Current Transducer
Hall Effect

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Description

The product are used for isolation measurement between primary and secondary, voltage signal output. It is often used to measure DC, AC, pulse current, etc. Circuit board welded type, the installation is convenient, change the connection mode of one welding pin to change three range, suitable for a variety of occasions.

The application areas are photovoltaic, motor drive, welding power supply, power supply equipment, power heating equipment, large UPS equipment, etc.

Features

- Linearity up to 0.1%
- Accuracy up to 0.45%
- Wide frequency bandwidth 200kHz
- Optimized response time 0.4µs
- No insertion losses
- High immunity to external interference
- Complies with UL94V-0 standards

Selection Guide

Part Number	Input Voltage (V DC)	Primary RMS Current (A)	Primary Current Measurement Range (A)	Rated Output Voltage (V)	Turns Ratio
MPL6-A3TPV	5V	±6	-20 to +20	Vref ±0.625	1:1600
MPL15-A3TPV		±15	-51 to +51		
MPL25-A3TPV		±25	-85 to +85		
MPL50-A3TPV		±50	-150 to +150		

Electrical Characteristics

Item	Operating Conditions		Min.	Typ.	Max.	Unit
Primary Nominal Rated RMS Current I_{PN} (A)	Ta=25°C, Vc=5V, N_P=1, R_L=1kΩ	MPL6-A3TPV	-	6	-	A
		MPL15-A3TPV	-	15	-	
		MPL25-A3TPV	-	25	-	
		MPL50-A3TPV	-	50	-	
Primary Current Measurement Range I_{PM} (A)	Ta=25°C, Vc=5V, N_P=1, R_L=1kΩ	MPL6-A3TPV	-20	-	+20	
		MPL15-A3TPV	-51	-	+51	
		MPL25-A3TPV	-85	-	85	
		MPL50-A3TPV	-150	-	150	
Supply Voltage Vc	Ta=25°C		4.75	5	5.25	V
Number of primary turns N_P			1, 2, 3			-
Conversion Ratio K_N	Primary turns=1		1:1600			

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Item	Operating Conditions	Min.	Typ.	Max.	Unit
Reference voltage Vref	Ta=25°C, @IP=0A	2.495	2.5	2.505	V
Output voltage Vout @ IP=0A	Ta=25°C, @IP=0A	-	Vref	-	
External reference voltage VEref	Ta=25°C	0.5	-	2.75	
Rated output voltage Vout @ IPN	Ta=25°C, @ IP = ±6A	-	Vref ±0.625	-	
Current Consumption Ic	Primary current IP, secondary turns Ns=1600	-	-	20.5+(IP/Ns)	mA
Load resistance RL	-	1	-	-	kΩ
Temperature coefficient of Vout TCVout	Ta=-40°C to 105°C, ppm/°C of 2.5V @ IP=0A	-	-	±70	ppm/°C
Temperature coefficient of Vref@IP=0A TCVref	Internal reference	-	±5	±50	
Temperature coefficient of sensitivity TCS	Ta=-40°C to 105°C	-	-	±40	

Dynamic Characteristics

Item	Operating Conditions		Min.	Typ.	Max.	Unit
Nominal sensitivity SN	625mV @ IPN	MPL6-A3TPV	-	104.2	-	mV/A
		MPL15-A3TPV	-	41.67	-	
		MPL25-A3TPV	-	25	-	
		MPL50-A3TPV	-	12.5	-	
Linearity Error εL	Ta=25°C, % OF IPN		-0.1	-	0.1	%
Accuracy X	Ta=25°C, % of IPN, Vref = Vout @IP = 0A		-	-	0.45	
Primary Current Measurement Range IPM (A)	Ta=25°C, Vc=5V, NP=1, RL=1kΩ	MPL6-A3TPV	-	-	0.75(1)	
		MPL15-A3TPV			0.65 (0.75)	
		MPL25-A3TPV				
		MPL50-A3TPV				
Accuracy X@Ta=85°C (105°C)	Ta=85°C(105°C), % of IPN, Vref = Vout @ IP = 0A	MPL6-A3TPV	-	-	1.25	
		MPL15-A3TPV			0.7	
		MPL25-A3TPV			0.75	
		MPL50-A3TPV			0.65	
Total accuracy Xtot	Ta=25°C, % of IPN, Vref = 2.5V	MPL6-A3TPV	-	-	1.25(1.5)	
		MPL15-A3TPV			0.75(1)	
		MPL25-A3TPV			0.85(0.9)	
		MPL50-A3TPV			0.7(0.8)	
Frequency bandwidth(±3dB)BW	RL=1kΩ		-	200	-	kHz
Delay time tD10	RL=1kΩ, di/dt=50A/µs, up to 10% of IPN		-	-	0.3	µs
Delay time tD90	RL=1kΩ, di/dt=50A/µs, up to 90% of IPN		-	-	0.4	

