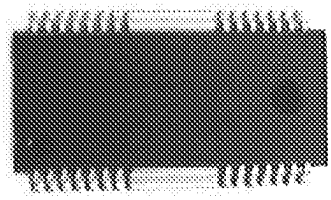
4-CH MOTOR DRIVER

The KA9258D is a monolithic integrated circuit, and suitable for 4-CH motor driver which drives tracking actuator, focus actuator, sled motor and loading motor of CD/CD-ROM/DVD system, and can also drive spindle motor of CD system.

28-SSOPH-375



FEATURES

- 1-phase, full-wave, linear DC motor driver
- Output gain adjustable
- Built in OP-amp
- Built in mute function
- Built in level shift circuit
- Built in thermal shutdown function
- Operating range 6~13.2V

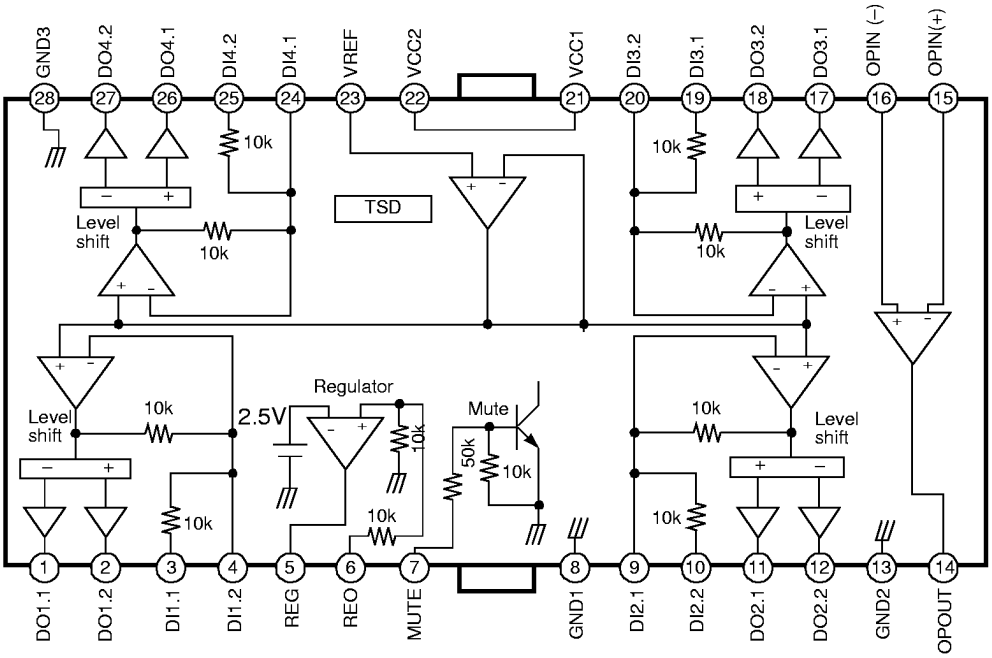
