



USA575

Preliminary

LINEAR INTEGRATED CIRCUIT

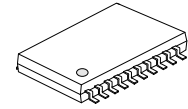
LOW VOLTAGE COMPANDOR

DESCRIPTION

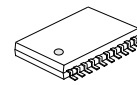
The UTC **USA575** is a precision dual gain control circuit designed for low voltage applications. The UTC **USA575**'s channel 1 is an expander, while channel 2 can be configured either for expander, compressor, or automatic level controller (ALC) application.

FEATURES

- * Operating voltage range from 3V to 7V
- * Reference voltage of 100mV_{RMS}=0dB
- * 600Ω drive capability
- * One dedicated summing op amp per channel and two extra uncommitted op amps
- * Single or split supply operation
- * Wide input/output swing capability



SSOP-20



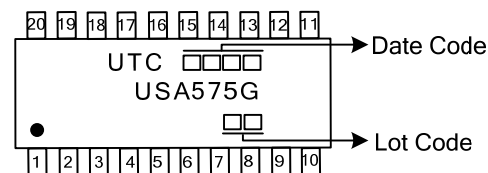
TSSOP-20

ORDERING INFORMATION

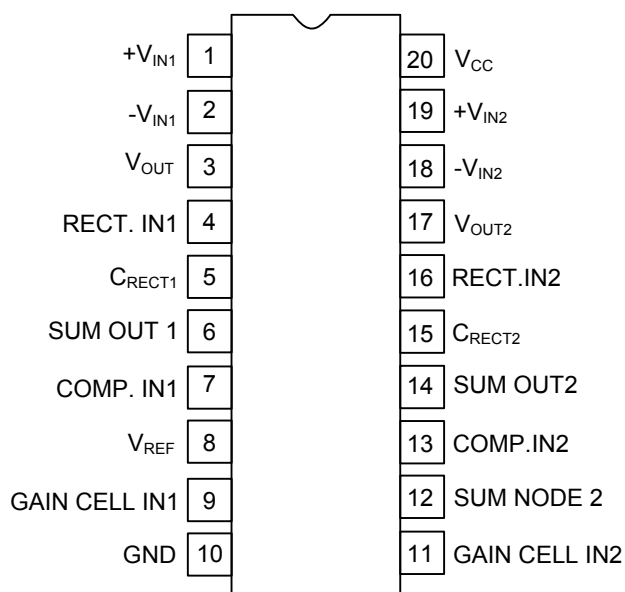
Ordering Number	Package	Packing
USA575G-R20-R	SSOP-20	Tape Reel
USA575G-P20-R	TSSOP-20	Tape Reel

USA575G-R20-R (1) Packing Type (2) Package Type (3) Green Package	(1) R: Tape Reel (2) R20: SSOP-20, P20: TSSOP-20 (3) G: Halogen Free and Lead Free
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MARKING



