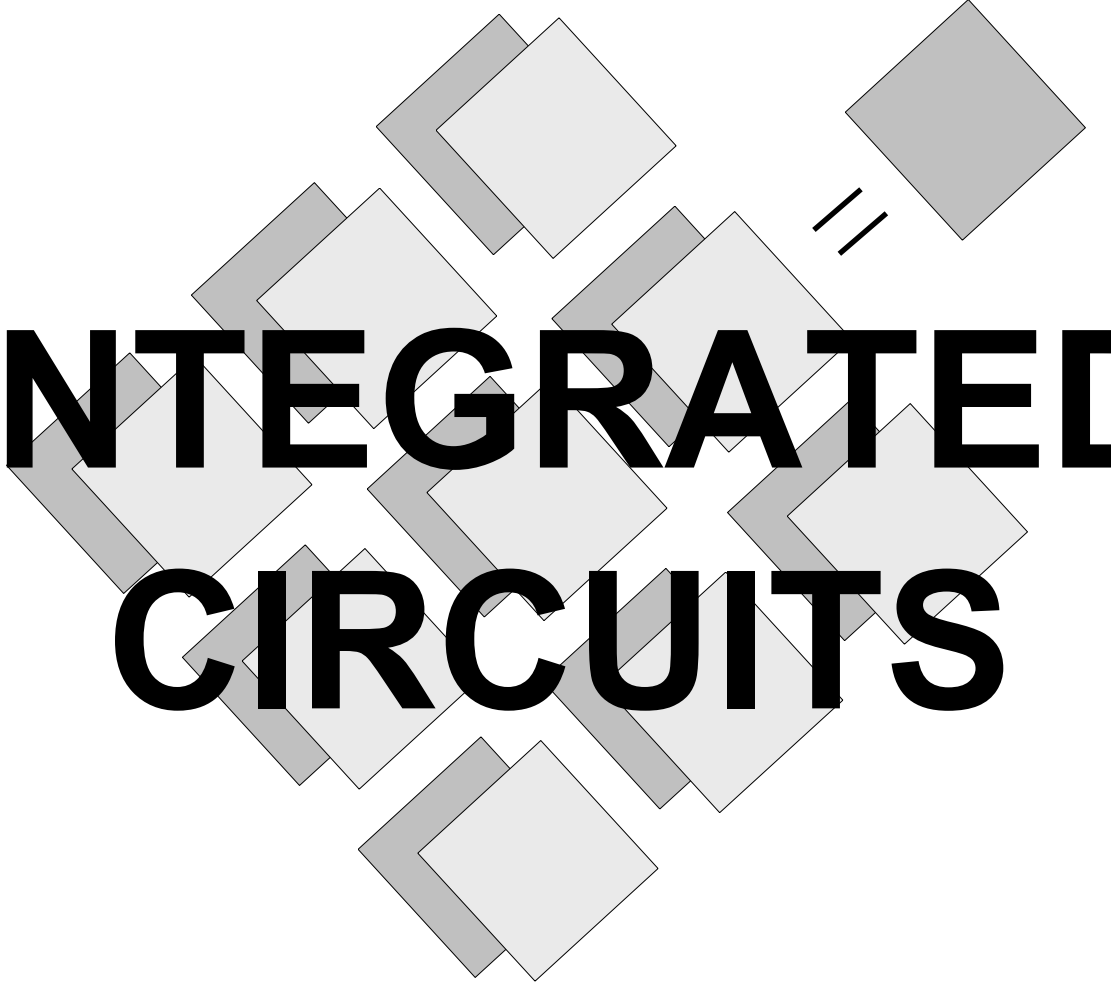


SHORT FORM CATALOG



INTEGRATED CIRCUITS

Celebrating 40 Years of Excellence



by LSI/CSI

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TIMERS

Programmable Digital Delay Timer.... (14 Pins)

LS7210, LS7210-S

- Generates delays from milliseconds to “years”
- Delays programmed by 5 Binary Weighted inputs and time-base
- External clock or RC oscillator sources time-base
- **Four Operating Modes:**
DUAL DELAY DELAYED OPERATE
ONE-SHOT DELAYED RELEASE
- 4.75V to 15V operation

Programmable Digital Delay Timer.... (18 Pins)

LS7211, LS7211-S; LS7212, LS7212-S

LS7211N, LS7211N-S; LS7212N, LS7212N-S **New!**

- LS7211N, LS7212N backward compatible with LS7211, LS7212, respectively
- Generates delays from microseconds to “days”
- **Time Base is External Clock or RC Oscillator (LS7211/LS7211N) Crystal Oscillator (LS7212/LS7212N)**
- 8 Binary-Weighted Delay Bits • 3 Selectable Prescalers
- Four Operating Modes • Reset for Delay Abort
- 3V (4V, LS7211& LS7212) to 18V Operation
- Programmable frequency division
- Real Time delays from
50/60Hz Clock (LS7211/LS7211N)
Watch Crystal (LS7212/LS7212N)

Programmable Digital Delay Timer.... (18 Pins; 20 Pins)

LS7215, LS7215-S; LS7216, LS7216-S **New!**

- LS7215, LS7216 are extended feature versions of LS7211N, LS7212N, respectively.
- **Extended features:**
 1. Latches for loading weighting bits from an 8-bit Bus.
 2. Open-Drain Output for direct drive of a Relay coil returned to chip VDD or to a voltage as high as 110V using a single external transistor.

