



钜地半导体
Tudi Semiconductor

Product Specification

TUDI-CA3140

4.5MHz, BiMOS Operational Amplifier
with MOSFET Input/Bipolar Output

网址 www.sztdbdt.com Q

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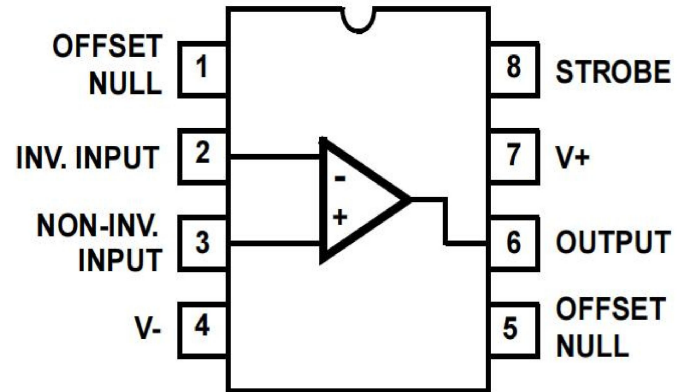
**semiconductor device
manufacturer**

- Design
- research and development
- production
- and sales



Features

- Low power consumption: 5 mA per amplifier
- Wide common-mode input voltage range
- Wide differential-mode input voltage range
- Low input bias current: 50 pA
- Low input offset current: 30 pA
- Output short-circuit protection
- High conversion rate: 9 V/ μ s
- High gain-bandwidth product: 4.5 MHz



Description

The CA3140 are integrated circuit operational amplifiers that combine the advantages of high voltage PMOS transistors with high voltage bipolar transistors on a single monolithic chip. The CA3140 BiMOS operational amplifiers feature gate protected MOSFET (PMOS) transistors in the input circuit to provide very high input impedance, very low input current, and high speed performance. These operational amplifiers are internally phase compensated to achieve stable operation in unity gain follower operation, and additionally, have access terminal for a supplementary external capacitor if additional frequency roll-off is desired. Terminals are also provided for use in applications requiring input offset voltage nulling. The use of PMOS field effect transistors in the input stage results in common mode input voltage capability down to 0.5V below the negative supply terminal, an important attribute for single supply applications. The output stage uses bipolar transistors and includes built-in protection against damage from load terminal short circuiting to either supply rail or to ground.

Application

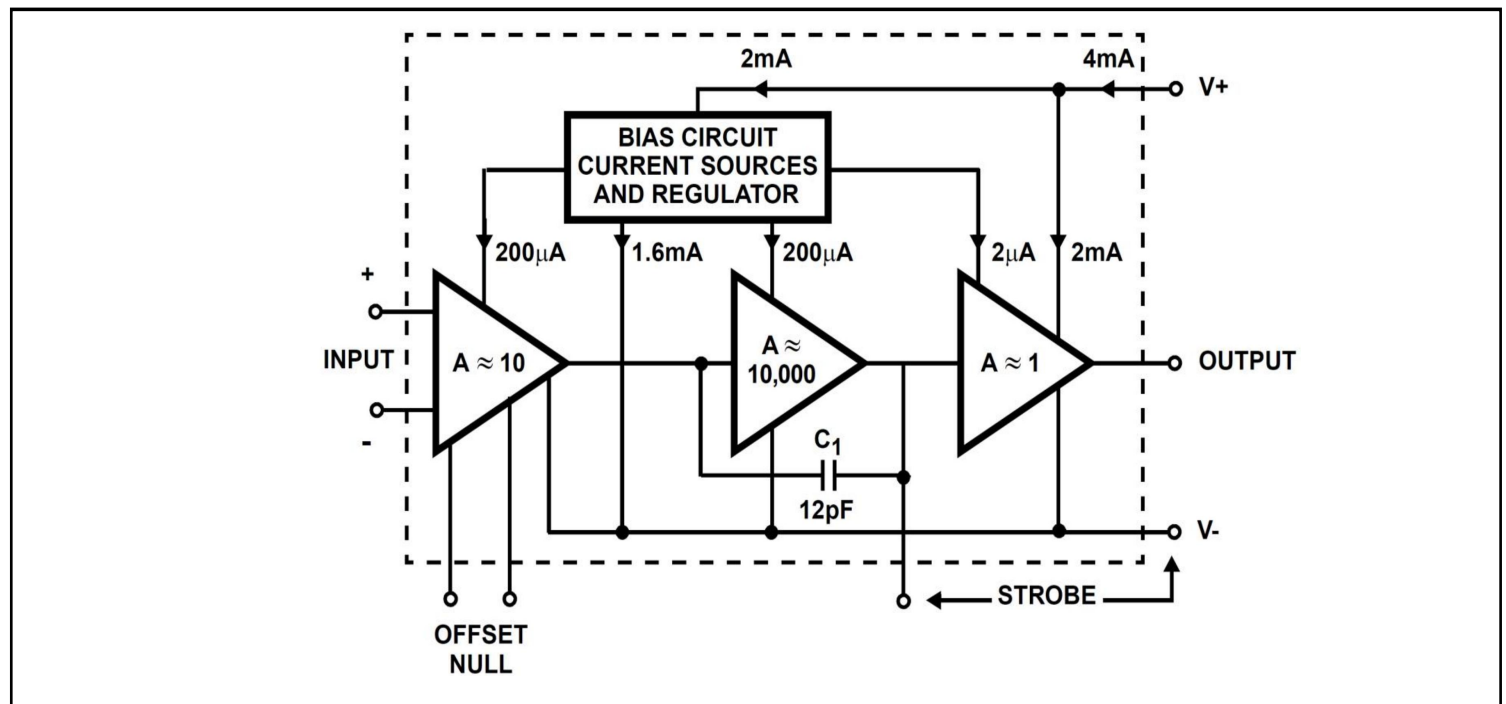
- Ground-Referenced Single Supply Amplifiers in Automobile and Portable Instrumentation
- Long Duration Timers/Multivibrators(μ seconds-Minutes-Hours)
- Interface in 5V TTL Systems and Other Low Supply Voltage Systems
- All Standard Operational Amplifier Applications
- Photocurrent Instrumentation
- Sample and Hold Amplifiers
- Function Generators
- Tone Controls
- Power Supplies
- Portable Instruments
- Intrusion Alarm Systems
- Peak Detectors
- Active Filters
- Comparators



