ON Semiconductor®

Test Procedure for the STK681-352GEVB Evaluation Board

Evaluation Board Setup

[Supply Voltage] Vcc (10 to 38V: STK681-332-E): Power Supply for stepping motor
Vcc (10 to 29V: STK681-352-E): Power Supply for stepping motor

Vref (0 to 2.0V): Const. Current Control for Reference Voltage
VDD (5V)   : Power Supply for internal logic IC

[Operation Guide]
   1. Motor Connection:
      Connect the motor to OUT1 and OUT2.

   2. Initial Condition Setting:
      Set to signal condition IN1=H, IN2=H, and ENABLE=L.

   3. Power Supply:
     <STK681-332-E>
       At first, supply DC voltage to VDD (5.0V), and VREF.
       Next, supply DC voltage to Vcc.
     <STK681-352-E>
       At first, supply DC voltage to VDD (3.3V or 5.0V), and VREF.
       Next, supply DC voltage to Vcc.

   4. Set to Forward or Reverse signal condition with ENABLE=Low.
        Turn "High" ENABLE signal.
      Output current flows between OUT1 and OUT2.

   5. Motor Operation

[Setting the current limit using the Vref pin]

   Output current peak (Iop) = (Vref÷4.9) ÷Rs
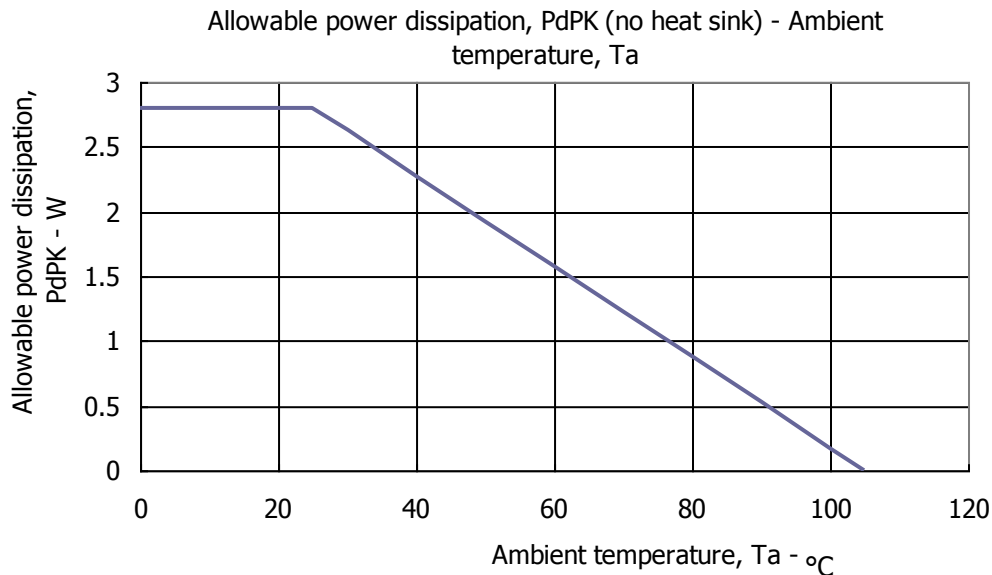   "4.9" in the above formula indicates the portion of the Vref voltage that is divided
      using the circuit inside the control IC.
   Vref=(R2÷(R1+R2))×5.0V(or 3.3V)
   Rs is the external current detection resistance value of the HIC, and Vref≦2.0V must
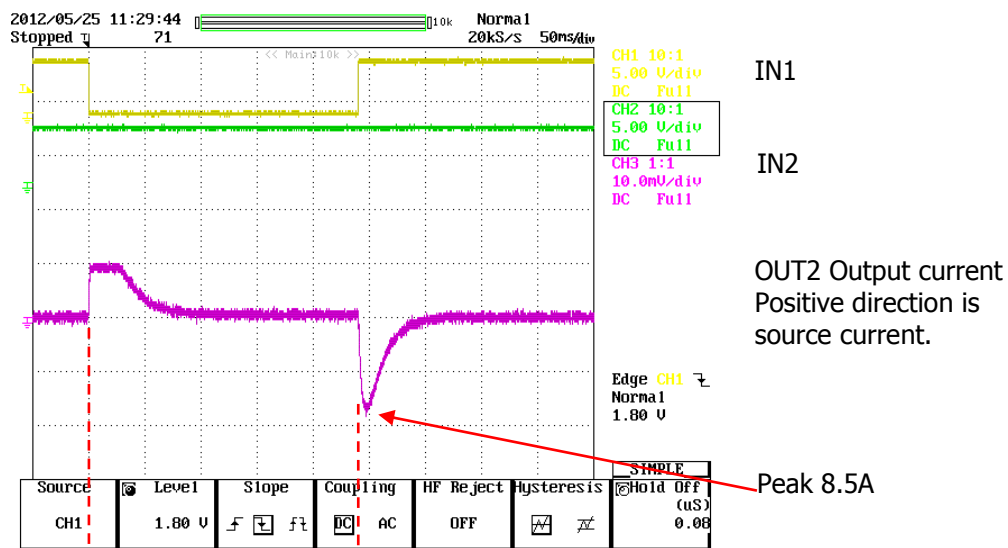   be satisfied so that overcurrent detection is not triggered.

Allowable power dissipation (Reference value)

Allowable power dissipation, PdPK (no heat sink) - Ambient temperature, Ta

[Graph: X-axis "Ambient temperature, Ta - °C" from 0 to 120; Y-axis "Allowable power dissipation, PdPK - W" from 0 to 3. Curve flat at ~2.8 W until Ta ≈ 25°C, then decreasing linearly to 0 at ~105°C.]

