Software Embedded WLAN Module IEEE802.11b/g/n

WYSACVLAY-WX

Data Report

TAIYO YUDEN CO., LTD.

WYSACVLAY-WX

注意：本モジュールは、日本の輸出管理下にある API（Application Programming Interface）仕様を有します。お客様の国、または用途（兵器など）によっては、弊社は API 仕様を提出できない場合があります。お近くの弊社の営業所までお問い合わせ下さい。

お近くの弊社の営業所または製品情報につきましては、*www.ty-top.com*.をご参照ください。

WYSACVLAY-WX

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変更履歴

17-. 2020> Ver.1.0 Release

WYSACVLAY-WX

Control No.	Control name
HD-AG-A191017 (1/10)	一般事項書

1. 適用
本仕様書は、太陽誘電株式会社(”弊社”)により製造される Wireless LAN モジュール ”WYSACVLAY-WX”(“本製品”)に適用します。

2. 内容
① 品名 : WYSACVLAY-WX
認証型式 : WYSACVLAY

本製品を発注する時は、品名(WYSACVLAY-WX)をご使用ください。

② チップ : NXP 88MW320

③ 機能 : CPU 内蔵無線通信モジュール
(IEEE802.11 b/g/n 準拠)

太陽誘電スタンダードアプリケーションソフトウェア内蔵

④ 用途 : IoT 機器

⑤ 構造 : シリコンモノリシック半導体を用いた混成集積回路

本製品内の環境物質含有に関し、RoHS 指令に適合しています。

お客様での Pb フリー実装可否(本製品の耐熱性) :可能

⑥ 外形 : 44 ピン ランドグリッドアレイ

⑦ 表示 : シールドケース上に品名、ロット番号、電波法 ID (日本、FCC、ISED)、会社名を印字

⑧ 製造国 : 日本 または タイ

⑨ 梱包 : 梱包形態 : トレイ
梱包単位: 840pcs
標準発注数量: 840pcs の倍数

⑩ その他 :

a. 保証

i) 本製品の保証使用条件は本仕様書の通りです。本保証条件以外の条件で御使用になった結果発生した不良・不具合につきましては、弊社は責任を負い兼ねますので御了承下さい。また、過電圧等本保証条件以外の条件で御使用になった場合、ショートモードで破壊する場合があります。安全性の確保のために、フューズや過電流保護回路等の追加をお願い致します。

ii) 本製品を構成する部材の一部について、代替品を使用する場合があります。代替使用は、本仕様書に記載された保証範囲(特性、外形、使用条件、信頼性、公的規格(電波法等))、および品質に照らし、弊社にて代替(完全な置換え)が可能と判断致し

ました Wireless LAN IC 以外の部材を対象とさせて頂きます。尚、使用した部材種についての追跡性は製造ロット毎に確保されます。

b. 使用上の注意事項

i) 本製品は、耐放射線設計をしておりませんので、放射線のストレスを受ける環境下での使用は避けて下さい。

ii) 本製品と本製品又は他製品の通信は、周囲の電波環境及び機器環境により確立又は維持し難くなることがあります。

iii) 本製品は 2.4GHz 帯の周波数を使用しています。本製品を本製品と同じ周波数を使用した他の無線機器の周辺でご使用になりますと、本製品とかかる他の無線機器との間で電波干渉が発生する可能性があります。電波干渉が発生した場合、他の無線機器を停止するか、本製品の使用場所を変えるなど電波干渉の生じない環境でご使用下さい。

c. サポート条件

i) お客様の都合により、ハードウェアのカスタム対応が必要となった場合、弊社はお客様の依頼により、有償にて本対応を行います。但し、カスタムの内容によりましては、対応できない場合がありますので予めご了承ください。

ii) お客様にて、量産適用前後を問わず、本製品に起因する問題が生じた場合、弊社は問題解決のために要因の検討を行います。この結果、問題の要因が弊社にないことが判明した後のお客様へのサポートにつきましては、一部有償とさせて戴きますので、予めご了承願います。尚、この際のサポート費用につきましては、その都度両社協議の上、定めさせて頂きます。

iii) 本製品はハードウェアの変更は行わないで下さい。弊社の許可なく変更した場合に、その変更によって生じたすべての問題に対して弊社は一切責任を負いません。

iv) 弊社はお客様のファームウェアに依存する機能や性能の保証は致しかねます。また本製品を組み込んだお客様の製品の機能や性能、その他品質上の瑕疵・不具合、お客様の製品への組み込み上の瑕疵・不具合につきましても保証範囲外とさせて頂きます。

d. 保証期間

弊社は納入後一年間、本製品が本仕様書を満足することを保証します。
本仕様に記載のない事項については協議の上解決するものとします。

e. 仕様書の記載事項

i) 本仕様書に疑義の生じた場合は、打ち合わせにより解決します。

ii) 本一般事項書は、日本語の記載を主文とし、日本語で解釈されるものとします。
翻訳による副本はあくまで参照の目的のみであり、両当事者を法的に拘束するものではありません。

f. 内蔵ソフトウェアの使用とサポートについて

本製品のご使用にあたっては、以下の事項をご理解頂き、ご了解頂いた上でご使用ください。

i) 太陽誘電株式会社（以下、「弊社」といいます）は、本製品に内蔵された記憶装置に書込まれたソフトウェア （以下、「内蔵ソフトウェア」といいます)に関する著作権その他の権利を適法に有しています。弊社は、内蔵ソフトウェアの全部又は一部を問わず、本製品以外での使用、第三者への開示・提供（Webサイトへの内蔵ソフトウェアの掲載やそこからの第三者によるダウンロード等を含む）及び内蔵ソフトウェアの複製・改変・バージョンアップ・仕様変更、譲渡等 （解析調査；Reverse engineering 含む)を禁止させて頂きます。

ii) 本製品を使用される際には、必ず貴社にて事前に充分な安全性・動作性、他の機器との接続性・適合性等の評価を行い、使用に際し支障が無い事をご確認下さい。本納入仕様書の取り交わしをもって、貴社にて本製品（内蔵ソフトウェア含む）を評価・確認済みであるとみなされます。（貴社にて評価・確認された内蔵ソフトウェアを以下「承認ソフトウェア」といい、その型番等を本仕様書に記載・特定します）。

iii) 弊社は内蔵ソフトウェアに関して充分な評価を実施しておりますが、内蔵ソフトウェアのBug その他内蔵ソフトウェアに内在若しくは起因する不具合又は他の機器（貴社製品含む）との組合せによる内蔵ソフトウェアの不具合により、本製品の品質・性能に異常（以下、「潜在的不具合」といいます）が発生する可能性があります。貴社は、潜在的不具合に関し本納入仕様書の取り交わしをもって次の各号に定める事項について合意したものとみなさせて頂きます。

1) 潜在的不具合が貴社と弊社との間の契約上（過去・将来を問わない）又は法律上定められた瑕疵又は本製品としての欠陥には該当しないこと。

2) 潜在的不具合に起因して貴社に損害が生じた場合であっても、弊社に損害賠償請求その他いかなる請求もしないこと。

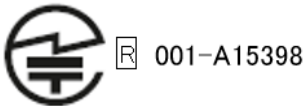
iv) 弊社では、あらゆる機器に対して本製品（内蔵ソフトウェア含む）の動作確認を実施しているわけではありません。また、本仕様書は、本製品において特定の機器への接続性・適合性等を保証するものではありません。内蔵ソフトウェアの潜在的不具合及び各機器との組合せ等により問題が発生した場合にその損害を最小限に止める為にも、本製品を使用する貴社製品に、内蔵ソフトウェアを書き換える為のインターフェイスや外部端子(詳細は本書“ピンレイアウト”を参照)を設けて戴くことを推奨致します。

v) 弊社は、原則として貴社の都合による承認ソフトウェアのバージョンアップや仕様変更のご要望はお引き受け致し兼ねます。

⑪ 日本規制情報

本製品は、特定アンテナとの組み合わせにおいて工事設計認証を受けた無線設備です。 御社製品にも下記を明示することが可能です。 製品が小さく明示できない場合には、製品の見やすい箇所(取扱説明書および梱包又は容器を含む)に明示することも可能です。 マークは、光学顕微鏡等の器具を使用せずに容易に識別できるサイズにしてください。

また、御社製品の取扱説明書には下記を明示することを推奨します。
本製品には、電波法に基づく小電力データ通信システムの無線局として、工事設計認証を受けた無線設備を内蔵しています。
WYSACVLAY ： 001-A15398



リージョンはデフォルトで US に設定されており、12 チャンネル(2467MHz)と 13 チャンネル(2472MHz)は使用できない状態になっております。最終製品でこれらのチャンネルを使用する必要がある場合は、リージョン設定を日本に変更して下さい。

⑫ カナダ規制情報

a) This device contains license-exempt transmitter(s)/receiver(s) that comply with Innovation, Science and Economic Development Canada’s license-exempt RSS(s). Operation is subject to the following two conditions:
(1) This device may not cause interference.
(2) This device must accept any interference, including interference that may cause undesired operation of the device.

本製品は、ISED の ライセンス免除の RSS 基準に適合した送信機/受信機を内蔵しています。
動作は下記の 2 条件に従います。
(1) 本製品は、妨害波の原因とはなりません。
(2) 本製品は、好ましくない装置動作の原因となるどのような妨害波を受信した場合も受け入れます。

Le présent appareil est conforme aux CNR Innovation, Sciences et Développement é conomique
Canada applicables au xapp ar eils radio exempts de licence. L’exploitation est autorisée aux deux conditions suivantes:
1) l’appareil ne doit pas produire de brouillage;
2) l’utilisateur de l’appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d’en compromettre le fonctionnement.

b) This equipment complies with ISED radiation exposure limits set forth for an uncontrolled environment and meets RSS-102 of the ISED radio frequency (RF) Exposure rules. This equipment should be installed and operated keeping the radiator at least 20cm or more away from person's body.

本製品は使用制限されていない環境での ISED の放射暴露限度値の規則に準じ、また ISED の無線周波数暴露規則の RSS-102 に合致しております。
本製品はアンテナを人体から少なくとも 20cm 又はそれ以上離してホスト製品に組み込み、運用してください。

Cet équipement est conforme aux limites d'exposition aux rayonnements énoncées pour un environnement non contrôlé et respecte les règles d'exposition aux fréquences radioé lectriques (RF) CNR-102 de l'ISED. Cet équipement doit être installé et utilisé en gardant une distance de 20 cm ou plus entre le radiateur et le corps humain.

c) Please notify certified ID by either one of the following method on your product.
本製品を組み込む製品には、認証 ID を下記いずれかの方法で記載をお願いします。
Specifiez ID certifiée dans votre produit par une de méthode suivante.

-Contains Transmitter module IC : 4389B-WYSACVLAY
-Contains IC : 4389B-WYSACVLAY

d) Please indicate your product name at any location on the exterior of the host product or product packaging or product literature, which shall be available with the host product or online.

本製品を組み込む製品には、ホスト製品の外部、または製品パッケージ、またはホスト製品と一緒に入手できる文書かオンラインで入手できる文書のどこかに、製品名称の記載をお願いします。

e) This product is certified under the conditions of using channels 1(2412MHz) to 11(2462MHz). Please set the region as CANADA or other which uses channels from 1 to 11. If channels 12(2467MHz) or 13(2472MHz) are used, it may violate the radio regulations.

本製品は、1(2412MHz)～11(2462MHz)チャンネルの使用条件下で認証を取得しております。カナダまたはその他の 1～11 チャンネルを使用するリージョンに設定して下さい。12(2467MHz) または 13(2472MHz)チャンネルを使用した場合は、法令に違反する可能性があります。

Ce produit est certifié pour une utilisation sur les canaux 1 (2412MHz) à 11 (2462MHz). Veuillez choisir la région CANADA ou toute autre région utilisant uniquement ces canaux. L'utilisation sur les canaux 12 (2467MHz) ou 13 (2472MHz) peut constituer une violation des r èglements sur les radiocommunications.

⑬ FCC 規制情報

a) 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.

本装置は FCC 規則第 15 章に準拠しています。動作は下記の 2 条件に従います。
(1) 本装置は、有害な妨害波の原因とはなりません。
(2) 本装置は、好ましくない装置動作の原因となるどのような妨害波を受信した場合も受け入れます。

b) Please notify certified ID by either one of the following method.
本製品を組み込む製品には、認証 ID を下記いずれかの方法で記載をお願いします。

-Contains Transmitter Module FCC ID: RYYWYSACVLAY
-Contains FCC ID: RYYWYSACVLAY

c) CAUTION: changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

適合に責任を持つ当事者によって承認されていない変更や改造は、装置運用の認定が無効となります。

d) This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment and meets the FCC radio frequency (RF) Exposure Guidelines. This equipment should be installed and operated keeping the radiator at least 20cm or more away from person's body.

本製品は使用制限されていない環境での FCC 放射暴露限度値の規則に準じ、また FCC 無線周波数暴露ガイドラインに合致しております。本製品はアンテナを人体から少なくとも 20cm 又はそれ以上離してホスト製品に組み込み、運用して下さい。

e) The antenna used for this transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

この無線機が使用するアンテナはいかなる他のアンテナ又は送信機と同一に配置しない、および同時に動作させないで下さい。

f) This module can change the output power depending on the circumstances by the application software which is developed by module installer. Any end user cannot change the output power.

このモジュールは、モジュール組み込み業者が開発するアプリケーションソフトウェアによって、状況に合わせて出力電力を設定できます。エンドユーザーは出力電力を変更することはできません。

g) This product is certified under the condition of using 1(2412MHz) to 11(2462MHz) channels. Region is set to US as default and 1 to 11 channels are used. Please set the region as default (US) and do not change. If 12(2467MHz) or 13(2472MHz) channels are used, it may violate the radio regulations.

本製品は、1(2412MHz)～11(2462MHz)チャンネルの使用条件下で認証を取得しております。 リージョンはデフォルトで US に設定されており、1～11 チャンネルが使用されます。リージョンをデフォルト(US)に設定し、変更しないで下さい。 12(2467MHz) または 13(2472MHz)チャンネルを使用した場合は、法令に違反する可能性があります。

h) Wireless LAN of this module complies with the following standards:
・ FCC part 15 Subpart C (2.4GHz band)

本モジュールの無線 LAN は以下の規格に適合しています。
・ FCC part 15 Subpart C (2.4GHz band)

i) This product is FCC approved only as a module. Manufacturers of final devices has a responsibility for the conditions which are not approved as a module. Please carry out the tests of FCC Part 15 Subpart B in case your final device installs this module.

本製品はモジュールとしてのみ FCC の認可を受けています。最終製品の製造者は、モジュールとして認可を受けていない条件に対する責任があります。本製品を搭載した最終製品は FCC Part 15 Subpart B の試験を行うようお願いいたします。

j) Co-location of this module with other transmitters that operate simultaneously are required to be evaluated using the FCC multi transmitter procedures. When installing this module to your final devices, please make sure to carry out all the necessary evaluations according to the applicable guidelines like follows:
-for RF exposure: KDB 447498, KDB 996369 and any other relevant guidelines
-for EMC: KDB 996369 D04 and any other relevant guidelines

同時に動作するその他送信機と一緒にこのモジュールを設置する場合、FCC マルチ送信機手順を使って評価する必要があります。最終製品に本モジュールを組み込む場合、適用する下記ガイドラインに従い必要な評価を行う必要があります。
-RF 暴露:KDB 447498、KDB 996369、その他適用するガイドライン
-EMC:KDB 996369 D04、その他適用するガイドライン

k) When you install this module to your final devices, please ensure that your final composite product complies with the applicable FCC rules in reference to a guidance in KDB 996369.

本モジュールを組み込む場合には、KDB996369 のガイダンスを参照し、最終製品が関連する FCC 規則に準拠していることを確認してください。

l) When you install this module to your final devices, please ensure to perform all the required equipment authorization and testing for the technical parameters which are not covered by the module grant (e.g., unintentional radiator Part 15 Subpart B requirements, or transmitters used in the host which are not previously approved as modules).

本モジュールを組み込む場合には、モジュールの認可ではカバーできない技術要件については追加で認証や測定を行ってください（Part 15B の非意図的放射器の要件やモジュールでは認可されていないその他送信機等）。

m) Antenna List
This module is approved along with the following antennas.
You cannot use any antennas other than the listed ones because it deviates from the accredited conditions

アンテナリスト
本製品は以下のアンテナとともに認可を受けています。
認可条件から逸脱するため、リスト化されたアンテナ以外は使用できません。

No.	Manufacture	Part No.	Antenna	Antenna Gain
1	TAIYO YUDEN	N/A (Printed on PCB)	Monopole	-2.9dBi @2.4GHz Band

⑭ CE 規制情報

a) When your end product installs this module, it is required to proceed additional certification processes before placing on the market in EU member states to make your products fully comply with relative EU standards. Additionally, if your end product is subject to the restrictions of RE Directive, Article 10.10, it is required to display the required information in addition to the certification processes.

本装置を内蔵する EU 加盟国で流通する製品は別途認証手続きが必要です。さらに、RE 指令 10.10 項に基づく制限の対象となる製品は、認証手続きに加えて表示要求への対応も必要です。

参照法令:
- ・Directive 2014/53/EU
- ・COMMISSION IMPLEMENTING REGULATION (EU) 2017/1354 of 20 July 2017 specifying how to present the information provided for in Article 10(10) of Directive 2014/53/EU of the European Parliament and of the Council

Restrictions to this product (as of June, 2018):
- ・Radio LAN operating in 5.15 – 5.35 GHz: restricted to indoor use only

本製品の制限事項（2018 年 6 月現在）
- ・5.15-5.35GHz の Radio LAN：使用は屋内のみ可能

Above regulations are referenced as of the issue date of this document. Since the aforementioned regulations have possibilities to be modified and added in the future, please make sure that you should always confirm the latest regulations.

上記法令は本仕様書発行時の情報です。上記法令は今後変更及び追加される可能性がございますので、お客様におかれましては常に最新の法令をご確認の上、ご対応をお願いします。

b) TAIYO YUDEN can provide you the test reports of conducted measurement portion for the radio module. You can utilize the test reports for the certification processes of your end product as it requires radio testing.

製品の認証手続きに無線部分の試験が必要となりますが、無線部分の Conducted 試験結果報告書を製品の認証の一部の資料としてご用意しています。

⑮ フランス規制情報

This radio module complies with European radiation exposure limits set forth for an uncontrolled environment and meets the European radio frequency exposure regulations. This radio module should be installed and operated keeping the radiator at least 20cm or more away from human body. When using this radio module within 20cm from human body, it can be required to proceed additional testing or evaluation for Specific Absorption Rate (SAR). When performing the additional SAR test or evaluation, please indicate the SAR value on your user instructions in a legible, intelligible and visible manner if your final device is being put into service and intended to be used in France.

本モジュールは制御されていない環境に対する欧州の人体暴露要求に準拠しており、欧州の関連規則に適合しています。本モジュールは人体との距離を 20cm 以上離して設置してください。人体から 20cm 以内の距離で使用する場合には、人体暴露の要求を満たすために追加の SAR 試験や評価が必要になることがあります。SAR の追加試験や評価を実施する場合には、フランスで使用される予定の最終製品の取扱説明書の中で見やすくわかりやすく目に見える形で SAR 値を記載してください。

参考法令（フランス）

-Order of amending the Order of 8 October 2003 on consumer information regarding radio terminal equipment issued pursuant to Article R20-10 of the Postal and Telecommunications Code, the Order of 8 October 2003 setting out the technical specifications applicable to radio terminal equipment and the Order of 12 October 2010 on displaying the specific absorption rate of radio terminal equipment
-Order of 8 October 2003 on consumer information regarding radio terminal equipment issued pursuant to Article R20-10 of the Postal and Telecommunications Code
-Order of 8 October 2003 setting out the technical specifications applicable to radio terminal equipment
-Order of 12 October 2010 on displaying the specific absorption rate of radio terminal equipment

Above regulations are referenced as of the issue date of this document. Since the aforementioned regulations have possibilities to be modified and added in the future, please make sure that you should always confirm the latest regulations.

上記法令は本仕様書発行時の情報です。上記法令は今後変更及び追加される可能性がございますので、お客様におかれましては常に最新の法令をご確認の上、ご対応をお願いします。

WYSACVLAY-WX

Control No.	Control name
HD-AM-A191017 (1/1)	絶対最大定格

絶対最大定格

Item	Symbol	Rating				Remark
		Min.	Typ.	Max.	Unit	
Supply voltage 1	VIO	-		3.63	V	
Supply voltage 2	VIOH	-		3.63	V	
Supply voltage 3	VIOF	-		3.63	V	
Supply voltage 4	V33	-		3.63	V	
Storage temperature range	Tstg	-40		85	Degrees C	
Operation temperature range	Topr	-30	25	85	Degrees C	

推奨動作条件

Item	Symbol	Rating				Remark
		Min.	Typ.	Max.	Unit	
Supply voltage 1	VIO	3.0	3.3	3.6	V	
Supply voltage 2	VIOH	3.0	3.3	3.6	V	
Supply voltage 3	VIOF	3.0	3.3	3.6	V	
Supply voltage 4	V33	3.0	3.3	3.6	V	

内蔵フラッシュメモリ特性

Item	Rating				Remark
	Min.	Typ.	Max.	Unit	
Write/Erase Cycle	10,000	-	-	Times	

DC 特性

ピーク電流 / 消費電力

Topr.=25℃、TYP 電圧供給時に適用

No.	Parameter	Condition	Symbol	Min.	Typ.	Max.	Unit	Remark
1	Peak Current	V33 peak current	Ip1	-		400	mA	
2	Power consumption3	Burst Tx (72.2Mbps)	Pc3	-	267	-	mW	Duty 4.2%
3	Power consumption4	Continuous Rx (72.2Mbps)	Pc4	-	271	-	mW	
4	Power consumption5	Burst Tx (54Mbps)	Pc5	-	347	-	mW	Duty 25.4%
5	Power consumption6	Continuous Rx (54Mbps)	Pc6	-	267	-	mW	
6	Power consumption7	Burst Tx (11Mbps)	Pc7	-	545	-	mW	Duty 46.8%
7	Power consumption8	Continuous Rx (11Mbps)	Pc8	-	267	-	mW	
8	Power consumption9	WLAN: Deep sleep and MPU: Stand By	Pc9	-	2	-	mW	Note1

Note1: 内蔵ソフトウェアのコマンド “WDPS1” および “WSBY0” 実行時。

デジタル端子 定格

No.	Parameter	Condition	Symbol	Min.	Typ.	Max.	Unit	Remark
1	Input high voltage		VIH	0.7*VIO	-	VIO+0.4	V	Note1
				0.7*VIOH	-	VIOH+0.4	V	Note2
2	Input low voltage		VIL	-0.4	-	0.3*VIO	V	Note1
				-0.4	-	0.3*VIOH	V	Note2
3	Output high voltage	I_{OH}=3Ma	VOH	VIO-0.5V	-	-	V	Note1
				VIOH-0.5V	-	-	V	Note2
4	Output low voltage	I_{OL}=4Ma	VOL	-	-	0.4	V	

Note1:IO ドメインが VIO の端子に適用.

