



DALLAS
DS1685 Real Time Clock
Year 2000-Compatible

Data Book Contents:

- Short-Form Catalog
- First-Page Data Sheets
- Sales Offices

CD ROM Contents:

- Complete Data Sheets and Application Notes for All Products
- User's Guides



DALLAS
SEMICONDUCTOR



<http://www.dalsemi.com>

For the latest information about every product we make, visit our World Wide Web site. You'll find the most complete, up-to-date information about our products available seven days a week, 24 hours a day. Here's just some of what you'll find:

- Complete Data Sheets for All Dallas Semiconductor Products Available in Adobe Acrobat™ and PostScript™
- Application Notes
- Press Releases
- New Product Announcements
- Technical Support
- Overviews of All Product Families
- Up-to-date List of World-wide Sales Offices
- Employment Opportunities
- How to Use Our Credit Card Sales Service
- Visit www.iButton.com for information on our iButton™ products

TABLE OF CONTENTS

Short-Form Catalog

Timekeeping	1
Memory Products	8
Thermal Sensors	14
Digital Potentiometers	24
Battery Management	35
CPU Supervisors	45
Nonvolatile Controllers	50
Silicon Timed Circuits	52
High-Speed Microcontrollers	61
Secure Microcontrollers	65
Automatic Information	69
Telecommunications	78
Termination Products	93

First-Page Data Sheets

Battery Management	97
DS1259 Battery Manager Chip	98
DS1260 Smart Battery	99
DS1633 High-Speed Battery Recharger	100
DS1633K-220 Battery Charger Programming Kit	101
DS1633x High Speed Battery Charger	102
DS2434 Battery Identification Chip	103
DS2435 Battery ID Chip with Time/Temp Histogram	104
Bus Termination	105
DS21S07A SCSI Terminator	106
DS2108 Differential SCSI Switchable Terminator	107
DS2109 Plug and Play SCSI Terminator	108
DS2112 BTL Terminator	109
CPU Supervisors	111
DS1231/S Power Monitor Chip	112
DS1232 MicroMonitor Chip	113
DS1232LP/LPS Low Power MicroMonitor Chip	114
DS1233 5V EconoReset	115
DS1233A 3.3V EconoReset	116
DS1233D 5V EconoReset	117
DS1236 MicroManager Chip	118
DS1236A MicroManager Chip	119
DS1238 MicroManager	120
DS1238A MicroManager	121
DS1239 MicroManager Chip	122
DS1632 PC Power Fail and Reset Controller	123
DS1705/DS1706 3.3 and 5.0 Volt MicroMonitor	124
DS1707/DS1708 3.3 and 5.0 Volt MicroMonitor	125
DS1810 5V EconoReset with Push-Pull Output	126
DS1811 5V EconoReset with Open Drain Output	127
DS1812 5V EconoReset w/Active High Push-Pull Output	128
DS1813 5V EconoReset with Pushbutton	129
DS1815 3.3V EconoReset with Push-Pull Output	130
DS1816 3.3V EconoReset with Open Drain Output	131
DS1817 Active High 3.3V EconoReset	132
DS1818 3.3V EconoReset with Pushbutton	133
DS1832 3.3 Volt MicroMonitor Chip	134
DS1833 5V EconoReset	135
DS1834A/D Dual EconoReset with Pushbutton	136
DS1836A/B/C/D 3.3V/5V MicroManager	137
Digital Potentiometers	139
DS1267 Dual Digital Potentiometer Chip	140
DS1666, DS1666S Audio Digital Resistor	141

TABLE OF CONTENTS

DS1667 Digital Resistor with OP AMP	142
DS1668, DS1669, DS1669S Dallastat™ Electronic Digital Rheostat	143
DS1800 Dual Inverting Log Gain/Attenuator	144
DS1801 Dual Audio Taper Potentiometer	145
DS1802 Dual Audio Taper Potentiometer w/Pushbutton Control	146
DS1803 Addressable Dual Digital Potentiometer	147
DS1804 NV Trimmer Potentiometer	148
DS1806 Digital Sextet Potentiometer	149
DS1807 Addressable Dual Audio Taper Potentiometer	150
DS1866 Log Trimmer Potentiometer	151
DS1867 Dual Digital Potentiometer with EEPROM	152
DS1868 Dual Digital Potentiometer Chip	153
DS1869 3V Dallastat™ Electronic Digital Rheostat	154
iButton™	155
DS1920 Temperature iButton™	156
DS1954 Cryptographic iButton™	157
DS1962/DS1963 1K–Bit/4K–Bit Monetary iButton™	158
DS1971 256–Bit EEPROM iButton™	159
DS1981U/DS1982U UniqueWare™ iButton™	160
DS1982 1Kbit Add–Only iButton™	161
DS1985 16K bit Add–Only iButton™	162
DS1986 64K bit Add–Only iButton™	163
DS1990A Serial Number iButton™	164
DS1991 MultiKey iButton™	165
DS1992/DS1993 1Kbit/4Kbit Memory iButton™	166
DS1994 4Kbit Plus Time Memory iButton	166
DS1995 16Kbit Memory iButton™	167
DS1996 64Kbit Memory iButton™	168
DS9091K 1–Wire™ MicroLAN™ Evaluation Kit	169
DS9092K iButton™ Starter Kit	170
DS1402x MicroLAN™ Cables	171
DS1404 Touch and Hold Probe Cable Cradle	172
DS1410E Parallel Port Adapter	173
DS9092 iButton™ Probe	174
DS9092R iButton™ Port	175
DS9093x iButton™ Mount Products	176
DS9094 iButton™ Clip	177
DS9096P iButton™ Adhesive Pads	178
DS9097/DS9097E COM Port Adapter	179
DS9098 iButton™ Retainer	180
DS9100 Touch and Hold Probe Stampings	181
DS9101 Multi–Purpose Clip	182
DS0621–SDK iButton™ TMEX™ Professional Software Developer's Kit: Version 3.00	183
DS1410K Parallel Port Developer's Kit	184
DS1820 1–Wire™ Digital Thermometer	185
DS2223/DS2224 EconoRAM	186
DS2401 Silicon Serial Number	187
DS2404 EconoRAM Time Chip	188
DS2404S–C01 Dual Port Memory Plus Time	189
DS2405 Addressable Switch	190
DS2407 Dual Addressable Switch Plus 1K–Bit Memory	191
DS2422/DS2423 1K/4K–Bit 1–Wire™ RAM with Counters	192
DS2430A 256–Bit 1–Wire™ EEPROM	193
DS2480 Serial 1–Wire™ Line Driver	194
DS2502 1Kbit Add–Only Memory	195
DS2502–E64 IEEE EUI–64 Node Address Chip	196
DS2501–UNW/DS2502–UNW UniqueWare™ Add Only Memory	197
DS2505 16K bit Add–Only Memory	198
DS2506 64K bit Add–Only Memory	199
DS9502 ESD Protection Diode	200
DS9503 ESD Protection Diode with Resistors	201
Line Interfaces	203
DS229 Triple RS–232 Transmitter/Receiver	204
DS232A Dual RS–232 Transmitter/Receiver	205
DS275 Line–Powered RS–232 Transceiver Chip	206

TABLE OF CONTENTS

Memory Products	207
DS1220AB/AD 16K Nonvolatile SRAM	.208
DS1220Y 16K Nonvolatile SRAM	.209
DS1225AB/AD 64K Nonvolatile SRAM	.210
DS1225Y 64K Nonvolatile SRAM	.211
DS1230Y/AB 256K Nonvolatile SRAM	.212
DS1230YL/BL 256K Nonvolatile SRAM	.213
DS1245Y/AB 1024K Nonvolatile SRAM	.214
DS1245YL/BL 1024K Nonvolatile SRAM	.215
DS1249Y/AB 2048K Nonvolatile SRAM	.216
DS1250Y/AB 4096K Nonvolatile SRAM	.217
DS1250YL/BL 4096K Nonvolatile SRAM	.218
DS1258Y/AB 128K x 16 Nonvolatile SRAM	.219
DS1265Y/AB 8M Nonvolatile SRAM	.220
DS1270Y/AB 16M Nonvolatile SRAM	.221
DS1330Y/AB 256K Nonvolatile SRAM with Battery Monitor	.222
DS1330YL/BL 256K Nonvolatile SRAM with Battery Monitor	.223
DS1345Y/AB 1024K Nonvolatile SRAM with Battery Monitor	.224
DS1345YL/BL 1024K Nonvolatile SRAM with Battery Monitor	.225
DS1350Y/AB 4096K Nonvolatile SRAM with Battery Monitor	.226
DS1350YL/BL 4096K Nonvolatile SRAM with Battery Monitor	.227
DS1380 RAMport	.228
DS1381 NV RAMport	.229
DS1630Y/AB Partitionable 256K NV SRAM	.230
DS1645Y/AB Partitionable 1024K NV SRAM	.231
DS1650Y/AB Partitionable 4096K NV SRAM	.232
DS1658Y/AB Partitionable 128K x 16 NV SRAM	.233
DS2227 Flexible NV SRAM Stik	.234
DS3803 1024K Flexible NV SRAM SIMM	.235
DS9034PC PowerCap	.236
DS2016 2K x 8 3V/5V Operation Static RAM	.237
DS2064 8K x 8 Static RAM	.238
DS2229 Word-Wide 8 Meg SRAM Stik	.239
DS1280 3-Wire to Byte-wide Converter Chip	.240
DS1609 Dual Port RAM	.241
DS1213B SmartSocket 16K/64K	.242
DS1213C SmartSocket 256K	.243
DS1213D SmartSocket 256K/1M	.244
DS1613C Partitionable 256K SmartSocket	.245
DS1613D Partitionable 1024K SmartSocket	.246
Microcontrollers	247
DS2250T Soft Microcontroller Module	.248
DS2251T 128K Soft Microcontroller Module	.249
DS2252T Secure Microcontroller Module	.250
DS5000(T) Soft Microcontroller Module	.251
DS5000FP Soft Microprocessor Chip	.252
DS5001FP 128K Soft Microprocessor Chip	.253
DS5002FP Secure Microprocessor Chip	.254
DS80C310 High-Speed Micro	.255
DS80C320/DS80C323 High-Speed/Low-Power Micro	.256
DS87C520/DS83C520 EPROM/ROM High-Speed Micro	.257
DS87C530 EPROM Micro with Real Time Clock	.258
NV RAM Controllers	259
DS1210 Nonvolatile Controller Chip	.260
DS1211 Nonvolatile Controller x 8 Chip	.261
DS1212 Nonvolatile Controller x 16 Chip	.262
DS1218 Nonvolatile Controller	.263
DS1221 Nonvolatile Controller x 4 Chip	.264
DS1234 Conditional Nonvolatile Controller Chip	.265
DS1312 Nonvolatile Controller with Lithium Battery Monitor	.266
DS1314 3V Nonvolatile Controller with Lithium Battery Monitor	.267
DS1321 Flexible Nonvolatile Controller with Lithium Battery Monitor	.268
DS1610 Partitioned NV Controller	.269
DS1710 Partitioned NV Controller	.270

TABLE OF CONTENTS

Silicon Timed Circuits	271
DS1000 5-Tap Silicon Delay Line	272
DS1000-IND Industrial Temperature Range 5-Tap Silicon Delay Line	273
DS1003 4-Tap Silicon Delay Line for RISC Applications	274
DS1004 5-Tap High-Speed Silicon Delay Line	275
DS1005 5-Tap Silicon Delay Line	276
DS1007 7-in-1 Silicon Delay Line	277
DS1010 10-Tap Silicon Delay Line	278
DS1012 2-in-1 Sub-Miniature Silicon Delay Line with Logic	279
DS1013 3-in-1 Silicon Delay Line	280
DS1020 Programmable 8-Bit Silicon Delay Line	281
DS1021 Programmable 8-Bit Silicon Delay Line	282
DS1033 3-in-1 Low Voltage Silicon Delay Line	283
DS1035 3-in-1 High-Speed Silicon Delay Line	284
DS1040 Programmable One-Shot Pulse Generator	285
DS1044 4-in-1 High-Speed Silicon Delay Line	286
DS1045 4-Bit Dual Programmable Delay Line	287
DS1075 EconOscillator/Divider	288
System Extension	289
DS1206 Phantom Serial Interface Chip	290
DS1222 BankSwitch Chip	291
DS129x Eliminator	292
DS1336 Afterburner Chip	293
DS1640/DS1640C Personal Computer Power FET	294
Telecommunications	295
DS2130Q Voice Messaging Processor	296
DS2132A/Q Digital Answering Machine Processor	297
DS2141A T1 Controller	298
DS21Q41B Quad T1 Framer	299
DS2143/DS2143Q E1 Controller	300
DS21Q43A Quad E1 Framer	301
DS2151Q T1 Single-Chip Transceiver	302
DS2152 Enhanced T1 Single Chip Transceiver	303
DS2153Q E1 Single-Chip Transceiver	304
DS2154 Enhanced E1 Single Chip Transceiver	305
DS2164Q G.726 ADPCM Processor	306
DS2165/DS2165Q 16/24/32Kbps ADPCM Processor	307
DS2172 Bit Error Rate Tester (BERT)	308
DS2175 T1/CEPT Elastic Store	309
DS2176 T1 Receive Buffer	310
DS2180A T1 Transceiver	311
DS2181A CEPT Primary Rate Transceiver	312
DS2182A T1 Line Monitor	313
DS2186 Transmit Line Interface	314
DS2187 Receive Line Interface	315
DS2188 T1/CEPT Jitter Attenuator	316
Thermal Management	317
DS1620 Digital Thermometer and Thermostat	318
DS1620K Digital Thermometer and Thermostat Demonstration Kit	319
DS1620R Self-Heating Temperature Sensor	320
DS1621 Digital Thermometer and Thermostat	321
DS1623 Digital Thermometer and Thermostat	322
DS1624 Digital Thermometer and Memory	323
DS1625 Digital Thermometer and Thermostat	324
DS1820 1-Wire™ Digital Thermometer	325
DS1820K 1-Wire™ Digital Thermometer Demonstration Kit	326
DS1821 Programmable Digital Thermostat	327
DS9091K 1-Wire™ MicroLAN™ Evaluation Kit	328
Timekeeping	329
DS1202,DS1202S Serial Timekeeping Chip	330
DS1215 Phantom Time Chip	331
DS1243Y 64K NV SRAM with Phantom Clock	332
DS1244Y 256K NV SRAM with Phantom Clock	333
DS1248Y 1024K NV SRAM with Phantom Clock	334
DS1251Y 4096K NV SRAM with Phantom Clock	335
DS1283 Watchdog Timekeeper Chip	336

TABLE OF CONTENTS

DS1284 Watchdog Timekeeper Chip	337
DS1286 Watchdog Timekeeper	338
DS12885, DS12885Q, DS12885T Real Time Clock	339
DS12887 Real Time Clock	340
DS12887A Real Time Clock	341
DS1302 Trickle Charge Timekeeping Chip	342
DS1305 Serial Alarm Real Time Clock (RTC)	343
DS1306 Serial Alarm Real Time Clock (RTC)	344
DS1307 64 X 8 Serial Real Time Clock	345
DS1315 Phantom Time Chip	346
DS1384 Watchdog Timekeeping Controller	347
DS1386 RAMified Watchdog Timekeeper	348
DS14285/DS14287 Real Timed Clock with NV RAM Control	349
DS1486 RAMified Watchdog Timekeeper	350
DS1602 Elapsed Time Counter	351
DS1603 Elapsed Time Counter Module	352
DS1642 Nonvolatile Timekeeping RAM	353
DS1643 Nonvolatile Timekeeping RAM	354
DS1643AL Nonvolatile Timekeeping RAM	355
DS1644/DS1644P Nonvolatile Timekeeping RAM	356
DS1644LPM Nonvolatile Timekeeping RAM	357
DS1646/DS1646P Nonvolatile Timekeeping RAM	358
DS1646LPM Nonvolatile Timekeeping RAM	359
DS1647/DS1647P Nonvolatile Timekeeping RAM	360
DS1670 Portable System Controller	361
DS1673 Portable System Controller	362
DS1685/DS1687 3 Volt/5 Volt Real Time Clock	363
DS1688/DS1691 3 Volt/5 Volt Serialized Real Time Clock w/NV RAM Control	364
DS1689/DS1693 3 Volt/5 Volt Serialized Real Time Clock w/NV RAM Control	365
DS17285/DS17287 3 Volt/5 Volt Real Time Clock	366
DS17485/DS17487 3 Volt/5 Volt Real Time Clock	367
DS17885/DS17887 3 Volt/5 Volt Real Time Clock	368
DS9034PCX PowerCap with Crystal	369
DS1216B SmartWatch/RAM 16K/64K	370
DS1216C SmartWatch/RAM 64K/256K	371
DS1216D SmartWatch/RAM 256K/1M	372
DS1216E SmartWatch/ROM 64K/256K	373
DS1216F SmartWatch/ROM 64K/256K/1M	374
Dallas Semiconductor Sales Offices	375
Running the CD-ROM	386

© Copyright 1997 by Dallas Semiconductor Corporation. All Rights Reserved. Dallas Semiconductor retains all ownership rights in the technology described herein. Trademarks and registered trademarks of Dallas Semiconductor include each of the following:

Dallas Semiconductor Corporation™	Silicon Label™	1-Wire™	SIP Stik™
Dallas™	Touch Memory™	MicroCan™	Smart Touch Lock™
Dallas Semiconductor™	Touch Thermometer™	Touch Time™	Touch Meter™
DSTM	Memory Button™	Authorization Button™	Micro Monitor™
Dallastat	Touch Memory Probe™	Touch Pen™	Cyber Card™
Stick'Em Chip™	Certified Dallas Touch™	Time Button™	Cyber Key™
Button Holder™	UniqueWare™	Button Ready PC™	Soft Microcontroller™
Touch Memory EXecutive™	Dallas Registered™	MicroLan™	Secure Microcontroller™
TMEX™	Button™	ID Button™	Soft Silicon™
MultiButton™	Dallas Personal SignOn™	Dallas Protected Software™	jButton™
Touch Memory Button™	Dallas SignOn™	Load & Lock™	All device numbers

Dallas Semiconductor has been issued U.S. and foreign patents and has patent applications pending that protect its products, including certain products described in this databook and, in some instances, certain uses, applications, combinations, machines or processes associated with such products. For a complete list of patents issued to Dallas Semiconductor covering the products described herein, please contact the Applications Department at (972) 371-4448. Products may also be protected by other intellectual property rights, including trademark, copyright, mask work and trade secret rights of Dallas Semiconductor.

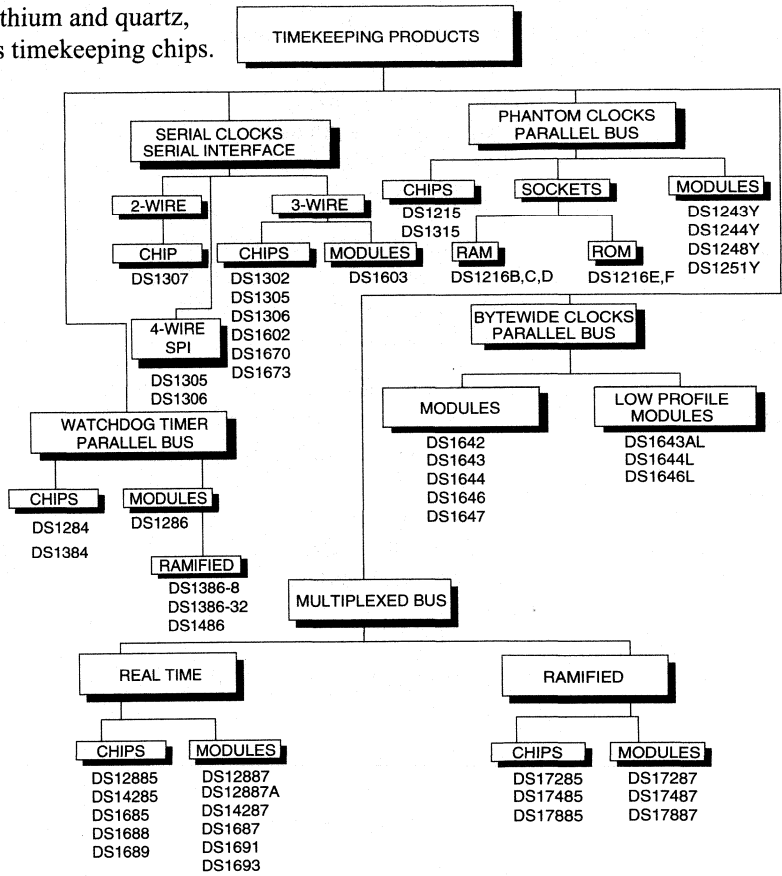
The Dallas Semiconductor products described in this databook may include copyrighted Dallas Semiconductor computer programs stored in semiconductor memories or other media. Any copyrighted Dallas Semiconductor computer program contained in a Dallas Semiconductor product may not be copied or reproduced in any manner without the express written consent of Dallas Semiconductor. Dallas Semiconductor's sale of the products described in this databook and provision of any supporting or other documentation or technical information or assistance are not intended to convey any license, express or implied, to any copyrights, patents, patent applications or other intellectual property rights of Dallas Semiconductor protecting any combination, machine, process, use or application in which these products might be used. DALLAS SEMICONDUCTOR MAKES NO WARRANTY, REPRESENTATION OR GUARANTEE, EXPRESS OR IMPLIED, REGARDING THE SUITABILITY OF ITS PRODUCTS FOR ANY PARTICULAR PURPOSE, NOR THAT THE USE OF ITS PRODUCTS WILL NOT INFRINGE ITS INTELLECTUAL PROPERTY RIGHTS OR THE RIGHTS OF THIRD PARTIES WITH RESPECT TO ANY PARTICULAR USE OR APPLICATION AND SPECIFICALLY DISCLAIMS ANY AND ALL LIABILITY ARISING OUT OF ANY SUCH USE OR APPLICATION, INCLUDING BUT NOT LIMITED TO, CONSEQUENTIAL OR INCIDENTAL DAMAGES.

Dallas Semiconductor products are not designed, intended, or authorized for use as components in systems intended for surgical implant into the body, or other applications intended to support or sustain life, or for any other application in which the failure of the Dallas Semiconductor product could create a situation where personal injury or death may occur.

Dallas Semiconductor reserves the right to make changes to or discontinue any product or service described herein without notice. Products with data sheets labeled "Preliminary" and other products described herein may not be in production or offered for sale. Dallas Semiconductor advises customers to obtain the current version of the relevant product information before placing orders. Circuit diagrams illustrate typical semiconductor applications and may not be complete. Information published herein supersedes all information regarding this technology published by Dallas Semiconductor in the U.S. before 1997.

Timekeeping

Dallas Semiconductor has been the leader in providing Real Time Clocks for a broad range of applications since 1985. The company's proprietary timekeeping CMOS circuits consume current at the nano-ampere level during periods of inactivity. As a result, they can be powered by a lithium cell for more than 10 years, longer than the useful life of most equipment. Because of this longevity, equipment manufacturers do not have to design provisions for battery replacement into their products. In addition to modules that combine circuits with lithium and quartz, Dallas Semiconductor offers timekeeping chips.



Applications

- ◆ Computers
- ◆ Data communication systems
- ◆ Medical equipment
- ◆ Cellular phones
- ◆ Fax machines
- ◆ Industrial controllers
- ◆ Security systems
- ◆ Hand-held GPS receivers

Featured Products

Watchdog Timekeeping Modules

Various configurations of directly addressable nonvolatile RAM are available.

- ◆ Provide four functions for a processor or controller:
 - Nonvolatile SRAM
 - Real time clock/calendar
 - Clock/calendar alarms
 - Watchdog timer
- ◆ Two highly programmable interrupts and a square wave output provide an external interface to alarm and/or watchdog events and a precise clock reference
- ◆ Various configurations of directly addressable nonvolatile RAM are available for uses such as general storage, system configuration, scratch-pad area, etc.
 - DS1286 - 50 bytes
 - DS1386 - 8K or 32K bytes
 - DS1486 - 128K bytes
- ◆ Self-contained packages
- ◆ Eliminate the need for any additional external components
- ◆ Maintain timekeeping and memory in the absence of system power for a minimum of 10 years with an accuracy of ± 1 minute/month at 25°C
- ◆ Interrupt outputs active during battery back mode

INTA	1	28	V _{CC}
NC	2	27	WE
NC	3	26	INTB (INTB)
NC	4	25	NC
A5	5	24	NC
A4	6	23	SQW
A3	7	22	OE
A2	8	21	NC
A1	9	20	CE
A0	10	19	DQ7
DQ0	11	18	DQ6
DQ1	12	17	DQ5
DQ2	13	16	DQ4
GND	14	15	DQ3

DS1286
28-Pin DIP
Module

INTA	1	32	V _{CC}
INTB (INTB)	2	31	SQW
NC	3	30	V _{CC}
A12	4	29	WE
A7	5	28	NC
A6	6	27	A8
A5	7	26	A9
A4	8	25	A11
A3	9	24	OE
A2	10	23	A10
A1	11	22	CE
A0	12	21	DQ7
DQ0	13	20	DQ6
DQ1	14	19	DQ5
DQ2	15	18	DQ4
GND	16	17	DQ3

DS1386-8
32-Pin DIP
Module

INTA	1	32	V _{CC}
INTB (INTB)	2	31	SQW
NC	3	30	V _{CC}
A12	4	29	WE
A7	5	28	A13
A6	6	27	A8
A5	7	26	A9
A4	8	25	A11
A3	9	24	OE
A2	10	23	A10
A1	11	22	CE
A0	12	21	DQ7
DQ0	13	20	DQ6
DQ1	14	19	DQ5
DQ2	15	18	DQ4
GND	16	17	DQ3

DS1386-32
32-Pin DIP
Module

INTB (INTB)	1	32	V _{CC}
A16	2	31	A15
A14	3	30	INTA/SQW
A12	4	29	WE
A7	5	28	A13
A6	6	27	A8
A5	7	26	A9
A4	8	25	A11
A3	9	24	OE
A2	10	23	A10
A1	11	22	CE
A0	12	21	DQ7
DQ0	13	20	DQ6
DQ1	14	19	DQ5
DQ2	15	18	DQ4
GND	16	17	DQ3

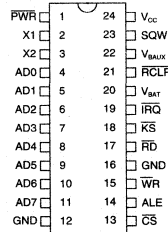
DS1486
32-Pin DIP
Module

Featured Products

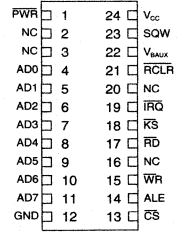
3V/5V Multiplexed Bus Real Time Clocks

These clocks incorporate the industry-standard DS1285/DS1287 clock plus additional features.

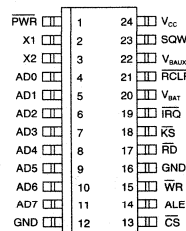
- ◆ Year 2000-compliant
- ◆ 64-bit silicon serial number
- ◆ 114 bytes of user RAM
- ◆ Additional extended general-purpose RAM:
 - 128 bytes (DS1685, DS1687)
 - 2K bytes (DS17285, DS17287)
 - 4K bytes (DS17485, DS17487)
 - 8K bytes (DS17885, DS17887)
- ◆ Burst mode feature available when accessing the extended RAM (DS17x8x devices only)
- ◆ Century counter and date alarm
- ◆ Power control circuitry supports system power-on from a date/time alarm or a key closure
- ◆ +3V or +5V operation
- ◆ Available as chip (DS1685, DS17285, DS17485, DS17885) or standalone module with embedded battery and 32.768 kHz crystal (DS1687, DS17287, DS17487, DS17887)
- ◆ Provide an easy upgrade path for systems requiring more memory without any hardware modifications
- ◆ Pin configuration closely matches the DS12885/DS12887
- ◆ Output a 32 kHz square wave signal each time system power is applied and are ideal devices for systems with processors requiring a clock at power-up



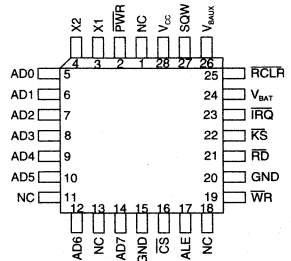
24-Pin SOIC
(24-Pin TSSOP
DS1685 Only)



24-Pin Encapsulated DIP



24-Pin DIP

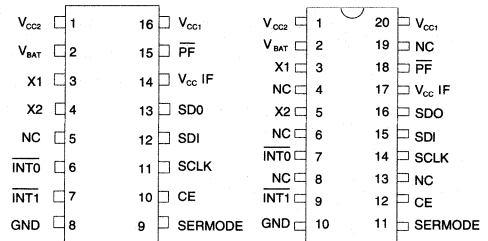


28-Pin PLCC

Featured Products

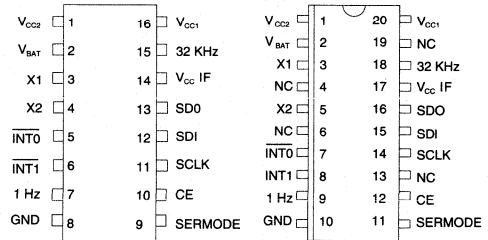
DS1305, DS1306 Serial Alarm Time Chips

- ◆ Two hardware-selectable serial interfaces: standard 3-wire or serial peripheral interface (SPI)
- ◆ Two time-of-day alarms with interrupt outputs
- ◆ Multiple power supply options supporting rechargeable backup power sources
- ◆ Interface logic power supply input for mixed 3V/5V supply system capability
- ◆ 2.0V to 5.5V operation
- ◆ Standard clock/calendar functions along with 96 bytes of user NV SRAM



DS1305
16-Pin DIP

DS1305
20-Pin TSSOP

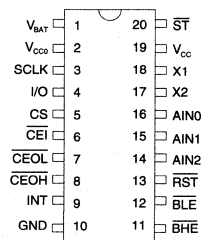


DS1306
16-Pin DIP

DS1306
20-Pin TSSOP

DS1670, DS1673 Portable System Controllers

- ◆ Low-power, highly integrated devices ideal for hand-held portable products
- ◆ Standard clock/calendar function with standard 3-wire interface
- ◆ CPU monitor functions including power-on reset and watchdog timer
- ◆ Contain a 3-channel multiplexed 8-bit A/D converter with 10ms conversion time
- ◆ Time-of-day alarm with interrupt output
- ◆ Perform nonvolatile backup control to external SRAM
- ◆ 3.0V, 3.3V, and 5.0V operation



DS1670, DS1673
20-Pin TSSOP
20-Pin SOIC

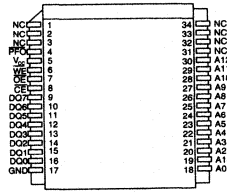


Featured Products

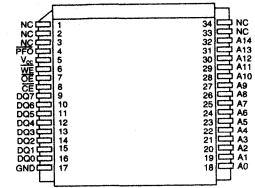
These Timekeeping RAM Modules provide identical functions and performance to their dual-in-line packaged counterparts. The low-profile module is a PLCC package which, when combined with a low-cost, surface mountable socket, provides a surface mount option to the NV Timekeeping RAM product family.

NV Timekeeping RAM Low Profile Modules

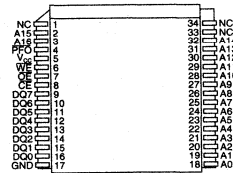
- ◆ Integrate a real time clock function with various configurations of non-volatile SRAM
- ◆ Self-contained packages include NV SRAM, real time clock, crystal, power control circuit, and lithium energy source
- ◆ Directly addressable byte-wide RAM and BCD formatted timekeeping registers
- ◆ Allow for a simple hardware/software device interface design
- ◆ Require no additional external components
- ◆ Maintain timekeeping and memory in the absence of system power for a minimum period of 10 years with an accuracy of ± 1 minute/month at 25°C



DS1643AL
34-Pin Low Profile Module



DS1644L
34-Pin Low Profile Module



DS1646L
34-Pin Low Profile Module

Selection Table

	Device Number	Power Options	Clock Format ^{1, 2}	Calendar Format	User RAM (Bytes)
Serial Clocks	DS1202 ³	2V-5V	STD	STD	24
	DS1302	3V-5V	STD	STD	31
	DS1305	3V-5V	STD	STD	96
	DS1306	3V-5V	STD	STD	96
	DS1307	5V	STD	STD	56
	DS1602	5V	BINARY	BINARY	
	DS1603	5V	BINARY	BINARY	
	DS1670	3.3V	STD	STD	
	DS1673	3.0V, 5V	STD	STD	
Phantom Clocks	DS1215	5V	STD+hh	STD	
	DS1216B	5V	STD+hh	STD	2K, 8K [†]
	DS1216C	5V	STD+hh	STD	8K, 32K [†]
	DS1216D	5V	STD+hh	STD	8K, 32K, 128K, 512K [†]
	DS1216E	5V	STD+hh	STD	ROM: 8K, 32K [†]
	DS1216F	5V	STD+hh	STD	ROM: 8K, 32K, 128K [†]
	DS1315	3.3V, 5V	STD+hh	STD	
NV SRAM with Phantom Clock	DS1243Y	5V	STD+hh	STD	8K
	DS1244Y	5V	STD+hh	STD	32K
	DS1248Y	5V	STD+hh	STD	128K
	DS1251Y	5V	STD+hh	STD	512K
Timekeeping NV RAM	DS1642	5V	STD	STD	2K
	DS1643	5V	STD	STD	8K
	DS1644	5V	STD	STD	32K
	DS1646	5V	STD	STD	128K
	DS1647	5V	STD	STD	512K
Watchdog Timekeepers	DS1284	5V	STD+hh	STD	50
	DS1286	5V	STD+hh	STD	50
	DS1384	5V	STD+hh	STD	50
	DS1386	5V	STD+hh	STD	8K, 32K
	DS1486	5V	STD+hh	STD	128K
Multiplexed Bus Real Time Clocks	DS12885	5V	STD	STD	114
	DS12887	5V	STD	STD	114
	DS12887A	5V	STD	STD	114
	DS14285	5V	STD	STD	114
	DS14287	5V	STD	STD	114
	DS1685	3V, 5V	STD	STD	114+128 (128 accessed via SW control)
	DS1687	3V, 5V	STD	STD	114+128 (128 accessed via SW control)
	DS1688	3V, 5V	STD	STD	114
	DS1689	3V, 5V	STD	STD	114
	DS1691	3V, 5V	STD	STD	114
	DS1693	3V, 5V	STD	STD	114
	DS17285	3V, 5V	STD	STD	114+2K (2K accessed via SW control)
	DS17287	3V, 5V	STD	STD	114+2K (2K accessed via SW control)
	DS17485	3V, 5V	STD	STD	114+4K (4K accessed via SW control)
	DS17487	3V, 5V	STD	STD	114+4K (4K accessed via SW control)
	DS17885	3V, 5V	STD	STD	114+8K (8K accessed via SW control)
	DS17887	3V, 5V	STD	STD	114+8K (8K accessed via SW control)

*** TYPES OF INTERRUPTS:**

A- TIME OF DAY ALARM: Programmable interrupt is activated when the time of day matches the programmed alarm registers.

WD- WATCHDOG: Interrupt occurs after a programmed interval if the real time clock's watchdog registers are not accessed.

WU- WAKE-UP: An internal alarm designed to wake up the system at a specified time/date.

KS-KICKSTART: An external signal to the real time clock causes an interrupt output which turns on the system power supply.

Memory Products

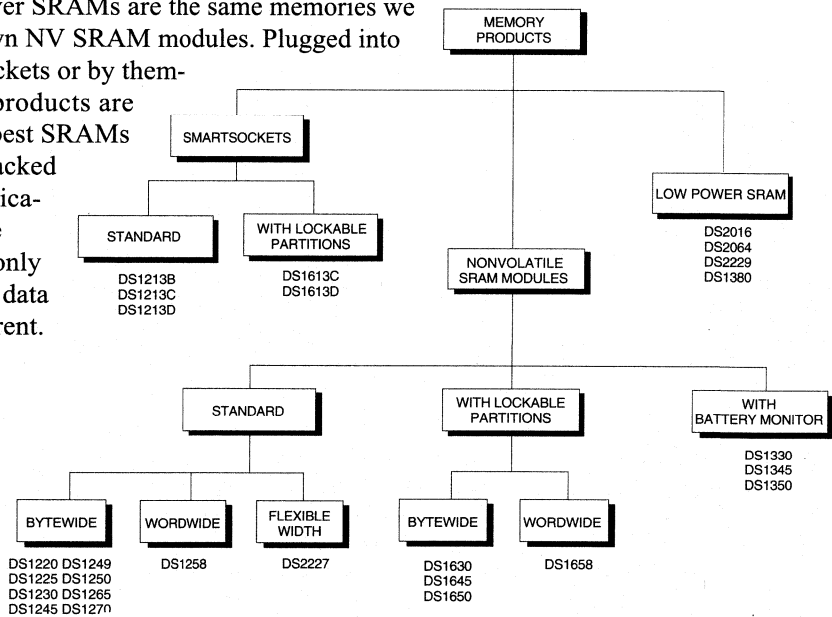
The centerpiece of the Memory Products family is our broad portfolio of Nonvolatile SRAM modules. Built using low-power SRAM, nonvolatile memory controllers and lithium batteries, these modules offer nonvolatile storage that can be read and written an unlimited number of times, at SRAM speeds, without wearing out. Capable of more than 10 years of battery-backed data retention, these products are truly ideal memories.

NV SRAM modules with lockable partitions offer programmable write protection for each of 16 memory array partitions. Using a simple software command, any of these 16 partitions can be configured to be either read-only or read/write memory. This capability allows critical code and data to be stored in read-only areas and changeable data to be stored in read/write areas, all in the same nonvolatile memory component.

NV SRAM modules with Battery Monitoring are the first battery-backed SRAMs in the industry with the built-in ability to monitor their own batteries and issue a warning before those batteries reach end-of-life.

SmartSockets contain the nonvolatile memory controller and backup batteries needed to nonvolatize standard byte-wide SRAM components. An SRAM inserted into a SmartSocket is a complete nonvolatile memory, identical in functionality to an NV SRAM module.

Our low-power SRAMs are the same memories we use in our own NV SRAM modules. Plugged into our SmartSockets or by themselves these products are the world's best SRAMs for battery-backed memory applications because they require only nanoamps of data retention current.



Most Nonvolatile SRAM modules are also available in 3-volt versions.

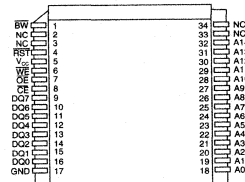
Featured Products

DS13xx Nonvolatile SRAM with Battery Monitor

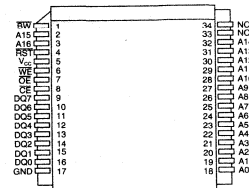
- ◆ Standard nonvolatile SRAM performance characteristics:

- More than 10 years of data retention
- Data automatically protected during power cycling
- Read and write access times as fast as 70ns
- Freshness seal: internal lithium battery is electrically disconnected to retain freshness until power is first applied

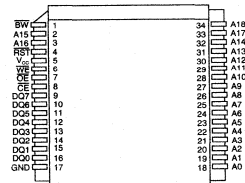
- ◆ Sophisticated battery monitor checks remaining capacity once per day and activates Battery Warning output when battery is nearing end of life
- ◆ CPU reset function holds system in reset when power supply goes out of tolerance and also serves as a power-on reset
- ◆ Low Profile Module package designed for surface-mount—snaps into standard, surface-mount PLCC sockets
- ◆ Compatible pinouts make designing for multiple memory sizes easy
- ◆ Optional industrial temperature range available



DS1330
34-Pin Low Profile Module



DS1345
34-Pin Low Profile Module

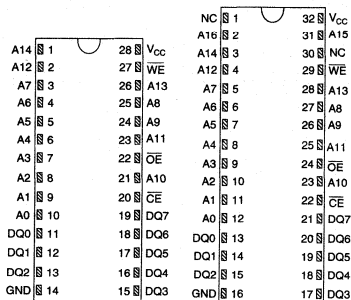


DS1350
34-Pin Low Profile Module

Featured Products

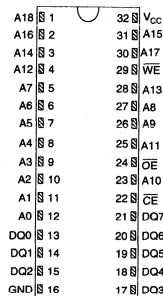
DS16xx Nonvolatile SRAM with Lockable Partitions

- ◆ Standard nonvolatile SRAM performance characteristics
 - More than 10 years of data retention
 - Data automatically protected during power cycling
 - Read and write access times as fast as 70ns
 - Freshness seal: internal lithium battery is electrically disconnected to retain freshness until power is first applied
- ◆ Programmable write-protection of any of 16 memory array partitions
- ◆ CPU interrupt function warns system when power supply goes out of tolerance
- ◆ DIP packages have JEDEC-standard, 600-mil SRAM pinouts
- ◆ Low Profile Module package designed for surface-mount—snaps into standard, surface-mount PLCC sockets
- ◆ Compatible pinouts make designing for multiple memory sizes easy
- ◆ Optional industrial temperature range available

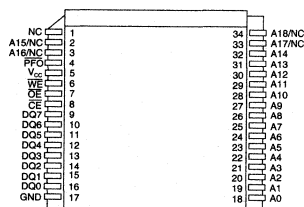


DS1630
28-Pin DIP
Module

DS1645
32-Pin DIP
Module



DS1650
32-Pin DIP
Module



DS1630, DS1645, DS1650
34-Pin Low Profile
Module

Selection Tables

DS12XXTTP-SSS-III	STANDARD
<p>Operating Temperature Blank: 0°C to 70°C IND: -40°C to +85°C</p>	
<p>Access Time 100, 120, 150, or 200ns (DS1220) 85, 150, or 200ns (DS1225)</p>	
<p>Package Blank: 24-pin DIP (DS1220) 28-pin DIP (DS1225)</p>	
<p>Vcc Tolerance AB: ±5% AD: ±10% Y: ±10%</p>	
<p>Device DS1220: 2K x 8 DS1225: 8K x 8</p>	

DS12XXTTP-SSS-III	STANDARD
<p>Operating Temperature Blank: 0°C to 70°C IND: -40°C to +85°C</p>	
<p>Access Time 70: 70ns 100: 100ns</p>	
<p>Package Blank: 28-pin DIP (DS1230) 32-pin DIP (DS1245, DS1250) 36-pin DIP (DS1265, DS1270) 40-pin DIP (DS1258) L: 34-pin Low Profile Module</p>	
<p>Vcc Tolerance AB: ±5% Y: ±10%</p>	
<p>Device DS1230: 32K x 8 DS1245: 128K x 8 DS1249: 256K x 8 DS1250: 512K x 8 DS1258: 128K x 16 DS1265: 1M x 8 DS1270: 2M x 8</p>	

DS16XXTTP-SSS-III	LOCKABLE PARTITIONS
<p>Operating Temperature Blank: 0°C to 70°C IND: -40°C to +85°C</p>	
<p>Access Time 70: 70ns 100: 100ns</p>	
<p>Package Blank: 28-pin DIP (DS1630) 32-pin DIP (DS1645, DS1650) 40-pin DIP (DS1658) L: 34-pin Low Profile Module</p>	
<p>Vcc Tolerance AB: ±5% Y: ±10%</p>	
<p>Device DS1630: 32K x 8 DS1645: 128K x 8 DS1650: 512K x 8 DS1658: 128K x 16</p>	

DS13XXTTP-SSS-III	BATTERY MONITOR
<p>Operating Temperature Blank: 0°C to 70°C IND: -40°C to +85°C</p>	
<p>Access Time 70: 70ns 100: 100ns</p>	
<p>Package L: 34-pin Low Profile Module</p>	
<p>Vcc Tolerance AB: ±5% Y: ±10%</p>	
<p>Device DS1330: 32K x 8 DS1345: 128K x 8 DS1350: 512K x 8</p>	

Selection Tables

SmartSockets

Number	Lockable Partitions	Supports 2K x 8 SRAM	Supports 8K x 8 SRAM	Supports 32K x 8 SRAM	Supports 128K x 8 SRAM	Supports 512K x 8 SRAM	DIP Pin Count
DS1213B		X	X				28
DS1213C				X			28
DS1213D					X	X*	32
DS1613C	X			X			28
DS1613D	X				X		32

*With user modification. See Application Note 4 in the Application Note Book.

Low-Power SRAM

Part Number	Density	Temperature	5-Volt Speed	3-Volt Speed	Package
DS2016-100	2K x 8	-40°C to +85°C	100ns	250ns	24-pin DIP
DS2016S-100	2K x 8	-40°C to +85°C	100ns	250ns	24-pin SOIC
DS2016-150	2K x 8	-40°C to +85°C	150ns	250ns	24-pin DIP
DS2016S-150	2K x 8	-40°C to +85°C	150ns	250ns	24-pin SOIC
DS2064-200	8K x 8	-40°C to +85°C	200ns	300ns	28-pin DIP
DS2064S-200	8K x 8	-40°C to +85°C	200ns	300ns	28-pin SOIC
DS2229-85	512K x 16	0°C to +70°C	85ns	n/a	80-pin SIP Stik

Cross Reference

Nonvolatile SRAM Modules

Benchmark Part Number	Memory Density	DS Standard Modules	DS Partitionable Modules
bq4010MA-XXX	8K x 8	DS1225AB-XXX	
bq4010MA-XXXN	8K x 8	DS1225AB-XXX-IND	
bq4010YMA-XXX	8K x 8	DS1225AD-XXX	
bq4010YMA-XXXN	8K x 8	DS1225AD-XXX-IND	
bq4011MA-XXX	32K x 8	DS1230AB-XXX	DS1630AB-XXX
bq4011MA-XXXN	32K x 8	DS1230AB-XXX-IND	DS1630AB-XXX-IND
bq4011YMA-XXX	32K x 8	DS1230Y-XXX	DS1630Y-XXX
bq4011YMA-XXXN	32K x 8	DS1230Y-XXX-IND	DS1630Y-XXX-IND
bq4013MA-XXX	128K x 8	DS1245AB-XXX	DS1645AB-XXX
bq4013MA-XXXN	128K x 8	DS1245AB-XXX-IND	DS1645AB-XXX-IND
bq4013YMA-XXX	128K x 8	DS1245Y-XXX	DS1645Y-XXX
bq4013YMA-XXXN	128K x 8	DS1245Y-XXX-IND	DS1645Y-XXX-IND
bq4014MB-XXX	256K x 8	DS1249AB-XXX	
bq4014YMB-XXX	256K x 8	DS1249Y-XXX	
bq4015MA-XXX	512K x 8	DS1250AB-XXX	DS1650AB-XXX
bq4015YMA-XXX	512K x 8	DS1250Y-XXX	DS1650Y-XXX
bq4016MC-XXX	1M x 8	DS1265AB-XXX	
bq4016YMC-XXX	1M x 8	DS1265Y-XXX	
bq4017MC-XXX	2M x 8	DS1270AB-XXX	
bq4017YMC-XXX	2M x 8	DS1270Y-XXX	
bq4024MA-XXX	128K x 16	DS1258AB-XXX	DS1658AB-XXX
bq4024YMA-XXX	128K x 16	DS1258Y-XXX	DS1658Y-XXX

SGS-Thomson Part Number	Memory Density	DS Standard Modules	DS Partitionable Modules
M48Z02-XXXPC1	2K x 8	DS1220AB-XXX	
M48Z02-XXXPC6	2K x 8	DS1220AB-XXX-IND	
M48Z12-XXXPC1	2K x 8	DS1220AD-XXX	
M48Z12-XXXPC6	2K x 8	DS1220AD-XXX-IND	
M48Z08-XXXPC1	8K x 8	DS1225AB-XXX	
M48Z18-XXXPC1	8K x 8	DS1225AD-XXX	
M48Z18-XXXPC6	8K x 8	DS1225AD-XXX-IND	
M48Z58-XXXPC1	8K x 8	DS1225AB-XXX	
M48Z58Y-XXXPC1	8K x 8	DS1225AD-XXX	
M48Z30-XXXPM1	32K x 8	DS1230AB-XXX	DS1630AB-XXX
M48Z30Y-XXXPM1	32K x 8	DS1230Y-XXX	DS1630Y-XXX
M48Z32-XXXPC1	32K x 8	DS1230AB-XXX	DS1630AB-XXX
M48Z32Y-XXXPC1	32K x 8	DS1230Y-XXX	DS1630Y-XXX
M48Z35-XXXPC1	32K x 8	DS1230AB-XXX	DS1630AB-XXX
M48Z35Y-XXXPC1	32K x 8	DS1230Y-XXX	DS1630Y-XXX
M48Z128-XXXPM1	128K x 8	DS1245AB-XXX	DS1645AB-XXX
M48Z128Y-XXXPM1	128K x 8	DS1245Y-XXX	DS1645Y-XXX
M48Z256-XXXPL1	256K x 8	DS1249AB-XXX	
M48Z256Y-XXXPL1	256K x 8	DS1249Y-XXX	
M48Z512-XXXPM1	512K x 8	DS1250AB-XXX	DS1650AB-XXX
M48Z512Y-XXXPM1	512K x 8	DS1250Y-XXX	DS1650Y-XXX
M46Z128-XXXPM1	128K x 16	DS1258AB-XXX	DS1658AB-XXX
M46Z128Y-XXXPM1	128K x 16	DS1258Y-XXX	DS1658Y-XXX

Thermal Sensors

Dallas Semiconductor makes Thermal Management easy with its line of direct-to-digital temperature sensors. These sensors provide a digital reading of temperature directly, eliminating the need for A/D converters dedicated to temperature conversions. Factory-calibrated to relieve the user of linearity corrections and other compensation, Dallas Semiconductor's sensors provide a range and accuracy unparalleled in the industry.

Beginning with our DS1620 Digital Thermometer and Thermostat, easy thermal management is available with three thermostatic outputs which change state based on where the temperature is in relation to user-programmed trip points. These trip points are stored in onboard EEPROM memory and are nonvolatile. For multi-point sensing applications, some temperature sensors can be multidropped, either through a two-wire interface or, for minimal wiring, through the Dallas 1-Wire™ interface.

Specialized functions are available in programmable standalone thermostats for heat limit switches and fan controls, as well as in a product which has a temperature sensor and 256 bytes of EEPROM memory for storage of temperature-related correction coefficients and other system-related lookup tables. Dallas also offers value-added options for most sensors to allow an OEM to purchase sensors with factory-programmed thermostat setpoints. Contact the factory or your local sales office for more details on this option.

Most of the Dallas Semiconductor thermal products also offer demo kits, complete with DOS/Windows software and interface electronics, to allow potential users to explore the capabilities of these products without expending time and energy.

Applications

- ◆ Fan control for computing equipment
- ◆ Clock speed adjustment to minimize temperature rise to high-power microprocessors like Pentium, Alpha, and PowerPC
- ◆ Scientific and analytical measurements
- ◆ Building automation and environmental controls
- ◆ Temperature compensation of crystal oscillators in sensitive time or frequency measurement applications such as cellular telephone handsets

Selection Table

Part	Packaging	Interface	Power Supply	Accuracy	Resolution *	Multidrop?	Thermostat Functions	NV Memory?	Parts Available?	Demo Available?
DS1620	300-mil PDIP8 208-mil SO8	3-wire	4.5V-5.5V	±0.5°C	≥9-bit	No	TH, TL, TCom	2 bytes	Now!	Yes!
DS1620R	300-mil SO16	3-wire	4.5V-5.5V	±0.5°C	≥9-bit	No	TH, TL, TCom	2 bytes	Now!	No
DS1621	300-mil PDIP8 150-mil SO8	2-wire	2.7V-5.5V	±0.5°C	≥9-bit	8	TCom	2 bytes	Now!	April 1997
DS1623	300-mil PDIP8 208-mil SO8	3-wire	2.7V-5.5V	±0.5°C	≥9-bit	No	TH, TL, TCom	2 bytes	Now!	Yes! **
DS1624	300-mil PDIP8 208-mil SO8	2-wire	2.7V-5.5V	±0.5°C	13-bit	8	None	256 bytes	Now!	No
DS1627	150-mil SO8	2-wire	2.7V-5.5V	±2.5°C	≥9-bit	8	TCom	2 bytes	May 97	No
DS1720	208-mil SO8	3-wire	2.7V-5.5V	±2.5°C	≥9-bit	No	TH, TL, TCom	2 bytes	Now!	Yes! **
DS1820	PR-35 SSOP16	1-Wire	4.3V-5.5V	±0.5°C	≥9-bit	Infinite	Alarm Search	2 bytes	Now!	Yes!
DS1821	PR-35 208-mil SO8 TO-220	1-Wire	4.3V-5.5V	±1.0°C	≥8-bit	No	TCom	2 bytes	Now!	Yes!

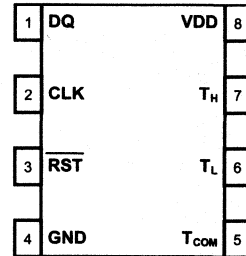
Notes: * Refer to Application Note 105 for a technique to increase readout resolution.

** DS1620 demo kit can be used.

Featured Products

DS1620 Digital Thermometer and Thermostat

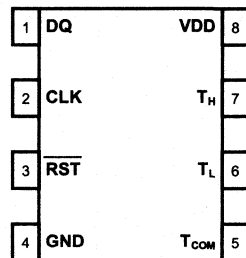
- ◆ Requires no external components
- ◆ 3-wire serial CPU-controlled interface
- ◆ $\pm 0.5^{\circ}\text{C}$ thermometer accuracy
- ◆ Measurement range of -55°C to $+125^{\circ}\text{C}$
- ◆ 3 dedicated thermostat logic outputs
- ◆ Thermostat settings are user-definable and nonvolatile
- ◆ 300-mil, 8-pin DIP (DS1620) or 208-mil SO8 (DS1620S) packages
- ◆ Pre-programmed option available
- ◆ Demo kit available



DS1620
8-pin DIP
8-pin SOIC (208 mil)

DS1623 Digital Thermometer and Thermostat

- ◆ Requires no external components
- ◆ 3-wire serial CPU-controlled interface
- ◆ $\pm 0.5^{\circ}\text{C}$ thermometer accuracy
- ◆ Measurement range of -55°C to $+125^{\circ}\text{C}$
- ◆ Power supply range of $2.7\text{V} \leq V_{\text{DD}} \leq 5.5\text{V}$
- ◆ 3 dedicated thermostat logic outputs
- ◆ Thermostat settings are user-definable and nonvolatile
- ◆ 300-mil 8-pin DIP (DS1623) and 208-mil SO8 (DS1623S) packages
- ◆ Pre-programmed option available



DS1623
8-pin DIP
8-pin SOIC (208 mil)

Featured Products

DS1620R Self-Heating Temperature Sensor

- ◆ Internal 50Ω resistor increases temperature approximately 40°C in still air (with 5V across R)
- ◆ 3-wire serial CPU-controlled interface
- ◆ $\pm 0.5^\circ\text{C}$ thermometer accuracy
- ◆ Die measurement range of -55°C to $+125^\circ\text{C}$
- ◆ 3 dedicated thermostat logic outputs
- ◆ Thermostat settings are user-definable and nonvolatile
- ◆ 300-mil SO16 (DS1620R) package
- ◆ Pre-programmed option available
- ◆ Applications include fan speed measurement/control in PCs/servers

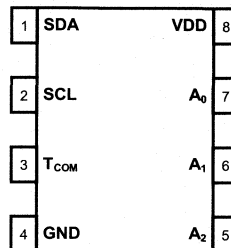
1	DQ	VDD	16
2	CLK	T_H	15
3	NC	NC	14
4	RST	T_L	13
5	GND	T_{COM}	12
6	RA	RB	11
7	NC	NC	10
8	NC	NC	9

DS1620R
16-pin SOIC (300 mil)

Featured Products

DS1621 Digital Thermometer and Thermostat

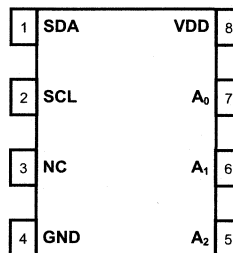
- ◆ Requires no external components
- ◆ 2-wire serial CPU-controlled interface
- ◆ $\pm 0.5^{\circ}\text{C}$ thermometer accuracy
- ◆ Measurement range of -55°C to $+125^{\circ}\text{C}$
- ◆ Power supply range of $2.7\text{V} \leq V_{\text{CC}} \leq 5.5\text{V}$
- ◆ Dedicated hysteresis thermostat logic output
- ◆ Thermostat settings are user-definable and nonvolatile
- ◆ Addressability allows multi-sense operation
- ◆ 300 mil, 8-pin DIP (DS1621) or 150-mil SO8 (DS1621S) packages
- ◆ Demo kit available April 1997



DS1621
8-pin DIP
8-pin SOIC (150 mil)

DS1624 Digital Thermometer and Memory

- ◆ Requires no external components
- ◆ 2-wire serial CPU-controlled interface
- ◆ $\pm 0.5^{\circ}\text{C}$ thermometer accuracy
- ◆ Measurement range of -55°C to $+125^{\circ}\text{C}$
- ◆ Power supply range of $2.7\text{V} \leq V_{\text{CC}} \leq 5.5\text{V}$
- ◆ 256-bytes of user-programmable EEPROM
- ◆ 13-bit readout resolution
- ◆ Addressability allows multi-sense operation
- ◆ 300 mil 8-pin DIP (DS1624) or 208-mil SO8 (DS1624S) packages

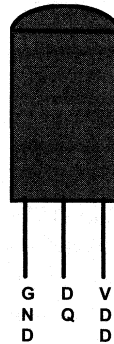


DS1624
8-pin DIP
8-pin SOIC (200 mil)

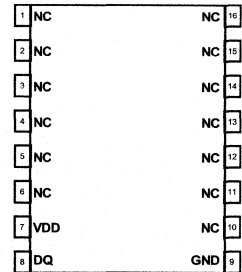
Featured Products

DS1820 1-Wire™ Digital Thermometer

- ◆ Requires only one port pin for communication
- ◆ Multidrop capability simplifies distributed temperature sensing applications
- ◆ Zero standby power
- ◆ $\pm 0.5^\circ\text{C}$ thermometer accuracy
- ◆ Measurement range of -55°C to $+125^\circ\text{C}$
- ◆ Alarm settings are user-definable and nonvolatile
- ◆ PR-35 (DS1820) or 16-pin SSOP (DS1820S) packages
- ◆ Demo kit available



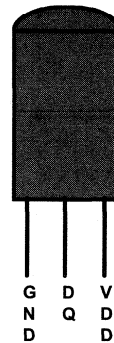
DS1820
PR-35



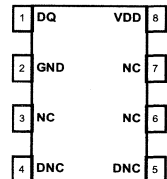
DS1820S
16-pin SSOP

DS1821 Programmable Digital Thermostat

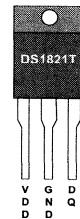
- ◆ Requires only one port pin for communication
- ◆ Hysteresis thermostat open-drain output
- ◆ $\pm 1.0^\circ\text{C}$ thermometer accuracy
- ◆ Measurement range of -55°C to $+125^\circ\text{C}$
- ◆ Thermostat settings are user-definable and nonvolatile
- ◆ PR-35 (DS1821), 208-mil SO8 (DS1821S), and TO-220 (DS1821T) packages
- ◆ Demo kit available



DS1821
PR-35



DS1821S
208-mil SO8



DS1821T
TO-220

New Products

DS1720 Econo-Digital Thermometer and Thermostat

The DS1720 is the relaxed-spec, reduced-cost version of the popular DS1620S 3-Wire Digital Thermometer and Thermostat. It features the same pinout and interface as the 208-mil SO8 DS1620S and DS1623S, and thus can be used as a drop-in replacement in applications that do not require the precision of the DS1620/3, such as fan control in personal computers. Thermometer accuracy of the DS1720 is $\pm 2.5^{\circ}\text{C}$ over the range 0°C to $+85^{\circ}\text{C}$. Like the DS1620, the DS1720 will measure across the -55°C to $+125^{\circ}\text{C}$ range, but the accuracy of the sensor falls off below 0°C and above $+85^{\circ}\text{C}$. See the DS1720 data sheet for the typical thermometer accuracy curve. The DS1720 has the same wide power supply range of the DS1623 ($2.7\text{V} \leq V_{\text{CC}} \leq 5.5\text{V}$), and thus can be used in a variety of applications, including Li-powered portable electronics.

The DS1720 has nonvolatile over-temperature and under-temperature setpoints. Three dedicated thermostat outputs become active when the respective thermal limit has been exceeded. With the nonvolatile storage of the thermal trip points, the end user can pre-program the DS1720 and use it as a standalone component for thermostat-only applications. The user can also have Dallas Semiconductor program the setpoints at the factory. Consult the factory or your local sales representative for details on this value-added option.

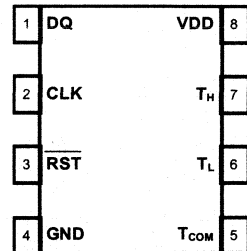
The DS1720 is expected to be sampling by April 1997. Consult the factory for a preliminary data sheet and contact your local sales representative for pricing information.



New Products

DS1720 Econo-Digital Thermometer and Thermostat

- ◆ DS1620S pin/software compatibility
- ◆ Requires no external components
- ◆ 3-wire serial CPU-controlled interface
- ◆ $\pm 2.5^{\circ}\text{C}$ thermometer accuracy
- ◆ Measurement range of -55°C to $+125^{\circ}\text{C}$
- ◆ Power supply range of $2.7\text{V} \leq V_{\text{CC}} \leq 5.5\text{V}$
- ◆ 3 dedicated thermostat logic outputs
- ◆ Thermostat settings are user-definable and nonvolatile
- ◆ 208-mil SO8 (DS1720S) package
- ◆ Pre-programmed option available
- ◆ *Samples available April 1997*



DS1720S
208-mil SO8

New Products

DS1627 Econo-Digital Thermometer and Thermostat

The DS1627 is the relaxed-spec, reduced-cost version of the popular DS1621S 2-wire Digital Thermometer and Thermostat. It features the same pinout and interface as the 150-mil SO8 DS1621S, and thus can be used a drop-in replacement in applications that do not require the precision of the DS1621, such as fan control in personal computers. Thermometer accuracy of the DS1627 is $\pm 2.5^{\circ}\text{C}$ over the range 0°C to $+85^{\circ}\text{C}$. Like the DS1621, the DS1627 will measure across the -55°C to $+125^{\circ}\text{C}$ range, but the accuracy of the sensor falls off below 0°C and above $+85^{\circ}\text{C}$. See the DS1627 data sheet for the typical thermometer accuracy curve. The DS1627 has the same wide power supply range of the DS1621 ($2.7\text{V} \leq V_{\text{CC}} \leq 5.5\text{V}$), and thus can be used in a variety of applications, including Li-powered portable electronics.

The DS1627 has nonvolatile over-temperature and under-temperature setpoints. A single hysteresis thermostat output is provided that becomes active when the measured temperature exceeds that stored in the high temperature trip point, and it is latched in that condition until the temperature falls below the low temperature trip point. Like the DS1621, the active state (high or low) is programmable.

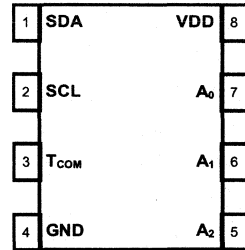
The DS1627 is expected to be sampling in May 1997. Consult the factory for a preliminary data sheet and contact your local sales representative for pricing information. The DS1627 is the most cost-effective digital thermal management solution in the industry today, helping Dallas maintain its leadership in this field.



New Products

DS1627 Econo-Digital Thermometer and Thermostat

- ◆ DS1621S pin/software compatibility
- ◆ Requires no external components
- ◆ 2-wire serial CPU-controlled interface
- ◆ $\pm 2.5^{\circ}\text{C}$ thermometer accuracy
- ◆ Measurement range of -55°C to $+125^{\circ}\text{C}$
- ◆ Power supply range of $2.7\text{V} \leq V_{\text{CC}} \leq 5.5\text{V}$
- ◆ Dedicated hysteresis thermostat logic output
- ◆ Thermostat settings are user-definable and nonvolatile
- ◆ Addressability allows multi-sense operation
- ◆ 150-mil SO8 (DS1627S) package



DS1627S
8-pin SOIC (150 mil)

Digital Potentiometers

Dallas Semiconductor has been manufacturing digital pots since 1989 when we introduced the DS1267 Dual Digital Potentiometer. Why are so many companies choosing digital pots over mechanical devices? The digital solution offers advantages in device control, reliability, power consumption, accuracy, manufacturing, and packaging options.

Dallas Digital Pots are used in all market segments, including personal computers, telecommunications, industrial, audio, multi-media, and automotive. Applications range from simple LCD contrast control to volume and tone control, automatic gain control, trimming, and battery charging.

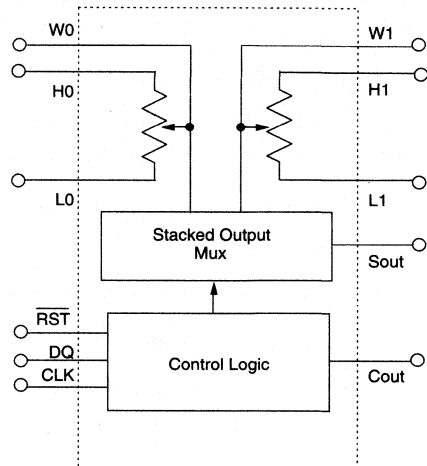
We now offer a family of 15 digital pots, with more to come. Current devices offer linear or non-linear characteristics; 3V, 5V or dual ($\pm 5V$) operation; volatile and nonvolatile versions; industrial and commercial temperature grades; and five interface control options, including Dallas 3-wire, increment/decrement, pushbutton control, 2-wire addressability, and 3-input parallel. If you don't see what you need here, give us a call. We have worked with a variety of customers to meet their needs.

Device	Pots/ Package	Wiper Memory	# of Positions	Resistance	Power Supply	Control Interface
DS1267	2	Volatile	256-Lin	10K, 50K, 100K	5V, $\pm 5V$	3-Wire Serial
DS1666	1	Volatile	128-Lin	10K, 50K, 100K	5V, $\pm 5V$	Increment/Decrement
DS1667	2	Volatile	256-Lin	10K, 50K, 100K	5V, $\pm 5V$	3-Wire Serial
DS1669	1	Nonvolatile	64-Lin	10K, 50K, 100K	4.5V to 8.0V	Contact-Closure
DS1800	2	Volatile	128-Log	50K	2.7V to 5.5V	3-Wire Serial
DS1801	2	Volatile	64-Log	50K	2.7V to 5.5V	3-Wire Serial
DS1802	2	Volatile	64-Log	50K	2.7V to 5.5V	3-Wire Serial
DS1803	2	Volatile	256-Lin	10K, 50K, 100K	2.7V to 5.5V	2-Wire Addressable
DS1804	1	Nonvolatile	100-Lin	10K, 50K, 100K	2.7V to 5.5V	Increment/Decrement
DS1806	6	Volatile	64-Lin	10K, 50K, 100K	2.7V to 5.5V	3-Wire Addressable
DS1807	2	Volatile	64-Log	50K	2.7V to 5.5V	2-Wire Addressable
DS1866	1	Volatile	8-Log	10K	2.7V to 5.5V	3-Input Parallel
DS1867	2	Nonvolatile	256-Lin	10K, 50K, 100K	5V, $\pm 5V$	3-Wire Serial
DS1868	2	Volatile	256-Lin	10K, 50K, 100K	5V, $\pm 3V$	3-Wire Serial
DS1869	1	Nonvolatile	64-Lin	10K, 50K, 100K	3.0V to 8.0V	Contact-Closure

Featured Products

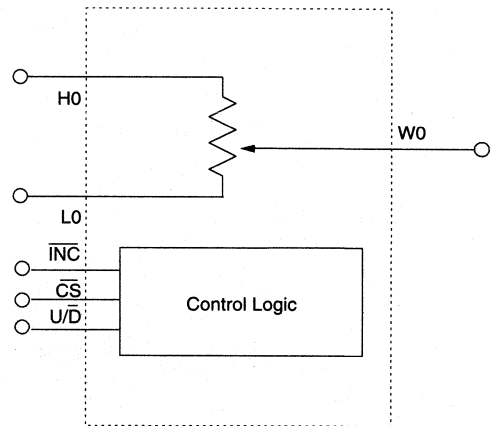
DS1267 Dual Digital Potentiometer

- ◆ Two 256-position potentiometers
- ◆ 3-wire serial CPU-controlled interface
- ◆ Single or dual power supply operation (5V or $\pm 5V$)
- ◆ Daisy chain capability
- ◆ Commercial and industrial versions
- ◆ 10K, 50K, and 100K ohm versions
- ◆ 14-pin DIP, 16 pin, 300-mil SOIC, and 20-pin TSSOP



DS1666 Audio Taper Potentiometer

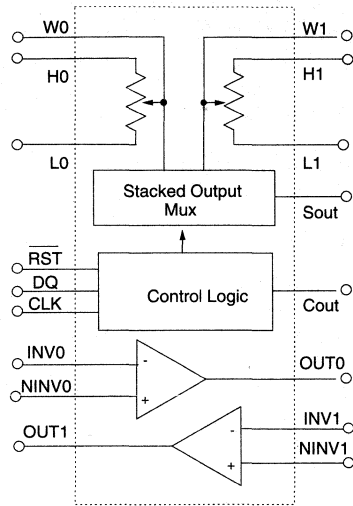
- ◆ Single 128-position potentiometer
- ◆ Tapered resistive characteristic
- ◆ Single or dual power supply operation (5V or $\pm 5V$)
- ◆ Increment/decrement control interface
- ◆ Power-up position 13
- ◆ Commercial and industrial versions
- ◆ 10K, 50K, and 100K ohm versions
- ◆ 14-pin DIP, 16-pin, 300-mil SOIC



Featured Products

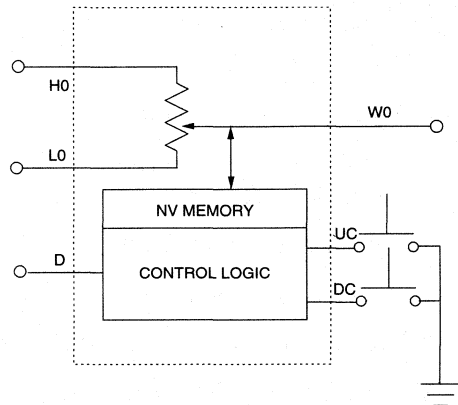
DS1667 Dual Digital Potentiometer w/Op Amps

- ◆ Two 256-position potentiometers
- ◆ Two independent wideband operational amplifiers
- ◆ 3-wire serial CPU-controlled interface
- ◆ Single or dual power supplies (5V or ±5V)
- ◆ Commercial and industrial versions
- ◆ 10K, 50K, and 100K ohm versions
- ◆ 20-pin DIP, 20-pin, 300-mil SOIC, and 20-pin TSSOP



DS1669 Dallastat™

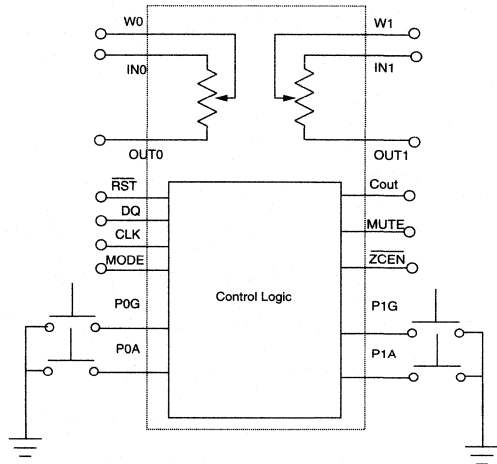
- ◆ Single 64-position potentiometer
- ◆ Nonvolatile auto-wiper storage
- ◆ Digital or pushbutton control interface options
- ◆ 4.5V to 8.0V power supplies
- ◆ Commercial and industrial versions
- ◆ 10K, 50K, and 100K ohm versions
- ◆ 8-pin DIP, 8-pin, 208-mil SOIC



Featured Products

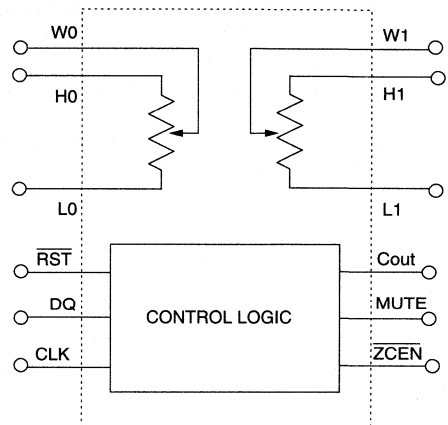
DS1800 Dual Inverting Log Gain/Attenuator

- ◆ Dual 128-position log taper
- ◆ Gain/attenuation range: +20dB to -63dB
- ◆ Frequency response: -3dB@1MHz
- ◆ Interchannel matching: ± 0.25 dB
- ◆ Interchannel isolation: -110dB
- ◆ Digital feedthrough: < -80dB
- ◆ 3-wire serial interface with pop-free transitions, pushbutton control operation, and daisy chain capability
- ◆ 2.7V to 5.5V power supply operation
- ◆ 45K ohm version
- ◆ 20-pin DIP, 20-pin, 300-mil SOIC, and TSSOP



DS1801 Dual Digital Audio Taper Potentiometer

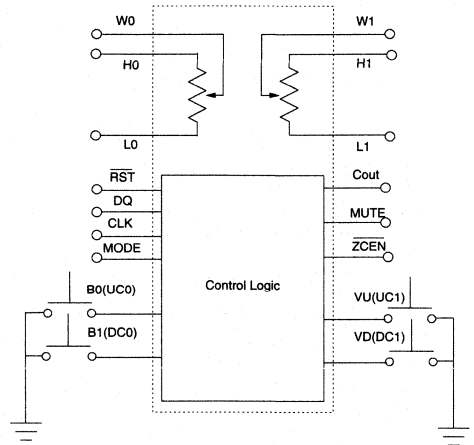
- ◆ Dual 64-position log taper with true 1dB/step accuracy
- ◆ 0.02% THD max. (20 Hz-20 kHz)
- ◆ Frequency response: -3dB @700 kHz
- ◆ Interchannel matching: ± 0.25 dB
- ◆ Interchannel isolation: -110dB
- ◆ Digital feedthrough: < -80dB
- ◆ 3-wire serial interface with pop-free transitions and daisy chain capability
- ◆ 2.7V to 5.5V power supply operation
- ◆ 14-pin DIP, 14-pin TSSOP and 16-pin, 300-mil SOIC



Featured Products

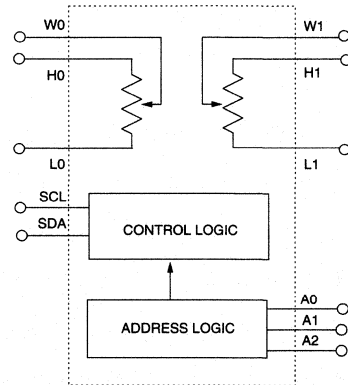
DS1802 Dual Digital Audio Taper Potentiometer with Pushbutton Control

- ◆ Dual 64-position log taper with true 1dB/step accuracy
- ◆ 0.02% THD max. (20 Hz-20 kHz)
- ◆ Frequency response: -3dB@700 kHz
- ◆ Interchannel matching: ± 0.25 dB
- ◆ Interchannel isolation: -110dB
- ◆ Digital feedthrough: < -80 dB
- ◆ 3-wire serial interface with pop-free transitions and daisy chain capability
- ◆ Manually controlled, contact-closure interface
- ◆ 2.7V to 5.5V power supply operation
- ◆ 20-pin DIP, 300-mil SOIC, and TSSOP



DS1803 Dual Addressable Potentiometer

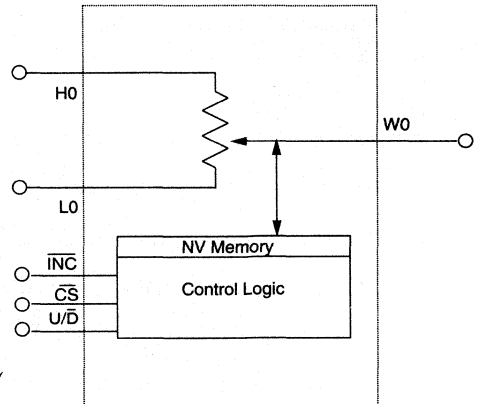
- ◆ Two 256-position potentiometers
- ◆ 2-wire addressable interface
- ◆ Addresses up to 8 devices on bus
- ◆ 2.7V to 5.5V power supply operation
- ◆ Commercial and industrial versions
- ◆ 10K, 50K, and 100K ohm versions
- ◆ 14-pin DIP, 16-pin, 150-mil SOIC, and 14-pin TSSOP



Featured Products

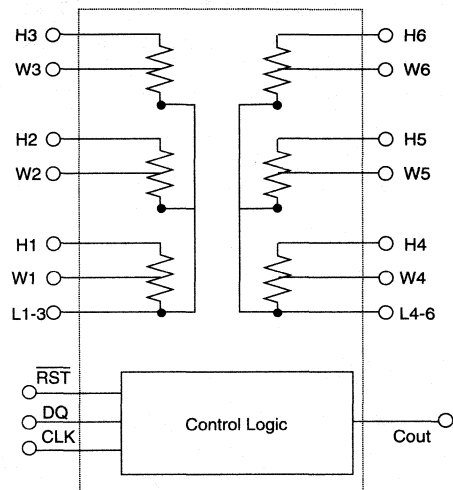
DS1804 NV Trimmer Potentiometer

- ◆ Single 100-position nonvolatile potentiometer
- ◆ Linear resistor characteristic
- ◆ 2.7V to 5.5V power supply operation
- ◆ Increment/decrement control interface
- ◆ Wiper position stored on-demand
- ◆ Powers up to last stored wiper position
- ◆ Commercial and industrial versions
- ◆ 10K, 50K, and 100K ohm versions
- ◆ 8-pin DIP, 8-pin, 150-mil SOIC



DS1806 Digital Sextet Potentiometer

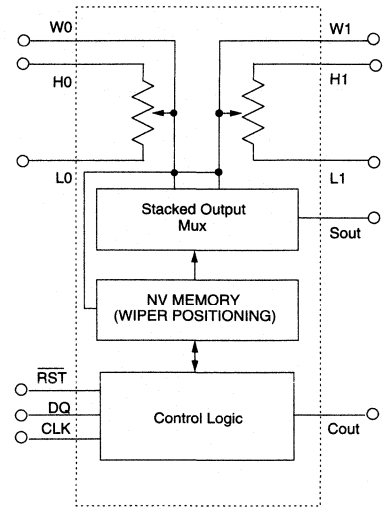
- ◆ Single 64-position potentiometer
- ◆ 3-wire serial CPU-controlled interface
- ◆ 2.7V to 5.5V power supply operation
- ◆ Daisy chain capability
- ◆ Commercial and industrial versions
- ◆ 10K, 50K, and 100K ohm versions
- ◆ 20-pin DIP, 20-pin, 300-mil SOIC and 20-pin TSSOP



Featured Products

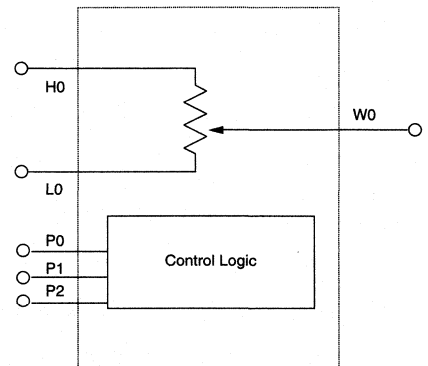
DS1807 Dual Audio Taper Potentiometer

- ◆ Dual 64-position log taper with true 1dB/step accuracy
- ◆ 0.02% THD max. (20 Hz-20 kHz)
- ◆ Frequency response: -3dB @ 700 kHz
- ◆ Interchannel matching: ± 0.25 dB
- ◆ Interchannel isolation: -110dB
- ◆ Digital feedthrough: < -80 dB
- ◆ Address up to 8 devices on bus
- ◆ 2-wire addressable interface
- ◆ 2.7V to 5.5V power supply operation
- ◆ 14-pin DIP, 14-pin TSSOP, and 16-pin, 300-mil SOIC



DS1866 Log Trimmer Potentiometer

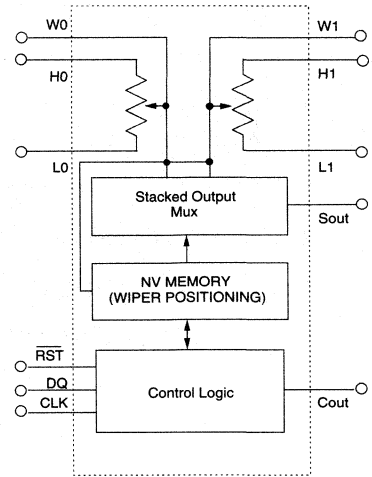
- ◆ Single 8-position potentiometer
- ◆ Tapered resistor characteristic: 5dB/step
- ◆ 2.7V to 5.5V power supply operation
- ◆ 3-terminal parallel interface control
- ◆ Wiper position powers up to state of parallel interface
- ◆ Commercial and industrial versions
- ◆ 10K ohm version
- ◆ 8-pin DIP, 8-pin, 150-mil SOIC



Featured Products

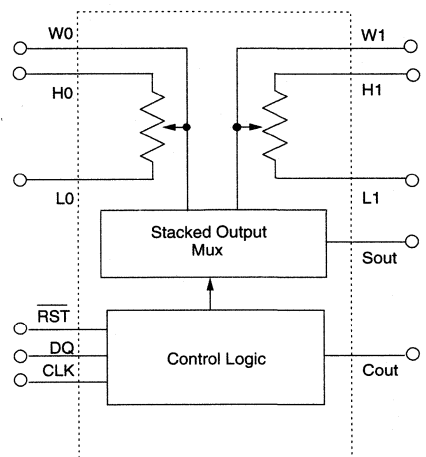
DS1867 Nonvolatile Dual Digital Potentiometer

- ◆ Two 256-position potentiometers
- ◆ Nonvolatile wiper position storage on power-down
- ◆ Single or dual power supplies (5V or $\pm 5V$)
- ◆ 3-wire serial interface
- ◆ Daisy chain capability
- ◆ Commercial and industrial versions
- ◆ 10K, 50K, and 100K ohm versions
- ◆ 14-pin DIP, 16-pin, 300-mil SOIC, and 20-pin TSSOP



DS1868 5V Dual Digital Potentiometer

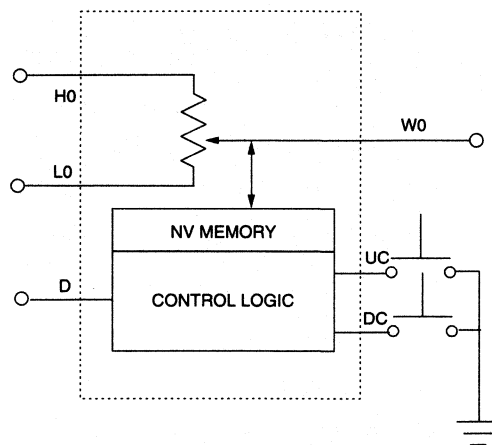
- ◆ Two 256-position potentiometers
- ◆ 3-wire serial interface
- ◆ Low-power device: 1mA standby
- ◆ Power supply (5V or $\pm 3V$)
- ◆ Daisy chain capability
- ◆ Commercial and industrial versions
- ◆ 10K, 50K, and 100K ohm versions
- ◆ 14-pin DIP, 16-pin, 300-mil SOIC, and 20-pin TSSOP



Featured Products

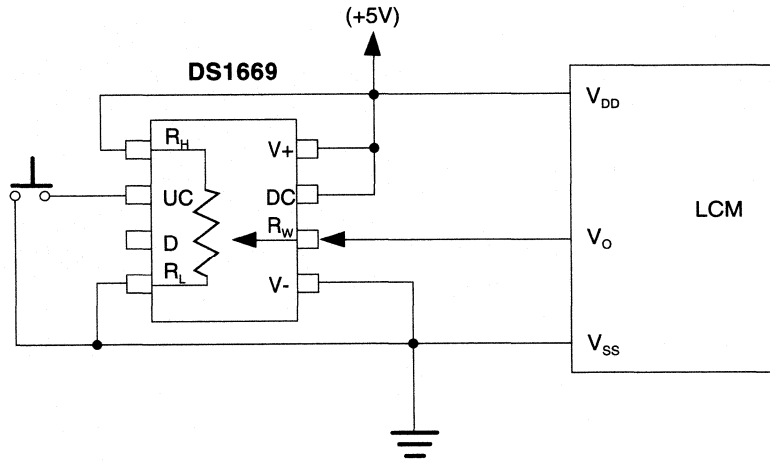
DS1869 Dallastat™

- ◆ Single 64-position potentiometer
- ◆ Nonvolatile auto-wiper storage
- ◆ Digital or pushbutton control interface options
- ◆ 3.0V to 8.0V power supply operation
- ◆ Commercial versions
- ◆ 10K, 50K, and 100K ohm versions
- ◆ 8-pin DIP, 8-pin, 208-mil SOIC

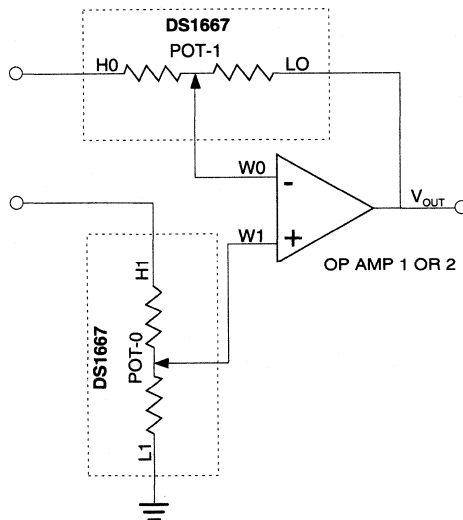


Application Diagrams

LCD Contrast Control Using the Dallastat

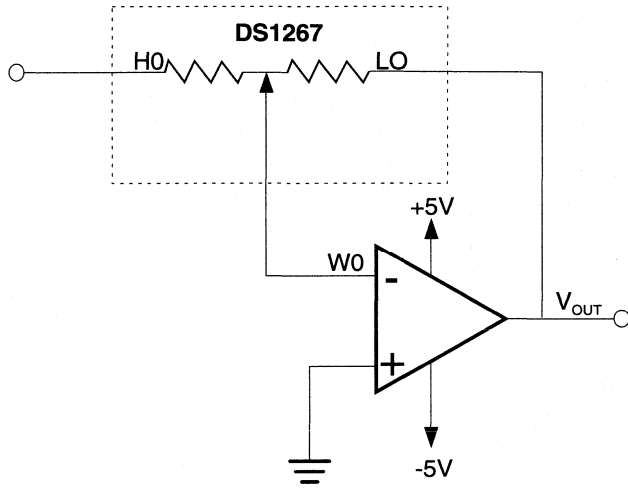


Programmable Differential Amplifier Using the DS1667

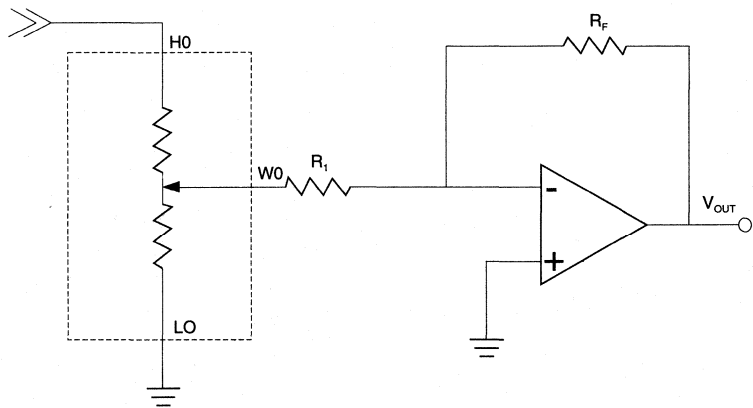


Application Diagrams

Inverting Variable Gain Amplifier



Fixed Gain Attenuator Amplifier



Battery Management

Dallas Semiconductor's Battery Management products target the growing demand for portable electronics such as notebook computers, pagers, cellular phones, and other hand-held instrumentation. With the use of batteries on the rise, the need to manage this battery power source is growing.

Battery management products at Dallas Semiconductor encompass two categories: Battery Chargers and Battery Instrumentation/Identification.

