



## High Power Monolithic OPERATIONAL AMPLIFIER

### FEATURES

- POWER SUPPLIES TO  $\pm 40\text{V}$
- OUTPUT CURRENT TO 10A PEAK
- PROGRAMMABLE CURRENT LIMIT
- INDUSTRY-STANDARD PIN OUT
- FET INPUT
- TO-3 AND LOW-COST POWER PLASTIC PACKAGES

### APPLICATIONS

- MOTOR DRIVER
- SERVO AMPLIFIER
- SYNCHRO EXCITATION
- AUDIO AMPLIFIER
- PROGRAMMABLE POWER SUPPLY

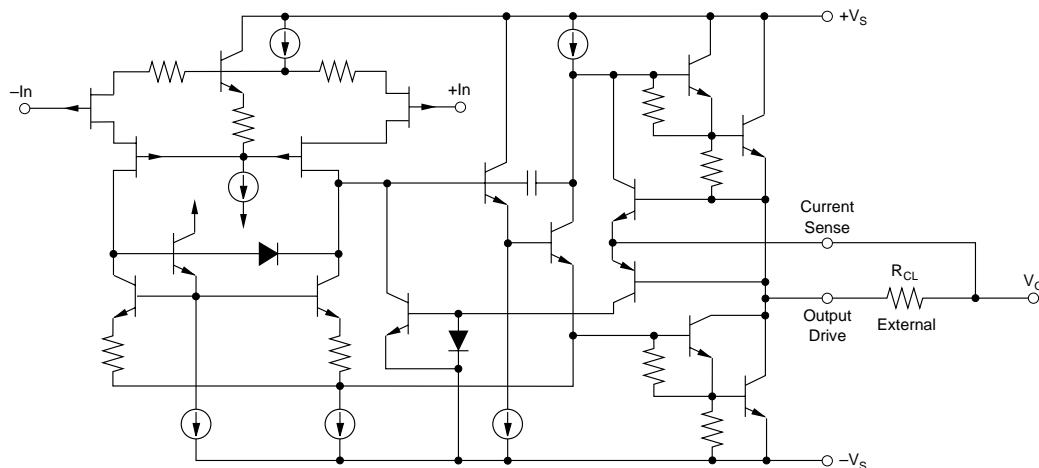
### DESCRIPTION

The OPA541 is a power operational amplifier capable of operation from power supplies up to  $\pm 40\text{V}$  and delivering continuous output currents up to 5A. Internal current limit circuitry can be user-programmed with a single external resistor, protecting the amplifier and load from fault conditions. The OPA541 is fabricated using a proprietary bipolar/FET process.

Pinout is compatible with popular hybrid power amplifiers such as the OPA511, OPA512 and the 3573. The OPA541 uses a single current-limit resistor to set both the positive and

negative current limits. Applications currently using hybrid power amplifiers requiring two current-limit resistors need not be modified.

The OPA541 is available in an 11-pin power plastic package and an industry-standard 8-pin TO-3 hermetic package. The power plastic package has a copper-lead frame to maximize heat transfer. The TO-3 package is isolated from all circuitry, allowing it to be mounted directly to a heat sink without special insulators.



Please be aware that an important notice concerning availability, standard warranty, and use in critical applications of Texas Instruments semiconductor products and disclaimers thereto appears at the end of this data sheet.

All trademarks are the property of their respective owners.

### ABSOLUTE MAXIMUM RATINGS<sup>(1)</sup>

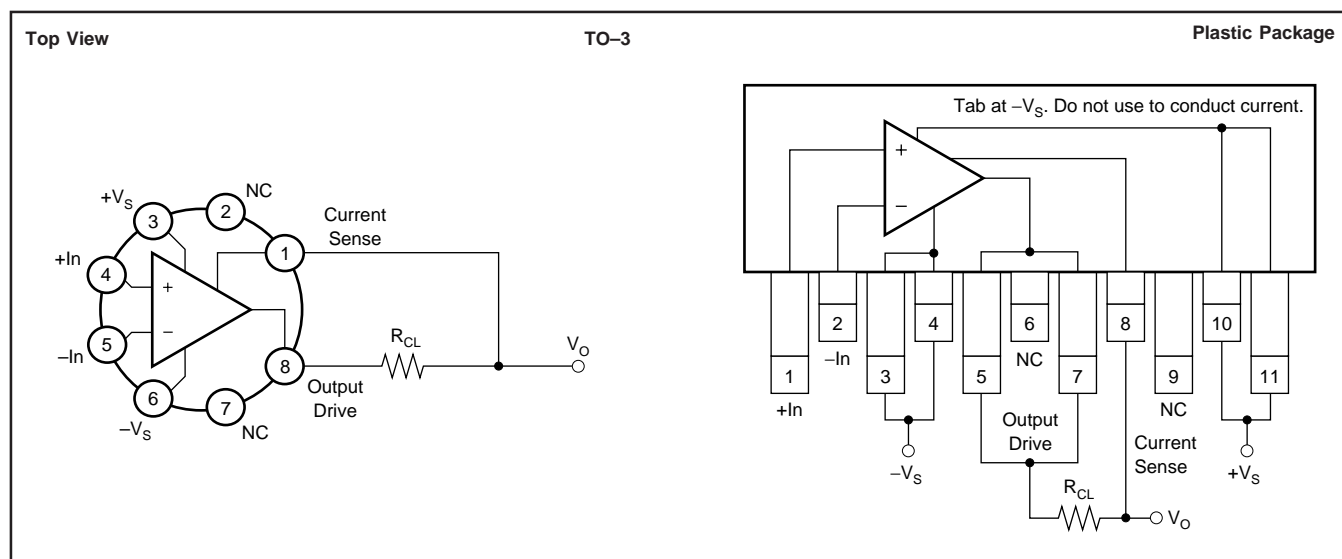
Supply Voltage, $+V_S$ to $-V_S$ .....	80V
Output Current .....	see SOA
Power Dissipation, Internal <sup>(2)</sup> .....	125W
Input Voltage: Differential .....	$\pm V_S$
Common-mode .....	$\pm V_S$
Temperature: Pin solder, 10s .....	+300°C
Junction <sup>(2)</sup> .....	+150°C
Temperature Range:	
AM, BM SM	
Storage .....	-65°C to +150°C
Operating (case) .....	-55°C to +125°C
AP	
Storage .....	-40°C to +85°C
Operating (case) .....	-25°C to +85°C

NOTE: (1) Stresses above these ratings may cause permanent damage. Exposure to absolute maximum conditions for extended periods may degrade device reliability. (2) Long term operation at the maximum junction temperature will result in reduced product life. Derate internal power dissipation to achieve high MTTF.

## PACKAGE/ORDERING INFORMATION

For the most current package and ordering information, see the Package Option Addendum at the end of this document, or see the TI website at [www.ti.com](http://www.ti.com).

## CONNECTION DIAGRAMS



This integrated circuit can be damaged by ESD. Texas Instruments recommends that all integrated circuits be handled with appropriate precautions. Failure to observe proper handling and installation procedures can cause damage.

ESD damage can range from subtle performance degradation to complete device failure. Precision integrated circuits may be more susceptible to damage because very small parametric changes could cause the device not to meet its published specifications.

