

CC6926

High-Performance, Hall-Effect Current Sensor 50A/100A/150A/200A/300A

FEATURES

- ◆ Built-in VREF Output, External VREF Input:
 - Built-in VREF Output: V_{OE} is programmable to $< 5\text{mV}$
 - External VREF Input: V_{OUT} quiescent output voltage is consistent with it
- ◆ Measuring current range: 50A, 100A, 150A, 200A, 300A
- ◆ The overcurrent point VOC is user-set, with a low latency error alarm output xFAULT
- ◆ Low noise, single-ended analogue output
- ◆ Less power loss, internal conductor's resistance is $30\mu\Omega$
- ◆ High bandwidth, up to 250kHz, 1.2us output rise time in response to step input current
- ◆ Room temperature error = 1%, Sensitivity Error = $\pm 2.5\%$
- ◆ Good temperature stability, using Hall signal amplification circuit and temperature compensation circuit
- ◆ Differential Hall structure, strong resistance to external magnetic interference
- ◆ Strong resistance to mechanical stress, magnetic parameters will not be offset by external pressure
- ◆ ESD (HBM) 4kV, ESD(CDM)1kV, LU 200mA

APPLICATIONS

- ◆ Motor Controller
- ◆ Load Monitoring System
- ◆ Switch-Mode Power Supplies
- ◆ Overcurrent Fault Protection
- ◆ PV and Energy Storage

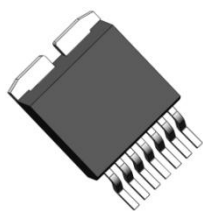


Certificate Number:
TUV MARK: R50590289



Certificate Number:
E526186-A6002-UL

PRODUCT PACKAGE DRAWING



front view



back view

GENERAL DESCRIPTION

The CC6926 device is a high-performance Hall-effect current sensor that can measure DC or AC current more efficiently, and has the advantages of high accuracy, excellent linearity and temperature stability in industrial, consumer, and communication equipment.

The CC6926 device consists of a high-precision, low-noise linear Hall integrated circuit and a low-resistance main current conductor. Ultra-low impedance conductor of $30\mu\Omega$ leads minimize power loss and heat dissipation. Otherwise, its internal inherent insulation provides $5000V_{RMS}$ (AC) insulation withstand voltage between the input current path and the secondary circuit. The sensor adopts linear Hall sensor temperature compensation technology, which has high temperature stability characteristics.

The differential common-mode suppression circuit integrated in CC6926 can make the chip output unaffected by external interference magnetic signals. The integrated dynamic offset elimination circuit makes the sensitivity of the chip independent of external stress and chip packaging stress.

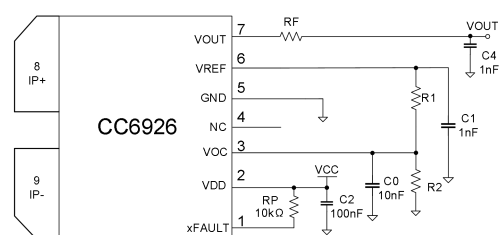
Another advantage of the CC6926 is the fast fault monitoring function of the open-drain output, which is ideal for overcurrent fault detection. This feature is flexible in fault detection and greatly simplifies board application layout. Reference voltage (VREF) allows differential measurements as well as a reference voltage (VOC) for setting overcurrent fault thresholds

CC6926 is available in TO263-7 package. It's operating ambient temperature range is $-40\sim 125^{\circ}\text{C}$. Comply with RoHS requirements.

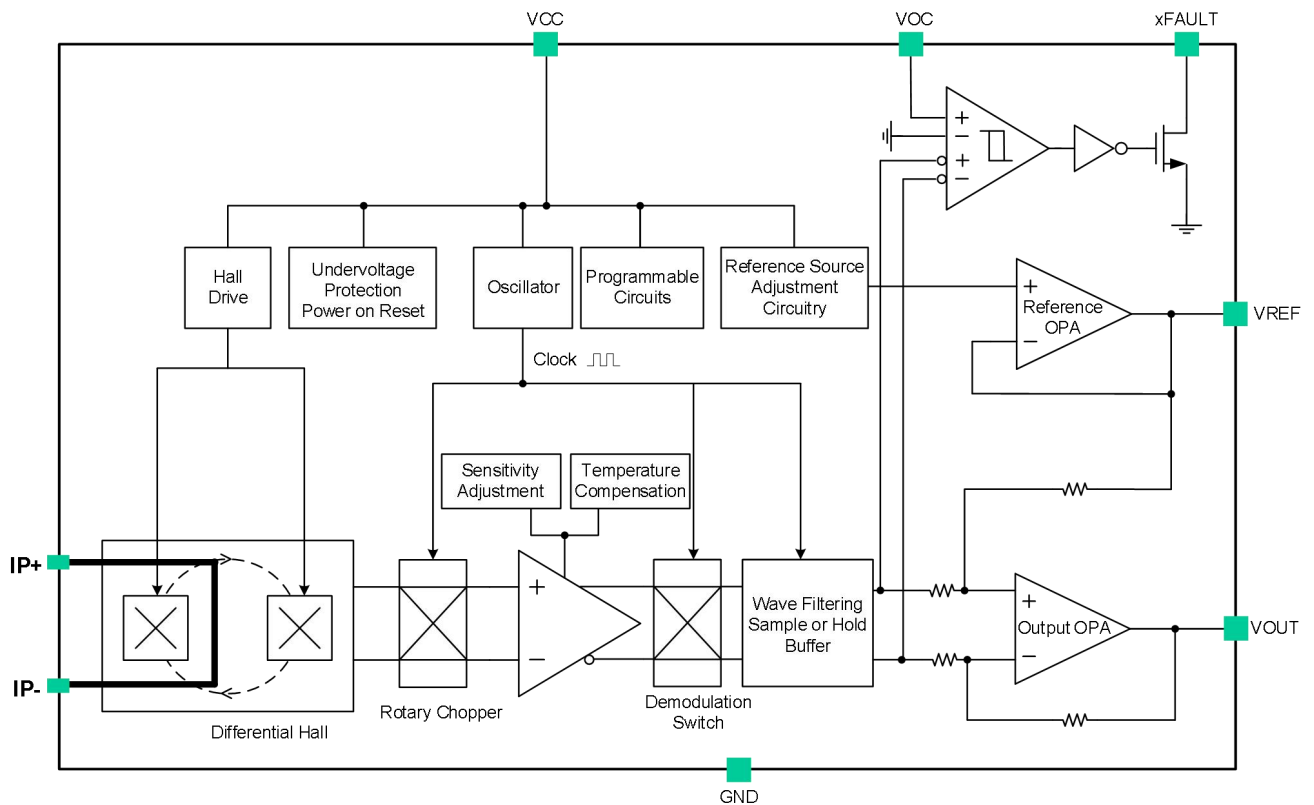
DEVICE INFORMATION

Part Number	Package	Body Size (TYP.)
CC6926	TO263-7	10.0mm×9.2mm

TYPICAL APPLICATION



FUNCTION BLOCK DIAGRAM

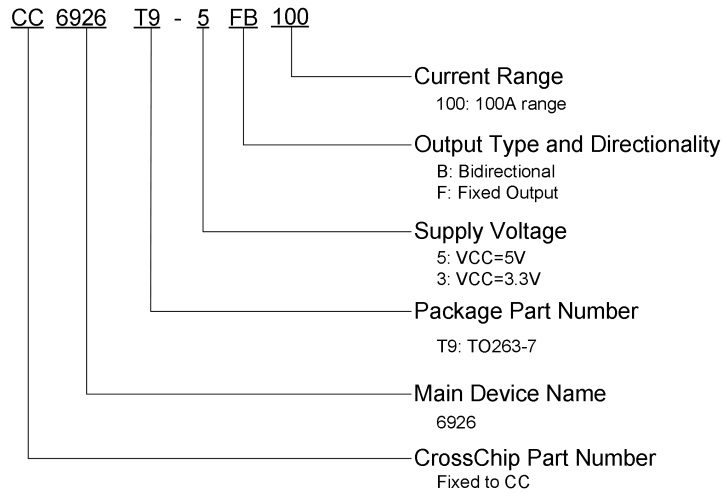


ORDERING INFORMATION

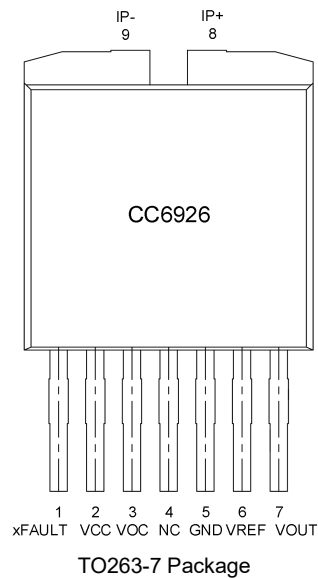
Part No.	SENS. (mV/A)	Package	Packing Form
CC6926T9-5FB050	40	TO263-7	Reel, 800 pcs/reel
CC6926T9-5FB100	20	TO263-7	Reel, 800 pcs/reel
CC6926T9-5FB150	13.33	TO263-7	Reel, 800 pcs/reel
CC6926T9-5FB200	10	TO263-7	Reel, 800 pcs/reel
CC6926T9-5FB300	6.67	TO263-7	Reel, 800 pcs/reel
CC6926T9-3FB050	26.4	TO263-7	Reel, 800 pcs/reel
CC6926T9-3FB100	13.2	TO263-7	Reel, 800 pcs/reel
CC6926T9-3FB150	8.8	TO263-7	Reel, 800 pcs/reel
CC6926T9-3FB200	6.6	TO263-7	Reel, 800 pcs/reel
CC6926T9-3FB300	4.4	TO263-7	Reel, 800 pcs/reel
CC6926T9-XXX (Note 1)	-	TO263-7	Reel, 800 pcs/reel

Note 1: When XXX is within the range of 300A, it can be customized according to customer needs.

PRODUCTION NAME DEFINITION



PINOUT DIAGRAM



PIN Name	PIN NO.	Description
xFAULT	1	Overcurrent sign pin, Open-drain output (low active) connect a 10kΩ pull-up resistor to the 5V power supply; Ground is recommended when this function is not used
VDD	2	Supply voltage
VOC	3	Define the overcurrent fault threshold; Ground is recommended when this function is not used
NC	4	Hang in the air, no internal connection
GND	5	Ground
VREF	6	Reference input and output
VOUT	7	Analog voltage output
IP+	8	Current sampled +
IP-	9	Current sampled -

ABSOLUTE MAXIMUM RATINGS

Parameter	Symbol	Value	Unit
Power Supply	V_{CC}	6.5	V
Output Voltage	V_{OUT} , V_{REF} , $xFAULT$	$-0.3 \sim V_{CC} + 0.3$	V
Input Voltage	V_{OC}	$-0.3 \sim V_{CC} + 0.3$	V
Input Current Peak Current (3 s)	I_{PEAK}	500	A
Input Current Continuous Current	I_{CON}	100	A
Operating Ambient Temperature	T_A	$-40 \sim 125$	$^{\circ}C$
Junction Temperature	T_J	165	$^{\circ}C$
Storage Temperature	T_S	$-55 \sim 150$	$^{\circ}C$
Electrostatic Discharge Voltage	HBM	4	kV
	CDM	1	kV
Latch-up	LU	200	mA

Note: Stresses beyond those listed under *Absolute Maximum Ratings* may cause permanent damage to the device. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability.

