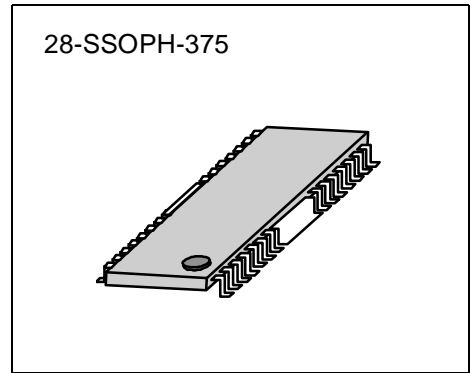


4-CH MOTOR DRIVER

The KA3021D is a monolithic integrated circuit, suitable for a 1-ch (forward.reverse) control DC motor driver and a 3-ch motor driver which drives the focus actuator,tracking actuator, and sled motor of a CD system.

FEATURES

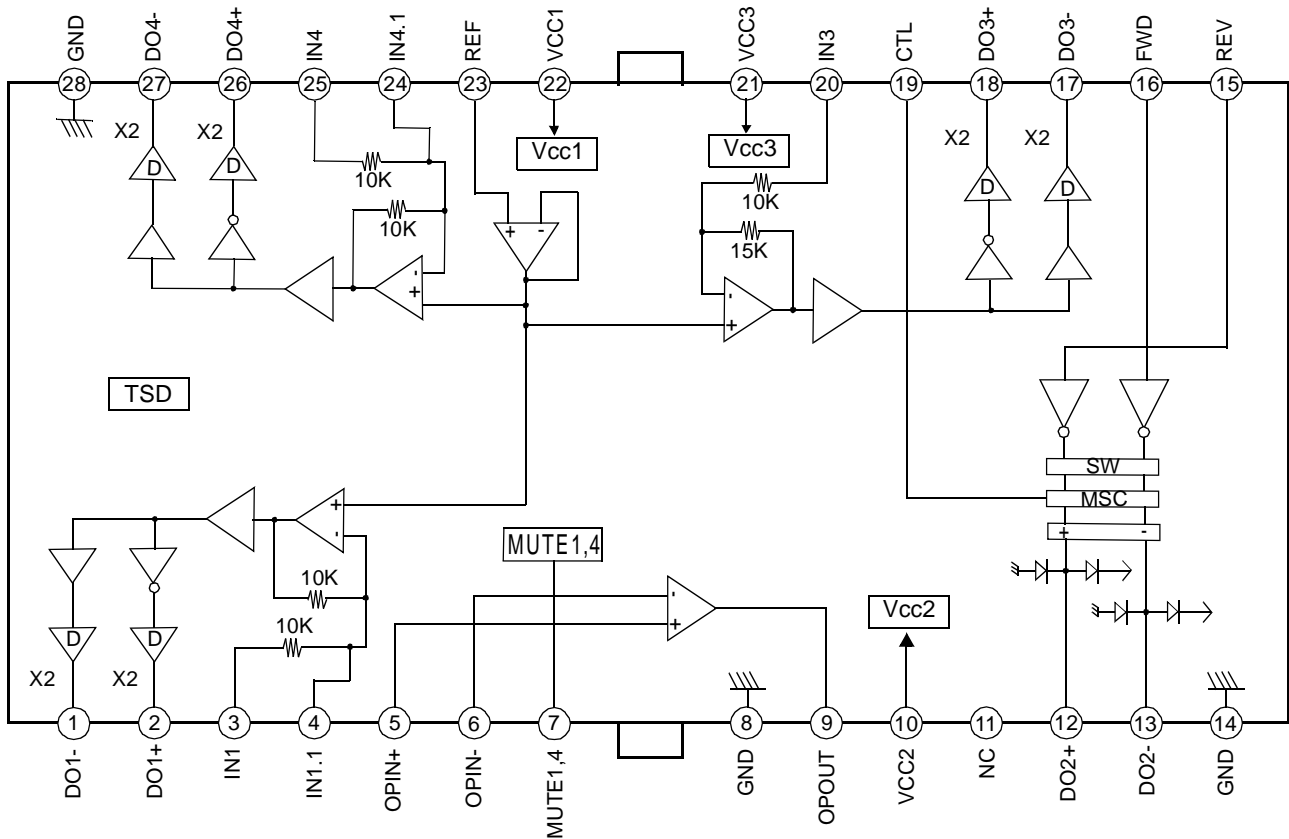
- 3-Channel BTL driver
- 1-Channel forward-Reverse control DC motor driver
- Built-in thermal shutdown circuit
- Built-in mute circuit
- Operating supply voltage: 4.5~13.2V
- Corresponds to 3.3V or 5V DSP



