# 3.125 Gbps LVDS Buffers with Pre-emphasis and Equalization (DS25BR100/110/120) Evaluation Kit

# *USER MANUAL*

**Part Number: DS25BR100EVK**

For the latest documents concerning these products and evaluation kit, visit lvds.national.com. Schematics and gerber files are also available at lvds.national.com.

March 2007
Rev. 0.1

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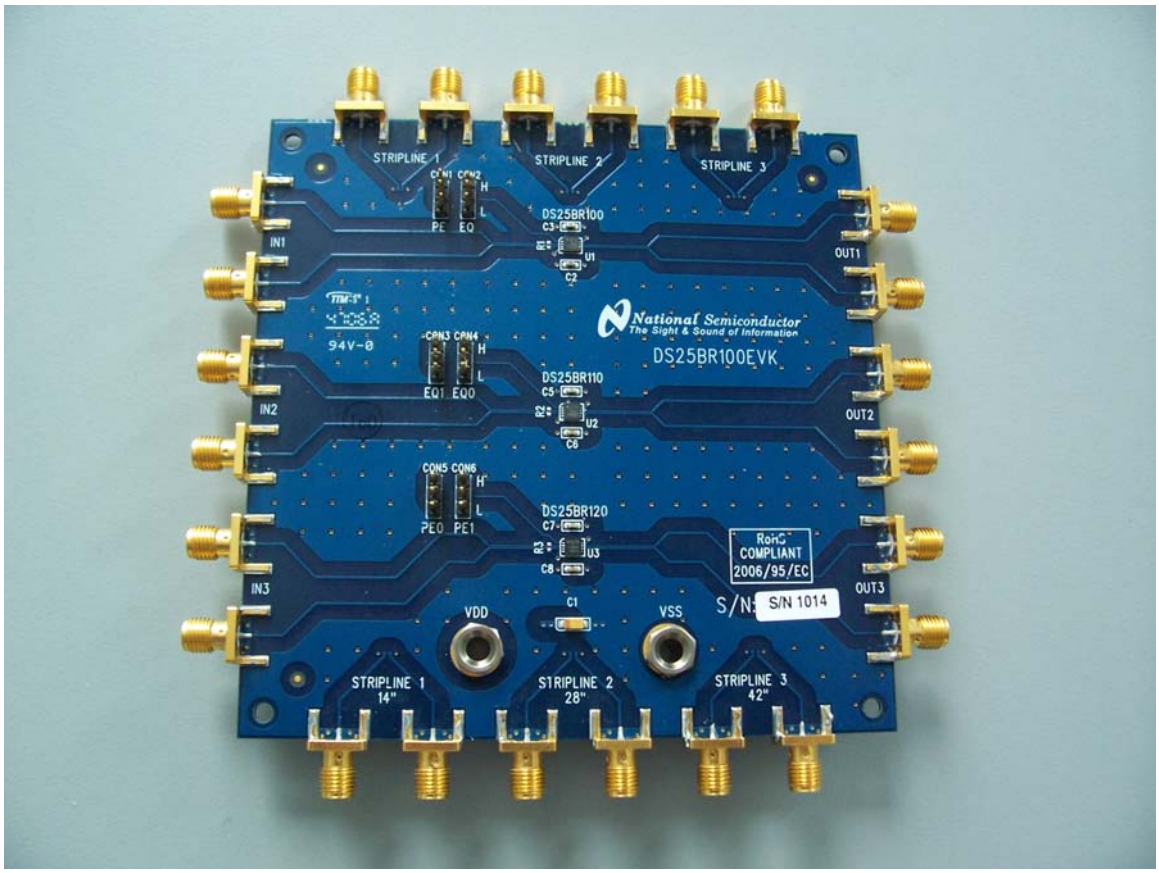
## Overview

The DS25BR100EVK is an evaluation kit designed for demonstrating performance of the 3.125 Gbps LVDS Single Channel Buffers with Transmit Pre-emphasis and Receive Equalization family (DS25BR100, DS25BR110 and DS25BR120). The evaluation kit provides all three devices on a single board and three FR4 striplines (14 (~35), 28 (~75) and 42 (~105) inches (cm) in length) for exercising devices' signal conditioning features (pre-emphasis and equalization).

The purpose of this document is to: familiarize you with the DS25BR100EVK, suggest the test setup procedures and instrumentation, and guide you through some typical measurements that demonstrate performance of the chipset in typical applications.



## DS25BR100EVK Description

Figure 1 shows the top layer drawing of the PCB with the silkscreen annotations. It is a 4.5 by 4.5 inch eight-layer PCB that has a three-device layout capable of demonstrating performance and all features of the DS25BR100, DS25BR110 and DS25BR120. In addition, three microstrips allow easy evaluation of transmit pre-emphasis and receive equalization.

