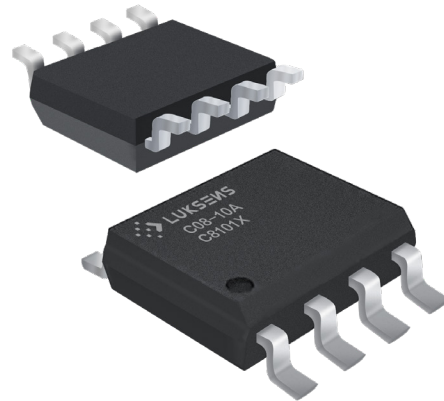


C08K Series Linear Hall Effect Current Sensor IC

Fully Integrated, 0.75 mΩ Conductor, 3 kVrms Isolation, 400 KHz High Bandwidth

The C08K is a high-performance, fully integrated Hall-effect current sensor employing a differential architecture to effectively suppress external common-mode magnetic interference. It provides a pair of differential outputs (OUT and REF) to maximize the signal-to-noise ratio (SNR) in noisy environments, while integrated temperature and stress compensation ensures high accuracy over a temperature range of -40 °C to 125 °C.

The C08K features a 400 KHz (3 dB) bandwidth, 3 kVrms isolation, and an ultra-low 750 μΩ primary resistance, optimized for the high-frequency, fast switching requirements of SiC and GaN-based power electronics. It provides a robust and efficient solution for next-generation high-density electric vehicle chargers, photovoltaic inverters, and precision motor control.



Features

- Factory trimmed sensitivity sensor
- Flexible supply voltage with factory selectable 5 V or 3.3 V mode
- Superior temperature stability and linearity
- Compact size for applications with limited space
- RoHS compliance (Lead-Free)

Applications

- Motor control
- Solar inverter
- Smart battery junction boxes
- Industrial power supply
- DCDC
- Charging pile

Advantages

- Accurately measures AC, DC and pulse currents
- Fast response 1.5 μs, minimal noise output
- No insertion losses
- Differential common-mode rejection circuitry eliminates errors from external magnetic fields
- Very low thermal drift for wide temperature range
- Ultra-high bandwidth of 400 KHz (-3 dB)

Standards

- IEC 61800-5-1
- IEC 62109-1: 2010
- EN 62638

Absolute maximum ratings

Symbol	Parameter	Min.	Max.	Unit
$V_{CC\text{ max.}}$	Maximum supply voltage (not destructive)	-0.3	12	V
T_A	Ambient operating temperature	-40	125	°C
$T_{J\text{ max.}}$	Maximum junction temperature		150	°C
T_S	Storage temperature range	-40	150	°C
$V_{ESD-HBM}$	ESD sensitivity Human-Body model, JEDEC JS-001	-8	8	kV
$V_{ESD-CDM}$	ESD sensitivity Charged-Device model, JEDEC JS-002	-2	2	kV

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

Common operating characteristics ($T_A = 25\text{ °C}$, $V_{CC} = 3.3\text{ V}$)

Symbol	Parameter	Test condition	Min.	Typ.	Max.	Unit
V_{CC}	Supply voltage	C08K-XXA33	3.0	3.3	3.6	V
I_C	Current consumption	$I_P = 0\text{ A}$ without load, $V_{CC} = 3.3\text{ V}$		22		mA
C_{BYPASS}	Supply bypass capacitor	V_{CC} to GND	100			nF
T_{POD}	Power-On Time	V_{CC} rises to $> U_{VLO}$ and continues for a period until the power is on.	0.1	1		ms
U_{VLO}	Undervoltage lockout	V_{CC} falling		2.65		V
$U_{VLO-HYS}$	Undervoltage lockout hysteresis			0.15		V
T_{VLO-RD}	Undervoltage lockout release delay	V_{CC} rising		940		μs
T_{VLO-ED}	Undervoltage lockout entry delay	V_{CC} falling		80		μs
$V_{CC-CLAMP}$	Overvoltage clamp			12.7		V
R_L	Output load resistance	V_{OUT} to GND	10			kΩ
C_L	Output load capacitance	V_{OUT} to GND		0.47	1	nF
R_{L-VREF}	V_{REF} load resistance	V_{REF} to GND	10			kΩ
C_{L-VREF}	V_{REF} load capacitance	V_{REF} to GND		2.2	4.7	nF
R_{PRI}	Primary conductor resistance	$T_A = 25\text{ °C}$		0.75		mΩ
$I_{P-MAX25}$	Maximum continuous input current	$T_A = 25\text{ °C}$, 2 layer 4.5 ounce PCB			62	A
$I_{P-MAX125}$	Maximum continuous input current	$T_A = 85\text{ °C}$, 2 layer 4.5 ounce PCB			50	A

