

20W CONVECTION COOLED

AC-DC POWER SUPPLIES

The VCE20 is a series of open frame and encapsulated AC-DC single output power supplies designed for low cost ITE, industrial and domestic applications. The series provides two mechanical options including open frame and encapsulated PCB mount. With approvals to world-wide safety standards including ITE and Household, compliance with class B for conducted and radiated emissions, these class II isolation parts benefit system designers with easy integration into a wide range of applications.



Features

- 85 to 305VAC Input
- Single Outputs from 3.3 to 48VDC
- PCB Mount
- Encapsulated & Open Frame
- ITE & Household Appliance Approvals
- EN55035 Immunity Standard
- Class II
- Low Cost
- 3 Year Warranty

Applications



Household Appliances



Industrial Electronics



Instrumentation



IoT



Security



Technology

Dimensions

VCE20:

2.60 x 1.30 x 0.92" (66.0 x 33.0 x 23.4 mm)

VCE20-P:

2.50 x 1.20 x 0.86" (63.5 x 30.5 x 21.8 mm)

Models & Ratings

| Model Number | Output Voltage | Output Current | Output Power |
|--------------------------|----------------|----------------|--------------|
| VCE20US03 | 3.3VDC | 4.55A | 15W |
| VCE20US05 | 5.0VDC | 4.00A | 20W |
| VCE20US09 ⁽¹⁾ | 9.0VDC | 2.22A | 20W |
| VCE20US12 ⁽¹⁾ | 12.0VDC | 1.67A | 20W |
| VCE20US15 ⁽¹⁾ | 15.0VDC | 1.33A | 20W |
| VCE20US24 ⁽¹⁾ | 24.0VDC | 0.83A | 20W |
| VCE20US48 ⁽¹⁾ | 48.0VDC | 0.42A | 20W |

Notes:

1. For Open Frame version add suffix -P to model number, e.g. VCE20US12-P.

Summary

| Characteristic | Minimum | Typical | Maximum | Units | Notes & Conditions | |
|-----------------------|--|---------|---------|-------|---|---|
| Input Voltage Range | 85 | | 305 | VAC | Derate from 100% at 90VAC to 90% at 85VAC | |
| No Load Input Power | | | 0.3 | W | | |
| Efficiency | | 85 | | % | Model dependent | |
| Operating Temperature | -25 | | +70 | °C | 3V3 & 5V models | Derate output linearly from 100% at +45°C to 45% at +70°C |
| | | | | | Other models | Derate output linearly from 100% at 50°C to 50% at 70°C |
| EMC | EN55032 Level B Conducted & Radiated, EN601000-3-2, EN61000-3-3, EN55035 | | | | | |
| Safety Approvals | IEC62368-1, IEC60335-1, IEC60950-1, EN62368-1, EN60335-1, UL62368-1 | | | | | |

Input

| Characteristic | Minimum | Typical | Maximum | Units | Notes & Conditions |
|---------------------------|---|-----------|---------|-------|---|
| Input Voltage Range | 85 | | 305 | VAC | Derate from 100% at 90VAC to 90% at 85VAC |
| Input Frequency | 47 | | 63 | Hz | |
| Input Current - Full Load | | 0.35/0.22 | | A rms | At 115/230VAC |
| No Load Input Power | | | 0.3 | W | |
| Inrush Current | | | 40 | A | At 230VAC, cold start 25°C |
| Earth Leakage Current | | | | | Class II construction no earth |
| Input Protection | Internal T1.0 A/300 VAC fuse fitted in line | | | | |

Output

| Characteristic | Minimum | Typical | Maximum | Units | Notes & Conditions |
|--------------------------|---------|---------|---------|----------|--|
| Output Voltage | 3.3 | | 48 | VDC | |
| Initial Set Accuracy | | | 1.5/1.0 | % | 1.5% for 3V3 & 5V models, 1% for others at 50% load |
| Minimum Load | 0 | | | A | No minimum load required |
| Line Regulation | | | 1 | % | |
| Load Regulation | | | 1 | | |
| Start Up Delay | | | 2 | s | |
| Start Up Rise Time | | | 35 | ms | |
| Hold Up Time | 8 | 14 | | ms | At full load and 115VAC |
| Transient Response | | | 4 | % | Deviation, recovery within 1% in less than 500µs for a 25% load change |
| Ripple & Noise | | | 100 | mV pk-pk | 3.3-5V models, 20 MHz bandwidth |
| | | | 1 | % pk-pk | 9V to 48V models, 20 MHz bandwidth |
| Overvoltage Protection | 115 | | 140 | % Vnom | 210% typical for 3V3 model, auto recovery |
| Overload Protection | 110 | | 190 | % | |
| Short Circuit Protection | | | | | Trip & Restart (hiccup mode) |
| Temperature Coefficient | | | 0.05 | %/°C | |

