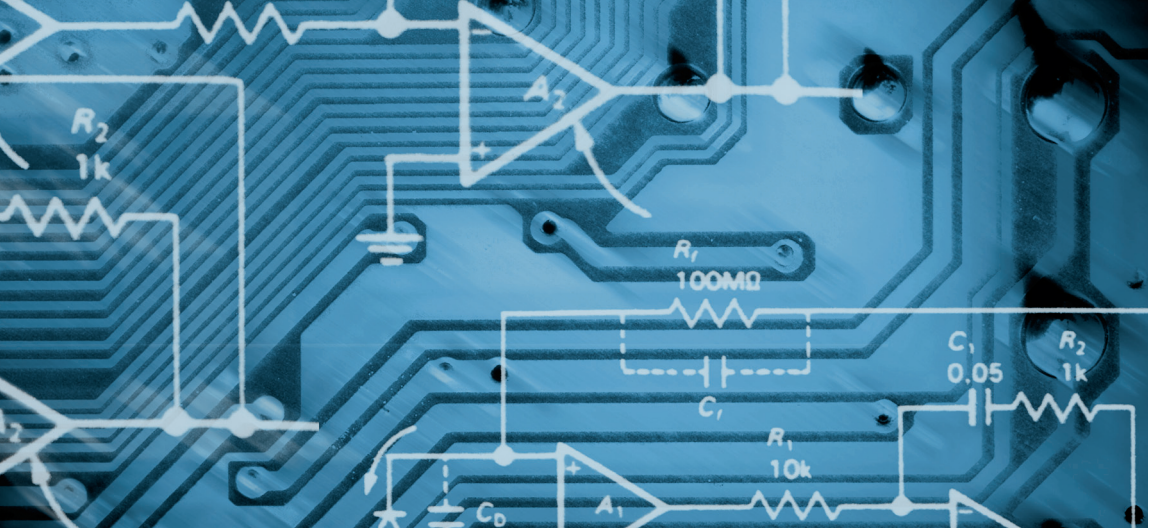


Defense and Aerospace Solutions

FEATURING APEX PRECISION POWER® TECHNOLOGY

2010

CIRRUS LOGIC®

DEFENSE AND AEROSPACE SOLUTIONS Portfolio

OUR VALUE

- Broad product portfolio of fully-certified "M/883" compliant amplifier solutions
- Commercial/Industrial Grade and Non-Compliant "M" Grade products suited to COTS level circuits
- All products are "off-the-shelf" to deliver high reliability and trim design time
- Dedicated power analog applications engineering technical support to guide product selection, review schematics, and de-bug circuits
- DSCC and ISO9001 (2008) Certified and Qualified manufacturing systems and processes
- Certified and Qualified QML-38534 manufacturing facility since 1990

A Comprehensive Portfolio of Defense and Aerospace Products

FEATURING APEX PRECISION POWER® TECHNOLOGY

Precision control in any type of application requires high power analog to generate movement. As a system's power level increases above 100 mA, or greater than 24 V, so do the complexities of designing power circuitry that is highly reliable and highly stable. The precision control of high current or high voltage also generates a complex set of electrical and thermal management issues. Cirrus Logic mitigates these issues by offering "off-the-shelf" solutions that simplify these challenges.

For more than 20 years, customers working in the defense and aerospace industries have relied upon the Cirrus Logic product technology of Apex Precision Power® linear amplifiers, switching (PWM) amplifiers and precision voltage references to meet the rigorous demands of their operating environments. These products are offered in a commercial/industrial grade, with select models also made available in either a non-compliant "M" (high reliability) or fully-certified "M/883" compliant grade.

The section that follows outlines specific defense and aerospace applications with suggested product selections. Product selection assistance is also available by contacting Cirrus Logic's dedicated team of Apex Precision Power applications engineers. Contact information is provided below.

For product selection assistance and technical support, call the dedicated Apex Precision Power Applications Engineers.

