

## Current Transducer GO-SME series

$I_{PN} = 10 \dots 20 \text{ A}$

Ref: GO 10-SME, GO 20-SME

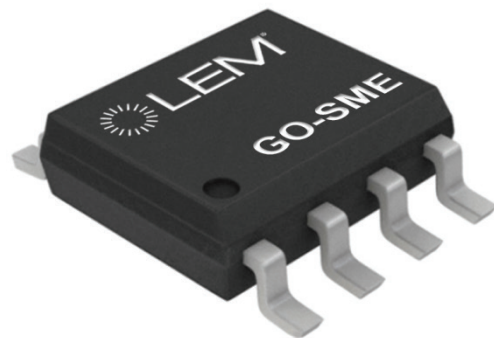
For the electronic measurement of current: DC, AC, pulsed..., with galvanic separation between the primary and the secondary circuit.



cRU<sup>®</sup>us

RoHS

Provisional



### Features

- Hall effect measuring principle
- Galvanic separation between primary and secondary circuit
- Insulated test voltage 2500 V RMS
- Low power consumption
- Extremely low profile
- Single power supply +5 V
- Fixed offset & sensitivity
- Response time 2  $\mu\text{s}$ .

### Advantages

- Small size and space saving
- High immunity to external interference
- High insulation capability
- Low electrical resistance (0.9 m $\Omega$ )
- No magnetic hysteresis
- Robust against external fields and cross-talk.

### Applications

- Small drives
- HVAC
- Appliances
- E-Bikes.

### Standards

- EN 61800-5-1
- IEC 62109-1
- IEC/UL 60950-1 (pending).

### Application Domains

- Industrial.

**Absolute maximum ratings**

Parameter	Symbol	Unit	Min	Typ	Max	Conditions
Maximum supply voltage (not destructive)	$U_{C\ max}$	V			8	
Maximum supply voltage (not entering non-standard modes)					6.5	
Maximum overload capability	$\hat{I}_{P\ max}$	A			±200	$T_A = 25\ ^\circ\text{C}$ , 1 ms pulse
Maximum electrostatic discharge voltage (HMB-Human Body Model)	$U_{ESD\ HBM}$	V			2000	AEC-Q100-002 REV D
Maximum electrostatic discharge voltage (CDM-Charged Device Model)	$U_{ESD\ CDM}$	V			500	AEC-Q100-011 REV B
Maximum output current source	$I_{out\ max}$	mA			25	
Maximum output current sink	$I_{out\ max}$	mA			50	
Maximum junction temperature	$T_{J\ max}$	°C			165	

**Insulation coordination**

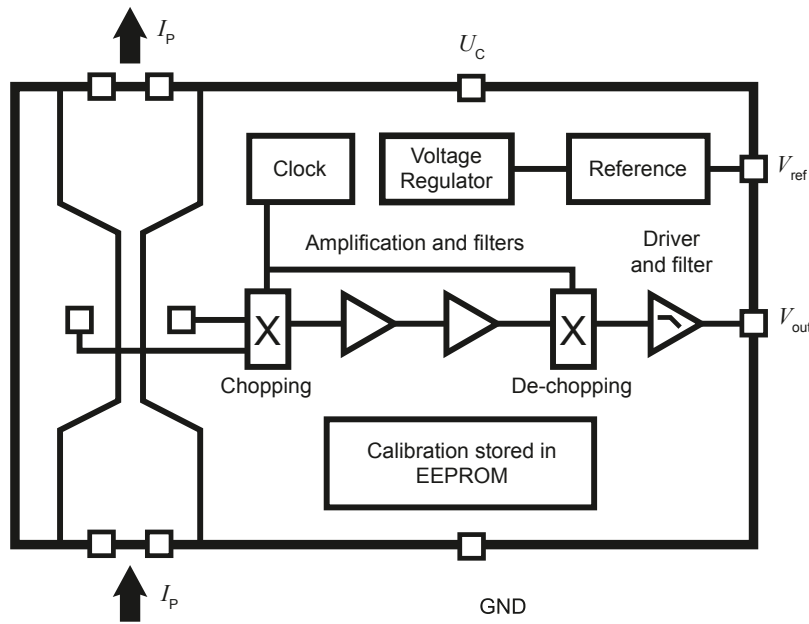
Parameter	Symbol	Unit	Value	Comment
RMS voltage for AC insulation test, 50 Hz, 1 min	$U_d$	V	2500	
Impulse withstand voltage 1.2/50 $\mu\text{s}$	$\hat{U}_W$	V	4000	According to IEC 61800-5-1, IEC 62109-1, UL 60950-1
Partial discharge RMS test voltage ( $q_m < 5\ \text{pC}$ )	$U_t$	V	850	Primary/secondary Corresponds to a recurring peak voltage of 728 V peak-to-peak According to IEC 61800-5-1, IEC 62109-1
Clearance (pri. - sec.)	$d_{Cl}$	mm	4	Shortest distance through air
Creepage distance (pri. - sec.)	$d_{Cp}$			Shortest path along body
Comparative tracking index	$CTI$		> 600	Material group I
Application example		V	300 V RMS CAT II, PD2	Basic insulation according to IEC 61800-5-1, IEC 62109-1, UL 60950-1

