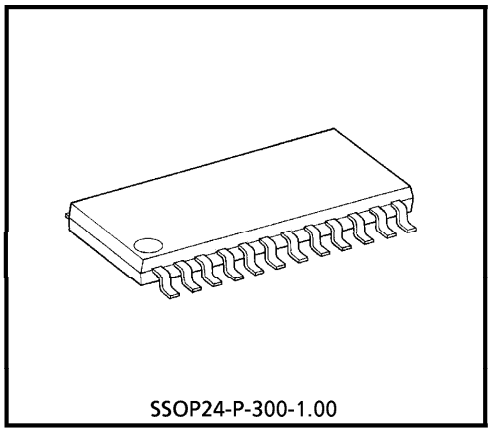
TOSHIBA BIPOLAR LINEAR INTEGRATED CIRCUIT SILICON MONOLITHIC

TA1250F

4-CHANNEL RECORDING AMPLIFIER & PRE-AMPLIFIER FOR VCR

The TA1250F is a 4-channel recording amplifier and pre-amplifier for use in VCR. Since the recording amplifier uses a differential mechanism, it is particularly effective in reducing high-frequency even-ordered distortion.
The pre-amplifier also has a differential mechanism and thus also reduces noise.



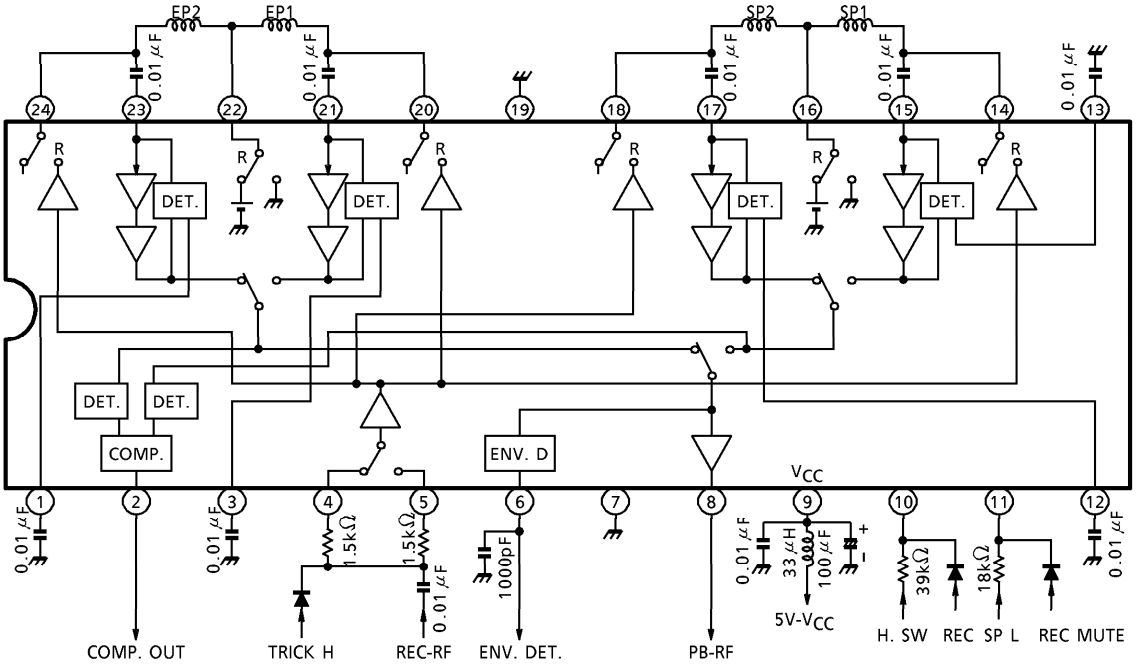
SSOP24-P-300-1.00

Weight : 0.32g (Typ.)

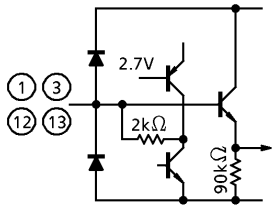
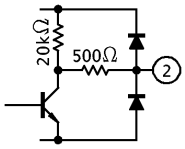
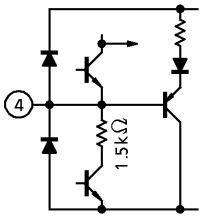
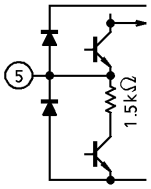
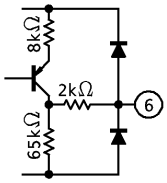
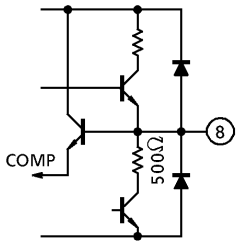
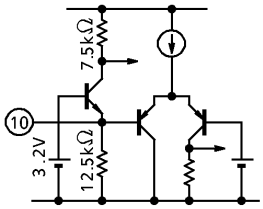
FEATURES

