Features & Benefits

- Passive EMI Filter - Quarter Brick Module
- 20 A output current
- Wide input voltage range
- More than 36 dB differential-mode attenuation at 250 kHz
- More than 41 dB common-mode attenuation at 250 kHz
- Bulk capacitors and damping resistors are included for input stability
- All capacitors are X7R multi-layer ceramic 100V rated
- Designed to meet all MIL-STD 461 EMI requirements (D, E, F, G)
- Designed to meet MIL-STD-810G

Compliance

- MIL-STD-461G
- MIL-STD-810G

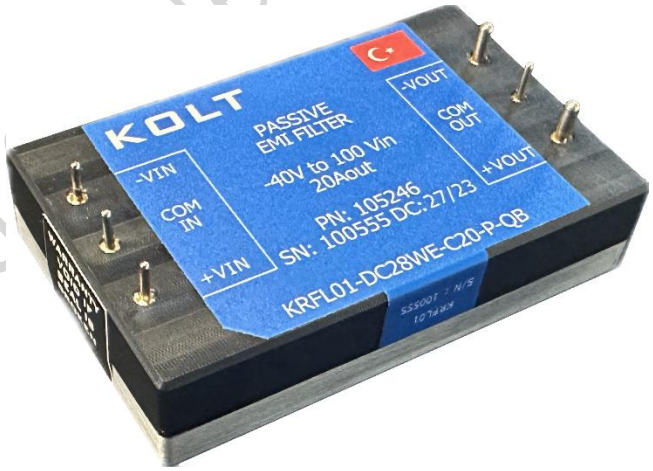
Typical Applications

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

Product Ratings	
V_{IN}	-75 V_{DC} to +75 V_{DC}
I_{OUT_MAX}	20 A

Product Description

KRFL01-DC28WE-C20-P-QB is a 20A passive EMI filter in quarter-brick size that operates from nominal 28 V input. It is designed to meet MIL-STD-461G EMI requirements for the KMBM02 DC/DC Converter module. Baseplate is designed and manufactured in house to provide efficient cooling and safe operation at 100 °C base plate temperature.



Size: 58.4 x 36.8 x 12.9 mm
[2.3” x 1.45” x 0.51”]

Weight: 53 g

Recommended alternative KRFL02-DC28WE-C30-P-QB

Electrical Characteristics

All data are obtained at nominal line and full load unless otherwise specified. (Ta = 25 °C)

General Characteristics					
Parameters	**Notes & Conditions**	**Min**	**Typ**	**Max**	**Unit**
Input Voltage Range	Continuous	-75		75	V
Input Voltage Transient	1s	-100		100	V
Output Current				20	A
Efficiency	Full load, 16 Vdc low line		97.9		%
	Full load, 28 Vdc nominal line		99.3		%
	Full load, 40 Vdc high line		99.6		%
Voltage Drop	Full load, 28 Vdc nominal line		0.36		V
Total differential-mode capacitance			200		µF
Total common-mode capacitance			0.24		µF
Bulk capacitor			169		µF
Damping resistor			2		Ω
Noise attenuation					
Differential-mode	@250kHz		36		dB
Common-mode	@250kHz		41		dB

Isolation Characteristics					
Parameters	**Notes & Conditions**	**Min**	**Typ**	**Max**	**Unit**
Insulation Resistance	500V_{DC}				
Input to Base Plate			>45		GΩ
Output to Base Plate			>45		GΩ
Isolation Voltage	60s dwell, 1mA trip current				
Input to Output			2250		V_{DC}
Input to Base Plate			2250		V_{DC}
Output to Base Plate			2250		V_{DC}

