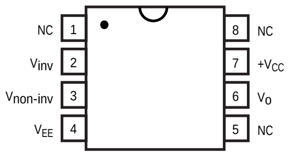
INDEX



Order Codes
789-707 (CLC408AJP)
789-719 (CLC408AJE)

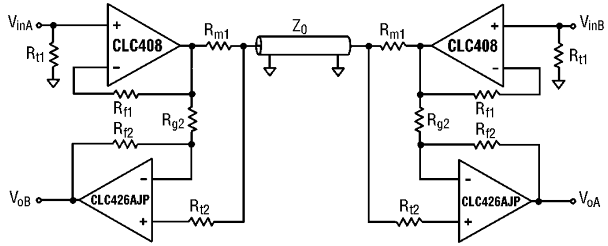
Features:
- 96mA output current
- 1.5mA supply current
- 130MHz bandwidth (Av=+2)
- -85/-75dBc HD2/HD3 (1MHz)
- 15ns settling to 0.2%
- 350V/µs slew rate

Applications:
- Coaxial cable driver
- Twisted pair driver
- Transformer/coil driver
- High capacitive load driver
- Video line driver
- ADSL/HDSL driver
- Portable/battery-powered line driver
- A/D driver

The Comlinear CLC408AJP (PDIP) and CLC408AJE (SOIC) deliver high output drive current (96mA), but consume minimal quiescent supply current (1.5mA). Their current feedback architecture, fabricated in an advanced complimentary bipolar process, maintains consistent performance over a wide range of gains and signal levels.

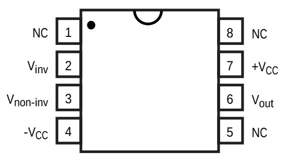
They offer superior dynamic performance and the combination of low quiescent power, high output drive current and high-speed performance make them a great choice for many portable and battery-powered personal communication and computing systems. The CLC408 drives low-impedance loads, including capacitive loads, with little change in performance. They also have an excellent choice for driving high currents into single-ended transformers and coils.

Typical Application:



Full Duplex Cable Driver

CLC436 200MHz, ±15V, Low Power Voltage Feedback Op Amp COMLINEAR (NSC)



Order Code
792-731 (CLC436AJP)

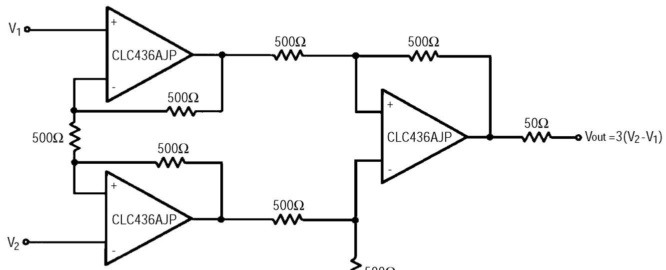
Features:
- 2.3mA supply current
- 200MHz unity-gain bandwidth
- 2400/Vµs slew rate
- 115dB common-mode rejection ratio
- 100mA drive current
- $20V_{PP}$ output swing
- ±5V or ±15V supplies

Applications:
- Video ADC driver
- Desktop multimedia
- Low powered cable driver
- Video DAC buffer
- Active filters
- NTSC & PAL video systems

The CLC436 is a high-performance voltage-feedback operational amplifier that has been designed for low-cost general-purpose applications. It can operate from dual ±5V, ±15V power supplies. Operating from ±5V rails, it consumes a mere 20mW.
Operating from ±15V power supplies, it uses only 2.3mA to provide a wide 200MHz unity gain bandwidth, a very fast 2400V/µs slew rate and quick 16ns rises/fall times (5Vpulse). At ±15V the device also provides larger signal swings ($20V_{PP}$) to give greater dynamic range and higher signal-to-noise ratios.

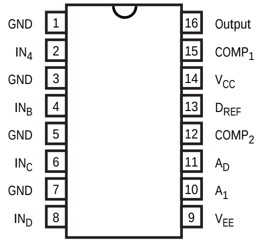
As a low-power NTSC or PAL video line-driver, the CLC436 delivers low differential gain and phase errors (0.1%, 1.0°) and very high output drive current of 100mA. Also as a video ADC driver, it offers low THD and high SFDR. The CLC436 may be configured as an excellent active filter for video-reconstruction DACs. The combination of low cost and high performance in addition to its low-power voltage-feedback topology make it a versatile conditioning building block for a wide range of consumer-type applications.

Typical Application:



Instrumentation Amplifier

CLC533 High-Speed 4:1 Analogue Multiplexer COMLINEAR (NSC)



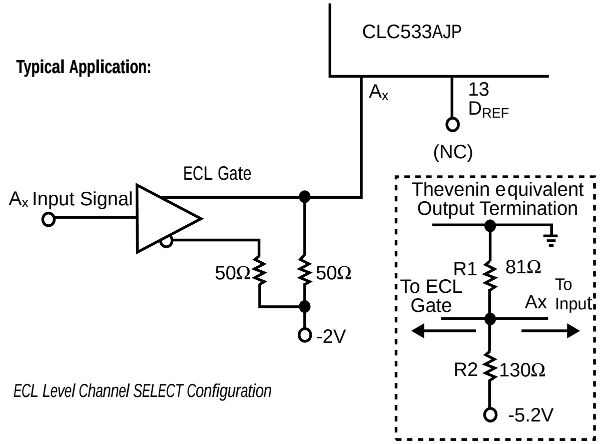
Order Code
792-561 (CLC533AJP)

The CLC533 is a high-speed 4:1 multiplexer employing active input and output stages. The CLC533 also employs a closed-loop design which dramatically improves accuracy over conventional analogue multiplexer circuits. This monolithic device is constructed using an advanced high-performance bipolar process. The CLC533 has been specifically designed to provide a 24ns settling time to 0.01%. This coupled with the adjustable bandwidth, makes it an ideal choice for infra-red and CCD imaging systems, with channel isolation of 80dB @ 10MHz. Low distortion and spurious signal levels (-80dBc) make the CLC533 a very suitable choice for I/Q processors in radar receivers.

Features:
- 12-bit settling (0.01%) - 17ns
- Low noise - 42µ Vrms
- Isolation - 80dB @ 10MHz
- 110MHz - 3dB bandwidth (A_V =+2)
- Low distortion - 80dB @ 5MHz
- Adjustable bandwidth - 180MHz (max)

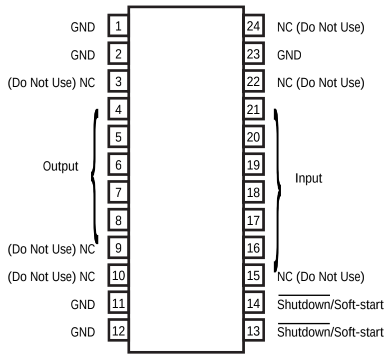
Applications:
- Infra-red system multiplexing
- CCD sensor signals
- Radar I/Q switching
- High definition video HDTV
- Test and calibration

Typical Application:



ECL Level Channel SELECT Configuration

LM2825 1A DC/DC Converter NSC



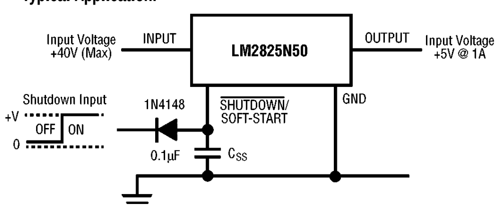
Order Codes
704-441 (LM2825N50)
704-453 (LM2825N33)

The LM2825N50 (5V) and LM2825N33 (3.3V) are complete 1A DC-DC Buck converters in a 24-lead moulded dual-in-line integrated circuit package. Contained within the package are all the active and passive components for a high efficiency step-down (Buck) switching regulator. Available in fixed output voltages of 3.3V and 5V, these devices can provide up to 1A of load current with fully guaranteed electrical specifications over the full operating temperature range. Self-contained, these converters are fully protected from output fault conditions, such as excessive load current, short circuits, or excessive temperatures.

Features:
- Minimum design time required
- 3.3V and 5V fixed output versions
- Guaranteed 1A output current
- Wide input voltage range, up to 40V
- Low-power standby mode, I_Q typically 65µA
- High-efficiency, typically 80%
- ±4% output voltage tolerance
- Excellent line and load regulation
- TTL shutdown capability/programmable soft-start
- Thermal shutdown and current limit protection

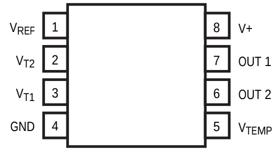
Applications:
- Simple high-efficiency step-down (Buck) regulator
- On-card switching regulator
- Efficient pre-regulator for linear regulators
- Distributed power systems
- DC/DC module replacement

Typical Application:



Circuit using Shutdown/Soft-Start features

LM56 Dual Output, Low Power Thermostat NSC



Order Code
792-160 (LM56BIM)
791-787 (LM56CIM)

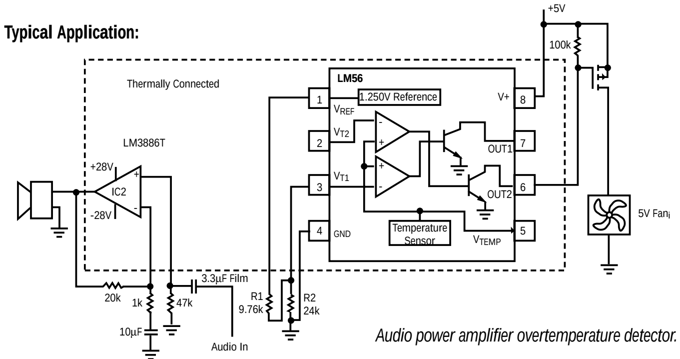
Features:
- Digital outputs support TTL logic levels
- Internal temperature sensor
- 2 internal comparators with hysteresis
- Internal voltage reference
- Temperature trip point accuracy:
  LM56BIM ±2°C(max)
  LM56CIM ±3°C(max)

Applications:
- Microprocessor thermal management
- Appliances
- Portable battery powered systems
- Fan control
- Industrial process control
- HVAC systems
- Remote temperature sensing
- Electronic system protection

The LM56 is a low power thermostat with two stable temperature trip points generated by three external resistors dividing the 1.25V bandgap voltage reference. It has two digital outputs. OUT1 goes LO when the temperature exceeds T1 and goes HI when the temperature goes below $T1\text{-}T_{HYST}$. OUT2 performs similarly with respect to T2, where T_{HYST} is an internally set 5°C typical hysteresis.

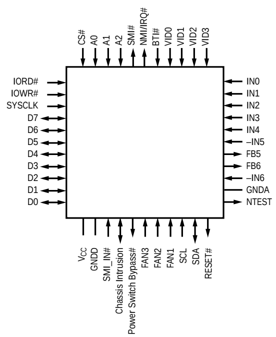
In the example shown here, an audio power amplifier IC is bolted to a heatsink which is mounted onto a PCB with the LM56 also mounted onto the PCB near the power amplifier. The back of the PCB has ground plane helping conduct heat to the device. The sensing element is to be at the same temperature as the heatsink therefore the sensor leads are fed through to the back of the PCB. The comparator output adjusts as the heatsink temperature changes relative to the threshold which is set by R1, R2 and the voltage reference. The comparator output can then be used for turning the fan on/off as the heatsink temperature exceeds 80°C or drops below 75°C.

Typical Application:



Audio power amplifier overtemperature detector.

LM78 Microprocessor System Hardware Monitor NSC



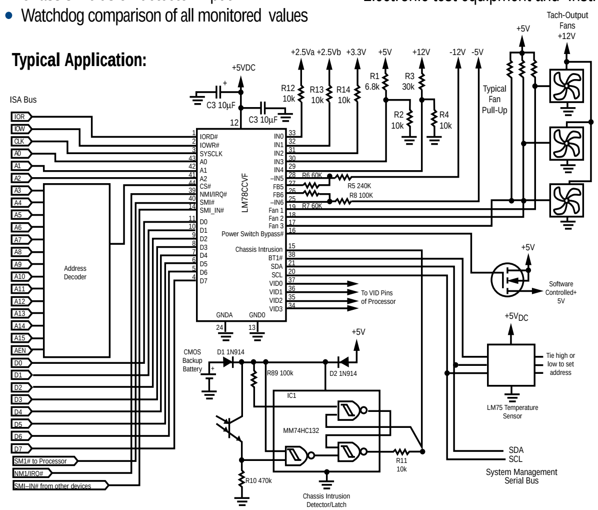
Order Code
790-722 (LM78CCVF)

The LM78 monitors servers, personal computer, or virtually any microprocessor based system. The device monitors power supply voltages, temperatures, and fan speeds in a PC environment. It also has, on-chip, two inverting inputs for monitoring negative voltages and an 8-bit ADC, making the LM78 a highly integrated Data Acquisition system.

Features:
- Temperature sensing
- 5 positive voltage inputs
- 2 op amps for negative voltage monitoring
- 3 fan speed monitoring inputs
- Input for additional temperature sensors
- Chassis intrusion detector input
- Watchdog comparison of all monitored values
- Power on self test code storage RAM
- ISA and I^{2}C serial bus interfaces

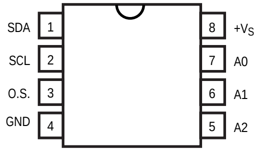
Applications:
- System hardware monitoring for servers and PCs
- Office electronics
- Electronic test equipment and instrumentation

Typical Application:



PC application where LM78CCVF monitors temperature, fan speed for 3 fans and 7 power supply voltages. It also monitors overtemperature shutdown outputs of up to 8 LM75ICM3 (703-722) or LM75CIM5 (703-710) digital temperature sensors as well as an optical chassis intrusion detector.

LM75 — I^{2}C Digital Temperature Sensor and Thermal Watchdog — NSC



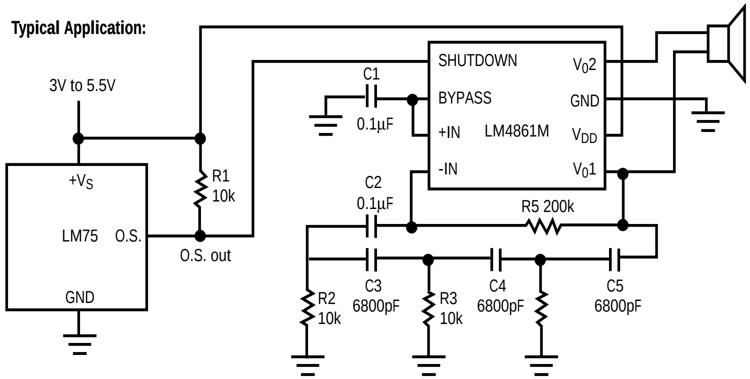
Order Code
703-722 (LM75CIM3)
703-710 (LM75CIM5)

Features:
- I^{2}C bus interface
- Separate open-drain output pin operates as interrupt or comparator/thermostat output
- Register readback capability
- Power up defaults permit stand-alone operation as thermostat
- Shutdown mode to minimize power consumption
- Up to 8 LM75s can be connected to a single I^{2}C bus

Applications:
- System thermal management
- Personal computers
- Office electronics
- Electronic test equipment

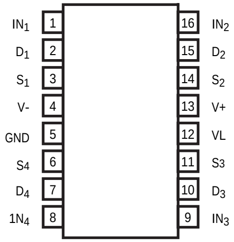
The LM75 is a temperature sensor, 9-bit Delta Sigma ADC and digital over-temperature shutdown detector with I^{2}C interface. A digital comparator is also incorporated for comparison of user-selectable number of readings. The host system can query the LM75 at any time to read temperature. The open-drain overtemperature shutdown output activates when the temperature exceeds a programmable limit. The 3.0V to 5.5V supply voltage range, low supply current and I^{2}C interface make the LM75 ideal for a range of applications, including those already highlighted.

Typical Application:



Temperature sensor with loudmouth alarm.

