

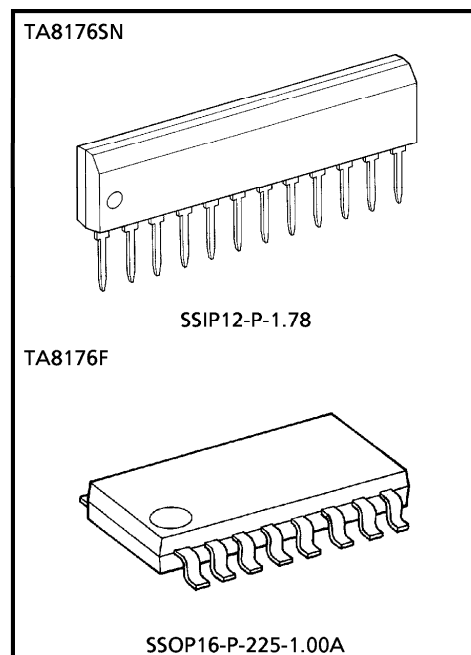
TOSHIBA BIPOLAR LINEAR INTEGRATED CIRCUIT SILICON MONOLITHIC

TA8176SN, TA8176F**FM FRONT END (FOR DIGITAL TUNING SYSTEM)**

The TA8176SN, TA8176F are FM FRONT END ICs which are designed for radio cassette players and music centers. They are suitable for Digital Tuning System Applications.

FEATURES

- Improved Inter-Modulation Characteristics by Double Balanced Type Mixer Circuit.
- Built-in Current Share Type AGC Circuit for the RF Amp.
- Applicable to double-tuning in radio frequency stage.
- Built-in Local Oscillator Buffer Output Circuit for Digital Tuning System Applications.
- Excellent overload characteristics for change oscillation frequency.
- It is available to TV band. (up to 220MHz)
- Built-in IF Amp.
: $R_O = 330\Omega$ (Typ.), $V_{out} = 80mV_{rms}$ (Typ.)
- Operating Supply Voltage Range
TA8176SN : $V_{CC(opr)} = 4\sim 14V$ ($T_a = 25^\circ C$)
TA8176F : $V_{CC(opr)} = 4\sim 8V$ ($T_a = 25^\circ C$)

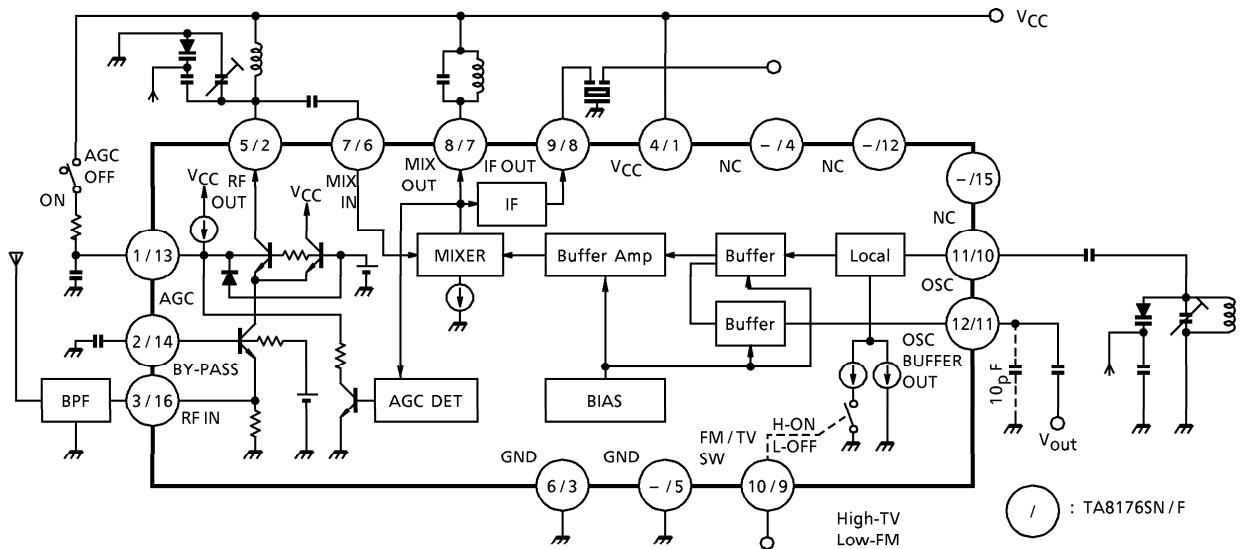


Weight
 SSIP12-P-1.78 : 0.65g (Typ.)
 SSOP16-P-225-1.00A : 0.14g (Typ.)