Note2: IO ドメインが VIOH の端子に適用.

Control No.	Control name
HD-AE-A191017 (2/4)	電気的特性

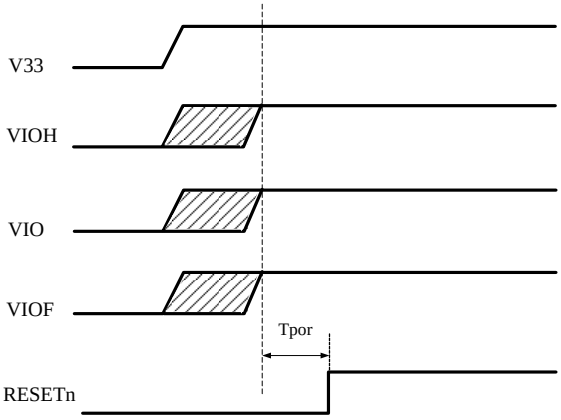
AC Specifications

AC 特性

パワーオンシーケンス

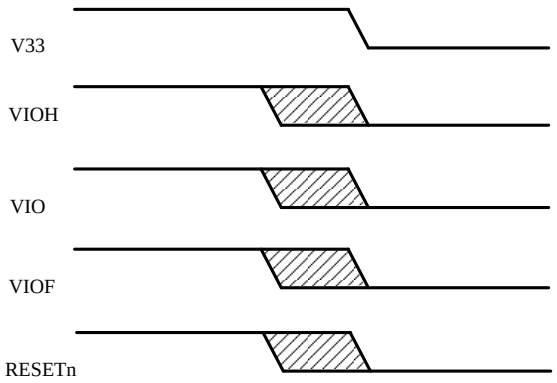
	Parameter	Condition	Symbol	Min	Typ	Max	Unit	Remark
1	Valid Power to RESETN de-asserted		Tpor	300	-	-	Ms	

V33 は VIOH、VIO、VIOF が起動する前または同時に起動して下さい。
RESETn 端子は V33 VIOH VIO VIF が起動後、Tpor 経過するまで、LOW レベルにしてください。V33、VIOH、VIO、VIOF は 0.15V 以下から起動して下さい。



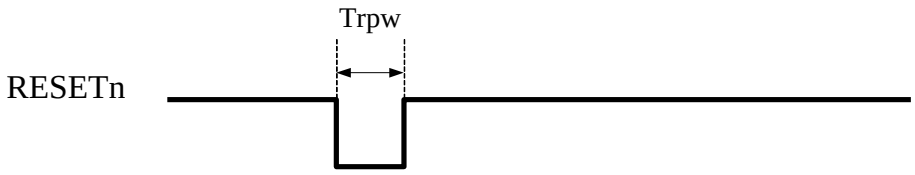
パワーオフシーケンス

V33 は VIOH VIO VIOF のあとに電源 OFF にしてください。
RESETn は VIO+0.4V を超えないようにしてください。



RESETn パルス幅

Parameter	Condition	Symbol	Min	Typ	Max	Unit
Minimum reset pulse width on RESETn pin	-	Trpw	300			ms



Control No.	Control name
HD-AE-A191017 (3/4)	電気的特性

RF 特性 (WLAN 11n/72.2Mbps, OFDM)

Topr.=25℃、TYP 電圧供給時に適用

No.	Parameter	Condition	Symbol	Min	Typ	Max	Unit	Remark
1	RF frequency range		FREQ	2412		2462	MHz	
2	TX Power		Po	7	9	11	dBm	
3	Spectrum Mask	1st Side Lobe	M1	-		-20	dBc	
		2nd Side Lobe	M2	-		-28	dBc	
		3rd Side Lobe	M3	-		-45	dBc	
4	Symbol clock tolerance		Ft	-25		25	ppm	
5	Frequency tolerance		Ft	-25		25	ppm	
6	EVM	Rms	EVM	-		-27	dB	
7	TX Out of band spurious1	30MHz to 1GHz	TOS1	-		-36	dBm	
8	TX Out of band spurious2	1GHz to 12.75GHz	TOS2	-		-30	dBm	
9	TX Out of band spurious3	1.8GHz to 1.9GHz 5.15GHz to 5.3GHz	TOS3			-47	dBm	
10	Rx sensitivity	PER<10%	SEN	-	-68	-64	dBm	
11	Maximum Input Level	PER<10%	MIL	-20		-	dBm	
12	RX Out of band spurious1	30MHz to 1GHz	ROS1	-		-57	dBm	
13	RX Out of band spurious2	1GHz to 12.75GHz	ROS2	-		-47	dBm	

RF 特性 (WLAN 11g/54Mbps, OFDM)

Topr.=25℃、TYP 電圧供給時に適用

No.	Parameter	Condition	Symbol	Min	Typ	Max	Unit	Remark
1	RF frequency range		FREQ	2412		2462	MHz	
2	TX Power		Po	7	9	11	dBm	
3	Spectrum Mask	1st Side Lobe	M1	-		-20	dBc	
		2nd Side Lobe	M2	-		-28	dBc	
		3rd Side Lobe	M3	-		-40	dBc	
4	Symbol clock tolerance		Ft	-25		25	ppm	
5	Frequency tolerance		Ft	-25		25	ppm	
6	EVM	Rms	EVM	-		-25	dB	
7	TX Out of band spurious1	30MHz to 1GHz	TOS1	-		-36	dBm	
8	TX Out of band spurious2	1GHz to 12.75GHz	TOS2	-		-30	dBm	
9	TX Out of band spurious3	1.8GHz to 1.9GHz 5.15GHz to 5.3GHz	TOS3			-47	dBm	
10	Rx sensitivity	PER<10%	SEN	-	-71	-65	dBm	
11	Maximum Input Level	PER<10%	MIL	-20		-	dBm	
12	RX Out of band spurious1	30MHz to 1GHz	ROS1	-		-57	dBm	
13	RX Out of band spurious2	1GHz to 12.75GHz	ROS2	-		-47	dBm	

Control No.	Control name
HD-AE-A191017 (4/4)	電気的特性

RF 特性 (WLAN 11b/11Mbps, CCK)

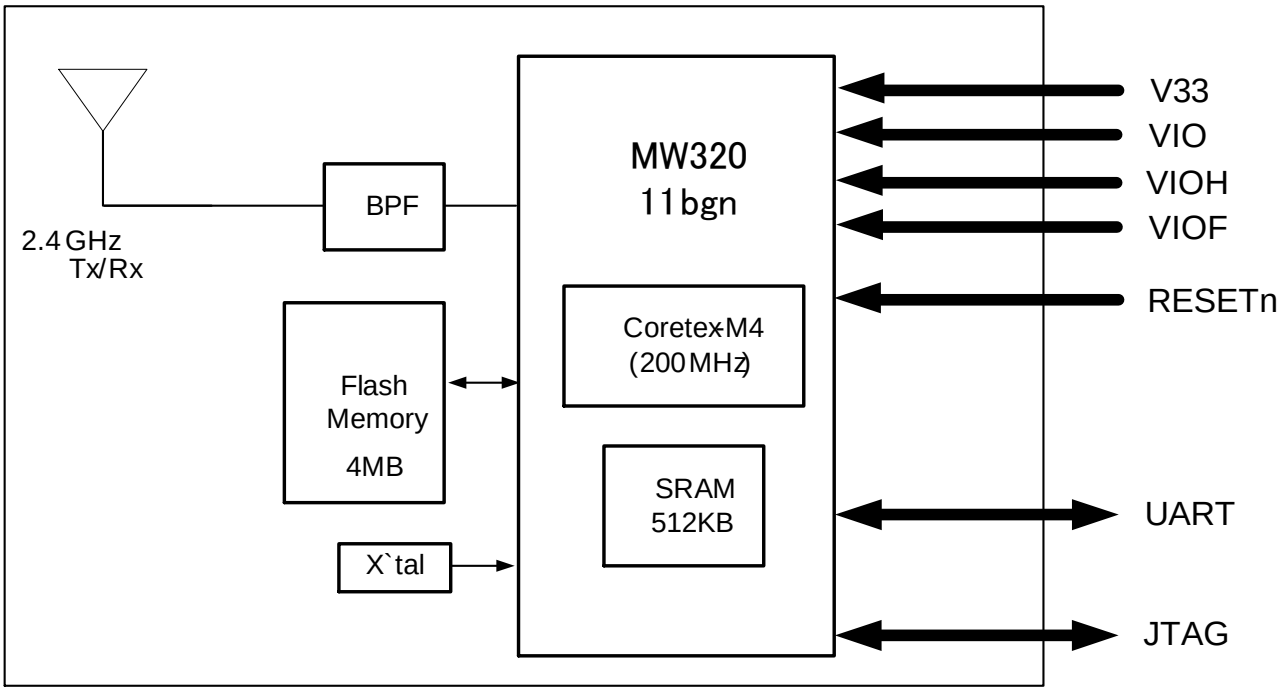
Topr.=25℃、TYP 電圧供給時に適用

No.	Parameter	Condition	Symbol	Min	Typ	Max	Unit	Remark
1	RF frequency range		FREQ	2412		2462	MHz	
2	TX Power		Po	13	15	17	dBm	
3	Spectrum Mask	1st Side Lobe	M1	-		-30	dBc	
		2nd Side Lobe	M2	-		-50	dBc	
4	Power up-down rump	Power up	TU	-		2	us	
		Power down	TD	-		2	us	
5	Frequency tolerance		Ft	-25		25	ppm	
6	EVM	Peak	EVM	-		35	%	
7	TX Out of band spurious1	30MHz to 1GHz	TOS1	-		-36	dBm	
8	TX Out of band spurious2	1GHz to 12.75GHz	TOS2	-		-30	dBm	
9	TX Out of band spurious3	1.8GHz to 1.9GHz 5.15GHz to 5.3GHz	TOS3			-47	dBm	
10	Rx sensitivity	PER<8%	SEN		-86	-76	dBm	
11	Maximum Input Level	PER<8%	MIL	-10			dBm	
12	RX Out of band spurious1	30MHz to 1GHz	ROS1	-		-57	dBm	
13	RX Out of band spurious2	1GHz to 12.75GHz	ROS2	-		-47	dBm	

WYSACVLAY-WX

Control No.	Control name
HD-MC-A191017 (1/2)	回路図

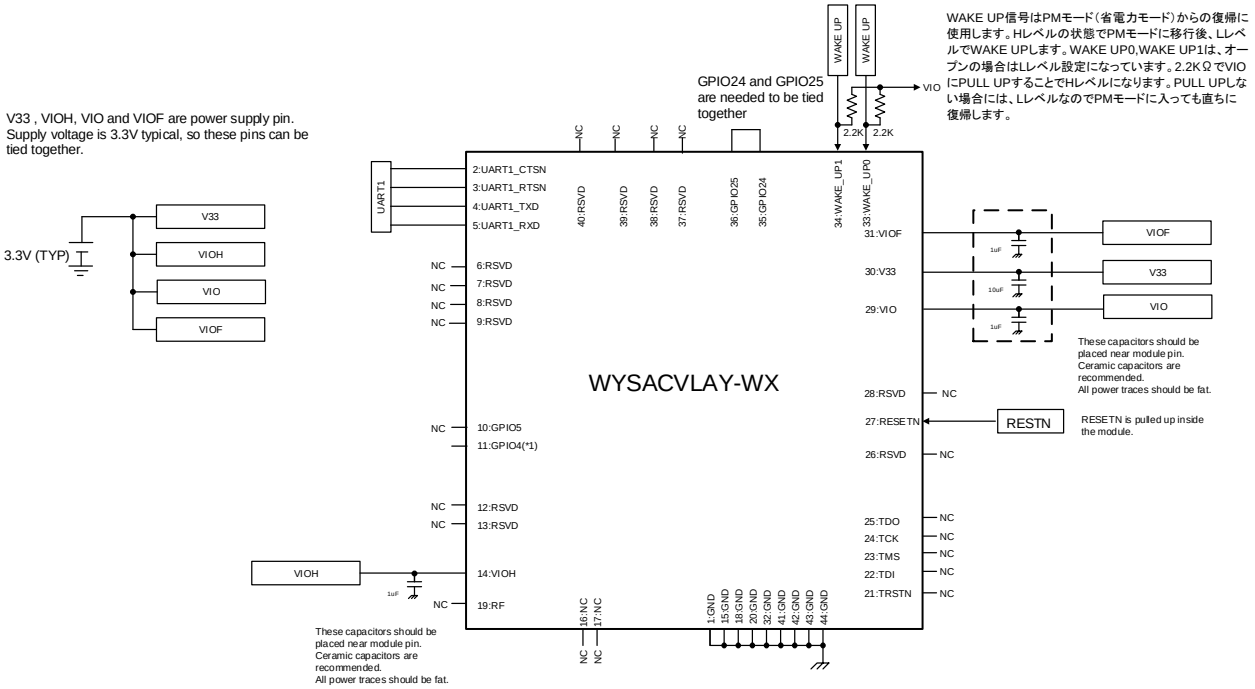
ブロックダイアグラム



Control No.	Control name
HD-MC-A191017 (2/2)	回路図

推奨周辺回路

HOST interface : UART 1



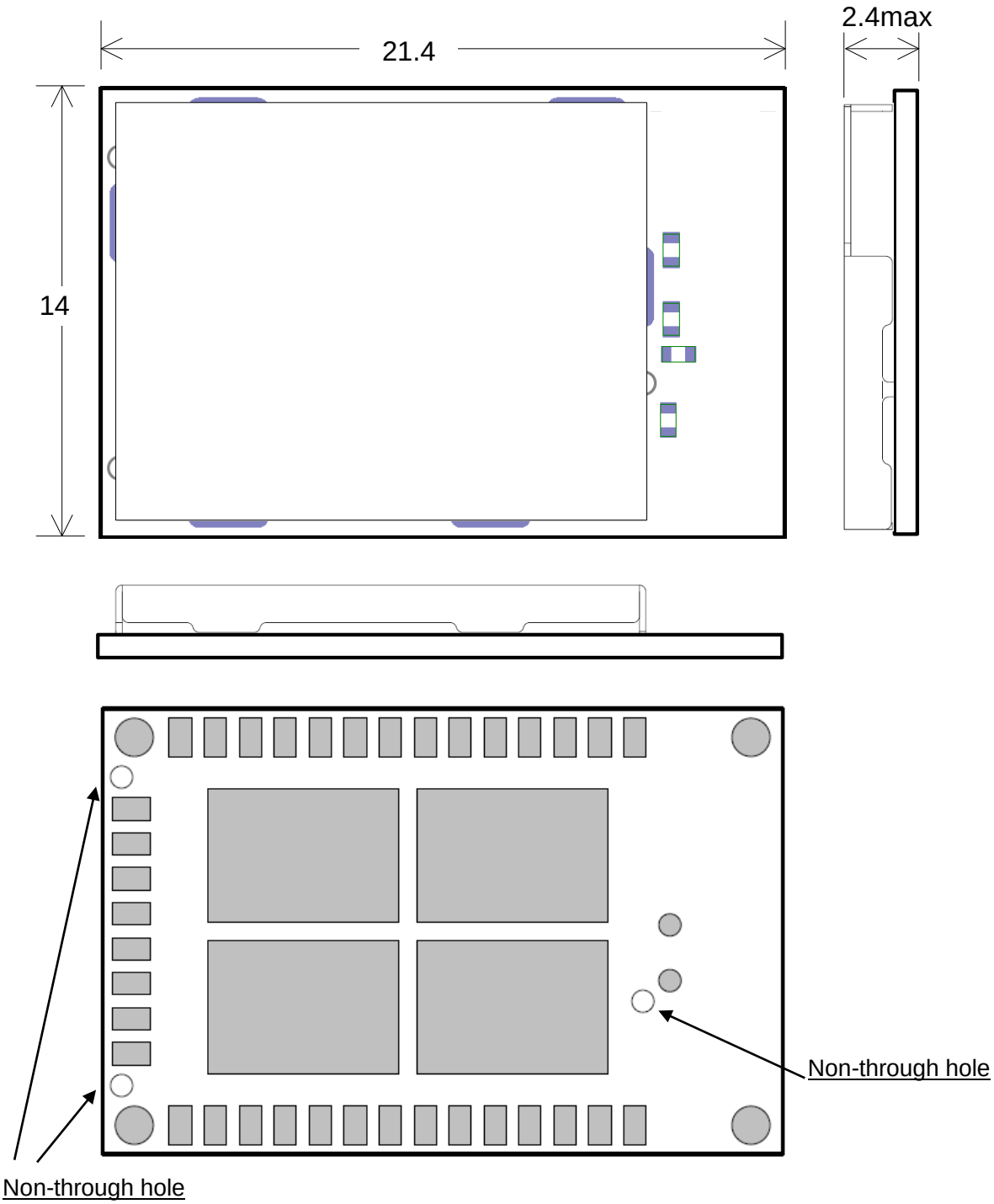
Note1 : All IO pins should be left open (no need to pull-up or pull-down) if not used.
(*1): GPIO4 are able to used as configuration pin.
Please refer to specification of embedded software for more detail.

WYSACVLAY-WX

Control No.	Control name
HD-AD-A191017 (1/5)	外形外観図

外形寸法図

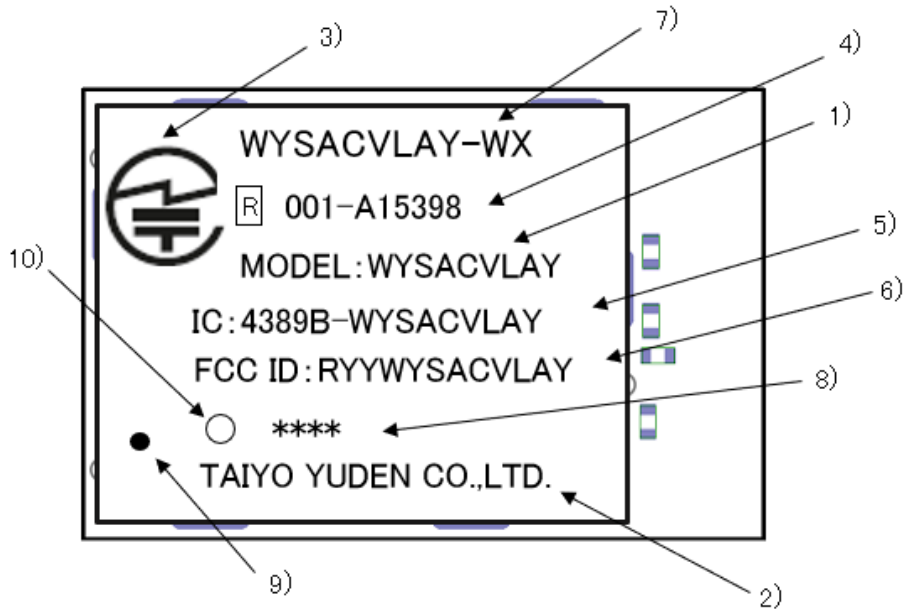
単位: mm, 交差 +/−0.2mm



(TOP VIEW)

Control No.	Control name
HD-AD- A191017 (2/5)	外形外観図

シールドケース表示

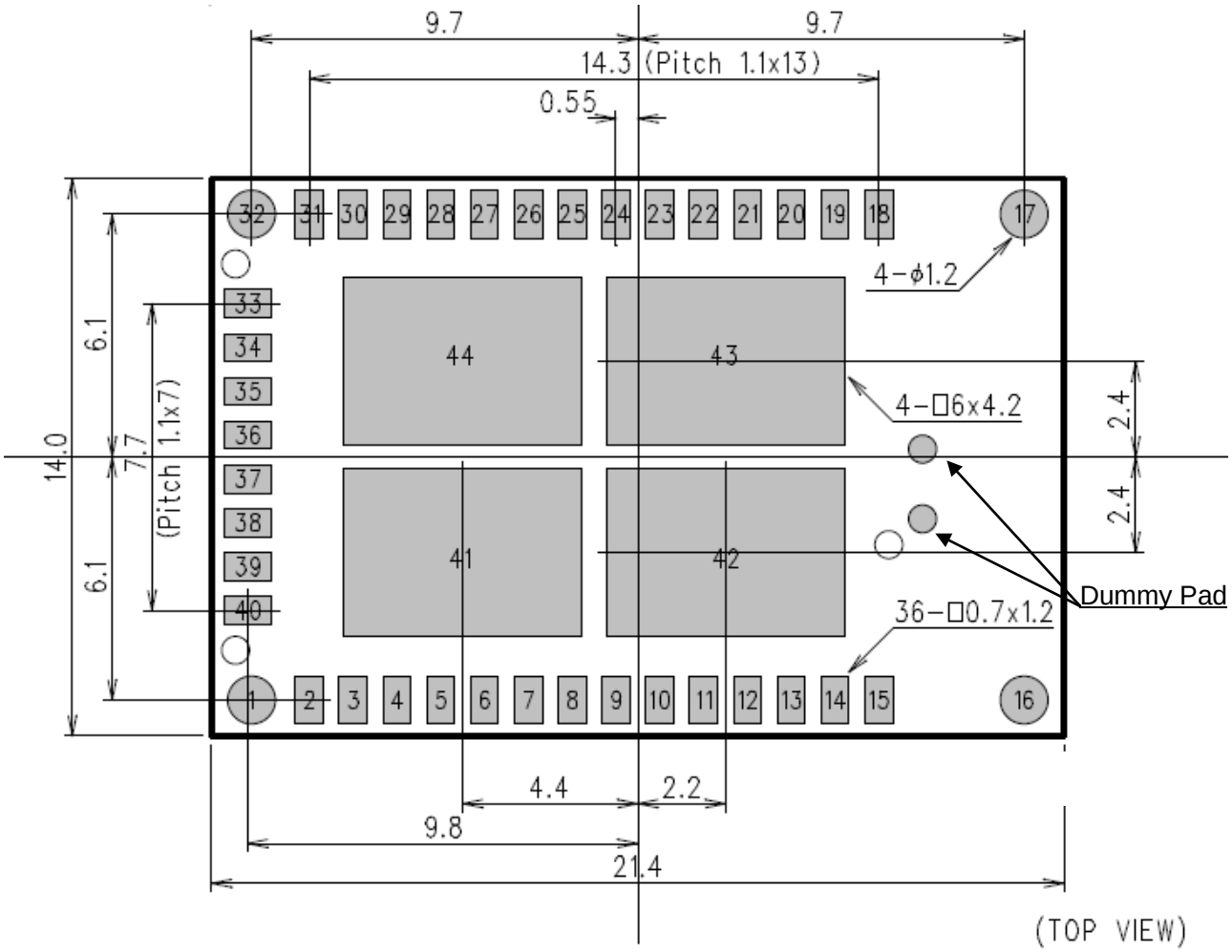


1) Model : WYSACVLAY
2) Manufacture : TAIYO YUDEN CO.,LTD.
3) Japan logo mark : Specified logo mark
4) Japan ID : 001-A15398
5) IC ID : 4389B-WYSACVLAY
6) FCC ID : RYYWYSACVLAY
7) Part Number : WYSACVLAY-WX
8) Lot number : Four digits
9) 1pin mark : φ0.6mm hole on the shield case
10) Identifying mark

