CORPORATE SYSTEMS ENGINEERING

For Control When It Counts

CISCO SMART GRID NETWORK ENDPOINT USER MANUAL 2016

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HARDWARE OVERVIEW

The primary purpose of this module is to allow Corporate Systems Engineering load control devices and approved third party devices to communicate over a Cisco Mesh Network..

This is NOT intended to be instructional about how to design, develop, deploy or operate Cisco Smart Grid Networks. Additionally, this should NOT be considered as a replacement for actual Cisco education and training.

Should 3rd party require Engineering Support from CSE, it is considered external to this agreement.

SPECIFICATIONS

POWER REQUIREMENTS	**5 VDC / 2A**
CURRENT DRAW	**450Ma (Typ) 1A (Max)**
MICROPROCESSOR	**ARM Cortex-M3 with OTA Capabilities**
RESET CIRCUITRY	**External Microprocessor Supervisor**
SERIAL INTERFACE BAUD RATE	**9600/N/8/1**
SERIAL INTEFACE SIGNAL LEVELS	**3.3 VDC (TXD, RXD, GPIOs)**
ANTENNA	**Onboard antenna**
OPERATING TEMP	**-30 C to 70 C**
FREQUENCY	**902 TO 927 MHz**
MESSAGE FORMAT	**7BIT ASCII**
MAXIMUM MESSAGE LENGTH	**460 CHACTERS**

THEORY OF OPERATION

CSE COM module is based on Cisco Radio Frequency mesh technology and it communicates with Neighborhood Area Network (NAN) rooted at a Cisco's Connected Grid Router (CGR). CSE COM module is driven by industry standards including UDP, IPV6, IEEE 802.15.4e, 802.1x / EAP-TLS, and topology (Field Area Network with the Wide Area Network and Neighborhood Area Network).

Mesh network can relay messages using routing technique. With routing, the message is propagated along a path by hopping from node to node until it reaches its destination. To ensure all its paths' availability, the network must allow for continuous connections and must reconfigure itself around broken paths, using self-healing algorithms such as Shortest Path Bridging. Self-healing allows a routing-based network to operate when a node breaks down or when a connection becomes unreliable. As a result, the network is typically quite reliable, as there is often more than one path between a source and a destination in the network. The channel hopping scheme employed in our RF CG-Mesh networks is of Cisco's own design but based upon IEEE 802.15.4e.

CG-Mesh frequency hopping utilizes different channels randomly for transmission at different times. Receiver will switch to the next channel for listening according to hash algorithm, and transmitter has to learn the receiver's schedule and use the same hash algorithm to calculate the same channel index for transmission. Hence, the hopping is random.

Below is the list of frequency the module can utilize with a dwell time to send a packet that is no greater than 400ms within 20s at each channel.

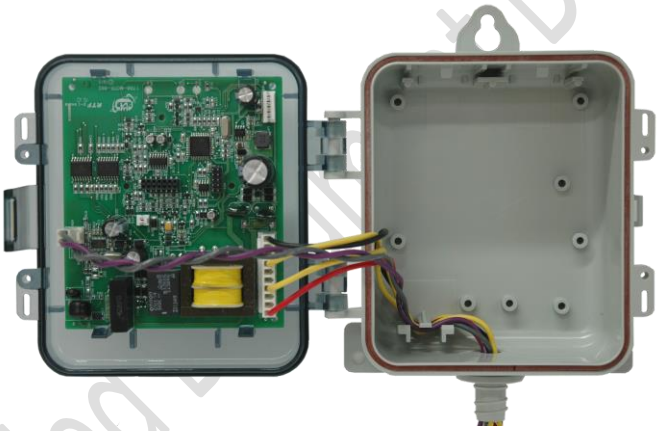
Channels	902.4 MHz to 927.6 MHz	64 Channels
Channel Spacing	400 KHz	
Dwell Time per channel	400 ms	
Window Per Channel	20 s	
Maximum Occupied Band Width	165 KHz	

DATA MESSAGE FORMAT

The CSE CISCO communications module was developed by CSE to pass data to and from a connected end devices via serial connection.

