1.4-V Ultra Low Voltage, 13 µA Micro-Power RRIO Op Amps

Features

- Ultra Low Supply Voltage: 1.4 V to 5.5 V
- Low Quiescent Current: 13 µA/ch
- Gain Bandwidth Product: 240 kHz
- Offset Voltage Range: ±3.1 mV at 25°C
- Rail-to-Rail Input and Output
- Unit-Gain Stable
- Slew Rate: 0.13 V/µs
- Operating Temperature Range: −40°C to 85°C

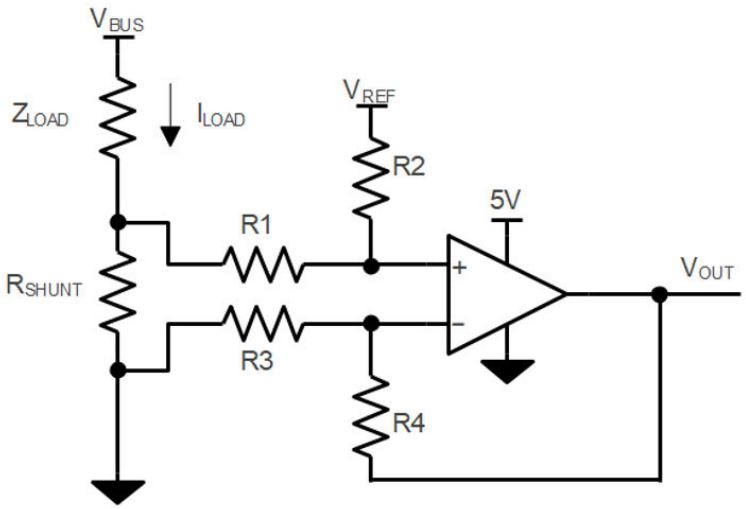
Description

The TPA610x are op-amps with rail-to-rail input and output. Besides, the device features micro quiescent current (13 µA, typ.) and ultra-low operating supply voltage (1.4 V to 5.5 V). Thus, the device is suitable for battery-powered devices, such as IOT devices, wearable devices, and other devices, in which both low operating voltage and low quiescent current are crucial. Further, the TPA6101 offers a space-saving package (DFN0.8×0.8), which makes it more suitable for highly integrated devices.

Applications

- Portable Electronic Devices
- Wearable Electronic Devices
- IOT Devices

Typical Application Circuit



$V_{OUT} = (I_{LOAD} \times R_{SHUNT}) \times (R2 / R1) + V_{REF}$

When R3 = R1, R2 = R4, $R_{SHUNT} << R1$

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Revision History

Date	Revision	Notes
2025-03-20	Rev.A.0	Initial version.

Pin Configuration and Functions

TPA6101
DFN0.8×0.8-4 (5 Pin)
Top View

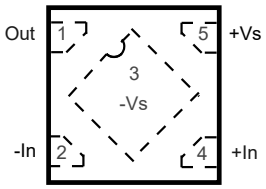
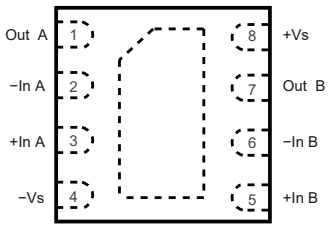


Table 1. Pin Functions: TPA6101

Pin No. DFN0.8×0.8-4 (5 Pin)	Name	I/O	Description
1	Out	O	Output
2	-In	I	Inverting input
3	$-V_S$		Negative power supply
4	+In	I	Noninverting input
5	$+V_S$		Positive power supply

TPA6102
DFN2x2-8
Top View



TPA6102
SOP8/TSSOP8/MSOP8
Top View

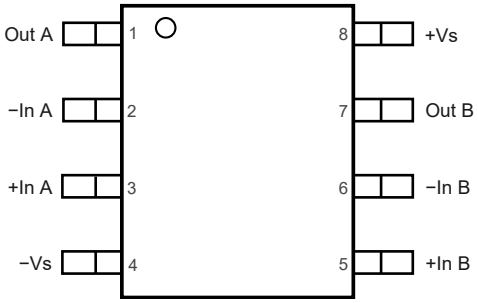


Table 2. Pin Functions: TPA6102

Pin No.	Name	I/O	Description
1	Out A	O	Output
2	−In A	I	Inverting input
3	+In A	I	Non-inverting input
4	$-V_S$		Negative power supply
5	+In B	I	Non-inverting input
6	−In B	I	Inverting input
7	Out B	O	Output
8	$+V_S$		Positive power supply
	Thermal Pad		The thermal pad of DFN or QFN package is recommended to be left float or connected to $-V_S$.

TPA6104
SOP14/TSSOP14
Top View

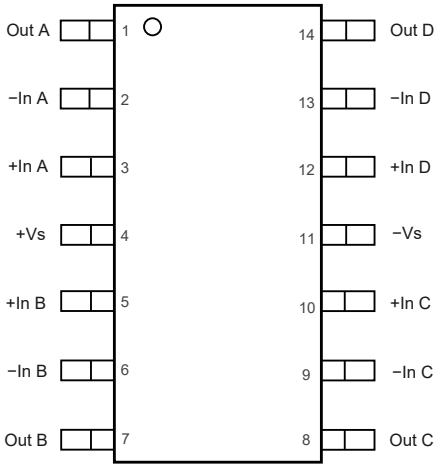
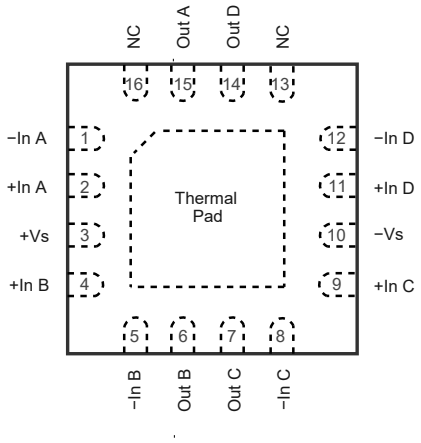


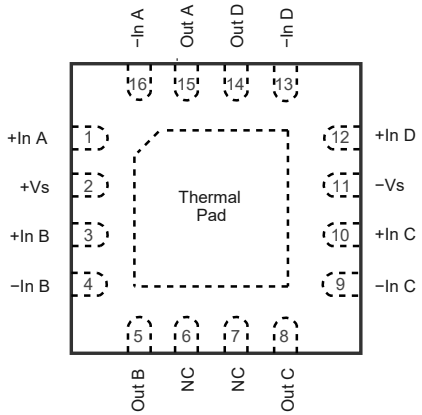
Table 3. Pin Functions: TPA6104

Pin No.	Name	I/O	Description
1	Out A	O	Output
2	−In A	I	Inverting input
3	+In A	I	Noninverting input
4	$+V_S$		Positive power supply
5	+In B	I	Noninverting input
6	−In B	I	Inverting input
7	Out B	O	Output
8	Out C	O	Output
9	−In C	I	Inverting input
10	+In C	I	Noninverting input
11	$-V_S$		Negative power supply
12	+In D	I	Noninverting input
13	−In D	I	Inverting input
14	Out D	O	Output

TPA6104
QFN3x3-16
Top View



TPA6104U
QFN3x3-16
Top View



TPA6104V
QFN3x3-16
Top View

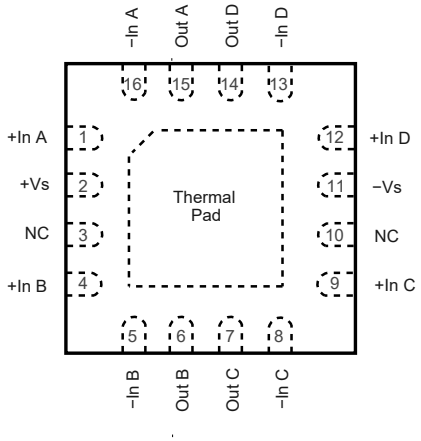


Table 4. Pin Functions: TPA6104, TPA6104U, TPA6104V

Pin No.			Name	I/O	Description
TPA6104	TPA6104U	TPA6104V			
1	16	16	−In A	I	Inverting input
2	1	1	+In A	I	Noninverting input
3	2	2	$+V_S$		Positive power supply
4	3	4	+In B	I	Noninverting input
5	4	5	−In B	I	Inverting input
6	5	6	Out B	O	Output
7	8	7	Out C	O	Output

Pin No.			Name	I/O	Description
TPA6104	TPA6104U	TPA6104V			
8	9	8	−In C	I	Inverting input
9	10	9	+In C	I	Noninverting input
10	11	11	$-V_S$		Negative power supply
11	12	12	+In D	I	Noninverting input
12	13	13	−In D	I	Inverting input
13, 16	6 , 7	3, 10	NC		No connection
14	14	14	Out D	O	Output
15	15	15	Out A	O	Output
			Thermal Pad		The thermal pad of DFN or QFN package is recommended to be left float or connected to $-V_S$.