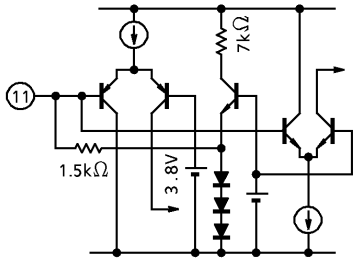
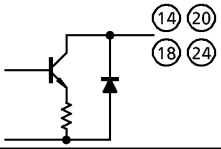
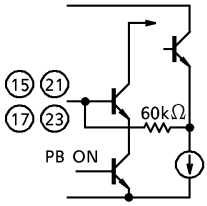
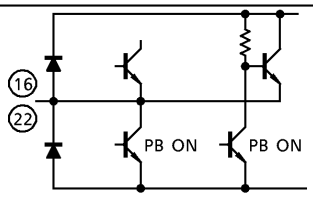
- Differential drive type recording amplifier
- Differential input type pre-amplifier
- Built-in envelope detector for auto-tracking
- Built-in envelope comparator for special playback
- Built-in recording mute circuit
- Board patterns can easily be shared, due to the high pin compatibility with the TA1249F 2-channel recording amplifier and pre-amplifier, and the TA1273F 6-channel recording amplifier and pre-amplifier.

BLOCK DIAGRAM



PIN FUNCTION (V_{CC} = 5.0V, Ta = 25°C)

PIN No.	FUNCTION	TYPICAL DC VOLTAGE	INTERFACE CIRCUIT	NOTES
1	Filter 4	1.8V		DC return filter
3	Filter 3			
12	Filter 2			
13	Filter 1			
2	ENV.COMP. OUT	—		SP : 0V EP : 5V
4	SP Rec input and trick mode switching	Rec : 0.9V		Current input type Trick mode set when pin 4 (TP4) raised to H.
5	EP Rec input	Rec : 0.9V		Current input type
6	ENV.DET.OUT	—		—
7	GND	(0V)	—	—
8	PB RF OUT	2V		SP : 0.3mV$_{p-p}$ input ↓ 57dB 212mV$_{p-p}$ output EP : 0.3mV$_{p-p}$ input ↓ 60dB 300mV$_{p-p}$ output
9	V_{CC}	(5V)	—	—
10	Head SW & Rec H	2.5V		Refer to the head switching table in the Control Tables. TP10→H : Rec Mode

PIN No.	FUNCTION	TYPICAL DC VOLTAGE	INTERFACE CIRCUIT	NOTES
11	Mode switching & Rec Mute	—		V_{11} voltage L : SP H : EP TP11 voltage H : Rec Mute
14	Rec OUT1 (SP1)	Open collector		—
18	Rec OUT2 (SP2)			
20	Rec OUT3 (EP1)			
24	Rec OUT4 (EP2)			
15	PB IN1 (SP1)	PB : 0.9V		—
17	PB IN2 (SP2)			
21	PB IN3 (EP1)			
23	PB IN4 (EP2)			
16	Head COMMON 1	Rec : 4.3V PB : 0.1V		—
22	Head COMMON 2			
19	Head GND	(0V)	—	—

CONTROL TABLES

HEAD switching

	V_{10} voltage	SP mode	EP mode
During PB	H	2ch	1ch
	L	1ch	2ch

(Note) The above settings are controlled by the input and output currents.
Pin10 (TP10) has function of Rec H too.

MODE switching

V_{11} voltage	Mode
L	SP
H	EP

(Note) Pin 11 has function of Rec Mute too.
When pin 11 (TP11) is raised to H (V_{CC}), then Rec Mute mode is set.

- Trick mode is set by raising pin 4 (TP4) to H.

