

To our customers,

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## Old Company Name in Catalogs and Other Documents

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April 1<sup>st</sup>, 2010  
Renesas Electronics Corporation

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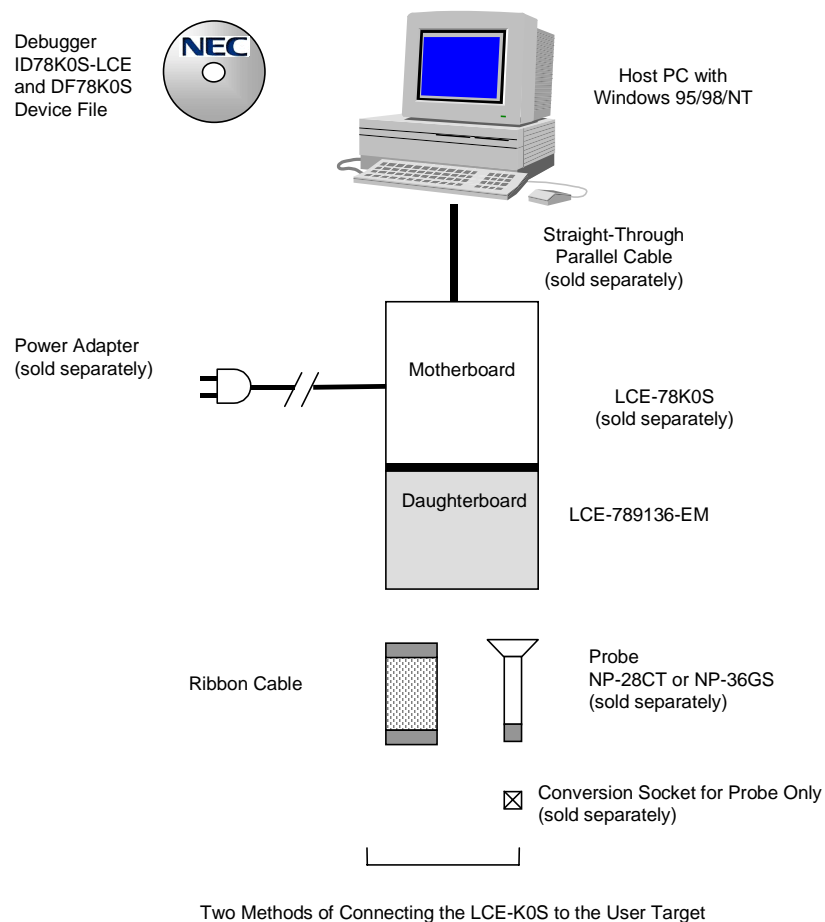
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### Introduction

The LCE-789136-EM is an emulation board or daughterboard for the LCE-K0S development system for NEC's 8-bit  $\mu$ PD789136 subseries microcontrollers. Combining this board with the LCE-78K0S allows you to efficiently emulate any  $\mu$ PD789136 subseries device. The LCE-789136-EM is shipped with the following contents:

- LCE-789136-EM daughterboard
- User's manual
- 50-pin ribbon cable
- CD-ROM containing debugger, compiler, assembler, and documentation

**Figure 1. System Configuration**



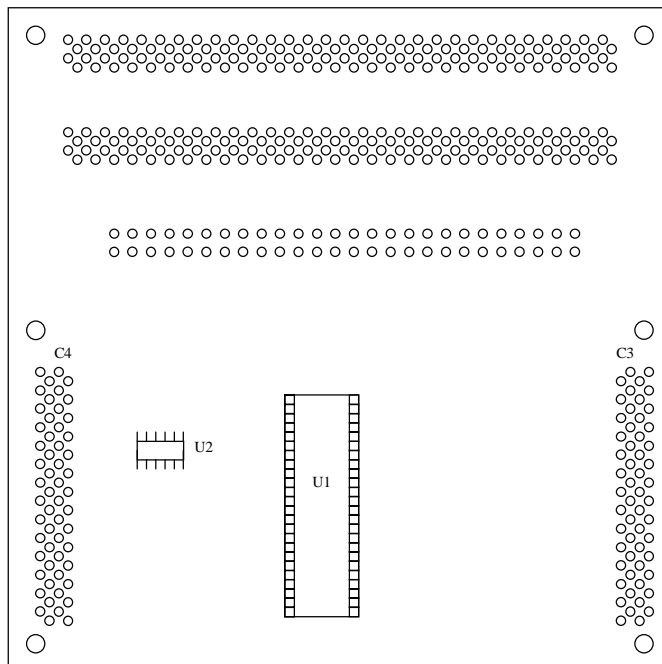
**Table 1. Basic Specifications**

Parameter	Description
Target device	μPD789101
	μPD789102
	μPD789104
	μPD789111
	μPD789112
	μPD789114
	μPD789116
	μPD789121
	μPD789122
	μPD789124
	μPD789131
	μPD789132
	μPD789134
μPD789136	
Clock supply	Internal: installed on the motherboard
	External: pulse input via an emulation probe from target system
Low-voltage compatible	1.8 to 5.5 volts

