# CC6937

## High-performance Hall-effect Current Sensor 5A/10A/20A/25A/30A/40A/50A/60A

## FEATURES

- Built-in VREF Output, External VREF Input:
  - Built-in VREF Output: $V_{OE}$ is programmable to < 5mV
  - External VREF Input: $V_{OUT}$ quiescent output voltage is consistent with it
- Measuring current range: 5A,10A,20A,25A,30A,40A,50A,60A
- High isolation and withstand voltage (3750$V_{RMS}$ isolation voltage between pins 1-4 and 5-8)
- High bandwidth (230kHz), Low noise, Single-end analog output
- Less power loss, internal conductor's resistance is 0.5mΩ
- Response time 1.5us
- Room temperature error ±1%, sensitivity temperature drift up to ±2.5%
- Good temperature stability, using Hall signal amplification circuit and temperature compensation circuit
- Differential Hall structure, strong resistance to external magnetic interference
- ESD (HBM) 4kV, ESD (CDM) 1kV, LU 200mA

## APPLCATIONS

- Base Station
- Air-conditioner
- Power Supply
- Control Board
- Other markets with demand for Current Sensor Applications

## GENERAL DESCRIPTION

The CC6937 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 CC6937 device consists of a high-precision, low-noise linear Hall integrated circuit and a low-resistance main current conductor. Internal copper conductor's resistance is typical 0.5mΩ, which provides much less power loss than the universal resistor sampling method. Otherwise, its internal inherent insulation provides 3750$V_{RMS}$ 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 CC6937 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.

CC6937 is available in SOP8 package. It's operating ambient temperature range is -40~125°C. Comply with RoHS requirements.

## DEVICE INFORMATION

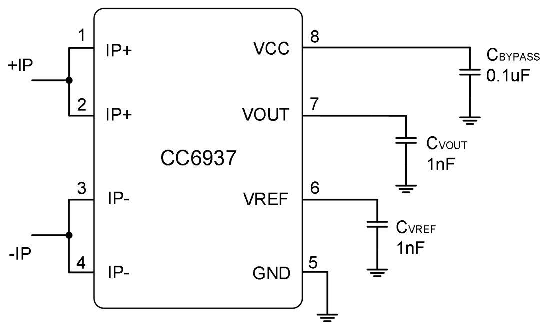
| Part Number | Package | Body Size（TYP.） |
|---|---|---|
| CC6937S8 | SOP8 | 4.90mm×3.90mm |

c UL us

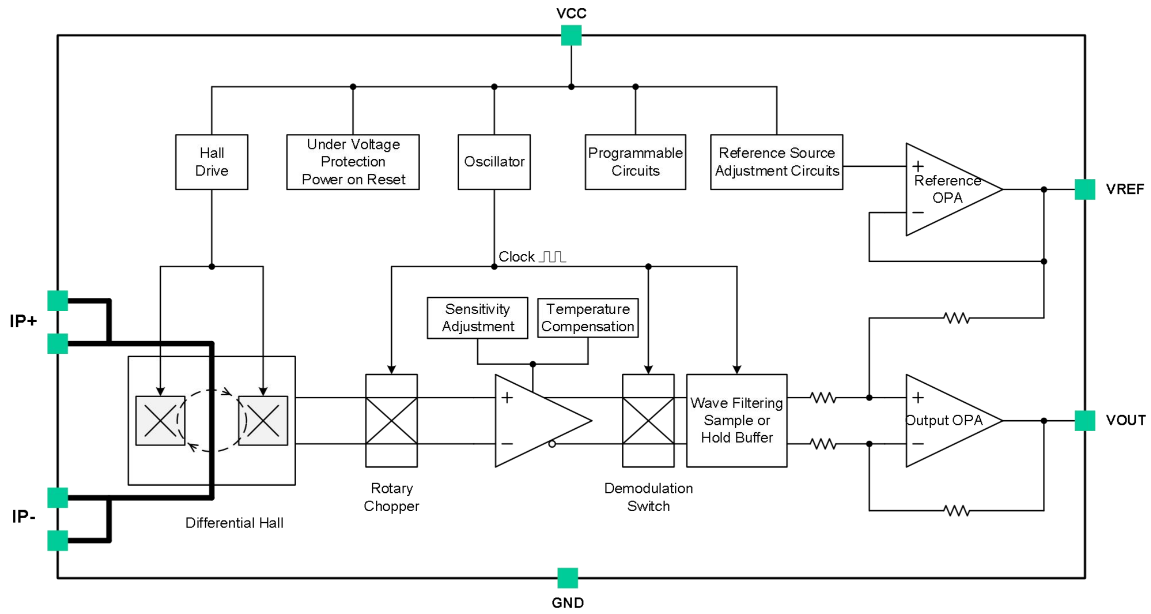
**Certificate Number:**
**E526186-A6003-UL**

## PRODUCT PACKAGE PICTURE


## TYPICAL APPLICATION



## FUNCTION BLOCK DIAGRAM




## ORDERING INFORMATION

| Part No. | SENS. (mV/A) | Package | Packing Form |
|---|---|---|---|
| CC6937S8-5FB005 | 400 | SOP8 | tape reel, 2000 pcs/reel |
| CC6937S8-5FB010 | 200 | SOP8 | tape reel, 2000 pcs/reel |
| CC6937S8-5FB020 | 100 | SOP8 | tape reel, 2000 pcs/reel |
| CC6937S8-5FB025 | 80 | SOP8 | tape reel, 2000 pcs/reel |
| CC6937S8-5FB030 | 66.67 | SOP8 | tape reel, 2000 pcs/reel |
| CC6937S8-5FB040 | 50 | SOP8 | tape reel, 2000 pcs/reel |
| CC6937S8-5FB050 | 40 | SOP8 | tape reel, 2000 pcs/reel |
| CC6937S8-3FB005 | 264 | SOP8 | tape reel, 2000 pcs/reel |
| CC6937S8-3FB010 | 132 | SOP8 | tape reel, 2000 pcs/reel |
| CC6937S8-3FB020 | 66 | SOP8 | tape reel, 2000 pcs/reel |
| CC6937S8-3FB030 | 44 | SOP8 | tape reel, 2000 pcs/reel |
| CC6937S8-3FB040 | 33 | SOP8 | tape reel, 2000 pcs/reel |
| CC6937S8-3FB050 | 26.4 | SOP8 | tape reel, 2000 pcs/reel |
| CC6937S8-XXX（Note1） | - | SOP8 | tape reel, 2000 pcs/reel |

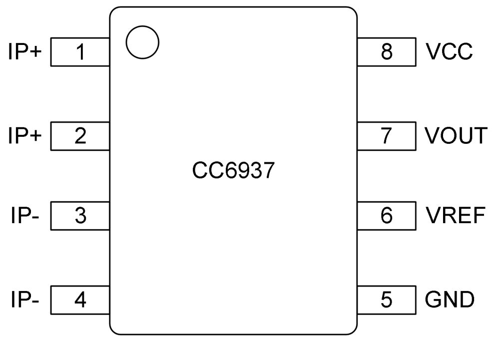
**Note1:** Customization is possible when XXX is in the 60A range

## PRODUCTION NAME DEFINITION

CC 6937 S8 - 5 FB 020

- **Current Range**
  020: 20A range
- **Output Type and Directionality**
  F: Fixed output
  B: Bidirectional
- **Supply Voltage**
  5: VCC=5V
  3: VCC=3.3V
- **Package Part Number**
  S8: SOP8
- **Main Device Name**
  6937
- **CrossChip Part Number**
  Fixed to CC

## PINOUT DIAGRAM




SOP8 Package

| Name | Number | Function |
|---|---|---|
| IP+ | 1 | Current Sampled + |
| IP+ | 2 | Current Sampled + |
| IP- | 3 | Current Sampled - |
| IP- | 4 | Current Sampled - |
| GND | 5 | Ground |
| VREF | 6 | Reference Output Voltage |
| VOUT | 7 | Output Voltage |
| VCC | 8 | Supply Voltage |

## ABSOLUTE MAXIMUM RATINGS

| Parameter | Symbol | Value | Unit |
|---|---|---|---|
| Power Supply Voltage | $V_{CC}$ | 6.5 | V |
| Output Voltage | $V_{OUT}$ | $V_{CC}$ +0.3 | V |
| Output Source Current | $I_{OUT(SOURCE)}$ | 25 | mA |
| Operating Ambient Temperature | $T_A$ | -40 ~ 125 | °C |
| Junction Temperature | $T_J$ | 165 | °C |
| Storage Temperature | $T_S$ | -55 ~ 150 | °C |
| Electrostatic Discharge Voltage (ESD) | 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 |
|---|---|---|---|---|
| Withstand Isolation Voltage | $V_{ISO}$ | Type test, 50/60Hz, 1min | 3750 | $V_{RMS}$ |
| Working Voltage for Basic Insulation | $V_{WVBI}$ | Basic Insulation UL/IEC 62368-1: 2018 | 834 | $V_{PK}$ / $V_{DC}$ |
| | | | 429 | $V_{RMS}$ |
| Working Voltage for Reinforced Insulation | $V_{WVRI}$ | Reinforced Insulation UL/IEC 62368-1: 2018 | 417 | $V_{PK}$ / $V_{DC}$ |
| | | | 214 | $V_{RMS}$ |
| Clearance | $D_{cl}$ | minimum distance through air from IP leads to signal leads | 4.3 | mm |
| Creepage | $D_{cr}$ | minimum distance from the IP wire to the signal wire along the package | 4.3 | mm |
| Comparative Tracking Index | CTI | | ≥600 | V |
| Maximum Surge Isolation Voltage | $V_{IOSM}$ | IEC 61000-4-5<br>Tested in air, ± 5 pulses, 2 times/min<br>1.2us (rise) / 50us (width) | 7 | kV |
| Surge Current | $I_{SURGE}$ | IEC 61000-4-5<br>Tested in air, ± 5 pulses, 1 times/min<br>8μs (rise) / 20μs (width) | 9 | kA |

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

| Parameter | Symbol | Conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| **Supply Section，VCC=5V** | | | | | | |
| Power Supply | $V_{CC}$ | - | 4.5 | 5 | 5.5 | V |
| Undervoltage Protection Release Threshold | UV | $V_{CC}$> UV,Undervoltage protection release | | 2.7 | | V |
| Undervoltage Protection Hysteresis Voltage | $UV_{HYS}$ | $V_{CC}$ < UV - $UV_{HYS}$，Lock the chip | | 0.22 | | V |
| Quiescent Current | $I_{CC}$ | | 10 | 12 | 14 | mA |
| **Supply Section，VCC=3.3V** | | | | | | |
| Power Supply | $V_{CC}$ | - | 3 | 3.3 | 3.6 | V |
| Undervoltage Protection Release Threshold | UV | $V_{CC}$> UV,Undervoltage protection release | | 2.8 | | V |
| Undervoltage Protection Hysteresis Voltage | $UV_{HYS}$ | $V_{CC}$ < UV - $UV_{HYS}$，Lock the chip | | 0.16 | | V |
| Quiescent Current | $I_{CC}$ | | 7 | 9 | 11 | mA |
| **Output Section，VOUT** | | | | | | |
| VOUT Filter Capacitors | $C_{OUT}$ | VOUT to GND | | 1 | 2.2 | nF |
| VOUT Load Resistance | $R_{L\_OUT}$ | VOUT to GND | 1.5 | | | kΩ |
| Zero Current Output Voltage | $V_{OUTQ}$ | 5V nominal supply voltage series | 2.492 | 2.500 | 2.508 | V |
| | | 3.3V nominal supply voltage series | 1.644 | 1.650 | 1.656 | V |
| VOUT Output Short Circuit Current | $I_{OUT\_SC\_GND}$ | VOUT to GND short-circuit current | | 30 | | mA |
| | $I_{OUT\_SC\_VCC}$ | VOUT to VCC short-circuit current | | 30 | | mA |
| Signal Chain -3dB Bandwidth | $f_{-3dB}$ | Small signal -3dB bandwidth | | 230 | | kHz |
| Signal Response Time | $t_{RES}$ | Input current up to 90% to VOUT 90% | | 1.5 | | us |
| **Reference Section，VREF** | | | | | | |
| VREF Filter Capacitors | $C_{REF}$ | VOUT to GND | | 1 | 2.2 | nF |
| VREF Load Resistance | $R_{L\_REF}$ | VOUT to GND | 1.5 | | | kΩ |
| VREF Output Voltage | $V_{REF}$ | 5V nominal supply voltage series | 2.45 | 2.50 | 2.55 | V |
| | | 3.3V nominal supply voltage series | 1.60 | 1.65 | 1.70 | V |
| VREF Input Voltage | $V_{REFIN}$ | VREF Input voltage range | 0 | | 4 | V |
| VREF Output Short Circuit Current | $I_{REF\_SC\_GND}$ | VREF to GND short-circuit current | | 5 | | mA |
| | $I_{REF\_SC\_VCC}$ | VREF to VCC short-circuit current | | 5 | | mA |
| **On-resistance** | | | | | | |
| Primary on-resistance | $R_P$ | $T_A$=25°C; $I_P$= 2A | | 0.5 | | mΩ |

**CC6937S8-5FB005** ($V_{CC}$=5V, $C_{OUT}$=1nF, $C_{REF}$=1nF, $T_A$=25°C, unless otherwise specified)

| Parameter | Symbol | Conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| Current Accuracy Range | $I_P$ | - | -5 | | 5 | A |
| Sensitivity | Sens | full range of $I_P$ | | 400 | | mV/A |
| Zero Current Differential Output Error | $V_{OE}$ | $T_A$=25°C, $V_{OE}$=$V_{OUT}$-$V_{REF}$, $I_P$=0A | -20 | | 20 | mV |
| Zero Current Output Offset Drift | $\Delta V_{OE}$ | $T_A$=-40°C ~125°C<br>$V_{OE}$ offset voltage drift =$V_{OE\_TA}$ - $V_{OE\_25℃}$ | -80 | | 80 | mV |
| Noise | $V_{N(RMS)}$ | $I_P$=0A | | 45 | | mV |
| Zero Current Quiescent Output Voltage | $V_{OUT(Q)}$ | $T_A$=25°C, $I_P$=0A | 2.485 | 2.500 | 2.515 | V |
| Zero Current Quiescent Output Voltage Temperature Drift | $\Delta V_{OUT(Q)}$ | $T_A$=-40°C ~125°C<br>$V_{OUT(Q)}$ voltage drift=$V_{OUT(Q)\_TA}$ -$V_{OUT(Q)\_25℃}$ | -80 | | 80 | mV |
| Sensitivity Error | $\Delta_{SENS}$ | $T_A$=-40°C ~ 125°C | -2.5 | | 2.5 | % |
| Total Output Error | $E_{TOT}$ | $T_A$=-40°C ~ 125°C, $I_P$=$I_{P\_MAX}$ | -3.0 | | 3.0 | % |

