CubicMos Class AB Stereo Headphone Driver with Mute CM3541A

The CM3541 is digital-source dual headphone amplifiers. The CM3541 has a fixed gain of 0dB and internal mute functions so that prevention of the popping source when power is turned on and off is greatly simplified. Also, these ICs are equipped with thermal shutdown circuits to prevent damage from short circuits.

Applications

Devices that use the headphone output from CD-ROMs, CDs, MDs, personal computers, notebook computers, camcorders, etc.

Features

1. Internal mute function to prevent popping sounds when the power is turned on and off.
2. Compact DIP8 packages.
3. High signal-to-noise ratio.
4. Low power consumption.
5. No switch ON/OFF clicks.
6. Large output Voltage swing.
7. Low distortion, high slew rate.
8. Excellent power supply ripple rejection.
9. Integrated voltage divider(VDD/2) to eliminate external resistors.

Block diagram

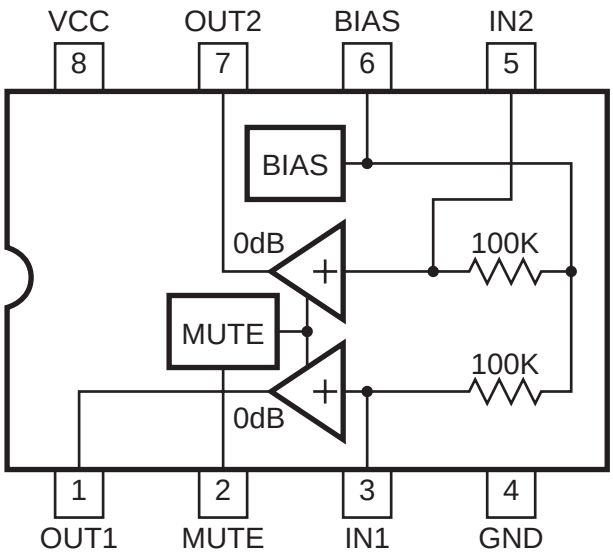


Fig. 1

Absolute maximum ratings (Ta=25°C)

Parameter	Symbol	Limits	Unit
Applied voltage	Vmax	9	V
Power dissipation	Pd	450*	mW
Operating temperature	Topr	-25 ~ +75	°C
Storage temperature	Tstg	-55 ~ +125	°C

Recommanded operating conditions (Ta=25°C)

Parameters	Symbol	Min.	Typ.	Max.	Unit
Power supply voltage	Vcc	2.0	--	7.0	V

Electrical characteristics (unless otherwise noted, Ta=25°C, Vcc=5.0V, R_L=32Ω,V_{IN}=0dBV, f=1KHz)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
Quiescent current	I_Q		250	300	uA	V_{IN}=0V
Supply current	I_S		2.5	5.0	mA	
Mute pin control voltage	V_{TM}	0.5	0.8	1.2	V	
Voltage gain	G_{VC}	-2	0	2	dB	
Voltage gain difference between channels	ΔG_{VC}	-0.5	0	0.5	dB	
Total harmonic distortion	THD	-	0.02	0.1	%	BW=20~20KHz
Rated output 1	P_{O1}	45	60	-	mW	R_L=32Ω, THD<0.1%
Rated output 2	P_{O2}	70	80	-	mW	R_L=16Ω, THD<0.1%
Output noise voltage	V_{NO}	-	-93	-85	dBV	BW=20~20KHz, Rg=0Ω
Channel separation	CS	82	90	-	dB	Rg=0Ω
Mute attenuation	ATT	70	80	-	dB	Rg=0Ω
Ripple rejection	RR	50	60	-	dB	f_{RR}=100Hz, V_{RR}=20dBV
Input resister		50K	100K	200K	Ω	