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BLOCK DIAGRAM



EXPLANATION OF TERMINALS (Terminal voltage shows the Typ. value at $T_a = 25^\circ\text{C}$, $V_{CC} = 5\text{V}$, AGC off,)
 FM mode, and non-signal test circuit

PIN No. (SN/F)	SYMBOL	CONTENTS	INTERNAL CIRCUIT	DC VOLTAGE (V)
1 / 13	AGC	AGC ON / OFF Switch $V_{1/13} = V_{CC} \rightarrow \text{AGC OFF}$ $V_{1/13} = \text{Open} \rightarrow \text{AGC ON}$		4.7
2 / 14	BY-PASS (RF IN)	By-pass Terminal for RF Amp Circuit. It is necessary to connect External Capacitance. (RF Amp Input Terminal. Antenna Tuning Circuit is connected)		1.46
3 / 16	RF IN (BY-PASS)	RF Amp Input Terminal. (By-pass Terminal for RF Amp Circuit. It is necessary to connect External Capacitance)		0.76
4 / 1	V_{CC}	Power Supply	—	5.0
5 / 2	RF OUT	RF Amp Output Terminal. RF Tuning Circuit is connected	Compare with Pin ① / ⑬, ② / ⑭, ③ / ⑯	5.0

PIN No. (SN/F)	SYMBOL	CONTENTS	INTERNAL CIRCUIT	DC VOLTAGE (V)
6/3, 5	GND	GND Terminal (Pin③ : GND Terminal of RF and MIX Circuit. Pin⑤ : GND Terminal of OSC Circuit. at Flat Package)	—	0
7/6	MIX IN	Mixer Input Terminal		1.86
8/7	MIX OUT	Mixer Output Terminal Mixer Coil is Connected.		5.0
9/8	IF OUT	IF Amp Output Terminal.		4.7
10/9	FM/TV SW	FM/TV Switch. At this Terminal Voltage is "H" : High OSC Voltage →TV Mode "L" : Low OSC Voltage →FM Mode		0
11/10	OSC	Local Terminal. OSC Tank Circuit is connected.		4.9
12/11	OSC BUFFER OUT	OSC BUFFER Output Terminal		4.8
- / 4	NC	—	—	—
- / 12				
- / 15				

MAXIMUM RATINGS (Ta = 25°C)

CHARACTERISTIC		SYMBOL	RATING	UNIT
Supply Voltage	TA8176SN	V _{CC}	15	V
	TA8176F		9	
Power Dissipation	TA8176SN	P _D (Note)	750	mW
	TA8176F		350	
Operating Temperature		T _{opr}	-25~75	°C
Storage Temperature		T _{stg}	-55~150	°C

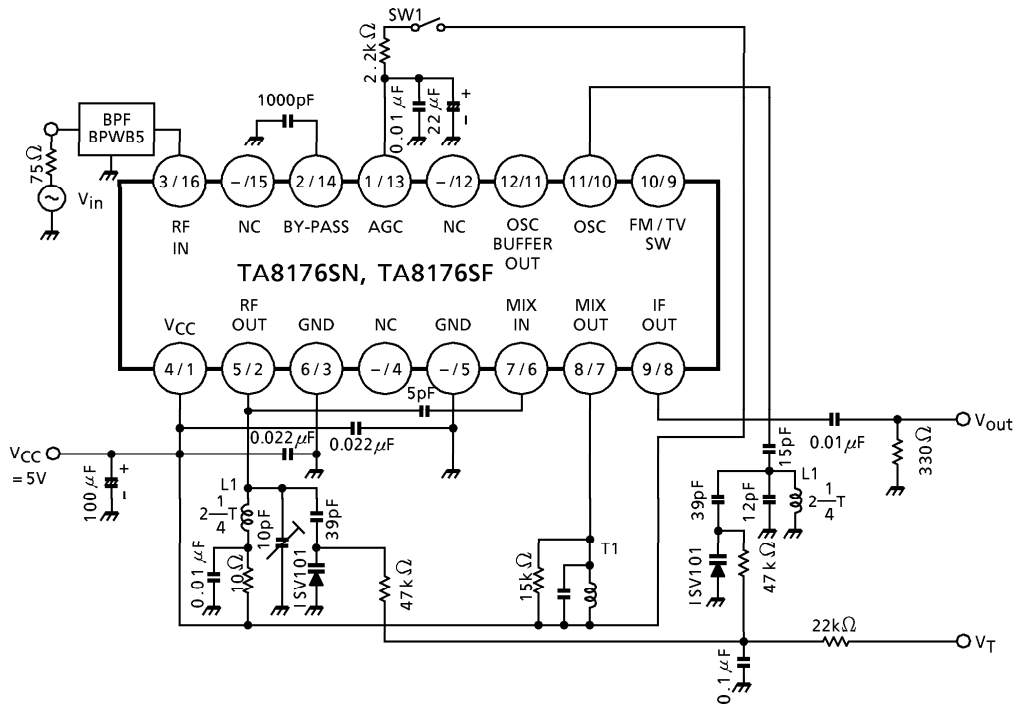
(Note) Derated above Ta = 25°C in the proportion of 6mW/°C for TA8176SN and of 2.8mW/°C for TA8176F.

