

LAMPIRAN

SHARP

PC817 Series

PC817 Series

High Density Mounting Type Photocoupler

※ Lead forming type (I type) and taping reel type (P type) are also available. (PC817I/PC817P)
 ※※ TÜV (VDE0884) approved type is also available as an option.

■ Features

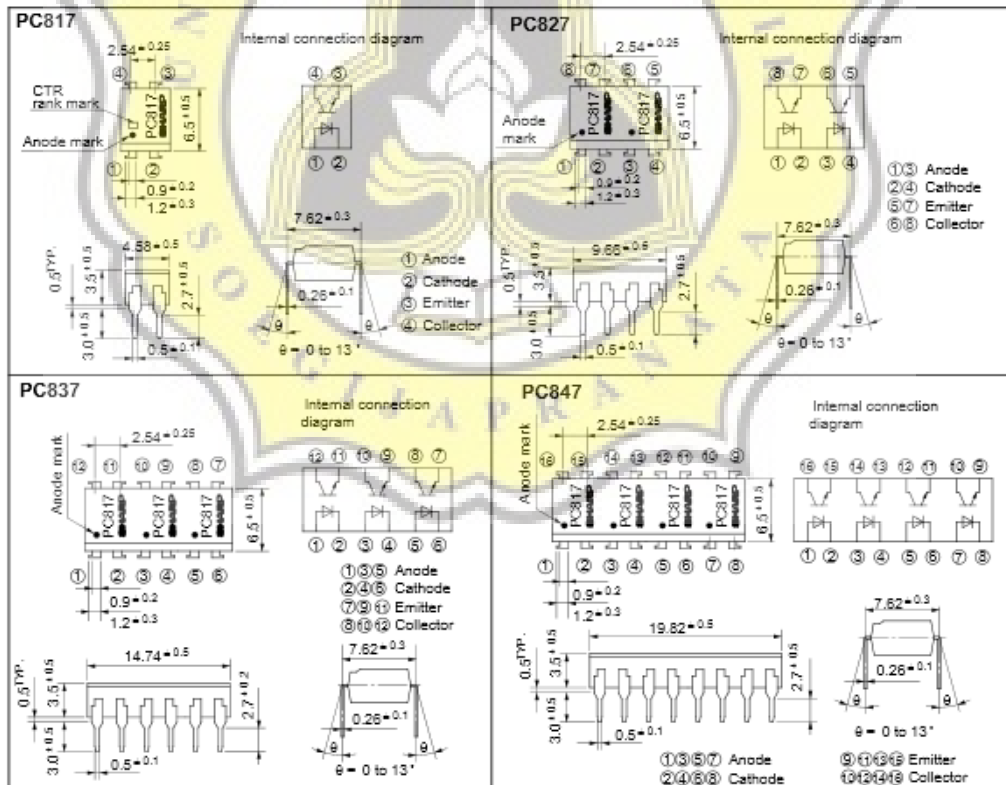
1. Current transfer ratio
(CTR: MIN. 50% at $I_T = 5\text{mA}$, $V_{CE} = 5\text{V}$)
2. High isolation voltage between input and output ($V_{iso} : 5000\text{V}_{rms}$)
3. Compact dual-in-line package
 PC817 : 1-channel type
 PC827 : 2-channel type
 PC837 : 3-channel type
 PC847 : 4-channel type
4. Recognized by UL, file No. E64380

■ Applications

1. Computer terminals
2. System appliances, measuring instruments
3. Registers, copiers, automatic vending machines
4. Electric home appliances, such as fan heaters, etc.
5. Signal transmission between circuits of different potentials and impedances

■ Outline Dimensions

(Unit : mm)



* In the absence of confirmation by device specification sheets, SHARP takes no responsibility for any defects that occur in equipment using any of SHARP's devices, shown in catalogs, data books, etc. Contact SHARP in order to obtain the latest version of the device specification sheets before using any SHARP's device.*

■ Absolute Maximum Ratings (Ta= 25°C)