ISOLATION CHARACTERISTICS

Parameter	Symbol	Test Conditions	Value	Unit
Distance Through Insulation	DTI	Minimum internal distance through insulation	150	μm
Dielectric strength test voltage	V_{ISO}	50/60Hz, 1min	5000	V_{RMS}
		$t = 1s$	6000	
Working Voltage for Basic Insulation	V_{WVBI}	Basic insulation TUV mark: EN IEC 62368-1:2020+A11:2020 UL 62368-1, 3rd Ed, 2021-10-22 CB Scheme: IEC 62368-1: 2018	2121	V_{PK} or V_{DC}
			1500	V_{RMS}
Working Voltage for Reinforced Insulation	V_{WVRI}	Reinforced insulation TUV mark: EN IEC 62368-1:2020+A11:2020 UL 62368-1, 3rd Ed, 2021-10-22 CB Scheme: IEC 62368-1: 2018	1060	V_{PK} or V_{DC}
			750	V_{RMS}
Clearance	D_{cl}	Minimum distance through air from IP leads to signal leads	8.3	mm
Creepage	D_{cr}	Minimum distance along package body from IP leads to signal leads	8.3	mm
Maximum Surge Isolation Voltage	V_{IOSM}	IEC 61000-4-5 Tested in air, ± 5 pulses, 2 times/min 1.2 μs (rise) / 50 μs (width)	12	kV
Surge Current	I_{SURGE}	IEC 61000-4-5 Tested in air, ± 5 pulses, 1 times/min 8 μs (rise) / 20 μs (width)	40	kA

ELECTRICAL PARAMETERS ($V_{CC}=5V/3.3V$, $C_{OUT}=1nF$, $C_{REF}=1nF$, $T_A=25^{\circ}C$, unless otherwise specified)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Supply Section, VCC=5V						
Power Supply	V_{CC}	5V nominal supply voltage series	4.5	5	5.5	V
Undervoltage Protection Release Threshold	UV	$V_{CC}=5V$, $V_{CC}>UV$, undervoltage protection release		4.15		V
Undervoltage Protection Hysteresis Voltage	UV_{HYS}	$V_{CC} < UV - UV_{HYS}$, lock the chip		0.2		V
Supply Current	I_{CC}		18	22	28	mA
Power-on Reset Time	T_{POR}	$V_{CC}>UV$ to V_{REF} start		22		us
Supply Section, VCC=3.3V						
Power Supply	V_{CC}	3.3V nominal supply voltage series	3	3.3	3.6	V
Undervoltage Protection Release Threshold	UV	$V_{CC}=3.3V$, $V_{CC}>UV$, Undervoltage protection release		2.85		V
Undervoltage Protection Hysteresis Voltage	UV_{HYS}	$V_{CC} < UV - UV_{HYS}$, lock the chip		0.2		V
Supply Current	I_{CC}		16	19	25	mA
Power-on Reset Time	t_{POR}			22		us
Output Section, VOUT						
VOUT Filter Capacitors	C_{OUT}	VOUT to GND		1	2.2	nF
VOUT Load Resistance	R_{L_OUT}	VOUT to GND	4.7			k Ω
VOUT High Saturation Voltage	V_{SATH}	$V_{SATH} = V_{CC} - V_{OUT}$, $R_L = 10k\Omega$ to GND		0.1	0.2	V
VOUT Low Saturation Voltage	V_{SATL}	$V_{SATL} = V_{OUT}$, $R_L = 10k\Omega$ to VCC		0.1	0.2	V
VOUT Output Source Current	I_{OUT_SOURCE}	VOUT to GND short-circuit current		8		mA
VOUT Output Sink Current	I_{OUT_SINK}	VOUT to VCC short-circuit current		28		mA
Signal Chain -3dB Bandwidth	f_{-3dB}	Small signal -3dB bandwidth		250		kHz
Signal Response Time	t_{RES}	Input current up to 90% to VOUT 90%		1.2	2	us
Reference Section, VREF						
VREF Filter Capacitors	C_{REF}	VREF to GND		1	2.2	nF
VREF Load Resistance	R_{L_REF}	VREF to GND	4.7			k Ω
VREF Output Voltage	V_{REF}	5V nominal supply voltage series	2.49	2.5	2.51	V
		3.3V nominal supply voltage series	1.64	1.65	1.66	V
VREF Input Voltage	V_{REF_IN}	VREF Input voltage range	$0.1 \times V_{CC}$		$0.9 \times V_{CC}$	V
VREF Output Source Current	I_{REF_SOURCE}	VREF to GND short-circuit current		2.8		mA
VREF Output Sink Current	I_{REF_SINK}	VREF to VCC short-circuit current		6		mA

Continued:

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Alarm section, VOC, xFAULT						
VOC Input Range	V_{VOC}	VOC Input voltage range	$0.2 \times V_{VREF}$		$0.8 \times V_{VREF}$	V
VOC Input Leakage Current	I_{LKVOC}	VOC pin input leakage current	-50		50	nA
Overcurrent Alarm Gain	A_{VOC}	$I_{VOC} = I_{MAX} \times (V_{OC} / V_{REF}) \times A_{VOC}$ I_{VOC} is the set alarm current value, I_{MAX} is the current value corresponding to V_{OUT} (rail-to-rail)		2.5		-
Overcurrent Alarm Hysteresis	I_{VOCHYS}	After $I_P < I_{VOC} - I_{VOCHYS}$, xFAULT changes from pull-low to high-impedance		$0.2 \times I_{MAX}$		A
VOC Alarm Error	E_{xFAULT}	$V_{OC} = 0.4 \times V_{REF}$ Output error relative to ideal value		± 5		%
xFAULT Output Low	V_{xFAULT}	In the case of overcurrent, xFAULT outputs low, the xFAULT pin is connected to a 10k Ω pull-up resistor to V_{CC}			0.4	V
xFAULT Sink Current	I_{FAULT}	No alarms		100		nA
		xFAULT alarm pull down			4	mA
xFAULT Response Time	t_{VOC}	The delay time of the input current transitions from 0A step to $1.2 \times I_{VOC}$, and the xFAULT pin pulls down from high to V_{xFAULT}		1.6		μs
xFAULT Hold Time	t_{HOLD}	The delay time of the input current transitions from $1.2 \times I_{VOC}$ step to 0A, and the xFAULT pin pulls up from low to V_{xFAULT}		6.8		μs
On-resistance						
Primary on-resistance	R_P	$T_A = 25^\circ C$, $I_P = 10A$		30		$\mu\Omega$

CC6926T9-5FB050 ($V_{CC}=5V$, $C_{OUT}=1nF$, $C_{REF}=1nF$, $T_A=25^{\circ}C$, unless otherwise specified)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Current Accuracy Range	I_P	-	-50		50	A
Sensitivity	Sens	full range of I_P		40		mV/A
Zero Current Differential Output Error	V_{OE}	$V_{OE}=V_{OUT}-V_{REF}$, $I_P=0A$	-5		5	mV
Noise	$V_{N(RMS)}$	$I_P=0A$		12		mV
Zero Current Output Offset Drift	ΔV_{OE}	$T_A=-40^{\circ}C \sim 125^{\circ}C$ V_{OE} offset voltage drift= $V_{OE_TA} - V_{OE_25^{\circ}C}$	-30		30	mV
Zero Current Quiescent Output Voltage Temperature Drift	$\Delta V_{OUT(Q)}$	$T_A=-40^{\circ}C \sim 125^{\circ}C$ $V_{OUT(Q)}$ voltage drift= $V_{OUT(Q)_TA} - V_{OUT(Q)_25^{\circ}C}$	-30		30	mV
Sensitivity Error	$\Delta SENS$	$T_A=-40^{\circ}C \sim 125^{\circ}C$	-4.0		4.0	%
Total Output Error	E_{TOT}	$T_A=-40^{\circ}C \sim 125^{\circ}C$, $I_P=I_{P_MAX}$	-4.5		4.5	%
Linearity Error	$LINERR$	$T_A=-40^{\circ}C \sim 125^{\circ}C$		0.2	0.4	%

CC6926T9-5FB100 ($V_{CC}=5V$, $C_{OUT}=1nF$, $C_{REF}=1nF$, $T_A=25^{\circ}C$, unless otherwise specified)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Current Accuracy Range	I_P	-	-100		100	A
Sensitivity	Sens	full range of I_P		20		mV/A
Zero Current Differential Output Error	V_{OE}	$V_{OE}=V_{OUT}-V_{REF}$, $I_P=0A$	-5		5	mV
Noise	$V_{N(RMS)}$	$I_P=0A$		6		mV
Zero Current Output Offset Drift	ΔV_{OE}	$T_A=-40^{\circ}C \sim 125^{\circ}C$ V_{OE} offset voltage drift= $V_{OE_TA} - V_{OE_25^{\circ}C}$	-15		15	mV
Zero Current Quiescent Output Voltage Temperature Drift	$\Delta V_{OUT(Q)}$	$T_A=-40^{\circ}C \sim 125^{\circ}C$ $V_{OUT(Q)}$ voltage drift= $V_{OUT(Q)_TA} - V_{OUT(Q)_25^{\circ}C}$	-20		20	mV
Sensitivity Error	$\Delta SENS$	$T_A=-40^{\circ}C \sim 125^{\circ}C$	-2.5		2.5	%
Total Output Error	E_{TOT}	$T_A=-40^{\circ}C \sim 125^{\circ}C$, $I_P=I_{P_MAX}$	-3.0		3.0	%
Linearity Error	$LINERR$	$T_A=-40^{\circ}C \sim 125^{\circ}C$		0.2	0.4	%

CC6926T9-5FB150 ($V_{CC}=5V$, $C_{OUT}=1nF$, $C_{REF}=1nF$, $T_A=25^{\circ}C$, unless otherwise specified)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Current Accuracy Range	I_P	-	-150		150	A
Sensitivity	Sens	full range of I_P		13.33		mV/A
Zero Current Differential Output Error	V_{OE}	$V_{OE}=V_{OUT}-V_{REF}$, $I_P=0A$	-5		5	mV
Noise	$V_{N(RMS)}$	$I_P=0A$		4		mV
Zero Current Output Offset Drift	ΔV_{OE}	$T_A=-40^{\circ}C \sim 125^{\circ}C$ V_{OE} offset voltage drift= $V_{OE_TA} - V_{OE_25^{\circ}C}$	-15		15	mV
Zero Current Quiescent Output Voltage Temperature Drift	$\Delta V_{OUT(Q)}$	$T_A=-40^{\circ}C \sim 125^{\circ}C$ $V_{OUT(Q)}$ voltage drift= $V_{OUT(Q)_TA} - V_{OUT(Q)_25^{\circ}C}$	-20		20	mV
Sensitivity Error	$\Delta SENS$	$T_A=-40^{\circ}C \sim 125^{\circ}C$	-2.5		2.5	%
Total Output Error	E_{TOT}	$T_A=-40^{\circ}C \sim 125^{\circ}C$, $I_P=I_{P_MAX}$	-3.0		3.0	%
Linearity Error	$LINERR$	$T_A=-40^{\circ}C \sim 125^{\circ}C$		0.2	0.4	%

CC6926T9-5FB200 ($V_{CC}=5V$, $C_{OUT}=1nF$, $C_{REF}=1nF$, $T_A=25^{\circ}C$, unless otherwise specified)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Current Accuracy Range	I_P	-	-200		200	A
Sensitivity	Sens	full range of I_P		10		mV/A
Zero Current Differential Output Error	V_{OE}	$V_{OE}=V_{OUT}-V_{REF}$, $I_P=0A$	-5		5	mV
Noise	$V_{N(RMS)}$	$I_P=0A$		3		mV
Zero Current Output Offset Drift	ΔV_{OE}	$T_A=-40^{\circ}C \sim 125^{\circ}C$ V_{OE} offset voltage drift= $V_{OE_TA} - V_{OE_25^{\circ}C}$	-15		15	mV
Zero Current Quiescent Output Voltage Temperature Drift	$\Delta V_{OUT(Q)}$	$T_A=-40^{\circ}C \sim 125^{\circ}C$ $V_{OUT(Q)}$ voltage drift= $V_{OUT(Q)_TA} - V_{OUT(Q)_25^{\circ}C}$	-20		20	mV
Sensitivity Error	$\Delta SENS$	$T_A=-40^{\circ}C \sim 125^{\circ}C$	-2.5		2.5	%
Total Output Error	E_{TOT}	$T_A=-40^{\circ}C \sim 125^{\circ}C$, $I_P=I_{P_MAX}$	-3.0		3.0	%
Linearity Error	$LINERR$	$T_A=-40^{\circ}C \sim 125^{\circ}C$		0.2	0.4	%

CC6926T9-5FB300 ($V_{CC}=5V$, $C_{OUT}=1nF$, $C_{REF}=1nF$, $T_A=25^{\circ}C$, unless otherwise specified)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Current Accuracy Range	I_P	-	-300		300	A
Sensitivity	Sens	full range of I_P		6.67		mV/A
Zero Current Differential Output Error	V_{OE}	$V_{OE}=V_{OUT}-V_{REF}$, $I_P=0A$	-5		5	mV
Noise	$V_{N(RMS)}$	$I_P=0A$		2		mV
Zero Current Output Offset Drift	ΔV_{OE}	$T_A=-40^{\circ}C \sim 125^{\circ}C$ V_{OE} offset voltage drift= $V_{OE_TA} - V_{OE_25^{\circ}C}$	-15		15	mV
Zero Current Quiescent Output Voltage Temperature Drift	$\Delta V_{OUT(Q)}$	$T_A=-40^{\circ}C \sim 125^{\circ}C$ $V_{OUT(Q)}$ voltage drift= $V_{OUT(Q)_TA} - V_{OUT(Q)_25^{\circ}C}$	-20		20	mV
Sensitivity Error	$\Delta SENS$	$T_A=-40^{\circ}C \sim 125^{\circ}C$	-2.5		2.5	%
Total Output Error	E_{TOT}	$T_A=-40^{\circ}C \sim 125^{\circ}C$, $I_P=I_{P_MAX}$	-3.0		3.0	%
Linearity Error	$LINERR$	$T_A=-40^{\circ}C \sim 125^{\circ}C$		0.2	0.4	%

CC6926T9-3FB050 ($V_{CC}=3.3V$, $C_{OUT}=1nF$, $C_{REF}=1nF$, $T_A=25^{\circ}C$, unless otherwise specified)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Current Accuracy Range	I_P	-	-50		50	A
Sensitivity	Sens	full range of I_P		26.4		mV/A
Zero Current Differential Output Error	V_{OE}	$V_{OE}=V_{OUT}-V_{REF}$, $I_P=0A$	-5		5	mV
Noise	$V_{N(RMS)}$	$I_P=0A$		12		mV
Zero Current Output Offset Drift	ΔV_{OE}	$T_A=-40^{\circ}C \sim 125^{\circ}C$ V_{OE} offset voltage drift= $V_{OE_TA} - V_{OE_25^{\circ}C}$	-30		30	mV
Zero Current Quiescent Output Voltage Temperature Drift	$\Delta V_{OUT(Q)}$	$T_A=-40^{\circ}C \sim 125^{\circ}C$ $V_{OUT(Q)}$ voltage drift= $V_{OUT(Q)_TA} - V_{OUT(Q)_25^{\circ}C}$	-30		30	mV
Sensitivity Error	$\Delta SENS$	$T_A=-40^{\circ}C \sim 125^{\circ}C$	-3.0		3.0	%
Total Output Error	E_{TOT}	$T_A=-40^{\circ}C \sim 125^{\circ}C$, $I_P=I_{P_MAX}$	-3.5		3.5	%
Linearity Error	$LINERR$	$T_A=-40^{\circ}C \sim 125^{\circ}C$		0.2	0.4	%

