



# LA1178M

## FM Front End for Car Radio, Home Radio-Use

### Functions

- Double end type mixer
- Oscillator
- Oscillator buffer
- Wide-band AGC circuit
- IF amplifier

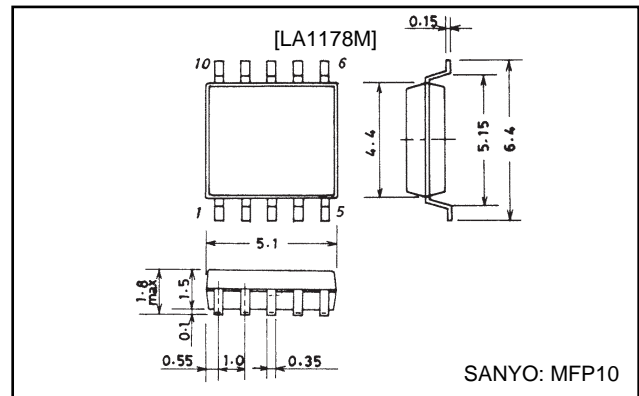
### Features

- Excellent intermodulation characteristic (wide-band AGC circuit)
- On-chip local oscillation buffer for electronic tuning.

### Package Dimensions

unit: mm

#### 3086-MFP10



### Specifications

#### Maximum Ratings at Ta=25°C

Parameter	Symbol	Conditions	Ratings	Unit
Maximum supply voltage	V <sub>CC</sub> max	Pins 2, 3, 10	10	V
Allowable power dissipation	P <sub>d</sub> max	T <sub>a</sub> ≤75°C	440	mW
Operating temperature	T <sub>opr</sub>		-20 to +70	°C
Storage temperature	T <sub>stg</sub>		-40 to +125	°C

#### Operating Conditions at Ta=25°C

Parameter	Symbol	Conditions	Ratings	Unit
Recommended supply voltage	V <sub>CC</sub>		8	V
Operating voltage range	V <sub>CC</sub> op		8 to 9	V

#### Electrical Characteristics at Ta=25°C, V<sub>CC</sub>=8V, f<sub>im</sub>=88MHz, See specified Test Circuit.

Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Quiescent current	I <sub>CCO</sub>	No input	21	26	31	mA
AGC high-level voltage	V <sub>AGC-H</sub>	0dBμ, pin 4	7.7	8.0		V
AGC low-level voltage	V <sub>AGC-L</sub>	100dBμ, pin 4		0.07	0.3	V
AGC mixer input	V <sub>IN AGC</sub>	V <sub>AGC</sub> ≤2V, Pin 4	67	74	81	dBμ
IF saturation output voltage	V <sub>IF-max</sub>	110dBμ	108	112	116	dBμ
Input limiting voltage	V <sub>lim</sub>		81	88	95	dBμ
Voltage gain	V <sub>G</sub>	65dBμ	84	88	92	dBμ
Local OSC output voltage	V <sub>OSC</sub>	No input, 75Ω termination	80	84	88	dBμ

