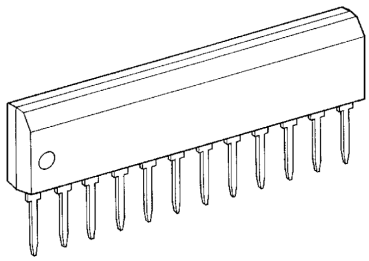
TOSHIBA Bipolar Linear Integrated Circuit Silicon Monolithic

TA8168SN

FM Front End IC

The TA8168SN is a FM front−end IC which is designed for radio cassette recorders and music centers.
Comparing with conventional types, RF inter−modulation characteristics and overload characteristics are improved.



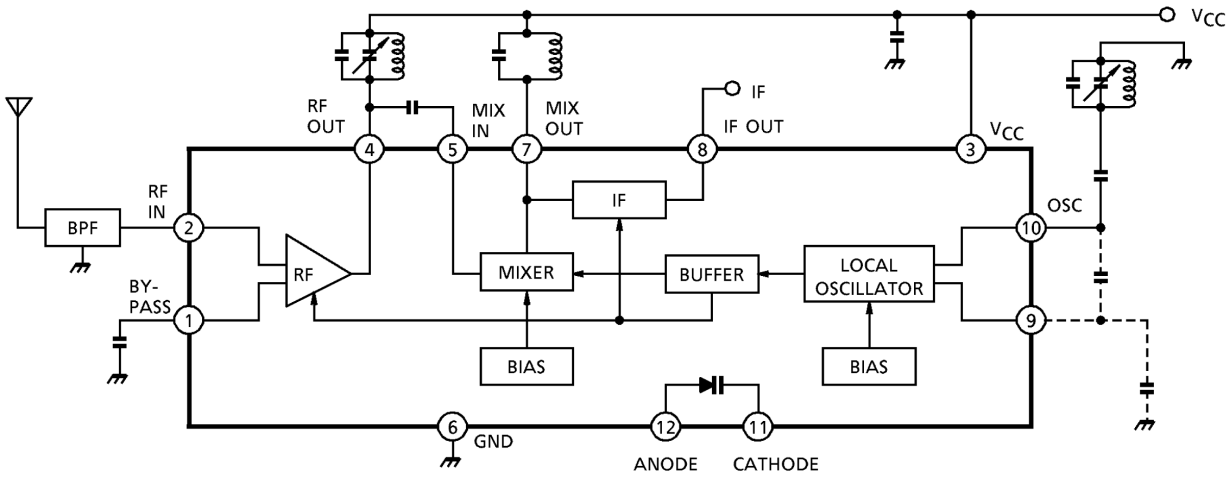
SSIP12-P-1.78

Weight: 0.65g (typ.)

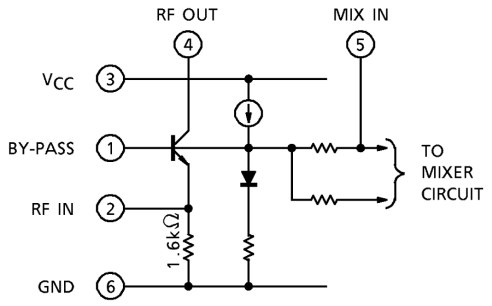
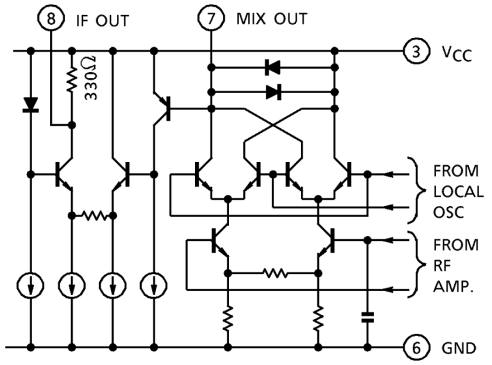
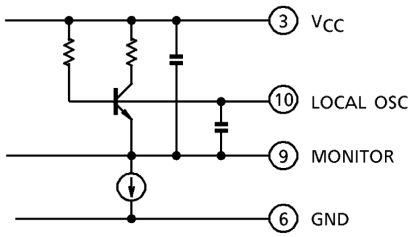
Features

