Highlights

- System implements ITU-T telecom profiles
- Composed of Renesas' IEEE 1588 software and Synchronization Management Unit (SMU) hardware
- Operates as IEEE 1588 / PTP slave
- Recovers accurate and stable synchronization signals from packet based IEEE 1588 / PTP master
- Provides integrated physical layer frequency support
- Operates as an IEEE 1588 / PTP master

SOFTWARE

- C99 source code distribution, supporting POSIX-based Operating Systems (OSs) such as Linux
- IEEE 1588 compliant Precision Time Protocol (PTP) stack
- Abstraction interface supports user-supplied IEEE 1588 compliant Precision Time Protocol (PTP) stack
- Reference trackers filter packet synchronization noise from IEEE 1588 unaware networks

HARDWARE

- Synchronization Management Unit (SMU) provides tools to manage physical layer and packet based synchronous clocks for IEEE 1588 Telecom Profile applications
- Supports independent IEEE 1588 and Synchronous Ethernet (SyncE) timing paths
- Combo mode provides SyncE physical layer frequency support for IEEE 1588 Telecom Boundary Clocks (T-BC) and Telecom Time Slave Clocks (T-TSC) per G.8273.2
- Digital PLLs can be configured as Digitally Controlled Oscillators (DCOs) for IEEE 1588 clock synthesis
- Generates G.8262 compliant SyncE clocks
- Fractional-N input dividers support a wide range of reference frequencies
- Locks to 1 pulse per second (PPS) references from GPS based sources
- Loads configuration from an external EPROM after reset

Applications

- Access routers, edge routers, core routers
- Carrier Ethernet switches
- Multiservice access platforms
- PON OLT
- LTE eNodeB
- ITU-T G.8265.1 and G.8275.1 Telecom Profile clock synthesizer
- ITU-T G.8273.2 Telecom Boundary Clock (T-BC) and Telecom
- Time Slave Clock (T-TSC)
- ITU-T G.8264 Synchronous Equipment Timing Source (SETS)
- ITU-T G.8263 Packet-based Equipment Clock (PEC)
- ITU-T G.8262 Synchronous Ethernet Equipment Clock (EEC)
- ITU-T G.813 Synchronous Equipment Clock (SEC)
- Telcordia GR-253-CORE Stratum 3 Clock (S3) and SONET Minimum Clock (SMC)

Description

IEEE 1588-2008 Precision Time Protocol (PTP) is a packet-based synchronization mechanism used in packet-switched networks. PTP synchronizes the clocks of different devices with the most accurate clock on the network – usually a precise, grandmaster clock, such as one using a Primary Reference Time Clock (PRTC) time signal. The 82P33931-1 is a software and hardware system that can operate as a PTP slave or PTP master. As a PTP slave the 82P33931-1 recovers accurate and stable electrical synchronization signals from a packet based reference generated by a PTP master. As a PTP master the 82P33931-1 can lock to a stable electrical clock source and generate packet based PTP references for downstream PTP slaves

The 82P33931-1 is available with several software and hardware options. The software options are outlined in Table 1 by root part number. The hardware options depend on the choice of Synchronization Management Unit (SMU) hardware; the SMU hardware documentation is listed in Table 3 by root part number.

Table 1: Software Options by Root Part Number

Root Part Number	Included Software
82P33931	Renesas clock recovery servo software
82P33931-1	Renesas clock recovery servo software IEEE 1588 Protocol Stack

System Component Documentation

The detailed characteristics of the 82P33931-1 software and hardware components are described in other documents as shown in Table 2 and Table 3.

Table 2: Software Documentation

Software System Component	Software Documentation
82P33931-1 IEEE 1588 software	Please contact Renesas

Table 3: SMU Hardware Documentation

Root Part Number	Documentation
82P33931 82P33931-1	82P33831 Datasheet (For specifications information about the 82P33931 and 82P33931-1, see the 82P33831 Datasheet.)

Package Outline Drawings

The package outline drawings are located at the end of this document and are accessible from the Renesas website. The package information is the most current data available and is subject to change without revision of this document.

