

WS1188-P / WS1188-SP / WS1188-SO

Keypad Encoder IC

8 x 8 Matrix Keypad Encoder IC:

Interfaces to any microcontroller

Electrically quiet with reduced EMI

Contact debouncing

Parallel Outputs with Data Valid output

TTL Serial Output (RS-232/RS-485)

2400 or 9600 serial Baud rates selection

Automatic key repeat 700 mS Delay /200 mS Auto-repeat

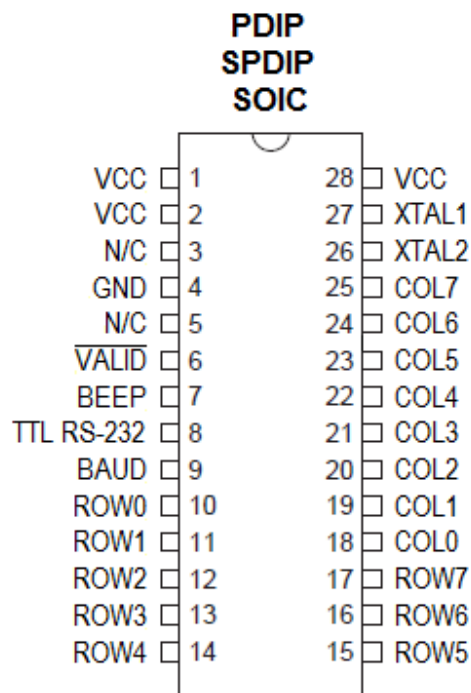
1 KHz Beep Output provides tactile feedback

Available in three packages:

WS1188-P 28-Lead Plastic – 600 mil [PDIP]

WS1188-SP 28-Lead Plastic – 300 mil [SPDIP]

WS1188-SO 28-Lead Plastic - 7.50 mm [SOIC]



WS1188

8 x 8 Keypad Encoder

Figure 1

Absolute Maximum Rating

Supply Voltage	6.0V
Storage Temperature	-65°C to +150°C
Max. output current any Row pin	±25 mA

Operating Conditions

Supply Voltage	4.75V to 5.25V
Operating Temperature	-40°C to +85°C
Oscillator frequency	4.0 MHz

Chip information

The WS1188 Keypad Encoder interfaces a keypad (up to 8 rows x 8 columns, or 64 keys) to a microcontroller. Two data outputs are available simultaneously: Parallel Output and Serial Output.

Parallel Output

8-bit parallel output (**Pins 10 to 17**), with Data Valid signal (**Pin 6**) for capture or processor interrupt.

Serial Output

One-wire serial output (**Pin 8**) following the N-8-1 format (no parity, 8 data bits, one stop bit, often used in RS-232). The output voltage level is TTL (0V to + 5V) and allows direct interface with the micro controller. However if RS-232 (-12 to + 12V) levels are required, a level converter IC (such as the MAX232) should be used.

Serial Rate

The serial data is sent at either 2400 or 9600 Baud, as selected by Baud Input (**Pin 9**). Low = 2400 Bauds, High = 9600 Bauds.

Tactile Feedback

To provide tactile feedback to the operator, the Beep Output (**Pin 7**) will supply a 1KHz square wave, toggling from 0 to 5 Volts, with a duration of 45 milliseconds.

Contact Debouncing

All mechanical switches exhibit some form of 'contact bounce'. As two metallic contacts are pressed together, there will be a finite amount of time (often up to 20 milliseconds) before a stable electrical contact is made. The switch contacts will open and close many times before finally staying closed. The WS1188 Contact Debouncing will ignore any additional closures (bounce) of contacts for 50 milliseconds.

Auto Repeat

If a contact is held longer than the auto-repeat delay of 700 milliseconds, the same output is repeated again at a rate of five times per second.

Electrically Quiet

The WS1188 is electrically quiet (reduced EMI). No continuous keypad scanning generating spurious electrical signals.

The WS1188 reduces this problem by scanning only once each time a keypress is detected.