Pin Description

Pin number	Pin Name	I/O	describe
1	OFFSET NULL	I	Bias (Zeroing terminal)
2	INV.INPUT	I	Inverting input
3	NON-INV.INPUT	I	Non-inverting input
4	V-	P	Negative power supply
5	OFFSET NULL	I	Bias (Zeroing terminal)
6	OUTPUT	O	Output
7	V+	P	Positive power supply
8	STROBE	I	Enable terminal

Functional Block Diagram



Note: Only the CA3140 features OFFSET NULL and STROBE pins.



Electrical characteristics

(unless otherwise specified: $V^+ = 15\text{ V}$, $V^- = -15\text{ V}$, $T_A = 25^\circ\text{C}$)

Parameter	Identification	Test conditions		CA3140			UNIT
				MIN	TYP	MAX	
Input offset voltage	V_{IO}			-	± 3	± 6	mV
Input offset voltage drift	$\Delta V_{IO}/\Delta T$			-	10	-	$\mu\text{V}/^\circ\text{C}$
Input offset current	I_{IO}			-	± 5	± 30	pA
Input bias current	I_{IB}			-	± 10	± 50	pA
Large-signal voltage gain	A_{OL}			70	100	-	dB
Common-mode rejection ratio	CMRR			70	90	-	dB
supply rejection ratio	PSRR			76	100	-	dB
Maximum output voltage	V_{OM+}			12	12.8	-	V
	V_{OM-}			-14	-14.4	-	V
Input resistance	R_I			-	1	-	$\text{T}\Omega$
Input capacitance	C_I			-	4	-	pF
Output resistance	R_O			-	60	-	Ω
Equivalent bandwidth input noise voltage	e_N	BW=140kHz, $R_s=1\text{ M}\Omega$		-	48	-	$\mu\text{ V}$
Equivalent Input Noise Voltage	e_N	$R_s=100\Omega$	$f=1\text{ kHz}$	-	40	-	$\text{nV}/\sqrt{\text{Hz}}$
			$f=10\text{ kHz}$	-	12	-	$\text{nV}/\sqrt{\text{Hz}}$
Input offset voltage adjustment resistor	/	Typical resistance value between pins 4&5 or 4&1 used to adjust maximum V_{IO} (only for CA3140)		-	4.7	-	k Ω
When the output goes low, the sink current flowing into pin 4 from pin 8	I_{sink}	(Target only CA3140)		-	220	-	μA
Short-circuit current of the reverse power supply	I_{OM+}		Source	-	45	-	mA
	I_{OM-}		Sink	-	18	-	mA
Gain-bandwidth product;	GBWP			-	4.5	-	MHz



