

TA7371AF

FM Front-End (1.5V USE)

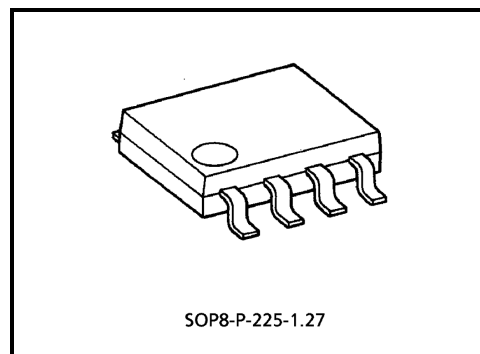
The TA7371AF is an FM front end IC designed for low voltage operation (1.5V), which is suitable for stereo headphone radio or radio cassette.

This IC contains RF amplifier, MIX, local oscillator and varactor diode for AFC.

It simplifies the design of front end circuit.

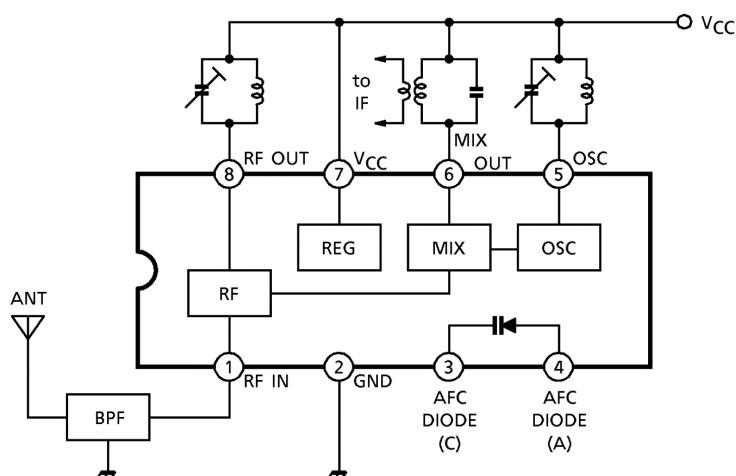
Features

- Clamping diode for mixer output.
- Varactor diode for AFC.
- Local OSC. stop voltage: $V_{CC} = 0.85V$ (typ.)
- Low quiescent current
 $I_{CC} = 1.8mA$ (typ.) ($V_{CC} = 1.5V$, $T_a = 25^\circ C$)
- Low noise.
- Very few external parts.
- Operating supply voltage range: $V_{CC} = 0.95 \sim 5V$ ($T_a = 25^\circ C$)



Weight: 0.08g (typ.)

Block Diagram

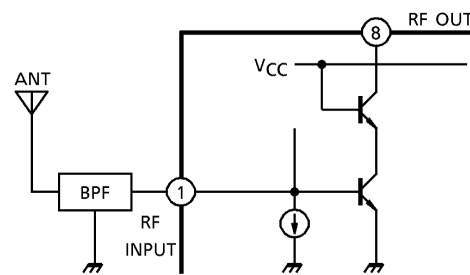


Explanation Of Inner Circuit And Functions

(1) RF block

The radio signal is applied to RF INPUT passed through the ANT and BPF.

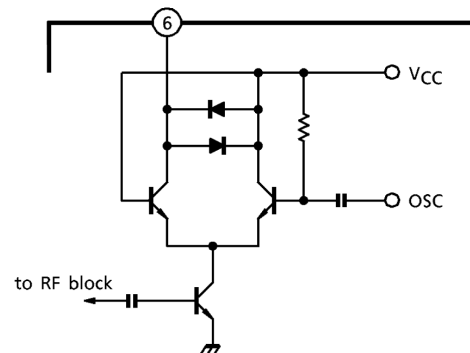
This RF block is composed of the common emitter amplifier. The output is designed to be the cascade connection, because of high sensitivity characteristic, and excellent spurious radiation. (Fig.1)



(Fig.1)

(2) MIX block

The MIX block is composed of the emitter coupled pair amplifier. (Fig.2)

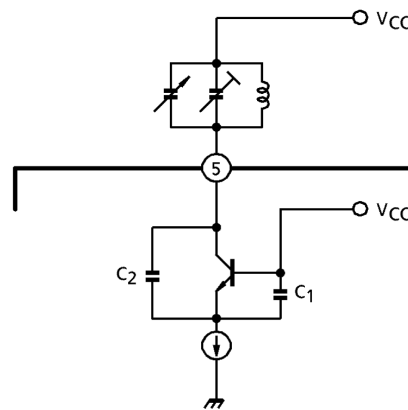


(Fig.2)

(3) OSC block

OSC block is composed of the colpitts oscillation circuit.

