

## TETRODE 7F37R Forced Air Cooling

Frequency (周波数)	130 MHz (Max.)	
Class AB Audio	Eb (陽極電圧)	3.5 kV
	Po (出力)	2.5 kW
Class AB SSB	Eb (陽極電圧)	5.0 kV
	Po (出力)	1.65 kW
Class C Plate Modulated	Eb (陽極電圧)	3.5 kV
	Po (出力)	1.2 kW
Class C FM	Eb (陽極電圧)	3.0 kV
	Po (出力)	1.1 kW



### GENERAL DATA (一般定格)

#### ELECTRICAL (電氣的定格) :

Filament : Thoriated Tungsten (フィラメント : トリウム・タングステン)

Voltage (電圧) ..... 4.0 V

Current (電流) ..... 35 A

Maximum Surge Current (最大瞬時電流) ..... 105 A

Transconductance (Ib=0.4A) (相互コンダクタンス) ..... 15 mS

Amplification Factor  $\mu_{g1g2}$ (第2グリッド増幅率) ..... 8.3 -

Interelectrode Capacitances (電極間静電容量) :

Grid No.1 - Plate (第1グリッド-陽極) ..... 0.25 pF<sup>(1)</sup>

Input (入力) ..... 40 pF

Output (出力) ..... 9 pF

Frequency for Maximum Ratings ..... 130 MHz  
(使用可能な最大周波数)

#### MECHANICAL (機械的定格) :

Overall Dimensions (外形寸法) :

Length (全長) ..... 125 mm

Diameter (Max.) (最大部直径) ..... 74 mm

Mass (質量) ..... 0.9 kg

Mounting Position (使用位置) ..... Vertical Plate Up or Down (垂直陽極上又は下)

Cooling(冷却):

Plate : Forced Air Cooling (陽極 : 強制空冷)

Percentage of Plate Dissipation (陽極損失の割合) ..... 60 80 100 %

Minimum Air Flow (最小風量) ..... 1.0 1.4 1.7 m<sup>3</sup>/min

Minimum Static Pressure Loss (最小静圧) ..... 13 26 35 mm Water

Terminals: Forced Air Cooling (端子部 : 強制空冷)

Minimum Air Flow (最小風量) ..... 0.2 m<sup>3</sup>/min

Maximum Radiator Temperature (最高ラジエータ温度) ..... 200 °C

Maximum Incoming Air Temperature (流入空気最高温度) ..... 40 °C

Maximum temperature on Filament and Grid Seals ..... 180 °C  
(フィラメント及びグリッド封止部最高温度)

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★The information contained herein may be changed without prior notice. It is therefore advisable to contact TOSHIBA ELECTRON TUBES & DEVICES CO.,LTD. before proceeding with the design of equipment incorporating this product.

**AUDIO FREQUENCY POWER AMPLIFIER AND MODULATOR****- Class AB -****(可聴周波電力増幅および変調 AB級)****ABSOLUTE MAXIMUM RATINGS (絶対最大定格) :**

DC Plate Voltage (陽極直流電圧) .....	5000	V
DC Grid No.2 Voltage (第2グリッド直流電圧) .....	800	V
DC Plate Current (陽極直流電流) .....	700	mA
Plate Input (Max. Signal) (最大信号陽極入力) .....	3500	W
Plate Dissipation (陽極損失) .....	1000	W
Grid No.2 Dissipation (第2グリッド損失) .....	50	W

**TYPICAL OPERATION (VALUES FOR TWO TUBES) (動作例 (2管の値)) :**

DC Plate Voltage (陽極直流電圧) .....	3500	3500	V
DC Grid No.2 Voltage (第2グリッド直流電圧) .....	500	500	V
DC Grid No.1 Voltage (第1グリッド直流電圧) .....	-55	-57	V
Grid No.1 to Grid No.1 AF Peak Voltage .....	158	186	V
(第1グリッド相互間可聴周波数尖頭電圧)			
DC Plate Current (Max. Signal) (最大信号陽極直流電流) .....	1.1	1.26	A
DC Plate Current (Zero. Signal) (零信号陽極直流電流) .....	240	200	mA
DC Grid No.2 Current (Max. Signal) (最大信号第2グリッド直流電流) .....	30	60	mA
DC Grid No.1 Current (Max. Signal) (最大信号第1グリッド直流電流) .....	20	25	mA
Driving Power (Max. Signal) (最大信号励振電力) .....	3.5	5	W
Effective Load Resistance (Plate to Plate) (実効負荷抵抗) .....	8000	6720	Ω
Plate Output Power (陽極出力) .....	2000	2500	W