CC6926T9-3FB100 ($V_{CC}=3.3V$, $C_{OUT}=1nF$, $C_{REF}=1nF$, $T_A=25^{\circ}C$, unless otherwise specified)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Current Accuracy Range	I_P	-	-100		100	A
Sensitivity	Sens	full range of I_P		13.2		mV/A
Zero Current Differential Output Error	V_{OE}	$V_{OE}=V_{OUT}-V_{REF}$, $I_P=0A$	-5		5	mV
Noise	$V_{N(RMS)}$	$I_P=0A$		6		mV
Zero Current Output Offset Drift	ΔV_{OE}	$T_A=-40^{\circ}C \sim 125^{\circ}C$ V_{OE} offset voltage drift= $V_{OE_TA} - V_{OE_25^{\circ}C}$	-15		15	mV
Zero Current Quiescent Output Voltage Temperature Drift	$\Delta V_{OUT(Q)}$	$T_A=-40^{\circ}C \sim 125^{\circ}C$ $V_{OUT(Q)}$ voltage drift= $V_{OUT(Q)_TA} - V_{OUT(Q)_25^{\circ}C}$	-20		20	mV
Sensitivity Error	$\Delta SENS$	$T_A=-40^{\circ}C \sim 125^{\circ}C$	-2.5		2.5	%
Total Output Error	E_{TOT}	$T_A=-40^{\circ}C \sim 125^{\circ}C$, $I_P=I_{P_MAX}$	-3.0		3.0	%
Linearity Error	$LINERR$	$T_A=-40^{\circ}C \sim 125^{\circ}C$		0.2	0.4	%

CC6926T9-3FB150 ($V_{CC}=3.3V$, $C_{OUT}=1nF$, $C_{REF}=1nF$, $T_A=25^{\circ}C$, unless otherwise specified)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Current Accuracy Range	I_P	-	-150		150	A
Sensitivity	Sens	full range of I_P		8.8		mV/A
Zero Current Differential Output Error	V_{OE}	$V_{OE}=V_{OUT}-V_{REF}$, $I_P=0A$	-5		5	mV
Noise	$V_{N(RMS)}$	$I_P=0A$		4		mV
Zero Current Output Offset Drift	ΔV_{OE}	$T_A=-40^{\circ}C \sim 125^{\circ}C$ V_{OE} offset voltage drift= $V_{OE_TA} - V_{OE_25^{\circ}C}$	-15		15	mV
Zero Current Quiescent Output Voltage Temperature Drift	$\Delta V_{OUT(Q)}$	$T_A=-40^{\circ}C \sim 125^{\circ}C$ $V_{OUT(Q)}$ voltage drift= $V_{OUT(Q)_TA} - V_{OUT(Q)_25^{\circ}C}$	-20		20	mV
Sensitivity Error	$\Delta SENS$	$T_A=-40^{\circ}C \sim 125^{\circ}C$	-2.5		2.5	%
Total Output Error	E_{TOT}	$T_A=-40^{\circ}C \sim 125^{\circ}C$, $I_P=I_{P_MAX}$	-3.0		3.0	%
Linearity Error	$LINERR$	$T_A=-40^{\circ}C \sim 125^{\circ}C$		0.2	0.4	%

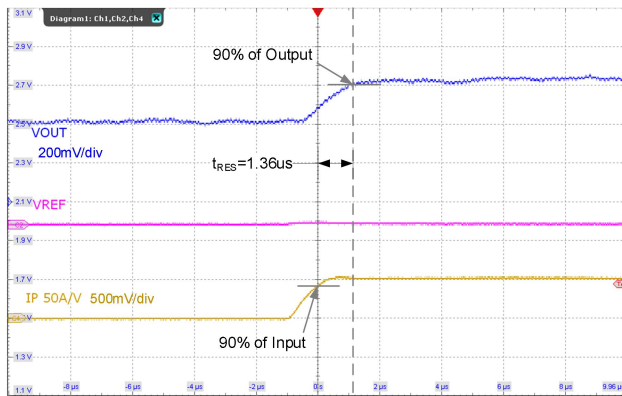
CC6926T9-3FB200 ($V_{CC}=3.3V$, $C_{OUT}=1nF$, $C_{REF}=1nF$, $T_A=25^{\circ}C$, unless otherwise specified)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Current Accuracy Range	I_P	-	-200		200	A
Sensitivity	Sens	full range of I_P		6.6		mV/A
Zero Current Differential Output Error	V_{OE}	$V_{OE}=V_{OUT}-V_{REF}$, $I_P=0A$	-5		5	mV
Noise	$V_{N(RMS)}$	$I_P=0A$		3		mV
Zero Current Output Offset Drift	ΔV_{OE}	$T_A=-40^{\circ}C \sim 125^{\circ}C$ V_{OE} offset voltage drift= $V_{OE_TA} - V_{OE_25^{\circ}C}$	-15		15	mV
Zero Current Quiescent Output Voltage Temperature Drift	$\Delta V_{OUT(Q)}$	$T_A=-40^{\circ}C \sim 125^{\circ}C$ $V_{OUT(Q)}$ voltage drift= $V_{OUT(Q)_TA} - V_{OUT(Q)_25^{\circ}C}$	-20		20	mV
Sensitivity Error	$\Delta SENS$	$T_A=-40^{\circ}C \sim 125^{\circ}C$	-2.5		2.5	%
Total Output Error	E_{TOT}	$T_A=-40^{\circ}C \sim 125^{\circ}C$, $I_P=I_{P_MAX}$	-3.0		3.0	%
Linearity Error	$LINERR$	$T_A=-40^{\circ}C \sim 125^{\circ}C$		0.2	0.4	%

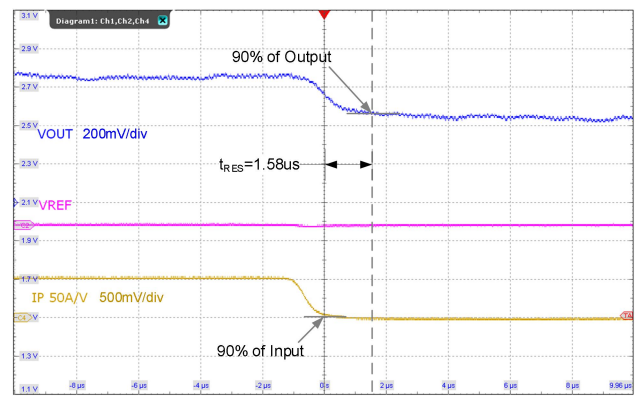
CC6926T9-3FB300 ($V_{CC}=3.3V$, $C_{OUT}=1nF$, $C_{REF}=1nF$, $T_A=25^{\circ}C$, unless otherwise specified)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Current Accuracy Range	I_P	-	-300		300	A
Sensitivity	Sens	full range of I_P		4.4		mV/A
Zero Current Differential Output Error	V_{OE}	$V_{OE}=V_{OUT}-V_{REF}$, $I_P=0A$	-5		5	mV
Noise	$V_{N(RMS)}$	$I_P=0A$		2		mV
Zero Current Output Offset Drift	ΔV_{OE}	$T_A=-40^{\circ}C \sim 125^{\circ}C$ V_{OE} offset voltage drift= $V_{OE_TA} - V_{OE_25^{\circ}C}$	-15		15	mV
Zero Current Quiescent Output Voltage Temperature Drift	$\Delta V_{OUT(Q)}$	$T_A=-40^{\circ}C \sim 125^{\circ}C$ $V_{OUT(Q)}$ voltage drift= $V_{OUT(Q)_TA} - V_{OUT(Q)_25^{\circ}C}$	-20		20	mV
Sensitivity Error	$\Delta SENS$	$T_A=-40^{\circ}C \sim 125^{\circ}C$	-2.5		2.5	%
Total Output Error	E_{TOT}	$T_A=-40^{\circ}C \sim 125^{\circ}C$, $I_P=I_{P_MAX}$	-3.0		3.0	%
Linearity Error	$LINERR$	$T_A=-40^{\circ}C \sim 125^{\circ}C$		0.2	0.4	%

CURVE & WAVEFORM

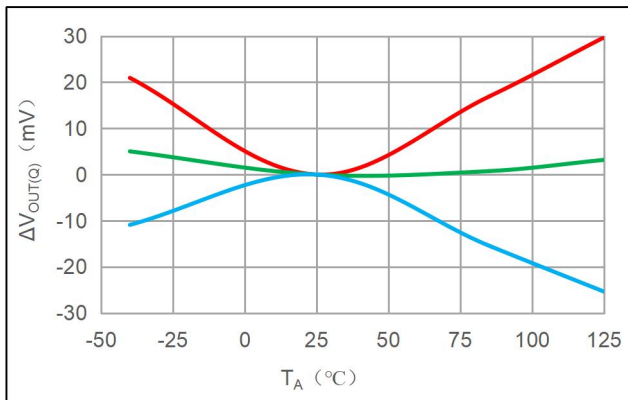


Transmission Response Rise Waveform

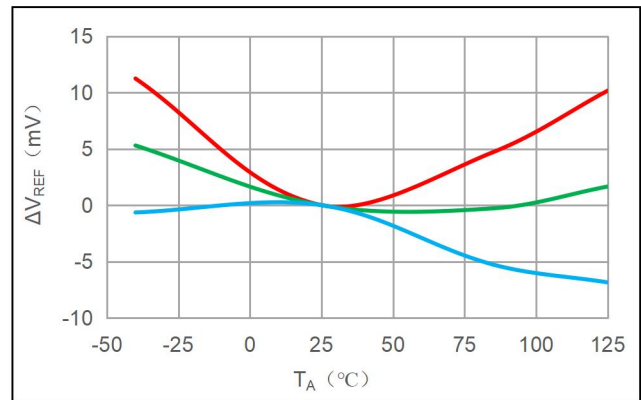


Transmission Response Fall Waveform

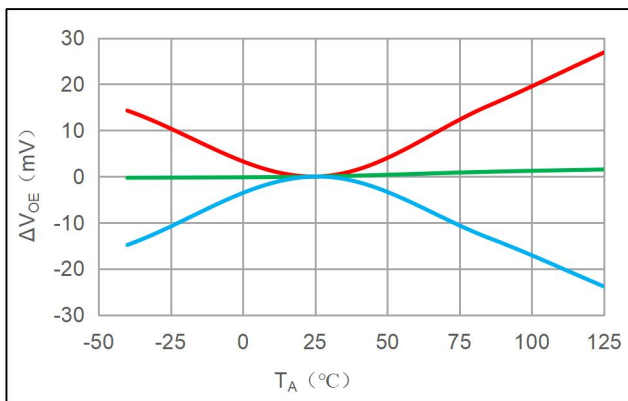
CC6926T9-5FB050^[1]



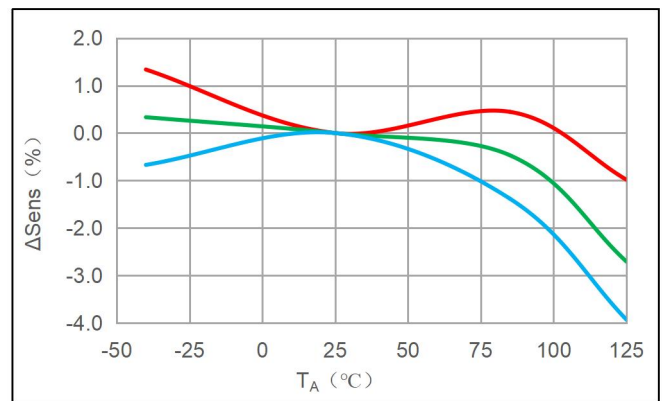
$\Delta V_{OUT(Q)}$ vs T_A



ΔV_{REF} vs T_A



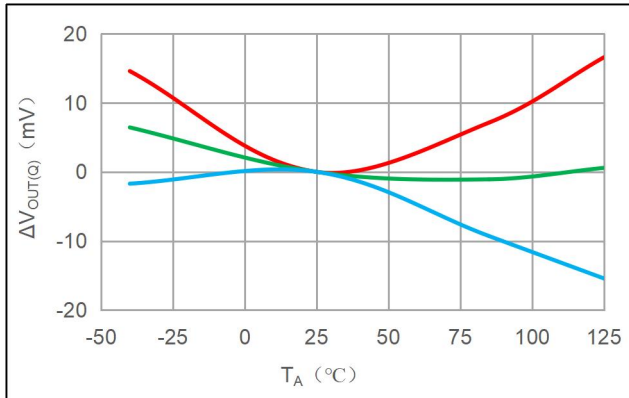
ΔV_{OE} vs T_A



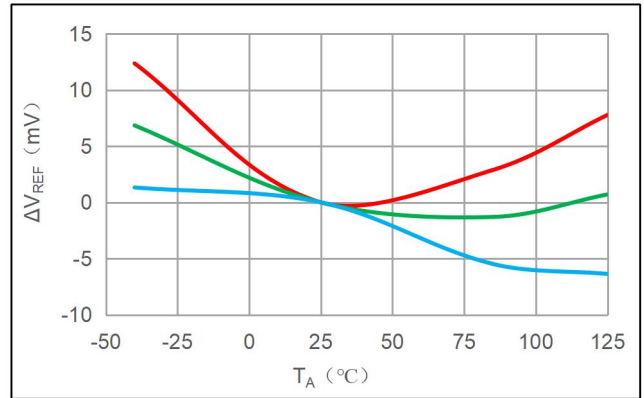
$\Delta Sens$ vs T_A

[1] Green represents the average, Red represents the average+3Sigma, Blue represents the average-3Sigma(-40°C, 25°C, 85°C, 125°C)

