

MC100LVEL33

3.3V ECL ÷4 Divider

The MC100LVEL33 is an integrated ÷4 divider. The LVEL is functionally equivalent to the EL33 and works from a 3.3 V supply.

The reset pin is asynchronous and is asserted on the rising edge. Upon power-up, the internal flip-flops will attain a random state; the reset allows for the synchronization of multiple LVEL33's in a system.

The V_{BB} pin, an internally generated voltage supply, is available to this device only. For single-ended input conditions, the unused differential input is connected to V_{BB} as a switching reference voltage. V_{BB} may also rebias AC coupled inputs. When used, decouple V_{BB} and V_{CC} via a 0.01 µF capacitor and limit current sourcing or sinking to 0.5 mA. When not used, V_{BB} should be left open.

- 630 ps Typical Propagation Delay
- 4.0 GHz Typical Maximum Frequency
- ESD Protection: >4 KV HBM, >200 V MM
- The 100 Series Contains Temperature Compensation
- PECL Mode Operating Range: V_{CC}= 3.0 V to 3.8 V with V_{EE}= 0 V
- NECL Mode Operating Range: V_{CC}= 0 V with V_{EE}= -3.0 V to -3.8 V
- Internal Input Pulldown Resistors
- Meets or Exceeds JEDEC Spec EIA/JESD78 IC Latchup Test
- Moisture Sensitivity Level 1
For Additional Information, see Application Note AND8003/D
- Flammability Rating: UL-94 code V-0 @ 1/8",
Oxygen Index 28 to 34
- Transistor Count = 130 devices



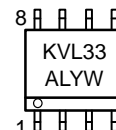
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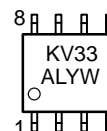
MARKING DIAGRAMS*



SO-8
D SUFFIX
CASE 751



TSSOP-8
DT SUFFIX
CASE 948R



A = Assembly Location
L = Wafer Lot
Y = Year
W = Work Week

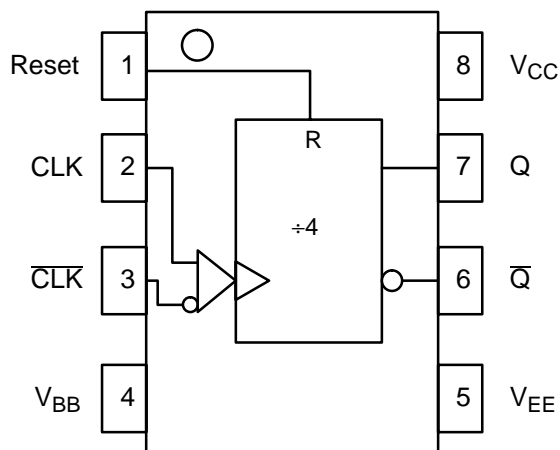
*For additional information, see Application Note AND8002/D

ORDERING INFORMATION

Device	Package	Shipping
MC100LVEL33D	SO-8	98 Units / Rail
MC100LVEL33DR2	SO-8	2500 / Reel
MC100LVEL33DT	TSSOP-8	98 Units / Rail
MC100LVEL33DTR2	TSSOP-8	2500 / Reel

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LOGIC DIAGRAM AND PINOUT ASSIGNMENT



PIN DESCRIPTION

PIN	FUNCTION
CLK, $\overline{\text{CLK}}$	ECL Differential Clock Inputs
Q, $\overline{\text{Q}}$	ECL Differential Data +4 Outputs
Reset	ECL Asynch Reset
V_{BB}	Reference Voltage Output
V_{CC}	Positive Supply
V_{EE}	Negative Supply

MAXIMUM RATINGS (Note 1.)

