

## Test Procedure for the “M-DraGON” LV8829LFQA Evaluation Board

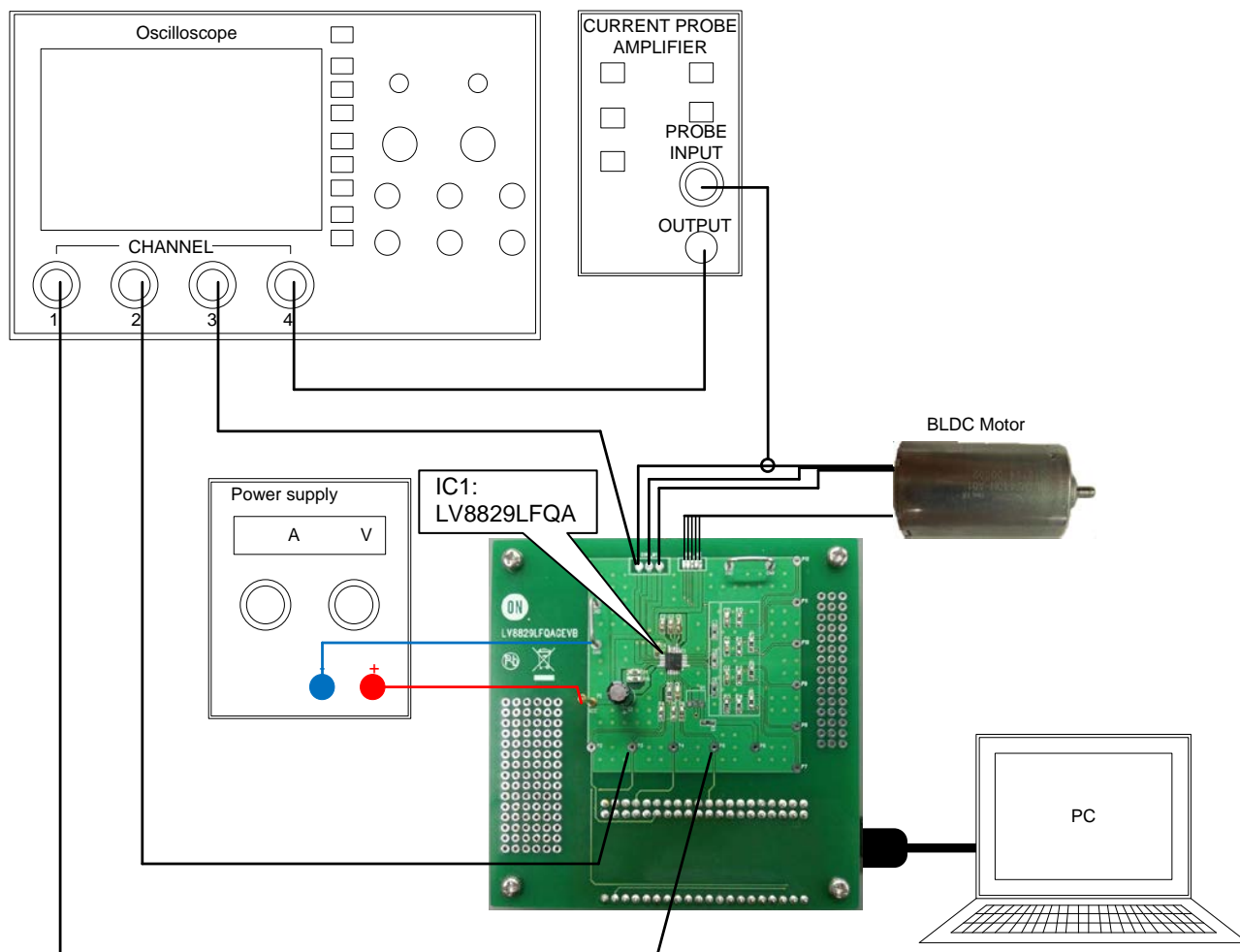
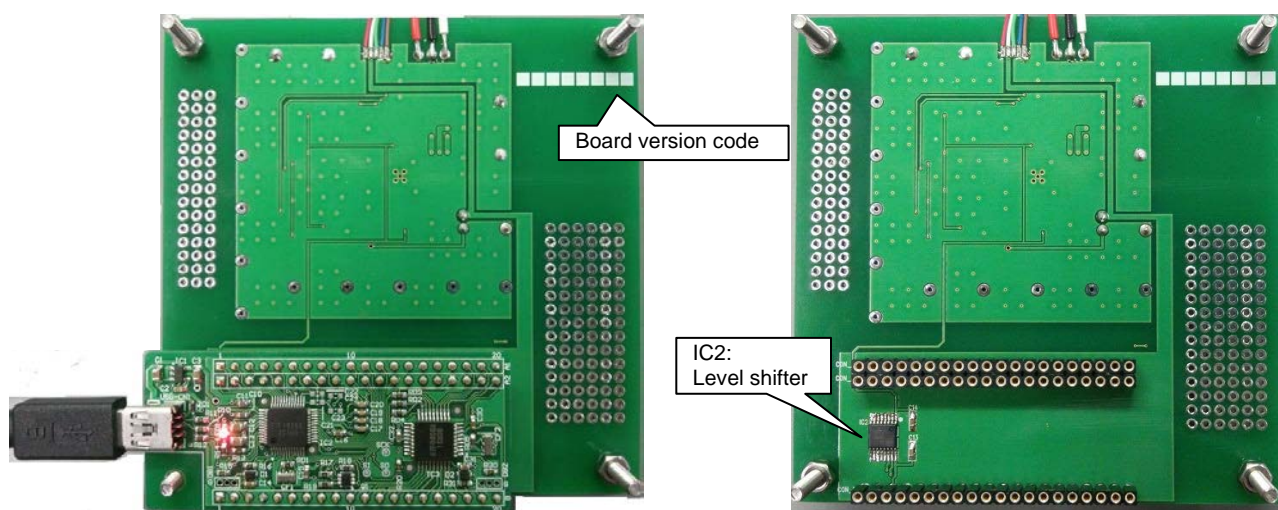


