Single, Dual, and Quad, 1.4-MHz, Low-Power, General-Purpose 1.8-V Operational Amplifiers

Description

The LMV61x devices are single, dual, and quad low-voltage, low-power operational amplifiers (op amps). They are designed specifically for low-voltage, general-purpose applications. Other important product characteristics are, rail-to-rail input or output, low supply voltage of 1.8 V and wide temperature range. The LMV61x input common mode extends 200 mV beyond the supplies and the output can swing rail-to-rail unloaded and within 30 mV with 2-kΩ load at 1.8-V supply. The LMV61x achieves a gain bandwidth of 1.4 MHz while drawing 100-µA (typical) quiescent current.

The industrial-plus temperature range of −40°C to 125°C allows the LMV61x to accommodate a broad range of extended environment applications.

The LMV611 is offered in the tiny 5-pin SC70 package, the LMV612 in space-saving 8-pin VSSOP and SOT packages, and the LMV614 in 14-pin TSSOP and SOT packages. These small package amplifiers offer an ideal solution for applications requiring minimum PCB footprint. Applications with area constrained PCB requirements include portable and battery-operated electronics.

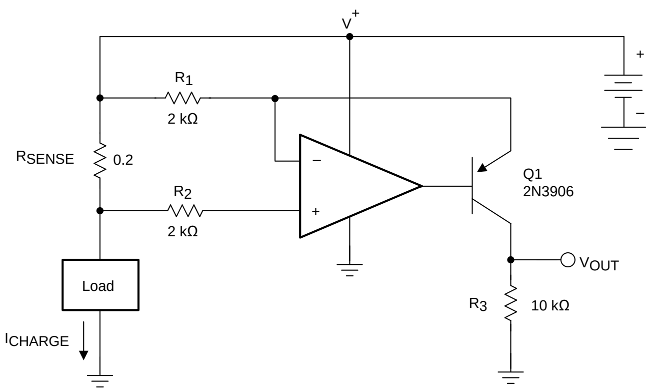
Features

- Supply Values: 1.8 V (Typical)
- Ensured 1.8-V, 2.7-V, and 5-V Specifications
- Output Swing:
  - 80 mV From Rail With 600-Ω Load
  - 30 mV From Rail With 2-kΩ Load
- V_{CM} = 200 mV Beyond Rails
- 100-µA Supply Current (Per Channel)
- 1.4-MHz Gain Bandwidth Product
- Maximum V_{OS} = 4 mV
- Temperature Range: −40°C to 125°C

Applications

- Consumer Communication
- Consumer Computing
- PDAs
- Audio Pre-Amplifiers
- Portable or Battery-Powered Electronic Equipment
- Supply Current Monitoring
- Battery Monitoring

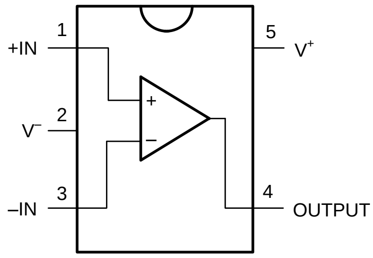
Typical Application



$$V_{OUT} = \frac{R_{SENSE} \bullet R_3}{R_1} \bullet I_{Charge} = 1\Omega \bullet I_{Charge}$$

Pin Configuration and Functions

DCK and DBV Packages
5-Pin SC70 and SOT-23
Top View

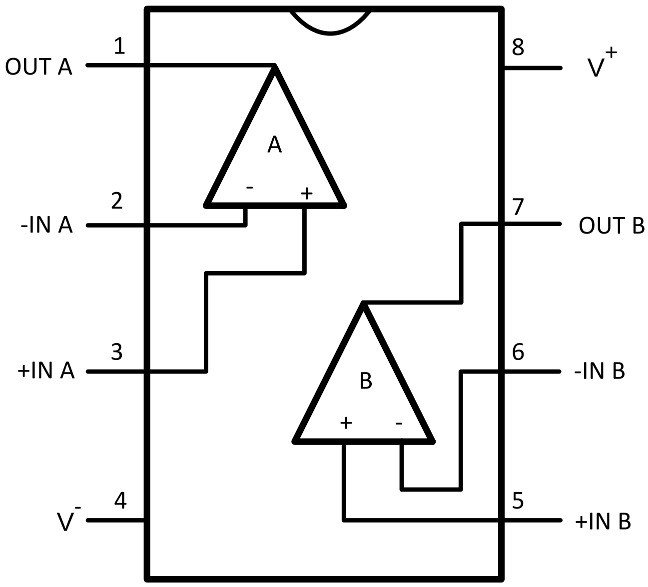


Pin Functions – LMV611

PIN		TYPE(1)	DESCRIPTION
NO.	NAME		
1	+IN	I	Noninverting input
2	V⁻	P	Negative supply input
3	–IN	I	Inverting input
4	OUTPUT	O	Output
5	V⁺	P	Positive supply input

(1) I = Input, O = Output, and P = Power

DGK and D Packages
8-Pin SOP Top View



Pin Functions – LMV612

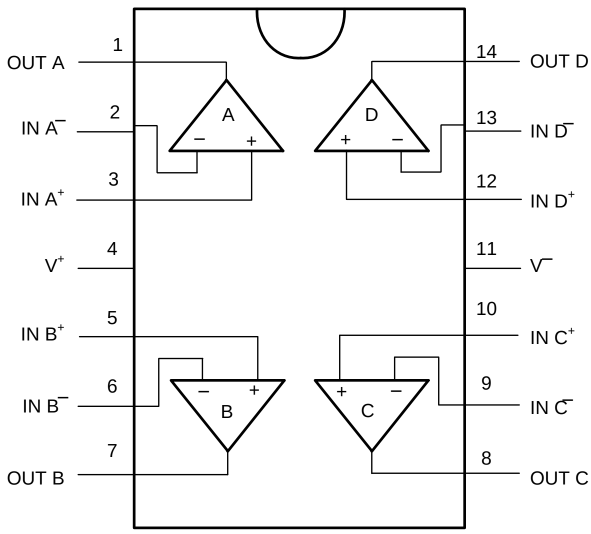
PIN		TYPE(1)	DESCRIPTION
NO.	NAME		
1	OUT A	O	Output A
2	–IN A	I	Inverting input A

(1) I = Input, O = Output, and P = Power

Pin Functions – LMV612 (continued)

PIN		TYPE (1)	DESCRIPTION
NO.	NAME		
3	+IN A	I	Noninverting input A
4	V^-	P	Negative supply input
5	+IN B	I	Noninverting input B
6	–IN B	I	Inverting input B
7	OUT B	O	Output B
8	V^+	P	Positive supply input

PW and D Packages
14-Pin TSSOP and SOP
Top View



Pin Functions – LMV614

PIN		TYPE (1)	DESCRIPTION
NO.	NAME		
1	OUT A	O	Output A
2	IN A^-	I	Inverting input A
3	IN A^+	I	Noninverting input A
4	V^+	P	Positive supply input
5	IN B^+	I	Noninverting input B
6	IN B^-	I	Inverting input B
7	OUT B	O	Output B
8	OUT C	O	Output C
9	IN C^-	I	Inverting input C
10	IN C^+	I	Noninverting input C
11	V^-	P	Negative supply input
12	IN D^+	I	Noninverting input D
13	IN D^-	I	Inverting input D
14	OUT D	O	Output D

(1) I = Input, O = Output, and P = Power

Absolute Maximum Ratings

over operating free-air temperature range (unless otherwise noted)(1)(2)(3)

	MIN	MAX	UNIT
Differential input voltage	±Supply voltage		
Supply voltage (V^+–V^-)		6	V
Voltage at input or output pin	V^- – 0.3	V^+ + 0.3	V
Junction temperature, T_{JMAX} (4)		150	°C
Storage temperature, T_{stg}	–65	150	°C

(1) Stresses beyond those listed under *Absolute Maximum Ratings* may cause permanent damage to the device. These are stress ratings only, which do not imply functional operation of the device at these or any other conditions beyond those indicated under *Recommended Operating Conditions*. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability.
(2) If Military/Aerospace specified devices are required, please contact the Texas Instruments Sales Office/Distributors for availability and specifications.