Control No.	Control name
HD-AD- A191017 (3/5)	外形外観図

モジュール端子寸法

単位: mm



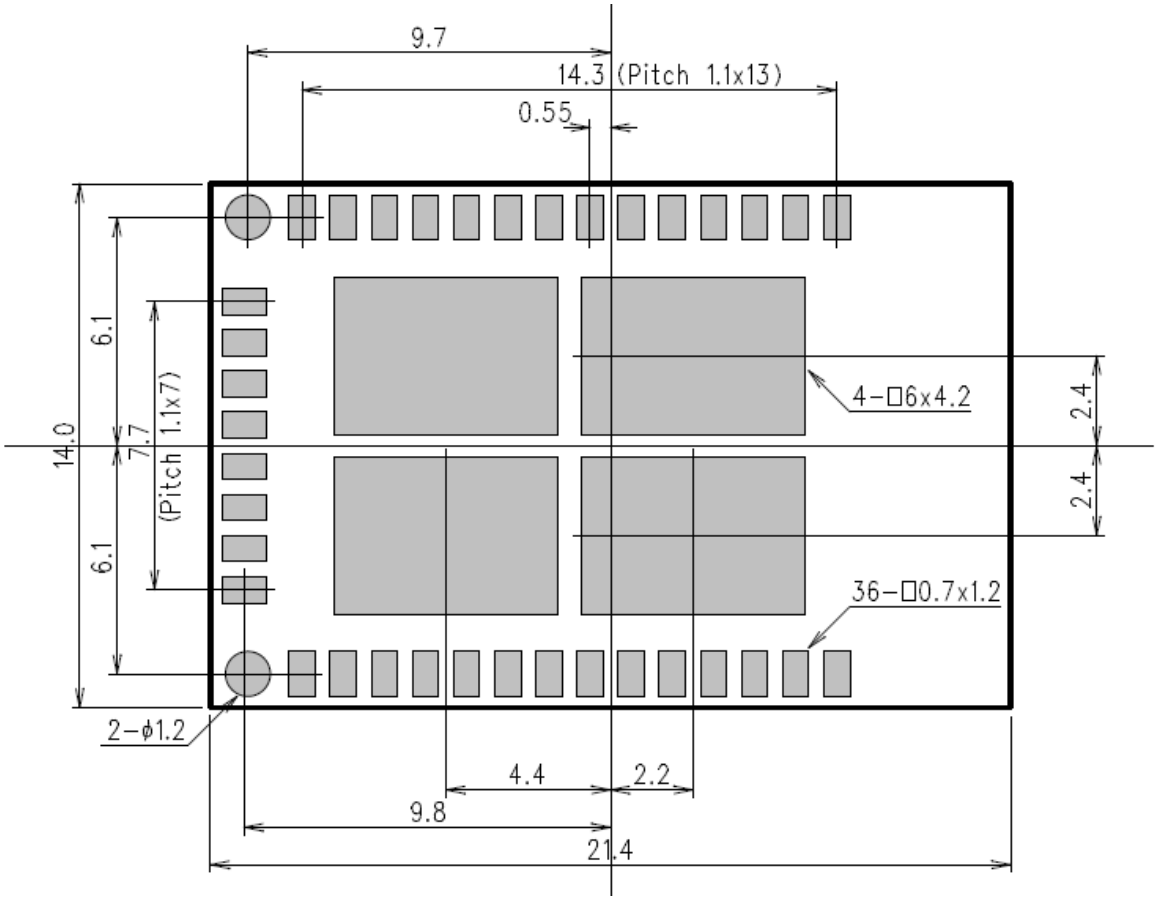
Control No.	Control name
HD-AD- A191017 (4/5)	外形外観図

単位: mm

推奨ランドパターン

Pad−16, Pad−17 を除いて、マザーボードのパッドサイズはモジュールのパッドサイズと同じにすることを推奨します。Pad−16, Pad−17 はマザーボードへのハンダ付けおよびランドパターンは不要です。

(Top View)



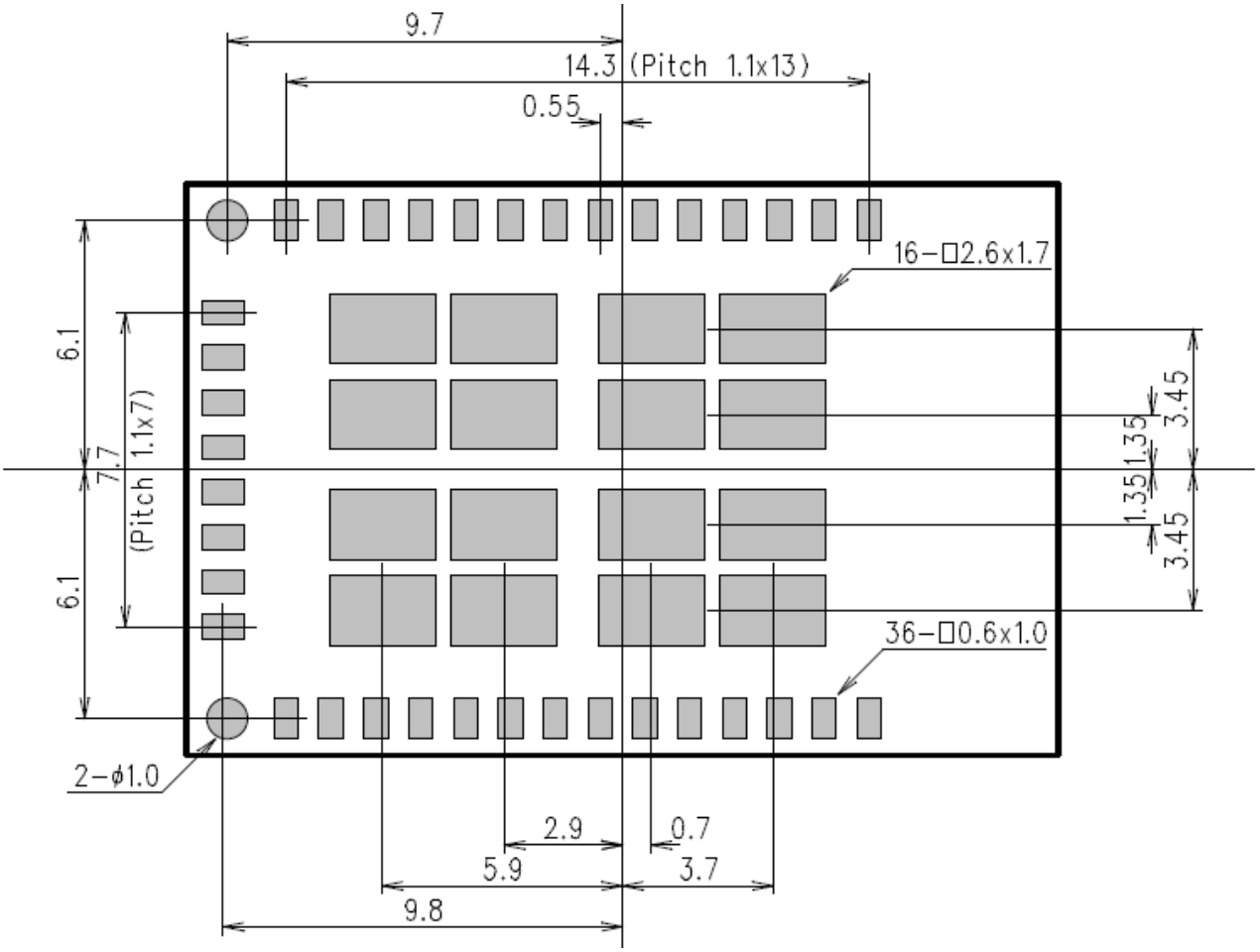
WYSACVLAY-WX

Control No.	Control name
HD-AD-A191017 (5/5)	外形外観図

単位: mm

推奨ハンダ印刷メタルマスク

マスク寸法は下記をご参照下さい。メタルマスクの厚みは 0.1mm を推奨します。



Control No.	Control name
HD-BA-A191017 (1/2)	ピンレイアウト

Pin No	module pin name	type	power domain	Description	Note
1	GND	-	Ground	GND	
2	UART1_CTSn	I	VIO	UART1 CTSn (L:Clear to send, H:Not clear to send)	
3	UART1_RTSn	O	VIO	UART1 RTSn(L:Request to send, H:Not request to send)	
4	UART1_TXD	O	VIO	UART1 TXD	
5	UART1_RXD	I	VIO	UART1 RXD	
6	RSVD	-	-	No Connect. Should be left open	
7	RSVD	-	-	No Connect. Should be left open	
8	RSVD	-	-	No Connect. Should be left open	
9	RSVD	-	-	No Connect. Should be left open	
10	GPIO5	I	VIOH	Not used. Should be left open	Not used
11	GPIO4	I	VIOH	Used to force initialization.(*1)	
12	RSVD	-	-	No Connect. Should be left open.	
13	RSVD	-	-	No Connect. Should be left open.	
14	VIOH	I	VIOH	I/O Digital Power Supply	
15	GND	-	Ground	GND	
16	N.C	-	-	Dummy pad. No connect and do not solder.	
17	N.C	-	-	Dummy pad. No connect and do not solder.	
18	GND	-	Ground	GND	
19	RF	I/O	-	WLAN RF Interface (2.4 GHz Transmit/Receive) Should be left open and do not trace longer than land pattern.	
20	GND	-	Ground	GND	
21	TRSTn	I	VIOH	JTAG-TRSTN (Active L)	Not used
22	TDI	I	VIOH	JTAG-TDI	Not used
23	TMS	I	VIOH	JTAG-TMS	Not used
24	TCK	I	VIOH	JTAG-TCK	Not used
25	TDO	O	VIOH	JTAG-TDO	Not used
26	RSVD	-	-	No Connect. Should be left open.	

Control No.	Control name
HD-BA-A191017 (2/2)	ピンレイアウト

Pin No	module pin name	type	power domain	Description	Note
27	RESETn	I	VIO	RESET signal (Active low) Pulled up to VIO by 51K ohm register inside the module.	
28	RSVD	-	-	No Connect. Should be left open.	
29	VIO	I	VIO	I/O Digital Power Supply	
30	V33	I	V33	3.3V Power Supply	
31	VIOF	I	VIO_F	I/O Digital Power Supply	
32	GND	-	Ground	GND	
33	WAKE_UP0	I	VIO	Wakeup-0 signal (Active L). Should be pulled up to VIO with 2.2K ohm register outside the module.	
34	WAKE_UP1	I	VIO	Wakeup-1 signal (Active L). Should be pulled up to VIO with 2.2K ohm register outside the module.	
35	GPIO24	I/O	VIO	GPIO24 and GPIO25 are used to calibrate RC32k inside the module. Tie GPIO24 and GPIO25 outside the module and do not tie other signal.	
36	GPIO25	I/O	VIO	GPIO24 and GPIO25 are used to calibrate RC32k inside the module. Tie GPIO24 and GPIO25 outside the module and do not tie other signal.	
37	RSVD	-	-	No Connect. Should be left open.	
38	RSVD	-	-	No Connect. Should be left open.	
39	RSVD	-	-	No Connect. Should be left open.	
40	RSVD	-	-	No Connect. Should be left open.	
41	GND	-	Ground	GND	
42	GND	-	Ground	GND	
43	GND	-	Ground	GND	
44	GND	-	Ground	GND	

Note: IO pins should be left open if not used, unless otherwise noted.

(*1) Please refer to the specification of embedded software for more detail.

WYSACVLAY-WX

Control No.	Control name
HQ-BA-537 (1/2)	取扱注意要領

本書類では特に実装時の御願い・条件について記載します。

御願い・条件

(1) 使用・保管環境の管理

1. 弊社出荷時の防湿梱包状態で保管する場合、**40**℃**/90%RH**以下の環境で保管してください。
2. 工程の環境は**30**℃**/60%RH**以下に管理してください。
3. モジュールを開梱状態で保管する(工程間の滞留含む)場合、**25±5**℃**/10%RH**以下の環境で保管してください。

(2) 製品取扱時の御願い・条件

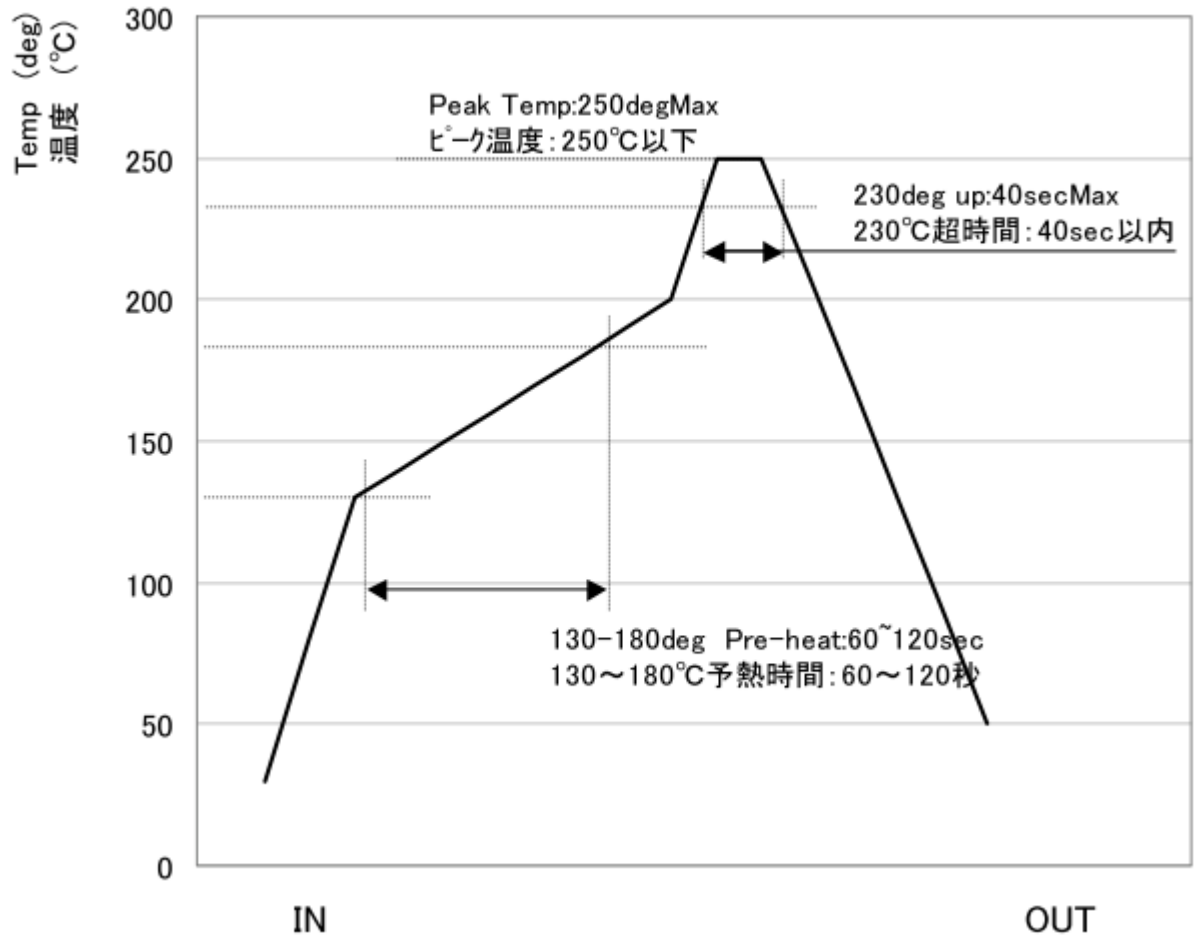
防湿梱包品入庫後、防湿袋に穴、裂け、キズ等のない事を確認してください。万が一異常があった場合、(2)-2項に従い、処置をお願い致します。

梱包に貼付のラベルをご参照ください。

1. 梱包日から**12**ヶ月以内に全ての実装(リフロー)作業(リワーク含む)を終了してください。
2. 防湿梱包開梱後、直ちに湿度インジケーターにて梱包内の環境が＜**10%RH** であることを確認してください。
3. 開封後**168**時間以内に全ての実装作業(リワーク含むリフロー作業)を終了してください。
   本モジュール以外の実装作業含みます
4. (1)項、及び(2)-2・(2)-3の基準からはずれた場合、**125**℃ **24h**にてベーキングを行ってください。
5. (2)-4項記載の条件によるベーキングは1回を原則とします。
6. 本モジュールは内部に半導体を有するため、取扱中には静電気に留意してください。(100V以下)
   必要に応じて、導電マット・アースバンド・静電靴・イオナイザー等を用いて、静電気の対策を講じてください。
7. 機械的振動、衝撃を極力少なくし、落下させないでください。
8. モジュールを実装する際には、裏面の電極を認識してください。
9. 本製品の洗浄は推奨しません。洗浄を行う場合は、洗浄、乾燥後に本製品機能を十分に確認してからご使用ください。尚、本製品への洗浄における不具合に関しましては、当社は一切の責任を負いません。
10. モジュールのリフロー時温度条件は、下記の範囲内で行って下さい。

    リフロー回数は最大2回として下さい。

推奨リフロープロファイル



WYSACVLAY-WX

TAIYO YUDEN CO., LTD.

Control No.	Control name
HD-BB-A191017 (1/2)	梱包仕様書

Packaging Specification
梱包仕様

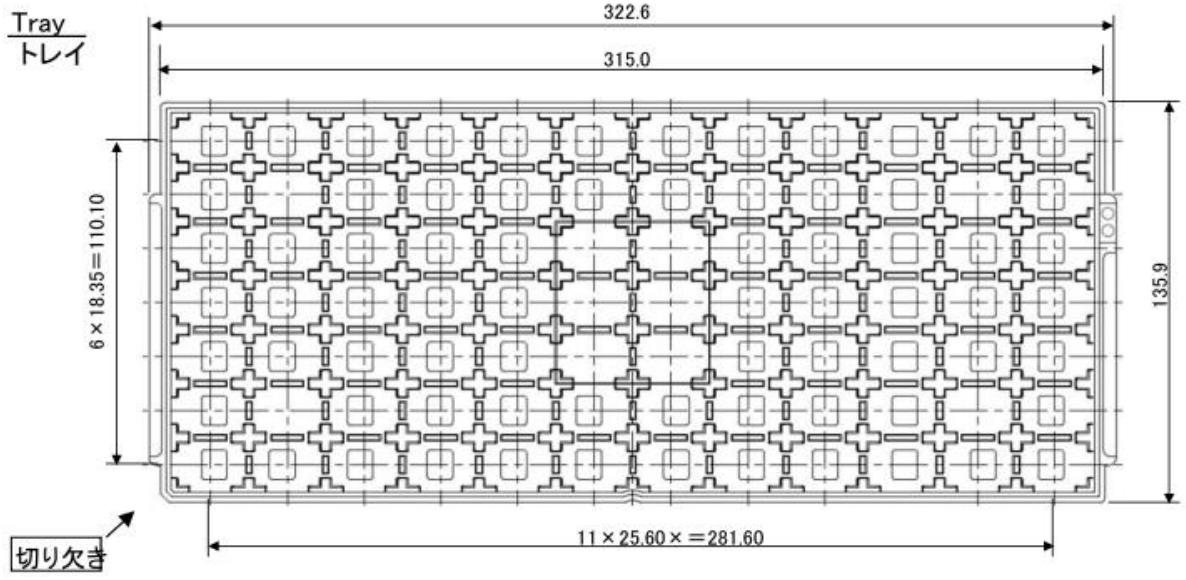
(1) Packaging Material
梱包材料

Name 部材名	Outline 概要	Materials 材質	Note 備考
Tray トレイ	315×135.9×7.62(mm)	Conductive PPE 導電性PPE	84 pieces/tray 84 個/トレイ
Antistatic band 帯電防止結束バンド	8mm wide 8mm幅	Antistatic PP 帯電防止 PP	—
Desiccant 乾燥剤	—	Desi-Pak デシパック	—
Humidity indicator card 湿度インジケータ	—		—
Aluminum moisture barrier bag アルミ防湿袋	260×460(mm)	(AS)PET/AL/NY/PE(AS)	—
Buffer corrugated paper 緩衝ダンボール	—	Corrugated fiberboard. ダンボール	—
Label ラベル	—	—	—
Corrugated cardboard boxx 個装箱	345×205×95(mm)	Corrugated fiberboard. ダンボール	—

