Features & Benefits

- Rugged Unit for Military Applications
- Switchable Modes: Power Supply & Battery Charger
- High Efficiency, High Power Density
- Wide Input Voltage Range
- Built-in Active PFC Function
- Programmable Output Voltage and Current
- Charger for Lead-Acid Batteries (Flooded, GEL and AGM) and Li-Ion Batteries (Lithium Iron and Lithium Manganese)
- Droop Current Sharing & Internal ORing Diode
- Two Units in a Redundant or Parallel System
- IP67 Sealed
- RS-485 Communication
- Input Under Voltage Protection
- Input/Output Over Voltage Protection
- Short Circuit Protection
- Over Temperature Protection
- Reverse Battery Protection
- Stand Alone or Two Unit Mounted in 19" Rack
- LCD Display
- LED Indicators
- Grounding Interface

Compliance

Module is designed to meet:

- MIL-STD-1399B
- MIL-STD-461G
- MIL-STD-810G

Typical Applications

- Military/Defense Power Supplies
- Armored Vehicles
- Land Platforms
- Communications and Radar Systems

Product Ratings	
V_{IN} = 90–265 V_{RMS}	V_{OUT_TYP} = 28 V_{DC}
V_{IN_NOM} = 220 V_{RMS} SINGLE PHASE	I_{OUT_MAX} = 120 A_{DC} P_{OUT_MAX} = 3360 W

Product Description

KMBC02 is a high efficiency and rugged multifunction AC-DC converter that offers operation in dual modes: power supply and battery charger modes. Mode selection can be done remotely or locally via front panel. As a power supply, it regulates a constant voltage with a programmable current limit. In battery charger mode, converter regulates a constant current according to the charging characteristics of the selected battery technology. Unit is designed to guarantee high performance in both modes under extreme environmental conditions. It has superior protection features against external faults and disturbances while meeting the major military standards. KOLT's innovative engineering has enabled a compact design of the converter with high power density and performance. This unit is factory configurable both electrically and mechanically to best fit the application.

Size: 550 x 220 x 128 mm
(19"/2 form factor, 3U height)

Weight: 18 kg

Electrical Characteristics

Input Characteristics					
Parameters	**Comments**	**Min**	**Typ**	**Max**	**Unit**
Input Voltage	Universal	90	220	265	V_{RMS}
Input Frequency	Universal	47	50	63	Hz
Input Current THD	@Rated output power	-	-	10%	-
Input No Load Current	@Nominal input voltage	-	0.63	-	A_{RMS}
Inrush Current	@Nominal input voltage	-	-	±40	A_{PK}
Leakage Current	@10% load, nominal input voltage	-	-	5	mA_{RMS}

Output Characteristics					
Parameters	**Comments**	**Min**	**Typ**	**Max**	**Unit**
Output Voltage	User settable	-	28	-	V_{DC}
Output Current	User settable	-	100	120	A_{DC}
Output Power	Subject to derating (see Figure 3)	-	2800	3360	W
Output Ripple and Noise	@20 MHz Bandwidth	-	-	500	mV_{PK-PK}
Line Regulation	Over the full range of line input voltage	Insignificantly small			-
Load Regulation	From 10% load to full load, nominal input voltage	-	100	-	mV
External Load Capacitance		-	-	700	µF

General Characteristics					
Parameters	**Comments**	**Min**	**Typ**	**Max**	**Unit**
Efficiency	@Rated output power	92%	-	-	-
Power Factor	@Rated output power	99%	-	-	-
Turn-on Delay	Factory settable, health check	-	-	500	ms
Soft-Start Time	Factory settable	-	-	1	s
Hold-up Time		10	-	-	ms
Power Density	@Rated output power	-	180	217	W/dm^3
Weight		-	18	-	kg
Length	Connectors and handle lengths are not included	-	550	-	mm
Depth		-	220	-	mm
Height		-	128	-	mm
Cooling	Forced air by temperature controlled fans				
Built-in Test Feature	DC OK, Remote Error Sensing				

Protections					
Parameters	**Comments**	**Min**	**Typ**	**Max**	**Unit**
Input Circuit Breaker	The input circuit breaker is for fault protection and is also used as an ON/OFF switch				
Input Under Voltage Protection	When the voltage returns within the normal limits, unit resumes operation automatically	80	85	90	V_{RMS}
Input Over Voltage Protection		300	305	310	V_{RMS}
Output Over Current Protection	Fully electronic against over-load	-	-	130%	I_{OUT_TYP}
Output Over Voltage Protection		-	-	115%	V_{OUT_TYP}
Output Short Circuit Protection	Fully electronic against over-load and continuous short-circuit conditions				
Over Temperature Protection	Automatically resumes operation when the heat sink temperature decreases below 70°C	-	80	-	°C
Surge/Spike Protection	EN 61000-4, EN 61000-5				
Battery	Prevention of battery discharge when charger is off				
	Reverse polarity				

