

# M64611FP

## DIGITAL SERVO MOTOR CONTROL FOR RADIO CONTROL

REJ03F0017-0100Z

Rev.1.00

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### Description

The M64611FP is a semiconductor integrated circuit of the BiCMOS structure for servo motor control for the radio control application.

### Features

- A quick response and a powerful holding torque
- Simple settings of dead band, pulse stretcher, boost time addition, and max duty.

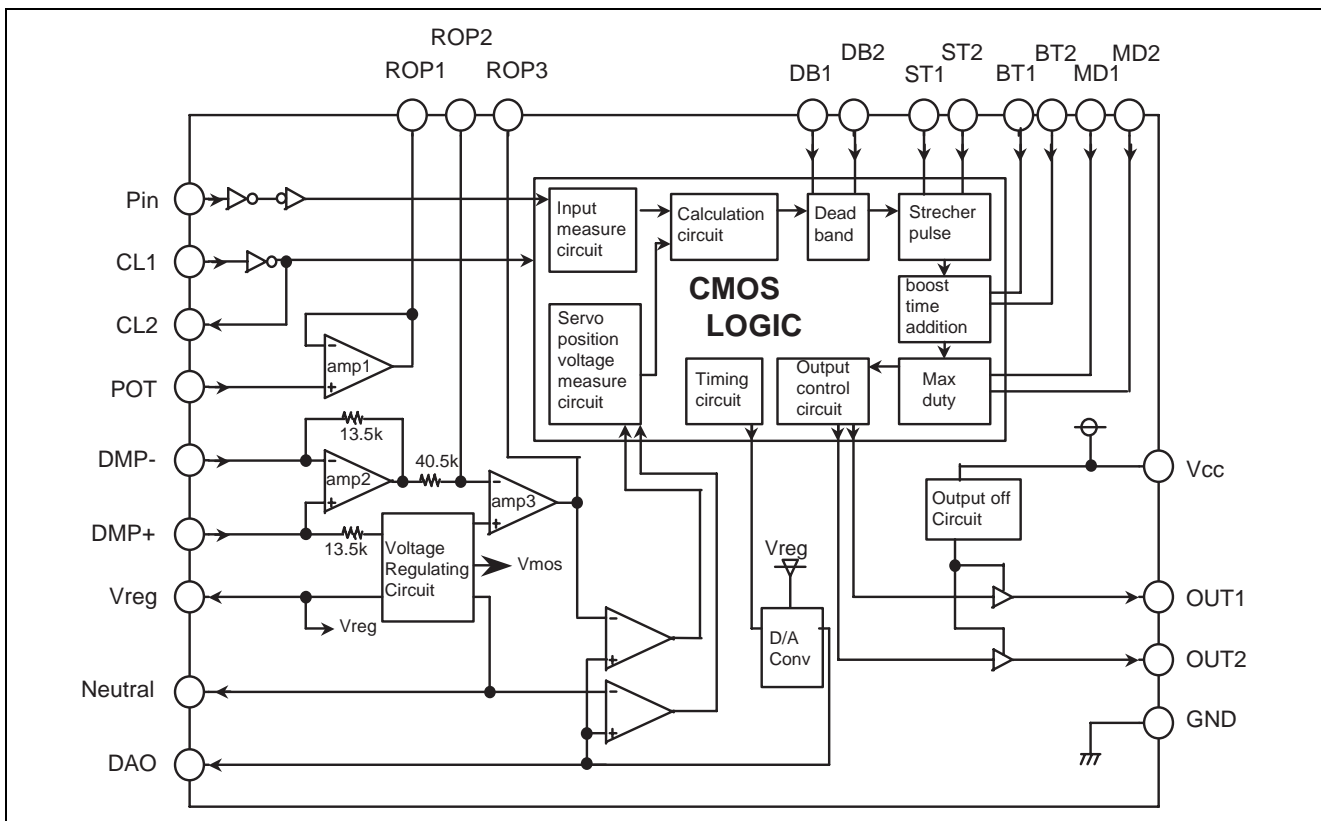
### Application

- Digital proportional system for radio control

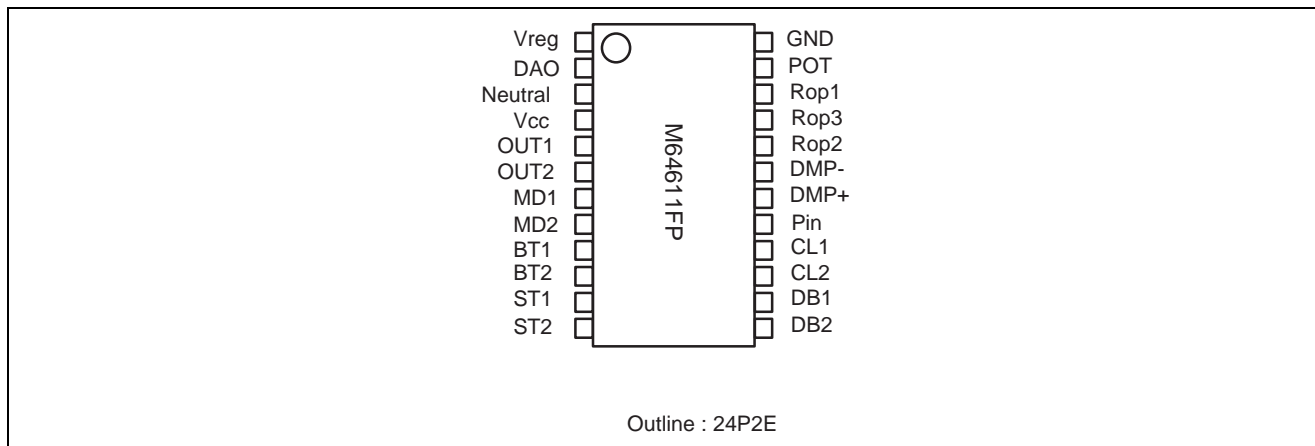
### Recommended operating condition

- Supply voltage range: 4 to 9 V

### Block diagram



## Pin Arrangement



## Pin Description

Pin No.	Symbol	Function	Notes
1	Vreg	Regulated voltage output	Connect a capacitor for the stabilization between Vreg and GND
2	DAO	D/A converter output	Connect the capacitor for the filter of 100 – 1000pF between DAO and GND.
3	Neutral	Neutral voltage output	Make it open usually. Connect a capacitor for the stabilization between Neutral and GND if Neutral voltage is unstable.
