Social Infrastructure Systems

In the social infrastructure systems field, Toshiba is developing technologies for monitoring and controlling social infrastructures to achieve a society where people can lead a safe and secure life. To cite two examples, we are supplying a vehicle license plate recognition system to expressway operators and have been implementing projects in Vietnam aimed at reducing greenhouse gas emissions from the wastewater of plants.

Vehicle License Plate Recognition System

Camera unit of vehicle license plate recognition system

There is an increasing need for correct vehicle license plate recognition for the electronic toll collection (ETC) system, due to the application of the ETC system to two-wheeled vehicles and the rising number of nonpaying drivers. However, license plate recognition is subject to disturbance under varying illumination environments such as the sunlight condition, shadows on the plate cast by parts of the vehicle itself, and so on.

To overcome these problems, Toshiba has developed a license plate recognition technology for both four-wheeled vehicles and two-wheeled vehicles that offers increased robustness against factors creating environmental disturbances. This system consists of an image sensing module and an image processing module, with countermeasures against the shadow problem. An algorithm for optimization of the camera parameters based on the intensity of the plate image and an algorithm for estimation of the plate location prior to recognition are incorporated in the system, both of which improve the robustness of the system's performance.

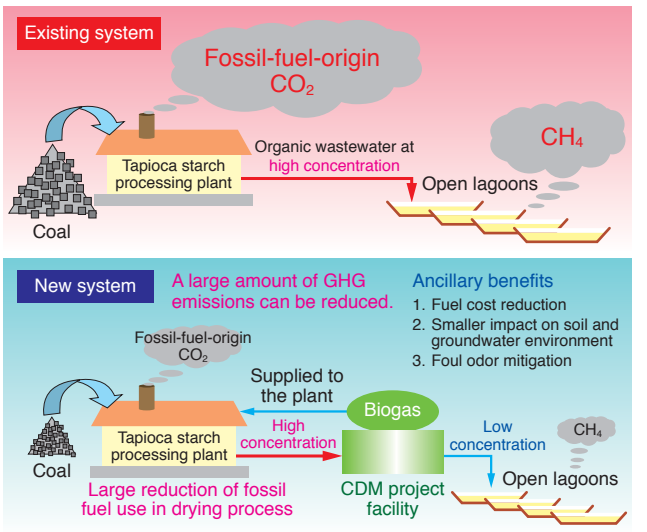
Through field tests carried out toward commercial production, problems that degrade the recognition performance under conditions with shadows on the license plate were identified. By newly employing a two-stage binarization method and optimizing the pre-processing parameters prior to recognition, we confirmed that improvements were achieved in the recognition rate and the robustness of the system under external environments, even in the case of shadows with strong contrast in summer sunlight conditions.

Progress of CDM Projects in Vietnam

Toshiba has been implementing two Clean Development Mechanism (CDM) projects in Vietnam at the tapioca starch processing plants of Viet Ma Co., Ltd. and Truong Thinh Co., Ltd., respectively. These projects are aimed at reducing greenhouse gas (GHG) emissions from the wastewater of the plants.

The two plants emit methane (CH_4), which has a global warming potential 21 times that of carbon dioxide (CO_2), into the atmosphere from the existing wastewater treatment system; i.e., open lagoons. By installing an anaerobic digester before the lagoons, the CH_4 emissions will be reduced by about 40 000 CO_2-equivalent tons/year for each plant. Both projects have been approved by the governments of the donor country, Japan, and the host country, Vietnam. The validation process by a designated operational entity (DOE) has also been completed for the projects. Currently, the two projects are undergoing the registration process following the submission of applications to the CDM Executive Board.

Toshiba has established Toshiba Clean Development Service (Vietnam) Co., Ltd. (TVS) to expand its CDM business in Vietnam. We will actively work for a better global environment starting with Vietnam, where TVS serves as the core organization to develop further CDM projects.



Outline of CDM projects

First Company Specializing in PCB-Contaminated Soil Remediation Services in Japan

Remediation facility for PCB-contaminated soil

Problems related to polychlorinated biphenyl (PCB)-contaminated soil have been increasingly appearing in recent years, giving rise to the need for safe and dependable remediation technology and services.

Toshiba has established Geosteam Corporation together with Term Corporation and Konoike Construction Co., Ltd. in Kitakyushu City. The new company, which commenced operations in August 2008, is the first(*1) company specializing in PCB-contaminated soil remediation services in Japan.

Geosteam Corporation has started verification of a larger scale plant (2 t/h) since November 2008 using GEOSTEAM™ technology(*2), taking over a 300 kg/h-scale plant operation inaugurated in 2007 from Term Corporation.

We intend to continue our efforts for the development of PCB-contaminated soil remediation services to reduce the future burden on the environment.

(*1) As of August 2008 (as researched by Toshiba)

(*2) Toshiba's original technology for PCB-contaminated soil remediation by destruction of PCBs using a chemical reaction with steam

Water Quality Monitoring Support System with Biosensor for Overseas Market

Demonstration unit of water quality monitoring support system

A water quality monitoring support system with biosensors allows raw water contamination by harmful materials to be detected quickly and with high sensitivity using iron-oxidizing bacteria. Toshiba has been delivering this system to drinking water treatment plants and water intake plants in Japan.

