Description

DPQA04HB50MF is a 4A,500V half-bridge Intelligent Power Module(IPM) designed for high-efficiency appliance motor drives. This module integrates 1 high voltage gate driver and 2 fast recovery MOSFETs in SOP-11 package.

Features

- High voltage gate driver
- Built-in 4A,500V fast recovery MOSFET
- Signal high level valid,compatible with 3.3V and 5V MCU
- Built-in bootstrap diode with current limiting resistor
- UVLO for both high side and low side
- Built-in dead time to avoid cross-conduction
- Internal integrated temperature detection output

Key Parameters

Topology	Half-bridge
Driver	HV Gate Driver
MOSFET	500V/4A/2.2Ω
P_D	15W
V_{ISO}	1500V

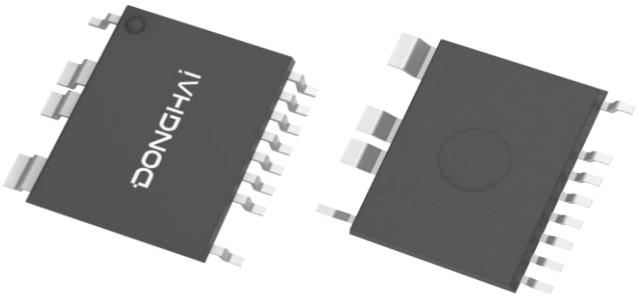
Applications

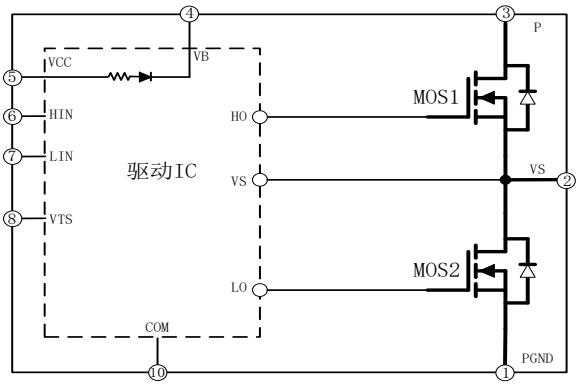
- Fans
- Pumps

Halogen FREE

RoHS COMPLIANT

SOP-11

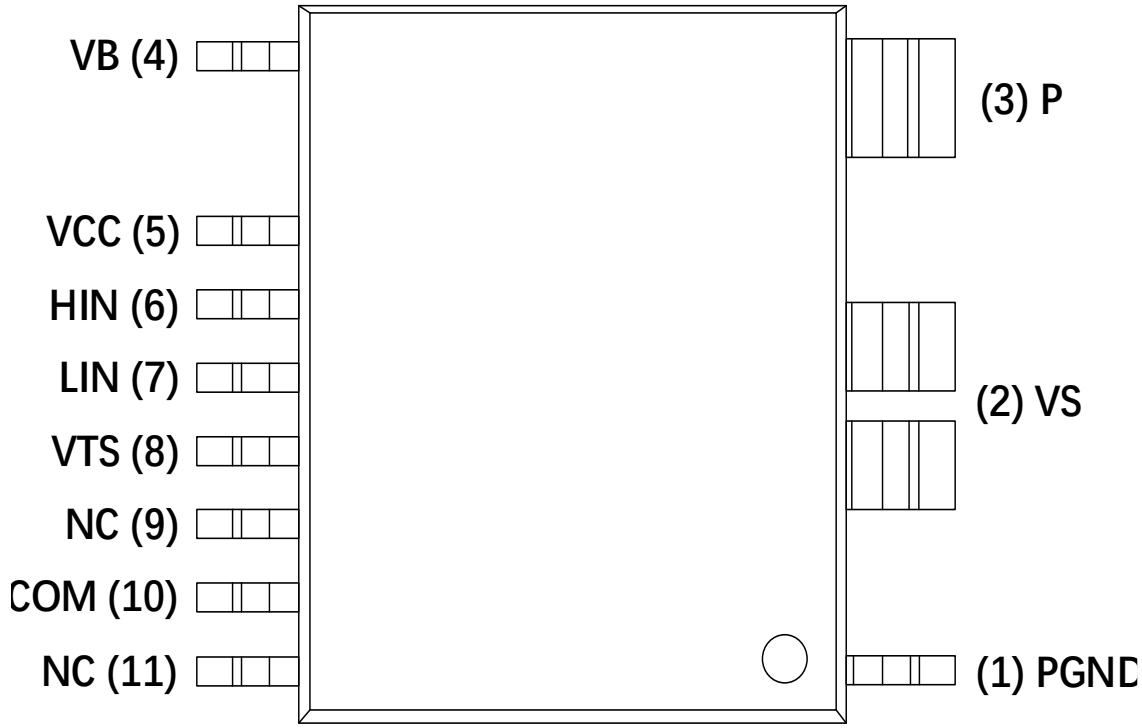




Marking & Packing Information

Part #	Package	Marking	Tube/Reel	Qty(pcs)
DPQA04HB50MF	SOP-11	DPQA04HB50MF	Reel	3000/box

Module Pin-Out Description



Pin Number	Pin Name	Description
1	PGND	Source For Low Side MOSFET
2	VS	High Side Floating Offset Voltage
3	P	DC Bus Voltage Positive
4	VB	High Side Floating Supply Voltage
5	VCC	Low Side Driving And High Side Logic Power Supply
6	HIN	Logic Input For High Side Gate Driver
7	LIN	Logic Input For Low Side Gate Driver
