

## 5W CONVECTION COOLED

The VCE05 is a series of open frame and encapsulated AC-DC single output power supplies designed for low cost ITE and Industrial applications. The series provides two mechanical options including open frame and encapsulated PCB mount. With approvals to world-wide safety standards, compliance with class B for conducted and radiated emissions and a 130%, 30s peak load capability, these class II isolation parts benefit system designers with easy integration into a wide range of applications.

### Features

- Compact size
- Single outputs from 3.3 to 48VDC
- Open frame & encapsulated PCB mount
- <0.3W no load input power
- Peak load capability
- No external components required
- Class II
- Low cost
- 3 year warranty

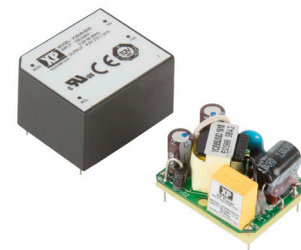
### Models & Ratings

| Model Number <sup>(1)</sup> | Output Voltage | Output Current |                     | Output Power |
|-----------------------------|----------------|----------------|---------------------|--------------|
|                             |                | Nominal        | Peak <sup>(1)</sup> |              |
| VCE05US03                   | 3.3VDC         | 1210mA         | 1573mA              | 5W           |
| VCE05US05                   | 5.0VDC         | 1000mA         | 1300mA              | 5W           |
| VCE05US09                   | 9.0VDC         | 550mA          | 722mA               | 5W           |
| VCE05US12                   | 12.0VDC        | 410mA          | 541mA               | 5W           |
| VCE05US15                   | 15.0VDC        | 330mA          | 433mA               | 5W           |
| VCE05US24                   | 24.0VDC        | 210mA          | 270mA               | 5W           |
| VCE05US48                   | 48.0VDC        | 100mA          | 135mA               | 5W           |

#### Notes:

1. Peak load lasting <30s with a maximum duty cycle of 10%, average output power not to exceed nominal.
2. For Open Frame version add suffix -P to model number, e.g. VCE05US12-P.

### AC-DC POWER SUPPLIES



### Applications



Industrial Electronics



Instrumentation



IoT



Security



Technology

### Dimensions

#### VCE05:

33.02 x 27.94 x 19.05mm (1.30 x 1.10 x 0.75")

#### VCE05-P:

30.8 x 25.4 x 17.9mm (1.20 x 1.00 x 0.705")

## Input

| Characteristic            | Minimum                                     | Typical   | Maximum | Units | Notes & Conditions             |
|---------------------------|---------------------------------------------|-----------|---------|-------|--------------------------------|
| Input Voltage Range       | 85                                          |           | 264     | VAC   |                                |
| Input Frequency           | 47                                          |           | 63      | Hz    |                                |
| Input Current - Full Load |                                             | 0.10/0.06 |         | A rms | At 115/230VAC                  |
| No Load Input Power       |                                             |           | 0.3     | W     |                                |
| Inrush Current            |                                             |           | 40      | A     | At 230/277VAC, cold start 25°C |
| Earth Leakage Current     |                                             |           |         |       | Class II construction no earth |
| Input Protection          | Internal T1.0 A/250 VAC fuse fitted in line |           |         |       |                                |