ESD Ratings

			VALUE	UNIT
$V_{(ESD)}$	Electrostatic discharge	Human-body model (HBM), per ANSI/ESDA/JEDEC JS-001 (1)	±2000	V
		Machine model (MM) (2)	±200	

(1) JEDEC document JEP155 states that 500-V HBM allows safe manufacturing with a standard ESD control process.
(2) Machine model, applicable std. JESD22-A115-A (ESD MM std. of JEDEC) Field-Induced Charge-Device Model, applicable std. JESD22-C101-C (ESD FICDM std. of JEDEC).

Recommended Operating Conditions

over operating free-air temperature range (unless otherwise noted)

	MIN	MAX	UNIT
Supply voltage	1.8	5.5	V
Temperature	–40	125	°C

Thermal Information

THERMAL METRIC (1)		LMV611		LMV612	LMV614		UNIT
		DBV (SOT-23)	DCK (SC70)	D (SOP)	D (SOP)	PW (TSSOP)	
		5 PINS	5 PINS	8 PINS	14 PINS	14 PINS	
$R_{\theta JA}$	Junction-to-ambient thermal resistance	197.2	285.9	125.9	94.4	124.8	°C/W
$R_{\theta JC(top)}$	Junction-to-case (top) thermal resistance	156.7	115.9	70.2	52.5	51.4	°C/W
$R_{\theta JB}$	Junction-to-board thermal resistance	55.6	63.7	66.5	48.9	67.2	°C/W
ψ_{JT}	Junction-to-top characterization parameter	41.4	4.5	19.8	14.3	6.6	°C/W
ψ_{JB}	Junction-to-board characterization parameter	55	62.9	65.9	48.6	66.6	°C/W
$R_{\theta JC(bot)}$	Junction-to-case (bottom) thermal resistance	—	—	—	—	—	°C/W

Electrical Characteristics – 1.8 V (DC)

All limits ensured for T_J = 25°C, V^+ = 1.8 V, V^- = 0 V, V_{CM} = V^+/ 2, V_O = V^+/ 2, and R_L > 1 MΩ (unless otherwise noted).(1)

PARAMETER		TEST CONDITIONS		MIN(2)	TYP(3)	MAX(2)	UNIT
V_{OS}	Input offset voltage	LMV611 (single)			1	4	mV
		LMV612 (dual) and LMV614 (quad)			1	5.5	
TCV_{OS}	Input offset voltage average drift				5.5		µV/°C
I_B	Input bias current				15		nA
I_{OS}	Input offset current				13		nA
I_S	Supply current (per channel)				103	185	µA
CMRR	Common-mode rejection ratio	LMV611, 0 V ≤ V_{CM} ≤ 0.6 V, 1.4 V ≤ V_{CM} ≤ 1.8 V(4)		60	78		dB
		LMV612 and LMV614, 0 V ≤ V_{CM} ≤ 0.6 V, 1.4 V ≤ V_{CM} ≤ 1.8 V(4)		55	76		
		−0.2 V ≤ V_{CM} ≤ 0 V, 1.8 V ≤ V_{CM} ≤ 2 V		50	72		
PSRR	Power supply rejection ratio	1.8 V ≤ V^+ ≤ 5 V			100		dB
CMVR	Input common-mode voltage	For CMRR range ≥ 50 dB	V^-, T_A = 25°C	V^- – 0.2	–0.2		V
			V^+, T_A = 25°C		2.1	V^+ + 0.2	
			T_A = −40°C to 85°C	V^-		V^+	
			T_A = 125°C	V^- + 0.2		V^+ – 0.2	
A_V	Large signal voltage gain LMV611 (single)	R_L = 600 Ω to 0.9 V, V_O = 0.2 V to 1.6 V, V_{CM} = 0.5 V		77	101		dB
		R_L = 2 kΩ to 0.9 V, V_O = 0.2 V to 1.6 V, V_{CM} = 0.5 V		80	105		
	Large signal voltage gain LMV612 (dual) and LMV614 (quad)	R_L = 600 Ω to 0.9 V, V_O = 0.2 V to 1.6 V, V_{CM} = 0.5 V		75	90		
		R_L = 2 kΩ to 0.9 V, V_O = 0.2 V to 1.6 V, V_{CM} = 0.5 V		78	100		
V_O	Output swing	R_L = 600 Ω to 0.9 V		1.65	1.72		V
		V_{IN} = ±100 mV			0.077	0.105	
		R_L = 2 kΩ to 0.9 V		1.75	1.77		
		V_{IN} = ±100 mV			0.024	0.035	
I_O	Output short-circuit current(5)	Sourcing, V_O = 0 V, V_{IN} = 100 mV			8		mA
		Sinking, V_O = 1.8 V, V_{IN} = –100 mV			9		

(1) Electrical characteristics values apply only for factory testing conditions at the temperature indicated. Factory testing conditions result in very limited self-heating of the device such that T_J = T_A. No assurance of parametric performance is indicated in the electrical tables under conditions of internal self-heating where T_J > T_A. See Application and Implementation for information of temperature derating of the device. Absolute Maximum Ratings indicated junction temperature limits beyond which the device may be permanently degraded, either mechanically or electrically.
(2) All limits are specified by testing or statistical analysis.
(3) Typical values represent the most likely parametric norm as determined at the time of characterization. Actual typical values may vary over time and also depends on the application and configuration. The typical values are not tested and are not ensured on shipped production material.
(4) For specified temperature ranges, see Input common mode voltage specifications.
(5) Applies to both single-supply and split-supply operation. Continuous short circuit operation at elevated ambient temperature can result in exceeding the maximum allowed junction temperature of 150°C. Output currents in excess of 45 mA over long term may adversely affect reliability.

Electrical Characteristics – 1.8 V (AC)

All limits ensured for T_J = 25°C, V^+ = 1.8 V, V^- = 0 V, V_{CM} = V^+/ 2, V_O = V^+/ 2, and R_L > 1 MΩ (unless otherwise noted).(1)

PARAMETER		TEST CONDITIONS	MIN(2)	TYP(3)	MAX(2)	UNIT
SR	Slew rate(4)			0.35		V/µs
GBW	Gain-bandwidth product			1.4		MHz
Φ_m	Phase margin			67		°
G_m	Gain margin			7		dB
e_n	Input-referred voltage noise	f = 10 kHz, V_{CM} = 0.5 V		60		nV/√Hz
i_n	Input-referred current noise	f = 10 kHz		0.08		pA/√Hz
THD	Total harmonic distortion	f = 1 kHz, A_V = +1, R_L = 600 Ω, V_{IN} = 1 V_{PP}		0.023%		
	Amp-to-amp isolation(5)			123		dB

(1) Electrical characteristics values apply only for factory testing conditions at the temperature indicated. Factory testing conditions result in very limited self-heating of the device such that T_J = T_A. No assurance of parametric performance is indicated in the electrical tables under conditions of internal self-heating where T_J > T_A. See Application and Implementation for information of temperature derating of the device. Absolute Maximum Ratings indicated junction temperature limits beyond which the device may be permanently degraded, either mechanically or electrically.
(2) All limits are specified by testing or statistical analysis.
(3) Typical values represent the most likely parametric norm as determined at the time of characterization. Actual typical values may vary over time and also depends on the application and configuration. The typical values are not tested and are not ensured on shipped production material.
(4) Connected as voltage follower with input step from V^- to V^+. Number specified is the slower of the positive and negative slew rates.
(5) Input-referred, R_L = 100 kΩ connected to V^+ / 2. Each amp excited in turn with 1 kHz to produce V_O = 3 V_{PP} (for supply voltages < 3 V, V_O = V^+).

