

**Proven  
Reliability**

# ULTRA-LOW POWER CONSUMPTION HIGH VOLTAGE MODULES

ULP SERIES: 500V to 5000V Delivering 0 to 4 Watts



## PRODUCT SELECTION TABLE

MODEL	OUTPUT VOLTAGE	INPUT POWER NO LOAD*2	OUTPUT CURRENT*1
ULP05P	+150 TO +500 VDC	2 mW	0 to 8 mA
ULP10P	+300 TO +1000 VDC	2 mW	0 to 4 mA
ULP20P	+600 TO +2000 VDC	2 mW	0 to 2mA
ULP30P	+900 TO +3000 VDC	2 mW	0 to 1.33 mA
ULP50P	+1500 TO +5000 VDC	2 mW	0 to 0.8 mA

## PRODUCT DESCRIPTION

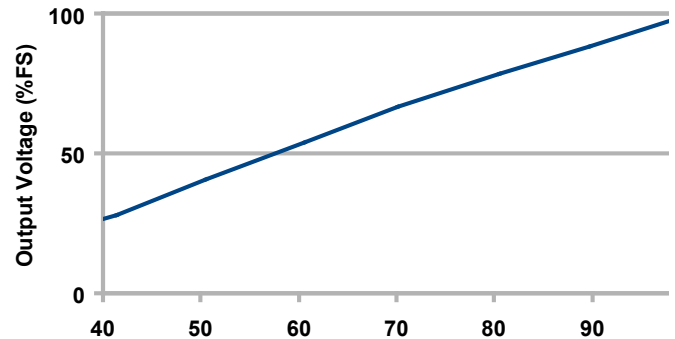
The ULP Series of miniature high voltage power supplies offers orders of magnitude reduction in power consumption, enabling designers to reduce battery size and weight in portable, scientific instruments.

Standard output voltages are available from 500 volts through 5000 volts, with power consumption at full output voltage, no load, running just 2 milli-watts.\*1,\*2

The output voltage is regulated and programmable, and is capable of delivering up to 4 watts of power on demand at a typical conversion efficiency of >85%. Its proprietary packaging results in a lightweight package weighing 2.0 ounces (typical), and features a height of only one half inch. Perfect for "green" designs, these power supplies also feature a shutdown pin which drops current consumption to less than 5 uA. Standard input voltage range is 5.4 to 7.4 volts.

Designed for portable, battery powered equipment, the ULP Series is offered with a standard operating temperature range of -20°C to +70°C, and an optional extended operating temperature of -55°C to +85°C. Small quantities available from stock from our factory or our stocking distributor in Switzerland, Condatas AG. For large quantity requests please consult our factory or our stocking distributor in Switzerland, Condatas AG.

## Output Voltage Vs. Prog. Voltage ULP30P



## FEATURES

- Ultra-Low Power Consumption
- Can operate for up to 4500 hours, no load on 2 lithium AA Batteries
- Can operate on Alkaline AA Batteries: consult factory
- Regulated, Programmable Output
- Voltage Monitor / Read-back
- Arc, Overload & Short Circuit Protected
- Designed to meet RoHS Directive
- Miniature Lightweight Package

## APPLICATIONS

- Portable, Battery Powered Instruments
- Electrophoresis
- Biological & Nuclear Detectors
- Avalanche Photodiodes
- Photomultiplier Tubes
- Solid State Detectors
- EO Lenses
- Piezo Devices
- Electrostatic Field Generation
- Capacitor Charging

## OPTIONS

- Extended Operating Temperature
- Alternate Input Voltages Available: Consult factory\*4

