

## MIDI (Musical Instrument Digital Interface) / Game Port Filter/Protection Circuit

### Features

- Integrated network contains 15 resistors, 10 capacitors, and ESD diodes
- ESD protection to greater than  $\pm 4\text{kV}$  (MIL-STD-883 Method 3015) and greater than  $\pm 8\text{kV}$  in-system

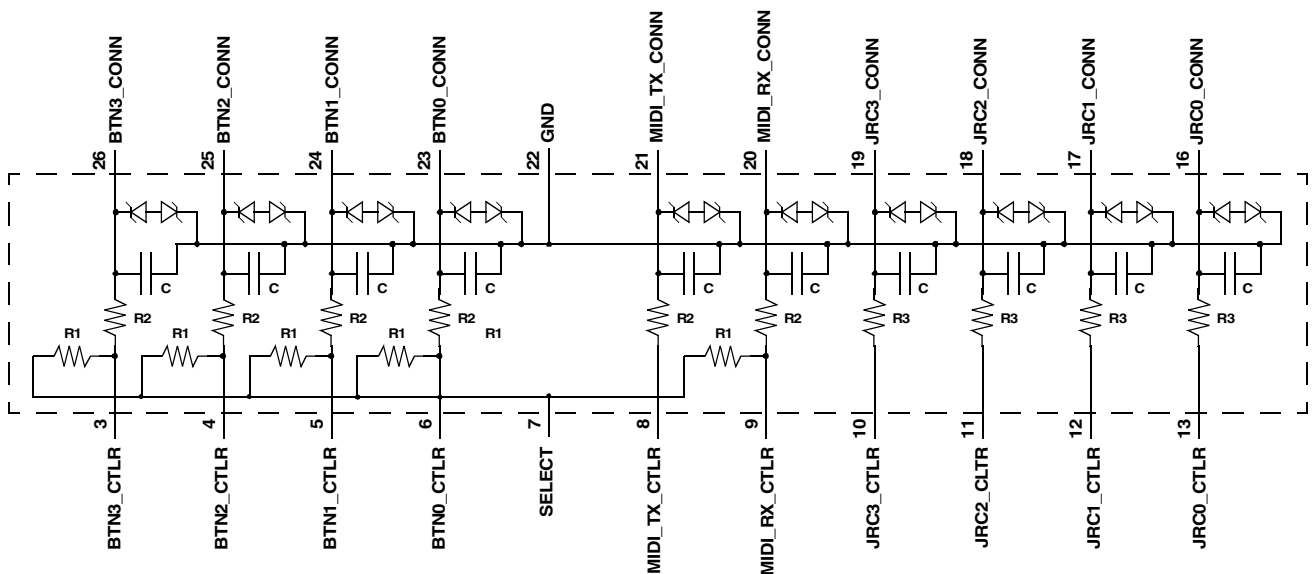
### Applications

- Personal computers and gaming devices requiring EMI/RFI filtering and ESD protection for MIDI/ Game Ports in a single package.

### Product Description

The PACGAME1™ provides EMI filtering, pull-up termination and ESD protection for Game Port interfaces in one convenient device. The signals to and from a MIDI/Game Port controller generally contain high frequency components that emit unwanted EMI at the connector. Likewise, the signals from the MIDI/Game Port controller must be protected from any possible external electrical discharges typically caused by static electricity. The PACGAME1 provides these functions as well as a selectable pull-up function.

### Simplified Electrical Schematic

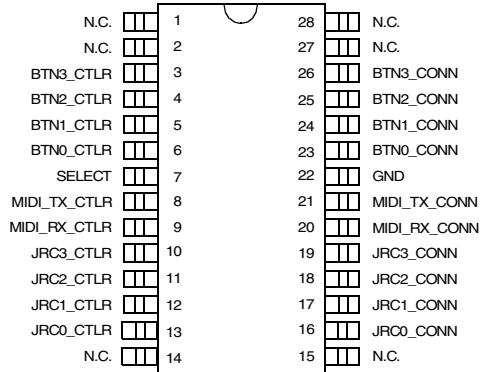


Notes:

- 1) Component values: R1=4.7K, R2=47Ω, R3=2.2K, C=470pF



**PACKAGE / PINOUT DIAGRAM**



Note: This drawing is not to scale.