# ELECTRICAL CHARACTERISTICS

At  $T_C = +25^\circ\text{C}$  and  $V_S = \pm 35\text{VDC}$ , unless otherwise noted.

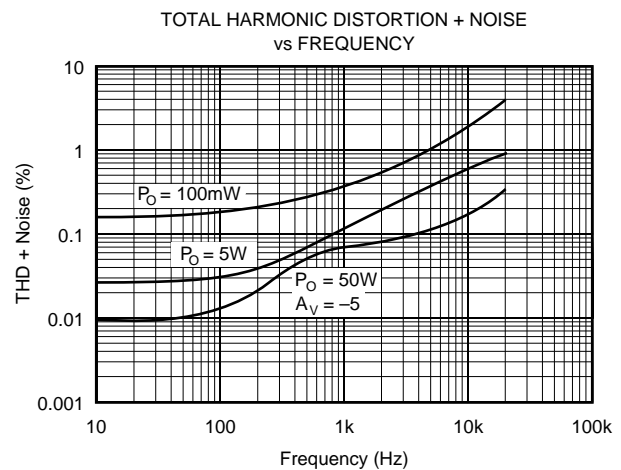
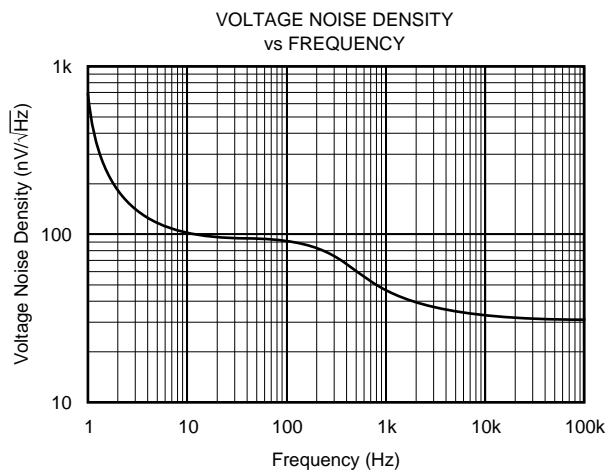
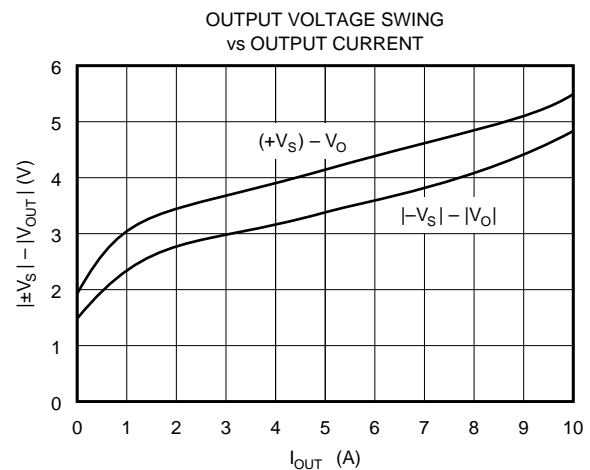
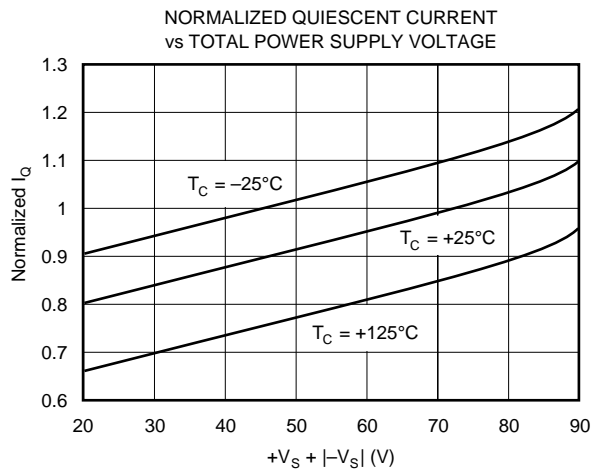
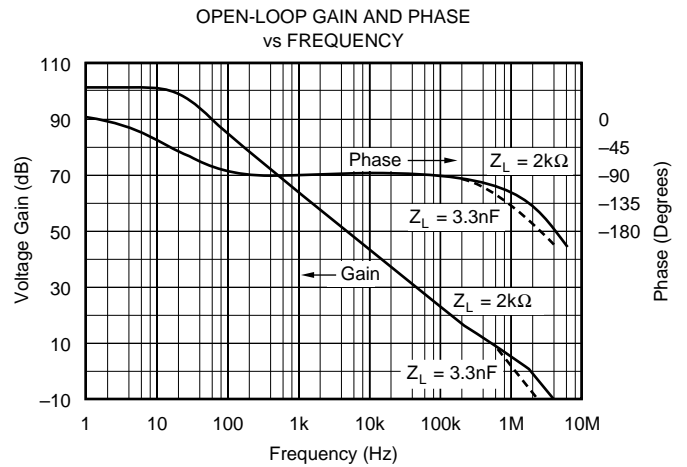
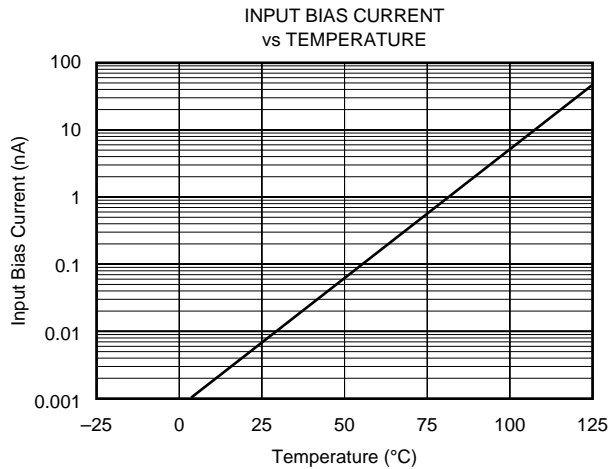
PARAMETER	CONDITIONS	OPA541AM/AP			OPA541BM/SM			UNITS
		MIN	TYP	MAX	MIN	TYP	MAX	
<b>INPUT OFFSET VOLTAGE</b> $V_{OS}$ vs Temperature vs Supply Voltage vs Power	Specified Temperature Range $V_S = \pm 10\text{V}$ to $\pm V_{MAX}$		$\pm 2$ $\pm 20$ $\pm 2.5$ $\pm 20$	$\pm 10$ $\pm 40$ $\pm 10$ $\pm 60$		$\pm 0.1$ $\pm 15$ * *	$\pm 1$ $\pm 30$ * *	mV $\mu\text{V}/^\circ\text{C}$ $\mu\text{V/V}$ $\mu\text{V/W}$
<b>INPUT BIAS CURRENT</b> $I_B$			4	50		*	*	pA
<b>INPUT OFFSET CURRENT</b> $I_{OS}$	Specified Temperature Range		$\pm 1$	$\pm 30$ 5		* *	* *	pA nA
<b>INPUT CHARACTERISTICS</b> Common-Mode Voltage Range Common-Mode Rejection Input Capacitance Input Impedance, DC	Specified Temperature Range $V_{CM} = ( V_S  - 6\text{V})$	$\pm( V_S  - 6)$ 95	$\pm( V_S  - 3)$ 113 5 1		* *	* * * *		V dB pF $T\Omega$
<b>GAIN CHARACTERISTICS</b> Open Loop Gain at 10Hz Gain-Bandwidth Product	$R_L = 6\Omega$	90	97 1.6		*	* *		dB MHz
<b>OUTPUT</b> Voltage Swing  Current, Peak	$I_O = 5\text{A}$ , Continuous $I_O = 2\text{A}$ $I_O = 0.5\text{A}$	$\pm( V_S  - 5.5)$ $\pm( V_S  - 4.5)$ $\pm( V_S  - 4)$ 9	$\pm( V_S  - 4.5)$ $\pm( V_S  - 3.6)$ $\pm( V_S  - 3.2)$ 10		* * * *	* * * *		V V V A
<b>AC PERFORMANCE</b> Slew Rate Power Bandwidth Settling Time to 0.1% Capacitive Load  Phase Margin	$R_L = 8\Omega$ , $V_O = 20\text{Vrms}$ 2V Step Specified Temperature Range, $G = 1$ Specified Temperature Range, $G > 10$ Specified Temperature Range, $R_L = 8\Omega$	6 45 3.3	10 55 2 40	  SOA <sup>(1)</sup>	* *  *	* * * *	* *	V/ $\mu\text{s}$ kHz $\mu\text{s}$ nF Degrees
<b>POWER SUPPLY</b> Power Supply Voltage, $\pm V_S$ Current, Quiescent	Specified Temperature Range	$\pm 10$	$\pm 30$ 20	$\pm 35$ 25	*	$\pm 35$ *	$\pm 40$ *	V mA
<b>THERMAL RESISTANCE</b> $\theta_{JC}$ (Junction-to-Case) <sup>(2)</sup> $\theta_{JC}^{(2)}$ $\theta_{JA}$ (Junction-to-Ambient) OPA541AP (Plastic)	AC Output $f > 60\text{Hz}$ DC Output No Heat Sink		2.5 3 40 40					$^\circ\text{C/W}$ $^\circ\text{C/W}$ $^\circ\text{C/W}$ $^\circ\text{C/W}$
<b>TEMPERATURE RANGE</b> $T_{CASE}$	AM, BM, AP SM	-25		+85	* -55		* +125	$^\circ\text{C}$ $^\circ\text{C}$