- The message must be 7-bit ASCII characters.
- ASCII characters below 0x20 (decimal 32, the Space character) and the DEL character (0x7F) are not allowed. Invalid bytes are discarded.
- The message must start with and open parenthesis "(“and end with a close parenthesis “)”.
- The open and close parentheses characters are not allowed in the message data.
- Messages total length must be from 2 to 460 characters.
- Example message (U1291I0000017100EE000300033).

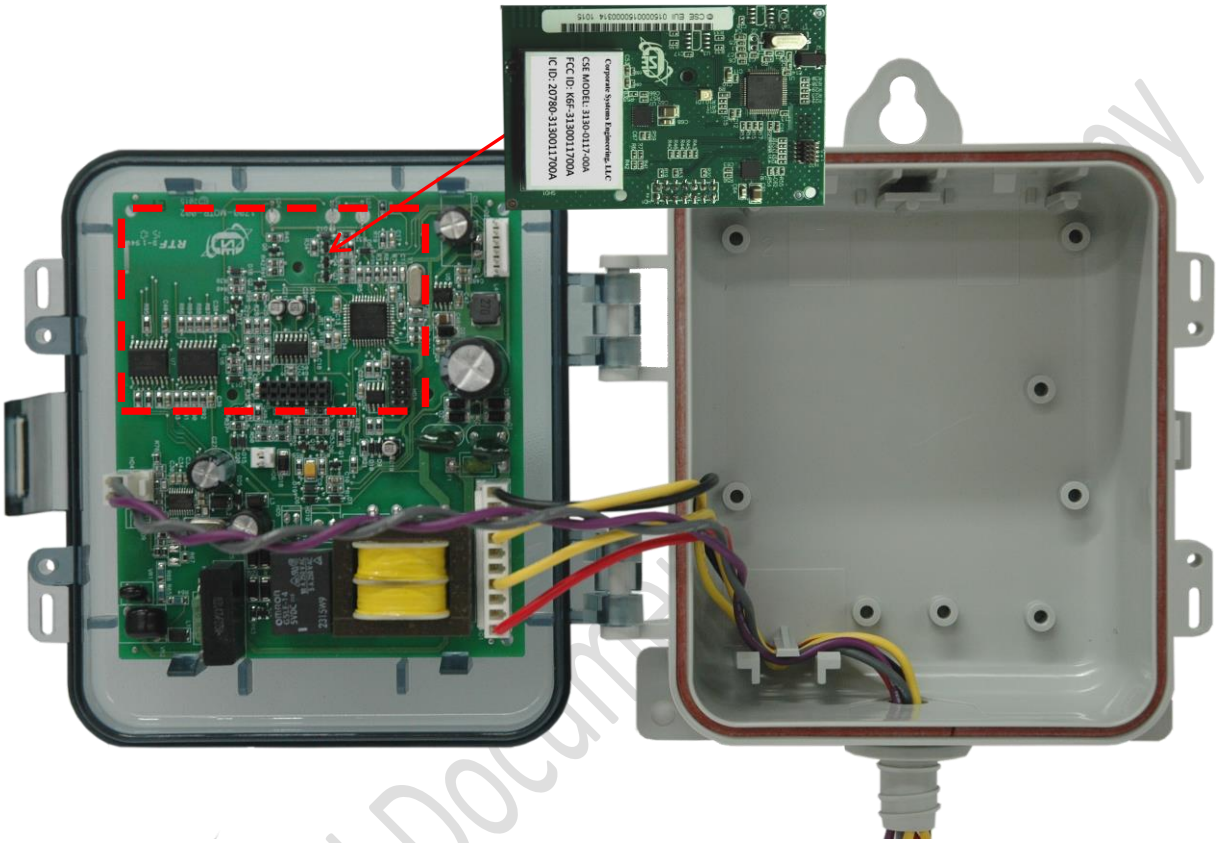
HOW TO INSTALL CSE CISCO MODULE INTO A CSE LOAD CONTROL DEVICE



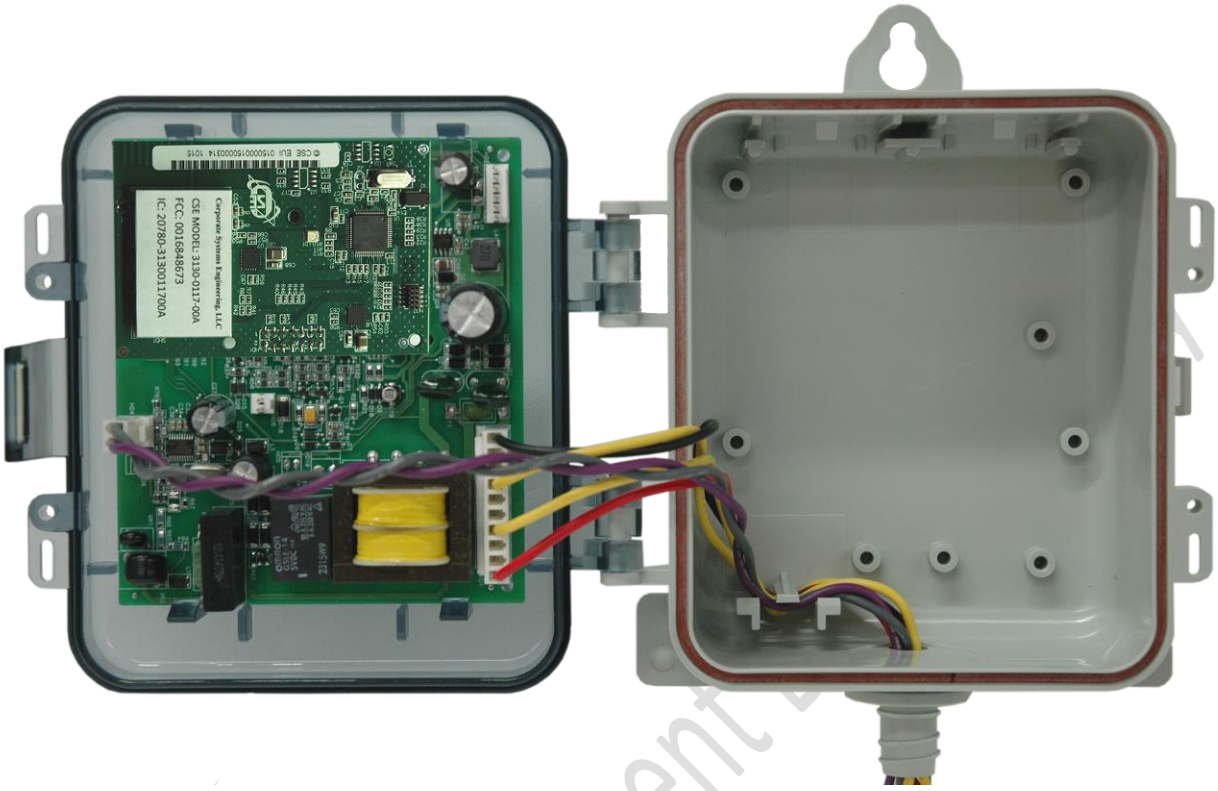
CSE Load Control Device

CSE Cisco Module Model 3130-0117-00A

Install the Cisco Communication Module as shown in the following images below:

