MINMAX®

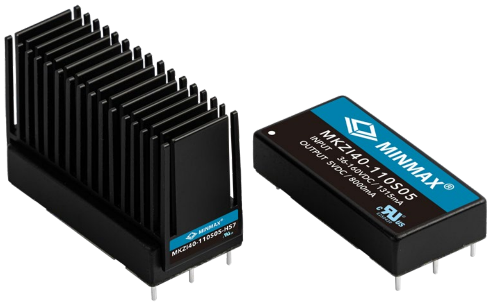
MKZI40 Series

Electric Characteristic Note

MKZI40 Series EC Note

DC-DC CONVERTER 40W, Reinforced Insulation, Railway Certified

Features



- ►**Industrial Standard 2"×1" Package**
- ►**Ultra-wide Input Range 36-160VDC**
- ►**I/O Isolation 3000VAC with Reinforced Insulation**
- ►**Excellent Efficiency up to 90%**
- ►**Operating Ambient Temp. Range -40℃ to +77.5℃**
- ►**No Min. Load Requirement**
- ►**Under-voltage, Overload/Voltage and Short Circuit Protection**
- ►**Remote On/Off Control, Output Voltage Trim**
- ►**Vibration and Shock/Bump Test EN 61373 Approved**
- ►**Cooling, Dry & Damp Heat Test IEC/EN 60068-2-1, 2, 30 Approved**
- ►**Railway EMC Standard EN 50121-3-2 Approved**
- ►**Railway Certified EN 50155 (IEC60571) Approved**
- ►**Fire Protection Test EN 45545-2 Approved**
- ►**UL/cUL/IEC/EN 62368-1 Safety Approval & CE Marking**

Applications

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

Product Overview

The MINMAX MKZI40 series is a latest generation of 40 Watt railway certified and isolated DC-DC power modules with ultra-wide input range of 36-160Vin for railway DC system and 7 models available for 5/12/15/24/54/±12/±15VDC tightly output voltage within compact size 2"x1" size with shielded and encapsulated package which specifically design for railway/railroad, battery-powered and harsh environmental applications. Key performance featuring high I/O isolation 3000VAC with reinforced insulation, high efficiency up to 90%, operating ambient temp. range -40℃ to +77.5℃, no min. load requirement, very low no-load power consumption, remote on/off, output voltage trim, build-in fault condition protection include under-voltage, overload, over-voltage and short circuit protection.

The MKZI40 series complies with railway certification EN 50155 (IEC 60571) which conform to vibration and shock/bump test EN 61373 approved, cooling/dry/damp heat test IEC/EN 60068-2-1,2,30 approved, railway EMC standard EN 50121-3-2 approved and fire protection test EN 45545-2 approved. The MKZI40 series has been intensely qualified to safety approval UL/cUL/IEC/EN 62368-1 with CB report and CE marking which offer a solution for the applications where wide input voltage range, high efficiency for wide operating ambient temp. range, isolated power with high I/O isolation & insulation level, robust environmental & mechanical sustainability and even railway certification are required.

Table of contents

Model Selection Guide

Model Number	Input Voltage (Range) VDC	Output Voltage VDC	Output Power W	Output Current Max. mA	Input Current @Max. Load mA(typ.)	Input Current @No Load mA(typ.)	Over Voltage Protection VDC	Max. capacitive Load µF	Efficiency (typ.) @Max. Load %
MKZI40-110S05	110 (36 ~ 160)	5	40.00	8000	413	40	6.2	13600	88
MKZI40-110S12		12	39.96	3330	408		15	2400	89
MKZI40-110S15		15	40.05	2670	409		18	1500	89
MKZI40-110S24		24	40.08	1670	409		30	600	89
MKZI40-110S54		54	40.01	741	404		66	130	90
MKZI40-110D12		±12	40.08	±1670	409		±15	1200#	89
MKZI40-110D15		±15	39.90	±1330	408		±18	750#	89

For each output

Input Specifications

Parameter	Model	Min.	Typ.	Max.	Unit
Input Surge Voltage (100ms. max)	All Models	-0.7	---	170	VDC
Start-Up Threshold Voltage		---	---	36	VDC
Under Voltage Shutdown		30	33	35.5	VDC
Start Up Time		---	30	100	mS
Input Filter		Internal Pi Type			

Remote On/Off Control

Parameter	Conditions	Min.	Typ.	Max.	Unit
Converter On	3.5V ~ 12V or Open Circuit				
Converter Off	0V ~ 1.2V or Short Circuit				
Control Input Current (on)	Vctrl = 5.0V	---	0.5	---	mA
Control Input Current (off)	Vctrl = 0V	---	-0.5	---	mA
Control Common	Referenced to Negative Input				
Standby Input Current	Nominal Vin	---	2.5	---	mA

Output Specifications

Parameter	Conditions			Min.	Typ.	Max.	Unit
Output Voltage Setting Accuracy				---	---	±1.0	%Vnom.
Output Voltage Balance	Dual Output, Balanced Loads			---	---	±2.0	%
Line Regulation	Vin=Min. to Max. @ Full Load			---	---	±0.2	%
Load Regulation	Io=0% to 100%		Single Output	---	---	±0.5	%
			Dual Output	---	---	±1.0	%
Minimum Load	No minimum Load Requirement						
Ripple & Noise	0-20 MHz Bandwidth	5Vo	Measured with a 1µF/100V MLCC	---	75	85	mV P-P
		12Vo,15Vo, ±12Vo, ±15Vo		---	125	140	mV P-P
		24Vo		---	150	170	mV P-P
		54Vo		---	250	280	mV P-P
Transient Recovery Time	25% Load Step Change (2)			---	250	---	µsec
Transient Response Deviation				---	±3	±5	%
Temperature Coefficient				---	---	±0.02	%/°C
Trim Up / Down Range (See Page 20)	% of Nominal Output Voltage		Other Models	---	---	±10	%
			54Vo Output	---	---	+5 / -15	%
Over Load Protection	Hiccup			110	150	185	%
Short Circuit Protection	Continuous, Automatic Recovery (Hiccup Mode 0.5Hz typ.)						

General Specifications

Parameter	Conditions	Min.	Typ.	Max.	Unit
I/O Isolation Voltage	Reinforced Insulation, Rated For 60 Seconds	3000	---	---	VAC
Isolation Voltage Input/Output to case	Rated For 60 Seconds	1500	---	---	VAC
I/O Isolation Resistance	500 VDC	1000	---	---	MΩ
I/O Isolation Capacitance	100kHz, 1V	---	1500	---	pF
Switching Frequency		220	265	310	kHz
MTBF(calculated)	MIL-HDBK-217F@25℃ Full Load, Ground Benign	900,000	---	---	Hours
Safety Approval	UL/cUL 62368-1 recognition(UL certificate), IEC/EN 62368-1(CB-report), EN 50155, IEC 60571				

EMC Specifications

Parameter	Standards & Level			Performance
General	Compliance with EN 50121-3-2 Railway Applications			
EMI(5)	Conduction	EN 55032, EN 55011	With external components	Class A
	Radiation			
EMS(5)	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 20V/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	EN61000-4-8 100A/M for Continuous；1000A/M for 1 Sec.		A

Environmental Specifications

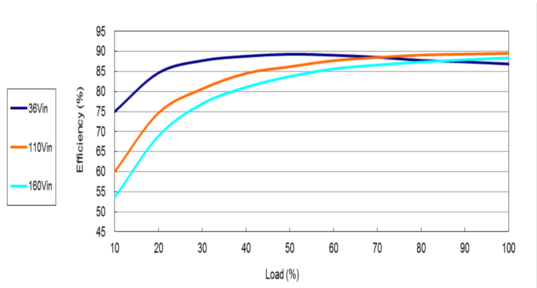
Parameter	Conditions / Model	Min.	Typ.	Max.	Unit
Operating Temperature Range Nominal Vin, Load 100% Inom. (for Power Derating see relative Derating Curves)	MKZI40-110S05	-40	---	+60	℃
	MKZI40-110S12, MKZI40-110S15, MKZI40-110S24 MKZI40-110S54, MKZI40-110D12, MKZI40-110D15			+65	
Thermal Impedance	20LFM Convection	12	---	---	℃/W
Case Temperature		---	---	+105	℃
Over Temperature Protection (Case)		---	+115	---	℃
Storage Temperature Range		-50	---	+125	℃
Humidity (non condensing)		---	---	95	% rel. H
Altitude		---	---	4000	M
Cooling	Compliance to IEC/EN60068-2-1				
Dry Heat	Compliance to IEC/EN60068-2-2				
Damp Heat	Compliance to IEC/EN60068-2-30				
Shock & Vibration Test	Compliance to IEC/EN 61373				
Operating Humidity (non condensing)		---	---	95	% rel. H
RFI	Six-Sided Shielded, Metal Case				
Lead Temperature (1.5mm from case for 10Sec.)		---	---	260	℃

Notes

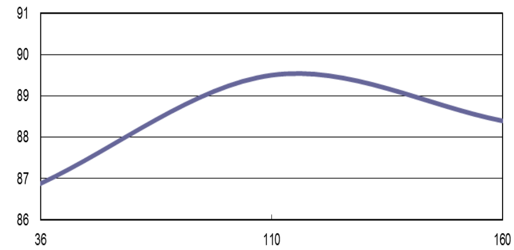
1. Specifications typical at Ta=+25℃, resistive load, nominal input voltage and rated output current unless otherwise noted.
2. Transient recovery time is measured to within 1% error band for a step change in output load of 75% to 100%.
3. We recommend to protect the converter by a slow blow fuse in the input supply line.
4. Other input and output voltage may be available, please contact MINMAX.
5. 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. Do not exceed maximum power specification when adjusting output voltage.
7. Specifications are subject to change without notice.