The DS1633 Battery Charger can be used to recharge Li, NiCd, NiMH, and Lead Acid batteries. The DS1633 is programmed to obtain any I vs. V curve the designer wishes. The DS1633 uses either V_{MAX} or an on-chip timer to determine charge termination, at which time the charger automatically enters a trickle charge mode. The DS1633 can operate as a standalone component for battery packs with 3 or fewer cells.

The second category of Battery Management products is the Battery Instrumentation/Identification family. All the products in this family feature Dallas' 1-Wire™ interface; thus the only battery pack contacts required are battery power, ground, and the 1-Wire interface. The core product, the DS2434 Battery ID Chip, features an ID code that the user can define so their supporting electronics can identify that battery pack as one of theirs. The DS2434 removes the requirement for a thermistor in the battery pack because it features a direct-to-digital thermometer to allow for self-discharge calculations based on the environment to which the battery has been subjected. The final core feature of the DS2434 is on-chip nonvolatile memory to allow the designer to carry around vital data such as gas gauge levels, warranty information, lot codes, etc. in the battery pack. The variability in the product family is the level of battery instrumentation available. The DS2435 adds to the DS2434 core functionality a time-temperature histogram to provide a more sophisticated means of predicting battery self-discharge. Two new products, the DS2436 and DS2437, to be introduced in the first part of 1997, provide further instrumentation functions to the designer of smart battery packs. Please see "New Product Offerings," beginning on page 40, for details.

All existing Dallas Semiconductor Battery Management products offer demo kits, complete with DOS/Windows software and interface electronics to allow users to explore the capabilities of these products without expending time and energy. We also offer value-added options for the Battery Management products to allow an OEM to purchase:

- ◆ the DS1633 with a factory-programmed charging profile, or
- ◆ a Battery ID/Instrumentation product with a custom ID that will only be sold by Dallas Semiconductor to that OEM.

Contact the factory for details of this program.

Applications

DS1633 Battery Charger

- ◆ Charging of NiCd, NiMH, and PbAcid batteries in consumer electronics, portable/cellular telephones, pagers, medical instruments, backup memory systems, and security systems

DS243x Battery ID

- ◆ Unique battery pack identification
- ◆ Perform gas gauge measurements
- ◆ Nonvolatile storage of critical data in the battery pack such as warranty information, gas gauge data, disposal information, charging instructions/limits
- ◆ End products include portable computers, portable/cellular telephones, medical instruments, electronic clipboards, or any portable electronics powered by a battery pack

Selection Table

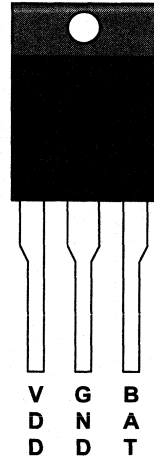
Product	Packaging	Interface	Power Supply	ID	Instrumentation	Instrumentation Accuracy	Memory	Parts Available?	Demo Available?
DS2434	PR-35 150-mil SO14	1-Wire	2.5V-6.4V	2-byte ID	Thermometer	±0.5°C	32 bytes SRAM 32 bytes EPROM	Now!	Yes!
DS2435	PR-35	1-Wire	2.5V-6.4V	2-byte ID	Thermometer Time/Temp Histogram Elapsed Time Counter	±0.5°C ±0.5°C ±10%	32 bytes SRAM 32 bytes EPROM	Now!	Yes!
DS2436	PR-35	1-Wire	2.7V-10V	64-bit S/N 2-byte ID	Thermometer Voltage A/D	±1.0°C ±50mV	8 bytes SRAM 32 bytes EPROM	August 1997	No
DS2437	SSOP16	1-Wire	2.7V-10V	64-bit S/N	Thermometer Voltage A/D Current A/D Elapsed Time Counter "Net Current Counter"	±1.0°C ±50mV ±2% * * ±5%	40 bytes EPROM	June 1997	3Q97

*Refer to respective data sheet for instrumentation accuracy spec conditions.

Featured Products

DS1633 High-Speed Battery Charger

- ◆ Recharges Li, NiCd, NiMH, and PbAcid batteries
- ◆ No additional components required for charging 3 or fewer cells
- ◆ Programmable (OTP) charging profile
- ◆ V_{MAX} and/or t_{MAX} charge termination
- ◆ Trickle charge (programmable) after charge termination
- ◆ TO-220 package
- ◆ Pre-programmed option available (See DS1633x)
- ◆ Custom pre-programmed option available
- ◆ Demo kit available

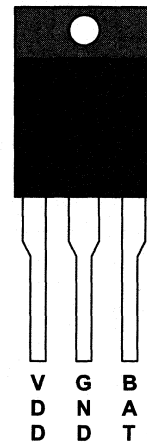


DS1633
TO-220 Package

DS1633x High-Speed Battery Charger

- ◆ Pre-programmed DS1633
- ◆ $V_{MAX} = 4.65V$
- ◆ $t_{MAX} = 8$ hours
- ◆ Trickle charge = 12.5% of I_{MAX}

Product	I_{MAX}
DS1633A	100mA
DS1633B	80mA
DS1633C	60mA
DS1633D	40mA
DS1633E	20mA
DS1633x	Custom

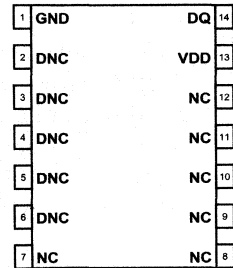
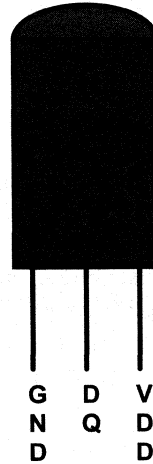


DS1633x
TO-220 Package

Featured Products

DS2434 Battery Identification Chip

- ◆ Requires only one port pin for communication
- ◆ Provides unique ID number to battery packs
- ◆ Eliminates thermistors by sensing battery temperature on-chip
- ◆ $\pm 0.5^{\circ}\text{C}$ thermometer accuracy
- ◆ Measurement range of -40°C to $+85^{\circ}\text{C}$
- ◆ 32 bytes of nonvolatile EEPROM and 32 bytes of volatile SRAM for storage of critical battery data
- ◆ Cycle counter
- ◆ PR-35 (DS2434) or 150-mil SO14 (DS2434S) packages
- ◆ Demo kit available



DS2434
SO14

DS2434
PR-35

DS2435 Battery Identification Chip with Time/Temperature Histogram

- ◆ Requires only one port pin for communication
- ◆ Provides unique ID number to battery packs
- ◆ Eliminates thermistors by sensing battery temperature on-chip
- ◆ $\pm 0.5^{\circ}\text{C}$ thermometer accuracy
- ◆ Measurement range of -40°C to $+85^{\circ}\text{C}$
- ◆ Eight programmable bins to store time/temperature histogram data
- ◆ Programmable histogram update frequency
- ◆ 32 bytes of nonvolatile EEPROM and 32 bytes of volatile SRAM for storage of critical battery data
- ◆ Elapsed time counter (1 min. resolution)
- ◆ Cycle counter
- ◆ PR-35 (DS2435) package
- ◆ Demo kit available



DS2435
PR-35

New Product Offerings

DS2436 Battery Identification/ Monitor Chip

The DS2436 is a MicroLAN™-compatible battery monitor. It features the same core as the DS2434, that is a 2-byte ID code to allow an OEM to customize battery packs, a direct-to-digital thermometer to replace thermistors in battery packs, and on-chip nonvolatile memory for storage of critical data that is kept with the battery pack over its lifetime. Because it is MicroLAN-compatible, any number of battery packs containing the DS2436 can exist on the same 1-Wire™ bus. This allows multiple battery packs to be used in the same system or charger. Furthermore, other MicroLAN products (see Automatic Information section) can also be used on the same bus, either in the battery pack or in the host system. With the MicroLAN compatibility comes a unique 64-bit serial number lasered into each DS2436 chip. Therefore, the 2-byte ID can be used to uniquely identify a particular OEM's battery packs and the 64-bit serial number can be used to distinguish between that OEM's packs.

The distinguishing feature of the DS2436 in Dallas' Battery ID/Instrumentation family is a 10-bit battery voltage A/D converter. The V_{DD} (or battery power) input is also the A/D input. This feature could be used by the charging system to determine when to terminate charging if either the V_{MAX} or -dV termination methods are to be implemented. The presence of the direct-to-digital temperature sensor also allows for battery temperature-related charge termination techniques. The voltage and temperature also make use of data that could be used to produce a gas gauge based solely on battery temperature and voltage.

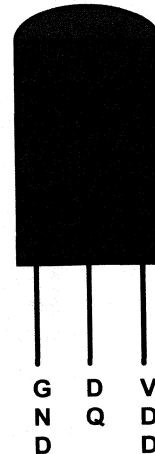
The DS2436 is expected to be sampling in the third quarter of 1997. Consult the factory for a preliminary data sheet and contact your local sales representative for pricing information.



New Product Offerings

DS2436 Battery Identification/ Monitor Chip

- ◆ Requires only one port pin for communication
- ◆ Provides unique 2-byte ID number to battery packs
- ◆ Unique 64-bit serial number lasered into each part
- ◆ Multi-drop bus allows several battery packs containing DS2436 to be used in the same system or charger
- ◆ Eliminates thermistors by sensing battery temperature on-chip
- ◆ $\pm 1.0^{\circ}\text{C}$ thermometer accuracy
- ◆ Measurement range of -40°C to $+85^{\circ}\text{C}$
- ◆ 10-bit battery voltage A/D converter
- ◆ 32 bytes of nonvolatile EEPROM and 8 bytes of volatile SRAM for storage of critical battery data
- ◆ PR-35 (DS2436) package
- ◆ *Sampling in Q3 1997*



DS2436
PR-35

New Product Offerings

DS2437 Smart Battery Monitor

The DS2437 is the flagship of Dallas' Battery Management family. It measures all parameters necessary for the host to calculate an accurate gas gauge and all parameters required for any charge termination technique (dT/dt_{MAX} , V_{MAX} , $-dV_{MAX}$, T_{MAX}).

Refer to the block diagram on page 44. Like the DS2436, the DS2437 features MicroLAN compatibility with a unique 64-bit serial number, a direct-to-digital temperature sensor, non-volatile EEPROM memory, and a 10-bit battery voltage A/D converter. The DS2437 adds functionality to provide for the complete smart battery system. First, the voltage A/D is internally multiplexed so that the user can either measure the battery (V_{DD}) voltage or some other voltage in the system via the V_{AD} input. This is useful because the battery voltage A/D input will only measure as specified for inputs in the range $2.7V \leq V_{DD} \leq 10.0V$. This is because V_{DD} is also the power input for the DS2437. If the V_{AD} input is used, the A/D will measure to spec for inputs ranging from $0V \leq V_{AD} \leq 2V_{DD}$ for $2.7V \leq V_{DD} \leq 5.0V$.

The DS2437 also performs two types of current measurements. By measuring the voltage across the sense resistor (R_{SENS}), the DS2437 effectively measures the instantaneous battery current with a 10-bit resolution. It does so in the background at the rate of about 32 times per second. The RC filter on the sense inputs allows high-amplitude, low duty cycle current peaks to be integrated into the measurement. These instantaneous measurements are then "accumulated" in a register. Positive (charging) current will increase the binary value of the register and negative (discharging) current will decrease the contents. The result is a binary representation of the net capacity (in C) remaining in the battery pack, not including second-order effects like temperature-related self discharge. This "Integrated Current Accumulator" is then the ground work for a gas gauge.

These second-order effects can be approximated accurately using the elapsed time and temperature measurements made by the DS2437. If the system knows how long a battery has been out of the charger and what the temperature profile was during that time, the host software can compute the approximate loss of capacity due to temperature-related self-discharge. The adjustment is not hard-wired into the DS2437. The host software computes the value based on the type of battery chemistry being used in the battery pack. This allows the DS2437 to be used with any battery chemistry, from NiCd to LiIon.

The DS2437 is expected to be sampling in the second quarter of 1997. Consult the factory for a preliminary data sheet and contact your local sales representative for pricing information.



New Product Offerings

DS2437 Smart Battery Monitor

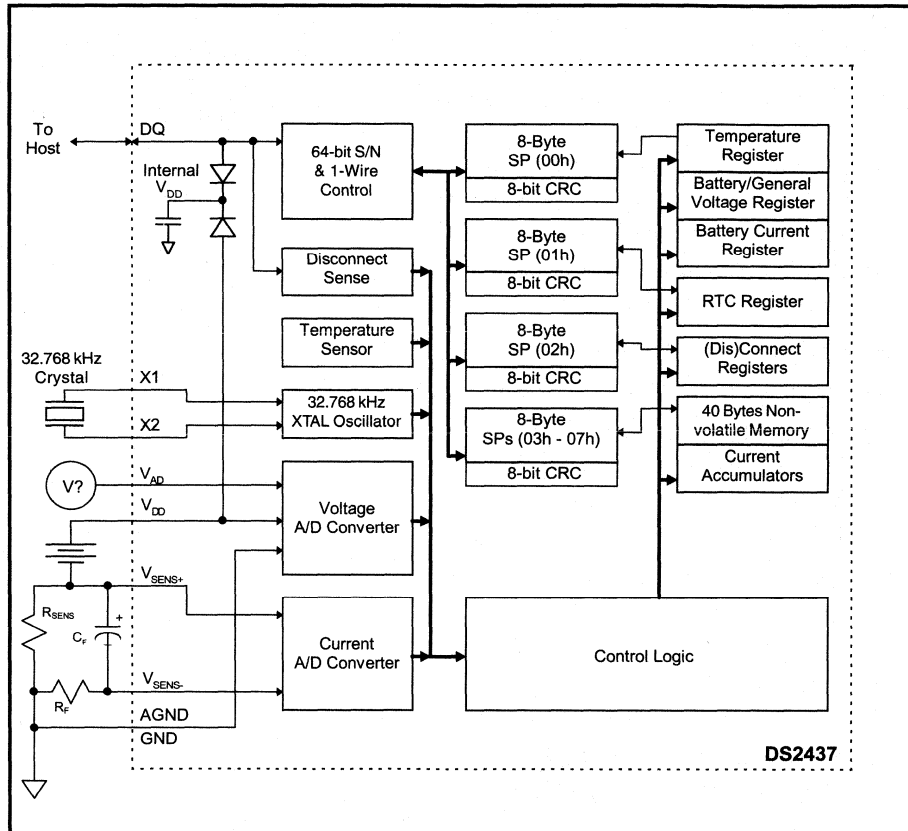
- ◆ Requires only one port pin for communication
- ◆ Unique 64-bit serial number lasered into each part
- ◆ Multi-drop bus allows several battery packs containing the DS2437 to be used in the same system or charger
- ◆ Eliminates thermistors by sensing battery temperature on-chip
- ◆ $\pm 1.0^{\circ}\text{C}$ thermometer accuracy
- ◆ Measurement range of -40°C to $+85^{\circ}\text{C}$
- ◆ 10-bit voltage A/D converter can be used for either the battery voltage (V_{DD}) or general A/D input (V_{AD})
- ◆ 10-bit battery current A/D converter
- ◆ “Integrated current accumulator” keeps a running total of net current remaining in the battery
- ◆ Elapsed time counter (1-second resolution)
- ◆ 40 bytes of nonvolatile EEPROM for storage of critical battery data
- ◆ 16-pin SSOP (DS2437S) package

1	DQ	V_{DD}	16
2	NC	NC	15
3	V_{AD}	NC	14
4	NC	X1	13
5	VSNS+	NC	12
6	VSNS-	X2	11
7	NC	NC	10
8	AGND	GND	9

DS2437
16-Pin SSOP

New Product Offerings

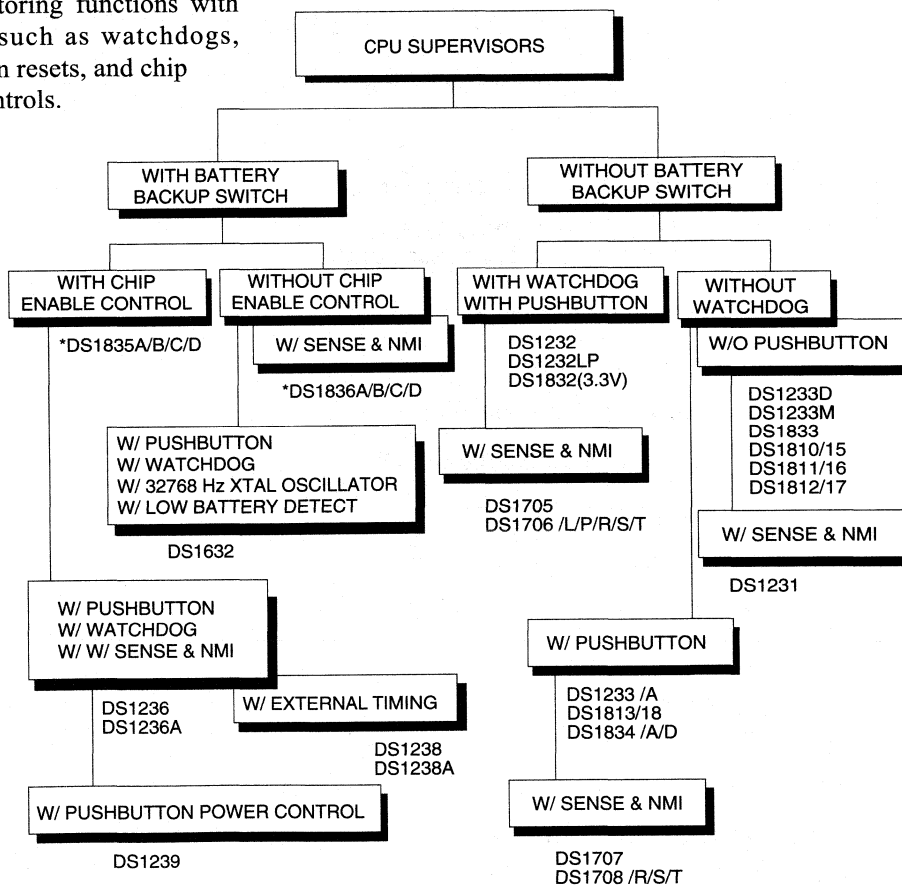
DS2437 Block Diagram



CPU Supervisors

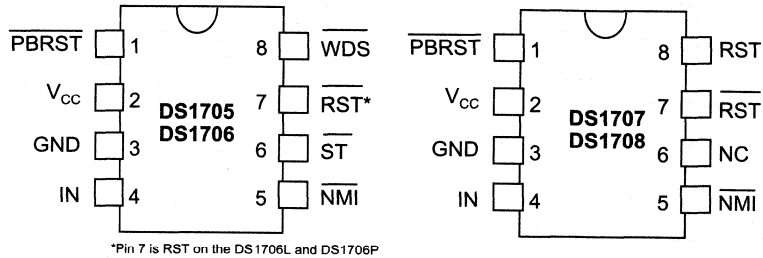
The defining feature of the CPU Supervisor family is a power monitor reset with a timed output guaranteeing stable, predictable operation during power transitions. These devices provide systems (*i.e.*, power supplies and microprocessors) time to stabilize prior to starting normal operation. They also stop microprocessors as power degrades to protect valuable nonvolatile memory.

Dallas Semiconductor's CPU Supervisors provide the advantage of a digital output to alert systems of critical analog power conditions. They improve reliability, simplify design, and minimize the number of discrete components required to perform vital power monitoring. They also provide more complex system monitoring functions with features such as watchdogs, pushbutton resets, and chip enable controls.



Featured Products

The DS170x MicroMonitors are pin- and function-compatible with the Maxim MAX705, MAX706x, MAX707, and MAX 708x family of μ P supervisory circuits. The devices are designed specifically for power-sensitive designs and have a low 60 μ A quiescent current maximum specification.



DS1705, DS1706x, DS1707, & DS1708x MicroMonitors

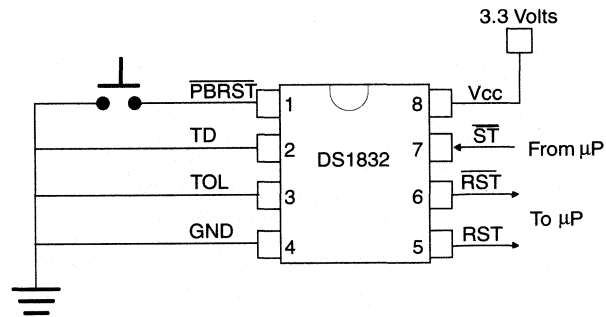
- ◆ Active high and active low CMOS reset outputs
- ◆ 5% or 10% 5V tolerances
- ◆ 5%, 10%, and 20% 3.3V tolerances
- ◆ Watchdog (DS1705 & DS1706x only)
- ◆ Debounced pushbutton reset
- ◆ Low 60 μ A quiescent current maximum
- ◆ All devices are spec'd at -40° to +85° C

Applications

- ◆ Virtually any 5V, 3.3V or 3.0V μ P-based system
- ◆ Existing MAX705, MAX706x, MAX707, and MAX 708x, or MAX813L applications

Featured Products

The DS1832 3.3-Volt MicroMonitor is pin- and function-compatible with the industry-standard DS1232 MicroMonitor chip. The device was designed specifically for 3.3-volt systems. Low power was a key design issue; the device only draws 35 μ A of quiescent current maximum.



DS1832 3.3-Volt MicroMonitor

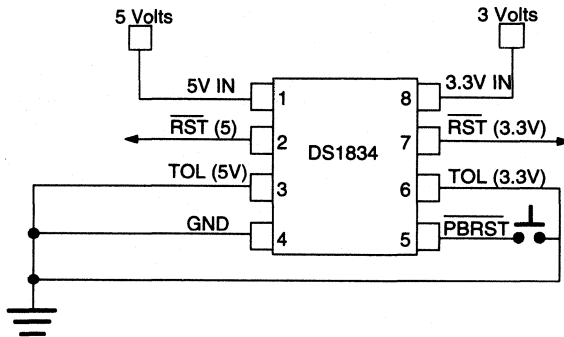
- ◆ Active high and active low CMOS reset outputs
- ◆ 10% or 20% 3.3V, user-selectable voltage tolerances
- ◆ Watchdog with selectable time-out
- ◆ Debounced pushbutton reset
- ◆ Low 35 μ A quiescent current maximum

Applications

- ◆ Virtually any 3.3V (or 3.0V) microprocessor-based system
- ◆ Existing DS1232 applications moving to 3.3V

Featured Products

The DS1834 monitors two supply voltages, a 3-volt supply and 5-volt supply, at the same time. Power is supplied from the higher of the two voltage inputs. Low power and versatility make the DS1834 ideal for many applications using 5 and 3 volts.



DS1834 Dual EconoReset with Pushbutton

- ◆ Dual voltage monitoring
- ◆ Selectable tolerances of 5V (5% or 10%) and 3.3V (10% or 20%)
- ◆ 3 output options: open drain active low, push/pull active low, and push/pull active high
- ◆ Pushbutton/manual reset input
- ◆ Low quiescent current of 50 μ A maximum



Applications

- ◆ Virtually any system making use of 5 volts and 3 volts
- ◆ PC/PCI motherboards and cards
- ◆ Network hubs and routers

CPU Supervisor and Nonvolatile Controller Cross Reference

CPU Supervisors and Nonvolatile Controller Cross Reference

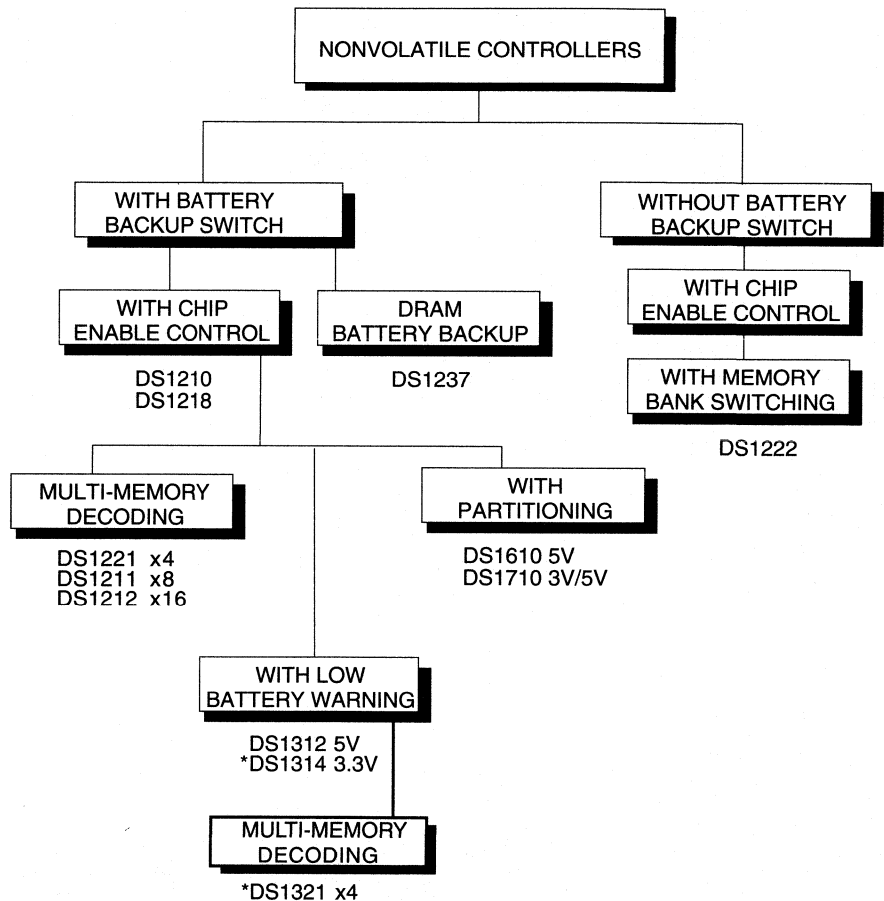
Dallas Semi	Maxim	Linear Tech.	Analog Dev.	California Micro	Crystal Semi.	Benchmark
DS1210	MXD1210CPA			CM1210P		bq2201PN
DS1210N	MXD1210NPA			CM1210PI		bq2201PNN
DS1210S				CM1210S		
DS1210SN				CM1210SI		bq2204PN
DS1221						bq2204PNN
DS1221N						bq2204SN
DS1221S						bq2204SNN
DS1221SN						
DS1232	MAX1232CPA	LTC1232CN8		CM1232P	CS1232-CP	
DS1232LP	MAX1232EPA	LTC1232LN8		CM1232PI	CS1232-IP	
DS1232LPN	MAX1232CWA			CM1232S	CS1232-CS	
DS1232S	MAX1232EWA			CM1232SI	CS1232-IS	
DS1232SN	MAX1232CSA	LTC1232CS8				
DS1232LPS-2	MAX1232ESA	LTC1232LS8				
DS1232LPSN-2						
DS1705EPA	MAX705XPA		ADM705AN			
DS1705ESA	MAX705XSA		ADM705AR			
DS1706EPA	MAX706XPA		ADM706AN			
DS1706ESA	MAX706XSA		ADM706AR			
DS1706LEPA	MAX706LXPA					
DS1706LESA	MAX706LXSA					
DS1706PEPA	MAX706PXPA		ADM1706PAN			
DS1706PESA	MAX706PXSA		ADM1706PAR			
DS1706REPA	MAX706RXPA		ADM1706RAN			
DS1706RESA	MAX706RXSA		ADM1706RAR			
DS1706SEPA	MAX706SXPA		ADM1706SAN			
DS1706SESA	MAX706SXSA		ADM1706SAR			
DS1706TEPA	MAX706TXPA		ADM1706TAN			
DS1706TESA	MAX706TXSA		ADM1706TAR			
DS1707EPA	MAX707XPA		ADM707AN			
DS1707ESA	MAX707XSA		ADM707AR			
DS1708EPA	MAX708XPA		ADM708AN			
DS1708ESA	MAX708XSA		ADM708AR			
DS1708REPA	MAX708RXPA		ADM1708RAN			
DS1708RESA	MAX708RXSA		ADM1708RAR			
DS1708SEPA	MAX708SXPA		ADM1708SAN			
DS1708SESA	MAX708SXSA		ADM1708SAR			
DS1708TEPA	MAX708TXPA		ADM1708TAN			
DS1708TESA	MAX708TXSA		ADM1708TAR			
DS1810-5		TelCom				
DS1810-10		TC54VC4812T				
DS1810-15		TC54VC4512T				
DS1815-10		TC54VC4412T				
DS1815-20		TC54VC2812T				
		TC54VC2512T				

Only true crosses with a high confidence factor.

*x can be a "C" or "E"

Nonvolatile Controllers

Nonvolatile Controllers switch power between a primary supply and a secondary supply to allow SRAMs to maintain memory even in the absence of primary power. These devices also control chip enable to protect the SRAM from spurious writes when power is out of tolerance.

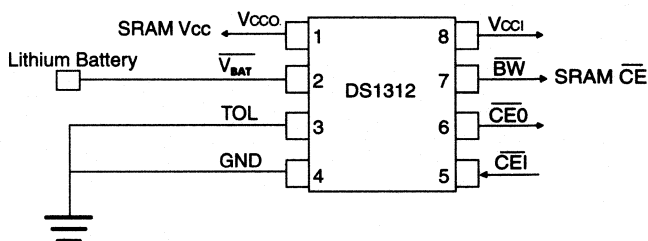


* Products in development

The products above are tested and meet the same stringent requirements as those controllers used in Dallas Semiconductor's Nonvolatile SRAMs. This provides designers with a known quality level and the option to customize the RAM or battery to meet special design requirements.

Featured Product

The DS1312 Nonvolatile Controller monitors a 5-volt supply and switches to a 3-volt lithium cell if V_{CC} drop below 2.7 volts. It also controls the chip enable to an SRAM to guarantee data protection when V_{CC} drops out of tolerance. On power-up, a load is placed on the lithium battery and the battery voltage is checked. If the battery level is low, a battery warning output is pulled active. The battery is rechecked every 24 hours that V_{CC} remains powered up for maximum data security.



DS1312 Nonvolatile Controller with Battery Monitor

- ◆ Converts CMOS SRAM into nonvolatile memory
- ◆ Write protects RAM whenever power is out of tolerance
- ◆ Sophisticated lithium battery provides early warning of failure
- ◆ Maximum V_{CC} quiescent current 400 μ A
- ◆ Extremely low quiescent current of less than 100nA maximum during battery backup

Applications

- ◆ Industrial controllers
- ◆ Medical equipment
- ◆ Data logging equipment
- ◆ Network hubs and routers

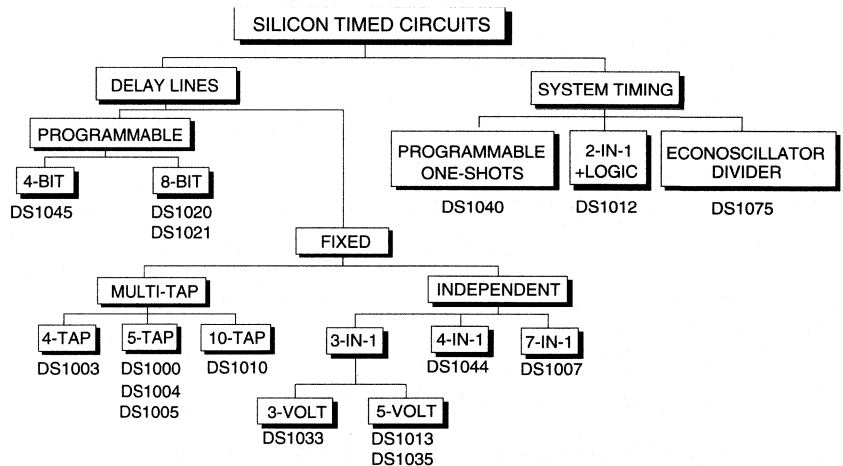


Silicon Timed Circuits

Fixed delay lines are the core of the Silicon Timed Circuits family. These are all-silicon replacements for hybrid delay lines. The all-silicon delay lines offer a number of advantages over hybrid components:

- ◆ Increased reliability
- ◆ Smaller packaging (including DIP and SOIC)
- ◆ Standard IC handling (*e.g.*, solder reflow)

The basic delay line IC technology allows functionality to be added to these devices. Examples include programmable delay lines, one-shots and delay lines combined with logic. These devices find applications in all market segments, especially computer, telecommunications, and industrial.

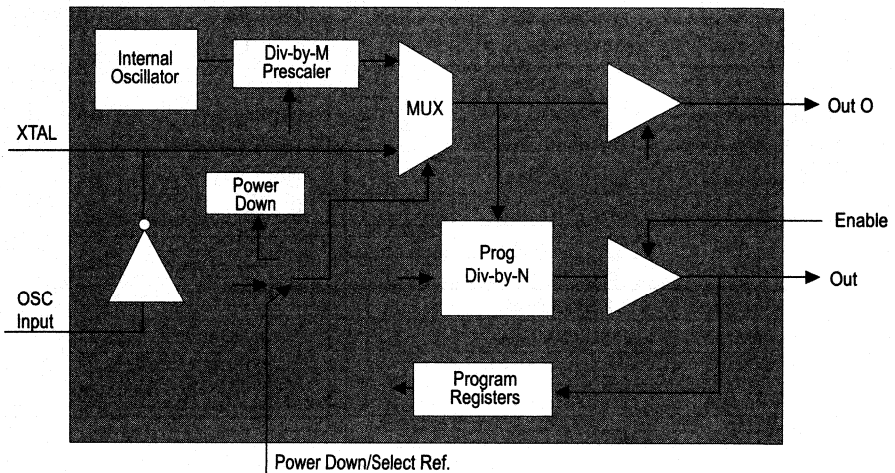


Applications

- ◆ Microprocessor and memory clock timing generation
- ◆ Optical networks
- ◆ Recovery of asynchronous data signals
- ◆ Laser and ultrasound control
- ◆ Overcoming timing mismatches between components
- ◆ Skew correction

Featured Product

DS1075 EconOscillator Functional Block Diagram



Features

- ◆ Nonvolatile user- or factory-programmable
- ◆ 1% accurate over specified temperature and voltage
- ◆ Timing reference choice, internal or external
- ◆ Two oscillator outputs



Applications

- ◆ System Clock: no external components required
- ◆ Fixed frequency master oscillator: factory set at 60, 66, 80 or 100 MHz
- ◆ Programmable oscillator: 200 kHz to 100 MHz

Cross References

Data Delay Part No.	Dallas Semiconductor Suggested Replacement
DDU-3J-5xxx	DS1000-xxx
DDU-4C-5xxx	DS1000K-xxx
DDU-4F-5xxx	DS1000K-xxx
DDU-6-xxx	DS1000K-xxx
DDU-66-xxx	DS1000K-xxx
DDU-66-xxxA	DS1000G-xxx
DDU-66C-xxx	DS1000K-xxx
DDU-66F-xxx	DS1000K-xxx
DDU-66F-xxxA	DS1000G-xxx
DDU-7F-xxx	DS1010-xxx
DDU-7J-xxx	DS1010-xxx
DDU-8C-xxx	DS1000M-xxx
DDU-8F-5xxx	DS1000M-xxx
MDU-3C-xxx	DS1013K-xxx
MDU-3F-xxx	DS1013K-xxx
MDU-4F-xxx	DS1044-xxx
MDU-38F-xxx	DS1013M-xxx, DS1035M-xxx

ESC Part No.	Dallas Semiconductor Suggested Replacement
8SGTxxx	DS1000H-xxx
8T25/8TDxxx	DS1000M-xxx
10SGTxxx	DS1010G-xxx
10T/10TDxxx	DS1010-xxx
14CMTDxxx	DS1000-xxx, DS1000K-xxx
14FP/14FPDxxx	DS1013K-xxx
14FT/14FTDxxx	DS1000-xxx
14HLT/14HLTDxxx	DS1000K-xxx
14HT/14HTDxxx	DS1000K-xxx
14LTDxxx	DS1000-xxx
14P/14PDxxx	DS1013K-xxx
14PL/14LPDxxx	DS1013K-xxx
14SGPxxx	DS1013G-xxx
14SGTxxx	DS1000G-xxx
14T/14LTxxx	DS1000K-xxx
14TDxxx	DS1000-xxx
14TDL/14LTDxxx	DS1000K-xxx

Belfuse Part No.	Dallas Semiconductor Suggested Replacement
A423-0xxx-02	DS1000H-xxx
A447-0xxx-A1	DS1000K-xxx
A447-0xxx-A3	DS1013K-xxx
A447-0xxx-02	DS1000K-xxx
A447-0xxx-09	DS1000K-xxx
A447-0xxx-10	DS1010-xxx
A463-0xxx-02	DS1000M-xxx
0447-0xxx-02	DS1000K-xxx
0450-0xxx-02	DS1000K-xxx
S422-0xxx-10	DS1010G-xxx
S423-0xxx-02	DS1000H-xxx

Rhombus Part No.	Dallas Semiconductor Suggested Replacement
AI3D-xxx	DS1013K-xx
AI3D-xxG	DS1013G-xx
AIDL-xxx	DS1000K-xxx (C)
AIDL-xxxG	DS1000G-xxx (C)
AIDM-xxx	DS1000K-xxx
AIDM-xxxG	DS1000G-xxx
AITD-xxx	DS1010-xxx
AITD-xxxG	DS1010G-xxx
AMDL-xxx	DS1000M-xxx
AMDL-xxxG	DS1000H-xxx
AMDM-xxx	DS1000M-xxx
AMDM-xxxG	DS1000H-xxx
D2TZMI-xxx	DS1010-xxx
DTZMI-xxx	DS1000K-xxx
FDM-xxx	DS1000M-xxx
FSDM-xxx	DS1000Q-xxx (C)
MSDM-xxx	DS1013K-xx
SDM-xxx	DS1000M-xxx

Consult individual data sheets for exact matches of delay timing and/or packaging.

For cross references to part numbers not listed, please contact the factory at (972) 371-4348 or fax us at (972) 371-3717.

(C) = Custom Delay

Cross References

Datatronics Part No.	Dallas Semiconductor Suggested Replacement
DL106x, 107x	DS1000M-yyy
DL610x, 611x	DS1000K-yyy
DL613x, 614x	DS1013K-yyy
DL620x	DS1000C-yyy (C)
DL622x, 623x	DS1000K-yyy
DL628x	DS1010-yyy
DL630x, 631x	DS1000K-yyy
DL633x, 634x	DS1000Q-yyy (C)
DL635x, 637x, 638x	DS1000K-yyy
DL651x, 652x, 658x	DS1000K-yyy
DL67xx	DS1010-yyy
SM61xx	DS1010G-yyy

Kappa Part No.	Dallas Semiconductor Suggested Replacement
DL14CBxxx	DS1000K-yyy
DL15CCxxx	DS1010-yyy
DL34CBxxx	DS1013-yyy
DT08CBxxx	DS1000M-yyy
DT13CBxxx	DS1000Q-yyy (C)
DT14CBxxx	DS1000K-yyy
DT15CCxxx	DS1010-yyy
DT16CBxxx	DS1000-yyy (C)
DT34CBxxx	DS1013K-yyy
DT38CBxxx	DS1013M-yyy
HCL14CBxxx	DS1000K-yyy
HCT14CBxxx	DS1000K-yyy
LD14CBxxx	DS1000K-yyy
LDS14CBxxx	DS1000K-yyy
LDS34CBxxx	DS1013-yyy
LS14CBxxx	DS1000K-yyy
LT14CBxxx	DS1000K-yyy
SMT08CBxxx	DS1000H-yyy
SMT14CBxxx	DS1000G-yyy
SMT44CBxxx	DS1044G-yyy

(C) = Custom Delay

Consult individual data sheets for exact matches of delay timing and/or packaging.

For cross references to part numbers not listed, please contact the factory at (972) 371-4348 or fax us at (972) 371-3717.

PCA Part No.	Dallas Semiconductor Suggested Replacement
EP82xx	DS1000K-yy
EP83xx	DS1010-yy
EP87xx	DS1000K-yy
EP93xx	DS1000K-yy
xx yy	xx yy
00 25	28 101 (C)
01 50	29 750(C)
02 100	30 550 (C)
03 150	70 50
04 200	71 55 (C)
05 250	72 60
06 300 (C)	73 65 (C)
07 350	74 70 (C)
08 400 (C)	75 75
09 450	76 80 (C)
10 500	77 85 (C)
11 60	78 90 (C)
13 30	79 95 (C)
14 35	80 100
15 40	81 125
16 45	82 150
17 75	83 175
18 420 (C)	84 200
19 125	85 225
20 175	86 250
21 225 (C)	87 275
22 440 (C)	88 300 (C)
23 470 (C)	89 350
24 600 (C)	90 400
25 700 (C)	91 450
EP9206-xxx	DS1013K-xxx*
EP9458-xx	DS1000M-xx
EP9810-xxx	DS1000K-xxx
EPA073-xxx	DS1000G-xxx
EPA189-xxx	DS1013K-xxx
EPA220-xxx	DS1000K-xxx
EPA249-xxx	DS1013M-xxx DS1035M-xxx
EPA280-xxx	DS1013G-xxx
EPA313-xxx	DS1013K-xxx
EPA366-xxx	DS1044G-xxx
EPA445-xxx	DS1013-xxx
EPA460-xxx	DS1010-xxx
EPA810-xxx	DS1000Q-xxx (C)
EPA1140-xxx	DS1000H-xxx

*10ns delays and slower. For shorter delays the DS1035M is functionally equivalent, but not pin-compatible.

Cross References

Pulse Part No.	Dallas Semiconductor Suggested Replacement
2119x, 2121x	DS1000K-yyy
2126x, 2127x	DS1013-yyy
2134x, 2138x	DS1000K-yyy
2141x, 2142x	DS1000-yyy
21468	DS1000K-25
21712	DS1000K-125
21741	DS1000K-60
2178x, 2179x	DS1010-yyy
2181x, 2182x	DS1000K-yyy
2190x, 2191x	DS1000M-yyy
2400x, 2401x	DS1000-yyy
2403x, 2404x	DS1000M-yyy
2403xW, 2404xW	DS1000H-yyy
24048W	DS1000G-75
2405xW, 2406xW	DS1000G-yyy
2411x	DS1010-yyy
2411xW	DS1010G-yyy

Technitrol Part No.	Dallas Semiconductor Suggested Replacement
HTTLDLxxx	DS1000M-xxx (PKG#3)
	DS1000H-xxx (PKG#3A)
LTLDLxxx	DS1010-xxx
LTTLDLxxx	DS1010G-xxx
LTTLDLxxx	DS1000K-xxx (PKG#2)
	DS1000G-xxx (PKG#2A)
TTL2Sxxx	DS1013K-xxx (C)
TTL3Sxxx	DS1013K-xxx (C)
TTLDDxxx	DS1010-xxx
TTLDLxxx	DS1000K-xxx (C)

(C) = Custom Delay

Consult individual data sheets for exact matches of delay timing and/or packaging.

For cross references to part numbers not listed, please contact the factory at (972) 371-4348 or fax us at (972) 371-3717.

Valor Part No.	Dallas Semiconductor Suggested Replacement
DL1846	DS1000K-175
DL188x	DS1000K-yyy
DL2060	DS1000K-300 (C)
DL2061	DS1000K-400 (C)
DL2080-2084	DS1000K-yyy
DL2086-2097	DS1000-yyy
DL2171	DS1000K-60
DL218x	DS1010-yyy
DL22xx	DS1013K-yyy
DL2325	DS1013K-65
DL2328	DS1013K-60
DL233x	DS1000K-yyy
DL2349	DS1013K-200
DL235x	DS1013K-yyy
DL2425	DS1013K-12
DL2427	DS1000K-80 (C)
DL2437	DS1000K-225 (C)
DL244x, DL245x	DS1013K-yyy
DL30xx	DS1000M-yyy
DL315x	DS1010-yyy
DL32xx	DS1013M-yyy, DS1035M-yyy
DL600x, DL601x	DS1000K-yyy
DL604x, DL605x	DS1000M-yyy
DL904x, DL905x	DS1000M-yyy
DL907x, DL908x	DS1000-yyy
SG0xxx	DS1010G-xxx
SG5xxx	DS1000G-xxx
SG904x, SG905x	DS1000H-yyy
SG907x, SG908x	DS1000G-yyy

Selection Tables

Tapped Delay Lines							
Part Number	# Taps	Tap 1 Delay (ns)	Tap Increment (ns)	Total Delay (ns)	Supply Voltage (V)	Packages	Applications
DS1000	5	4-100	4-100	20-500	5	8, 14-Pin DIP 8-Pin SOIC	General Purpose
DS1004	5	5	2,3,4,5	13,17, 21, 25	5	8-Pin DIP, SOIC	General Purpose
DS1005	5	12-50	12-50	60-250	5	8, 14-Pin DIP 16-Pin SOIC	General Purpose
DS1010	10	5-100	5-100	50-1000	5	14-Pin DIP 16-Pin SOIC	General Purpose
DS1003	4	6, 8	4, 4.5, 6, 8,10	14, 15, 20, 22, 24	5	8,14-Pin DIP	RISC Microprocessors

Independent Multiple Delay Lines						
Part Number	# Delays	Delay Values	Supply Voltage	Packages	Applications	
DS1013	3	10-200	5	8, 14-Pin DIP 16-Pin SOIC	General Purpose	
DS1033	3	8-30	3	8-Pin DIP, SOIC	3V or Portable Systems	
DS1035	3	6-30	5	8-Pin DIP, SOIC	General Purpose	
DS1044	4	5-25	5	14-Pin DIP, SOIC	General Purpose	
DS1007	7	3-10, 9-40	5	16-Pin DIP, SOIC	General Purpose	

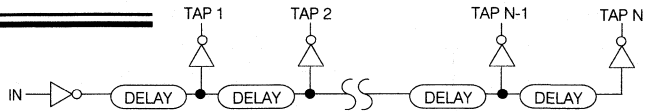
Programmable Delays							
Part Number	Resolution	Step Zero Delay	Step Sizes (ns)	Max Delay (ns)	Supply Voltage (V)	Packages	Applications
DS1020	8 Bits	10	0.15, 0.25 0.5, 1, 2	48, 74, 138 265, 520	5	16-Pin DIP, SOIC	Laser, Optical, Networking, Ultrasonic Control
DS1021	8 Bits	10	0.25, 0.5	74, 138	5	16-Pin SOIC	
DS1045	Dual 4-Bit	9	2, 3, 4, 5	39, 54, 69, 84	5	16-Pin DIP, SOIC	

System Timing Functions				
Part Number	Description	Timing Range	Packages	Applications
DS1012	2-Input, 4-Output Multiple Delays w/Logic	3-40ns Delays	8-Pin DIP, SOIC	Frequency Doubler, General Purpose
DS1040	Programmable 1-Shot	5-500ns Pulse Width	8-Pin DIP, SOIC	Pulse Width Modulator, Clock Oscillator
DS1075	EconOscillator/Divider	0.20 to 100 MHz Fixed Frequency Outputs	8-Pin DIP, SOIC	System Clock, Fixed Frequency Oscillator, Programmable Oscillator

Functional Block Diagrams

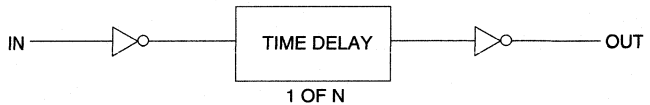
Multiple Tap Delays:

DS1000; DS1004; DS1005 (N=5);
DS1010 (N=10)

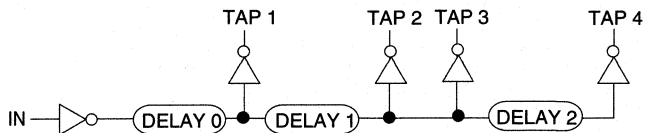


Multiple Independent Delays:

DS1013; DS1033; DS1035 (N=3);
DS1044 (N=4); DS1007 (N=7)

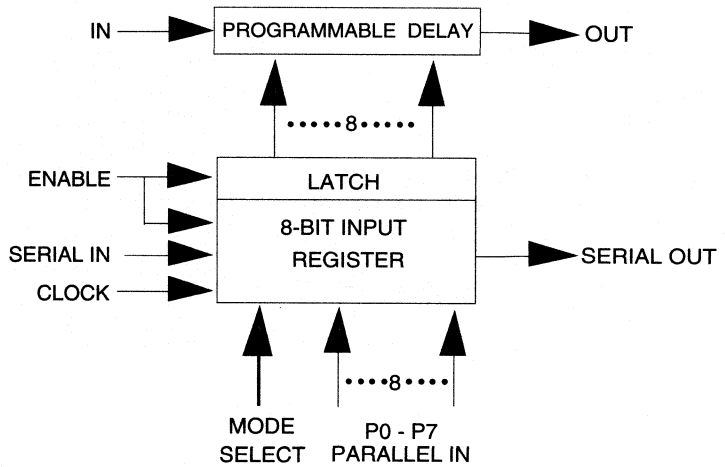


DS1003 4-Tap Silicon Delay Line for RISC Applications

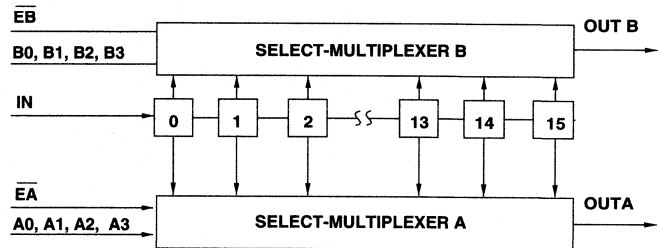


Functional Block Diagrams

DS1020/21 8-Bit Programmable Delay Line



DS1045 14-Bit Dual Programmable Delay Line

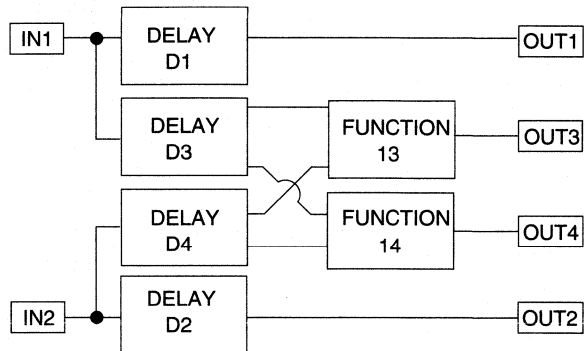


Functional Block Diagrams

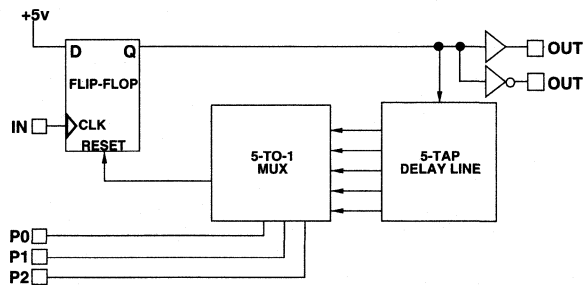
DS1012 2-in-1 Sub-Miniature Delay Line with Logic

f3=AND, NAND,
HALF-XOR, HALF-XNOR,
D3 or D3

f4=OR, NOR, XOR, XNOR
D4 or D4



DS1040 Programmable One-Shot Pulse Generator



High-Speed Microcontrollers

Dallas Semiconductor's High-Speed Microcontrollers are direct performance upgrades for the 8051, one of the most popular microcontrollers in the world. We recreated the heart of the microprocessor, doing in only 4 clock cycles what has traditionally taken 12 clock cycles. Designed to be drop-in upgrades, the High-Speed Micros' core has been redesigned, resulting in over 3X performance with the same external clock. In addition to increasing the speed of existing designs, High-Speed Microcontrollers boast a top external clock speed of 33 MHz.

Additional Features

- ◆ Peak performance level of 8.25 MIPS. Equivalent to a 99 MHz 8051!
- ◆ 100% pin-compatible with 80C51 family. Drop-in replacement means direct upgrade path for existing designs.
- ◆ 100% binary compatible with 80C51 family. Existing compiled code runs with no modification.
- ◆ 100% compatible with existing 80C51 software tools. Compatible with existing high-level language software tools.

Why Upgrade?

◆ 16-bit performance at an 8-bit price

You don't have to redesign around an expensive 16-bit processor for high-performance designs. The increased speed of the High-Speed Microcontroller family means that you can get the performance you need without paying for what you don't need.

◆ Reduce power without sacrificing performance

Because the High-Speed Microcontroller is more efficient than a traditional 8051, the crystal speed and power consumption can be reduced without sacrificing performance. In addition, many devices incorporate power-saving features, such as new low-power modes and a low-current ring oscillator.

◆ Upgrade your software, not your hardware

New software features can be accommodated without a costly redesign of the system hardware, getting you to market faster and allowing room for future expansion.

◆ More speed, less EMI

The improved efficiency of the High-Speed Microcontroller dramatically reduces electro-magnetic interference (EMI). The EMI reduction mode means that your design won't wreak havoc with nearby electronic systems.

◆ Features, Features, Features

Our dual UARTs, watchdog timer, precision reset circuitry, and a host of other features allow you to consolidate your design, saving money, time and PCB real estate.

Enhanced Feature Set

New systems demand not just increased speed, but increased functionality. The High-Speed Microcontroller family incorporates enhanced features and peripherals that simplify circuit design and reduce overall system cost. Some of the features available in High-Speed Microcontrollers include:

- ◆ Up to 14 interrupts, including 6 external
- ◆ Three 16-bit timers
- ◆ 256 bytes scratchpad RAM
- ◆ 1KB on-chip MOVX SRAM
- ◆ 2 data pointers
- ◆ 2 high-speed UARTs
- ◆ Power-fail monitor
- ◆ Precision reset circuitry
- ◆ Watchdog timer
- ◆ Real time clock
- ◆ Nonvolatile SRAM
- ◆ Power management modes
- ◆ Low-power ring oscillator

Available Options

- ◆ Commercial temperature range 0°C to 70°C
- ◆ Industrial temperature range -40°C to 85°C
- ◆ ROMless
- ◆ EPROM (UV-erasable and One-Time Programmable[OTP])
- ◆ Mask ROM
- ◆ 3V operation

Applications

Applications for the High-Speed Microcontroller family include any system where high performance and/or low power are important.

- ◆ Telecommunications
- ◆ Industrial controls
- ◆ System supervision
- ◆ Data logging
- ◆ Motor control
- ◆ Hand-held/portable devices

Featured Products

DS80C320 Microcontroller

High-Speed Microcontroller upgrade for 80C31/80C32.

- ◆ High-speed core
- ◆ 13 interrupts, including 6 external
- ◆ Three 16-bit timers
- ◆ 256 bytes scratchpad RAM
- ◆ 2 data pointers
- ◆ 2 high-speed UARTs
- ◆ Precision reset circuitry
- ◆ Watchdog timer

DS87C520 Microcontroller

High-Speed EPROM Microcontroller upgrade for 87C51FX.

- ◆ High-speed core
- ◆ 16KB EPROM
- ◆ 13 interrupts, including 6 external
- ◆ Three 16-bit timers
- ◆ 256 bytes scratchpad RAM
- ◆ 2 data pointers
- ◆ 2 high-speed UARTs
- ◆ Power-fail monitor
- ◆ Precision reset circuitry
- ◆ Watchdog timer
- ◆ 1KB on-chip MOVX SRAM
- ◆ Power management modes

DS87C530 Microcontroller

The DS87C530 High-Speed EPROM Microcontroller is the first 8051 derivative to incorporate a real time clock. In conjunction with an external lithium power source and watch crystal, this provides the processor direct access to timekeeping registers, eliminating the need for dedicated I/O lines. In addition to 16 Kbytes of EPROM program storage, the on-chip 1KB SRAM is battery backed, providing nonvolatile data storage.

- ◆ High-speed core
- ◆ 14 interrupts, including 6 external
- ◆ Three 16-bit timers
- ◆ 256KB scratchpad RAM
- ◆ 16KB EPROM
- ◆ 1KB on-chip nonvolatile MOVX SRAM
- ◆ 2 data pointers
- ◆ 2 high-speed UARTs
- ◆ Power-fail monitor
- ◆ Precision reset circuitry
- ◆ Watchdog timer
- ◆ Real-time clock
- ◆ Power management modes
- ◆ Low-power ring oscillator

Featured Products

DS80C310 Microcontroller

The DS80C310 is a High-Speed Microcontroller upgrade for the 80C31/80C32. It is a reduced feature set version of the DS80C320, designed for cost-sensitive applications.

- ◆ High-speed core
- ◆ 10 interrupts, including 6 external
- ◆ Three 16-bit timers
- ◆ 256 bytes scratchpad RAM
- ◆ 2 data pointers
- ◆ 1 high-speed UART

DS80C323 Low-Power Microcontroller

The DS80C323 is a low-power version of our popular DS80C320 High-Speed Microcontroller. It operates from 2.7V to 5.5V.

DS83C520 Microcontroller

The DS83C520 is a 16KB factory mask ROM version of our popular DS87C520 High-Speed Microcontroller.

Device	High Speed Core	ROM	RAM	On-chip MOVX SRAM	Serial I/O	Timer Counter	External Interrupts	Power Mgmt. Mode	EMI Reduction Mode	Precision Reset/Power-fail Interrupt	Data Pointers (16-bit)	Real Time Clock	Operating Voltage	Packages
DS80C310	✓	—	256	—	1	3	6				2		4.5V-5.5V	DIP-40 PLCC-44 TQFP-44
DS80C320	✓	—	256	—	2	3+ Watchdog	6			✓	2		4.5V-5.5V	DIP-40 PLCC-44 TQFP-44
DS80C323	✓	—	256	—	2	3+ Watchdog	6			✓	2		2.7V-5.5V	DIP-40 PLCC-44 TQFP-44
DS83C520	✓	16KB Mask ROM	256	1KB	2	3+ Watchdog	6	✓	✓	✓	2		4.5V-5.5V	DIP-40 PLCC-44 TQFP-44
DS87C520	✓	16KB EPROM	256	1KB	2	3+ Watchdog	6	✓	✓	✓	2		4.5V-5.5V	DIP-40* PLCC-44 TQFP-44
DS87C530	✓	16KB EPROM	256	1KB	2	3+ Watchdog	6	✓	✓	✓	2	✓	4.5V-5.5V	PLCC-52* TQFP-52

*Also available in windowed version.

Secure Microcontrollers

The Secure Microcontroller family features 8051-compatible microcontrollers based on nonvolatile RAM rather than ROM for program and data storage. Using NV RAM in a microcontroller provides in-system reprogrammability; software security; and data collection ability. Secure Microcontrollers are available as monolithic microprocessors or as modules that combine the microprocessors, SRAM, and a lithium cell in a single package.

- ◆ Fully 8051-compatible
 - 8051 instruction set
 - Four 8-bit, pseudo-bi-directional I/O ports
 - 128 bytes scratchpad RAM
 - Two 16-bit timer/counters
 - One UART
- ◆ Enhanced features for reliability and ease-of-use
 - Non-multiplexed, byte-wide address/data bus for memory access
 - Nonvolatile SRAM control guaranteed for 10+ years of data retention (with appropriate battery RAM)
 - Partitioned code and data segments
 - Power-fail reset/power-fail interrupt
 - Precision watchdog timer
 - ROM-based serial bootstrap loader allows in-system reprogramming
- ◆ Optional features in various family members include
 - Firmware security
 - Real-time clock
 - Random number generator
 - CRC hardware for checking memory validity
 - 8042-style reprogrammable peripheral controller (RPC) mode
- ◆ Modules guarantee 10+ years of data retention in the absence of external power

Featured Products

DS5000FP Soft Microprocessor Chip

The DS5000FP is the original Soft Microprocessor Chip in an 80-pin QFP (Quad Flat Pack). It adds the following to the basic family features described above:

- ◆ Nonvolatile control for 8K x 8 or 32K x 8 SRAMs
- ◆ Partitions one SRAM into program and data areas, and write protects the program segment
- ◆ Decodes memory for up to two 32K x 8 SRAMs
- ◆ Optional security features
 - Real-time memory encryption
 - 48-bit, user-selected encryption key
 - Security lock destroys memory if unlocked
 - Interrupt vector table hidden on-chip

DS5000/DS5000T Soft Microcontroller Module

The DS5000 and DS5000T incorporate the DS5000FP, RAM, lithium battery, and an optional real-time clock in a 40-pin DIP module with an 8051 footprint and pinout.

- ◆ Built-in 8KB or 32KB of NV RAM
- ◆ Partitions memory into program and data areas, and write protects the program segment
- ◆ Optional internal real-time clock (“T” option)
- ◆ Incorporates the DS5000FP optional security features

DS2250/DSS2250T Soft Microcontroller Module

The DS2250 and DS2250T have the identical feature set as the DS5000, but in a SIMM form factor. This package change allows up to 64KB of NV RAM instead of 32KB. The second 32KB of memory is restricted to data memory.

Featured Products

DS5001FP 128K Soft Microprocessor Chip

The DS5001FP provides the base feature set of the DS5000FP with the following additions:

- ◆ Accesses up to 128KB on the bytewise bus
- ◆ Decodes memory for 32K x 8 or 128K x 8 SRAMs
- ◆ Four additional decoded peripheral enables
- ◆ CRC hardware for checking program validity
- ◆ 8042-style Reprogrammable Peripheral Controller (RPC) mode
- ◆ Bandgap reference for more accurate power monitoring
- ◆ Note: the DS5001FP has no memory encryption feature

DS2251T 128K Soft Microcontroller Module

The DS2251T is a 72-pin SIMM based on the DS5001FP. It provides up to 128KB of onboard NV RAM and a real-time clock. The bytewise bus is available at the connector. This is used with the decoded peripheral enables for memory mapped external peripherals such as a UART or A/D converter. The real-time clock has interrupt capability.

Featured Products

DS5002FP Secure Microprocessor Chip

The DS5002P is a highly secure version of the DS5001FP. It combines the operating features of the DS5001FP with the following enhancements to the DS5000FP security features:

- ◆ Security is active at all times
- ◆ Improved memory encryption using a 64-bit encryption key
- ◆ Automatic random generation of encryption keys
- ◆ Self-destruct input for tamper protection
- ◆ Die top coating prevents microprobe (DS5002FPM)

DS2252T Secure Microcontroller Module

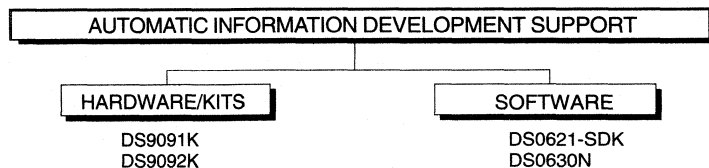
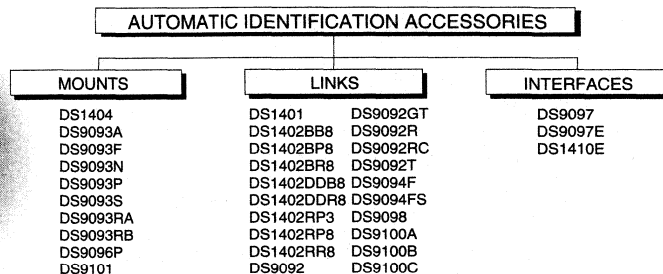
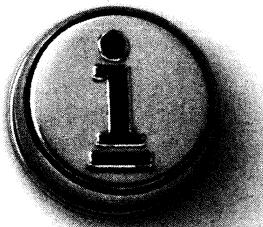
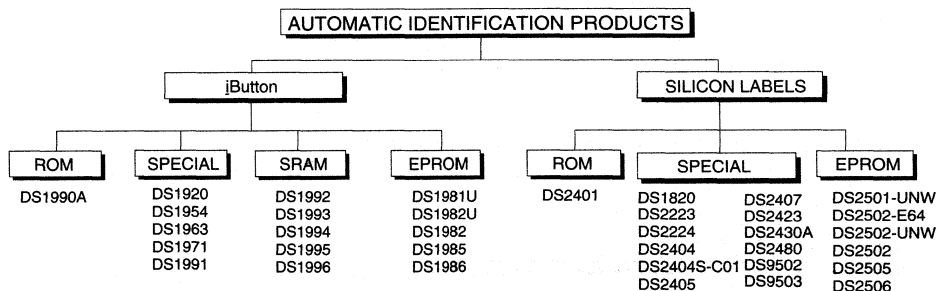
The DS2252T is a 40-pin SIMM based on the DS5002FP. It provides up to 128KB of onboard secure NV RAM with a real-time clock. The memory is highly secure from tampering and from competitors.

Automatic Information

iButtons™, chips housed in stainless steel cans, are the core of the Automatic Information product line. The MicroCan™ serves two purposes: electrical contact and protection from the environment. Each iButton proves its identity by its unique registration number. The contents of the iButton can be changed while it is attached to an object. Unlike bar codes, iButtons can be read or written without expensive electro-optical equipment. Packaged in solder-mount packages, Automatic Information products function as silicon labels. These devices find applications as re-writable data carriers in many market segments, such as:

- ◆ Access control
- ◆ Personal identification
- ◆ Time/attendance control
- ◆ Asset management
- ◆ Manufacturing

They also serve as electronic labels storing manufacturing history, revision status and other important information on products to which they are attached.



Featured Products

DS1994 Memory Plus Time iButton™

- ◆ Smallest real time clock and memory module with over 10 years of permanent operation
- ◆ Interval timer can automatically accumulate time when power is applied
- ◆ Programmable cycle counter can accumulate the number of system power-on/off cycles
- ◆ Programmable alarms can be set to generate interrupts for interval timer, real time clock and/or cycle counter
- ◆ Write-protect feature provides tamper-proof time data
- ◆ Programmable expiration date limits access to SRAM and timekeeping
- ◆ Clock accuracy is better than ± 2 minutes/month at 25°C

Applications

- ◆ Stopwatch, alarm clock, calendar
- ◆ Time and date stamping of events
- ◆ Run time meter (power cycles, hours) for equipment
- ◆ Time-restricted access control
- ◆ Expiration controller for leased equipment
- ◆ Interval timer, event scheduler for maintenance

Featured Products

DS1986 64Kbit Add-Only iButton™

- ◆ 65,536-bit Electrically Programmable Read Only Memory (EPROM)
- ◆ Each memory page can be permanently write-protected to prevent tampering
- ◆ Device is an “add-only” memory where additional data can be programmed into EPROM without disturbing existing data
- ◆ Architecture allows software to patch data by superseding an old page in favor of a newly programmed page
- ◆ Reads over a wide voltage range of 2.8V to 6.0V from -40°C to +85°C; programs at 11.5V to 12.0V from -40°C to +85°C

Applications

- ◆ On-line storage of manufacturing history
- ◆ Storage of equipment revision status and material used
- ◆ Storage of calibration constants
- ◆ Electronic personal identification
- ◆ Electronic ticket or debit token

Featured Products

DS1920 Temperature iButton™

- ◆ Digital thermometer measures temperatures from -55°C to $+100^{\circ}\text{C}$, typically in 0.2 seconds
- ◆ Accuracy $\pm 0.5^{\circ}\text{C}$ within 0°C to $+70^{\circ}\text{C}$; no calibration or reference required
- ◆ Zero standby power
- ◆ Power supply through data contact
- ◆ Access to internal counters allows increased resolution through interpolation
- ◆ Two bytes of EEPROM for use as alarm triggers or user memory
- ◆ Built-in network controller supports conditional search to directly identify devices sensing alarming temperatures
- ◆ Device-generated 8-bit CRC for on-the-fly data integrity check

Applications

- ◆ HVAC environmental controls
- ◆ Thermostatic controls
- ◆ Sense temperature in buildings, equipment or machinery
- ◆ In-process thermal monitoring and control
- ◆ Thermodynamic research of temperature profiles
- ◆ Fire alarm and sprinkler systems

Featured Products

UniqueWare™ Devices

- ◆ 512-bit or 1024-bit 1-Wire EPROM is factory-programmed and serialized according to customer-supplied information and then write-protected
- ◆ Dallas Semiconductor handles serialization and bookkeeping for tracking the last number used
- ◆ Up to 57 bytes (512-bit device) or 121 bytes (1024-bit device) of user-defined information, including serialization
- ◆ Customer-specific project ID number together with custom ROM for highest level of product security
- ◆ Programmed devices are made available only to the owner of the project ID or their authorized agents
- ◆ Minimum order size 1000 pieces; no NRE charge, short lead-time
- ◆ Wide operating voltage range (2.8V to 6.0V) and industrial temperature range (-40°C to +85°C)
- ◆ Available as DS2501-UNW (512-bit) or DS2502-UNW (1024-bit) Silicon Label and DS1981U (512-bit) or DS1982U (1024-bit) UniqueWare iButton

Applications

- ◆ After-market protection of products by restricted availability
- ◆ Node ID for network cards (IEEE-assigned number)
- ◆ Wireless phone ID plus battery information
- ◆ Electronic product identification label with serialization

Featured Products

DS2407 Dual Addressable Switch Plus 1Kbit Memory

- ◆ Dual, open-drain PIO read/write channels are remotely controlled over 1-Wire bus
- ◆ Channel A sink capability of 40 mA typically at 0.4V; channel B:8 mA at 0.4V
- ◆ Maximum operating voltage of 13V at PIO-A, 6.5V at PIO-B
- ◆ Activity latch with each channel to capture short pulses
- ◆ 1024 bits user-programmable OTP EPROM
- ◆ Operates over a wide voltage range of 2.8V to 6.0V from -40°C to +85°C
- ◆ Supports conditional search with user-programmable condition
- ◆ Low cost TO-92 (Channel A only) or 6-pin TSOC surface mount package

Applications

- ◆ Automation in homes, laboratories or factories
- ◆ Burglar alarms
- ◆ Irrigation controls
- ◆ Greenhouses
- ◆ Vending machines

Selection Tables

iButton™ Family

Part Number	Description	Registration Number	Memory	Micro-LAN™	Packages
DS1920	Temperature iButton	8+48+8 Bits ROM	16 Bits EEPROM	Yes	F50
DS1954	Crypto iButton	8+48+8 Bits ROM	Secure Coprocessor	Yes	F50
DS1963	Monetary iButton	8+48+8 Bits ROM	4096 Bits NV RAM	Yes	F50
DS1971	EEPROM iButton	8+48+8 Bits ROM	256+64 Bits EEPROM	Yes	F30, F50
DS1981U	UniqueWare iButton	8+48+8 Bits ROM	512 Bits EPROM	Yes	F30, F50
DS1982U	UniqueWare iButton	8+48+8 Bits ROM	1024 Bits EPROM	Yes	F30, F50
DS1982	Add-Only iButton	8+48+8 Bits ROM	1024 Bits EPROM	Yes	F30, F50
DS1985	Add-Only iButton	8+48+8 Bits ROM	16384 Bits EPROM	Yes	F30, F50
DS1986	Add-Only iButton	8+48+8 Bits ROM	65536 Bits EPROM	Yes	F30, F50
DS1990A	Serial Number iButton	8+48+8 Bits ROM	—	Yes	F30, F50
DS1991	MultiKey iButton,	8+48+8 Bits ROM	1344 Bits NV RAM	Yes	F50
DS1992	Memory iButton	8+48+8 Bits ROM	1024 Bits NV RAM	Yes	F50
DS1993	Memory iButton	8+48+8 Bits ROM	4096 Bits NV RAM	Yes	F50
DS1994	Memory + Time iButton	8+48+8 Bits ROM	4096 Bits NV RAM	Yes	F50
DS1995	Memory iButton	8+48+8 Bits ROM	16384 Bits NV RAM	Yes	F50
DS1996	Memory iButton	8+48+8 Bits ROM	65536 Bits NV RAM	Yes	F50

Silicon Labels™

Part Number	Description	Registration Number	Memory	Micro-LAN™	Packages*
DS1820	1-Wire Thermometer	8+48+8 Bits ROM	16 Bits EEPROM	Yes	1, 2
DS2223	EconoRAM	—	256 Bits RAM	No	3, 4
DS2224	EconoRAM + ROM	32 Bits ROM	224 Bits RAM	No	3, 4
DS2401	Silicon Serial Number	8+48+8 Bits ROM		Yes	3, 4, 5
DS2404	EconoRAM + Time	8+48+8 Bits ROM	4096 Bits RAM	Yes	2, 6, 7
DS2404S-C01	Dual-port Mem.+Time	8+48+8 Bits ROM	4096 Bits RAM	Yes	7
DS2405	Addressable Switch	8+48+8 Bits ROM	—	Yes	3, 4, 5
DS2407	Dual Addressable Switch + Memory	8+48+8 Bits ROM	1024 Bits EPROM	Yes	3, 5
DS2423	1-Wire RAM+counter	8+48+8 Bits ROM	4096 Bits RAM	Yes	5
DS2430A	1-Wire EEPROM	8+48+8 Bits ROM	256+64 Bits EEPROM	Yes	3, 5
DS2480	1-Wire Line Driver			—	8
DS2501-UNW	Uniqueware	8+48+8 Bits ROM	512 Bits EPROM	Yes	3, 5, 8
DS2502-UNW	Uniqueware	8+48+8 Bits ROM	1024 Bits EPROM	Yes	3, 5, 8
DS2502-E64	IEEE EUI-64 Address	8+48+8 Bits ROM	1024 Bits EPROM	Yes	3, 5
DS2502	Add-only Memory	8+48+8 Bits ROM	1024 Bits EPROM	Yes	3, 5, 8
DS2505	Add-only Memory	8+48+8 Bits ROM	16384 Bits EPROM	Yes	3, 5
DS2506	Add-only Memory	8+48+8 Bits ROM	65536 Bits EPROM	Yes	1, 9
DS9502	ESD Protection Diode	—	—	—	5
DS9503	ESD Diode w Resistor	—	—	—	5

*1: PR-35 2: SSOP 3: TO-92 4: SOT-223 5: 6-Pin TSOC
6: 16-Pin DIP 7: 16-Pin SOIC 8: 8-Pin SOIC 150 mil 9: 8-Pin SOIC 208 mil

Selection Tables

Accessories

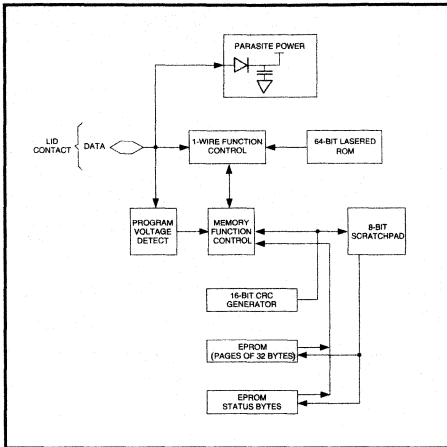
Part Number	Category	Description
DS1404	Mount	Touch and Hold Probe Cable Cradle
DS9093A	Mount	Angled Snap-In Fob For F5 MicroCan
DS9093F	Mount	Snap-In Fob For Flanged MicroCan
DS9093N	Mount	Angled Fob For Flanged MicroCan
DS9093P	Mount	Permanent Mount For F5 MicroCan, 1 Screw
DS9093S	Mount	Permanent Mount For F5 MicroCan, 2 Screws
DS9093RA	Mount	Lock Ring
DS9093RB	Mount	Flange Enlargement
DS9096P	Mount	Adhesive Pad
DS9101	Mount	Multi-Purpose Clip
DS1401	Link	Front Panel Button Holder
DS1402BB8	Link	Button-To-Button Coiled Cord, 2.4m
DS1402BP8	Link	Button-To-Cup Coiled Cord, 2.4m
DS1402BR8	Link	Button-To-RJ-11 Coiled Cord, 2.4m
DS1402DDB8	Link	Blue Dot Receptor to Button Coiled Cord, 2.4m
DS1402DDR8	Link	Blue Dot Receptor to RJ-11 Coiled Cord, 2.4m
DS1402RP3	Link	RJ-11-To-Cup Coiled Cord, 0.9m
DS1402RP8	Link	Button-To-Cup Coiled Cord, 2.4m
DS1402RR8	Link	RJ-To-RJ-11 Coiled Cord, 2.4m
DS9092	Link	Panel-Mount Probe
DS9092GT	Link	Hand-Grip Probe With Tactile Feedback
DS9092R	Link	iButton Port, Tabbed MicroCan
DS9092R-C	Link	iButton Port, Tabbed MicroCan With Logo
DS9092T	Link	Panel-Mount Probe With Tactile Feedback
DS9094F	Link	Clip For F5 MicroCan, Through-Hole Solder Mount
DS9094FS	Link	Clip For F5 MicroCan For Surface Solder Mount
DS9098	Link	iButton Retainer For Surface Solder Mount
DS9100A	Link	Touch And Hold Probe Stampings, Ground Contact
DS9100B	Link	Touch And Hold Probe Stampings, Data Contact
DS9100C	Link	Touch And Hold Probe Stampings, Data Contact Coiled Spring
DS1410E	Interface	Parallel Port Adapter
DS9097	Interface	COM Port Adapter
DS9097E	Interface	COM Port Adapter, EPROM Upgraded Version

Development Support

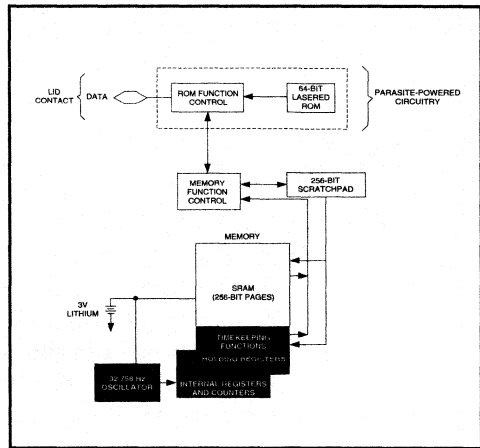
Part Number	Category	Description
DS9091K	Kit	MicroLAN Kit
DS9092K	Kit	iButton Starter Kit
DS0621-SDK	Software	TMEX Professional Software Developer's Kit
DS0630N	Software	TMEX MicroLAN Manager

Functional Block Diagrams

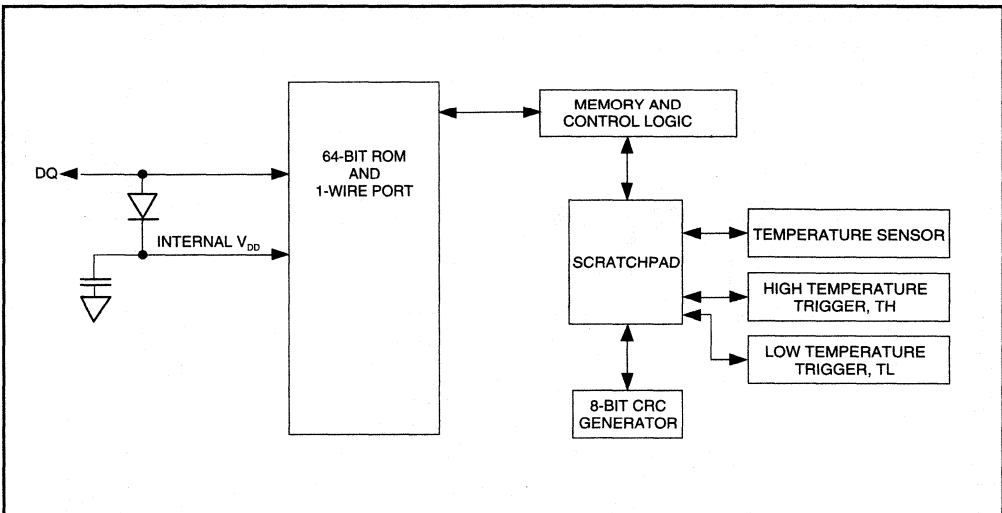
DS1985/6 Block Diagram



DS199x Block Diagram



DS1920 Block Diagram

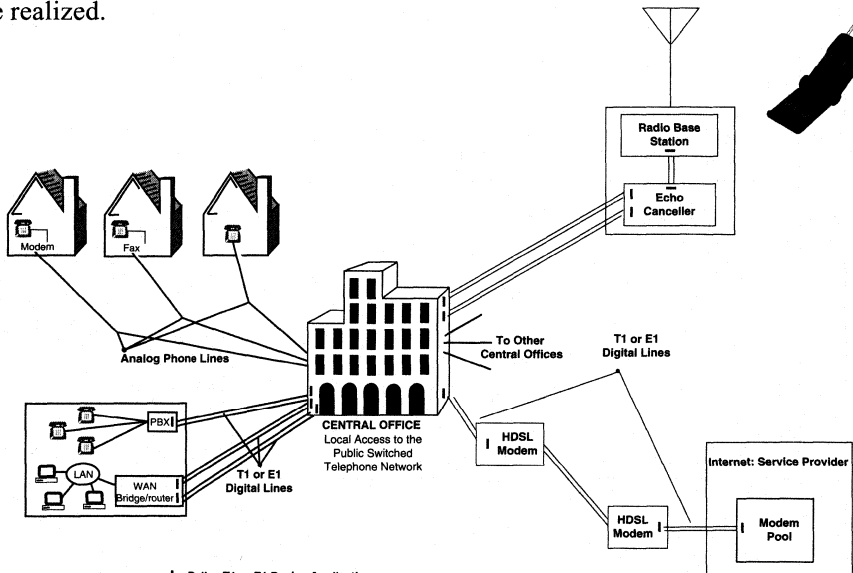


Telecommunications

T1 and E1 are digital carrier systems deployed over two twisted pairs of wire, operating at 1.544Mbps and 2.048Mbps data rates, respectively. T1 is used predominantly in the United States, Canada, and Japan while E1 is found in all other parts of the world.

About the T1 and E1 Network

Central Offices (COs) provide connectivity between other COs, Local Exchanges, and their subscribers via the Public Switched Telephone Network. "A Typical Network" is a simplistic diagram identifying a Central Office and its various subscribers. In the diagram, single lines denote analog Plain Old Telephone Service (POTS) lines while double lines denote T1 or E1 digital transmission lines. Line cards are used to terminate these T1/E1 transmission lines and contain the following functions: a line interface, a framer, and an elastic store. The line interface is responsible for transmitting and receiving the pulses which carry user data as well as the transmit or receive clock. The line interface also has a jitter attenuation function used for removing unwanted phase deviations found in the transmit or receive data clock. The framing function identifies individual voice channels or detects and generates alarms and is synchronized to the line interface data and clock. Using a DS2151/53 Single-Chip Transceiver from Dallas Semiconductor along with software and a few passive components, a complete T1 or E1 transmission line card for short haul or long haul can be realized.



A Typical Network

The T1/E1 Advantage

◆ A Decade of Innovative Solutions

Since 1986, Dallas has been introducing innovative solutions for T1 and E1. Dallas was the first in the industry to introduce a line interface that can support both short haul and long haul applications. Dallas was also the first to introduce a combination line interface/framer that supported long haul applications.

◆ Most Advanced Products

Dallas offers the most advanced T1 and E1 products available. No other vendor can match Dallas' level of integration and performance. The high level of integration provided in the products eases the task of the designer; the extensive feature sets of the products ensure that they fit all applications.

◆ Standard Compliance

Dallas T1 and E1 products are designed to meet the latest ANSI, AT&T, ETSI, and ITU (CCITT) standards. To ensure compliance, Dallas has independent testing labs verify the performance of the products.

◆ Upgrade Path

Dallas' product enhancement strategy is to build upon existing solutions. In this manner, users can easily upgrade their designs as the more advanced products become available. Software written for the current generations of T1 and E1 solutions will be portable into future generations of devices.

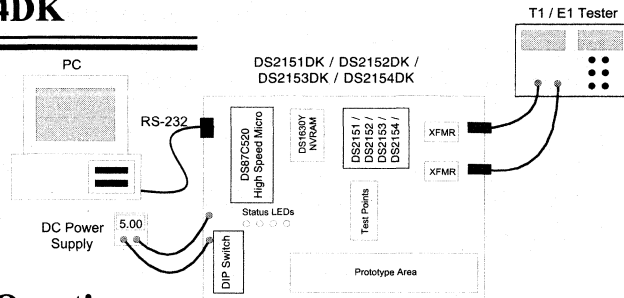
◆ Design Support

Dallas offers a variety of application notes (over 40 at last count) as well as design kits and application firmware to support T1/E1 functions like the T1 Facility Data Link (FDL).

Applications Notes are available on Dallas Semiconductor's Web site at <http://www.dalsemi.com/DocControl/index.html>

Single-Chip Transceiver Design Kits

DS2151DK/DS2152DK/ DS2153DK/DS2154DK



Frequently Asked Questions

1. Why offer T1 and E1 in separate chips?

Dallas has always offered both T1 and E1 products in separate pin-for-pin compatible chips. Because the framing algorithms in T1 are quite different from those in E1, they require separate circuitry. Since no application requires performing both T1 and E1 at the same time, the extra circuitry just consumes excess power and adds cost to the design. Since Dallas' chips are for pin-for-pin compatible, switching a design from T1 to E1 (or vice versa) requires a simple board stuffing change, normally required anyway to switch out termination resistors and crystals.

2. What is the best approach to a multi-channel design?

At first glance it may appear that a horizontally integrated approach like a Dual or Quad T1/E1 Line Interface or Framer is probably the best fit for a four- or eight-port design, but this is not the case. When you consider the board space requirements and overall system costs, the vertically integrated per-channel approach (like Dallas' Single-Chip Transceivers) is equal to or better than a Dual or Quad solution. The per-channel approach has the added benefits that it can easily be de-populated for a lesser number of ports, and a single point failure will not take out multiple channels. Please contact the factory for a white paper on the subject.

3. What is the advantage of a crystal-less device?

In a traditional T1 and E1 line interface, a pullable crystal has been used for jitter attenuation. The latest generation of Single-Chip Transceivers from Dallas (the DS2152 and DS2154) has crystal-less jitter attenuation, which means that only an accurate T1 or E1 clock source needs to be provided to the device; a pullable crystal is not required. The advantage of the crystal-less design is the savings in board space and cost as well as availability. The pullable crystals are big (larger than even the chips that they support) and they are not available in surface mount. Also, they are not inexpensive (\$3 to \$6 each) and since they are not standard crystals, the lead times can be excessive.

Frequently Asked Questions, con't.

4. What is the Facility Data Link (FDL) and how is it supported?

The Facility Data Link (FDL) is one of three functions contained in the framing bit position of an Extended Super Frame (ESF) T1 frame. The FDL is a 4-Kbit/s data link conforming to an HDLC protocol that is used to carry performance information and control signals across the T1 span. In a typical application, the FDL is used to transmit a 13-byte Performance Report Message (PRM) at one-second intervals.

The DS2152 Enhanced T1 Single-Chip Transceiver contains an on-chip, fully featured HDLC controller for the FDL with 16-byte buffers in both the transmit and receive paths. Large FDL buffer depth together with full interrupt support allows the servicing microprocessor to transfer data at the message level. The 16-byte buffers allow a complete PRM to be received or loaded for transmission in one step, reducing firmware access to once a second. This greatly reduces real-time servicing and also simplifies the FDL firmware. Example FDL code is available from our FTP site at <ftp://ftp.dalsemi.com/pub/telecom>

5. What is the difference between short haul transmission and long haul transmission?

T1 transmissions must meet certain pulse template requirements. The two main distinctions which separate long haul and short haul pulse template requirements are the relative shape of the T1 pulse template itself and the location in the transmission path where the pulse template must be met. Long haul transmission (DS1) is used within the telephone network between local offices and from customer premises equipment (CPE) to the local exchange. In a long haul application, a T1 device must meet the T1 pulse template measured differentially at the transmit-side network interface. Long haul pulses are good as far out as 6000 feet. In a short haul application, a T1 device must meet a certain pulse, which is similar to the long haul template for 0dB, measured differentially at the cross-connect point which is specified from 0 to 655 feet from the transmit-side network interface. In E1, both long haul and short haul pulse templates must be met at the transmit-side network interface. Short haul applications require the pulse template to be compliant with G.703 and can be transmitted over distances with up to 6dB of attenuation. Long haul transmission lengths vary greatly depending on the country. Typical transmission lengths are out as far as -40 to -43dB of attenuation. Dallas Semiconductor Telecom products such as the DS2151, DS2152, DS2153, and DS2154 support short haul and long haul transmission while implementing all of the necessary framing functions. These products, combined with the secondary overvoltage protection and termination resistors, offer complete T1 and E1 solutions.

