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_NOM} = 28 V_{DC}
V_{IN_NOM} = 220 V_{RMS} SINGLE PHASE	I_{OUT_MAX} = 60 A_{DC} P_{OUT_NOM} = 1680 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: 510 × 215 × 44 mm

Electrical Characteristics

Parameters	Comments	Min	Typ.	Max	Unit
Input Characteristics					
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	-	1.12	-	A
Inrush Current	@Nominal input voltage	-	-	±40	A
Leakage Current	@10% load, nominal input voltage	-	-	6	mA_{RMS}
Output Characteristics					
Output Voltage	User settable	18	28	30	V
Output Current	User settable	-	-	60	A
Output Power	Subject to derating (see Figure 3)	-	1680	1800	W
Output Ripple and Noise (pk-pk)	@20 MHz Bandwidth	-	-	800	mV
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		-	-	TBD	µF
General Characteristics					
Efficiency	@Rated output power	90%	-	-	-
Power Factor	@Rated output power	99%	-	-	-
Turn-on Delay	Health Check	-	-	500	ms
Soft-Start Time		-	-	1	s
Hold-up Time		10	-	-	ms
Power Density	@Rated output power	-	348	373	W/dm^3
Weight		-	-	8	kg
Length	Connectors and handle lengths are not included	-	-	510	mm
Depth		-	-	215	mm
Height		-	-	44	mm
Cooling	Forced air				
Built-in Test Feature	DC OK, Remote Error Sensing				

Protections					
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		265	270	275	V_{RMS}
Output Over Current Protection	Fully electronic against over-load	-	-	110%	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					
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					
Operational Temperature	MIL-STD-810G	-32	-	+50	°C
Storage / Transport Temperature	MIL-STD-810G	-40	-	+63	°C
Operational Low Pressure	MIL-STD-810G	-	-	10000	ft
Storage / Transport Low Pressure	MIL-STD-810G	-	-	15000	ft
Salt Fog	MIL-STD-810G	24 hours spray, 24 hours dry, applied 2 times			
Sand and Dust	MIL-STD-810G	<150 µm Dust 150-850 µm Sand			
Fungus	MIL-STD-810G	Analysis of the degree of inertness to fungus growth of the components.			
Solar Radiation	MIL-STD-810G	A2			
Shock	MIL-STD-810G	Sawtooth		20g 11 ms	±X, ±Y, ±Z
		Half-Sine		10g 11 ms	±X, ±Y, ±Z
Vibration	MIL-STD-810G	Category 4		Secured Cargo	Truck Transportation and Composite Wheeled Vehicles
		Category 8		Aircraft	Propeller
		Category 11		Railroad	Train
		Category 20		Ground Vehicles	Wheeled and Tracked Vehicles
		Category 21		Watercraft	Marine Vehicles
Humidity	MIL-STD-810G	≥ %95 Relative @30°C			
EMI/EMC	MIL-STD-461G	CE102 CS101 CS114 CS115 CS116 CS118 RE102 RS103			
Noise	MIL-STD-1474E	≤ 75 dB at a distance of 1 meter			
Impermeability	Tested by immersion in 1 m water for 30 minutes	IP67			