Application example circuit

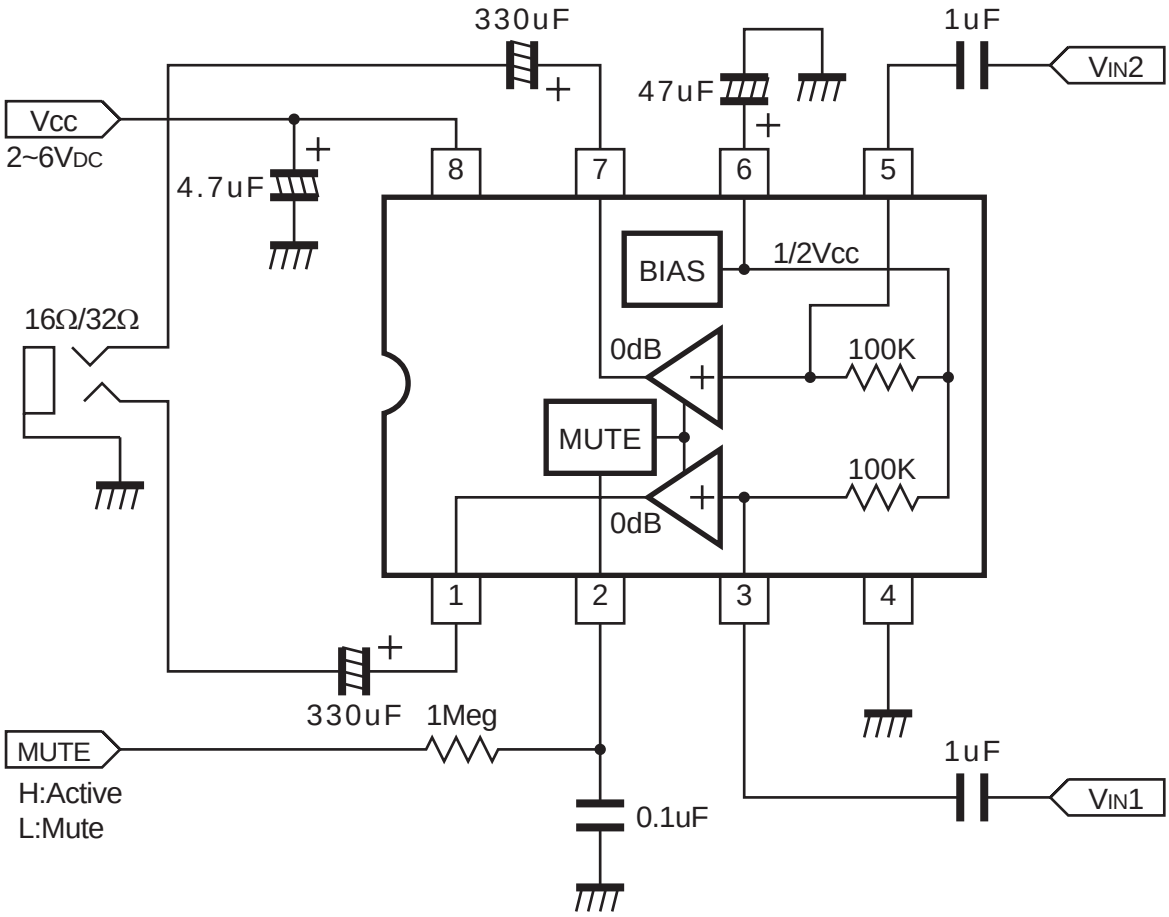
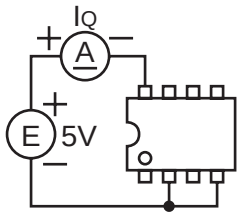


Fig. 2

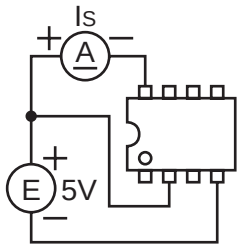
Measurement procedure

All chips from CubicMOS have passed the following test procedures.