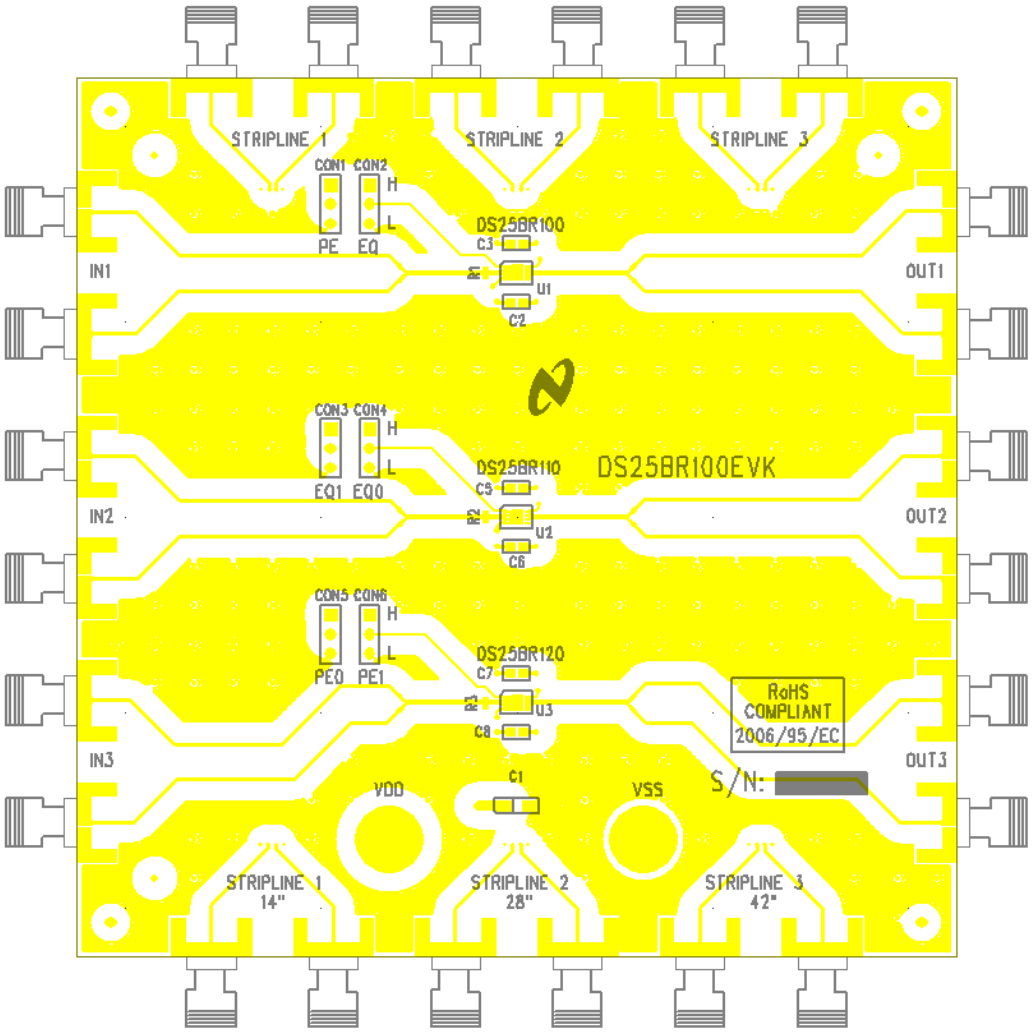



**Figure 1.** Driver Board

| Connector | Device | Function |
|---|---|---|
| CON1, CON2 | U1 | Select PE or EQ Level |
| CON3, CON4 | U2 | Select EQ Level |
| CON5, CON6 | U3 | Select PE Level |

**Table 1.** Driver Board Connector-Device-Function Cross Reference

## DS25BR100 (U1) Evaluation

The DS25BR100 is a 3.125 Gbps LVDS buffer featuring two levels of transmit pre-emphasis (Off and Medium) and two levels of receive equalization (Low and Medium). The following is a recommended test setup procedure for the device evaluation. Figure 2 depicts a typical setup and instrumentation used for the device evaluation.

1. Apply the power to the device (3.3V typical) between VDD and VSS banana plug receptacles.

2. Connect desired STRIPLINE(s) to the input and / or output of the device using short 50-ohm coaxial cables (e.g. PE-SR402-AL from www.pasternack.com).

3. Connect a signal source (i.e. signal generator or an LVDS driver) to the IN1 inputs on the board and adjust the signal parameters (VOH, VOL, VCM) so that they comply with the device input recommendations.

4. Select equalization level by setting the EQ pin (CON2) to L (for Low setting) or H (for Medium setting).

5. If a STRIPLINE is connected to the device outputs, select pre-emphasis level by setting the PE pin (CON1) to L (for Off setting) or H (for Medium setting)

6. Connect the OUT1 outputs to an oscilloscope and view the output signals with an oscilloscope with the bandwidth of at least 5 GHz.