Common operating characteristics ($T_A = 25\text{ }^{\circ}\text{C}$, $V_{CC} = 3.3\text{ V}$)

Symbol	Parameter	Test condition	Min.	Typ.	Max.	Unit
Output signal characteristics						
V_{OOR}	Output Operating Range		0.33		2.97	V
V_{SAT-H}	High-level saturation voltage	$I_P > 1.2 \cdot I_{PN}$, $V_{SAT-H} = V_{CC} - V_{OUT}$ $R_L = 10\text{ k}\Omega$ to GND		0.05		V
V_{SAT-L}	Low-level saturation voltage	$I_P < -1.2 \cdot I_{PN}$, $V_{SAT-L} = V_{OUT}$ $R_L = 10\text{ k}\Omega$ to V_{CC}		0.05		V
I_{OUT_SOURCE}	Output current limit	V_{OUT} shorted to GND		39		mA
I_{OUT_SINK}	Output current limit	V_{OUT} shorted to V_{CC}		37		mA
V_{REF}	Internal reference voltage	$I_P = 0\text{ A}$, $V_{CC} = 3.3\text{ V}$	1.646	1.650	1.654	V
I_{REF_SOURCE}	Reference current limit	V_{REF} shorted to GND		28		mA
I_{REF_SINK}	Reference current limit	V_{REF} shorted to V_{CC}		28		mA
ϵ_L	Non-linearity error	$\pm I_{PN}$ without offset		± 0.2		% / I_{PN}
IND	Input-referenced noise density	$V_{CC} = 3.3\text{ V}$, $C_L = 0.47\text{ nF}$		240		$\mu\text{A} / \sqrt{\text{Hz}}$
$CMFR$	Common-mode field rejection	$CMFR = (\Delta V_{OUT} / \Delta B) / G$, DC to 1 kHz.		0.5		mA / G
$CMTI$	Common-mode transient immunity	$V_{CM} = 1000\text{ V}$, $\Delta V_{OUT} > 100\text{ mV}$ and duration $> 1\text{ }\mu\text{s}$		150		V / ns
$PSRR_G$	Power supply rejection ratio sensitivity	DC to 1 kHz, 100 mV peak ripple around V_{CC} , $I_P = I_{PN}$, $20\log(\Delta G / G / \Delta V_{CC} / V_{CC})$		-25		dB
$PSRR_{VOE}$	Power supply rejection ratio offset	DC to 1 kHz, 100 mV peak ripple around V_{CC} , $I_P = 0$, $20\log(\Delta V_{OE} / \Delta V_{CC})$		-50		dB
BW	Frequency bandwidth (-3 dB)			400		kHz
T_{D90}	V_{OUT} delay time to 90% I_{PN}	I_P step $\leq 100\text{ ns}$		1.5		μs
T_{D10}	V_{OUT} delay time to 10% I_{PN}	I_P step $\leq 100\text{ ns}$		0.2		μs
T_R	V_{OUT} rise time (10% to 90%)	I_P step $\leq 100\text{ ns}$		1.2		μs
T_F	V_{OUT} fall time (90% to 10%)	I_P step $\leq 100\text{ ns}$		1.2		μs

C08K-10A33 characteristics ($T_A = 25\text{ }^{\circ}\text{C}$, $V_{CC} = 3.3\text{ V}$) *1