8	VTS	Temperature-sensing Voltage Output
9	NC	Not Connected
10	COM	Logic Common Ground
11	NC	Not Connected

Absolute Maximum Ratings

Parameter	Symbol	Value	Unit
Drain-Source Voltage	V_{DS}	500	V
Continuous Drain Current T_C = 25℃(Silicon limit) T_C = 25℃(Package limit) T_C = 80℃(Package limit)	I_D	 4 1.8 1.3	A
Pulsed Drain Current (T_C = 25℃,t_p<100μs)	I_{DP}	7.2	A
Power Dissipation (T_C = 25℃,Each MOSFET)	P_D	15.2	W
Low Side Driving And High Side Logic Power Supply	V_{CC}	20	V
High-Side Bias Voltage	V_{BS}	20	V
Input Signal Voltage	V_{IN}	-0.3~Vcc+0.3	V
Operating Junction Temperature	T_J	-40~150	℃
Operating Case Temperature	T_C	-40~125	℃
Storage Temperature	T_{stg}	-40~125	℃
Junction to Case Thermal Resistance	θ_{JC}	8.2	℃/W
Isolation Voltage(60Hz,Sinusoidal,AC 1 min)	V_{ISO}	1500	V
Bootstrap Diode Reverse Voltage	V_{RRMB}	500	V

Recommended Operating Conditions

Parameter	Symbol	Value			Unit
		min.	typ.	max.	
Supply Voltage	V_{PN}	-	300	400	V
Low Side Driving And High Side Logic Power Supply	V_{CC}	12	15	18	V
High-Side Bias Voltage	V_{BS}	12	15	18	V
Input ON Threshold Voltage	$V_{IN(ON)}$	3	-	V_{CC}	V
Input OFF Threshold Voltage	$V_{IN(OFF)}$	0	-	0.8	V
Blanking Time for Preventing Arm-Short	t_{DEAD}	1	-	-	μs
PWM Switching Frequency	f_{PWM}	-	25	35	kHz

Electrical Characteristic (at Tj = 25 °C, unless otherwise specified)