Applications

◆ DS2151, DS2152, DS2153 & DS2154

Single-Chip Transceivers

Dallas Single-Chip Transceivers are recommended for single or multi-port T1/E1 designs requiring a line interface function. Applications include:

Channel Banks	Modem Pools
Channel Service Units (CSU)	Internet Service Access
SLC-96/Digital Loop Carrier (DLC)	Wireless Base Stations
Echo Cancellers	Personal Communications Service (PCS)
Fractional T1/E1 Interfaces	Wide Area Network (WAN)
High-data-rate Digital Subscriber Line (HDSL)	ATM/Frame Relay
Multiplexers	Primary Rate ISDN
Private Branch Exchange (PBX)	SONET/SDH Add/Drop Multiplexers
Remote Access	Test Equipment
Voice Response Systems	
Digital Access and Cross-connect System (DACCS)	

◆ DS21Q41 & DS21Q43

Quad Framers

The DS21Q41 T1 and DS21Q43 E1 Quad Framers provide high density framer/formatter solutions for applications that do not require a line interface function. Applications include:

T3/E3 Multiplexers	T3/E3 Cross Connects
SONET/SDH Multiplexers	SONET/SDH Cross Connects
Optical Multiplexers	Optical Cross Connects

◆ DS2172

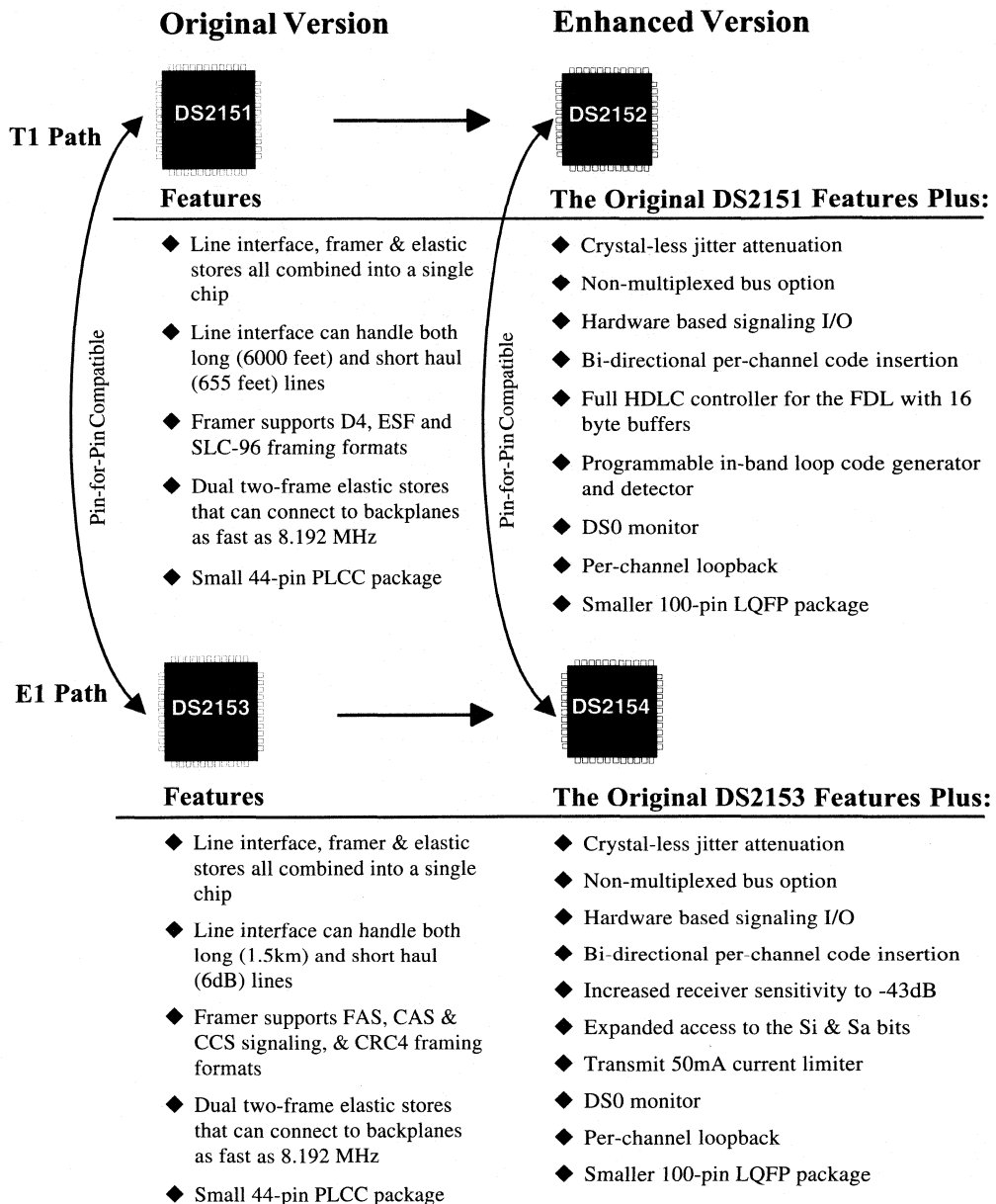
Bit Error Rate Tester (BERT)

The DS2172 Bit Error Rate Tester is a single chip used to test digital communications links up to 52 MHz. It gives telecommunications equipment the ability to remotely test itself and its connections. Applications include:

Routers	Switching Equipment
Bridges	Multiplexers
Channel Service Units (CSU)	Test Equipment
Data Service Units (DSU)	

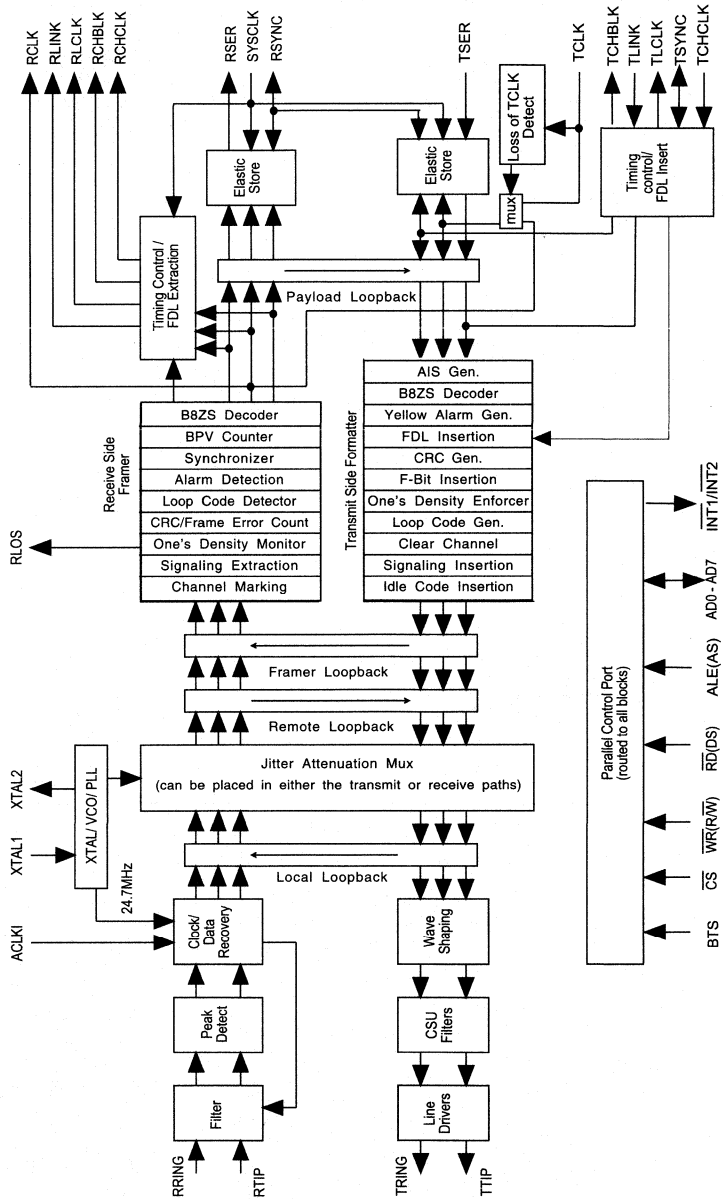
Featured Products

Evolution of the Combination Line Interface/Framer Products



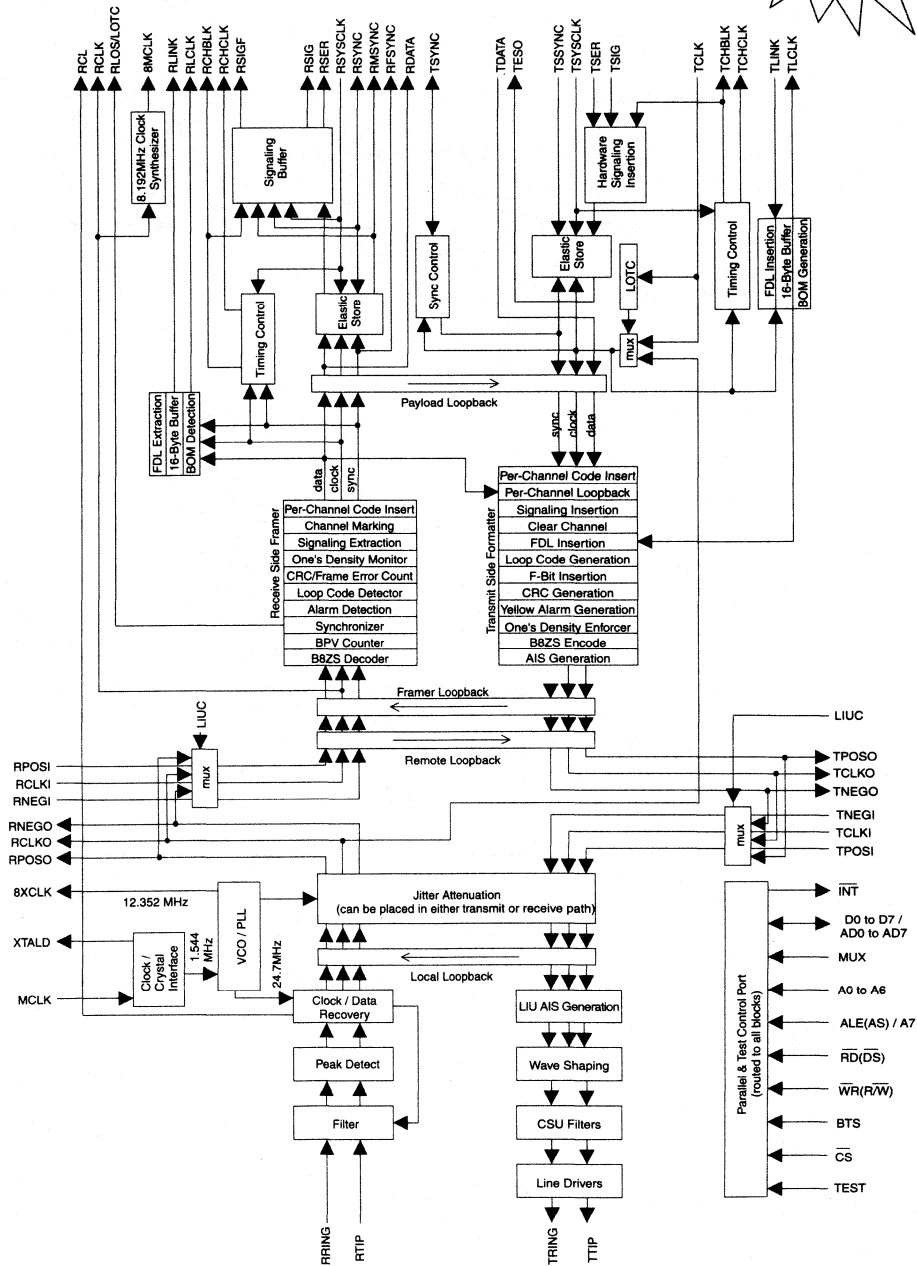
Featured Products

DS2151 T1 Single-Chip Transceiver



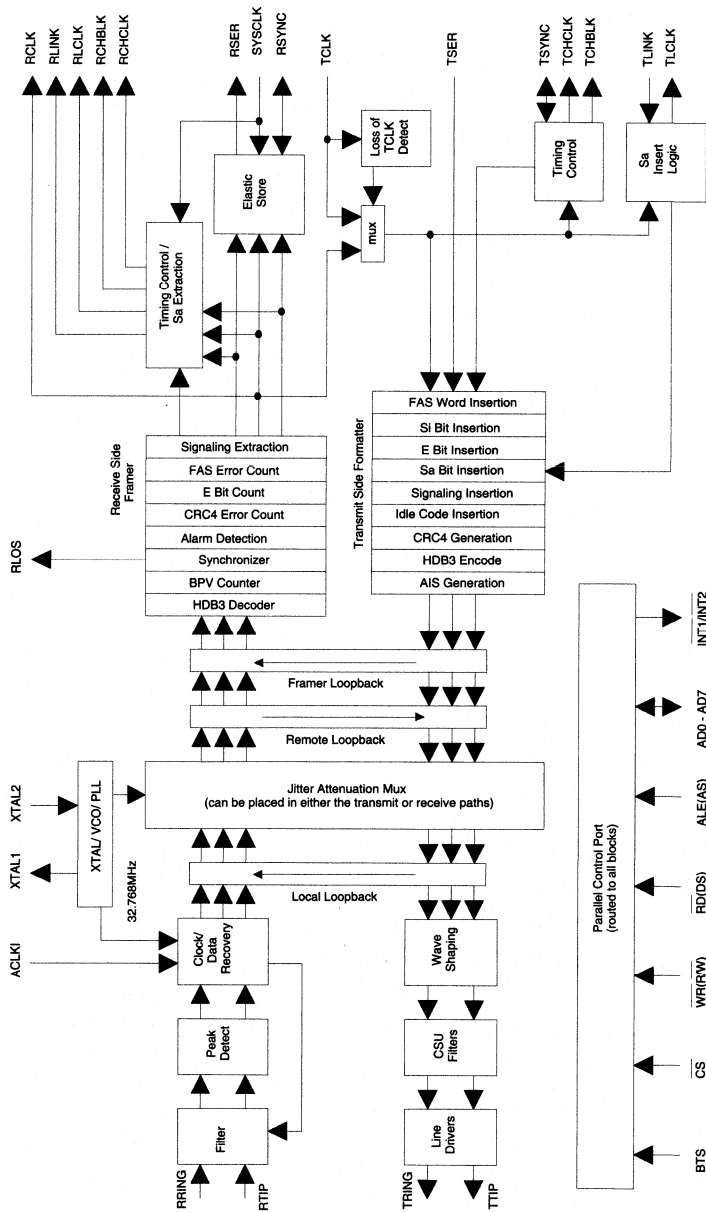
Featured Products

DS2152 Enhanced T1 Single-Chip Transceiver



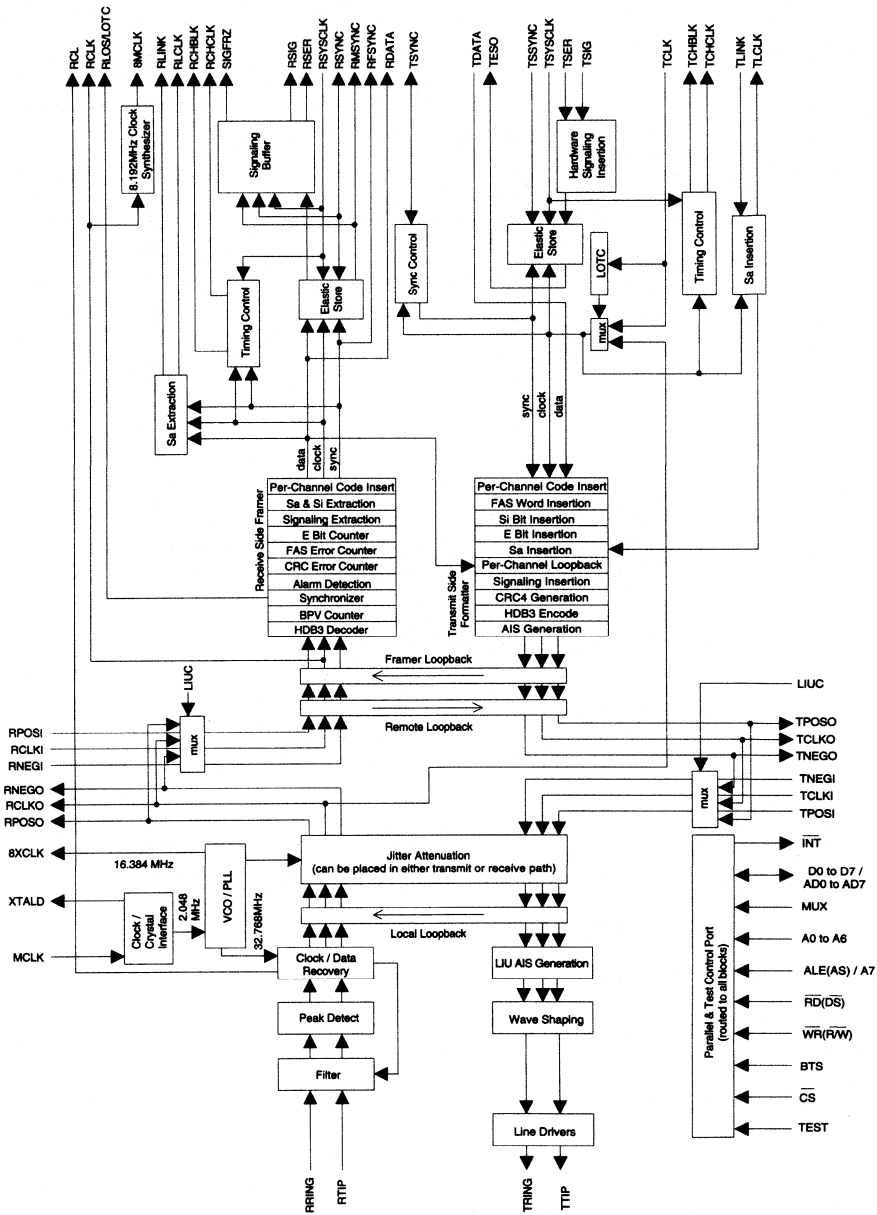
Featured Products

DS2153 E1 Single-Chip Transceiver



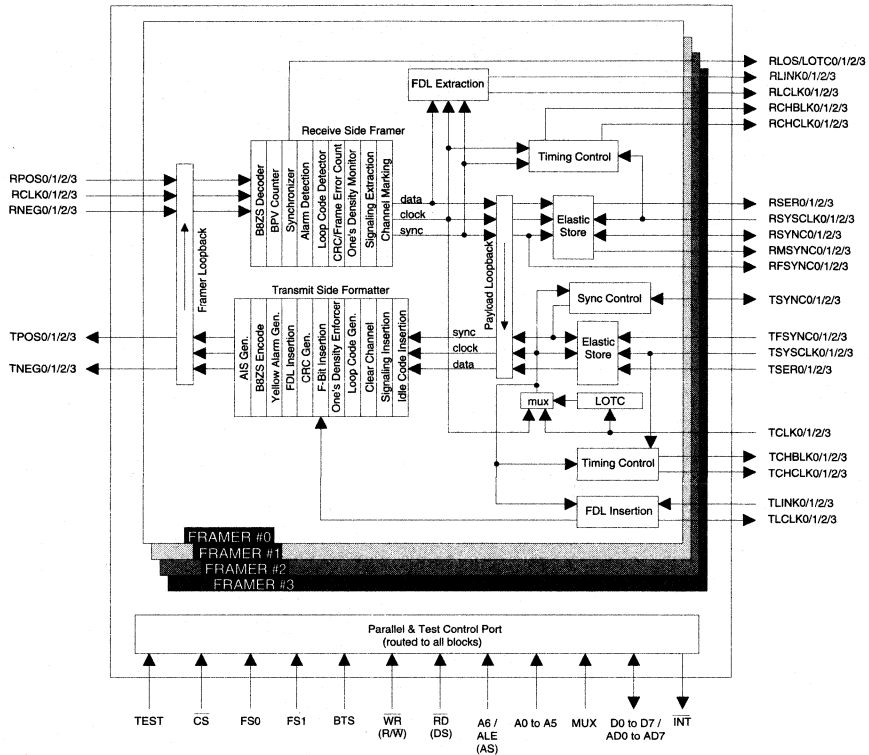
Featured Products

DS2154 Enhanced E1 Single-Chip Transceiver



Featured Products

DS21Q41B Quad T1 Framer

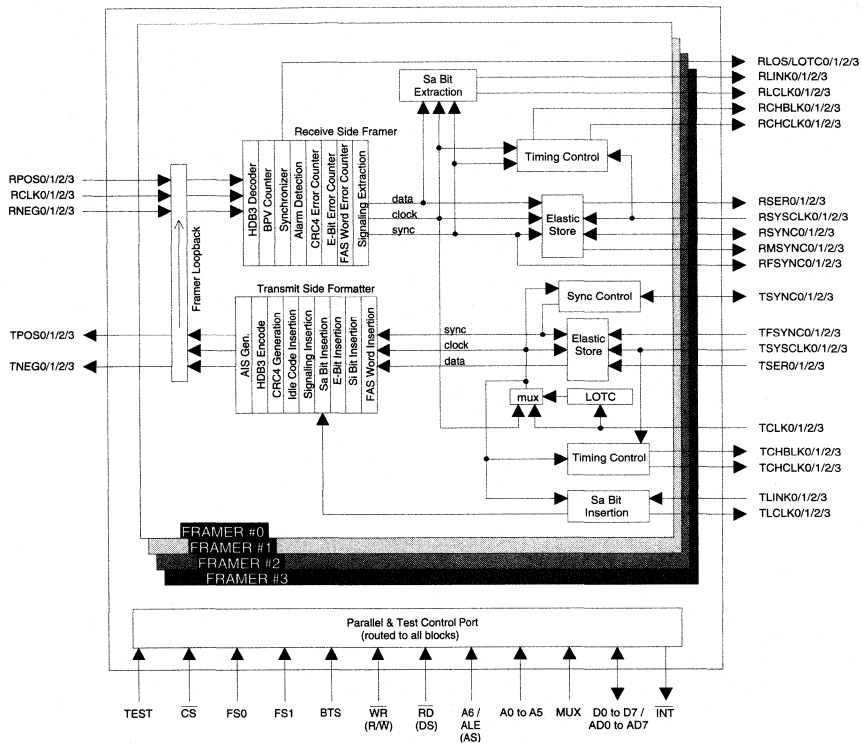


Features

- ◆ Four completely independent T1 framers on a single monolithic die
- ◆ Small 128-pin TQFP package for minimal footprint
- ◆ Low-power CMOS for minimal power consumption
- ◆ Can directly connect to backplanes with speeds up to 8.192 MHz
- ◆ Pin-for-pin compatible with the DS21Q43A Quad E1 Framer

Featured Products

DS21Q43A Quad E1 Framer

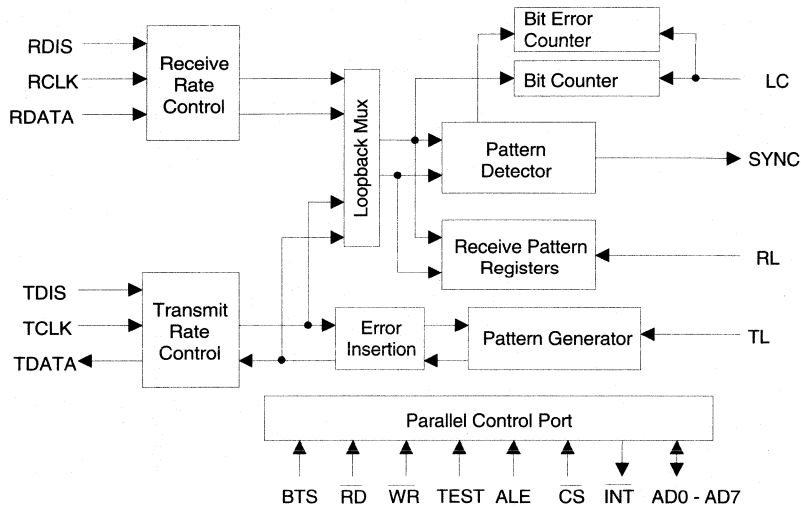


Features

- ◆ Four completely independent E1 framers on a single monolithic die
- ◆ Small 128-pin TQFP package for minimal footprint
- ◆ Low-power CMOS for minimal power consumption
- ◆ Can directly connect to backplanes with speeds up to 8.192 MHz
- ◆ Pin-for-pin compatible with the DS21Q41B Quad T1 Framer

Featured Products

DS2172 Bit Error Rate Tester Chip



Features

- ◆ Generates and detects digital test patterns for analyzing, evaluating, and troubleshooting digital communications systems
- ◆ Operates up to 52 MHz
- ◆ Can generate and detect both repeating and pseudorandom patterns such as:

—1 in 8	—2E15 - 1
—3 in 24	—2E32 - 1
—QRSS (2E20 - 1 with zero restriction)	—2E11 - 1
- ◆ Contains large, onboard 32-bit error counters for minimal processor intervention
- ◆ Small 32-pin TQFP package for minimal footprint

Selection Guide

◆ Combination Line Interface/Framers

Function: Provide complete T1 and E1 interface functionality including clock/data recovery from both long and short haul lines, waveshaping and line driving, framing, alarm monitoring, error performance checking, and elastic store rate buffering.

DS2151	T1 Single-Chip Transceiver
DS2152	T1 Enhanced Single-Chip Transceiver
DS2153	E1 Single-Chip Transceiver
DS2154	E1 Enhanced Single-Chip Transceiver

◆ Line Interfaces

Function: To recover clock and data from the T1/E1 line and create the waveforms that are driven onto the T1/E1 line; also to remove phase jitter from the T1/E1 lines.

DS2186	T1 & E1 Long and Short Haul Transmitter
DS2187	T1 & E1 Short Haul Receiver
DS2188	T1 & E1 Jitter Attenuator

◆ Framers

Function: To find the frame, multiframe and channel boundaries in a T1 and E1 data stream and to monitor the T1 and E1 data for errors and alarms.

DS2141A	T1 Controller with Elastic Stores with Parallel Interface
DS21Q41B	Quad Version of the DS2141A
DS2143	E1 Controller with Elastic Store with Parallel Interface
DS21Q43A	Quad Version of the DS2143
DS2180A	T1 Transceiver with Serial Control Interface
DS2181A	E1 Transceiver with Serial Control Interface
DS2182	T1 Line Monitor with Serial Control Interface

Selection Guide

◆ Elastic Stores

Function: To absorb the frequency and phase differences between two separate clocks and to rate-convert T1 to E1 and vice versa.

DS2175 T1 and E1 Two-Frame Buffer

DS2176 T1 Receive Elastic Store with Signaling Buffer

◆ Bit Error Rate Tester

Function: To generate and synchronize to the standard fixed and pseudorandom test patterns for the purpose of stressing and testing digital communications channels.

DS2172 Bit Error Rate Tester (BERT) Chip

◆ ADPCM Voice Compression

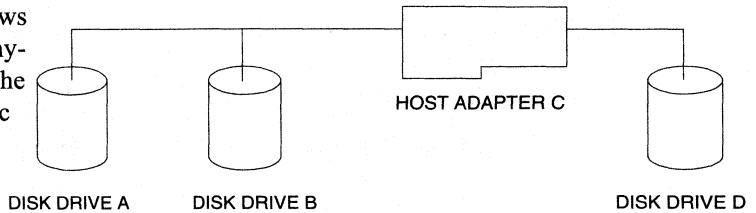
Function: To compress and expand digitally-encoded PCM voice signals from 64Kbps down to either 32Kbps, 24Kbps, or 16Kbps.

DS2164 ADPCM G.726 Processor with 32K/24K/16Kbps rates

DS2165 ADPCM G.721 Processor with 32K/24K/16Kbps rates

Termination Products

The Termination product family consists of integrated terminator solutions for single-ended SCSI, high voltage differential SCSI, BTL, and GTL systems. The DS21S07A, DS2105, and DS2114 provide active termination for nine lines of a single-ended SCSI bus. The DS2108 terminates nine high voltage differential SCSI pairs of lines. The DS2112 terminates BTL (Backplane Transceiver Logic) buses, and the DS2113 terminates GTL (Gunning Transceiver Logic) systems. The DS21S07A, DS2105 and DS2108 have a power-down feature that allows the terminators to be used anywhere on the SCSI bus. The DS2109 has an automatic power-down feature that is ideal for Plug and Play SCSI host bus adapters and motherboards.



The terminators on disk drives A and D are powered on, and the terminators on drive B and host adapter C are powered off. When drive D is removed from the system, the terminator on the host adapter C can be switched on via software or hardware.

Featured Products

DS21S07A SCSI Terminator

Features

- ◆ SCSI-1, Fast SCSI, and Ultra SCSI compliant
- ◆ Lowest standby current of 3 mA
- ◆ Switchable via software or hardware
 - Lowest power-down capacitance of 3pF
 - Lowest power-down current of 100 μ A
- ◆ 2% tolerance on termination resistors and voltage regulator
- ◆ TSSOP and SOIC packages
- ◆ Fully supports active negation controllers
- ◆ SCSI bus hot-plug support

Benefits

- ◆ Compatible with industry-accepted standards
- ◆ Power-conscious designs
- ◆ End user doesn't need to open system cover
- ◆ Maximum current into SCSI bus gives more noise margin for end user configuration
- ◆ Alternative for board space-limited designs
- ◆ Compatible with high-performance SCSI systems

Featured Products

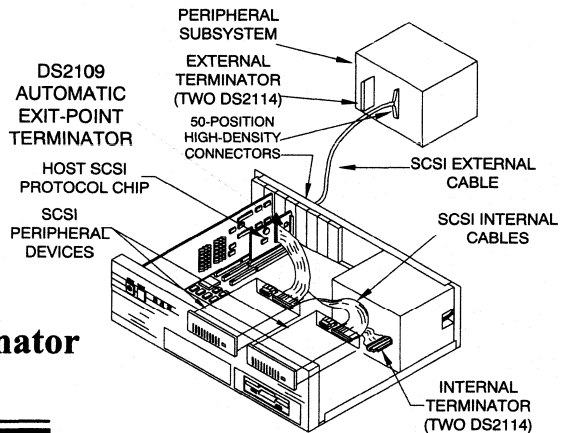
DS2108 SCSI Terminator

Features

- ◆ SCSI-1, Fast SCSI, Ultra SCSI and RS-485 compliant
- ◆ -7 to +12V signal voltage range
- ◆ Switchable via software or hardware
- ◆ 24-pin SOIC package

Benefits

- ◆ Compatible with industry-accepted standards
- ◆ Fully supports differential common mode voltage range
- ◆ End user doesn't need to open cover
- ◆ Board space savings



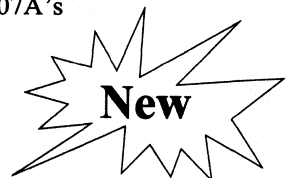
DS2109 SCSI Terminator

Features

- ◆ SCSI-1, Fast SCSI, and Ultra SCSI compliant
- ◆ Provides active termination for 18 signal lines
- ◆ Bus termination sensing and automatic disconnection
- ◆ 2% tolerance on termination resistors and voltage regulator
- ◆ Low power-down capacitance of 3pF

Benefits

- ◆ Compatible with industry-accepted standards
- ◆ One-chip solution for Plug and Play SCSI termination
- ◆ Functionally compatible with two DS21S07A's



Featured Products

DS2112 BTL Terminator

Features

- ◆ Complies with IEEE 1194.1-1991
- ◆ Complies with IEEE 896.2-1991
- ◆ Active termination for 8 signal lines
- ◆ Precise 2.1V voltage regulator onboard
- ◆ 16-pin package
- ◆ Package optimized for minimum parasitic inductance and resistance

Benefits

- ◆ Compatible with BTL standards
- ◆ Compatible with Futurebus+ standards
- ◆ Fully supports high switching speeds
- ◆ Eliminates specialized 2.1V supply
- ◆ Backplane space savings
- ◆ Minimizes effects of large di/dt

DS2113 GTL Terminator

Features

- ◆ Complies with GTL specifications
- ◆ Active termination for 8 signal lines
- ◆ Precise 1.2V voltage regulator
- ◆ 16-pin package
- ◆ Package optimized for minimum parasitic inductance and resistance

Benefits

- ◆ Compatible with Gunning Transceiver Logic Standard
- ◆ Fully supports high switching speeds
- ◆ Eliminates specialized 1.2V supply
- ◆ Minimizes effects of large di/dt

DS2105 and DS2114 SCSI Terminators

Features

- ◆ SCSI-1, Fast SCSI, and Ultra SCSI compliant
- ◆ Lowest standby current of 3 mA
- ◆ 150-mil SOIC package
- ◆ Fully support active negation controllers
- ◆ Tolerance on termination resistors and voltage regulator: 2% - DS2114, 5% - DS2105
- ◆ DS2105 switchable via hardware or software

Benefits

- ◆ Compatible with industry-accepted standards
- ◆ Power-conscious designs
- ◆ Compatible with high-performance SCSI systems
- ◆ Maximum current into SCSI bus for largest noise margin
- ◆ DS2114 ideal for non-switching applications
- ◆ DS2105 ideal for high-volume applications

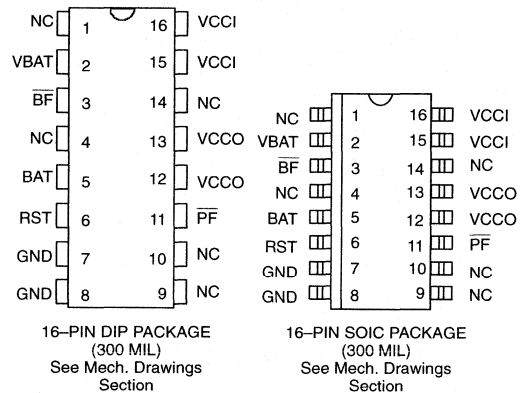


BATTERY MANAGEMENT

FEATURES

- Facilitates uninterrupted power
- Uses battery only when primary V_{CC} is not available
- Low forward voltage drop
- Power fail signal interrupts processor or write protects memory
- Consumes less than 100 nA of battery current
- Low battery warning signal
- Battery can be electrically disconnected upon command
- Battery will automatically reconnect when V_{CC} is applied
- Mates directly with DS1212 Nonvolatile Controller x 16 Chip to back up 16 RAMs
- Optional 16-pin SOIC surface mount package

PIN ASSIGNMENT



PIN DESCRIPTION

NC	- No Connection
V_{BAT}	- Battery Input Connection
\overline{BF}	- Battery Fail Output Signal
BAT	- Battery Output
RST	- Reset Input
GND	- Ground
\overline{PF}	- Power Fail Output Signal
V_{CCO}	- RAM Supply
V_{CCI}	- +5V Supply

DESCRIPTION

The DS1259 Battery Manager Chip is a low-cost battery management system for portable and nonvolatile electronic equipment. A battery connected to the battery input pin supplies power to CMOS electronic circuits when primary power is lost through an efficient switch via the V_{CCO} pins. When power is supplied from the bat-

tery, the power fail signal is active to warn electronic reset circuits of the power status. Energy loss during shipping and handling is avoided by pulsing reset, thereby causing the battery to be isolated from other elements in the circuits.

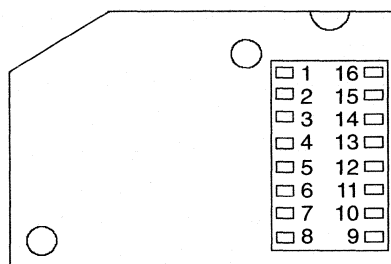
FEATURES

- Encapsulated lithium energy cell with shelf life beyond 10 years
- Available with energy capacities of 250, 500, and 1,000 mAh @ 3 volts
- Plugs into a standard 16-pin DIP socket
- Lithium cell electrically disconnects from exposed pins upon command
- Battery isolation ensures full capacity after shipping and handling
- Lithium cell automatically reconnects when V_{CC} is applied
- Recessed pins prevent bending
- V_{CC} fail signal interrupts processor or write protects memory
- Exhausted energy cell warning signal
- Low profile permits mounting on 0.5-inch printed circuit board centers
- Mates directly with DS1212 Nonvolatile Controller to back up 16 SRAMs
- Uninterruptible supply for CMOS and portable devices

DESCRIPTION

The DS1260 SmartBattery is a low-cost, backup energy supply for portable and nonvolatile electronic equipment. A lithium energy source of up to 1 amp hour can supply power to CMOS electronic circuits when primary power is lost through an intelligent and efficient switch. When power is supplied from the lithium power source, the power fail signal is held low to warn electronic

PIN ASSIGNMENT



See Mech. Drawings
Section

PIN DESCRIPTION

Pins 1, 2, 4, 7, 9, 10, and 14 are No-Connects
 Pin 3 is Battery Fail (\overline{BF})
 Pin 5 is Battery Out (BAT)
 Pin 6 is RESET (RST) Input
 Pin 8 is Ground
 Pin 11 is Power Fail (\overline{PF})
 Pins 12 and 13 are RAM Supply (V_{CCO})
 Pins 15 and 16 are +5V Supply (V_{CC1})

(RESET) circuits of the power status. Energy loss during shipping and handling is avoided by pulsing RESET, thereby causing the backup energy source to be isolated from the exposed pins. The DS1260 can be plugged into a standard 16-pin, low-cost DIP socket, allowing for proven interconnect and simple replacement if the energy has been exhausted.

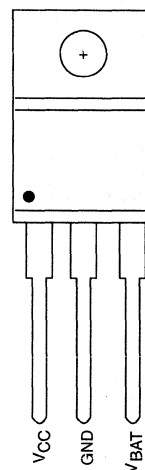
DALLAS SEMICONDUCTOR

DS1633 High-Speed Battery Recharger

FEATURES

- Recharges Lithium, NiCad, NiMH and Lead acid batteries
- Retains battery and power supply limits in onboard memory
- Serial 1-wire interface is used to program operating limits
- 3-pin TO-220 package
- Operating range 0°C to 70°C
- Applications include consumer electronics, portable/cellular phones, pagers, medical instruments, backup memory systems, security systems
- Configurable to operate with 5V or 6V supplies

PIN ASSIGNMENT TO-220



See Mech. Drawings
Section

PIN DESCRIPTION

V_{CC}	- Supply Voltage
V_{BAT}	- Battery Output
GND	- Ground

DESCRIPTION

The DS1633 Battery Recharger is designed to be a complete battery charging system for standard charge or trickle charge applications. It can be configured to be used with either 5V or 6V supplies and battery voltages as high as 4.7V (3.7V for 5V supplies). The device is flexible enough to be used with a variety of battery chemistries and cell capacities. It provides timer termination of standard charge and automatically shifts into trickle charge. Battery voltage can be monitored and charging terminated if it exceeds a preset maximum as a safety feature. The output load line can be speci-

fied as the usual constant current recharge with a voltage limit or it can be configured to approximate any practical load line. All parameters, such as power supply range, charge current load line, trickle charge rate, and timer setting, are programmed into nonvolatile memory using the battery pin as a 1-wire communication port. To ease the task of configuring the device to specific application needs, Dallas Semiconductor makes available a programming kit, the DS1633K, containing easy-to-use software and hardware for IBM personal computers.

DALLAS

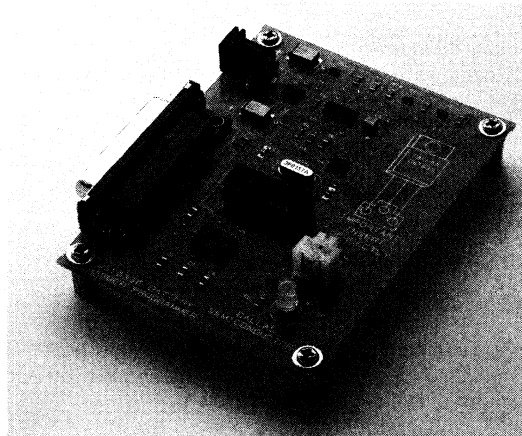
SEMICONDUCTOR

DS1633K DS1633K-220 Battery Charger Programming Kit

FEATURES

- Eases development of load lines for Battery Chargers
- Programs EPROM DS1633 devices
- Operates with a PC compatible host system
- Communicates via standard 9600 baud RS232 serial port

DS1633K PROGRAMMING MODULE



INTRODUCTION

The DS1633K Battery Charger Kit provides everything you need to program the Battery Charger chip with your battery's specifications. Unlike other battery chargers, the DS1633 requires no external components, and you don't need to write sophisticated microcode. The Load Line Software included with the kit lets you draw a load line and specify other charger parameters to meet your requirements, and then program a DS1633 in a matter of minutes. You can generate as many prototypes as you need with as many different curves as you need.

KIT CONTENTS

The DS1633K kit contains the following:

1. Four unprogrammed DS1633 Battery Chargers*
2. Programming Module
3. DS1633K data sheet (this data sheet)
4. DS1633 data sheet
5. DS1633 Load Line Software floppy diskette
6. 12V AC-DC Adaptor (DS1633K - 110 VAC, DS1633K-220 - 220 VAC European version)

If you do not receive one of these items in your kit, please contact Dallas Semiconductor Customer Service at (972) 371-4969.

*We also offer DS1633s pre-programmed to work with several popular battery packs.

DALLAS

SEMICONDUCTOR

DS1633x

High-Speed Battery Charger

FEATURES

- Preprogrammed versions of DS1633
- Recharges lithium, NiCad, and lead acid batteries
- Retains battery and power supply limits in onboard memory
- Timer-terminated standard charge followed by trickle charge
- 3-pin TO-220 package
- Operating range 0 to 70°C
- Applications include consumer electronics, portable/cellular phones, pagers, medical instruments, backup memory systems, security systems
- Available in six different preprogrammed variations to meet the needs of 3-cell NiCad battery packs

PRODUCT SELECTION GUIDE Table 1

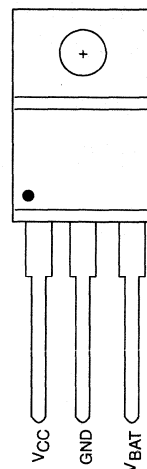
PART NUMBER	I _{MAX} (mA)	V _{MAX} (V)	TIMER (hours)
DS1633-A	100	4.65	8
DS1633-B	80	4.65	8
DS1633-C	60	4.65	8
DS1633-D	40	4.65	8
DS1633-E	20	4.65	8

DESCRIPTION

The DS1633x High-Speed Battery Recharger automatically provides a constant current recharge to a battery as long as the battery's voltage is below the specified maximum voltage. The DS1633x charges the battery using its V_{CC} input as a source. When V_{CC} is floated, the DS1633x is dormant. When V_{CC} is reapplied, the DS1633x begins charging.

Although a variety of load curves can be used to charge a battery, most do not take advantage of the fact that a

PIN ASSIGNMENT TO-220



See Mech. Drawings Section

PIN DESCRIPTION

V_{CC} Input Voltage, +
 V_{BAT} Battery Voltage Input, +
 GND Ground

battery can accept its maximum current rating for charging purposes over its entire voltage range. The DS1633x takes advantage of this opportunity by constantly readjusting the current supplied to the battery being charged. As the voltage level of the battery being charged rises, and the supply current drops, the DS1633x adjusts to boost the charging current back to its maximum.

DALLAS

SEMICONDUCTOR

DS2434

Battery Identification Chip

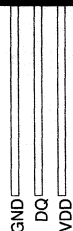
FEATURES

- Provides unique ID number to battery packs
- Eliminates thermistors by sensing battery temperature on-chip
- 256-bit nonvolatile user memory available for storage of user data such as gas gauge and manufacturing information.
- Operating range of -40°C to $+85^{\circ}\text{C}$
- Applications include portable computers, portable/cellular phones, consumer electronics, and handheld instrumentation.
- Surface mount option under development (209 MIL SSOP16)

PACKAGE OUTLINE



BOTTOM VIEW



DS2434
PR-35 PACKAGE
See Mech. Drawings
Section

PIN DESCRIPTION

GND	– Ground
DQ	– Data In/Out
V _{DD}	– Supply Voltage

DESCRIPTION

The DS2434 Battery Identification Chip provides a convenient method of tagging and identifying battery packs by manufacturer, chemistry, or other identifying parameters. The DS2434 allows the battery pack to be coded with a unique identification number, and also store information regarding the battery life and charge/discharge characteristics in its nonvolatile memory.

The DS2434 also performs the essential function of monitoring battery temperature, without the need for a thermistor in the battery pack.

Information is sent to/from the DS2434 over a 1-Wire™ interface, so that battery packs need only have three output connectors; power, ground, and the 1-Wire interface.

DALLAS SEMICONDUCTOR

DS2435 Battery Identification Chip with Time/Temperature Histogram

FEATURES

- Provides unique ID number to battery packs
- Eliminates thermistors by sensing battery temperature on-chip
- Elapsed time counter provides indication of battery usage/storage time
- Time/Temperature histogram function provides essential information for determining battery self-discharge
- 256-bit nonvolatile user memory available for storage of user data such as gas gauge and manufacturing information.
- Operating range of -40°C to $+85^{\circ}\text{C}$
- Applications include portable computers, portable/cellular phones, consumer electronics, and hand held instrumentation.

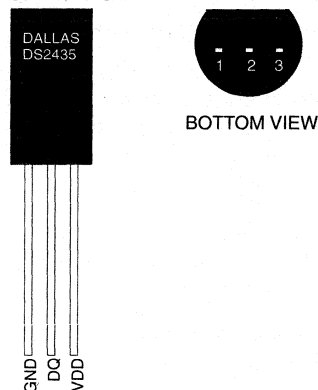
DESCRIPTION

The DS2435 Battery Identification Chip provides a convenient method of tagging and identifying battery packs by manufacturer, chemistry, or other identifying parameters. The DS2435 allows the battery pack to be coded with a unique identification number, and also store information regarding the battery life and charge/discharge characteristics in its nonvolatile memory.

The DS2435 also performs the essential function of monitoring battery temperature, without the need for a thermistor in the battery pack. A time/temperature histogram function stores the amount of time that the bat-

PACKAGE OUTLINE

PR-35 PACKAGE



See Mech. Drawings
Section

PIN DESCRIPTION

GND	– Ground
DQ	– Data In/Out
V _{DD}	– Supply Voltage

tery has been in up to eight temperature bands, allowing more accurate self-discharge calculations to be carried out by the user for determining remaining battery capacity. In addition, the on-board elapsed time counter provides a method of determining the amount of time that a battery pack has been in storage, to allow more accurate self-discharge determination.

Information is sent to/from the DS2435 over a 1-Wire™ interface, so that battery packs need only have three output connectors; power, ground, and the 1-Wire interface.



BUS TERMINATION

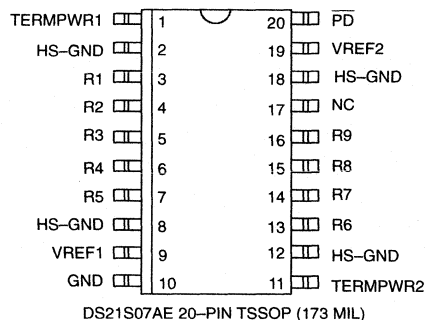
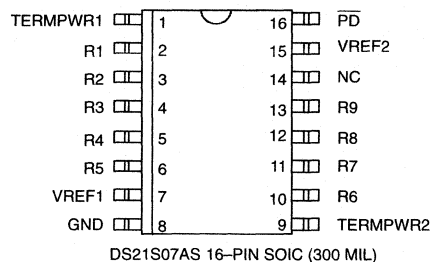
DALLAS SEMICONDUCTOR

DS21S07A SCSI Terminator

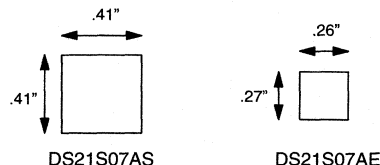
FEATURES

- Fully compliant with SCSI-1, Fast SCSI and Ultra SCSI
- Backward compatible to the DS2107 and DS2107A
- Provides active termination for nine signal lines
- Laser-trimmed 110 ohm termination resistors have 2% tolerance
- Low dropout voltage regulator
- Power-down mode isolates termination resistors from the bus
- SCSI bus hot plug-compatible
- Fully supports actively negated SCSI signals
- Onboard thermal shutdown circuitry
- 16-pin plastic SOIC (DS21S07AS) and 20-pin plastic TSSOP (Thin Shrink Small Outline Package) (DS21S07AE)

PIN ASSIGNMENT



ACTUAL FOOTPRINT SIZE



DESCRIPTION

Fast SCSI and Ultra SCSI require the use of active terminations at both ends of every cable segment in a SCSI system with single-ended drivers and receivers. The DS21S07A SCSI Terminator, which is fully compliant with these standards, enables the designer to gain the benefits of active termination: greater immunity to voltage drops on the TERMPWR (TERmination

PoWer) line, enhanced high-level noise immunity, intrinsic TERMPWR decoupling, and very low quiescent current consumption. The DS21S07A integrates a regulator and nine precise switched 110 ohm termination resistors into a monolithic IC. The DS21S07A can be electrically isolated from the SCSI bus without physical removal from the SCSI device.

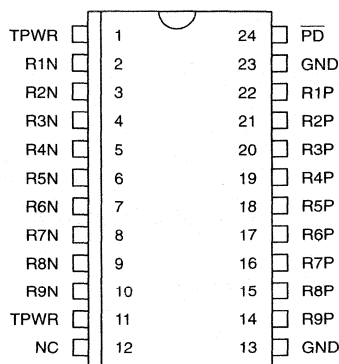
DALLAS SEMICONDUCTOR

DS2108 Differential SCSI Switchable Terminator

FEATURES

- Fully compliant with SCSI, SCSI-2 and SCSI-3 standards
- Conforms to EIA RS-485 standard
- Provides differential termination for 9 pairs of signal lines
- Operates with SCSI signal voltages of -7 to +12 Volts
- Laser-trimmed 330 and 150 ohm termination resistors have $\pm 5\%$ tolerance over full temperature range
- Switchable power down mode
- Low power down capacitance of 6 pF
- 24-pin plastic SOIC (DS2108S)

PIN ASSIGNMENT



DS2108S 24-PIN SOIC (300 MIL)

DESCRIPTION

The DS2108 SCSI Terminator has been specifically designed for Differential SCSI systems requiring switchable termination. The DS2108 integrates eighteen 330 ohm and nine 150 ohm precise switched termination resistors into a monolithic IC. The surface mount SOIC package saves board space over conventional resistor SIPs. The termination resistors can be isolated from the SCSI bus under software or hardware control. While in the powered down mode, the DS2108 isolates the 9 terminator blocks from the bus while adding only 6 pF capacitance to each signal line of the SCSI bus.

FUNCTIONAL DESCRIPTION

The DS2108 consists of power down circuitry, eighteen 330 ohm and nine 150 ohm termination resistors (Figure 1). The DS2108 can be removed from the circuit by bringing the power down pin (\overline{PD}) low. The power down capacitance on the terminating resistors is 6 pF, well below the SCSI-3 allotment of 25 pF. The DS2108 supports SCSI signal voltages of -7 to +12 volts when powered on or off. When all lines settle into the quiescent state (no signal transitions), 56 mA is typically consumed. Only 1 mA is typically consumed in the powered down mode.

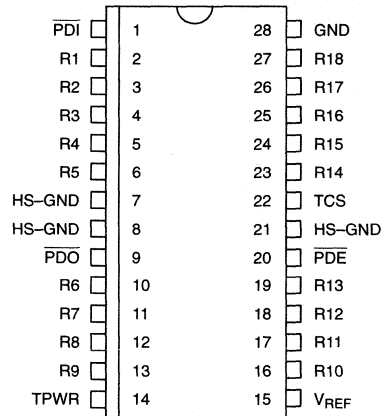
DALLAS SEMICONDUCTOR

DS2109 Plug and Play SCSI Terminator

FEATURES

- Fully compliant with SCSI-1, Fast SCSI and Ultra SCSI
- Compatible with Plug and Play SCSI Profile
- Functionally compatible with DS21S07A
- Provides active termination for 18 signal lines
- 2% tolerance on termination resistors and voltage regulator
- Bus termination sensing
- Low power down capacitance of 3 pF
- Onboard thermal shutdown circuitry

PIN ASSIGNMENT



DS2109 28-PIN SOIC (300 MIL)

DESCRIPTION

The DS2109 is intended for one chip Plug and Play (PnP) SCSI termination. Plug and Play SCSI requires the exit-point terminator on computer motherboards or host bus adapters to automatically switch off if an external device is connected to the system. The DS2109 satisfies this requirement by offering the engineer a choice of onboard current sensing circuitry or onboard ground detect circuitry. If an external device is connected, the DS2109 will automatically be isolated from the SCSI bus thereby maintaining proper system termination.

The DS2109 integrates a low drop-out regulator, 18 precise switched 110 ohm termination resistors, and bus termination sensors into a 28-pin 300 mil SOIC package. Active termination provides: greater immunity to voltage drops on the TERMPWR (TERMination PoWeR) line, enhanced high-level noise immunity, intrinsic TERMPWR decoupling, and very low quiescent current consumption. The DS2109 contains an output port that can control the power down pin of additional terminators (DS21S07A) for Wide SCSI applications.

FEATURES

- Complies with Backplane Transceiver Logic (BTL) specifications (IEEE 1194.1–1991) and Futurebus+ specifications (IEEE 896.2–1991)
- Provides active termination for eight signal lines
- Laser-trimmed 33Ω termination resistors have 2.5% tolerance from 0°C to 70°C
- Onboard precise 2.1V ($\pm 2\%$) voltage regulator
- Package optimized for minimum parasitic inductance and resistance
- 16-pin (300 mil) plastic SOIC package

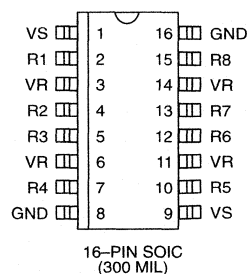
DESCRIPTION

The DS2112 Terminator provides active termination for Backplane Transceiver Logic (BTL) drivers and is fully compliant with IEEE 1194.1–1991, as well as the Futurebus+ specification (IEEE 896.2–1991). The DS2112 integrates a low dropout regulator and eight precision resistors into a single monolithic CMOS IC that is optimized for the high switching speeds and current required of BTL systems. The DS2112 allows the user to provide a distributed 2.1 volt supply that supports the instantaneous current required in incident wave switching while meeting the stringent ripple requirements of BTL without using a costly high speed specialized power supply.

FUNCTIONAL DESCRIPTION

The DS2112 consists of a bandgap reference, a power amplifier, and eight precise 33Ω terminating resistors (see Figure 1). The bandgap reference produces a laser-trimmed 1.26 volt source which is amplified to 2.1 volts and fed to the unity gain power amp. The power amp is capable of sourcing 41 mA into each of the eight terminating resistors when the signal line is driven low. When the driver releases the line, the terminator

PIN ASSIGNMENT



will pull it back to 2.1 volts. When all lines are in the quiescent state, the DS2112 consumes about 10 mA ($V_S=5.0$ volts). The DS2112 can operate with supply voltages as low as 4.0 volts and meet all BTL specifications.

Due to the high switching speeds and the amount of current that can be switched, layout and bypass capacitor placement is critical to the proper operation of the DS2112's regulator. The DS2112 die, pinout and package have been optimized to reduce parasitic inductance and resistance, thereby minimizing the effects of large di/dt . The V_S pins should be connected to the backplane power supply and bypassed with a $10\ \mu\text{F}$ tantalum; the two sets of V_R pins are designed to be tied together externally and bypassed. The preferred configuration would be to tie pins 3, 6, 11, and 14 together and bypass each pair locally with a $15\ \mu\text{F}$ tantalum in parallel with a $0.47\ \mu\text{F}$ ceramic. This optimizes the current path to the internal resistors while minimizing parasitic inductances and resistances. The traces making all connections to the DS2112 should be as short as possible. A typical configuration for one DS2112 is shown in Figure 2.

CPU SUPERVISORS

DALLAS

SEMICONDUCTOR

DS1231/S

Power Monitor Chip

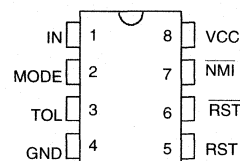
FEATURES

- Warns processor of an impending power failure
- Provides time for an orderly shutdown
- Prevents processor from destroying nonvolatile memory during power transients
- Automatically restarts processor after power is restored
- Suitable for linear or switching power supplies
- Adjusts to hold time of the power supply
- Supplies necessary signals for processor interface
- Accurate 5% or 10% V_{CC} monitoring
- Replaces power-up reset circuitry
- No external capacitors required
- Optional 16-pin SOIC surface mount package

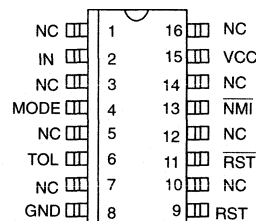
DESCRIPTION

The DS1231 Power Monitor Chip uses a precise temperature-compensated reference circuit which provides an orderly shutdown and an automatic restart of a processor-based system. A signal warning of an impending power failure is generated well before regulated DC voltages go out of specification by monitoring high voltage inputs to the power supply regulators. If line isolation is required a UL-approved opto-isolator can be directly interfaced to the DS1231. The time for pro-

PIN ASSIGNMENT



DS1231 8-PIN DIP
(300 MIL)
See Mech. Drawings
Section



DS1231S 16-PIN SOIC
(300 MIL)
See Mech. Drawings
Section

PIN DESCRIPTION

IN	– Input
MODE	– Selects input pin characteristics
TOL	– Selects 5% or 10% V_{CC} detect
GND	– Ground
RST	– Reset (Active High)
$\overline{\text{RST}}$	– Reset (Active Low, open drain)
$\overline{\text{NMI}}$	– Non-Maskable Interrupt
V_{CC}	– +5V Supply
NC	– No Connections

cessor shutdown is directly proportional to the available hold-up time of the power supply. Just before the hold-up time is exhausted, the Power Monitor unconditionally halts the processor to prevent spurious cycles by enabling Reset as V_{CC} falls below a selectable 5 or 10 percent threshold. When power returns, the processor is held inactive until well after power conditions have stabilized, safeguarding any nonvolatile memory in the system from inadvertent data changes.

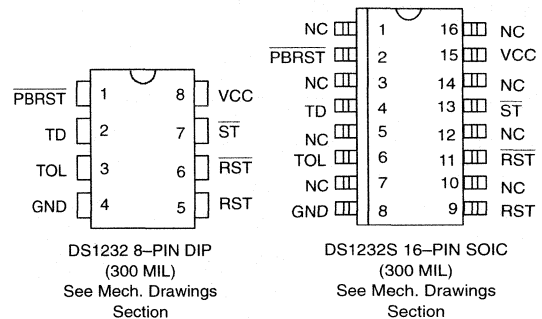
FEATURES

- Halts and restarts an out-of-control microprocessor
- Holds microprocessor in check during power transients
- Automatically restarts microprocessor after power failure
- Monitors pushbutton for external override
- Accurate 5% or 10% microprocessor power supply monitoring
- Eliminates the need for discrete components
- Space-saving, 8-pin mini-DIP
- Optional 16-pin SOIC surface mount package
- Industrial temperature -40°C to $+85^{\circ}\text{C}$ available, designated N

DESCRIPTION

The DS1232 MicroMonitor Chip monitors three vital conditions for a microprocessor: power supply, software execution, and external override. First, a precision temperature-compensated reference and comparator circuit monitors the status of V_{CC} . When an out-of-tolerance condition occurs, an internal power fail signal is generated which forces reset to the active state. When V_{CC} returns to an in-tolerance condition, the reset signals are kept in the active state for a minimum of 250 ms to allow the power supply and processor to stabilize.

PIN ASSIGNMENT



PIN DESCRIPTION

PBRST	- Pushbutton Reset Input
TD	- Time Delay Set
TOL	- Selects 5% or 10% V_{CC} Detect
GND	- Ground
RST	- Reset Output (Active High)
$\overline{\text{RST}}$	- Reset Output (Active Low, open drain)
ST	- Strobe Input
V_{CC}	- +5 Volt Power
NC	- No Connections

The second function the DS1232 performs is pushbutton reset control. The DS1232 debounces the pushbutton input and guarantees an active reset pulse width of 250 ms minimum. The third function is a watchdog timer. The DS1232 has an internal timer that forces the reset signals to the active state if the strobe input is not driven low prior to time-out. The watchdog timer function can be set to operate on time-out settings of approximately 150 ms, 600 ms, and 1.2 seconds.

DALLAS

SEMICONDUCTOR

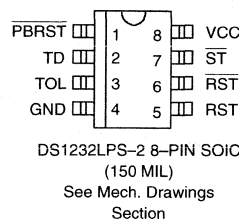
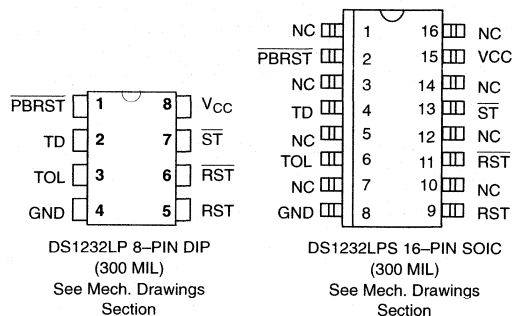
DS1232LP/LPS

Low Power MicroMonitor Chip

FEATURES

- Super low-power version of DS1232
- 50 μ A quiescent current
- Halts and restarts an out-of-control microprocessor
- Automatically restarts microprocessor after power failure
- Monitors pushbutton for external override
- Accurate 5% or 10% microprocessor power supply monitoring
- 8-pin DIP or 8-pin SOIC package
- Optional 16-pin SOIC package available
- Industrial temperature -40°C to $+85^{\circ}\text{C}$ available, designated N

PIN ASSIGNMENT



PIN DESCRIPTION

PBRST	-	Pushbutton Reset Input
TD	-	Time Delay Set
TOL	-	Selects 5% or 10% V _{CC} Detect
GND	-	Ground
RST	-	Reset Output (Active High)
RST	-	Reset Output (Active Low, open drain)
ST	-	Strobe Input
VCC	-	+5 Volt Power

DESCRIPTION

The DS1232LP/LPS Low Power MicroMonitor Chip monitors three vital conditions for a microprocessor: power supply, software execution, and external override. First, a precision temperature-compensated reference and comparator circuit monitors the status of V_{CC}. When an out-of-tolerance condition occurs, an internal power fail signal is generated which forces reset to the active state. When V_{CC} returns to an in-tolerance condition, the reset signals are kept in the active state for a minimum of 250 ms to allow the power supply and processor to stabilize.

The second function the DS1232LP/LPS performs is pushbutton reset control. The DS1232LP/LPS debounces the pushbutton input and guarantees an active reset pulse width of 250 ms minimum. The third function is a watchdog timer. The DS1232LP/LPS has an internal timer that forces the reset signals to the active state if the strobe input is not driven low prior to time-out. The watchdog timer function can be set to operate on time-out settings of approximately 150 ms, 600 ms, and 1.2 seconds.

DALLAS

SEMICONDUCTOR

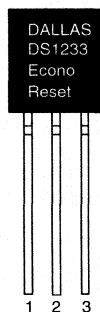
DS1233

5V EconoReset

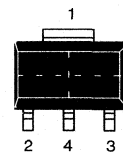
FEATURES

- Automatically restarts microprocessor after power failure
- Monitors pushbutton for external override
- Internal circuitry debounces pushbutton switch
- Maintains reset for 350 ms after V_{CC} returns to an in-tolerance condition or pushbutton released
- Accurate 5%, 10% or 15% microprocessor 5V power supply monitoring
- Reduces need for discrete components
- Precision temperature-compensated voltage reference and voltage sensor
- Low-cost TO-92 package or surface mount SOT-223 package
- Internal 5K Ω pull-up resistor
- Operating temperature of -40°C to $+85^{\circ}\text{C}$

PIN ASSIGNMENT



TO-92 PACKAGE
See Mech. Drawings
Section



SOT-223 PACKAGE
See Mech. Drawings
Section

PIN DESCRIPTION

PIN 1	GROUND
PIN 2	RESET
PIN 3	V_{CC}
PIN 4	GROUND (SOT-223 ONLY)

DESCRIPTION

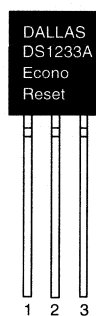
The DS1233 EconoReset monitors two vital conditions for a microprocessor: power supply and external override. A precision temperature compensated reference and comparator circuit are used to monitor the status of the power supply (V_{CC}). When an out-of-tolerance condition is detected, an internal power fail signal is generated which forces reset to the active state. When

V_{CC} returns to an in-tolerance condition, the reset signal is kept in the active state for approximately 350 ms to allow the power supply and processor to stabilize. The second function of the DS1233 is pushbutton reset control. The DS1233 debounces a pushbutton closure and will generate a 350 ms reset pulse upon release.

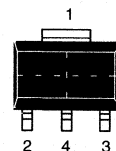
FEATURES

- Automatically restarts microprocessor after power failure
- Monitors pushbutton for external override
- Internal circuitry debounces pushbutton switch
- Maintains reset for 350 ms after V_{CC} returns to an in-tolerance condition or pushbutton released
- Accurate 10% or 15% microprocessor 3.3V power supply monitoring
- Reduces need for discrete components
- Precision temperature-compensated voltage reference and voltage sensor
- Low-cost TO-92 package or surface mount SOT-223 package
- Internal 5K Ω pull-up resistor
- Operating temperature of -40°C to $+85^{\circ}\text{C}$

PIN ASSIGNMENT



TO-92 PACKAGE
See Mech. Drawings
Section



SOT-223 PACKAGE
See Mech. Drawings
Section

PIN DESCRIPTION

PIN 1	GROUND
PIN 2	RESET
PIN 3	V_{CC}
PIN 4	GROUND (SOT-223 ONLY)

DESCRIPTION

The DS1233A EconoReset monitors two vital conditions for a microprocessor: power supply and external override. A precision temperature compensated reference and comparator circuit are used to monitor the status of the power supply (V_{CC}). When an out-of-tolerance condition is detected, an internal power fail signal is generated which forces reset to the active state.

When V_{CC} returns to an in-tolerance condition, the reset signal is kept in the active state for approximately 350 ms to allow the power supply and processor to stabilize. The second function of the DS1233A is pushbutton reset control. The DS1233A debounces a pushbutton closure and will generate a 350 ms reset pulse upon release.

DALLAS

SEMICONDUCTOR

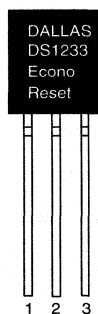
DS1233D

5V EconoReset

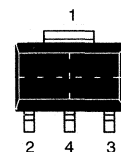
FEATURES

- Automatically restarts microprocessor after power failure
- Maintains reset for 350 ms after V_{CC} returns to an in-tolerance condition
- Accurate 5%, 10% or 15% microprocessor 5V power supply monitoring
- Reduces need for discrete components
- Precision temperature-compensated voltage reference and voltage sensor
- Low-cost TO-92 package or surface mount SOT-223 package
- Internal 5K Ω pull-up resistor
- Compatible with Motorola 68XXX series and HC16 Microprocessors
- Operating temperature of -40°C to $+85^{\circ}\text{C}$

PIN ASSIGNMENT



TO-92 PACKAGE
See Mech. Drawings
Section



SOT-223 PACKAGE
See Mech. Drawings
Section

PIN DESCRIPTION

PIN 1	GROUND
PIN 2	$\overline{\text{RESET}}$
PIN 3	V_{CC}
PIN 4	GROUND (SOT-223 ONLY)

DESCRIPTION

The DS1233D EconoReset uses a precision temperature compensated reference and comparator circuit to monitor the status of the power supply (V_{CC}). When an out-of-tolerance condition is detected, an internal power fail signal is generated which forces reset to the active

state. When V_{CC} returns to an in-tolerance condition, the reset signal is kept in the active state for approximately 350 ms to allow the power supply and processor to stabilize.

DALLAS

SEMICONDUCTOR

DS1236

MicroManager Chip

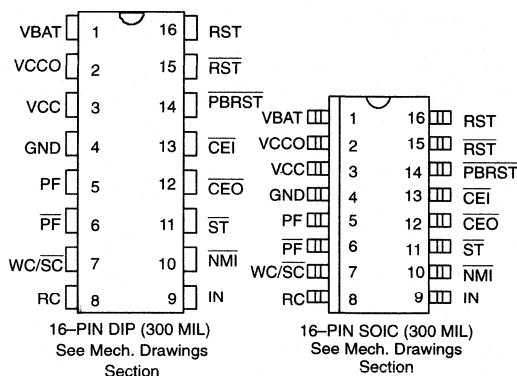
FEATURES

- Holds microprocessor in check during power transients
- Halts and restarts an out-of-control microprocessor
- Monitors pushbutton for external override
- Warns microprocessor of an impending power failure
- Converts CMOS SRAM into nonvolatile memory
- Unconditionally write protects memory when power supply is out of tolerance
- Consumes less than 100 nA of battery current at 25°C
- Controls external power switch for high current applications
- Accurate 10% power supply monitoring
- Optional 5% power supply monitoring designated DS1236-5
- Provides orderly shutdown in nonvolatile microprocessor applications
- Supplies necessary control for low-power "stop mode" in battery operated hand-held applications
- Standard 16-pin DIP or space-saving 16-pin SOIC
- Optional industrial temperature range -40°C to +85°C

DESCRIPTION

The DS1236 MicroManager Chip provides all the necessary functions for power supply monitoring, reset control, and memory backup in microprocessor-based systems. A precise internal voltage reference and comparator circuit monitor power supply status. When an out-of-tolerance condition occurs, the microprocessor reset and power fail outputs are forced active, and static RAM control unconditionally write protects external memory. The DS1236 also provides early warning detection of a user-defined threshold by driving a non-

PIN ASSIGNMENT



PIN DESCRIPTION

V _{BAT}	- +3 Volt Battery Input
V _{CCO}	- Switched SRAM Supply Output
V _{CC}	- +5 Volt Power Supply Input
GND	- Ground
PF	- Power Fail (Active High)
\overline{PF}	- Power Fail (Active Low)
WC/ \overline{SC}	- Wake-Up Control (Sleep)
RC	- Reset Control
IN	- Early Warning Input
\overline{NMI}	- Non-Maskable Interrupt
\overline{ST}	- Strobe Input
\overline{CEO}	- Chip Enable Output
\overline{CEI}	- Chip Enable Input
\overline{PBRST}	- Pushbutton Reset Input
RST	- Reset Output (Active Low)
RST	- Reset Output (Active High)

maskable interrupt. External reset control is provided by a pushbutton reset input which is debounced and activates reset outputs. An internal watchdog timer can also force the reset outputs to the active state if the strobe input is not driven low prior to watchdog time-out. Reset control and wake-up/sleep control inputs also provide the necessary signals for orderly shutdown and start-up in battery backup and battery operated applications.

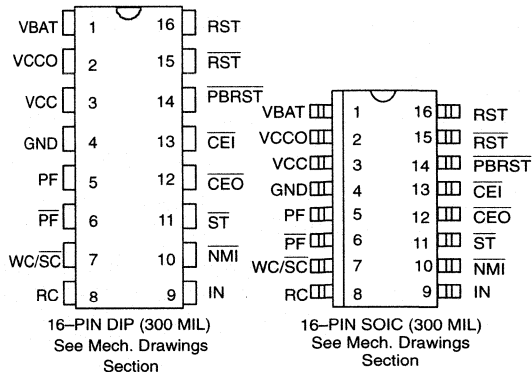
FEATURES

- Holds microprocessor in check during power transients
- Halts and restarts an out-of-control microprocessor
- Monitors pushbutton for external override
- Warns microprocessor of an impending power failure
- Converts CMOS SRAM into nonvolatile memory
- Unconditionally write protects memory when power supply is out of tolerance
- Consumes less than 100 nA of battery current at 25°C
- Controls external power switch for high current applications
- Accurate 10% power supply monitoring
- Optional 5% power supply monitoring designated DS1236A-5
- Provides orderly shutdown in nonvolatile microprocessor applications
- Supplies necessary control for low-power "stop mode" in battery operated hand-held applications
- Standard 16-pin DIP or space-saving 16-pin SOIC
- Optional industrial temperature range -40°C to +85°C

DESCRIPTION

The DS1236A MicroManager Chip provides all the necessary functions for power supply monitoring, reset control, and memory backup in microprocessor-based systems. A precise internal voltage reference and comparator circuit monitor power supply status. When an out-of-tolerance condition occurs, the microprocessor reset and power fail outputs are forced active, and static RAM control unconditionally write protects external memory. The DS1236A also provides early warning detection of a user-defined threshold by driving a non-

PIN ASSIGNMENT



PIN DESCRIPTION

V _{BAT}	- +3 Volt Battery Input
V _{CCO}	- Switched SRAM Supply Output
V _{CC}	- +5 Volt Power Supply Input
GND	- Ground
PF	- Power Fail (Active High)
$\overline{\text{PF}}$	- Power Fail (Active Low)
WC/SC	- Wake-Up Control (Sleep)
RC	- Reset Control
IN	- Early Warning Input
$\overline{\text{NMI}}$	- Non-Maskable Interrupt
$\overline{\text{ST}}$	- Strobe Input
$\overline{\text{CEO}}$	- Chip Enable Output
CEI	- Chip Enable Input
$\overline{\text{PBRST}}$	- Pushbutton Reset Input
RST	- Reset Output (Active Low)
RST	- Reset Output (Active High)

maskable interrupt. External reset control is provided by a pushbutton reset input which is debounced and activates reset outputs. An internal watchdog timer can also force the reset outputs to the active state if the strobe input is not driven low prior to watchdog time-out. Reset control and wake-up/sleep control inputs also provide the necessary signals for orderly shutdown and start-up in battery backup and battery operated applications.

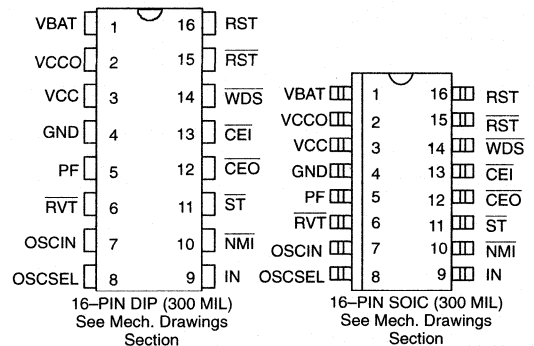
FEATURES

- Holds microprocessor in check during power transients
- Halts and restarts an out-of-control microprocessor
- Warns microprocessor of an impending power failure
- Converts CMOS SRAM into nonvolatile memory
- Unconditionally write protects memory when power supply is out of tolerance
- Delays write protection until completion of the current memory cycle
- Consumes less than 200 nA of battery current
- Controls external power switch for high current applications
- Debounces pushbutton reset
- Accurate 10% power supply monitoring
- Optional 5% power supply monitoring designated DS1238-5
- Provides orderly shutdown in microprocessor applications
- Pin-for-pin compatible with MAX691
- Standard 16-pin DIP or space-saving 16-pin SOIC
- Optional industrial temperature range -40°C to +85°C

DESCRIPTION

The DS1238 MicroManager provides all the necessary functions for power supply monitoring, reset control, and memory backup in microprocessor-based systems. A precise internal voltage reference and comparator circuit monitor power supply status. When an out-of-tolerance condition occurs, the microprocessor reset and power fail outputs are forced active, and static RAM control unconditionally write protects external memory. The DS1238 also provides early warning detection of a user-defined threshold by driving a non-maskable interrupt. External reset control is provided

PIN ASSIGNMENT



PIN DESCRIPTION

V_{BAT}	- +3 Volt Battery Input
V_{CCO}	- Switched SRAM Supply Output
V_{CC}	- +5 Volt Power Supply Input
GND	- Ground
PF	- Power Fail
\overline{RVT}	- Reset Voltage Threshold
OSCIN	- Oscillator In
OSCSEL	- Oscillator Select
IN	- Early Warning Input
\overline{NMI}	- Non-Maskable Interrupt
\overline{ST}	- Strobe Input
\overline{CEO}	- Chip Enable Output
\overline{CEI}	- Chip Enable Input
\overline{WDS}	- Watchdog Status
\overline{RST}	- Reset Output (active low)
RST	- Reset Output (active high)

by a pushbutton reset debounce circuit connected to the \overline{RST} pin. An internal watchdog timer can also force the reset outputs to the active state if the strobe input is not driven low prior to watchdog timeout. Oscillator control pins OSCSEL and OSCIN provide either external or internal clock timing for both the reset pulse width and the watchdog timeout period. The Watchdog Status and Reset Voltage Threshold are provided via \overline{WDS} and \overline{RVT} , respectively.

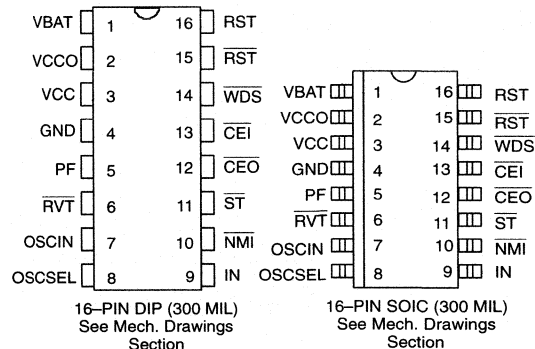
FEATURES

- Holds microprocessor in check during power transients
- Halts and restarts an out-of-control microprocessor
- Warns microprocessor of an impending power failure
- Converts CMOS SRAM into nonvolatile memory
- Unconditionally write protects memory when power supply is out of tolerance
- Delays write protection until completion of the current memory cycle
- Consumes less than 200 nA of battery current
- Controls external power switch for high current applications
- Debounces pushbutton reset
- Accurate 10% power supply monitoring
- Optional 5% power supply monitoring designated DS1238A-5
- Provides orderly shutdown in microprocessor applications
- Pin-for-pin compatible with MAX691
- Standard 16-pin DIP or space-saving 16-pin SOIC
- Optional industrial temperature range -40°C to +85°C

DESCRIPTION

The DS1238A MicroManager provides all the necessary functions for power supply monitoring, reset control, and memory backup in microprocessor-based systems. A precise internal voltage reference and comparator circuit monitor power supply status. When an out-of-tolerance condition occurs, the microprocessor reset and power fail outputs are forced active, and static RAM control unconditionally write protects external memory. The DS1238A also provides early warning detection of a user-defined threshold by driving a non-maskable interrupt. External reset control is provided

PIN ASSIGNMENT



PIN DESCRIPTION

V_{BAT}	- +3 Volt Battery Input
V_{CCO}	- Switched SRAM Supply Output
V_{CC}	- +5 Volt Power Supply Input
GND	- Ground
PF	- Power Fail
\overline{RVT}	- Reset Voltage Threshold
OSCIN	- Oscillator In
OSCSEL	- Oscillator Select
IN	- Early Warning Input
\overline{NMI}	- Non-Maskable Interrupt
\overline{ST}	- Strobe Input
\overline{CEO}	- Chip Enable Output
\overline{CEI}	- Chip Enable Input
\overline{WDS}	- Watchdog Status
\overline{RST}	- Reset Output (active low)
RST	- Reset Output (active high)

by a pushbutton reset debounce circuit connected to the \overline{RST} pin. An internal watchdog timer can also force the reset outputs to the active state if the strobe input is not driven low prior to watchdog timeout. Oscillator control pins OSCSEL and OSCIN provide either external or internal clock timing for both the reset pulse width and the watchdog timeout period. The Watchdog Status and Reset Voltage Threshold are provided via \overline{WDS} and \overline{RVT} , respectively.

DALLAS

SEMICONDUCTOR

DS1239

MicroManager Chip

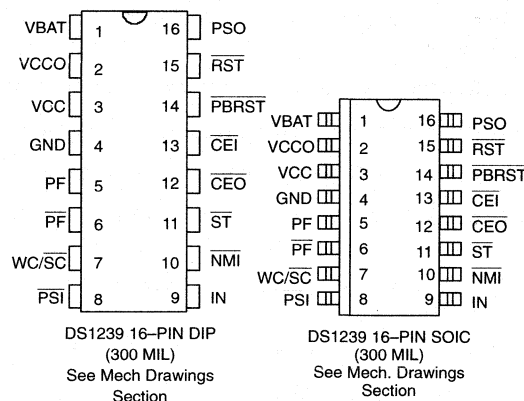
FEATURES

- Provides necessary control for start up and shutdown of power supply from keyboard
- Holds microprocessor in check during power transients
- Halts and restarts an out-of-control microprocessor
- Monitors push button for external override
- Warns microprocessor of an impending power failure
- Converts CMOS SRAM into nonvolatile memory
- Unconditionally write-protects memory when power supply is out of tolerance
- Consumes less than 100 nA of battery current
- Controls external power switch for high current applications
- Accurate 10% power supply monitoring
- Optional 5% power supply monitoring designated DS1239-5
- Provides orderly shutdown in nonvolatile microprocessor applications
- Supplies necessary control for low-power "stop mode" in battery operate hand-held applications
- Standard 16-pin DIP or space-saving 16-pin SOIC
- Optional industrial temperature range -40°C to +85°C

DESCRIPTION

The DS1239 MicroManager provides all the necessary functions for power supply control and monitoring, reset control, and memory backup in microprocessor-based systems. Using the DS1239, an AC power switch is no longer required for microprocessor-based systems. A keyboard control system for power supply start up and shutdown is provided through the use of the Power Supply Control Input and Output. In other respects, the

PIN ASSIGNMENT



PIN DESCRIPTION

V _{BAT}	- +3 Volt Battery Input
V _{CCO}	- Switched SRAM Supply Output
V _{CC}	- +5 Volt Power Supply Input
GND	- Ground
PF	- Power Fail (Active High)
PF	- Power Fail (Active Low)
WC/SC	- Wake-Up Control (Sleep)
PSI	- Power Supply Control Input
IN	- Early Warning Input
NMI	- Non-Maskable Interrupt
ST	- Strobe Input
CEO	- Chip Enable Output
CEI	- Chip Enable Input
PBRST	- Pushbutton Reset Input
RST	- Reset Output (Active low)
PSO	- Power Supply Control Outputs

DS1239 is functionally identical to a DS1236 in the NMOS mode. For a complete description of the other DS1239 features, refer to the DS1236 data sheet. Pin-out of the DS1239 is identical to the DS1236 with two exceptions. The RC and RST pins have been replaced with PSI and PSO, respectively. Other pins and functions operate exactly as the DS1236 in NMOS mode.

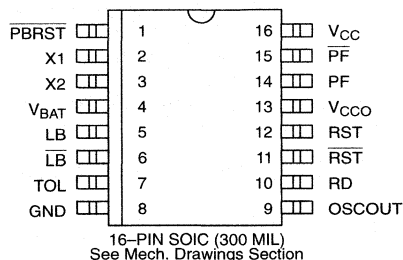
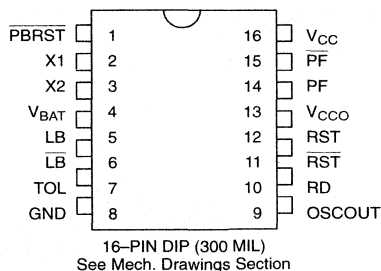
FEATURES

- Power fail detector for personal computers and workstations
- Connects directly to popular personal computer chip sets
- On chip 32.768 KHz oscillator for real time clock
- Provides battery backup power to clock chip
- Pushbutton reset input
- Accurate 5% or 10% +5 volt power supply monitoring
- Complementary outputs for reset, power fail, and low battery
- Provides for reset pulse width of either 95 ms or 190 ms
- Eliminates the need for discrete components
- Low-power CMOS circuitry
- 16-pin DIP or SOIC surface mount package
- 0°C to 70°C operation

DESCRIPTION

The DS1632 PC Power Fail and Reset Controller is designed to do various functions involving battery backup and other functions typically accomplished with discrete components. The DS1632 provides a 32.768 KHz battery backed up crystal oscillator and switched V_{CC}/V_{BAT} power via V_{CCO} for the real-time clock function located in accompanying chip sets. In addition, the DS1632 provides for reset on both power up and via pushbutton

PIN ASSIGNMENT



PIN DESCRIPTION

\overline{PBRST}	– Pushbutton Reset Input
X1, X2	– Crystal Inputs
V_{BAT}	– Battery Input
LB, LB	– Low Battery Outputs
RST, \overline{RST}	– Reset Outputs
RD	– Reset Duration
TOL	– Selects 5% Or 10% Detection
GND	– Ground
OSCOUT	– Oscillator Out
V_{CCO}	– Switched Power Out
PF, PF	– Power Fail Outputs
V_{CC}	– +5 Volt Power In

input, power fail status signals for the processor, and low battery warning signals. The DS1632 is capable of detecting power failure at both the 5% and 10% power supply tolerances, and the reset pulse width can be set for either 95 ms or 190 ms. The device is designed to connect directly to popular laptop and notebook chip sets which eliminates the need for discrete components and reduces cost.

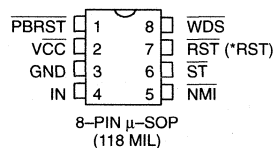
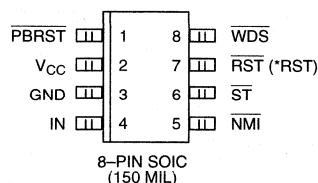
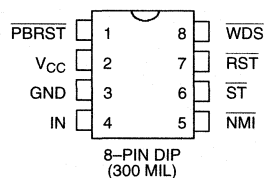
FEATURES

- Halts and restarts an out-of-control microprocessor
- Holds microprocessor in check during power transients
- Automatically restarts microprocessor after power failure
- Monitors pushbutton for external override
- Accurate 5%, 10% or 20% resets for 3.3 systems and 5% or 10% resets for 5.0 volt systems
- Eliminates the need for discrete components
- 3.3 volt 20% tolerance for use with 3.0 volt systems
- Pin compatible with the MAXIM MAX705/MAX706 in 8-pin DIP and 8-pin SOIC
- 8-pin DIP, 8-pin SOIC and 8-pin μ -SOP packages
- Industrial temperature range -40°C to $+85^{\circ}\text{C}$

DESCRIPTION

The DS1705/DS1706 3.3 or 5.0 Volt MicroMonitor monitors three vital conditions for a microprocessor: power supply, software execution, and external override. A precision temperature compensated reference and comparator circuit monitors the status of V_{CC} at the device and at an upstream point for maximum protection. When the sense input detects an out-of-tolerance

PIN ASSIGNMENT



See Mech. Drawings
Section

DS1705 and DS1706_/R/S/T (*DS1706L and DS1706P)

PIN DESCRIPTION

$\overline{\text{PBRST}}$	– Pushbutton Reset Input
V_{CC}	– Power Supply
GND	– Ground
IN	– Input
$\overline{\text{NMI}}$	– Non-maskable Interrupt
ST	– Strobe Input
$\overline{\text{RST}}$	– Active Low Reset Output
*RST	– Active High Reset Output (DS1706P and DS1706L only)
$\overline{\text{WDS}}$	– Watchdog Status Output

condition a non-maskable interrupt is generated. As the voltage at the device degrades an internal power fail signal is generated which forces the reset to an active state. When V_{CC} returns to an in-tolerance condition, the reset signal is kept in the active state for a minimum of 130 ms to allow the power supply and processor to stabilize.

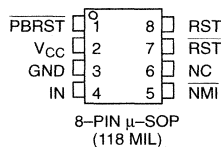
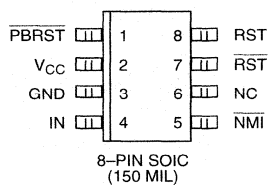
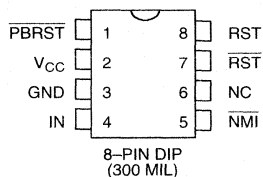
FEATURES

- Holds microprocessor in check during power transients
- Automatically restarts microprocessor after power failure
- Monitors pushbutton for external override
- Accurate 5%, 10% or 20% resets for 3.3 systems and 5% or 10% resets for 5.0 volt systems
- Eliminates the need for discrete components
- 20% tolerance compatible with 3.0 volt systems
- Pin compatible with the MAXIM MAX707/MAX708 in 8-pin DIP and 8-pin SOIC packages
- 8-pin DIP, 8-pin SOIC and 8-pin μ -SOP packages available
- Industrial temperature range -40°C to $+85^{\circ}\text{C}$

DESCRIPTION

The DS1705/DS1706 3.3 or 5.0 Volt MicroMonitor monitors three vital conditions for a microprocessor: power supply, voltage sense, and external override. A precision temperature-compensated reference and comparator circuit monitors the status of V_{CC} at the device and at an upstream point for maximum protection. When the sense input detects an out-of-tolerance

PIN ASSIGNMENT



See Mech. Drawings
Section

DS1707 and DS1708_/R/S/T

PIN DESCRIPTION

$\overline{\text{PBRST}}$	–	Pushbutton Reset Input
V_{CC}	–	Power Supply
GND	–	Ground
IN	–	Input
$\overline{\text{NMI}}$	–	Non-maskable Interrupt
NC	–	No Connect
$\overline{\text{RST}}$	–	Active Low Reset Output
RST	–	Active High Reset Output

condition a non-maskable interrupt is generated. As the voltage at the device degrades an internal power fail signal is generated which forces the reset to an active state. When V_{CC} returns to an in-tolerance condition, the reset signal is kept in the active state for a minimum of 130 ms to allow the power supply and processor to stabilize.

