# RENESAS

EL7412

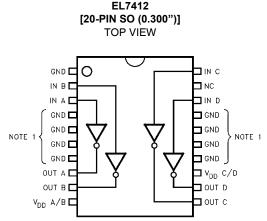
## High Speed, Four Channel Power MOSFET Drivers

FN7287 Rev 1.00 August 26, 2004

DATASHEET

The EL7412 contains (4) high performance matched drivers. These very high speed drivers are capable of delivering peak currents of 2.0 amps into highly capacitive loads and are ideally suited for "Full bridge' and ultrasound applications. The high speed performance is achieved by means of a proprietary "Turbo-Driver' circuit that speeds up input stages by tapping the wider voltage swing at the output. Improved speed and drive capability are enhanced by matched rise and fall delay times. The matched delays maintain the integrity of input-to-output pulse-widths to reduce timing errors and clock skew problems. This improved performance is accompanied by a 10 fold reduction in supply currents over bipolar drivers, yet without the delay time problems commonly associated with CMOS devices. Dynamic switching losses are minimized with nonoverlapped drive techniques.

# Pinout



Note 1: Pins 4-7 and 14-17 are electrically connected.

Manufactured under U.S. Patent Nos. 5,334,883, #5,331,047

### Features

OBSOLETE PRODUCT NO RECOMMENDED REPLACEMENT contact our Technical Support Center at

1-888-INTERSIL or www.intersil.com/tsc

- Excellent response times
- · Matched rise and fall times
- Reduced clock skew
- Low output impedance
- Low input capacitance
- High noise immunity
- Improved clocking rate
- · Low supply current
- Wide operating voltage range
- Pb-free available

### **Applications**

- Full bridge drivers
- Clock/line drivers
- CCD Drivers
- Ultra-sound transducer drivers
- Power MOSFET drivers
- · Switch mode power supplies
- Class D switching amplifiers
- Ultrasonic and RF generators
- Pulsed circuits

# **Ordering Information**

| PART NUMBER                  | PACKAGE                         | TAPE &<br>REEL | PKG. DWG.<br># |
|------------------------------|---------------------------------|----------------|----------------|
| EL7412CM                     | 20-Pin SO (0.300")              | -              | MDP0027        |
| EL7412CM-T13                 | 20-Pin SO (0.300")              | 13"            | MDP0027        |
| EL7412CMZ<br>(See Note)      | 20-Pin SO (0.300")<br>(Pb-free) | -              | MDP0027        |
| EL7412CMZ-<br>T13 (See Note) | 20-Pin SO (0.300")<br>(Pb-free) | 13"            | MDP0027        |

NOTE: Intersil Pb-free products employ special Pb-free material sets; molding compounds/die attach materials and 100% matte tin plate termination finish, which is compatible with both SnPb and Pb-free soldering operations. Intersil Pb-free products are MSL classified at Pb-free peak reflow temperatures that meet or exceed the Pb-free requirements of IPC/JEDEC J-Std-020C.



#### **Absolute Maximum Ratings** $(T_A = 25^{\circ}C)$

| Supply (V+ to Gnd) 16.5                 | V |
|---|---|
| Input Pins                              | + |
| Combined Peak Output Current            | А |
| Storage Temperature Range65°C to +150°C |   |

 Ambient Operating Temperature
 -40°C to +85°C
 Operating Junction Temperature
 125°C

 Power Dissipation
 See Curves
 See Curves

CAUTION: Stresses above those listed in "Absolute Maximum Ratings" may cause permanent damage to the device. This is a stress only rating and operation of the device at these or any other conditions above those indicated in the operational sections of this specification is not implied.

IMPORTANT NOTE: All parameters having Min/Max specifications are guaranteed. Typical values are for information purposes only. Unless otherwise noted, all tests are at the specified temperature and are pulsed tests, therefore:  $T_J = T_C = T_A$ 

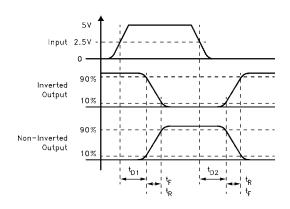
| DESCRIPTION               | TEST CONDITIONS   | MIN   | TYP  | MAX   | UNITS  |
|---------------------------|---|---|--|---|--|
|                           |   |   |  |   |  |
| Logic "1' Input Voltage   |   | 2.4   |  |   | V  |
| Logic "1' Input Current   | @V <sub>DD</sub>  |   | 0.1  | 10  | μA   |
| Logic "0' Input Voltage   |   |   |  | 0.8   | V  |
| Logic "0' Input Current   | @0V   |   | 0.1  | 10  | μA   |
| Input Hysteresis          |   |   | 0.3  |   | V  |
|                           |   | -   |  |   |  |
| Pull-Up Resistance        | I <sub>OUT</sub> = -100mA   |   | 3  | 6   | Ω  |
| Pull-Down Resistance      | I <sub>OUT</sub> = +100mA   |   | 4  | 6   | Ω  |
| Peak Output Current       | Source<br>Sink  |   | 2<br>2   |   | A  |
| Continuous Output Current | Source/Sink   | 100   |  |   | mA   |
| Y                         |   | -+  |  |   | -+   |
| Power Supply Current      | Inputs High   |   | 2  | 5   | mA   |
| Operating Voltage         |   | 4.5   |  | 15  | V  |
|                           | Logic "1' Input Voltage<br>Logic "1' Input Current<br>Logic "0' Input Voltage<br>Logic "0' Input Current<br>Input Hysteresis<br>Pull-Up Resistance<br>Pull-Down Resistance<br>Peak Output Current<br>Continuous Output Current<br>Y<br>Power Supply Current | Logic "1' Input Voltage         Logic "0' Input Voltage         Logic "0' Input Voltage         Logic "0' Input Current         @ 0V         Input Hysteresis         Pull-Up Resistance         Pull-Down Resistance         IOUT = -100mA         Pull-Down Resistance         IOUT = +100mA         Peak Output Current         Source Sink         Y         Power Supply Current         Inputs High | Logic "1' Input Voltage       2.4         Logic "1' Input Current       @VDD         Logic "0' Input Voltage | Logic "1' Input Voltage       2.4         Logic "1' Input Current       @ V <sub>DD</sub> 0.1         Logic "0' Input Voltage | Logic "1' Input Voltage2.4Logic "1' Input Current@VDD0.1Logic "0' Input Voltage0.8Logic "0' Input Current@0V0.1Input Hysteresis0.3Pull-Up ResistanceIOUT = -100mA3Pull-Down ResistanceIOUT = +100mA4Peak Output CurrentSource2Sink25YPower Supply CurrentInputs High2Power Supply CurrentInputs High25 |