4	Vcc	Supply voltage	Connect the Electrolytic condenser more than 10 $\mu$ F and the ceramics condenser more than 0.1 $\mu$ F.
5	OUT1	Output pin 1	Connect to the external driver IC for servo drive.
6	OUT2	Output pin 2	
7	MD1	Max. duty input 1	Refer to the following input table.
8	MD2	Max. duty input 2	When it is "H" : OPEN
9	BT1	Boost input 1	When it is "L" : GND
10	BT2	Boost input 2	
11	ST1	Stretcher input 1	
12	ST2	Stretcher input 2	
13	DB2	Dead Band input 2	
14	DB1	Dead Band input 1	
15	CL2	Oscillation terminal 2	Connect to resonator between CL1 and CL2.
16	CL1	Oscillation terminal 1	
17	Pin	Receiving pulse input	
18	DMP+	Damping resistor input+	Connect to the damping resistor of 100 k $\Omega$ -1 M $\Omega$ .
19	DMP-	Damping resistor input-	
20	ROP2	Gain Adjustment Resistor 2	Connect to the resistances for adjusting Gain.
21	ROP3	Gain Adjustment Resistor 3	
22	ROP1	Gain Adjustment Resistor 1	
23	POT	Servo position voltage input	Connect the potentiometer.
24	GND	GND	

