LF03 Series Fluxgate Current Sensor

The LF03 series fluxgate current sensor incorporates dynamic fluxgate detection technology. Its design is simple and practical, with the ability to inhibit high temperature drift. Fluxgate technology makes use of the phenomenon of magnetic core saturation to modulate the measured magnetic field, transforming it into an electric field and thus, completing the magnetic field measurement process.

Features

- Fluxgate technology without hall element
- Output voltage proportional to carried current
- Max. measuring range ±270A (DC or AC peak)
- Compact size for PCB mount
- Unipolar power supply
- RoHs compliance (Lead-Free)

Advantages

- Accurately measures AC, DC and pulse currents
- Very low offset voltage
- Fast response 1μs
- High frequency bandwidth
- Nearly zero offset voltage

Applications

- Solar inverters
- Servo motor drives
- Uninterruptible power supplies
- Battery management systems
- Welding applications

Standards

- IEC 60068-2 Series
- EN 61000-4 Series
- EN 50178: 1998
- IEC 62109: 2010
- IEC 61800-3: 2017
- IEC 61800-5-1: 2016

Absolute maximum ratings

Symbol	Parameter	Min.	Max.	Unit
$V_{DD\ max.}$	Maximum supply voltage (not destructive)		7	V
T_{PC}	Primary conductor temperature		105	°C
T_A	Ambient operating temperature	-40	85	°C
T_S	Storage temperature range	-40	110	°C
$V_{ESD-HBM}$	ESD sensitivity HBM(Human Body Model)	4	8	kV

Stresses above these ratings may cause permanent damage. Exposure to absolute maximum ratings for extended periods may degrade reliability.

Specifications (T_A= 25°C, V_{DD}= 5.0V)

Symbol	Parameter	Test condition	Min.	Typ.	Max.	Unit
V_{DD}	Supply voltage		4.75	5	5.25	V
I_C	Current consumption	I_P=0A without load		$20+I_P/N_S+V_{OUT}/R_L$		mA
I_{PN}	Current nominal measuring range	LF03-50	-150	±50	150	A
		LF03-100	-270	±100	270	
		LF03-150	-270	±150	270	
N_S	Number of secondary turns	LF03-50		1,258		
		LF03-100		1,258		
		LF03-150		1,588		
V_{REF1}	Internal reference voltage	I_P=0A	2.495	2.5	2.505	V
V_{REF2}	External reference voltage		0		4	V
V_{OUT}	Output voltage		0.375		4.625	V
V_0	Zero current output voltage	I_P=0A		V_{REF1} or V_{REF2} *1		V
V_{OE}	Offset voltage	$V_{OE}=V_{OUT}(@I_P=0A)-V_{REF1\ or\ REF2}$	-1		1	mV
T_{CVREF1}	Temperature coefficient of V_{REF1}		-50		50	ppm/°C
T_{CVO}	Temperature coefficient of V_0	@I_P=0A T_A=-40°C ...85°C	-10		10	ppm/°C
T_{RA}	Step response to 10% of I_{PN}			1		µs
T_R	Step response to 90% of I_{PN}			1		µs
BW	Frequency bandwidth(-3dB)			100		kHz

*1 V_O can work in internal reference voltage (V_{REF1}) or external reference voltage (V_{REF2}) mode.

Specifications (T_A= 25°C, V_{DD}= 5.0V)

Symbol	Parameter	Test condition	Min.	Typ.	Max.	Unit
I_{OE}	Offset current referred to primary without magnetic hysteresis	LF03-50	-80		80	mA
		LF03-100	-160		160	
		LF03-150	-240		240	
G	Nominal sensitivity (625mV / I_{PN})	LF03-50		12.5		mV/A
		LF03-100		6.25		
		LF03-150		4.17		
ε_G	Sensitivity error	$\pm I_{PN}$ @T_A =-40°C ...85°C	-0.7		0.7	%/I_{PN}
T_{CG}	Temperature coefficient of G	T_A = -40°C ...85°C	-40		40	ppm/°C
ε_L	Non-linearity error	$\pm I_{PN}$ without offset	-0.1		0.1	%/I_{PN}