**RADIO FREQUENCY POWER AMPLIFIER****- Class AB<sub>1</sub>SSB Telephony -****(無線周波電力増幅、AB<sub>1</sub>級SSB電話)****ABSOLUTE MAXIMUM RATINGS (絶対最大定格) :**

Frequency (周波数) .....	30	MHz
DC Plate Voltage (陽極直流電圧) .....	5000	V
DC Grid No.2 Voltage (第2グリッド直流電圧) .....	800	V
DC Plate Current (陽極直流電流) .....	700	mA
Plate Input (陽極入力) .....	3500	W
Plate Dissipation (陽極損失) .....	1000	W
Grid No.2 Dissipation (第2グリッド損失) .....	50	W

**TYPICAL OPERATION (動作例) :**

DC Plate Voltage (陽極直流電圧) .....	4000	5000	5000	V
DC Grid No.2 Voltage (第2グリッド直流電圧) .....	700	600	800	V
DC Grid No.1 Voltage (第1グリッド直流電圧) .....	-90	-80	-100	V
Peak RF Grid No.1 Voltage (第1グリッド無線周波数尖頭電圧) .....	90	80	100	V
DC Plate Current (陽極直流電流) .....	500	430	560	mA
DC Plate Current (Zero. Signal) (零信号陽極直流電流) .....	50	50	60	mA
DC Grid No.2 Current (第2グリッド直流電流) .....	35	25	35	mA
DC Grid No.1 Current (第1グリッド直流電流) .....	0	0	0	mA
Effective Load Resistance (実効負荷抵抗) .....	3900	5360	4850	Ω
Driving Power (励振電力) .....	-	-	-	W
Plate Output Power (陽極出力) .....	1200	1200	1800	W
Useful Output Power (有効出力) .....	1100	1100	1650	W

**RADIO FREQUENCY POWER AMPLIFIER**  
**- Class C Plate Modulated Telephony -**  
**(無線周波電力増幅、C級陽極変調電話)**

**ABSOLUTE MAXIMUM RATINGS (絶対最大定格) :**

Frequency (周波数) .....	30	MHz
DC Plate Voltage (陽極直流電圧) .....	4000	V
DC Grid No.2 Voltage (第2グリッド直流電圧) .....	600	V
DC Grid No.1 Voltage (第1グリッド直流電圧) .....	-500	V
DC Plate Current (陽極直流電流) .....	560	mA
Plate Input (陽極入力) .....	2300	W
Plate Dissipation (陽極損失) .....	670	W
Grid No.2 Dissipation (第2グリッド損失) .....	35	W
Grid No.1 Dissipation (第1グリッド損失) .....	15	W

**TYPICAL OPERATION (動作例) :**

DC Plate Voltage (陽極直流電圧) .....	3500	V
DC Grid No.2 Voltage (第2グリッド直流電圧) .....	500	V
DC Grid No.1 Voltage (第1グリッド直流電圧) .....	-300	V
Peak RF Grid No.1 Voltage (第1グリッド無線周波数尖頭電圧) .....	375	V
DC Plate Current (陽極直流電流) .....	460	mA
DC Grid No.2 Current (第2グリッド直流電流) .....	24	mA
DC Grid No.1 Current (第1グリッド直流電流) .....	17	mA
Driving Power (励振電力) .....	10	W
Plate Output Power (陽極出力) .....	1200	W

**RADIO FREQUENCY POWER AMPLIFIER**  
**- Class C Telegraphy FM Telephony -**  
**(無線周波電力増幅、C級電信 FM 電話)**

**ABSOLUTE MAXIMUM RATINGS (絶対最大定格) :**

Frequency (周波数) .....	30	130	MHz
DC Plate Voltage (陽極直流電圧) .....	5000	4000	V
DC Grid No.2 Voltage (第2グリッド直流電圧) .....	800	600	V
DC Grid No.1 Voltage (第1グリッド直流電圧) .....	-500	-500	V
DC Plate Current (陽極直流電流) .....	700	700	mA
Plate Input (陽極入力) .....	3500	2500	W
Plate Dissipation (陽極損失) .....	1000	1000	W
Grid No.2 Dissipation (第2グリッド損失) .....	50	50	W
Grid No.1 Dissipation (第1グリッド損失) .....	15	15	W

