

# MC10H643

## Dual Supply ECL to TTL 1:8 Clock Driver

### Description

The MC10H643 is a dual supply, low skew translating 1:8 clock driver. Devices in the ON Semiconductor H643 translator series utilize the PLCC-28 for optimal power pinning, signal flow through and electrical performance. The dual-supply H643 is similar to the H641, which is a single-supply 1:9 version of the same function.

The device features a 48 mA TTL output stage, with AC performance specified into a 50 pF load capacitance. A Latch is provided on-chip. When LEN is LOW (or left open, in which case it is pulled LOW by the internal pulldowns) the latch is transparent. A HIGH on the enable pin ( $\overline{EN}$ ) forces all outputs LOW.

The MC10H643 is compatible with MECL 10H™ ECL logic levels.

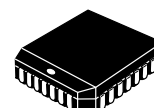
### Features

- ECL/TTL Version of Popular ECLinPS™ E111
- Low Skew Within Device 0.5 ns
- Guaranteed Skew Spec Part-to-Part 1.0 ns
- Latch
- Differential Internal Design
- $V_{BB}$  Output
- Dual Supply
- Reset/Enable
- Multiple TTL and ECL Power/Ground Pins
- These Devices are Pb-Free, Halogen Free and are RoHS Compliant



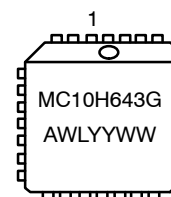
**ON Semiconductor®**

[www.onsemi.com](http://www.onsemi.com)



PLCC-28  
FN SUFFIX  
CASE 776-02

### MARKING DIAGRAM\*



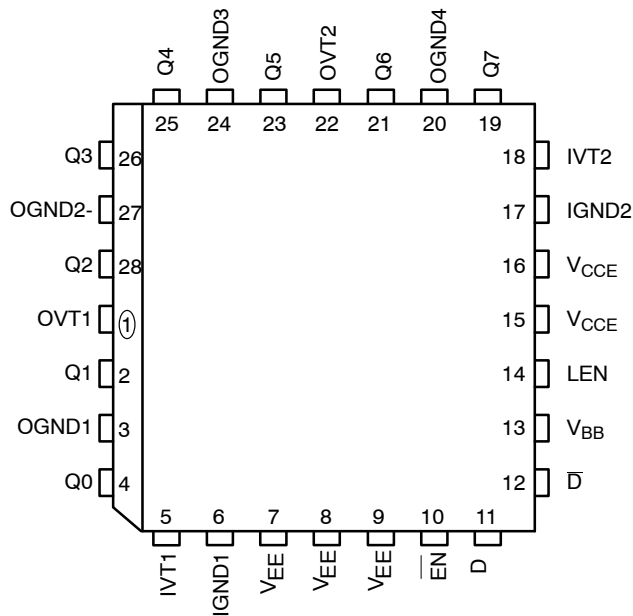
A = Assembly Location  
WL = Wafer Lot  
YY = Year  
WW = Work Week  
G = Pb-Free Package

\*For additional marking information, refer to Application Note [AND8002/D](#).

