance	100kHz, 1V	---	1500	---	pF
Switching Frequency		150	---	500(8)	kHz
MTBF(calculated)	MIL-HDBK-217F@25℃ Full Load, Ground Benign	114,244			Hours
Safety Approval (Pending)	UL/cUL 62368-1 recognition(UL certificate), IEC/EN 62368-1(CB-report)				

EMC Specifications

Parameter	Standards & Level			Performance
EMI(6)	Conduction	EN 55032	With external components	Class A
	Radiation			
EMS(6)	EN 55035			
	ESD	Direct discharge	Indirect discharge HCP & VCP	A
		EN 61000-4-2 Air ± 8kV, Contact ± 6kV	Contact ± 6kV	
	Radiated immunity	EN 61000-4-3 10V/m		A
	Fast transient	EN 61000-4-4 ±2kV		A
	Surge	EN 61000-4-5 ±2kV		A
	Conducted immunity	EN 61000-4-6 10Vrms		A
	PFMF	EN 61000-4-8 100A/m for Continuous; 1000 A/m for 1 s		A

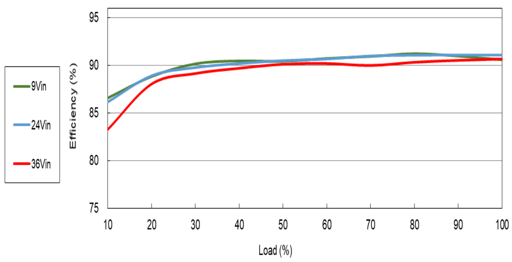
Environmental Specifications					
Parameter	Conditions / Model	Min.	Max.		Unit
			without Heatsink	with Heatsink	
Operating Ambient Temperature Range Nominal Vin, Load 100% Inom. (for Power Derating see relative Derating Curves)	MKWI80-24S05, MKWI80-48S05	-40	+50	+65	℃
	MKWI80-24S12, MKWI80-24S15, MKWI80-24S24 MKWI80-24D12, MKWI80-24D15, MKWI80-48S12 MKWI80-48S15, MKWI80-48S24, MKWI80-48D12 MKWI80-48D15		+60	+75	
	MKWI80-24S48, MKWI80-24S54 MKWI80-48S48, MKWI80-48S54		+55	+70	
Case Temperature		---	+105		℃
Over Temperature Protection (Case)		---	+115		℃
Storage Temperature Range		-50	+125		℃
Humidity (non condensing)		---	95		% rel. H
RFI	Six-Sided Shielded, Metal Case				
Lead Temperature (1.5mm from case for 10Sec.)		---	260		℃

Notes

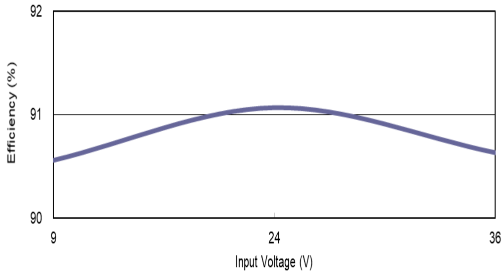
1. Specifications typical at Ta=+25℃, resistive load, nominal input voltage and rated output current unless otherwise noted.
2. Transient recovery time is measured to within 1% error band for a step change in output load of 75% to 100%.
3. We recommend to protect the converter by a slow blow fuse in the input supply line.
4. Other input and output voltage may be available, please contact MINMAX.
5. It is necessary to parallel a capacitor across the input pins under hot-swap operation. Minimum Capacitance: 68μF/ 100V KZE.
6. The external components might be required to meet EMI/EMS standard for some of test items. Please contact MINMAX for the solution in detail.
7. Do not exceed maximum power specification when adjusting output voltage.
8. Switching frequency changes depending on input and load.
9. Specifications are subject to change without notice.
10. The repeated high voltage isolation testing of the converter can degrade isolation capability, to a lesser or greater degree depending on materials, construction, environment and reflow solder process. Any material is susceptible to eventual chemical degradation when subject to very high applied voltages thus implying that the number of tests should be strictly limited. We therefore strongly advise against repeated high voltage isolation testing, but if it is absolutely required, that the voltage be reduced by 20% from specified test voltage. Furthermore, the high voltage isolation capability after reflow solder process should be evaluated as it is applied on system.

Characteristic Curves

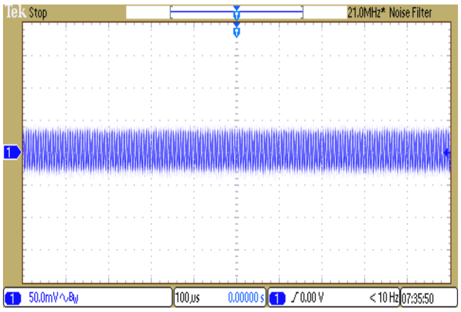
All test conditions are at 25℃ The figures are identical for MKWI80-24S05



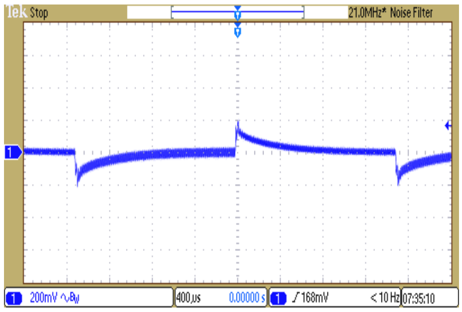
Efficiency Versus Output Current



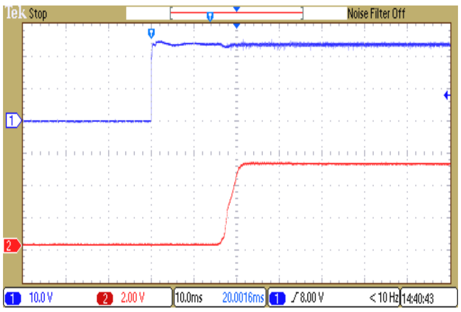
Efficiency Versus Input Voltage
Full Load



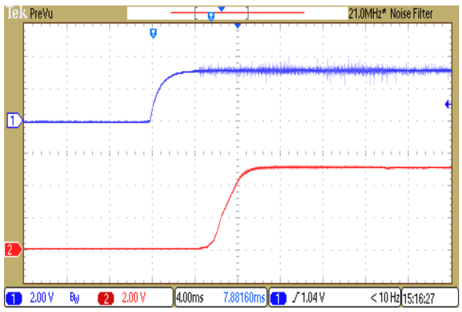
Typical Output Ripple and Noise
V_{in}=$V_{in\ nom}$; Full Load



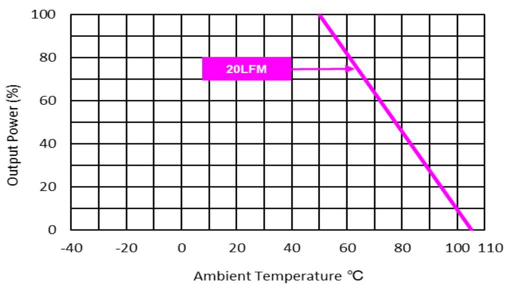
Transient Response to Dynamic Load Change
from 100% to 75% of Full Load ; V_{in}=$V_{in\ nom}$



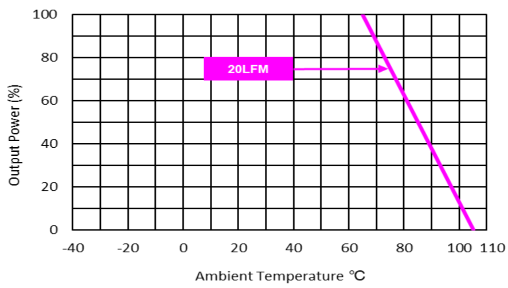
Typical Input Start-Up and Output Rise Characteristic
V_{in}=$V_{in\ nom}$; Full Load



ON/OFF Voltage Start-Up and Output Rise Characteristic
V_{in}=$V_{in\ nom}$; Full Load



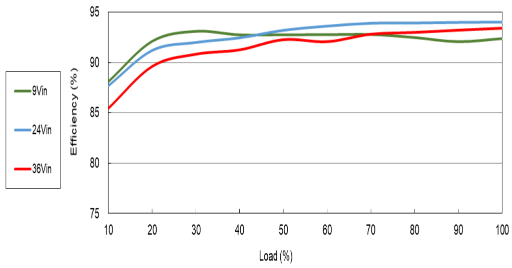
Derating Output Current Versus Ambient Temperature
V_{in}=$V_{in\ nom}$ (without heatsink)



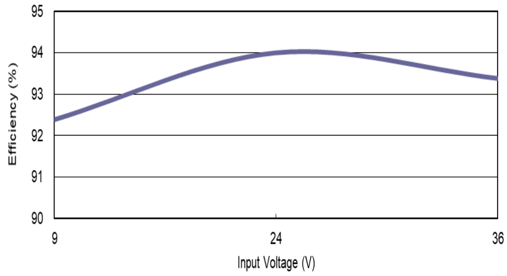
Derating Output Current Versus Ambient Temperature
V_{in}=$V_{in\ nom}$ (with heatsink)

Characteristic Curves

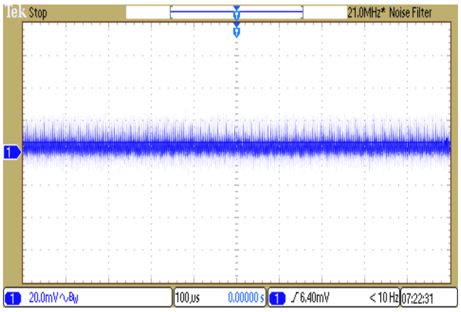
All test conditions are at 25℃ The figures are identical for MKWI80-24S12



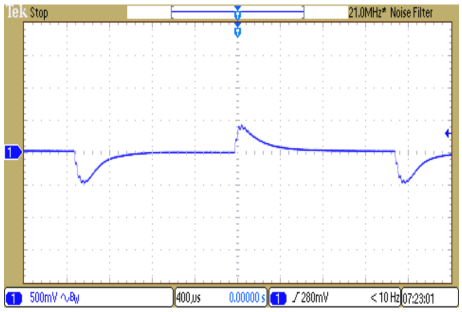
Efficiency Versus Output Current



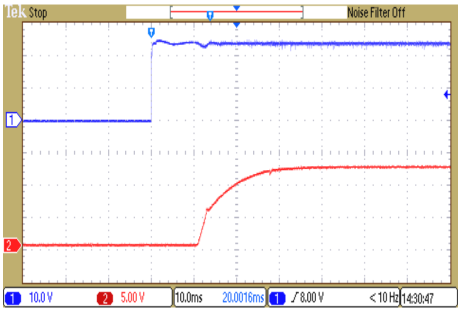
Efficiency Versus Input Voltage
Full Load



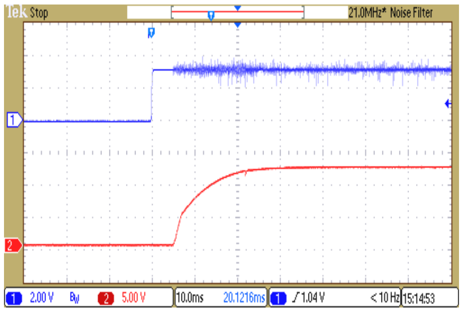
Typical Output Ripple and Noise
V_{in}=$V_{in\ nom}$; Full Load



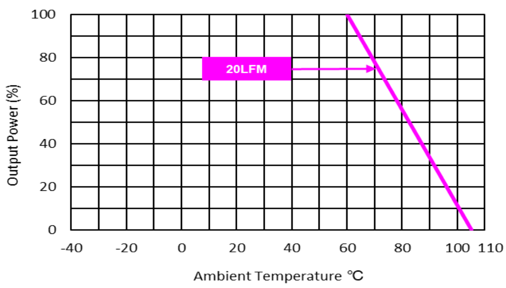
Transient Response to Dynamic Load Change
from 100% to 75% of Full Load ; V_{in}=$V_{in\ nom}$