Specifications

Absolute Maximum Ratings (1)

All test conditions: over the operating ambient temperature, unless otherwise noted.

Parameter		Min	Max	Unit
	Supply Voltage, $(+V_S) - (-V_S)$		6.5	V
	Input Voltage	$(-V_S) - 0.3$	$(+V_S) + 0.3$	V
	Differential Input Voltage	$(-V_S) - (+V_S)$	$(+V_S) - (-V_S)$	V
	Input Current: +IN, −IN (2)	−10	10	mA
	Output Voltage	$(-V_S) - 0.3$	$(+V_S) + 0.3$	V
	Output Short-Circuit Duration (3)		Infinite	
T_J	Maximum Junction Temperature		150	°C
T_A	Operating Temperature Range	−40	125	°C
T_{STG}	Storage Temperature Range	−65	150	°C
T_L	Lead Temperature (Soldering, 10 sec)		260	°C

(1) Stresses beyond those listed under Absolute Maximum Ratings may cause permanent damage to the device. Exposure to any Absolute Maximum Rating condition for extended periods may affect device reliability and lifetime.
(2) The inputs are protected by ESD-protection diodes to the power supply. If the input extends more than 300 mV beyond the power supply, the input current should be limited to less than 10 mA.
(3) A heat sink may be required to keep the junction temperature below the absolute maximum. This depends on the power supply voltage and how many amplifiers are shorted. The thermal resistance varies with the amount of PC board metal connected to the package. The specified values are for short traces connected to the leads.

ESD, Electrostatic Discharge Protection

Symbol	Parameter	Condition	Minimum Level	Unit
HBM	Human Body Model ESD	ANSI/ESDA/JEDEC JS-001 (1)	3	kV
CDM	Charged Device Model ESD	ANSI/ESDA/JEDEC JS-002 (2)	1.5	kV

(1) JEDEC document JEP155 states that 500-V HBM allows safe manufacturing with a standard ESD control process.
(2) JEDEC document JEP157 states that 250-V CDM allows safe manufacturing with a standard ESD control process.

Recommended Operating Conditions

Parameter		Min	Typ	Max	Unit
V_S	Supply Voltage, $(+V_S) - (-V_S)$	1.4		5.5	V
T_A	Operating Temperature Range	−40		85	°C

Thermal Information

Package Type	θ_{JA}	θ_{JC}	Unit
DFN0.8×0.8-4 (5 Pin)	500	200	°C/W
SOP8	158	43	°C/W
MSOP8	210	45	°C/W
TSSOP8	191	44	°C/W
DFN2×2-8	100	60	°C/W
SOP14	120	36	°C/W
TSSOP14	180	35	°C/W
QFN3×3-16	75	54	°C/W

Electrical Characteristics

All test conditions: V_S = 5.5 V, V_{OUT}= 2.75 V, T_A= 25 °C, R_L= 10 kΩ, C_L= 100 pF, unless otherwise noted.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Power Supply						
V_S	Supply Voltage Range		1.4		5.5	V
I_Q	Quiescent Current per Amplifier	V_S = 1.4 V to 5.5 V		13	20	µA
		V_S = 1.4 V to 5.5 V, T_A = −40°C to 85°C			23	µA
PSRR	Power Supply Rejection Ratio	V_S = 1.6 V to 5.5 V, V_{CM} = 0 V	71	93		dB
		V_S = 1.6 V to 5.5 V, V_{CM} = 0 V T_A = −40°C to 85°C	67			dB
Input Characteristics						
V_{OS}	Input Offset Voltage	V_S = 5.5 V, V_{CM} = 2.75 V	−3.1	±0.8	3.1	mV
		V_S = 5.5 V, V_{CM} = 2.75 V T_A = −40°C to 85°C	−3.5		3.5	mV
		V_S = 1.4 V, V_{CM} = 0.7 V	−3.5	±1	3.5	mV
		V_S = 1.4 V, V_{CM} = 0.7 V T_A= −40°C to 85°C	−4.5		4.5	mV
	Input Offset Voltage Drift	V_S = 5.5 V, V_{CM} = 2.75 V T_A = −40°C to 85°C		2		µV/°C
I_B	Input Bias Current	V_{CM} = 2.75 V		10		pA
I_{OS}	Input Offset Current	V_{CM} = 2.75 V		10		pA
C_{IN}	Input Capacitance	Differential Mode		2		pF
		Common Mode		4		pF
A_{OL}	Open-Loop Voltage Gain	V_S = 5.5 V, (V_-) + 0.1 V < V_O < (V_+) – 0.1 V, R_L = 100 kΩ to V_S / 2	90	126		dB
		V_S = 5.5 V, (V_-) + 0.1 V < V_O < (V_+) – 0.1 V, R_L = 100 kΩ to V_S / 2 T_A = −40°C to 85°C	85			dB
V_{CMR}	Common-mode Input Voltage Range	T_A = −40°C to 85°C	$(-V_S)$		$(+V_S)$	V
CMRR	Common-mode Rejection Ratio	V_S = 5.5 V, V_{CM} = 0 V to 5.5 V	55	80		dB
		V_S = 5.5 V, V_{CM} = 0 V to 5.5 V, T_A = −40°C to 85°C	50			dB
Output Characteristics						
	Output Voltage Swing from Power Rail	V_S = 5.5 V, R_L = 100 kΩ to V_S/ 2		2	5	mV
		V_S = 5.5V, R_L = 100 kΩ to V_S/ 2, T_A = −40°C to 85°C			10	mV
		V_S = 5.5 V, R_L = 10 kΩ to V_S/ 2		10	20	mV

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
		V_S = 5.5 V, R_L = 10 kΩ to V_S/ 2, T_A = −40°C to 85°C			25	mV
I_{SC}	Output Short-Circuit Current	Sink current		60		mA
		Source current		50		mA
AC Specifications						
GBW	Gain-Bandwidth Product	V_S = 5 V		240		kHz
SR	Slew Rate	V_S = 5 V, G = 1, 2 V Step		0.13		V/µs
Z_O	Z_{OUT}	V_S = 5 V, f =10 kHz		7500		Ω
t_{OR}	Overload Recovery	V_S = 5 V		26		µs
t_S	Settling Time, 0.1%	V_S = 5 V, G = 1, 2 V Step		80		µs
PM	Phase Margin	V_S = 5 V, R_L = 10 kΩ, C_L = 100 pF		45		°
	Channel Separation	V_S = 5 V, f = 100 kHz		110		dB
Noise Performance						
E_N	Input Voltage Noise	V_S = 5 V, f = 0.1 Hz to 10 Hz		20		μV_{VPP}
e_N	Input Voltage Noise Density	V_S = 5 V, f = 0.1 kHz		130		$nV/\sqrt{Hz}$
e_N	Input Voltage Noise Density	V_S = 5 V, f = 1 kHz		60		$nV/\sqrt{Hz}$
THD+N	Total Harmonic Distortion and Noise	V_S = 5 V, f = 1 kHz, G = 1, R_L = 10 kΩ, V_{OUT} = 1 V_{RMS}		0.02		%

Typical Performance Characteristics

All test conditions: V_S = 5 V, T_A = +25℃, unless otherwise noted.

