EVCS1823-Q-00A

Ultra-Small Package, Linear Hall-Effect Current Sensor with Over-Current Detection Evaluation Board

DESCRIPTION

The EVCS1823-Q-00A is an evaluation board designed to demonstrate the capabilities of the MCS1823 series, which are linear Hall-effect current sensors for AC or DC current sensing with integrated over-current detection (OCD). The Hall array is differential, which cancels out stray magnetic field. The MCS1823 series provides two power supply options (3.3V or 5V) and current ranges of 5A to 50A to optimize accuracy in different applications.

The output voltage (V_{OUT}) is proportional to the applied current flowing through the primary conductor. The galvanic isolation between the primary conductive path pins and the sensor leads allow the MCS1823 to replace optoisolators or other expensive isolation devices.

The MCS1823 is available in an ultra-small TQFN-12 (3mmx3mm) package.

PERFORMANCE SUMMARY

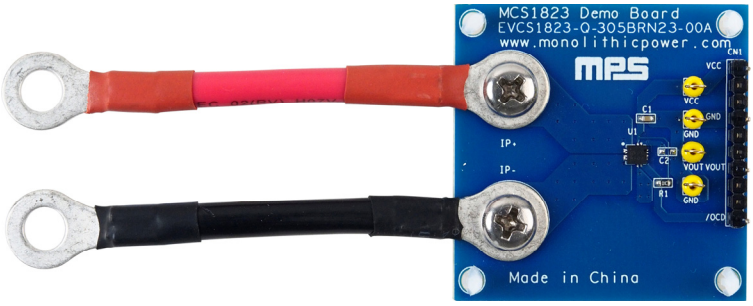
Specifications are at T_A = 25°C, unless otherwise noted.

Parameters	Conditions	Value
Supply voltage (V_{CC})		3.3V or 5V
Maximum primary applied current (I_{P_MAX})		±5A to ±50A
Output voltage (V_{OUT}) for bidirectional options	Ratiometric option	0.5 x V_{CC} + $Sens_{(TYP)}$ x I_P (1)
	Absolute option, 3.3V option	1.65V + $Sens_{(TYP)}$ x I_P (1)
	Absolute option, 5V option	2.5V + $Sens_{(TYP)}$ x I_P (1)
V_{OUT} for unidirectional options	Ratiometric option	0.1 x V_{CC} + $Sens_{(TYP)}$ x I_P (1)
	Absolute option, 3.3V option	0.33V + $Sens_{(TYP)}$ x I_P (1)
	Absolute option, 5V option	0.5V + $Sens_{(TYP)}$ x I_P (1)
Total accuracy	I_P from 10% x I_{P_MAX} to I_{P_MAX}	<2.5%
/OCD error		<10%

Note:

1) $Sens_{(TYP)}$ is the symbol for “typical sensitivity.”

EVCS1823-Q-00A EVALUATION BOARD



LxWxH (45mmx115mmx17mm)
2 Layers

Board Number	MPS IC Number
EVCS1823-Q-ABBCDEFF-00A	MCS1823GQTE-ABBCDEFF

EVALUATION BOARD BASIC INFORMATION (2)

Evaluation Board PN	Typical V_{CC} Supply Voltage (V)	Optimized Primary Current (A)	Typical Sensitivity (mV/A)	/OCD Trigger Point (A)
EVCS1823-Q-305BRN96-00A	3.3	±5	264	±4.8
EVCS1823-Q-305BRN23-00A	3.3	±5	264	±11.5
EVCS1823-Q-310BRN-00A	3.3	±10	132	±10
EVCS1823-Q-320BRN-00A	3.3	±20	66	±20
EVCS1823-Q-330BRN-00A	3.3	±30	44	±30
EVCS1823-Q-330BAL-00A	3.3	±30	44	±30
EVCS1823-Q-330BAN-00A	3.3	±30	44	±30
EVCS1823-Q-335URN-00A	3.3	35	75.4	35
EVCS1823-Q-340BRN-00A	3.3	±40	33	±40
EVCS1823-Q-350BRN-00A	3.3	±50	26.4	±50
EVCS1823-Q-505BRN-00A	5	±5	400	±5
EVCS1823-Q-510BRN-00A	5	±10	200	±10
EVCS1823-Q-520BRN-00A	5	±20	100	±20
EVCS1823-Q-530BRN-00A	5	±30	66	±30
EVCS1823-Q-540BRN-00A	5	±40	50	±40
EVCS1823-Q-550BRN-00A	5	±50	40	±50

Note:

2) Contact an MPS FAE for additional variants.