Programmable Digital Delay Timer.... (14 Pins)

LS7213R, LS7213R-S

- Produces real-time delays from 10kHz-1kHz time-base range
- **Eight time delay ranges:**
0.1 – 1: Seconds; Minutes; Hours
1 - 10: Seconds; Minutes; Hours
10 - 100: Seconds; Minutes
- RC Oscillator generates time-base
- Four operating modes
- Reset for Delay Abort • Complementary outputs
- Delay-in-Progress indicator output
- 3V to 5.5V Operation

Light-Activated Programmable Timer... (8 Pins)

LS7217, LS7217-S **New!**

- Interfaces directly to photo-resistor
- **Programmable duration selection:**
4 hours, 6 hours, 8 hours, dusk-to-dawn
- Shunt regulator • 50Hz / 60Hz time base selection
- Relay driver output • 6.5V +/- 0.75V operation
- Applications include lighting timer for low-voltage landscape lighting

INCREMENTAL ENCODER INTERFACE

Quadrature Clock Decoders.... (14 Pins; 8 Pins; 8 Pins)

LS7082N, LS7082N-S;

LS7083, LS7083-S; LS7084, LS7084-S;

LS7183, LS7183-S; LS7184, LS7184-S

- Interfaces Incremental Encoders to Up/Down Counters
- Interfaces Rotary Encoders to Digital Pots (LS7084, LS7184)
- Converts Quadrature Pulses to Up/Down Counter Controls
- x1, x4 Frequency Multiplication: LS7083, LS7084
- x1, x2, x4 Frequency Multiplication: LS7082N, LS7183, LS7184
- Index I/O (LS7082N)
- **Outputs by device type:**
LS7082N - Up Clock, Down Clock, Direction Control
LS7083, LS7183 - Up Clock and Down Clock
LS7084, LS7184 - Clock and Direction Control
- 4.5V to 10V Operation: LS7082N, LS7083, LS7084
- 3V to 5.5V Operation: LS7183, LS7184

Quadrature Clock Decoders.... (14 Pins; 8 Pins; 8 Pins)

LS7082N1, LS7082N1-S; **New!**

LS7083N, LS7083N-S; LS7084N, LS7084N-S; **New!**

LS7183N, LS7183N-S; LS7184N, LS7184N-S **New!**

- Each **New** P/N is backward compatible with its predecessor P/N:
LS7082N1 compatible with LS7082N
LS7083N, LS7084N compatible with LS7083, LS7084
LS7183N, LS7184N compatible with LS7183, LS7184
- **All New P/Ns** provide x1, x2, x4 Frequency Multiplication
- **All New P/Ns** operate from 3V to 12V

24-Bit Quadrature Pulse Counter.... (20 Pins; 24 Pins)

LS7166, LS7166-S; LS7166-TS24

- Interfaces Incremental Encoders to Microprocessor Bus
- 1.2MHz Quadrature Clock Frequency
- x1, x2, x4 Frequency Multiplication
- 8-Bit I/O Bus • 24-Bit Comparator
- TTL and CMOS compatible • 3V to 5.5V operation

24-Bit x 2 Axes Quadrature Pulse Counter.... (28 Pins)

LS7266R1, LS7266R1-S, LS7266R1-TS

Same features as LS7166 except as shown below:

- Dual architecture to support X and Y axes
- Digital filtering of Quadrature clocks
- Programmable 8-Bit filter clock prescalers
- Error flag for excessive noise indication
- Programmable Count Range Limits
- Programmable Index input
- Up to 4.3MHz Quadrature Clock Frequency

32-Bit Quadrature Counter with Serial Interface... (14 Pins)

LS7366R, LS7366R-S, LS7366R-TS

- Interfaces Incremental Encoders to Microprocessors via 4-wire SPI/Microwire bus
- Up to 9.6MHz Quadrature Clock Frequency with x1, x2 and x4 Frequency Multiplication
- Internal digital filtering of Quadrature clocks and Index
- Internal decoding of Quadrature clocks
- Index Driven Operations
- 8-Bit, 16-Bit, 24-Bit and 32-Bit Programmable Configuration
- 3V to 5.5V operation

24-Bit x 4-Axes Quadrature Clock Counter... (48 Pins)

LS7566R-TS

- Interfaces Incremental Encoders to a Microprocessor Bus
- Up to 9.6MHz Quadrature Clock Frequency
- Independent Programmability of each axis for multiple count and I/O modes with Independent Read/Write Control Registers
- x1, x2 and x4 Resolution Multiplication
- Maskable processor Interrupt Output
- 3-state Octal I/O Bus
- Digital Filtering of Quadrature Clock
- 3V to 5.5V Operation

32-Bit x 1-Axis Quadrature Counter..... (24 Pins; 38 Pins)

LS7766SO, LS7766SO-S, LS7766SO-TS; LS7766SH-TS

32-Bit x 2-Axes Quadrature Counter..... (28 Pins; 48 Pins)

LS7766DO, LS7766DO-S, LS7766DO-TS; LS7766DH-TS

- Direct Interface with Incremental Encoders
- 9.6MHz (5V), 4.5MHz (3.3V) Quadrature Clock Frequency
- Programmable I/Os for Index and Marker Flags
- Separate mode-control registers for each axis
- Sets of 32-bit counters, input registers, output registers, comparators and octal status registers for each axis
- Digital filtering of the input quadrature clocks
- Pin selectable 3-state Hex / Octal bus
- **SO / DO** = Single-axis / Dual-axes Octal I/O Bus
- **SH / DH** = Single-axis / Dual-axes with pin selectable Hex / Octal I/O Bus
- 3V to 5.5V Operating voltage range

LIGHTING CONTROLS

Touch Control Light Dimmer (8 Pins)

LS7231, LS7231-S, LS7232, LS7232-S, LS7233, LS7233-S

- Touch or pushbutton input control
- Controls resistive loads
- Momentary input activation causes ON/OFF switching
- Prolonged input activation causes variable dimming
- Brightness Memory and Dimming Direction Reverse features depending on Part Number
- DOZE input for external control of DIM-TO-OFF time
- SLAVE input for control by Remote Extension
- Ideal for wall-switch control of ceiling mounted lighting, foot-switch control of large floor lamps and hand-switch control of small table lamps.