We have now embarked on overseas delivery of the system by introducing it to Chinese customers, who have strong interest in securing water quality. The results of verification field tests conducted at drinking water treatment plants in China have confirmed the adaptability of the system to raw water in China as well as its stable operation and appropriate response. The good performance of the system has also been highly evaluated by the customers due to the satisfactory test results obtained.

We are currently engaged in joint research with Tsinghua University in China to develop additional application technologies in order to expand the applicable water areas.

GFSTATION™ Flash Memory Recorder

GFSTATION™ flash memory recorder

Toshiba has developed the GFSTATION™ flash memory recorder as a solution for the transition of a broadcasting system to a tapeless workflow system. Targeted as a replacement for a video tape recorder (VTR), GFSTATION™ has the features of a VTR such as the jog/shuttle dial search functions and interfaces for external control devices.

With its additional features such as thumbnail display for file search, playlist editing, file sharing through networks, and the adoption of metadata, GFSTATION™ offers a range of functionalities that are not found in conventional equipment. GFSTATION™ also has a server-like capability, thanks to its 128 Gbyte internal flash memory, permitting playback while recording.

Solid-State Power Amplifier Using GaN FETs for Ku-Band Applications

Ku-band solid-state power amplifier for satellite communications

Toshiba has developed a Ku-band solid-state power amplifier (SSPA) using gallium nitride (GaN) field-effect transistors (FETs) for satellite communications. This is the world's first(*1) high-power amplifier (HPA) using GaN FETs, and its output power exceeding 50 W has established a commercial record in the Ku band(*2).

The new generation of live satellite broadcasts such as satellite news gathering (SNG) require high-quality pictures for high-definition (HD) TV. HDTV needs a wide spectrum and high output power. Our SSPA is capable of outputting up to 100 W as rated operation power, yet it is very compact and has low electric power consumption. The key to its high performance is the improved power amplifier technology using GaN FETs in its linearity.

Traveling wave tube amplifiers (TWTAs) and SSPAs using gallium arsenide (GaAs) FETs have long been conventionally used as HPAs. We have been offering our newly developed SSPA to replace all of these devices since October 2008.

(*1) As of October 2008 (as researched by Toshiba)

(*2) 14.0 GHz to 14.5 GHz Ku band

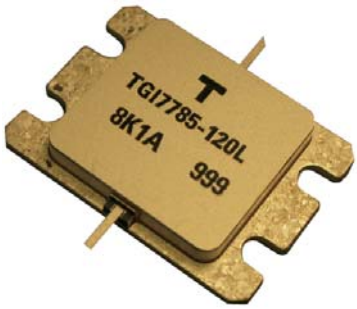
8 GHz-Band GaN HEMT with 120 W-Class Output Power

Toshiba has developed an 8 GHz-band gallium nitride (GaN) high electron mobility transistor (HEMT) with an output power exceeding 100 W. Expected applications for this device include solid-state power amplifiers (SSPAs) for satellite communication (SATCOM) systems, etc.

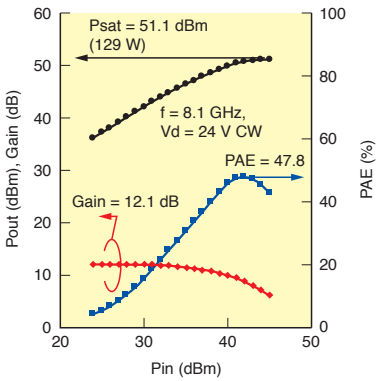
The newly developed 8 GHz GaN HEMT achieves a peak output power of 129 W (51.1 dBm) at 8.1 GHz, and a power added efficiency of 47.8%, the highest level of performance yet reported at this frequency band with this output power level.

In order to attain higher output power without excessive junction-temperature rise, four dies with internal matching circuits were placed in parallel in a 17.4 mm × 24.4 mm size package.

This HEMT achieves approximately double the saturation power of gallium arsenide (GaAs) FETs of the same size.



External view of 120 W-class GaN HEMT for 8 GHz band



Input-output characteristics of 120 W-class GaN HEMT at 8.1 GHz

FS-1220 Banknote Sorting Machine

Toshiba has developed the FS-1220 banknote sorting machine for central banks and other financial institutions.

This machine counts and checks the genuineness and quality of banknotes returned from the public to the central bank. Depending on the results of the quality checking, the banknotes are sorted into two categories: notes that are fit and unfit for recirculation. The fit notes are strapped together with paper bands in batches of 100, while the unfit notes are shredded into small pieces.

Central banks have recently been demanding higher precision in the sorting of banknotes according to quality. The FS-1220 has the capacity to sort 1 200 banknotes per minute, while the sensor hardware and its algorithm have been improved to increase the quality-sorting capability. The machine is also ergonomically designed to reduce the workload of the operator.

FS-1220 banknote sorting machine