

KEPCO/TDK MRM™ triple and quadruple output frameless switching power supplies

These new frameless, printed-card style switching power supplies produce multiple outputs to meet, in various combinations, the logic, display, serial output, and disk drive needs of CRT terminals, microcomputers, and video games.

MRM 144K, 144KV, and 146K are flyback converters with +5V, +12V, and -12V outputs for logic, display, and communications. Each output will deliver any current within its rated range, but the total power from the three outputs must add up to no more than 40 Watts.

MRM 183K, another flyback converter, and MRM 147K, a forward converter, both produce three outputs, and are intended for use with 8" floppy disk drives. Both have a +24V output: in the MRM 183K it can produce 1.3A, and in the MRM 174K, 2.2A.

MRM 174K, also a forward converter, has four outputs; two separate +12V outputs, one to power a CRT displays, the other up to two 5-1/4" floppy disk drives; a +5V output for TTL logic; and a -12V negative reference rail for serial communications. A special feature of the MRM 174K is a circuit which minimizes transient disturbances on the +12V output, powering a video display. Such disturbances normally occur when other outputs undergo load change, as when a disk motor starts, or its head seeks.

Also, the source frequency component of the ripple in the +12V output for the CRT is held below 4mV p-p to minimize interaction

with the vertical rate of a CRT display.

MRM 250KV, a power FET based flyback that operates above 100Khz produces 60 Watts divided among 4 outputs suitable for logic video and diskettes.

MRM 144K, 144KV, 250KV, 147K, and 174K features a selectable 115/230V a-c input; MRM 146K and 183K are rated for 115V a-c only.

GENERAL SPECIFICATIONS

ENVIRONMENTAL

OPERATING TEMPERATURE: 0-70°C (derate above +50°C)

STORAGE TEMPERATURE: -20°C to +75°C

HUMIDITY (non condensing): 0-95%

VIBRATION: 5-10 mm amplitude, 3 axes; 10-55Hz, 2g, 3 axes

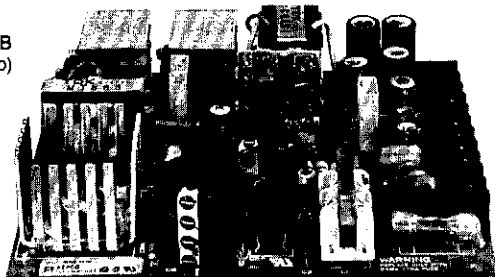
SHOCK: 20 g, 3 axes, 11 msec ± 5 msec.

EMI: meets FCC Class B (except MRM 147K, Class A)

SAFETY: All models feature built-in EMI filters which attenuate conducted noise below the limits of FCC 20780 for Class B computing devices (except MRM 147K, Class A). All are UL recognized UL 478 and CSA certified C22.2-154. MRM 144KV and MRM 250KV are additionally certified to VDE 0804/0806 by TÜV Rheinland.

DIMENSIONS: See outline drawings page 36.

MRM 147KB
(with barrier strip)



