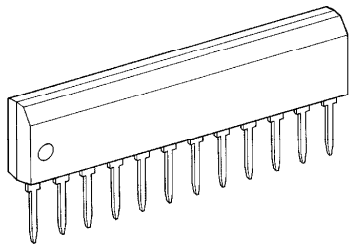
TOSHIBA BIPOLAR LINEAR INTEGRATED CIRCUIT SILICON MONOLITHIC

TA8176SN, TA8176F

FM FRONT END (FOR DIGITAL TUNING SYSTEM)

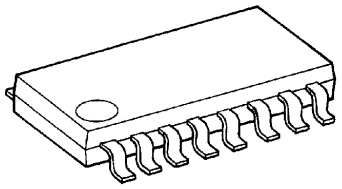
The TA8176SN, TA8176F are FM FRONT END ICs which are designed for radio cassette players and music centers. They are suitable for Digital Tuning System Applications.

TA8176SN



SSIP12-P-1.78

TA8176F



SSOP16-P-225-1.00A

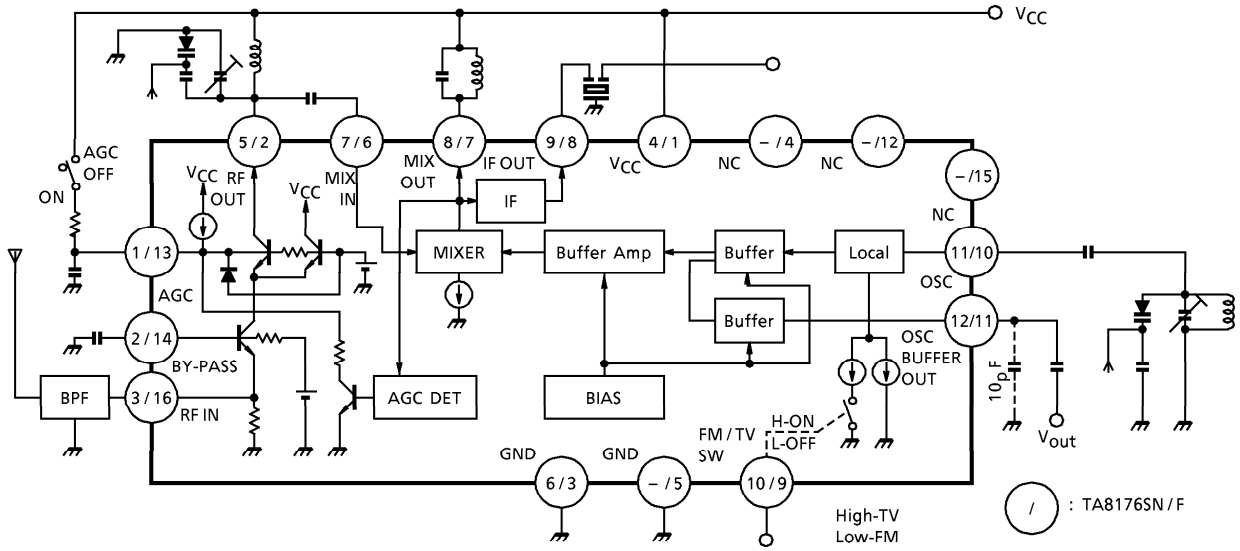
Weight
SSIP12-P-1.78 : 0.65g (Typ.)
SSOP16-P-225-1.00A : 0.14g (Typ.)

FEATURES

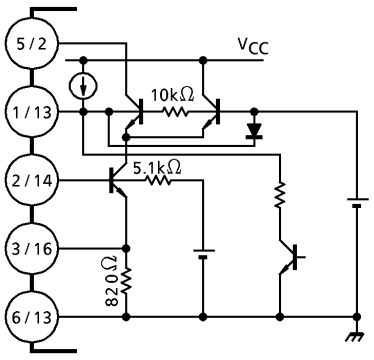
- Improved Inter-Modulation Characteristics by Double Balanced Type Mixer Circuit.
- Built-in Current Share Type AGC Circuit for the RF Amp.
- Applicatable to double-tuning in radio frequency stage.
- Built-in Local Oscillator Buffer Output Circuit for Digital Tuning System Applications.
- Excellent 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

