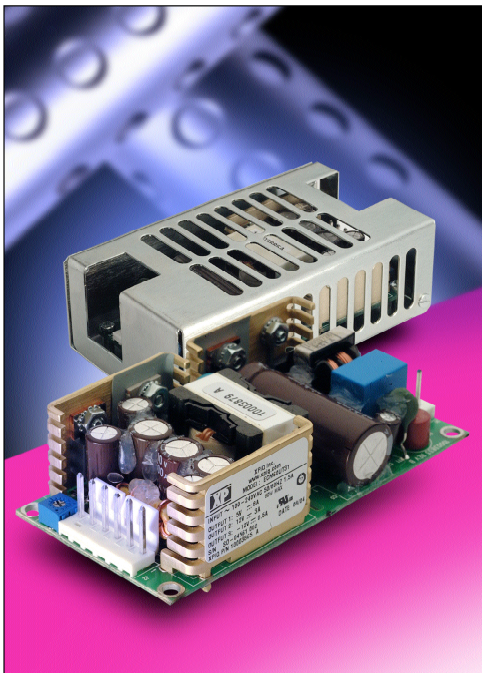


# ECM40/60 Series



- 40 & 60 Watt Models
- Small Size 2.0" x 4.0" x 1.2"
- Low Leakage Current
- Industrial & Medical Approvals
- Full Load Available Convection Cooled
- Wide Operating Temperature 0 °C to +80 °C
- Level B Conducted Emissions
- EN61000-3-2 Compliant
- Universal AC Input 90-264 VAC
- Input Frequency 47-63 & 440 Hz
- Single & Multiple Outputs
- Cover Kits Available
- Mating Connector & Loom Kits Available

Approved for Class I and Class II applications, the ECM range of single and multiple output AC-DC, 40-60 W power supplies from XP feature the world's smallest footprint for units of these ratings. Both are just 2" x 4" (50.8 mm x 101.6 mm) and 1.2" (30.48 mm) high. Furthermore, these high-density power supplies meet EN55022 Level B conducted emissions with maximum leakage currents of 100  $\mu$ A at 115 VAC or 200  $\mu$ A at 230 VAC. As a result, these switchers are equally suitable for industrial, IT and medical applications, with no price premium for meeting medical requirements.

The ECM40-60 series have single output versions from 5 V to 48 VDC, adjustable by  $\pm 10\%$ , and dual and triple output versions covering combinations of 3.3 V, 5 V, 12 V, 15 V and 24 V. They are dual-fused for compliance with IEC60601-1 and efficiency is 80-85%, depending upon the model, so minimal excess heat is generated.

The power supplies deliver full power between 0 °C and +50 °C and will operate at up to +80 °C with derating and only 5 CFM of cooling. Comprehensive overvoltage, overload and short circuit protection is built in. Covers, looms and connector kits are available.



T H E X P E R T S I N P O W E R

## Input Characteristics

ECM40/60

Characteristic	Minimum	Typical	Maximum	Units	Notes & Conditions
Input Voltage - Operating	90		264	VAC	170-370 VDC
Input Frequency	47	50/60	63	Hz	400 Hz operation avail
Power Factor		0.62			230 VAC
Input Current - No Load			41	mA	230 VAC
Input Current - Full Load			1.38	A	90 VAC
Inrush Current			40	A	230 VAC cold start
Earth Leakage Current			100/200	$\mu$ A	115/230 VAC
Input Protection	T3.15A / 250V Internal Fuse in line and neutral				

All specifications are at nominal input, full resistance load at 25°C unless otherwise stated.

## Output Characteristics

Characteristic	Minimum	Typical	Maximum	Units	Notes & Conditions
Output Voltage	5.0		48.0	VDC	See modules table
Initial Set Accuracy			$\pm 1 V_1, \pm 5 V_2 \& V_3$	%	
Output Voltage Adjustment	$\pm 10$			%	V1 (V <sub>2</sub> will trace V <sub>1</sub> by the same %)
Minimum Load	0.5V <sub>1</sub> ; 0.1V <sub>2</sub>			A	
Start Up Delay			2	s	90 VAR
Start Up Rise Time			50	ms	
Hold Up Time	16		75	ms	115-230 VAC input
Drift			$\pm 0.2$	%	
Line Regulation			$\pm 0.5$	%	90-264 VAC
Load Regulation			$\pm 1.0$ Single output $\pm 3 V_1, \pm 5 V_2 \& V_3$ of multi output	%	
Transient Response			4	%	Recovery to within 1% in 500 $\mu$ s for 25% load change
Ripple & Noise			1	% pk-pk	20 MHz bandwidth
Overvoltage Protection	115		135	VDC	Recycle input to reset
Overload Protection	110		150	% I <sub>max</sub>	Auto-recovery
Short Circuit Protection					Trip & restart
Temperature Coefficient			0.05	%/°C	