Parameter	Symbol	Rating	Unit
Input	Forward current	I_F	50 mA
	*1Peak forward current	I_{FM}	1 A
	Reverse voltage	V_R	6 V
	Power dissipation	P	70 mW
Output	Collector-emitter voltage	V_{CEO}	35 V
	Emitter-collector voltage	V_{ECO}	6 V
	Collector current	I_C	50 mA
	Collector power dissipation	P_C	150 mW
	Total power dissipation	P_{tot}	200 mW
*2Isolation voltage	V_{iso}	5 000	V _{rms}
Operating temperature	T_{op}	-30 to +100	°C
Storage temperature	T_{stg}	-55 to +125	°C
*3Soldering temperature	T_{sol}	260	°C

*1 Pulse width <=100µs, Duty ratio : 0.001

*2 40 to 60% RH, AC for 1 minute

*3 For 10 seconds

■ Electro-optical Characteristics (Ta= 25°C)

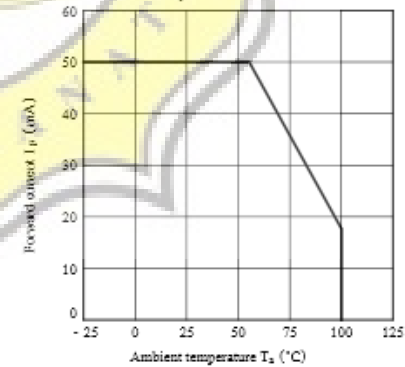
Parameter	Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Input	Forward voltage	V_F $I_F = 20mA$	-	1.2	1.4	V
	Peak forward voltage	V_{FM} $I_{FM} = 0.5A$	-	-	3.0	V
	Reverse current	I_R $V_R = 4V$	-	-	10	µA
	Terminal capacitance	C_t $V = 0, f = 1kHz$	-	30	250	pF
Output	Collector dark current	I_{CDO} $V_{CE} = 20V$	-	-	10	A
	*4Current transfer ratio	CTR $I_F = 5mA, V_{CE} = 5V$	50	-	600	%
	Collector-emitter saturation voltage	$V_{CE(sat)}$ $I_F = 20mA, I_C = 1mA$	-	0.1	0.2	V
Transfer characteristics	Isolation resistance	R_{iso} DC500V, 40 to 60%RH	5×10^{10}	10^{11}	-	Ω
	Floating capacitance	C_f $V = 0, f = 1MHz$	-	0.6	1.0	pF
	Cut-off frequency	f_c $V_{CE} = 5V, I_C = 2mA, R_L = 100\Omega, -3dB$	-	80	-	kHz
	Response time	Rise time	t_r $V_{CE} = 2V, I_C = 2mA, R_L = 100\Omega$	-	4	18
Fall time		t_f	-	3	18	µs

*4 Classification table of current transfer ratio is shown below.

Model No.	Rank mark	CTR (%)
PC817A	A	80 to 160
PC817B	B	130 to 260
PC817C	C	200 to 400
PC817D	D	300 to 600
PC8#7AB	A or B	80 to 260
PC8#7BC	B or C	130 to 400
PC8#7CD	C or D	200 to 600
PC8#7AC	A, B or C	80 to 400
PC8#7BD	B, C or D	130 to 600
PC8#7AD	A, B, C or D	80 to 600
PC8#7	A, B, C, D or No mark	50 to 600

