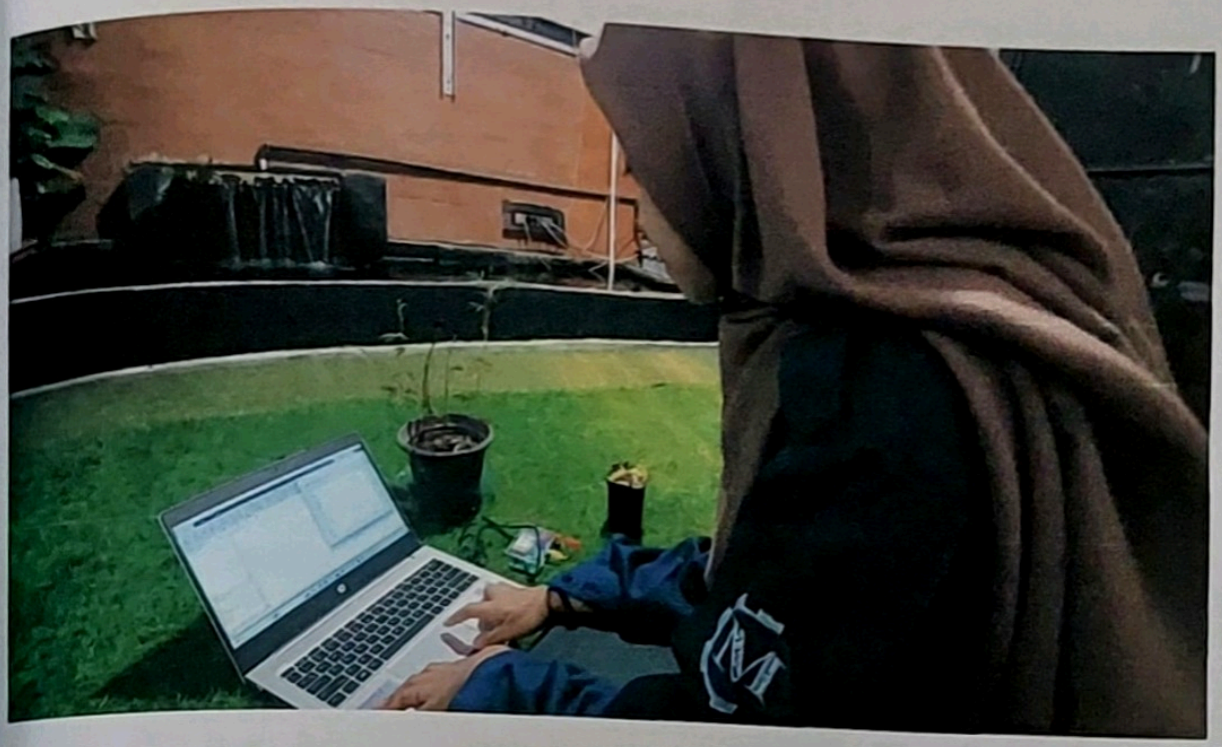

KEMENTERIAN PENDIDIKAN DAN KEBUDAYAAN
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Website : www.polisriwijaya.ac.id E-mail : info@polsri.ac.id

PELAKSANAAN REVISI TUGAS AKHIR (TA)

Mahasiswa berikut,

Nama	:	Ajeng Setyo Rini
NIM	:	061940342310
Jurusan/Program Studi	:	Teknik Elektro / Sarjana Terapan Teknik Elektro
Judul Laporan Akhir	:	Analisis Sinyal Tegangan Listrik Yang Dihasilkan Oleh Tanaman Dengan Matlab

Telah melaksanakan revisi terhadap Tugas Akhir yang diujikan pada hari Kamis tanggal 10 bulan Agustus tahun 2023 Pelaksanaan revisi terhadap Laporan Akhir tersebut telah disetujui oleh Dosen Penguji yang memberikan revisi:

No.	Komentar	Nama Dosen Penguji *)	Tanggal	Tanda Tangan
1.	Acc	Ir. Yordan Hasan, M.Kom.		
2.		Dr. Eng. Tresna Dewi, S.T.,M.Eng.		
3.	Telah direvisi	Dewi Permata Sari, S.T.,M.Kom.	01/10/2023	
4.	Acc to revisied	Destra Andika Pratama, S.T.,M.T.	16/8/2023	
5.	Acc	Agum Tri Wardhana, B.Eng.,M.Tr.T.	16/8/2023	

Palembang, Agustus 2023
Ketua Penguji **),

(Ir. Yordan Hasan, M.Kom.)
NIP 195910101990031004

Catatan:
*) Dosen penguji yang memberikan revisi saat ujian laporan akhir.
**) Dosen penguji yang ditugaskan sebagai Ketua Penguji saat ujian LA.
Lembaran pelaksanaan revisi ini harus dilampirkan dalam Laporan Akhir.

KEMENTERIAN PENDIDIKAN DAN KEBUDAYAAN
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REKOMENDASI UJIAN LAPORAN TUGAS AKHIR (TA)

Pembimbing Laporan Tugas Akhir memberikan rekomendasi kepada,

Nama	:	Ajeng Setyo Rini
NIM	:	061940342310
Jurusan/Program Studi	:	Teknik Elektro / Sarjana Terapan Teknik Elektro
Judul Laporan Akhir	:	Analisis Sinyal Tegangan Listrik Yang Dihasilkan Oleh Tanaman dengan Matlab

Mahasiswa tersebut telah memenuhi persyaratan dan dapat mengikuti Ujian Laporan Tugas Akhir (TA) pada Tahun Akademik 2022/2023

Palembang, 7 Agustus 2023

Pembimbing I,

Destra Andika Pratama, S.T., M.T.
NIP 197712202008121001

Pembimbing II,

Ir. Yordan Hasan, M.Kom.
NIP 195910101990031004

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KESEPAKATAN BIMBINGAN LAPORAN TUGAS AKHIR (TA)

Kami yang bertanda tangan di bawah ini,

Pihak Pertama

Nama	: Ajeng Setyo Rini
NIM	: 061940342310
Jurusan	: Teknik Elektro
Program Studi	: Sarjana Terapan Teknik Elektro

Pihak Kedua

Nama	: Destra Andika Pratama, S.T.,M.T.
NIP	: 197712202008121001
Jurusan	: Teknik Elektro
Program Studi	: Sarjana Terapan Teknik Elektro

Pada hari ini Selasa tanggal 28 Februari 2023 telah sepakat untuk melakukan konsultasi bimbingan Laporan Tugas Akhir.

