

Precision, Low Noise FGA™ Voltage References

The ISL21007 FGA™ voltage references are extremely low power, high precision, and low noise voltage references fabricated on Intersil's proprietary Floating Gate Analog technology. The ISL21007 features very low noise (4.5µV_{P-P} for 0.1Hz to 10Hz) and very low operating current (150µA, Max). In addition, the ISL21007 family features guaranteed initial accuracy as low as ±0.5mV.

This combination of high initial accuracy, low drift, and low output noise performance of the ISL21007 enables versatile high performance control and data acquisition applications with low power consumption.

Available Options

PART NUMBER	V _{OUT} OPTION (V)	INITIAL ACCURACY (mV)	TEMPCO. (ppm/°C)
ISL21007BFB812Z	1.250	±0.5	3
ISL21007CFB812Z	1.250	±1.0	5
ISL21007DFB812Z	1.250	±2.0	10
ISL21007BFB820Z	2.048	±0.5	3
ISL21007CFB820Z	2.048	±1.0	5
ISL21007DFB820Z	2.048	±2.0	10
ISL21007BFB825Z	2.500	±0.5	3
ISL21007CFB825Z	2.500	±1.0	5
ISL21007DFB825Z	2.500	±2.0	10
ISL21007BFB830Z	3.000	±0.5	3
ISL21007CFB830Z	3.000	±1.0	5
ISL21007DFB830Z	3.000	±2.0	10

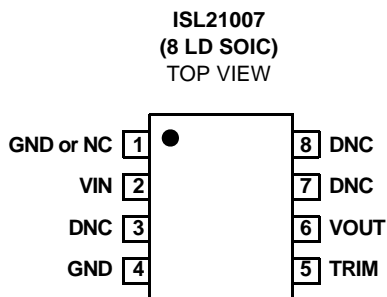
Features

- Reference Output Voltage 1.250V, 2.048V, 2.500V, 3.000V
- Initial Accuracy ±0.5mV (B grade)
- Input Voltage Range
ISL21007-12, 20, 25. 2.7V to 5.5V
ISL21007-30. 3.2V to 5.5V
- Low Output Voltage Noise 4.5µV_{P-P} (0.1Hz to 10Hz)
- Supply Current 150µA (Max)
- Temperature Coefficient 3ppm/°C (B grade)
- Operating Temperature Range. -40°C to +125°C
- Package 8 Ld SOIC
- Pb-Free (RoHS Compliant)

Applications

- High Resolution A/Ds and D/As
- Digital Meters
- Bar Code Scanners
- Basestations
- Battery Management/Monitoring
- Industrial/Instrumentation Equipment

Pinout



Ordering Information

PART NUMBER (Notes 1, 2)	PART MARKING	V _{OUT} OPTION (V)	GRADE	TEMP. RANGE (°C)	PACKAGE (Pb-Free)	PKG. DWG. #
ISL21007BFB812Z	21007BF Z12	1.250	±0.5mV, 3ppm/°C	-40 to +125	8 Ld SOIC	M8.15
ISL21007CFB812Z	21007CF Z12	1.250	±1.0mV, 5ppm/°C	-40 to +125	8 Ld SOIC	M8.15
ISL21007DFB812Z	21007DF Z12	1.250	±2.0mV, 10ppm/°C	-40 to +125	8 Ld SOIC	M8.15
ISL21007BFB820Z	21007BF Z20	2.048	±0.5mV, 3ppm/°C	-40 to +125	8 Ld SOIC	M8.15
ISL21007CFB820Z	21007CF Z20	2.048	±1.0mV, 5ppm/°C	-40 to +125	8 Ld SOIC	M8.15
ISL21007DFB820Z	21007DF Z20	2.048	±2.0mV, 10ppm/°C	-40 to +125	8 Ld SOIC	M8.15
ISL21007BFB825Z	21007BF Z25	2.500	±0.5mV, 3ppm/°C	-40 to +125	8 Ld SOIC	M8.15
ISL21007CFB825Z	21007CF Z25	2.500	±1.0mV, 5ppm/°C	-40 to +125	8 Ld SOIC	M8.15
ISL21007DFB825Z	21007DF Z25	2.500	±2.0mV, 10ppm/°C	-40 to +125	8 Ld SOIC	M8.15
ISL21007BFB830Z	21007BF Z30	3.000	±0.5mV, 3ppm/°C	-40 to +125	8 Ld SOIC	M8.15
ISL21007CFB830Z	21007CF Z30	3.000	±1.0mV, 5ppm/°C	-40 to +125	8 Ld SOIC	M8.15
ISL21007DFB830Z	21007DF Z30	3.000	±2.0mV, 10ppm/°C	-40 to +125	8 Ld SOIC	M8.15