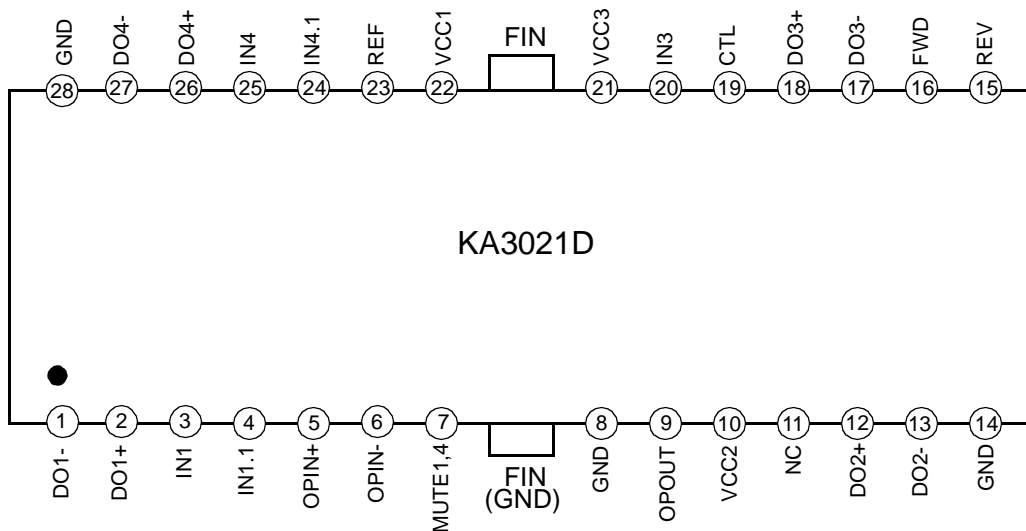
ORDERING INFORMATION

Device	Package	Operating Temperature
KA3021D	28-SSOPH-375	-25 °C ~ 75 °C

BLOCK DIAGRAM



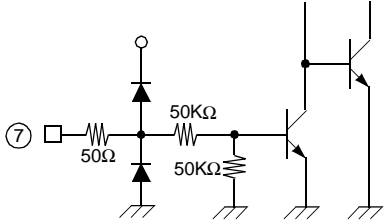
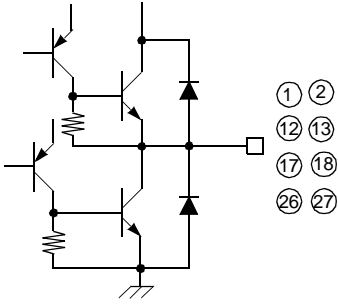
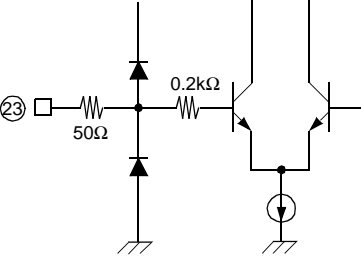
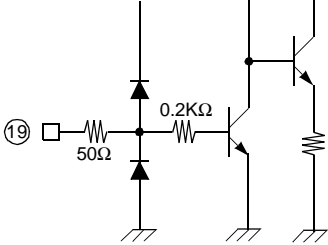
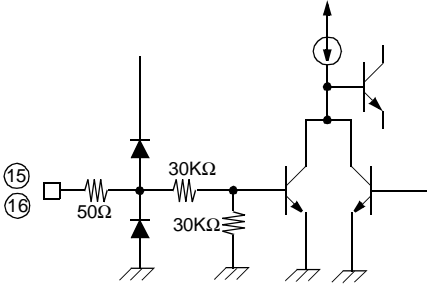
PIN CONFIGURATION