EXAMPLES OF REC CURRENT SETTING

Input : 500mV$_{p-p}$, 4MHz

MODE	INPUT RESISTANCE	REC CURRENT (SINGLE-CHANNEL OUTPUT)
SP	1.5kΩ	14.9mA
	2.0kΩ	11.2mA
EP	1.5kΩ	10.5mA
	2.0kΩ	7.9mA

MAXIMUM RATINGS (Ta = 25°C)

CHARACTERISTIC	SYMBOL	RATING	UNIT
Power Supply Voltage	V_{CC}	7	V
Power Dissipation 1	P_{D1} (Note 1)	595	mW
Power Dissipation 2	P_{D2} (Note 2)	830	mW
Input Voltage	V_{IN}	GND − 0.3~V_{CC} + 0.3	V
Operating Temperature	T_{opr}	− 20~75	°C
Storage Temperature	T_{stg}	− 55~150	°C

(Note 1) Derated linearly above Ta = 25°C in the proportion of 4.8mW / °C.
(Note 2) On the board mounting (Glass epoxy 50 × 50 × 1.6mm, Area of copper : 30%)
Derated linearly above Ta = 25°C in the proportion of 6.7mW / °C.

RECOMMENDED POWER SUPPLY VOLTAGE RANGE

Power supply voltage : 4.5~5.5V, 5V (typical)

ELECTRICAL CHARACTERISTICS (V_{CC} = 5V, Ta = 25°C)
PB mode

CHARACTERISTIC	SYMBOL	TEST CIR-CUIT	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Power Supply Current	Iccp	—	—	26	32	40	mA
Voltage Gain (SP Mode)	Gs1	—	Input (V15, V17, V21, V23) : f = 1MHz, 0.3mV$_{p-p}$	54	57	60	dB
	Gs2						
Voltage Gain (EP Mode)	Ge1			57	60	63	
	Ge2						
Voltage Gain Difference	ΔGS	—	Gs1 − Gs2	− 0.5	0	0.5	dB
	ΔGE		Ge1 − Ge2				
Frequency Characteristic	GFs1	—	Input (V15, V17, V21, V23) : 0.3mV$_{p-p}$ Output ratio 8M / 1M	− 1.5	0.5	2.5	dB
	GFs2						
	GFe1						
	GFe2						
Secondary Harmonic Distortion	HDs1	—	Input (V15, V17, V21, V23) : 0.3mV$_{p-p}$ Power ratio 8M / 4M	—	− 45	− 40	dB
	HDs2						
	HDe1						
	HDe2						
Maximum Output Voltage	V_{oms1}	—	Input (V15, V17, V21, V23) : f = 1MHz Level when thirdly harmonic distortion of output reaches − 30dB.	2.0	2.2	—	V_{p-p}
	V_{oms2}						
	V_{ome1}						
	V_{ome2}						

CHARACTERISTIC	SYMBOL	TEST CIR-CUIT	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Crosstalk Between Channels (SP Mode)	CRS12	—	Input (V15, V17, V21, V23) : f = 4MHz, 0.3mV$_{p-p}$ Level difference between channels.	—	– 40	– 38	dB
	CRS21						
Crosstalk Between Channels (EP Mode)	CRE12			—	– 34	– 32	
	CRE21						
Crosstalk Between Modes	CRS1E1	—	Input (V15, V17, V21, V23) : f = 4MHz, 0.3mV$_{p-p}$ Level difference between modes.	—	– 60	– 40	dB
	CRS1E2						
	CRS2E1						
	CRS2E2						
	CRE1S1						
	CRE1S2						
	CRE2S1						
	CRE2S1						
Output DC Offset	ΔVs1s2	—	DC difference between outputs	– 15	0	15	mV
	ΔVs1e1						
	ΔVs1e2						
	ΔVs2e1						
	ΔVs2e2						
	ΔVe1e2						
Equated Input Noise	NS1	—	Measurement point 4MHz RBW : 10kHz	—	0.1	—	μV_{rms}
	NS2						
	NE1						
	NE2						
ENV Det (SP Mode)	VENVS1	—	Input : f = 4MHz, 50μV$_{p-p}$	0.4	0.7	1.0	V
	VENVS2	—	Input : f = 4MHz, 1mV$_{p-p}$	2.95	3.35	3.75	
ENV Det (EP Mode)	VENVE1	—	Input : f = 4MHz, 50μV$_{p-p}$	0.8	1.1	1.4	
	VENVE2	—	Input : f = 4MHz, 1mV$_{p-p}$	3.3	3.7	4.1	
ENV Comp	VCOM1	—	Selects SP head; pin 11 low	0	0.1	0.3	V
	VCOM2	—	Selects EP head; pin 11 high	4.7	4.9	5.0	