Konsultasi bimbingan sekurang-kurangnya 1 (satu) kali dalam satu minggu. Pelaksanaan bimbingan pada setiap hari ..... pukul ....., tempat di Politeknik Negeri Sriwijaya.

Demikianlah kesepakatan ini dibuat dengan penuh kesadaran guna kelancaran penyelesaian Laporan Akhir.

Palembang, 8 - 03 - 2023

Pihak Pertama,

(Ajeng Setyo Rini)
NIM 061940342310

Pihak Kedua,

(Destra Andika Pratama, S.T.,M.T.)
NIP 197712202008121001

Mengetahui,
Ketua Jurusan

(Ir. Iskandar Lutfi, M.T.)
NIP 196501291991031002

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Website : www.polisriwijaya.ac.id **E-mail :** info@polsri.ac.id

KESEPAKATAN BIMBINGAN LAPORAN TUGAS AKHIR (TA)

Kami yang bertanda tangan di bawah ini,

Pihak Pertama

Nama	: Ajeng Setyo Rini
NIM	: 061940342310
Jurusan	: Teknik Elektro
Program Studi	: Sarjana Terapan Teknik Elektro

Pihak Kedua

Nama	: Ir. Yordan Hasan, M.Kom.
NIP	: 195910101990031004
Jurusan	: Teknik Elektro
Program Studi	: Sarjana Terapan Teknik Elektro

Pada hari ini ..... Selasa ..... tanggal ..... 28 Februari 2023 ..... telah sepakat untuk melakukan konsultasi bimbingan Laporan Tugas Akhir.

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Pihak Kedua,

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NIP 195910101990031004

Mengetahui,
Ketua Jurusan

(Ir. Iskandar Lutfi, M.T.)
NIP 196501291991031002

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Website : www.polisriwijaya.ac.id E-mail : info@polsri.ac.id

LEMBAR BIMBINGAN LAPORAN TUGAS AKHIR

Lembar 1

Nama : Ajeng Setyo Rini
NIM : 061940342310
Jurusan/Program Studi : Teknik Elektro Program Studi D4 Teknik Elektro
Judul Laporan Tugas Akhir : ANALISIS SINYAL TEGANGAN LISTRIK YANG DIHASILKAN OLEH TANAMAN DENGAN MATLAB
Pembimbing I / II *) : Destra Andika Pratama, S.T., M.T.

No.	Tanggal	Uraian Bimbingan	Tanda Tangan Pembimbing
1.	13 Februari 2023	Pengajuan judul /diskusi judul	
2.	22 Februari 2023	Fokus judul Tugas Akhir	
3.	15 Maret 2023	Pengajuan BAB I, BAB II revisi latar belakang, Batasan Masalah Membahas secara teori BAB II	
4.	7 April 2023	Revisi BAB I, BAB II, BAB III ACC BAB I	
5.	19 April 2023	Revisi BAB II dan III	
6.	25 April 2023	Revisi BAB II dan III ACC BAB II dan III	
7.	1 Mei 2023	Konsultasi jurnal	

No.	Tanggal	Uraian Bimbingan	Tanda Tangan Pembimbing
8.	12 juni 2023	ACC jurnal	
9.	28 juni 2023	Bimbingan BAB IV Pengujian Alat	
10.	10 juli 2023	Bimbingan BAB IV dan V	
11.	24 juli 2023.	Bimbingan BAB 4 dan 5	
12.	07/08/2023	Acc to final tst	

Palembang,

Ketua Jurusan/KPS,

(Masayu Anisah. S.T., M.T)
NIP 19701228 199302 2 001

Catatan:
*) melingkari angka yang sesuai.
Ketua Jurusan/Ketua Program Studi harus memeriksa jumlah pelaksanaan bimbingan sesuai yang dipersyaratkan dalam Pedoman Laporan Akhir sebelum menandatangani lembar bimbingan ini.
Lembar pembimbingan LA ini harus dilampirkan dalam Laporan Akhir.

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LEMBAR BIMBINGAN LAPORAN TUGAS AKHIR

Lembar 1

Nama : Ajeng Setyo Rini
NIM : 061940342310
Jurusan/Program Studi : Teknik Elektro Program Studi D4 Teknik Elektro
Judul Laporan Tugas Akhir : ANALISIS SINYAL TEGANGAN LISTRIK YANG DIHASILKAN OLEH TANAMAN DENGAN MATLAB
Pembimbing I / II *) : Ir. Yordan Hasan, M.Kom.

No.	Tanggal	Uraian Bimbingan	Tanda Tangan Pembimbing
1.	13 maret 2023	Pengajuan judul proposal Tugas Akhir	
2.	20 maret 2023	Konsultasi judul tugas akhir	
3.	3 April 2023	Bimbingan proposal BAB I, II, III	
4.	11 April 2023	ACC Proposal	
5.	19 juni 2023	Bimbingan jurnal Bimbingan BAB I II III	
6.	11 juli 2023	ACC Bimbingan BAB I II III Konsultasi /Bimbingan BAB IV V	
7.	25 juli 2023	Bimbingan BAB IV V Pengujian Alat	

No.	Tanggal	Uraian Bimbingan	Tanda Tangan Pembimbing
8.	24 juli 2023	Bimbingan BAB IV dan V ACC BAB IV	
9.	28 juli 2023	Bimbingan BAB V	
10.	07/08/2023	Acc	
11.			
12.			

Palembang,

Ketua Jurusan/KPS,

(Masayu Anisah. S.T., M.T)
NIP 19701228 199302 2 001

Catatan:
*) melingkari angka yang sesuai.
Ketua Jurusan/Ketua Program Studi harus memeriksa jumlah pelaksanaan bimbingan sesuai yang dipersyaratkan dalam Pedoman Laporan Akhir sebelum menandatangani lembar bimbingan ini.
Lembar pembimbingan LA ini harus dilampirkan dalam Laporan Akhir.

KEMENTERIAN PENDIDIKAN, KEBUDAYAAN, RISET, DAN TEKNOLOGI
POLITEKNIK PERTANIAN NEGERI SAMARINDA
Kampus Gunung Panjang Jl. Samratulangi Samarinda 75131 Telepon.0541- 260421, Fax.0541- 260680
email : info@politanisamarinda.ac.id dan politanismd@gmail.com, www.politanisamarinda.ac.id

LETTER OF ACCEPTANCE

Yth. Sdr/i. **Destra Andika Pratama, Yordan Hasan, Ajeng Setyo Rini**

SELAMAT!