## Output

| Characteristic           | Minimum | Typical | Maximum | Units    | Notes & Conditions                                                     |
|--------------------------|---------|---------|---------|----------|------------------------------------------------------------------------|
| Output Voltage           | 3.3     |         | 48      | VDC      |                                                                        |
| Initial Set Accuracy     |         |         | 3/2     | %        | At 50% load for 3.3 & 5V models/Other models                           |
| Minimum Load             | 0       |         |         | A        | No minimum load required                                               |
| Line Regulation          |         |         | ±1.0    | %        |                                                                        |
| Load Regulation          |         |         | 3/2     |          | 3% for 03 & 05 models, 2% for others from 10% to 100% load             |
| Start Up Delay           |         |         | 2       | s        |                                                                        |
| Start Up Rise Time       |         |         | 14      | ms       |                                                                        |
| Hold Up Time             | 6       | 9       |         | ms       | At full load and 115VAC                                                |
| Transient Response       |         |         | 4       | %        | Deviation, recovery within 1% in less than 500µs for a 25% load change |
| Ripple & Noise           |         |         | 180     | mV pk-pk | 3.3-5V, 20MHz bandwidth                                                |
|                          |         |         | 1       | % pk-pk  | 9V to 48V models, 20MHz bandwidth                                      |
| Overvoltage Protection   | 115     |         | 140     | % Vnom   | Recycle input to reset                                                 |
| Overload Protection      | 110     |         | 180     | %        |                                                                        |
| Short Circuit Protection |         |         |         |          | Trip & Restart (hiccup mode)                                           |
| Temperature Coefficient  |         |         | 0.05    | %/°C     |                                                                        |

## General

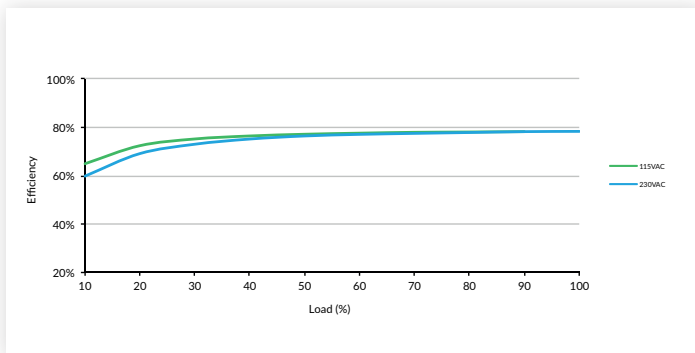
| Characteristic             | Minimum | Typical    | Maximum | Units             | Notes & Conditions       |
|----------------------------|---------|------------|---------|-------------------|--------------------------|
| Efficiency                 |         | 78         |         | %                 | Model dependent          |
| Isolation: Input to Output | 3000    |            |         | VAC               |                          |
| Switching Frequency        |         | 40         |         | kHz               |                          |
| Power Density              |         |            | 14.98   | W/cm <sup>3</sup> | For '-P' version         |
| Mean Time Between Failure  |         | >400       |         | khls              | MIL-HDBK-217F, +25°C GB  |
| Weight                     |         | 14 (0.03)  |         | g (lb)            | Open frame versions (-P) |
|                            |         | 24 (0.053) |         |                   | Encapsulated version     |

## Environmental

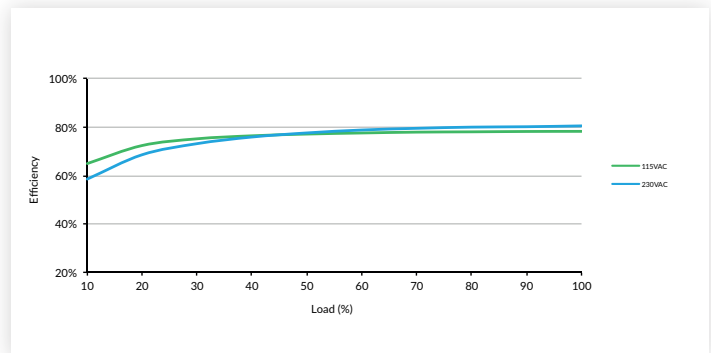
| Characteristic        | Minimum                                                         | Typical | Maximum | Units | Notes & Conditions                                 |
|-----------------------|-----------------------------------------------------------------|---------|---------|-------|----------------------------------------------------|
| Operating Temperature | -25                                                             |         | +70     | °C    | Derate linearly from 100% at +50°C to 50% at +70°C |
| Storage Temperature   | -40                                                             |         | +85     | °C    |                                                    |
| Cooling               | Convection-cooled                                               |         |         |       |                                                    |
| Humidity              |                                                                 |         | 95      | %RH   | Non-condensing                                     |
| Operating Altitude    |                                                                 |         | 3048    | m     |                                                    |
| Shock                 | IEC68-2-27, 30g, 11ms half sine, 3 times in each of 6 axes      |         |         |       |                                                    |
| Vibration             | IEC68-2-6, 2g, 10Hz to 500kHz, 10mins/cycle, 60 mins each cycle |         |         |       |                                                    |