ORDERING INFORMATION

Device	Package	Operating Temperature
KA9258D	28-SSOPH-375	–40°C ~ +85°C

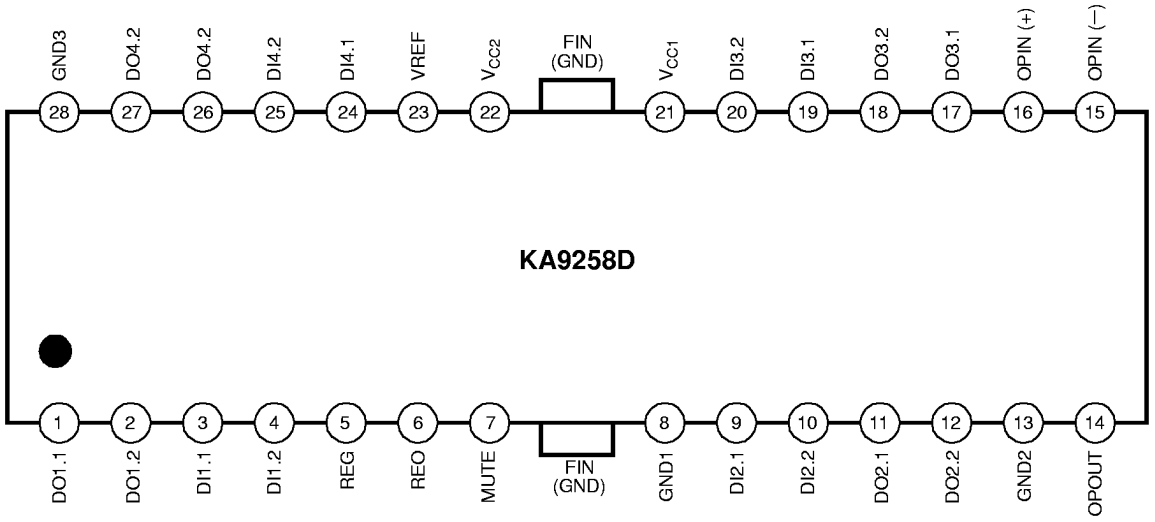
TARGET APPLICATION

- CD-PLAYER
- VIDEO-CD
- CAR-CD

BLOCK DIAGRAM



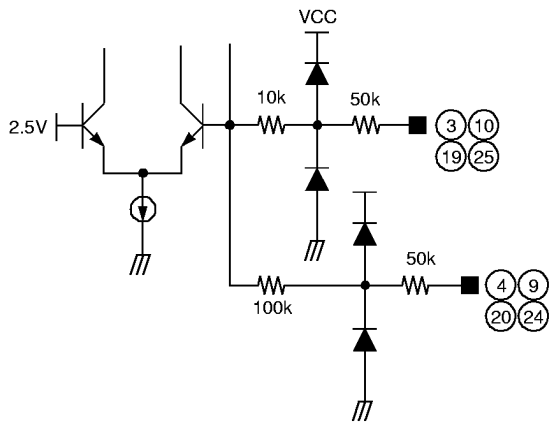
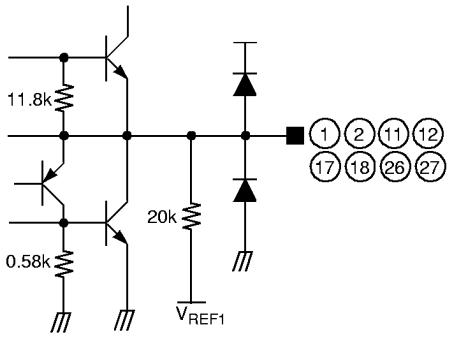
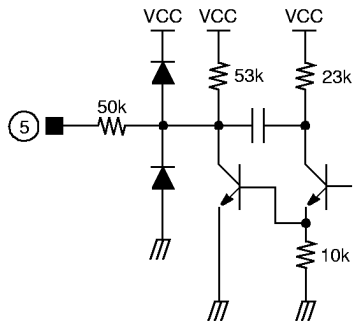
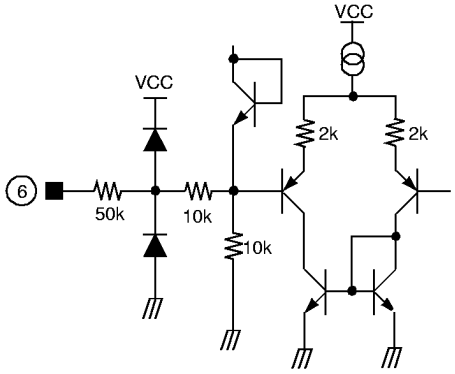
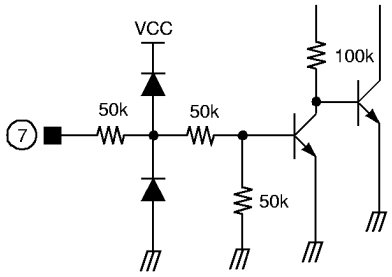
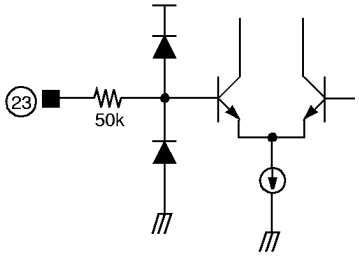
PIN CONFIGURATION



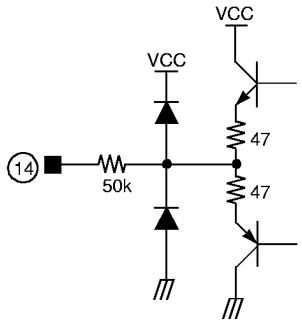
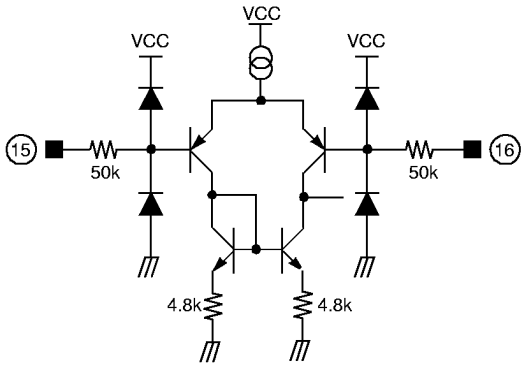
PIN DESCRIPTION