Setelah peninjauan akhir dari Naskah anda :

"Analysis Of Electric Voltage Signals Produced By Plants Using Matlab"

Keputusan kami : ***Accept Submission***

Jurnal Sasaran : ***TEPIAN Vol.4 No.3 September 2023***

Semua Naskah akan dipublikasikan di **secara online** dan dengan **akses terbuka** di OJS Politani Samarinda e-journal.politanisamarinda.ac.id/index.php/tepian pada bulan September 2023.

Demikian surat keterangan ini kami sampaikan, atas kontribusinya kami ucapkan terima kasih.

Samarinda, 8 Juli 2023
Editor in-Chief

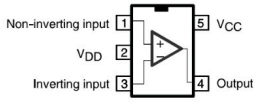
Reza Andrea, M.Kom

LMV321, LMV358, LMV324

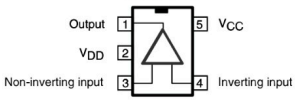
Datasheet

Low cost, low power, input/output rail-to-rail operational amplifiers

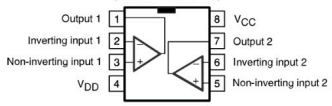
LMV321ILT
(SOT23-5)



LMV321RILT
(SOT23-5)



LMV358IDT-LMV358IPT
(SO8, TSSOP8)



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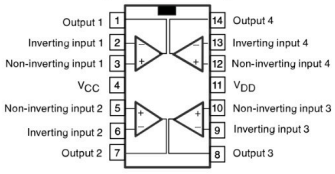
(SO14, TSSOP14)



Maturity status link
LMV321
LMV324
LMV358

Related products	
LMV321L, LMV324L, LMV358L	For newer technological version
TSV851, TSV852, TSV854	For enhanced performances

Features

- Operating range from V_{CC} = 2.7 to 6 V
- Rail-to-rail input and output
- Extended V_{icm} (V_{DD} - 0.2 V to V_{CC} + 0.2 V)
- Low supply current (145 µA)
- Gain bandwidth product (1 MHz)
- ESD tolerance (2 kV)

Applications

- Battery powered electronic equipment
- Personal medical care (glucose meters)
- Laptops

Description

The LMV321/LMV324/LMV358 family (single, dual, and quad) answers the need for low cost, general-purpose operational amplifiers. They operate with voltages as low as 2.7 V and feature both input and output rail-to-rail, 145 µA consumption current, and 1 MHz gain bandwidth product (GBP).

With such a low consumption and a sufficient GBP for many applications, these op amps are well suited for any kind of battery supplied and portable equipment application.

The LMV321 device is housed in the space-saving 5-pin SOT23-5 package, which simplifies board design. The SOT23-5 has two pinning configurations to answer all application requirements.

1 Absolute maximum ratings and operating conditions

Table 1. Absolute maximum ratings

Symbol	Parameter		Value	Unit
V_{CC}	Supply voltage (1)		7	V
V_{id}	Differential input voltage (2)		±1	
V_{in}	Input voltage		V_{DD} - 0.3 to V_{CC} + 0.3	
T_{oper}	Operating free air temperature range		-40 to 125	°C
T_{stg}	Storage temperature		-65 to 150	
T_j	Maximum junction temperature		150	
R_{thja}	Thermal resistance junction-to-ambient (3)	SOT23-5	250	°C/W
		SO8	125	
		TSSOP8	120	
		SO14	103	
		TSSOP14	100	
R_{thjc}	Thermal resistance junction-to-case(3)	SOT23-5	81	
		SO8	40	
		TSSOP8	37	
		SO14	31	
		TSSOP14	32	
ESD	HBM: human body model (4)		2	kV
	MM: machine model (5)		200	V
	CDM: charged device model (6)		1.5	kV
	Lead temperature (soldering, 10 s)		250	°C
	Output short-circuit duration		See (7)	

1. *All voltage values, except differential voltage are with respect to network terminal.*
2. *The differential voltage is the non-inverting input terminal with respect to the inverting input terminal. If V_{id} > ±1 V, the maximum input current must not exceed ±1 mA. In this case (V_{id} > ±1 V), an input series resistor must be added to limit input current.*
3. *Short-circuits can cause excessive heating. Destructive dissipation can result from simultaneous short-circuits on all amplifiers. All values are typical.*
4. *Human body model: a 100 pF capacitor is charged to the specified voltage, then discharged through a 1.5 kΩ resistor between two pins of the device. This is done for all couples of connected pin combinations while the other pins are floating.*
5. *Machine model: a 200 pF capacitor is charged to the specified voltage, then discharged directly between two pins of the device with no external series resistor (internal resistor < 5 Ω). This is done for all couples of connected pin combinations while the other pins are floating.*
6. *Charged device model: all pins and the package are charged together to the specified voltage and then discharged directly to the ground through only one pin. This is done for all pins. No value specified for CDM on SOT23-5 package. The value is given for SO8 and TSSOP packages.*
7. *Short-circuits from the output to V_{CC} can cause excessive heating. The maximum output current is approximately 48 mA, independent of the magnitude of V_{CC}. Destructive dissipation can result from simultaneous short-circuits on all amplifiers.*

Table 2. Operating conditions

Symbol	Parameter	Value	Unit
V_{CC}	Supply voltage	2.7 to 6	V
V_{icm}	Common mode input voltage range (1)	V_{DD} - 0.2 to V_{CC} + 0.2	
V_{icm}	Common mode input voltage range (2)	V_{DD} to V_{CC}	
T_{oper}	Operating free air temperature range	-40 to 125	°C

1. *At 25 °C, for 2.7 ≤ V_{CC} ≤ 6 V, V_{icm} is extended to V_{DD} - 0.2 V, V_{CC} + 0.2 V.*
2. *In full temperature range, both rails can be reached when V_{CC} does not exceed 5.5 V.*