Power Characteristic

Parameter	Symbol	Value			Unit	Test Condition
		min.	typ.	max.		
Drain-Source Breakdown Voltage (1)	BV_{DSS}	500	-	-	V	V_{IN}=0V, I_D=250μA
Zero Gate Voltage Drain Current	I_{DSS}	-	-	250	μA	V_{IN}=0V, V_{DS}=500V
Drain-Source on-state Resistance	$R_{DS(on)}$	-	2.2	2.6	Ω	V_{CC}=V_{BS}=15V V_{IN}=5V, I_D=2A
Diode Forward Voltage	V_{SD}	-	-	1.5	V	V_{CC}=V_{BS}=15V V_{IN}=0V, I_{SD}=4A
Switching Times (2)	t_{ON}	-	531	-	ns	V_{PN}=300V V_{CC}=V_{BS}=15V V_{IN}=0~5V, I_D=2A
	t_{OFF}	-	513	-	ns	
	t_{rr}	-	78	-	ns	
	E_{ON}	-	87	-	μJ	
	E_{OFF}	-	13	-	μJ	

Control Characteristic

Parameter	Symbol	Value			Unit	Test Condition
		min.	typ.	max.		
Quiescent VCC Supply Current	I_{QCC}	-	-	200	μA	V_{CC}=V_{BS}=15V V_{LIN}=5V
Quiescent VBS Supply Current	I_{QBS}	-	-	150	μA	V_{CC}=V_{BS}=15V V_{HIN}=5V
High-side Control Supply under-voltage Protection	UV_{BSD}	7.4	8.2	9	V	Trip Level
	UV_{BSR}	8	8.9	9.8	V	Reset Level
Low-side Control Supply under-voltage Protection	UV_{CCD}	7.4	8.2	9	V	Trip Level
	UV_{CCR}	8	8.9	9.8	V	Reset Level
ON Threshold Voltage	V_{IH}	-	-	2.5	V	Logic High Level
OFF Threshold Voltage	V_{IL}	0.8	-	-	V	Logic Low Level
ON Input Bias Current	I_{IH}	-	-	15	μA	V_{CC}=15V, V_{IH}=5V
Off Input Bias Current	I_{IL}	-	-	1	μA	V_{CC}=15V, V_{IH}=0V
Temperature-sensing Output	V_{TS}	0.6	0.79	0.98	V	V_{CC}=15V, T=25℃

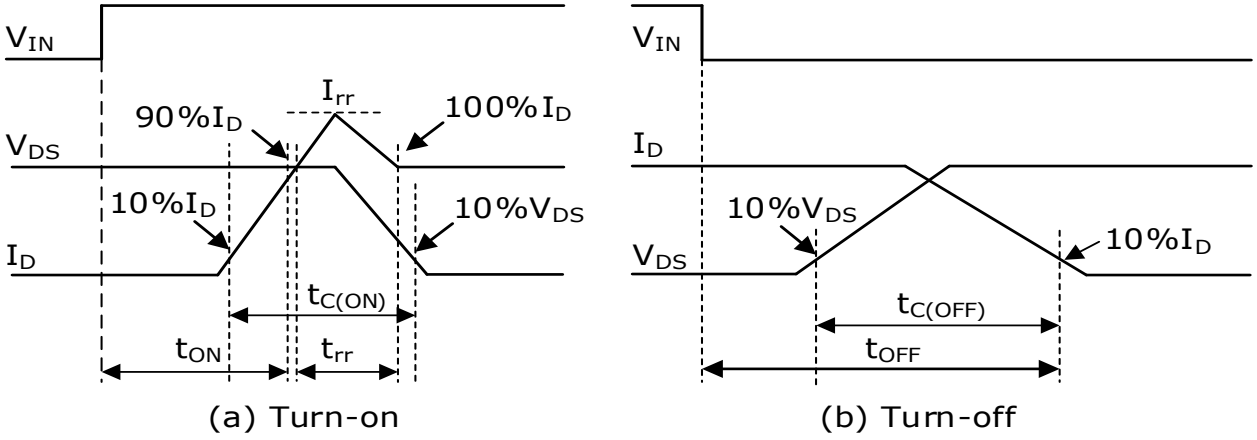
Bootstrap Diode Characteristic

Parameter	Symbol	Value			Unit	Test Condition
		min.	typ.	max.		
Bootstrap Diode Forward Voltage	V_F	-	2.6	-	V	I_F=10mA,T_C=25℃
Built-in Limiting Resistance	R_{BS}	-	200	-	Ω	

