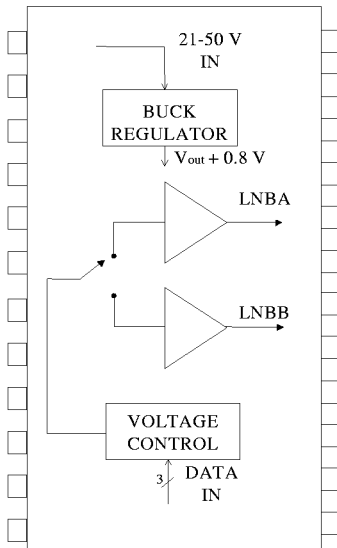


# 8284

Interim Data Sheet



## Two Output LNB Supply and Control Voltage Regulator

- Complete interface for two LNBs remote supply and control
- LNB selection and stand-by function
- Built-in tone oscillator factory trimmed to 22 kHz facilitates DiSEqC™ encoding
- Full modulation with no load
- Tracking switch-mode power converter for lowest dissipation
- Externally adjustable short-circuit protection
- LNB short-circuit protection and diagnostics
- Auxiliary modulation input
- Cable length compensation
- Internal over temperature protection
- Reverse current protection

Intended for analog and digital satellite receivers, the low noise block converter regulator (LNBR) is a monolithic linear and switching voltage regulator, specifically designed to provide the power and the interface signals to the LNB downconverter via the coaxial cable. Because most satellite receivers have two antenna ports, the output voltage of the regulator is available at one of two logic-selectable output terminals (LNBA, LNBB). If the device is in stand-by mode (EN terminal LOW), both regulator outputs are disabled. This is to allow the antenna downconverters to be supplied and controlled by other satellite receivers sharing the same coaxial cable. In this mode the device will limit reverse current to 3 mA.

### ABSOLUTE MAXIMUM RATINGS

DC Input voltage.....	50 V
Output Current .....	Internally limited
Logic Input Voltage.....	-0.5 to 7 V
Storage temperature range.....	-40 to 150°C
Operating Junction Temperature Range....	-40 to 150°C

The regulator outputs are set to 12, 13, 18, or 20 volts by the VSEL terminals. Additionally, it is possible to increase by 1 V the selected voltage to compensate the voltage drop in the coaxial cable (LLC terminal HIGH). Cont....

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The LNBR is a combination of a tracking switching regulator and low-noise linear regulators. Logic inputs (VSEL0, VSEL1 and LLC) select the desired output voltage. A tracking current-mode buck converter provides the linear regulator input voltage that is set to the output voltage plus typically 0.8 volt. This maintains constant voltage drop across the linear regulators while permitting adequate voltage range for tone injection.

The ENT (Tone Enable) terminal activates the internal tone signal modulating the dc output with a  $\pm 0.3$  V, 22 kHz symmetrical waveform. The internal oscillator is factory trimmed to provide a tone of 22 kHz  $\pm 2$  kHz. No further adjustment is required. The internal oscillator operates the buck converter at 16 times the tone frequency.

Burst coding of the 22 kHz tone can be accomplished, due to the fast response of the ENT input and rapid tone response. This allows implementation of the DiSEqC™ protocols.

To improve design flexibility and to allow implementation of proposed LNB remote control standards, an analog modulation input terminal is available (EXTM). An appropriate dc blocking capacitor must be used to couple the modulating signal source to the EXTM terminal. If external modulation is not used, the EXTM terminal can be left open.

The output linear regulators will sink and source current. This feature allows full modulation capability into capacitive loads as high as 250 nF.

The programmed output voltage rise and fall times can be set by an internal 50 k  $\Omega$  resistor and an external capacitor located on the TCAP terminal. Although any value of capacitor is permitted, practical values are typically 1 nF to 20 nF. This feature only affects the turn on and programmed voltage rise and fall times. Modulation is unaffected by the choice of TCAP. This terminal can be left open if voltage rise and fall time control is not required.