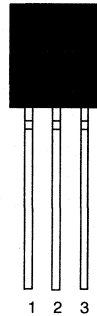
DALLAS SEMICONDUCTOR

DS1810 5V EconoReset with Push-Pull Output

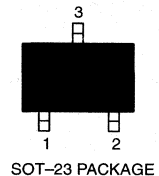
FEATURES

- Automatically restarts a microprocessor after power failure
- Maintains reset for 150 ms after V_{CC} returns to an in-tolerance condition
- Reduces need for discrete components
- Precision temperature-compensated voltage reference and voltage sensor
- Low-cost TO-92 or space saving surface mount SOT-23 packages available
- Push-Pull output for low current operation
- Operating temperature -40°C to $+85^{\circ}\text{C}$

PIN ASSIGNMENT



TO-92 PACKAGE
See Mech. Drawings
Section



SOT-23 PACKAGE

PIN DESCRIPTIONS

TO-92

1	$\overline{\text{RST}}$	Active Low Reset Output
2	V_{CC}	Power Supply
3	GND	Ground

SOT-23

1	$\overline{\text{RST}}$	Active Low Reset Output
2	V_{CC}	Power Supply
3	GND	Ground

DESCRIPTION

The DS1810 EconoReset uses a precision temperature reference and comparator circuit to monitor the status of the power supply (V_{CC}). When an out-of-tolerance condition is detected, an internal power-fail signal is

generated which forces reset to the active state. When V_{CC} returns to an in-tolerance condition, the reset signal is kept in the active state for approximately 150 ms to allow the power supply and processor to stabilize.

DALLAS

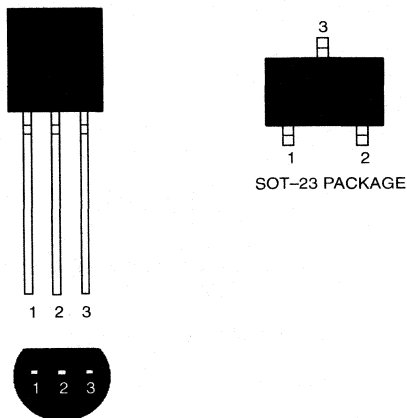
SEMICONDUCTOR

DS1811 5V EconoReset with Open Drain Output

FEATURES

- Automatically restarts a microprocessor after power failure
- Maintains reset for 150 ms after V_{CC} returns to an in-tolerance condition
- Reduces need for discrete components
- Precision temperature-compensated voltage reference and voltage sensor
- Low-cost TO-92 or space saving SOT-23 packages available
- Efficient open-drain output with internal 5.5K Ω pull-up resistor
- Operating temperature -40°C to $+85^{\circ}\text{C}$

PIN ASSIGNMENT



TO-92 PACKAGE
See Mech. Drawings
Section

PIN DESCRIPTIONS

TO-92

1	$\overline{\text{RST}}$	Active Low Reset Output
2	V_{CC}	Power Supply
3	GND	Ground

SOT-23

1	$\overline{\text{RST}}$	Active Low Reset Output
2	V_{CC}	Power Supply
3	GND	Ground

DESCRIPTION

The DS1811 EconoReset uses a precision temperature reference and comparator circuit to monitor the status of the power supply (V_{CC}). When an out-of-tolerance condition is detected, an internal power-fail signal is

generated which forces reset to the active state. When V_{CC} returns to an in-tolerance condition, the reset signal is kept in the active state for approximately 150 ms to allow the power supply and processor to stabilize.

DALLAS

SEMICONDUCTOR

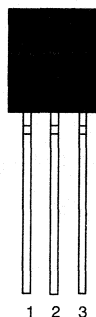
DS1812

5V EconoReset with Active High Push-Pull Output

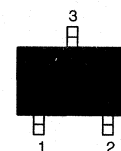
FEATURES

- Automatically restarts a microprocessor after power failure
- Maintains reset for 150 ms after V_{CC} returns to an in-tolerance condition
- Reduces need for discrete components
- Precision temperature-compensated voltage reference and voltage sensor
- Low-cost TO-92, or space saving surface mount SOT-23 packages available
- Push-Pull active high output
- Operating temperature -40°C to $+85^{\circ}\text{C}$

PIN ASSIGNMENT



TO-92 PACKAGE
See Mech. Drawings



SOT-23 PACKAGE
See Mech. Drawing

PIN DESCRIPTIONS

TO-92

1	RST	Active High Reset Output
2	V_{CC}	Power Supply
3	GND	Ground

SOT-23

1	RST	Active High Reset Output
2	V_{CC}	Power Supply
3	GND	Ground

DESCRIPTION

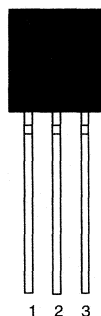
The DS1812 EconoReset uses a precision temperature reference and comparator circuit to monitor the status of the power supply (V_{CC}). When an out-of-tolerance condition is detected, an internal power-fail signal is

generated which forces reset to the active state. When V_{CC} returns to an in-tolerance condition, the reset signal is kept in the active state for approximately 150 ms to allow the power supply and processor to stabilize.

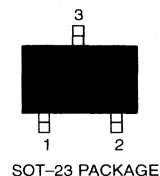
FEATURES

- Automatically restarts a microprocessor after power failure
- Monitors pushbutton for external override
- Maintains reset for typically 150 ms after V_{CC} returns to an in-tolerance condition
- Reduces need for discrete components
- Precision temperature-compensated voltage reference and voltage sensor
- Low-cost TO-92 or space saving surface-mount SOT-23 packages available
- Efficient open-drain output with internal 5.5K Ω pull-up resistor
- Operating temperature -40°C to $+85^{\circ}\text{C}$

PIN ASSIGNMENT



TO-92 PACKAGE
See Mech. Drawings
Section



SOT-23 PACKAGE

PIN DESCRIPTIONS

TO-92

1	$\overline{\text{RST}}$	Active Low Reset Output
2	V_{CC}	Power Supply
3	GND	Ground

SOT-23

1	$\overline{\text{RST}}$	Active Low Reset Output
2	V_{CC}	Power Supply
3	GND	Ground

DESCRIPTION

The DS1813 EconoReset uses a precision temperature reference and comparator circuit to monitor the status of the power supply (V_{CC}). When an out-of-tolerance condition is detected, an internal power-fail signal is generated which forces reset to the active state. When V_{CC} returns to an in-tolerance condition, the reset sig-

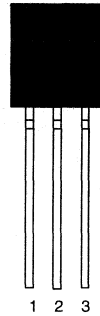
nal is kept in the active state for approximately 150 ms to allow the power supply and processor to stabilize.

The DS1813 also monitors a pushbutton on the reset output. If the reset line is pulled low, a reset is generated upon release and will be held in reset output low for typically 150 ms.

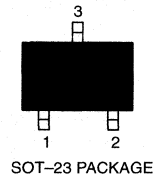
FEATURES

- Automatically restarts a microprocessor after power failure
- Maintains reset for 150 ms after V_{CC} returns to an in-tolerance condition
- Reduces need for discrete components
- Precision temperature-compensated voltage reference and voltage sensor
- Accurate 10% or 20% power monitoring
- Low-cost TO-92 or space saving surface-mount SOT-23 packages available
- Push-Pull output for low current operation
- Operating temperature -40°C to $+85^{\circ}\text{C}$

PIN ASSIGNMENT



TO-92 PACKAGE
See Mech. Drawings
Section



SOT-23 PACKAGE

PIN DESCRIPTIONS

TO-92

1	$\overline{\text{RST}}$	Active Low Reset Output
2	V_{CC}	Power Supply
3	GND	Ground

SOT-23

1	$\overline{\text{RST}}$	Active Low Reset Output
2	V_{CC}	Power Supply
3	GND	Ground

DESCRIPTION

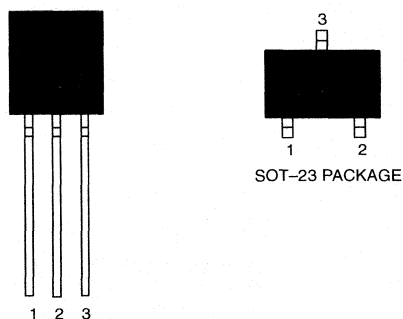
The DS1815 EconoReset uses a precision temperature reference and comparator circuit to monitor the status of the power supply (V_{CC}). When an out-of-tolerance condition is detected, an internal power fail signal is

generated which forces reset to the active state. When V_{CC} returns to an in-tolerance condition, the reset signal is kept in the active state for approximately 150 ms to allow the power supply and processor to stabilize.

FEATURES

- Automatically restarts a microprocessor after power failure
- Maintains reset for 150 ms after V_{CC} returns to an in-tolerance condition
- Reduces need for discrete components
- Precision temperature-compensated voltage reference and voltage sensor
- Accurate 10% or 20% power monitoring
- 20% tolerance for use with 3.0 volt systems
- Low-cost TO-92 or space saving SOT-23 packages available
- Efficient open-drain output with internal 5 K Ω pull-up resistor
- Operating temperature -40°C to $+85^{\circ}\text{C}$

PIN ASSIGNMENT



TO-92 PACKAGE
See Mech. Drawings
Section

PIN DESCRIPTIONS

TO-92

1	$\overline{\text{RST}}$	Active Low Reset Output
2	V_{CC}	Power Supply
3	GND	Ground

SOT-23

1	$\overline{\text{RST}}$	Active Low Reset Output
2	V_{CC}	Power Supply
3	GND	Ground

DESCRIPTION

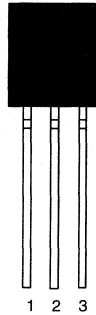
The DS1816 EconoReset uses a precision temperature reference and comparator circuit to monitor the status of the power supply (V_{CC}). When an out-of-tolerance condition is detected, an internal power fail signal is

generated which forces reset to the active state. When V_{CC} returns to an in-tolerance condition, the reset signal is kept in the active state for approximately 150 ms to allow the power supply and processor to stabilize.

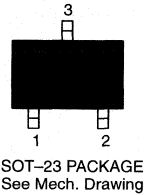
FEATURES

- Automatically restarts a microprocessor after power failure
- Maintains reset for 150 ms after V_{CC} returns to an in-tolerance condition
- Reduces need for discrete components
- Precision temperature-compensated voltage reference and voltage sensor
- Accurate 10% or 20% power monitoring
- 20% tolerance for use with 3.0 volt systems
- Low-cost TO-92 or space saving surface mount SOT-23 packages available
- Push-Pull active high output
- Operating temperature -40°C to $+85^{\circ}\text{C}$

PIN ASSIGNMENT



TO-92 PACKAGE
See Mech. Drawings



SOT-23 PACKAGE
See Mech. Drawing

PIN DESCRIPTIONS

TO-92

1	RST	Active High Reset Output
2	V_{CC}	Power Supply
3	GND	Ground

SOT-23

1	RST	Active High Reset Output
2	V_{CC}	Power Supply
3	GND	Ground

DESCRIPTION

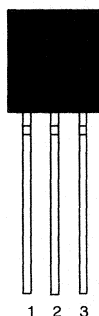
The DS1817 EconoReset uses a precision temperature reference and comparator circuit to monitor the status of the power supply (V_{CC}). When an out-of-tolerance condition is detected, an internal power fail signal is

generated which forces reset to the active state. When V_{CC} returns to an in-tolerance condition, the reset signal is kept in the active state for approximately 150 ms to allow the power supply and processor to stabilize.

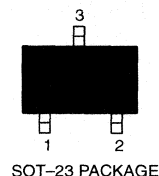
FEATURES

- Automatically restarts a microprocessor after power failure
- Monitors pushbutton for external override
- Maintains reset for 150 ms after V_{CC} returns to an in-tolerance condition
- Reduces need for discrete components
- Precision temperature-compensated voltage reference and voltage sensor
- Accurate 10% or 20% power monitoring
- Low-cost TO-92 or space saving surface mount SOT-23 packages available
- Efficient open-drain output with internal 5.5K Ω pull-up resistor
- Operating temperature -40°C to $+85^{\circ}\text{C}$

PIN ASSIGNMENT



TO-92 PACKAGE
See Mech. Drawings
Section



SOT-23 PACKAGE

PIN DESCRIPTIONS

TO-92

1	$\overline{\text{RST}}$	Active Low Reset Output
2	V_{CC}	Power Supply
3	GND	Ground

SOT-23

1	$\overline{\text{RST}}$	Active Low Reset Output
2	V_{CC}	Power Supply
3	GND	Ground

DESCRIPTION

The DS1818 EconoReset uses a precision temperature compensated reference and comparator circuit to monitor the status of the power supply (V_{CC}). When an out-of-tolerance condition is detected, an internal power fail signal is generated which forces reset to the active

state. When V_{CC} returns to an in-tolerance condition, the reset signal is kept in the active state for approximately 150 ms to allow the power supply and processor to stabilize.

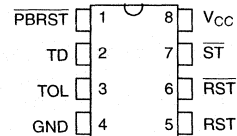
FEATURES

- Halts and restarts an out-of-control microprocessor
- Holds microprocessor in check during power transients
- Automatically restarts microprocessor after power failure
- Monitors pushbutton for external override
- Accurate 10% or 20% microprocessor power monitoring
- Eliminates need for discrete components
- 20% tolerance for use with 3.0 volt systems
- Pin compatible with the DS1232
- Low cost 8-pin DIP and 8-pin SOIC packages available
- Industrial temperature range of -40°C to $+85^{\circ}\text{C}$

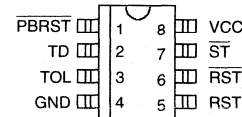
DESCRIPTION

The DS1832 3.3 Volt MicroMonitor monitors three vital conditions for a microprocessor: power supply, software execution, and external override. First, a precision temperature-compensated reference and comparator circuit monitors the status of V_{CC} . When an out-of-tolerance condition occurs, an internal power fail signal is generated which forces the resets to an active state. When V_{CC} returns to an in-tolerance condition, the reset signals are kept in the active state for a minimum of 250 ms to allow the power supply and processor to stabilize.

PIN ASSIGNMENT



DS1832 8-PIN DIP (300 MIL)
See Mech. Drawings
Section



DS1832 8-PIN SOIC (150 MIL)
See Mech. Drawings
Section

PIN DESCRIPTION

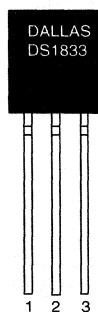
\overline{PBRST}	- Pushbutton Reset Input
TD	- Time Delay Set
TOL	- Selects 10% or 20% V_{CC} Detect
GND	- Ground
RST	- Active High Reset Output
\overline{RST}	- Active Low Reset Output
\overline{ST}	- Strobe Input
V_{CC}	- Power Supply

The second function the DS1832 performs is pushbutton reset control. The DS1832 debounces the pushbutton input and guarantees an active reset pulse width of 250 ms minimum. The third function is a watchdog timer. The DS1832 has an internal timer that forces the reset signals to the active state if the strobe input is not driven low prior to time-out. The watchdog timer function can be set to operate on time-out settings of approximately 150 ms, 600 ms, or 1.2 seconds.

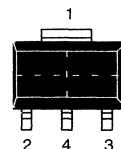
FEATURES

- Automatically restarts microprocessor after power failure
- Maintains active-high reset for 350 ms after V_{CC} returns to an in-tolerance condition
- Accurate 5%, 10% or 15% microprocessor 5V power supply monitoring
- Reduces need for discrete components
- Precision temperature-compensated voltage reference and voltage sensor
- Low-cost TO-92 package or surface mount SOT-223 package
- Internal 5K pull-up resistor
- Operating temperature of -40°C to $+85^{\circ}\text{C}$

PIN ASSIGNMENT



TO-92 PACKAGE
See Mech. Drawings
Section



SOT-223 PACKAGE
See Mech. Drawings
Section

PIN DESCRIPTION

Pin 1	Ground
Pin 2	Reset
Pin 3	V_{CC}
Pin 4	Ground (SOT-223 only)

DESCRIPTION

The DS1833 EconoReset uses a precision temperature compensated reference and comparator circuit to monitor the status of the power supply (V_{CC}). When an out-of-tolerance condition is detected, an internal power fail signal is generated which forces reset to the active

(high) state. When V_{CC} returns to an in-tolerance condition, the reset signal is kept in the active state for approximately 350 ms to allow the power supply and processor to stabilize.

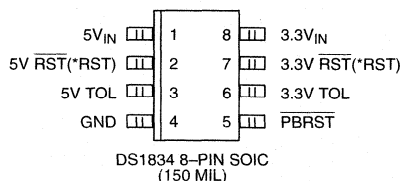
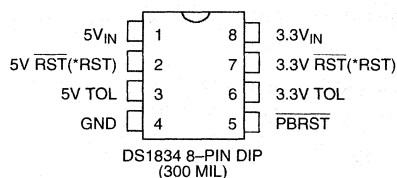
FEATURES

- 5 volt power-on reset
- 3.3 volt power-on reset
- Internal power is drawn from higher of either the 5V IN input or the 3.3V IN input
- Excellent for systems designed to operate with dual power supplies
- Asserts resets during power transients
- Pushbutton reset input for system override
- Maintains reset for 350 ms after V_{CC} returns to an in-tolerance condition
- Reduces need for discrete components
- Precision temperature-compensated voltage reference and voltage sensor
- 8-pin or DIP 8-pin SOIC available
- CMOS output for low current operation on the DS1834 and DS1834D
- Operating temperature of -40°C to $+85^{\circ}\text{C}$

DESCRIPTION

The DS1834 Dual EconoResets monitors three vital system conditions: 5 volt supply, 3.3 volt supply, and an external override. First a precision temperature reference and comparator circuit monitors the status of the 5 volt supply and the 3.3 volt supply. When an out-of-tolerance condition is detected, an internal power fail

PIN ASSIGNMENT



PIN DESCRIPTION

$5V_{IN}$	– 5V Power Supply Input
$5V_{\overline{RST}}(*RST)$	– 5V Reset Output
$5V_{TOL}$	– Selects 5V Input Tolerance
GND	– Ground
\overline{PBRST}	– Pushbutton Reset
$3.3V_{TOL}$	– Selects 3.3V Input Tolerance
$3.3V_{\overline{RST}}(*RST)$	– 3.3V Reset Output
$3.3V_{IN}$	– 3.3V Power Supply Input
*DS1834D Active High Reset	

signal is generated which forces the reset of the affected supply to an active state.

Lastly, the DS1834 supports an external reset via an internally debounced pushbutton input. When the pushbutton is pulled low both resets will be asserted for approximately 350 ms after the pushbutton is released.

DALLAS

SEMICONDUCTOR

DS1836A/B/C/D

3.3V/5V MicroManager

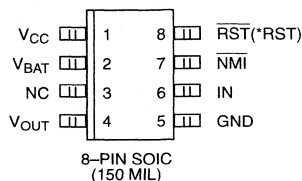
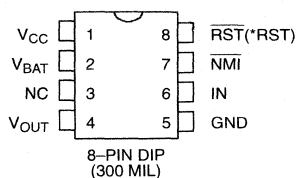
FEATURES

- 5 volt or 3.3 volt power-on reset
- True 3 volt operation power switch
- Switches to battery at 2.6 volts
- Excellent for systems designed to operate with dual power supplies
- Asserts resets during power transients
- Maintains reset for 350 ms after V_{CC} returns to an in-tolerance condition
- Reduces need for discrete components
- Precision temperature-compensated voltage reference and voltage sensor
- 8-pin DIP or space saving 8-pin SOIC surface mount available
- CMOS reset output for low current operation
- Operating temperature of -40°C to $+85^{\circ}\text{C}$
- Perfect for PIC microprocessor applications

DESCRIPTION

The DS1836 MicroManager performs three vital system functions. First a precision temperature compensated reference and comparator circuit monitors the status of the voltage on V_{CC} and when an out-of-tolerance condition is detected, an internal power fail signal is generated which forces the reset active. If V_{CC} continues to degrade it switches to the battery supply when V_{CC} drops below 2.6 volts. When V_{CC} exceeds 2.8

PIN ASSIGNMENT



DS1836A/B (*DS1836C/D)

PIN DESCRIPTION

V_{CC}	– Power Supply Input
V_{BAT}	– Battery Supply Input
NC	– No Connect
V_{OUT}	– Power Supply Output
GND	– Ground
IN	– Sense Input
$\overline{\text{NMI}}$	– Non-maskable Interrupt
$\overline{\text{RST}}(*\text{RST})$	– Reset Output

volts; V_{OUT} will again be supplied from V_{CC} . Reset will remain active for 350 ms after V_{CC} returns to an in-tolerance condition.

Lastly, the DS1836 supports a sense input that sends a non-maskable interrupt whenever the sense input drops below 1.25 volts.

DIGITAL POTENTIOMETERS

DALLAS

SEMICONDUCTOR

DS1267

Dual Digital Potentiometer Chip

FEATURES

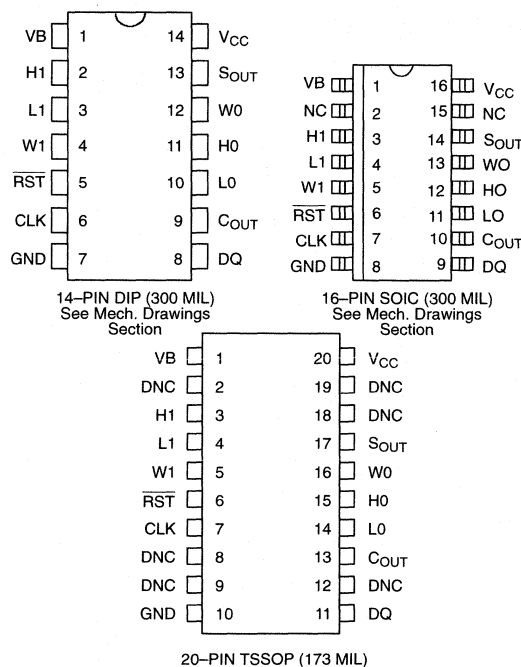
- Ultra-low power consumption, quiet, pumpless design
- Two digitally controlled, 256-position potentiometers
- Serial port provides means for setting and reading both potentiometers
- Resistors can be connected in series to provide increased total resistance
- 14-pin DIP, 16-pin SOIC, 20-pin TSSOP packages
- Resistive elements are temperature compensated to ± 0.3 LSB relative linearity
- Standard resistance values:
 - DS1267-10 $\sim 10K\Omega$
 - DS1267-50 $\sim 50K\Omega$
 - DS1267-100 $\sim 100K\Omega$
- Temperature:
 - Commercial: 0°C to 70°C
 - Industrial: -40°C to 85°C

DESCRIPTION

The DS1267 consist of two digitally controlled solid-state potentiometers. Each potentiometer is composed of 256 resistive sections. Between each resistive section and both ends of the potentiometer are tap points which are accessible to the wiper. The position of the wiper on the resistive array is set by an 8-bit value that controls which tap point is connected to the wiper output. Communication and control of the device is accomplished via a 3-wire serial port interface. This interface allows the device wiper position to be read or written.

Both potentiometers can be connected in series (or stacked) for an increased total resistance with the same resolution. For multiple device-single processor environments, the DS1267 can be cascaded or daisy chained. This feature provides for control of multiple devices over a single 3-wire bus.

PIN ASSIGNMENT



PIN DESCRIPTION

- | | |
|------------------|--------------------------------|
| L0, L1 | – Low End of Resistor |
| H0, H1 | – High End of Resistor |
| W0, W1 | – Wiper Terminal of Resistor |
| V _B | – Substrate Bias Voltage |
| S _{OUT} | – Stacked Configuration Output |
| R _{ST} | – Serial Port Reset Input |
| DQ | – Serial Port Data Input |
| CLK | – Serial Port Clock Input |
| C _{OUT} | – Cascade Port Output |
| V _{CC} | – +5 Volt Supply |
| GND | – Ground |
| NC | – No Internal Connection |
| DNC | – Do Not Connect |

DALLAS

SEMICONDUCTOR

DS1666, DS1666S

Audio Digital Resistor

FEATURES

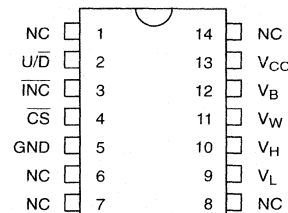
- 128 position, digitally controlled potentiometer
- Operates from a +5 volts power supply with TTL signal inputs
- Wide analog voltage range of ± 5 volts
- Resistive elements are temperature compensated to ± 20 percent end to end
- Low-power CMOS
- 14-pin DIP or 16-pin SOIC for surface mount applications
- Default position on power up sets wiper position at 10%
- Operating temperature range
 - 0°C to 70°C ; commercial version
 - -40°C to $+85^{\circ}\text{C}$; industrial version

	Resolution/Step			
	Low End	High End	-3dB Point	
DS1666-10	10K Ω	24 Ω	152 Ω	1.1 MHz
DS1666-50	50K Ω	122 Ω	759 Ω	200 KHz
DS1666-100	100K Ω	243 Ω	1.519K Ω	100 KHz

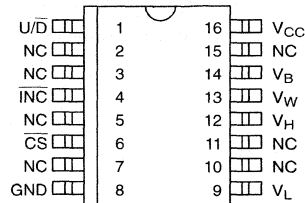
DESCRIPTION

The DS1666 is a solid-state potentiometer which is set to value by digitally controlled resistive elements. The potentiometer is composed of 127 resistive sections. Between each resistive section and both ends of the potentiometer are TAP points accessible to the wiper. The position of the wiper on the resistance array is controlled by the $\overline{\text{CS}}$, $\text{U}/\overline{\text{D}}$ and $\overline{\text{INC}}$ inputs. The position of the wiper defaults to the 10% position on power up. The resolution of the DS1666 is shown in Figure 1.

PIN ASSIGNMENT



14-PIN DIP (300 MIL)
See Mech. Drawings Section



16-PIN SOIC (300 MIL)
See Mech. Drawings Section

PIN DESCRIPTION

V_H	– High Terminal of Resistor
V_L	– Low Terminal of Resistor
V_W	– Wiper Terminal of Resistor
$\text{U}/\overline{\text{D}}$	– Up/Down Control
$\overline{\text{INC}}$	– Wiper Movement Control
$\overline{\text{CS}}$	– Chip Select for Wiper Movement
NC	– No Connection
V_{CC}	– +5 Volts
GND	– Ground
V_B	– 0 to –5 Volts

The DS1666 Digital Audio Resistor is uniquely designed to provide a potentiometer that is logarithmic rather than linear across its entire range. The lower half of the potentiometer advances 1% of total resistance for each 3% of scale advanced, providing for precise amplification of low volume signals. The upper half of the potentiometer advances 2% of resistance for every 1% of scale advanced, providing for the lower resolution gain required for high volume amplification.

DALLAS SEMICONDUCTOR

DS1667 Digital Resistor with OP AMP

FEATURES

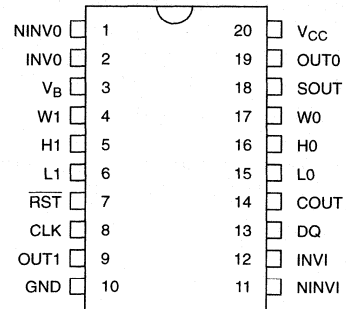
- Two digitally controlled 256-position potentiometers
- Serial port provides means for setting and reading both potentiometers
- Resistors can be connected in series to provide additional resolution
- Default wiper position on power up is 50%
- Resistive elements are temperature compensated to $\pm 20\%$ end to end
- Two high gain wide bandwidth operational amplifiers
- Low power CMOS design
- Applications include analog-to-digital and digital-to-analog converters, variable oscillators, and variable gain amplifiers
- 20-pin DIP package or optional 20-pin SOIC surface mount package
- Operating temperature range of 0°C to 70°C
- Resistance Values

		RESOLUTION		-3 dB POINT
DS1667-10:	10K	39 ohms		1.1 MHz
DS1667-50:	50K	195 ohms		200 kHz
DS1667-100:	100K	390 ohms		100 kHz

DESCRIPTION

The DS1667 is a dual-solid state potentiometer that is adjustable by digitally selected resistive elements. Each potentiometer is composed of 256 resistive elements. Between each resistive section of each potentiometer are tap points accessible to the wiper. The position of the wiper on the resistive array is set by an 8-bit register that controls which tap point is connected to the wiper output. Each 8-bit register can be read or written by sending or receiving data bits over a 3-wire serial port. In addition, the resistors can be stacked such that

PIN ASSIGNMENT



20-PIN DIP (300 MIL) AND 20-PIN SOIC
See Mech. Drawings Section

PIN DESCRIPTION

V _{CC}	- +5 Volt Supply
GND	- Ground
L0, L1	- Low End of Resistor
H0, H1	- High End of Resistor
W0, W1	- Wiper End of Resistor
V _B	- Substrate Bias and OP AMP Negative Supply
SOUT	- Wiper for Stacked Configuration
RST	- Serial Port Reset Input
DQ	- Serial Port Input/Output
CLK	- Serial Port Clock Input
COUT	- Cascade Serial Port Output
NINV0, NINVI	- Noninverting OP AMP Input
INV0, INV1	- Inverting OP AMP Input
OUT0, OUT1	- OP AMP Outputs

a single potentiometer of 512 sections results. When two separate potentiometers are used, the resolution of the DS1667 is equal to the resistance value divided by 256. When the potentiometers are stacked end to end, the resistance value is doubled while the resolution remains the same. The DS1667 also contains two high gain wide bandwidth operational amplifiers. Each amplifier has both the inverting and non-inverting inputs and the output available for user configuration.

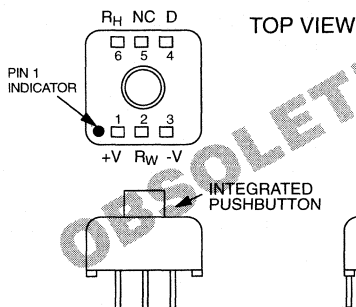
DALLAS SEMICONDUCTOR

DS1668, DS1669, DS1669S Dallastat™ Electronic Digital Rheostat

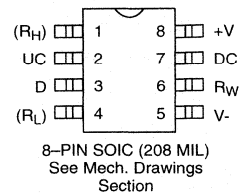
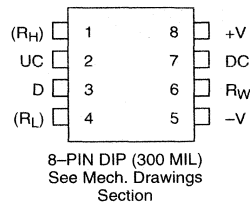
FEATURES

- Replaces mechanical variable resistors
- Available as the DS1668 with manual interface or the DS1669 integrated circuit
- Human engineered interface provides easy control with DS1668
- Electronic interface provided for digital as well as manual control
- Wide differential input voltage range between 4.5 and 8 volts
- Wiper position is maintained in the absence of power
- Low cost alternative to mechanical controls
- Applications include volume, tone, contrast, brightness, and dimmer control
- 8-pin SOIC and 8-pin DIP packages for DS1669
- Standard resistance values for Dallastat
 - DS1668/DS1669–10 ~ 10K Ω
 - DS1668/DS1669–50 ~ 50K Ω
 - DS1668/DS1669–100 ~ 100K Ω
- Operating Temperature Range
 - Commercial: 0°C to 70°C; DS1668, DS1669
 - Industrial: -40°C to +85°C; DS1669

PIN ASSIGNMENT DS1668



PIN ASSIGNMENT DS1669



PIN DESCRIPTION DS1669

R _H	– Resistor High End
R _w	– Resistor Wiper
R _L	– Resistor Low End
-V, +V	– Voltage Inputs
UC	– Up Contact Input
D	– Digital Input
DC	– Down Contact Input

PIN DESCRIPTION DS1668

+V	– Positive Voltage Input
-V	– Negative Voltage
R _w	– Resistor Wiper
D	– Digital Input
R _H	– Resistor High End
NC	– No Connection – Pin Missing

DALLAS SEMICONDUCTOR

DS1800 Dual Inverting Log Gain/Attenuator

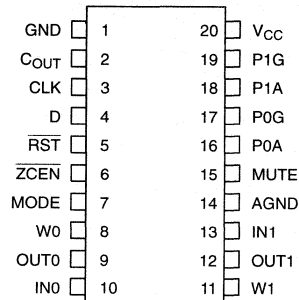
FEATURES

- Ultra-low power consumption
- Operates from 3V or 5V supplies
- Two digitally controlled, 128-position potentiometers including mute
- Logarithmic Gain Characteristics
- Zero-crossing detection circuitry eliminates noise caused by discrete wiper position changes
- Two Control Interfaces
 - 3-wire serial CPU control
 - Push-button control
- 20-pin DIP (300 Mil), 20-pin SOIC (300 Mil), and 20-pin (173 Mil) TSSOP packaging available
- Operating Temperature:
 - Commercial: 0°C to 70°C
 - Industrial: -40°C to +85°C
- Software and hardware mute
- Resistance Available: 53KΩ

DESCRIPTION

The DS1800 is a dual audio-taper potentiometer designed specifically for use in the feedback path of the inverting configuration of an operational amplifier (see Figure 2). In this configuration, the DS1800 provides a V_O/V_I relationship of $-20\log(R_F/R_I)$ giving a gain/attenuation range covering +20 dB to -63 dB. Each potentiometer has a total of 129 positions including mute. The

PIN ASSIGNMENT



20-PIN DIP (300 MIL)
20-PIN SOIC (300 MIL)
20-PIN TSSOP

See Mech. Drawings
Section

PIN DESCRIPTION

OUT0,OUT1	– Low-end of resistor
IN0, IN1	– High-end of resistor
W0,W1	– Wiper Terminal
V _{CC}	– 3V or 5V Power Supply Input
$\overline{\text{RST}}$	– Serial Port Reset Input
CLK	– Serial Port Clock Input
D	– Serial Port Data Input
C _{OUT}	– Cascade Data Output
P0G,P1G	– Gain Input Pot Controls
P0A,P1A	– Attenuation Input Pot Controls
$\overline{\text{ZCEN}}$	– Zero-Crossing Detect Input
MUTE	– Hardware Mute Control Input
AGND	– Analog Ground
GND	– Ground

DS1800 provides five areas of resolution which include 0.25 dB per step from +20 dB to +3 dB, 0.5 dB per step from +3 dB to -12 dB, 1 dB from -12 dB to -27 dB, and from -27 dB to -47 dB; 2 dB per step, and from -47 dB to -63 dB; 4 dB per step. The mute position provides 100 dB of attenuation.

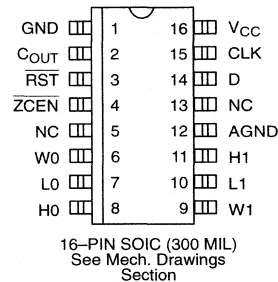
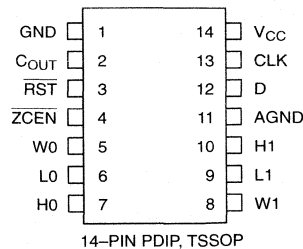
FEATURES

- Ultra-low power consumption
- Operates from 3V or 5V supplies
- Two digitally controlled, 65-position potentiometers including mute
- Logarithmic resistive characteristics (1 dB per step)
- Zero-crossing detection eliminates noise caused by wiper movement
- Serial port provides means for setting and reading both potentiometer wipers
- 14-pin PDIP, 16-pin SOIC, and 14-pin TSSOP packages
- Temperature:
 - Industrial: -40°C to $+85^{\circ}\text{C}$
- Software mute

DESCRIPTION

The DS1801 is a dual audio taper potentiometer having logarithmic resistive characteristics over the device range. Each potentiometer provides 65 wiper positions with a 1 dB increment per step and device mute. The 3-wire serial interface, using a CPU, provides the user the ability of reading or writing exact wiper positions of the two potentiometers. Additionally, the part contains a zero-crossing detection feature that minimizes noise resulting from wiper transitions. Packages for the part include a 14-pin PDIP, 16-pin SOIC, and 14-pin TSSOP.

PIN ASSIGNMENT



PIN DESCRIPTION

- L0, L1 – Low End of Resistor
- H0, H1 – High End of Resistor
- W1, W2 – Wiper End of Resistor
- V_{CC} – 3V/5V Power Supply Input
- R_{ST} – Serial Port Reset Input
- D – Serial Port Data Input
- CLK – Serial Port Clock Input
- GND – Digital Ground
- AGND – Analog Ground
- ZCEN – Zero-Crossing Detect
- C_{OUT} – Cascade Output
- NC – No Connect

DALLAS SEMICONDUCTOR

DS1802 Dual Audio Taper Potentiometer with Push-button Control

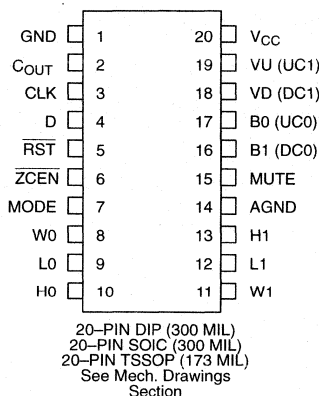
FEATURES

- Ultra-low power consumption
- Operates from 3V or 5V supplies
- Two digitally controlled, 65-position potentiometers including mute
- Logarithmic resistive characteristics (1 dB per step)
- Zero-crossing detection eliminates noise caused by wiper movement
- Digital or mechanical push-button wiper control
- Serial port provides means for setting and reading both potentiometer wipers
- 20-pin SOIC and 20-pin TSSOP for surface mount applications
- Temperature:
 - Commercial: 0°C to 70°C
- Software and hardware mute

DESCRIPTION

The DS1802 is a dual audio taper-potentiometer having logarithmic resistive characteristics over the device range. Each potentiometer provides 65 wiper positions with a 1 dB increment per step and device mute. The DS1802 has two methods of device control which include contact closure (push-button) inputs and a 3-wire serial interface for wiper positioning. The push-button control inputs provide a simple interface for device control without the need for a CPU. While the 3-wire serial interface, using a CPU, provides the user the ability of reading or

PIN ASSIGNMENT



PIN DESCRIPTION

L0, L1	– Low End of Resistor
H0, H1	– High End of Resistor
W1, W2	– Wiper End of Resistor
V _{CC}	– 3V/5V Power Supply Input
RST	– Serial Port Reset Input
D	– Serial Port Data Input
CLK	– Serial Port Clock Input
MODE	– Mode Select Input
UC0, UC1	– Up Control push-button Inputs
DC0, DC1	– Down Control push-button Inputs
VU, VD	– Volume-Up/Volume-Down Inputs
B0, B1	– Balance Pot-0, Pot-1 Inputs
GND	– Digital Ground
MUTE	– Mute
AGND	– Analog Ground
ZCEN	– Zero-Crossing Detect
C _{OUT}	– Cascade Output

writing exact wiper positions of the two potentiometers. The DS1802 can also be configured to operate in either independent or "stereo" modes, when using push-button control. Independent mode of operation allows for independent wiper control and stereo mode of operation provides single input control over both potentiometer wiper positions. The DS1802 is offered in commercial temperature versions. Packages for the part include a 20-pin DIP, 20-pin SOIC, and 20-pin TSSOP.

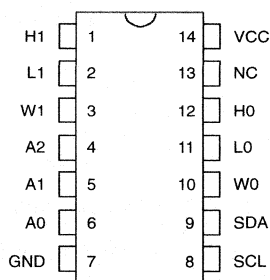
FEATURES

- 3V or 5V Power Supplies
- Ultra-low power consumption
- Two digitally controlled, 256-position potentiometers
- 14-Pin TSSOP (173 mil) and 16-Pin SOIC (150 mil) packaging available for surface mount applications
- Addressable using 3-Chip Select Inputs
- Serial/Synchronous Bus Interface
- Operating Temperature
 - Industrial: -40°C to $+85^{\circ}\text{C}$
- Standard Resistance Values:
 - DS1803-010 10K Ω
 - DS1803-050 50K Ω
 - DS1803-100 100K Ω

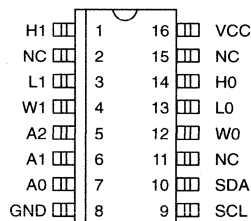
DESCRIPTION

The DS1803 is an addressable device having two independently controlled potentiometers. Each potentiometer's wiper can be set to one of 256 positions. Device control is achieved via a 2-wire serial interface having a data I/O terminal and a clock input terminal. Device addressing is provided through three chip select input terminals and correct communication protocol. Addressing capability, when operating in a bus topology, allows

PIN ASSIGNMENT



DS1803E 14-PIN TSSOP (173 MIL)



DS1803Z 16-PIN SOIC (150 MIL)

DS1803 16-PIN DIP (300 MIL)

See Mech. Drawings
Section

PIN DESCRIPTION

- L0, L1 – Low End of Resistor
- H0, H1 – High End of Resistor
- W0, W1 – Wiper Terminal of Resistor
- V_{CC} – 3V/5V Power Supply Input
- A0 ..A2 – Chip Select Inputs
- SDA – Serial Data I/O
- SCL – Serial Clock Input
- GND – Ground
- NC – No connection

up to eight devices to be controlled by the serial interface. The exact wiper position of each potentiometer can be written or read. The DS1803 is available in a 16-pin DIP, 16-pin SOIC and 14-pin TSSOP package. The device is available in commercial or industrial grade temperature versions and three standard resistance values: 10K Ω , 50K Ω , and 100K Ω .

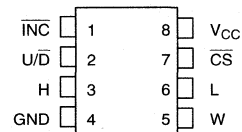
DALLAS SEMICONDUCTOR

DS1804 NV Trimmer Potentiometer

FEATURES

- Single 100-Position Linear Taper Potentiometer
- Nonvolatile "On-Demand" Wiper Storage
- Operates from 3V or 5V supplies
- Up/Down, Increment Controlled Interface
- Resistance Values: 10K Ω , 50K Ω , and 100K Ω
- Available in 8-Pin (300 Mil) DIP, 8-Pin (150 Mil) SOIC packages
- Operating Temperature:
 - Commercial: 0°C to 70°C
 - Industrial: -40°C to +85°C

PIN ASSIGNMENT



8-PIN DIP (300 MIL)
8-PIN SOIC (150 MIL)

See Mech. Drawings
Section

PIN DESCRIPTION

H	– High-End of Resistor
L	– Low-End of Resistor
W	– Wiper Terminal
V_{CC}	– 3V or 5V Power Supply Input
$\overline{\text{CS}}$	– Chip Select
$\overline{\text{U/D}}$	– Up/Down Control Input
$\overline{\text{INC}}$	– Increment/Decrement Counter Input
GND	– Ground

DESCRIPTION

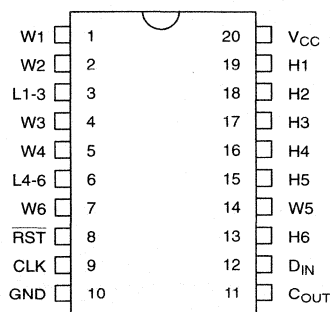
The DS1804 is a nonvolatile digital potentiometer having 100 positions. The device provides an ideal method for low-cost trimming applications using a CPU or manual control input with minimal external circuitry. Wiper position of the DS1804 can be stored in EEPROM memory on demand. The device's wiper position is manipulated by a 3-terminal port that provides an increment/decrement counter controlled interface. This port consist of the control inputs $\overline{\text{CS}}$, $\overline{\text{INC}}$, and $\overline{\text{U/D}}$.

The DS1804 is available in three resistor grades which include a 10K Ω , 50K Ω , and 100K Ω . Commercial and industrial versions of the device are available. Additionally, the DS1804 will operate from 3V or 5V supplies and is ideal for portable application requirements. Two packaging options are available and include the 8-pin (300 mil) DIP and 8-Pin (150 mil) SOIC.

FEATURES

- Six digitally controlled 64-position potentiometers
- 3-Wire Serial Port provides for reading and setting each potentiometer
- Devices can be cascaded for single processor multi-device control
- Standard Resistance Values
 - DS1806-010 – 10K ohm
 - DS1806-050 – 50K ohm
 - DS1806-100 – 100K ohm
- Temperature:
 - Industrial: -40°C to $+85^{\circ}\text{C}$

PIN ASSIGNMENT



DS1806 20-PIN DIP (300 MIL)
 DS1806S 20-PIN SOIC (300 MIL)
 DS1806E 20-PIN TSSOP (173 MIL)
 See Mech. Drawings
 Section

PIN DESCRIPTION

V_{CC}	– 3V or 5V Supply
\overline{RST}	– Serial Port Reset Input
D_{IN}	– Serial Port Data Input
CLK	– Serial Port Clock Input
C_{OUT}	– Cascade Data Output
H1 – H6	– High End Terminal of Pot
W1 – W6	– Wiper Terminal of Pot
GND	– Ground
L1–3	– Low Terminal Pots 1 thru 3
L4–6	– Low Terminal Pots 4 thru 6

DESCRIPTION

The DS1806 is a six-channel digitally controlled solid-state linear potentiometer. Each potentiometer is comprised of 63 equiresistive sections as illustrated in the block diagram of Figure 1. Each potentiometer has three terminals accessible to the user. These include the high side terminals, H_x , the wiper terminals, W_x , and the low-end terminals, L1–3 and L4–6. Potentiometers 1 through 3 share the same low-end terminal L1–3. And likewise, potentiometers 4 through 6 share the low-end terminal L4–6.

Each wiper's position is selected via an 8-bit register value. Communication and control of the device is ac-

complished via a 3-wire serial port interface. This interface in conjunction with a cascade output allows the value of the device wiper settings to be read.

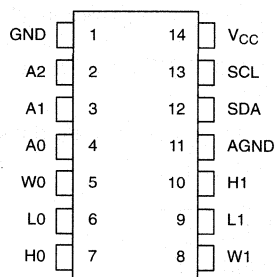
For multiple device and single processor environments, the DS1806 can be cascaded or daisy chained. This feature allows a single processor to control multiple devices.

The DS1806 is available in 10K, 50K and 100K ohm versions. The DS1806 is available in commercial and industrial temperature versions. Packages for the device include 20-lead DIPs, SOICs, and TSSOPs.

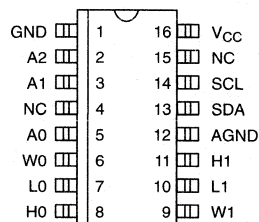
FEATURES

- Operates from 3V or 5V Power Supplies
- Ultra-low power consumption
- Two digitally controlled, 65-position potentiometers
- Logarithmic resistor characteristics (1 dB per step)
- Zero-crossing detection eliminates noise caused by discrete wiper changes
- Addressable using 3-Chip Select Inputs
- Serial/Synchronous Bus Interface
- Operating Temperature
 - Commercial: 0°C to 70°C
 - Industrial: -40°C to +85°C
- Resistance Value: 45KΩ

PIN ASSIGNMENT



DS1807 14-PIN DIP (300 MIL)
 DS1807E 14-PIN TSSOP (173 MIL)



DS1807S 16-PIN SOIC (300 MIL)
 See Mech. Drawings
 Section

PIN DESCRIPTION

L0,L1	– Low End of Resistor
H0,H1	– High End of Resistor
W0,W1	– Wiper Terminal of Resistor
V _{CC}	– 3V/5V Power Supply Input
A0 . . . A2	– Chip Select Inputs
SDA	– Serial Data I/O
SCL	– Serial Clock Input
GND	– Digital Ground
AGND	– Analog Ground
NC	– No connection

DESCRIPTION

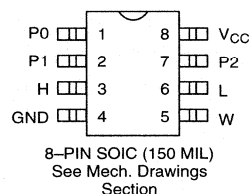
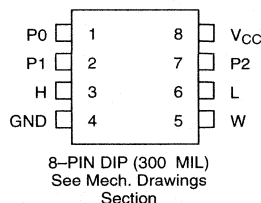
The DS1807 is a dual audio taper potentiometer having a logarithmic resistive characteristic. Each potentiometer has a total of 65 wiper positions including the mute position. Adjacent wiper positions are separated by 1 dB giving a total attenuation range of 64 dB. When the wipers are in the mute position, attenuation in excess of 90 dB is achieved. The DS1807 also provides a zero-

crossing detection capability. This capability eliminates noise caused by discrete wiper position changes. The DS1807 is controlled via a two input, serial synchronous interface that provides the capability of addressing up to eight different DS1807s. Addressability is obtained via communication protocol and three (3) address select inputs A0, A1, and A2.

FEATURES

- Single 8-position Log Trimmer Potentiometer 5-dB/step
- Operates from 2.7V to 5.5V supplies
- Parallel interface control: P0, P1, P2
- Resistance values: 10K Ω
- 8-pin DIPs; 8-pin (150) SOICs
- Operating temperature:
 - Industrial: -40°C to $+85^{\circ}\text{C}$

PIN ASSIGNMENT



PIN DESCRIPTION

H	– High End of Resistor
L	– Low End of Resistor
W	– Wiper Terminal
V _{CC}	– 3V or 5V Power Supply Input
P0	– Position Select – Bit 0
P1	– Position Select – Bit 1
P2	– Position Select – Bit 2
GND	– Ground

DESCRIPTION

The DS1866 is a single volatile digital potentiometer having eight positions with a 5 dB resolution per step. The device provides an ideal method for low-cost trimming or volume control using a CPU or manual control input. The device's wiper position is set to one of eight positions by a 3-terminal parallel port. The value of the wiper position is determined by the states the P0, P1, and P2 port pins.

The DS1866 is available as a 10K potentiometer and is available in an industrial temperature grade. Additionally, the DS1866 will operate from 3V or 5V supplies and is ideal for portable applications requiring low standby

current. Two packaging options are available and include the 8-pin (300 mil) DIP, 8-pin (150 mil) SOIC.

OPERATION

The DS1866 is a single volatile potentiometer. The device has a total of eight positions providing a resolution of 5 dB per step and giving a total attenuation range of 0 dB to -35 dB. These tap points are accessible to the W-terminal whose position is controlled via a 3-terminal parallel port consisting of input signals P0, P1, and P2. A block diagram of the DS1866 is shown in Figure 1.

DALLAS SEMICONDUCTOR

DS1867 Dual Digital Potentiometer with EEPROM

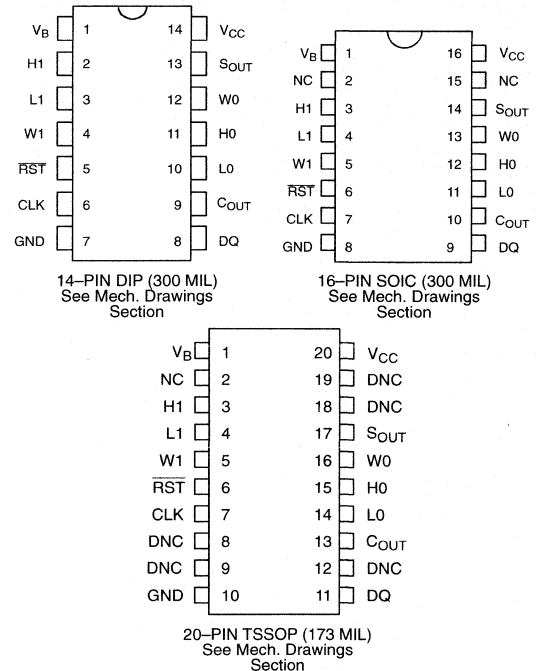
FEATURES

- Nonvolatile version of the popular DS1267
- Low power consumption, quiet, pumpless design
- Operates from single 5V or $\pm 5V$ supplies
- Two digitally controlled, 256-position potentiometers
- Wiper position is maintained in the absence of power
- Serial port provides means for setting and reading both potentiometers
- Resistors can be connected in series to provide increased total resistance
- 16-pin SOIC and 20-pin TSSOP for surface mount applications
- Standard resistance values:
 - DS1867-10 $\sim 10K\Omega$
 - DS1867-50 $\sim 50K\Omega$
 - DS1867-100 $\sim 100K\Omega$
- Temperature:
 - Commercial: $0^{\circ}C$ to $70^{\circ}C$
 - Industrial: $-40^{\circ}C$ to $+85^{\circ}C$

DESCRIPTION

The DS1867 is the nonvolatile version of the popular DS1267 Dual Digital Potentiometer. The DS1867 consists of two digitally controlled potentiometers having 256-position wiper settings. Wiper position is maintained in the absence of power through the use of EEPROM memory cell arrays. Communication and control of the device is accomplished over a 3-wire serial port which allows reads and writes of the wiper position. Both potentiometers can be stacked for increased total resistance with the same resolution. For multiple device-single processor environments, the DS1867 can be cascaded for control over a single 3-wire bus. The DS1867 is offered in three standard resistance values and commercial and industrial temperature versions.

PIN ASSIGNMENT



PIN DESCRIPTION

- | | |
|----------|-----------------------------------|
| L0, L1 | – Low End of Resistor |
| H0, H1 | – High End of Resistor |
| W1, W2 | – Wiper End of Resistor |
| V_B | – Substrate Bias |
| SOUT | – Wiper for Stacked Configuration |
| RST | – Serial Port Reset Input |
| DQ | – Serial Port Data Input |
| CLK | – Serial Port Clock Input |
| COUT | – Cascade Serial Port Output |
| V_{CC} | – +5 Volt Supply Input |
| GND | – Ground |
| NC | – No Internal Connection |
| DNC | – Do Not Connect |

FEATURES

- Ultra-low power consumption, quiet, pumless design
- Two digitally controlled, 256-position potentiometers
- Serial port provides means for setting and reading both potentiometers
- Resistors can be connected in series to provide increased total resistance
- 20-pin TSSOP package
- Resistive elements are temperature compensated to ± 0.3 LSB relative linearity
- Standard resistance values:
 - DS1868-10 $\sim 10k\Omega$
 - DS1868-50 $\sim 50k\Omega$
 - DS1868-100 $\sim 100k\Omega$
- +5V or $\pm 3V$ operation
- Temperature: 0°C to 70°C commercial
 -40°C to $+85^{\circ}\text{C}$ industrial

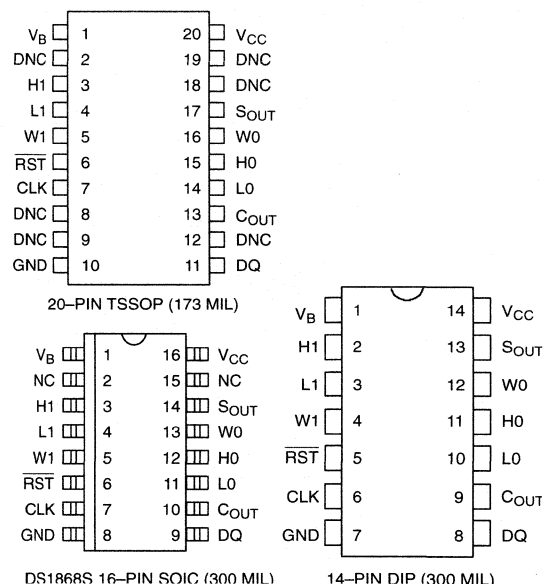
DESCRIPTION

The DS1868 consist of two digitally controlled solid-state potentiometers. Each potentiometer is composed of 256 resistive sections. Between each resistive section and both ends of the potentiometer are tap points which are accessible to the wiper. The position of the wiper on the resistor array is set by an 8-bit value that controls which tap point is connected to the wiper output. Communication and control of the device is accomplished via a 3-wire serial port interface. This interface allows the device wiper position to be read or written.

Both potentiometers can be connected in series (or stacked) for an increased total resistance with the same resolution. For multiple device-single processor environments, the DS1868 can be cascaded or daisy chained. This feature provides for control of multiple devices over a single 3-wire bus.

The DS1868 is offered in three standard resistance values which include 10k, 50k, and 100k Ohm versions.

PIN ASSIGNMENT



The part is available in 16-pin SOIC (300 mil), 14-pin DIP, and 20-pin (173 mil) TSSOP packages. Both commercial and industrial temperature grades are also available.

PIN DESCRIPTION

- LO, L1 - Low End of Resistor
- H0, H1 - High End of Resistor
- W0, W1 - Wiper Terminal of Resistor
- SOUT - Stacked Configuration Output
- RST - Serial Port Reset Input
- DQ - Serial Port Data Input
- CLK - Serial Port Clock Input
- COUT - Cascade Port Output
- V_{CC} - +5 Volt Supply
- GND - Ground Connections
- NC - No Internal Connection
- V_B - Substrate Bias Voltage
- DNC - Do Not Connect

*All GND pins must be connected to ground.

DALLAS SEMICONDUCTOR

DS1869 3V Dallastat™ Electronic Digital Rheostat

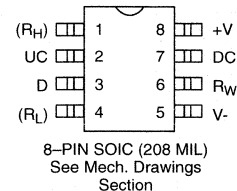
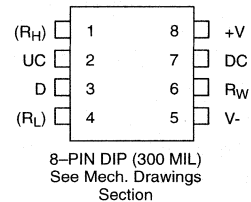
FEATURES

- Replaces mechanical variable resistors
- Operates from 3V or 5V supplies
- Electronic interface provided for digital as well as manual control
- Wiper position is maintained in the absence of power
- Low cost alternative to mechanical controls
- Applications include volume, tone, contrast, brightness, and dimmer control
- 8-pin SOIC and 8-pin DIP packages for DS1869
- Standard resistance values for Dallastat
 - DS1869–10 ~ 10KΩ
 - DS1869–50 ~ 50KΩ
 - DS1869–100 ~ 100KΩ
- Operating Temperature Range
 - 20°C to 70°C
- 3V to 8V differential supply operational range

DESCRIPTION

The DS1869 Dallastat™ is a digital rheostat or potentiometer. This device provides 64 possible uniform tap points over the resistive range and is available in standard versions of 10KΩ, 50KΩ, and 100KΩ. The Dallastats can be controlled by either a mechanical-type contact closure input or a digital source input such as a CPU. The DS1869 operates from 3V or 5V supplies. Wiper position is maintained in the absence of power which is accomplished through the use of a EEPROM memory cell array. The EEPROM cell array is specified to accept greater than 50,000 writes.

PIN ASSIGNMENT



PIN DESCRIPTION

R _H	– Resistor High End (Option)
R _W	– Resistor Wiper
R _L	– Resistor Low End
–V, +V	– Voltage Inputs
UC	– Up Contact Input
D	– Digital Input
DC	– Down Contact Input

The DS1869 is offered in two standard IC packages which include an 8-pin 300 mil DIP and an 8-pin 208 mil SOIC. The DS1869 can be configured to operate using a single push-button, dual push-button or digital source input. This is illustrated in Figures 1 and 2. The DS1869 pinouts allow access to both ends of the potentiometer R_L, R_H, and the wiper, R_W. Control inputs include the digital source input, D, the up contact input, UC, and the down contact input, DC. Other pins include the positive, +V, and negative, –V, supply inputs. The DS1869 is specified to operate from –20°C to +70°C.



iBUTTON™



DS1920 Temperature iButton™

SPECIAL FEATURES

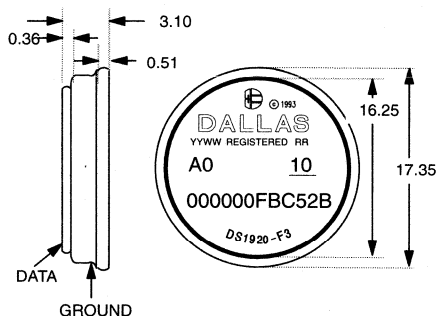
- Digital thermometer measures temperatures from -55°C to $+100^{\circ}\text{C}$ in typically 0.2 seconds
- Accuracy $\pm 0.5^{\circ}\text{C}$ within 0°C to $+70^{\circ}\text{C}$, no calibration or reference required
- Zero standby power
- 0.5°C resolution, digital temperature reading is two's complement of $^{\circ}\text{C}$ value
- Access to internal counters allows increased resolution through interpolation
- Reduces control, address, data, and power to a single data contact
- 8-bit device-generated CRC for data integrity
- 8-bit family code specifies DS1920 communications requirements to reader
- Special command set allows user to skip ROM section and do temperature measurements simultaneously for all devices on the bus
- Two bytes of EEPROM to be used either as alarm triggers or user memory
- Alarm search directly indicates which device senses alarming temperatures

COMMON iButton FEATURES

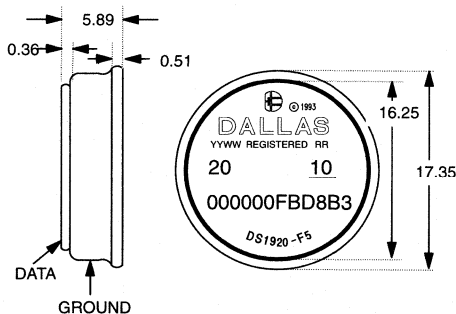
- Unique, factory-lasered and tested 64-bit registration number (8-bit family code + 48-bit serial number + 8-bit CRC tester) assures absolute traceability because no two parts are alike
- Multidrop controller for MicroLAN™
- Digital identification and information by momentary contact
- Chip-based data carrier compactly stores information
- Data can be accessed while affixed to object
- Economically communicates to bus master with a single digital signal at 16.3k bits per second
- Standard 16 mm diameter and 1-Wire™ protocol ensure compatibility with iButton family

- Button shape is self-aligning with cup-shaped probes
- Durable stainless steel case engraved with registration number withstands harsh environments
- Easily affixed with self-stick adhesive backing, latched by its flange, or locked with a ring pressed onto its rim
- Presence detector acknowledges when reader first applies voltage
- Meets UL#913 (4th Edit.); Intrinsically Safe Apparatus, Approved under Entity Concept for use in Class I, Division 1, Group A, B, C and D Locations (application pending)

F3 MICROCANT™



F5 MICROCANT™



All dimensions are shown in millimeters.



DS1954 Cryptographic iButton™

SECURITY FEATURES

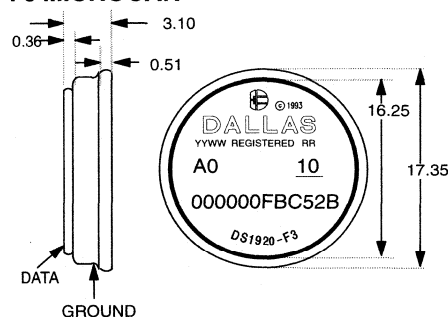
- Single-chip, physically secure coprocessor for non-secure host
- Arithmetic accelerator executes 1024-bit public key cryptography in less than 1 second
- Unresettable True Time Clock self-imposes expiration dates and date/time stamping
- Durable stainless steel case clearly shows visual evidence of physical tampering
- 6K bytes NVSRAM zeroes itself in response to tampering or cooling below -30°C
- 32K bytes of ROM stores unalterable validated firmware as Software ICs
- Unique, factory-lasered 64-bit registration number (8-bit family code + 48-bit serial number + 8-bit CRC tester) assures absolute traceability because no two parts are alike
- Multi-drop controller supports multiple iButtons on the same signal line for n-factor security
- Signal path to the chip is limited to the lid of the iButton to enhance security
- Communication protocol includes 16-bit CRCs to insure error free packet transfers to the buffer memory even with intermittent connection
- The iButton can be accessed while affixed to a wearable accessory to lower the chance of being lost or stolen
- Only an authorized service provider can install a transaction file which programs the iButton for a specific application
- The transaction file contains scripts that call on tested pre-fabricated cryptographic functions
- Each file can be locked after installation so that additional transaction files for new services may be installed without interference

GENERAL FEATURES

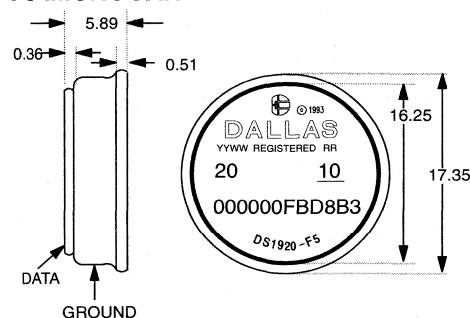
- Overdrive mode boosts communication speed from 16.3k to 142k bits per second
- Operating temperature range from -20°C to $+70^{\circ}\text{C}$
- Over 10 years of data retention

- Button shape is self-aligning with cup-shaped probes
- Durable stainless steel case engraved with registration number withstands harsh environments
- Easily affixed with self-stick adhesive backing, latched by its flange, or locked with a ring pressed onto its rim
- Presence detector acknowledges when reader first applies voltage
- Meets UL#913 (4th Edit.); Intrinsically Safe Apparatus, Approved under Entity Concept for use in Class I, Division 1, Group A, B, C and D Locations (application pending)

F3 MICROCANT™



F5 MICROCANT™



All dimensions are shown in millimeters.

DALLAS SEMICONDUCTOR

DS1962/DS1963 1K-Bit/4K-Bit Monetary iButton™

SPECIAL FEATURES

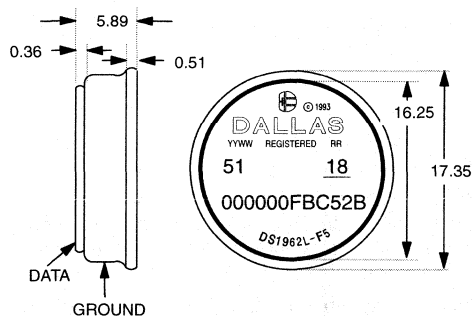
- 4096 bits of read/write nonvolatile memory (DS1963), 1024 bits with the DS1962
- Overdrive mode boosts communication speed to 142k bits per second
- 256-bit scratchpad ensures integrity of data transfer
- Memory partitioned into 256-bit pages for packetizing data
- Data integrity assured with strict read/write protocols
- Four 32-bit read-only non rolling-over page write cycle counters (DS1963), three page write cycle counters with the DS1962
- 32 factory-preset tamper-detect bits to indicate physical intrusion
- On-chip 16-bit CRC generator for safeguarding data transfers
- Operating temperature range from -40°C to +70°C
- Over 10 years of data retention

COMMON iButton FEATURES

- Unique, factory-lasered and tested 64-bit registration number (8-bit family code + 48-bit serial number + 8-bit CRC tester) assures absolute traceability because no two parts are alike
- Multidrop controller for MicroLAN™
- Digital identification and information by momentary contact
- Chip-based data carrier compactly stores information
- Can be accessed while affixed to object
- Economically communicates to host with a single digital signal at 16.3k bits per second
- Standard 16 mm diameter and 1-Wire™ protocol ensure compatibility with iButton Device family
- Button shape is self-aligning with cup-shaped probes
- Durable stainless steel case engraved with registration number withstands harsh environments
- Easily affixed with self-stick adhesive backing, latched by its flange, or locked with a ring pressed onto its rim
- Presence detector acknowledges when reader first applies voltage

- Meets UL#913 (4th Edit.); Intrinsically Safe Apparatus, Approved under Entity Concept for use in Class I, Division 1, Group A, B, C and D Locations (application pending)

F5 MICROCAN™



ORDERING INFORMATION

DS1962L-F5	F5 MicroCan
DS1963L-F5	F5 MicroCan

EXAMPLES OF ACCESSORIES

DS9096P	Self-Stick Adhesive Pad
DS9101	Multi-Purpose Clip
DS9093RA	Mounting Lock Ring
DS9093F	Snap-In Fob
DS9092	iButton Probe

iButton DESCRIPTION

The DS1962/DS1963 Monetary iButton (hereafter referred to as DS196X) is a rugged read/write data carrier that acts as a localized database that can be easily accessed with minimal hardware. The nonvolatile memory offers a simple solution to storing and retrieving information pertaining to the object to which the iButton is associated. Data is transferred serially via the 1-Wire protocol which requires only a single data lead and a ground return.



DS1971 256-Bit EEPROM iButton™

SPECIAL FEATURES

- 256-bits Electrically Erasable Programmable Read Only Memory (EEPROM) communicates with the economy of one signal plus ground
- EEPROM organized as one 256-bit page
- 64-bit one-time programmable application register is automatically write-protected after programming
- Reduces control, address, data, power, and programming signals to a single data pin
- 8-bit family code specifies DS1971 communications requirements to reader
- Reads and writes over a wide voltage range of 2.8V to 6.0V from -40°C to +85°C

COMMON iButton FEATURES

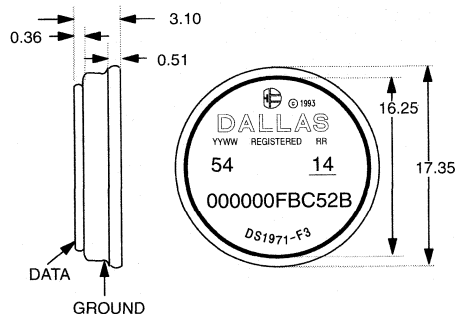
- Unique, factory-lasered and tested 64-bit registration number (8-bit family code + 48-bit serial number + 8-bit CRC tester) assures absolute traceability because no two parts are alike
- Multidrop controller for MicroLAN™
- Digital identification and information by momentary contact
- Chip-based data carrier compactly stores information

- Data can be accessed while affixed to object
- Economically communicates to bus master with a single digital signal at 16.3k bits per second
- Standard 16 mm diameter and 1-Wire protocol ensure compatibility with iButton family
- Button shape is self-aligning with cup-shaped probes
- Durable stainless steel case engraved with registration number withstands harsh environments
- Easily affixed with self-stick adhesive backing, latched by its flange, or locked with a ring pressed onto its rim
- Presence detector acknowledges when reader first applies voltage
- Meets UL#913 (4th Edit.); Intrinsically Safe Apparatus, Approved under Entity Concept for use in Class I, Division 1, Group A, B, C and D Locations (application pending)

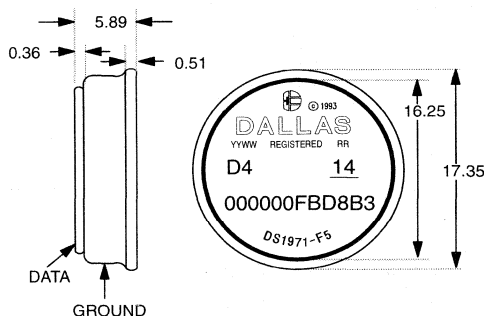
ORDERING INFORMATION

DS1971-F3 F3 MicroCan
DS1971-F5 F5 MicroCan

F3 MICROCAN™



F5 MICROCAN™



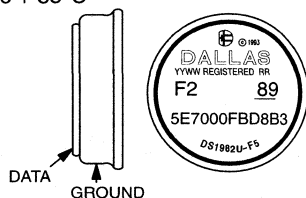
All dimensions shown in millimeters.



DS1981U/DS1982U UniqueWare™ iButton™

SPECIAL FEATURES

- 512 bits (DS1981U) or 1024 bits (DS1982U) Electrically Programmable Read Only Memory (EPROM) communicates with the economy of one signal plus ground
- Unique, factory lasered and tested 64-bit registration number (8-bit family code, 36-bit serialization, 12-bit UniqueWare™ Identifier 5E7H, 8-bit CRC tester) assures absolute traceability because no two parts are alike. Family code 91H for the DS1981U, 89H for the DS1982U
- EPROM partitioned into two (DS1981U) or four (DS1982U) 256-bit pages for randomly accessing packetized data records
- Each memory page can be permanently write-protected to prevent tampering
- Device is an "add only" memory where additional data can be programmed into EPROM without disturbing existing data
- Reduces control, address, data, power and programming signals to a single pin
- 8-bit family code specifies DS1981U or DS1982U communications requirements to reader
- Reads over a wide voltage range of 2.8V to 6.0V from -40°C to +85°C; programs at 11.5V ± 0.5V from -40°C to + 85°C



MSB

LSB

DS1981U	CRC	5E7	SERIAL #	91H
DS1982U	CRC	5E7	SERIAL #	89H

BYTES 1 1 ½ 4 ½ 1

ORDERING INFORMATION

DS1981U-F5	F5 MicroCan
DS1982U-F5	F5 MicroCan
DS1981U-F3	F3 MicroCan
DS1982U-F3	F3 MicroCan

COMMON iButton FEATURES

- Multidrop controller for MicroLAN™
- Digital identification and information by momentary contact
- Chip-based data carrier compactly stores information
- Data can be accessed while affixed to object
- Economically communicates to bus master with a single digital signal at 16.3k bits per second
- Standard 16 mm diameter and 1-Wire protocol ensure compatibility with iButton family
- Button Shape is self-aligning with cup-shaped probes
- Durable stainless steel case engraved with registration number withstands harsh environments
- Easily affixed with self-stick adhesive backing, latched by its flange, or locked with a ring pressed onto its rim
- Presence detector acknowledges when reader first applies voltage
- Meets UL#913 (4th edit.); Intrinsically Safe Apparatus, Approved under Entity Concept for use in Class I, Division 1, Group A, B, C and D Locations (application pending)

iButton DESCRIPTION

The DS1981U and DS1982U are factory programmed versions of the DS1982 1K-bit Add-Only iButton. They differ from the standard DS1982 in their custom ROM family code 91H (DS1981U) and 89H (DS1982U) respectively, and the UniqueWare™ Identifier 5E7 in place of the upper 12 bits of the standard serialization field. With the DS1981U the upper two memory pages are not accessible; they always read FFH and cannot be programmed. Otherwise, the electrical and logical behavior is identical to that of the DS1982. For technical details please refer to the DS1982 data sheet.

The DS1981U and DS1982U are only available preprogrammed with customer specific and write-protected UniqueWare™ data. Memory pages not used for UniqueWare™ data can be programmed in the application. For more details on UniqueWare™, please refer to the UniqueWare™ Project Setup Manual, available as Application Note 99 from Dallas Semiconductor.



DS1982 1Kbit Add-Only iButton™

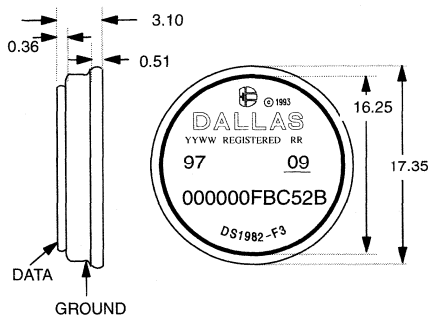
SPECIAL FEATURES

- 1024 bits Electrically Programmable Read Only Memory (EPROM) communicates with the economy of one signal plus ground
- EPROM partitioned into four 256-bit pages for randomly accessing packetized data records
- Each memory page can be permanently write-protected to prevent tampering
- Device is an "add only" memory where additional data can be programmed into EPROM without disturbing existing data
- Architecture allows software to patch data by superseding an old page in favor of a newly programmed page
- Reduces control, address, data, power, and programming signals to a single data pin
- 8-bit family code specifies DS1982 communications requirements to reader
- Reads over a wide voltage range of 2.8V to 6.0V from -40°C to $+85^{\circ}\text{C}$; programs at $11.5\text{V} \pm 0.5\text{V}$ from -40°C to $+85^{\circ}\text{C}$

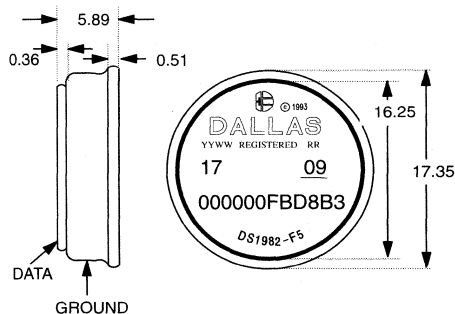
COMMON iButton FEATURES

- Unique, factory-lasered and tested 64-bit registration number (8-bit family code + 48-bit serial number + 8-bit CRC tester) assures absolute traceability because no two parts are alike
- Multidrop controller for MicroLAN™
- Digital identification and information by momentary contact
- Chip-based data carrier compactly stores information
- Data can be accessed while affixed to object
- Economically communicates to bus master with a single digital signal at 16.3k bits per second
- Standard 16 mm diameter and 1-Wire™ protocol ensure compatibility with iButton family
- Button shape is self-aligning with cup-shaped probes
- Durable stainless steel case engraved with registration number withstands harsh environments
- Easily affixed with self-stick adhesive backing, latched by its flange, or locked with a ring pressed onto its rim
- Presence detector acknowledges when reader first applies voltage
- Meets UL#913 (4th Edit.); Intrinsically Safe Apparatus, Approved under Entity Concept for use in Class I, Division 1, Group A, B, C and D Locations (application pending)

F3 MICROCAN™



F5 MICROCAN™



All dimensions shown in millimeters.



DS1985 16K bit Add-Only iButton™

SPECIAL FEATURES

- 16384-bits Electrically Programmable Read Only Memory (EPROM) communicates with the economy of one signal plus ground
- EPROM partitioned into sixty-four 256-bit pages for randomly accessing packetized data records
- Each memory page can be permanently write-protected to prevent tampering
- Device is an "add only" memory where additional data can be programmed into EPROM without disturbing existing data
- Architecture allows software to patch data by superseding an old page in favor of a newly programmed page
- Reduces control, address, data, power, and programming signals to a single data pin
- 8-bit family code specifies DS1985 communications requirements to reader
- Reads over a wide voltage range of 2.8V to 6.0V from -40°C to +85°C; programs at 11.5V to 12.0V from -40°C to +85°C

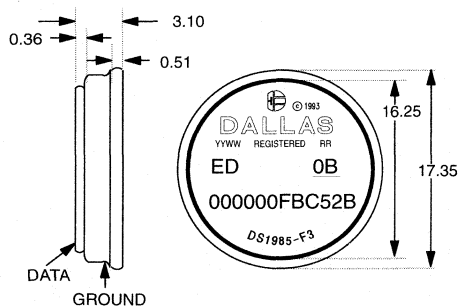
COMMON iButton FEATURES

- Unique, factory-lasered and tested 64-bit registration number (8-bit family code + 48-bit serial number

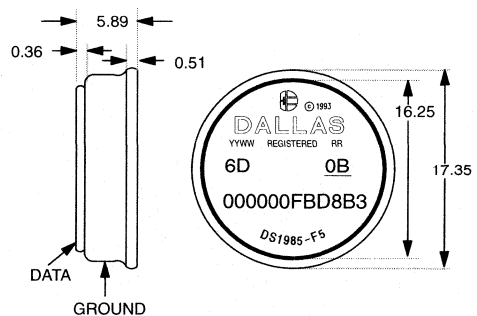
+ 8-bit CRC tester) assures absolute traceability because no two parts are alike

- Multidrop controller for MicroLAN™
- Digital identification and information by momentary contact
- Chip-based data carrier compactly stores information
- Data can be accessed while affixed to object
- Economically communicates to bus master with a single digital signal at 16.3k bits per second
- Standard 16 mm diameter and 1-Wire™ protocol ensure compatibility with iButton family
- Button shape is self-aligning with cup-shaped probes
- Durable stainless steel case engraved with registration number withstands harsh environments
- Easily affixed with self-stick adhesive backing, latched by its flange, or locked with a ring pressed onto its rim
- Presence detector acknowledges when reader first applies voltage
- Meets UL#913 (4th Edit.); Intrinsically Safe Apparatus, Approved under Entity Concept for use in Class I, Division 1, Group A, B, C and D Locations (application pending)

F3 MICROCAN™



F5 MICROCAN™



All dimensions shown in millimeters.



DS1986 64K bit Add-Only iButton™

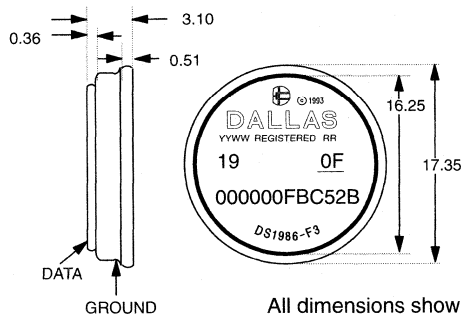
SPECIAL FEATURES

- 65536-bits Electrically Programmable Read Only Memory (EPROM) communicates with the economy of one signal plus ground
- Overdrive mode boosts communication speed to 142k bits per second
- EPROM partitioned into two hundred and fifty-six 256-bit pages for randomly accessing packetized data records
- Each memory page can be permanently write-protected to prevent tampering
- Device is an "add only" memory where additional data can be programmed into EPROM without disturbing existing data
- Architecture allows software to patch data by superseding an old page in favor of a newly programmed page
- Reduces control, address, data, power, and programming signals to a single data pin
- 8-bit family code specifies DS1986 communications requirements to reader
- Reads over a wide voltage range of 2.8V to 6.0V from -40°C to +85°C; programs at 11.5V to 12.0V from -40°C to +85°C

COMMON iButton FEATURES

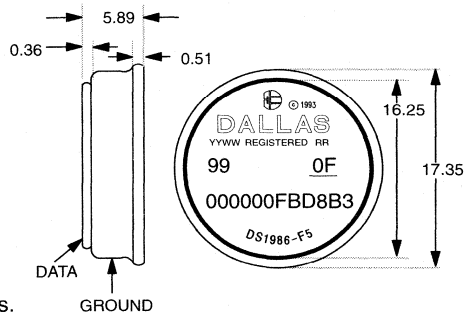
- Unique, factory-lasered and tested 64-bit registration number (8-bit family code + 48-bit serial number + 8-bit CRC tester) assures absolute traceability because no two parts are alike
- Multidrop controller for MicroLAN™
- Digital identification and information by momentary contact
- Chip-based data carrier compactly stores information
- Data can be accessed while affixed to object
- Economically communicates to bus master with a single digital signal at 16.3k bits per second
- Standard 16 mm diameter and 1-Wire™ protocol ensure compatibility with iButton family
- Button shape is self-aligning with cup-shaped probes
- Durable stainless steel case engraved with registration number withstands harsh environments
- Easily affixed with self-stick adhesive backing, latched by its flange, or locked with a ring pressed onto its rim
- Presence detector acknowledges when reader first applies voltage
- Meets UL#913 (4th Edit.); Intrinsically Safe Apparatus, Approved under Entity Concept for use in Class I, Division 1, Group A, B, C and D Locations (application pending)

F3 MICROCANT™



All dimensions shown in millimeters.

F5 MICROCANT™



GROUND



DS1990A

Serial Number iButton™

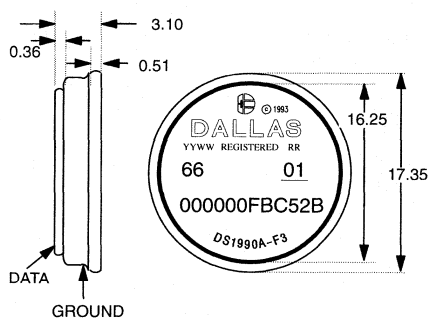
DS1990A SPECIAL FEATURES

- Upgrade of DS1990 allows multiple Serial Number iButtons to reside on a common bus
- Unique 48-bit serial number
- Low-cost electronic key for access control
- 8-bit CRC for checking data integrity
- Can be read in less than 5 ms
- Operating temperature range of -40°C to $+85^{\circ}\text{C}$

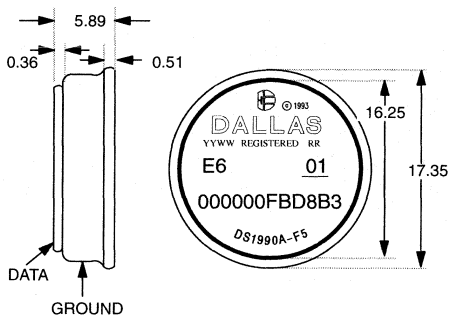
COMMON iButton FEATURES

- Unique, factory-lasered and tested 64-bit registration number (8-bit family code + 48-bit serial number + 8-bit CRC tester) assures absolute traceability because no two parts are alike
- Multidrop controller for MicroLAN™
- Digital identification by momentary contact
- Chip-based data carrier compactly stores information
- Data can be accessed while affixed to an object
- Economically communicates to bus master with a single digital signal at 16.3k bits per second
- Standard 16 mm diameter and 1-Wire™ protocol ensure compatibility with iButton family
- Button shape is self-aligning with cup-shaped probes
- Durable stainless steel case engraved with registration number withstands harsh environments
- Easily affixed with self-stick adhesive backing, latched by its flange, or locked with a ring pressed onto its rim
- Presence detector acknowledges when reader first applies voltage
- Meets UL#913 (4th Edit.); Intrinsically Safe Apparatus, Approved under Entity Concept for use in Class I, Division 1, Group A, B, C and D locations

F3 MICROCAN™



F5 MICROCAN™



All dimensions shown in millimeters

ORDERING INFORMATION

DS1990A-F3	F3 MicroCan
DS1990A-F5	F5 MicroCan

EXAMPLES OF ACCESSORIES

DS9096P	Self-Stick Adhesive Pad
DS9101	Multi-Purpose Clip
DS9093RA	Mounting Lock Ring
DS9093F	Snap-In Fob
DS9092	iButton Probe



DS1991 MultiKey iButton™

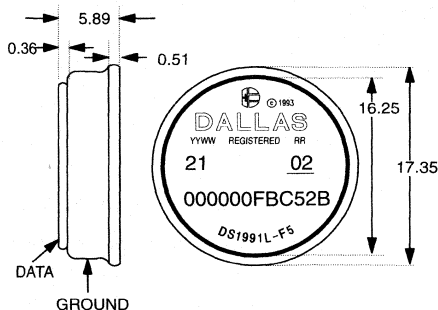
SPECIAL FEATURES

- 1,152-bit secure read/write, nonvolatile memory
- Secure memory cannot be deciphered without matching 64-bit password
- Memory is partitioned into 3 blocks of 384 bits each
- 64-bit password and ID fields for each memory block
- 512-bit scratchpad ensures data transfer integrity
- Operating temperature range: -40°C to +70°C
- Over 10 years of data retention

COMMON iButton FEATURES

- Unique, factory-lasered and tested 64-bit registration number (8-bit family code + 48-bit serial number + 8-bit CRC tester) assures absolute traceability because no two parts are alike
- Multidrop controller for MicroLAN™
- Digital identification and information by momentary contact
- Chip-based data carrier compactly stores information
- Data can be accessed while affixed to object
- Economically communicates to bus master with a single digital signal at 16.3k bits per second
- Standard 16 mm diameter and 1-Wire protocol ensure compatibility with iButton family
- Button shape is self-aligning with cup-shaped probes
- Durable stainless steel case engraved with registration number withstands harsh environments
- Easily affixed with self-stick adhesive backing, latched by its flange, or locked with a ring pressed onto its rim
- Presence detector acknowledges when reader first applies voltage
- Meets UL#913 (4th Edit.); Intrinsically Safe Apparatus, Approved under Entity Concept for use in Class I, Division 1, Group A, B, C and D Locations

F5 MICROCAN™



All dimensions shown in millimeters

ORDERING INFORMATION

DS1991L-F5 F5 MicroCan

EXAMPLES OF ACCESSORIES

DS9096P	Self-Stick Adhesive Pad
DS9101	Multi-Purpose Clip
DS9093RA	Mounting Lock Ring
DS9093F	Snap-In Fob
DS9092	iButton Probe



DS1992/DS1993 1Kbit/4Kbit Memory iButton™ DS1994 4Kbit Plus Time Memory iButton

SPECIAL FEATURES

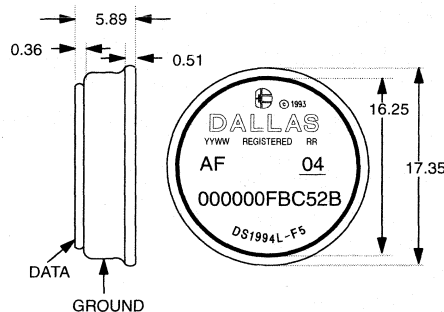
- 4096 bits of read/write nonvolatile memory (DS1993 and DS1994)
- 1024 bits of read/write nonvolatile memory (DS1992)
- 256-bit scratchpad ensures integrity of data transfer
- Memory partitioned into 256-bit pages for packetizing data
- Data integrity assured with strict read/write protocols
- Contains real time clock/calendar in binary format (DS1994)
- Interval timer can automatically accumulate time when power is applied (DS1994)
- Programmable cycle counter can accumulate the number of system power-on/off cycles (DS1994)
- Programmable alarms can be set to generate interrupts for interval timer, real time clock, and/or cycle counter (DS1994)
- Write protect feature provides tamper-proof time data (DS1994)
- Programmable expiration date that will limit access to SRAM and timekeeping (DS1994)
- Clock accuracy is better than ± 2 minute/month at 25°C (DS1994)
- Operating temperature range from -40°C to +70°C
- Over 10 years of data retention

COMMON iBUTTON FEATURES

- Unique, factory-lasered and tested 64-bit registration number (8-bit family code + 48-bit serial number + 8-bit CRC tester) assures absolute traceability because no two parts are alike
- Multidrop controller for MicroLAN™
- Digital identification and information by momentary contact
- Chip-based data carrier compactly stores information
- Data can be accessed while affixed to object
- Economically communicates to bus master with a single digital signal at 16.3k bits per second

- Standard 16 mm diameter and 1-Wire protocol ensure compatibility with iButton family
- Button shape is self-aligning with cup-shaped probes
- Durable stainless steel case engraved with registration number withstands harsh environments
- Easily affixed with self-stick adhesive backing, latched by its flange, or locked with a ring pressed onto its rim
- Presence detector acknowledges when reader first applies voltage
- Meets UL#913 (4th Edit.); Intrinsically Safe Apparatus, Approved under Entity Concept for use in Class I, Division 1, Group A, B, C and D Locations

F5 MICROCAN™



All dimensions shown in millimeters.