**Input Table**

<Dead Band >

Input		Set value
DB1	DB2	
L	L	4tosc
H	L	6tosc
L	H	9tosc
H	H	13tosc

<Max Duty >

Input		Set value
MD1	MD2	
L	L	about 97%
H	L	about 94%
L	H	about 88%
H	H	about 82%

<Boost>

Input		Set value
BT1	BT2	
L	L	12x64xtosc
H	L	28x64xtosc
L	H	64x64xtosc
H	H	116x64xtosc

<Stretcher Gain >

Input		Set value
ST1	ST2	
L	L	x 1
H	L	x 2
L	H	x 4
H	H	x 8

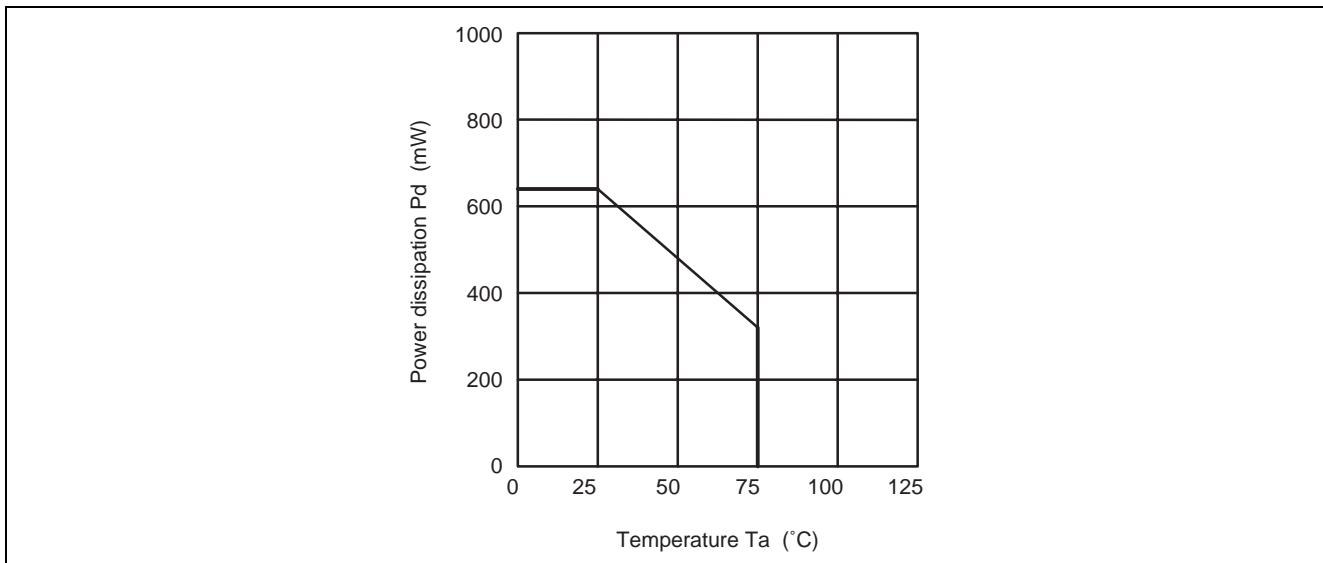
Note: tosc: oscillation period of resonator

**Absolute Maximum Ratings**

(Ta = -20 to 75°C, unless otherwise noted)

Symbol	Parameter	Test Conditions	Ratings	Unit
V <sub>CC</sub>	Supply voltage		-0.3 to +9.0	V
I <sub>o</sub>	Output current	OUT1, OUT2	-5 to +5	mA
P <sub>d</sub>	Power dissipation	Ta = 25°C	630	mW
T <sub>opr</sub>	Operating temperature		-20 to +75	°C
T <sub>stg</sub>	Storage temperature		-40 to 125	°C

**Thermal Derating (Absolute Maximum Rating)**



**Recommended operating conditions**

(Ta = -20 to +75°C)