The capacitors C₁ and C₂ are built in this IC.



(Fig.3)

Maximum Ratings (Ta = 25°C)

Characteristic	Symbol	Rating	Unit
Supply voltage	V _{CC}	5	V
Power dissipation	P _D (Note)	240	mW
Operating temperature	T _{opr}	−25~75	°C
Storage temperature	T _{stg}	−55~150	°C

(Note) Derated above Ta = 25°C in the proportion of 2mW / °C.

Electrical Characteristics

(unless otherwise specified, V_{CC} = 1.5V, Ta = 25°C, f = 83MHz, Δf = ±22.5kHz, f_m = 1kHz)

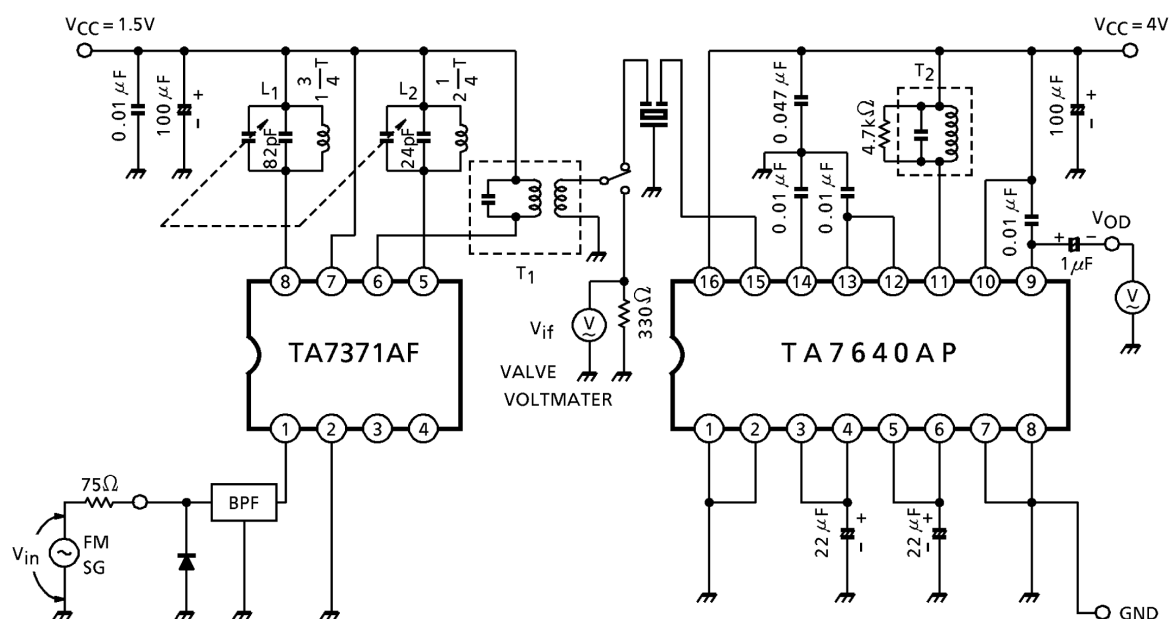
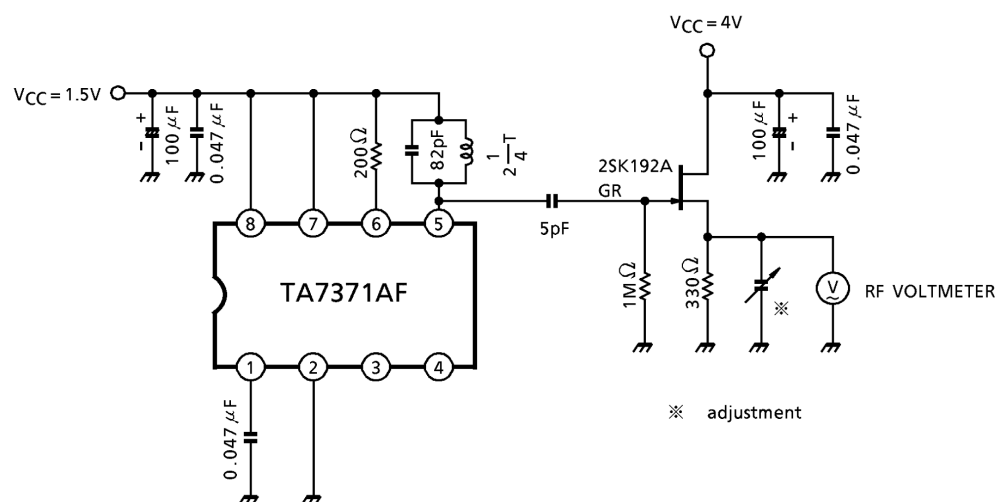
Characteristic	Symbol	Test Cir-cuit	Test Condition	Min.	Typ.	Max.	Unit
Supply current	I _{CC}	2	V _{in} = 0	—	1.8	2.6	mA
Input limiting sensitivity	V _{in} (lim)	2	−3dB limiting point	—	10	16	dBμV EMF
Quiescent sensitivity	Q _S	2	S / N = 30dB	—	12	—	dBμV EMF
Conversion gain	G _C	2	V _{if} = 20mV _{rms}	—	25	—	dB
Local oscillator voltage	V _{osc}	1	f = 60MHz	75	110	150	mV _{rms}
Local oscillator stop voltage	V _{stop}	1	f = 60MHz	—	0.85	0.95	V
AFC diode capacity	C _{AFC}	6	f = 70MHz, V _{AFC} = 3V	—	5.0	—	pF
Pin(1) input impedance	R _{ip1}	3	f = 83MHz	—	300	—	Ω
	C _{ip1}			—	8.7	—	pF
Pin(6) input impedance	R _{op2}	4	f = 10.7MHz	—	100	—	kΩ
	C _{op2}			—	3.8	—	pF
Pin(8) input impedance	R _{op3}	5	f = 83MHz	—	2.2	—	kΩ
	C _{op3}			—	4.8	—	pF