Symbol	Parameter	Test condition	Min.	Typ.	Max.	Unit
I_{PN}	Current nominal measuring range		-10		10	A
G	Nominal sensitivity			132		mV / A
V_{OE}	Offset voltage	$V_{OE} = V_{OUT} - V_{REF}$ at $I_P = 0\text{ A}$	-5		5	mV
V_O	V_{OUT} at $I_P = 0\text{ A}$	$I_P = 0\text{ A}$	1.646	1.650	1.654	V
T_{CVO}	Temperature coefficient of V_O at $I_P = 0\text{ A}$ $T_A = -40\text{ }^{\circ}\text{C} \dots 125\text{ }^{\circ}\text{C}$		-5		5	mV
T_{CC}	Temperature coefficient of G	$T_A = -40\text{ }^{\circ}\text{C} \dots 125\text{ }^{\circ}\text{C}$	-1.5		1.5	%
ϵ_{TOT}	Total Output Error	Percentage of I_{PN}	-3	± 2	3	%

1. Ensure T_J remains below $T_{J\text{max}}$ when operating at higher I_P and T_A .

C08K-20A33 characteristics ($T_A = 25\text{ }^{\circ}\text{C}$, $V_{CC} = 3.3\text{ V}$) *1

Symbol	Parameter	Test condition	Min.	Typ.	Max.	Unit
I_{PN}	Current nominal measuring range		-20		20	A
G	Nominal sensitivity			66		mV / A
V_{OE}	Offset voltage	$V_{OE} = V_{OUT} - V_{REF}$ at $I_P = 0\text{ A}$	-5		5	mV
V_O	V_{OUT} at $I_P = 0\text{ A}$	$I_P = 0\text{ A}$	1.646	1.650	1.654	V
T_{CVO}	Temperature coefficient of V_O at $I_P = 0\text{ A}$ $T_A = -40\text{ }^{\circ}\text{C} \dots 125\text{ }^{\circ}\text{C}$		-5		5	mV
T_{CC}	Temperature coefficient of G	$T_A = -40\text{ }^{\circ}\text{C} \dots 125\text{ }^{\circ}\text{C}$	-1.5		1.5	%
ϵ_{TOT}	Total output error	Percentage of I_{PN}	-3	± 2	3	%

1. Ensure T_J remains below $T_{J\text{max}}$ when operating at higher I_P and T_A .

C08K-30A33 characteristics ($T_A = 25\text{ }^{\circ}\text{C}$, $V_{CC} = 3.3\text{ V}$) *1

Symbol	Parameter	Test condition	Min.	Typ.	Max.	Unit
I_{PN}	Current nominal measuring range		-30		30	A
G	Nominal sensitivity			44		mV / A
V_{OE}	Offset voltage	$V_{OE} = V_{OUT} - V_{REF}$, at $I_P = 0\text{ A}$	-5		5	mV
V_O	V_{OUT} at $I_P = 0\text{ A}$	$I_P = 0\text{ A}$	1.646	1.650	1.654	V
T_{CVO}	Temperature coefficient of V_O at $I_P = 0\text{ A}$ $T_A = -40\text{ }^{\circ}\text{C} \dots 125\text{ }^{\circ}\text{C}$		-5		5	mV
T_{CG}	Temperature coefficient of G	$T_A = -40\text{ }^{\circ}\text{C} \dots 125\text{ }^{\circ}\text{C}$	-1.5		1.5	%
ϵ_{TOT}	Total output error	Percentage of I_{PN}	-3	± 2	3	%

1. Ensure T_J remains below $T_{J\text{ max}}$, when operating at higher I_P and T_A .

C08K-40A33 characteristics ($T_A = 25\text{ }^{\circ}\text{C}$, $V_{CC} = 3.3\text{ V}$) *1

Symbol	Parameter	Test condition	Min.	Typ.	Max.	Unit
I_{PN}	Current nominal measuring range		-40		40	A
G	Nominal sensitivity			33		mV / A
V_{OE}	Offset voltage	$V_{OE} = V_{OUT} - V_{REF}$, at $I_P = 0\text{ A}$	-5		5	mV
V_O	V_{OUT} at $I_P = 0\text{ A}$	$I_P = 0\text{ A}$	1.646	1.650	1.654	V
T_{CVO}	Temperature coefficient of V_O at $I_P = 0\text{ A}$ $T_A = -40\text{ }^{\circ}\text{C} \dots 125\text{ }^{\circ}\text{C}$		-5		5	mV
T_{CG}	Temperature coefficient of G	$T_A = -40\text{ }^{\circ}\text{C} \dots 125\text{ }^{\circ}\text{C}$	-1.5		1.5	%
ϵ_{TOT}	Total output error	Percentage of I_{PN}	-3	± 2	3	%