Figure 1. Setup for motor control



With the Daughter Board plugged into USB

Without the Daughter Board

Figure 2. Bottom view of the Evaluation Board



Table1: Reference Equipment

Equipment	Specifications
DC Power supply	30V-2.0A
Oscilloscope	4 channel
BLDC Motor	<a href="#">BLIM2430H-A01/ Minebea</a> 18V-1A, builtin Hall IC
Current probe	
LV8829LFQAGEVB Evaluation Board	
MOTOR DRIVER DAUGHTER BOARD	
USB Type A to Type mini-B cable	
PC with M-DrAGON* GUI installed	32bit: Windows XP(SP3) / 7 / 8 64bit: Windows 7

\*) It means “Motor- Driver And GUI produced by ON semiconductor”.

### Allowable Operating Ratings

Motor supply voltage (VCC): 8 to 26V\*

\* The maximum rating is limited to 26V due to the supplied motor.

The board may be driven with 35V when appropriate motors are utilized.

Current LIMIT set as:  $I_{limit} = V_{RF} / R_f$

Default current limit supplied as 823mA.

$$I_{limit} = 0.21V / 0.255\Omega = 823mA$$

### Test Procedure

- Connect the test setup as shown Figure 1.
- It is important to follow the order shown for starting the system:
  1. Plug a USB cable into the Daughter Board.
  2. Start up the GUI for LV8829LFQA.
  3. Apply input voltage to the terminal P1 “VCC”.
  4. Apply drive signals with GUI (See below).
- Always remove Vcc before unplugging the daughter board.

