

- ◆ Operating Voltage Range (Single Cell) 1.2V to 10V
- ◆ Input / Output Rail To Rail Operation
- ◆ Gain Bandwidth 210kHz
- ◆ Slew Rate 0.07V /  $\mu$ S
- ◆ Low Power Consumption 15  $\mu$ A
- ◆ SOT - 25 Ultra Small Package

### Applications

- Palmtop computers, PDAs
- Cellular and portable phones
- Portable audio systems
- Various battery powered systems

### General Description

The XC221A1100MR is an input / output rail to rail CMOS Op Amp. With rail to rail functions, operation is guaranteed from power supplies as low as 1.2V. Moreover, since the XC221 comes in an ultra small SOT-25 package, the series is particularly suited for use with various types of portable phones. Margins of 210kHz and slew rates of 0.07V can be achieved even with power consumption as low as 15 $\mu$ A. Even with large capacitance levels of CL = 200pF (unity gain connection), the XC221 will not be susceptible to oscillation.

### Features

- Operating Voltage Range** : 1.2 to 10V ( single cell )  
 $\pm 0.6$  to 5V ( + ve / - ve supply )
- Common Mode Input Voltage Range** : VSS -0.2V to VDD +0.2V
- Output Signal** : 0.1 to 2.9V (3V single cell, RL=2k)
- Gain Bandwidth** : 210kHz
- Slew Rate** : 0.07v /  $\mu$ S
- High Capacitance Load** : CL=200pF ( 500pF also available )
- Low Supply Current** : 15 $\mu$ A

### Pin Assignment

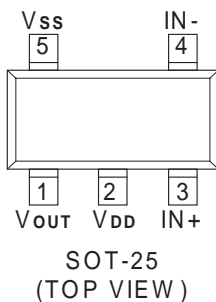
PIN NUMBER	SYMBOL	FUNCTION
1	VOUT	Output Pin
2	VDD	Positive Power Supply Pin
3	IN+	Positive Input
4	IN-	Negative Input
5	VSS	Negative Power Supply Pin

### Absolute Maximum Ratings

Ta = 25°C, VSS = 0V

PARAMETER	SYMBOL	RATINGS	UNITS
VDD pin voltage	VDD	-0.3 to 12	V
OUT pin voltage	VOUT	-0.3 to 12	V
IN pin voltage	VIN+	- 0.3 to VDD + 0.3	V
IN/ pin voltage	VIN-	- 0.3 to VDD + 0.3	V
OUT pin current	IOUT	$\pm 100$	mA
Continuous Total Power Dissipation	Pd	150	mW
Ambient Operating Temp.	Topr	-30 to +80	°C
Storage Temp.	Tstg	-40 to +125	°C

### Pin Configuration



## ■ Electrical Characteristics

### XC221A1100

$I_{DD} = 15\mu A$ ,  $V_{OF} = 20.0mV$

$T_a = 25^\circ C$

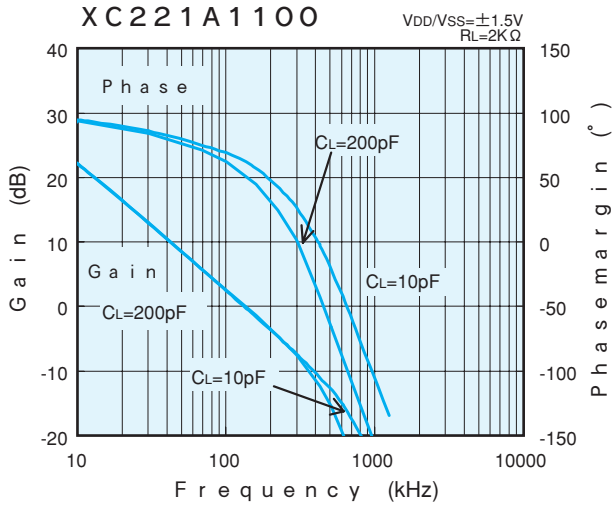
PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS
Power Supply Voltage Range	VDD		1.2	-	10	V
Supply Current	IDD	VDD = 3V	10	15	23	$\mu A$
		VDD = 1.2V	2.5	8	23	$\mu A$
Input Offset Voltage	VOF		-	-	20.0	mV
Input Offset Current	IOF		-	1	-	pA
Input Bias Current	IB		-	1	-	pA
Input Resistance	RIN		-	1	-	T $\Omega$
Large Signal Voltage Gain	AVD		75	110	-	dB
Common Mode Rejection Ratio	CMRR	$0 < V_{CM} < 3.0V$	60	75	-	dB
Power Supply Rejection Ratio	PSRR +	VDD = 3 to 10V, VSS = 0V, VOUT = 1.5V	60	75	-	dB
	PSRR -	VSS = -3 to -10V, VDD = 0V, VOUT = -1.5V	60	75	-	dB
Output Voltage Range	VOUT	RL = $\infty$	0.05	-	VDD - 0.05	V
		VDD = 1.2V, RL = 47k $\Omega$ (to VDD/2)	0.10	-	1.10	V
		VDD = 3V, RL = 2k $\Omega$ (to VDD/2)	0.10	-	2.90	V
		VDD = 5V, RL = 2k $\Omega$ (to VDD/2)	0.10	-	4.90	V
		VDD = 10V, RL = 2k $\Omega$ (to VDD/2)	0.10	-	9.80	V
Gain Bandwidth	FT	VDD = 3V	-	210	-	kHz
Slew Rate	SR	VDD = 3V	0.04	0.07	-	V/ $\mu s$