\* Specification same as OPA541AM/AP.

NOTE: (1) SOA is the Safe Operating Area shown in Figure 1. (2) Plastic package may require insulator which typically adds  $1^\circ\text{C/W}$ .

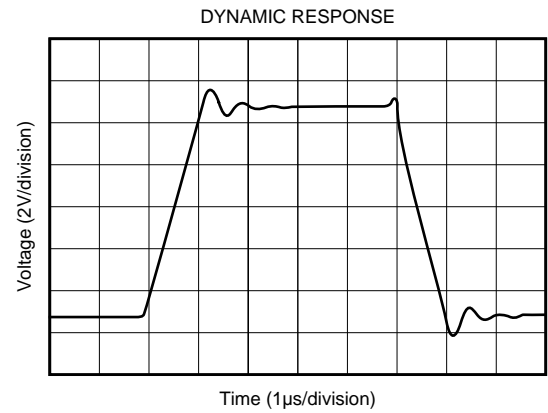
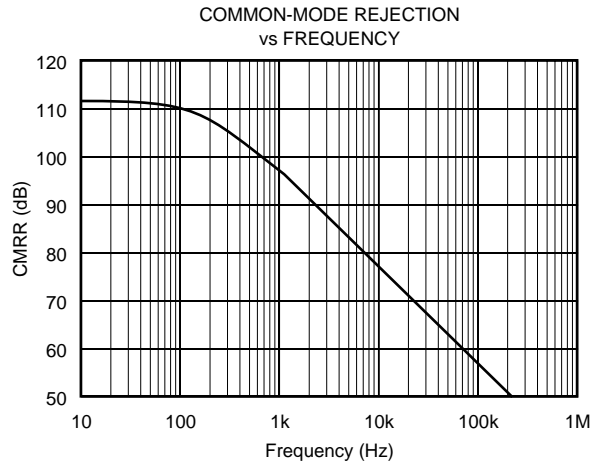
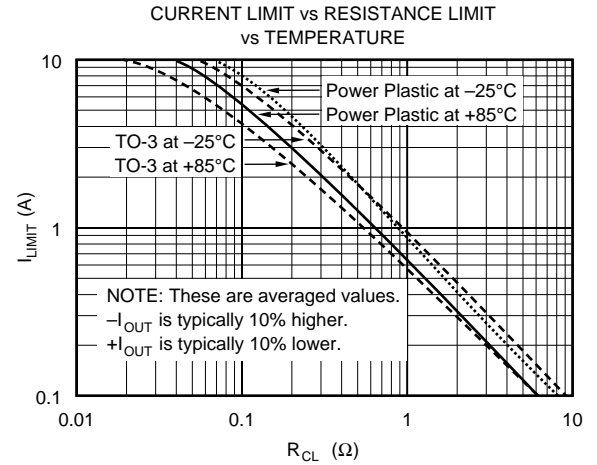
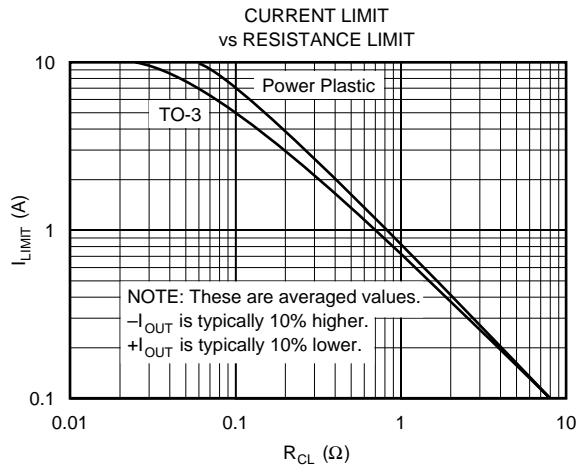
# TYPICAL CHARACTERISTICS

At  $T_A = +25^\circ\text{C}$ ,  $V_S = \pm 35\text{VDC}$ , unless otherwise noted.



# TYPICAL CHARACTERISTICS (Cont)

At  $T_A = +25^\circ\text{C}$ ,  $V_S = \pm 35\text{VDC}$ , unless otherwise noted.



# INSTALLATION INSTRUCTIONS

## POWER SUPPLIES

The OPA541 is specified for operation from power supplies up to  $\pm 40\text{V}$ . It can also be operated from unbalanced power supplies or a single power supply, as long as the total power supply voltage does not exceed  $80\text{V}$ . The power supplies should be bypassed with low series impedance capacitors such as ceramic or tantalum. These should be located as near as practical to the amplifier's power supply pins. Good power amplifier circuit layout is, in general, like good high frequency layout. Consider the path of large power supply and output currents. Avoid routing these connections near low-level input circuitry to avoid waveform distortion and oscillations.