**CC6937S8-5FB010** ($V_{CC}$=5V, $C_{OUT}$=1nF, $C_{REF}$=1nF, $T_A$=25°C, unless otherwise specified)

| Parameter | Symbol | Conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| Current Accuracy Range | $I_P$ | - | -10 | | 10 | A |
| Sensitivity | Sens | full range of $I_P$ | | 200 | | mV/A |
| Zero Current Differential Output Error | $V_{OE}$ | $T_A$=25°C, $V_{OE}$=$V_{OUT}$-$V_{REF}$, $I_P$=0A | -5 | | 5 | mV |
| Zero Current Output Offset Drift | $\Delta V_{OE}$ | $T_A$=-40°C ~125°C<br>$V_{OE}$ offset voltage drift =$V_{OE\_TA}$ - $V_{OE\_25℃}$ | -80 | | 80 | mV |
| Noise | $V_{N(RMS)}$ | $I_P$=0A | | 30 | | mV |
| Zero Current Quiescent Output Voltage | $V_{OUT(Q)}$ | $T_A$=25°C, $I_P$=0A | 2.492 | 2.500 | 2.508 | V |
| Zero Current Quiescent Output Voltage Temperature Drift | $\Delta V_{OUT(Q)}$ | $T_A$=-40°C ~125°C<br>$V_{OUT(Q)}$ voltage drift=$V_{OUT(Q)\_TA}$ -$V_{OUT(Q)\_25℃}$ | -80 | | 80 | mV |
| Sensitivity Error | $\Delta_{SENS}$ | $T_A$=-40°C ~ 125°C | -2.5 | | 2.5 | % |
| Total Output Error | $E_{TOT}$ | $T_A$=-40°C ~ 125°C, $I_P$=$I_{P\_MAX}$ | -3.0 | | 3.0 | % |

**CC6937S8-5FB020** ($V_{CC}$=5V, $C_{OUT}$=1nF, $C_{REF}$=1nF, $T_A$=25°C, unless otherwise specified)

| Parameter | Symbol | Conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| Current Accuracy Range | $I_P$ | - | -20 | | 20 | A |
| Sensitivity | Sens | full range of $I_P$ | | 100 | | mV/A |
| Zero Current Differential Output Error | $V_{OE}$ | $T_A$=25°C, $V_{OE}$=$V_{OUT}$-$V_{REF}$, $I_P$=0A | -5 | | 5 | mV |
| Zero Current Output Offset Drift | $\Delta V_{OE}$ | $T_A$=-40°C ~125°C<br>$V_{OE}$ offset voltage drift =$V_{OE\_TA}$ - $V_{OE\_25℃}$ | -25 | | 25 | mV |
| Noise | $V_{N(RMS)}$ | $I_P$=0A | | 15 | | mV |
| Zero Current Quiescent Output Voltage | $V_{OUT(Q)}$ | $T_A$=25°C, $I_P$=0A | 2.492 | 2.500 | 2.508 | V |
| Zero Current Quiescent Output Voltage Temperature Drift | $\Delta V_{OUT(Q)}$ | $T_A$=-40°C ~125°C<br>$V_{OUT(Q)}$ voltage drift=$V_{OUT(Q)\_TA}$ -$V_{OUT(Q)\_25℃}$ | -20 | | 20 | mV |
| Sensitivity Error | $\Delta_{SENS}$ | $T_A$=-40°C ~ 125°C | -2.5 | | 2.5 | % |
| Total Output Error | $E_{TOT}$ | $T_A$=-40°C ~ 125°C, $I_P$=$I_{P\_MAX}$ | -3.0 | | 3.0 | % |

**CC6937S8-5FB025** ($V_{CC}$=5V, $C_{OUT}$=1nF, $C_{REF}$=1nF, $T_A$=25°C, unless otherwise specified)

| Parameter | Symbol | Conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| Current Accuracy Range | $I_P$ | - | -25 | | 25 | A |
| Sensitivity | Sens | full range of $I_P$ | | 80 | | mV/A |
| Zero Current Differential Output Error | $V_{OE}$ | $T_A$=25°C, $V_{OE}$=$V_{OUT}$-$V_{REF}$, $I_P$=0A | -5 | | 5 | mV |
| Zero Current Output Offset Drift | $\Delta V_{OE}$ | $T_A$=-40°C ~125°C<br>$V_{OE}$ offset voltage drift =$V_{OE\_TA}$ - $V_{OE\_25℃}$ | -25 | | 25 | mV |
| Noise | $V_{N(RMS)}$ | $I_P$=0A | | 9 | | mV |
| Zero Current Quiescent Output Voltage | $V_{OUT(Q)}$ | $T_A$=25°C, $I_P$=0A | 2.492 | 2.500 | 2.508 | V |
| Zero Current Quiescent Output Voltage Temperature Drift | $\Delta V_{OUT(Q)}$ | $T_A$=-40°C ~125°C<br>$V_{OUT(Q)}$ voltage drift=$V_{OUT(Q)\_TA}$ -$V_{OUT(Q)\_25℃}$ | -20 | | 20 | mV |
| Sensitivity Error | $\Delta_{SENS}$ | $T_A$=-40°C ~ 125°C | -2.5 | | 2.5 | % |
| Total Output Error | $E_{TOT}$ | $T_A$=-40°C ~ 125°C, $I_P$=$I_{P\_MAX}$ | -3.0 | | 3.0 | % |

**CC6937S8-5FB030** ($V_{CC}$=5V, $C_{OUT}$=1nF, $C_{REF}$=1nF, $T_A$=25°C, unless otherwise specified)

| Parameter | Symbol | Conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| Current Accuracy Range | $I_P$ | - | -30 | | 30 | A |
| Sensitivity | Sens | full range of $I_P$ | | 66.67 | | mV/A |
| Zero Current Differential Output Error | $V_{OE}$ | $T_A$=25°C, $V_{OE}$=$V_{OUT}$-$V_{REF}$, $I_P$=0A | -5 | | 5 | mV |
| Zero Current Output Offset Drift | $\Delta V_{OE}$ | $T_A$=-40°C ~125°C<br>$V_{OE}$ offset voltage drift =$V_{OE\_TA}$ - $V_{OE\_25°C}$ | -25 | | 25 | mV |
| Noise | $V_{N(RMS)}$ | $I_P$=0A | | 10 | | mV |
| Zero Current Quiescent Output Voltage | $V_{OUT(Q)}$ | $T_A$=25°C, $I_P$=0A | 2.492 | 2.500 | 2.508 | V |
| Zero Current Quiescent Output Voltage Temperature Drift | $\Delta V_{OUT(Q)}$ | $T_A$=-40°C ~125°C<br>$V_{OUT(Q)}$ voltage drift=$V_{OUT(Q)\_TA}$ -$V_{OUT(Q)\_25°C}$ | -20 | | 20 | mV |
| Sensitivity Error | $\Delta_{SENS}$ | $T_A$=-40°C ~ 125°C | -2.5 | | 2.5 | % |
| Total Output Error | $E_{TOT}$ | $T_A$=-40°C ~ 125°C, $I_P$=$I_{P\_MAX}$ | -3.0 | | 3.0 | % |

**CC6937S8-5FB040** ($V_{CC}$=5V, $C_{OUT}$=1nF, $C_{REF}$=1nF, $T_A$=25°C, unless otherwise specified)

| Parameter | Symbol | Conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| Current Accuracy Range | $I_P$ | - | -40 | | 40 | A |
| Sensitivity | Sens | full range of $I_P$ | | 50 | | mV/A |
| Zero Current Differential Output Error | $V_{OE}$ | $T_A$=25°C, $V_{OE}$=$V_{OUT}$-$V_{REF}$, $I_P$=0A | -5 | | 5 | mV |
| Zero Current Output Offset Drift | $\Delta V_{OE}$ | $T_A$=-40°C ~125°C<br>$V_{OE}$ offset voltage drift =$V_{OE\_TA}$ - $V_{OE\_25°C}$ | -25 | | 25 | mV |
| Noise | $V_{N(RMS)}$ | $I_P$=0A | | 7.5 | | mV |
| Zero Current Quiescent Output Voltage | $V_{OUT(Q)}$ | $T_A$=25°C, $I_P$=0A | 2.492 | 2.500 | 2.508 | V |
| Zero Current Quiescent Output Voltage Temperature Drift | $\Delta V_{OUT(Q)}$ | $T_A$=-40°C ~125°C<br>$V_{OUT(Q)}$ voltage drift=$V_{OUT(Q)\_TA}$ -$V_{OUT(Q)\_25°C}$ | -20 | | 20 | mV |
| Sensitivity Error | $\Delta_{SENS}$ | $T_A$=-40°C ~ 125°C | -2.5 | | 2.5 | % |
| Total Output Error | $E_{TOT}$ | $T_A$=-40°C ~ 125°C, $I_P$=$I_{P\_MAX}$ | -3.0 | | 3.0 | % |

**CC6937S8-5FB050** ($V_{CC}$=5V，$C_{OUT}$=1nF，$C_{REF}$=1nF，$T_A$=25°C, unless otherwise specified)

| Parameter | Symbol | Conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| Current Accuracy Range | $I_P$ | - | -50 | | 50 | A |
| Sensitivity | Sens | full range of $I_P$ | | 20 | | mV/A |
| Zero Current Differential Output Error | $V_{OE}$ | $T_A$=25°C，$V_{OE}$=$V_{OUT}$-$V_{REF}$，$I_P$=0A | -5 | | 5 | mV |
| Zero Current Output Offset Drift | $\Delta V_{OE}$ | $T_A$=-40°C ~125°C<br>$V_{OE}$ offset voltage drift =$V_{OE\_TA}$ - $V_{OE\_25℃}$ | -20 | | 20 | mV |
| Noise | $V_{N(RMS)}$ | $I_P$=0A | | 6 | | mV |
| Zero Current Quiescent Output Voltage | $V_{OUT(Q)}$ | $T_A$=25°C，$I_P$=0A | 2.492 | 2.500 | 2.508 | V |
| Zero Current Quiescent Output Voltage Temperature Drift | $\Delta V_{OUT(Q)}$ | $T_A$=-40°C ~125°C<br>$V_{OUT(Q)}$ voltage drift=$V_{OUT(Q)\_TA}$ -$V_{OUT(Q)\_25℃}$ | -20 | | 20 | mV |
| Sensitivity Error | $\Delta_{SENS}$ | $T_A$=-40°C ~ 125°C | -2.5 | | 2.5 | % |
| Total Output Error | $E_{TOT}$ | $T_A$=-40°C ~ 125°C，$I_P$=$I_{P\_MAX}$ | -3.0 | | 3.0 | % |

**CC6937S8-5FB060** ($V_{CC}$=5V，$C_{OUT}$=1nF，$C_{REF}$=1nF，$T_A$=25°C, unless otherwise specified)

| Parameter | Symbol | Conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| Current Accuracy Range | $I_P$ | - | -60 | | 60 | A |
| Sensitivity | Sens | full range of $I_P$ | | 33.33 | | mV/A |
| Zero Current Differential Output Error | $V_{OE}$ | $T_A$=25°C，$V_{OE}$=$V_{OUT}$-$V_{REF}$，$I_P$=0A | -5 | | 5 | mV |
| Zero Current Output Offset Drift | $\Delta V_{OE}$ | $T_A$=-40°C ~125°C<br>$V_{OE}$ offset voltage drift =$V_{OE\_TA}$ - $V_{OE\_25℃}$ | -20 | | 20 | mV |
| Noise | $V_{N(RMS)}$ | $I_P$=0A | | 5 | | mV |
| Zero Current Quiescent Output Voltage | $V_{OUT(Q)}$ | $T_A$=25°C，$I_P$=0A | 2.492 | 2.500 | 2.508 | V |
| Zero Current Quiescent Output Voltage Temperature Drift | $\Delta V_{OUT(Q)}$ | $T_A$=-40°C ~125°C<br>$V_{OUT(Q)}$ voltage drift=$V_{OUT(Q)\_TA}$ -$V_{OUT(Q)\_25℃}$ | -20 | | 20 | mV |
| Sensitivity Error | $\Delta_{SENS}$ | $T_A$=-40°C ~ 125°C | -2.5 | | 2.5 | % |
| Total Output Error | $E_{TOT}$ | $T_A$=-40°C ~ 125°C，$I_P$=$I_{P\_MAX}$ | -3.0 | | 3.0 | % |

**CC6937S8-3FB005** ($V_{CC}$=3.3V， $C_{OUT}$=1nF， $C_{REF}$=1nF， $T_A$=25°C, unless otherwise specified)

| Parameter | Symbol | Conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| Current Accuracy Range | $I_P$ | - | -5 | | 5 | A |
| Sensitivity | Sens | full range of $I_P$ | | 264 | | mV/A |
| Zero Current Differential Output Error | $V_{OE}$ | $T_A$=25°C， $V_{OE}$=$V_{OUT}$-$V_{REF}$， $I_P$=0A | -15 | | 15 | mV |
| Zero Current Output Offset Drift | $\Delta V_{OE}$ | $T_A$=-40°C ~125°C<br>$V_{OE}$ offset voltage drift =$V_{OE\_TA}$ - $V_{OE\_25°C}$ | -50 | | 50 | mV |
| Noise | $V_{N(RMS)}$ | $I_P$=0A | | 45 | | mV |
| Zero Current Quiescent Output Voltage | $V_{OUT(Q)}$ | $T_A$=25°C， $I_P$=0A | 1.64 | 1.65 | 1.66 | V |
| Zero Current Quiescent Output Voltage Temperature Drift | $\Delta V_{OUT(Q)}$ | $T_A$=-40°C ~125°C<br>$V_{OUT(Q)}$ voltage drift=$V_{OUT(Q)\_TA}$ -$V_{OUT(Q)\_25°C}$ | -50 | | 50 | mV |
| Sensitivity Error | $\Delta_{SENS}$ | $T_A$=-40°C ~ 125°C | -2.5 | | 2.5 | % |
| Total Output Error | $E_{TOT}$ | $T_A$=-40°C ~ 125°C， $I_P$=$I_{P\_MAX}$ | -3.0 | | 3.0 | % |

**CC6937S8-3FB010** ($V_{CC}$=3.3V， $C_{OUT}$=1nF， $C_{REF}$=1nF， $T_A$=25°C, unless otherwise specified)

| Parameter | Symbol | Conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| Current Accuracy Range | $I_P$ | - | -10 | | 10 | A |
| Sensitivity | Sens | full range of $I_P$ | | 132 | | mV/A |
| Zero Current Differential Output Error | $V_{OE}$ | $T_A$=25°C， $V_{OE}$=$V_{OUT}$-$V_{REF}$， $I_P$=0A | -15 | | 15 | mV |
| Zero Current Output Offset Drift | $\Delta V_{OE}$ | $T_A$=-40°C ~125°C<br>$V_{OE}$ offset voltage drift =$V_{OE\_TA}$ - $V_{OE\_25°C}$ | -50 | | 50 | mV |
| Noise | $V_{N(RMS)}$ | $I_P$=0A | | 22.5 | | mV |
| Zero Current Quiescent Output Voltage | $V_{OUT(Q)}$ | $T_A$=25°C， $I_P$=0A | 1.64 | 1.65 | 1.66 | V |
| Zero Current Quiescent Output Voltage Temperature Drift | $\Delta V_{OUT(Q)}$ | $T_A$=-40°C ~125°C<br>$V_{OUT(Q)}$ voltage drift=$V_{OUT(Q)\_TA}$ -$V_{OUT(Q)\_25°C}$ | -50 | | 50 | mV |
| Sensitivity Error | $\Delta_{SENS}$ | $T_A$=-40°C ~ 125°C | -2.5 | | 2.5 | % |
| Total Output Error | $E_{TOT}$ | $T_A$=-40°C ~ 125°C， $I_P$=$I_{P\_MAX}$ | -3.0 | | 3.0 | % |