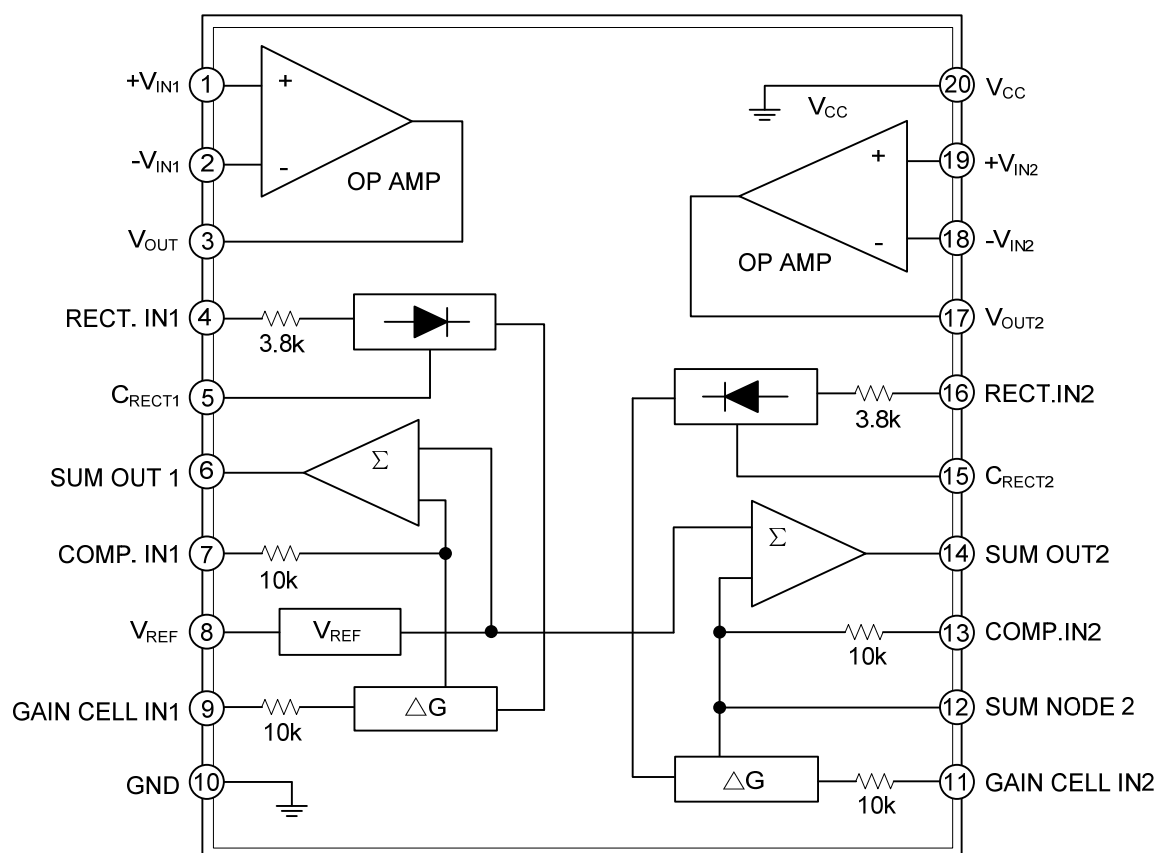
■ PIN CONFIGURATION



■ PIN DESCRIPTION

PIN NO.	PIN NAME	DESCRIPTION
1	+V _{IN1}	Non-Inverted Input 1
2	-V _{IN1}	Inverted Input 1
3	V _{OUT}	Output
4	RECT. IN1	Rectifier 1 Input
5	C _{RECT1}	External Capacitor Pinout for Rectifier 1
6	SUM OUT1	Summation Output 1
7	COMP. IN1	Compensator Pin
8	V _{REF}	Voltage Reference
9	GAIN CELL IN1	Variable Gain Cell Input 1
10	GND	Ground
11	GAIN CELL IN2	Variable Gain Cell Input 2
12	SUM NODE 2	Summation Node 2
13	COMP. IN2	Compensator Pin
14	SUM OUT2	Summation Output 2
15	C _{RECT2}	External Capacitor Pinout for Rectifier 2
16	RECT. IN2	Rectifier 2 Input
17	V _{OUT2}	Output 2
18	-V _{IN2}	Inverted Input 2
19	+V _{IN2}	Non-Inverted Input 2
20	V _{CC}	Positive Power Supply

■ BLOCK DIAGRAM



■ ABSOLUTE MAXIMUM RATING

PARAMETER	SYMBOL	RATINGS	UNIT
Single Supply Voltage	V_{CC}	-0.3 ~ 8	V
Voltage Applied to Any Other Pin	V_{IN}	-0.3 ~ ($V_{CC}+0.3$)	V
Operating Ambient Temperature Range	T_A	-40 ~ +85	°C
Storage Temperature Range	T_{STG}	-65 ~ +150	°C

Note: Absolute maximum ratings are those values beyond which the device could be permanently damaged. Absolute maximum ratings are stress ratings only and functional device operation is not implied.

■ THERMAL DATA

PARAMETER		SYMBOL	RATINGS	UNIT
Junction to Ambient	SSOP-20	θ_{JA}	117	°C/W
	TSSOP-20		140	°C/W