ORDERING INFORMATION

DS1992L-F5	F5 MicroCan
DS1993L-F5	F5 MicroCan
DS1994L-F5	F5 MicroCan

EXAMPLES OF ACCESSORIES

DS9096P	Self-Stick Adhesive Pad
DS9101	Multi-Purpose Clip
DS9093RA	Mounting Lock Ring
DS9093F	Snap-In Fob
DS9092	iButton Probe



DS1995 16Kbit Memory iButton™

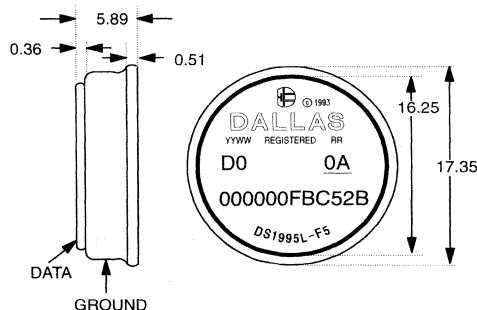
SPECIAL FEATURES

- 16384 bits of read/write nonvolatile memory
- 256-bit scratchpad ensures integrity of data transfer
- Overdrive mode boosts communication to 142k bits per second
- Memory partitioned into 256-bit pages for packetizing data
- Data integrity assured with strict read/write protocols
- Operating temperature range from -40°C to $+70^{\circ}\text{C}$
- Over 10 years of data retention

COMMON iButton FEATURES

- Unique, factory-lasered and tested 64-bit registration number (8-bit family code + 48-bit serial number + 8-bit CRC tester) assures absolute traceability because no two parts are alike
- Multidrop controller for MicroLAN™
- Digital identification and information by momentary contact
- Chip-based data carrier compactly stores information
- Data can be accessed while affixed to object
- Economically communicates to bus master with a single digital signal at 16.3k bits per second
- Standard 16 mm diameter and 1-Wire protocol ensure compatibility with iButton family
- Button shape is self-aligning with cup-shaped probes
- Durable stainless steel case engraved with registration number withstands harsh environments
- Easily affixed with self-stick adhesive backing, latched by its flange, or locked with a ring pressed onto its rim
- Presence detector acknowledges when reader first applies voltage
- Meets UL#913 (4th Edit.); Intrinsically Safe Apparatus, Approved under Entity Concept for use in Class I, Division 1, Group A, B, C and D Locations (application pending)

F5 MICROCAN™



All dimensions are shown in millimeters.

ORDERING INFORMATION

DS1995L-F5 F5 MicroCan

EXAMPLES OF ACCESSORIES

DS9096P	Self-Stick Adhesive Pad
DS9101	Multi-Purpose Clip
DS9093RA	Mounting Lock Ring
DS9093F	Snap-In Fob
DS9092	iButton Probe

iButton DESCRIPTION

The DS1995 Memory iButton operates nearly identically to the DS1996. The main differences are: 16K bits of memory organized as 64 pages of 32 bytes and a family code of 0A hexadecimal. For further details please refer to the DS1996 data sheet.



DS1996 64Kbit Memory iButton™

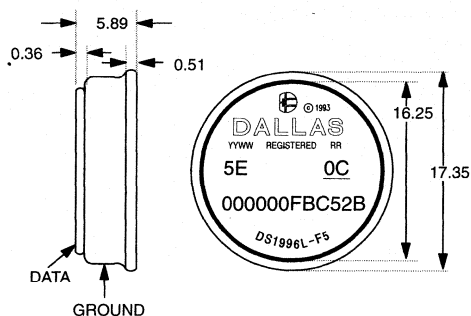
SPECIAL FEATURES

- 65536 bits of read/write nonvolatile memory
- Overdrive mode boosts communication speed to 142k bits per second
- 256-bit scratchpad ensures integrity of data transfer
- Memory partitioned into 256-bit pages for packetizing data
- Data integrity assured with strict read/write protocols
- Operating temperature range from -40°C to +70°C
- Over 10 years of data retention

COMMON iButton FEATURES

- Unique, factory-lasered and tested 64-bit registration number (8-bit family code + 48-bit serial number + 8-bit CRC tester) assures absolute traceability because no two parts are alike
- Multidrop controller for MicroLAN™
- Digital identification and information by momentary contact
- Chip-based data carrier compactly stores information
- Data can be accessed while affixed to object
- Economically communicates to bus master with a single digital signal at 16.3k bits per second
- Standard 16 mm diameter and 1-Wire protocol ensure compatibility with iButton family
- Button shape is self-aligning with cup-shaped probes
- Durable stainless steel case engraved with registration number withstands harsh environments
- Easily affixed with self-stick adhesive backing, latched by its flange, or locked with a ring pressed onto its rim
- Presence detector acknowledges when reader first applies voltage
- Meets UL#913 (4th Edit.); Intrinsically Safe Apparatus, Approved under Entity Concept for use in Class I, Division 1, Group A, B, C and D Locations (application pending)

F5 MICROCAN™



All dimensions are shown in millimeters.

ORDERING INFORMATION

DS1996L-F5 F5 MicroCan

EXAMPLES OF ACCESSORIES

DS9096P	Self-Stick Adhesive Pad
DS9101	Multi-Purpose Clip
DS9093RA	Mounting Lock Ring
DS9093F	Snap-In Fob
DS9092	iButton Probe

iButton DESCRIPTION

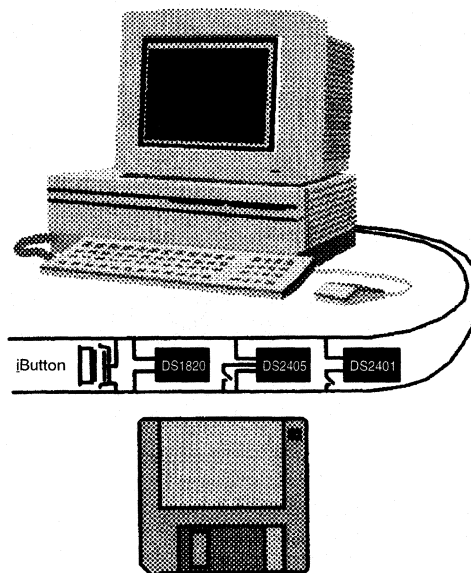
The DS1996 Memory iButton is a rugged read/write data carrier that acts as a localized database that can be easily accessed with minimal hardware. The nonvolatile memory offers a simple solution to storing and retrieving vital information pertaining to the object to which the iButton is attached. Data is transferred serially via the 1-wire protocol which requires only a single data lead and a ground return. The scratchpad is an additional page that acts as a buffer when writing to memory. Data is first written to the scratchpad where it can be read back. After the data has been verified, a copy scratchpad command will transfer the data to memory. This process insures data integrity when modifying the memory.

DALLAS SEMICONDUCTOR

1-Wire™ MicroLAN™ Evaluation Kit DS9091K

FEATURES

- Evaluation kit for 1-Wire MicroLAN networking through the serial port of an IBM PC-compatible computer
- 5 experiments of different complexity demonstrate typical MicroLAN applications such as window/door monitor, temperature monitor, burglar alarm system with integrated room temperature control
- Easy to understand manual explains experiments, communications protocol, MicroLAN components, theory of operation, interfacing and network optimization
- Featured MicroLAN components: DS2401, DS2405, DS1820, DS1990A, DS1993 and DS9097 Serial-Port adapter
- 3 1/2" disk with evaluation software for Windows including C++ source code listings
- Book of DS19xx iButton Standards
- Automatic Identification Data Book
- Touch Connections Catalog



DESCRIPTION

The DS9091K MicroLAN Evaluation Kit provides hardware, software and documentation for evaluation of Dallas Semiconductor's 1-Wire MicroLAN technology using integrated circuits and iButtons. The software included in the kit runs under Windows on a PC-compatible DOS computer. It consists of 5 modules demonstrating 1) window/door monitor with DS2401, 2) Window/door monitor with DS2405, 3) Temperature logger with DS1820, 4) simulated room temperature control with DS1820 and DS2405 and 5) burglar alarm system with simulated room temperature control. Each experiment can be expanded by simply adding more components available from Dallas Semiconductor.

The kit includes all special electrical and mechanical components required for the experiments. Not included are unshielded twisted pair cable, mechanical switches and a battery (4.5 or 6V). Experiments 4 and 5 allow controlling an electric heater and air conditioner. The relays for power switching are not included. For demonstration and electrical safety, these appliances are replaced by battery-operated LEDs.

Windows is a trademark of Microsoft Corporation.

DALLAS SEMICONDUCTOR

iButton™ DS9092K Starter Kit

FEATURES

- Starter Kit to help evaluate the iButton technology using an IBM compatible PC.
- An assortment of iButton devices
- An assortment of iButton attachment accessories
- DS9092 iButton probe
- DS9092GT iButton Probe with Hand Grip
- DS9097E PC serial port adapter DB25 to RJ11 port
- Book of DS 19XX iButton Standards
- Data Sheets and application notes
- 3 1/2" disk with DOS demonstration software and utility functions
- iButton TMEX software compatible with DOS, Windows 3.1x and Windows 95/NT is downloadable from Dallas Semiconductors Web site <http://www.iButton.com/>



DESCRIPTION

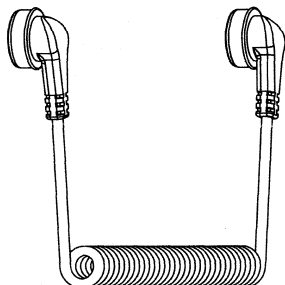
The DS9092K iButton Starter Kit provides **basic** hardware and software for a quick evaluation of Dallas Semiconductor's iButton family, using an IBM compatible computer. The kit includes iButtons and demonstration software to easily communicate with the iButtons as well as an assortment of accessories.

The DS9092K is not intended for software developers and does not include run-time licenses. A Software Developer's Kit (DS0621-SDK) is available for software developers and more advanced users. The Developer's Kit does include callable routines and example programs.

FEATURES

- Coiled cables to connect iButtons to MicroLAN Networks
- Convenient, off-the-shelf connectivity
- Touch And Hold Probes DS1402RP and DS1402BP for momentary touch (F3/F5 MicroCan) or dwelled contact (F5 MicroCan only) in two cable lengths (0.9 m and 2.4 m max.)
- Blue Dot Dual Receptors for momentary (F3/F5 MicroCan) or dwelled contact (F5 MicroCan only) with velcro backing to mount on objects (DS1402D-DB8, DS1402D-DR8, each 2.4 m max.)
- iButton™ cables to connect COM Port to iButton Holder (DS1402BR) and to daisy-chain iButton Holders (DS1402BB) in 2.4 m length max.
- RJ-11 cables DS1402RR to extend the length of a probe or button cable in 2.4 m length max.
- Can be used with any Dallas Semiconductor port adapter
- iButtons can be connected in any combination

DS1402BB

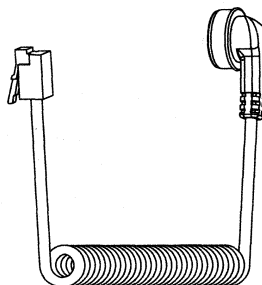


DESCRIPTION

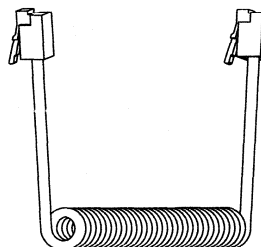
Using four basic types of connectors, RJ-11, iButton, Touch And Hold Probe and Blue Dot Receptor, the DS1402 series of MicroLAN cables provides connectivity for iButtons. The cables are designed to connect COM-port adapter or parallel port adapter to any type of DS1401 front panel iButton Holder or Touch And Hold Probe. The two versions of the Blue Dot Receptor

directly connect to any port adapter. Applications range from software protection to handheld computers and complex MicroLANs.

DS1402BR



DS1402RR

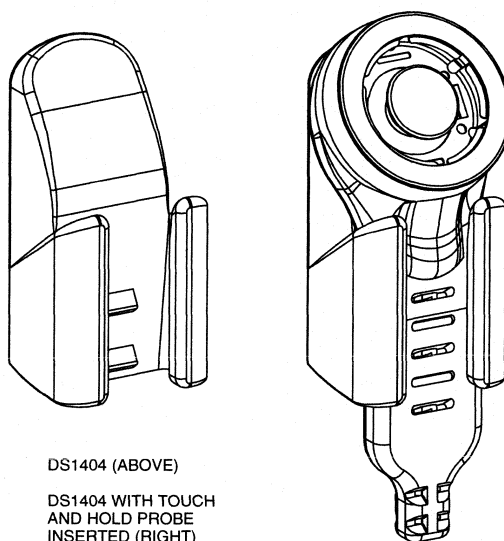


ORDERING INFORMATION

DS1402BB8	2.4 meter (8 feet) cable
DS1402BR8	2.4 meter (8 feet) cable
DS1402RR8	2.4 meter (8 feet) cable
DS1402BP8	2.4 meter (8 feet) cable
DS1402RP3	0.9 meter (3 feet) cable
DS1402RP8	2.4 meter (8 feet) cable
DS1402D-DB8	2.4 meter (8 feet) cable
DS1402D-DR8	2.4 meter (8 feet) cable

FEATURES

- Precision molded black plastic holder that mounts using double-sided adhesive tape
- Holds the Touch And Hold Probe end of the DS1402RP or DS1402BP
- Probe can be inserted loosely for temporary holding or firmly for probing
- Allows a palmtop or handheld computer to be used as handy iButton™ reader/writer



DS1404 (ABOVE)

DS1404 WITH TOUCH
AND HOLD PROBE
INSERTED (RIGHT)

(BOTH PICTURES ARE APPROXIMATELY ACTUAL SIZE)

ORDERING INFORMATION

DS1404 includes adhesive tape

DESCRIPTION

With handheld equipment functioning as iButton reader/writer one often faces the problem of finding a place for the probe when it is not use. The DS1404 Touch and Hold Probe Cable Cradle solves this problem. In addition to that, it converts the handheld equipment into a compact single-unit reader/writer for iButtons if the probe is firmly inserted into the cradle.

The DS1404 comes with double-side adhesive tape. For best results, clean and dry the surface of the object where the DS1404 is to be mounted.

FEATURES

- Provides a parallel port interface for Dallas iButtons
- Compatible with low power parallel ports
- No external power required
- Operates with DOS, Windows, Windows 95, Windows NT, SCO UNIX, UNIXWARE, and HP_UX for workstations

DESCRIPTION

The DS1410E Parallel Port Adapter interfaces Dallas Semiconductor Authorization iButtons to host computers via a PC parallel port. In conjunction with the iButton, the DS1410E provides a high security storage vault for critical execution control information. Only users that possess an iButton can utilize the software, preventing execution of unauthorized copies.

The modularity of the DS1410E allows for easy feature customization. The device supports the insertion of two iButtons, which can be removed and replaced to vary functionality.

For example, a DS1427 Time iButton can be programmed for a 30 day expiration, issued with a DS1410E, and a software copy. The evaluator can be converted into a registered user by issuing a DS1425 Multi iButton and inserting it into the second receptacle.

The DS1410E supports the same iButtons as other Dallas port adapters. This allows standardization of any protection scheme across virtually all hardware platforms, regardless of the operating system. The iButtons remain constant, and the port adapters change according to the specific platform interface.

DS1410E SOFTWARE

The DS1410K Development Kit contains access system software which must be linked with the application software in order to complete integration. The support for the application development environments and operating systems lies in the interface software of the access system. The access system contains the low level interface for communicating with the iButtons.

DALLAS SEMICONDUCTOR

DS9092 iButton™ Probe

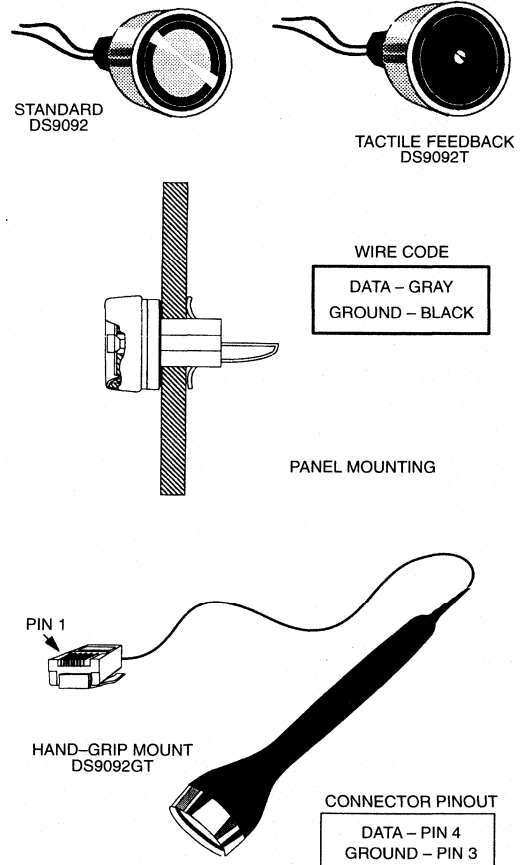
FEATURES

- Simple, low-cost metal stampings form a read/write probe for the iButton family
- Probe guides the entry of the iButton
- iButton slides over the surface to self-clean contacts
- Accessible shallow probe cavity simplifies removal of debris such as mud
- Flexible design supports panel mount or hand-grip mount with optional tactile feedback
- Bright tarnish-resistant metal surface provides millions of operations
- Panel-mount probe, pre-wired for easy installation
- Hand-grip probe mates to RJ-11 jack for quick installation

ORDERING INFORMATION

DS9092	Panel-mount probe, solid face
DS9092T	Panel-mount probe with tactile feedback
DS9092GT	Hand-grip mount with tactile feedback

PACKAGE DESCRIPTION



DESCRIPTION

The DS9092 iButton Probe provides the electrical contact necessary for the transfer of data to and from the DS19xx family of iButtons. The round probe shape provides a self-aligning interface that readily matches the circular rim of the iButton's MicroCan package. Metal contacts resist wear and are easy to keep clean.

The DS9092 is available with a flat face plate (standard) or with optional tactile feedback. The center contact of the standard reader has no moving parts, making this a more rugged interface for harsh environments. This type of probe is best suited for designs where the iButton is brought into contact with the reader.

DALLAS

SEMICONDUCTOR

DS9092R

iButton™ Port

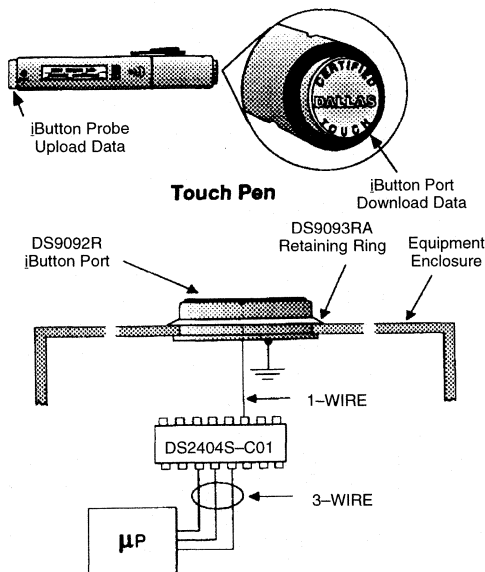
FEATURES

- Empty stainless steel F5 MicroCan with opening in rear and solder tabs.
- Acts as a touch contact for remotely located 1-Wire™ devices
- Together with DS2404S-C01 makes complex functions involving microcontrollers behave as if they were iButtons.
- Available with "CERTIFIED DALLAS TOUCH" logo

DESCRIPTION

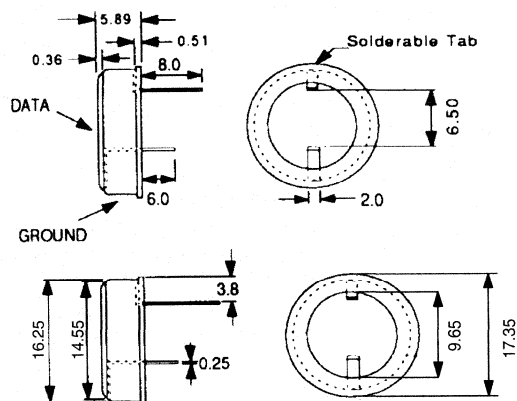
The DS9092R iButton Port provides the electrical contact necessary for mating remotely located iButtons or other 1-Wire MicroLAN devices with reader/writers. The DS9092R is also available with logo.

APPLICATIONS



Equipment fitted with 1-Wire button contact.

PACKAGE OUTLINE



LOGO WITH
DS9092RC
ONLY



LOGO



All dimensions are shown in millimeters.

CONTACTS

Rim	Ground
Inner Face	Data

ORDERING INFORMATION

DS9092R	Tabbed F5 MicroCan
DS9092RC	Tabbed F5 MicroCan with logo

DALLAS SEMICONDUCTOR

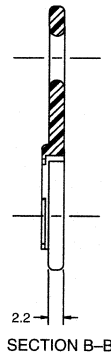
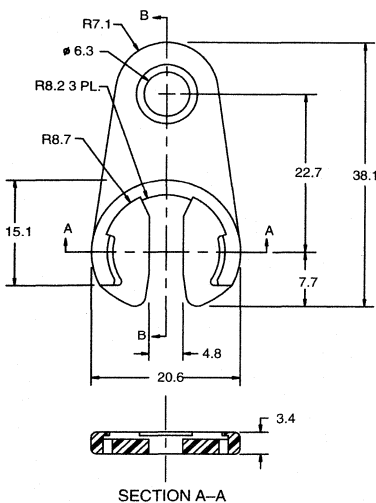
DS9093x iButton™ Mount Products

FEATURES

- Key ring mount version:
 - DS9093F snap-in fob for use with F5 MicroCan™
 - DS9093N angled fob for use with F5 MicroCan
 - DS9093A snap-in angled fob for use with F5 MicroCan
- Two permanent mount versions:
 - DS9093S allows an iButton to be easily and permanently attached to an object using screws or rivets (F5 MicroCan)
 - DS9093P has a locating pin and a single mounting hole for permanent attachment (F5 MicroCan)
- Prepunched hole mount:
 - DS9093RA lock ring firmly fastens F5 package
 - DS9093RB flange enlargement provides additional flange surface area if needed

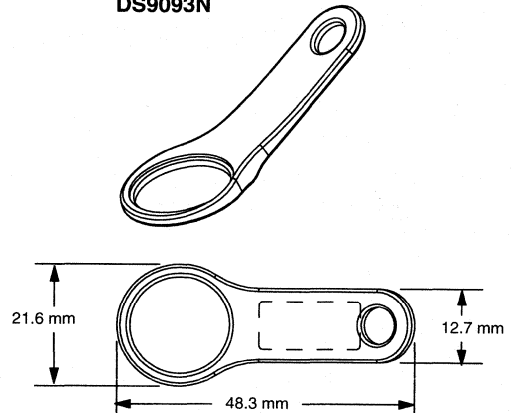
KEY RING MOUNTS

DS9093F

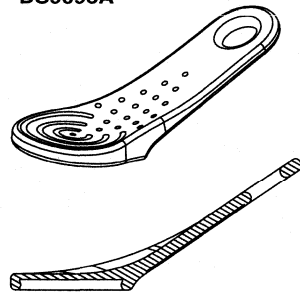


All dimensions are in millimeters.

DS9093N



DS9093A



DESCRIPTION

The DS9093 iButton Mount Products offer the user low-cost fixtures that hold an iButton for thumbpad applications or permanent attachment to an object.

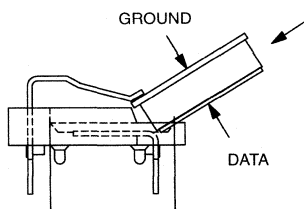
The DS9093F plastic snap-in fob offers the simplest way to mount an iButton for applications that require only momentary contact. The fob can be attached to a key ring for carrying. Do not apply solvents or adhesives to this fob. This might affect the mechanical strength and reliability.

DALLAS SEMICONDUCTOR

DS9094 iButton™ Clip

FEATURES

- Low cost holder for 16.3 mm MicroCan
- Printed circuit board mount
- Contacts are 302 spring stainless steel
- Flammability rating: UL94V-O
- Two versions:
 - DS9094F for F5 MicroCan (flanged rim, 5.8 mm high)
 - DS9094FS for surface mounting F5 MicroCan (flanged rim, 5.8 mm high)
- Printed circuit contacts are selectively tin-lead plated for improved solderability



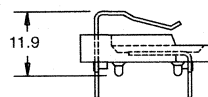
INSERTION OF iButton

DESCRIPTION

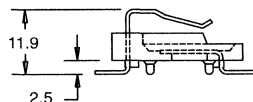
The DS9094 Clip holds an iButton and connects to a printed circuit board. By deflecting the spring clip in the molded housing, an iButton can be inserted and extracted without special tools. If reverse insertion is attempted, the beveled edge on the housing prevents contact. The DS9094's low profile minimizes the clearance height above the printed circuit board.

NOTE:

Due to the large variation of cycles and temperatures in reflow ovens, it is recommended to experiment with this clip first before using it in production. If guaranteed compliance with the reflow soldering process is required, the DS9098 iButton Retainer should be preferred.

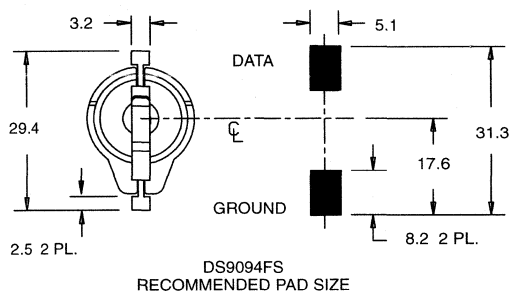
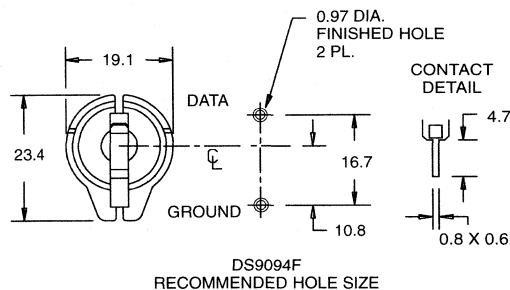


DS9094F



DS9094FS

PC BOARD MOUNTING DETAILS



All dimensions are in millimeters.

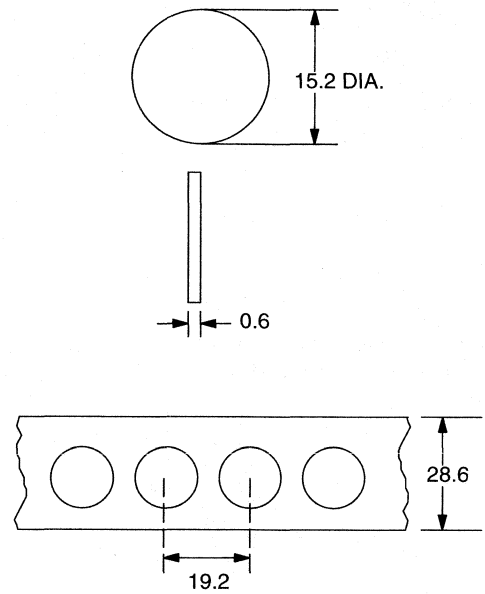
DALLAS SEMICONDUCTOR

DS9096P iButton™ Adhesive Pads

FEATURES

- Low-cost permanent attachment method for iButton
- Readily attaches iButton to any smooth flat surface
- Available in die-cut rolls of 500/roll

DIMENSIONS



All dimensions are shown in millimeters.

DESCRIPTION

The DS9096P iButton adhesive pad is a double-sided pad that is die-cut to match the diameter of iButton devices. The pads allow iButtons to be attached to virtu-

ally any smooth surface. The DS9096P offers a very permanent attachment method that is not intended to be removed.

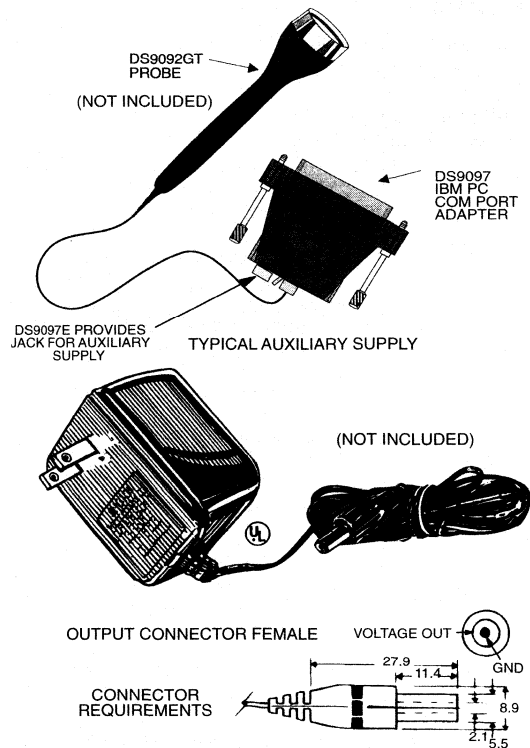
DALLAS SEMICONDUCTOR

DS9097/DS9097E COM Port Adapter

FEATURES

- Provides a simple, low-cost interface to an RS232C COM Port for reading and writing iButton devices (DS9097E required for programming DS198x Add-Only iButtons)
- Adapter is powered entirely from an RS232 interface (DS9097E may require optional auxiliary 12V supply)
- Standard DB-25 connector for mating DS9097 to the COM Port of a computer and RJ-11 connector for easy attachment of a probe such as the DS9092GT
- DS9097E has an additional 2.1 mm male power jack to allow for an auxiliary 12V DC supply for programming Add-Only iButtons

Auxiliary supply should be a regulated 12V @ 10 mA minimum, center=GND, outer ring=V+ (Newark Electronics Stock No. 84F2081, Allied Electronics Stock No. 928-9895, Stancor Model STA-300R, or equivalent)



All dimensions are in millimeters.

DESCRIPTION

The DS9097 COM Port Adapter is a simple, low-cost passive adapter which performs RS232C level conversion, allowing an iButton probe to be connected to the serial port of a computer so that an iButton can be read and written directly. The serial port must support a data transmission rate of 115,200 bits/s in order to create the 1-Wire time slots correctly. Nearly all PCs support the required bit rate and are fully compatible with the DS9097. Since an eight bit character on the RS232 bus operating at 115,200 bits/s is used to form the 1-Wire time slots, the maximum effective 1-Wire transfer rate is 14,400 bits/s. A selection of software examples illustrating how to communicate with iButtons using the DS9097 is provided in the DS9092K iButton Starter Kit, available from Dallas Semiconductor.

The DS9097E is an upgraded version of the DS9097 that is capable of supplying the 12 volts necessary to program the EPROM-based iButton products (DS198x Add-Only Memories) in addition to reading and writing standard devices (DS199x). When combined with the appropriate software, the DS9097E can be used in a standalone mode where all of the programming current is supplied by the serial port itself. In this configuration, the maximum number of EPROM bits that can be programmed simultaneously is four on a typical serial port. For higher performance, the above mentioned 12V auxiliary supply can be plugged into the power jack on the DS9097E and with proper software enable the serial port to program up to eight EPROM bits simultaneously.

DALLAS SEMICONDUCTOR

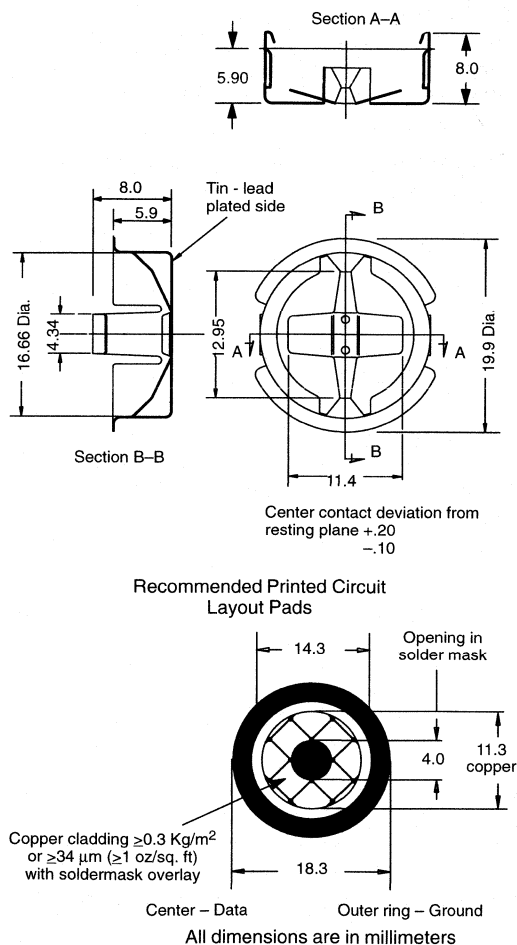
DS9098 iButton™ Retainer

FEATURES

- Compact single-piece, all-metal receptacle for iButton mounting
- Retainer withstands high temperatures required for surface mounting
- Center contact is permanently separated at first insertion of the iButton
- Material is stainless steel with selective tin-lead plating for optimal solderability to printed circuit board
- Retainer to iButton connection is stainless steel to stainless steel
- Quadruple redundancy of contacts (4 plus 4)
- Contact force exceeds 200 grams for reliable connection
- At insertion, the iButton is latched for retention
- Pops up for removal when latch is released
- Gentle deflection of latches allows removal of the iButton
- >25 insertion/withdrawal cycles with no performance degradation
- Compatible with standard pick and place equipment; insensitive to angular orientation
- Cleaning fluids drain freely for quick clean up
- Available in bulk packaging (DS9098) or in extruded tube packaging (DS9098T)

DESCRIPTION

The DS9098 iButton Retainer is a low-cost, surface mount device that retains a 16.3mm x 5.8mm MicroCan on a printed circuit board. The slender design secures the iButton for a compact printed circuit board mount. The retainer latches the flange of the iButton and prevents reversed insertion.



PRECAUTIONS ON USE

At first insertion closely align axis of the iButton and the Retainer, and then apply approximately 10 kg force for the separation of the center contacts. At subsequent insertion maintain similar axial alignment to avoid permanent deformation. At removal, limit deflection of retainer latches to just free the iButton edge from retained state. Avoid applying excess force to latches.

FEATURES

- Compact two-piece, all-metal receptacle for F5 MicroCan™
- Accepts two thirds of the MicroCan – one third of MicroCan will extend out
- Allows reading iButtons with either momentary or dwelled contact
- Outer ring will hold MicroCan for dwelled contact
- Two options for data contact: cantilever (DS9100B) or coiled spring (DS9100C)
- >10000 insertion/withdrawal cycles with no performance degradation
- Redundancy of contacts and high contact force ensures reliability
- Probe withstands high temperatures required for PCB solder reflow operations
- Material is stainless steel with selective tin-lead plating for optimal solderability to printed circuit board
- Cleaning fluids drain freely for quick clean up

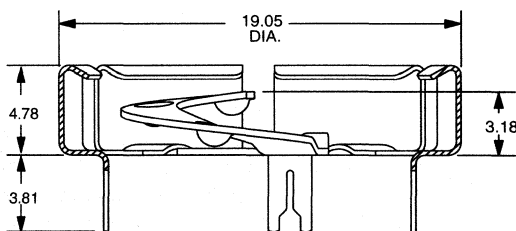
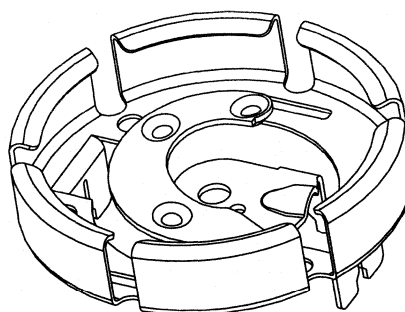
ORDERING INFORMATION

DS9100A	Outer Contact (Ground)
DS9100B	Center Contact Cantilever (Data)
DS9100C	Center Contact Coiled Spring (Data)

DESCRIPTION

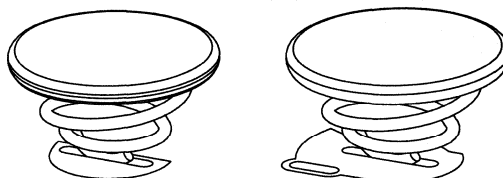
The DS9100 Touch and Hold Probe stampings function is similar to the DS9098 iButton Retainer. An F5 MicroCan will fit completely into the can will extend out if pressed into the DS9100. As a probe, the DS9100A together with the coiled spring DS9100C allows reading iButtons on contact. With Additional pressure, the stiff springs of the DS9100A's outer ring will deflect and grip the MicroCan sufficiently to provide a continuous contact to both the can rim (ground) and the can lid (data). If reading on contact is not required, the cantilever type center contact DS9100B can be used rather than the DS9100C.

DS9100A WITH DS9100B



Dimensions are in millimeters

DS9100C WITH CORRECT ORIENTATION TO SOLDER PAD



DALLAS SEMICONDUCTOR

DS9101 Multi-Purpose Clip

FEATURES

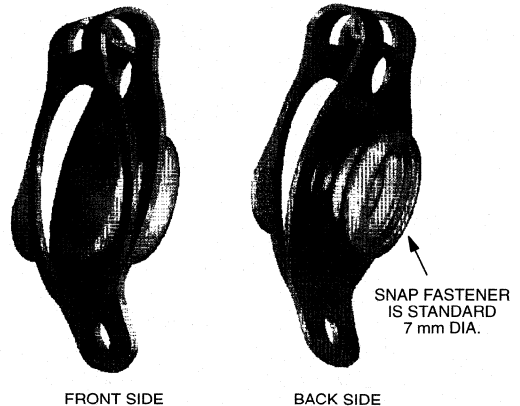
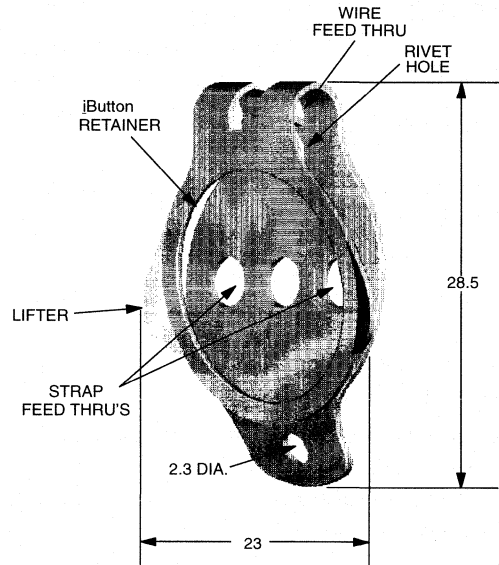
- Attachable to a badge
- Easy detachment by hand
- Mountable by safety pin to fabric
- Two pairs of holes for attachment, one for wire mounting, and one for tie wrapping, and one for tie wrap
- Clipable to shirt pocket
- Stainless steel 0.5mm thickness
- Attachable to other items with snap fastener (DS9101S)

DESCRIPTION

The DS9101 Multi-Purpose Clip offers the user a low-cost fixture that mounts an iButton to a plastic badge or, using an additional wire or tie wrap, any object that provides a hole for strap-mounting. In contrast to the DS9093P/S, the DS9101 also allows mounting iButtons to bags or other soft surfaced objects.

The DS9101 is designed for easy attachment and detachment. Using a DS9093RA Lock Ring, the DS9101 can hold an iButton permanently and still allow all the flexibility of strap mounting.

For quick attachment and dismount use DS9101S, assembled with snap fastener, providing smooth and reliable fastening means.



DS9101S for snap fastening

Dimensions are shown in millimeters.

DALLAS SEMICONDUCTOR

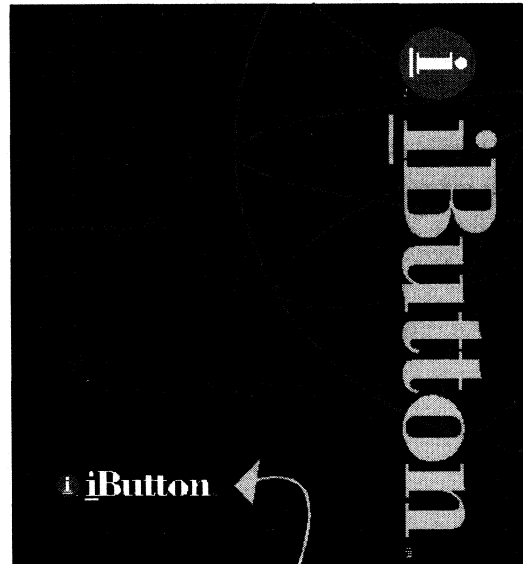
DS0621-SDK iButton™ TMEX™ Professional Software Developer's Kit: Version 3.00

NEW FEATURES

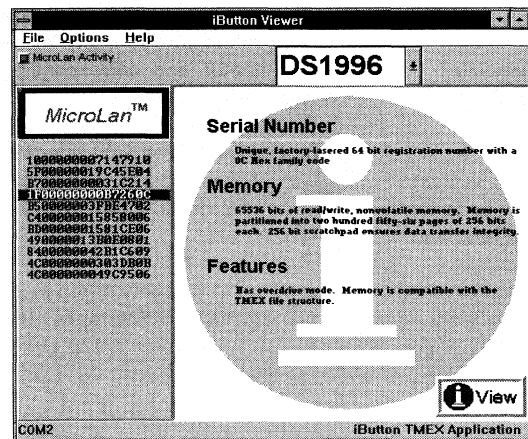
- Easy installation under Windows 3.1 or higher
- Includes 32-bit drivers and examples for Microsoft Windows 95 and NT
- Drivers are automatically installed with the included iButton TMEX installation disks for DOS, Windows 3.1, and Windows 95/NT
- Hyper-linked Windows Help files on the TMEX API and the source code examples
- Full TMEX documentation in Adobe Acrobat (PDF) format on disk
- Overdrive (fast) communication mode supported with the DS1410E parallel port adapter and Overdrive capable iButtons

FEATURES

- Language-independent support for iButton TMEX on IBM PCs, compatibles, and DOS handhelds
- TMEX provides API calls to locate and identify iButtons, and to read and write TMEX Extended File Structure files
- Supports Microsoft Windows 3.1, 95 and NT with universally callable DLLs
- Supports DOS with installable interrupt service routines
- Includes TMEX iButton utilities similar to FORMAT, DIR, MD, RD, CD, TREE, TYPE, COPY, RENAME, DELETE, CHKDSK, ATTRIB, and DISKCOPY, and a utility to perform storage optimization and defragmentation
- Includes source code example programs for DOS written in C, Pascal, and Basic, and Microsoft Windows (16- and 32-bit) examples written in C, Delphi (Pascal), and Visual Basic
- Supports all SRAM, EEPROM and EPROM iButton devices up to 64K bits through the DS9097E COM-Port adapter
- Supports all SRAM and EEPROM iButton and reads all EPROM iButton devices up to 64K bits through the DS1410E and DS1410D parallel port adapter



iButton VIEWER

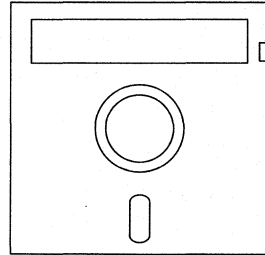


DALLAS SEMICONDUCTOR

DS1410K Parallel Port Developer's Kit

INCLUDES:

- DS1410E Parallel Port Adapter
- DS1402D-DB8 Blue Dot Receptor
- DS1425 Multi iButton
- DS1427 Time iButton
- Software
- Product data sheets
- Customer registration form



DESCRIPTION

The DS1410K Developer's Kit contains all the software and hardware necessary to complete integration of the DS1410E Parallel Port Adapter and corresponding iButtons into an application.

The software provided contains an object file (called the Access System), which must be linked with the application code to provide the communication path between the host and the DS1410E.

Documentation and examples in a variety of programming languages are also provided for reference. The DS1410E supports DOS, OS/2, Windows (3.1, 3.11, 95, NT), and PC-UNIX operating systems.

The kit also provides two different iButtons, a DS1410E Parallel Port Adapter, and optional accessories to extend the number of iButtons per holder or to provide convenient access. No other software or hardware is necessary to move into production. Simply choose the iButton(s) according to your scheme, link the object file with the application code, and purchase additional iButtons and holders on an as needed basis.

A Customer Registration Form is provided for easy access to free upgrades and discounts on the purchase of other Dallas Authorization Developer's kits.

DALLAS SEMICONDUCTOR

DS1820 1-Wire™ Digital Thermometer

FEATURES

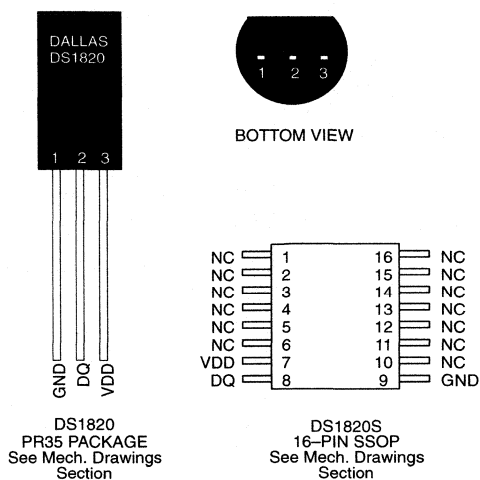
- Unique 1-Wire™ interface requires only one port pin for communication
- Multidrop capability simplifies distributed temperature sensing applications
- Requires no external components
- Can be powered from data line
- Zero standby power required
- Measures temperatures from -55°C to $+125^{\circ}\text{C}$ in 0.5°C increments. Fahrenheit equivalent is -67°F to $+257^{\circ}\text{F}$ in 0.9°F increments
- Temperature is read as a 9-bit digital value.
- Converts temperature to digital word in 200 ms (typ.)
- User-definable, nonvolatile temperature alarm settings
- Alarm search command identifies and addresses devices whose temperature is outside of programmed limits (temperature alarm condition)
- Applications include thermostatic controls, industrial systems, consumer products, thermometers, or any thermally sensitive system

DESCRIPTION

The DS1820 Digital Thermometer provides 9-bit temperature readings which indicate the temperature of the device.

Information is sent to/from the DS1820 over a 1-Wire interface, so that only one wire (and ground) needs to be connected from a central microprocessor to a DS1820. Power for reading, writing, and performing temperature conversions can be derived from the data line itself with no need for an external power source.

PIN ASSIGNMENT



PIN DESCRIPTION

GND	–	Ground
DQ	–	Data In/Out
V_{DD}	–	Optional V_{DD}
NC	–	No Connect

Because each DS1820 contains a unique silicon serial number, multiple DS1820s can exist on the same 1-Wire bus. This allows for placing temperature sensors in many different places. Applications where this feature is useful include HVAC environmental controls, sensing temperatures inside buildings, equipment or machinery, and in process monitoring and control.

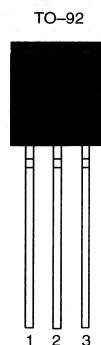
FEATURES

- Low-cost, general-purpose, 256-bit memory
 - DS2223 has 256-bit SRAM
 - DS2224 has 32-bit ROM, 224-bit SRAM
- Reduces control, address and data interface to a single pin
- Each DS2224 32-bit ROM is factory-lasered with a unique serial number
- DS2224 portion of ROM with custom code and unique serial number available
- Minimal operating power: 45 nanocoulombs per transaction @ 1.5V typical
- Less than 15 nA standby current at 25°C
- Nonvolatile data retention easily achieved via low-cost alkaline batteries or capacitors
- Directly connects to a port pin of popular microcontrollers
- Operation from 1.2 to 5.5 volts
- Popular TO-92 or SOT-223 surface mount package
- Operates over industrial temperature range -40°C to +85°C

DESCRIPTION

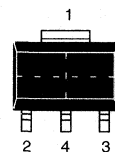
The DS2223 and DS2224 EconoRAMs are fully static, micro-powered, read/write memories in low-cost TO-92 or SOT-223 packages. The DS2223 is organized as a serial 256 x 1 bit static read/write memory. The DS2224's first 32 bits are lasered with a unique ID code at the time of manufacture; the remaining 224 bits are static read/write memory. Signaling necessary for reading or writing is reduced to just one interface lead.

PACKAGE OUTLINE



BOTTOM VIEW
See Mech. Drawings
Section

SOT-223



TOP VIEW
See Mech. Drawings
Section

PIN CONNECTIONS

Pin 1	GND	– Ground
Pin 2	DQ	– Data In/Out
Pin 3	V _{CC}	– Supply
Pin 4	GND	– Ground

ORDERING INFORMATION

DS2223	256-bit SRAM – TO-92 Package
DS2223Z	256-bit SRAM – SOT-223 Package
DS2223T	1000 piece tape-and-reel of DS2223
DS2223Y	2500 piece tape-and-reel of DS2223Z
DS2224	32-bit serial number (ROM), 224-bit SRAM – TO-92 Package
DS2224Z	32-bit serial number (ROM), 224-bit SRAM – SOT-223 Package
DS2224T	1000 piece tape-and-reel of DS2224
DS2224Y	2500 piece tape-and-reel of DS2224Z

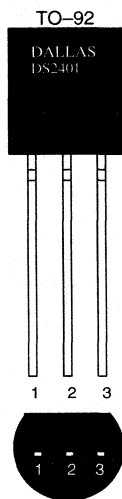
FEATURES

- Upgrade and drop-in replacement for DS2400
 - Extended 2.8 to 6.0 voltage range
 - Multiple DS2401s can reside on a common 1-Wire™ bus
- Unique, factory-lasered and tested 64-bit registration number (8-bit family code + 48-bit serial number + 8-bit CRC tester); guaranteed no two parts alike
- Built-in multidrop controller ensures compatibility with other MicroLAN™ products
- 8-bit family code specifies DS2401 communications requirements to reader
- Presence pulse acknowledges when the reader first applies voltage
- Low-cost TO-92, SOT-223 and TSOC surface mount packages
- Reduces control, address, and data to a single pin
- Zero standby power required
- Directly connects to a single port pin of a microprocessor and communicates at up to 16.3k bits/s
- Pulse width measurement determines 1s or 0s
- Power derived from data line
- Applications
 - PCB Identification
 - Network Node ID
 - Equipment Registration
- Operates over industrial temperature range of -40°C to +85°C

DESCRIPTION

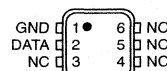
The DS2401 enhanced Silicon Serial Number is a low-cost, electronic registration number that provides an absolutely unique identity which can be determined with a minimal electronic interface, typically a single port pin of a microcontroller. The DS2401 consists of a factory-

PIN ASSIGNMENT

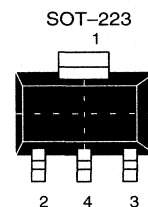


BOTTOM VIEW
See Mech. Drawings
Section

TSOC PACKAGE



TOP VIEW
3.7 X 4.0 X 1.5 mm



TOP VIEW
See Mech. Drawings
Section

PIN DESCRIPTION

TO-92/SOT-223

Pin 1	– Ground
Pin 2	– Data (DQ)
Pin 3	– No Connect
Pin 4	– Ground

TSOC

Pin 1	– Ground
Pin 2	– Data (DQ)
Pin 3	– No Connect
Pin 4–6	– No Connect

ORDERING INFORMATION

DS2401	TO-92 Package
DS2401Z	SOT-223 Surface Mount Package
DS2401T	Tape & Reel of DS2401
DS2401Y	Tape & Reel of DS2401Z
DS2401P	TSOC Surface Mount Package
DS2401V	Tape & Reel of DS2401P

lasered, 64-bit ROM that includes a unique 48-bit serial number, an 8-bit CRC, and an 8-bit Family Code (01h). Data is transferred serially via the 1-Wire protocol which requires only a single data lead and a ground return.

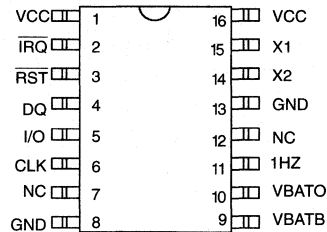
FEATURES

- 4096 bits of nonvolatile dual-port memory including real time clock/calendar in binary format, programmable interval timer, and programmable power-on cycle counter
- 1-Wire™ interface for MicroLAN™ communication at 16.3k bits per second
- 3-wire host interface for high-speed data communications at 2M bits per second
- Unique, factory-lasered and tested 64-bit registration number (8-bit family code + 48-bit serial number + 8-bit CRC tester) assures absolute traceability because no two parts are alike
- Memory partitioned into 16 pages of 256-bits for packetizing data
- 256-bit scratchpad with strict read/write protocols ensures integrity of data transfer
- Programmable alarms can be set to generate interrupts for interval timer, real time clock, and/or cycle counter
- 16-pin DIP, SOIC and SSOP packages
- Operating temperature range from -40°C to +85°C
- Operating voltage range from 2.8 to 5.5 Volts

DESCRIPTION

The DS2404 EconoRAM Time Chip offers a simple solution for storing and retrieving vital data and time information with minimal hardware. The DS2404 contains a unique lasered ROM, real-time clock/calendar, interval timer, cycle counter, programmable interrupts and 4096-bits of SRAM. Two separate ports are provided for communication, 1-Wire and 3-wire. Using the 1-Wire port, only one pin is required for communication, and the lasered ROM can be read even when the DS2404 is without power. The 3-wire port provides high

PIN ASSIGNMENT



16-PIN DIP (300 MIL)
 16-PIN SOIC (300 MIL)
 16-PIN SSOP (300 MIL)
 See Mechanical Drawings Section

PIN DESCRIPTION

V _{CC}	- 2.8 to 5.5 Volts
IRQ	- Interrupt Output
RST	- 3-Wire Reset Input
DQ	- 3-Wire Input/Output
I/O	- 1-Wire Input/Output
CLK	- 3-Wire Clock Input
NC	- No Connection
GND	- Ground
VBATB	- Battery Backup Input
VBATO	- Battery Operate Input
1 Hz	- 1 Hz Output
X ₁ , X ₂	- Crystal Connections

ORDERING INFORMATION

DS2404	16-pin DIP
DS2404S	16-pin SOIC
DS2404B	16-pin SSOP

speed communication using the traditional Dallas Semiconductor 3-wire interface. With either interface, a strict protocol for accessing the DS2404 insures data integrity. Utilizing backup energy sources, the data is nonvolatile and allows for stand-alone operation.

The DS2404 features can be used to create a stopwatch, alarm clock, time and date stamp, logbook, hour meter, calendar, system power cycle timer, expiration timer, and event scheduler.

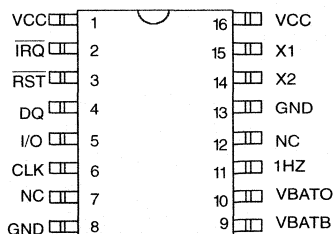
FEATURES

- Bridge for electronic equipment to the 1-Wire Micro-LAN
- 4096 bits of nonvolatile dual-port memory including real time clock/calendar in binary format, programmable interval timer, and programmable power-on cycle counter
- 1-Wire interface for MicroLAN communication at 16.3k bits per second
- 3-Wire host interface for high-speed data communications at 2M bits per second
- Unique, factory-lasered and tested 64-bit registration number (8-bit family code + 48-bit serial number + 8-bit CRC tester) assures absolute traceability because no two parts are alike
- Memory partitioned into 16 pages of 256-bits for packetizing data
- 256-bit scratchpad with strict read/write protocols ensures integrity of data transfer
- Programmable alarms can be set to generate interrupts for interval timer, real time clock, and/or cycle counter
- Space saving 16-pin SOIC package
- Operating temperature range from -40°C to $+85^{\circ}\text{C}$
- Operating voltage range from 2.8 to 5.5 Volts

DESCRIPTION

In order to provide universal access to the MicroLAN, the DS2404S-C01 Dual Port Memory Plus Time has been developed. This device has both 1-Wire and a 3-Wire serial microcontroller interface. The DS2404S-C01 can be used to make complex functions involving microcontrollers behave as if they were iButtons.

PIN ASSIGNMENT



16-PIN SOIC (300 MIL)
See Mech. Drawings
Section

PIN DESCRIPTION

Pin #	Pin Name	Description
Pin 1 & 16	- V _{CC}	2.8 to 5.5 Volts
Pin 2	- IRQ	Interrupt Output
Pin 3	- RST	3-Wire Reset Input
Pin 4	- DQ	3-Wire Input/Output
Pin 5	- I/O	1-wire Input/Output
Pin 6	- CLK	3-Wire Clock Input
Pin 7 & 12	- NC	No Connection
Pin 8 & 13	- GND	Ground
Pin 9	- V _{BATB}	Battery Backup Input
Pin 10	- V _{BATO}	Battery Operate Input
Pin 11	- 1 Hz	1 Hz Output
Pin 14 & 15	- X ₁ , X ₂	Crystal Connections

Being a custom-ROM version of the DS2404, the DS2404S-C01 has the family code 84H. In addition to this, the 12 most significant bit of the serialization field are coded 001H, leaving 28 bits for serialization. The communication with the DS2404S-C01 through the 1-Wire port is identical to the DS1994; all functions of the DS1994 are available.

DALLAS SEMICONDUCTOR

DS2405 Addressable Switch

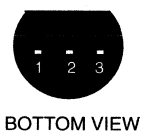
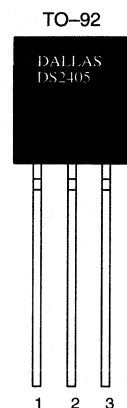
FEATURES

- Open drain PIO pin is controlled by matching 64-bit, laser-engraved registration number associated with each device
- Logic level of open drain output can be determined over 1-Wire bus for closed-loop control
- PIO pin sink capability is greater than 4 mA at 0.4V
- Multiple DS2405's can be identified on a common 1-Wire bus and be turned on or off independent of other devices on the bus
- Unique, factory-lasered and tested 64-bit registration number (8-bit family code + 48-bit serial number + 8-bit CRC tester) assures absolute identity because no two parts are alike
- Built-in multidrop controller ensures compatibility with other MicroLAN™ products
- Reduces control, address, data, and power to a single data pin
- Directly connects to a single port pin of a microprocessor and communicates at up to 16.3kbits/s
- 8-bit family code specifies DS2405 communications requirements to reader
- 8-bit cyclic redundancy check ensures error-free selection
- Zero standby power required
- Low cost TO-92, SOT-223, or 6-pin C-Lead surface mount package
- 1-Wire communication operates over a wide voltage range of 2.8V to 6.0V from -40°C to +85°C

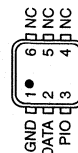
ORDERING INFORMATION

DS2405	TO-92 package
DS2405Z	4-pin SOT-223 package
DS2405P	6-pin C-lead package
DS2405T	Tape & Reel version of DS2405
DS2405Y	Tape & Reel version of DS2405Z
DS2405V	Tape & Reel version of DS2405P

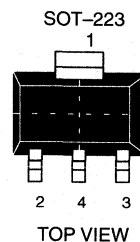
PIN ASSIGNMENT



C-LEAD PACKAGE



TOP VIEW
3.7 X 4.0 X 1.5 mm

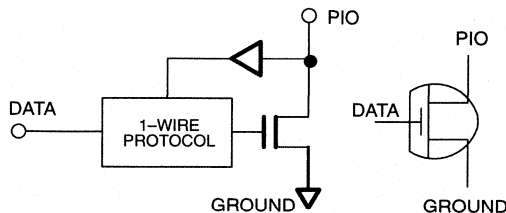


PIN DESCRIPTION

Pin 1	-	Ground
Pin 2	-	Data
Pin 3	-	PIO
Pin 4	-	Ground

C-LEAD

Pin 1	-	Ground
Pin 2	-	Data
Pin 3	-	PIO
Pin 4-6	-	No Connect



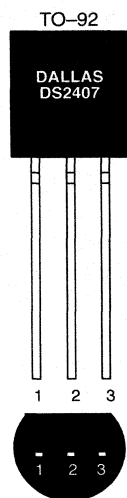
DALLAS SEMICONDUCTOR

DS2407 Dual Addressable Switch Plus 1K-Bit Memory

FEATURES

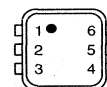
- Open drain PIO pins are controlled and their logic level can be determined over 1-Wire™ bus for closed-loop control
- Dual Channel operation (TSOC package)
- PIO pin channel A sink capability of 50 mA at 0.4V with soft turn-on; channel B 8 mA at 0.4V
- Maximum operating voltage of 13V at PIO-A, 6.5V at PIO-B
- 1024 bits user-programmable OTP EPROM
- 7 bytes of user-programmable status memory to control the device
- Multiple DS2407s can be identified on a common 1-Wire bus and be turned on or off independently of other devices on the bus
- Unique, factory-lasered and tested 64-bit registration number (8-bit family code + 48-bit serial number + 8-bit CRC tester) assures error-free selection and absolute identity because no two parts are alike
- On-chip CRC16 generator allows detection of data transfer errors
- Built-in multidrop controller ensures compatibility with other MicroLAN™ products
- Reduces control, address, data, programming and power to a single data pin
- Directly connects to a single port pin of a microprocessor and communicates at up to 16.3k bits/s
- Low cost TO-92 or 6-pin TSOC surface mount package
- 1-Wire communication operates over a wide voltage range of 2.8V to 6.0V from -40°C to +85°C
- Supports Conditional Search with user-programmable condition
- V_{CC} bondout for optional external supply to the device (TSOC package only)
- Hidden Mode; the device will respond only to a Match ROM command or a Conditional Search when in this mode.

PIN ASSIGNMENT



BOTTOM VIEW
See Mech. Drawings
Section

TSOC PACKAGE



TOP VIEW
3.7 X 4.0 X 1.5 mm

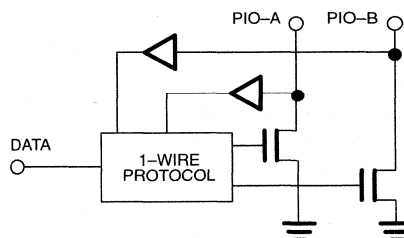


SIDE VIEW

See Mech. Drawings
Section

PIN DESCRIPTION

	TO-92	TSOC
Pin 1	Ground	Ground
Pin 2	Data	Data
Pin 3	PIO-A	PIO-A
Pin 4	—	V _{CC}
Pin 5	—	NC
Pin 6	—	PIO-B



DALLAS SEMICONDUCTOR

DS2422/DS2423 1K/4K-Bit 1-Wire™ RAM with Counters

FEATURES

- 4096 bits of SRAM (DS2423), 1024 bits with the DS2422
- Four 32-bit read-only counters (DS2423), three counters with the DS2422
- Active-low external trigger inputs for two of the counters with on-chip debouncing compatible with reed and Wiegand switches
- Unique, factory-lasered and tested 64-bit registration number (8-bit family code + 48-bit serial number + 8-bit CRC tester) assures absolute traceability because no two parts are alike
- Memory partitioned into 16 256-bit pages in DS2423, (4 pages in DS2422), for packetizing data
- 256-bit scratchpad with strict read/write protocols ensures integrity of data transfer
- On-chip 16-bit CRC generator for safeguarding data transfers
- Built-in multidrop controller ensures compatibility with other MicroLAN™ products
- Directly connects to a single port pin of a microprocessor and communicates at up to 16.3k bits per second
- Overdrive mode boosts communication speed to 142k bits per second
- 8-bit family code specifies device communication requirements to reader
- Presence detector acknowledges when reader first applies voltage
- Compact, low cost 6-pin TSOC surface mount package
- Reads, writes and counts over a wide voltage range of 2.8V to 5.5V from -40°C to +85°C

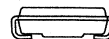
PIN ASSIGNMENT

TSOC PACKAGE



TOP VIEW

3.7 X 4.0 X 1.5 mm



SIDE VIEW

PIN DESCRIPTION

Pin 1	Ground
Pin 2	Data
Pin 3	Vbat
Pin 4	NC
Pin 5	Input channel B
Pin 6	Input channel A

ORDERING INFORMATION

contact factory

DESCRIPTION

The DS2422/DS2423 1-Wire™ RAM With Counters (hereafter referred to as DS242X) is a fully static, read/write memory for battery operation in a low cost 6-lead TSOC surface mount package. The memory is organized as sixteen pages (DS2423) or four pages (DS2422) of 256 bits each. In addition, the device has four (DS2423) or three (DS2422) counters, two of them with external trigger inputs called A and B. Each of the counters is associated with a memory page. A counter without external trigger input increments each time data is written to the page it is associated with (Write Cycle Counter). The counters triggered by inputs A and B, respectively, increment with every low-going pulse on their input. All counters are read-only. They are automatically cleared to zero when the battery is connected.

DALLAS SEMICONDUCTOR

DS2430A 256-Bit 1-Wire™ EEPROM

FEATURES

- 256-bit Electrically Erasable Programmable Read Only Memory (EEPROM) plus 64-bit one-time programmable application register
- Unique, factory-lasered and tested 64-bit registration number (8-bit family code + 48-bit serial number + 8-bit CRC tester) assures absolute identity because no two parts are alike
- Built-in multidrop controller ensures compatibility with other MicroLAN™ products
- EEPROM organized as one page of 32 bytes for random access
- Reduces control, address, data and power to a single data pin
- Directly connects to a single port pin of a microprocessor and communicates at up to 16.3k bits per second
- 8-bit family code specifies DS2430A communication requirements to reader
- Presence detector acknowledges when reader first applies voltage
- Low cost TO-92 or 6-pin TSOC surface mount package
- Reads and writes over a wide voltage range of 2.8V to 6.0V from -40°C to +85°C

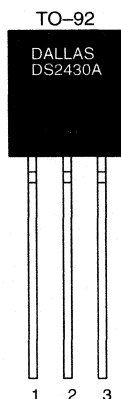
ORDERING INFORMATION

DS2430A	TO-92 package
DS2430AP	6-pin TSOC package
DS2430AT	Tape & Reel version of DS2430A
DS2430AV	Tape & Reel version of DS2430AP

SILICON LABEL DESCRIPTION

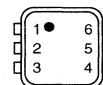
The DS2430A 256-bit 1-Wire EEPROM identifies and stores relevant information about the product to which it is associated. This lot or product specific information can be accessed with minimal interface, for example a single port pin of a microcontroller. The DS2430A consists of a factory-lasered registration number that

PIN ASSIGNMENT

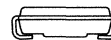


BOTTOM VIEW
See Mech. Drawings
Section

TSOC PACKAGE



TOP VIEW
3.7 X 4.0 X 1.5 mm



SIDE VIEW
See Mech. Drawings
Section

PIN DESCRIPTION

	TO-92	TSOC
Pin 1	Ground	Ground
Pin 2	Data	Data
Pin 3	NC	NC
Pin 4	—	NC
Pin 5	—	NC
Pin 6	—	NC

includes a unique 48-bit serial number, an 8-bit CRC, and an 8-bit Family Code (14h) plus 256 bits of user-programmable EEPROM and a 64-bit one-time programmable application register. The power to read and write the DS2430A is derived entirely from the 1-Wire communication line.

DALLAS SEMICONDUCTOR

DS2480 Serial 1-Wire™ Line Driver

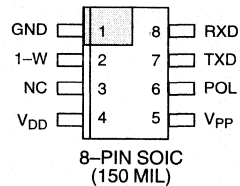
FEATURES

- Universal, common-ground serial port to 1-Wire™ line driver for MicroLAN™ applications
- Meets iButton™ and MicroLAN communication Standards
- Communicates at regular and Overdrive 1-Wire speed and serial port data rates of 9600 (default), 19200, 57600 and 115200 bps
- Supports 12V EPROM programming and stiff 5V pull-up for Crypto iButton, sensors and EEPROM
- Self-calibrating time base with +0/-3% tolerance for serial and 1-Wire communication
- Slew rate controlled 1-Wire pull-down and active pull-up to accommodate long lines and reduce radiation
- User-selectable RXD/TXD polarity minimizes component count when interfacing to 5V based RS232 systems or directly to UARTs
- Programmable 1-Wire timing and driver characteristics accommodate a wide range of MicroLAN configurations at regular speed
- Smart protocol combines data and control information without requiring extra pins
- Compatible to optical, IR and RF to RS232 converters
- Low cost 8-pin SOIC surface mount package
- Operates over 4.5V to 5.5V from -40°C to +85°C

DESCRIPTION

The DS2480 is a serial port to 1-Wire interface chip that supports standard and Overdrive speeds. It connects directly to UARTs and 5V RS232 systems. Interfacing to RS232C ($\pm 12V$ levels) requires a passive clamping circuit and one 5V to $\pm 12V$ level translator. Internal timers relieve the host of the burden of generating the time-critical 1-Wire communication waveforms. In contrast to the DS9097(E) where a full character must be sent by the host for each 1-Wire time slot, the DS2480 can translate each character into eight 1-Wire time slots thereby increasing the data throughput significantly. In addition, the DS2480 can be set to communicate at four different data rates including 115.2 kbps, 57.6 kbps and 19.2 kbps with 9.6 kbps being the power-on default.

PIN ASSIGNMENT



PIN DESCRIPTION

GND	Ground
1-W	1-Wire Input/Output
NC	No Connection
V _{DD}	4.5 to 5.5 Volts
V _{PP}	Optional EPROM Programming Voltage
POL	RXD/TXD Polarity Select
TXD	Serial Data from UART
RXD	Serial Data to UART

ORDERING INFORMATION

DS2480S	8-pin SOIC
---------	------------

Command codes received from the host's crystal controlled UART serve as a reference to continuously calibrate the on-chip timing generator. The DS2480 uses a unique protocol that merges data and control information without requiring control pins. This approach maintains compatibility to off-the-shelf serial to wireless converters allowing easy realization of 1-Wire media jumpers. The various control functions of the DS2480 are optimized for MicroLAN 1-Wire networks and support the special needs of all current 1-Wire devices including the Crypto iButton, EPROM-based Add-Only Memories, EEPROM devices and 1-Wire Thermometers.

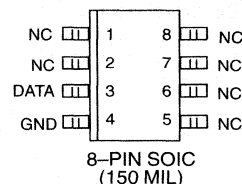
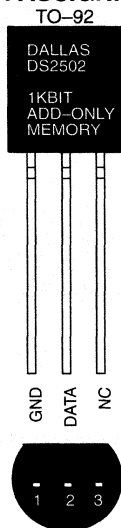
DALLAS SEMICONDUCTOR

DS2502 1Kbit Add-Only Memory

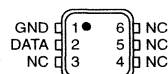
FEATURES

- 1024 bits Electrically Programmable Read Only Memory (EPROM) communicates with the economy of one signal plus ground
- Unique, factory-lasered and tested 64-bit registration number (8-bit family code + 48-bit serial number + 8-bit CRC tester) assures absolute traceability because no two parts are alike
- Built-in multidrop controller ensures compatibility with other MicroLAN™ products
- EPROM partitioned into four 256-bit pages for randomly accessing packetized data records
- Each memory page can be permanently write-protected to prevent tampering
- Device is an "add only" memory where additional data can be programmed into EPROM without disturbing existing data
- Architecture allows software to patch data by superseding an old page in favor of a newly programmed page
- Reduces control, address, data, power, and programming signals to a single data pin
- Directly connects to a single port pin of a microprocessor and communicates at up to 16.3k bits per second
- 8-bit family code specifies DS2502 communications requirements to reader
- Presence detector acknowledges when reader first applies voltage
- Low cost TO-92 or 8-pin SOIC and TSOC surface mount packages
- Reads over a wide voltage range of 2.8V to 6.0V from -40°C to +85°C; programs at 11.5V ± 0.5V from -40°C to +85°C

PIN ASSIGNMENT



TSOC PACKAGE



TOP VIEW
3.7 X 4.0 X 1.5 mm
See Mech. Drawings
Section

ORDERING INFORMATION

DS2502	TO-92 package
DS2502S	8-pin SOIC package
DS2502P	6-pin TSOC package
DS2502T	Tape & Reel version of DS2502
DS2502Y	Tape & Reel version of DS2502S
DS2502V	Tape & Reel version of DS2502P

SILICON LABEL DESCRIPTION

The DS2502 1K-bit Add-Only Memory identifies and stores relevant information about the product to which it is associated. This lot or product specific information can be accessed with minimal interface, for example a single port pin of a microcontroller. The DS2502 consists of a factory-lasered registration number that includes a unique 48-bit serial number, an 8-bit CRC, and an 8-bit Family Code (09h) plus 1K-bit of EPROM which is user-programmable.

DALLAS SEMICONDUCTOR

DS2502-E64 IEEE EUI-64 Node Address Chip

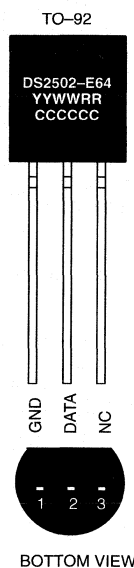
FEATURES

- IEEE-approved factory programmed 64-bit node address chip (EUI-64) with 768 bits user-programmable OTP-EPROM communicates with the economy of one signal plus ground
- Meets the node identification requirements of IEEE Standard 1394-1995 (FireWire™)
- Unique, factory lasered and tested 64-bit registration number (8-bit family code 89H + 36-bit serial number + 12-bit UniqueWare Identifier 5E7H + 8-bit CRC tester) assures absolute traceability because no two parts are alike
- Built-in multidrop controller ensures compatibility with other MicroLAN™ products
- Device is an "add only" memory where additional data can be programmed into EPROM without disturbing existing data
- Reduces control, address, data, power and programming signals to a single pin
- Directly connects to a single port pin of a microprocessor and communicates at up to 16.3k bits per second
- Presence detector acknowledges when reader first applies voltage
- Low cost TO-92 or TSOC surface mount packages
- Reads over a wide voltage range of 2.8V to 6.0V from -40°C to +85°C; programs at 11.5V ± 0.5V from -40°C to +85°C

GLOBAL IDENTIFIER DESCRIPTION

The DS2502-E64 is a variant of the DS2502 1024-bit Add-Only Memory. It differs from the standard DS2502 in its custom ROM family code 89H, and the UniqueWare Identifier 5E7 in place of the upper 12 bits of the standard ROM serialization field. Otherwise, the electrical and logical behavior is identical to that of the DS2502. For technical details please refer to the DS2502 data sheet.

The first 32 bytes of the DS2502-E64's EPROM memory contain a globally unique 64-bit node address (EUI-64) and are write-protected. The data structure



TSOC PACKAGE



TOP VIEW
THE DOT MARKS PIN 1

YYWW = DATE CODE
RR = DIE REVISION CODE
CCCCC = COUNTRY CODE



See Mech. Drawings
Section

ORDERING INFORMATION

DS2502-E64 TO-92 package
DS2502P-E64 6-pin TSOC package

follows the conventions of UniqueWare devices using Default Data Structure (Figure 1).

The data record starts with a length byte (0CH) and the 4-byte UniqueWare Project ID 00001128H. The next eight bytes contain the EUI-64 global identifier (node address) which consists of an incrementing 40-bit extension identifier and the IEEE-assigned 24-bit company ID value 006035H. A 16-bit CRC ends the data record. The remaining bytes of the 32-byte memory page remain unprogrammed.

DALLAS SEMICONDUCTOR

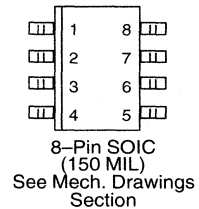
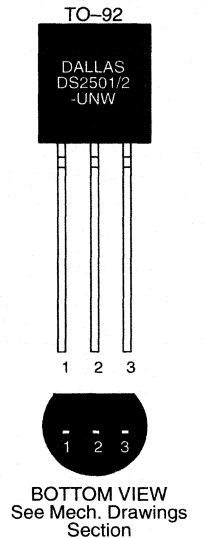
DS2501-UNW/DS2502-UNW UniqueWare™ Add Only Memory

SPECIAL FEATURES

- 512 bits (DS2501-UNW) or 1024 bits (DS2502-UNW) Electrically Programmable Read Only Memory (EPROM) communicates with the economy of one signal plus ground
- Unique, factory-lasered and tested 64-bit registration number (8-bit family code, 36-bit serialization, 12-bit UniqueWare Identifier 5E7H, 8-bit CRC-tester) assures absolute traceability because no two parts are alike. Family code 91H for the DS2501-UNW, 89H for the DS2502-UNW
- Built-in multidrop controller ensures compatibility with other MicroLAN™ products
- EPROM partitioned into two (DS2501-UNW) or four (DS2502-UNW) 256-bit pages for randomly accessing packetized data records
- Each memory page can be permanently write-protected to prevent tampering
- Device is an "add only" memory where additional data can be programmed into EPROM without disturbing existing data
- Reduces control, address, data, power and programming signals to a single pin
- Directly connects to a single port pin of a microprocessor and communicates at up to 16.3k bits per second
- Presence detector acknowledges when reader first applies voltage
- Low cost TO-92 or 8-pin SOIC and TSOC surface mount packages
- Reads over a wide voltage range of 2.8V to 6.0V from -40°C to +85°C; programs at 11.5V ± 0.5V from -40°C to + 85°C

SILICON LABEL DESCRIPTION

The DS2501-UNW and DS2502-UNW are factory programmed versions of the DS2502 1K-bit Add-Only Memory. They differ from the standard DS2502 in their custom ROM family code 91H (DS2501-UNW) and 89H (DS2502-UNW) respectively, and the UniqueWare Identifier 5E7 in place of the upper 12 bits of the standard serialization field. With the DS2501-UNW, the upper two memory pages are not accessible; they always read FFH and cannot be programmed. Otherwise, the electrical and logical behavior is identical to



TSOC PACKAGE



3.7 X 4.0 X 1.5 mm
See Mech. Drawings
Section

PIN ASSIGNMENT

	TO-92	TSOC	SOIC
Pin 1	Ground	Ground	NC
Pin 2	Data	Data	NC
Pin 3	NC	NC	Data
Pin 4	—	NC	Ground
Pins 5 to 8	—	NC	NC

ORDERING INFORMATION

DS2501-UNW	TO-92 package
DS2501S-UNW	8-pin SOIC package
DS2501P-UNW	6-pin TSOC package
DS2502-UNW	TO-92 package
DS2502S-UNW	8-pin SOIC package
DS2502P-UNW	6-pin TSOC package

that of the DS2502. For technical details please refer to the DS2502 data sheet.

The DS2501-UNW and DS2502-UNW are only available preprogrammed with customer specific and write-protected UniqueWare data. Memory pages not used for UniqueWare data can be programmed in the application. For more details on UniqueWare, please refer to the UniqueWare Project Setup Manual, available as Application Note 99 from Dallas Semiconductor.

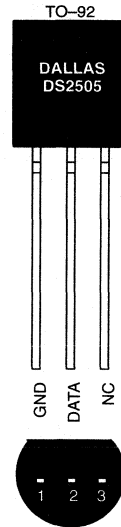
DALLAS SEMICONDUCTOR

DS2505 16K bit Add-Only Memory

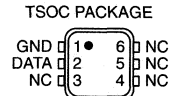
FEATURES

- 16384 bits Electrically Programmable Read Only Memory (EPROM) communicates with the economy of one signal plus ground
- Unique, factory-lasered and tested 64-bit registration number (8-bit family code + 48-bit serial number + 8-bit CRC tester) assures absolute traceability because no two parts are alike
- Built-in multidrop controller ensures compatibility with other MicroLAN™ products
- EPROM partitioned into sixty-four 256-bit pages for randomly accessing packetized data records
- Each memory page can be permanently write-protected to prevent tampering
- Device is an "add only" memory where additional data can be programmed into EPROM without disturbing existing data
- Architecture allows software to patch data by superseding an old page in favor of a newly programmed page
- Reduces control, address, data, power, and programming signals to a single data pin
- Directly connects to a single port pin of a microprocessor and communicates at up to 16.3k bits per second
- 8-bit family code specifies DS2505 communications requirements to reader
- Presence detector acknowledges when the reader first applies voltage
- Low cost TO-92 or 6-pin TSOC surface mount package
- Reads over a wide voltage range of 2.8V to 6.0V from -40°C to +85°C; programs at 11.5V to 12.0V from -40°C to +85°C

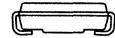
PIN ASSIGNMENT



BOTTOM VIEW
See Mech. Drawings
Section



TOP VIEW
3.7 X 4.0 X 1.5 mm



SIDE VIEW
See Mech. Drawings
Section

ORDERING INFORMATION

DS2505	TO-92 Package
DS2505P	6-pin TSOC Package
DS2505T	Tape & Reel version of DS2505
DS2505V	Tape & Reel version of DS2505P

SILICON LABEL DESCRIPTION

The DS2505 16k bits Add-Only Memory identifies and stores relevant information about the product to which it is associated. This lot or product specific information can be accessed with minimal interface, for example a single port pin of a microcontroller.

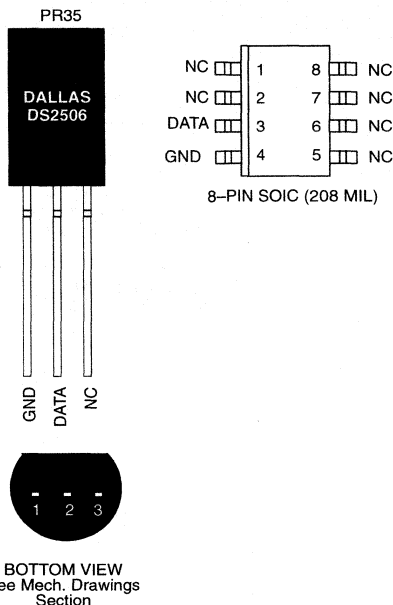
DALLAS SEMICONDUCTOR

DS2506 64K bit Add-Only Memory

FEATURES

- 65536 bits Electrically Programmable Read Only Memory (EPROM) communicates with the economy of one signal plus ground
- Unique, factory-lasered and tested 64-bit registration number (8-bit family code + 48-bit serial number + 8-bit CRC tester) assures absolute traceability because no two parts are alike
- Built-in multidrop controller ensures compatibility with other MicroLAN™ products
- EPROM partitioned into two hundred fifty six 256-bit pages for randomly accessing packetized data records
- Each memory page can be permanently write-protected to prevent tampering
- Device is an "add only" memory where additional data can be programmed into EPROM without disturbing existing data
- Architecture allows software to patch data by superseding an old page in favor of a newly programmed page
- Reduces control, address, data, power, and programming signals to a single data pin
- Directly connects to a single port pin of a microprocessor and communicates at up to 16.3k bits per second
- Overdrive mode boosts communication speed to 142k bits per second
- 8-bit family code specifies DS2506 communications requirements to reader
- Presence detector acknowledges when the reader first applies voltage
- Low cost PR35 or 8-pin SOIC surface mount package
- Reads over a wide voltage range of 2.8V to 6.0V from -40°C to +85°C; programs at 11.5V to 12.0V from -40°C to +85°C

PIN ASSIGNMENT



ORDERING INFORMATION

DS2506	PR35 Package
DS2506S	8-Pin SOIC Package

SILICON LABEL DESCRIPTION

The DS2506 64k bits Add-Only Memory identifies and stores relevant information about the product to which it is associated. This lot or product specific information can be accessed with minimal interface, for example a single port pin of a microcontroller. The DS2506 consists of a factory-lasered registration number that includes a unique 48-bit serial number, an 8-bit CRC, and an 8-bit Family Code (0FH) plus 64k-bits of user-programmable EPROM. The power to program and read the DS2506 is derived entirely from the 1-Wire™ communication line. Data is transferred serially via the 1-Wire protocol which requires only a single data lead and a ground return.

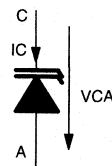
DALLAS SEMICONDUCTOR

DS9502 ESD Protection Diode

SPECIAL FEATURES

- Zener characteristic with voltage snap-back to protect against ESD hits
- High avalanche voltage, low leakage and low capacitance avoid signal attenuation
- Compatible to all 5V logic families
- Space saving, low inductance TSOC surface mount package
- Symmetric dual-port bondout to maximize energy dissipation in protection device
- Industrial temperature range

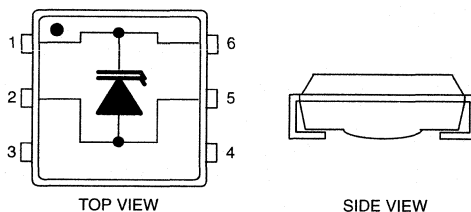
SYMBOL AND CONVENTIONS



PACKAGE OUTLINE

TSOC SURFACE MOUNT PACKAGE

3.7 X 4.0 X 1.5 mm



DESCRIPTION

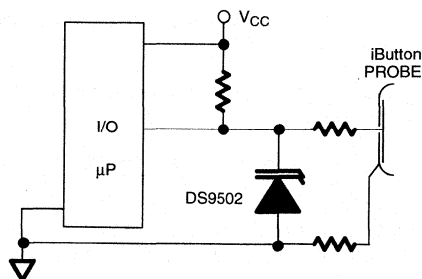
This DS9502 was designed as an additional ESD protection for SRAM-based battery-buffered portable memory modules. The memory chips used for these modules have already a strong ESD-protection structure on their I/O line. Together with the DS9502 the ESD protection level is raised to more than 27 kV (IEC 801-2 Reference model). In case of abnormal ESD hits beyond its maximum ratings the DS9502 will eventually fail "short" thus preventing further damage.

During normal operation the DS9502 behaves like a regular 7.5V Zener Diode. When the voltage exceeds the trigger voltage, the I/V characteristic of the device will "snapback" allowing the same or higher amount of current to flow, but at a significantly lower voltage. As long as a minimum current or voltage is maintained, the device will stay in the "snapback mode". If the voltage or the current falls below the holding voltage or holding current, the device will abruptly change to its normal mode and conduct only a small leakage current.

ORDERING INFORMATION

DS9502P 6-lead TSOC package

TYPICAL APPLICATION



SPECIAL FEATURES

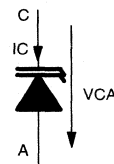
- Zener characteristic with voltage snap-back to protect against ESD hits
- High avalanche voltage, low leakage and low capacitance avoid signal attenuation
- Compatible to all 5V logic families
- Space saving, low inductance TSOC surface mount package
- On-chip 5Ω resistors for isolation at both anode and cathode terminals
- Industrial temperature range

DESCRIPTION

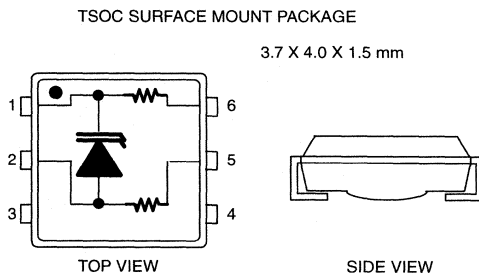
This DS9503 is designed as an ESD protection device for 1-Wire MicroLAN interfaces. In contrast to the DS9502, the DS9503 includes two 5Ω isolation resistors on chip. Although 5Ω are negligible during communication, they represent a high impedance relative to the conducting diode during an ESD event. Thus, the diode absorbs the energy while the resistors further isolate and protect the circuit at the other side of the package. If used with circuits that already have a strong ESD-protection at their I/O port, the ESD protection level is raised to more than 27 kV (IEC 801-2 Reference model). In case of abnormal ESD hits beyond its maximum ratings the DS9503 will eventually fail "short" thus preventing further damage.

During normal operation the DS9503 behaves like a regular 7.5V Zener Diode. When the voltage exceeds the trigger voltage, the I/V characteristic of the device will "snapback" allowing the same or higher amount of current to flow, but at a significantly lower voltage. As long as a minimum current or voltage is maintained, the device will stay in the "snapback mode". If the voltage or the current falls below the holding voltage or holding current, the device will abruptly change to its normal mode and conduct only a small leakage current.