Product	Product Definition	Operating Temperature Range	Accuracy (Tmin to Tmax)	Sensor gain (Tmin to Tmax)	Supply Voltage Range	Quiescent Current (Tmin to Tmax)
LM34CZ LM34DZ	Output voltage linearity proportional to Fahrenheit temperature complement to LM35 family	–40°F to +230°F +32°F to +212°F	±3.0°F ±4.0°F	10mV/°F 10mV/°F	+5V to +30V +5V to +30V	159µA 159µA
LM35CAH LM35CZ LM35DH/DZ	Output voltage linearly proportional to Celsius temperature. Complements to LM34 family.	–40°C to +110°C –40°C to +110°C 0°C to +110°C	±1.0°C ±1.5°C ±2.0°C	10mV/°C 10mV/°C 10mV/°C	+4V to +30V +4V to +30V +4V to +30V	116µA 141µA 141µA
LM45CIM3	Low output impedance	–20°C to +100°C	±4.0°C	10mV/°C	+4V to +10V	160µA
LM50CIM3	Negative temperature output available from single supply.	–40°C to +125°C	±4.0°C	10mV/°C	+4.5V to +10V	180µA
LM60CIM3	Negative temperature reading	–40°C to +125°C	±2.0°C	6.25mV/°C	+2.7V to +10V	—
LM75CIM3 LM75CIM5	Integrated 9-bit Delta Sigma ADC. I^{2}C communication interface. Programmable temperature trip points.	–55°C to +125°C	±2.0°C	—	+3.0V to +5.5V	250µA



Order Code
597-351 (DG611DJ)
597-363 (DG612DJ)
597-375 (DG613DJ)

Features:

- Fast sample & hold
- Synchronous demodulators
- Pixel rate video switching
- Disk/tape drives
- DAC deglitching
- Switched capacitor filters
- GaAs FET drivers
- Satellite receivers

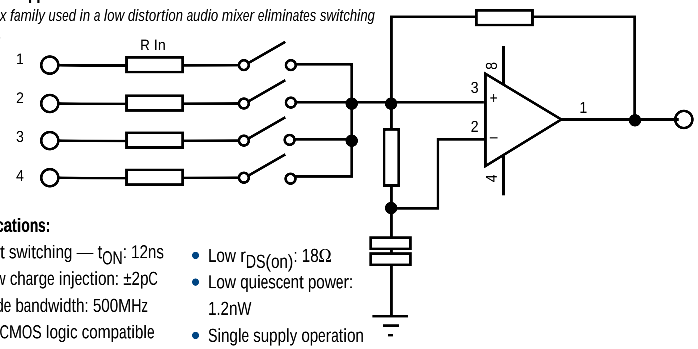
The TEMIC DG61/612/613 switches combine CMOS and DMOS technologies to produce extremely fast (12ns typical) low noise switches.

These characteristics can be used to good advantage when switching audio inputs at the summing junction of an op amp. It is of benefit to have the switches connected directly to the input of the op amp because the voltage swing and therefore any distortion due to resistance modulation is reduced when switching in to a virtual earth (0V).

The drawback of this configuration is that any charge injected into this node is amplified and can cause large output spikes. These switching spikes usually cause extremely low charge injection due to the very small values of capacitances inherent in DMOS technology. This virtually eliminates this type of switching noise completely and any remaining noise can be removed with a small snubbing filter.

Typical Applications:

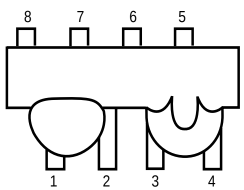
DG61x family used in a low distortion audio mixer eliminates switching noise.



Applications:

- Fast switching — t_{ON}: 12ns
- Low charge injection: ±2pC
- Wide bandwidth: 500MHz
- 5V CMOS logic compatible
- Low $r_{DS(on)}$: 18Ω
- Low quiescent power: 1.2nW
- Single supply operation

TFDS4000 IrDA Compatible Transceiver TEMIC



Order Code
941-864(TFDS4000)

Features:

- Compatible to IrDA standard
- SMD Sideview
- Low profile (height = 5.6mm)
- Low Power Consumption
- Microcomputer compatible
- Very few external components
- AGC for EMI Immunity
- Wide supply voltage range : 2.7V ~5.5V

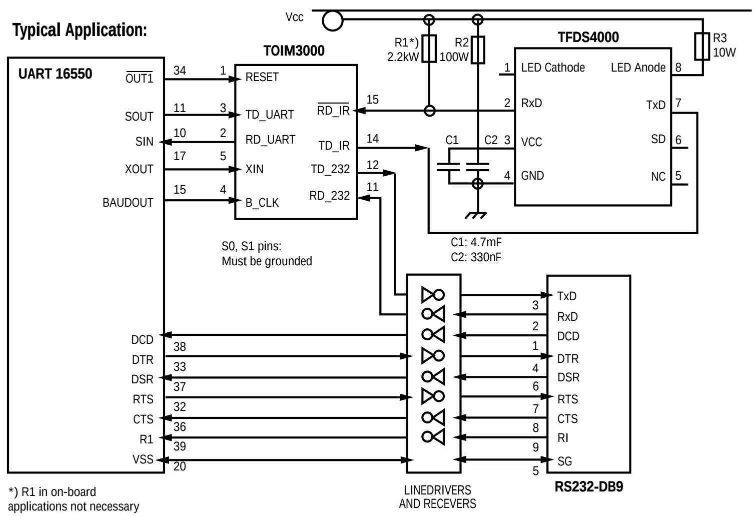
Applications:

- Personal Computer
- Printers
- Hand Held Terminal
- Cellular Phone
- Modem
- Fax Machine
- Personal digital Assistant

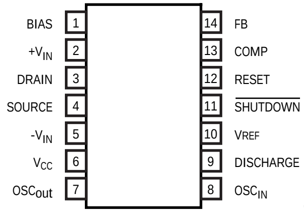
The TFDS4000 is an infrared transceiver for data communications systems. The transceiver is compatible to the IrDA standard which allows data rates up to 115kBaud and also supports SHARP AST-mode. An internal AGC (Automatic Gain Control) ensures proper operation under EMI conditions.

The output pin 8 can be connected by external resistor to an unregulated power supply. This will allow efficient serial drive capability for additional IREDs for high power applications.

Typical Application:



Si9104 High-Voltage Switchmode Regulator TEMIC



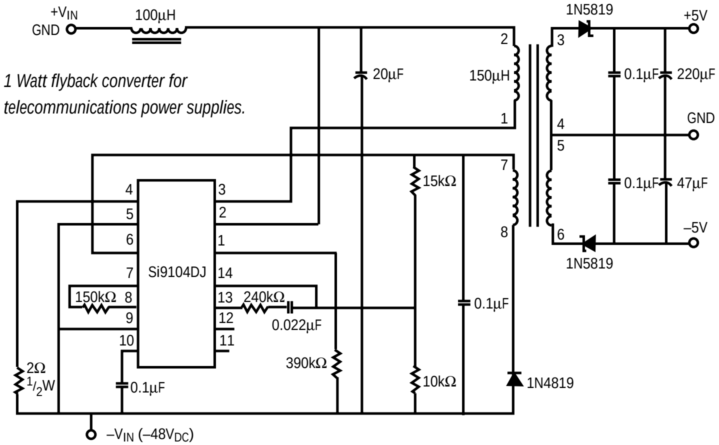
Order Code
705-263 (Si9104DJ)

Features:

- 10 to 20V input range
- Current-mode control
- On-chip 200V, 5Ω MOSFET switch
- Shutdown and reset
- High efficiency operation (>80%)
- Internal start-up circuit
- Internal Oscillator (1MHz)

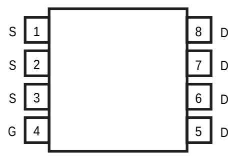
The Si9104 contains most of the components to implement a high-effiency DC/DC converter up to 3 Watts. It can be operated from a low-voltage dc supply or from a 10 to 20V unregulated dc power source due to low quiescent current of the device. With an appropriate transformer most single-ended isolated power converter topologies can be implemented; flyback and forward.

Typical Application:



1 Watt flyback converter for telecommunications power supplies.

Si9434DY P-Channel Enhancement-Mode MOSFET TEMIC



Order Code
663-773 (Si9434DY)

Features:

- High power dissipation
- Low profile
- Low $R_{DS(on)}$
- High current capability
- 5V and 3.3V logic input compatible

Applications:

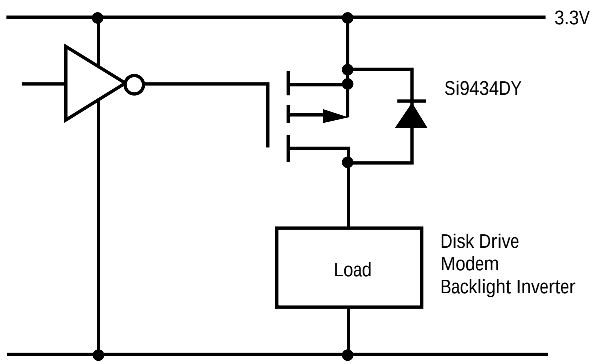
- Portable electronics power switching
- Battery back-up switching
- DC/DC conversion
- Load switching
- Motor drives
- Backlight inverter

Load switches help to save energy and extend battery life in multifunctional products, by closing down circuits not in use.

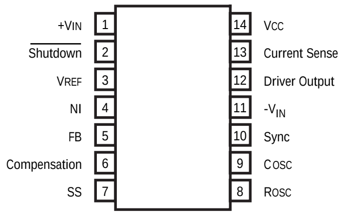
The p-channel Si9434DY in this application replaces expensive high-side driver IC and additional components used in an n-channel solution.

This simple solution offers greater system efficiency, reduced parts count, greater space saving and lower power consumption (up to 8 times less than typical high-side driver and n-channel combinations).

Typical Application:



Logic-compatible high-side switch.

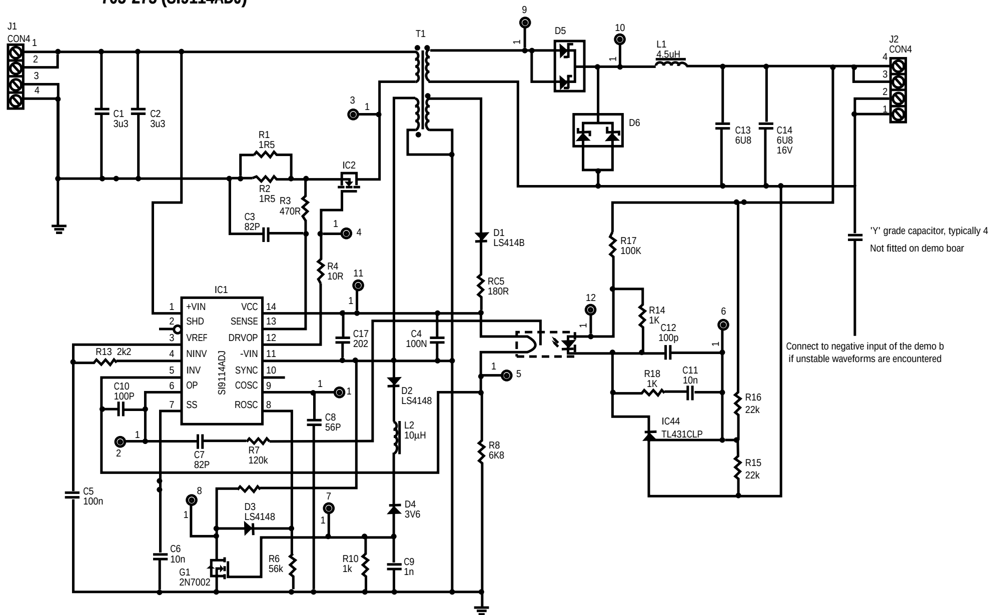


Order Code
705-275 (Si9114ADJ)

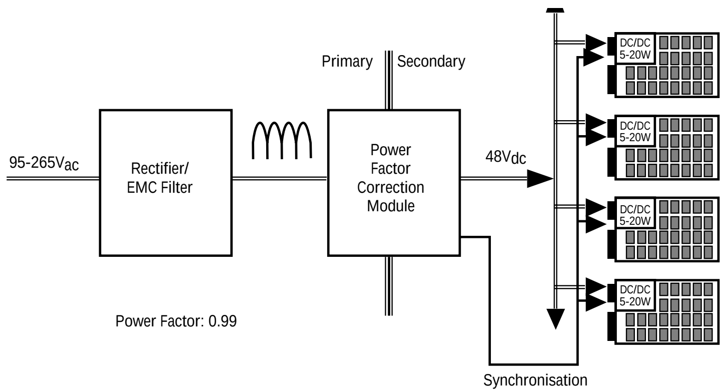
Features:

- Conventional, single ended DC/DC converter topologies
- Low power consumption
- Minimised delay times (65ns sync to O/P)
- Integrated high voltage (200V) start circuit
- Precision current limit threshold (±75mV)
- Soft start
- Current mode control

The Si9114A is a BiC/DMOS current controlled pulse width modulation (PWM) controller IC for high frequency DC/DC converters. Single ended topologies (forward and flyback) can be implemented at frequencies up to 1MHz. The oscillator has an internal divide-by-two that limits the duty ratio to 50%. An oscillator sync output allows converters to be synchronised in phase as well as in frequency, in a master/slave configuration.

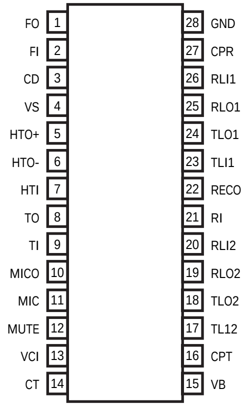


The Si9114A is ideal for use in Distributed Power Systems



Advantages of distributed power:

- Single 'safe' d.c. voltage within system
- System upgrades without PSU redesign
- Improved local load regulation
- Reduced short circuit currents
- Increased reliability
- 'Hot' plug-in: No system downtime
- Smaller energy storage components (high switching frequency)



Order Code
704-957 (U4082BA)

The U4082B incorporates numerous functions including amplifiers, level detectors, transmit and receive attenuators, background noise monitors, chip disable, dial tone detector and mute function. It can operate by low supply or via telephone line requiring 5.5mA typically. It also features standalone operation or in conjunction with a handset speech network.

The fundamental difference between speakerphone and handset operation is that of half or full duplex. The handset carries conversation in both directions simultaneously, hence full duplex. The gain levels are low enough not to cause oscillatory problems and coupling from earpiece to microphone. To date one solution has been to operate on a half duplex where one person speaks while the other listens. The circuit detects who is talking and switches appropriately maintaining loop gain under unity. To eliminate ‘push to talk’ process speech level detectors are used here to provide hands-free operation.

In the circuit shown, two level detectors are at transmit and two at receive end. The terms in parenthesis form one system and the other terms form the second system. Each level detector has a diode network in the feedback path allowing for non-linear gain, permitting operation under a wide dynamic range of speech levels. The sensitivity of each level detector is determind by resistor/capacitor at each input.

Another key feature of this device is the monitoring of background noise. Speech consists of bursts whereas background noise is relatively constant signal level. The device has two background noise monitors which monitor the noise by storing representative voltage of the noise levels. When speech is present it causes the comparator output to change which is sensed by the attenuator control block.

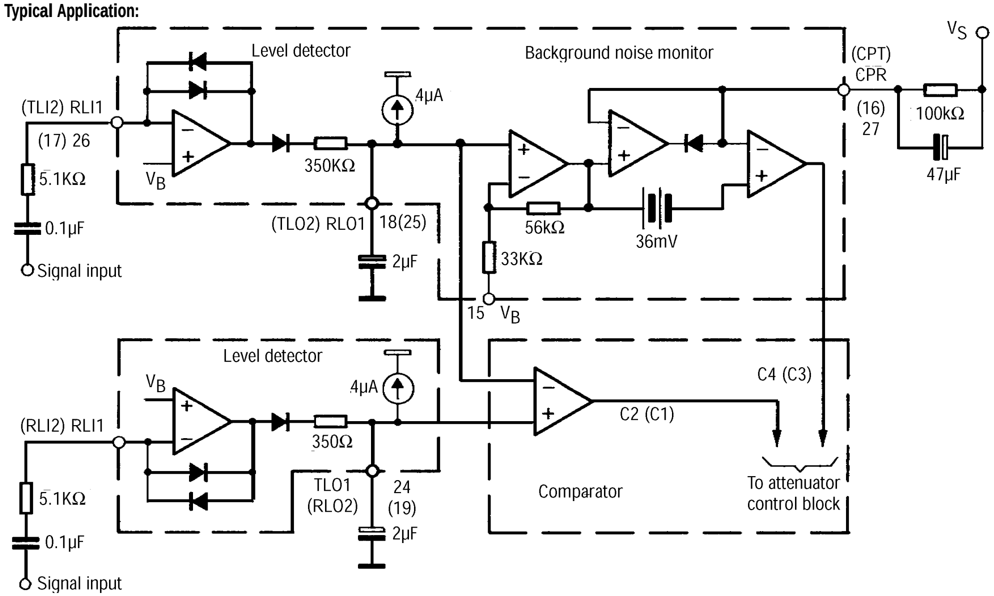
Features:

- Low voltage operation: 3.0 to 6.5V
- Attenuator gain range between transmit and receive: 52dB
- Four point signal sensing for improved sensitivity
- Monitoring system for background noise level
- Microphone amplifier gain adjustable
- Mute function
- Chip disable for active/standby operation
- On board filter
- Dial tone detector

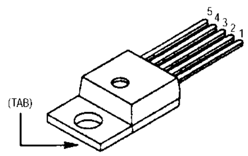
Applications:

- Hands-free operation in:
  Telephones
  Intercom systems
  Household
  Business use
  Car telephones

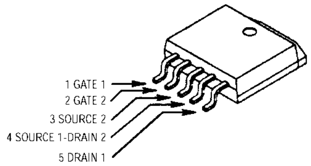
Typical Application:



Level detectors/background noise monitor



Order Code
786-809 (HIP2060AS1)

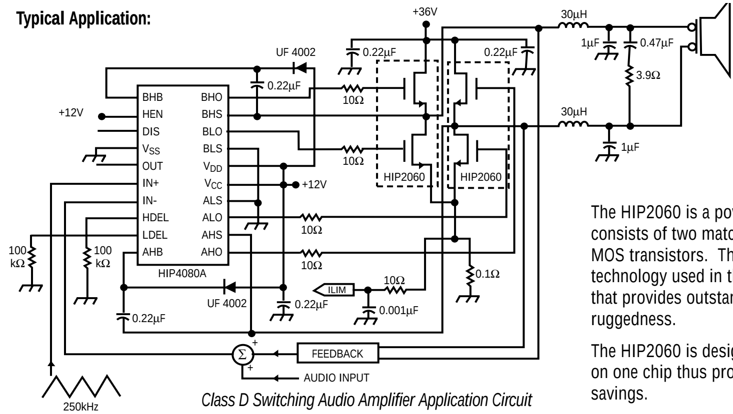


Order Code
786-810 (HIP2060AS2)

Features:

- Two 10A Power MOS N-channel transistor
- Output voltage to 60V
- $r_{DS(ON)}$ 0.125Ω max. per transistor at V_{GS} =15V
- $r_{DS(ON)}$ 0.15Ω max. per transistor at V_{GS} =10V
- Pulsed current : 25A/transistor
- Avalanche energy : 100mJ/transistor
- Grounded tab eliminates heat sink isolation

Typical Application:



Class D Switching Audio Amplifier Application Circuit

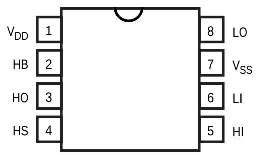
Applications:

- Motor controls
- Uninterruptible power supplies
- Switch mode power supplies
- Voice coil motors
- Class D power amplifiers

The HIP2060 is a power half-bridge MOSFET array that consists of two matched N-channel enhancement-mode MOS transistors. The advanced Harris PASIC2 process technology utilises efficient geometry that provides outstanding device performance and ruggedness.