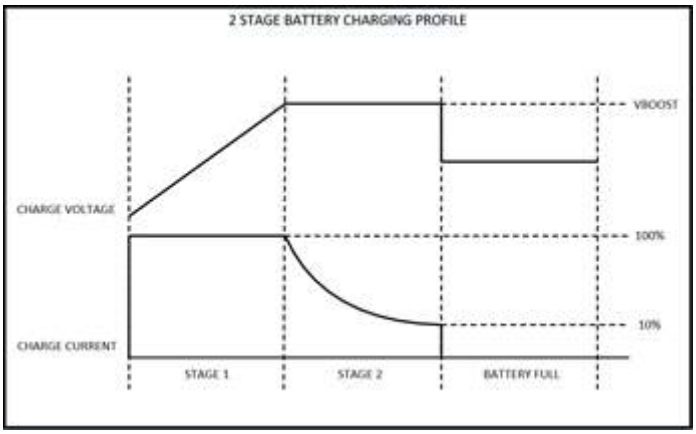


Figure 1. Two stage battery charging profile

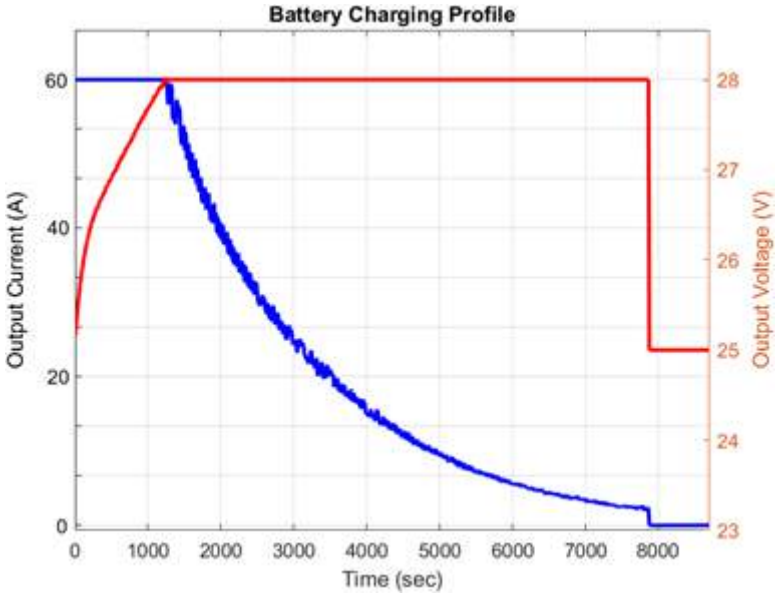
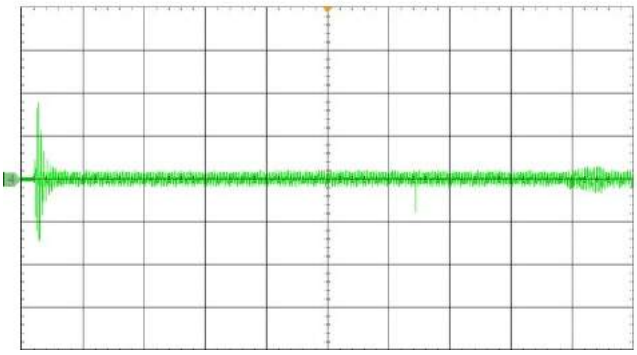
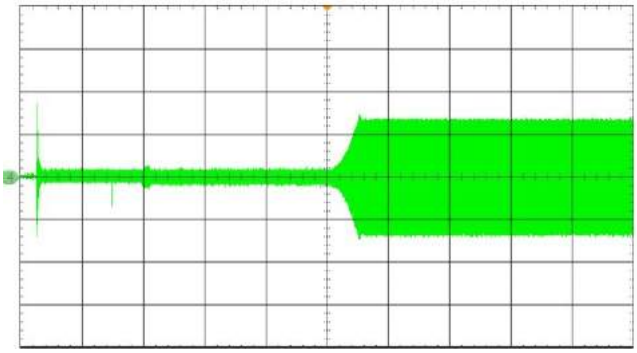


Figure 2. Battery charging profile based on measured battery current and battery voltage data. Maximum power delivered is 1680 W.