**CC6937S8-3FB020** ($V_{CC}$=3.3V， $C_{OUT}$=1nF， $C_{REF}$=1nF， $T_A$=25°C, unless otherwise specified)

| Parameter | Symbol | Conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| Current Accuracy Range | $I_P$ | - | -20 | | 20 | A |
| Sensitivity | Sens | full range of $I_P$ | | 66 | | mV/A |
| Zero Current Differential Output Error | $V_{OE}$ | $T_A$=25°C， $V_{OE}$=$V_{OUT}$-$V_{REF}$， $I_P$=0A | -10 | | 10 | mV |
| Zero Current Output Offset Drift | $\Delta V_{OE}$ | $T_A$=-40°C ~125°C<br>$V_{OE}$ offset voltage drift =$V_{OE\_TA}$ - $V_{OE\_25℃}$ | -30 | | 30 | mV |
| Noise | $V_{N(RMS)}$ | $I_P$=0A | | 11.25 | | mV |
| Zero Current Quiescent Output Voltage | $V_{OUT(Q)}$ | $T_A$=25°C， $I_P$=0A | 1.64 | 1.65 | 1.66 | V |
| Zero Current Quiescent Output Voltage Temperature Drift | $\Delta V_{OUT(Q)}$ | $T_A$=-40°C ~125°C<br>$V_{OUT(Q)}$ voltage drift=$V_{OUT(Q)\_TA}$ -$V_{OUT(Q)\_25℃}$ | -30 | | 30 | mV |
| Sensitivity Error | $\Delta_{SENS}$ | $T_A$=-40°C ~ 125°C | -3.0 | | 3.0 | % |
| Total Output Error | $E_{TOT}$ | $T_A$=-40°C ~ 125°C， $I_P$=$I_{P\_MAX}$ | -3.5 | | 3.5 | % |

**CC6937S8-3FB030** ($V_{CC}$=3.3V， $C_{OUT}$=1nF， $C_{REF}$=1nF， $T_A$=25°C, unless otherwise specified)

| Parameter | Symbol | Conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| Current Accuracy Range | $I_P$ | - | -30 | | 30 | A |
| Sensitivity | Sens | full range of $I_P$ | | 44 | | mV/A |
| Zero Current Differential Output Error | $V_{OE}$ | $T_A$=25°C， $V_{OE}$=$V_{OUT}$-$V_{REF}$， $I_P$=0A | -5 | | 5 | mV |
| Zero Current Output Offset Drift | $\Delta V_{OE}$ | $T_A$=-40°C ~125°C<br>$V_{OE}$ offset voltage drift =$V_{OE\_TA}$ - $V_{OE\_25℃}$ | -20 | | 20 | mV |
| Noise | $V_{N(RMS)}$ | $I_P$=0A | | 7.5 | | mV |
| Zero Current Quiescent Output Voltage | $V_{OUT(Q)}$ | $T_A$=25°C， $I_P$=0A | 1.64 | 1.65 | 1.66 | V |
| Zero Current Quiescent Output Voltage Temperature Drift | $\Delta V_{OUT(Q)}$ | $T_A$=-40°C ~125°C<br>$V_{OUT(Q)}$ voltage drift=$V_{OUT(Q)\_TA}$ -$V_{OUT(Q)\_25℃}$ | -20 | | 20 | mV |
| Sensitivity Error | $\Delta_{SENS}$ | $T_A$=-40°C ~ 125°C | -2.5 | | 2.5 | % |
| Total Output Error | $E_{TOT}$ | $T_A$=-40°C ~ 125°C， $I_P$=$I_{P\_MAX}$ | -3.0 | | 3.0 | % |

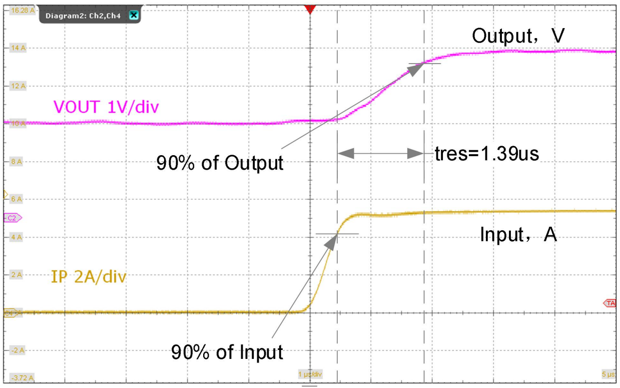
**CC6937S8-3FB040** ($V_{CC}$=3.3V, $C_{OUT}$=1nF, $C_{REF}$=1nF, $T_A$=25°C, unless otherwise specified)

| Parameter | Symbol | Conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| Current Accuracy Range | $I_P$ | - | -40 | | 40 | A |
| Sensitivity | Sens | full range of $I_P$ | | 33 | | mV/A |
| Zero Current Differential Output Error | $V_{OE}$ | $T_A$=25°C, $V_{OE}$=$V_{OUT}$-$V_{REF}$, $I_P$=0A | -5 | | 5 | mV |
| Zero Current Output Offset Drift | $\Delta V_{OE}$ | $T_A$=-40°C ~125°C<br>$V_{OE}$ offset voltage drift =$V_{OE\_TA}$ - $V_{OE\_25°C}$ | -20 | | 20 | mV |
| Noise | $V_{N(RMS)}$ | $I_P$=0A | | 5.63 | | mV |
| Zero Current Quiescent Output Voltage | $V_{OUT(Q)}$ | $T_A$=25°C, $I_P$=0A | 1.64 | 1.65 | 1.66 | V |
| Zero Current Quiescent Output Voltage Temperature Drift | $\Delta V_{OUT(Q)}$ | $T_A$=-40°C ~125°C<br>$V_{OUT(Q)}$ voltage drift=$V_{OUT(Q)\_TA}$ -$V_{OUT(Q)\_25°C}$ | -20 | | 20 | mV |
| Sensitivity Error | $\Delta_{SENS}$ | $T_A$=-40°C ~ 125°C | -3.0 | | 3.0 | % |
| Total Output Error | $E_{TOT}$ | $T_A$=-40°C ~ 125°C, $I_P$=$I_{P\_MAX}$ | -3.5 | | 3.5 | % |

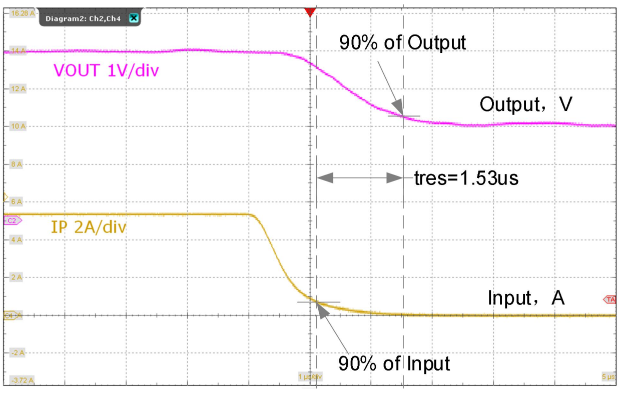
**CC6937S8-3FB050** ($V_{CC}$=3.3V, $C_{OUT}$=1nF, $C_{REF}$=1nF, $T_A$=25°C, unless otherwise specified)

| 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 | $V_{OE}$ | $T_A$=25°C, $V_{OE}$=$V_{OUT}$-$V_{REF}$, $I_P$=0A | -5 | | 5 | mV |
| Zero Current Output Offset Drift | $\Delta V_{OE}$ | $T_A$=-40°C ~125°C<br>$V_{OE}$ offset voltage drift =$V_{OE\_TA}$ - $V_{OE\_25°C}$ | -15 | | 15 | mV |
| Noise | $V_{N(RMS)}$ | $I_P$=0A | | 4.5 | | mV |
| Zero Current Quiescent Output Voltage | $V_{OUT(Q)}$ | $T_A$=25°C, $I_P$=0A | 1.64 | 1.65 | 1.66 | V |
| Zero Current Quiescent Output Voltage Temperature Drift | $\Delta V_{OUT(Q)}$ | $T_A$=-40°C ~125°C<br>$V_{OUT(Q)}$ voltage drift=$V_{OUT(Q)\_TA}$ -$V_{OUT(Q)\_25°C}$ | -15 | | 15 | mV |
| Sensitivity Error | $\Delta_{SENS}$ | $T_A$=-40°C ~ 125°C | -3.0 | | 3.0 | % |
| Total Output Error | $E_{TOT}$ | $T_A$=-40°C ~ 125°C, $I_P$=$I_{P\_MAX}$ | -3.5 | | 3.5 | % |

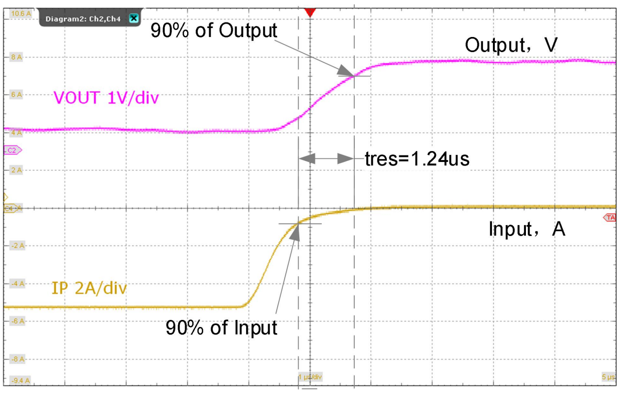
**CURVE & WAVEFORM** ($V_{CC}$=5V, $T_A$=25°C, unless otherwise specified )



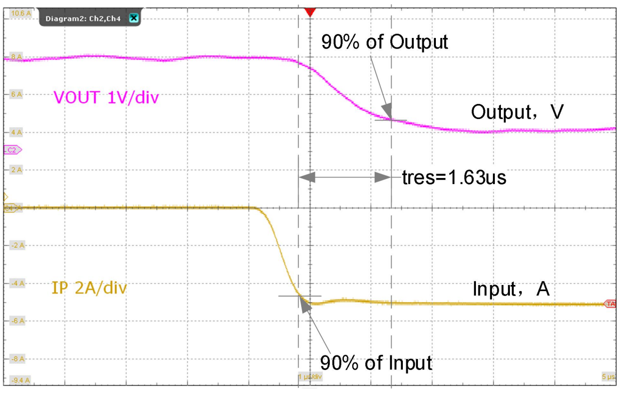

Transmission Response Forward Current Rise Waveform




Transmission Response Forward Current Fall Waveform



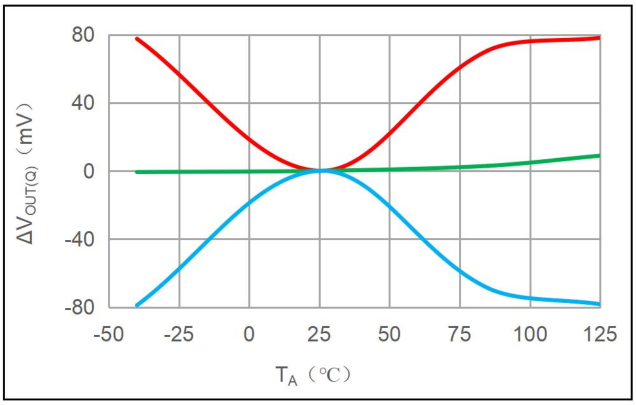

Transmission Response Reverse Current Rise Waveform



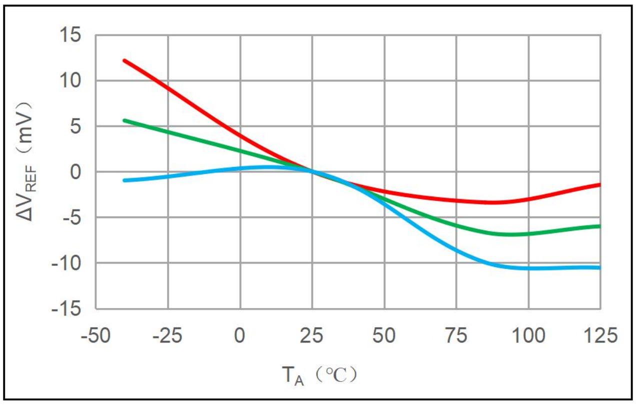

Transmission Response Reverse Current Fall Waveform

## CURVE & WAVEFORM

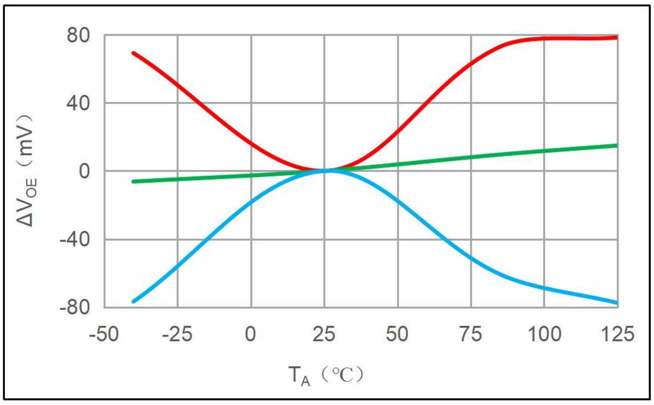
CC6937S8-5FB005[1]



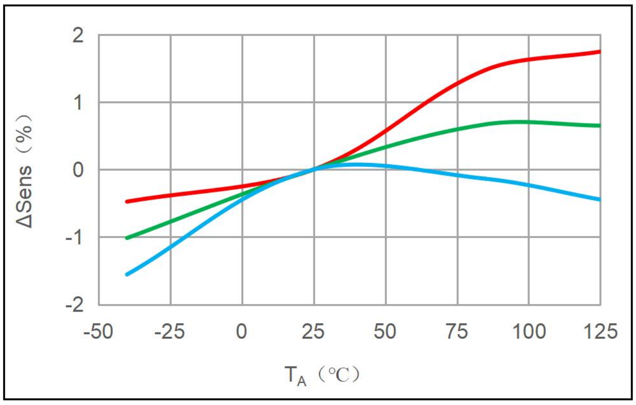

Δ $V_{OUT(Q)}$ vs $T_A$




Δ $V_{REF}$ vs $T_A$



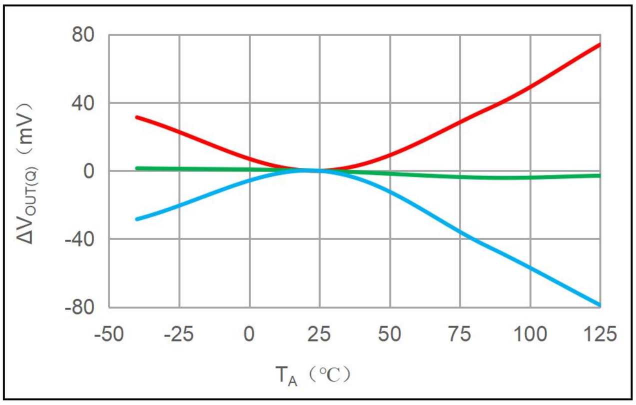

Δ$V_{OE}$ vs $T_A$



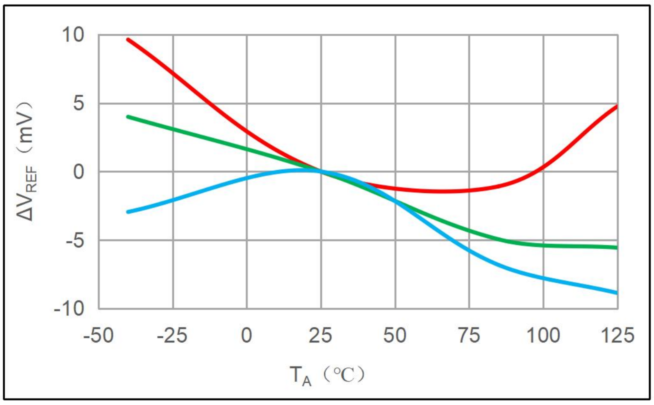

ΔSens vs $T_A$

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

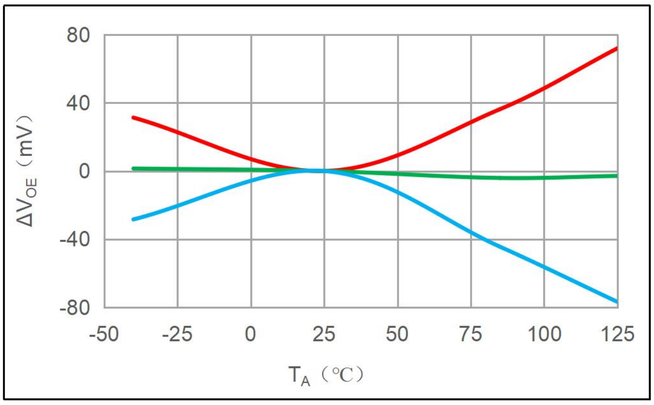
CC6937S8-5FB010[1]