ELECTRICAL CHARACTERISTICS (Unless otherwise specified, V_{CC} = 5V, Ta = 25°C, f = 98MHz, f_m = 1kHz, Δf = ±22.5kHz, SW1 = ON, SW2 = OFF)

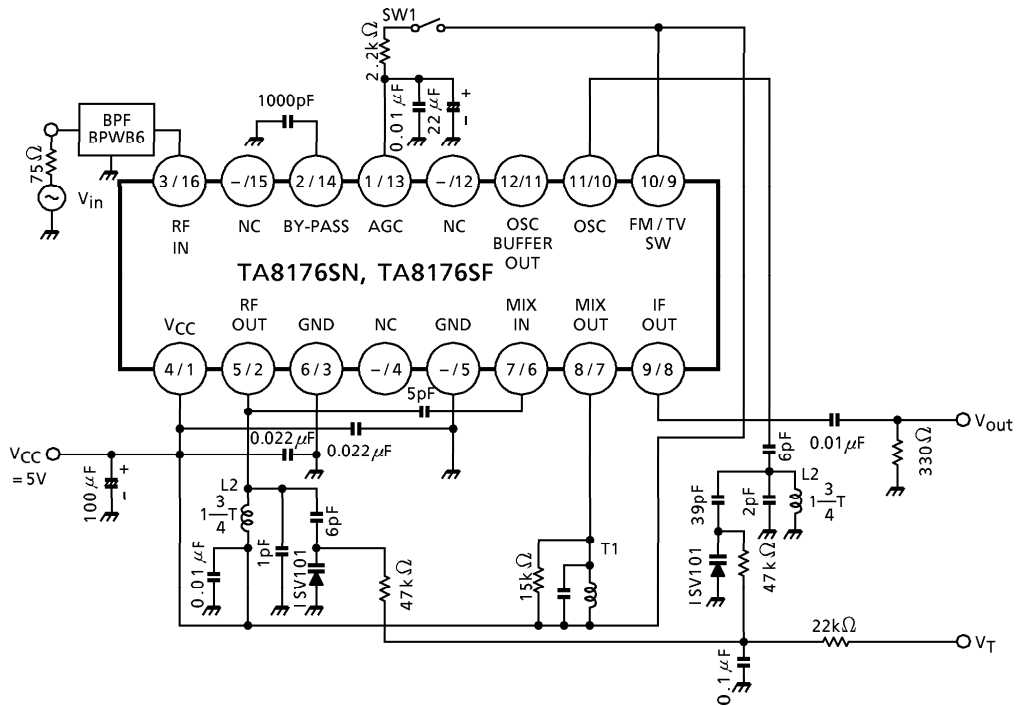
CHARACTERISTIC	SYMBOL	TEST CIRCUIT	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Supply Current	I _{CC1}	1	V _{in} = 0	—	16.5	22	mA
	I _{CC2}	2	V _{in} = 0	—	17.0	22.5	
Conversion Gain	G _{C1}	1	f _{in} = 98MHz V _{in} = 50dBμV EMF G _{C1} = 20log ₁₀ $\frac{V_{out}}{V_{in}}$	37	41	—	dB
	G _{C2}	2	f _{in} = 180MHz V _{in} = 55dBμV EMF G _{C2} = 20log ₁₀ $\frac{V_{out}}{V_{in}}$	36	40	—	
Local OSC Voltage	V _{osc1}	3	f _{OSC} = 108.7MHz	—	275	—	mV _{rms}
	V _{osc2}	3	f _{OSC} = 190.7MHz SW2 = ON	—	150	—	
Local OSC Buffer output Voltage	V _o (osc1)	3	f _{OSC} = 108.7MHz	45	80	—	mV _{rms}
	V _o (osc2)	3	f _{OSC} = 190.7MHz SW2 = ON	—	80	—	
IF Amp. Output Voltage	V _{out1}	1	f _{in} = 98MHz V _{in} = 80dBμV EMF	—	130	—	mV _{rms}
	V _{out2}	2	f _{in} = 98MHz V _{in} = 80dBμV EMF	—	130	—	
Local OSC Stop Voltage	V _{stop1}	3	f _{OSC} = 108.7MHz	—	2.5	2.8	V
	V _{stop2}	3	f _{OSC} = 190.7MHz SW2 = ON	—	2.7	3.0	