Electrical Characteristics – 2.7 V (DC)

All limits ensured for T_J = 25°C, V^+ = 2.7 V, V^- = 0 V, V_{CM} = V^+/ 2, V_O = V^+/ 2, and R_L > 1 MΩ (unless otherwise noted).(1)

PARAMETER		TEST CONDITIONS	MIN(2)	TYP(3)	MAX(2)	UNIT
V_{OS}	Input offset voltage	LMV611 (single)		1	4	mV
		LMV612 (dual) and LMV614 (quad)		1	5.5	
TCV_{OS}	Input offset voltage average drift			5.5		µV/°C
I_B	Input bias current			15		nA
I_{OS}	Input offset current			8		nA
I_S	Supply current (per channel)			105	190	µA
CMRR	Common-mode rejection ratio	LMV611, 0 V ≤ V_{CM} ≤ 1.5 V, 2.3 V ≤ V_{CM} ≤ 2.7 V(4)	60	81		dB
		LMV612 and LMV614, 0 V ≤ V_{CM} ≤ 1.5 V, 2.3 V ≤ V_{CM} ≤ 2.7 V(4)	55	80		
		−0.2 V ≤ V_{CM} ≤ 0 V, 2.7 V ≤ V_{CM} ≤ 2.9 V	50	74		
PSRR	Power supply rejection ratio	1.8 V ≤ V^+ ≤ 5 V, V_{CM} = 0.5 V		100		dB

(1) Electrical characteristics values apply only for factory testing conditions at the temperature indicated. Factory testing conditions result in very limited self-heating of the device such that T_J = T_A. No assurance of parametric performance is indicated in the electrical tables under conditions of internal self-heating where T_J > T_A. See Application and Implementation for information of temperature derating of the device. Absolute Maximum Ratings indicated junction temperature limits beyond which the device may be permanently degraded, either mechanically or electrically.
(2) All limits are specified by testing or statistical analysis.
(3) Typical values represent the most likely parametric norm as determined at the time of characterization. Actual typical values may vary over time and also depends on the application and configuration. The typical values are not tested and are not ensured on shipped production material.
(4) For specified temperature ranges, see input common mode voltage specifications.

Electrical Characteristics – 2.7 V (DC) (continued)

All limits ensured for T_J = 25°C, V^+ = 2.7 V, V^- = 0 V, V_{CM} = V^+/ 2, V_O = V^+/ 2, and R_L > 1 MΩ (unless otherwise noted).(1)

PARAMETER		TEST CONDITIONS		MIN(2)	TYP(3)	MAX(2)	UNIT
V_{CM}	Input common-mode voltage	For CMRR range ≥ 50 dB	V^-, T_A = 25°C	V^- – 0.2	–0.2		V
			V^+, T_A = 25°C		3	V^+ + 0.2	
			T_A = –40°C to 85°C	V^-		V^+	
			T_A = 125°C	V^- + 0.2		V^+ – 0.2	
A_V	Large signal voltage gain LMV611 (single)	R_L = 600 Ω to 1.35 V, V_O = 0.2 V to 2.5 V		87	104		dB
		R_L = 2 kΩ to 1.35 V, V_O = 0.2 V to 2.5 V		92	110		
	Large signal voltage gain LMV612 (dual) and LMV614 (quad)	R_L = 600 Ω to 1.35 V, V_O = 0.2 V to 2.5 V		78	90		
		R_L = 2 kΩ to 1.35 V, V_O = 0.2 V to 2.5 V		81	100		
V_O	Output swing	R_L = 600 Ω to 1.35 V		2.55	2.62		V
		V_{IN} = ±100 mV			0.083	0.11	
		R_L = 2 kΩ to 1.35 V		2.65	2.675		
		V_{IN} = ±100 mV			0.025	0.04	
I_O	Output short-circuit current(5)	Sourcing, V_O = 0 V, V_{IN} = 100 mV			30		mA
		Sinking, V_O = 0 V, V_{IN} = –100 mV			25		

(5) Applies to both single-supply and split-supply operation. Continuous short circuit operation at elevated ambient temperature can result in exceeding the maximum allowed junction temperature of 150°C. Output currents in excess of 45 mA over long term may adversely affect reliability.

Electrical Characteristics – 2.7 V (AC)

All limits ensured for T_J = 25°C, V^+ = 2.7 V, V^- = 0 V, V_{CM} = 1 V, V_O = 1.35 V, and R_L > 1 MΩ (unless otherwise noted).(1)

PARAMETER		TEST CONDITIONS	MIN(2)	TYP(3)	MAX(2)	UNIT
SR	Slew rate(4)			0.4		V/µs
GBW	Gain-bandwidth product			1.4		MHz
Φ_m	Phase margin			70		°
G_m	Gain margin			7.5		dB
e_n	Input-referred voltage noise	f = 10 kHz, V_{CM} = 0.5 V		57		nV/√Hz
i_n	Input-referred current noise	f = 10 kHz		0.08		pA/√Hz
THD	Total harmonic distortion	f = 1 kHz, A_V = +1, R_L = 600 Ω, V_{IN} = 1 V_{PP}		0.022%		
	Amp-to-amp isolation(5)			123		dB

(1) Electrical characteristics values apply only for factory testing conditions at the temperature indicated. Factory testing conditions result in very limited self-heating of the device such that T_J = T_A. No assurance of parametric performance is indicated in the electrical tables under conditions of internal self-heating where T_J > T_A. See Application and Implementation for information of temperature derating of the device. Absolute Maximum Ratings indicated junction temperature limits beyond which the device may be permanently degraded, either mechanically or electrically.
(2) All limits are specified by testing or statistical analysis.
(3) Typical values represent the most likely parametric norm as determined at the time of characterization. Actual typical values may vary over time and also depends on the application and configuration. The typical values are not tested and are not ensured on shipped production material.
(4) Connected as voltage follower with input step from V^- to V^+. Number specified is the slower of the positive and negative slew rates.
(5) Input-referred, R_L = 100 kΩ connected to V^+ / 2. Each amp excited in turn with 1 kHz to produce V_O = 3 V_{PP} (for supply voltages < 3 V, V_O = V^+).