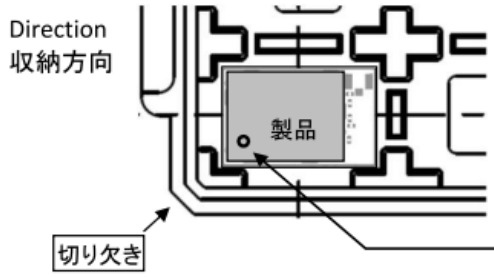
(2) Packaging Unit
梱包数量

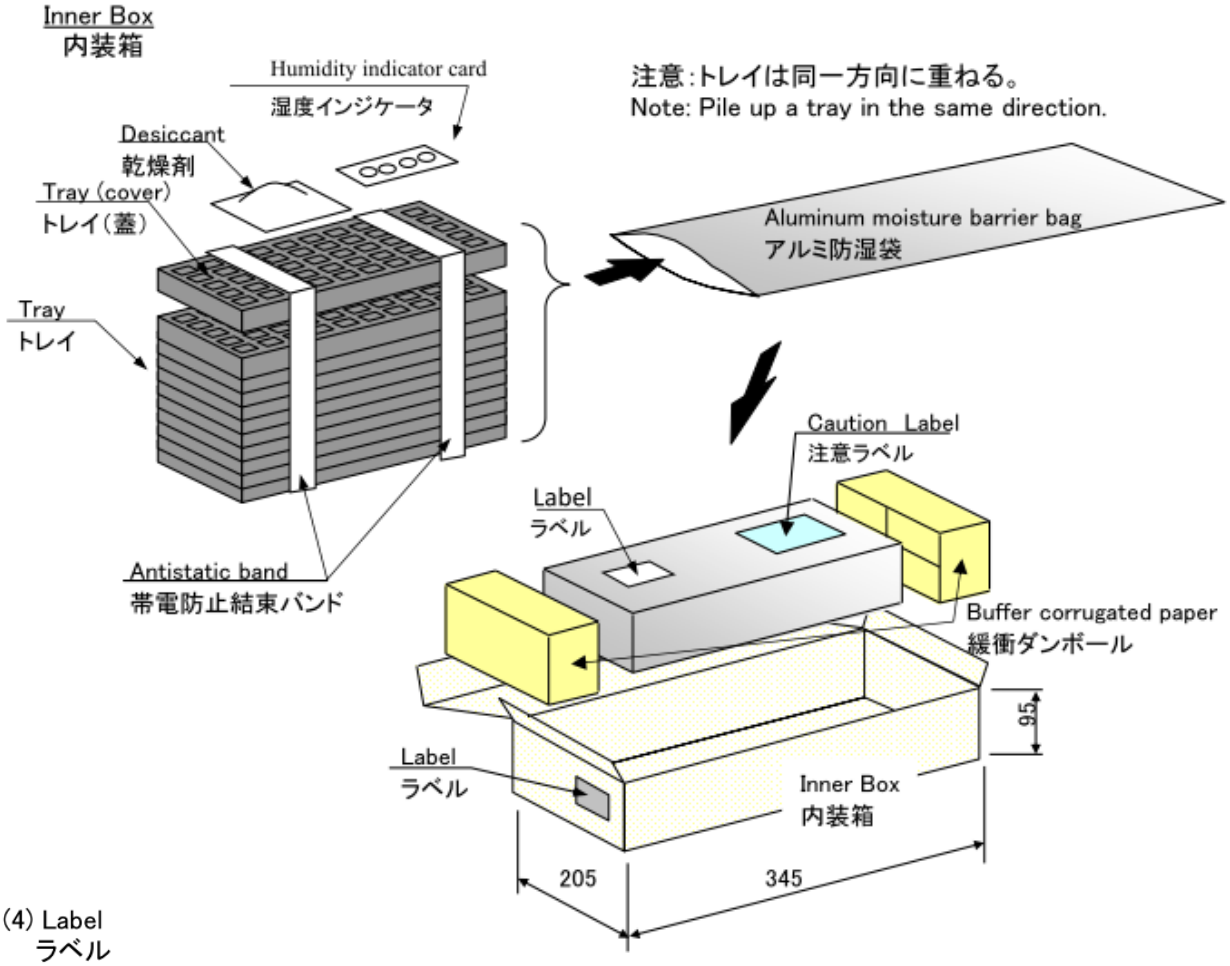
84 pieces/tray × 10 tray = 840 pieces
84 個/トレイ × 10 トレイ = 840 個

(3) Packaging Figure
梱包形態



Control No.	Control name
HD-BB-A191017 (2/2)	梱包仕様書





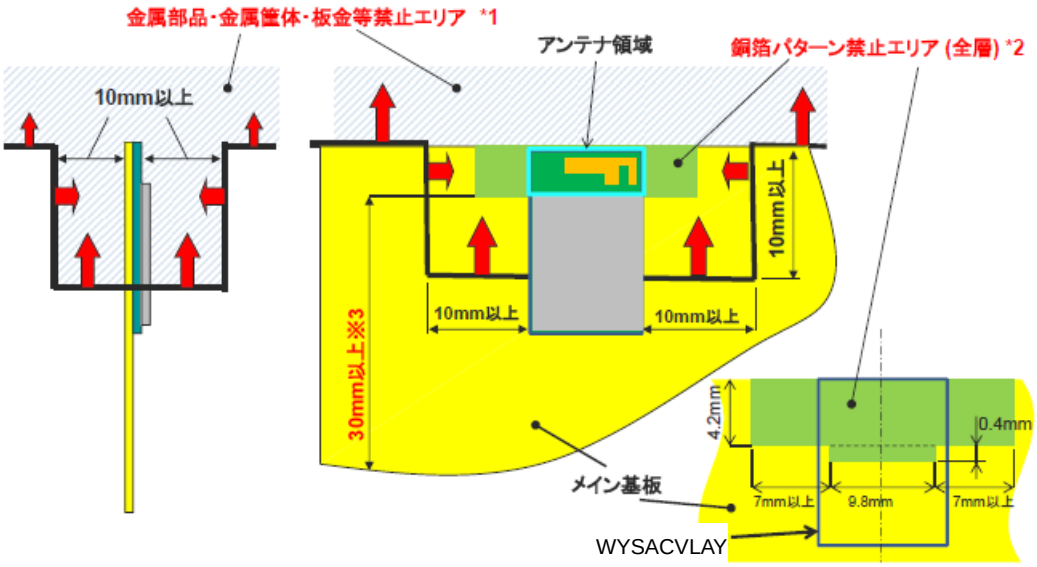
(4) Label
ラベル

The entry item to a label
ラベルへの記載内容

COMPANY NAME	御社名
DESCRIPTION	品名
QUANTITY	納入数量
LotNo.	ロット
NOTE	備考
COUNTRY OF ORIGIN	原産国

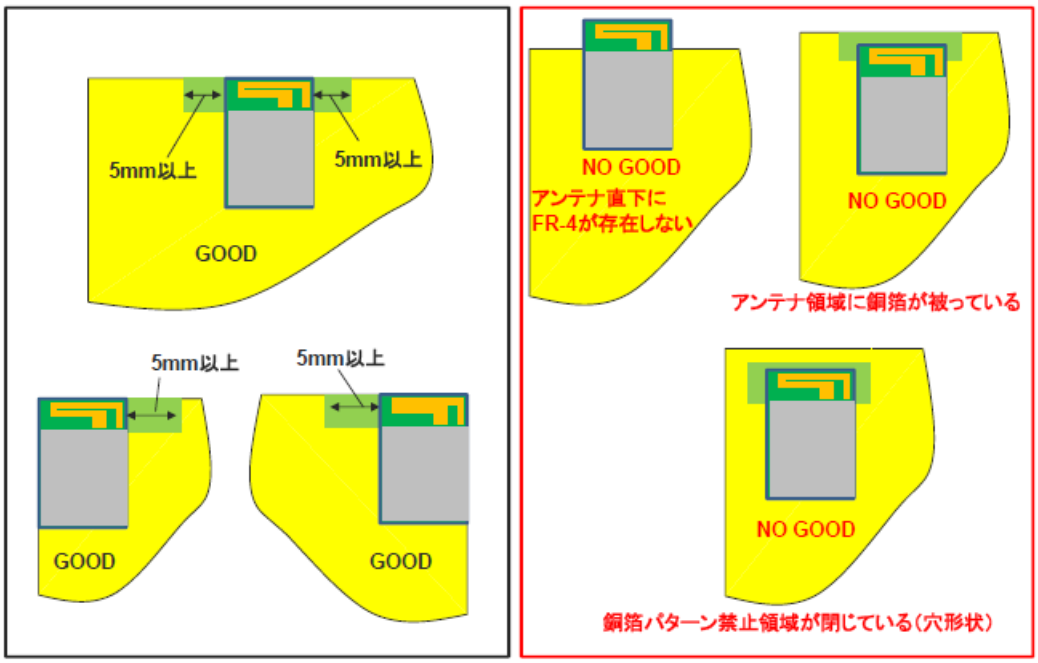
Control No. (1/3)	Control name アンテナアプリケーションノート

1. メイン基板へのモジュール実装例 (当社推奨)



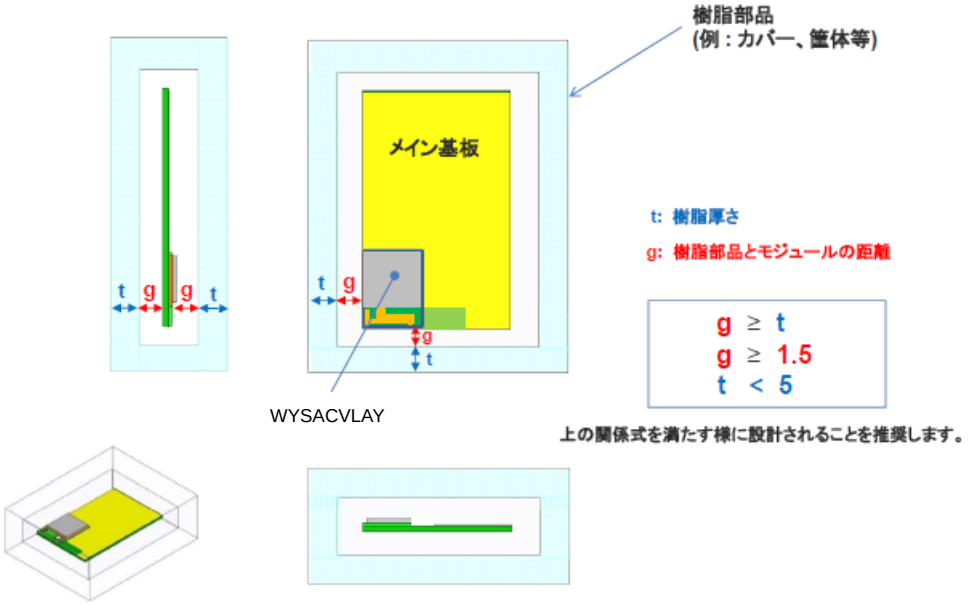
・赤矢印が指す斜線の空間内には、メイン基板以外の金属部品(配線、金属筐体、金属めっきの樹脂など)が無い様にしてください。
但し、メイン基板上への部品実装は銅箔パターン禁止エリア(*2)を除き問題ありません。
・メイン基板上のGNDパターン長(※3)が30mmを下回るとアンテナ性能が低下しますので、できる限り30mm以上としてください。
・本条件を満足している場合でも、製品の構造によっては通信性能が著しく低下する場合があります。

2. その他の実装例



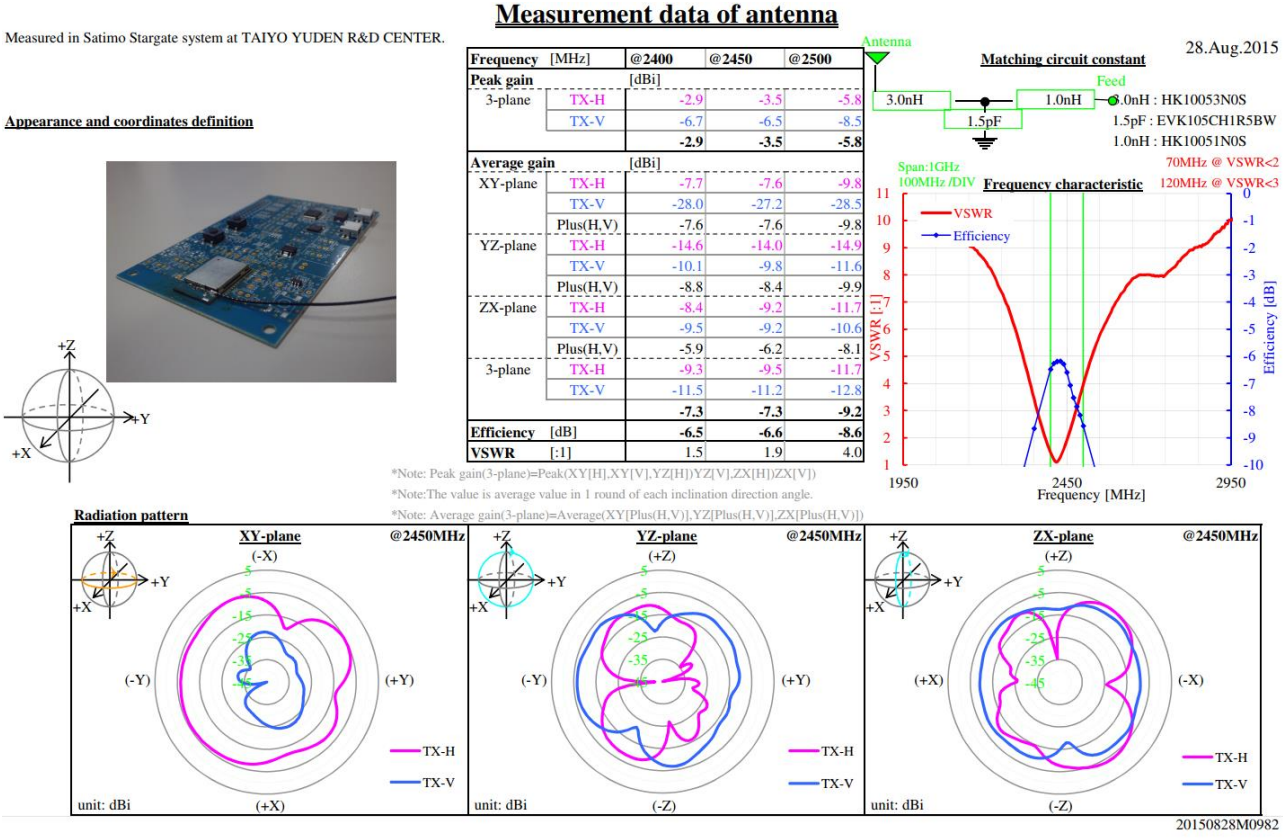
Control No. (2/3)	Control name アンテナアプリケーションノート

3. 樹脂部品の配置について



Please do not apply molding over the antenna area of WYSACVLAY.

4. 指向性特性例（評価基板実装時）



Frequency [MHz]		@2400	@2450	@2500
Peak gain		[dBi]		
3-plane	TX-H	-2.9	-3.5	-5.8
	TX-V	-6.7	-6.5	-8.5
		-2.9	**-3.5**	**-5.8**
Average gain		[dBi]		
XY-plane	TX-H	-7.7	-7.6	-9.8
	TX-V	-28.0	-27.2	-28.5
	Plus(H,V)	-7.6	-7.6	-9.8
YZ-plane	TX-H	-14.6	-14.0	-14.9
	TX-V	-10.1	-9.8	-11.6
	Plus(H,V)	-8.8	-8.4	-9.9
ZX-plane	TX-H	-8.4	-9.2	-11.7
	TX-V	-9.5	-9.2	-10.6
	Plus(H,V)	-5.9	-6.2	-8.1
3-plane	TX-H	-9.3	-9.5	-11.7
	TX-V	-11.5	-11.2	-12.8
		-7.3	**-7.3**	**-9.2**
Efficiency	[dB]	**-6.5**	**-6.6**	**-8.6**
VSWR	[:1]	1.5	1.9	4.0

5. 本資料について

・本アンテナアプリケーションノートは、WYSACVLAY-WX モジュールに搭載されているアンテナ特性をより良く確保するための参考資料です。
通信性能・飛距離を確保・保証するものではありません。

・本製品は、WYSACVLAY-WX モジュールとして電波法認証を取得しておりますので、周囲環境の影響に合わせて、モジュール内のアンテナ用マッチング回路の乗数を変更することはできません。
変更した場合は、電波法認証を取り直す必要があります

その他、注意事項について （Precautions）

■ 弊社製品のご使用に際しては、使用する機器に実装された状態および実際の使用環境での評価および確認を必ず行ってください。

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■ Please conduct validation and verification of our products in actual condition of mounting and operating environment before using our products.

■ The products listed in this specification are intended for use in general electronic equipment (e.g., AV equipment, OA equipment, home electric appliances, office equipment, information and communication equipment including, without limitation, mobile phone, and PC). Please be sure to contact TAIYO YUDEN for further information before using the products for any equipment which may directly cause loss of human life or bodily injury (e.g., transportation equipment including, without limitation, automotive powertrain control system, train control system, and ship control system, traffic signal equipment, disaster prevention equipment, medical equipment classified as Class I, II or III by IMDRF, highly public information network equipment including, without limitation, telephone exchange, and base station).

Please do not incorporate our products into any equipment requiring high levels of safety and/or reliability (e.g., aerospace equipment, aviation equipment, medical equipment classified as Class IV by IMDRF, nuclear control equipment, undersea equipment, military equipment).

When our products are used even for high safety and/or reliability-required devices or circuits of general electronic equipment, it is strongly recommended to perform a thorough safety evaluation prior to use of our products and to install a protection circuit as necessary.

Please note that unless you obtain prior written consent of TAIYO YUDEN, TAIYO YUDEN shall not be in any way responsible for any damages incurred by you or third parties arising from use of the products listed in this specification for any equipment requiring inquiry to TAIYO YUDEN or prohibited for use by TAIYO YUDEN as described above.

■ Information contained in this specification is intended to convey examples of typical performances and/or applications of our products and is not intended to make any warranty with respect to the intellectual property rights or any other related rights of TAIYO YUDEN or any third parties nor grant any license under such rights.

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- The contents of this specification are applicable to our products which are purchased from our sales offices or authorized distributors (hereinafter “TAIYO YUDEN’s official sales channel”). Please note that the contents of this specification are not applicable to our products purchased from any seller other than TAIYO YUDEN’s official sales channel.
- Caution for Export

  Some of our products listed in this specification may require specific procedures for export according to “U.S. Export Administration Regulations”, “Foreign Exchange and Foreign Trade Control Law” of Japan, and other applicable regulations. Should you have any questions on this matter, please contact our sales staff.

WLAN Embedded Software Spec.

TAIYO YUDEN Standard Application for WLAN

In case you adopt this module and design some appliance, please ask for the latest specifications from the local sales office.

We wish the customer to request the Specification Report when the design for the mass production begins because the content of this Data Report might change without a previous notice to the customer.

Rev. Record

04-Mar.-2016> Ver.2.00

02-Sep.-2016> Ver.2.01

23-Jun.-2017> Ver.2.02

19-Oct.-2017> Ver.2.03

07-Nov.-2017> Ver.2.04

20-Nov.-2017> Ver.2.05

22-Nov.-2017> Ver.2.06

23-Apr.-2018> Ver.2.07

Revision History

Version	Date	Description
2.00	**2016/03/04**	First official release
2.01	**2016/09/02**	Updated content: ● Section 4.1 "TCP" : data size ● Section 4.2 "UDP" : data size ● Section 5.9 "Data Transmission" : data size ● Chapter 9 : Note 5, 6
2.02	**2017/06/23**	Added content: ● Chapter 9 : Note 10, 11 ● Chapter 10 : No.5 Updated content: ● Section 5.2 "Common Response Events" : DCO response
2.03	**2017/10/19**	Added content: ● Section 5.1 "Common Commands" : SRN , STG , GTG , SCN ● Section 5.2 "Common Response Events" : SHD , GHD , HTT, HTS ● Section 8.6 : HTTP Request ● Section 8.7 : WEB Configuration
2.04	**2017/11/07**	Updated content: ● Section 5.1 "Common Commands" : STC , SHD , SCT ● Section 5.4 "Common Commands" : STI ● Section 5.7 "micro-AP Control Commands" : STU ● Section 6.1 "Common Error Codes" ● Section 5.2 "Common Response Events" : SCN
2.05	**2017/11/20**	Update content: ● Section 5.1 "Common Commands" : SHD , GHD , HTT ● Section 8.6 "HTTP Request"
2.06	**2017/11/20**	Update content: ● Section 5.1 "Common Commands" : HTS
2.07	**2018/03/09**	Added content: ● Section 5.1 "Common Commands" : GT3, SHD ● Section 5.2 "Common Response Events" : VT3, SCN ● Section 5.10 "MQTT" Update content: ● Section 5.1 "Common Commands" : DNS ● Section 5.3 "Common value (STC, GTC)" : SSL certificate option for HTTPS ● Section 5.8 " Update Firmware Commands" ● Section 5.9 "Data Transmission" : queue size ● Section 6.1 "Common Error Codes" ● Section 6.2 "Socket Error Codes"

		● Chapter 9 : No.12 ● Chapter 10 : No.3 ● Appendix B : Common value (STC, GTC) ● Appendix C

Copyright Information:

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Firmware Version is 2.07.04 (Build4.0.r3.1)

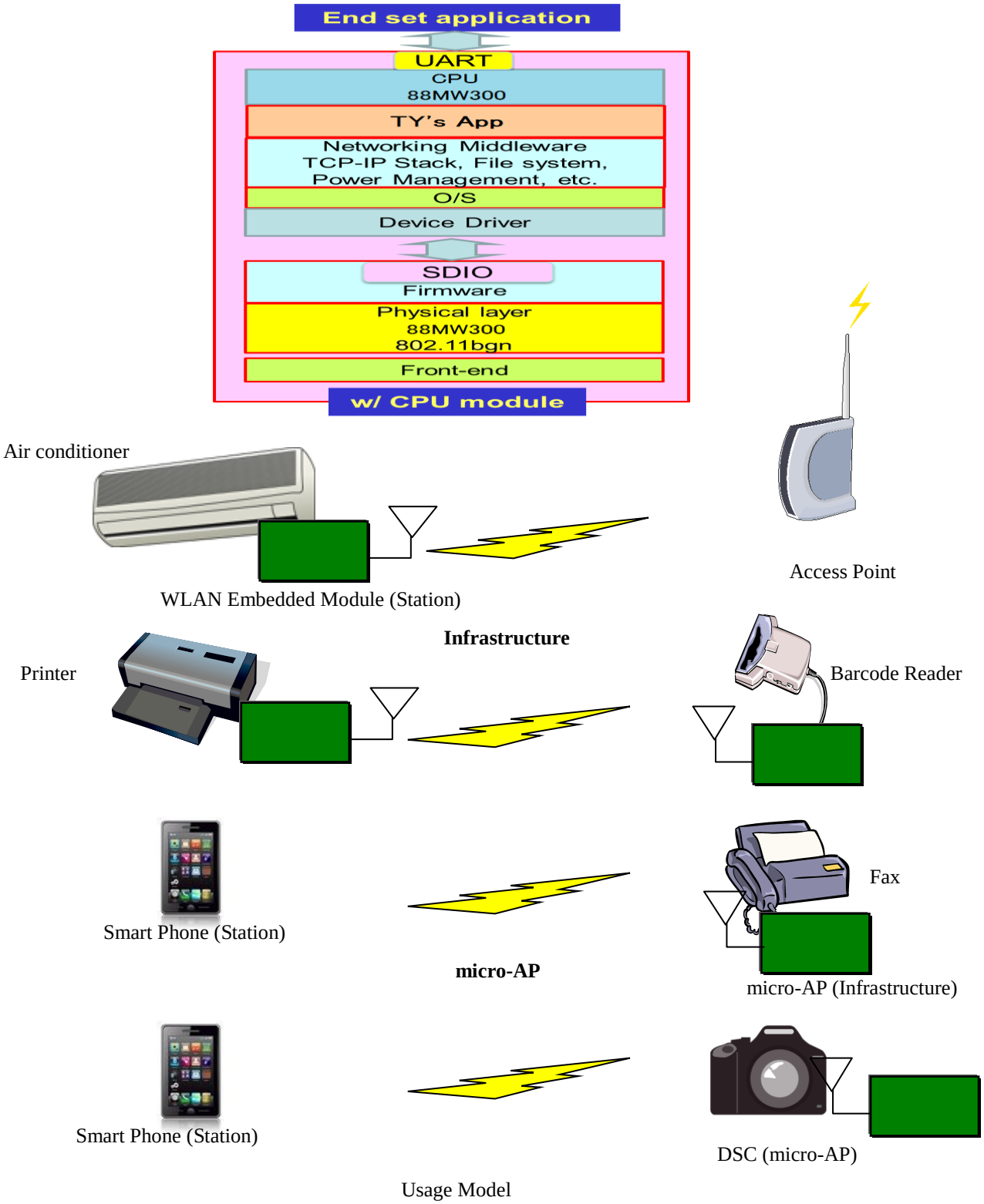
There is a possibility of changing a software specification.

