# RENESAS

# DATASHEET

# EL7104

High Speed, Single Channel, Power MOSFET Driver

The EL7104 is a matched driver IC that improves the operation of the industry-standard TC-4420/29 clock drivers. The Elantec version is a very high speed driver capable of delivering peak currents of 1A into highly capacitive loads. 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. These 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 drivers.

The EL7104 is available in 8-pin SO and 8-pin PDIP packages and is specified for operation over the full -40°C to +85°C temperature range.

# **Ordering Information**

PART NUMBER	PART MARKING	PACKAGE	TAPE & REEL	PKG. DWG. #
EL7104CN	EL7104CN	8 Ld PDIP	-	MDP0031
EL7104CNZ	EL7104CN Z	8 Ld PDIP*	-	MDP0031
EL7104CS	7104CS	8 Ld SOIC	-	MDP0027
EL7104CS-T7	7104CS	8 Ld SOIC	7"	MDP0027
EL7104CS-T13	7104CS	8 Ld SOIC	13"	MDP0027
EL7104CSZ (See Note)	7104CSZ	8 Ld SOIC (Pb-free)	-	MDP0027
EL7104CSZ-T7 (See Note)	7104CSZ	8 Ld SOIC (Pb-free)	7"	MDP0027
EL7104CSZ-T13 (See Note)	7104CSZ	8 Ld SOIC (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 are RoHS compliant and 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-020.

\*Pb-free PDIPs can be used for through hole wave solder processing only. They are not intended for use in Reflow solder processing applications. FN7113 Rev 2.00 July 6, 2006

## Features

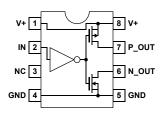
- Industry-standard driver replacement
- Improved response times
- Matched rise and fall times
- Reduced clock skew
- Low output impedance
- Low input capacitance
- High noise immunity
- Improved clocking rate
- Low supply current
- · Wide operating range
- · Separate drain connections
- Pb-Free available (RoHS compliant)

## Applications

- Clock/line drivers
- CCD drivers
- Ultrasound transducer drivers
- Power MOSFET drivers
- · Switch mode power supplies
- · Resonant charging
- Cascoded drivers

## Pinout







#### **Absolute Maximum Ratings** (T<sub>A</sub> = 25°C)

Supply (V+ to GND)	
Input Pins	0.3V to +0.3V above V+
Peak Output Current	
Ambient Operating Temperature	40°C to +85°C

Storage Temperature Range	65°C to +150°C
Operating Junction Temperature	+125°C
Power Dissipation	
SO	570mW
PDIP	1050mW

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. Typ values are for information purposes only. Unless otherwise noted, all tests are at the specified temperature and are pulsed tests, therefore:  $T_J = T_C = T_A$ 

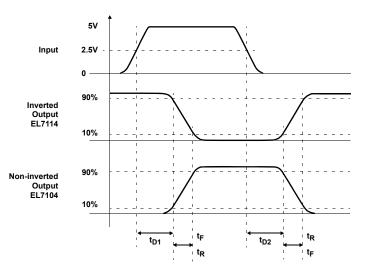
### DC Electrical Specifications V+ = 15V, T<sub>A</sub> = 25°C unless otherwise specified.

PARAMETER	DESCRIPTION	CONDITIONS	MIN	ТҮР	MAX	UNIT
INPUT		·				
V <sub>IH</sub>	Logic "1" Input Voltage		2.4			V
IIH	Logic "1" Input Current	@V+		0.1	10	μA
V <sub>IL</sub>	Logic "0" Input Voltage				0.8	V
IIL	Logic "0" Input Current	@0V		0.1	10	μA
V <sub>HVS</sub>	Input Hysteresis			0.3		V
OUTPUT			H			
R <sub>OH</sub>	Pull-Up Resistance	I <sub>OUT</sub> = -100mA		1.5	4	Ω
R <sub>OL</sub>	Pull-Down Resistance	I <sub>OUT</sub> = +100mA		2	4	Ω
IOUT	Output Leakage Current	V+/GND		0.2	10	μA
I <sub>PK</sub>	Peak Output Current	Source/Sink		4.0		Α
IDC	Continuous Output Current	Source/Sink	200			mA
POWER SUPPL	Y		I.		1	1
IS	Power Supply Current	Input = V+		4.5	7.5	mA
V <sub>S</sub>	Operating Voltage		4.5		16	V

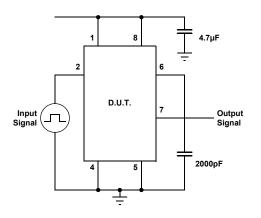
### AC Electrical Specifications V = 15V, T<sub>A</sub> = 25°C unless otherwise specified.