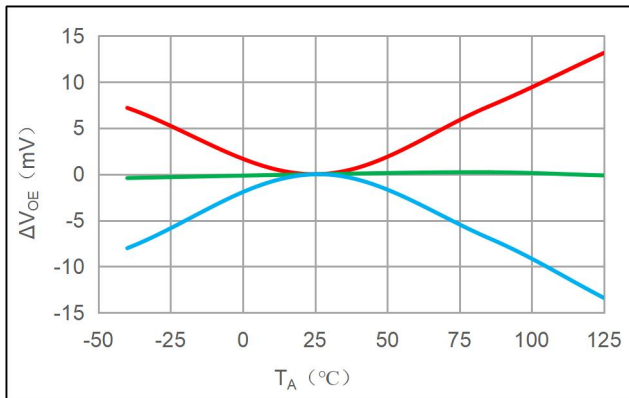
CC6926T9-5FB100^[1]



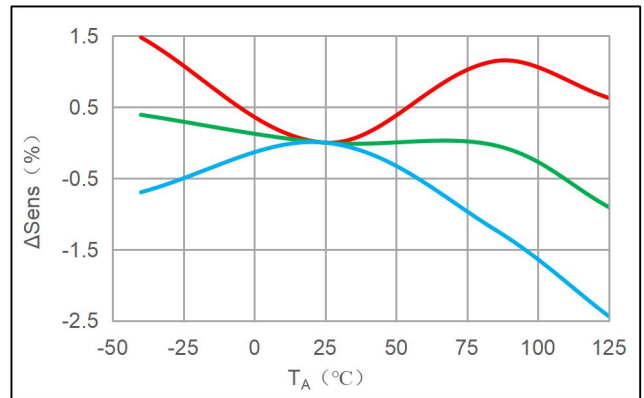
Δ V_{OUT(Q)} vs T_A



Δ V_{REF} vs T_A



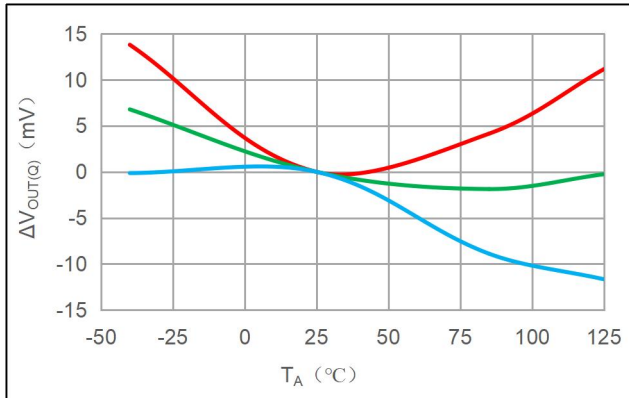
Δ V_{OE} vs T_A



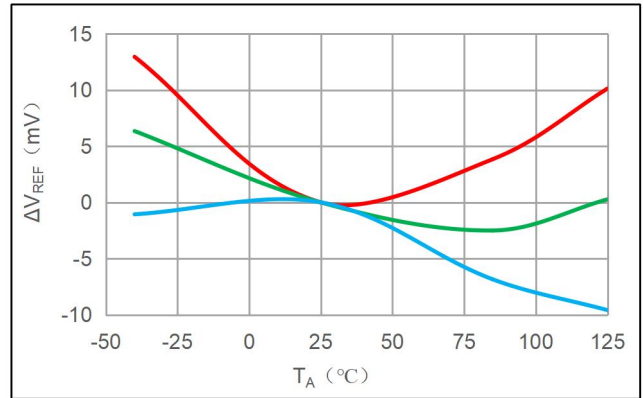
Δ Sens vs T_A

[1] Green represents the average, Red represents the average+3Sigma, Blue represents the average-3Sigma(-40°C, 25°C, 85°C, 125°C)

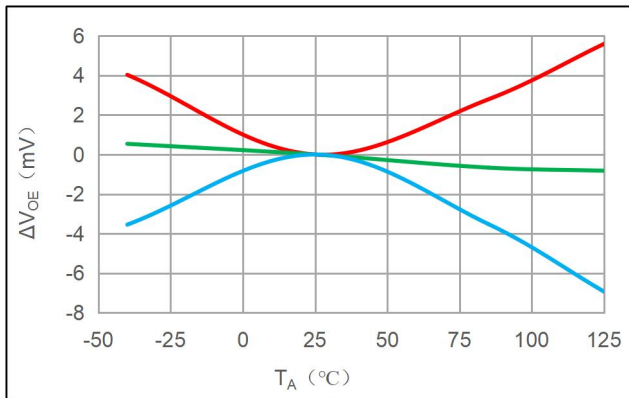
CC6926T9-5FB150^[1]



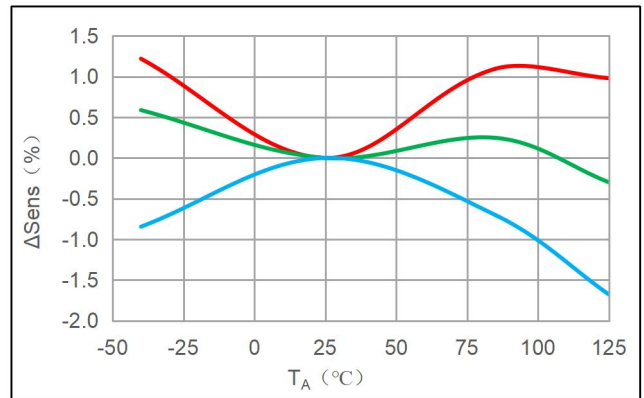
$\Delta V_{OUT(Q)}$ vs T_A



ΔV_{REF} vs T_A



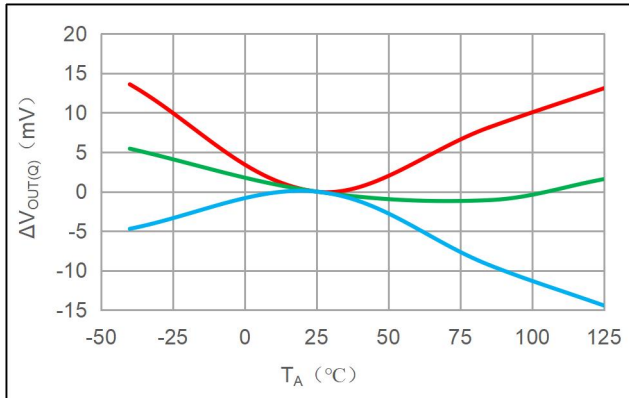
ΔV_{OE} vs T_A



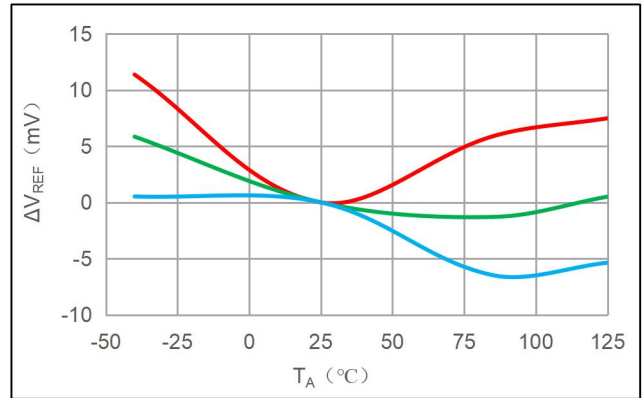
$\Delta Sens$ vs T_A

[1] Green represents the average, Red represents the average+3Sigma, Blue represents the average-3Sigma(-40°C, 25°C, 85°C, 125°C)

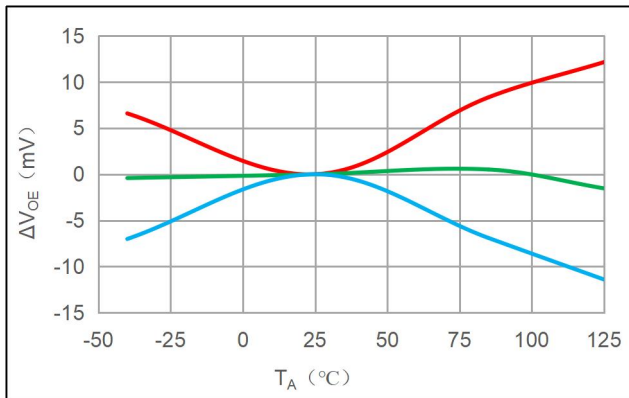
CC6926T9-5FB200^[1]



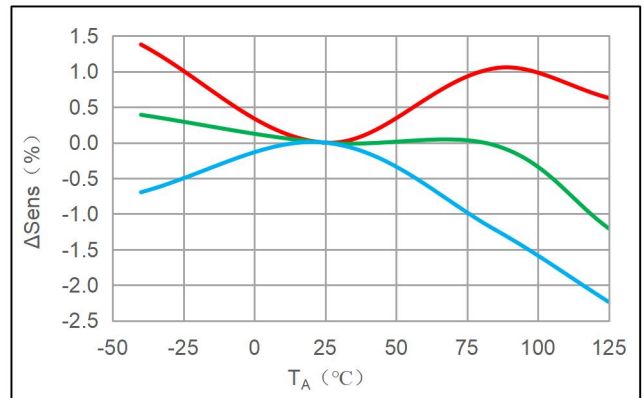
$\Delta V_{OUT(Q)}$ vs T_A



ΔV_{REF} vs T_A



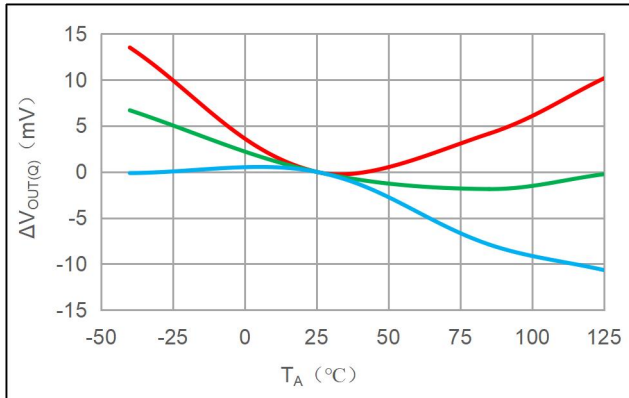
ΔV_{OE} vs T_A



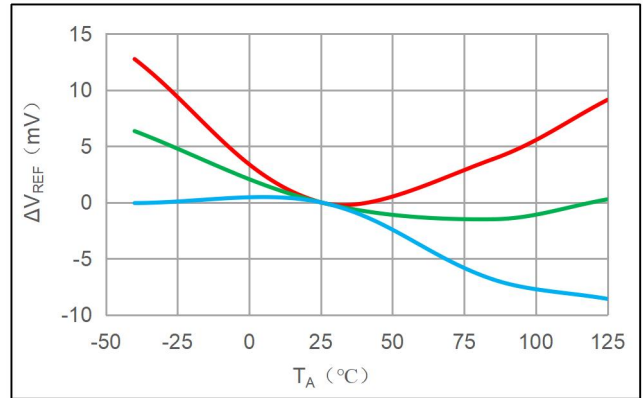
$\Delta Sens$ vs T_A

[1] Green represents the average, Red represents the average+3Sigma, Blue represents the average-3Sigma(-40°C, 25°C, 85°C, 125°C)

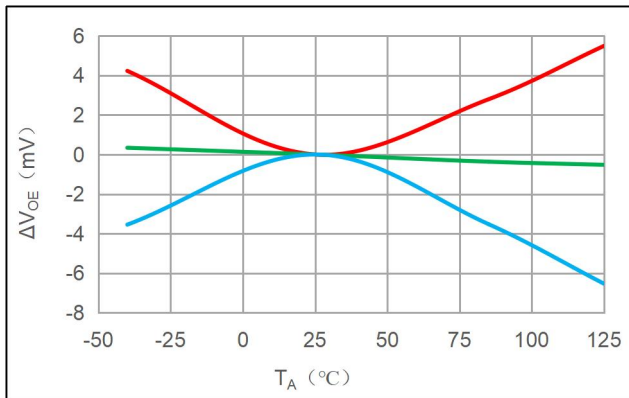
CC6926T9-5FB300^[1]