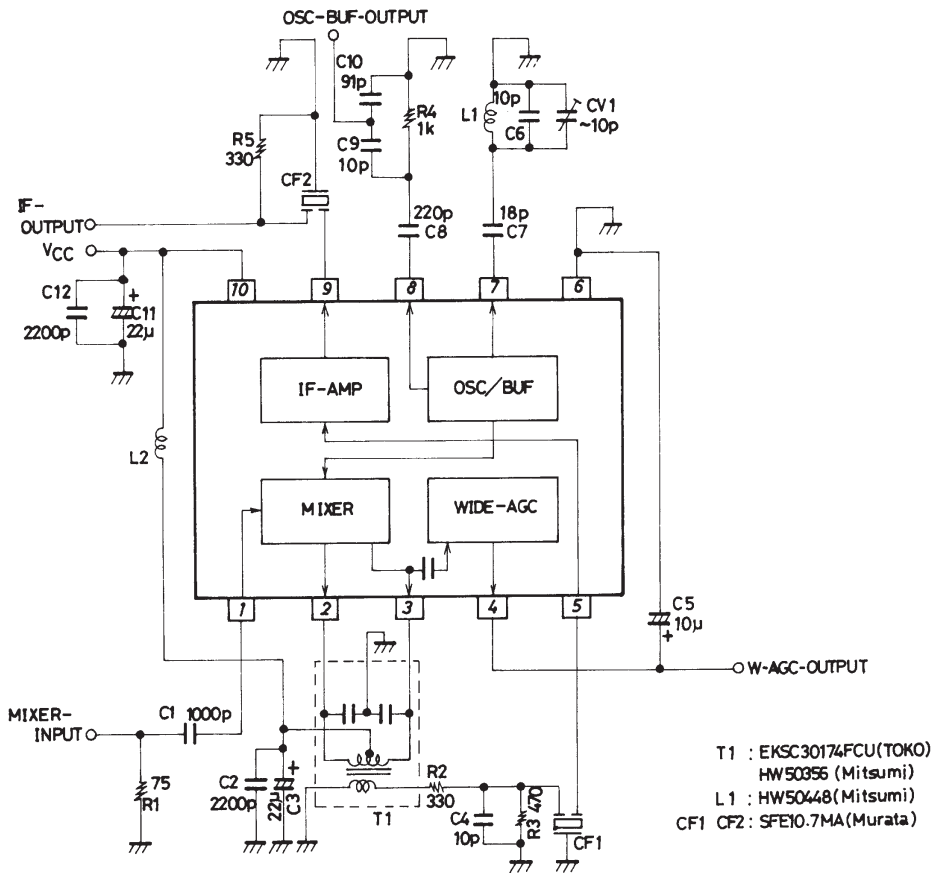
Note) Extreme caution should be exercised when applying voltage across pin 10 and 3 as dielectric breakdown may occur.

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## Typical Voltage on Each Pin and Pin Description

Pin No.	Typical voltage [V]	Description	Remarks
1	2.7	Mixer input	
2	8.0	Mixer output	
3	8.0	Mixer output	
4	8.0	AGC input	No input
5	2.0	IF amp input	
6	0.0	GND	
7	4.9	Oscillator base terminal	
8	1.4	Oscillation buffer output	
9	4.4	IF output	
10	8.0	V <sub>CC</sub>	

