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Knowledge Data Base Inquiry & Test Plan for the

R-Tron APEX1933 Industrial Booster

FCC ID: STE-APEX1933
(FCC Tracking Number 404513)

for compliance with

FCC Part 20, Part 24E &
FCC OET Document: "SIGNAL BOOSTERS CERTIFICATION
REQUIREMENTS" (935210 D02 Signal Boosters Certification v01r01)

Revision 1
December 6, 2013

Prepared by:

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Introduction

This document has been prepared to address recent changes to the FCC Rules regarding Industrial Boosters that are certified under Parts 20, 22, 24, 27 and 90 of the FCC Rules.

This document supports the application for FCC Knowledge Data Base (KDB) inquiry in accordance with the requirements for Signal Boosters (935210 D02).

This revision to this inquiry addresses issues and questions raised in response to initial inquiry (FCC Tracking Number 404513).

References:

1. CFR 47 Part 20
2. CFR 47 Part 2, Part 24, Subpart E
3. SIGNAL BOOSTERS CERTIFICATION REQUIREMENTS" (935210 D02 Signal Boosters Certification v01r01)
4. Estech Co., Ltd Test Report ESTR1308-023
5. TCB Permit-But-Ask List. KDB 388624 D02

Supplementary information (User's Manual) will be provided as part of this inquiry.

Note to this Inquiry: This inquiry is filed on behalf of the applicant in accordance with suggestions in KDB 935210, viz, *"Due to the significant changes from the old rules, manufacturers, test labs, and TCBs are encouraged to submit KDB inquiries to request clarification and guidance before starting compliance testing or submitting an equipment authorization application."*

We are not requesting a KDB because of any perceived deviation from KDB 935210, but for clear review of applicability of new requirements levied under recent publications and guidance.

Equipment Description

The APEX1933 is used to fill out areas in APEX systems, such as base station fringe areas, business and industrial building, etc.

The APEX1933 receives signals from a base station, amplifies and retransmits the signals to the mobile stations. It also receives, amplifies and retransmits signals in the opposite direction. It is designed to be used with the femto-cell transceivers for local communications with mobile devices.

The APEX1933 uses the following frequencies in the broadband PCS service band:

Uplink: 1850.00MHz ~ 1915.00MHz

Downlink: 1930.00MHz ~ 1995.00MHz

Requirements for Certification

The following essential requirements are required for Certification:

1. CFR 47 Part 2
2. CFR 47 Part 20.21 Signal Boosters
3. CFR Part 24, Subpart E
4. SIGNAL BOOSTERS CERTIFICATION REQUIREMENTS" (935210 D02 Signal Boosters Certification v01r01)

CFR 47 Part 2 & Part 24 Requirements

The necessary tests, and information to be supplied for these requirements are shown in the following table:

Table 1. CFR47 Part 2: Essential Technical Requirements

Section	Parameter	Response
2.1046, 24.232	RF Output Power	Estech Co., Ltd Test Report ESTR1308-023. Section 4.
2.1049	Occupied Bandwidth	do. Section 5.
2.1049	Band Edge	N/A
2.1051	Spurious and Harmonic Emission at Antenna Terminal	do. Section 6.
2.1053, 24.236, 24.238	Field Strength of Spurious Radiation	do. Section 7.
2.1055, 24.235	Frequency stability	do. Section 8.
2.1047	Modulation Characteristics	N/A
24.229	Frequencies	do. Section 4.
24.237	Interference Protection	By licensee

Table 2. Additional Technical Requirements referenced by KDB 935210 - Intermodulation

KDB 935210	Intermodulation Emissions	<p>To be performed in accordance with the following:</p> <p>Intermodulation –Test all modulation types [TDMA, CDMA, and FM (covers GSM and F1D)]</p> <p>i) CW signal rather than typical signal is acceptable (for FM).</p> <p>ii) At maximum drive level, for each modulation: one test with three tones, or two tests (high-, low-band edge) with two tones</p> <p>iii) Limit usually is -13dBm conducted.</p> <p>iv) Not needed for Single Channel systems.</p> <p>v) Combination of modulation types not needed</p>
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The basic technical requirements for the APEX1933 Booster are addressed in Estech Co., Ltd's test report, which is provided as an Annex to this KDB submission. Further technical information will be addressed in formal application.

Estech Co. Ltd is located at (headquarters) Rm. 1015, World Venture Center II, 426-5 Gasan-dong Geumcheon-gu, Seoul, 153-803. Korea.

Estech Co. Ltd is accredited by KOLAS to ISO 17025.