## CURRENT LIMIT

Internal current limit circuitry is controlled by a single external resistor,  $R_{CL}$ . Output load current flows through this external resistor. The current limit is activated when the voltage across this resistor is approximately a base-emitter turn-on voltage. The value of the current limit resistor is approximately:

$$\begin{aligned} (\text{AM, BM, SM}) \quad R_{CL} &= \frac{0.809}{|I_{LIM}|} - 0.057 \\ (\text{AP}) \quad R_{CL} &= \frac{0.813}{|I_{LIM}|} - 0.02 \end{aligned}$$

Because of the internal structure of the OPA541, the actual current limit depends on whether current is positive or negative. The above  $R_{CL}$  gives an average value. For a given  $R_{CL}$ ,  $+I_{OUT}$  will actually be limited at about 10% below the expected level, while  $-I_{OUT}$  will be limited about 10% above the expected level.

The current limit value decreases with increasing temperature due to the temperature coefficient of a base-emitter junction voltage. Similarly, the current limit value increases at low temperatures. Current limit versus resistor value and temperature effects are shown in the Typical Performance Curves. Approximate values for  $R_{CL}$  at other temperatures may be calculated by adjusting  $R_{CL}$  as follows:

$$\Delta R_{CL} = \frac{-2\text{mV}}{|I_{LIM}|} \times (T - 25)$$

The adjustable current limit can be set to provide protection from short circuits. The safe short-circuit current depends on power supply voltage. See the discussion on Safe Operating Area to determine the proper current limit value.

Since the full load current flows through  $R_{CL}$ , it must be selected for sufficient power dissipation. For a  $5\text{A}$  current limit on the TO-3 package, the formula yields an  $R_{CL}$  of  $0.105\Omega$  ( $0.143\Omega$  on the power plastic package due to different internal resistances). A continuous  $5\text{A}$  through  $0.105\Omega$  would require an  $R_{CL}$  that can dissipate  $2.625\text{W}$ .

Sinusoidal outputs create dissipation according to rms load current. For the same  $R_{CL}$ , AC peaks would still be limited to  $5\text{A}$ , but rms current would be  $3.5\text{A}$ , and a current limiting resistor with a lower power rating could be used. Some applications (such as voice amplification) are assured of signals with much lower duty cycles, allowing a current resistor with a low power rating. Wire-wound resistors may be used for  $R_{CL}$ . Some wire-wound resistors, however, have excessive inductance and may cause loop-stability problems. Be sure to evaluate circuit performance with the resistor type planned for production to assure proper circuit operation.

## HEAT SINKING

Power amplifiers are rated by case temperature, not ambient temperature as with signal op amps. Sufficient heat sinking must be provided to keep the case temperature within rated limits for the maximum ambient temperature and power dissipation. The thermal resistance of the heat sink required may be calculated by:

$$\theta_{HS} = \frac{T_{CASE} - T_{AMBIENT}}{P_D (\text{max})}$$

Commercially available heat sinks often specify their thermal resistance. These ratings are often suspect, however, since they depend greatly on the mounting environment and air flow conditions. Actual thermal performance should be verified by measurement of case temperature under the required load and environmental conditions.

No insulating hardware is required when using the TO-3 package. Since mica and other similar insulators typically add approximately  $0.7^\circ\text{C/W}$  thermal resistance, their elimination significantly improves thermal performance. See Application Bulletin SBOA021, available for download at [www.ti.com](http://www.ti.com), for further details on heat sinking. On the power plastic package, the metal tab may have a high or low impedance connection to  $-V_S$ . The case should be allowed to float and will likely assume the potential of  $-V_S$ . Current should **NOT** be conducted through the case.

## SAFE OPERATING AREA

The safe operating area (SOA) plot provides comprehensive information on the power handling abilities of the OPA541. It shows the allowable output current as a function of the voltage across the conducting output transistor (see Figure 1). This voltage is equal to the power supply voltage minus the output voltage. For example, as the amplifier output swings near the positive power supply voltage, the voltage

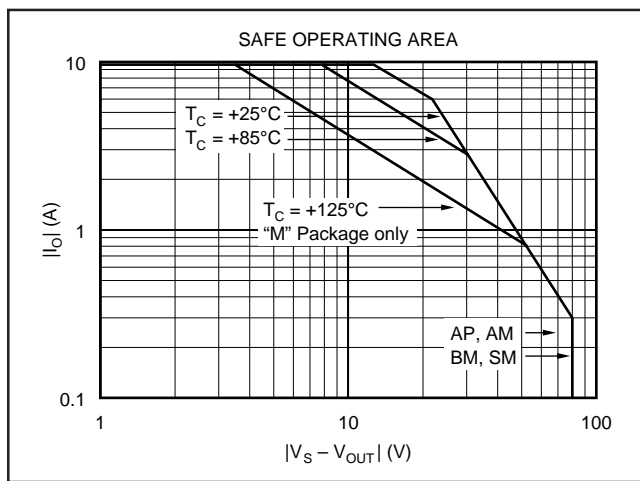


FIGURE 1. Safe Operating Area.

across the output transistor decreases and the device can safely provide large output currents demanded by the load.

Short circuit protection requires evaluation of the SOA. When the amplifier output is shorted to ground, the full power supply voltage is impressed across the conducting output transistor. The current limit must be set to a value which is safe for the power supply voltage used. For instance, with  $V_S \pm 35V$ , a short to ground would force 35V across the conducting power transistor. A current limit of 1.8A would be safe.

Reactive, or EMF-generating, loads such as DC motors can present difficult SOA requirements. With a purely reactive load, output voltage and load current are 90° out of phase. Thus, peak output current occurs when the output voltage is zero and the voltage across the conducting transistor is equal to the full power supply voltage. See Burr-Brown Application Bulletin SBOA022 (available at [www.ti.com](http://www.ti.com)) for further information on evaluating SOA.

## REPLACING HYBRID POWER AMPLIFIERS

The OPA541 can be used in applications currently using various hybrid power amplifiers, including the OPA501, OPA511, OPA512, and 3573. Of course, the application must be evaluated to assure that the output capability and other performance attributes of the OPA541 meet the necessary requirements. These hybrid power amplifiers use two current limit resistors to independently set the positive and negative current limit value. Since the OPA541 uses only one current limit resistor to set both the positive and negative current limit, only one resistor (see Figure 4) need be installed. If installed, the resistor connected to pin 2 (TO-3 package) is superfluous, but it does no harm.

Because one resistor carries the current previously carried by two, the resistor may require a higher power rating. Minor adjustments may be required in the resistor value to achieve the same current limit value. Often, however, the change in current limit value when changing models is small compared to its variation over temperature. Many applications can use the same current limit resistor.

## APPLICATIONS CIRCUITS

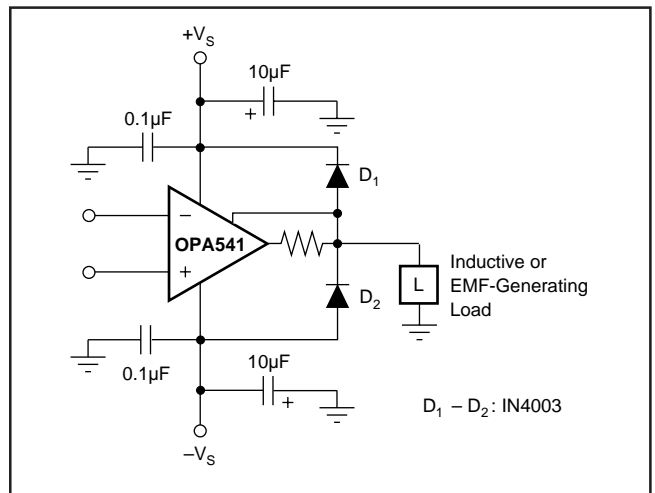


FIGURE 2. Clamping Output for EMF-Generating Loads.