**Environmental and mechanical characteristics**

Parameter	Symbol	Unit	Min	Typ	Max	Conditions
Ambient operating temperature	$T_A$	°C	-40		125	
Ambient storage temperature	$T_S$	°C	-55		165	
Resistance of the primary @ $T_A = 25\ ^\circ\text{C}$	$R_p$	m $\Omega$		0.75		
Thermal resistance junction to board <sup>1)</sup>	$R_{th\ JB}$	°K/W		15		
Time constant	$t$	s		1		To reach steady state

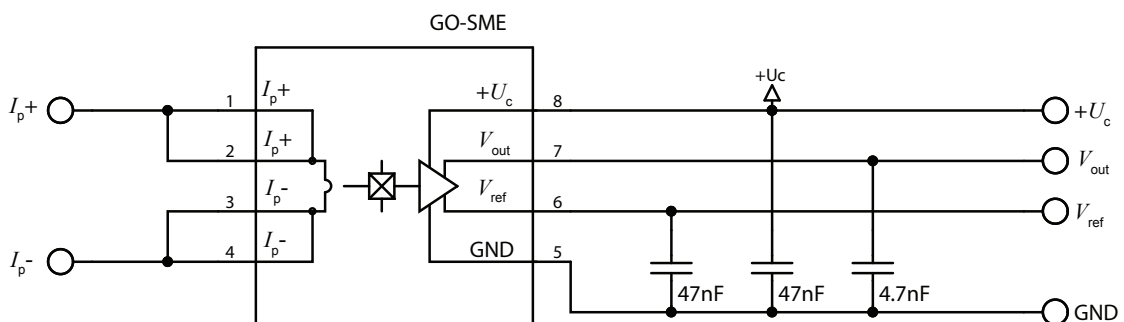
Note: <sup>1)</sup> Done on LEM evaluation board PCB 2320.

Block diagram



Connection diagram

Pin#	Name	Function
From 1 to 2	$I_{p+}$	Input of the primary current
From 3 to 4	$I_{p-}$	Output of the primary current
5	GND	Ground
6	$V_{ref}$	Reference voltage (output)
7	$V_{out}$	Output voltage
8	$U_c$	Supply voltage



**Electrical data GO 10-SME**

 At  $T_A = -40\text{ °C} \dots 125\text{ °C}$ ,  $U_C = +5\text{ V}$ ,  $R_L = 10\text{ k}\Omega$  unless otherwise noted.