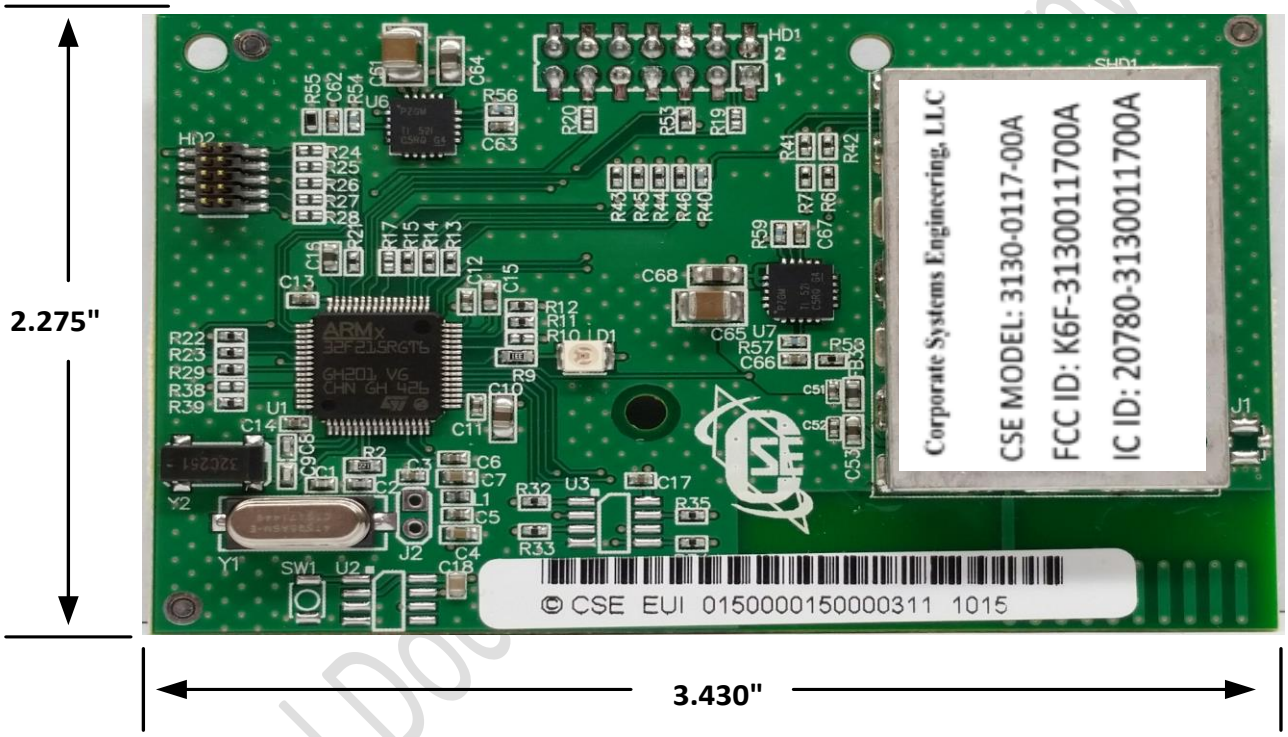


CSE Cisco Communication Module Placement



CSE Load Control Device with Installed Cisco Communication Module

COMMUNICATIONS BOARD



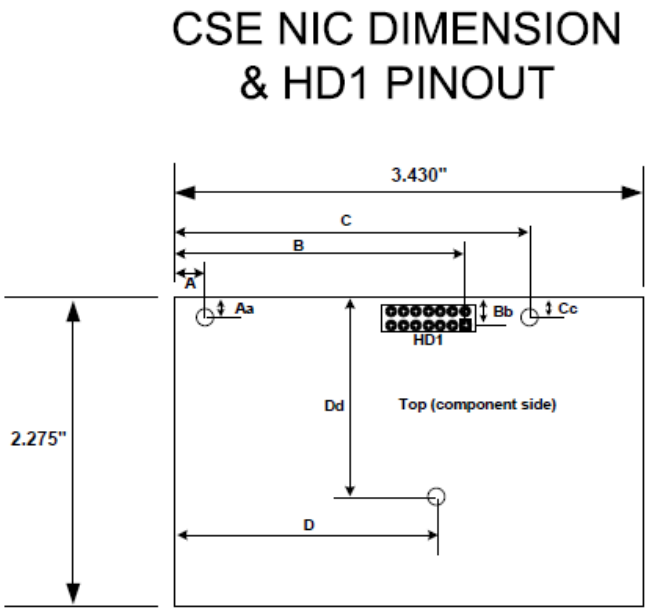
HD1 PINOUT

P1_5v	P2_NC
P3_NC	P4_IO
P5_NC	P6_GND
P7_GND	P8_IO
P9_NC	P10_NC
P11_IO	P12_RxD
P13_TxD	P14_NC

Connect Pin 12 to TxD of users MCU
Connect Pin 13 to RxD of users MCU

Demo Kit has 3.3v USB Cable provided.
5v 1A Desktop Power Supply Provided.