Less than 64 keys

The WS1188 can be used with Less than 64 keys. Simply remove from Figure 2 the not used switches.

Be certain to use the eight 4.7K Ohm resistors on all column (Col0...Col7). The rows resistors (390 Ohms) must be connect to each row of your keypad if any.

Clock Oscillator

For timing reference use a 4MHz parallel-cut crystal (as illustrated in Figure 3) or a resonator or direct 4MHz TTL clock input at XTAL1 (**pin 27**).

When using direct TTL clock 4MHz leave floating XTAL2 (**Pin 26**).

Overview of Operation

Once a key is pressed the Parallel Output (bit0...bit7) represents the key press value. Two microseconds later, the Data Valid (**Pin 6**) goes low, indicating that there is valid data on the parallel output pins.

After this, the 1KHz Beeper Output (**Pin 7**) is generated for 45 milliseconds. Following this, the Serial Output (**pin 8**) transmits the data at the Baud Rate selected by (**Pin 9**).

Once a key is pressed any additional closures (bounce) of contacts are ignored for 50 milliseconds.

Parallel Output (**Pins 10 to 17**) and Data Valid (**Pin 6**) will be present by 50 milliseconds to complete the entire process.

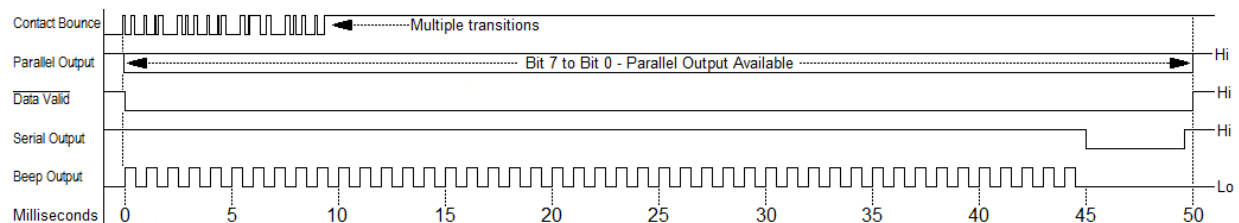


Figure 2

Typical Application

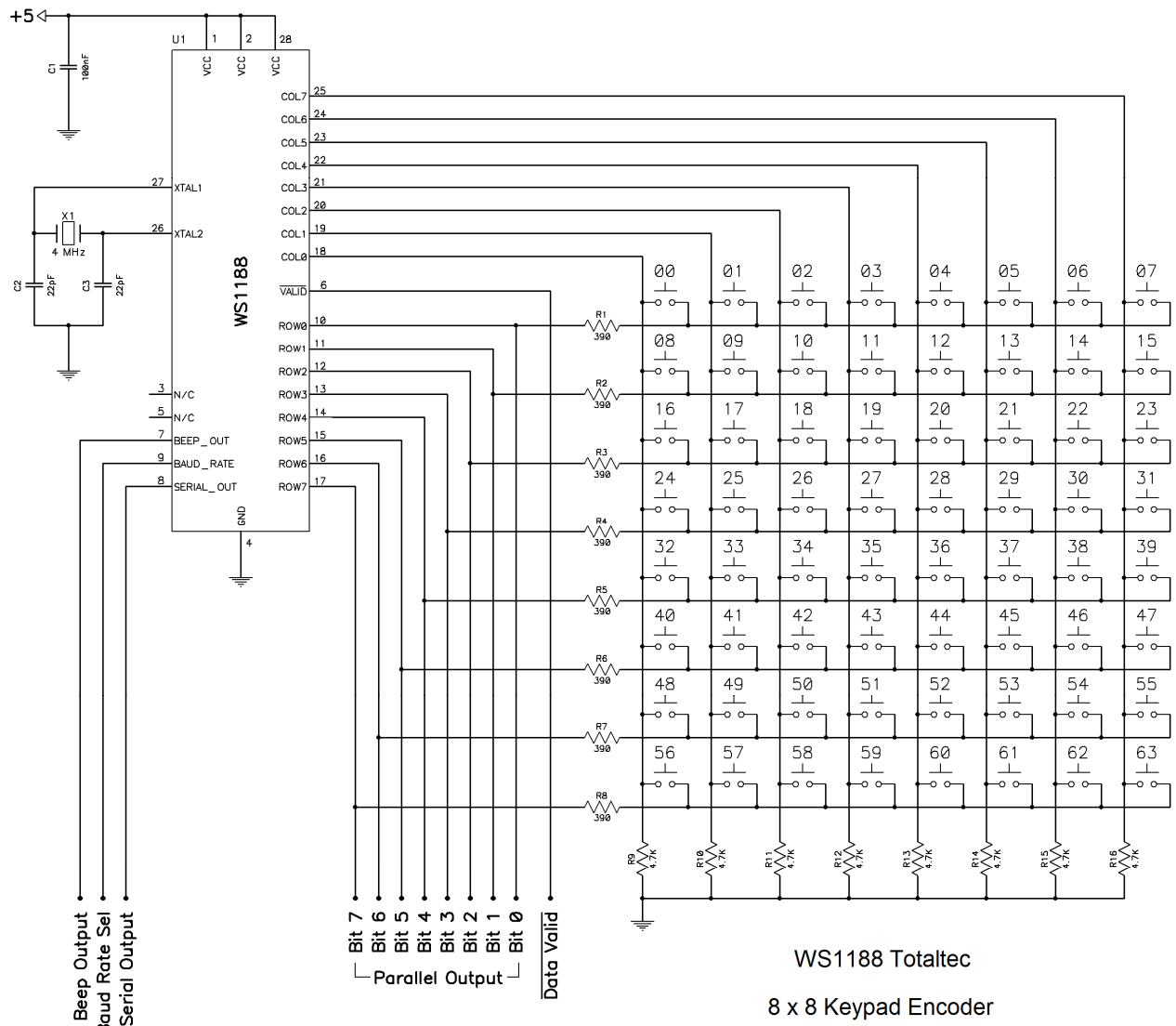
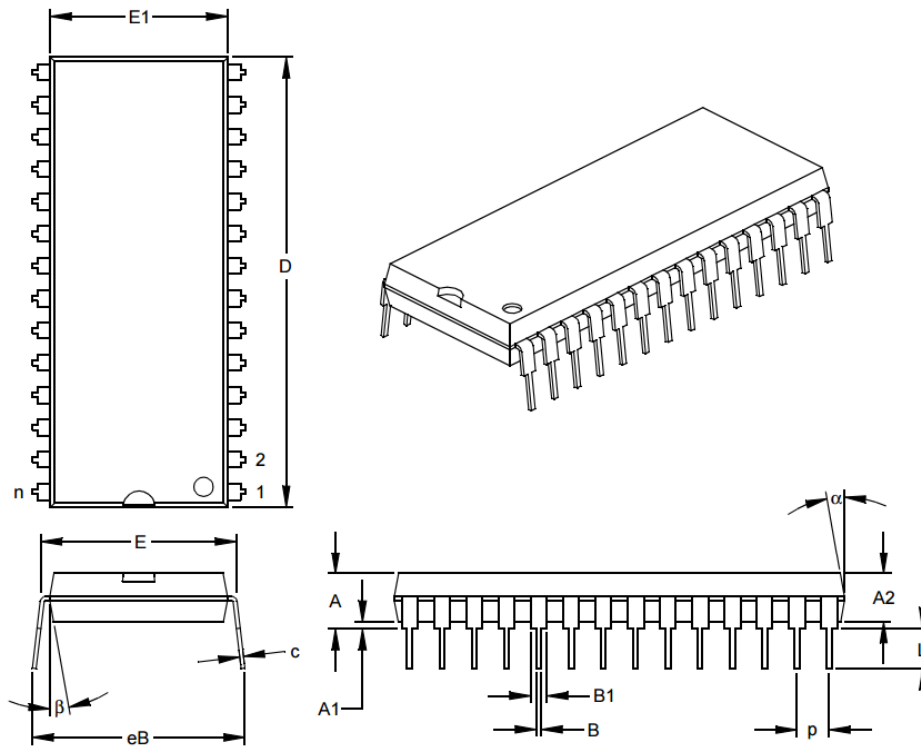


