

# ECM40-60



- 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 +70 °C
- Level B Conducted Emissions
- EN61000 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 EN55032 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 +70 °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.

## Input Characteristics

| Characteristic            | Minimum | Typical | Maximum | Units | Notes & Conditions                             |
|---------------------------|---------|---------|---------|-------|------------------------------------------------|
| Input Voltage - Operating | 90      |         | 264     | VAC   | 120-370 VDC                                    |
| Input Frequency           | 47      | 50/60   | 63      | Hz    | 400 Hz operation available                     |
| Input Current - No load   |         |         | 41      | mA    | 230 VAC                                        |
| Input Current - Full load |         |         | 1.38    | A     | 90 VAC                                         |
| Inrush Current            |         |         | 40      | A     | Cold start at 230 VAC                          |
| Power Factor              |         | 0.62    |         |       | 230 VAC                                        |
| Earth Leakage Current     |         |         | 290     | μA    | 264 VAC                                        |
| Input Protection          |         |         |         |       | T3.15 A/ 250 V internal fuse in line & 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     |                                            |         | V <sup>1</sup> : ±1, V <sup>2</sup> & V <sup>3</sup> : ±5 | %                  |                                                                               |
| Output Voltage Trim      | ±10                                        |         |                                                           | %                  | V <sup>1</sup> (V <sup>2</sup> will track V <sup>1</sup> by the same %)       |
| Minimum load             | V <sup>1</sup> : 0.5, V <sup>2</sup> : 0.1 |         |                                                           | A                  | Not required on single output models                                          |
| Start Up Delay           |                                            |         | 1.5                                                       | s                  | 90 VAC                                                                        |
| Start Up Rise Time       |                                            |         | 10                                                        | ms                 |                                                                               |
| Hold Up Time             | 16                                         |         | 75                                                        | ms                 | 115-230 VAC input                                                             |
| Drift                    |                                            |         | ±0.2                                                      | %                  |                                                                               |
| Line Regulation          |                                            |         | ±0.5                                                      | %                  | 90-264 VAC                                                                    |
| Load Regulation          |                                            |         | ±1.0                                                      | %                  | Single output                                                                 |
|                          |                                            |         | V <sup>1</sup> : ±3, V <sup>2</sup> & V <sup>3</sup> : ±5 | %                  | Dual output                                                                   |
| Transient Response       |                                            |         | 4                                                         | %                  | Output voltage recovers to within 1% in less than 500 μs for 50% load change. |
| Ripple & Noise           |                                            |         | 1                                                         | %pk-pk             | 20 MHz bandwidth                                                              |
| Overvoltage Protection   | 115                                        |         | 135                                                       | VDC                | Recycle input to reset                                                        |
| Overload Protection      | 110                                        |         | 170                                                       | % I <sub>max</sub> | Auto-recovery                                                                 |
| Short Circuit Protection |                                            |         |                                                           |                    | Trip & restart (hiccup mode)                                                  |
| Temperature Coefficient  |                                            |         | 0.05                                                      | %/°C               |                                                                               |

## General Specifications

| Characteristic      | Minimum | Typical    | Maximum | Units             | Notes & Conditions               |
|---------------------|---------|------------|---------|-------------------|----------------------------------|
| Efficiency          | 70      |            |         | %                 | 3.3 & 5 V single output versions |
|                     | 80      |            |         |                   | All other single output versions |
|                     | 75      |            |         |                   | Dual output versions             |
| Isolation Voltage   |         | 4000       |         | VAC               | Input to output                  |
|                     |         | 1500       |         |                   | Input to ground                  |
|                     |         | 500        |         |                   | Output to ground                 |
| Switching Frequency |         | 70         |         | kHz               | Fixed                            |
| Power Density       |         |            | 6.25    | W/In <sup>3</sup> | For 60 W version                 |
| Weight              |         | 0.33 (150) |         | lbs (g)           |                                  |
| MTBF                |         | 600        |         | kHrs              | Mil HDBK 217F                    |

## Environmental

| Characteristic        | Minimum | Typical | Maximum | Units | Notes & Conditions  |
|-----------------------|---------|---------|---------|-------|---------------------|
| Operating Temperature | -0      |         | +70     | °C    | See derating curves |
| Storage Temperature   | -40     |         | +85     | °C    |                     |
| Cooling               |         | 0       |         | CFM   | Convection-cooled   |
| Operating Humidity    |         |         | 95      | % RH  | Non- condensing     |
| Operating Altitude    |         |         | 3000    | m     |                     |
| Shock                 |         |         | 30      | Gpk   | Half sine 6 axis    |
| Vibration             |         |         | 2       | G     | 5-500 Hz 3 axis     |

## Electromagnetic Compatibility & Immunity

| Standard             | Test Level                | Criteria                                    | Notes & Conditions              |
|----------------------|---------------------------|---------------------------------------------|---------------------------------|
| Emissions            | EN55032                   | Class B Conducted                           |                                 |
|                      | EN55032                   | Class A Radiated                            |                                 |
|                      | EN60601-1-2               | Class B Conducted                           |                                 |
| Harmonic Currents    | EN61000-3-2               |                                             |                                 |
| Voltage Flicker      | EN61000-3-3               |                                             |                                 |
| ESD Immunity         | EN61000-4-2               | level 2, performance criteria A             |                                 |
| Radiated Immunity    | EN61000-4-3               | 10 V/m, performance criteria A              |                                 |
| EFT/Burst            | EN61000-4-4               | level 2, performance criteria A             |                                 |
| Surge                | EN61000-4-5               | level 3, performance criteria A             |                                 |
| Conducted Immunity   | EN61000-4-6               | 10 Vrms, performance criteria A             |                                 |
| Dips & Interruptions | EN61000-4-11              | 70% U <sup>T</sup> : performance criteria A | For 10 ms, 100% load            |
|                      |                           | 40% U <sup>T</sup> : performance criteria B | For 100 ms, 100% load           |
|                      |                           | 0% U <sup>T</sup> : performance criteria B  | For 5000 ms, 100% load          |
| Dips & Interruptions | EN61000-4-11<br>(Medical) | 70% U <sub>t</sub> , performance criteria A | For 500 ms, Medical, 100% load  |
|                      |                           | 40% U <sub>t</sub> , performance criteria A | For 100 ms, Medical, 60% load   |
|                      |                           | 0% U <sub>t</sub> , performance criteria A  | For 10 ms, Medical, 100% load   |
|                      |                           | 0% U <sub>t</sub> , performance criteria B  | For 5000 ms, Medical, 100% load |