Pin No.	Symbol	I/O	Description	Pin No.	Symbol	I/O	Description
1	DO1.1	O	Drive output	15	OPIN(–)	I	Op-amp input (–)
2	DO1.2	O	Drive output	16	OPIN(+)	I	Op-amp input (+)
3	DI1.1	I	Drive input	17	DO3.1	O	Drive output
4	DI1.2	I	Drive input	18	DO3.2	O	Drive output
5	REG	–	Regulator	19	DI3.1	I	Drive input
6	REO	O	Regulator output	20	DI3.2	I	Drive input
7	MUTE	I	Mute	21	V_{CC1}	–	Supply voltage
8	GND1	–	Ground 1	22	V_{CC2}	–	Supply voltage
9	DI2.1	I	Drive input	23	VREF	I	2.5V bias voltage
10	DI2.2	I	Drive input	24	DI4.1	I	Drive input
11	DO2.1	O	Drive output	25	DI4.2	I	Drive input
12	DO2.2	O	Drive output	26	DO4.1	O	Drive output
13	GND2	–	Ground 2	27	DO4.2	O	Drive output
14	OPOUT	O	Op-amp output	28	GND3	–	Ground 3

EQUIVALENT CIRCUITS

Driver input	Driver output
	
Regulator	**Regulator output**
	
Mute input	**Bias input**
	

EQUIVALENT CIRCUITS

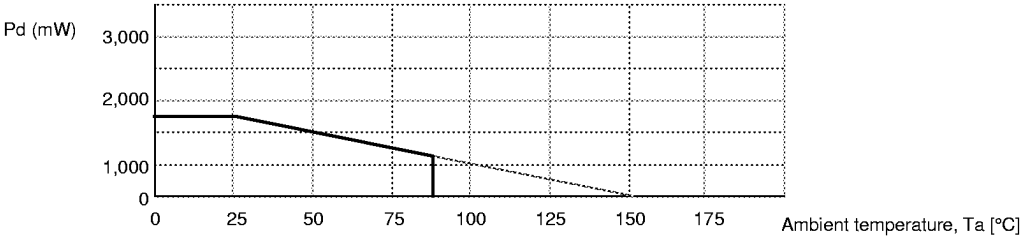
Op amp output	Op amp input
	

ABSOLUTE MAXIMUM RATING (Ta=25°C)

Characteristics	Symbol	Value	Unit
Supply voltage	V_{CC}	18	V
Power dissipation	P_D	1.7[note]	W
Operating temperature	T_{OPR}	−40 ~ +85	°C
Storage temperature	T_{STG}	−55 ~ +150	°C
Maximum output current	I_{OMAX}	1	A

NOTE:@

1. When mounted on 76.2mm × 114mm × 1.57mm PCB (Phenolic resin material).
2. Power dissipation reduces 13.6mW / °C for using above Ta=25°C
3. Do not exceed Pd and SOA.



RECOMMENDED OPERATING CONDITION (Ta=25°C)

Characteristics	Symbol	Value	Unit
Operating supply voltage	V_{OPR}	6 ~ 13.2	V

ELECTRICAL CHARACTERISTICS (Ta=25°C, V_{CC}=8V, unless otherwise specified)

A. REGULATOR PART

Characteristic	Symbol	Test conditions	Min.	Typ.	Max.	Unit
Regulator output voltage	V_{REG}	I_L=100mA	4.75	5	5.25	V
Load regulation	ΔV_{RL}	I_L=0 ~ 200mA	–40.0	0	10.0	mV
Line regulation	ΔV_{CC}	I_L=200mA, V_{CC}=6 ~ 9V	–10.0	0	20.0	mV

B. DRIVE PART

Characteristic	Symbol	Test conditions	Min.	Typ.	Max.	Unit
Quiescent circuit current	I_{CCQ}	V_I=0	5.5	9.5	13.5	mA
Input bias current	I_{BOP}	V_I=0	–	–	300	nA
Input offset voltage	V_{OFOP}	–	–5.0	0	5.0	mV
Output offset voltage	V_{OO}	–	–30	0	30	
Maximum sink current	I_{SINK}	R_L=4Ω, V_{CC}	0.5	0.8	–	A
Maximum source current	I_{SOURCE}	R_L=4Ω, GND	0.5	0.8	–	
Maximum output voltage	V_{OM}	V_I=2V_{RMS}, 1kHz	2.5	3.0	–	V
Closed loop voltage gain	A_{VF}	V_I=0.1V_{RMS}, 1kHz	4.5	6.5	7.5	dB
Ripple rejection ratio	RR	V_I=–20dB, 120Hz	60.0	80.0	–	
Slew rate	SR	100Hz, Square wave	1.0	2.0	–	V / µs