#### Measuring Conditions :

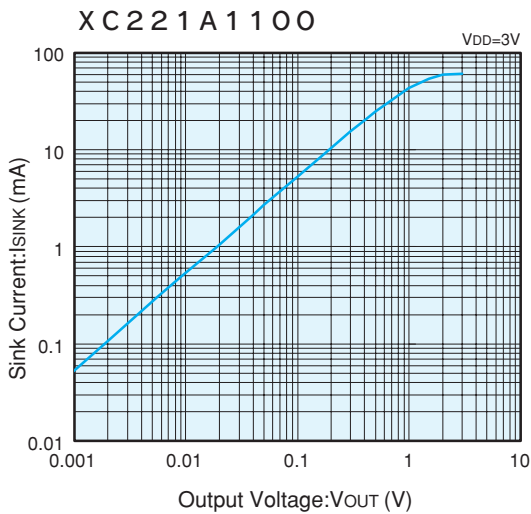
Unless otherwise stated, VDD = 3.0V, VSS = 0V, VCM = VOUT = VDD / 2, RL = 1M $\Omega$  (to VSS), CL = 10pF (to VSS)

### XC221A1100 (15 $\mu$ A) Electrical characteristics

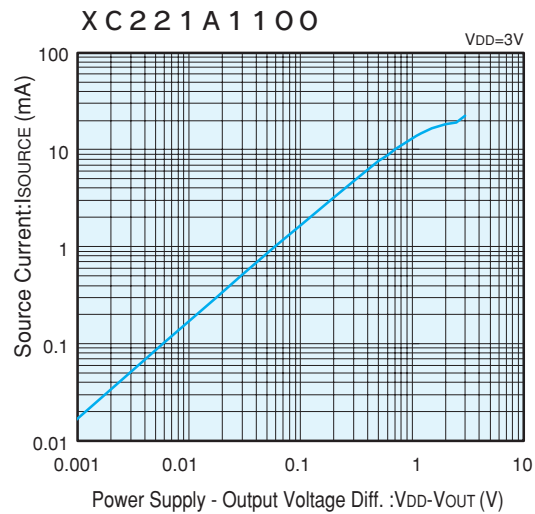
(1) Voltage Gain, Phase Margin



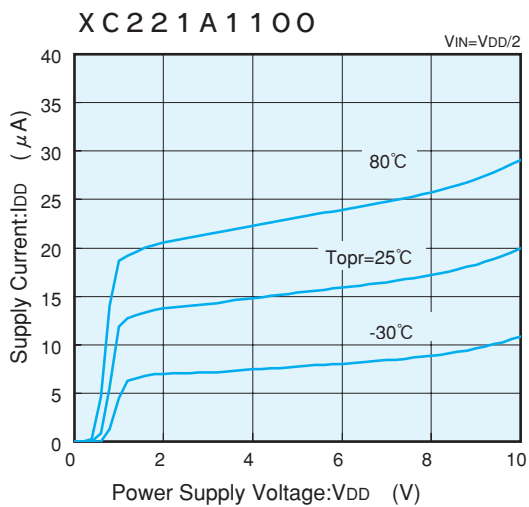
(2) Sink Current vs. Output Voltage



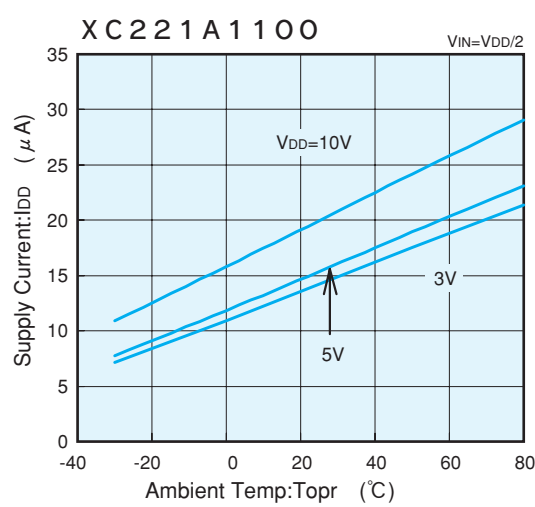
(3) Source Current vs. Output Voltage



(4) Supply Current vs. Power Supply Voltage



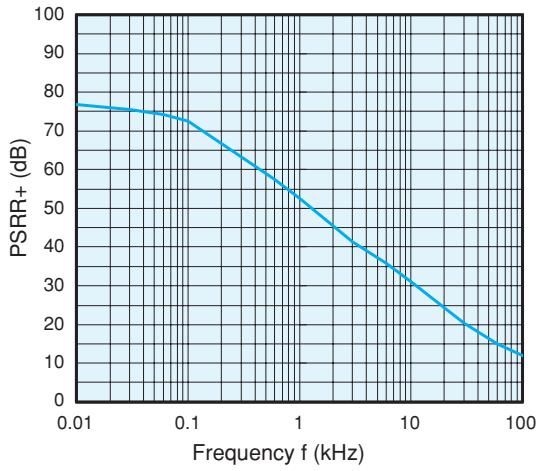
(5) Supply Current vs. Ambient Temperature



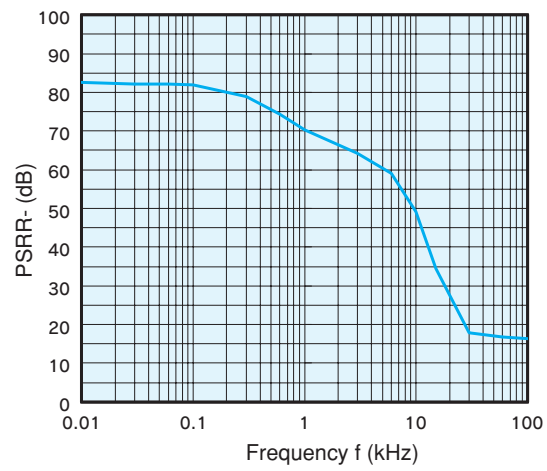
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(6) Power Supply Rejection Ratio vs. Frequency

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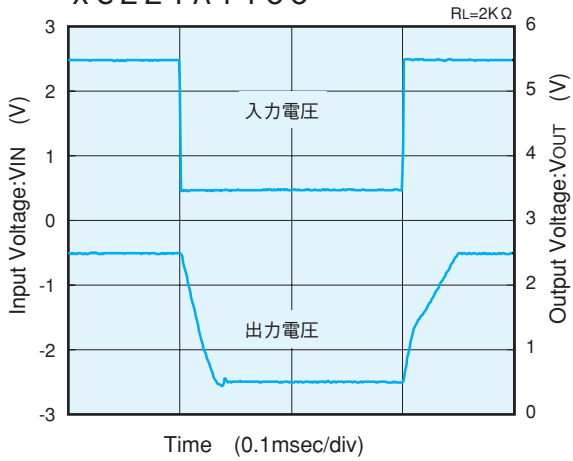