## Safety Approvals

| Safety Agency | Safety Standard                                                             | Category               |
|---------------|-----------------------------------------------------------------------------|------------------------|
| CB Report     | IEC60950-1:2005 Ed 2 / IEC62368-1:2014                                      | Information Technology |
|               | Certificate #US/18293 & 18269/UL, IEC60601-1 Ed 3 Including Risk Management | Medical                |
| UL            | UL 62368-1 & CAN/CSA C22.2 No. 62368-1-14                                   | Information Technology |
|               | UL File # E146893, ANSI/AAMI ES 60601-1:2005 & CSA C22.2 No. 60601-1:08     | Medical                |
| EN            | EN62368-1:2014/A11:2017                                                     | Information Technology |
|               | TUV Certificate # B12 01 57396 125, EN60601-1:2006                          | Medical                |
| CE            | Meets all applicable directives                                             |                        |
| UKCA          | Meets all applicable legislation                                            |                        |

| Means of Protection  |                                                                   | Category        |
|----------------------|-------------------------------------------------------------------|-----------------|
| Primary to Secondary | 1 x MOPP (Means of Patient Protection) Contact Sales for 2 x MOPP | IEC60601-1 Ed 3 |
| Primary to Earth     | 1 x MOPP (Means of Patient Protection)                            |                 |

| Equipment Protection Class | Safety Standard                        | Notes & Conditions                                        |
|----------------------------|----------------------------------------|-----------------------------------------------------------|
| Class I & Class II         | IEC60950-1:2005 Ed 2 / IEC62368-1:2014 | See safety agency conditions of acceptability for details |

## Models & Ratings

| Max Power | Outputs |                          |        |               |        |               | Model Number |
|-----------|---------|--------------------------|--------|---------------|--------|---------------|--------------|
|           | V1      | Imin/Imax <sup>(3)</sup> | V2     | Imin/Imax     | V3     | Imin/Imax     |              |
| 40 W      | 5.0V    | 0.0 A / 8.0 A            |        |               |        |               | ECM40US05    |
|           | 7.0V    | 0.0 A / 5.7 A            |        |               |        |               | ECM40US07    |
|           | 9.0V    | 0.0 A / 4.4 A            |        |               |        |               | ECM40US09    |
|           | 12.0V   | 0.0 A / 3.5 A            |        |               |        |               | ECM40US12    |
|           | 15.0V   | 0.0 A / 2.7 A            |        |               |        |               | ECM40US15    |
|           | 18.0V   | 0.0 A / 2.2 A            |        |               |        |               | ECM40US18    |
|           | 24.0V   | 0.0 A / 1.7 A            |        |               |        |               | ECM40US24    |
|           | 33.0V   | 0.0 A / 1.2 A            |        |               |        |               | ECM40US33    |
|           | 48.0V   | 0.0 A / 0.9 A            |        |               |        |               | ECM40US48    |
|           | +5.0V   | 0.5 A / 6.0 A            | +12.0V | 0.1 A / 2.0 A |        |               | ECM40UD21    |
|           | +5.0V   | 0.5 A / 6.0 A            | +15.0V | 0.1 A / 1.5 A |        |               | ECM40UD22    |
|           | +5.0V   | 0.5 A / 6.0 A            | +12.0V | 0.1 A / 2.0 A | -12.0V | 0.0 A / 0.5 A | ECM40UT31    |
|           | +5.0V   | 0.5 A / 6.0 A            | +24.0V | 0.1 A / 1.0 A | -12.0V | 0.0 A / 0.5 A | ECM40UT32    |
|           | +5.0V   | 0.5 A / 6.0 A            | +15.0V | 0.1 A / 1.5 A | -15.0V | 0.0 A / 0.5 A | ECM40UT33    |
|           | +3.3V   | 0.5 A / 6.0 A            | +5.0V  | 0.1 A / 1.5 A | +12.0V | 0.0 A / 0.5 A | ECM40UT34    |
|           | +5.0V   | 0.5 A / 6.0 A            | +3.3V  | 0.1 A / 1.5 A | +12.0V | 0.0 A / 0.5 A | ECM40UT35    |