Isolation Characteristics					
Parameters	**Comments**	**Min**	**Typ**	**Max**	**Unit**
Insulation Resistance	Input to Case	-	>100	-	MΩ
Isolation Voltage	Input to Output	**-**	-	500	V
Isolation Voltage	Input to Case	**-**	-	500	V
Isolation Voltage	Output to Case	**-**	-	500	V

Environmental Characteristics						
Parameters	**Standard**	**Min**	**Typ**	**Max**	**Unit**	**Status**
Operational Temperature	MIL-STD-810G Method 501.5/502.5 Procedure II	-32	-	+50	°C	Passed
Storage / Transport Temperature	MIL-STD-810G Method 501.5/502.5 Procedure I	-40	-	+63	°C	Passed
Operational Low Pressure	MIL-STD-810G Method 500.5 Procedure II	-	-	10000	ft	Similarity*
Storage / Transport Low Pressure	MIL-STD-810G Method 500.5 Procedure I	-	-	15000	ft	Designed to Meet
Parameters	**Standard**	**Waveform**	**Peak Value**	**Pulse Duration**	**Axis**	**Status**
Shock	MIL-STD-810G Method 516.6 Procedure I	Sawtooth	20g	11 ms	±X, ±Y, ±Z	Similarity*
		Half-Sine	10g	11 ms	±X, ±Y, ±Z	Similarity*
Parameters	**Standard**	**Category**		**Platform**	**Vehicle**	**Status**
Vibration	MIL-STD-810G Method 514.6 Procedure I	Category 4		Secured Cargo	Truck Transportation and Composite Wheeled Vehicles	Similarity*
		Category 8		Aircraft	Propeller	Similarity*
		Category 11		Railroad	Train	Similarity*
		Category 20		Ground	Wheeled Vehicles	Similarity*
		Category 21		Watercraft	Marine Vehicles	Similarity*
Parameters	**Standard**	**Condition**				**Status**
Salt Fog	MIL-STD-810G Method 509.5	24 hours spray, 24 hours dry, applied 2 times				Designed to Meet
Sand and Dust	MIL-STD-810G Method 510.5 Procedure I/II	<150 µm Dust 150-850 µm Sand				Similarity*
Fungus	MIL-STD-810G Method 508.6	Analysis of the degree of inertness to fungus growth of the components.				Designed to Meet
Solar Radiation	MIL-STD-810G Method 505.5 Procedure I	A2				Designed to Meet
Humidity	MIL-STD-810G Method 507.5 Procedure II	≥ %95 Relative @30°C				Similarity*
Noise	MIL-STD-1474E	≤ 75 dB at a distance of 1 meter				Passed
Impermeability	IP67	Tested by immersion in 1 m water for 30 minutes				Passed
Parameters	**Standard**	**Test**				**Status**
EMI/EMC	MIL-STD-461G Ground Army	CE102	CS101 CS114 CS115 CS116 CS118	RE102	RS103	Similarity*

* Verified on similar unit with a height of 2U. Both units consist of identical converter modules.

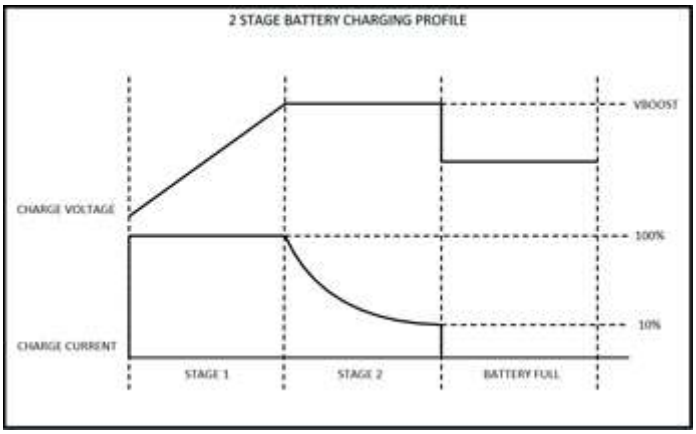


Figure 1. Two stage battery charging profile

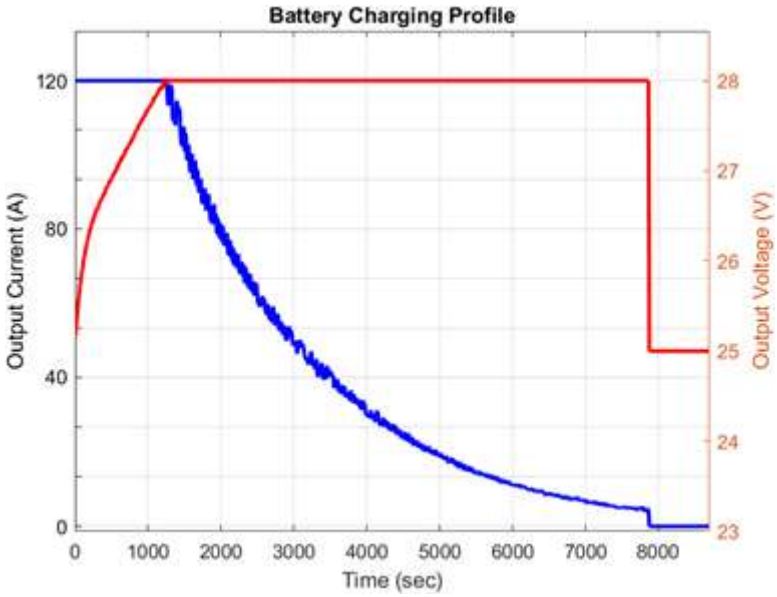


Figure 2. Battery charging profile based on measured battery current and battery voltage data. Maximum power delivered is 3360 W.