ISO 9001:2008  
CERTIFIED

ISO 14001:2004  
CERTIFIED

RoHS  
COMPLIANT

IPC  
Certified J-STD-001  
Application Specialist

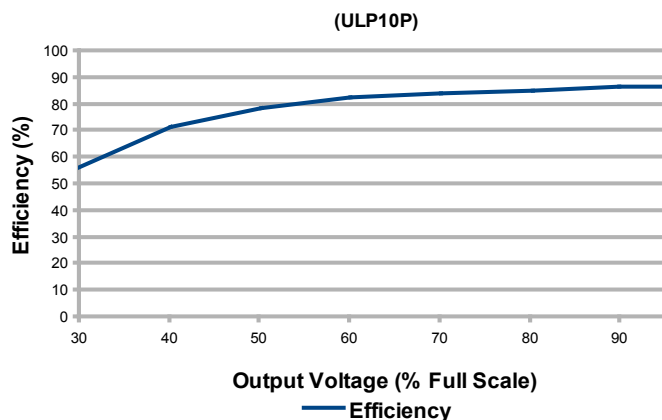


## ELECTRICAL SPECIFICATIONS\*3

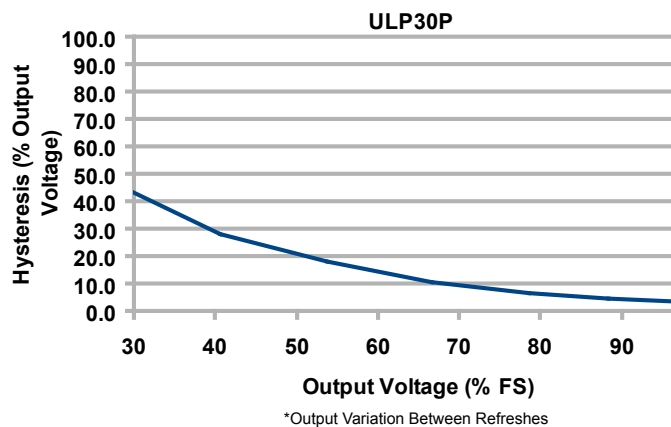
MODEL	MAXIMUM VOLTAGE	OUTPUT CURRENT <sup>x1</sup>
ULP05P	+150 TO +500 VDC	0 TO 8 mA
ULP10P	+300 TO +1000 VDC	0 TO 4 mA
ULP20P	+600 TO +2000 VDC	0 TO 2 mA
ULP30P	+900 TO +3000 VDC	0 TO 1.33 mA
ULP50P	+1500 TO +5000 VDC	0 TO 0.8 mA

PARAMETER	VALUE
INPUT VOLTAGE	5.4V-7.4V (unloaded units), 7.0V-7.8V (loaded units)
INPUT POWER, FULL LOAD	<4.75W
PROGRAMMING VOLTAGE	0 to 2.5V (INPUT), <30uA
VOLTAGE REFERENCE	2.5V (OUTPUT)
VOLTAGE MONITOR	0 to 2.5V (OUTPUT)
GAIN ADJUST <sup>6</sup>	1%
SHUT DOWN	TTL High (INPUT)
STANDARD TEMPERATURE RANGES	OPERATING -20°C to +70°C <sup>5</sup> (CASE)
	STORAGE -25°C to +85°C
EXTENDED TEMPERATURE RANGES (-T OPTION)	OPERATING -55°C to + 85°C <sup>5</sup> (CASE)
	STORAGE -55°C to +95°C