- Improved RF inter−modulation characteristics by double balanced type mixer circuit
- Low drift oscillation frequency for strong input
- It is available TV band frequency (up to 220MHz)
- Built−in IF amplifier
  R_O = 330Ω (typ.), $V_{O\ (IF)}$ = 70mV_{rms} (typ.)
- Emitter output of local oscillation transistor
- Built−in varactordiode for AFC
  Cathode and anode are floating
- Operating supply voltage range
  $V_{CC\ (opr)}$ = 3.5~14V (Ta = 25°C)

Block Diagram



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

Pin No.	Symbol	Contents	Internal Circuit	Terminal Voltage (V)
1	By−pass	Bias terminal for RF amp. Capacitor is connected		2.0
2	RF in	RF input terminal		1.3
3	V_{CC}	Power supply terminal	—	5.0
4	RF out	RF output terminal RF tank circuit is connected	Refer to pin(1), (2).	5.0
5	Mix in	Mixer input terminal		2.0
6	GND	Ground terminal	—	—
7	Mix out	Mixer output terminal Mixer coil is connected		5.0
8	IF out	IF output terminal output impedance $R_{O\ (IF)}$ = 330Ω (typ.)		4.85
9	Monitor	Local OSC monitor terminal		4.25
10	Local OSC	Local OSC terminal OSC tank circuit is connected		4.9
11	AFC (C)	AFC diode cathode terminal		—
12	AFC (A)	AFC diode anode terminal		

Maximum Ratings (Ta = 25°C)

Characteristic	Symbol	Rating	Unit
Supply voltage	V_{CC}	15	V
AFC diode reverse voltage	V_R	4	V
Power dissipation	P_D (Note)	750	mW
Operating temperature	T_{opr}	−25~75	°C
Storage temperature	T_{stg}	−55~150	°C

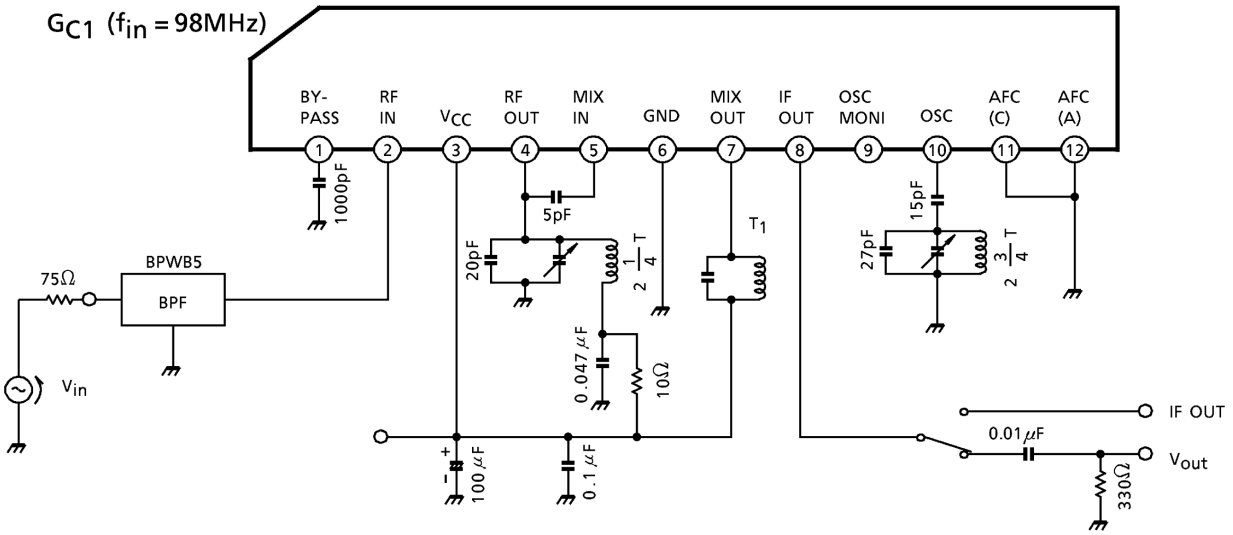
(Note) Derated linearly above Ta = 25°C in the proportion of 6mW / °C.