Touch Control Light Dimmer (8 Pins)

LS7232ND, LS7232ND-S

- Same features as **LS7231**, **LS7232**, or **LS7233** except DOZE input is replaced by 3-State MODE input.
- MODE input selects **LS7231**, **LS7232** or **LS7233** type functionality.
- **LS7232ND** can directly replace **LS7232** in PCBs, without modification, where DOZE input is not used.

Proximity/Touch Control Halogen Light Dimmer... (14 Pins)

LS7232NT, LS7232NT-S

- Proximity (No-Touch), touch or pushbutton input control
- No-Touch control through optical sensing
- Controls resistive and inductive loads
- Automatic safety cutout
- Soft turn-on • Mode inputs select from 7 operating modes
- Operating options include Memory and Delayed-Off

Multi-Level Dimmer.... (16 Pins)

LS7315, LS7315-SW

- Pushbutton input controls
- Up to 10 selectable intensity (power) levels
- Controls high-voltage lamps and **electronic-transformer** coupled low-voltage lamps via a triac interface
- A selected BRIGHTNESS LEVEL input becomes an output that can drive an LED to indicate the selected intensity
- Applications include wall switch (two-wire) and plug-in (three-wire) dimmer configurations

Multi-Level Dimmer.... (14 Pins)

LS7317, LS7317-S

New!

- Pushbutton input controls
- Up to 5 selectable intensity (power) levels
- A selected intensity level input becomes an output that can drive an LED to indicate the selected intensity
- Applications include wall switch (two-wire) and plug-in (three-wire) dimmer configurations

Light Dimmer with Up and Down Controls.... (8 Pins)

LS7535, LS7535-S; LS7535FT, LS7535FT-S

- Touch or pushbutton UP and DOWN input controls
- Momentary UP/DOWN input activation cause ramping to MEMORY ON/OFF states
- Prolonged UP/DOWN input activation cause variable dimming operation towards MAX/MIN Brightness Levels
- DOZE input for external control of DIM-TO-OFF time
- **LS7535** has “soft” Turn-On/Off; **LS7535FT** has instant Turn-On/Off

Touch Control Step Dimmer with AGC.... (8 Pins)

LS7538, LS7538-S; LS7539, LS7539-S; LS7541, LS7541-S

- Touch Sensitivity is independent of Touch Plate Size and Line-Plug Polarity.
- Pin selection of three available Brightness Step Sequences
- **LS7539** and **LS7541** are functionally equivalent
- Pushbutton control can be implemented
- Applications include Wall Switch step dimmers and Touch Control step dimmer modules for small table lamps to large floor lamps

AGC Touch Control Light Switch with Soft-Off(8 Pins)

LS7540, LS7540-S

- Touch Sensitivity is independent of Touch Plate Size and Line-Plug Polarity.
- If Off, a 'Touch' produces Max Intensity (On) instantaneously
- If On, a 'Touch' initiates intensity ramp-down (**Soft-Off**). Max intensity to Off ramp-down time is programmed by an external RC. The **Soft-Off** feature provides light for the User to exit the room. Ramp-down time = 0 if no RC is connected.
- Applying a 'Touch' during ramp-down causes the ramp- down to stop. Once stopped, a 'Touch' causes the ramp-down to Off to resume. Stopping and starting the ramp-down can be repeated as often as desired giving the User full control in setting the light intensity.
- Pushbutton control can be implemented.
- Applications include Wall Switches and Touch Control modules for small table lamps to large floor lamps.

Touch Control Halogen Light Dimmer (8 Pins)

LS7631, LS7631-S; LS7632, LS7632-S

- Touch or pushbutton input control
- Controls high-voltage lamps and *transformer-coupled low-voltage halogen lamps. ***Magnetic transformers and many electronic transformers.**
- Controls **Florescents** and CFLs via dimming ballasts
- Direct replacement for P/N SLB0587
- Soft-turn on
- Automatic safety shutdown
- 3-state input selects one of three modes of operation
- **LS7631** - dimming cycles through Maximum and Minimum
- **LS7632** - dimming stops at Maximum and Minimum

Touch Control Halogen Light Dimmer (8 Pins)

LS7634, LS7634-S, LS7634FO, LS7634FO-S

LS7635, LS7635-S, LS7635FO, LS7635FO-S

- **LS7634** functionally equivalent to **LS7631**
- **LS7635** functionally equivalent to **LS7632**
- **Compatible with virtually all electronic transformers.**
- “FO” versions power up Full On.

Reverse-Phase (Trailing-Edge) Halogen Light Dimmer...(8 Pins)

LS7636, LS7636-S; LS7636FO, LS7636FO-S

New!

LS7637, LS7637-S; LS7637FO, LS7637FO-S

New!

- **Pushbutton control** for direct or remote activation or **Touch control** for direct activation
- Controls high-voltage lamps and ***electronic transformer** coupled low-voltage halogen lamps.
***Compatible with all electronic transformers.**
- Controls **Florescents** and CFLs via dimming ballasts
- Drives FETs or IGBTs
- Reverse-phase technology **eliminates RFI** generation
- Soft turn-on and soft turn-off
- “FO” versions power up Full On after application of AC.
- 3-state input selects one of three modes of operation
- **LS7636 P/Ns** - dimming cycles through Maximum and Minimum
- **LS7637 P/Ns** - dimming stops at Maximum and Minimum

Voltage Controlled Light Dimmer with Soft On/Off.... (8 Pins)

LS7642, LS7642-S, LS7642FO, LS7642FO-S

New!