Extreme operating conditions

(unless otherwise specified, $T_A = 25^{\circ}\text{C}$)

Parameter	Identification	value
Power supply voltage	Vcc	$\pm 18\text{V}$
Differential input voltage	ViD	$\pm 8\text{V}$
Input current	IIn	1 mA
Maximum operating junction temperature	Tj	150°C
Storage temperature	Ts	$-65 \sim +150^{\circ}\text{C}$
Lead temperature (soldering, 10s)	Tw	260°C

Recommended working conditions

(unless otherwise specified, $T = 25^{\circ}\text{C}$)

Parameter	Symbol	MIN	MAX	UNIT
Positive supply	V+	+5	+15	V
Negative supply	V-	-5	-15	V
Common-mode input voltage	V _{CM}	(V-)+4	(V +)-4	V
Operating temperature range	T _A	-40	+85	$^{\circ}\text{C}$
Operating junction temperature	T _J	-40	+125	$^{\circ}\text{C}$

Electrical characteristics

(unless otherwise specified: V+ = 15 V, V- = -15 V, $T_A = 25^{\circ}\text{C}$)

Parameter	Identification	Test conditions	CA3140			UNIT
			MIN	TYP	MAX	
conversion rate	SR		-	9	-	V/ μs
Dynamic response	t _r	R _L =2k Ω , C _L =100pF	Rise time		-	μs
	OS		Overshoot		-	%
The setup time at 10V _{p-p}	t _s	R _L =2k Ω , C _L =100pF Voltage Follower	To 1mV		-	μs
			To 10mV		-	μs
Power Current (per Channel)	I+		-	5	-	mA