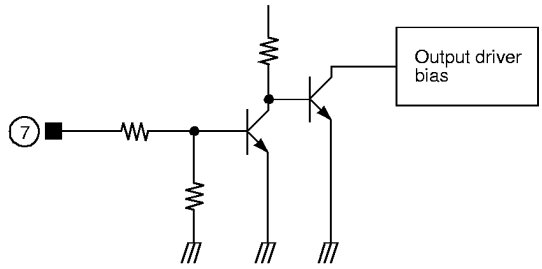
C. OP AMP PART

Characteristic	Symbol	Test conditions	Min.	Typ.	Max.	Unit
Input offset voltage	V_{OF1}	–	–5	–	+5	mA
Input bias current	I_{B1}	–	–	–	300	nA
High level output voltage	V_{OH1}	–	6	–	–	V
Low level output voltage	V_{OL1}	–	–	–	1.8	V
Output sink current	I_{SINK1}	RL=50Ω, GND	10	40	–	mA
Output source current	IS_{OURCE1}	RL=50Ω, V_{CC}	10	50	–	mA
Open loop voltage gain	G_{VO1}	V_{IN}=–75dB, f=1kHz	65	78	–	dB
Ripple rejection ratio	RR1	V_{IN}=–20dB, f=120kHz	50	70	–	dB
Slew Rate	SR1	Square, V_{OUT}=2Vp-p, f=120kHz	0.5	1	–	V / µs
Common mode rejection ratio	CMRR1	V_{IN}=–20dB, f=1kHz	70	84	–	dB

APPLICATION INFORMATION

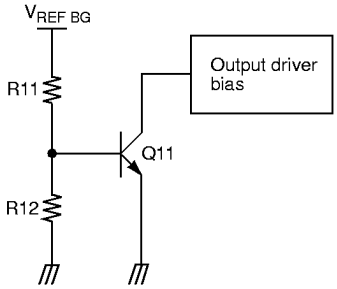
1. MUTE

Pin #7	Mute circuit
High	Turn-off
Low	Turn-on
Open	Turn-on



- When the mute pin #7 is open or the voltage of the mute pin #7 is below 0.5V, the mute circuit is activated so that the output circuit will be muted.
- When the voltage of the mute pin is above 2V, the mute circuit is stopped and the output circuit is operated normally.
- If the chip temperature rises above 175°C, then the TSD (Thermal Shutdown) circuit is activated and the output circuit is muted.

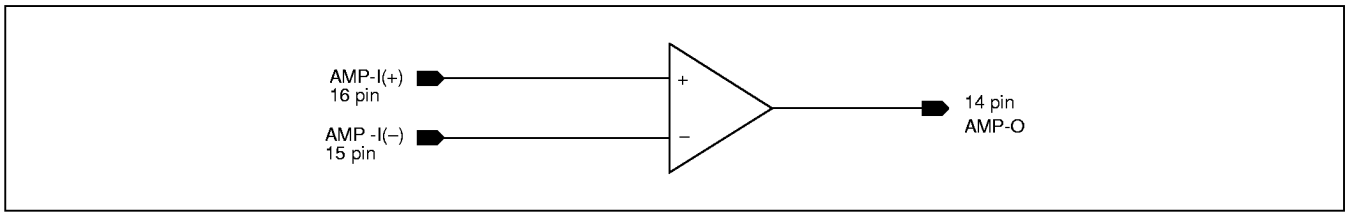
2. TSD (THERMAL SHUTDOWN)



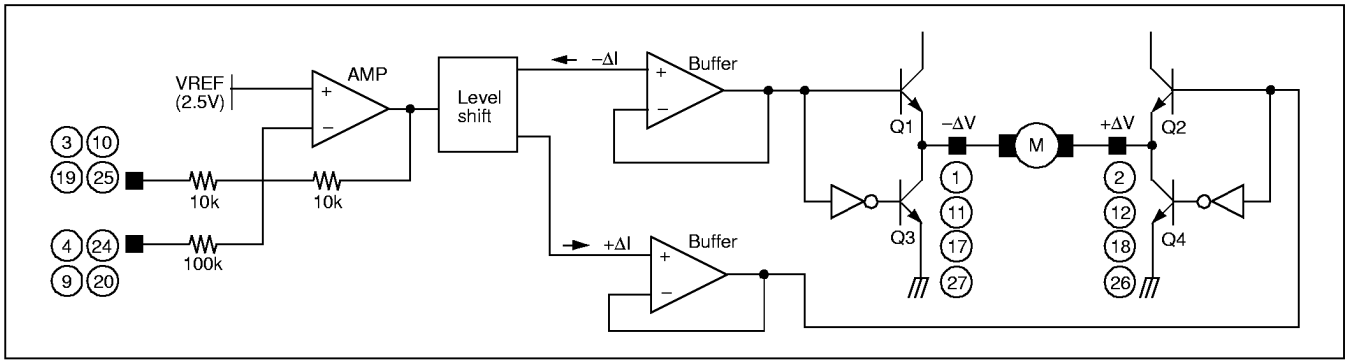
- The $V_{REF\ BG}$ is the output voltage of the band-gap-referenced biasing circuit and acts as the input voltage of the TSD circuit.
- The base-emitter voltage of the TR, Q11 is designed to turn-on at below voltage.
  $V_{BE} = V_{REF\ BG} \times R12 / (R11 + R12) = 460mV$
- When the chip temperature rises up to 175°C, then the turn-on voltage of the Q11 would drop down to 460mV. (Hysteresis: 25°C)
  Hence, the Q11 would turn on so the output circuit will be muted.

3. OP-AMP

OP-amp is integrated in the IC for user's convenience.