**Components**

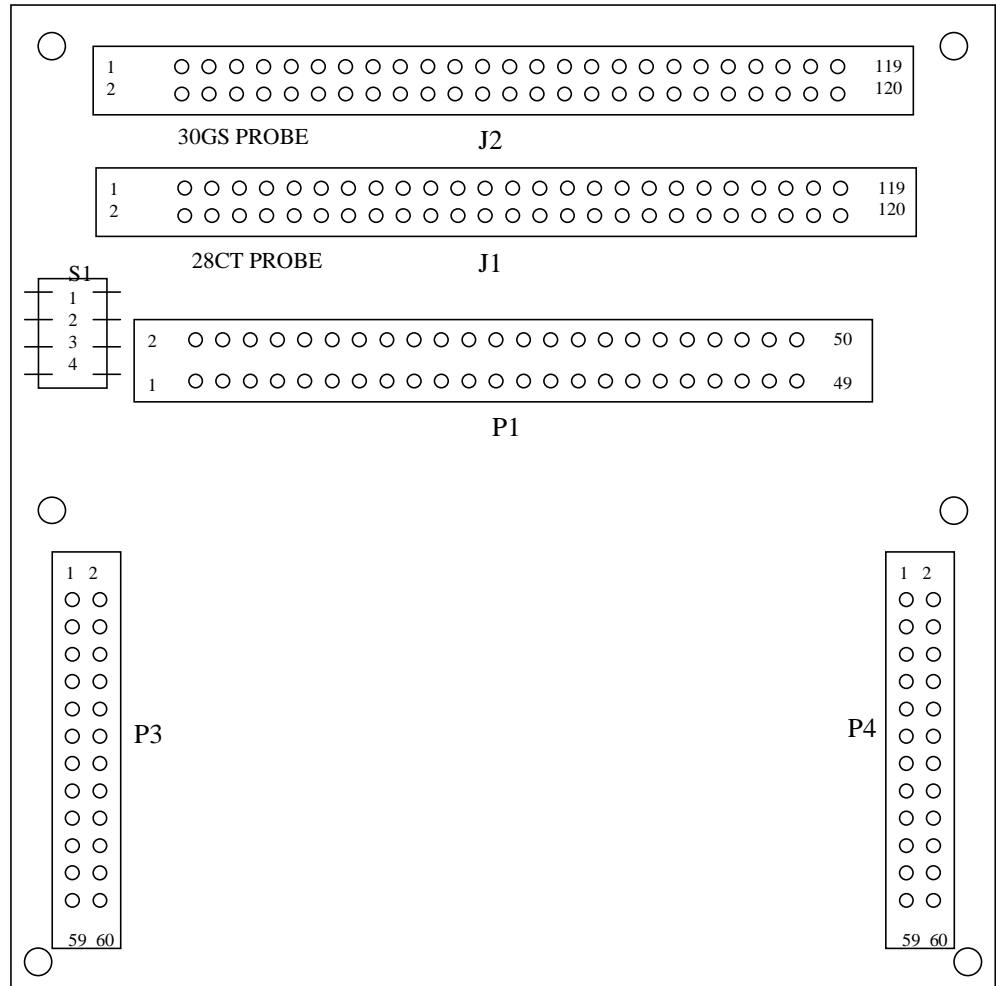
The LCE-789136-EM daughterboard mates with the LCE-78K0S motherboard. As shown in Figure 2, a bottom view of the daughterboard, U1 is the Realchip that provides peripherals unique to the μPD789136 devices.

**Figure 2. Bottom View of Daughterboard**



In the top view shown in Figure 3, J1, J2 and P1 are connectors to the user target. These connectors contain all of the pins available on the device. J1 and J2 are KEL connector for the probe, while P1 is a dual-row, male-shrouded header with latching levers for the ribbon cables. See Tables 2-4 for pin assignments. S1 is a DIP switch for enabling or disabling pull-up resistors on the input pins for mask ROM. P3 and P4 are connectors for the motherboard, which attaches to the top of the daughterboard.

**Figure 3. Top View of Daughterboard**



**Ribbon Cable**

The ribbon cable is a 50-pin female-to-female cable that connects the LCE-K0S to the user target. Alternatively, an emulation probe may be used. One end of the ribbon cable connects to the daughterboard and the other to the target. The side of the ribbon cable with a red stripe is pin 1.

