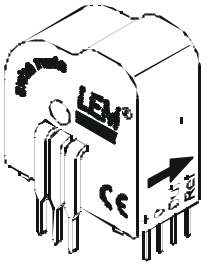
Multi-Range Current Transducer

I_{PN} = 6 - 15 - 25 A

LTSR 6-NP, LTSR 15-NP, LTSR 25-NP

For the electronic measurement of currents : DC, AC, pulsed, mixed, with a galvanic isolation between the primary circuit (high power) and the secondary circuit (electronic circuit).



Electrical data

I_{PN}	Primary nominal r.m.s. current		6/15/25	At
I_P	Primary current, measuring range		0 .. ± 19.2/48/80 [1]	At
V_{OUT}	Analog output voltage @ I_P		2.5 ± (0.625·I_P/I_{PN})	V
		I_P = 0	2.5 [2]	V
V_{REF}	Voltage reference (internal reference), refout mode		2.5 [3]	V
	Voltage reference (external reference), refin mode		1.9 .. 2.7 [4]	V
N_S	Number of secondary turns (± 0.1 %)		2000	
R_L	Load resistance		≥ 2	kΩ
C_L	Max. capacitive loading		500	pF
R_{IM}	Internal measuring resistance (± 0.5 %)		208.33/83.33/50	Ω
TCR_{IM}	Thermal drift of R_{IM}		< 50	ppm/K
V_C	Supply voltage (± 5 %)		5	V
I_C	Current consumption @ V_C = 5 V	Typ	28 + I_S [5] + (V_{OUT}/R_L)	mA
V_d	R.m.s. voltage for AC isolation test, 50/60 Hz, 1 mn		3	kV
V_e	R.m.s. voltage for partial discharge extinction @ 10 pC		> 1.5	kV
$\hat{V}_w$	Impulse withstand voltage 1.2/50 µs		> 8	kV

Accuracy - Dynamic performance data

X	Accuracy @ I_{PN}, T_A = 25°C		± 0.2	%
	Accuracy with R_{IM} @ I_{PN}, T_A = 25°C		± 0.7	%
ε_L	Linearity error		< 0.1	%
			Max.	
TCV_{OUT}	Thermal drift of V_{OUT}/V_{REF} @ I_P = 0	- 40°C .. + 85°C	150/64/37.5	ppm/K
$TC\varepsilon_G$	Thermal drift of the gain	- 40°C .. + 85°C	50 [6]	ppm/K
V_{OM}	Residual voltage @ I_P = 0 after an overload of	3 x I_{PN}	± 0.5	mV
		5 x I_{PN}	± 2	mV
		10 x I_{PN}	± 2	mV
TCV_{REF}	Thermal drift of internal V_{REF} @ I_P = 0			
		- 10°C .. + 85°C	50	ppm/K
		- 40°C .. - 10°C	100	ppm/K
t_{ra}	Reaction time @ 10 % of I_{PN}		< 100	ns
t_r	Response time @ 90 % of I_{PN}		< 400	ns
di/dt	di/dt accurately followed		> 15/35/60	A/µs
f	Frequency bandwidth	(0 .. - 0.5 dB)	DC .. 100	kHz
		(- 0.5 .. 1 dB)	DC .. 200	kHz

Features

- Closed loop (compensated) multi-range current transducer using the Hall effect
- Unipolar voltage supply
- Compact design for PCB mounting
- Insulated plastic case recognized according to UL 94-V0
- Incorporated measuring resistance
- Extended measuring range
- Access to the internal voltage reference
- Possibility to feed the transducer reference from external supply.

Advantages

- Excellent accuracy
- Very good linearity
- Very low temperature drift
- Optimized response time
- Wide frequency bandwidth
- No insertion losses
- High immunity to external interference
- Current overload capability.

Applications

- AC variable speed drives and servo motor drives
- Static converters for DC motor drives
- Battery supplied applications
- Uninterruptible Power Supplies (UPS)
- Switched Mode Power Supplies (SMPS)
- Power supplies for welding applications.

