July 28, 2025

Anumana, Inc.
Taylor Gold West
Director, Regulatory Affairs
One Main St, Suite 400
East Arcade, 4th Floor
Cambridge, Massachusetts 02142

Re: K250652
Trade/Device Name: ECG-AI Low Ejection Fraction (LEF) 12-Lead Algorithm
Regulation Number: 21 CFR 870.2380
Regulation Name: Cardiovascular Machine Learning-Based Notification Software
Regulatory Class: Class II
Product Code: QYE
Dated: March 4, 2025
Received: June 27, 2025

Dear Taylor Gold West:

We have reviewed your section 510(k) premarket notification of intent to market the device referenced above and have determined the device is substantially equivalent (for the indications for use stated in the enclosure) to legally marketed predicate devices marketed in interstate commerce prior to May 28, 1976, the enactment date of the Medical Device Amendments, or to devices that have been reclassified in accordance with the provisions of the Federal Food, Drug, and Cosmetic Act (the Act) that do not require approval of a premarket approval application (PMA). You may, therefore, market the device, subject to the general controls provisions of the Act. Although this letter refers to your product as a device, please be aware that some cleared products may instead be combination products. The 510(k) Premarket Notification Database available at https://www.accessdata.fda.gov/scripts/cdrh/cfdocs/cfpmn/pmn.cfm identifies combination product submissions. The general controls provisions of the Act include requirements for annual registration, listing of devices, good manufacturing practice, labeling, and prohibitions against misbranding and adulteration. Please note: CDRH does not evaluate information related to contract liability warranties. We remind you, however, that device labeling must be truthful and not misleading.

If your device is classified (see above) into either class II (Special Controls) or class III (PMA), it may be subject to additional controls. Existing major regulations affecting your device can be found in the Code of Federal Regulations, Title 21, Parts 800 to 898. In addition, FDA may publish further announcements concerning your device in the Federal Register.

FDA's substantial equivalence determination also included the review and clearance of your Predetermined Change Control Plan (PCCP). Under section 515C(b)(1) of the Act, a new premarket notification is not required for a change to a device cleared under section 510(k) of the Act, if such change is consistent with an

established PCCP granted pursuant to section 515C(b)(2) of the Act. Under 21 CFR 807.81(a)(3), a new premarket notification is required if there is a major change or modification in the intended use of a device, or if there is a change or modification in a device that could significantly affect the safety or effectiveness of the device, e.g., a significant change or modification in design, material, chemical composition, energy source, or manufacturing process. Accordingly, if deviations from the established PCCP result in a major change or modification in the intended use of the device, or result in a change or modification in the device that could significantly affect the safety or effectiveness of the device, then a new premarket notification would be required consistent with section 515C(b)(1) of the Act and 21 CFR 807.81(a)(3). Failure to submit such a premarket submission would constitute adulteration and misbranding under sections 501(f)(1)(B) and 502(o) of the Act, respectively.

Additional information about changes that may require a new premarket notification are provided in the FDA guidance documents entitled "Deciding When to Submit a 510(k) for a Change to an Existing Device" (https://www.fda.gov/media/99812/download) and "Deciding When to Submit a 510(k) for a Software Change to an Existing Device" (https://www.fda.gov/media/99785/download).

Your device is also subject to, among other requirements, the Quality System (QS) regulation (21 CFR Part 820), which includes, but is not limited to, 21 CFR 820.30, Design controls; 21 CFR 820.90, Nonconforming product; and 21 CFR 820.100, Corrective and preventive action. Please note that regardless of whether a change requires premarket review, the QS regulation requires device manufacturers to review and approve changes to device design and production (21 CFR 820.30 and 21 CFR 820.70) and document changes and approvals in the device master record (21 CFR 820.181).

Please be advised that FDA's issuance of a substantial equivalence determination does not mean that FDA has made a determination that your device complies with other requirements of the Act or any Federal statutes and regulations administered by other Federal agencies. You must comply with all the Act's requirements, including, but not limited to: registration and listing (21 CFR Part 807); labeling (21 CFR Part 801); medical device reporting (reporting of medical device-related adverse events) (21 CFR Part 803) for devices or postmarketing safety reporting (21 CFR Part 4, Subpart B) for combination products (see https://www.fda.gov/combination-products/guidance-regulatory-information/postmarketing-safety-reporting-combination-products); good manufacturing practice requirements as set forth in the quality systems (QS) regulation (21 CFR Part 820) for devices or current good manufacturing practices (21 CFR Part 4, Subpart A) for combination products; and, if applicable, the electronic product radiation control provisions (Sections 531-542 of the Act); 21 CFR Parts 1000-1050.