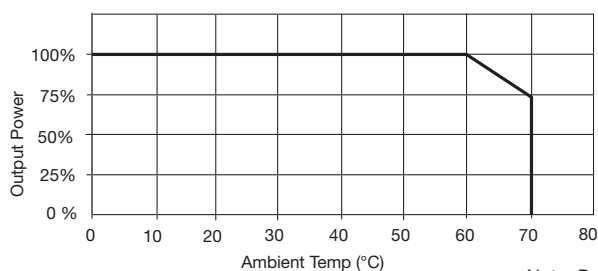
| Max Power | Outputs |                          |        |               |        |               | Model Number |
|-----------|---------|--------------------------|--------|---------------|--------|---------------|--------------|
|           | V1      | Imin/Imax <sup>(3)</sup> | V2     | Imin/Imax     | V3     | Imin/Imax     |              |
| 60 W      | 5.0V    | 0.0 A / 12.00 A          |        |               |        |               | ECM60US05    |
|           | 7.0V    | 0.0 A / 8.60 A           |        |               |        |               | ECM60US07    |
|           | 9.0V    | 0.0 A / 6.70 A           |        |               |        |               | ECM60US09    |
|           | 12.0V   | 0.0 A / 5.00 A           |        |               |        |               | ECM60US12    |
|           | 15.0V   | 0.0 A / 4.00 A           |        |               |        |               | ECM60US15    |
|           | 18.0V   | 0.0 A / 3.30 A           |        |               |        |               | ECM60US18    |
|           | 20.0V   | 0.0 A / 3.00 A           |        |               |        |               | ECM60US20    |
|           | 24.0V   | 0.0 A / 2.50 A           |        |               |        |               | ECM60US24    |
|           | 28.0V   | 0.0 A / 2.14 A           |        |               |        |               | ECM60US28    |
|           | 33.0V   | 0.0 A / 1.80 A           |        |               |        |               | ECM60US33    |
|           | 48.0V   | 0.0 A / 1.25 A           |        |               |        |               | ECM60US48    |
|           | +5.0V   | 0.5 A / 8.00 A           | +12.0V | 0.1 A / 3.0 A |        |               | ECM60UD21    |
|           | +5.0V   | 0.5 A / 8.00 A           | +15.0V | 0.1 A / 2.5 A |        |               | ECM60UD22    |
|           | +5.0V   | 0.5 A / 8.00 A           | +12.0V | 0.1 A / 3.0 A | -12.0V | 0.0 A / 0.5 A | ECM60UT31    |
|           | +5.0V   | 0.5 A / 8.00 A           | +24.0V | 0.1 A / 1.5 A | -12.0V | 0.0 A / 0.5 A | ECM60UT32    |
|           | +5.0V   | 0.5 A / 8.00 A           | +15.0V | 0.1 A / 2.5 A | -15.0V | 0.0 A / 0.5 A | ECM60UT33    |
|           | +3.3V   | 0.5 A / 8.00 A           | +5.0V  | 0.1 A / 1.5 A | +12.0V | 0.0 A / 0.5 A | ECM60UT34    |
|           | +5.0V   | 0.5 A / 8.00 A           | +3.3V  | 0.1 A / 1.5 A | +12.0V | 0.0 A / 0.5 A | ECM60UT35    |

### Notes

1. V2 will track a change in V1 by the same percentage change in voltage as V1 is trimmed.
2. To receive unit with cover fitted, add suffix '-C' to model number. For Class I operation only.
3. A 120% peak load can be taken for up to 100 ms with a 25% duty cycle. Average load not to exceed maximum power rating.

