

## **User's Manual**

# **K0RE9418**

**EVALUATION PLATFORM FOR  $\mu$ PD78F9418 MICROCONTROLLER**

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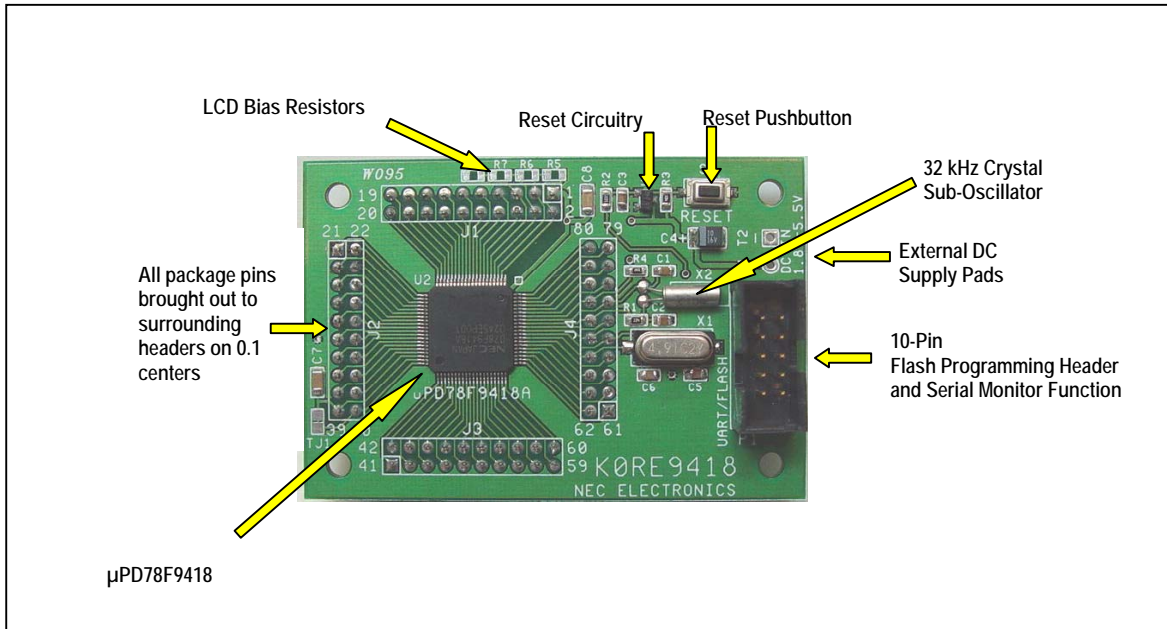
## 1. INTRODUCTION

To facilitate designing with the  $\mu$ PD78F9418 NEC Electronics flash microcontroller, the device, along with appropriate crystals and reset circuitry, is provided on a printed circuit board (K0RE9418-KB). All of the package pins are brought out to standard 0.1-inch headers that surround the microcontroller package on all four sides.

### 1.1 $\mu$ PD789418 Features

- 32 KB flash memory
- Internal data memory
  - 512-byte high-speed RAM
  - 28 x 4-bit LCD display RAM
- Minimum instruction execution time can be changed from high-speed (0.4  $\mu$ s at 5.0 MHz with main system clock) to ultra-low-speed (122  $\mu$ s at 32.768 KHz with subsystem clock)
- I/O port: 43 pins
- Serial interface: 1 channel (3-wire serial I/O mode or UART mode selectable)
- Seven-channel A/D converter with 10-bit resolution
- Timer: 6 channels
  - One-channel, 16-bit timer
  - Two-channel, 8-bit timer/event counter
  - One-channel, 8-bit timer
  - One-channel watch timer
  - One-channel watchdog timer
- LCD Controller/Driver
  - Segment signals: 28 pins max.
  - Common signals: 4 pins max.
- Supply voltage:  $V_{DD} = 1.8$  to 5.5V