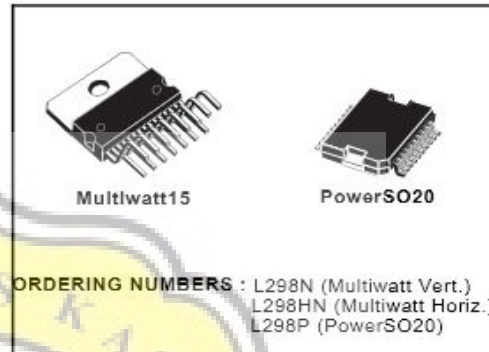
※ : 1 or 2 or 3 or 4

Fig. 1 Forward Current vs. Ambient Temperature



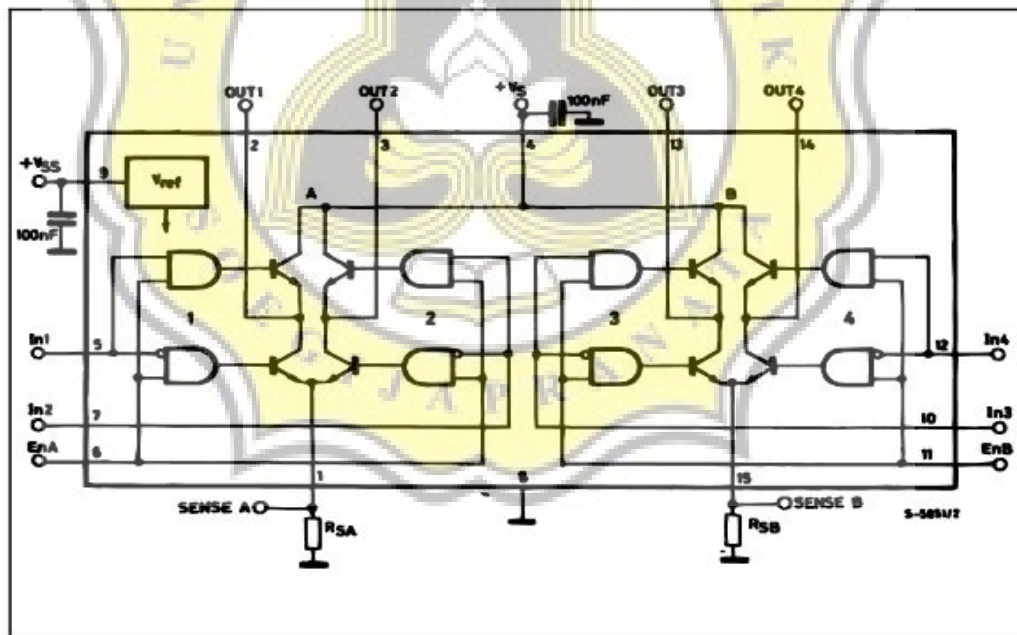
DUAL FULL-BRIDGE DRIVER

- OPERATING SUPPLY VOLTAGE UP TO 46 V
- TOTAL DC CURRENT UP TO 4 A
- LOW SATURATION VOLTAGE
- OVERTEMPERATURE PROTECTION
- LOGICAL "0" INPUT VOLTAGE UP TO 1.5 V (HIGH NOISE IMMUNITY)


DESCRIPTION

The L298 is an integrated monolithic circuit in a 15-lead Multiwatt and PowerSO20 packages. It is a high voltage, high current dual full-bridge driver designed to accept standard TTL logic levels and drive inductive loads such as relays, solenoids, DC and stepping motors. Two enable inputs are provided to enable or disable the device independently of the input signals. The emitters of the lower transistors of each bridge are connected together and the corresponding external terminal can be used for the con-

nection of an external sensing resistor. An additional supply input is provided so that the logic works at a lower voltage.