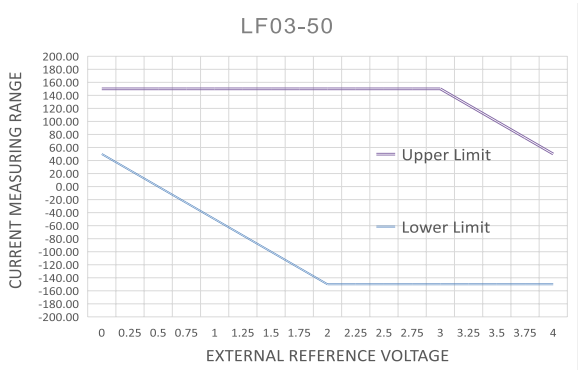
Insulation characteristics

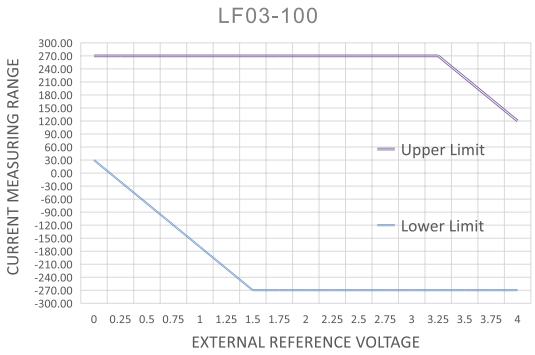
Symbol	Parameter	Value	Unit	Comment
V_D	Insulation voltage for isolation, 50Hz, 1 min	4300	V	
R_{ISO}	Isolation resistance @ DC 500V	>500	MΩ	
D-CLE	Clearance	12.9	mm	Shortest distance through air
D-CRD	Creepage distance	12.9	mm	Shortest path along body

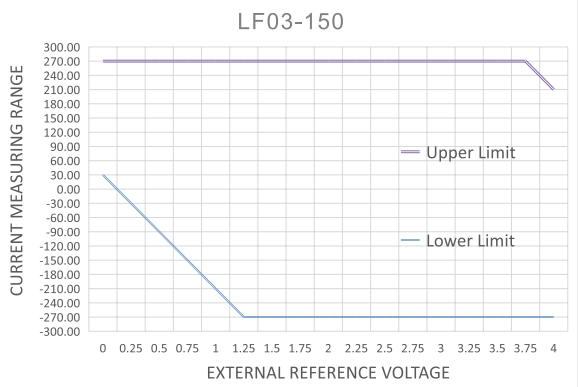
General characteristics

Symbol	Parameter	Value	Unit	Comment
m-HSE	Housing material	V0		Flame retardant UL 94
m	Mass	35	grams	

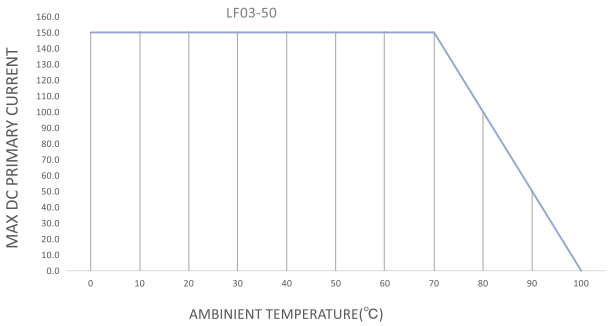
Current measurement range versus external reference voltage

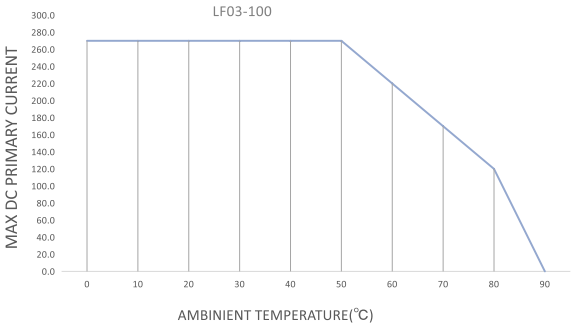


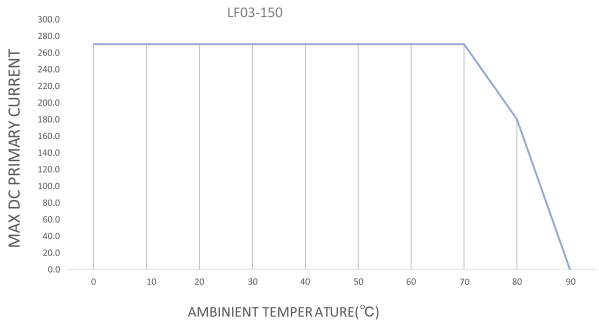




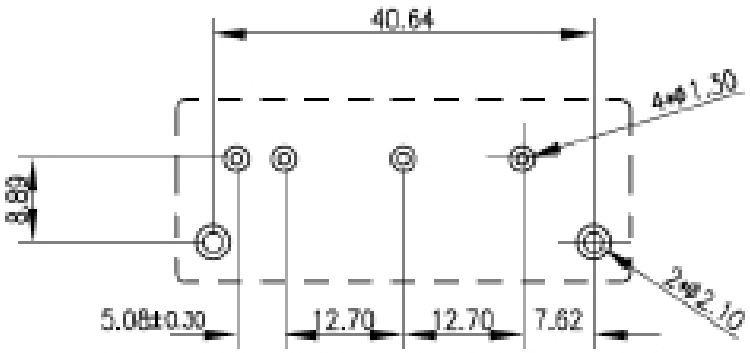
Max. DC primary current versus ambient temperature