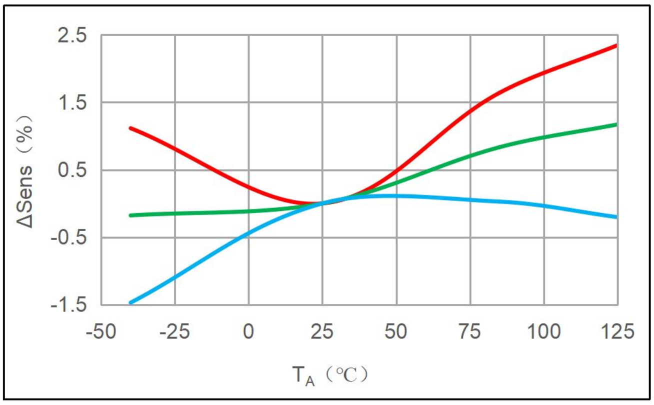

Δ $V_{OUT(Q)}$ vs $T_A$




Δ $V_{REF}$ vs $T_A$



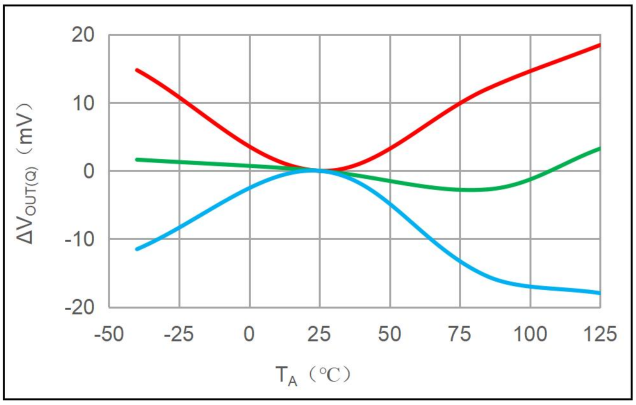

$\Delta V_{OE}$ vs $T_A$



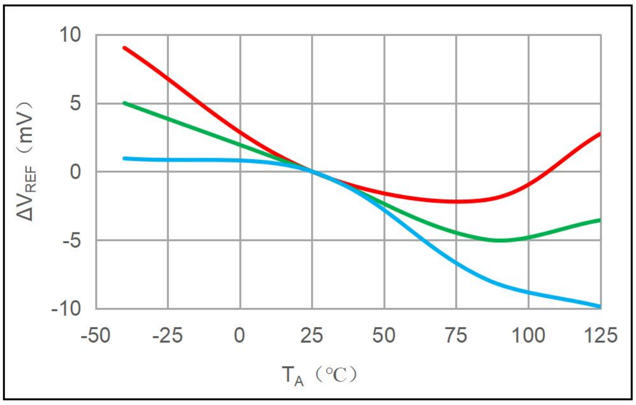

ΔSens vs $T_A$

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

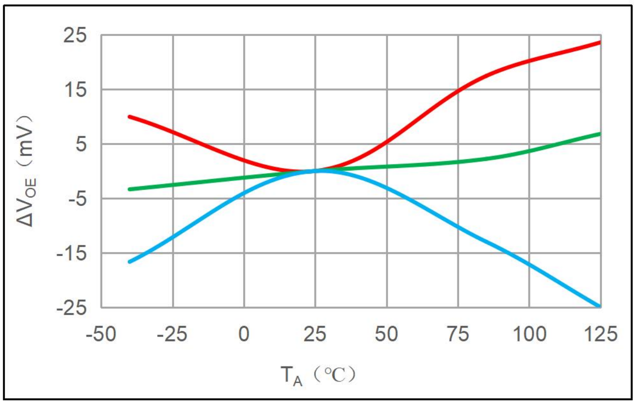
CC6937S8-5FB020[1]



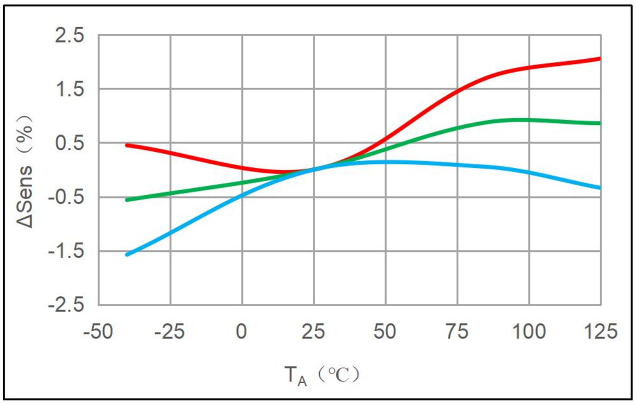

Δ $V_{OUT(Q)}$ vs $T_A$




Δ $V_{REF}$ vs $T_A$



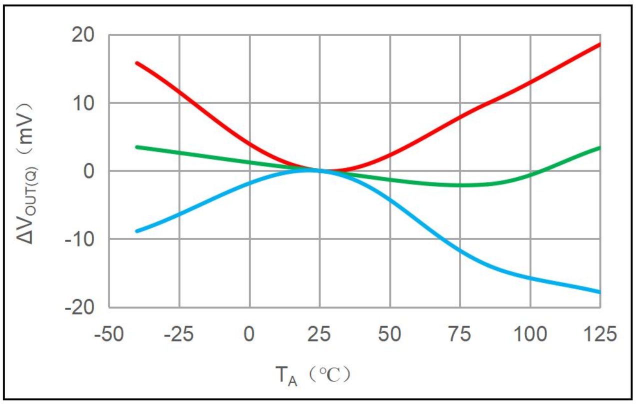

$\Delta V_{OE}$ vs $T_A$



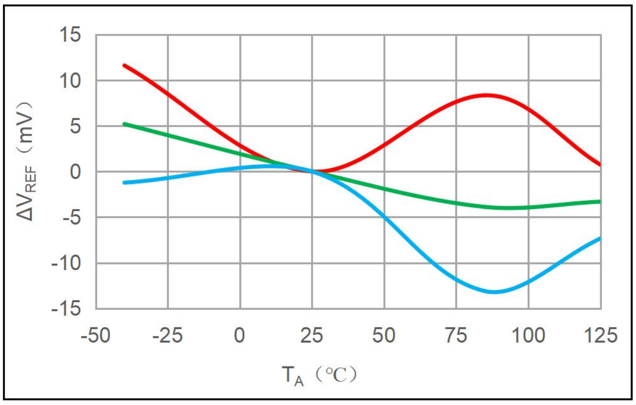

ΔSens vs $T_A$

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

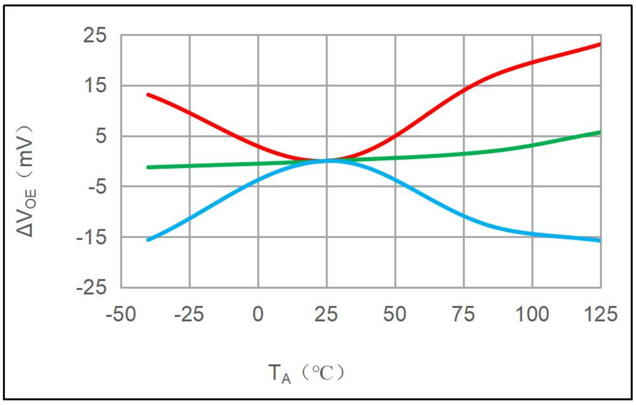
CC6937S8-5FB025[1]



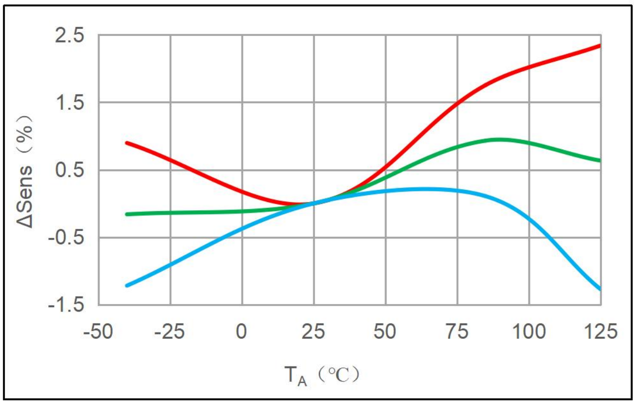

Δ $V_{OUT(Q)}$ vs $T_A$




Δ $V_{REF}$ vs $T_A$



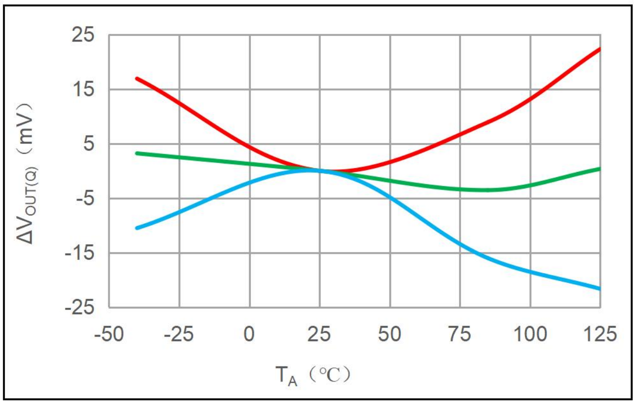

Δ$V_{OE}$ vs $T_A$



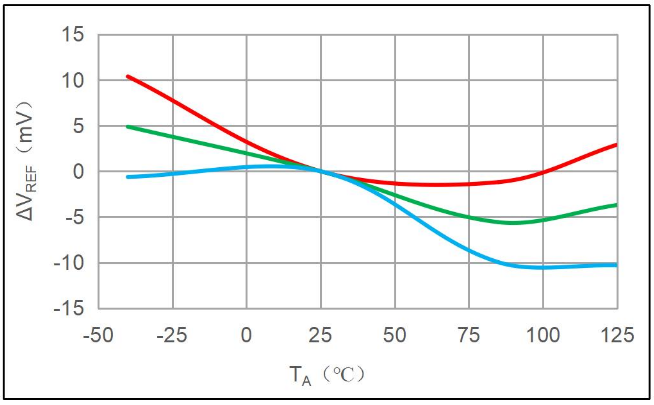

ΔSens vs $T_A$

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

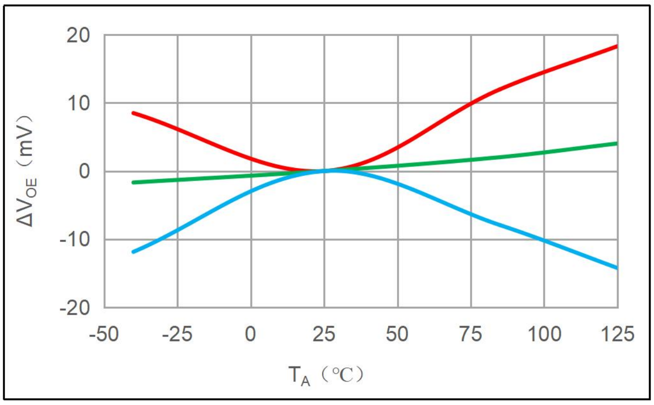
CC6937S8-5FB030[1]



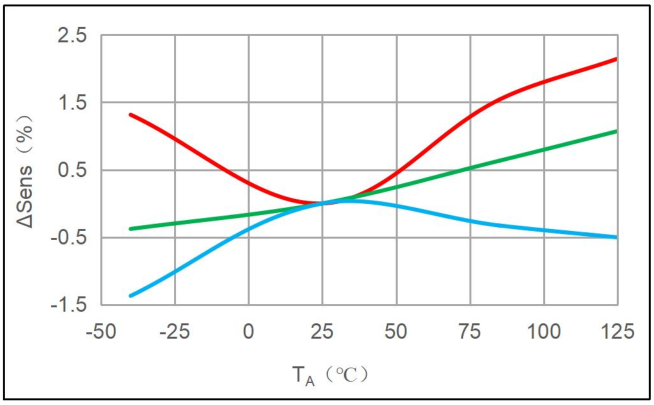

Δ $V_{OUT(Q)}$ vs $T_A$




Δ $V_{REF}$ vs $T_A$



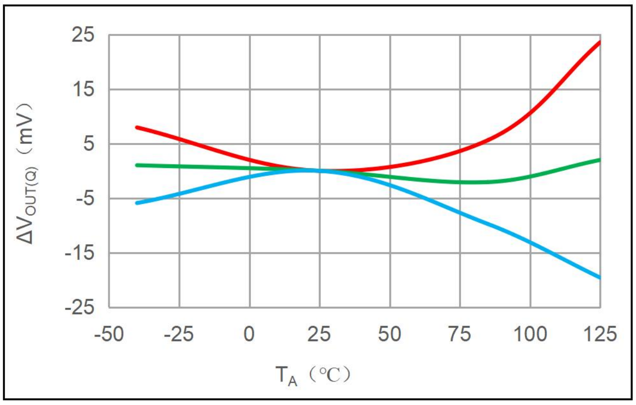

$\Delta V_{OE}$ vs $T_A$



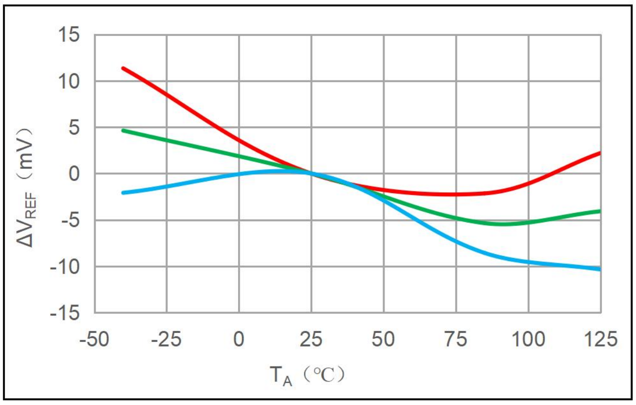

ΔSens vs $T_A$

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

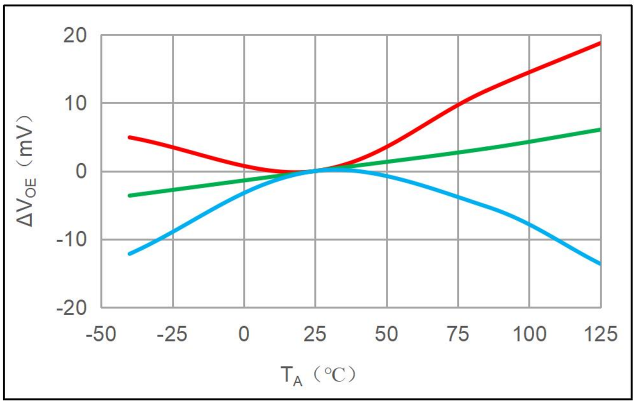
CC6937S8-5FB040[1]