PARAMETER	DESCRIPTION	CONDITIONS	MIN	ТҮР	MAX	UNIT			
SWITCHING CHARACTERISTICS ( $V_{DD} = V_H = 12V$ ; $V_L = -3V$ )									
t <sub>R</sub>	Rise Time	C <sub>L</sub> = 1000pF		7.5		ns			
		C <sub>L</sub> = 2000pF		10	20	ns			
t <sub>F</sub>	Fall Time	C <sub>L</sub> = 1000pF		10		ns			
		C <sub>L</sub> = 2000pF		15	20	ns			
t <sub>D-ON</sub>	Turn-On Delay Time	See Timing Table		18	25	ns			
t <sub>D-OFF</sub>	Turn-Off Delay Time	See Timing Table		18	25	ns			

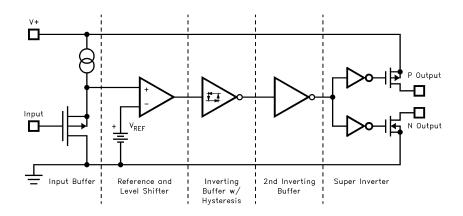
# Timing Table



# Standard Test Configuration



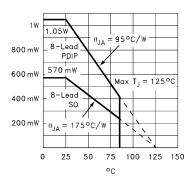
# Simplified Schematic



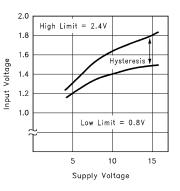


# **Typical Performance Curves**

#### MAX POWER/DERATING CURVES

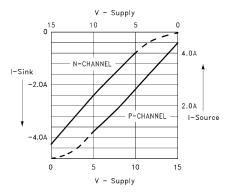


SWITCH THRESHOLD vs SUPPLY VOLTAGE

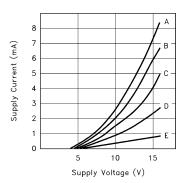


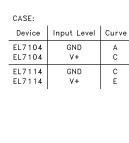
PEAK DRIVE vs SUPPLY VOLTAGE

INPUT CURRENT vs VOLTAGE

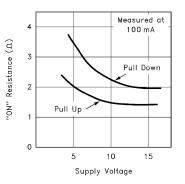


QUIESCENT SUPPLY CURRENT

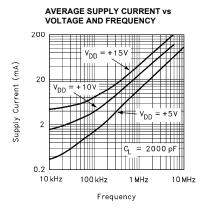




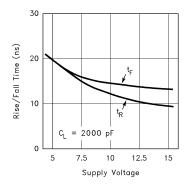
"ON" RESISTANCE vs SUPPLY VOLTAGE



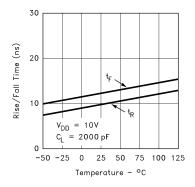
# Typical Performance Curves (Continued)

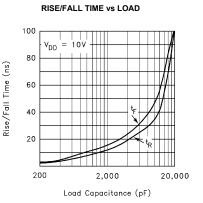




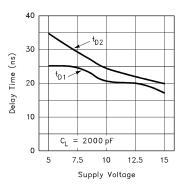


**RISE/FALL TIME vs TEMPERATURE** 

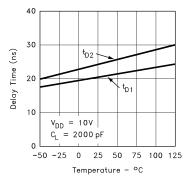


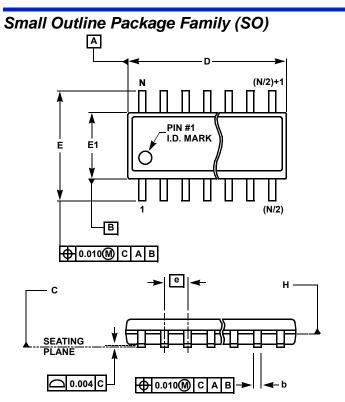


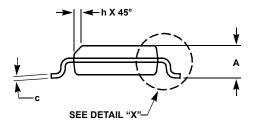
PROPAGATION DELAY vs SUPPLY VOLTAGE

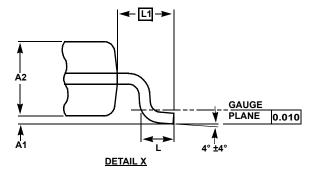


#### RISE/FALL TIME vs TEMPERATURE









### **MDP0027**

SMALL OUTLINE PACKAGE FAMILY (SO)