CHARACTERISTIC		SYMBOL	TEST CIR-CUIT	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Pin③ / ⑬ Impedance	Parallel Input Resistance	$r_{ip3/16}$	4	f = 98MHz	—	42	—	Ω
	Parallel Input Capacitance	$c_{ip3/16}$	4		—	-12	—	pF
Pin⑤ / ② Impedance	Parallel Output Resistance	$r_{op5/2}$	4		—	10	—	k Ω
	Parallel Output Capacitance	$c_{op5/2}$	4		—	7.3	—	pF
Pin⑦ / ⑥ Impedance	Parallel Input Resistance	$r_{ip7/6}$	4		—	2.7	—	k Ω
	Parallel Input Capacitance	$c_{ip7/6}$	4		—	6.7	—	pF
Pin⑧ / ⑦ Impedance	Parallel Output Resistance	$r_{op8/7}$	4	f = 10.7MHz	—	39	—	k Ω
	Parallel Output Capacitance	$c_{op8/7}$	4		—	6.7	—	pF
Pin⑫ / ⑪ Impedance	Parallel Output Resistance	$r_{op12/11}$	4	f = 108MHz	—	95	—	Ω
	Parallel Output Capacitance	$c_{op12/11}$	4		—	1.4	—	pF

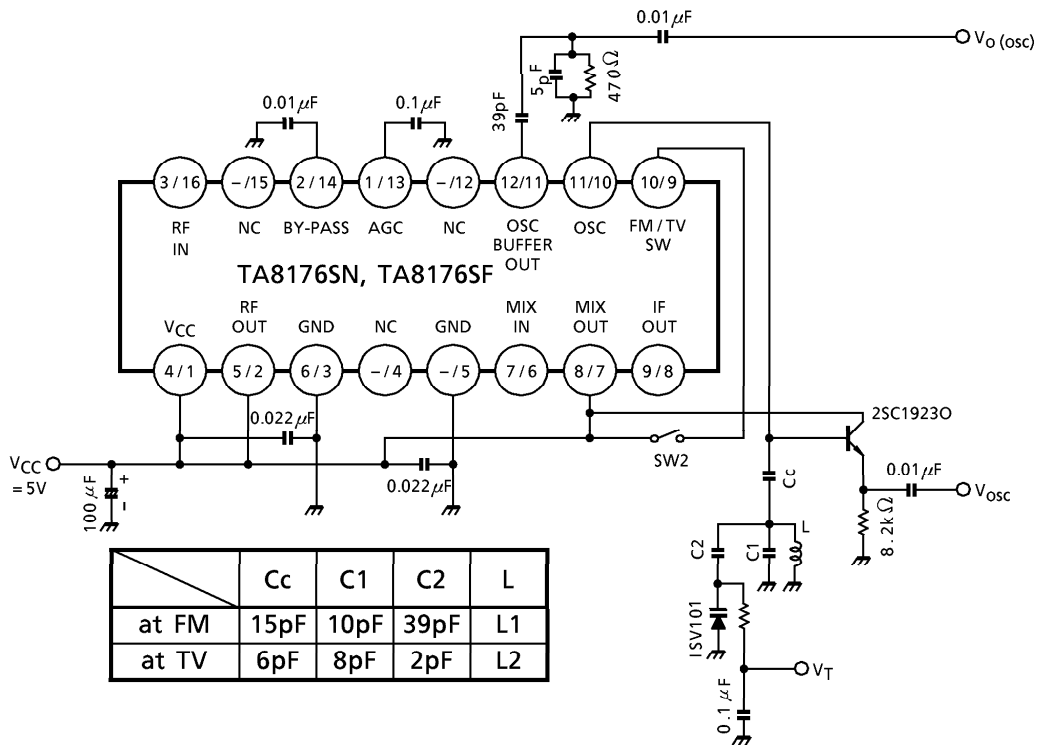
TEST CIRCUIT 1



TEST CIRCUIT 2



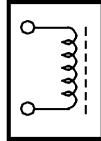
TEST CIRCUIT 3



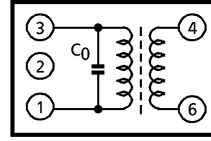
COIL DATA

COIL No.	STAGE	TEST FREQ	L (μH)	C ₀ (pF)	Q ₀	TURNS				WIRE (mm)	REMARKS
						①-②	②-③	①-③	④-⑥		
L1	FM RF / OSC	100MHz	0.06		100		2 $\frac{1}{4}$			φ 0.5 UEW	Within Core
L2	TV RF / OSC	100MHz	0.045		100		1 $\frac{3}{4}$			φ 0.5 UEW	Within Core
T1	FM IFT	10.7MHz		75	100			13	2	φ 0.16 UEW	SUMIDA 2153-414-041A