2 Electrical characteristics

Table 3. Electrical characteristics at V_{CC} = 2.7 V, V_{DD} = 0 V, C_L and R_L connected to $V_{CC}/2$, T_{amb} = 25 °C (unless otherwise specified)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
V_{io}	Input offset voltage	$V_{icm} = V_{out} = V_{CC}/2$		0.1	3	mV
		$T_{min} \le T_{amb} \le T_{max}$			6	
$\Delta V_{io}/\Delta T$	Input offset voltage drift			2		µV/°C
I_{io}	Input offset current	$V_{icm} = V_{out} = V_{CC}/2$ (1)		1	9	nA
		$T_{min} \le T_{amb} \le T_{max}$			25	
I_{ib}	Input bias current	$V_{icm} = V_{out} = V_{CC}/2$ (1)		10	50	
		$T_{min} \le T_{amb} \le T_{max}$			85	
CMR	Common mode rejection ratio	$0 \le V_{icm} \le V_{CC}$	55	85		dB
SVR	Supply voltage rejection ratio	$V_{icm} = V_{CC}/2$	70	80		
A_{vd}	Large signal voltage gain	V_{out} = 0.5 V to 2.2 V, R_L = 10 kΩ	80	100		
		V_{out} = 0.5 V to 2.2 V, R_L = 2 kΩ	70	88		
V_{OH}	High level output voltage	V_{id} = 100 mV, $T_{min} \le T_{amb} \le T_{max}$, R_L = 10 kΩ	2.6	2.65		V
		V_{id} = 100 mV, $T_{min} \le T_{amb} \le T_{max}$, R_L = 2 kΩ	2.55	2.6		
V_{OL}	Low level output voltage	V_{id} = -100 mV, $T_{min} \le T_{amb} \le T_{max}$, R_L = 10 kΩ		15	90	mV
		V_{id} = -100 mV, $T_{min} \le T_{amb} \le T_{max}$, R_L = 2 kΩ		50	100	
I_o	Output current	Output source current, V_{id} = 100 mV, $V_O = V_{DD}$	5	46		mA
		Output sink current, V_{id} = -100 mV, $V_O = V_{CC}$	5	46		
I_{CC}	Supply current (per amplifier)	$V_{out} = V_{CC}/2$, A_{VCL} = 1, no load		145	200	µA
		$T_{min} \le T_{amb} \le T_{max}$			230	
GBP	Gain bandwidth product	R_L = 10 kΩ, C_L = 100 pF, f = 100 kHz		1		MHz
SR	Slew rate	R_L = 600 Ω, C_L = 100 pF, A_V = 1		0.35		V/µs
ϕm	Phase margin	R_L = 600 Ω, C_L = 100 pF		44		Degrees
en	Input voltage noise			40		nV/√ Hz
THD	Total harmonic distortion			0.01		%

1. *Maximum values include unavoidable inaccuracies of the industrial tests.*

Table 4. Electrical characteristics at V_{CC} = 5 V, V_{DD} = 0 V, C_L and R_L connected to $V_{CC}/2$, T_{amb} = 25 °C (unless otherwise specified)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
V_{io}	Input offset voltage	$V_{icm} = V_{out} = V_{CC}/2$		0.1	3	mV
		$T_{min} \le T_{amb} \le T_{max}$			6	
$\Delta V_{io}/\Delta T$	Input offset voltage drift			2		µV/°C
I_{io}	Input offset current	$V_{icm} = V_{out} = V_{CC}/2$ (1)		1	9	nA
		$T_{min} \le T_{amb} \le T_{max}$			25	
I_{ib}	Input bias current	$V_{icm} = V_{out} = V_{CC}/2$ (1)		16	63	
		$T_{min} \le T_{amb} \le T_{max}$			95	
CMR	Common mode rejection ratio	$0 \le V_{icm} \le V_{CC}$	65	95		dB
SVR	Supply voltage rejection ratio	$V_{icm} = V_{CC}/2$	70	90		
A_{vd}	Large signal voltage gain	V_{out} = 0.5 V to 4.5 V, R_L = 10 kΩ	85	97		
		V_{out} = 0.5 V to 4.5 V, R_L = 2 kΩ	77	93		
V_{OH}	High level output voltage	V_{id} = 100 mV, $T_{min} \le T_{amb} \le T_{max}$, R_L = 10 kΩ	4.85	4.95		V
		V_{id} = 100 mV, $T_{min} \le T_{amb} \le T_{max}$, R_L = 2 kΩ	4.8	4.91		
V_{OL}	Low level output voltage	V_{id} = -100 mV, $T_{min} \le T_{amb} \le T_{max}$, R_L = 10 kΩ		40	180	mV
		V_{id} = -100 mV, $T_{min} \le T_{amb} \le T_{max}$, R_L = 2 kΩ		80	200	
I_o	Output current	Output source current, V_{id} = 100 mV, $V_O = V_{DD}$	7	48		mA
		Output sink current, V_{id} = -100 mV, $V_O = V_{CC}$	7	48		
I_{CC}	Supply current (per amplifier)	$V_{out} = V_{CC}/2$, A_{VCL} = 1, no load		162	220	µA
		$T_{min} \le T_{amb} \le T_{max}$			250	
GBP	Gain bandwidth product	R_L = 10 kΩ, C_L = 100 pF, f = 100 kHz		1.3		MHz
SR	Slew rate	R_L = 600 Ω, C_L = 100 pF, A_V = 1		0.45		V/µs
ϕm	Phase margin	R_L = 600 Ω, C_L = 100 pF		48		Degrees
en	Input voltage noise			40		nV/√ Hz
THD	Total harmonic distortion			0.01		%

1. *Maximum values include unavoidable inaccuracies of the industrial tests.*

Figure 1. Supply current/amplifier vs. supply voltage

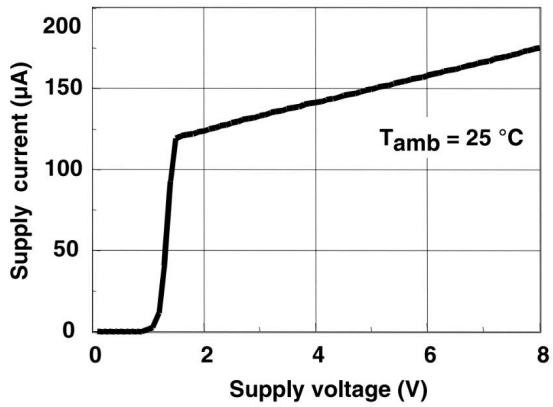


Figure 2. Input bias current vs. temperature (V_{CC} = 3 V, V_{icm} = 1.5 V)

