

TOSHIBA BIPOLAR DIGITAL INTEGRATED CIRCUIT SILICON MONOLITHIC

# TD62706P-H, TD62706FA-H

## 6CH HIGH-VOLTAGE SOURCE-CURRENT DRIVER

The TD62706P-H and TD62706FA-H are comprised of six source current Transistor Arrays.

These drivers are specifically designed for fluorescent display applications.

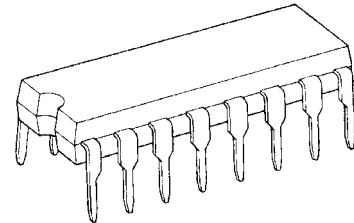
For proper operation, the substrate (SUB) must be connected to the most negative voltage.

Please observe the thermal condition for using.

### FEATURES

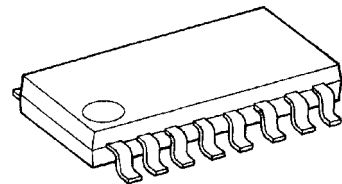
- Package Type
  - P-H Type : DIP16pin
  - FA-H Type : SSOP16pin (1.0 mm pitch)
- High Output Voltage
  - :  $V_{CC} - V_{OUT} = 60 \text{ V (MIN)}$
- Output Current (Single Output)
  - :  $I_{OUT} = -50 \text{ mA (MAX)}$
- Input Compatible with Various Types of Logic
  - :  $R_{IN} = 10 \text{ k}\Omega$
- Wide operating temperature range. :  $T_{opr} = -40 \sim 105^\circ\text{C}$

TD62706P-H



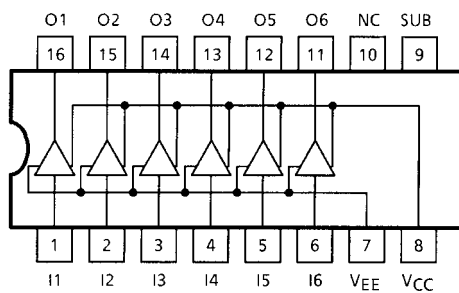
DIP16-P-300-2.54A

TD62706FA-H



SSOP16-P-225-1.00A

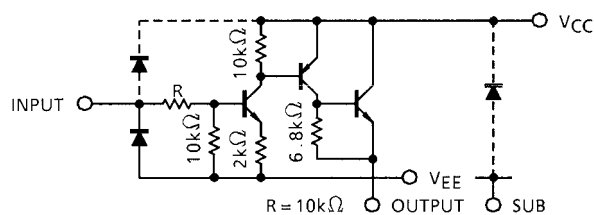
### PIN ASSIGNMENT (Top view)



### Weight

- DIP16-P-300-2.54A : 1.11 g (Typ.)
- SSOP16-P-225-1.00A : 0.14 g (Typ.)

### SCHEMATICS (Each driver)



Note: The input and output parasitic diodes cannot be used as clamp diodes.

## MAXIMUM RATINGS (Ta = 25°C)

CHARACTERISTIC	SYMBOL	RATING	UNIT
Power Supply Voltage	$V_{CC}-V_{EE}$	30	V
	$V_{CC}-V_{SUB}$	60	
Output Voltage	$V_{CC}-V_{OUT}$	60	V
Input Voltage	$V_{IN}-V_{EE}$	$V_{CC}-V_{EE}$	V
Output Current	$I_{OUT}$	-50	mA / ch
Input Current	$I_{IN}$	±10	mA
Power Dissipation	$P_D$ (Note 1)	1.0	W
	$P_D$ (Note 2)	0.78	
Operating Temperature	$T_{opr}$	-40~105	°C
Storage Temperature	$T_{stg}$	-55~150	°C

Note 1: TD62706P-H : Delated above 25°C in the proportion of 8.0 mw / °C.

Note 2: TD62706FA-H : On Glass Epoxy PCB ( 50. × 50 × 1.6 mm Cu 40% ).  
Delated above 25°C in the proportion of 6.2 mw / °C.