Contents

1. Overview

This specification is for TAIYO YUDEN Standard Application for WLAN (referred to as TY's App).

Target applications are POS, Handy Terminal, Telemetry, FA, etc.



Usage Model

2. PIN configuration

2.1. UART

Port : UART1

Baud rate : 115200 bps (default)

Parity : none

Stop bit : 1

Flow control : hardware

Baud rate can be configured by STC command.

See section 5.3 for detail.

2.2. GPIO

2.2.1. Force initialization

PIN : I2C0_SDA (GPIO_4)

Setting : input, pull-up

In case Low input to this pin at startup, format and initialize user data area at statup.

2.2.2. Labtool

PIN : I2C0_SCL (GPIO_5)

Setting : input, pull-up

In case Low input to this pin at startup, Start as Labtool mode that is RF calibration and testing tool.

In Labtool mode, the following message is output at startup (UART1 baud rate is fixed 115200 bps).

<CR><LF>MFG Ver. 2.07.04<CR><LF>

In Normal mode, the following message is output at startup.

<CR><LF>Ver. 2.07.04<CR><LF>

*** Please contact TAIYO YUDEN when you use Labtool.**

3. Control Command Syntax

Control commands which the host sends are based on character strings that start with “W”(ASCII code: 0x57, 87 decimal), and that end with <CR><LF> (ASCII code: 0x0D 0x0A) (decimal values 13, 10).

Response event which host receives are started with <CR><LF> and ended <CR><LF>. Please note that this specification / application does not allow for multiple commands to be sent to the host. The application is not responsible for parsing of packets / command sequences.

Command Mode – Control Command:

“W”{*command characters*}[*Parameter1Parameter2:: Parameter(N)*]<CR><LF>

Response Event:

<CR><LF>{*command characters*}[*Parameter1,Parameter2,::Parameter(N)*]<CR><LF>

4. Data Format

4.1. TCP

To transmit TCP data, the data must be wrapped with STX(0x02), CH and ETX(0x03).

0x03 (ETX) and 0x1b (ESC) inside the data cannot be transmitted without escaping them.

To escape a character you must precede it by the ESC(0x1b).

The character right after ESC is interpreted as a data byte.

The incoming data is delivered in the same format.

<STX><CH><data : up to 1460byte><ETX>

For instance

Data: 0x41, 0x03, 0x41, 0x1b, 0x41

CH: 1

Data			0x41	0x03		0x41	0x1b		0x41	
Format	STX	CH	0x41	ESC	0x03	0x41	ESC	0x1b	0x41	ETX
Binary	0x02	0x01	0x41	0x1b	0x03	0x41	0x1b	0x1b	0x41	0x03

4.2. UDP

To transmit UDP data, in addition to STX, CH and ETX, the destination IP address and Port is required.

The data section must be escaped in the same manner.

The incoming data is delivered in the same format.

IP address and Port are those of the source(sender).

<STX><CH><IP Address : 4byte><Port : 2byte><data : up to 1460byte><ETX>

For instance

IP Address: 192.168.11.5

Port: 3000

Format	STX	CH	IP Address				Port		data	ETX
Binary	0x02	0x01	0xc0	0xa8	0x0b	0x05	0x0b	0xb8	…	0x03

5. Command and Event List

5.1 Common Commands

Command Character	Function	Parameter	Response
Configuration			
STC	Set common setting value *For instance* *WSTC0100* *No.: 01 (UART baud rate)* *Value: 00*	<u>Parameter 0:</u> Item No. Refer 5.3 <u>Parameter 1:</u> Value Refer 5.3	Successful: ACK Failed: NAK##
GTC	Get common setting value *For instance* *WGTC01* *No.: 01 (UART baud rate)*	<u>Parameter:</u> Item No. Refer 5.3	Successful: Value Failed: NAK##
GT1	Get firmware version		Success: VT1 Failed: NAK##
GT2	Get a MAC address		Success: VT2 Failed: NAK##
GT3	Get Wi-Fi firmware version		Success: VT3 Failed: NAK##
DPS	Turn on/off deep sleep power save of wlan chip * Only wlan chip enters deep sleep mode and it does not affect MCU. * Available when disconnect status, otherwise return NAK.	<u>Parameter:</u> on/off '1' : ON '0' : OFF	Successful: ACK Failed: NAK##

SBY	Put the module into standby mode. The module wakes up automatically after the timer has expired or when the gpio pin is asserted. Wakeup: WAKE_UP0 (GPIO_22) WAKE_UP1 (GPIO_23) * Only MCU enters low power mode (PM2) and it does not affect wlan chip. * Any command can't be processed in this mode. * The module also wakes up by the data from AP when the module is connected to AP with IEEE power save enabled and micro-AP mode is stopped.	<u>Parameter:</u> None : wakeup by GPIO '0' : wakeup by GPIO '1' –'172800000' : wakeup by RTC (milliseconds) or GPIO Min: 1 millisecond Max: 48 hour	Successful: ACK : standby WUP : wakeup Failed: NAK##
RST	Soft reset		Successful: ACK Failed: NAK##
STT	Set the time *For instance* *WSTT0time.google.com* *NTP* *WSTT11420113600* *POSIX time (1420113600=2015/01/01 12:00:00)* *WSTT220150101120000* *Normal in UTC (Coordinated Universal Time)* *(2015/01/01 12:00:00)* * The time is reset to 1970/01/01 00:00:00 after Power OFF. * Network access should be available for NTP. * NTP client uses following paramters. Leap Indicator : 00 (no warning) Version Number : 011 (version 3) Mode : 011 (client) others : all 0	<u>Parameter 0:</u> Format 0 : NTP 1 : POSIX time 2 : Normal <u>Parameter 1:</u> [NTP] Host name (Max length 255) [POSIX time] The number of seconds that have elapsed since 00:00:00, 1 January 1970. [Normal] The time in the following format. 20150101120000 means "2015/01/01 12:00:00"	Successful: ACK Failed: NAK##

GTT	Get the time *For instance* *WGTT1* *1420113600* *POSIX time (1420113600=2015/01/01 12:00:00)* *WGTT2* *2015/01/01 12:00:00* *Normal in UTC (Coordinated Universal Time)*	Parameter: format 1 : POSIX time 2 : Normal	Successful: Current module time in the specified format. Failed: NAK##
SCT	Set Certificate *For instance* *WSCT1-----BEGIN CERTIFICATE-----<LF>M...* *5Tynh+dXIVtx6quTx8itc2VrbqnzPmrC3p/<LF>* *-----END CERTIFICATE-----<LF><CR><LF>* *Set certificate in Index 1* *WSCT2* *Erase Index 2* ** input format* - Max length of one line is 64. - Line feed code must be <LF>. - Command termination is <CR><LF>.	Parameter 0: Index '1' ～ '5' Parameter 1: Certificate in PEM format If parameter 1 is omitted, erase the data. (Max length 3072)	Successful: ACK Failed: NAK##
GCT	Get Certificate	Parameter: Index '1' ～ '5'	Successful: Certificate in PEM format. Failed: NAK##

ERS	Erase Profile and Setting of STC command *For instance* *WERS* *all Profiles and Settings of STC command* *WERS01* *micro-AP Profile index : 1* *WERS11* *Infrastructure Profile index : 1* *WERS10* *Infrastructure WPS Profile* *WERS21* *Certificate index : 1*	Optional If a parameter is omitted, all Profiles and Settings of STC command **except UART baud rate** will be erased, and then the module will be automatically rebooted. <u>Parameter 0:</u> '0' : micro-AP profile '1' : Infrastructure profile '2' : Certificate <u>Parameter 1:</u> '0' ～ '4' : Profile index In micro-AP, only '1' is available here. '1' ～ '5' : Certificate index	Successful: ACK Failed: NAK##
SRN	Setting Reflection Nortification The host notifies WLAN module of the acknowledgment of SCN event receipt.		
STG	Set Generic setting value *For instance* *WSTG014* *Index : 01* *Value : 4*	<u>Parameter0:</u> Index. '01' ～ '64' <u>Parameter1:</u> Value	Successful: ACK Failed: NAK##
GTG	Get Generic Setting Value *For instance* *WGTG01* *4*	<u>Parameter0:</u> Index. '01' ～ '64'	Successful: Value Failed: NAK##

Link Control			
GCN	Retrieve the system's current infrastructure network configuration		Successful: CFG Failed: NAK##
SOC	Create Socket *For instance* *WSOC0192.168.011.0033000* *Socket limitation in number* *Total : 12* *TCP : 8* *UDP : 10*	<u>Parameter 0:</u> TCP/UDP '0' : TCP '1' : UDP <u>Parameter 1:</u> IP Address TCP: Server address UDP: 000.000.000.000 <u>Parameter 2:</u> Port TCP: Server port UDP: Local port to bind (If set to 0, a socket will not be bounded to any port. Only TX data is available.)	Successful: SOK Failed: NAK##
SOS	Start TCP Server Listening Socket *Socket limitation in number* *Total : 12* *TCP : 8* *UDP : 10*	<u>Parameter 0:</u> Port	Successful: SOK Failed: NAK##, SNG
CSO	Close Socket	<u>Parameter 0:</u> Channel	Successful: SCL Failed: NAK##
GLS	Get Listening Socket Channel	<u>Parameter 0:</u> Port	Successful: LSC Failed: NAK##
GSI	Get Socket Information	<u>Parameter 0:</u> Channel	Successful: SOI Failed: NAK##
WPS	Start/Stop WPS Enrollee : when micro-AP is not started	<u>Parameter 0:</u> Start/Stop '1' : Start '0' : Stop	Successful: ACK, Enrolle: WEF, CON Registrar:

	Registrar : when micro-AP is started with "USA" command *For instance* *WWPS1060* *(Start, Timeout=60sec)*	 Parameter 1: Timeout (Second, 010～999) Parameter 2: PIN Code (To the button method if don't set the PIN CODE.)	WRF Failed: NAK##
PNG	ICMP Ping *For instance* *command (default parameter)* *WPNG0192.168.003.002<CR><LF>* *response* *<CR><LF>* *PING 192.168.3.2 (192.168.3.2) 56(84) bytes of data<CR><LF>* *<CR><LF>* *64 bytes from 192.168.3.2: icmp_req=1 ttl=128 time=1 ms<CR><LF>* *<CR><LF>* *64 bytes from 192.168.3.2: icmp_req=2 ttl=128 time=1 ms<CR><LF>* *<CR><LF>* *64 bytes from 192.168.3.2: icmp_req=3 ttl=128 time=0 ms<CR><LF>* *<CR><LF>* *64 bytes from 192.168.3.2: icmp_req=4 ttl=128 time=1 ms<CR><LF>* *<CR><LF>* *64 bytes from 192.168.3.2: icmp_req=5 ttl=128 time=1 ms<CR><LF>* *<CR><LF>* *--- 192.168.3.1 ping statistics ---<CR><LF>* *<CR><LF>* *5 packets transmitted, 5 received, 0% packet loss<CR><LF>* *command (custom parameter)* *WPNG1192.168.003.002030720001002<CR><LF>* *Option : 1* *IP Address : 192.168.3.2* *Length : 3072 bytes* *Count : 10 times* *Timeout : 2 seconds*	Parameter 0: Option '0' : default '1' : custom Parameter 1: IP Address DDD.DDD.DDD.DDD (Decimal) Below parameter is available when Parameter 0 = 1 Parameter 2: Length (byte) DDDDD (Decimal) default 00056 maximum 03072 Parameter 3: Count DDDDD (Decimal) default 00005 maximum 99999 Parameter 4: Timeout (second) DD (Decimal) default 02 maximum 99	Successful: Response Failed: NAK##
DNS	Get IP Address of given host name	Parameter:	Successful: Value

	For instance *command* *WDNSwww.google.co.jp<CR><LF>* *Host name : www.google.co.jp* *response* *<CR><LF>174.125.235.215<CR><LF>* *command* *WDNSyahoo.co.jp<CR><LF>* *Host name : yahoo.co.jp* *response* *<CR><LF> 183.079.135.206<CR><LF>*	Host name (Max length 255)	Failed: NAK##
TTC	ttcp (Test TCP) ttcp is a utility for measuring network throughput. *For instance* *TCP TX* *WTTC01192.168.003.002050010102420000<CR><LF>* Protocol : TCP, Role : TX, IP Address : 192.168.3.2 Port : 5001, Length : 1024, Number : 20000 *response* *<CR><LF>* *ttcp-t: connecting to server<CR><LF>* *<CR><LF>* *ttcp-t: 20480000 bytes in 20876 ms = 7848 Kbit/sec +++<CR><LF>* *<CR><LF>* *ttcp-t: 20000 I/O calls, msec/call = 1, calls/sec = 958<CR><LF>* *TCP RX* *WTTC00000.000.000.00000000000000000000<CR><LF>* Protocol : TCP, Role : RX, IP Address : - Port : 5001, Length : 8192, Number : - *response* *<CR><LF>* *ttcp-r: waiting for connection<CR><LF>* *<CR><LF>* *ttcp-r: net_accept from 192.168.3.2<CR><LF>* *<CR><LF>*	If a parameter is omitted, stop ongoing ttcp execution. Parameter 0: Protocol ‘0’ : TCP ‘1’ : UDP Parameter 1: Role ‘0’ : RX ‘1’ : TX Parameter 2: IP Address DDD.DDD.DDD.DDD (Decimal) * ignored in RX role Parameter 3: Port DDDDD (Decimal) default: 05001 (in case 00000)	Successful: Response Failed: NAK##

	ttcp-r: 20480000 bytes in 7646 ms = 21424 Kbit/sec +++<CR><LF> *<CR><LF>* *ttcp-r: 19630 I/O calls, msec/call = 0, calls/sec = 2567<CR><LF>* *UDP TX* *WTTC11192.168.003.002050010102420000<CR><LF>* Protocol : UDP, Role : TX, IP Address : 192.168.3.2 Port : 5001, Length : 1024, Number : 20000 *response* *<CR><LF>* *ttcp-t: starting udp stream<CR><LF>* *<CR><LF>* *ttcp-t: 5753856 bytes in 2024 ms = 22736 Kbit/sec +++<CR><LF>* *<CR><LF>* *ttcp-t: 20002 I/O calls, msec/call = 0, calls/sec = 9882<CR><LF>* *UDP RX* *WTTC10000.000.000.00000000000000000000<CR><LF>* Protocol : UDP, Role : RX, IP Address : - Port : 5001, Length : 8192, Number : - *response* *<CR><LF>* *ttcp-r: waiting for connection<CR><LF>* *<CR><LF>* *ttcp-r: 20480000 bytes in 7388 ms = 22176 Kbit/sec +++<CR><LF>* *<CR><LF>* *ttcp-r: 20002 I/O calls, msec/call = 0, calls/sec = 2707<CR><LF>* *Stop ttcp* *WTTC<CR><LF>*	Parameter 4: Length (byte) DDDDD (Decimal) default: 08192 (in case 00000) maximum: 99999 Parameter 5: Number DDDDD (Decimal) default: 4294967295 (in case 00000) maximum: 99999 * ignored in RX role	
SHD	Set HTTP custom header *For instance* *WSHD01Content-Type:text/html* *Index : 01* *Name : "Content-Type"* *Value : "text/html"*	Parameter 0: Index. '01' ～ '15' Parameter 1: Name Index'1'～'12' : Max 30characters Index'13'～'15' : Max 50characters	Successful: ACK Failed: NAK##

		The following characters is unaccepted : "(),/:;<=>?@[¥]{} (Put a ':' in the edge of the Name) <u>Parameter 2:</u> Value Index'1'～'12' : Max 50characters Index'13'～'14' : Max 105characters Index'11'～'15' : Max 600characters Printable US-ASCII	
GHD	Get HTTP custom header *For instance* *WGHD01* *Content-Type:text/html*	<u>Parameter:</u> Index. '01' ～ '15'	Successful: Value Failed: NAK##
HTT	Send HTTP request *For instance* *WHTT10003http//www.test.org/index.html*abc=1234&def=5678* *Method : POST* *Use HTTP custom Header : Index1 , Index2*	<u>Parameter0:</u> Method. 0 : GET 1 : POST 2 : PUT 3 : DELETE <u>Parameter1:</u> Use HTTP Custom Header. Bit0 : Index1 Bit1 : Index2 … Bit13 : Index14 Bit14 : Index15 The same index of SHD and GHD command/ <u>Parameter2:</u> URI.	Successful: RCT Failed: NAK## * NAK31 is followed by RCT response.

		(Put a '*' in the edge of the URI.) (Max length 1024 without '*') Parameter3: Content. (Up to 3072byte, ASCII data)	
HTS	HTTP Server Startup *For instance* *WHTS2* *HTTP Server Start* Only one client can connect at the same time. About Firmware Update feature, See Section 5.8 "Update Firmware Commands" for details.	Parameter0: Start/Stop 0 : Stop 1 : Start (HTTP Server for Firmware Update) 2 : Start (HTTP Server)	Successful: ACK Failed: NAK##

5.2 Common Response Events

Response Events	Function	Parameters
ACK	Successful	
NAK##	Failed	Failed Reason – See Error Chapter 6. For further details.
FTL##	Fatal Error	Error Reason – See Error Chapter 7. For further details.
VT1	Firmware Version *For instance* *VT12.07.04(Build4.0.r3.1)*	Parameter: Version
VT2	MAC address *For instance* *VT2002258ABC659*	Parameter: MAC address
VT3	Wi-Fi firmware *For instance* *VT314.76.36.p126*	Parameter: Wi-Fi firmware version
RCS	Handle *For instance* *RCS01* *Handle : 01*	Parameter 0: Handle
RCT	*Content Data* *For instance* *RCTXXXXXXXXXX*	Parameter 0: Content Data * When there is not Content data, it means termination. * <CR> in Content Data is removed. * If <LF> appears, current RCT response is terminated after <LF> (plus <CR><LF>) and further data is output as next RCT response.
CON	Connection successful *For instance* *CON1,MOBILE AP-A* *CON0,123456789ABC*	Parameter 0: Mode '0' : micro-AP '1' : Infrastructure [micro-AP] Parameter 1: MAC address

		[Infrastructure] Parameter 1: SSID
DCO	Disconnect * In Infrastructure mode, Link Lost is notified when beacon is missed for 60 consecutive times. (beacon interval) * 60 millisecond * When "Auto connect flag" is OFF, Link Lost response delays 3 seconds in addition above.	Parameter 0: Mode '0' : micro-AP '1' : Infrastructure [micro-AP] Parameter 1: MAC address [Infrastructure] Parameter 1: Reason '0': User Disconnect '1': Link Lost '2': Disconnected from AP side
CFG	Current network configuration *For instance* *CFG* *0022581234,06,0,192.168.11.2,TAIYO AP*	Parameter 0: BSSID Parameter 1: Channel Parameter 2: Security '0' : Not use security '1' : WEP with open key. '2' : WEP with shared key '3' : WPA or WPA/WPA2 with PSK mixed '4' : WPA2 with PSK Parameter 3: IP Address Parameter 4: SSID
SOK	Create socket successful	Parameter:0 Channel

		Parameter 1: '0' : TCP Client '1' : TCP Server (Listening) '2' : TCP Server (Accepted) '3' : UDP Parameter 2: Local Port Return 0 in TCP Client Parameter 3: Remote IP Return 0.0.0.0 in TCP Server (Listening) or UDP Parameter 4: Remote Port Return 0 in TCP Server (Listening) or UDP
SNG	Create socket failed	Parameter 0: Listen Channel Parameter 1: Remote IP address
DOK	Data send successful	
DNG	Data send failed	
SCL	Close socket successful	Parameter: Channel
LSC	Listening Socket Channel	Parameter: Channel
SOI	Socket Information	Parameter 0: '0' : TCP Client '1' : TCP Server (Listening) '2' : TCP Server (Accepted) '3' : UDP Parameter 1: Local Port Return 0 in TCP Client Parameter 2: Remote IP Return 0.0.0.0 in TCP Server (Listening) or UDP

		Parameter 3: Remote Port Return 0 in TCP Server (Listening) or UDP
WUP	Wakeup	
WRF	WPS Registrar Finish	
WEF	WPS Enrollee Finish	
UBG	Server mode update begins	
UEN	Server mode update ends in success	
SCN	Setting Change Notification When any parameters of the module is changed through the web page, the module notifies the host of the changed items. *For instance* *SCN0186148761B3315FA24D85313C5DE953F0* *Initialization flag : False* *Profile : STA index 1* *Updated items :* *Bit0-3 : 0x0 (Item No.1-4 are unchanged)* *Bit4-7 : 0xF (Item No.5-8 are changed)* *Bit8-11 : 0x3* *(Item No.9 and 10 are changed.* *Item No.11 and 12 are unchanged.)* *Bit12-15 : 0x5* *(Item No.13 and 15 are changed.* *Item No.14 and 16 are unchanged.)* … *SCN10000000000000000000000000000000* *Initialization flag : True*	Parameter0: Initialization flag 0 : False 1 : True When "1" is set to Parameter0, - Parameter1 and Parameter2 are all 0. - In the module, default value is set to all parameters except UART baud rate. Parameter1: Profile index (STI/STU command) 0 : STA index 0 1 : STA index 1 2 : STA index 2 3 : STA index 3 4 : STA index 4 5 : UAP index 1 One profile can be updated at one time. Updated items is indicated in Parameter 2. Parameter2: Updated items (Hexadecimal Number in ASCII) Each bit value : 0 (unchanged) / 1 (changed) Bit 0-31 : Profile items (STI/STU command) Refer 5.6 From Item No.1 in order. Bit 0 : Item No.1 Bit 1 : Item No.2 … Bit 32-39 : Common value (STC command) Refer 5.3

		From Item No.1 in order. Bit 32 : Item No.1 Bit 33 : Item No.2 … Bit 40 : Current time (STT command) Bit 41 : User Certificate (SCT command Index1) Bit 42-47 : Unused Bit 48-63 : HTTP custom header (SHD command) Refer 5.1 From Index 1 in order. Bit 48 : Index 1 Bit 49 : Index 2 … Bit 64-127 : Generic setting value (STG command) Refer 5.1 From Index 1 in order. Bit 64 : Index 1 Bit 65 : Index 2 …

5.3 Common value (STC, GTC)

No.	Item Name	
01	UART baud rate (bps)	"00" - "11" 00 : 115200 (default) 01 : 9600 02 : 19200 03 : 38400 04 : 57600 05 : 115200 06 : 230400 07 : 250000 08 : 500000 09 : 1000000 10 : 1500000 11 : 2000000 * Baud rate setting will be updated after reboot.
02	Auto connect flag	"00" / "01" 00 : OFF (default) 01 : ON In infrastructure mode, keep attempt to connect to Access Point until stop with IDC command.
03	IEEE PS	"00" / "01" 00 : OFF (default) 01 : ON IEEE power save enable / disable In infrastructure mode. While micro-AP is active, IEEE power save is force to be disabled.