Electrical Characteristics
(unless otherwise specified, Ta = 25°C, V_{CC} = 5V, f_m = 1kHz, f = 98MHz, Δf = ±22.5kHz dev.)

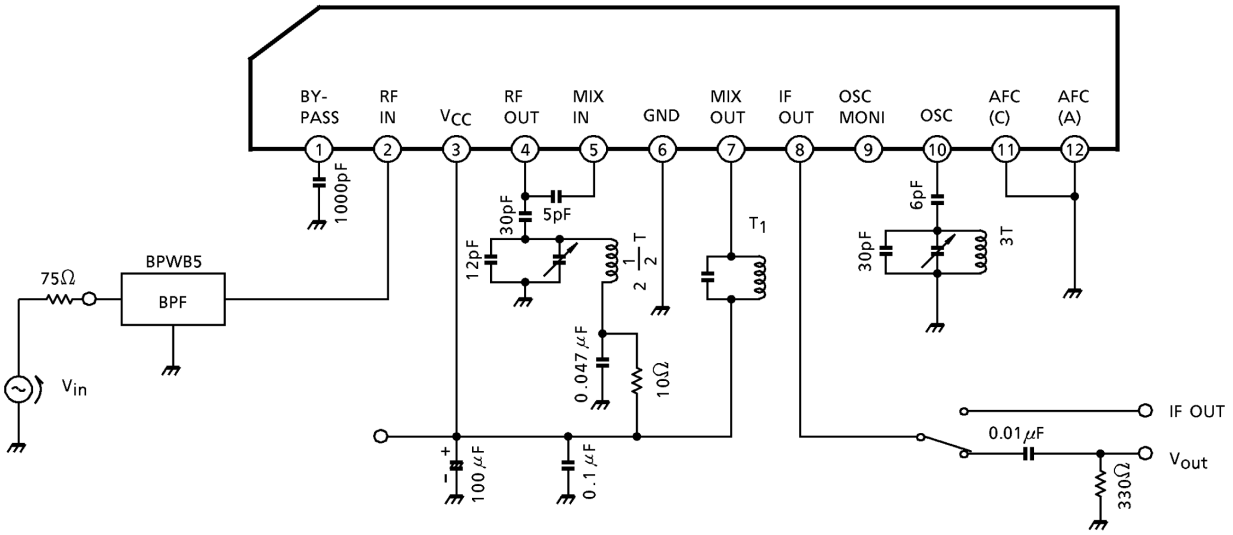
Characteristic		Symbol	Test Circuit	Test Condition	Min.	Typ.	Max.	Unit
Supply current		I_{CC}	1	V_{in} = 0	—	10	15	mA
Conversion gain		G_{C1}	1	f_{in} = 98MHz, V_{in} = 50dBμV EMF	42	46	50	dB
		G_{C2}	1	f_{in} = 220MHz, V_{in} = 50dBμV EMF	—	42	—	
Local oscillation voltage		V_{OSC1}	2	f_{OSC} = 108.7MHz	220	310	440	mV_{rms}
		V_{OSC2}	2	f_{OSC} = 230MHz	—	100	—	
Pin(2) input impedance	Parallel input resistance	r_{ip2}	3	f = 98MHz	—	50	—	Ω
	Parallel input capacitance	c_{ip2}			—	−15	—	pF
Pin(4) output impedance	Parallel output resistance	r_{op4}	3		—	70	—	kΩ
	Parallel output Capacitance	c_{op4}			—	1.5	—	pF
Pin(5) input impedance	Parallel input resistance	r_{ip5}	3		—	4.0	—	kΩ
	Parallel input capacitance	c_{ip5}			—	2.0	—	pF
Pin(7) output impedance	Parallel output resistance	r_{op7}	3	f = 10.7MHz	—	80	—	kΩ
	Parallel output capacitance	c_{op7}			—	2.5	—	pF
Local OSC stop voltage		V_{stop}	2	f_{OSC} = 108.7MHz	—	1.5	1.8	V
AFC diode capacitance		C_{AFC}	3	f = 98MHz, V_{AFC} = 3V	—	13	—	pF