UL RECOGNIZED



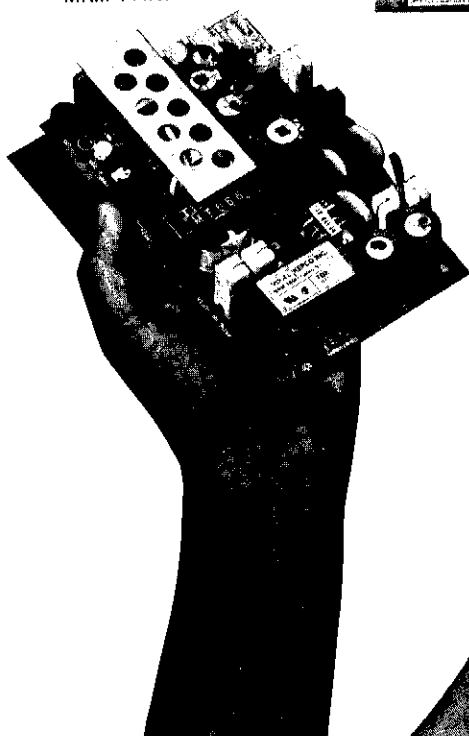
CSA CERTIFIED



TUV APPROVED

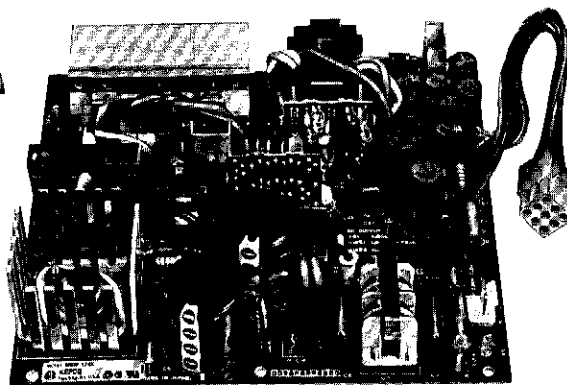
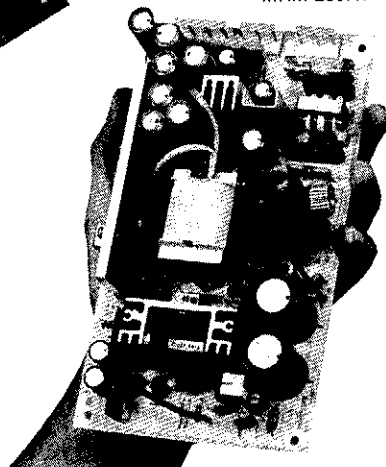
*MRM 144KV
MRM 250KV

MRM 144K
MRM 144KV

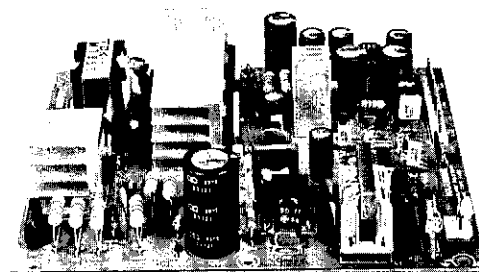


This KEPCO
product is backed
by a firm
**1-YEAR
WARRANTY**

MRM 250KV



MRM 174KF (with flying lead/connector)