SYMBOL AND CONVENTIONS



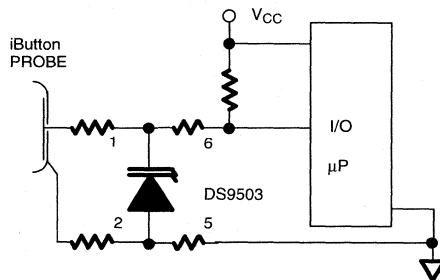
PACKAGE OUTLINE



ORDERING INFORMATION

DS9503P 6-lead TSOC package

TYPICAL APPLICATION





LINE INTERFACES

FEATURES

- Compatible with DS1229
- 5V operation
- 20-pin DIP or SOIC package
- 20-pin TSSOP package for height restricted applications
- Operate from single +5V power
- Meets all EIA-232E and V.28 specifications
- Uses small capacitors: 0.1 μ F
- Optional industrial temperature range available (-40°C to +85°C)

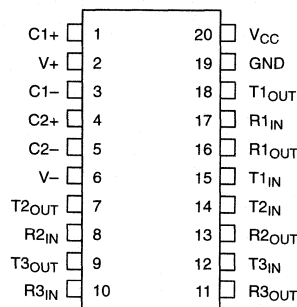
ORDERING INFORMATION

DS229	20-pin DIP
DS229N	20-pin DIP (Industrial)
DS229S	20-pin SOIC
DS229SN	20-pin SOIC (Industrial)
DS229E	20-pin TSSOP
DS229EN	20-pin TSSOP (Industrial)

DESCRIPTION

The DS229 is a triple RS-232 driver/receiver pair that generates RS-232 voltage levels from a single +5 volt power supply. Additional ± 12 volt supplies are not needed since the DS229 uses on-board charge pumps to convert the +5 volt supply to ± 10 volts. The DS229 is fully compliant with EIA RS-232E and V.28/V.24 standards. The DS229 contains three drivers and three receivers. Driver slew rates and data rates are guaranteed up to 116 kbits/sec. The DS229 operates with only 0.1 μ F charge pump capacitors.

PIN ASSIGNMENT



20-PIN DIP, SOIC AND TSSOP

PIN DESCRIPTION

V _{CC}	- +5 Volt Supply
GND	- Ground
V+	- Positive Supply Output
V-	- Negative Supply Output
T1 _{IN} , T2 _{IN} , T3 _{IN}	- RS-232 Driver Inputs
T1 _{OUT} , T2 _{OUT} , T3 _{OUT}	- RS-232 Driver Outputs
R1 _{IN} , R2 _{IN} , R3 _{IN}	- Receiver Inputs
R1 _{OUT} , R2 _{OUT} , R3 _{OUT}	- Receiver Outputs
C1+, C1-	- Capacitor 1 Connections
C2+, C2-	- Capacitor 2 Connections

OPERATION

The diagram in Figure 1 shows the main elements of the DS229. The following paragraphs describe the function of each pin.

FEATURES

- Compatible with LT1181A and MAX232A
- High data rate – 250K bits/sec under load
- 16-pin DIP or SOIC package
- 20-pin TSSOP package for height restricted applications
- Operate from single +5V power
- Meets all EIA-232E and V0.28 specifications
- Uses small capacitors: 0.1 μ F
- Optional industrial temperature range available (-40°C to $+85^{\circ}\text{C}$)

ORDERING INFORMATION

DS232A	16-pin DIP
DS232A-N	16-pin DIP (Industrial)
DS232AR	16-pin SOIC (150 Mil)
DS232AR-N	16-pin SOIC (150 Mil) (Industrial)
DS232AS	16-pin SOIC (300 Mil)
DS232AS-N	16-pin SOIC (300 Mil) (Industrial)
DS232AE	20-pin TSSOP
DS232AE-N	20-pin TSSOP (Industrial)

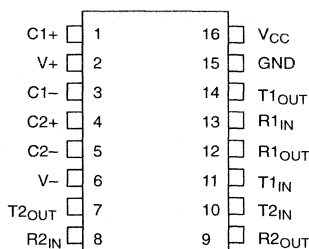
DESCRIPTION

The DS232A is a dual RS-232 driver/receiver pair that generates RS-232 voltage levels from a single +5 volt power supply. Additional ± 12 volt supplies are not needed since the DS232A uses on-board charge pumps to convert the +5 volt supply to ± 10 volts. The DS232A is fully compliant with EIA RS-232E and V0.28/V0.24 standards. The DS232A contains two drivers and two receivers. Driver slew rates and data rates are guaranteed up to 250K bits/sec. The DS232A operates with only 0.1 μ F charge pump capacitors.

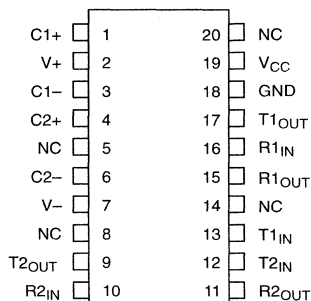
OPERATION

The diagram in Figure 1 shows the main elements of the DS232A. The following paragraphs describe the function of each pin.

PIN ASSIGNMENT



16-PIN DIP AND SOIC



20-PIN TSSOP

PIN DESCRIPTION

V _{CC}	– +5 Volt Supply
GND	– Ground
V+	– Positive Supply Output
V-	– Negative Supply Output
T _{1IN} , T _{2IN}	– RS-232 Driver Inputs
T _{1OUT} , T _{2OUT}	– RS-232 Driver Outputs
R _{1IN} , R _{2IN}	– Receiver Inputs
R _{1OUT} , R _{2OUT}	– Receiver Outputs
C1+, C1-	– Capacitor 1 Connections
C2+, C2-	– Capacitor 2 Connections

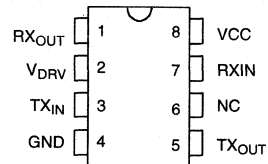
FEATURES

- Low-power serial transmitter/receiver for battery-backed systems
- Transmitter steals power from receive signal line to save power
- Ultra-low static current, even when connected to RS-232-E port
- Variable transmitter level from +5 to +12 volts
- Compatible with RS-232-E signals
- Available in 8-pin, 150-mil wide SOIC package (DS275S) and 14-pin TSSOP package
- Low-power CMOS

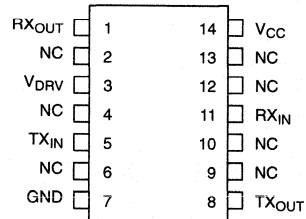
ORDERING INFORMATION

DS275	8-pin DIP
DS275S	8-pin SOIC
DS275E	14-pin TSSOP

PIN ASSIGNMENT



DS275 8-PIN DIP (300 MIL)
DS275S 8-PIN SOIC (150 MIL)



DS275E 14-PIN TSSOP

PIN DESCRIPTION

RX _{OUT}	- RS-232 Receiver Output
V _{DRV}	- Transmit Driver +V
TX _{IN}	- RS-232 Driver Input
GND	- System Ground (0V)
TX _{OUT}	- RS-232 Driver Output
NC	- No Connection
RX _{IN}	- RS-232 Receiver Input
V _{CC}	- System Logic Supply (+5V)

DESCRIPTION

The DS275 Line-Powered RS-232 Transceiver Chip is a CMOS device that provides a low-cost, very low-power interface to RS-232 serial ports. The receiver input translates RS-232 signal levels to common CMOS/TTL levels. The transmitter employs a unique circuit which steals current from the receive RS-232 signal when that signal is in a negative state (marking). Since most serial communication ports remain in a negative state statically, using the receive signal for negative

power greatly reduces the DS275's static power consumption. This feature is especially important for battery-powered systems such as laptop computers, remote sensors, and portable medical instruments. During an actual communication session, the DS275's transmitter will use system power (5-12 volts) for positive transitions while still employing the receive signal for negative transitions.



MEMORY PRODUCTS

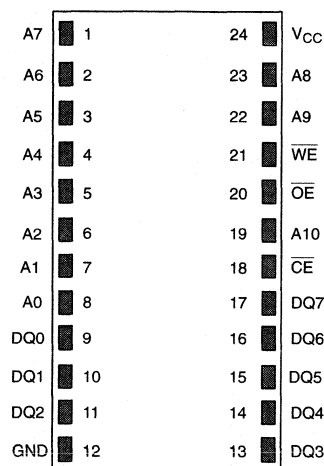
FEATURES

- 10 years minimum data retention in the absence of external power
- Data is automatically protected during power loss
- Directly replaces 2K x 8 volatile static RAM or EEPROM
- Unlimited write cycles
- Low-power CMOS
- JEDEC standard 24-pin DIP package
- Read and write access times as fast as 100 ns
- Lithium energy source is electrically disconnected to retain freshness until power is applied for the first time
- Full $\pm 10\%$ V_{CC} operating range (DS1220AD)
- Optional $\pm 5\%$ V_{CC} operating range (DS1220AB)
- Optional industrial temperature range of -40°C to $+85^{\circ}\text{C}$, designated IND

DESCRIPTION

The DS1220AB and DS1220AD are 16,384-bit, fully static, nonvolatile SRAMs organized as 2048 words by 8 bits. Each NV SRAM has a self-contained lithium energy source and control circuitry which constantly monitors V_{CC} for an out-of-tolerance condition. When such a condition occurs, the lithium energy source is automatically switched on and write protection is unconditionally enabled to prevent data corruption. The NV

PIN ASSIGNMENT



24-PIN ENCAPSULATED PACKAGE
720 MIL EXTENDED

PIN DESCRIPTION

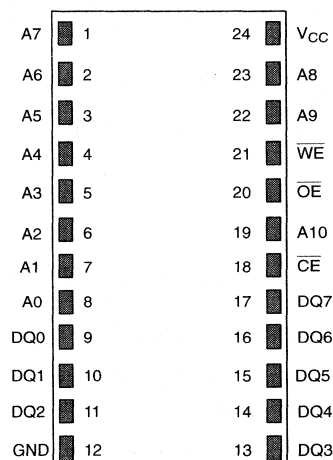
A0–A10	– Address Inputs
DQ0–DQ7	– Data In/Data Out
\overline{CE}	– Chip Enable
\overline{WE}	– Write Enable
\overline{OE}	– Output Enable
V_{CC}	– Power (+5V)
GND	– Ground

SRAMs can be used in place of existing 2K x 8 SRAMs directly conforming to the popular byte-wide 24-pin DIP standard. The devices also match the pinout of the 2716 EPROM and the 2816 EEPROM, allowing direct substitution while enhancing performance. There is no limit on the number of write cycles that can be executed and no additional support circuitry is required for microprocessor interfacing.

FEATURES

- 10 years minimum data retention in the absence of external power
- Data is automatically protected during power loss
- Directly replaces 2K x 8 volatile static RAM or EEPROM
- Unlimited write cycles
- Low-power CMOS
- JEDEC standard 24-pin DIP package
- Read and write access times as fast as 100 ns
- Full $\pm 10\%$ operating range
- Optional industrial temperature range of -40°C to $+85^{\circ}\text{C}$, designated IND

PIN ASSIGNMENT



24-PIN ENCAPSULATED PACKAGE
720 MIL EXTENDED

PIN DESCRIPTION

A0–A10	– Address Inputs
DQ0–DQ7	– Data In/Data Out
$\overline{\text{CE}}$	– Chip Enable
$\overline{\text{WE}}$	– Write Enable
$\overline{\text{OE}}$	– Output Enable
V _{CC}	– Power (+5V)
GND	– Ground

DESCRIPTION

The DS1220Y 16K Nonvolatile SRAM is a 16,384-bit, fully static, nonvolatile RAM organized as 2048 words by 8 bits. Each NV SRAM has a self-contained lithium energy source and control circuitry which constantly monitors V_{CC} for an out-of-tolerance condition. When such a condition occurs, the lithium energy source is automatically switched on and write protection is unconditionally enabled to prevent data corruption. The NV

SRAM can be used in place of existing 2K x 8 SRAMs directly conforming to the popular byte-wide 24-pin DIP standard. The DS1220Y also matches the pinout of the 2716 EPROM or the 2816 EEPROM, allowing direct substitution while enhancing performance. There is no limit on the number of write cycles that can be executed and no additional support circuitry is required for micro-processor interfacing.

DALLAS

SEMICONDUCTOR

DS1225AB/AD

64K Nonvolatile SRAM

FEATURES

- 10 years minimum data retention in the absence of external power
- Data is automatically protected during power loss
- Directly replaces 8K x 8 volatile static RAM or EEPROM
- Unlimited write cycles
- Low-power CMOS
- JEDEC standard 28-pin DIP package
- Read and write access times as fast as 70 ns
- Lithium energy source is electrically disconnected to retain freshness until power is applied for the first time
- Full $\pm 10\%$ V_{CC} operating range (DS1225AD)
- Optional $\pm 5\%$ V_{CC} operating range (DS1225AB)
- Optional industrial temperature range of -40°C to $+85^{\circ}\text{C}$, designated IND

DESCRIPTION

The DS1225AB and DS1225AD are 65,536-bit, fully static, nonvolatile SRAMs organized as 8192 words by 8 bits. Each NV SRAM has a self-contained lithium energy source and control circuitry which constantly monitors V_{CC} for an out-of-tolerance condition. When such a condition occurs, the lithium energy source is automatically switched on and write protection is unconditionally enabled to prevent data corruption. The NV

PIN ASSIGNMENT

NC	1	28	V_{CC}
A12	2	27	\overline{WE}
A7	3	26	NC
A6	4	25	A8
A5	5	24	A9
A4	6	23	A11
A3	7	22	\overline{OE}
A2	8	21	A10
A1	9	20	\overline{CE}
A0	10	19	DQ7
DQ0	11	18	DQ6
DQ1	12	17	DQ5
DQ2	13	16	DQ4
GND	14	15	DQ3

28-PIN ENCAPSULATED PACKAGE
720 MIL EXTENDED

PIN DESCRIPTION

A0–A12	– Address Inputs
DQ0–DQ7	– Data In/Data Out
\overline{CE}	– Chip Enable
\overline{WE}	– Write Enable
\overline{OE}	– Output Enable
V_{CC}	– Power (+5V)
GND	– Ground
NC	– No Connect

SRAMs can be used in place of existing 8K x 8 SRAMs directly conforming to the popular byte-wide 28-pin DIP standard. The devices also match the pinout of the 2764 EPROM and the 2864 EEPROM, allowing direct substitution while enhancing performance. There is no limit on the number of write cycles that can be executed and no additional support circuitry is required for microprocessor interfacing.

DALLAS

SEMICONDUCTOR

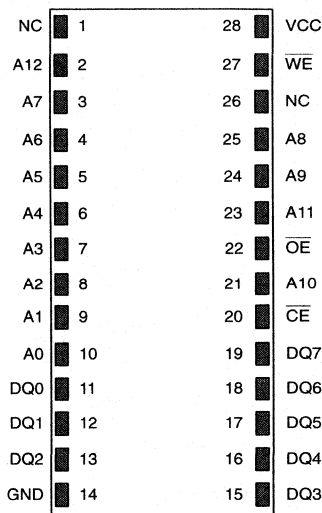
DS1225Y

64K Nonvolatile SRAM

FEATURES

- 10 years minimum data retention in the absence of external power
- Data is automatically protected during power loss
- Directly replaces 8K x 8 volatile static RAM or EE-PROM
- Unlimited write cycles
- Low-power CMOS
- JEDEC standard 28-pin DIP package
- Read and write access times as fast as 150 ns
- Full $\pm 10\%$ operating range
- Optional industrial temperature range of -40°C to $+85^{\circ}\text{C}$, designated IND

PIN ASSIGNMENT



28-PIN ENCAPSULATED PACKAGE
720 MIL EXTENDED

PIN DESCRIPTION

A0–A12	–	Address Inputs
DQ0–DQ7	–	Data In/Data Out
$\overline{\text{CE}}$	–	Chip Enable
$\overline{\text{WE}}$	–	Write Enable
$\overline{\text{OE}}$	–	Output Enable
V _{CC}	–	Power (+5V)
GND	–	Ground
NC	–	No Connect

DESCRIPTION

The DS1225Y 64K Nonvolatile SRAM is a 65,536-bit, fully static, nonvolatile RAM organized as 8192 words by 8 bits. Each NV SRAM has a self-contained lithium energy source and control circuitry which constantly monitors V_{CC} for an out-of-tolerance condition. When such a condition occurs, the lithium energy source is automatically switched on and write protection is unconditionally enabled to prevent data corruption. The NV

SRAM can be used in place of existing 8K x 8 SRAMs directly conforming to the popular byte-wide 28-pin DIP standard. The DS1225Y also matches the pinout of the 2764 EPROM or the 2864 EEPROM, allowing direct substitution while enhancing performance. There is no limit on the number of write cycles that can be executed and no additional support circuitry is required for micro-processor interfacing.

DALLAS

SEMICONDUCTOR

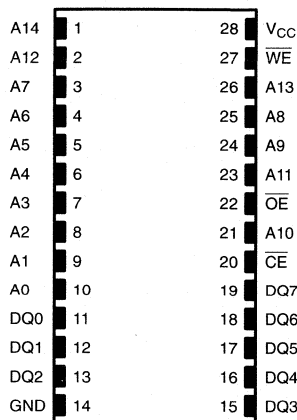
DS1230Y/AB

256K Nonvolatile SRAM

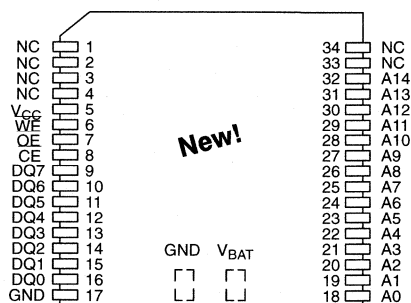
FEATURES

- 10 years minimum data retention in the absence of external power
- Data is automatically protected during power loss
- Replaces 32K x 8 volatile static RAM, EEPROM or Flash memory
- Unlimited write cycles
- Low-power CMOS
- Read and write access times as fast as 70 ns
- Lithium energy source is electrically disconnected to retain freshness until power is applied for the first time
- Full $\pm 10\%$ V_{CC} operating range (DS1230Y)
- Optional $\pm 5\%$ V_{CC} operating range (DS1230AB)
- Optional industrial temperature range of -40°C to $+85^{\circ}\text{C}$, designated IND
- JEDEC standard 28-pin DIP package
- New PowerCap Module (PCM) package
 - Directly surface-mountable module
 - Replaceable snap-on PowerCap provides lithium backup battery
 - Standardized pinout for all nonvolatile SRAM products
 - Detachment feature on PowerCap allows easy removal using a regular screwdriver

PIN ASSIGNMENT



28-PIN ENCAPSULATED PACKAGE
740 MIL EXTENDED



34-PIN POWERCAP MODULE (PCM)
(USES DS9034PC POWERCAP)

PIN DESCRIPTION

- | | | |
|-----------------|---|------------------|
| A0 – A14 | – | Address Inputs |
| DQ0 – DQ7 | – | Data In/Data Out |
| \overline{CE} | – | Chip Enable |
| \overline{WE} | – | Write Enable |
| \overline{OE} | – | Output Enable |
| V_{CC} | – | Power (+5V) |
| GND | – | Ground |
| NC | – | No Connect |

NOT RECOMMENDED FOR NEW DESIGNS. SEE DS1230Y/AB DATA SHEET.

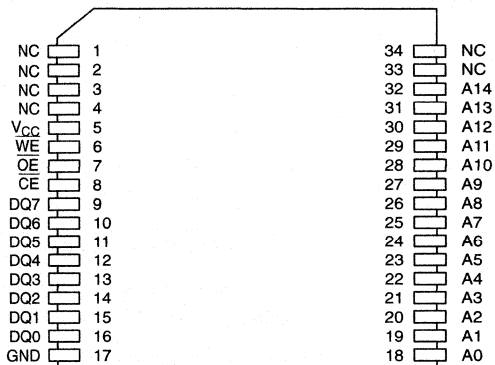
FEATURES

- 10 years minimum data retention in the absence of external power
- Data is automatically protected during power loss
- Unlimited write cycles
- Low-power CMOS
- Read and write access times as fast as 70 ns
- Lithium energy source is electrically disconnected to retain freshness until power is applied for the first time
- Full $\pm 10\%$ V_{CC} operating range (DS1230YL)
- Optional $\pm 5\%$ V_{CC} operating range (DS1230BL)
- Optional industrial temperature range of -40°C to $+85^{\circ}\text{C}$, designated IND
- Low Profile Module (LPM) package
 - Fits into standard 68-pin PLCC surface-mountable sockets
 - 250 mil package height

DESCRIPTION

The DS1230 256K Nonvolatile SRAMs are 262,144-bit, fully static, nonvolatile SRAMs organized as 32,768 words by 8 bits. Each NV SRAM has a self-contained lithium energy source and control circuitry which constantly monitors V_{CC} for an out-of-tolerance condition. When such a condition occurs, the lithium energy

PIN ASSIGNMENT



34-PIN LOW PROFILE MODULE (LPM)

PIN DESCRIPTION

A0 – A14	– Address Inputs
DQ0 – DQ7	– Data In/Data Out
\overline{CE}	– Chip Enable
\overline{WE}	– Write Enable
\overline{OE}	– Output Enable
V_{CC}	– Power (+5V)
GND	– Ground

source is automatically switched on and write protection is unconditionally enabled to prevent data corruption. There is no limit on the number of write cycles that can be executed and no additional support circuitry is required for microprocessor interfacing.

DALLAS

SEMICONDUCTOR

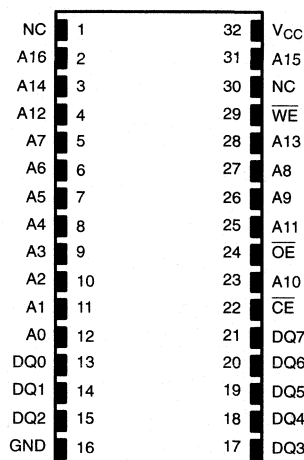
DS1245Y/AB

1024K Nonvolatile SRAM

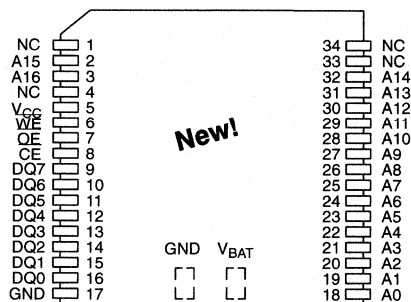
FEATURES

- 10 years minimum data retention in the absence of external power
- Data is automatically protected during power loss
- Replaces 128K x 8 volatile static RAM, EEPROM or Flash memory
- Unlimited write cycles
- Low-power CMOS
- Read and write access times as fast as 70 ns
- Lithium energy source is electrically disconnected to retain freshness until power is applied for the first time
- Full $\pm 10\%$ V_{CC} operating range (DS1245Y)
- Optional $\pm 5\%$ V_{CC} operating range (DS1245AB)
- Optional industrial temperature range of -40°C to $+85^{\circ}\text{C}$, designated IND
- JEDEC standard 32-pin DIP package
- New PowerCap Module (PCM) package
 - Directly surface-mountable module
 - Replaceable snap-on PowerCap provides lithium backup battery
 - Standardized pinout for all nonvolatile SRAM products
 - Detachment feature on PowerCap allows easy removal using a regular screwdriver

PIN ASSIGNMENT



32-PIN ENCAPSULATED PACKAGE
740 MIL EXTENDED



34-PIN POWERCAP MODULE (PCM)
(USES DS9034PC POWERCAP)

PIN DESCRIPTION

- | | | |
|-----------------|---|------------------|
| A0 – A16 | – | Address Inputs |
| DQ0 – DQ7 | – | Data In/Data Out |
| \overline{CE} | – | Chip Enable |
| \overline{WE} | – | Write Enable |
| \overline{OE} | – | Output Enable |
| V_{CC} | – | Power (+5V) |
| GND | – | Ground |
| NC | – | No Connect |

NOT RECOMMENDED FOR NEW DESIGNS. SEE DS1245Y/AB DATA SHEET.

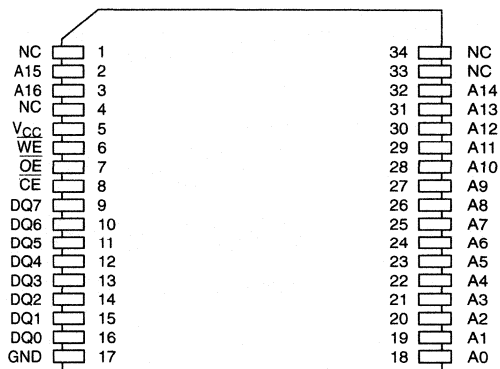
FEATURES

- 10 years minimum data retention in the absence of external power
- Data is automatically protected during power loss
- Unlimited write cycles
- Low-power CMOS
- Read and write access times as fast as 70 ns
- Lithium energy source is electrically disconnected to retain freshness until power is applied for the first time.
- Full $\pm 10\%$ V_{CC} operating range (DS1245YL)
- Optional $\pm 5\%$ V_{CC} operating range DS1245BL)
- Optional industrial temperature range of -40°C to $+85^{\circ}\text{C}$, designated IND
- Low Profile Module (LPM) package
 - Fits into standard 68-pin PLCC surface-mountable sockets
 - 250 mil package height

DESCRIPTION

The DS1245 1024K Nonvolatile SRAMs are 1,048,576-bit, fully static, nonvolatile SRAMs organized as 131,072 words by 8 bits. Each NV SRAM has a self-contained lithium energy source and control circuitry which constantly monitors V_{CC} for an out-of-tolerance condition. When such a condition occurs, the lithi-

PIN ASSIGNMENT



34-PIN LOW PROFILE MODULE (LPM)

PIN DESCRIPTION

A0 – A16	– Address Inputs
DQ0 – DQ7	– Data In/Data Out
$\overline{\text{CE}}$	– Chip Enable
$\overline{\text{WE}}$	– Write Enable
$\overline{\text{OE}}$	– Output Enable
V_{CC}	– Power (+5V)
GND	– Ground
NC	– No Connect

um energy source is automatically switched on and write protection is unconditionally enabled to prevent data corruption. There is no limit on the number of write cycles which can be executed and no additional support circuitry is required for microprocessor interfacing.

FEATURES

- 10 years minimum data retention in the absence of external power
- Data is automatically protected during power loss
- Unlimited write cycles
- Low-power CMOS operation
- Read and write access times as fast as 70 ns
- Lithium energy source is electrically disconnected to retain freshness until power is applied for the first time
- Full $\pm 10\%$ V_{CC} operating range (DS1249Y)
- Optional $\pm 5\%$ V_{CC} operating range (DS1249AB)
- Optional industrial temperature range of -40°C to $+85^{\circ}\text{C}$, designated IND
- JEDEC standard 32-pin DIP package

PIN ASSIGNMENT

NC	1	32	V_{CC}
A16	2	31	A15
A14	3	30	A17
A12	4	29	\overline{WE}
A7	5	28	A13
A6	6	27	A8
A5	7	26	A9
A4	8	25	A11
A3	9	24	\overline{OE}
A2	10	23	A10
A1	11	22	\overline{CE}
A0	12	21	DQ7
DQ0	13	20	DQ6
DQ1	14	19	DQ5
DQ2	15	18	DQ4
GND	16	17	DQ3

32-PIN ENCAPSULATED PACKAGE
740 MIL EXTENDED

PIN DESCRIPTION

A0 – A17	– Address Inputs
DQ0 – DQ7	– Data In/Data Out
\overline{CE}	– Chip Enable
\overline{WE}	– Write Enable
\overline{OE}	– Output Enable
V_{CC}	– Power (+5V)
GND	– Ground
NC	– No Connect

DESCRIPTION

The DS1249 2048K Nonvolatile SRAMs are 2,097,152-bit, fully static, nonvolatile SRAMs organized as 262,144 words by 8 bits. Each NV SRAM has a self-contained lithium energy source and control circuitry which constantly monitors V_{CC} for an out-of-tolerance condition. When such a condition occurs, the

lithium energy source is automatically switched on and write protection is unconditionally enabled to prevent data corruption. There is no limit on the number of write cycles which can be executed and no additional support circuitry is required for microprocessor interfacing.

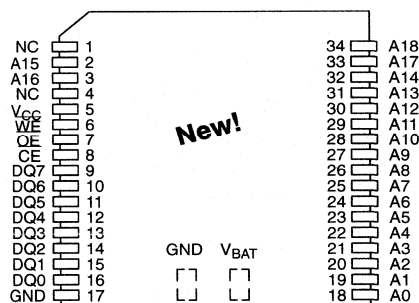
FEATURES

- 10 years minimum data retention in the absence of external power
- Data is automatically protected during power loss
- Replaces 512K x 8 volatile static RAM, EEPROM or Flash memory
- Unlimited write cycles
- Low-power CMOS
- Read and write access times as fast as 70 ns
- Lithium energy source is electrically disconnected to retain freshness until power is applied for the first time
- Full $\pm 10\%$ V_{CC} operating range (DS1250Y)
- Optional $\pm 5\%$ V_{CC} operating range (DS1250AB)
- Optional industrial temperature range of -40°C to $+85^{\circ}\text{C}$, designated IND
- JEDEC standard 32-pin DIP package
- New PowerCap Module (PCM) package
 - Directly surface-mountable module
 - Replaceable snap-on PowerCap provides lithium backup battery
 - Standardized pinout for all nonvolatile SRAM products
 - Detachment feature on PCM allows easy removal using a regular screwdriver

PIN ASSIGNMENT

A18	1	32	V_{CC}
A16	2	31	A15
A14	3	30	A17
A12	4	29	\overline{WE}
A7	5	28	A13
A6	6	27	A8
A5	7	26	A9
A4	8	25	A11
A3	9	24	\overline{OE}
A2	10	23	A10
A1	11	22	\overline{CE}
A0	12	21	DQ7
DQ0	13	20	DQ6
DQ1	14	19	DQ5
DQ2	15	18	DQ4
GND	16	17	DQ3

32-PIN ENCAPSULATED PACKAGE
740 MIL EXTENDED



34-PIN POWERCAP MODULE (PCM)
(USES DS9034PC POWERCAP)

PIN DESCRIPTION

A0 – A18	–	Address Inputs
DQ0 – DQ7	–	Data In/Data Out
\overline{CE}	–	Chip Enable
\overline{WE}	–	Write Enable
\overline{OE}	–	Output Enable
V_{CC}	–	Power (+5V)
GND	–	Ground
NC	–	No Charge

DALLAS SEMICONDUCTOR

DS1250YL/BL 4096K Nonvolatile SRAM

NOT RECOMMENDED FOR NEW DESIGNS. SEE DS1250Y/AB DATA SHEET.

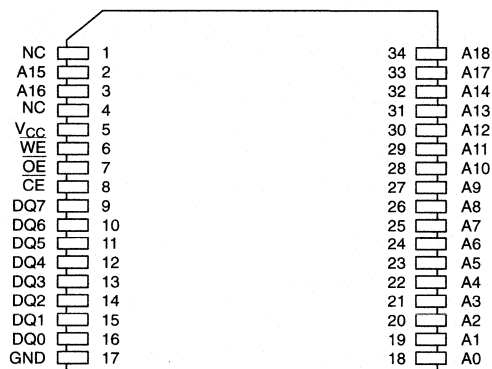
FEATURES

- 10 years minimum data retention in the absence of external power
- Data is automatically protected during power loss
- Unlimited write cycles
- Low-power CMOS
- Read and write access times as fast as 70 ns
- Lithium energy source is electrically disconnected to retain freshness until power is applied for the first time.
- Full $\pm 10\%$ V_{CC} operating range (DS1250YL)
- Optional $\pm 5\%$ V_{CC} operating range (DS1250BL)
- Optional industrial temperature range of -40°C to $+85^{\circ}\text{C}$, designated IND
- JEDEC standard 32-pin DIP package
- Low Profile Module (LPM) package
 - Fits into standard 68-pin PLCC surface-mountable sockets
 - 250 mil package height

DESCRIPTION

The DS1250 4096K Nonvolatile SRAMs are 4,194,304-bit, fully static, nonvolatile SRAMs organized as 524,288 words by 8 bits. Each NV SRAM has a self-contained lithium energy source and control circuitry which constantly monitors V_{CC} for an out-of-tolerance condition. When such a condition occurs, the

PIN ASSIGNMENT



34-PIN LOW PROFILE MODULE (LPM)

PIN DESCRIPTION

A0 – A18	– Address Inputs
DQ0 – DQ7	– Data In/Data Out
$\overline{\text{CE}}$	– Chip Enable
$\overline{\text{WE}}$	– Write Enable
$\overline{\text{OE}}$	– Output Enable
V_{CC}	– Power (+5V)
GND	– Ground

lithium energy source is automatically switched on and write protection is unconditionally enabled to prevent data corruption. There is no limit on the number of write cycles which can be executed and no additional support circuitry is required for microprocessor interfacing.

FEATURES

- 10 year minimum data retention in the absence of external power
- Data is automatically protected during a power loss
- Separate upper byte and lower byte chip select inputs
- Unlimited write cycles
- Low-power CMOS
- Read and write access times as fast as 70 ns
- Lithium energy source is electrically disconnected to retain freshness until power is applied for the first time
- Full $\pm 10\%$ operating range (DS1258Y)
- Optional $\pm 5\%$ operating range (DS1258AB)
- Optional industrial temperature range of -40°C to 85°C , designated IND

PIN ASSIGNMENT

$\overline{\text{CEU}}$	1	40	V_{CC}
$\overline{\text{CEL}}$	2	39	WE
DQ15	3	38	A16
DQ14	4	37	A15
DQ13	5	36	A14
DQ12	6	35	A13
DQ11	7	34	A12
DQ10	8	33	A11
DQ9	9	32	A10
DQ8	10	31	A9
GND	11	30	GND
DQ7	12	29	A8
DQ6	13	28	A7
DQ5	14	27	A6
DQ4	15	26	A5
DQ3	16	25	A4
DQ2	17	24	A3
DQ1	18	23	A2
DQ0	19	22	A1
$\overline{\text{OE}}$	20	21	A0

40-PIN ENCAPSULATED PACKAGE
740 MIL EXTENDED

PIN DESCRIPTION

A0–A16	–	Address Inputs
DQ0–DQ15	–	Data In/Data Out
$\overline{\text{CEU}}$	–	Chip Enable Upper Byte
$\overline{\text{CEL}}$	–	Chip Enable Lower Byte
$\overline{\text{WE}}$	–	Write Enable
$\overline{\text{OE}}$	–	Output Enable
V_{CC}	–	Power Supply (+5V)
GND	–	Ground

DESCRIPTION

The DS1258 128K x 16 Nonvolatile SRAMs are 2,097,152-bit fully static, nonvolatile SRAMs, organized as 131,072 words by 16 bits. Each NV SRAM has a self contained lithium energy source and control circuitry which constantly monitors V_{CC} for an out-of-tolerance condition. When such a condition occurs, the lithium energy source is automatically switched on and

write protection is unconditionally enabled to prevent data corruption. DIP-package DS1258 devices can be used in place of solutions which build nonvolatile 128K x 16 memory by utilizing a variety of discrete components. There is no limit on the number of write cycles that can be executed and no additional support circuitry is required for microprocessor interfacing.

DALLAS

SEMICONDUCTOR

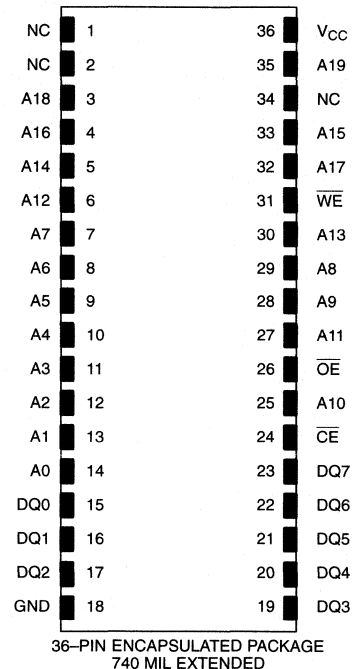
DS1265Y/AB

8M Nonvolatile SRAM

FEATURES

- 10 years minimum data retention in the absence of external power
- Data is automatically protected during power loss
- Unlimited write cycles
- Low-power CMOS operation
- Read and write access times as fast as 70 ns
- Lithium energy source is electrically disconnected to retain freshness until power is applied for the first time
- Full $\pm 10\%$ V_{CC} operating range (DS1265Y)
- Optional $\pm 5\%$ V_{CC} operating range (DS1265AB)
- Optional industrial temperature range of -40°C to $+85^{\circ}\text{C}$, designated IND

PIN ASSIGNMENT



PIN DESCRIPTION

A0 – A19	– Address Inputs
DQ0 – DQ7	– Data In/Data Out
CE	– Chip Enable
WE	– Write Enable
OE	– Output Enable
V_{CC}	– Power (+5V)
GND	– Ground
NC	– No Connect

DESCRIPTION

The DS1265 8M Nonvolatile SRAMs are 8,388,608-bit, fully static nonvolatile SRAMs organized as 1,048,576 words by 8 bits. Each NV SRAM has a self-contained lithium energy source and control circuitry which constantly monitors V_{CC} for an out-of-tolerance condition. When such a condition occurs, the lithium energy

source is automatically switched on and write protection is unconditionally enabled to prevent data corruption. There is no limit on the number of write cycles which can be executed and no additional support circuitry is required for microprocessor interfacing.

DALLAS

SEMICONDUCTOR

DS1270Y/AB

16M Nonvolatile SRAM

FEATURES

- 5 years minimum data retention in the absence of external power
- Data is automatically protected during power loss
- Unlimited write cycles
- Low-power CMOS operation
- Read and write access times as fast as 70 ns
- Lithium energy source is electrically disconnected to retain freshness until power is applied for the first time
- Full $\pm 10\%$ V_{CC} operating range (DS1270Y)
- Optional $\pm 5\%$ V_{CC} operating range (DS1270AB)
- Optional industrial temperature range of -40°C to $+85^{\circ}\text{C}$, designated IND

PIN ASSIGNMENT

NC	1	36	V_{CC}
A20	2	35	A19
A18	3	34	NC
A16	4	33	A15
A14	5	32	A17
A12	6	31	\overline{WE}
A7	7	30	A13
A6	8	29	A8
A5	9	28	A9
A4	10	27	A11
A3	11	26	\overline{OE}
A2	12	25	A10
A1	13	24	\overline{CE}
A0	14	23	DQ7
DQ0	15	22	DQ6
DQ1	16	21	DQ5
DQ2	17	20	DQ4
GND	18	19	DQ3

36-PIN ENCAPSULATED PACKAGE
740 MIL EXTENDED

PIN DESCRIPTION

A0 – A20	– Address Inputs
DQ0 – DQ7	– Data In/Data Out
CE	– Chip Enable
WE	– Write Enable
OE	– Output Enable
V_{CC}	– Power (+5V)
GND	– Ground
NC	– No Connect

DESCRIPTION

The DS1270 16M Nonvolatile SRAMs are 16,777,216-bit, fully static nonvolatile SRAMs organized as 2,097,152 words by 8 bits. Each NV SRAM has a self-contained lithium energy source and control circuitry which constantly monitors V_{CC} for an out-of-tolerance condition. When such a condition occurs, the

lithium energy source is automatically switched on and write protection is unconditionally enabled to prevent data corruption. There is no limit on the number of write cycles which can be executed and no additional support circuitry is required for microprocessor interfacing.

DALLAS SEMICONDUCTOR

DS1330Y/AB 256K Nonvolatile SRAM with Battery Monitor

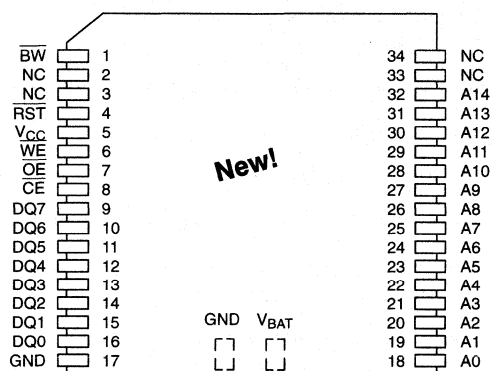
FEATURES

- 10 years minimum data retention in the absence of external power
- Data is automatically protected during power loss
- Power supply monitor resets processor when V_{CC} power loss occurs and holds processor in reset during V_{CC} ramp-up
- Battery monitor checks remaining capacity daily
- Read and write access times as fast as 70 ns
- Unlimited write cycle endurance
- Typical standby current 50 μ A
- Upgrade for 32K x 8 SRAM, EEPROM or Flash
- Lithium battery is electrically disconnected to retain freshness until power is applied for the first time
- Full $\pm 10\%$ V_{CC} operating range (DS1330Y) or optional $\pm 5\%$ V_{CC} operating range (DS1330AB)
- Optional industrial temperature range of -40°C to $+85^{\circ}\text{C}$, designated IND
- New PowerCap Module (PCM) package
 - Directly surface-mountable module
 - Replaceable snap-on PowerCap provides lithium backup battery
 - Standardized pinout for all nonvolatile SRAM products
 - Detachment feature on PowerCap allows easy removal using a regular screwdriver

DESCRIPTION

The DS1330 256K Nonvolatile SRAMs are 262,144-bit, fully static, nonvolatile SRAMs organized as 32,768 words by eight bits. Each NV SRAM has a self-contained lithium energy source and control circuitry which constantly monitors V_{CC} for an out-of-tolerance condition. When such a condition occurs, the lithium energy source is automatically switched on and write protection is unconditionally enabled to prevent data corruption.

PIN ASSIGNMENT



34-PIN POWERCAP MODULE (PCM)
(USES DS9034PC POWERCAP)

PIN DESCRIPTION

A0–A14	– Address Inputs
DQ0–DQ7	– Data In/Data Out
$\overline{\text{CE}}$	– Chip Enable
$\overline{\text{WE}}$	– Write Enable
$\overline{\text{OE}}$	– Output Enable
$\overline{\text{RST}}$	– Reset Output
$\overline{\text{BW}}$	– Battery Warning Output
V_{CC}	– Power (+5 Volts)
GND	– Ground
NC	– No Connect

Additionally, the DS1330 devices have dedicated circuitry for monitoring the status of V_{CC} and the status of the internal lithium battery. DS1330 devices in the PowerCap Module package are directly surface mountable and are normally paired with a DS9034PC PowerCap to form a complete Nonvolatile SRAM module. The devices can be used in place of 32K x 8 SRAM, EEPROM or Flash components.

DALLAS

SEMICONDUCTOR

DS1330YL/BL

256K Nonvolatile SRAM with Battery Monitor

NOT RECOMMENDED FOR NEW DESIGNS. SEE DS1330Y/AB DATA SHEET.

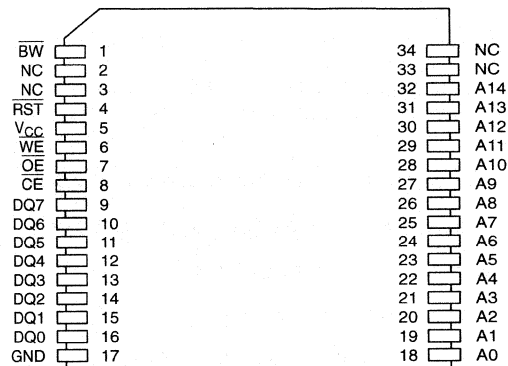
FEATURES

- Built-in lithium battery provides more than 10 years of data retention
- Data is automatically protected during V_{CC} power loss
- Power supply monitor resets processor when V_{CC} power loss occurs and holds processor in reset during V_{CC} ramp-up
- Battery monitor checks remaining capacity daily
- Read and write access times as fast as 70 ns
- Unlimited write cycle endurance
- Typical standby current 50 μ A
- Upgrade for 32K x 8 SRAM, EEPROM or Flash devices
- Lithium battery is electrically disconnected to retain freshness until power is applied for the first time
- Full $\pm 10\%$ V_{CC} operating range (DS1330YL) or optional $\pm 5\%$ V_{CC} operating range (DS1330BL)
- Low Profile Module package fits into standard 68-pin surface mountable PLCC sockets
- Optional industrial temperature range of -40°C to $+85^{\circ}\text{C}$, designated IND

DESCRIPTION

The DS1330 256K Nonvolatile SRAMs are 262,144-bit, fully static, nonvolatile SRAMs organized as 32,768 words by eight bits. Each NV SRAM has a self-contained lithium energy source and control circuitry which constantly monitors V_{CC} for an out-of-tolerance condition. When such a condition occurs, the lithium energy source is automatically switched on and write protection is unconditionally enabled to prevent data corruption. Additionally, the DS1330 devices have dedicated cir-

PIN ASSIGNMENT



34-PIN LOW PROFILE MODULE (LPM)

PIN DESCRIPTION

A0–A14	– Address Inputs
DQ0–DQ7	– Data In/Data Out
$\overline{\text{CE}}$	– Chip Enable
$\overline{\text{WE}}$	– Write Enable
$\overline{\text{OE}}$	– Output Enable
$\overline{\text{RST}}$	– Reset Output
BW	– Battery Warning Output
V_{CC}	– +5 Volts
GND	– Ground
NC	– No Connect

cuitry for monitoring the status of V_{CC} and the status of the internal lithium battery. There is no limit on the number of write cycles which can be executed, and no additional support circuitry is required for microprocessor interfacing. The devices can be used in place of 32K x 8 SRAM, EEPROM or Flash components. Available in the Low Profile Module package, DS1330 devices are specifically designed for surface mount applications.

DALLAS SEMICONDUCTOR

DS1345Y/AB 1024K Nonvolatile SRAM with Battery Monitor

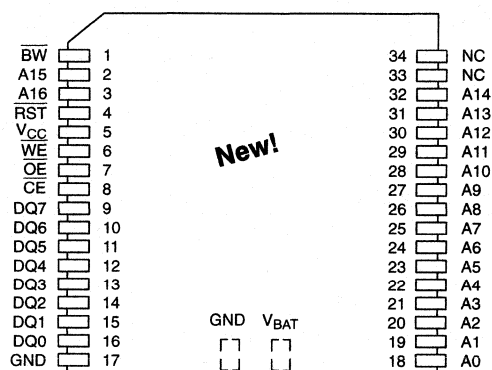
FEATURES

- 10 years minimum data retention in the absence of external power
- Data is automatically protected during power loss
- Power supply monitor resets processor when V_{CC} power loss occurs and holds processor in reset during V_{CC} ramp-up
- Battery monitor checks remaining capacity daily
- Read and write access times as fast as 70 ns
- Unlimited write cycle endurance
- Typical standby current 50 μ A
- Upgrade for 128K x 8 SRAM, EEPROM or Flash
- Lithium battery is electrically disconnected to retain freshness until power is applied for the first time
- Full $\pm 10\%$ V_{CC} operating range (DS1345Y) or optional $\pm 5\%$ V_{CC} operating range (DS1345AB)
- Optional industrial temperature range of -40°C to $+85^{\circ}\text{C}$, designated IND
- New PowerCap Module (PCM) package
 - Directly surface-mountable module
 - Replaceable snap-on PowerCap provides lithium backup battery
 - Standardized pinout for all nonvolatile SRAM products
 - Detachment feature on PowerCap allows easy removal using a regular screwdriver

DESCRIPTION

The DS1345 1024K Nonvolatile SRAMs are 1,048,576-bit, fully static, nonvolatile SRAMs organized as 131,072 words by eight bits. Each NV SRAM has a self-contained lithium energy source and control circuitry which constantly monitors V_{CC} for an out-of-tolerance condition. When such a condition occurs, the lithium energy source is automatically switched on and write protection is unconditionally enabled to prevent

PIN ASSIGNMENT



34-PIN POWERCAP MODULE (PCM)
(USES DS9034PC POWERCAP)

PIN DESCRIPTION

A0–A16	– Address Inputs
DQ0–DQ7	– Data In/Data Out
$\overline{\text{CE}}$	– Chip Enable
$\overline{\text{WE}}$	– Write Enable
$\overline{\text{OE}}$	– Output Enable
$\overline{\text{RST}}$	– Reset Output
$\overline{\text{BW}}$	– Battery Warning Output
V_{CC}	– Power (+5 Volts)
GND	– Ground
NC	– No Connect

data corruption. Additionally, the DS1345 devices have dedicated circuitry for monitoring the status of V_{CC} and the status of the internal lithium battery. DS1345 devices in the PowerCap Module package are directly surface mountable and are normally paired with a DS9034PC PowerCap to form a complete Nonvolatile SRAM module. The devices can be used in place of 128K x 8 SRAM, EEPROM or Flash components.

DALLAS

SEMICONDUCTOR

DS1345YL/BL

1024K Nonvolatile SRAM with Battery Monitor

NOT RECOMMENDED FOR NEW DESIGNS. SEE DS1345Y/AB DATA SHEET.

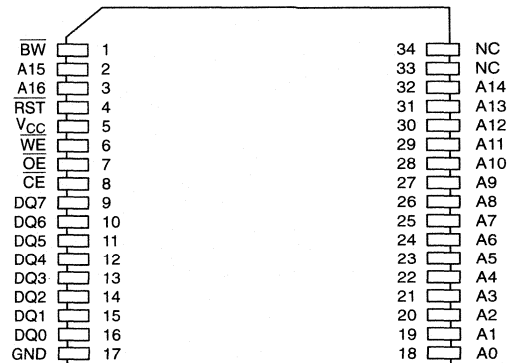
FEATURES

- Built-in lithium battery provides more than 10 years of data retention
- Data is automatically protected during V_{CC} power loss
- Power supply monitor resets processor when V_{CC} power loss occurs and holds processor in reset during V_{CC} ramp-up
- Battery monitor checks remaining capacity daily
- Read and write access times as fast as 70 ns
- Unlimited write cycle endurance
- Typical standby current 50 μ A
- Upgrade for 128K x 8 SRAM, EEPROM or Flash devices
- Lithium battery is electrically disconnected to retain freshness until power is applied for the first time
- Full $\pm 10\%$ V_{CC} operating range (DS1345YL) or optional $\pm 5\%$ V_{CC} operating range (DS1345BL)
- Low Profile Module package fits into standard 68-pin surface mountable PLCC sockets
- Optional industrial temperature range of -40°C to $+85^{\circ}\text{C}$, designated IND

DESCRIPTION

The DS1345 1024K Nonvolatile SRAMs are 1,048,576-bit, fully static, nonvolatile SRAMs organized as 131,072 words by eight bits. Each NV SRAM has a self-contained lithium energy source and control circuitry which constantly monitors V_{CC} for an out-of-tolerance condition. When such a condition occurs, the lithium energy source is automatically switched on and write protection is unconditionally enabled to prevent data corruption. Additionally, the DS1345 devices have

PIN ASSIGNMENT



34-PIN LOW PROFILE MODULE (LPM)

PIN DESCRIPTION

A0–A16	– Address Inputs
DQ0–DQ7	– Data In/Data Out
$\overline{\text{CE}}$	– Chip Enable
$\overline{\text{WE}}$	– Write Enable
$\overline{\text{OE}}$	– Output Enable
$\overline{\text{RST}}$	– Reset Output
$\overline{\text{BW}}$	– Battery Warning Output
V_{CC}	– +5 Volts
GND	– Ground
NC	– No Connect

dedicated circuitry for monitoring the status of V_{CC} and the status of the internal lithium battery. There is no limit on the number of write cycles which can be executed, and no additional support circuitry is required for micro-processor interfacing. The devices can be used in place of 128K x 8 SRAM, EEPROM or Flash components. Available in the Low Profile Module package, DS1345 devices are specifically designed for surface mount applications.

DALLAS SEMICONDUCTOR

DS1350Y/AB 4096K Nonvolatile SRAM with Battery Monitor

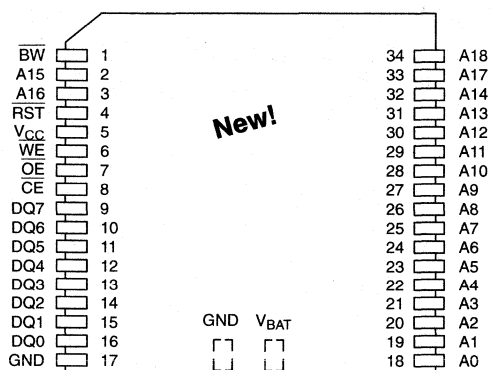
FEATURES

- 10 years minimum data retention in the absence of external power
- Data is automatically protected during power loss
- Power supply monitor resets processor when V_{CC} power loss occurs and holds processor in reset during V_{CC} ramp-up
- Battery monitor checks remaining capacity daily
- Read and write access times as fast as 70 ns
- Unlimited write cycle endurance
- Typical standby current 50 μ A
- Upgrade for 512K x 8 SRAM, EEPROM or Flash
- Lithium battery is electrically disconnected to retain freshness until power is applied for the first time
- Full $\pm 10\%$ V_{CC} operating range (DS1350Y) or optional $\pm 5\%$ V_{CC} operating range (DS1350AB)
- Optional industrial temperature range of -40°C to $+85^{\circ}\text{C}$, designated IND
- New PowerCap Module (PCM) package
 - Directly surface-mountable module
 - Replaceable snap-on PowerCap provides lithium backup battery
 - Standardized pinout for all nonvolatile SRAM products
 - Detachment feature on PowerCap allows easy removal using a regular screwdriver

DESCRIPTION

The DS1350 4096K Nonvolatile SRAMs are 4,194,304-bit, fully static, nonvolatile SRAMs organized as 524,288 words by eight bits. Each NV SRAM has a self-contained lithium energy source and control circuitry which constantly monitors V_{CC} for an out-of-tolerance condition. When such a condition occurs, the lithium energy source is automatically switched on and write protection is unconditionally enabled to prevent

PIN ASSIGNMENT



34-PIN POWERCAP MODULE (PCM)
(USES DS9034PC POWERCAP)

PIN DESCRIPTION

A0–A18	– Address Inputs
DQ0–DQ7	– Data In/Data Out
$\overline{\text{CE}}$	– Chip Enable
$\overline{\text{WE}}$	– Write Enable
$\overline{\text{OE}}$	– Output Enable
$\overline{\text{RST}}$	– Reset Output
$\overline{\text{BW}}$	– Battery Warning Output
V_{CC}	– Power (+5 Volts)
GND	– Ground
NC	– No Connect

data corruption. Additionally, the DS1350 devices have dedicated circuitry for monitoring the status of V_{CC} and the status of the internal lithium battery. DS1350 devices in the PowerCap Module package are directly surface mountable and are normally paired with a DS9034PC PowerCap to form a complete Nonvolatile SRAM module. The devices can be used in place of 512K x 8 SRAM, EEPROM or Flash components.

DS1350YL/BL

4096K Nonvolatile SRAM with Battery Monitor

NOT RECOMMENDED FOR NEW DESIGNS. SEE DS1350Y/AB DATA SHEET.

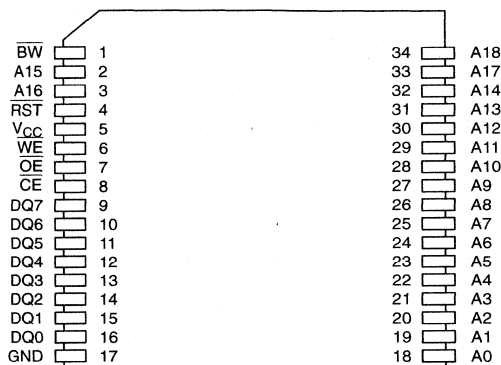
FEATURES

- Built-in lithium battery provides more than 10 years of data retention
- Data is automatically protected during V_{CC} power loss
- Power supply monitor resets processor when V_{CC} power loss occurs and holds processor in reset during V_{CC} ramp-up
- Battery monitor checks remaining capacity daily
- Read and write access times as fast as 70 ns
- Unlimited write cycle endurance
- Typical standby current 50 μ A
- Upgrade for 512K x 8 SRAM, EEPROM or Flash devices
- Lithium battery is electrically disconnected to retain freshness until power is applied for the first time
- Full $\pm 10\%$ V_{CC} operating range (DS1350YL) or optional $\pm 5\%$ V_{CC} operating range (DS1350BL)
- Low Profile Module package fits into standard 68-pin surface mountable PLCC sockets
- Optional industrial temperature range of -40°C to $+85^{\circ}\text{C}$, designated IND

DESCRIPTION

The DS1350 4096K Nonvolatile SRAMs are 4,194,304-bit, fully static, nonvolatile SRAMs organized as 524,288 words by eight bits. Each NV SRAM has a self-contained lithium energy source and control circuitry which constantly monitors V_{CC} for an out-of-tolerance condition. When such a condition occurs, the lithium energy source is automatically switched on and write protection is unconditionally enabled to prevent data corruption. Additionally, the DS1350 devices have

PIN ASSIGNMENT



34-PIN LOW PROFILE MODULE (LPM)

PIN DESCRIPTION

A0–A18	– Address Inputs
DQ0–DQ7	– Data In/Data Out
$\overline{\text{CE}}$	– Chip Enable
WE	– Write Enable
$\overline{\text{OE}}$	– Output Enable
RST	– Reset Output
BW	– Battery Warning Output
V_{CC}	– +5 Volts
GND	– Ground
NC	– No Connect

dedicated circuitry for monitoring the status of V_{CC} and the status of the internal lithium battery. There is no limit on the number of write cycles which can be executed, and no additional support circuitry is required for micro-processor interfacing. The devices can be used in place of 512K x 8 SRAM, EEPROM or Flash components. Available in the Low Profile Module package, DS1350 devices are specifically designed for surface mount applications.

DALLAS

SEMICONDUCTOR

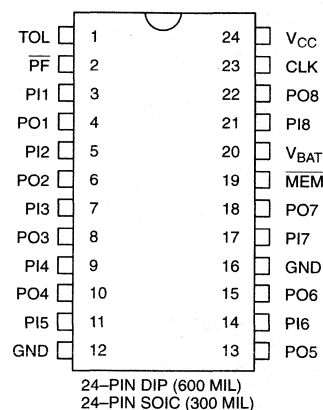
DS1380

RAMport

FEATURES

- 2K x 8 static RAM
- 8-Bit transparent I/O port
- Battery connection provided for nonvolatility
- Multiplexed address/data bus reduces pin count
- 5% or 10% V_{CC} tolerance
- Power Fail output signal
- Low power CMOS
- 24-pin DIP package or optional 24-pin SOIC
- Ideally suited for microcontroller applications as add on memory

PIN ASSIGNMENT



PIN DESCRIPTION

PI1 – PI8	–	Port Inputs (μP Ports)
PO1 – PO8	–	Port Outputs (External Ports)
\overline{PF}	–	Power Fail Output
CLK	–	Clock
\overline{MEM}	–	Memory Select
V_{BAT}	–	+ Battery Connection
V_{CC}	–	+5 Volts
GND	–	Ground

DESCRIPTION

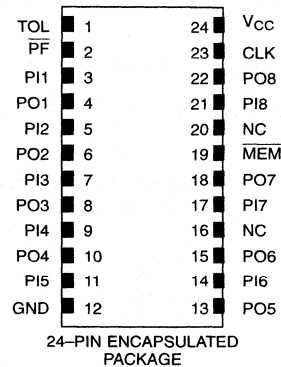
The DS1380 is a 2K x 8 nonvolatile static RAM designed to connect directly to the port pins of a microcontroller. Eight of ten port pins required to interface with the microcontroller are reproduced by the DS1380 for general purpose use. The reproduced port pins can be both inputs and outputs and will appear exactly the same as the pins on the attached microcontroller. The static RAM is read or written with three successive cycles con-

taining high order address, low order address and then data. Read, write and status information is passed to the DS1380 along with the high order address transfer. While transferring data to and from memory, the I/O status is locked and maintained. All data within the DS1380 can be made nonvolatile with direct connection of a 3-volt lithium battery. The DS1380 is controlled by only two signals: clock and memory select.

FEATURES

- 2K x 8 Nonvolatile Static RAM
- 8–Bit transparent I/O Port
- Greater than 10 years of data retention in absence of V_{CC}
- Multiplexed address/data bus reduces pin count
- Write protection for both RAM and port status at either 5% or 10%
- Power Fail output signal
- Low power CMOS
- 24–pin DIP package
- Ideally suited for microcontroller applications as add on memory

PIN ASSIGNMENT



PIN DESCRIPTION

PI1 – PI8	–	Port Inputs (μ P Ports)
PO1 – PO8	–	Port Outputs (External Ports)
\overline{PF}	–	Power Fail Output
CLK	–	Clock
\overline{MEM}	–	Memory Select
V_{CC}	–	+5 Volts
GND	–	Ground
NC	–	No Connection

Note: Pins 16 and 20 are missing by design.

DESCRIPTION

The DS1381 is a 2K x 8 nonvolatile static RAM designed to connect directly to the port pins of a microcontroller. Eight of ten port pins required to interface with the microcontroller are reproduced by the DS1381 for general purpose use. The reproduced port pins can be both inputs and outputs and will appear exactly the same as the pins on the attached microcontroller. The static RAM is read or written with three successive cycles con-

taining high order address, low order address and then data. Read, write and status information is passed to the DS1381 along with the high order address transfer. While transferring data to and from memory, the I/O status is locked and maintained. All data within the DS1381 is nonvolatile and data retention time is over 10 years. The DS1381 is controlled by only two signals; clock and memory select.

DALLAS

SEMICONDUCTOR

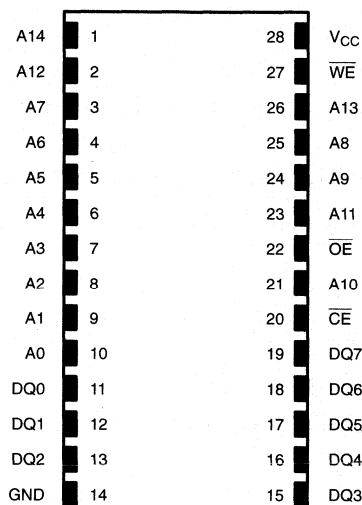
DS1630Y/AB

Partitionable 256K NV SRAM

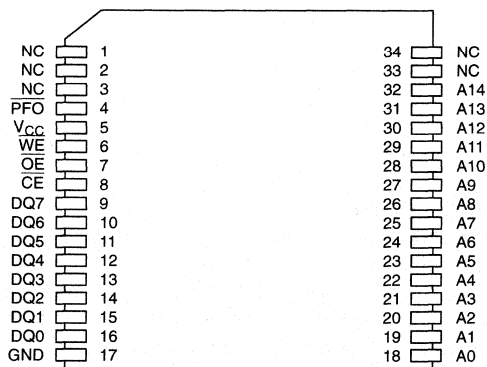
FEATURES

- 10 years minimum data retention in the absence of external power
- Data is automatically protected during power loss
- Directly replaces 32K x 8 volatile static RAM or EEPROM
- Write protects selected blocks of memory when programmed
- Unlimited write cycles
- Low-power CMOS
- Read and write access times as fast as 70 ns
- Lithium energy source is electrically disconnected to retain freshness until power is applied for the first time
- Full $\pm 10\%$ V_{CC} operating range (DS1630Y)
- Optional $\pm 5\%$ V_{CC} operating range (DS1630AB)
- Optional industrial temperature range of -40°C to $+85^{\circ}\text{C}$, designated IND
- JEDEC standard 28-pin DIP package
- Low Profile Module (LPM) package
 - Fits into standard 68-pin PLCC surface mountable socket
 - 255 mils package height
 - Power Fail Output (PFO) warns system of impending V_{CC} power failure

PIN ASSIGNMENT



28-PIN ENCAPSULATED PACKAGE
740 MIL EXTENDED

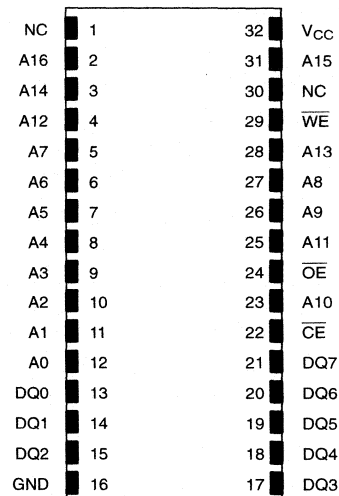


34-PIN LOW PROFILE MODULE (LPM)

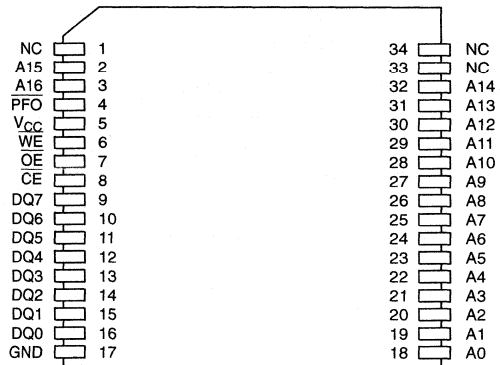
FEATURES

- 10 years minimum data retention in the absence of external power
- Data is automatically protected during power loss
- Directly replaces 128K x 8 volatile static RAM
- Write protects selected blocks of memory when programmed
- Unlimited write cycles
- Low-power CMOS
- Read and write access times as fast as 70 ns
- Lithium energy source is electrically disconnected to retain freshness until power is applied for the first time
- Full $\pm 10\%$ V_{CC} operating range (DS1645Y)
- Optional $\pm 5\%$ V_{CC} operating range (DS1645AB)
- Optional industrial temperature range of -40°C to $+85^{\circ}\text{C}$, designated IND
- JEDEC standard 32-pin DIP package
- Low Profile Module (LPM) package
 - Fits into standard 68-pin PLCC surface mountable socket
 - 250 mil package height
 - Power Fail Output (PFO) warns system of impending V_{CC} power failure

PIN ASSIGNMENT



32-PIN ENCAPSULATED PACKAGE
740 MIL EXTENDED



34-PIN LOW PROFILE MODULE (LPM)

DALLAS

SEMICONDUCTOR

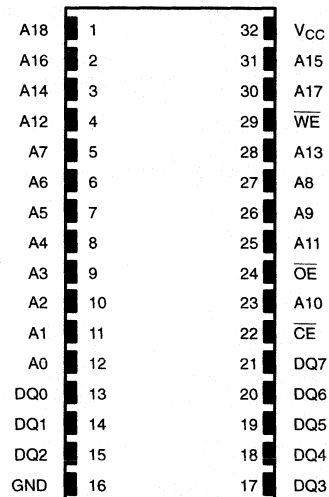
DS1650Y/AB

Partitionable 4096K NV SRAM

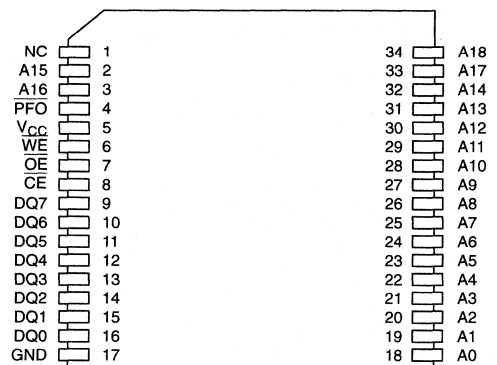
FEATURES

- 10 years minimum data retention in the absence of external power
- Data is automatically protected during power loss
- Directly replaces 512K x 8 volatile static RAM
- Write protects selected blocks of memory when programmed
- Unlimited write cycles
- Low-power CMOS
- Read and write access times as fast as 70 ns
- Lithium energy source is electrically disconnected to retain freshness until power is applied for the first time
- Full $\pm 10\%$ V_{CC} operating range (DS1650Y)
- Optional $\pm 5\%$ V_{CC} operating range (DS1650AB)
- Optional industrial temperature range of -40°C to $+85^{\circ}\text{C}$, designated IND
- JEDEC standard 32-pin DIP package
- Low Profile Module (LPM) package
 - Fits into standard 68-pin PLCC surface mountable socket
 - 255 mils package height
 - Power Fail Output ($\overline{\text{PFO}}$) warns system of impending V_{CC} power failure

PIN ASSIGNMENT



32-PIN ENCAPSULATED PACKAGE
740 MIL EXTENDED



34-PIN LOW PROFILE MODULE (LPM)

FEATURES

- 10 year minimum data retention in the absence of external power
- Data is automatically protected during power loss
- Write protects selected blocks of memory when programmed
- Separate upper byte and lower byte chip selection inputs
- Unlimited write cycles
- Low-power CMOS
- Read and write access times as fast as 70 ns
- Lithium energy source is electrically disconnected to retain freshness until power is applied for the first time
- Full $\pm 10\%$ V_{CC} operating range (DS1658Y)
- Optional $\pm 5\%$ V_{CC} operating range (DS1658AB)
- Optional industrial temperature range of -40°C to 85°C (designated IND)

PIN ASSIGNMENT

$\overline{\text{CEU}}$	1	40	V_{CC}
$\overline{\text{CEL}}$	2	39	$\overline{\text{WE}}$
DQ15	3	38	A16
DQ14	4	37	A15
DQ13	5	36	A14
DQ12	6	35	A13
DQ11	7	34	A12
DQ10	8	33	A11
DQ9	9	32	A10
DQ8	10	31	A9
GND	11	30	GND
DQ7	12	29	A8
DQ6	13	28	A7
DQ5	14	27	A6
DQ4	15	26	A5
DQ3	16	25	A4
DQ2	17	24	A3
DQ1	18	23	A2
DQ0	19	22	A1
$\overline{\text{OE}}$	20	21	A0

40-PIN EXCAPSULATED PACKAGE
740 MIL EXTENDED

PIN DESCRIPTION

A0–A16	– Address Inputs
DQ0–DQ15	– Data In/Data Out
$\overline{\text{CEU}}$	– Chip Enable Upper Byte
$\overline{\text{CEL}}$	– Chip Enable Lower Byte
$\overline{\text{WE}}$	– Write Enable
$\overline{\text{OE}}$	– Output Enable
V_{CC}	– Power Supply (+5V)
GND	– Ground

DESCRIPTION

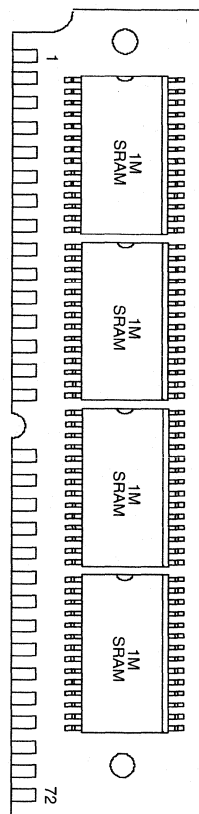
The DS1658 128K x 16 NV SRAMs are 2,097,152 bit fully static, nonvolatile SRAMs, organized as 131,072 words by 16 bits. Each NV SRAM has a self contained lithium energy source and control circuitry which constantly monitors V_{CC} for an out-of-tolerance condition. When such a condition occurs, the lithium energy source is automatically switched on and write protection is unconditionally enabled to prevent data corruption. In addition, the DS1658 has the ability to unconditionally

write protect blocks of memory so that inadvertent write cycles do not corrupt programs and important data. DS1658 devices can be used in place of solutions which build nonvolatile 128K x 16 memory by utilizing a variety of discrete components. There is no limit on the number of write cycles that can be executed, and no additional support circuitry is required for microprocessor interfacing.

FEATURES

- Flexibly organized as 128K x 32, 256K x 16, or 512K x 8 bits
- Data retention >10 years in the absence of V_{CC}
- Nonvolatile circuitry transparent to and independent from host system
- Automatic write protection circuitry safeguards against data loss
- Separate chip enables allow access by byte, word, or long word
- Fast access times: 70ns, 100ns, or 120ns
- Unlimited write cycles
- Read cycle time equals write cycle time
- Employs popular JEDEC standard 72-position SIMM connection scheme
- Lithium energy source is electrically disconnected to retain freshness until power is applied for the first time

PIN ASSIGNMENT



72-PIN SIP STIK

DESCRIPTION

The DS2227 Flexible NV SRAM Stik is a self-contained 4,194,304-bit nonvolatile static RAM which can be flexibly organized as 128K x 32 bits, 256K x 16 bits, or 512K x 8 bits. The nonvolatile memory contains all necessary control circuitry and lithium energy sources to maintain

data integrity in the absence of power for more than 10 years. The DS2227 employs the popular JEDEC standard 72-position SIMM connection scheme requiring no additional circuitry.

FEATURES

- Flexibly organized as 32K x 32, 64K x 16 or 128K x 8 bits
- 10 years minimum data retention in the absence of external power
- Nonvolatile circuitry transparent to and independent from host system
- Automatic write protection circuitry safeguards against data loss
- Separate control and data signals for each SRAM allow byte, word or doubleword access
- Fast access time of 70 ns
- Full $V_{CC} \pm 10\%$ operating range
- Employs popular JEDEC standard 72–position SIMM connector
- Extremely thin design built using TSOP–package IC components

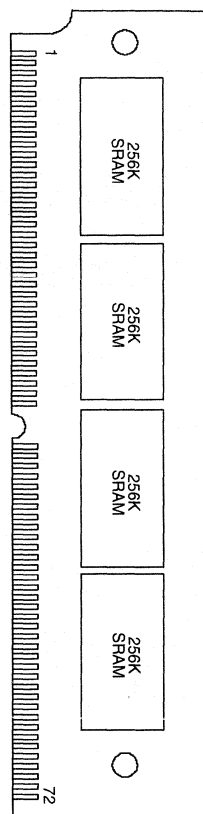
PIN DESCRIPTION

A0 – A14	– Address Inputs
D0A – D7A	– Data Inputs/Outputs, Byte A
D0B – D7B	– Data Inputs/Outputs, Byte B
D0C – D7C	– Data Inputs/Outputs, Byte C
D0D – D7D	– Data Inputs/Outputs, Byte D
CEA – CED	– Chip Enable Inputs
WEA – WED	– Write Enable Inputs
OEA – OED	– Output Enable Inputs
VCC	– +5V Power Supply
GND	– Ground
NC	– No Connect

DESCRIPTION

The DS3803 is a self-contained 1,048,576-bit, nonvolatile static RAM which can be flexibly organized as 32K x 32, 64K x 16 or 128K x 8. Built using four 32K x 8 SRAMs, four nonvolatile control ICs and four lithium batteries, this nonvolatile memory contains all necessary

PIN ASSIGNMENT



DS3803 72–PIN SIMM

control circuitry and lithium energy sources to maintain data integrity in the absence of power for more than 10 years. The DS3803 employs the popular JEDEC standard 72–position SIMM connection scheme and requires no additional circuitry.

DALLAS SEMICONDUCTOR

DS9034PC PowerCap

FEATURES

- Provides 10 years of battery backup power for Non-volatile SRAMs in the PowerCap Module (PCM) package
- Snaps directly onto a surface-mounted PowerCap Module to form a complete Nonvolatile SRAM module
- Attaches after PCM has been surface-mounted to protect lithium battery from the high temperatures of reflow soldering
- Maintains mechanical and electrical connection with PCM even during severe shock and vibration stresses
- Detachment feature allows easy removal using a regular screwdriver
- Periodic replacement allows Nonvolatile SRAM module life to be extended indefinitely
- Compatible with these 34-pin PowerCap Modules:

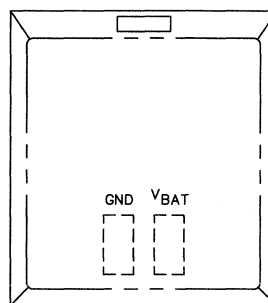
DS1230YP/ABP
DS1245YP/ABP
DS1250YP/ABP

DS1330YP/ABP
DS1345YP/ABP
DS1350YP/ABP

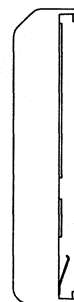
DESCRIPTION

The DS9034PC PowerCap is a snap-on lithium power source for Nonvolatile SRAMs in Dallas Semiconductor's directly surface-mountable PowerCap Module (PCM) package. After a PowerCap Module has been soldered in place, the DS9034PC PowerCap is snapped onto the PCM to form a complete Nonvolatile SRAM module. The PowerCap is keyed to prevent

PIN ASSIGNMENT



TOP VIEW



SIDE VIEW

PIN DESCRIPTION

V_{BAT} - +3 Volt Battery Output
GND - Ground

ABSOLUTE MAXIMUM RATINGS

Operating Temperature -40°C to +85°C
Storage Temperature -40°C to +85°C

BATTERY CHARACTERISTICS

Nominal Voltage 3 volts
Nominal Capacity 130 mAh
Chemistry Li(CF)_x
Data Retention Life 10 Years (25°C)

incorrect attachment and is designed to maintain mechanical and electrical contact with its host PowerCap Module even during severe mechanical shock and vibration. The DS9034PC is easily removed by inserting a regular screwdriver into the detachment feature and prying gently outward and upward to release the PowerCap from the PCM board.

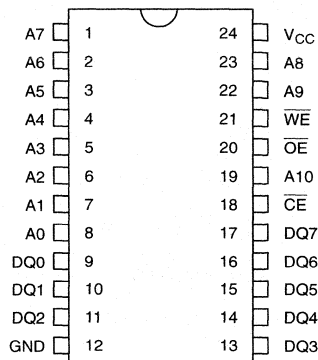
FEATURES

- Low power CMOS design
- Standby current
 - 50 nA max at $t_A = 25^\circ\text{C}$ $V_{CC} = 3.0\text{V}$
 - 100 nA max at $t_A = 25^\circ\text{C}$ $V_{CC} = 5.5\text{V}$
 - 1 μA max at $t_A = 60^\circ\text{C}$ $V_{CC} = 5.5\text{V}$
- Full operation for $V_{CC} = 5.5\text{V}$ to 2.7V
- Data Retention Voltage = 5.5V to 2.0V
- Fast 5V access time
 - DS2016 – 100 100 ns
 - DS2016 – 150 150 ns
- Reduced-speed 3V access time
 - DS2016 – 100 250 ns
 - DS2016 – 150 250 ns
- Operating temperature range of -40°C to $+85^\circ\text{C}$
- Full static operation
- TTL compatible inputs and outputs over voltage range of 5.5V to 2.7 volts.
- Available in 24-pin DIP and 24-pin SOIC packages
- Suitable for both battery operate and battery backup applications

DESCRIPTION

The DS2016 is a 16,384-bit, low-power, fully static random access memory organized as 2048 words by 8-bits using CMOS technology. The device operates from a single power supply with a voltage input between 2.7 and 5.5 volts. The chip enable input ($\overline{\text{CE}}$) is used for device selection and can be used in order to achieve the minimum standby current mode, which facilitates both battery operate and battery backup applications. The device provides access times as fast as 100 ns when

PIN ASSIGNMENT



DS2016 24-PIN DIP (600 MIL)
 DS2016S 24-PIN SOIC (330 MIL)

PIN DESCRIPTION

A0 – A10	– Address Inputs
DQ0 – DQ7	– Data Input/Output
$\overline{\text{CE}}$	– Chip Enable Input
$\overline{\text{WE}}$	– Write Enable Input
$\overline{\text{OE}}$	– Output Enable Input
V _{CC}	– Power Supply Input 2.7V – 5.5V
GND	– Ground

operated from a 5 volt power supply input, and also provides relatively good performance of 250 ns access while operating from a 3 volt input. The device maintains TTL-level inputs and outputs over the input voltage range of 2.7 to 5.5 volts. The DS2016 is most suitable for low power applications where battery operation or battery backup for nonvolatility are required. The DS2016 is a JEDEC-standard 2K x 8 SRAM and is pin-compatible with ROM and EPROM of similar density.

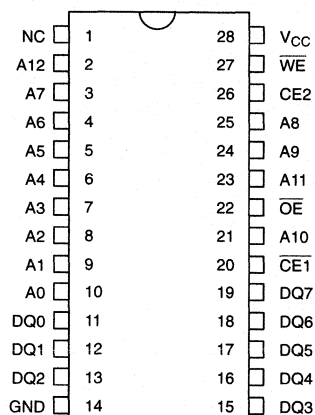
FEATURES

- Low power CMOS design
- Standby current
 - 50 nA max at $t_A = 25^\circ\text{C}$ $V_{CC} = 3.0\text{V}$
 - 100 nA max at $t_A = 25^\circ\text{C}$ $V_{CC} = 5.5\text{V}$
 - 1 μA max at $t_A = 60^\circ\text{C}$ $V_{CC} = 5.5\text{V}$
- Full operation for $V_{CC} = 4.5\text{V}$ to 5.5V
- Data Retention Voltage = 5.5V to 2.0V
- Access time equals 200 ns at 5.0V
- Operating temperature range of -40°C to $+85^\circ\text{C}$
- Full static operation
- TTL compatible inputs and outputs
- Available in 28-pin DIP and 28-pin SOIC packages
- Suitable for both battery operated and battery backup applications

DESCRIPTION

The DS2064 is a 65536-bit low power, fully static random access memory organized as 8192 words by eight bits using CMOS technology. The device operates from a single power supply with a voltage input between 4.5V and 5.5V. The chip enable inputs ($\overline{\text{CE1}}$ and $\overline{\text{CE2}}$) are used for device selection and can be used in order to achieve the minimum standby current mode, which fa-

PIN ASSIGNMENT



DS2064-200 28-PIN DIP (600 MIL)
DS2064S-200 28-PIN SOIC (330 MIL)

PIN DESCRIPTION

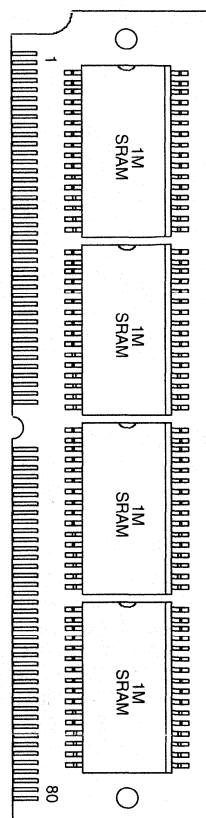
A0 – A12	–	Address Inputs
DQ0 – DQ7	–	Data Input/Output
$\overline{\text{CE1}}$, CE2	–	Chip Enable Inputs
$\overline{\text{WE}}$	–	Write Enable Input
$\overline{\text{OE}}$	–	Output Enable Input
V_{CC}	–	5V Power Supply Input
GND	–	Ground
NC	–	No Connection

ilitates both battery operate and battery backup applications. The device provides fast access time of 200 ns and is most suitable for low power applications where battery operation or battery backup for nonvolatility are required. The DS2064 is a JEDEC-standard 8K x 8 SRAM and is pin-compatible with ROM and EPROM of similar density.

FEATURES

- Organized as a high density 512K x 16 bit Stik™
- Fast access time of 85 ns
- Unlimited write cycles
- Employs popular JEDEC standard 80-position SIMM connector
- Full $\pm 10\%$ operating range
- Read cycle time equals write cycle time
- Ultra-low standby current < 10 μA
- Suitable for battery-backed applications

PIN ASSIGNMENT



80-pin SIP Stik

DESCRIPTION

The DS2229 is a 8,388,608-bit low-power fully static Random Access Memory organized as a 524,888 word by 16 bits using CMOS technology. The device employs the popular JEDEC standard 80-pin SIMM connection scheme with no additional circuitry required. The device operates from a single power supply with a voltage input of 4.5 to 5.5 volts. The Chip Enable inputs ($\overline{\text{CE0}}$, $\overline{\text{CE1}}$, $\overline{\text{CE2}}$, $\overline{\text{CE3}}$) are used for device selection and can be

used in order to achieve the minimum standby current mode which facilitates battery backup. The device provides a fast access time of 85 ns. The DS2229 maintains TTL levels over input voltage range 4.5V to 5.5V. The DS2229 is JEDEC pin compatible (see Figure 1) with flash EEPROM memory SIMM boards of similar density.

DALLAS

SEMICONDUCTOR

DS1280

3-Wire to Byte-wide Converter Chip

FEATURES

- Adapts JEDEC byte-wide memory to a 3-wire serial port
- Supports 512K bytes of memory
- 68-pin version provides arbitration mechanisms for dual port operation
- CMOS circuitry design for battery backup and battery operate applications
- Cyclic redundancy check monitors serial data transmission for error
- Available in 44- or 80-pin quad flat pack for high density requirements

ORDERING INFORMATION

DS1280FP-XX -80 80-pin Flat Pack
 -44 44-pin Flat Pack

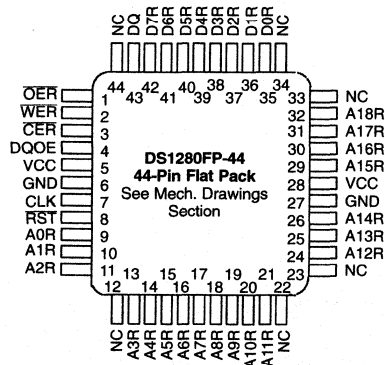
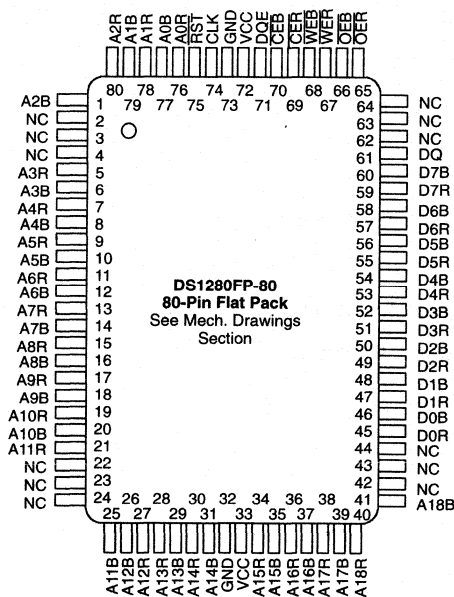
PIN DESCRIPTION

RST	– Reset For Serial Port
DQ	– Data Input/Output For Serial Port
CLK	– Clock Input For Serial Port
DQE	– Serial Port Active Output
CEB	– System Bus Enable
OEB	– System Bus Read Enable
WEB	– System Bus Write Enable
A0B-A18B	– System Address Bus
D0B-D7B	– System Data Bus
CER	– RAM Chip Enable
WER	– RAM Write Enable
OER	– RAM Output Enable
A0R-A18R	– RAM Address Bus
D0R-D7R	– RAM Data Bus
GND	– Ground
V _{CC}	– +5 Volts

DESCRIPTION

The DS1280 adds a 3-wire serial port to a byte-wide static RAM yet maintains the existing byte-wide port. Memory capacity of up to 512K bytes can be addressed directly. Arbitration between the serial and byte-wide

PIN ASSIGNMENT



port is accomplished by handshaking or using predictable idle time as an access window. The serial port requires a 6-byte protocol to set up memory transfers.

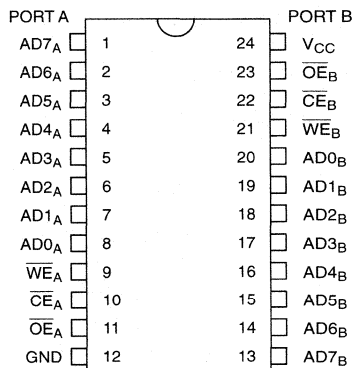
FEATURES

- Totally asynchronous 256 byte dual port memory
- Multiplexed address and data bus keeps pin count low
- Dual port memory cell allows random access with minimum arbitration
- Each port has standard independent RAM control signals
- Fast access time
- Low power CMOS design
- 24-pin DIP or 24-pin SOIC surface mount package
- Both CMOS and TTL compatible
- Reduced performance operation down to 2.5 volts
- Operating temperature of -40°C to $+85^{\circ}\text{C}$
- Standby current of 100 nA @ 25°C makes the device ideal for battery backup or battery operate applications.

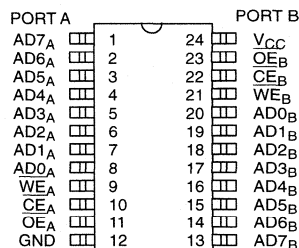
DESCRIPTION

The DS1609 is a random access 256 byte dual port memory designed to connect two asynchronous address/data buses together with a common memory element. Both ports have unrestricted access to all 256 bytes of memory and with modest system discipline no arbitration is required. Each port is controlled by three

PIN ASSIGNMENT



DS1609 24-PIN DIP (600 MIL)
See Mech. Drawings Section



DS1609S 24-PIN SOIC (300 MIL)
See Mech. Drawings Section

PIN DESCRIPTION

AD0-AD7	- Port address/data
$\overline{\text{CE}}$	- Port enable
$\overline{\text{WE}}$	- Write enable
$\overline{\text{OE}}$	- Output enable
V _{CC}	- +5 volt supply
GND	- Ground

control signals: output enable, write enable, and port enable. The device is packaged in plastic 24-pin DIP and 24-pin SOIC. Output enable access time of 50 ns is available when operating at 5 volts. Reduced performance operation at reduced voltage can be achieved down to 2.5 volts.

