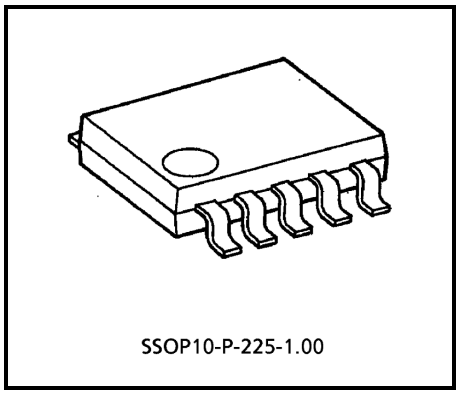
TOSHIBA Bipolar Linear Integrated Circuit Silicon Monolithic

TA8158FG

FM Front End IC

The TA8158FG is low operation voltage FM front end IC for the portable equipments which is suitable for the headphone stereo radios and radio cassette players.



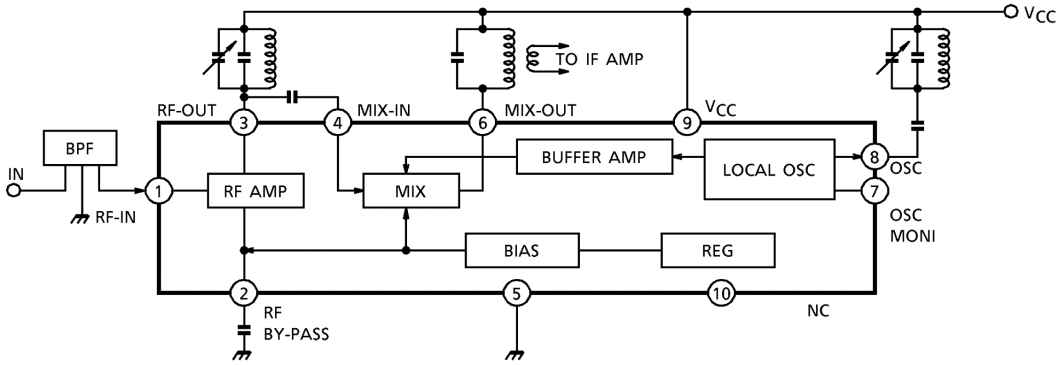
SSOP10-P-225-1.00

Weight: 0.10g (typ.)

Features

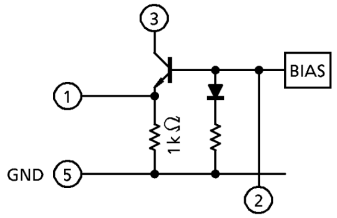
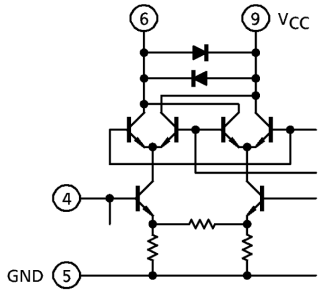
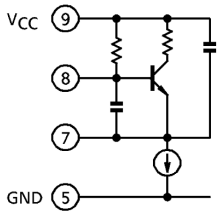
- Wide supply voltage range: V_{CC} = 1.6~6.0V (Ta = 25°C)
- Excellent supply voltage dependence of local oscillator : Oscillation stop V_{CC} = 0.9V (typ.)
- Improved inter−modulation characteristics by double balanced type mixer circuit.
- Built−in clampping diode for the local oscillator output.

Block Diagram



Explanation Of Terminal

(terminal voltage is DC voltage at Ta = 25°C, V_{CC} = 5V, and no signal)

Pin No.	Symbol	Internal Circuit	Terminal Voltage (V)
1	FM−RF IN		0.8
2	By pass		1.5
3	FM−RF OUT		5.0
4	MIX IN		1.5
5	GND	—	0
6	MIX OUT	Cf, pin(4)	5.0
7	OSC MONITOR		4.3
8	OSC		5.0
9	V_{CC}	—	5.0
10	NC	—	—

Maximum Ratings (Ta = 25°C)

Characteristic	Symbol	Rating	Unit
Supply voltage	V_{CC}	8	V
Power dissipation	P_D (Note)	400	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 3.2mW / °C.