Figure 1. Board Layout



**Table 1. K0RE9418-KB ( $\mu$ PD78F9418) Header to Pin Configuration**

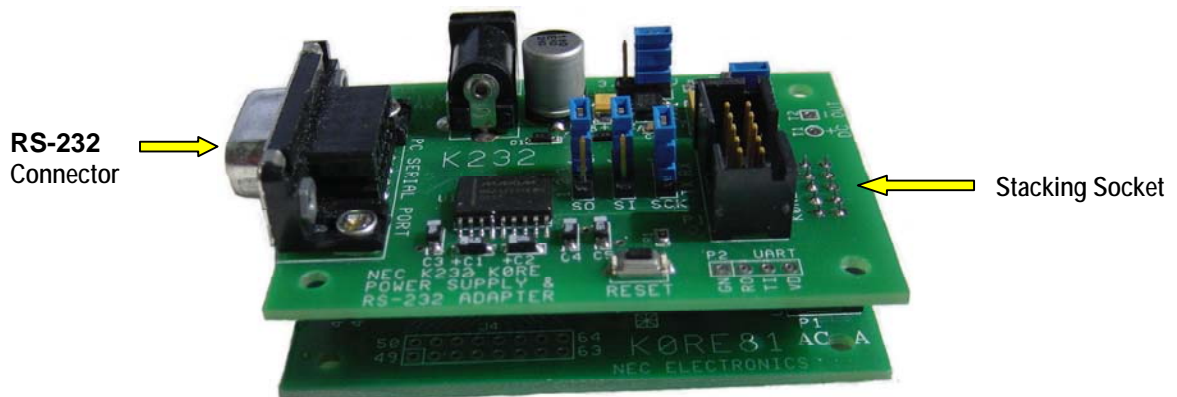
1	V <sub>DD1</sub>	21	S10	41	P66/ANI6	61	P03
2	BIAS	22	S11	42	P65//ANI5	62	P02
3	V <sub>LC0</sub>	23	S12	43	P64//ANI4	63	P01
4	V <sub>LC1</sub>	24	S13	44	P63//ANI3	64	P00
5	V <sub>LC2</sub>	25	S14	45	P62/ANI2	65	P47
6	V <sub>SS1</sub>	26	S15	46	P61/ANI1	66	P46
7	COM <sub>0</sub>	27	P93/S16	47	P60/ANI0/CMPIN0	67	/RESET
8	COM <sub>1</sub>	28	P92/S17	48	AVSS	68	X2
9	COM <sub>2</sub>	29	P91/S18	49	P27.INTP3/CPT5	69	X1
10	COM <sub>3</sub>	30	P90/S19	50	P26/INTP2/TO5	70	VSS0
11	S0	31	P87/S20	51	P25.INTP1/TI1	71	VDD0
12	S1	32	P86/S21	52	P24.INTP0/TI0	72	XT2
13	S2	33	P85/S22	53	P23/CMPTOUT0/TO2	73	XT1
14	S3	34	P84/S23	54	P22.SI/RxD	74	VPP
15	S4	35	P83/S24	55	P21/SO/TxD	75	P45/KR5
16	S5	36	P82/S25	56	P20//SCK/ASCK	76	P44/KR4
17	S6	37	P81/S26	57	P53	77	P43/KR3
18	S7	38	P80/S27	58	P52	78	P42/KR2
19	S8	39	AV <sub>DD</sub>	59	P51	79	P41/KR1
20	S9	40	AV <sub>REF</sub>	60	P50	80	P40/KR0

**Note:** Package pin numbers match the header pinout numbers.

## 2. CONNECTING TO THE K232 SERIAL ADAPTER

There are two ways to connect to the K232. The first is via the 10-pin stackable J2 header. Figure 2 shows the board's orientation for stacking.