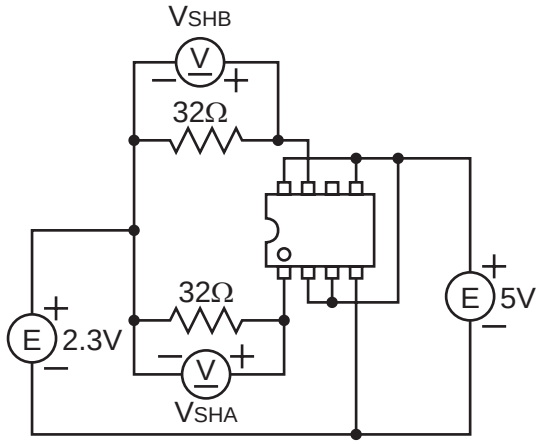
(1) Quiescent current measurement



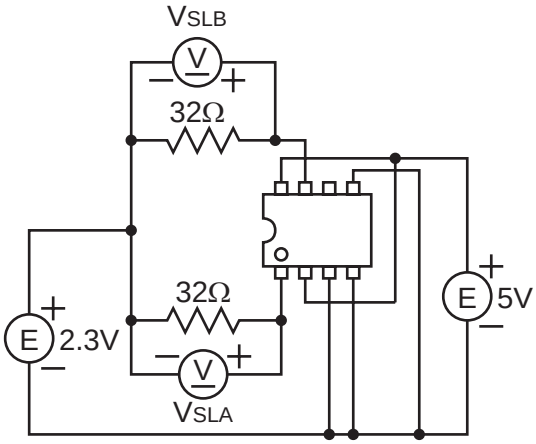
(2) Supply current measurement



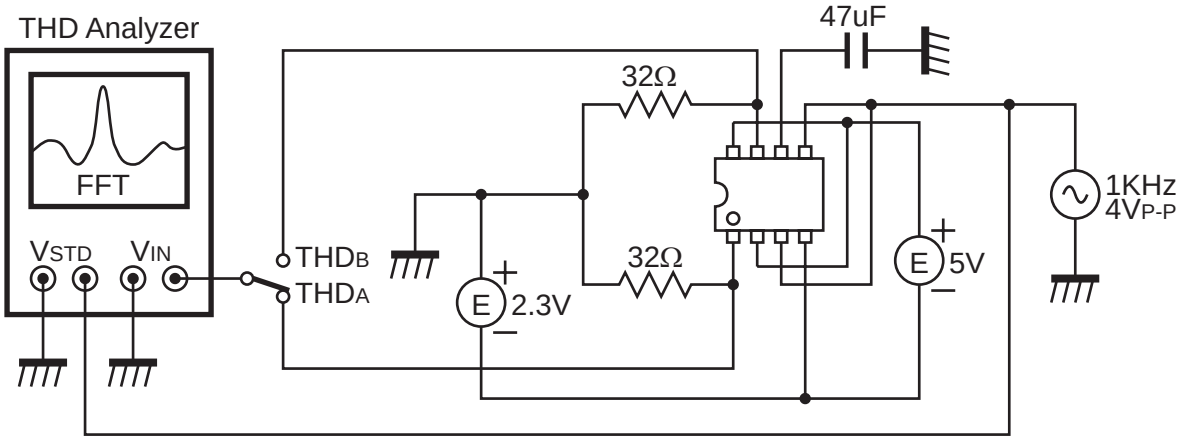
(3) Output swing voltage measurement (output high)



(4) Output swing voltage measurement (output low)



(5) Distortion measurement



Electrical actual test result (1/3)