## Evaluation Circuit and Internal Equivalent Circuit Block Diagram



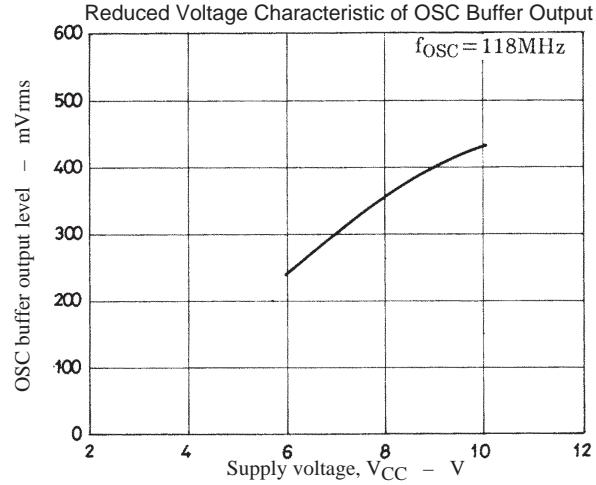
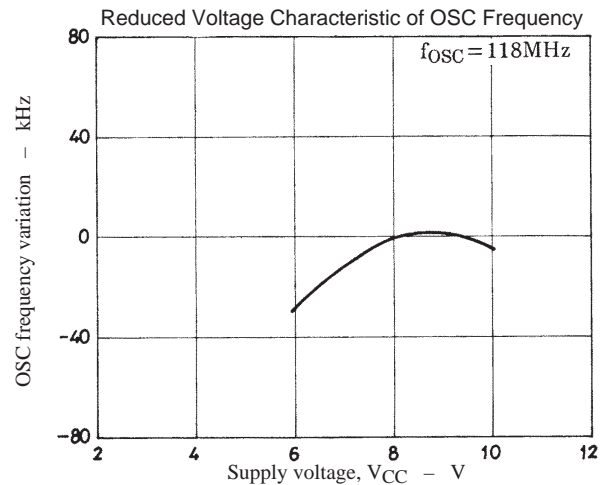
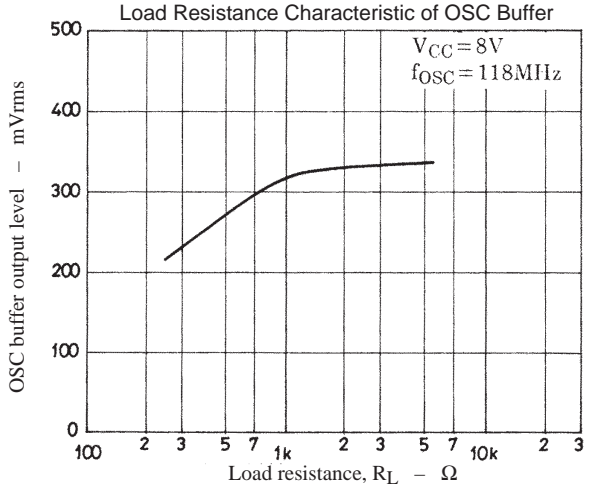
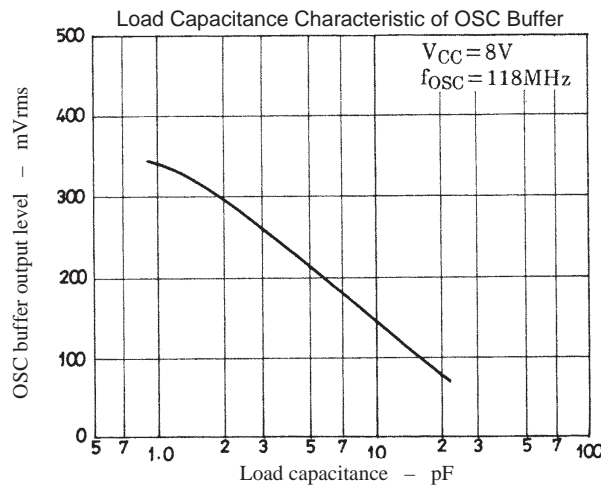