1. Ensure T_J remains below $T_{J\text{ max}}$, when operating at higher I_P and T_A .

C08K-50A33 characteristics ($T_A = 25\text{ °C}$, $V_{CC} = 3.3\text{ V}$) ^{*1}

Symbol	Parameter	Test condition	Min.	Typ.	Max.	Unit
I_{pN}	Current nominal measuring range		-50		50	µA
G	Nominal sensitivity			26.4		mV / µA
V_{OE}	Offset voltage	$V_{OE} = V_{OUT} - V_{REF}$ at $I_p = 0\text{ A}$	-5		5	mV
V_O	V_{OUT} at $I_p = 0\text{ A}$	$I_p = 0\text{ A}$	1.646	1.650	1.654	V
T_{cvo}	Temperature coefficient of V_O at $I_p = 0\text{ A}$ $T_A = -40\text{ °C} \dots 125\text{ °C}$		-5		5	mV
T_{cc}	Temperature coefficient of G	$T_A = -40\text{ °C} \dots 125\text{ °C}$	-1.5		1.5	%
ϵ_{TOT}	Total output error	Percentage of I_{pN}	-3	±2	3	%

1. Ensure T_J remains below $T_{J\text{ max}}$ when operating at higher I_p and T_A .

C08K-60A33 characteristics ($T_A = 25\text{ °C}$, $V_{CC} = 3.3\text{ V}$) ^{*1}

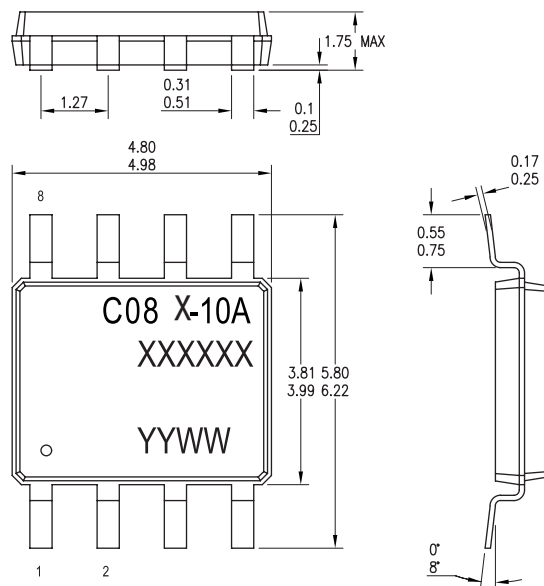
Symbol	Parameter	Test condition	Min.	Typ.	Max.	Unit
I_{pN}	Current nominal measuring range		-60		60	µA
G	Nominal sensitivity			22		mV / µA
V_{OE}	Offset voltage	$V_{OE} = V_{OUT} - V_{REF}$ at $I_p = 0\text{ A}$	-5		5	mV
V_O	V_{OUT} at $I_p = 0\text{ A}$	$I_p = 0\text{ A}$	1.646	1.650	1.654	V
T_{cvo}	Temperature coefficient of V_O at $I_p = 0\text{ A}$ $T_A = -40\text{ °C} \dots 125\text{ °C}$		-5		5	mV
T_{cc}	Temperature coefficient of G	$T_A = -40\text{ °C} \dots 125\text{ °C}$	-1.5		1.5	%
ϵ_{TOT}	Total output error	Percentage of I_{pN}	-3	±2	3	%