## RECOMMENDED OPERATING CONDITIONS (Ta = -40~85°C)

CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN	TYP.	MAX	UNIT
Power Supply Voltage	$V_{CC}$	$V_{EE} = 0 V$	4.5	—	25	V
	$V_{SUB}$	$V_{CC} = 0 V$	$V_{OUT}$	—	-55	
Output Voltage	$V_{OUT}$	$V_{CC} = 0 V$	0	—	-55	V
Output Current	$I_{OUT}$	—	0	—	-40	mA / ch
Input Voltage	$V_{IN}$	$V_{EE} = 0 V, V_{CC} = 25 V$	0	—	7	V
Power Dissipation	$P_D$	TD62706P-H	—	—	0.52	W
		TD62706FA-H when mounting	—	—	0.4	

## ELECTRICAL CHARACTERISTICS (Ta = 25°C)

CHARACTERISTIC		SYMBOL	TEST CIR-CUIT	TEST CONDITION	MIN	TYP.	MA	UNIT
Input Voltage	"H" Level	$V_{IH}$	1	$V_{EE} = 0\text{ V}$	2.2	—	—	V
	"L" Level	$V_{IL}$		$V_{EE} = 0\text{ V}$	—	—	0.8	
Input Current	"H" Level	$I_{IH}$	2	$V_{EE} = 0\text{ V}, V_{IN} = 2.4\text{ V}$ $V_{EE} = V_{IN} = 0\text{ V}, V_{CC} = 25\text{ V}$	—	0.12	0.18	mA
	"L" Level	$I_{IL}$		—	—	±1	μA	
Output Leakage Current		$I_{CEX}$	3	$V_{EE} = 0\text{ V}, V_{CC} = 25\text{ V}$ $V_{IN} = V_{IL\text{ MAX.}}, V_{OUT} = -30\text{ V}$	—	—	-100	μA
Collector-Emitter Saturation Voltage		$V_{CE(sat)}$	4	$V_{EE} = 0\text{ V}, V_{CC} = V_{CC\text{ MIN.}}$ $V_{IN} = V_{IH\text{ MIN.}}$ $I_{OUT} = -40\text{ mA}$	—	—	$V_{CC}$ -2.5	V
Supply Current (Output On)		$I_{CC(ON)}$	1	$V_{EE} = 0\text{ V}, V_{CC} = 25\text{ V}$ $V_{IN} = V_{IH\text{ MAX.}}$ OUTPUT = OPEN	—	—	25	mA
Turn-On Delay		$t_{ON}$	5	$R_L = 1.4\text{ k}\Omega$ $C_L = 15\text{ pF}$	—	0.2	—	μs
Turn-Off Delay		$t_{OFF}$			—	1.5	—	

## RECOMMENDED OPERATING CONDITIONS (Ta = -40~105°C)

CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN	TYP.	MAX	UNIT	
Power Supply Voltage	$V_{CC}$	$V_{EE} = 0\text{ V}$	4.5	—	25	V	
	$V_{SUB}$	$V_{CC} = 0\text{ V}$	$V_{OUT}$	—	-55		
Output Voltage	$V_{OUT}$	$V_{CC} = 0\text{ V}$	0	—	-55	V	
Output Current	$I_{OUT}$	2 Circuits Parallel ON	TD62706P-H	0	—	-40	mA / ch
			TD62706FA-H	0	—	-40	
		4 Circuits Parallel ON	TD62706P-H	0	—	-37	
			TD62706FA-H	0	—	-30	
		6 Circuits Parallel ON	TD62706P-H	0	—	-15	
			TD62706FA-H	0	—	-25	
Input Voltage	$V_{IN}$	$V_{EE} = 0\text{ V}, V_{CC} = 25\text{ V}$	0	—	7	V	
Power Dissipation	$P_D$	TD62706P-H	—	—	0.36	W	
		TD62706FA-H when mounting	—	—	0.28		

