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CTSLVEL16VT

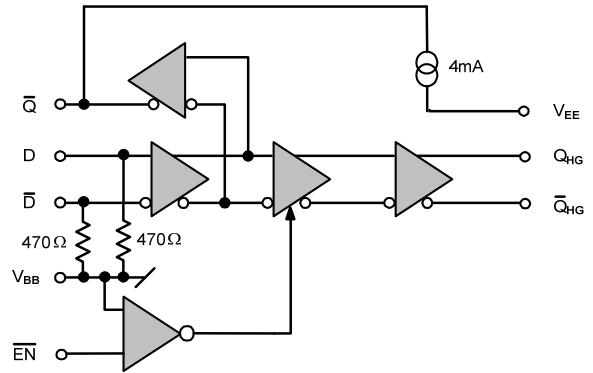
PECL/ECL Oscillator Gain Stage & Buffer with Selectable Enable

MLP8

FEATURES

- Minimizes External Components
- High Bandwidth for $\geq 1\text{GHz}$
- Similar Operation as CTSLVEL16VR
 - Except in Disabled Condition
 - Q_{HG} is High
- -147 dBc/Hz Typical Noise Floor

BLOCK DIAGRAM



DESCRIPTION

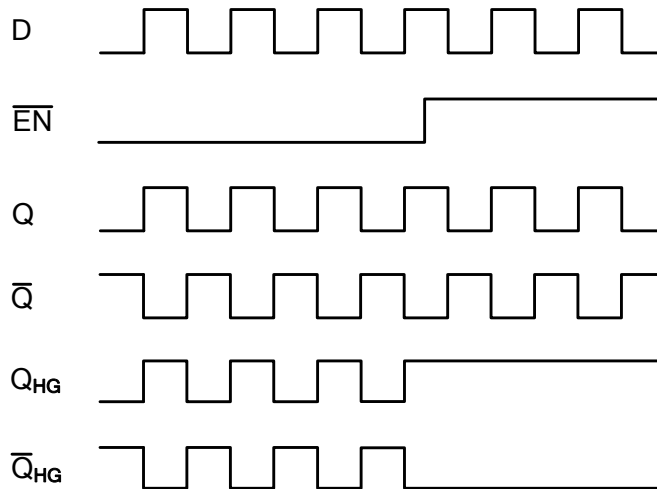
The CTSLVEL16VT is a specialized oscillator gain stage with a high gain output buffer including an enable function. The Q_{HG}/\bar{Q}_{HG} outputs have voltage gain several times greater than the \bar{Q} output. It provides a Q_{HG}/\bar{Q}_{HG} enable that allows continuous oscillator operation via the \bar{Q} outputs.

The CTSLVEL16VT also provides a 4mA internal pull-down current source for \bar{Q} outputs. Internal input biasing further reduces the number of needed external components.

ENGINEERING NOTES

The CTSLVEL16VT is a specialized oscillator gain stage with a high gain output buffer including an enable. The Q_{HG}/\bar{Q}_{HG} outputs have a voltage gain several times greater than the \bar{Q} output. When the \bar{EN} input is LOW, the \bar{Q} and Q_{HG}/\bar{Q}_{HG} outputs follow the data inputs. When \bar{EN} is HIGH, the Q_{HG} output is forced high and the \bar{Q}_{HG} output is forced low.

In the CTSLVEL16VT, the \bar{D} input is internally tied directly to the V_{BB} pin and the D input is tied to the V_{BB} pin through a 470Ω internal bias resistor. Bypassing V_{BB} to ground with a $0.01\ \mu\text{F}$ capacitor is recommended.