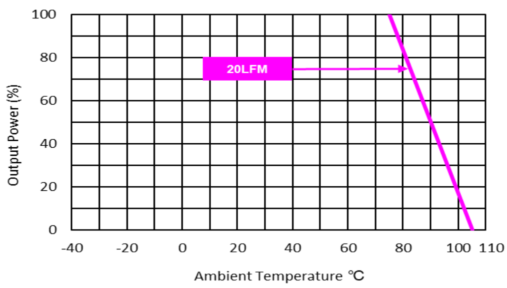
Typical Input Start-Up and Output Rise Characteristic
V_{in}=$V_{in\ nom}$; Full Load



ON/OFF Voltage Start-Up and Output Rise Characteristic
V_{in}=$V_{in\ nom}$; Full Load



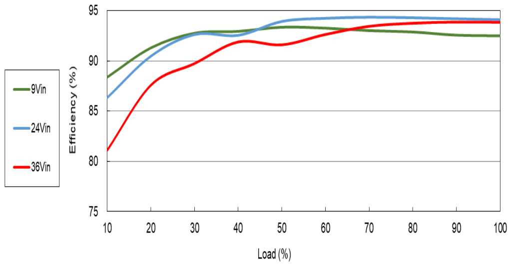
Derating Output Current Versus Ambient Temperature
V_{in}=$V_{in\ nom}$ (without heatsink)



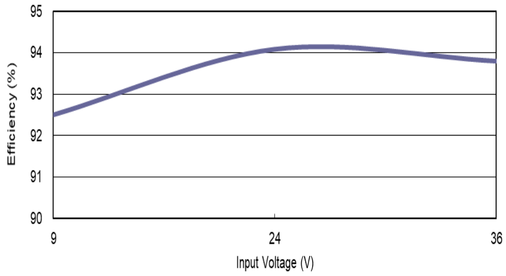
Derating Output Current Versus Ambient Temperature
V_{in}=$V_{in\ nom}$ (with heatsink)

Characteristic Curves

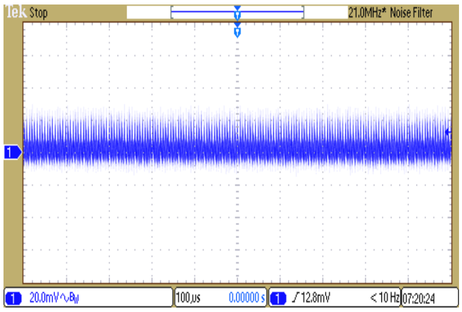
All test conditions are at 25℃ The figures are identical for MKWI80-24S15



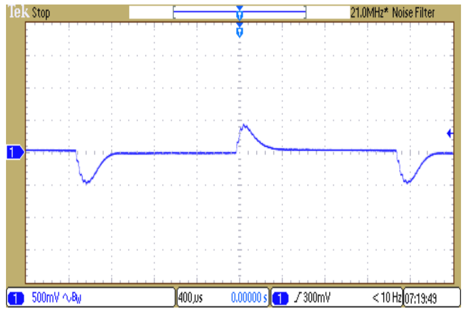
Efficiency Versus Output Current



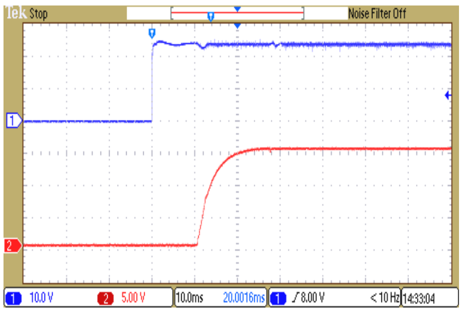
Efficiency Versus Input Voltage
Full Load



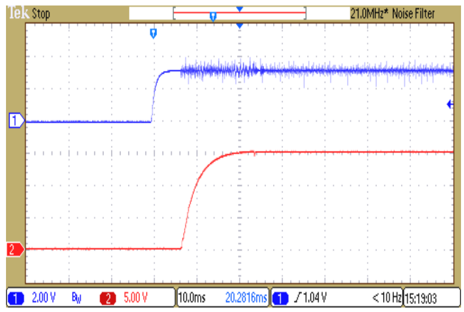
Typical Output Ripple and Noise
$V_{in}=V_{in\ nom}$; Full Load



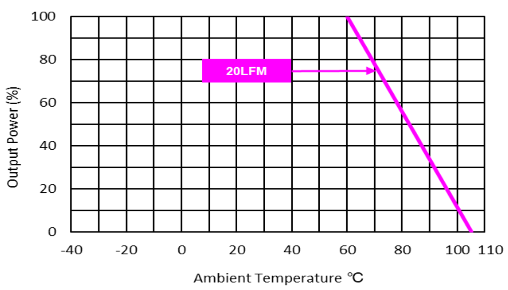
Transient Response to Dynamic Load Change
from 100% to 75% of Full Load ; $V_{in}=V_{in\ nom}$



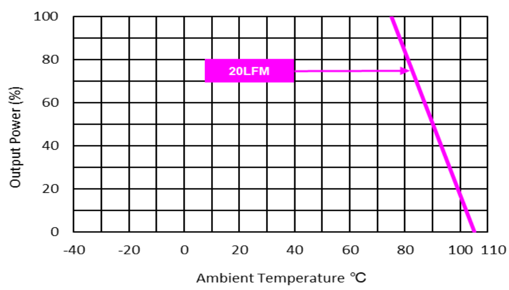
Typical Input Start-Up and Output Rise Characteristic
$V_{in}=V_{in\ nom}$; Full Load



ON/OFF Voltage Start-Up and Output Rise Characteristic
$V_{in}=V_{in\ nom}$; Full Load



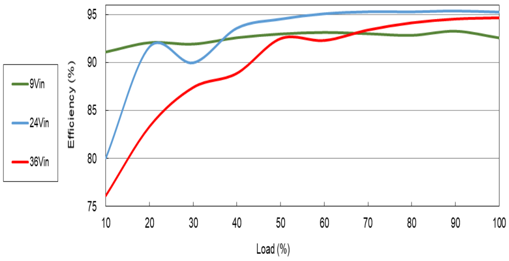
Derating Output Current Versus Ambient Temperature
$V_{in}=V_{in\ nom}$ (without heatsink)



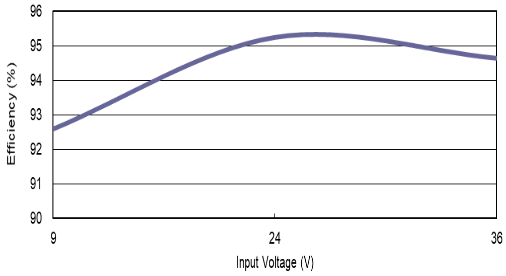
Derating Output Current Versus Ambient Temperature
$V_{in}=V_{in\ nom}$ (with heatsink)

Characteristic Curves

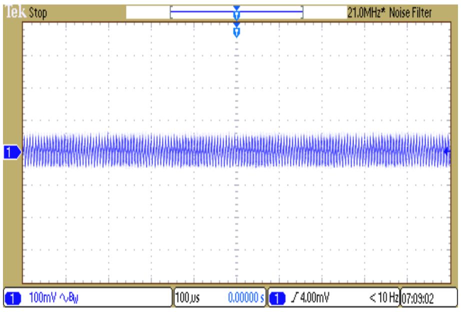
All test conditions are at 25℃ The figures are identical for MKWI80-24S24



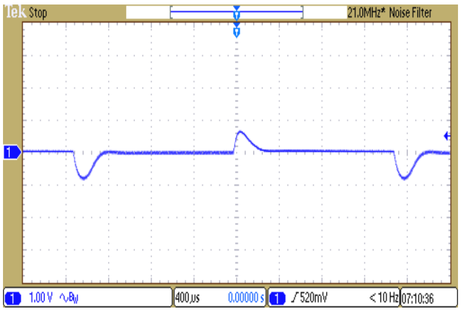
Efficiency Versus Output Current



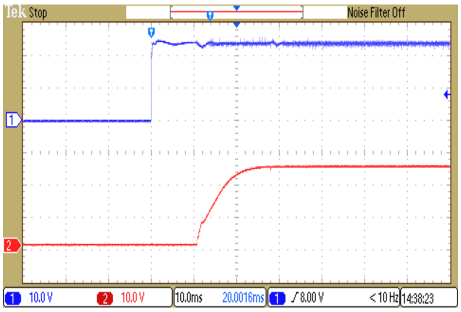
Efficiency Versus Input Voltage
Full Load



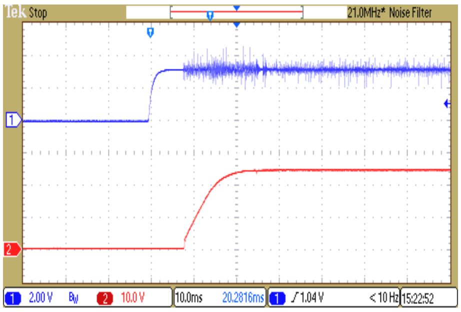
Typical Output Ripple and Noise
V_{in}=$V_{in\ nom}$; Full Load



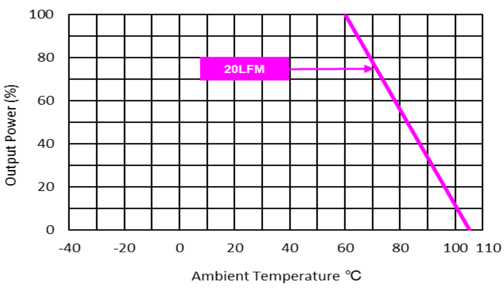
Transient Response to Dynamic Load Change
from 100% to 75% of Full Load ; V_{in}=$V_{in\ nom}$



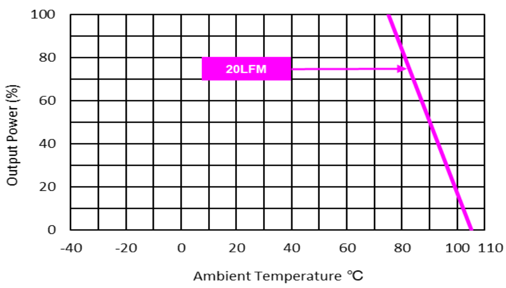
Typical Input Start-Up and Output Rise Characteristic
V_{in}=$V_{in\ nom}$; Full Load



ON/OFF Voltage Start-Up and Output Rise Characteristic
V_{in}=$V_{in\ nom}$; Full Load



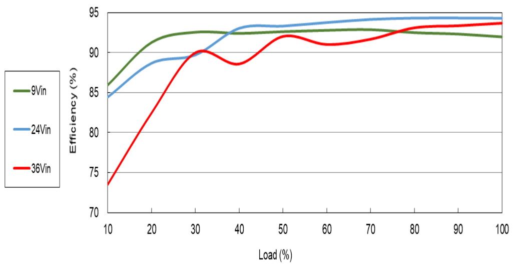
Derating Output Current Versus Ambient Temperature
V_{in}=$V_{in\ nom}$ (without heatsink)



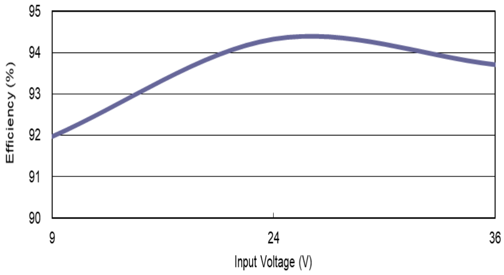
Derating Output Current Versus Ambient Temperature
V_{in}=$V_{in\ nom}$ (with heatsink)

Characteristic Curves

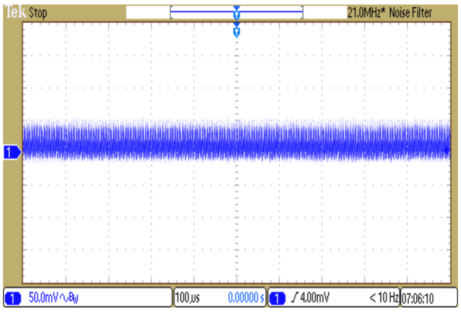
All test conditions are at 25℃ The figures are identical for MKWI80-24S48