Characteristic Curve

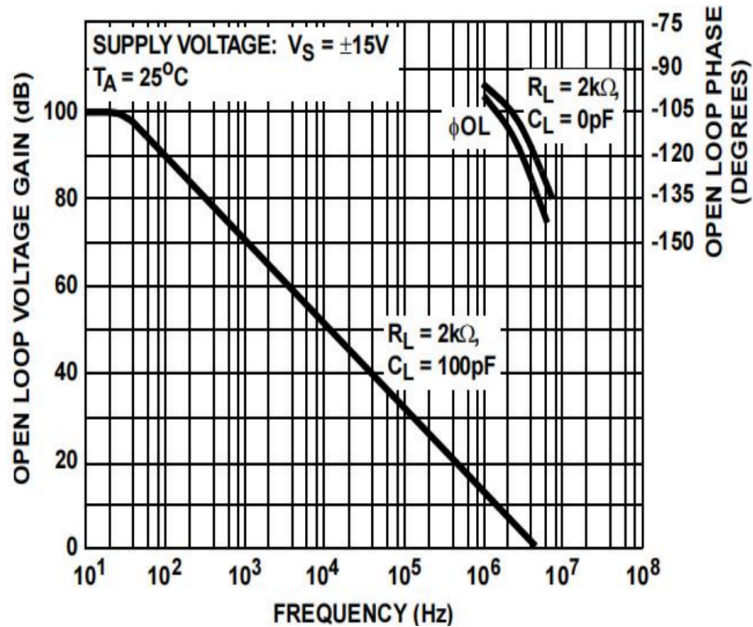


Figure 1: Relationship between open-loop voltage gain and phase versus frequency

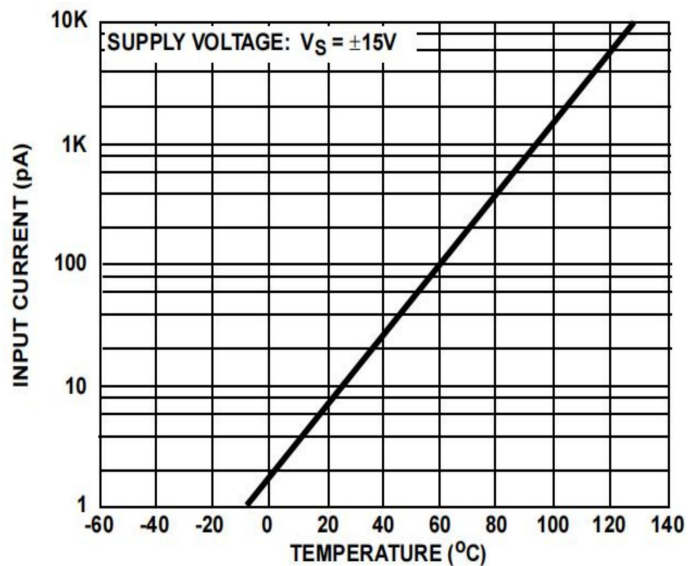


Figure 2: Relationship between input current and ambient temperature