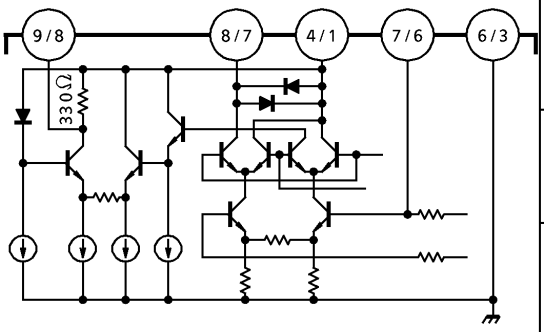
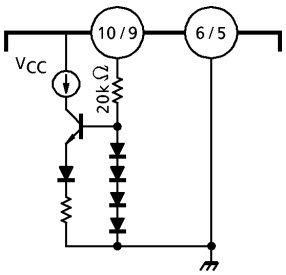
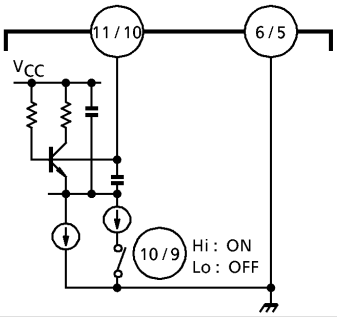
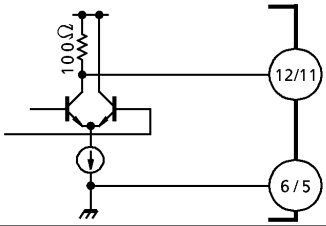
  TA8176SN : $V_{CC\,(opr)} = 4 \sim 14V$ (Ta = 25°C)
  TA8176F : $V_{CC\,(opr)} = 4 \sim 8V$ (Ta = 25°C)

BLOCK DIAGRAM



EXPLANATION OF TERMINALS (Terminal voltage shows the Typ. value at Ta = 25°C, V_{CC} – 5V, 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 $V_{1/13} = V_{CC}$ → AGC OFF $V_{1/13}$ = Open → 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 Pin① / 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 - / 12 - / 15	NC	—	—	—

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

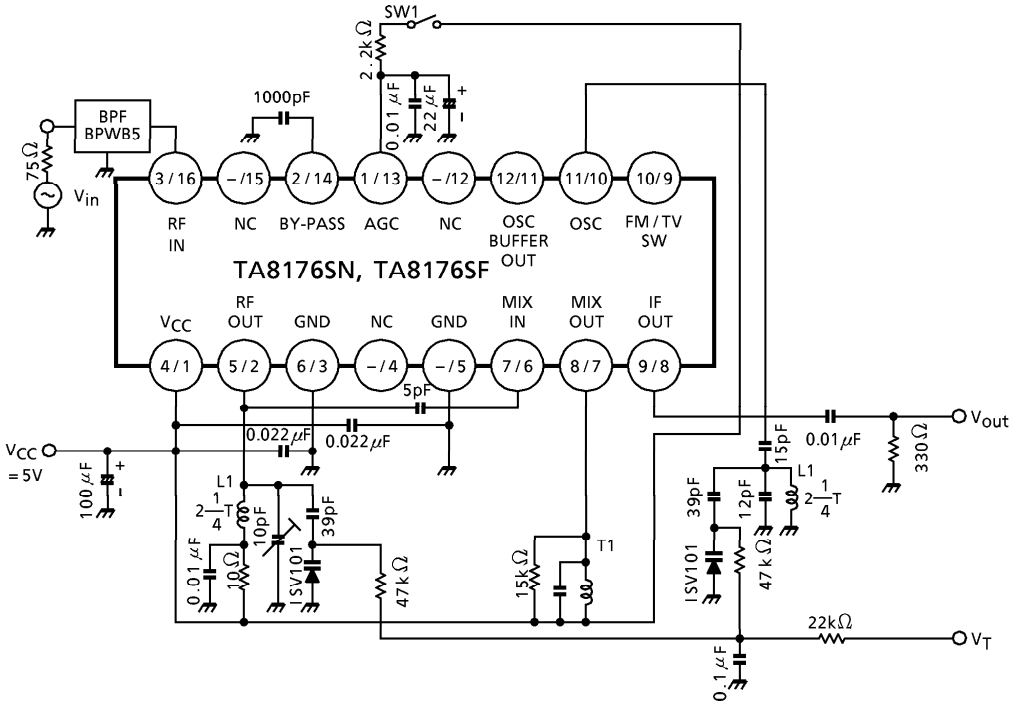
(Note) Derated above Ta = 25°C in the proportion of 6mW / °C for TA8176SN and of 2.8mW / °C for TA8176F.