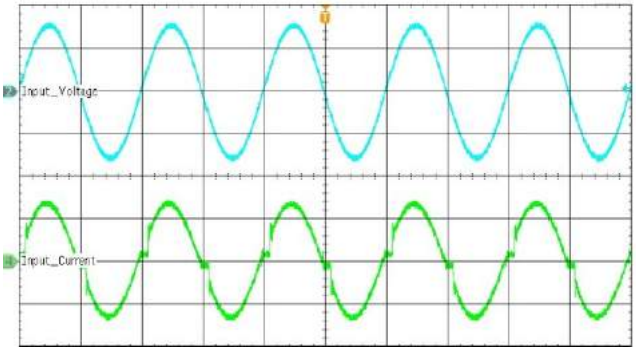
Input current (green) (10 A/div) Time base : 400 ms/div

Figure 3. Inrush current at nominal input voltage



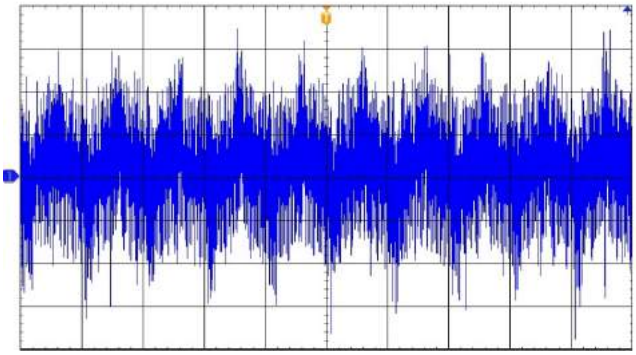
Input current (green) (10 A/div) Time base : 2 s/div

Figure 4. Input current for inrush and start-up stages at nominal input voltage



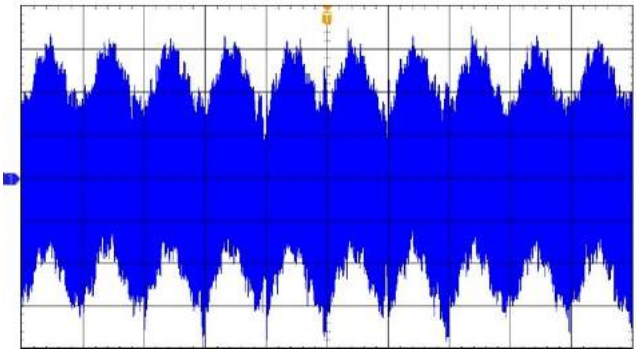
Input voltage (blue) (200 V/div) Time base : 10 ms/div
Input current (green) (10 A/div)

Figure 5. Typical input voltage and current waveforms at rated load current



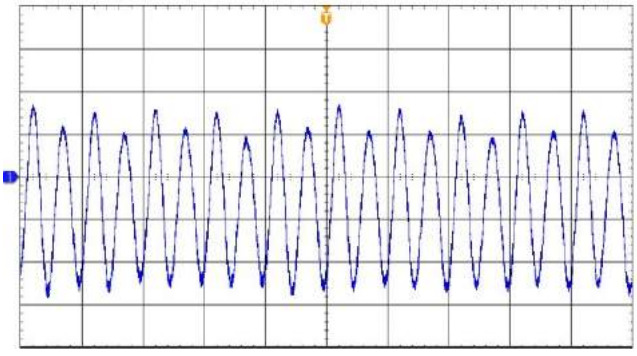
Leakage current (navy blue) (10 mA/div) Time base : 20 ms/div

Figure 6. Leakage current at nominal input voltage and 10% load current



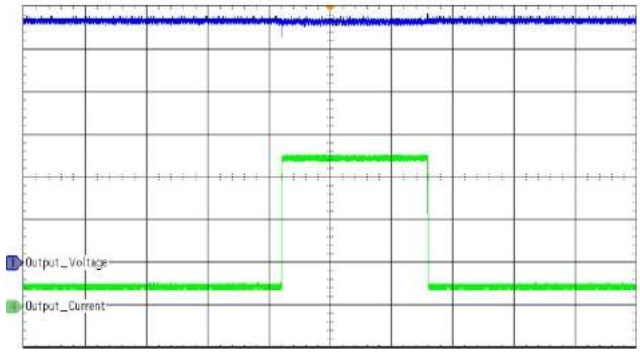
Output voltage (navy blue) (100 mV/div) Time base : 10 ms/div