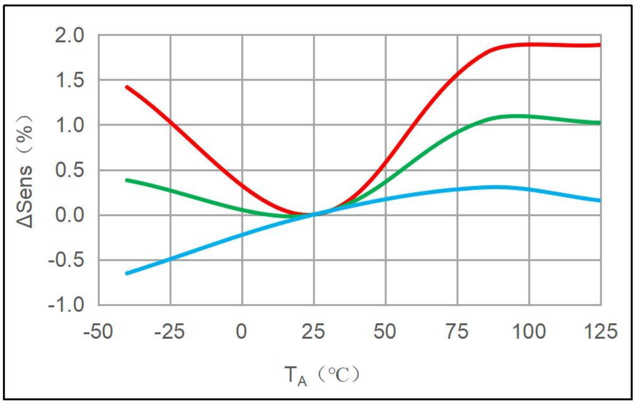

Δ $V_{OUT(Q)}$ vs $T_A$




Δ $V_{REF}$ vs $T_A$



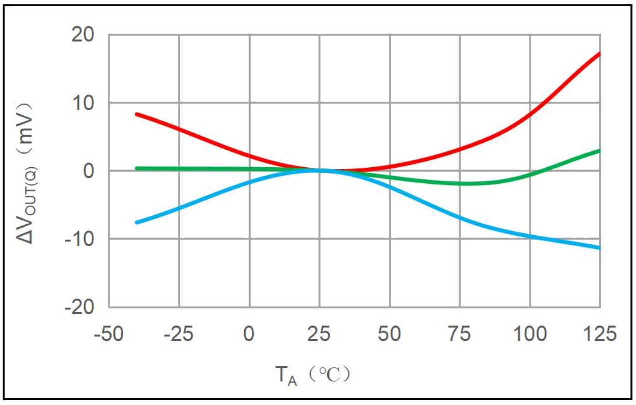

$\Delta V_{OE}$ vs $T_A$



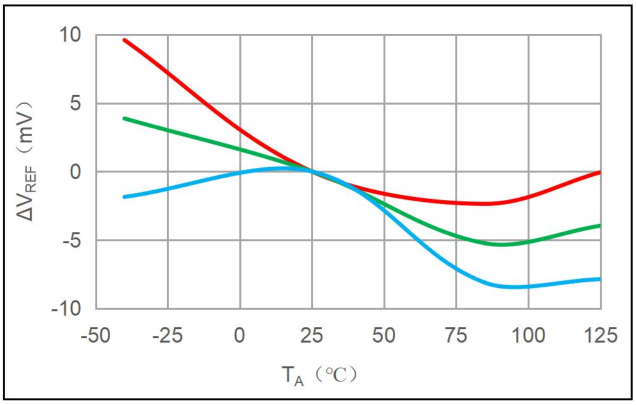

ΔSens vs $T_A$

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

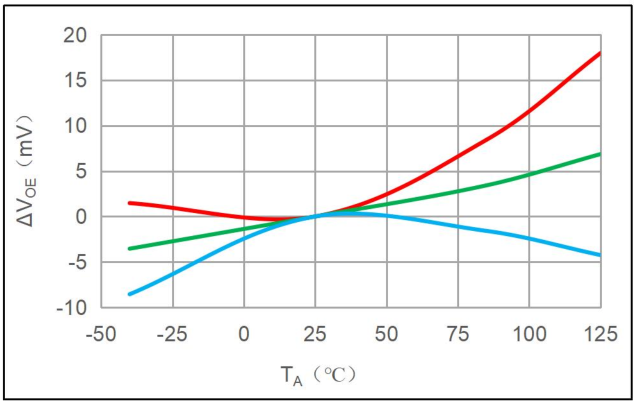
CC6937S8-5FB050[1]



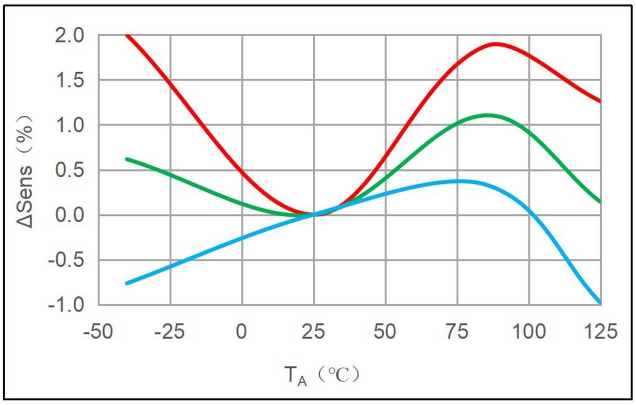

Δ $V_{OUT(Q)}$ vs $T_A$




Δ $V_{REF}$ vs $T_A$



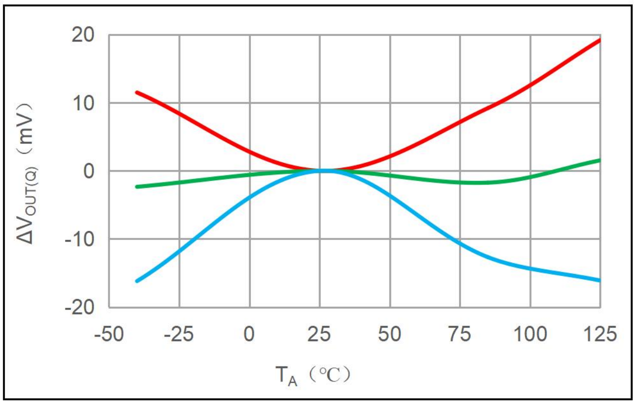

$\Delta V_{OE}$ vs $T_A$



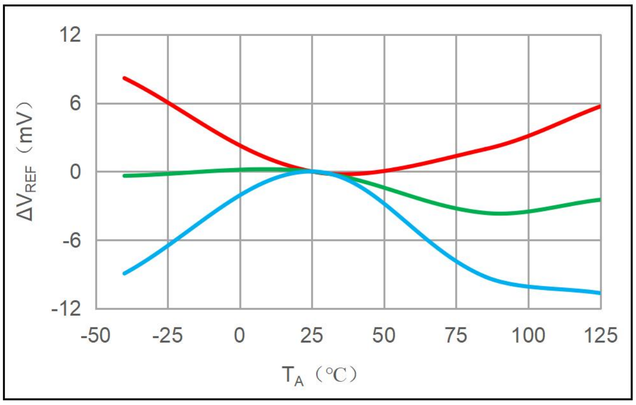

ΔSens vs $T_A$

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

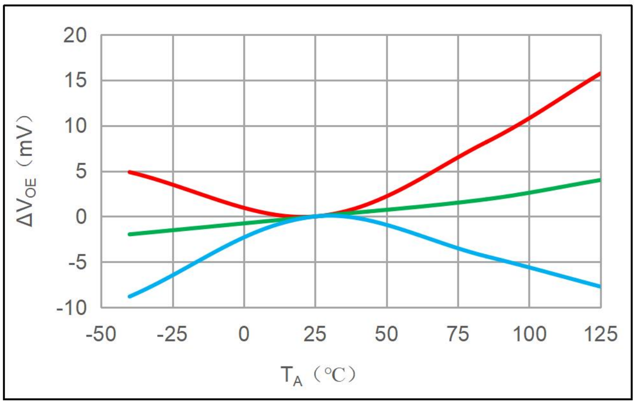
CC6937S8-5FB060[1]



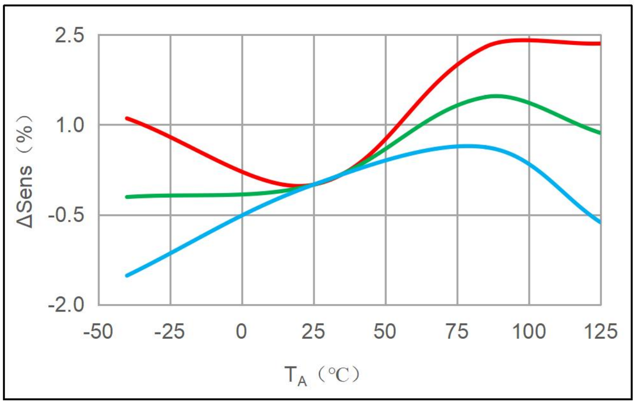

Δ $V_{OUT(Q)}$ vs $T_A$




Δ $V_{REF}$ vs $T_A$



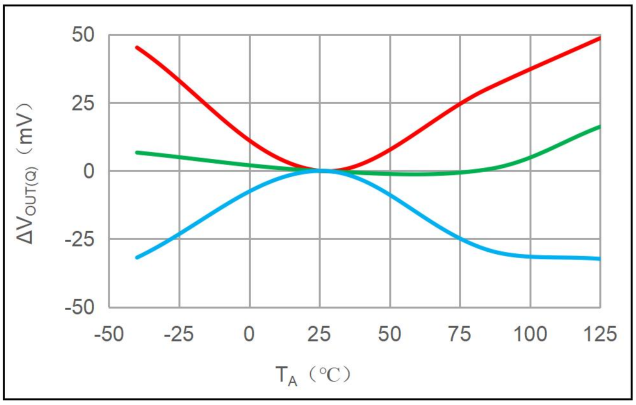

$\Delta V_{OE}$ vs $T_A$



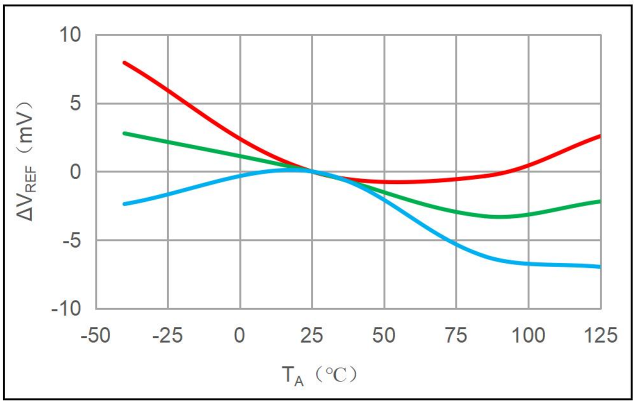

ΔSens vs $T_A$

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

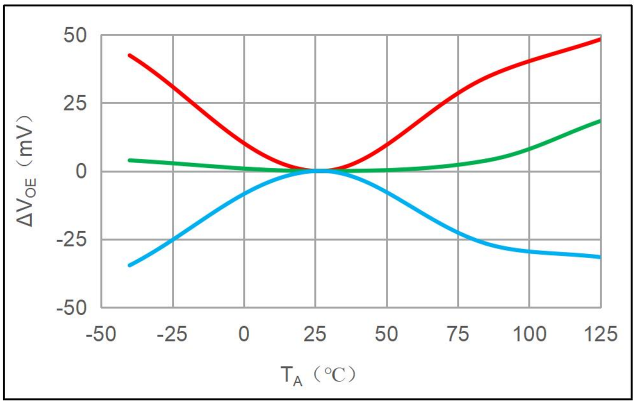
CC6937S8-3FB005[1]



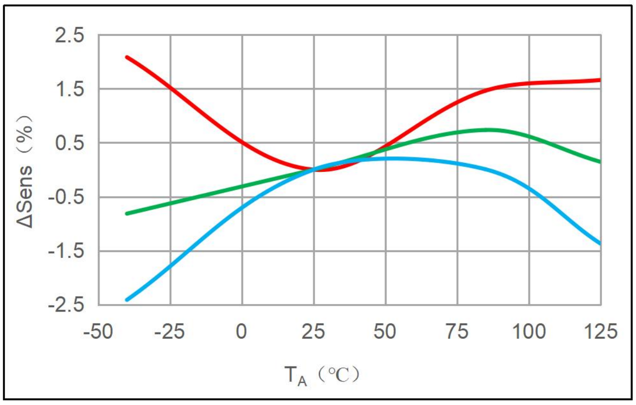

Δ $V_{OUT(Q)}$ vs $T_A$




Δ $V_{REF}$ vs $T_A$



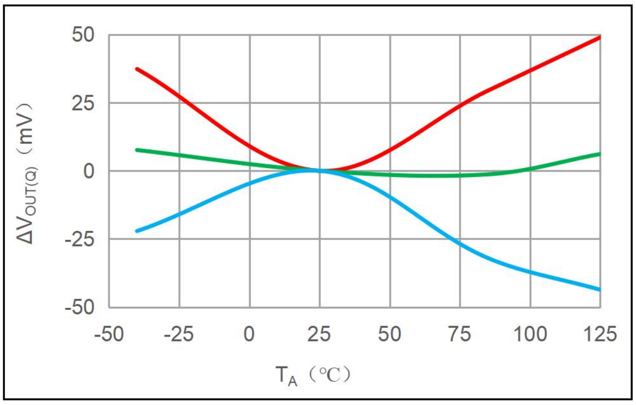

Δ$V_{OE}$ vs $T_A$



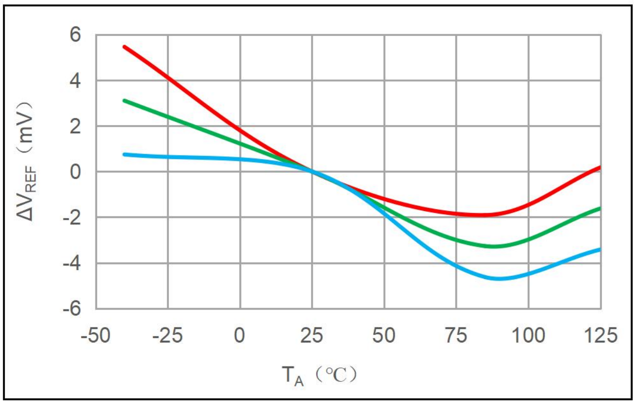

ΔSens vs $T_A$

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

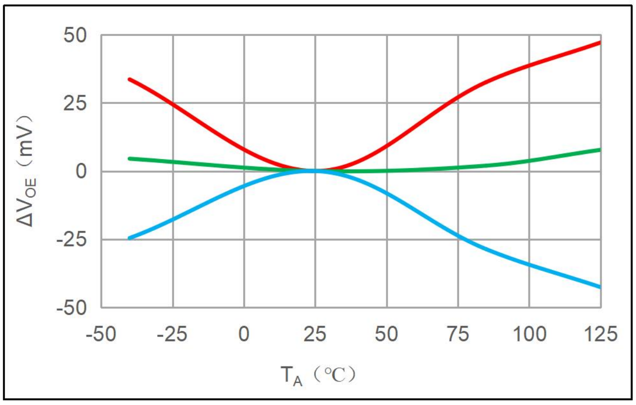
CC6937S8-3FB010[1]