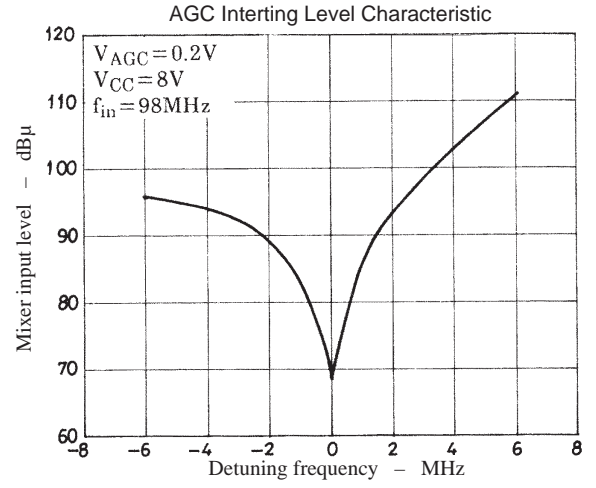
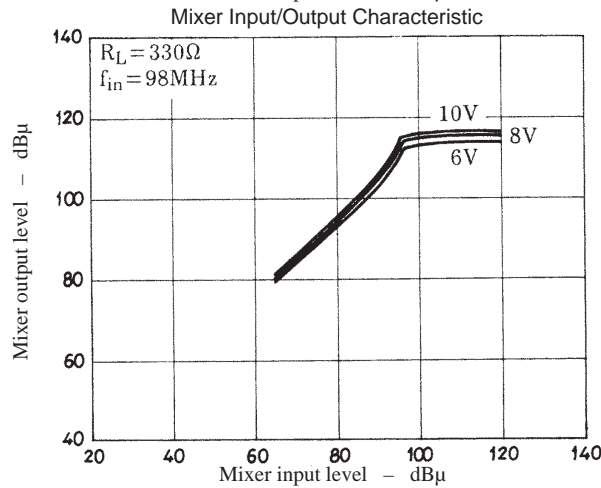
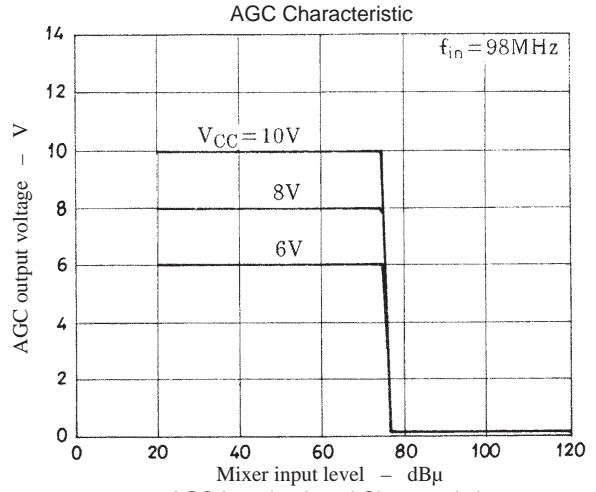
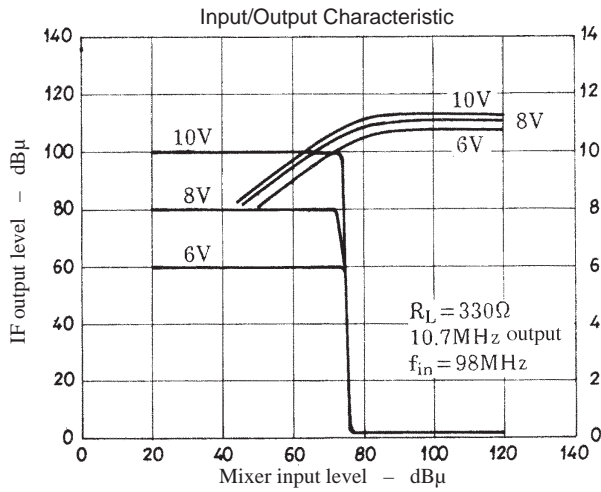
Unit (resistance : Ω, capacitance : F)