Test Circuit 1

G_{C1} (f_{in} = 98MHz)



G_{C2} (f_{in} = 220MHz)



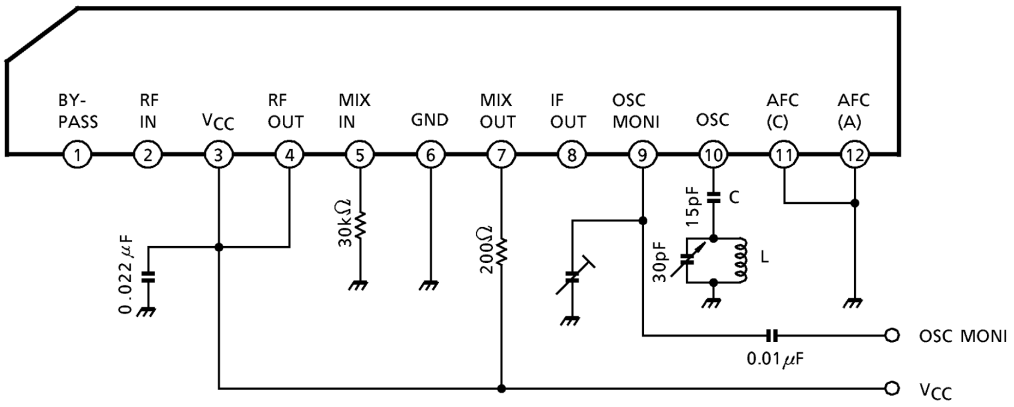
Coil Data For Test Circuit

Coil No.	Test Frequency (Hz)	L (μH)	C_o (pF)	Q_o	Turns					Wire (mmϕ)	Note
					1–2	2–3	1–3	1–4	4–6		
T_1	10.7M	—	75	100	—	—	13	—	2	0.1UEW	(S) 2153–414–041A

(S) : SUMIDA ELECTRIC CO., LTD

Test Circuit 2

V_{OSC}, V_{stop}

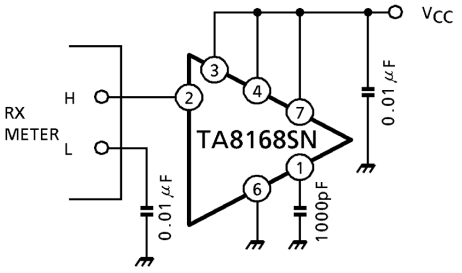


(1) f_{OSC} = 108.7MHz
L: 5mmϕ, $2\frac{1}{2}$ turn with ferrite core
C: 15pF

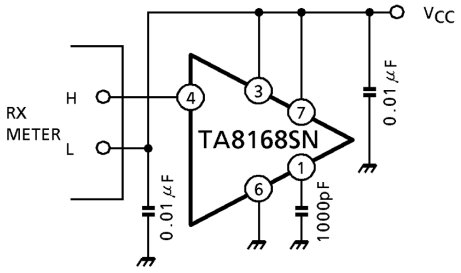
(2) f_{OSC} = 230MHz
L: 5mmϕ, 3 turn without ferrite core
C: 6pF

Test Circuit 3

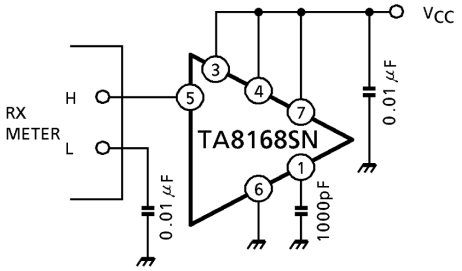
Pin② input resistance, input capacitance



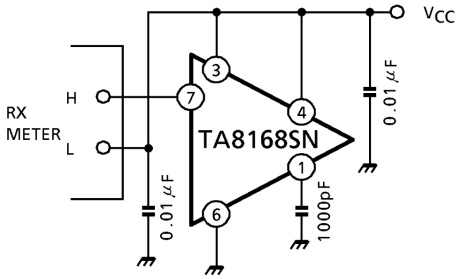
Pin④ output resistance, output capacitance