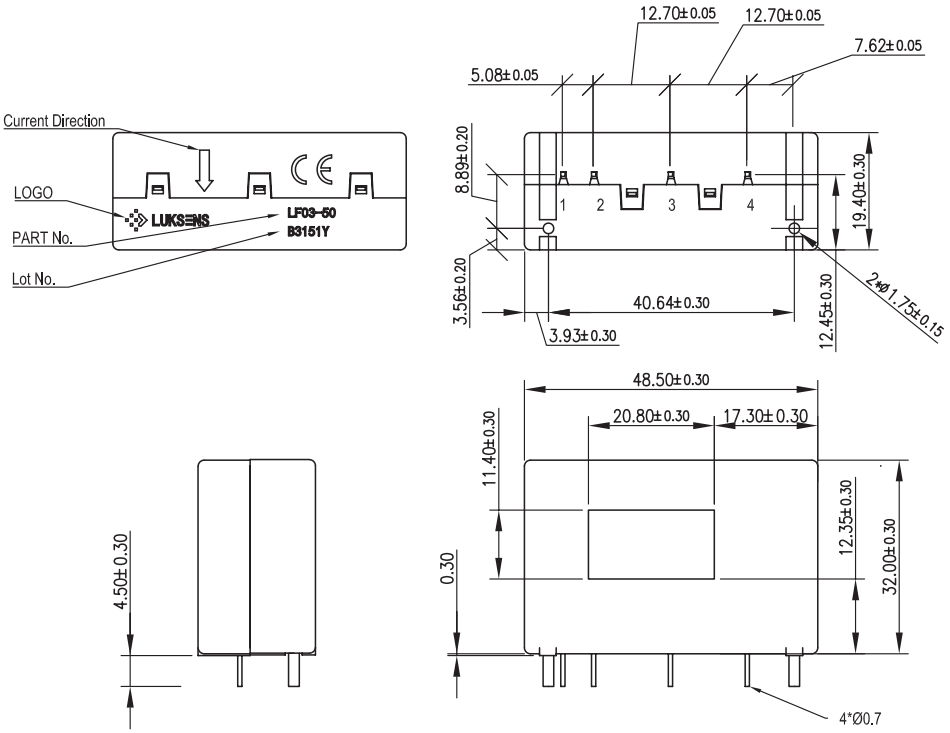




PCB footprint (mm, general tolerance ±0.05mm)



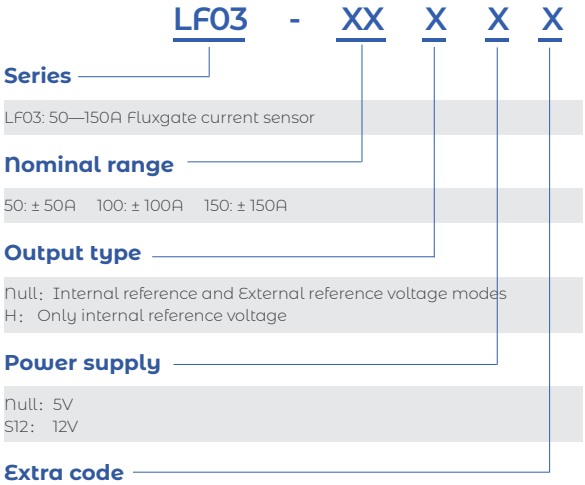
Dimension (mm)



Pin	Symbol
1	V_{REF} *1
2	V_{OUT}
3	GND
4	V_{DD}

*1 V_{REF} can be used in internal reference or external reference voltage mode

Name Guide Description



Notes

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Safety and Environment

The product is to be installed by manufacturer trained personnel or competent person trained in accordance with manufacturer installation instructions.
With respect to applicable standards IEC 61010-1/ EN 61010-1 *safety requirements for electrical equipment for measurement, control and laboratory use part 1 general requirements*, the product should be used in limited energy secondary circuits.

Risk of electrical shock

Certain parts of the module can carry hazardous voltage during the operation process of the product because hazardous live voltage of primary conductor, power supply occurs, injury and/or serious damage will be caused if this warning is ignored.
Conducting parts must be inaccessible after installation of the product. Additional protection including shield or protective housing could be used according to IEC 60664 Insulation coordination for equipment within low-voltage supply systems.
Disconnection of the main supply will protect against possible injury and serious damage.

ESD protection

Damage from an ESD event will occur if the personnel is not well grounded when handling.

Important notice

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