ELECTRICAL CHARACTERISTICS (Unless otherwise specified, V_{CC} = 5V, Ta = 25°C, f = 98MHz, fm = 1kHz, $\Delta f = \pm 22.5$kHz, SW1 = ON, SW2 = OFF)

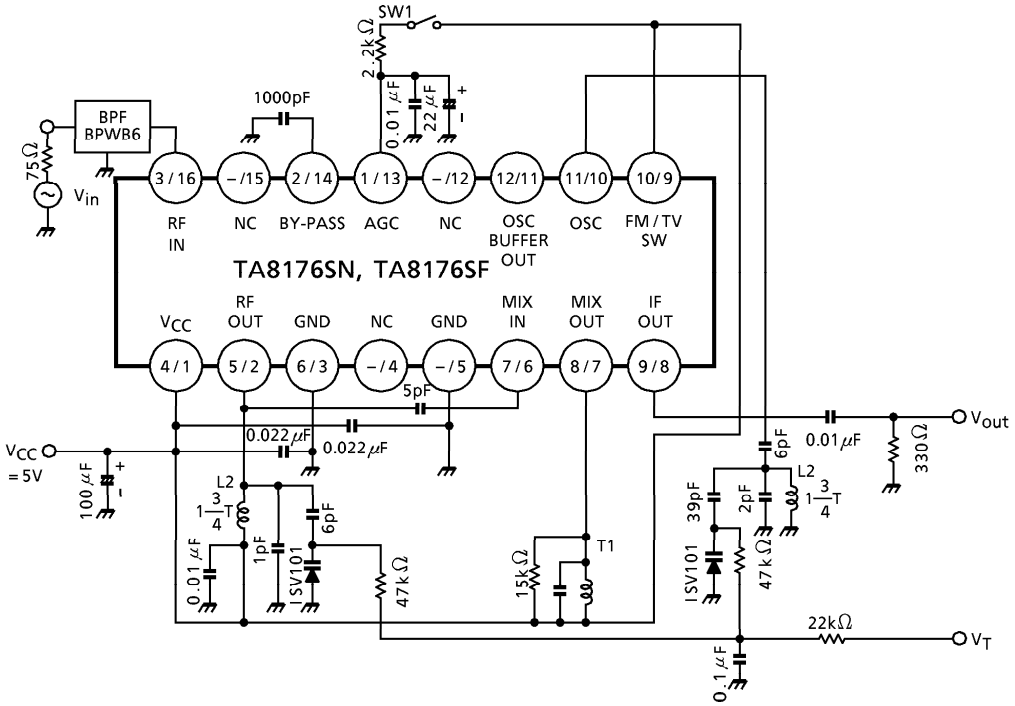
CHARACTERISTIC	SYMBOL	TEST CIR-CUIT	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Supply Current	I_{CC1}	1	V_{in} = 0	—	16.5	22	mA
	I_{CC2}	2	V_{in} = 0	—	17.0	22.5	
Conversion Gain	G_{C1}	1	f_{in} = 98MHz V_{in} = 50dBμV EMF $G_{C1} = 20\ell og_{10}\frac{V_{out}}{V_{in}}$	37	41	—	dB
	G_{C2}	2	f_{in} = 180MHz V_{in} = 55dBμV EMF $G_{C2} = 20\ell og_{10}\frac{V_{out}}{V_{in}}$	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 / ⑯ Impedance	Parallel Input Resistance	$r_{ip}3 / 16$	4	f = 98MHz	—	42	—	Ω
	Parallel Input Capacitance	$c_{ip}3 / 16$	4		—	– 12	—	pF
Pin⑤ / ② Impedance	Parallel Output Resistance	$r_{op}5 / 2$	4		—	10	—	kΩ
	Parallel Output Capacitance	$c_{op}5 / 2$	4		—	7.3	—	pF
Pin⑦ / ⑥ Impedance	Parallel Input Resistance	$r_{ip}7 / 6$	4		—	2.7	—	kΩ
	Parallel Input Capacitance	$c_{ip}7 / 6$	4		—	6.7	—	pF
Pin⑧ / ⑦ Impedance	Parallel Output Resistance	$r_{op}8 / 7$	4	f = 10.7MHz	—	39	—	kΩ
	Parallel Output Capacitance	$c_{op}8 / 7$	4		—	6.7	—	pF
Pin⑫ / ⑪ Impedance	Parallel Output Resistance	$r_{op}12 / 11$	4	f = 108MHz	—	95	—	Ω
	Parallel Output Capacitance	$c_{op}12 / 11$	4		—	1.4	—	pF