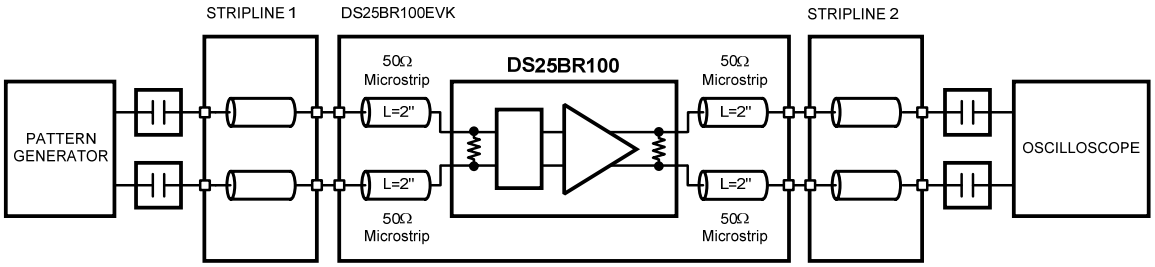



**Figure 2.** DS25BR100 Test Setup Example

## DS25BR110 (U2) Evaluation

The DS25BR110 is a 3.125 Gbps LVDS buffer featuring four levels of receive equalization (Off, Low, Medium and High). The following is a recommended test setup procedure for the device evaluation. Figure 3 depicts a typical setup and instrumentation used for the device evaluation.

1. Apply the power to the device (3.3V typical) between VDD and VSS banana plug receptacles.

2. Connect desired STRIPLINE to the input of the device using short 50-ohm coaxial cables (e.g. PE-SR402-AL from www.pasternack.com).

3. Connect a signal source (i.e. signal generator or an LVDS driver) to the IN2 inputs on the board and adjust the signal parameters (VOH, VOL, VCM) so that they comply with the device input recommendations.

4. Select equalization level by setting the EQ0 (CON4) and EQ1 (CON3) pins to L or H. Refer to Table 2.

| EQ1 | EQ0 | Equalization Level |
|---|---|---|
| 0 | 0 | Off |
| 0 | 1 | Low |
| 1 | 0 | Medium |
| 1 | 1 | High |

**Table 2.** Equalization Level Selection

5. Connect the OUT2 outputs to an oscilloscope and view the output signals with an oscilloscope with the bandwidth of at least 5 GHz.

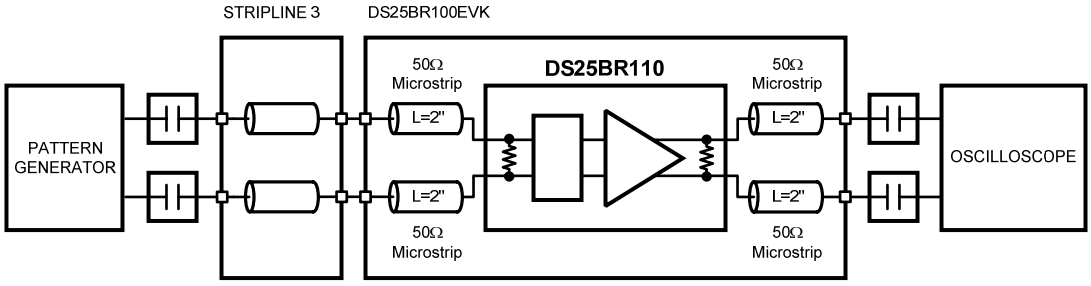



**Figure 3.** DS25BR110 Test Setup Example

## DS25BR120 (U3) Evaluation

The DS25BR120 is a 3.125 Gbps LVDS buffer featuring four levels of transmit pre-emphasis (Off, Low, Medium and High). The following is a recommended test setup procedure for the device evaluation. Figure 4 depicts a typical setup and instrumentation used for the device evaluation.

1. Apply the power to the device (3.3V typical) between VDD and VSS banana plug receptacles.

2. Connect desired STRIPLINE to the output of the device using short 50-ohm coaxial cables (e.g. PE-SR402-AL from www.pasternack.com).

3. Connect a signal source (i.e. signal generator or an LVDS driver) to the IN3 inputs on the board and adjust the signal parameters (VOH, VOL, VCM) so that they comply with the device input recommendations.

4. Select pre-emphasis level by setting the PE0 (CON5) and PE1 (CON6) pins to L or H. Refer to Table 3.

| PE1 | PE0 | Pre-emphasis Level |
|---|---|---|
| 0 | 0 | Off |
| 0 | 1 | Low |
| 1 | 0 | Medium |
| 1 | 1 | High |

**Table 3.** Pre-emphasis Level Selection

5. Connect the OUT3 outputs to an oscilloscope and view the output signals with an oscilloscope with the bandwidth of at least 5 GHz.

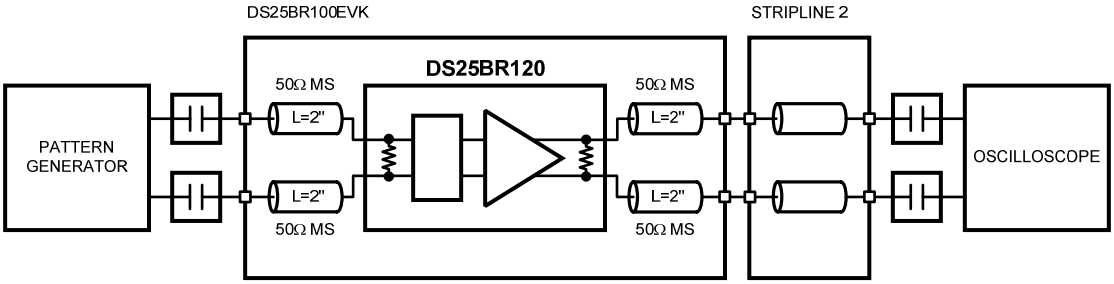
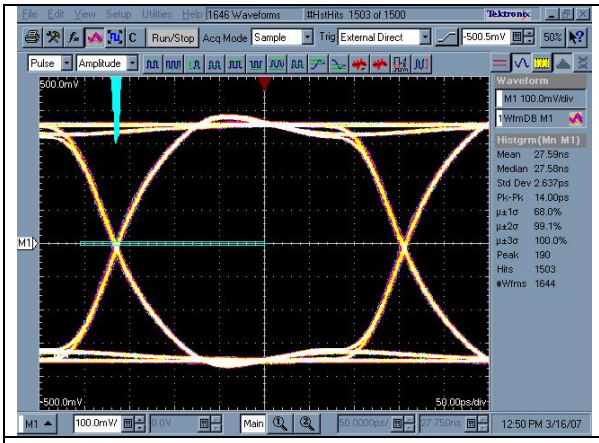