04	SSL certificate option for HTTPS	"01" - "03" 01 : pre-installed certificates only (default) 02 : user certificates only 03 : none (disable server verification) Set the certificate option for HTTPS connection in HTT command. See Appendix C for pre-installed certificates. User certificates can be set with SCT command.
05	Energy Detection for ETSI R&TTE EN 300 328 adaptivity requirement	"00" / "01" 00 : OFF (default) 01 : ON * Energy Detection setting will be updated after reboot.
06	Listen Interval for IEEE power save mode (Common value No.03)	"01" - "49" 01 : receive all beacon (default) 02 : receive every 2nd beacon … 49 : receive every 49th beacon * The configured listen interval will be used in subsequent association attempt. * Actual listen interval set will be a multiple of DTIM closest to the value.

5.4 Infrastructure Control Commands

Command Character	Function	Parameter	Response
Link Control			
ISC	Scan for wireless networks * up to 30th Access Point		Successful: SCR, ACK (ACK is termination) Failed: NAK##
ISD	Request a scan result detail. *For instance* *WISD02 (Index = 2)*	<u>Parameter:</u> Scan Index	Successful: SCD Failed: NAK##
ICO	Connect to a network *For instance* *WICO1* Before this command is issued, List Index corresponding to AP information must be set using STI command.	<u>Parameter:</u> List Index '0' – '4' '0' : Configured by WPS '1' – '4' : Profile Index	Successful: CON Failed: NAK##
IDC	Disconnect from the current network		Successful: ACK : command accepted DCO : disconnected Failed: NAK##

Configuration			
STI	Set infrastructure configuration. *For instance* *WSTI101ACCESS POINTA* *List: 1* *No.: 01 (SSID)* *Value: ACCESS POINTA* *WSTI10312345678* *List: 1* *No.: 03 (PSK)* *Value: 12345678*	<u>Parameter 0</u> List Index "1" ～ "4" <u>Parameter 1</u> Item No. "01" ～ "99" Refer 5.6 <u>Parameter 2</u> Value Refer 5.6	Successful: ACK Failed: NAK##
GTI	Get infrastructure configuration *For instance* *WGTI101* *List: 1* *No.: 01 (SSID)*	<u>Parameter 0</u> List Index "0" ～ "4" '0' : configured by WPS Enrollee '1' – '4' : Profile Index <u>Parameter 1</u> Item No. "01" ～ "99" Refer 5.6	Successful: Value Failed: NAK##
GSS	Get current RSSI and Signal to Noise ratio *For instance* *WGSS* *-46,51* *RSSI : -46 (decimal value)* *SNR : 51 (decimal value)* * available only when connected to AP		Successful: Value1 (RSSI), Value2 (SNR) Failed: NAK##

5.5 Infrastructure Response Events

Response Events	Function	Parameters
SCR	List of Scan results *For instance* *SCR01,0022581234AB,TAIYO AP*	<u>Parameter 0:</u> Scan Index "01" ～ "30" (It is added in turn.) <u>Parameter 1:</u> BSSID <u>Parameter 2:</u> SSID

SCD	Scan result detail *For instance* *SCD01,0022581234AB,* *06,0,1,1,0,0,1,-98 ,TAIYO AP*	Parameter 0: Scan Index “01” ～ “30” Parameter 1: BSSID Parameter 2: channel Parameter 3: WMM ‘0’: Not support ‘1’: Support Parameter 4: WPS ‘0’: Not support ‘1’: Support Parameter 5: WPS Type ‘0’: PBC ‘1’: PIN Parameter 6: WEP ‘0’: disable ‘1’: enable Parameter 7: WPA ‘0’: disable ‘1’: enable Parameter 8: WPA2 ‘0’: disable ‘1’: enable

		Parameter 9: Rssi Parameter 10: SSID

5.6 Profile Table (STI, GTI, STU, GTU)

No.	Item Name	
01	ssid	Max 32characters
02	security type	'0' : No security '1' : WEP with open key. '2' : WEP with shared key '3' : WPA/WPA2 with PSK mixed '4' : WPA2 with PSK In STU/GTU, only '0' or '4' can be accepted.
03	security key	Max 64 characters *WEP : ASCII (5 or 13byte) / HEX (10 or 26byte)* *WPA/WPA2 : ASCII*
04	addr_type '0' in STU/GTU	'0' : Static '1' : DHCP
05	IP address (static addr type)	"XXX.XXX.XXX.XXX"
06	subnet mask (static addr type)	"XXX.XXX.XXX.XXX"
07	default gateway (static addr type)	"XXX.XXX.XXX.XXX"
08	primary DNS server (static addr type)	"XXX.XXX.XXX.XXX"
09	secondary DNS server (static addr type)	"XXX.XXX.XXX.XXX"
10	bssid (option)	"000000000000"～"FFFFFFFFFFFF"
11	channel (option)	"00" ～ "11" 00 in Infrastructure : scan AP in all 1-11 channel. 00 in micro-AP : automatically select the least congested channel.

12	bssid specific (option)	'0' : Connect to any network whose SSID matches. '1' : Not connect to any other network with the same SSID unless the BSSID matches.
13	channel specific (option)	'0' : available channel '1' : specific channel

STU/GTU only

20	MAC Address filtering	'0' : Disable '1' : Enable
21	Allowed MAC Address 1	"000000000000"～"FFFFFFFFFFFF" Ignored when "FFFFFFFFFFFF" is set.
22	Allowed MAC Address 2	"000000000000"～"FFFFFFFFFFFF" Ignored when "FFFFFFFFFFFF" is set.
23	Allowed MAC Address 3	"000000000000"～"FFFFFFFFFFFF" Ignored when "FFFFFFFFFFFF" is set.
24	Allowed MAC Address 4	"000000000000"～"FFFFFFFFFFFF" Ignored when "FFFFFFFFFFFF" is set.
25	Allowed MAC Address 5	"000000000000"～"FFFFFFFFFFFF" Ignored when "FFFFFFFFFFFF" is set.

5.7 micro-AP Control Commands

Command Character	Function	Parameter	Response
Link Control			
USA	Start / Stop uAP network * uAP Stop command will also stop DHCP server.	Parameter: Start / Stop '1' : Start '0' : Stop	Successful: ACK Failed: NAK##
UDC	Start / Stop DHCP server * This command can be called after micro-AP is started with USA command	Parameter: Start / Stop '1' : Start '0' : Stop	Successful: ACK Failed: NAK##
Configuration			
STU	Set micro-AP (uAP) configuration. *For instance* *WSTU101UAP Module* *List: 1* *No.: 01 (SSID)* *Value: UAP Module* *WSTU10312345678* *List: 1* *No.: 03 (PSK)* *Value: 12345678*	Parameter 0 List Index '1' : List 1 Parameter 1 Item No. "01" ～ "99" Refer 5.6 Parameter 2 Value Refer 5.6	Successful: ACK Failed: NAK##
GTU	Get micro-AP (uAP) configuration *For instance* *WGTU101* *List: 1* *No.: 01 (SSID)*	Parameter 0 List Index '1' : List 1 Parameter 1 Item No. Refer 5.6	Successful: Value Failed: NAK##

5.8 Update Firmware Commands

Command Character	Function	Parameter	Response
Link Control			
UFW	Update Firmware in HTTP Client mode *For instance* *WUFW1http://set-your-host/fw.bin* *Kind: 1 (Module Firmware)* *URI: http://set-your-host/fw.bin* *WUFW2http://set-your-host/wifi.xz* *Kind: 2 (Wi-Fi Firmware)* *URI: http://set-your-host/wifi.xz* About 10 seconds after "UEN" response, the module reboots and loads the new firmware.	Parameter 0: Kind '1' : Module Firmware '2' : Wi-Fi Firmware '3' : FTFS Parameter 1: Firmware file URI (Max length 1024)	Successful: ACK : Server Start/Stop UBG : Update Begin UEN : Update End Failed: NAK##
HTS	Update Firmware in HTTP Server mode About 10 seconds after "UEN" response, the module reboots and loads the new firmware.	Parameter0: Start/Stop 0 : Stop HTTP Server 1 : Start HTTP Server for Firmware Update	Successful: ACK : Server Start/Stop UBG : Update Begin UEN : Update End Failed: NAK##

In server mode, use the form in http://< TY's App's IP Address>/index.html or "curl" command as follows:

Module Firmware

curl –F "filename=@/tmp/fw.bin" 192.168.100.100/sys/firmware

Wi-Fi Firmware

curl –F "filename=@/tmp/wifi.xz" 192.168.100.100/sys/wifi-firmware

FTFS

curl –F "filename=@/tmp/new.ftfs" 192.168.100.100/sys/filesystem

Important notes

- Do not turn the power off while updating firmware.
- Before this command, IP Address should be assigned by ICO or USA command.
- Do not use the firmware image which is not released by our company.

5.9 Data Transmission

Command Character	Function	Parameter	Response
Data Transmission			
Refer to chapter4	Transmit data with a socket TCP: <STX><CH><data><ETX> UDP: <STX><CH><IPAddress><Port><data><ETX> A transmission data size is limited to 1460byte or smaller. If you transmit a data over 1460byte, divide so that each data is within the limitation. If you need flow control for every packet, send next data after DOK of previous data. When you send data continuously, you can go on adding the data to the queue (size is 2) before DOK is respond until NAK23 (full queue) response. * Maximum TCP retransmission timeout is about 40 minutes. Therefore it is possible that the response of DOK or DNG delays up to 40 minutes.		Successful: ACK, DOK Failed: NAK##, DNG ACK : the data is queued DOK : the data is sent
BST	Burst transmission mode When enabled, it omits ACK or DOK response from above transmission command. However, negative acknowledgement (NAK, DNG) is available in any mode. The setting is dynamically reflected and isn't saved to the flash.	<u>Parameter:</u> on/off '0' : OFF (default) both ACK and DOK '1' : output only ACK '2' : output only DOK '3' : no output	Successful: ACK Failed: NAK##

5.10 MQTT

5.10.1 Command

Command Character	Function	Parameter	Response
Data Transmission			
MQT	MQTT	Parameter 0: Operation '0' : Set the configuration '1' : Get the configuration '2' : Connect to the broker '3' : Subscribe '4' : Publish '5' : Get (AWS IoT Thing Shadow only) '6' : Delete (AWS IoT Thing Shadow only) Refer 5.10.3 for the parameters of each operation.	Refer 5.10.3 for the Responses of each operation.

5.10.2 Response

Response Events	Function	Parameters
ACK	Successful	
NAK##	Failed	Failed Reason – See 5.10.4 For further details.
RCM	MQTT response	Parameter 0: (1byte) Operation – See 5.10.1 For further details. Parameter 1: (2byte) Error code – See 5.10.4 For further details. Parameter 2: Operation 3 (Subscribe) : 1-5 : Subscribe index Operation 5 (Get) : 0 The Others : Null Parameter 3: Operation 3, 5 : Data The Others : Null

5.10.3 Command parameters

Param 0	Param 1	Param 2	Param 3	Param 4	Param 5	Description	Response
0	0	0	0	-		AWS IoT Thing Shadow	Successful: ACK Failed: NAK##
			1			Normal MQTT	
		1	1024byte			MQTT broker endpoint	
		2	80byte			Client ID	
		3	3072byte PEM			root ca cert	
		4	3072byte PEM			device certificate (client cert)	
		5	3072byte PEM			device private key (client key)	
		6	0			Publish QoS 0	
			1			Publish QoS 1	
		7	0			Subscribe QoS 0	
			1			Subscribe QoS 1	
	1	0	30byte	-		device thing name	
		1	1	0-9 Primitive Type	90byte	Subscribe JSON key 1 *1	
			2		90byte	Subscribe JSON key 2 *1	
			3		90byte	Subscribe JSON key 3 *1	
			4		90byte	Subscribe JSON key 4 *1	
			5		90byte	Subscribe JSON key 5 *1	
	2	0	1	90byte	-	Subscribe topic No.1	
			2	90byte		Subscribe topic No.2	
			3	90byte		Subscribe topic No.3	
			4	90byte		Subscribe topic No.4	
			5	90byte		Subscribe topic No.5	
		1	0	-		CleanSession : false	
			1			CleanSession : true	
		2	32byte			username	
		3	32byte			password	
		4	16bit decimal			keep alive interval in seccond	
		5	0			will flag : 0	
			1			will flag : 1	
		6	0			retain flag (publish) : 0	

			1			retain flag (publish) : 1	
1	0	0	-			0: AWS IoT Thing Shadow	Successful: ACK Failed: NAK##
						1: Normal MQTT	
		1				MQTT broker endpoint	
		2				Client ID	
		3				root ca cert	
		4				device certificate (client cert)	
		5				device private key (client key)	
		6				0: Publish QoS 0	
						1: Publish QoS 1	
		7				0: Subscribe QoS 0	
						1: Subscribe QoS 1	
	1	0	-			device thing name	
	2	0	1	-		Subscribe topic No.1 *2	
			2			Subscribe topic No.2 *2	
			3			Subscribe topic No.3 *2	
			4			Subscribe topic No.4 *2	
			5			Subscribe topic No.5 *2	
		1	-			0: CleanSession : false	
						1: CleanSession : true	
		2				username	
		3				password	
		4				keep alive interval in seccond	
		5				0: will flag : 0	
						1: will flag : 1	
		6				0: retain flag (publish) : 0	
						1: retain flag (publish) : 1	
2	0	-				Disconnect	RCM
	1					Connect	
3	1	0	-			Unsubscribe topic No.1 (*1 / *2)	RCM
		1				Subscribe topic No.1 (*1 / *2)	
	2	0				Unsubscribe topic No.2 (*1 / *2)	
		1				Subscribe topic No.2 (*1 / *2)	
	3	0				Unsubscribe topic No.3 (*1 / *2)	
		1				Subscribe topic No.3 (*1 / *2)	
	4	0				Unsubscribe topic No.4 (*1 / *2)	
		1				Subscribe topic No.4 (*1 / *2)	
	5	0				Unsubscribe topic No.5 (*1 / *2)	
		1				Subscribe topic No.5 (*1 / *2)	

4	0	90byte	-	Set Publish topic (Normal MQTT) *2	RCM
	1	1024byte		Publish data	
5	-			Get (AWS only)	RCM
6	-			Delete (AWS only)	RCM

AWS IoT Shadow PING Interval (keep alive interval) : 600 seconds

5.10.4 MQTT Error Codes

#	Description
06	NETWORK_PHYSICAL_LAYER_CONNECTED
05	NETWORK_MANUALLY_DISCONNECTED
04	NETWORK_ATTEMPTING_RECONNECT
03	NETWORK_RECONNECTED
02	MQTT_NOTHING_TO_READ
01	MQTT_CONNACK_CONNECTION_ACCEPTED
00	AWS_SUCCESS
FF	AWS_FAILURE
FE	NULL_VALUE_ERROR
FD	TCP_CONNECTION_ERROR
FC	SSL_CONNECTION_ERROR
FB	TCP_SETUP_ERROR
FA	NETWORK_SSL_CONNECT_TIMEOUT_ERROR
F9	NETWORK_SSL_WRITE_ERROR
F8	NETWORK_SSL_INIT_ERROR
F7	NETWORK_SSL_CERT_ERROR
F6	NETWORK_SSL_WRITE_TIMEOUT_ERROR
F5	NETWORK_SSL_READ_TIMEOUT_ERROR
F4	NETWORK_SSL_READ_ERROR
F3	NETWORK_DISCONNECTED_ERROR
F2	NETWORK_RECONNECT_TIMED_OUT_ERROR
F1	NETWORK_ALREADY_CONNECTED_ERROR
F0	NETWORK_MBEDTLS_ERR_CTR_DRBG_ENTROPY_SOURCE_FAILED
EF	NETWORK_SSL_UNKNOWN_ERROR
EE	NETWORK_PHYSICAL_LAYER_DISCONNECTED
ED	NETWORK_X509_ROOT_CRT_PARSE_ERROR
EC	NETWORK_X509_DEVICE_CRT_PARSE_ERROR
EB	NETWORK_PK_PRIVATE_KEY_PARSE_ERROR
EA	NETWORK_ERR_NET_SOCKET_FAILED
E9	NETWORK_ERR_NET_UNKNOWN_HOST
E8	NETWORK_ERR_NET_CONNECT_FAILED
E7	NETWORK_SSL_NOTHING_TO_READ
E6	MQTT_CONNECTION_ERROR
E5	MQTT_CONNECT_TIMEOUT_ERROR
E4	MQTT_REQUEST_TIMEOUT_ERROR
E3	MQTT_UNEXPECTED_CLIENT_STATE_ERROR

E2	MQTT_CLIENT_NOT_IDLE_ERROR
E1	MQTT_RX_MESSAGE_PACKET_TYPE_INVALID_ERROR
E0	MQTT_RX_BUFFER_TOO_SHORT_ERROR
DF	MQTT_TX_BUFFER_TOO_SHORT_ERROR
DE	MQTT_MAX_SUBSCRIPTIONS_REACHED_ERROR
DD	MQTT_DECODE_REMAINING_LENGTH_ERROR
DC	MQTT_CONNACK_UNKNOWN_ERROR
DB	MQTT_CONNACK_UNACCEPTABLE_PROTOCOL_VERSION_ERROR
DA	MQTT_CONNACK_IDENTIFIER_REJECTED_ERROR
D9	MQTT_CONNACK_SERVER_UNAVAILABLE_ERROR
D8	MQTT_CONNACK_BAD_USERDATA_ERROR
D7	MQTT_CONNACK_NOT_AUTHORIZED_ERROR
D6	JSON_PARSE_ERROR
D5	SHADOW_WAIT_FOR_PUBLISH
D4	SHADOW_JSON_BUFFER_TRUNCATED
D3	SHADOW_JSON_ERROR
D2	MUTEX_INIT_ERROR
D1	MUTEX_LOCK_ERROR
D0	MUTEX_UNLOCK_ERROR
CF	MUTEX_DESTROY_ERROR

6 Error Code

6.1 Common Error Codes

#	Error Name	Program Logic Cause	Action taken by host
FF	**System Error**	There is the possibility that the hardware is out of order.	Please inquire Taiyo Yuden.
00	**Command Not Recognized**	It confirms whether or not the command is correct.	Send the command once again.
01	**Bad Parameter**	It confirms whether or not the parameter is correct.	Send the command once again.
04	**Connection Error**	General connection error	Check parameter and retry. Reconnect or reboot.
05	**Profile Error**	UAP / ICO command is called with invalid profile setting.	Set micro-AP / Infrastructure profile
06	**WPS running Error**	Input commands while WPS is running.	Wait or stop WPS.
07	**FlashRom Access Error**	It failed in FlashROM access of STC / SHD / STI / STU / SCT / GTC / GHD / GTI / GTU / GCT command.	Please inquire Taiyo Yuden.
10	**Network Not Found**	Access Point is not exist.	Check Access Point setting.
11	**Authentication Failed**	Authentication error occurs in association to Access Point.	Check parameter and retry.
12	**DHCP Failed**	IP address is not assigned after association to Access Point.	Check Access Point setting.
14	**Other Infrastructure Connection error**	Other error occurs in connection to Access Point.	Check Access Point setting.
15	**Infrastructure is connected**	ICO / WPS command is called while infrastructure is connected.	Disconnect infrastructure with IDC command.
16	**Firmware update Failed**	It failed in Firmware update.	Check if firmware file is valid and the command parameters.
20	**TCP socket full**	Create TCP socket over the limit	Close socket.
21	**UDP socket full**	Create UDP socket over the limit	Close socket.
22	**Socket full**	Create socket over the limit	Close socket.
23	**Socket TX queue full**	Socket TX queue is full	Wait until the queued data is sent.

30	**HTTP connection error**	Can not access HTTP server	Check WLAN connection and HTTP address. In HTTPS, check whether the server's certificate is installed.
31	**HTTP status code Error**	HTTP status code is not 200 (OK). Status code will be added after a comma. For instance NAK31,301 NAK31,404	Check HTTP status code.
32	**Invalid User certificates**	There is one or more invalid user certificates.	Check User certificates.
33	**HTTP Header Invalid**	Cannot add HTTP header	Check HTTP Custom Header Setting
34	**HTTP Server is running**	HTTP Server is running and SSL certificate option for HTTPS is pre-installed certificates.	Stop HTTP Server or Change SSL certificate option for HTTPS
35	**WEB is updating internal setting values.**	Internal setting values are being updated by Request from WEB.	Send the command once again.