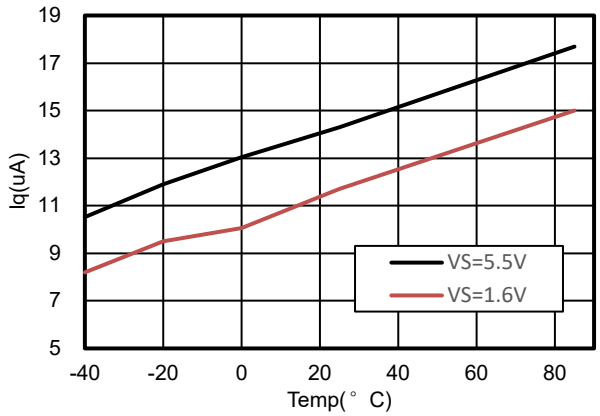


Figure 1. Quiescent Current vs. Temperature

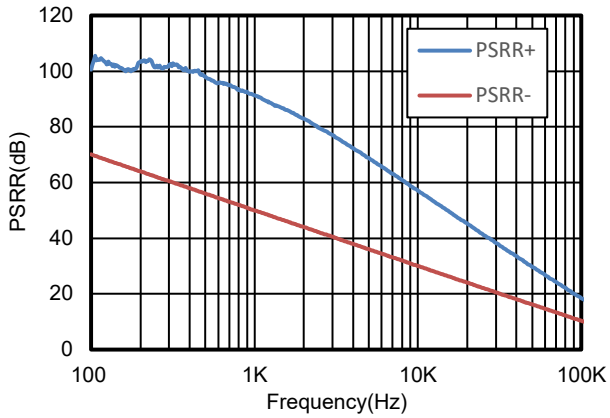


Figure 2. PSRR vs. Frequency

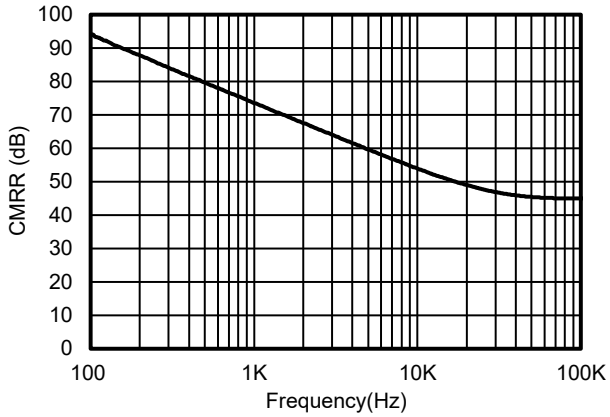


Figure 3. CMRR vs. Frequency

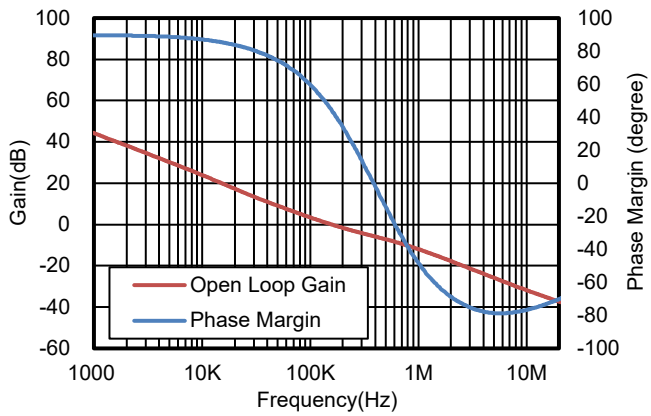


Figure 4. Open-Loop Gain and Phase Margin vs. Frequency, R_L = 10 kΩ, C_L = 100 pF

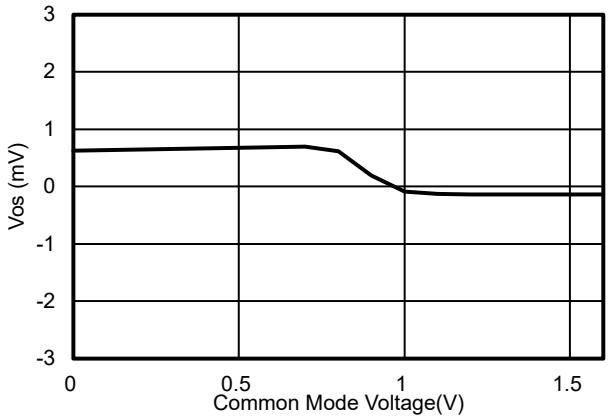


Figure 5. V_{OS} vs. V_{CM}, V_S = 1.6 V

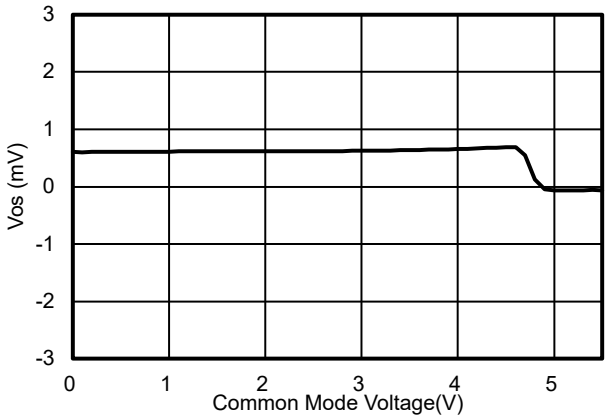


Figure 6. V_{OS} vs. V_{CM}, V_S = 5.5 V

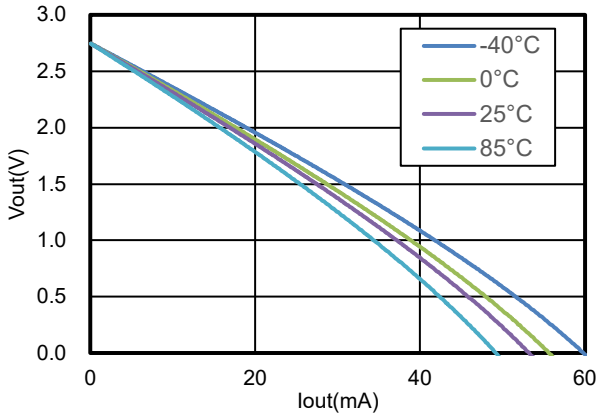


Figure 7. Output Voltage vs. Output Current. ($-V_S$) = −2.75 V, ($+V_S$) = 2.75 V

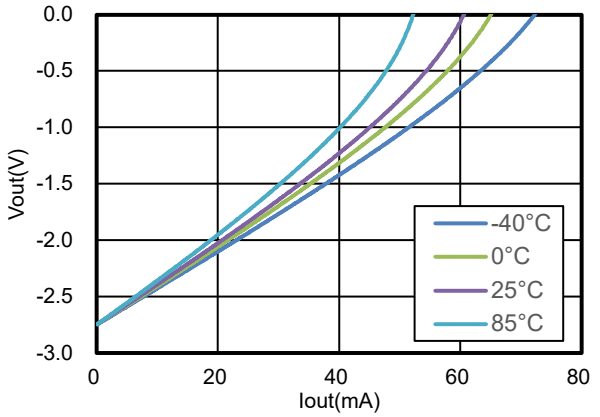


Figure 8. Output Voltage vs. Output Current, ($-V_S$) = −2.75 V, ($+V_S$) = 2.75 V