All medical devices, including Class I and unclassified devices and combination product device constituent parts are required to be in compliance with the final Unique Device Identification System rule ("UDI Rule"). The UDI Rule requires, among other things, that a device bear a unique device identifier (UDI) on its label and package (21 CFR 801.20(a)) unless an exception or alternative applies (21 CFR 801.20(b)) and that the dates on the device label be formatted in accordance with 21 CFR 801.18. The UDI Rule (21 CFR 830.300(a) and 830.320(b)) also requires that certain information be submitted to the Global Unique Device Identification Database (GUDID) (21 CFR Part 830 Subpart E). For additional information on these requirements, please see the UDI System webpage at https://www.fda.gov/medical-devices/device-advice-comprehensive-regulatory-assistance/unique-device-identification-system-udi-system.

Also, please note the regulation entitled, "Misbranding by reference to premarket notification" (21 CFR 807.97). For questions regarding the reporting of adverse events under the MDR regulation (21 CFR Part 803), please go to https://www.fda.gov/medical-devices/medical-device-safety/medical-device-reporting-mdr-how-report-medical-device-problems.

For comprehensive regulatory information about medical devices and radiation-emitting products, including information about labeling regulations, please see Device Advice (https://www.fda.gov/medical-devices/device-advice-comprehensive-regulatory-assistance) and CDRH Learn (https://www.fda.gov/training-and-continuing-education/cdrh-learn). Additionally, you may contact the Division of Industry and Consumer Education (DICE) to ask a question about a specific regulatory topic. See the DICE website (https://www.fda.gov/medical-devices/device-advice-comprehensive-regulatory-assistance/contact-us-division-industry-and-consumer-education-dice) for more information or contact DICE by email (DICE@fda.hhs.gov) or phone (1-800-638-2041 or 301-796-7100).

Sincerely,

Stephen C. Browning -S

LCDR Stephen Browning
Assistant Director
Division of Cardiac Electrophysiology,
Diagnostics, and Monitoring Devices
Office of Cardiovascular Devices
Office of Product Evaluation and Quality
Center for Devices and Radiological Health

Enclosure

Indications for Use

Please type in the marketing application/submission number, if it is known. This textbox will be left blank for original applications/submissions.	K250652

Please provide the device trade name(s).

ECG-AI Low Ejection Fraction (LEF) 12-Lead algorithm

Please provide your Indications for Use below.

The ECG-AI LEF 12-Lead algorithm is software intended to aid in earlier detection of Left Ventricular Ejection Fraction (LVEF) less than or equal to 40% in adults at risk for heart failure. This population includes, but is not limited to:

- patients with cardiomyopathies
- patients who are post-myocardial infarction
- patients with aortic stenosis
- patients with chronic atrial fibrillation
- patients receiving pharmaceutical therapies that are cardiotoxic, and
- postpartum women.

The ECG-AI LEF 12-Lead algorithm is not intended to be a stand-alone diagnostic device for cardiac conditions, should not be used for monitoring of patients, and should not be used on ECGs with a paced rhythm.

A positive result may suggest the need for further clinical evaluation in order to establish a diagnosis of Left Ventricular Ejection Fraction (LVEF) less than or equal to 40%. Additionally, if the patient is at high risk for the cardiac condition, a negative result should not rule out further non-invasive evaluation.

The ECG-AI LEF 12-Lead Algorithm should be applied jointly with clinician judgment.

Please select the types of uses (select one or both, as applicable).

- ☒ Prescription Use (Part 21 CFR 801 Subpart D)
- ☐ Over-The-Counter Use (21 CFR 801 Subpart C)

510(k) Summary
ECG-AI Low Ejection Fraction 12-Lead Algorithm

Submission Number:	K250652
Applicant Name:	Anumana, Inc. One Main Street, Suite 400 East Arcade 4th Floor Cambridge, MA 02142
Contact Person:	Taylor Gold West Director, Regulatory Affairs Anumana, Inc. tgoldwest@anumana.ai
Date Summary Prepared:	July 25, 2025
Trade Name	ECG-AI Low Ejection Fraction (LEF) 12-Lead Algorithm
Regulation Name	Cardiovascular machine learning-based notification software
Classification Panel	Cardiovascular
Classification Regulation	21 CFR 870.2380
Device Class	Class II
Product Code	QYE
Device Description	Reduced Ejection Fraction machine learning-based notification software
Premarket Review	Cardiovascular Devices (OHT2)/Cardiac Electrophysiology, Diagnostics, and Monitoring Devices (DHT2A)

Predicate Device(s):

Device Name:	ECG-AI Low Ejection Fraction 12-Lead algorithm
Manufacturer:	Anumana, Inc.
Application Number:	K232699

Submission Purpose

The purpose of this submission is to expand compatibility with other ECG devices from the Philips Medical Systems PageWriter series (TC50 and TC30, K210560) and describe other changes made since original clearance of the ECG-AI LEF 12-Lead algorithm (K232699).