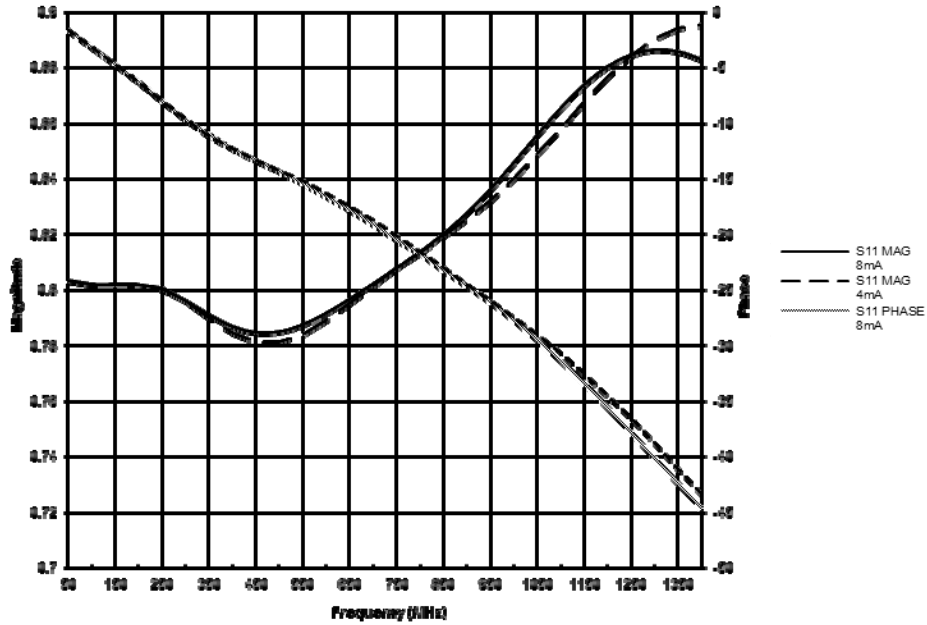


Timing Diagram

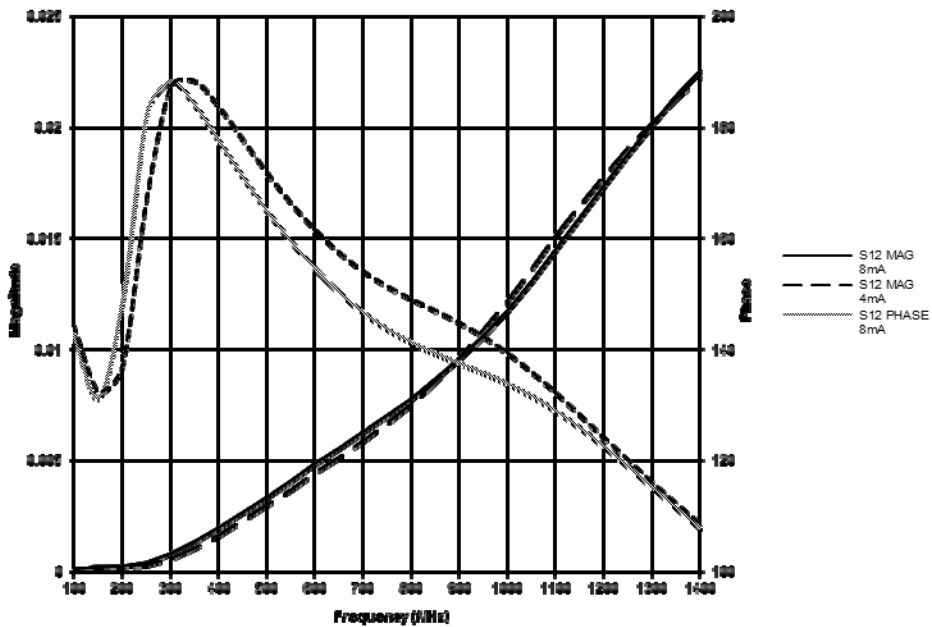
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S11