Environmental Characteristics						
Parameters	**Standard**	**Min**	**Typ**	**Max**	**Unit**	**Status**
Operational Baseplate Temperature	MIL-STD-810G_CHG-1 Method 501.6/502.6 Procedure II	-40	-	+100	°C	Passed*
Storage / Transport Temperature	MIL-STD-810G_CHG-1 Method 501.6/502.6 Procedure I	-55	-	+125	°C	Passed*
Operational Low Pressure	MIL-STD-810G_CHG-1 Method 500.6 Procedure II	-	-	3000	m	Passed*
Storage / Transport Low Pressure	MIL-STD-810G_CHG-1 Method 500.6 Procedure I	-	-	9000	m	Designed to Meet
Parameters	**Standard**	**Waveform**	**Peak Value**	**Pulse Duration**	**Axis**	**Status**
Shock	MIL-STD-810G_CHG-1 Method 516.7 Procedure I	Half-Sine	10g	11 ms	±X, ±Y, ±Z	Passed*
Parameters	**Standard**	**Category**	**Figure**	**Platform**	**Vehicle**	**Status**
Vibration	MIL-STD-810G_CHG-1 Method 514.7 Procedure I	Category 4	514.7C-2	Secured Cargo	Truck Transportation and Composite Wheeled Vehicles	Passed*
		Category 8	514.7C-8	Aircraft	Propeller	Passed*
		Category 11	514.7C-11	Railroad	Train	Passed*
		Category 20	514.7C-4	Ground	Wheeled Vehicles	Passed*
		Category 21	514.7D-9	Watercraft	Marine Vehicles	Passed*
Parameters	**Standard**	**Condition**				**Status**
Salt Fog	MIL-STD-810G_CHG-1 Method 509.6	24 hours spray, 24 hours dry, applied 2 times				Designed to Meet
Sand and Dust	MIL-STD-810G_CHG-1 Method 510.6 Procedure I/II	<150 µm Dust 150-850 µm Sand				Designed to Meet
Fungus	MIL-STD-810G_CHG-1 Method 508.7	Analysis of the degree of inertness to fungus growth of the components.				Analysis
Solar Radiation	MIL-STD-810G_CHG-1 Method 505.6 Procedure I	A2				Passed*
Humidity	MIL-STD-810G_CHG-1 Method 507.6 Procedure II	≥ %95 Relative @30°C				Passed*
Parameters	**Standard**	**Test**				**Status**
EMI/EMC	MIL-STD-461G Ground Army	CE102	CS101 CS114 CS115 CS116 CS118	RE102	RS103	Passed*

* Verified in a multi-channel power supply with a KMBM02 Converter.

Basic Operation and Features

Following EMI measurements have been performed in KOLT's EMI test laboratory using Rohde&Schwarz FPC1000 Spectrum Analyzer. The output of the KRFL01 is connected to KMBM02 Brick Module, which is loaded to supply 300 W to a resistive load at 28 Vdc input. KRFL01 filter module complies with the CE102 28Vdc limits.