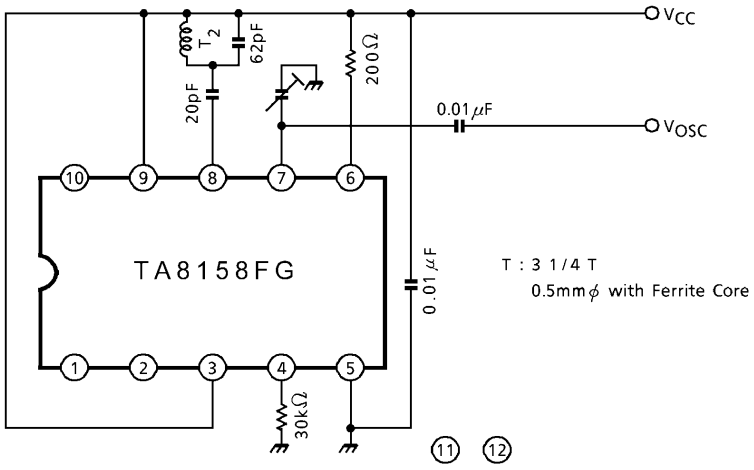
Electrical Characteristics

Unless Otherwise Specified

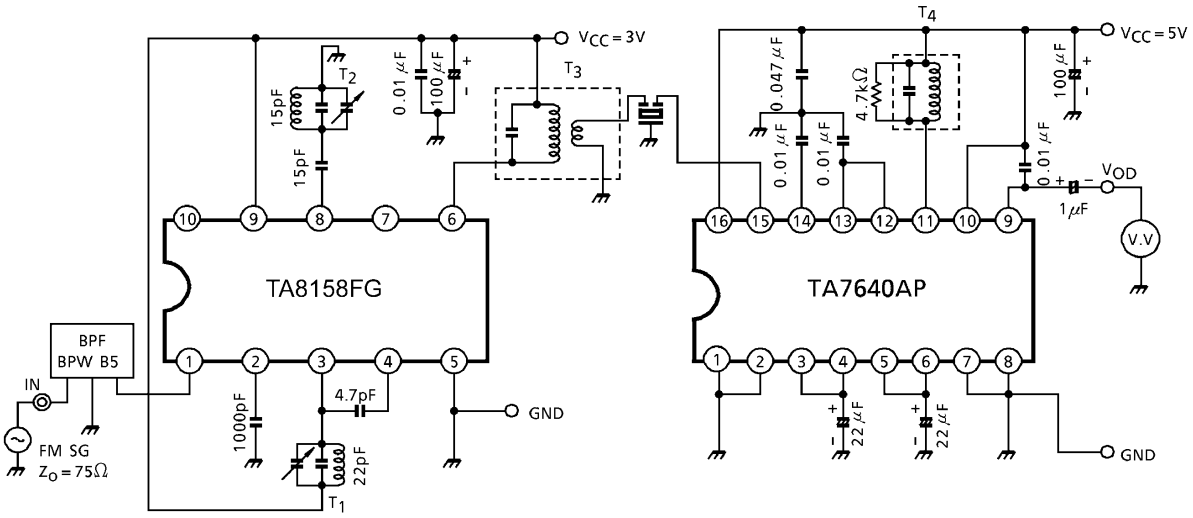
(V_{CC} = 3V, f = 83MHz, f_m = 1kHz, Δf = 22.5kHz dev, Ta = 25°C)

Characteristic		Symbol	Test Cir−cuit	Test Condition	Min.	Typ.	Max.	Unit
Supply current		I_{CC}	2	V_{in} = 0	—	5.2	8.0	mA
−3dB limiting sensitivity		$V_{in\ (lim)}$	2	—	—	3.0	7.0	dBμV EMF
Quiescent sensitivity		Q_S	2	—	—	11.0	—	dBμV EMF
Conversion gain		G_C	—	—	—	31	—	dB
Local OSC voltage		V_{OSC}	1	f_{OSC} = 60MHz	140	220	340	mV_{rms}
Pin(1) impedance	Parallel input resistance	r_{ip1}	3	f = 83MHz	—	57	—	Ω
Pin(3) impedance	Parallel output resistance	r_{op3}	3		—	25	—	kΩ
	Parallel output capacitance	c_{op3}			—	2.0	—	pF
Pin(4) impedance	Parallel input resistance	r_{ip4}	3		—	2.7	—	kΩ
	Parallel input capacitance	c_{ip4}			—	3.3	—	pF
Pin(6) impedance	Parallel output resistance	r_{op6}	3	f = 10.7MHz	—	100	—	kΩ
	Parallel output capacitance	c_{op6}			—	4.8	—	pF
Local OSC stop voltage		V_{stop}	1	—	—	0.9	—	V