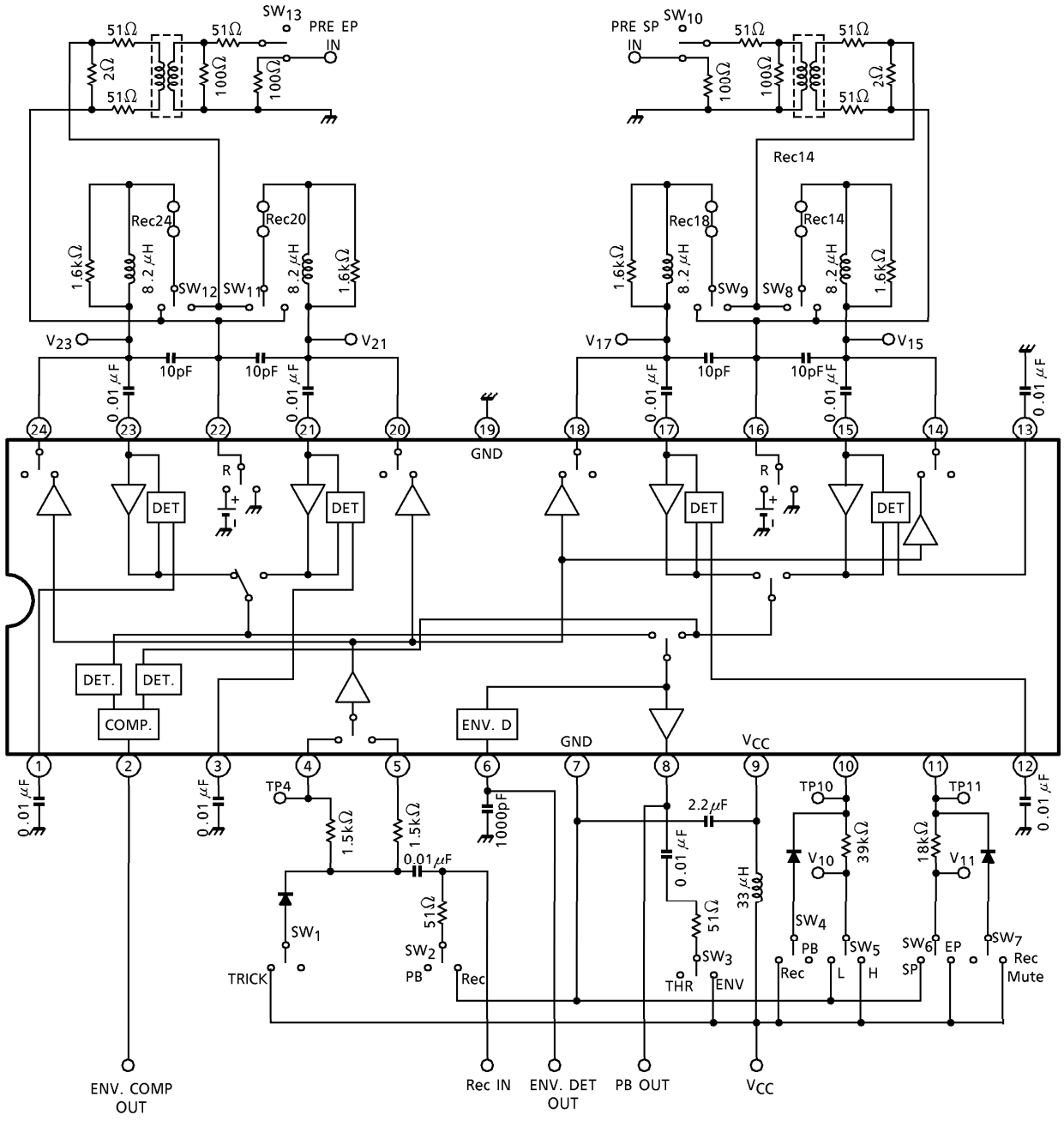
REC mode (Input resistance : 1.5kΩ)

CHARACTERISTIC	SYMBOL	TEST CIR-CUIT	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Power Supply Current	Iccr	—	—	32	52	65	mA
Current Gain (SP Mode)	Grs1	—	Input : f = 1MHz, 500mV$_{p-p}$	32.5	33	33.5	dB
	Grs2						
Current Gain (EP Mode)	Gre1			29.1	29.6	30.1	
	Gre2						
Frequency Characteristic	Grfs1	—	Input : 500mV$_{p-p}$ Output ratio 1M / 8M	– 1.5	0	1.5	dB
	Grfs2						
	Grfe1						
	Grfe2						
Secondary Harmonic Distortion	HDRs1	—	Input : f = 4MHz, 500mV$_{p-p}$ Output ratio 8M / 4M	—	– 45	– 40	dB
	HDRs2						
	HDRe1						
	HDRe2						