### Optional Modifications

The board provided has circuitry to utilize motors with on board Hall effect sensors and open drain outputs. The motor supplied with this board has on board Hall sensors and is compatible.

If the position inputs are driven from an external Hall Effect chip with TTL/CMOS outputs the open drain interface needs to be removed.

In this case remove:

- ✧ R7-R14
- ✧ C10-C12

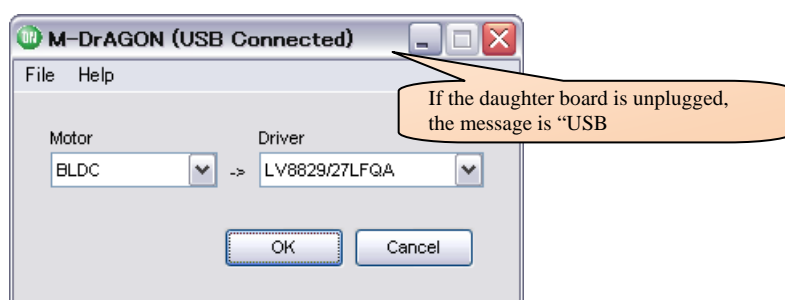
Add:

- R3
- C7-C9
- Jumper from P6 to IN1, IN2 and IN3 (refer to application note “ANDLV8829LFQA-D” P.12).

If the DSP is used to drive the LV8829 the USB Daughter board should be removed and the DSP attached to P2-P5.