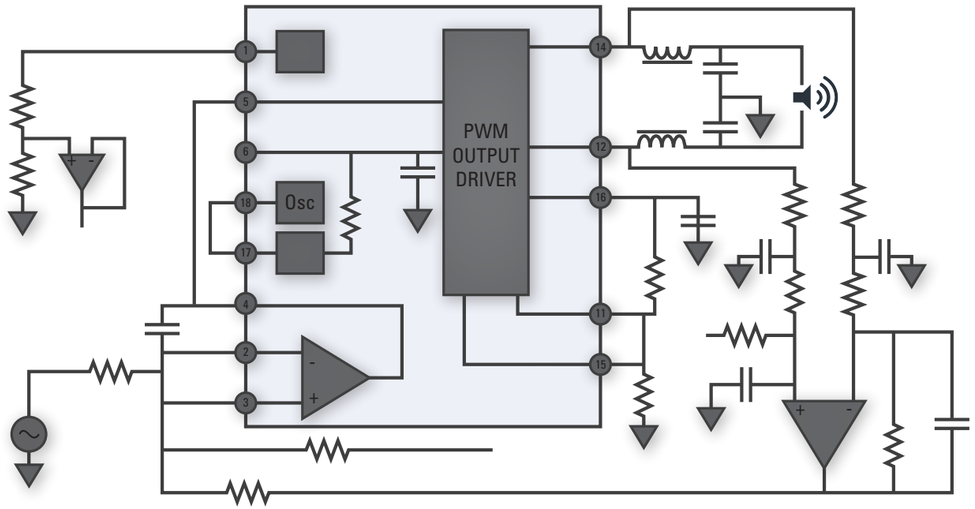
800-546-2739

APEX™ PRECISION POWER

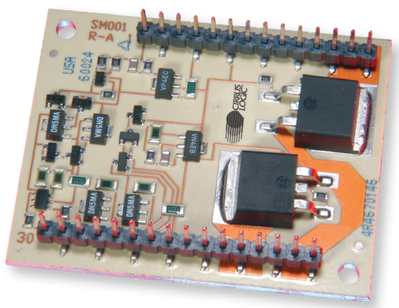
AUDIO, NOISE CANCELLATION

Application	Product Type	Product Model
Vibration Cancellation	Linear Power Amplifiers	PA02*, PA04, PA05, PA07*, PA10*, PA12*, PA73*, PA162, MP38, MP39
	PWM Amplifiers	SA60

* Available in a non-compliant "M" or fully-certified M/883 product grade



Aircraft Audio Amplifier

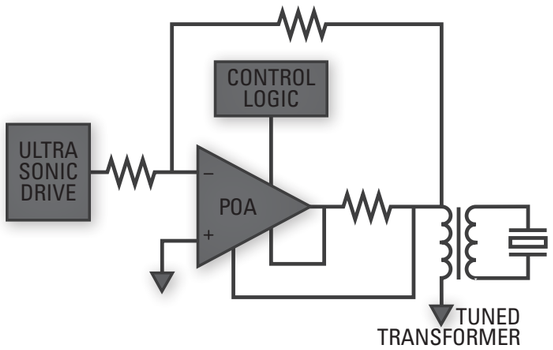


Reducing the size and weight of aircraft electrical systems is always of paramount concern. Even the slightest reduction in the number of system components can provide a benefit. System reliability is also a critical factor to avoiding costly down time. Cirrus Logic products are designed into aircraft audio and noise cancellation systems for their reputation for high reliability, as well as for the high level of integration they provide inside a single, space saving package. These "off-the-shelf" solutions can be the best choice to reduce a system's overall component count and simplify heat sinking requirements.