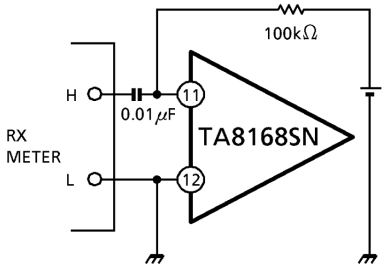
Pin⑤ input resistance, input capacitance



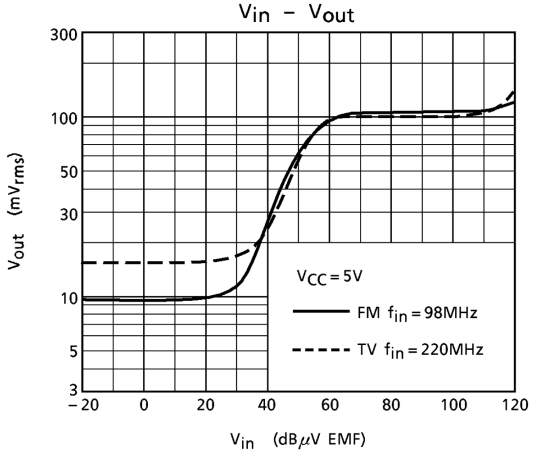
Pin⑦ output resistance, output capacitance