## Efficiency Graphs

VCE05US12-P



VCE05US24-P



## Safety Approvals

| Certification | Standard                         | Notes & Conditions |
|---------------|----------------------------------|--------------------|
| CB            | IEC60950-1                       | ITE                |
|               | IEC62368-1                       |                    |
| UL            | UL62368-1                        | ITE                |
| TUV           | EN62368-1                        |                    |
| CE            | Meets all applicable directives  |                    |
| UKCA          | Meets all applicable legislation |                    |

## EMC: Emissions

| Phenomenon       | Standard    | Test Level | Notes & Conditions                                                                                        |
|------------------|-------------|------------|-----------------------------------------------------------------------------------------------------------|
| Conducted        | EN55032     | Class B    | If output is connected to a ground additional external components will be required. See application notes |
| Radiated         | EN55032     | Class B    |                                                                                                           |
| Harmonic Current | EN61000-3-2 | Class A    |                                                                                                           |
| Voltage Flicker  | EN61000-3-3 |            |                                                                                                           |

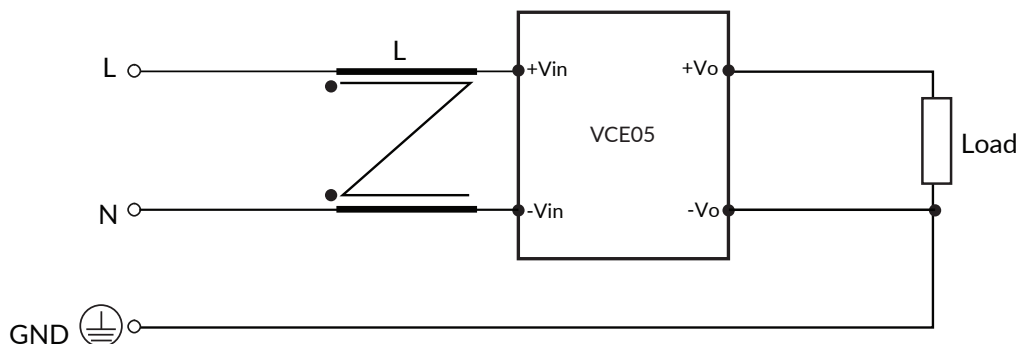
## EMC: Immunity

| Phenomenon             | Standard                 | Test Level                                                  | Criteria | Notes & Conditions            |
|------------------------|--------------------------|-------------------------------------------------------------|----------|-------------------------------|
| ESD Immunity           | EN61000-4-2              | $\pm 6\text{kV}$ contact,<br>$\pm 8\text{kV}$ air discharge | A        |                               |
| Radiated Immunity      | EN61000-4-3              | 10 V/m                                                      | A        |                               |
| EFT/Burst              | EN61000-4-4              | 3                                                           | A        |                               |
| Surge                  | EN61000-4-5              | 2                                                           | A        | Line to line                  |
| Conducted              | EN61000-4-6              | 10Vrms                                                      | A        |                               |
| Magnetic Fields        | EN61000-4-8              | 30A/m                                                       | A        |                               |
| Dips and Interruptions | EN61000-4-11<br>(115VAC) | 70% $U_T$ (80.5VAC) for 100ms                               | A        | A at High Line, B at Low Line |
|                        |                          | 40% $U_T$ (46VAC) for 200ms                                 | B        |                               |
|                        |                          | <5% $U_T$ (0VAC) for 10ms                                   | A        |                               |
|                        |                          | <5% $U_T$ (0VAC) for 5000ms                                 | B        |                               |
|                        | EN61000-4-11<br>(230VAC) | 70% $U_T$ (161VAC) for 100ms                                | A        | A at High Line, B at Low Line |
|                        |                          | 40% $U_T$ (92VAC) for 200ms                                 | A        |                               |
|                        |                          | <5% $U_T$ (0VAC) for 10ms                                   | A        |                               |
|                        |                          | <5% $U_T$ (0VAC) for 5000ms                                 | B        |                               |