PIEZO TRANSDUCERS, DEFLECTION

Application	Product Type	Product Model
Sonar	Linear Power Amplifiers	PA02*, PA04, PA07*, PA08*, PA09*, PA10*, PA12*, PA73*, PA78, PA79, PA83*, PA84*, PA89, PA90, PA91, PA92, PA93, PA94, PA95
	Power Boosters	PB50, PB51, PB58

* Available in a non-compliant "M" or fully-certified M/883 product grade



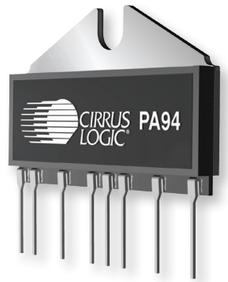
Sonar Transducer Driver

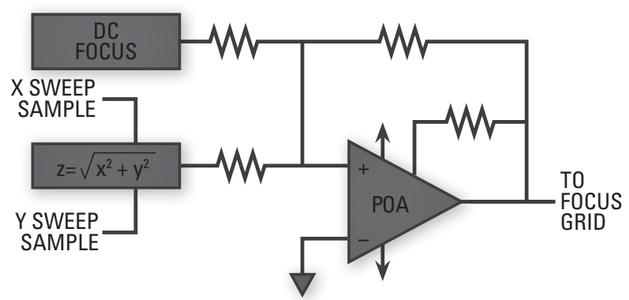
Cirrus Logic linear amplifiers, featuring Apex Precision Power technology, are designed into a wide range of piezo and deflection applications for their exceptional linearity, high slew rates, high voltage output, fast settling times, low crossover distortion and low internal losses. Typical applications include sonar transducer drivers and mirror positioning which require random beam positioning. For high current applications, power boosters are selected for their slew rate and power bandwidth.

HIGH VOLTAGE DRIVERS

Application	Product Type	Product Model
Heads-Up Displays	Linear Power Amplifiers	PA08*, PA78, PA79, PA85*, PA89, PA90, PA91, PA92, PA93, PA94, PA95, PA241*

* Available in a non-compliant "M" or fully-certified M/883 product grade





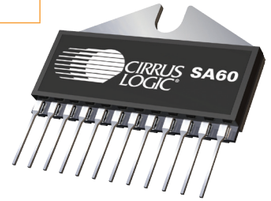
CRT Dynamic Focus

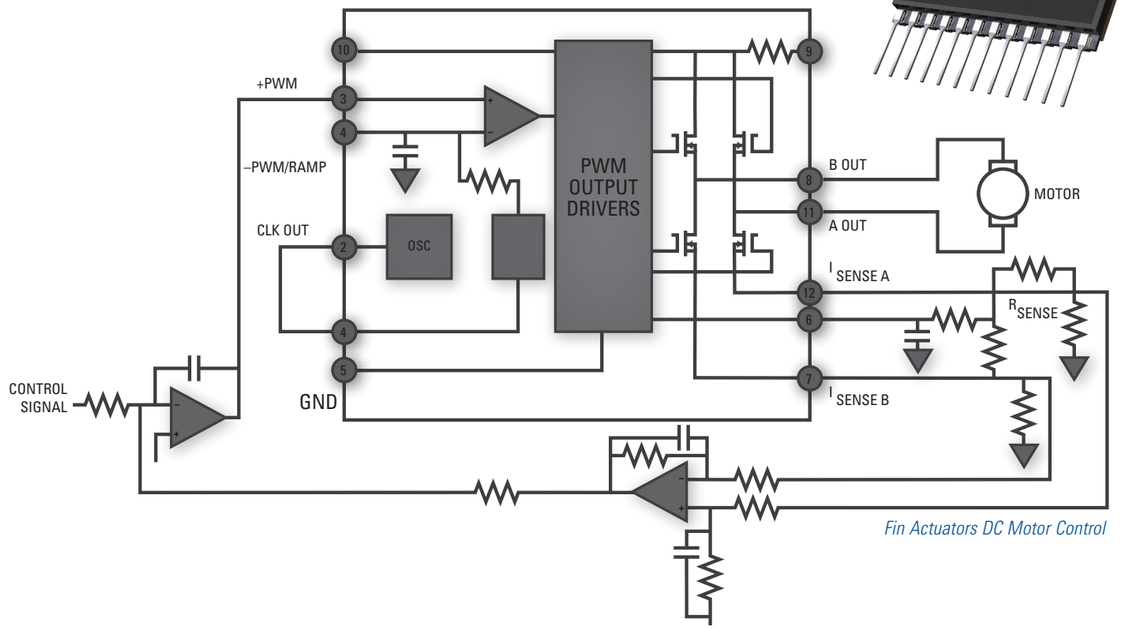
The combination of high speed and high voltage made available with Cirrus Logic linear amplifiers allows for the rapid correction of focus for high resolution displays. Dynamic focusing is the active correction of focusing voltage as a beam moves from the center to the edges of a CRT. Linear amplifiers lend themselves well to this application with their ability to be connected as a summing amplifier with inputs from the nominal focus potential and the dynamic correction.

