

Parts for Robot and Other Projects

EECE691 EMBEDDED COMPUTING

WWW.MWFTR.COM

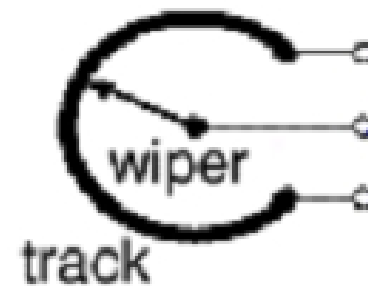
By

Dr. Charles J. Kim

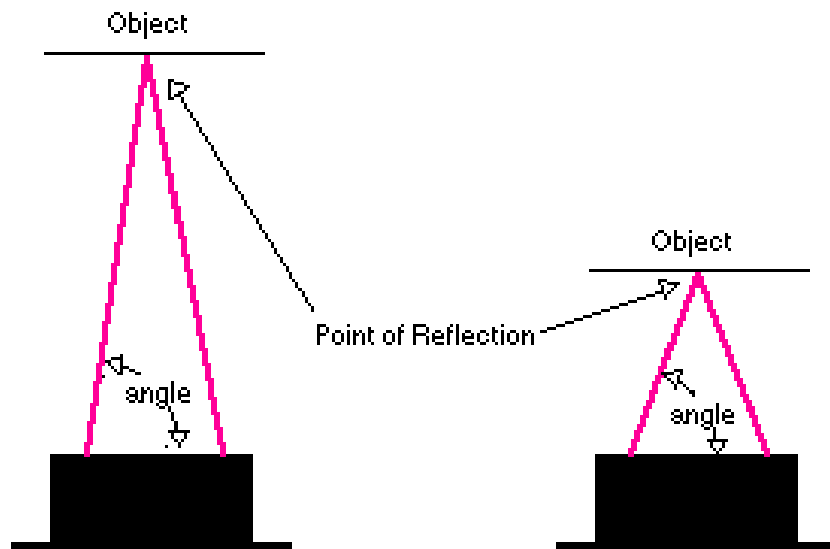
Department of Electrical and Computer Engineering

Howard University

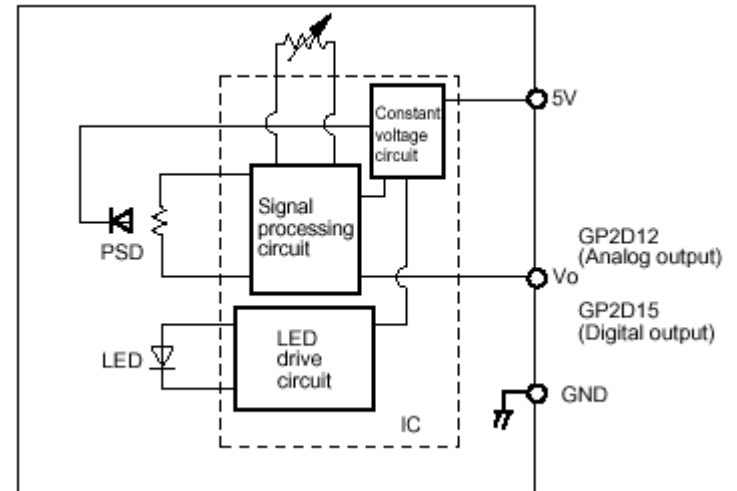
Variable Resistor or Rheostat



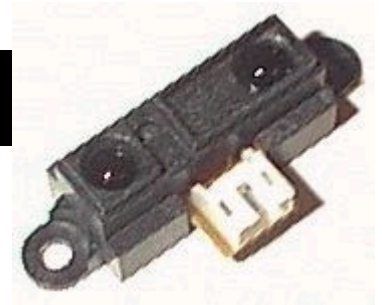
Infrared Ranger



Internal block diagram



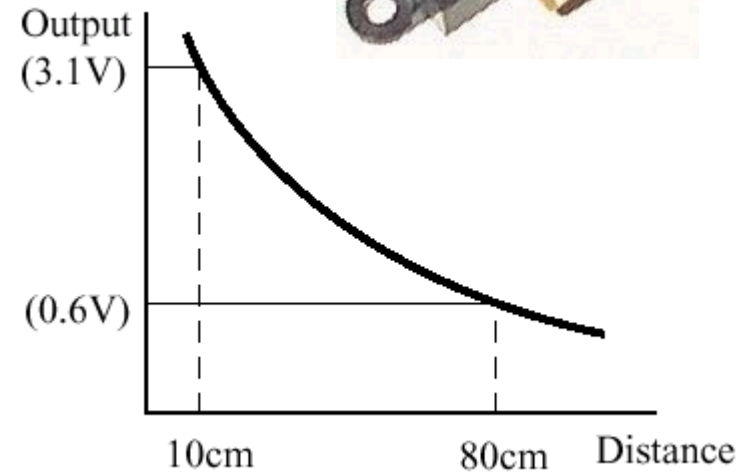
Sharp Ranger Module



GP2D12

($T_a=25^{\circ}\text{C}$)

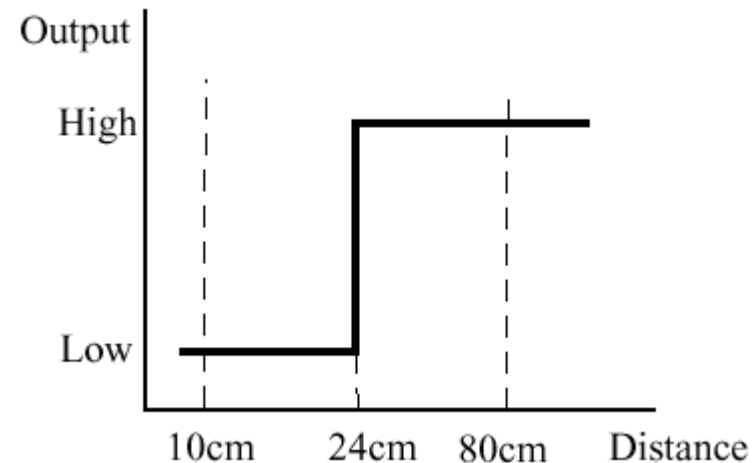
Parameter	Symbol	Rating
Supply voltage	Vcc	4.5 to 5.5V
Dissipation current	Icc	MAX.35mA
Measuring range	L	10 to 80cm
Output type	—	Analog output
Operating temperature	Topr	-10 to +60°C