Ordering Information

Table 4: Ordering Information

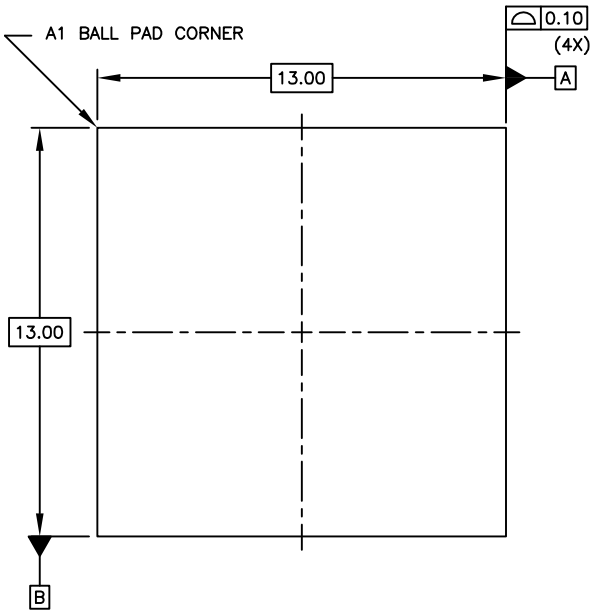
Part/Order Number [a]	Package	Shipping Packaging	Temperature
82P33931BAG	144-pin CABGA green package	Tray	-40° to +85°C
82P33931BAG8	144-pin CABGA green package	Tape and Reel	-40° to +85°C
82P33931-1BAG	144-pin CABGA green package	Tray	-40° to +85°C
82P33931-1BAG8	144-pin CABGA green package	Tape and Reel	-40° to +85°C

a. "G" after the two-letter package code denotes Pb-Free configuration, RoHS compliant.

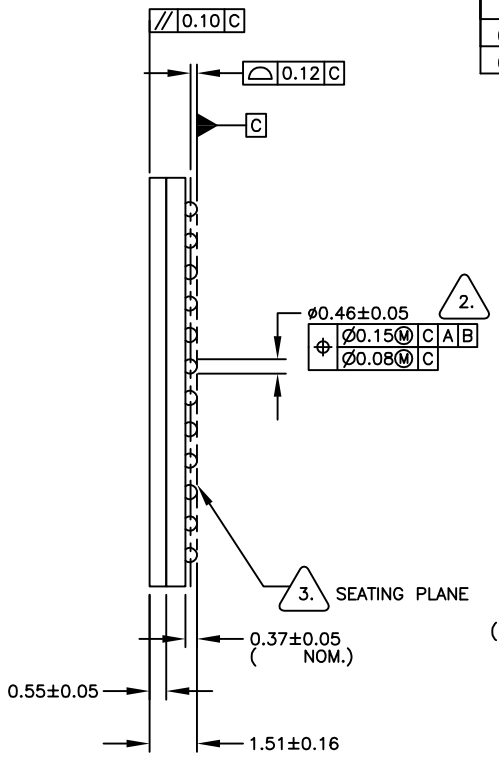
Revision History

Date	Description of Change
Jun 3, 2025	Added a Package Outline Drawings section. Completed other minor changes.
Apr 5, 2017	Separated parts into individual datasheets.
Mar 16, 2016	Table 4, Ordering Information Table - corrected "Shipping & Packaging" for 82P33913/ -1.
Mar 14, 2016	Added part number 82P33913/82P33913-1 throughout the datasheet. Ordering Information table - added 82P33913/82P33913-1 part number information.
May 14, 2015	Initial release

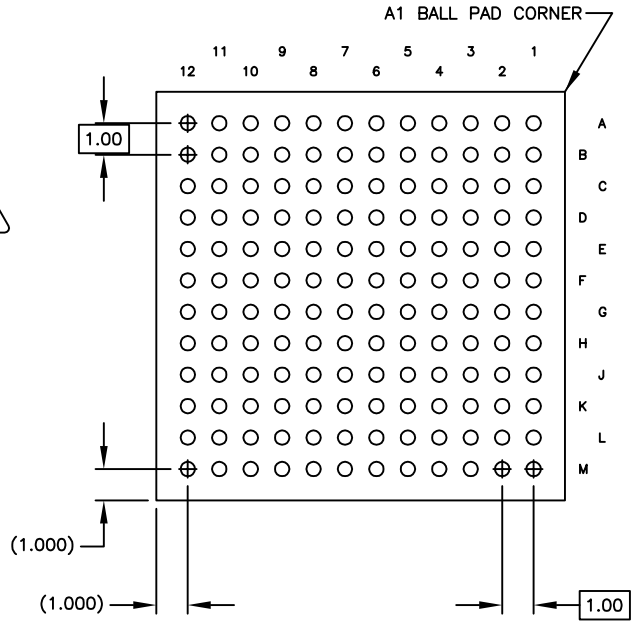
REVISIONS			
REV	DESCRIPTION	DATE	APPROVED
00	INITIAL RELEASE	02/08/13	CM
01	CHANGE TOTAL PACKAGE THICKNESS, SOLDER BALL DIMENSIONING	10/04/13	CK LEE
02	ADD MISSING DIMENSION ON MOLD CAP	2/3/14	CK LEE
03	CHANGE MOLD CAP THICKNESS FROM 0.53MM TO 0.55MM	4/1/14	CK LEE