NOTES	TOLERANCE	SO28 (SOL-28)	SO24 (SOL-24)	SO20 (SOL-20)	SO16 (0.300") (SOL-16)	SO16 (0.150")	SO-14	SO-8	SYMBOL
-	MAX	0.104	0.104	0.104	0.104	0.068	0.068	0.068	А
-	±0.003	0.007	0.007	0.007	0.007	0.006	0.006	0.006	A1
-	±0.002	0.092	0.092	0.092	0.092	0.057	0.057	0.057	A2
-	±0.003	0.017	0.017	0.017	0.017	0.017	0.017	0.017	b
-	±0.001	0.011	0.011	0.011	0.011	0.009	0.009	0.009	С
1, 3	±0.004	0.704	0.606	0.504	0.406	0.390	0.341	0.193	D
-	±0.008	0.406	0.406	0.406	0.406	0.236	0.236	0.236	Е
2, 3	±0.004	0.295	0.295	0.295	0.295	0.154	0.154	0.154	E1
-	Basic	0.050	0.050	0.050	0.050	0.050	0.050	0.050	е
-	±0.009	0.030	0.030	0.030	0.030	0.025	0.025	0.025	L
-	Basic	0.056	0.056	0.056	0.056	0.041	0.041	0.041	L1
-	Reference	0.020	0.020	0.020	0.020	0.013	0.013	0.013	h
-	Reference	28	24	20	16	16	14	8	Ν

NOTES:

1. Plastic or metal protrusions of 0.006" maximum per side are not included.

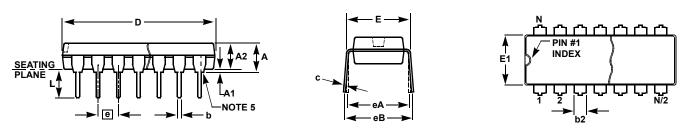
2. Plastic interlead protrusions of 0.010" maximum per side are not included.

3. Dimensions "D" and "E1" are measured at Datum Plane "H".

4. Dimensioning and tolerancing per ASME Y14.5M-1994



# Plastic Dual-In-Line Packages (PDIP)



#### MDP0031 PLASTIC DUAL-IN-LINE PACKAGE

SYMBOL	PDIP8	PDIP14	PDIP16	PDIP18	PDIP20	TOLERANCE	NOTES
А	0.210	0.210	0.210	0.210	0.210	MAX	
A1	0.015	0.015	0.015	0.015	0.015	MIN	
A2	0.130	0.130	0.130	0.130	0.130	±0.005	
b	0.018	0.018	0.018	0.018	0.018	±0.002	
b2	0.060	0.060	0.060	0.060	0.060	+0.010/-0.015	
С	0.010	0.010	0.010	0.010	0.010	+0.004/-0.002	
D	0.375	0.750	0.750	0.890	1.020	±0.010	
E	0.310	0.310	0.310	0.310	0.310	+0.015/-0.010	
E1	0.250	0.250	0.250	0.250	0.250	±0.005	
е	0.100	0.100	0.100	0.100	0.100	Basic	
eA	0.300	0.300	0.300	0.300	0.300	Basic	
eB	0.345	0.345	0.345	0.345	0.345	±0.025	
L	0.125	0.125	0.125	0.125	0.125	±0.010	
Ν	8	14	16	18	20	Reference	

NOTES:

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- 1. Plastic or metal protrusions of 0.010" maximum per side are not included.
- 2. Plastic interlead protrusions of 0.010" maximum per side are not included.
- 3. Dimensions E and eA are measured with the leads constrained perpendicular to the seating plane.
- 4. Dimension eB is measured with the lead tips unconstrained.
- 5. 8 and 16 lead packages have half end-leads as shown.

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