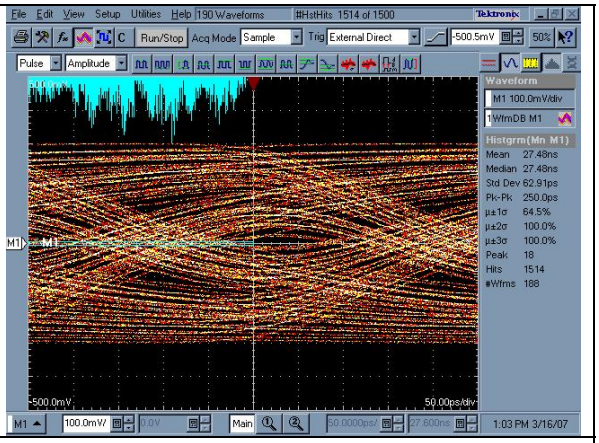

**Figure 4.** DS25BR120 Test Setup Example

## Typical Performance

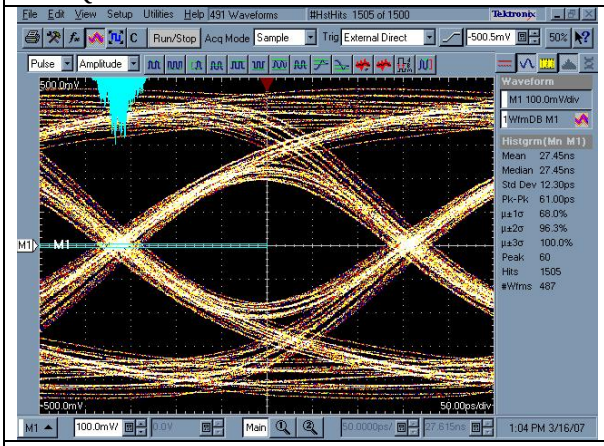
This section of the User Manual shows typical eye diagrams you can expect to see when evaluating the DS25BR100EVK.



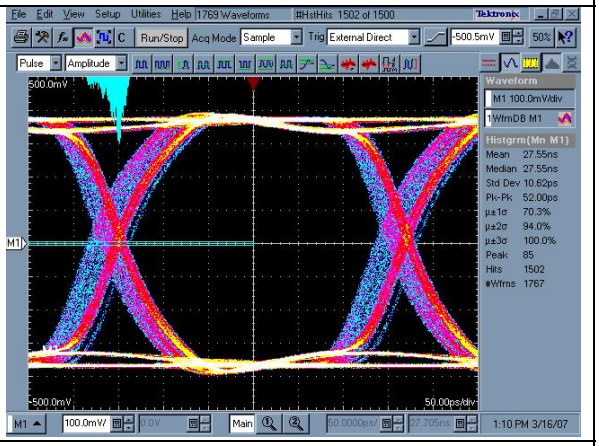
The DS25BRxxx 3.125 Gbps PRBS-7 output eye diagram without any STRIPLINE connected and with PE/EQ = Off



The DS25BRxxx 3.125 Gbps PRBS-7 output eye diagram after the STRIPLINE 3 and with PE/EQ = Off



The DS25BR120 3.125 Gbps PRBS-7 output eye diagram after the STRIPLINE 3 and with PE = High. See Figure 4 for the Setup used.



The DS25BR110 3.125 Gbps PRBS-7 output eye diagram after the STRIPLINE 3 and with EQ = High. See Figure 3 for the Setup used.

# ENERCON - BILL OF MATERIALS

TITLE: **NATIONAL SEMICONDUCTOR**
**PCBA,** DS25BR100EVK **, ROHS**

| PL Number: | Rev: | Rev By: | Rev Date: | PL Status: |
|---|---|---|---|---|
| Z3016-01 | 2 | BJ | 3/1/2007 | Released |

Main Product: **PCBA,** DS25BR100EVK **, ROHS**

Responsible Eng/Mgr:

Creator: **Arlene Fox**

Creation Date: **10/26/2006**

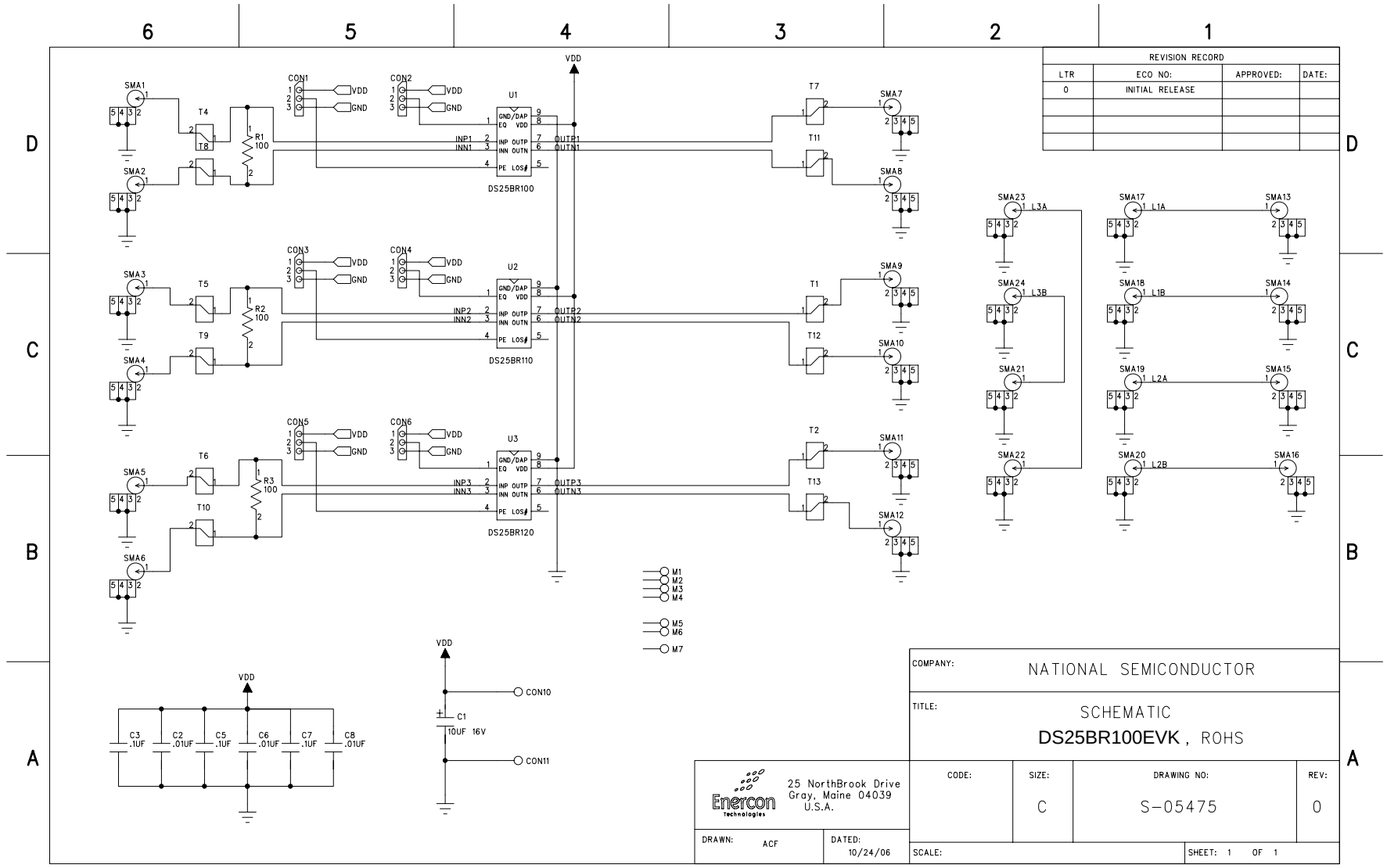
| Item | Part Type | Part Number/Value | Mfg | NoSub | Description | Qty | SMT | Ref Des | Notes | Rev |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | PCB | P-05479R0 | | | DS25BR100: 4.50x4.50x.062in, 8 layer | 1 | | | Bd: (114.30x 114.30mm) Panel: ( 4.50x13.70in) (114.30x 347.98mm) 3 bds/panel | 0 |
| 2 | | | | | | | | | | |
| 3 | IC | DS25BR100TSD | NAT | | | 1 | X | U1 | Customer Supplied | 0 |
| 4 | IC | DS25BR110TSD | NAT | | | 1 | X | U2 | Customer Supplied | 0 |
| 5 | IC | DS25BR120TSD | NAT | | | 1 | X | U3 | Customer Supplied | 0 |
| 6 | | | | | | | | | | |
| 7 | | | | | | | | | | |
| 8 | CAP | 06035C103KAT | AVX | | .01µF, 50V, ±10%, 0603, Ceramic, X7R, Pb-Free | 3 | X | C2,6,8 | | 0 |
| | <ALT> | C0603C103K5RAC | KEMET | | .01µF, 50V, ±10%, 0603, Ceramic, X7R, Pb-Free | | | | | |
| | <ALT> | ECJ-1VB1H103K | PANA | | .01µF, 50V, ±10%, 0603, Ceramic, X7R, Pb-Free | | | | | |
| 9 | CAP | 0603YC104KAT | AVX | | .1µF, 16V, ±10%, 0603, Ceramic, X7R, Pb-Free | 3 | X | C3,5,7 | | 0 |
| | <ALT> | C0603C104K3RAC | KEMET | | .1µF, 25V, ±10%, 0603, Ceramic, X7R, Pb-Free | | | | | |
| | <ALT> | C0603C104K4RAC | KEMET | | .1µF, 16V, ±10%, 0603, Ceramic, X7R, Pb-Free | | | | | |
| | <ALT> | ECJ-1VB1C104K | PANA | | .1µF, 16V, ±10%, 0603, Ceramic, X7R, Pb-Free | | | | | |
| | <ALT> | ECJ-1VB1E104K | PANA | | .1µF, 25V, ±10%, 0603, Ceramic, X7R, Pb-Free | | | | | |
| 10 | CAP | TAJA106K016 | AVX | | 10µF, 16V, ±10%, A-Case, Tantalum, Pb-Free | 1 | X | C1 | | 0 |
| | <ALT> | T491A106K016AT | KEMET | | 10µF, 16V, ±10%, A-Case, Tantalum, Pb-Free | | | | | |
| 11 | | | | | | | | | | |