Symbol	Parameter	Condition 1	Condition 2	Rating	Units
V_{CC}	PECL Mode Power Supply	$V_{\text{EE}} = 0 \text{ V}$		8 to 0	V
V_{EE}	NECL Mode Power Supply	$V_{\text{CC}} = 0 \text{ V}$		-8 to 0	V
V_{I}	PECL Mode Input Voltage NECL Mode Input Voltage	$V_{\text{EE}} = 0 \text{ V}$ $V_{\text{CC}} = 0 \text{ V}$	$V_{\text{I}} \leq V_{\text{CC}}$ $V_{\text{I}} \geq V_{\text{EE}}$	6 to 0 -6 to 0	V V
I_{out}	Output Current	Continuous Surge		50 100	mA mA
I_{BB}	V_{BB} Sink/Source			± 0.5	mA
T_{A}	Operating Temperature Range			-40 to +85	$^{\circ}\text{C}$
T_{stg}	Storage Temperature Range			-65 to +150	$^{\circ}\text{C}$
θ_{JA}	Thermal Resistance (Junction to Ambient)	0 LFPM 500 LFPM	8 SOIC 8 SOIC	190 130	$^{\circ}\text{C}/\text{W}$ $^{\circ}\text{C}/\text{W}$
θ_{JC}	Thermal Resistance (Junction to Case)	std bd	8 SOIC	41 to 44 $\pm 5\%$	$^{\circ}\text{C}/\text{W}$
θ_{JA}	Thermal Resistance (Junction to Ambient)	0 LFPM 500 LFPM	8 TSSOP 8 TSSOP	185 140	$^{\circ}\text{C}/\text{W}$ $^{\circ}\text{C}/\text{W}$
θ_{JC}	Thermal Resistance (Junction to Case)	std bd	8 TSSOP	41 to 44 $\pm 5\%$	$^{\circ}\text{C}/\text{W}$
T_{sol}	Wave Solder	<2 to 3 sec @ 248 $^{\circ}\text{C}$		265	$^{\circ}\text{C}$

1. Maximum Ratings are those values beyond which device damage may occur.

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LVPECL DC CHARACTERISTICS $V_{CC}=3.3\text{ V}$; $V_{EE}=0.0\text{ V}$ (Note 1)

Symbol	Characteristic	-40°C			25°C			85°C			Unit
		Min	Typ	Max	Min	Typ	Max	Min	Typ	Max	
I_{EE}	Power Supply Current		33	37		33	37		35	39	mA
V_{OH}	Output HIGH Voltage (Note 2.)	2215	2295	2420	2275	2345	2420	2275	2345	2420	mV
V_{OL}	Output LOW Voltage (Note 2.)	1470	1605	1745	1490	1595	1680	1490	1595	1680	mV
V_{IH}	Input HIGH Voltage (Single Ended)	2135		2420	2135		2420	2135		2420	mV
V_{IL}	Input LOW Voltage (Single Ended)	1490		1825	1490		1825	1490		1825	mV
V_{BB}	Output Voltage Reference	1.92		2.04	1.92		2.04	1.92		2.04	V
V_{IHCMR}	Input HIGH Voltage Common Mode Range (Differential) (Note 3.) $V_{pp} < 500\text{ mV}$ $V_{pp} \geq 500\text{ mV}$	1.2		2.9	1.1		2.9	1.1		2.9	V
		1.4		2.9	1.3		2.9	1.3		2.9	V
I_{IH}	Input HIGH Current			150			150			150	μA
I_{IL}	Input LOW Current Other CLK	0.5			0.5			0.5			μA
		-600			-600			-600			μA

NOTE: Devices are designed to meet the DC specifications shown in the above table, after thermal equilibrium has been established. The circuit is in a test socket or mounted on a printed circuit board and transverse air flow greater than 500 lfm is maintained.

1. Input and output parameters vary 1:1 with V_{CC} . V_{EE} can vary $\pm 0.3\text{ V}$.
2. Outputs are terminated through a 50 ohm resistor to $V_{CC}-2\text{ volts}$.
3. V_{IHCMR} min varies 1:1 with V_{EE} , max varies 1:1 with V_{CC} . The V_{IHCMR} range is referenced to the most positive side of the differential input signal. Normal operation is obtained if the HIGH level falls within the specified range and the peak-to-peak voltage lies between V_{ppmin} and 1 V.