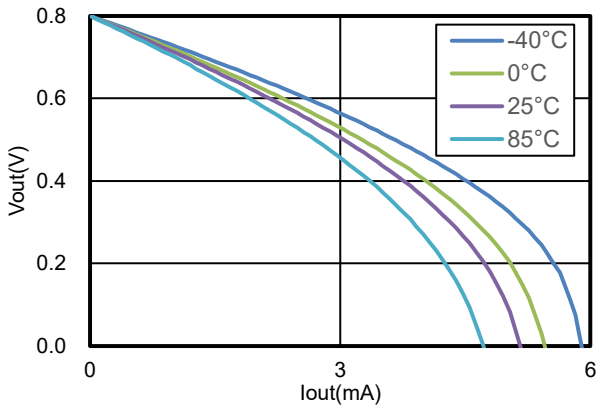


Figure 9. Output Voltage vs. Output Current, ($-V_S$) = −0.8 V, ($+V_S$) = 0.8 V

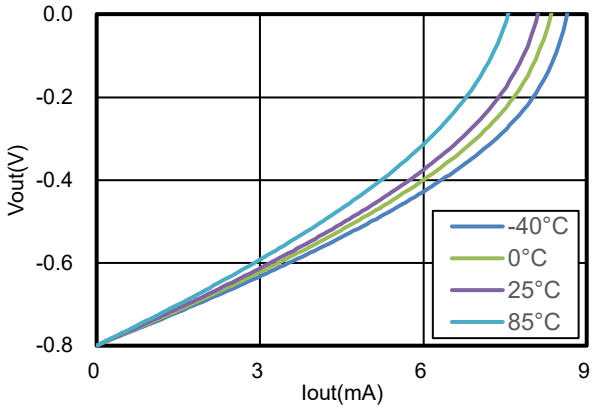


Figure 10. Output Voltage vs. Output Current, ($-V_S$) = −0.8 V, ($+V_S$) = 0.8 V

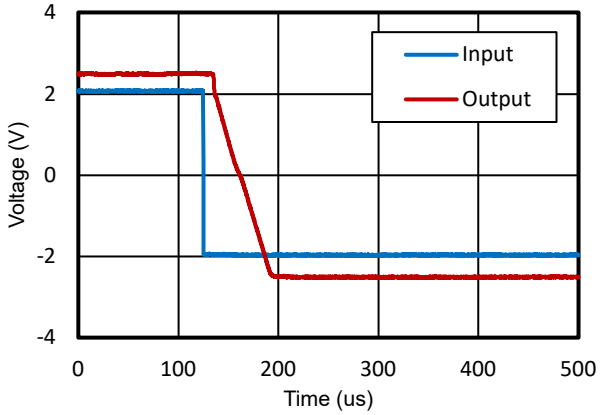


Figure 11. Overload Recovery at Negative Rail

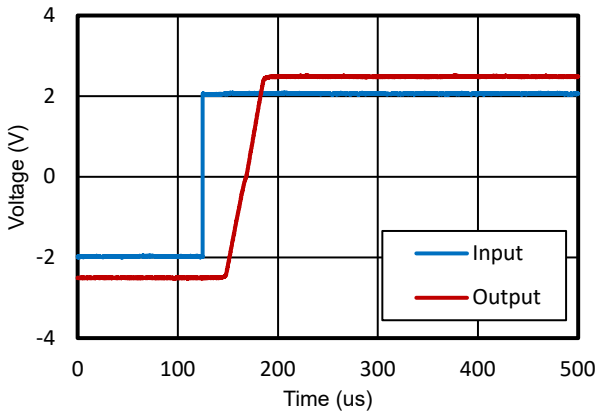


Figure 12. Overload Recovery at Positive Rail

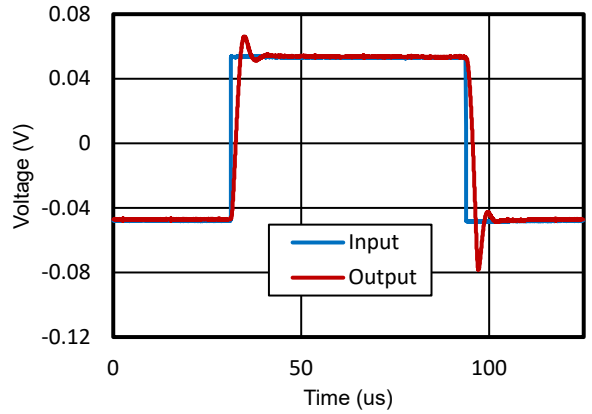


Figure 13. Small-Signal Step Response

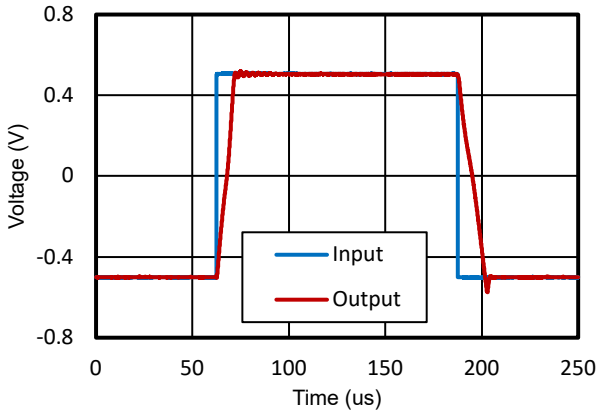


Figure 14. Large-Signal Step Response

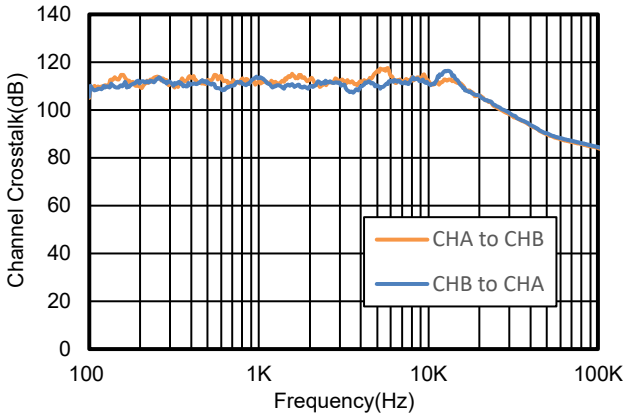


Figure 15. Crosstalk vs. Frequency

Detailed Description

Overview

The TPA610x series of op-amps can operate on a single-supply voltage (1.4 V to 5.5 V), or a split-supply voltage (±0.7 V to ±2.75 V), making them highly versatile and easy to use. The power supply pins should have local bypass ceramic capacitors (typically 0.01 µF to 0.1 µF). These amplifiers are fully specified from 1.4 V to 5.5 V and over the extended temperature range from −40°C to 85°C. Parameters that can exhibit variance with regard to operating voltage or temperature are presented in the Typical Characteristics.

Functional Block Diagram

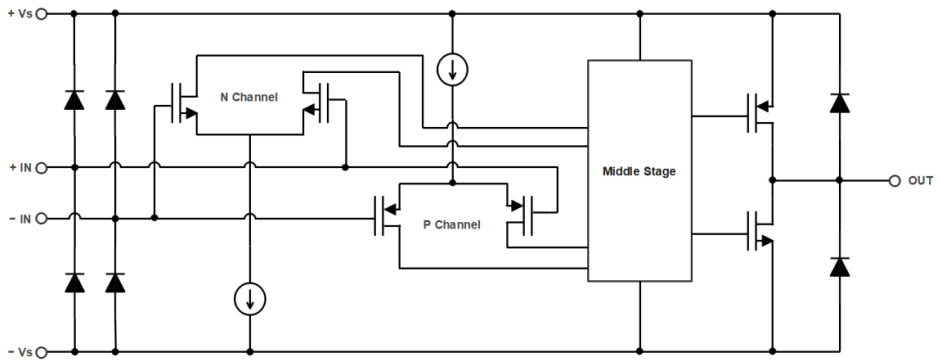


Figure 16. Functional Block Diagram

Feature Description

Operating Voltage

The devices are designed for single supply operation from 1.4 V to 5.5 V or dual supply operation from ±0.7 V to ±2.75 V. The recommended operating voltage conditions are as follows: Power supply voltage (+VS) - (-VS): 1.4 V to 5.5 V. The power supply voltage can support the following three scenarios: Single supply, Dual supplies with equal voltage values Various voltage configurations, as long as the voltage range of (+VS) - (-VS) is within 1.4 V to 5.5 V. For example, if operating with a single supply, (-VS) = 0 V, then (+VS) can support 1.4 V to 5.5 V. If using dual supplies with equal absolute values, the minimum voltage is ±0.7 V and the maximum voltage is ±2.75 V. It can even support other voltage configurations, such as (-VS) = 0 V, (+VS) = 5.5 V, or (-VS) = -1 V, (+VS) = 4.5 V, and so on.