### ORDERING INFORMATION

Device	Package	Shipping
MC10H643FNG	PLCC-28 (Pb-Free)	37 Units/Tube

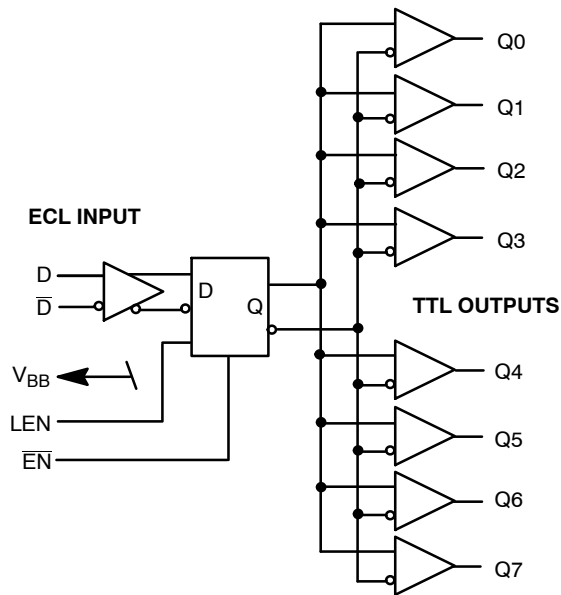
# MC10H643



**Figure 1. Pinout: PLCC-28**  
(Top View)

**Table 1. PIN DESCRIPTION**

PIN	FUNCTION
OGND	TTL Output Ground (0V)
OVT	TTL Output $V_{CC}$ (+5.0V)
IGND	Internal TTL GND (0V)
IVT	Internal TTL $V_{CC}$ (+5.0V)
$V_{EE}$	ECL $V_{EE}$ (-5.2/-4.5V)
$V_{CCE}$	ECL Ground (0V)
D, $\bar{D}$	Signal Input (ECL)
$V_{BB}$	$V_{BB}$ Reference Output
Q0 - Q7	Signal Outputs (TTL)
EN	Enable Input (ECL)
LEN	Latch Enable Input (ECL)



**Figure 2. Logic Diagram**

**Table 2. TRUTH TABLE**

D	LEN	EN	Q
L	L	L	L
H	L	L	H
X	H	L	$Q_0$
X	X	H	L

# MC10H643

**Table 3. DC CHARACTERISTICS** (IVT = OVT = 5.0 V  $\pm$  5%; V<sub>EE</sub> = -5.2 V  $\pm$  5%)

Symbol	Characteristic		Condition	0°C		25°C		85°C		Unit
				Min	Max	Min	Max	Min	Max	
I <sub>EE</sub>	Power Supply Current	ECL	V <sub>EE</sub> Pins	–	42	–	42	–	42	mA
I <sub>CCL</sub>		TTL	Total all OVT and IVT pins	–	106	–	106	–	106	mA
I <sub>CCH</sub>				–	95	–	95	–	95	mA

NOTE: Device will meet the specifications after thermal equilibrium has been established when mounted in a test socket or printed circuit board with maintained transverse airflow greater than 500 lfpm. Electrical parameters are guaranteed only over the declared operating temperature range. Functional operation of the device exceeding these conditions is not implied. Device specification limit values are applied individually under normal operating conditions and not valid simultaneously.

**Table 4. ECL DC CHARACTERISTICS** (IVT = OVT = 5.0 V  $\pm$  5%; V<sub>EE</sub> = -5.2 V  $\pm$  5%)

Symbol	Characteristic	0°C		25°C		85°C		Unit
		Min	Max	Min	Max	Min	Max	
I <sub>INH</sub> I <sub>INL</sub>	Input HIGH Current Input LOW Current	– 0.5	255 –	– 0.5	175 –	– 0.5	175 –	μA
V <sub>IH</sub> V <sub>IL</sub>	Input HIGH Voltage Input LOW Voltage	–1170 –1950	–840 –1480	–1130 –1950	–810 –1480	–1070 –1950	–735 –1450	mV
V <sub>BB</sub>	Output Reference Voltage	–1380	–1270	–1350	–1250	–1310	–1190	mV

NOTE: Device will meet the specifications after thermal equilibrium has been established when mounted in a test socket or printed circuit board with maintained transverse airflow greater than 500 lfpm. Electrical parameters are guaranteed only over the declared operating temperature range. Functional operation of the device exceeding these conditions is not implied. Device specification limit values are applied individually under normal operating conditions and not valid simultaneously.