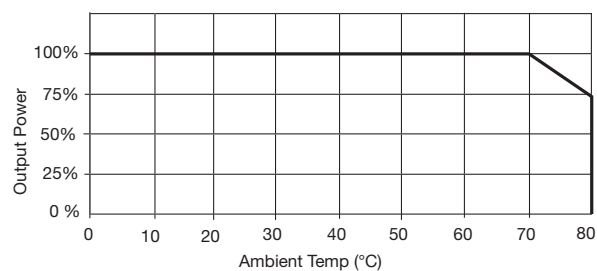
## Thermal Derating Curves

All ECM40 models convection-cooled

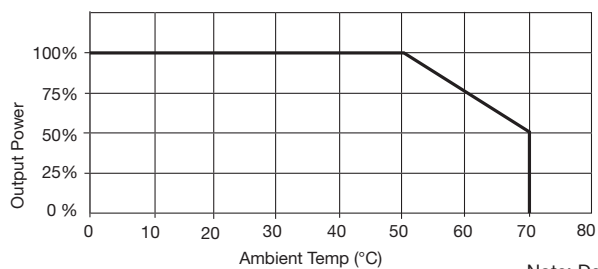


Note: Derate by 10% if cover is fitted

All ECM40 models with 5 CFM

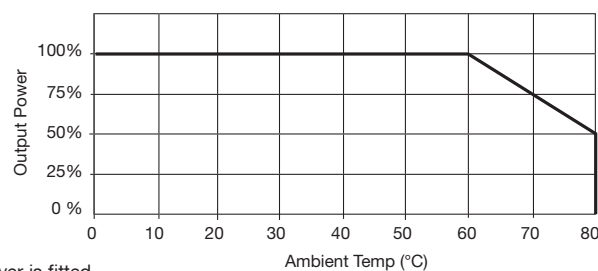


All ECM60 models convection-cooled

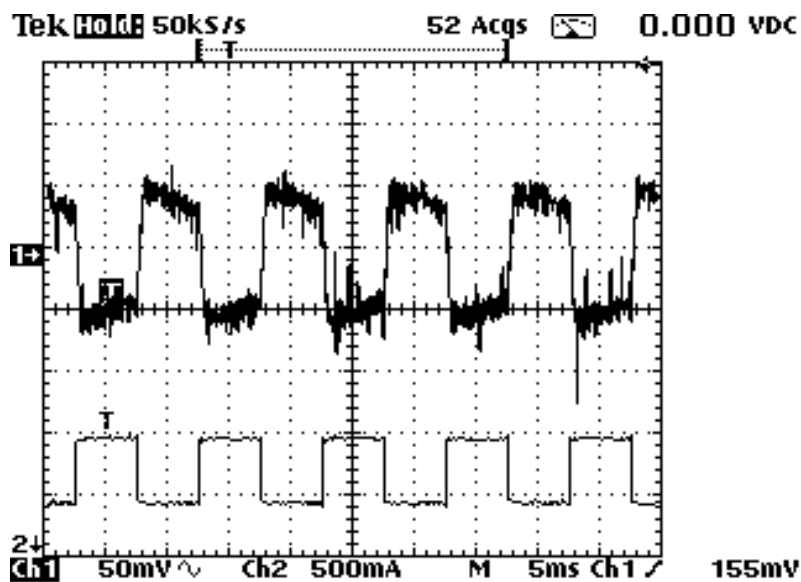


Note: Derate by 10% if cover is fitted

All ECM60 models with 5 CFM

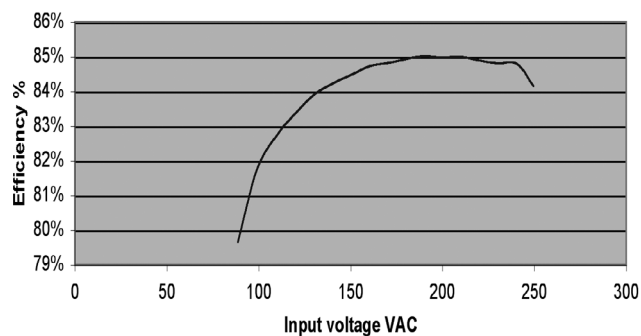


## Transient Response

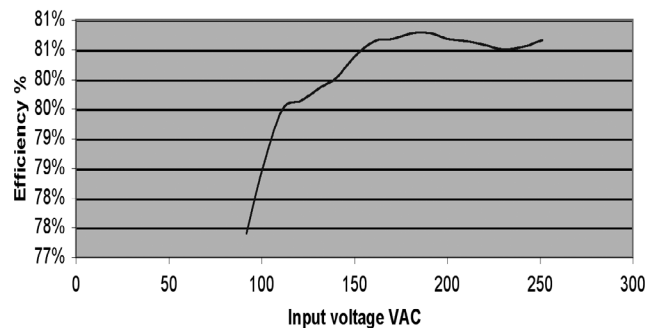


ECM60US24 25% load change

## Efficiency Versus Input Voltage

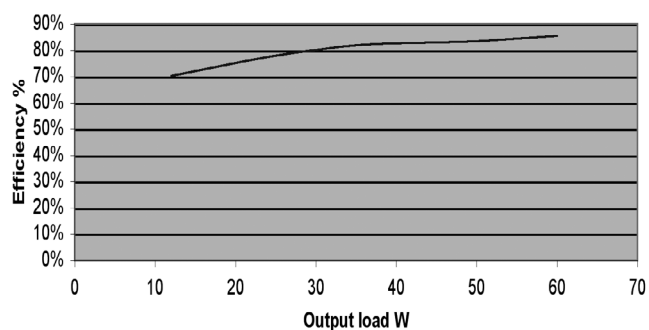


ECM60US24 with 60 W load

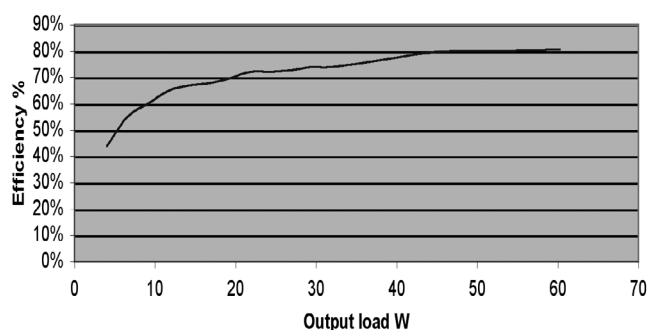


ECM60UT33 with 50 W load