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Isolation Characteristics

| Item	Operating Conditions	Min.	Typ.	Max.	Unit
Isolation withstand voltage V_D	Primary input, secondary output, 50Hz, 1min, leakage current <1mA.	-	4.5	-	kVAC
Insulation resistance	Primary input, secondary output, 500V DC	-	18	-	GΩ
Creepage distance	Primary input, secondary output	-	7.55	-	mm
Partial discharge test	<10pC	-	1.65	-	kV
ESD Electrostatic withstand voltage (HBM)		-	-	4	kV
Comparative tracking index (CTI)		-	600	-	V

General Characteristics

Item	Min.	Typ.	Max.	Unit
Operating ambient temperature Ta	-40	+25	+105	°C
Storage Environment Temperature Ts	-55	-	+125	
Weight m	-	10	-	g

Pin Function

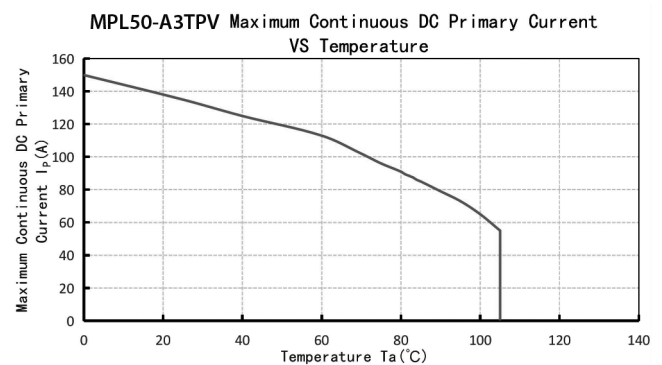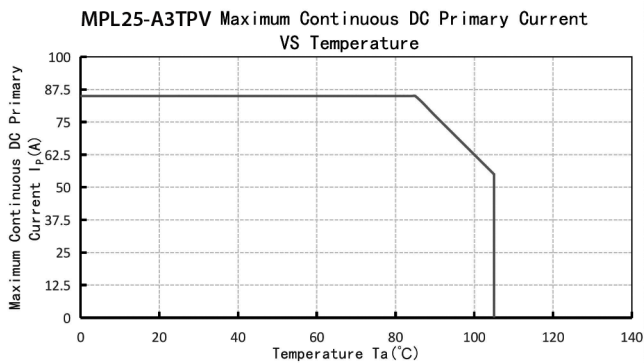| Pin	Symbol	Function Description
2, 3, 4	IN	Primary current input pin
7, 8, 9	OUT	Primary current output pin
11	Vref	Reference voltage pin
12	Vout	Output voltage pin
13	GND	Power supply ground.
14	+Uc	Power supply (VC).

Product Characteristic Curve
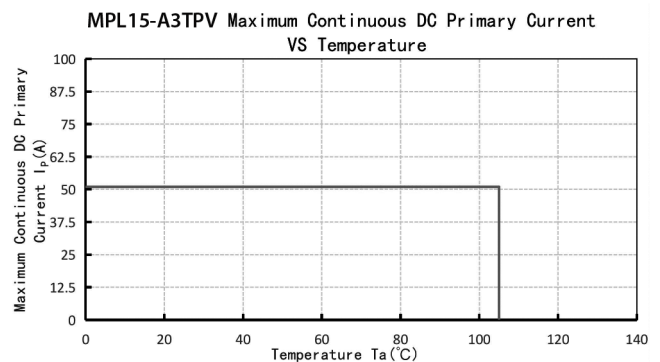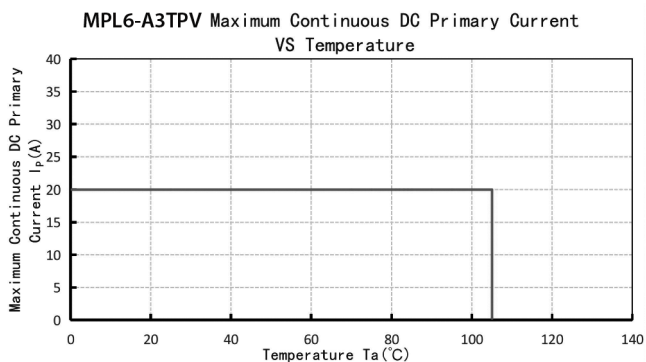
MPL6-A3TPV Maximum Continuous DC Primary Current VS Temperature