The HIP2060 is designed to integrate two power devices on one chip thus providing board layout area and heatsink savings.

HIP2100 High Frequency, Half-Bridge Driver 100V, 2A Peak HARRIS



Order Code
786-822 (HIP2100IP)

The HIP2100IP is a high frequency, 100V half-bridge N-channel MOSFET driver IC. The low-side and high-side gate drivers are independently controlled and matched to 5ns. This gives the user maximum flexibility in dead-time selection and driver protocol. Undervoltage protection on both the low-side and high-side supplies force the outputs low. An on-chip diode eliminates the discrete diode required with other driver ICs. A new level-shifter topology yields the low-power benefits of pulsed operation with the safety of DC operation. On this device the high-side output returns to its correct state after a momentary undervoltage of the high-side supply.

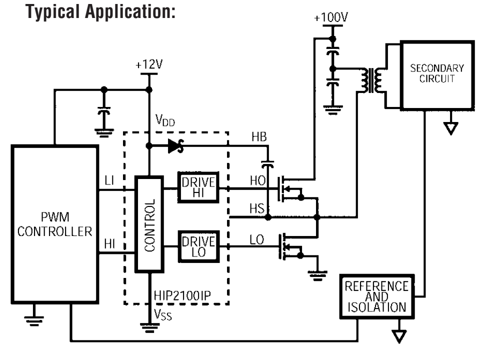
Features:

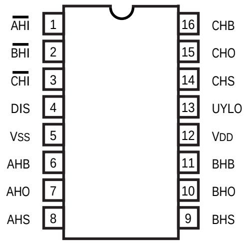
- Drives N-channel MOSFET half bridge
- Bootstrap supply max. voltage to 116Vdc
- On-chip bootstrap diode
- Fast propagation times needed for multi-MHz circuits
- Drives 1000pF load at 1MHz with rise and fall times of typically 10ns
- CMOS input thresholds for improved noise immunity
- Independent inputs for non-half-bridge topologies
- No start-up problems
- Outputs unaffected by supply glitches, HS ringing below ground, or HS slewing at high dv/dt
- Low power consumption
- Wide supply range
- Supply undervoltage protection
- 2Ω output resistance

Applications:

- Telecom half-bridge power supplies
- Avionic DC/DC converters
- Two-switch forward converters
- Active clamp forward converters

Typical Application:



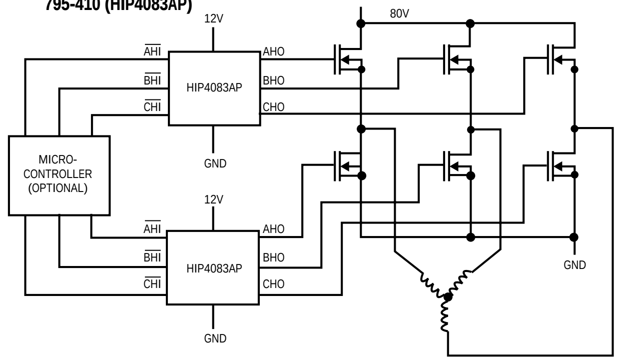


Order Code
795-410 (HIP4083AP)

Features:

- Independently drives three high side N-channel MOSFETs in three phase bridge configuration
- Bootstrap supply max. voltage to 95Vdc
- Bias supply operation from 7V to 15V
- Drives 1000pF load with typical rise times of 35ns and fall times of 30ns
- CMOS/TTL compatible inputs
- Programmable undervoltage protection

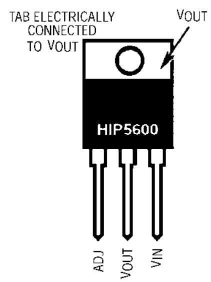
Typical Application:



Applications:

- Brushless motors
- High side switches
- AC motor drives
- Switched reluctance motor drives

The HIP4083 is specifically targeted for PWM motor control. Two HIP4083 may be used together for 3 phase full-bridge applications (see block diagram). Alternatively, the lower gates may be controlled directly from a buffered microprocessor output. This device has no built-in turn-on delay. Each output (AHO, BHO and CHO) will turn-on 65ns after its input is switched low. Likewise, each output will turn-off 60ns after its input is switched high. Very short and very long dead times are possible when two HIP4083s are used to drive a full bridge. This dead time is controlled by the input signal timing.
The HIP4083 has reduced drive current making it ideal for low to moderate power applications and is optimised for applications where size and cost are important.



Order Code
505-031 (HIP5600IS)

Features:

- Operates from $50V_{DC}$ to $400V_{DC}$
- Operates from $50V_{RMS}$ to $280V_{RMS}$ line.
- UL recognised
- Variable DC output voltage $1.2V_{DC}$ to V_{IN} -50
- Internal thermal shutdown protection
- Internal over current protection

- Up to 40mA peak output current
- Surge rated to ±650V; meets IEEE/ANSI C62.41.1980

Applications:

- Switch mode power supply start-up
- Electronically communicated motor housekeeping supply
- Power supply for simple industrial/commercial /consumer equipment controls
- Off-line (Buck) switch mode power supply

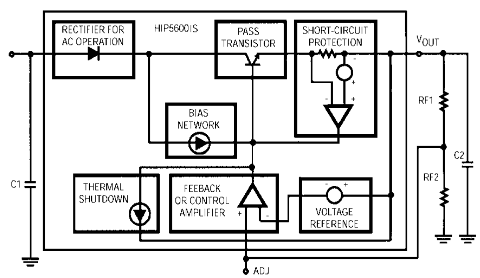
The HIP5600 is an adjustable high voltage, 3-terminal positive linear voltage regulator which is capable of sourcing 1mA to 30mA with proper heat sinking.

Protection is provided by the on chip thermal shutdown and output current limiting circuitry. The HIP5600IS has a unique advantage over other high voltage linear regulators due to its ability to withstand input to output voltages as high as 400V(peak), a condition that could exist under output short circuit conditions.

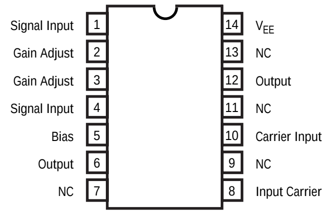
Common linear regulator configurations can be implemented as well as AC/DC conversion and start-up circuits for switch mode power supplies. The HIP5600 requires a minimum output capacitor of 10µF for stability of the output and may require a 0.02µF input decoupling capacitor depending on the source impedance. It also requires a minimum load current of 1mA to maintain output voltage regulation.

All protection circuitry remains fully functional even if the adjustment terminal is disconnected. However, if this happens the output voltage will approach the input voltage.

Typical Application:



MC1496 Balanced Modulator/Demodulator



Order Code
792-962 (MC1496P)

Features:

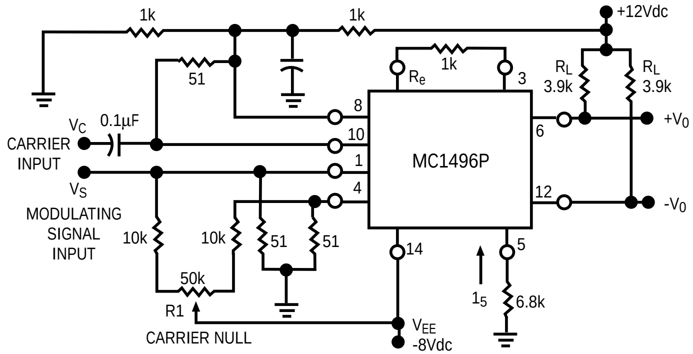
- Excellent carrier suppression :
  65dB typ. @ 0.5MHz
  50dB typ. @ 10MHz
- Adjustable gain and signal handling
- Balanced inputs and outputs
- High common mode rejection :
  85dB typ.

Applications:

- Suppressed carrier and amplitude modulation
- Synchronous detection
- FM detection
- Chopper applications

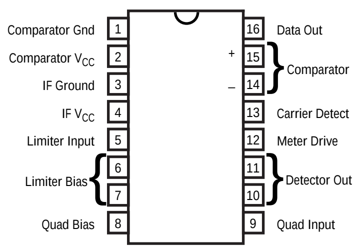
The MC1496 monolithic balanced modulator is a versatile HF communications building block. It functions as a broadband, double-sideband suppressed-carrier balanced modulator without the need for transformers or tuned circuits. This device was designed for use where the output voltage is a product of an input voltage (signal) and a switching function (carrier).

Typical Application:



Balanced Modulator/Demodulator

MC13055 Wideband FSK Receiver



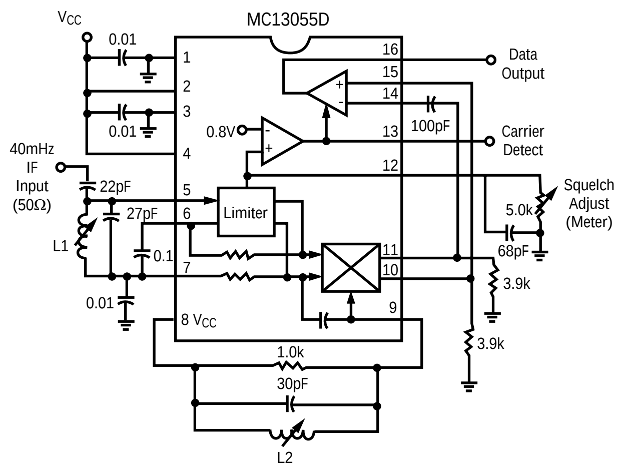
Order Code
793-061 (MC13055D)

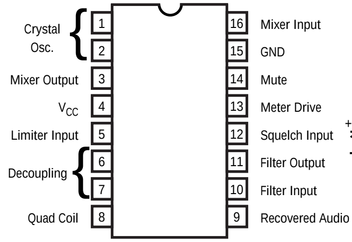
Features:

- Input sensitivity 20µV @ 40MHz
- Signal strength indicator linear over 3 decades
- Easy applications, few peripheral components

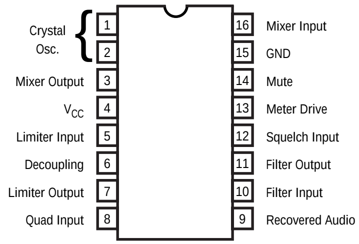
The MC13055 is intended for RF data link systems using carrier frequencies up to 40MHz and FSK (Frequency Shift Keying) data rates up to 2.0M Baud (1.0MHz). This design is similar to the MC3356, except that it does not include the oscillator/mixer. The IF bandwidth has been increased and the detector output has been revised to a balanced configuration. The received signal strength metering circuit has been retained, as has the versatile data slicer/comparator.

Typical Application:



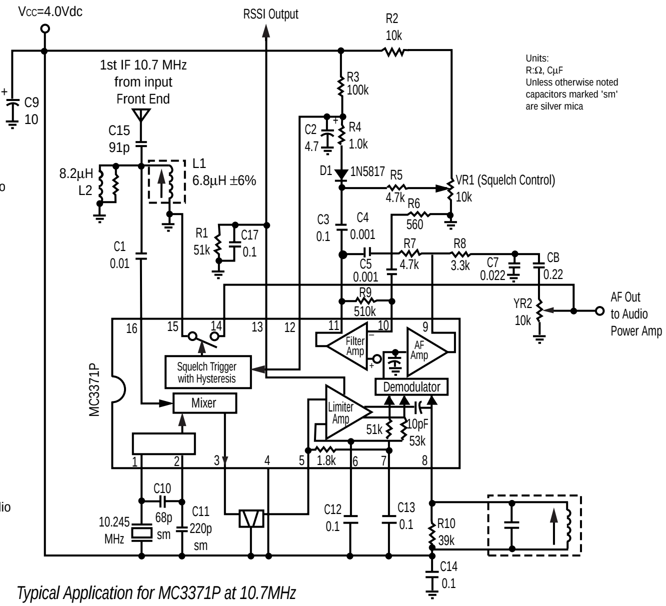


Order Code
793-358 (MC3371P)



Order Code
793-360 (MC3372P)

Typical Application:

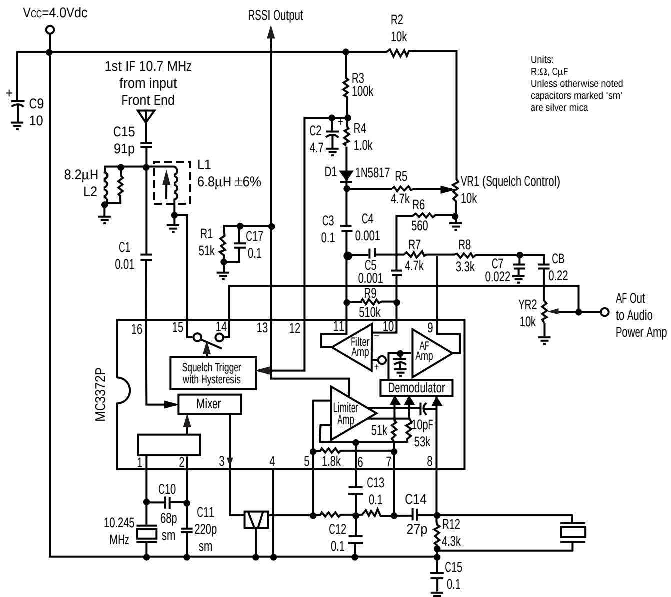


Typical Application for MC3371P at 10.7MHz

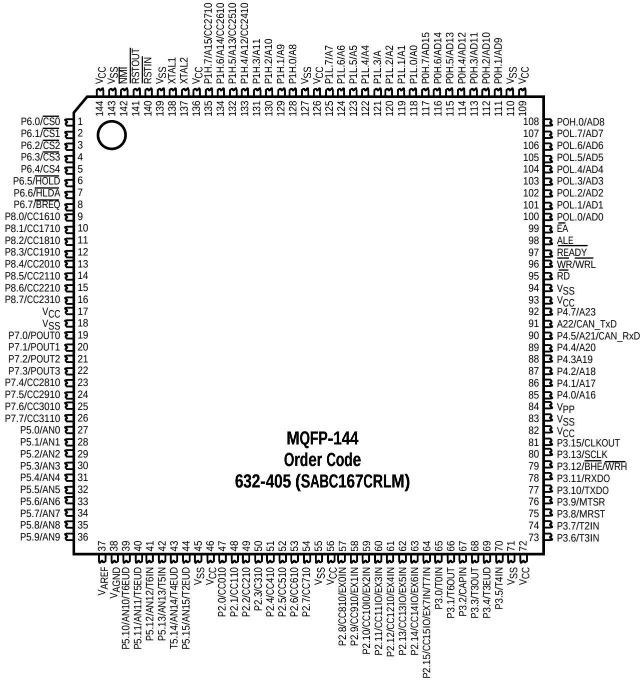
Features:

- Wide operating supply voltage range :V_{CC} = 2.0 to 9.0V
- Input limiting voltage sensitivity of -3.0dB
- Low drain current : I_{CC} = 3.2mA, @ V_{CC} = 4.0V, squelch off
- Minimal drain current increase when squelched
- Signal starength indicator : 60dB dynamic range
- Mixer operating frequency up to 100MHz
- Fewer external parts required than earlier devices

The MC3371 and MC3372 perform single conversion FM reception and consist of an oscillator, mixer, limiting IF amplifier, quadrature discriminator, active filter, squelch switch and meter drive circuitry. These devices are designed for use in FM dual conversion communications equipment. The MC3371 is designed for the use of parallel LC components, while the MC3372 is designed for use with either a 455 kHz ceramic discriminator or parallel LC components.