## GUI Operation

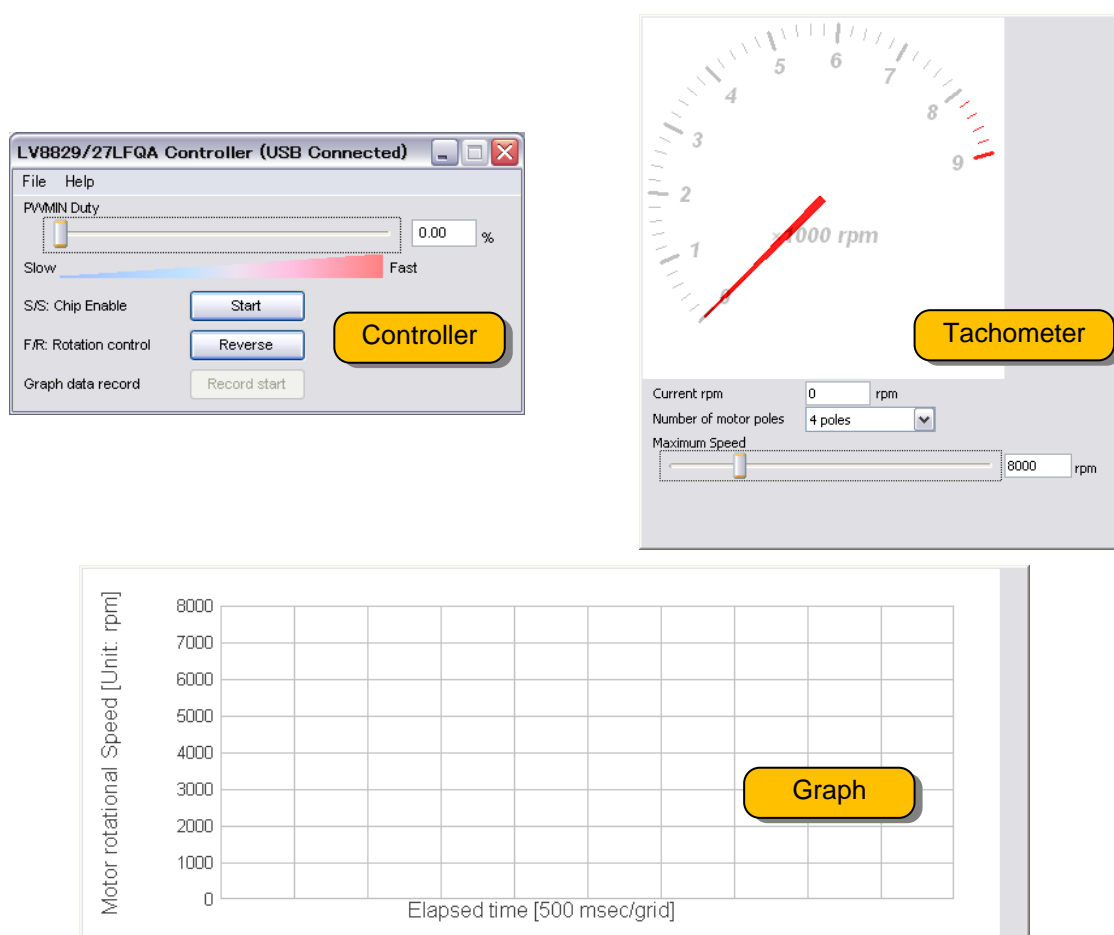


**Figure 3. The first window of M-DrAGON**

When you double click the icon the above window appears.

1. Select "BLDC" in Motor Type.
2. Select "LV8829/27LFQA" in Driver type.
3. Push the "OK" button.

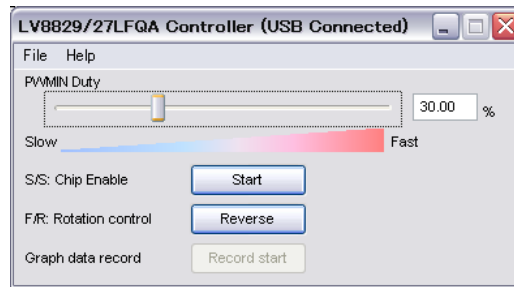
The following windows should appear:



**Figure 4. GUI windows for LV8829LFQA**



- Controller window



**Figure 5. Controller window**

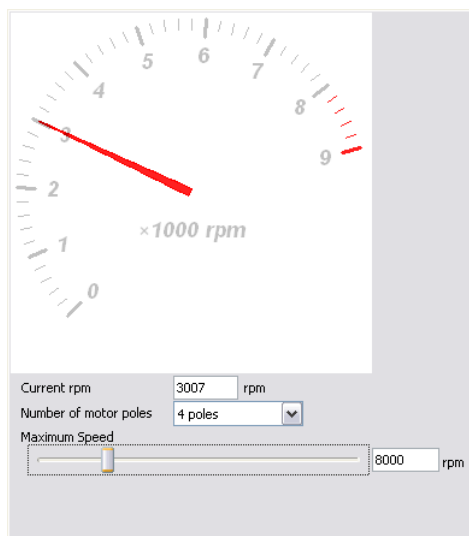
- PWMIN Duty: Controls the duty cycle which controls the torque produced.
  - ✧ When at 0% the motor stops. When at 100% the motor rotates at maximum speed.
  - ✧ It can be set by either the slide bar or the edit box.
  - ✧ When using the edit box be careful to change in small increments.

The PWM frequency is fixed at 50kHz.

- S/S: This is the chip enable button.
  - Either Start or Brake are displayed.
    - ✧ If “Start” is displayed the LV8829LFQA is turned off. Push to start the motor.
    - ✧ If “Brake” is displayed the LV8829LFQA is turned on. Push to brake and stop the motor.
  - The LED on the Daughter Board should blink while the motor is running.
  - **Caution: If the Duty Cycle is set to a non-zero value the motor will start immediately upon pushing ‘start’.**
  - Braking should not be used while the motor is at high speeds.
- F/R: This is the Forward/Reverse button and controls direction of rotation.
  - **Caution: Do not change direction at high speed.**
- Graph data record: Selecting this button will log the motor rotation speed in an Excel Comma Delimited (CSV) file.
  - This button must first be enabled and set up with the “Export Speed graph data” entry using the “file” tab in the main toolbar.