Rail-to-Rail Input

The input common-mode voltage range of the TPA610x series extends to both positive and negative supply rails. The complementary input stage consists of a P-Channel pair and an N-Channel pair. A transition region exists in the input common-mode range. Within this transition region, PSRR, CMRR, Offset Voltage, offset drift, and THD can degrade compared to that operating outside this region.

Rail-to-Rail Output

The devices deliver rail-to-rail output swing capability with a Class-AB output stage. Different load conditions change the ability of the amplifier to swing close to the rails.

Phase Reversal Protection

Phase Reversal Protection characterizes the functionality of an Op Amp when the input common-mode voltage exceeds the negative or positive power supply rail. In most cases, the Phase Reversal happens when the Op amp is configured as a unit buffer. Once the input voltage exceeds the power supply rail, the output goes to the opposite rail. The TP610x features rail-to-rail input stage which extends the input voltage range to power supply rails. Additionally, input voltage exceeding power supply rails does not induce Phase Reversal, the output is limited at the corresponding rail.

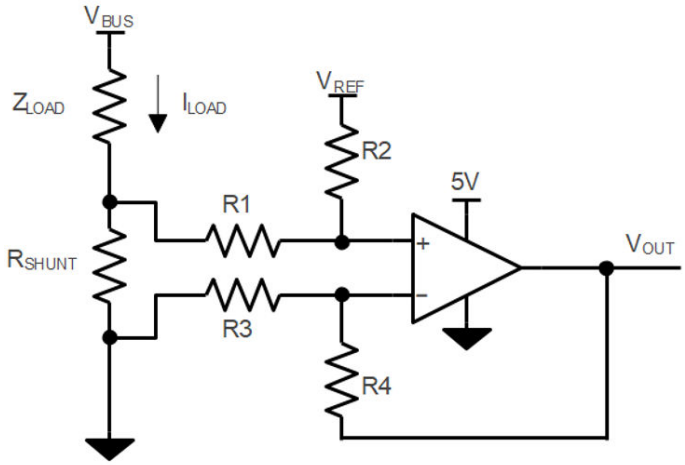
Application and Implementation

> Note
>
> Information in the following application sections is not part of the 3PEAK's component specification and 3PEAK does not warrant its accuracy or completeness. 3PEAK's customers are responsible for determining suitability of components for their purposes. Customers should validate and test their design implementation to confirm system functionality.

Application Information

Low-Side Current-Sensing Application

Figure 17 shows that the TPA610x series is configured in a low-side current sensing application. The low-side current sensing methods consist of placing a sense resistor between the load and the circuit ground. The voltage dropping across the resistor is amplified by different amplifier circuits with the TPA610x series. V_{REF} can be used to add bias voltage to the output voltage. Particular attention must be paid to the matching and precision of R1, R2, R3, and R4, to maximize the accuracy of the measurement.



$$V_{OUT} = (I_{LOAD} \times R_{SHUNT}) \times (R2 / R1) + V_{REF}$$

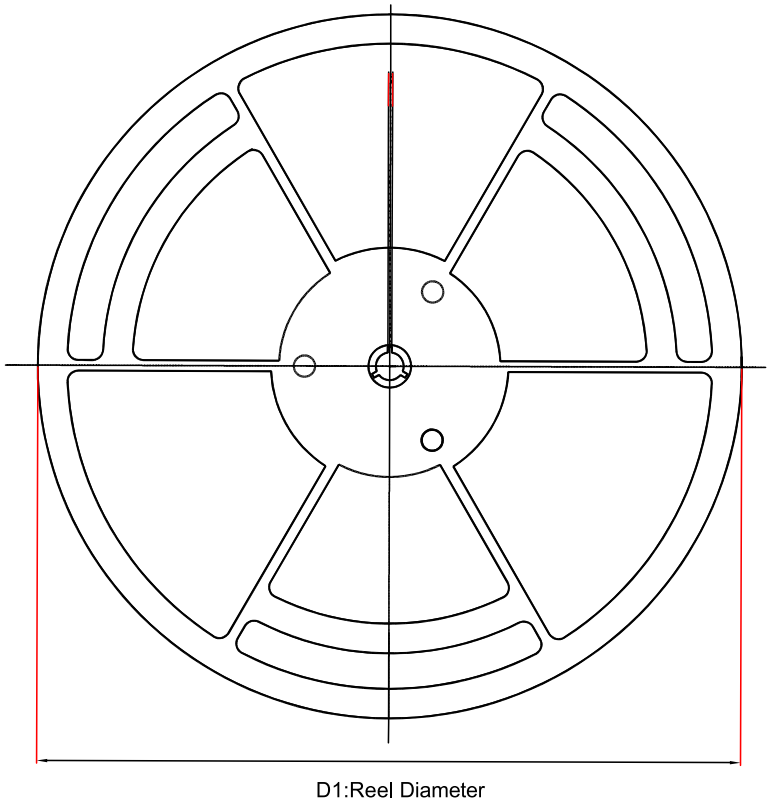
When R3 = R1, R2 = R4, $R_{SHUNT} << R1$

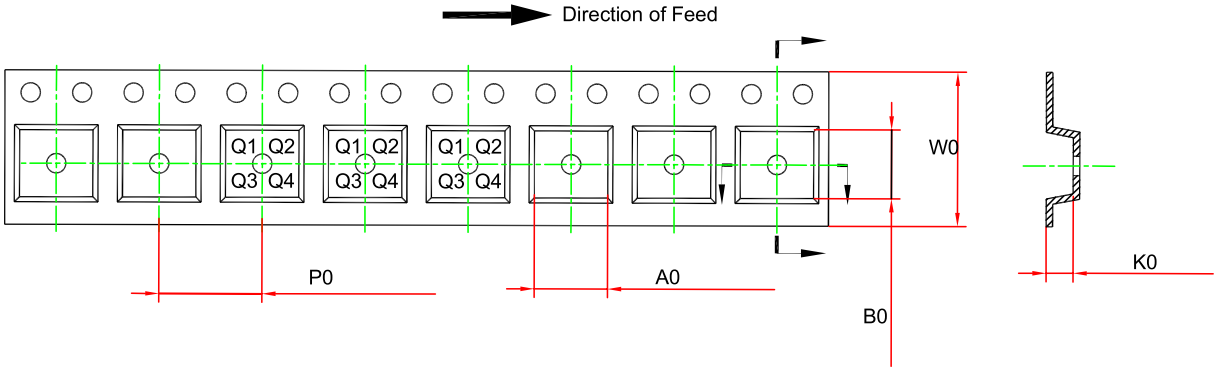
Figure 17. Dual-Supply Operation Connections

Power Supply Recommendations

Place 0.1-µF bypass capacitors close to the power-supply pins to reduce coupling errors from the noise or high-impedance power supplies.

