

VCCS300 Series

USER MANUAL

Single Output Conduction Cooled PSU



300W | 600W | 900W

Scalable

4" x 2" x 1.61"

Small

Fan-less

Silent



Fan-less conduction cooled 300W scalable power

The VCCS300 series user manual has been prepared by our design team to assist qualified engineers in correctly designing in the VCCS300 product into their application to achieve the best reliability and performance possible.

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VCCS300 Series Overview

The VCCS300 series of conduction cooled power supplies deliver a silent 300 Watts of power in a miniature 4x2x1.61 inch package and is the ultimate power solution for industrial or medical applications where a high efficiency, ruggedized, noiseless and BF rated power solution with Class I or II installation capability is required. The product series offers power densities exceeding 23W per cubic inch with efficiencies up to 95% in a scalable power architecture. The VCCS300 conduction cooled power solution can be scaled up to 600 watts, 900 watts and beyond by utilising the onboard current sharing feature. The VCCS300S is approved to the latest industrial safety standards (IEC/UL62368-1 Edition 2 & 3) while the VCCS300M is approved to the latest medical safety standards (IEC/UL60601-1 3rd Edition & IEC/UL60601-1-2 4th Edition). Both versions are approved to the latest EMC standards and feature market leading specifications and design-in application support.

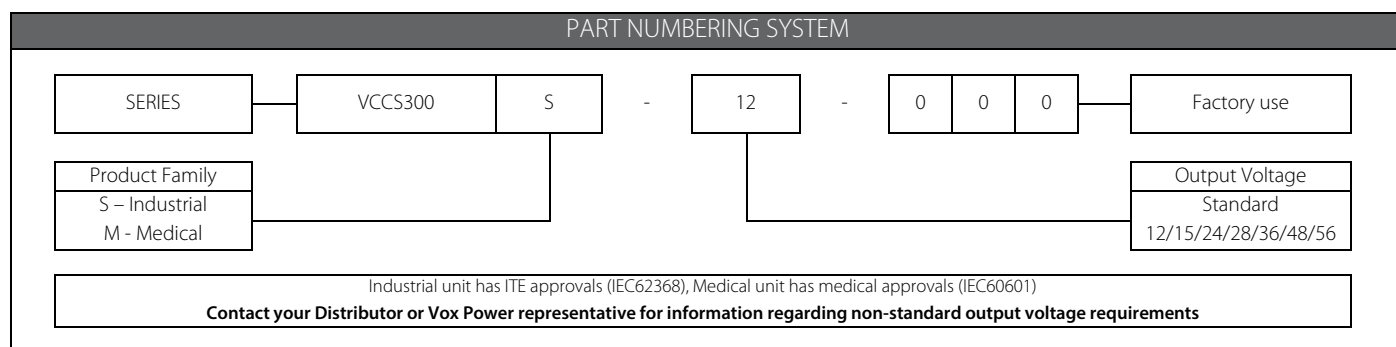


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Part Numbers and Ordering Information

SUMMARY SPECIFICATION							
Model	Nominal voltage	Rated current	Rated Power	Ripple	Load regulation	Line regulation	OVP
VCCS300X-12 ⁽¹⁾	12V	25A	300W ⁽²⁾	180mV	±50mV	±0.1%V _{NOM}	15V
VCCS300X-15 ⁽¹⁾	15V	20A	300W ⁽²⁾	150mV	±50mV	±0.1%V _{NOM}	19V
VCCS300X-24 ⁽¹⁾	24V	12.5A	300W ⁽²⁾	240mV	±50mV	±0.1% V _{NOM}	30V
VCCS300X-28 ⁽¹⁾	28V	10.71A	300W ⁽²⁾	280mV	±50mV	±0.1%V _{NOM}	35V
VCCS300X-36 ⁽¹⁾	36V	8.33A	300W ⁽²⁾	360mV	±50mV	±0.1%V _{NOM}	45V
VCCS300X-48 ⁽¹⁾	48V	6.25A	300W ⁽²⁾	480mV	±50mV	±0.1% V _{NOM}	60V
VCCS300X-56 ⁽¹⁾	56V	5.35A	300W ⁽²⁾	560mV	±50mV	±0.1% V _{NOM}	70V
1. X = S for ITE, M for Medical 2. Subject to appropriate deratings.							





Installation Notes

The instructions in this manual and all warning labels on the product must be followed carefully.



PRODUCT USE

Vox Power Ltd products are not intended for use in connection with life support systems, human implantations, nuclear facilities or systems, aircraft, spacecraft, military or naval missile, ground support or control equipment used for the purpose of guidance navigation or direction of any aircraft, spacecraft or military or naval missile or any other application where product failure could lead to loss of life or catastrophic property damage. The user will hold Vox Power Ltd harmless from any loss, cost or damage resulting from its breach of these provisions.

INSTALLATION

This power supply has been designed in accordance with the relevant safety requirements of IEC/EN/UL/CSA 62368-1, IEC/EN/UL/CSA 60950-1, IEC/EN/UL/CSA 60601-1, Low voltage Directive LVD 2014/35/EU and EMC directive EMC 2014/30/EU.

The power supply is considered a component power supply and must be installed within an end equipment by qualified personnel. The end equipment must provide a controlled environment which restricts access to any unauthorised personnel. Equipment and system manufacturers must protect operators and service personnel against unintentional contact with hazardous terminals.

HAZARDS

	Risk of electric shock This power supply contains dangerous voltages. Appropriate protections must be implemented.		Hot Surface The external surfaces of this power supply may become hot during and after use. Appropriate protections must be implemented.
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If series and/or parallel combinations of outputs exceed safe voltage and/or energy levels, the final equipment manufacturer must provide appropriate protection for both users and service personnel.

SYSTEM LABELING

A label that is clearly visible to service personnel must be placed on the final equipment, which warns that surfaces of the power supply may be hot and should not be touched when the product is operating.

Where the incoming wiring earth is intended for connection as the main protective earth conductor and where the terminals for such a connection is not supplied on a component or subassembly, the user shall add an appropriate label displaying a protective earth symbol in accordance with IEC60417-5019 (2006-08) directly adjacent to the terminal.

All labels should be durable and legible and should withstand the 15 second rub test as per UL60950-1 section 1.7.15.

FUSING

The power supply has internal dual pole fusing. One fuse in each line.

Fuses are not replaceable. Damaged units should be returned to Vox Power for analysis and repair.

DC operation is not covered by safety approvals. Contact Vox Power for details.

DE-RATINGS

Thermal	The output power must be de-rated as outlined in the "Power Ratings" section of the user manual.
Input Voltage	The input module power must be de-rated by 0.833%/V _{RMS} below 120 V _{RMS} (e.g. 300W @ 120 V _{RMS} , 225W @ 90 V _{RMS}) Note that the mains supply voltage tolerance must be included when calculating the derating. E.g. 100V nominal mains with -15% tolerance must be derated to 85V rating.

Remember to take the appropriate de-rating into consideration before specifying any power supply for an application. If in any doubt, please contact Vox Power directly or your local Vox Power representative.

SERVICING

This power supply contains no user serviceable parts. Repairs must be carried out by authorised personnel only. Contact Vox Power Ltd for further information.

COOLING

For proper operation of the power supply, the user must ensure all component temperatures are within specifications. A thorough review of the user manual should be carried out for details of thermal performance.

CLASS II INSTALLATIONS

To ensure end equipment complies with safety certifications, the user should carry out a thorough review of the safety certification reports and any engineering conditions of acceptability contained therein. A review of the "Installing your VCCS300 product" section in the user manual should also be carried out.

END OF LIFE DISPOSAL

This power supply may contain components that require special disposal. At end of life, ensure that the unit is disposed of according to local regulations.

OTHER

- To prolong the life of the unit, use in a dust free environment.
- If units are damaged during transit, contact your sales agent or Vox Power and DO NOT apply power to the unit.
- Always use adequately sized cables and ensure good crimp connections. Use cable supports to minimise stress on connectors.
- Avoid excessive shock or vibration.
- Ensure to adhere to maximum penetration depth for mounting screws. See the *Mechanical Dimensions and Mounting* section in the user manual.
- Ensure to adhere to minimum installation clearances. See the *Installing your VCCS300 product* section in the user manual.

GENERAL INSTALLATION PARAMETERS

• Equipment class	I	• Installation category	II
• Pollution degree	2	• Material group	IIIb (Indoor use only)
• Flammability rating	94V-2	• IP rating	IP10
• RoHS compliance	2011/65/EU & 2015/863/EU		



Installationshinweise

Die Anweisungen in dieser Anleitung und alle Warnhinweise auf dem Produkt sind sorgfältig zu befolgen.



PRODUKTVERWENDUNG

Produkte von Vox Power Ltd sind nicht vorgesehen für den Gebrauch in Zusammenhang mit Lebenserhaltungssystemen, menschliche Implantaten, Nuklearanlagen oder -systemen, Flugzeugen, Raumfahrzeugen, militärischen Lenkflugkörpern, boden- oder steuerungstechnischem Gerät für den Einsatz zum Zwecke der Navigation oder Lenkung von Flugzeugen, Raumfahrzeugen oder Lenkflugkörpern oder sonstigen Anwendungen, bei denen ein Produktversagen zum Tode oder zu katastrophalen Schäden führen kann. Der Anwender wird Vox Power Ltd von jeglichen Verlusten, Kosten oder Schäden schadlos halten, die auf die Verletzung dieser Bestimmungen zurückzuführen sind.

INSTALLATION

Diese Netzteil entspricht in Auslegung und Konstruktion den einschlägigen Sicherheitsanforderungen gemäß DIN EN IEC 62368-1, DIN EN IEC 60950-1, DIN EN IEC 60601-1, Niederspannungsrichtlinie 2014/35/EU und EMV-Richtlinie 2014/30/EU.

Das Netzteil wird als Einbaunetzteil betrachtet und muss daher von einer Elektrofachkraft in ein Endgerät eingebaut werden. Das Endgerät muss eine geschützte Umgebung/Umhäusung aufweisen, die den Zugang für unbefugte Personen beschränkt. Geräte- und Anlagenhersteller müssen Bedien- und Wartungspersonal vor unbeabsichtigtem Kontakt der gefährlichen Anschlüsse schützen.

GEFAHREN

	Gefahr durch elektrischen Schlag In diesem Netzteil können gefährliche Spannungen anliegen. Es sind geeignete Schutzmaßnahmen vorzusehen.		Heiße Fläche Die äußeren Flächen dieses Netzteils können beim und nach dem Gebrauch heiß werden. Es sind geeignete Schutzmaßnahmen vorzusehen.
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Überschreiten in Reihe oder parallel geschaltete Ausgangskombinationen sichere Spannungs- und/oder Energiepegel, hat der Endgerätehersteller für den angemessenen Schutz für Anwender und Wartungspersonal zu sorgen.

SYSTEMKENNZEICHNUNG

Das Endgerät ist mit einem gut für das Wartungspersonal sichtbaren Aufkleber (o. ä.) zu versehen, der davor warnt, dass die Netzteiloberflächen im Betrieb heiß sein könnten und nicht berührt werden sollten.

Ist die eingehende Erdleitung für den Anschluss als Hauptschutzleiter vorgesehen und es sind auf Baugruppen- oder Bauteilebene keine Anschlüsse für einen solchen Anschluss vorhanden, hat der Anwender in unmittelbarer Nähe des Anschlusses einen geeigneten Aufkleber mit dem Symbol Schutz Erde gemäß IEC 60417-5019 (2006-08) anzubringen.

Alle Aufkleber müssen dauerhaft und lesbar sein und die 15-Sekunden-Reibprüfung gemäß UL60950-1 Abschnitt 1.7.15 bestehen.

SICHERUNG

Das Netzteil ist mit einer doppelten internen Sicherung ausgestattet. Eine Sicherung in jedem Leiter.

Sicherungen sind nicht auswechselbar. Beschädigte Geräte sollten zwecks Diagnose und Reparatur an Vox Power zurückgesendet werden.

Der Betrieb an Gleichspannung ist nicht Bestandteil der Sicherheitszulassungen. Bei Fragen bitte an Vox Power wenden.

DERATING (Reduzierung von Maximalwerten)

Temperaturen	Die Ausgangsleistung ist gemäß Abschnitt „Power Ratings“ im Handbuch zu reduzieren.
Eingangsspannung	Die Leistung des Eingangsmoduls ist unterhalb 120 V _{eff} um 0,833 % je V _{eff} zu reduzieren (Beispiel: 300 W bei 120 V _{eff} = 225 W bei 90 V _{eff})

Berücksichtigen bei der Bemessung und Spezifikation jedes Netzteils stets ein entsprechendes Derating. Bei Fragen bitte direkt an Vox Power oder an Ihre zuständige Vertretung für Vox Power wenden.

INSTANDHALTUNG

Reparaturen sind ausschließlich durch befugte Personen durchzuführen. Bei Informationsbedarf bitte an Vox Power Ltd wenden.