Figure 7. Output voltage ripple at nominal input voltage and rated load current (AC Coupled), Bandwidth: 20 MHz



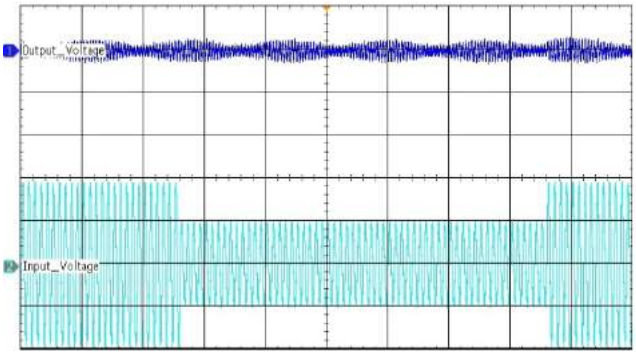
Output voltage (navy blue) (50 mV/div) Time base : 10 µs/div

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



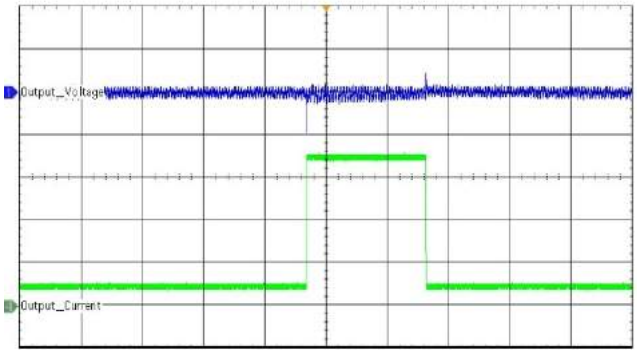
Output voltage (navy blue) (5 V/div) Time base : 200 ms/div
Output current (green) (25 A/div)

Figure 9. Load transient response: from 10% to 100% and from 100% to 10% at nominal output voltage (DC Coupled)



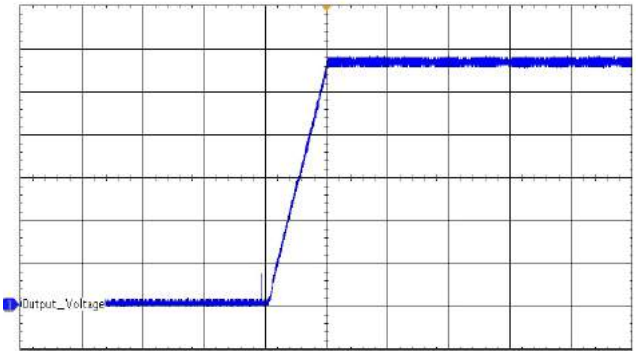
Output voltage (navy blue) (1 V/div) Time base : 200 ms/div
Input voltage (blue) (200 V/div)

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



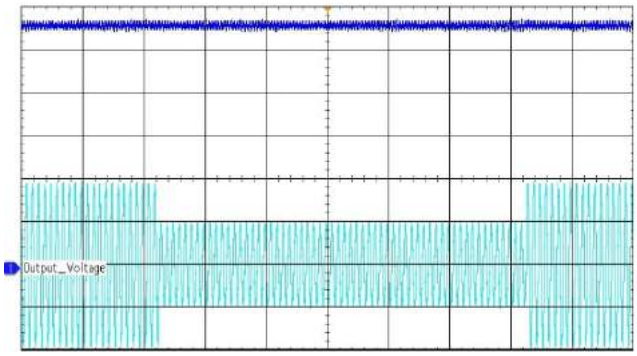
Output voltage (navy blue) (1 V/div) Time base : 100 ms/div
Output current (green) (20 A/div)