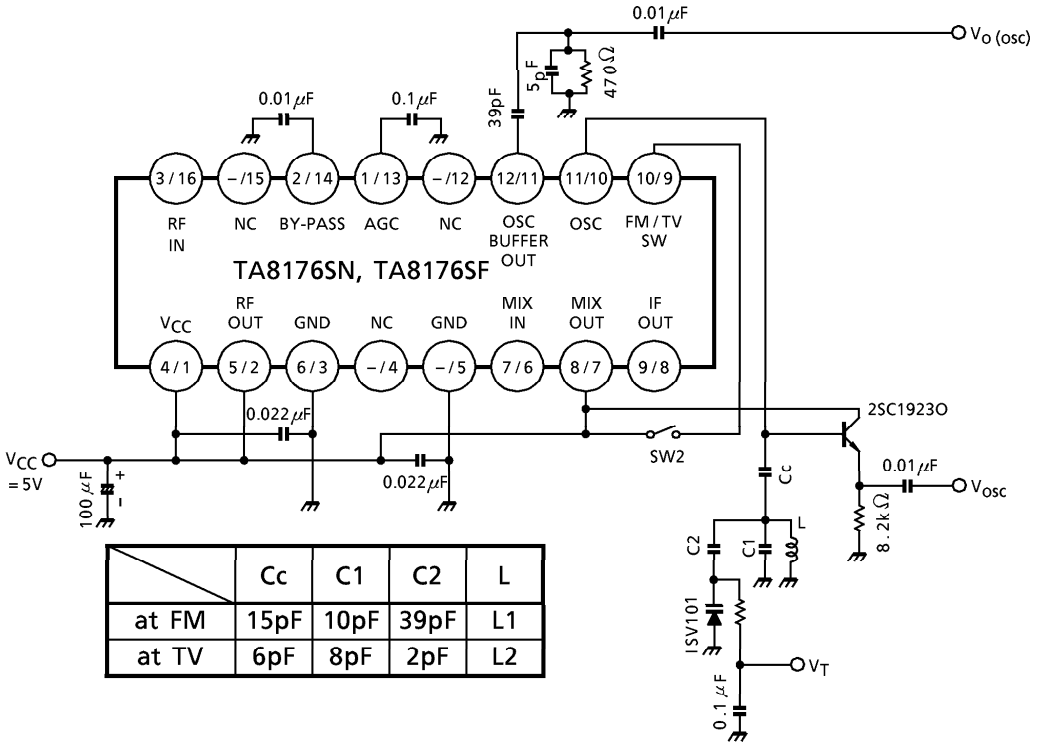
TEST CIRCUIT 1



TEST CIRCUIT 2



TEST CIRCUIT 3

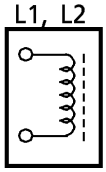


	Cc	C1	C2	L
at FM	15pF	10pF	39pF	L1
at TV	6pF	8pF	2pF	L2

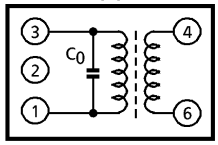
COIL DATA

COIL No.	STAGE	TEST FREO	L (μH)	C_O (pF)	Q_O	TURNS ①-②	TURNS ②-③	TURNS ①-③	TURNS ④-⑥	WIRE (mm)	REMARKS
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