COMMUNICATIONS BOARD DIMENSIONS



A = 0.1580"
Aa = 0.1530"
B = 1.8290"
Bb = 0.2360"
C = 2.2045"
Cc = 0.1530"
D = 1.4930"
Dd = 1.4745"

HD1 PINOUT

Pin 1_+5v	Pin 2_NC
Pin 3_NC	Pin 4_CTS
Pin 5_EPF	Pin 6_GND
Pin 7_GND	Pin 8_NC
Pin 9_NC	Pin 10_NC
Pin 11_RTS	Pin 12_TxD
Pin 13_RxD	Pin 14_NC

FCC:

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

1. This device may not cause harmful interference, and

2. This device must accept any interference received, including interference that may cause undesired operation.

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

FCC Interference Statement (Part 15.105 (b))

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one of the following measures:

- Reorient or relocate the receiving antenna.

- Increase the separation between the equipment and receiver.

- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.

- Consult the dealer or an experienced radio/TV technician for help.

Industry Canada:

This Device complies with Industry Canada License-exempt RSS standard(s). Operation is subject to the following two conditions: 1) this device may not cause interference, and 2) this device must accept any interference, including interference that may cause undesired operation of the device.

Cet appareil est conforme avec Industrie Canada, exempts de licence standard RSS (s). Son fonctionnement est soumis aux deux conditions suivantes: 1) ce dispositif ne peut pas causer d'interférences, et 2) ce dispositif doit accepter toute interférence, y compris les interférences qui peuvent causer un mauvais fonctionnement de l'appareil.

Under Industry Canada regulations, this radio transmitter may only operate using an antenna of a type and maximum (or lesser) gain approved for the transmitter by Industry Canada. To reduce potential radio interference to other users, the antenna type and its gain should be so chosen that the equivalent isotropically radiated power (e.i.r.p.) is not more than that necessary for successful communication.

En vertu de la réglementation d'Industrie Canada, cet émetteur radio risquera uniquement à l'aide d'une antenne de type et de gain maximum (ou moins) pour l'émetteur a approuvé par Industrie Canada. Pour réduire les interférences radio potentielles à d'autres utilisateurs, le type d'antenne et son gain doivent être choisie que la puissance isotrope rayonnée équivalente (p.i.r.e.) n'est pas plus que celui nécessaire à une communication efficace.

OEM Responsibilities to comply with FCC and Industry Canada Regulations

The 3130-0117-00A Radio Module has been certified for integration into products only by OEM integrators under the following conditions:

To comply with FCC RF exposure limits for general population / uncontrolled exposure, the antenna(s) used for this transmitter must be installed to provide a separation distance of at least 10cm from all persons and operating in conjunction with any other antenna or transmitter.

To comply with Industry Canada RF exposure limits for general population / uncontrolled exposure, the antenna(s) used for this transmitter must be installed to provide a separation distance of at least 20cm from all persons and must not be operating in conjunction with any other antenna or transmitter

If the module is used in a multi-transmitter or simultaneous transmission host then the module must be evaluated and approved to one of the host platform exposure conditions. (Mobile exposure, Portable exposure or Mixed Mobile and Portable exposure).

However, the OEM Intergator is still responsible for testing their end-product for any additional compliance requirements required with this module installed (for example, digital device emissions, PC peripheral requirements, etc.).

IMPORTANT NOTE: In the event that this condition cannot be met (for certain configurations or co-location with another transmitter), then the FCC and Industry Canada authorizations are no longer considered valid and the FCC ID and IC Certification Number cannot be used on the final product. In these circumstances the OEM integrator will be responsible for re-evaluating the end product (including the transmitter) and obtaining a separate FCC and Industry Canada authorization.