### **DC Electrical Specifications** $T_A = 25^{\circ}C$ , $V_{DD} = 15V$ unless otherwise specified

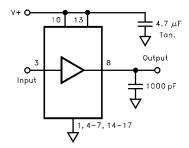
#### AC Electrical Specifications $T_A = 25^{\circ}C$ , V = 15V unless otherwise specified

| PARAMETER                 | DESCRIPTION         | TEST CONDITIONS                                   | MIN | ТҮР       | MAX | UNITS |  |
|---------------------------|---------------------|---|-----|-----------|-----|-------|--|
| SWITCHING CHARACTERISTICS |                     |   |     |           |     |       |  |
| t <sub>R</sub>            | Rise Time           | C <sub>L</sub> = 500pF<br>C <sub>L</sub> = 1000pF |     | 7.5<br>10 | 20  | ns    |  |
| t <sub>F</sub>            | Fall Time           | C <sub>L</sub> = 500pF<br>C <sub>L</sub> = 1000pF |     | 10<br>13  | 20  | ns    |  |
| <sup>t</sup> D1           | Turn-On Delay Time  | See Timing Table                                  |     | 18        | 25  | ns    |  |
| t <sub>D2</sub>           | Turn-Off Delay Time | See Timing Table                                  |     | 20        | 25  | ns    |  |

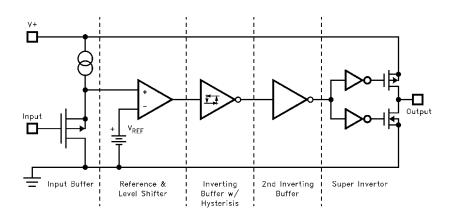
# Timing Table



# Standard Test Configuration



# Simplified Schematic





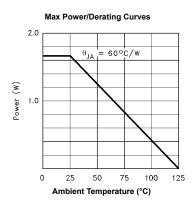
# Typical Performance Curves

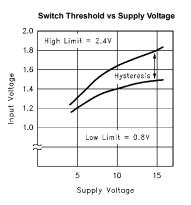
10.00

2.000 I<sub>IN</sub> (mA) /div

> -10.00 -5.0

0

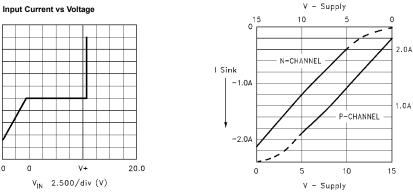




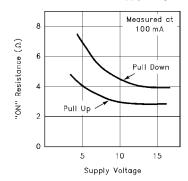
Peak Drive vs Supply Voltage

I Source

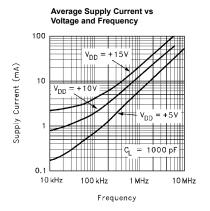




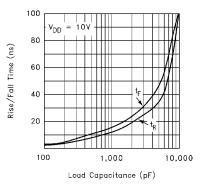
#### "ON' Resistance vs Supply Voltage

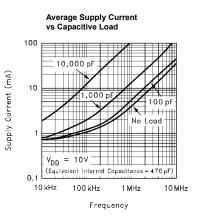


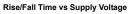
# Typical Performance Curves (Continued)

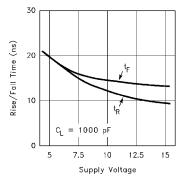






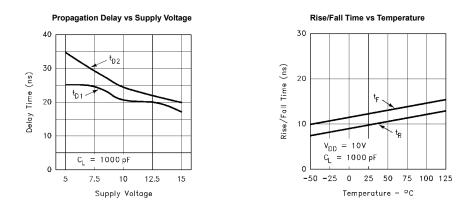




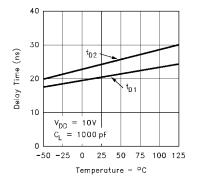




# Typical Performance Curves (Continued)







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