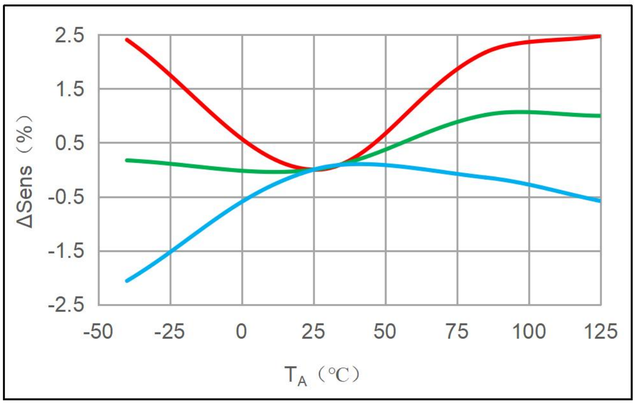

Δ $V_{OUT(Q)}$ vs $T_A$




Δ $V_{REF}$ vs $T_A$



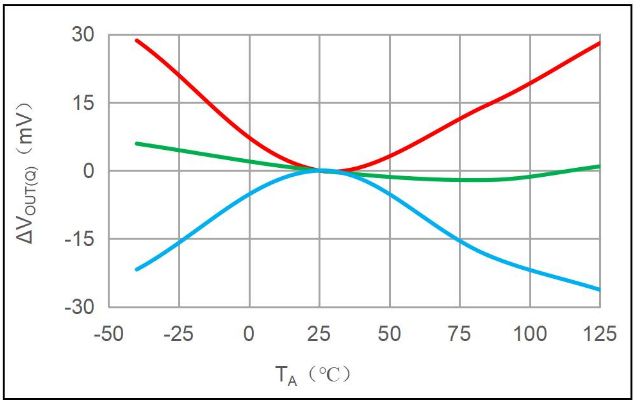

$\Delta V_{OE}$ vs $T_A$



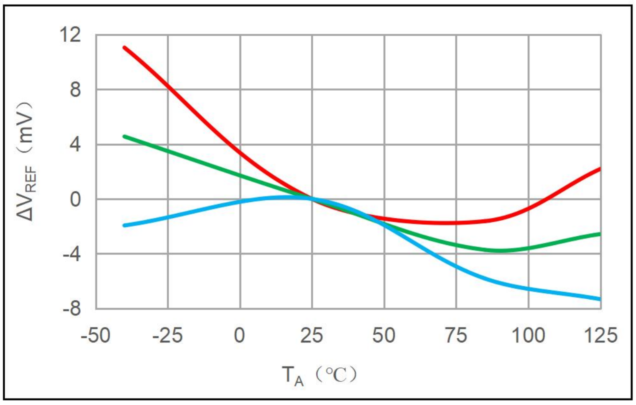

ΔSens vs $T_A$

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

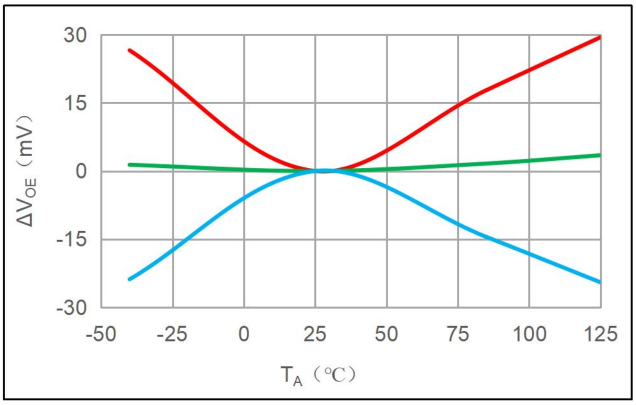
CC6937S8-3FB020[1]



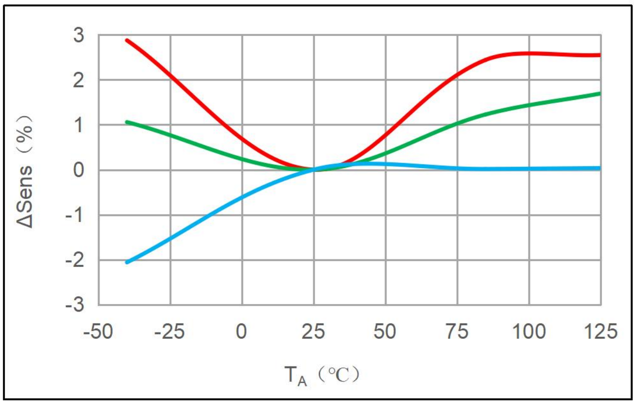

Δ $V_{OUT(Q)}$ vs $T_A$




Δ $V_{REF}$ vs $T_A$



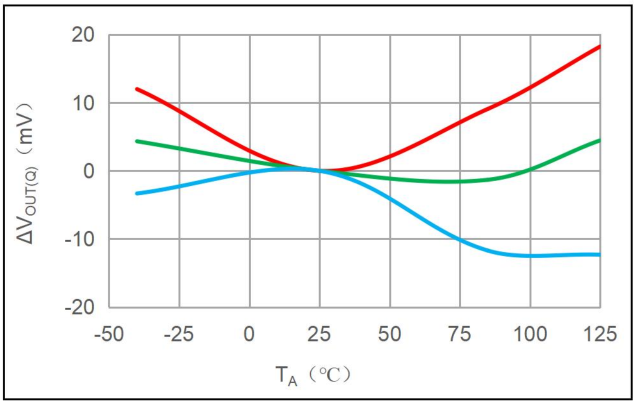

$\Delta V_{OE}$ vs $T_A$



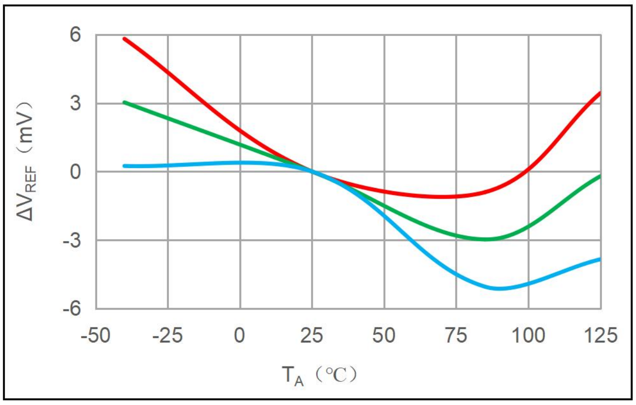

ΔSens vs $T_A$

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

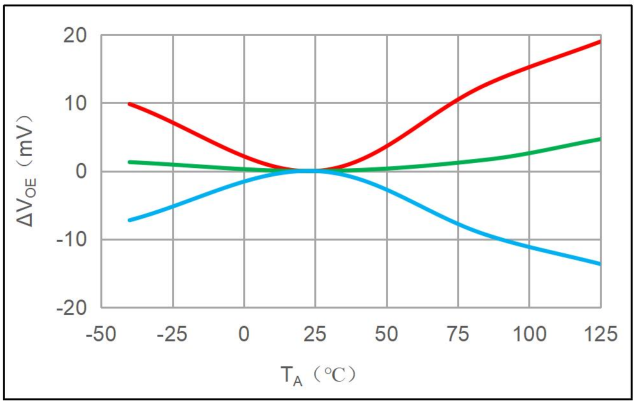
CC6937S8-3FB030[1]



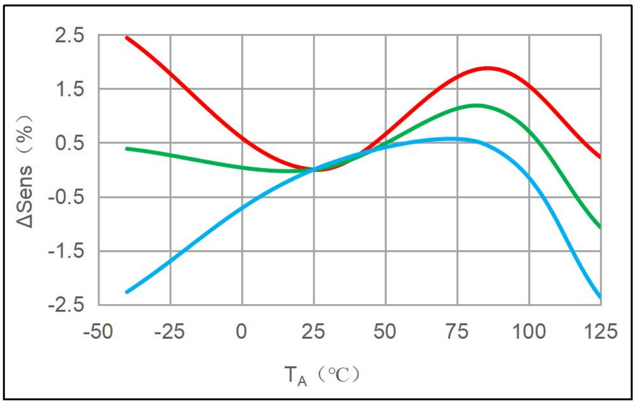

Δ $V_{OUT(Q)}$ vs $T_A$




Δ $V_{REF}$ vs $T_A$



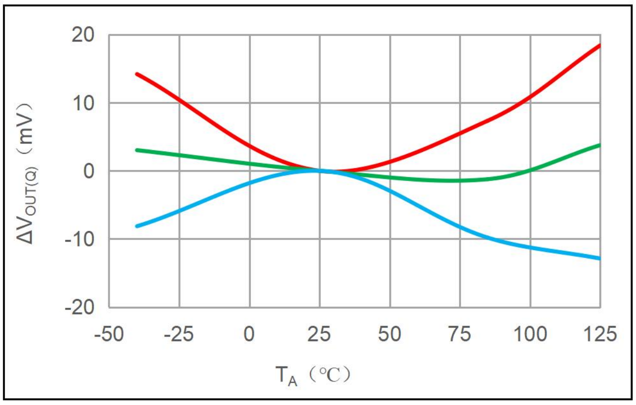

$\Delta V_{OE}$ vs $T_A$



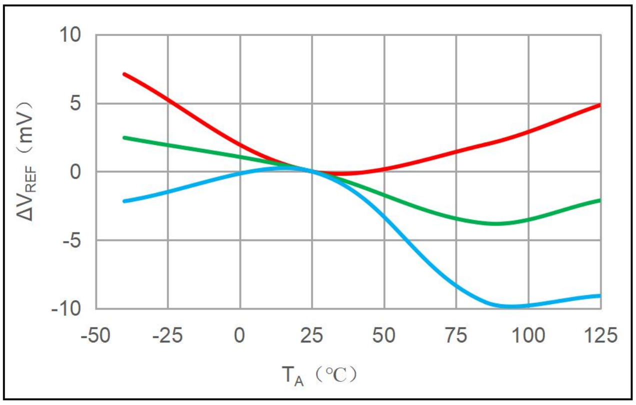

ΔSens vs $T_A$

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

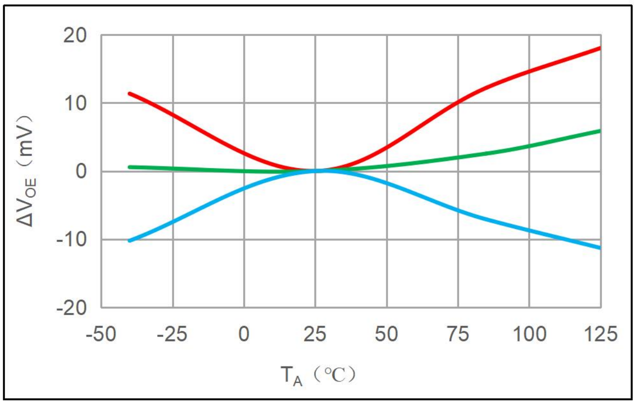
CC6937S8-3FB040[1]



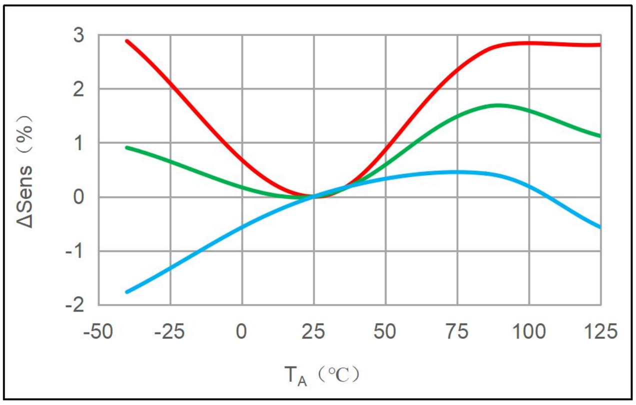

Δ $V_{OUT(Q)}$ vs $T_A$




Δ $V_{REF}$ vs $T_A$



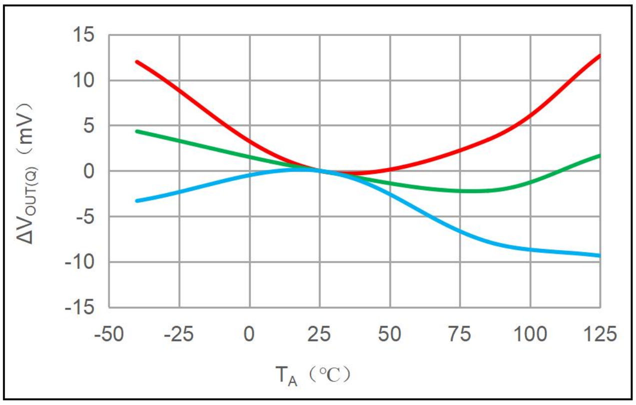

$\Delta V_{OE}$ vs $T_A$



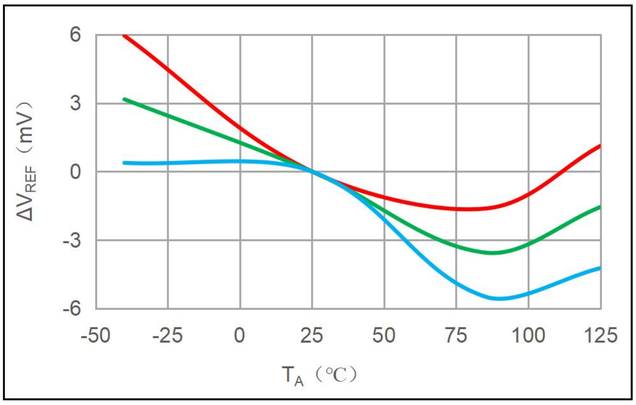

ΔSens vs $T_A$

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

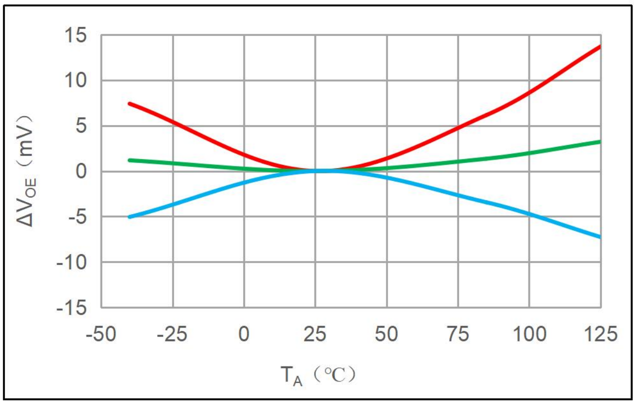
CC6937S8-3FB050[1]



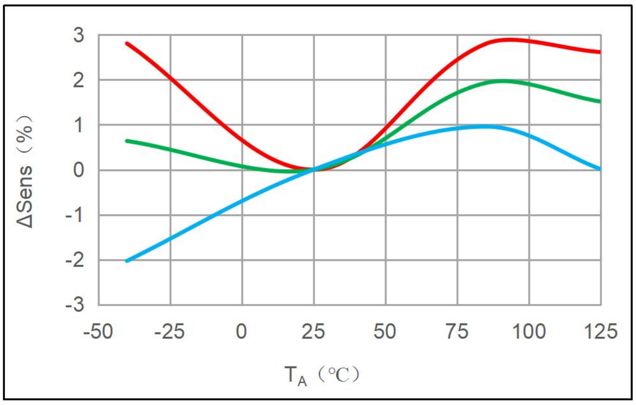

Δ $V_{OUT(Q)}$ vs $T_A$




Δ $V_{REF}$ vs $T_A$




$\Delta V_{OE}$ vs $T_A$




ΔSens 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 CC6937 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 0.5mΩ 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 230kHz.The measuring current is 5 ~ 60A. There are 8 kinds of Current sensing range to choose. CC6937 is optimized for high accuracy and temperature stability, compensating for misalignment and sensitivity over the entire range.