■ ELECTRICAL CHARACTERISTICS

(Typical values are at $T_A=25^\circ\text{C}$. Minimum and Maximum values are for the full operating temperature range: -40~+85°C, except SSOP package is tested at +25°C only. $V_{CC}=5\text{V}$, unless otherwise stated. Both channels are tested in the expander mode)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
FOR COMPANDOR, INCLUDING SUMMING AMPLIFIER						
Supply Voltage (Note 1)	V_{CC}		3	5	7	V
Supply Current	I_{CC}	No Signal	3	4.2	5.5	mA
Reference Voltage (Note 2)	V_{REF}	$V_{CC}=5\text{V}$	2.4	2.5	2.6	V
Summing Amp Output Load	R_L		10			kΩ
Total Harmonic Distortion	THD	1kHz, 0dB BW=3.5kHz		0.12	1.5	%
Output Voltage Noise	E_{NO}	BW=20kHz, $R_S=0\Omega$		6	30	μV
Unity Gain Level	0dB	1kHz	-1.5		1.5	dB
Output Voltage Offset	V_{OS}	No Signal	-150		150	mV
Output DC Shift		No Signal to 0dB	-100		100	mV
Tracking Error Relative to 0dB		Gain Cell Input=0dB, 1kHz Rectifier Input=6dB, 1kHz	-1.0		1.0	dB
		Gain Cell Input=0dB, 1kHz Rectifier Input=-30dB, 1kHz	-1.0		1.0	dB
Crosstalk		1kHz, 0dB, $C_{REF}=220\mu\text{F}$		-80	-65	dB
FOR OPERATIONAL AMPLIFIER						
Output Swing	V_O	$R_L=10\text{k}\Omega$	$V_{CC}-0.4$	V_{CC}		V
Output Load	R_L	1kHz	600			Ω
Input Common-Mode Range	CMR		0		V_{CC}	V
Common-Mode Rejection Ratio	CMRR		60	80		dB
Input Bias Current	I_B	$V_{IN}=0.5\text{V}\sim 4.5\text{V}$	-1		1	μA
Input Offset Voltage	V_{OS}			3		mV
Open-Loop Gain	A_{VOL}	$R_L=10\text{k}\Omega$		80		dB
Slew Rate	SR	Unity Gain		1		V/μs
Bandwidth	GBW	Unity Gain		3		MHz
Input Voltage Noise	E_{NI}	BW=20kHz		2.5		μV
Power Supply Rejection Ratio	PSRR	1kHz, 250mV		60		dB

Notes: 1. Operation down to $V_{CC}=2\text{V}$ is possible, but performance is reduced.