Terminal Voltage

Terminal Voltage at no Signal (V_{CC} = 1.5V, Ta = 25°C)

Terminal No.	Terminal Name	Terminal Voltage Typ. (V)
1	RF INPUT	0.7
2	GND	0
3	AFC DIODE (cathode)	—
4	AFC DIODE (anode)	—
5	LOCAL OSC	1.5
6	MIXER OUTPUT	1.5
7	V _{CC}	1.5
8	RF OUTPUT	1.5

V_{osc}, V_{stop} TEST CIRCUIT



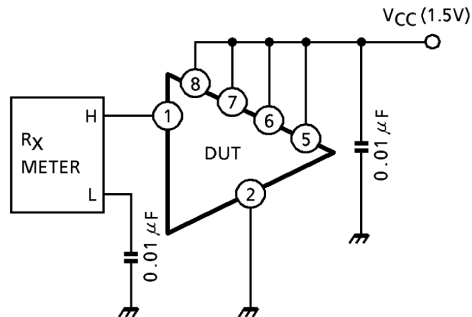
- Conversion gain: $G_C \text{ (dB)} = 20 \log \frac{V_{if}}{V_{in}}$

Input / Output Impedance Test Circuit

Input / output impedance and AFC diode capacity test circuit

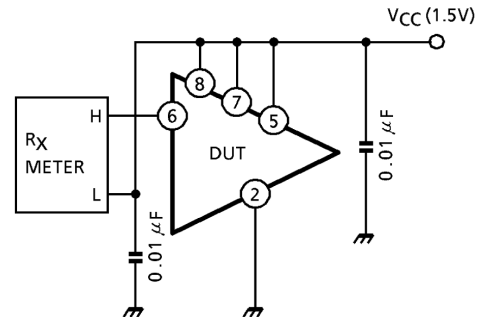
TEST CIRCUIT 3 (R_{ip} 1, C_{ip} 1)