TOP VIEW



SIDE VIEW



BOTTOM VIEW

NOTES: UNLESS OTHERWISE SPECIFIED

1. ALL DIMENSIONS AND TOLERANCES CONFORM TO ASME Y14.5M–1994.
2. DIMENSION IS MEASURED AT THE MAXIMUM SOLDER BALL DIAMETER, PARALLEL TO PRIMARY DATUM C.
3. PRIMARY DATUM C AND SEATING PLANE ARE DEFINED BY THE SPHERICAL CROWNS OF THE SOLDER BALLS.
4. "A1" ID CORNER MUST BE IDENTIFIED. IDENTIFICATION MAY BE BY MEANS OF CHAMFER, METALLIZED OR INK MARK, INDENTATION OR OTHER FEATURE OF THE PACKAGE BODY.

TOLERANCES UNLESS SPECIFIED DECIMAL ANGULAR X±0.01 XX±0.05 XXX±0.03	IDT™ www.IDT.com	6024 Silver Creek Valley Road San Jose, CA 95138 PHONE: (408) 248–8333 FAX: (408) 248–8591
APPROVALS DATE DRAWN CM 08/29/13 CHECKED	TITLE	BA/BAG144 PACKAGE OUTLINE 13.0 X 13.0 mm BODY 1.0 mm PITCH CABGA
	SIZE C	DRAWING No. PSC–4471 REV 03
	DO NOT SCALE DRAWING	SHEET 1 OF 2

REVISIONS			
REV	DESCRIPTION	DATE	APPROVED
00	INITIAL RELEASE	08/29/13	CM
01	CHANGE TOTAL PACKAGE THICKNESS, SOLDER BALL DIMENSIONING	10/04/13	CK LEE
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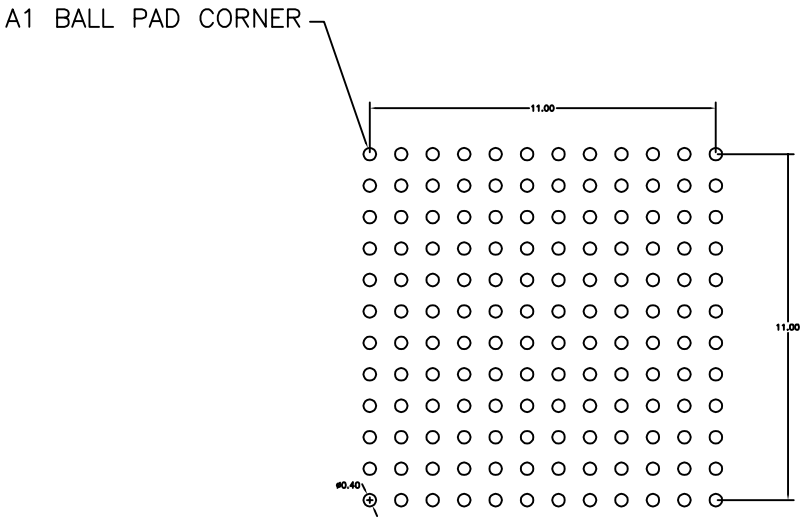

RECOMMENDED LAND PATTERN

NOTE:

1) ALL dimensions are in mm, Angles in degrees.
2) Top down view, as view on PCB.
3) NSMD Land Pattern Assumed
4) Land Pattern Recommendation as per IPC-7351B generic requirement for surface mount design and Land Pattern.

TOLERANCES UNLESS SPECIFIED DECIMAL ANGULAR X±0.01 XX±0.05 XXX±0.03		IDT™ www.IDT.com 6024 Silver Creek Valley Road San Jose, CA 95138 PHONE: (408) 248-8333 FAX: (408) 248-8591
APPROVALS	DATE	TITLE BA/BAG144 PACKAGE OUTLINE 13.0 X 13.0 mm BODY 1.0 mm PITCH CABGA
DRAWN cm	08/29/13	
CHECKED		
		SIZE C / DRAWING No. PSC-4471 / REV 03
		DO NOT SCALE DRAWING / SHEET 2 OF 2

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