Two terminals are dedicated to the over current protection/monitoring: SENSE and OLF. The LNB output is current limited. The short-circuit protection threshold is set by the value of an external resistor, Rsense.  $R_{sense} = 0.15/I_{max}$  where  $I_{max}$  is the desired current limit. The minimum safe value for Rsense is 0.22 ohm

In operation the short-circuit protection produces current fold-back at the input due to the tracking converter. If the output is shorted the linear regulator will limit the output current to  $I_{max}$ . The tracking converter will maintain a constant voltage drop of 0.8 volts across the linear regulator. This condition results in  $(I_{max}) \cdot (0.8 \text{ volts})$  or typically 550 mW dissipation. Short-circuit or thermal shutdown activation will cause the OLF terminal, an open-drain diagnostic output flag, to go LOW.

The device is packaged in a 24 DIP or an SOIC power-tab package.  
Thermal resistance: DIP  $R_{\theta JA}=40^{\circ}\text{C}/\text{W}$ ,  $R_{\theta JT}=6^{\circ}\text{C}/\text{W}$ , SOIC  $R_{\theta JA}=55^{\circ}\text{C}/\text{W}$ ,  $R_{\theta JT}=6^{\circ}\text{C}/\text{W}$

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## Terminal Configuration

Symbol	Terminal	Function
VINT		Bypass capacitor for internal voltage reference
CPUMP		High side of charge-pump cap
EN		Logic input: enables switcher and outputs
ENT		Logic input: enable internal modulation
EXTM		External modulation input
GND		Ground
VBULK		Tracking supply voltage to linear regulators
LLC		Logic input: increases output voltage by 1 V for line length
Voa		LNBA output voltage A
Vob		LNBB output voltage B
LX		Inductor drive point
SENSE		Current limit setup resistor
OLF		Overload flag output
OSEL		Logic input: selects between LNB, A or B
VIN or Vcc		Supply input voltage (range VLNB+2.5 V to 47 V)
VPUMP		Gate supply voltage for high side drivers
PUMPX		Charge-pump drive
TCAP		Capacitor for setting the rise and fall time of the outputs
VSEL0		Logic input: output voltage select
VSEL1		Logic input: output voltage select

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## Truth Tables

Control I/O	Terminal Name	L	H
OUT	OLF	$I_{out} > I_{max}$ or $T_j > 165^{\circ}\text{C}$	$I_{out} < I_{max}$ and $T_j < 130^{\circ}\text{C}$
IN	ENT	22 kHz tone OFF	22 kHz tone ON