DALLAS

SEMICONDUCTOR

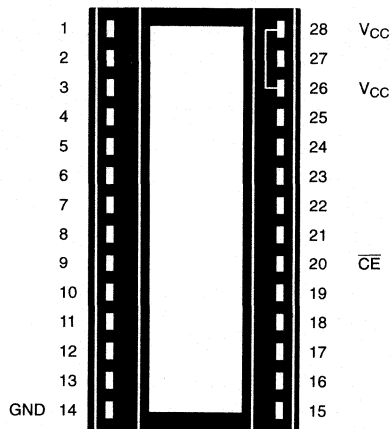
DS1213B

SmartSocket 16K/64K

FEATURES

- Accepts standard 2K x 8 or 8K x 8 CMOS static RAMs
- Embedded lithium energy cell retains RAM data
- Self-contained circuitry safeguards data
- Data retention time is greater than 10 years with the proper RAM selection
- IC socket permits upgrading from 2K x 8 to 8K x 8 RAM
- Proven gas-tight socket contacts
- Operating temperature range 0°C to 70°C

PIN ASSIGNMENT



28-PIN INTELLIGENT SOCKET

PIN DESCRIPTION

- \overline{CE} – Conditioned Chip Enable
 V_{CC} – Switched V_{CC}
 GND – Ground

All pins pass through except 20, 26 and 28.

DESCRIPTION

The DS1213B SmartSocket is a 28-pin, 600 mil DIP socket with a built-in CMOS controller circuit and an embedded lithium energy source. It accepts either 24-pin 2K x 8 (lower-justified) or 28-pin 8K x 8 JEDEC bytewise CMOS static RAM. When the socket is mated with a CMOS RAM, it provides a complete solution to problems associated with memory volatility. The SmartSocket monitors incoming V_{CC} for an out-of-tolerance condition. When such a condition occurs, the internal

lithium energy source is automatically switched on and write protection is unconditionally enabled to prevent data corruption.

Using the SmartSocket saves printed circuit board space since the SRAM/SmartSocket combination occupies no more area than the SRAM alone. The SmartSocket modifies only pins 20, 26 and 28, to nonvolatize the RAM. All other pins are passed straight through.

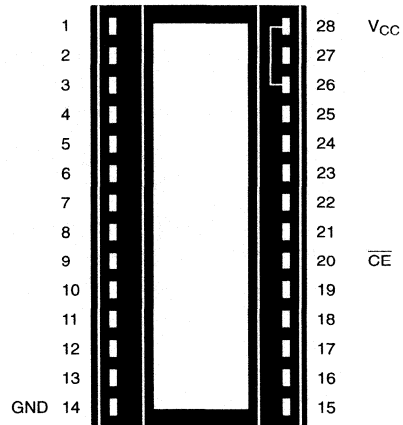
DALLAS SEMICONDUCTOR

DS1213C SmartSocket 256K

FEATURES

- Accepts standard 32K x 8 CMOS static RAMs
- Embedded lithium energy cell retains RAM data
- Self-contained circuitry safeguards data
- Data retention time is greater than 10 years with the proper RAM selection
- Proven gas-tight socket contacts
- Operating temperature range 0°C to 70°C

PIN ASSIGNMENT



28-PIN INTELLIGENT SOCKET

PIN DESCRIPTION

\overline{CE} – Conditioned Chip Enable

V_{CC} – Switched V_{CC}

GND – Ground

All pins pass through except 20 and 28.

DESCRIPTION

The DS1213C SmartSocket is a 28-pin, 600 mil DIP socket with a built-in CMOS controller circuit and an embedded lithium energy source. It accepts a 32K x 8 JEDEC byte-wide CMOS static RAM. When the socket is mated with a CMOS RAM, it provides a complete solution to problems associated with memory volatility. The SmartSocket monitors incoming V_{CC} for an out-of-tolerance condition. When such a condition occurs, the internal lithium energy source is automatically switched on and write protection is unconditionally enabled to prevent data corruption.

Using the SmartSocket saves printed circuit board space since the SRAM/SmartSocket combination occupies no more area than the memory alone. The SmartSocket uses only Pins 20 and 28 for RAM control. All other pins are passed straight through.

See the DS1213B SmartSocket data sheet for technical details.

DALLAS

SEMICONDUCTOR

DS1213D

SmartSocket 256K/1M

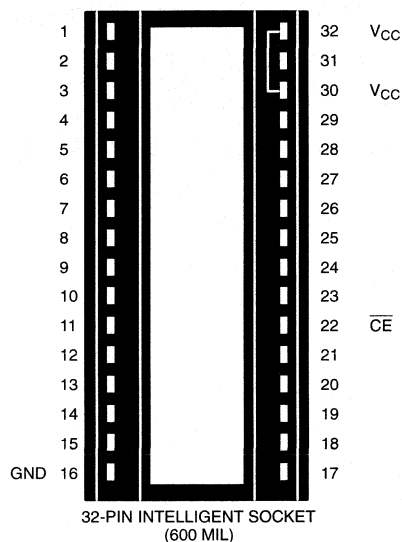
FEATURES

- Accepts standard 32K x 8 or 128K x 8 CMOS static RAMs
- Embedded lithium energy cell retains RAM data
- Self-contained circuitry safeguards data
- Data retention time is greater than 10 years with the proper RAM selection
- IC socket permits upgrading from 32K x 8 to 128K x 8 RAM
- Proven gas-tight socket contacts
- Operating temperature range 0°C to 70°C

DESCRIPTION

The DS1213D SmartSocket is a 32-pin, 600 mil DIP socket with a built-in CMOS controller circuit and an embedded lithium energy source. It accepts 32K x 8 or 128K x 8 JEDEC bytewise CMOS static RAM. When the socket is mated with a CMOS RAM, it provides a complete solution to problems associated with memory volatility. The SmartSocket monitors incoming V_{CC} for an out-of-tolerance condition. When such a condition occurs, an internal lithium energy source is automatically switched on and write protection is unconditionally enabled to prevent data corruption.

PIN ASSIGNMENT



PIN DESCRIPTION

- \overline{CE} – Conditioned Chip Enable
 V_{CC} – Switched V_{CC}
 GND – Ground

All pins pass through except 22, 30 and 32.

Using the SmartSocket saves printed circuit board space since the SRAM/SmartSocket combination occupies no more area than the SRAM alone. The SmartSocket uses only Pins 22, 30 and 32 for RAM control. All other pins are passed straight through.

See the DS1213B SmartSocket data sheet for technical details.

See Dallas Semiconductor Application Note 4 for modification instructions to allow use of 512K x 8 RAM with this part.

DALLAS

SEMICONDUCTOR

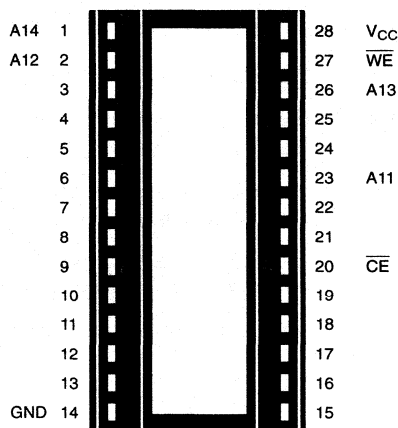
DS1613C

Partitionable 256K SmartSocket

FEATURES

- Accepts standard 32K x 8, CMOS static RAMs
- Embedded lithium energy cell retains RAM data
- Unconditionally write protects all of memory when V_{CC} is out of tolerance
- Write protects selected blocks of memory when programmed
- Automatically switches to battery backup supply when power fail occurs
- Data retention time is greater than 10 years with the proper RAM selection
- Proven gas-tight socket contacts
- Operating temperature range 0°C to 70°C

PIN ASSIGNMENT



28-PIN INTELLIGENT SOCKET

PIN DESCRIPTION

A11–A14	–	Address Lines
\overline{CE}	–	Conditioned Chip Enable
\overline{WE}	–	Conditioned Write Enable
V_{CC}	–	Switched V_{CC}
GND	–	Ground

All pins pass through except 20, 28, and 27.

DESCRIPTION

The DS1613C SmartSocket is a 28-pin, 600 mil DIP socket with a built-in CMOS controller circuit and an embedded lithium energy source. It accepts a 32K x 8 JEDEC byte-wide CMOS static RAM. When the socket is mated with a CMOS RAM, it provides a complete solution to problems associated with memory volatility. The SmartSocket monitors incoming V_{CC} for an out-of-tolerance condition. When such a condition occurs, an internal lithium energy source is automatically switched on and write protection is unconditionally enabled to prevent data corruption. In addition the device has the

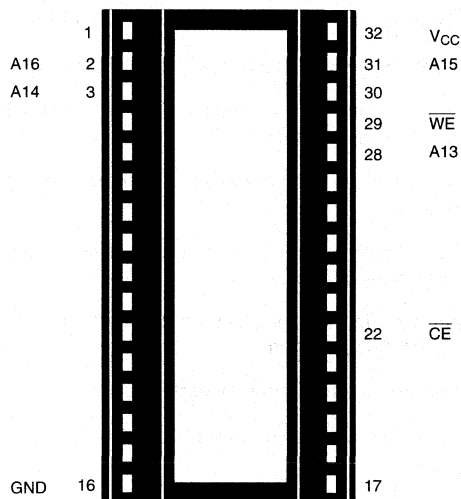
ability to unconditionally write protect blocks of memory so that inadvertent write cycles do not corrupt programs important data.

Using the SmartSocket saves printed circuit board space since the SRAM/SmartSocket combination occupies no more area than the SRAM alone. The SmartSocket modifies only pins 20, 27 and 28 to nonvolatize the RAM. All other pins are passed straight through. Pins 1, 2, 23, and 26 are address inputs used to program memory partitions.

FEATURES

- Accepts standard 128K x 8, CMOS static RAM
- Embedded lithium energy cell retains RAM data
- Unconditionally write protects all of memory when V_{CC} is out of tolerance
- Write protects selected blocks of memory regardless of V_{CC} status when programmed
- Automatically switches to battery backup supply when power fail occurs
- Data retention time is greater than 10 years with the proper RAM selection
- Proven gas-tight socket contacts
- Operating temperature range 0°C to 70°C

PIN ASSIGNMENT



32-PIN SOCKET (600 MIL)

PIN DESCRIPTION

A13–A16	– Address Lines
\overline{CE}	– Conditioned Chip Enable
\overline{WE}	– Conditioned Write Enable
V_{CC}	– Switched V_{CC}
GND	– Ground

All pins pass through except 22, 29, 30 and 32.

DESCRIPTION

The DS1613D SmartSocket is a 32-pin, 600 mil DIP socket with a built-in CMOS controller circuit and an embedded lithium energy source. It accepts 128K x 8 JEDEC bytewise CMOS static RAM. When the socket is mated with a CMOS RAM, it provides a complete solution to problems associated with memory volatility. The SmartSocket monitors incoming V_{CC} for an out-of-tolerance condition. When such a condition occurs, an internal lithium energy source is automatically switched on and write protection is unconditionally enabled to prevent data corruption. In addition the device has the

ability to unconditionally write protect blocks of memory so that inadvertent write cycles do not corrupt programs and important data.

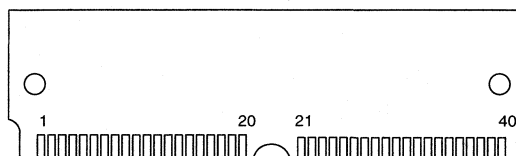
Using the SmartSocket saves printed circuit board packing since the SRAM/SmartSocket combination occupies no more area than the SRAM alone. The SmartSocket modifies only pins 22, 29, 30, and 32 to nonvolatize the RAM. All other pins are passed straight through. Pins 2, 3, 28, and 31 are address inputs used to program memory partitions.

MICROCONTROLLERS

FEATURES

- 8-bit 8051 compatible microcontroller adapts to task-at-hand:
 - 8K, 32K, or 64K bytes of nonvolatile RAM for program and/or data memory storage
 - Initial downloading of software in end system via on-chip serial port
 - Capable of modifying its own program and/or data memory in end use
- High-reliability operation:
 - Maintains all nonvolatile resources for 10 years in the absence of V_{CC}
 - Power-fail reset
 - Early warning power-fail interrupt
 - Watchdog timer
- Software Security Feature:
 - Executes encrypted software to prevent unauthorized disclosure
- On-chip, full-duplex serial I/O ports
- Two on-chip timer/event counters
- 32 parallel I/O lines
- Compatible with industry standard 8051 instruction set
- Permanently Powered real time clock

PIN ASSIGNMENT



40-PIN SIMM

DESCRIPTION

The DS2250(T) Soft Microcontroller Module is a fully 8051 compatible 8-bit CMOS microcontroller that offers "softness" in all aspects of its application. This is accomplished through the comprehensive use of nonvolatile technology to preserve all information in the absence of system V_{CC} . The internal program/data memory space is implemented using 8K, 32K, or 64K bytes of nonvolatile CMOS SRAM. Furthermore, inter-

nal data registers and key configuration registers are also nonvolatile. An optional real time clock gives permanently powered timekeeping. The clock keeps time to a hundredth of a second using an on-board crystal. All nonvolatile memory and resources are maintained for over 10 years at room temperature in the absence of power.

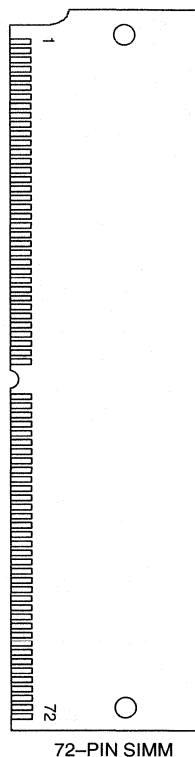
FEATURES

- 8051 compatible microcontroller adapts to its task
 - 32K, 64K, or 128K bytes of nonvolatile SRAM for program and/or data storage
 - In-system programming via on-chip serial port
 - Capable of modifying its own program or data memory in the end system
 - Provides separate Byte-wide bus for peripherals
 - Performs CRC-16 check of NV RAM memory
- High-reliability Operation
 - Maintains all nonvolatile resources for over 10 years in the absence of power
 - Power-fail reset
 - Early Warning Power-fail Interrupt
 - Watchdog Timer
 - Lithium backed memory remembers system state
 - Precision reference for power monitor
- Fully 8051 Compatible
 - 128 bytes scratchpad RAM
 - Two timer/counters
 - On-chip serial port
 - 32 parallel I/O port pins
- Permanently powered real time clock

DESCRIPTION

The DS2251T is an 8051 compatible microcontroller module based on nonvolatile RAM technology. It is designed for systems that need large quantities of non-volatile memory. Like other members of the Secure Microcontroller family, it provides full compatibility with the 8051 instruction set, timers, serial port, and parallel I/O ports. By using NV RAM instead of ROM, the user can program, then reprogram the microcontroller while in-system. The application software can even change its own operation. This allows frequent software upgrades, adaptive programs, customized systems, etc. In addition, by using NV RAM, the DS2251T is ideal for data logging applications. The powerful real time

PACKAGE OUTLINE



72-PIN SIMM

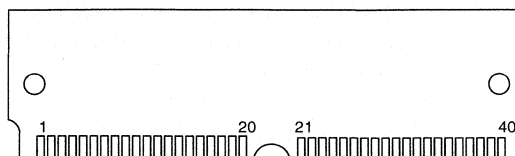
clock includes interrupts for time stamp and date. It keeps time to one hundredth of second using its on-board 32 KHz crystal.

The DS2251T provides the benefits of NV RAM without using I/O resources. Between 32K bytes and 128K bytes of on-board NV RAM are available. A non-multiplexed Byte-wide address and data bus is used for memory access. This bus, which is available at the connector, can perform all memory access and also provides decoded chip enables for off-board memory mapped peripherals. This leaves the 32 I/O port pins free for application use.

FEATURES

- 8051 compatible microcontroller for secure/sensitive applications
 - 32K, 64K, or 128K bytes of nonvolatile SRAM for program and/or data storage
 - In-system programming via on-chip serial port
 - Capable of modifying its own program or data memory in the end system
- Firmware Security Features:
 - Memory stored in encrypted form
 - Encryption using on-chip 64-bit key
 - Automatic true random key generator
 - SDI Self Destruct Input
 - Improved security over previous generations
 - Protects memory contents from piracy
- Crashproof Operation
 - Maintains all nonvolatile resources for over 10 years in the absence of power
 - Power-fail Reset
 - Early Warning Power-fail Interrupt
 - Watchdog Timer
 - Precision reference for power monitor
- Fully 8051 Compatible
 - 128 bytes scratchpad RAM
 - Two timer/counters
 - On-chip serial port
 - 32 parallel I/O port pins
- Permanently powered real time clock

PACKAGE OUTLINE



40-PIN SIMM

DESCRIPTION

The DS2252T is an 8051 compatible microcontroller based on nonvolatile RAM technology. It is designed for systems that need to protect memory contents from disclosure. This includes key data, sensitive algorithms, and proprietary information of all types. Like other members of the Secure Microcontroller family, it provides full compatibility with the 8051 instruction set, timers, serial port, and parallel I/O ports. By using NV RAM instead of ROM, the user can program, then reprogram the microcontroller while in-system. This allows frequent changing of sensitive processes with minimal effort. The DS2252T provides an array of mechanisms to prevent an attacker from examining the memory. It is designed to resist all levels of threat including observation, analysis, and physical attack. As a result, a massive effort would be required to obtain any information about memory contents. Furthermore, the "Soft" nature of the DS2252T allows frequent modification of secure information. This minimizes that value of any information that is obtained.

DALLAS SEMICONDUCTOR

DS5000(T) Soft Microcontroller Module

FEATURES

- 8-bit 8051 compatible Microcontroller adapts to task-at-hand:
 - 8 or 32K bytes of nonvolatile RAM for program and/or data memory storage
 - Initial downloading of software in end system via on-chip serial port
 - Capable of modifying its own program and/or data memory in end use
- Crashproof operation:
 - Maintains all nonvolatile resources for 10 years in the absence of V_{CC}
 - Power-fail reset
 - Early warning power-fail interrupt
 - Watchdog timer
- Software Security Feature:
 - Executes encrypted software to prevent unauthorized disclosure
- On-chip, full-duplex serial I/O ports
- Two on-chip timer/event counters
- 32 parallel I/O lines
- Compatible with industry standard 8051 instruction set and pinout
- Optional Permanently Powered Real-Time Clock (DS5000T)

DESCRIPTION

The DS5000(T) Soft Microcontroller Module is a fully 8051 compatible 8-bit CMOS microcontroller that offers "softness" in all aspects of its application. This is accomplished through the comprehensive use of nonvolatile technology to preserve all information in the absence of system V_{CC} . The internal program/data memory space is implemented using either 8K or

PIN ASSIGNMENT

P1.0	1	40	V_{CC}
P1.1	2	39	P0.0 AD0
P1.2	3	38	P0.1 AD1
P1.3	4	37	P0.2 AD2
P1.4	5	36	P0.3 AD3
P1.5	6	35	P0.4 AD4
P1.6	7	34	P0.5 AD5
P1.7	8	33	P0.6 AD6
RST	9	32	P0.7 AD7
RXD P3.0	10	31	\overline{EA}
TXD P3.1	11	30	ALE
$\overline{INT0}$ P3.2	12	29	\overline{PSEN}
$\overline{INT1}$ P3.3	13	28	P2.7 A15
T0 P3.4	14	27	P2.6 A14
T1 P3.5	15	26	P2.5 A13
WR P3.6	16	25	P2.4 A12
RD P3.7	17	24	P2.3 A11
XTAL2	18	23	P2.2 A10
XTAL1	19	22	P2.1 A9
GND	20	21	P2.0 A8

40-PIN ENCAPSULATED PACKAGE

32K bytes of nonvolatile CMOS SRAM. Furthermore, internal data registers and key configuration registers are also nonvolatile. An optional real time clock gives permanently powered timekeeping. The clock keeps time to a hundredth of a second using an on-board crystal.

DALLAS SEMICONDUCTOR

DS5000FP Soft Microprocessor Chip

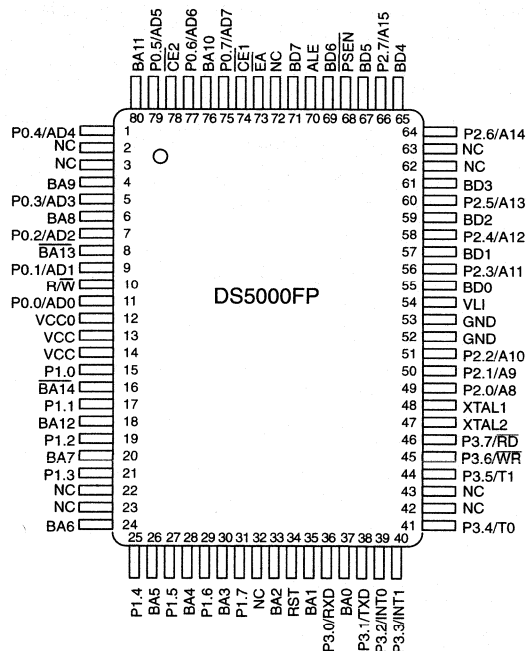
FEATURES

- 8051 compatible microprocessor adapts to its task
 - Accesses between 8K and 64K bytes of nonvolatile SRAM
 - In-system programming via on-chip serial port
 - Can modify its own program or data memory
 - Accesses memory on a separate Byte-wide bus
- Crashproof Operation
 - Maintains all nonvolatile resources for over 10 years
 - Power-fail Reset
 - Early Warning Power-fail Interrupt
 - Watchdog Timer
 - User supplied Lithium battery backs user SRAM for program/data storage
- Software Security
 - Executes encrypted programs to prevent observation
 - Security Lock prevents download
 - Unlocking destroys contents
- Fully 8051 Compatible
 - 128 bytes scratchpad RAM
 - Two timer/counters
 - On-chip serial port
 - 32 parallel I/O port pins

DESCRIPTION

The DS5000FP is an 8051 compatible processor based on nonvolatile RAM technology. It is substantially more flexible than a standard 8051, yet provides full compatibility with the 8051 instruction set, timers, serial port, and parallel I/O ports. By using NV RAM instead of ROM, the user can program, then reprogram the microcontroller while in-system. The application software can even change its own operation. This allows frequent software upgrades, adaptive programs, customized systems, etc. In addition, by using NV SRAM, the DS5000FP is ideal for data logging applications. It con-

PIN ASSIGNMENT



nects easily to a Dallas Real Time Clock for time stamp and date.

The DS5000FP provides the benefits of NV RAM without using I/O resources. It uses a non-multiplexed Byte-wide address and data bus for memory access. This bus can perform all memory access and provides decoded chip enables for SRAM. This leaves the 32 I/O port pins free for application use. The DS5000FP uses ordinary SRAM and battery backs the memory contents with a user's external lithium cell.

DALLAS

SEMICONDUCTOR

DS5001FP

128K Soft Microprocessor Chip

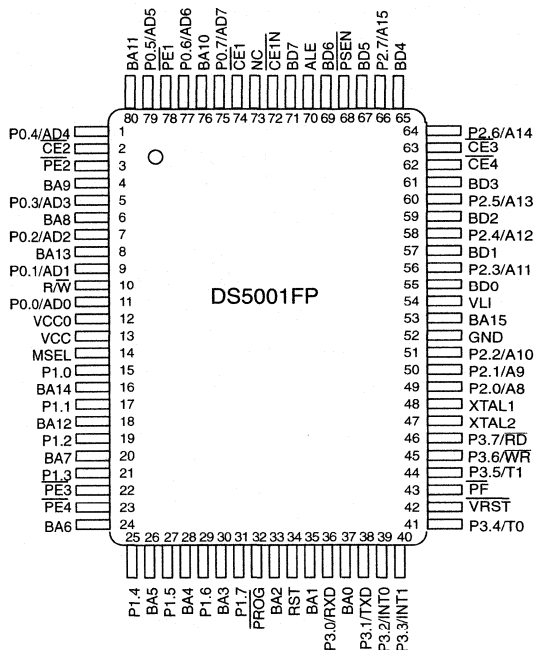
FEATURES

- 8051 compatible microprocessor adapts to its task
 - Accesses up to 128K bytes of nonvolatile SRAM
 - In-system programming via on-chip serial port
 - Can modify its own program or data memory
 - Accesses memory on a separate Byte-wide bus
 - Performs CRC-16 check of NV RAM memory
 - Decodes memory and peripheral chip enables
- Crashproof Operation
 - Maintains all nonvolatile resources for over 10 years
 - Power-fail Reset
 - Early Warning Power-fail Interrupt
 - Watchdog Timer
 - Lithium backs user SRAM for program/data storage
 - Precision band-gap reference for power monitor
- Fully 8051 Compatible
 - 128K bytes scratchpad RAM
 - Two timer/counters
 - On-chip serial port
 - 32 parallel I/O port pins
- Software Security Available with DS5002FP Secure Microprocessor

DESCRIPTION

The DS5001FP is an 8051 compatible microprocessor based on nonvolatile RAM technology. It is designed for systems that need large quantities of nonvolatile memory. Like its predecessor the DS5000(T), the DS5001FP is substantially more flexible than a standard 8051. It provides full compatibility with the 8051 instruction set, timers, serial port, and parallel I/O ports. By using NV RAM instead of ROM, the user can pro-

PIN ASSIGNMENT



gram, then reprogram the microprocessor while in-system. The application software can even change its own operation. This allows frequent software upgrades, adaptive programs, customized systems, etc. In addition, by using NV SRAM, the DS5001FP is ideal for data logging applications. It also connects easily to a Dallas Real Time Clock for time stamp and date.

DALLAS SEMICONDUCTOR

DS5002FP Secure Microprocessor Chip

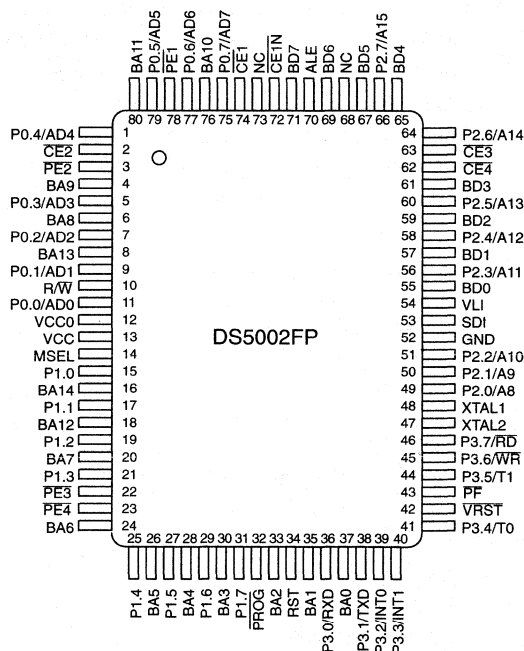
FEATURES

- 8051 compatible microprocessor for secure/sensitive applications
 - Access 32K, 64K, or 128K bytes of nonvolatile SRAM for program and/or data storage
 - In-system programming via on-chip serial port
 - Capable of modifying its own program or data memory in the end system
- Firmware Security Features:
 - Memory stored in encrypted form
 - Encryption using on-chip 64-bit key
 - Automatic true random key generator
 - SDI Self Destruct Input
 - Optional top coating prevents microprobe (DS5002FPM)
 - Improved security over previous generations
 - Protects memory contents from piracy
- Crashproof Operation
 - Maintains all nonvolatile resources for over 10 years in the absence of power
 - Power-fail Reset
 - Early Warning Power-fail Interrupt
 - Watchdog Timer

DESCRIPTION

The DS5002FP Secure Microprocessor Chip is a secure version of the DS5001FP 128K Soft Microprocessor Chip. In addition to the memory and I/O enhancements of the DS5001FP, the Secure Microprocessor Chip incorporates the most sophisticated security features available in any processor. The security features of the DS5002FP include an array of mechanisms which are designed to resist all levels of threat, including observation, analysis, and physical attack. As a result, a massive effort would be required to obtain any information about memory contents. Furthermore, the "soft" nature of the DS5002FP allows frequent modification of the secure information, thereby minimizing the value of

PIN ASSIGNMENT



any secure information obtained by such a massive effort.

The DS5002FP implements a security system which is an improved version of its predecessor, the DS5000FP. Like the DS5000FP, the DS5002FP loads and executes application software in encrypted form. Up to 128K x 8 bytes of standard SRAM can be accessed via its Byte-wide bus. This RAM is converted by the DS5002FP into lithium-backed nonvolatile storage for program and data. Data is maintained for over 10 years at room temperature with a very small lithium cell.

DALLAS

SEMICONDUCTOR

DS80C310

High-Speed Micro

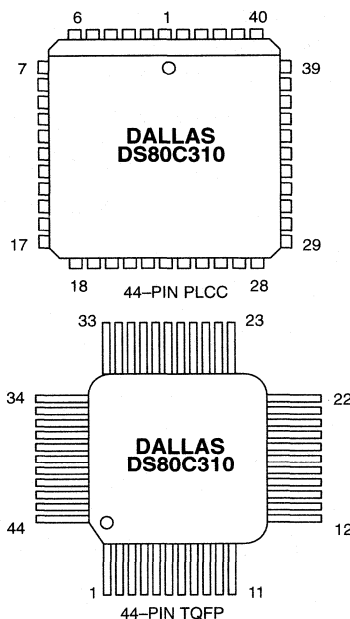
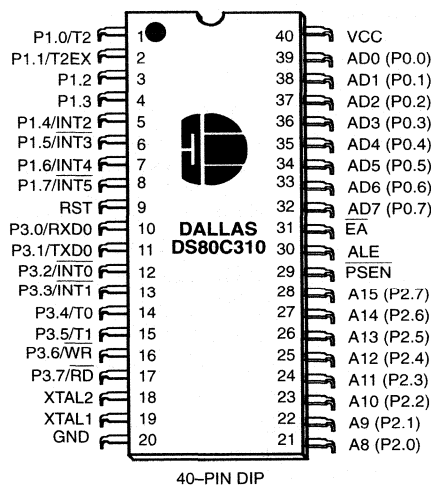
FEATURES

- 80C32 Compatible
 - 8051 pin and instruction set compatible
 - Full duplex serial port
 - Three 16-bit timer/counters
 - 256 bytes scratchpad RAM
 - Multiplexed address/data bus
 - Addresses 64KB ROM and 64KB RAM
- High-Speed Architecture
 - 4 clocks/machine cycle (8051 = 12)
 - Runs DC to 33 MHz clock rates
 - Single-cycle instruction in 121 ns
 - Dual data pointer
 - Optional variable length MOVX to access fast/slow RAM/peripherals
- 10 total interrupt sources with 6 external
- Internal power on reset circuit
- Upwardly compatible with the DS80C320
- Available in 40-pin PDIP, 44-pin PLCC, and 44-pin TQFP

DESCRIPTION

The DS80C310 is a fast 80C31/80C32 compatible microcontroller. It features a redesigned processor core without wasted clock and memory cycles. As a result, it executes every 8051 instruction between 1.5 and 3 times faster than the original architecture for the same crystal speed. Typical applications will see a speed improvement of 2.5 times using the same code and the same crystal. The DS80C310 offers a maximum crystal speed of 33 MHz, resulting in apparent execution speeds of 82.5 MHz (approximately 2.5X).

PACKAGE OUTLINE



DALLAS SEMICONDUCTOR

DS80C320/DS80C323 High-Speed/Low-Power Micro

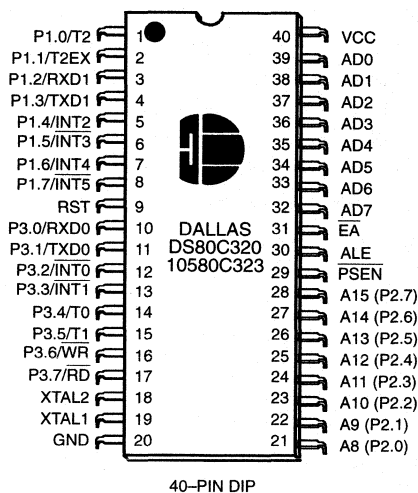
FEATURES

- 80C32–Compatible
 - 8051 Pin and instruction set compatible
 - Four 8-bit I/O ports
 - Three 16-bit timer/counters
 - 256 bytes scratchpad RAM
 - Addresses 64KB ROM and 64KB RAM
- High-speed architecture
 - 4 clocks/machine cycle (8032=12)
 - DC to 33 MHz (DS80C320)
 - DC to 18 MHz (DS80C323)
 - Single-cycle instruction in 121 ns
 - Uses less power for equivalent work
 - Dual data pointer
 - Optional variable length MOVX to access fast/slow RAM/peripherals
- High integration controller includes:
 - Power-fail reset
 - Programmable Watchdog timer
 - Early-warning power-fail interrupt
- Two full-duplex hardware serial ports
- 13 total interrupt sources with six external
- Available in 40-pin DIP, 44-pin PLCC and TQFP

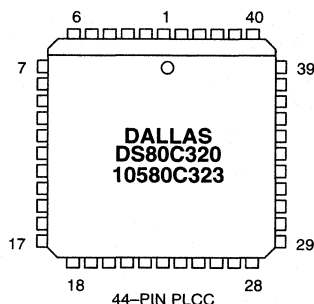
DESCRIPTION

The DS80C320/DS80C323 is a fast 80C31/80C32-compatible microcontroller. Wasted clock and memory cycles have been removed using a redesigned processor core. As a result, every 8051 instruction is executed between 1.5 and 3 times faster than the original for the same crystal speed. Typical applications will see a speed improvement of 2.5 times using the same code and same crystal. The DS80C320/DS80C323 offers a maximum crystal rate of 33 MHz, resulting in apparent execution speeds of 82.5 MHz (approximately 2.5X).

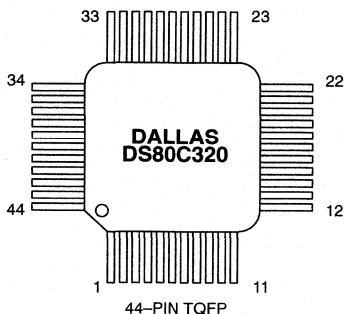
PIN ASSIGNMENT



40-PIN DIP



44-PIN PLCC



44-PIN TQFP

DALLAS

SEMICONDUCTOR

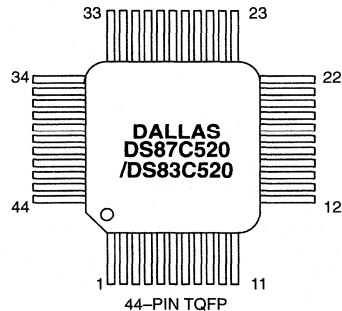
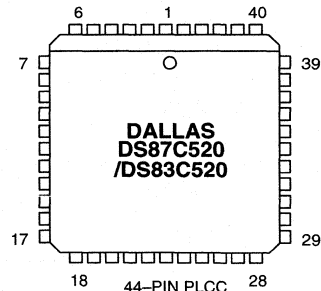
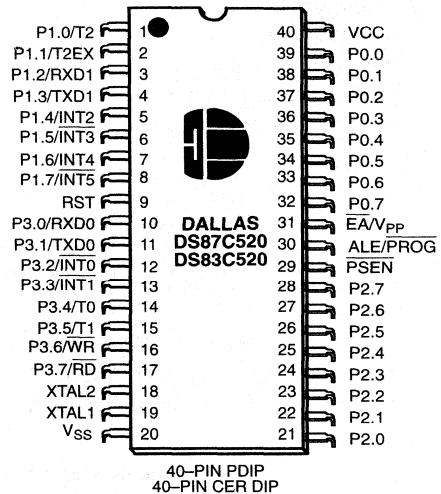
DS87C520/DS83C520

EPROM/ROM High-Speed Micro

FEATURES

- 80C52 compatible
 - 8051 pin and instruction set compatible
 - Four 8-bit I/O ports
 - Three 16-bit timer/counters
 - 256 bytes scratchpad RAM
- Large On-chip Memory
 - 16KB Program Memory
 - 1KB extra on-chip SRAM for MOVX
- ROMSIZE Feature
 - Selects internal ROM size from 0 to 16KB
 - Allows access to entire external memory map
 - Dynamically adjustable by software
 - Useful as boot block for external FLASH
- High-Speed Architecture
 - 4 clocks/machine cycle (8051 = 12)
 - Runs DC to 33 MHz clock rates
 - Single-cycle instruction in 121 ns
 - Dual data pointer
 - Optional variable length MOVX to access fast/slow RAM/peripherals
- Power Management Mode
 - Programmable clock source to save power
 - CPU runs from (crystal/64) or (crystal/1024)
 - Provides automatic hardware and software exit
- EMI Reduction Mode disables ALE
- Two full-duplex hardware serial ports
- High integration controller includes:
 - Power-fail reset
 - Early-warning power-fail interrupt
 - Programmable Watchdog timer
- 13 total interrupt sources with 6 external
- Available in 40-pin PDIP, 44-pin PLCC, 44-pin TQFP, and 40-pin windowed CERDIP
- Factory Mask DS83C520 or EPROM (OTP) DS87C520

PACKAGE OUTLINE



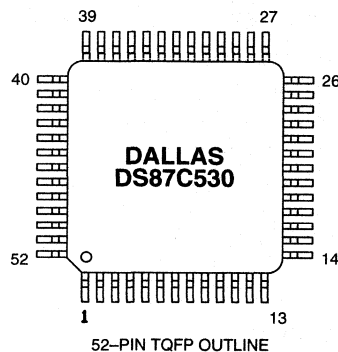
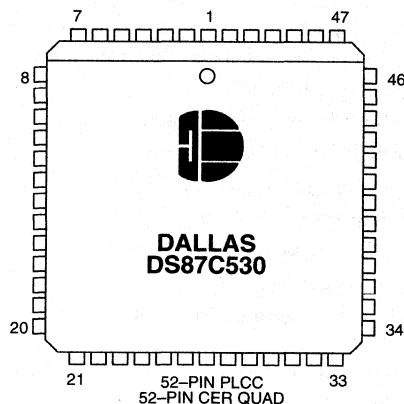
DALLAS SEMICONDUCTOR

DS87C530 EPROM Micro with Real Time Clock

FEATURES

- 80C52 Compatible
 - 8051 Instruction set
 - Four 8-bit I/O ports
 - Three 16-bit timer/counters
 - 256 bytes scratchpad RAM
- Large On-chip Memory
 - 16KB EPROM (OTP)
 - 1KB extra on-chip SRAM for MOVX
- **ROMSIZE™ Feature**
 - Selects effective on-chip ROM size from 0 to 16KB
 - Allows access to entire external memory map
 - Dynamically adjustable by software
 - Useful as boot block for external Flash
- Nonvolatile Functions
 - **On-chip Real Time Clock w/ Alarm Interrupt**
 - **Battery backup support of 1KB SRAM**
- High-Speed Architecture
 - 4 clocks/machine cycle (8051 = 12)
 - Runs DC to 33 MHz clock rates
 - Single-cycle instruction in 121 ns
 - Dual data pointer
 - Optional variable length MOVX to access fast/slow RAM /peripherals
- Power Management Mode
 - Programmable clock source saves power
 - Runs from (crystal/64) or (crystal/1024)
 - Provides automatic hardware and software exit
- EMI Reduction Mode disables ALE
- High integration controller includes:
 - Power-fail reset
 - Early-warning power-fail interrupt
 - Programmable Watchdog timer
- Two full-duplex hardware serial ports
- 14 total interrupt sources with 6 external

PACKAGE OUTLINE



DESCRIPTION

The DS87C530 is an 8051 compatible microcontroller based on the Dallas High Speed core. It uses four clocks per instruction cycle instead of 12 used by the standard 8051. It also provides a unique mix of peripherals not widely available on other processors. They include an on-chip Real Time Clock (RTC) and battery back up support for an on-chip 1K x 8 SRAM. The new Power Management Mode allows software to select reduced power operation while still processing.



NV RAM CONTROLLERS

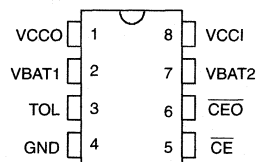
DALLAS SEMICONDUCTOR

DS1210 Nonvolatile Controller Chip

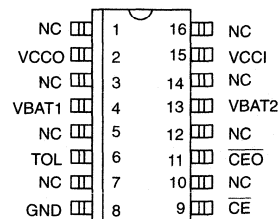
FEATURES

- Converts CMOS RAMs into nonvolatile memories
- Unconditionally write protects when V_{CC} is out of tolerance
- Automatically switches to battery when power fail occurs
- Space saving 8-pin DIP
- Consumes less than 100 nA of battery current
- Tests battery condition on power up
- Provides for redundant batteries
- Optional 5% or 10% power fail detection
- Low forward voltage drop on the V_{CC} switch
- Optional 16-pin SOIC surface mount package
- Optional industrial temperature range of -40°C to $+85^{\circ}\text{C}$.

PIN ASSIGNMENT



DS1210 8-Pin DIP (300 MIL)
See Mech. Drawings Section



DS1210S 16-Pin SOIC (300 MIL)
See Mech. Drawings Section

PIN DESCRIPTION

V_{CCO}	– RAM Supply
V_{BAT1}	– + Battery 1
TOL	– Power Supply Tolerance
GND	– Ground
$\overline{\text{CE}}$	– Chip Enable Input
$\overline{\text{CE}}$	– Chip Enable Output
V_{BAT2}	– + Battery 2
V_{CCI}	– + Supply
NC	– No Connect

DESCRIPTION

The DS1210 Nonvolatile Controller Chip is a CMOS circuit which solves the application problem of converting CMOS RAM into nonvolatile memory. Incoming power is monitored for an out-of-tolerance condition. When such a condition is detected, chip enable is inhibited to accomplish write protection and the battery is switched on to supply the RAM with uninterrupted power. Special

circuitry uses a low-leakage CMOS process which affords precise voltage detection at extremely low battery consumption. The 8-pin DIP package keeps PC board real estate requirements to a minimum. By combining the DS1210 Nonvolatile Controller Chip with a CMOS memory and batteries, nonvolatile RAM operation can be achieved.

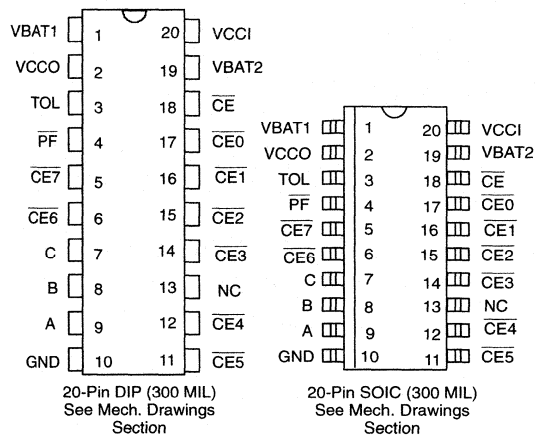
FEATURES

- Converts full CMOS RAMs into nonvolatile memories
- Unconditionally write protects when V_{CC} is out of tolerance
- Automatically switches to battery when power fail occurs
- 3 to 8 decoder provides control for up to eight CMOS RAMs
- Consumes less than 100 nA of battery current
- Tests battery condition on power-up
- Provides for redundant batteries
- Power fail signal can be used to interrupt processor on power failure
- Optional 5% or 10% power fail detection
- Optional 20-pin SOIC surface mount package
- Optional industrial temperature range of -40°C to $+85^{\circ}\text{C}$

DESCRIPTION

The DS1211 Nonvolatile Controller x 8 Chip is a CMOS circuit which solves the application problem of converting CMOS RAMs into nonvolatile memories. Incoming power is monitored for an out-of-tolerance condition. When such a condition is detected, the chip enables are inhibited to accomplish write protection and the battery is switched on to supply RAMs with uninterrupted power. Special circuitry uses a low-leakage CMOS process

PIN ASSIGNMENT



PIN DESCRIPTION

A, B, C	– Address Inputs
$\overline{\text{CE}}$	– Chip Enable Input
$\overline{\text{CE0}} - \overline{\text{CE7}}$	– Chip Enable Outputs
GND	– Ground
V_{BAT1}	– + Battery 1
V_{BAT2}	– + Battery 2
TOL	– Power Supply Tolerance
V_{CCI}	– +5V Supply
V_{CC0}	– RAM Supply
PF	– Power Fail
NC	– No Connection

which affords precise voltage detection at extremely low battery consumption.

By combining the DS1211 nonvolatile controller/decoder chip and lithium batteries, nonvolatile RAM operation can be achieved for up to eight CMOS memories.

See the data sheet for the DS1212 Nonvolatile Controller x 16 Chip for electrical specifications and operation.

DALLAS

SEMICONDUCTOR

DS1212

Nonvolatile Controller x 16 Chip

FEATURES

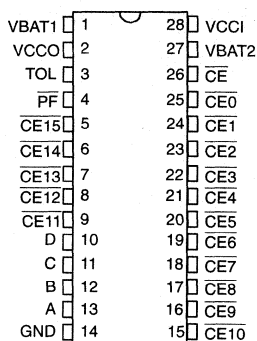
- Converts full CMOS RAM into nonvolatile memory
- Unconditionally write protects when V_{CC} is out of tolerance
- Automatically switches to battery when power fail occurs
- 4 to 16 decoder provides control for up to 16 CMOS RAMs
- Consumes less than 100 nA of battery current
- Tests battery condition on power-up
- Provides for redundant batteries
- Power fail signal can be used to interrupt processor on power failure
- Optional 5% or 10% power fail detection
- Optional 28-pin PLCC surface mount package
- Optional industrial temperature range of -40°C to $+85^{\circ}\text{C}$

DESCRIPTION

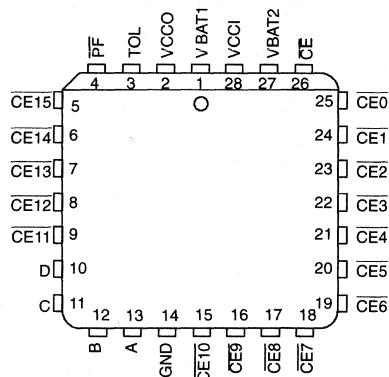
The DS1212 Nonvolatile Controller x16 Chip is a CMOS circuit that solves the application problem of converting CMOS RAMs into nonvolatile memories. Incoming power is monitored for an out-of-tolerance condition. When such a condition is detected, the chip enables are inhibited to accomplish write protection and the battery is switched on to supply the RAMs with uninterrupted power. Special circuitry uses a low-leakage CMOS process that affords precise voltage detection at extremely low battery consumption.

By combining the DS1212 Nonvolatile Controller chip and lithium batteries, nonvolatile RAM operation can be achieved for up to 16 CMOS memories.

PIN ASSIGNMENT



28-Pin DIP (600 MIL)
See Mech. Drawings Section



28-Pin PLCC
See Mech. Drawings Section

PIN DESCRIPTION

- | | |
|--|--------------------------|
| A, B, C, D | – Address Inputs |
| $\overline{\text{CE}}$ | – Chip Enable |
| $\overline{\text{CE0}}\text{--}\overline{\text{CE15}}$ | – Chip Enable Outputs |
| GND | – Ground |
| V_{BAT1} | – + Battery 1 |
| V_{BAT2} | – + Battery 2 |
| TOL | – Power Supply Tolerance |
| V_{CCI} | – +5V Supply |
| V_{CCO} | – RAM Supply |
| PF | – Power Fail |

DALLAS

SEMICONDUCTOR

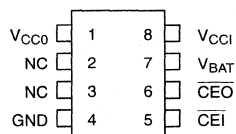
DS1218

Nonvolatile Controller

FEATURES

- Converts CMOS RAM into nonvolatile memories
- Unconditionally write protects when V_{CC} is out of tolerance
- Automatically switches to battery when power fail occurs
- Space saving 8-pin mini-DIP/8-pin 150 mil SOIC
- Consumes less than 100 na of battery current

PIN ASSIGNMENT



PIN DESCRIPTION

V_{CCI}	– Input +5 Volt Supply
V_{CCO}	– RAM Power (V_{CC}) Supply
\overline{CEI}	– Chip Enable Input
NC	– No Connection
\overline{CEO}	– Chip Enable Output
V_{BAT}	– + Battery
GND	– Ground

DESCRIPTION

The DS1218 is a CMOS circuit which solves the application problems of converting CMOS RAM into nonvolatile memory. Incoming power is monitored for an out of tolerance condition. When such a condition is detected, the chip enable output is inhibited to accomplish write protection and the battery is switched on to supply RAM with uninterrupted power. Special circuitry uses a low-leakage CMOS process which affords precise voltage detection at extremely low battery consumption. The 8-pin mini-DIP package keeps PC board real estate requirements to a minimum. By combining the DS1218 nonvolatile controller chip with a full CMOS memory and lithium batteries, ten years of nonvolatile RAM operation can be achieved.

OPERATION

The DS1218 Nonvolatile Controller performs the circuit functions required to battery back up a RAM. First, a

switch is provided to direct power from the battery or V_{CCI} supply depending on which is greater. This switch has a voltage drop of less than 0.2V. The second function which the nonvolatile controller provides is power fail detection. The DS1218 constantly monitors the V_{CC} supply. When V_{CCI} falls to 1.26 times the battery voltage a precision comparator outputs a power fail detect signal to the chip enable logic. The third function of write protection is accomplished by holding the chip enable output signal to within 0.2V of the V_{CCI} or battery supply, when a power fail condition is detected.

During nominal supply conditions, the chip enable output will follow chip enable input with a maximum propagation delay of 10 ns.

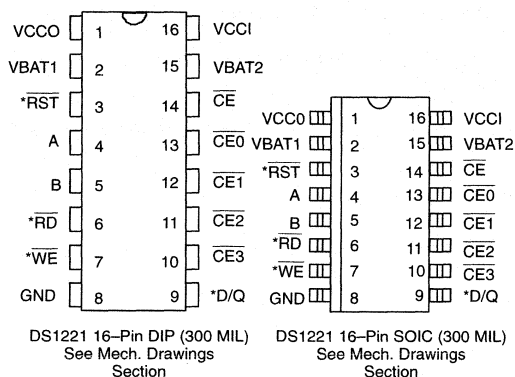
FEATURES

- Converts CMOS RAMs into nonvolatile memories
- Data is automatically protected during power loss
- 2-to-4 decoder provides for up to 4 CMOS RAMs
- Provides for redundant batteries
- Test battery condition on power-up
- Full $\pm 10\%$ operating range
- Unauthorized access can be prevented with optional security feature
- 16-pin 0.3-inch DIP saves PC board space
- Optional 16-pin SOIC surface mount package
- Optional industrial temperature range of -40°C to $+85^{\circ}\text{C}$ available

DESCRIPTION

The DS1221 Nonvolatile Controller x 4 Chip is a CMOS circuit which solves the application problem of converting CMOS RAMs into nonvolatile memories. Incoming power is monitored for an out-of-tolerance condition. When such a condition is detected, the chip enable outputs are inhibited to accomplish write protection and the battery is switched on to supply RAMs with uninterrupted power. An optional security code prevents unau-

PIN ASSIGNMENT



PIN DESCRIPTION

A, B	– Address Inputs
$\overline{\text{CE}}$	– Chip Enable Input
$\overline{\text{CE0}} - \overline{\text{CE3}}$	– Chip Enable Outputs
V_{BAT1}	– + Battery 1
V_{BAT2}	– + Battery 2
*RST	– Reset
V_{CCI}	– +5V Supply
V_{CCO}	– RAM Supply
*RD	– Read Input
*WE	– Write Input
*D/Q	– Data Input/Output

*Used with optional security circuit only and must be connected to ground in all other cases.

thorized users from obtaining access to the memory space. The nonvolatile controller/decoder circuitry uses a low-leakage CMOS process which affords precise voltage detection at extremely low battery consumption. By combining the DS1221 with up to four CMOS memories and lithium batteries, nonvolatile operation can be achieved.

DALLAS

SEMICONDUCTOR

DS1234 Conditional Nonvolatile Controller Chip

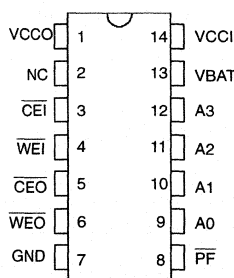
FEATURES

- Converts CMOS static RAMs into nonvolatile memories
- Software-controlled write inhibit
- Software-controlled battery disconnect extends battery life
- Unconditionally write protects when V_{CC} is out of tolerance
- Consumes less than 100 nA of battery current
- Power fail signal can be used to interrupt processor on power failure
- Low forward voltage drop on the V_{CC} switch
- Optional 16-pin SOIC surface mount package

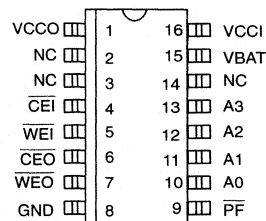
DESCRIPTION

The DS1234 is a CMOS circuit that converts CMOS RAM into nonvolatile memory and adds two software selectable switches. Incoming power is monitored for an out-of-tolerance condition. When such a condition is detected, chip enable and write enable to the RAM are inhibited to accomplish write protection, and the battery is switched on to supply the memory with uninterrupted power. The two software selectable switches provided by the DS1234 are capable of inhibiting both the write

PIN ASSIGNMENT



DS1234 14-Pin DIP (300 MIL)
See Mech. Drawings
Section



DS1234S 16-Pin SOIC (300 MIL)
See Mech. Drawings
Section

PIN DESCRIPTION

V_{CCO}	– RAM Supply
NC	– No Connection
\overline{CEI}	– Chip Enable Input
\overline{WEI}	– Write Enable Input
\overline{CEO}	– Chip Enable Output to RAM
\overline{WEO}	– Write Enable Output to RAM
GND	– Ground
\overline{PF}	– Power Fail Output
A0-A3	– Address Inputs
V_{BAT}	– Battery Input
V_{CCI}	– +5V Supply

enable to the RAM and the battery backup circuitry by a pattern recognition sequence across four address lines. Inhibiting the write enable to the nonvolatile RAM provides data integrity by isolating the memory contents from external change. The second switch provides added flexibility and increases battery life to the system by enabling/disabling the battery for shipment or storage, or when battery backup is not needed.

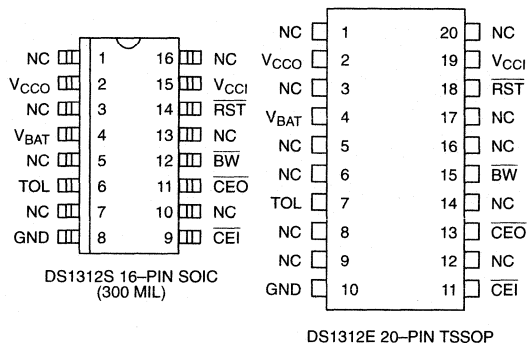
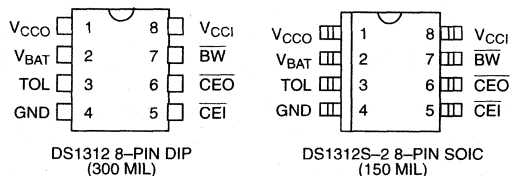
DALLAS SEMICONDUCTOR

DS1312 Nonvolatile Controller with Lithium Battery Monitor

FEATURES

- Converts CMOS SRAM into nonvolatile memory
- Unconditionally write-protects SRAM when V_{CC} is out of tolerance
- Automatically switches to battery backup supply when V_{CC} power failure occurs
- Monitors voltage of a lithium cell and provides advanced warning of impending battery failure
- Signals low-battery condition on active low Battery Warning output signal
- Optional -5% or -10% power fail detection
- Space-saving 8-pin DIP and SOIC packages
- Optional 16-pin SOIC and 20-pin TSSOP versions reset processor when power failure occurs and hold processor in reset during system power-up
- Industrial temperature range of -40°C to $+85^{\circ}\text{C}$

PIN ASSIGNMENT



DESCRIPTION

The DS1312 Nonvolatile Controller with Battery Monitor is a CMOS circuit which solves the application problem of converting CMOS RAM into nonvolatile memory. Incoming power is monitored for an out-of-tolerance condition. When such a condition is detected, chip enable is inhibited to accomplish write protection and the battery is switched on to supply the RAM with uninterrupted power. Special circuitry uses a low-leakage CMOS process which affords precise voltage detection at extremely low battery consumption.

PIN DESCRIPTION

V_{CCI}	- +5V Power Supply Input
V_{CCO}	- SRAM Power Supply Output
V_{BAT}	- Backup Battery Input
\overline{CEI}	- Chip Enable Input
\overline{CEO}	- Chip Enable Output
TOL	- V_{CC} Tolerance Select
\overline{BW}	- Battery Warning Output (Open Drain)
\overline{RST}	- Reset Output (Open Drain)
GND	- Ground
NC	- No Connection

DALLAS SEMICONDUCTOR

DS1314 3V Nonvolatile Controller with Lithium Battery Monitor

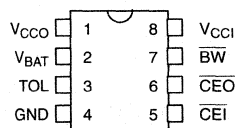
FEATURE

- Converts CMOS SRAM into nonvolatile memory
- Unconditionally write-protects SRAM when V_{CC} is out of tolerance
- Automatically switches to battery-backup supply when V_{CC} power failure occurs
- Monitors voltage of a lithium cell and provides advanced warning of impending battery failure
- Signals low-battery condition on active low Battery Warning output signal
- Automatic V_{CC} power-fail detection for 3.0V or 3.3V power supplies
- Space-saving 8-pin DIP and SOIC packages
- Optional 16-pin SOIC and 20-pin TSSOP versions reset processor when power failure occurs and hold processor in reset during system power-up
- Industrial temperature range of -40°C to $+85^{\circ}\text{C}$.

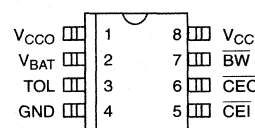
DESCRIPTION

The DS1314 Nonvolatile Controller with Battery Monitor is a CMOS circuit which solves the application problem of converting CMOS RAM into nonvolatile memory. Incoming power is monitored for an out-of-tolerance condition. When such a condition is detected, chip enable is inhibited to accomplish write protection and the battery is switched on to supply the RAM with uninterrupted power. Special circuitry uses a low-leakage CMOS process which affords precise voltage detection at extremely low battery consumption.

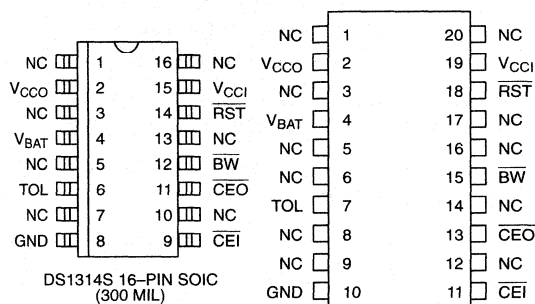
PIN ASSIGNMENT



DS1314 8-PIN DIP
(300 MIL)



DS1314S-2 8-PIN SOIC
(150 MIL)



DS1314E 20-PIN TSSOP

PIN DESCRIPTION

- V_{CCI} – Power Supply Input
- V_{CCO} – SRAM Power Supply Output
- V_{BAT} – Backup Battery Input
- \overline{CEI} – Chip Enable Input
- \overline{CEO} – Chip Enable Output
- TOL – V_{CC} Tolerance Select
- \overline{BW} – Battery Warning Output (Open Drain)
- \overline{RST} – Reset Output (Open Drain)
- GND – Ground
- NC – No Connection

DALLAS SEMICONDUCTOR

DS1321 Flexible Nonvolatile Controller with Lithium Battery Monitor

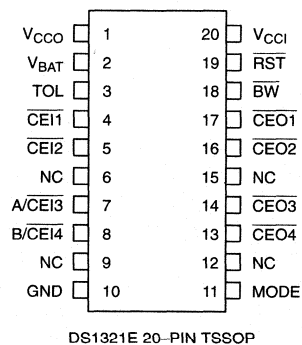
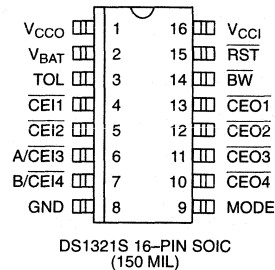
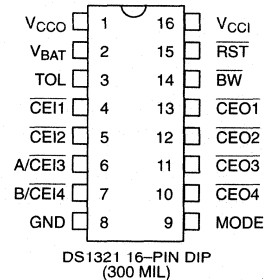
FEATURES

- Converts CMOS SRAM into nonvolatile memory
- Unconditionally write-protects SRAM when V_{CC} is out of tolerance
- Automatically switches to battery backup supply when V_{CC} power failure occurs
- Flexible memory organization
 - Mode 0: 4 banks with 1 SRAM each
 - Mode 1: 2 banks with 2 SRAMs each
 - Mode 2: 1 bank with 4 SRAMs each
- Monitors voltage of a lithium cell and provides advanced warning of impending battery failure
- Signals low-battery condition on active low Battery Warning output signal
- Resets processor when power failure occurs and holds processor in reset during system power-up
- Optional -5% or -10% power fail detection
- 16-pin DIP, 16-pin SOIC and 20-pin TSSOP packages
- Industrial temperature range of -40°C to $+85^{\circ}\text{C}$.

PIN DESCRIPTION

V_{CC1}	– +5V Power Supply Input
V_{CC0}	– SRAM Power Supply Output
V_{BAT}	– Backup Battery Input
A, B	– Address Inputs
$\overline{CE1} - \overline{CE4}$	– Chip Enable Inputs
$\overline{CEO1} - \overline{CEO4}$	– Chip Enable Outputs
TOL	– V_{CC} Tolerance Select
\overline{BW}	– Battery Warning Output (Open Drain)
\overline{RST}	– Reset Output (Open Drain)
MODE	– Mode Input
GND	– Ground
NC	– No Connection

PIN ASSIGNMENT



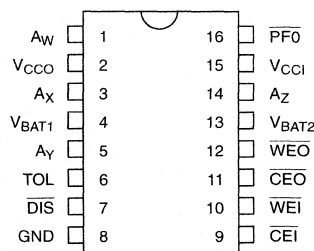
FEATURES

- Converts CMOS RAMs into nonvolatile memories
- SOIC version is pin compatible with the Dallas Semiconductor DS1210 NV Controller
- Unconditionally write protects all of memory when V_{CC} is out of tolerance
- Write protects selected blocks of memory regardless of V_{CC} status when programmed
- Automatically switches to battery backup supply when power fail occurs
- Provides for multiple batteries
- Consumes less than 100 nA of battery current
- Test battery on power up by inhibiting the second memory cycle
- Optional 5% or 10% Power Fail Detection
- 16-pin DIP or 16-pin SOIC Surface Mount Package
- Low forward voltage drop on the V_{CC} switch with currents of up to 150 mA
- Optional industrial temperature range of -40°C to +85°C

DESCRIPTION

The DS1610 is a low power CMOS circuit which solves the application problems of converting CMOS RAMs into nonvolatile memories. In addition the device has the ability to unconditionally write protect blocks of memory so that inadvertent write cycles do not corrupt program and special data space. The power supply incoming voltage at the V_{CCI} input pin is constantly monitored for an out of tolerance condition. When such a condition is detected, both the chip enable and write enable outputs are inhibited to protect stored data. The battery inputs are used to supply V_{CCO} with power when V_{CCI} is less than the battery input voltages. Special circuitry uses a low leakage CMOS process which affords

PIN ASSIGNMENT



16-Pin DIP and 16-Pin SOIC

PIN DESCRIPTION

V_{CCI}	– Input +5 Volt Supply
V_{BAT1}	– + Battery 1 Input
V_{BAT2}	– + Battery 2 Input
V_{CCO}	– RAM Power (V_{CC}) Supply
GND	– Ground
\overline{CEI}	– Chip Enable Input
\overline{CEO}	– Chip Enable Output
\overline{WEI}	– Write Enable Input
\overline{WEO}	– Write Enable Output
TOL	– Power Supply Tolerance Select
$A_W - A_Z$	– Address Inputs
\overline{DIS}	– Memory Partition Disable
$\overline{PF0}$	– Power Fail Output

precise voltage detection at extremely low current consumption. By combining the DS1610 Partitioned NV Controller chip with a CMOS memory and batteries, nonvolatile RAM operation can be achieved.

The DS1610 Partitioned NV Controller functions like the Dallas Semiconductor DS1210 NV controller when the (\overline{DIS}) disable pin is grounded. An internal pulldown resistor to ground on the \overline{DIS} pin of the DS1610S allows it to retrofit into DS1210S applications. When the \overline{DIS} pin is grounded the address inputs $A_W - A_Z$ and the write enable input \overline{WEI} are ignored. Also the power fail output $\overline{PF0}$ and the write enable output \overline{WEO} are tristated.

DALLAS

SEMICONDUCTOR

DS1710

Partitioned NV Controller

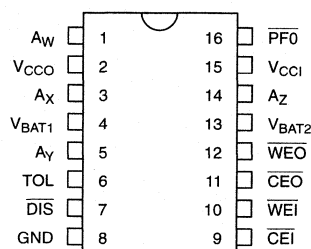
FEATURES

- Converts CMOS RAMs into nonvolatile memories
- Automatically selects +3.0V or +5.0V operation
- SOIC version is pin compatible with the Dallas Semiconductor DS1210S and DS1610S NV Controllers
- Unconditionally write protects all of memory when V_{CC} is out of tolerance
- Write protects selected blocks of memory regardless of V_{CC} status when programmed
- Automatically switches to battery backup supply when power fail occurs
- Provides for multiple batteries
- Consumes less than 100 nA of battery current
- Tests battery on power up by inhibiting the second memory cycle
- Optional 5% or 10% Power Fail Detection
- 16-pin DIP or 16-pin SOIC surface mount package or 20-pin TSSOP package
- Low forward voltage drop on the V_{CC} switch with currents of up to 150 mA
- Optional industrial temperature range of -40°C to $+85^{\circ}\text{C}$

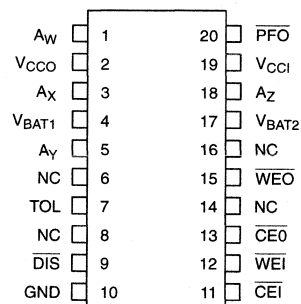
DESCRIPTION

The DS1710 is a low power CMOS circuit which solves the application problems of converting CMOS RAMs into nonvolatile memories. In addition the device has the ability to unconditionally write protect blocks of memory so that inadvertent write cycles do not corrupt program and special data space. The incoming power supply voltage at the V_{CCI} input pin is constantly monitored for an out of tolerance condition. When such a condition is detected, both the chip enable and write enable outputs are inhibited to protect stored data.

PIN ASSIGNMENT



16-Pin DIP and 16-Pin SOIC



20-Pin TSSOP

PIN DESCRIPTION

V_{CCI}	- Input 2.7 to 5.5 Volt Supply
V_{BAT1}	- + Battery 1 Input
V_{BAT2}	- + Battery 2 Input
V_{CCO}	- RAM Power (V_{CC}) Supply
GND	- Ground
\overline{CEI}	- Chip Enable Input
\overline{CEO}	- Chip Enable Output
\overline{WEI}	- Write Enable Input
\overline{WEO}	- Write Enable Output
TOL	- Power Supply Tolerance Select
$A_W - A_Z$	- Address Inputs
\overline{DIS}	- Memory Partition Disable
$\overline{PF0}$	- Power Fail Output
NC	- No Connect



SILICON TIMED CIRCUITS

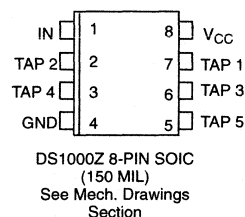
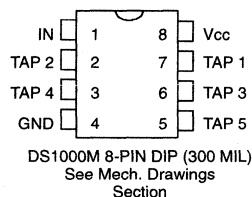
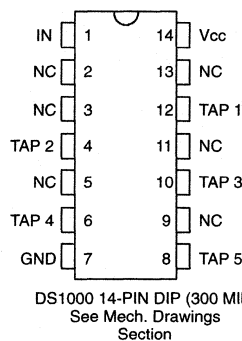
DALLAS SEMICONDUCTOR

DS1000 5-Tap Silicon Delay Line

FEATURES

- All-silicon time delay
- 5 taps equally spaced
- Delays are stable and precise
- Both leading and trailing edge accuracy
- Delay tolerance $\pm 5\%$ or ± 2 ns, whichever is greater
- Low-power CMOS
- TTL/CMOS-compatible
- Vapor phase, IR and wave solderable
- Custom delays available
- Fast turn prototypes
- Extended temperature range available (DS1000-IND)

PIN ASSIGNMENT



PIN DESCRIPTION

TAP 1-TAP 5	-	TAP Output Number
V _{CC}	-	+5 Volts
GND	-	Ground
NC	-	No Connection
IN	-	Input

DESCRIPTION

The DS1000 series delay lines have five equally spaced taps providing delays from 4 ns to 500 ns. These devices are offered in a standard 14-pin DIP that is pin-compatible with hybrid delay lines. Alternatively, 8-pin DIPs and surface mount packages are available to save PC board area. Low cost and superior reliability over hybrid technology is achieved by the combination of a 100% silicon delay line and industry standard DIP and SOIC packaging. In order to maintain complete pin compatibility, DIP packages are available with hybrid lead configurations. The DS1000 series delay lines pro-

vide a nominal accuracy of $\pm 5\%$ or ± 2 ns, whichever is greater. The DS1000 5-Tap Silicon Delay Line reproduces the input logic state at the output after a fixed delay as specified by the extension of the part number after the dash. The DS1000 is designed to reproduce both leading and trailing edges with equal precision. Each tap is capable of driving up to ten 74LS loads.

Dallas Semiconductor can customize standard products to meet special needs. For special requests and rapid delivery, call (972) 371-4348.

DALLAS SEMICONDUCTOR

DS1000-IND Industrial Temperature Range 5-Tap Silicon Delay Line

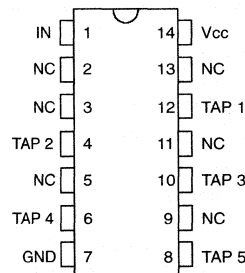
FEATURES

- All-silicon time delay
- 5 taps equally spaced
- Delays are stable and precise
- Both leading and trailing edge accuracy
- Delay tolerance $\pm 5\%$ or ± 2 ns, whichever is greater (@25°C)
- Delays characterized over -40°C to $+85^{\circ}\text{C}$ temperature range (± 2 ns or $\pm 8\%$)
- Low-power CMOS
- TTL/CMOS-compatible
- Vapor phase, IR and wave solderable
- Custom delays available
- Fast turn prototypes

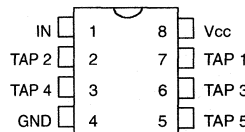
DESCRIPTION

The DS1000-IND series delay lines have five equally spaced taps providing delays from 4 ns to 500 ns. These devices are offered in standard 8- and 14-pin DIPs that are pin-compatible with hybrid delay lines. Alternatively, 8-pin SOICs are available to save PC board area. Low cost and superior reliability over hybrid technology is achieved by the combination of a 100% silicon delay line and industry standard DIP and SOIC packaging. In order to maintain complete pin compatibility, DIP packages are available with hybrid lead configurations. The DS1000-IND series delay lines provide a

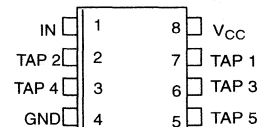
PIN ASSIGNMENT



DS1000-IND 14-PIN DIP (300 MIL)
See Mech Drawings
Section



DS1000M-IND 8-PIN DIP
(300 MIL)
See Mech. Drawings
Section



DS1000Z-IND 8-PIN SOIC
(150 MIL)
See Mech. Drawings
Section

PIN DESCRIPTION

TAP 1-TAP 5	- TAP Output Number
V _{CC}	- +5 Volts
GND	- Ground
NC	- No Connection
IN	- Input

nominal accuracy of $\pm 5\%$ or ± 2 ns, whichever is greater. The DS1000-IND 5-Tap Silicon Delay Line reproduces the input logic state at the output after a fixed delay as specified by the extension of the part number after the dash. The DS1000-IND is designed to reproduce both leading and trailing edges with equal precision. Each tap is capable of driving up to ten 74LS loads.

Dallas Semiconductor can customize standard products to meet special needs. For special requests and rapid delivery, call (214) 371-4348.

DALLAS SEMICONDUCTOR

DS1003 4-Tap Silicon Delay Line for RISC Applications

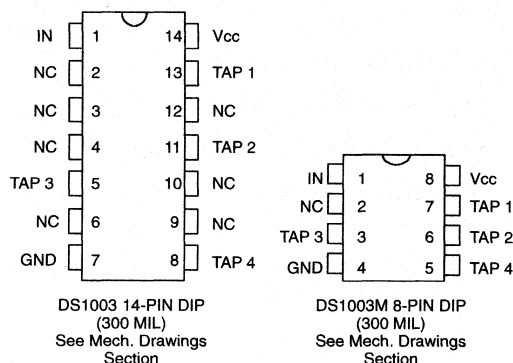
FEATURES

- All-silicon time delay
- Four delayed clock phases from input
- Input frequency independent
- Precise tap-to-tap delays
- Leading and trailing edge precision
- Preserves input symmetry
- Output rise time minimizes ringing
- Economical
- 8- and 14-pin packages available in DIP and surface mount
- TTL/CMOS-compatible
- Vapor phase, IR and wave solderable
- Custom delays and pinouts available
- Fast turn prototypes

DESCRIPTION

The DS1003 Delay Line has been specifically designed to supply the four independent clock timing phases required by some RISC microprocessors and their related coprocessors. For optimum compatibility, the DS1003 accepts TTL input levels and supplies CMOS and TTL compatible output levels. The DS1003 is offered in 8- and 14-pin DIP packages. Low cost and superior reliability is achieved by the combination of a 100% silicon delay line and industry standard packaging. The DS1003 series of delay lines provides precise tap-to-tap delays while preserving input waveform symmetry.

PIN ASSIGNMENT



PIN DESCRIPTION

TAP 1 – TAP 4	– TAP Output Number
V _{CC}	– +5 Volts
GND	– Ground
NC	– No Connection
IN	– Input

Since the DS1003 is not based on Phase Locked Loop (PLL) technology, timing is input frequency-independent. Each tap is capable of driving a minimum of four LSTTL or CMOS loads. Tap-to-tap timing accuracy is not affected by the addition of equal capacitive loads (e.g. coprocessors).

Dallas Semiconductor can customize standard products to meet special needs. For special requests and rapid delivery, call (214) 371-4348.

FEATURES

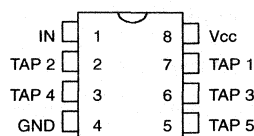
- All-silicon timing circuit
- Five equally delayed clock phases per input
- Precise tap-to-tap delay tolerances of ± 0.5 , ± 0.75 , or ± 1 ns
- Input-to-tap 1 delay of 5 ns
- Delay tolerances of ± 1.5 ns over temperature and voltage
- Leading and trailing edge precision preserves the input symmetry
- CMOS design with TTL compatibility
- Standard 8-pin DIP and 150 mil 8-pin SOIC
- Vapor phase, IR and wave solderable
- Available in Tape and Reel

DESCRIPTION

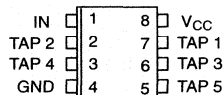
The DS1004 is a 5-tap all silicon delay line which can provide 2, 3, 4, or 5 ns tap-to-tap delays within a standard part family. The device is Dallas Semiconductor's fastest 5-tap delay line. It is available in a standard 8-pin DIP and 150 mil 8-pin mini-SOIC. The device features precise leading and trailing edge accuracies and has the inherent reliability of an all-silicon delay line solution.

The DS1004 is specified for tap-to-tap tolerances as shown in Table 1. Each device has a minimum input-

PIN ASSIGNMENT



DS1004M 8-PIN DIP
(300 MIL)
See Mech. Drawings
Section



DS1004Z 8-PIN SOIC
(150 MIL)
See Mech. Drawings
Section

PIN DESCRIPTION

TAP 1-5	-	TAP Output Number
V _{CC}	-	+5 Volt Supply
GND	-	Ground
IN	-	Input

to-tap 1 delay of 5 ns. Subsequent taps (taps 2 through 5) are precisely delayed by 2, 3, 4, or 5 ns. See Table 1 for details. Tolerance over temperature and voltage is ± 1.5 ns. Nominal tap-to-tap tolerances range from ± 0.5 ns to ± 1.0 ns. Each output is capable of driving up to 10 LS loads.

For customers needing non-standard delay values, the Late Package Program (LPP) is available. Customers may contact Dallas Semiconductor at (242) 371-4348 for further details.

DALLAS SEMICONDUCTOR

DS1005 5-Tap Silicon Delay Line

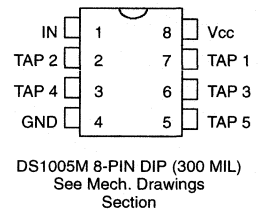
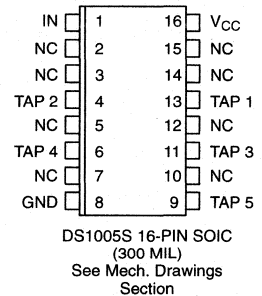
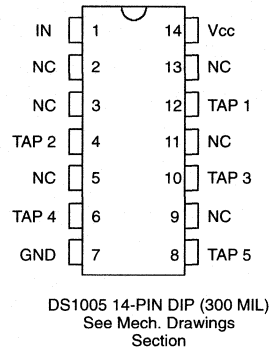
FEATURES

- All-silicon time delay
- 5 taps equally spaced
- Delay tolerance ± 2 ns or $\pm 3\%$, whichever is greater
- Stable and precise over temperature and voltage range
- Leading and trailing edge accuracy
- Economical
- Auto-insertable, low profile
- Standard 14-pin DIP, 8-pin DIP, or 16-pin SOIC
- Tape and reel available for surface-mount
- Low-power CMOS
- TTL/CMOS compatible
- Vapor phase, IR and wave solderability
- Custom delays available
- Quick turn prototypes
- Extended temperature range available

DESCRIPTION

The DS1005 5-Tap Silicon Delay Line provides five equally spaced taps with delays ranging from 12 ns to 250 ns, with an accuracy of ± 2 ns or $\pm 3\%$, whichever is greater. This device is offered in a standard 14-pin DIP making it compatible with existing delay line products. Space-saving 8-pin DIPs and 16-pin SOICs are also available. Both enhanced performance and superior reliability over hybrid technology is achieved by the combination of a 100% silicon delay line and industry standard DIP and SOIC packaging. In order to maintain complete

PIN ASSIGNMENT



PIN DESCRIPTION

TAP 1 – TAP 5	– TAP Output Number
V _{CC}	– +5 Volts
GND	– Ground
NC	– No Connection
IN	– Input

pin compatibility, DIP packages are available with hybrid lead configurations. The DS1005 reproduces the input logic level at each tap after the fixed delay specified by the dash number in NO TAG. The device is designed with both leading and trailing edge accuracy. Each tap is capable of driving up to ten 74LS loads. Dallas Semiconductor can customize standard products to meet special needs. For special requests and rapid delivery, call (214) 371-4348.

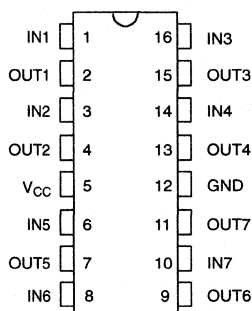
FEATURES

- All-silicon time delay
- 7 independent buffered delays
- Delay tolerance ± 2 ns
- Four delays can be custom set between 3 ns and 10 ns
- Three delays can be custom set between 9 ns and 40 ns
- Delays are stable and precise
- Economical
- Auto-insertable, low profile
- Surface mount 16-pin SOIC
- Low-power CMOS
- TTL/CMOS-compatible
- Vapor phase, IR and wave solderable
- Custom specifications available
- Quick turn prototypes

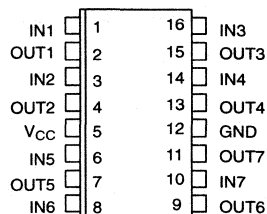
DESCRIPTION

The DS1007 7-in-1 Silicon Delay Line provides seven independent delay times which are set by Dallas Semiconductor to the customer's specification. The delay times can be set from 3 ns to 40 ns with an accuracy of ± 2 ns at room temperature. The device is offered in both a 16-pin DIP and a 16-pin SOIC. Since the DS1007 is an all-silicon solution, better economy and reliability are

PIN ASSIGNMENT



DS1007 16-PIN DIP (300 MIL)
See Mech. Drawings
Section



DS1007S 16-PIN SOIC
(300 MIL)
See Mech. Drawings
Section

PIN DESCRIPTION

IN1 - IN7	-	Inputs
Out1 - Out7	-	Outputs
GND	-	Ground
V _{CC}	-	+5 Volts

achieved when compared to older methods using hybrid technology. The DS1007 reproduces the input logic state at the output after the fixed delay. Dallas Semiconductor can customize standard products to meet special needs. For special requests and rapid delivery, call (214) 371-4348.

DALLAS SEMICONDUCTOR

DS1010 10-Tap Silicon Delay Line

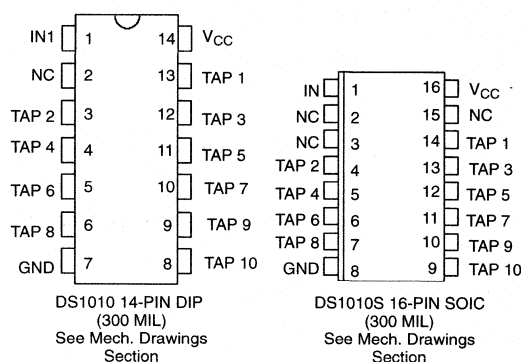
FEATURES

- All-silicon time delay
- 10 taps equally spaced
- Delays are stable and precise
- Leading and trailing edge accuracy
- Delay tolerance $\pm 5\%$ or ± 2 ns, whichever is greater
- Economical
- Auto-insertable, low profile
- Standard 14-pin DIP or 16-pin SOIC
- Low-power CMOS
- TTL/CMOS-compatible
- Vapor phase, IR and wave solderable
- Custom delays available
- Fast turn prototypes

DESCRIPTION

The DS1010 series delay line has ten equally spaced taps providing delays from 5 ns to 500 ns. The devices are offered in a standard 14-pin DIP which is pin-compatible with hybrid delay lines. Alternatively, a 16-pin SOIC is available for surface mount technology which reduces PC board area. Since the DS1010 is an all-silicon solution, better economy is achieved when compared to older methods using hybrid techniques. The DS1010 series delay lines provide a nominal accuracy

PIN ASSIGNMENT



PIN DESCRIPTION

TAP 1-TAP 10	– TAP Output Number
V _{CC}	– 5 Volts
GND	– Ground
NC	– No Connection
IN	– Input

of $\pm 5\%$ or ± 2 ns, whichever is greater. The DS1010 reproduces the input logic state at the TAP 10 output after a fixed delay as specified by the dash number extension of the part number. The DS1010 is designed to produce both leading and trailing edge with equal precision. Each tap is capable of driving up to ten 74LS type loads. Dallas Semiconductor can customize standard products to meet special needs.

DALLAS SEMICONDUCTOR

DS1012 2-in-1 Sub-Miniature Silicon Delay Line with Logic

FEATURES

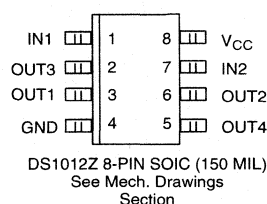
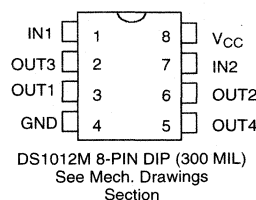
- All-silicon time delay
- 53 μ W max. CMOS quiescent mode
- Surface mount 8-pin mini-SOIC and standard 8-pin DIP
- 2 independent buffered delays per input
- Option of complemented output(s)
- Option of timed AND, NAND, OR, NOR, XOR, XNOR, HALF-XOR and HALF-XNOR logic outputs
- Delay tolerance: ± 1.5 ns (delays: 3-10 ns),
 ± 2.0 ns (delays: 11-40 ns)
- Vapor phase, IR and wave solderability
- Economical
- TTL/CMOS-compatible
- Quick turn prototypes
- Custom delays and logic options available

DESCRIPTION

In its most simple configuration, the DS1012 2-in-1 Sub-Miniature Silicon Delay Line Chip provides two inputs, each of which in turn provides independent delays to a pair of outputs. The DS1012-1 and DS1012-3 are examples of catalog parts having this basic configuration. Any of the four outputs can be inverted at the time of manufacture.

For applications requiring two-input timed logic functions, at the time of manufacture the simple delay on OUT4 can be replaced by one of the following: OR, NOR, XOR, or XNOR. Similarly, a timed AND, NAND, HALF-XOR (D3 AND $\overline{D4}$), or NOT HALF-XOR ($\overline{D3}$ OR D4) can be substituted for the simple delay on OUT3. DS1012-2, DS1012-4, and DS1012-5 are examples of

PIN ASSIGNMENT



PIN DESCRIPTION

IN1, IN2	– Inputs
OUT1, OUT2	– Outputs (delays)
OUT3, OUT4	– Outputs (delays, logic)
GND	– Ground
V _{CC}	– +5 Volts

catalog parts configured with logic functions on OUT3 and OUT4. Note that DS1012-2 also utilizes an output inversion on OUT2.

In any configuration, delays D1 (t_{D1}) and D2 (t_{D2}) can be specified within the range of ~ 3 ns to 10 ns. Delays D3 (t_{D3}) and D4 (t_{D4}) can be specified to have values between ~ 3 ns and 40 ns. The worst case leading edge delay accuracy at nominal voltage and room temperature is ± 2 ns. The DS1012 is offered in two packages: an 8-pin DIP and an 8-pin 150 mil wide mini-SOIC.

Dallas Semiconductor offers the DS1012 in a wide variety of custom delay and logic configurations. For special requests and quick turn delivery, call (972) 371-4348.

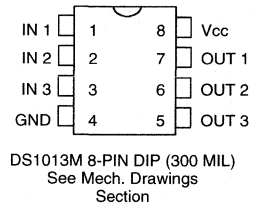
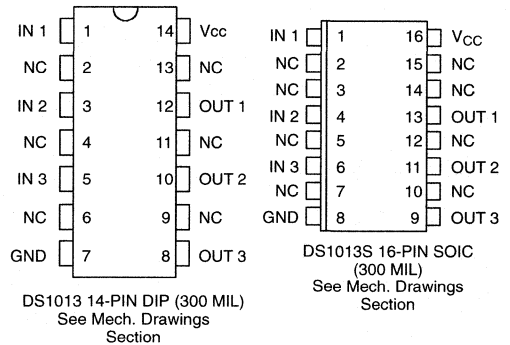
FEATURES

- All-silicon time delay
- 3 independent buffered delays
- Delay tolerance ± 2 ns for -10 through -60
- Stable and precise over temperature and voltage range
- Leading and trailing edge accuracy
- Economical
- Auto-insertable, low profile
- Standard 14-pin DIP, 8-pin DIP, or 16-pin SOIC
- Low-power CMOS
- TTL/CMOS-compatible
- Vapor phase, IR and wave solderable
- Custom delays available
- Quick turn prototypes
- Extended temperature ranges available

DESCRIPTION

The DS1013 series of delay lines has three independent logic buffered delays in a single package. The devices are offered in a standard 14-pin DIP which is pin-compatible with hybrid delay lines. Alternative 8-pin DIP and surface mount packages are available which save PC board area. Since the DS1013 products are an all silicon solution, better economy is achieved when compared to older methods using hybrid techniques. The DS1013 series delay lines provide a nominal accuracy of ± 2 ns for delay times ranging from 10 ns to 60 ns, increasing to 5% for delays of 150 ns and longer. The DS1013 delay line reproduces the input logic state at the output after a fixed delay as specified by the dash number extension of the part number. The DS1013 is designed to reproduce both leading and trailing edges with equal precision. Each output is capable of driving up to ten 74LS loads. Dallas Semiconductor can customize standard products to meet special needs. For special requests and rapid delivery, call (972) 371-4348.