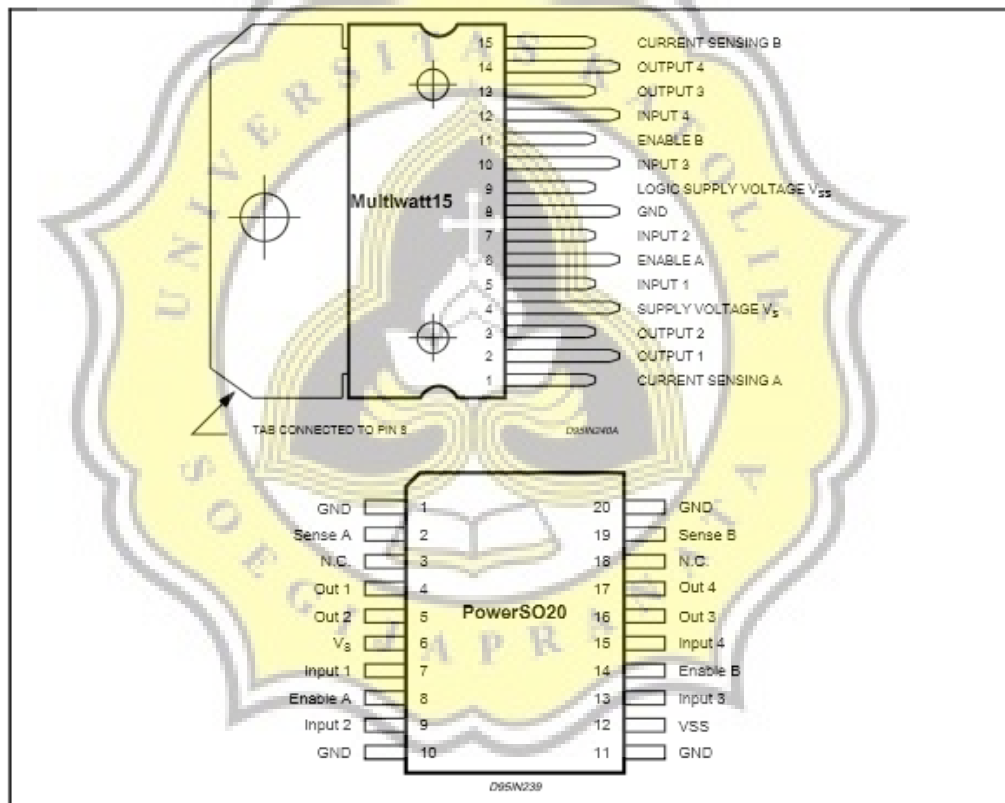
BLOCK DIAGRAM


L298

ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
V_S	Power Supply	50	V
V_{SS}	Logic Supply Voltage	7	V
V_i, V_{en}	Input and Enable Voltage	-0.3 to 7	V
I_O	Peak Output Current (each Channel)		
	- Non Repetitive ($t = 100\mu s$)	3	A
	- Repetitive (80% on -20% off; $t_{on} = 10ms$)	2.5	A
	-DC Operation	2	A
V_{sens}	Sensing Voltage	-1 to 2.3	V
P_{tot}	Total Power Dissipation ($T_{case} = 75^\circ C$)	25	W
T_{op}	Junction Operating Temperature	-25 to 130	$^\circ C$
T_{stg}, T_j	Storage and Junction Temperature	-40 to 150	$^\circ C$

PIN CONNECTIONS (top-view)



THERMAL DATA

Symbol	Parameter		PowerSO20	Multiwatt15	Unit
$R_{th-j-case}$	Thermal Resistance Junction-case	Max.	-	3	$^\circ C/W$
$R_{th-j-amb}$	Thermal Resistance Junction-ambient	Max.	13 (*)	35	$^\circ C/W$

(*) Mounted on aluminum substrate

PIN FUNCTIONS (refer to the block diagram)

MW.15	PowerSO	Name	Function
1;15	2;19	Sense A; Sense B	Between this pin and ground is connected the sense resistor to control the current of the load.
2;3	4;5	Out 1; Out 2	Outputs of the Bridge A; the current that flows through the load connected between these two pins is monitored at pin 1.
4	6	V _S	Supply Voltage for the Power Output Stages. A non-inductive 100nF capacitor must be connected between this pin and ground.
5;7	7;9	Input 1; Input 2	TTL Compatible Inputs of the Bridge A.
6;11	8;14	Enable A; Enable B	TTL Compatible Enable Input: the L state disables the bridge A (enable A) and/or the bridge B (enable B).
8	1,10,11,20	GND	Ground.
9	12	V _{SS}	Supply Voltage for the Logic Blocks. A 100nF capacitor must be connected between this pin and ground.
10; 12	13;15	Input 3; Input 4	TTL Compatible Inputs of the Bridge B.
13; 14	16;17	Out 3; Out 4	Outputs of the Bridge B. The current that flows through the load connected between these two pins is monitored at pin 15.
-	3;18	N.C.	Not Connected