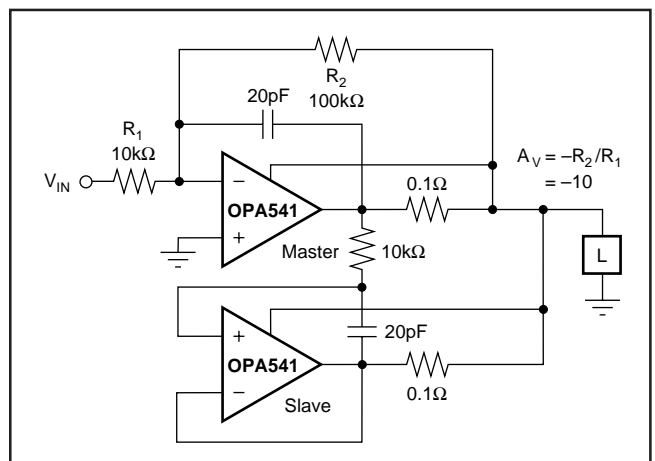


FIGURE 3. Replacing OPA501 with OPA541.

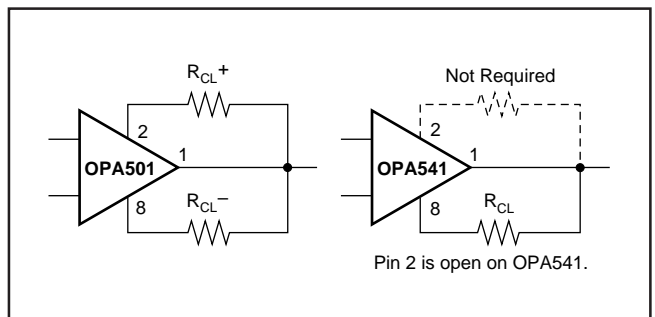


FIGURE 4. Isolating Capacitive Loads.

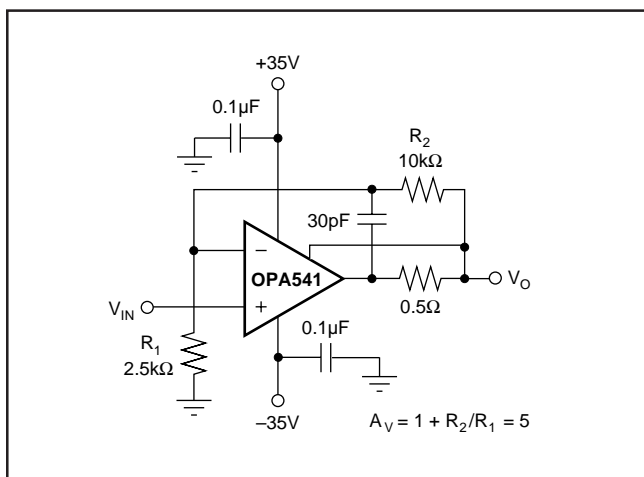


FIGURE 5. Paralleled Operation, Extended SOA.

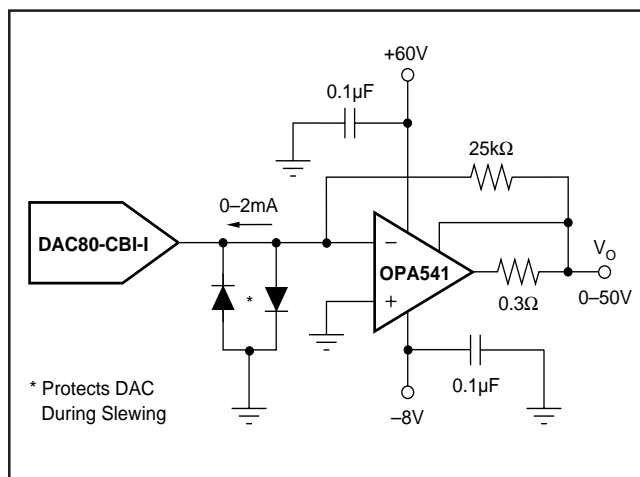


FIGURE 6. Programmable Voltage Source.

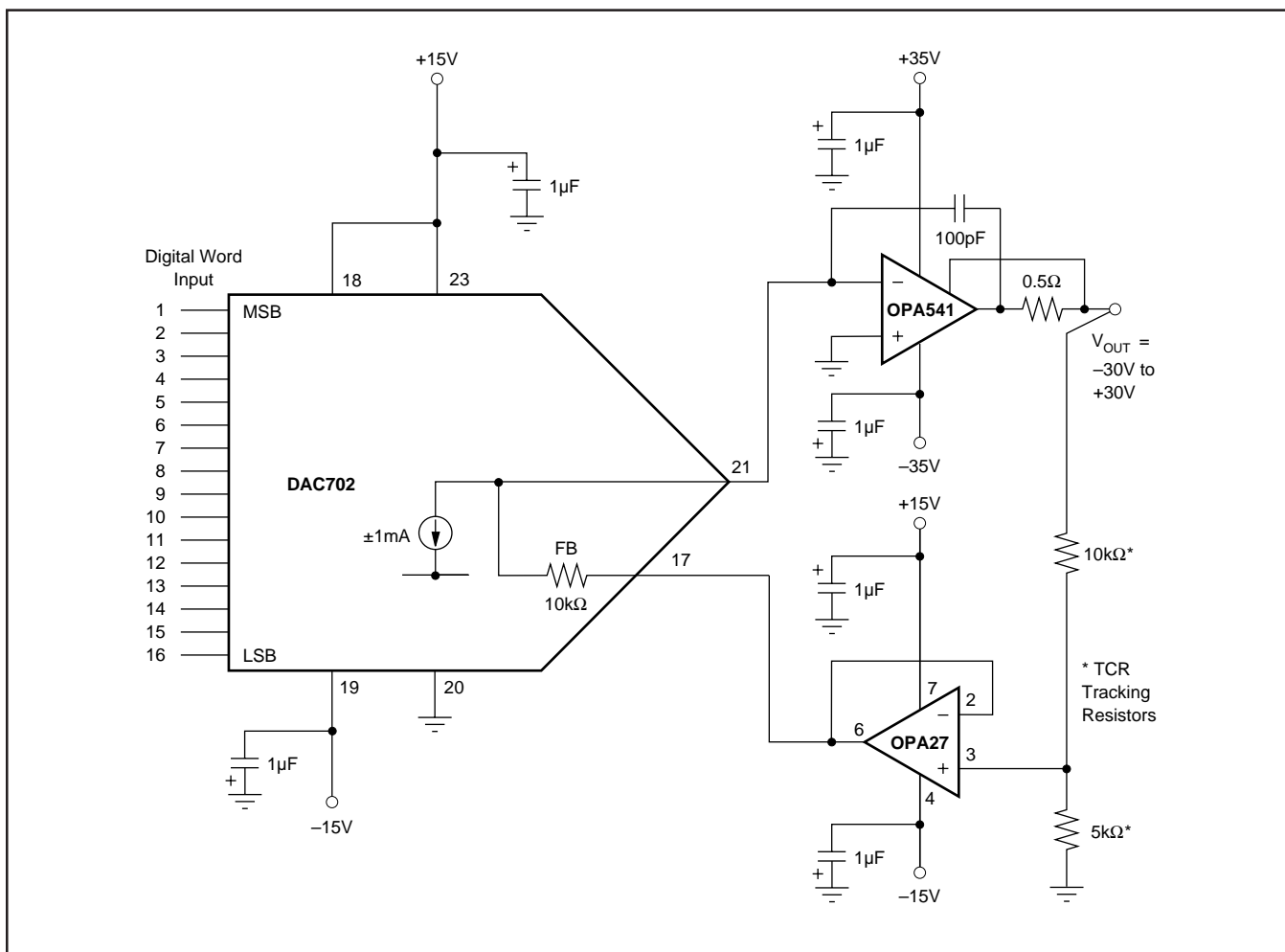


FIGURE 7. 16-Bit Programmable Voltage Source.