2. Reference voltage, V_{REF} , is typically at $1/2V_{CC}$.

■ TYPICAL APPLICATION CIRCUIT

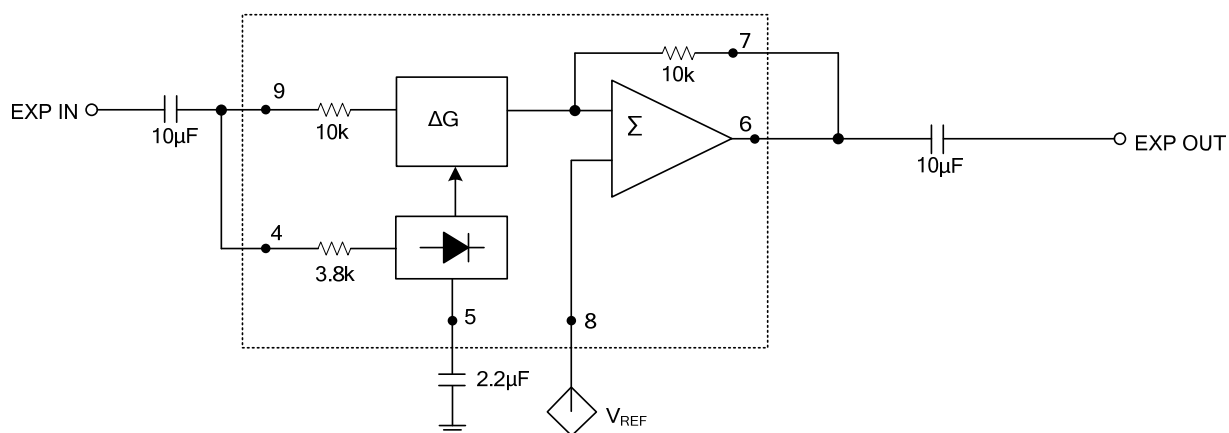


Figure 1. Typical Expander Configuration

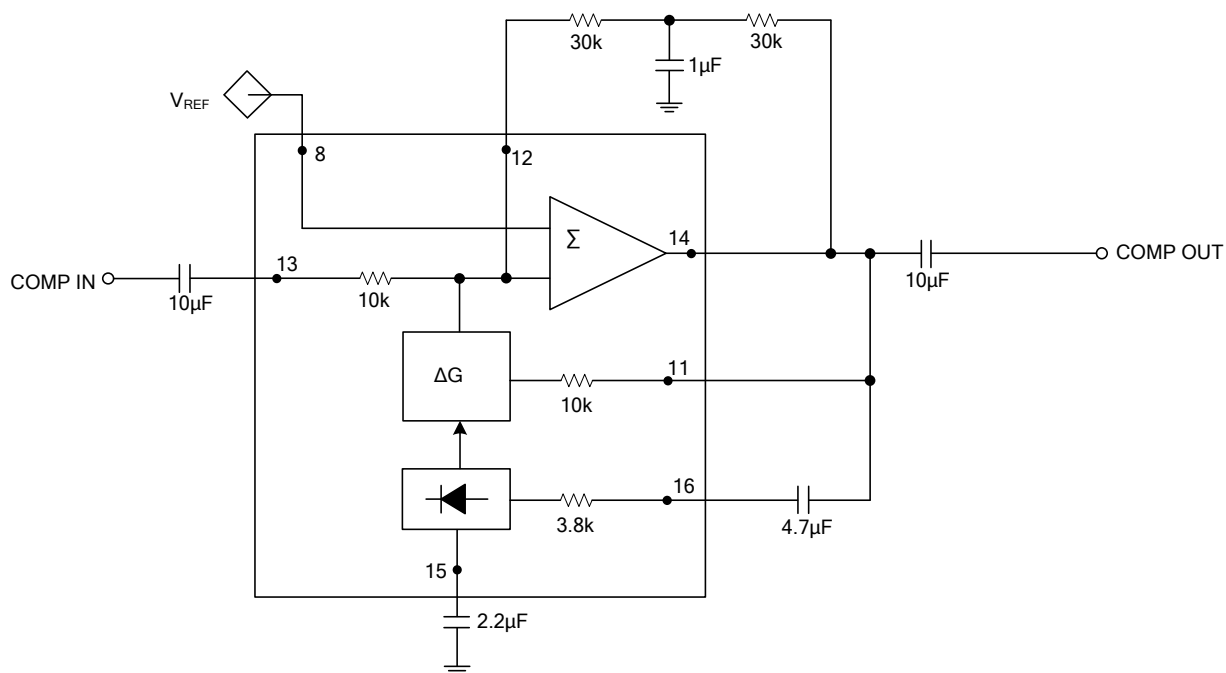