Item	I_Q(mA)	I_S(mA)	VSHA	VSHB	THDA(%)	VSLA	VSLB	THDB(%)
1	0.2856	2.4594	1.8469	-1.8823	0.01	1.7978	-1.7947	0.09
2	0.2862	2.4554	1.8463	-1.8814	0.01	1.8021	-1.795	0.05
3	0.2596	2.6071	1.8585	-1.8982	0.01	1.778	-1.7862	0.08
4	0.2639	2.3529	1.8637	-1.8851	0.01	1.8176	-1.8051	0.06
5	0.2782	2.3669	1.8356	-1.8854	0.01	1.7673	-1.7969	0.09
6	0.2688	2.3428	1.8225	-1.8857	0.01	1.7542	-1.774	0.09
7	0.2611	2.4295	1.8329	-1.8854	0.02	1.8146	-1.796	0.06
8	0.2514	2.5238	1.8729	-1.904	0.01	1.8076	-1.7896	0.09
9	0.2672	2.4954	1.8094	-1.8851	0.02	1.7667	-1.788	0.03
10	0.2462	2.4854	1.81	-1.8488	0.01	1.8118	-1.8057	0.02
11	0.2526	2.2751	1.8683	-1.8976	0.02	1.7871	-1.7703	0.03
12	0.2538	2.2607	1.8494	-1.8967	0.02	1.8005	-1.8076	0.05
13	0.2618	2.6041	1.8668	-1.8958	0.02	1.813	-1.8066	0.06
14	0.2434	2.2964	1.8616	-1.8961	0.01	1.8176	-1.8039	0.02
15	0.2679	2.4088	1.868	-1.8823	0.03	1.8237	-1.814	0.09
16	0.2505	2.3422	1.857	-1.9019	0.03	1.8399	-1.795	0.05
17	0.2556	2.4377	1.8057	-1.8661	0.01	1.7697	-1.7554	0.03
18	0.2718	2.4426	1.7969	-1.8967	0.02	1.7502	-1.7654	0.07
19	0.2523	2.41	1.8817	-1.8967	0.01	1.7996	-1.7862	0.07
20	0.2444	2.2827	1.8735	-1.8954	0.02	1.8039	-1.8057	0.09
21	0.2575	2.4002	1.8393	-1.8713	0.02	1.7993	-1.8011	0.02
22	0.27	2.417	1.8753	-1.8436	0.02	1.7816	-1.7548	0.09
23	0.2624	2.4057	1.842	-1.8924	0.02	1.7969	-1.8027	0.09
24	0.2721	2.5714	1.8735	-1.8994	0.03	1.8112	-1.7987	0.01
25	0.2596	2.514	1.8646	-1.8848	0.02	1.835	-1.8088	0.04
26	0.2575	2.3901	1.8918	-1.8903	0.02	1.817	-1.8069	0.09
27	0.2575	2.3413	1.8573	-1.9043	0.02	1.8185	-1.8109	0.1
28	0.2495	2.4451	1.8759	-1.8988	0.02	1.8243	-1.8097	0.09
29	0.2621	2.3904	1.861	-1.8915	0.02	1.788	-1.7874	0.07
30	0.2828	2.3459	1.8625	-1.8985	0.01	1.8204	-1.8024	0.07
31	0.2758	2.4179	1.8533	-1.8808	0.1	1.8207	-1.81	0.05
32	0.2785	2.4994	1.8536	-1.8951	0.02	1.8161	-1.8103	0.08
33	0.2831	2.2232	1.8536	-1.8921	0.02	1.8073	-1.8112	0.04
34	0.2529	2.3703	1.8866	-1.9009	0.02	1.8198	-1.8036	0.06

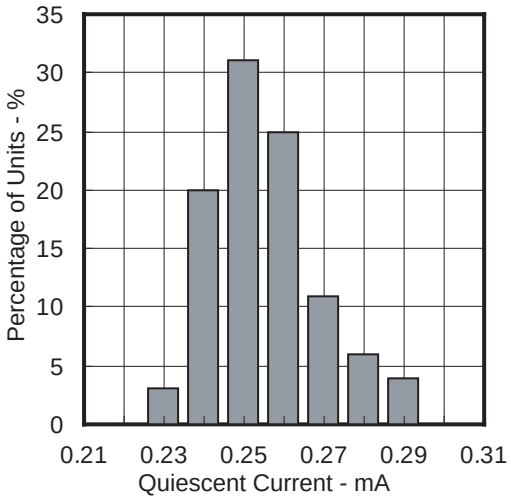
Electrical actual test result (2/3)

