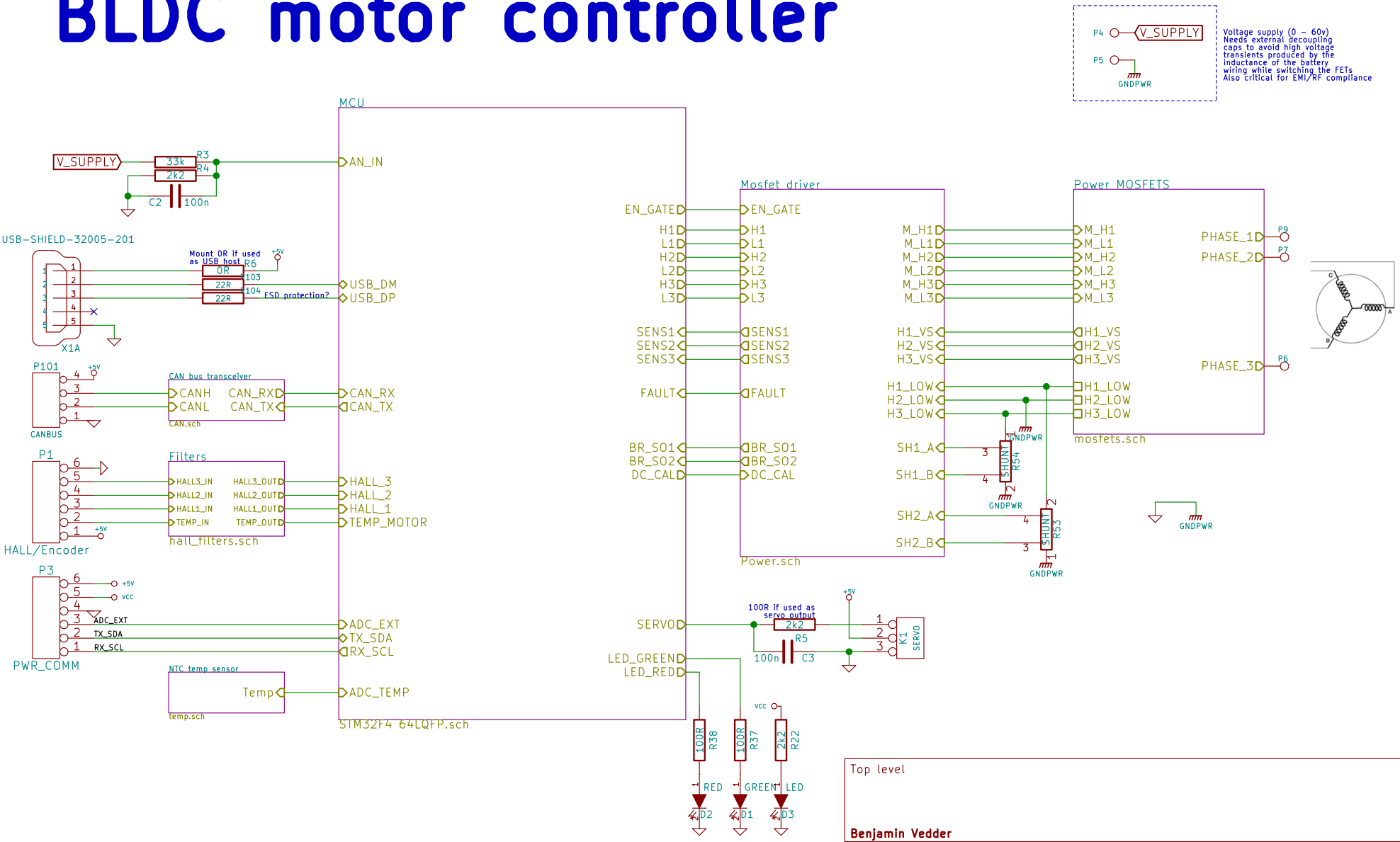
BLDC motor controller



Top level

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Sheet: /
File: BLDC_4.sch

Title: BLDC Driver 4.6

Size: A4	Date: 25 Aug 2014	**Rev: 4.6**
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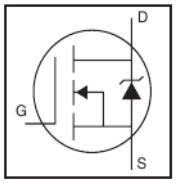
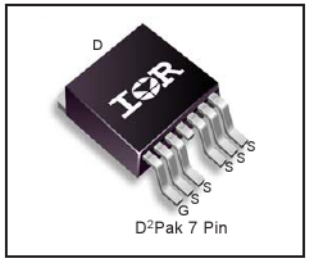
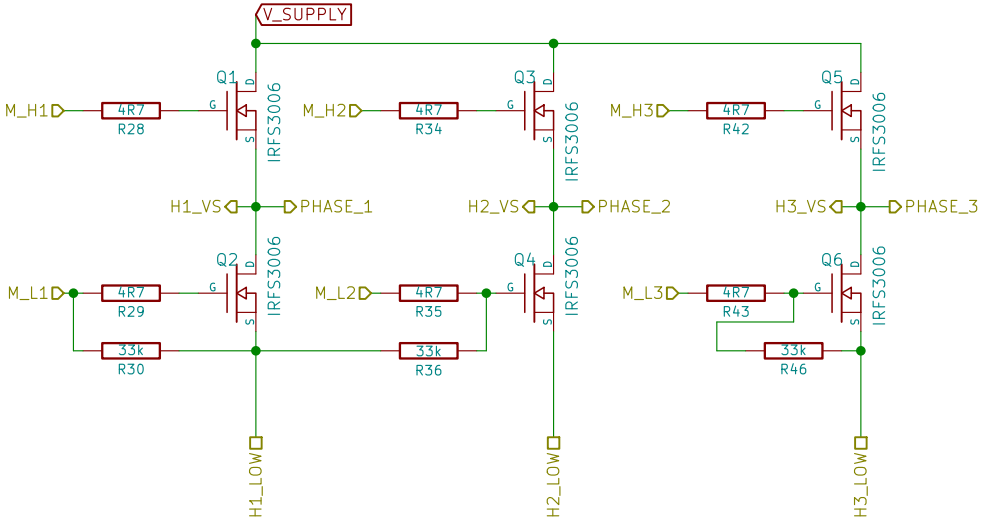
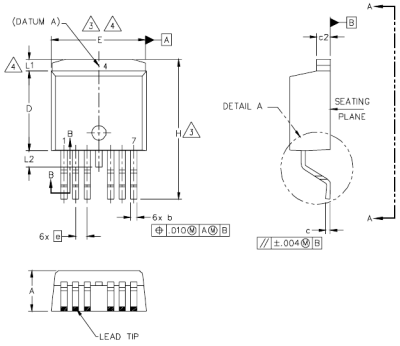
HEXFET® Power MOSFET



V_{DSS}	60V
$R_{DS(on)}$ typ.	1.5mΩ
max.	2.1mΩ
I_D (Silicon Limited)	293A①
I_D (Package Limited)	240A







Absolute Maximum Ratings

Symbol	Parameter	Max.	Units
I_D @ T_C = 25°C	Continuous Drain Current, V_{GS} @ 10V (Silicon Limited)	293①	A
I_D @ T_C = 100°C	Continuous Drain Current, V_{GS} @ 10V (Silicon Limited)	207 ①	