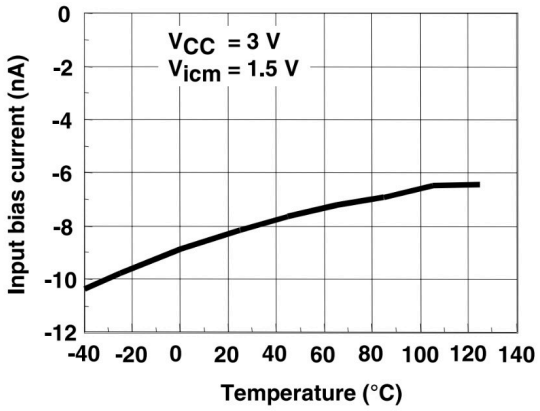


Figure 3. Input bias current vs. temperature (V_{CC} = 5 V, V_{icm} = 2.5 V)

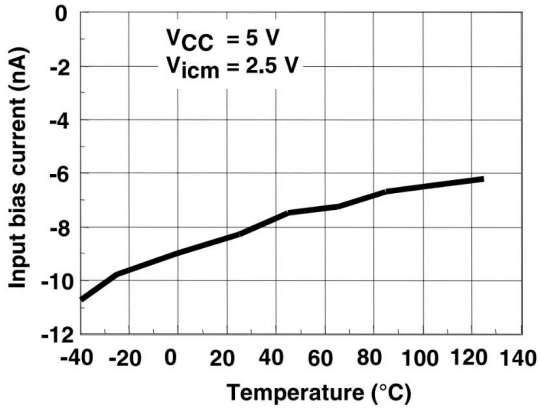


Figure 4. Common mode rejection vs. temperature (V_{CC} = 3 V)

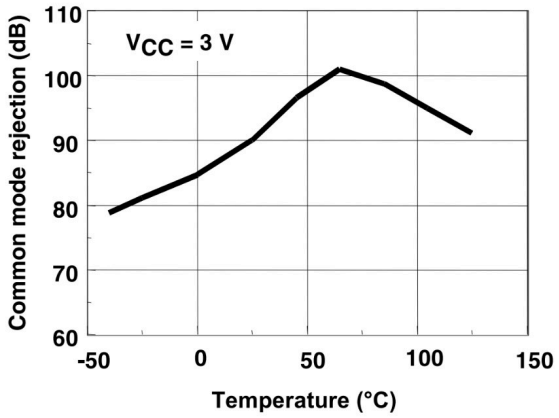


Figure 5. Common mode rejection vs. temperature (V_{CC} = 5 V)

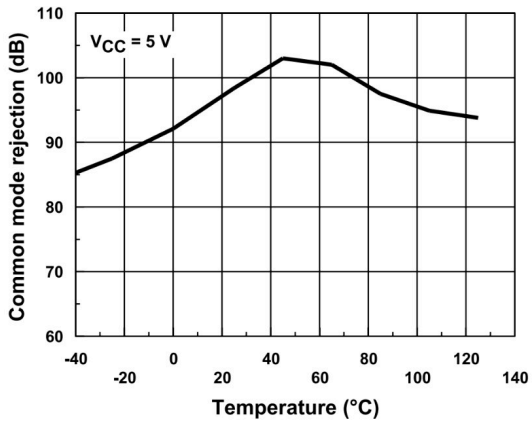


Figure 6. Supply voltage rejection vs. temperature (V_{CC} = 5 V, V_{icm} = 2.5 V)

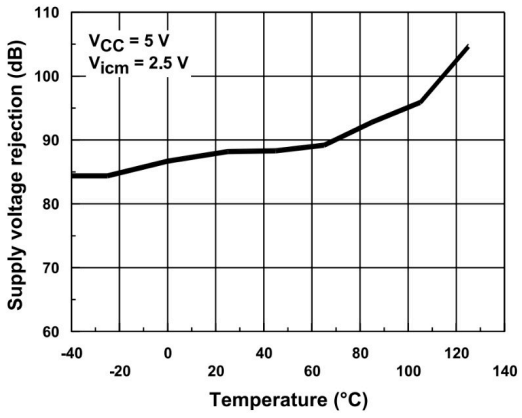


Figure 7. Open loop gain vs. temperature (V_{CC} = 3 V, R_L = 10 kΩ, R_L = 2 kΩ)

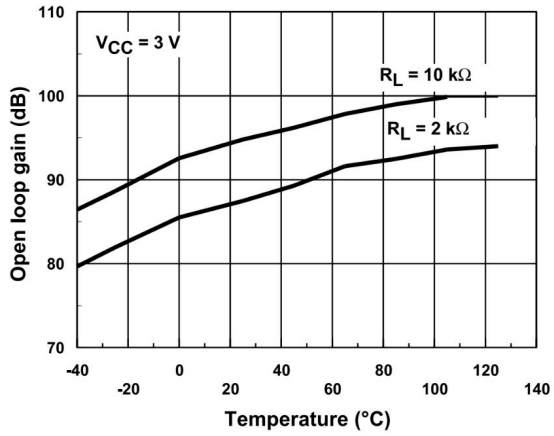


Figure 8. Open loop gain vs. temperature (V_{CC} = 5 V, R_L = 10 kΩ, R_L = 2 kΩ)

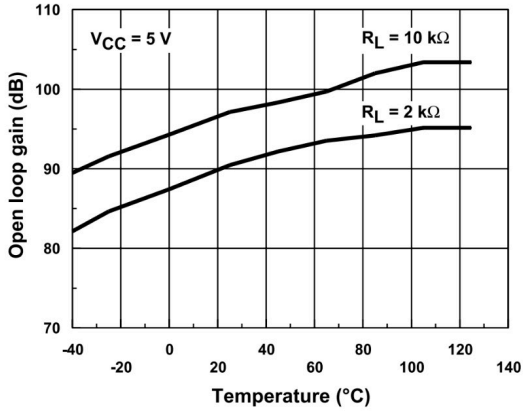


Figure 9. Supply voltage rejection vs. temperature (V_{CC} = 3 V, V_{icm} = 1.5 V)