Typical Application for MC3372P at 10.7MHz

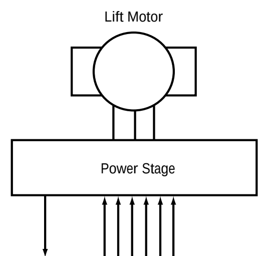


The SABC167CRLM is a high end member of the Siemens C166 family of 16 bit microcontrollers designed to provided ultra high real time performance. The C166 Processing Core executes most instructions in a single instruction cycle (100ns at 20MHz CPU clock). A high speed divide and multiply unit provides multiplication (16 bit by 16 bit) in 500ns and division (32 bit by 16 bit)in 1µs. To even further enhance real time performance the C166 family incorporates a fast and flexible interrupt system. This interrupt system provides 16 levels of interrupt priotity with a typical interrupt response time of 400ns and a context switch time of 100ns. In addition an 8 channel peripheral event controller can be used to implement a DMA function (by cycle stealing) and thereby relieve the CPU of repetitive interrupt overhead.

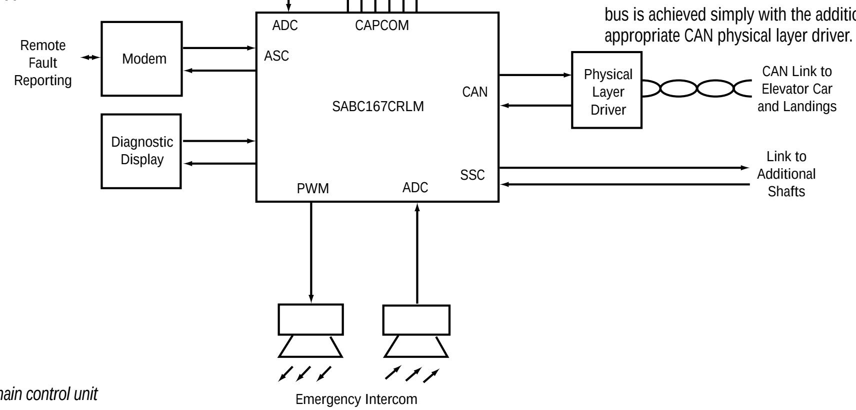
The SABC167CRLM provides 4k bytes of on-chip high speed RAM, a 1K byte special function register area and integral chip select hardware (5 channels) which allows configuration of the external memory map for multiple memory/peripheral speeds and bus configuration (mux/demux and 8-/16-bit). An on-chip bootstrap loader facilitates in-situ system programming (FLASH memories etc.). The SABC167CRLM includes an extensive set of peripherals in addition to the standard C166 family peripheral set (asynchronous and synchronous serial channels, 5 timers etc.). The device features a fast and accurate 16 channel 10-bit A to D converter (9.7µs conversion ±2 LSB TUE), 32 capture compare channels, 4 PWM channels (with 50ns resolution), oscillator watchdog, watchdog timer and CAN module. The CAN module is a ‘Full Can’ module providing 15 message objects to allow a high degree of decoupling from the CPU. It supports CAN version 2.0 part B (both 11 and 29-bit identifiers) at all data rates up to the maximum data rate of 1 Mbit/s. Connection to the CAN bus is achieved simply with the addition of the appropriate CAN physical layer driver.

Features:

- Ultra high performance
- Fast and flexibile interrupt system
- 4K byte on-chip high speed RAM
- Embedded programmable chip selects
- Extensive peripheral set
- V2.0B full CAN module



Typical Application:

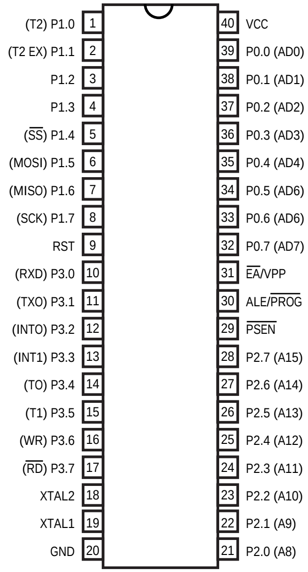


Elevator main control unit

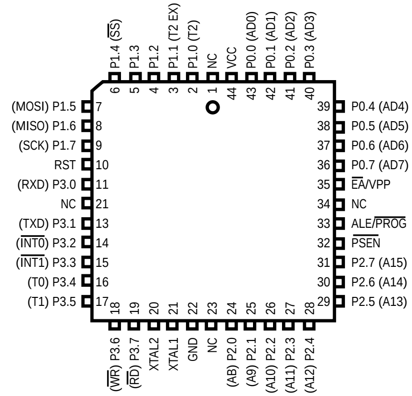
The MICRO-ISP Programmer System (795-239) features include:

- Connects to parallel port
- No power supply required
- Windows based software
- 8051 socket stealer module
- 89S8252 microcontroller
- Atmel CD-ROM Databook

Supports ATMEL microcontrollers: AT89S8252-24PC (795-392) and AT89S8252-24JC (795-409)



795-392 (AT8958252-24PC)



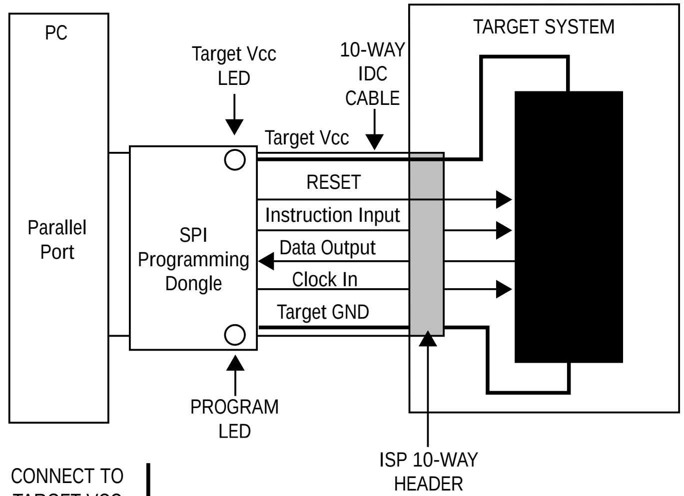
795-409 (AT8958252-24JC)

Why use an In-System Programmable (ISP) Microcontroller?

An ISP microcontroller, such as those in the Atmel 89S and 90S families, can be soldered directly to the user target socket and serially re-programmed *in-system* with no need to ever remove the device from the socket. With In-System Programming (ISP), data is transferred one bit at a time, via a serial link, to the target device. Obviously, this will be slower than a parallel transfer, but the hardware requirements are considerably less, and other advantages are gained, as shown in the table below.

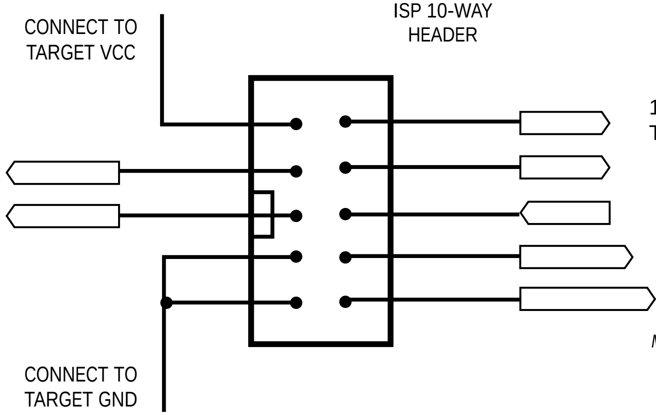
	PARALLEL MODE	SERIAL MODE (ISP)
Programming speed (CODE+DATA)	FAST: Typically <15 secs	SLOW: Typically 30–40 secs
Programmer Flexibility	Remove device from socket	Solder device to board and use ISP
Programmer device support	Supports many devices	Only supports 89S, 90S and some serial EEPROM devices
Programmer cost	More expensive than SERIAL	Less expensive than Parallel
Device reliability	Less reliable as device is continually stressed when removed from socket	Very reliable as device does not physically move
Commission device during production?	No – all devices would have to be programmed before insertion into assembled PCB	Yes – The latest code revision can be downloaded 'just-in-time' during production
Update code during production due to a last-minute bug?	Very difficult – All devices would have to be removed from their sockets, re-programmed and then re-inserted.	Straightforward – Each unit is simply re-programmed again via the ISP header with no need to remove the device from the socket.
Program device with production line test parameters for unit under test? e.g. Calibration data	Not possible – Need to store parameters in external EEPROM	Parameters can be programmed either into the FLASH or EEPROM areas at time of test
Best used for:	Code development stage – Use in conjunction with Equinox AD-ICR-51 'parallel' in-circuit re-programmable adapter. This allows for fast code download and enhanced debugging facilities	High Volume Production Environments Products which require frequent code updates

The MICRO-ISP Programmer



The MICRO-ISP is a dedicated programmer capable of transferring data serially to/from an ISP microcontroller. Enclosed in a PC dongle case, it connects directly to any standard PC parallel port. A 10-way ribbon cable connects the programmer to the user target system, as shown in figures below.

MICRO-ISP Programming Configuration Connection Details



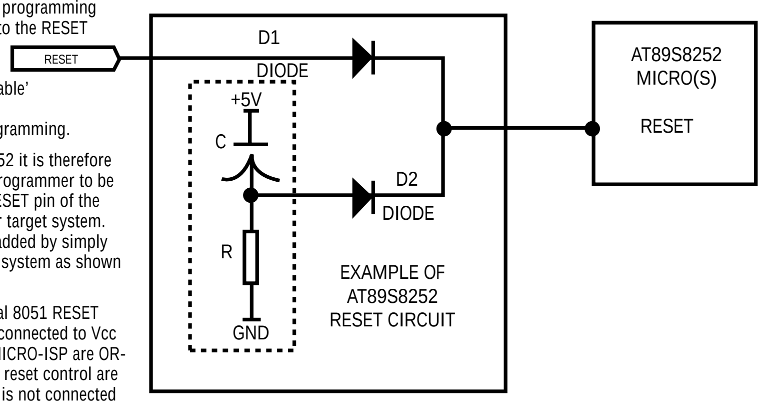
MICRO-ISP Target System

Control of the microcontroller RESET (RST) pin

The 89S8252 is placed in serial programming mode by applying a high (Vcc) to the RESET (RST) pin of the device for a period of >10 ms. At this point the SPI 'Programming Enable' command must be sent to initiate actual serial programming.

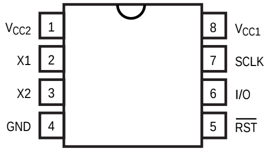
To implement ISP of the 89S8252 it is therefore necessary for the MICRO-ISP programmer to be able to externally control the RESET pin of the device when in place in the user target system. This functionality can often be added by simply adding two diodes to the target system as shown in figure below.

The RESET outputs of the typical 8051 RESET circuit (made up of a capacitor connected to Vcc and a resistor to ground) and MICRO-ISP are OR-d together so that both types of reset control are possible. When the MICRO-ISP is not connected to the target system, only the target system RESET circuit has any effect.

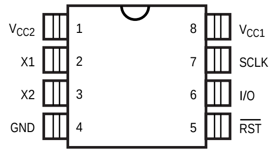


A suitable Reset Circuit for use with the MICRO-ISP and AT89S8252

DS1302 Trickle Charge Timekeeping Chip DALLAS



Order Code
787-115 (DS1302)



Order Code
SOIC
787-127 (DS1302Z)

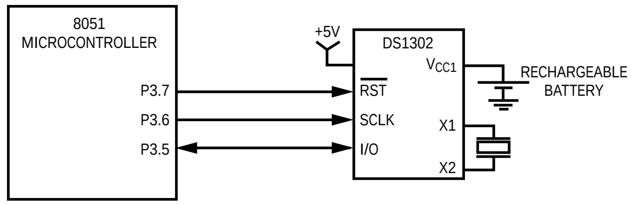
Features:

- Real time clock counts from secs to years with leap year compensation
- 31 x 8 RAM for scratchpad data storage
- Serial I/O for minimum pin count
- 2.5 to 5.5V full operation
- Uses less than 300nA at 2.5V
- Single-byte or multiple-byte data transfer for read/write of clock/RAM data
- Simple 3-wire interface
- TLL-compatible (Vcc=5V)

In the example shown, DS1302 is interfaced with an 8051 microcontroller. Each of the three lines from the DS1302 is connected to the bi-directional P3 bus of the 8051. This configuration can be used for any of the Dallas Semiconductor 3-wire interface devices. Here the DS1302 has its trickle charge circuit enabled and is being backed up by a rechargeable battery, which could also be replaced by a super cap (~1F). If the trickle charge circuit is disabled, the device can be backed up with a 3V lithium battery.

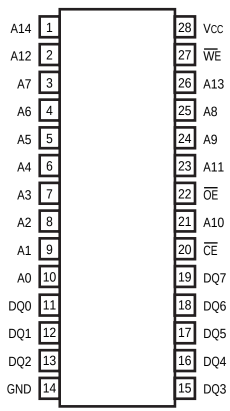
The DS1302 communicates with a microprocessor via a serial interface and requires only 3-wires to communicate with the clock/RAM. Data can be transferred to and from the clock/RAM one byte at a time or in a burst of up to 31 bytes. It is designed to operate on very low power and retain data/clock information on less than 1 microwatt. The DS1302 is the programmable trickle charger for Vcc1, and seven additional bytes of scratchpad memory.

Typical Application:



Interfacing an 8051 microcontroller with a DS1302

DS1644 Non-volatile Timekeeping RAM DALLAS



Order Code
787-164 (DS1644-120)

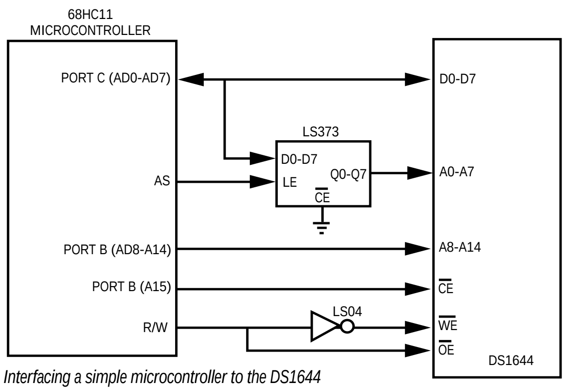
Features:

- Upward compatibile with the DS1643 timekeeping RAM
- Integrated NV SRAM, real time clock, crystal power fail control circuit and lithium energy source
- Standard JEDEC bytewide 32k x 8 Static RAM pinout
- Totally non-volatile with over 10 years of operation in the absence of power
- Quartz accuracy ±1 minute a month @ 25°C
- BCD coded year, month, date, day, hours, minutes and seconds
- Power fail write protection allows for ±10% Vcc power supply tolerance

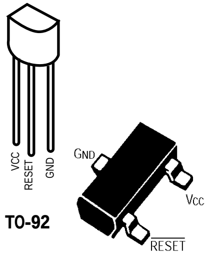
The DS1644 can substitute ROM, EPROM and EEPROM providing read/write non-volatility and additionally real time clock function with the real time information residing in the uppermost RAM locations. The RTC clock registers are double buffered to avoid incorrect access of data.

In the example shown, the DS1644 interfaces with a microcontroller. Multiplexed port C of the 64HC11 is used to provide both the output of eight LSDs of memory address and input/output of the data byte from the desired memory location. Port B of the 68HC11 is used to provide the 7MSBs of memory address. With this arrangement, the 68HC11 has direct access to 32K bytes of non-volatile RAM and a real time clock.