28-pin QSOP

**PIN DESCRIPTIONS**

PIN(S)	NAME	DESCRIPTION
3	BTN3_CTLR	Controller-side Joystick Button 3 channel.
4	BTN2_CTLR	Controller-side Joystick Button 2 channel.
5	BTN1_CTLR	Controller-side Joystick Button 1 channel.
6	BTN0_CTLR	Controller-side Joystick Button 0 channel.
7	SELECT	Select Input Typically tied to V <sub>CC</sub> to pull up the BTN <sub>x</sub> _CTLR and MIDI_RX_CTLR inputs.
8	MIDI_TX_CTLR	Controller-side MIDI Transmit channel.
9	MIDI_RX_CTLR	Controller-side MIDI Receive channel.
10	JRC3_CTLR	Controller-side Axis Control 3 channel.
11	JRC2_CTLR	Controller-side Axis Control 2 channel.
12	JRC1_CTLR	Controller-side Axis Control 1 channel.
13	JRC0_CTLR	Controller-side Axis Control 0 channel.
16	JRC0_CONN	Connector-side Axis Control 0 channel.
17	JRC1_CONN	Connector-side Axis Control 1 channel.
18	JRC2_CONN	Connector-side Axis Control 2 channel.
19	JRC3_CONN	Connector-side Axis Control 3 channel.
20	MIDI_RX_CONN	Connector-side MIDI Receive channel.
21	MIDI_TX_CONN	Connector-side MIDI Transmit channel.
22	GND	Device ground reference.
23	BTN0_CONN	Connector-side Joystick Button 0 channel.
24	BTN1_CONN	Connector-side Joystick Button 1 channel.
25	BTN2_CONN	Connector-side Joystick Button 2 channel.
26	BTN3_CONN	Connector-side Joystick Button 3 channel.
1,2,14,15, 27,28	N.C.	No connect pins.

## Ordering Information

PART ORDERING INFORMATION			
Package		Ordering Part Number <sup>1</sup>	
Pins	Style	Tape & Reel or Tubes	Part Marking
28	QSOP	PACGAME1Q	PACGAME1Q

Note 1: Parts are shipped in Tape & Reel form unless otherwise specified.

## Specifications

ABSOLUTE MAXIMUM RATINGS		
PARAMETER	RATING	UNITS
Storage Temperature Range	-65 to +150	°C
DC Power to Resistor	100	mW
Package Power	1.0	W

STANDARD OPERATING CONDITIONS		
PARAMETER	RATING	UNITS
Operating Temperature Range	0 to +70	°C

ELECTRICAL OPERATING CHARACTERISTICS						
SYMBOL	PARAMETER	CONDITIONS	MIN	TYP	MAX	UNITS
TOL <sub>R1</sub>	Absolute Tolerance of R1 Resistance				±20	%
TOL <sub>R2</sub>	Absolute Tolerance of R2 Resistance				±20	%
TOL <sub>R3</sub>	Absolute Tolerance of R3 Resistance				±20	%
TOL <sub>C1</sub>	Absolute Tolerance of C1 Capacitance				±10	%
I <sub>LEAK</sub>	Diode Leakage	@ 5.0V			±1	μA
V <sub>SIGNAL</sub>	Signal Amplitude Range		-6		+6	V
V <sub>PP</sub>	ESD Protection 1) Peak Discharge Voltage at any I/O (Human Body Model, MIL-STD-883, Method 3015) 2) In-system Protection, HBM 3) In-system Protection, IEC 61000-4-2, Level 3	Notes 2,5  Notes 3,5 Notes 3,4,5	±4  ±8 ±4			kV kV kV
V <sub>CL</sub>	Channel Clamp Voltage at 8KV ESD Pulses, HBM	Notes 2,3			±30	V

Note 1: Specified at T<sub>A</sub>=25°C unless otherwise specified.

Note 2: Human Body Model per MIL-STD-883, Method 3015, C<sub>Discharge</sub> = 100pF; R<sub>Discharge</sub> = 1.5KΩ; pin 7=5V; pin 22 grounded.

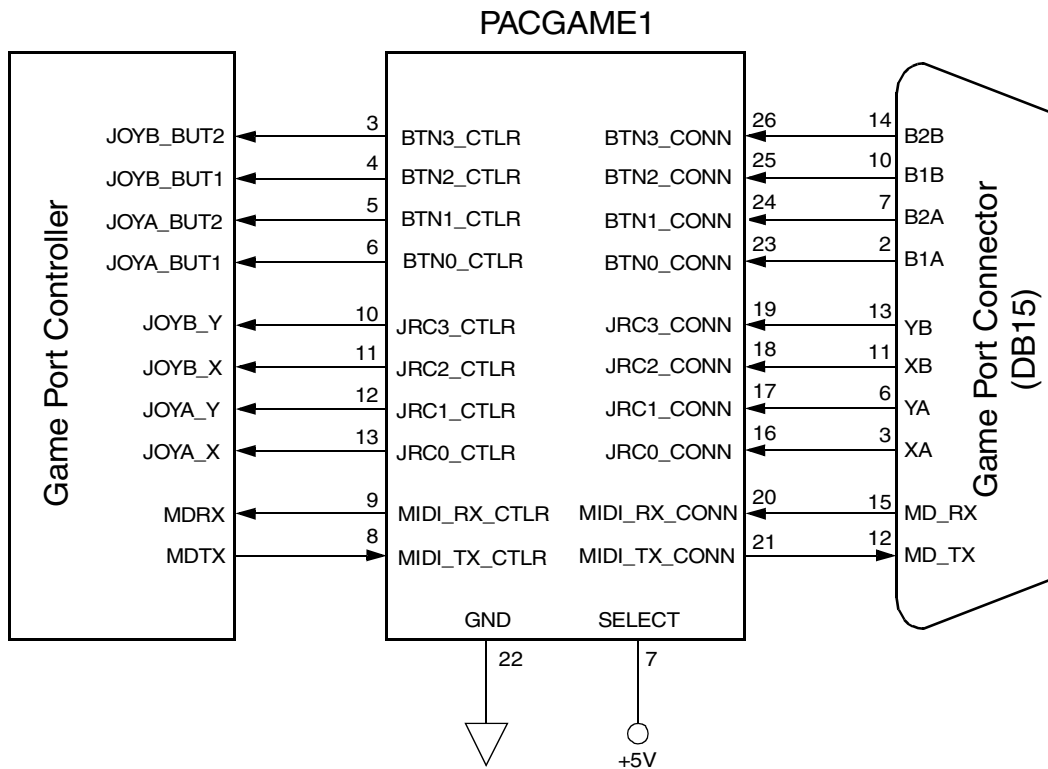
Note 3: Pin 22 grounded; pin 7 at V<sub>CC</sub>; all other pins are open. ESD contact discharge between ground and pins 16, 17, 18, 19, 20, 21, 23, 24, 25, & 26, one at a time.