The input current of CC6937 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 0.5mΩ. 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%.

## INPUT CURRENT

In use, the primary side of the chip (package pins 1-4) is connected in series at any position in the whole circuit. The input current flowing from IP+ (package pins 1-2) to IP- (package pins 3-4) 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 VREF as a reference，VREF has two modes: input / output, which can be used as an internal reference to an external circuit or to adjust the $V_{OQ}$.

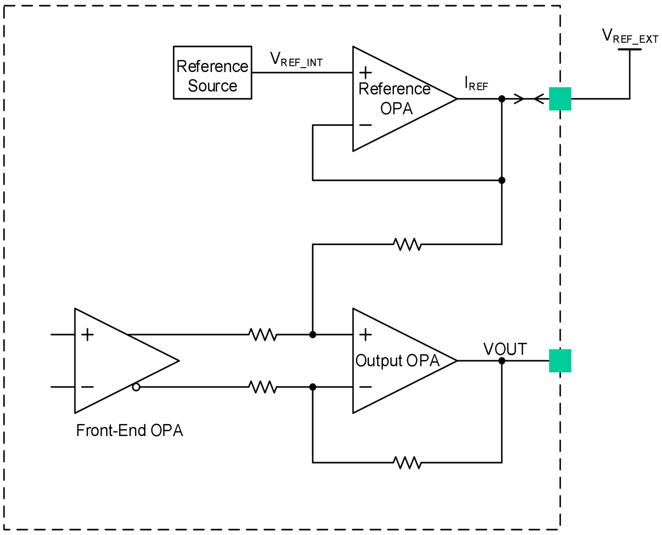
1. When using the VREF output mode：

Rated working voltage $V_{CC}$ = 5V series products, $V_{REF}$ can reach 2.500 V, after factory programming, the nominal value error ≤ 5mV;

The typical value of $I_{VREF\_SOURCE}$ = 2.8mA and $I_{VREF\_SINK}$ = 6mA. Upon application, the current of 2mA of the $V_{REF}$ is recommended.

2. When using the VREF input mode：

When the drive capability of the external reference exceeds the output of the reference op amp, the external reference forces VOQ 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 ±10mA drive capability for input. At this time, the sensitivity of CC6937 remains unchanged.



### VOUT OUTPUT CHARACTERISTIC

The quiescent output point of the CC6924 (IP = 0A, with VREF 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 (VCC – rail voltage); when the current decreases, the $V_{OUT}$ decreases until the saturation voltage (GND + 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 VREF output mode:

| Product Name | Input Current | Nominal Supply Voltage(V) | Sensitivity(mV/A) | Calculation Formula *(Note 1)* |
|---|---|---|---|---|
| CC6937S8-5FB005 | -5A ~ +5A | 5 | 400 | $V_{OUT}$ =2500 + $I_P$(A) × 400…….........(mV) |
| CC6937S8-5FB010 | -10A ~ +10A | 5 | 200 | $V_{OUT}$ =2500 + $I_P$(A) × 200……..........(mV) |
| CC6937S8-5FB020 | -20A ~ +20A | 5 | 100 | $V_{OUT}$ =2500 + $I_P$(A) × 100……..........(mV) |
| CC6937S8-5FB025 | -25A ~ +25A | 5 | 80 | $V_{OUT}$ =2500 + $I_P$(A) × 80....…….........(mV) |
| CC6937S8-5FB030 | -30A ~ +30A | 5 | 66.67 | $V_{OUT}$ =2500 + $I_P$(A) × 66.67 ….........(mV) |
| CC6937S8-5FB040 | -40A ~ +40A | 5 | 50 | $V_{OUT}$ =2500 + $I_P$(A) × 50 ......…......(mV) |
| CC6937S8-5FB050 | -50A ~ +50A | 5 | 40 | $V_{OUT}$ =2500 + $I_P$(A) × 40……............(mV) |
| CC6937S8-5FB060 | -60A ~ +60A | 5 | 33.33 | $V_{OUT}$ =2500 + $I_P$(A) × 33.33…..........(mV) |
| CC6937S8-3FB005 | -5A ~ +5A | 3.3 | 264 | $V_{OUT}$ =1650 + $I_P$(A) × 264……..........(mV) |
| CC6937S8-3FB010 | -10A ~ +10A | 3.3 | 132 | $V_{OUT}$ =1650 + $I_P$(A) × 132……..........(mV) |
| CC6937S8-3FB020 | -20A ~ +20A | 3.3 | 66 | $V_{OUT}$ =1650 + $I_P$(A) × 66....…….........(mV) |
| CC6937S8-3FB030 | -30A ~ +30A | 3.3 | 44 | $V_{OUT}$ =1650 + $I_P$(A) × 44....…….........(mV) |
| CC6937S8-3FB040 | -40A ~ +40A | 3.3 | 33 | $V_{OUT}$ =1650 + $I_P$(A) × 33....…….........(mV) |
| CC6937S8-3FB050 | -50A ~ +50A | 3.3 | 26.4 | $V_{OUT}$ =1650 + $I_P$(A) × 26.4……..........(mV) |

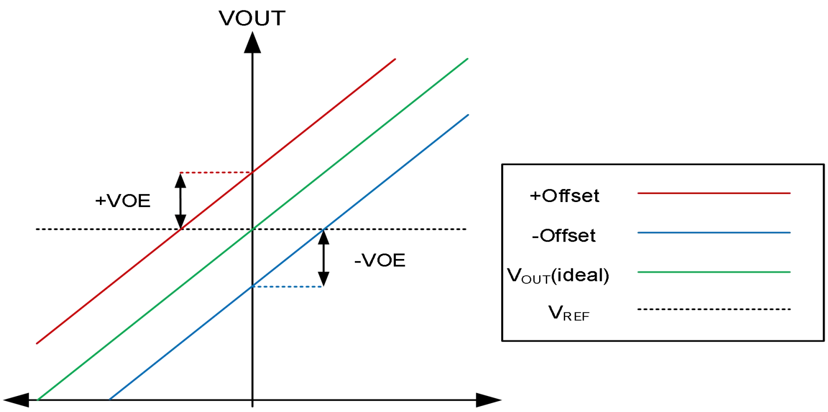
When using the VREF input mode: （$0 \le V_{REF} \le 4V$）

| Product Name | Input Current | Nominal Supply Voltage(V) | Sensitivity(mV/A) | Calculation Formula *(Note 1)* |
|---|---|---|---|---|
| CC6937S8-5FB005 | -5A ~ +5A | 5 | 400 | $V_{OUT} = V_{REF} + I_P(A) \times 400$……..........(mV) |
| CC6937S8-5FB010 | -10A ~ +10A | 5 | 200 | $V_{OUT} = V_{REF} + I_P(A) \times 200$……..........(mV) |
| CC6937S8-5FB020 | -20A ~ +20A | 5 | 100 | $V_{OUT} = V_{REF} + I_P(A) \times 100$……..........(mV) |
| CC6937S8-5FB025 | -25A ~ +25A | 5 | 80 | $V_{OUT} = V_{REF} + I_P(A) \times 80$……............(mV) |
| CC6937S8-5FB030 | -30A ~ +30A | 5 | 66.67 | $V_{OUT} = V_{REF} + I_P(A) \times 66.67$………..(mV) |
| CC6937S8-5FB040 | -40A ~ +40A | 5 | 50 | $V_{OUT} = V_{REF} + I_P(A) \times 50$ ….............(mV) |
| CC6937S8-5FB050 | -50A ~ +50A | 5 | 40 | $V_{OUT} = V_{REF} + I_P(A) \times 40$……............(mV) |
| CC6937S8-5FB060 | -60A ~ +60A | 5 | 33.33 | $V_{OUT} = V_{REF} + I_P(A) \times 33.33$….........(mV) |
| CC6937S8-3FB005 | -5A ~ +5A | 3.3 | 264 | $V_{OUT} = V_{REF} + I_P(A) \times 264$……..........(mV) |
| CC6937S8-3FB010 | -10A ~ +10A | 3.3 | 132 | $V_{OUT} = V_{REF} + I_P(A) \times 132$……..........(mV) |
| CC6937S8-3FB020 | -20A ~ +20A | 3.3 | 66 | $V_{OUT} = V_{REF} + I_P(A) \times 66$……............(mV) |
| CC6937S8-3FB030 | -30A ~ +30A | 3.3 | 44 | $V_{OUT} = V_{REF} + I_P(A) \times 44$……............(mV) |
| CC6937S8-3FB040 | -40A ~ +40A | 3.3 | 33 | $V_{OUT} = V_{REF} + I_P(A) \times 33$……............(mV) |
| CC6937S8-3FB050 | -50A ~ +50A | 3.3 | 26.4 | $V_{OUT} = V_{REF} + I_P(A) \times 26.4$…............(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

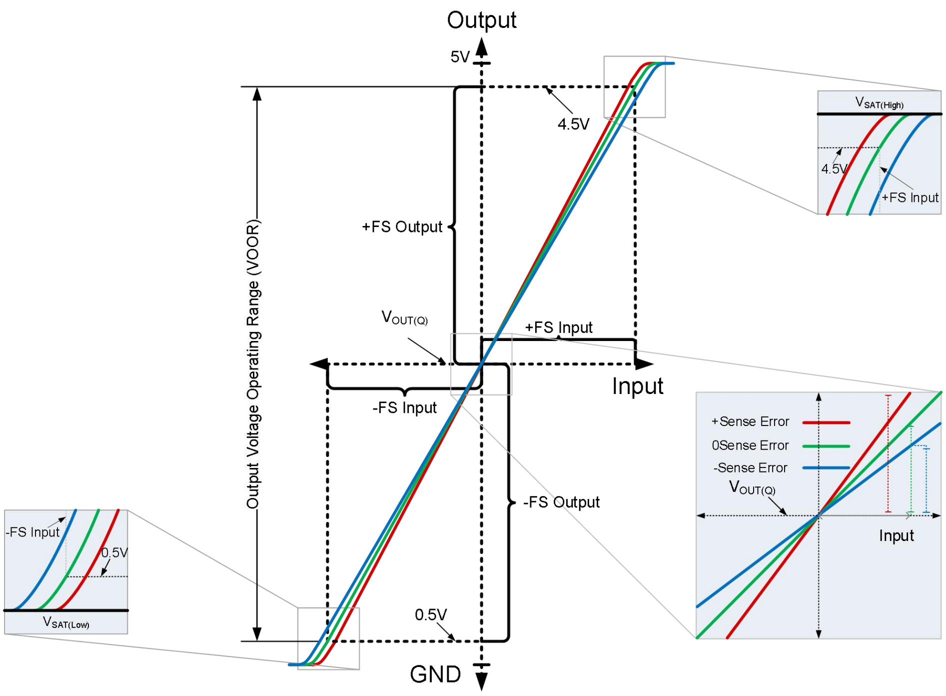
Offset Voltage, or $V_{OE}$, is defined as the difference between $V_{OUT(Q)}$ and $V_{REF}$ (as shown in the figure below). $V_{OE}$ includes the drift of $V_{OUT(Q)}$ minus $V_{REF}$ from room to hot or room to cold (–40°C to +125°C respectively).



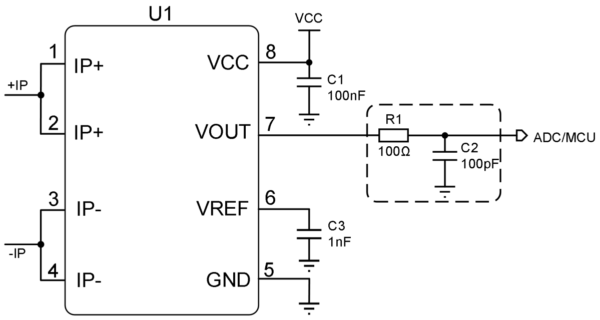

## OUTPUT VOLTAGE OPERATING RANGE

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.

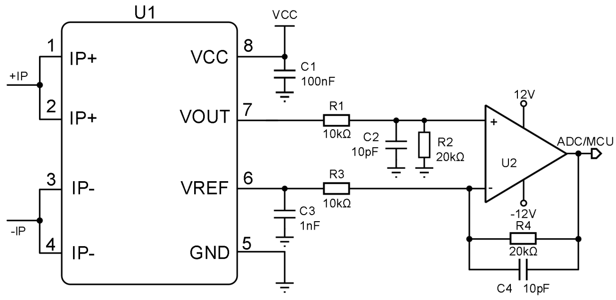
| Voltage Output Operating Range for $V_{CC}$ and Output Modes | |
|---|---|
| $V_{CC}$ | Bidirectional |
| 3.3V | ±1.32 |
| 5V | ±2 |



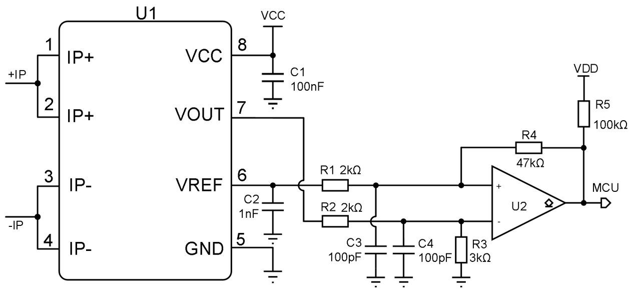
## TYPICAL APPLICATION CIRCUITS




Recommended Typical Application

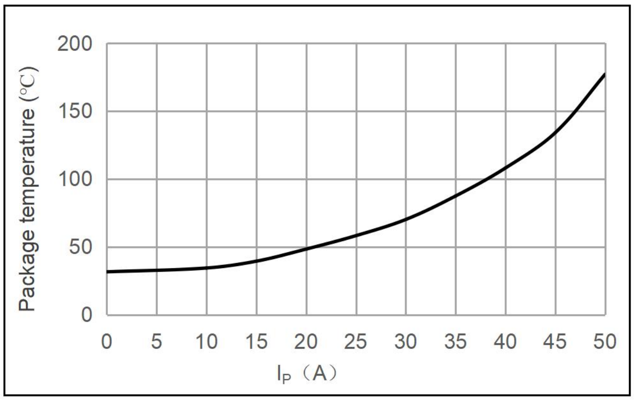



Zero Migration Application (VREF Output Mode)

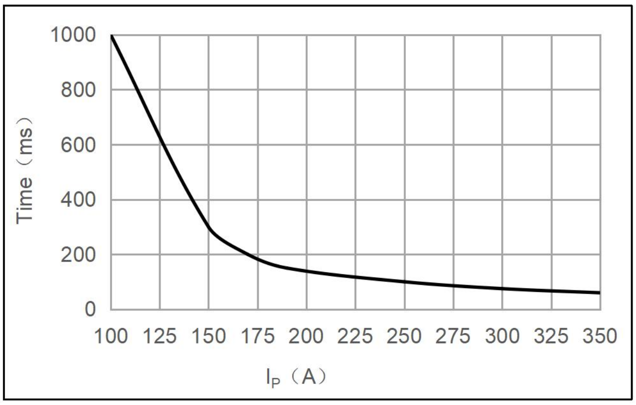



Over-current Fault Detector

## RELATIONSHIP BETWEEN PACKAGE TEMPERATURE & INPUT CURRENT

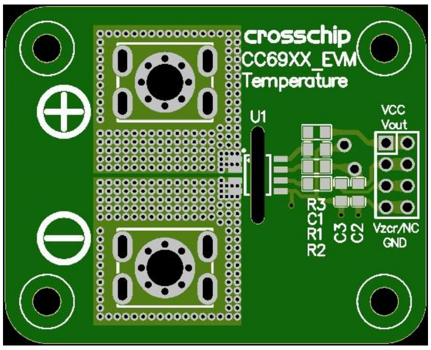



Input Current (IP) vs. Package Temperature



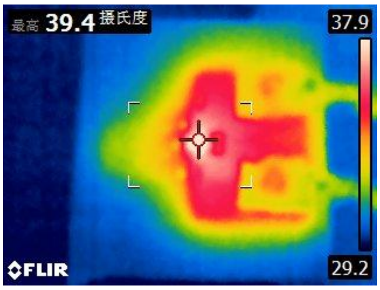

SOA Curve

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.