Typical Application:



Interfacing a simple microcontroller to the DS1644



TO-92 SOT-23

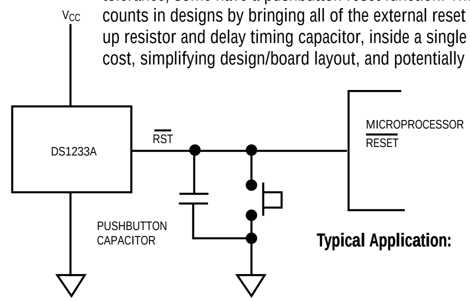
Mfrts. No. Order Code	DS1233 563-330	DS1233A-10 795-847	DS1233M-5 795-859	DS1810-10 795-896	DS1810R-10 795-902
5.0V Operation	✓		✓	✓	✓
3.3V Operation		✓	✓		
Power Fail Detect	✓	✓	✓	✓	✓
Pushbutton Reset	✓	✓			
Active Low Reset	✓	✓	✓	✓	✓
Package Type	3/TO-92	3/TO-92	3/TO-92	3/TO-92	3/SOT-23

EconoReset Selection Guide

The simplest of Dallas Semiconductor's CPU supervisors are the EconoResets. These generally output a reset when voltages are out of tolerance; some have a pushbutton reset function. They reduce component counts in designs by bringing all of the external reset components, i.e. pull-up resistor and delay timing capacitor, inside a single package, thus reducing cost, simplifying design/board layout, and potentially improving reliability.

Features:

- Automatically restarts microprocessor after power failure
- Monitors pushbutton for external override
- Internal circuitry debounces pushbutton switch
- Maintains reset for 350ms after Vcc returns to an in-tolerance condition or pushbutton released
- Reduces need for discrete components
- Precision temperature-compensated voltage reference and voltage sensor
- Internal 5K pull-up resistor
- Operating temperature of –40°C to +85°C



Typical Application:

Micromonitors

MicroMonitor Selection Guide

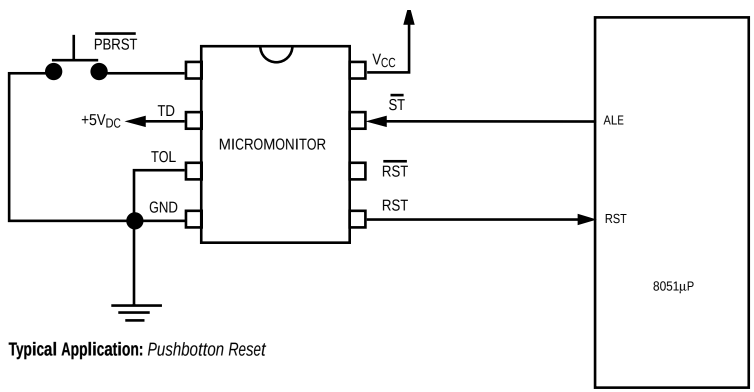
Mfrts. No. Order Code	DS1231-20 391-372	DS1232 391-384	DS1232LP 526-204	DS1705EPA 795-860	DS1706EPA 795-872	DS1707EPA 795-884
5.0V operation	✓	✓	✓	✓	✓	✓
3.3V operation						
Power fail detect	✓	✓	✓	✓	✓	✓
Pushbutton reset		✓	✓	✓	✓	✓
Referenced comparator	✓			✓	✓	✓
Watchdog timer		✓	✓	✓	✓	
Active high reset	✓	✓	✓			✓
Active low reset	✓	✓	✓	✓	✓	✓

Micromonitors by Dallas Semiconductor include a variety, as tabulated below, as well as the original industry standard and popular DS1232. These devices perform the same functions as the EconoResets but have additional functions such as watchdogs and voltage sense inputs to monitor power upstream from the actual device. Reliability is improved by closer monitoring processors and system functions by these devices.

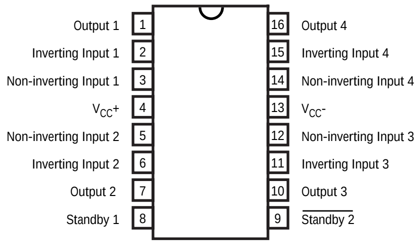
The DS1705/6/7 are function and pin-compatible with the Maxim MAX705/6/7.

The MicroMonitors perform three vital functions for microprocessors:

- Monitoring status of power supply, Vcc
- Pushbutton reset button
- Watchdog timer



Typical Application: *Pushbotton Reset*



Order Code
787-346 (TSH94IN)

Features:

- 2 Separate standby: Reduced consumption and high impedance outputs
- Low supply current: 4.5mA/amp. typical
- High speed: 150MHz – 110V/µs
- Unity gain stability
- Low offset voltage: 3mV
- Low noise 4.2nV/√HZ
- Specified for 600Ω and 150Ω loads
- High video performances:
  differential gain: 0.03%
  differential phase: 0.07°
  gain Flatness: 6MHz, 0.1dB max. @ 10dB Gain
- High audio performances

Sample and hold using TSH94:

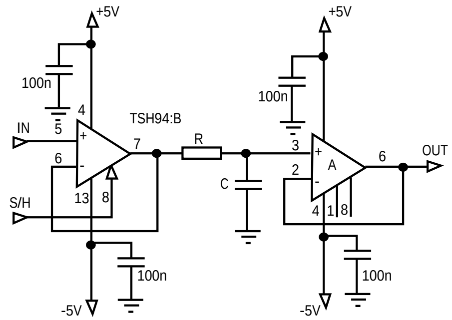
The TSH94 in follower drives a tank capacitor and goes in high impedance state on logic threshold signal on standby pin. The output voltage then remains at the capacitor charge level. It is followed with a high impedance buffer to allow voltage reading without discharging the capacitor.

The only external components required are a resistor, the sampling capacitor and the decoupling capacitors.

C is the tank capacitor that must remain charged at constant voltage between two samples. The accuracy and the bandwidth depend on its value.

As the input current of A is 2pA typ. and the leakage current of the TSH94 output and inverting input in standby mode is less than 20pA. It is possible to reach long hold time with small capacitor size.

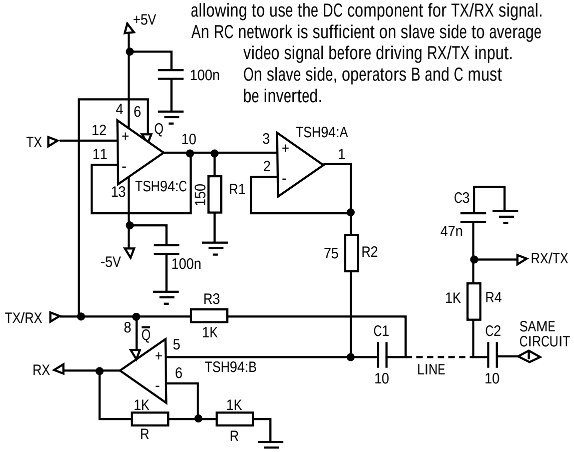
R resistor is used to prevent the TSH94 from oscillating when using large C capacitor. A 10Ω value allows to drive any capacitor without oscillating.



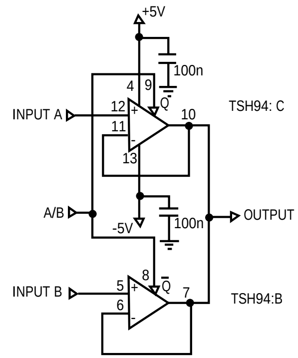
Video Line Transceiver with Remote Control:
Two operational amplifiers are used for transmission as followers. TSH94:C is a switch, to have on TSH94:A input the TX signal during transmission, and a ground in reception. Thus, output of TSH94:A drive the line in transmission and shows a virtual ground in reception allowing good impedance matching at cable end.

In reception, TSH94:B is a +2 amplifier to compensate the necessary voltage loss due to impedance matching resistors.

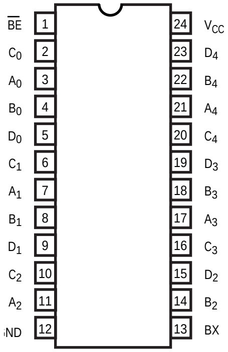
The remote control is achieved using a coupling capacitor on each line side, allowing to use the DC component for TX/RX signal. An RC network is sufficient on slave side to average video signal before driving RX/TX input. On slave side, operators B and C must be inverted.



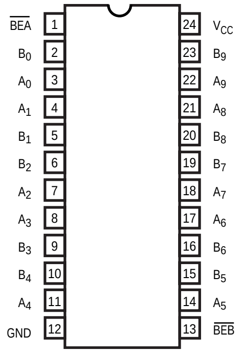
Signal multiplexing:



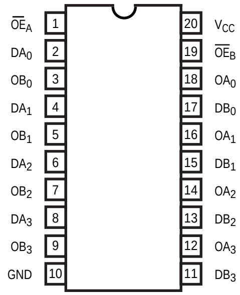
The operational amplifiers are used as followers, outputs and standby pins are connected together forming a very simple circuit. The only external components are the supply decoupling capacitors.



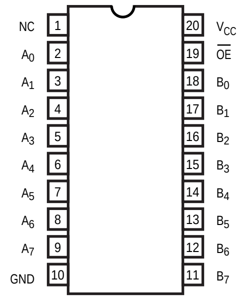
Order Code
787-887
(IDT74FST3383SO)



Order Code
787-899
(IDT74FST3384SO)



Order Code
787-863
(IDT74FST3244SO)

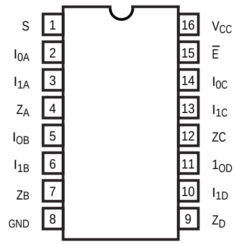


Order Code
787-875
(IDT74FST3245SO)

IDT Bus Switch Applications

IDT Bus switch devices have many applications in digital systems. Internal construction is an enhanced mode N-FET which is on when the gate is sufficiently forward biased. They provide a "Zero delay" between input and output. In the off state the input capacitance is very low, typically Ci=4pF. With a low on resistance of 5Ω between drain and source and a low noise 28Ω version available, they are suitable for a variety of applications.

Bus switches are suitable for hot insertion into rack systems, mobile communications products, laptop accessories and PCMCIA cards. There are no parasitic diodes to Vcc or Gnd from either inputs or outputs.

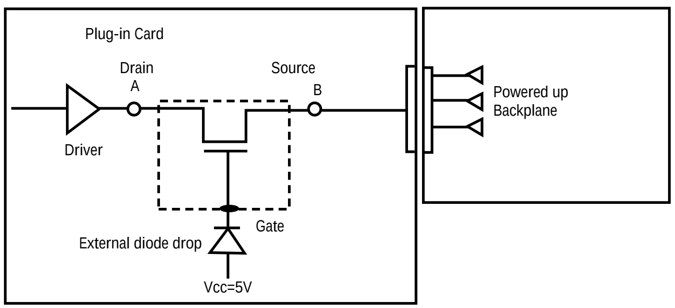


Order Code
787-905
(IDT74FST3257SO)

Features:

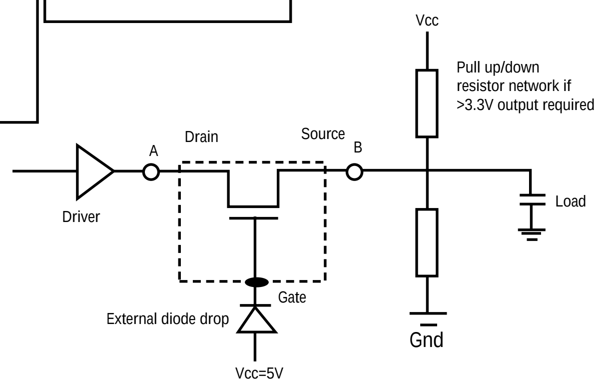
- Zero delay paths
- Low switch on-resistance
- TTL-compatible input and output levels
- ESD>200V per MIL-STD-883

Bus switches connect or isolate two-ports without any inherent current sink or source thereby generating little or no noise while providing a low resistance path for an external driver.

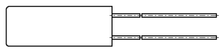


Heavily loaded lines can be isolated using a Bus switch which has two advantages. Firstly the rise times can be improved, and secondly a lower drive buffering system can be implemented, saving cost and improving EMC characteristics.

Bi-directional voltage conversion from 5V to 3.3V is easily implemented using a Bus switch and an external diode.



3x6mm Watch Crystal



Order Code
569-914

Features:
- Compact design with excellent characteristics of AT-cut fundamental crystal
- Excellent shock resistance
- High stability assured with tight vacuum sealing

Applications:
- Microprocessor systems
- Telecommunications
- Consumer electronics
- Automotive electronics

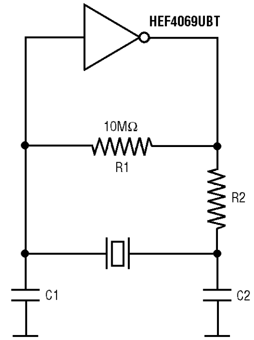
The circuit shown is typical for a watch crystal, 32.768kHz. The values for the components are given but some precaution should be taken, such as:

$R_1 \cong 10M\Omega$ otherwise hard to oscillate when too low

Max. drive levels: 10mW

This circuit is difficult to realize using transistors and a linear IC circuit results in a too high a drive level which could damage the crystal element. CMOS ICs are therefore used provided the power supply voltage is around 5 Volts.

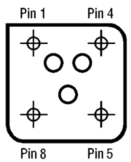
Typical Application:



Oscillation Circuit for Wrist Watches

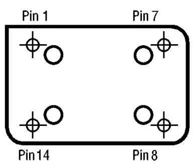
Freq. Range (kHz)	R_2 (kΩ)
16-25	1000
25-35	470
35-60	220

8/14 Pin DIL Crystal Clock Oscillator Modules



8-pin DIL
(bottom view)

Order Code
788-491 (20MHz)



14-pin DIL
(bottom view)

Order Code
788-296 (20MHz)

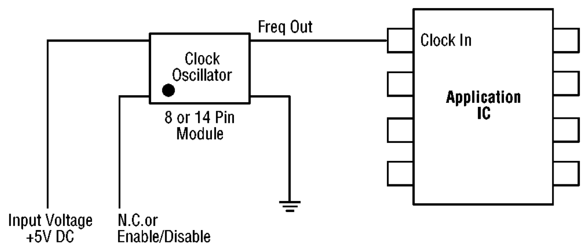
Pin Connections

8-Pin	**14-Pin**	
Pin 1	Pin 1	N.C. (Enable/disable)
Pin 4	Pin 7	Ground
Pin 5	Pin 8	O/P
Pin 8	Pin 14	+V DC

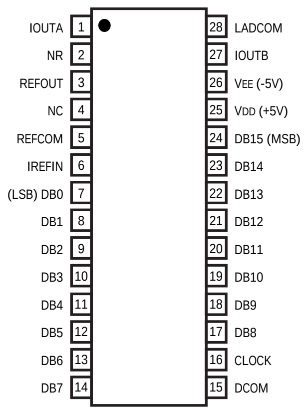
Applications:
- Microprocessor systems
- P.C.
- Network systems
- Instrumentation

The Crystal Clock Oscillator provides a TTL/HCMOS compatible square-wave output signal. Requiring only a +5V DC voltage supply it gives a modular approach to clock signal provision. Current consumption is typically 30mA with an absolute maximum rise/fall time of 10ns and duty cycle of 45:55. Frequency stability is a maximum of 100ppm overall. The device consists of a thick film substrate containing the oscillator circuitry, and a quartz crystal providing the frequency source.

Typical Application:



AD768 16-Bit, 30MPS D/A Convertor ANALOG DEVICES



Order Code
789-446 (AD768AR)

Features:

- 30MSPS update rate
- 16-bit resolution
- Linearity: ½ LSB DNL @ 14 bits
  1 LSB INL @ 14 bits
- Fast Settling: 25ns full-scale settling to 0.025%
- SFDR @ 1MHz output: 86dBc
- THD @ 1MHz output: 71dBc
- Low glitch impulse: 35pV-s
- Power dissipation: 465mW
- On-chip 2.5V reference
- Edge-triggered latches
- Multiplying reference capability

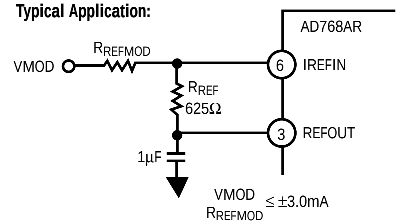
Applications:

- Arbitrary Waveform Generation
- Communications Waveform Reconstruction
- Vector Stroke Display

The AD768 is a high speed DAC with exceptional AC to DC performance. It is a current output DAC with nominal full-scale current of 20mA and a 1kΩ output impedance. Single or differential outputs are supported. Proprietary techniques from ADI have produced devices with excellent dc linearity, reduced glitch energy and maximised dynamic accuracy. The digital interface allows for compatibility to CMOS logic and support to clock rates of up to 40MSPS.

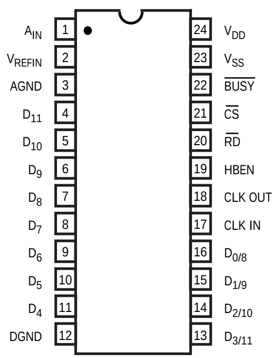
The AD768 can easily be used as a multiplying DAC since the Input Reference Current can be modulated from 1mA to 7mA. The reference amplifier sets the maximum multiplying bandwidth to 15MHz while an external capacitor to the noise reduction node limits the bandwidth. The circuit shown demonstrates how the modulating signal can be scaled and converted to a current via R_{REFMOD}.