KÜHLUNG

Für den ordnungsgemäßen Betrieb des Netzteils muss der Anwender gewährleisten, dass alle Bauteiltemperaturen innerhalb der angegebenen Werte/Spezifikationen bleiben. Lesen Sie sich bitte sorgfältig die Abschnitte bzw. Daten mit Bezug auf das Temperaturverhalten im Gerätehandbuch durch.

ANLAGEN SCHUTZKLASSE II

Zur Gewährleistung der Konformität des Endgerätes mit Sicherheitszertifizierungen sollte sich der Anwender mit den Berichten zur Sicherheitszertifizierung und jeglichen darin aufgeführten Bedingungen in Bezug auf die technische Abnahme (Conditions of Acceptability, COA) vertraut machen. Mit dem Kapitel zu Einbau und Anschluss (*Installing your VCCS300 Product*) im Handbuch sollte der Anwender ebenfalls vertraut sein.

ENTSORGUNG

Dieses Netzteil kann Komponenten enthalten, die gesondert entsorgt werden müssen. Bei der Entsorgung des Gerätes sind die jeweils gültigen Vorschriften zu beachten.

SONSTIGES

- Zur Optimierung der Lebensdauer sollte das Gerät in einer staubfreien Umgebung betrieben werden.
- Bei Transportschäden das GERÄT NICHT ANSCHLIESSEN ODER IN BETRIEB NEHMEN. Wenden Sie sich bitte an Ihre Handelsvertretung oder an Vox Power.
- Verwenden Sie stets Kabel mit ausreichenden Querschnitten und achten Sie auf gute Crimpanschlüsse. Verwenden Sie Kabelhalter, um die Steckverbinder möglichst wenig zu beanspruchen.
- Vermeiden Sie übermäßige Stoß- oder Schwingbeanspruchungen.
- Die maximale Eindringtiefe der Montageschrauben darf nicht überschritten werden. Siehe Abschnitt zu Abmessungen und Montage (*Mechanical Dimensions and Mounting*) im Handbuch.
- Die Mindestabstände bei der Montage sind einzuhalten. Siehe Abschnitt zu Einbau und Anschluss (*Installing your VCCS300 Product*) im Handbuch.

ALLGEMEINE INSTALLATIONSPARAMETER

• Geräteklasse	I	• Überspannungskategorie	II
• Verschmutzungsgrad	2	• Isolierstoffgruppe	IIIb (nur Innenbereich)
• Entflammbarkeit	UL 94V-2	• Schutzart	IP10
• RoHS-Konformität	2011/65/EU & 2015/863/EU		



Instrucciones de instalación

Las instrucciones de este manual y las etiquetas de advertencia del producto se deben seguir estrictamente.



USO DEL PRODUCTO

Los productos de Vox Power Ltd no están destinados a su conexión a sistemas de soporte vital, implantaciones en personas, instalaciones o sistemas nucleares, aviones, vehículos espaciales, misiles militares o navales, equipamiento de soporte o control terrestre utilizado para guiar la navegación o la dirección de aviones, vehículos espaciales o misiles militares o navales o cualquier otra aplicación en las que una avería del producto pudiera provocar la pérdida de vidas o daños catastróficos en propiedades. El usuario eximirá a Vox Power Ltd de cualquier pérdida, coste o daño resultante del incumplimiento de estas condiciones.

INSTALACIÓN

Esta fuente de alimentación se ha diseñado en conformidad con los requisitos de seguridad correspondientes de IEC/EN/UL/CSA 62368-1, IEC/EN/UL/CSA 60950-1, IEC/EN/UL/CSA 60601-1, Directiva de Baja Tensión LVD 2014/35/EU y Directiva EMC 2014/30/EU.

La fuente de alimentación se considera un componente que debe ser instalado en un equipo final por personal cualificado. El equipo final debe proporcionar un entorno controlado que limite el acceso al personal no autorizado. Los fabricantes de los equipos y los sistemas deben proteger a los operarios y al personal de mantenimiento frente al contacto accidental con terminales peligrosos.

PELIGROS

	Riesgo de descarga eléctrica Esta fuente de alimentación contiene tensiones peligrosas. Se deben aplicar las protecciones apropiadas.		Superficies calientes Las superficies externas de esta fuente de alimentación se pueden calentar durante y después de su uso. Se deben aplicar las protecciones apropiadas.
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Si las combinaciones en serie y/o paralelo de las salidas superan los niveles de tensión y/o energía de seguridad, el fabricante del equipo final debe proporcionar la protección apropiada a los usuarios y al personal de mantenimiento.

ETIQUETADO DEL SISTEMA

Se debe colocar una etiqueta sobre el equipo final de manera que sea claramente visible para el personal de mantenimiento. Esta etiqueta advertirá que las superficies de la fuente de alimentación pueden estar calientes y no se deberían tocar cuando el producto está en funcionamiento.

Cuando la entrada de la toma de tierra esté destinada a la conexión como conductor a tierra de protección principal y los terminales para esta conexión no hayan sido suministrados en un componente o subsistema, el usuario añadirá una etiqueta apropiada que indique un símbolo de toma de tierra de protección en conformidad con IEC60417-5019 (2006-08) y la colocará al lado del terminal.

Todas las etiquetas deben ser resistentes y legibles, y deben superar la prueba de rasgado durante 15 segundos de UL60950-1 sección 1.7.15.

FUSIBLES

La fuente de alimentación tiene fusibles internos de dos polos, un fusible para cada línea.

Los fusibles no son sustituibles. Las unidades averiadas se deben enviar a Vox Power para su análisis y reparación.

El funcionamiento con CC no queda cubierto por las homologaciones de seguridad. Contacte con Vox Power para más información.

REAJUSTE DE ESPECIFICACIONES

Térmicas	La potencia de salida se debe reducir según lo indicado en la sección "Valores de potencia" del manual de usuario.
Tensión de entrada	La potencia del módulo de entrada se debe reducir un 0,833%/V _{RMS} por debajo de 120 V _{RMS} (p.ej., 300W a 120 V _{RMS} , 225W a 90 V _{RMS})

Recuerde que es necesario reajustar las especificaciones antes de escoger una fuente de alimentación para una determinada aplicación. Si tiene alguna duda, contacte con Vox Power directamente o a través de un representante de la empresa.

REPARACIONES

Esta fuente de alimentación no contiene piezas reparables. Las reparaciones deben ser efectuadas únicamente por personal autorizado. Contacte con Vox Power Ltd para más información.

REFRIGERACIÓN

Para que el funcionamiento de la fuente de alimentación sea adecuado, el usuario debe asegurarse de que la refrigeración sea suficiente para mantener las temperaturas de todos los componentes dentro de sus especificaciones. Revise el manual de usuario para más información.

INSTALACIONES DE CLASE II

Para asegurar que el equipo final cumpla las certificaciones de seguridad, el usuario debería revisar detalladamente los informes de certificación de seguridad y cualquier requisito que contengan relacionados con la ingeniería. También se debería revisar la sección "Instalación de su producto VCCS300" en el manual de usuario.

ELIMINACIÓN AL FINAL DE LA VIDA ÚTIL

Esta fuente de alimentación puede contener componentes que requieren un tratamiento especial al desecharlos. Asegúrese de cumplir la normativa correspondiente cuando finalice la vida útil de la unidad.

OTROS

- Para prolongar la vida útil de la unidad utilícela en un entorno libre de polvo.
- Si las unidades sufren daños durante su traslado, contacte con su representante comercial o con Vox Power y NO alimente la unidad.
- Use siempre los cables del diámetro adecuado y compruebe que conexiones tienen el engarce correcto. Utilice soporte para el cable para minimizar el esfuerzo en los conectores.
- Evite fuertes choques o vibraciones.
- Compruebe que cumple la profundidad máxima de penetración de los tornillos de montaje. Consulte la sección *Dimensiones mecánicas y montaje* en el manual de usuario.
- Compruebe que ha dejado los márgenes mínimos en la instalación. Consulte la sección *Instalación de su producto VCCS300* en el manual de usuario.

PARÁMETROS GENERALES DE INSTALACIÓN

- | | | | |
|---------------------------|--------------------------|----------------------------|------------------------------------|
| • Clase del equipo | I | • Categoría de instalación | II |
| • Grado de contaminación | 2 | • Grupo de material | IIIb (para uso solo en interiores) |
| • Grado de inflamabilidad | 94V-2 | • Grado de IP | IP10 |
| • Conformidad con RoHS | 2011/65/EU & 2015/863/EU | | |



Remarques relatives à l'installation

Les instructions de ce manuel et les étiquettes d'avertissement présentes sur le produit doivent être respectées scrupuleusement.



UTILISATION DU PRODUIT

Les produits Vox Power Ltd ne sont pas destinés à être utilisés dans des systèmes de survie, des implants chirurgicaux, des installations ou systèmes nucléaires, des aéronefs, des engins spatiaux, des missiles militaires ou navals, des équipements de soutien au sol ou de commande utilisés à des fins de guidage, de navigation ou d'orientation d'aéronef, d'engin spatial ou de missile militaire ou naval, ni dans toute autre application dans laquelle une défaillance du produit pourrait entraîner une perte de vie humaine ou des dommages matériels catastrophiques. L'utilisateur ne saurait tenir responsable Vox Power Ltd de toute perte financière, coût ou dommage résultant du non-respect de ces termes.

INSTALLATION

Cette alimentation est conçue conformément aux exigences de sécurité applicables des normes IEC/EN/UL/CSA 62368-1, IEC/EN/UL/CSA 60950-1, IEC/EN/UL/CSA 60601-1, de la directive basse tension LVD 2014/35/EU et de la directive CEM 2014/30/EU.

L'alimentation est considérée comme un composant de puissance, et doit être installée dans l'équipement final par du personnel qualifié. L'équipement final doit fournir un environnement contrôlé qui restreint l'accès à toute personne non autorisée. Les fabricants d'équipements et de systèmes doivent protéger les opérateurs et le personnel de service contre tout contact involontaire avec les bornes présentant un danger.

DANGERS

	Risque de choc électrique Cette alimentation contient des tensions dangereuses. Des protections appropriées doivent être mises en place.		Surfaces chaudes Les surfaces externes de cette alimentation peuvent devenir très chaudes pendant et après l'utilisation. Des protections appropriées doivent être mises en place.
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Si la combinaison en série et/ou en parallèle de sorties multiples amène à dépasser les niveaux de tension et/ou d'énergie sûrs, le fabricant de l'équipement final doit fournir une protection appropriée aux utilisateurs et au personnel de maintenance.

ÉTIQUETAGE DU SYSTÈME

Une étiquette bien visible du personnel de maintenance doit être apposée sur l'équipement final, pour avertir que certaines surfaces de l'alimentation peuvent être chaudes et ne doivent pas être touchées lorsque l'équipement fonctionne.

Lorsque le conducteur de terre du câblage entrant est destiné à être connecté en tant que conducteur principal de protection et que la borne de connexion ne se trouve pas sur un composant ou un sous-ensemble, l'utilisateur doit apposer une étiquette appropriée affichant un symbole de protection conformément à la norme CEI60417-5019 (2006-08) à proximité directe de la borne.

Toutes les étiquettes doivent être durables et lisibles, et résister au test de frottement de 15 secondes conformément à la section 1.7.15 de la norme UL60950-1.

FUSIBLE DE PROTECTION

L'alimentation est dotée d'un fusible bipolaire interne. Un fusible dans chaque ligne.

Les fusibles ne sont pas remplaçables Les unités endommagées doivent être retournées à Vox Power pour analyse et réparation.

Le fonctionnement en courant continu n'est pas couvert par les homologations de sécurité. Contactez Vox Power pour plus de détails.

DÉCLASSEMENT

Thermique	La puissance de sortie doit être déclassée comme indiqué dans la section « Puissances nominales » du manuel d'utilisation.
Tension d'entrée	La puissance du module d'entrée doit être réduite de 0,833%/V _{eff} en dessous de 120 V _{eff} (Ex :300 W à 120 V _{eff} équivaut à 225 W à 90 V _{eff})

N'oubliez pas de tenir compte du déclassement approprié avant de spécifier une alimentation pour une application. En cas de doute, veuillez contacter directement Vox Power ou votre représentant local Vox Power.

MAINTENANCE

Cette alimentation ne contient aucun composant réparable par l'utilisateur. Les réparations ne doivent être effectuées que par du personnel autorisé. Contactez Vox Power Ltd pour plus d'informations.

REFROIDISSEMENT

Pour un fonctionnement correct de l'alimentation, l'utilisateur doit s'assurer que la température de tous les composants reste dans les limites des spécifications. Lire le manuel d'utilisation attentivement pour les détails de performance thermique.

INSTALLATIONS DE CLASSE II

Pour s'assurer que l'équipement final est conforme aux certifications de sécurité, l'utilisateur doit procéder à un examen approfondi des rapports de certification de sécurité et de toutes les conditions techniques de conformité qu'ils contiennent. Il convient également d'examiner la section « Installation de votre produit VCCS300 » du manuel d'utilisation.

ÉLIMINATION EN FIN DE VIE

Cette alimentation peut contenir des composants nécessitant une procédure d'élimination particulière. En fin de vie, assurez-vous que l'appareil est éliminé conformément aux réglementations locales.

