



Toshiba Medical Systems Corporation, Japan
% Paul Biggins
Director Regulatory Affairs
Toshiba America Medical Systems, Inc.
2441 Michelle Drive
Tustin, California 92780

November 17, 2017

Re: K172878

Trade/Device Name: Vantage Titan 3T, MRT-3010/A7, M-Power GX
Regulation Number: 21 CFR 892.1000
Regulation Name: Magnetic Resonance Diagnostic Device
Regulatory Class: Class II
Product Code: LNH
Dated: September 20, 2017
Received: September 21, 2017

Dear Paul Biggins:

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 (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. 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](#).

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 803); good manufacturing practice requirements as set forth in the quality systems (QS) regulation (21 CFR Part 820); and if applicable, the electronic product radiation control provisions (Sections 531-542 of the Act); 21 CFR 1000-1050.

Also, please note the regulation entitled, "Misbranding by reference to premarket notification" (21 CFR Part 807.97). For questions regarding the reporting of adverse events under the MDR regulation (21 CFR Part 803), please go to <http://www.fda.gov/MedicalDevices/Safety/ReportaProblem/default.htm> for the CDRH's Office of Surveillance and Biometrics/Division of Postmarket Surveillance.

For comprehensive regulatory information about medical devices and radiation-emitting products, including information about labeling regulations, please see Device Advice (<https://www.fda.gov/MedicalDevices/DeviceRegulationandGuidance/>) and CDRH Learn (<http://www.fda.gov/Training/CDRHLearn>). 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 (<http://www.fda.gov/DICE>) for more information or contact DICE by email (DICE@fda.hhs.gov) or phone (1-800-638-2041 or 301-796-7100).

Sincerely,

A handwritten signature in black ink that reads "Robert Ochs". The signature is written in a cursive style. In the background, there is a large, light blue watermark of the letters "FDA".

Robert Ochs, Ph.D.
Director
Division of Radiological Health
Office of In Vitro Diagnostics
and Radiological Health
Center for Devices and Radiological Health

Enclosure

DEPARTMENT OF HEALTH AND HUMAN SERVICES
Food and Drug Administration

Indications for Use

Form Approved: OMB No. 0910-0120
Expiration Date: January 31, 2017
See PRA Statement below.

510(k) Number (if known)

k172878

Device Name

Vantage Titan 3T, MRT-3010/A7, M-Power GX

Indications for Use (Describe)

Vantage Titan 3T systems are indicated for use as a diagnostic imaging modality that produces cross-sectional transaxial, coronal, sagittal, and oblique images that display anatomic structures of the head or body. Additionally, this system is capable of non-contrast enhanced imaging, such as MRA.

MRI (magnetic resonance imaging) images correspond to the spatial distribution of protons (hydrogen nuclei) that exhibit nuclear magnetic resonance (NMR). The NMR properties of body tissues and fluids are:

- Proton density (PD) (also called hydrogen density)
- Spin-lattice relaxation time (T1)
- Spin-spin relaxation time (T2)
- Flow dynamics
- Chemical Shift

Contrast agent use is restricted to the approved drug indications. When interpreted by a trained physician, these images yield information that can be useful in diagnosis.

Type of Use (Select one or both, as applicable)

☒ Prescription Use (Part 21 CFR 801 Subpart D)

☐ Over-The-Counter Use (21 CFR 801 Subpart C)

CONTINUE ON A SEPARATE PAGE IF NEEDED.

This section applies only to requirements of the Paperwork Reduction Act of 1995.

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k172878

510(k) SUMMARY

This summary of 510(k) safety and effectiveness information is being submitted in accordance with the requirements of Safe Medical Device Act 1990 and 21 CFR § 807.92

1. CLASSIFICATION and DEVICE NAME

Classification Name:	Magnetic Resonance Diagnostic Device
Regulation Number:	90-LNH (Per 21 CFR § 892.1000)
Trade Proprietary Name:	Vantage Titan 3T, MRT-3010/A7, M-Power GX
Model Number:	MRT-3010/A7

2. SUBMITTER'S NAME

Toshiba Medical Systems Corporation (TMSC)
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Otawara-Shi, Tochigi-ken, Japan 324-8550