Electrical Characteristics – 5 V (DC)

All limits ensured for T_J = 25°C, V^+ = 5 V, V^- = 0 V, V_{CM} = V^+/ 2, V_O = V^+/ 2, and R_L > 1 MΩ (unless otherwise noted).[1]

PARAMETER		TEST CONDITIONS		MIN[2]	TYP[3]	MAX[2]	UNIT
V_{OS}	Input offset voltage	LMV611 (single)			1	4	mV
		LMV612 (dual) and LMV614 (quad)			1	5.5	
TCV_{OS}	Input offset voltage average drift				5.5		µV/°C
I_B	Input bias current				14	35	nA
I_{OS}	Input offset current				9		nA
I_S	Supply current (per channel)				116	210	µA
CMRR	Common-mode rejection ratio	0 V ≤ V_{CM} ≤ 3.8 V, 4.6 V ≤ V_{CM} ≤ 5 V[4]		60	86		dB
		–0.2 V ≤ V_{CM} ≤ 0 V 5 V ≤ V_{CM} ≤ 5.2 V		50	78		
PSRR	Power supply rejection ratio	1.8 V ≤ V^+ ≤ 5 V, V_{CM} = 0.5 V			100		dB
CMVR	Input common-mode voltage	For CMRR range ≥ 50 dB	V^-, T_A = 25°C	V^- – 0.2	–0.2		V
			V^+, T_A = 25°C		5.3	V^+ + 0.2	
			T_A = –40°C to 85°C	V^-		V^+	
			T_A = 125°C	V^- + 0.3		V^+ – 0.3	
A_V	Large signal voltage gain LMV611 (single)	R_L = 600 Ω to 2.5 V, V_O = 0.2 V to 4.8 V		88	102		dB
		R_L = 2 kΩ to 2.5 V, V_O = 0.2 V to 4.8 V		94	113		
	Large signal voltage gain LMV612 (dual) and LMV614 (quad)	R_L = 600 Ω to 2.5 V, V_O = 0.2 V to 4.8 V		81	90		
		R_L = 2 kΩ to 2.5 V, V_O = 0.2 V to 4.8 V		85	100		
V_O	Output swing	R_L = 600 Ω to 2.5 V		4.855	4.89		V
		V_{IN} = ±100 mV			0.12	0.16	
		R_L = 2 kΩ to 2.5 V		4.945	4.967		
		V_{IN} = ±100 mV			0.037	0.065	
I_O	Output short-circuit current[5]	LMV611, Sourcing, V_O = 0 V, V_{IN} = 100 mV			100		mA
		Sinking, V_O = 5 V, V_{IN} = –100 mV			65		

(1) Electrical characteristics values apply only for factory testing conditions at the temperature indicated. Factory testing conditions result in very limited self-heating of the device such that T_J = T_A. No assurance of parametric performance is indicated in the electrical tables under conditions of internal self-heating where T_J > T_A. See Application and Implementation for information of temperature derating of the device. Absolute Maximum Ratings indicated junction temperature limits beyond which the device may be permanently degraded, either mechanically or electrically.
(2) All limits are specified by testing or statistical analysis.
(3) Typical values represent the most likely parametric norm as determined at the time of characterization. Actual typical values may vary over time and also depends on the application and configuration. The typical values are not tested and are not ensured on shipped production material.
(4) For specified temperature ranges, see Input common mode voltage specifications.
(5) Applies to both single-supply and split-supply operation. Continuous short circuit operation at elevated ambient temperature can result in exceeding the maximum allowed junction temperature of 150°C. Output currents in excess of 45 mA over long term may adversely affect reliability.

Electrical Characteristics – 5 V (AC)

All limits ensured for T_J = 25°C, V^+ = 5 V, V^- = 0 V, V_{CM} = V^+/ 2, V_O = 2.5 V, and R_L > 1 MΩ (unless otherwise noted).(1)

PARAMETER		TEST CONDITIONS	MIN (2)	TYP (3)	MAX (2)	UNIT
SR	Slew rate (4)			0.42		V/µs
GBW	Gain-bandwidth product			1.5		MHz
Φ_m	Phase margin			71		°
G_m	Gain margin			8		dB
e_n	Input-referred voltage noise	f = 10 kHz, V_{CM} = 1 V		50		nV/√Hz
i_n	Input-referred current noise	f = 10 kHz		0.08		pA/√Hz
THD	Total harmonic distortion	f = 1 kHz, A_V = +1, R_L = 600 Ω, V_O = 1 V_{PP}		0.022%		
	Amp-to-amp isolation (5)			123		dB

(1) Electrical characteristics values apply only for factory testing conditions at the temperature indicated. Factory testing conditions result in very limited self-heating of the device such that T_J = T_A. No assurance of parametric performance is indicated in the electrical tables under conditions of internal self-heating where T_J > T_A. See Application and Implementation for information of temperature derating of the device. Absolute Maximum Ratings indicated junction temperature limits beyond which the device may be permanently degraded, either mechanically or electrically.

(2) All limits are specified by testing or statistical analysis.

(3) Typical values represent the most likely parametric norm as determined at the time of characterization. Actual typical values may vary over time and also depends on the application and configuration. The typical values are not tested and are not ensured on shipped production material.

(4) Connected as voltage follower with input step from V^- to V^+. Number specified is the slower of the positive and negative slew rates.

(5) Input-referred, R_L = 100 kΩ connected to V^+ / 2. Each amp excited in turn with 1 kHz to produce V_O = 3 V_{PP} (for supply voltages < 3 V, V_O = V^+).

Typical Characteristics

V_S = 5 V, single supply, T_A = 25°C (unless otherwise noted)

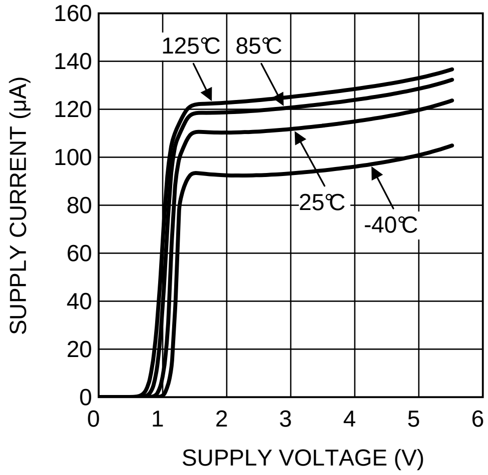


Figure 1. Supply Current vs Supply Voltage (LMV611)

