Seagate Microelectronics Limited PRELIMINARY

5-AMP STEPPER MOTOR DRIVER

T-52-13-25

IP1D03, IP2D03, IP3D03

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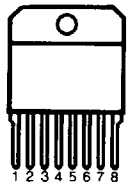
DESCRIPTION

The IP3D03W is a high voltage, high current monolithic integrated H-bridge driver designed to drive DC and stepper motors with up to 5 amps continuous current. TTL compatible control is provided by two INPUT pins to control the respective phase of each push-pull channel and an ENABLE pin for four-quadrant chopping applications. The entire circuit operates from a single supply with a maximum of 50 volts. Logic pins can be switched from −0.3 volts to supply making this device ideal for military applications. The IP1D03K is packaged in an 8 pin TO-3 for applications which require a hermetic power package. Other features include an external current sense pin, thermal shutdown protection with hysteresis, input hysteresis and internal crossover-current protection to avoid destructive current spikes through the device.

FEATURES

- 5A maximum continuous output current
- 50V maximum supply voltage
- External current sense capability
- Internal crossover-current protection
- Thermal shutdown protection with hysteresis
- TTL compatible inputs with hysteresis
- Power SIP package (Future)
- Hermetic 8 pin TO-3 package
- Parasitic protection from inductive transients

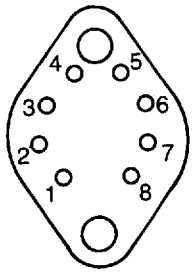
CONNECTIONS



Power SIP

IP3D03W (FUTURE)

1—SUPPLY
2—INPUT 1
3—OUTPUT 1
4—SENSE
5—OUTPUT 2
6—INPUT 2
7—ENABLE
8—GROUND

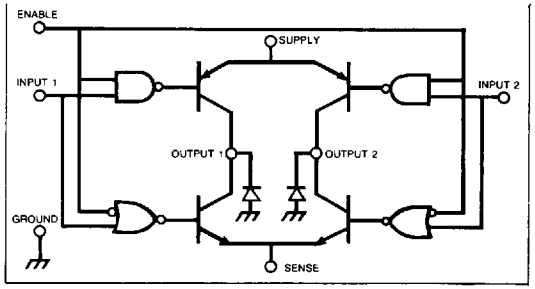


IP1D03K

1—SENSE
2—OUTPUT 1
3—INPUT 1
4—ENABLE
5—GROUND/CASE
6—SUPPLY
7—INPUT 2
8—OUTPUT 2

TO-3

BLOCK DIAGRAM



TRUTH TABLE

INPUT	ENABLE	OUTPUT
X	L	HIGH Z
L	H	SINK
H	H	SOURCE

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ABSOLUTE MAXIMUM RATINGS

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Supply Voltage, V_S 50V

Input Voltage, V_{IN} −0.3 to +50V

Output Voltage, V_O (Note 1)

Output Current, I_O 5A

Operating Junction Temperature, T_J 150°C

Storage Temperature, T_{STG} −60°C to 150°C

Package Thermal Resistance

Power SIP, R_{JC} 1.5°C/W

R_{JA} 25°C/W

TO-3 R_{JC} 1.0°C/W

Note 1: Voltage transients above supply must be limited by external suppression diodes. See application information for more details.

Absolute maximum ratings are those values beyond which the safety of the device cannot be guaranteed. They are not meant to imply that the device should be operated at these limits. The electrical characteristics provide conditions for actual device operation.

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ELECTRICAL CHARACTERISTICS

Unless otherwise noted, these specifications apply over the full operating ambient temperature range. Typical values are given for V_S = 28V and T_A = 25°C.

Symbol	Parameter	Conditions	Min	Typ	Max	Units
V_S	Supply Voltage		4.5		48	V
I_S	Supply Current	EN = H, IN = H		19		mA
		EN = H, IN = L		37		mA
		EN = L		9		mA
V_{IL}	Input Low Voltage		-0.3		0.8	V
V_{IH}	Input High Voltage		2.4		VS	V
I_{IL}	Input Low Current	V_{IL} = 0V		−50		uA
I_{IH}	Input High Current	V_{IH} = 5V		10		uA
U_{th}	Upper Threshold			2.10		V
L_{th}	Lower Threshold			1.50		V
$V_{CE}satH$	Source Saturation Voltage	1_O = −0.5A		1.45		V
		I_O = −5.0A		1.90		V
$V_{CE}satL$	Sink Saturation Voltage	I_O = 0.5A		0.75		V
		I_O = 5.0A		1.1		V
V_{OD}	Output Voltage Differential	I_O = 0.5A		0	25	mV
		I_O = 5.0A		0	100	mV
V_F	Diode Forward Voltage	I_O = 0.5A		0.95		V
		I_O = 5.0A		1.55		V
T_{tsd}	Thermal Shutdown Threshold		150	175		C
T_{hys}	Thermal Shutdown Hysteresis			25		C

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TYPICAL PERFORMANCE CHARACTERISTICS

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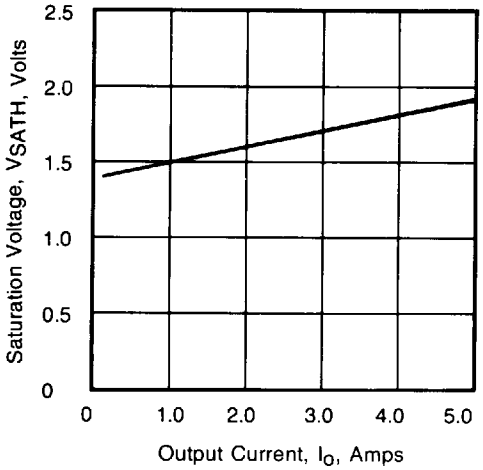
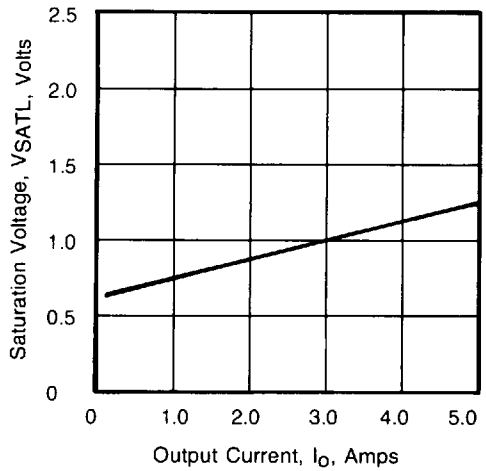
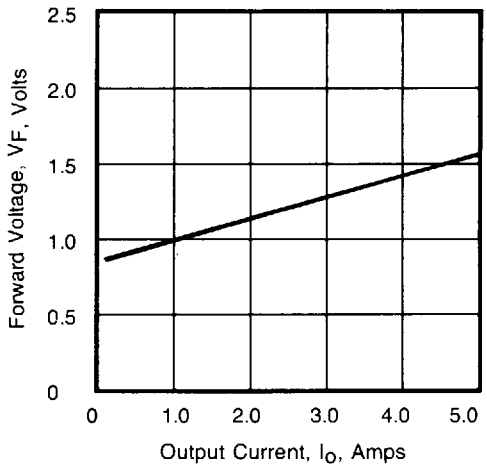
Source Saturation Voltage vs Output Current



Sink Saturation Voltage vs Output Current



Diode Forward Voltage vs Output Current



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SWITCHING CHARACTERISTICS

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			Min	Typ	Max	Units
INPUT Switching (t1 - t4 Source, t5 - t8 Sink)						
t1	Turn-off delay	0.5Vi to 0.5Io		300		ns
t2	Fall time	0.9Io to 0.1Io		150		ns
t3	Turn-on delay	0.5Vi to 0.5Io		1500		ns
t4	Rise time	0.1Io to 0.9Io		200		ns
t5	Turn-off delay	0.5Vi to 0.5Io		400		ns
t6	Fall time	0.9Io to 0.1Io		300		ns
t7	Turn-on delay	0.5Vi to0.5Io		450		ns
t8	Rise time	0.1Io to 0.9Io		300		ns
ENABLE Switching (t9 - t12 Source, t13 - t16 Sink)						
t9	Turn-off delay	0.5Vi to 0.5Io		3400		ns
t10	Fall time	0.91o to 0.1Io		850		ns
t11	Turn-on delay	0.5Vi to 0.5Io		800		ns
t12	Rise time	0.1Io to 0.9Io		150		ns
t13	Turn-off delay	0.5Vi to 0.5Io		2900		ns
t14	Fall time	0.9Io to 0.1Io		800		ns
t15	Turn-on delay	0.5Vi to 0.5Io		500		ns
t16	Rise time	0.1Io to 0.9Io		100		ns
Cross-over Delays, INPUT Switching						
t17	Source to Sink delay			1600		ns
t18	Sink to Source delay			1600		ns

ORDER INFORMATION

Part Number	Temperature Range	Package
IP1D03K	−55°C to +125°C	8 Pin TO-3
IP2D03W	−40°C to +105°C	8 Pin Power SIP (FUTURE)
IP3D03W	0°C to + 70°C	8 Pin Power SIP (FUTURE)
IP3D03K	0°C to + 70°C	8 pin TO-3