Typical Application:



AD768 as a multiplying DAC.

ADC912A CMOS Microprocessor Compatible 12-Bit ADC ANALOG DEVICES



Order Code
699-871 (ADC912AFP)

Features:

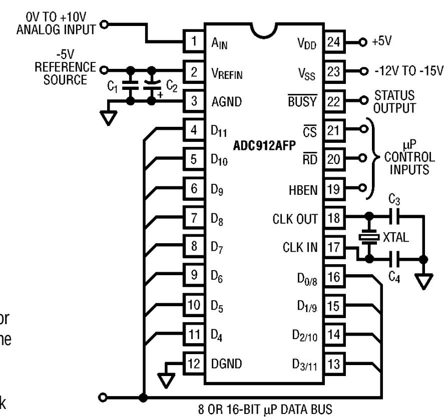
- Low transition noise between codes
- 12-bit accurate
- ±1 LSB nonlinearity error over temperature. No missing codes at all temperatures
- 10µs conversion time
- 8- or 16-bit data bus compatible
- Improved ESD resistant design
- Latchup resistant Epi-CMOS processing
- Low 95 mW power consumption

Applications:

- Data acquisition systems
- DSP system front end
- Process control systems
- Portable instrumentation

The ADC912AFP is a monolithic 12-bit accurate CMOS ADC containing a complete successive approximation with high accuracy DAC and a precision bipolar transistor high-speed comparator, with improved transition noise between adjacent codes. The NPN digital output transistors provide excellent bus interface timing, access time and bus disconnect time resulting in faster data transfer eliminating the need for wait states. 10µs conversion time is achieved with 1.25MHz clock. An internal clock with external crystal may be used in standalone applications. For microprocessor interfacing the device contains logic for 8-bit and 16-bit data buses. The output data can be formatted into either 12-bit parallel word or 8-bit data word pair.

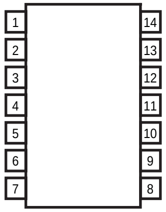
Typical Application:



XTAL=1MHz C_1=0.1µF C2=10µF C_3, C_4=30 TO 100pF Depending on XTAL chosen

Basic Connection Diagram

IVC102 Precision Switched Integrator Transimpedance Amplifier BURR-BROWN



Order Code
794-764 (IVC102P)

The IVC102 is a precision integrating amplifier with FET op amp, integrating capacitors and low leakage FET switches. It integrates low-level input current for a user-determined period, storing the resulting voltage on the capacitor. The output voltage can be held for accurate measurement. The IVC102 provides a precision, low noise alternative to conventional transimpedance op amp circuits that require a very high value feedback resistor. The IVC102 is ideal for amplifying low-level sensors such as photodiodes and ionization chambers. The input signal current can be positive or negative. TTL/CMOS-compatible timing inputs control the integration period, hold and reset functions to set the effective transimpedance gain and to reset (discharge) the integrator capacitor.

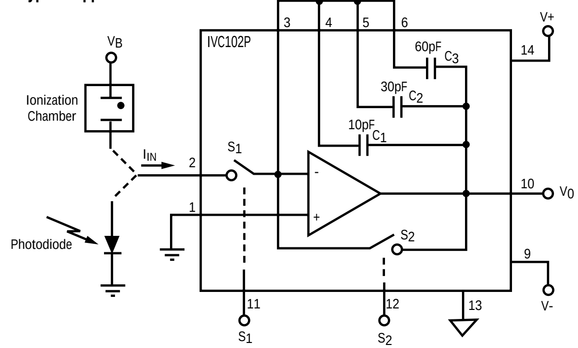
Features:

- On-chip integrating capacitor
- Gain programmed by timing
- Low input bias current : 500fA (max)
- Low noise
- Fast pulse integration
- Low nonlinearity : 0.2% max

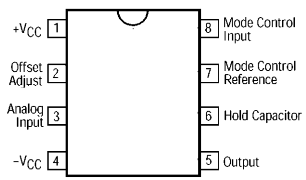
Applications:

- Precision low current measurement
- Photodiode measurements
- Ionization chamber measurements
- Current-output sensors
- Leakage current measurement

Typical Application:



SHC298A Monolithic Sample/Hold Amplifier BURR-BROWN



Order Code
791-945 (SHC298AJP)

Features:

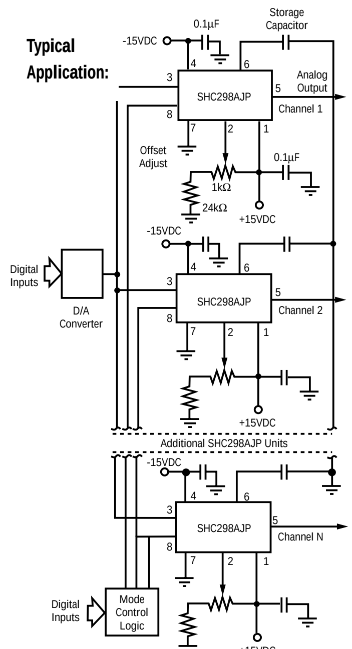
- 12-bit throughput accuracy
- Less than 10µs acquisition time
- Wideband noise less than 20µ Vrms
- Reliable monolithic construction
- $10^{10}\Omega$ input resistance
- TTL-CMOS compatible logic input

Applications:

- 12-bit A/D converters
- Data acquisition systems
- Data distribution systems
- Analogue delay circuits

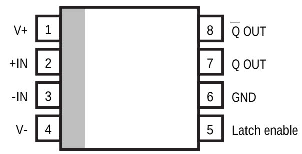
The SHC298A is a high performance monolithic sample/hold amplifier featuring high DC accuracy with fast acquisition times and a low droop rate. Dynamic performance and holding performance can be optimized with proper selection of the external holding capacitor. With a 1000pF holding capacitor, 12-bit accuracy can be achieved with a 6µs acquisition time. Droop rates less than 5mV/min are possible with a 1µF holding capacitor. These sample/holds will operate over a wide supply voltage ranging from ±5V to ±18V with very little change in performance. A separate Offset Adjust pin is used to adjust the offset in either the Sample or the Hold modes. The fully differential logic inputs have low input current and are compatible with TTL, 5V CMOS and CMOS logic families. The SHCA features improved gain and offset error, improved drift over temperature and faster acquisition time.

Typical Application:



Data Distribution

LT1016 Ultra Fast Precision Comparator LINEAR TECHNOLOGY



Order Code
796-293 (LT1016CS8)

Features:

- Ultra fast (10ns typ)
- Operates off single +5V supply, or ±5V
- Complementary output to TTL
- Low offset voltage
- No minimum input slew rate requirement
- No power supply current spiking
- Output latch capability

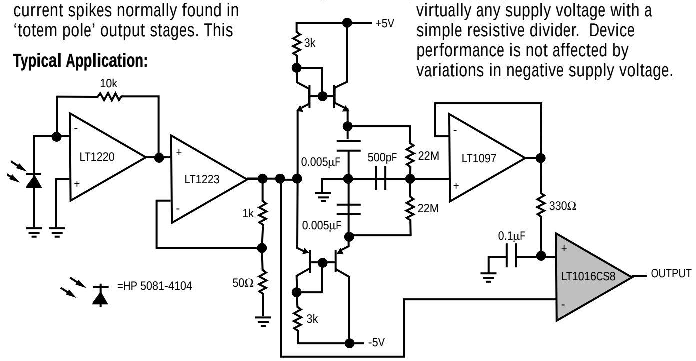
Applications:

- High speed A to D converters
- High speed sampling circuits
- Line receiver
- Extended range V to F converters
- Fast pulse height/width discriminators

The LT1016 is an ultra fast (10ns) comparator specifically designed to interface directly to TTL logic while operating off either a dual ±5V or a single +5V supply. Tight offset voltage specifications and high gain allow the LT1016 to be used in precision applications. Matched complementary outputs further extend the versatility of this comparator.

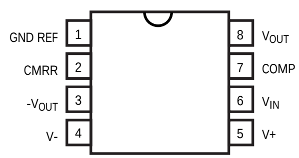
A unique output stage is featured on the LT1016. It provides active drive in both directions for maximum speed into TTL logic or passive loads, yet does not exhibit the large current spikes normally found in 'totem pole' output stages. This eliminates the need for a minimum input slew rate typical of other very fast comparators. The ability of the LT1016 to remain stable with the outputs in the active region greatly reduces the problem of output 'glitching' when the input signal is slow moving or is low level. The LT1016 has a true latch pin for retaining input data at the outputs. The outputs will remain latched as long as the latch pin is held high. Quiescent negative power supply current is only 3mA. This reduces die temperature and allows the negative supply pin to be driven from virtually any supply voltage with a simple resistive divider. Device performance is not affected by variations in negative supply voltage.

Typical Application:



50MHz Fibre Optic Receiver with Adaptive Trigger

LTC1100 Precision Chopper-Stabilised Instrumentation Amplifier LINEAR TECHNOLOGY



Order Code
796-335 (LTC1100CN8)

The LTC1100 is a high precision instrumentation amplifier using chopper-stabilisation techniques to achieve out standing DC performance. The input DC offset is typically 1µV while the DC offset is typically 10nV/°C a very low bias current of 50pA is also achieved.

The LTC1100 is self-contained, that is, it achieves a differential gain setting resistor or trim pot. The gain linearity is 8ppm and the gain drift is 4ppm/°C. The LTC1100 operates from a single 5V supply up to ±8V. The output typically swings 300mV from its power supply rails with a 10k load.

An optional external capacitor can be added from pin 7 to pin 8 to tailor the device's 18kHz bandwidth and to eliminate any unwanted noise pickup. The LTC1100 is manufactured using Linear Technology's enhanced LTCMOS™ silicon gate process.

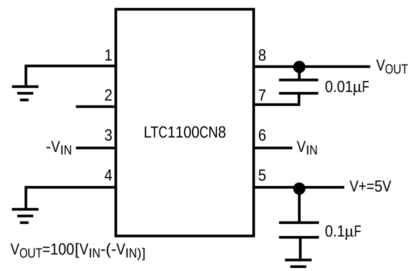
Features:

- Offset voltage : 10µV (max.)
- Offset voltage drift : 50nV/°C (max.)
- Bias current : 50pA (max.)
- Offset current : 50pA (max.)
- Gain nonlinearity : 8ppm (max.)
- Gain error : ±0.05% (max.)
- CMRR : 104dB
- 0.1Hz to 10Hz noise : 2µV_{P-P}
- Single 5V supply operation

Applications:

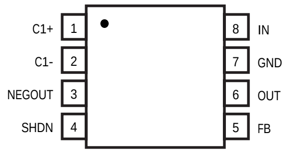
- Thermocouple amplifiers
- Strain gauge amplifiers
- Differential to single-ended converters

Typical Application:



Single 5V Supply, DC Instrumentation Amplifier

MAX840 Low Noise Regulated-2V GaAsFET Bias



Order Code
788-971 (MAX840ISA)

The MAX840ISA is a low-noise, inverting charge-purge power supply for biasing GaAsFETs in cellular telephone transmitter amplifiers. It offers preset -2V output and an adjustable -0.5V to -9.4V output. The devices can be designed-in to operate with capacitors as low as 0.22µF.

The device inverts the input voltage to a negative voltage by a capacitive charge pump followed by regulation; an internal low-noise linear regulator. The linear regulator reduces ripple noise induced by the charge pump and its AC rejection attenuates noise from the incoming supply.

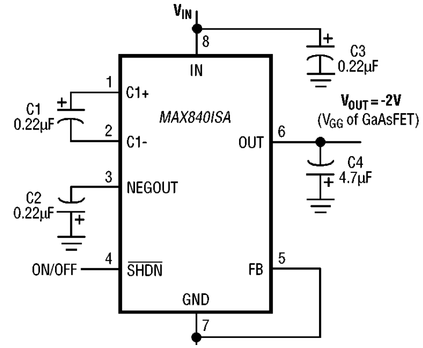
Features:

- Fixed -2V or adjustable -0.5V to -9.4V output at 4mA
- 2.5V to 10V input voltage range
- Operate with small capacitors
- 1mVp-p output voltage ripple
- Charge-pump switching frequency: 1000kHz in normal operation
- 1µA max logic-level shutdown over temperature

Applications:

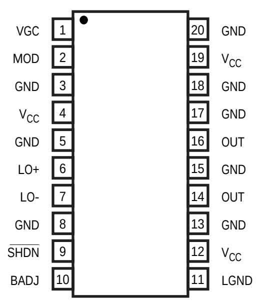
- Cellular phones
- GaAsFET power amplifier modules
- Personal communicators, PDAs, wireless data loggers
- Continuously adjustable GaAsFET bias
- LCD-bias contrast control
- Requested negative power supplies

Typical Application:



Circuit Using Smaller Capacitors

MAX2402 800MHz to 1000MHz Transmitter MAXIM



Order Code
794-612 (MAX2402CEP)

Features:

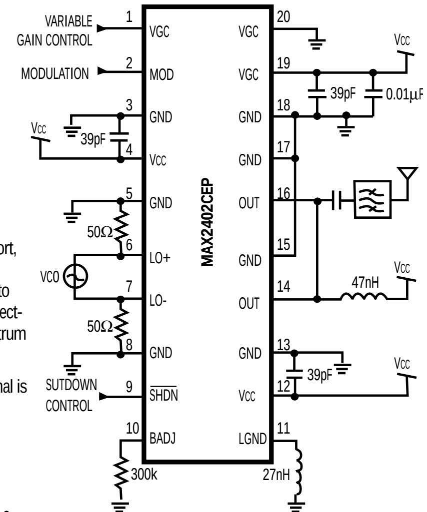
- Low cost, flexible transmitter
- More than 100mW of output into 50Ω
- Operates from 800MHz to 1000MHz
- Single +5V supply
- Uses less than 2µA in power-down
- More than 35dB of power range
- LO input power range from -6dBm to +6dBm
- 2V linear range on modulation input

Applications:

- Direct-sequence spread-spectrum transmitter
- Frequency-hopping spread-spectrum transmitter
- FSK, GMSK, BPSK and ASK digital transmitter
- AM and FM analogue transmitter

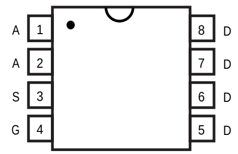
The MAX2402 transmitter integrates a double-balanced mixer, buffered local oscillator (LO) port, variable gain stage and power amplifier into a single IC. It is intended for use in the 800MHz to 1000MHz band and is compatible with both direct-sequence and frequency-hopping spread-spectrum designs in the 902MHz to 928MHz ISM band.

In a typical application, a digital baseband signal is mixed with a local oscillator signal to yield a BPSK-modulated carrier at the antenna. Alternatively, the baseband input may be grounded and an FSK-modulated LO signal applied directly to the LO port. The LO port consists of a limiting amplifier that can accept a single-ended or differential signal with input power between-6dBm in the 800MHz to 1000MHz frequency range. The baseband modulation input is linear over a 2V range and limits with larger signal levels within the supply range. The double-balanced mixer has been optimised for high



carrier rejection. The variable gain stage offers typically 40dB of adjustment range. The power amplifier provides more than 20dBm output power and has a bias adjustment, which allows adjustment of efficiency and harmonic distortion. A shutdown function reduces the current draw to less than 2µA in less than 10µs.

IRF7422 ‘Fetky’ HEXFET and Schottky Diode — INTERNATIONAL RECTIFIER



Order Code
740-871 (IRF7422D2)

Features:

- Combined package saves board space
- Latest Generation V technology
- 2.5W power handling
- 4.6A
- Reduced parts count
- Reduced R_{th} packaging

Applications:

- Battery protection
- Synchonous Buck regulators
- DC/DC conversion

New devices have been developed that take a MOSFET transistor built with Generation 5 vertical DMOS technology, add a Schottky diode offering extremely low forward voltage drop technology and combine them both in a single package using a customised leadframe. This concept is the basis for the new FETKY family of devices.

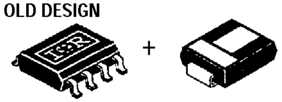
This FETKY product line aims to solve some of the board space and assembly cost issues facing designers today. The first FETKY products incpororate a co-packaged MOSFET and Schottky diode in surface mount SO-8 packages, and are targeted for use in portable electronics power converter applications.

Traditionally, designers of a 2-3A standard Buck regulator use a discrete MOSFET and a discrete Schottky diode. A typical solution for this design could have used a single P channel MOSFET rated at 100mΩ, 20V in an SO-8 with a single surface mount Schottky diode rated at 30V, 3A in an SMC package.

Now the designer can use a single device with a 90mΩ, 20V P-channel MOSFET and a 3A Schottky

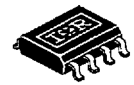
SO-8 ($30mm^2$) + SMC ($47mm^2$) =total board area of $77mm^2$.

