DEPARTMENT OF HEALTH & HUMAN SERVICES

Public Health Service

Food and Drug Administration
10903 New Hampshire Avenue
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Silver Spring, MD 20993-0002

Quality Electrodynamics, LLC
% Kathleen Aras
Director, Regulatory and Quality Affairs
700 Beta Drive Suite 100
MAYFIELD VILLAGE, OH 44143

August 27, 2015

Re: K151753
Trade/Device Name: 16ch Tx/Rx Knee SPEEDER
Regulation Number: 21 CFR 892.1000
Regulation Name: Magnetic Resonance Diagnostic Device
Regulatory Class: Class II
Product Code: MOS
Dated: June 26, 2015
Received: June 29, 2015

Dear Ms. Aras:

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.

If you desire specific advice for your device on our labeling regulation (21 CFR Part 801), please contact the Division of Industry and Consumer Education at its toll-free number (800) 638-2041 or (301) 796-7100 or at its Internet address

http://www.fda.gov/MedicalDevices/ResourcesforYou/Industry/default.htm. 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.

You may obtain other general information on your responsibilities under the Act from the Division of Industry and Consumer Education at its toll-free number (800) 638-2041 or (301) 796-7100 or at its Internet address http://www.fda.gov/MedicalDevices/ResourcesforYou/Industry/default.htm.

Sincerely yours,

Robert A Ochs

Robert Ochs, Ph.D.
Acting 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)*
k151753

Device Name
16ch Tx/Rx Knee SPEEDER

Indications for Use *(Describe)*
The 16ch Tx/Rx Knee SPEEDER is intended for use with Toshiba 3T MR systems to produce diagnostic images of the knee, wrist, hand, and forefoot that can be interpreted by a trained physician

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)

PLEASE DO NOT WRITE BELOW THIS LINE – CONTINUE ON A SEPARATE PAGE IF NEEDED.

FOR FDA USE ONLY

Concurrence of Center for Devices and Radiological Health (CDRH) *(Signature)*

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

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510(k) Summary

1. Applicant

Quality Electrodynamics, LLC. (QED)
700 Beta Drive, Suite 100
Mayfield Village, OH 44143

2. Contact

Kathleen Aras
Director, Regulatory and Quality Affairs
(440) 484-2964
kathleen.aras@qualedyn.com

3. Date Prepared

26 June 2015

4. Tradenames

16ch Tx/Rx Knee SPEEDER

5. Common name

Coil, magnetic resonance, specialty

6. Model Numbers

QED Model Number: Q7000147

Toshiba Model Number: MJAJ-232A

This device is manufactured and sold by QED to Toshiba. Toshiba sells the device to end users under their own model number.

7. Classification

Magnetic resonance diagnostic device (21 CFR 892.1000, Product Code MOS, Class II)

8. Predicate Device

18ch T/R Knee Coil, Quality Electrodynamics, LLC., K150331

9. Device Description

The 16ch Tx/Rx Knee SPEEDER is a transmit/receive coil designed for magnetic resonance imaging (MRI) using Toshiba 3T MRI systems. The device contains a 1-channel birdcage transmitter. Receive mode can be switched between 15-channel receive array and 1-channel birdcage receiver. The 16ch Tx/Rx Knee SPEEDER is intended to be used for imaging the knee, hand, wrist, and forefoot.

The 16ch Tx/Rx Knee SPEEDER is a reusable, non-invasive device with limited exposure with regard to duration of contact with the body. All coil elements are enclosed in a rigid plastic housing which is fire-rated, has impact and tensile strength, and has been tested for biocompatibility.

The 16ch Tx/Rx Knee SPEEDER also includes the accessories listed in Table 1. The accessories consist only of patient comfort pads.

Table 1: 16ch Tx/Rx Knee SPEEDER Accessories

QED Part Number	Description	Qty
3003890	Anterior Knee Pad (1/4" Thick Pad)	1
3003864	Posterior Knee Support Pad (Bottom Thermoformed Pad)	1
3003866	Free Leg Pad (Non-Imaged Knee Pad)	1
3003865	Inferior Leg Pad (Foot/Ankle Pad)	1

10. Indications for Use

The 16ch Tx/Rx Knee SPEEDER is intended for use with Toshiba 3T MR systems to produce diagnostic images of the knee, wrist, hand, and forefoot that can be interpreted by a trained physician.