Note 4: Standard IEC 61000-4-2 with C<sub>Discharge</sub> = 150pF, R<sub>Discharge</sub> = 330Ω, pin 7=5V and pin 22 grounded.

Note 5: These parameters guaranteed by design.

### Application Information

A system-level diagram illustrating the relationship between a MIDI/Game Port controller device, the PACGAME1 device, and a DB15 Game Port connector is shown in [Figure 1](#).



**Figure 1. PACGAME1 Typical Application Circuit**

## Mechanical Details

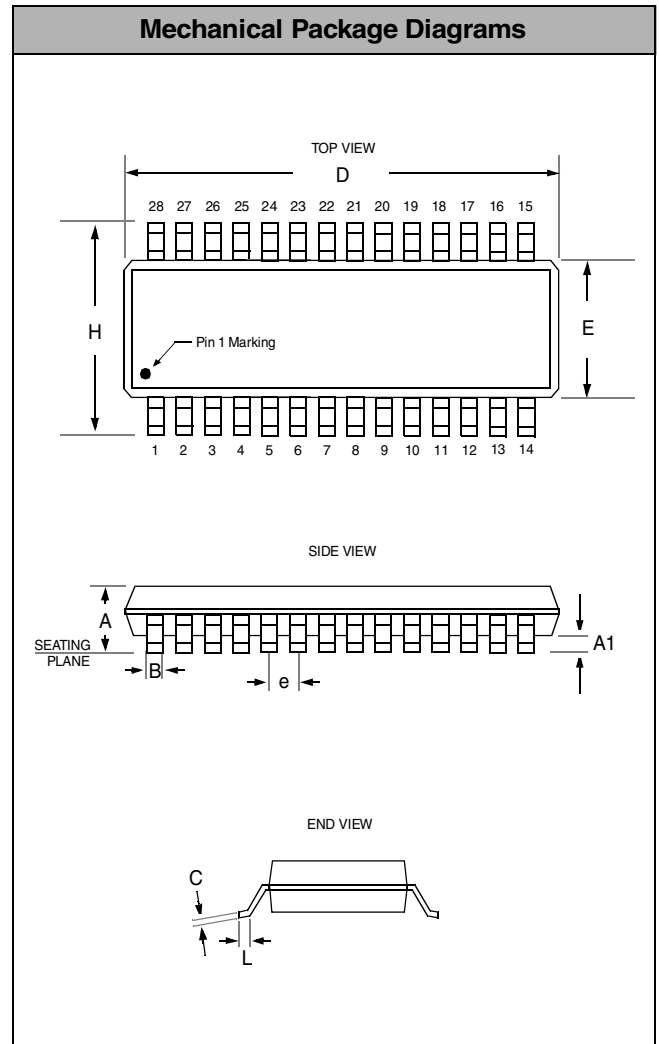
### QSOP Mechanical Specifications:

PACGAME1 devices are packaged in 28-pin QSOP packages. Dimensions are presented below.

For complete information on the QSOP-28 package, see the California Micro Devices QSOP Package Information document.

PACKAGE DIMENSIONS				
Package	QSOP (JEDEC name is SSOP)			
Pins	28			
Dimensions	Millimeters		Inches	
	Min	Max	Min	Max
<b>A</b>	1.35	1.75	0.053	0.069
<b>A1</b>	0.10	0.25	0.004	0.010
<b>B</b>	0.20	0.30	0.008	0.012
<b>C</b>	0.18	0.25	0.007	0.010
<b>D</b>	9.80	9.98	0.386	0.393
<b>E</b>	3.81	3.98	0.150	0.157
<b>e</b>	0.64 BSC		0.025 BSC	
<b>H</b>	5.79	6.20	0.228	0.244
<b>L</b>	0.40	1.27	0.016	0.050
<b># per tube</b>	50 pieces*			
<b># per tape and reel</b>	2500 pieces			
<b>Controlling Dimensions: inches</b>				

\* This is an approximate amount which may vary.



**Package Dimensions for QSOP-28**