- Touch or pushbutton input control for soft turn-on and turn-off.
- Analog voltage input directly controls lamp intensity
- Interfaces easily with a uC for programmable lighting control
- Controls high-voltage lamps and *transformer-coupled low-voltage halogen lamps. ***Magnetic transformers and virtually all electronic transformers.**
- Automatic safety shutdown
- Controls **Florescents** and CFLs via dimming ballasts
- “FO” version powers up at the intensity set by the analog voltage.

NOTE:

Our “Bright Ideas” brochure contains some unique ideas for wall switch products. It is available upon request or as a PDF download file from our website at:

<http://www.lsicsi.com/brochure.htm>

COUNTERS

8/6 Decade Up Counter with 8 Decade Latch.... (40 Pins)

LS7030; LS7031

- 10MHz Count Frequency
- Multiplexed BCD and 7-Segment (**LS7030**) data outputs
- Leading Zero Blanking output • On-chip Scan Oscillator
- Decimal Point and Overflow control inputs
- The **LS7031** can latch external prescalers into the two LSD latches for counting to 1GHz
- 4.75V to 15V operation

6 Decade Pre-Determining Up/Down Counter.... (40 Pins)

LS7055; LS7056

- 250kHz Count Frequency
- Fully Synchronous counting
- Multiplexed BCD and 7 Segment data outputs
- Preset, Presignal and Main Signal Storage Registers
- Three Comparators with Output Flags
- Thumbwheel interface for loading registers
- On-chip Scan Oscillator
- 4.75V to 15V operation

32-Bit/Dual 16-Bit Binary Up Counter.... (18 Pins)

LS7060, LS7060-S; LS7062, LS7062-S

- 15MHz Count Frequency
- Byte multiplexed Three-State data outputs
- Unique Cascade Feature allows data bytes from many counters to be sequentially multiplexed to the output bus in a Multiple Counter System
- 32-bit latch
- 4.75V to 5.25V operation

32-Bit/Dual 16 Bit Binary Up Counter.... (24 Pins)

LS7061, LS7061-SD, LS7061-S; LS7063, LS7063-SD, LS7063-S

- Same features as **LS7060** and **LS7062** except there is a 40-bit latch instead of 32-bit latch
- Ability to latch external eight bits allows attachment of external prescaler for counting to 3.84GHz

24-Bit Multi-Mode Counter.... (20 Pins; 24 Pins)

LS7166, LS7166-S; LS7166-TS24

- 25MHz Count Frequency
- 8-Bit I/O bus
- 24-Bit Comparator
- **Programmable Count Modes:**
Quadrature (x1, x2, x4); Non-Quadrature Normal/Modulo-N; 24 Hour Clock; Non-Recycle, Binary; BCD
- TTL and CMOS compatible
- 3V to 5.5V operation

24-Bit x 2 Axes Multi-Mode Counter.... (28 Pins)

LS7266R1, LS7266R1-S, LS7266R1-TS

- Up to 30MHz Count Frequency
- 8-Bit I/O bus • Dual 24-Bit Comparator
- **Programmable Count Modes:**
Quadrature (x1, x2, x4); Non-Quadrature, Range Limit; Normal/Modulo-N; Non-Recycle, Binary; BCD
- TTL and CMOS compatible
- 3V to 5.5V operation

32-Bit Multi-Mode Counter with Serial Interface.... (14 Pins)

LS7366R, LS7366R-S, LS7366R-TS

- Synchronous (SPI) serial interface
- Up to 40MHz count frequency
- 32-bit Counter, Comparator, Input and Output Registers
- Two 8-bit registers to program functional modes
- 8-bit instruction register and 8-bit status register
- Programmable input for Counter Load Output Register Load or Counter Reset
- Modulo-N, Non-recycle, Range-limit or Free-running modes of up/down counting
- 8-bit, 16-bit, 24-bit and 32-bit programmable configuration
- 3V to 5.5V operation

24-Bit x 4 Multi-Mode Counter.... (48 Pins)

LS7566R-TS

- Up to 40MHz Count Frequency • 3-state Octal I/O Bus
- Each of the four Binary Counters have independent support circuits: Comparators, Registers, Latches, etc.
- **Programmable Count Modes include:**
Quadrature (x1, x2, x4); Non-Quadrature (Up/Down); Free-run; Non-recycle; Modulo-N; Range-limit
- 3V to 5.5V operation

32-Bit x 1-Axis Multi-Mode Counter..... (24 Pins; 38 Pins)

LS7766SO, LS7766SO-S, LS7766SO-TS; LS7766SH-TS

32-Bit x 2-Axes Multi-Mode Counter..... (28 Pins; 48 Pins)

LS7766DO, LS7766DO-S, LS7766DO-TS; LS7766DH-TS

- 40MHz (5V), 20MHz (3.3V) Count Frequency
- Separate mode-control registers for each axis
- Sets of 32-bit counters, input registers, output registers, comparators and octal status registers for each axis
- Pin selectable 3-state Hex / Octal Bus
- **SO / DO** = Single-axis / Dual-axes Octal I/O Bus
- **SH / DH** = Single-axis / Dual-axes with pin selectable Hex / Octal I/O Bus
- **Programmable Count Modes:**
Quadrature (x1, x2, x4); Non-Quadrature (Up/Down), Range Limit; Normal/Modulo-N; Non-Recycle
- 3V to 5.5V Operating voltage range

PIR SENSOR INTERFACE ICs

All ICs feature:

- Direct Interface to PIR sensor
- Two-stage differential amplifier-filter
- Amplifier-filter characteristics externally programmable
- Noise rejection circuitry
- Programmable on-time
- Single Pulse Mode
- *Dual Pulse Mode (*except LS6506R, LS6507R)
- LED indicator output

PIR Sensor Interface.... (16 Pins)