Device Description

The ECG-AI LEF 12-Lead algorithm interprets 12-lead ECG voltage times series data using an artificial intelligence-based algorithm. The device analyzes 10 seconds of a single 12-lead ECG acquisition, and within seconds provides likelihood of LVEF (ejection fraction less than or equal to 40%) to third party software. The results are displayed by the third party software on a device such as a smartphone, tablet,

or PC. The ECG-AI LEF 12-Lead algorithm was trained to detect Low LVEF using positive and control cohorts, and the detection of Low LVEF in patients is generated using defined conditions and covariates.

The ECG-AI LEF 12-Lead algorithm device is intended to address the unmet need for a point-of-care screen for LVEF less than or equal to 40% and is expected to be used by cardiologists, frontline clinicians at primary care, urgent care, and emergency care settings, where cardiac imaging may not be available or may be difficult or unreliable for clinicians to operate. Clinicians will use the ECG-AI LEF 12-Lead algorithm to aid in earlier detection of LVEF less than or equal to 40% and making a decision for further cardiac evaluation.

The software module can be integrated into a client application to be accessed by clinicians and results viewed through an Electronic Medical Record (EMR) system or an ECG Management System (EMS) accessed via a PC, mobile device, or another medical device. In each case, the physician imports 12-lead ECG data in digital format. The tool analyzes the 10 seconds or longer duration of voltage data collected during a standard 12-lead ECG and outputs a binary result of the likelihood of low ejection fraction as an API result.

Indications for Use
The ECG-AI LEF 12-Lead algorithm is software intended to aid in earlier detection of Left Ventricular Ejection Fraction (LVEF) less than or equal to 40% in adults at risk for heart failure. This population includes, but is not limited to:

- patients with cardiomyopathies
- patients who are post-myocardial infarction
- patients with aortic stenosis
- patients with chronic atrial fibrillation
- patients receiving pharmaceutical therapies that are cardiotoxic, and
- postpartum women.

The ECG-AI LEF 12-Lead algorithm is not intended to be a stand-alone diagnostic device for cardiac conditions, should not be used for monitoring of patients, and should not be used on ECGs with a paced rhythm.

A positive result may suggest the need for further clinical evaluation in order to establish a diagnosis of Left Ventricular Ejection Fraction (LVEF) less than or equal to 40%. Additionally, if the patient is at high risk for the cardiac condition, a negative result should not rule out further non-invasive evaluation.

The ECG-AI LEF 12-Lead algorithm should be applied jointly with clinician judgement.

Technological Characteristics
ECG-AI LEF 12-Lead algorithm is provided as a software module packaged in a Docker container to facilitate installation. Technical installation details including access to docker hub, docker hub path, software upgrades, and associated access rights can be found in the Installation Manual ECG-AI Low Ejection Fraction 12-Lead algorithm. ECG-AI LEF 12-Lead algorithm does not provide a graphical user interface (GUI) of its own. It is integrated with other medical systems such as Electronic Medical Record (EMR) systems or ECG Management Systems (EMS). The third-party integrating software will furnish a

12-lead ECG digital waveform as input to ECG-AI LEF 12-Lead algorithm and record the output from the device for display or for printing in an offline report.

Summary of Non-Clinical Performance Data
The performance characteristics for the ECG-AI LEF 12-Lead algorithm were evaluated through software verification and labeling verification.

Predetermined Change Control Plan
This device has been cleared by the U.S. Food and Drug Administration (FDA) with a Predetermined Change Control Plan (PCCP). As part of this authorization, the device software may be updated periodically to enhance performance, including for higher sensitivity and/or specificity.

Each modification will be validated through a multi-center retrospective clinical study that uses a combination of new and existing data. This approach involves supplementing the validation dataset with at least 20% new data for each iteration to ensure it remains current and representative. To be implemented, a modified version must demonstrate improved performance by meeting pre-specified acceptance criteria. These criteria require the new version's sensitivity and specificity point estimates to be greater than or equal to the previous version, with an improvement shown by either an increased point estimate or a tighter confidence interval lower bound for at least one of these metrics.

Users will be informed of each applicable update through revised labeling, release notes, or other appropriate communication channels. It is important to review updated instructions and performance summaries accompanying each software version to ensure continued proper use of the device.

Substantial Equivalence

The subject device, Anumana ECG-AI LEF 12-Lead algorithm (v2.4.0), is substantially equivalent to the predicate, ECG-AI LEF 12-Lead algorithm (v2.3.0, K232699). The devices have equivalent intended uses, and identical principles of operation and technical characteristics. Where differences occur between the subject device and the predicate, results of non-clinical verification demonstrate that the subject device is as safe and as effective as the predicate.