QUICK START GUIDE

1. Preset the DC power supply to 3.3V or 5V, then turn the power supply off.
2. Connect the DC power supply terminals to:
   a. Positive (+): VCC
   b. Negative (-): GND
3. Connect the current source load terminals to:
   a. Positive (+): IP+
   b. Negative (-): IP-
4. Turn on the DC power supply and current source, then measure the output result via the VOUT pin.
5. If over-current detection (OCD) is required, measure the /OCD signal via the /OCD pin.

EVALUATION BOARD SCHEMATIC

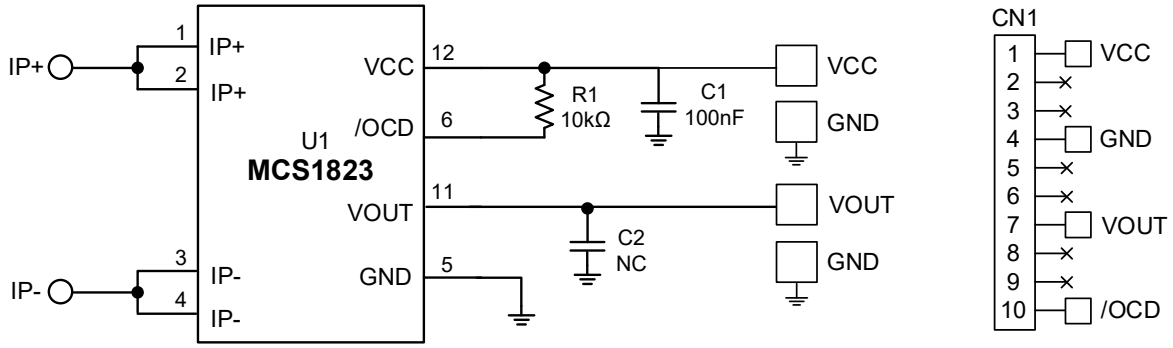


Figure 1: Evaluation Board Schematic

EVCS1823-Q-00A BILL OF MATERIALS

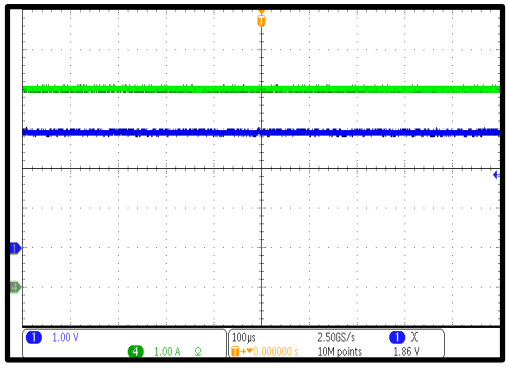
Qty	Ref	Value	Description	Package	Manufacturer	Manufacturer PN
1	C1	0.1μF	VCC ceramic decoupling capacitor, 16V, X7R	0603	Murata	GRM188R71C104KA01D
1	C2	NC				
1	R1	10kΩ	/OCD pull-up resistor	0603	Yageo	RC0603FR-0710KL
1	CN1	2.54mm	Male pin header, 10-pin	DIP	Custom	
1	U1	MCS1823	Ultra-small, Hall-effect linear current sensor with OCD	TQFN-12 (3mmx 3mm)	MPS	MCS1823GQTE-ABBCDEFF

EVB TEST RESULTS

Performance waveforms are tested on the EVCS1823-Q-305BRN23-00A evaluation board (see the Evaluation Board Basic Information section on page 2) with an /OCD trigger point at 11.5A. V_{CC} = 3.3V, C2 is open, T_A = 25°C, unless otherwise noted.