LVNECL DC CHARACTERISTICS $V_{CC}=0.0\text{ V}$; $V_{EE}=-3.3\text{ V}$ (Note 1.)

Symbol	Characteristic	-40°C			25°C			85°C			Unit
		Min	Typ	Max	Min	Typ	Max	Min	Typ	Max	
I_{EE}	Power Supply Current		33	37		33	37		35	39	mA
V_{OH}	Output HIGH Voltage (Note 2.)	-1085	-1005	-880	-1025	-955	-880	-1025	-955	-880	mV
V_{OL}	Output LOW Voltage (Note 2.)	-1830	-1695	-1555	-1810	-1705	-1620	-1810	-1705	-1620	mV
V_{IH}	Input HIGH Voltage (Single Ended)	-1165		-880	-1165		-880	-1165		-880	mV
V_{IL}	Input LOW Voltage (Single Ended)	-1810		-1475	-1810		-1475	-1810		-1475	mV
V_{BB}	Output Voltage Reference	-1.38		-1.26	-1.38		-1.26	-1.38		-1.26	V
V_{IHCMR}	Input HIGH Voltage Common Mode Range (Differential) (Note 3.) $V_{pp} < 500\text{ mV}$ $V_{pp} \geq 500\text{ mV}$	-2.1		-0.4	-2.2		-0.4	-2.2		-0.4	V
		-1.9		-0.4	-2.0		-0.4	-2.0		-0.4	V
I_{IH}	Input HIGH Current			150			150			150	μA
I_{IL}	Input LOW Current Other CLK	0.5			0.5			0.5			μA
		-600			-600			-600			μA

NOTE: Devices are designed to meet the DC specifications shown in the above table, after thermal equilibrium has been established. The circuit is in a test socket or mounted on a printed circuit board and transverse air flow greater than 500 lfm is maintained.

1. Input and output parameters vary 1:1 with V_{CC} . V_{EE} can vary $\pm 0.3\text{ V}$.
2. Outputs are terminated through a 50 ohm resistor to $V_{CC}-2\text{ volts}$.
3. V_{IHCMR} min varies 1:1 with V_{EE} , max varies 1:1 with V_{CC} . The V_{IHCMR} range is referenced to the most positive side of the differential input signal. Normal operation is obtained if the HIGH level falls within the specified range and the peak-to-peak voltage lies between V_{ppmin} and 1 V.

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AC CHARACTERISTICS $V_{CC}= 3.3\text{ V}$; $V_{EE}= 0.0\text{ V}$ or $V_{CC}= 0.0\text{ V}$; $V_{EE}= -3.3\text{ V}$ (Note 1.)

Symbol	Characteristic	-40°C			25°C			85°C			Unit
		Min	Typ	Max	Min	Typ	Max	Min	Typ	Max	
f_{\max}	Maximum Toggle Frequency	3.4			3.8	4.0		3.8			GHz
t_{PLH} t_{PHL}	Propagation Delay CLK to Q (Diff) CLK to Q (SE) Reset to Q	510 460 500		690 740 700	540 490 520	630	720 770 720	600 550 580		780 830 780	ps
t_{RR}	Reset Recovery	300			300			300			ps
t_{skew}	Duty Cycle Skew (Note 2.)			20			20			20	ps
t_{JITTER}	Cycle-to-Cycle Jitter		TBD			TBD			TBD		ps
V_{PP}	Input Swing (Note 3.)	150		1000	150		1000	150		1000	mV
t_{r} t_{f}	Output Rise/Fall Times Q (20% – 80%)	120		320	120		320	120		320	ps

- V_{EE} can vary $\pm 0.3\text{ V}$.
- Duty cycle skew is the difference between T_{PLH} and T_{PHL} .
- V_{PP} (min) is minimum input swing for which AC parameters are guaranteed.