Table 3: Substantial Equivalence Comparison of Subject Device to the Predicate

	Subject Device	Predicate Device	Discussion
Manufacturer	Anumana Inc.	Anumana Inc.	
Product Name	ECG-AI LEF 12-Lead algorithm	ECG-AI LEF 12-Lead algorithm	
Application No.	K250652	K232699	
Product Code	QYE	QYE	**Identical.**
Regulation No.	21 CFR 870.2380	21 CFR 870.2380	**Identical.**
Regulation Name	Reduced Ejection Fraction machine learning-based notification software	Reduced Ejection Fraction machine learning-based notification software	**Identical.**
Intended Use/ Indications for Use	The ECG-AI LEF 12-Lead algorithm is software intended to aid in earlier detection of Left Ventricular Ejection Fraction (LVEF) less than or equal to 40% in adults at risk for heart failure. This population includes, but is not limited to: • patients with cardiomyopathies • patients who are post-myocardial infarction • patients with aortic stenosis • patients with chronic atrial fibrillation • patients receiving pharmaceutical therapies that are cardiotoxic, and • postpartum women. The ECG-AI LEF 12-Lead algorithm is not intended to be a stand-alone diagnostic device for cardiac conditions, should not be used for	The Anumana Low Ejection Fraction AI-ECG Algorithm is software intended to aid in screening for Left Ventricular Ejection Fraction (LVEF) less than or equal to 40% in adults at risk for heart failure. This population includes, but is not limited to: • patients with cardiomyopathies • patients who are post-myocardial infarction • patients with aortic stenosis • patients with chronic atrial fibrillation • patients receiving pharmaceutical therapies that are cardiotoxic, and • postpartum women. Anumana Low Ejection Fraction AI-ECG Algorithm is not intended to be a stand-alone diagnostic device for cardiac conditions, should	**Equivalent**. The subject device indications for use are equivalent to the predicate in that the device is intended to treat the same patient population. Minor modifications were made (as outlined in the section above). Changes made to the indications are not substantial; naming convention and minor modification to verbiage (e.g. earlier detection vs screening) do not change the overall intended use.

	Subject Device	Predicate Device	Discussion
Manufacturer	Anumana Inc.	Anumana Inc.	
Product Name	ECG-AI LEF 12-Lead algorithm	ECG-AI LEF 12-Lead algorithm	
	monitoring of patients, and should not be used on ECGs with a paced rhythm. A positive result may suggest the need for further clinical evaluation in order to establish a diagnosis of Left Ventricular Ejection Fraction (LVEF) less than or equal to 40%. Additionally, if the patient is at high risk for the cardiac condition, a negative result should not rule out further non-invasive evaluation. The ECG-AI LEF 12-Lead algorithm should be applied jointly with clinician judgment.	not be used for monitoring of patients, and should not be used on ECGs with a paced rhythm. A positive result may suggest the need for further clinical evaluation in order to establish a diagnosis of Left Ventricular Ejection Fraction (LVEF) less than or equal to 40%. Additionally, if the patient is at high risk for the cardiac condition, a negative result should not rule out further non-invasive evaluation. The Anumana Low Ejection Fraction AI-ECG Algorithm should be applied jointly with clinician judgment.	
Diagnostic Application	Left Ventricular Ejection Fraction (LVEF) less than or equal to 40%	Left Ventricular Ejection Fraction (LVEF) less than or equal to 40%	**Identical.**
Patient Population	Adults at risk for heart failure	Adults at risk for heart failure	**Identical.**
Intended User	Clinicians	Clinicians	**Identical.**
Environment of Use	Primary care, urgent care, and emergency care settings	Primary care, urgent care, and emergency care settings	**Identical.**
Device Output Format	Algorithm output is provided to third party software that displays the result to clinicians. Output provided for each ECG is “Low LVEF Detected” “Low LVEF Not Detected” or “Error”.	Algorithm output is provided to third party software that displays the result to clinicians. Output provided for each ECG is “Low LVEF Detected” “Low LVEF Not Detected” or “Error”.	**Identical.**
Hardware	Compatible 12-Lead diagnostic ECG machines with 500Hz digital output	Compatible 12-Lead diagnostic ECG machines with 500Hz digital output	**Identical.**

	Subject Device	Predicate Device	Discussion
Manufacturer	Anumana Inc.	Anumana Inc.	
Product Name	ECG-AI LEF 12-Lead algorithm	ECG-AI LEF 12-Lead algorithm	
Software	ECG-AI LEF 12-Lead algorithm	ECG-AI LEF 12-Lead algorithm	**Equivalent.**