## Efficiency Versus Output Load

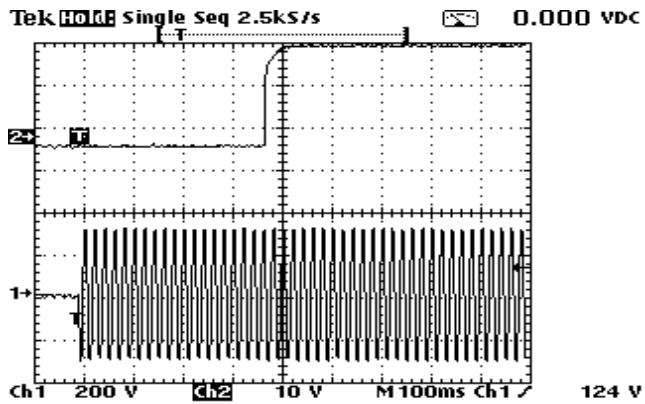


ECM60US24 at 230 VAC input

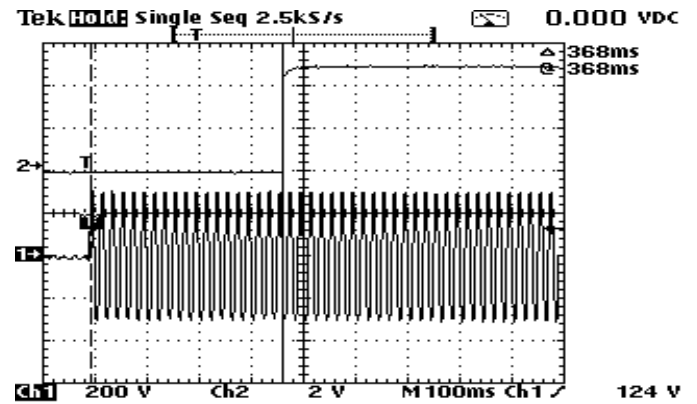


ECM60UT33 at 230 VAC input

## Start Up Delay

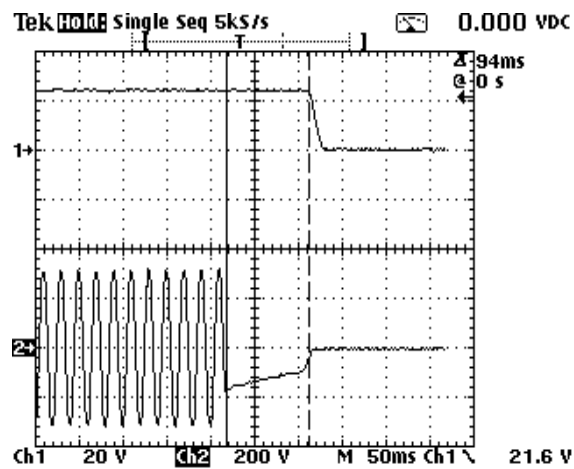


ECM60US24 with 60 W load



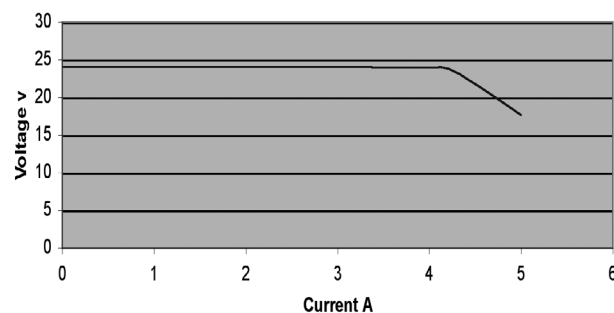
ECM60UT33 with 60 W load

## Hold Up Time



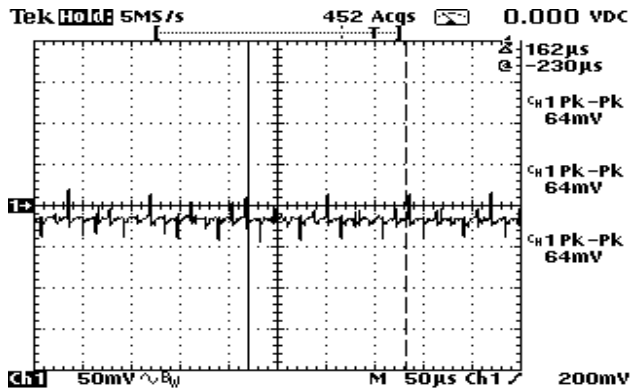
ECM60US24 with 60 W load at 230 VAC

## Overload Characteristics

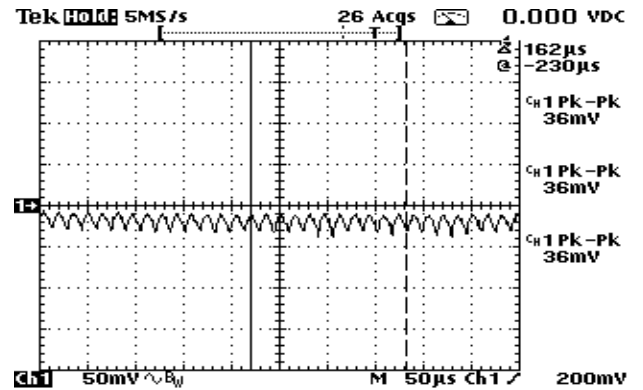


ECM60US24. When current reaches 5.4 A, output goes into trip and restart (hiccup) mode

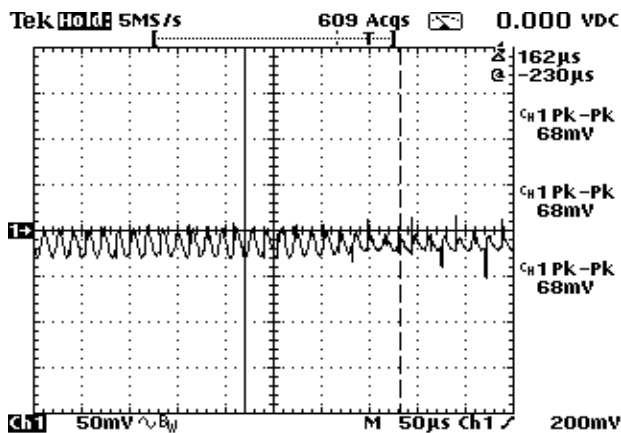
## Ripple & Noise



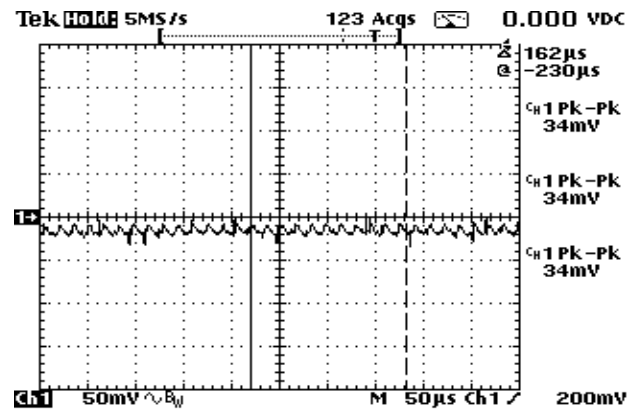
ECM60US24 with 60 W load  
 Noise measured is 64 mV pk-pk