PIN DESCRIPTION

Pin No.	Symbol	I/O	Description	Pin No.	Symbol	I/O	Description
1	DO1-	O	Drive1 Output (-)	15	REV	I	CH2 Reverse
2	DO1+	O	Drive1 Output (+)	16	FWD	I	CH2 Forward
3	IN1	I	Drive1 Input	17	DO3-	O	Drive3 Output (-)
4	IN1.1	I	Drive1 Input, gain ajust.	18	DO3+	O	Drive3 Output (+)
5	OPIN+	I	OP-AMP Input (+)	19	CTL	I	CH2 Motor Speed Control
6	OPIN-	I	OP-AMP Input (-)	20	IN3	I	CH3 Input
7	MUTE1,4	I	CH1,4 Mute	21	VCC3	I	Power Supply for CH3
8	GND	-	Ground	22	VCC1	I	Power Supply for CH1
9	OPOUT	O	OP-Amp Output	23	REF	I	Bias Voltage Input
10	VCC2	I	Power Supply for CH2	24	IN4.1	I	Drive4 Input, gain ajust.
11	NC	-	No Connection	25	IN4	I	Drive4 Input
12	DO2+	O	Drive2 Output (+)	26	DO4+	O	Drive4 Output (+)
13	DO2-	O	Drive2 Output (-)	27	DO4-	O	Drive4 Output (-)
14	GND	-	Ground	28	GND	-	Ground

EQUIVALENT CIRCUITS

MUTE INPUT	POWER OUTPUT
 <p>The MUTE INPUT circuit consists of a 50Ω resistor connected to a square symbol labeled 7. This resistor is in series with a diode connected to ground. Following the diode is a 50KΩ resistor, which is in series with another diode connected to ground. This second diode is in parallel with a 50KΩ resistor connected to ground. The output of this network is connected to the base of a PNP transistor, which is part of a push-pull output stage.</p>	 <p>The POWER OUTPUT circuit is a push-pull stage. It features a PNP transistor and an NPN transistor. The PNP transistor's base is connected to a network of resistors and diodes. The NPN transistor's base is connected to a similar network. The emitters of both transistors are connected to ground. The collectors are connected to a load, which is represented by a square symbol with labels 1, 2, 12, 13, 17, 18, 26, and 27.</p>
SIGNAL REFERENCE INPUT	LOADING CONTROL INPUT
 <p>The SIGNAL REFERENCE INPUT circuit has a 50Ω resistor connected to a square symbol labeled 23. This resistor is in series with a diode connected to ground. The output of this network is connected to the base of a PNP transistor. The emitter of this transistor is connected to ground. The collector is connected to the base of an NPN transistor, whose emitter is also connected to ground.</p>	 <p>The LOADING CONTROL INPUT circuit has a 50Ω resistor connected to a square symbol labeled 19. This resistor is in series with a diode connected to ground. The output of this network is connected to the base of a PNP transistor. The emitter of this transistor is connected to ground. The collector is connected to the base of an NPN transistor, whose emitter is also connected to ground.</p>
LOADING LOGIC INPUT	
 <p>The LOADING LOGIC INPUT circuit has two inputs, 15 and 16, connected to a 50Ω resistor. This resistor is in series with a diode connected to ground. The output of this network is connected to the base of a PNP transistor. The emitter of this transistor is connected to ground. The collector is connected to the base of an NPN transistor, whose emitter is also connected to ground. The collector of the NPN transistor is connected to a load, represented by a square symbol with an upward-pointing arrow.</p>	

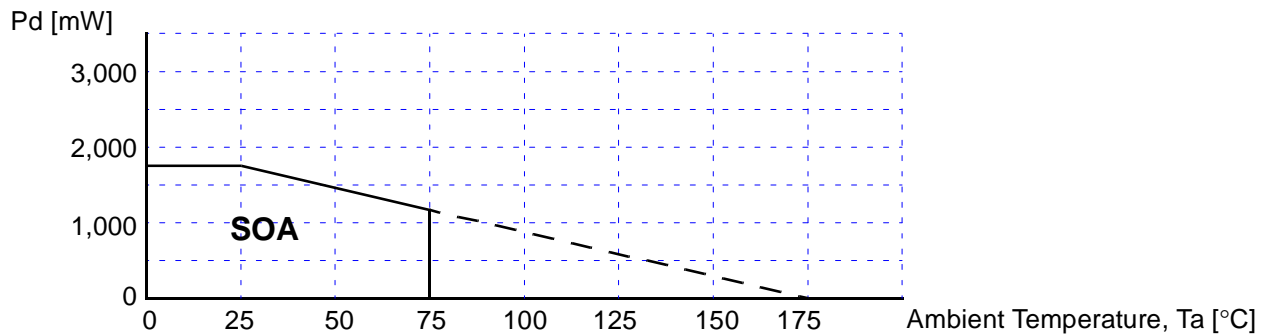
ABSOLUTE MAXIMUM RATINGS (TA = 25 °C)

Characteristics	Symbol	Value	Unit
Maximum supply voltage	V_{CCmax}	18	V
Power dissipation	P_d	1.7 _{note}	W
Operating temperature range	T_{opr}	-35 ~ +85	°C
Storage temperature range	T_{stg}	-55 ~ +150	°C

Note 1. When mounted on a 50mm × 50mm × 1mm PCB (Phenolic resin material).