Pin(1) input impedance



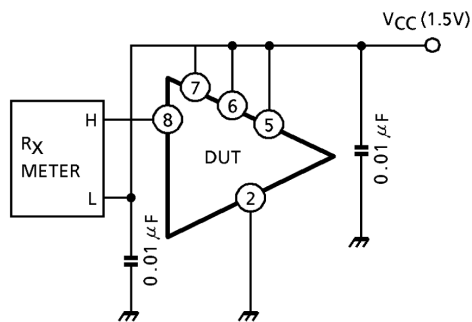
TEST CIRCUIT 4 (R_{op} 2, C_{op} 2)

Pin(6) output impedance



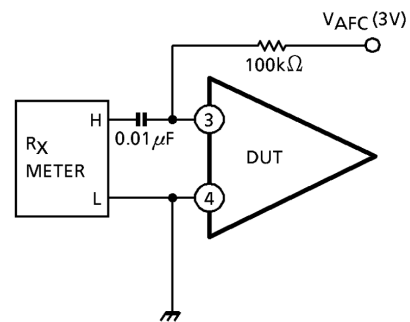
TEST CIRCUIT 5 (R_{op} 3, C_{op} 3)

Pin(8) output impedance



TEST CIRCUIT 6 (C_{AFC})

AFC diode

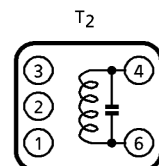
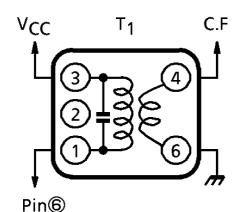


Coil Data For Test Circuit (lower side heterodyne type)