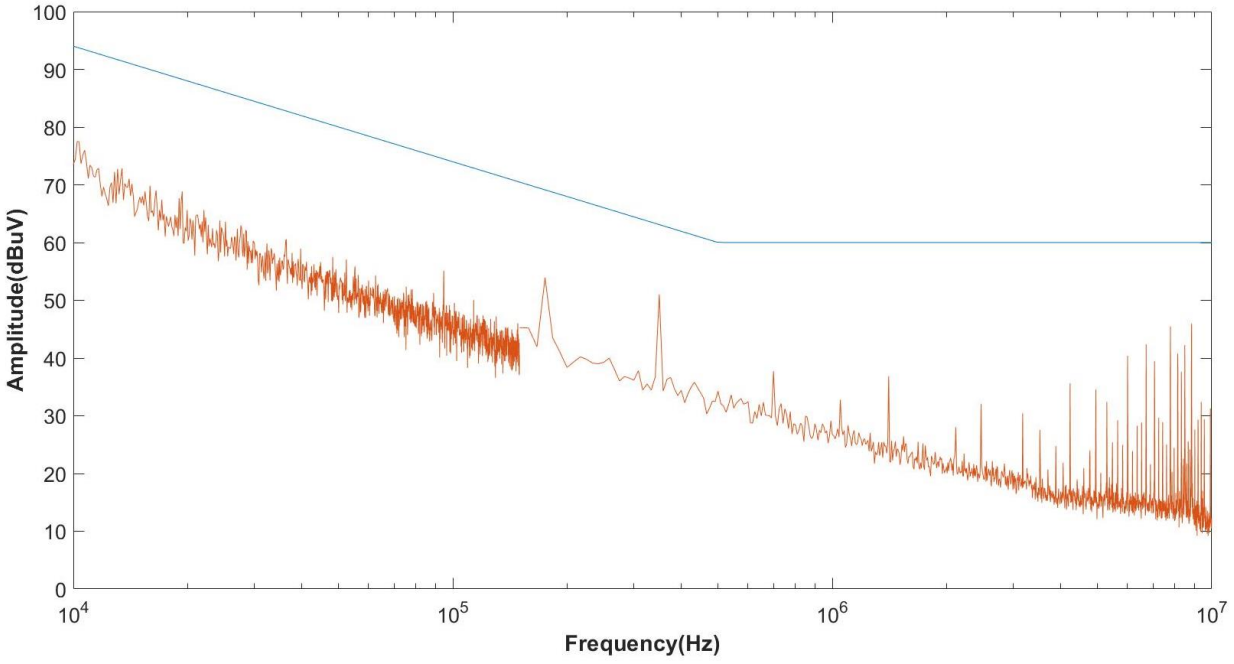


Figure 1. MIL-STD-461G CE102 Positive Line with KMBM02 Converter

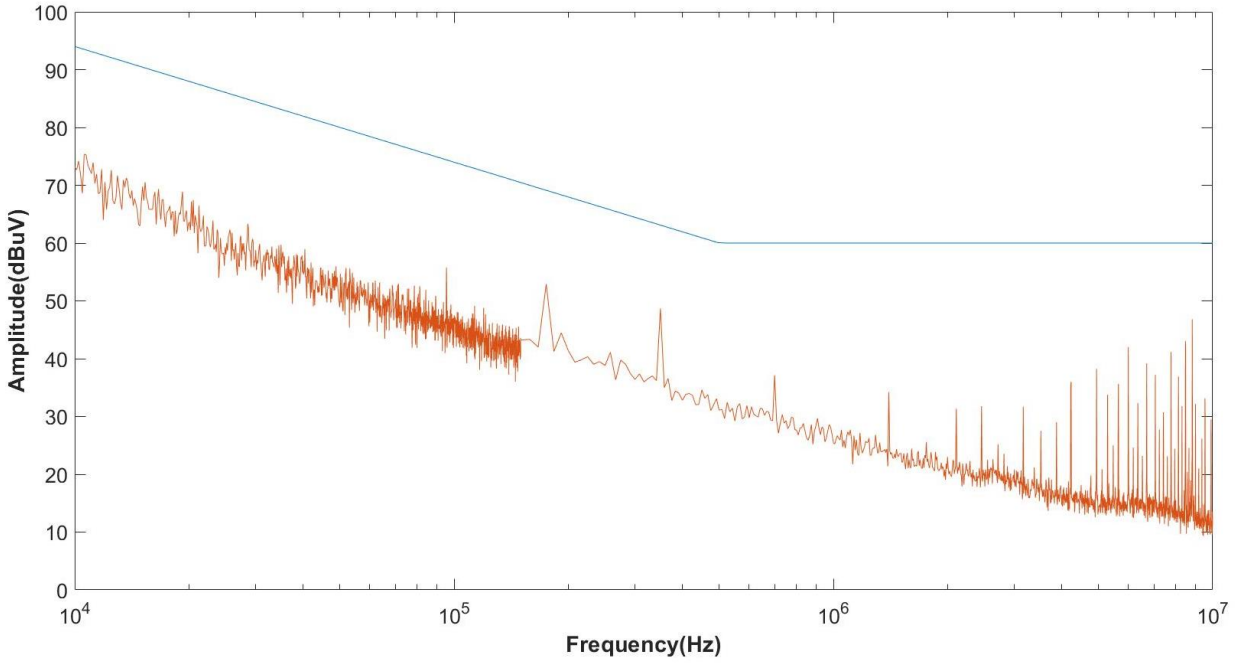