AUTRE

- Pour prolonger la durée de vie de l'appareil, utilisez-le dans un environnement non-poussièreux.
- Si l'unité a été endommagée durant son transport, contactez votre représentant commercial ou Vox Power, et NE mettez PAS l'unité sous tension.
- Utilisez toujours des câbles de diamètre adéquat et assurez-vous que les connexions soient bien serties et bien serrées. Utilisez des supports de câbles pour minimiser les contraintes sur les connecteurs.
- Évitez les chocs et les vibrations excessives.
- Assurez-vous de respecter la profondeur maximale de pénétration des vis de montage. Voir la section « Dimensions mécaniques et montage » du manuel d'utilisation.
- Veillez à respecter les distances minimales d'installation. Consultez la section « Installation de votre produit VCCS300 » dans le manuel d'utilisation.

PARAMÈTRES D'INSTALLATION GÉNÉRAUX

• Classe d'équipement	I	• Catégorie d'installation	II
• Degré de pollution	2	• Groupe de matériaux	IIIb (intérieur uniquement)
• Indice d'inflammabilité	94V-2	• Indice IP	IP10
• Conformité RoHS	2011/65/EU & 2015/863/EU		



Note per l'installazione

Seguire scrupolosamente le istruzioni del presente manuale e le indicazioni di tutte le etichette di avvertenza presenti sul prodotto.



USO DEL PRODOTTO

I prodotti Vox Power Ltd non sono previsti per l'uso in relazione a sistemi di supporto delle funzioni vitali, impianti su esseri umani, impianti o centrali nucleari, aeroplani, veicoli spaziali, missili navali o per usi militari, apparecchiature di controllo o supporto di sistemi terrestri impiegati per la guida o l'orientamento di qualsiasi aerodina, missili navali oppure per usi militari o veicoli spaziali o qualunque altra applicazione in cui un guasto al prodotto potrebbe comportare la perdita di vite o danni catastrofici alle cose. L'utilizzatore manleverà e terrà indenne Vox Power Ltd da qualsiasi perdita, costo o danno risultante dalla violazione di queste disposizioni.

INSTALLAZIONE

Questo alimentatore è stato progettato in conformità ai requisiti relativi alla sicurezza specificati nelle seguenti norme e direttive: IEC/EN/UL/CSA 62368-1, IEC/EN/UL/CSA 60950-1, IEC/EN/UL/CSA 60601-1, Direttiva 2014/35/UE "bassa tensione" e Direttiva 2014/30/UE relativa alla compatibilità elettromagnetica.

L'alimentatore è considerato un componente di un'apparecchiatura finale e deve essere installato nella stessa da personale qualificato. Tale apparecchiatura deve assicurare un ambiente controllato che limiti l'accesso a personale non autorizzato. I produttori di apparecchiature e sistemi devono proteggere gli operatori e il personale di manutenzione contro il contatto non intenzionale con terminali pericolosi.

RISCHI

	Rischio di folgorazione In questo alimentatore sono presenti alte tensioni. Attuare misure di protezione appropriate.		Superfici ad alta temperatura Le superfici esterne di questo alimentatore possono raggiungere temperature elevate durante e dopo l'uso. Attuare misure di protezione appropriate.
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Se combinazioni in serie e/o in parallelo delle uscite superano livelli sicuri di tensione e/o energia, il produttore dell'apparecchiatura finale deve garantire una protezione adatta sia per gli utilizzatori che per il personale di manutenzione.

ETICHETTATURA DELL'IMPIANTO

Sull'apparecchiatura finale deve essere apposta un'etichetta, chiaramente visibile dal personale di manutenzione, avvisante che le superfici dell'alimentatore possono raggiungere temperature elevate e non devono essere toccate mentre il prodotto è in funzione.

Nel caso in cui il cavo di terra in ingresso sia concepito per la connessione come principale conduttore di protezione al potenziale di terra e i terminali per tale connessione non siano forniti su un componente o un gruppo secondario, direttamente accanto al terminale l'utilizzatore deve aggiungere un'appropriata etichetta che mostri un simbolo di terra di protezione in conformità alla norma IEC60417-5019 (2006-08).

Tutte le etichette devono essere durevoli e leggibili e devono superare la prova di strofinamento di 15 secondi a norma UL60950-1 sezione 1.7.15.

FUSIBILI

Questo alimentatore è dotato di fusibili bipolari interni, un fusibile in ciascuna linea.

I fusibili non possono essere sostituiti. Un alimentatore danneggiato deve essere restituito a Vox Power per essere analizzato e riparato.

Il funzionamento in CC non ricade nell'ambito delle approvazioni di sicurezza. Per maggiori informazioni contattare Vox Power.

DERATING

Derating in funzione della temperatura	La potenza di uscita deve ridursi come indicato nella sezione "Valori nominali della potenza" del manuale per l'uso.
Tensione d'ingresso	La potenza del modulo d'ingresso deve ridursi dello 0,833%/V _{eff} sotto 120 V _{eff} (per es., 300 W a 120 V _{eff} , 225 W a 90 V _{eff})

Prendere in considerazione l'appropriato derating prima di specificare un eventuale alimentatore per un'applicazione. In caso di dubbi, contattare direttamente Vox Power o il rappresentante locale Vox Power.

RIPARAZIONI

Questo alimentatore non contiene parti su cui l'utilizzatore possa intervenire. Eventuali riparazioni devono essere eseguite esclusivamente da personale autorizzato. Per ulteriori informazioni contattare Vox Power Ltd.

RAFFREDDAMENTO

Ai fini del corretto funzionamento dell'alimentatore, l'utilizzatore deve far sì che le temperature di tutti i componenti rimangano entro le specifiche. Leggere con attenzione il manuale per l'uso per informazioni dettagliate sulle prestazioni termiche.

INSTALLAZIONI DI CLASSE II

Affinché l'apparecchiatura finale soddisfi i requisiti delle certificazioni di sicurezza, l'utilizzatore deve rivedere con attenzione tali certificazioni ed eventuali condizioni tecniche di accettabilità riportate nelle stesse. Rivedere anche la sezione "Installazione del prodotto VCCS300" del manuale per l'uso.

SMALTIMENTO A FINE VITA

Questo alimentatore potrebbe contenere componenti che richiedono uno smaltimento speciale. Al termine della sua durata, accertarsi che venga smaltito in conformità alle norme di legge.

ALTRE INDICAZIONI

- Per prolungare la durata del dispositivo, impiegarlo in un ambiente privo di polvere.
- Se un dispositivo viene danneggiato durante il trasporto, contattare l'agente di vendita locale o Vox Power e NON accenderlo.
- Usare sempre cavi di sezione adeguata e accertarsi che le connessioni siano salde. Usare pressacavo per ridurre al minimo le sollecitazioni sui connettori.
- Evitare urti o vibrazioni di livello eccessivo.
- Accertarsi di non superare la profondità di penetrazione massima delle viti di fissaggio. Vedere la sezione *Dimensioni relative alla viteria e fissaggio* del manuale per l'uso.
- Accertarsi di rispettare gli spazi liberi minimi di installazione. Vedere la sezione *Installazione del prodotto VCCS300* del manuale per l'uso.

PARAMETRI DI INSTALLAZIONE GENERALI

- | | | | |
|--------------------------|--------------------------|---------------------------------|---------------------------------------|
| • Classe apparecchiatura | I | • Categoria di installazione | II |
| • Grado d'inquinamento | 2 | • Gruppo materiali | IIb (solo per l'uso in locali chiusi) |
| • Grado d'infiammabilità | 94V-2 | • Grado di protezione involucro | IP10 |
| • Conformità RoHS | 2011/65/EU & 2015/863/EU | | |



Informações sobre a instalação

As instruções neste manual e em todas as etiquetas de aviso afixadas no produto devem ser cuidadosamente observadas



UTILIZAÇÃO DO PRODUTO

Os produtos da Vox Power Ltd não se destinam a ser utilizados em sistemas de suporte de vida, sistemas para implantação no corpo humano, instalações ou sistemas nucleares, aeronaves, naves espaciais, mísseis militares ou navais, equipamento de suporte no solo ou de controlo para fins de guiamento de navegação ou orientação de aeronaves, naves espaciais ou mísseis militares ou navais ou quaisquer outras aplicações onde a falha do produto possa conduzir à perda de vidas ou a danos materiais catastróficos. O utilizar deve isentar a Vox Power Ltd de quaisquer perdas, custos ou danos decorrentes da violação destas disposições.

INSTALAÇÃO

Esta fonte de alimentação foi desenvolvida e construída de acordo com os requisitos de segurança relevantes das normas IEC / EN / UL / CSA 62368-1, IEC / EN / UL / CSA 60950-1, IEC / EN / UL / CSA 60601-1, Directiva de Baixa Tensão 2014/35 / EU e Directiva de Compatibilidade Electromagnética 2014/30 / EU.

A fonte de alimentação é considerada um componente de alimentação e deve ser instalada no equipamento final por pessoal qualificado. O equipamento final deve assegurar um ambiente controlado que restrinja o seu acesso a pessoal não autorizado. Os fabricantes dos equipamentos e sistemas devem proteger os operadores e o pessoal de manutenção contra os contactos não intencionais com terminais perigosos.

RISCOS

	Risco de choque eléctrico Esta fonte de alimentação contém correntes eléctricas perigosas. Por isso, devem ser utilizadas protecções apropriadas.		Superfície quente As superfícies exteriores desta fonte de alimentação podem ficar quentes durante e após a sua utilização. Por isso, devem ser utilizadas protecções apropriadas.
--	--	--	---

Se as montagens em série e/ou paralelo das saídas excederem os níveis de tensão e/ou energia de segurança, o fabricante do equipamento final deve fornecer protecção adequada para os utilizadores e técnicos de manutenção.

ETIQUETAS AFIXADAS

Deve ser afixado no equipamento final uma etiqueta claramente visível para o pessoal de manutenção, avisando que as superfícies da fonte de alimentação podem estar quentes e não devem ser tocadas quando o produto estiver em funcionamento.

Quando o condutor de terra de entrada se destinar a ser a ligação principal da terra de protecção e se os terminais para tal conexão não forem fornecidos como componente ou subconjunto único, o utilizador deve afixar uma etiqueta adicional directamente adjacente ao terminal com um símbolo de terra de protecção de acordo com a norma IEC60417-5019 (2006-08) .

Todas as etiquetas devem ser duráveis e legíveis e devem resistir ao ensaio de abrasão durante 15 segundos, conforme a norma UL60950-1, parágrafo 1.7.15.

FUSÍVEIS

Esta fonte de alimentação está equipada com dois fusíveis bipolares internos. Um fusível em cada condutor.

Os fusíveis não são substituíveis. Em caso de defeito ou avaria, enviar a fonte de alimentação para a Vox Power, para análise.

O funcionamento com corrente DC não está coberto pelas aprovações de segurança. Contactar a Vox Power para mais informações.

REDUÇÃO DOS VALORES NOMINAIS

Térmica	A potência de saída deve ser reduzida conforme descrito na secção "Potências Nominais" do Manual de Utilização.
Tensão de Entrada	A potência do módulo de entrada deve ser reduzida 0,833%/V _{RMS} abaixo de 120 V _{RMS} (por exemplo, 300 W a 120 V _{RMS} , 225 W a 90 V _{RMS})

Não esquecer de ter em consideração a redução apropriada, antes de especificar a fonte de alimentação para uma aplicação. Em caso de dúvida, contactar directamente com a Vox Power ou um dos seus Distribuidores.

SERVIÇO E MANUTENÇÃO

Esta fonte de alimentação não contém peças cuja manutenção possa ser feita pelo utilizador. As reparações devem ser realizadas apenas por pessoal autorizado. Para mais informações, contactar a Vox Power Ltd.

ARREFECIMENTO

Para o funcionamento adequado da fonte de alimentação, o utilizador deve assegurar um arrefecimento suficiente para manter as temperaturas de todos os componentes dentro dos parâmetros especificados. Analisar completamente o Manual de Utilização, para obter informações sobre o desempenho térmico.

INSTALAÇÕES DE CLASSE II

Para assegurar a conformidade do equipamento final com as certificações de segurança, o utilizador deve realizar uma análise completa dos relatórios de certificação de segurança e das condições técnicas de aceitabilidade neles contidas. Analisar também a secção "Instalação do equipamento VCCS300" no Manual de Utilização.

ELIMINAÇÃO FINAL DO PRODUTO

Esta fonte de alimentação pode conter componentes que exijam uma eliminação final especial. No final da sua vida útil, a fonte de alimentação deve ser eliminada de acordo com os regulamentos locais em vigor aplicáveis.