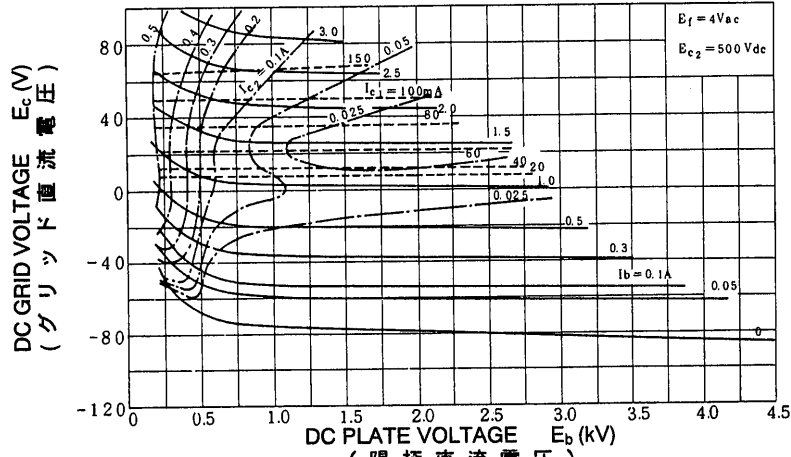
**TYPICAL OPERATION (動作例) :**

Frequency (周波数) .....	30	90	MHz
DC Plate Voltage (陽極直流電圧) .....	4500	3000	V
DC Grid No.2 Voltage (第2グリッド直流電圧) .....	500	500	V
DC Grid No.1 Voltage (第1グリッド直流電圧) .....	-220	-150	V
Peak RF Grid No.1 Voltage (第1グリッド無線周波数尖頭電圧) .....	295	220	V
DC Plate Current (陽極直流電流) .....	650	600	mA
DC Grid No.2 Current (第2グリッド直流電流) .....	50	45	mA
DC Grid No.1 Current (第1グリッド直流電流) .....	32	25	mA
Driving Power (励振電力) .....	10	15	W
Plate Output Power (陽極出力) .....	2200	1250	W
Useful Output Power (有効出力) .....	2000	1100	W

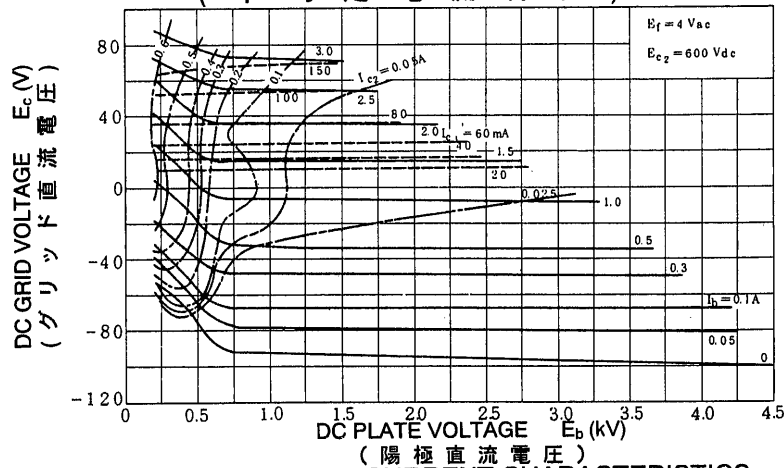
## Notes

- (1) With external flat metal shield of 300mm in square having a center hole of 61mm in diameter.  
 Shield is located in plane of grid No.2 terminal, perpendicular to the tube axis, and is connected to the grid No.2.