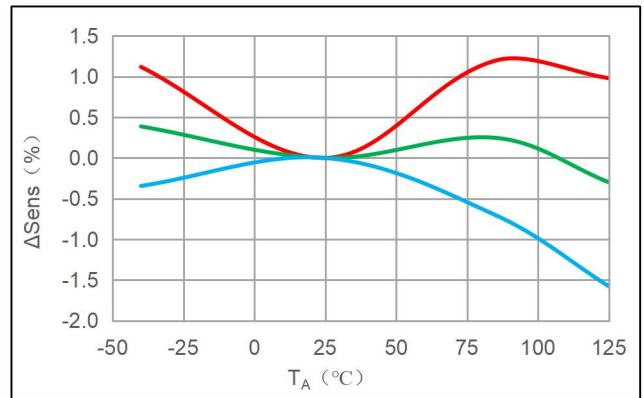
$\Delta V_{OUT(Q)}$ vs T_A



ΔV_{REF} vs T_A



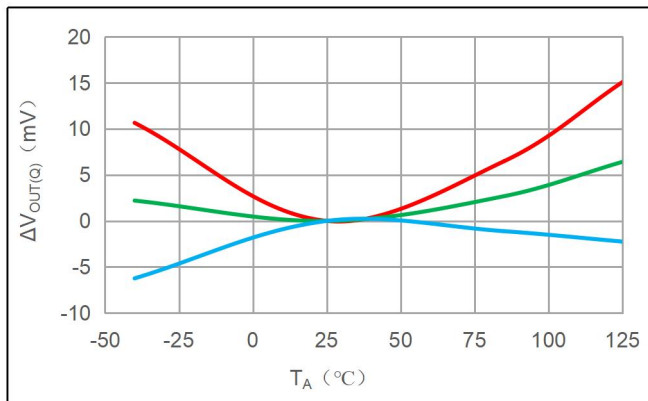
ΔV_{OE} vs T_A



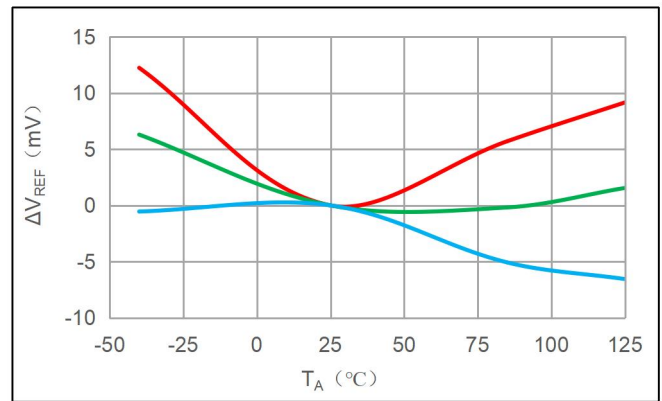
$\Delta Sens$ vs T_A

[1] Green represents the average, Red represents the average+3Sigma, Blue represents the average-3Sigma(-40°C, 25°C, 85°C, 125°C)

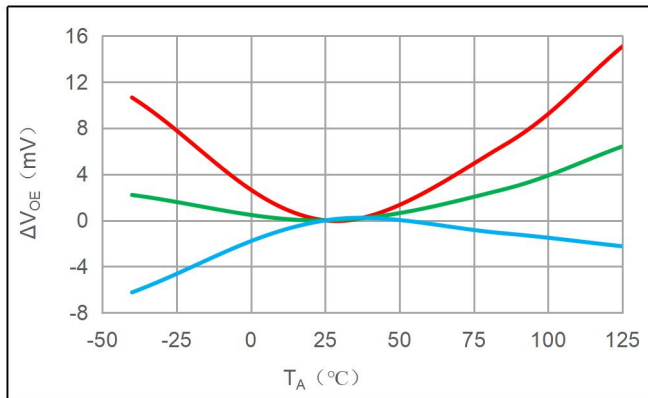
CC6926T9-3FB050^[1]



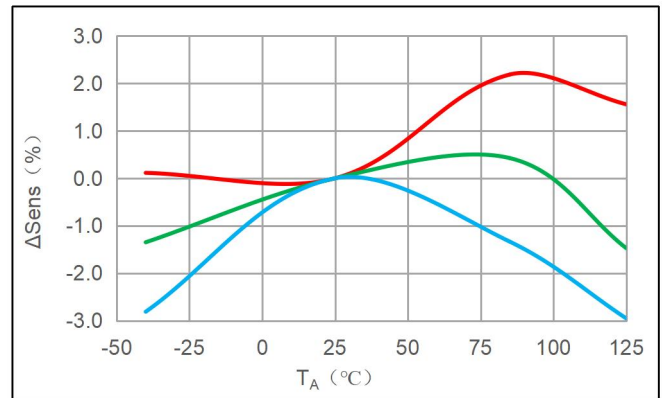
$\Delta V_{OUT(Q)}$ vs T_A



ΔV_{REF} vs T_A



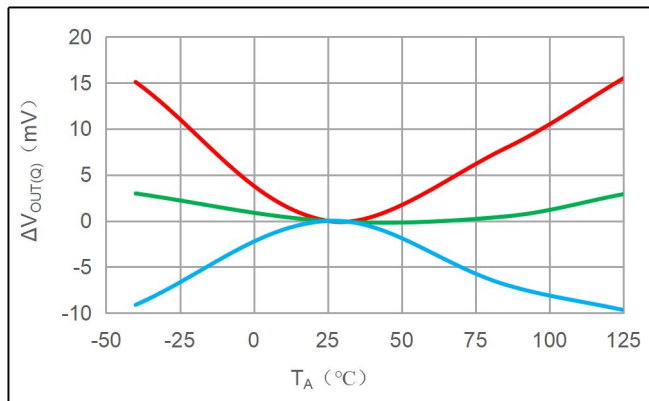
ΔV_{OE} vs T_A



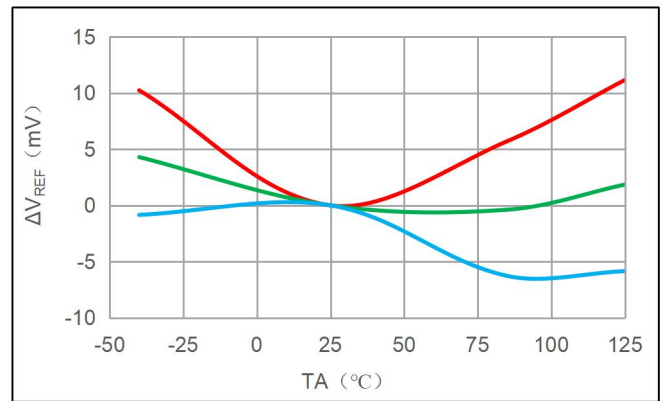
$\Delta Sens$ vs T_A

[1] Green represents the average, Red represents the average+3Sigma, Blue represents the average-3Sigma(-40°C, 25°C, 85°C, 125°C)

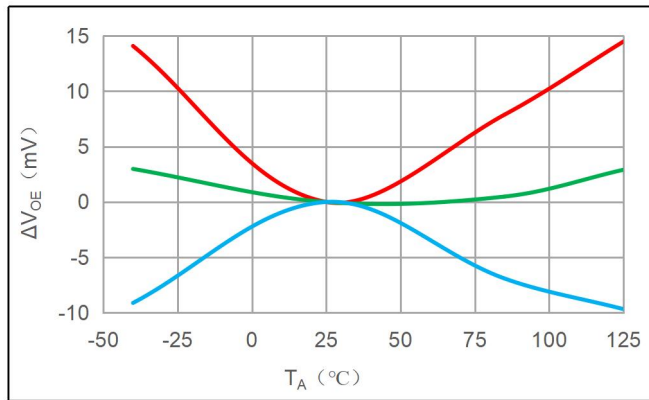
CC6926T9-3FB100^[1]



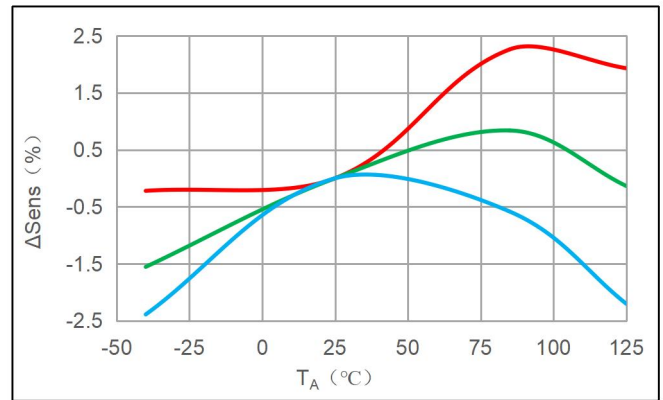
$\Delta V_{OUT(Q)}$ vs T_A



ΔV_{REF} vs T_A



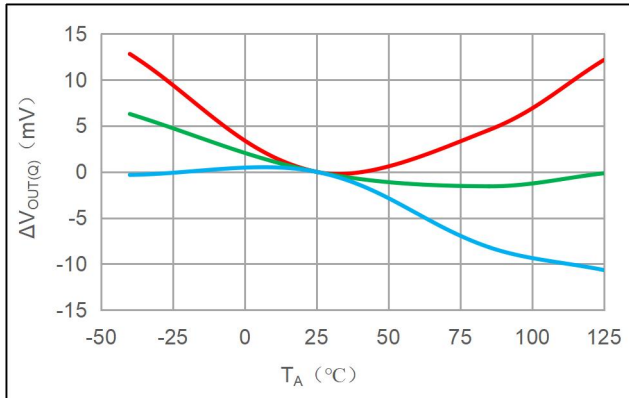
ΔV_{OE} vs T_A



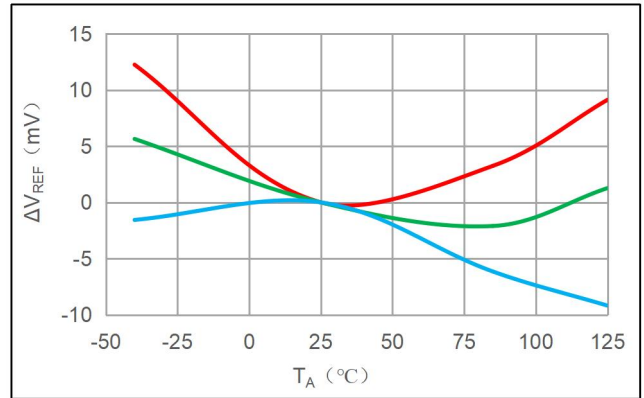
$\Delta Sens$ vs T_A

[1] Green represents the average, Red represents the average+3Sigma, Blue represents the average-3Sigma(-40°C, 25°C, 85°C, 125°C)

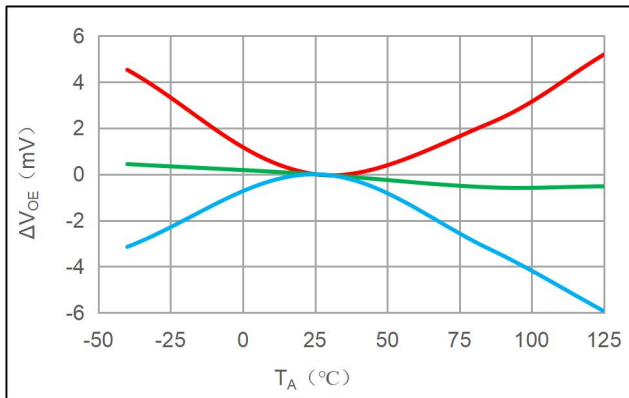
CC6926T9-3FB150^[1]



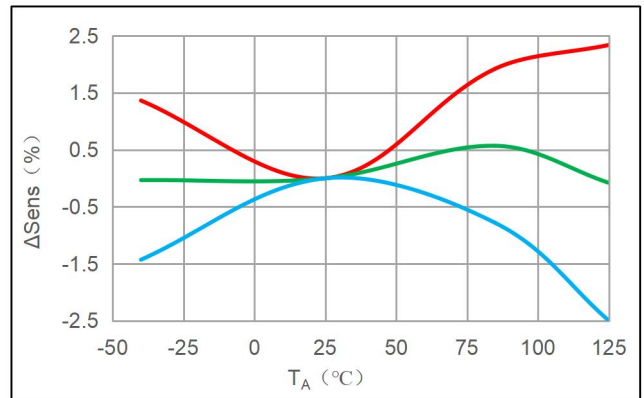
Δ V_{OUT(Q)} vs T_A



Δ V_{REF} vs T_A



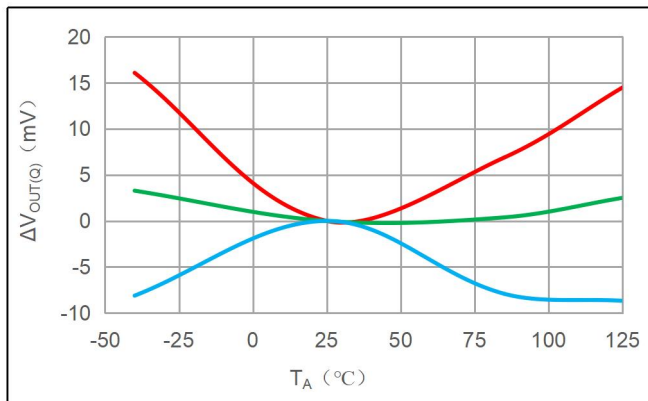
Δ V_{OE} vs T_A



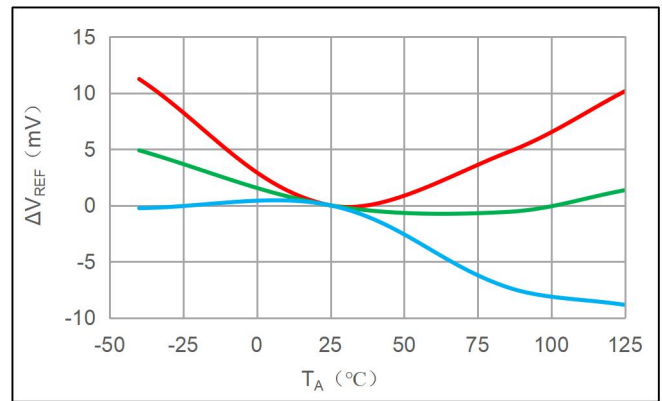
Δ Sens vs T_A

[1] Green represents the average, Red represents the average+3Sigma, Blue represents the average-3Sigma(-40°C, 25°C, 85°C, 125°C)