Characteristic Curves

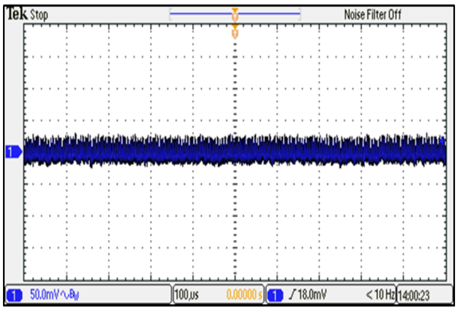
All test conditions are at 25℃ The figures are identical for MKZI40-110S05



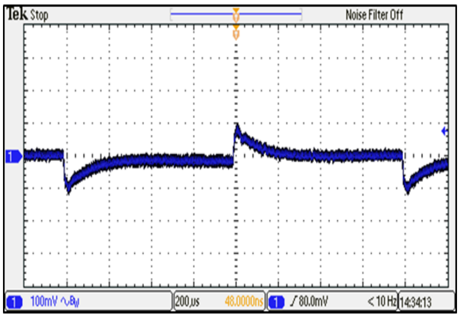
Efficiency Versus Output Current



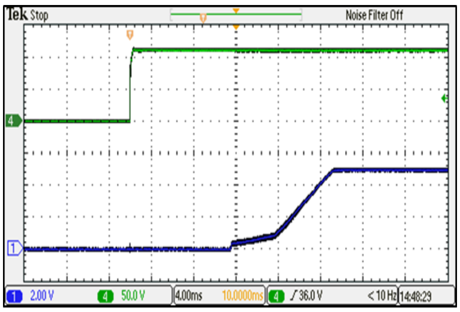
Efficiency Versus Input Voltage
Full Load



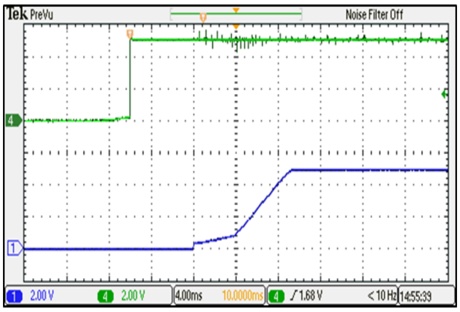
Typical Output Ripple and Noise
V_{in}=$V_{in\ nom}$; Full Load



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



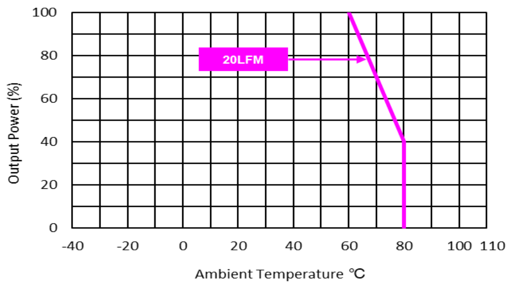
Typical Input Start-Up and Output Rise Characteristic
V_{in}=$V_{in\ nom}$; Full Load



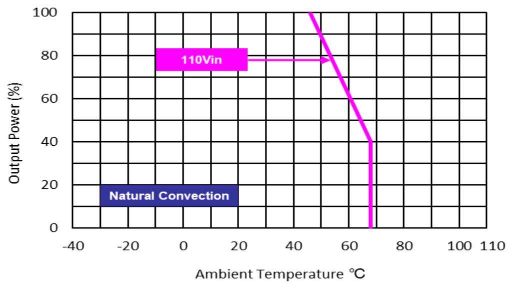
ON/OFF Voltage Start-Up and Output Rise Characteristic
V_{in}=$V_{in\ nom}$; Full Load

Characteristic Curves

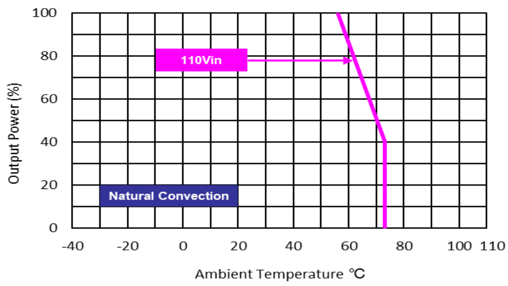
All test conditions are at 25℃ The figures are identical for MKZI40-110S05 (continued)



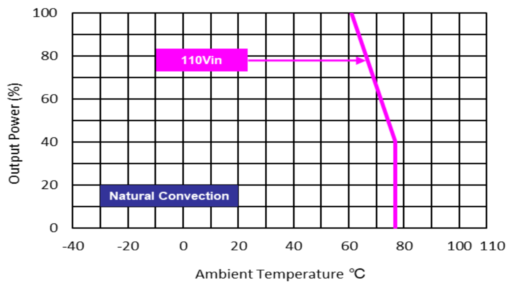
Derating Output Power Versus Ambient Temperature V_{in}=$V_{in\ nom}$



Derating Output Power Versus Ambient Temperature
(with HS5 heatsink)



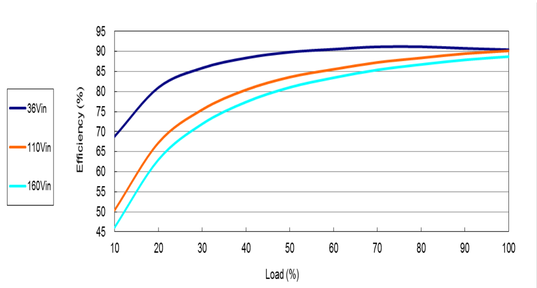
Derating Output Power Versus Ambient Temperature
(with HS6 heatsink)



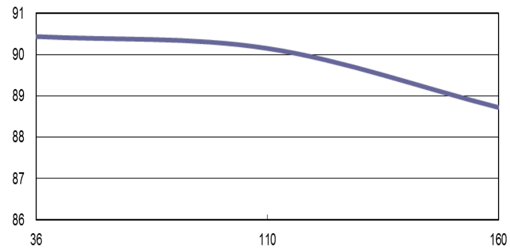
Derating Output Power Versus Ambient Temperature
(with HS7 heatsink)

Characteristic Curves

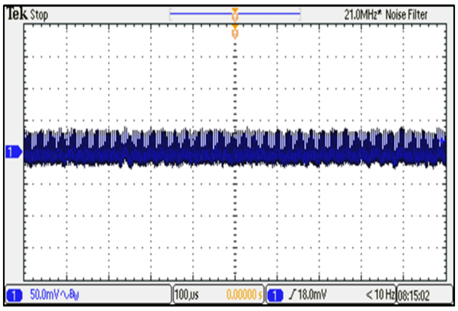
All test conditions are at 25℃ The figures are identical for MKZI40-110S12



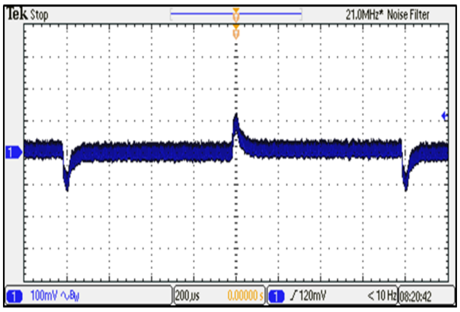
Efficiency Versus Output Current



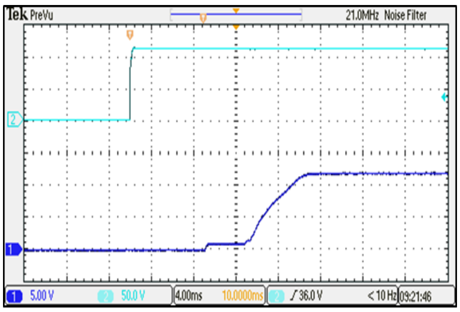
Efficiency Versus Input Voltage
Full Load



