

DBL 5020

LOW VOLTAGE COMPANDER

The DBL5020 contains two variable gain circuits configured for compressing and expanding the dynamic range of an audio signal. One circuit is configured as an expander, while the other circuit can be configured as a compressor or expander. Each circuit has a full wave rectifier to provide average value information to a variable gain cell located in either the input stage or the feedback path.

An internal temperature stable bandgap reference provides the necessary precision voltages and currents required. It contains also compressor and expander mute circuit.

FEATURES

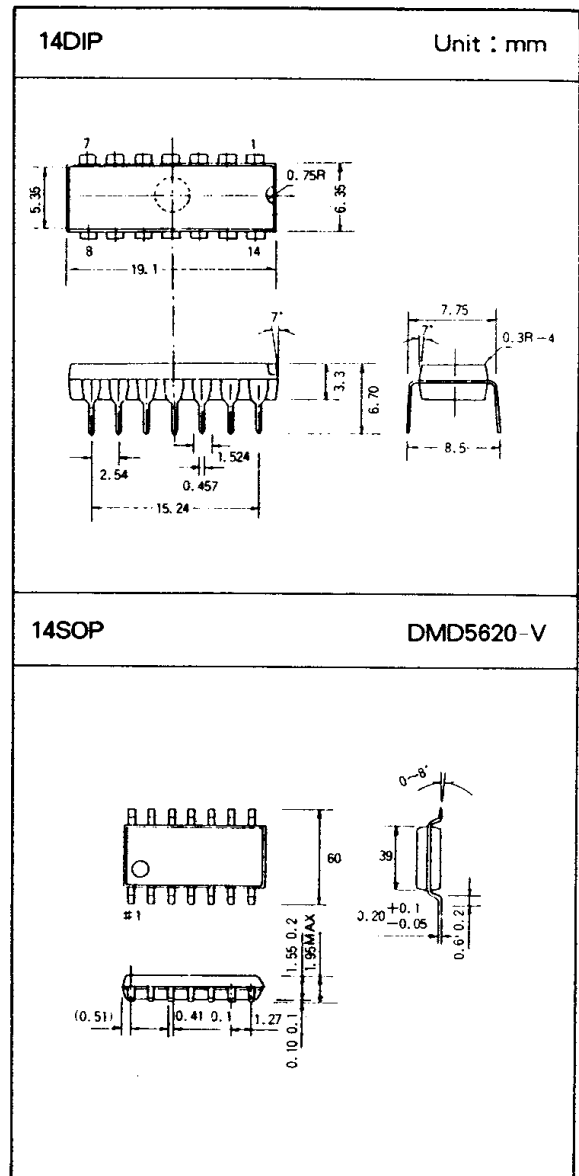
- Low voltage operation $V_{opr} = 1.8 \sim 5.0V$
- Decreasing external components
- Built in compressor and expander mute circuit
- Unity gain level set at $100mV_{rms}$
- Response time adjustable

MAXIMUM RATINGS($T_a = 25^\circ C$)

CHARACTERSTIC	SYMBOL	RATING	UNIT
Maximum Supply Voltage	V_{cc}	10	V
Power Dissipation	P_d	410	mW
Storage Temperatuer Range	T_{sig}	$-55 \sim 150$	$^\circ C$