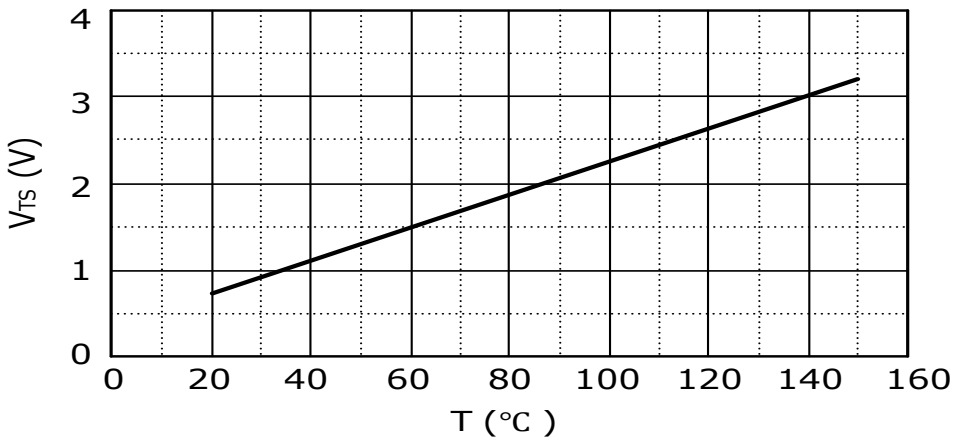
Note:

1、BVDSS is the absolute maximum rated voltage between drain and source of each MOSFET. Thinking of the effects of stray inductance，VPN should be less than this value to ensure that VDS doesn't exceed BVDSS in any case.

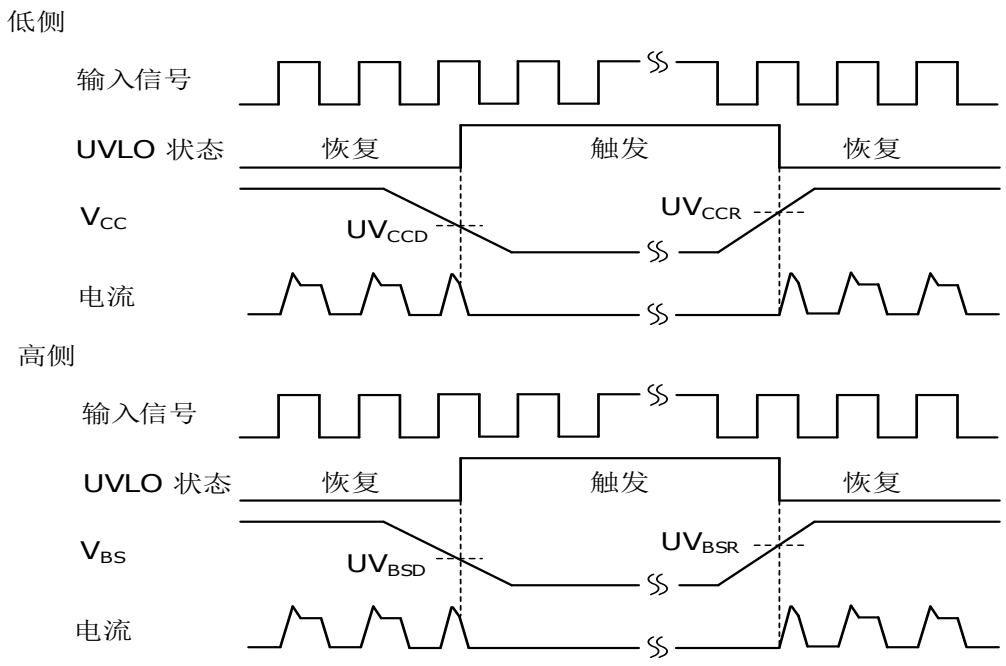
2、T_{on},T_{off} include delay time of internal driver IC. The values were mresured under laboratory test conditions. Due to printed circuit board and wiring, they may vary depending on the field application. And the definition of switching times can refer to the following figure.