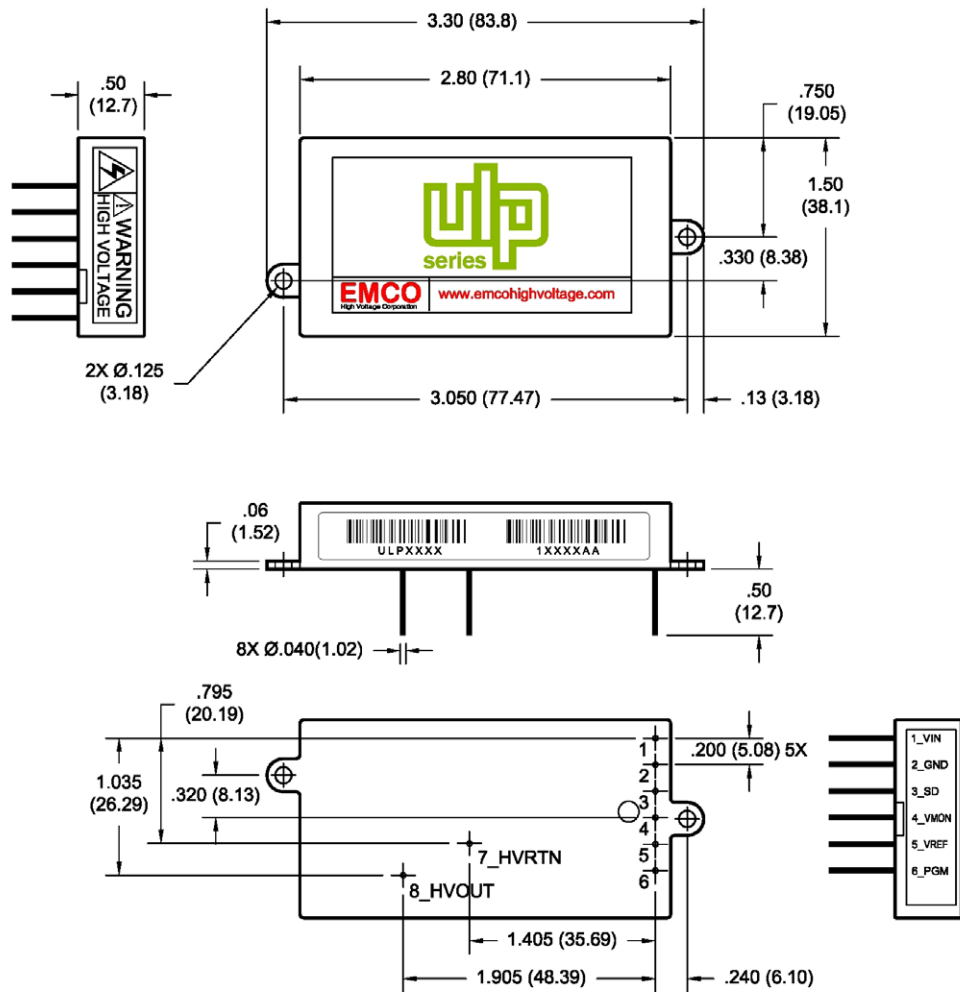
### Efficiency vs Output Voltage



### Re-refresh Hysteresis\* vs. Output Voltage



MECHANICAL SPECIFICATIONS



DIMENSIONS ARE IN INCHES (METRIC EQUIVALENTS ARE IN PARENTHESIS)  
 DIMENSIONAL TOLERANCES: .XX = ±0.03 (0.76)

PIN #	FUNCTION
1	INPUT: +5.4 TO 7.4V
2	GROUND
3	INPUT: SHUT DOWN -TTL - ACTIVE HIGH
4	OUTPUT: VOLTAGE MONITOR: 0 TO +2.5V
5	OUTPUT: VOLTAGE REFERENCE: +2.5V
6	INPUT: PROGRAMMING: 0 TO +2.5V
7	OUTPUT: RETURN
8	OUTPUT: VOLTAGE

PARAMETER	VALUE
WEIGHT	2 OUNCES (51 GRAMS)
DIMENSIONS	3.30L (76.2L) x 1.50W (38.1W) x .50H (12.7mm)
CASE MATERIAL	GLASS-FILLED EPOXY
PINS	.041" (1.04MM) DIAMETER (X8)