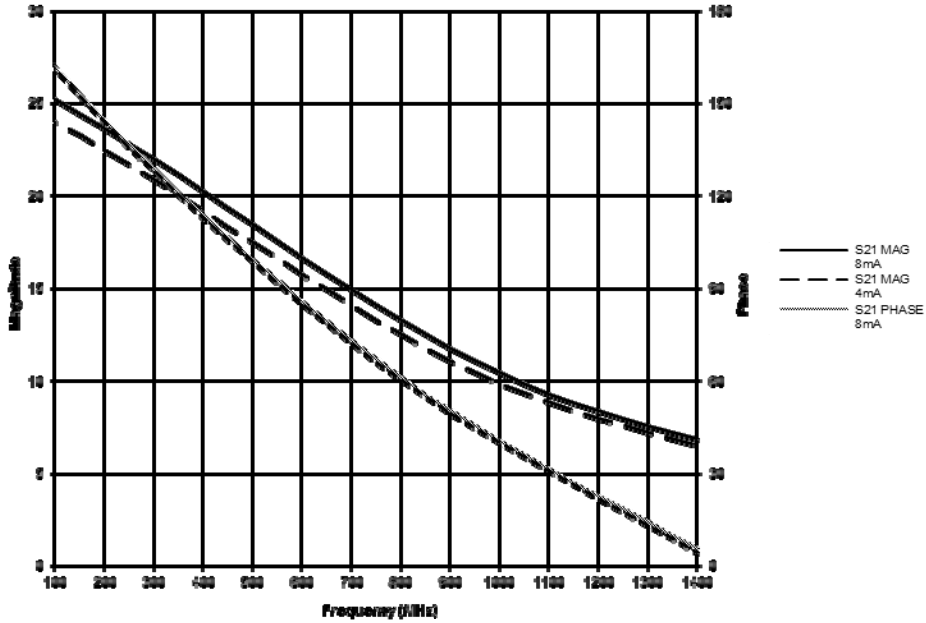


S12

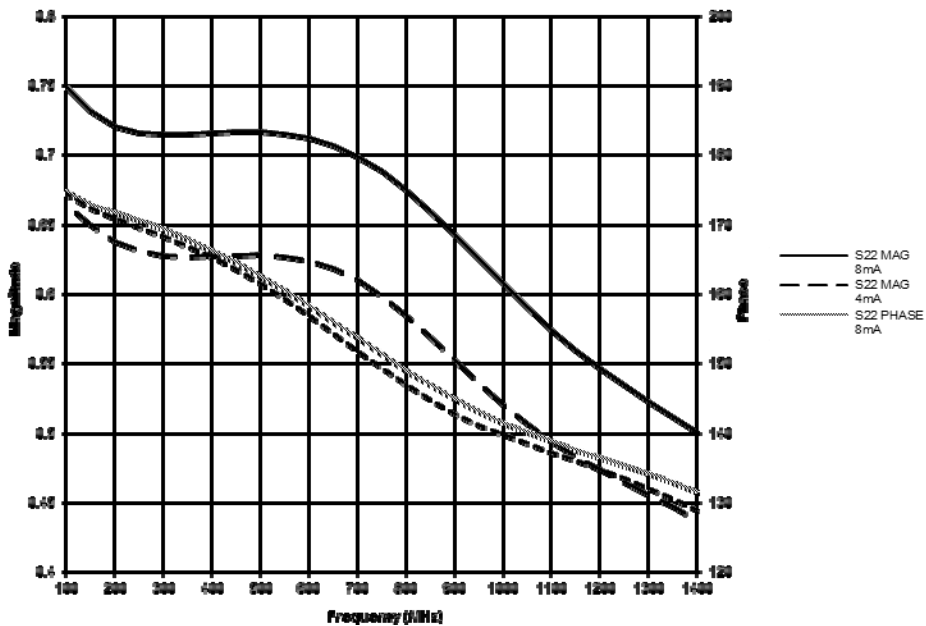
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S21



S22

ELECTRICAL SPECIFICATIONS

Absolute Maximum Ratings are those values beyond which device life may be impaired.