MOTOR DRIVERS

Application	Product Type	Product Model
Flight Control Actuators, Gimbal Controls	Linear Power Amplifiers	PA02*, PA04, PA05, PA07*, PA10*, PA12*, PA73*, PA74*, PA75, PA76, MP38, MP39
	PWM Amplifiers	SA03, SA08, SA53, SA57, SA60, SA303, SA306, MSA240, MSA260

* Available in a non-compliant "M" or fully-certified M/883 product grade





Fin Actuators DC Motor Control

Motor drives probably represent the most common application within the defense and aerospace industries. Cirrus Logic high current linear and high current PWM amplifiers are both popular choices for motor control applications because of their high reliability and their ability to perform as promised. The choice between linear versus switching (PWM) typically comes down to the power level within the application circuit. A project can become unmanageable when internal power dissipation requirements are significant; thus, indicating a PWM solution is the best option. These amplifiers also offer varying levels of integration, including cycle-by-cycle current limit and integrated gate driver logic for the most sophisticated models.

PRECISION VOLTAGE REFERENCES

The Cirrus Logic 100 and 200 series of precision voltage references are zener-based references that offer either a single or dual output voltage. These are popular in systems where positive and negative reference voltages are required. Packaged in 14-pin DIPs and 20-pin LCCs, many are available with military process options (class H or K).

Application	Product Type	Product Model
Flight Control Actuators, Gimbal Controls	Linear Power Amplifiers	PA02*, PA04, PA05, PA07*, PA10*, PA12*, PA73*, PA74*, PA75, PA76, MP38, MP39
	PWM Amplifiers	SA03, SA08, SA53, SA57, SA60, SA303, SA306, MSA240, MSA260
Guidance and Systems Calibration	Precision Voltage References	VRE100/101/102*/ VRE202/204/205/210*

Model	Output(V)	Initial Error (mV)	TempCo (ppm/oC)	Noise (µVpp)	Package	Feature
VRE100/101/102	±10	0.5, 0.8, 1.0, 1.5	0.3, 0.5	6	DIP14	High Rel Military
VRE104	4.5	0.4, 0.8	0.4, 0.8	3	DIP14	High Rel Military
VRE107	±5	0.4, 0.8	0.4, 0.8	3	DIP14	High Rel Military
VRE117	±3	0.2, 0.3	0.3, 0.6	1.5	DIP14	Low Output V, High Rel Military
VRE202	2.5	0.2, 0.3	0.4, 0.8	1.5	LCC20	Small Pkg
VRE204	4.5	0.4, 0.8	0.4, 0.8	3	LCC20	Small Pkg, High Rel Military
VRE205	5	0.4, 0.8	0.4, 0.8	3	LCC20	Small Pkg, High Rel Military
VRE210	10	0.3, 0.4, 0.5, 0.8	0.3, 0.5	6	LCC20	Small Pkg, High Rel Military