**Table 2. P1 Pin Assignments**

P1 Connector	30-Pin SSOP Package	28-Pin SDIP Package	Signal Name	Note
1				GND on probe cable
2				GND on probe cable
3				GND on probe cable
4				GND on probe cable
5				GND on probe cable
6				GND on probe cable
7				GND on probe cable
8				GND on probe cable
9				GND on probe cable
10				GND on probe cable
11	1	1	P23/INTP0/CPT20/SS20	
12	2	2	P24/INTP1/TO80/TO20	
13	3	3	P25/INTP2/TI80	
14	4	4	AVDD	Connect to target VDD
15	5	5	P60/ANI0	
16	6	6	P61/ANI1	
17	7	7	P62/ANI2	
18	8	8	P63/ANI3	
19	9	9	AVSS	Connected to GND on EM Not connected on probe
20	10	---	NC	Not connected on probe
21	11	10	P50	
22	12	11	P51	
23	13	12	P52	
24	14	13	P53	
25	15	14	P00	
26	16	15	P01	
27	17	16	P02	
28	18	17	P03	
29	19	18	RESET	Negative true
30	20	19	VPP	Not connected on probe
31	21	---	NC	Not connected on probe
32	22	20	X2	Not connected on probe
33	23	21	X1	External clock input for target oscillator
34	24	22	VSS	Tied to GND
35	25	23	VDD	Probe VDD is voltage sense
36	26	24	P10	

**Table 2. P1 Pin Assignments (continued)**

P1 Connector	30-Pin SSOP Package	28-Pin SDIP Package	Signal Name	Note
37	27	25	P11	
38	28	26	P20/ $\overline{\text{SCK20}}$ /ASCK20	
39	29	27	P21/SO20/TxD20	
40	30	28	P22/SI20/RxD20	
41				GND on probe cable
42				GND on probe cable
43				GND on probe cable
44				GND on probe cable
45				GND on probe cable
46				GND on probe cable
47				GND on probe cable
48				GND on probe cable
49				GND on probe cable
50				GND on probe cable

**Emulation Probe (Optional)**

In place of a ribbon cable, an emulation probe can be used to connect the LCE to the user target, provided the target has a conversion socket/adaptor installed.

**Table 3. NP-28CT Emulation Probe Pin Assignments**

Emulation Device Pin No.	J1 Pin No.	Emulation Device Pin No.	J1 Pin No.
1	70	15	21
2	69	16	22
3	72	17	18
4	102	18	19
5	71	19	55
6	104	20	49
7	103	21	56
8	27	22	23
9	61	23	24
10	62	24	29
11	65	25	30
12	66	26	93
13	92	27	94
14	91	28	99

**Table 4. NGS-30 and NP36GS Emulation Probe Pin Assignments**

NGS-30 Pin No.	NP-36GS Pin No.	J2 Pin No.	NGS-30 Pin No.	NP-36GS Pin No.	J2 Pin No.
1	19	58	16	11	99
2	20	56	17	10	63
3	21	49	18	9	64
4	22	55	19	8	70
5	23	19	20	7	69
6	24	18	21	6	72
7	25	22	22	5	102
8	33	62	23	4	71
9	32	65	24	12	94
10	31	66	25	13	93
11	30	92	26	14	30
12	29	91	27	15	29
13	28	98	28	16	24
14	27	97	29	17	23
15	26	21	30	18	20

**Table 5. Emulation Probe and Socket for  $\mu$ PD789136 Subseries**

Target Device	Emulation Probe + Conversion Socket
$\mu$ PD789101MC	NP-28CT or NP-36GS + NGS-30
$\mu$ PD789102MC	
$\mu$ PD789104MC	
$\mu$ PD789111MC	
$\mu$ PD789112MC	
$\mu$ PD789114MC	
$\mu$ PD78F9116MC	
$\mu$ PD789121MC	
$\mu$ PD789122MC	
$\mu$ PD789124MMC	
$\mu$ PD789131MC	
$\mu$ PD789132MC	
$\mu$ PD789134MC	
$\mu$ PD78F9136MC	

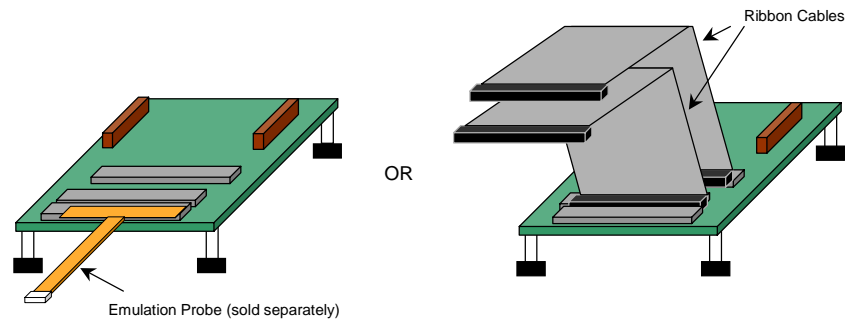


### Assembly

This procedure explains how to connect the LCE-789136-EM to the LCE-78K0S motherboard.