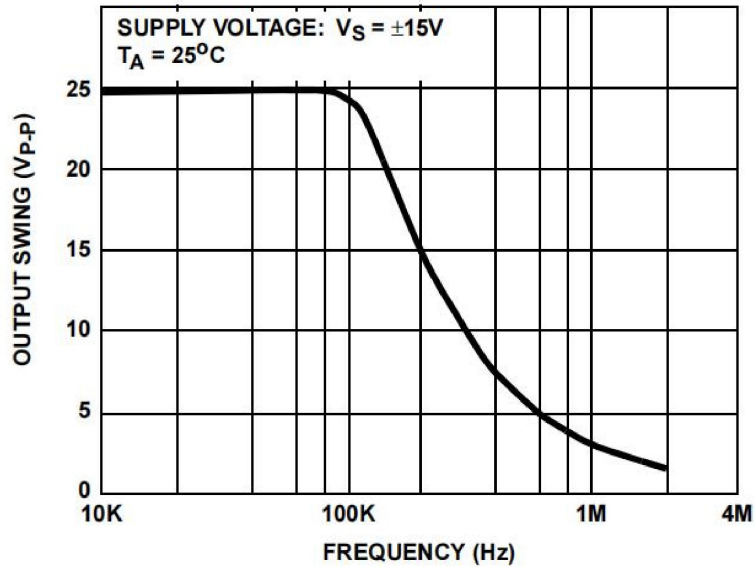


Figure 3: Relationship between maximum output voltage amplitude and frequency

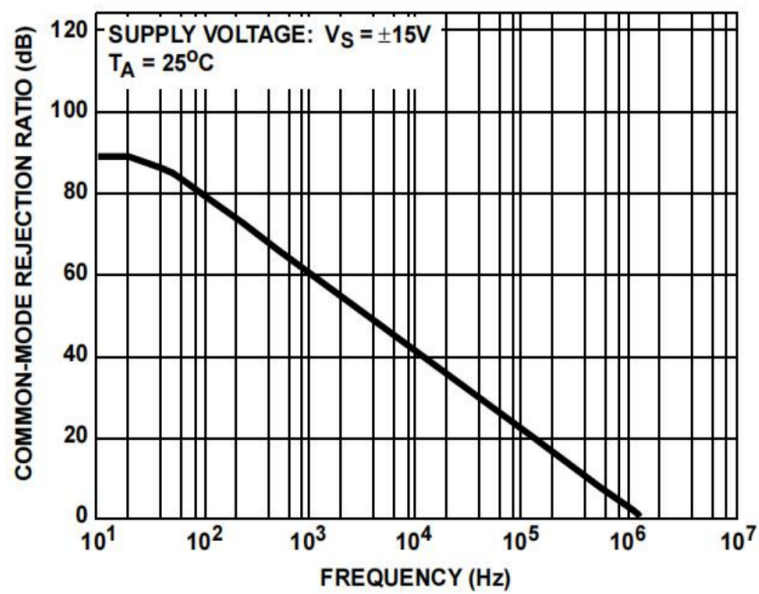


Figure 4: Relationship between common-mode rejection ratio and frequency