3. OFFICIAL CORRESPONDENT

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4. CONTACT PERSON, U.S. AGENT and ADDRESS

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5. MANUFACTURING SITE

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Otawara-shi, Tochigi 324-8550, Japan

6. ESTABLISHMENT REGISTRATION

9614698


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7. DATE PREPARED

September 20, 2017

8. DEVICE NAME

Vantage Titan 3T, MRT-3010/A7, M-Power GX

9. TRADE NAME

Vantage Titan 3T, MRT-3010/A7, M-Power GX

10. CLASSIFICATION NAME

Magnetic Resonance Diagnostic Device (MRDD)

11. CLASSIFICATION PANEL

Radiology

12. DEVICE CLASSIFICATION

Class II (per 21 CFR 892.1000, Magnetic Resonance Diagnostic Device)

13. PRODUCT CODE

90-LNH

14. PREDICATE DEVICE
Primary Predicate Device (system): Vantage Titan 3T, MRT-3010/A7, V3.5

Secondary Predicate Devices (added software functionalities): Vantage Galan 3T, MRT-3020, V4.0 and Vantage Titan 1.5T, MRT-1510, M-Power GX

	Subject	Primary Predicate	Reference Predicate	Reference Predicate
System	Vantage Titan 3T, MRT-3010/A7, M-Power GX	Vantage Titan 3T, MRT-3010, V3.5	Vantage Galan 3T, MRT-3020, V4.0	Vantage Titan 1.5T, MRT-1510, M-Power GX
Marketed By	Toshiba America Medical Systems	Toshiba America Medical Systems	Toshiba America Medical Systems	Toshiba America Medical Systems
510(k) Number	This Submission	K152371	K162183	K170412
Clearance Date		October 23, 2015	November 25, 2016	July 21, 2017

15. REASON FOR SUBMISSION

This submission is to add software items that were cleared previously via the reference predicate Toshiba MR systems listed above.

16. SUBMISSION TYPE

Traditional 510(k) Premarket Notification

17. DEVICE DESCRIPTION

The Vantage Titan (Model MRT-3010) is a 3 Tesla Magnetic Resonance Imaging (MRI) System, previously cleared under K152371. This system is based upon the technology, software and


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materials of previously marketed Toshiba MRI systems and is intended to acquire and display cross-sectional transaxial, coronal, sagittal, and oblique images of anatomic structures of the head or body.

18. SUMMARY OF CHANGE(S)

This submission is to report the following software functionalities that are being migrated from the listed Secondary Predicate devices:

- **Sequence Enhancements:**

- **FFE3D:**

- **SPAIR:** Pre-pulse for fat suppression
 - **T2Prep:** Pre-pulse for T2 contrast
 - **mUTE:** Ultra short TE T1 weighted sequence with reduced acoustic noise
 - **mUTE 4D-MRA:** Ultra short TE time resolved MR angiography with reduced acoustic noise
 - **2D-RMC:** Two dimensional real-time motion correction

- **MP2RAGE:** Images with multiple TI (Inversion time) to create T1 map

- **FSE2D mEcho:** Images with multiple TE (Echo time) to create T2 map

- **FFE2D mEcho:** Images with multiple TE (Echo time) to create T2* map

- **mASTAR:** Multiple phase ASL (Arterial Spin Labeling)

- **FASE DWI:** Spin Echo based Diffusion Weighted Imaging with reduced acoustic noise

- **PSIR:** Phase Sensitive Inversion Recovery

- **MOLLI:** Modified Look Locker Inversion recovery

- **V-TISP:** Variable TI^{*1} and TS^{*2} Prep (*1 inversion recovery time *2 saturation recovery time)

- **Enhancement of SPEEDER post-processing**
- **EasyTech Cardiac:** SUREVOI and CardioLine+
- **Improvement of SURE ECG R-wave detection**
-

19. SAFETY PARAMETERS

Item	Subject Device: Vantage Titan 3T, MRT-3010/A7, M-Power GX	Predicate Device: Vantage Titan 3T , MRT-3010, V3.5	Notes
Static field strength	3T	3T	Same
Operational Modes	Normal and 1st Operating Mode	Normal and 1st Operating Mode	Same
i. Safety parameter display	SAR, dB/dt	SAR, dB/dt	Same