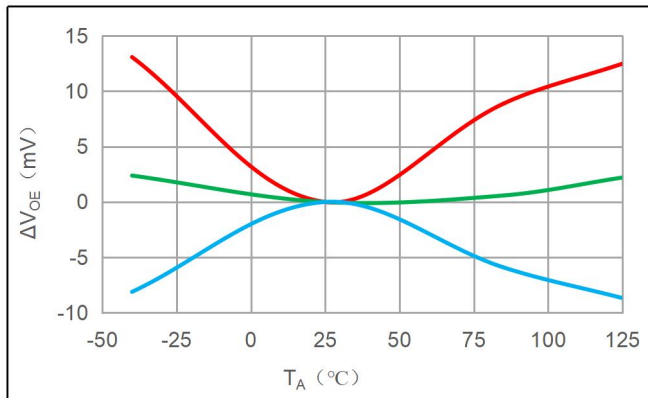
CC6926T9-3FB200^[1]



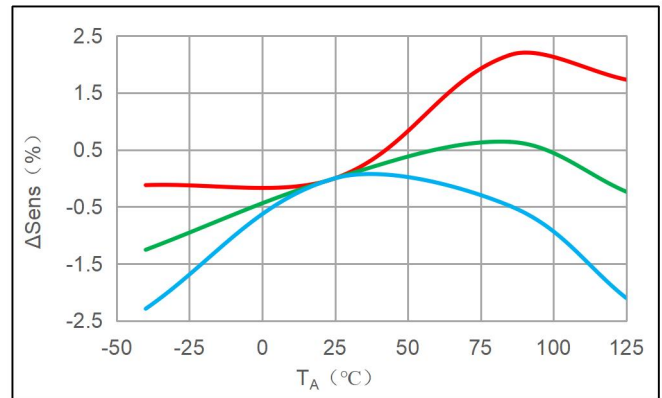
$\Delta V_{OUT(Q)}$ vs T_A



ΔV_{REF} vs T_A



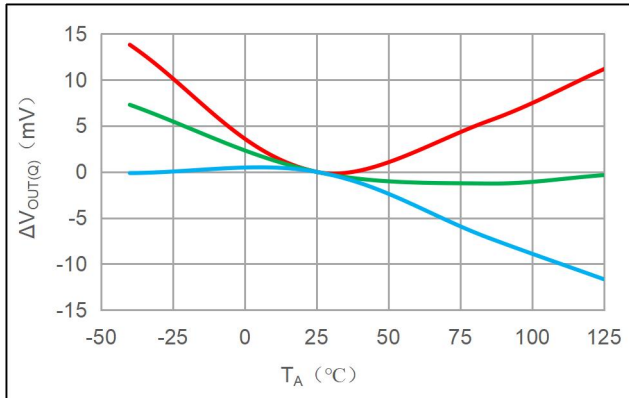
ΔV_{OE} vs T_A



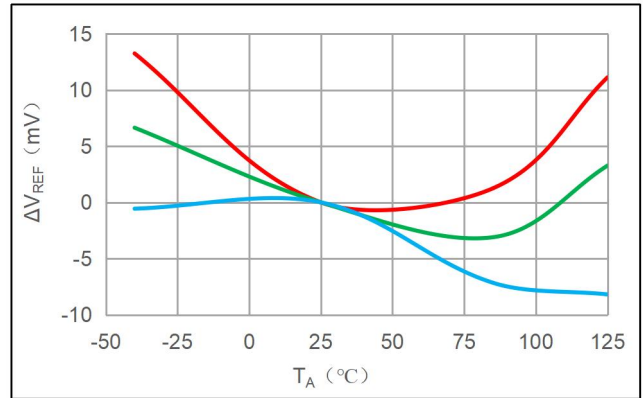
$\Delta Sens$ vs T_A

[1] Green represents the average, Red represents the average+3Sigma, Blue represents the average-3Sigma(-40°C, 25°C, 85°C, 125°C)

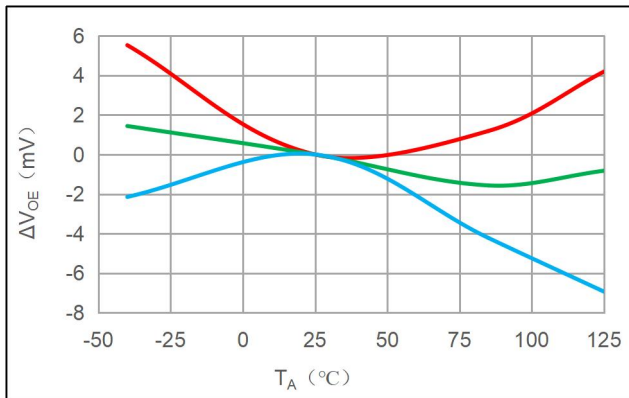
CC6926T9-3FB300^[1]



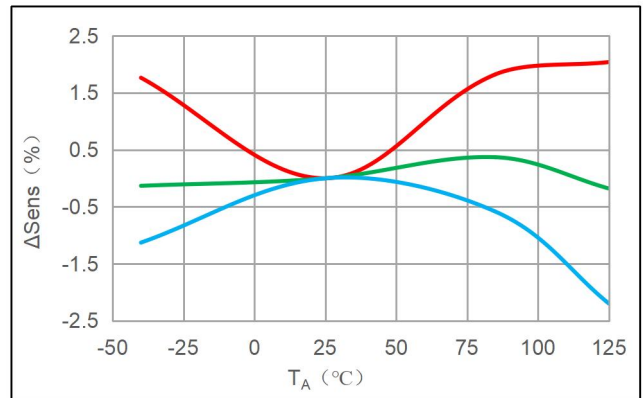
$\Delta V_{OUT(Q)}$ vs T_A



ΔV_{REF} vs T_A



ΔV_{OE} vs T_A



$\Delta Sens$ vs T_A

[1] Green represents the average, Red represents the average+3Sigma, Blue represents the average-3Sigma(-40°C, 25°C, 85°C, 125°C)

FUNCTION DESCRIPTION

The CC6926 device is a precision current sensor based on Hall sensor. It has less than 3% full scale error and zero current reference signal output in the whole temperature range, which can realize unidirectional or bidirectional current detection. The input current flows through a wire between isolated input current pins, which has a resistance of 30uΩ at room temperature to reduce insertion loss. The magnetic field generated by the input current is sensed by Hall sensor and amplified by precise signal chain. It can be used for AC and DC current measurement with a bandwidth of 250kHz. The measuring current is 50A~300A. There are 5 kinds of Current sensing range to choose. CC6926 is optimized for high accuracy and temperature stability, compensating for misalignment and sensitivity over the entire range.

The input current of CC6926 flows through the primary side of the package through IP+ and IP- pins, the current flowing through the chip generates a magnetic field proportional to the input current and is measured by an isolated Precision Hall sensor IC. Compared with other current measurement methods, the low impedance lead frame path reduces power consumption and does not require any external devices on the primary side. In addition, the internal integrated differential common mode suppression circuit can make the chip output not affected by external interference magnetic signal, and only measure the magnetic field generated by the input current, so as to suppress the interference of external magnetic field.

The typical resistance of the primary current input conductor at 25°C is 30uΩ. The lead frame is made of copper. The temperature coefficient of the input wire is positive, and the wire resistance increases with the increase of temperature. The typical temperature coefficient is 3900 ppm/°C. For every 100°C increase in temperature, the primary side resistance will increase by 39%.

CC6926 has an on-chip overcurrent reminder function, when the primary side current exceeds the set overcurrent threshold, the internal comparator is reversed, driving the OD output to work, and the pin is pulled down. The overcurrent threshold can be set by an external resistor on the VOC pin, which can be derived from V_{REF} or another external voltage input. When using the xFAULT function, V_{REF} can only use the reference output mode. The effective input voltage of V_{OC} is between 0.2×V_{VREF} and 0.8×V_{VREF}, and the correspondence of the overcurrent threshold and the V_{OC} voltage is as follows:

$$I_{xFAULT} = \frac{V_{OC}}{V_{REF}} \times 2.5 \times I_{pr}$$

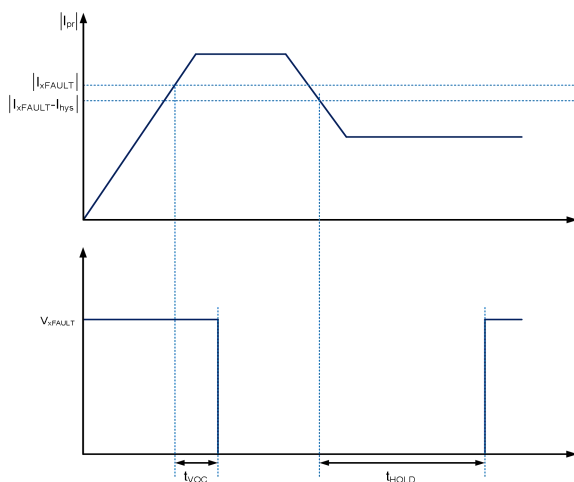
e.g.: CC6926T9-5FB100, its overcurrent protection point threshold range that can be set is 50A ~ 200A.

When V_{OC}=0.2×V_{VREF}=0.5V, the threshold = 50A, the current is above 50A or the reverse is less than -50A, xFAULT pin pull down;

When V_{OC}=0.8×V_{VREF}=2.0V, the threshold = 200A, the current is above 200A or the reverse is less than -200A, xFAULT pin pull down.

When the primary current (positive and negative currents) exceeds the overcurrent threshold set above, an overcurrent alarm is triggered.

xFAULT is cleared when the absolute value of the primary current is less than the set current threshold minus the current hysteresis. t_{VOC} is the overcurrent response time, which is the time when the primary current reaches the overcurrent point to the xFAULT pin pulls down. t_{HOLD} is the overcurrent duration time, which is the time the original edge current is less than the set threshold | I_{xFAULT}-I_{hys} | to the xFAULT pin pulls up. The overcurrent protection timing is as follows:



INPUT CURRENT

In use, the primary side of the chip (package pins 8-9) is connected in series at any position in the whole circuit. The input current flowing from IP+ (package pins 8) to IP- (package pins 9) is positive, otherwise it is negative. Do not shunt resistors between IP+ and IP-, unless there are very special reasons — such as minimizing insertion loss — which will reduce the current flowing through the chip, and the wire resistance will also be affected by temperature drift, which requires external temperature and precision correction of the whole system.

VREF INPUT/OUTPUT CHARACTERISTIC

The quiescent output voltage V_{OQ} of V_{OUT} is V_{REF} as a reference, V_{REF} has two modes: input / output, which can be used as an internal reference to an external circuit or to adjust the V_{OQ} .

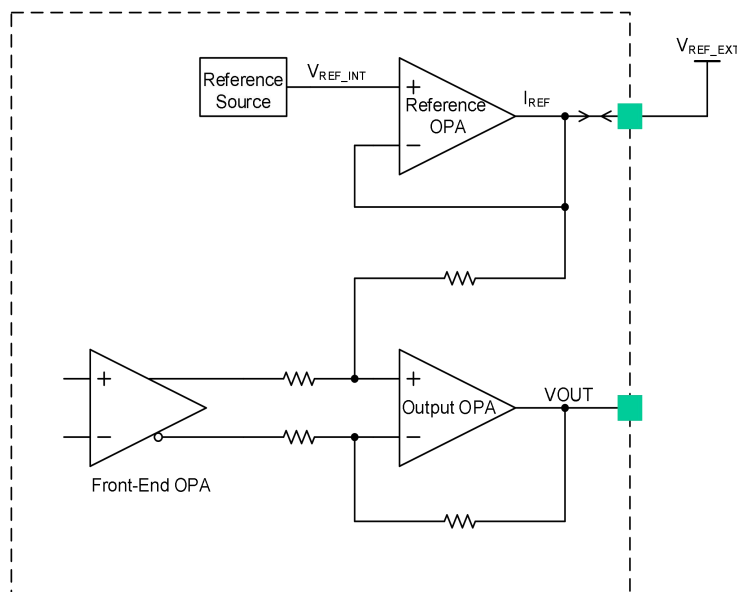
1. When using the V_{REF} output mode:

After factory programming, the nominal value error $\leq 5\text{mV}$;

The typical value of $I_{VREF_SOURCE} = 2.8\text{mA}$, and the typical value of $I_{VREF_SINK} = 6\text{mA}$. Upon application, the recommended current value of $V_{REF} \leq 2\text{mV}$.

2. When using the V_{REF} input mode:

When the drive capability of the external reference exceeds the output of the Reference Op Amp, the external reference forces V_{OQ} to use the external reference as a reference. When the input voltage is lower than the nominal value of V_{REF} , the drive capability of the input source needs to be higher than I_{VREF_SOURCE} ; When the input voltage is higher than the nominal value of V_{REF} , the drive capability of the input source needs to be higher than I_{VREF_SINK} . It is recommended that customers use an external reference source that $\pm 10\text{mA}$ drive capability for input. Limited by the rail-to-rail output range of the output op amp, the voltage range of the external input of V_{REF} is $0.1 \times V_{CC} \sim 0.9 \times V_{CC}$, V_{OQ} changes with V_{REF} , and the sensitivity of CC6926 remains unchanged.