**Reliability & Service Life**

ECM40/60

Characteristic	Min	Typ	Max	Units	Notes & Conditions
Mean Time Between Failure		250,000		Hours	MIL-HDBK-217F

**Isolation**

Characteristic	Min	Typ	Max	Units	Notes & Conditions
Input to Output Test Voltage	4000			AC	Test duration 1 min,
Input to Ground Test Voltage	1500			AC	Test duration 1 min,
Output to Ground Test Voltage	500			AC	Test duration 1 min,

**Other Specifications**

Characteristic	Min	Typ	Max	Units	Notes & Conditions
Switching Frequency		70		kHz	Fixed
Weight		150		g	
Power Density			6.25	W/in <sup>3</sup>	For 60 W version

**Environmental Requirements**

Characteristic	Min	Typ	Max	Units	Notes & Conditions
Operating Temperature	0		+80	°C	See derating curves
Storage Temperature	-20		+85	°C	
Cooling		0		CFM	Convection cooled
Humidity			95	% RH	Non-condensing
Operating Altitude			3000	m	
Vibration			2	G	5-500 Hz 3 axis
Shock			30	Gpk	Half Sine 6 axis

**Efficiency**

Model Number	Min	Typ	Max	Units	Notes & Conditions
ECM60US05		81		%	Full load
ECM60US24		85		%	Full load
ECM60UT33		81		%	Full load



**EMC**  
**Electromagnetic Compatibility**

Phenomenon	Standard		Test Level	
Criteria	Notes & Conditions			
Immunity				
ESD	EN61000-4-2	2	A	
EFT	EN61000-4-4	2	A	
Radiated Field	EN61000-4-3	10 V/m	A	
Surges	EN61000-4-5	3	A	
Conducted	EN61000-4-6	10 V RMS	A	
Dips & Interruptions	EN61000-4-11	70% U <sub>T</sub> 40% U <sub>T</sub>	B C	For 10 ms For 100 ms

**EMC**  
**Electromagnetic Compatibility**

Phenomenon	Standard	Test Level	Criteria	Notes & Conditions
Emission				
Conducte	EN55022/EN60601-1-2		CLASS B	
Voltage Fluctuations	EN61000-3-3			
Radiated	EN55022		CLASS A	

**Safety Agency Approvals**

Hazard	Category
UL/cUL 60950 File Number	E136109
UL/cUL 60601-1 File Number	E146893
IEC 60950	US/8413/UL
IEC 60601	US/8386/UL US/8609/UL

**Standards Compliance List**

Standard	Category
EN 60950	2000
UL/cUL 60950	3rd Edition
UL/cUL 60601-1	1st Edition (2003)
IEC 60950	IEC 60950-1 (2001) 1st Edition
IEC 60601-1	IEC 60601-1 (1988) 2nd Edition, amendment nos. 1&2

