Full Bridge DC Motor Driver ICs SPF7301(under development)

Features

- A DMOS of low ON resistance (0.1Ω typ) is mounted on the high and low side power elements
- Two input signals control the forward/reverse/brake of a DC motor
- Current limit and overcurrent protection circuits
- Low voltage and thermal protection, excess input detecting output and input terminal open protection

Absolute Maximum Ratings

(Ta=25°C)

Parameter	Symbol	Ratings	Unit	Remarks
Main power supply voltage	V_B	–0.3 to 36	V	
Input terminal input voltage	$V_{IN}1, V_{IN}2$	–0.3 to 6	V	
EN terminal voltage	V_{EN}	–0.3 to 12	V	
Disable terminal input voltage	V_{DI}	–0.3 to 6	V	
Output current	Io	±7	A	
	IoPeak	±15	A	1kHz, Duty＜1%, Pulse＜10μS
DIAG output current	V_{DIAG}	–0.3 to 6	V	
DIAG inflow current	I_{DIAG}	–3	mA	DIAG terminal sink current
Power dissipation	P_D1	39	W	With an infinite heatsink mounted
	P_D2	4	W	*1
Junction temperature	Tj	–40 to 150	°C	
Operating temperature	Top	–40 to 105	°C	
Storage temperature	Tstg	–40 to 150	°C	
Thermal resistance (junction to case)	θj-c	3.2	°C/W	
Thermal resistance (junction to ambient air)	θj-a	31	°C/W	

Note: *1: With glass epoxy + copper foil board (size 5.0•7.4cm; t: glass epoxy=1.6mm/copper foil=18μm)

Recommended Operation Range

Parameter	Symbol	Ratings	Unit	Remarks
Main power supply voltage	V_B	8 to 18	V	
DI terminal input voltage	V_{DI}	–0.3 to 5.3	V	
Input terminal input voltage	V_{INx}	–0.3 to 5.3	V	
Output current	Io	±1	A	
DIAG terminal voltage	V_{DIAG}	–0.3 to 5.3	V	
Operating temperature	Top	–40 to 105	°C	

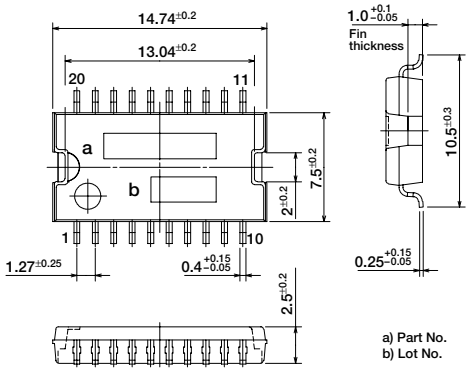
Electrical Characteristics

(Tj=30 to 125°C, V_B=14V, EN=DI=5V, Ccp=33nF, R_{DIAG}=20kΩ unless otherwise specified) *2

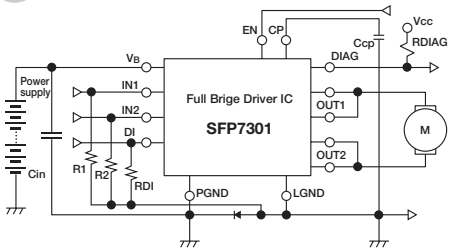
Parameter	Symbol	Ratings min	Ratings typ	Ratings max	Unit	Conditions
Main power supply current	$I_{BB}1$		15		mA	
	$I_{BB}2$			100	μA	For V_{EN}=0V
Low voltage protection operation voltage	VuvloH	5.0		7.0	V	
	VuvloL	4.5		6.5	V	
UVLO hysteresis voltage	ΔUVLO		0.5		V	
Output terminal leak current	IleakHS	–100			μA	
	IleakLS			100	μA	
Output DMOS RDS (ON)	$R_{DS(ON)}$_1H		100	200	mΩ	
	$R_{DS(ON)}$_2H		100	200	mΩ	
	$R_{DS(ON)}$_1L		100	200	mΩ	
	$R_{DS(ON)}$_2L		100	200	mΩ	
Forward voltage characteristics between output DMOS and DS	V_F_H1		1.5		V	Io1=1A
	V_F_H2		1.5		V	Io2=1A
	V_F_L1		1.5		V	Io1=–1A
	V_F_L2		1.5		V	Io2=–1A
Overcurrent limiting operation current	Iocp1_H1	4.5	7	10	A	
	Iocp1_H2	4.5	7	10	A	
	Iocp1_L1	4.5	7	10	A	
	Iocp1_L2	4.5	7	10	A	
OPC start current	Iocp2_H1		15		A	
	Iocp2_H2		15		A	
	Iocp2_L1		15		A	
	Iocp2_L2		15		A	
Input terminal voltage $V_{IN}1$, $V_{IN}2$	V_{INx}H	2			V	
	V_{INx}L			0.8	V	
Input terminal current $V_{IN}1$, $V_{IN}2$	I_{INx}H	–100			μA	V_{DI}=5V
	I_{INx}L	–100			μA	V_{DI}=0V
DI terminal voltage	V_{DIx}H	2			V	
	V_{DIx}L			0.8	V	
DI terminal current	I_{DIx}H	–100			μA	V_{DI}=5V
	I_{DIx}L	–100			μA	V_{DI}=0V
EN terminal input voltage	V_{EN}th	0.8		4	V	
EN terminal input current	I_{EN}H			100	μA	V_{EN}=5V
	I_{EN}L	–10		10	μA	V_{EN}=0V
DIAG terminal output voltage	V_{DIAG}			0.8	V	I_{DIAG}=0.5mA
DIAG terminal output current	I_{DIAG}	1.5			mA	For V_{DIAG}=1.6V
DIAG terminal leak current	I_{DIAG}L	–10		15	μA	
Input delay time	Td_{ON}			20	μS	Time from V_{INx}H to Voutx•0.2
	Td_{OFF}			15	μS	Time from V_{INx}L to Voutx•0.8
	Tr			6	μS	Time of Voutx from 20% to 80%
	Tf			6	μS	Time of Voutx from 80% to 20%
	Tddis			4	μS	Time from DIthH to Voutx•0.2
Overvoltage protection operation voltage	V_{OVP}	35	40	45	V	
OVP hysteresis width	ΔV_{OVP}		5		V	
Thermal protection starting temperature	Ttsd_ON	151	165		°C	*3
Thermal protection hysteresis width	ΔTtsd		15		°C	*3

Note:
*2: For the electrical characteristics for Tj=–40 to 150°C, the design warranty applies to the above specification values.
*3: Thermal protection starting temperature is 165°C (typ) by design. The above parameters are the design specifications.

External Dimensions (unit: mm)



Standard Circuit Diagram



* Recommended connection parts
Pressure rise capacitor for charge pump circuits (CP to GND) Cp 33nF
DIAG terminal pull-up resistance RDIAG: 20kΩ
Input terminal pull-down resistance R1, R2, RDI: 10kΩ