## ELECTRICAL CHARACTERISTICS (Ta = 105°C): TD62706P-H

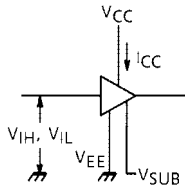
CHARACTERISTIC		SYMBOL	TEST CIR-CUIT	TEST CONDITION	MIN	TYP.	MAX	UNIT
Input Voltage	"H" Level	$V_{IH}$	1	$V_{EE} = 0\text{ V}$	1.8	—	—	V
	"L" Level	$V_{IL}$		$V_{EE} = 0\text{ V}$	—	—	0.6	
Input Current	"H" Level	$I_{IH}$	2	$V_{EE} = 0\text{ V}, V_{IN} = 2.4\text{ V}$	—	0.12	0.18	mA
	"L" Level	$I_{IL}$		$V_{EE} = V_{IN} = 0\text{ V}, V_{CC} = 25\text{ V}$	—	—	$\pm 10$	
Output Leakage Current		$I_{CEX}$	3	$V_{EE} = 0\text{ V}, V_{CC} = 25\text{ V}$ $V_{IN} = V_{IL\text{ MAX.}}$ $V_{OUT} = -30\text{ V}$	—	—	-300	$\mu\text{A}$
Collector-Emitter Saturation Voltage		$V_{CE(sat)}$	4	$V_{EE} = 0\text{ V}, V_{CC} = V_{CC\text{ MIN.}}$ $V_{IN} = V_{IH\text{ MIN.}}$ $I_{OUT} = -40\text{ mA}$	—	—	$V_{CC} - 2.5$	V
Supply Current (Output On)		$I_{CC(ON)}$	1	$V_{EE} = 0\text{ V}, V_{CC} = 25\text{ V}$ $V_{IN} = V_{IH\text{ MAX.}}$ OUTPUT = OPEN	—	—	25	mA
Turn-On Delay		$t_{ON}$	5	$R_L = 1.4\text{ k}\Omega$ , Single circuit $C_L = 15\text{ pF}$	—	0.4	—	$\mu\text{s}$
Turn-Off Delay		$t_{OFF}$			—	3.0	—	

## ELECTRICAL CHARACTERISTICS (Ta = 105°C): TD62706A-H

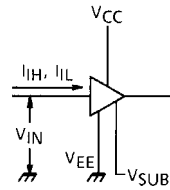
CHARACTERISTIC		SYMBOL	TEST CIR-CUIT	TEST CONDITION	MIN	TYP.	MAX	UNIT
Input Voltage	"H" Level	$V_{IH}$	1	$V_{EE} = 0\text{ V}$	1.8	—	—	V
	"L" Level	$V_{IL}$		$V_{EE} = 0\text{ V}$	—	—	0.6	
Input Current	"H" Level	$I_{IH}$	2	$V_{EE} = 0\text{ V}, V_{IN} = 2.4\text{ V}$	—	0.12	0.18	mA
	"L" Level	$I_{IL}$		$V_{EE} = V_{IN} = 0\text{ V}, V_{CC} = 25\text{ V}$	—	—	$\pm 10$	
Output Leakage Current		$I_{CEX}$	3	$V_{EE} = 0\text{ V}, V_{CC} = 25\text{ V}$ $V_{IN} = V_{IL\text{ MAX.}}$ $V_{OUT} = -30\text{ V}$	—	—	-300	$\mu\text{A}$
Collector-Emitter Saturation Voltage		$V_{CE(sat)}$	4	$V_{EE} = V_{SUB} = 0\text{ V}$ $V_{CC} = V_{CC\text{ MIN.}}$ $V_{IN} = V_{IH\text{ MIN.}}$ $I_{OUT} = -25\text{ mA}$	—	—	$V_{CC} - 1.1$	V
Supply Current (Output On)		$I_{CC(ON)}$	1	$V_{EE} = V_{SUB} = 0\text{ V}$ $V_{CC} = 16\text{ V}$ $V_{IN} = V_{IH\text{ MAX.}}$ OUTPUT = OPEN	—	—	10	mA
Turn-On Delay		$t_{ON}$	5	$R_L = 1.4\text{ k}\Omega$ , Single circuit $C_L = 15\text{ pF}$	—	0.4	—	$\mu\text{s}$
Turn-Off Delay		$t_{OFF}$			—	3.0	—	

## TEST CIRCUIT

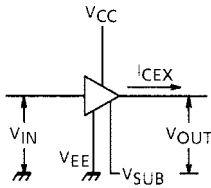
### 1. $V_{IH}$ , $V_{IL}$ , $I_{CC}$



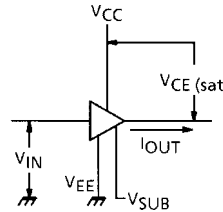
### 2. $I_{IH}$ , $I_{IL}$



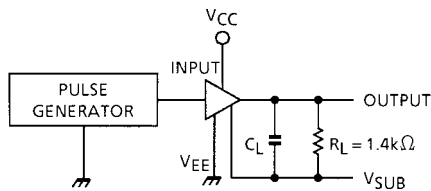
### 3. $I_{CEX}$



### 4. $V_{CE(sat)}$



### 5. $t_{ON}$ , $t_{OFF}$



$C_L = 15 \text{ pF}$   
(Includes probe and jig capacitance)