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



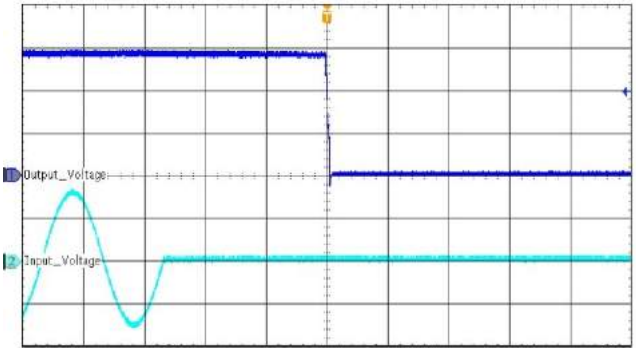
Output voltage (navy blue) (5 V/div) Time base : 1 s/div

Figure 13. Start-up waveform at rated load current and nominal output voltage



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

Figure 11. Line transient response: from 265 V_{RMS} to 135 V_{RMS} and from 135 V_{RMS} to 265 V_{RMS} at nominal output voltage (DC Coupled)



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

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

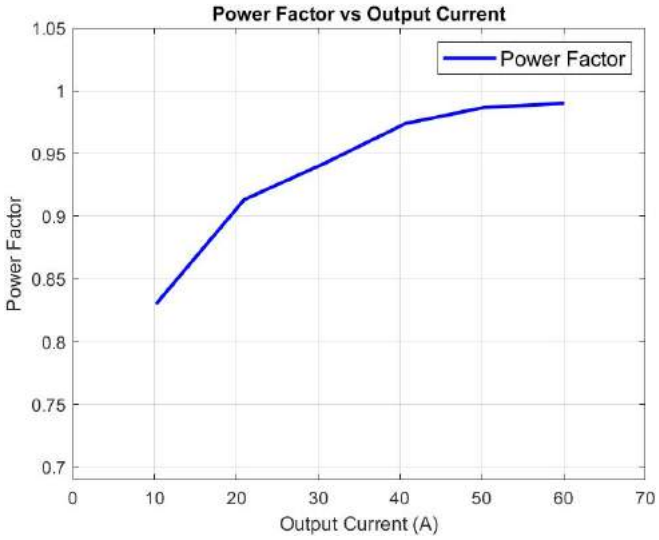


Figure 15. Power factor versus output current at nominal input voltage

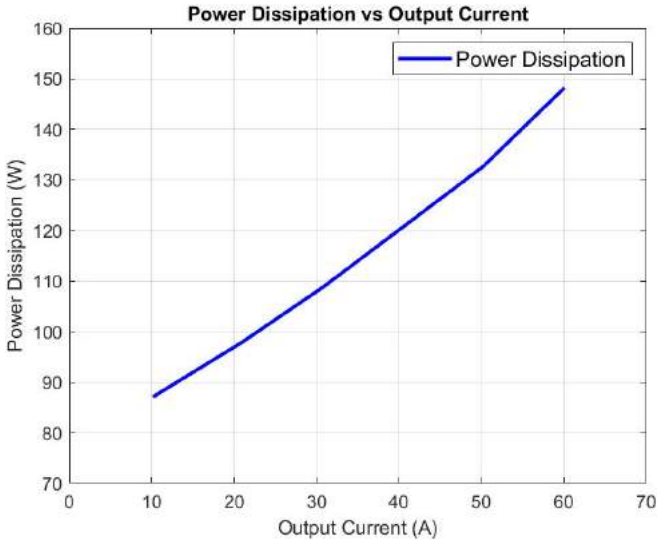


Figure 17. Power dissipation versus output current at nominal input voltage