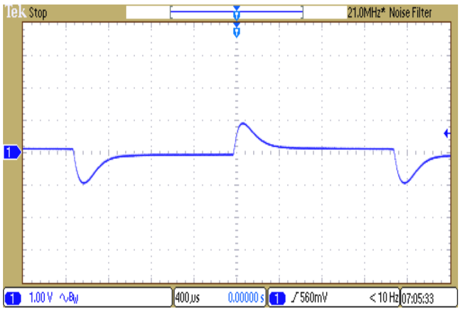
Efficiency Versus Output Current



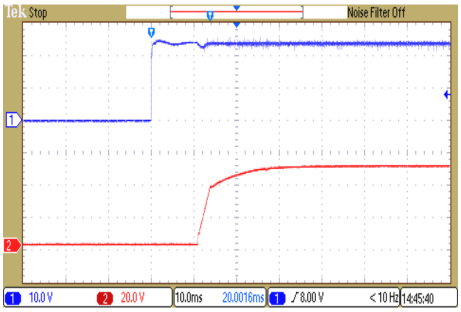
Efficiency Versus Input Voltage
Full Load



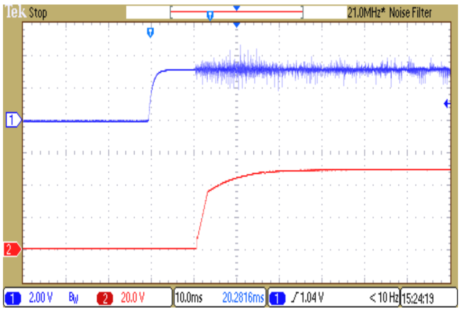
Typical Output Ripple and Noise
$V_{in}=V_{in\ nom}$; Full Load



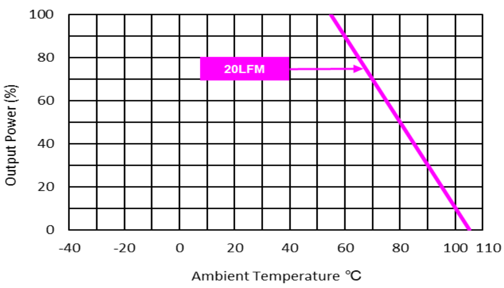
Transient Response to Dynamic Load Change
from 100% to 75% of Full Load ; $V_{in}=V_{in\ nom}$



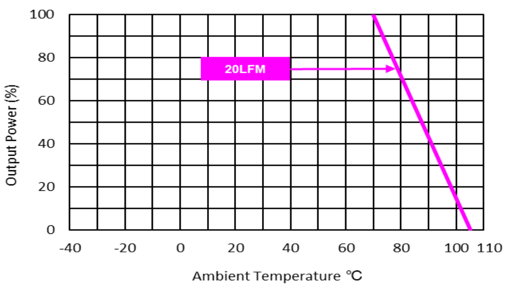
Typical Input Start-Up and Output Rise Characteristic
$V_{in}=V_{in\ nom}$; Full Load



ON/OFF Voltage Start-Up and Output Rise Characteristic
$V_{in}=V_{in\ nom}$; Full Load



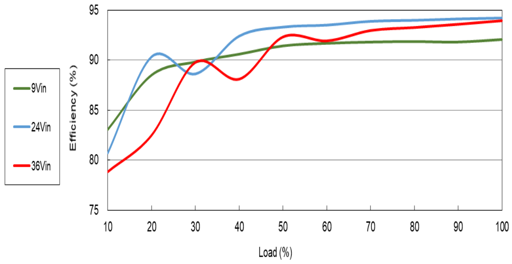
Derating Output Current Versus Ambient Temperature
$V_{in}=V_{in\ nom}$ (without heatsink)



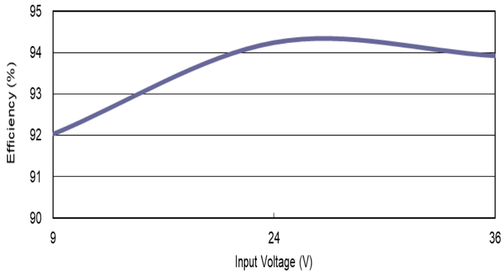
Derating Output Current Versus Ambient Temperature
$V_{in}=V_{in\ nom}$ (with heatsink)

Characteristic Curves

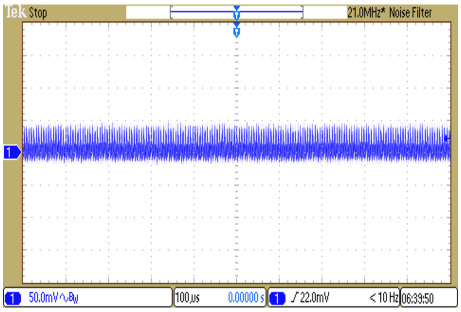
All test conditions are at 25℃ The figures are identical for MKWI80-24S54



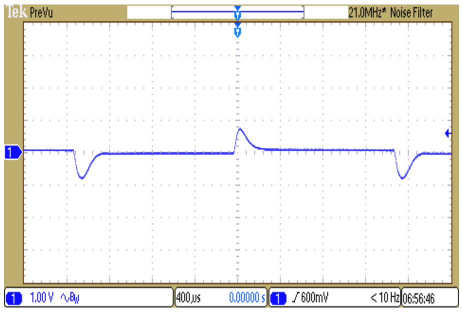
Efficiency Versus Output Current



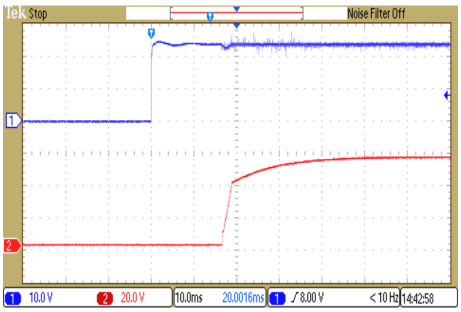
Efficiency Versus Input Voltage
Full Load



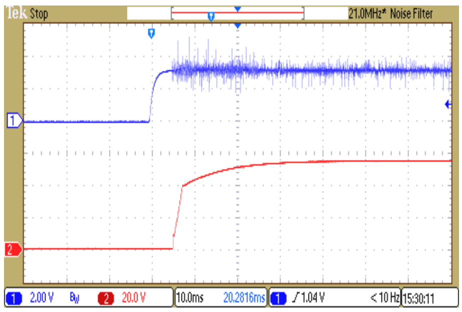
Typical Output Ripple and Noise
V_{in}=$V_{in\ nom}$; Full Load



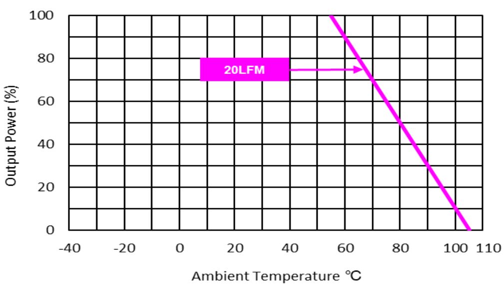
Transient Response to Dynamic Load Change
from 100% to 75% of Full Load ; V_{in}=$V_{in\ nom}$



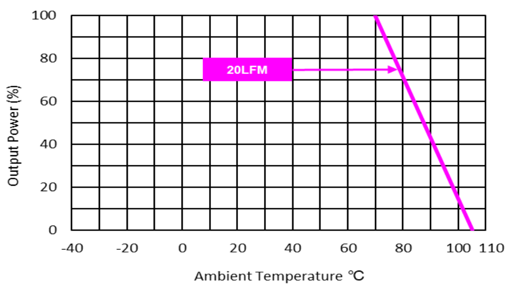
Typical Input Start-Up and Output Rise Characteristic
V_{in}=$V_{in\ nom}$; Full Load



ON/OFF Voltage Start-Up and Output Rise Characteristic
V_{in}=$V_{in\ nom}$; Full Load



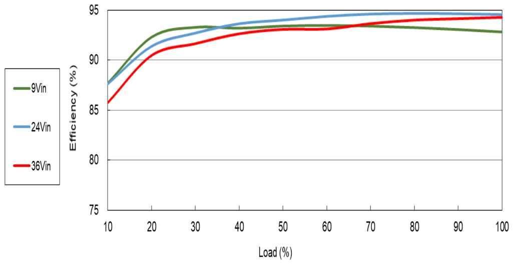
Derating Output Current Versus Ambient Temperature
V_{in}=$V_{in\ nom}$ (without heatsink)



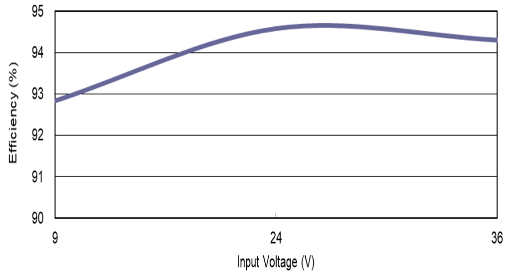
Derating Output Current Versus Ambient Temperature
V_{in}=$V_{in\ nom}$ (with heatsink)

Characteristic Curves

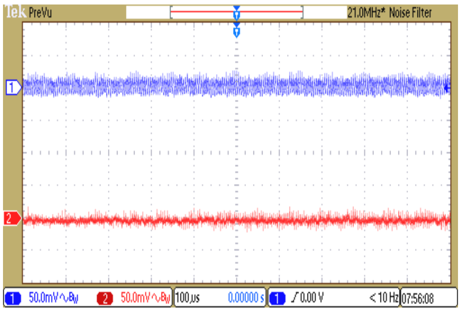
All test conditions are at 25℃ The figures are identical for MKWI80-24D12



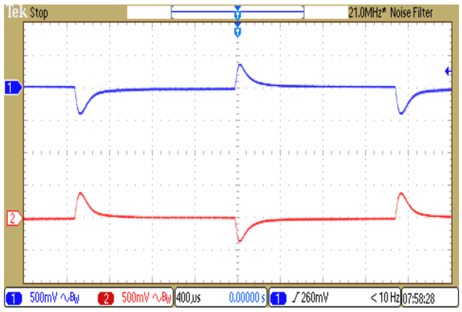
Efficiency Versus Output Current



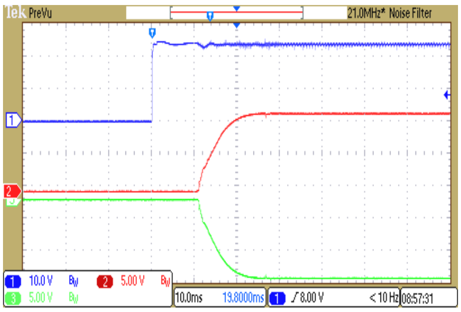
Efficiency Versus Input Voltage
Full Load



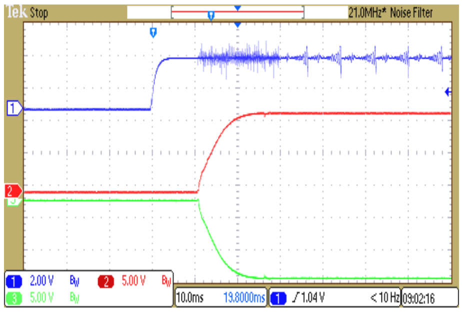
Typical Output Ripple and Noise
$V_{in}=V_{in\ nom}$; Full Load



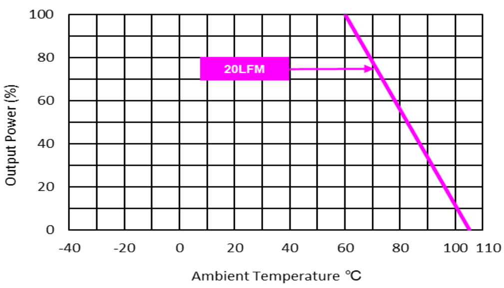
Transient Response to Dynamic Load Change
from 100% to 75% of Full Load ; $V_{in}=V_{in\ nom}$



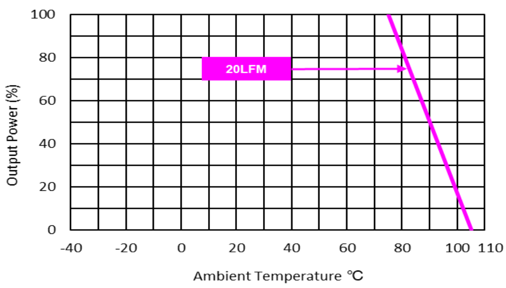
Typical Input Start-Up and Output Rise Characteristic
$V_{in}=V_{in\ nom}$; Full Load



ON/OFF Voltage Start-Up and Output Rise Characteristic
$V_{in}=V_{in\ nom}$; Full Load