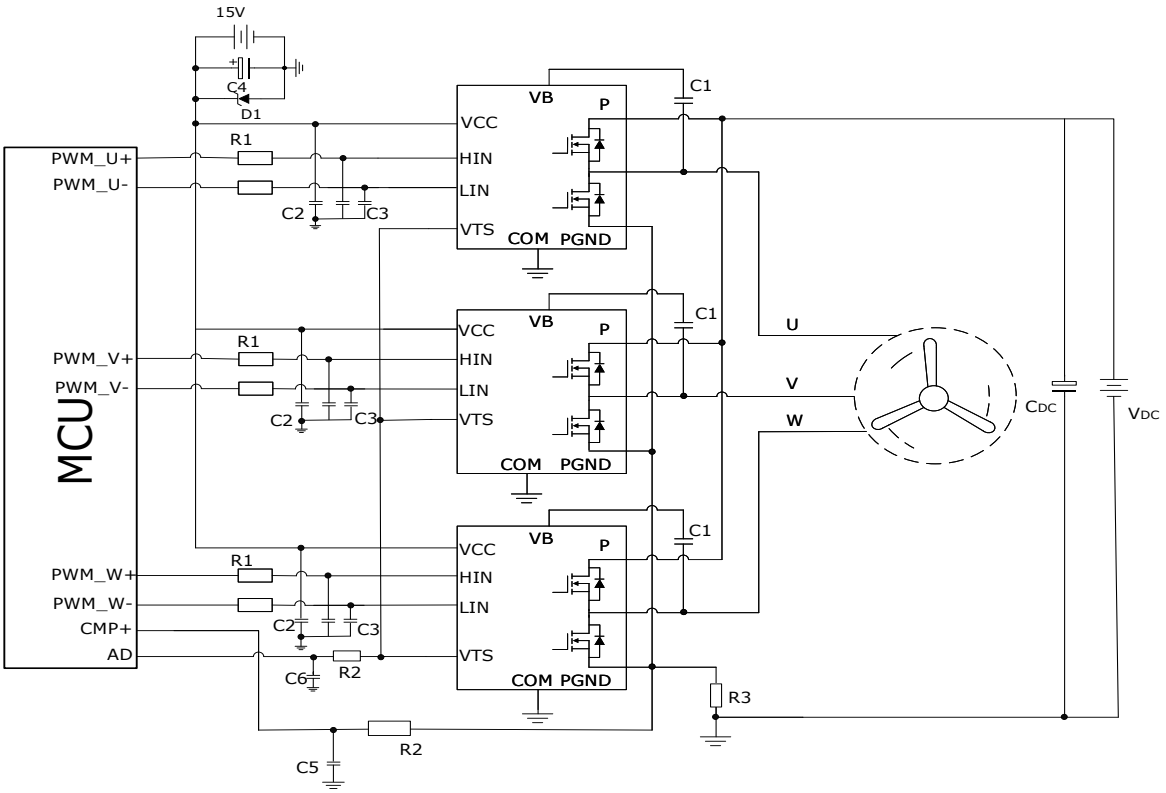
Temperature-sensing Output



Undervoltage Lockout Protection Circuit

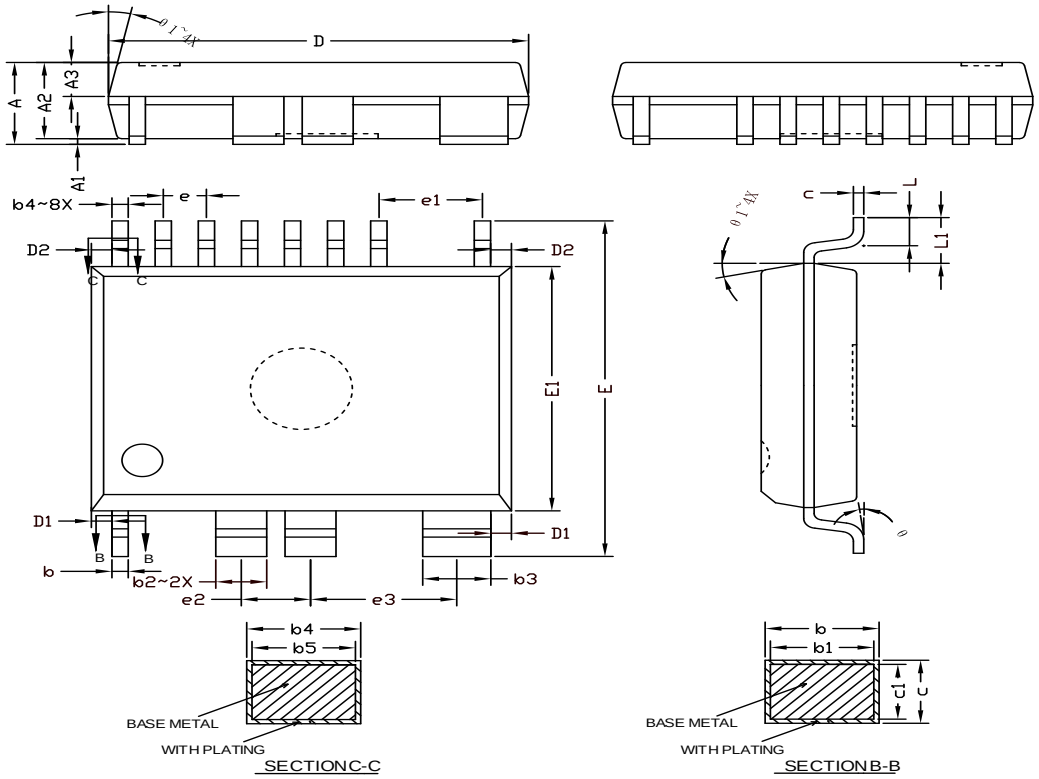


Recommended Application Circuit



Package Outline : SOP-11

*Dimensions in mm



Symbol	Value			Symbol	Value		
	min.	typ.	max.		min.	typ.	max.
A	-	-	2.615	D1	0.502(BSC)		
A1	0.125	-	0.225	D2	0.515(BSC)		
A2	2.29	2.34	2.39	E	10.106	10.306	10.506
A3	0.993	1.043	1.093	E1	7.40	7.50	7.60
b	0.37	-	0.47	e	1.058(BSC)		
b1	0.36	0.4	0.46	e1	2.54(BSC)		
b2	-	-	1.25	e2	1.69(BSC)		
b3	-	-	1.67	e3	3.60(BSC)		
b4	0.35	-	0.45	L	0.75	-	0.97
b5	0.34	0.38	0.44	L1	1.403(REF)		
c	0.25	-	0.29	θ	0°	-	8°
c1	0.24	0.25	0.26	θ1	6°	-	15°
D	10.20	10.30	10.40				

Disclaimer

Unless otherwise specified in the datasheet, the product is designed and qulified as a standard commercial product and is not intended for use in applications that require extraordinary levels of quality and reliability, such as aviation, aerospace, life-support devices or systems.

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