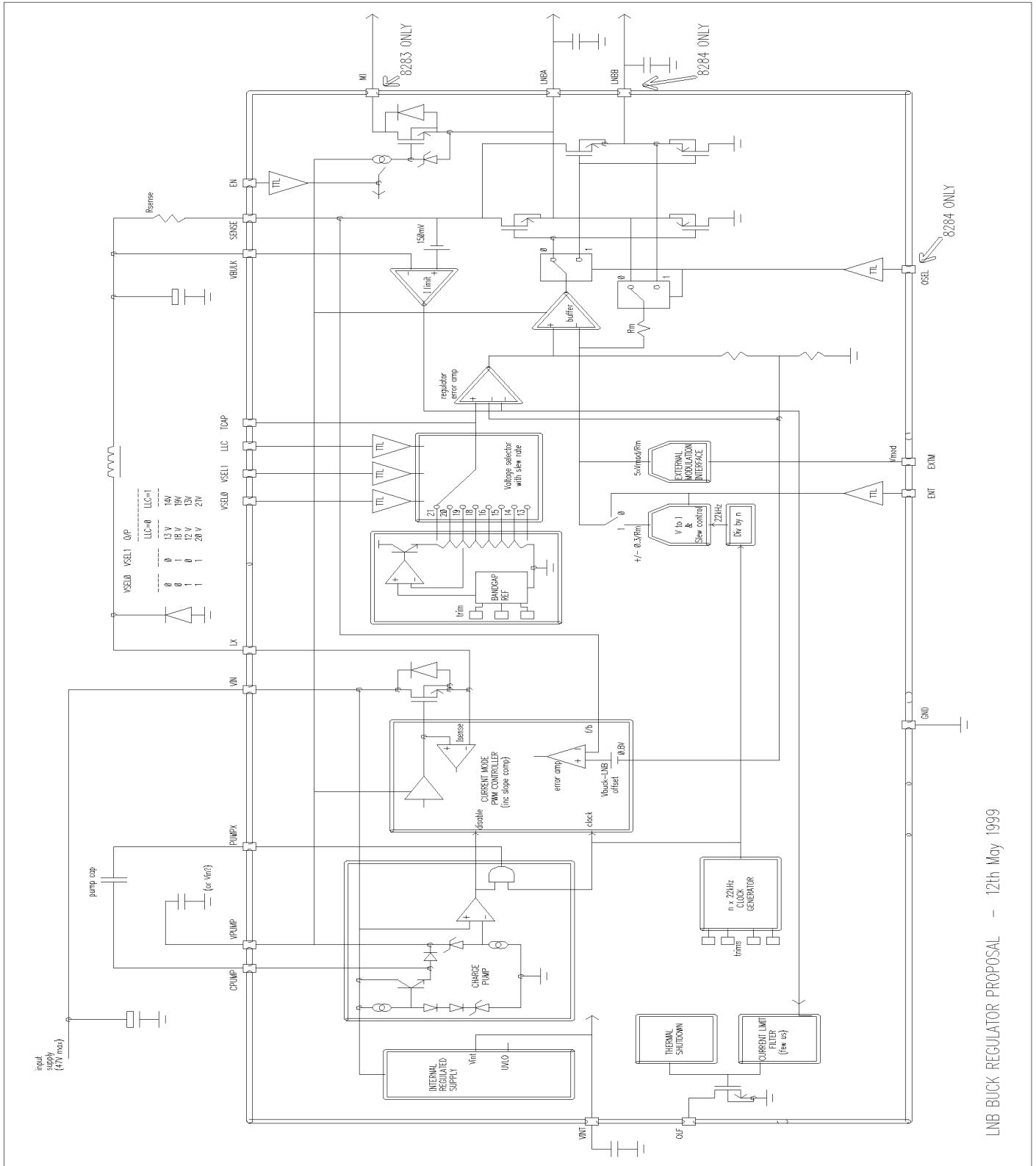
SEL	VSEL0	VSEL1	LLC	VLNBA (typ.)	VLNBB (typ.)
L	L	L	L	13 V	Low
L	L	H	L	18 V	Low
L	L	L	H	14 V	Low
L	L	H	H	19 V	Low
H	L	L	L	Low	13 V
H	L	H	L	Low	18 V
H	L	L	H	Low	14 V
H	L	H	H	Low	19 V
L	H	L	L	12 V	Low
L	H	H	L	20 V	Low
L	H	L	H	13 V	Low
L	H	H	H	21 V	Low
H	H	L	L	Low	12 V
H	H	H	L	Low	20 V
H	H	L	H	Low	13 V
H	H	H	H	Low	21 V

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Electrical Characteristics for LNBR Series ( $T_A = 25^\circ\text{C}$ , ENT=L, EN=H, LLC=L,  $V_{IN}=24\text{ V}$ ,  $I_{out}=50\text{ mA}$  (unless otherwise specified)).