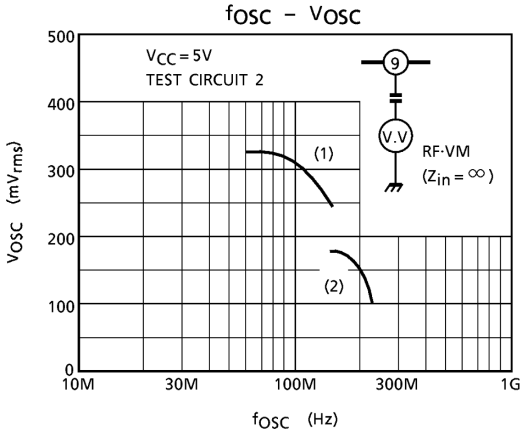
AFC diode capacitance



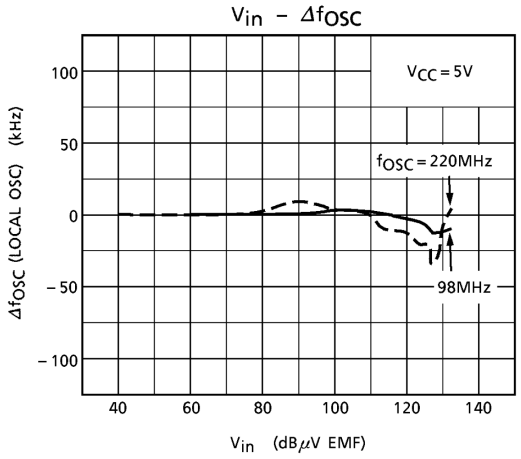
V_{in} – V_{out}



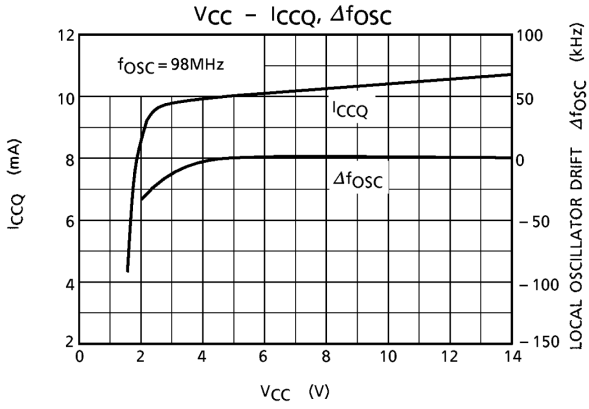
f_{OSC} – V_{OSC}



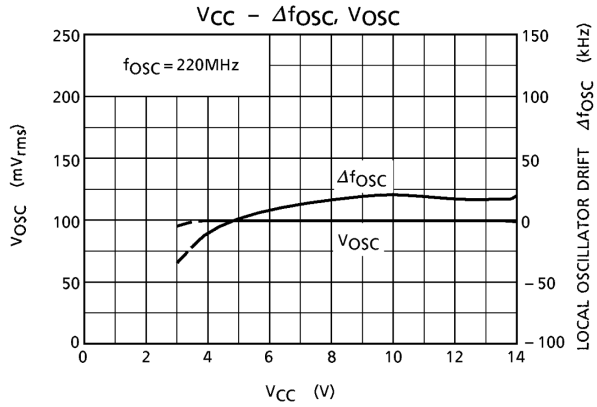
V_{in} – Δf_{OSC}



V_{CC} – I_{CCQ}, Δf_{OSC}



V_{CC} – Δf_{OSC}, V_{OSC}



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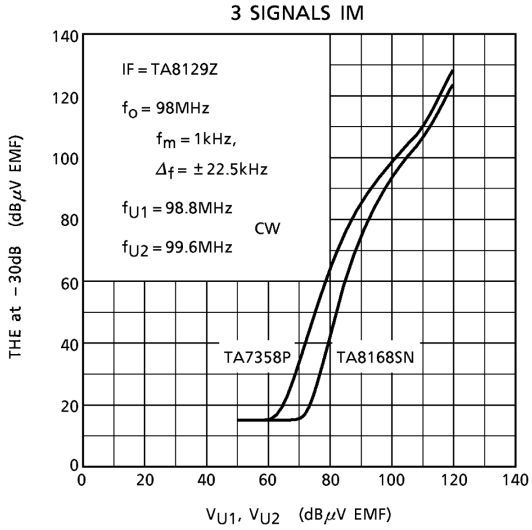
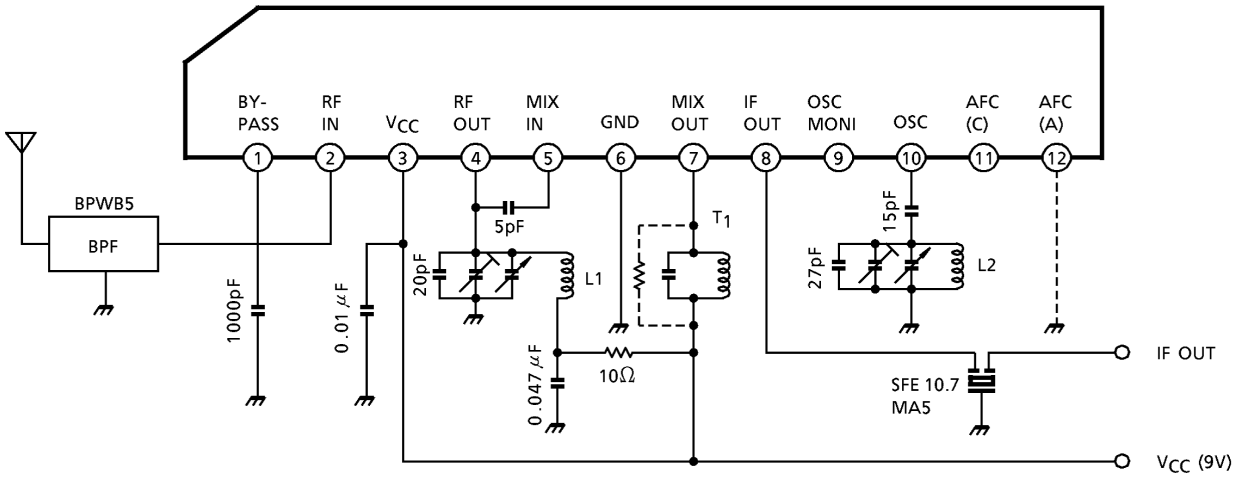