| ENERCON - BILL OF MATERIALS | TITLE: NATIONAL SEMICONDUCTOR PCBA, DS25BR100EVK , ROHS | PL Number: Z3016-01 | Rev: 2 | Rev By: BJ | Rev Date: 3/1/2007 | PL Status: Released |
|---|---|---|---|---|---|---|
| Main Product: PCBA, DS25BR100EVK , ROHS | | Responsible Eng/Mgr: | Creator: Arlene Fox | | Creation Date: 10/26/2006 | |

| Item | Part Type | Part Number/Value | Mfg | NoSub | Description | Qty | SMT | Ref Des | Notes | Rev |
|---|---|---|---|---|---|---|---|---|---|---|
| 12 | CONN | 142-0701-851 | EMERSON | | SMA, Jack Receptacle, 50 OHM, Pb-Free | 24 | | SMA1-24 | | 0 |
| 13 | CONN | 3267 | POMONA | | Banana, 1p, Female, Pb-Free | 2 | | CON10,11 | | 0 |
| 14 | CONN | TSW-103-07-G-S | SAMTEC | | Header, 3p, Male, .100"sp, Gold, Pb-Free | 6 | | CON1-6 | | 0 |
| 15 | | | | | | | | | | |
| 16 | STENCL | T-05481R0 | ENERCON | | STENCIL FABRICATION, DS25BR100-EVK, ROHS | 1 | | | | 0 |
| 17 | | | | | | | | | | |
| 18 | REF | C-05480R0 | ENERCON | | FABRICATION DWG, DS25BR100-EVK, ROHS | | | | | 0 |
| 19 | REF | S-05475R0 | ENERCON | | SCHEMATIC, DS25BR100-EVK, ROHS | | | | | 0 |
| 20 | REF | C-05491R0 | ENERCON | | PALLET DWG, DS25BR100-EVK, ROHS | | | | | 0 |

*Notes:*

**Do Not Stuff Resistors R1, R2, and R3**




| REVISION RECORD | | | |
|---|---|---|---|
| LTR | ECO NO: | APPROVED: | DATE: |
| 0 | INITIAL RELEASE | | |
| | | | |
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| | | | |