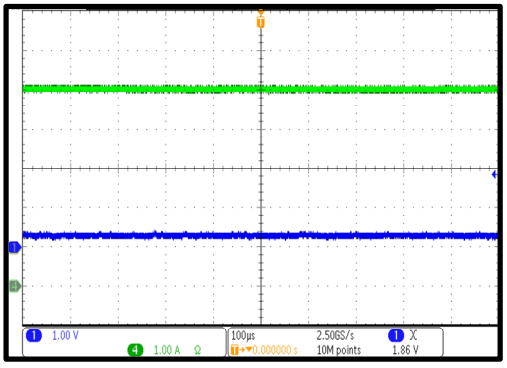
DC Current Status

I_P = 5A



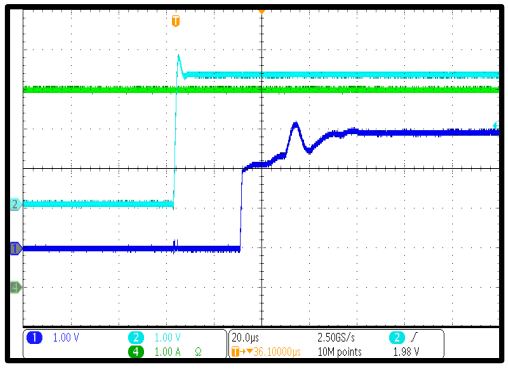
DC Current Status

I_P = -5A



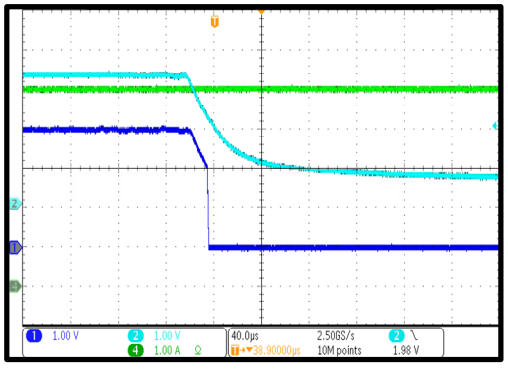
Start-Up through VCC

I_P = 5A



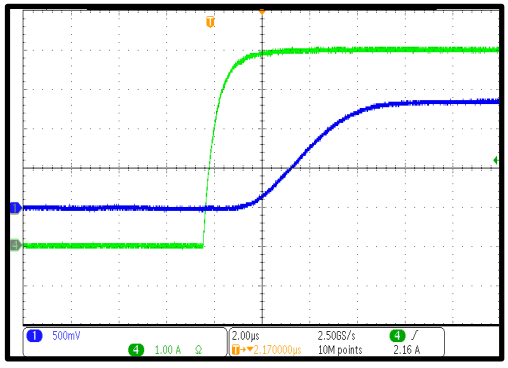
Shutdown through VCC

I_P = 5A



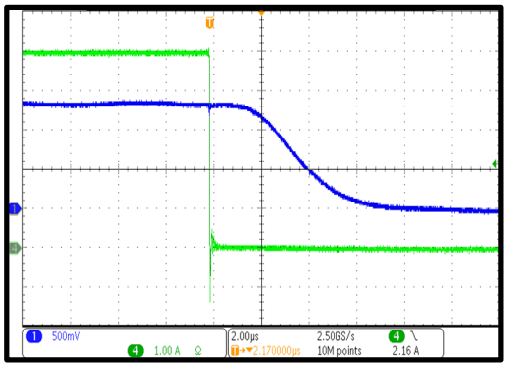
Step-Up Current

I_P = 5A



Step-Down Current

I_P = 5A

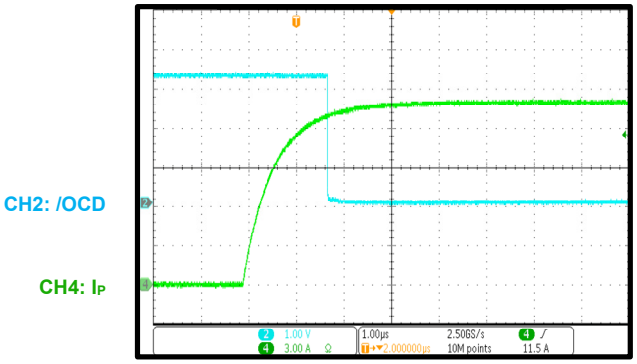


EVB TEST RESULTS *(continued)*

Performance waveforms are tested on the EVCS1823-Q-305BRN23-00A evaluation board (see the Evaluation Board Basic Information section on page 2) with an /OCD trigger point at 11.5A. V_{CC} = 3.3V, C2 is open, T_A = 25°C, unless otherwise noted.