OUTRAS INSTRUÇÕES

- Para prolongar a vida útil do equipamento, utilizá-lo em ambientes sem poeiras.
- Em caso de danificação do equipamento durante o transporte, contactar o responsável pelo fornecimento ou a Vox Power e NÃO energizar o equipamento.
- Usar sempre cabos de calibre adequado e com boas ligações por cravagem. Suportar devidamente as cablagens, para minimizar as tensões nos conectores.
- Evitar choques ou vibrações excessivas.
- Respeitar a profundidade de penetração máxima dos parafusos de montagem. Consultar a secção *Dimensões e Montagem Mecânica* no Manual de Utilização.
- Respeitar as folgas de instalação mínimas. Consultar a secção *Instalação do equipamento VCCS300* no Manual de Utilização.

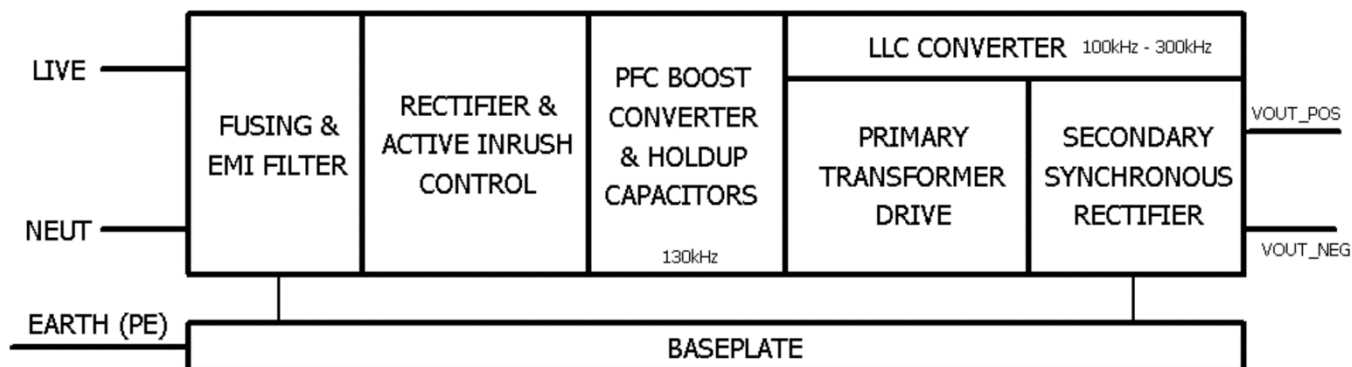
PARÂMETROS GERAIS DA INSTALAÇÃO

- | | | | |
|---|--------------------------|---------------------------|--|
| • Classe de equipamento | 1 | • Categoria da instalação | II |
| • Nível de poluição | 2 | • Grupo de materiais | IIIb (apenas para utilização interior) |
| • Classe de inflamabilidade | 94V-2 | • Classe de protecção | IP10 |
| • Certificação RoHS (materiais perigosos) | 2011/65/EU & 2015/863/EU | | |

Product Operation

System overview

The diagram below outlines the topology and major internal components of a VCCS300 power supply.



The AC mains is fused, filtered, and rectified before being boosted to an appropriate DC voltage. Protection is provided from AC line disturbances and excessive EMI emissions. The integrated EMI filter attenuates high frequency current emissions to levels below EN55032 class B. It also provides dual pole fusing, one fuse in each conductor and protection from line disturbances as outlined in EN61000.

Inrush current is controlled by a resistive element upon initial connection to the AC line. Once the internal capacitances have been charged, the resistive element is bypassed to reduce losses. Note that the inrush specification in the datasheet is given at 25°C, cold start. Inrush current will increase for temperatures above 25°C and re-application of AC mains.

Active Power Factor Correction (PFC) is used to ensure an accurate input current waveform with extremely low harmonic content, exceeding the requirements of EN61000-3-2. This stage also provides active input current limiting which prevents overloading of the input stage while maintaining high power factor.

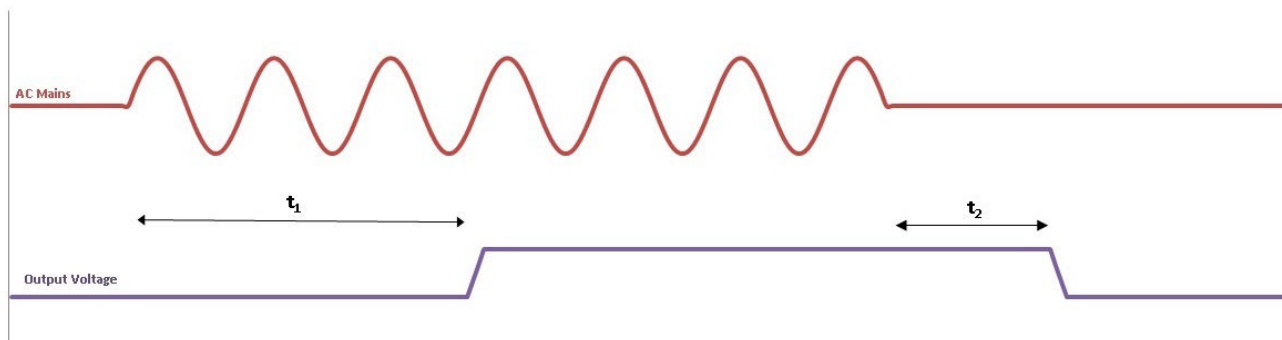
The output of the PFC stage charges the hold-up electrolytic capacitors which store enough energy to allow the VCCS300 product to continue operating during minor line disturbances. Long lifetime and high temperature capacitors are used which ensures extended lifetime and product reliability.

A highly efficient zero voltage switching circuit is used to drive the LLC transformer from the hold-up capacitors. The output synchronous rectifiers connect to the transformer secondary and provide safe isolated power. This power converter is controlled using the latest analog control technology to produce superior output performance in a miniature size.

Startup & Shut Down Timing

The VCCS300 operates from a universal input voltage range and starts automatically upon application of adequate AC mains voltage ($>50V_{RMS}$). After a short delay the output voltage starts and delivers power to the application loads.

The diagram below shows the normal start up/shut down sequence and gives typical timings.



Typical timing values at 120Vac 300W 25°C: $t_{1j} \approx 600\text{ ms}$, $t_{2j} \geq 16\text{ms}$ (minimum)

When the AC mains voltage is removed, the internal hold-up capacitors will supply power to the load for typically 16ms (t_2) at maximum power.

Hold-up

For short line disturbances ($<16\text{ms}$), the unit can deliver full output power without disturbances on the output voltage.

No Load Power Consumption

The VCCS300 series has an extremely low no-load power consumption of $<1\text{W}$. To achieve this the unit enters burst mode when the output power is below 6W. When in burst mode the ripple frequency will reduce significantly. The unit returns to normal operation when the output load goes above 12W.

Input Over Current Protection (OCP)

The input circuitry is protected from excessive input current by means of an over current protection circuit which limits the input current to approximately 5Arms. If the OCP threshold is exceeded the unit may shut down and attempt to automatically restart.

Input Under Voltage Protection (UVP)

The input circuitry will not operate until the applied mains voltage exceeds $50V_{RMS}$. Once the unit is active it can operate down to approximately $10V_{RMS}$ under no load conditions. When operating below the minimum specified mains voltage ($85V_{RMS}$) the input circuitry is protected by the input over current protection (OCP).

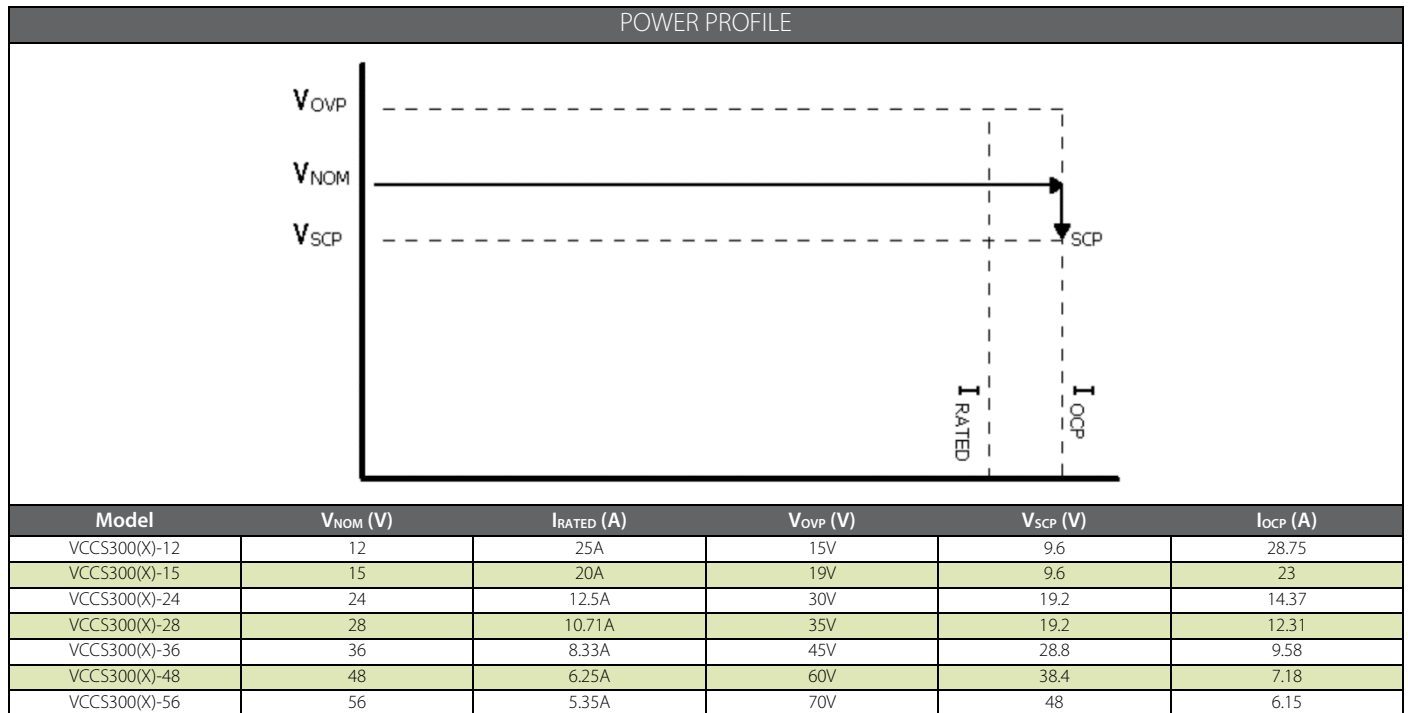
Over Temperature Protection (OTP)

The unit is protected from excessive temperatures by means of various internal temperature sensors. If temperature thresholds are exceeded the unit may turn off. The unit will automatically recover once it has cooled sufficiently.

Output Performance (12V, 24V & 48V Models)

Power Profile

The power profile diagram below is a voltage/current plot that together with the associated table provides details of the main features of the standard output voltages. Alternative output voltage constructions are available to order, consult your Vox Power Distributer or Vox Power representative for further details.



Over Voltage Protection (OVP)

In the event of an output fault, the unit is protected against excessive output voltages. If the output voltage exceeds the V_{OVP} threshold, the output will be disabled, and the unit will attempt to restart at a minimum of 1 second intervals.

Over Current & Short Circuit Protection (OCP & SCP)

The over current threshold is typically set at 115% of the rated current and has a constant current, straight line characteristic that reduces the output voltage as the load resistance decreases. If the output voltages falls below the short circuit voltage threshold (V_{SCP}) the unit enters short circuit protection mode. In SCP mode, the output shuts down completely for a minimum of 1 second then attempts to restart. This process repeats until the overload condition is removed, at which point normal operation resumes.

Reverse Current Protection (RCP)

The output rectifier uses synchronous rectification to achieve high efficiency. Typically synchronously rectified outputs can both source and sink current. The VCCS300 series outputs have internal protection to prevent any reverse current flowing into the unit.

Start-up

The outputs are designed to have a controlled start-up with a rise time of approximately 2ms (0% to 67%) under full load. Start-up into pre-biased loads will not discharge any external capacitance or cause any damage to the unit.

External capacitance

The outputs can support a large external capacitance as detailed in the table shown. The capacitances specified ensure reliable start-up with rated load applied. Larger capacitances can be applied for reduced load currents.

V _{OUT}	12	15	24	28	36	48	56
C _{EXT_MAX} (mF)	3	2	1.5	1.5	0.7	0.6	0.2

Start up into Pre-biased loads

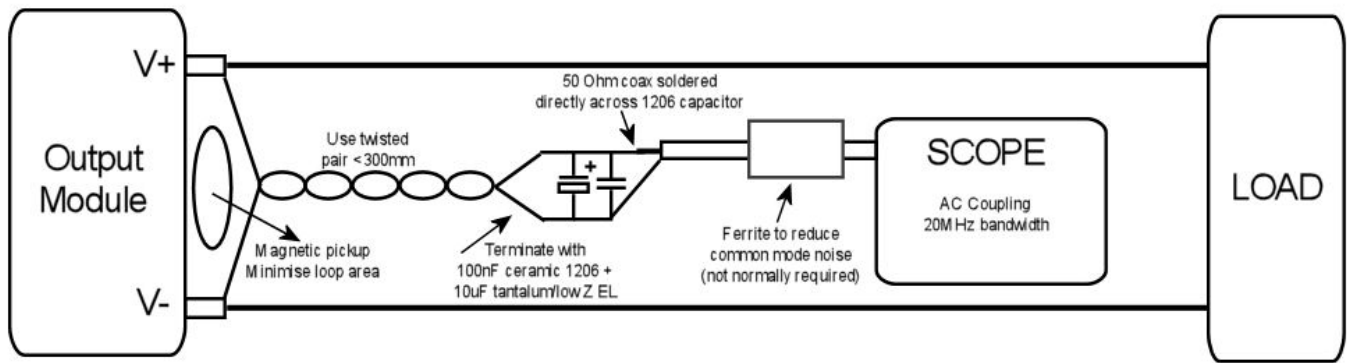
A pre-biased load is a load that already has a voltage present when the power supply is turned on. This can occur if the output capacitors are not loaded and the unit is turned off and then on again before the capacitors have had a chance to discharge. In such circumstances there may be a small voltage overshoot of approximately 10% at start up. However, this can be eliminated by adding sufficient external capacitance.