COMPANY: NATIONAL SEMICONDUCTOR

TITLE: SCHEMATIC
DS25BR100EVK , ROHS

Enercon Technologies
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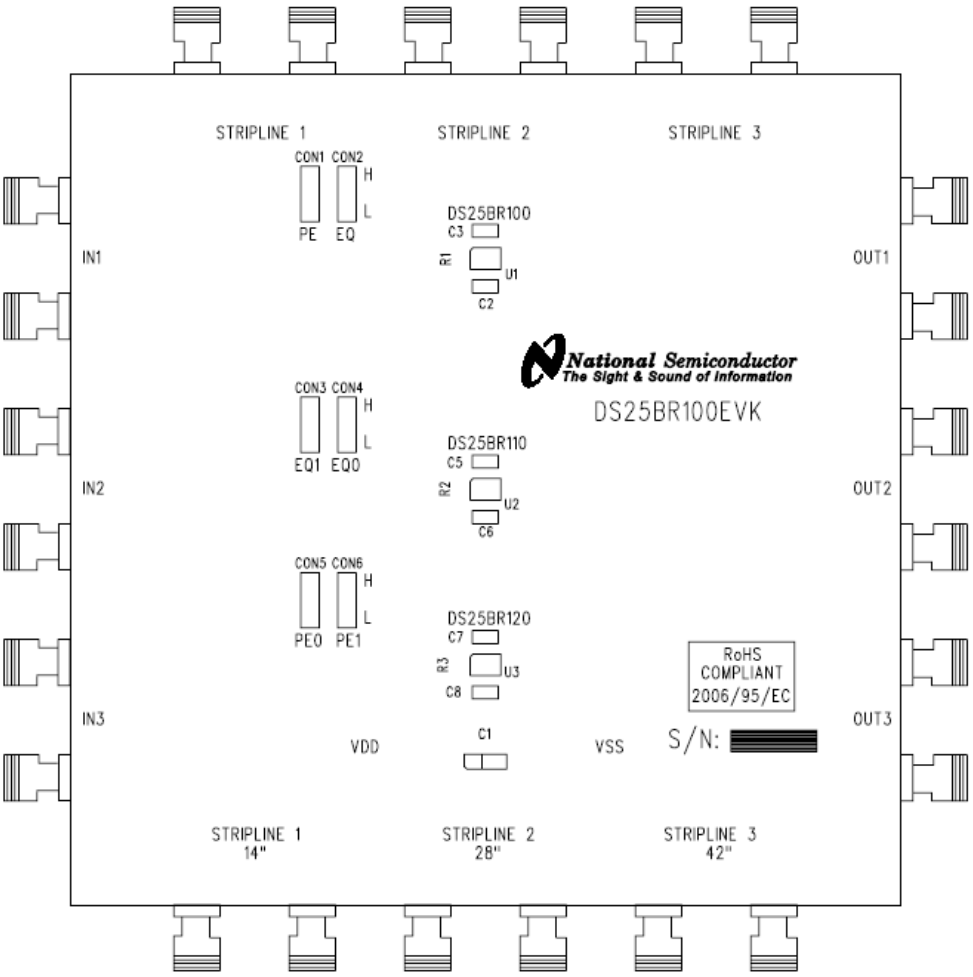
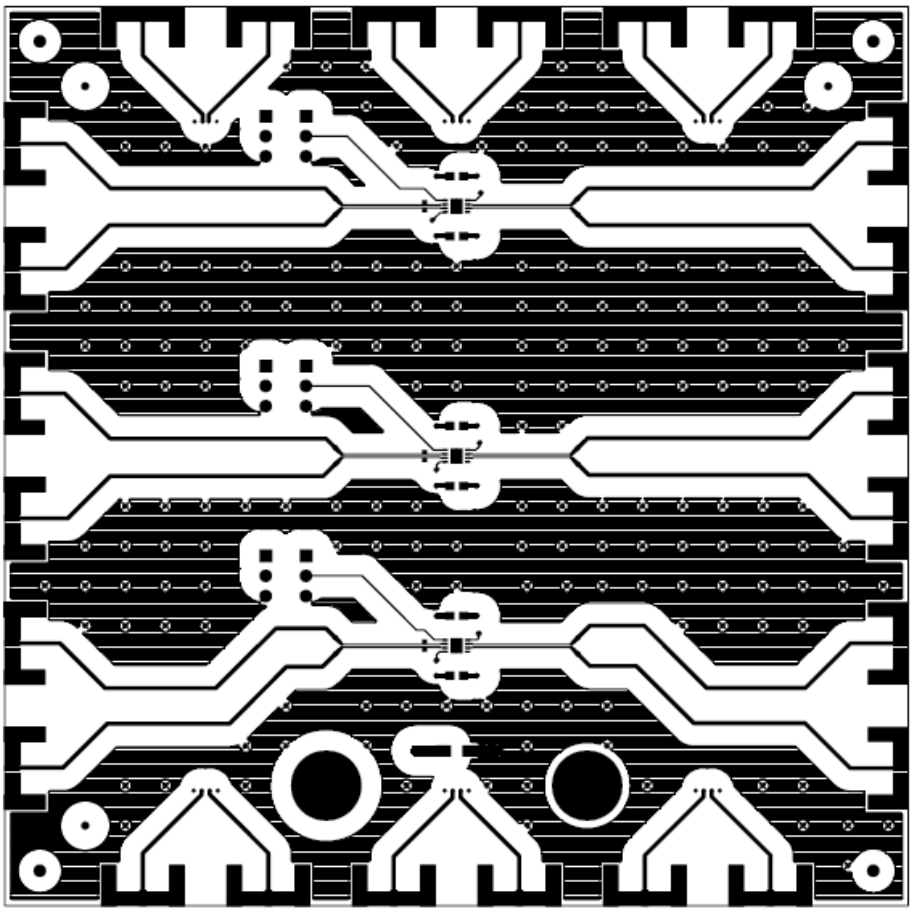
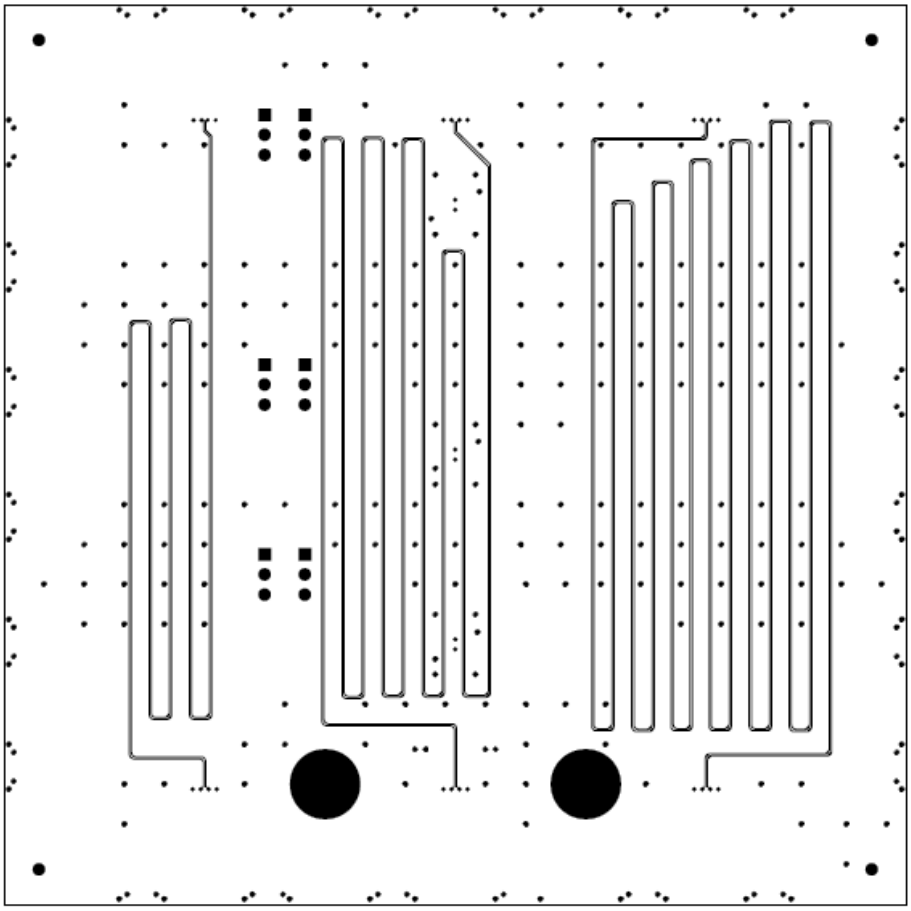
Gray, Maine 04039
U.S.A.