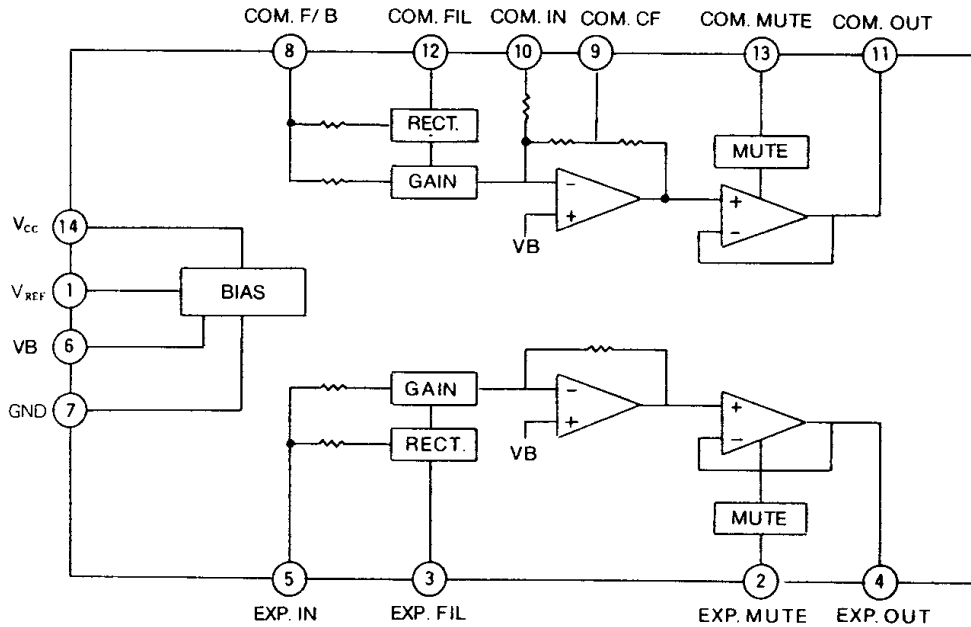
OPERATING CONDITIONS

- Operating Supply Voltage : $1.8 \sim 5.0(V)$
- Operating Temperature Range : $-20 \sim 70(^\circ C)$
- Input frequency Range : $100 \sim 20K(Hz)$
- Input Voltage : Compressor Input = $700mV_{rms}$
($V_{cc} = 3V$) Expander Input = $316mV_{rms}$



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□ BLOCK DIAGRAM



□ PIN VOLTAGE AND DESCRIPTION

Pin		Voltage (V)	Description
NO	NAME		
1	V _{REF}	1.3	Bandgap Voltage.
2	EXP.MUTE	1.4	Expander mute adjust.
3	EXP.FILTER	0~0.6	Expander Filter. Connect to an external capacitor to filter the full wave rectifier's output. This capacitor affects attack & delay times, as well as low frequency accuracy.
4	EXP.OUTPUT	1.5	Output of the expander amplifier
5	EXP.INPUT	1.5	Expander input. Nominally signal range is 3.16mVrms to 316mVrms. Must be capacitor coupled to the signal source.
6	VB	2.2	An internal reference voltage. This is an AC ground, and must be well filtered to obtain high power supply rejection and low crosstalk.
7	GND	GND	Ground
8	COM.FEEDBACK	1.5	Input to the compressor Variable gain stage and rectifier

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DC PIN VOLTAGE AND DESCRIPTION (Continued)

Pin		Voltage (V)	Description
NO	NAME		
9	COM.CF	1.5	Normally, this is connected to the compressor's output through filtered DC feedback path.
10	COM.INPUT	1.5	Compressor input. Normally, signal range is 100 μ Vrms to 1.0Vrms. Must be capacitor coupled to the signal source
11	COM.OUTPUT	1.5	Output of the compressor amplifier.
12	COM.FILTER	0~0.6	Compressor filter. Connect to an external capacitor to filter the full wave rectifier's output. This capacitor affects attack & decay times, and low frequency accuracy.
13	COM.MUTE	1.4	Compressor mute adjust.
14	V _{cc}	3	Power supply pin. Connect to a power supply providing between 1.8 and 5.0volts

ELECTRICAL CHARACTERISTICS

(Unless Otherwise Specified, T_a=25°C, V_{cc}=3V, f=1KHz)

Characteristics	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Supply Current	I _{cc}	No Signal	-	3.1	-	mA
Compressor Section						
0dB Gain	G _{co}	V _{inc} =100mVrms, 0dB	-1.5	0	+1.5	dB
Gain Error (NOTE 1)	G _{c1}	V _{inc} =316mVrms, 10dB	-1	0	+1	dB
	G _{c2}	V _{inc} =10mVrms, -20dB	-1	0	+1	dB
	G _{c3}	V _{inc} =1mVrms, -40dB	-1	0	+1	dB
	G _{c4}	V _{inc} =100 μ Vrms, -60dB	-1	0	+1	dB
Distortion	THD _C	V _{inc} =100mVrms, f=1KHz		0.3	1.5	%
Noise Output	V _{noc}	R _g =600 Ω	-	0.8	5.0	mVrms
Ripple Rejection Ratio	RR _C	V _{cc} =1KHz, 3V(DC), 100mVrms	-	-25	-18	dB

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□ ELECTRICAL CHARACTERISTICS(Continued)

(Unless Otherwise Specified, $T_a=25^\circ\text{C}$, $V_{cc}=3\text{V}$, $f=1\text{KHz}$)