ECM60UT33 output 1 with 30 W load.  
 Noise measured is 36 mV pk-pk

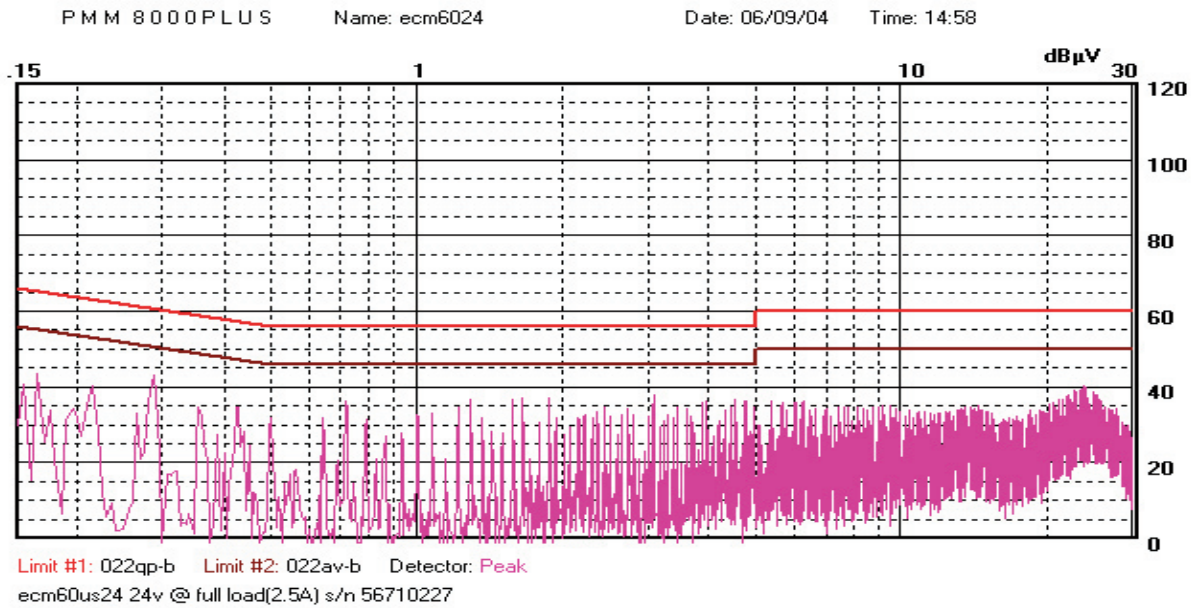


ECM60UT33 output 2 with 15 W load.  
 Noise measured is 68 mV pk-pk

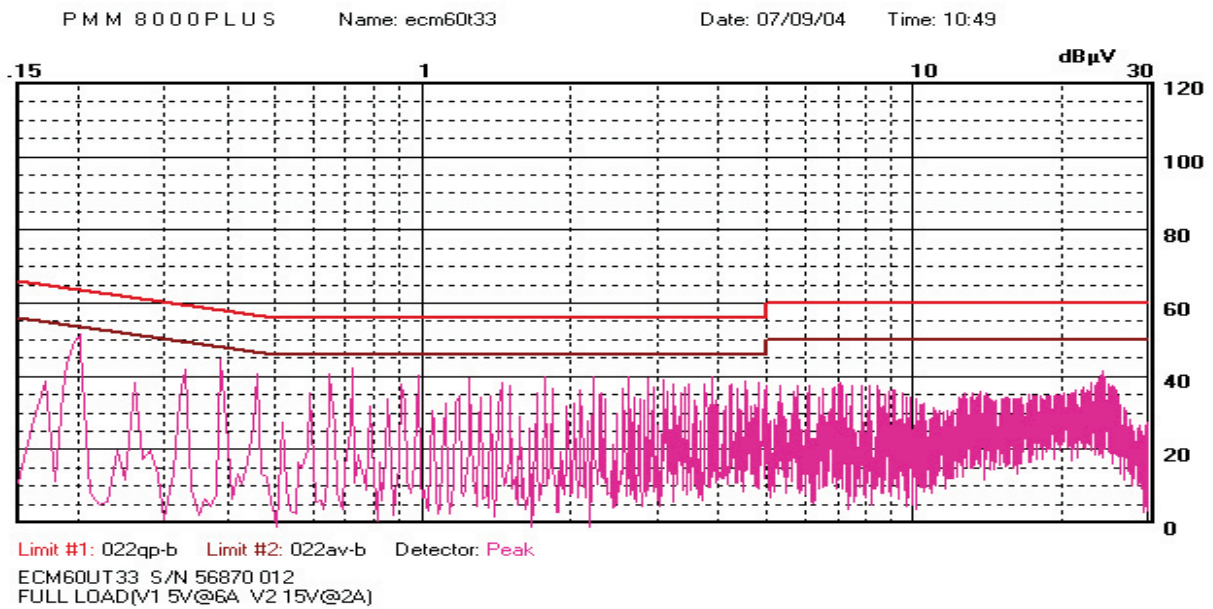


ECM60UT33 output 3 with 7 W load.  
 Noise measured is 34 mV pk-pk

## Conducted Noise



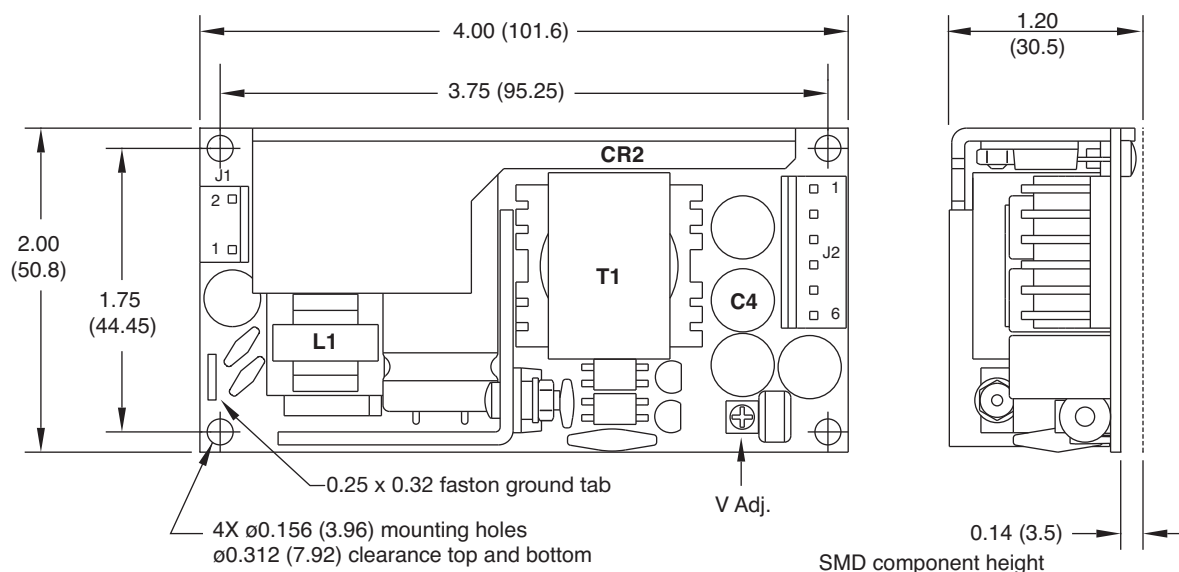
ECM60US24 at full load



ECM60UT33 at full load

## Mechanical Details - Single Output Models

Weight: approx. 0.33 lb (150g)



| Input Connector J1 |         |
|--------------------|---------|
| Pin 1              | Line    |
| Pin 2              | Neutral |

J1 mates with Molex housing 43061-0003 and Molex series 5194 crimp terminals. Ground (0.25 faston) tab standard.

| Output Connector J2 |        |
|---------------------|--------|
| Pin                 | Single |
| 1                   | +V1    |
| 2                   | +V1    |
