"EFL" SERIES

ENHANCED FLOATING HOT DECK LVPS WITH ISOLATED DIGITAL AND ANALOG I/O

PRELIMINARY DATA SHEET

- Precision analog control
- Isolated up to 15kV
- DC leakage current of <10nA</p>
- AC leakage capacitance of <40pF
- 4 regulated floating LV power outputs
- Isolated digital I/O to and from floating hot deck
- Isolated analog I/O to and from floating hot deck

GENERAL INFORMATION:

The "EFL" Series of floating-hot-deck, low-voltage power supplies offers an integrated solution for systems requiring LV power & controls with high-voltage isolation. Combining a highly isolated, DC-to-DC, multi-output low-voltage power supply (LVPS) with an advanced isolated digital & analog I/O topology, the "EFL" sub-system provides both power and controls to floating-hot-deck circuitry. This solution, when combined with one or more UV HVPS or other circuitry, can provide high-performance solutions for applications such as:

Floating/Stacked Ion- or E-Beam Biases Floating Filament Bias Floating Pulsers & Gated Grids Floating High Side Current Monitors

Floating Capacitance Meters Floating Leakage Testers

Please contact UltraVolt's customer service department for an analysis of your requirements.

DESIGN METHODOLOGY:

The "EFL" Series utilizes a dual-ended forward converter topology with a nominal switching frequency of <100 kHz. Once input voltage stabilizes, under-voltage lockout is released. When the LVPS enable is raised above a TTL 1, the converter begins to switch. The soft-start circuit brings the converter to full power over a 1mS period, reducing surges on the source supply. A constant-frequency PWM regulation system with optically isolated feed back controls the MOSFET push-pull power stage, driving a highly isolated transformer. This isolated power ultimately provides 4 separate LV floating outputs. The power stage is protected from intermittent output-current overloads or short circuits via a primary current limit circuit. The isolated digital I/O channel(s) are optically transmitted directly to the floating hot deck with a schmitt trigger buffer providing glitch-free output on the floating hot deck. The isolated analog I/O channel(s) are converted to digital data and optically transmitted directly to the floating hot deck for conversion back to analog.

COMPATIBILITY:

The "EFL" Series works directly with any UltraVolt "A" or "C" Series DC-to-DC HVPS from 0 to 62V through 0 to 40kV @ 0 to 4 watts through 0 to 20 watts. By providing isolated power, TTL enable/disable, and voltage programming, UV HVPS can be floated or stacked on one another.

ISOLATED POWER OUTPUTS:

The "15EFL12-12W" provides floating +12VDC @ 1 Amp, ±15VDC @ 50 mA, and +5.1VDC @ 500mA from a single ground side +12VDC input. The "15EFL24-24W" provides floating +24VDC @ 1 Amp, ±15VDC @ 50 mA, and +5.1VDC @ 500 mA from a single ground side +24VDC input. The main output is typically used to drive a floating HVPS, or filament switching regulator, etc. The ±15VDC provides bias to floated Op-Amps, DACs & ADCs. The +5.1VDC can run floating microcontrollers or watchdog reset circuits.



ISOLATED CONTROLS: DIGITAL CHANNELS

The "-I/O" option provides one isolated digital I/O channel from the grounded system side to the floating hot deck and one from the hot deck to the ground deck. The TTL bit is inverted. The output, a schmitt trigger TTL buffer, sources up to 0.8mA and sinks up to 3mA. This bit is typically used to enable/ disable a floated UV HVPS.

ISOLATED CONTROLS: ANALOG CHANNELS

The "-I/O" option provides isolated analog I/O channel(s) from the grounded system side to the floating hot deck. The analog signal is converted to digital and translated back to analog at the floating hot deck. The output is buffered. This signal is typically used to remote program a floated UV HVPS or a floating filament regulator with precision characteristics.

STANDBY MODE:

All "EFL" models feature an LVPS enable/disable function. When the enable is TTL 0 (<+0.7 VDC +/-0.2 lsink=1mA), the floating LVPS is in standby mode. All isolated outputs go to 0VDC; input current drops to < 150 mA; and all functions are shut down except the +5 Volt reference, which is always operational. If the LVPS enable pin is left unconnected, TTL 1 or at greater voltages up to +5VDC the converter operates normally.

MECHANICAL:

"EFL" Series units are in PCB-mountable plastic cases requiring a footprint of 8.5 in² and only 10 in³ of volume. Mounting plates and brackets are available for chassis mounting. See Application Note 6 for thermal considerations and for mounting configurations.

ENVIRONMENTAL:

The "EFL" Series provides full power operation at case temperatures from -20 to +55°C. All units receive a 24-hour burn-in prior to final testing. Extended temperature range is available along with other enhanced capabilities. Please contact the factory.