APPLICATION NOTES

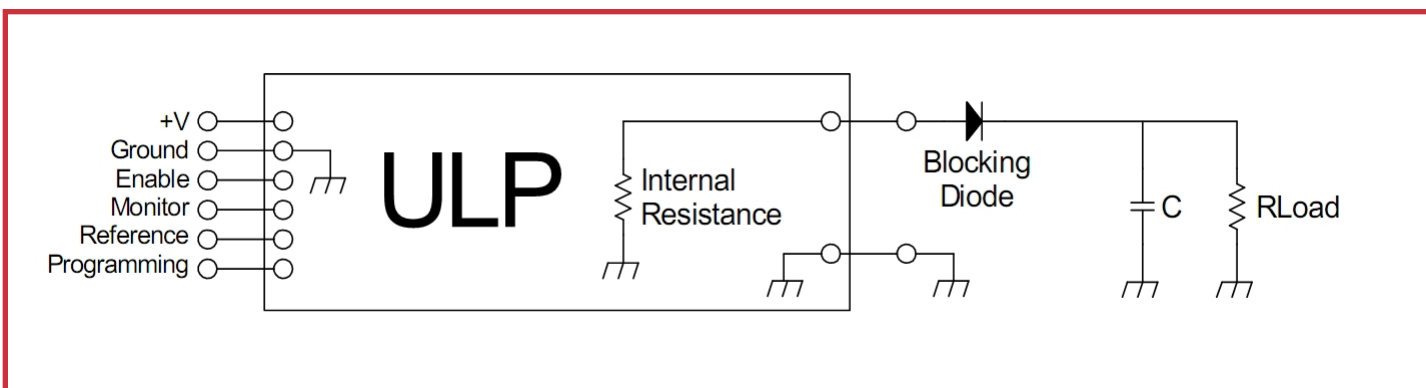
OUTPUT CONDITION	RIPPLE VOLTAGE	RIPPLE FREQUENCY
1 kV, 4.0 mA	21.6 V	67.5 kHz
1 kV, 0.0 mA	19.2 V	6.6 kHz
500 V, 8.0 mA	36.8 V	13.32 kHz
500 V, 0.0 mA	38.4 V	9.6 kHz

REDUCING THE RIPPLE

Due to the pulse-burst-mode topology used to achieve ultra-low power consumption, the output variation is larger than the other typical EMCO designs. The actual ripple amplitude and frequency depend on both the load current and the output voltage setting. The adjacent table shows the ripple characteristics of a typical ULP10P unit.

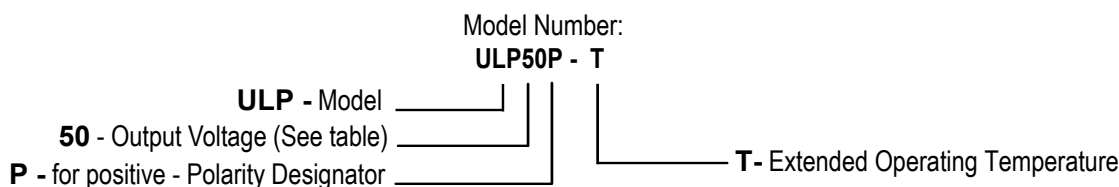
If this level of ripple is unacceptable for the application, it can be greatly attenuated with a simple output filter. If the load current is very light, a blocking diode and a capacitor can be used to greatly reduce the output variation. For heavier load currents, the internal resistance becomes a smaller percent of the load. The diode can be replaced with a resistor to form a conventional RC filter.

To prevent output overshoot, if desired, limit the programming input ramp to 600 mV/sec.



HOW TO ORDER

PART NUMBER SELECTOR:



EXAMPLE: **ULP50P-T** (ULP Series, **50**-Output Voltage, **P**-positive, **T**- Extended Operating Temperature)

Note:  
 1. At maximum rated output voltage  
 2. Typical performance  
 3. Specifications after 1 hour warm-up, full load, at 25°C unless otherwise indicated  
 4. Alternate input voltages can be quoted as a custom model only.  
 5. Proper thermal management techniques are required to maintain safe case temperature at maximum power output.  
 6. GAIN ADJUSTMENT refers to the ability to alter the gain of the circuit to bring the resultant output voltage to the programmed setpoint. This is intended to allow compensation for set point accuracy error.

We reserve the right to make changes without notification

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