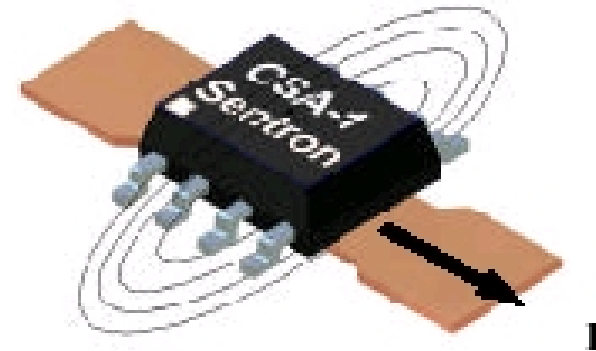
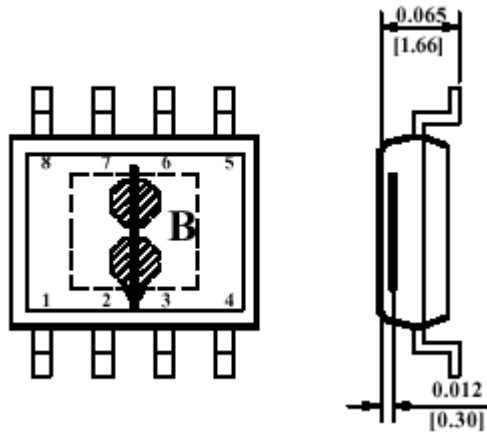
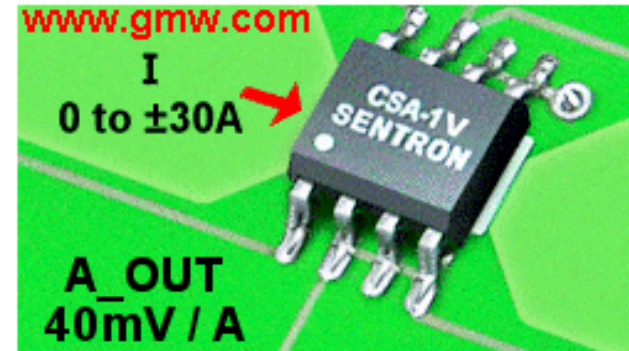
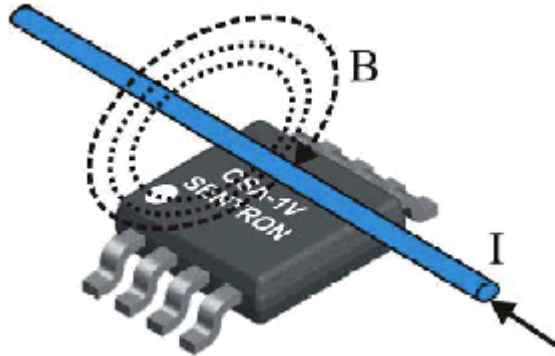
GP2D15

($T_a=25^{\circ}\text{C}$)

Parameter	Symbol	Rating
Supply voltage	Vcc	4.5 to 5.5V
Dissipation current	Icc	MAX.35mA
*Judgement distance	L	TYP.24cm
Output type	—	Digital output
Operating temperature	Topr	-10 to +60°C

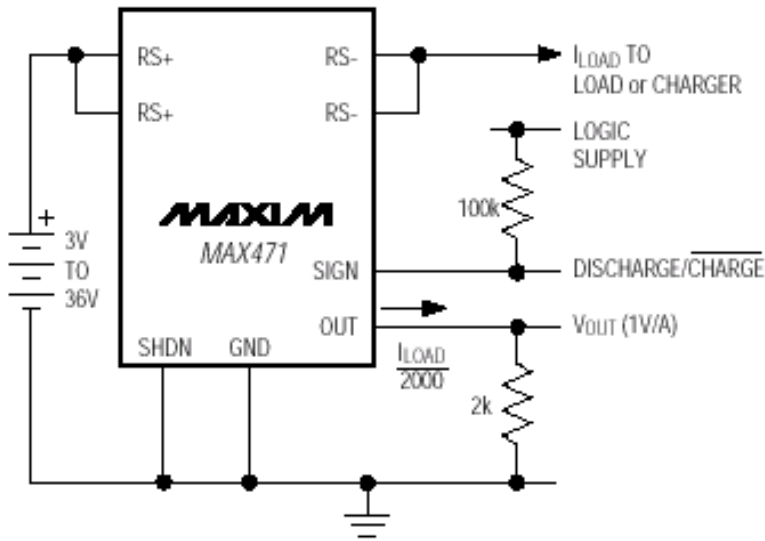


CSA-1V Hall Effect Current Sensor



Battery (power) Monitor using MAX471/MAX472

Precision, High-Side Current-Sense Amplifiers **MAX471/MAX472**



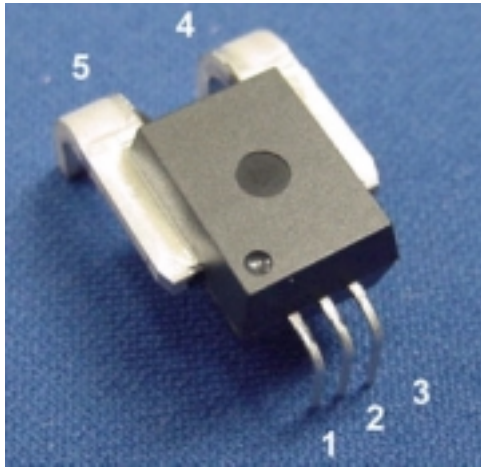
Ordering Information

PART	TEMP. RANGE	PIN-PACKAGE
MAX471CPA	0°C to +70°C	8 Plastic DIP
MAX471CSA	0°C to +70°C	8 SO
MAX471EPA	-40°C to +85°C	8 Plastic DIP
MAX471ESA	-40°C to +85°C	8 SO
MAX472CPA	0°C to +70°C	8 Plastic DIP
MAX472CSA	0°C to +70°C	8 SO
MAX472EPA	-40°C to +85°C	8 Plastic DIP
MAX472ESA	-40°C to +85°C	8 SO

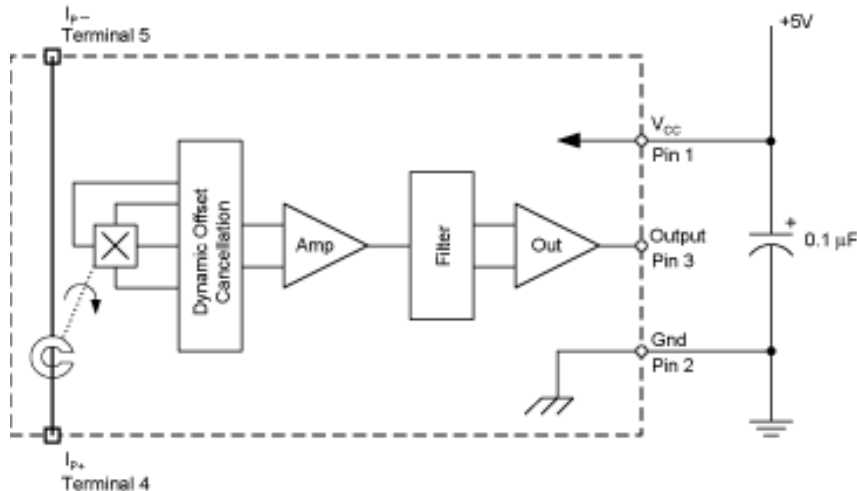
- ◆ Complete High-Side Current Sensing
- ◆ Precision Internal Sense Resistor (MAX471)
- ◆ 2% Accuracy Over Temperature
- ◆ Monitors Both Charge and Discharge
- ◆ 3A Sense Capability with Internal Sense Resistor (MAX471)
- ◆ 3V to 36V Supply Operation
- ◆ 8-Pin DIP/SO Packages