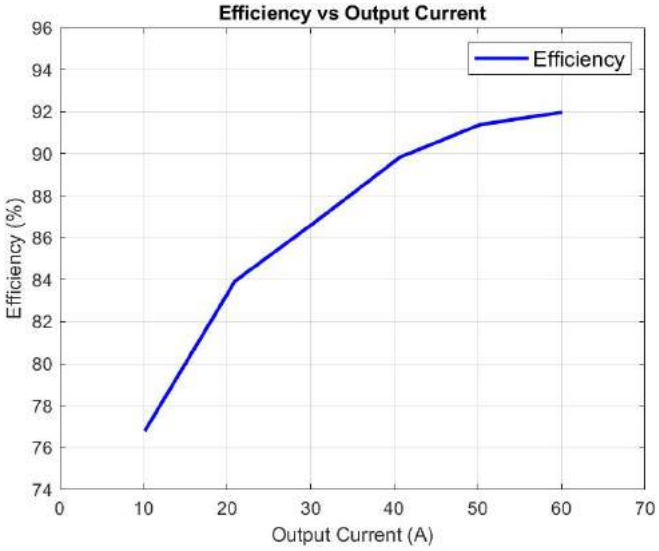


Figure 16. Efficiency versus output current at nominal input voltage

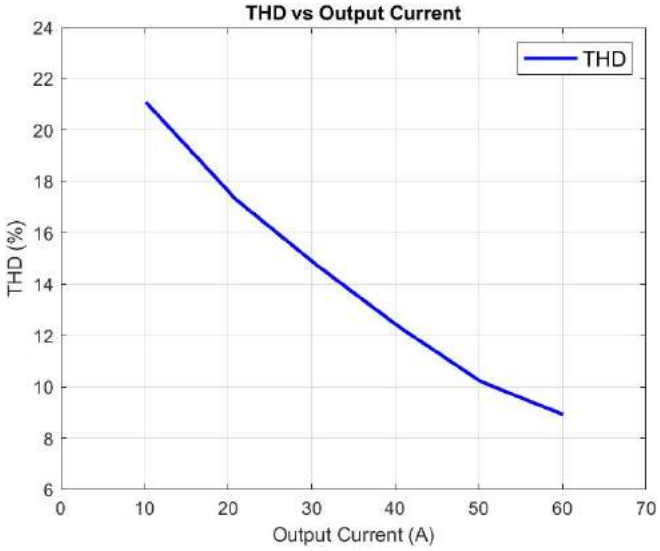
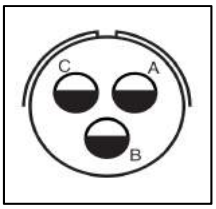


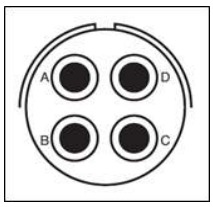
Figure 18. Total harmonic distortion (THD) versus output current at nominal input voltage

Connector Configuration

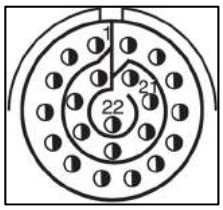
Input Connector 97B-3102E-16-10P	
Pin	**Signal**
A	PHASE
B	NEUTRAL
C	CHASSIS



Output Connector 97B-3102E-22-22S	
Pin	**Signal**
A	OUT
B	OUT
C	OUT RTN
D	OUT RTN



Signal Connector D38999/20WC35SN	
Pin	**Signal**
1	RS485 Data-
2	RS485 Data+
3	RS485 RTN
4	-
5	ID SET
6	ID SET RTN
7	-
8	CS Data-
9	CS Data+
10	CS RTN
11	-
12	-
13	-
14	-
15	-
16	-
17	-
18	-
19	-
20	-
21	-
22	-