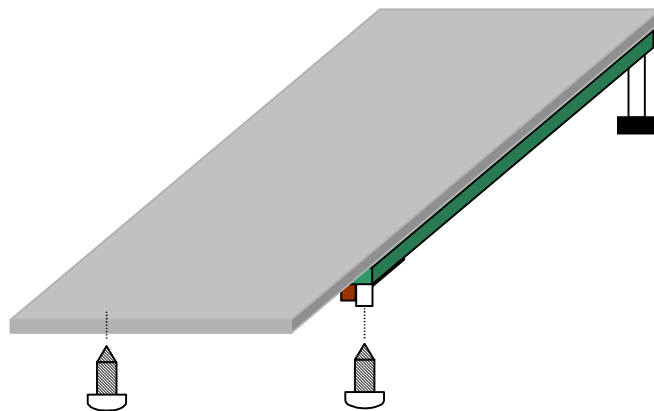
1. Connect the probe or ribbon cable to their respective connectors on the LCE-789136-EM (Figure 4). Note that the number of KEL connectors, headers, and ribbon cables shown in Figure 4 varies for each emulation board. The LCE-789136 has two KEL connectors, one header, and one ribbon cable.

**Figure 4. Connections for Emulation Probe or Ribbon Cables**



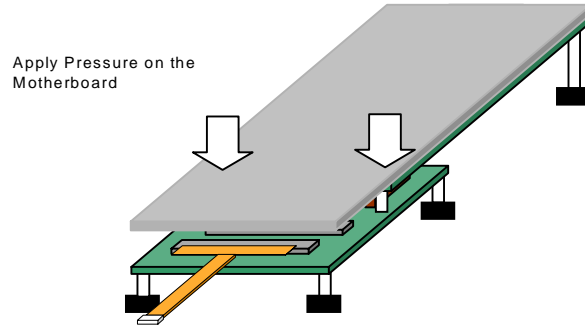
2. Make sure power is off from the LCE-78K0S motherboard.
3. Remove the two screws at the bottom of the standoffs on the motherboard (Figure 5).

**Figure 5. Screws on Bottom of Motherboard**



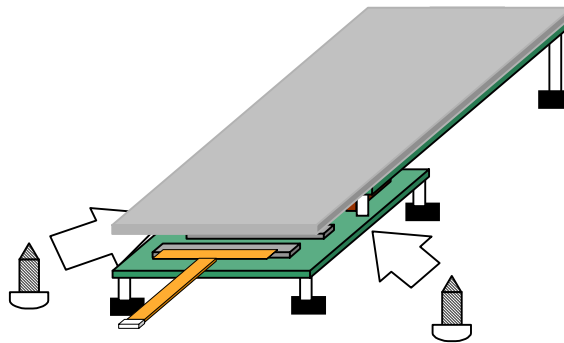
4. With the daughterboard on a stable surface, connect the motherboard on the daughterboard by gently applying pressure on the mating connectors. Avoid applying too much pressure on the plastic cover (Figure 6).

**Figure 6. Daughterboard Mating Connectors**



5. Replace the screws on the bottom of the daughterboard to securely connect it to the motherboard (Figure 7).

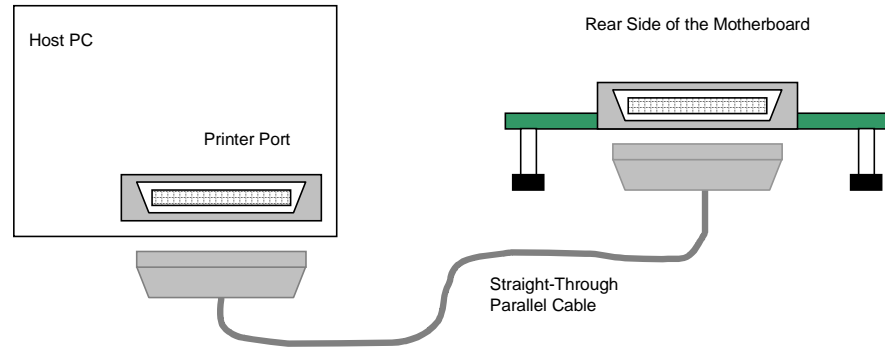
**Figure 7. Connection to Motherboard**



6. Connect the loose end of the probe or ribbon cable to the user target. Refer to Tables 2-4 for pin assignments.

7. With a 25-pin male-to-male parallel cable (included in the motherboard package), connect the LCE-K0S system to the host computer (Figure 8).

**Figure 8. Connection to Host PC**



8. With the power adapter connected, turn the switch to the ON position. The green LED turns on when power is supplied to the system.
9. Launch the debugger from your PC.



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