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Item	Subject Device: Vantage Titan 3T, MRT-3010/A7, M-Power GX	Predicate Device: Vantage Titan 3T , MRT-3010, V3.5	Notes
ii. Operating mode access requirements	Allows screen access to 1st level operating mode	Allows screen access to 1st level operating mode	Same
Maximum SAR	4W/kg for whole body (1st operating mode specified in IEC 60601-2-33: 2010)	4W/kg for whole body (1st operating mode specified in IEC 60601-2-33: 2010)	Same
Maximum dB/dt	1st operating mode specified in IEC 60601-2-33: 2010	1st operating mode specified in IEC 60601-2-33: 2010	Same
Potential emergency condition and means provided for shutdown	Shutdown by Emergency Ramp Down Unit for collision hazard for ferromagnetic objects	Shutdown by Emergency Ramp Down Unit for collision hazard for ferromagnetic objects	Same

20. IMAGING PERFORMANCE PARAMETERS

No change from the previous predicate submission, K152371.

21. INDICATIONS FOR USE

Vantage Titan 3T systems are indicated for use as a diagnostic imaging modality that produces cross-sectional transaxial, coronal, sagittal, and oblique images that display anatomic structures of the head or body. Additionally, this system is capable of non-contrast enhanced imaging, such as MRA.

MRI (magnetic resonance imaging) images correspond to the spatial distribution of protons (hydrogen nuclei) that exhibit nuclear magnetic resonance (NMR). The NMR properties of body tissues and fluids are:

- Proton density (PD) (also called hydrogen density)
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- Spin-spin relaxation time (T2)
- Flow dynamics
- Chemical Shift

Contrast agent use is restricted to the approved drug indications. When interpreted by a trained physician, these images yield information that can be useful in diagnosis.

NOTE No changes to the previously cleared indication, K152371.

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22. SUMMARY OF DESIGN CONTROL ACTIVITIES

Risk Management activities for new software functionalities and pulse sequences are included in this submission. The test methods used are the same as those submitted in the previously cleared submissions of the primary predicate device, Vantage Titan 3T, MRT-3010, V3.5 (K152371), and the reference predicate devices, Vantage Galan 3T, MRT-3020, V4.0 (K162183) and Vantage Titan 1.5T, MRT-1510, M-Power GX (K170412). A declaration of conformity with design controls is included in this submission.

23. SAFETY

This device is designed and manufactured under the Quality System Regulations as outlined in 21 CFR § 820 and ISO 13485 Standards. The changes to this device are limited to the application software that is being presented for review. As the hardware and related safety considerations remain unchanged from the previous submission no information related to these aspects are presented for the determination of safety. Performance and/or clinical testing are being provided to demonstrate the safety and effectiveness of the application software.

This device is in conformance with the applicable parts of the following consensus standards published by the International Electrotechnical Commission (IEC) for medical devices and the National Electrical Manufacturers Association (NEMA).

LIST OF APPLICABLE STANDARDS

- IEC 60601-1:2005
- IEC 60601-2-33:2010
- IEC 60601-1-2:2007
- IEC 60601-1-8:2006
- IEC 60825-1:2007
- IEC 62304:2006
- IEC 62366:2007

24. TESTING

Software Documentation for a Moderate Level of Concern, per the FDA guidance document, "Guidance for the Content of Premarket Submissions for Software Contained in Medical Devices Document" issued on May 11, 2005, is also included as part of this submission.

25. SUBSTANTIAL EQUIVALENCE

Toshiba Medical Systems Corporation believes that the Vantage Titan 3T, MRT-3010/A7, M-Power GX Magnetic Resonance Imaging (MRI) System is substantially equivalent to the previously cleared predicate device referenced in this submission. Toshiba Medical Systems Corporation believes that the changes incorporated into the Vantage Titan 3T, MRT-3010/A7, M-Power GX software are substantially equivalent to the previously cleared predicate devices.

*Made For life***26. CONCLUSION**

The modifications incorporated into the Vantage Titan 3T, MRT-3010/A7, M-Power GX software do not change the indications for use or the intended use of the device. Based upon bench testing, phantom imaging, volunteer clinical imaging, successful completion of software validation and application of risk management and design controls, it is concluded that the subject device is safe and effective for its intended use.