## PACKAGING INFORMATION

Orderable Device	Status (1)	Package Type	Package Drawing	Pins	Package Qty	Eco Plan (2)	Lead/Ball Finish	MSL Peak Temp (3)	Op Temp (°C)	Top-Side Markings (4)	Samples
OPA541-W	ACTIVE	WAFERSALE	YS	0		TBD	Call TI	Call TI			<a href="#">Samples</a>
OPA541AM	NRND	TO-3	LMF	8	1	Pb-Free (RoHS Exempt)	NI	N / A for Pkg Type		OPA541AM	
OPA541AM-BI	NRND	ZZ (BB)	ZZ030	8		TBD	Call TI	Call TI			
OPA541AP	ACTIVE	TO-220	KV	11	25	Green (RoHS & no Sb/Br)	CU SN	N / A for Pkg Type	-25 to 85	OPA541AP	<a href="#">Samples</a>
OPA541APG3	ACTIVE	TO-220	KV	11	25	Green (RoHS & no Sb/Br)	CU SN	N / A for Pkg Type	-25 to 85	OPA541AP	<a href="#">Samples</a>
OPA541BM	NRND	TO-3	LMF	8	18	Pb-Free (RoHS Exempt)	NI	N / A for Pkg Type		OPA541BM	
OPA541SM	NRND	TO-3	LMF	8	18	Pb-Free (RoHS Exempt)	NI	N / A for Pkg Type		OPA541 OPA541SM	
OPA541SM-BI	OBSOLETE	TO-3	LMF	8		TBD	Call TI	Call TI			

(1) The marketing status values are defined as follows:

**ACTIVE:** Product device recommended for new designs.

**LIFEBUY:** TI has announced that the device will be discontinued, and a lifetime-buy period is in effect.

**NRND:** Not recommended for new designs. Device is in production to support existing customers, but TI does not recommend using this part in a new design.

**PREVIEW:** Device has been announced but is not in production. Samples may or may not be available.

**OBSOLETE:** TI has discontinued the production of the device.

(2) Eco Plan - The planned eco-friendly classification: Pb-Free (RoHS), Pb-Free (RoHS Exempt), or Green (RoHS & no Sb/Br) - please check <http://www.ti.com/productcontent> for the latest availability information and additional product content details.

**TBD:** The Pb-Free/Green conversion plan has not been defined.

**Pb-Free (RoHS):** TI's terms "Lead-Free" or "Pb-Free" mean semiconductor products that are compatible with the current RoHS requirements for all 6 substances, including the requirement that lead not exceed 0.1% by weight in homogeneous materials. Where designed to be soldered at high temperatures, TI Pb-Free products are suitable for use in specified lead-free processes.

**Pb-Free (RoHS Exempt):** This component has a RoHS exemption for either 1) lead-based flip-chip solder bumps used between the die and package, or 2) lead-based die adhesive used between the die and leadframe. The component is otherwise considered Pb-Free (RoHS compatible) as defined above.

**Green (RoHS & no Sb/Br):** TI defines "Green" to mean Pb-Free (RoHS compatible), and free of Bromine (Br) and Antimony (Sb) based flame retardants (Br or Sb do not exceed 0.1% by weight in homogeneous material)

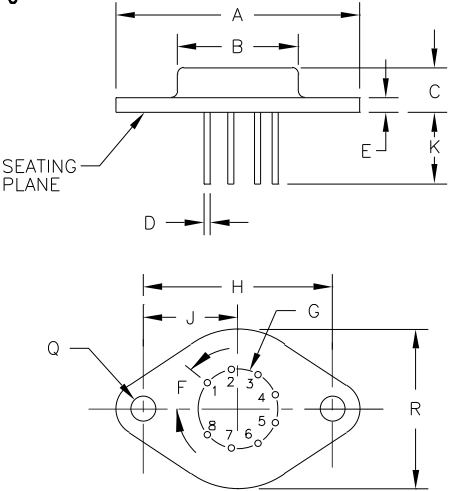
(3) MSL, Peak Temp. -- The Moisture Sensitivity Level rating according to the JEDEC industry standard classifications, and peak solder temperature.

(4) Multiple Top-Side Markings will be inside parentheses. Only one Top-Side Marking contained in parentheses and separated by a "~" will appear on a device. If a line is indented then it is a continuation of the previous line and the two combined represent the entire Top-Side Marking for that device.

**Important Information and Disclaimer:** The information provided on this page represents TI's knowledge and belief as of the date that it is provided. TI bases its knowledge and belief on information provided by third parties, and makes no representation or warranty as to the accuracy of such information. Efforts are underway to better integrate information from third parties. TI has taken and continues to take reasonable steps to provide representative and accurate information but may not have conducted destructive testing or chemical analysis on incoming materials and chemicals. TI and TI suppliers consider certain information to be proprietary, and thus CAS numbers and other limited information may not be available for release.

In no event shall TI's liability arising out of such information exceed the total purchase price of the TI part(s) at issue in this document sold by TI to Customer on an annual basis.