NOTES:

1. These Intersil Pb-free plastic packaged products employ special Pb-free material sets; molding compounds/die attach materials and 100% matte tin plate PLUS ANNEAL - e3 termination finish, which is RoHS compliant and compatible with both SnPb and Pb-free soldering operations. Intersil Pb-free products are MSL classified at Pb-free peak reflow temperatures that meet or exceed the Pb-free requirements of IPC/JEDEC J STD-020.
2. Add "-TK" suffix for tape and reel. Please refer to TB347 for details on reel specifications.

Absolute Voltage Ratings

Storage Temperature Range -65°C to +150°C
 Max Voltage V_{IN} to GND -0.5V to +6.5V
 Max Voltage V_{OUT} to GND (10s) -0.5V to $V_{OUT} + 1$
 Voltage on “DNC” pins No connections permitted to these pins.
 ESD Rating
 Human Body Model (HBM) 6kV
 Machine Model (MM) 600V
 Charged Device Model (CDM) 2kV

Thermal Information

Thermal Resistance (Typical, Note 3) θ_{JA} (°C/W)
 8 Ld SOIC 113.12
 Continuous Power Dissipation (Note 3) $T_A = +70^\circ\text{C}$
 8 Ld SOIC derate 5.88mW/°C above +70°C 471mW
 Pb-free reflow profile. see link below

Recommended Operating Conditions

Temperature Range (Industrial) -40°C to +125°C

CAUTION: Do not operate at or near the maximum ratings listed for extended periods of time. Exposure to such conditions may adversely impact product reliability and result in failures not covered by warranty.

IMPORTANT NOTE: All parameters having Min/Max specifications are guaranteed. Typ values are for information purposes only. Unless otherwise noted, all tests are at the specified temperature and are pulsed tests, therefore: $T_J = T_C = T_A$

NOTE:

- 3. θ_{JA} is measured with the component mounted on a high effective thermal conductivity test board in free air. See Tech Brief TB379 for details.

Common Electrical Specifications (ISL21007-12, -20, -25, -30) $T_A = -40^\circ\text{C}$ to $+125^\circ\text{C}$, unless otherwise specified.

PARAMETER	DESCRIPTION	CONDITIONS	MIN	TYP	MAX	UNIT
V_{OA}	V_{OUT} Accuracy @ $T_A = +25^\circ\text{C}$	ISL21007B	-0.5		+0.5	mV
		ISL21007C	-1.0		+1.0	mV
		ISL21007D	-2.0		+2.0	mV
TC V_{OUT}	Output Voltage Temperature Coefficient (Note 4)	ISL21007B			3	ppm/°C
		ISL21007C			5	ppm/°C
		ISL21007D			10	ppm/°C
I_{IN}	Supply Current			75	150	μA
	Trim Range		± 2.0	± 2.5		%
t_R	Turn-on Settling Time	$V_{OUT} = \pm 0.1\%$		120		μs
	Ripple Rejection	$f = 10\text{kHz}$		60		dB
e_N	Output Voltage Noise	$0.1\text{Hz} \leq f \leq 10\text{Hz}$		4.5		μV_{P-P}
V_N	Broadband Voltage Noise	$10\text{Hz} \leq f \leq 1\text{kHz}$		2.2		μV_{RMS}
	Noise Density	$f = 1\text{kHz}$		60		$\text{nV}/\sqrt{\text{Hz}}$

Electrical Specifications (ISL21007-12, $V_{OUT} = 1.250\text{V}$) $V_{IN} = 3.0\text{V}$, $T_A = -40^\circ\text{C}$ to $+125^\circ\text{C}$, unless otherwise specified.