For free samples & the latest literature: <http://www.maxim-ic.com>, or phone 1-800-998-8800

Allegro ACS750 Current Sensor



ACS750SCA-050 or
ACS750LCA-050



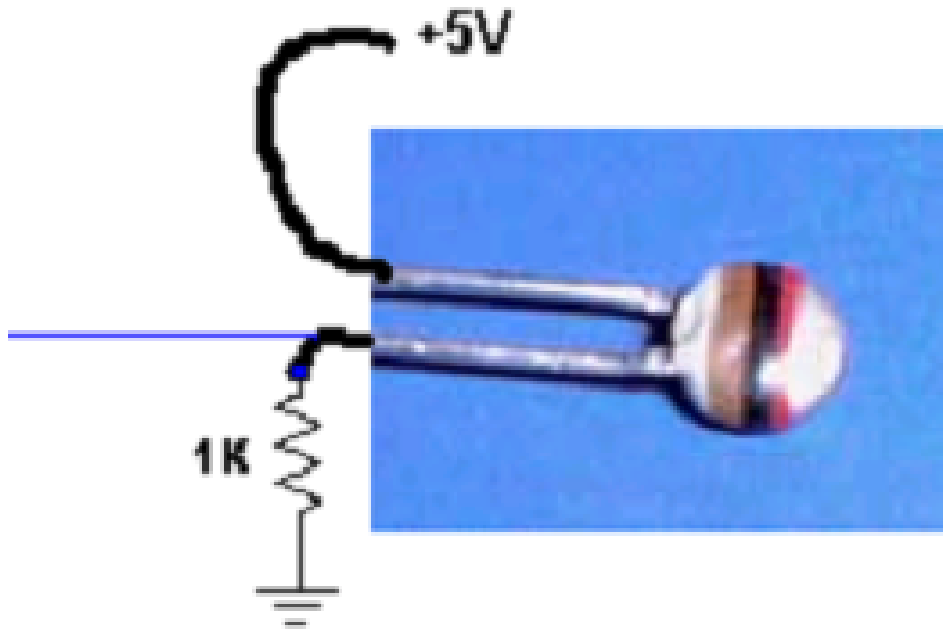
Features and Benefits

- Monolithic Hall IC for High Reliability
- Single +5V Supply
- High Isolation Voltage
- Lead-free
- Automotive Temperature Range
- End-of-line Factory Trimmed for Gain and Offset
- Ultra-low Power Loss: Low Resistance of Primary Conductor
- Ratiometric Output from Supply Voltage
- Low Thermal Drift of Offset Voltage
- On-chip Transient Protection
- Small Package Size with Easy Mounting Capability

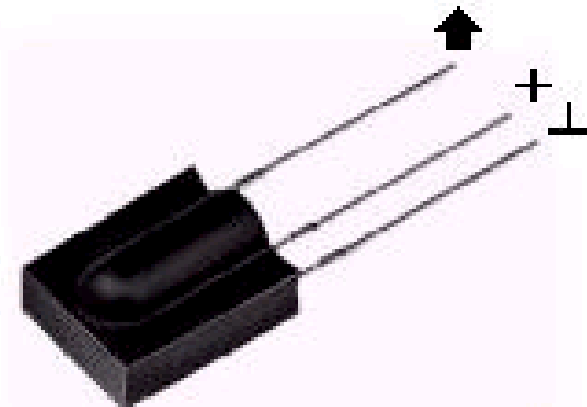
Applications

- Automotive Systems
- Industrial Systems
- Motor Control
- Servo Systems
- Power Conversion
- Battery Monitors

Thermister for Temperature Sensing



IR Receivers



IR Receivers

Infrared Remote-Control Receiver Modules

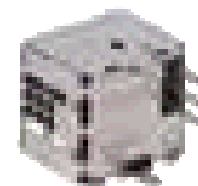


220628CA



165008CA

Quantity
SAVE



176541CA

Commonly used in TVs, VCRs, audio equipment, car stereos and home computers that receive signals or data via infrared
 Single unit module which incorporates a PIN diode & a receiving preamplifier IC
 Excellent mechanical strength and electrical stability
 940nm wavelength Size: 0.6"L x 0.6"W x 0.5"H

**New Lower
Prices**

Part No.	Description	Voltage Input	1	10
220628CA	38.0kHz, side view	4.5VDC @ 1.4mA	\$2.99	\$2.69
165008CA	40.0kHz, top view	5VDC @ 5mA	2.99	2.69
176541CA	56.8kHz, side view	5VDC @ 2mA	1.69	1.53

Piezo-Buzzer

CE-328 Series



color Black
Noryl
Housing Material
Pin Terminal

ELECTRICAL SPECIFICATIONS

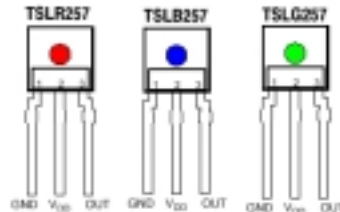
MODEL NO.	32S4120
Operating Voltage (VDC)	3 - 16
Rated Voltage (VDC)	12
*Max. Rated Current (mA.)	7
*Min. Sound Output (dBA/10cm)	80
*Frequency (Hz.)	4000±500
Tone Nature	single
Operating Temperature (°C)	-20 - +60
Weight (gm.)	1

*Value applying at rated voltage

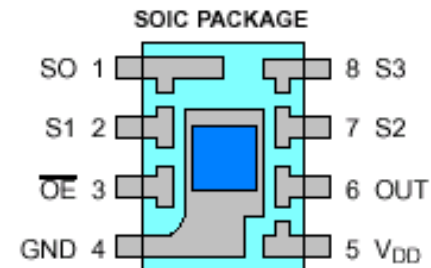
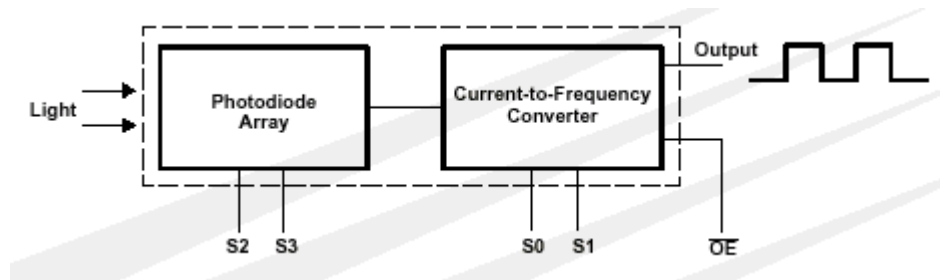
Color Sensor



- High-Resolution Conversion of Light Intensity to Frequency
- Programmable Color and Full-Scale Output Frequency
- Communicates Directly With a Microcontroller
- Single-Supply Operation (2.7 V to 5.5 V)
- Power Down Feature
- Nonlinearity Error Typically 0.2% at 50 kHz
- Stable 200 ppm/°C Temperature Coefficient
- Low-Profile Surface-Mount Package