1800 OCEAN AVE., FRNT RONKONKOMA, NY 11779 TEL 800-9HV-POWER TEL 631-471-4444 FAX 631-471-4696

www.ultravolt.com

"EFL" SERIES

ENHANCED FLOATING HOT DECK LVPS WITH ISOLATED DIGITAL AND ANALOG I/O

Typical Characteristics:

Parameter	Conditions		Models		Units
Input Power:		12W Models	24W Models	36W Models	
Voltage Range	Full Power	+12 ± 5%	+24 ± 10%	+24 ± 10%	VDC
Current	Standby (Disabled)	< 150	< 100	< 100	mA
Current	No Load	< 0.25	< 0.35	< 0.35	A
Current	Max Load	< 2.50	< 1.90	< 2.80	A
AC Ripple Current	Nominal Input, Full Load	< 50	< 50	< 50	mA p-p
Local Controls: Referen	nce		All Types		1
Output Voltage	T = +25°C. Initial value		+ 5.00 ± 2 %		VDC
Output Impedance	$T = +25^{\circ}C$		464 ± 1%		Ω
Stability	Over full temperature range		See Figure A		Graph
Local Controls: LVPS	Enable / Disable		All Types		1 1-
Power supply on	Open, or a voltage above TTL high		+2.4 to 5		VDC
Power supply off	Grounded, or a voltage below TTL low	0 to + 0.	7 ± 0.2 (Isink 1mA m	ninimum)	VDC
Input / Output Isolation	1:		All Types		1
Isolation Voltage	Continuous		15		kV
Leakage Current	All inputs to all outputs		< 10		nA
Leakage Capacitance	All inputs to all outputs		< 40 std. < 50 "-F"		pF
Isolated Power Outputs		15EFL12-12W 15EFL24-24W 15EFL24-36W		1 4.	
Output #1 Power	Nominal input max lout	12	24	36	W
Output #1 Voltage	Nominal input voltage range	+12 + 1%	+24 + 1%	+24 + 1%	
Output #1 Current	Minimum to Maximum	0 to 1	0 to 1	0 to 1.5	
Output #1 Line Regulation	Nominal input range full load	< 0.1 %	< 0.1 %	< 0.1 %	
Output #1 Load Regulation	No load to full load	< 0.1 %	< 0.25 %	< 0.25 %	
Output #1 Pipple	Full load	< 2.5 %	< 1.5%	< 1.5%	VDO
Output #2 & #4 Voltage	Nominal input voltage range	+15 + 2%	+15 + 2%	+15 + 2%	
Output #2 & #4 Current	Minimum to Maximum	0 to 50	$10 \pm 2\%$	0 to 50	mA
Output #2 & #4 Line Regulation	Nominal input range full load	< 0.1 %	< 0.3 %	< 0.3 %	VDC
Output #2 & #4 Load Regulation	No load to full load	< 5 %	< 1 %	< 1 %	
Output #2 & #4 Ripple	Full load	< 2.5 %	< 2.5 %	< 2.5 %	V n-n
Output #3 Voltage	Nominal input voltage range	+5 1 + 1%	+5 1 + 1%	+5 1 + 1%	
Output #3 Current		500	500	500	mA
Output #3 Line Regulation	Nominal input range full load	< 1 %	< 1 %	< 1 %	VDC
Output #3 Load Regulation	No load to full load	< 1 %	< 1 %	< 1 %	VDC
Output #3 Ripple	Full load	< 4 %	< 4 %	< 4 %	V n-n
Isolated Controls: TTL	Channel "UD"	- 1 /0	All Types1		
Isolated Collitions. ITL		0 < 1	All Typest		-
Local input	Source voltage, sink current	0 ≤ 0 1 ≥ 2.4	4 (300uA or open col	llector)	VDC
Isolated output	Inverted & buffered TTL	$1 \ge 2.4, 0 \le 0.4 \pm (Sources 0.8 \text{ mA}. Sinks 3 \text{ mA})$		VDC	
Baud Rate	Duty cycle		< 15		ms
Isolated Controls: Anal	og Channel "UP"	12V Models	24V N	Iodels	
Local input voltage	Range	0 to + 5	0 to	+ 10	VDC
Isolated output voltage	Range	0 to + 5	0 to	+ 10	VDC
Local input impedance			20.0 K		Ω
Initial offset error		< ± 2		mV	
Gain error	Full scale		< ± 0.2 %		VDC
Linearity error	Full scale	< ± 0.05 %		VDC	
Stability	30 min. warm-up. per 8 hrs/dav	< 0.02%		VDC	
Temperature Coefficient	0 to +55 °C	< ± 10 pp		ppm/°C	
Bandwidth	Symmetric or asymmetric signal	DC to 4		Hz	



"Making High Voltage Easier!"