LS6501LP, LS6501LP-S, LS6501LP-SW

- Selectable dead time
- Ambient light inhibit
- Regulated 5V for PIR Sensor
- Triac/Relay output interface for AC/DC applications
- Applications include triac or relay controlled indoor occupancy sensors and outdoor motion-triggered lighting providing energy savings, security and convenience

PIR Sensor Interface.... (16 Pins)

LS6505, LS6505-S

- Selectable dead time
- Triac output interface
- Three operating modes
- **Each mode offers 3 operating conditions:**
Mode A: On - Auto - Off
***Mode B:** On then Auto until Off for 15 seconds - Prior condition – Off
Mode C: On then Auto - Auto - Off for 8 seconds then Auto
***Note: Mode B is compliant with California Title 24**
- Wall switch sensors are adaptable to 3-way operation with a remote switch

PIR Sensor Interface.... (16 Pins)

LS6506R, LS6506R-S; LS6507R, LS6507R-S **New!**

- **LS6506R** drives a Latching Relay • **LS6507R** drives a Triac
- Same common features as the other PIR Sensor Interface ICs except for Dual Pulse Mode
- Sensitivity adjustment • Pushbutton for Manual-On /Off control
- Ambient light override adjustment
- Selectable time-out adjustments
- **3 Operating Modes:**
 1. Manual On **or** Auto On / (Manual Off and Delayed Auto On) **or** (Manual Off and Manual On) **or** Auto Off
 2. Manual On / Manual Off **or** Auto Off
 3. Manual On **or** Auto On / Manual Off **or** Auto Off
- Applications include Ceiling or Wall-Mounted Occupancy Sensors for control of fluorescent lights, electronic and magnetic ballasts, motors (**LS6506R**), incandescent lamps (**LS6506R, LS6507R**)

PIR Sensor Interface.... (14 Pins)

LS6511, LS6511-S

LS6511N, LS6511N-S **New!**

- **LS6511N** backward compatible with **LS6511**
- Concurrent pulse mode
- 5V Shunt Regulator • Low Voltage Detection
- Direct relay drive • Very low quiescent current
- Ideal for security systems

PIR Sensor Interface.... (14 Pins; 16 Pins)

LS6512, LS6512-S; LS6513, LS6513-S **New!**

- **LS6512** same as **LS6511N** without Low Voltage Detection
- **LS6513** same as **LS6511N** and **LS6512** except Low Voltage Detection is User selectable and Enable function is an added feature which is also User selectable
- **LS6512** is ideal for automatic doors; motion-triggered remote monitoring (for cameras, etc.) **LS6513** can be used in any application in place of **LS6511N** and **LS6512** determined solely by the User selected features.

BRUSHLESS DC MOTOR CONTROLS

BLDC Motor Commutator/Controller.... (20 Pins)

LS7260, LS7260-S, LS7260-TS; LS7262, LS7262-S, LS7262-TS

- Open or closed loop control of 3 and 4 phase motors
- Hall Sensor inputs control output commutation sequence for electrical sensor spacings of 60°, 120°, 240°, or 300°
- Speed controlled by Pulse Width Modulation (PWM) of output drivers
- Control inputs include Analog Speed, Forward/Reverse, Output Enable and Positive Static Braking
- Overcurrent Sensing disables output drivers
- Direct drive of FETs (LS7260) and Bipolar Transistors (LS7262)
- 5V to 28V operation

BLDC Motor Commutator/Controller.... (20 Pins)

LS7362, LS7362-S, LS7362-TS

- Same features as LS7262 except Pulse Width Modulation occurs only in low-side drivers allowing use with High Voltage motors

BLDC Motor Controller.... (28 Pins)

LS7560N, LS7560N-S, LS7560N-TS;

LS7561N, LS7561N-S, LS7561N-TS

- Backwards compatible to LS7560, LS7561
- Single-Chip Open or Closed Loop Motor Controller
- **User Selectable Features Include:**
 - PWM of All Drivers or Low-Side Drivers Only
 - Polarity of High Side Drivers, Static or Dynamic Braking
 - 60°/300° or 120°/240° Electrical Sensor Spacing
- Level-Sensitive Enable
- Cycle-by-Cycle Overcurrent Sensing
- Overcurrent Condition Disables All Drivers (LS7560N) or Low-Side Drivers Only (LS7561N)
- Fault LED Indicator Output • 10V to 18V Operation

AC MOTOR CONTROLS

AC Motor Multi-Speed Controller.... (18 Pins)

LS7311, LS7311-S

- Pushbutton input controls
- Up to ten selectable Speed (power) Levels
- A selected Speed Level input becomes an output that can drive an LED to indicate the selected speed
- Run, Pulse and Off control inputs
- Applications include consumer appliances such as Blenders, Range Hoods, Fans, etc.

AC Motor Multi-Speed Controller.... (16 Pins)

LS7315, LS7315-SW

- Same features as LS7311 except there are no Run and Pulse inputs

AC Motor Multi-Speed Controller.... (14 Pins)

LS7317, LS7317-S

New!

- Pushbutton input controls
- Up to 5 selectable speed (power) levels
- Auto-Pulse, Boost and Off control inputs
- A selected speed level input becomes an output that can drive an LED to indicate the selected speed
- Applications include consumer appliances such as Blenders, Range Hoods, Fans, etc.

STEPPER MOTOR CONTROLS

Stepper Motor Controller..... (24 Pins)

LS7290, LS7290-S, LS7290-TS

New!