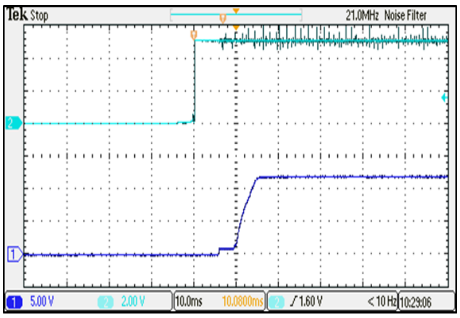
Typical Output Ripple and Noise
V_{in}=$V_{in\ nom}$; Full Load



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



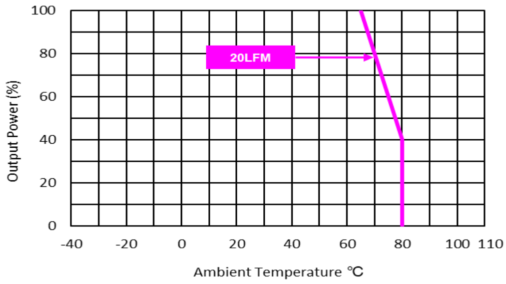
Typical Input Start-Up and Output Rise Characteristic
V_{in}=$V_{in\ nom}$; Full Load



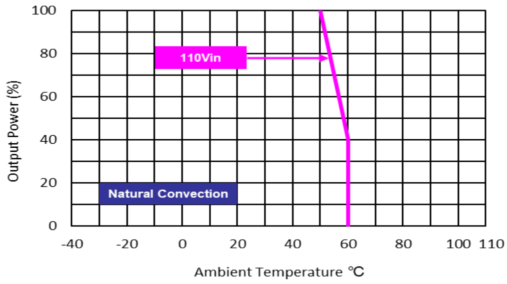
ON/OFF Voltage Start-Up and Output Rise Characteristic
V_{in}=$V_{in\ nom}$; Full Load

Characteristic Curves

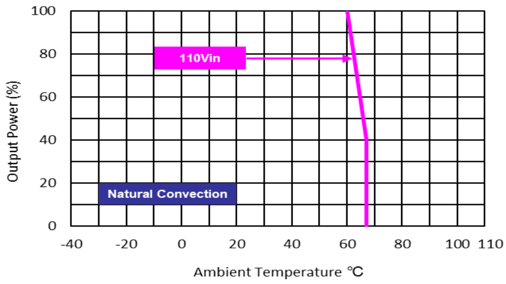
All test conditions are at 25℃ The figures are identical for MKZI40-110S12 (continued)



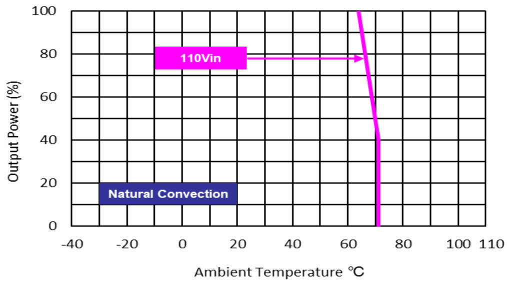
Derating Output Power Versus Ambient Temperature $V_{in}=V_{in\ nom}$



Derating Output Power Versus Ambient Temperature
(with HS5 heatsink)



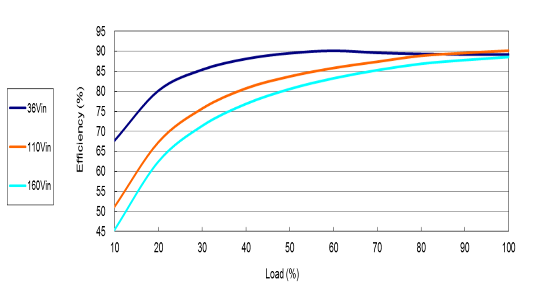
Derating Output Power Versus Ambient Temperature
(with HS6 heatsink)



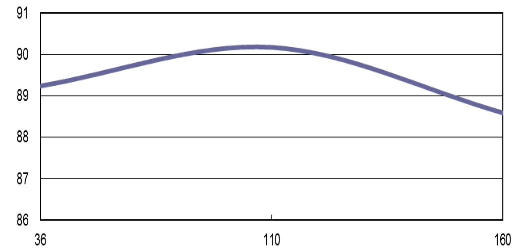
Derating Output Power Versus Ambient Temperature
(with HS7 heatsink)

Characteristic Curves

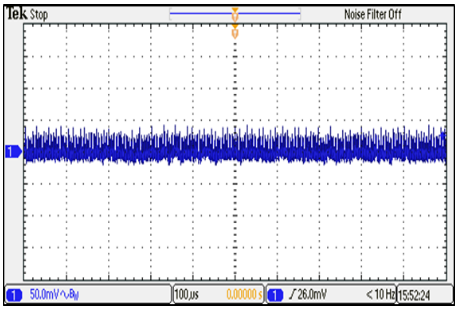
All test conditions are at 25℃ The figures are identical for MKZI40-110S15



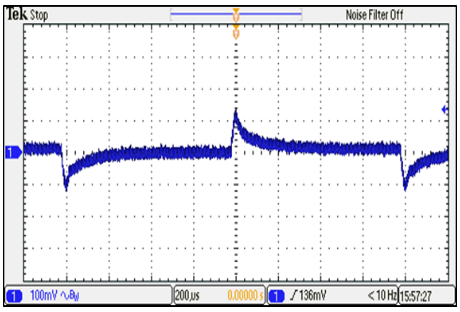
Efficiency Versus Output Current



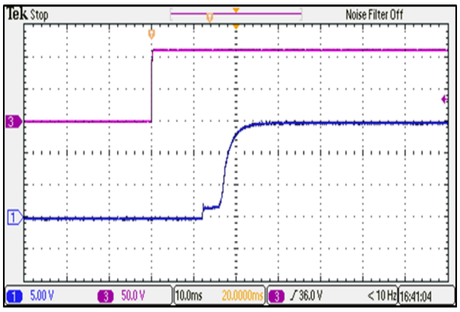
Efficiency Versus Input Voltage
Full Load



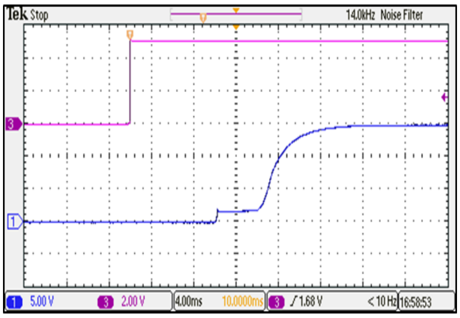
Typical Output Ripple and Noise
$V_{in}=V_{in\ nom}$; Full Load



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



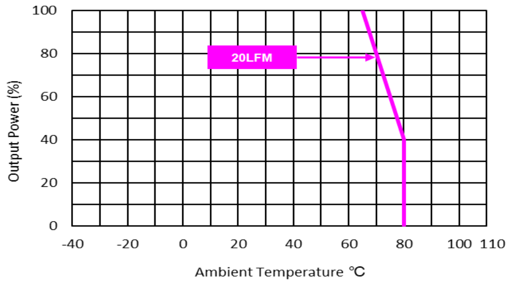
Typical Input Start-Up and Output Rise Characteristic
$V_{in}=V_{in\ nom}$; Full Load



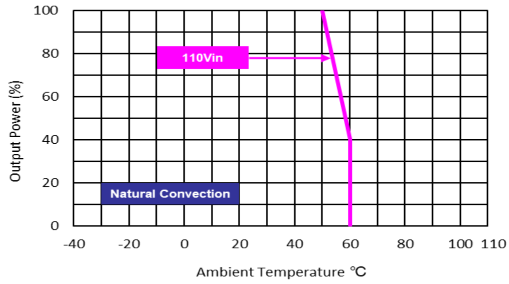
ON/OFF Voltage Start-Up and Output Rise Characteristic
$V_{in}=V_{in\ nom}$; Full Load

Characteristic Curves

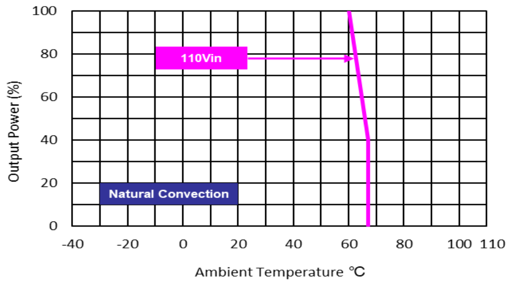
All test conditions are at 25℃ The figures are identical for MKZI40-110S15 (continued)



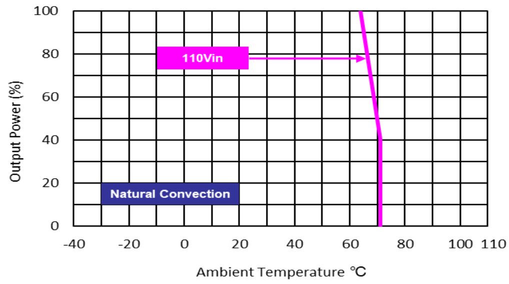
Derating Output Power Versus Ambient Temperature $V_{in}=V_{in\ nom}$