Characteristics	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Crosstalk (C → E)	CT_c	$V_{in_c}=100\text{mVrms}$, Exp Output	–	–72	–50	dB
Mutting Attenuation	Att_c	$V_{in_c}=100\text{mVrms}$ $V_{pin3}=GND$	–	–65	–50	dB
Input Impedance	R_{in_c}	PIN 10	–	20	–	$k\Omega$
Expander Section						
0dB Gain	G_{ex}	$V_{in_c}=100\text{mVrms}$ 0dB	–1.5	0	+1.5	dB
Gain Error (NOTE 1)	G_{e1}	$V_{in_c}=178\text{mVrms}$ 5dB	–1	0	+1	dB
	G_{e2}	$V_{in_c}=31.6\text{mVrms}$ –10dB	–1	0	+1	dB
	G_{e3}	$V_{in_c}=10\text{mVrms}$ –20dB	–1	0	+1	dB
	G_{e4}	$V_{in_c}=3.16\text{mVrms}$ –30dB	–1	0	+1	dB
Distortion	THD_c	$V_{in_c}=100\text{mVrms}$ $f=1\text{KHz}$	–	0.4	1.5	%
Noise Output	V_{no_c}	$R_g=600\Omega$	–	0.06	5.0	mVrms
Ripple Rejection Ratio	RR_c	$V_{cc}=1\text{KHz}$, 3V(DC), 100mVrms	–	–58	–38	dB
Crosstalk (E → C)	CT_e	$V_{in_c}=100\text{mVrms}$, Com Output	–	–34	–24	dB
Mutting Attenuation	Att_e	$V_{in_c}=316\text{mVrms}$, $V_{pin2}=GND$	–	–70	–50	dB
Input Impedance	R_{in_e}	PIN4	–	4.3	–	$k\Omega$

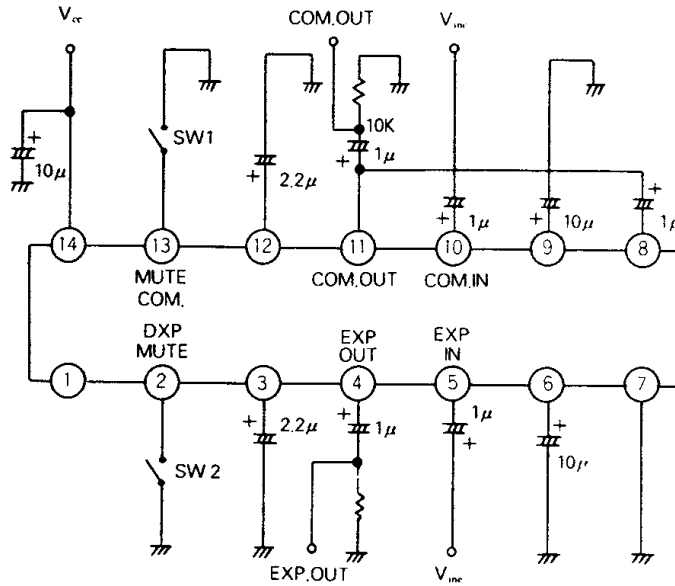
NOTE 1) Gain Error = $(V_{out} - 20\text{dB}) - V_{in} \times K$