| Symbol | Characteristic | Condition | Rating | Unit |
|----------------|---|------------------------|-------------|-------------|
| V_{CC} | PECL Power Supply | $V_{EE} = 0V$ | 0 to + 6.0 | V |
| V_{D_PECL} | PECL D Input Voltage | Referenced to V_{BB} | ± 0.75 | V |
| V_{EN_PECL} | PECL D Input Voltage | $V_{EE} = 0V$ | 0 to + 6.0 | V |
| V_{EE} | ECL Power Supply | $V_{CC} = 0V$ | -6.0 to 0 | V |
| V_{D_ECL} | ECL D Input Voltage | Referenced to V_{BB} | ± 0.75 | V |
| V_{EN_ECL} | ECL D Input Voltage | $V_{CC} = 0V$ | -6.0 to 0 | V |
| I_{OUT} | Output Current | Continuous Q | 25 | mA |
| | | Surge Q | 50 | |
| | | Continuous Q_{HG} | 50 | |
| | | Surge Q_{HG} | 100 | |
| T_A | Operating Temperature Range | - | -40 to +85 | $^{\circ}C$ |
| T_{STG} | Storage Temperature Range | - | -65 to +150 | $^{\circ}C$ |
| ESD_{HBM} | Human Body Model Electro Static Discharge | - | 2500 | V |
| ESD_{MM} | Machine Model Electro Static Discharge | - | 200 | V |
| ESD_{CDM} | Charged Device Model Electro Static Discharge | - | 2000 | V |

ECL DC Characteristics ($V_{EE} = -3.0V$ to $-5.5V$, $V_{CC} = GND$)

| Symbol | Characteristic | $-40^{\circ}C$ | | $0^{\circ}C$ | | $25^{\circ}C$ | | $85^{\circ}C$ | | Unit |
|----------|-----------------------------------|----------------|-------|--------------|-------|---------------|-------|---------------|-------|---------|
| | | Min | Max | Min | Max | Min | Max | Min | Max | |
| V_{OH} | Output HIGH Voltage ¹ | -1045 | -835 | -1025 | -835 | -1025 | -835 | -1025 | -835 | mV |
| V_{OL} | Output LOW Voltage ¹ | -1925 | -1555 | -1900 | -1620 | -1900 | -1620 | -1900 | -1620 | mV |
| V_{IH} | Input HIGH Voltage D,EN | -1165 | -740 | -1165 | -740 | -1165 | -740 | -1165 | -740 | mV |
| V_{IL} | Input LOW Voltage D,EN | -1900 | -1475 | -1900 | -1475 | -1900 | -1475 | -1900 | -1475 | mV |
| V_{BB} | Reference Voltage | -1390 | -1250 | -1390 | -1250 | -1390 | -1250 | -1390 | -1250 | mV |
| I_{IH} | Input HIGH Current EN | | 150 | | 150 | | 150 | | 150 | μA |
| I_{IL} | Input LOW Current EN | 0.5 | | 0.5 | | 0.5 | | 0.5 | | μA |
| I_{EE} | Power Supply Current ¹ | | 48 | | 48 | | 48 | | 54 | mA |

¹ Specified with each output terminated through 50 Ω resistors to $V_{CC} - 2V$.

LVPECL DC Characteristics ($V_{EE} = \text{GND}$, $V_{CC} = +3.3\text{V}$)

| Symbol | Characteristic | -40°C | | 0°C | | 25°C | | 85°C | | Unit |
|----------|------------------------------------|-------|------|------|------|------|------|------|------|------|
| | | Min | Max | Min | Max | Min | Max | Min | Max | |
| V_{OH} | Output HIGH Voltage ^{1,2} | 2255 | 2465 | 2275 | 2465 | 2275 | 2465 | 2275 | 2465 | mV |
| V_{OL} | Output LOW Voltage ^{1,2} | 1375 | 1745 | 1400 | 1680 | 1400 | 1680 | 1400 | 1680 | mV |
| V_{IH} | Input HIGH Voltage D,EN | 2135 | 2560 | 2135 | 2560 | 2135 | 2560 | 2135 | 2560 | mV |
| V_{IL} | Input LOW Voltage D,EN | 1400 | 1825 | 1400 | 1825 | 1400 | 1825 | 1400 | 1825 | mV |
| V_{BB} | Reference Voltage ¹ | 1910 | 2050 | 1910 | 2050 | 1910 | 2050 | 1910 | 2050 | mV |
| I_{IH} | Input HIGH Current EN | | 150 | | 150 | | 150 | | 150 | μA |
| I_{IL} | Input LOW Current EN | 0.5 | | 0.5 | | 0.5 | | 0.5 | | μA |
| I_{EE} | Power Supply Current ² | | 48 | | 48 | | 48 | | 54 | mA |