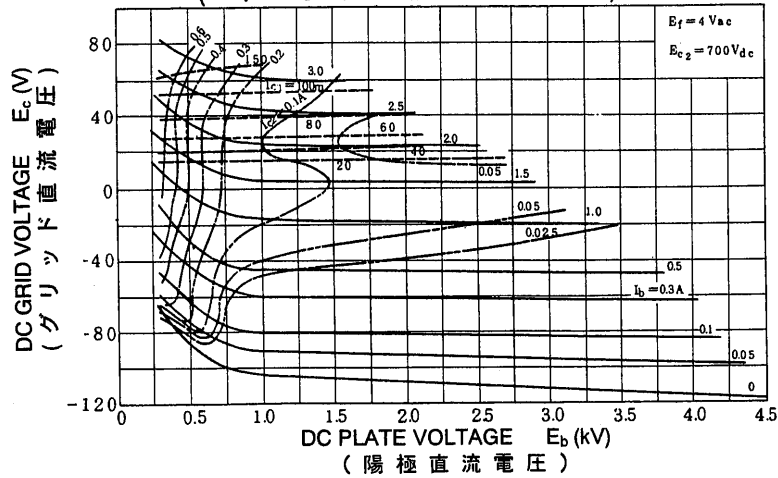
**AVERAGE CONSTANT CURRENT CHARACTERISTICS**  
(平均定電流特性)



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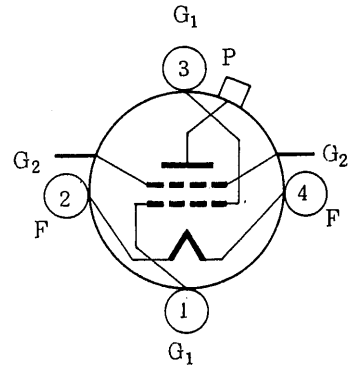
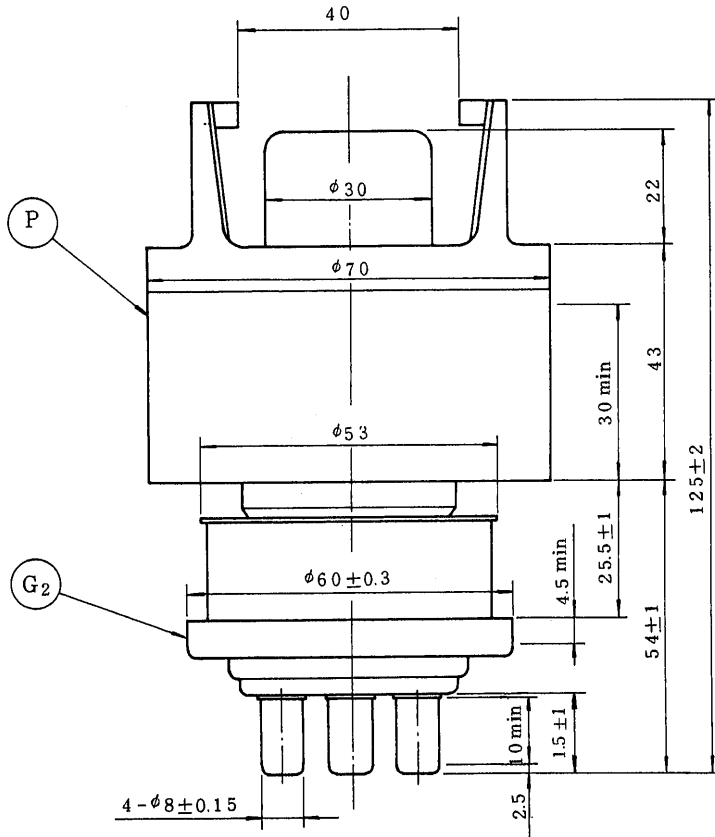


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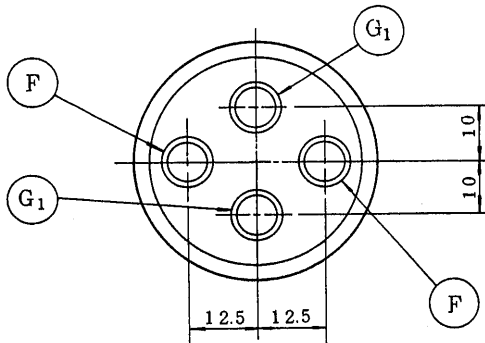


**DIMENSIONAL OUTLINE**  
(外形図)

Unit: mm  
(単位)



- P : Plate  
(陽極)
- G : Grid  
(グリッド)
- F : Filament  
(フィラメント)



## Operation and Handling

Since the power consumption of transmitting tubes is generally high, the voltages applied to each electrodes are high and the temperature of the electrodes rises accordingly. Therefore, incorrect operation may result in personal injury. In addition, it is difficult to determine the mechanical design strength of a transmitting tube from its external appearance. Therefore, all personnel who work with transmitting tubes must have a thorough understanding of correct operating procedures to prevent damage and must handle such tubes with extreme care.