Symbol	Parameter	Test Conditions	Min.	Typ.	Max	Unit
$V_{IN}$	$V_{CC1}$ Supply Voltage	$I_O=600\text{ mA}$ , VSEL0=L, VSEL1=L, LLC=L	$2.5+V_O$		47	V
$V_{O1}$	Output Voltage	$I_O=600\text{ mA}$ , VSEL0=L, VSEL1=H, LLC=L $I_O=600\text{ mA}$ , SEL0=L, VSEL1=H, LLC=H	17.3	18 19	18.7	V V
$V_{O2}$	Output Voltage	$I_O=600\text{ mA}$ , VSEL0=L, VSEL1=L LLC=L $I_O=600\text{ mA}$ , VSEL0=L, VSEL1=L, LLC=H	12.5	13 14	13.5	V V
$V_{O1}$	Output Voltage	$I_O=600\text{ mA}$ , VSEL0=H, VSEL1=H, LLC=L $I_O=600\text{ mA}$ , SEL0=H, VSEL1=H, LLC=H		20 21		V V
$V_{O2}$	Output Voltage	$I_O=600\text{ mA}$ , VSEL0=H, VSEL1=L LLC=L $I_O=600\text{ mA}$ , VSEL0=H, VSEL1=L, LLC=H		12 13		V V
!VO	Line Regulation	$V_O=13\text{ V}$ , $V_{IN}=16\text{ to }40\text{ V}$ $V_O=18\text{ V}$ , $V_{IN}=21\text{ to }40\text{ V}$		4.0 4.0	40 40	mV mV
!VO	Load Regulation	$V_O=13\text{ or }18\text{ V}$ $I_O=50\text{ to }600\text{ mA}$		80	180	mV
SVR	Supply Voltage Rejection	$f_{AC}=100\text{ Hz}$		45		dB
$I_{MAX}$	Output Current Limiting	$R_{sense}=0.22\text{ ohm}$	630	680	730	mA
$f_{TONE}$	Tone Frequency	ENT=H	20	22	24	kHz
$a_{TONE}$	Tone Amplitude	ENT=H	0.55	0.68	0.8	Vpp
$d_{TONE}$	Tone duty cycle	ENT=H	40	50	60	%
$t_R, t_F$	Tone rise or fall time	ENT=H	5.0	10	15	$\mu\text{s}$
$g_{EXTM}$	External modulation gain	! VO/! $V_{EXTM}$ , $f=10\text{ Hz to }40\text{ kHz}$		1.0		V/V
$V_{EXTM}$	External modulation input voltage	AC coupling			0.8	Vpp
$Z_{EXTM}$	External modulation input impedance	$f=10\text{ Hz to }40\text{ kHz}$		5		k "
$V_{OL}$	Overload flag terminal logic low	$I_{OL}=8.0\text{ mA}$		0.28		V
$I_{OZ}$	Overload flag terminal OFF state leakage current	$V_{OH}=6.0\text{ V}$		< 1.0		$\mu\text{a}$
$V_{IL}$	Control input terminal logic low				0.8	V
$V_{IH}$	Control input terminal logic high		2.0			V
$I_{IH}$	Control terminals input current	$V_{IH}=5\text{ V}$		< 1.0		$\mu\text{A}$
$I_{CC}$	Supply current	Outputs disabled (EN=L)		.5		mA
$I_{CC}$	Supply current	ENT=H, $I_{OUT}=600\text{ mA}$ $V_O=13$		382		mA
$I_{OBK}$	Output reverse current	EN=L, $V_{LNBA}=V_{LNBB}=18\text{ V}$ $V_{IN1}=V_{IN2}=22\text{ V}$ or floating		1.0		mA
$T_{SHDN}$	Thermal shutdown threshold			165		$^\circ\text{C}$
! $V_{BUCK}$	Linear regulator voltage drop	$V_{BULK} - V_O$		0.8		V
$f_O$	Switching frequency	$f_{TONE} * 16$	320	352	384	kHz

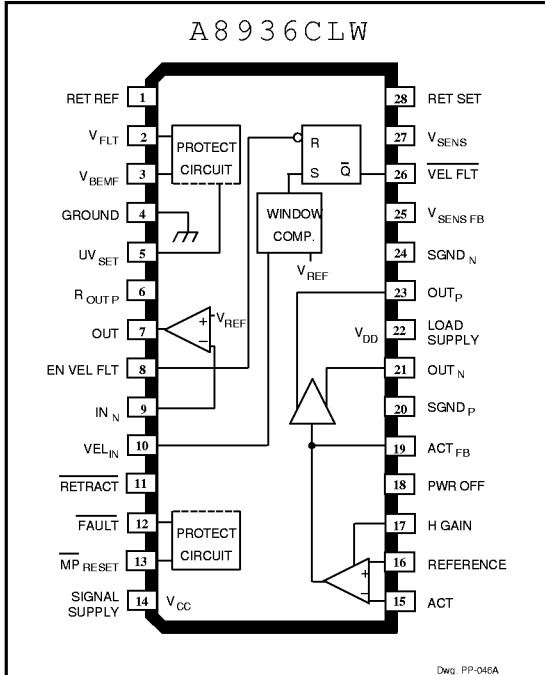
# 8284



LNB BUCK REGULATOR PROPOSAL - 12th May 1999



## VOICE COIL MOTOR DRIVER



Providing control and drive of the voice coil motor used for head positioning in 5 V disk drive applications, the A8936C— is a full-bridge driver which can be configured so that its output current is a direct function of an externally applied control voltage or current. This linear current control function is supplemented by additional circuitry to protect the heads and the data disk during system failure or normal system shutdown. An under- or over-velocity sense disables the system in a controlled sequence if a fault condition occurs.