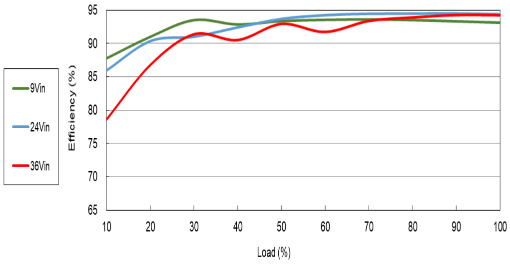
Derating Output Current Versus Ambient Temperature
$V_{in}=V_{in\ nom}$ (without heatsink)



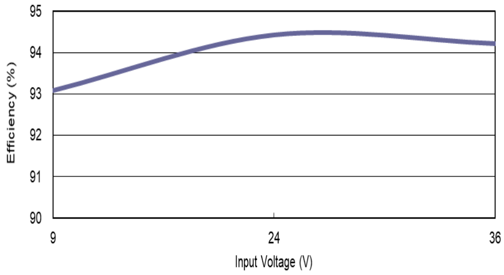
Derating Output Current Versus Ambient Temperature
$V_{in}=V_{in\ nom}$ (with heatsink)

Characteristic Curves

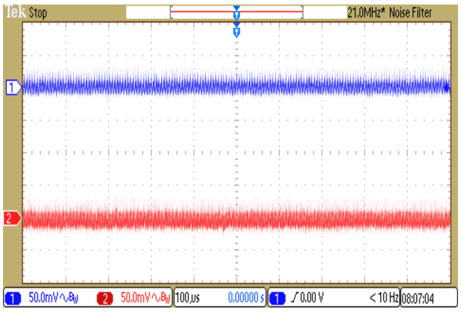
All test conditions are at 25℃ The figures are identical for MKWI80-24D15



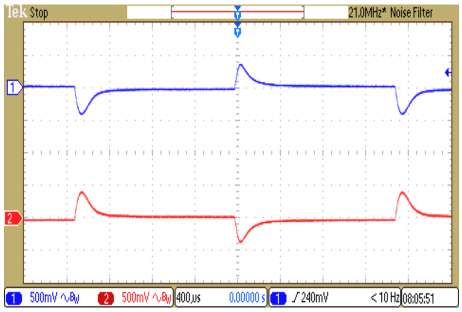
Efficiency Versus Output Current



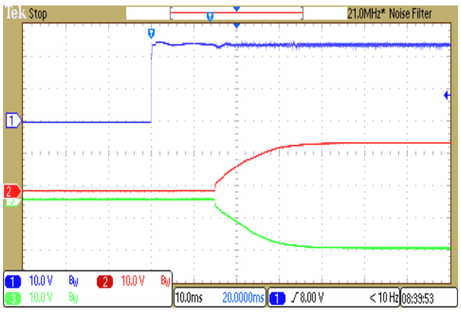
Efficiency Versus Input Voltage
Full Load



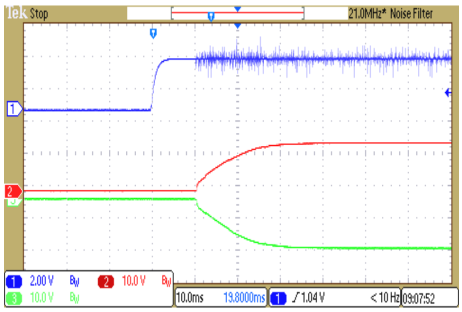
Typical Output Ripple and Noise
V_{in}=$V_{in\ nom}$; Full Load



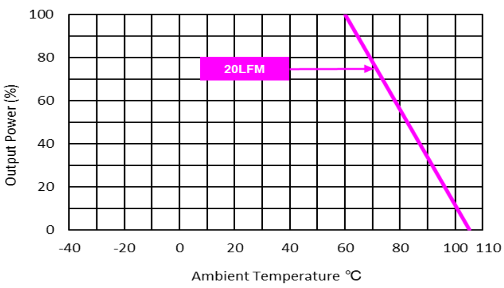
Transient Response to Dynamic Load Change
from 100% to 75% of Full Load ; V_{in}=$V_{in\ nom}$



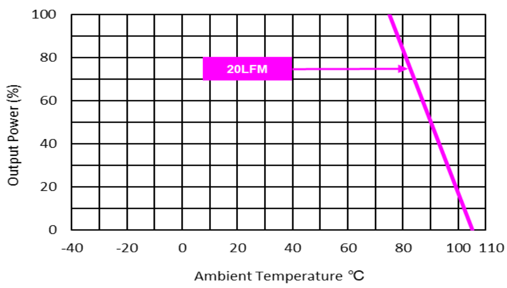
Typical Input Start-Up and Output Rise Characteristic
V_{in}=$V_{in\ nom}$; Full Load



ON/OFF Voltage Start-Up and Output Rise Characteristic
V_{in}=$V_{in\ nom}$; Full Load



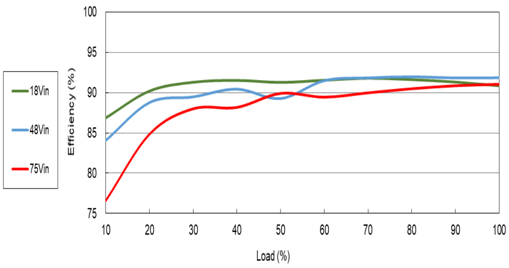
Derating Output Current Versus Ambient Temperature
V_{in}=$V_{in\ nom}$ (without heatsink)



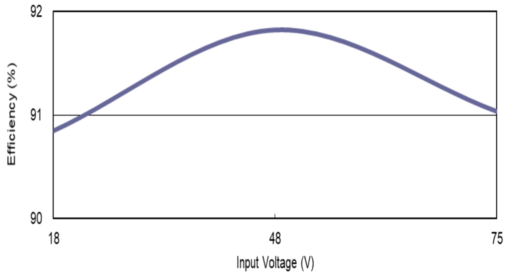
Derating Output Current Versus Ambient Temperature
V_{in}=$V_{in\ nom}$ (with heatsink)

Characteristic Curves

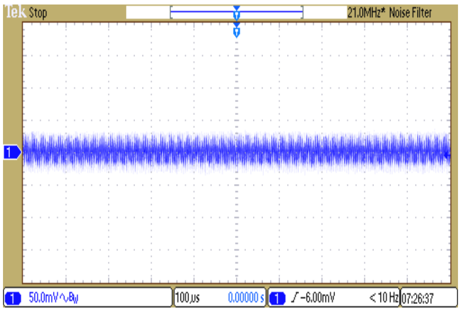
All test conditions are at 25℃ The figures are identical for MKWI80-48S05



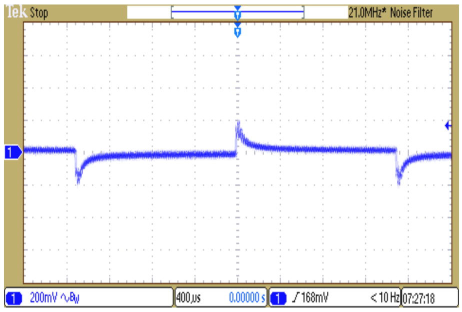
Efficiency Versus Output Current



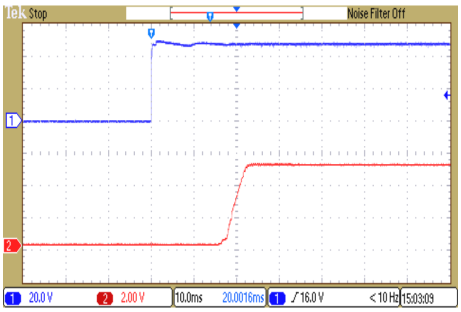
Efficiency Versus Input Voltage
Full Load



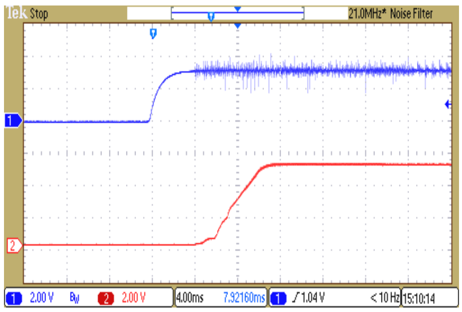
Typical Output Ripple and Noise
$V_{in}=V_{in\ nom}$; Full Load



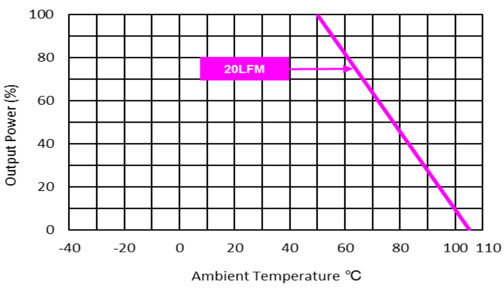
Transient Response to Dynamic Load Change
from 100% to 75% of Full Load ; $V_{in}=V_{in\ nom}$



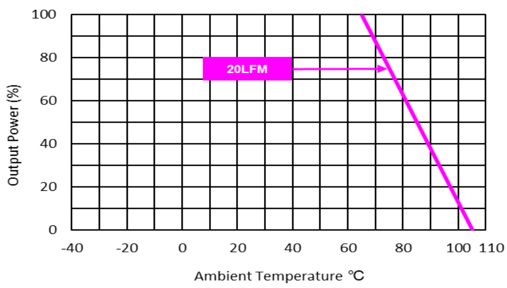
Typical Input Start-Up and Output Rise Characteristic
$V_{in}=V_{in\ nom}$; Full Load



ON/OFF Voltage Start-Up and Output Rise Characteristic
$V_{in}=V_{in\ nom}$; Full Load



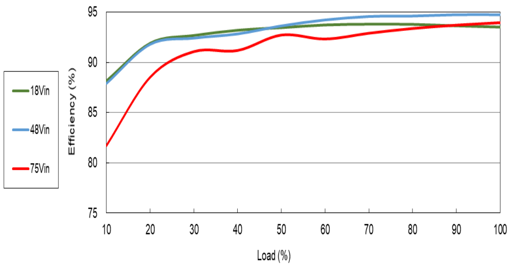
Derating Output Current Versus Ambient Temperature
$V_{in}=V_{in\ nom}$ (without heatsink)



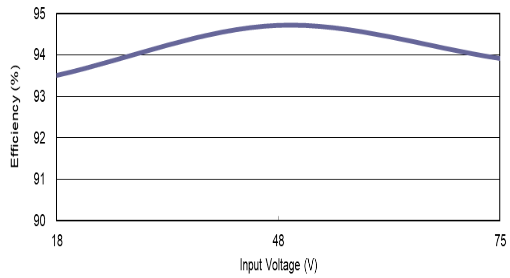
Derating Output Current Versus Ambient Temperature
$V_{in}=V_{in\ nom}$ (with heatsink)

Characteristic Curves

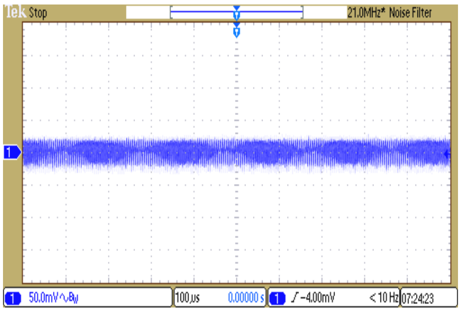
All test conditions are at 25℃ The figures are identical for MKWI80-48S12



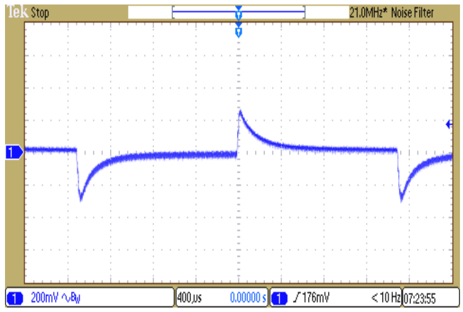
Efficiency Versus Output Current



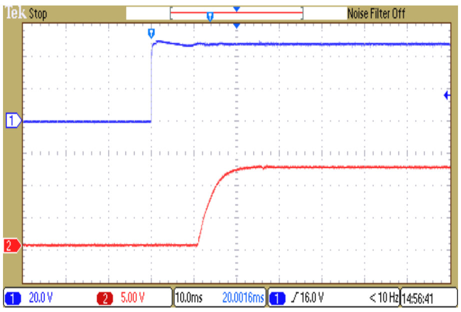
Efficiency Versus Input Voltage
Full Load