L1, L2

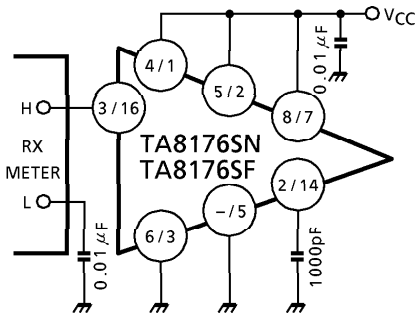


T1

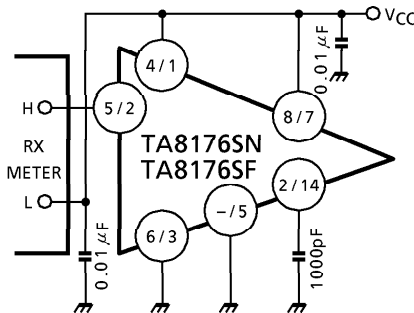


TEST CIRCUIT 4

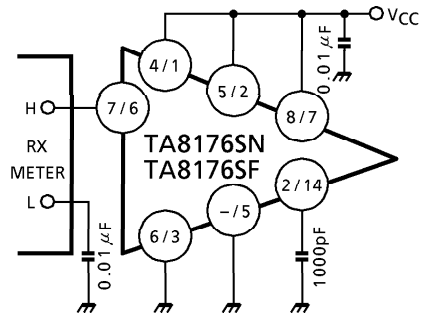
Pin③ / ⑬ input impedance



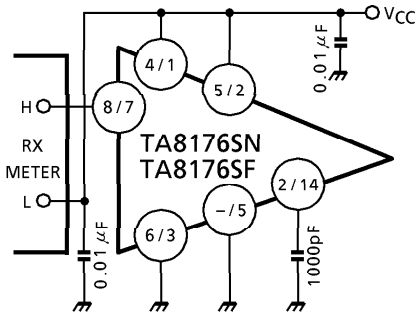
Pin⑤ / ② output impedance



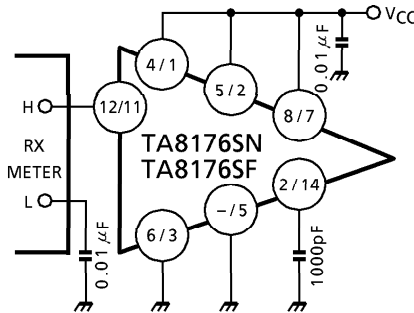