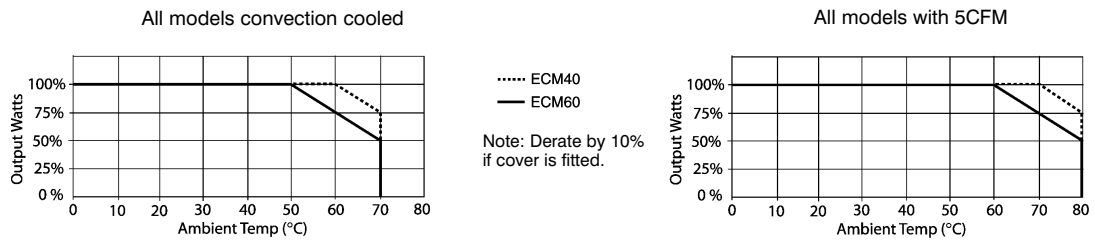


OUTPUT VOLTAGE & CURRENT RATINGS - 40 WATT MODELS							ECM40/60
Max Power	Outputs						Model Number
	V1	Imin/Imax	V2	Imin/Imax	V3	Imin/Imax	
40 W	+5.0 V	0.0 A/8.0 A					ECM40US05
	+7.0 V	0.0 A/5.7 A					ECM40US07
	+9.0 V	0.0 A/4.4 A					ECM40US09
	+12.0 V	0.0 A/3.5 A					ECM40US12
	+15.0 V	0.0 A/2.7 A					ECM40US15
	+18.0 V	0.0 A/2.2 A					ECM40US18
	+24.0 V	0.0 A/1.7 A					ECM40US24
	+33.0 V	0.0 A/1.2 A					ECM40US33
	+48.0 V	0.0 A/0.9 A					ECM40US48
	+5.0 V	0.5 A/6.0 A	+12.0 V	0.1 A/2.0 A			ECM40UD21
	+5.0 V	0.5 A/6.0 A	+15.0 V	0.1 A/1.5 A			ECM40UD22
	+5.0 V	0.5 A/6.0 A	+12.0 V	0.1 A/2.0 A	-12.0 V	0.0 A/0.5 A	ECM40UT31
	+5.0 V	0.5 A/6.0 A	+24.0 V	0.1 A/1.0 A	-12.0 V	0.0 A/0.5 A	ECM40UT32
	+5.0 V	0.5 A/6.0 A	+15.0 V	0.1 A/1.5 A	-15.0 V	0.0 A/0.5 A	ECM40UT33
	+3.3 V	0.5 A/6.0 A	+5.0 V	0.1 A/1.5 A	+12.0 V	0.0 A/0.5 A	ECM40UT34
	+5.0 V	0.5 A/6.0 A	+3.3 V	0.1 A/1.5 A	+12.0 V	0.0 A/0.5 A	ECM40UT35

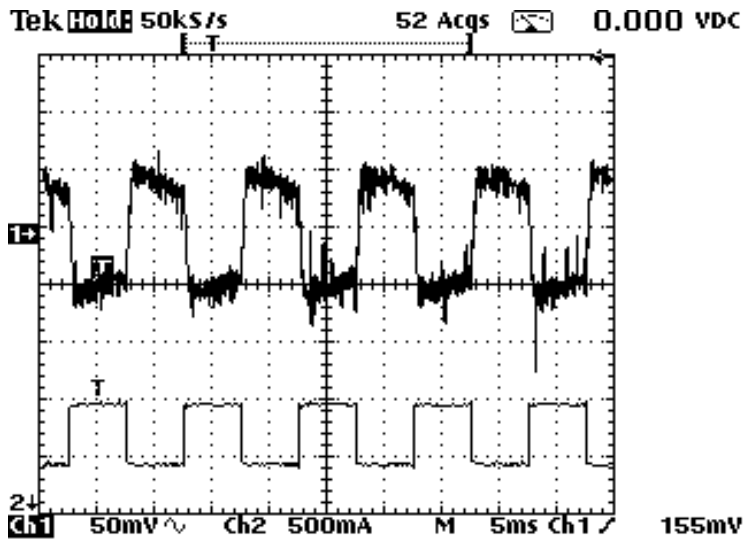
OUTPUT VOLTAGE & CURRENT RATINGS - 60 WATT MODELS							ECM40/60
Max Power	Outputs						Model Number
	V1	Imin/Imax	V2	Imin/Imax	V3	Imin/Imax	
60 W	+5.0 V	0.0 A/12.00 A					ECM60US05
	+7.0 V	0.0 A/8.60 A					ECM60US07
	+9.0 V	0.0 A/6.70 A					ECM60US09
	+12.0 V	0.0 A/5.00 A					ECM60US12
	+15.0 V	0.0 A/4.00 A					ECM60US15
	+18.0 V	0.0 A/3.30 A					ECM60US18
	+24.0 V	0.0 A/2.50 A					ECM60US24
	+33.0 V	0.0 A/1.80 A					ECM60US33
	+48.0 V	0.0 A/1.25 A					ECM60US48
	+5.0 V	0.5 A/8.00 A	+12.0 V	0.1 A/3.0 A			ECM60UD21
	+5.0 V	0.5 A/8.00 A	+15.0 V	0.1 A/2.5 A			ECM60UD22
	+5.0 V	0.5 A/8.00 A	+12.0 V	0.1 A/3.0 A	-12.0 V	0.0 A/0.5 A	ECM60UT31
	+5.0 V	0.5 A/8.00 A	+24.0 V	0.1 A/1.5 A	-12.0 V	0.0 A/0.5 A	ECM60UT32
	+5.0 V	0.5 A/8.00 A	+15.0 V	0.1 A/2.5 A	-15.0 V	0.0 A/0.5 A	ECM60UT33
	+3.3 V	0.5 A/8.00 A	+5.0 V	0.1 A/1.5 A	+12.0 V	0.0 A/0.5 A	ECM60UT34
	+5.0 V	0.5 A/8.00 A	+3.3 V	0.1 A/1.5 A	+12.0 V	0.0 A/0.5 A	ECM60UT35