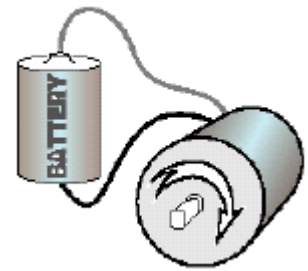


TCS230 PROGRAMMABLE COLOR LIGHT-TO-FREQUENCY CONVERTER



S0	S1	OUTPUT FREQUENCY SCALING (f_o)		S2	S3	PHOTODIODE TYPE
L	L	Power down		L	L	Red
L	H	2%	12 KHz	L	H	Blue
H	L	20%	120 KHz	H	L	Clear (no filter)
H	H	100%	600 KHz	H	H	Green

Relays



CLARE



106462CA



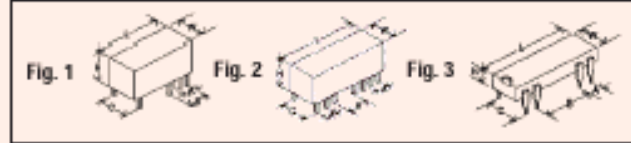
99901CA



206543CA



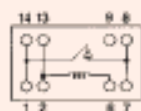
215909CA



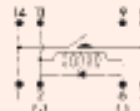
EGE

FUJITSU

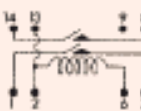
Aromat



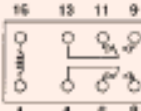
Schematic 1



Schematic 2



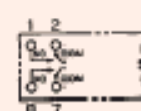
Schematic 3



Schematic 4



Schematic 5



Schematic 6



Schematic 7



Schematic 8

Part No.	Mfr. Cross Reference No.	Manufacturer	Contact Schem.	Contact Form	Coil Voltage	Coil Ohms	Contact Voltage	Contact Current	Pins	Jameco Socket	Fig.	Size L x W x H (in.)	Leads A x B x C (in.)	Pricing			
														1	10	50	100
106462CA	201A05	Excel Cell Elect.	1	SPST-NO	5VDC	500	100VDC	0.5A	8	37161	3	.78 x .25 x .20	.10 x .40 x .30	\$2.15	\$1.81	\$1.52	\$1.25
138430CA	2D1A05	Excel Cell Elect.	2	SPST-NO	5VDC	500	100VDC	0.5A	8	37161	3	.77 x .30 x .22	.10 x .40 x .30	2.29	1.95	1.65	1.34
215896CA	OJE-SS-109LMF	OEG	7	SBT-NO	9VDC	400	250VAC/30VDC	3A/3A	4	—	1	.71 x .39 x .57	.50 x .60 x .30	2.29	1.95	1.69	1.39
106471CA	201A12	Excel Cell Elect.	1	SPST-NO	12VDC	1000	100VDC	0.5A	8	37161	3	.78 x .25 x .20	.10 x .40 x .30	2.29	1.95	1.65	1.39
138448CA	2D1A1200	Excel Cell Elect.	2	SPST-NO	12VDC	1000	100VDC	0.5A	8	37161	3	.77 x .30 x .22	.10 x .40 x .30	2.25	1.95	1.75	1.49
192760CA	5MBU-5	Fujitsu	6	DPST-NO	5VDC	35	240VAC/24VDC	5A	8	—	1	1.13 x .50 x .98	.17 x .76 x .28	1.95	1.75	1.49	1.25
138456CA	202A05	Excel Cell Elect.	3	DPST-NO	5VDC	140	100VDC	0.5A	8	37161	3	.77 x .30 x .28	.10 x .40 x .30	3.49	3.15	2.69	2.19
173913CA	AZ831-2C-5DSE	American Zetler	4	DPDT	5VDC	125	125VAC/100VDC	.5A/1.25A	8	37401	1	.79 x .38 x .44	.18 x .28 x .29	2.35	2.15	1.69	1.25
139977CA	RSB5S	Shin Mei	4	DPDT	5VDC	125	120VAC/30VDC	1A/2A	8	37372	1	.79 x .39 x .37	.20 x .40 x .30	2.49	2.25	1.95	1.75
99338CA	LM12C00	Clare	4	DPDT	6VDC	71	125VAC/100VDC	2A	8	37372	1	.79 x .40 x .43	.20 x .40 x .30	2.49	2.19	1.59	1.29
99311CA	DS2Y-S-DC12V*	Aromat (NAIS)	4	DPDT	12VDC	720	110VAC/30VDC	.3A/1A	8	37372	1	.79 x .40 x .43	.20 x .40 x .30	2.49	2.31	2.05	1.75
99901CA	LX200D00	Clare	4	DPDT	12VDC	720	125VAC/100VDC	2A	8	37372	1	.79 x .40 x .30	.20 x .40 x .30	6.95	6.25	5.63	4.49
99320CA	LM12ED0*	NEC	4	DPDT	24VDC	1110	125VAC/100VDC	2A	8	37372	1	.79 x .40 x .43	.20 x .40 x .30	2.95	2.69	2.39	2.15
136549CA	DS4E-M-DC5V*	Aromat	5	4PDT	5VDC	62.5	125VAC/30VDC	.6A/2A	14	112299	2	1.40 x .40 x .36	.20 x .30 x .30	5.49	4.95	4.45	4.05
176313CA	DS4E-M-DC12V	Aromat	5	4PDT	12VDC	360	125VAC/30VDC	.6A/2A	14	112299	2	1.40 x .40 x .36	.20 x .30 x .30	6.95	6.29	5.29	4.39
206543CA	DS4E-S-DC5V-1C/N137	Aromat	6	4PDT	5VDC	125	250VAC/220VDC	2A	14	112299	2	1.40 x .40 x .42	.20 x .30 x .30	8.45	7.77	7.10	6.82
215909CA	RKA-7D2-12	P & B	8	DPST-NO	12VDC	270	250VAC/24VDC	5A/5A	6	—	1	1.13 x .49 x .97	.20 x .80 x .30	2.29	1.95	1.69	1.39

DC Motor Control by Relay



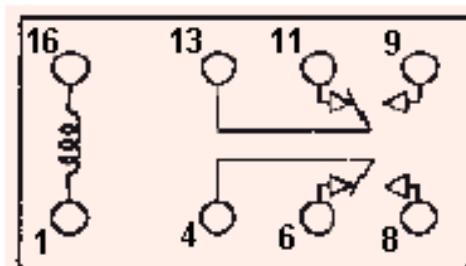
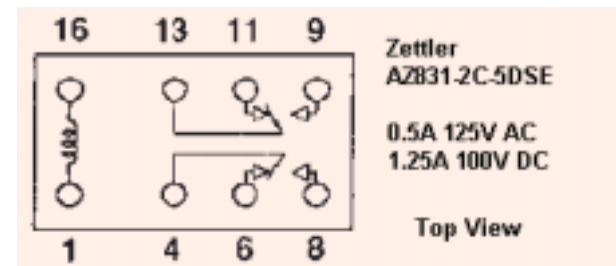
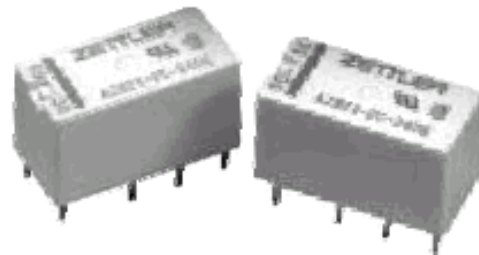
AZ821/AZ831

AMERICAN ZETTLER, INC.