Typical Applications

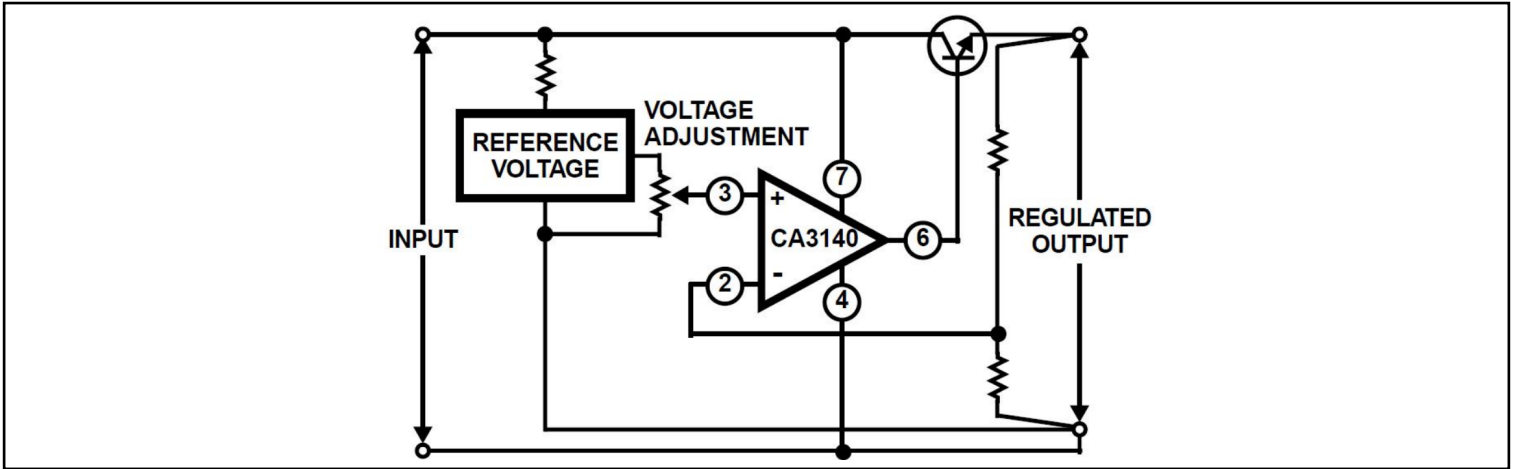


Figure 5: Basic Single-Source Voltage Regulator

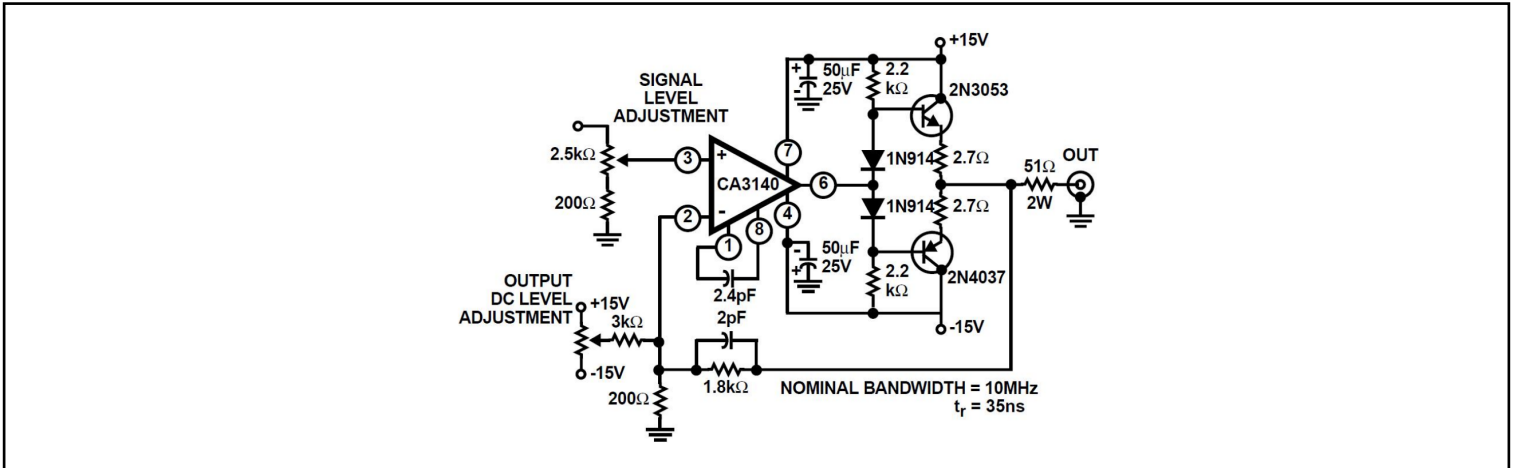


Figure 6: Broadband Output Amplifier

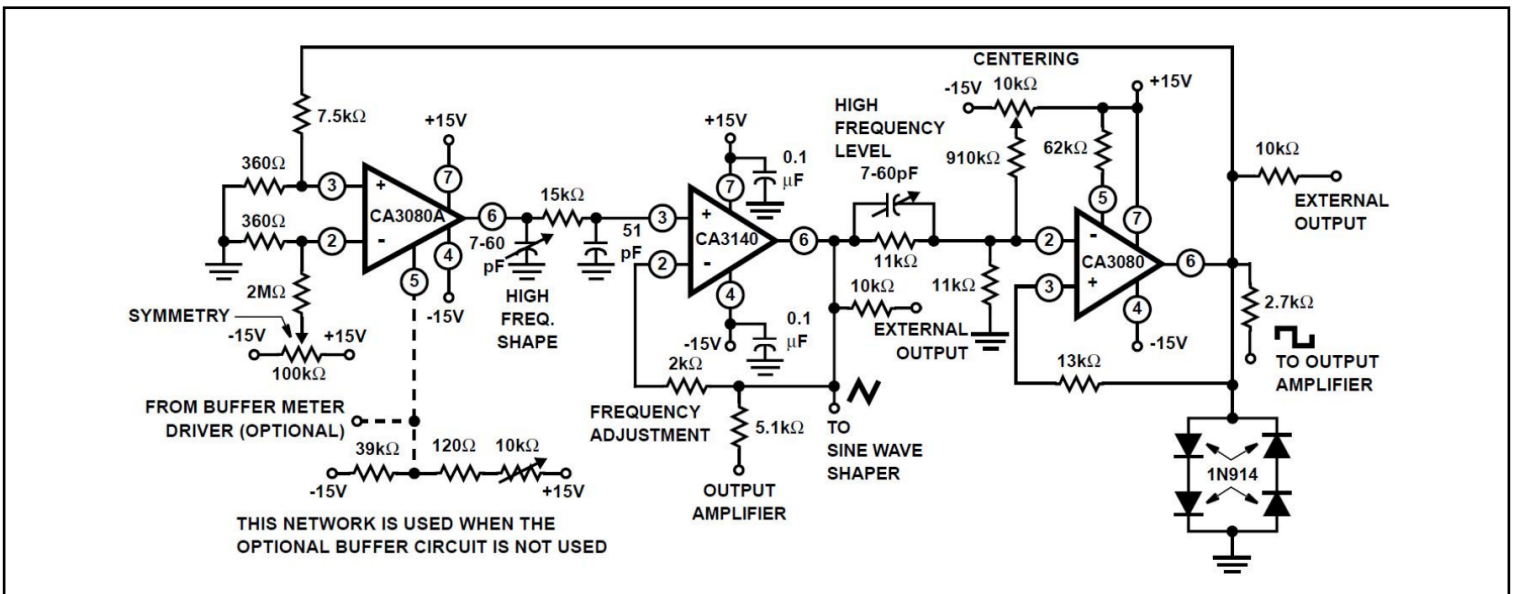