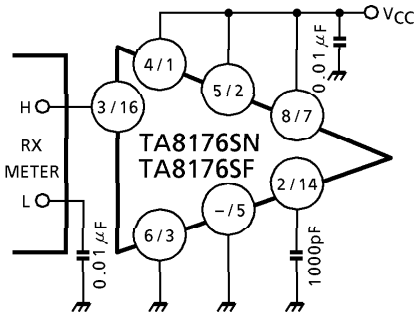


T1

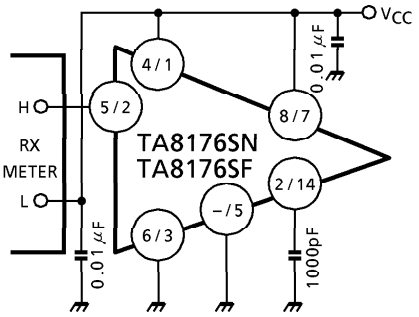


TEST CIRCUIT 4

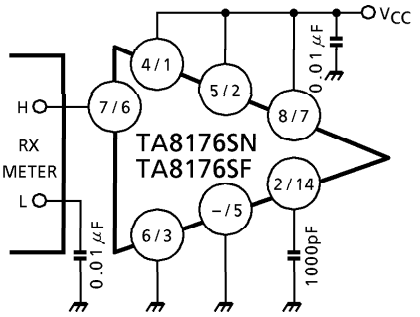
Pin③ / ⑯ input impedance



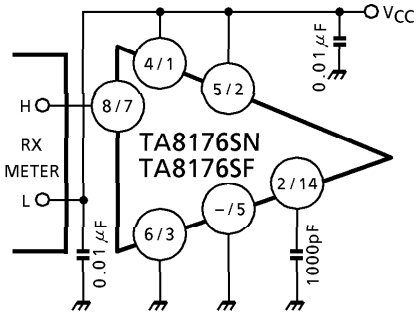
Pin⑤ / ② output impedance



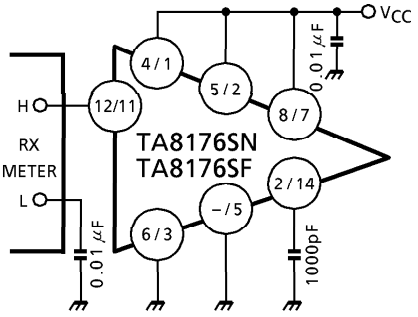
Pin⑦ / ⑥ input impedance



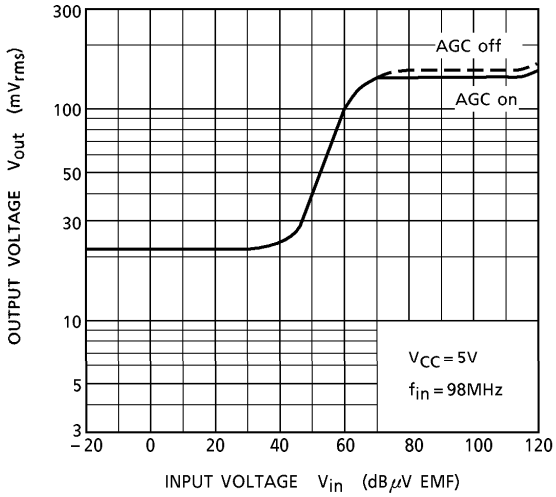
Pin⑧ / ⑦ output impedance



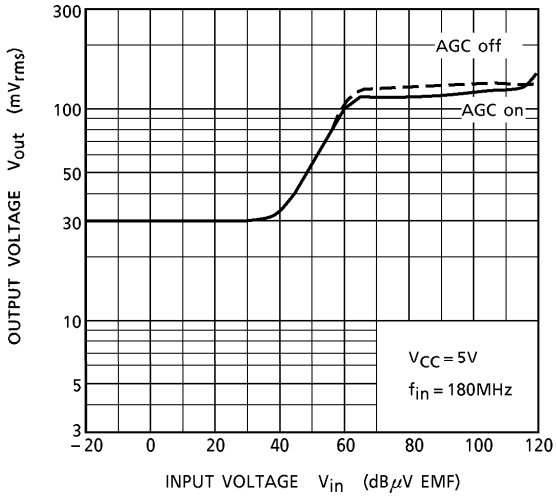
Pin⑫ / ⑪ output impedance



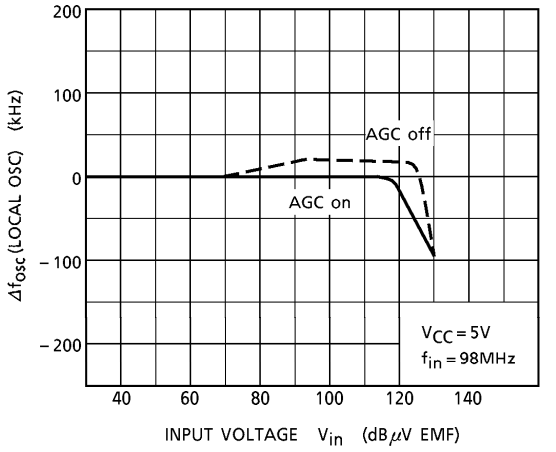
V_{in} – V_{out} (FM)