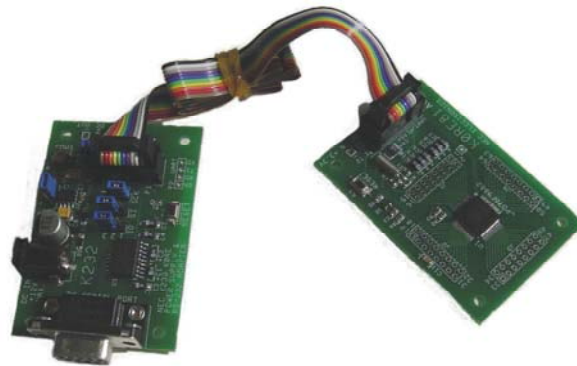
Figure 2. Stacked Connection





The second is with an extension ribbon cable supplied with the K232 that plugs onto the P1 10-pin header on the circuit side of the K232. The other side plugs into the flash programmer header on the K0RE9418. These connections use keyed headers and can only be plugged in one way (Figure 3).

**Figure 3. Ribbon Cable Connection**



### **3. K232 JUMPER SETTINGS FOR THE K0RE9418**

1. Set a jumper to JP1 if you want the K0RE9418 to derive power from the K232 adapter.
2. Set a jumper to JP2 for 3.3-volt operation.
3. JP3 does not require a jumper.
4. Set JP4 jumper 2 to 3.
5. Set JP5 jumper 1 to 2.

### **4. PRE-FLASHED SOFTWARE**

The K0RE9418 was flash-programmed in manufacturing with the K0S mini-monitor program for testing and diagnostics. The K232 will work with the K0RE9418 right out of the box. Check the *K232 User's Manual* for communication port settings.

Table 2. Bill of Materials

Item	Part Name	Description	Value	Digi-Key Part No.	Quantity
1	R2	RES, SMT, 0805, 10k OHM, 5%	1.0k	P1.0KACT-ND	5
2	R3	RES, SMT, 0805, 100k OHM, 5%	3.3k	P3.3KACT-ND	1
3	R4	RES, SMT, 0805, 3.3k OHM, 5%	10k	P10KACT-ND	3
4	R5,R6,R7,R8	RES, SMT, 0805, Value	Defined by User		4
5	R1	RES, SMT, 0805, 220k OHM, 5%	220k	P220KACT-ND	1
6	C1, C2	CAP, MLC, C0G, SMT, 0805, 33 pF, 50V, 5%	33 pF	PCC330CGCT-ND	2
7	C3	CAP, MLC, C0G, SMT, 0805, 470 pF, 50V, 5%	470 pF	PCC471CGCT-ND	1
8	C4	10uF, 16V, TAN CAP, TANT, SMT, 3528	10 $\mu$ F, 16V, 10%	PCS3106CT-ND	1
9	C5,C6	CAP, MLC, C0G, SMT, 0805, 22pF, 50V, 5%	33 pF	PCC220CGCT-ND	
10	C7,C8	CAP, MLC, X7R, SMT, 1206, 100 nF, 50V, 10%	100 nF	PCC104BCT-ND	1
11	X1	XTAL, 4.9152MHz, 8.2 mm,	4.9152MHz		1
12	X2	XTAL, 32 kHz, 8.2 mm, ECS-3X8	32 kHz	X801-ND	1
13	U2	IC, LIN, VOLTAGE DETECTOR, 2.7V (SOT-23)	TC54VN2702	TC54V2702ECB71CT	1
14	U1	IC, MCU, SMT, FLASH, NEC $\mu$ PD78F9418	$\mu$ PD78F9418	Available from NEC	1
15	P1	HDR, TWO-ROW, VERT, SHRD, 0.100", 10-Pin	HDR, 10-Pin	A26267-ND	1
16	S1	SWITCH, PUSHBUTTON, SPST, 6 mm x 3.5 mm, SMT	SW, EVQPP	P8086SCT-ND	1
17	T1, T2	Terminal	TERM	N/A	2
18	PCB	Printed Circuit Board	PCB	N/A	1

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