- Tachometer



**Figure 6. The tachometer window**

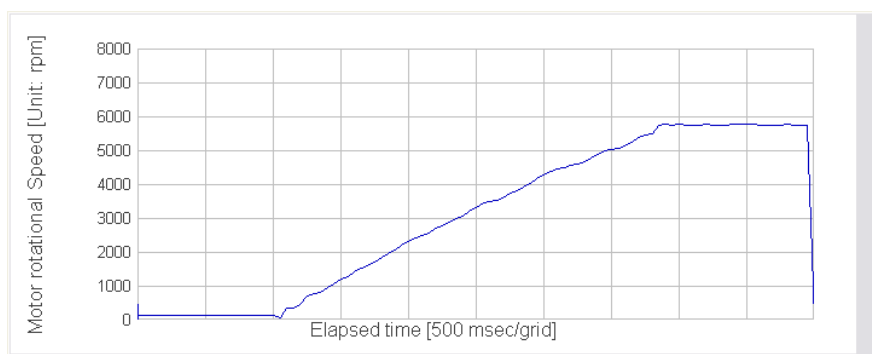
- Current rpm: Displays the motor rotational speed in rpm's. The system senses speed from the motor and calculates the speed by the following formula:

$$rpm = \left( f \times \frac{2}{N} \right) \times 60$$

Where f = Frequency of the motor signal and N= Number of motor poles

If you are not sure about number of poles in your motor this can be set to read in PPS (pulses per second).

- Number of motor poles: Sets the number of poles in the motor under test.
  - ✧ The motor we provide is a 4 pole motor.
  - ✧ If you are unsure about the number motor poles select "N/A".
- Maximum Speed: This sets the maximum speed on both the tachometer dial and the graph.
- Graph



**Figure 7. The graph window**

- This displays the motor rotational speed with respect to time.
  - The speed displayed is the same as the tachometer speed.
  - The upper limit is the same as the tachometer and set in the manner discussed earlier.
  - The Elapsed time scale is fixed at 500msec/division. The scale will expand automatically as time progresses.
  - If data logging is required please see earlier discussion under 'Graph Data Record'.

Table2: Example 1

INPUT	OUTPUT
VCC=24V (Power Supply) PWMIN duty= 20.42% F/R= Reverse	Motor rotational speed = approx. 2000rpm

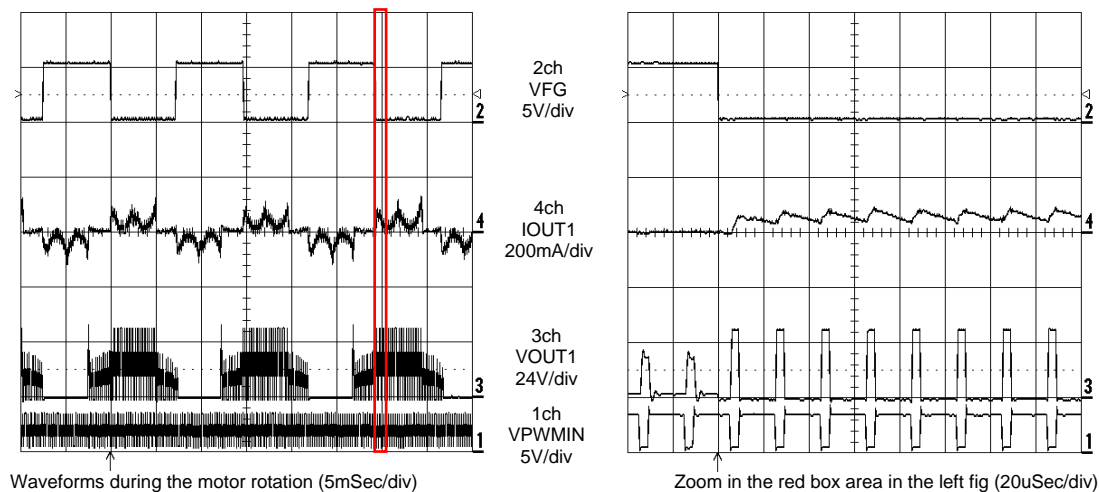


Figure 8. The image of waveforms for example 1

Table3: Example 2

INPUT	OUTPUT
VCC=12V (Power Supply) PWMIN duty= 100% , F/R= Reverse	Motor rotational speed =approx. 5800rpm