Figure 2. Typical Compressor Configuration

■ TYPICAL APPLICATION CIRCUIT

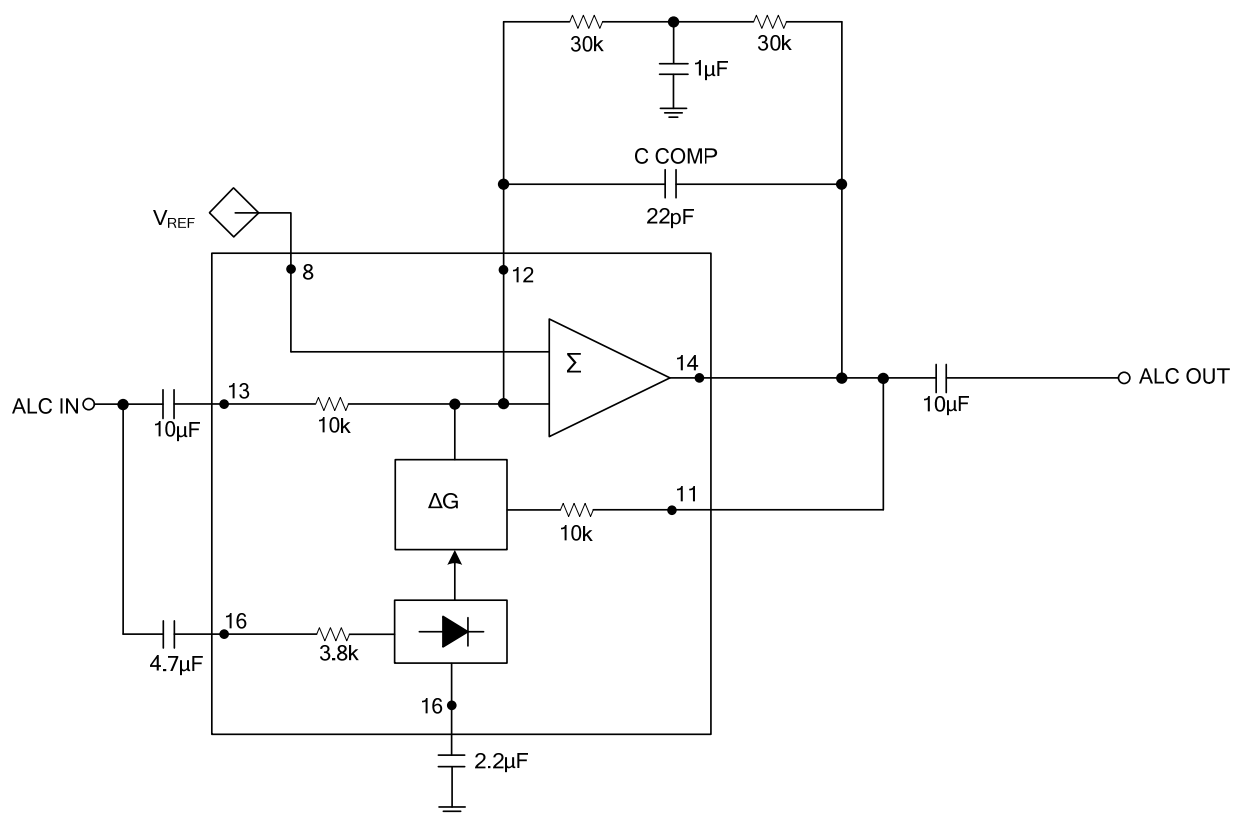
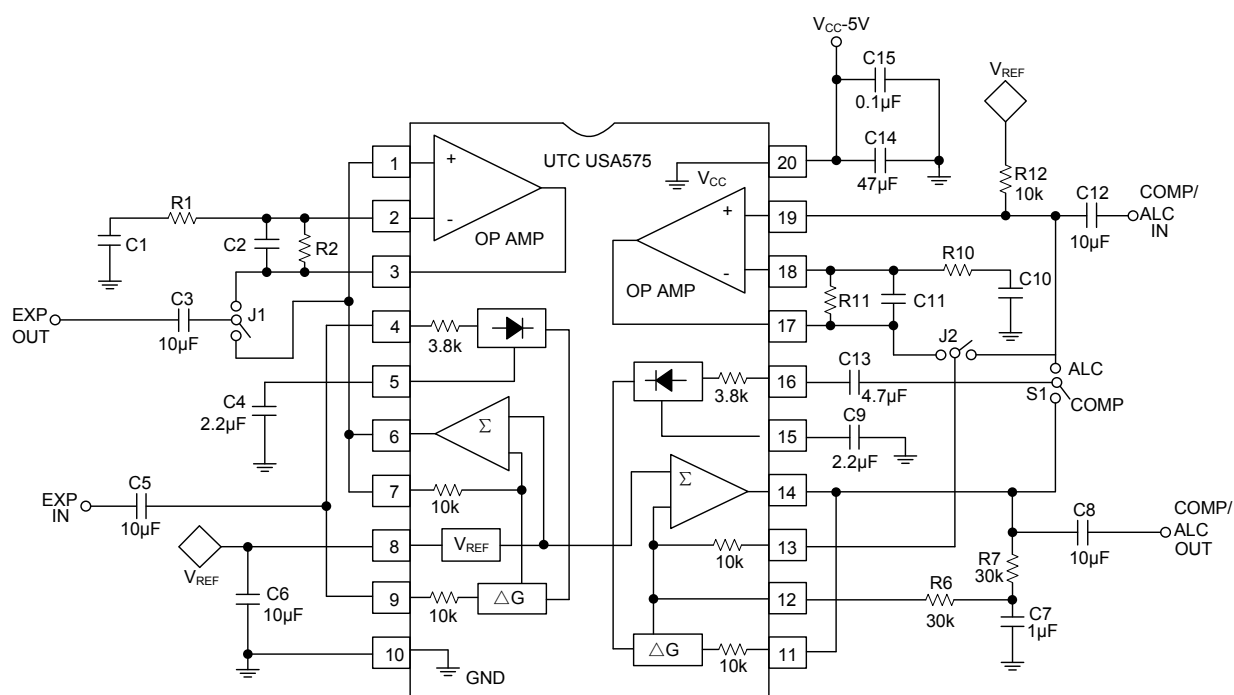


Figure 3. Typical ALC Configuration



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