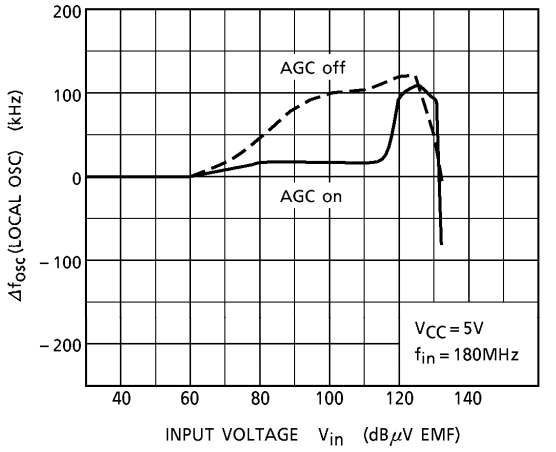
V_{in} – V_{out} (TV)



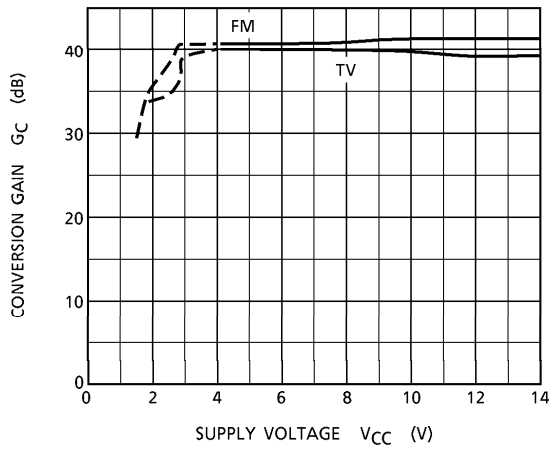
V_{in} – Δf_{osc} (FM)



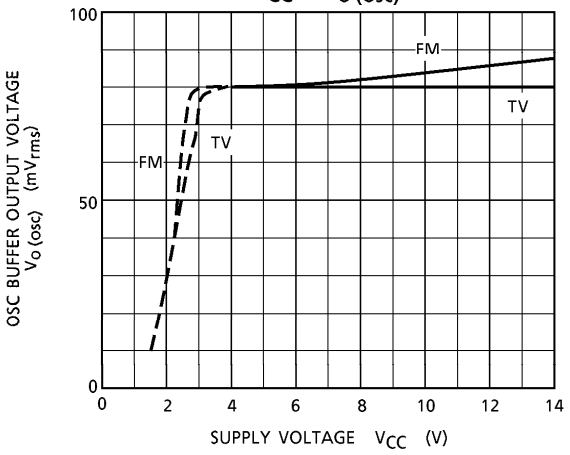
V_{in} – Δf_{osc} (TV)