The Indications for Use statement for the 16ch Tx/Rx Knee SPEEDER is not identical to the predicate device; however, the differences do not alter the intended diagnostic use of the device nor do they affect the safety and effectiveness of the device relative to the predicate. Both Indications for Use statements indicate that the device is intended to be used in conjuction with a 3T MR system to produce images of the knee and that the images can be interpreted by a trained physician. The Indications for Use statements differ in two ways. First, they differ in the manufacturer of MR systems the coils are intended to be used with; the predicate is intended to be used with a GE MR system while the proposed device is

intended to be used with a Toshiba MR system. Second, the proposed device is intended to be used to produce diagnostic images of the wrist, hand, and forefoot, in addition to the knee.

11. Summary of Technological Characteristics Compared to the Predicate Device

The proposed 16ch Tx/Rx Knee SPEEDER and the predicate 18ch T/R Knee Coil are both transmit/receive phased array RF coils intended to be used with a 3T MR system to provide images of the knee.

At a high level, the subject and predicate devices are based on the following same technological elements:

- Transmit/receive phased array RF coils
- Compatible with 3T MR systems
- Active PIN diode switching blocking circuitry. Passive blocking circuitry.
- Split-top mechanical design with an inner cross section shaped to fit the knee and leg
- Polycarbonate housing material

The following technological differences exist between the subject and predicate devices:

- Number of channels (16 (subject) versus 18 (predicate))
- Compatible MR system (3T Toshiba Vantage Titan (subject) versus 3T GE SIGNA Pioneer (predicate))

12. Performance Data

The following performance data were provided in support of the substantial equivalence determination.

Biocompatibility Testing

All surface materials on the 16ch Tx/Rx Knee SPEEDER and its accessories that are intended to come into direct or indirect contact with patient biological tissues, cells or body fluids either have a history of safe use in previously-cleared devices or have been assessed for biocompatibility according to ISO 10993-1. Per ISO 10993-1, all patient-

contacting materials on the 16ch Tx/Rx Knee SPEEDER are classified as surface-contacting, limited exposure (A) devices. Therefore, where testing was performed, the materials were tested for cytotoxicity per ISO 10993-5 and for irritation and sensitization per ISO 10993-10.

Electrical Safety and Electromagnetic Compatibility

The 16ch Tx/Rx Knee SPEEDER was tested to and found to be compliant with AAMI/ANSI ES60601-1 and IEC 60601-2-33.

Surface heating was tested in accordance with AAMI/ANSI ES60601-1. The measured temperature of the surface of the coil never exceeded the maximum limit of 41^{o}C

Specific Absorption Rate (SAR) is controlled by the MR system, which estimates the total power delivered to the imaging volume with respect to whole body mass and estimated mass present in the imaging volume. SAR was tested in conjuction with the intended MR system; results showed that the whole body SAR for the 16ch Tx/Rx Knee SPEEDER is below the IEC 60601-2-33 whole body SAR limit. Head and partial body SAR are controlled under the Toshiba scanner SAR management using the whole body SAR data.

Performance Testing - Bench

The SNR and uniformity of the 16ch Tx/Rx Knee SPEEDER was analyzed per NEMA MS 6-2008 and was found to conform to predetermined acceptance criteria.

Performance Testing – Clinical

In accordance with the *FDA Guidance for Industry: Guidance for the Submission of Premarket Notifications for Magnetic Resonance Diagnostic Devices*, clinical images from volunteer scanning of the knee, hand, wrist, and forefoot were obtained from the 16ch Tx/Rx Knee SPEEDER. These images were used to demonstrate that the 16ch Tx/Rx Knee SPEEDER produces diagnostic quality images of the intended anatomies.

13. Conclusion

The electrical safety and electromagnetic compatibility and biocompatibility data support the safety of the 16ch Tx/Rx Knee SPEEDER and the bench testing per the NEMA standards demonstrates the performance and effectiveness of the device under the specified use

conditions. This testing demonstrates that the 16ch Tx/Rx Knee SPEEDER performs as well as or better than the predicate device.