Symbol	Parameter	Conditions	Ratings	Unit
V <sub>CC</sub>	Supply voltage		4.0 to 9.0	V
V <sub>INPin</sub>	Pin input voltage		0 to V <sub>CC</sub>	V
V <sub>INPOT</sub>	POT input voltage		0.2 to 2.0	V
I <sub>OVreg</sub>	V <sub>reg</sub> output current		-2 to 0	mA
V <sub>OROP3</sub>	ROP3 output voltage range		0.2 to 2.0	V

## Electrical Characteristics

(V<sub>CC</sub> = 5V, T<sub>a</sub> = 25°C, unless otherwise noted)

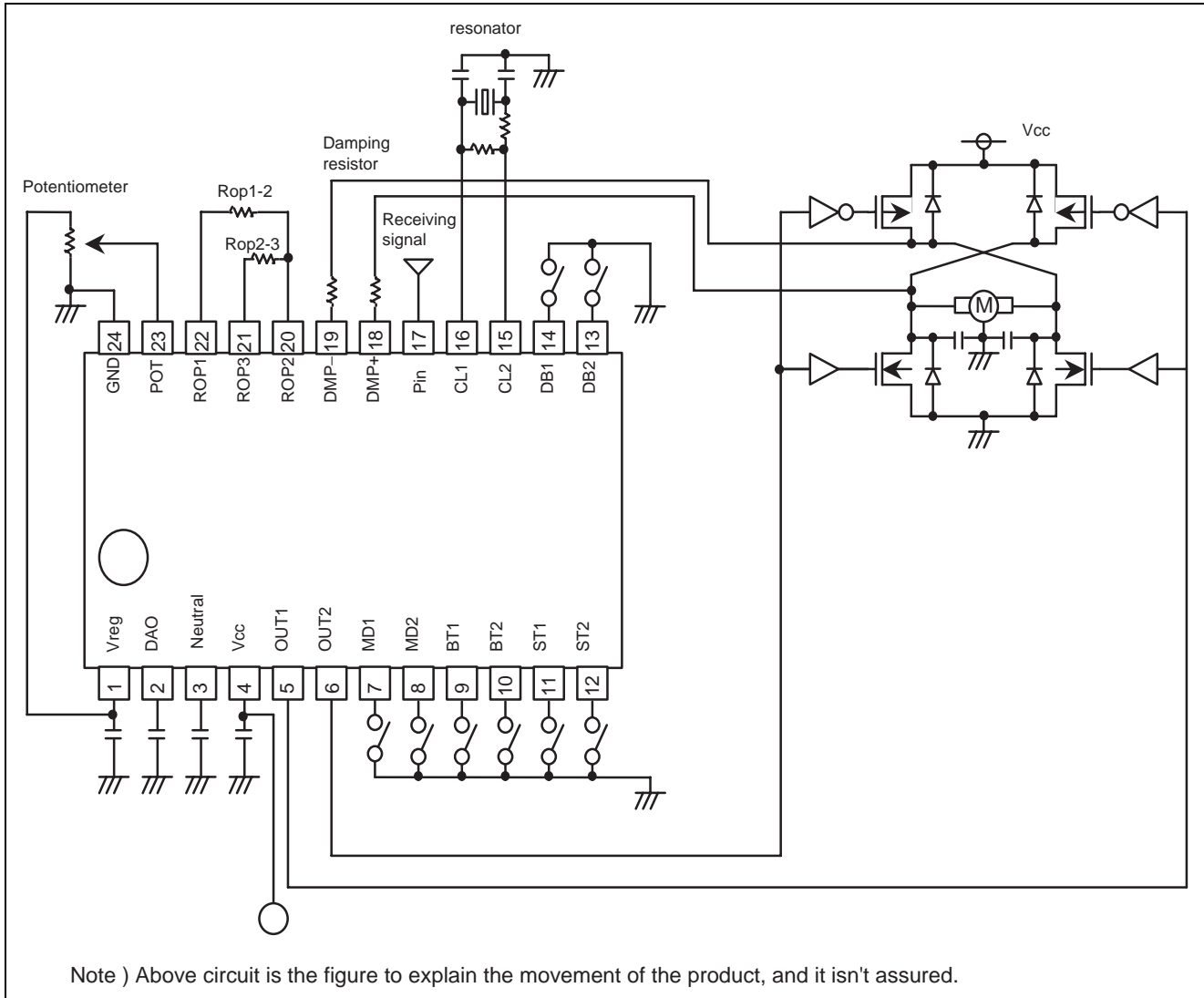
Symbol	Parameters	Test conditions	Measure Pin	Limits			Unit
				Min	Typ	Max	
I <sub>CC1</sub>	Supply current 1	V <sub>CC</sub> 1 = 9 V OUT 1 and OUT2 are OFF.	V <sub>CC</sub>	—	19	28	mA
I <sub>CC2</sub>	Supply current 2	V <sub>CC</sub> 1 = 5 V OUT 1 and OUT2 are OFF.	V <sub>CC</sub>	—	15	21	mA
V <sub>OFF</sub>	Output voltage		V <sub>CC</sub>	2.80	3.02	3.30	V
V <sub>ON</sub>	Output voltage		V <sub>CC</sub>	2.93	3.15	3.43	V
V <sub>reg1</sub>	Regulated voltage 1	I <sub>o</sub> = 0 μA	V <sub>reg</sub>	2.02	2.15	2.28	V
V <sub>reg2</sub>	Regulated voltage 2	I <sub>o</sub> = -2 mA	V <sub>reg</sub>	2.00	2.14	2.27	V
dV <sub>reg</sub>	Supply Voltage dependence of V <sub>reg</sub>	V <sub>reg</sub> 1 standard. I <sub>o</sub> = 0 μA V <sub>CC</sub> = 4 to 9 (V)	V <sub>reg</sub>	—	0.11	0.25	% / V
V <sub>Neutral</sub>	Natural Voltage	V <sub>Neutral</sub> = 0.6 V <sub>reg</sub>	Natural	1.21	1.29	1.37	V
I <sub>OH</sub>	"H" Output current	V <sub>o</sub> = 0.7 V	OUT1 OUT2	-2.4	-1.54	-1.1	mA
V <sub>OL</sub>	"L" Output voltage	I <sub>o</sub> = 1 mA	OUT1 OUT2	0.02	0.1	0.3	mV
V <sub>OF1</sub>	amp 1 offset voltage	POT = 1.1 V	Rop1	-10	1	10	mV
I <sub>IN amp1</sub>	amp 1 input current	POT = 0.2 V	POT	-1	0.3	0	μA
V <sub>OH amp1</sub>	"H" output voltage	I <sub>o</sub> = -250 μA, POT = 2 V	Rop1	1.97	2.00	2.02	V
V <sub>OL amp1</sub>	"L" output voltage	I <sub>o</sub> = 250 μA, POT = 0.2 V	Rop1	0.18	0.20	0.23	V
G <sub>V1ROP3</sub>	Voltage gain 1 (from amp2 to amp3)	Damping resistors = 300 K Ω Rop2 to 3 = 12 K Ω DMP- = 5 V, DMP+ = 0 V	Rop3	-41	-37.5	-35	dB
G <sub>V2ROP3</sub>	Voltage gain 2 (from amp2 to amp3)	Damping resistors = 300 K Ω Rop2 to 3 = 12 K Ω DMP- = 5 V, DMP+ = 5 V	Rop3	-41	-37.5	-35	dB
V <sub>IHPin</sub>	"H" input voltage of Pin		Pin	1.5	—	V <sub>CC</sub>	V

## Timing Requirement Conditions

(V<sub>CC</sub> = 5 V, T<sub>a</sub> = 25°C, unless otherwise noted)

Symbol	Parameters	Conditions	Limits			Unit
			Min	Typ.	Max	
f <sub>CLK</sub>	Clock frequency		—	4.915	—	MHz
T <sub>wh (Pin)</sub>	Pin "H" pulse width	f <sub>CLK</sub> = 4.915 MHz	782	—	2187	μS

## Application Example



Note ) Above circuit is the figure to explain the movement of the product, and it isn't assured.