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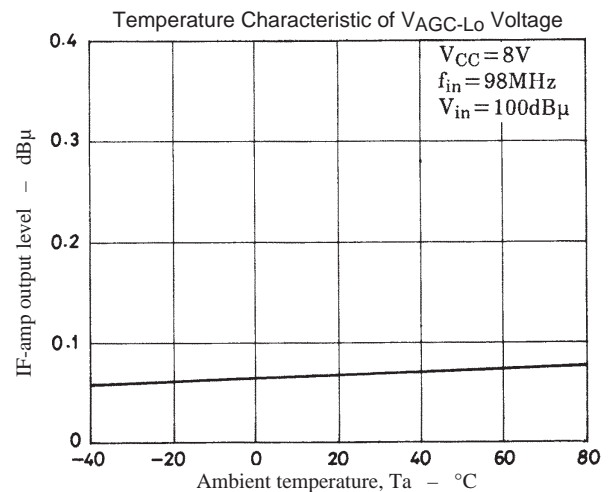
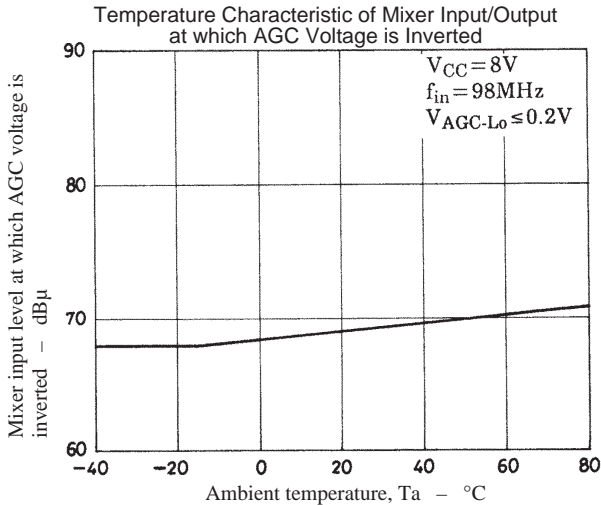
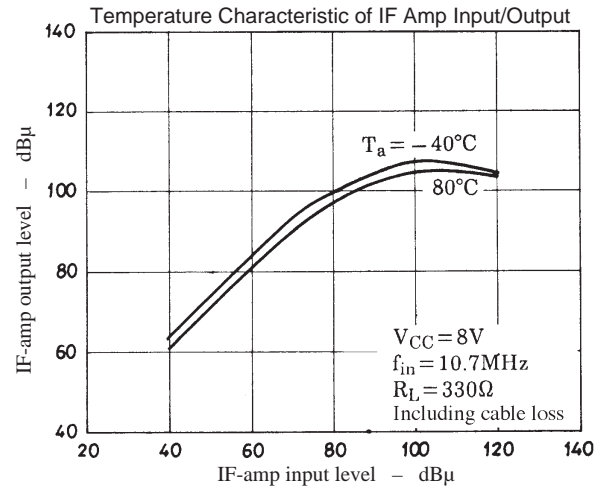
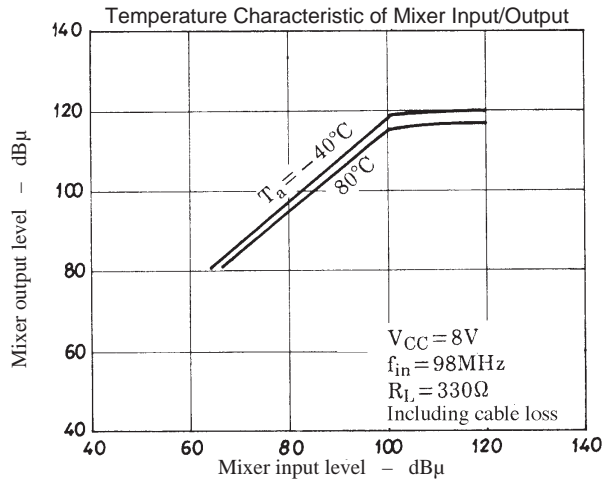