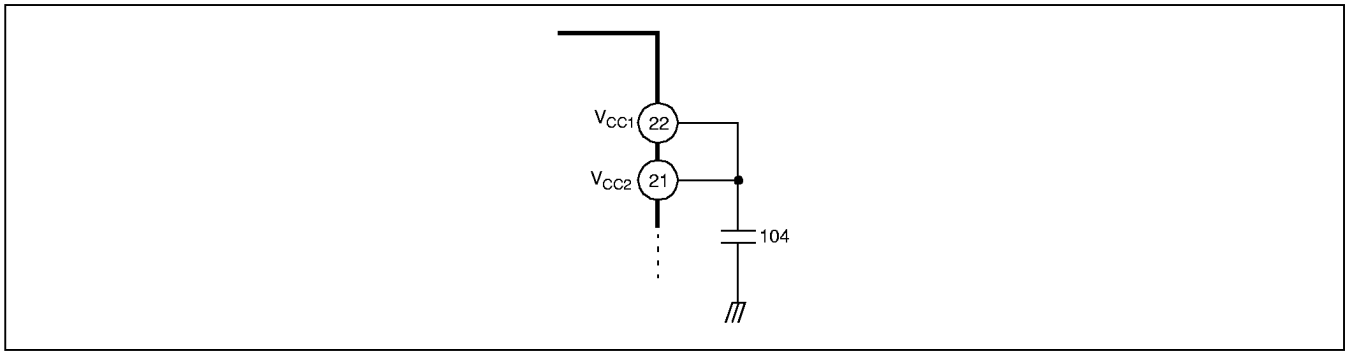


4. DRIVER



- The voltage, V_{REF}, is the reference voltage given by the bias voltage of the pin #23.
- The input signal through the pin #3 is amplified by 10k/10k times and then fed to the level shift.
- The level shift produces the current due to the difference between the input signal and the arbitrary reference signal. The current produced as $+\Delta I$ and $-\Delta I$ is fed into the driver buffer.
- Driver Buffer operates the power TR of the output stage according to the state of the input signal.
- The output stage is the BTL driver and the motor is rotating in forward direction by operating TR Q1 and TR Q4. On the other hand, if TR Q2 and TR Q3 is operating, the motor is rotating in reverse direction
- When the input voltage through the pin #3 is below the V_{REF}, then the direction of the motor in forward direction.
- When the input voltage through the pin #3 is above the V_{REF}, then the direction of the motor in reverse direction.
- If it is desired to change the gain, then the pin #4 or #24 can be used.

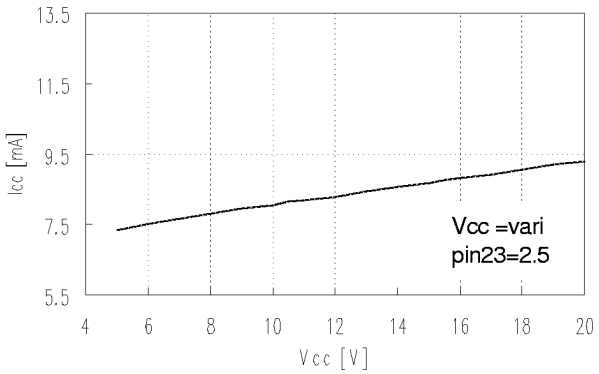
5. Connect a by-pass capacitor, 0.1μF between the supply voltage source.



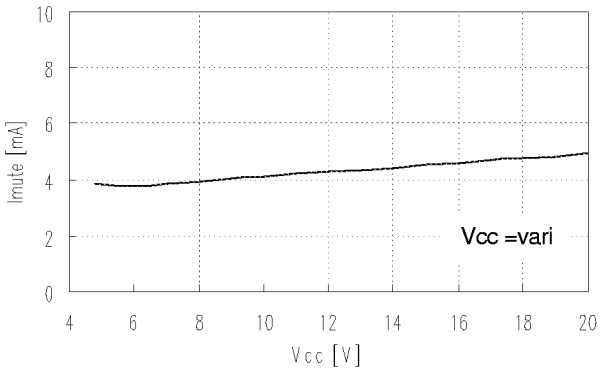
6. Radiation fin is connecting to the internal GND of the package.
Connect the fin to the external GND.