1. Ensure T_J remains below $T_{J\text{ max}}$ when operating at higher I_p and T_A .

Insulation characteristics

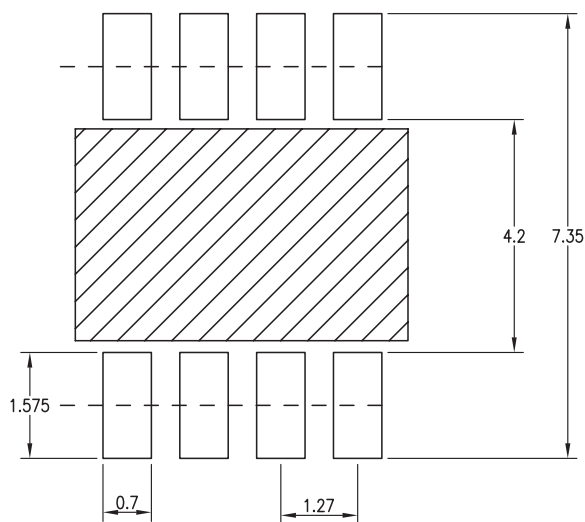
Symbol	Parameter	Value	Unit	Comment
V_{ISO}	Dielectric Strength Test Voltage	3000	V _{RMS}	Agency type-tested for 60 seconds per UL standard 60950-1, 1st Edition
V_{SURGE}	Impulse withstand voltage 1.2 / 50 µs	6000	V	According to IEC 61000-4-5, tested in air, ±5 pulses, 2 pulses / min, 1.2 µs (rise) / 50 µs (width).
I_{SURGE}	Impulse withstand current 8 / 20 µs	8	kA	
V_{WFSI}	Basic isolation	600	V _{peak} / V _{DC}	According to UL / IEC 62368-1: 2018
		424	V _{RMS}	
V_{WVRI}	Reinforced (double) isolation	417	V _{peak} / V _{DC}	According to UL / IEC 62368-1: 2018
		214	V _{RMS}	
CTI	Comparative tracking index	≥ 600	V	
CMTI	Common-mode transient immunity	150	V / ns	
D-CLE	Clearance	4	mm	Shortest distance through air
D-CRD	Creepage distance	4	mm	Shortest distance through body

Dimension (mm)



PCB footprint (mm, general tolerance: ± 0.05 mm)

PCB Layout

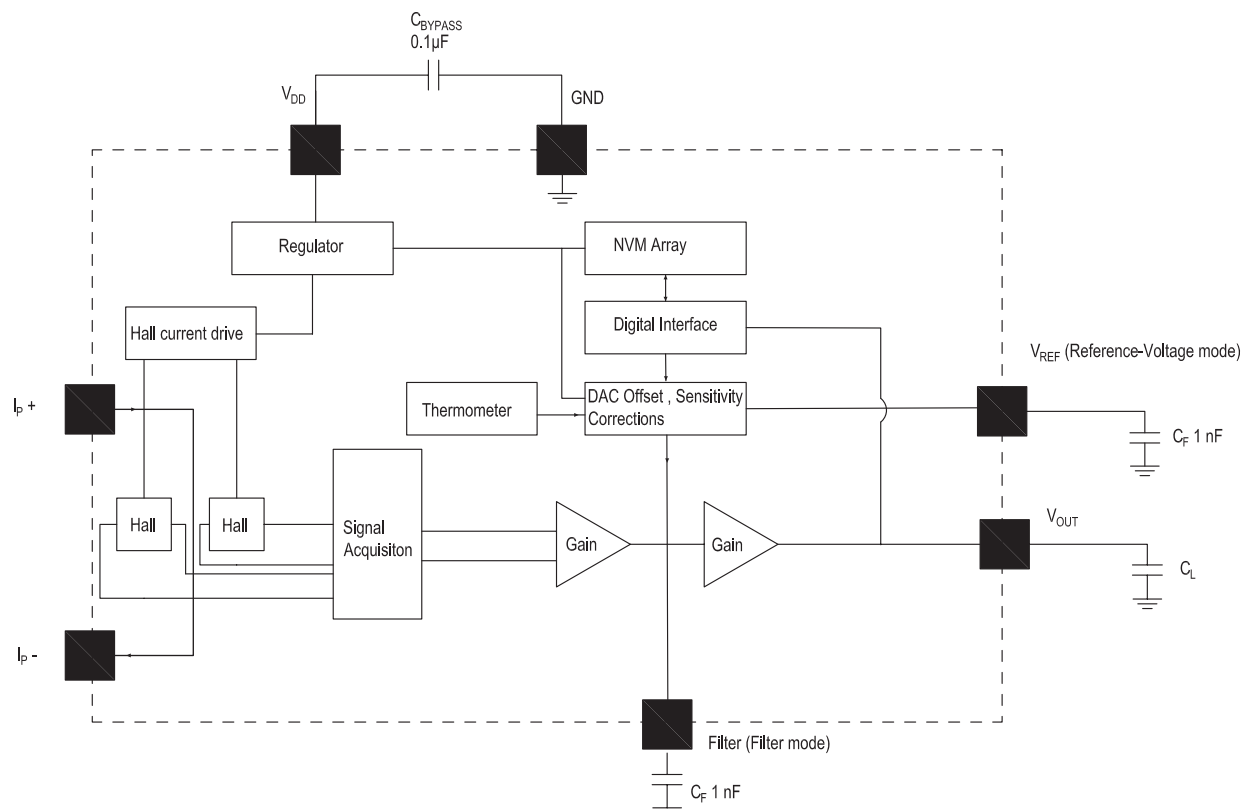


Note:

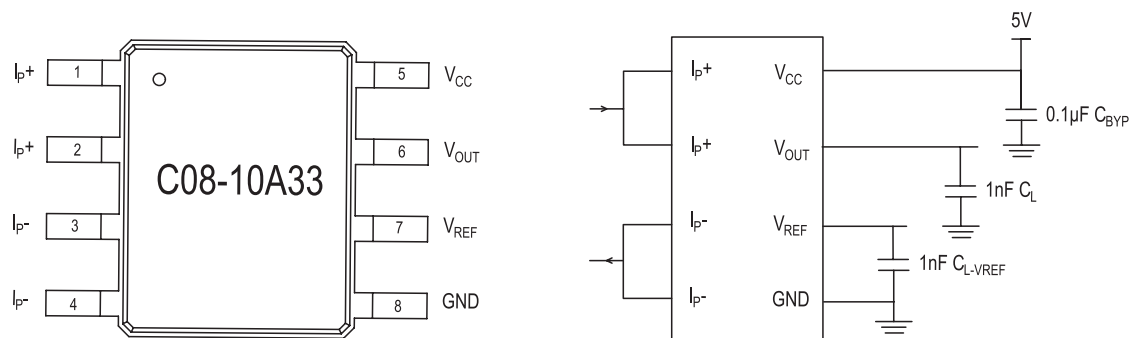
Maximum soldering temperature 260 °C, 10 s