Test Circuit 1



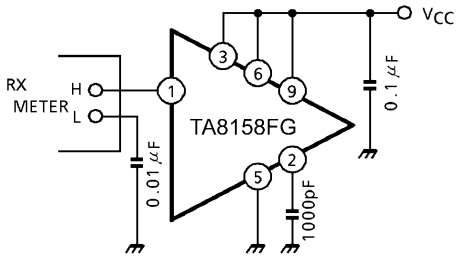
Test Circuit 2



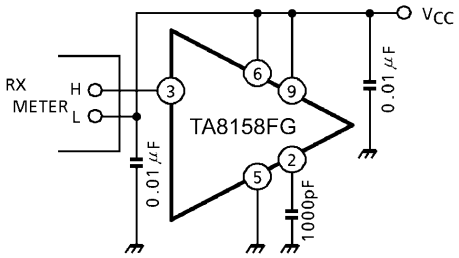
Test Circuit 3

Input, output impedance

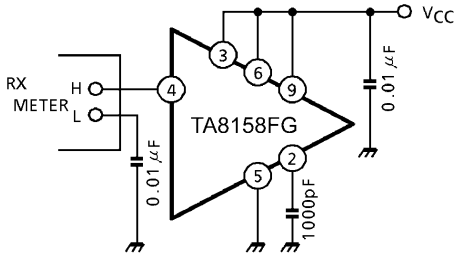
(1) r_{ip1}



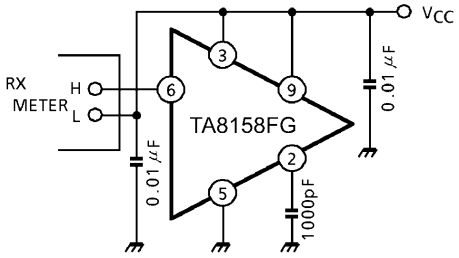
(2) r_{op3}, c_{op3}



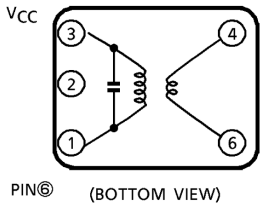
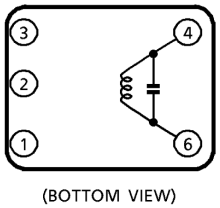
(3) r_{ip4}, c_{ip4}



(4) r_{op6}, c_{op6}



Text Circuit Coil Data (Japan band for 76.0MHz to 108.0MHz)

Coil	f_o	Q_o	Turns	Capaci–tance	
T_1 RF coil	100MHz	100	0.5mmϕ $2\frac{1}{4}$ T Center tap	15pF (external)	
T_2 OSC coil	100MHz	100	0.5mmϕ $2\frac{1}{2}$ T	15pF (external)	
T_3 IFT coil	10.7MHz	115	(1)–(3) 12T (4)–(6) 1T Wire 0.12mmϕ UEW SUMIDA ELECTRIC Co., LTD. 5764 or equivalent	75pF	
T_4 Quad coil	10.7MHz	150	(4)–(6) 14T Wire 0.12mmϕ UEW SUMIDA ELECTRIC Co., LTD. 44M–933A or equivalent	47pF	