Shut Down

At shutdown, the outputs enter a high impedance state. Where no external load is present it may take some time for the voltage to decay. When driving inductive loads, care must be taken to limit the voltage at the output terminals to prevent damage to the unit.

Ripple and Noise

The ripple and noise figures stated in the datasheet are defined based on a standard measuring method. To obtain the same results the same test setup must be used, and care must be taken to eliminate any parasitic noise pickup. The diagram below shows details of the setup and sources of noise pickup.



The output ripple frequency can vary from 100kHz to 300kHz but is typically 180kHz. Under light load conditions (<6W) the unit may enter burst mode and the ripple frequency will reduce significantly but will remain within specification.

Transient Response

The VCCS300 series uses the latest current mode control algorithms to achieve a fast (<500uS) and stable response to dynamic loading. Where large dynamic loading and tight voltage deviation specification are required, additional low impedance external capacitance should be placed at the load.

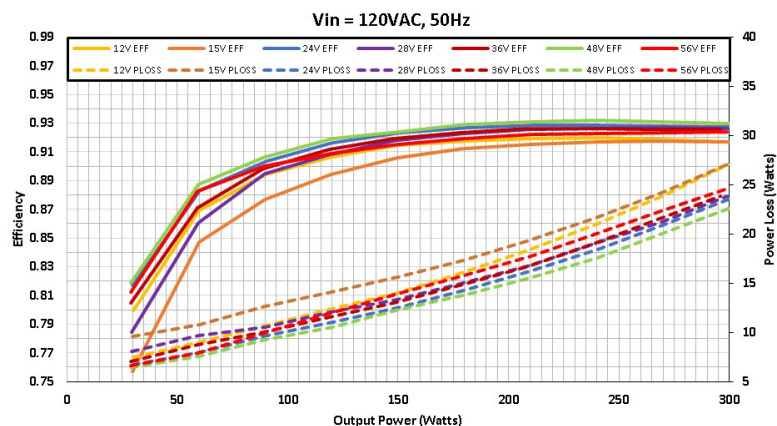
Efficiency Performance

The efficiency of the VCCS300 product is dependent on parameters such as mains voltage, output power and on the model. The plots below show typical efficiencies of a VCCS300 product for the standard output voltages. The plots cover the full load and line voltage range.

TYPICAL EFFICIENCIES

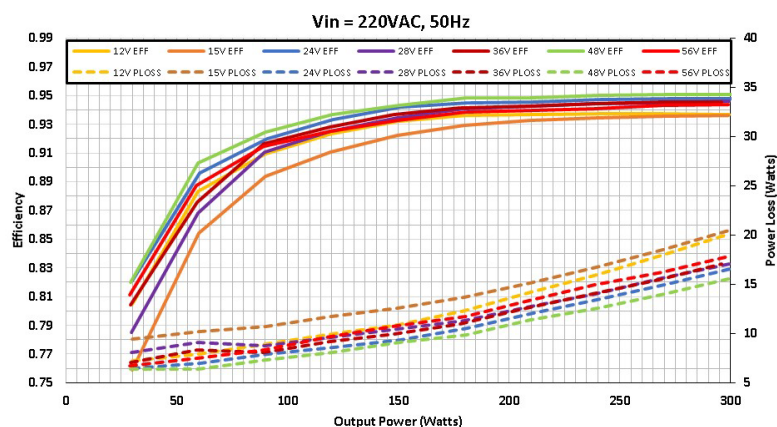
Typical 120V 50Hz efficiency

Load (W)	60	150	300
12V	0.869	0.914	0.917
15V	0.847	0.906	0.917
24V	0.883	0.923	0.927
28V	0.861	0.918	0.926
36V	0.871	0.919	0.926
48V	0.887	0.924	0.930
56V	0.882	0.915	0.924



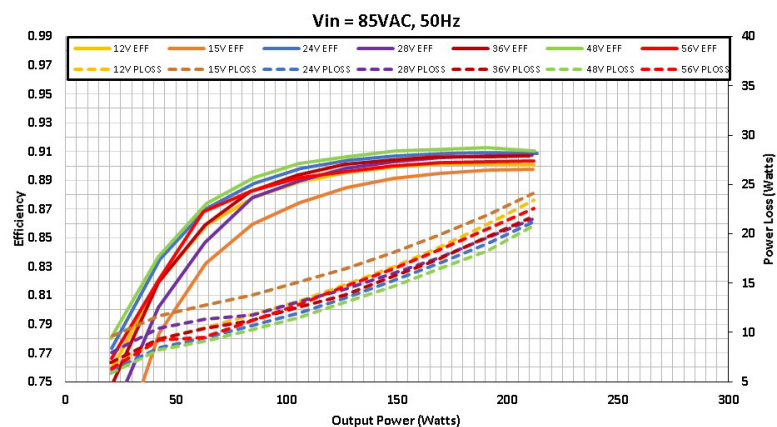
Typical 220V 50Hz efficiency

Load (W)	60	150	300
12V	0.883	0.932	0.937
15V	0.854	0.922	0.936
24V	0.896	0.942	0.948
28V	0.868	0.935	0.946
36V	0.876	0.937	0.946
48V	0.903	0.943	0.951
56V	0.888	0.933	0.944



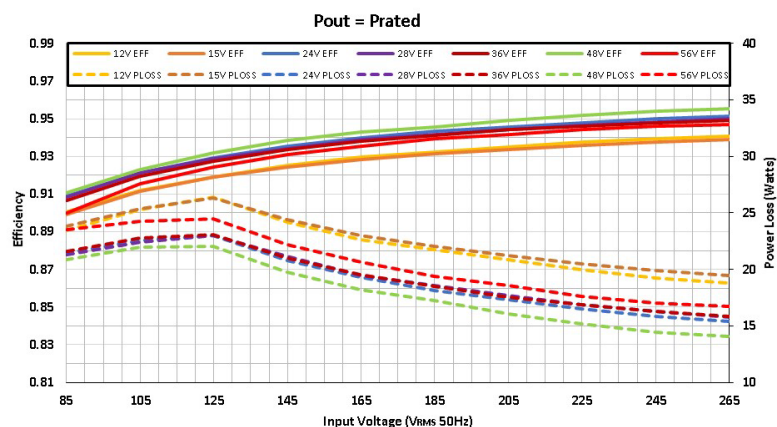
Typical 85V 50Hz efficiency

Load (W)	42.5	106.25	212.5
12V	0.820	0.889	0.901
15V	0.784	0.875	0.898
24V	0.835	0.898	0.909
28V	0.802	0.890	0.908
36V	0.819	0.894	0.907
48V	0.837	0.902	0.911
56V	0.821	0.892	0.904



Typical Line efficiency

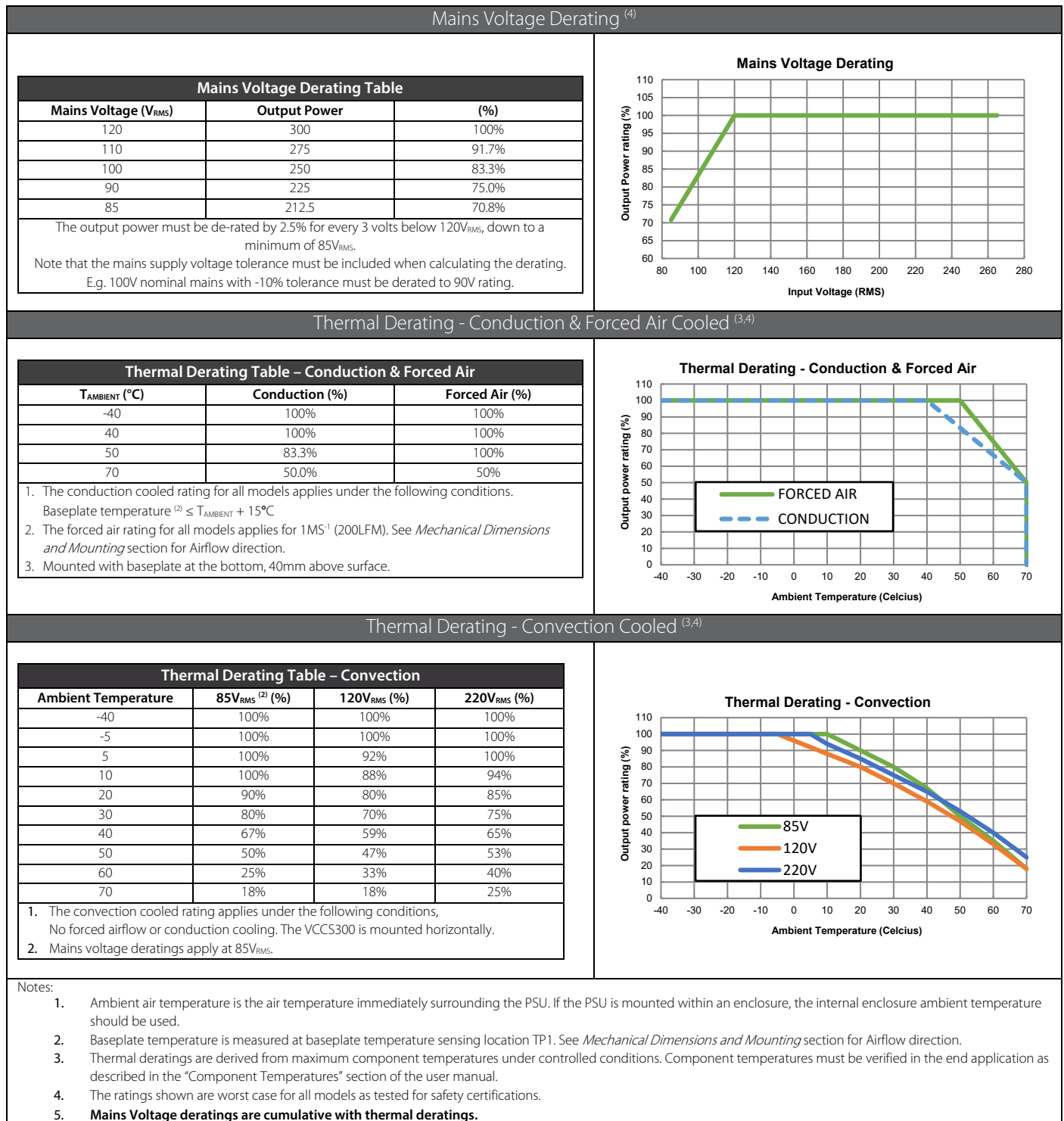
Vin (V)	85	125	225
12V	0.900	0.919	0.937
15V	0.899	0.919	0.936
24V	0.909	0.929	0.948
28V	0.908	0.929	0.947
36V	0.907	0.928	0.946
48V	0.911	0.932	0.952
56V	0.900	0.924	0.944



Power Ratings

VCCS300 series products must always be operated within stated operating limits. Equipment manufacturers and other users must take the appropriate derating into account when specifying a unit for the intended application. If in doubt, contact your sales representative or Vox Power for assistance.

The relevant deratings for the VCCS300 series power supplies are detailed below,



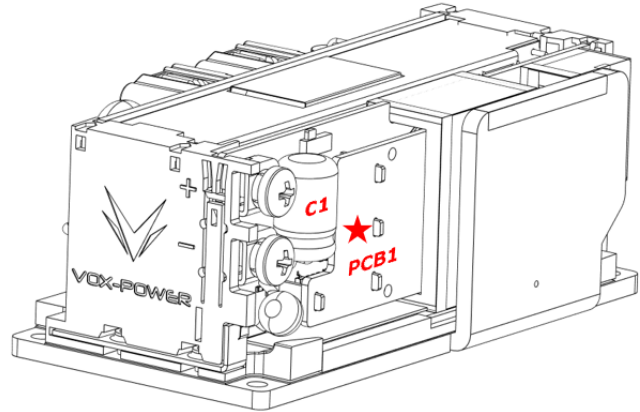
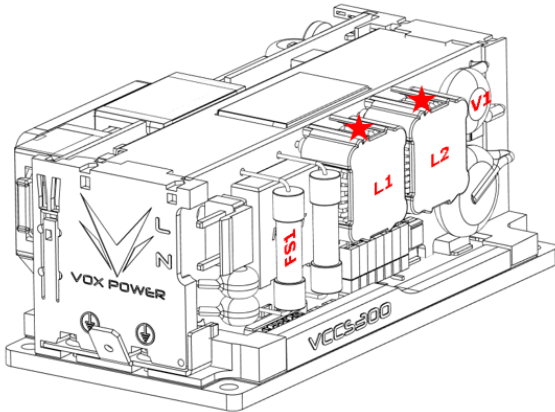
Component Temperatures

Evaluating the VCCS300 product in the end application

To ensure the product is operating within its ratings in the end application the following procedure should be performed during the design stage.