Led Configuration

Figure 19. 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

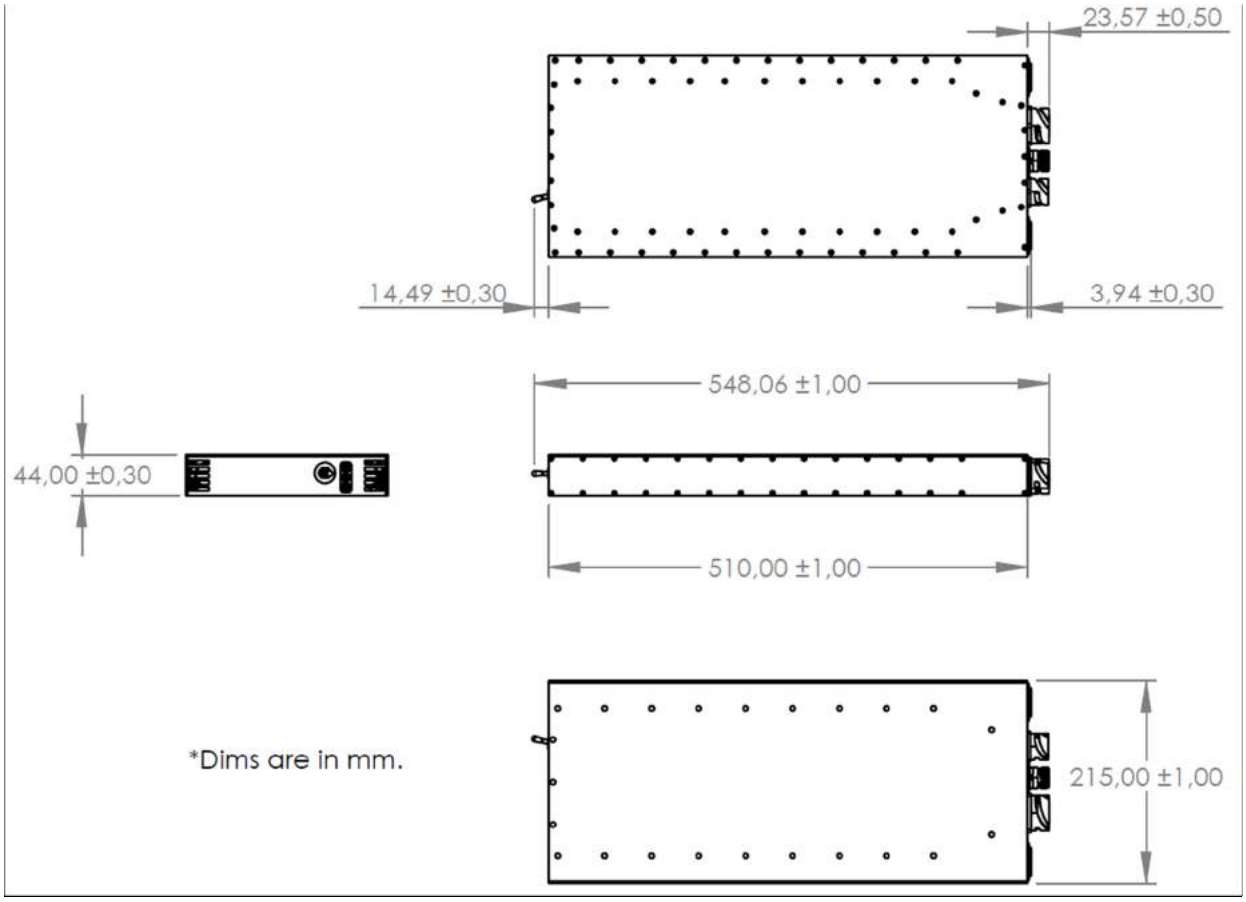
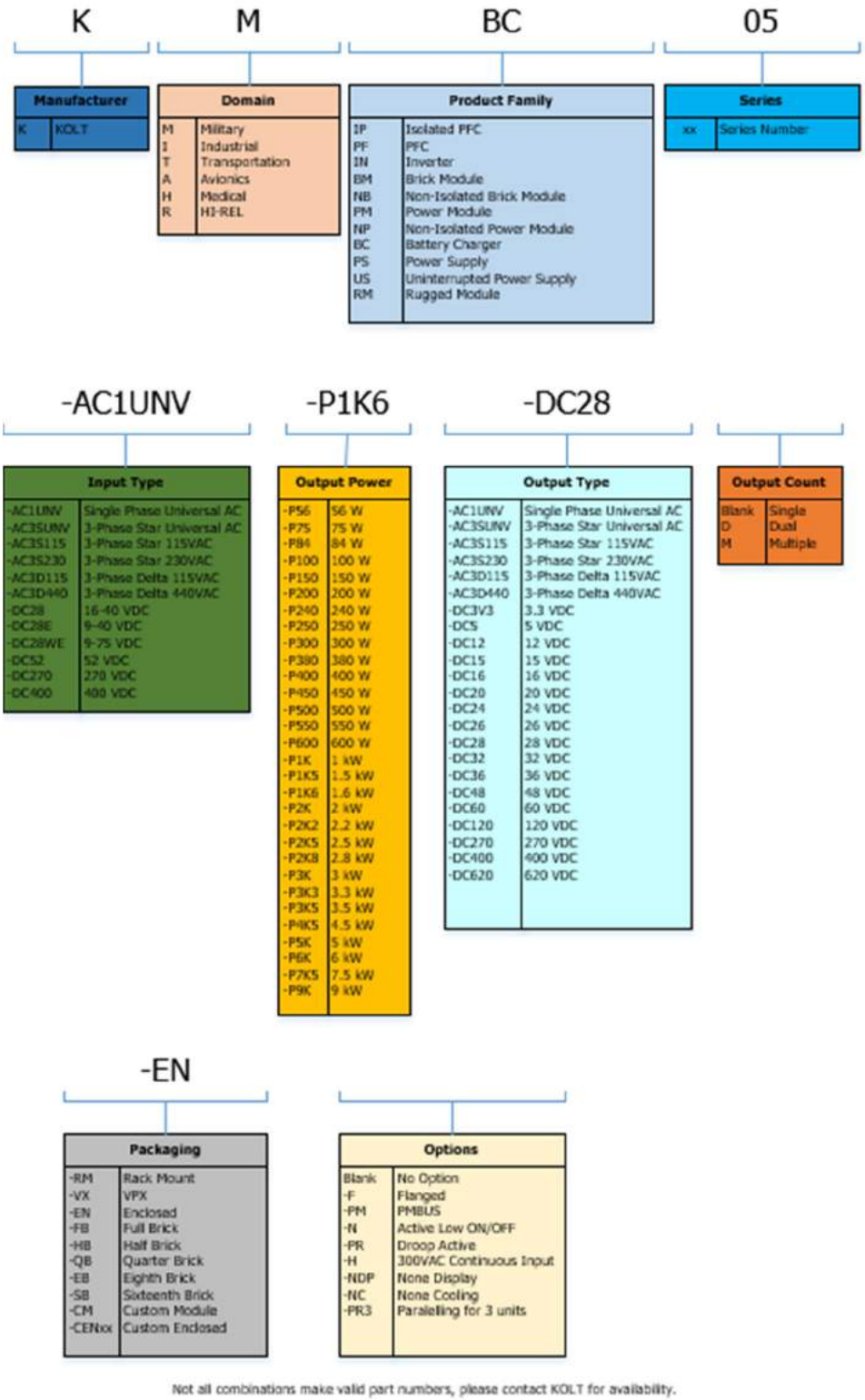


Figure 20. Mechanical Dimensions

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

Part Ordering Information

Manufacturer	Manufacturer Part Number
KOLT	KMBC05-AC1UNV-P1K6-DC28-EN



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

Revision History

Revision	Date	Description	Page Number(s)
A-PC1	05.04.2023	Initial Release	-