Package Number 030 - 8-Pin Metal TO-3



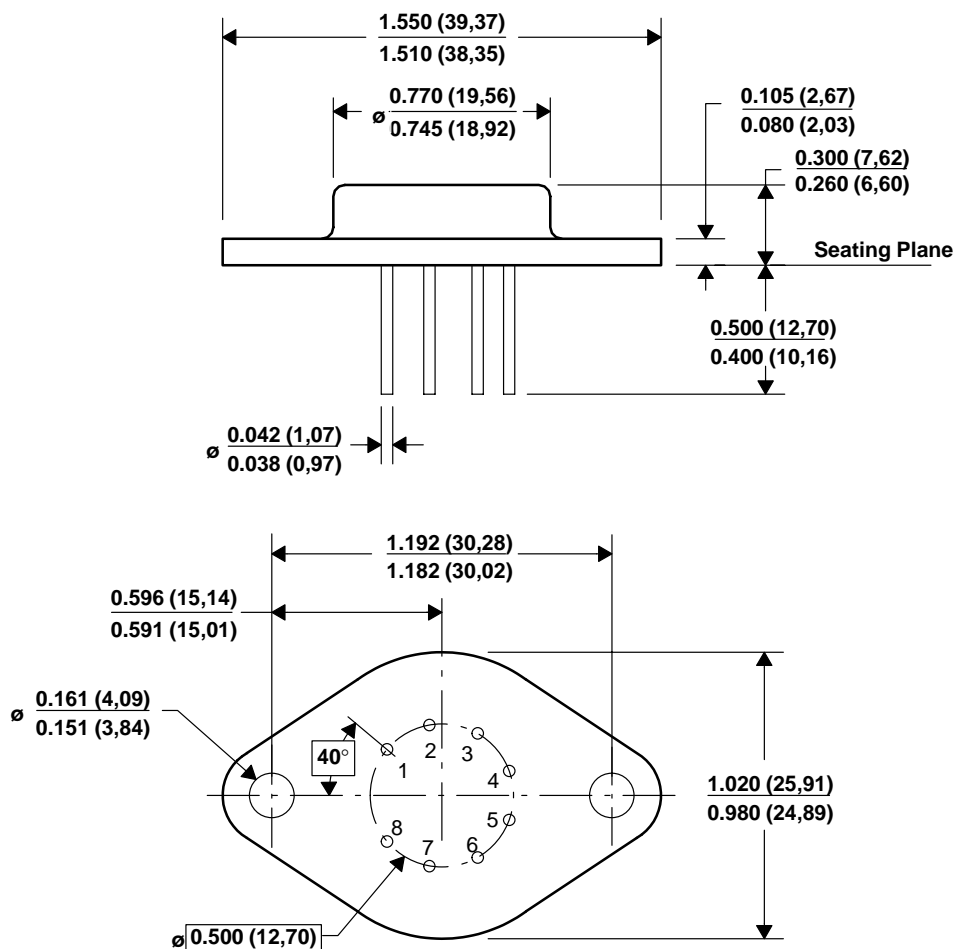
DIM	INCHES		MILLIMETERS		NOTE
	MIN.	MAX.	MIN.	MAX.	
A	1.510	1.550	38.35	39.37	
B	.745	.770	18.92	19.56	
C	.260	.300	6.60	7.62	
D	.038	.042	0.97	1.07	
E	.080	.105	2.03	2.67	
F	40°	BASIC	40°	BASIC	
G	.500	BASIC	12.70	BASIC	
H	1.182	1.192	30.02	30.28	
J	.591	.596	15.01	15.14	
K	.400	.500	10.16	12.70	
Q	.151	.161	3.84	4.09	
R	.980	1.020	24.89	25.91	

- NOTES:
- LEADS IN TRUE POSITION WITHIN .010" (.25mm) © MMC AT SEATING PLANE.
  - PIN NUMBERS SHOWN FOR REFERENCE ONLY. NUMBERS MAY NOT BE MARKED ON PACKAGE.

PACKAGE NUMBER: ZZ030      REV.: C  
JEDEC NUMBER: UNKNOWN

## LMF (O-MBCY-W8)

## METAL CYLINDRICAL PACKAGE



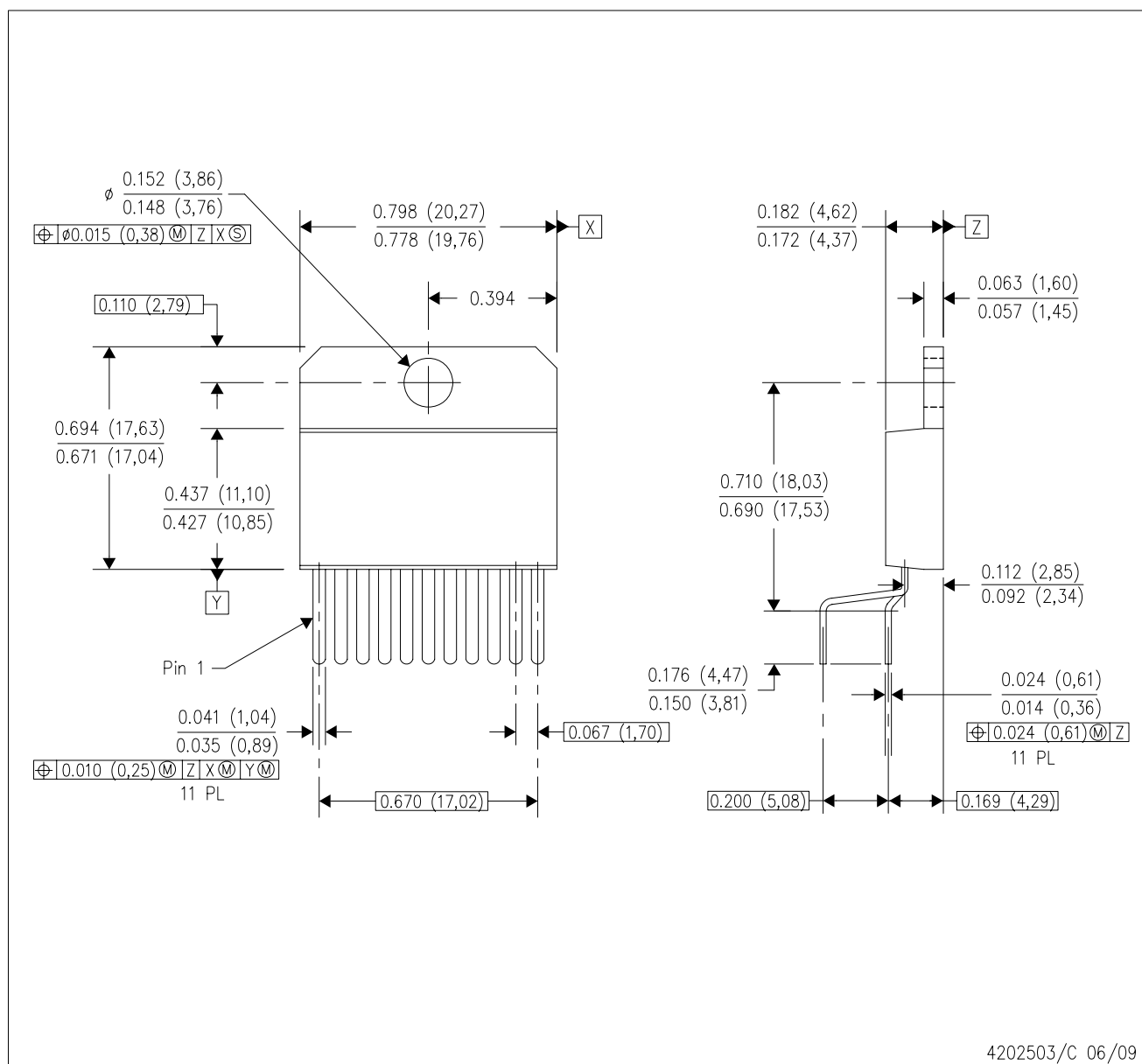
4202491/A 03/01

- NOTES:
- All linear dimensions are in inches (millimeters).
  - This drawing is subject to change without notice.
  - Leads in true position within 0.010 (0,25) R @ MMC at seating plane.
  - Pin numbers shown for reference only. Numbers may not be marked on package.

## MECHANICAL DATA

KV (R-PZFM-T11)

## PLASTIC FLANGE-MOUNT



- NOTES:
- A. All linear dimensions are in inches (millimeters).
  - B. This drawing is subject to change without notice.
  - C. Controlling dimension: inch.
  - D. All lead dimensions apply before solder dip.
  - E. Falls within JEDEC MO-48-AA.