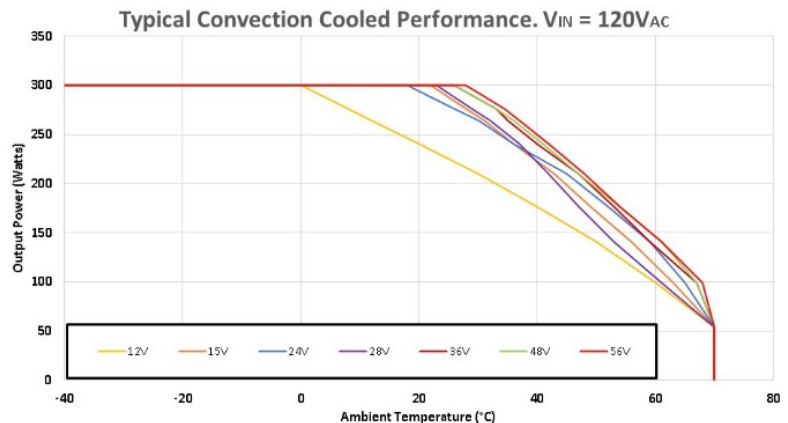
1. Setup the application in worst case conditions, considering mains voltage, output power, ambient temperature, mounting orientation, airflow, and cooling restrictions.
2. Install thermocouples in the positions listed below using glue to hold the thermocouples in place.
3. Power the system and monitor the temperatures until they reach steady state.
4. Ensure that all temperatures remain below recommended temperatures under normal conditions and do not exceed maximum temperatures under worst case conditions. It is good practice to leave some margin in the design.

Description	Reference	Measurement Position	Recommended temperature	Maximum allowed temperature
Fuse	FS1	Body Centre	100°C	125°C
Filter Inductors	L1 & L2	Winding Top (Starred)	110°C	130°C
Varistor	V1	Body Centre	80°C	85°C
Electrolytic capacitor	C1	Body Centre	90°C	105°C
Transformer	PCB1	Centre (Starred)	115°C	130°C



Typical Convection Cooled Performance.
V_{IN} = 120VAC

Ambient (°C)	0	20	30	50	70
12V	300	240	210	141	54
15V	300	300	268	172	54
24V	300	294	264	186	54
28V	300	300	272	159	54
36V	300	300	286	193	54
48V	300	300	286	196	54
56V	300	300	292	199	54



Notes:

1. Ambient air temperature is the air temperature immediately surrounding the PSU. If the PSU is mounted within an enclosure, the internal enclosure ambient temperature should be used.
2. Typical convection cooled performance is measured under controlled conditions in a sealed chamber of approximately 0.5mx0.3mx0.5m with the unit positioned in the centre of the volume.
3. The profiles shown ensure all components remain within their IPC9592B deratings.
4. Operation of components above the recommended temperatures will result in reduced lifetime of the unit and invalidate the warranty.

Mechanical Dimensions and Mounting

SCREWS			
Location	Details	Penetration	Tightening
Baseplate Mount (Screw from top side): N1 – N4 ⁽¹⁾	M3 Hex Socket Head Cap Screw	3mm Head height	0.50NM
Baseplate Mount (Screw from bottom side): N1 – N4	M4 - Customer Preference	6mm from bottom of Baseplate	0.55NM
Output Terminal	M4 SEM POZI	M4 SEM screw, 8mm max length	0.55NM

Top side Mounting Screw Penetration Depth

M3 Mounting Screw, Max 3mm, PSU Baseplate, Equipment chassis, M4 Thread, M3 Thread

Bottom side Mounting Screw Penetration Depth

M4 Mounting Screw, Max 6mm, PSU Baseplate, Equipment chassis, M4 Thread

Mounting
From Bottom: M4
From Top: M3

AIRFLOW

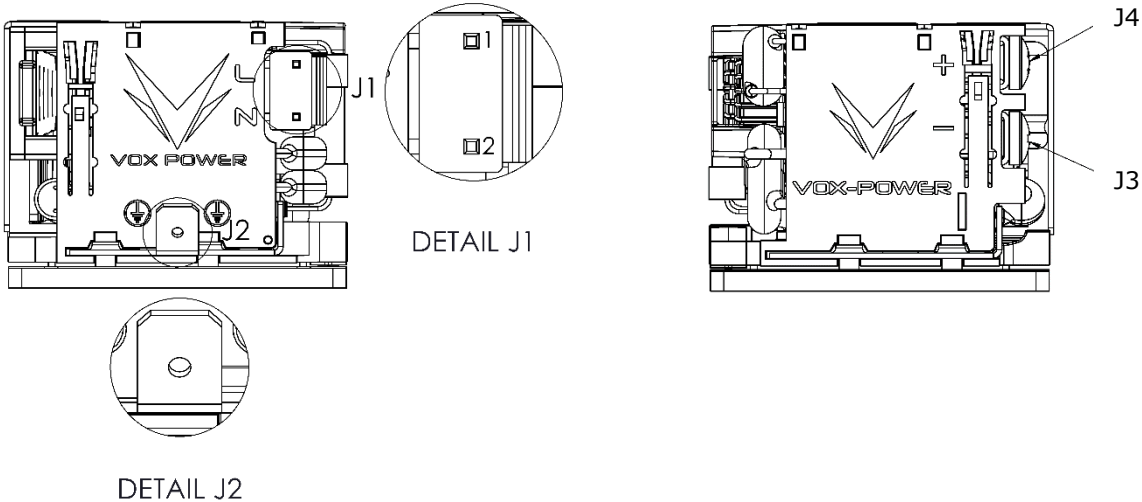
M4 Pan-Head Screw Terminal

TP1

Dimensions: 50.78, 54.03, 6.40, 7.75, 7.92, 12.29, 5.19, 101.30, 40.20, 5.99, 3.25, 6.70, 11.35, 8.25, 32.95, 94.00, 43.00, 02.50, J1, J2, J3, J4, N1, N2, N3, N4.

- Notes
- Top Side mounting screws are obstructed by components in some areas. M3 Hex socket screws should be used to allow angled access for tightening with a 2.5mm hex ball screwdriver. Care should be taken to ensure components are not damaged while tightening.

Connector Details

CONNECTOR DETAILS				
 DETAIL J1 DETAIL J2				
MATING CONNECTORS				
Ref.	Details	Manufacturer	Housing	Terminal
J1 - Mains Input 1 – Live 2 – Neutral	2 Pin, 7A, 250V _{AC} , 7.92mm Locking ⁽¹⁾	JST	VAR-2	SVA-41T-P1.1
J2 - Protective Earth	FASTON, PIDG series, Positive lock 0.25EX	TE Connectivity	-	165536-1
J4 - Positive Output Power J3 - Negative Output Power	M4 terminal, 0.55Nm	KST	-	SNB55-4
Notes	1. Cable 18-20AWG, 300V, >7A, 105°C. 2. Direct equivalents may be used for any connector parts. 3. All cables must be rated 105°C min, equivalent to UL1015			

Safety

The VCCS300 unit has been designed to comply with the Low Voltage Directive DIR 2014/35/EU (LVD), the EMC Directive DIR 2014/30/EU and DIR 2011/65/EU regarding the restriction of certain hazardous substances and is CE marked to show its compliance.

When correctly installed (per the installation instructions in this manual) in a limited access environment the VCCS300S & M comply with the requirements of IEC/EN/UL/CSA 62368-1 Edition 2 & 3 and IEC/EN/UL/CSA 60601-1 Edition 3.1, respectively.

- The power supply should not be operated close to combustible materials or atmosphere.
- Care should be taken to ensure liquid or metal shavings do not enter the power supply as this can cause a fire hazard.
- The power supply does not contain any user serviceable parts and should be returned to Vox Power for repair.

WARNING!

- Series connected units with combined voltages exceeding 60 volts are not considered SELV. Paralleled and/or series units with combined energy ratings greater than 240 VA may cause energy hazards. The equipment manufacturer must provide additional and adequate protection to service and technical personnel.
- Always remove the power before handling the unit. During operation, the external surface of the unit can become hot. Leave to stand for 10 minutes to allow the unit to cool down before handling the unit.
- Dangerous voltages are present within the power supply even when the supply voltage has been removed.

SAFETY SPECIFICATIONS					
Parameter	Details	Typical	Max	Units	Notes
Isolation Voltages	Input to Output (2 MOPP) ⁽¹⁾ Input to Chassis (1 MOPP) Output to Chassis (1 MOPP)		4000 2000 1500	V _{AC} V _{AC} V _{AC}	
Earth Leakage Current	NC/SFC (Class I), 264Vac, 63Hz, 25°C	186/337	<300/<400	µA	
Touch Leakage Current (Enclosure to Earth)	NC (Class I/Class II), 264Vac, 63Hz, 25°C SFC (Class I/Class II), 264Vac, 63Hz, 25°C	0/186 186/337	<20/<300 <300/<500	µA	
Patient Leakage Current (Output to Earth)	NC (Class I/Class II), 264Vac, 63Hz, 25°C SFC (Class I/Class II), 264Vac, 63Hz, 25°C	33/77 77/150	<100/<100 <100/<200	µA	
Notes 1. Use DC equivalent voltage to test assembled unit. 2. NC = Normal Condition, SFC = Single Fault condition 3. Leakage currents will sum for paralleled units. N units will have N times the leakage current.					

INSTALLATION SPECIFICATIONS			
Parameter	Details	Parameter	Details
Equipment class	I or II ⁽¹⁾	Flammability Rating	94V-2
Overvoltage category	II	Ingress protection rating	IP10
Material Group	IIIb (indoor use only)	Intended usage environment	Home Healthcare (M)/ Industrial (S)
Pollution degree	2		
1. Conditions of acceptability may apply. See UL report.			

Withstand Voltage Test

The VCCS300 units are designed to withstand the test voltages listed below using the test circuit shown.

Test Circuit							
Voltage	Ramp	Dwell	I _{MIN}	I _{MAX}	Test Type	SW1	SW2
6000VDC	10s	60s	0	5mA	Input to Output.	A	A
3000VDC	10s	60s	0	5mA	Input to Chassis.	B	B
2500VDC	10s	60s	0	5mA	Output to Chassis.	A	B

EMC Compliance

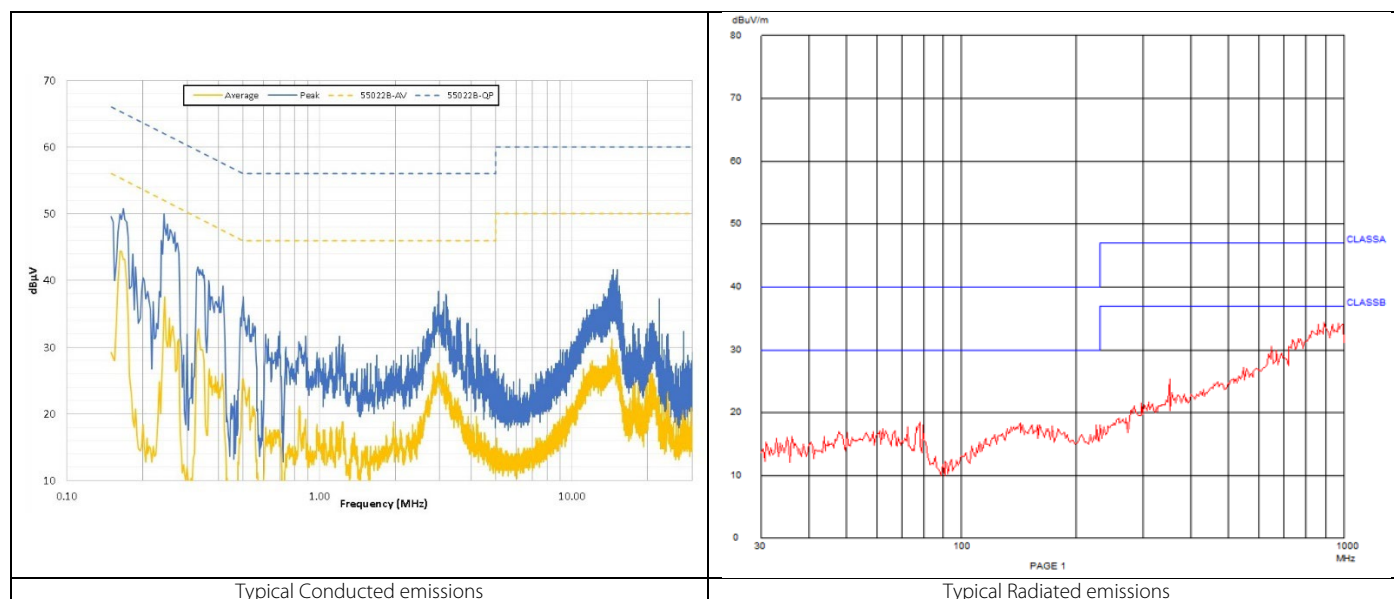
To support compliance of the final system design with the EMC directive 2014/30/EU, the VCCS300 PSU has been designed and tested to the following standards.