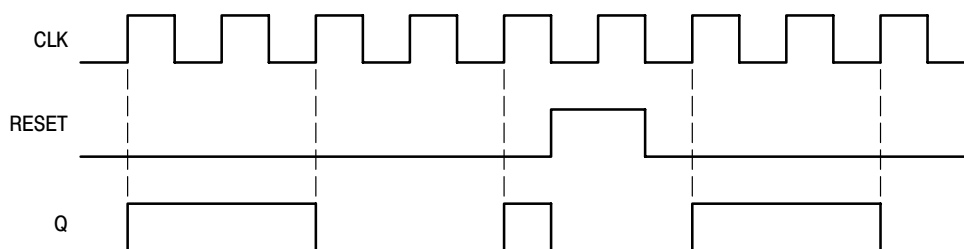


Figure 1. Timing Diagram

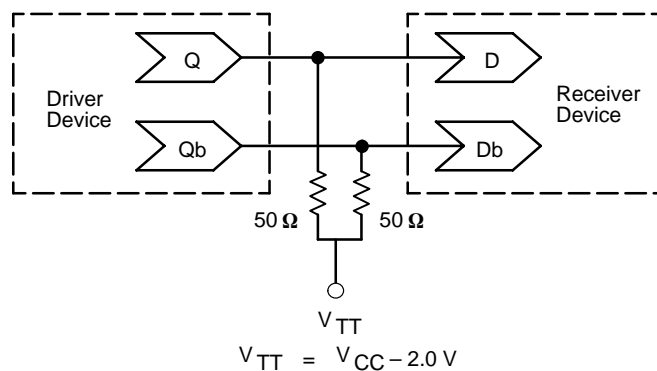


Figure 2. Typical Termination for Output Driver and Device Evaluation
(See Application Note AND8020 – Termination of ECL Logic Devices.)

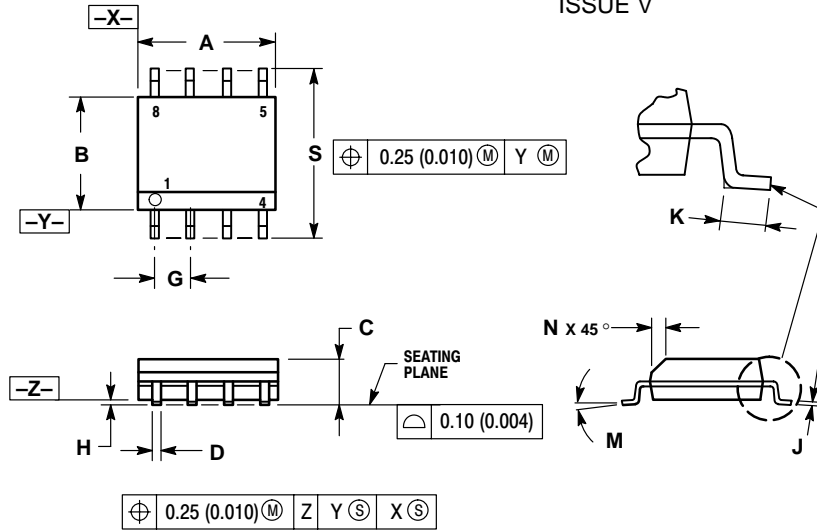
Resource Reference of Application Notes

- AN1404** – ECLinPS Circuit Performance at Non–Standard V_{IH} Levels
- AN1405** – ECL Clock Distribution Techniques
- AN1406** – Designing with PECL (ECL at +5.0 V)
- AN1503** – ECLinPS I/O SPICE Modeling Kit
- AN1504** – Metastability and the ECLinPS Family
- AN1560** – Low Voltage ECLinPS SPICE Modeling Kit
- AN1568** – Interfacing Between LVDS and ECL
- AN1596** – ECLinPS Lite Translator ELT Family SPICE I/O Model Kit
- AN1650** – Using Wire–OR Ties in ECLinPS Designs
- AN1672** – The ECL Translator Guide
- AND8001** – Odd Number Counters Design
- AND8002** – Marking and Date Codes
- AND8020** – Termination of ECL Logic Devices