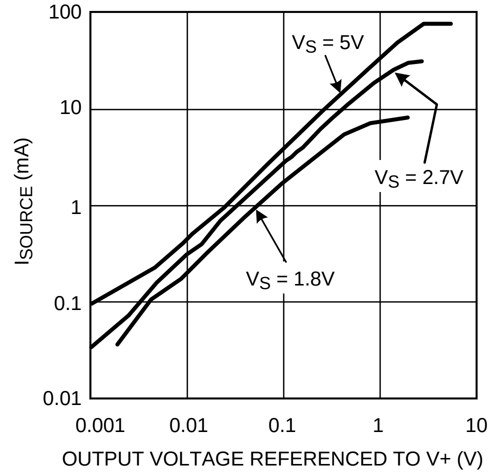


Figure 2. Sourcing Current vs Output Voltage

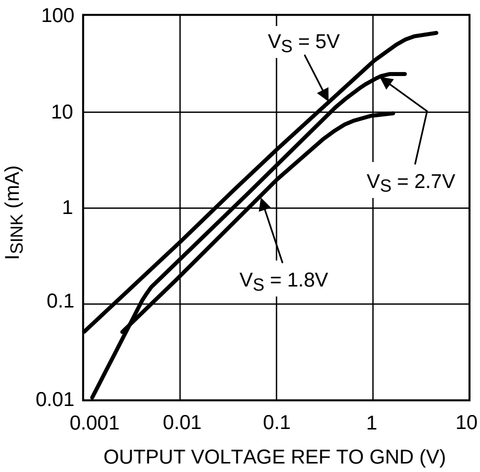


Figure 3. Sinking Current vs Output Voltage

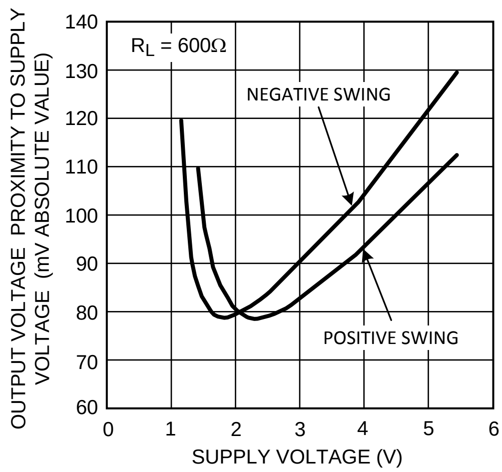


Figure 4. Output Voltage Swing vs Supply Voltage

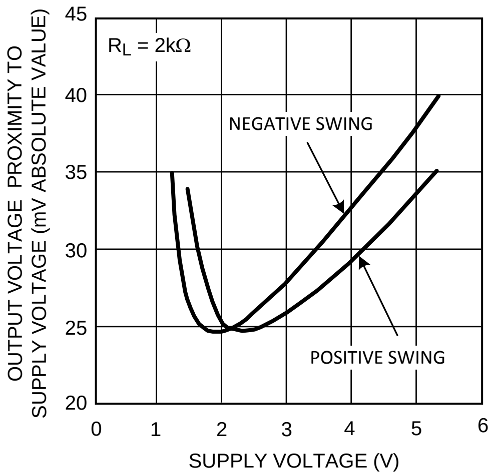


Figure 5. Output Voltage Swing vs Supply Voltage

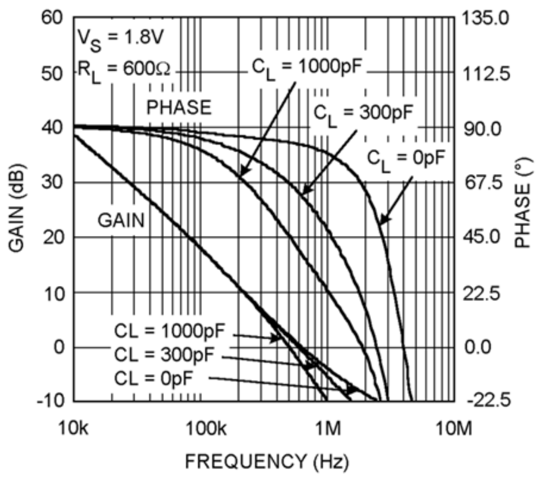


Figure 6. Gain and Phase vs Frequency

Typical Characteristics (continued)

V_S = 5 V, single supply, T_A = 25°C (unless otherwise noted)

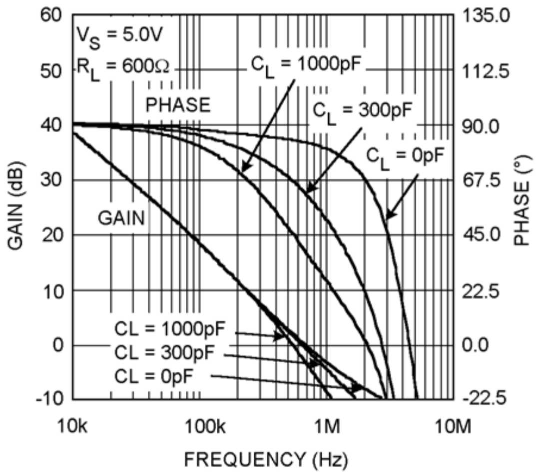


Figure 7. Gain and Phase vs Frequency

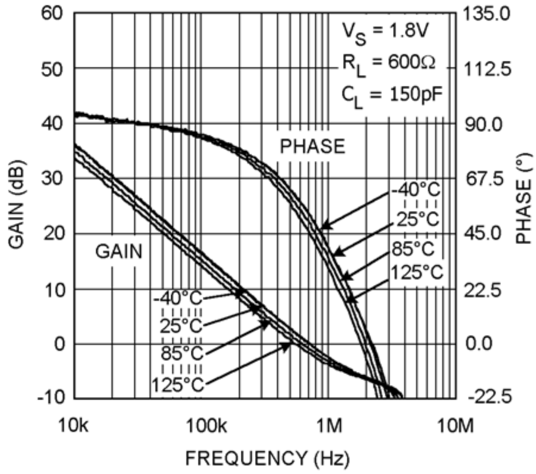


Figure 8. Gain and Phase vs Frequency

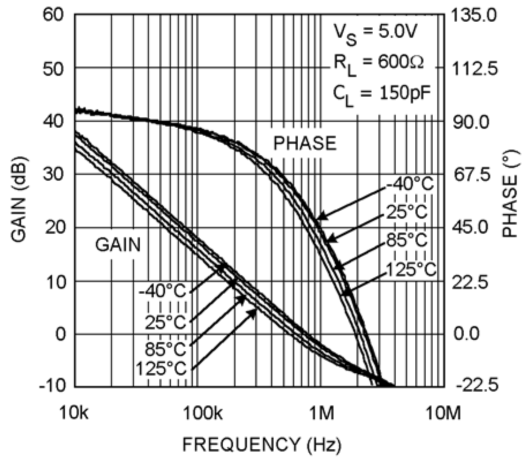


Figure 9. Gain and Phase vs Frequency

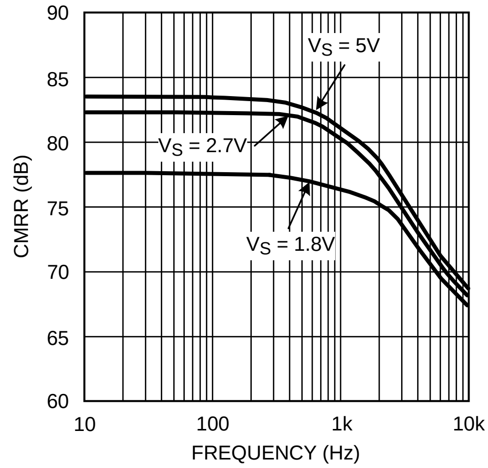


Figure 10. CMRR vs Frequency

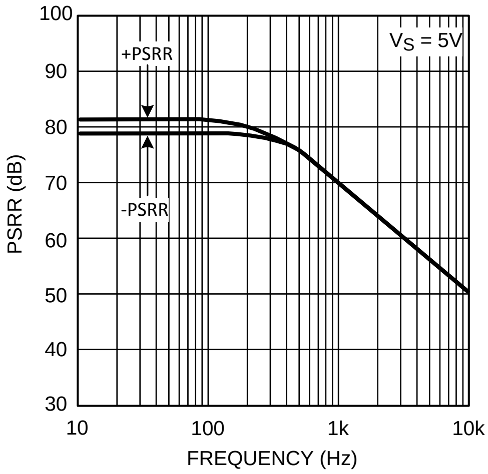


Figure 11. PSRR vs Frequency

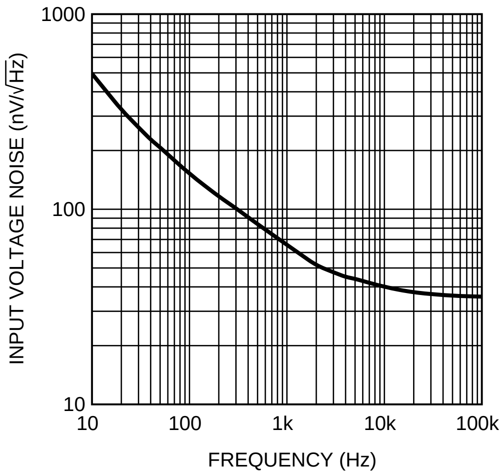


Figure 12. Input Voltage Noise vs Frequency

Typical Characteristics (continued)