ELECTROMAGNETIC COMPLIANCE – EMISSIONS		
Phenomenon	Basic EMC Standard	Test Details
Radiated emissions, electric field	EN55011/32	Class B compliant
Conducted emissions	EN55011/32, FCC part 15, CISPR 32/11	Class B compliant
Harmonic Distortion	IEC61000-3-2	Compliant
Flicker & Fluctuation	IEC61000-3-3	Compliant
Radiated emissions, electric field, 30Hz-18GHz.	MIL-STD-461F: RE102 (Ground, Fixed)	Compliant (When mounted in enclosure)
Conducted emissions, power leads, 10kHz-10MHz.	MIL-STD-461F: CE102	Compliant

ELECTROMAGNETIC COMPLIANCE – IMMUNITY		
Phenomenon	Basic EMC Standard	Test Details
Electrostatic discharge	IEC61000-4-2	Test level 4: 15kV air, 8kV contact
Radiated RF EM fields	IEC61000-4-3	Test Level 3: (10V/m, 80MHz-2.7GHz) sine wave AM 80% 1kHz
Proximity fields from RF wireless communications equipment	IEC61000-4-3	Test levels as per IEC60601-1-2:2014 Table 9
Electrical Fast Transients/bursts	IEC61000-4-4	Test Level 3: (2kV Power, 1kV I/O) 5kHz(ed3) & 100kHz(ed4)
Surges	IEC61000-4-5	Test Level 3: 1kV L-N, 2kV L-E
Conducted disturbances induced by RF fields	IEC61000-4-6	Test Level 3: 10V, 0.15 to 80MHz sine wave AM 80% 1kHz
Power Frequency Magnetic Fields	IEC61000-4-8	Test level 4: 30A/m 50Hz
Voltage Dips	IEC61000-4-11 ⁽²⁾	0% 10ms (Criterion A) 0% 20ms (Criterion B ⁽³⁾) 70% 0.5s, 40% 0.2s (Criterion A at 240V and Criterion B at 100V)
Voltage interruptions	IEC61000-4-11	0% 250/300 cycle as per IEC60601-1-2:2014 (Criterion B)
Voltage Sag Immunity	SEMI-F47-0706 ⁽²⁾	0% 20mS (Criterion B ⁽³⁾) 80% 1s, 80% 10s, 90% continuous (Criterion A) 70% 0.5s, 50% 0.2s (Criterion A at 240V and Criterion B at 100V ⁽⁴⁾)
Shipboard Electric Power. Voltage Spike Test	MIL-STD-1399, SECTION 300A	Type 1, 115V 60Hz single phase
Conducted susceptibility, power leads	MIL-STD-461F: CS101	30Hz-150kHz
Conducted susceptibility, Bulk cable injection	MIL-STD-461F: CS114	10kHz-200MHz
Conducted susceptibility, Bulk cable injection, impulse excitation	MIL-STD-461F: CS115	
Conducted susceptibility, damped sinusoidal transients, cables and power leads	MIL-STD-461F: CS116	10kHz-100MHz
Radiated susceptibility, Magnetic field	MIL-STD-461F: RS101	30Hz-100kHz
Radiated susceptibility, electric field	MIL-STD-461F: RS103	2 MHz to 40 GHz, 20V
Aircraft Electric Power Characteristic	MIL-STD-704F	SAC102,104,105,109,110 (MIL-HDBK-704-2) & SXF102,104,105,109,110 (MIL-HDBK-704-6)

Notes:

1. Criterion A = No degradation of performance or loss of function.
Criterion B = Temporary degradation of performance or loss of function is allowed, provided the function is self-recoverable.
Criterion C = Temporary loss of function is allowed but requires operator intervention to recover.
2. Tested at nominal range (100V to 240V). Line deratings applied where appropriate.
3. Criterion A is achieved for all input voltages when Pout <= 280W
4. Criterion A is achieved for full power when Vin >=160V or at all input voltages when Pout <= 200W



For radiated and conducted emissions, compliance of the final system relies on proper installation of the PSU component. The installation guidelines detailed below should be followed.

Installation Guidelines for optimum EMC performance

- VCCS300 units should be mounted within a metal enclosure using the mounting fixtures provided.
(See “Mechanical Dimensions & Mounting” section)
- If the application enclosure is not metal, then a metal ground plate should be used to mount both the power supply and the load.
- Both input and output cables should be fixed as close as possible to the ground plate or metal enclosure.
- Input and output cables should be separated as much as possible from each other or a shield/screen used to isolate RF currents
- All cables lengths and loop areas should be minimised.
- Where cables must enter or exit the enclosure, good high frequency 100nF decoupling capacitors of sufficient voltage rating should be connected to the cables as close to the entry/exit point as possible.

For further details or assistance contact Vox Power.

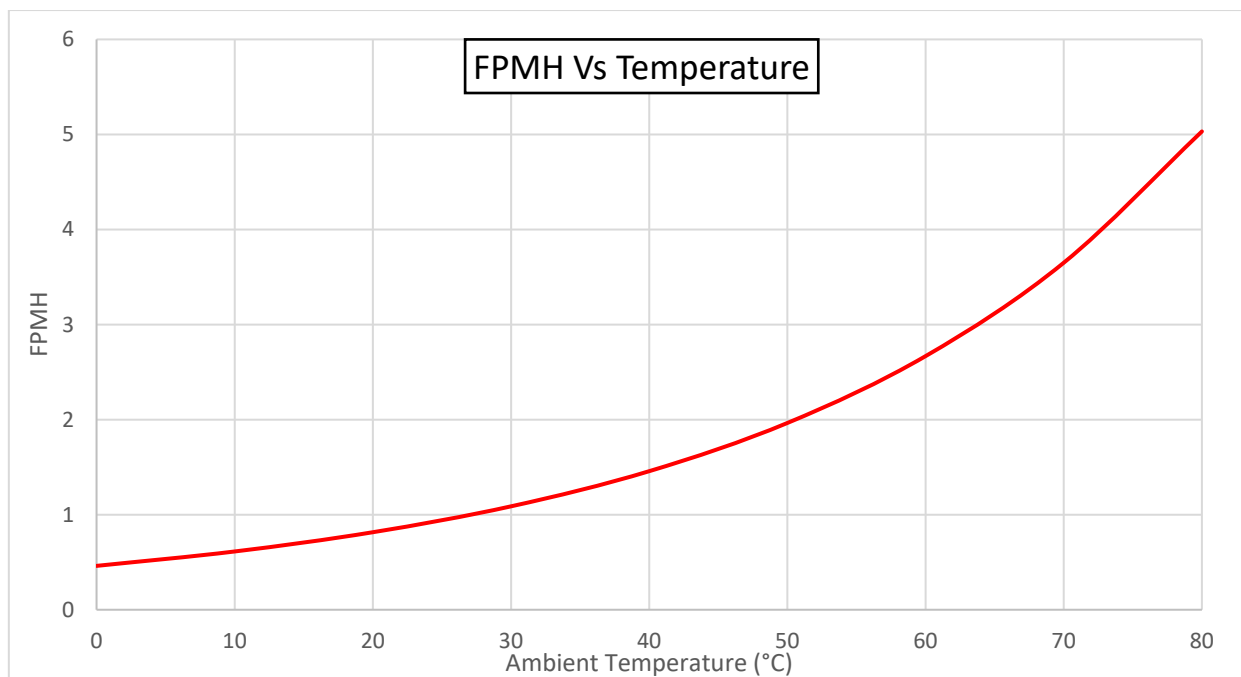
Reliability

The VCCS300 series has undergone extensive testing, including HALT and Environmental testing. Reliability data is collected on an ongoing basis. Please contact Vox Power or your distributor for the most up to date reliability data.

The reliability data quoted in the datasheets are the calculated *failures per million hours* (FPMH) using the Telcordia SR-332, issue 2 standard. The procedure defined in SR-332 allows several different techniques to be used for calculating MTBF and when evaluating competing MTBF figures it is important that only the same techniques are compared.

The quoted VCCS300 reliability figures use Method I Case 3, Ground, Fixed, controlled which specifies an ambient temperature of 30°C and an upper confidence level of 90%. It is also assumed that the product is operated at 100% duty cycle, has an input voltage of 120V_{RMS}, an output power of 300W and that the baseplate temperature is the same as the ambient temperature.

The variation in FPMH is shown in the graph and table below.



Ambient Temperature	0	10	20	30	40	50	60	70	80
Failure Rate (FPMH)	0.46144630	0.613015302	0.815511105	1.0879098	1.45771725	1.96498947	2.66813507	3.65047088	5.0317409
MTBF (Hrs)	2167099.35	1631280.64	1226224.87	919193.78	686004.089	508908.57	374793.61	273937.26	198738.37

Installing your VCCS300 Product

The VCCS300 power supply is designed to be used as part of an end-system in a restricted environment and therefore should only be accessible to qualified and trained personnel. Persons attempting to install a unit must have the necessary knowledge and training before doing so. Incorrect installation may cause damage to the power supply and may affect the warranty.

DO NOT use parts if any part of the product exhibits any kind of physical damage.
DO NOT connect any mains power before the installation is complete.

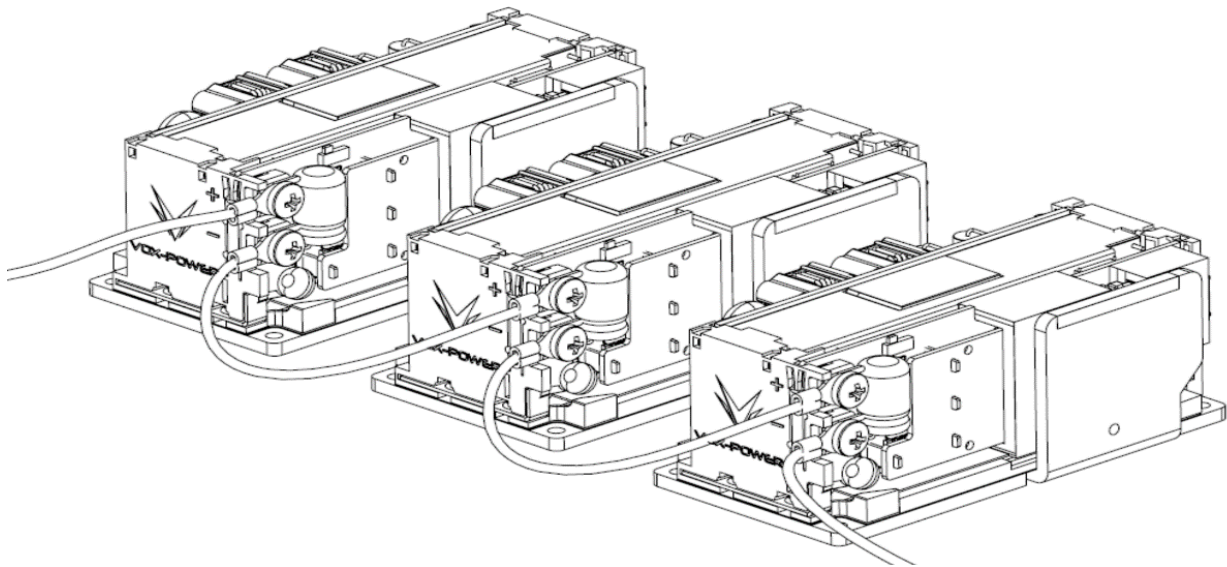
Once installation has been completed, operation of the unit should be verified.

Please contact Vox Power or your distributor for assistance in installing your power supply. Never assume, always ask.

Connecting units in series

VCCS300 units of the same type can be series connected to achieve higher output voltages. Below is an illustration of how-to series connect three units to give 900W of output power.

When mounting multiple units ensure to maintain sufficient safety clearances between units. See installation clearances section for more details.



WARNING!

- Energy and voltage hazards may arise when individual units are series connected. When safe energy and voltage levels are exceeded ensure that an appropriate warning label is affixed to the power supply in a manner that service personnel will always notice it. See the Safety section for more details.
- Leakage currents will increase when multiple units are installed in an end-system.

Isolation to Ground

Care must be taken not to exceed the output isolation to chassis ground when series connecting units. Each output is rated for 2200 Volts maximum between each output terminal and chassis ground. Exceeding this voltage may damage the unit.

SELV Precautions

Where series combinations of units exceed 60V, the output can no longer be considered SELV (Safety Extra Low Voltage) and hence the final equipment manufacturer must provide suitable protection for both users and service personnel.