Specifications subject to change without notice

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ENHANCED FLOATING HOT DECK LVPS WITH ISOLATED DIGITAL AND ANALOG I/O

ParameterConditionsAll TypesUnitsIsolated 'Hot Deck' InputSource voltage, sink current $0 ≤ 0.5$ (slink 1mA Minimum)VDCLocal outputInverted & Buffered TTL $1 ≥ 2.4$ (300uA or open collector)VDCPropagation DelayDuty cycle<15msIsolated Controls: Analog Channels #I & #2 "DOWN"VDCVDCIsolated Chot Deck' + InputRange0 to +5 for 12V and 0 to +10 for 24VVDCIsolated Hot Deck' + InputRange0 to -5 for 12V and 0 to +10 for 24VVDCIsolated Hot Deck' + InputRange0 to -5 for 12V and 0 to +10 for 24VVDCIsolated Hot Deck' + or - Input impedanceSignal source> 10MegΩLocal output +voltageRange0 to +5 for 12V and 0 to +10 for 24VVDCInitial offset errorSignal source< ± 2mVDCInitial offset errorFull scale< ± 2%WDCInitial offset errorSignal source< ± 2%WDCStability30 min. warm-up, per 8 hrs / per day< 0.01% / < 0.02%VDCTemperature:ConditionsAll TypesCOperatingFull load, case measurement-2 to 10 +55°CStorageNon-operating, case measurement-2 to 10 +55°CAltitude:On-operating, case measurement-5 to 142%COperatingAll operating conditionsSea level to VacuumStorageNon-operatingSea level to VacuumStorageNon-operatingSea le	'-RB' Isolated Controls: TTL Channel "DOWN"					
Isolated 'Hot Deck' InputSource voltage, sink current $0 \le 0.5$ (link 'fmA Minimum) $1 \ge 2.4$ (300uA or open collector)VDCLocal outputInverted & Buffered TTL $0 \le 0.4$ (Sinks 3mA)VDCPropagation DelayDuty cycle<15msIsolated Controls: Analog Channels #1 & #2 "DOWN"<15msParameterConditionsAll TypesUnitsIsolated 'Hot Deck' +InputRange0 to +5 for 12V and 0 to +10 for 24VVDCIsolated 'Hot Deck' +InputRange0 to -5 for 12V and 0 to +10 for 24VVDCIsolated 'Hot Deck' +orRange0 to +5 for 12V and 0 to +10 for 24VVDCLocal output +voltageRange0 to +5 for 12V and 0 to -10 for 24VVDCLocal output +voltageRange0 to +5 for 12V and 0 to +10 for 24VVDCLocal output +voltageRange0 to +5 for 12V and 0 to -10 for 24VVDCLocal output +voltageRange0 to +5 for 12V and 0 to +10 for 24VVDCLocal output +voltageRange0 to +5 for 12V and 0 to +10 for 24VVDCLocal output +voltageRange0 to +5 for 12V and 0 to +10 for 24VVDCLocal output +voltageRange0 to +5 for 12V and 0 to +10 for 24VVDCLocal output +voltageRange0 to +5 for 12V and 0 to +10 for 24VVDCLocal output +voltageRange0 to +5 for 12V and 0 to +10 for 24VVDCLocal output +voltageRange0 to +5 for 12V and 0 to +10 for 24VVDCLocal output +voltageRange0 to +5 for 12V and 0 to	Parameter	Conditions	All Types			
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VolumeNot including pins or mounting points11.1 (182)In³ (cc)WeightOverall13.3 (377.1)Oz (a)	Height	Not including pins or mounting points	1.30" ± 0.050" (33.0)	In (mm)		
Weight Overall 13.3 (377.1) Oz (g)	Volume	Not including pins or mounting points	11.1 (182)	In ³ (cc)		
	Weight	Overall	13.3 (377.1)	Oz (q)		





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"EFL" SERIES

ENHANCED FLOATING HOT DECK LVPS WITH ISOLATED DIGITAL AND ANALOG I/O



Local Connections

1 - Input Power Ground
2 - Positive Power Input
3 - LVPS Enable/Disable/Sync In
4 - TTL Up
5 - Signal Ground
6 - Analog Up Channel 1
7 - +5V Reference Output
8 - Analog Down Channel 1, +
9 - Analog Down Channel 1, -
10 - Analog Down Channel 2, +
11 - Analog Down Channel 2, -
12 - Analog Up Channel 2
13 - Mode
14 - TTL Output (Inverted Digital Down Channel 1)

Isolated/Floating Connections

1 - Analog Down Channel 1, +
2 - Analog Down Channel 1, -
3 - Analog Down Channel 2, +
4 - Analog Down Channel 2, -
5 - +15VDC Output
6 - Analog Up Channel 2
7 - Floating TTL input (Digital Down Channel 1)
8 - Floating PWR Ground
9 - Floating +12VDC or +24VDC Output
10 - Floating -15VDC Output
11 - Floating TTL Up
12 - Floating Signal Ground
13 - Floating Analog Up Channel 1
14 - Floating +5.1VDC Reference Output



Ordering Information

Туре:	15 kV Isolation	15EFL
Input Voltage:	12 VDC Nominal	12
	24 VDC Nominal	24
Power:	Watts Output (12V only)	-12W
	Watts Output (24V only)	-24W
	Watts Output (24V only)	-36W
Standard Features:	(1) Digital Up Channel & (2) Analog Up Channels	-I/O
	(1) Digital Down Channel & (2) Analog Down Channel	-R/B
Options:	Partial Mu-Metal Shield	-M
Case:	Plastic Case - Diallyl Phthalate	STD
	"Eared" Chassis Mounting Plate	-E



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Rev. 1 5/08

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