6.2 Socket Error Codes

51	**EPERM**	Not owner	
52	**ENOENT**	No such file or directory	
53	**ESRCH**	No such process	
54	**EINTR**	Interrupted system call	
55	**EIO**	I/O error	
56	**ENXIO**	No such device or address	
57	**E2BIG**	Arg list too long	
58	**ENOEXEC**	Exec format error	
59	**EBADF**	Bad file number	
5A	**ECHILD**	No children	
5B	**EAGAIN** **EWOULDBLOCK**	No more processes	
5C	**ENOMEM**	Not enough space	
5D	**EACCES**	Permission denied	
5E	**EFAULT**	Bad address	
5F	**ENOTBLK**	Block device required	
60	**EBUSY**	Device or resource busy	
61	**EEXIST**	File exists	
62	**EXDEV**	Cross-device link	
63	**ENODEV**	No such device	
64	**ENOTDIR**	Not a directory	
65	**EISDIR**	Is a directory	
66	**EINVAL**	Invalid argument	
67	**ENFILE**	Too many open files in system	
68	**EMFILE**	File descriptor value too large	
69	**ENOTTY**	Not a character device	
6A	**ETXTBSY**	Text file busy	
6B	**EFBIG**	File too large	
6C	**ENOSPC**	No space left on device	
6D	**ESPIPE**	Illegal seek	
6E	**EROFS**	Read-only file system	
6F	**EMLINK**	Too many links	
70	**EPIPE**	Broken pipe	
71	**EDOM**	Mathematics argument out of domain of function	
72	**ERANGE**	Result too large	
73	**ENOMSG**	No message of desired type	
74	**EIDRM**	Identifier removed	

75	**ECHRNG**	Channel number out of range	
76	**EL2NSYNC**	Level 2 not synchronized	
77	**EL3HLT**	Level 3 halted	
78	**EL3RST**	Level 3 reset	
79	**ELNRNG**	Link number out of range	
7A	**EUNATCH**	Protocol driver not attached	
7B	**ENOCSI**	No CSI structure available	
7C	**EL2HLT**	Level 2 halted	
7D	**EDEADLK**	Deadlock	
7E	**ENOLCK**	No lock	
7F	**-**		
80	**-**		
81	**-**		
82	**EBADE**	Invalid exchange	
83	**EBADR**	Invalid request descriptor	
84	**EXFULL**	Exchange full	
85	**ENOANO**	No anode	
86	**EBADRQC**	Invalid request code	
87	**EBADSLT**	Invalid slot	
88	**EDEADLOCK**	File locking deadlock error	
89	**EBFONT**	Bad font file fmt	
8C	**ENOSTR**	Not a stream	
8D	**ENODATA**	No data (for no delay io)	
8E	**ETIME**	Stream ioctl timeout	
8F	**ENOSR**	No stream resources	
90	**ENONET**	Machine is not on the network	
91	**ENOPKG**	Package not installed	
92	**EREMOTE**	The object is remote	
93	**ENOLINK**	Virtual circuit is gone	
94	**EADV**	Advertise error	
95	**ESRMNT**	Srmount error	
96	**ECOMM**	Communication error on send	
97	**EPROTO**	Protocol error	
98	**-**		
99	**-**		
9A	**EMULTIHOP**	Multihop attempted	
9B	**ELBIN**	Inode is remote (not really error)	
9C	**EDOTDOT**	Cross mount point (not really error)	
9D	**EBADMSG**	Bad message	
9E	**-**		

9F	**EFTYPE**	Inappropriate file type or format	
A0	**ENOTUNIQ**	Given log. Name not unique	
A1	**EBADFD**	f.d. invalid for this operation	
A2	**EREMCHG**	Remote address changed	
A3	**ELIBACC**	Can't access a needed shared lib	
A4	**ELIBBAD**	Accessing a corrupted shared lib	
A5	**ELIBSCN**	.lib section in a.out corrupted	
A6	**ELIBMAX**	Attempting to link in too many libs	
A7	**ELIBEXEC**	Attempting to exec a shared library	
A8	**ENOSYS**	Function not implemented	
A9	**ENMFILE**	No more files	
AA	**ENOTEMPTY**	Directory not empty	
AB	**ENAMETOOLONG**	File or path name too long	
AC	**ELOOP**	Too many symbolic links	
AD	**-**		
AE	**-**		
AF	**EOPNOTSUPP**	Operation not supported on socket	
B0	**EPFNOSUPPORT**	Protocol family not supported	
B1	**-**		
B2	**-**		
B3	**-**		
B4	**-**		
B5	**-**		
B6	**-**		
B7	**-**		
B8	**ECONNRESET**	Connection reset by peer	
B9	**ENOBUFS**	No buffer space available	
BA	**EAFNOSUPPORT**	Address family not supported by protocol family	
BB	**EPROTOTYPE**	Protocol wrong type for socket	
BC	**ENOTSOCK**	Socket operation on non-socket	
BD	**ENOPROTOOPT**	Protocol not available	
BE	**ESHUTDOWN**	Can't send after socket shutdown	
BF	**ECONNREFUSED**	Connection refused	
C0	**EADDRINUSE**	Address already in use	
C1	**ECONNABORTED**	Software caused connection abort	
C2	**ENETUNREACH**	Network is unreachable	
C3	**ENETDOWN**	Network interface is not configured	
C4	**ETIMEDOUT**	Connection timed out	
C5	**EHOSTDOWN**	Host is down	

C6	**EHOSTUNREACH**	Host is unreachable	
C7	**EINPROGRESS**	Connection already in progress	
C8	**EALREADY**	Socket already connected	
C9	**EDESTADDRREQ**	Destination address required	
CA	**EMSGSIZE**	Message too long	
CB	**EPROTONOSUPPORT**	Unknown protocol	
CC	**ESOCKTNOSUPPORT**	Socket type not supported	
CD	**EADDRNOTAVAIL**	Address not available	
CE	**ENETRESET**	Connection aborted by network	
CF	**EISCONN**	Socket is already connected	
D0	**ENOTCONN**	Socket is not connected	
D1	**ETOOMANYREFS**	Too many references: cannot splice	
D2	**EPROCLIM**	Too many process	
D3	**EUSERS**	Too many users	
D4	**EDQUOT**	Quota exceeded	
D5	**ESTALE**	Stale NFS file handle	
D6	**ENOTSUP**	Not supported	
D7	**ENOMEDIUM**	No medium (in tape drive)	
D8	**ENOSHARE**	No such host or network path	
D9	**ECASECLASH**	Filename exists with different case	
DA	**EILSEQ**	Illegal byte sequence	
DB	**EOVERFLOW**	Value too large for defined data type	
DC	**ECANCELED**	Operation canceled	
DD	**ENOTRECOVERABLE**	State not recoverable	
DE	**EOWNERDEAD**	Previous owner died	
DF	**ESTRPIPE**	Streams pipe error	

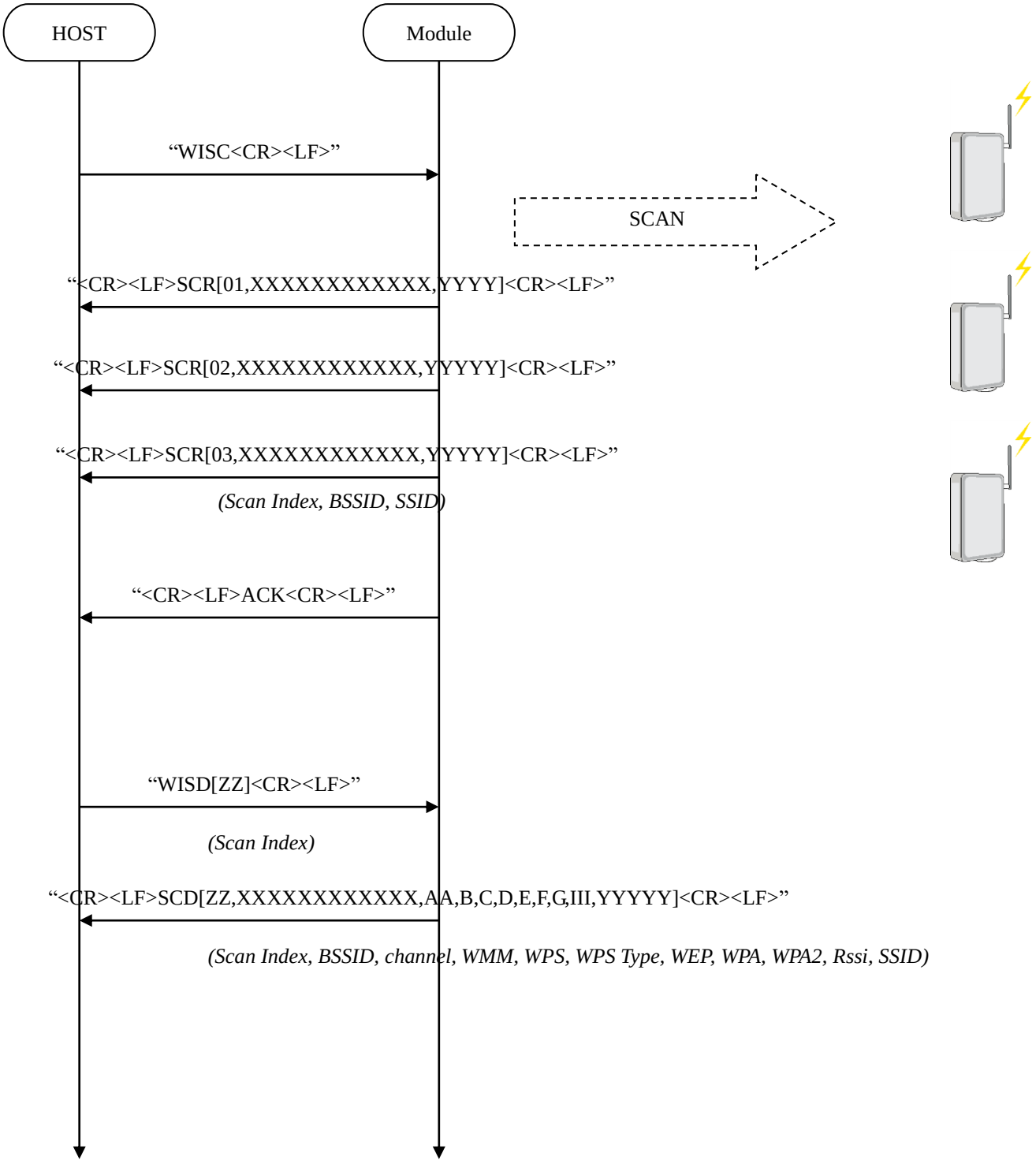
7 Fatal Error

After output Fatal error response, the module will be rebooted.

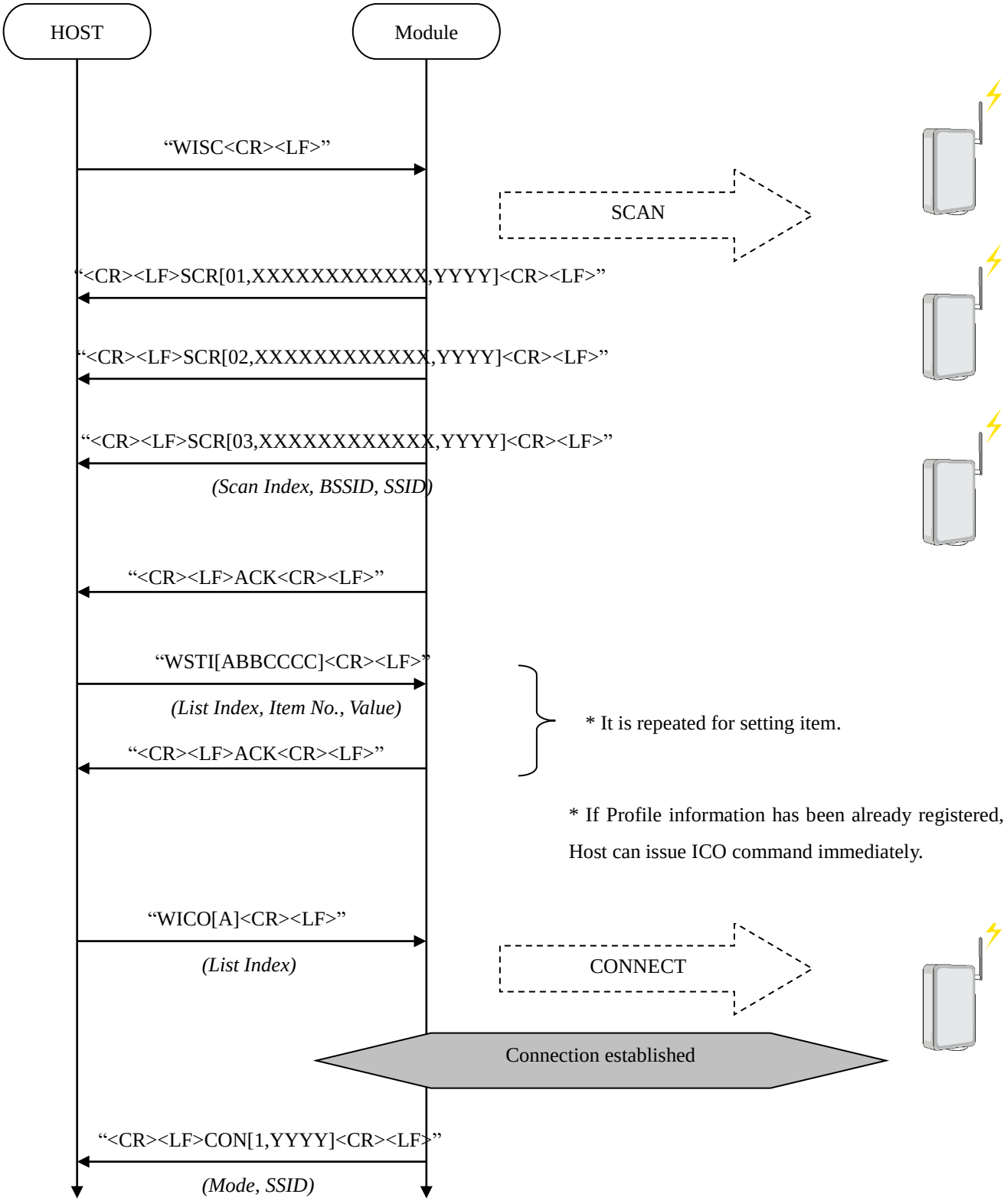
#	Name	Description
00	**Hardware fault**	Hardware fault
01	**Critical error**	WLAN initialization failure
02	**Critical error**	Application Framework initialization failure
03	**Critical error**	Application Framework critical error
04	**SDK critical error**	SDK critical error
05	**SDK panic**	SDK panic
06	**Stack overflow**	Stack overflow
07	**Heap overflow**	Heap overflow

8 Message Sequence Chart

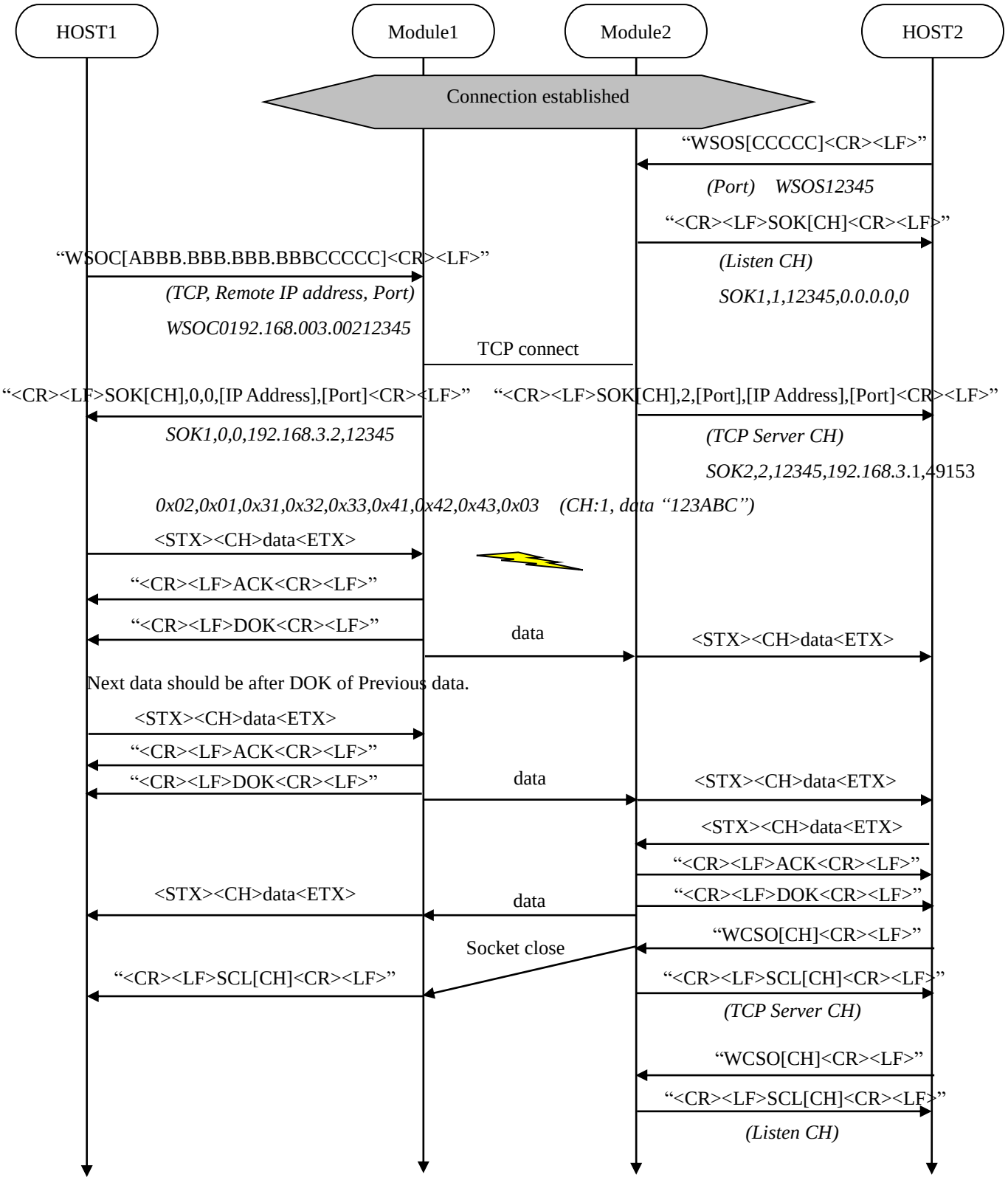
8.1 Scan and scan result detail



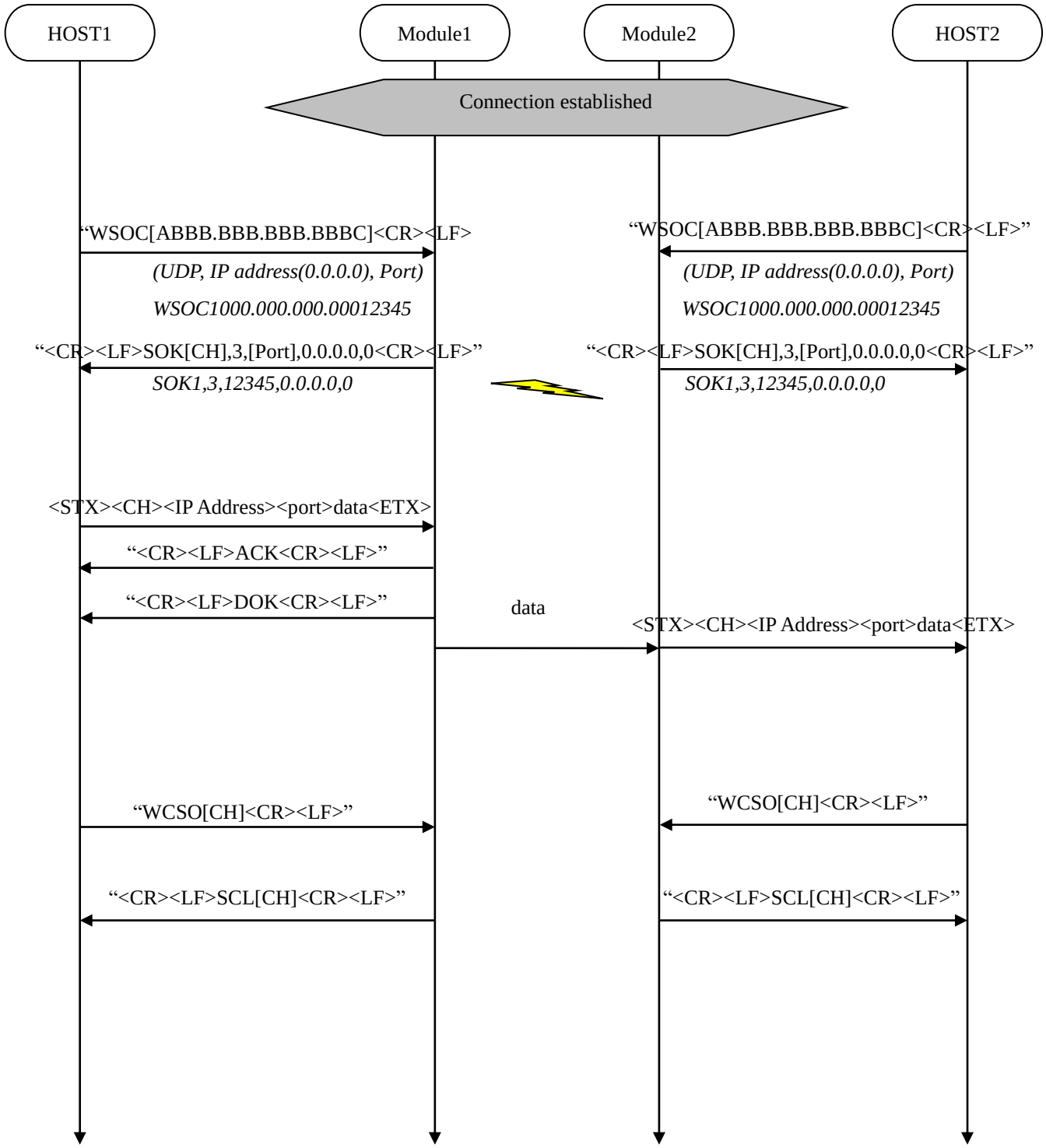
8.2 Connect


HOST
Module
"WISC<CR><LF>"
SCAN
"<CR><LF>SCR[01,XXXXXXXXXXXX,YYYY]<CR><LF>"
"<CR><LF>SCR[02,XXXXXXXXXXXX,YYYY]<CR><LF>"
"<CR><LF>SCR[03,XXXXXXXXXXXX,YYYY]<CR><LF>"
(Scan Index, BSSID, SSID)
"<CR><LF>ACK<CR><LF>"
"WSTI[ABBCCCC]<CR><LF>"
(List Index, Item No., Value)
"<CR><LF>ACK<CR><LF>"
* It is repeated for setting item.
* If Profile information has been already registered, Host can issue ICO command immediately.
"WICO[A]<CR><LF>"
(List Index)
CONNECT
Connection established
"<CR><LF>CON[1,YYYY]<CR><LF>"
(Mode, SSID)