K : Compressor = 0.5

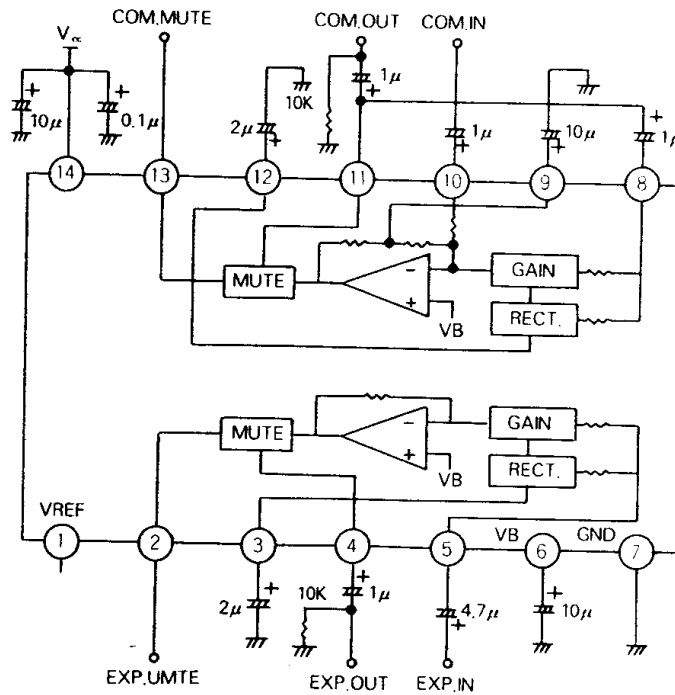
Expander = 2

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TEST CIRCUIT

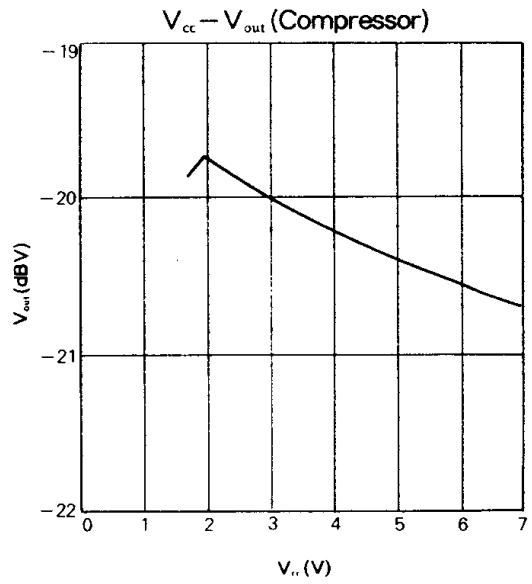
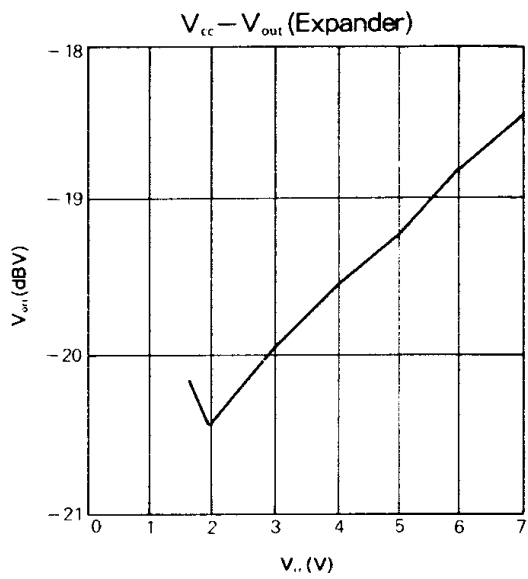
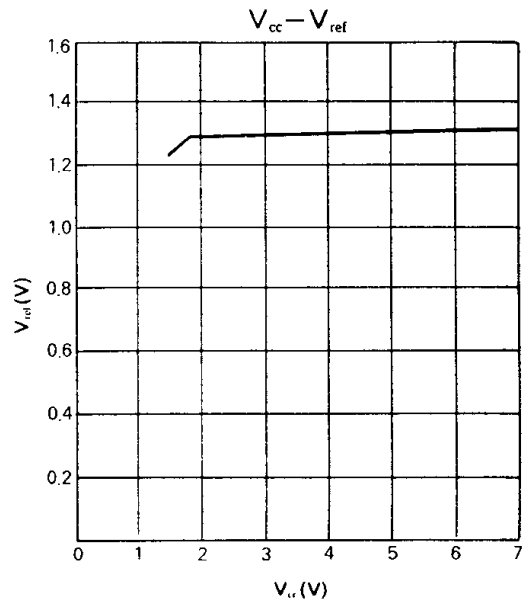
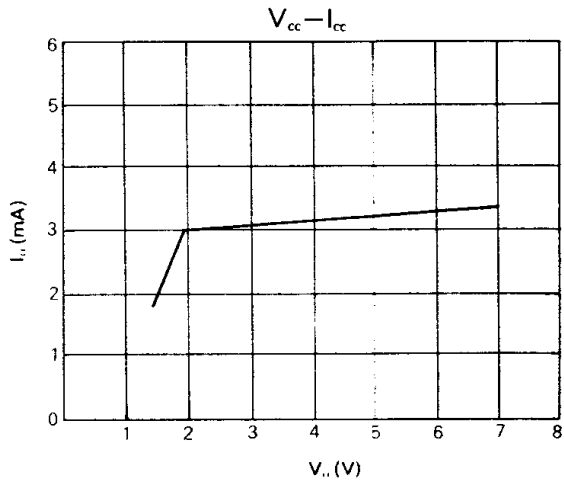