* Available in a non-compliant "M" or fully-certified M/883 product grade

PRODUCT GRADE BY OPERATING TEMPERATURE RANGE

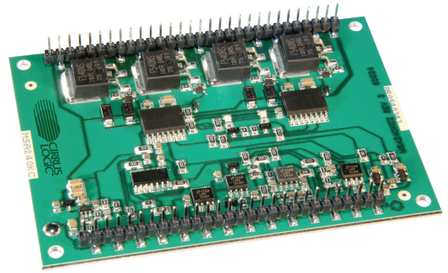
Cirrus Logic products, featuring Apex Precision Power technology, are graded across four specific operating temperature ranges: commercial, industrial, non-compliant "M", and fully compliant "M/883". Depending on the application, a commercial grade product may be a suitable solution if the operating environment is less rigorous. A good example is the ongoing expansion of the COTS program. Commercial grade products are routinely used in COTS level circuits; however, for applications that are more demanding, customers can opt for a fully compliant, fully certified, "M/883" device that is capable of guaranteed operation over the military temperature range.

Package type is another variable to be considered during the product selection process. Cirrus Logic offers a number of packaging options suited to a wide spectrum of operating conditions. Taking the time to make the right packaging choice can also deliver cost savings. For less rigorous environments, a low-cost, non-hermetic package such as a plastic PowerSIP, or an open frame module, can be a suitable choice that is also very cost effective. However, a hermetically sealed, metal package may be the best option for long-term reliability in the most rigorous of operating conditions.

Operating Temperature Range (°C)	Product Grade	Packaging Options
0°C to +70°C	Commercial	PowerSIP, TO-220, LCC, Open Frame Modules, PDIP
-25°C to +85°C	Industrial	PowerSIP, TO-220, LCC, Open Frame Modules, PDIP
-55°C to +125°C	Non-Compliant "M"	QFPs, TO-3, PowerDip, LCC, CERDIP
-55°C to +125°C	/883 Compliant Military	TO-3

PRODUCT GRADE BY SCREENING PROCESS

The chart below outlines the static and dynamic test operations performed for the commercial/industrial, non-compliant "M" and fully-certified "M/883" compliant grades. In addition, the non-compliant "M" grade and fully-certified "M/883" are distinguished further by the DSCC certification which substantiates the level of quality screening required.



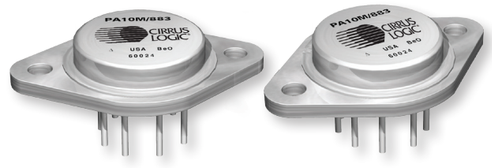
Operation	Commercial/ Industrial	Non-Compliant "M"	/883 Compliant Military
Clean Room Processing	Yes	Yes	Yes
Clean Room Testing	Yes	Yes	Yes
Solder Integrity Testing	Yes	Yes	Yes
Wire Bond Integrity	Yes	Yes	Yes
All Processing Under Document Control	Yes	Yes	Yes
High Power Die Inspection	No	Yes	Yes
Processed on Military Line	Yes	Yes	Yes
Pre-cap Visual	Sample	90	90
Pre-seal Vacuum Bake	Yes	Yes	Yes
Welded in Controlled Atmosphere[1]	Yes	Yes	Yes
Checked for Hermeticity[1]	Sample	100%	100%
Temperature Cycle: -65°C to +150°C for 10 Cycles	No	Yes	Yes
Constant Acceleration Condition 5000G	No	Yes	Yes
Burn-in: 160 hours @ TC = 125°C	No	Yes	Yes
Dynamic Testing	+25°C	-55°C, +25°C, +125°C	-55°C, +25°C, +125°C
External Visual Inspection	Yes	Yes	Yes
Pin Finish	Ni or Sn	Solder	Solder
Maximum Number of Re-work Cycles Specified			
Solder	Yes	Yes	Yes
Epoxy	No	Yes	Yes
Wirebond	Yes	Yes	Yes

[1]Metal Packaged Hybrid Models

CIRRUS LOGIC® | DEFENSE AND AEROSPACE SOLUTIONS

AVAILABLE "M" GRADE AND "M/883" SMD GRADE PRODUCTS

The listing below captures the complete Cirrus Logic product offerings that are available as either non-compliant "M" grade, or fully-certified "M/883" with Standard Military Drawing (SMD) numbers. Please refer to *www.cirrus.com* for the current technical product data sheets for each of these models.