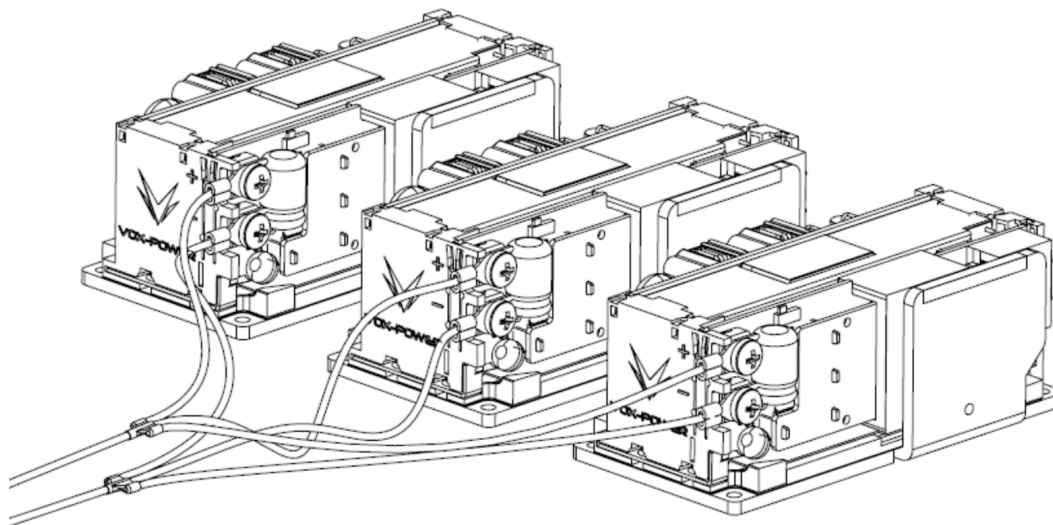
Ripple

When outputs are series connected, the output ripple will increase and may contain frequencies in the audio spectrum.

Connecting units in parallel

VCCS300 units of the same type can be paralleled in any number to achieve higher output currents. To parallel the outputs simply connect all the positive power cables together and all the negative power cables together. No other external circuitry is necessary. For best performance and increased reliability, it is recommended to enable share mode on each unit (See “Share Mode (Droop)” section below for details). The accuracy of current sharing is highly dependent on external cable resistance. To minimise errors, it is important to have equal cable lengths from each output terminal to the common connection point for both positive and negative cables.

Below is an illustration of optimised parallel connection of three units to give 900W of output power.



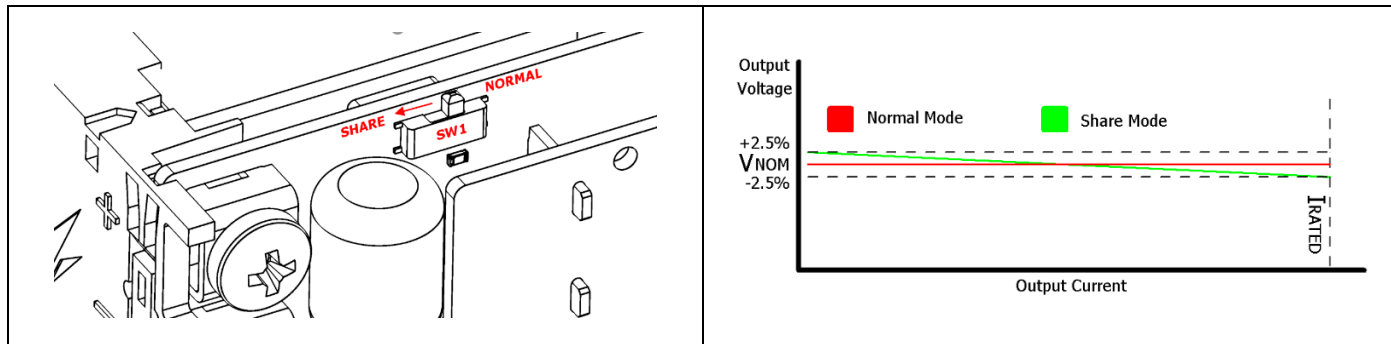
WARNING!

- Energy and voltage hazards may arise when individual units are paralleled. When safe energy and voltage levels are exceeded ensure that an appropriate warning label is affixed to the power supply in a manner that service personnel will always notice it. See the Safety section for more details.
- Leakage currents will increase when multiple units are installed in an end-system.

Share Mode (Droop)

When paralleling multiple units, share mode should be enabled by sliding SW1 to the share position as shown below.

This will introduce a $\pm 2.5\%$ slope to the load regulation that enables the paralleled units to share load current equally between them and increase system reliability.



In share mode, the output voltage of each unit has an artificial voltage drop added that reduces the output voltage as the current increases. At 0% load the voltage is typically $V_{NOM} + 2.5\%$, at 50% load it is V_{NOM} and at 100% load it is $V_{NOM} - 2.5\%$.

Normal Mode

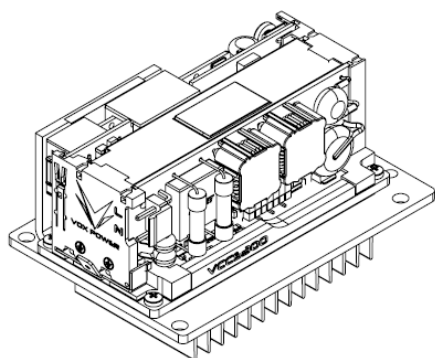
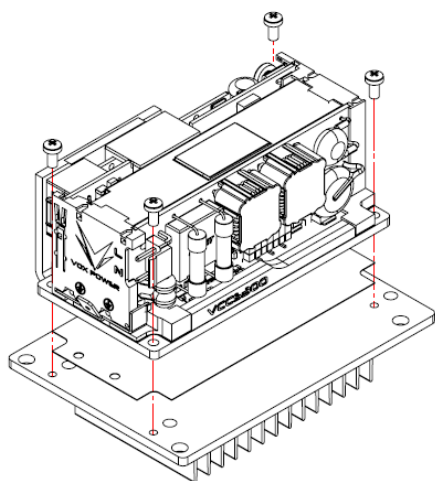
For normal parallel mode, SW1 should be set to normal position. In this mode, the highest set output will supply all the load current until its current limit is reached. If the load demand exceeds this level the output voltage will drop to the level of the next highest set output and that output will begin to supply the load current while the first output continues delivering full current. This process repeats for the total number of paralleled outputs. Typically, system reliability is reduced in this mode of operation as the higher set outputs will do most of the work with the lower set outputs only delivering current during peak load demand.

Ripple

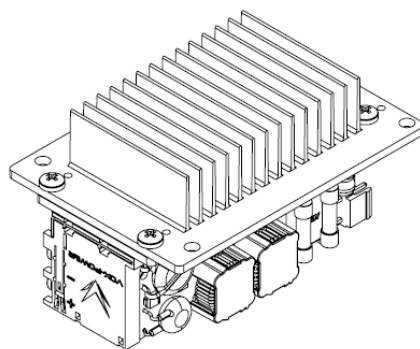
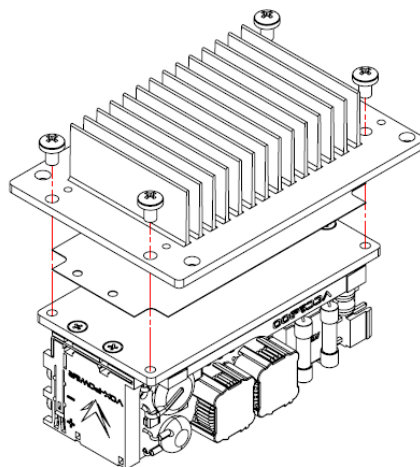
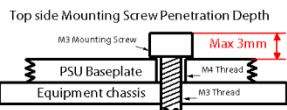
When outputs are paralleled, the output ripple may contain frequencies in the audio spectrum.

Attaching a heatsink or cooling plate

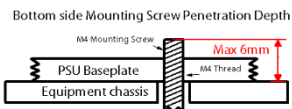
For improved performance & reliability, the baseplate of the VCCS300 unit can be attached to a heatsink, cooling plate or equipment enclosure. It is recommended to use a thermal interface material (such as SILPAD400) between the baseplate and mounting surface to ensure efficient cooling. The baseplate has four M4 threaded mounting holes which allow the unit to be mounted from the top side with 4x M3 Hex Socket Head Cap Screws or from the bottom side with 4x M4 screws. The diagrams below show a VCCS300 unit attachment to a heatsink from top side and bottom side. Before assembly ensure both the baseplate and heatsink surfaces are clean and free from debris.



TOP SIDE MOUNTING



BOTTOM SIDE MOUNTING

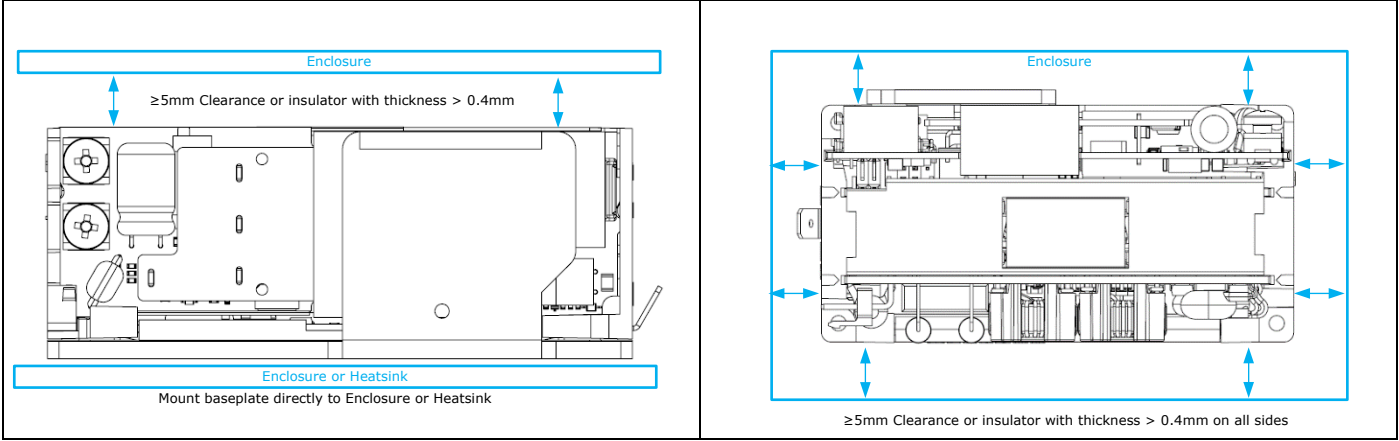


Top Side mounting screws are obstructed by components in some areas. M3 Hex socket screws should be used to allow angled access for tightening with a 2.5mm hex ball screwdriver. Care should be taken to ensure components are not damaged while tightening.

It is recommended to tighten the baseplate mounting screws to 0.5NM. In high vibration environments, an appropriate thread lock should be used. All recommended screw tightening torques are nominal values and should be verified in the application where appropriate.

Installation Clearances

The diagram below shows the minimum recommended clearances to meet safety isolation requirements.

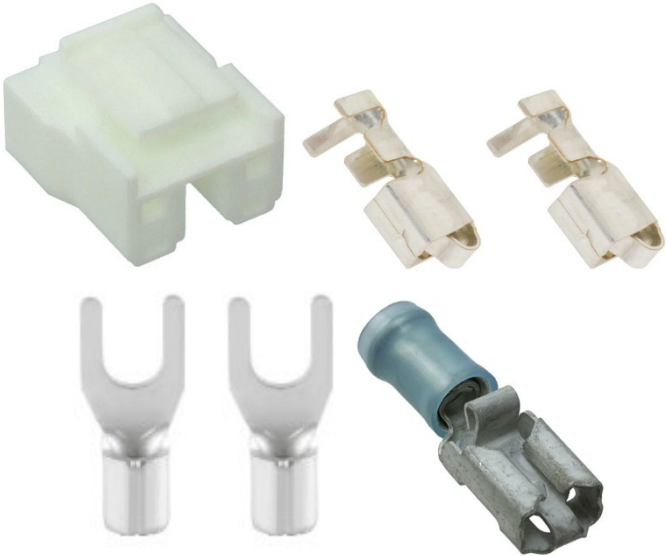


Class II equipment

For Class II equipment, the end equipment must also provide a supplementary insulation barrier to the baseplate. This can be achieved in a variety of ways such as a plastic enclosure, insulating sheet or insulating mounting pillars.

Plastic enclosure	Insulator	Insulating Spacers
Must meet safety agency requirements. No accessible conductive parts.	Must meet safety agency requirements. Recommend 5mm creepage from all edges.	M4 thread, Male-Male or Male-Female, Nylon 6/6

Accessories

Description	Photo/Drawing	Order code
VCCS300 Cable Set 1x Input connector housing 2x Input crimp connectors 1x Earth crimp connector 2x Output crimp connector		CAB-V3
VCCS300 Cover Kit		CKIT-V3
VCCS300 Right Angle Terminal		ACC-RAV3