Figure 3

Packaging Information

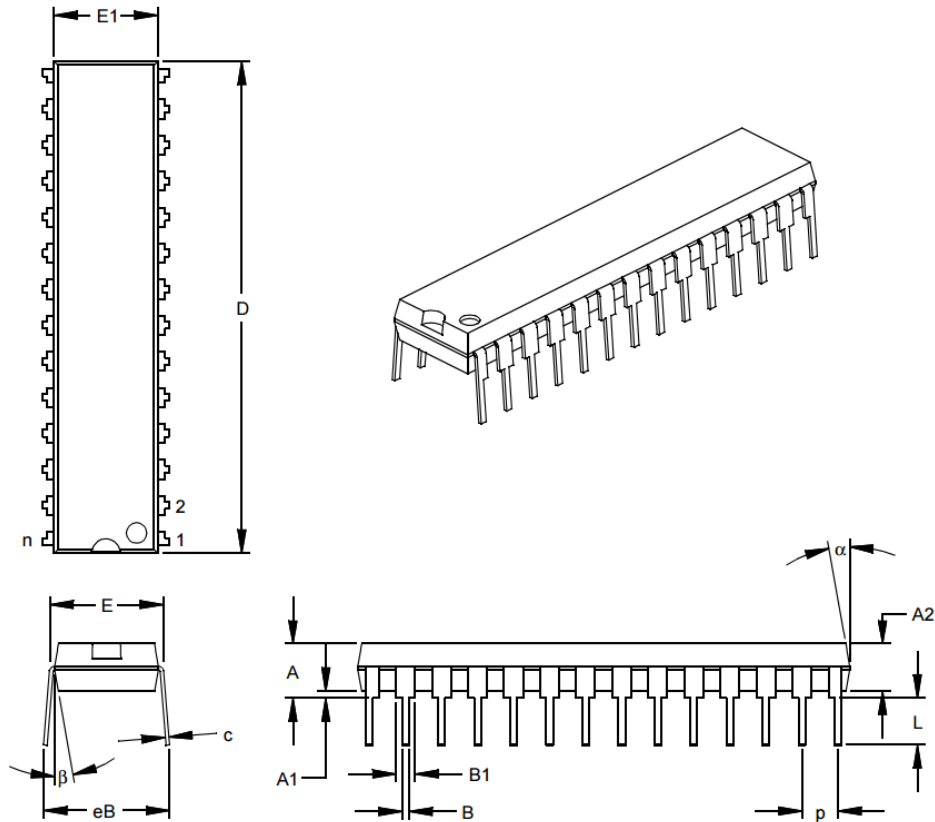
28-Lead Plastic Dual In-line (P) – 600 mil (PDIP)



Units	INCHES*			MILLIMETERS		
	MIN	NOM	MAX	MIN	NOM	MAX
n		28			28	
p		.100			2.54	
A	.160	.175	.190	4.06	4.45	4.83
A2	.140	.150	.160	3.56	3.81	4.06
A1	.015			0.38		
E	.595	.600	.625	15.11	15.24	15.88
E1	.505	.545	.560	12.83	13.84	14.22
D	1.395	1.430	1.465	35.43	36.32	37.21
L	.120	.130	.135	3.05	3.30	3.43
c	.008	.012	.015	0.20	0.29	0.38
B1	.030	.050	.070	0.76	1.27	1.78
B	.014	.018	.022	0.36	0.46	0.56
eB	.620	.650	.680	15.75	16.51	17.27
α	5	10	15	5	10	15
β	5	10	15	5	10	15