ELECTRICAL CHARACTERISTICS (V_S = 42V; V_{SS} = 5V, T_J = 25°C; unless otherwise specified)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V _S	Supply Voltage (pin 4)	Operative Condition	V _H +2.5		46	V
V _{SS}	Logic Supply Voltage (pin 9)		4.5	5	7	V
I _S	Quiescent Supply Current (pin 4)	V _{en} = H; I _L = 0		13	22	mA
		V _i = L		50	70	mA
		V _{en} = L			4	mA
I _{SS}	Quiescent Current from V _{SS} (pin 9)	V _{en} = H; I _L = 0		24	36	mA
		V _i = L		7	12	mA
		V _{en} = L			6	mA
V _L	Input Low Voltage (pins 5, 7, 10, 12)		-0.3		1.5	V
V _H	Input High Voltage (pins 5, 7, 10, 12)		2.3		V _{SS}	V
I _L	Low Voltage Input Current (pins 5, 7, 10, 12)	V _i = L			-10	μA
I _H	High Voltage Input Current (pins 5, 7, 10, 12)	V _i = H ≤ V _{SS} - 0.6V		30	100	μA
V _{en} = L	Enable Low Voltage (pins 6, 11)		-0.3		1.5	V
V _{en} = H	Enable High Voltage (pins 6, 11)		2.3		V _{SS}	V
I _{en} = L	Low Voltage Enable Current (pins 6, 11)	V _{en} = L			-10	μA
I _{en} = H	High Voltage Enable Current (pins 6, 11)	V _{en} = H ≤ V _{SS} - 0.6V		30	100	μA
V _{CEsat(H)}	Source Saturation Voltage	I _L = 1A I _L = 2A	0.95	1.35 2	1.7 2.7	V
V _{CEsat(L)}	Sink Saturation Voltage	I _L = 1A (5) I _L = 2A (5)	0.85	1.2 1.7	1.6 2.3	V
V _{CEsat}	Total Drop	I _L = 1A (5) I _L = 2A (5)	1.80		3.2 4.9	V
V _{sens}	Sensing Voltage (pins 1, 15)		-1 (1)		2	V

ELECTRICAL CHARACTERISTICS (continued)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
T ₁ (V _i)	Source Current Turn-off Delay	0.5 V _i to 0.9 I _L (2); (4)		1.5		μs
T ₂ (V _i)	Source Current Fall Time	0.9 I _L to 0.1 I _L (2); (4)		0.2		μs
T ₃ (V _i)	Source Current Turn-on Delay	0.5 V _i to 0.1 I _L (2); (4)		2		μs
T ₄ (V _i)	Source Current Rise Time	0.1 I _L to 0.9 I _L (2); (4)		0.7		μs
T ₅ (V _i)	Sink Current Turn-off Delay	0.5 V _i to 0.9 I _L (3); (4)		0.7		μs
T ₆ (V _i)	Sink Current Fall Time	0.9 I _L to 0.1 I _L (3); (4)		0.25		μs
T ₇ (V _i)	Sink Current Turn-on Delay	0.5 V _i to 0.9 I _L (3); (4)		1.6		μs
T ₈ (V _i)	Sink Current Rise Time	0.1 I _L to 0.9 I _L (3); (4)		0.2		μs
f _c (V _i)	Commutation Frequency	I _L = 2A		25	40	KHz
T ₁ (V _{en})	Source Current Turn-off Delay	0.5 V _{en} to 0.9 I _L (2); (4)		3		μs
T ₂ (V _{en})	Source Current Fall Time	0.9 I _L to 0.1 I _L (2); (4)		1		μs
T ₃ (V _{en})	Source Current Turn-on Delay	0.5 V _{en} to 0.1 I _L (2); (4)		0.3		μs
T ₄ (V _{en})	Source Current Rise Time	0.1 I _L to 0.9 I _L (2); (4)		0.4		μs
T ₅ (V _{en})	Sink Current Turn-off Delay	0.5 V _{en} to 0.9 I _L (3); (4)		2.2		μs
T ₆ (V _{en})	Sink Current Fall Time	0.9 I _L to 0.1 I _L (3); (4)		0.35		μs
T ₇ (V _{en})	Sink Current Turn-on Delay	0.5 V _{en} to 0.9 I _L (3); (4)		0.25		μs
T ₈ (V _{en})	Sink Current Rise Time	0.1 I _L to 0.9 I _L (3); (4)		0.1		μs

- 1) Sensing voltage can be -1 V for t ≤ 50 μsec; in steady state V_{sen} min ≥ -0.5 V.
- 2) See fig. 2.
- 3) See fig. 4.
- 4) The load must be a pure resistor.

Figure 1 : Typical Saturation Voltage vs. Output Current.