## Thermal Derating Curves



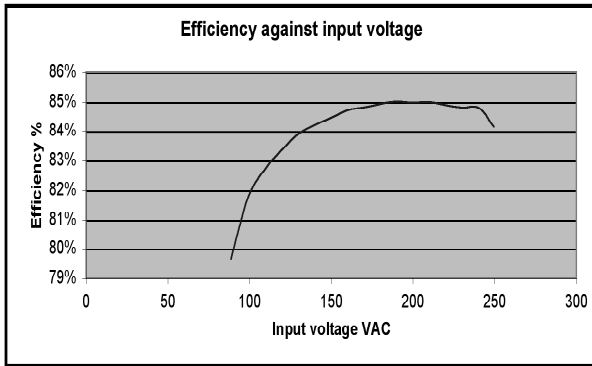
## Transient Response



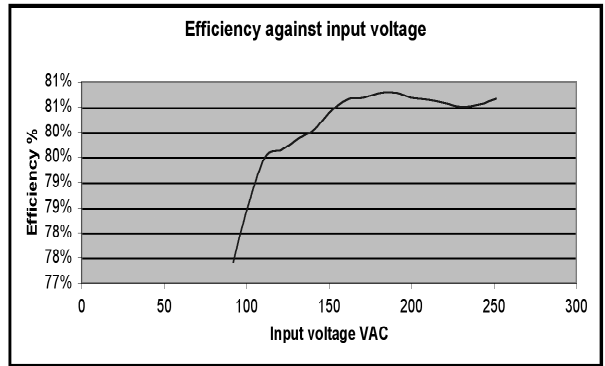
ECM60US24 25% LOAD CHANGE



## Efficiency Against Input Voltage

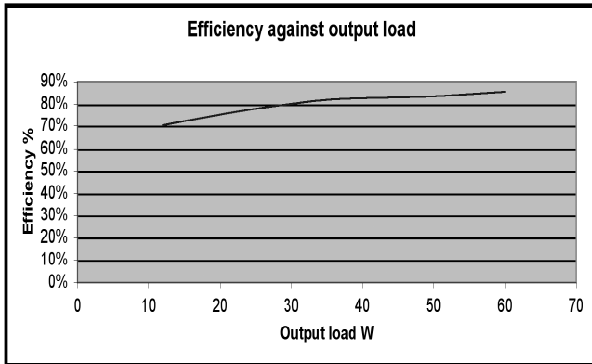


**ECM60US24 WITH 60W LOAD**

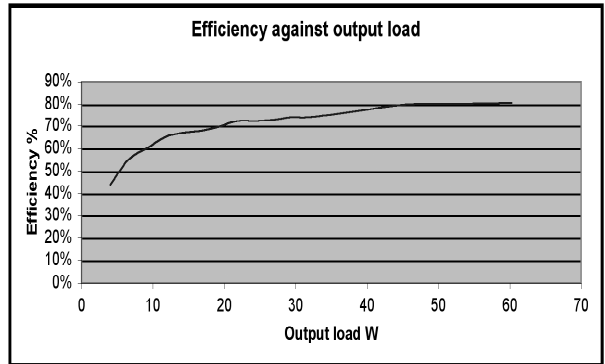