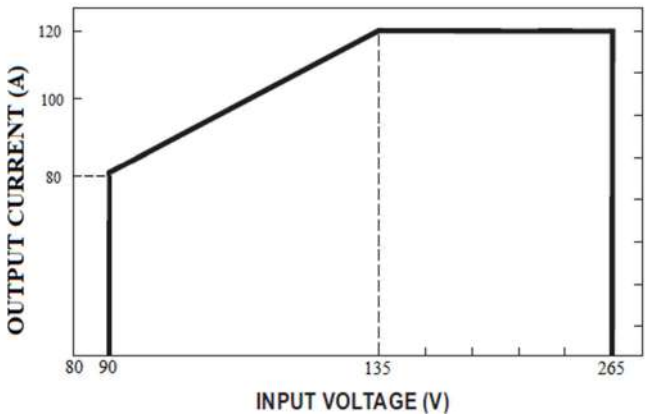
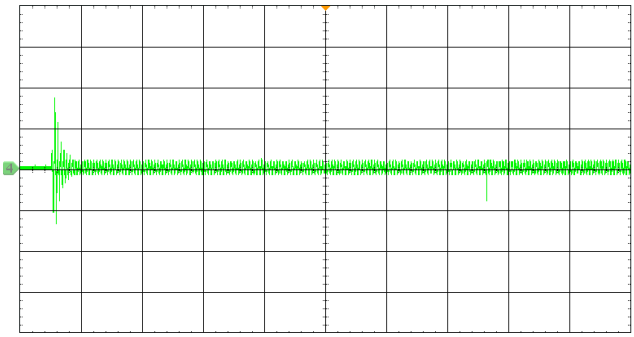
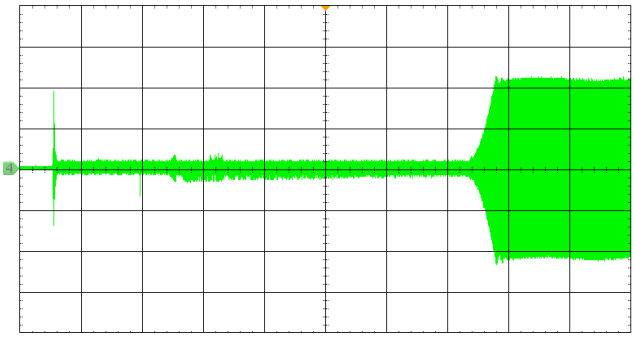


Figure 3. Derating curve of output load versus input voltage



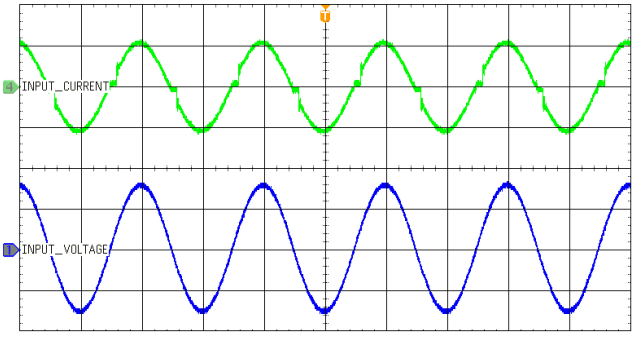
Input current (green) (10 A/div) Time base : 400 ms/div

Figure 4. Inrush current at nominal input voltage



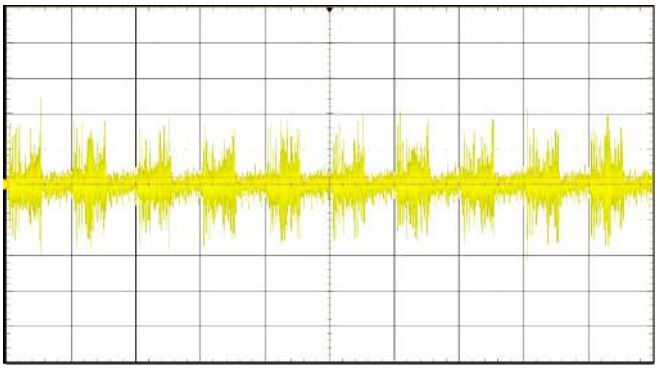
Input current (green) (10 A/div) Time base : 2 s/div