### Input condition

	$V_{IN}$	$V_{CC}$	$V_{SUB}$
TD62706	0 - 3 V	25 V	-30

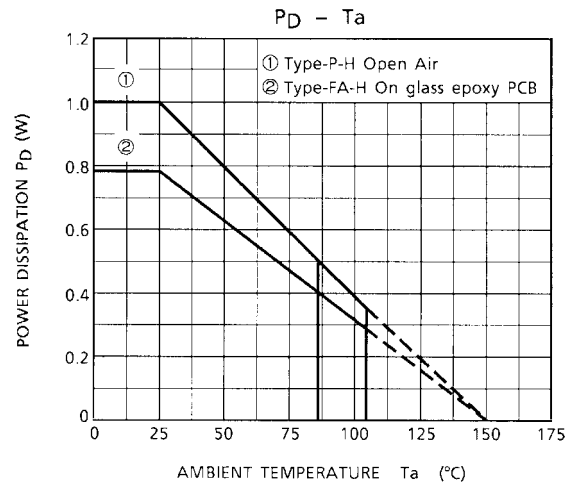
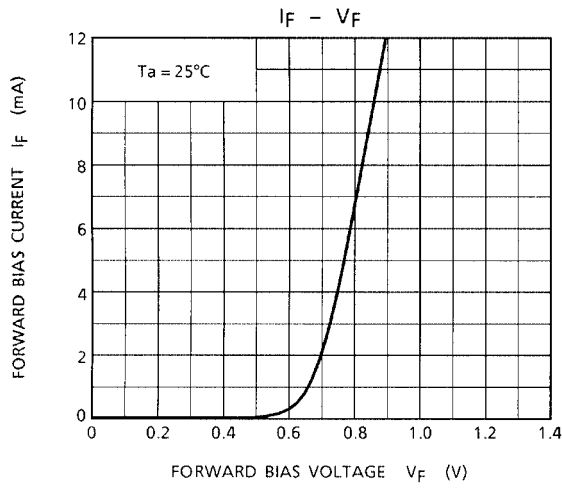
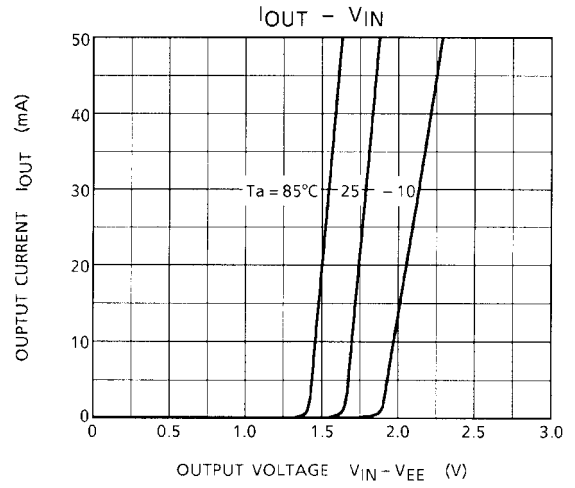
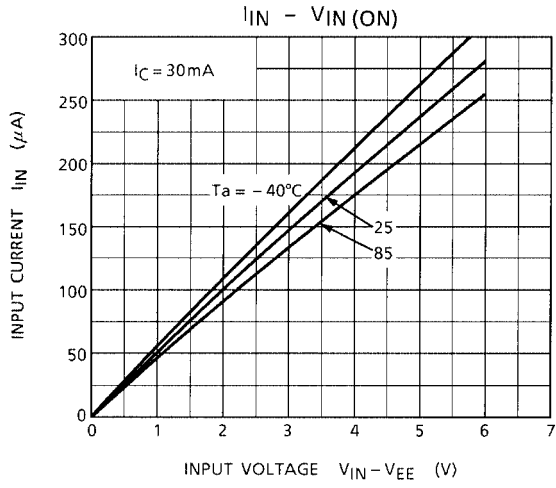
$V_{IN}$ : Pulse Width 50  $\mu\text{s}$   
Duty Cycle 50%  
 $t_r \leq 5 \text{ ns}$   
 $t_f \leq 10 \text{ ns}$

## PRECAUTIONS for USING

This IC does not integrate protection circuits such as overcurrent and overvoltage protectors.