Responsabilités OEM se conformer aux règlements de la FCC et Industrie Canada

Le Module Radio 3130-0117-00A a été certifié pour l'intégration dans des produits que par les intégrateurs OEM dans les conditions suivantes:
Pour se conformer aux limites d'exposition aux RF de la FCC Canada pour la population générale / exposition non contrôlée, l'antenne (s) utilisé pour cet émetteur doit être installé pour fournir une distance de séparation d'au moins 10cm de toutes les personnes et opérant en conjonction avec une autre antenne ou émetteur.

Pour se conformer à Industrie Canada RF limites d'exposition pour la population générale / exposition non contrôlée, l'antenne utilisée pour ce transmetteur doit être installée pour fournir une distance d'au moins 20 cm de toute personne et ne doit pas fonctionner en conjonction avec toute autre antenne ou transmetteur.

Si le module est utilisé dans un environnement multi-émetteur ou hôte de la transmission simultanée alors le module doit être évaluée et a approuvé l'une quelconque des conditions d'exposition de la plate-forme d'accueil. (Exposition mobile, l'exposition portable ou l'exposition mobile et portable mixte).

Toutefois, l'intégrateur OEM est toujours responsable de tester leur produit final pour toutes les exigences de conformité supplémentaires nécessaires avec ce module installé (par exemple, les émissions de périphériques numériques, les exigences périphériques de PC, etc.).

NOTE IMPORTANTE: Dans le cas où cette condition ne peut être respectée (pour certaines configurations ou co-location avec un autre émetteur), les autorisations de la FCC et d'Industrie Canada ne sont plus considéré comme valide et la FCC ID et IC Nombre de certification ne peut pas être utilisé sur le produit final. Dans ces circonstances, l'intégrateur OEM sera chargé de réévaluer le produit final (y compris l'émetteur) et l'obtention d'une autorisation distincte FCC et d'Industrie Canada.

End Product Labeling

The 3130-0117-00A Radio Module is labeled with its own FCC ID and IC Certification Number. If the FCC ID and IC Certification Number are not visible when the module is installed inside another device, then the outside of the device into which the module is installed must also display a label referring to the enclosed module. In that case, the final end product must be labeled in a visible area with the following:

"**Contains Transmitter Module FCC ID: K6F-3130011700A"**

"**Contains Transmitter Module IC: 20780-3130011700A"**

or

"**Contains FCC ID: K6F-3130011700A"**

"**Contains IC: 20780-3130011700A"**

Le module de 3130-0117-00A est étiqueté avec son propre ID de la FCC et IC numéro de certification. L'ID de la FCC et IC numéros de certification ne sont pas visibles lorsque le module est installé à l'intérieur d'un autre appareil, comme par exemple le terminal dans lequel le module est installé doit afficher une etiquette faisant référence au module cijoint. Le produit final doit être étiqueté dans un endroit visible par le suivant:

"Contient Module émetteur FCC ID: K6F-3130011700A"

"Contient Module émetteur IC: 20936-3130011700A"

ou

"Contient FCC ID: K6F-3130011700A"

"Contient IC: 20936-3130011700A"

The OEM integrator has to be aware not to provide information to the end user regarding how to install or remove this RF module or change RF related parameters in the user manual of the end product.

L'intégrateur OEM ne devraient pas fournir des informations à l'utilisateur final sur la façon d'installer ou de supprimer ce module RF ou modifier les paramètres liés RF dans le manuel utilisateur du produit final.

To comply with FCC RF exposure limits for general population / uncontrolled exposure, the antenna(s) used for this transmitter must be installed to provide a separation distance of at least 10cm from all persons and operating in conjunction with any other antenna or transmitter.

To comply with Industry Canada RF exposure limits for general population / uncontrolled exposure, the antenna(s) used for this transmitter must be installed to provide a separation distance of at least 20cm from all persons and must not be operating in conjunction with any other antenna or transmitter.

Pour se conformer à Industrie Canada RF limites d'exposition pour la population générale / exposition non contrôlée, l'antenne utilisée pour ce transmetteur doit être installée pour fournir une distance d'au moins 20 cm de toute personne et ne doit pas fonctionner en conjonction avec toute autre antenne ou transmetteur.

NOTES: