TPD4008K

● 3-Phase DC Brushless Motor Driver (PWM Circuit Include)

The TPD4008K is a DC brushless motor driver using high voltage PWM control. It is fabricated by high voltage SOI process. It contains PWM circuit, 3-phase decode logic, level shift high side driver, low side driver, IGBT outputs, FRDs and protective functions for overcurrent, over-heating and under voltage. 5 V C-MOS interface makes it easy to control a DC brushless motor by just putting logic inputs from a microcomputer and hole IC into the TPD4008K.

Features

- Level shift high side driver is built in
- Bootstrap circuit gives simple high side supply
- 3-phase bridge output using 6 IGBTs
- 6 FRDs are built in
- PWM and 3-phase decoder circuit are built in
- Protective functions for over-current, overheating and under voltage
- Outputs rotation pulse signals
- 23-pin ZIP package with heat sink

HZIP23-P-1.27H

Maximum Rating (T_a = 25°C)

Characteristic	Symbol	Rating	Unit
Power Supply Voltage	V_{BB}	250	V
	V_{CC}	18	
Output Current (DC)	I_{out}	1	A
Output Current (Pulse)	I_{out}	2	A
Input Voltage (except VS)	V_{IN}	−0.5 to V_{REG} + 0.5	V
Input Voltage (only VS)	V_{VS}	6.5	V
Power Dissipation (T_a = 25°C)	P_C	4	W
Power Dissipation (T_c = 25°C)	P_C	20	W
Operating Temperature	Topr	−20 to 135	°C
Junction Temperature	Tj	150	°C
Storage Temperature	Tstg	−55 to 150	°C
Lead to Heat Sink Isolation Voltage	V_{hs}	1000 (1 min)	V

Electrical Characteristics (T_a = 25°C)

Characteristic	Symbol	Test Condition	Min	Typ.	Max	Unit
Operating Power Supply Voltage	V_{BB}	—	50	—	165	V
	V_{CC}	—	9	12	16.5	
Current Dissipation	I_{BB}	V_{BB} = 165 V duty = 0%	—	0.1	1	mA
	I_{CC}	V_{CC} = 12 V duty = 0%	—	1.8	10	
	$I_{BS (ON)}$	V_{BS} = 6 V, high side ON	—	280	430	µA
	$I_{BS (OFF)}$	V_{BS} = 6 V, high side OFF	—	230	350	
Input Voltage	V_{IH}	V_{IN} = "H"	3.5	—	—	V
	V_{IL}	V_{IN} = "L"	—	—	1.5	
Input Current	I_{IH}	V_{IN} = V_{REG}	—	—	100	µA
	I_{IL}	V_{IN} = 0V	—	—	100	
Output Saturation Voltage	$V_{CEsat}H$	V_{CC} = 12 V, IC = 0.5 A	—	2.0	3.0	V
	$V_{CEsat}L$	V_{CC} = 12 V, IC = 0.5 A	—	2.0	3.0	
FRD Forward Voltage	$V_F H$	IF = 0.5 A, high side	—	1.4	2.1	V
	$V_F L$	IF = 0.5 A, low side	—	1.2	1.8	
PWM ON-Duty Ratio	PWMMIN	—	0	—	—	%
	PWMMAX	—	—	—	100	
PWM ON-Duty Ratio, 0 %	$VV_S0\%$	PWM = 0%	1.7	2.1	2.5	V
PWM ON-Duty Ratio, 100 %	$VV_S100\%$	PWM = 100%	4.9	5.4	6.1	V
PWM ON-Duty Voltage Range	VV_SW	$VV_S100\%$ – $VV_S0\%$	2.8	3.3	3.8	V
Output All-OFF Voltage	VV_SOFF	Output all-OFF	1.1	1.3	1.5	V
Regulator Voltage	V_{REG}	V_{CC} = 12 V, I_O = 30 mA	5	5.6	7	V
Speed Control Voltage Range	V_S	—	0	—	6.5	V
FG Output Saturation Voltage	VFGsat	IFG = 20 mA	—	—	0.5	V
Current Limiting Voltage	V_R	—	0.45	0.5	0.55	V
Overheat Protection Temperature	TSD	—	150	165	200	˚C
Overheat Protection Hysteresis	ΔTSD	—	—	10	—	˚C
V_{CC} Under Voltage Protection	$V_{CC}UVD$	—	6.5	7.5	8.5	V
V_{CC} Under Voltage Protection Recovery	$V_{CC}UVR$	—	7.0	8.0	9.0	V
V_{BS} Under Voltage Protection	$V_{BS}UVD$	—	3.2	3.8	4.2	V
V_{BS} Under Voltage Protection Recovery	$V_{BS}UVR$	—	3.8	4.4	4.9	V
Refresh Operating ON Voltage	T_{RFON}	Refresh operation	1.1	1.3	1.5	V
Refresh Operating OFF Voltage	T_{RFOFF}	OFF refresh operation	3.1	3.8	4.6	V
Triangular Wave Frequency	f_c	R = 27 kΩ, C = 1000 pF	16.5	20	25	kHz
Output ON Delay Time	t_{on}	V_{BB} = 141 V, IC = 0.5 A	—	2.0	3	µs
Output OFF Delay Time	t_{off}	V_{BB} = 141 V, IC = 0.5 A	—	1.5	3	µs
FRD Reverse Recovery Time	t_{rr}	V_{BB} = 141 V, IC = 0.5 A	—	200	—	ns