Figure 5. Input current for inrush and start-up stages at nominal input voltage



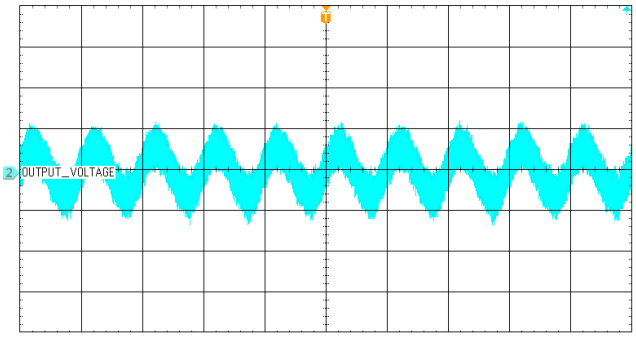
Input voltage (navy blue) (200 V/div) Time base : 10 ms/div
Input current (green) (20 A/div)

Figure 6. Typical input voltage and current waveforms at rated load current



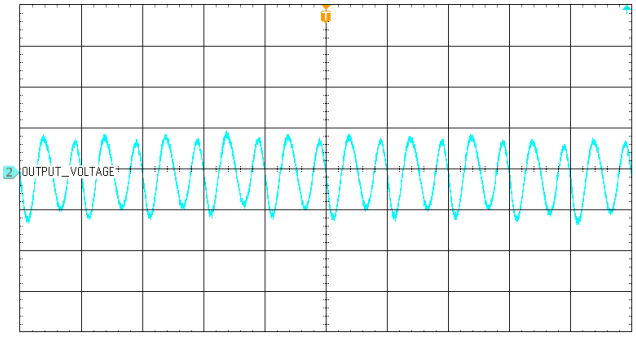
Leakage current (yellow) (10 mA/div) Time base : 20 ms/div

Figure 7. Leakage current at nominal input voltage and 10% load current



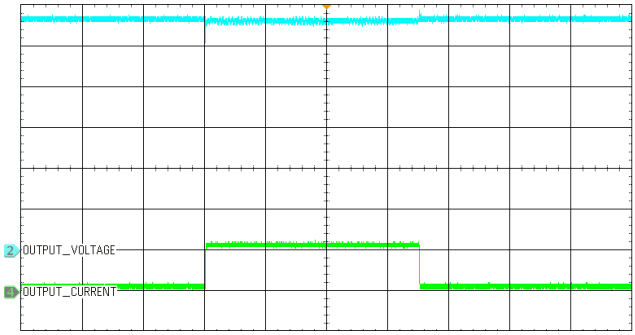
Output voltage (blue) (200 mV/div) Time base : 10 ms/div

Figure 8. Output voltage ripple at nominal input voltage and rated load current (AC Coupled), Bandwidth: 20 MHz



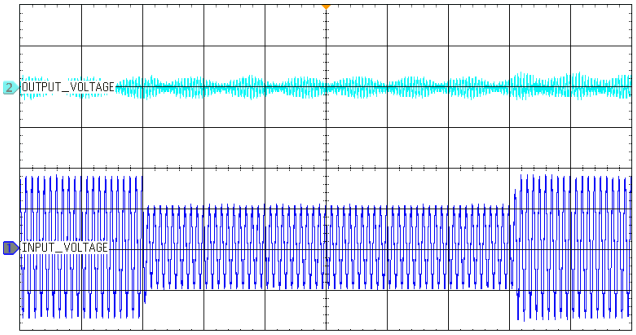
Output voltage (blue) (100 mV/div) Time base : 10 µs/div

Figure 9. Output voltage ripple at nominal input voltage and rated load current (AC Coupled), Bandwidth: 20 MHz



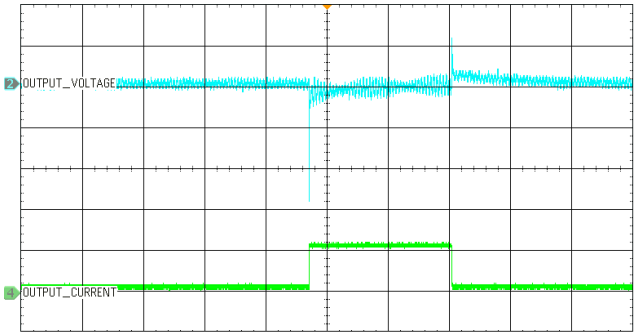
Output voltage (blue) (5 V/div) Time base : 200 ms/div
Output current (green) (100 A/div)

Figure 10. Load transient response: from 10% to 100% and from 100% to 10% at nominal output voltage (DC Coupled)



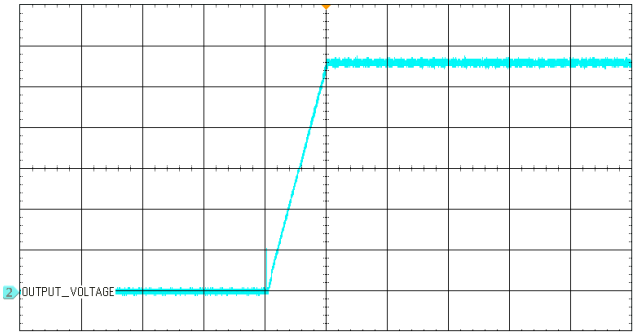
Output voltage (blue) (1 V/div) Time base : 200 ms/div
Input voltage (navy blue) (200 V/div)