Derating Output Power Versus Ambient Temperature
(with HS5 heatsink)



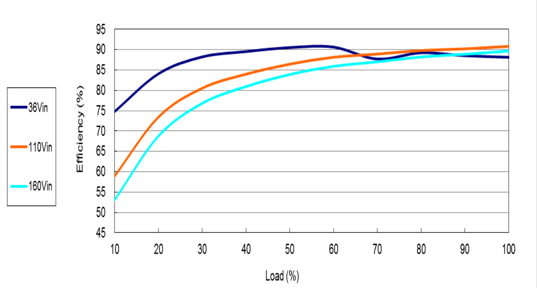
Derating Output Power Versus Ambient Temperature
(with HS6 heatsink)



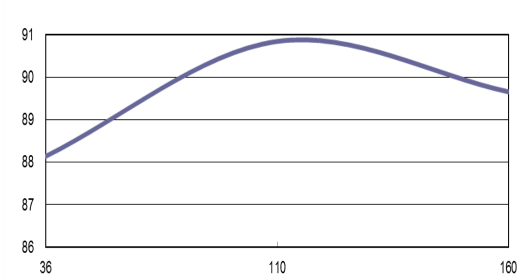
Derating Output Power Versus Ambient Temperature
(with HS7 heatsink)

Characteristic Curves

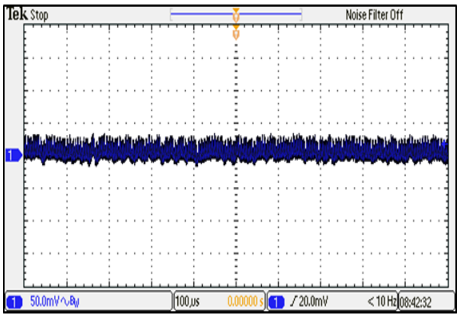
All test conditions are at 25℃ The figures are identical for MKZI40-110S24



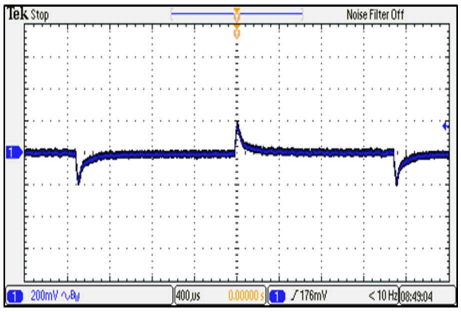
Efficiency Versus Output Current



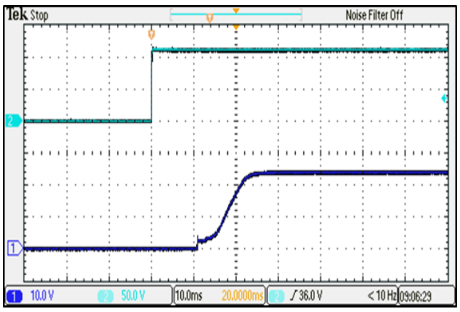
Efficiency Versus Input Voltage
Full Load



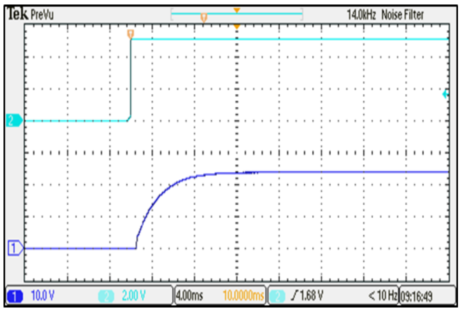
Typical Output Ripple and Noise
$V_{in}=V_{in\ nom}$; Full Load



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



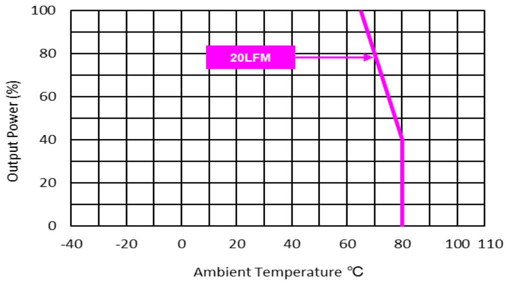
Typical Input Start-Up and Output Rise Characteristic
$V_{in}=V_{in\ nom}$; Full Load



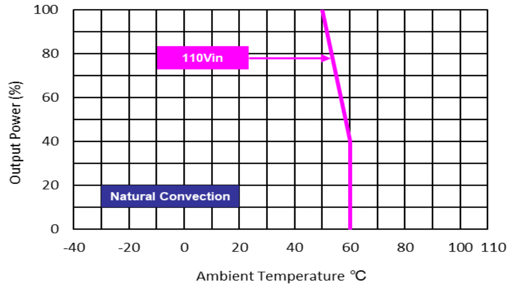
ON/OFF Voltage Start-Up and Output Rise Characteristic
$V_{in}=V_{in\ nom}$; Full Load

Characteristic Curves

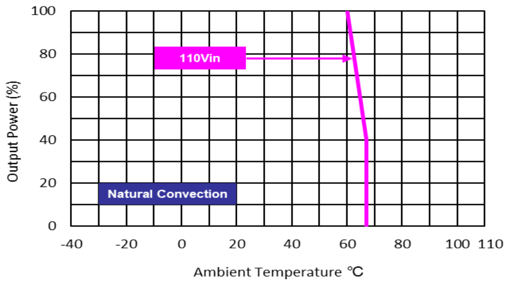
All test conditions are at 25℃ The figures are identical for MKZI40-110S24 (continued)



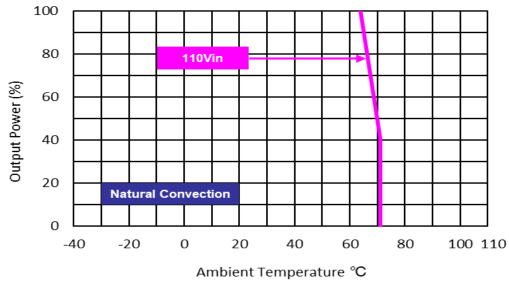
Derating Output Power Versus Ambient Temperature $V_{in}=V_{in\ nom}$



Derating Output Power Versus Ambient Temperature
(with HS5 heatsink)



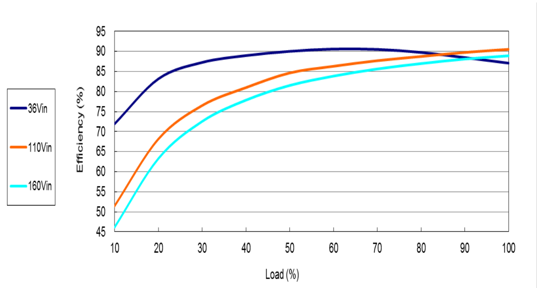
Derating Output Power Versus Ambient Temperature
(with HS6 heatsink)



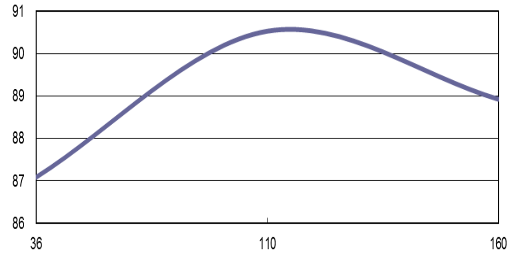
Derating Output Power Versus Ambient Temperature
(with HS7 heatsink)

Characteristic Curves

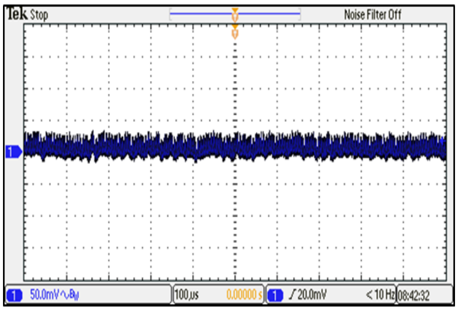
All test conditions are at 25℃ The figures are identical for MKZI40-110S54



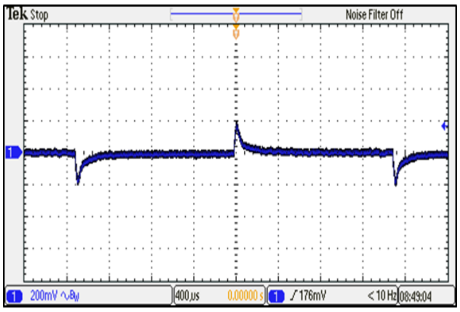
Efficiency Versus Output Current



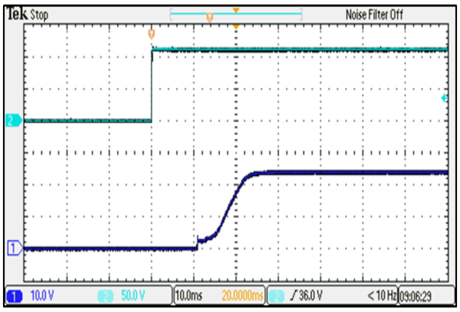
Efficiency Versus Input Voltage
Full Load