I_D @ T_C = 25°C	Continuous Drain Current, V_{GS} @ 10V (Package Limited)	240	
I_{DM}	Pulsed Drain Current ②	1172	
P_D @T_C = 25°C	Maximum Power Dissipation	375	W
	Linear Derating Factor	2.5	W/°C
V_{GS}	Gate-to-Source Voltage	± 20	V
dv/dt	Peak Diode Recovery ⑥	11	V/ns
T_J	Operating Junction and	-55 to + 175	°C
T_{STG}	Storage Temperature Range		
	Soldering Temperature, for 10 seconds (1.6mm from case)	300	
	Mounting torque, 6-32 or M3 screw	10lb·in (1.1N·m)	

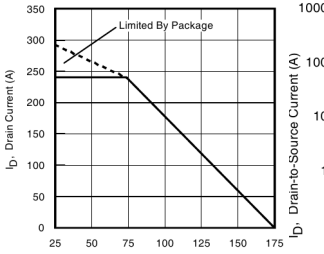


Fig 9. Maximum Drain Current vs. Case Temperature

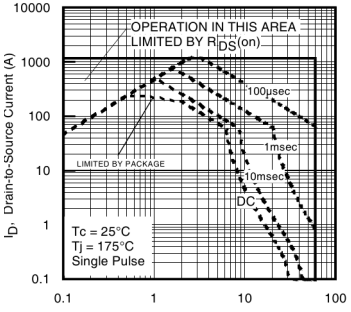


Fig 8. Maximum Safe Operating Area

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Sheet: /Power MOSFETS/
File: mosfets.sch