- Controls two-phase **Bipolar** and four-phase **Unipolar** motors
- **Inexpensive replacement for L297.**
- Direct interface to **L298 for Bipolar motors**
- Interfaces to four AND Gates driving four N-Channel MOSFETs for **Unipolar motors**
- **Programmable step sizes:** Full, 1/2, *1/4, *1/8, *1/16, *1/32
*Current feedback control not available for microsteps.
- **Nominal clock frequency:** 8MHz
- **Maximum stepping rate:** greater than 30k per second
- **Programmable inter-step blanking delays:** 1.25us, 2.5us, 3.75us, and 5us at 8MHz
- **H-bridge PWM resolution:** 0.39%
- Two PWM and Four Phase outputs for H-Bridge control
- On-chip Crystal Oscillator, RC Oscillator or External source, controls Step Frequency and Duty Cycle
- **Supply voltage:** 3V to 5.5V

Stepper Motor Controller.... (20 Pins; 20 Pins)

LS8297, LS8297-S, LS8297-TS;

LS8297CT, LS8297CT-S, LS8297CT-TS

New!

New!

- **Low cost, low current, pin-compatible replacement for L297.**
- Torque Ripple Compensated half-steps – **LS8297CT**
- Controls two-phase **Bipolar** and four-phase **Unipolar** motors
- Half-step and full-step modes
- Direct interface to **L298 for Bipolar motors**
- Interfaces to four AND Gates driving four N-Channel MOSFETs for **Unipolar motors**
- Normal/wave drive
- PWM chopper circuit for current control
- Two over current sense comparators with external references input
- All inputs and outputs TTL/CMOS compatible (TTL for 5V operation)
- **Supply current < 400uA**
- Supply voltage: 4.75 to 7V

Stepper Motor Controller.... (24 Pins)

LS8397, LS8397-S, LS8397-TS

New!

- **Low cost, low current, replacement for L297.**
- **L297** operating modes with added functions:
 - **Selectable Torque Ripple Compensation MODE**
 - **Selectable Holding Torque MODE**
- Other features same as LS8297

PROGRAMMABLE DIGITAL LOCKS

Automotive Ignition Digital Lock (14 Pins)

LS7220, LS7220-S

- 5,040 four digit Combinations (for a 10 number keypad)
- Combinations are hard-wire programmed
- Sense input enables chip operation
- Save Memory feature saves Unlock Condition for Valet Parking
- Save input sets Save Memory and Lock input resets Save Memory
- Save Memory and Lock Status outputs
- Convenience Delay determined by external capacitor
- Static or Momentary Lock Control output

Keypad Programmable Digital Lock (20 Pins)

LS7222, LS7222-S; LS7223, LS7223-S

- 38,416 four digit Combinations (for a 4 x 4 keypad matrix)
- 3 different user programmable codes
- LS7222 Programmable Codes: Arm, Disarm, Duress
- LS7223 Programmable Codes: Lock 1, Lock 2, Duress
- Lock and Program Status Outputs
- Static and Momentary Lock Control outputs
- Alarm and Tamper Detection outputs

Machine or Area Access Digital Lock (14 Pins)

LS7225, LS7225-S; LS7226, LS7226-S

- 5,040 four digit Combinations (for a 10 number keypad)
- Combinations are hard-wire programmed
- Sequence Enable Input enables Combination Entry
- Combination Entry time controlled by external capacitor
- Static or Momentary Lock Control Output
- Tamper Detection Output
- Lock Status Output

DIVIDERS

AC Line Frequency Dividers.... (8 Pins)

REDx/y, REDx/y-S

- Frequency division of 50Hz/60Hz sine waves
- 50Hz/60Hz Division Select input
- Reset and Enable input controls
- Clock input shaping network interfaces directly with 50Hz/60Hz AC Line through a current limiting resistor
- 4.5V to 15V operation
- Available Dividers:
5/6, 50/60, 100/120, 300/360, 500/600, 3000/3600

Selectable Six-Decade Divider.... (8 Pins)

RDD106, RDD106-S

- Backwards compatible to RDD104
- Divides by 10^1 , 10^2 , 10^3 , 10^4 , 10^5 , 10^6
- Division Select determined by state of two inputs
- Divides External Clock or Crystal Oscillator Frequency
- Up to 30MHz Frequency
- 3V to 15V operation

LS6506R LS6507R PRESS RELEASE

Versatile PIR Interface IC Controls Any Type of AC Load

LSI/CSI introduces the **LS6506R**, a step forward in PIR Sensor Interface ICs. Since the **LS6506R** is designed to drive a latching relay, it can be used in a Wall Switch configuration (no Neutral available) to enable the full AC Mains cycle to be applied across any load rendering the Wall Switch suitable for driving all types of resistive and inductive loads including incandescent lamps, fluorescent lamps, electronic and magnetic transformers, motors, etc. Products incorporating the **LS6506R** produce energy savings in commercial and home applications. A sister chip, the **LS6507R**, drives a triac in series with the load and is suitable to be used in a lower cost Wall Switch configuration for driving incandescent lamp loads.

For home and commercial occupancy sensor applications, the ICs can be used in Wall Switch configurations to manually or automatically switch loads on and off. For commercial applications, a feature is offered where the lights can be manually switched off and will remain off as long as motion is detected allowing for uninterrupted Power Point Presentations, etc.

Other features include:

- Five timeout selections ranging between 30 seconds and 30 minutes.
- Three operating modes.
- On-chip voltage regulator for reliable performance.
- PIR sensitivity adjustment.
- Ambient light override control.
- LED indication for motion detection.
- 50Hz/60Hz operation.

LS6506R and **LS6507R** are available in 16-Pin SOIC and DIP packages.

Quadrature Clock Converter Integrated Circuits

LSI/CSI announces the addition of five new devices to its family of Quadrature Clock Converter ICs. Designated **LS7082N1**, **LS7083N**, **LS7084N**, **LS7183N** and **LS7184N**, these devices are designed to interface between incremental encoders and counting devices by converting the encoder quadrature outputs into directional up/down clocks or clock and direction signals for driving the counting devices. When interfaced with microcontrollers, these devices can free up the resources of a microcontroller by relieving its computational burden used for decoding the quadrature signals. This is especially true at high speeds where the microcontroller becomes an unwieldy tool in performing the task effectively.