**ECM60UT33 WITH 50W LOAD**

## Efficiency Against Output Load



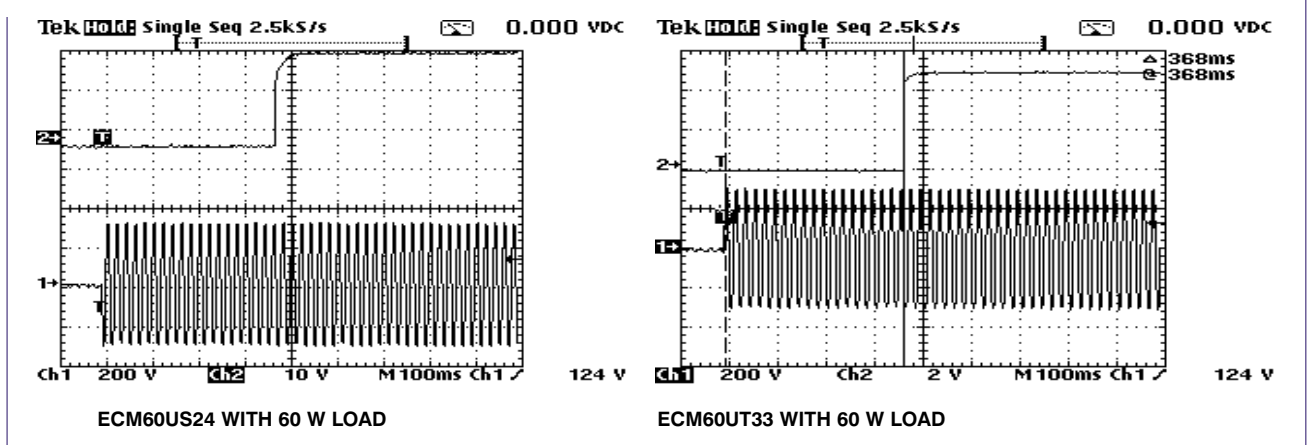
**ECM60US24 AT 230VAC I/P**



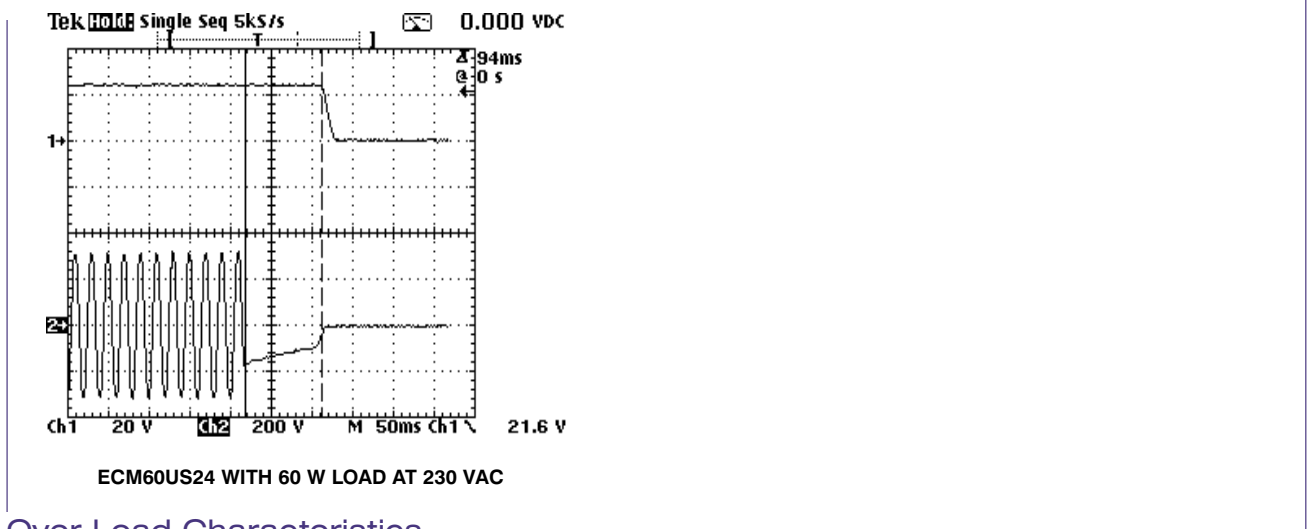
**ECM60UT33 AT 230VAC I/P**



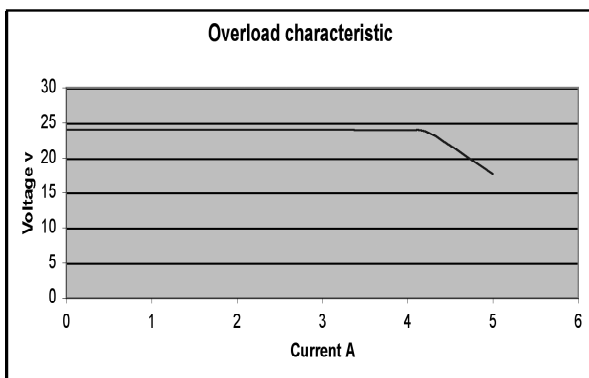
## Start-Up Delay



## Hold-Up Time



## Over Load Characteristics

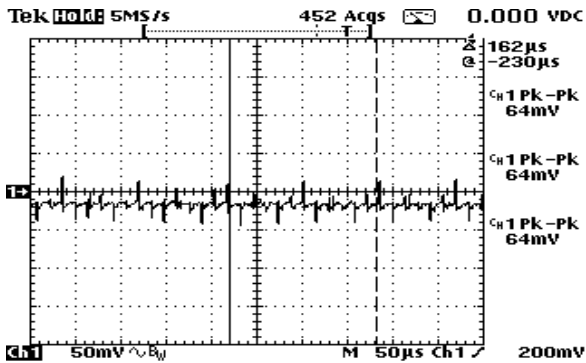