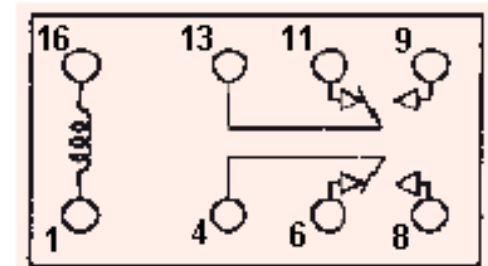
SUBMINIATURE DIP RELAY

FEATURES

- Low profile for compact board spacing
- DC coils to 48 VDC
- Single button crossbar contacts
- High sensitivity, 100 mW pickup
- Life expectancy to 15 million operations

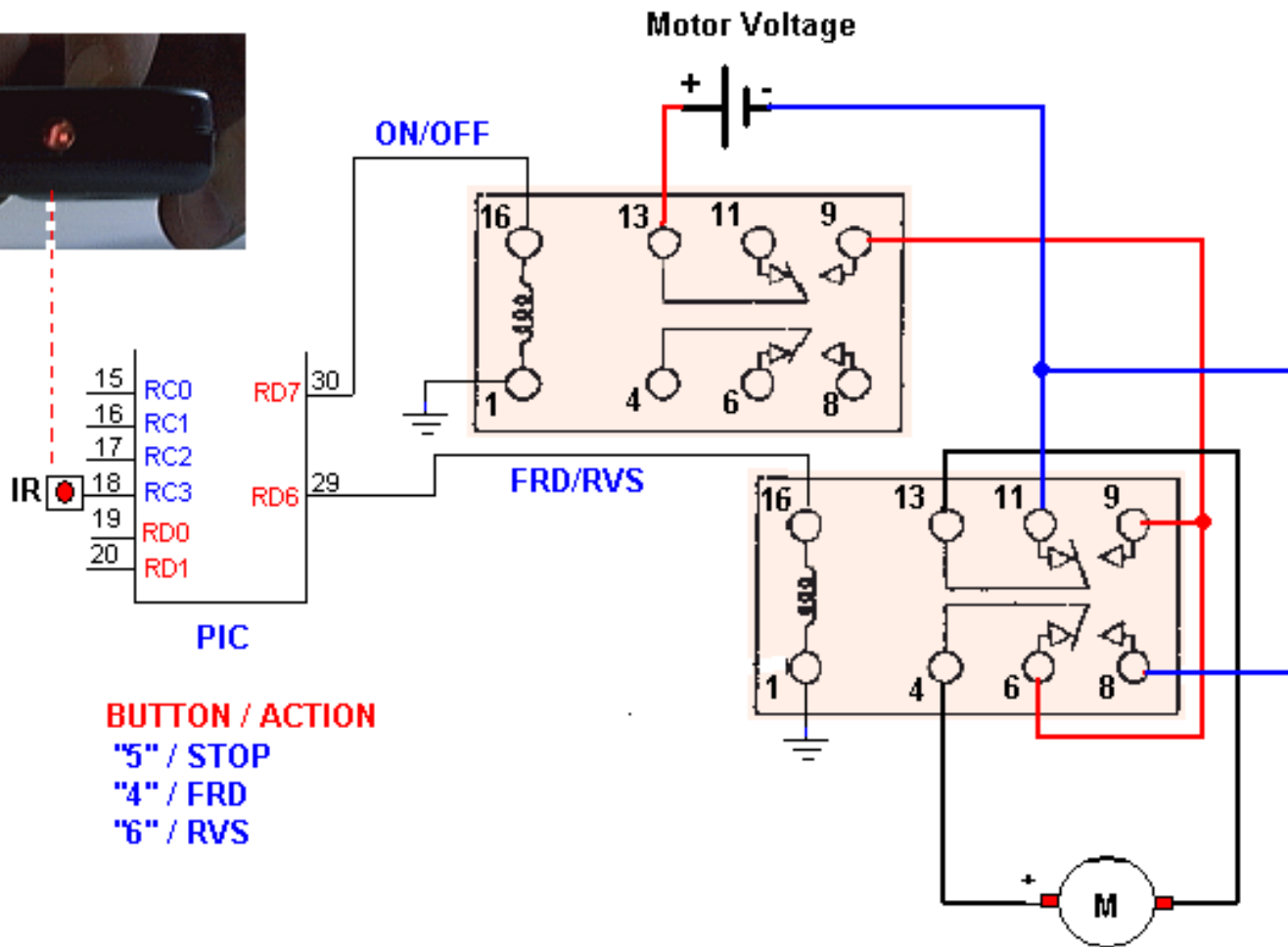
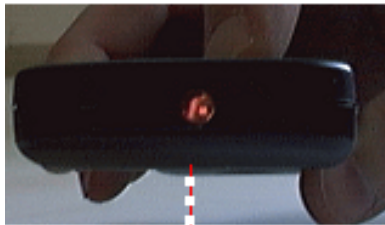


ON/OFF Control



DIRECTION Control

DC Motor Control by Relay



Motor Control Chips

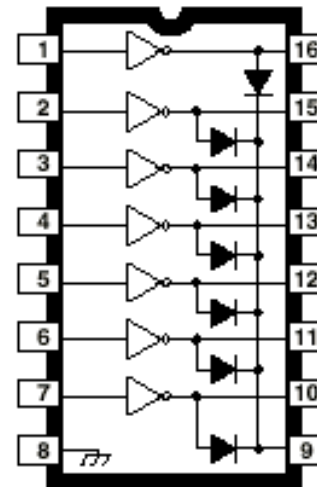
 **2003** THRU **2024**

FEATURES

- TTL, DTL, PMOS, or CMOS-Compatible Inputs
- Output Current to 500 mA
- Output Voltage to 95 V
- Transient-Protected Outputs

***HIGH-VOLTAGE,
HIGH-CURRENT
DARLINGTON
ARRAYS***

Ideally suited for interfacing between low-level logic circuitry and multiple peripheral power loads