OLD DESIGN



90mΩ P Ch SO-8 $30mm^2$ + 3A Schottky SMC $47mm^2$

NEW DESIGN

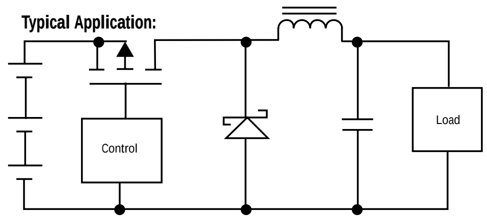


IRF7422D2 90mΩ P Ch, 3A Schottky SO-8 $30mm^2$

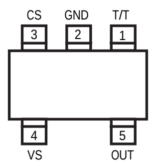
SO-8 FETKY (IRF7422D2)=$30mm^2$

So the FETKY affords the designer a 60% savings in board space and the associated reduced assembly costs.

Typical Application:



MIC1557 CMOS RC Oscillator — MICREL



Order Code
790-278
(MIC1557BM5)

Features:

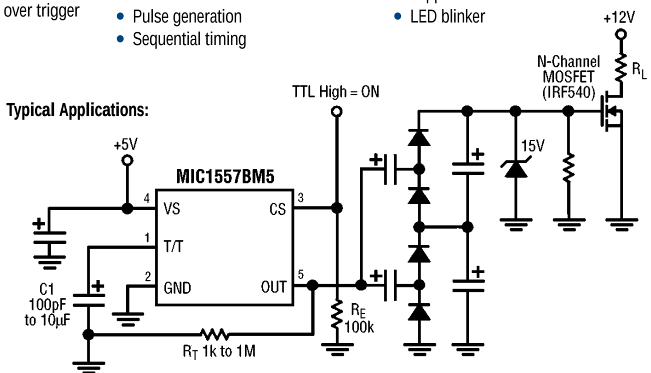
- +2.7V to +18V operation
- Low Current
  - <1µA Typ. shutdown mode
  - 200µA Typ. (TRG and THR low) @ 3V supply
- Timing from microseconds to hours
- TTL compatible inputs and outputs
- ‘Zero’ leakage trigger and threshold inputs
- Threshold precedence over trigger input
- <15Ω output on resistance
- No output cross-conduction current spikes
- <0.005% per °C temperature stability
- <0.005% per volt supply stability
- 50% square wave with one resistor, one capacitor

Applications:

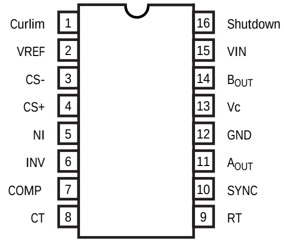
- Precision timer
- Pulse generation
- Sequential timing
- Time-delay generation
- Missing pulse detector
- Micropower oscillator to 5MHz
- Charge-pump driver
- Voltage converter
- Linear Sweep generation
- Variable frequency and duty cycle oscillator
- Isolated feedback for power supplies
- LED blinker

The MIC1557BM5 is designed to provide rail-to-rail pulses for precise time delay or frequency generation. The device is similar in function to the industry standard ‘555’ but with different pin configuration. The MIC1557BM5 is designed for astable-oscillator operation with a chip select/reset (CS) input for low power shutdown.
In the circuit shown the device is configured as a voltage quadrupler with 5V input to fully enhance an N-channel MOSFET, for minimum $r_{DS}(on)$. A TTL ‘1’ at CS enables a 10kHz oscillator, allowing for 15V at the MOSFET gate, clamped by a zener diode. A resistor from the gate to ground turns the FET off when the MIC1557 is turned off.

Typical Applications:

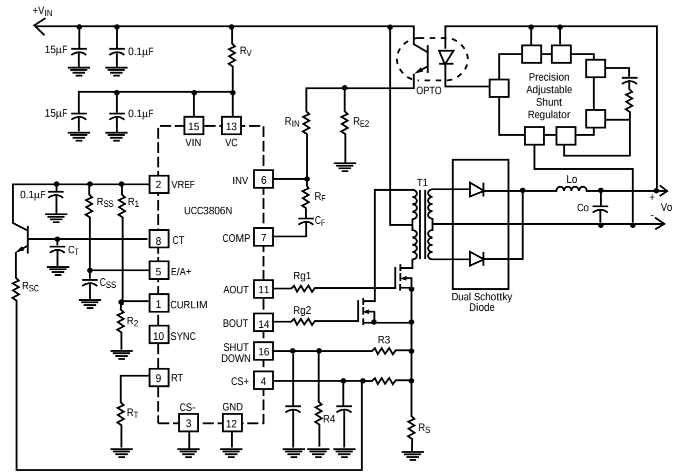


Charge-Pump



Order Code
641-510 (UCC3806N)

Typical Application:

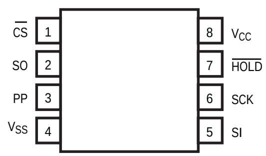


Features:

- 1.4mA maximum operating current
- 100µA maximum start-up current
- 125ns circuit delay
- Easier parallelability
- Improved benefits of current mode control

The UCC3806 is a BiCMOS PWM controller offering exceptionally improved performance with a family architecture. It has increased switching frequency capability while greatly reducing the bias current used within the device. With a typical start-up current of 50µA and a well defined voltage threshold for turn-on, this device favours applications ranging from off-line power supplies to battery operated portable equipment. Dual high current, FET driving outputs and a fast current sense loop enhance device versatility. All the benefits of current mode control including simpler loop closing, voltage feed-forward, parallelability with current sharing, pulse-by-pulse current limiting and push-pull symmetry correction are readily achievable with this device.

X25F064 Serial Flash™ Memory with BlockLock™ Protection XICOR



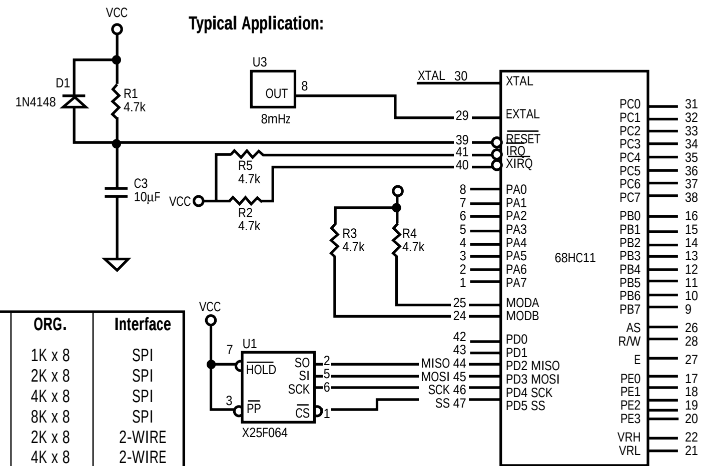
Xicor Serial Flash devices find applications where low voltage and power solutions are required. These devices are compatible with Serial EEPROM and operate down to 1.8V and are ideal for hand held battery operated systems, such as remote control units. These devices utilize Xicor's proprietary flash cell, allowing for a minimum endurance of 100,000 cycles and a minimum data retention of 100 years.

In the application circuit, the X25F064 is shown to interface with 68HC11 via SPI port pins.

Features:

- Low voltage, 1.8V
- Low standby current, 1µA
- 1MHz data rate
- 32 byte sector programming
- SPI interface
- Blocklock capability

Typical Application:

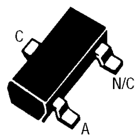


Typical hardware connection for interfacing an X25F064 to the 68HC11 microcontroller

Other members of the family include:

Mfrts. No.	Order Code	Density	ORG.	Interface
X25F008P	787-747	8K BITS	1K x 8	SPI
X25F016P	787-759	16K BITS	2K x 8	SPI
X25F032P	787-760	32K BITS	4K x 8	SPI
X25F064P	787-772	64K BITS	8K x 8	SPI
X24F016P	787-784	6K BITS	2K x 8	2-WIRE
X24F032P	787-796	32K BITS	4K x 8	2-WIRE
X24F064P	787-802	64K BITS	8K x 8	2-WIRE

ZHCS1000 'Super-BAT' Schottky Diode ZETEX



Order Code
743-781 (ZHCS1000)

Applications:

- DC/DC converters
- PSU
- Mobile phones
- Reverse battery protection
- Power conversion
- Camcorders

Features:

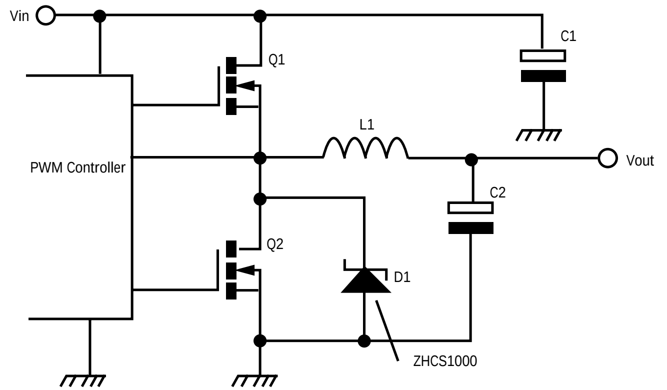
- Compact size
- 1A (cont.) current rating
- Low package height
- V_f 0.5V @ I_f 1A
- Supplied on tape and reel
- Replacement for axial, MELF, SMA and SMB packages

Typical Application:

As switch mode PSU current densities increase, switching frequencies have correspondingly increased to several hundred kHz typically. In response, IC manufacturers now offer switch mode controllers incorporating synchronous rectification, replacing high current Schottky diodes with an N-channel MOSFET.

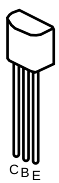
However, because of the slower switching time of the MOSFET and timing mismatch between the high and low side switching MOSFETs, a Schottky is still needed to conduct the initial current as Q1 turns off, to prevent damage to the IC.

As the average diode current is low, the ZHCS series enhanced SOT-23 power capability is more than adequate, providing a much smaller solution than the alternative products.



Schottky use with Synchronous Rectifier to compensate for MOSFET switching time.

ZTX1047A/ZTX1147A High Current, High Gain PNP Transistor ZETEX



Order Code
663-256 (ZTX1047A)
935-440 (ZTX1147A)

Features:

- Complimentary pair
- 4A collector current, 20A pulsed
- h_{FE} 250 min @ 0.5A Ic
- $V_{CE\ (sat)}$ 235mV @ 4A Ic

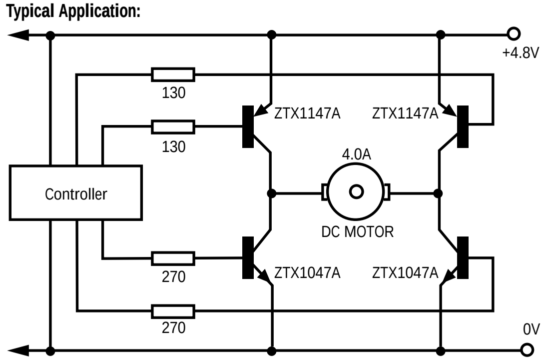
Applications:

- DC/DC conversion
- Battery powered circuits
- Motor drives
- Darlington and P-channel MOSFET replacement

In battery powered applications it is vital that as much of the supply as possible is applied across the load, maximising battery life through greater efficiency and lower end of life battery voltage. Using the ZTX1047A and ZTZX1147A, the bridge circuit shown will handle load/stall currents up to 4.0A. The circuit can easy be adapted for lower current motors by increasing the value of the base drive resistors. (Set 1_B for the PNPs to 1/50 of the maximum load current and 1_B for the NPNs to 1/100). The saturation voltage losses at 4.0A are a total of only 0.425V for both NPN and PNP transistors combined at lower load currents, less than half this level can be expected.

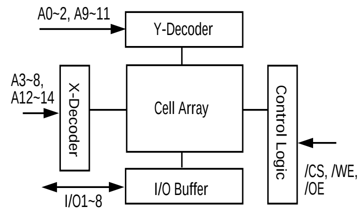
The combination of low saturation losses and low base drive requirements of the ZTX1047A/1147A gives improved motor performance and endurance. Parallel diodes are not necessary for this circuit as the reverse h_{FE} of the driver transistor is sufficiently high to conduct regenerative currents and transients safely away.

Typical Application:

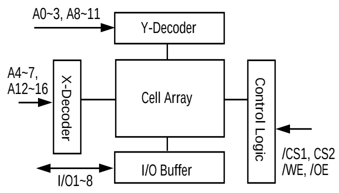


H Bridge Motor Drivers

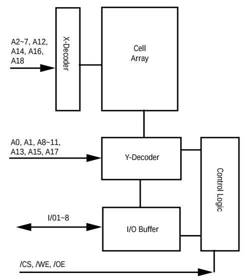
FUNCTIONAL BLOCK DIAGRAM KM62256CLXX



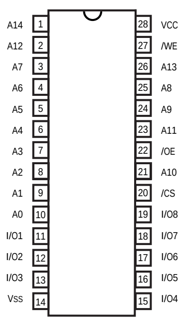
FUNCTIONAL BLOCK DIAGRAM KM68100BXX



FUNCTIONAL BLOCK DIAGRAM KM64000ALXX

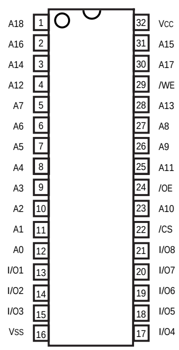


Memory Density	Memory Organisation	Access Time	Voltage	Operating Temp	Package Pin Out, Function	Mftr List No.	Order Code
256K bit	32K x 8	70ns	5V±10%	0°-70°	A	KM62256CLP-7	794-144
256K bit	32K x 8	70ns	5V±10%	0°-70°	A	KM62256CLG-7	794-156
256K bit	32K x 8	70ns	5V±10%	0°-70°	B	KM62256CLT-7	794-168
1M bit	128K x 8	70ns	5V±10%	0°-70°	C	KM681000BLG-7	794-170
1M bit	128K x 8	70ns	5V±10%	0°-70°	D	KM681000BLT-7	794-181
4M bit	512K x 8	70ns	5V±10%	0°-70°	E	KM684000ALP-7	794-193
4M bit	512K x 8	70ns	5V±10%	0°-70°	E	KM684000ALG-7	794-200
4M bit	512K x 8	70ns	5V±10%	0°-70°	E	KM684000ALT-7	794-211



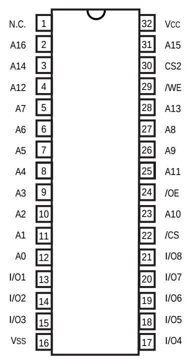
Pin Name	Function
A0~A14	Address Inputs
/WE	Write Enable Input
/CS	Chip Select Input
/OE	Output Enable Input
I/O1~I/O8	Data Input/Output
Vcc	Power
Vss	Ground

KM62256CLXX



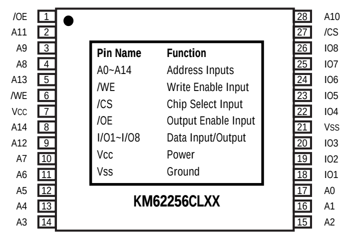
Pin Name	Function
A0~A18	Address Inputs
/WE	Write Enable Input
/CS	Chip Select Input
/OE	Output Enable Input
I/O1~I/O8	Data Input/Output
Vcc	Power (5V)
Vss	Ground

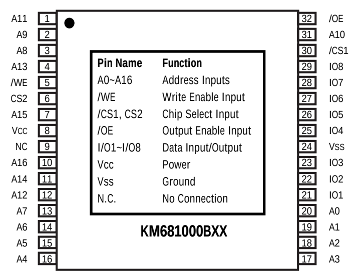
KM684000ALXX



Pin Name	Function
A0~A16	Address Inputs
/WE	Write Enable Input
/CS1, CS2	Chip Select Input
/OE	Output Enable Input
I/O1~I/O8	Data Input/Output
Vcc	Power
Vss	Ground
N.C.	No Connection

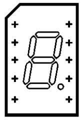
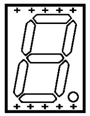
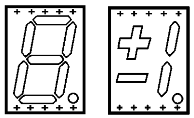
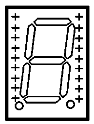
KM681000BXX