Figure 13. Line transient response: from 265 V_{RMS} to 135 V_{RMS} and from 135 V_{RMS} to 250 V_{RMS} at nominal output voltage (AC Coupled)



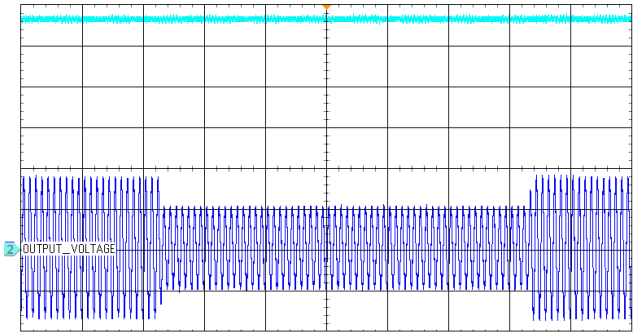
Output voltage (blue) (1 V/div) Time base : 100 ms/div
Output current (green) (100 A/div)

Figure 11. Load transient response: from 10% to 100% and from 100% to 10% at nominal output voltage (AC Coupled)



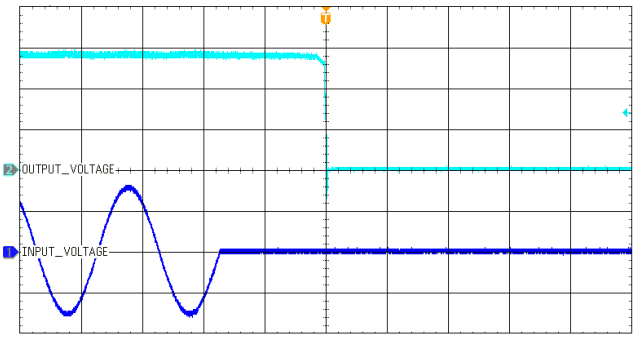
Output voltage (blue) (5 V/div) Time base : 1 s/div

Figure 14. Start-up waveform at rated load current and nominal output voltage



Output voltage (blue) (5 V/div) Time base : 200 ms/div
Input voltage (navy blue) (200 V/div)

Figure 12. Line transient response: from 265 V_{RMS} to 135 V_{RMS} and from 135 V_{RMS} to 250 V_{RMS} at nominal output voltage (DC Coupled)



Output voltage (blue) (10 V/div) Time base : 10 ms/div
Input voltage (navy blue) (200 V/div)