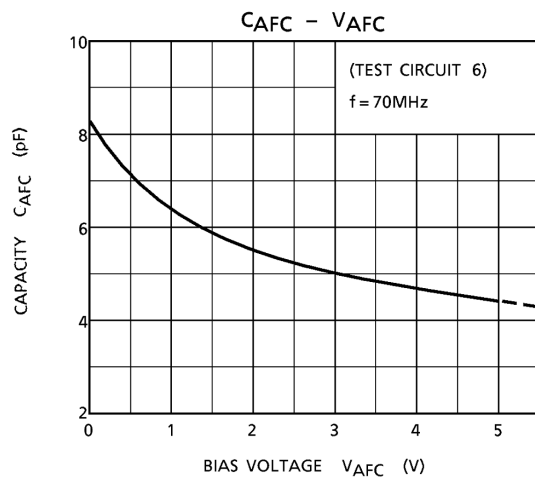
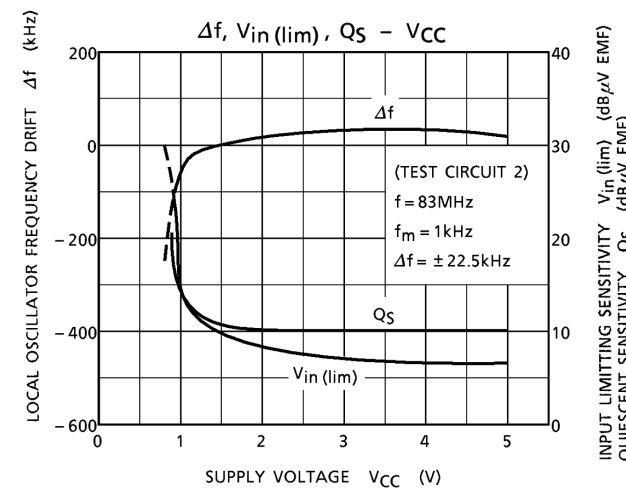
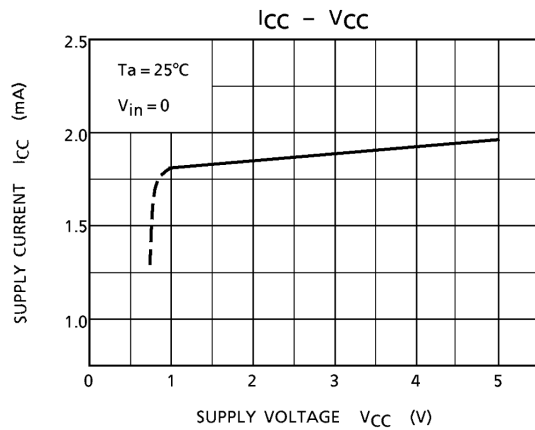
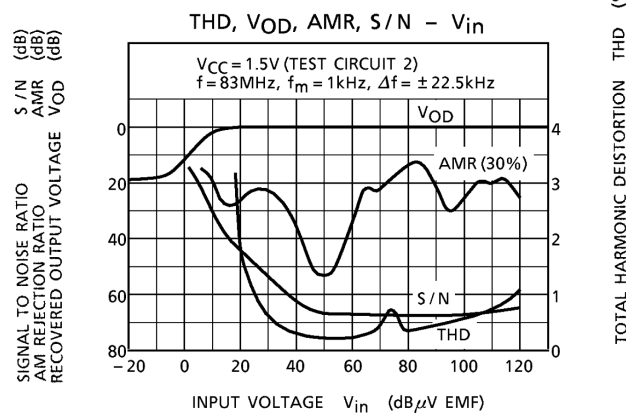
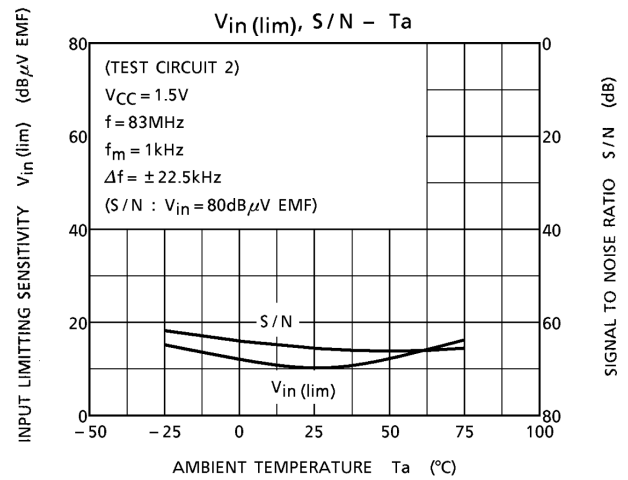
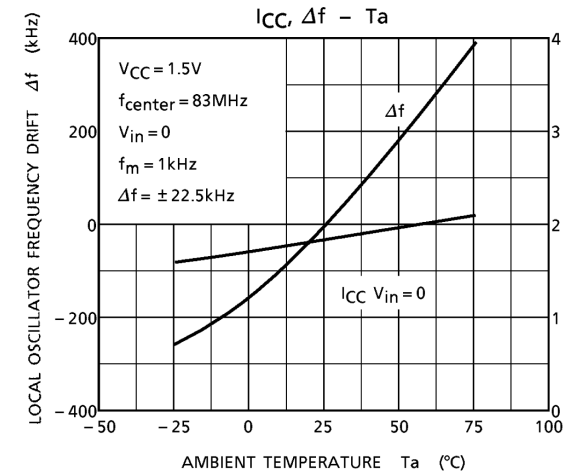
Coil Name	f_0	Q_0	Turn	Capacitance	Comment
L ₁ RF	100MHz	85	(1)-(3) $1\frac{3}{4}$ T	82pF (external)	Bobbin with ferrite core φ0.5mm UEW
L ₂ OSC	100MHz	100	(1)-(3) $2\frac{1}{4}$ T	24pF (external)	Bobbin with ferrite core φ0.5mm UEW
T ₁ IFT	10.7MHz	115	(1)-(3) 12T (4)-(6) 1T	75pF	SUMIDA ELECTRIC Co. LTD. 0133-309-048
T ₂ QUAD	10.7MHz	150	(4)-(6) 14T	47pF	SUMIDA ELECTRIC Co. LTD. 44M-037-933A

RF BPF SOSHIN ELECTRIC Co. LTD.
IF BPF MURATA ELECTRIC Co. LTD.