APPLICATION CIRCUIT



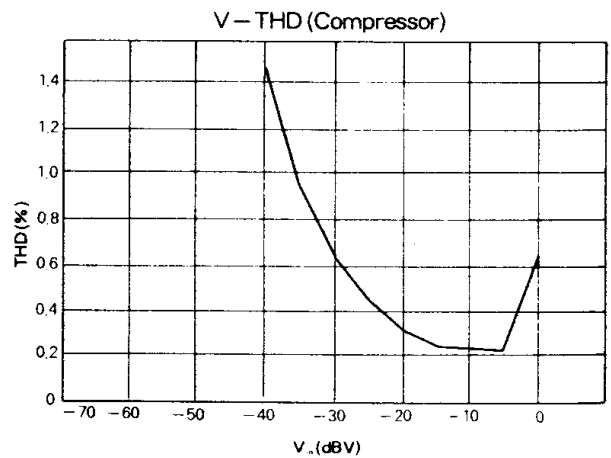
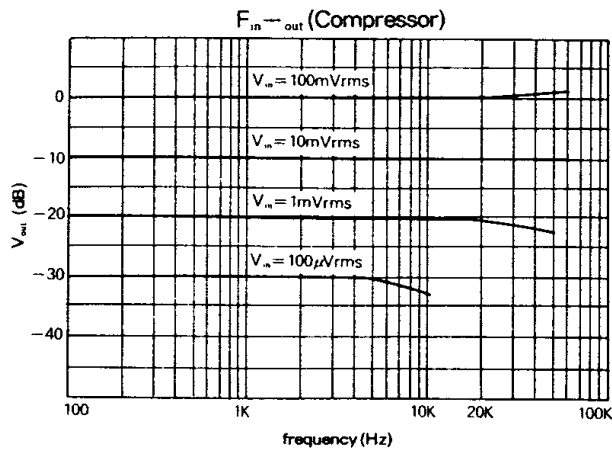
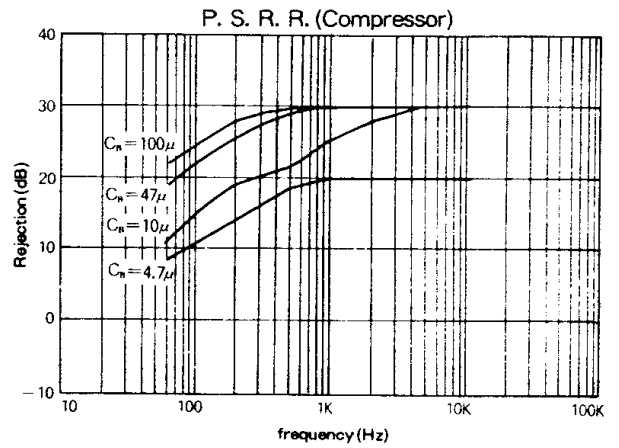
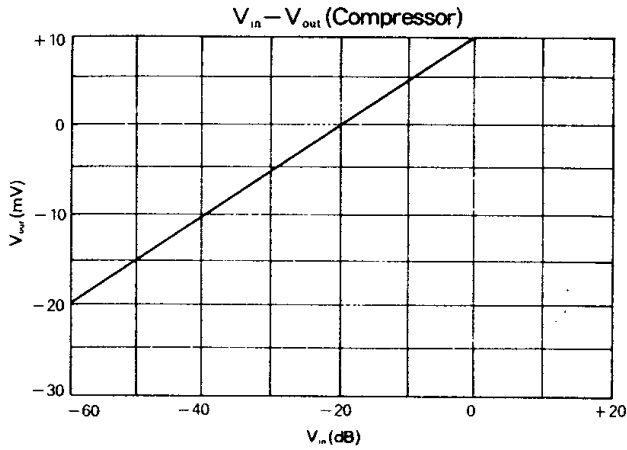
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TYPICAL PERFORMANCE CHARACTERISTICS



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□ TYPICAL PERFORMANCE CHARACTERISTICS(Continued)



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TYPICAL PERFORMANCE CHARACTERISTICS(Continued)