Figure 15. Hold-up waveform at rated load current and nominal output voltage

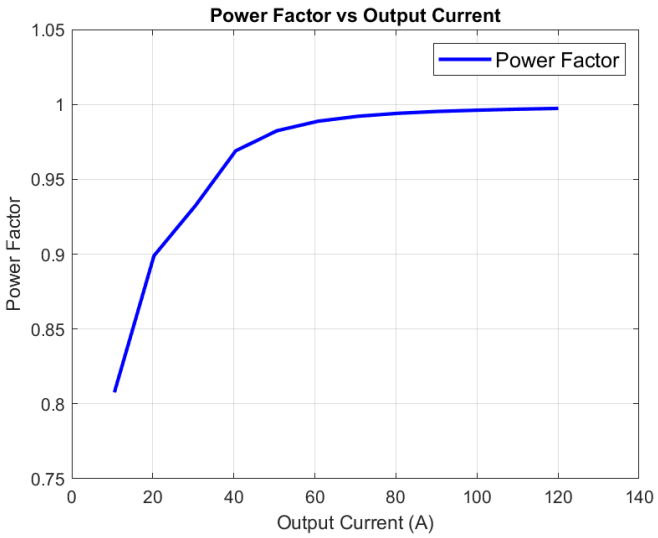


Figure 16. Power factor versus output current at nominal input voltage

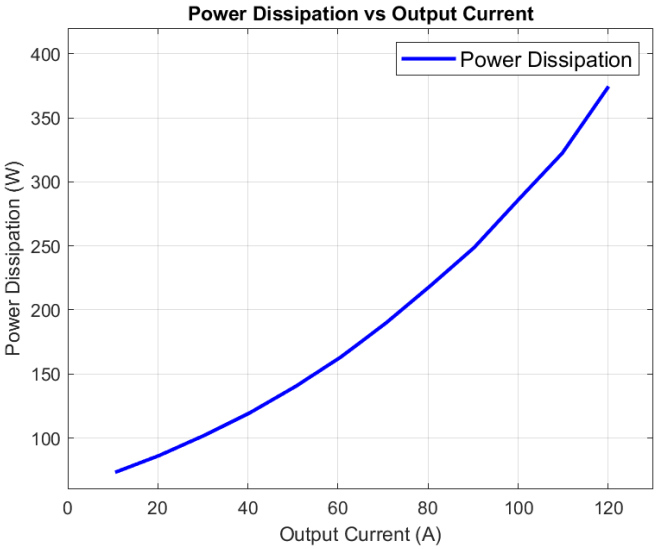


Figure 18. Power dissipation versus output current at nominal input voltage

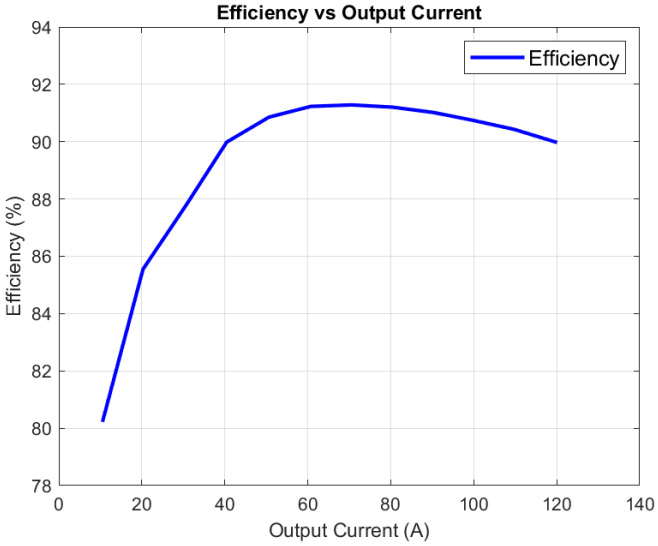


Figure 17. Efficiency versus output current at nominal input voltage

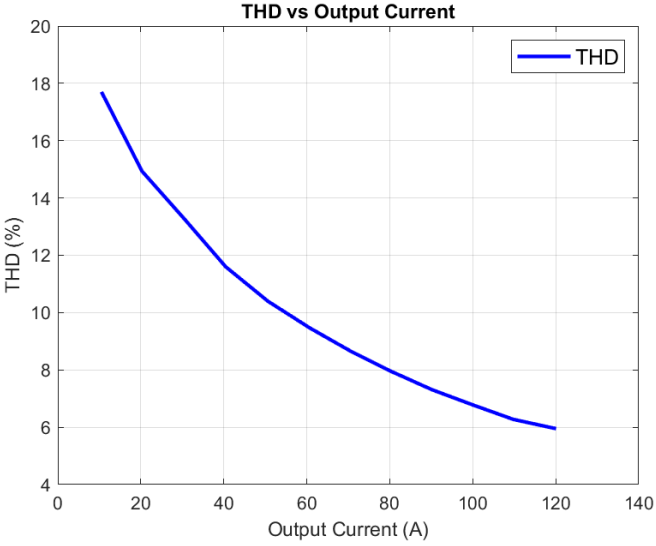
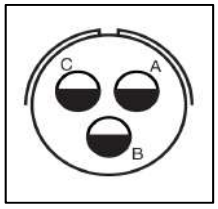


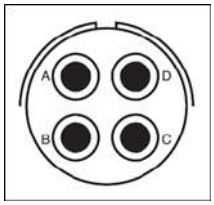
Figure 19. Total harmonic distortion (THD) versus output current at nominal input voltage

Connector Configuration

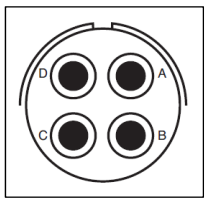
Input Connector CA3102E18-21P-B-05	
Pin	**Signal**
A	PHASE
B	NEUTRAL
C	CHASSIS



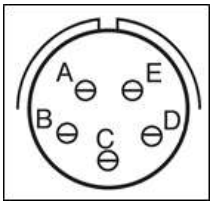
Output Connector #1 CA3102E32-17S	
Pin	**Signal**
A	OUT
B	OUT
C	OUT_RTN
D	OUT_RTN



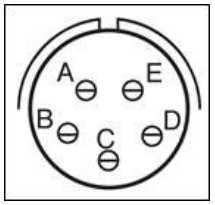
Output Connector #2 CA3102E32-17P	
Pin	**Signal**
A	OUT
B	OUT
C	OUT_RTN
D	OUT_RTN



Signal Connector #1 D38999/20WB5SN	
Pin	**Signal**
A	RS485 Data+
B	RS485 Data-
C	RS485_RTN
D	ID_SET
E	ID_SET_RTN



Signal Connector #2 D38999/20WB5SA	
Pin	**Signal**
A	RS485 Data+
B	RS485 Data-
C	RS485_RTN
D	CS Data+
E	CS Data-