8.3 Socket Interface usage (TCP)

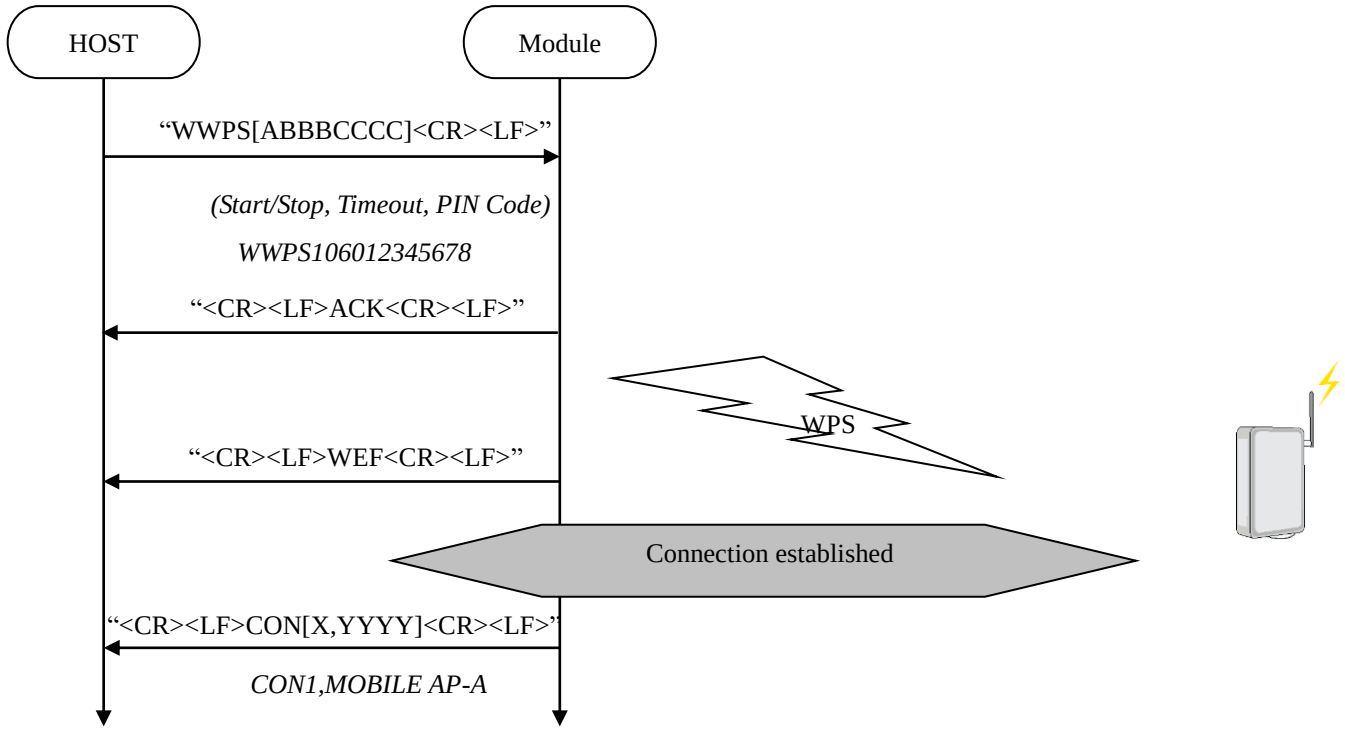


8.4 Socket Interface usage (UDP)

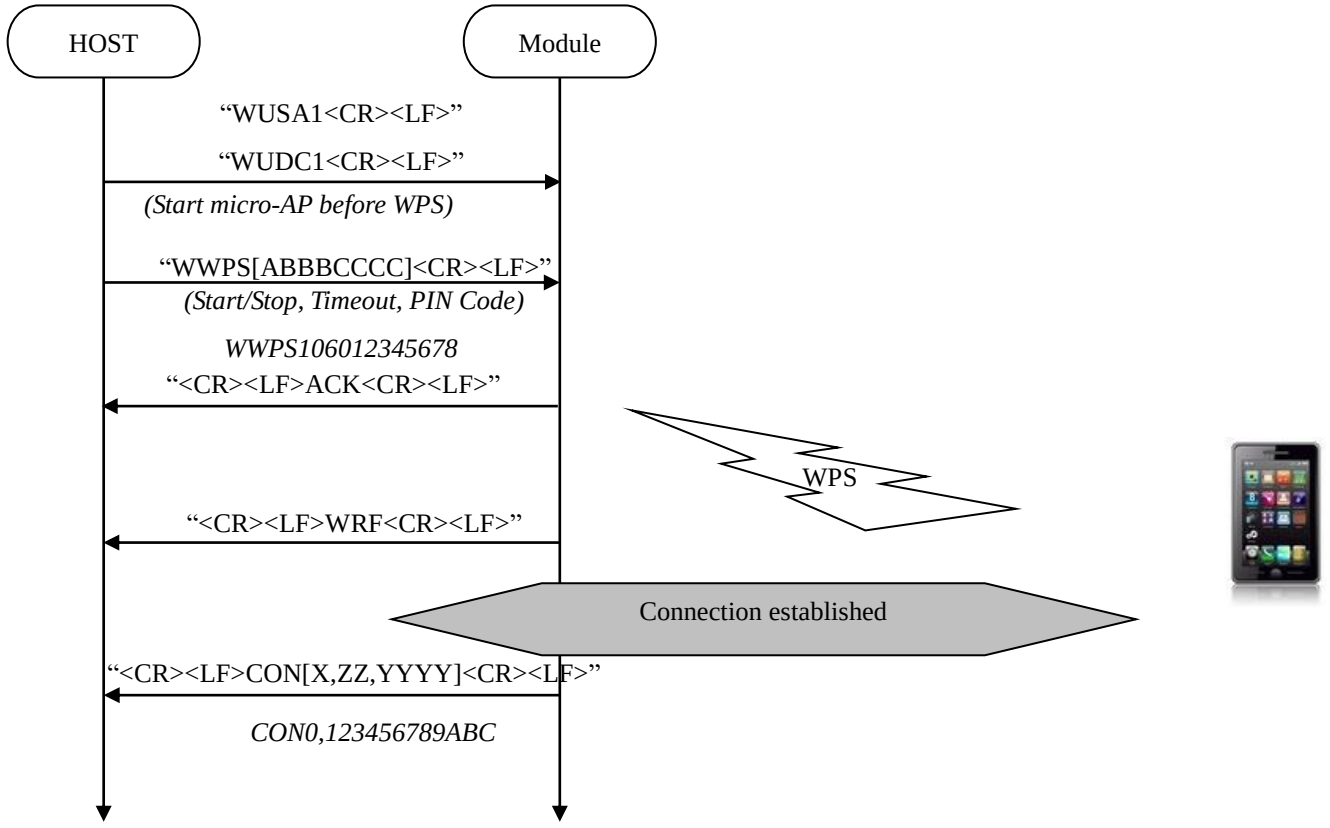


8.5 WPS

8.5.1 Infrastructure mode (WPS Enrollee)



8.5.2 uAP mode (WPS Registrar)



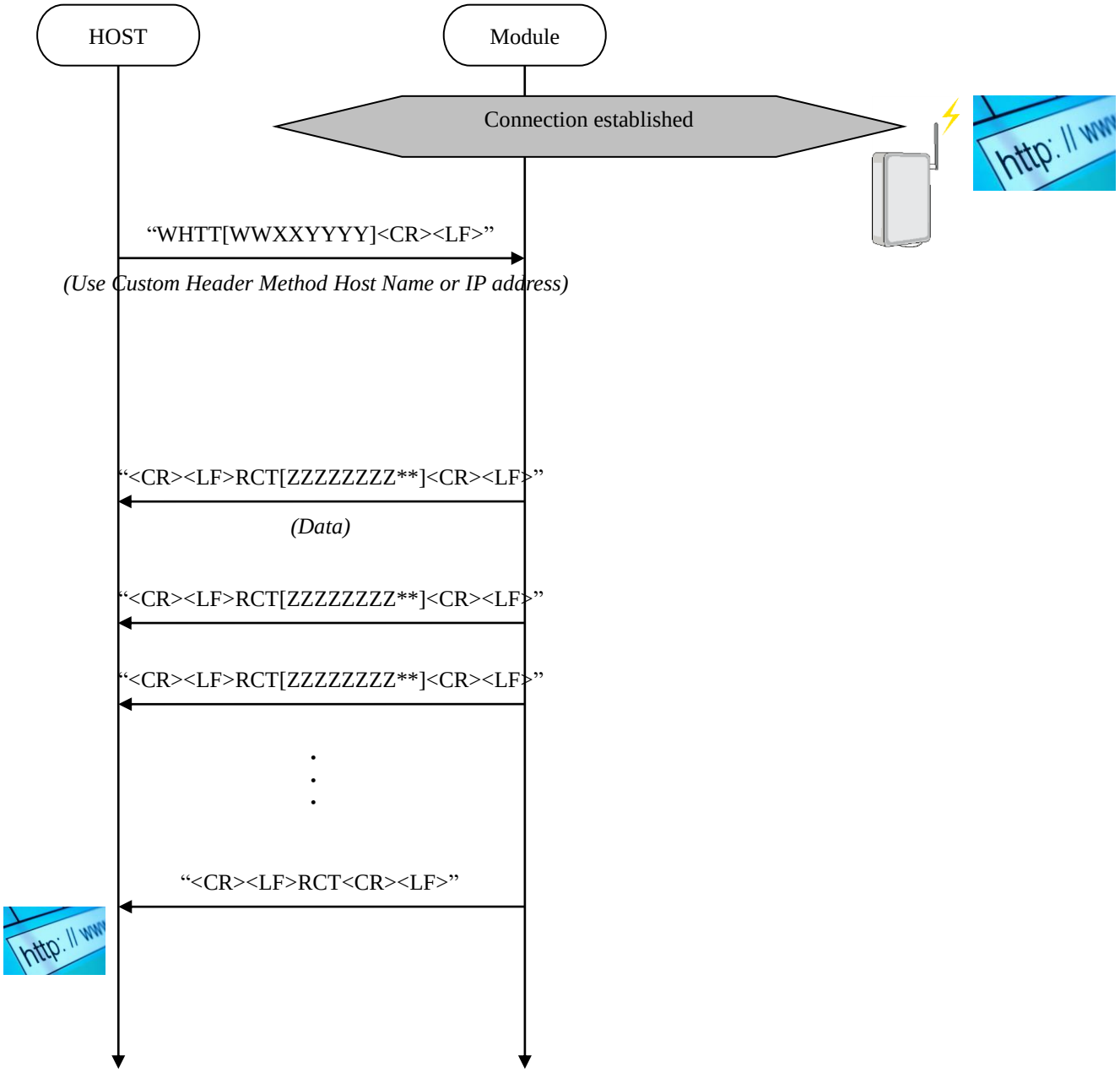
8.6 HTTP Request

8.6.1 GET

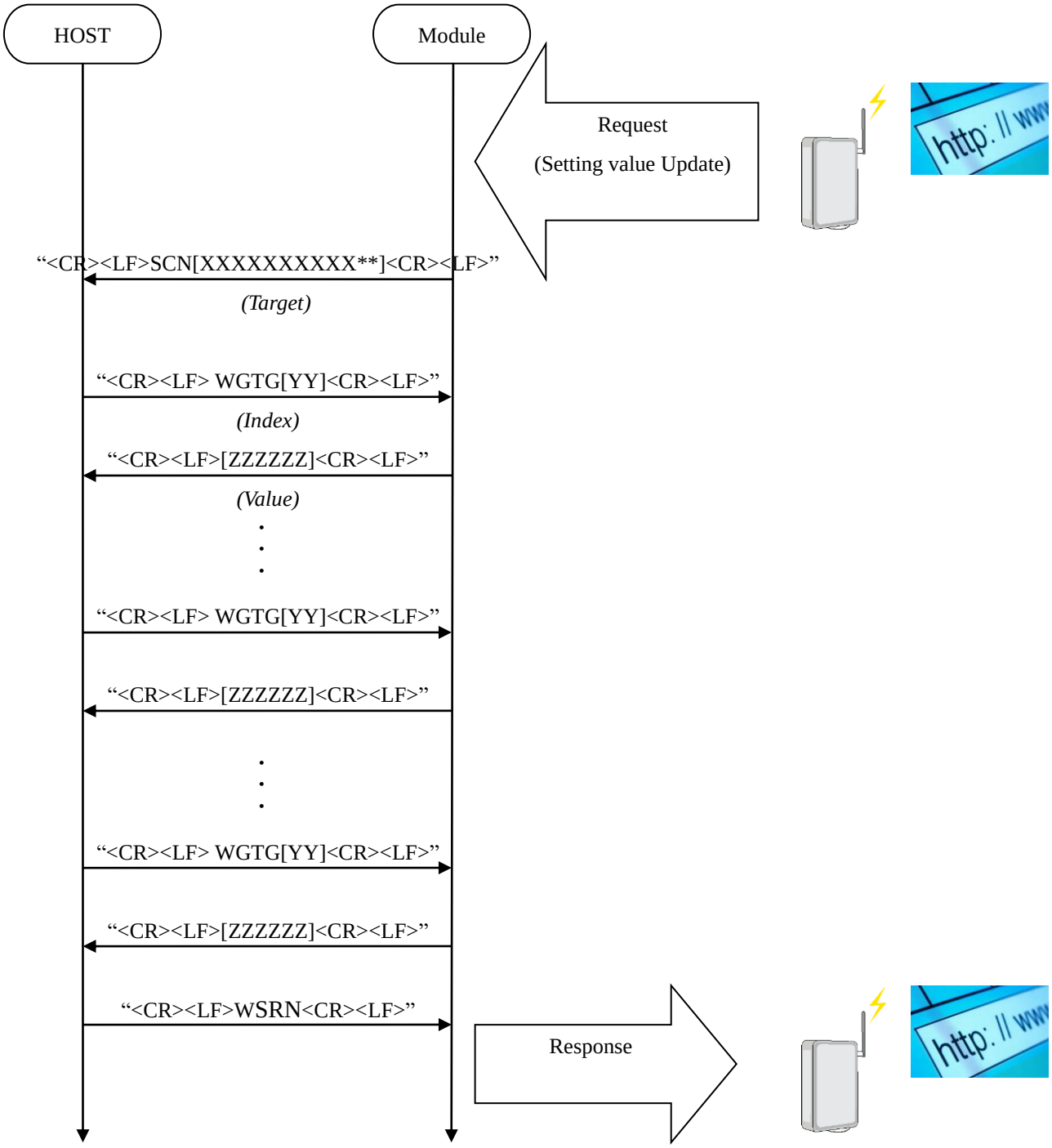
8.6.2 POST

8.6.3 PUT

8.6.4 DELETE



8.7 WEB Configuration



9 Note

1. When the module receives HTTP content and Socket data at the same time, there is a possibility that they are mixed in UART output.
2. While infrastructure network is connected, micro-AP can start only under the following condition.
   channel = 00 and channel specific = 0
3. The maximum number of micro-AP clients is 8.
4. The security of micro-AP mode can be set only either “No security” or “WPA2-PSK (AES)”.
5. Received TCP/UDP socket data is divided into maximum 730byte data and converted into TY's App format then sent to the host in order.
   Therefore, if whole data don't need to be escaped, maximum size of each data from TY's App is 730byte.
6. Maximum UDP packet size that TY's App can receive is 3072byte.
   Received UDP data is sent to the host every 730byte until 3072byte and further data is discard.
7. When user certificates option is enabled in STC command and invalid certificate is included, NAK32 is returned in HTT command.
   In HTTPS communication, when TY's App fails in the server verification, NAK30 is returned in HTT command.
   It is necessary for the server verification to set the time with STT command.
8. To comply with ETSI R&TTE EN 300 328 adaptivity requirement, enable Energy Detection with STC command.
9. DPS command affects only wlan chip and SBY command affects only MCU.
   Therefore, when both wlan chip and MCU put into low power mode, execute both commands in turn.
10. When the module run concurrently in micro-AP mode and Infrastructure mode, each network shall be set diffent subnets.
    Running these modes in the same subnetwork is not guaranteed.
11. When the module is connected to AP by DHCP in Infrastructure mode, “TCP Client” and “TCP Server (Accepted)” socket will be closed.
12. While HTTP Server is running and SSL certificate option for HTTPS is pre-installed certificates, HTT command returns NAK34.
    Please stop HTTP Server before HTT command or change SSL certificate option for HTTPS if both functions run concurrently.
13. If the writing to FLASH command (STC, STI, STU, SCT, STG and SHD) is repeated, FLASH access performance gradually drops. Therefore, the FLASH compaction (relocation) is processed so that the worst performance falls within about 100ms without UART output.
    The compaction is performed every 3000 times write commands or about total 300KB write size, whichever comes earlier, in the write command and it takes about 3500ms to complete the process.

10 Known issues

1. If you send data in a socket while receiving data in two or more sockets at the same time at high speed, it may cause IP stack hang up.
   In that case, the module needs reset for a recovery.
2. GSS command rarely returns NAKFF when IEEE PS is enabled.
   In that case, wait more than 30 seconds for retrying GSS command or reset then reconnect.
3. HTT command cannot connect to some web server which uses the following root certificate.
   DigiCert Assured ID Root G3
4. UFW command may not be executed again before reboot **once firmware update ends in success**.
   If the last UFW command fails or is suspended, the module will not boot and can not recover.
5. Immediately after writing to FLASH command (STC, STI, STU, SCT, STG and SHD), reading command (GTC, GTI, GTU, GCT, GTG and GHD) may fails.
   In that case, put the wait between writing and reading.

Appendix A.

Configuration Table (This information is written in flash memory.)

1. Infrastructure configuration

Profile table

List Index	SSID	Security Type	PSK	Addr Type	IP Addr	Subnet Mask	Default GW	Primary DNS Server	Secondary DNS Server	bssid	channel	bssid Specific	Channel Specific
0													
1													
2													
3													
4													

2. micro-AP configuration

Profile Table

List Index	SSID	Security Type	PSK	Addr Type	IP Addr	Subnet Mask	Default GW	Primary DNS Server	Secondary DNS Server	bssid	channel	bssid Specific	Channel Specific
1				-									

List Index	MAC Address filtering	Allowed MAC Address 1	Allowed MAC Address 2	Allowed MAC Address 3	Allowed MAC Address 4	Allowed MAC Address 5
1						

Appendix B.

Factory reset value

Factory setting / ERS command without parameter / Force Initilization (GPIO_4 (I2C0_SDA, PIN11))

* In ERS command, UART baud rate is not initialized.

Common value (STC, GTC)

No.	Item Name	value
01	UART baud rate (bps)	00 : 115200
02	Auto connect flag	00 : OFF
03	IEEE PS	00 : OFF
04	SSL certificate option for HTTPS	01 : pre-installed certificates only
05	Energy Detection	00 : OFF
06	Listen Interval	01 : 1

Profile (STI, GTI, STU, GTU)

Infrastructure profile 0 : unavailable

The values of other profiles are below.

No.	Item Name	Value
01	ssid	Null
02	security type	0 : No security
03	security key	Null
04	addr_type	0 : Static
05	IP address	000.000.000.000
06	subnet mask	000.000.000.000
07	default gateway	000.000.000.000
08	primary DNS server	000.000.000.000
09	secondary DNS server	000.000.000.000
10	bssid	000000000000
11	channel	00 : any channel.
12	bssid specific	0 : connect to any network whose SSID matches.
13	channel specific	0 : any available channel
20 (STU/GTU)	MAC Address filtering	0 : Disable
21-25 (STU/GTU)	Allowed MAC Address	FFFFFFFFFFFF

User certificates (SCT, GCT)

No.	Value
1	Null
2	Null
3	Null
4	Null
5	Null

Appendix C.

Pre-installed certificates

2018/02/05

https://pki.google.com/roots.pem (in https://pki.google.com/faq.html)

label	pre-installed	
Comodo AAA Services root	○	
AddTrust Low-Value Services Root	○	
AddTrust External Root	○	
AddTrust Public Services Root	○	
AddTrust Qualified Certificates Root	○	
COMODO Certification Authority	○	
COMODO ECC Certification Authority	×	
COMODO RSA Certification Authority	○	
Comodo Secure Services root	○	
Comodo Trusted Services root	○	
USERTrust ECC Certification Authority	×	
USERTrust RSA Certification Authority	○	
UTN USERFirst Hardware Root CA	○	
Baltimore CyberTrust Root	○	
Cybertrust Global Root	○	
DigiCert Assured ID Root CA	○	
DigiCert Assured ID Root G2	○	
DigiCert Assured ID Root G3	×	See Known issues
DigiCert Global Root CA	○	
DigiCert Global Root G2	○	
DigiCert Global Root G3	×	
DigiCert High Assurance EV Root CA	○	
DigiCert Trusted Root G4	○	
Entrust Root Certification Authority	○	
Entrust Root Certification Authority - EC1	×	
Entrust Root Certification Authority - G2	○	
Entrust.net Premium 2048 Secure Server CA	○	
GlobalSign Root CA	○	
GlobalSign Root CA - R2	○	
GlobalSign Root CA - R3	○	
GlobalSign ECC Root CA - R4	×	
GlobalSign ECC Root CA - R5	×	
GlobalSign Root CA - R6	○	
GlobalSign Root CA - R8	○	

Go Daddy Root Certificate Authority - G2	○	
Starfield Root Certificate Authority - G2	○	
Starfield Class 2 CA	○	
Go Daddy Class 2 CA	○	
Equifax Secure CA	○	
GeoTrust Global CA	○	
GeoTrust Global CA 2	○	
GeoTrust Primary Certification Authority	○	
GeoTrust Primary Certification Authority - G2	○	
GeoTrust Primary Certification Authority - G3	○	
GeoTrust Universal CA	○	
GeoTrust Universal CA 2	○	
thawte Primary Root CA	○	
thawte Primary Root CA - G2	×	
thawte Primary Root CA - G3	×	
Verisign Class 3 Public Primary Certification Authority - G3	○	
VeriSign Class 3 Public Primary Certification Authority - G4	○	
VeriSign Class 3 Public Primary Certification Authority - G5	○	
VeriSign Universal Root Certification Authority	○	
AffirmTrust Commercial	○	
AffirmTrust Networking	○	
AffirmTrust Premium	○	
AffirmTrust Premium ECC	×	
GTS Root R1	○	
GTS Root R2	○	
GTS Root R3	○	
GTS Root R4	○	

Appendix D.

Usage in EU

Set the following common value when you use in EU.

[Adaptivity requirement of ETSI R&TTE EN 300 328]

Enable Energy Detection

STC command No.05

WSTC0501<CR><LF>

Energy Detection ON

Appendix E.

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