Item	I_Q(mA)	I_S(mA)	VSHA	VSHB	THDA(%)	VSLA	VSLB	THDB(%)
35	0.2648	2.3001	1.8497	-1.9	0.01	1.8109	-1.806	0.06
36	0.2618	2.4707	1.8494	-1.8698	0.02	1.8213	-1.7996	0.05
37	0.2358	2.5641	1.8832	-1.8909	0.02	1.8503	-1.8164	0.03
38	0.2526	2.6111	1.8735	-1.8896	0.01	1.8463	-1.8118	0.02
39	0.2523	2.4722	1.861	-1.9003	0.01	1.8445	-1.813	0.01
40	0.2447	2.3502	1.8735	-1.8945	0.02	1.8356	-1.8121	0.01
41	0.2358	2.4908	1.8784	-1.8973	0.01	1.8378	-1.8094	0.02
42	0.2352	2.5119	1.8826	-1.9055	0.01	1.8372	-1.81	0.1
43	0.2425	2.3807	1.8695	-1.9	0.01	1.8326	-1.8112	0.02
44	0.2395	2.3355	1.8817	-1.8994	0.07	1.8298	-1.8127	0.02
45	0.2651	2.6605	1.8735	-1.8826	0.01	1.8271	-1.8082	0.05
46	0.2514	2.2964	1.8619	-1.9019	0.02	1.8295	-1.8124	0.07
47	0.2511	2.3892	1.8573	-1.8991	0.02	1.8237	-1.8167	0.06
48	0.2462	2.3569	1.8674	-1.9003	0.01	1.8323	-1.8121	0.02
49	0.2547	2.4527	1.8753	-1.8997	0.01	1.8457	-1.8085	0.04
50	0.2465	2.3526	1.8735	-1.897	0.01	1.8176	-1.8106	0.09
51	0.2419	2.2842	1.871	-1.8991	0.02	1.8192	-1.8106	0.09
52	0.2441	2.5684	1.8665	-1.8948	0.01	1.8274	-1.8155	0.09
53	0.2383	2.3566	1.8793	-1.8954	0.02	1.8265	-1.8121	0.02
54	0.2572	2.3764	1.8753	-1.9006	0.02	1.8274	-1.8103	0.06
55	0.2376	2.4631	1.893	-1.8945	0.03	1.8417	-1.8155	0.07
56	0.2358	2.3257	1.8613	-1.8954	0.02	1.8298	-1.8127	0.07
57	0.2422	2.291	1.8695	-1.8945	0.02	1.8307	-1.8143	0.1
58	0.255	2.576	1.8802	-1.9003	0.01	1.832	-1.81	0.02
59	0.2425	2.5015	1.8781	-1.9003	0.01	1.8353	-1.8146	0.09
60	0.2273	2.2964	1.8835	-1.9016	0.02	1.8481	-1.8027	0.03
61	0.2453	2.4136	1.8762	-1.8695	0.02	1.832	-1.8124	0.01
62	0.2505	2.287	1.8652	-1.9019	0.02	1.8188	-1.8115	0.05
63	0.2352	2.4527	1.8829	-1.8777	0.02	1.8307	-1.8146	0.06
64	0.2364	2.3962	1.871	-1.8958	0.02	1.8127	-1.8069	0.06
65	0.2532	2.2491	1.8661	-1.8991	0.01	1.8182	-1.8127	0.08
66	0.2511	2.338	1.8613	-1.8826	0.01	1.8259	-1.8164	0.03
67	0.2492	2.5784	1.8661	-1.8979	0.02	1.832	-1.81	0.02
68	0.2499	2.3001	1.8695	-1.8973	0.02	1.8231	-1.8167	0.1

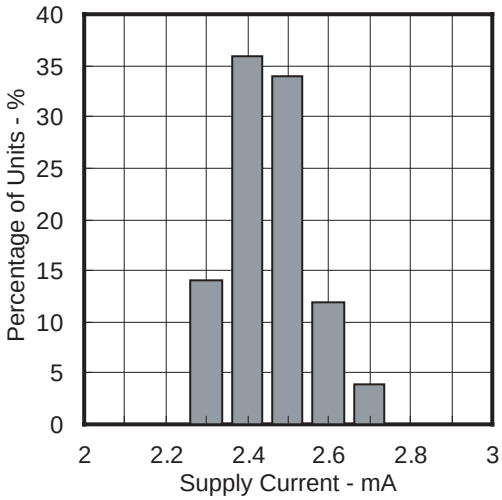
Electrical actual test result (3/3)