| CODE: | SIZE: | DRAWING NO: | REV: |
|---|---|---|---|
| | C | S-05475 | 0 |

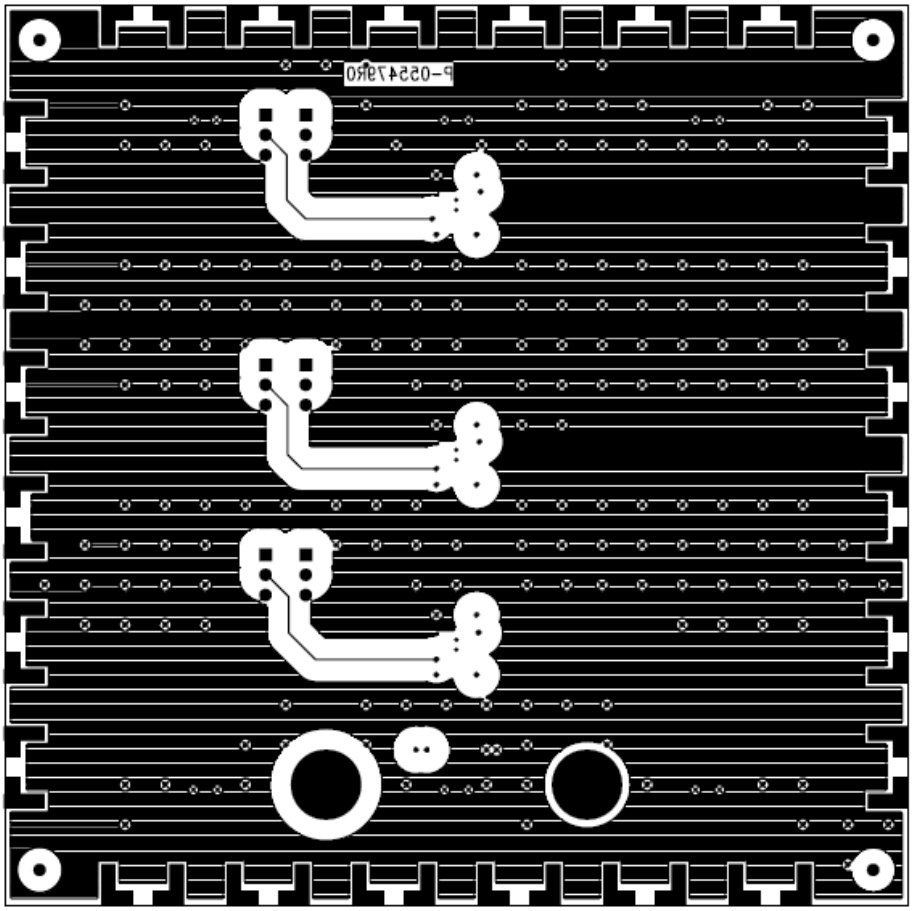
DRAWN: ACF
DATED: 10/24/06
SCALE:
SHEET: 1 OF 1


STRIPLINE 1
STRIPLINE 2
STRIPLINE 3
CON1 CON2
H
L
PE EQ
DS25BR100
C3
R1
U1
C2
IN1
OUT1
National Semiconductor
The Sight & Sound of Information
DS25BR100EVK
CON3 CON4
H
L
EQ1 EQ0
DS25BR110
C5
R2
U2
C6
IN2
OUT2
CON5 CON6
H
L
PE0 PE1
DS25BR120
C7
R3
U3
C8
RoHS
COMPLIANT
2006/95/EC
IN3
OUT3
VDD
C1
VSS
S/N:
STRIPLINE 1
14"
STRIPLINE 2
28"
STRIPLINE 3
42"





LAYER 6 SIGNAL


P-0554790

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