ELECTIRICAL CHARACTERISTICS CURVES

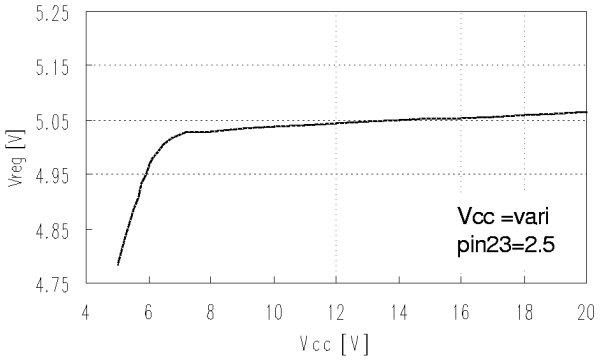
Vcc vs. Icc



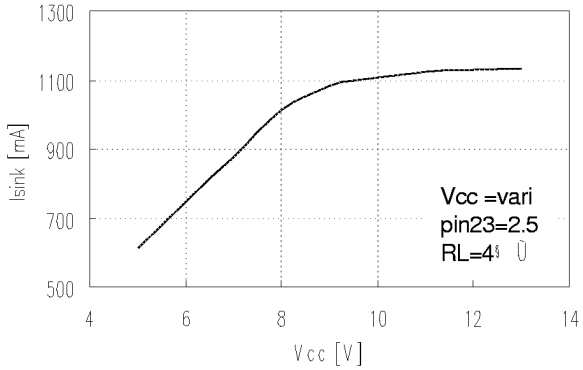
Vcc vs. Imute



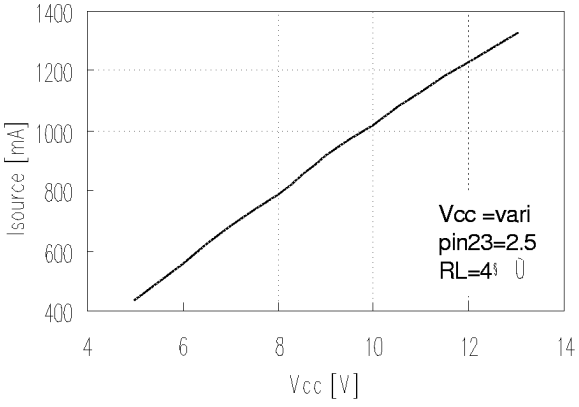
Vcc vs. Vreg



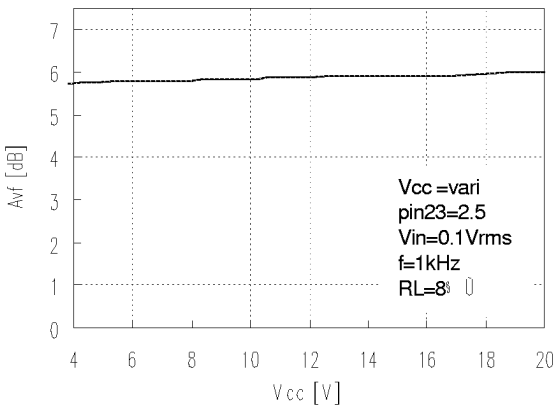
Vcc vs. Isink



Vcc vs. Isource

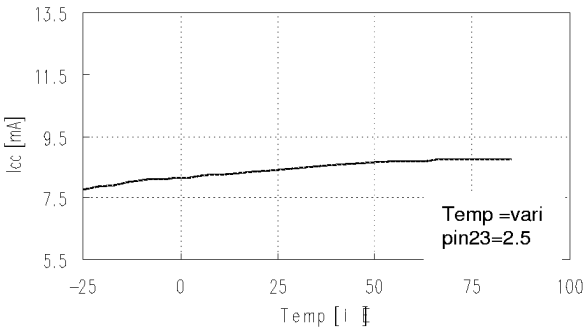


Vcc vs. Avf

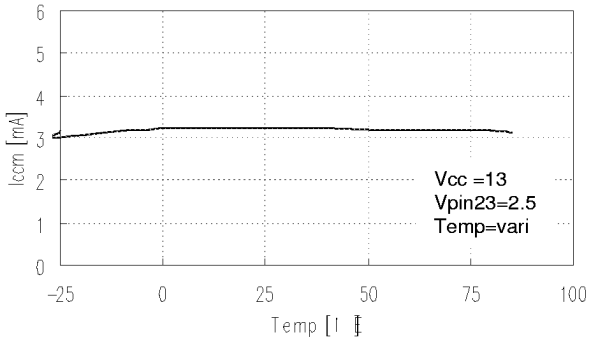


ELECTIRICAL CHARACTERISTICS CURVES (Continued)