Item	I_Q(mA)	I_S(mA)	VSHA	VSHB	THDA(%)	VSLA	VSLB	THDB(%)
69	0.241	2.3453	1.8805	-1.8994	0.01	1.8527	-1.8011	0.04
70	0.2477	2.3206	1.8777	-1.8951	0.02	1.8262	-1.8051	0.01
71	0.2322	2.3965	1.8698	-1.8997	0.01	1.8338	-1.8143	0.05
72	0.2486	2.3615	1.8765	-1.9034	0.01	1.8338	-1.8109	0.02
73	0.2456	2.4857	1.8823	-1.8967	0.01	1.8231	-1.8149	0.08
74	0.2395	2.261	1.8866	-1.8994	0.02	1.8436	-1.8146	0.1
75	0.2465	2.4829	1.8741	-1.8967	0.01	1.8268	-1.8073	0.02
76	0.2322	2.3257	1.8692	-1.9016	0.01	1.8274	-1.8005	0.02
77	0.2404	2.3044	1.8781	-1.8973	0.02	1.8381	-1.8134	0.09
78	0.2413	2.3239	1.8747	-1.8985	0.01	1.8469	-1.8134	0.02
79	0.2401	2.28	1.8826	-1.8985	0.01	1.8365	-1.8158	0.09
80	0.2523	2.4069	1.8713	-1.8991	0.01	1.8323	-1.8112	0.02
81	0.2483	2.2595	1.8643	-1.8997	0.01	1.8292	-1.8121	0.1
82	0.2358	2.3523	1.8686	-1.8961	0.02	1.8298	-1.813	0.1
83	0.2355	2.309	1.8719	-1.8985	0.01	1.8274	-1.8097	0.03
84	0.2288	2.4039	1.8784	-1.8961	0.02	1.8295	-1.8149	0.08
85	0.2398	2.3065	1.8652	-1.9016	0.01	1.8262	-1.8082	0.01
86	0.2428	2.5049	1.8881	-1.9012	0.02	1.821	-1.81	0.1
87	0.2459	2.424	1.8802	-1.8945	0.02	1.8338	-1.8134	0.02
88	0.248	2.3981	1.8777	-1.9009	0.06	1.8408	-1.8134	0.02
89	0.2315	2.42	1.8817	-1.8985	0.02	1.8222	-1.8103	0.08
90	0.2224	2.3688	1.8723	-1.8973	0.01	1.8497	-1.8127	0.02
91	0.2386	2.446	1.8771	-1.8958	0.02	1.8341	-1.813	0.09
92	0.2434	2.4854	1.8646	-1.9003	0.01	1.8185	-1.813	0.07
93	0.2364	2.4362	1.8756	-1.8964	0.01	1.8307	-1.8134	0.06
94	0.2315	2.3672	1.8616	-1.8976	0.02	1.8359	-1.8073	0.03
95	0.2468	2.5784	1.8796	-1.8964	0.02	1.8448	-1.8137	0.03
96	0.2431	2.4167	1.8732	-1.8997	0.01	1.8256	-1.8088	0.09
97	0.2358	2.421	1.8762	-1.9012	0.01	1.8188	-1.8106	0.09
98	0.2538	2.5436	1.8781	-1.9003	0.01	1.8219	-1.8143	0.09
99	0.2407	2.3285	1.8704	-1.8979	0.01	1.828	-1.8088	0.05
100	0.252	2.4335	1.879	-1.8921	0.01	1.8262	-1.8112	0.06

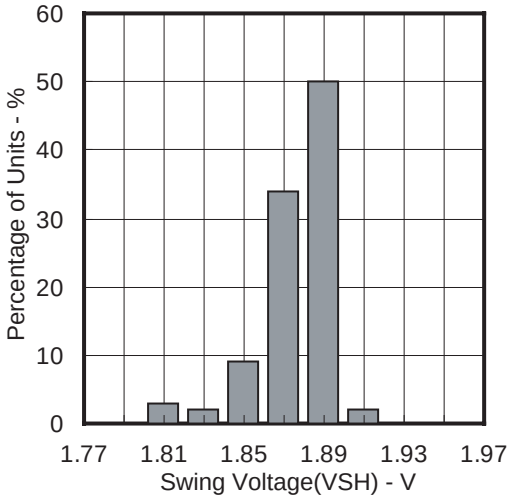
Distribution of CM3541 Quiescent Current



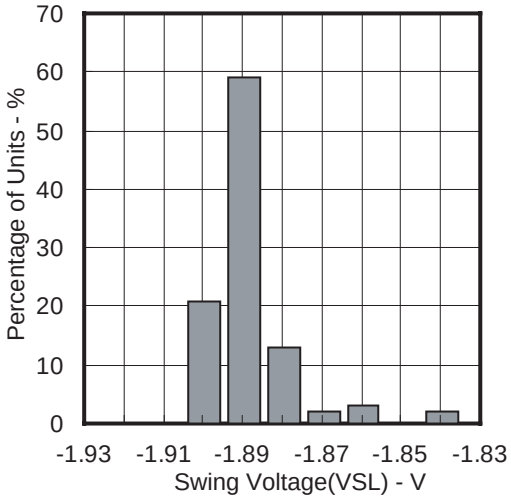
Distribution of CM3541 Supply Current



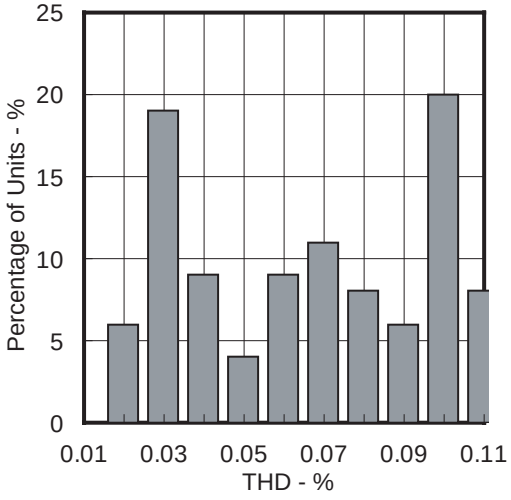
Distribution of CM3541 Swing Voltage(VSH)