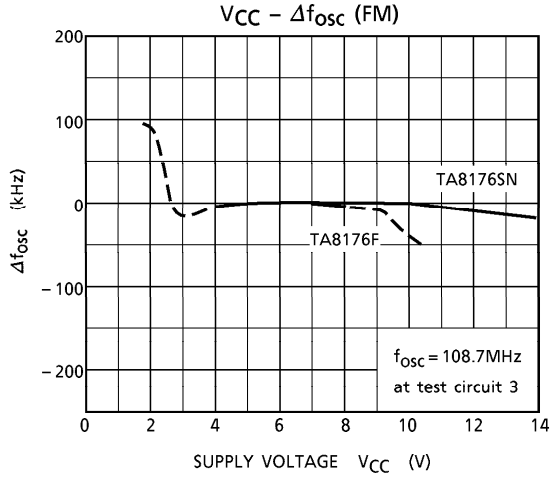
V_{CC} – G_C



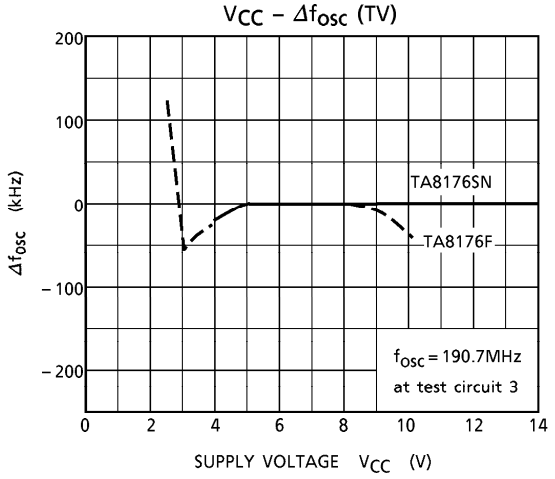
V_{CC} – $V_{O\,(osc)}$



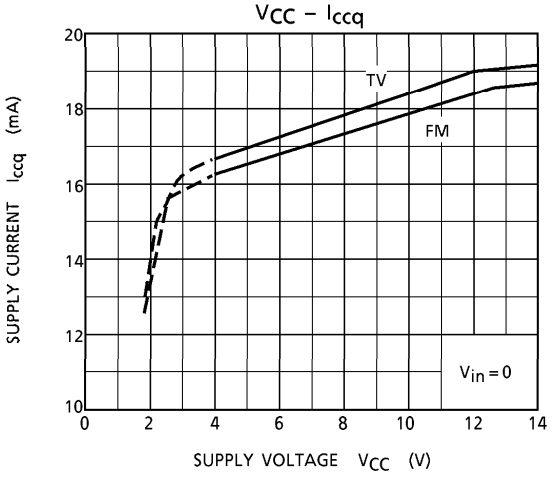
V_{CC} – Δf_{osc} (FM)



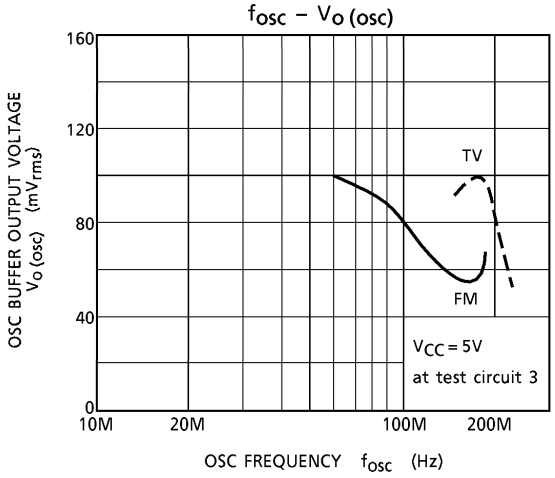
V_{CC} – Δf_{osc} (TV)