V_S = 5 V, single supply, T_A = 25°C (unless otherwise noted)

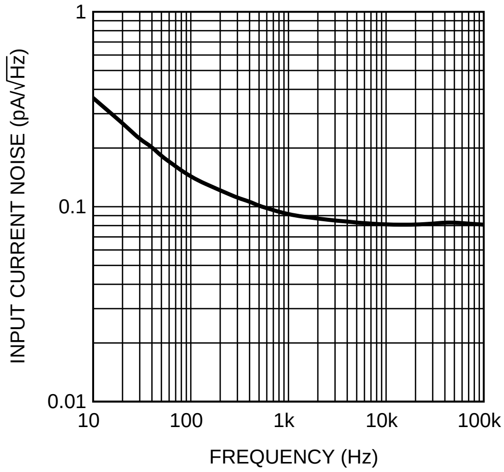


Figure 13. Input Current Noise vs Frequency

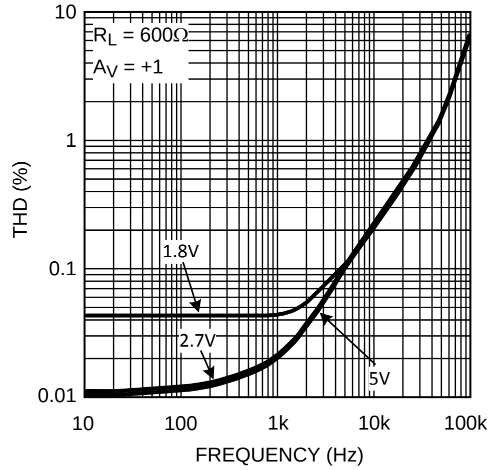


Figure 14. THD vs Frequency

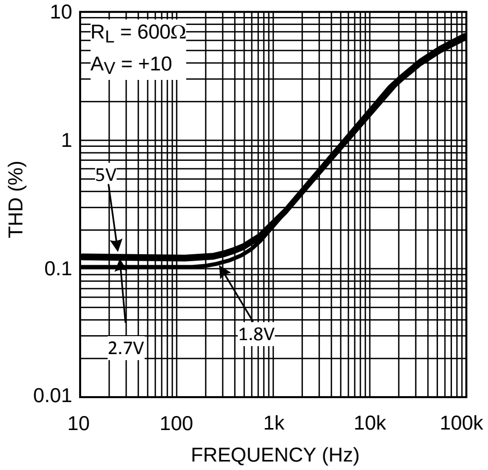


Figure 15. THD vs Frequency

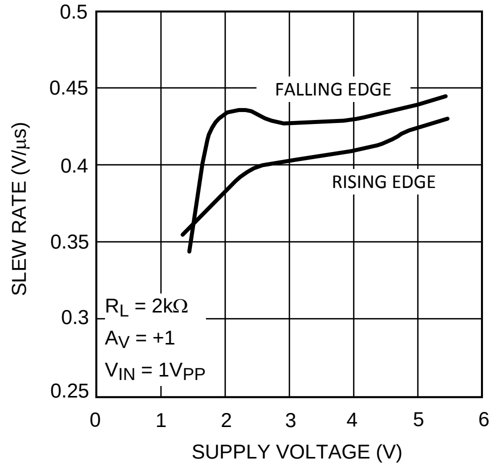


Figure 16. Slew Rate vs Supply Voltage

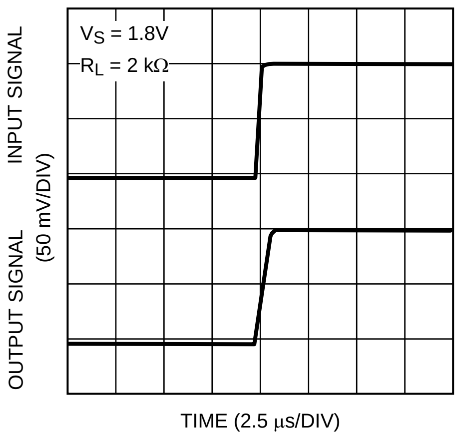


Figure 17. Small Signal Noninverting Response

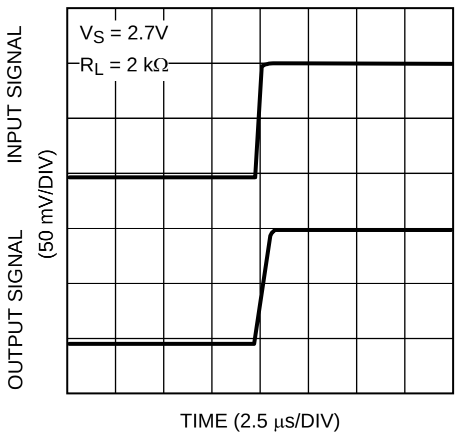


Figure 18. Small Signal Noninverting Response

Typical Characteristics (continued)

V_S = 5 V, single supply, T_A = 25°C (unless otherwise noted)