Distribution of CM3541 Swing Voltage(VSL)

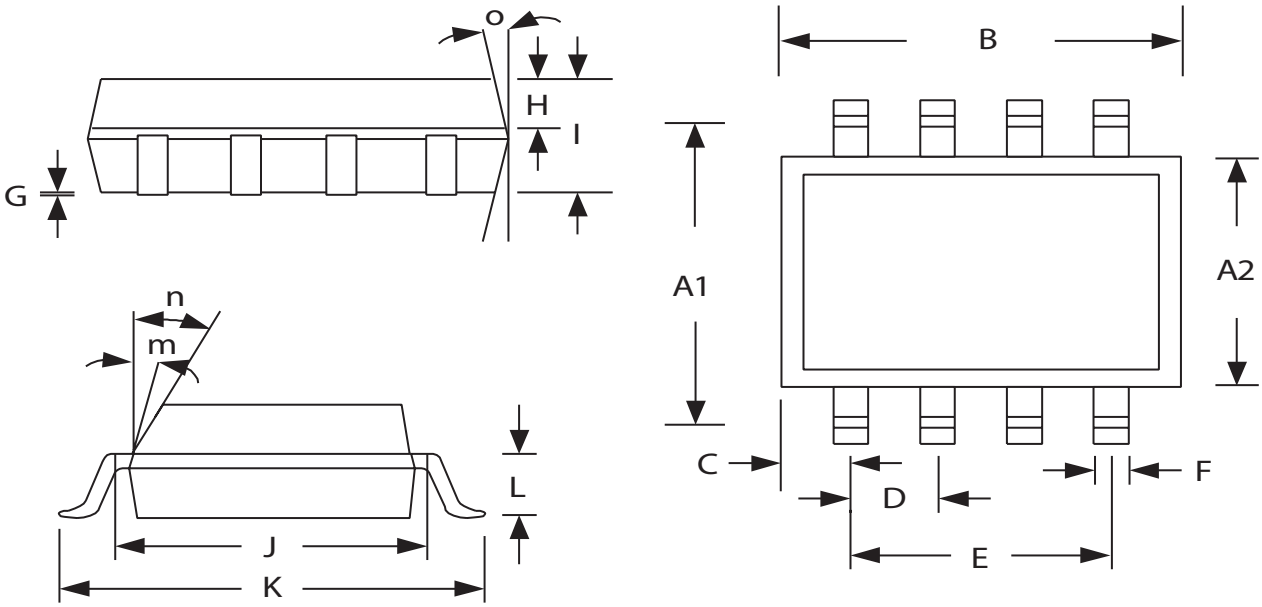


Distribution of CM3541 THD



CubicMos Class AB Stereo Headphone Driver with Mute CM3541A

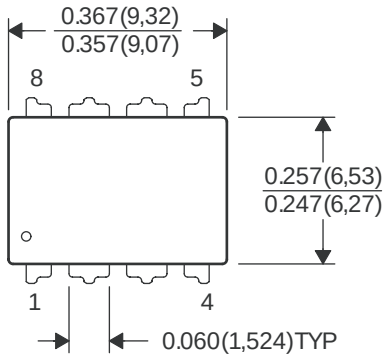
Packaging Information SOP8/150mil

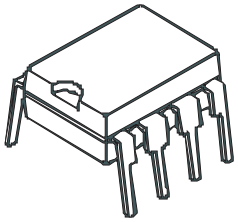


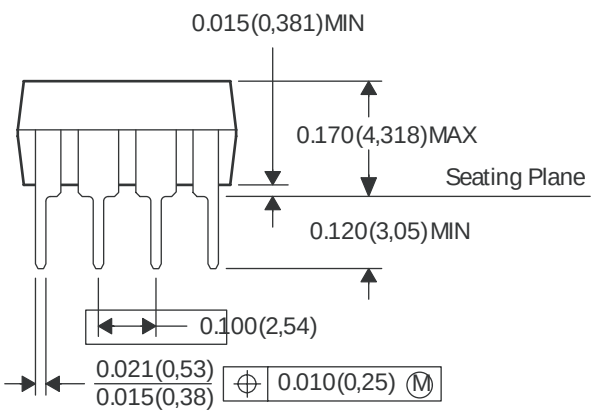
DIM	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A1	4.80	5.00	0.190	0.200
A2	3.80	4.00	0.149	0.157
B	4.80	5.00	0.189	0.196
C	0.558		0.022	
D	1.2BSC		0.050BSC	
E	3.810		0.150	
F	0.33	0.51	0.013	0.069
G	0.152	0.202	0.006	0.008
H	0.406		0.016	
I	1.35	1.75	0.053	0.069
J	4.496	4.623	0.177	0.182
K	5.994	6.197	0.236	0.244
L	0.939		0.037	
m	7°		7°	
n	45°		45°	
o	8°		8°	

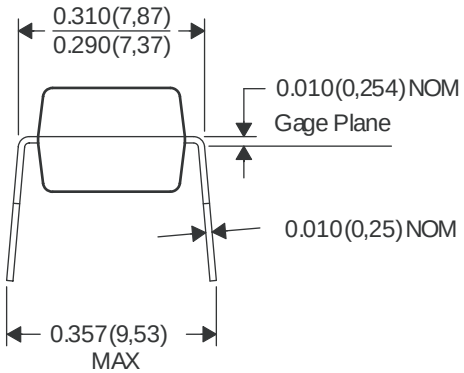
Packaging Information

8-Lead Plastic Dual In-Line Package Type P (DIP8)