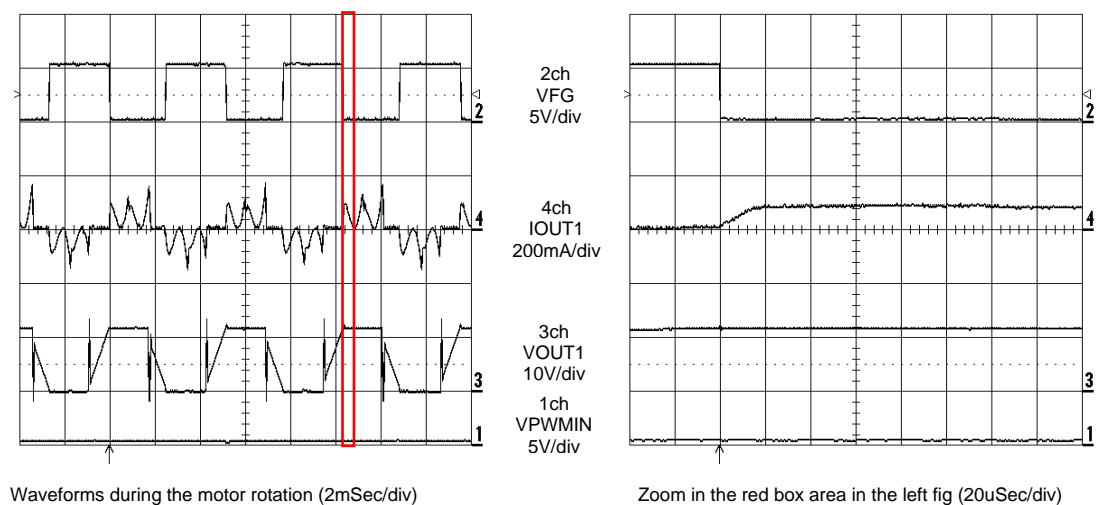


Figure 9. The image of waveforms example 2

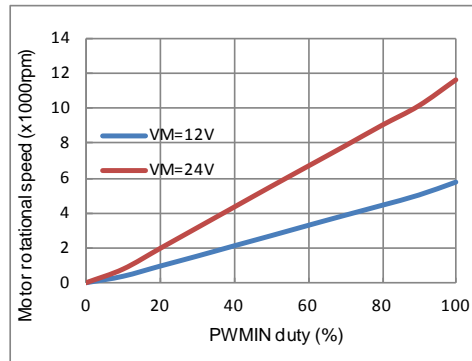
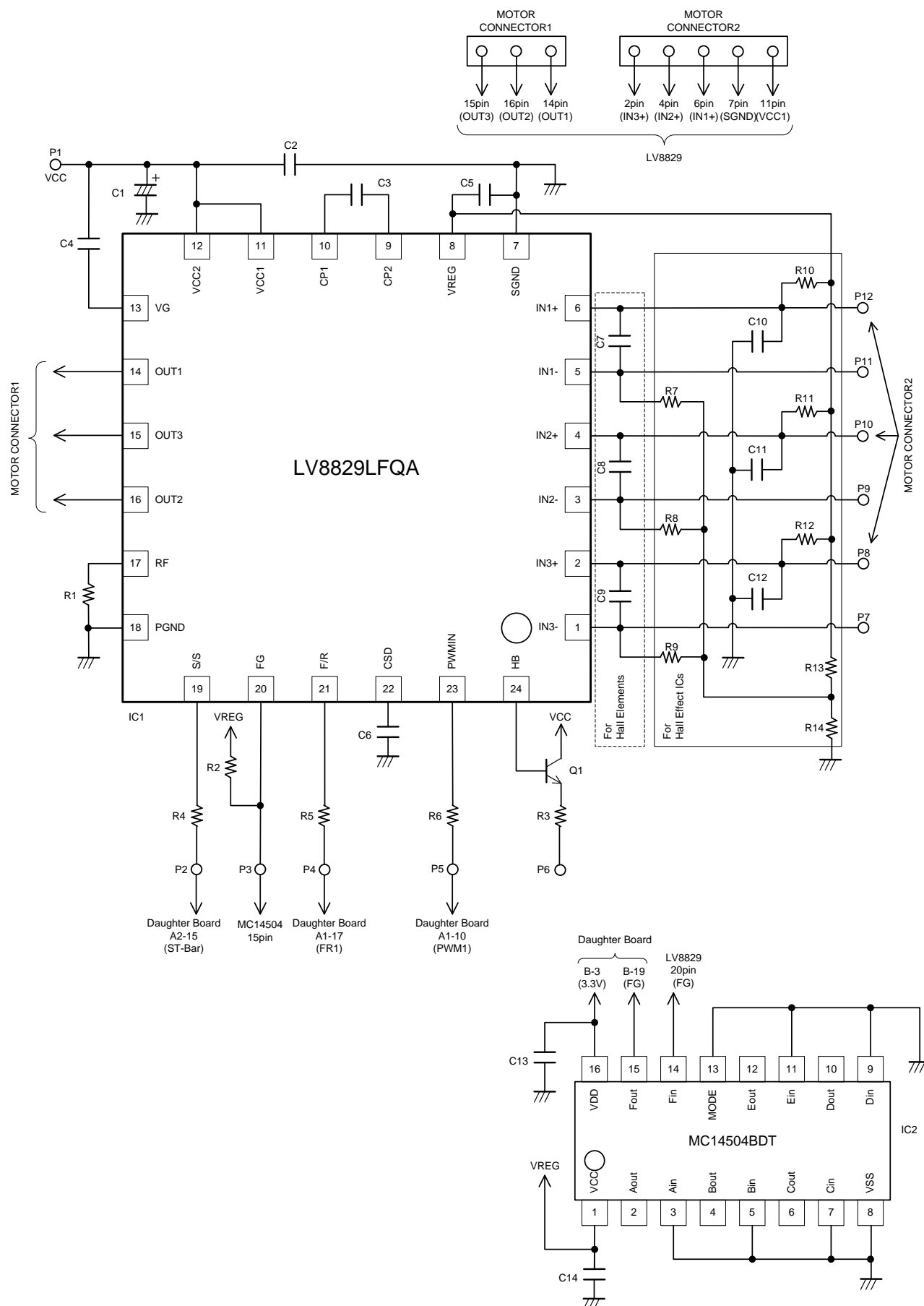


Figure 10. PWMIN no load duty-speed characteristic (BLIM2440H-A01 motor)

# Schematic for the LV8829LFQA Demonstration





**Cautions**

- This system is intended for an initial evaluation of LV8829LFQA. We will not guarantee measured values as full evaluation and validation must be performed on your system independently.
- Never hold the motor with the lead wire or shaft. The motor should be affixed to a stand prior to operation.
- Depending on the conditions of use or installation, the motor produces excessive heat when it runs. Install a heatsink, cooling fan or take other measures against excess heat.
- Attach all motor leads prior to application of power.

**Safety**

- Do not touch the rotating part when the motor is powered. Doing so may result in injury.
- Do not touch conductive parts such as connectors when the motor is powered. Doing so may result in electric shocks.