Figure 2. MIL-STD-461G CE102 Negative Line with KMBM02 Converter

Application Consideration

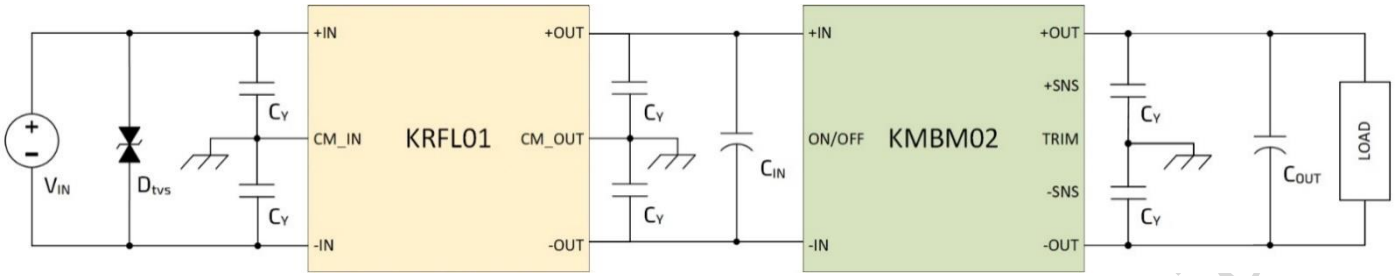
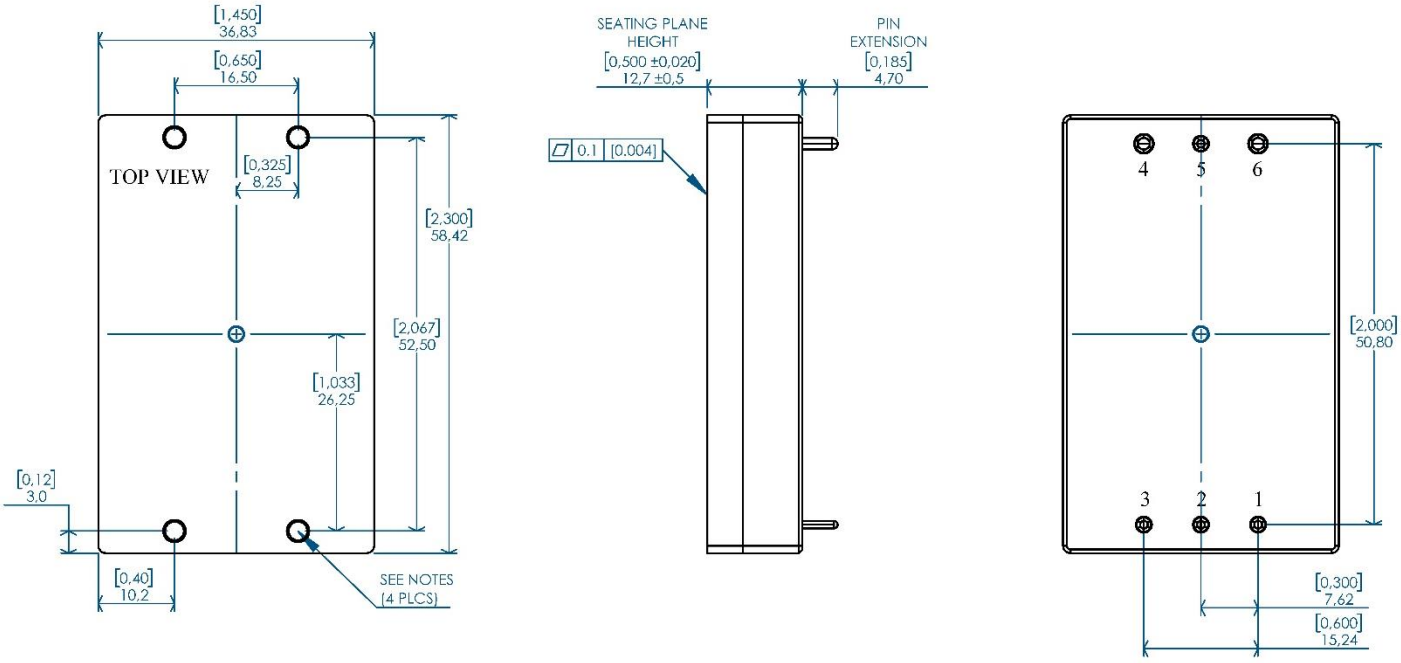