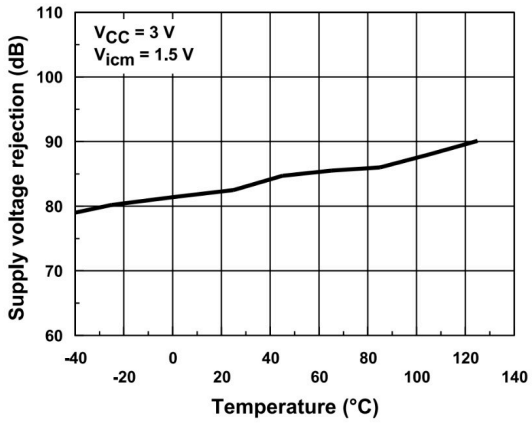


Figure 10. Output current vs. output voltage (V_{CC} = 3 V, V_{id} = 0.1 V, V_{icm} = 1.5 V)

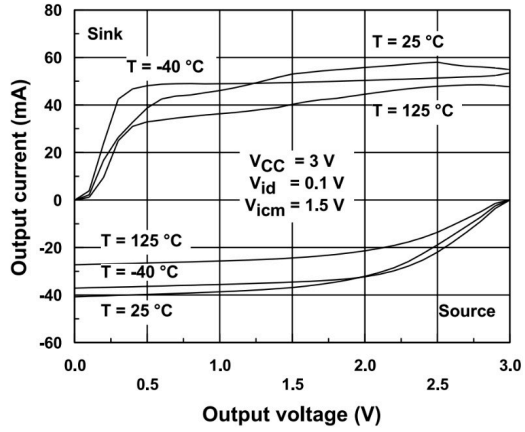


Figure 11. Output current vs. output voltage (V_{CC} = 5 V, V_{id} = 0.1 V, V_{icm} = 2.5 V)

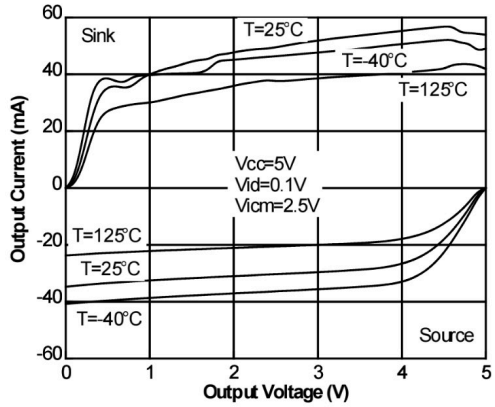


Figure 12. Noise versus frequency

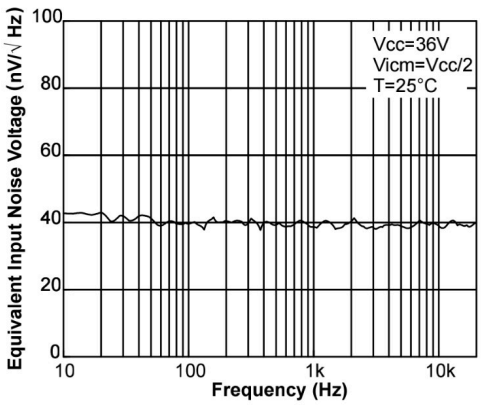
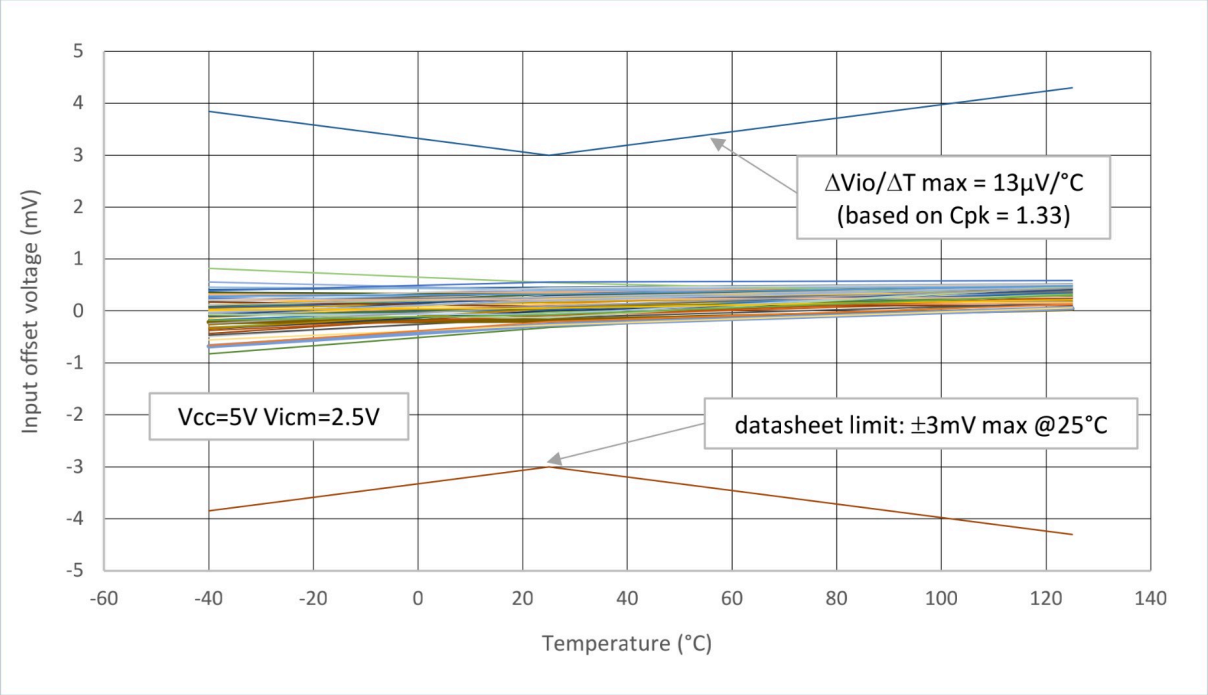


Figure 13. LMV358IYPT Input offset voltage vs. temperature at 5 V supply voltage



3 Package information

In order to meet environmental requirements, ST offers these devices in different grades of ECOPACK packages, depending on their level of environmental compliance. ECOPACK specifications, grade definitions and product status are available at: www.st.com. ECOPACK is an ST trademark.