Bipolar Driver Chip



2916

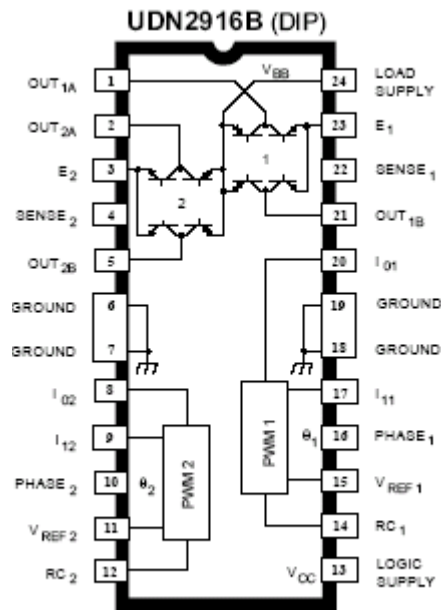
Part Number	Package
UDN2916B	24-Pin DIP
UDN2916EB	44-Lead PLCC
UDN2916LB	24-Lead SOIC

FEATURES

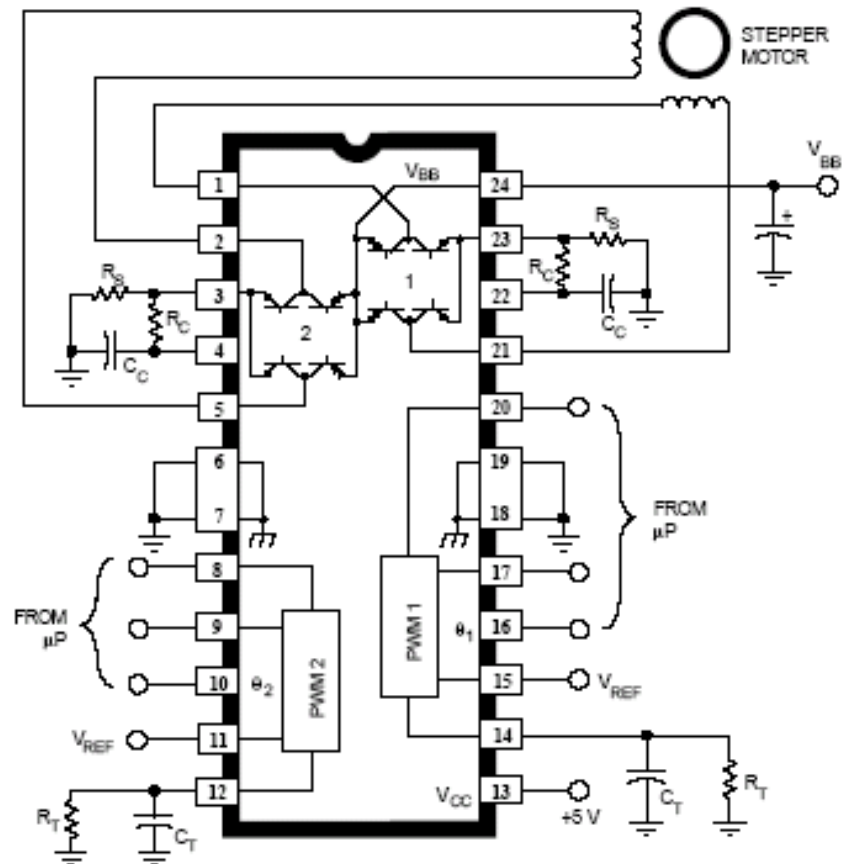
- 750 mA Continuous Output Current
- 45 V Output Sustaining Voltage

*DUAL FULL-BRIDGE
PWM MOTOR DRIVER*

For **BIPOLAR STEPPER /DC**



Dwg. PP-005



Dwg. EP-008B

Unipolar Driver Chip



5804

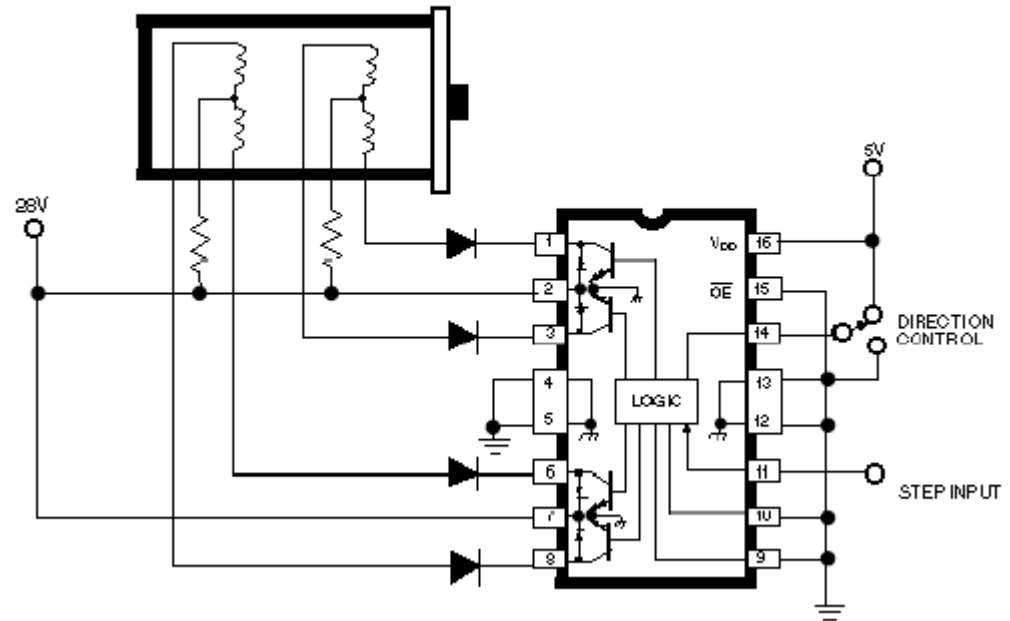
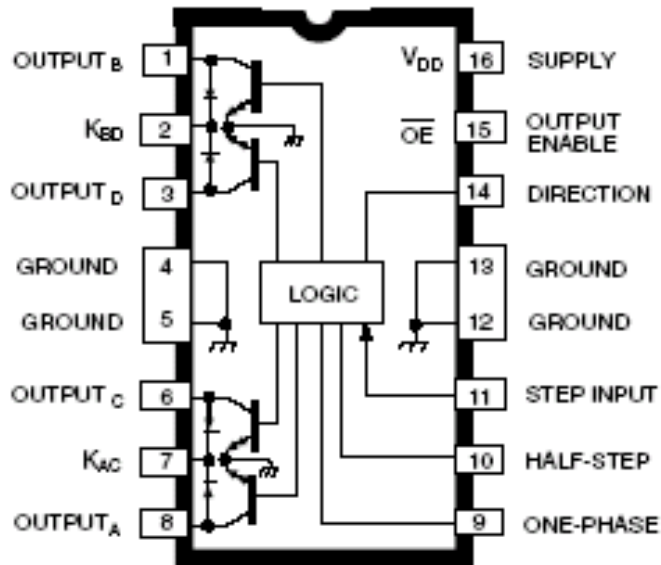
UCN5804B