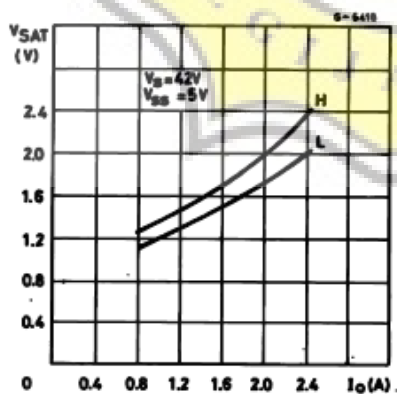
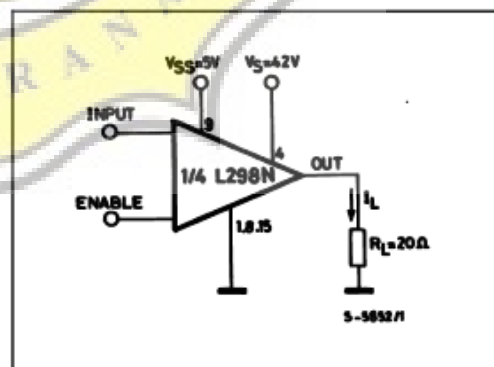


Figure 2 : Switching Times Test Circuits.



Note : For INPUT Switching, set EN = H
For ENABLE Switching, set IN = H



MICROCHIP

**dsPIC30F6011, dsPIC30F6012
dsPIC30F6013, dsPIC30F6014
Data Sheet**

High-Performance
Digital Signal Controllers



MICROCHIP

dsPIC30F6011/6012/6013/6014

**dsPIC30F6011/6012/6013/6014 High Performance
Digital Signal Controllers**

Note: This data sheet summarizes features of this group of dsPIC30F devices and is not intended to be a complete reference source. For more information on the CPU, peripherals, register descriptions and general device functionality, refer to the *dsPIC30F Family Reference Manual* (DS70048). For more information on the device instruction set and programming, refer to the *dsPIC30F Programmer's Reference Manual* (DS70030).

High Performance Modified RISC CPU:

- Modified Harvard architecture
- C compiler optimized instruction set architecture
- Flexible addressing modes
- 84 base instructions
- 24-bit wide instructions, 16-bit wide data path
- Up to 144 Kbytes on-chip Flash program space
- Up to 48K instruction words
- Up to 8 Kbytes of on-chip data RAM
- Up to 4 Kbytes of non-volatile data EEPROM
- 16 x 16-bit working register array
- Up to 30 MIPs operation:
 - DC to 40 MHz external clock input
 - 4 MHz-10 MHz oscillator input with PLL active (4x, 8x, 16x)
- Up to 41 interrupt sources:
 - 8 user selectable priority levels
 - 5 external interrupt sources
 - 4 processor traps

DSP Features:

- Dual data fetch
- Modulo and Bit-reversed modes
- Two 40-bit wide accumulators with optional saturation logic
- 17-bit x 17-bit single cycle hardware fractional/integer multiplier
- All DSP instructions are single cycle
 - Multiply-Accumulate (MAC) operation
- Single cycle ± 16 shift

Peripheral Features:

- High current sink/source I/O pins: 25 mA/25 mA
- Five 16-bit timers/counters; optionally pair up 16-bit timers into 32-bit timer modules
- 16-bit Capture input functions
- 16-bit Compare/PWM output functions:
- Data Converter Interface (DCI) supports common audio Codec protocols, including I²S and AC'97
- 3-wire SPI™ modules (supports 4 Frame modes)
- I²C™ module supports Multi-Master/Slave mode and 7-bit/10-bit addressing
- Two addressable UART modules with FIFO buffers
- Two CAN bus modules compliant with CAN 2.0B standard

Analog Features:

- 12-bit Analog-to-Digital Converter (A/D) with:
 - 100 Ksps conversion rate
 - Up to 16 input channels
 - Conversion available during Sleep and Idle
- Programmable Low Voltage Detection (PLVD)
- Programmable Brown-out Detection and Reset generation

Special Microcontroller Features:

- Enhanced Flash program memory:
 - 10,000 erase/write cycle (min.) for industrial temperature range, 100K (typical)
- Data EEPROM memory:
 - 100,000 erase/write cycle (min.) for industrial temperature range, 1M (typical)
- Self-reprogrammable under software control
- Power-on Reset (POR), Power-up Timer (PWRT) and Oscillator Start-up Timer (OST)
- Flexible Watchdog Timer (WDT) with on-chip low power RC oscillator for reliable operation

dsPIC30F6011/6012/6013/6014

Special Microcontroller Features (Cont.):

- Fail-Safe Clock Monitor operation:
 - Detects clock failure and switches to on-chip low power RC oscillator
- Programmable code protection
- In-Circuit Serial Programming™ (ICSP™)
- Selectable Power Management modes:
 - Sleep, Idle and Alternate Clock modes