VOUT OUTPUT CHARACTERISTIC

The quiescent output point of the CC6926 ($I_P = 0A$, with V_{REF} in output mode) is 2.5V/1.65V.

When the current increases, the V_{OUT} increases until the saturation voltage of the output operational amplifier ($V_{CC} - \text{rail voltage}$); when the current decreases, the V_{OUT} decreases until the saturation voltage ($GND + \text{rail voltage}$) of the Output OP Amp. Crosschip ensures the accuracy and linearity of V_{OUT} in the range of 0.5~4.5V/0.33~2.97V. In order to ensure the consistency of mass manufacturing, there is a certain margin in this range, but it is not recommended for customers to use this margin.

When the input current exceeds the range, the output of V_{OUT} is close to the rail voltage of the power supply. When the input current does not exceed the tolerance limit of the chip, the voltage will always be maintained. After the input current returns to the range, the output of V_{OUT} will return to normal without any damage to the chip.

When using the V_{REF} output mode:

Product Name	Input Current	Nominal Supply Voltage(V)	Sensitivity(mV/A)	Calculation Formula (Note 1)
CC6926T9-5FB050	-50A ~ +50A	5	40	$V_{OUT} = 2500 + I_P(A) \times 40 \dots \dots \dots (mV)$
CC6926T9-5FB100	-100A ~ +100A	5	20	$V_{OUT} = 2500 + I_P(A) \times 20 \dots \dots \dots (mV)$
CC6926T9-5FB150	-150A ~ +150A	5	13.33	$V_{OUT} = 2500 + I_P(A) \times 13.33 \dots \dots \dots (mV)$
CC6926T9-5FB200	-200A ~ +200A	5	10	$V_{OUT} = 2500 + I_P(A) \times 10 \dots \dots \dots (mV)$
CC6926T9-5FB300	-300A ~ +300A	5	6.67	$V_{OUT} = 2500 + I_P(A) \times 6.67 \dots \dots \dots (mV)$
CC6926T9-3FB050	-50A ~ +50A	3.3	26.4	$V_{OUT} = 1650 + I_P(A) \times 26.4 \dots \dots \dots (mV)$
CC6926T9-3FB100	-100A ~ +100A	3.3	13.2	$V_{OUT} = 1650 + I_P(A) \times 13.2 \dots \dots \dots (mV)$
CC6926T9-3FB150	-150A ~ +150A	3.3	8.8	$V_{OUT} = 1650 + I_P(A) \times 8.8 \dots \dots \dots (mV)$
CC6926T9-3FB200	-200A ~ +200A	3.3	6.6	$V_{OUT} = 1650 + I_P(A) \times 6.6 \dots \dots \dots (mV)$
CC6926T9-3FB300	-300A ~ +300A	3.3	4.4	$V_{OUT} = 1650 + I_P(A) \times 4.4 \dots \dots \dots (mV)$

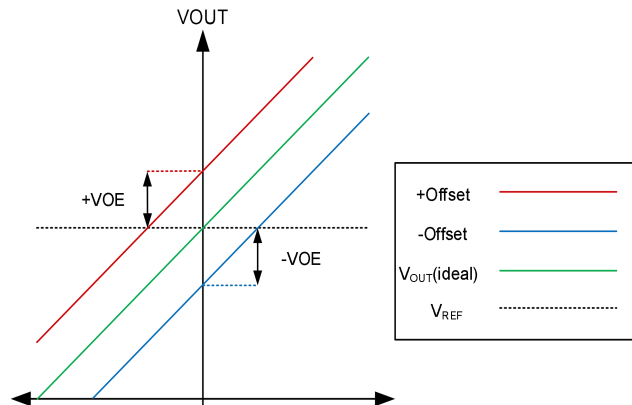
When using the V_{REF} input mode: ($0.1 \times V_{CC} \leq V_{REF} \leq 0.9 \times V_{CC}$)

Product Name	Input Current	Nominal Supply Voltage(V)	Sensitivity(mV/A)	Calculation Formula (Note 1)
CC6926T9-5FB050	-50A ~ +50A	5	40	$V_{OUT} = V_{REF} + I_P(A) \times 40 \dots \dots \dots (mV)$
CC6926T9-5FB100	-100A ~ +100A	5	20	$V_{OUT} = V_{REF} + I_P(A) \times 20 \dots \dots \dots (mV)$
CC6926T9-5FB150	-150A ~ +150A	5	13.33	$V_{OUT} = V_{REF} + I_P(A) \times 13.33 \dots \dots \dots (mV)$
CC6926T9-5FB200	-200A ~ +200A	5	10	$V_{OUT} = V_{REF} + I_P(A) \times 10 \dots \dots \dots (mV)$
CC6926T9-5FB300	-300A ~ +300A	5	6.67	$V_{OUT} = V_{REF} + I_P(A) \times 6.67 \dots \dots \dots (mV)$
CC6926T9-3FB050	-50A ~ +50A	3.3	26.4	$V_{OUT} = V_{REF} + I_P(A) \times 26.4 \dots \dots \dots (mV)$
CC6926T9-3FB100	-100A ~ +100A	3.3	13.2	$V_{OUT} = V_{REF} + I_P(A) \times 13.2 \dots \dots \dots (mV)$
CC6926T9-3FB150	-150A ~ +150A	3.3	8.8	$V_{OUT} = V_{REF} + I_P(A) \times 8.8 \dots \dots \dots (mV)$
CC6926T9-3FB200	-200A ~ +200A	3.3	6.6	$V_{OUT} = V_{REF} + I_P(A) \times 6.6 \dots \dots \dots (mV)$
CC6926T9-3FB300	-300A ~ +300A	3.3	4.4	$V_{OUT} = V_{REF} + I_P(A) \times 4.4 \dots \dots \dots (mV)$

Note1: This formula is only applicable to DC current calculations, when AC current applications, one should pay attention to $I_{PEAK} = 1.414 \times I_{RMS}$ and pay attention to the positive and negative current direction.

OFFSET VOLTAGE

Offset Voltage, or V_{OE} , is defined as the difference between $V_{OUT(Q)}$ and V_{REF} (as shown in the figure below). V_{OE} includes the drift of $V_{OUT(Q)}$ minus V_{REF} over the entire temperature range ($-40^{\circ}\text{C} \sim +125^{\circ}\text{C}$).

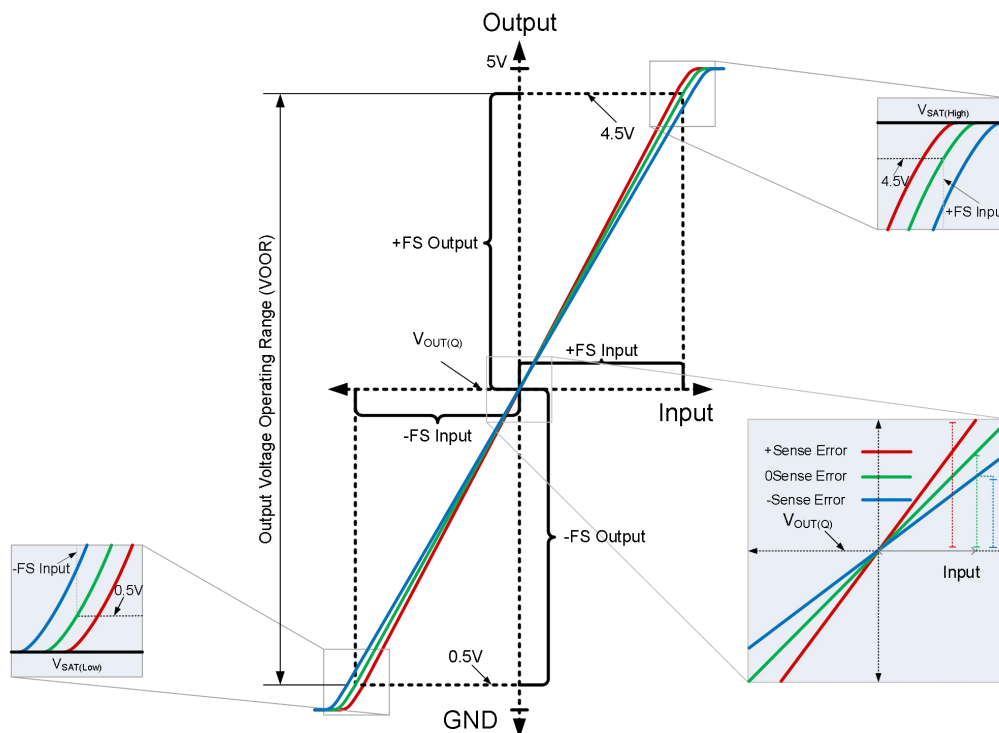


OUTPUT VOLTAGE OPERATING RANGE

As shown in the figure, the output voltage operating range V_{OOR} is the swing range of the linear output of V_{OUT} . V_{OUT} beyond V_{OOR} could still work until V_{SAT} , but performance deteriorated in this range.

Voltage Output Operating Range for V_{CC} and Output Modes

V_{CC}	Bidirectional
5V	± 2
3.3V	± 1.32



TEMPERATURE RISE vs. INPUT CURRENT

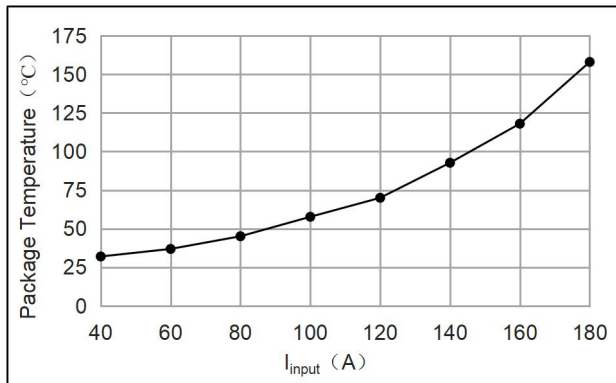
When designing any current sensing system, self-heating due to a single current measurement should be considered. As current flows through the system, the sensor, printed circuit board (PCB), and contact resistance all generate heat. Temperature rise is highly dependent on PCB layout, copper foil thickness, cooling method, and input current method. The primary current includes peak current, the conducting time of current and duty cycle. The data presented in this section is a DC test that can be used to approximate the temperature rise of AC and pulse currents.

The test environment of this experiment is: room temperature, open environment, no wind; The temperature rise test method is: the chip surface is attached to our Demo Board, and the temperature data is collected after the chip temperature is stable. The following chart shows the CC6926 package body surface temperature vs. the continuous current flowing through the primary side.

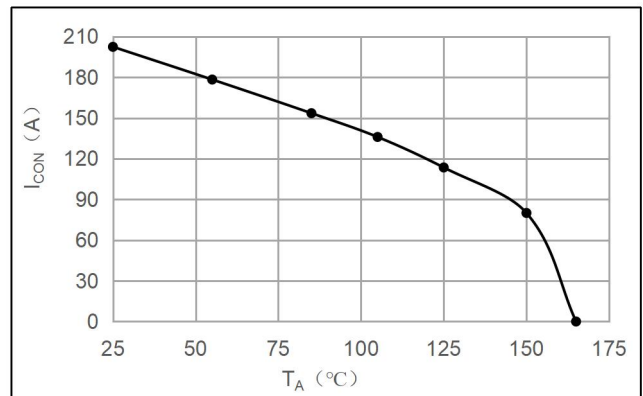
The heat capacity of the CC6926 should be verified by final customer under the specific conditions of the application. The maximum junction temperature $T_{J(MAX)}$ (165°C) should not be exceeded.

For further information on testing this application, please refer to CrossChip 《CrossChip Current Sensor Layout Application Guide》.

Relationship between Package Temperature & Input Current



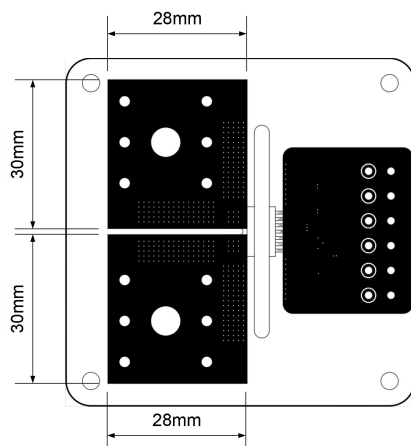
Input Current (IP) vs. Package Temperature



I_{CON} vs T_A

Note: Based on the demo board test, for specific applications, it is necessary to strengthen heat dissipation or choose Tg high plates according to actual application scenarios.

Continuous power supply at 200A current, if the wind speed of the auxiliary cooling fan is 17.5 m/s, the temperature rise can be controlled within the 5°C range.