Pin⑦ / ⑥ input impedance

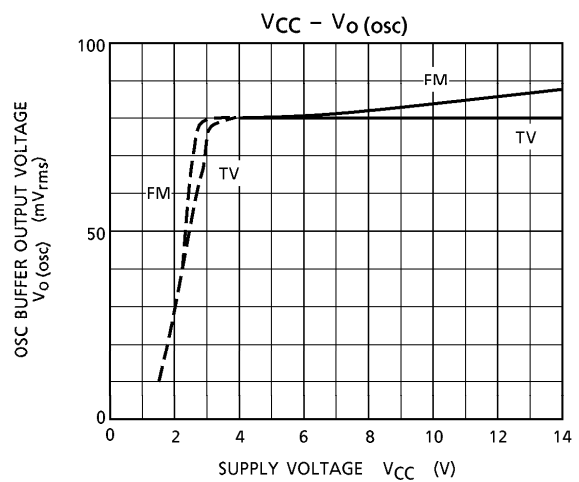
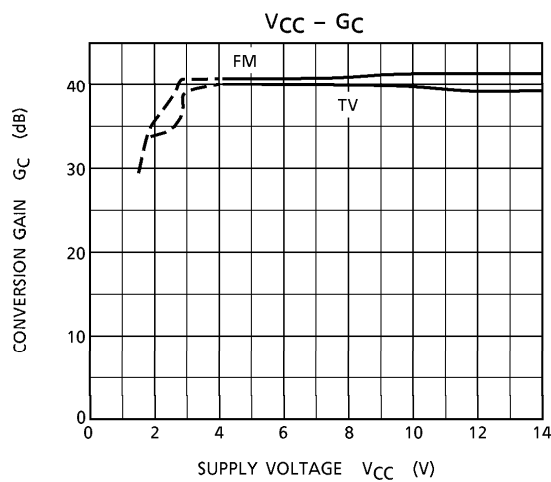
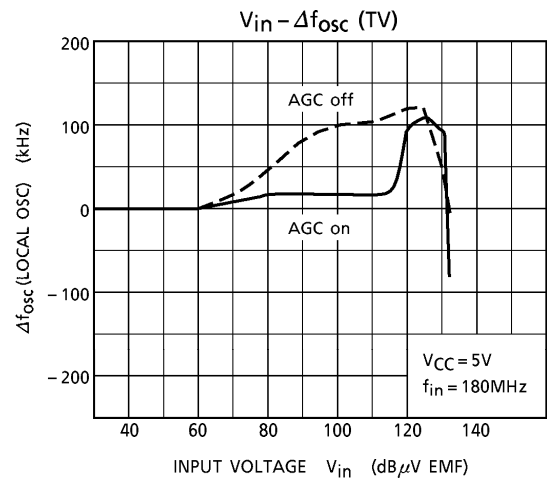
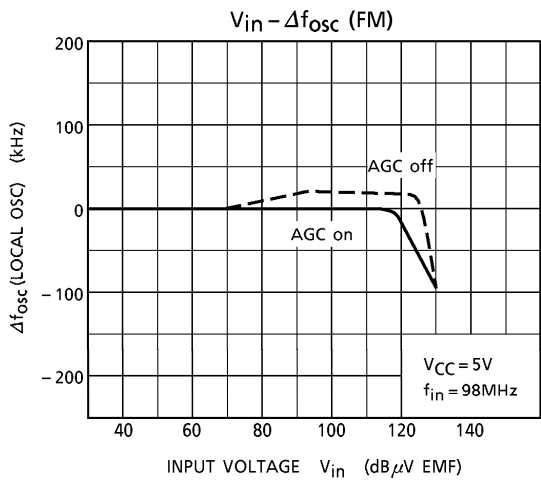
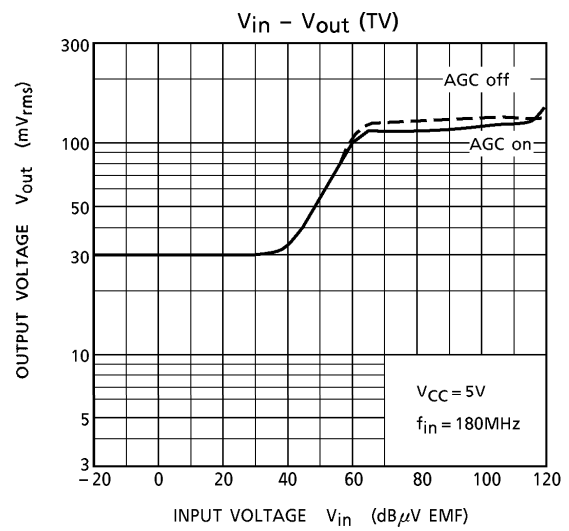
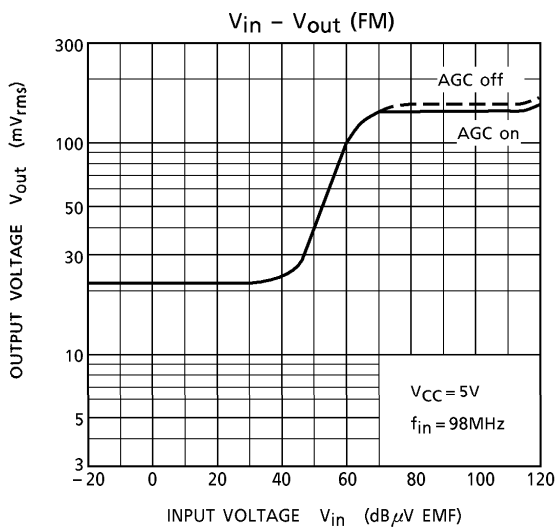