2. Power dissipation reduces 13.6mW/°C for using above Ta = 25°C

3. Do not exceed PD and SOA(Safe operating area).

**RECOMMENDED OPERATING CONDITIONS**

Characteristics	Symbol	Value			Unit
		Min	Typ	Max	
Supply Voltage	Vcc	4.5	-	13.2	V

ELECTRICAL CHARACTERISTICS(Unless otherwise specified, $T_a = 25\text{ }^\circ\text{C}$, $V_{CC} = V_{M12} = V_{M3,4} = 5\text{V}$)

Characteristics	Symbol	Conditions	Spec			Unit
			Min	Typ	Max	
Quiescent Current	I_{CC}	$V_{in} = 0\text{V}$	-	8	12	mA
Mute On Current	I_{mute}	Mute Pin = GND	-	1	3	mA
Mute On Voltage	V_{mon}		-	-	0.5	V
Mute Off Voltage	V_{moff}		2	-	-	V
DRIVE PART						
Input Offset Voltage	V_{io}		-20	-	+20	mV
Output Offset Voltage	V_{oo}	$V_{in} = 2.5\text{V}$	-20	-	+20	mV
Maximum Output Voltage1	V_{om1}	$V_{CC} = 8\text{V}$, $R_L = 8\Omega$ (CH1, 2)	4	5.7	-	V
Maximum Output Voltage2	V_{om2}	$V_{CC} = 12\text{V}$, $R_L = 24\Omega$ (CH3)	7	9	-	V
Close Loop Voltage Gain1	G_{vc1}	$f = 1\text{KHz}$, $V_{in} = 0.1\text{V}_{rms}$ (CH1, 2)	9.5	11.5	13.5	dB
Close Loop Voltage Gain2	G_{vc2}	$f = 1\text{KHz}$, $V_{in} = 0.1\text{V}_{rms}$ (CH3)	13.0	15.0	17.0	dB
Ripple Rejection Ratio	RR	$V_{in} = 0.1\text{V}_{rms}$, $f = 120\text{Hz}$	-	60	-	dB
Slew Rate	SR	$V_o = 2\text{V}_{p-p}$, $f = 120\text{KHz}$	-	0.8	-	V/us
TRAY DRIVE PART ($V_{CC} = V_{M34} = 8\text{V}$, $R_L = 45\Omega$)						
Input High Level Voltage	V_{ih}		2	-	-	V
Input Low Level Voltage	V_{il}		-	-	0.5	V
Output Voltage1	V_{o1}	$V_{CC} = 8\text{V}$, $V_{ctl} = 3.5\text{V}$	5.2	6	6.8	V
Output Voltage2	V_{o2}	$V_{CC} = 13\text{V}$, $V_{ctl} = 4.5\text{V}$	7.5	8.5	9.5	V
Output Load Regulation	ΔV_{RL}		-	300	700	mV
Output Offset Voltage1	V_{oo1}	$V_{in} = 5\text{V}$	-10	-	+10	mV
Output Offset Voltage2	V_{oo2}	$V_{in} = 5\text{V}$	-10	-	+10	mV
GENERAL OP AMP PART						
Input Offset Voltage	V_{ofop}		-10	-	+10	mV
Input Bias Current	I_{bop}		-	-	300	nA
High Level Output Voltage	V_{ohop}	$V_{CC} = 5\text{V}$, $R_L = 1\text{K}\Omega$	3	4	-	V

Characteristics	Symbol	Conditions	Spec			Unit
			Min	Typ	Max	
Low Level Output Voltage	Volop	Vcc = 5V, RL = 1K Ω	0.7	1	1.3	V
Output Sink Current	Isink	Vcc = 5V, RL = 50 Ω	5	10	-	mA
Output Source Current	Isource	Vcc = 5V, RL = 50 Ω	5	10	-	mA
Open Loop Voltage Gain	Gvo	Vin = -75dB, f = 1KHz	-	75	-	dB
Ripple Rejection Ratio	RRop	Vin = -20dB, f = 120Hz	-	65	-	dB
Slew Rate	SROp	f = 120KHz, 2Vp-p	-	1	-	V/us
Common Mode Rejection Ratio	CMRR	Vin = -20dB, f = 1KHz	-	80	-	dB
Common Mode Input Range	Vicm	Vcc = 8V	-0.3	-	6.8	V