CMOS Technology:

- Low power, high speed Flash technology
- Wide operating voltage range (2.5V to 5.5V)
- Industrial and Extended temperature ranges
- Low power consumption

dsPIC30F6011/6012/6013/6014 Controller Families

Device	Pins	Program Memory		SRAM Bytes	EEPROM Bytes	Timer 16-bit	Input Cap	Output Comp/Std PWM	Codec Interface	A/D 12-bit 100 Ksps	UART	SPI™	I ² C™	CAN
		Bytes	Instructions											
dsPIC30F6011	64	132K	44K	6144	2048	5	8	8	—	16 ch	2	2	1	2
dsPIC30F6012	64	144K	48K	8192	4096	5	8	8	AC97, I ² S	16 ch	2	2	1	2
dsPIC30F6013	80	132K	44K	6144	2048	5	8	8	—	16 ch	2	2	1	2
dsPIC30F6014	80	144K	48K	8192	4096	5	8	8	AC97, I ² S	16 ch	2	2	1	2



dsPIC30F6011/6012/6013/6014

Pin Diagrams



Note: For descriptions of individual pins, see Section 1.0.

Stepper Motor NEMA 17

This document describes mechanical and electrical specifications for PBC Linear stepper motors; including standard, hollow, and extended shaft variations.

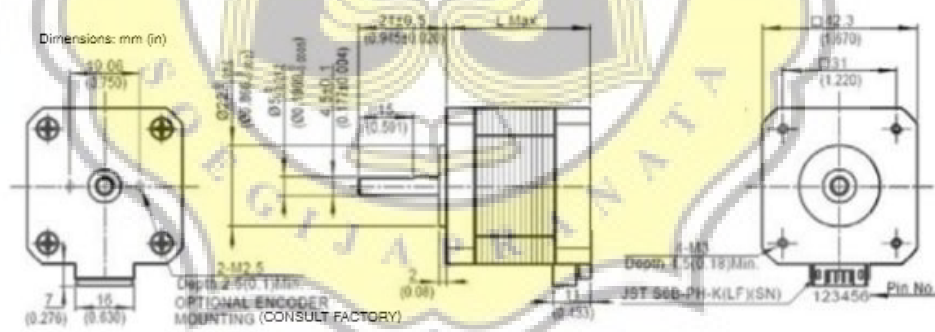


Phases	2
Steps/Revolution	200
Step Accuracy	±5%
Shaft Load	20,000 Hours at 1000 RPM
Axial	25 N (5.6 lbs.) Push 65 N (15 lbs.) Pull
Radial	29 N (6.5 lbs.) At Flat Center
IP Rating	40
Approvals	RoHS
Operating Temp	-20° C to +40° C
Insulation Class	B, 130° C
Insulation Resistance	100 MegOhms

Standard shaft motor shown.

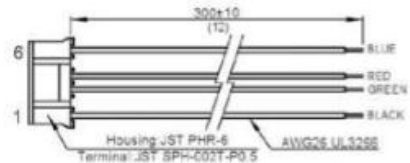
Description	Length "L" Max	Mounted Rated Current Amps	Mounted Holding Torque		Winding Ohms mH		Detent Torque		Rotor Inertia		Motor Weight	
			Nm oz-in Typ.	oz-in Typ.	±10% @ 20° C Typ.	mNm oz-in Typ.	g cm ² oz-in ²	kg lbs	lbs			
Single	39.8 mm (1.57 in)	2	0.48 88	1.04 2.2	15	2.1	57	0.31	0.28	0.62		
Double	48.3 mm (1.90 in)	2	0.65 89	1.3 2.9	25	3.5	82	0.45	0.36	0.79		
Triple	62.8 mm (2.47 in)	2	0.85 120	1.49 3.6	30	4.2	128	0.67	0.6	1.3		

*All standard motors have plug connector. Consult factory for other options.



Standard shaft dimensions shown. All other dimensions apply to hollow and extended shaft options.

Dimensions: mm (in)
4 Lead Connector, PBC Part#6200490
(Consult factory for optional motor connectors)



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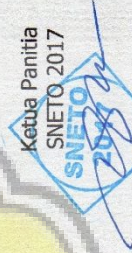
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