Maximum PCB thickness 2.4 mm

Function block diagram

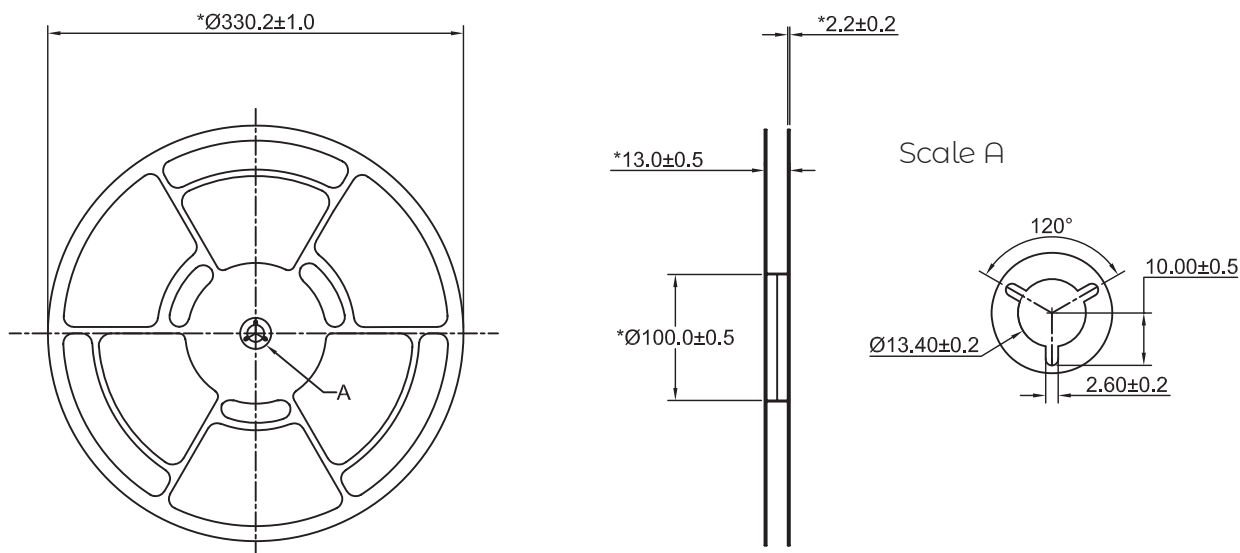


Pin-out diagram

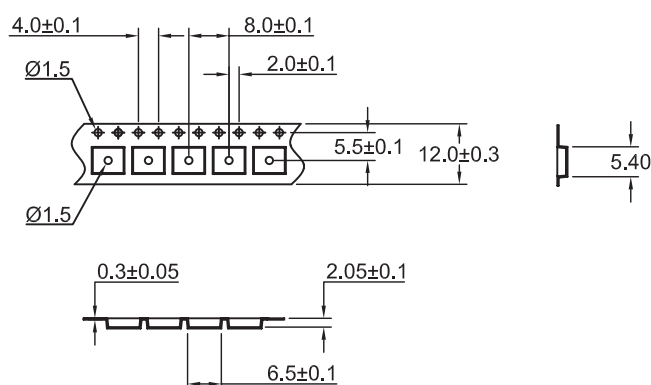


Packaging information

Reel size



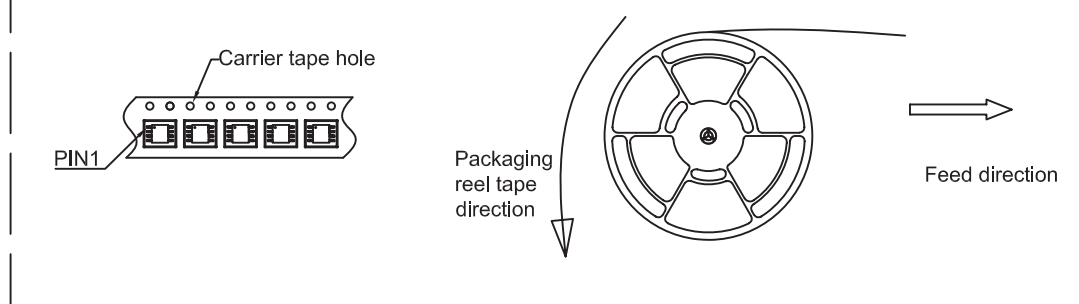
Tape size



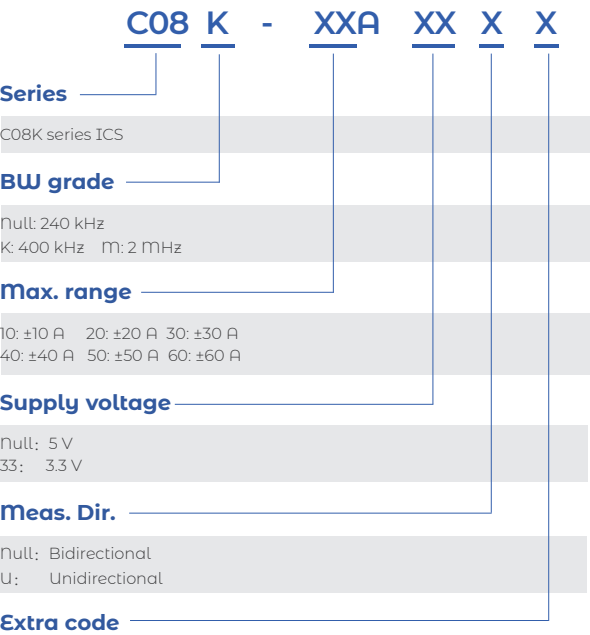
Notes

1. All measurements are in mm.
2. Pay special attention to sizes marked with (*); these are key dimensions.

The position of chip PIN1 in the carrier tape



Name Guide Description



Selection guide

Part Number	Package	Moisture Sensitivity Level	Nominal Range (A)	Sensitivity (mV / A)	SPQ (Standard Pack Quantity)
C08K-10A33	SOIC8	MSL3	±10 A	132	Tape and reel, 3000 pieces / reel
C08K-20A33	SOIC8	MSL3	±20 A	66	Tape and reel, 3000 pieces / reel
C08K-30A33	SOIC8	MSL3	±30 A	44	Tape and reel, 3000 pieces / reel
C08K-40A33	SOIC8	MSL3	±40 A	33	Tape and reel, 3000 pieces / reel
C08K-50A33	SOIC8	MSL3	±50 A	26.4	Tape and reel, 3000 pieces / reel
C08K-60A33	SOIC8	MSL3	±60 A	22	Tape and reel, 3000 pieces / reel

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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