If you need heat sink to STK681-332 and 352, mount heat sink with something such as clips.

Waveform example

STK681-332 (Current limit 5A setting)
IN1 and IN2; 5V/div, Output current; 5A/div

```
2012/05/25 11:29:44          10k   Normal
Stopped ↓       71                 20kS/s   50ms/div
                 << Main 10k >>
                                          CH1 10:1        IN1
                                          5.00 V/div
                                          DC   Full
                                          CH2 10:1
                                          5.00 V/div
                                          DC   Full
                                          CH3 1:1          IN2
                                          10.0mV/div
                                          DC   Full

                                          OUT2 Output current
                                          Positive direction is
                                          source current.

                                          Edge CH1 ↲
                                          Normal
                                          1.80 V
                                          SIMPLE
  Source     Level    Slope   Coupling  HF Reject  Hysteresis  Hold Off
                                                                 (uS)
  CH1        1.80 V           DC   AC    OFF                    0.08
```
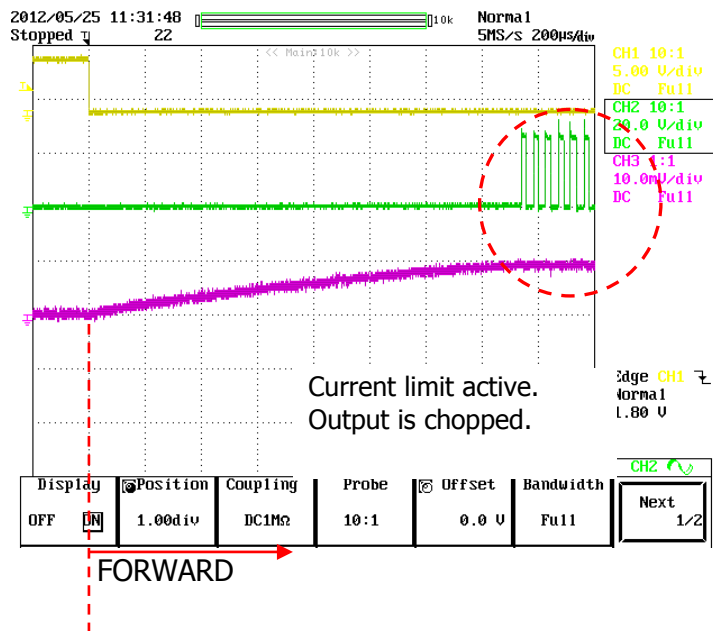
Peak 8.5A

FORWARD

BRAKING

STK681-332 (Current limit 5A setting)
IN1 5V/div, OUT2 20V/div, Output current; 5A/div

IN1

OUT2

OUT2 Output current
Positive direction is
source current.

Current limit active.
Output is chopped.

FORWARD

Current control is slow decay.
STK681-332 and 352 control MOSFET at Low side by constant-current PWM control system.
Current control enters Slow decay mode.
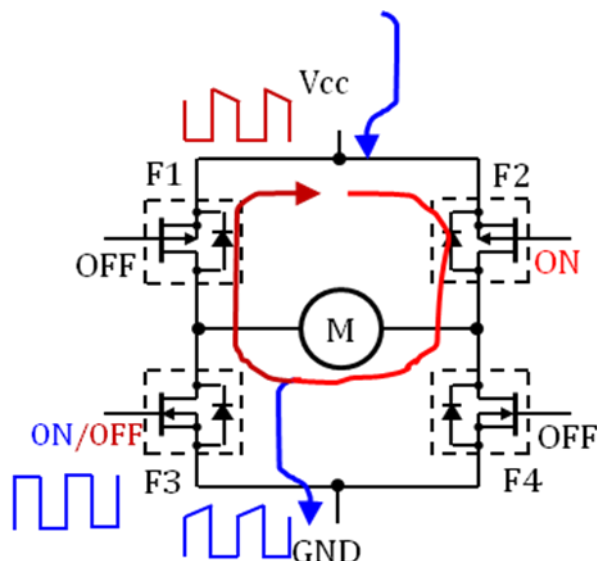
STK681-332 and 352 have ENABLE terminal built-in, which controls motor rotation.
At the point of ENABLE=High, F3 or F4 at Low side turns on.
STK681-332, 352(ENABLE: 20kHz)
ENABLE ; 5V/div, OUT1 ; 20V/div, Output current; 0.5A/div
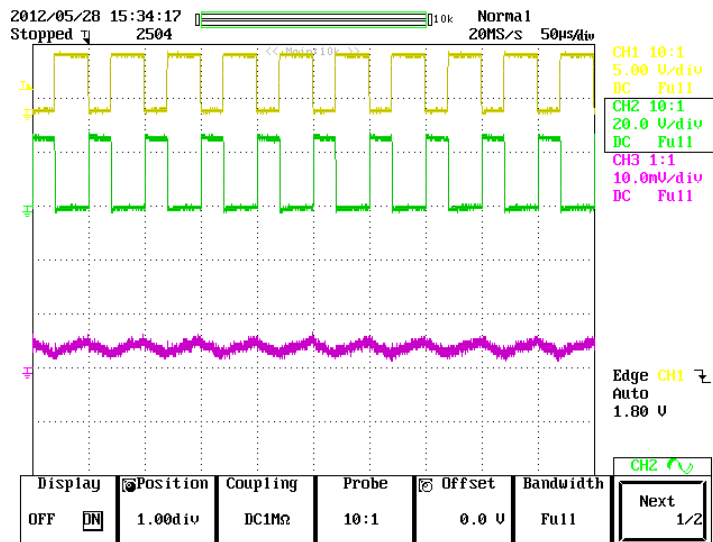
ENABLE High duty 60%

OUT1

Output current