CONTROL SYSTEM

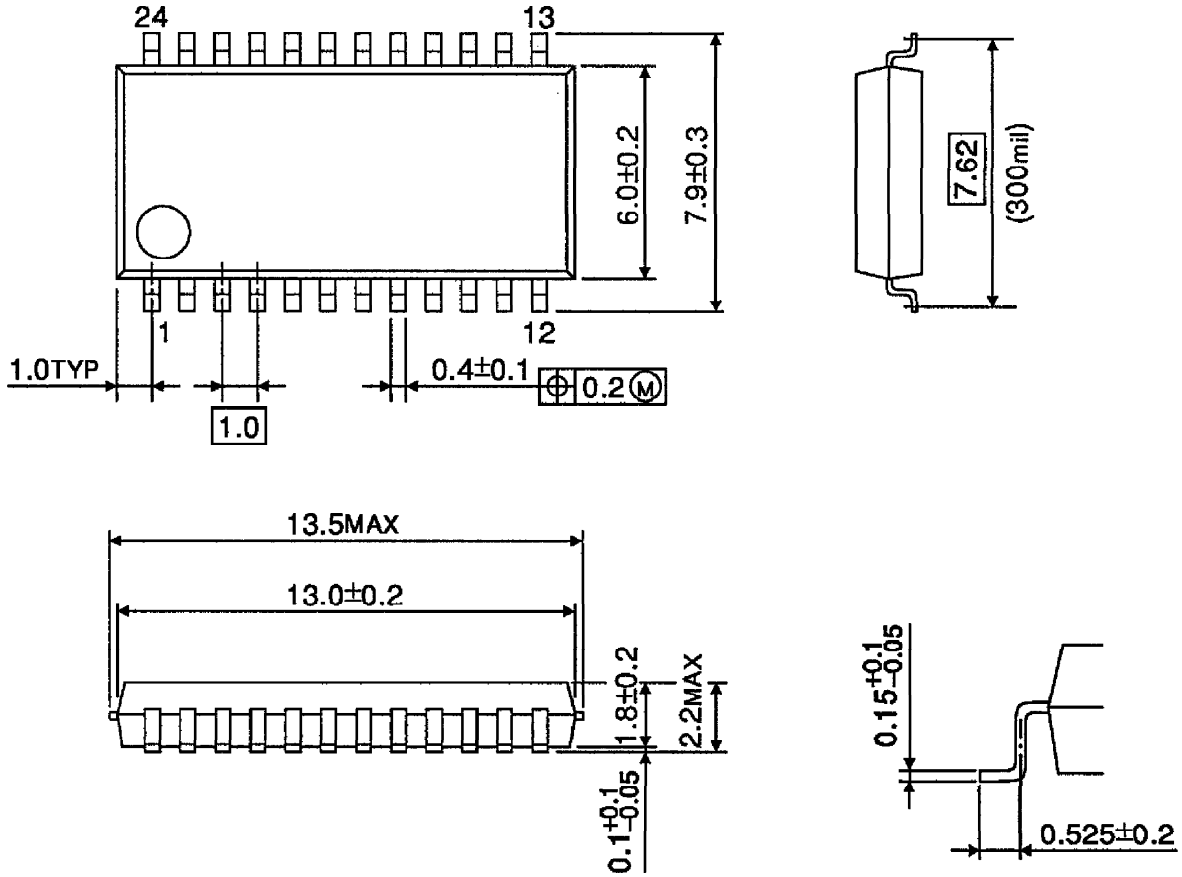
CHARACTERISTIC	SYMBOL	TEST CIR-CUIT	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Short SW ON Resistance	R_{in}	—	—	—	6	—	Ω
Input Resistance	r_{in}	—	—	—	600	—	Ω
Rec Mute	Mute1	—	Mute ON (TP11)	4.2		5.0	V
	Mute2	—	Mute OFF (TP11)	0.0		3.4	
Rec / PB	R / P1	—	Rec mode (TP10)	3.8		5.0	V
	R / P2	—	PB mode (TP10)	0.0		2.8	
SP / EP	EPS1	—	SP mode (V_{11})	0.0		0.9	V
	EPS2	—	EP mode (V_{11})	1.7		5.0	
LCH / HCH	SWP1	—	LCH (V_{10})	0.0		1.5	V
	SWP2	—	HCH (V_{10})	3.5		5.0	
Normal / Trick	NT1	—	Normal mode (TP4)	0.0		0.4	V
	NT2	—	Trick mode (TP4)	1.0			

TEST CIRCUIT



PACKAGE DIMENSIONS

SSOP24-P-300-1.00 Unit : mm



Weight : 0.32g (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.