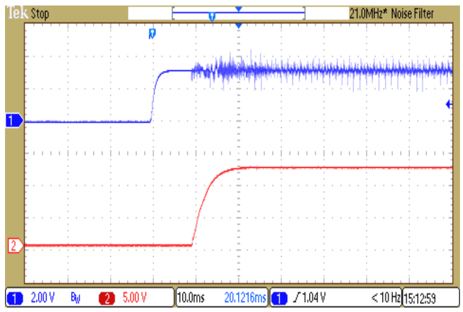
Typical Output Ripple and Noise
V_{in}=$V_{in\ nom}$; Full Load



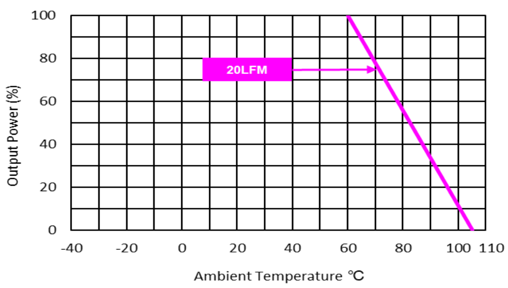
Transient Response to Dynamic Load Change
from 100% to 75% of Full Load ; V_{in}=$V_{in\ nom}$

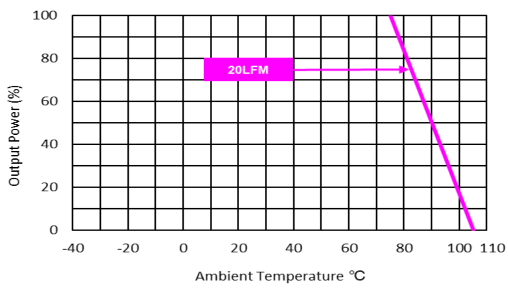


Typical Input Start-Up and Output Rise Characteristic
V_{in}=$V_{in\ nom}$; Full Load



ON/OFF Voltage Start-Up and Output Rise Characteristic
V_{in}=$V_{in\ nom}$; Full Load



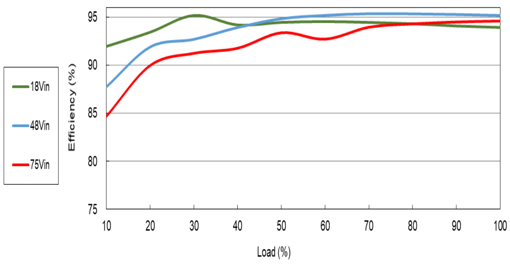


Derating Output Current Versus Ambient Temperature
V_{in}=$V_{in\ nom}$ (without heatsink)

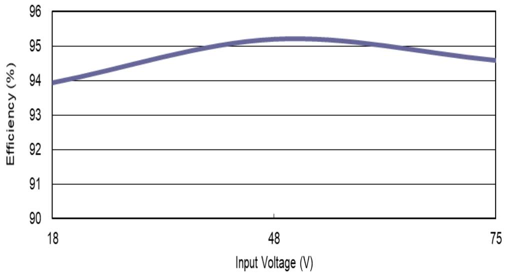
Derating Output Current Versus Ambient Temperature
V_{in}=$V_{in\ nom}$ (with heatsink)

Characteristic Curves

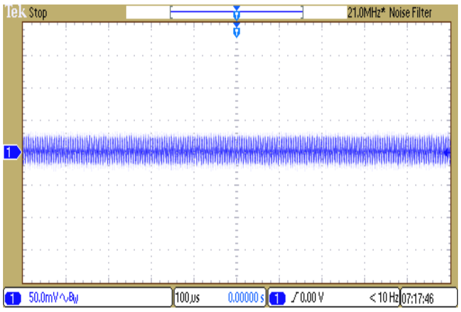
All test conditions are at 25℃ The figures are identical for MKWI80-48S15



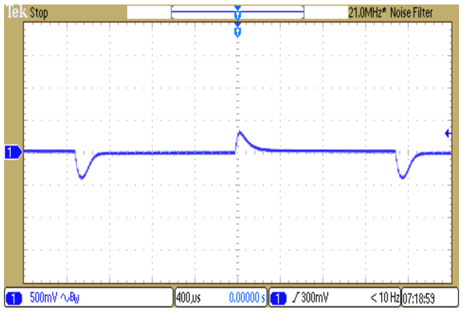
Efficiency Versus Output Current



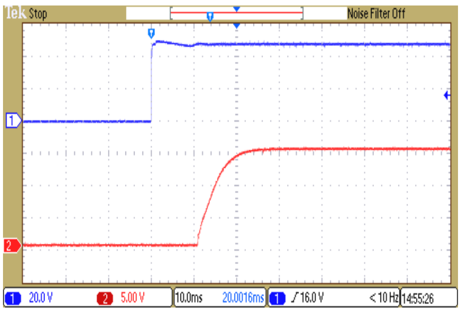
Efficiency Versus Input Voltage
Full Load



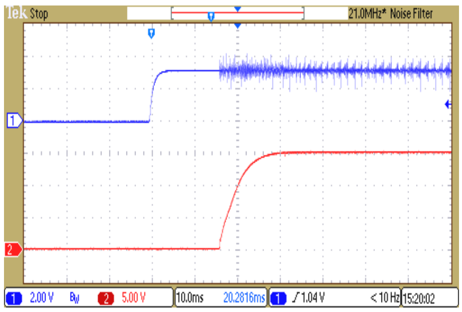
Typical Output Ripple and Noise
$V_{in}=V_{in\ nom}$; Full Load



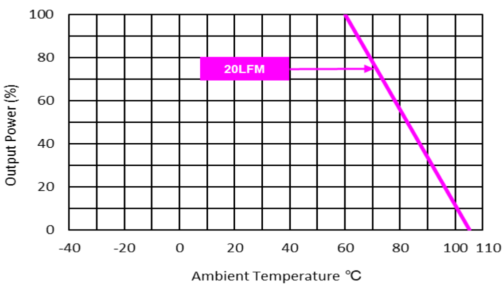
Transient Response to Dynamic Load Change
from 100% to 75% of Full Load ; $V_{in}=V_{in\ nom}$



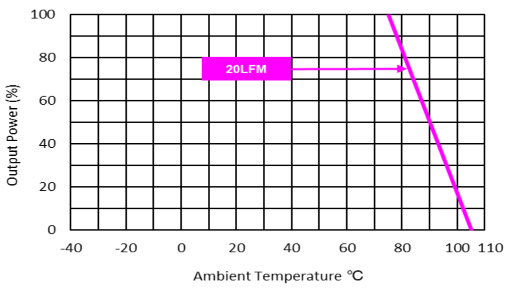
Typical Input Start-Up and Output Rise Characteristic
$V_{in}=V_{in\ nom}$; Full Load



ON/OFF Voltage Start-Up and Output Rise Characteristic
$V_{in}=V_{in\ nom}$; Full Load



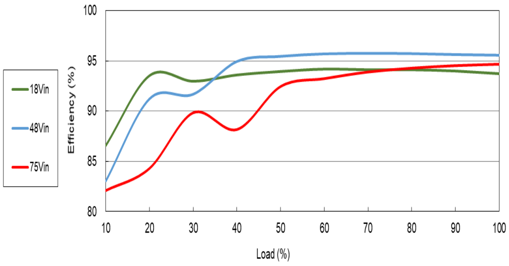
Derating Output Current Versus Ambient Temperature
$V_{in}=V_{in\ nom}$ (without heatsink)



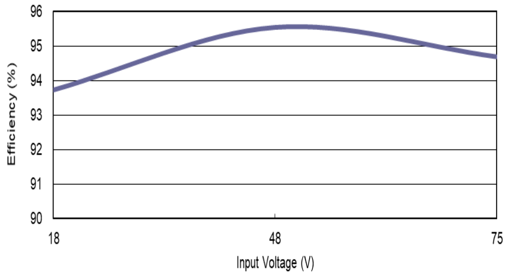
Derating Output Current Versus Ambient Temperature
$V_{in}=V_{in\ nom}$ (with heatsink)

Characteristic Curves

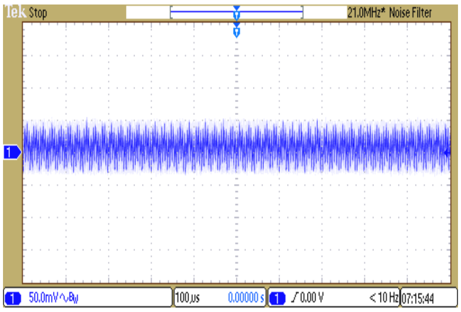
All test conditions are at 25℃ The figures are identical for MKWI80-48S24



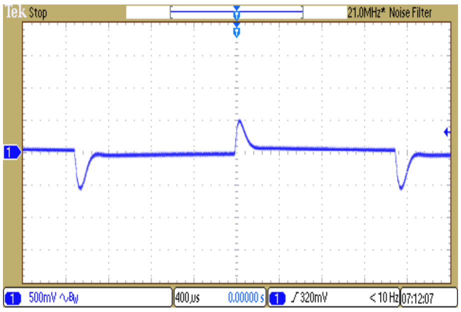
Efficiency Versus Output Current



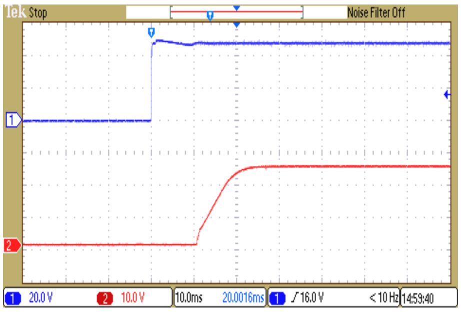
Efficiency Versus Input Voltage
Full Load



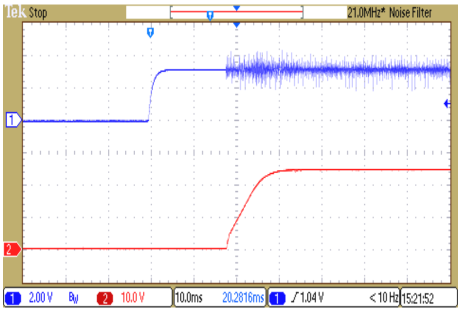
Typical Output Ripple and Noise
$V_{in}=V_{in\ nom}$; Full Load



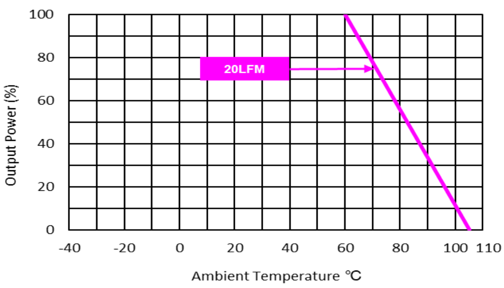
Transient Response to Dynamic Load Change
from 100% to 75% of Full Load ; $V_{in}=V_{in\ nom}$



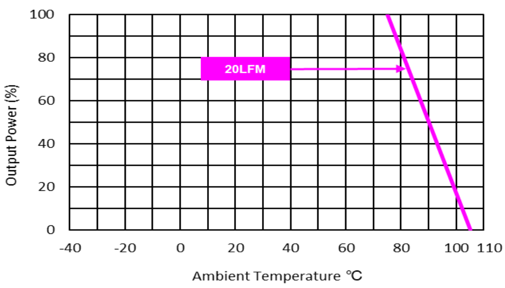
Typical Input Start-Up and Output Rise Characteristic
$V_{in}=V_{in\ nom}$; Full Load



ON/OFF Voltage Start-Up and Output Rise Characteristic
$V_{in}=V_{in\ nom}$; Full Load



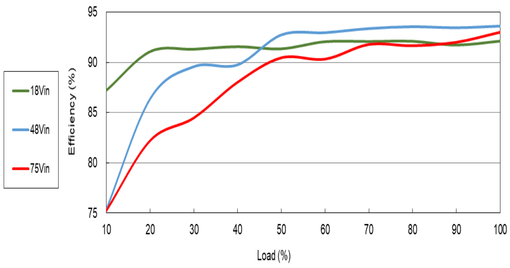
Derating Output Current Versus Ambient Temperature
$V_{in}=V_{in\ nom}$ (without heatsink)