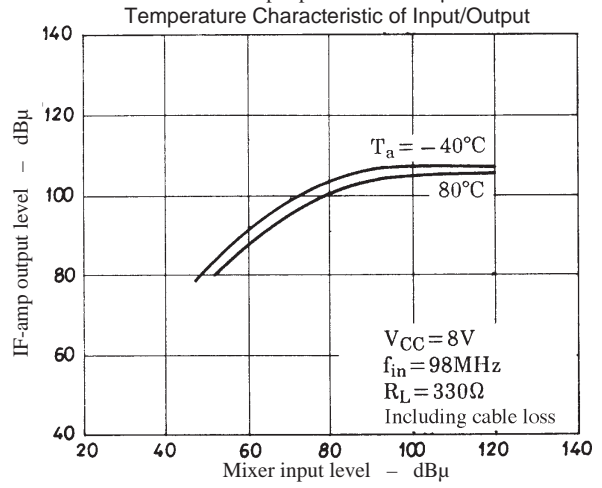
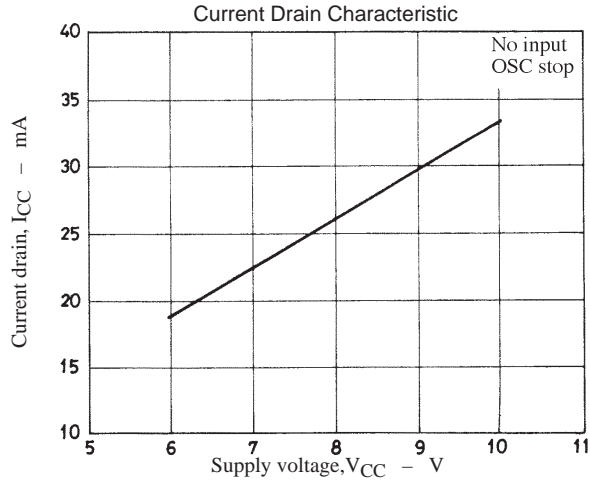
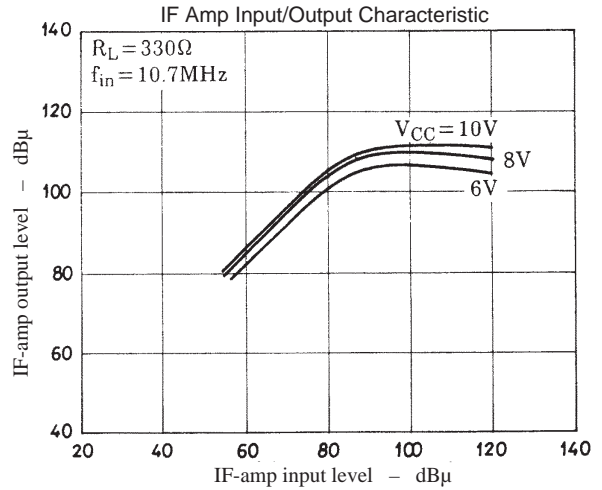
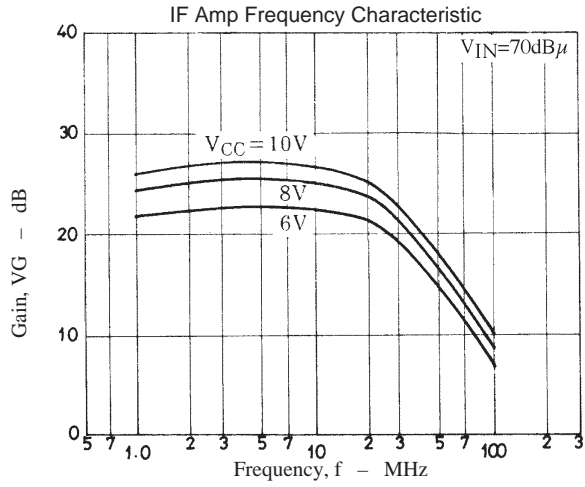
## Pin Description