3.1 SOT23-5 package information

Figure 14. **SOT23-5 package outline**

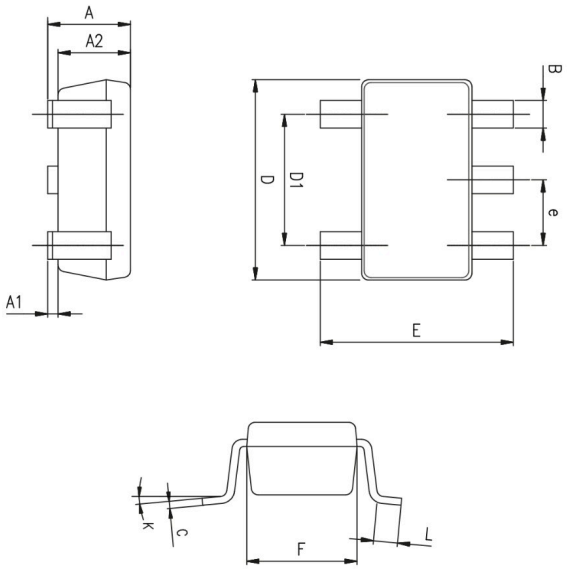


Table 5. **SOT23-5 mechanical data**

Ref.	Dimensions					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	0.90	1.20	1.45	0.035	0.047	0.057
A1			0.15			0.006
A2	0.90	1.05	1.30	0.035	0.041	0.051
B	0.35	0.40	0.50	0.014	0.016	0.020
C	0.09	0.15	0.20	0.004	0.006	0.008
D	2.80	2.90	3.00	0.110	0.114	0.118
D1		1.90			0.075	
e		0.95			0.037	
E	2.60	2.80	3.00	0.102	0.110	0.118
F	1.50	1.60	1.75	0.059	0.063	0.069
L	0.10	0.35	0.60	0.004	0.014	0.024
K	0 degrees		10 degrees	0 degrees		10 degrees

3.2 SO8 package information

Figure 15. **SO8 package outline**

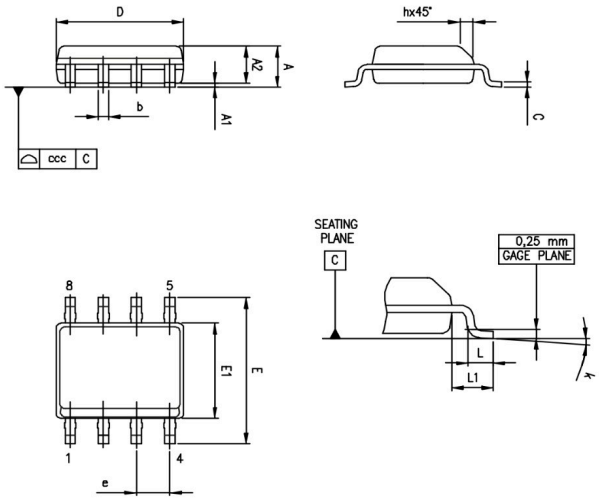


Table 6. **SO8 package mechanical data**

Ref.	Dimensions					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A			1.75			0.069
A1	0.10		0.25	0.004		0.010
A2	1.25			0.049		
b	0.28		0.48	0.011		0.019
c	0.17		0.23	0.007		0.010
D	4.80	4.90	5.00	0.189	0.193	0.197
E	5.80	6.00	6.20	0.228	0.236	0.244
E1	3.80	3.90	4.00	0.150	0.154	0.157
e		1.27			0.050	
h	0.25		0.50	0.010		0.020
L	0.40		1.27	0.016		0.050
L1		1.04			0.040	
k	0°		8°	0°		8°
ccc			0.10			0.004

3.3 TSSOP8 package information

Figure 16. **TSSOP8 package outline**

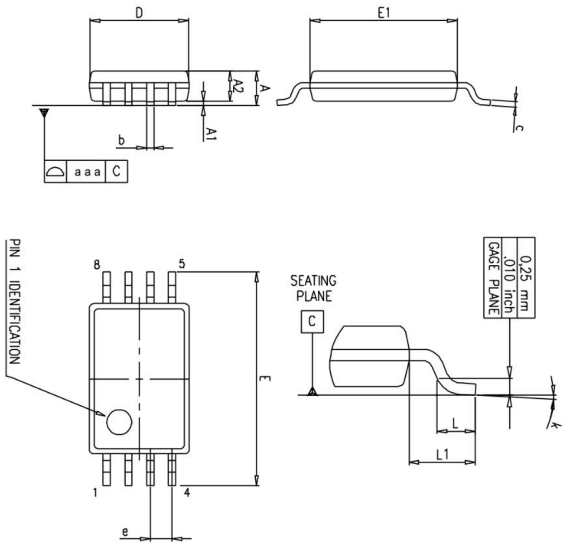


Table 7. **TSSOP8 package mechanical data**

Ref.	Dimensions					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A			1.20			0.047
A1	0.05		0.15	0.002		0.006
A2	0.80	1.00	1.05	0.031	0.039	0.041
b	0.19		0.30	0.007		0.012
c	0.09		0.20	0.004		0.008
D	2.90	3.00	3.10	0.114	0.118	0.122
E	6.20	6.40	6.60	0.244	0.252	0.260
E1	4.30	4.40	4.50	0.169	0.173	0.177
e		0.65			0.0256	
k	0°		8°	0°		8°
L	0.45	0.60	0.75	0.018	0.024	0.030
L1		1			0.039	
aaa			0.10			0.004

3.4 SO14 package information

Figure 17. **SO14 package outline**

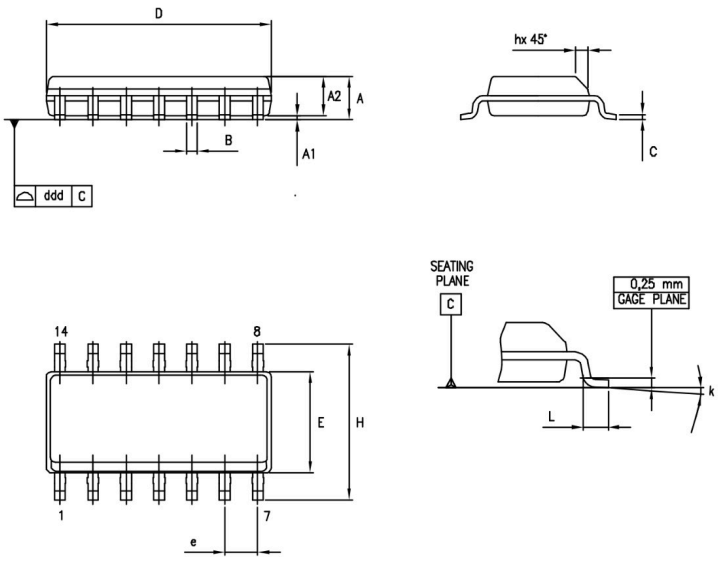


Table 8. **SO14 package mechanical data**

Ref.	Dimensions					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	1.35		1.75	0.05		0.068
A1	0.10		0.25	0.004		0.009
A2	1.10		1.65	0.04		0.06
B	0.33		0.51	0.01		0.02
C	0.19		0.25	0.007		0.009
D	8.55		8.75	0.33		0.34
E	3.80		4.0	0.15		0.15
e		1.27			0.05	
H	5.80		6.20	0.22		0.24
h	0.25		0.50	0.009		0.02
L	0.40		1.27	0.015		0.05
k	8° (max.)					
ddd			0.10			0.004