Title: BLDC Driver 4.6

Size: A4	Date: 25 Aug 2014	**Rev: 4.6**
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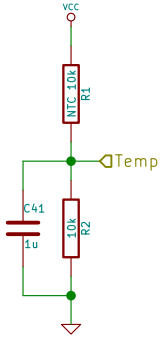
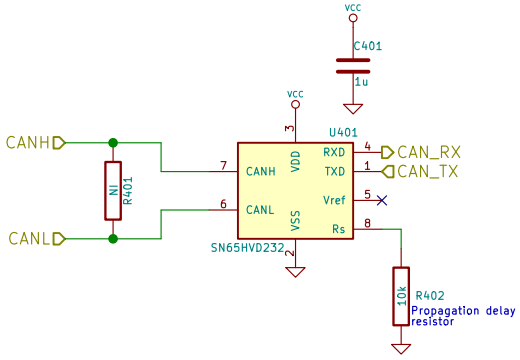


Mrk Industries

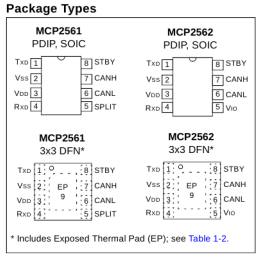
Sheet: /NTC temp sensor/
File: temp.sch

Title: NTC resistor temperature sensor

Size: A4	Date: 27 sep 2014	**Rev:**
KiCad E.D.A.	kicad (2014-09-02 BZR 5112)-product	Id: 3/7



Package Types



Mrk Industries

Sheet: /CAN bus transceiver/
File: CAN.sch

Title: CAN BUS transceiver

Size: A4	Date: 25 Aug 2014	**Rev:**
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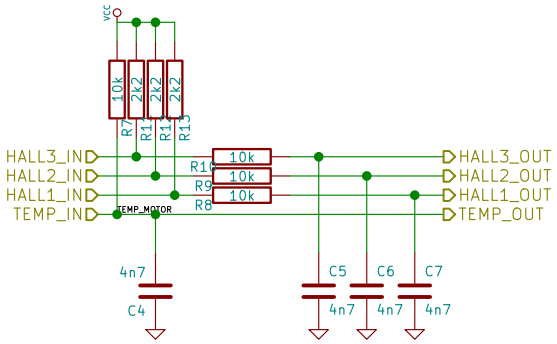


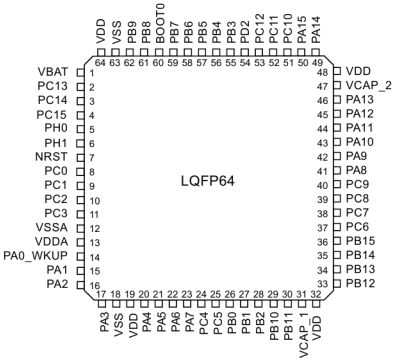
Sheet: /Filters/
File: hall_filters.sch

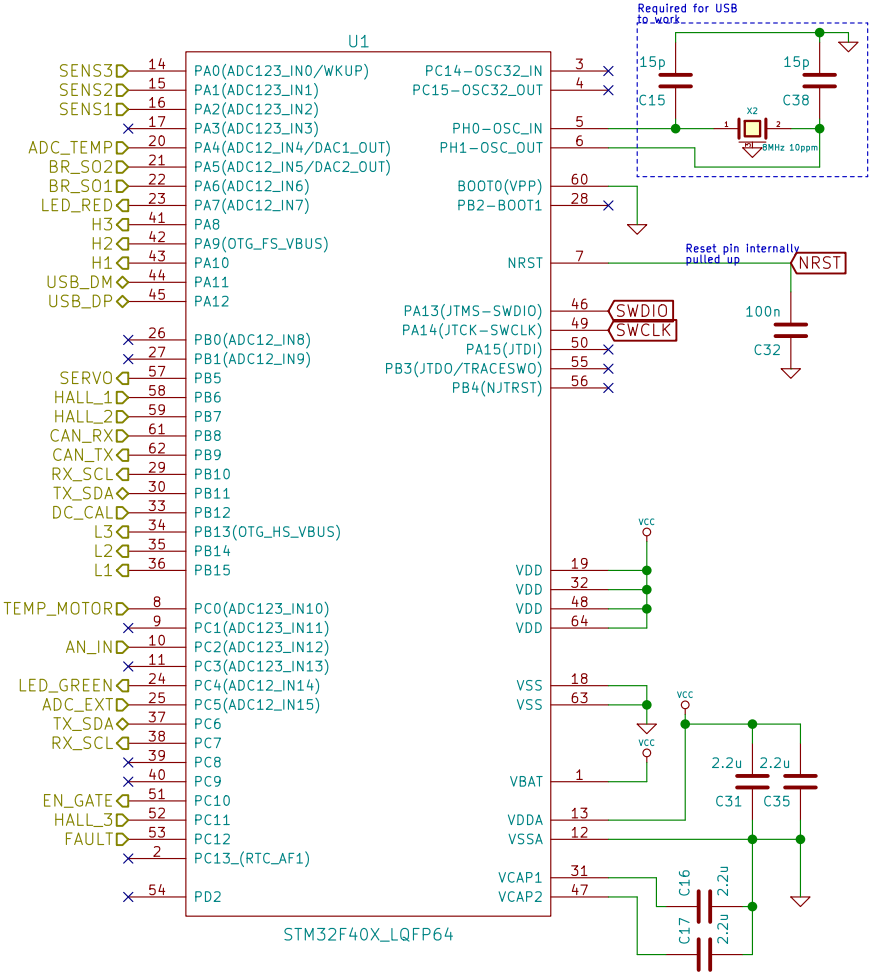
Title:

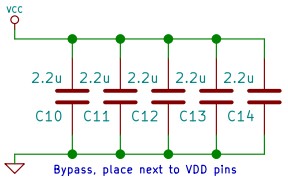
Size: A4	Date: 25 Aug 2014	**Rev:**
KiCad E.D.A. kicad (2014-09-02 BZR 5112)-product		Id: 5/7

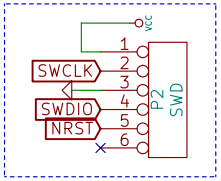
STM32F405xx
STM32F407xx

ARM Cortex-M4 32b MCU+FPU, 210DMIPS, up to 1MB Flash/192+4KB RAM, USB OTG HS/FS, Ethernet, 17 TIMs, 3 ADCs, 15 comm. interfaces & camera









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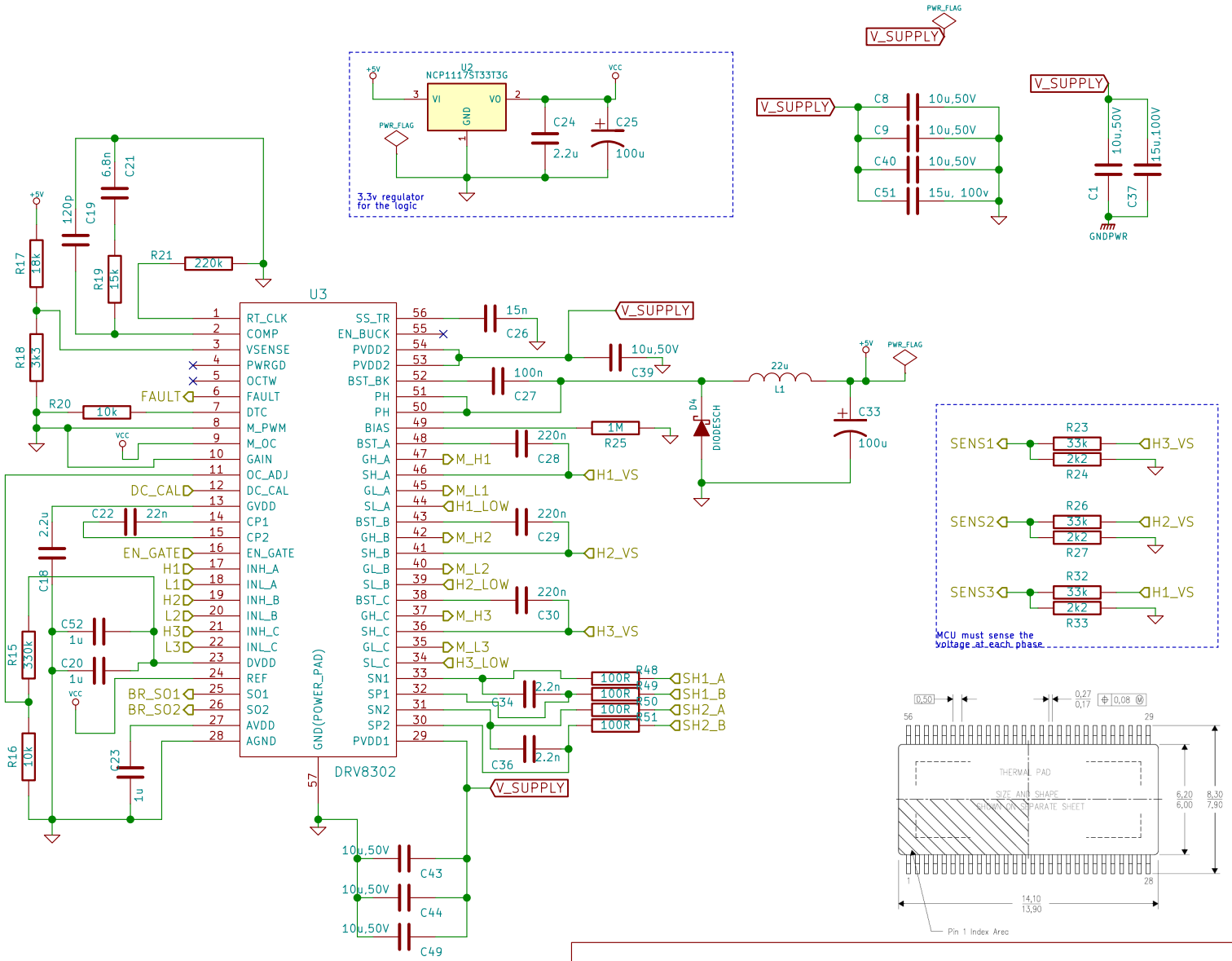
Sheet: /MCU/
File: STM32F4 64LQFP.sch