**Table 5. DC TTL CHARACTERISTICS** (IVT = OVT = 5.0 V  $\pm$  5%; V<sub>EE</sub> = -5.2 V  $\pm$  5%)

Symbol	Characteristic	Condition	0°C		25°C		85°C		Unit
			Min	Max	Min	Max	Min	Max	
V <sub>OH</sub>	Output HIGH Voltage	I <sub>OH</sub> = -3.0 mA I <sub>OH</sub> = -15 mA	2.5 2.0	– –	2.5 2.0	– –	2.5 2.0	– –	V
V <sub>OL</sub>	Output LOW Voltage	I <sub>OH</sub> = 48 mA	–	0.5	–	0.5	–	0.5	V
I <sub>OS</sub>	Output Short Circuit Current	V <sub>OUT</sub> = 0 V	–100	–225	–100	–225	–100	–225	mA

NOTE: Device will meet the specifications after thermal equilibrium has been established when mounted in a test socket or printed circuit board with maintained transverse airflow greater than 500 lfpm. Electrical parameters are guaranteed only over the declared operating temperature range. Functional operation of the device exceeding these conditions is not implied. Device specification limit values are applied individually under normal operating conditions and not valid simultaneously.

# MC10H643

**Table 6. AC CHARACTERISTICS** (IVT = OVT = 5.0 V  $\pm$  5%; V<sub>EE</sub> = -5.2 V  $\pm$  10%; V<sub>CC</sub>E = GND)

Symbol	Characteristic	Condition	0°C		25°C		85°C		Unit
			Min	Max	Min	Max	Min	Max	
t <sub>PLH</sub>	Propagation Delay to Output D LEN EN	CL = 50 pF	4.0 3.5 3.5	5.0 5.5 5.5	4.1 3.5 3.5	5.1 5.5 5.5	4.4 3.9 3.9	5.4 5.9 5.9	ns
t <sub>SK</sub>	Within-Device Skew	(Note 1)	–	0.5	–	0.5		0.5	ns
t <sub>w</sub>	Pulse Width Out HIGH or LOW @ f <sub>out</sub> = 50MHz	CL = 50 pF (Note 2)	9.0	11.0	9.0	11.0	9.0	11.0	ns
t <sub>s</sub>	Setup Time D		0.75	–	0.75	–	0.75	–	ns
t <sub>h</sub>	Hold Time D		0.75	–	0.75	–	0.75	–	ns
t <sub>RR</sub>	Recovery Time LEN EN		1.25 1.25	– –	1.25 1.25	– –	1.25 1.25	– –	ns
t <sub>pw</sub>	Minimum Pulse Width LEN EN		1.5 1.5	– –	1.5 1.5	– –	1.5 1.5	– –	ns
t <sub>r</sub> t <sub>f</sub>	Rise / Fall Times 0.8 V – 2.0 V	CL = 50 pF	–	1.2	–	1.2	–	1.2	ns

NOTE: Device will meet the specifications after thermal equilibrium has been established when mounted in a test socket or printed circuit board with maintained transverse airflow greater than 500 lpm. Electrical parameters are guaranteed only over the declared operating temperature range. Functional operation of the device exceeding these conditions is not implied. Device specification limit values are applied individually under normal operating conditions and not valid simultaneously.