## IMPORTANT NOTICE

Texas Instruments Incorporated and its subsidiaries (TI) reserve the right to make corrections, enhancements, improvements and other changes to its semiconductor products and services per JESD46, latest issue, and to discontinue any product or service per JESD48, latest issue. Buyers should obtain the latest relevant information before placing orders and should verify that such information is current and complete. All semiconductor products (also referred to herein as "components") are sold subject to TI's terms and conditions of sale supplied at the time of order acknowledgment.

TI warrants performance of its components to the specifications applicable at the time of sale, in accordance with the warranty in TI's terms and conditions of sale of semiconductor products. Testing and other quality control techniques are used to the extent TI deems necessary to support this warranty. Except where mandated by applicable law, testing of all parameters of each component is not necessarily performed.

TI assumes no liability for applications assistance or the design of Buyers' products. Buyers are responsible for their products and applications using TI components. To minimize the risks associated with Buyers' products and applications, Buyers should provide adequate design and operating safeguards.

TI does not warrant or represent that any license, either express or implied, is granted under any patent right, copyright, mask work right, or other intellectual property right relating to any combination, machine, or process in which TI components or services are used. Information published by TI regarding third-party products or services does not constitute a license to use such products or services or a warranty or endorsement thereof. Use of such information may require a license from a third party under the patents or other intellectual property of the third party, or a license from TI under the patents or other intellectual property of TI.

Reproduction of significant portions of TI information in TI data books or data sheets is permissible only if reproduction is without alteration and is accompanied by all associated warranties, conditions, limitations, and notices. TI is not responsible or liable for such altered documentation. Information of third parties may be subject to additional restrictions.

Resale of TI components or services with statements different from or beyond the parameters stated by TI for that component or service voids all express and any implied warranties for the associated TI component or service and is an unfair and deceptive business practice. TI is not responsible or liable for any such statements.

Buyer acknowledges and agrees that it is solely responsible for compliance with all legal, regulatory and safety-related requirements concerning its products, and any use of TI components in its applications, notwithstanding any applications-related information or support that may be provided by TI. Buyer represents and agrees that it has all the necessary expertise to create and implement safeguards which anticipate dangerous consequences of failures, monitor failures and their consequences, lessen the likelihood of failures that might cause harm and take appropriate remedial actions. Buyer will fully indemnify TI and its representatives against any damages arising out of the use of any TI components in safety-critical applications.

In some cases, TI components may be promoted specifically to facilitate safety-related applications. With such components, TI's goal is to help enable customers to design and create their own end-product solutions that meet applicable functional safety standards and requirements. Nonetheless, such components are subject to these terms.

No TI components are authorized for use in FDA Class III (or similar life-critical medical equipment) unless authorized officers of the parties have executed a special agreement specifically governing such use.

Only those TI components which TI has specifically designated as military grade or "enhanced plastic" are designed and intended for use in military/aerospace applications or environments. Buyer acknowledges and agrees that any military or aerospace use of TI components which have **not** been so designated is solely at the Buyer's risk, and that Buyer is solely responsible for compliance with all legal and regulatory requirements in connection with such use.

TI has specifically designated certain components as meeting ISO/TS16949 requirements, mainly for automotive use. In any case of use of non-designated products, TI will not be responsible for any failure to meet ISO/TS16949.

### Products

Audio	<a href="http://www.ti.com/audio">www.ti.com/audio</a>
Amplifiers	<a href="http://amplifier.ti.com">amplifier.ti.com</a>
Data Converters	<a href="http://dataconverter.ti.com">dataconverter.ti.com</a>
DLP® Products	<a href="http://www.dlp.com">www.dlp.com</a>
DSP	<a href="http://dsp.ti.com">dsp.ti.com</a>
Clocks and Timers	<a href="http://www.ti.com/clocks">www.ti.com/clocks</a>
Interface	<a href="http://interface.ti.com">interface.ti.com</a>
Logic	<a href="http://logic.ti.com">logic.ti.com</a>
Power Mgmt	<a href="http://power.ti.com">power.ti.com</a>
Microcontrollers	<a href="http://microcontroller.ti.com">microcontroller.ti.com</a>
RFID	<a href="http://www.ti-rfid.com">www.ti-rfid.com</a>
OMAP Applications Processors	<a href="http://www.ti.com/omap">www.ti.com/omap</a>
Wireless Connectivity	<a href="http://www.ti.com/wirelessconnectivity">www.ti.com/wirelessconnectivity</a>

### Applications

Automotive and Transportation	<a href="http://www.ti.com/automotive">www.ti.com/automotive</a>
Communications and Telecom	<a href="http://www.ti.com/communications">www.ti.com/communications</a>
Computers and Peripherals	<a href="http://www.ti.com/computers">www.ti.com/computers</a>
Consumer Electronics	<a href="http://www.ti.com/consumer-apps">www.ti.com/consumer-apps</a>
Energy and Lighting	<a href="http://www.ti.com/energy">www.ti.com/energy</a>
Industrial	<a href="http://www.ti.com/industrial">www.ti.com/industrial</a>
Medical	<a href="http://www.ti.com/medical">www.ti.com/medical</a>
Security	<a href="http://www.ti.com/security">www.ti.com/security</a>
Space, Avionics and Defense	<a href="http://www.ti.com/space-avionics-defense">www.ti.com/space-avionics-defense</a>
Video and Imaging	<a href="http://www.ti.com/video">www.ti.com/video</a>

### TI E2E Community

[e2e.ti.com](http://e2e.ti.com)



Компания «ЭлектроПласт» предлагает заключение долгосрочных отношений при поставках импортных электронных компонентов на взаимовыгодных условиях!

Наши преимущества:

- Оперативные поставки широкого спектра электронных компонентов отечественного и импортного производства напрямую от производителей и с крупнейших мировых складов;
- Поставка более 17-ти миллионов наименований электронных компонентов;
- Поставка сложных, дефицитных, либо снятых с производства позиций;
- Оперативные сроки поставки под заказ (от 5 рабочих дней);
- Экспресс доставка в любую точку России;
- Техническая поддержка проекта, помощь в подборе аналогов, поставка прототипов;
- Система менеджмента качества сертифицирована по Международному стандарту ISO 9001;
- Лицензия ФСБ на осуществление работ с использованием сведений, составляющих государственную тайну;
- Поставка специализированных компонентов (Xilinx, Altera, Analog Devices, Intersil, Interpoint, Microsemi, Aeroflex, Peregrine, Syfer, Eurofarad, Texas Instrument, Miteq, Cobham, E2V, MA-COM, Hittite, Mini-Circuits, General Dynamics и др.);

Помимо этого, одним из направлений компании «ЭлектроПласт» является направление «Источники питания». Мы предлагаем Вам помощь Конструкторского отдела:

- Подбор оптимального решения, техническое обоснование при выборе компонента;
- Подбор аналогов;
- Консультации по применению компонента;
- Поставка образцов и прототипов;
- Техническая поддержка проекта;
- Защита от снятия компонента с производства.



#### Как с нами связаться

**Телефон:** 8 (812) 309 58 32 (многоканальный)

**Факс:** 8 (812) 320-02-42

**Электронная почта:** [org@eplast1.ru](mailto:org@eplast1.ru)

**Адрес:** 198099, г. Санкт-Петербург, ул. Калинина, дом 2, корпус 4, литера А.