CFR 47 Part 20.21 Signal Boosters

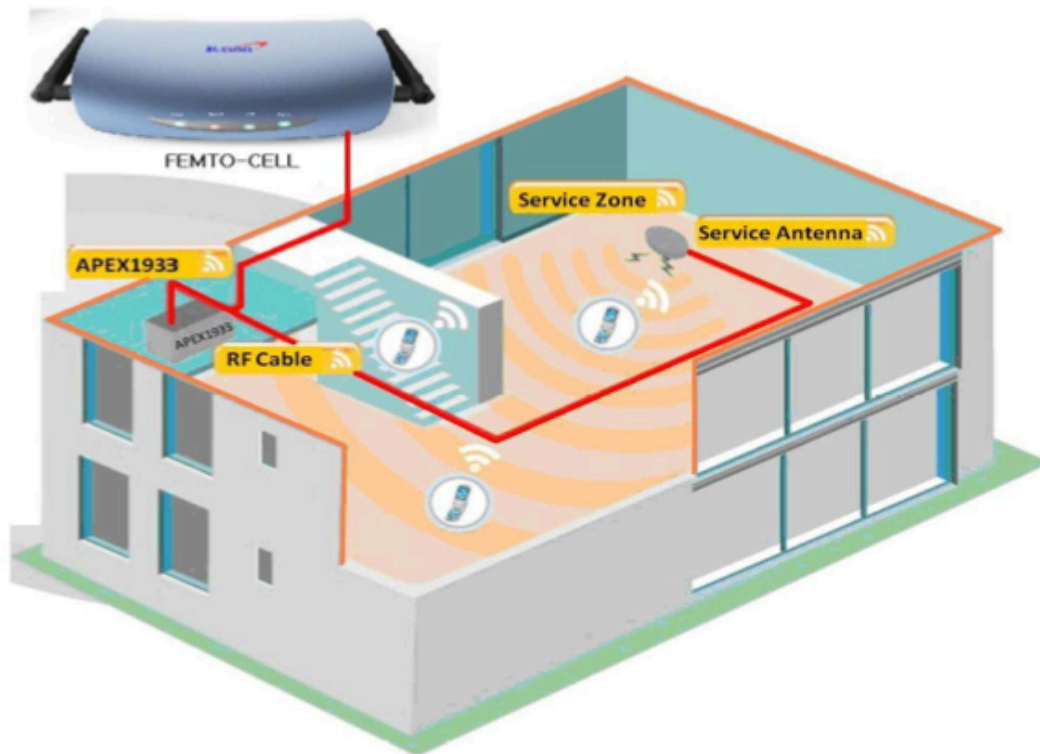
The following requirements are delineated in SIGNAL BOOSTERS CERTIFICATION REQUIREMENTS" (935210 D02 Signal Boosters Certification v01r01), Annex A

1) Form 731 requirements

The APEX1933 device meets the description of Booster, from 935210 D0:

"Booster" is a device that automatically reradiates signals from base transmitters without channel translation, for the purpose of improving the reliability of existing service by increasing the signal strength in dead spots. An "in-building radiation system" is a signal booster. These devices are not intended to extend the size of coverage from the originating base station. A booster can be either single or multiple channels."

An example of the application of the APEX1933 is shown in the following figure.



The APEX1933 satisfies the operation description 1) b) 2) (in two enclosures host/remote).

4 Industrial (Part 20) Signal Booster Specifics

- (a) Industrial boosters may only be used by FCC licensees or those given express (individualized) consent of a licensee.
- (b) Consent can be in the form of a letter, e-mail or other record sent from a licensee or agent of a licensee to an operator, owner, or installer of an industrial signal booster with specified frequency bands for retransmission. .

(c) Industrial booster warning label

- (1) Sample label

WARNING. This is **NOT** a **CONSUMER** device. It is designed for installation by **FCC LICENSEES** and **QUALIFIED INSTALLERS**. You **MUST** have an **FCC LICENSE** or express consent of an FCC Licensee to operate this device. Unauthorized use may result in significant forfeiture penalties, including penalties in excess of \$100,000 for each continuing violation.

(2) NOTE: Can be combined with the FCC ID label.

(4) Permanently affixed to a permanently attached part of the equipment enclosure, readily visible.

(d) **Attestation** (must be non-confidential exhibit, signed by R-Tron; signature by test lab, agent, or TCB is not acceptable) will include:

(1) Warning label messages will be also shown in online and point-of-sale marketing materials and on outside packaging of device.

(e) **Operational Description** shall include:

(1) Provide a list of all operation bands and the scope of the license or the licensee consent:

(2) If HW or SW platform permits other frequency bands, describe how are they selected and managed:

(3) Describe the automatic power down mechanism and its adjustable range to ensure that the booster operates only with the power necessary to achieve the intended communications:

(f) **User's Manual** (non-confidential or short-term confidential) should include:

- (1) Signal booster warning label message.
- (2) Warning message for use of unauthorized antennas, cables, and/or coupling devices.
- (3) Provide a complete list of authorized antennas, cables, and/or coupling devices.
- (4) List default antenna, cable, and/or coupling device that are shipped with the booster.
- (5) Describe installation procedure and any power, RF cable, and antenna adjustment guidelines.
- (6) Licensee contact information (if available)