Tape and Reel Information





Order Number	Package	D1 (mm)	W1 (mm)	A0 (mm) (1)	B0 (mm) (1)	K0 (mm) (1)	P0 (mm)	W0 (mm)	Pin1 Quadrant
TPA6101-DF0R-S	DFN0.8X0.8-4	180	12.5	0.91	0.91	0.5	2	8	Q1
TPA6102-DF4R-S	DFN2X2-8	180	12.5	2.3	2.3	1.1	4	8	Q2
TPA6102-SO1R	SOP8	330	17.6	6.5	5.4	2	8	12	Q1
TPA6102-TS1R	TSSOP8	330	17.6	6.8	3.4	1.8	8	12	Q1
TPA6102-VS1R	MSOP8	330	17.6	5.3	3.4	1.3	8	12	Q1

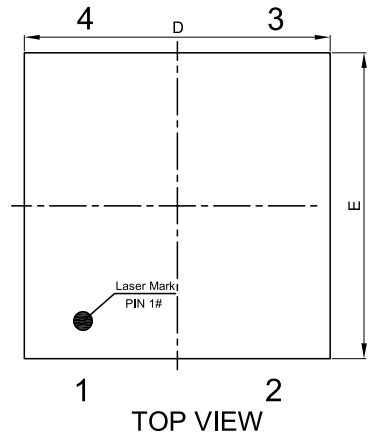
Order Number	Package	D1 (mm)	W1 (mm)	A0 (mm) (1)	B0 (mm) (1)	K0 (mm) (1)	P0 (mm)	W0 (mm)	Pin1 Quadrant
TPA6104-SO2R	SOP14	330	21.6	6.5	9.3	2.1	8	16	Q1
TPA6104-TS2R	TSSOP14	330	17.6	6.8	5.5	1.5	8	12	Q1

(1) The value is for reference only. Contact the 3PEAK factory for more information.

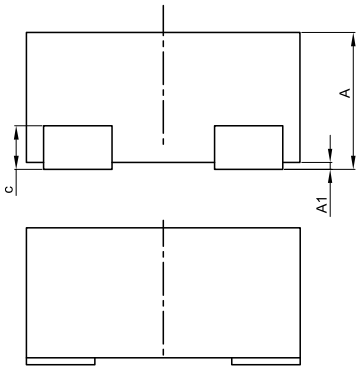
Package Outline Dimensions

DFN0.8×0.8-4

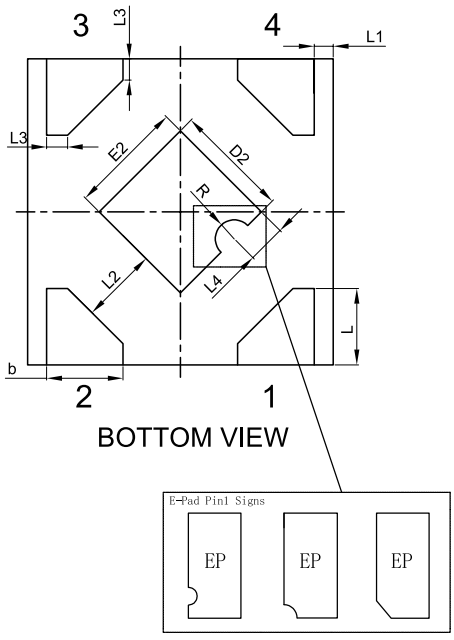
Package Outline Dimensions DF0(DFN0.8X0.8-4-A)



TOP VIEW



SIDE VIEW



BOTTOM VIEW

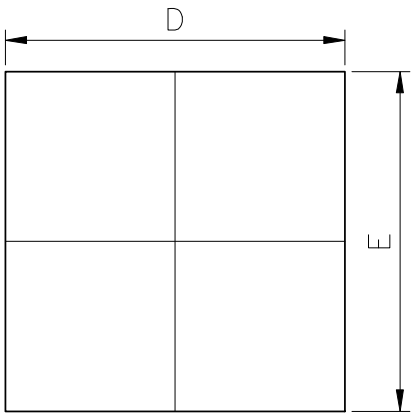
Symbol	Dimensions In Millimeters		Dimensions In Inches	
	MIN	MAX	MIN	MAX
A	0.370	0.430	0.015	0.017
A1	0.000	0.050	0.000	0.002
b	0.150	0.250	0.006	0.010
c	0.100	0.150	0.004	0.006
D	0.750	0.850	0.030	0.033
D2	0.200	0.400	0.008	0.016
E	0.750	0.850	0.030	0.033
E2	0.200	0.400	0.008	0.016
e	0.500 BSC		0.020 BSC	
L	0.150	0.250	0.006	0.010
L1	0.050 BSC		0.002 BSC	
L2	0.200 BSC		0.008 BSC	
L3	0.055 BSC		0.002 BSC	
L4	0.100 BSC		0.004 BSC	

NOTES

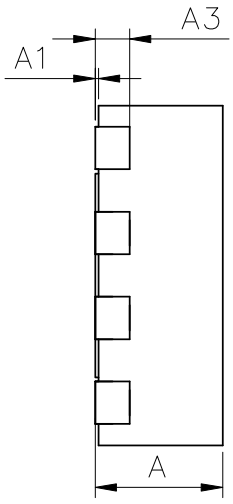
1. Do not include mold flash or protrusion.
2. This drawing is subject to change without notice.
3. The many types of E-pad Pin1 signs may appear in the product.

DFN2×2-8

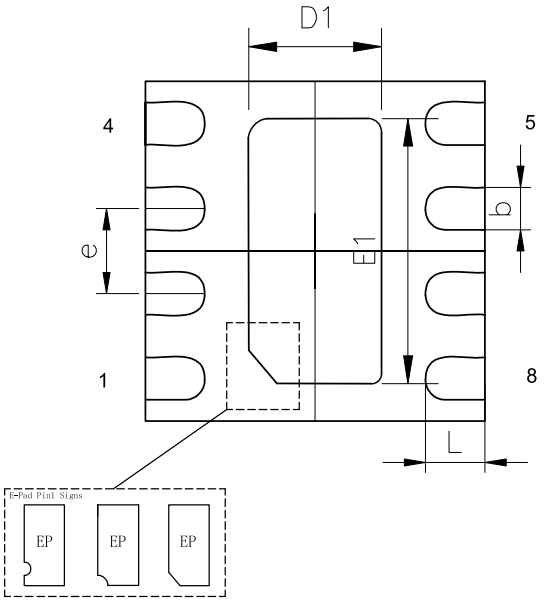
Package Outline Dimensions DFG(DFN2X2-8-E)



Top View



Side View



Bottom View

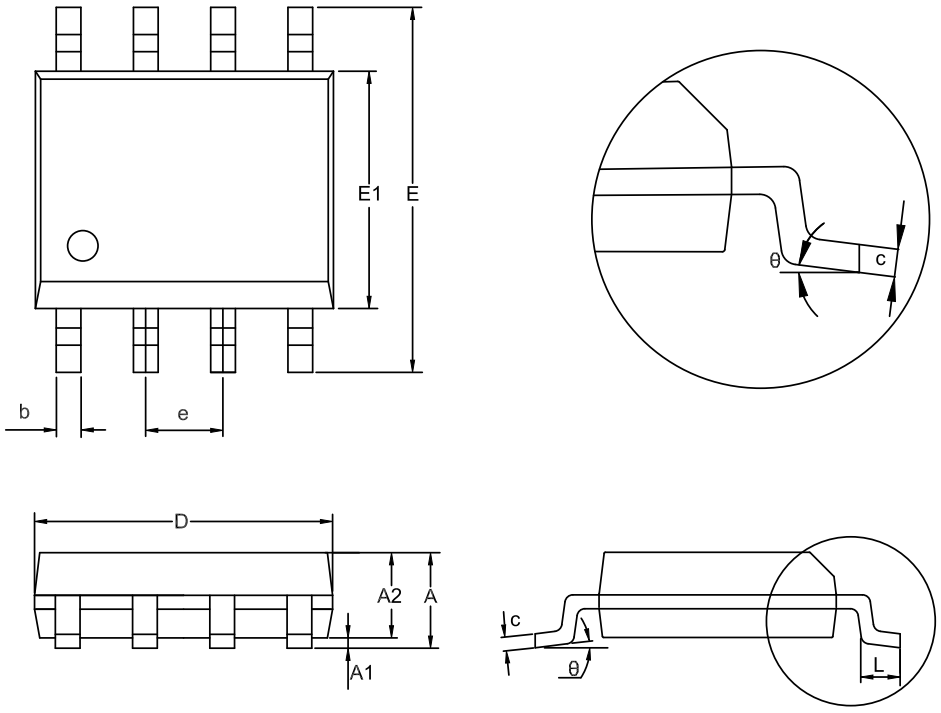
NOTES

1. Do not include mold flash or protrusion.
2. This drawing is subject to change without notice.
3. The many types of E-pad Pin1 signs may appear in the product.