Thus, if excess current or voltage is applied to the IC, the IC may be damaged. Please design the IC so that excess current or voltage will not be applied to the IC.

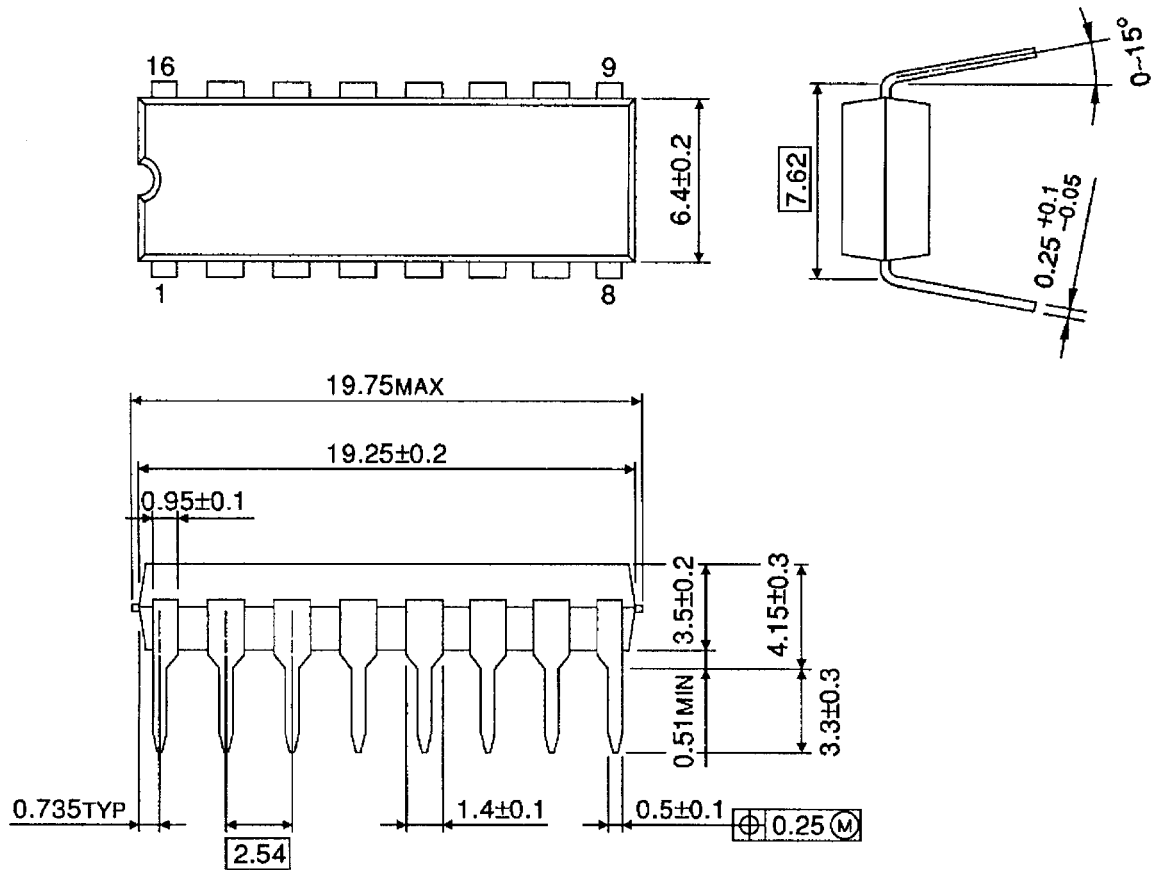
Utmost care is necessary in the design of the output line,  $V_{CC}$  and GND (SUB, VEE) line since IC may be destroyed due to short-circuit between outputs, air contamination fault, or fault by improper grounding.