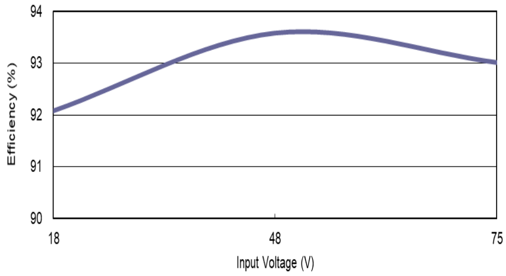
Derating Output Current Versus Ambient Temperature
$V_{in}=V_{in\ nom}$ (with heatsink)

Characteristic Curves

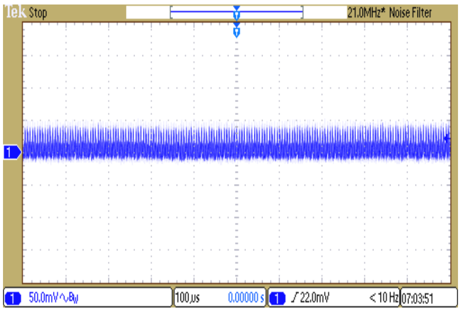
All test conditions are at 25℃ The figures are identical for MKWI80-48S48



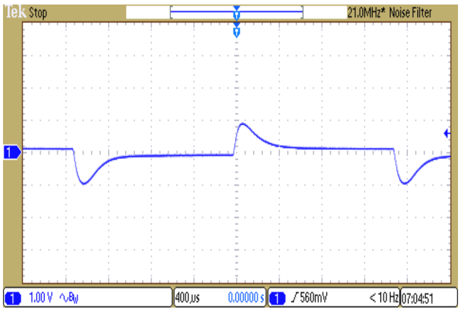
Efficiency Versus Output Current



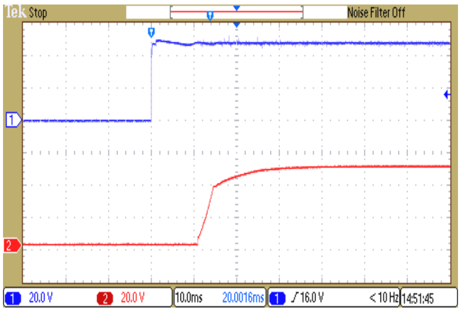
Efficiency Versus Input Voltage
Full Load



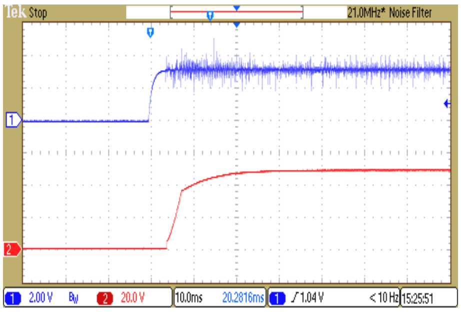
Typical Output Ripple and Noise
$V_{in}=V_{in\ nom}$; Full Load



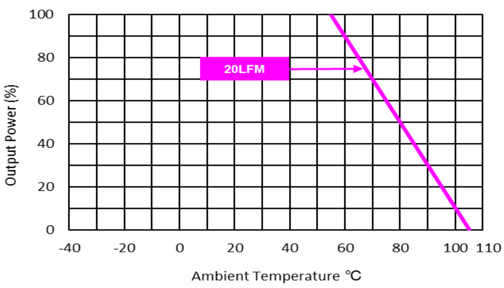
Transient Response to Dynamic Load Change
from 100% to 75% of Full Load ; $V_{in}=V_{in\ nom}$



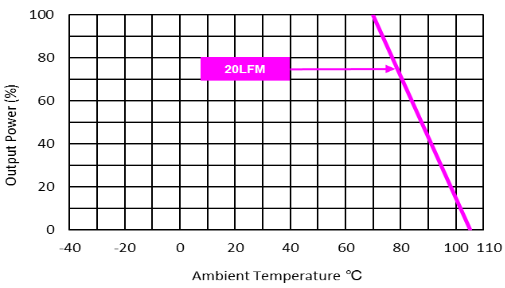
Typical Input Start-Up and Output Rise Characteristic
$V_{in}=V_{in\ nom}$; Full Load



ON/OFF Voltage Start-Up and Output Rise Characteristic
$V_{in}=V_{in\ nom}$; Full Load



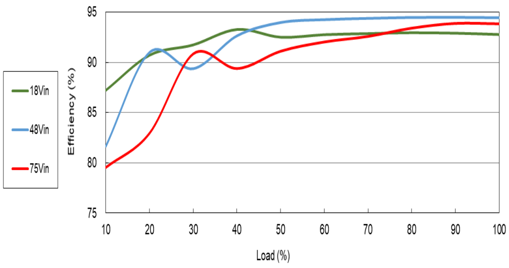
Derating Output Current Versus Ambient Temperature
$V_{in}=V_{in\ nom}$ (without heatsink)



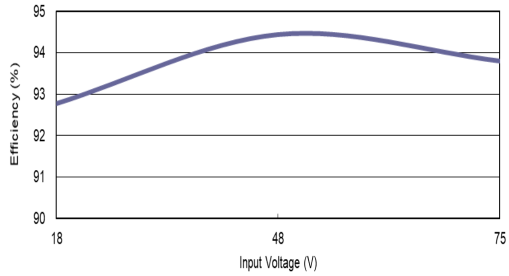
Derating Output Current Versus Ambient Temperature
$V_{in}=V_{in\ nom}$ (with heatsink)

Characteristic Curves

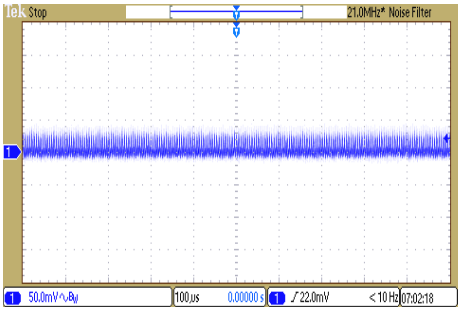
All test conditions are at 25℃ The figures are identical for MKWI80-48S54



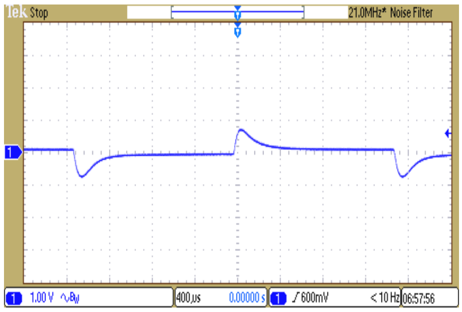
Efficiency Versus Output Current



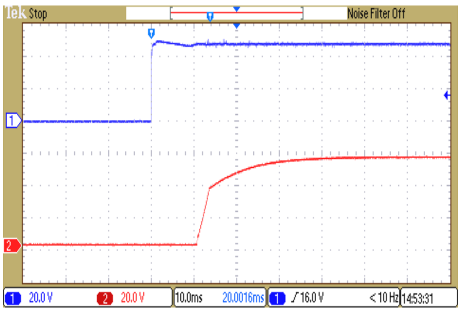
Efficiency Versus Input Voltage
Full Load



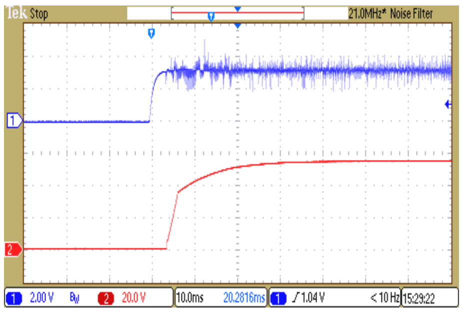
Typical Output Ripple and Noise
V_{in}=$V_{in\ nom}$; Full Load



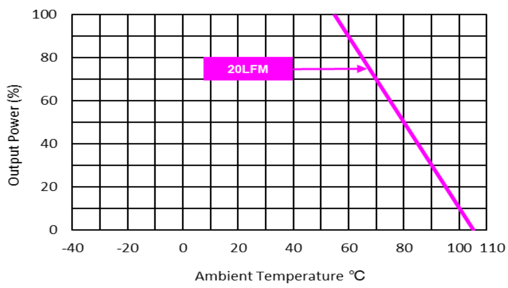
Transient Response to Dynamic Load Change
from 100% to 75% of Full Load ; V_{in}=$V_{in\ nom}$



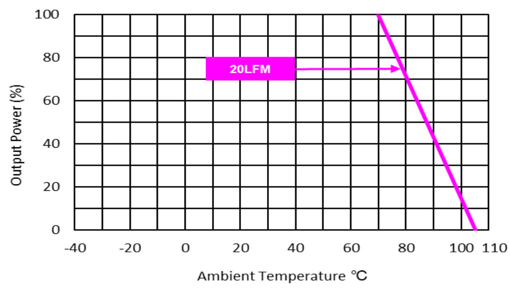
Typical Input Start-Up and Output Rise Characteristic
V_{in}=$V_{in\ nom}$; Full Load



ON/OFF Voltage Start-Up and Output Rise Characteristic
V_{in}=$V_{in\ nom}$; Full Load



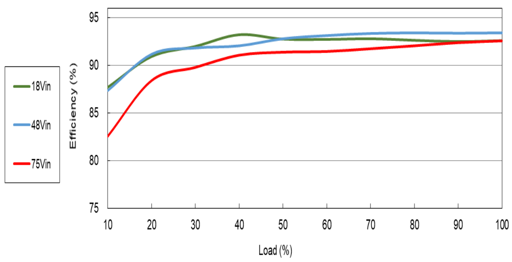
Derating Output Current Versus Ambient Temperature
V_{in}=$V_{in\ nom}$ (without heatsink)



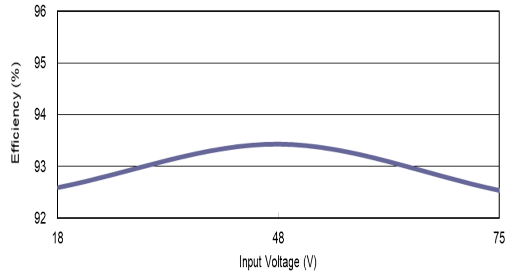
Derating Output Current Versus Ambient Temperature
V_{in}=$V_{in\ nom}$ (with heatsink)

Characteristic Curves

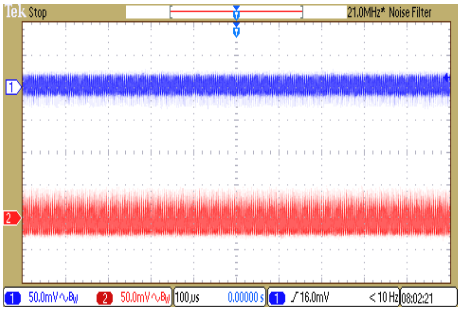
All test conditions are at 25℃ The figures are identical for MKWI80-48D12



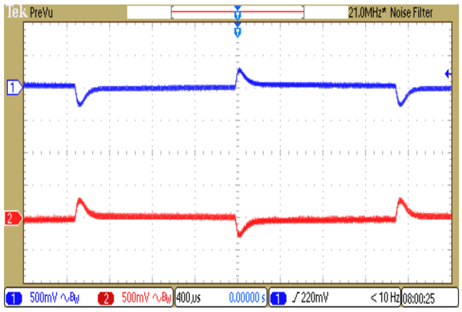
Efficiency Versus Output Current



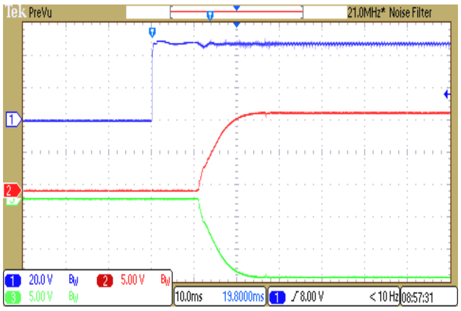
Efficiency Versus Input Voltage
Full Load