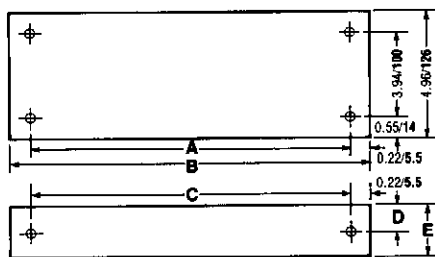


MRM 183K

SPECIFICATIONS	CONDITIONS	MRM 144K 144KV	MRM 146K	MRM 183K	MRM 147K 147KB	MRM 174K 174KF	MRM 250KV	MRM 260KV
Type of Circuit		Flyback		Flyback	Forward converter	Forward converter	Flyback -FET	Flyback -FET
D-C Outputs	+ 5V	0.45-5.0A (1)		0.13-2.2A	0.75-3.0A (6.6A peak)	2.0-5.0A	2.0-6.0A(2)	3.0-8.0A
	+ 12V	0.3-2.5A (1)		—	—	0.5-1.8A (2.8A peak)	0.5-3.0A(2)	0.5-3.0A
	+ 12V	—	—	—	—	0.5-2.0A	—	—
	- 12V	0.0-0.5A (1)		—	0.04-0.17A (0.37A peak)	0.25-0.5A	0.0-1.0A	0.0-0.7A
	- 5V	—	—	0.08-0.14A	—	—	0.0-0.5A	0.0-0.3A
	+ 24V	—	—	0.0-1.3A (1.7A peak)	0.0-2.2A (3.3A peak)	—	—	—
A-C Source Voltage	47-63 Hz	115/230V a-c		115V a-c	115/230V a-c	115/230V a-c	115/230V a-c	85-132/170-264V a-c
Brown Out	@ 25°C	90/180V ac		95V a-c	90/180V a-c	90/180V a-c	80/160V a-c	85/170V a-c
Source Current (typical)	@ 115V a-c	< 0.9A		1.1A	1.7A	1.7A	1.8A	2.5A
	@ 230V a-c	< 0.5A		—	0.9A	0.95A	0.9A	1.3A
½-Cycle Peak Current at turn-on	@ 115V a-c	< 30A		< 30A	< 50A	< 50A	< 42A	20A
	@ 230V a-c	< 35A		< 30A	< 50A	< 50A	< 42A	40A
Efficiency	Max. load, nominal source	> 65%		> 65%	> 70%	> 70%	> 65%	> 70%
Holdup Time	Max. load, min. source @ 25°C	half-cycle minimum		> 16.8 msec.	> 16.8 msec.	> 16.8 msec.	> 20 msec.	> 20 msec.
Power	0-50°C	40 Watts		43 Watts	70 Watts	75 Watts	60 Watts	80 Watts
Source Effect	min-max	< ± 2%		< ± 1%	< ± 1%	< ± 1%	< ± 1%	< ± 1.5%
Load Effect	+ 5V	0.45-2.5A: < 5%		0.13-2.2A: < 2%	0.75-3.0A: < 2%	2.0-5.0A: < 2%	2.0-6.0A: < 3%	< 4%
	+ 12V	0.3-2.0A: < 5%		—	—	0.5-1.8A: < 5%	0.5-3.0A: < 4%	< 4%
	+ 12V	—	—	—	—	0.5-2.0A: < 5%	—	—
	- 12V	0.05-0.1A: < 10%		—	0.42-0.17A: < 0.5%	0.25-0.5A: < 0.5%	0.0-1.0: < 2.0	< 2%
	- 5V	—	—	0.08-0.14A: < 0.5%	—	—	0.0-0.5: < 2.0	< 2%
	+ 24V	—	—	0.1-1.3A: < 5%	0.0-2.2A: < 15%	—	—	—
Temperature Effect	0-50°C	< 2%		< 2%	< 2%	< 2%	< 3%	< 3%
Time effect (0.5-8.5 hr drift + 25°C, maximum load)	+ 5V	< 10mV		< 10mV	< 10mV	< 10mV	< 10mV	< 10mV
	+ 12V	< 10mV		—	—	< 20mV	< 50mV	< 50mV
	+ 12V	—	—	—	—	< 20mV	—	—
	- 12V	< 100mV		—	< 10mV	< 10mV	< 100mV	< 100mV
	- 5V	—	—	< 10mV	—	—	< 50mV	< 50mV
	+ 24V	—	—	< 40mV	< 40mV	—	—	—
Combined Tolerance (for the effect of source, load, temperature, and time)	+ 5V	+ 4.75V to + 5.25V		< ± 5%	< ± 2%	< ± 2%	< ± 3%	< ± 3%
	+ 12V	+ 11.4V to + 12.6V		—	—	< ± 5%	< ± 5%	< ± 5%
	+ 12V	—	—	—	—	< ± 5%	—	< ± 5%
	- 12V	- 11.0V to - 15.0V		—	< ± 5%	< ± 5%	< ± 5%	< ± 5%
	- 5V	—	—	< ± 5%	—	—	< ± 5%	< ± 5%
	+ 24V	—	—	< ± 5%	< + 20%, - 10%	—	—	—
Overvoltage Protection	+ 5V only	5.8-6.8V		5.6-7.0V	5.95-7.0V	5.8-7.0V	6.0-7.0	5.5-7.0
Ripple & Noise (In mV p-p)	Nominal source, maximum load							
Source frequency	+ 5V	< 30mV		< 30mV	< 30mV	< 30mV	50mV combined	< 50mV
Switching frequency		< 100mV		< 50mV	< 100mV	< 50mV	combined	< 50mV
Spike voltage		< 100mV		< 150mV	< 150mV	< 150mV	100mV	< 100mV
Source frequency	+ 12V	< 30mV		—	—	< 40mV	100mV	< 100mV
Switching frequency		< 100mV		—	—	< 50mV	combined	< 100mV
Spike voltage		< 100mV		—	—	< 200mV	200mV	< 200mV
Source frequency	+ 12V	—	—	—	—	< 4mV	—	—
Switching frequency		—	—	—	—	< 50mV	—	—
Spike voltage		—	—	—	—	< 200mV	—	—
Source frequency	- 12V	< 70mV		—	< 60mV	< 50mV	50mV combined	< 50mV
Switching frequency		< 300mV		—	< 50mV	< 50mV	combined	< 50mV
Spike voltage		< 300mV		—	< 100mV	< 200mV	200mV	< 200mV
Source frequency	- 5V	—	—	< 50mV	—	—	50mV combined	< 50mV
Switching frequency		—	—	< 50mV	—	—	combined	< 50mV
Spike voltage		—	—	< 100mV	—	—	100mV	< 150mV
Source frequency	+ 24V	—	—	< 100mV	< 150mV	—	—	—
Switching frequency		—	—	< 100mV	< 100mV	—	—	—
Spike voltage		—	—	< 500mV	< 500mV	—	—	—