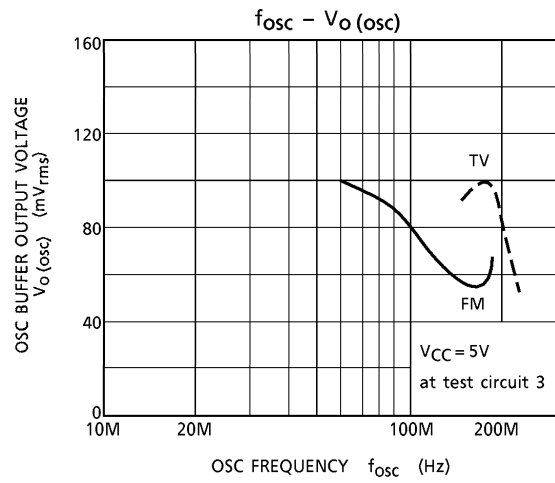
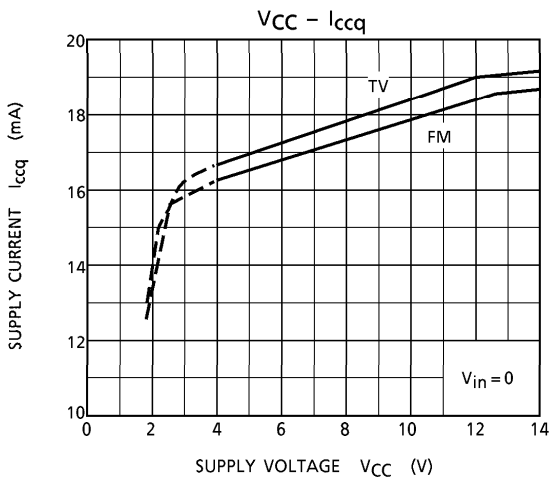
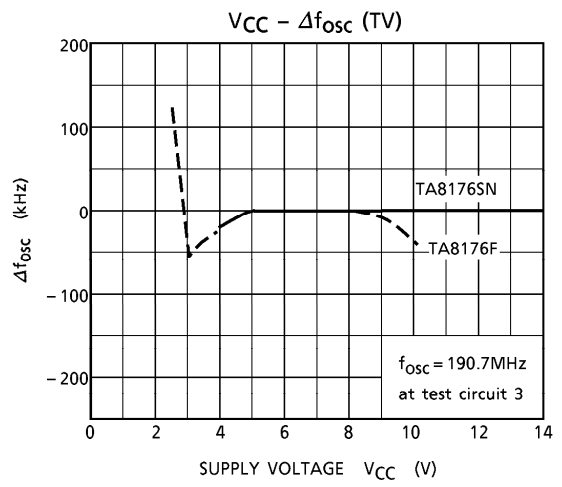
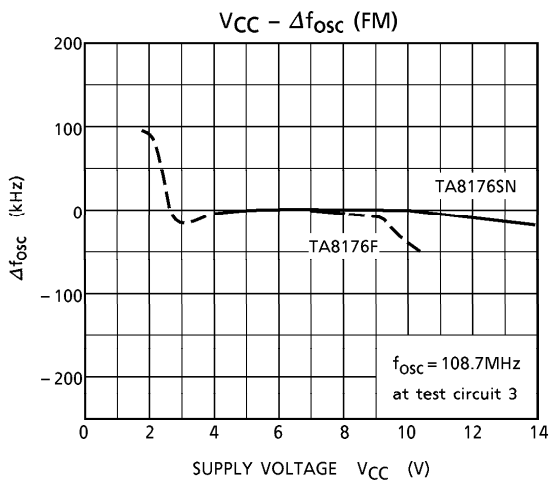
Pin⑧ / ⑦ output impedance