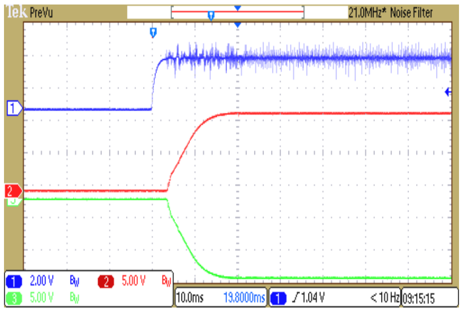
Typical Output Ripple and Noise
$V_{in}=V_{in\ nom}$; Full Load



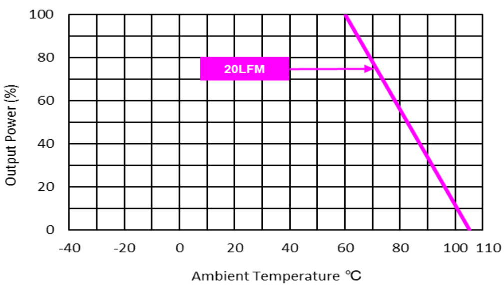
Transient Response to Dynamic Load Change
from 100% to 75% of Full Load ; $V_{in}=V_{in\ nom}$



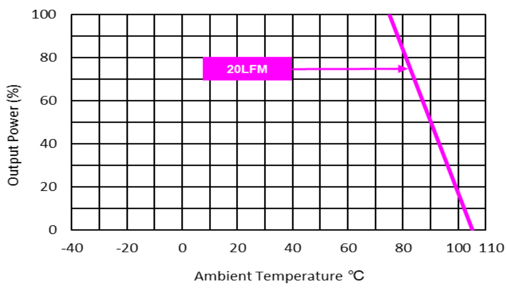
Typical Input Start-Up and Output Rise Characteristic
$V_{in}=V_{in\ nom}$; Full Load



ON/OFF Voltage Start-Up and Output Rise Characteristic
$V_{in}=V_{in\ nom}$; Full Load



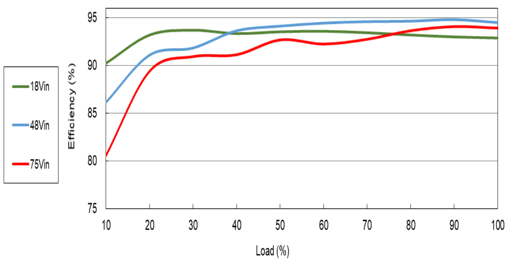
Derating Output Current Versus Ambient Temperature
$V_{in}=V_{in\ nom}$ (without heatsink)



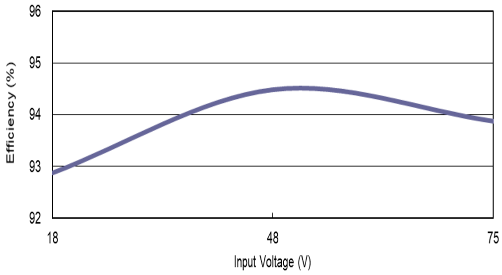
Derating Output Current Versus Ambient Temperature
$V_{in}=V_{in\ nom}$ (with heatsink)

Characteristic Curves

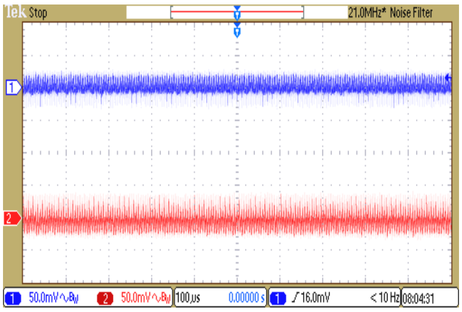
All test conditions are at 25℃ The figures are identical for MKWI80-48D15



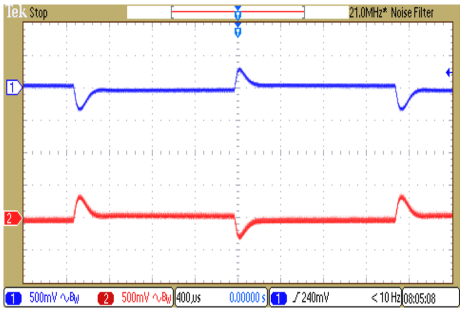
Efficiency Versus Output Current



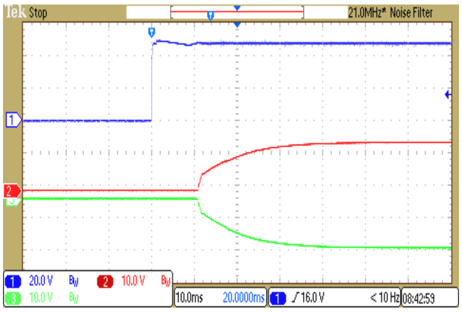
Efficiency Versus Input Voltage
Full Load



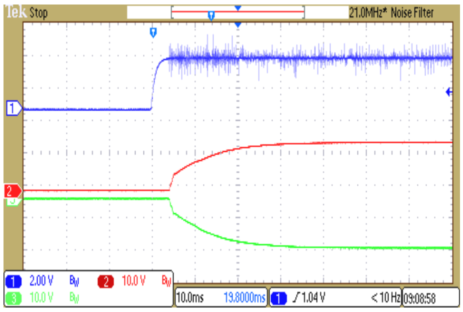
Typical Output Ripple and Noise
V_{in}=$V_{in\ nom}$; Full Load



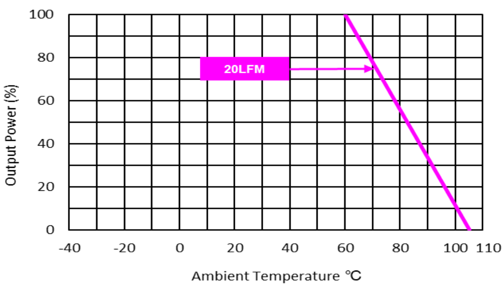
Transient Response to Dynamic Load Change
from 100% to 75% of Full Load ; V_{in}=$V_{in\ nom}$



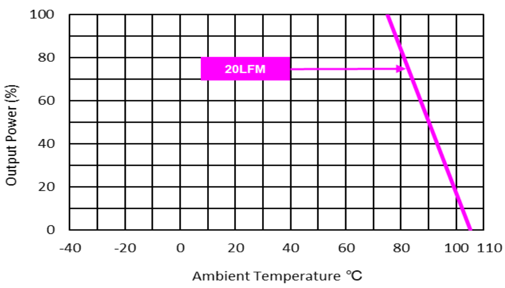
Typical Input Start-Up and Output Rise Characteristic
V_{in}=$V_{in\ nom}$; Full Load



ON/OFF Voltage Start-Up and Output Rise Characteristic
V_{in}=$V_{in\ nom}$; Full Load



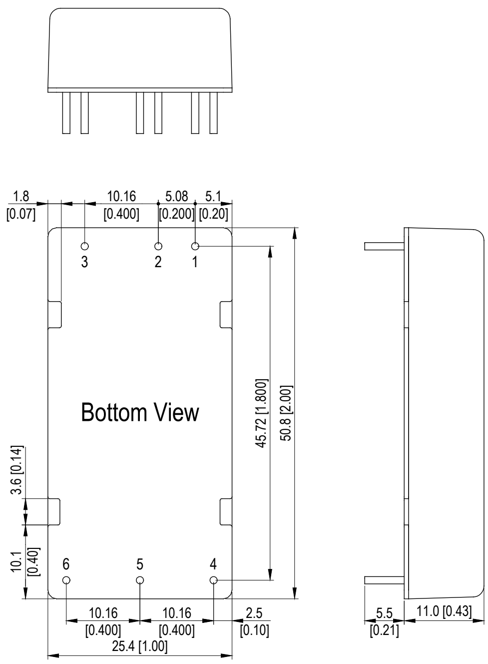
Derating Output Current Versus Ambient Temperature
V_{in}=$V_{in\ nom}$ (without heatsink)



Derating Output Current Versus Ambient Temperature
V_{in}=$V_{in\ nom}$ (with heatsink)

Package Specifications

Mechanical Dimensions



Pin Connections

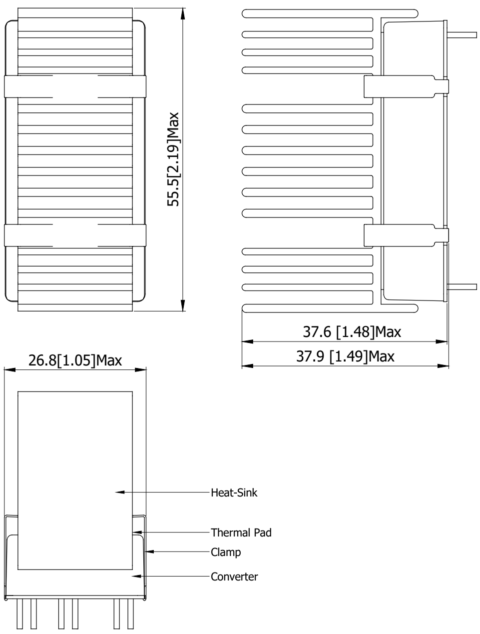
Pin	Single Output	Dual Output	Diameter mm (inches)
1	+Vin	+Vin	Ø 1.0 [0.04]
2	-Vin	-Vin	Ø 1.0 [0.04]
3	Remote On/Off	Remote On/Off	Ø 1.0 [0.04]
4	+Vout	+Vout	Ø 1.0 [0.04]
5	-Vout	Common	Ø 1.0 [0.04]
6	Trim	-Vout	Ø 1.0 [0.04]

- All dimensions in mm (inches)
- Tolerance: X.X±0.75 (X.XX±0.03)
  X.XX±0.25 (X.XXX±0.01)
- Pin diameter tolerance: X.X±0.05 (X.XX±0.002)

Physical Characteristics

Case Size	:	50.8x25.4x11.0 mm (2.0x1.0x0.43 inches)
Case Material	:	Metal With Non-Conductive Baseplate
Base Material	:	FR4 PCB (flammability to UL 94V-0 rated)
Pin Material	:	Copper Alloy
Potting Material	:	Silicone (UL94-V0)
Weight	:	46g

Heatsink (Option –HS)



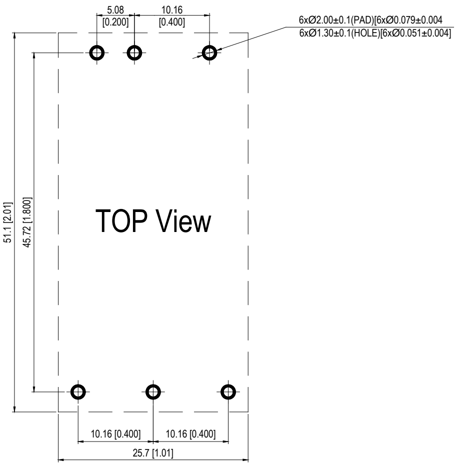
Physical Characteristics

Heatsink Material	:	Aluminum
Finish	:	Black Anodized Coating
Weight	:	29.85g

- The advantages of adding a heatsink are:

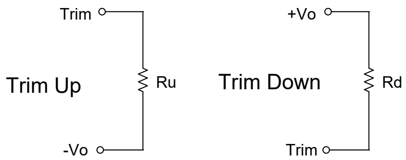
1. To improve heat dissipation and increase the stability and reliability of the DC-DC converters at high operating temperatures.
2. To increase operating temperature of the DC-DC converter, please refer to Derating Curve.