## Applications Notes

## EMC with output grounded

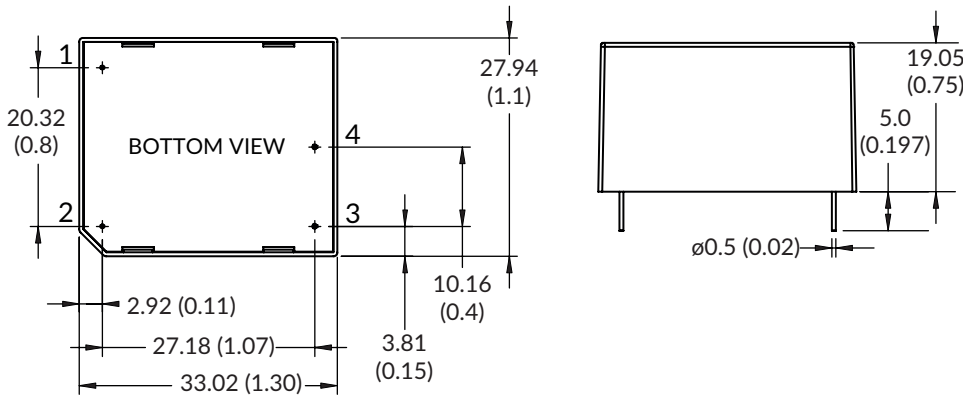
This product is designed for class II operation, but if there is a requirement to connect the output to ground then the common mode choke shown in the diagram can be added to improve emissions.



Suggested value - L: 15mH, 500mA common mode choke such as Würth Elektronik 7446620015.

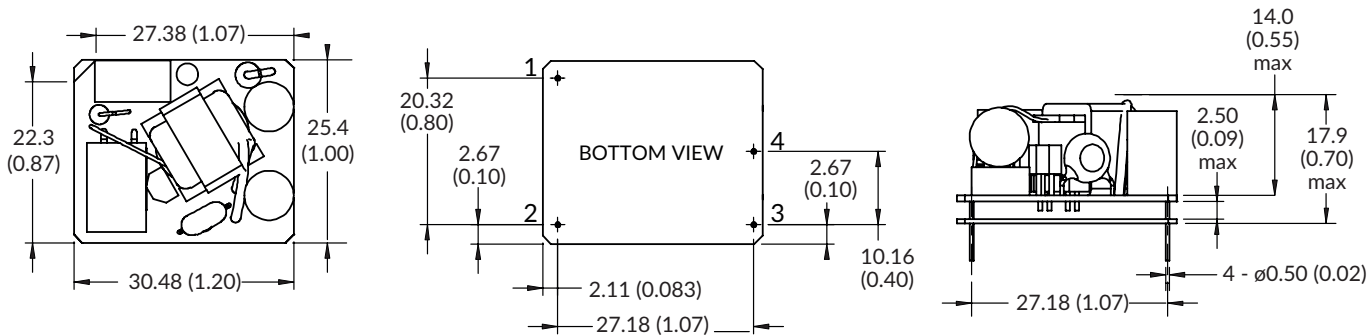
Mechanical Details

Encapsulated



| Pin Connections |        |
|-----------------|--------|
| Pin             | Single |
| 1               | ACL    |
| 2               | ACN    |
| 3               | -Vout  |
| 4               | +Vout  |

Open Frame (-P)



Notes:

1. Dimensions in mm (inches).
2. Weight: Open frame versions (-P): 14g (0.03lbs)  
Encapsulated: 24g (0.053lbs)
3. Tolerances: x.xx (x.x) = ±0.5 (±0.02). x.xxx (x.xx) = ±0.25 (±0.01)