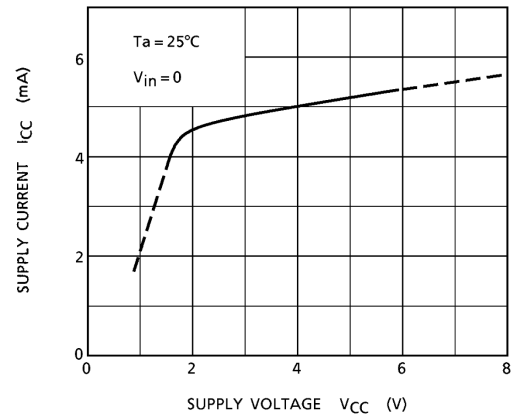
Band pass filter (BPF)

SOSHIN ELECTRIC Co., LTD. BPWB5

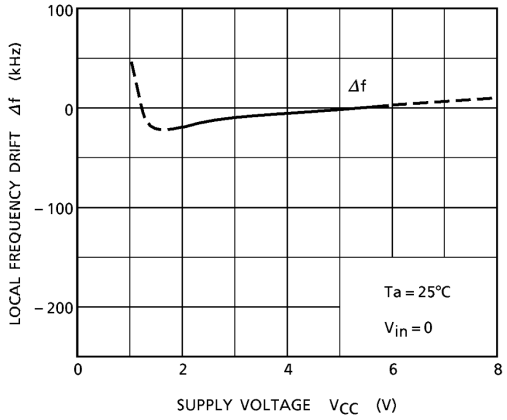
Tuning capacitor

ALPS ELECTRIC Co., LTD. CB41EL933

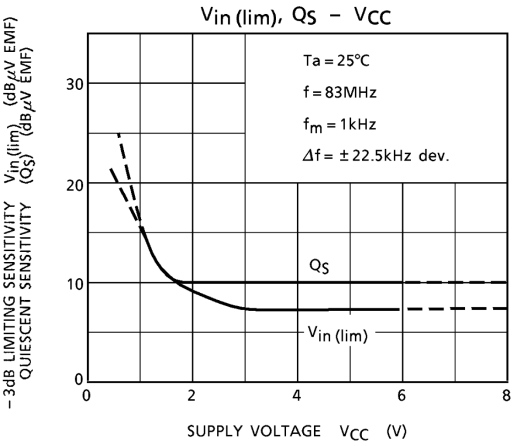
I_{CC} – V_{CC}



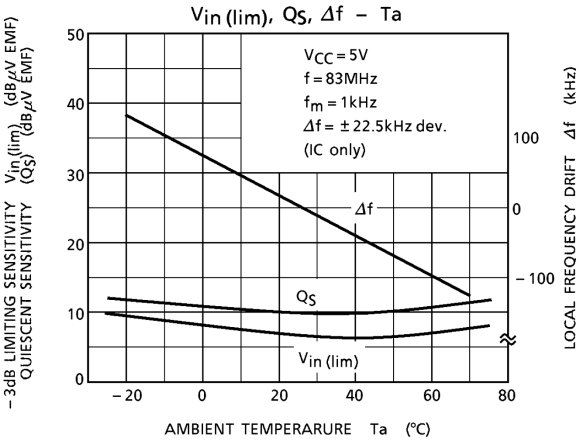
Δf – V_{CC}



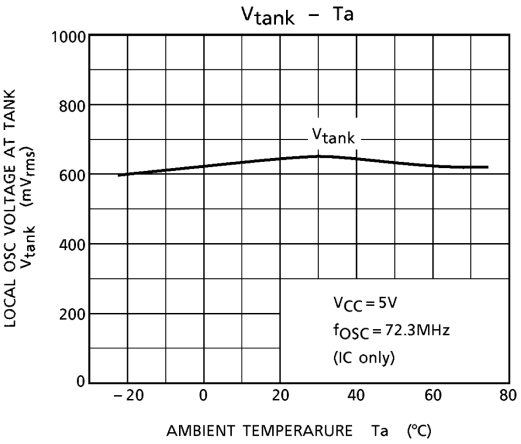
$V_{in\,(lim)}$, Qs – V_{CC}



$V_{in\,(lim)}$, Qs, Δf – Ta

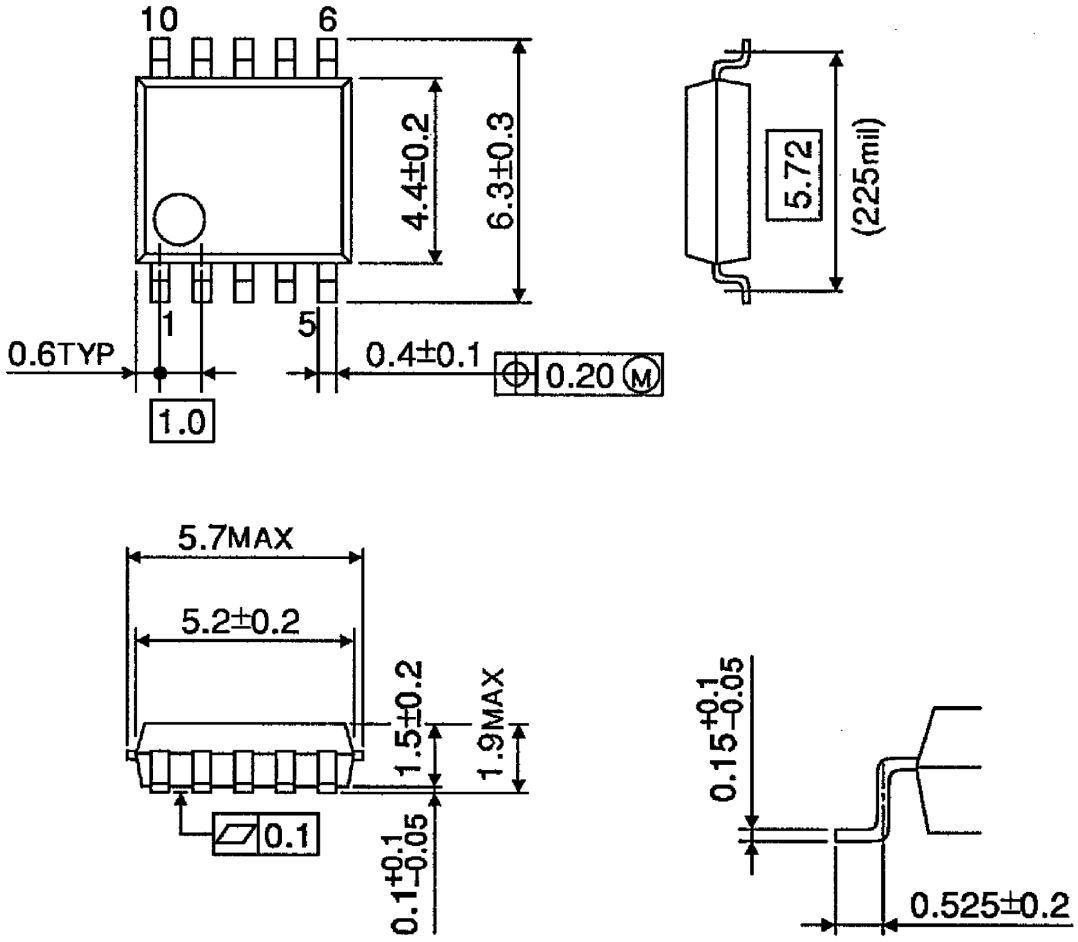


V_{tank} – Ta



Package Dimensions

SSOP10-P-225-1.00 Unit : mm



Weight: 0.10g (typ.)

About solderability, following conditions were confirmed

- Solderability

  (1) Use of Sn-63Pb solder Bath
  - solder bath temperature = 230°C
  - dipping time = 5 seconds
  - the number of times = once
  - use of R-type flux

  (2) Use of Sn-3.0Ag-0.5Cu solder Bath
  - solder bath temperature = 245°C
  - dipping time = 5 seconds
  - the number of times = once
  - use of R-type flux

RESTRICTIONS ON PRODUCT USE

030619EBA

- The information contained herein is subject to change without notice.
- The information contained herein is presented only as a guide for the applications of our products. No responsibility is assumed by TOSHIBA for any infringements of patents or other rights of the third parties which may result from its use. No license is granted by implication or otherwise under any patent or patent rights of TOSHIBA or others.
- 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.
- TOSHIBA products should not be embedded to the downstream products which are prohibited to be produced and sold, under any law and regulations.