Figure 7 Super Scan Function Generator

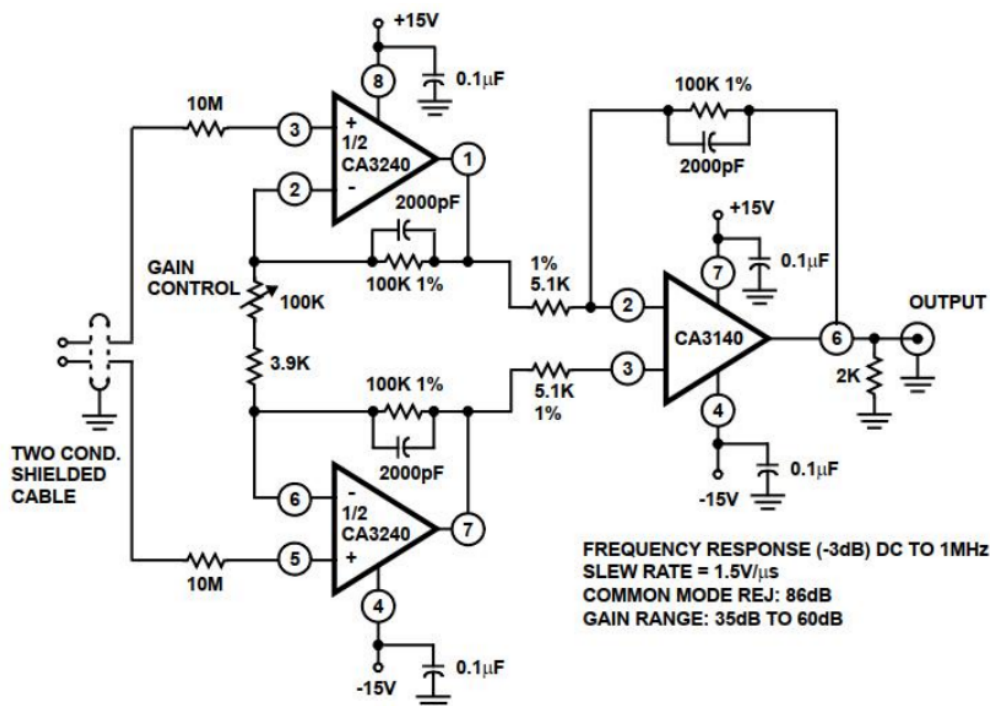


Figure 8: Precision Differential Amplifier

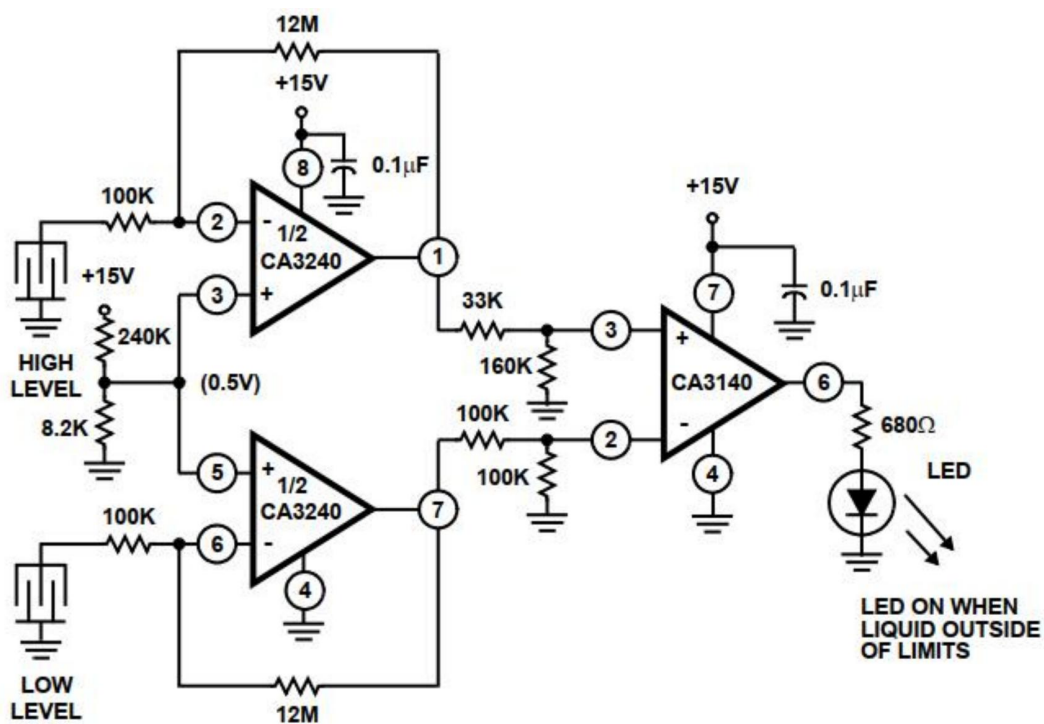
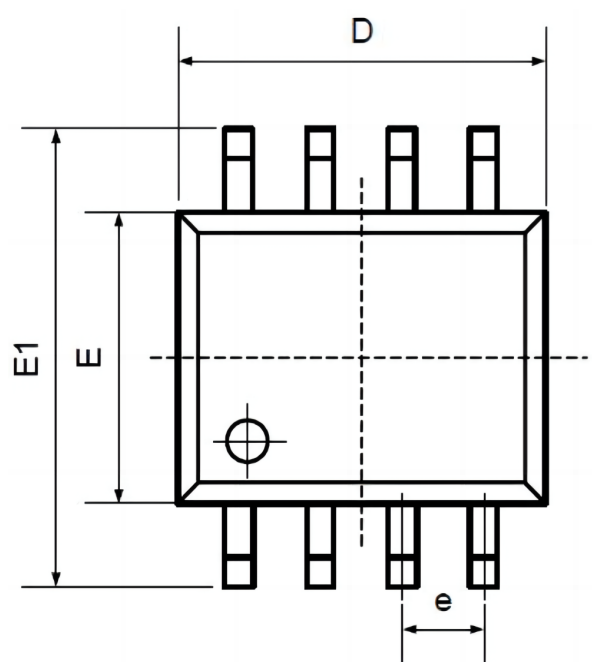
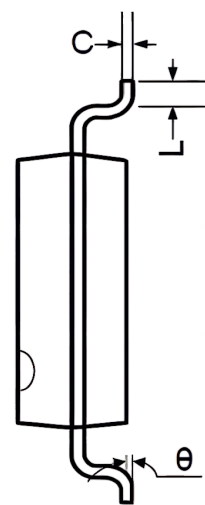