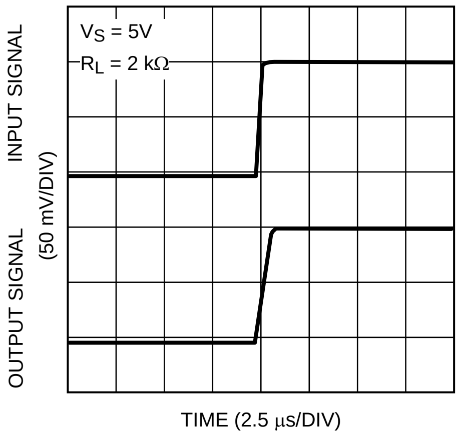


Figure 19. Small Signal Noninverting Response

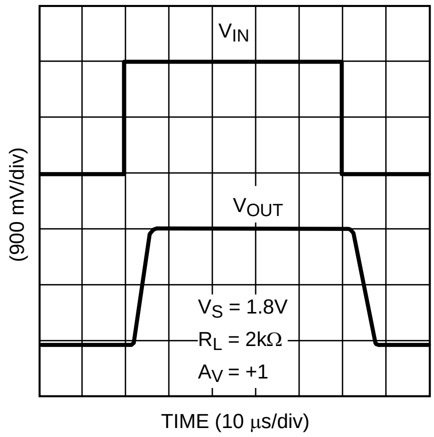


Figure 20. Large Signal Noninverting Response

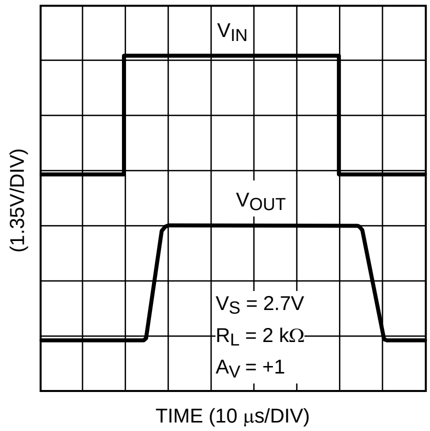


Figure 21. Large Signal Noninverting Response

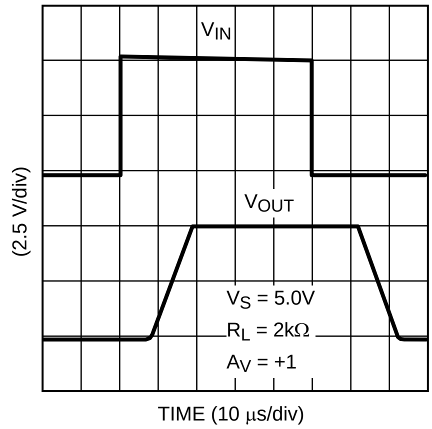


Figure 22. Large Signal Noninverting Response

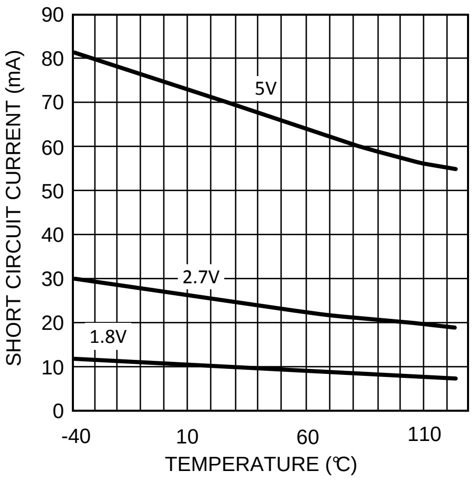


Figure 23. Short-Circuit Current vs Temperature (Sinking)

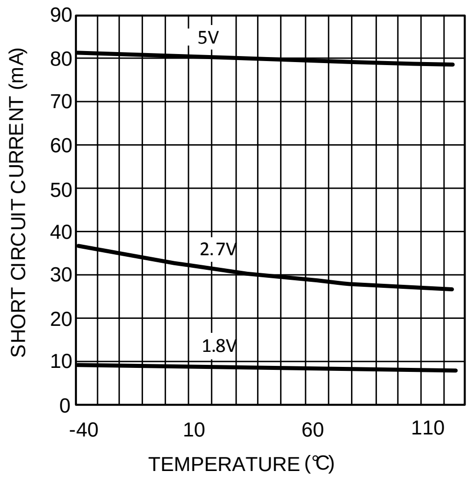


Figure 24. Short-Circuit Current vs Temperature (Sourcing)

Typical Characteristics (continued)

V_S = 5 V, single supply, T_A = 25°C (unless otherwise noted)

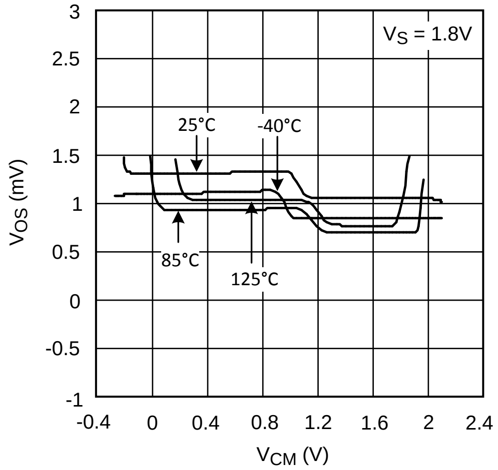


Figure 25. Offset Voltage vs Common-Mode Range

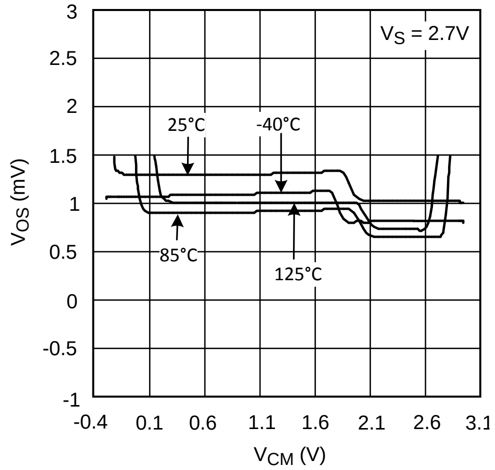


Figure 26. Offset Voltage vs Common-Mode Range

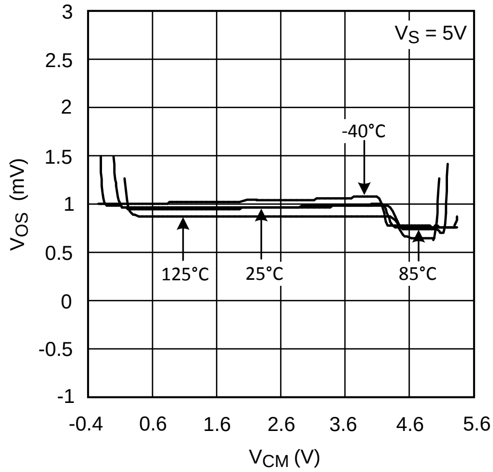
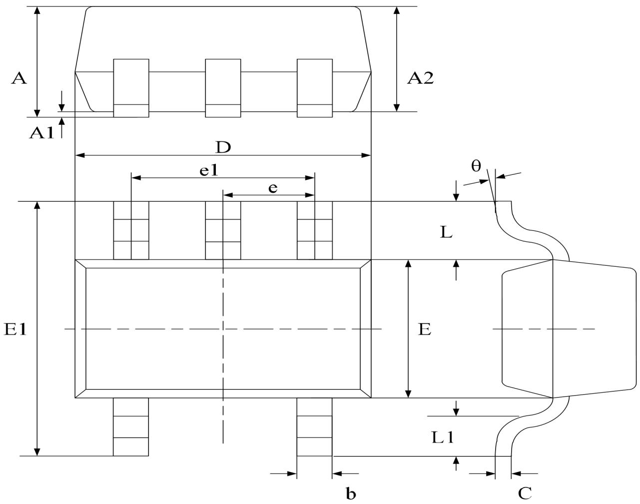