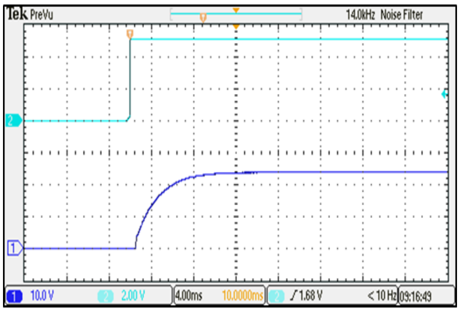
Typical Output Ripple and Noise
V_{in}=$V_{in\ nom}$; Full Load



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



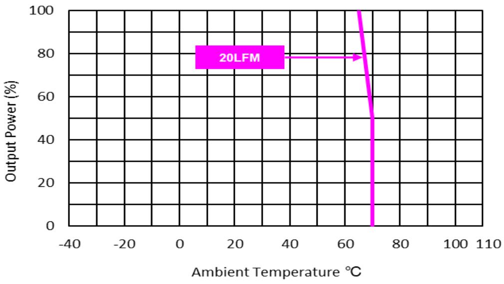
Typical Input Start-Up and Output Rise Characteristic
V_{in}=$V_{in\ nom}$; Full Load



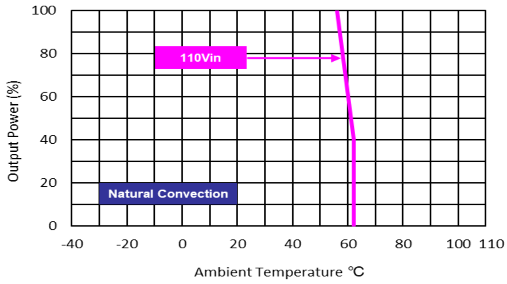
ON/OFF Voltage Start-Up and Output Rise Characteristic
V_{in}=$V_{in\ nom}$; Full Load

Characteristic Curves

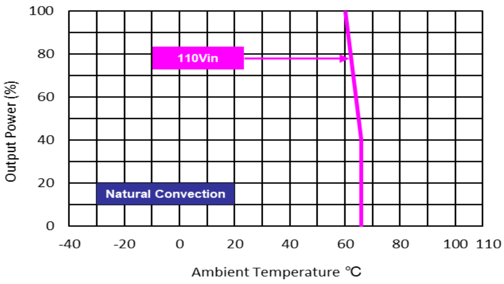
All test conditions are at 25℃ The figures are identical for MKZI40-110S54 (continued)



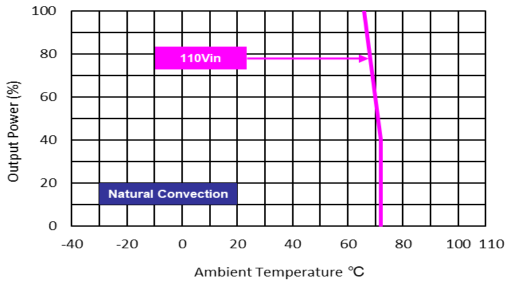
Derating Output Power Versus Ambient Temperature $V_{in}=V_{in\ nom}$



Derating Output Power Versus Ambient Temperature
(with HS5 heatsink)



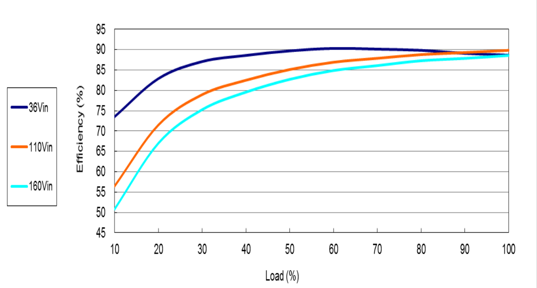
Derating Output Power Versus Ambient Temperature
(with HS6 heatsink)



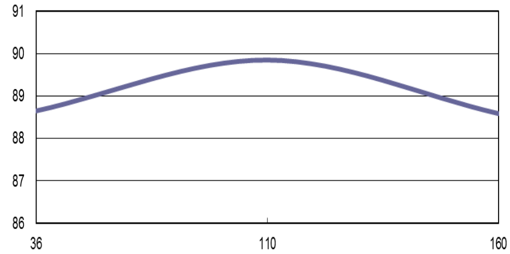
Derating Output Power Versus Ambient Temperature
(with HS7 heatsink)

Characteristic Curves

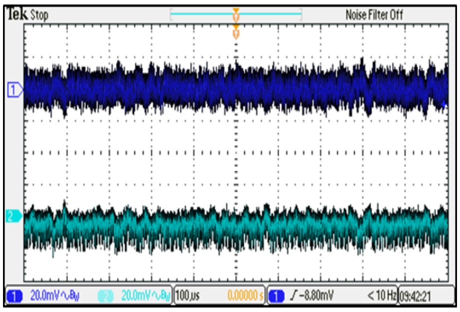
All test conditions are at 25℃ The figures are identical for MKZI40-110D12



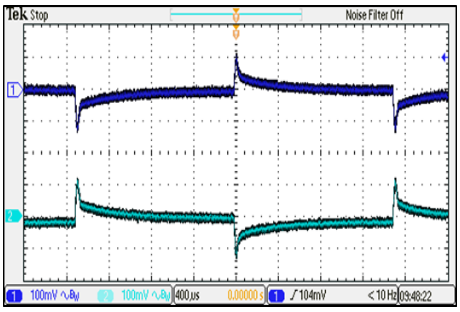
Efficiency Versus Output Current



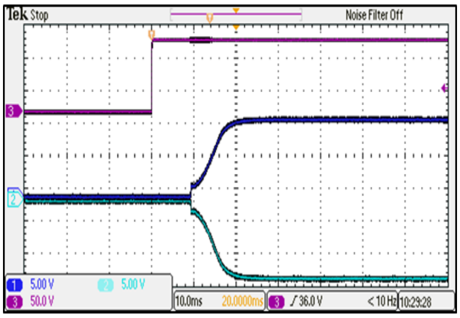
Efficiency Versus Input Voltage
Full Load



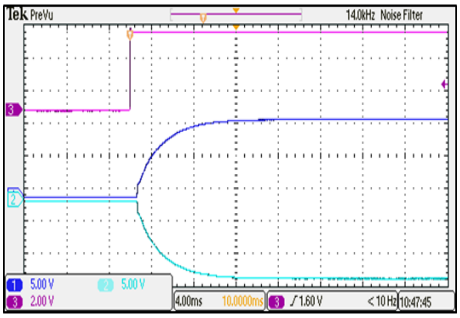
Typical Output Ripple and Noise
V_{in}=$V_{in\ nom}$; Full Load



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



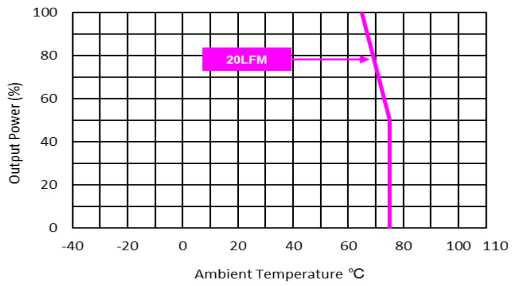
Typical Input Start-Up and Output Rise Characteristic
V_{in}=$V_{in\ nom}$; Full Load



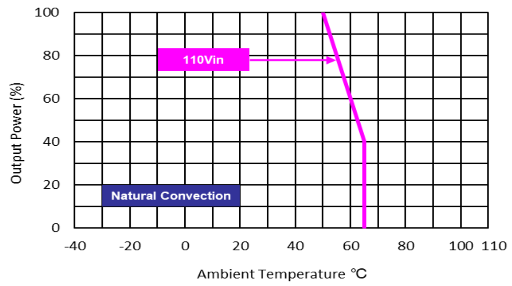
ON/OFF Voltage Start-Up and Output Rise Characteristic
V_{in}=$V_{in\ nom}$; Full Load

Characteristic Curves

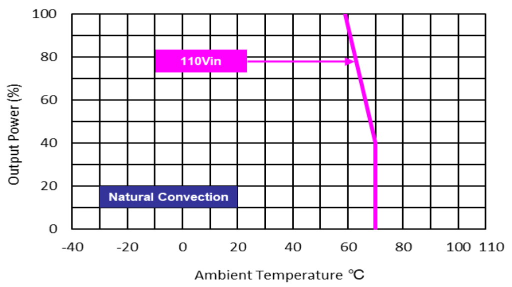
All test conditions are at 25℃ The figures are identical for MKZI40-110D12 (continued)