XC221A1100



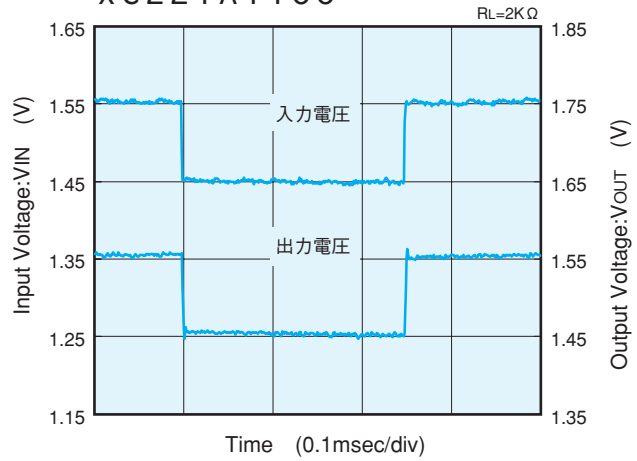
(7) Large Signal Input Response

XC221A1100



(8) Small Signal Input Response

XC221A1100

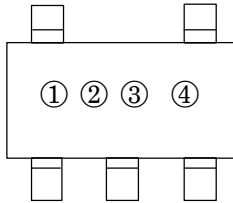


■ **Ordering Information**

XC221A x x x x x x  
a b c d e f

DESIGNATOR	DESCRIPTION	DESIGNATOR	DESCRIPTION
a	Number of Channels : 1=one	e	Package Type : M = SOT-25
b	Consumption Current : 1=15μA		
c	0 = Internal standard	f	Device Orientation : R = Embossed Tape ( Right ) L = Embossed Tape ( Left )
d	Load Capacitance : 0=200pF		

■ **Marking**



**SOT-25  
(TOP VIEW)**

① Represents the part name and the consumption current level

PART	CURRENT	SYMBOL
XC221A11	15μA	1

② Based on internal standards

③ Represents load capacitance

CAPACITANCE	SYMBOL
200Pf	0

④ Represents the assembly lot no.  
0 - 9, A - Z repeated (excluding G,I,J,O,Q & W)