ECM60US24. WHEN CURRENT REACHES 5.4 A, OUTPUT GOES INTO TRIP AND RESTART MODE

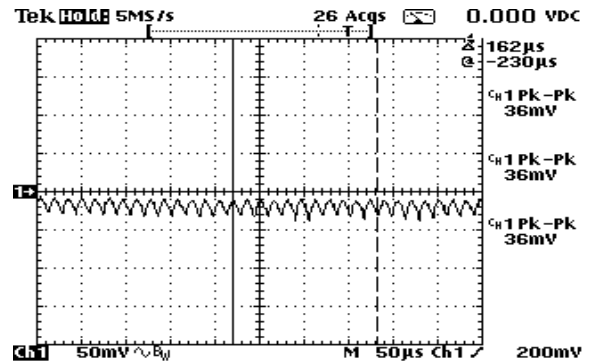




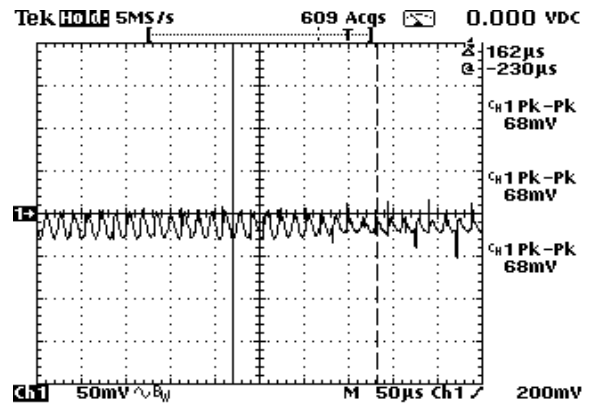
## Output Noise & Ripple



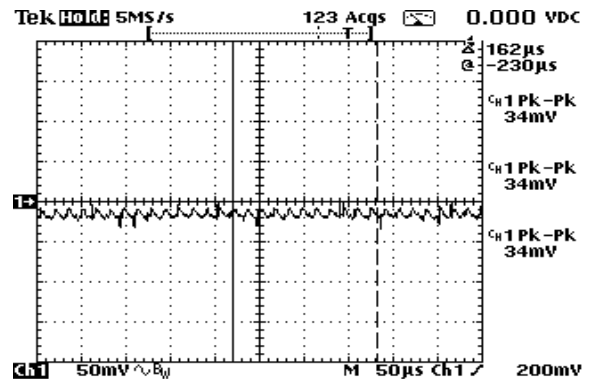
ECM60US24 WITH 60 W LOAD  
Noise measured is 64 mV pk-pk