General

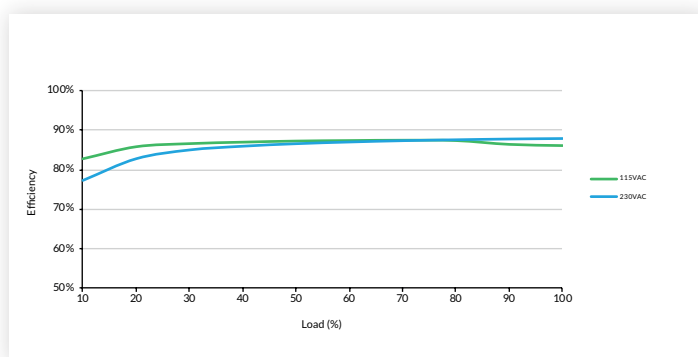
| Characteristic | Minimum | Typical | Maximum | Units | Notes & Conditions |
|----------------------------|---------|------------|---------|-------------------|--------------------------|
| Efficiency | | 85 | | % | Model dependent |
| Isolation: Input to Output | 3000 | | | VAC | |
| Switching Frequency | 5 | | 65 | kHz | Varied load |
| Power Density | | | 7.7 | W/in ³ | For '-P' version |
| Mean Time Between Failure | 550 | 600 | | khrs | MIL-HDBK-217F, +25°C GB |
| Weight | | 0.088 (40) | | lb (g) | Open frame versions (-P) |
| | | 0.198 (90) | | | Encapsulated version |

Environmental

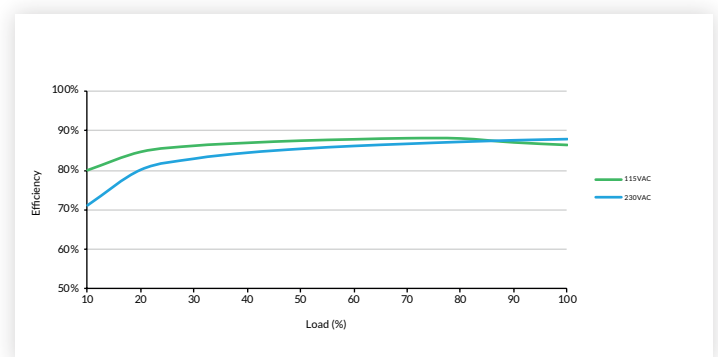
| Characteristic | Minimum | Typical | Maximum | Units | Notes & Conditions |
|-----------------------|--|---------|---------|-------|---|
| Operating Temperature | -25 | | +70 | °C | 3V3 & 5V models: derate output linearly from 100% at +45°C to 45% at +70°C. Other models: derate output linearly from 100% at 50 °C to 50% at 70°C. |
| Storage Temperature | -40 | | +85 | °C | |
| Cooling | Convection-cooled | | | | |
| Humidity | | | 95 | %RH | Non-condensing |
| Operating Altitude | | | 5000 | m | |
| Shock | IEC68-2-27, 30g, 11ms half sine, 3 times in each of 6 axes | | | | |
| Vibration | IEC68-2-6, 2g, 10Hz to 500kHz, 10 mins/cycle, 60 mins each cycle | | | | |

Efficiency Graphs

VCE20US12-P



VCE20US24-P



Safety Approvals

| Certification | Standard | Notes & Conditions |
|---------------|----------------------------------|-----------------------------|
| CB | IEC60950-1 | ITE |
| | IEC62368-1 | |
| IEC | IEC60335-1 | Household, informative only |
| 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 | | |