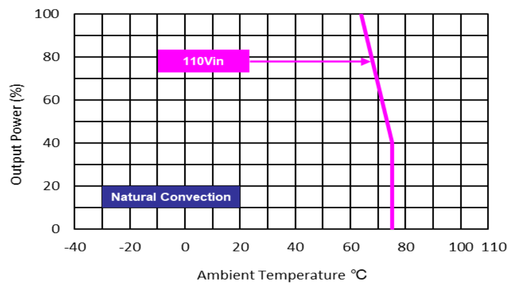
Derating Output Power Versus Ambient Temperature V_{in}=$V_{in\ nom}$



Derating Output Power Versus Ambient Temperature
(with HS5 heatsink)



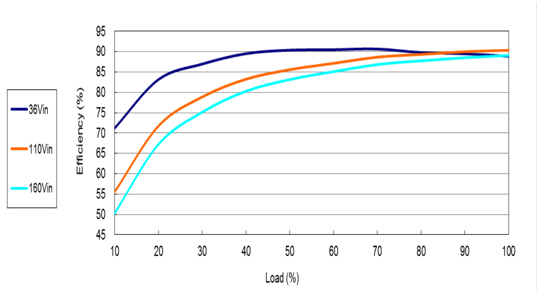
Derating Output Power Versus Ambient Temperature
(with HS6 heatsink)



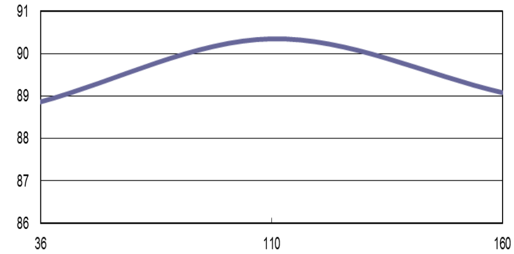
Derating Output Power Versus Ambient Temperature
(with HS7 heatsink)

Characteristic Curves

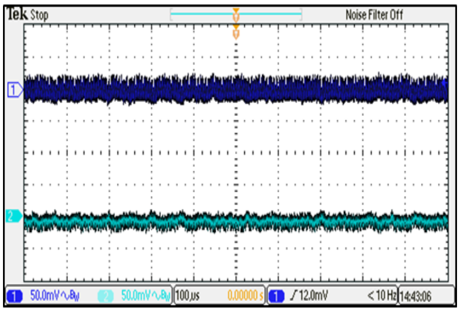
All test conditions are at 25℃ The figures are identical for MKZI40-110D15



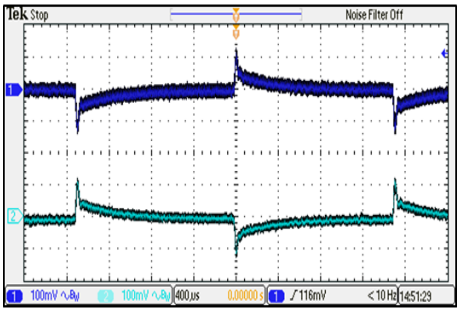
Efficiency Versus Output Current



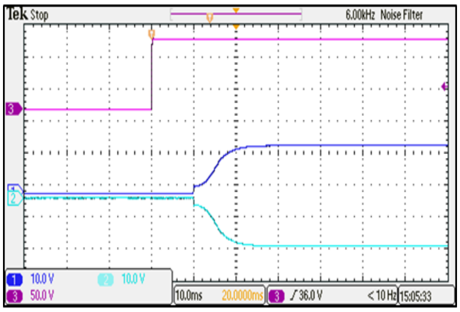
Efficiency Versus Input Voltage
Full Load



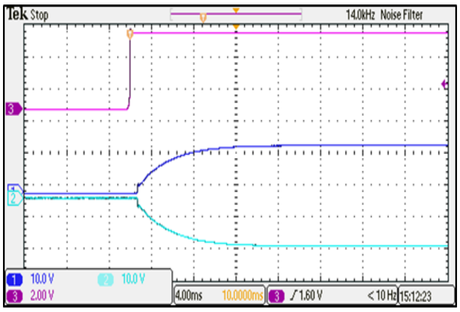
Typical Output Ripple and Noise
V_{in}=$V_{in\ nom}$; Full Load



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



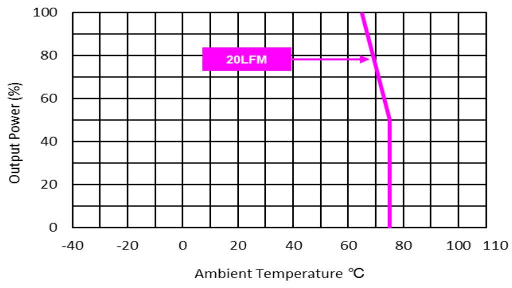
Typical Input Start-Up and Output Rise Characteristic
V_{in}=$V_{in\ nom}$; Full Load



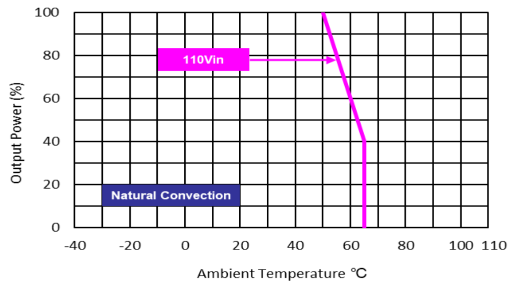
ON/OFF Voltage Start-Up and Output Rise Characteristic
V_{in}=$V_{in\ nom}$; Full Load

Characteristic Curves

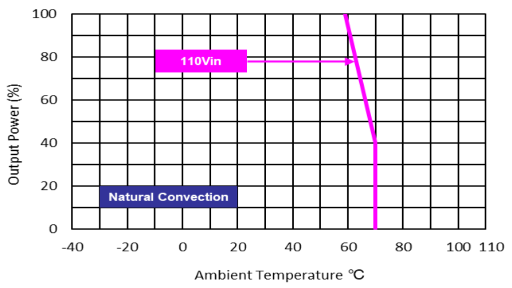
All test conditions are at 25℃ The figures are identical for MKZI40-110D15 (continued)



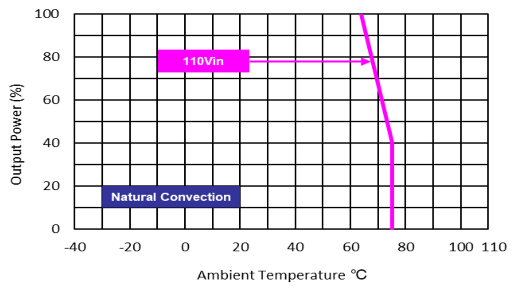
Derating Output Power Versus Ambient Temperature $V_{in}=V_{in\ nom}$



Derating Output Power Versus Ambient Temperature
(with HS5 heatsink)



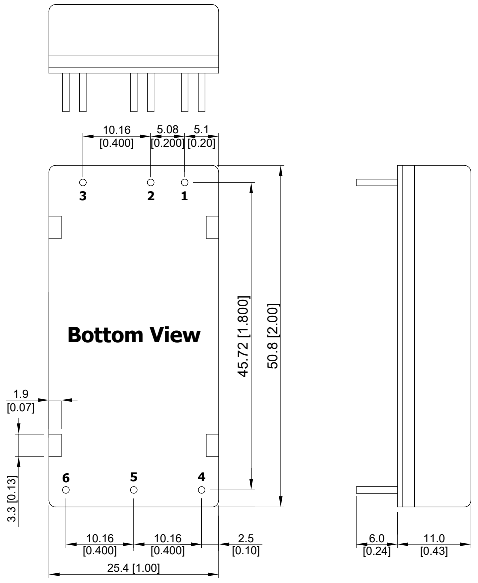
Derating Output Power Versus Ambient Temperature
(with HS6 heatsink)



Derating Output Power Versus Ambient Temperature
(with HS7 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]

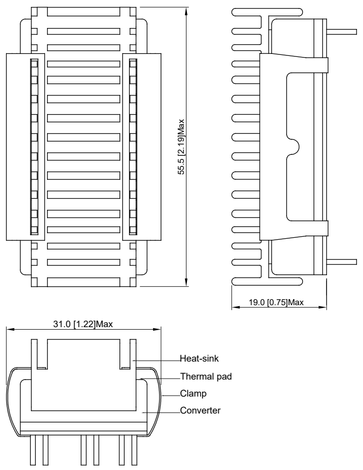
- All dimensions in mm (inches)
- Tolerance: X.X±0.75 (X.XX±0.03)
  X.XX±0.25 (X.XXX±0.01)
- Pin diameter tolerance: X.X±0.05 (X.XX±0.002)