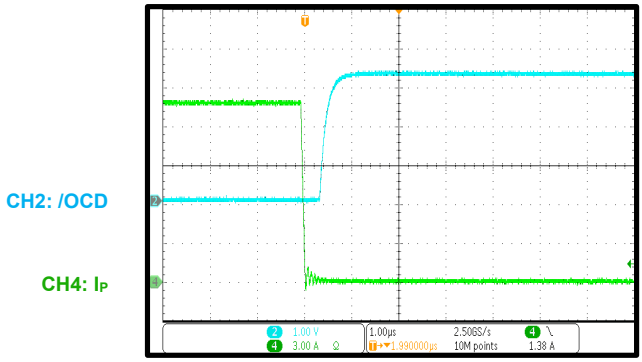
/OCD Response

I_P = 20% above /OCD trigger point



/OCD Recover

I_P = 20% above /OCD trigger point



PCB LAYOUT

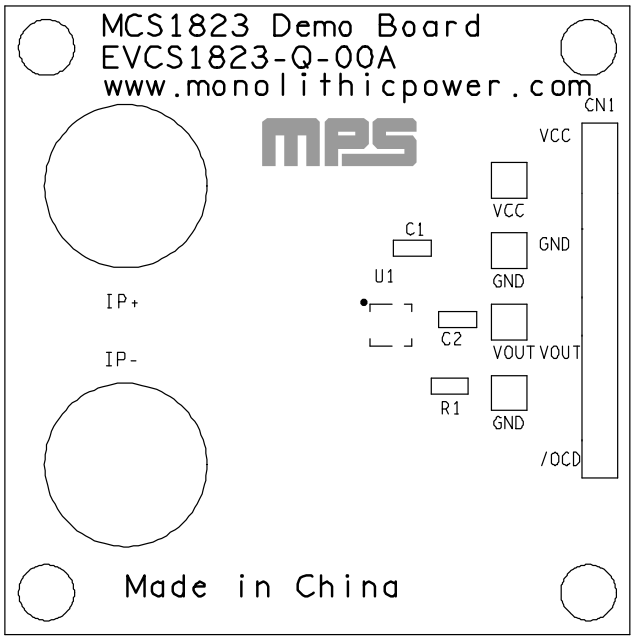


Figure 2: Top Silk

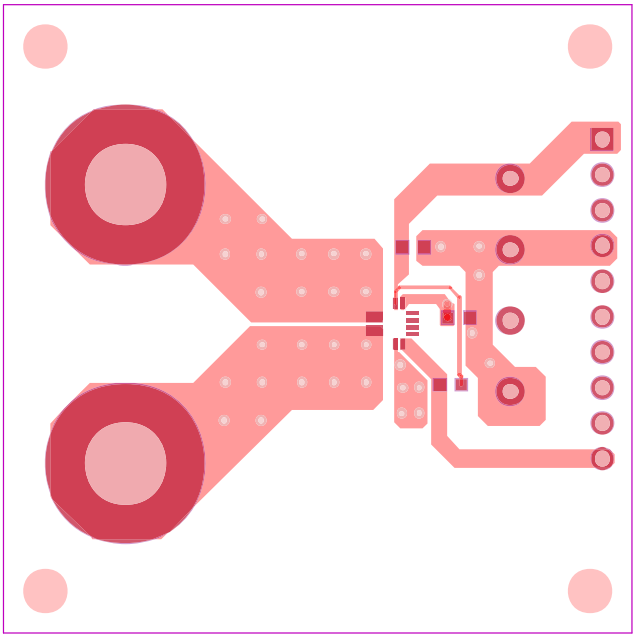


Figure 3: Top Layer

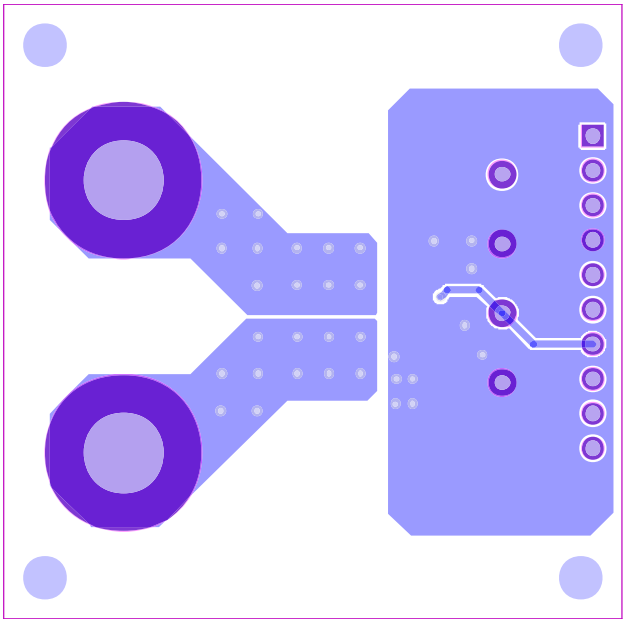


Figure 4: Bottom Layer

REVISION HISTORY

Revision #	Revision Date	Description	Pages Updated
1.0	8/15/2023	Initial Release	-