Parameter	Symbol	Unit	Min	Typ	Max	Conditions
Primary nominal RMS current	$I_{PN}$	A		10		
Primary current, measuring range	$I_{PM}$	A	-25		25	
Supply voltage	$U_C$	V	4.5	5	5.5	
Current consumption	$I_C$	mA		20	26	
Reference voltage (output)	$V_{ref}$	V	2.48	2.5	2.52	@ 25 °C
Reference voltage (input)	$V_{ref}$	V	0.5		2.6	$U_C = 5\text{ V}$
Output voltage range @ $I_{PM}$	$V_{out} - V_{ref}$	V	-2		2	
Output internal resistance	$R_{out}$	$\Omega$			5	Up to 10 kHz
Reference internal resistance	$R_{ref}$	$\Omega$	120	200	333	
Load resistance	$R_L$	k $\Omega$	5		100	
Capacitive loading	$C_L$	nF	0		6	
Theoretical sensitivity	$G_{th}$	mV/A		80		
Electrical offset voltage @ $I_{PN} = 0$	$V_{OE}$	mV	-5		5	$T_A = 25\text{ °C}$ , $V_{out} - V_{ref}$ @ $V_{ref} = 2.5\text{ V}$
Electrical offset current referred to $I_{PN}$	$I_{OE}$	mA	-62.5		62.5	$T_A = 25\text{ °C}$
Temperature coefficient of $V_{ref}$	$TCV_{ref}$	ppm/K	-150		150	$V_{ref} = 2.5\text{ V}$
Temperature coefficient of $V_{OE}$	$TCV_{OE}$	mV/K	-0.075		0.075	
Temperature coefficient of $I_{OE}$	$TCI_{OE}$	mA/K	-0.94		0.94	
Temperature coefficient of $G$	$TCG$	ppm/K	-150		150	
Step response time to 90 % of $I_{PN}$	$t_r$	$\mu\text{s}$			2	
Reaction time @ 10 % of $I_{PN}$	$t_{ra}$	$\mu\text{s}$			1.5	
Frequency bandwidth -3 dB, $T_A = 25\text{ °C}$	$BW$	KHz		300		
Output noise voltage spectral density	$e_{no}$	$\mu\text{V}/\text{Hz}^{1/2}$		13.5		NBW = 1 kHz ... 100 kHz
Sensitivity error	$\varepsilon_G$	%	-1		1	Factory adjustment
Linearity error 0 ... $I_{PN}$	$\varepsilon_L$	%	-0.3		0.3	
Linearity error 0 ... $I_{PM}$	$\varepsilon_L$	%	-0.6		0.6	
Measurement error @ $I_{PN}$	$\varepsilon$	%	-1.3		1.3	$T_A = 25\text{ °C}$
Measurement error @ $I_{PN}$ @ $T_A = 85\text{ °C}$ <sup>1)</sup>	$\varepsilon$	%	-2.76		2.76	
Measurement error @ $I_{PN}$ @ $T_A = 105\text{ °C}$	$\varepsilon$	%	-3.25		3.25	
Measurement error @ $I_{PN}$ @ $T_A = 125\text{ °C}$	$\varepsilon$	%	-3.74		3.74	