Title: BLDC Driver 4.6

Size: A4	Date: 25 Aug 2014	**Rev: 4.6**
KiCad E.D.A. kicad (2014-09-02 BZR 5112)-product		Id: 6/7

FEATURES

- Operating Supply Voltage 8V–60V
- 2.3A Sink and 1.7A Source Gate Drive Current Capability
- Integrated Dual Shunt Current Amplifiers With Adjustable Gain and Offset
- Integrated Buck Converter to Support up to 1.5A External Load
- Independent Control of 3 or 6 PWM Inputs
- Bootstrap Gate Driver With 100% Duty Cycle Support
- Programmable Dead Time to Protect External FETs from Shoot Through
- Programmable Overcurrent Protection of External MOSFETs
- Thermally Enhanced 56-Pin TSSOP Pad Down DCA Package



RECOMMENDED OPERATING CONDITIONS

			MIN	TYP	MAX	UNITS
PVDD1	DC supply voltage PVDD1 for normal operation	Relative to PGND	8		60	V
PVDD2	DC supply voltage PVDD2 for buck converter		3.5		60	V
C_{AVDD}	External capacitance on AVDD pin (ceramic cap) 20% tolerance			1		µF
C_{DVDD}	External capacitance on DVDD pin (ceramic cap) 20% tolerance			1		µF
C_{GVDD}	External capacitance on GVDD pin (ceramic cap) 20% tolerance			2.2		µF
C_{CP}	Flying cap on charge pump pins (between CP1 and CP2) (ceramic cap) 20% tolerance			22		nF
C_{BST}	Bootstrap cap (ceramic cap)			100		nF
I_{DIN_EN}	Input current of digital pins when EN_GATE is high				100	µA
I_{DIN_DIS}	Input current of digital pins when EN_GATE is low				1	µA
C_{DIN}	Maximum capacitance on digital input pin				10	pF
C_{O_OPA}	Maximum output capacitance on outputs of shunt amplifier				20	pF
R_{DTC}	Dead time control resistor range. Time range is 50ns (-GND) to 500ns (150kΩ) with a linear approximation.		0		150	kΩ
I_{FAULT}	$\overline{FAULT}$ pin sink current. Open-drain	V = 0.4 V			2	mA
I_{OCTW}	$\overline{OCTW}$ pin sink current. Open-drain	V = 0.4 V			2	mA
V_{REF}	External voltage reference voltage for current shunt amplifiers		2		6	V
f_{gate}	Operating switching frequency of gate driver	Qg(TOT) = 25 nC or total 30 mA gate drive average current			200	kHz
T_A	Ambient temperature		–40		125	°C

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Sheet: /Mosfet driver/
File: Power.sch

Title: BLDC Driver 4.5

Size: A4	Date: 25 Aug 2014	**Rev: 4.5**
KiCad E.D.A. kicad (2014-09-02 BZR 5112)-product		Id: 7/7