FEATURES

- 1.5 A Maximum Output Current
- 35 V Output Sustaining Voltage

UNIPOLAR STEPPER-MOTOR DRIVER

TYPICAL APPLICATION L/R Stepper-Motor Drive

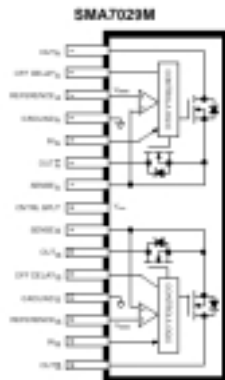


Unipolar Stepper Driver



SLA7024M, SLA7026M, AND SMA7029M

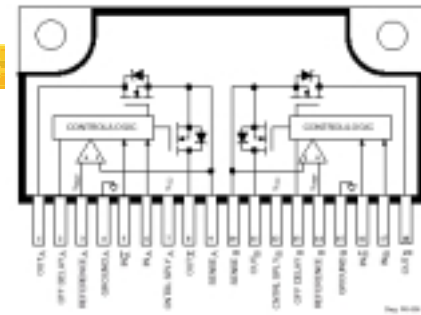
*HIGH-CURRENT PWM, UNIPOLAR STEPPER
MOTOR CONTROLLER/DRIVERS*



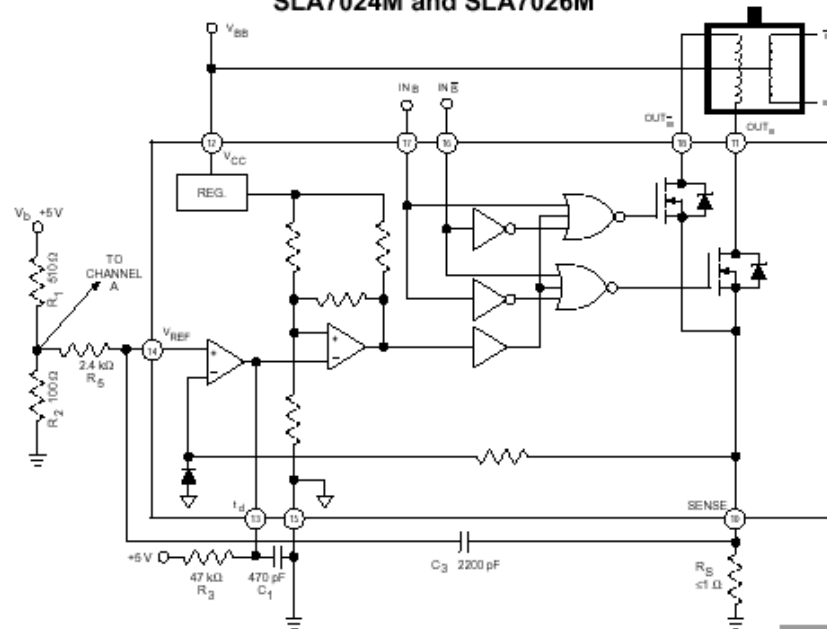
**2-PHASE (FULL STEP) OPERATION
for SLA7024M and SLA7026M**

Sequence	0	1	2	3	0
Input A	H	L	L	H	H
Input \bar{A}	L	H	H	L	L
Input B	H	H	L	L	H
Input \bar{B}	L	L	H	H	L
Outputs ON	AB	$\bar{A}B$	$\bar{A}\bar{B}$	$A\bar{B}$	AB

SLA7024M and SLA7026M



**TYPICAL STEPPER MOTOR APPLICATIONS
(Half of Each Device Shown)
SLA7024M and SLA7026M**



Motors



12VDC Bipolar Stepper Motor

3.6° / Step

- No. of phases: 2
- Detent torque: 80 g-cm
- Holding torque: 600 g-cm
- Phase resistance: 25Ω
- Phase inductance: 31mH
- Current: 480mA
- Mounting hole size: 0.11"
- Shaft size: 0.43"L x 0.197"Dia.
- Motor size: 1.66"Dia. x 1.31"H



Part No.	Mfr. Cross Ref. No.	1	10	50
105881	SM4203	\$5.99	\$5.59	\$4.95

12VDC Unipolar Stepper Motor

3.6° / Step

- No. of phases: 4
- Detent torque: 80 g-cm
- Holding torque: 600 g-cm
- Phase resistance: 75Ω
- Phase inductance: 39mH
- Current: 150mA
- Mounting hole size: 0.11"
- Shaft size: 0.43"L x 0.197"Dia.
- Motor size: 1.66"Dia. x 1.28"H



Part No.	Mfr. Cross Ref. No.	1	10	50
105890	SM4200	\$8.79	\$7.85	\$6.99

12VDC Unipolar Stepper Motor

.09° / Step

- No. of phases: 4
- Detent torque: 400 g-cm
- Holding torque: 400 g-cm
- Phase resistance: 200Ω
- Phase inductance: 49.5mH
- Current: 60mA
- Mounting hole size: 0.14"
- Shaft size: 0.36"L x 0.194"Dia.
- Motor size: 1.18"Dia. x 0.68"H



Part No.	Mfr. Cross Ref. No.	1	10	50
173180	30BYJ02AH	\$11.49	\$10.35	\$9.35

Bipolar and Unipolar Stepper Motors



Fig. 2



Fig. 3



Fig. 4



Fig. 5



Fig. 6



Fig. 7



Fig. 8

Part Number	Mfr. Cross Ref. No.	Fig.	Step Angle	No. of Phases	Drive System	Volt. (VDC)	Phase Resis. (Ohms)	Curr. (mA)	Phase Inductance (mH)	Detent Torque (g-cm)	Holding Torque (g-cm)	Mounting Hole Space Diagonal (In.)	Mounting Holes (In.)	Shaft Dia. (In.)	Shaft Length (In.)	Motor Dia. (In.)	Motor Height (In.)	Pricing		
																		1	10	50
117954	LB82773-M1	1	7.5°	2	Bipolar	5	6	800	7	100	1080	2.60	1.95	0.250	0.75	2.25	1.00	\$3.79	\$2.99	\$2.25
163395	5017-935 ¹	2	0.9°	2	Bipolar	8.4	30	280	25	36	791	1.73	0.15	0.155	0.29	1.64	1.20	4.95	3.75	2.65
163408	4017-806 ¹	2	1.8°	2	Bipolar	9.2	38	240	52	36	664	1.73	0.15	0.155	0.23	1.66	1.25	2.49	1.89	1.35
105881	SM4203 ^{2/3}	3	3.6°	2	Bipolar	12	25	480	31	80	600	1.73	0.11	0.197	0.43	1.66	1.31	5.99	5.59	4.95
164056	M82101-P1	1	7.5°	3	Unipolar	5	20	255	5	9	94	1.4	0.13	0.078	0.35	1.00	0.46	1.85	1.69	1.55
151861	C-42M048A04	4	7.5°	4	Unipolar	5	9	550	10	90	750	1.94	0.13	0.117	0.40	1.65	0.83	5.59	5.05	4.55
171601	PF35T48L4 ⁴	1	3.6°	4	Unipolar	7	20	350	9	40	680	1.68	0.14	0.078	0.47	1.38	0.58	4.39	3.49	2.65
166705	PM42S-096	1	3.8°	4	Unipolar	12	84	140	16	60	450	1.95	0.13	0.117	0.40	1.66	1.64	3.95	2.95	2.15
105890	SM4200 ³	3	3.6°	4	Unipolar	12	75	150	39	80	600	1.73	0.11	0.197	0.43	1.66	1.28	8.79	7.85	6.99
213321	35BY48-27	7	7.5°	4	Unipolar	12	15	800	68	90	460	1.96	0.13	0.078	0.25	1.38	8.30	14.95	13.49	12.29
173180	30BY102AH ⁵	6	.09°	4	Unipolar	12	200	60	49.5	400	400	1.42	0.14	0.194	0.36	1.18	0.68	11.49	10.35	9.35
192794	PM42S048 ⁶	5	7.5°	4	Unipolar	24	45	500	17.5	39	570	1.97	0.09	0.117	0.33	1.66	0.54	4.95	3.75	2.65
210382	5620	1	7.5°	4	Unipolar	24	100	436	60	40	380	1.67	0.13	0.078	0.40	1.38	0.58	5.95	5.49	4.95
210391	STP42N1963	8	3.75°	4	Unipolar	24	110	436	60	60	600	1.95	0.13	0.118	0.42	1.65	0.54	6.95	6.25	5.59