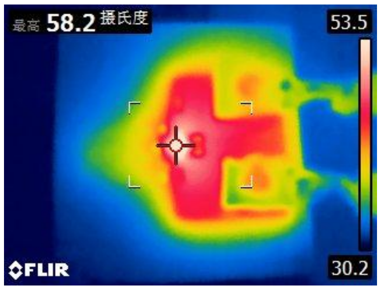

Thickness 1.6mm, FR-4 double-sided panel, 2oz copper foil, total 1200mm²

Test environment: open environment, quiescent air



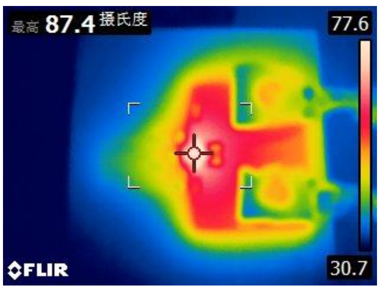

Package Thermography

(Input Current 15A)



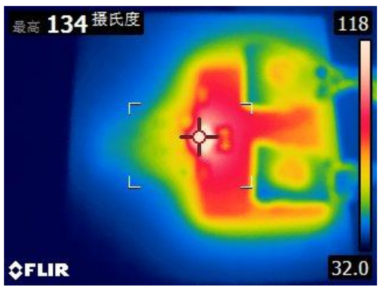

Package Thermography

(Input Current 25A)




Package Thermography

(Input Current 35A)

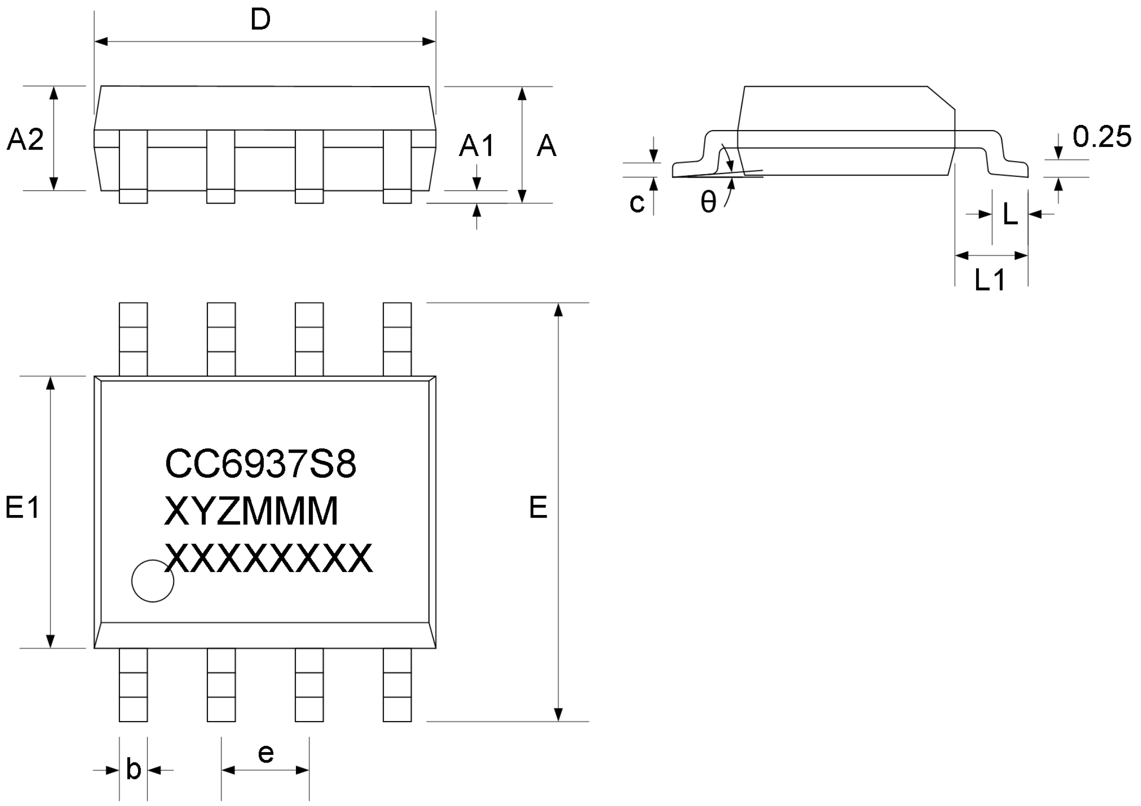



Package Thermography

(Input Current 45A)

## PACKAGE INFORMATION

**SOP16W Package**




| Size | Millimeters | | |
|---|---|---|---|
| | Min. | Typ. | Max. |
| A | 1.50 | - | 1.70 |
| A1 | 0.10 | - | 0.25 |
| A2 | 1.30 | 1.40 | 1.50 |
| b | 0.33 | 0.40 | 0.47 |
| c | 0.20 | - | 0.25 |
| D | 4.70 | 4.90 | 5.10 |
| E | 5.90 | 6.00 | 6.10 |
| E1 | 3.80 | 3.90 | 4.00 |
| e | 1.27 (BSC) | | |
| L | 0.55 | 0.60 | 0.75 |
| L1 | 1.05(BSC) | | |
| θ | 0° | 4° | 8° |

**Marking:**

1st Line: CC6937S8 – Device Name

2nd Line: XYZMMM

- X – Rated operating voltage
- Y – Output type
- Z – Output polarity
- MMM – The current range

3rd Line: XXXXXXXX

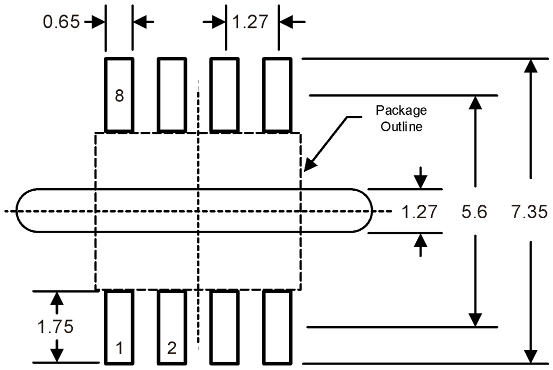
- XXXXXXXX – Production serial number

**Note:**

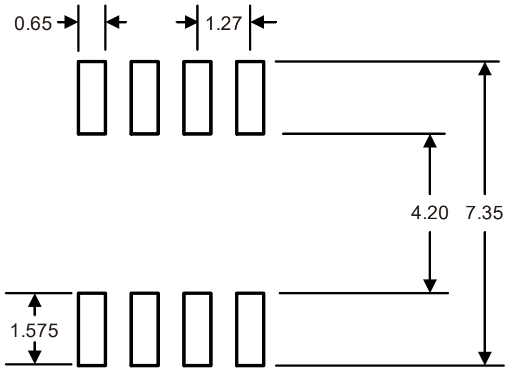
1. All dimensions are in millimeters.
2. For details: refer to Product Name Definition

## PACKAGE REFERENCE

Recommended Welding Disc

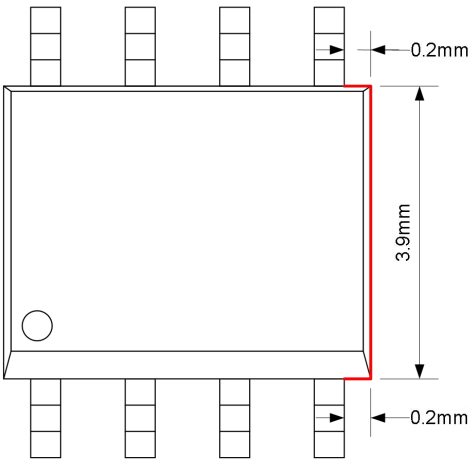


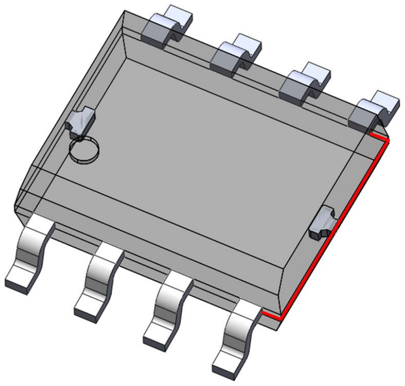

Reference 1: PCB slotting to increase creepage distance




Reference 2: Shorten welding disc length to increase creepage distance

Creepage distance of the chip

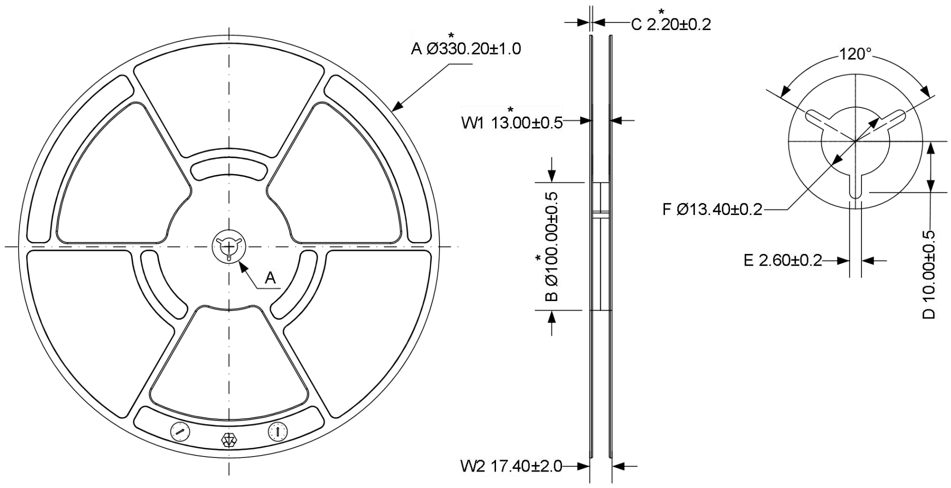


The red line is the creepage distance of the chip：Dcr=0.2+3.9+0.2=4.3(mm)

## TAPE AND REEL INFORMATION

**Reel Dimensions**

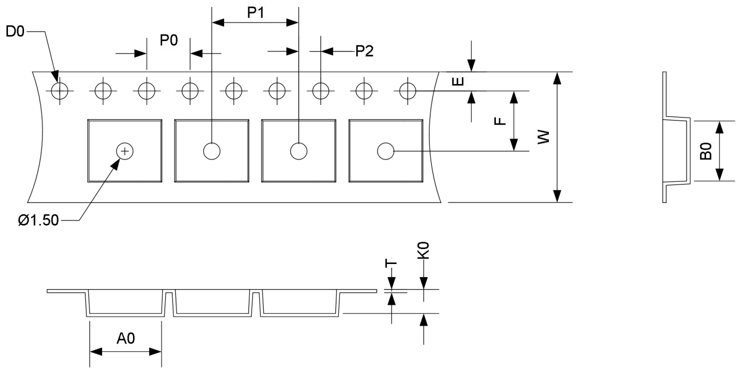



**Note:**

(1) *Marked as a key dimension.

(2) All dimensions are in millimeters

**Tape Dimensions**

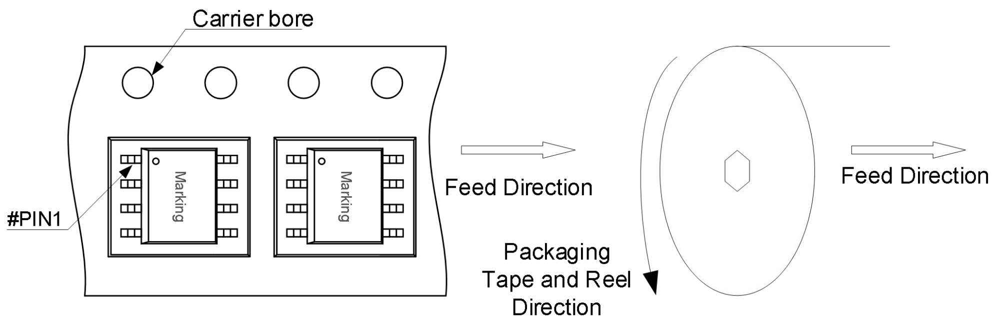



Note:

1. *Marked as a key dimension, All dimensions are in millimeters;
2. The cumulative error of any 10 ratchet holes does not exceed ±0.2mm.;
3. Non-parallelism must not exceed 1mm for a distance of 250mm along the length of the carrier tape.

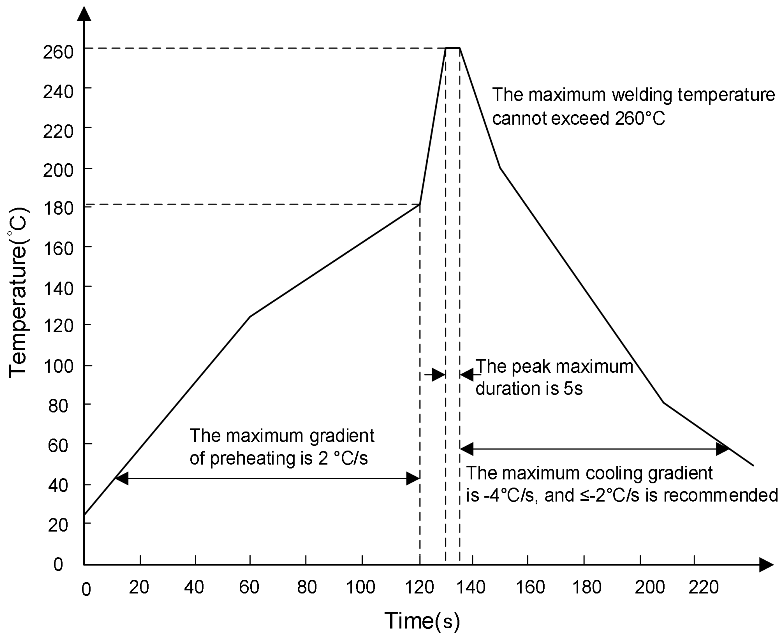
| Symbol | *W | *A0 | *B0 | *K0 | P0 | P1 |
|---|---|---|---|---|---|---|
| Size | 12±0.30 | 6.50±0.1 | 5.40±0.1 | 2.05±0.1 | 4.0±0.1 | 8.00±0.1 |
| Symbol | P2 | F | S | E | D0 | T |
| Size | 2.0±0.1 | 5.5±0.1 | 0.0±0.1 | 1.75±0.1 | $1.5^{+0.1}_{-0.0}$ | 0.3±0.05 |

## QUADRANT ASSIGNMENTS FOR PIN1 ORIENTATION IN TAPE



## THE WELDING PROCESS OF THE CHIP

Welding Process Requirements:



## REVISION HISTORY

| Revision Date | Description of Revision | Revision |
|---|---|---|
| 2024.07.24 | Initial released. | rev1.0 |
| 2024.08.27 | Add **UL Certificate Number**. | rev1.1 |

## 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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