Figure 27. Offset Voltage vs Common-Mode Range

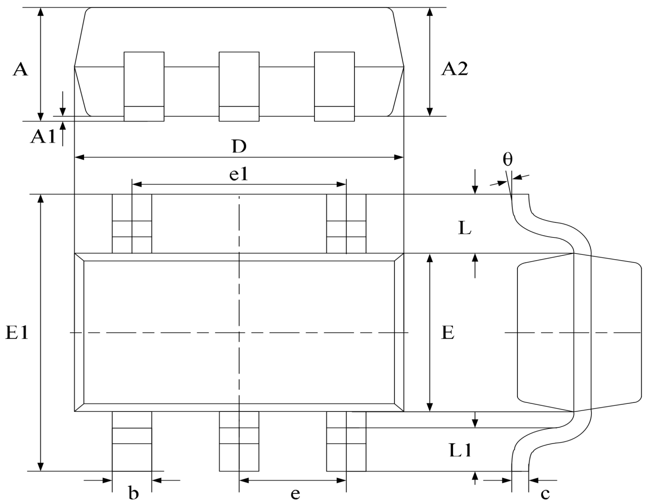
Package Information

SC70-5（SOT353）



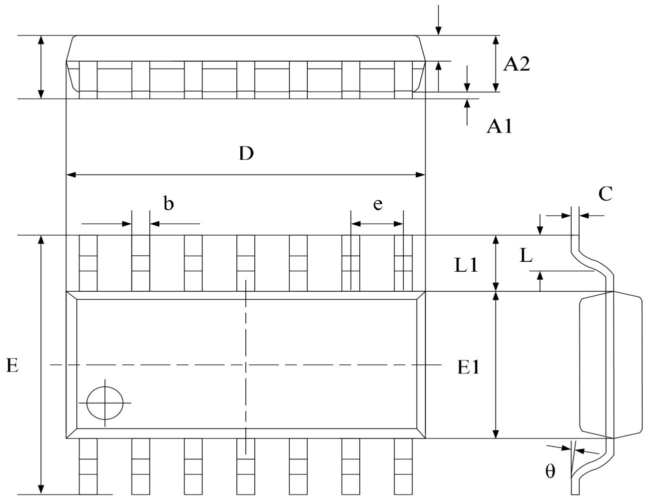
Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	0.800	1.100	0.035	0.043
A1	0.000	0.100	0.000	0.004
A2	0.800	0.900	0.035	0.039
b	0.150	0.350	0.006	0.014
C	0.080	0.150	0.003	0.006
D	1.8500	2.150	0.079	0.087
E	1.100	1.400	0.045	0.053
E1	1.950	2.200	0.085	0.096
e	0.850 typ.		0.026 typ.	
e1	1.200	1.400	0.047	0.055
L	0.42 ref.		0.021 ref.	
L1	0.260	0.460	0.010	0.018
θ	0°	8°	0°	8°

SOT23-5



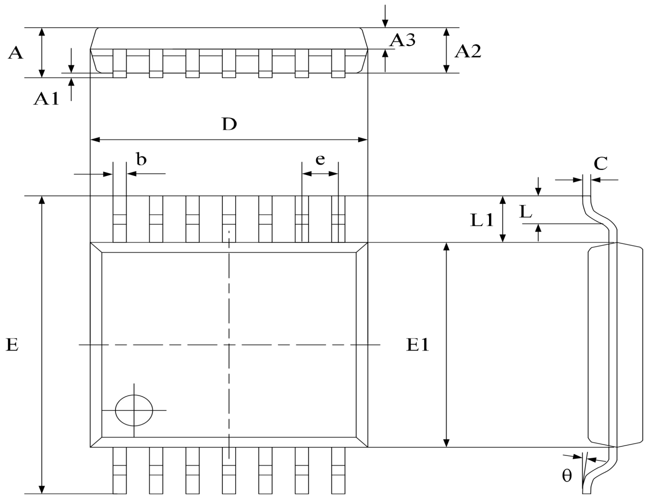
Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	1.040	1.350	0.042	0.055
A1	0.040	0.150	0.002	0.006
A2	1.000	1.200	0.041	0.049
b	0.380	0.480	0.015	0.020
c	0.110	0.210	0.004	0.009
D	2.720	3.120	0.111	0.127
E	1.400	1.800	0.057	0.073
E1	2.600	3.000	0.106	0.122
e	0.950 typ.		0.037 typ.	
e1	1.900 typ.		0.078 typ.	
L	0.700 ref.		0.028 ref.	
L1	0.300	0.600	0.012	0.024
θ	0°	8°	0°	8°

SOP-14



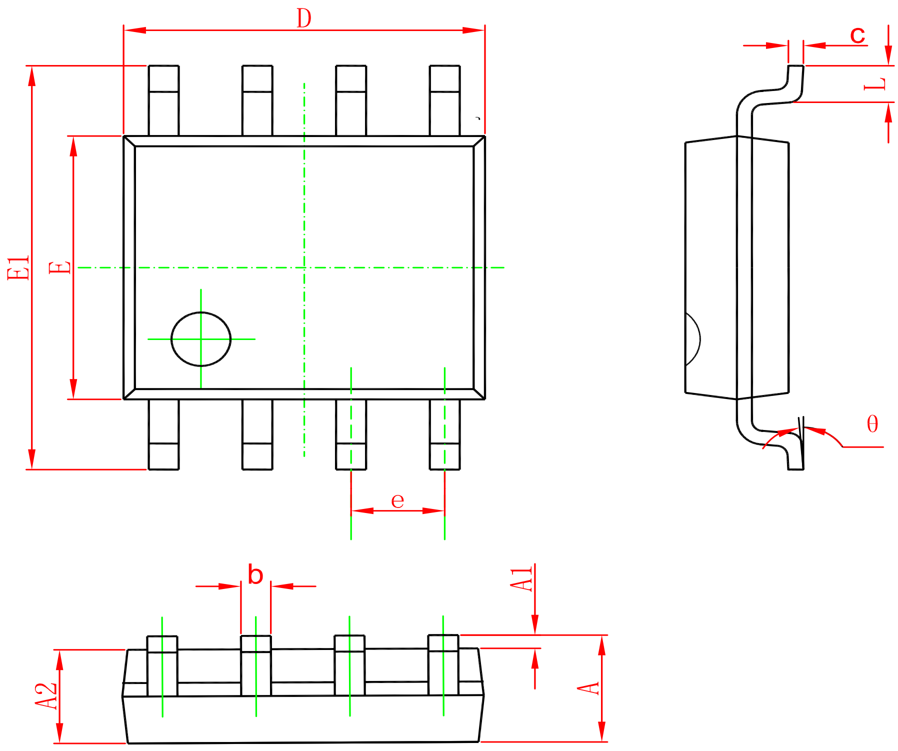
Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	1.450	1.850	0.059	0.076
A1	0.100	0.300	0.004	0.012
A2	1.350	1.550	0.055	0.063
A3	0.550	0.750	0.022	0.031
b	0.406typ.		0.017typ.	
C	0.203typ.		0.008typ.	
D	8.630	8.830	0.352	0.360
E	5.840	6.240	0.238	0.255
E1	3.850	4.050	0.157	0.165
e	1.270 typ.		0.050 typ.	
L1	1.040 ref.		0.041 ref.	
L	0.350	0.750	0.014	0.031
θ	2°	8°	2°	8°

TSSOP-14



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	-	1.200	-	0.0472
A1	0.050	0.150	0.002	0.006
A2	0.900	1.050	0.037	0.043
A3	0.390	0.490	0.016	0.020
b	0.200	0.290	0.008	0.012
C	0.130	0.180	0.005	0.007
D	4.860	5.060	0.198	0.207
E	6.200	6.600	0.253	0.269
E1	4.300	4.500	0.176	0.184
e	0.650 typ.		0.0256 typ.	
L1	1.000 ref.		0.0393 ref.	
L	0.450	0.750	0.018	0.031
θ	0°	8°	0°	8°

SOP-8



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	1.350	1.750	0.053	0.069
A1	0.100	0.250	0.004	0.010
A2	1.350	1.550	0.053	0.061
b	0.330	0.510	0.013	0.020
c	0.170	0.250	0.006	0.010
D	4.700	5.100	0.185	0.200
E	3.800	4.000	0.150	0.157
E1	5.800	6.200	0.228	0.244
e	1.270(BSC)		0.050(BSC)	
L	0.400	1.270	0.016	0.050
θ	0°	8°	0°	8°

Ordering information

Order code	Package	Baseqty	Deliverymode	Marking
UMW LMV614MTX	TSSOP-14	4000	Tape and reel	LMV614
UMW LMV611MF	SOT23-5	3000	Tape and reel	AE9A U
UMW LMV612MAX	SOP-8	2500	Tape and reel	LMV612MA
UMW LMV614MAX	SOP-14	2500	Tape and reel	LMV614MA
UMW LMV611MG	SC70-5	3000	Tape and reel	AVA U