1 For supply voltages other than 3.3V, use the ECL table values and ADD supply voltage value.

2 Specified with each output terminated through 50 Ω resistors to $V_{CC} - 2\text{V}$.

PECL DC Characteristics ($V_{EE} = \text{GND}$, $V_{CC} = +5.0\text{V}$)

| Symbol | Characteristic | -40°C | | 0°C | | 25°C | | 85°C | | Unit |
|----------|------------------------------------|-------|------|------|------|------|------|------|------|------|
| | | Min | Max | Min | Max | Min | Max | Min | Max | |
| V_{OH} | Output HIGH Voltage ^{1,2} | 3955 | 4165 | 3975 | 4165 | 3975 | 4165 | 3975 | 4165 | mV |
| V_{OL} | Output LOW Voltage ^{1,2} | 3075 | 3445 | 3100 | 3380 | 3100 | 3380 | 3100 | 3380 | mV |
| V_{IH} | Input HIGH Voltage D,EN | 3835 | 4260 | 3835 | 4260 | 3835 | 4260 | 3835 | 4260 | mV |
| V_{IL} | Input LOW Voltage D,EN | 3100 | 3525 | 3100 | 3525 | 3100 | 3525 | 3100 | 3525 | mV |
| V_{BB} | Reference Voltage ¹ | 3610 | 3750 | 3610 | 3750 | 3610 | 3750 | 3610 | 3750 | mV |
| I_{IH} | Input HIGH Current EN | | 150 | | 150 | | 150 | | 150 | μA |
| I_{IL} | Input LOW Current EN | 0.5 | | 0.5 | | 0.5 | | 0.5 | | μA |
| I_{EE} | Power Supply Current ² | | 48 | | 48 | | 48 | | 54 | mA |

1 For supply voltages other than 3.3V, use the ECL table values and ADD supply voltage value.

2 Specified with each output terminated through 50Ω resistors to $V_{CC} - 2\text{V}$.

CTSLVEL16VT

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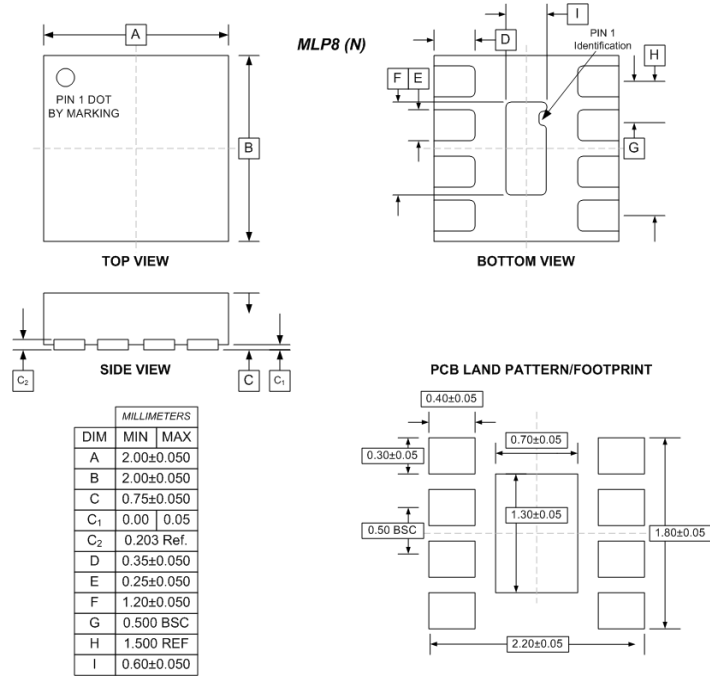
MLP8