Dual Motor Gearbox Kit

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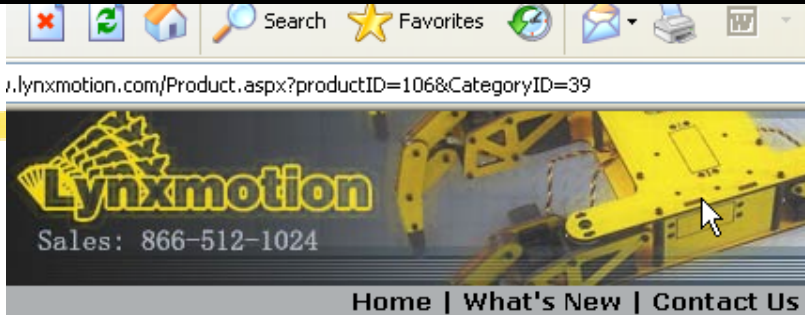
Dual Motor Gearbox Kit



Two independent motors, gear boxes, and axles
Voltage = 3vdc
RPM = 81 or 282
Reduction = 203:1 or 58:1
Stall Torque = 124 or 36 oz-in
(8.9 or 2.6 kg-cm)
Wheels = Sport ([STS-01](#)), Off Road ([ORT-01](#)), Truck ([ORT-02](#))

Price [\$13.95]
Model Number [DMG-01]
Weight [0.25]

Dual Motor Gearbox Kit- Wheels



Off-Road Tire

► Products

- Robotic Arms
- Bipeds
- Quadrapods
- Hexapods
- Polypods
- Carpet Rovers
- 4WD Rovers
- Sumo Robots
- Mechanical
- Hardware
- Electronics
- Batteries & Acces.
- Cables
- Motors, Wheels
 - Planetary Motors
 - Spur Gear Motors
 - Misc. Motors
 - Mounts / Hubs
 - Wheels
- Servos, Access.
- Robot Books
- Misc Stuff
- SSC Software

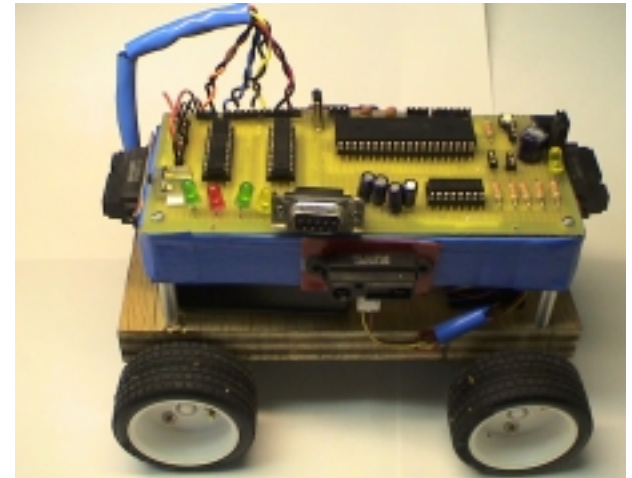
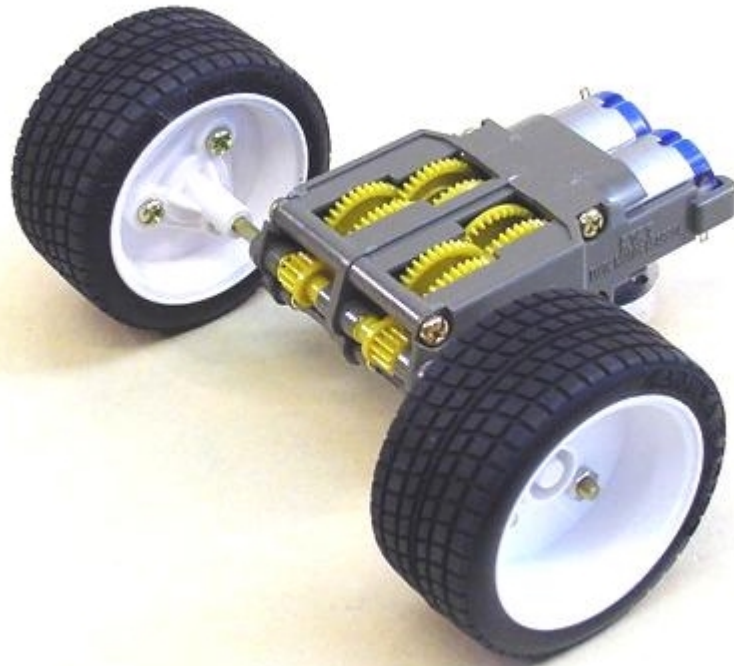
Sport Tire - 2.2" x 1.0" (pair)



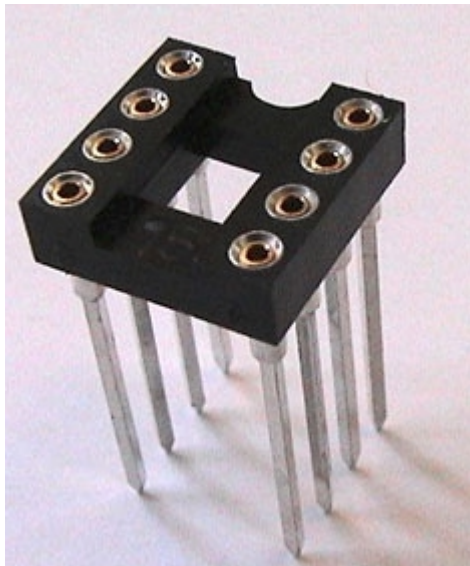
Diameter = 2.2"
Width = 1.0"
Motor = Dual Motor Gearbox
([DMG-01](#))

Price [\$7.95]
Model Number [STS-01]
Weight [0.19]

Motor with Wheels



2 AA Batter Holders/Wire Wrapping Tools



Regular Wrap Tool



Modified Wrap Tool