**Electrical data GO 20-SME**

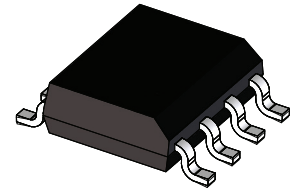
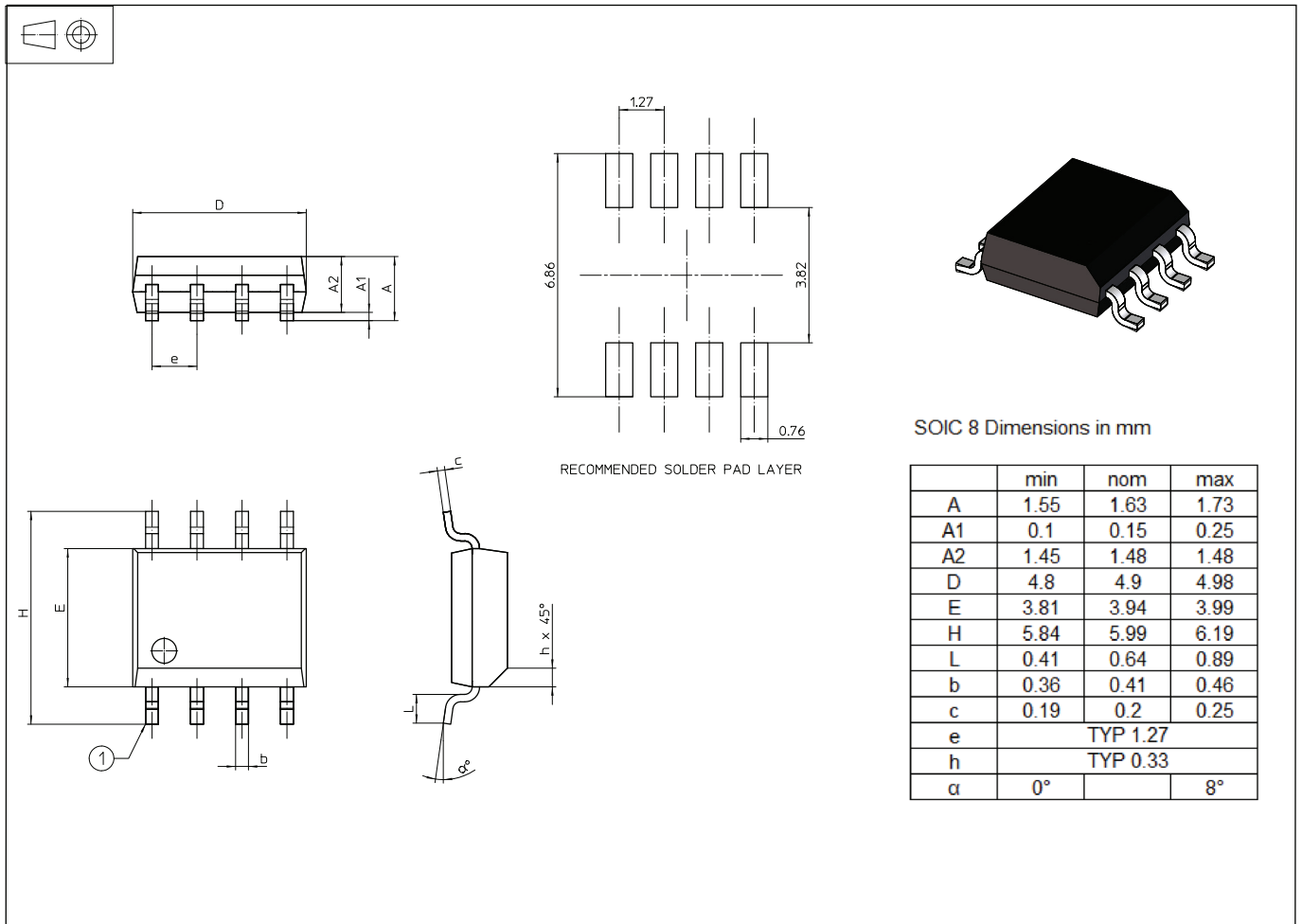
 At  $T_A = -40\text{ °C} \dots 125\text{ °C}$ ,  $U_C = +5\text{ V}$ ,  $R_L = 10\text{ k}\Omega$  unless otherwise noted.