AC Characteristics ($V_{EE} = -3.0V$ to $-5.5V$; $V_{CC} = GND$ or $V_{EE} = GND$; $V_{CC} = +3.0V$ to $+5.5V$)

| Symbol | Characteristic | 40°C | | | 0°C | | | 25°C | | | 85°C | | | Unit |
|----------------------|---|------|-----|------|-----|-----|------|------|-----|------|------|-----|------|------|
| | | Min | Typ | Max | Min | Typ | Max | Min | Typ | Max | Min | Typ | Max | |
| t_{PLH}/t_{PHL} | Propagation Delay | | | | | | | | | | | | | |
| | D to Q ¹ | | | 350 | | | 350 | | | 350 | | | 350 | ps |
| | D to Q _{HG} ² | | | 450 | | | 450 | | | 450 | | | 450 | ps |
| t_{SKEW} | Duty Cycle Skew ³ | | 5 | 20 | | 5 | 20 | | 5 | 20 | | 5 | 20 | ps |
| V _{pp} (AC) | Input Swing ⁴ Differential | 80 | | 1000 | 80 | | 1000 | 80 | | 1000 | 80 | | 1000 | mV |
| | Input Swing ⁴ Single Ended | 160 | | 1500 | 160 | | 1500 | 160 | | 1500 | 160 | | 1500 | |
| t_r/t_f | Output Rise/Fall ^{1,2} (20% - 80%) | 100 | | 240 | 100 | | 240 | 100 | | 240 | 100 | | 240 | ps |

- 1 Specified with each output terminated through 50Ω resistors to $V_{CC} - 2V$.
- 2 Specified with each output terminated through 50Ω resistors to $V_{CC} - 2V$.
- 3 Duty cycle skew is the difference between a t_{PLH} and t_{PHL} propagation delay through a device.
- 4 The peak-to-peak input swing is the range for which AC parameters are guaranteed. D and \bar{D} must remain within the range of ± 750 mV with respect to V_{BB} . The device has a voltage gain of ~ 20 to the \bar{Q} outputs and a voltage gain of ~ 100 to the Q_{HG}/\bar{Q}_{HG} outputs.

PACKAGE DIMENSIONS



CTSLVEL16VT

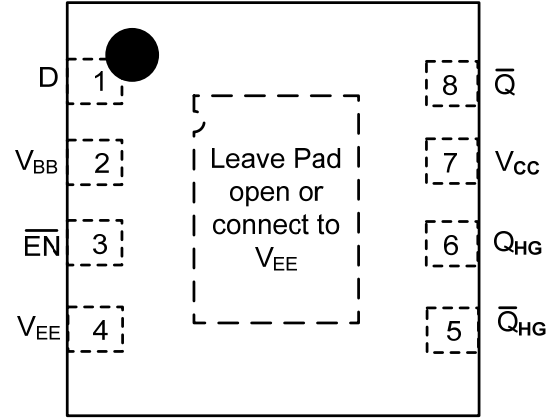
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Pin Description and Configuration

Pin Assignments for CTSLVEL16VTNNG

| Pin | Name | Type | Function |
|-----|-----------------|--------|---------------------------------|
| 1 | D | Input | Data Input |
| 2 | V _{BB} | Output | Reference Voltage |
| 3 | EN | Input | Output Enable |
| 4 | V _{EE} | Power | Negative Supply |
| 5 | \bar{Q}_{HG} | Output | High Gain Inverting PECL Output |
| 6 | Q _{HG} | Output | High Gain PECL Output |
| 7 | V _{CC} | Power | Positive Supply |
| 8 | \bar{Q} | Output | Inverting PECL Output |
| 9 | NC | - | N/A |



CTSLVEL16VTNNG

PART ORDERING NUMBER

| Part Number | Package | Marking |
|----------------|---------|----------|
| CTSLVEL16VTNNG | MLP8 | P8G YYWW |