Linear Power Amplifiers	Non-Compliant "M"	Full-Compliant "M/883"	Stocked SMD #
PA02M/883		x	5962-9067901HXA
PA07M/883		x	5962-9063801HXA
PA08M/883		x	5962-9072301HXA
PA09M/883		x	5962-9170001HXA
PA10M/883		x	5962-9082801HXA
PA12M/883		x	5962-9065901HXA
PA51M/883		x	5962-8762001,02YA
PA61M/883		x	
PA73M/883		x	
PA74M	x		
PA83M/883		x	5962-9162101HXA
PA84M/883		x	5962-9073601HXA
PA85M	x		
PA241M	x		

Precision Voltage References	Non-Compliant "M"	Full-Compliant "M/883"	Stocked SMD #
VRE100M	x		
VRE101M	x		
VRE102M	x		
VRE104M	x		
VRE107M	x		
VRE117M	x		
VRE202M	x		
VRE204M	x		
VRE205M	x		
VRE210M	x		

DSCC, ISO9001 QUALIFIED AND CERTIFIED PRODUCT BUILD FOR ALL GRADES

Apex Precision Power product technology delivers high quality and reliability by using the same DSCC and ISO9001 (2008) certified and qualified manufacturing systems and processes across all product grades. Cirrus Logic Tucson is the design and manufacturing home of Apex Precision Power product technology and a DSCC certified and qualified QML-38534 facility. Certification has been maintained since November 8, 1989, and a QML listing as of May 31, 1990. All products are screened to MIL-PRF-38534 and Class H.

The only point at which variables occur is during electrical testing. The "M" grade products are tested over a wider temperature range, in addition to certain environmental screenings and internal visual inspection criteria. Commercial and industrial grade products are 100% static and dynamic tested at +25°C. Military level products are 100% tested over their respective full temperature ranges.

For more information about Cirrus Logic products featuring Apex Precision Power technology, including complete technical data sheets and supporting design documentation, or to request product samples visit *www.cirrus.com*.

ISO 9001 REGISTRATION

This is to certify that the Quality Management System meets ISO 9001 (2008). Registration is hereby awarded to

CIRRUS LOGIC-APP TUCSON
5980 North Shannon Road
Tucson, AZ 85741

FOR: The Design, Development, Production and Test of Hybrid Microcircuits at the Tucson, AZ Facility.

THIS REGISTRATION IS VALID UNTIL TERMINATED BY WRITTEN NOTIFICATION FROM DSCC.
REGISTRATION IS GRANTED IN CONJUNCTION WITH SPECIFICATION MIL-PRF-38534.

Certificate Number: VQ-208
Issue Date: June 28, 2010
DSCC Contact Point: VQ
Telephone Number: 614-692-0663

SAMUEL E. MERRITT
Director, Operations Support Directorate
Defense Supply Center, Columbus

MIL-PRF-38534
HYBRID MICROCIRCUIT CERTIFICATION
FOR
CLASS H
IS HEREBY AWARDED TO

CIRRUS LOGIC-APP TUCSON
5980 North Shannon Road
Tucson, AZ 85741

THIS CERTIFICATION IS VALID UNTIL TERMINATED BY WRITTEN NOTIFICATION FROM DSCC.
REFERENCE DSCC LETTER VQ(VQH-10-020483) FOR DETAILS PERTAINING TO THIS CERTIFICATION.

SAMUEL E. MERRITT
Director, Operations Support Directorate
Defense Supply Center, Columbus

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CONTACT US

For product selection assistance or technical support call the dedicated Apex Precision Power Application Engineers 800-546-2739, email **apex.support@cirrus.com**, or contact the Cirrus Logic office in your region.

For a complete list of Cirrus Logic's sales representatives and authorized distributors, please visit the Contacts area at **www.cirrus.com**

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