Notes: Be careful of handling because 1 to 4 pin and 17, 23 pin break easily to other pins.

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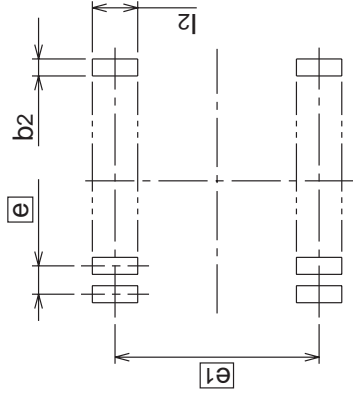
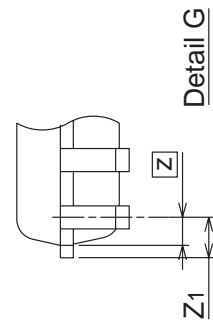
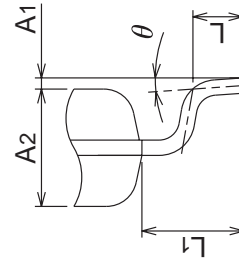
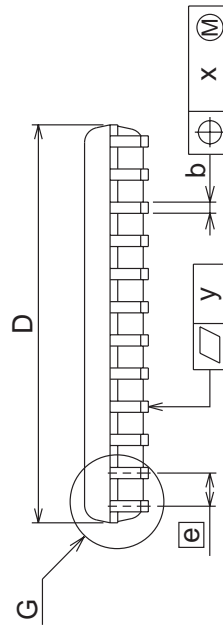
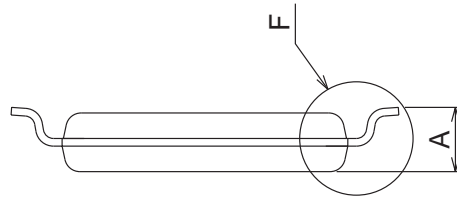
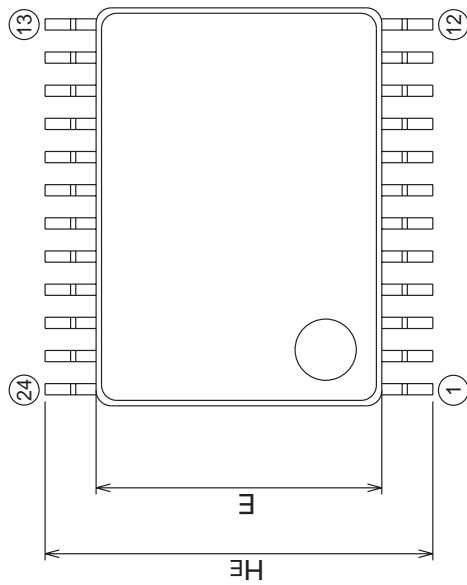
Package Dimension

**24P2E-A**

(MMP)

**Plastic 24pin 275mil SSOP**

EIAJ Package Code SSOP24-P-275-0.65	JEDEC Code -	Weight(g) 0.12	Lead Material Alloy 42
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Recommended Mount Pad

Symbol	Dimension in Millimeters		
	Min	Nom	Max
A	-	-	1.45
A1	0	0.1	0.2
A2	-	1.15	-
b	0.17	0.22	0.32
c	0.13	0.15	0.2
D	7.7	7.8	7.9
E	5.5	5.6	5.7
e	-	0.65	-
HE	7.4	7.6	7.8
L	0.3	0.5	0.7
L1	-	1.0	-
Z	-	0.325	-
Z1	-	-	0.475
x	-	-	0.13
y	-	-	0.1
$\theta$	0°	-	10°
b2	-	0.35	-
e1	-	7.0	-
l2	1.0	-	-

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