PARAMETER	DESCRIPTION	CONDITIONS	MIN	TYP	MAX	UNIT
V_{IN}	Input Voltage Range		2.7		5.5	V
V_{OUT}	Output Voltage			1.250		V
$\Delta V_{OUT} / \Delta V_{IN}$	Line Regulation	$2.7\text{V} \leq V_{IN} \leq 5.5\text{V}$		100	700	$\mu\text{V}/\text{V}$
$\Delta V_{OUT} / \Delta I_{OUT}$	Load Regulation	Sourcing: $0\text{mA} \leq I_{OUT} \leq 7\text{mA}$		10	100	$\mu\text{V}/\text{mA}$
		Sinking: $-7\text{mA} \leq I_{OUT} \leq 0\text{mA}$		20	150	$\mu\text{V}/\text{mA}$
I_{SC}	Short Circuit Current	$T_A = +25^\circ\text{C}$, V_{OUT} tied to GND		40		mA
$\Delta V_{OUT} / \Delta T_A$	Thermal Hysteresis (Note 5)	$\Delta T_A = +165^\circ\text{C}$		50		ppm
$\Delta V_{OUT} / \Delta t$	Long Term Stability (Note 6)	$T_A = +25^\circ\text{C}$		100		ppm

Electrical Specifications (ISL21007-20, V_{OUT} = 2.048V) V_{IN} = 3.0V, T_A = -40°C to +125°C, unless otherwise specified.

PARAMETER	DESCRIPTION	CONDITIONS	MIN	TYP	MAX	UNIT
V _{IN}	Input Voltage Range		2.7		5.5	V
V _{OUT}	Output Voltage			2.048		V
ΔV _{OUT} /ΔV _{IN}	Line Regulation	2.7V ≤ V _{IN} ≤ 5.5V		50	200	μV/V
ΔV _{OUT} /ΔI _{OUT}	Load Regulation	Sourcing: 0mA ≤ I _{OUT} ≤ 7mA		10	100	μV/mA
		Sinking: -7mA ≤ I _{OUT} ≤ 0mA		20	150	μV/mA
I _{SC}	Short Circuit Current	T _A = +25°C, V _{OUT} tied to GND		50		mA
ΔV _{OUT} /ΔT _A	Thermal Hysteresis (Note 5)	ΔT _A = +165°C		50		ppm
ΔV _{OUT} /Δt	Long Term Stability (Note 6)	T _A = +25°C		75		ppm

Electrical Specifications (ISL21007-25, V_{OUT} = 2.500V) V_{IN} = 3.0V, T_A = -40°C to +125°C, unless otherwise specified.

PARAMETER	DESCRIPTION	CONDITIONS	MIN	TYP	MAX	UNIT
V _{IN}	Input Voltage Range		2.7		5.5	V
V _{OUT}	Output Voltage			2.500		V
ΔV _{OUT} /ΔV _{IN}	Line Regulation	2.7V ≤ V _{IN} ≤ 5.5V		50	200	μV/V
ΔV _{OUT} /ΔI _{OUT}	Load Regulation	Sourcing: 0mA ≤ I _{OUT} ≤ 5mA		10	100	μV/mA
		Sinking: -5mA ≤ I _{OUT} ≤ 0mA		20	150	μV/mA
I _{SC}	Short Circuit Current	T _A = +25°C, V _{OUT} tied to GND		50		mA
ΔV _{OUT} /ΔT _A	Thermal Hysteresis (Note 5)	ΔT _A = +165°C		50		ppm
ΔV _{OUT} /Δt	Long Term Stability (Note 6)	T _A = +25°C		50		ppm

Electrical Specifications (ISL21007-30, V_{OUT} = 3.000V) V_{IN} = 5.0V, T_A = -40°C to +125°C, unless otherwise specified.