Led Configuration

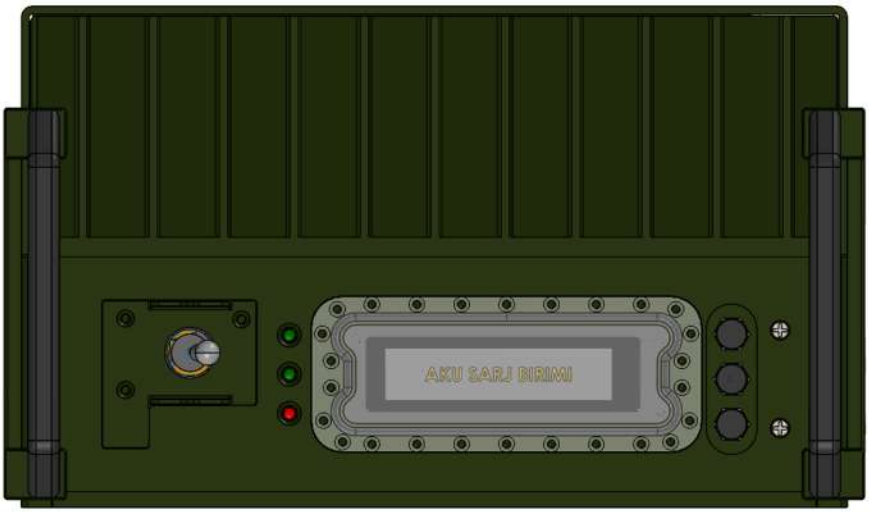


Figure 20. Front Panel

Placement	Definition	Description	Status
	Input	AC Input Active	GREEN
		AC Input Passive	OFF
		AC Input Fault	RED
	Output	DC Output Active	GREEN
		DC Output Passive	OFF
	Fault	Device Fault	RED
		Device OK	OFF