(1) The maximum combined power for all three outputs is 40W (0-50°C). (2) Maximum current, $I_1 + I_2 = 8A$

EFXTM

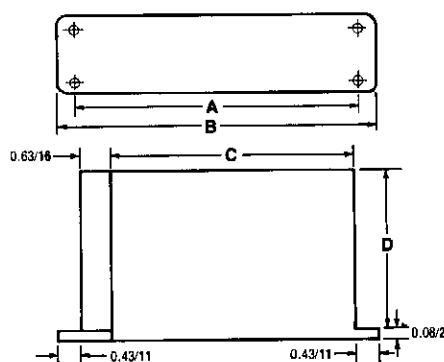


DIMENSIONS

MODEL	A	B	C	D	E	WEIGHT lbs. kg.
EFX-050T	6.77 172	7.20 183	6.77 172	0.98 25	1.97 50	2.0 0.9
EFX-100T	8.98 228	9.41 239	8.98 228	0.98 25	1.97 50	2.7 1.2
EFX-150T	12.91 328	13.35 339	12.91 328	1.18 30	2.48 63	3.8 1.7
EFX-210T	14.53 369	14.96 380	14.53 369	1.18 30	2.48 63	4.8 2.2

Tolerance: $\pm 0.02''$ (0.5 mm) between mounting holes. $\pm 0.04''$ (1.0 mm) other dimensions.

EMRTM

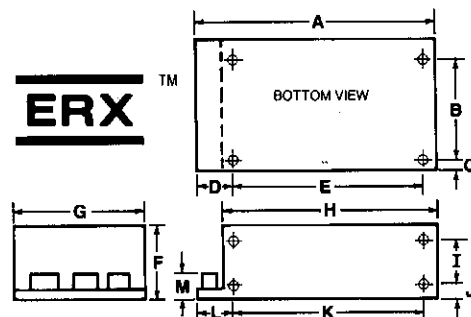


DIMENSIONS Connector kits available (see page 104)

MODEL	A	B	C	D	WEIGHT lbs. kg.	CONNECTORS (MOLEX) INPUT	CONNECTORS (MOLEX) OUTPUT
EMR 100K	6.89 175	7.28 185	6.42 163	3.90 99	2.0 0.9	5277 Series mates with 2139 Series	5275 Series mates with 2139 Series
EMR 200K	8.30 211	8.70 221	7.83 199	3.90 99	3.0 1.4		
EMR 300K	9.25 235	9.64 245	8.78 223	4.49 114	3.0 1.4		
EMR 400K	9.25 235	9.64 245	8.78 223	5.08 129	4.0 1.8		
EMR 500K	10.43 265	10.83 275	10.83 275	5.08 129	4.0 1.8		

Tolerance: $\pm 0.03''$ (0.7 mm) between tapping holes $\pm 0.04''$ (1.0 mm) other dimensions.