| 3                   | RTN    |
| 4                   | RTN    |
| 5                   | N.C.   |
| 6                   | N.C.   |

J2 mates with Molex housing 43061-0006 & Molex series 5194 crimp terminals.

### Notes

- All dimensions in inches (mm). Tolerance .xx =  $\pm 0.02$  (0.50); .xxx =  $\pm 0.01$  (0.25)
- Cable harnesses with 300mm wire available.  
For single output models, order part number ECM40/60S LOOM.  
For multi-output models, order part number ECM40/60DT LOOM.
- Mating connector kit available. Order part number ECM40/60 CONKIT.
- Covers available. Order part number ECM40/60 COVER. Cover dimensions are 4.49 x 2.52 x 1.52 (114 x 64 x 38.5)

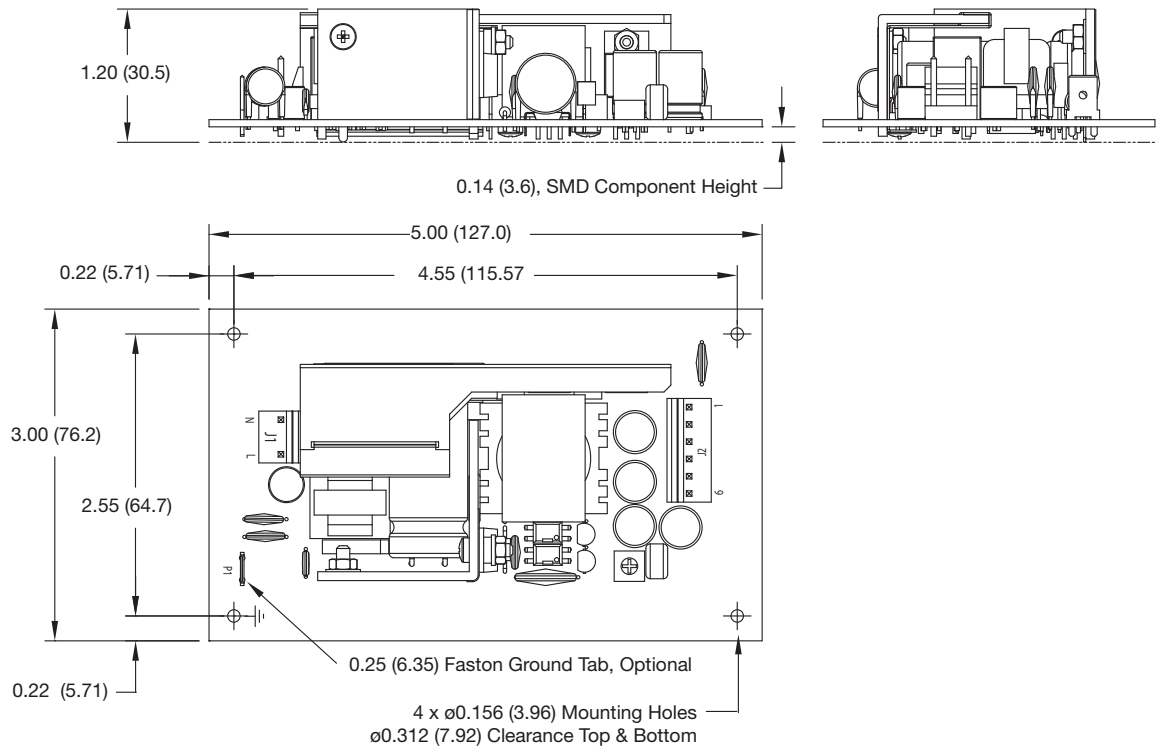
## Thermal Considerations

To ensure correct and safe operation of the PSU, the temperature of the components listed in the table below must not be exceeded. See mechanical details for component locations.