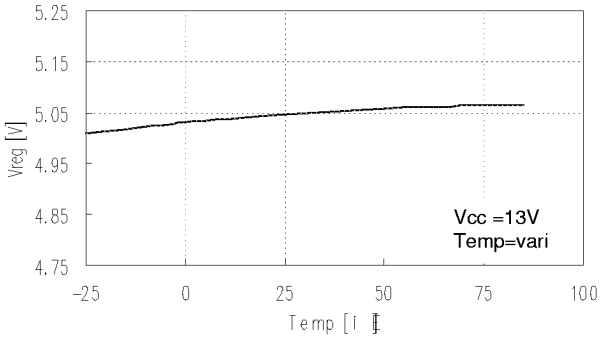
Temp vs. Icc



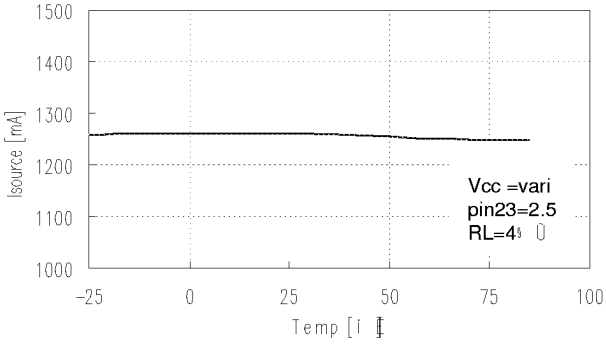
Temp vs. Iccm



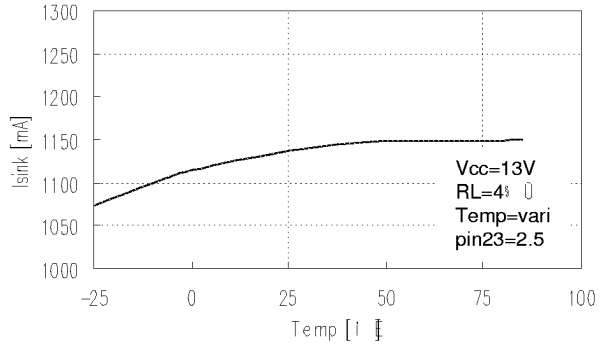
Temp vs. Vreg



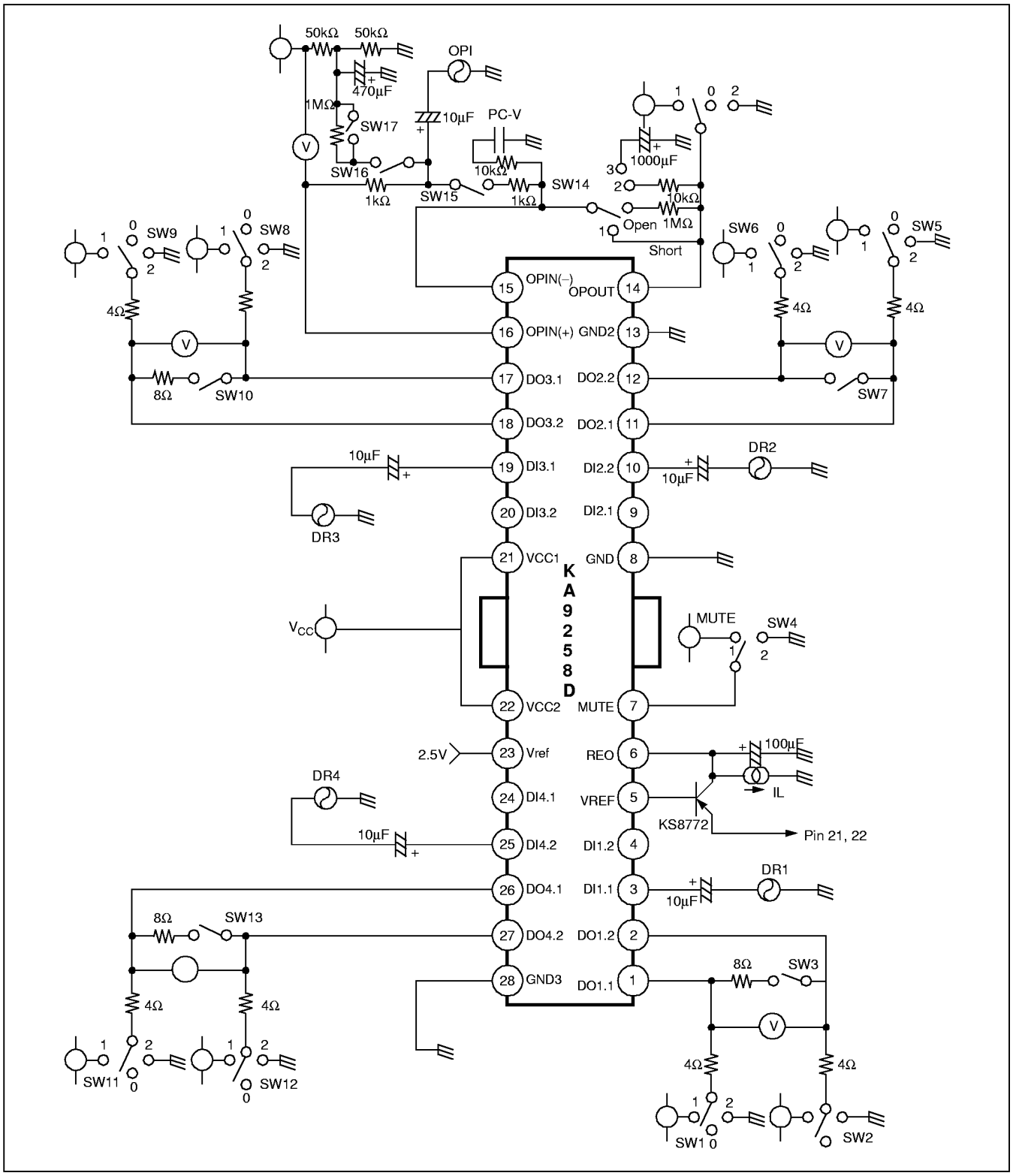
Temp vs. Isource



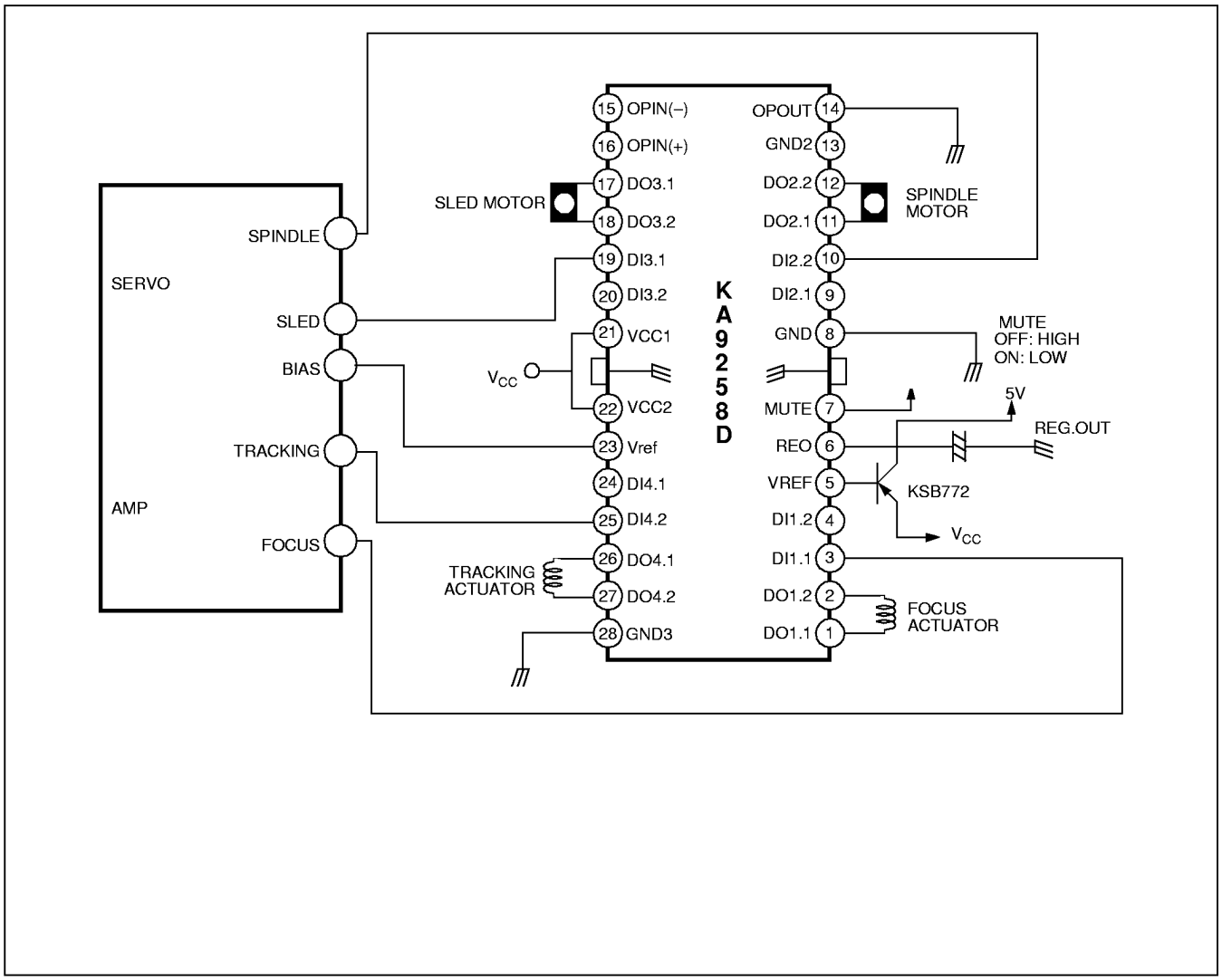
Temp vs. Isink



TEST CIRCUIT



APPLICATION CIRCUIT



THERMAL SHUT DOWN CIRCUIT

The IC is breaked down by the heat when overload condition continue for a long time. So KA9258D have thermal shut down circuit to prevent this case. At that time the temperature of IC rise over 175°C, the circuit is operating and protect the IC against breakdown.

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PRODUCT STATUS DEFINITIONS

Definition of Terms

Datasheet Identification	Product Status	Definition
Advance Information	Formative or In Design	This datasheet contains the design specifications for product development. Specifications may change in any manner without notice.
Preliminary	First Production	This datasheet contains preliminary data, and supplementary data will be published at a later date. Fairchild Semiconductor reserves the right to make changes at any time without notice in order to improve design.
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