Physical Characteristics

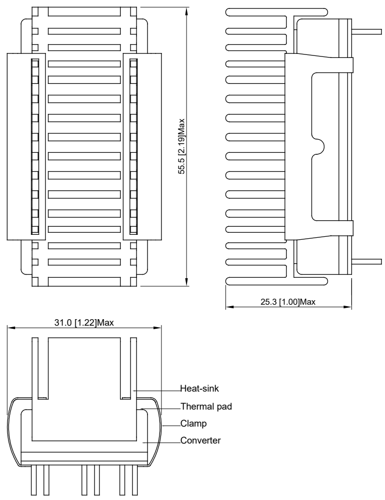
Case Size	:	50.8x25.4x11.0 mm (2.0x1.0x0.43 inches)
Case Material	:	Metal With Non-Conductive Baseplate
Base Material	:	FR4 PCB (flammability to UL 94V-0 rated)
Insulated Frame Material	:	Non-Conductive Black Plastic (flammability to UL 94V-0 rated)
Pin Material	:	Copper Alloy
Potting Material	:	Silicone (UL 94V-0)
Weight	:	51.5g

Heatsink

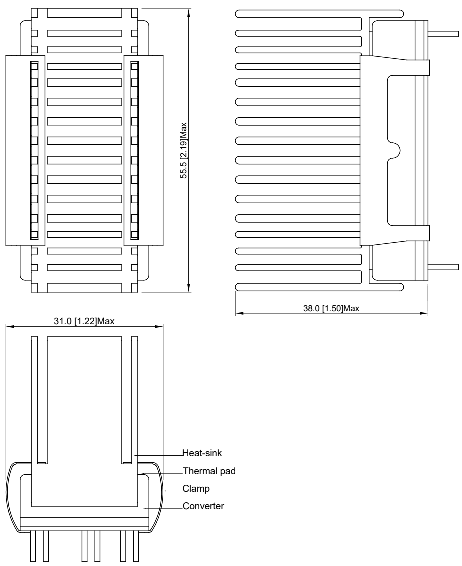
Option–HS5



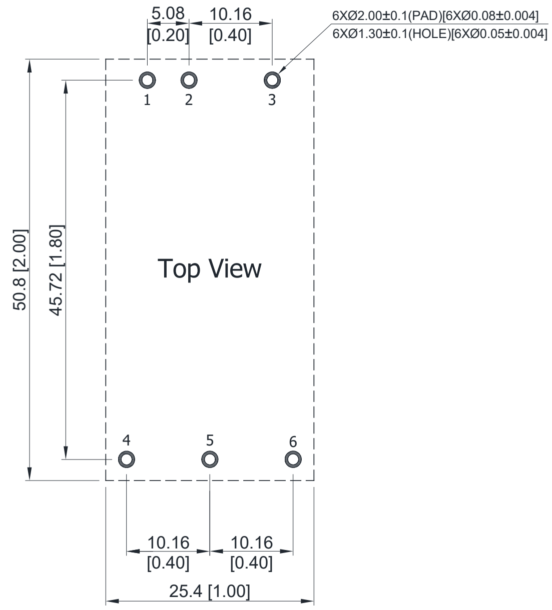
Option–HS6



Option–HS7

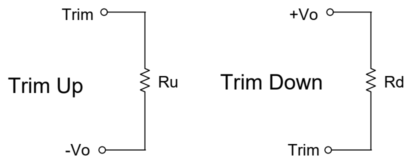


Recommended Pad Layout for Single & Dual Output Converter



External Output Trimming

Output can be externally trimmed by using the method shown below

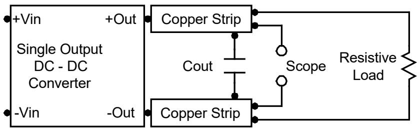


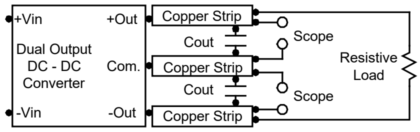
	MKZI40-110S05		MKZI40-110S12		MKZI40-110S15		MKZI40-110S24		MKZI40-110S54	
Trim Range (%)	Trim down (kΩ)	Trim up (kΩ)	Trim down (kΩ)	Trim up (kΩ)	Trim down (kΩ)	Trim up (kΩ)	Trim down (kΩ)	Trim up (kΩ)	Trim down (kΩ)	Trim up (kΩ)
1	156.81	119.77	419.81	344.74	602.92	482.88	598.97	486.83	1946.08	487.21
2	70.69	53.70	187.68	154.37	269.91	215.89	267.93	217.87	907.19	191.10
3	41.99	31.67	110.30	90.92	158.91	126.89	157.59	128.21	560.89	92.40
4	27.64	20.66	71.61	59.19	103.41	82.40	102.42	83.88	387.75	43.05
5	19.03	14.05	48.40	40.15	70.10	55.70	69.31	56.49	283.86	13.44
6	13.29	9.65	32.93	27.46	47.90	37.90	47.25	38.56	214.60	---
7	9.18	6.50	21.87	18.39	32.05	25.18	31.48	25.75	165.13	---
8	6.11	4.14	13.58	11.59	20.15	15.65	19.66	16.14	128.02	---
9	3.72	2.31	7.13	6.31	10.90	8.23	10.46	8.67	99.16	---
10	1.80	0.84	1.98	2. 07	3.50	2.30	3.11	2.69	76.08	---
11	---	---	---	---	---	---	---	---	57.19	---
12	---	---	---	---	---	---	---	---	41.45	---
13	---	---	---	---	---	---	---	---	28.13	---
14	---	---	---	---	---	---	---	---	16.71	---
15	---	---	---	---	---	---	---	---	6.82	---

Test Setup

Peak-to-Peak Output Noise Measurement Test

Use a 1µF ceramic capacitor and a 10µF tantalum 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

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 the on/off terminal (Pin 3) during a logic low is -100µA.

Overload Protection

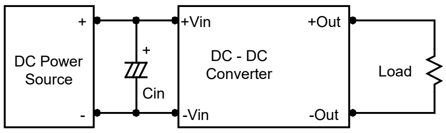
To provide hiccup mode protection in a fault (output overload) condition, the unit is equipped with internal current limiting circuitry and can endure overload for an unlimited duration.

Overvoltage Protection

The output overvoltage clamp consists of control circuitry, which is independent of the primary regulation loop, that monitors the voltage on the output terminals. The control loop of the clamp has a higher voltage set point than the primary loop. This provides a redundant voltage control that reduces the risk of output overvoltage. The OVP level can be found in the output data.

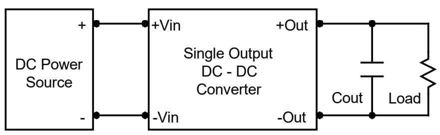
Input Source Impedance

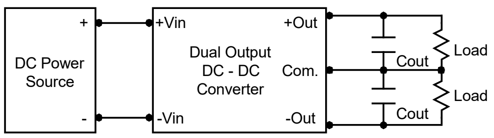
The power module should be connected to a low ac-impedance input source. Highly inductive source impedances can affect the stability of the power module.In applications where power is supplied over long lines and output loading is high, it may be necessary to use a capacitor at the input to ensure startup.
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 1µF for the 110V input 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 1µF capacitors at the output.



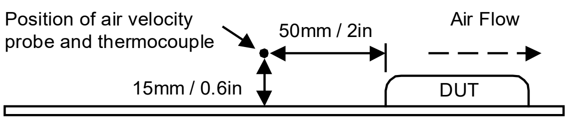


Maximum Capacitive Load

The MKZI40 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.

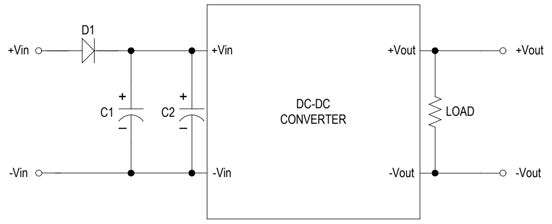
Thermal Considerations

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.