1. Within-Device skew defined as identical transitions on similar paths through a device.

2. Pulse width is defined relative to 1.5 V measurement points on the output waveform.

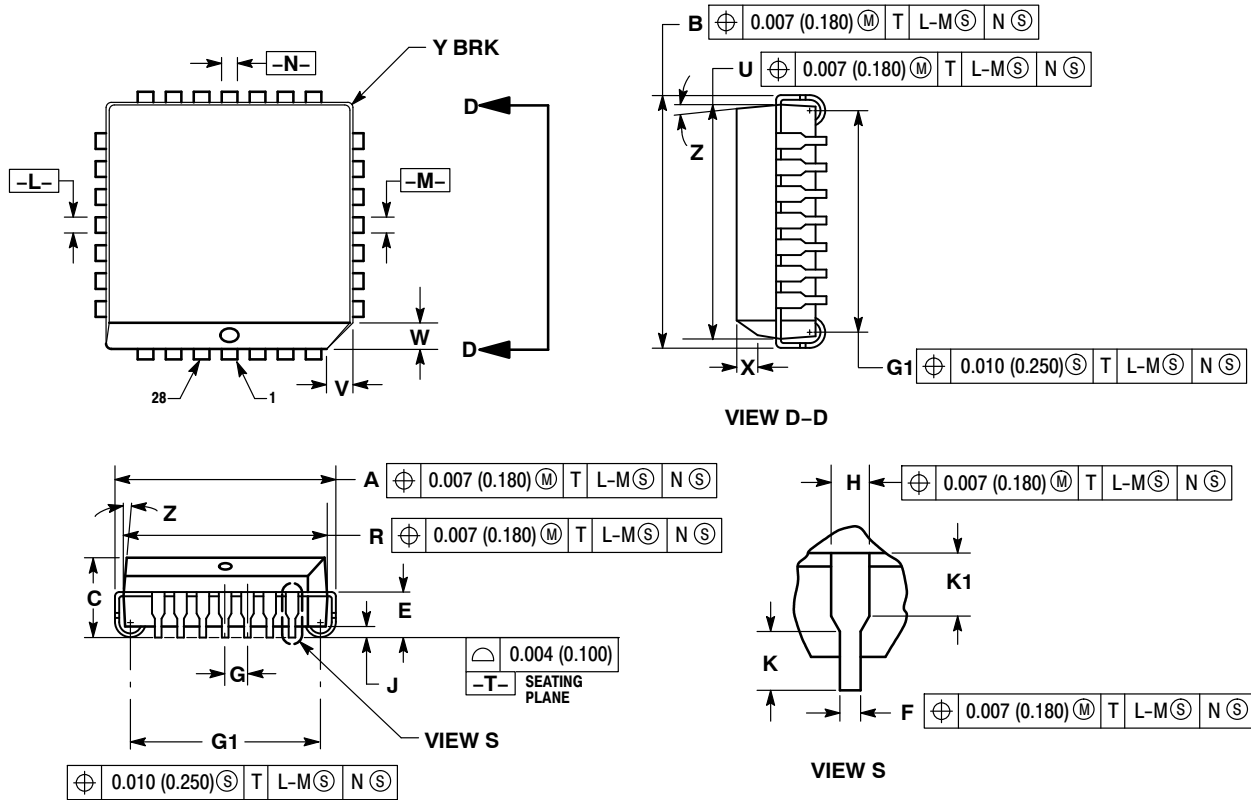
## Resource Reference of Application Notes

- AN1405/D** – ECL Clock Distribution Techniques
- AN1406/D** – Designing with PECL (ECL at +5.0 V)
- AN1503/D** – ECLinPS™ I/O SPiCE Modeling Kit
- AN1504/D** – Metastability and the ECLinPS Family
- AN1568/D** – Interfacing Between LVDS and ECL
- AN1672/D** – The ECL Translator Guide
- AND8001/D** – Odd Number Counters Design
- AND8002/D** – Marking and Date Codes
- AND8020/D** – Termination of ECL Logic Devices
- AND8066/D** – Interfacing with ECLinPS
- AND8090/D** – AC Characteristics of ECL Devices

# MC10H643

## PACKAGE DIMENSIONS

28 LEAD PLLC  
CASE 776-02  
ISSUE F




### NOTES:

1. DATUMS -L-, -M-, AND -N- DETERMINED WHERE TOP OF LEAD SHOULDER EXITS PLASTIC BODY AT MOLD PARTING LINE.
2. DIMENSION G1, TRUE POSITION TO BE MEASURED AT DATUM -T-, SEATING PLANE.
3. DIMENSIONS R AND U DO NOT INCLUDE MOLD FLASH. ALLOWABLE MOLD FLASH IS 0.010 (0.250) PER SIDE.
4. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
5. CONTROLLING DIMENSION: INCH.
6. THE PACKAGE TOP MAY BE SMALLER THAN THE PACKAGE BOTTOM BY UP TO 0.012 (0.300). DIMENSIONS R AND U ARE DETERMINED AT THE OUTERMOST EXTREMES OF THE PLASTIC BODY EXCLUSIVE OF MOLD FLASH, TIE BAR BURRS, GATE BURRS AND INTERLEAD FLASH, BUT INCLUDING ANY MISMATCH BETWEEN THE TOP AND BOTTOM OF THE PLASTIC BODY.
7. DIMENSION H DOES NOT INCLUDE DAMBAR PROTRUSION OR INTRUSION. THE DAMBAR PROTRUSION(S) SHALL NOT CAUSE THE H DIMENSION TO BE GREATER THAN 0.037 (0.940). THE DAMBAR INTRUSION(S) SHALL NOT CAUSE THE H DIMENSION TO BE SMALLER THAN 0.025 (0.635).

DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	0.485	0.495	12.32	12.57
B	0.485	0.495	12.32	12.57
C	0.165	0.180	4.20	4.57
E	0.090	0.110	2.29	2.79
F	0.013	0.021	0.33	0.53
G	0.050 BSC		1.27 BSC	
H	0.026	0.032	0.66	0.81
J	0.020	---	0.51	---
K	0.025	---	0.64	---
R	0.450	0.456	11.43	11.58
U	0.450	0.456	11.43	11.58
V	0.042	0.048	1.07	1.21
W	0.042	0.048	1.07	1.21
X	0.042	0.056	1.07	1.42
Y	---	0.020	---	0.50
Z	2°	10°	2°	10°
G1	0.410	0.430	10.42	10.92
K1	0.040	---	1.02	---

MECL is a trademark of Semiconductor Components Industries, LLC (SCILLC) or its subsidiaries in the United States and/or other countries.

ON Semiconductor and  are trademarks of Semiconductor Components Industries, LLC dba ON Semiconductor or its subsidiaries in the United States and/or other countries. ON Semiconductor owns the rights to a number of patents, trademarks, copyrights, trade secrets, and other intellectual property. A listing of ON Semiconductor's product/patent coverage may be accessed at [www.onsemi.com/site/pdf/Patent-Marking.pdf](http://www.onsemi.com/site/pdf/Patent-Marking.pdf). ON Semiconductor reserves the right to make changes without further notice to any products herein. ON Semiconductor makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does ON Semiconductor assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation special, consequential or incidental damages. Buyer is responsible for its products and applications using ON Semiconductor products, including compliance with all laws, regulations and safety requirements or standards, regardless of any support or applications information provided by ON Semiconductor. "Typical" parameters which may be provided in ON Semiconductor data sheets and/or specifications can and do vary in different applications and actual performance may vary over time. All operating parameters, including "Typicals" must be validated for each customer application by customer's technical experts. ON Semiconductor does not convey any license under its patent rights nor the rights of others. ON Semiconductor products are not designed, intended, or authorized for use as a critical component in life support systems or any FDA Class 3 medical devices or medical devices with a same or similar classification in a foreign jurisdiction or any devices intended for implantation in the human body. Should Buyer purchase or use ON Semiconductor products for any such unintended or unauthorized application, Buyer shall indemnify and hold ON Semiconductor and its officers, employees, subsidiaries, affiliates, and distributors harmless against all claims, costs, damages, and expenses, and reasonable attorney fees arising out of, directly or indirectly, any claim of personal injury or death associated with such unintended or unauthorized use, even if such claim alleges that ON Semiconductor was negligent regarding the design or manufacture of the part. ON Semiconductor is an Equal Opportunity/Affirmative Action Employer. This literature is subject to all applicable copyright laws and is not for resale in any manner.

## PUBLICATION ORDERING INFORMATION

### LITERATURE FULFILLMENT:

Literature Distribution Center for ON Semiconductor  
19521 E. 32nd Pkwy, Aurora, Colorado 80011 USA  
**Phone:** 303-675-2175 or 800-344-3860 Toll Free USA/Canada  
**Fax:** 303-675-2176 or 800-344-3867 Toll Free USA/Canada  
**Email:** [orderlit@onsemi.com](mailto:orderlit@onsemi.com)

**N. American Technical Support:** 800-282-9855 Toll Free  
USA/Canada

**Europe, Middle East and Africa Technical Support:**  
Phone: 421 33 790 2910

**Japan Customer Focus Center**  
Phone: 81-3-5817-1050

**ON Semiconductor Website:** [www.onsemi.com](http://www.onsemi.com)

**Order Literature:** <http://www.onsemi.com/orderlit>

For additional information, please contact your local  
Sales Representative