BPW B6A
SFE 10.7 MA5



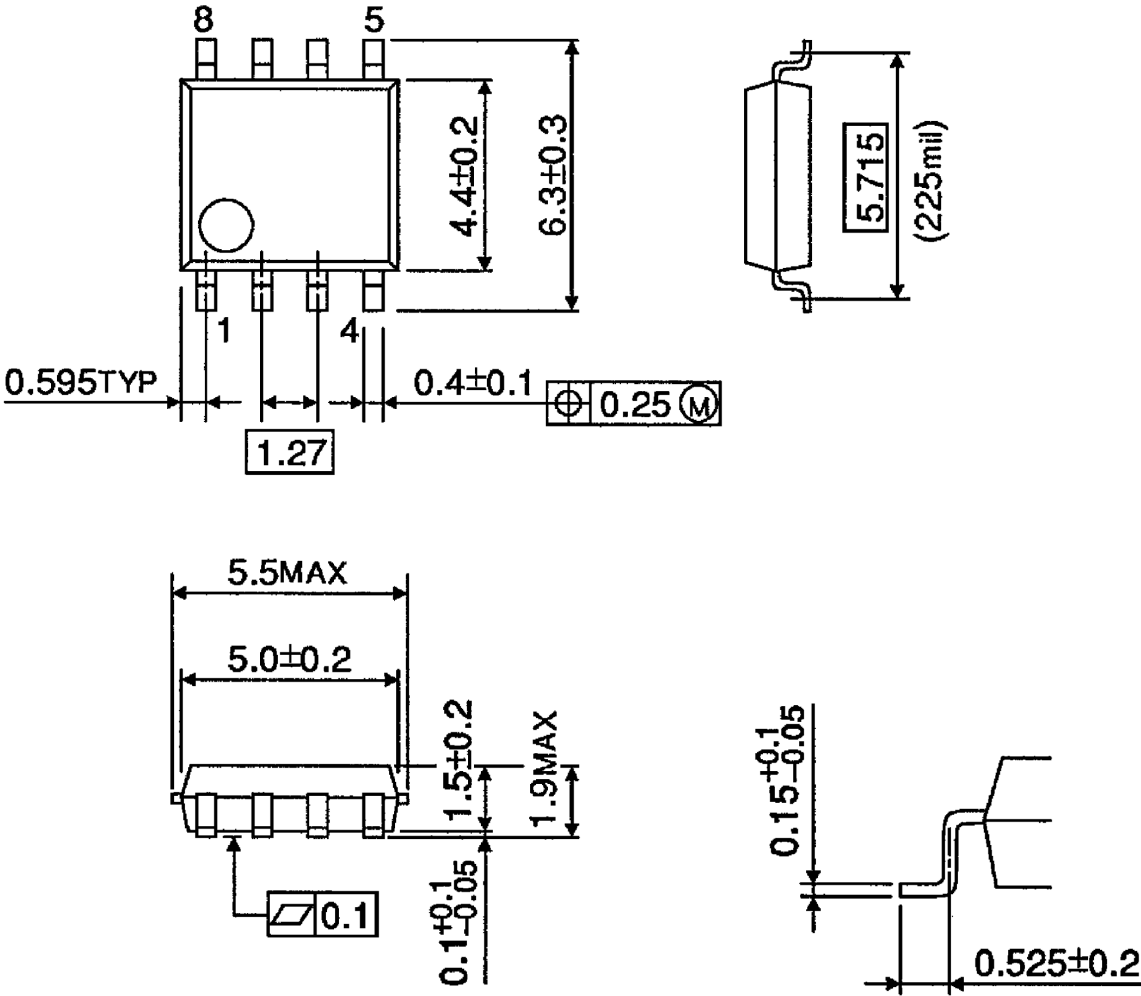
(Bottom view)



Package Dimensions

SOP8-P-225-1.27

Unit : mm



Weight: 0.08g (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.