ECM60UT33 OUTPUT 1 WITH 30 W LOAD.  
Noise measured is 36 mV pk-pk



ECM60UT33 OUTPUT 2 WITH 15 W LOAD.  
Noise measured is 68 mV pk-pk



ECM60UT33 OUTPUT 3 WITH 7 W LOAD.  
Noise measured is 34 mV pk-pk



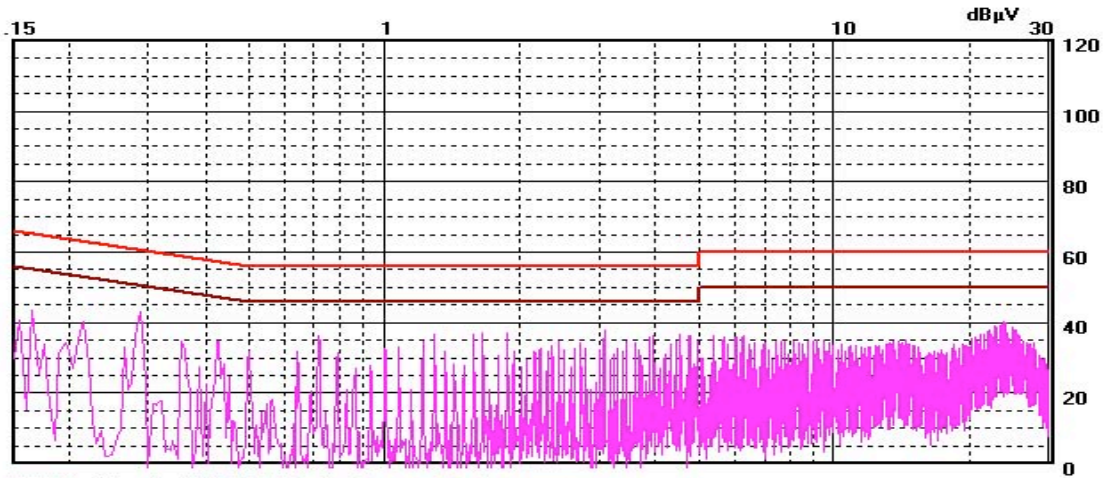
## Conducted Noise

PMM 8000PLUS

Name: ecm6024

Date: 06/09/04

Time: 14:58



Limit #1: 022qp-b Limit #2: 022av-b Detector: Peak  
ecm60us24 24v @ full load(2.5A) s/n 56710227

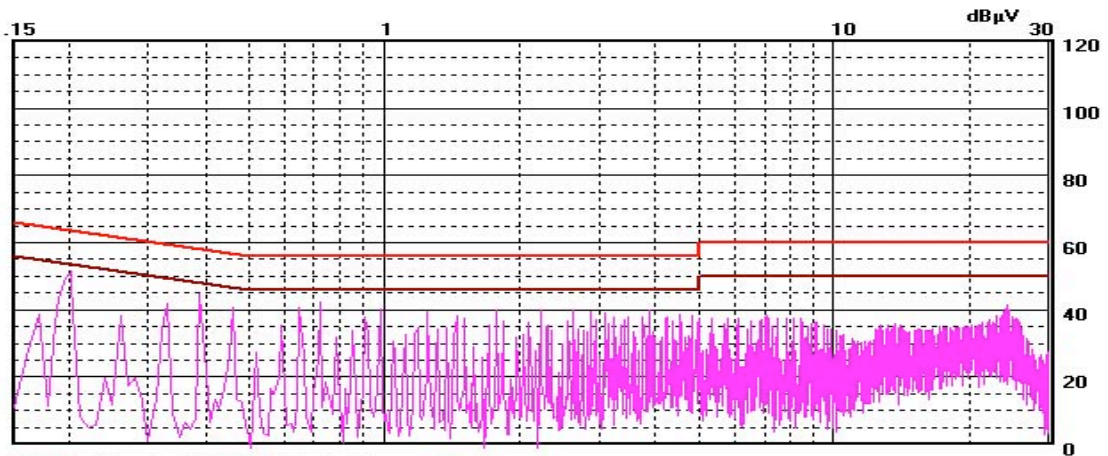
### ECM60US24 AT FULL LOAD

PMM 8000PLUS

Name: ecm60t33

Date: 07/09/04

Time: 10:49

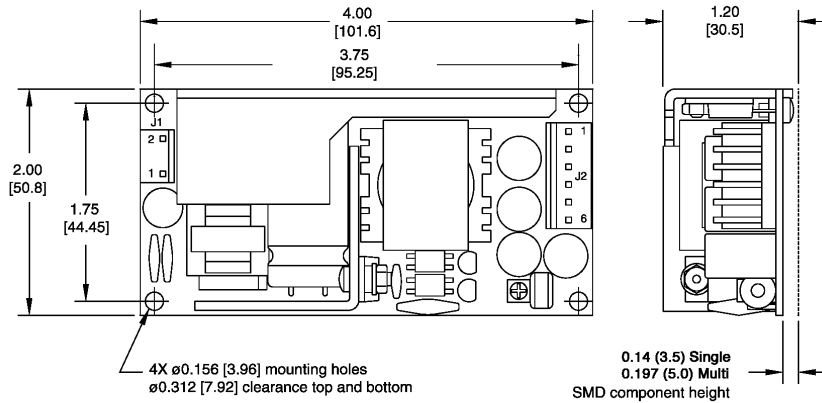


Limit #1: 022qp-b Limit #2: 022av-b Detector: Peak  
ECM60UT33 S/N 56870 012  
FULL LOAD[V1 5V@6A V2 15V@2A]

### ECM60UT33 AT FULL LOAD



## Mechanical Details



Dimensions in inches (mm)

Tolerance:

.xx =  $\pm$ 0.02 (0.50)

.xxx =  $\pm$ 0.01 (0.25)

J1 mates with Molex housing 09-50-3031 &

Molex series 2878 crimp terminals.