According to Peter J. Visconti, LSI's VP of Sales & Marketing, besides their primary application in motion control systems, these devices can be used in a variety of systems requiring control with directional clocks. One such application is replacing a mechanical potentiometer with a precision control comprised of a Rotary Encoder, Quadrature Clock Converter and Digital Potentiometer (think audio volume control, etc). These new Quadrature Clock Converters are backward compatible with their respective older versions, **LS7082N**, **LS7083**, **LS7084**, **LS7183** and **LS7184**, while providing an enhanced feature set.

Features include:

- x1, x2 or x4 frequency multiplication of the quadrature clock
- Up-clock and down-clock outputs or clock and direction outputs
- Programmable output clock pulse width
- On-chip filtering of quadrature inputs for added reliability
- Up to 16MHz output clock frequency
- 3V to 12V operation
- TTL and CMOS compatibility

LS7082N1 is available in 14-Pin DIP and SOIC packages.

LS7083N, **LS7084N**, **LS7183N** and **LS7184N** are available in 8-Pin DIP and SOIC packages.

Mixed-Signal Full Custom Integrated Circuits from LSI/CSI

In addition to its line of Standard Product ICs, LSI/CSI has been producing Turnkey, Mixed-Signal Full Custom ICs for a broad range of industries **since 1969**.

Our **Capabilities Brochure** describes the Processes, Non-Volatile Memory Options and Design Methodologies that show why we are the ideal high-volume, low-cost solution.

Please contact us to receive our **Capabilities Brochure**.

We can be reached at **631-271-0400**, or **sales@lsicsi.com**.

Alternatively, you can download this brochure from our Web Site at: **<http://www.lsicsi.com/brochure.htm>**.

LS7211N, LS7212N, LS7215, LS7216 PRESS RELEASE

PROGRAMMABLE DIGITAL DELAY TIMER ICs

LSI/CSI announces the addition of four new devices to its family of Programmable Digital Delay Timers. Designated **LS7211N**, **LS7212N**, **LS7215** and **LS7216**, these ICs provide delay times programmable from microseconds to days using 8 Binary-Weighted Delay bits. An external clock or oscillator can be used as the time base for these ICs. The on-chip oscillator for **LS7211N**, **LS7215** is controlled by an external RC while the on-chip oscillator for the **LS7212N**, **LS7216** is controlled by an external crystal.

The ICs can be operated in either of **4 Operating Modes**:

1. One-Shot
2. Delayed Operate
3. Delayed Release
4. Dual Delay.

Selectable prescalers are available to generate delays in units of minutes from 50Hz / 60Hz frequency sources (**LS7211N**, **LS7215**) and delays in units of seconds or minutes from a Watch Crystal (**LS7212N**, **LS7216**).

According to Pete Visconti, LSI/CSI's VP of Sales and Marketing, the ability of **LS7215** and **LS7216** to latch Binary-Weighted Delay bits from a shared 8-bit Bus opens up applications for these ICs to be used in a wide range of uC based systems. Typical applications include Time Delay Relays for Medical Equipment, HVAC, Automotive, Security Systems, Lighting Controls, etc.

Providing added flexibility, the **LS7215** and **LS7216** have an Open-Drain Output in addition to the standard push-pull Output available on the **LS7211N** and **LS7212N**. This added output allows the IC to direct drive a Relay coil returned to the same voltage as the chip VDD or, using one external transistor, the IC can control a Relay coil returned to a voltage as high as 110V with a chip VDD as low as 3V. The push-pull Output can be used to light an LED to indicate that the Relay coil is energized.

Other features include:

- Wide Operating voltage range: 3V to 18V
- Low Current Drain
- Direct drive of Relays
- Triggered input for delay initiation
- Reset Input for Delay abort

LS7211N and **LS7212N** are available in 18-Pin DIP and SOIC packages.

LS7215 and **LS7216** are available in 20-Pin DIP and SOIC packages.

LS7636, LS7637 PRESS RELEASE

New Reverse Phase (Trailing-Edge) Dimmer ICs Eliminate RFI

LSI/CSI announces the addition of four innovative Reverse Phase Dimmers, **LS7636**, **LS7636FO**, **LS7637** and **LS7637FO**, to its extensive line of Lighting Control ICs. According to Pete Visconti, VP Sales and Marketing, "A huge advantage is gained by our customers using LSI's ICs employing Reverse Phase (Trailing-Edge) technology driving FETs or IGBTs. These new ICs overcome the disadvantages associated with triac-based (Leading-Edge) dimmers. Dimmers made with these new ICs eliminate the RFI generated by triac-based light dimmers that can interfere with a nearby electronics such as an AM radio."

A Reverse Phase Dimmer IC turns on the drive transistors at the zero-crossover point of each half cycle, enabling a slow current rise. Current is terminated later during the half-cycle depending on the desired dimming level. RFI generation is minimized since power to the load is not turned on abruptly as with leading-edge (triac-based) dimmers eliminating the need for external filtering. Another important benefit is that these Dimmer ICs can drive **any** Electronic Transformer.

The LS7636 ICs automatically reverse direction when reaching maximum or minimum intensity while the LS7637 ICs stop dimming when reaching maximum or minimum intensity. LSI's **LS7636FO** and **LS7637FO** versions power up to **Full-On** intensity when AC power is first applied.

All of these ICs have three selectable operating modes. These modes allow the load to be turned on to maximum intensity or to a previous set memory level in response to a short pushbutton application and to continue dimming in the same direction or reverse with each new long pushbutton application.