## PACKAGE DIMENSIONS

DIP16-P-300-2.54A

Unit: mm

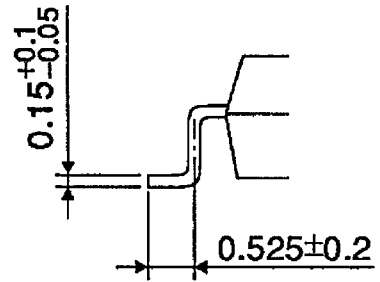
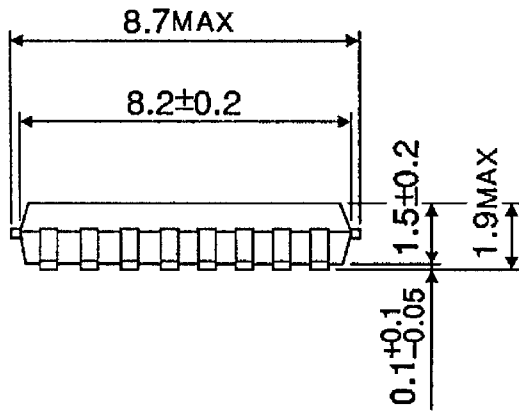
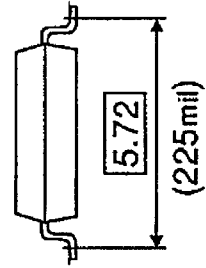
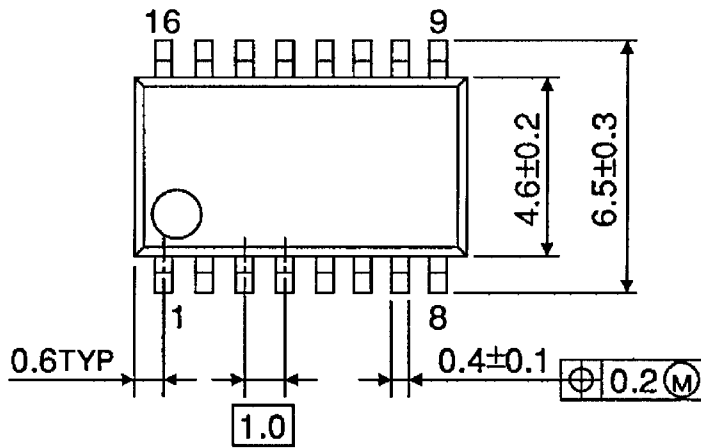


Weight: 1.11 g (Typ.)

## PACKAGE DIMENSIONS

SSOP16-P-225-1.00A

Unit: mm



Weight: 0.14 g (Typ.)



**RESTRICTIONS ON PRODUCT USE**

000707EBA

- TOSHIBA is continually working to improve the quality and reliability of its products. Nevertheless, semiconductor devices in general can malfunction or fail due to their inherent electrical sensitivity and vulnerability to physical stress. It is the responsibility of the buyer, when utilizing TOSHIBA products, to comply with the standards of safety in making a safe design for the entire system, and to avoid situations in which a malfunction or failure of such TOSHIBA products could cause loss of human life, bodily injury or damage to property.  
In developing your designs, please ensure that TOSHIBA products are used within specified operating ranges as set forth in the most recent TOSHIBA products specifications. Also, please keep in mind the precautions and conditions set forth in the "Handling Guide for Semiconductor Devices," or "TOSHIBA Semiconductor Reliability Handbook" etc..
- The TOSHIBA products listed in this document are intended for usage in general electronics applications (computer, personal equipment, office equipment, measuring equipment, industrial robotics, domestic appliances, etc.). These TOSHIBA products are neither intended nor warranted for usage in equipment that requires extraordinarily high quality and/or reliability or a malfunction or failure of which may cause loss of human life or bodily injury ("Unintended Usage"). Unintended Usage include atomic energy control instruments, airplane or spaceship instruments, transportation instruments, traffic signal instruments, combustion control instruments, medical instruments, all types of safety devices, etc.. Unintended Usage of TOSHIBA products listed in this document shall be made at the customer's own risk.
- The products described in this document are subject to the foreign exchange and foreign trade laws.
- The information contained herein is presented only as a guide for the applications of our products. No responsibility is assumed by TOSHIBA CORPORATION for any infringements of intellectual property or other rights of the third parties which may result from its use. No license is granted by implication or otherwise under any intellectual property or other rights of TOSHIBA CORPORATION or others.
- The information contained herein is subject to change without notice.