ERXTM



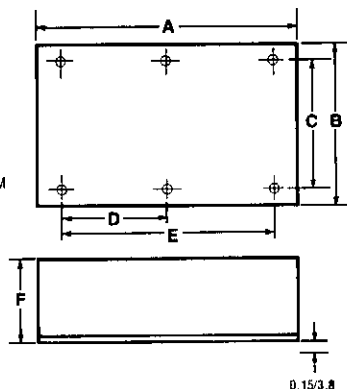
DIMENSIONS Connector kits available (see page 104)

MODEL	A	B	C	D	E	F	G	H	I	J	K	L	M	WEIGHT lbs. kg.	CONNECTORS (MOLEX) INPUT	CONNECTORS (MOLEX) OUTPUT
30 W	5.51 140	3.35 85	0.71 18	0.55 14	4.72 120	2.71 55	4.84 123	4.8 122	1.02 26	0.67 17	4.33 110	0.94 24	Max 1.06 Max 27	1.5 0.7	5219 Series mates with 3191 Series	5277 Series mates with 5196 Series
60 W	7.09 180	3.35 85	0.65 16.5	0.7 17.75	6.09 154.75	2.36 60	4.84 123	6.38 162	1.10 28	0.7 18	5.79 147	1.0 24.5	Max 1.06 Max 27	1.5 0.7		
120 W	8.90 226	3.74 95	0.39 10	1.1 28	7.4 188	2.76 70	4.84 123	8.0 203	1.58 40	0.63 16	7.44 189	1.14 29	Max 1.06 Max 27	3.0 1.4		5219 Series mates with 3191 Series

Tolerance: $\pm 0.03''$ (0.7 mm) between tapping holes $\pm 0.04''$ (1.0 mm) other dimensions

Fractional dimensions in light face type are in inches, dimensions in bold face type are in millimeters.

MRMTM



DIMENSIONS Connector kits available (see page 104)

MODEL	A	B	C	D	E	F	WEIGHT	CONNECTORS (MOLEX) INPUT	CONNECTORS (MOLEX) OUTPUT
MRM 144K & MRM 144KV ⁽¹⁾	6.30 160.0	3.94 100.0	3.15 80.0	—	4.80 121.9	1.65 42.0	1.0 lbs. 0.45 kg.	5277 Series mates with 5196 Series or 2139 Series	5046 Series mates with 5102 Series
MRM 146K ⁽¹⁾	5.75 146.1	3.75 95.3	3.15 80.0	—	4.80 121.9	1.65 42.0	0.8 lb. 0.35 kg.		
MRM 147K ⁽²⁾	7.40 188.0	6.18 157.0	5.83 148.0	3.35 85.0	6.70 170.0	1.77 45.0	1.75 lbs. 0.8 kg.	5273 Series mates with 5196 Series without center pins	5275 Series mates with 5196 or 1292 Series
MRM 147KB	7.40 188.0	6.18 157.0	5.83 148.0	3.35 85.0	6.70 170.0	1.77 45.0	1.75 lbs. 0.8 kg.	Barrier Strip	
MRM 174K ⁽²⁾	7.40 188.0	6.18 157.0	5.83 148.0	3.35 85.0	6.70 170.0	1.97 50.0	1.75 lbs. 0.8 kg.	5273 Series mates with 5195 Series without center pins	3008 Series mates with 3001 Series
MRM 174KF	7.40 188.0	6.18 157.0	5.83 148.0	3.35 85.0	6.70 170.0	1.97 50.0	1.75 lbs. 0.8 kg.		1292 Series mates with 1292 Series
MRM 183K	7.40 188.0	6.18 157.0	5.83 148.0	3.35 85.0	6.70 170.0	1.57 40.0	1.2 lbs. 0.6 kg.	5273 Series mates with 5195 Series	5275 Series mates with 5196 or 2139 Series
MRM 250KV	7.75 196.9	4.25 108.0	3.75 95.3	—	7.25 184.2	2.00 50.8	1.25 0.57	5277 Series mates with 2139 Series	

⁽¹⁾ Ground Lug: AMP "FASTON" Series 250, mates with AMP "FASTON" Series 250 receptacle. ⁽²⁾ Ground Lug: AMP "FASTON" Series 187, mates with AMP "FASTON" Series 187 receptacle.