3.5 TSSOP14 package information

Figure 18. **TSSOP14 package outline**

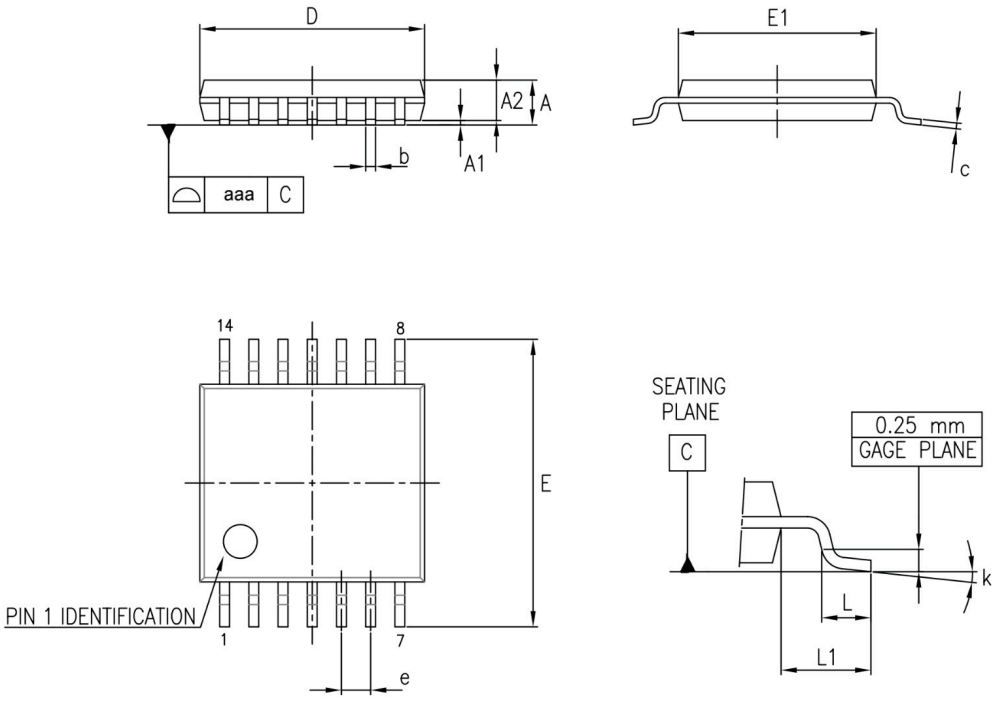


Table 9. **TSSOP14 package mechanical data**

Ref.	Dimensions					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A			1.20			0.047
A1	0.05		0.15	0.002	0.004	0.006
A2	0.80	1.00	1.05	0.031	0.039	0.041
b	0.19		0.30	0.007		0.012
c	0.09		0.20	0.004		0.0089
D	4.90	5.00	5.10	0.193	0.197	0.201
E	6.20	6.40	6.60	0.244	0.252	0.260
E1	4.30	4.40	4.50	0.169	0.173	0.176
e		0.65			0.0256	
L	0.45	0.60	0.75	0.018	0.024	0.030
L1		1.00			0.039	
k	0°		8°	0°		8°
aaa			0.10			0.004

4 Ordering information

Table 10. Order codes

Order code	Temperature range	Package	Packaging	Marking
LMV321ILT	-40 °C to 125 °C	SOT23-5	Tape and reel	K177
LMV321RILT				K176
LMV321IYLT (1)		SOT23-5 (automotive grade)		K180
LMV321RIYLT (1)				K185
LMV358IDT		SO8		LMV358
LMV358IYDT (1)		SO8 (automotive grade)		LMV358IY
LMV358IPT		TSSOP8		MV358
LMV358IYPT (1)		TSSOP8 (automotive grade)		K181Y
LMV324IDT		SO14		LMV324
LMV324IYDT (1)		SO14 (automotive grade)		V324Y
LMV324IPT		TSSOP14		MV324
LMV324IYPT (1)		TSSOP14 (automotive grade)		V324IY

1. *Qualified and characterized according to AEC Q100 and Q003 or equivalent, advanced screening according to AEC Q001 and Q 002 or equivalent.*

Revision history

Table 11. **Document revision history**

Date	Revision	Changes
1-Dec-2005	1	First release - Products in full production.
25-May-2007	2	Added automotive grade part numbers to order codes table. Moved order codes table to Section 4: "Ordering information".
20-Feb-2008	3	Added Figure 12: "Noise versus frequency". Updated presentation of package information. Corrected footnote for automotive grade part numbers in order codes table.
18-Jan-2010	4	Updated document format. Updated packages in Section 3: "Package information". Modified Note 1 and added Note 2 under Table 10: "Order codes".
05-Nov-2012	5	Updated Features (added SO8, TSSOP8, SO14, and TSSOP14 package). Updated titles of Figure 2 to Figure 11 (added conditions). Updated LMV321RIYLT order code in Table 10: "Order codes" (status qualified), removed LMV358IYD and LMV324IYD order codes from Table 10: "Order codes". Minor corrections throughout document.
16-Aug-2013	6	Updated Features Added Related products Table 3 and Table 4: replaced ΔV_{io} with $\Delta V_{io}/\Delta T$ Table 6: updated minimum inches “k” value (0 instead of 1) Table 10: "Order codes": updated footnote associated with order code LMV358IYPT
05-Jun-2015	7	Updated Figure 11. TSSOP package information: updated "aaa" value Table 10: "Order codes": removed obsolete order codes LMV358ID and LMV324ID.
15-Oct-2015	8	Replaced Figure 12: "Noise versus frequency.
06-May-2019	9	Added Figure 13. LMV358IYPT Input offset voltage vs. temperature at 5 V supply voltage.
20-Sep-2021	10	Updated Section 3.4 SO14 package information.