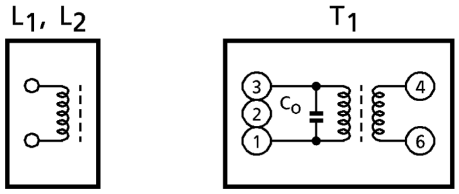
Application Circuit



Coil Data For Application Circuit

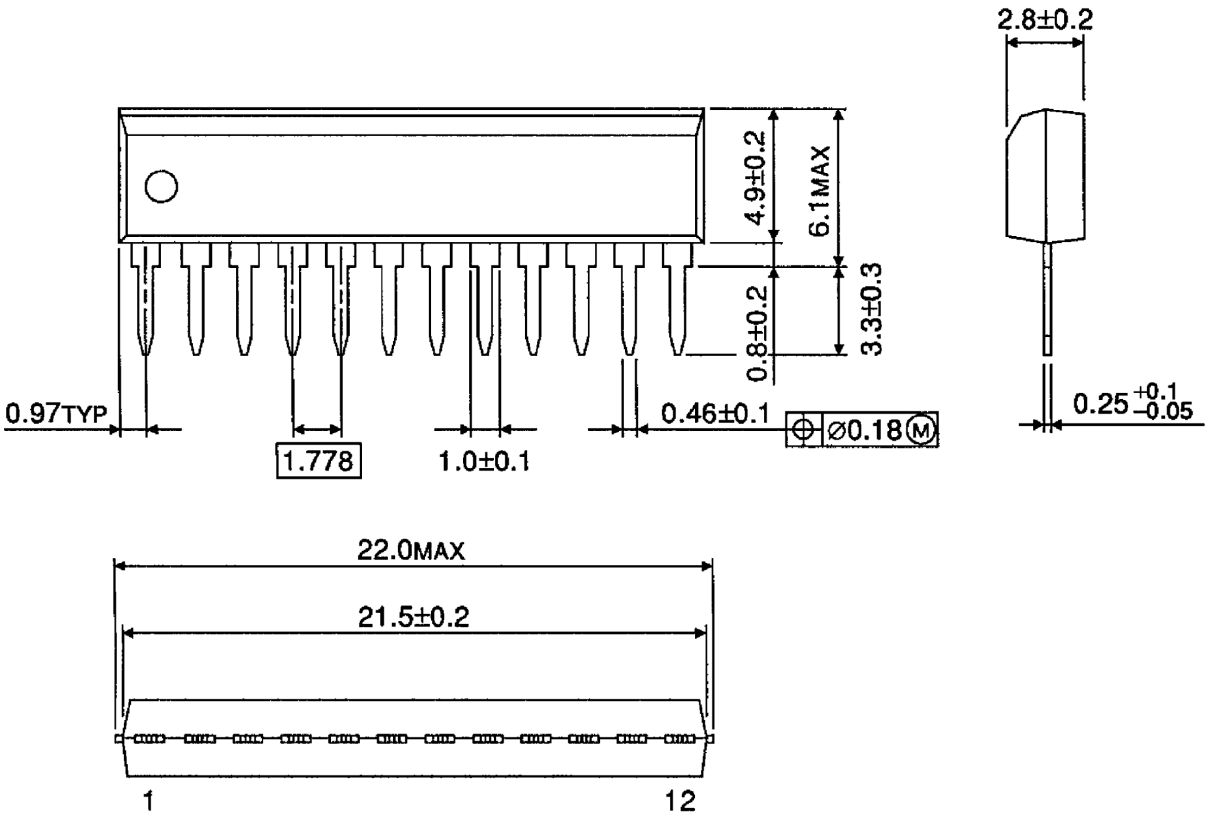
Coil No.	Stage	Test Freq	L (μH)	C_o (pF)	Q_o	Turns				Wire (mm)	Remarks
						1–2	2–3	1–3	4–6		
L_1	FM RF	100M	0.06	—	100	—	—	$2\frac{1}{4}$	—	φ0.5UEW	Within core
L_2	FM OSC	100M	0.045	—	100	—	—	$1\frac{3}{4}$	—	φ0.5UEW	Within core
T_1	FM IFT	10.7M	—	75	100	—	—	13	2	φ0.16UEW	(M)TY–20580 (S)2153–414–041A

(S): SUMIDA ELECTRIC CO., LTD
(M): MITSUMI ELECTRIC CO., LTD



Package Dimensions

SSIP12-P-1.78 Unit : mm



Weight: 0.65g (typ.)

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