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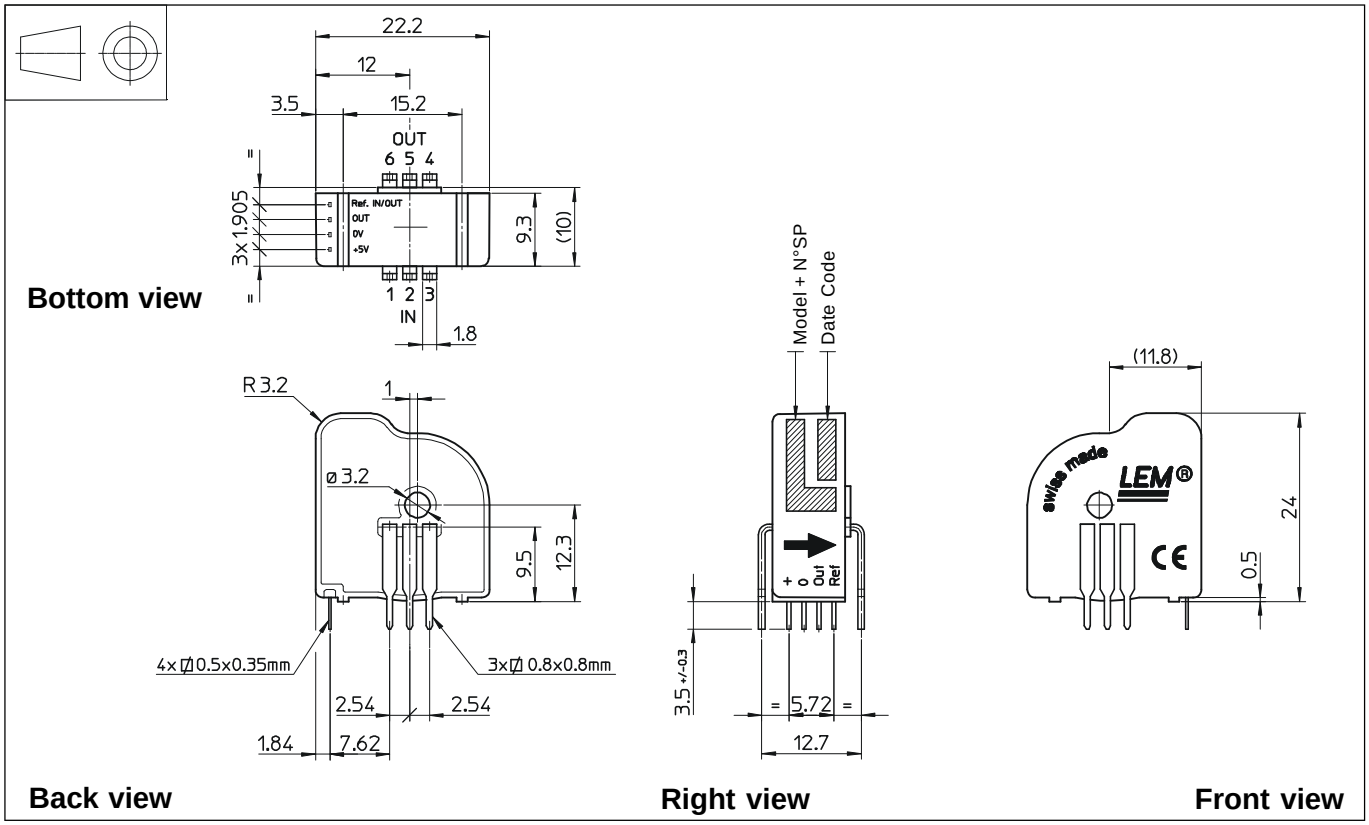
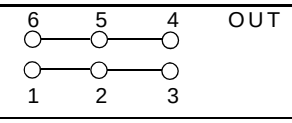
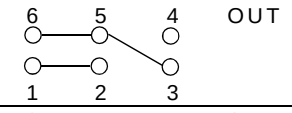
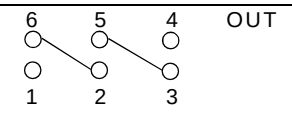
Dimensions LTSR 6, LTSR 15, LTSR 25-NP (in mm. 1 mm = 0.0394 inch)



Number of primary turns	Primary nominal r.m.s. current I_{PN} [A]	Nominal output voltage V_{OUT} [V]	Primary resistance R_P [mΩ]	Primary insertion inductance L_P [µH]	Recommended connections
1	LTSR 6-NP ± 6 LTSR 15-NP ± 15 LTSR 25-NP ± 25	V_{REF}*± 0.625	0.18	0.013	
2	LTSR 6-NP ± 3 LTSR 15-NP ± 7.5 LTSR 25-NP ± 12	V_{REF}* ± 0.625 V_{REF}* ± 0.625 V_{REF}* ± 0.600	0.81	0.05	
3	LTSR 6-NP ± 2 LTSR 15-NP ± 5 LTSR 25-NP ± 8	V_{REF}* ± 0.625 V_{REF}* ± 0.625 V_{REF}* ± 0.600	1.62	0.12	