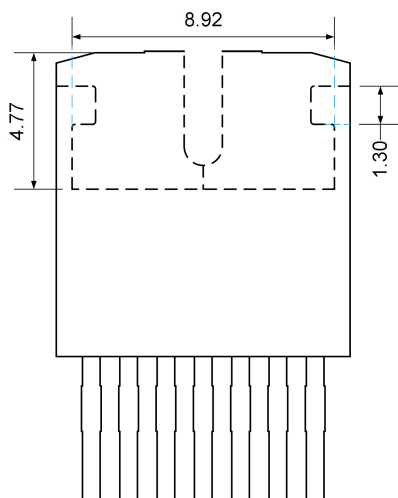
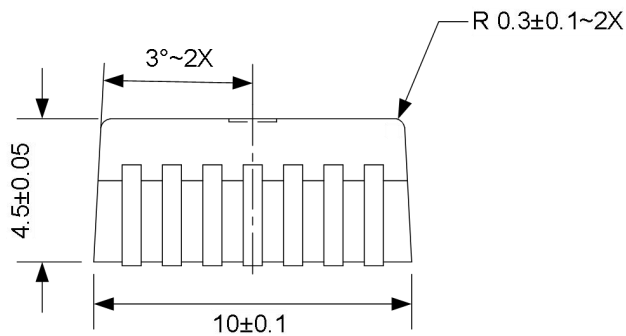
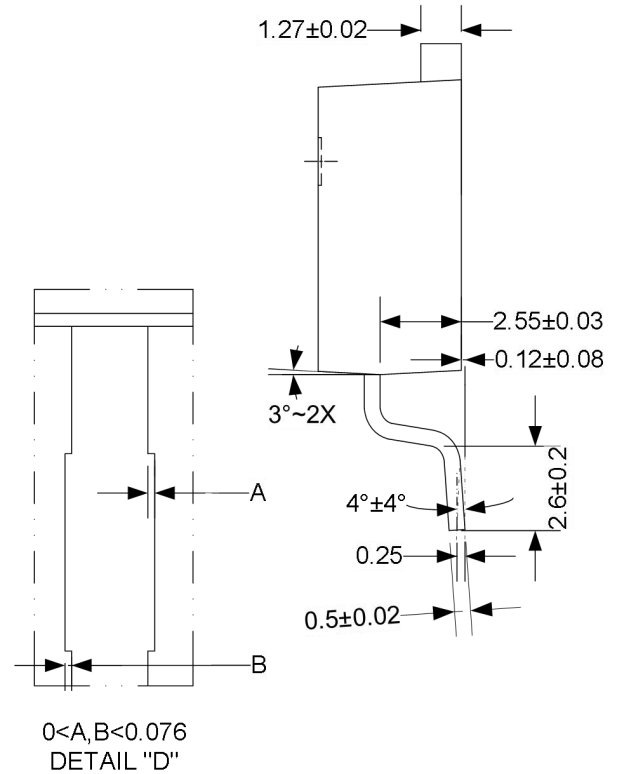
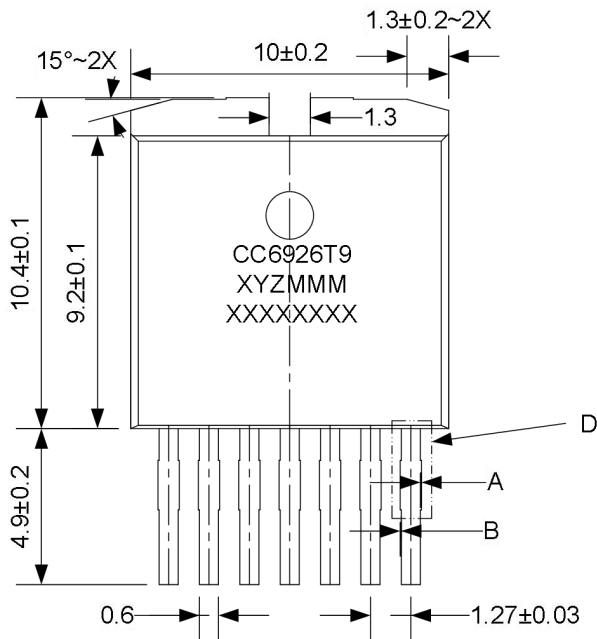


Thickness 1.6mm, FR-4 double layer board, top and bottom 4.5oz copper foils, about 840mm² per foil connected to IP pins, each layer connected with via holes.

Test environment: open environment, quiescent air

PACKAGE INFORMATION

TO263-7 Package



Back

Note:

1. All dimensions are in millimeters.

Marking:

1st Line: CC6926T9 – Device Name

2nd Line: XYZMMM

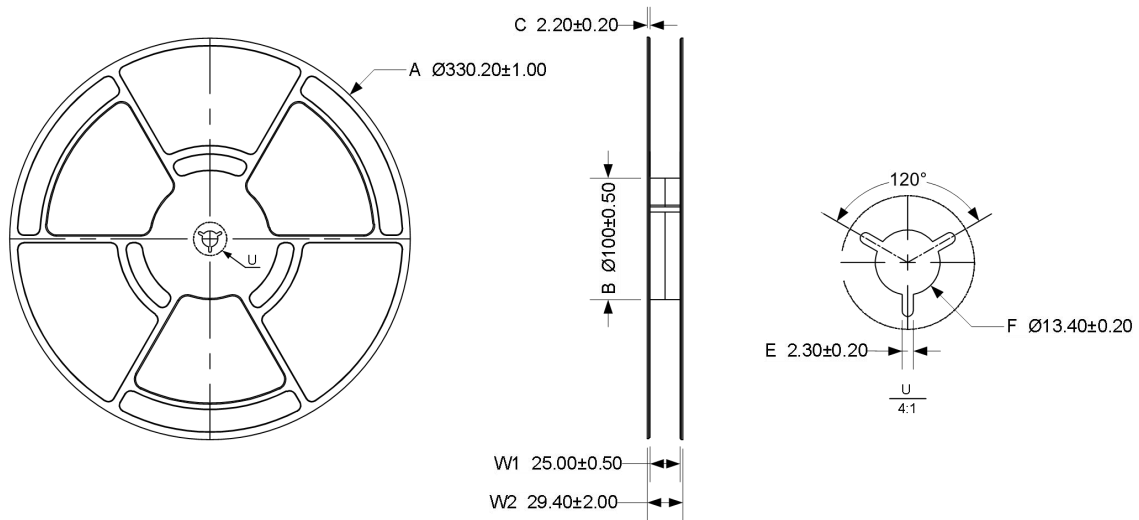
- X: Rated operational voltage
- Y: Output type
- Z: Output polarity
- MMM: Current measurement range

3rd Line: XXXXXXXX

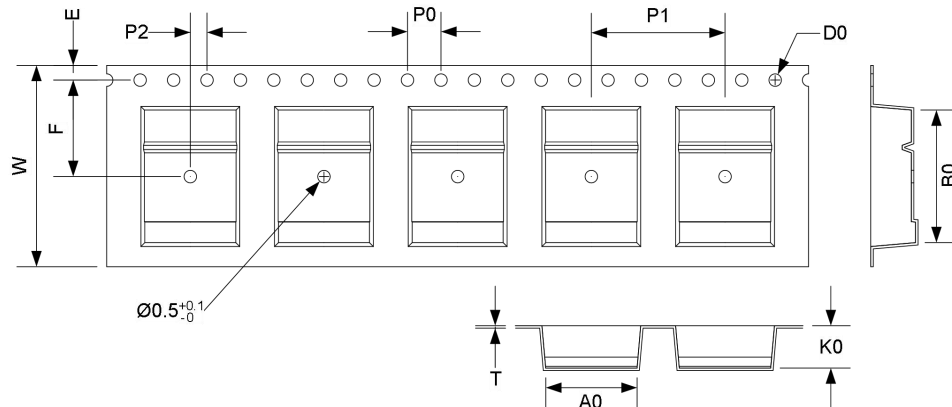
- XXXXXXXX - Production serial number

TAPE AND REEL INFORMATION

Reel Dimensions



Tape Dimensions

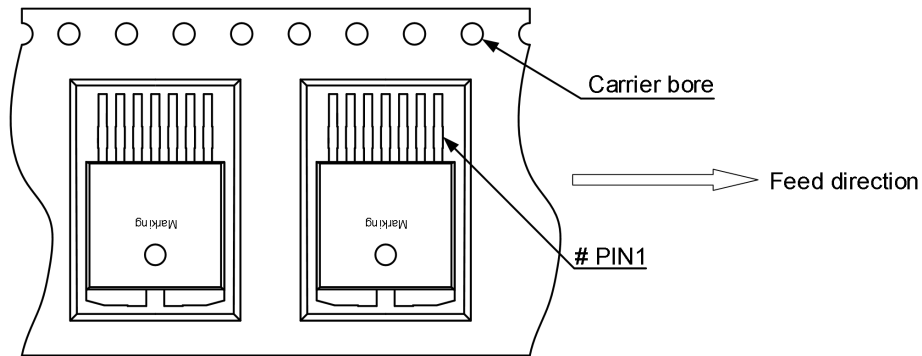


Carrier Tape Basic Size(mm)

W	A0	B0	K0	P0	P1
24 ± 0.30	10.80 ± 0.1	15.80 ± 0.1	5.00 ± 0.1	4.0 ± 0.1	16.00 ± 0.1
P2	F	S	E	D0	T
2.0 ± 0.1	11.5 ± 0.1	0.0 ± 0.1	1.75 ± 0.1	$1.5^{+0.1}_{-0.0}$	0.35 ± 0.05

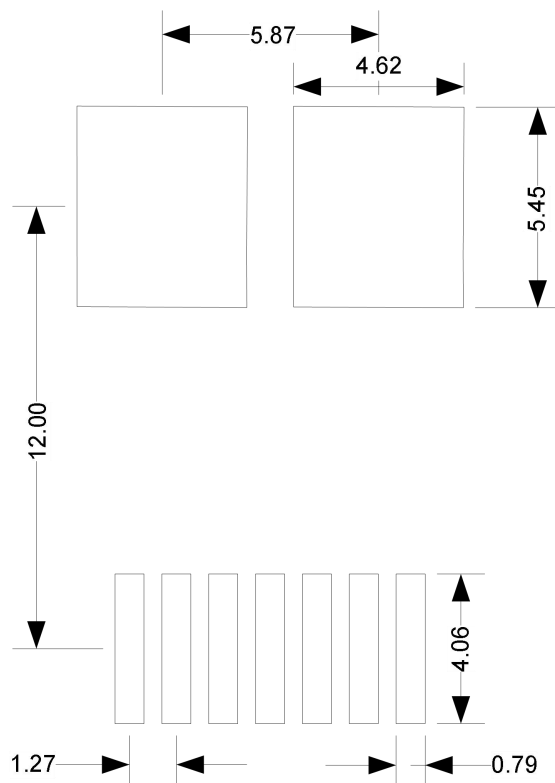
Note: (1) The cumulative error of any 10 consecutive chain holes shall not exceed $\pm 0.2\text{mm}$, and the non-parallelism of 250mm distance in the direction of the length of the carrier belt shall not exceed 1mm. (2) Tolerance $\pm 0.2\text{mm}$ is not specified.

QUADRANT ASSIGNMENTS FOR PIN1 ORIENTATION IN TAPE

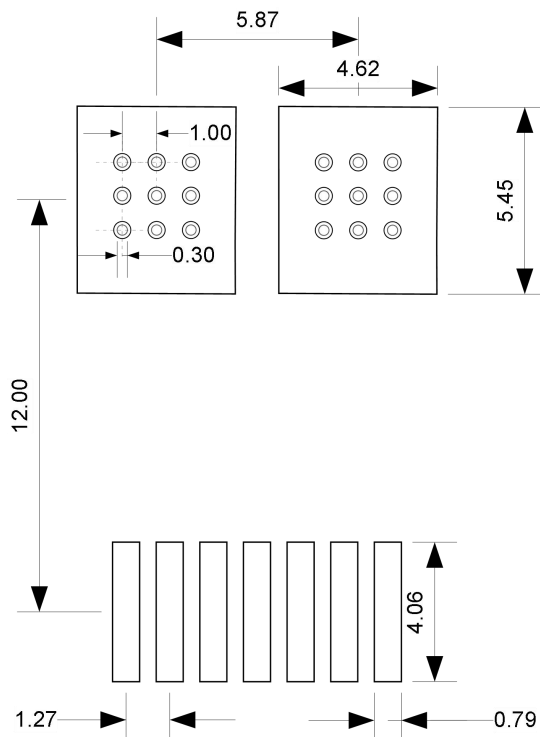


PACKAGE REFERENCE

Recommended welding disc



When the current exceeds 100A, the recommended welding disc need to be punched.



Note: All dimensions are in millimeters.

REVISION HISTORY

Revision Date	Description of Revision	Revision
2024.04.15	Initial release.	rev1.0
2024.05.21	Supplemental transmission response waveforms.	rev1.1
2024.05.23	Supplements the dimensions of the pin width in the package outline of the CC6926.	rev1.2
2024.05.31	Supplements the backside pad dimensions in the package outline of CC6926.	rev1.3
2024.06.18	- Package shipping method changed from tube shipment to tape shipment, supplemented with tape size and reel size information; - Updated format of explanatory notes for product naming definitions; - Indicate the PIN1 position of the chip in the carrier tape in the package information.	rev1.4

CrossChip

CrossChip Microsystems Inc. was founded in 2013, is a national high-tech enterprise, engaged in integrated circuit design and sales. The company has strong technical strength, has more than 60 kinds of patents, mainly used in Hall sensor signal processing, with the following product lines:

- ✓ High precision linear Hall sensor
- ✓ All kinds of Hall switches
- ✓ Single phase motor drive
- ✓ Single chip current sensor
- ✓ AMR Magnetoresistance sensor
- ✓ Isolation drive class chip

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