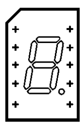
Low Current Seven Segment Displays

HEWLETT PACKARD

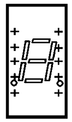
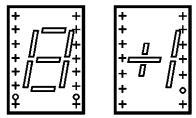
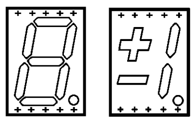
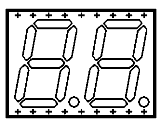
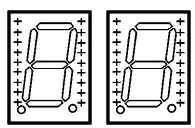
Device	Order Code	Mftrs. List No.	Description	Color	Typical I_V
 **7.62mm (0.30in.)** **Mini Dual-in-Line** **0.5"Hx0.3"Wx0.24"D**	324-140 324-152	HDSP-A101 HDSP-A103	Common Anode Right Hand Decimal Common Cathode Right Hand Decimal	AlGas Red	600 µcd @ 1mA
	324-164 324-176	HDSP-7511 HDSP-7513	Common Anode Right Hand Decimal Common Cathode Right Hand Decimal	High Efficiency Red	270 µcd @ 2mA
 **10.92mm (0.43in.)** **Mini Dual-in-Line** **0.75"Hx0.3"Wx0.25"D**	324-504 324-516	HDSP-E101 HDSP-E103	Common Anode Right Hand Decimal Common Cathode Right Hand Decimal	AlGas Red	650 µcd @ 1mA
	324-530 324-541	HDSP-3351 HDSP-3353	Common Cathode Right Hand Decimal Common Anode ±1. Overflow	High Efficiency Red	300 µcd @ 2mA
 **14.2mm (0.56in.)** **Dual-in-Line (Single Digit)** **0.67"Hx0.49"Wx0.31"D**	324-723 324-735 324-747 324-607 324-619	HDSP-H101 HDSP-H103 HDSP-H107 HDSP-K121 HDSP-K123	Common Anode Right Hand Decimal Common Cathode Right Hand Decimal Common Anode ±1. Overflow Two Digit Common Anode Right Hand Decimal Two Digit Common Cathode Right Hand Decimal	AlGas Red	700 µcd @ 1mA
	324-759 324-760	HDSP-5551 HDSP-5553	Common Anode Right Hand Decimal Common Cathode Right Hand Decimal	High Efficiency Red	370 µcd @ 2mA
 **20mm (0.8in.)** **Dual-in-Line** **1.09"Hx0.78"Wx0.33"D**	324-875 324-887	HDSP-N101 HDSP-N103	Common Anode Right Hand Decimal Common Cathode Right Hand Decimal	AlGas Red	590 µcd @ 1mA

Seven Segment Displays

HEWLETT PACKARD

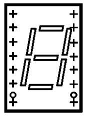
Device	Order Code	Mftrs. List No.	Description	Color	Typical I_V
 **7.62mm (0.3in.)** **Microbright** **Dual-in-Line** **0.5"Hx0.3"Wx0.24"D**	324-073 324-085	HDSP-7301 HDSP-7303	Common Anode Right Hand Decimal Common Cathode Right Hand Decimal	Red	1100 µcd @ 20mA
	264-260 264-271	HDSP-A151 HDSP-A153	Common Anode Right Hand Decimal Common Cathode Right Hand Decimal	AlGas Red	14 mcd @ 20mA
	324-103 324-115	HDSP-7501 HDSP-7503	Common Anode Right Hand Decimal Common Cathode Right Hand Decimal	High Efficiency Red	980 µcd @ 5mA
	324-127 324-139	HDSP-7801 HDSP-7803	Common Anode Right Hand Decimal Common Cathode Right Hand Decimal	Green	3000 µcd @10mA

Seven Segment Displays (continued)

Device	Order Code	Mftrs. List No.	Description	Color	Typical I_V
 **7.62mm (0.3in.)** **Dual-in-Line** **0.75”Hx0.4”Wx0.18”D**	324-188 324-190 324-206	5082-7730 5082-7731 5082-7740	Common Anode Left Hand Decimal Common Anode Right Hand Decimal Common Cathode Right Hand Decimal	Red	770 µcd @ 20mA
	324-220 324-231	5082-7610 5082-7613	Common Anode Left Hand Decimal Common Cathode Right Hand Decimal	High Efficiency Red	800 µcd @ 5mA
	324-243	HDSP-3601	Common Anode Right Hand Decimal	Green	2700 µcd @ 10mA
 **10.92mm (0.43in.)** **Dual-in-Line** **0.75”Hx0.5”Wx0.25”D**	324-360 324-371 324-383 324-395	5082-7750 5082-7751 5082-7760 5082-7756	Common Anode Left Hand Decimal Common Anode Right Hand Decimal Common Cathode Right Hand Decimal Universal ±1. Overflow Right Hand Decimal	Red	1100 µcd @ 20mA
	264-301	HDSP-E153	Common Cathode Right Hand Decimal	AlGaAs Red	15.0mcd @ 20mA
	324-401 324-413 324-425 324-436	5082-7650 5082-7651 5082-7653 5082-7656	Common Anode Left Hand Decimal Common Anode Right Hand Decimal Common Cathode Right Hand Decimal Universal ±1. Overflow Right Hand Decimal	High Efficiency Red	1115 µcd @ 5mA
	324-474 324-486	HDSP-4600 HDSP-4603	Common Anode Left Hand Decimal Common Cathode Right Hand Decimal	Green	4000 µcd @ 10mA
 **14.2mm (0.56in.)** **Dual-in-Line (Single Digit)** **0.67”Hx0.49”Wx0.31”D**	324-620 324-632 324-644 324-553 324-565	HDSP-5301 HDSP-5303 HDSP-5207 HDSP-5321 HDSP-5323	Common Anode Right Hand Decimal Common Cathode Right Hand Decimal Common Anode ±1. Overflow Two Digit Common Anode Right Hand Decimal Two Digit Common Cathode Right Hand Decimal	Red	1300 µcd @ 20mA
	264-313 264-325 324-607 324-619	HDSP-H151 HDSP-H153 HDSP-K121 HDSP-K123	Common Anode Right Hand Decimal Common Cathode Right Hand Decimal Two Digit Common Anode Right Hand Decimal Two Digit Common Cathode Right Hand Decimal	AlGaAs Red	16.0 mcd @ 20mA
	324-656 324-668 324-670 324-577 324-589	HDSP-5501 HDSP-5503 HDSP-5507 HDSP-5521 HDSP-5523	Common Anode Right Hand Decimal Common Cathode Right Hand Decimal Common Anode ±1. Overflow Two Digit Common Anonde Right Hand Decimal Two Digit Common Cathode Right Hand Decimal	High Efficiency Red	2800 µcd @ 10mA
 **14.2mm (0.56in.)** **Dual-in-Line (Single Digit)** **0.67”Hx0.49”Wx0.31”D**	324-693 324-700 324-711 324-590	HDSP-5601 HDSP-5603 HDSP-5607 HDSP-5623	Common Anode Right Hand Decimal Common Cathode Right Hand Decimal Common Anode±1. Overflow Two Digit Common Cathode Right Hand Decimal	Green	2500 µcd @ 10mA
 **20mm (0.8in.)** **Dual-in-Line** **1.09”Hx0.78”Wx0.33”D**	324-772 324-796	HDSP-3400 HDSP-3403	Common Anode Left Hand Decimal Common Cathode Right Hand Decimal	Red	1200 µcd @ 20mA
	264-350	HDSP-N151	Common Anode Right Hand Decimal	AlGaAs Red	14.0 µcd @20mA
	324-814 324-826 324-838 324-840 324-851 324-863	HDSP-3900 HDSP-3901 HDSP-3903 HDSP-3905 HDSP-3906 HDSP-8600	Common Anode Left Hand Decimal Common Anode Right Hand Decimal Common Cathode Right Hand Decimal Common Cathode Left Hand Decimal Universal ±1. Overflow Right Hand Decimal Common Anode Left Hand Decimal	High Efficiency Red Green	7000 µcd @ 100mA peak 1/5 Duty Factor 1500 µcd @ 10mA

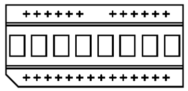
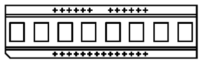
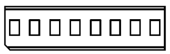
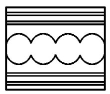
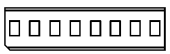
High Ambient Light, Seven Segment Displays

HEWLETT PACKARD

Device	Order Code	Mftrs. List No.	Description	Typical I_V @ 100mA Peak 1/5 Duty Factor
 **20mm (0.8in.) Dual-in-Line 1.09"Hx0.78W x 0.33"D**	324-449 324-450 324-462	HDSP-3730 HDSP-3731 HDSP-3733	High Efficiency Red, Common Anode, LHDP High Efficiency Red, Common Anode, RHDP High Efficiency Red, Common Cathode, RHDP	10900cd/seg

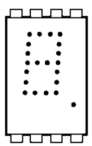
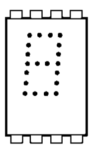
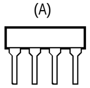
Alphanumeric LED Displays

HEWLETT PACKARD

Device	Order Code	Mftrs. List No.	Description	Color	Application
	325-168 325-170	HDSP-2112 HDSP-2113	5.0mm (0.2in) 5x7 Eight Character Intelligent Display Operating Temperature Range: 45ºC to +85ºC HDSP-211X ASCII	High Efficiency Red Green	• Medical • Telecommunications • Analytical Equipment • Computer Products • Office Equipment • Industrial Equipment
	265-585 265-603	HDSP-2502 HDSP-2503	15.24mm (0.6in) 28 pin DIP, ASCII 5x7 Eight Character Intelligent Display Operating Temperature Range: 45ºC to +85ºC	High Efficiency Red Green	• Computer Products • Industrial Instrumentation • Medical Equipment • Portable Data Entry Devices • Cellular PHones • Telecommunications • Test Equipment
	280-410 280-409	HDSP-2533 HDSP-2534	5.0mm (0.2in) Eight Character Intelligent Display Operating Temperature Range: -40ºC to +85ºC	Green AlGaAs Red	• Avionics • Computer Products • Industrial Instrumentation • Medical Equipment • Portable Data Entry Devices • Telecommunications • Test Equipment
	325-144 325-132 325-120	HDLG-2416 HDLO-2416 HDLR-2416	5.0mm (0.2in) 5x7 Four Character Intelligent Display Operating Temperature Range: -40ºC to +85ºC	Green High Efficiency Red Red	• Portable Data Entry Devices • Industrial Instrumentation • Computer Products • Telecommunications
	280-446 280-434	HCMS-2973 HCMS-2975	1 Row of 8 Characters 5.0mm (0.20in)	Green AlGaAs	• Telecommunications • Portable Data Entry Devices • Computer Products • Medical Equipment • Test Equipment • Business Machines • Avionics • Industrial Controls

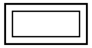
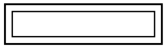
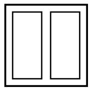
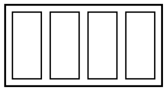
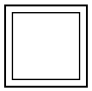
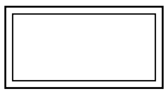
Hexadecimal and Dot Matrix Displays

HEWLETT PACKARD

Device	Order Code	Mftrs. List No.	Description	Package	Application
 (A)  (B)  **7.4mm (0.29in) 4x7 Single Digit**	(A) 324-991 (B) 325-016	5082-7300 5082-7340	Numeric RHDP Built-in Decoder/Driver/Memory Numeric RHDP Built-in Decoder/Driver/Memory	8.5 Pin Epoxy 15.2mm (0.6in) DIP	• Medical • Telecommunications • Analytical Equipment • Computer Products • Office Equipment • Industrial Equipment

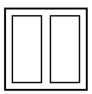
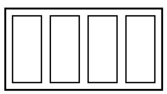
LED Light Bars

HEWLETT PACKARD

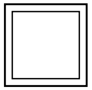
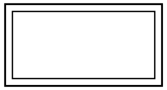
Device			Description			Typical Luminous Intensity	Typical Forward Voltage
Package Outline Drawing	Order Code	Mfrts. List No.	Color	Package	Lens	@ 20mA	@ 20mA
	323-561	HLMP-2300	High Efficiency Red	4 Pin In-Line; 0.100" Centers; 0.400"L x 0.195"W x 0.245"H	Diffused	23mcd	2.0V
	323-585	HLMP-2400	Yellow		Diffused	20mcd	2.1V
	323-603	HLMP-2500	Green		Green Diffused	25mcd	2.2V
	323-573	HLMP-2350	High Efficiency Red	8 Pin In-Line; 0.100" Centers; 0.800"L x 0.195"W x 0.245"H	Diffused	45mcd	2.0V
	323-597	HLMP-2450	Yellow		Diffused	38mcd	2.1V
	323-615	HLMP-2550	Green		Green Diffused	50mcd	2.2V
	323-720	HLMP-2600	High Efficiency Red	8 DIP; 0.100" Centers; 0.400"L x 0.400"W x 0.245"H Dual Arrangement	Diffused	22mcd	2.0V
	323-834	HLMP-2800	Green		Green Diffused	25mcd	2.2V
	323-731	HLMP-2620	High Efficiency Red	16 Pin DIP; 0.100" Centers; 0.800"L x 0.400"W x 0.245"H Quad Arrangement	Diffused	25mcd	2.0V
	323-846	HLMP-2820	Green		Green Diffused	25mcd	2.2V
	323-755	HLMP-2655	High Efficiency Red	8 Pin DIP; 0.100" Centers; 0.400"L x 0.400"W x 0.245"H Square Arrangement	Diffused	43mcd	2.0V
	323-809	HLMP-2755	Yellow		Diffused	35mcd	2.1V
	323-858	HLMP-2855	Green		Green Diffused	50mcd	2.2V
	323-779	HLMP-2685	High Efficiency Red	16 Pin DIP; 0.100" Centers; 0.800"L x 0.400"W x 0.245"H Single Bar Arrangement	Diffused	80mcd	2.0V
	323-822	HLMP-2785	Yellow		Diffused	70mcd	2.1V
	323-858	HLMP-2855	Green		Green Diffused	100mcd	2.2V

DH AlGaAs Low Current LED Light Bars

HEWLETT PACKARD

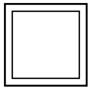
Device			Description			Typical Luminous Intensity	Typical Forward Voltage
Package Outline Drawing	Order Code	Mfrts. List No.	Color	Package	Lens	@ 3mA	@ 3mA
	323-676	HLCP-D100	AlGaAs Red	8 Pin DIP; 0.100" Centers; 0.400"L x 0.400"W x 0.245"H Dual Arrangement	Diffused	7.5mcd	1.6V
	323-688	HLCP-E100	AlGaAs Red	16 Pin DIP; 0.100" Centers; 0.800"L x 0.400"W x 0.245"H Quad Arrangement	Diffused	7.5mcd	

DH AlGaAs Low Current LED Light Bars (Continued)

Device			Description			Typical Luminous Intensity @ 3mA	Typical Forward Voltage @ 3mA
Package Outline Drawing	Order Code	Mfrts. List No.	Color	Package	Lens		
	323-690	HLCP-C100	AlGaAs Red	8 Pin DIP; 0.100” Centers; 0.400”L x 0.400”W x 0.245”H Square Arrangement	Diffused	15.0mcd	1.6V
	323-718	HLCP-H100	AlGaAs Red	16 Pin DIP; 0.100” Centers; 0.800”L x 0.400”W x 0.245”H Single Bar Arrangement	Diffused	30.0mcd	

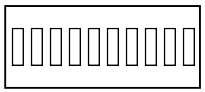
LED Bicolour Light Bars

HEWLETT PACKARD

Device			Description			Typical Luminous Intensity @ 20mA	Typical Forward Voltage @ 20mA
Package Outline Drawing	Order Code	Mfrts. List No.	Color	Package	Lens		
	323-871	HLCP-2965	High Efficiency Red/ Green	8 Pin DIP; 0.100” Centers; 0.400”L x 0.400”W x 0.245”H Square Arrangement	Diffused	HER: 20mcd Green: 20mcd	HER: 2.0V Green: 2.2V

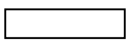
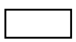
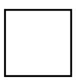
LED Bar Graph Arrays

HEWLETT PACKARD

Device			Description			Typical Luminous Intensity	Typical Forward Voltage
Package Outline Drawing	Order Code	Mfrts. List No.	Color	Package	Lens		
	323-901	HDSP-4820	Standard Red	20 Pin DIP; 0.100” Centers; 1.0”L x 0.400”W x 0.200 “	Diffused	1250µcd @ 20mA DC	1.6V @ 20mA DC
	323-925	HDSP-4830	High Efficiency Red		Diffused	3500µcd @ 10mA DC	2.1V @ 20mA DC
	323-949	HDSP-4840	Yellow		Diffused	1900µcd @ 10mA DC	2.2V @ 20mA DC
	323-962	HDSP-4850	High Performance Green		Green Diffused	1900µcd @ 10mA DC	2.1V @ 10mA DC
	323-986	HDSP-4832	Multicolor		Diffused	1900µcd @ 10mA DC	
	323-998	HDSP-4836	Multicolor		Diffused	1900µcd @ 10mA DC	
	323-913	HLCP-J100	AlGaAs Red		Diffused	1000µcd @ 1mA DC	1.6V @ 1mA

Panel Mounts for LED Light Bars

HEWLETT PACKARD

Device			
Package Outline Drawing	Order Code	Mfrts. List No.	Corresponding Light Bar Module Part Number
	323-639	HLMP-2598	HLMP -2350, -2450, -2550
	323-627	HLMP-2599	HLMP -2300, -2400, -2500
	323-883	HLMP-2898	HLMP -2600, -2800 -2655, -2755, -2855 -2965, HLCP-C100, -D100