V_{CC} – I_{ccq}



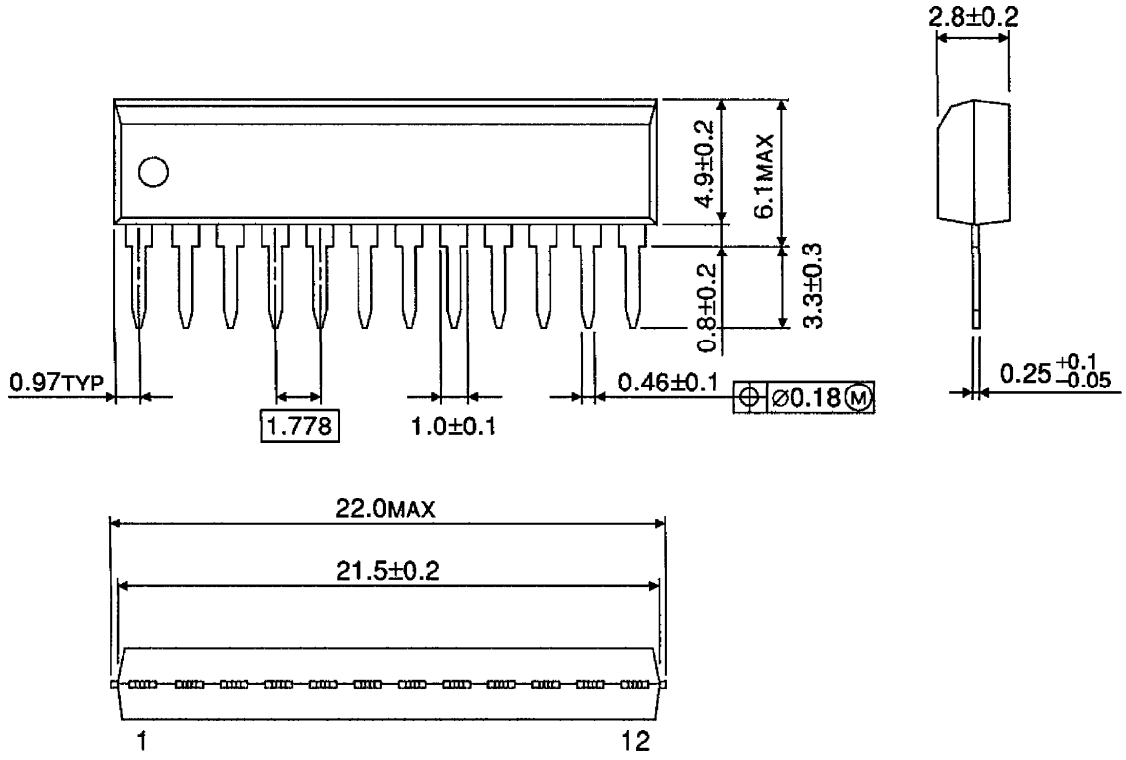
f_{osc} – $V_{O\,(osc)}$



OUTLINE DRAWING

SSIP12-P-1.78

Unit : mm

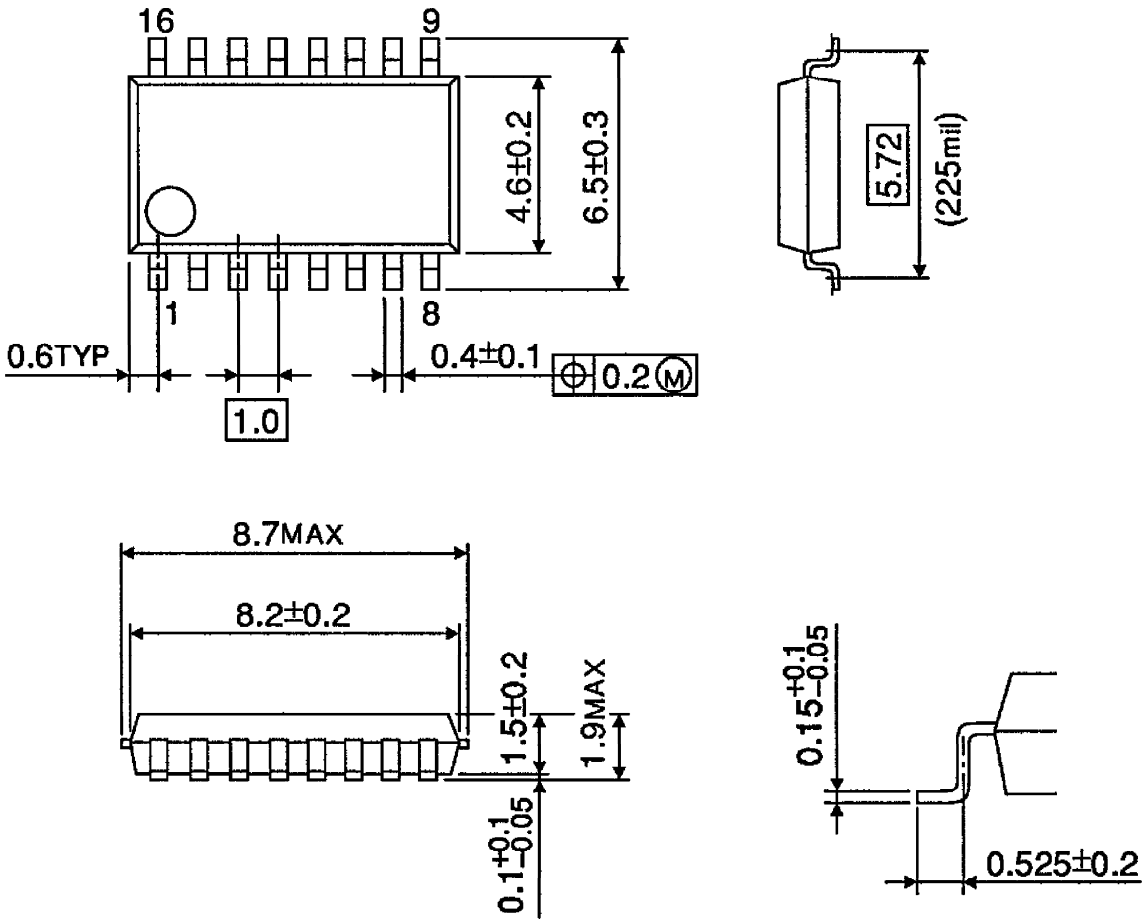


Weight : 0.65g (Typ.)

OUTLINE DRAWING

SSOP16-P-225-1.00A

Unit : mm



Weight : 0.14g (Typ.)