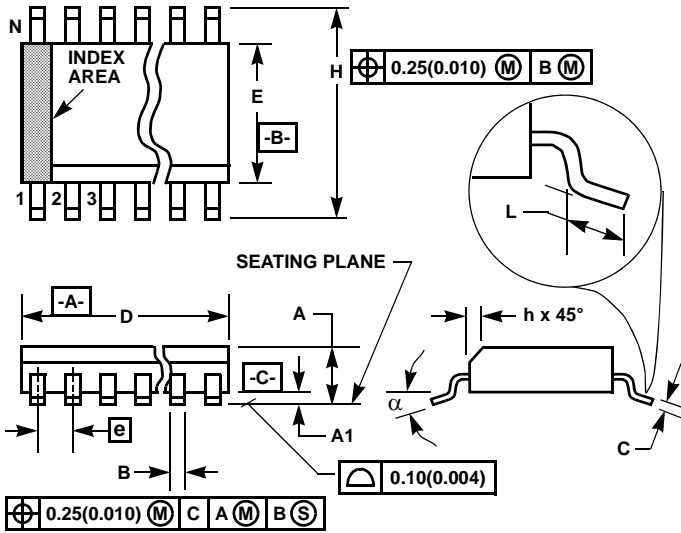
PARAMETER	DESCRIPTION	CONDITIONS	MIN	TYP	MAX	UNIT
V _{IN}	Input Voltage Range		3.2		5.5	V
V _{OUT}	Output Voltage			3.000		V
ΔV _{OUT} /ΔV _{IN}	Line Regulation	3.2V ≤ V _{IN} ≤ 5.5V		50	200	μV/V
ΔV _{OUT} /ΔI _{OUT}	Load Regulation	Sourcing: 0mA ≤ I _{OUT} ≤ 7mA		10	100	μV/mA
		Sinking: -7mA ≤ I _{OUT} ≤ 0mA		20	150	μV/mA
I _{SC}	Short Circuit Current	T _A = +25°C, V _{OUT} tied to GND		50		mA
ΔV _{OUT} /ΔT _A	Thermal Hysteresis (Note 5)	ΔT _A = +165°C		50		ppm
ΔV _{OUT} /Δt	Long Term Stability (Note 6)	T _A = +25°C		50		ppm

4. Over the specified temperature range. Temperature coefficient is measured by the box method whereby the change in V_{OUT} is divided by the temperature range; in this case, -40°C to +125°C = +165°C.

5. Thermal Hysteresis is the change of V_{OUT} measured at T_A = +25°C after temperature cycling over a specified range. ΔT_A. V_{OUT} is read initially at T_A = +25°C for the device under test. The device is temperature cycled and a second V_{OUT} measurement is taken at +25°C. The difference between the initial V_{OUT} reading and the second V_{OUT} reading is then expressed in ppm. For Δ T_A = +165°C, the device under test is cycled from +25°C to +125°C to -40°C to +25°C.

6. Long term drift is logarithmic in nature and diminishes over time. Drift after the first 1000 hours will be approximately 10ppm/√(1kHrs)

Small Outline Plastic Packages (SOIC)



M8.15 (JEDEC MS-012-AA ISSUE C)
8 LEAD NARROW BODY SMALL OUTLINE PLASTIC PACKAGE

SYMBOL	INCHES		MILLIMETERS		NOTES
	MIN	MAX	MIN	MAX	
A	0.0532	0.0688	1.35	1.75	-
A1	0.0040	0.0098	0.10	0.25	-
B	0.013	0.020	0.33	0.51	9
C	0.0075	0.0098	0.19	0.25	-
D	0.1890	0.1968	4.80	5.00	3
E	0.1497	0.1574	3.80	4.00	4
e	0.050 BSC		1.27 BSC		-
H	0.2284	0.2440	5.80	6.20	-
h	0.0099	0.0196	0.25	0.50	5
L	0.016	0.050	0.40	1.27	6
N	8		8		7
α	0°	8°	0°	8°	-

NOTES:

1. Symbols are defined in the "MO Series Symbol List" in Section 2.2 of Publication Number 95.
2. Dimensioning and tolerancing per ANSI Y14.5M-1982.
3. Dimension "D" does not include mold flash, protrusions or gate burrs. Mold flash, protrusion and gate burrs shall not exceed 0.15mm (0.006 inch) per side.
4. Dimension "E" does not include interlead flash or protrusions. Interlead flash and protrusions shall not exceed 0.25mm (0.010 inch) per side.
5. The chamfer on the body is optional. If it is not present, a visual index feature must be located within the crosshatched area.
6. "L" is the length of terminal for soldering to a substrate.
7. "N" is the number of terminal positions.
8. Terminal numbers are shown for reference only.
9. The lead width "B", as measured 0.36mm (0.014 inch) or greater above the seating plane, shall not exceed a maximum value of 0.61mm (0.024 inch).
10. Controlling dimension: MILLIMETER. Converted inch dimensions are not necessarily exact.