Figure C. Recommended Application for better EMI/EMC compliance

CM_IN and CM_OUT of KRFL01 should be connected to the chassis.
C_Y: CHV1206N2K0472KXT (4700 pF 2kV X7R Ceramic Capacitor)
C_{IN}: A759KS476M1KAAE045 (47uF 80V Aluminum-Polymer Capacitor)
C_{OUT}: EEH-ZS1H181UP (180uF 50V Aluminum-Polymer Capacitor)
D_{TVS}: 5.0SMDJ40CA (Bi-directional 40Vwm TVS Diode)

Mechanical Drawing – Threaded

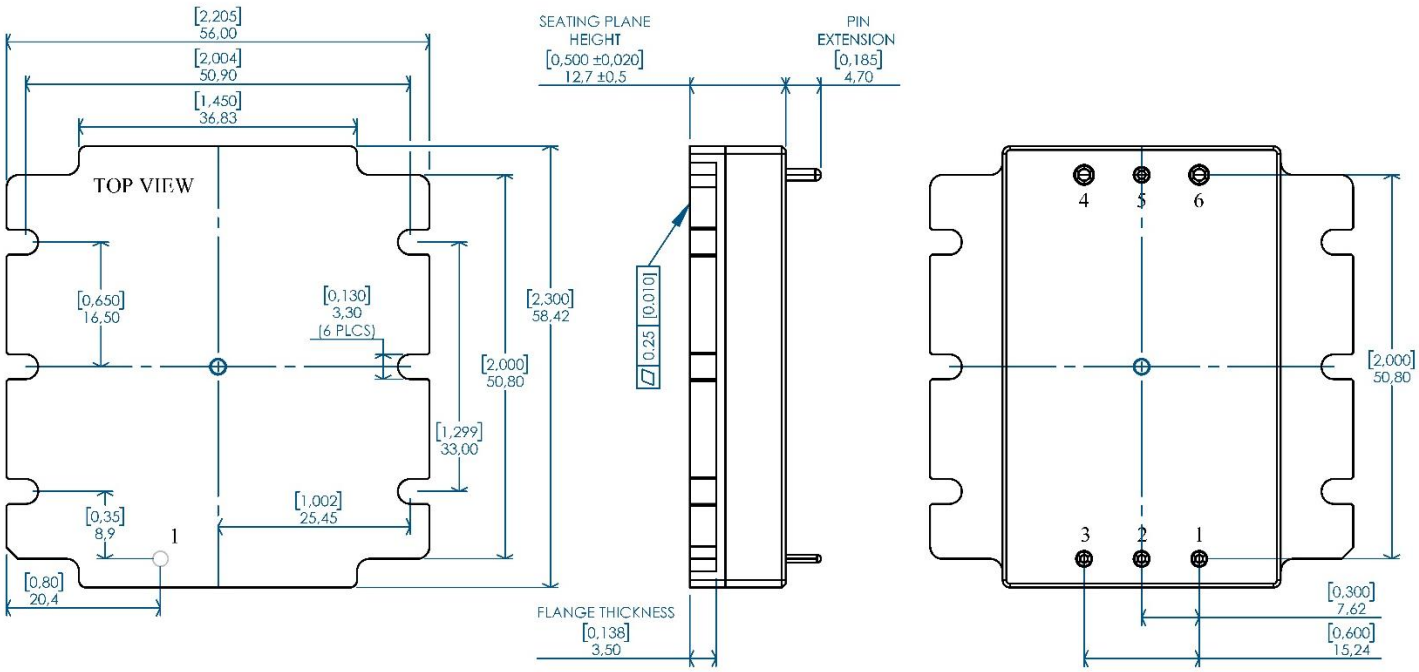


NOTES:

- APPLIED TORQUE PER M3 SCREW 0.36Nm (3in-lb) RECOMMENDED [0.4Nm (3.5in-lb) LIMIT]. M3 SCREW SHOULD NOT EXCEED 3mm (0.118") DEPTH BELOW THE SURFACE OF THE BASEPLATE.
- BASEPLATE FLATNESS TOLERANCE IS 0.1mm (0.004") TIR FOR SURFACE.
- PINS 1-3 AND 5 ARE 1.02mm DIA. (0.040") WITH 2.03mm DIA. (0.080") STANDOFFS.
- PINS 4 AND 6 ARE 1.57mm DIA. (0.062") WITH 2.54mm DIA. (0.100") STANDOFFS.
- PINS 1-6
  MATERIAL: BRASS ALLOY
  FINISH: 10µ" GOLD OVER NICKEL
- WEIGHT: 53 g (1.87 oz)
- ALL DIMENSIONS IN MILIMETERS [inches]
- TOLERANCES: X.Xmm ±0.5mm (X.XXIN ±0.020)
  X.XXmm ±0.25mm (X.XXXIN ±0.010)

Pin	Name	Function
1	+IN	Positive input voltage
2	COM IN	Input-side common-mode
3	-IN	Input return
4	-OUT	Output return
5	COM OUT	Output-side common-mode
6	+OUT	Positive output voltage

Mechanical Drawing – Flanged



NOTES:

- APPLIED TORQUE NOT TO EXCEED 0.7Nm (6in-lb).
- BASEPLATE FLATNESS TOLERANCE IS 0.25mm (0.010") TIR FOR SURFACE.
- PINS 1-3 AND 5 ARE 1.02mm DIA. (0.040") WITH 2.03mm DIA. (0.080") STANDOFFS.
- PINS 4 AND 6 ARE 1.57mm DIA. (0.062") WITH 2.54mm DIA. (0.100") STANDOFFS.
- PINS 1-6
  MATERIAL: BRASS ALLOY
  FINISH: 10µ" GOLD OVER NICKEL
- WEIGHT: 62.0 g (2.19 oz)
- ALL DIMENSIONS IN MILIMETERS [inches]
- TOLERANCES: X.Xmm ±0.5mm (X.XXIN ±0.020)
  X.XXmm ±0.25mm (X.XXXIN ±0.010)

Pin	Name	Function
1	+IN	Positive input voltage
2	COM IN	Input-side common-mode
3	-IN	Input return
4	-OUT	Output return
5	COM OUT	Output-side common-mode
6	+OUT	Positive output voltage

Part Ordering Information

Family	Input Voltage	Current	Filter Type	Package	Option Field
KRFL01	**DC28WE** 9-70 VDC	**C20** 20A	**P** Passive	**QB** Quarter Brick	**F:** Flanged

Ordering Number	Baseplate
KRFL01-DC28WE-C20-P-QB	Threaded
KRFL01-DC28WE-C20-P-QB -F	Flanged

Revision History

Revision	Date	Description	Page Number(s)
A1	01.2023	First production revision - Full bandwidth noise suppression per MIL-STD-461	-
A2	10.2023	- General organizing.	-
A3	10.2024	- Product status updated to "Not Recommended for New Designs"	-

Contact

KOLT Mühendislik A.Ş.

Phone: +90 312 354 47 06

E-Mail: KSG@kolt.com.tr

Web: www.kolt.com.tr

Address: Ostim OSB Mah. 1148. Sok. No:32/B1 – 06374
Yenimahalle / Ankara / TÜRKİYE