Pin No.	Function	Internal Equivalent Circuit	Remarks
1	Mixer input		
2	Mixer output		AGC pickup pin is connected.
3	Mixer output		
4	Wide-band AGC output		
5	IF amp input		$R_{IN} \approx 330\Omega$
6	IF amp input		
7	OSC		
8	OSC buffer output		
9	IF amp output		$R_{OUT} \approx 330\Omega$
10	Vcc	Vcc	

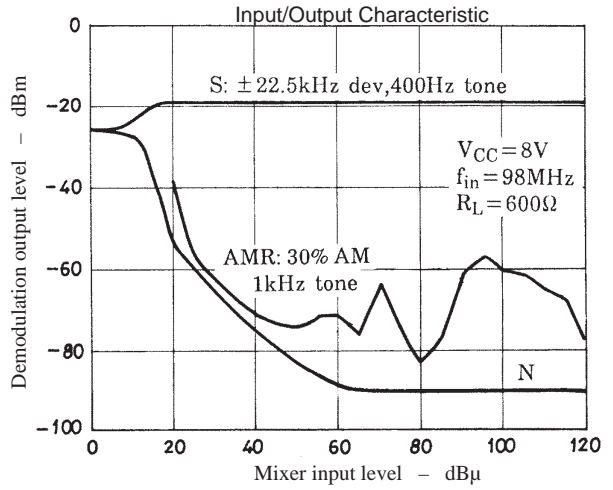
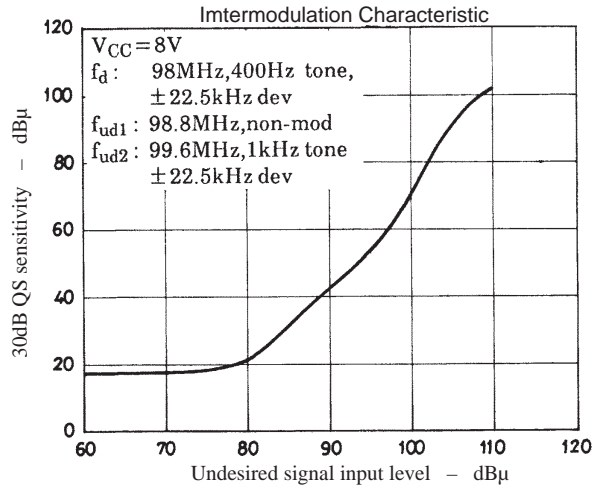
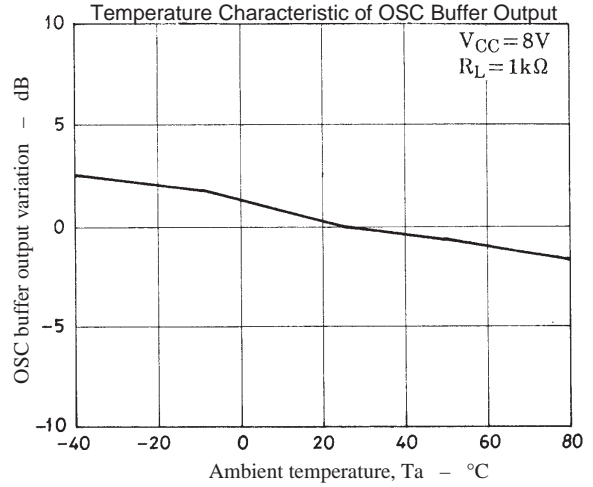
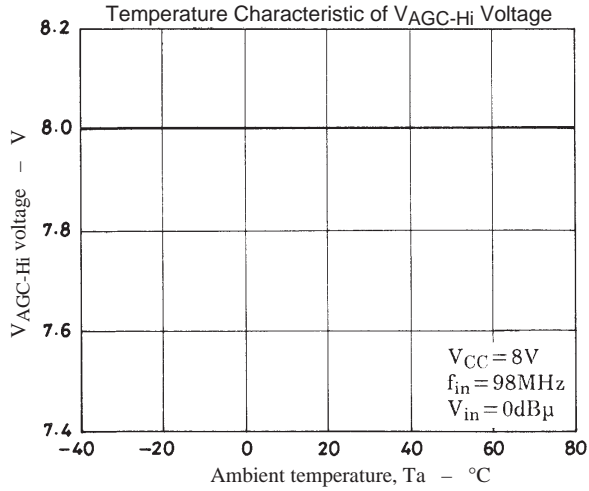
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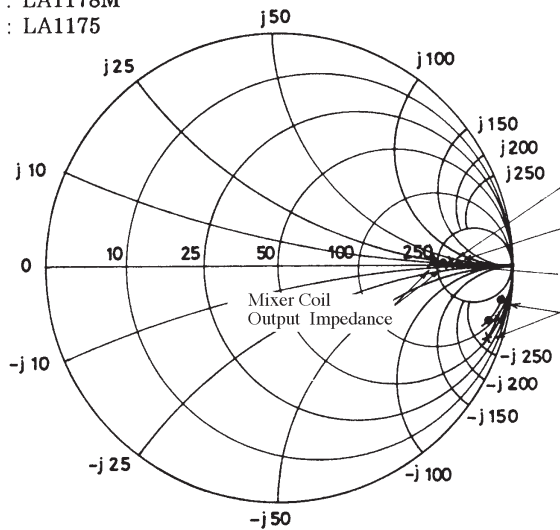
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## Smith Chart

$V_{CC} = 8V$

- : LA1178M
- × : LA1175



- IF AMP
  - Input/Output impedance (LA1175)
  - IF AMP
  - Input impedance (LA1178M)
  - IF AMP
  - Output impedance (LA1178M)
  - Mixer
  - Input impedance :  $f = 80$  to  $110MHz$
- }  $f = 10.7MHz$

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