* V_{REF} = 2.5 V ± 25 mV in Refout mode, V_{REF} = External reference (1.9 .. 2.7 ± 25 mV) in Refin mode

Mechanical characteristics

- General tolerance ± 0.2 mm
- Fastening & connection of primary 6 pins 0.8 x 0.8 mm
  Recommended PCB hole 1.3 mm
- Fastening & connection of secondary 4 pins 0.5 x 0.35 mm
  Recommended PCB hole 0.8 mm
- Additional primary through-hole ∅ 3.2 mm

Remark

- V_{OUT} is positive when I_P flows from terminals 1, 2, 3 to terminals 6, 5, 4.
- This transducer is expected to be integrated, which must have its conductive parts inaccessible due to the installation (IEC 61010-1).

LTSR 6, LTSR 15, LTSR 25-NP

General data

$\mathbf{T}_A$	Ambient operating temperature	- 40 .. + 85	°C
$\mathbf{T}_S$	Ambient storage temperature	- 40 .. + 100	°C
	Insulating material group	III a	
m	Mass	10	g
dCp	Creepage distance	6.27 mm	
dCl	Clearance distance	6.27 mm (sur PCB)	

Example of working voltage calculation Unm.

Insulation	Pollution degree	Overvoltage category	Unm
Single	PD2	CAT III	600 Vrms
Reinforced	PD2	CAT III	300 Vrms

Standards [7)] EN 50178 (97.10.01)
CEI 60950-1(01.10.26)
CEI 61010-1(02.05.28)

Notes :

[1)] Only in Refout mode or with external REF less than 2.525 V and greater than 2.475 V.
For external REF out of these limits see leaflet.

[2)] $\mathbf{V}_{OUT}$ is linked to $\mathbf{V}_{REF}$, by conception the difference between these two nodes at $\mathbf{I}_P$ = 0 is maximum ± 25 mV, 2.475 V < $\mathbf{V}_{OUT}$ < 2.525 V.

[3)] In Refout mode at $\mathbf{T}_A$ = 25°C, 2.475 V < $\mathbf{V}_{REF}$ < 2.525 V.
The minimal impedance loading the ref pin should be > 220 kΩ.
Internal impedance = 600 Ω.
For most applications you need to buffer this output to feed it into an ADC for example.

[4)] To overdrive the REF (1.9 V .. 2.7 V) max. ± 1 mA is needed.

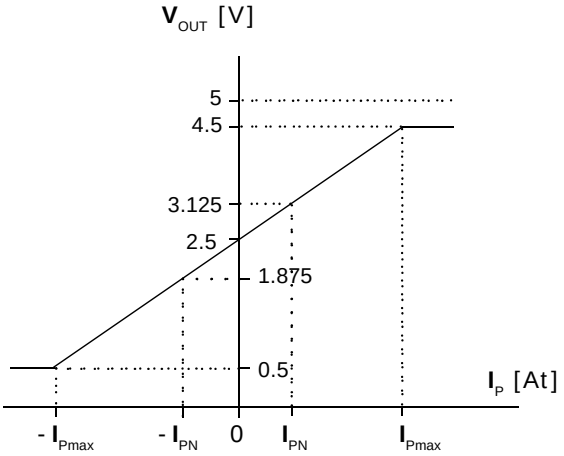
[5)] Please see the operation principle below.

[6)] Only due to $\mathbf{TCR}_{IM}$.

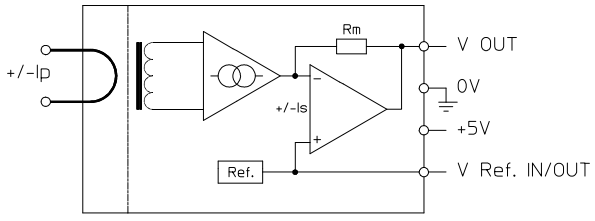
[7)] The tolerance for the IEC 1000-4-8 test is extended to 1.5 % instead of 1 % for the LTSR 6-NP.

Output Voltage - Primary Current

$\mathbf{V}_{REF}$ = 2.5 V (in this example)



Operation principle



$\mathbf{I}_S = \mathbf{I}_P / \mathbf{N}_S$ = ± 3 mA @ $\mathbf{I}_P$ = ± 6 At for LTSR 6-NP
$\mathbf{I}_S = \mathbf{I}_P / \mathbf{N}_S$ = ± 7.5 mA @ $\mathbf{I}_P$ = ± 15 At for LTSR 15-NP
$\mathbf{I}_S = \mathbf{I}_P / \mathbf{N}_S$ = ± 12.5 mA @ $\mathbf{I}_P$ = ± 25 At for LTSR 25-NP