Symbol	Dimensions In Millimeters		Dimensions In Inches	
	MIN	MAX	MIN	MAX
A	0.500	0.600	0.020	0.024
A1	0.000	0.050	0.000	0.002
b	0.150	0.300	0.006	0.012
A3	0.100	0.200	0.004	0.008
D	1.900	2.100	0.075	0.083
D1	0.800	1.000	0.031	0.039
E	1.900	2.100	0.075	0.083
E1	1.600	1.800	0.063	0.071
e	0.500 BSC		0.020BSC	
L	0.224	0.376	0.009	0.015

SOP8

Package Outline Dimensions SO1(SOP-8-A)



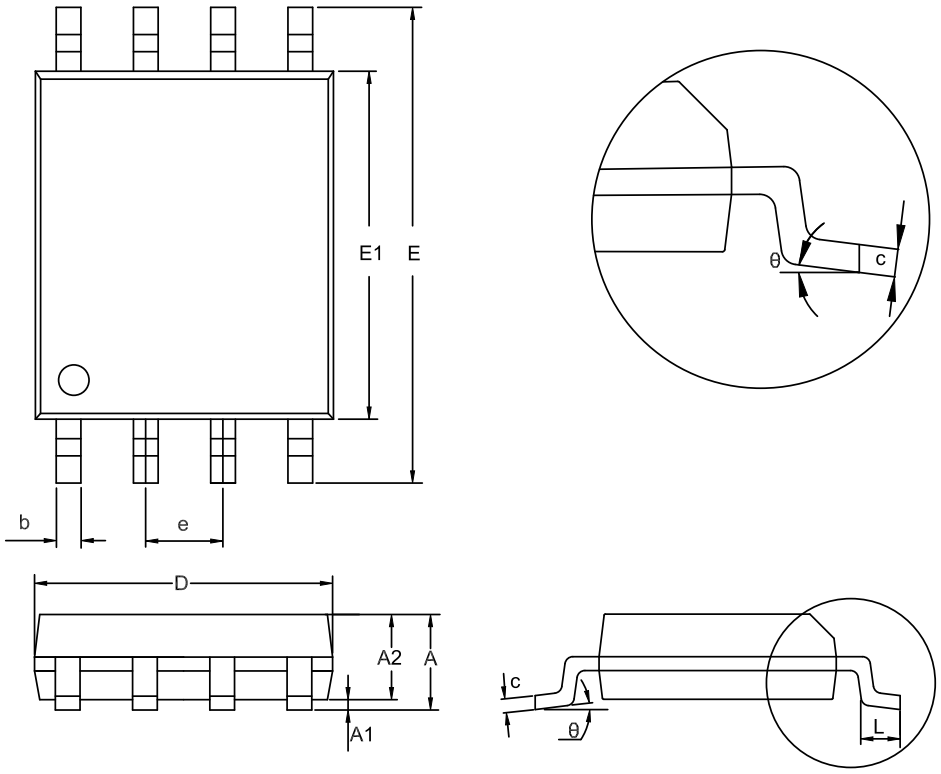
Symbol	Dimensions In Millimeters		Dimensions In Inches	
	MIN	MAX	MIN	MAX
A	1.350	1.750	0.053	0.069
A1	0.050	0.250	0.002	0.010
A2	1.250	1.550	0.049	0.061
b	0.330	0.510	0.013	0.020
c	0.170	0.250	0.007	0.010
D	4.700	5.100	0.185	0.201
E	5.800	6.200	0.228	0.244
E1	3.800	4.000	0.150	0.157
e	1.270 BSC		0.050 BSC	
L	0.400	1.000	0.016	0.039
θ	0	8°	0	8°

NOTES

1. Do not include mold flash or protrusion.
2. This drawing is subject to change without notice.

TSSOP8

Package Outline Dimensions TS1(TSSOP-8-A)



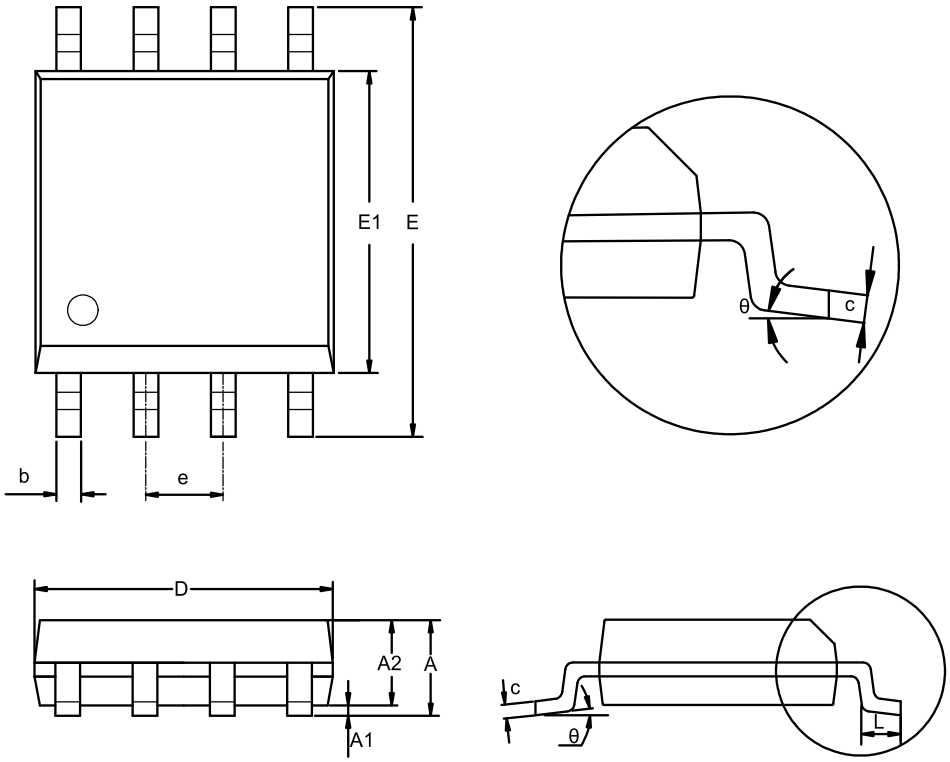
Symbol	Dimensions In Millimeters		Dimensions In Inches	
	MIN	MAX	MIN	MAX
A	0.900	1.200	0.035	0.047
A1	0.050	0.150	0.002	0.006
A2	0.800	1.050	0.031	0.041
b	0.190	0.300	0.007	0.012
c	0.090	0.200	0.004	0.008
D	2.900	3.100	0.114	0.122
E	6.200	6.600	0.244	0.260
E1	4.300	4.500	0.169	0.177
e	0.650 BSC		0.026 BSC	
L	0.450	0.750	0.018	0.030
θ	0	8°	0	8°

NOTES

1. Do not include mold flash or protrusion.
2. This drawing is subject to change without notice.

MSOP8

Package Outline Dimensions VS1(MSOP-8-A)