Other features include:

- Soft turn-on and soft turn-off.
- Local or remote Pushbutton control. Local Touch control.
- Interfaces with N-Channel FETs or IGBT power devices to drive output loads.
- **Two application configurations available:**
 1. A single output driver version for moderate power loads.
 2. A dual output driver version for large power loads.
- Over Current Sense Input shuts down the output if the voltage across a fractional-Ohm feedback resistor exceeds an internal threshold.
- 50Hz/60Hz AC line frequency
- 115VAC/220VAC operation
- Supply voltage: 12V

LS7636, **LS7636FO**, **LS7637** and **LS7637FO** are available in 8-Pin DIP and SOIC packages

LS8297, LS8297CT, LS8397 PRESS RELEASE

Precision, Low Cost, Stepper Motor Controller ICs for Bipolar and Unipolar Motors

LSI/CSI announces the availability of three new high performance stepper motor controller ICs. Designated **LS8297**, **LS8297CT** and **LS8397**, these ICs can replace the expensive **L297** in all applications, while providing additional features not available in **L297**. According to Pete Visconti, LSI's VP Sales and Marketing, all these devices offer half-step and full-step sequences in both normal drive and wave drive modes similar to the **L297**. In addition the **LS8297CT** and the **LS8397** offer correction for the torque-ripple, not provided in **L297** half-step sequence. A power saving holding-torque mode is also available in **LS8397** for maintaining the drivers at a reduced power level when the motor is not turning. Four phase outputs and two inhibit outputs are provided for driving external H-bridge drivers, allowing for the selection of a standard driver, such as the popular L298 or an application specific custom driver. An external reference voltage, in conjunction with the winding current sense voltages, regulate the PWM duty cycles of the driver outputs. One of two decay modes, fast-decay and slow-decay, can be selected to suit the characteristics of the motor winding.

LS8297 and LS8297CT features include:

- Pin-for-pin cost effective replacement for **L297**
- Half and full step sequences
- Normal-drive/wave-drive
- Torque ripple correction in **LS8297CT**
- PWM chopper circuit for motor current control
- Inputs for step, forward/reverse, reset and output blanking control
- Supply current < 400uA
- Supply voltage: 4.5V to 7V

LS8397 includes all of the above plus a mode for reduced power holding torque.

LS8297 and **LS8297CT** are available in available in 20-pin DIP, SOIC and TSSOP packages

LS8397 is available in 24-pin DIP, SOIC and TSSOP packages

- ADVANCE INFORMATION ICs -

COUNTERS

32-Bit Binary Up Counter (18 Pins; 24 Pins)

Prototype SOICs available for evaluation!

LS7060C, LS7060C-S, LS7062C, LS7062C-S;

LS7061C, LS7061C-S, LS 7061C-SD,

LS7063C, LS7063C-S, LS7063C-SD

- Same features as **LS7060**, **LS7062** and **LS7061**, **LS7063**, respectively, except operation is at higher speed and lower power.

[Advance Information IC Data Sheets](#) can be obtained by calling **631-271-0400
or sending an e-mail to **sales@lsicsi.com**. We welcome your comments and suggestions.**

ORDERING SYSTEM

CODE	PACKAGE	NOTES
P/N	RoHS Compliant Standard Plastic DIP	1, 2, 3
P/N - SD	RoHS Compliant Skinny DIP option	1, 2, 3
P/N - S	RoHS Compliant Standard SOIC	1, 2, 3, 4
P/N - SW	RoHS Compliant Widebody SOIC option	1, 2, 3, 4
P/N - S14	RoHS Compliant 14-Pin SOIC version of 8-pin part	1, 2, 3, 4
P/N - C	Ceramic DIP Option	1, 2, 3, 5
P/N - CM	Ceramic Military DIP Option	1, 2, 3, 6
P/N - TS	RoHS Compliant TSSOP	1, 2, 3, 4
P/N - TS24	24-pin RoHS Compliant TSSOP version of 20-pin part	1, 2, 3, 4

Note 1: See Table 1 for package body widths

Note 2: Package outline drawings conform to JEDEC standards

Note 3: Packages shipped in anti-static tubes

Note 4: Tape and Reel option is available. Contact factory for details.

Note 5: Includes Mil-Std 883E Class B visual per Method 2014, plus fine and gross leak testing per Method 1014

Note 6: Includes all testing per Note 5 plus HTRB Burn-In at 125 degrees C for 168 hours per Mil-Std 883E Class B, Method 1015.

Table 1. Package Body Width (mils) - All packages conform to JEDEC Standards

# of Pins	P/N, -C, -CM	-SD	-S	-SW	-TS
8	300	-	150	-	-
14	300	-	150	-	173
16	300	-	150	300	-
18	300	-	300	-	-
20	300	-	300	-	173
24	600	300	300	-	173
28	600	*	300	-	173
38	-	-	-	-	173
40	600	-	-	-	-
48	-	-	-	-	240

***28-Pin 'SD' package is no longer available.**

ADDITIONAL ORDERING OPTIONS:

Probed Wafers (P/N-PW), Waffle Packed Die (P/N-WP)

Non-RoHS Compliant Packages may be available by Special Order - Contact Factory for details.

All our Standard Products are assembled in RoHS compliant packages. Non-RoHS packages may be available on special order. Please contact our Sales Department for more information.

LSI/CSI is certified to ISO 9001:2000.

LSI/CSI has been ISO certified since 1996.

LSI/CSI [Data Sheets](#) can be downloaded directly from our website, www.lsicsi.com.

Price and delivery information can be obtained by calling **631-271-0400** or sending an e-mail to sales@lsicsi.com.

[Package Outline Drawings](#) are available at: <http://www.lsicsi.com/orderinginfo.htm>

LSI/CSI



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