System designers and personnel involved in performing work are responsible for ensuring worker safety.

### 1. Applications and objectives

- (1) This product is intended for use in industrial equipment only. It is not to be sold to or used by the general public.
- (2) This product is not designed or intended for use in combination with equipment in which malfunction or incorrect operation could lead to personal injury or death, Such use is strictly prohibited.
- (3) Refer to delivery specifications and engineering information issued by Toshiba to ensure safe operation of this product.

### 2. Ambient conditions

- (1) Store this product in a dry location (relative humidity < 60 %). Do not store this product in a location where the temperature or humidity may change rapidly because condensation may form on the surface of the product.
- (2) A filter should be used because accumulated dust will lead to deterioration of withstand voltage and may generate smoke or catch fire.

### 3. Precaution against incorrect or inappropriate operation

- (1) If this product is operated with an excessively high voltage or current, X-rays exceeding the standard may be generated. Never use this product with a voltage or current exceeding the rated values.
- (2) Prior consultation with Toshiba is required if this product is to be used under conditions other than those specified or if it is used for a new type of equipment.
- (3) Before using this product, determine whether or not it can be used for industrial heating applications.
- (4) Only qualified engineers are permitted to use, assemble, maintain, or check this product. Other personnel are prohibited from handling this product.

### 4. Precautions for operation and maintenance

To ensure that the end user is aware of the safety precautions, include the descriptions given in the safety precautions in the operations manual provided with the equipment or take other appropriate actions.

#### 4.1 High voltage

The voltage applied to the electrodes of the power tube can exceed 10kV, which is deadly, and the equipment must be designed properly and operating precautions must be followed.

##### (1) Safety features to be incorporated in the design

\*The following safety features should be incorporated in the system design:

The equipment must be designed to prevent personnel from coming into contact with high circuit.

\*Interlock switches must be provided on access doors, so that when these are opened for inspection or replacement of the tube, power supply is turned off and high-voltage capacitors are discharged.

\*The power supply cannot be turned on again unless the access door is fully closed.

##### (2) Safety precautions for inspection and replacement to tube

It is preferable to request that the system manufacturer send an engineer to inspect and replace the tube; if this is not possible, two or more qualified persons well-trained in electrical work can perform the inspection and replacement. In either case, all power supplies must be turned off before beginning any service procedure, and parts being inspected or replaced must be grounded with a ground bar.

#### 4.2 High temperature

Although a cooling system is used, the electrode terminals are very hot both during and after operation. Do not touch the tube just after turn off the power; wait until the temperature decreases enough not to be dangerous.



#### 4.3 X-ray radiation

At voltage over 10kV, X-rays are generated. X-ray radiation at voltages up to 20kV~30kV is soft X-ray with low penetration, therefore, it is absorbed and contained by the metal cabinet and by the glass bulb and metal parts of the tube. However, the intensity of the radiation could become high enough to leak to the outside, adequate evaluation of X-ray radiation for personal protection is necessary when designing the equipment.

#### 4.4 Operating the tube

When the tube is operated for the first time or after long intermission, it is desirable to preheat for more than 15 minutes and to increase the high voltage gradually.

This operation is effective to improve and stabilize the vacuum level and ensure stable operation.

#### 4.5 Mounting and demounting the tube

The mechanical strength of power tubes is actually fragile, even appear strong.

The internal structure of the electrodes, especially Thoriated filament, is easily affected by shock and vibration. The mechanical strength of internal structure is same for ceramics envelope tube as that of glass envelope tube. Therefore, careful handling is necessary for installing these tubes.

When mounting or demounting tube in the socket of equipment, special care should be taken not to subject the tube to excess shock and vibration, such as trying to mount it into or remove it from a tight socket or by touching the tube while it is hot.