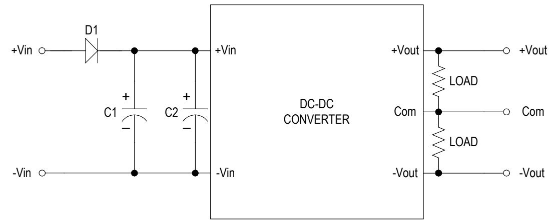


Railway EN 50155 Certified

External Filter meets Power Supply Test for EN 50155 DIP & INTERRUPTION



Single Output

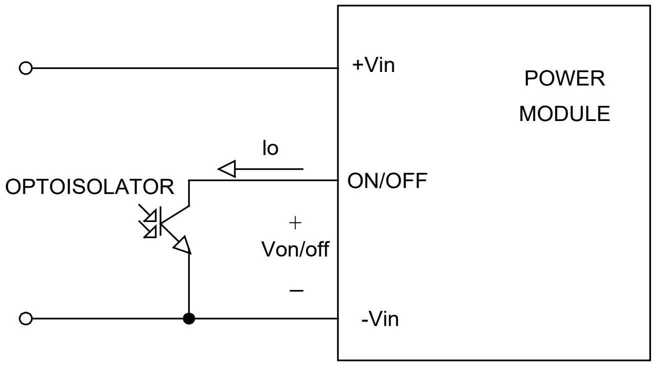


Dual Output

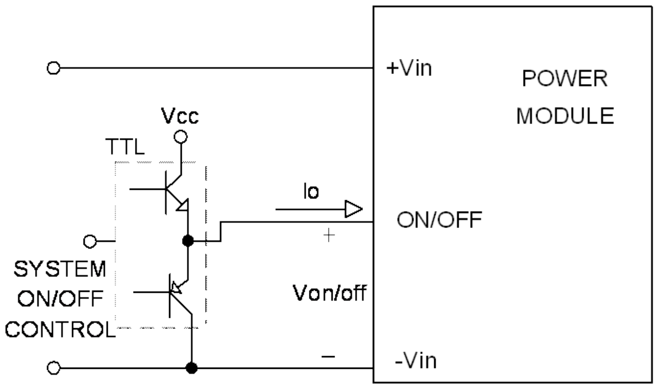
Model	D1	C1, C2
MKZI40-110SXX	IN5408	390μF/200V CHEMI-CON KY Series
MKZI40-110DXX	IN5408	390μF/200V CHEMI-CON KY Series

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.

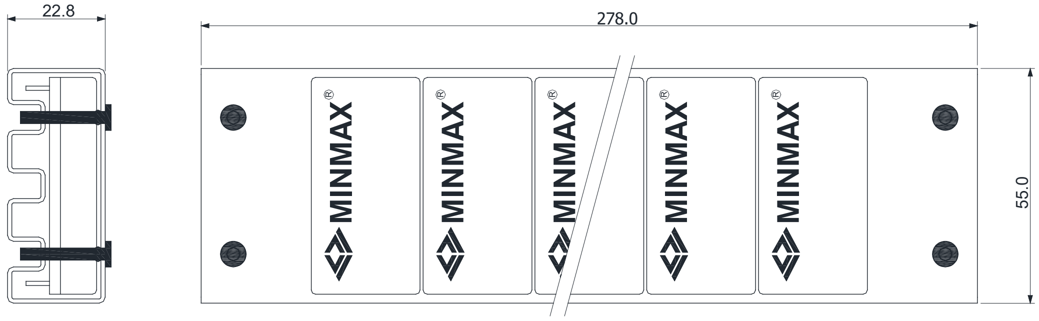


Isolated-Closure Remote ON/OFF

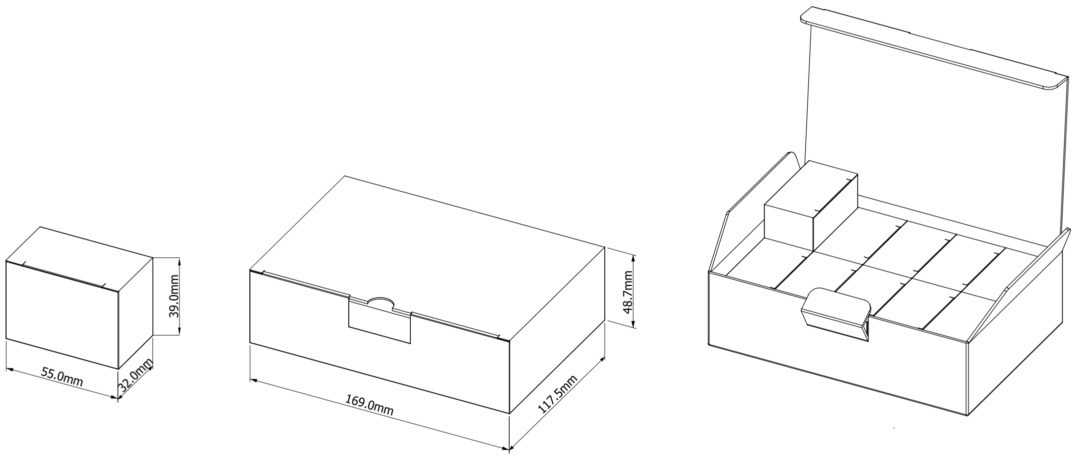


Level Control Using TTL Output

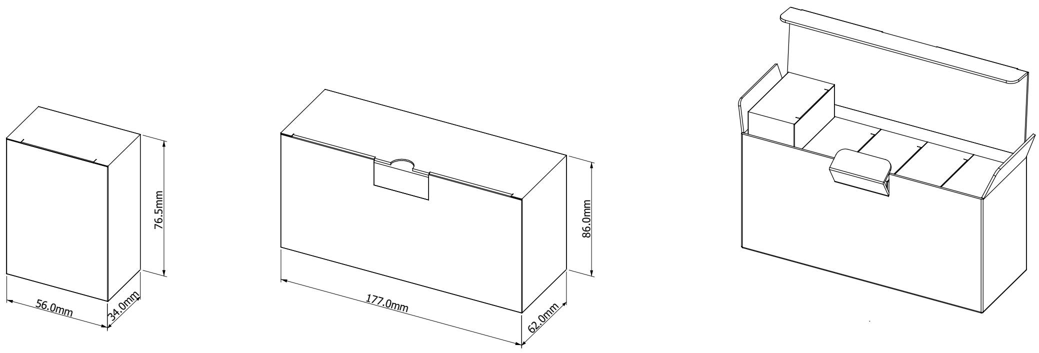
Packaging Information



Unit: mm
10 PCS per TUBE (Without heatsink)



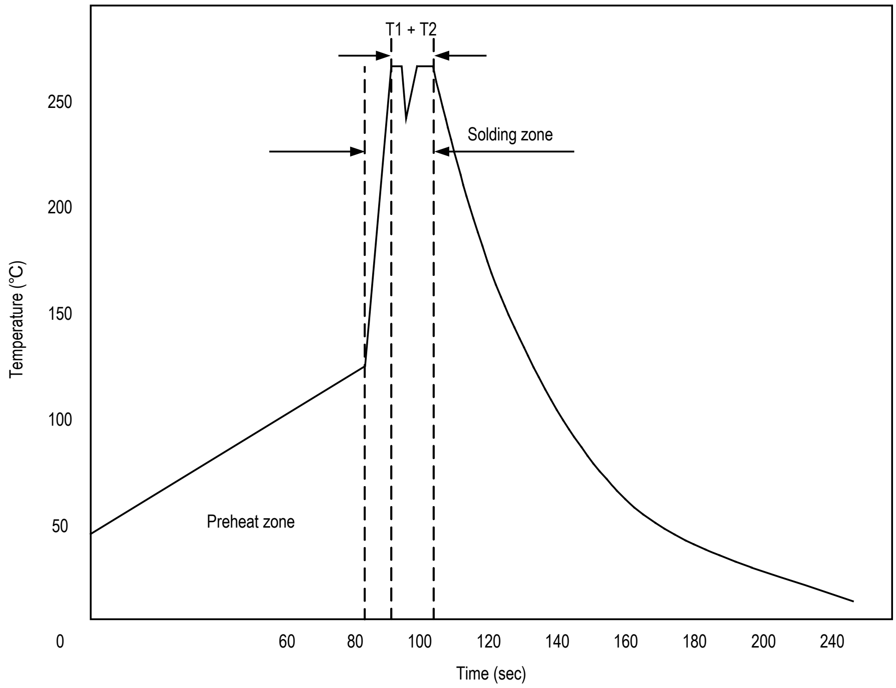
MKZI40-HS5, MKZI40-HS6 10 PCS per Box (With heatsink)



MKZI40-HS7 10 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	ZI	40	-	110	S	05
	Package Type 2" X 1"	Ultra-wide 4:1 Input Voltage Range	Output Power 40 Watt		Input Voltage Range 110: 40 ~ 160 VDC	Output Quantity S: Single D: Dual	Output Voltage 05: 5 VDC 12: 12 VDC 15: 15 VDC 24: 24 VDC 54: 54 VDC 12: ±12 VDC 15: ±15 VDC

MTBF and Reliability

The MTBF of MKZI40 series of DC-DC converters has been calculated using

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

Model	MTBF	Unit
MKZI40-110S05	937,394	Hours
MKZI40-110S12	1,085,054	
MKZI40-110S15	1,106,075	
MKZI40-110S24	1,131,663	
MKZI40-110S54	1,251,296	
MKZI40-110D12	1,123,028	
MKZI40-110D15	1,119,825	