MPL15-A3TPV Maximum Continuous DC Primary Current VS Temperature

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MPL25-A3TPV Maximum Continuous DC Primary Current VS Temperature
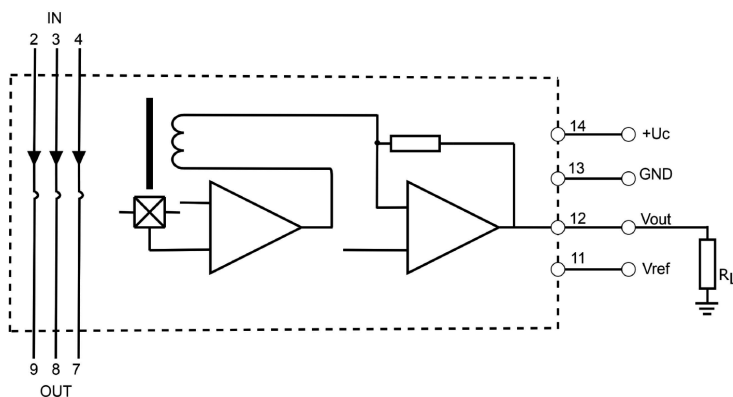
MPL50-A3TPV Maximum Continuous DC Primary Current VS Temperature

The primary side maximum continuous DC current temperature curve satisfies the following conditions:

a. $I_P < I_{PM}$

b. Junction temperature $T_J < 130°C$

c. Primary conductor temperature $<120°C$

Connection and Description

1. I_P is measured current. When the detected current is input from pin 2, 3 and 4, it is a forward current. When the detected current is input from pin 7, 8 and 9, it is a reverse current.

2. RL is load resistance, the minimum load resistance is 1kΩ. If the product is not operated within the required load range, the product performance cannot be guaranteed to comply with all parameters in the datasheet.

3. Pin 11 is the reference voltage Vref detection point, pin 12 is the output voltage Vout detection point.
   Forward current measurement range: $V_{out} = V_{ref} + (I_P/I_{PN}) * 0.625V$.
   Reverse current measurement range: $V_{out} = V_{ref} - (I_P/I_{PN}) * 0.625V$.

4. The accuracy is defined as the actual zero output voltage $V_{out}@I_P = 0A$, and the total accuracy is defined as the nominal zero output voltage of 2.5V.

5. Vref can be used either as a reference output or as a reference input. When it used as reference voltage output, the current transducer uses the internal reference voltage as the reference point, and the Vref pin can be unconnected or used as the reference voltage input pin of the back-end sampling circuit. When it used as reference voltage input, the external reference voltage is connected to the Vref pin, the Vref pin is not connected. The maximum allowable external reference voltage range is 0.5V to 2.75V.

6. When the external reference voltage is used, the external reference voltage source must be able to provide or absorb a certain amount of current I. The measurement range of the external reference voltage and the original side of the current transducer is as follows:

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Part Number	External reference voltage source current I(mA)	Primary Current Measurement Range(A)
MPL6-A3TPV	$\pm(V_{Eref}-2.5)/150$	Forward current measurement range: $I_P=-9.6*V_{Eref}+45.6A$ ($V_{Eref}=0.5\sim2.75V$) Reverse current measurement range: $I_P=-9.6*V_{Eref}+2.4A$ ($V_{Eref}=0.5\sim2.75V$)
MPL15-A3TPV	$\pm(V_{Eref}-2.5)/150$	Forward current measurement range: $I_P=-24*V_{Eref}+114A$ ($V_{Eref}=0.5\sim2.75V$) Reverse current measurement range: $I_P=-24*V_{Eref}+6A$ ($V_{Eref}=0.5\sim2.75V$)
MPL25-A3TPV	$\pm(V_{Eref}-2.5)/150$	Forward current measurement range: $I_P=-40*V_{Eref}+190A$ ($V_{Eref}=0.5\sim2.75V$) Reverse current measurement range: $I_P=-40*V_{Eref}+10A$ ($V_{Eref}=0.5\sim2.75V$)
MPL50-A3TPV	$\pm(V_{Eref}-2.5)/300$	Forward current measurement range: $I_P=150A$ ($V_{Eref}=0.5\sim2.75V$) Reverse current measurement range: $I_P=-80*V_{Eref}+20A$ ($V_{Eref}=0.5\sim2.75V$)