The two  $\pm 500$  mA MOS driver outputs provide very low saturation voltage and minimal power dissipation. Additional headroom is achieved by the sense-FET structure eliminating the need for an external current-sense resistor. Thermal protection and under-voltage lockout disables the system in a controlled sequence if a fault condition occurs.

### FEATURES

- Over-Velocity Fault Function
- Lossless Current Sensing
- Zero Deadband
- High Transconductance Bandwidth
- User-Adjustable Transconductance Gain
- Digital Transconductance Gain Switch (4:1 Ratio)
- 5 Volt Monitor with Selectable UV Trip Point
- Retract Circuitry Functional to 0 Volts
- Chip Enable/Sleep Mode Function
- 1 V at 500 mA Output Saturation Voltage
- Internal Thermal Shutdown Circuitry

### ABSOLUTE MAXIMUM RATINGS

Supply Voltages, $V_{CC}$ and $V_{DD}$ .....	<b>6.0 V</b>
Output Current, $I_{OUT}$ (peak) .....	<b><math>\pm 600</math> mA</b>
(continuous) .....	<b><math>\pm 500</math> mA</b>
Analog Input Voltage Range,	
$V_{IN}$ .....	<b>-0.3 V to <math>V_{CC}</math></b>
Logic Input Voltage Range,	
$V_{IN}$ .....	<b>-0.3 V to +6.0 V</b>
Package Power Dissipation,	
$P_D$ .....	<b>See Graph</b>
Operating Temperature Range,	
$T_A$ .....	<b>0°C to +70°C</b>
Junction Temperature, $T_J$ .....	<b>+150°C†</b>
Storage Temperature Range,	
$T_S$ .....	<b>-55°C to +150°C</b>

† Fault conditions that produce excessive junction temperature will activate device thermal shutdown circuitry. These conditions can be tolerated, but should be avoided.