This tube should be held vertically by holding anode or anode flange, and not to apply excess force to the terminals, etc.

#### 4.6 Connecting the tube

The lead wires connected to the tube must be protected from vibration and thermal expansion and cooling.

There must be no force applied directly to the sealed parts.

If the connecting socket is of the wrong size, it may cause improper electric contact, fall off during operation, damage the tube during mounting and demounting, cause degrading the cooling effect. When tightening terminals, do not apply excessive force to the seat parts. When connecting the tubes, do not solder the leads nor attempt connection by winding bare wires to the terminal directly as this is very dangerous. Contact Toshiba for the requirements of the proper accessory parts such as sockets, cap, etc.

#### 4.7 Maintenance and inspection

We recommend that a record be kept for the operating conditions, and that periodic maintenance checks be performed to ensure stable operation and maximum operation life of the tube. Record voltage, current and electrode temperature, and the cause of fluctuations, if any.

Check the operation of the safety devices such as the overload relay, water relay and air flow relay.

Confirm that the tube is mounted correctly.

Attention should also be paid to environmental conditions, as high humidity and dust may damage the external insulation of the tube.

#### 4.8 Storage

When the tube is to be stored for a long time, pack it in the box and store the box in a location with less vibration and low humidity, oriented correctly as indicated.

Vibration may break the filament or the tube; high humidity may damage the insulation of the valve base and cause poor electric contact. Do not place the bare tube directly on the floor, even when remounting the tube.

#### 4.9 Transportation

When the tube is to be transported, pack it taking the original packing method.

Any other method may damage the tube.





## Precaution for Safe Operation and Handling

This operation manual describes the important information for preventing injury to personnel at manufactures employing this electron tube, users, and other personnel, as well as for preventing property loss and for ensuring safe operation. Fully understand the meanings of following indications and symbols before reading this manual and observe all precautions for safe operation.

Keep this operation manual near the electron tube for immediate reference.



### [Description of indications]

Indication	Meaning
 WARNING	Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.
 CAUTION	Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury or property damage.

\*1: The phrase "minor or moderate injury" means personal injury, burn, electrical shock, etc. that does not require inpatient medical care.

\*2: The term "property damage" means extended damage such as damage to facilities or materials.

### [Description of symbols]

Symbol	Meaning
	"DON'T" : Indicates a prohibition (something that you must NOT do). Details are described in words near the symbol.
	"DO" : Indicates a compulsion (something that you must do). Details are described in words near the symbol.

### [Disclaimer]

- **Toshiba will not be held responsible for associated damage (loss of business profits, interruption of business, etc.) resulting from the operation or non-availability of the equipment.**
- **Toshiba will not be held responsible for damage caused by natural calamities, fires, acts by the third parties, accidents, intentional or accidental mis-operation, and operation under abnormal conditions.**
- **Toshiba will not be held responsible for damage caused by non-observance of the ratings of this equipment.**
- **Toshiba will not be held responsible for damage caused by malfunctions of the system in which this equipment is incorporated.**

### [Restrictions on use]

- **This equipment is not designed or manufactured for use in combination with systems that include components that directly affect the maintenance or loss of human life(\*1). Do not use this equipment for such systems.**
  - \*1 : Systems / equipment directly affecting the maintenance or loss of human life include the following:
    - Life-support systems, surgical equipment, and diagnostic equipment
- **If this equipment is used in combination with systems (\*2) that are related to public safety or maintenance of essential public services, special procedures (\*3) are required for the operation, maintenance, and management of the systems. Contact Toshiba in advance.**
  - \*2 : Systems related to public safety or maintenance of essential public services include the following:
    - The main control systems of nuclear power plants, safety protection systems for unclear facilities, and other important systems for safety
    - Mass-transit and air traffic control systems
  - \*3 : Special procedures refers to the development of safe systems (fool-proof, fail-safe, and advanced design, etc.) in close cooperation with Toshiba engineers.

### [Manufacturing, installation, and operation of the equipment]

**The manufacturing, installation, and operation of systems which incorporate this equipment and transmit electromagnetic waves should be performed in compliance with all applicable regulations related to electromagnetic waves.**