J2 mates with Molex housing 09-50-3061 &

Molex series 2878 crimp terminals.

Cover dimensions are 114 x 64 x 38.5 mm.

Input Connector J1

Pin 1	Line
Pin 2	Neutral

Output Connector J2

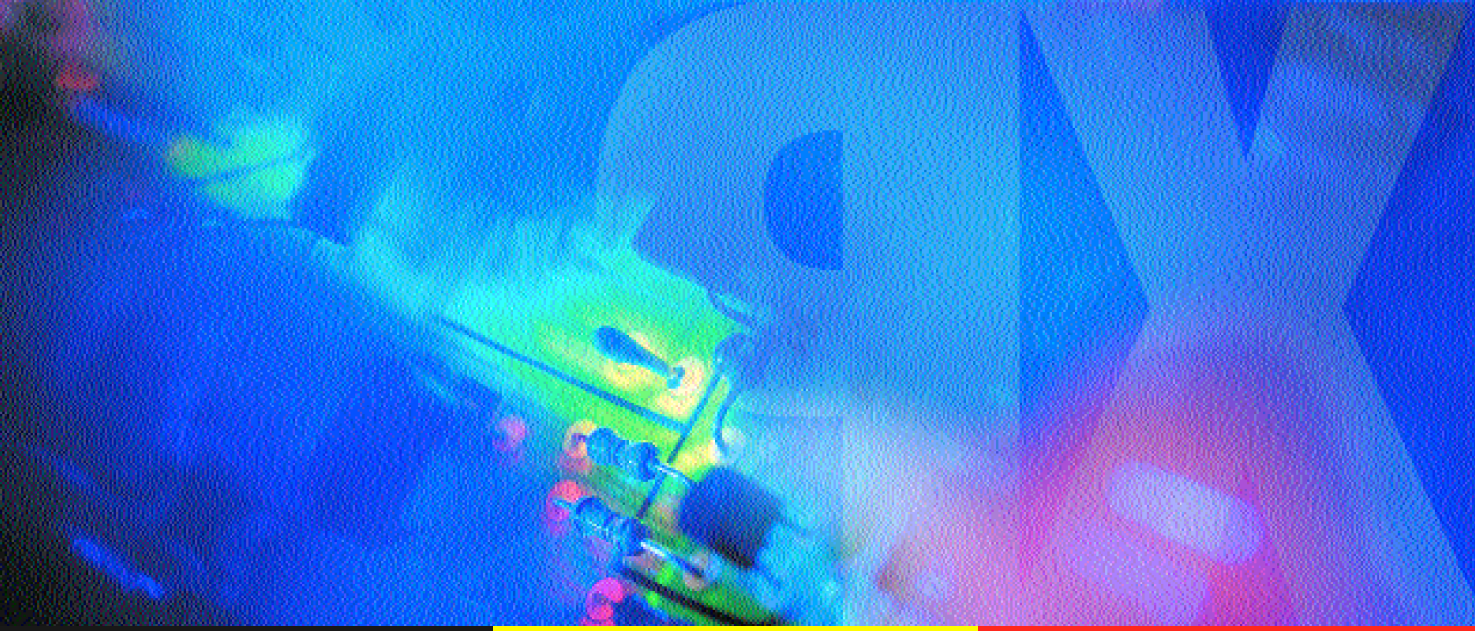
Pin No.	Single	Multi
1	+V1	+V1
2	+V1	+V1
3	RTN	RTN
4	RTN	RTN
5	NC	-V3
6	NC	+V2

## Installation Instructions for Class II operation

The open frame power supply components are for building-in Class I or Class II.

They will be considered Class II when protection against electric shock does not rely on basic insulation only, unit provides additional safety precautions such as Double/Reinforced Insulation and provide minimum of 5 mm creepage and 4 mm clearance distance (mounted above chassis/accessible metal parts on insulating posts). Class II units have no reliance upon protective earthing. In all other cases, the units will be considered Class I.





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**XP-ForeSight**  
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Sunnyvale, CA 94086  
Phone : +1 408 732-7777  
Fax : +1 408 732-2002

[www.xp-foresight.com](http://www.xp-foresight.com)  
[sales@xp-foresight.com](mailto:sales@xp-foresight.com)

#### European HQ

**XP plc**  
Horseshoe Park  
Pangbourne  
Berkshire, RG8 7JW  
Phone : +44 (0)118 984 5515  
Fax : +44 (0)118 984 3423

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T H E X P E R T S I N P O W E R