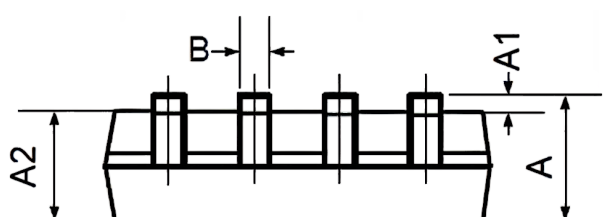
Figure 9: Dual-Level Detector



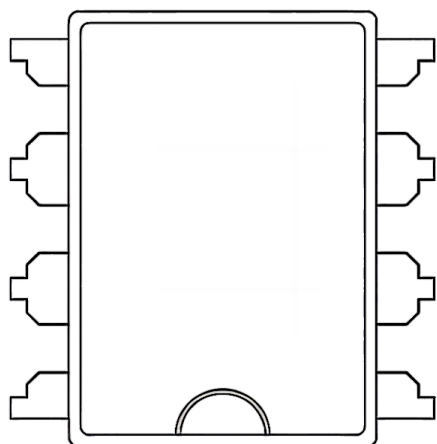
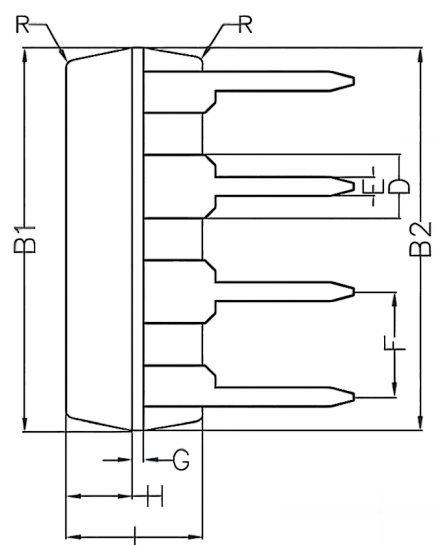
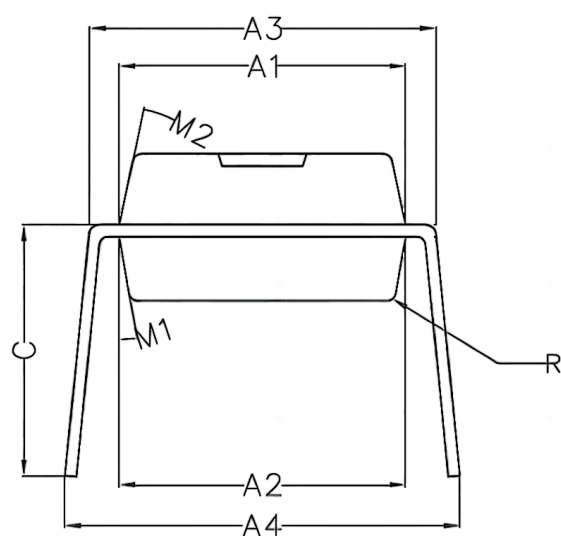
Package SOP8



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	1.350	1.750	0.053	0.069
A1	0.100	0.250	0.004	0.010
A2	1.350	1.550	0.053	0.061
B	0.330	0.510	0.013	0.020
C	0.190	0.250	0.007	0.010
D	4.780	5.000	0.188	0.197
E	3.800	4.000	0.150	0.157
E1	5.800	6.300	0.228	0.248
e	1.270TYP		0.050TYP	
L	0.400	1.270	0.016	0.050
θ	0°	8°	0°	8°



Package DIP8



Symbol	Min	Non	Max
A1	6.28	6.33	6.38
A2	6.33	6.38	6.43
A3	7.52	7.62	7.72
A4	7.80	8.40	9.00
B1	9.15	9.20	9.25
B2	9.20	9.25	9.30
C		5.57	
D		1.52	
E	0.43	0.45	0.47
F		2.54	
G		0.25	
H	1.54	1.59	1.64
I	3.22	3.27	3.32
R		0.20	
M1	9°	10°	11°
M2	11°	12°	13°



Order information

Order Number	Package	Package Quantity	Marking On The park	Temperature
CA3140EZ-TUDI	DIP8	Tube,50,A box of 2000	CA3140EZ	-40°C to +125°C
CA3140MZ96-TUDI	SOP8	Tape,Reel,4000	3140MZ	

*Pb-free PDIPs can be used for through hole wave solder processing only. They are not intended for use in Reflow solder processing applications.



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