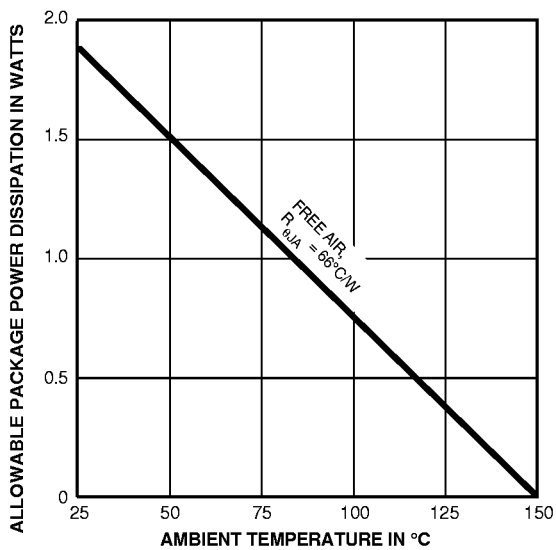
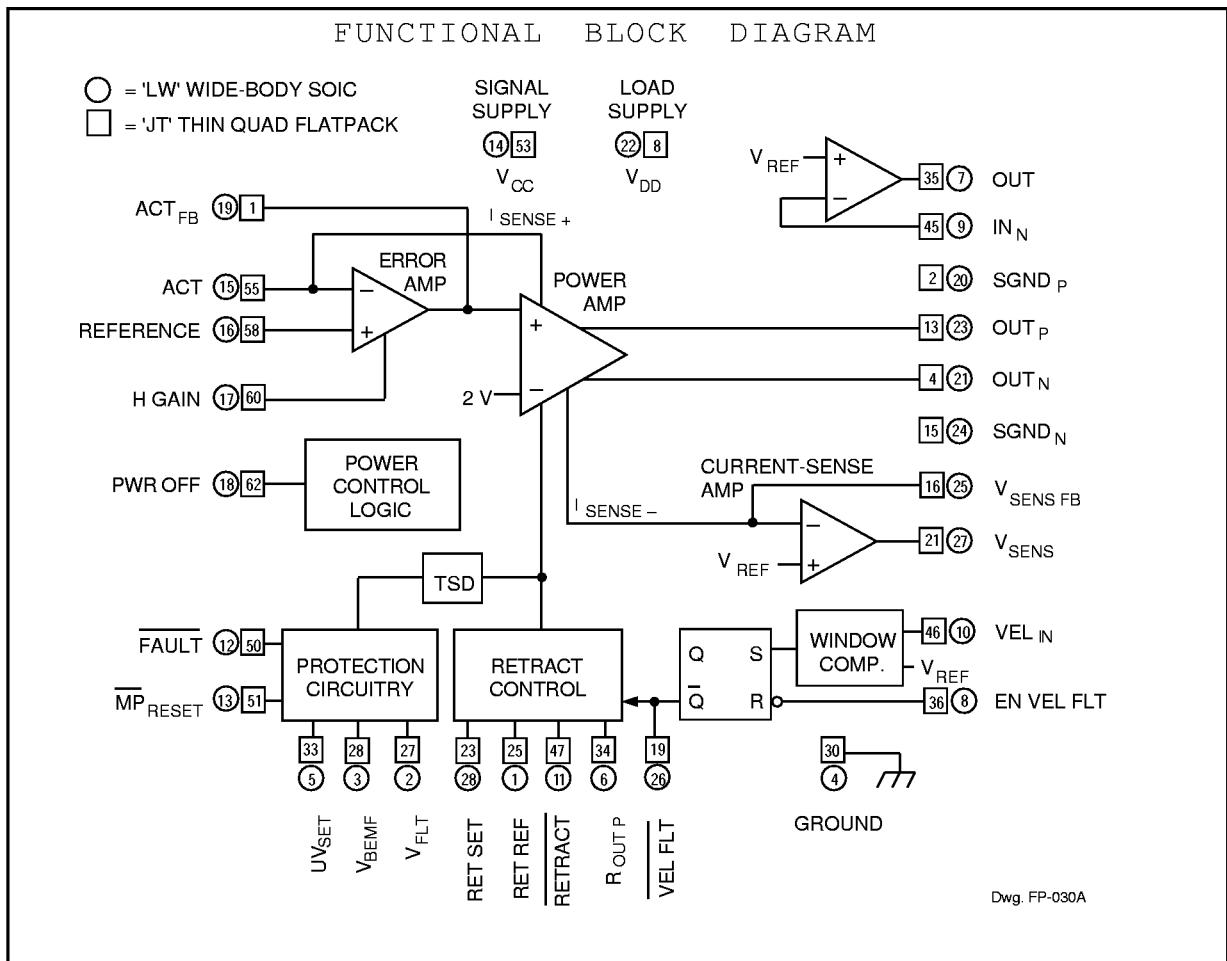
Output current rating may be restricted to a value determined by system concerns and factors. These include: system duty cycle and timing, ambient temperature, and use of any heatsinking and/or forced cooling. For reliable operation the specified maximum junction temperature should not be exceeded.

Always order by complete part number:

Part Number	Package
<b>A8936CJT</b>	<b>64-Lead Thin Quad Flatpack</b>
<b>A8936CLW</b>	<b>28-Lead SOIC</b>

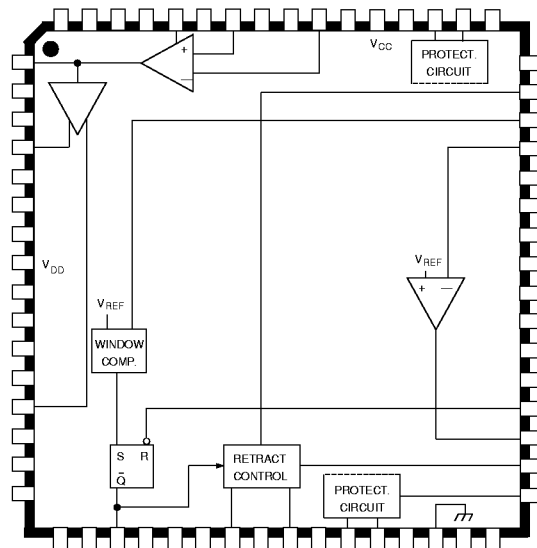


# 8936 VOICE COIL MOTOR DRIVER



Dwg. GP-034

### A8936CJT



Dwg. PP-052-1



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