Recommended Pad Layout



External Output Trimming

Output can be externally trimmed by using the method shown below

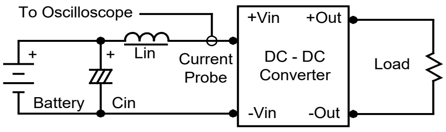


Trim Range (%)	MKWI80-XXS05		MKWI80-XXS12		MKWI80-XXS15		MKWI80-XXS24		MKWI80-XXS48		MKWI80-XXS54	
	Trim down (kΩ)	Trim up (kΩ)	Trim down (kΩ)	Trim up (kΩ)	Trim down (kΩ)	Trim up (kΩ)	Trim down (kΩ)	Trim up (kΩ)	Trim down (kΩ)	Trim up (kΩ)	Trim down (kΩ)	Trim up (kΩ)
1	138.88	106.87	413.55	351.00	530.73	422.77	598.66	487.14	1,194.43	920.37	3,000.15	748.65
2	62.41	47.76	184.55	157.50	238.61	189.89	267.78	218.02	540.12	414.68	1,396.97	291.83
3	36.92	28.06	108.22	93.00	141.24	112.26	157.49	128.31	322.01	246.12	862.58	139.55
4	24.18	18.21	70.05	60.75	92.56	73.44	102.34	83.46	212.96	161.84	595.39	63.41
5	16.53	12.30	47.15	41.40	63.35	50.15	69.25	56.55	147.53	111.27	435.07	17.73
6	11.44	8.36	31.88	28.50	43.87	34.63	47.19	38.61	103.91	77.56	328.19	---
7	7.79	5.55	20.98	19.29	29.96	23.54	31.44	25.79	72.75	53.48	251.85	---
8	5.06	3.44	12.80	12.37	19.53	15.22	19.62	16.18	49.38	35.42	194.59	---
9	2.94	1.79	6.44	7.00	11.41	8.75	10.43	8.70	31.20	21.37	150.06	---
10	1.24	0.48	1.35	2.70	4.92	3.58	3.08	2.72	16.66	10.14	114.43	---
11	---	---	---	---	---	---	---	---	---	---	85.29	---
12	---	---	---	---	---	---	---	---	---	---	61.00	---
13	---	---	---	---	---	---	---	---	---	---	40.44	---
14	---	---	---	---	---	---	---	---	---	---	22.82	---
15	---	---	---	---	---	---	---	---	---	---	7.56	---

Test Setup

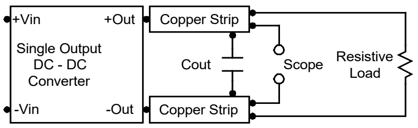
Input Reflected-Ripple Current Test Setup

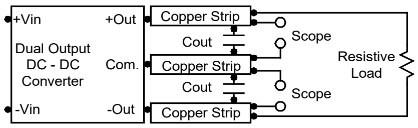
Input reflected-ripple current is measured with a inductor Lin (4.7μH) and Cin (220μF, ESR < 1.0Ω at 100 kHz) to simulate source impedance. Capacitor Cin, offsets possible battery impedance. Current ripple is measured at the input terminals of the module, measurement bandwidth is 0-500 kHz.



Peak-to-Peak Output Noise Measurement Test

Use external ceramic capacitor, please refer to the descriptions in the "Ripple & Noise" section on page 2. 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

Remote On/Off

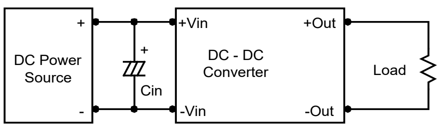
Positive logic remote on/off turns the module on during a logic high voltage on the remote on/off pin, and off during a logic low. To turn the power module on and off, the user must supply a switch to control the voltage between the on/off terminal and the -Vin terminal.
The switch can be an open collector or equivalent. A logic low is 0V to 1.2V. A logic high is 3.5V to 12V. The maximum sink current at on/off terminal during a logic low is -500μA. The maximum allowable leakage current of the switch at on/off terminal (3.5 to 12V) is 500μA.

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.

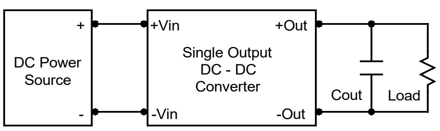
Input Source Impedance

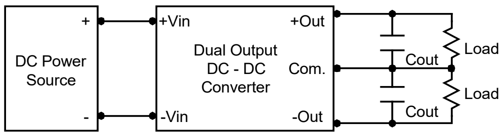
The power module should be connected to a low ac-impedance input source. Highly inductive source impedances can affect the stability of the power module.
In applications where power is supplied over long lines and output loading is high, it may be necessary to use a capacitor at the input to ensure startup.
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 < 1.0Ω at 100 kHz) capacitor of a 68μF 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 22μF capacitors at the output.



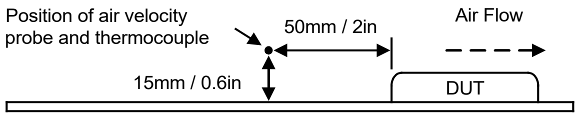


Maximum Capacitive Load

The MKWI80 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

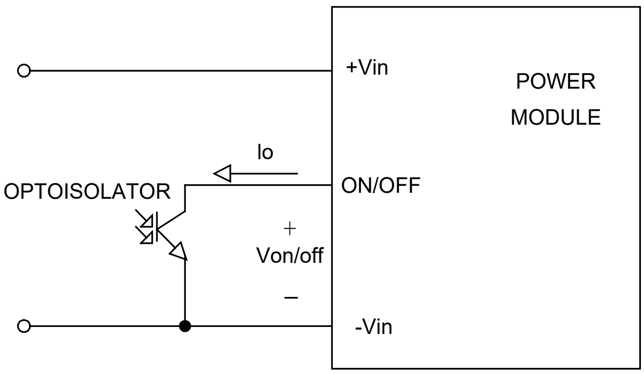
Many conditions affect the thermal performance of the power module, such as orientation, airflow over the module and board spacing. To avoid exceeding the maximum temperature rating of the components inside the power module, the case temperature must be kept below 105℃. The derating curves are determined from measurements obtained in a test setup.



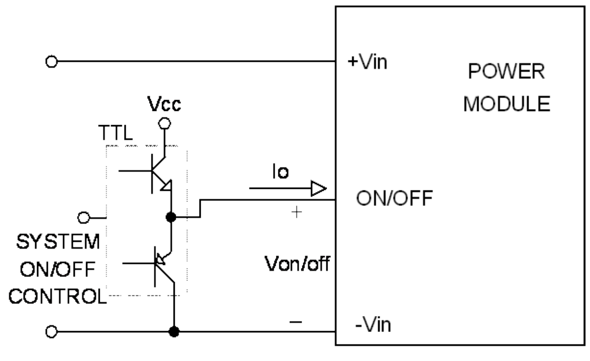
Remote ON/OFF Implementation

The positive logic remote ON/OFF control circuit is included. Turns the module ON during logic High on the ON/Off pin and turns OFF during logic Low. The ON/OFF input signal (Von/off) that referenced to GND. If not using the remote on/off feature, please open circuit between on/off pin and -Vin pin to turn the module on.

Remote ON/OFF implementation



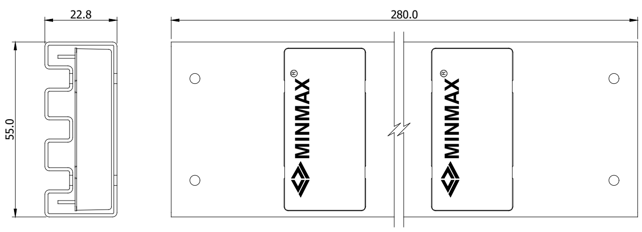
Isolated-Closure Remote ON/OFF



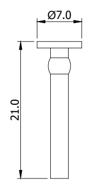
Level Control Using TTL Output

Packaging Information

Tube

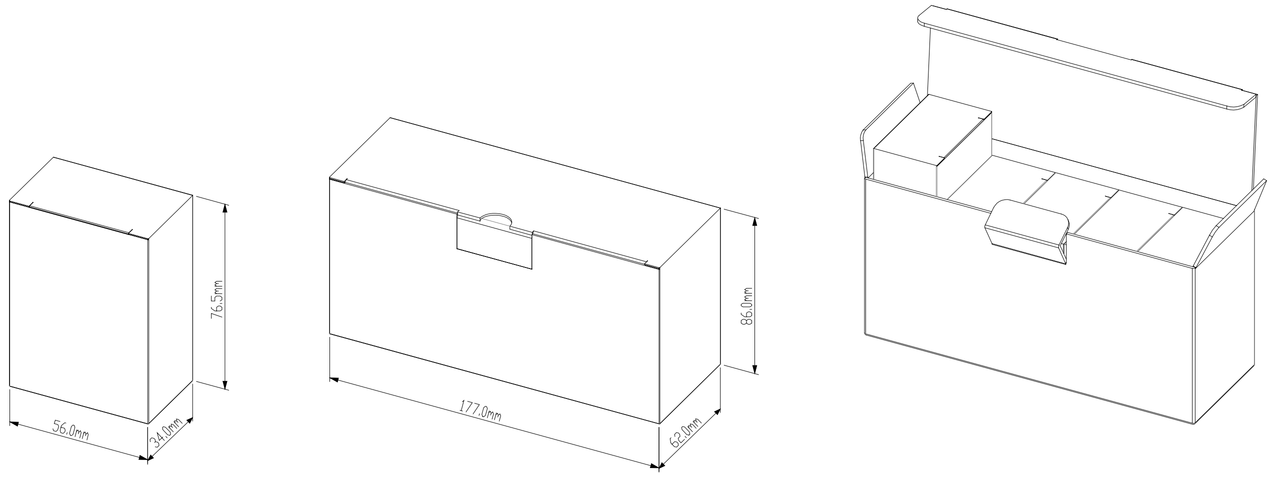


Nail



Unit: mm

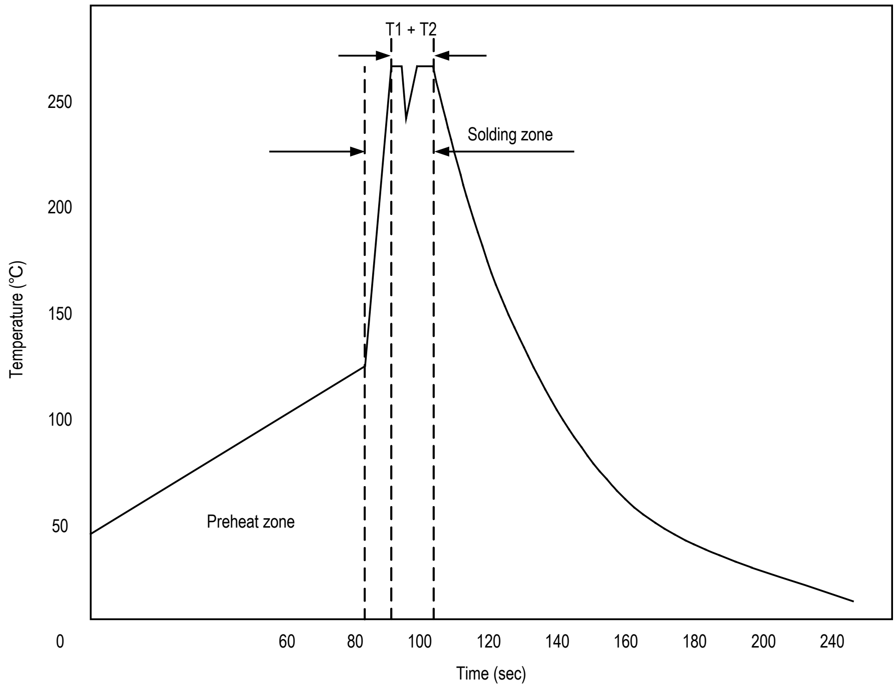
10 PCS per TUBE (Without Heatsink)



MKWI80-HS 5 PCS per Box (With heatsink)

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

M	K	WI	80	-	24	S	05	N
	Package Type 2" X 1"	Ultra-wide 4:1 Input Voltage Range	Output Power 80 Watt		Input Voltage Range 24: 9 ~ 36 VDC 48: 18 ~ 75 VDC	Output Quantity S: Single D: Dual	Output Voltage 05: 5 VDC 12: 12 VDC 15: 15 VDC 24: 24 VDC 48: 48 VDC 54: 54 VDC	Negative logic

MTBF and Reliability

The MTBF of MKWI80 series of DC-DC converters has been calculated using

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

Model	MTBF	Unit
MKWI80-24S05	114,244	Hours
MKWI80-24S12	244,579	
MKWI80-24S15	250,513	
MKWI80-24S24	294,163	
MKWI80-24S48	268,468	
MKWI80-24S54	260,681	
MKWI80-24D12	276,722	
MKWI80-24D15	269,302	
MKWI80-48S05	141,755	
MKWI80-48S12	274,229	
MKWI80-48S15	284,237	
MKWI80-48S24	324,228	
MKWI80-48S48	256,070	
MKWI80-48S54	264,513	
MKWI80-48D12	262,059	
MKWI80-48D15	275,761	