MC100LEVEL33

PACKAGE DIMENSIONS

SO-8
D SUFFIX
PLASTIC SOIC PACKAGE
CASE 751-07
ISSUE V



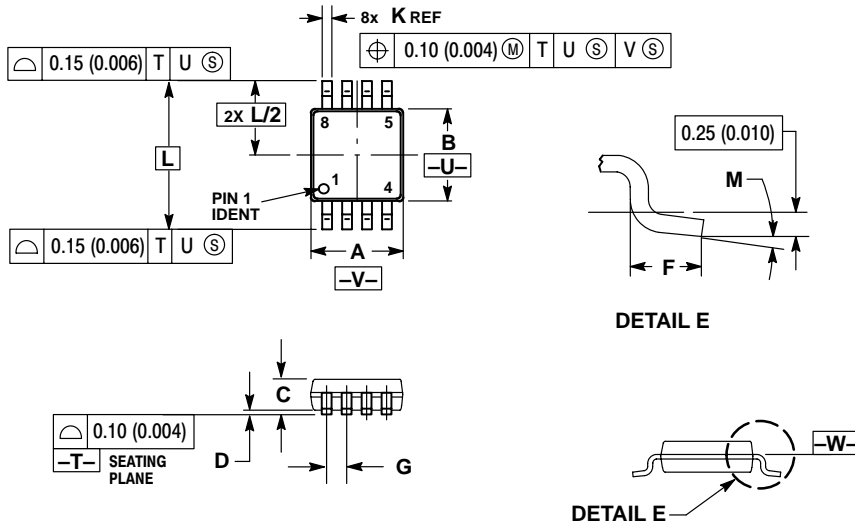
- NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
 2. CONTROLLING DIMENSION: MILLIMETER.
 3. DIMENSION A AND B DO NOT INCLUDE MOLD PROTRUSION.
 4. MAXIMUM MOLD PROTRUSION 0.15 (0.006) PER SIDE.
 5. DIMENSION D DOES NOT INCLUDE DAMBAR PROTRUSION. ALLOWABLE DAMBAR PROTRUSION SHALL BE 0.127 (0.005) TOTAL IN EXCESS OF THE D DIMENSION AT MAXIMUM MATERIAL CONDITION.

DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	4.80	5.00	0.189	0.197
B	3.80	4.00	0.150	0.157
C	1.35	1.75	0.053	0.069
D	0.33	0.51	0.013	0.020
G	1.27 BSC		0.050 BSC	
H	0.10	0.25	0.004	0.010
J	0.19	0.25	0.007	0.010
K	0.40	1.27	0.016	0.050
M	0°	8°	0°	8°
N	0.25	0.50	0.010	0.020
S	5.80	6.20	0.228	0.244

MC100LVEL33

PACKAGE DIMENSIONS


TSSOP-8
DT SUFFIX
PLASTIC TSSOP PACKAGE
CASE 948R-02
ISSUE A



NOTES:

1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: MILLIMETER.
3. DIMENSION A DOES NOT INCLUDE MOLD FLASH. PROTRUSIONS OR GATE BURRS. MOLD FLASH OR GATE BURRS SHALL NOT EXCEED 0.15 (0.006) PER SIDE.
4. DIMENSION B DOES NOT INCLUDE INTERLEAD FLASH OR PROTRUSION. INTERLEAD FLASH OR PROTRUSION SHALL NOT EXCEED 0.25 (0.010) PER SIDE.
5. TERMINAL NUMBERS ARE SHOWN FOR REFERENCE ONLY.
6. DIMENSION A AND B ARE TO BE DETERMINED AT DATUM PLANE -W-.

DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	2.90	3.10	0.114	0.122
B	2.90	3.10	0.114	0.122
C	0.80	1.10	0.031	0.043
D	0.05	0.15	0.002	0.006
F	0.40	0.70	0.016	0.028
G	0.65 BSC		0.026 BSC	
K	0.25	0.40	0.010	0.016
L	4.90 BSC		0.193 BSC	
M	0°	6°	0°	6°

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