7. Hot plug is unavailable.

8. Three different current ranges of the original side can be changed by changing the connection mode of the current input pin of the original side:
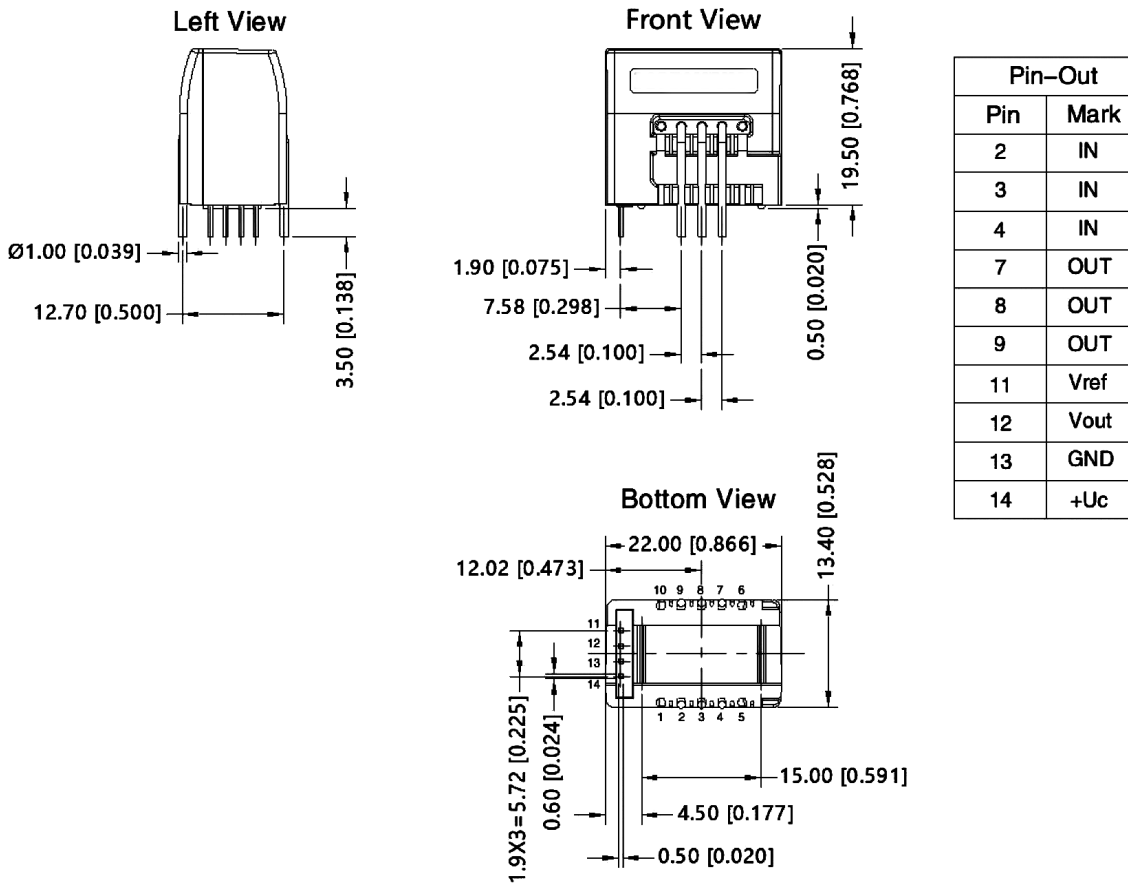
Number of primary turns NP	Primary nominal RMS current	Recommended connections	Output voltage V_{OUT}(V)
1	$\pm I_{PN}$		$V_{ref}\pm0.625$
2	$\pm I_{PN}/2$		$V_{ref}\pm0.625$
3	$\pm I_{PN}/3$		$V_{ref}\pm0.625$

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Diagram

Left View

Ø1.00 [0.039]

12.70 [0.500]

3.50 [0.138]

Front View

19.50 [0.768]

0.50 [0.020]

1.90 [0.075]

7.58 [0.298]

2.54 [0.100]

2.54 [0.100]

Pin–Out	
Pin	Mark
2	IN
3	IN
4	IN
7	OUT
8	OUT
9	OUT
11	Vref
12	Vout
13	GND
14	+Uc

Bottom View

22.00 [0.866]

12.02 [0.473]

13.40 [0.528]

10 9 8 7 6

11
12
13
14

1 2 3 4 5

1.9X3=5.72 [0.225]

0.60 [0.024]

15.00 [0.591]

4.50 [0.177]

0.50 [0.020]

Pin Diameter Tolerances   : ±0.1 (±0.004)
General Tolerances   : ±0.5 (±0.02)
Dimensions : Millimetres (Inches)

Part Number Table

Description	Part Number
Current Transducer, 6A	MPL6-A3TPV
Current Transducer, 15A	MPL15-A3TPV
Current Transducer, 25A	MPL25-A3TPV
Current Transducer, 50A	MPL50-A3TPV

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