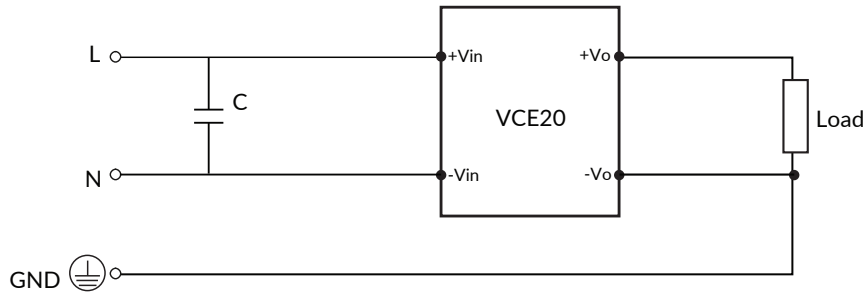
EMC: Immunity

| Phenomenon | Standard | Test Level | Criteria | Notes & Conditions |
|------------------------|--------------------------|-------------------------------------|----------|--------------------|
| ITE | EN55035 | As below | | As below |
| ESD Immunity | EN61000-4-2 | ±6kV contact, ±8kV 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 (115VAC) | 70% U_T (80.5VAC) for 100ms | A | |
| | | 40% U_T (46VAC) for 200ms | B | |
| | | <5% U_T (0VAC) for 10ms | A | |
| | | <5% U_T (0VAC) for 5000ms | B | |
| | EN61000-4-11 (230VAC) | 70% U_T (161VAC) for 100 ms | A | |
| | | 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

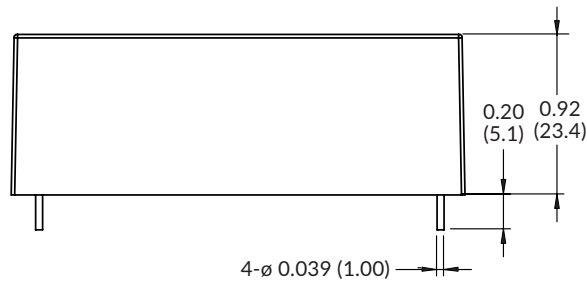
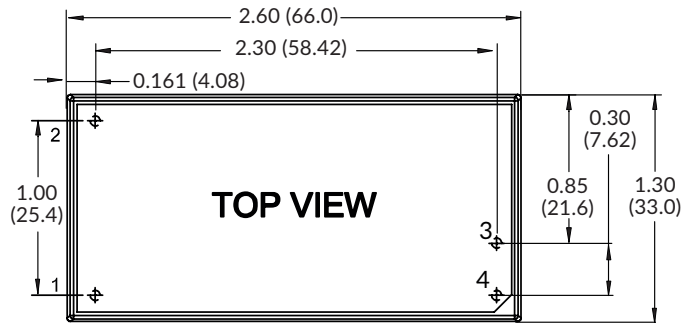
This product is designed for class II operation, but if there is a requirement to connect the output to ground then an X-capacitor as shown in the diagram can be added to improve emissions.



Suggested value - C: X2 cap, 0.4 μ F/310V, 10%, metallised polypropylene film.

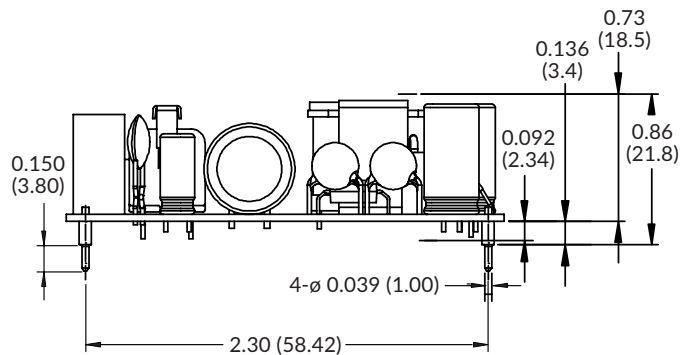
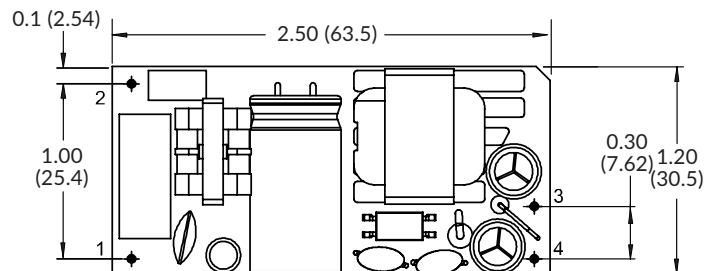
Mechanical Details

Encapsulated



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

Open Frame (-P)



Notes:

1. Dimensions in inches (mm).
2. Weight: Open frame versions (-P): 0.088 lbs (40 g) Encapsulated: 0.198 lbs (90 g)
3. Tolerances: x.xx = ± 0.02 (x.x = ± 0.5) x.xxx = ± 0.01 (x.xx = ± 0.25)