Parameter	Symbol	Unit	Min	Typ	Max	Conditions
Primary nominal RMS current	$I_{PN}$	A		20		
Primary current, measuring range	$I_{PM}$	A	-50		50	
Supply voltage	$U_C$	V	4.5	5	5.5	
Current consumption	$I_C$	mA		20	26	
Reference voltage (output)	$V_{ref}$	V	2.48	2.5	2.52	@ 25 °C
Reference voltage (input)	$V_{ref}$	V	0.5		2.6	$U_C = 5\text{ V}$
Output voltage range @ $I_{PM}$	$V_{out} - V_{ref}$	V	-2		2	
Output internal resistance	$R_{out}$	$\Omega$			5	Up to 10 kHz
Reference internal resistance	$R_{ref}$	$\Omega$	120	200	333	
Load resistance	$R_L$	k $\Omega$	5		100	
Capacitive loading	$C_L$	nF	0		6	
Theoretical sensitivity	$G_{th}$	mV/A		40		
Electrical offset voltage @ $I_{PN} = 0$	$V_{OE}$	mV	-5		5	$T_A = 25\text{ °C}$ , $V_{out} - V_{ref}$ @ $V_{ref} = 2.5\text{ V}$
Electrical offset current referred to $I_{PN}$	$I_{OE}$	mA	-62.5		62.5	$T_A = 25\text{ °C}$
Temperature coefficient of $V_{ref}$	$TCV_{ref}$	ppm/K	-150		150	$V_{ref} = 2.5\text{ V}$
Temperature coefficient of $V_{OE}$	$TCV_{OE}$	mV/K	-0.075		0.075	
Temperature coefficient of $I_{OE}$	$TCI_{OE}$	mA/K	-1.88		1.88	
Temperature coefficient of $G$	$TCG$	ppm/K	-150		150	
Step response time to 90 % of $I_{PN}$	$t_r$	$\mu\text{s}$			2	
Reaction time @ 10 % of $I_{PN}$	$t_{ra}$	$\mu\text{s}$			1.5	
Frequency bandwidth -3 dB, $T_A = 25\text{ °C}$	$BW$	KHz		300		
Output noise voltage spectral density	$e_{no}$	$\mu\text{V}/\text{Hz}^{1/2}$		7		NBW = 1 kHz ... 100 kHz
Sensitivity error	$\varepsilon_G$	%	-1		1	Factory adjustment
Linearity error 0 ... $I_{PN}$	$\varepsilon_L$	%	-0.3		0.3	
Linearity error 0 ... $I_{PN}$	$\varepsilon_L$	%	-0.6		0.6	
Measurement error @ $I_{PN}$ @ $T_A = 85\text{ °C}$ <sup>1)</sup>	$\varepsilon$	%	-1.3		1.3	$T_A = 25\text{ °C}$
Measurement error @ $I_{PN}$ @ $T_A = 105\text{ °C}$	$\varepsilon$	%	-2.76		2.76	
Measurement error @ $I_{PN}$ @ $T_A = 125\text{ °C}$	$\varepsilon$	%	-3.25		3.25	
Accuracy @ $I_{PN}$ @ $T_A = 125\text{ °C}$	$\varepsilon$	%	-3.74		3.74	

**Note:** <sup>1)</sup> Measurement error  $\varepsilon$ :

$$\varepsilon_{TA} = (\varepsilon_L + \varepsilon_G) + \left( \frac{TCV_{OE}}{I_{PN} \times G} + TCG \times 10^{-6} \right) \times (T_A - 25) \times 100$$

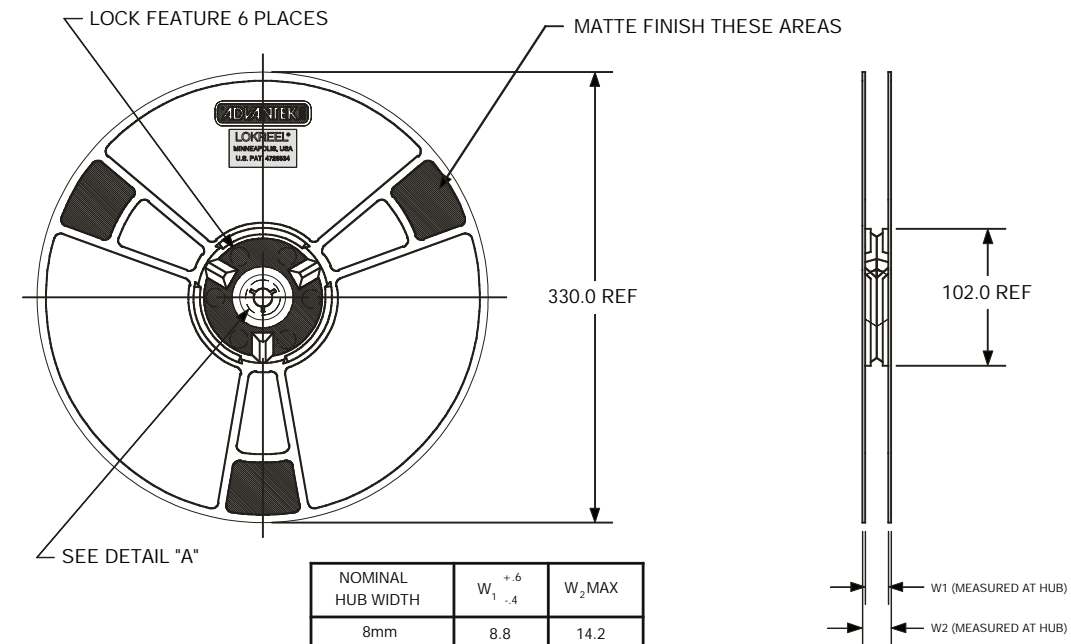
Dimensions (in mm)