Pin⑩ / ⑪ output impedance

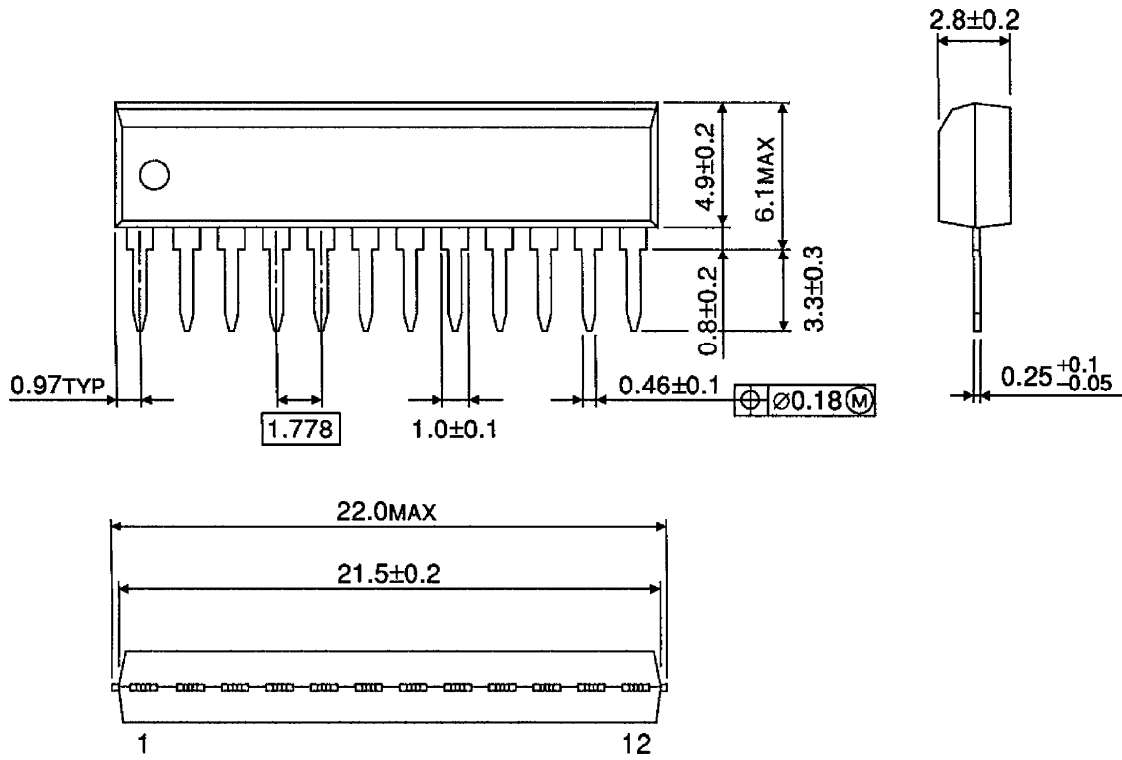






OUTLINE DRAWING
SSIP12-P-1.78

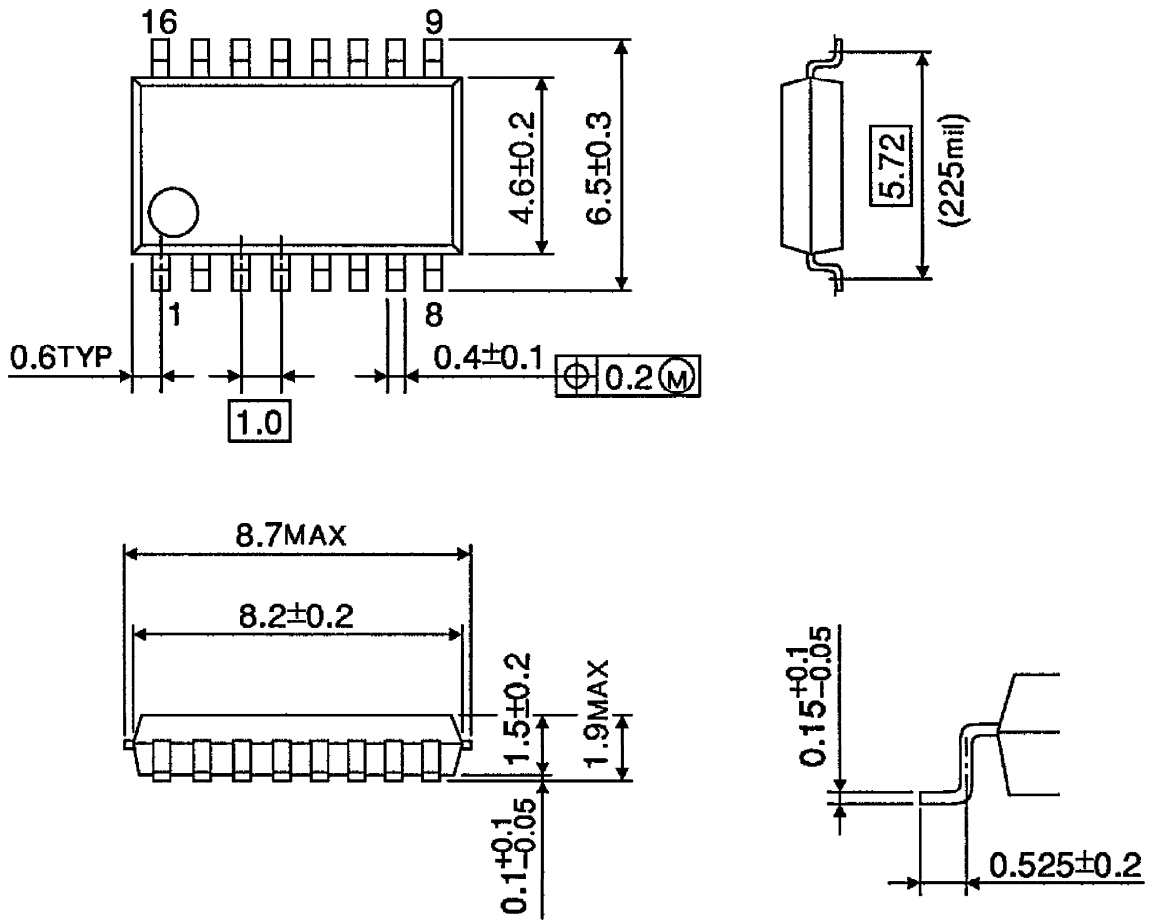
Unit : mm



Weight : 0.65g (Typ.)

OUTLINE DRAWING
SSOP16-P-225-1.00A

Unit : mm



Weight : 0.14g (Typ.)