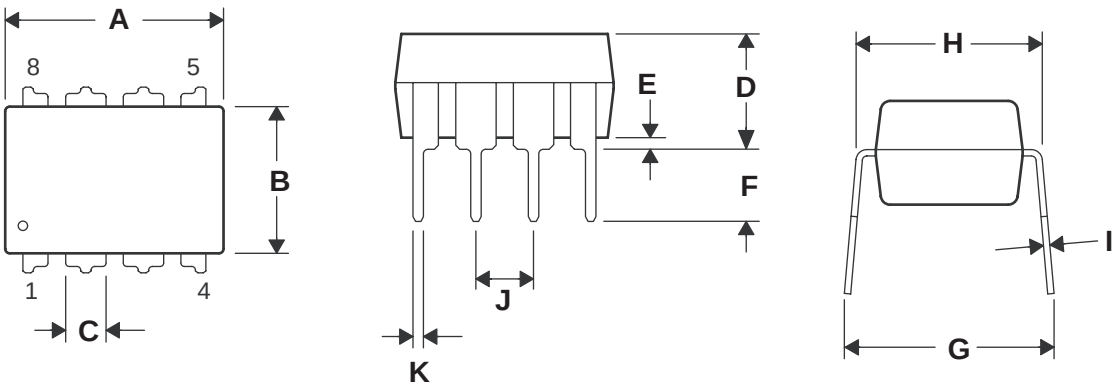




NOTE: All dimensions in Inches (in parenthesis in Millimeters)

Packaging Information

DIP-8 Package Outline Dimensions for 10 pcs:



No.	A	B	C	D	E	F	G	H	I	J	K
1	9.31	6.33	1.61	3.87	0.57	3.21	9.11	7.92	0.25	2.54	0.47
2	9.3	6.48	1.61	3.88	0.58	3.2	9.15	7.99	0.25	2.54	0.47
3	9.31	6.3	1.63	3.87	0.58	3.21	9.05	7.91	0.25	2.54	0.47
4	9.3	6.5	1.62	3.87	0.57	3.22	9.2	7.93	0.25	2.54	0.47
5	9.3	6.31	1.63	3.88	0.59	3.2	9.13	7.93	0.25	2.54	0.47
6	9.31	6.5	1.61	3.9	0.61	3.18	9.12	7.95	0.25	2.54	0.47
7	9.29	6.5	1.62	3.87	0.57	3.21	9.16	7.91	0.25	2.54	0.47
8	9.3	6.28	1.62	3.92	0.62	3.17	9.15	7.95	0.25	2.54	0.47
9	9.31	6.51	1.63	3.87	0.58	3.22	9.15	7.99	0.25	2.54	0.47
10	9.31	6.35	1.61	3.87	0.57	3.22	9.17	7.92	0.25	2.54	0.47

NOTE: All dimensions in Millimeters