Packaging Information

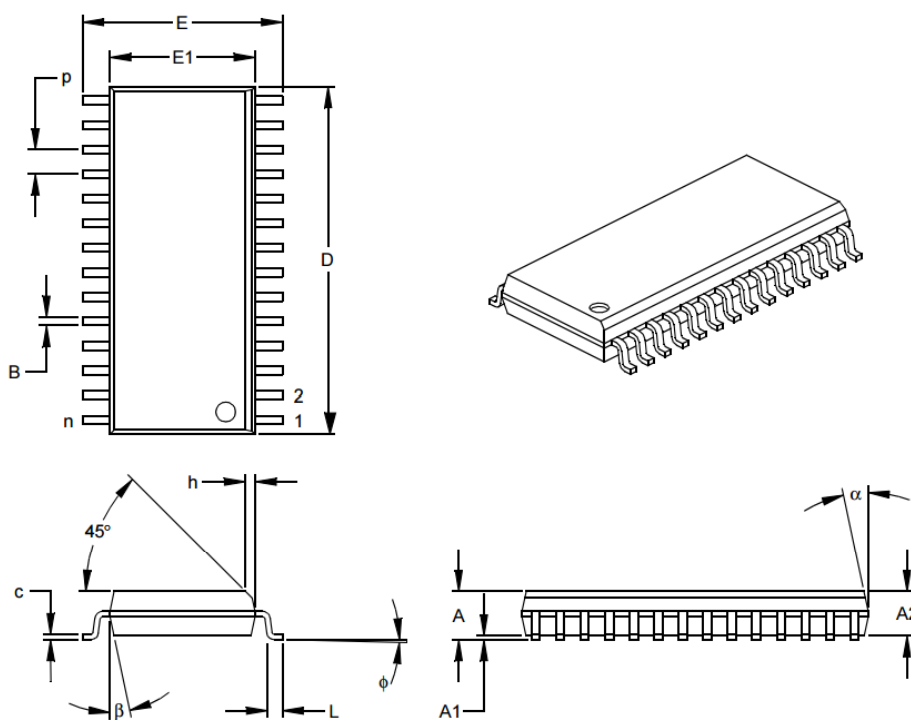
28-Lead Skinny Plastic Dual In-line (SP) – 300 mil (PDIP)



Units	INCHES*			MILLIMETERS		
	MIN	NOM	MAX	MIN	NOM	MAX
n		28			28	
p		.100			2.54	
A	.140	.150	.160	3.56	3.81	4.06
A2	.125	.130	.135	3.18	3.30	3.43
A1	.015			0.38		
E	.300	.310	.325	7.62	7.87	8.26
E1	.275	.285	.295	6.99	7.24	7.49
D	1.345	1.365	1.385	34.16	34.67	35.18
L	.125	.130	.135	3.18	3.30	3.43
c	.008	.012	.015	0.20	0.29	0.38
B1	.040	.053	.065	1.02	1.33	1.65
B	.016	.019	.022	0.41	0.48	0.56
eB	.320	.350	.430	8.13	8.89	10.92
α	5	10	15	5	10	15
β	5	10	15	5	10	15

Packaging Information

28-Lead Plastic Small Outline (SO) – Wide, 300 mil (SOIC)



Units	INCHES*			MILLIMETERS		
	MIN	NOM	MAX	MIN	NOM	MAX
n		28			28	
p		.050			1.27	
A	.093	.099	.104	2.36	2.50	2.64
A2	.088	.091	.094	2.24	2.31	2.39
A1	.004	.008	.012	0.10	0.20	0.30
E	.394	.407	.420	10.01	10.34	10.67
E1	.288	.295	.299	7.32	7.49	7.59
D	.695	.704	.712	17.65	17.87	18.08
h	.010	.020	.029	0.25	0.50	0.74
L	.016	.033	.050	0.41	0.84	1.27
φ	0	4	8	0	4	8
c	.009	.011	.013	0.23	0.28	0.33
B	.014	.017	.020	0.36	0.42	0.51
α	0	12	15	0	12	15
β	0	12	15	0	12	15