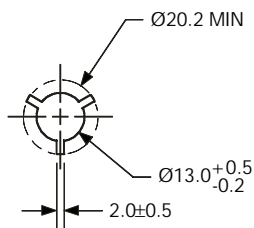
SOIC 8 Dimensions in mm

	min	nom	max
A	1.55	1.63	1.73
A1	0.1	0.15	0.25
A2	1.45	1.48	1.48
D	4.8	4.9	4.98
E	3.81	3.94	3.99
H	5.84	5.99	6.19
L	0.41	0.64	0.89
b	0.36	0.41	0.46
c	0.19	0.2	0.25
e	TYP 1.27		
h	TYP 0.33		
alpha	0°		8°

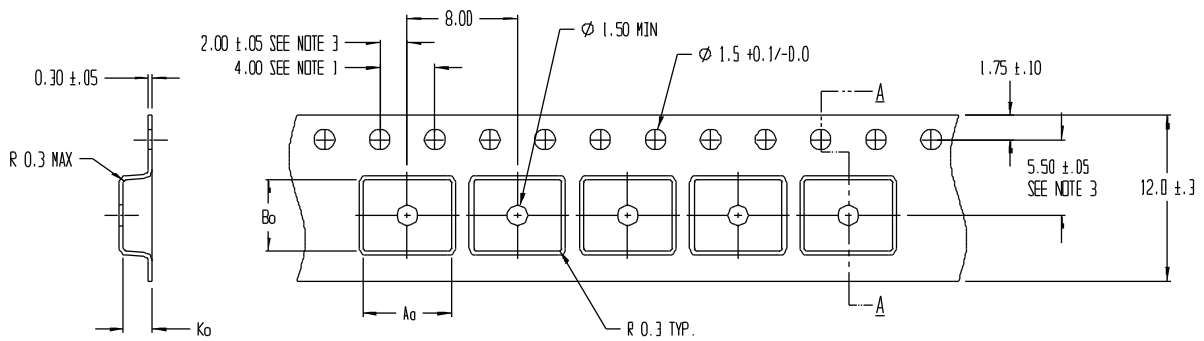
Tape and reel dimensions (in mm)



NOMINAL HUB WIDTH	$W_1 \begin{smallmatrix} +.6 \\ -.4 \end{smallmatrix}$	$W_2 \text{ MAX}$
8mm	8.8	14.2
12mm	12.8	18.2
16mm	16.8	22.2
24mm	24.8	30.2
32mm	32.8	38.2
44mm	44.8	50.2
56mm	56.8	62.2



DETAIL "A"



SECTION A - A

- Notes:
- 1) 10 Sprocket hole pitch cumulative tolerance  $\pm 0.2$  mm
  - 2) Camber in compliance with EIA 481
  - 3) Pocket position relative to sprocket hole measured as true position of pocket, not pocket hole.

**Soldering requirements**

MSL3, 260 °C - IPC/JEDEC J-STD-020

**Ordering information**

<b>Item number</b>	<b>Description</b>	<b>Package type</b>	<b>Package quantity</b>
G2.05.13.000.0	GO 10-SME	Reel	3000
G2.05.13.100.0	GO 10-SME KIT 5P	Blister	5
G2.05.13.300.0	GO 10-SMS SET OF 50 PCS	ESD Bag	50
G2.05.17.000.0	GO 20-SME	Reel	3000
G2.05.17.100.0	GO 20-SME KIT 5P	Blister	5
G2.05.17.300.0	GO 20-SME SET OF 50 PCS	ESD Bag	50