Mechanical Drawings

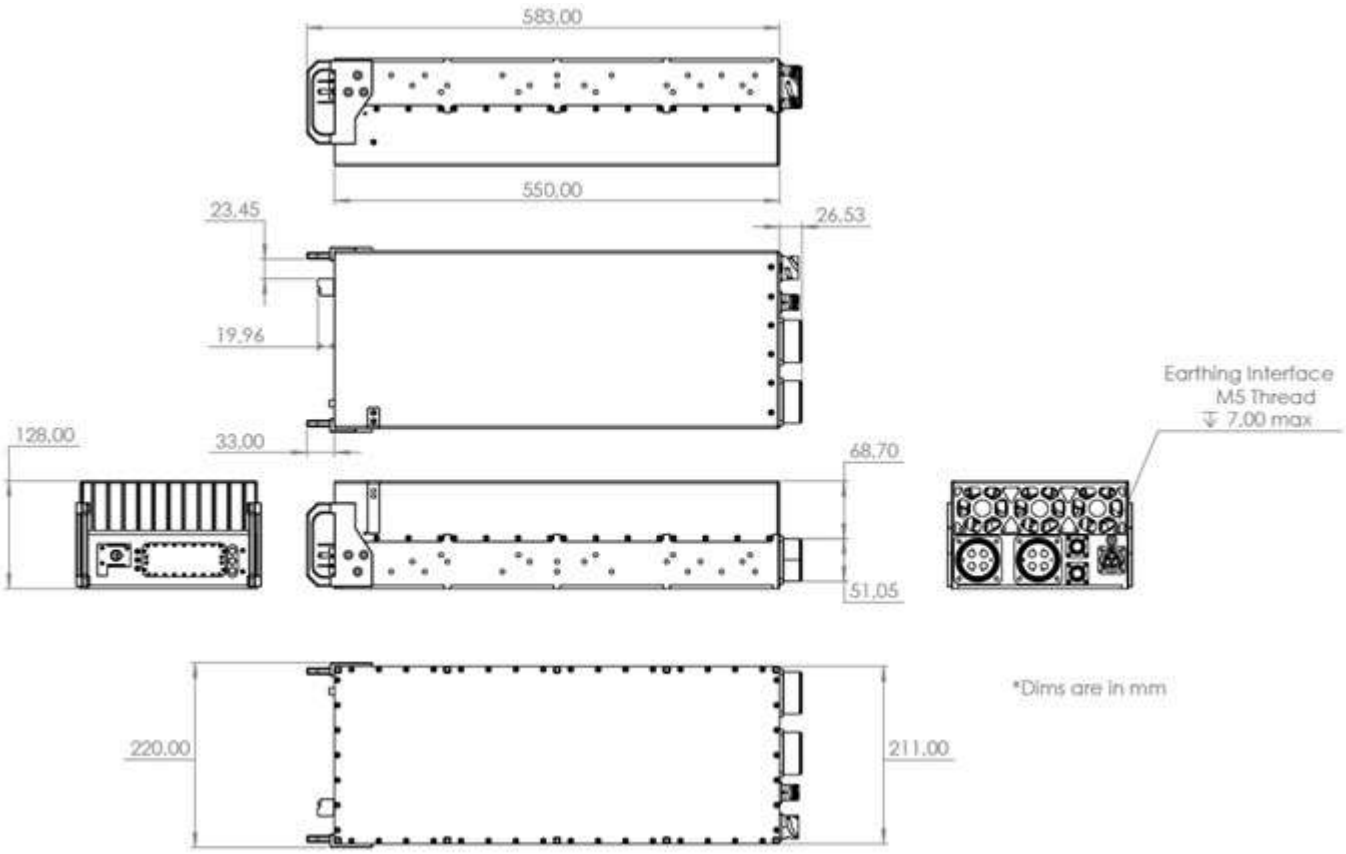
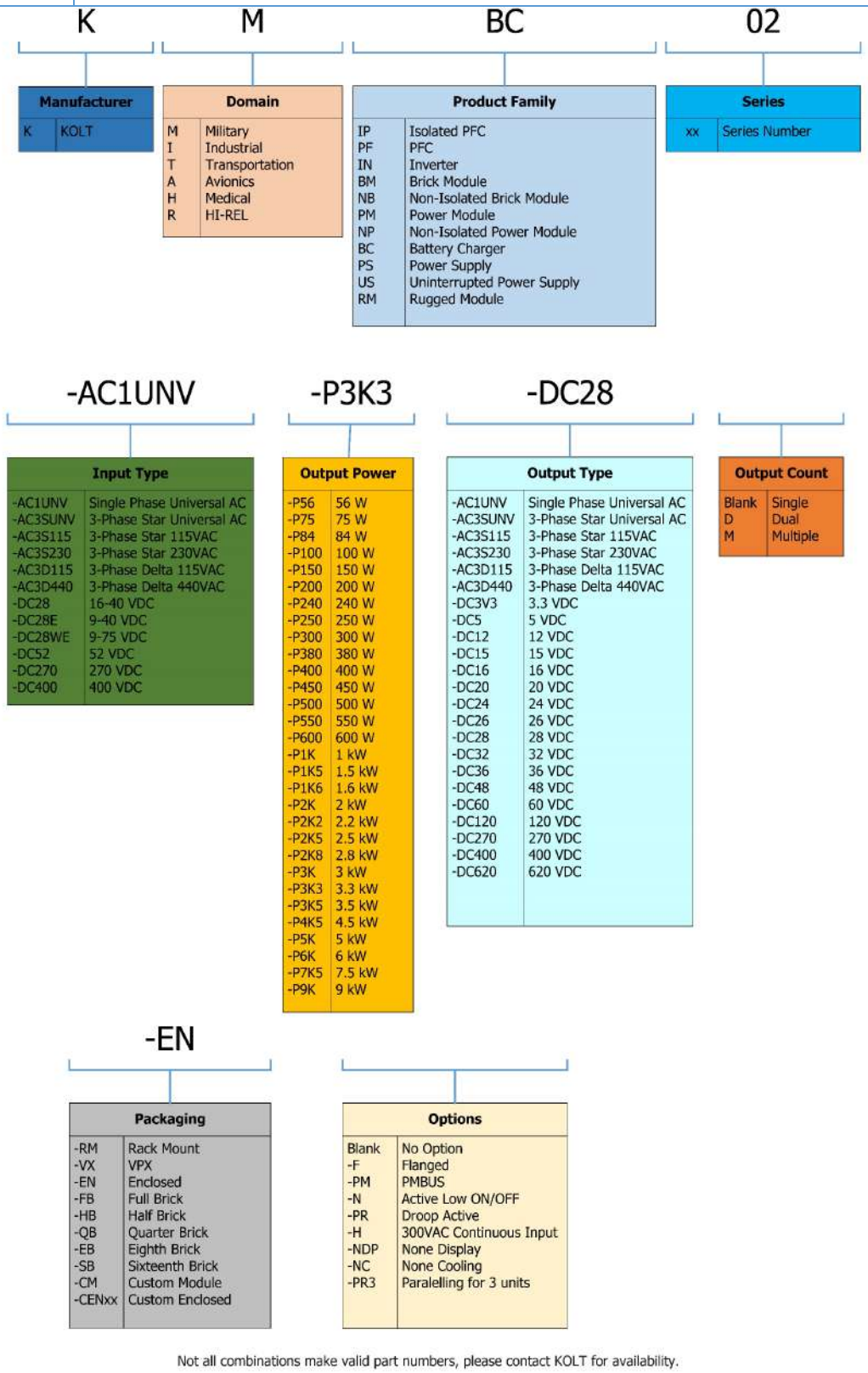


Figure 21. Mechanical Dimensions

Material Finish	**Sealed Aluminum Alloy 6061-T6 Case** **Color Options: 37030, 34094**

Part Ordering Information

Manufacturer	Manufacturer Part Number
KOLT	KMBC02-AC1UNV-P3K3-DC28-EN



Not all combinations make valid part numbers, please contact KOLT for availability.

Revision History

Revision	Date	Description	Page Number(s)
A-PC1	06.04.2023	Initial Release	-
A-PC2	27.04.2023	Second Release	-
A-PC3	02.05.2023	Third Release	-
A-PC4	03.05.2023	Fourth Release	-