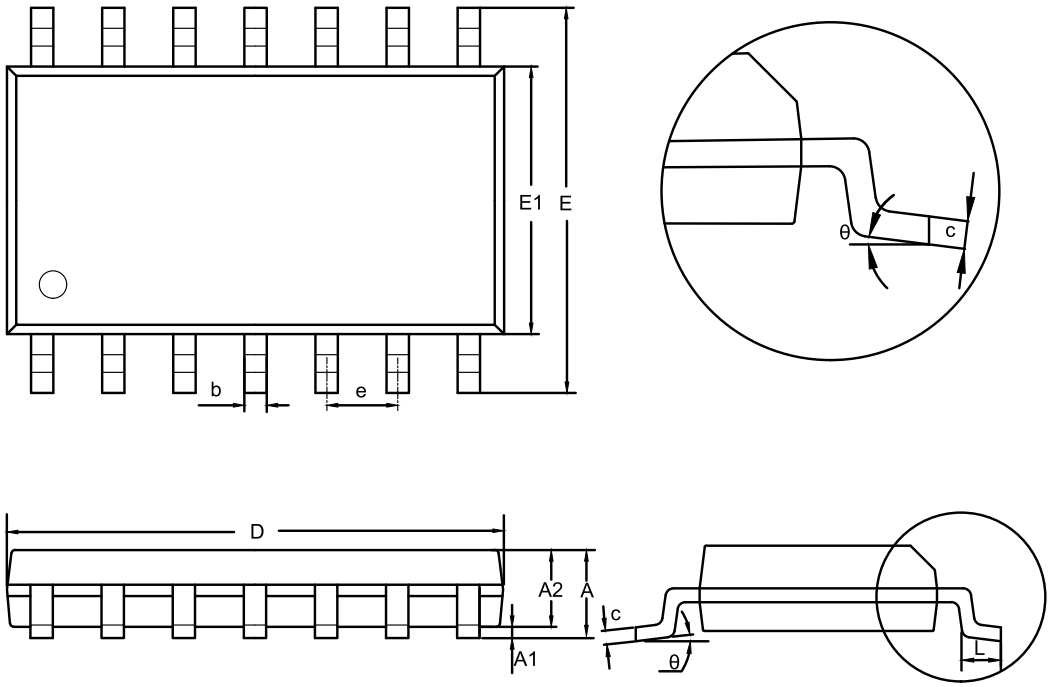
Symbol	Dimensions In Millimeters		Dimensions In Inches	
	MIN	MAX	MIN	MAX
A	0.800	1.100	0.031	0.043
A1	0.020	0.150	0.001	0.006
A2	0.750	0.950	0.030	0.037
b	0.250	0.380	0.010	0.015
c	0.090	0.230	0.004	0.009
D	2.900	3.100	0.114	0.122
E	4.700	5.100	0.185	0.201
E1	2.900	3.100	0.114	0.122
e	0.650 BSC		0.026 BSC	
L	0.400	0.800	0.016	0.031
θ	0	8°	0	8°

NOTES

1. Do not include mold flash or protrusion.
2. This drawing is subject to change without notice.

SOP14

Package Outline Dimensions SO2(SOP-14-A)



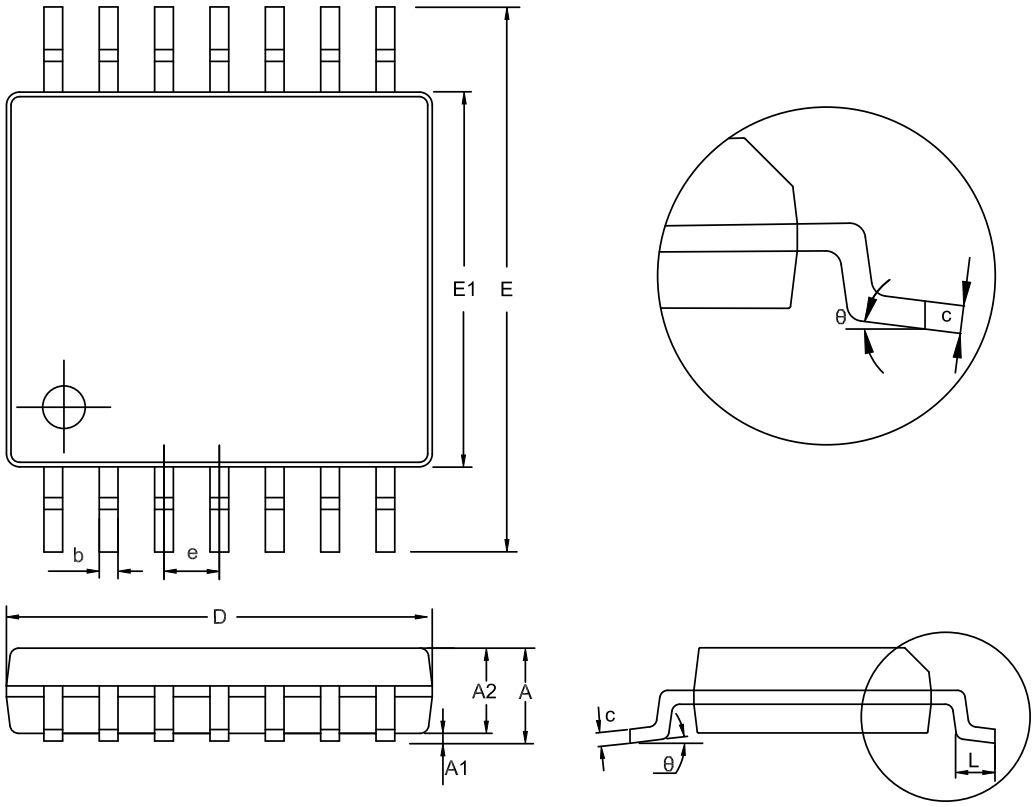
Symbol	Dimensions In Millimeters		Dimensions In Inches	
	MIN	MAX	MIN	MAX
A	1.350	1.750	0.053	0.069
A1	0.050	0.250	0.002	0.010
A2	1.250	1.650	0.049	0.065
b	0.310	0.510	0.012	0.020
c	0.100	0.250	0.004	0.010
D	8.450	8.850	0.333	0.348
E	5.800	6.200	0.228	0.244
E1	3.800	4.000	0.150	0.157
e	1.270 BSC		0.050 BSC	
L	0.400	1.270	0.016	0.050
θ	0	8°	0	8°

NOTES

1. Do not include mold flash or protrusion.
2. This drawing is subject to change without notice.

TSSOP14

Package Outline Dimensions — TS2(TSSOP-14-A)



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	MIN	MAX	MIN	MAX
A	0.900	1.200	0.035	0.047
A1	0.050	0.150	0.002	0.006
A2	0.800	1.050	0.031	0.041
b	0.190	0.300	0.007	0.012
c	0.090	0.200	0.004	0.008
D	4.900	5.100	0.193	0.201
E	6.200	6.600	0.244	0.260
E1	4.300	4.500	0.169	0.177
e	0.650 BSC		0.026 BSC	
L	0.450	0.750	0.018	0.030
θ	0	8°	0	8°

NOTES

1. Do not include mold flash or protrusion.
2. This drawing is subject to change without notice.

Order Information

Order Number	Operating Temperature Range	Package	Marking Information	MSL	Transport Media, Quantity	Eco Plan
TPA6101-DF0R-S	−40 to 85°C	DFN0.8×0.8-4 (5 Pin)	6101	3	Tape and Reel, 12000	Green
TPA6102-SO1R (1)	−40 to 85°C	SOP8	6102		Tape and Reel, 4000	Green
TPA6102-DF4R-S (1)	−40 to 85°C	DFN2×2-8	6102		Tape and Reel, 3000	Green
TPA6102-TS1R (1)	−40 to 85°C	TSSOP8	6102		Tape and Reel, 3000	Green
TPA6102-VS1R (1)	−40 to 85°C	MSOP8	6102		Tape and Reel, 3000	Green
TPA6104-SO2R (1)	−40 to 85°C	SOP14	6104		Tape and Reel, 2500	Green
TPA6104-TS2R (1)	−40 to 85°C	TSSOP14	6104		Tape and Reel, 3000	Green
TPA6104-QF4R (1)	−40 to 85°C	QFN3×3-16			Tape and Reel, 4000	Green
TPA6104U-QF4R (1)	−40 to 85°C	QFN3×3-16			Tape and Reel, 4000	Green
TPA6104V-QF4R (1)	−40 to 85°C	QFN3×3-16			Tape and Reel, 4000	Green

(1) For future products, contact the 3PEAK factory for more information and samples.

Green: 3PEAK defines "Green" to mean RoHS compatible and free of halogen substances.

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