| Component | Maximum Temperature |
|-----------|---------------------|
| L1        | 110 °C              |
| T1        | 110 °C              |
| CR2       | 120 °C              |
| C4        | 95 °C               |

## Mechanical Details - Single Output Models (3 x 5)

Weight: approx. 0.4 lb (180 g)



| Input Connector J1 |         |
|--------------------|---------|
| Pin 1              | Line    |
| Pin 2              | Neutral |

J1 mates with Molex housing 43061-0003 and Molex series 5194 crimp terminals. Ground (0.25 faston) tab standard.

| Output Connector J2 |        |
|---------------------|--------|
| Pin                 | Single |
| 1                   | +V1    |
| 2                   | +V1    |
| 3                   | RTN    |
| 4                   | RTN    |
| 5                   | N.C.   |
| 6                   | N.C.   |

J2 mates with Molex housing 43061-0006 & Molex series 5194 crimp terminals.

### Notes

- All dimensions in inches (mm). Tolerance .xx =  $\pm 0.02$  (0.50); .xxx =  $\pm 0.01$  (0.25)
- Cable harnesses with 300mm wire available.  
For single output models, order part number ECM40/60S LOOM.  
For multi-output models, order part number ECM40/60DT LOOM .
- Mating connector kit available. Order part number ECM40/60 CONKIT.
- Covers available. Order part number ECM40/60 COVER. Cover dimensions are 4.49 x 2.52 x 1.52 (114 x 64 x 38.5)

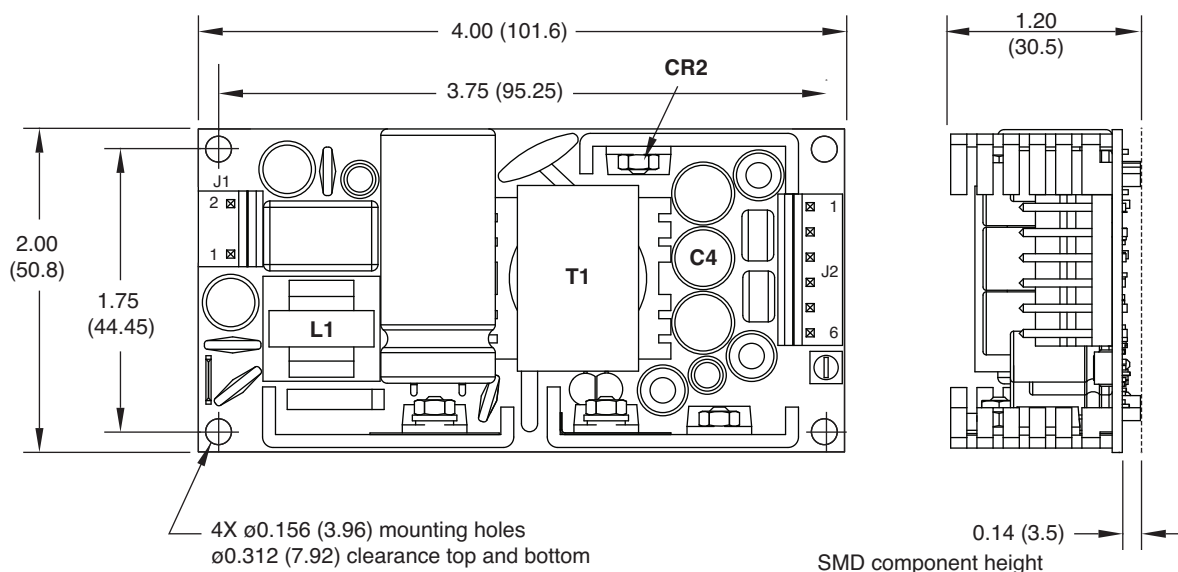
## Thermal Considerations

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| Component | Maximum Temperature |
|-----------|---------------------|
| L1        | 110 °C              |
| T1        | 110 °C              |
| CR2       | 120 °C              |
| C4        | 95 °C               |

## Mechanical Details - Multi Output Models

Weight: approx. 0.33 lb (150g)



| Input Connector J1 |         |
|--------------------|---------|
| Pin 1              | Line    |
| Pin 2              | Neutral |

J1 mates with Molex housing 43061-0003 and Molex series 5194 crimp terminals. Ground (0.25 faston) tab standard.

| Output Connector J2 |        |
|---------------------|--------|
| Pin                 | Single |
| 1                   | +V1    |
| 2                   | +V1    |
| 3                   | RTN    |
| 4                   | RTN    |
| 5                   | -V3    |
| 6                   | +V2    |

J2 mates with Molex housing 43061-0006 & Molex series 5194 crimp terminals.

### Notes

- All dimensions in inches (mm). Tolerance .xx =  $\pm 0.02$  (0.50); .xxx =  $\pm 0.01$  (0.25)
- Cable harnesses with 300mm wire available.  
For single output models, order part number ECM40/60S LOOM.  
For multi-output models, order part number ECM40/60DT LOOM.
- Mating connector kit available. Order part number ECM40/60 CONKIT.
- Covers available. Order part number ECM40/60 COVER. Cover dimensions are 4.49 x 2.52 x 1.52 (114 x 64 x 38.5)

## Thermal Considerations

To ensure correct and safe operation of the PSU, the temperature of the components listed in the table below must not be exceeded. See mechanical details for component locations.

| Component | Maximum Temperature |
|-----------|---------------------|
| L1        | 110 °C              |
| T1        | 110 °C              |
| CR2       | 120 °C              |
| C4        | 95 °C               |