PIN ASSIGNMENT



PIN DESCRIPTION

IN 1, IN 2, IN 3	- Inputs
OUT 1, OUT 2, OUT 3	- Outputs
GND	- Ground
V _{CC}	- +5 Volts
NC	- No Connection

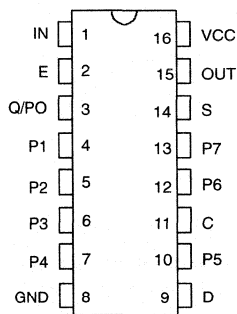
DALLAS SEMICONDUCTOR

DS1020 Programmable 8-Bit Silicon Delay Line

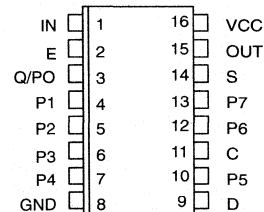
FEATURES

- All-silicon time delay
- Models with 0.15 ns, 0.25 ns, 0.5 ns, 1 ns, and 2 ns steps
- Programmable using 3-wire serial port or 8-bit parallel port
- Leading and trailing edge accuracy
- Standard 16-pin DIP or 16-pin SOIC
- Economical
- Auto-insertable, low profile
- Low-power CMOS
- TTL/CMOS-compatible
- Vapor phase, IR and wave solderable

PIN ASSIGNMENT



DS1020 16-PIN DIP
(300 MIL)
See Mech. Drawings
Section



DS1020S 16-PIN SOIC
(300 MIL)
See Mech. Drawings
Section

PIN DESCRIPTION

IN	– Delay Input
P0-P7	– Parallel Program Pins
GND	– Ground
OUT	– Delay Output
VCC	– +5 Volts
S	– Mode Select
E	– Enable
C	– Serial Port Clock
Q	– Serial Data Output
D	– Serial Data Input

DESCRIPTION

The DS1020 Programmable 8-Bit Silicon Delay Line consists of an 8-bit, user-programmable CMOS silicon integrated circuit. Delay values, programmed using either the 3-wire serial port or the 8-bit parallel port, can be varied over 256 equal steps. The fastest model (-15) offers a maximum delay of 48.25 ns with an incremental delay of 0.15 ns, while the slowest model (-200) has a maximum delay of 520 ns with an incremental delay of 2 ns. All models have an inherent (step zero) delay of 10 ns. After the user-determined delay, the input logic

state is reproduced at the output without inversion. The DS1020 is TTL- and CMOS-compatible, capable of driving 10 74LS-type loads, and features both rising and falling edge accuracy.

The all-CMOS DS1020 integrated circuit has been designed as a reliable, economic alternative to hybrid programmable delay lines. It is offered in a standard 16-pin auto-insertable DIP and a space-saving surface mount 16-pin SOIC.

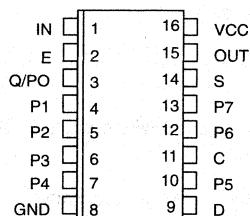
FEATURES

- All-silicon time delay
- Models with 0.25 ns and 0.5 ns steps
- Programmable using 3-wire serial port or 8-bit parallel port
- Leading and trailing edge accuracy
- Economical
- Auto-insertable, low profile, 16-pin SOIC package
- Low-power CMOS
- TTL/CMOS-compatible
- Vapor phase, IR and wave solderable

DESCRIPTION

The DS1021 Programmable 8-Bit Silicon Delay Line consists of an 8-bit, user-programmable CMOS silicon integrated circuit. Delay values, programmed using either the 3-wire serial port or the 8-bit parallel port, can be varied over 256 equal steps. The faster model (-25) offers a maximum delay of 73.75 ns with an incremental delay of 0.25 ns, while the slower model (-50) has a maximum delay of 137.5 ns with an incremental delay of 0.5 ns. Both models have an inherent (step zero) delay of 10 ns. After the user-determined delay, the input logic

PIN ASSIGNMENT



DS1021S 16-PIN SOIC (300 MIL)
 See Mech. Drawings
 Section

PIN DESCRIPTION

IN	- Delay Input
P0-P7	- Parallel Program Pins
GND	- Ground
OUT	- Delay Output
VCC	- +5 Volts
S	- Mode Select
E	- Enable
C	- Serial Port Clock
Q	- Serial Data Output
D	- Serial Data Input

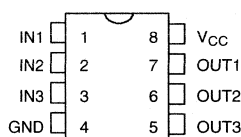
state is reproduced at the output without inversion. The DS1021 is TTL- and CMOS-compatible, capable of driving 10 74LS-type loads, and features both rising and falling edge accuracy.

The all-CMOS DS1021 integrated circuit has been designed as a reliable, economic alternative to hybrid programmable delay lines. It is offered in a space-saving surface mount 16-pin SOIC.

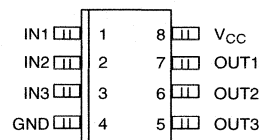
FEATURES

- All-silicon timing circuit
- Three independent buffered delays
- Initial delay tolerance ± 1.5 ns
- Stable and precise over temperature and voltage
- Leading and trailing edge precision preserves the input symmetry
- Standard 8-pin DIP, 8-pin SOIC
- Vapor phasing, IR and wave solderable
- Available in Tape and Reel

PIN ASSIGNMENT



DS1033M 8-PIN DIP
See Mech. Drawings
Section



DS1033Z 8-PIN SOIC (150 MIL)
See Mech. Drawings
Section

PIN DESCRIPTION

IN1-IN3	- Input Signals
OUT1-OUT3	- Output Signals
NC	- No Connection
V _{CC}	- Supply Voltage
GND	- Ground
(Sub)	- Internal substrate connection, do not make any external connections to these pins

DESCRIPTION

The DS1033 series is a low-power +3.3 Volt version of the DS1035. It is characterized for operation over the range of 2.7V to 3.6V.

The DS1033 series of delay lines have three independent logic buffered delays in a single package. It is available in a standard 8-pin DIP, 150 Mil 8-pin Mini-SOIC.

The device features precise leading and trailing edge accuracies. It has the inherent reliability of an all-silicon

delay line solution. The DS1033's nominal tolerance is ± 1.5 ns and an additional tolerance over temperature and voltage of ± 1.0 ns for the faster delays. Detailed specifications are shown in Table 1.

Standard delay values are indicated in Table 1. Customers may contact Dallas Semiconductor at (972) 371-4348 for further information.

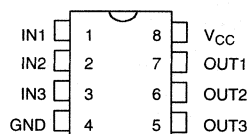
DALLAS SEMICONDUCTOR

DS1035 3-in-1 High-Speed Silicon Delay Line

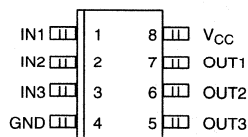
FEATURES

- All-silicon timing circuit
- Three independent buffered delays
- Stable and precise over temperature and voltage
- Leading and trailing edge precision preserves the input symmetry
- Standard 8-pin DIP and 8-pin SOIC (150 mil)
- Vapor phasing, IR and wave solderable
- Available in Tape and Reel

PIN ASSIGNMENT



DS1035M 8-PIN DIP
See Mech. Drawings
Section



DS1035Z 8-PIN SOIC (150 MIL)
See Mech. Drawings
Section

PIN DESCRIPTION

- IN1-IN3 – Input Signals
- OUT1-OUT3 – Output Signals
- NC – No Connection
- V_{CC} – +5 Volt Supply
- GND – Ground
- (Sub) – Internal substrate connection, do not make any external connections to these pins

DESCRIPTION

The DS1035 series is a low-power +5 Volt high speed version of the popular DS1013 and compliments the DS1033 +3.3 Volt version.

The DS1035 series of delay lines have three independent logic buffered delays in a single package. The device is Dallas Semiconductor's fastest 3-in-1 delay line. It is available in a standard 8-pin DIP and 150 Mil 8-pin Mini-SOIC.

The device features precise leading and trailing edge accuracies. It has the inherent reliability of an all-silicon delay line solution. The DS1035's initial tolerance is ± 1.5 or ± 2.0 ns with an additional tolerance over temperature and voltage of ± 1.0 ns or ± 1.5 ns, depending on the delay value. Each output is capable of driving up to 10 LS loads.

Standard delay values are indicated in Table 1.

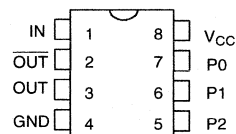
FEATURES

- All-silicon pulse width generator
- Five programmable widths
- Equal and unequal increments available
- Pulse widths from 5 ns to 500 ns
- Widths are stable and precise
- Rising edge-triggered
- Inverted and non-inverted outputs
- Width tolerance $\pm 5\%$ or ± 2 ns, whichever is greater
- Economical
- Auto-insertable, low profile
- Low-power CMOS
- TTL/CMOS-compatible
- Vapor phase, IR and wave solderable
- Custom widths available
- Fast turn prototypes
- Extended temperature range available

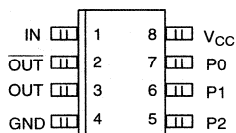
DESCRIPTION

The DS1040 Pulse Generator is a user-programmable one-shot with a choice of five precise pulse widths. Maximum widths range from 50 ns to 500 ns; increments range from 2.5 ns to 100 ns. For maximum flexibility in applications such as magneto-optical read/write disk laser power control, varieties are offered with equal and unequal increments. The DS1040 is offered in standard 8-pin DIPs and 8-pin mini-SOICs. Low cost and superior reliability over hybrid technology are achieved by the combination of a 100% CMOS silicon design and industry standard packaging. The DS1040 series of pulse generators provide a nominal width accuracy of $\pm 5\%$ or

PIN ASSIGNMENT



DS1040M 8-PIN DIP (300 MIL)
See Mech. Drawings
Section



DS1040Z 8-PIN SOIC (150 MIL)
See Mech. Drawings
Section

PIN DESCRIPTION

IN	– Trigger Input
P0-P2	– Programming Pins
GND	– Ground
OUT	– Pulse Output
$\overline{\text{OUT}}$	– Inverted Pulse Output
V _{CC}	– +5V

± 2 ns, whichever is greater. In response to the rising edge of the input (trigger) pulse, the DS1040 produces an output pulse with a width determined by the logic states of the three parallel programming pins. For convenience, both inverting and non-inverting outputs are supplied. The intrinsic delay between the trigger pulse and the output pulse is no more than 10 ns. Each output is capable of driving up to five 74LS loads.

Dallas Semiconductor can customize standard products to meet special needs. For special request and rapid delivery, call (972) 371-4348.

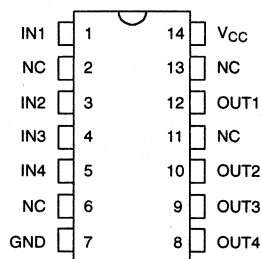
DALLAS SEMICONDUCTOR

DS1044 4-in-1 High-Speed Silicon Delay Line

FEATURES

- All-silicon timing circuit
- Four independent buffered delays
- Initial delay tolerance ± 1.5 ns
- Stable and precise over temperature and voltage
- Leading and trailing edge precision preserves the input symmetry
- Standard 14-pin DIP, 14-pin SOIC (150 mil)
- Vapor phase, IR and wave solderable
- Available in Tape and Reel

PIN ASSIGNMENT



DS1044 14-PIN DIP
DS1044R 14-PIN SOIC (150 MIL)
See Mech. Drawings
Section

PIN DESCRIPTION

IN1-IN4	- Input Signals
OUT1-OUT4	- Output Signals
NC	- No Connection
V _{CC}	- +5 Volt Supply
GND	- Ground

DESCRIPTION

The DS1044 series is a 4-in-1 version of the low-power, +5 Volt, high speed, DS1035.

The DS1044 series of delay lines have four independent logic buffered delays in a single package. The device is Dallas Semiconductor's fastest 4-in-1 delay line. It is available in a standard 14-pin DIP and 14-pin SOIC.

The device features precise leading and trailing edge accuracies. It has the inherent reliability of an all-silicon

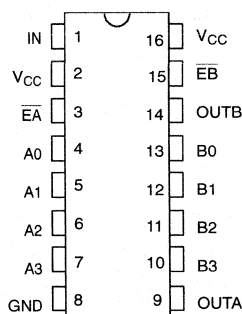
delay line solution. The DS1044's nominal tolerance is ± 1.5 ns and an additional tolerance over temperature and voltage of ± 1.0 ns for the faster delays. Each output is capable of driving up to 10 LS loads.

Standard delay values are indicated in Table 1. Customers may contact Dallas Semiconductor at (972) 371-4348 for further information.

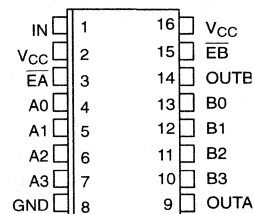
FEATURES

- All-silicon time delay
- Two programmable outputs from a single input produce output-to-output delays between 9 and 84 ns depending on device type
- Programmable via four input pins
- Programmable increments of 2 to 5 ns with a minimum of 9 ns and a maximum of 84 ns
- Output pulse is a reproduction of input pulse after delay with both leading and trailing edge accuracy
- Standard 16-pin DIP or surface mount 16-pin SOIC
- Auto-insertable
- Low-power CMOS design is TTL-compatible

PIN ASSIGNMENT



DS1045 16-PIN DIP
See Mech. Drawings
Section



DS1045S 16-PIN SOIC (300 MIL)
See Mech. Drawings
Section

PIN DESCRIPTION

IN	- Delay Line Input
OUTA, OUTB	- Delay Line Outputs
A0-A3	- Parallel Program Inputs for OUT1
B0-B3	- Parallel Program Inputs for OUT2
\overline{EA} , \overline{EB}	- Enable A and B Inputs
V _{CC}	- +5 Volt Input
GND	- Ground

DESCRIPTION

The DS1045 is a programmable silicon delay line having one input and two 4-bit programmable delay outputs. Each 4-bit programmable output offers the user 16 possible delay values to select from, starting with a minimum inherent DS1045 delay of 9 ns and a maximum achievable delay in the standard DS1045 family of 84 ns. The standard DS1045 product line provides the user with four devices having uniform delay increments of 2, 3, 4, and 5 ns depending on the device. Table 1 presents standard device family and delay capability. Additionally,

custom delay increments are available for special order through Dallas Semiconductor.

The DS1045 is TTL and CMOS-compatible and capable of driving ten 74LS-type loads. The output produced by the DS1045 is both rising and falling edge precise. The DS1045 programmable silicon delay line has been designed as a reliable, economic alternative to hybrid programmable delay lines. It is offered in a standard 16-pin auto-insertable DIP and a space-saving surface mount 16-pin SOIC package.

DALLAS SEMICONDUCTOR

DS1075 EconOscillator/Divider

FEATURES

- Dual Fixed frequency outputs (200 KHz – 100 MHz)
- User-programmable on-chip dividers (from 1 – 513)
- User-programmable on-chip prescaler (1, 2, 4)
- No external components
- $\pm 0.5\%$ Initial tolerance
- $\pm 1\%$ variation over temperature and voltage
- Internal clock, External clock or crystal reference options
- Single 5V supply
- Power-down mode
- Synchronous output gating

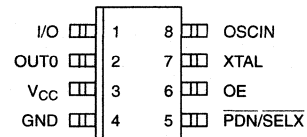
DESCRIPTION

The DS1075 is a fixed frequency oscillator requiring no external components for operation. Numerous operating frequencies are possible in the range 0.2 to 100 MHz through the use of an on-chip programmable prescaler and divider.

The DS1075 features a master oscillator followed by a prescaler and then a programmable divider. The prescaler and programmable divider are user-programmable with the desired values being stored in non-volatile memory. This allows the user to buy an off the shelf component and program it on site prior to board production. Design changes can be readily accommodated by programming, or reprogramming, the desired values into the on-chip non-volatile registers. An evaluation board, DS1075K is available to simplify this task.

The DS1075 is shipped from the factory configured for half the maximum operating frequency. Pre-programmed devices can be ordered on a custom basis as

PIN ASSIGNMENT



DS1075Z 150-MIL SOIC
DS1075M 300-MIL DIP

FREQUENCY OPTIONS

Part No.	Max O/P freq.
DS1075-100	100 MHz
DS1075-80	80 MHz
DS1075-66	66 MHz
DS1075-60	60 MHz

DS1075C-xxx. As alternatives to the on-board oscillator an external clock signal or a crystal may be used as a reference. The choice of reference source (internal or external) is user-selectable at the time of programming (or on the fly if the SEL mode is chosen).

The DS1075 features a dual-purpose Input/Output pin. If the device is powered up in Program mode this pin can be used to input serial data to the on chip registers. After a Write command this data is stored in non-volatile memory. When the chip is subsequently powered up in operating mode these values are automatically restored to the on-chip registers and the Input/Output pin becomes the oscillator output.

The DS1075 is available in 8-pin DIP or SOIC packages, allowing the generation of a clock signal easily, economically and using minimal board area.

SYSTEM EXTENSION

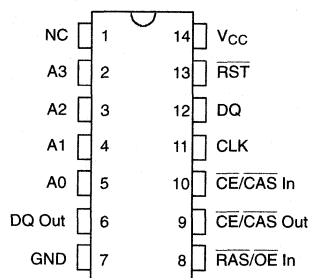
FEATURES

- Minimum expense add-on serial port
- Converts standard byte-wide or DRAM memory waveforms into a 3-wire serial port
- Operation is transparent to memory
- Software-generated memory cycles activate serial port and transfer data
- High bandwidth – 1-bit data transfer per two memory cycles
- Intercepts memory signals so that pass-through connections to memory can be maintained
- Controls communications for as many as ten DS1201 Electronic Tags, DS1204U Electronic Keys, DS1207 TimeKeys or DS1290 Eliminators
- Low-power CMOS circuitry
- Optional 16-pin SOIC surface mount package

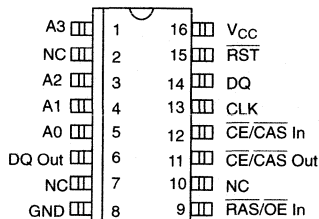
DESCRIPTION

The DS1206 Phantom Serial Interface Chip is a CMOS circuit which intercepts the standardized memory bus found in computer systems and adapts the bus to a 3-wire serial port. Multiple memory cycles are used as a basis for generating the appropriate signals to control

PIN ASSIGNMENT



14-Pin DIP (300 MIL)
See Mech. Drawings
Section



16-Pin SOIC (300 MIL)
See Mech. Drawings
Section

PIN DESCRIPTION

- NC – No Connection
- A0–A3 – Memory Address Bus
- DQ Out – Data Out To Memory Bus
- GND – Ground
- $\overline{\text{RAS/OE}}$ In – Output Enable or $\overline{\text{RAS}}$ input from memory bus
- $\overline{\text{CE/CAS}}$ In – Chip enable or $\overline{\text{CAS}}$ from memory bus
- $\overline{\text{CE/CAS}}$ Out – Chip enable or $\overline{\text{CAS}}$ to memory circuit
- CLK – Clock for Serial Port
- DQ – Data I/O for Serial Port
- $\overline{\text{RST}}$ – Reset for Serial Port
- V_{CC} – +5 Volts

the serial port. A sequence of software-generated memory cycles encodes commands and transfers data with low pin count.

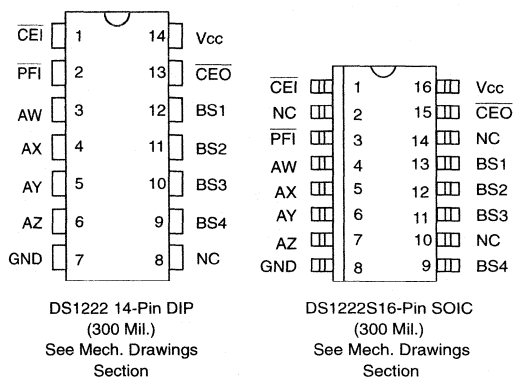
FEATURES

- Provides bank switching for 16 banks of memory
- Bank switching is software-controlled by a pattern recognition sequence on four address inputs
- Automatically sets all 16 banks off on power-up
- Bank switching logic allows only one bank on at a time
- Custom recognition patterns are available to prevent unauthorized access
- Full $\pm 10\%$ operating range
- Low-power CMOS circuitry
- Can be used to expand the address range of microprocessors and decoders
- Optional 16-pin SOIC surface mount package

DESCRIPTION

The DS1222 BankSwitch Chip is a CMOS circuit designed to select one of sixteen memory banks under software control. Memory bank switching allows for an increase in memory capacity without additional address lines. Continuous blocks of memory are enabled by selecting the proper memory bank through a pattern recognition sequence on four address inputs. Custom patterns available from Dallas Semiconductor can provide security through uniqueness and prevent unauthorized access. By combining the DS1222 with the DS1212 Nonvolatile Controller x16 Chip, up to 16 banks of static RAMs can be selected.

PIN ASSIGNMENT



PIN DESCRIPTION

A_W - A_Z	– Address Inputs
\overline{CEI}	– Chip Enable Input
\overline{CEO}	– Chip Enable Output
NC	– No Connection
BS1,BS2,	– Bank Select Outputs
BS3,BS4	– Bank Select Outputs
PFI	– Power Fail Input
V_{CC}	– +5 Volts
GND	– Ground

OPERATION – BANK SWITCHING

Initially, on power-up all four bank select outputs are low and the chip enable output (\overline{CEO}) is held high. (Note: the power fail input [PFI] must be low prior to power-up to assure proper initialization.) Bank switching is achieved by matching a predefined pattern stored within the DS1222 with a 16-bit sequence received on four address inputs. Prior to entering the 16-bit pattern, which sets the bank switch, a read cycle of 1111 on address inputs AW through AZ should be executed to guarantee that pattern entry starts with bit 0. Each set of address inputs is clocked into the DS1222 when \overline{CEI} is driven low. All 16 inputs must be consecutive read cycles.

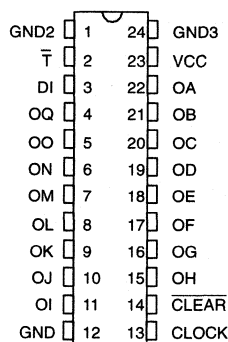
FEATURES

- Replaces 8 or 16 hard-to-get-at manual switches
- Options printed circuit board via software
- Modular expansion by cascading packages
- Set or interrogate with only three signals
- Requires no pull-up resistors
- Links to system bus with the DS1206 Phantom Serial Interface Chip
- Low-power CMOS
- Switch setting changes occur simultaneously
- DS1290 and DS1292 maintain settings in the absence of power; DS1291 and DS1293 are volatile
- Over 10 years of data retention for DS1290 and DS1292

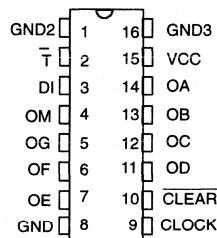
DESCRIPTION

The DS129x Eliminator replaces manual switches used to option printed circuit boards. Up to sixteen output pins can be set to a logic level or interrogated by three signals: clock, data and transfer. The Eliminator can be controlled with software using the DS1206 Phantom Interface to synthesize the clock, data and transfer signals from a system bus. Multiple packages can be strung together for modular expansion. Once programmed, the DS1290 and DS1292 will maintain high or low level outputs, duplicating the effects of a mechanical switch and pull-up resistor. The technical support needed to configure a system is minimized with the Eliminator, Phantom Interface and menu-driven software.

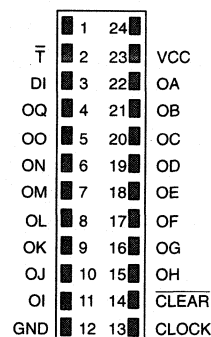
PIN ASSIGNMENT



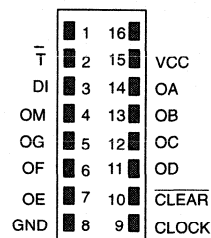
DS1293 24-PIN DIP (300 MIL)
See Mech. Drawings Section



DS1291 16-PIN DIP (300 MIL)
See Mech. Drawings Section



DS1292 24-PIN ENCAPSULATED PACKAGE (450 MIL)
See Mech. Drawings Section



DS1290 16-PIN ENCAPSULATED PACKAGE (450 MIL) See Mech. Drawings Section

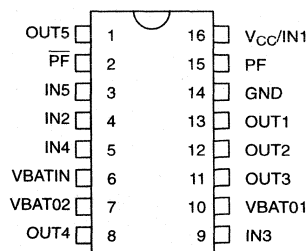
PIN DESCRIPTION

- \bar{T} – Transfer
- DI – Data Input
- O_A-O_Q – Switch Outputs
- CLOCK – Clock Input
- $\overline{\text{CLEAR}}$ – All Outputs Set Low
- V_{CC} – +5 Volts
- GND – Ground
- GND2 – Missing on DS1292 and DS1290. Must be grounded on DS1293 and DS1291.
- GND3 – Missing on DS1292 and DS1290. Must be grounded on DS1293 and DS1291.

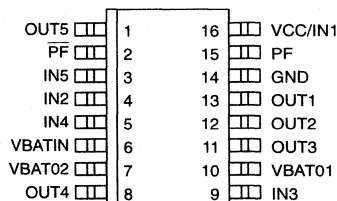
FEATURES

- Provides power switching of up to 1.5 amps at voltages between 3.0 and 5.0 volts
- Five separate power switches
- Selectable battery switches for use with battery-backed systems
- Very low on impedance of 0.7 Ω
- Battery backup current of 4 mA
- Diode-isolated battery path
- Available in 16-pin DIP or 16-pin SOIC surface mount package
- Low voltage drop battery path
- Connects directly to a variety of Dallas Semiconductor devices adding increased switching capability for large battery backup current applications

PIN ASSIGNMENT



16-PIN DIP (300 MIL)
See Mech. Drawings Section



16-PIN SOIC (300 MIL)
See Mech. Drawings Section

PIN DESCRIPTION

V _{CC} /IN1	-	+5V Input and Input 1
IN2 – IN5	-	Inputs 2 – 5
OUT1 – 5	-	Outputs 1 – 5
V _{BATIN}	-	External Battery Input
V _{BAT01}	-	Diode Protected Battery Output
V _{BAT02}	-	Low Voltage Drop Battery Output
PF, \overline{PF}	-	Power Fail Inputs
GND	-	Ground

DESCRIPTION

The DS1336 Afterburner Chip is designed to provide power switching between a primary power supply (V_{CC}) and a backup battery power supply (V_{BAT}). Five V_{CC} and two battery paths are provided which can be used individually or in parallel to supply uninterrupted power in applications such as SRAM networks. When used with one of the Dallas power monitoring devices listed in Section 10, Page 119, Table 1, the DS1336 allows a load to be switched from its main power supply V_{CC} to a battery backup supply when V_{CC} falls out of toler-

ance. A user may selectively tie together any combination of the output pins to provide the desired high current supply, providing up to 300 mA per OUT pin or a maximum of 1.5A. Depending upon the user's backup supply load requirements, either of the V_{BAT} outputs may be tied to the OUT pins to supply current when V_{CC} is out of tolerance. The DS1336 switches back to the higher current V_{CC} from battery current when PF and \overline{PF} become inactive.

DALLAS

SEMICONDUCTOR

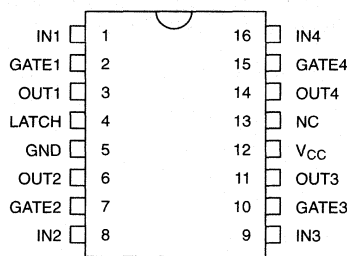
DS1640/DS1640C

Personal Computer Power FET

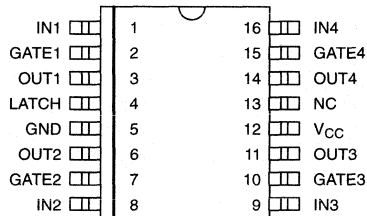
FEATURES

- Contains four P channel power FET switches that can each supply over 300 mA @ 0.2 volts drop
- Controlled directly from CMOS or TTL level signals
- Fast switching time of less than 10 μ s at rated supply current
- 16-pin DIP or 16-pin SOIC surface mount package
- Positive logic signal turns each FET on and ground or low level signal turns each FET off
- Off condition allows less than 50 nA of current flow
- Low control gate capacitance of less than 5 pF
- FET gates can either follow inputs or be latched
- Designed for use with power supplies ranging from +3 to +5 volts

PIN ASSIGNMENT



16-Pin DIP (300 Mil)
See Mech. Drawings
Section



16-Pin SOIC (300 Mil)
See Mech. Drawings
Section

PIN DESCRIPTION

V _{CC}	-	+3 to +5 Volt Input
GND	-	Ground
IN1-IN4	-	FET Sources
OUT1-OUT4	-	FET Drains
GATE1-GATE4	-	FET Control Gates
NC	-	No Connection
LATCH	-	Gate Inputs Latch Control

DESCRIPTION

The DS1640 contains four P channel power MOS FET's designed as switches to conserve power in personal computer systems. When connected to power management control units, power consuming devices like disk drives or display panel backlights can be routinely shut down to conserve battery or main power supply en-

ergy. The P channel power MOS FET's are individually controlled and are capable of handling 300 mA each continuously with less than 0.2 volts drop from input to output. The device requires a +3 to +5 volt power supply input which is used to power internal logic and to operate a gate bias generator.



TELECOMMUNICATIONS

DALLAS SEMICONDUCTOR

DS2130Q Voice Messaging Processor

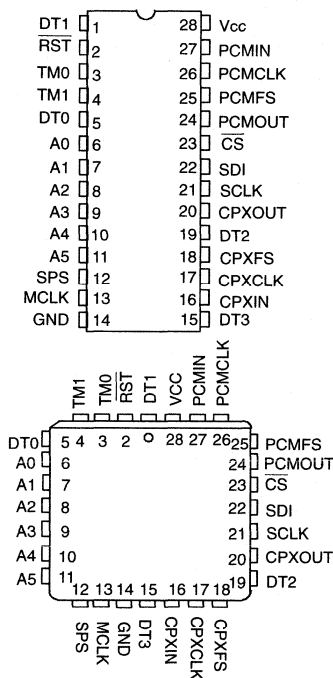
FEATURES

- Per-channel voice messaging processor for digitized voice storage and retrieval
- High fidelity speech recording and playback at 8, 12, 16, 24 and 32 Kbits/sec
- Integral DTMF transceiver for remote touch-tone control and dialing
- Connects to popular PCM codec/filters for analog interfacing
- Direct PCM serial data bus interfaces to any of 32 possible TDM time slots
- Monitors and reports audio energy levels for call progress and voice detection
- Selectable beep generator for sound prompts
- 3-wire synchronous serial control port
- 28-pin DIP or PLCC (DS2130Q) packages

DESCRIPTION

The DS2130 Voice Messaging Processor is a CMOS DSP processor that serves as a voice messaging engine for digitized voice storage and retrieval applications. It offers half-duplex speech compression or expansion at either 8, 12, 16, 24 or 32 Kbits/sec. The advanced speech compression algorithm maintains excellent audio clarity even at low bit rates. The algorithm also incorporates a DTMF transceiver for decoding or generating touch-tone signals for remote control and automatic dialing. The tone generator can be used to create single-tone beeps used in popular answering machines. Voice and call progress detection can be easily implemented using the energy threshold detect outputs.

PIN ASSIGNMENT



The DS2130 can be used together with a low-cost codec/filter device for analog interfacing in standalone applications such as answering machines or feature phones. It can also interface directly to a serial PCM bus on any of up to 32 possible time slots using an internal software-selectable time slot assigner circuit (TSAC). This configuration can be used in digital switching systems for adding voice messaging services to existing backplane designs.

Applications include digital answering machines, embedded voice response, speech annunciators, voice mail, key telephone systems and automatic operator services.

FEATURES

- Two high quality speech compression algorithms permit either 7 or 14 minutes of speech storage in a single 4 Mbit DRAM or ARAM
- Economical three-wire data/control/status port frees up microcontroller port pins
- Detects and generates the 12 standard DTMF tones plus the A/B/C/D tones
- Detects CCITT T.30 FAX calling tone (1100 Hz)
- Generates musical tones which allow "melodies-on-hold" or customizable prompts
- Echo cancellation for improved DTMF receiver performance
- Precise signal level detection capability
- Record/Playback gain control
- 28-pin DIP or PLCC (DS2132AQ) packages

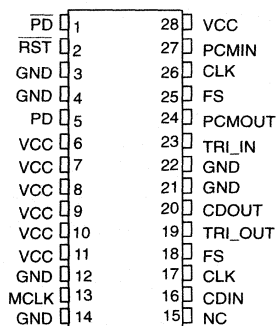
There is a series of Application Notes that accompany this data sheet.

DESCRIPTION

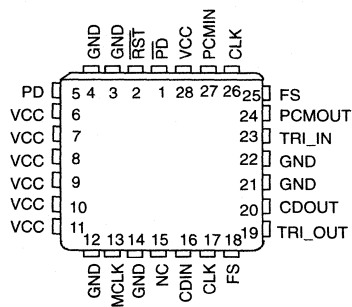
The DS2132A Digital Answering Machine Processor is a Digital Signal Processor (DSP) optimized for the compression/expansion of PCM coded voice to/from an extremely low bit rate. The DS2132A contains two advanced speech compression algorithms that offer outstanding fidelity. The Standard Record/Playback algorithm compresses speech to 9.8Kbps and the Extended Record/Playback algorithm compresses speech to 4.9Kbps.

The DS2132A is ideal for embedded applications such as digital answering machines, voice mail, voice annunciators, and any other device that needs to maximize speech storage in a limited memory space. A simple

PIN ASSIGNMENT



DS2132A 28-PIN DIP
600 MIL



DS2132AQ 28-PIN
PLCC

three wire interface to the embedded microcontroller frees up valuable controller port pins for other uses and simplifies the software needed to transfer speech data, issue commands, and receive DTMF/energy level/status information. The DS2132A detects and generates all 16 DTMF tones and can also generate a wide variety of call progress tones. In addition, the DS2132A provides CCITT Rec. T.30 FAX calling tone detection which enables the answering machine to determine if the incoming call is a voice or FAX transmission. The energy level detector allows the microcontroller to perform call progress detection and automatic gain control functions.

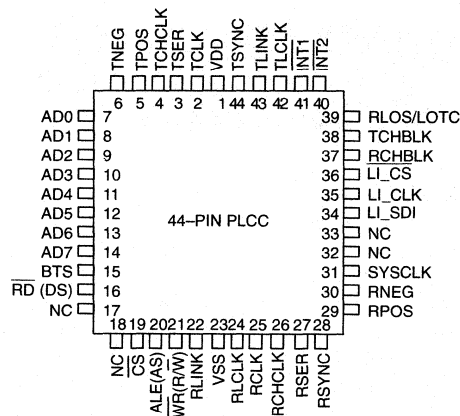
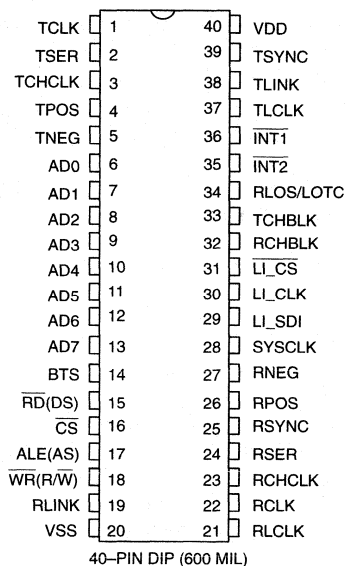
FEATURES

- DS1/ISDN–PRI framing transceiver
- Frames to D4, ESF, and SLC–96 formats
- Parallel control port
- Onboard, dual two–frame elastic store slip buffers
- Extracts and inserts robbed–bit signaling
- Programmable output clocks
- Onboard FDL support circuitry
- 5V supply; low–power CMOS
- Available in 40–pin DIP and 44–pin PLCC (DS2141Q)
- Compatible with DS2186 Transmit Line Interface, DS2187 Receive Line Interface, DS2188 Jitter Attenuator, DS2290 T1 Isolation Stik, and DS2291 T1 Long Loop Stik.

DESCRIPTION

The DS2141A is a comprehensive, software–driven T1 framer. It is meant to act as a slave or coprocessor to a microcontroller or microprocessor. Quick access via the parallel control port allows a single micro to handle many T1 lines. The DS2141A is very flexible and can be configured into numerous orientations via software. The software orientation of the device allows the user to modify their design to conform to future T1 specification changes. The controller contains a set of 62 8–bit internal registers which the user can access. These internal registers are used to configure the device and obtain information from the T1 link. The device fully meets all of the latest T1 specifications including ANSI T1.403–1989, AT&T TR 62411 (12–90), and CCITT G.704 and G.706.

PIN ASSIGNMENT



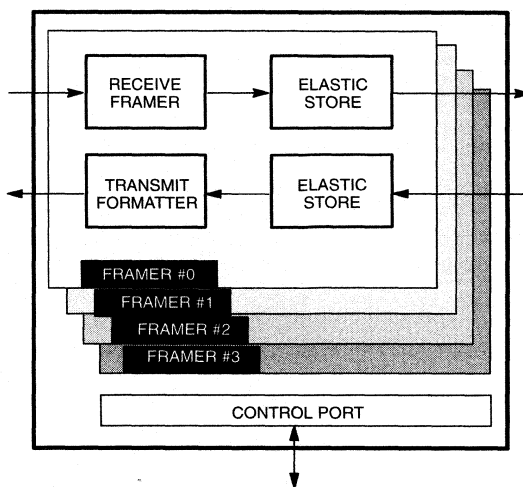
FEATURES

- Four T1 DS1/ISDN-PRI framing transceivers
- All four framers are fully independent
- Frames to D4, ESF, and SLC-96 formats
- 8-bit parallel control port that can be connected to either multiplexed or non-multiplexed buses
- Each of the four framers contains dual two-frame elastic stores that can connect to asynchronous or synchronous backplanes up to 8.192 MHz
- Extracts and inserts robbed bit signaling
- Framer and payload loopbacks
- Large counters for BPVs, LCVs, EXZs, CRC6, PCVs, F-bit errors and the number of multiframes out of sync
- Contains ANSI ones density monitor and enforcer
- CSU loop code generator and detector
- Programmable output clocks for Fractional T1, ISDN-PRI, Actual Size and per channel loopback applications
- Onboard FDL support circuitry
- Pin compatible with DS21Q43 Quad E1 Framer
- 5V supply; low power CMOS
- Available in 128-pin TQFP
- Industrial (-40°C to +85°C) grade version available (DS21Q41BTN)

DESCRIPTION

The DS21Q41B combines four of the popular DS2141A T1 Controllers onto a single monolithic die. The "B" designation denotes that some new features are available in the Quad version that were not available in the single T1 device. The added features in the DS21Q41B are listed in Section 1. The DS21Q41B offers a substantial space savings to applications that require more than one T1 framer on a card. The Quad version is only slightly bigger than the single T1 device. All four framers in the DS21Q41B are totally independent, they do

FUNCTIONAL DIAGRAM



ACTUAL SIZE



not share a common framing synchronizer. Also, the transmit and receive sides of each framer are totally independent. The dual two-frame elastic stores contained in each of the four framers can be independently enabled and disabled as required. The DS21Q41B meets all of the latest specifications including ANSI T1.403 (and the emerging T1.403-199X), ANSI T1.231-1993, AT&T TR62411, AT&T TR54016, ITU G.704 and G.706.

DALLAS

SEMICONDUCTOR

DS2143/DS2143Q

E1 Controller

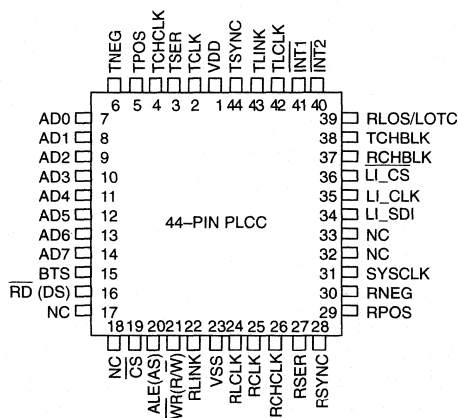
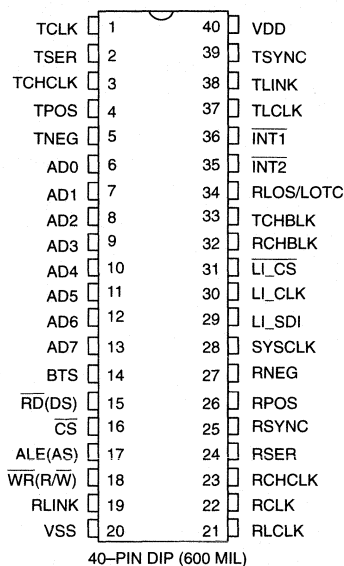
FEATURES

- E1/ISDN–PRI framing transceiver
- Frames to CAS, CCS, and CRC4 formats
- Parallel Control Port
- Onboard two frame elastic store slip buffer
- Extracts and inserts CAS signaling bits
- Programmable output clocks for fractional E1 links, DS0 loopbacks, and Drop and Insert applications
- Onboard Sa data link support circuitry
- FEBE E–Bit Detection, Counting and Generation
- Pin compatible with DS2141A T1 Controller
- 5V supply; low power (50 mW) CMOS
- Available in 40–pin DIP and 44–pin PLCC (DS2143Q)

DESCRIPTION

The DS2143 is a comprehensive, software–driven E1 framer. It is meant to act as a slave or coprocessor to a microcontroller or microprocessor. Quick access via the parallel control port allows a single micro to handle many E1 lines. The DS2143 is very flexible and can be configured into numerous orientations via software. The software orientation of the device allows the user to modify their design to conform to future E1 specification changes. The controller contains a set of 69 eight–bit internal registers which the user can access. These internal registers are used to configure the device and obtain information from the E1 link. The device fully meets all of the latest E1 specifications including CCITT G.704, G.706, and G.732.

PIN ASSIGNMENT



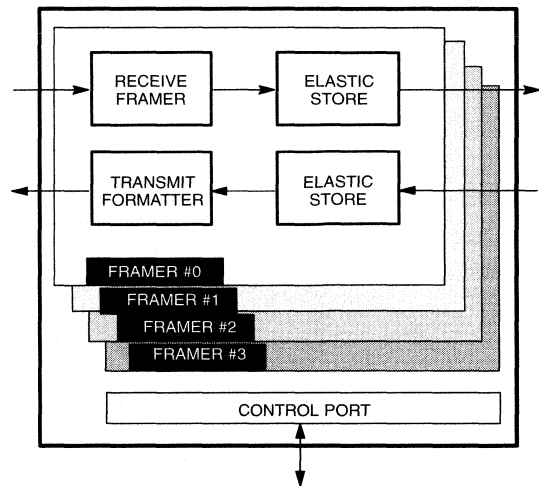
FEATURES

- Four E1 (CEPT or PCM-30) /ISDN-PRI framing transceivers
- All four framers are fully independent; transmit and receive sections of each framer are fully independent
- Frames to FAS, CAS, CCS, and CRC4 formats
- 8-bit parallel control port that can be connected to either multiplexed or non-multiplexed buses
- Each of the four framers contains dual two-frame elastic stores that can connect to asynchronous or synchronous backplanes up to 8.192 MHz
- Easy access to Si and Sa bits
- Extracts and inserts CAS signaling
- Large counters for bipolar and code violations, CRC4 code word errors, FAS word errors, and E-bits
- Programmable output clocks for Fractional E1, per channel loopback, H0 and H12 applications
- Detects and generates AIS, remote alarm, and remote multiframe alarms
- Pin compatible with DS21Q41B Quad T1 Framer
- 5V supply; low power CMOS
- Available in 128-pin TQFP
- Industrial (-40°C to +85°C) grade version available (DS21Q43ATN)

DESCRIPTION

The DS21Q43A combines four of the popular DS2143 E1 Controllers onto a single monolithic die. The "A" designation denotes that some new features are available in the Quad version that were not available in the single E1 device. The added features in the DS21Q43A are listed in Section 1. The DS21Q43A offers a substantial space savings to applications that require more than one E1 framer on a card. The Quad version is only slightly bigger than the single E1 device. All four fram-

FUNCTIONAL DIAGRAM



ACTUAL SIZE



ers in the DS21Q43A are totally independent, they do not share a common framing synchronizer. Also, the transmit and receive sides of each framer are totally independent. The dual two-frame elastic stores contained in each of the four framers can be independently enabled and disabled as required. The DS21Q43A meets all of the latest specifications including CCITT/ITU G.704, G.706, G.962, and I.431 as well as ETS 300 011 and ETS 300 233.

DALLAS

SEMICONDUCTOR

DS2151Q

T1 Single-Chip Transceiver

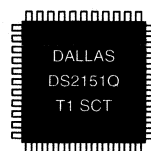
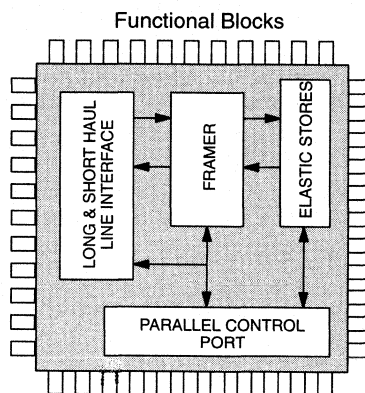
FEATURES

- Complete DS1/ISDN–PRI transceiver functionality
- Line interface can handle both long and short haul trunks
- 32–bit or 128–bit jitter attenuator
- Generates DSX–1 and CSU line build outs
- Frames to D4, ESF, and SLC–96^R formats
- Dual onboard two–frame elastic store slip buffers that connect to backplanes up to 8.192 MHz
- 8–bit parallel control port that can be used on either multiplexed or non–multiplexed buses
- Extracts and inserts Robbed–Bit signaling
- Detects and generates yellow and blue alarms
- Programmable output clocks for Fractional T1
- Fully independent transmit and receive functionality
- Onboard FDL support circuitry
- Generates and detects CSU loop codes
- Contains ANSI one's density monitor and enforcer
- Large path and line error counters including BPV, CV, CRC6, and framing bit errors
- Pin compatible with DS2153Q E1 Single–Chip Transceiver
- 5V supply; low power CMOS
- Industrial grade version (–40°C to +85°C) available (DS2151QN)

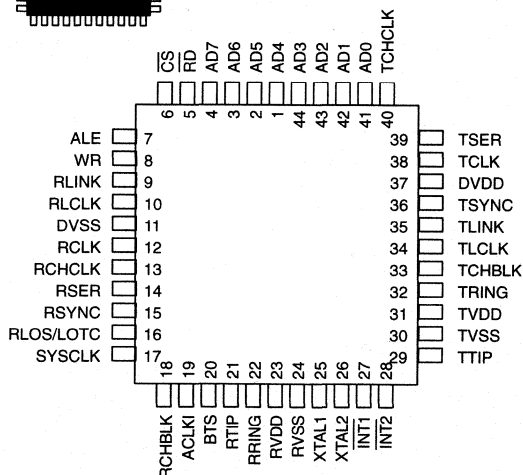
DESCRIPTION

The DS2151Q T1 Single–Chip Transceiver (SCT) contains all of the necessary functions for connection to T1 lines whether they be DS–1 long haul or DSX–1 short haul. The clock recovery circuitry automatically adjusts

PIN ASSIGNMENT



Actual Size of
44–pin PLCC



to T1 lines from 0 feet to over 6000 feet in length. The device can generate both DSX–1 line build outs as well as CSU build outs of –7.5 dB, –15 dB, and –22.5 dB.

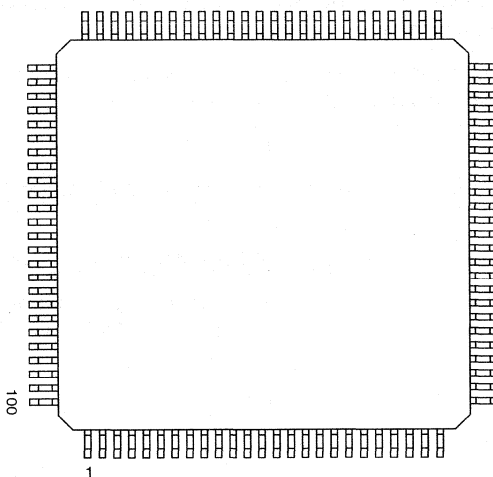
FEATURES

- Complete DS1/ISDN-PRI transceiver functionality
- Line interface can handle both long and short haul trunks
- 32-bit or 128-bit crystal-less jitter attenuator
- Generates DSX-1 and CSU line build outs
- Frames to D4, ESF, and SLC-96^R formats
- Dual onboard two-frame elastic store slip buffers that can connect to asynchronous backplanes up to 8.192 MHz
- 8-bit parallel control port that can be used directly on either multiplexed or non-multiplexed buses (Intel or Motorola)
- Extracts and inserts robbed bit signaling
- Detects and generates yellow (RAI) and blue (AIS) alarms
- Programmable output clocks for Fractional T1
- Fully independent transmit and receive functionality
- Integral HDLC controller with 16-byte buffers for the FDL
- Generates and detects in-band loop codes from 1 to 8 bits in length including CSU loop codes
- Contains ANSI one's density monitor and enforcer
- Large path and line error counters including BPV, CV, CRC6, and framing bit errors
- Pin compatible with DS2154 E1 Enhanced Single-Chip Transceiver
- 5V supply; low power CMOS
- 100-pin 14mm² body LQFP package

DESCRIPTION

The DS2152 T1 Enhanced Single-Chip Transceiver contains all of the necessary functions for connection to T1 lines whether they be DS-1 long haul or DSX-1 short haul. The clock recovery circuitry automatically adjusts to T1 lines from 0 feet to over 6000 feet in length. The device can generate both DSX-1 line build outs as well as CSU line build outs of -7.5 dB, -15 dB, and -22.5 dB.

PIN ASSIGNMENT



ORDERING INFORMATION

DS2152L	(0°C to 70°C)
DS2152LN	(-40°C to +85°C)

The onboard jitter attenuator (selectable to either 32 bits or 128 bits) can be placed in either the transmit or receive data paths. The framer locates the frame and multiframe boundaries and monitors the data stream for alarms. It is also used for extracting and inserting robbed-bit signaling data and FDL data.

DALLAS

SEMICONDUCTOR

DS2153Q

E1 Single-Chip Transceiver

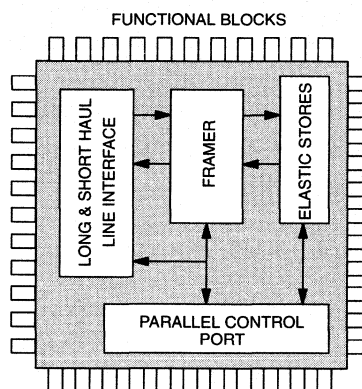
FEATURES

- Complete E1 (CEPT) PCM-30/ISDN-PRI transceiver functionality
- Onboard line interface for clock/data recovery and waveshaping
- 32-bit or 128-bit jitter attenuator
- Generates line build-outs for both 120 ohm and 75 ohm lines
- Frames to FAS, CAS, and CRC4 formats
- Dual onboard two-frame elastic store slip buffers that can connect to backplanes up to 8.192 MHz
- 8-bit parallel control port that can be used on either multiplexed or non-multiplexed buses
- Extracts and inserts CAS signaling
- Detects and generates Remote and AIS alarms
- Programmable output clocks for Fractional E1, H0, and H12 applications
- Fully independent transmit and receive functionality
- Full access to both Si and Sa bits
- Three separate loopbacks for testing
- Large counters for bipolar and code violations, CRC4 code word errors, FAS errors, and E bits
- Pin compatible with DS2151Q T1 Single-Chip Transceiver
- 5V supply; low power CMOS
- Industrial grade version (-40°C to +85°C) available (DS2153QN)

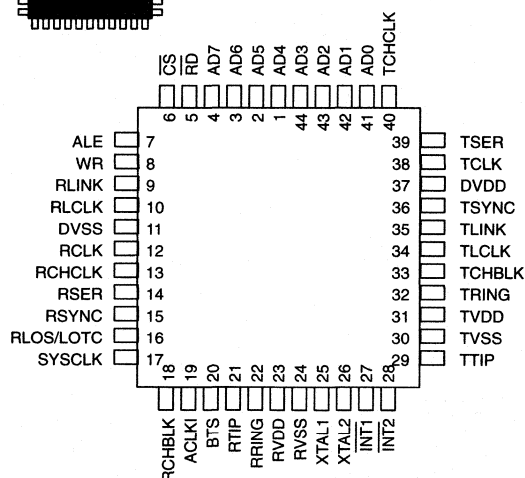
DESCRIPTION

The DS2153Q T1 Single-Chip Transceiver (SCT) contains all of the necessary functions for connection to E1 lines. The onboard clock/data recovery circuitry converts the AMI/HDB3 E1 waveforms to a NRZ serial stream.

PIN ASSIGNMENT



ACTUAL SIZE OF
44-PIN PLCC



The DS2153 automatically adjusts to E1 22 AWG (0.6 mm) twisted-pair cables from 0 to 1.5 KM. The device can generate the necessary G.703 waveshapes for both 75 ohm and 120 ohm cables.

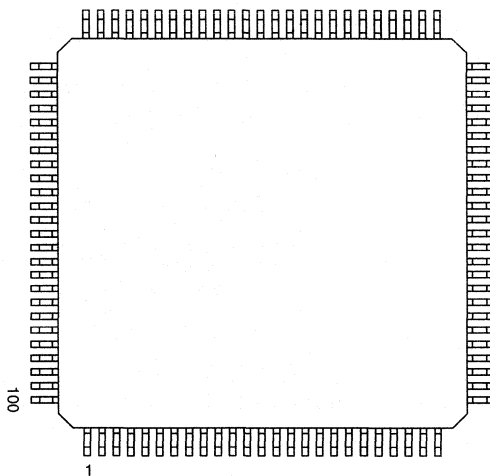
FEATURES

- Complete E1 (CEPT) PCM-30/ISDN-PRI transceiver functionality
- Onboard long and short haul line interface for clock/data recovery and waveshaping
- 32-bit or 128-bit crystal-less jitter attenuator
- Generates line build outs for both 120Ω and 75Ω lines
- Frames to FAS, CAS, and CRC4 formats
- Dual onboard two-frame elastic store slip buffers that can connect to asynchronous backplanes up to 8.192 MHz
- 8-bit parallel control port that can be used directly on either multiplexed or non-multiplexed buses
- Extracts and inserts CAS signaling
- Detects and generates Remote and AIS alarms
- Programmable output clocks for Fractional E1, H0, and H12 applications
- Fully independent transmit and receive functionality
- Full access to both Si and Sa bits aligned with CRC multiframe
- Four separate loopbacks for testing functions
- Large counters for bipolar and code violations, CRC4 codeword errors, FAS errors, and E bits
- Pin compatible with DS2152 T1 Enhanced Single-Chip Transceiver
- 5V supply; low power CMOS
- 100-pin 14mm² body LQFP package

DESCRIPTION

The DS2154 Enhanced Single-Chip Transceiver (ESCT) contains all of the necessary functions for connection to E1 lines. The device is an upward compatible version of the DS2153 Single-Chip Transceiver. The onboard clock/data recovery circuitry converts the AMI/

PACKAGE OUTLINE



ORDERING INFORMATION

DS2154L	(0°C to 70°C)
DS2154LN	(-40°C to +85°C)

HDB3 E1 waveforms to a NRZ serial stream. The DS2154 automatically adjusts to E1 22AWG (0.6 mm) twisted-pair cables from 0 to over 2km in length. The device can generate the necessary G.703 waveshapes for both 75 ohm coax and 120 ohm twisted cables.

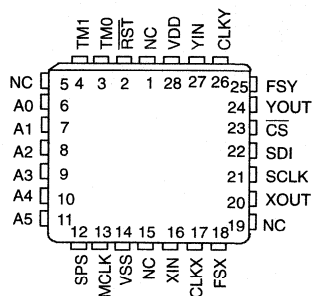
FEATURES

- Compresses/expands 64Kbps PCM voice to/from either 32Kbps, 24Kbps, or 16Kbps as per the CCITT/ITU G.726 specification
- Dual, fully independent channel architecture; device can be programmed to perform either:
 - two expansions
 - two compressions
 - one expansion and one compression
- Interconnects directly to combo-codec devices
- Input to output delay is less than 375 μ s
- Simple serial port used to configure the device
- Onboard Time Slot Assigner Circuit (TSAC) function allows data to be input/output at various time slots
- Supports Channel Associated Signaling
- Each channel can be independently idled or placed into bypass
- Available hardware mode requires no host processor; ideal for voice storage applications
- Backward-compatible with the DS2165 ADPCM Processor Chip
- Single +5V supply; low-power CMOS technology
- Available in 28-pin PLCC

DESCRIPTION

The DS2164Q ADPCM Processor Chip is a dedicated Digital Signal Processing (DSP) chip that has been optimized to perform Adaptive Differential Pulse Code Modulation (ADPCM) speech compression at three different rates. The chip can be programmed to compress (expand) 64Kbps voice data down to (up from) either 32Kbps, 24Kbps, or 16Kbps. The compression follows the algorithm specified by CCITT Recommendation G.726. The DS2164Q can switch compression algorithms on-the-fly. This allows the user to make maximum use of the available bandwidth on a dynamic basis.

PIN ASSIGNMENT



28-Pin PLCC

OVERVIEW

The DS2164Q contains three major functional blocks: a high performance (10 MIPS) DSP engine, two independent PCM interfaces (X and Y) which connect directly to serial Time Division Multiplexed (TDM) backplanes, and a serial port that can configure the device on-the-fly via an external controller. A 10 MHz master clock is required by the DSP engine. The DS2164Q can be configured to perform either two expansions, two compressions, or one expansion and one compression. The PCM/ADPCM data interfaces support data rates from 256 KHz to 4.096 MHz.

DALLAS

SEMICONDUCTOR

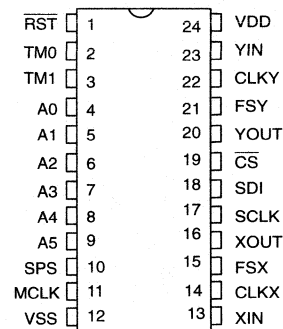
DS2165/DS2165Q

16/24/32Kbps ADPCM Processor

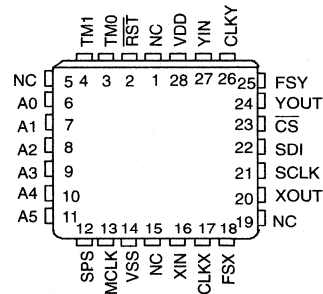
FEATURES

- Compresses/expands 64Kbps PCM voice to/from either 32Kbps, 24Kbps, or 16Kbps
- Dual, fully independent channel architecture; device can be programmed to perform either:
 - two expansions
 - two compressions
 - one expansion and one compression
- Interconnects directly to combo-codec devices
- Input to output delay is less than 375 μ s
- Simple serial port used to configure the device
- Onboard Time Slot Assigner Circuit (TSAC) function allows data to be input/output at various time slots
- Supports Channel Associated Signaling
- Each channel can be independently idled or placed into bypass
- Available hardware mode requires no host processor; ideal for voice storage applications
- Backward-compatible with the DS2167 ADPCM Processor Chip
- Single +5V supply; low-power CMOS technology
- Available in 24-pin DIP and 28-pin PLCC

PIN ASSIGNMENT



24-Pin DIP (600 MIL)



28-Pin PLCC

A 3-volt Operation Version
is Available (DS2165QL)

DESCRIPTION

The DS2165 ADPCM Processor Chip is a dedicated Digital Signal Processing (DSP) chip that has been optimized to perform Adaptive Differential Pulse Code Modulation (ADPCM) speech compression at three different rates. The chip can be programmed to compress (expand) 64Kbps voice data down to (up from) either 32Kbps, 24Kbps, or 16Kbps. The compression to 32Kbps follows the algorithm specified by CCITT Rec-

ommendation G.721 (July 1986) and ANSI document T1.301 (April 1987). The compression to 24Kbps follows ANSI document T1.303. The compression to 16Kbps follows a proprietary algorithm developed by Dallas Semiconductor. The DS2165 can switch compression algorithms on-the-fly. This allows the user to make maximum use of the available bandwidth on a dynamic basis.

FEATURES

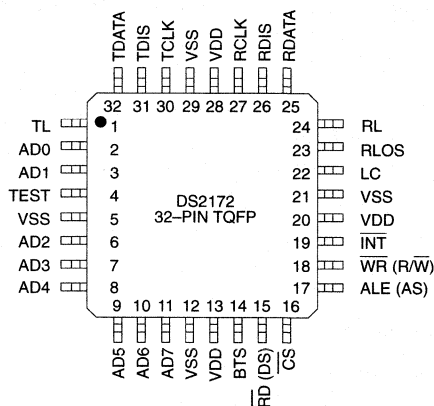
- Generates/Detects digital bit patterns for analyzing, evaluating and troubleshooting digital communications systems
- Operates at speeds from DC to 52 MHz
- Programmable polynomial length and feedback taps for generation of any other pseudorandom pattern up to 32 bits in length including: 2^6-1 , 2^9-1 , $2^{11}-1$, $2^{15}-1$, $2^{20}-1$, $2^{23}-1$, and $2^{32}-1$
- Programmable user-defined pattern and length for generation of any repetitive pattern up to 32 bits in length
- Large 32-bit error count and bit count registers
- Software programmable bit error insertion
- Fully independent transmit and receive sections
- 8-bit parallel control port
- Detects test patterns with bit error rates up to 10^{-2}

DESCRIPTION

The DS2172 Bit Error Rate Tester (BERT) is a software programmable test pattern generator, receiver, and analyzer capable of meeting the most stringent error performance requirements of digital transmission facilities. Two categories of test pattern generation (Pseudorandom and Repetitive) conform to CCITT/ITU O.151, O.152, O.153, and O.161 standards. The DS2172 operates at clock rates ranging from DC to 52 MHz. This wide range of operating frequency allows the DS2172 to be used in existing and future test equipment, transmission facilities, switching equipment, multiplexers, DACs, Routers, Bridges, CSUs, DSUs, and CPE equipment.

The DS2172 user programmable pattern registers provide the unique ability to generate loopback patterns required for T1, Fractional-T1, Smart Jack, and other

PIN ASSIGNMENT



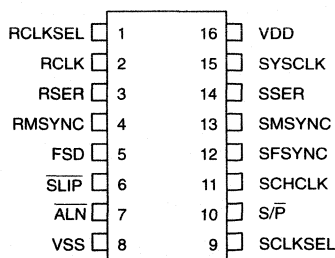
test procedures. Hence the DS2172 can initiate the loopback, run the test, check for errors, and finally deactivate the loopback.

The DS2172 consists of four functional blocks: the pattern generator, pattern detector, error counter, and control interface. The DS2172 can be programmed to generate any pseudorandom pattern with length up to $2^{32}-1$ bits (See Table 5, Note 9) or any user programmable bit pattern from 1 to 32 bits in length. Logic inputs can be used to configure the DS2172 for applications requiring gap clocking such as Fractional-T1, Switched-56, DDS, normal framing requirements, and per-channel test procedures. In addition, the DS2172 can insert single or 10^{-1} to 10^{-7} bit errors to verify equipment operation and connectivity.

FEATURES

- Rate buffer for T1 and CEPT transmission systems
- Synchronizes loop-timed and system timed data streams on frame boundaries
- Ideal for T1 (1.544 MHz) to CEPT (2.048 MHz), CEPT to T1 interfaces
- Supports parallel and serial backplanes
- Buffer depth is 2 frames
- Comprehensive on-chip "slip" control logic
 - Slips occur only on frame boundaries
 - Outputs report slip occurrences and direction
 - Align feature allows buffer to be recentered at any time
 - Buffer depth easily monitored
- Compatible with DS2180A T1 and DS2181A CEPT Transceivers
- Industrial temperature range of -40°C to $+85^{\circ}\text{C}$ available, designated DS2175N

PIN ASSIGNMENT



16-PIN DIP (300 MIL)
16-PIN SOIC (300 MIL)

DESCRIPTION

The DS2175 is a low-power CMOS elastic-store memory optimized for use in primary rate telecommunications transmission equipment. The device serves as a synchronizing element between async data streams and is compatible with North American (T1–1.544 MHz) and European (CEPT–2.048 MHz) rate networks. The chip has several flexible operating

modes which eliminate support logic and hardware currently required to interconnect parallel or serial TDM backplanes. Application areas include digital trunks, drop and insert equipment, digital cross-connects (DACs), private network equipment and PABX-to-computer interfaces such as DMI and CPI.

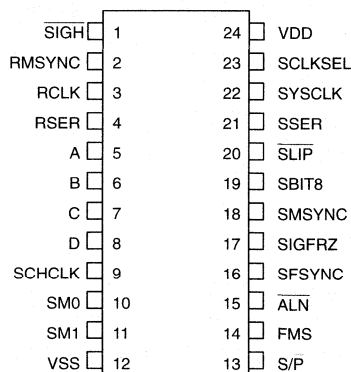
FEATURES

- Synchronizes loop-timed and system-timed T1 data streams
- Two-frame buffer depth; slips occur on frame boundaries
- Output indicates when slip occurs
- Buffer may be recentered externally
- Ideal for 1.544 to 2.048 MHz rate conversion
- Interfaces to parallel or serial backplanes
- Extracts and buffers robbed-bit signalling
- Inhibits signalling updates during alarm or slip conditions
- Integration feature “debounces” signalling
- Slip-compensated output indicates when signalling updates occur
- Compatible with DS2180A T1 Transceiver
- Surface mount package available, designated DS2176Q
- Industrial temperature range of -40°C to $+85^{\circ}\text{C}$ available, designated DS2176N

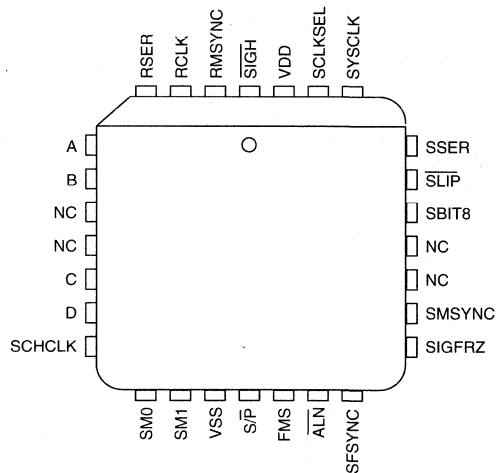
DESCRIPTION

The DS2176 is a low-power CMOS device specifically designed for synchronizing receive side loop-timed T-carrier data streams with system side timing. The device has several flexible operating modes which simplify interfacing incoming data to parallel and serial TDM backplanes. The device extracts, buffers and integrates ABCD signalling; signalling updates are prohibited during

PIN ASSIGNMENT



24-PIN 300 MIL DIP



28-PIN PLCC

ing alarm or slip conditions. The buffer replaces extensive hardware in existing applications with one “skinny” 24-lead package. Application areas include digital trunks, drop and insert equipment, transcoders, digital cross-connects (DACs), private network equipment and PABX-to-computer interfaces such as DMI and CPI.

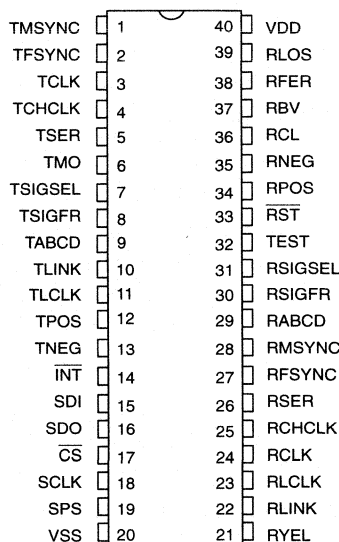
FEATURES

- Single chip DS1 rate transceiver
- Supports common framing standards
 - 12 frames/superframe "193S"
 - 24 frames/superframe "193E"
- Three zero suppression modes
 - B7 stuffing
 - B8ZS
 - Transparent
- Simple serial interface used for configuration, control and status monitoring in "processor" mode
- "Hardware" mode requires no host processor; intended for stand-alone applications
- Selectable 0, 2, 4, 16 state robbed bit signaling modes
- Allows mix of "clear" and "non-clear" DS0 channels on same DS1 link
- Alarm generation and detection
- Receive error detection and counting for transmission performance monitoring
- 5V supply, low-power CMOS technology
- Surface mount package available, designated DS2180AQ
- Industrial temperature range of -40°C to +85°C available, designated DS2180AN or DS2180AQN
- Compatible to DS2186 Transmit Line Interface, DS2187 Receive Line Interface, DS2188 Jitter Attenuator, DS2175 T1/CEPT Elastic Store, DS2290 T1 Isolation Stik, and DS2291 T1 Long Loop Stik

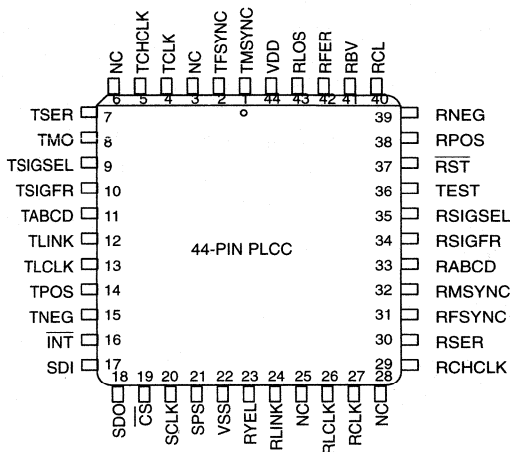
DESCRIPTION

The DS2180A is a monolithic CMOS device designed to implement primary rate (1.544 MHz) T-carrier transmission systems. The 193S framing mode is intended to support existing F1/Fs applications (12 frames/superframe). The 193E framing mode supports the extended superframe format (24 frames/superframe). Clear channel capability is provided by selection of appropriate zero suppression and signaling modes.

PIN ASSIGNMENT



40-Pin DIP (600 MIL)



44-PIN PLCC

FEATURES

- Single-chip primary rate transceiver meets CCITT standards G.704, G.706 and G.732
- Supports new CRC4-based framing standards and CAS and CCS signalling standards
- Simple serial interface used for device configuration and control in processor mode
- Hardware mode requires no host processor; intended for stand-alone applications
- Comprehensive, on-chip alarm generation, alarm detection, and error logging logic
- Shares footprint with DS2180A T1 Transceiver
- Companion to DS2175 T1/CEPT Elastic Store, DS2186 Transmit Line Interface, DS2187 Receive Line Interface, and DS2188 Jitter Attenuator
- 5V supply; low-power CMOS technology

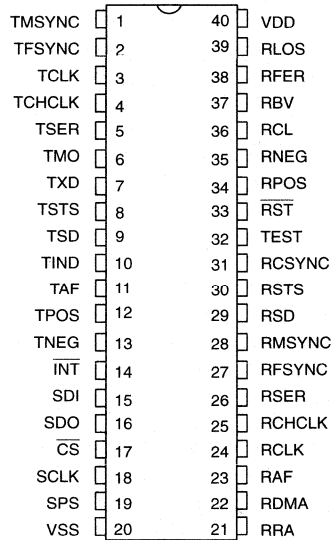
DESCRIPTION

The DS2181A is designed for use in CEPT networks and supports all logical requirements of CCITT Red Book Recommendations G.704, G.706 and G.732. The transmit side generates framing patterns and CRC4 codes, formats outgoing channel and signalling data, and produces network alarm codes when enabled. The receive side decodes the incoming data and establishes frame, CAS multiframe, and CRC4 multiframe alignments. Once synchronized, the device extracts channel, signalling, and alarm data.

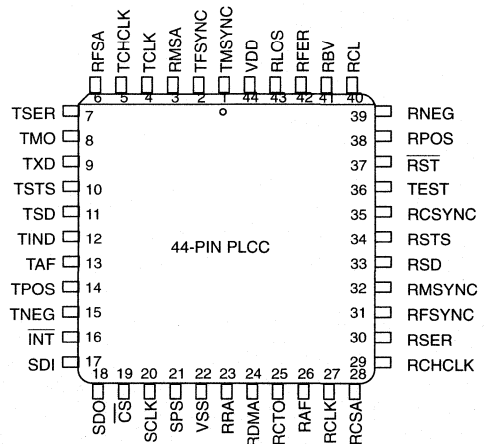
A serial port allows access to 14 on-chip control and status registers in the processor mode. In this mode, a host processor controls features such as error logging, per-channel code manipulation, and alteration of the receive synchronizer algorithm.

The hardware mode is intended for preliminary system prototyping and/or retrofitting into existing systems. This mode requires no host processor and disables special features available in the processor mode.

PIN ASSIGNMENT



40-Pin DIP (600 MIL)



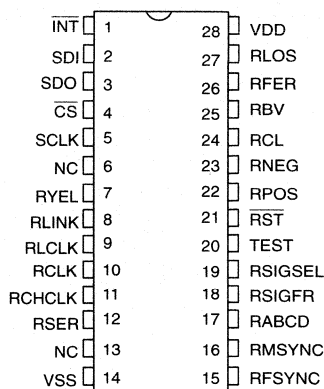
FEATURES

- Performs framing and monitoring functions
- Supports Superframe and Extended Superframe formats
- Four onboard error counters
 - 16-bit bipolar violation
 - 8-bit CRC
 - 8-bit OOF
 - 8-bit frame bit error
- Indication of the following
 - yellow and blue alarms
 - incoming B8ZS code words
 - 8 and 16 zero strings
 - change of frame alignment
 - loss of sync
 - carrier loss
- Simple serial interface used for configuration, control and status monitoring
- Burst mode allows quick access to counters for status updates
- Automatic counter reset feature
- Single 5V supply; low-power CMOS technology
- Available in 28-pin DIP and 28-pin PLCC
- The DS2182A is upward-compatible from the original DS2182

DESCRIPTION

The DS2182A T1 Line Monitor Chip is a monolithic CMOS device designed to monitor real-time performance on T1 lines. The DS2182A frames to the data on the line, counts errors, and supplies detailed information about the status and condition of the line. Large on-board counters allow the accumulation of errors for ex-

PIN ASSIGNMENT



28-Pin DIP (600 MIL)

The updated DS2182A includes the following changes from the original DS2182:

- ability to count excessive zeros
- Severely Errored Framing Event indication
- updated AIS detection
- updated RCL detection
- AIS and RCL alarm clear indications

tended periods, which permits a single CPU to monitor a number of T1 lines. Output clocks that are synchronized to the incoming data stream are provided for easy extraction of S-Bits, FDL bits, signaling bits, and channel data. The DS2182A meets the requirements of ANSI T1.231.

FEATURES

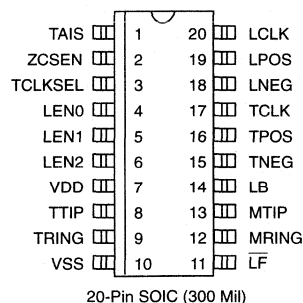
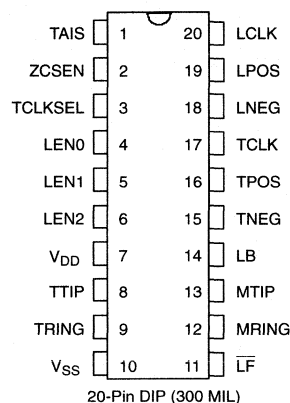
- Line interface for T1 (1.544 MHz) and CEPT (2.048 MHz) primary rate networks
- On-chip transmit LBO (line build out) and line drivers eliminate external components
- Programmable output pulse shape supports short- and long-loop applications
- Supports bipolar and unipolar input data formats
- Transparent B8ZS and HDB3 zero code suppression modes
- Compatible with DS2180A T1 and DS2181A CEPT Transceivers DS2141A T1 and DS2143 E1 Controllers
- Companion to the DS2187 Receive Line Interface and DS2188 T1/CEPT Jitter Attenuator
- Single 5V supply; low-power CMOS technology

DESCRIPTION

The DS2186 T1/CEPT Transmit Line Interface Chip interfaces user equipment to North American (T1–1.544 MHz) and European (CEPT–2.048 MHz) primary rate communications networks. The device is compatible with all types of twisted pair and coax cable found in such networks.

Key on-chip components include: programmable wave shaping circuitry, line drivers, remote loopback, and zero suppression logic. A line-coupling transformer is the only external component required.

PIN ASSIGNMENT



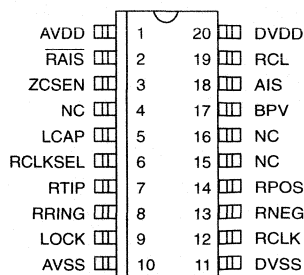
Short loop (DSX–1, 0 to 655 feet) and long loop (CSU; 0 dB, –7.5 dB and –15 dB) pulse templates found in T1 applications are supported. Appropriate CCITT recommendations are met in the CEPT mode.

Application areas include DACS, CSU, CPE, channel banks, and PABX-to-computer interfaces such as DMI and CPI. The DS2186 supports ISDN–PRI (Primary Rate Interface) specifications.

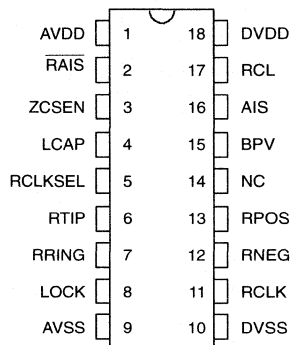
FEATURES

- Line interface for T1 (1.544 MHz) and CEPT (2.048 MHz) primary rate networks
- Extracts clock and data from twisted pair or coax
- Meets requirements of PUB 43801, TR 62411, and applicable CCITT G.823
- Precision on-chip PLL eliminates external crystal or LC tank - no tuning required
- Decodes AMI, B8ZS, and HDB3 coded signals
- Designed for short loop applications such as terminal equipment to DSX-1
- Reports alarm and error events
- Compatible with the DS2180A T1/ISDN Primary Rate and DS2181A CEPT Transceivers, as well as DS2141A T1 and DS2143 E1 Controllers
- Companion to the DS2186 T1/CEPT Transmit Line Interface and DS2188 T1/CEPT Jitter Attenuator
- Single 5V supply; low-power CMOS technology

PIN ASSIGNMENT



20-Pin SOIC (300 Mil)



18-Pin DIP (300 Mil)

DESCRIPTION

The DS2187 T1/CEPT Receive Line Interface Chip interfaces user equipment to North American (T1 1.544 MHz) and European (CEPT 2.048 MHz) primary rate communication networks. The device extracts clock and data from twisted pair or coax transmission media and eliminates expensive discrete components and/or

manual tuning required in existing T1 and CEPT line termination electronics.

Application areas include DACS, CSU, CPE, channel banks, and PABX-to-computer interfaces such as DMI and CPI.

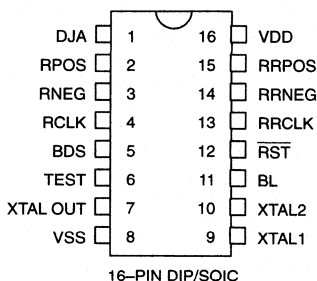
DALLAS SEMICONDUCTOR

DS2188 T1/CEPT Jitter Attenuator

FEATURES

- Attenuates clock and data jitter present in T1 or CEPT lines
- Meets the jitter attenuation templates outlined in TR62411, TR-TSY-000170, G.735, and G.742
- Only one external component required; either a 6.176 MHz (T1) or 8.192 MHz (CEPT) crystal
- Selectable buffer size of 128 or 32 bits
- Jitter attenuation is easily disabled
- Single +5V supply; low-power CMOS technology
- Available in 16-pin DIP and 16-pin SOIC (DS2188S)
- Companion to the DS2186 Transmit Line and DS2187 Receive Line Interfaces

PIN ASSIGNMENT



DESCRIPTION

The DS2188 T1/CEPT Jitter Attenuator Chip contains a 128 X 2-bit buffer which, in conjunction with an external 4X crystal, is used to attenuate the incoming jitter present in clock and data. The device meets all of the latest applicable specifications including those outlined in TR 62411 (Accunet* T1.5 Service Description and Interface Specifications, December 1990), TR-TSY-000170 (Digital Cross-Connect System Requirements and Ob-

jectives, November 1985), and the CCITT Recommendations G.735 and G.742. The DS2188 is compatible with the DS2180A T1/ISDN Primary Rate Transceiver and DS2181A CEPT Transceiver and it is the companion to the DS2187 T1/CEPT Receive Line Interface and DS2186 T1/CEPT Transmit Line Interface. It can also be used in conjunction with the DS2190 T1 Network Interface Unit.

* Service mark of AT&T Communications

THERMAL MANAGEMENT

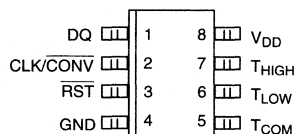
FEATURES

- Requires no external components
- Supply voltage range covers from 2.7V to 5.5V
- Measures temperatures from -55°C to $+125^{\circ}\text{C}$ in 0.5°C increments. Fahrenheit equivalent is -67°F to $+257^{\circ}\text{F}$ in 0.9°F increments
- Temperature is read as a 9-bit value
- Converts temperature to digital word in 1 second (max)
- Thermostatic settings are user-definable and non-volatile
- Data is read from/written via a 3-wire serial interface (CLK, DQ, $\overline{\text{RST}}$)
- Applications include thermostatic controls, industrial systems, consumer products, thermometers, or any thermally sensitive system
- 8-pin DIP or SOIC (208 mil) packages

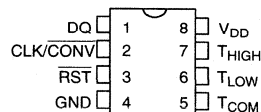
DESCRIPTION

The DS1620 Digital Thermometer and Thermostat provides 9-bit temperature readings which indicate the temperature of the device. With three thermal alarm outputs, the DS1620 can also act as a thermostat. T_{HIGH} is driven high if the DS1620's temperature is greater than or equal to a user-defined temperature TH. T_{LOW} is driven high if the DS1620's temperature is less than or equal to a user-defined temperature TL. T_{COM} is driven

PIN ASSIGNMENT



DS1620S 8-PIN SOIC (208 MIL)
See Mech Drawings Section



DS1620 8-PIN PDIP (300 MIL)
See Mech Drawings Section

PIN DESCRIPTION

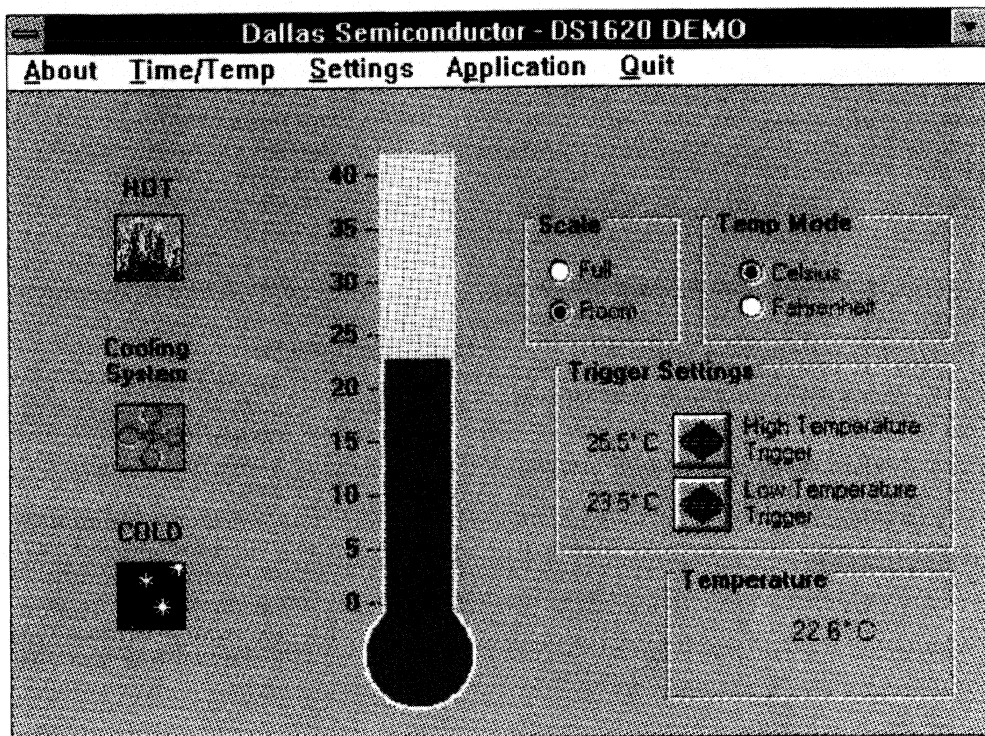
DQ	– 3-Wire Input/Output
CLK/ $\overline{\text{CONV}}$	– 3-Wire Clock Input and Stand-alone Convert Input
$\overline{\text{RST}}$	– 3-Wire Reset Input
GND	– Ground
T_{HIGH}	– High Temperature Trigger
T_{LOW}	– Low Temperature Trigger
T_{COM}	– High/Low Combination Trigger
V_{DD}	– Power Supply Voltage (3V – 5V)

high when the temperature exceeds TH and stays high until the temperature falls below that of TL.

User-defined temperature settings are stored in non-volatile memory, so parts can be programmed prior to insertion in a system, as well as used in stand-alone applications without a CPU. Temperature settings and temperature readings are all communicated to/from the DS1620 over a simple 3-wire interface.

DALLAS SEMICONDUCTOR

DS1620K Digital Thermometer and Thermostat Demonstration Kit



The DS1620K demonstration kit allows a potential user of the DS1620 to observe the operation of the DS1620 in an actual temperature measurement application. Temperature is measured and displayed in a text box, as well as on a graphical thermometer. Thermostat trip-points may be set by the user, and a graphical display of the status of each thermostat output is available on the screen at all times. Temperature may be displayed in Celsius or Fahrenheit.

The DS1620K consists of a small printed circuit board with a DS1620 mounted on it, and a connector and cable is supplied to allow the user to connect the device to a PC parallel port. The demonstration kit “steals” power from the PC’s parallel port, so no additional power supplies are needed.

Software is provided that runs under Windows 3.1 and also under DOS.

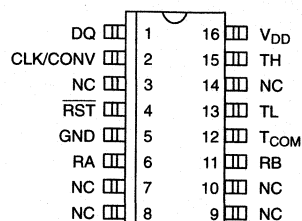
FEATURES

- Requires no external components
- Measures temperatures from -55°C to $+125^{\circ}\text{C}$ in 0.5°C increments. Fahrenheit equivalent is -67°F to 257°F in 0.9°F increments
- Temperature is read as a 9-bit value
- Converts temperature to digital word in 200 ms, typical
- Thermostatic settings are user-definable and non-volatile
- Internal 50 ohm resistor provides self heating
- Data is read from/written via a 3-wire serial interface (CLK, DQ, RST)
- Applications include thermostatic controls, industrial systems, consumer products, thermometers, or any thermally sensitive system
- 16-pin SOIC package

DESCRIPTION

The DS1620R self-heating temperature sensor provides 9-bit temperature readings which indicate the temperature of the device. The internal 50 ohm resistor acts as the self-heating element. Predictable self-heating characteristics allow users to model temperature rise of active components in their system, allowing monitoring of airflow and other thermal management parameters. With three thermal alarm outputs, the DS1620R can also act as a thermostat. T_{HIGH} is driven high if the DS1620R's temperature exceeds a user defined temperature TH. T_{LOW} is driven high if the

PIN ASSIGNMENT



DS1620R
16-PIN SOIC (300 MIL)

PIN DESCRIPTION

DQ	- 3-Wire Input/Output
CLK/CONV	- 3-Wire Clock Input and Standalone Convert Input
RST	- 3-Wire Reset Input
GND	- Ground
RA	- Connection to internal 50Ω resistor
RB	- Connection to internal 50Ω resistor
T_{HIGH}	- High Temperature Trigger
T_{LOW}	- Low Temperature Trigger
T_{COM}	- High/Low Combination Trigger
VDD	- Power Supply Voltage (+5V)

DS1620R's temperature falls below a user defined temperature TL. T_{COM} is driven high when the temperature exceeds TH, and stays high until the temperature falls below that of TL.

User defined temperature settings are stored in non-volatile memory, so parts may be programmed prior to insertion in a system, as well as used in stand-alone applications without a CPU. Temperature settings, and temperature readings are all communicated to/from the DS1620R over a simple 3-wire interface.

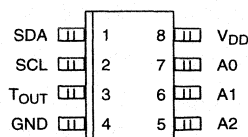
FEATURES

- Temperature measurements require no external components
- Measures temperatures from -55°C to $+125^{\circ}\text{C}$ in 0.5°C increments. Fahrenheit equivalent is -67°F to 257°F in 0.9°F increments
- Temperature is read as a 9-bit value (two byte transfer)
- Wide power supply range (2.7V to 5.5V)
- Converts temperature to digital word in 1 second
- Thermostatic settings are user definable and nonvolatile
- Data is read from/written via a 2-wire serial interface (open drain I/O lines)
- Applications include thermostatic controls, industrial systems, consumer products, thermometers, or any thermal sensitive system.
- 8-pin DIP or SOIC package

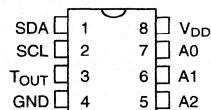
DESCRIPTION

The DS1621 digital thermometer and thermostat provides 9-bit temperature readings which indicate the temperature of the device. The thermal alarm output, T_{OUT} , is active when the temperature of the device

PIN ASSIGNMENT



DS1621S
8-PIN SOIC (150 MIL)
See Mech. Drawings
Section



DS1621
8-PIN DIP (300 MIL)
See Mech. Drawings
Section

PIN DESCRIPTION

SDA	– 2-Wire Serial Data Input/Output
SCL	– 2-Wire Serial Clock
GND	– Ground
T_{OUT}	– Thermostat Output Signal
A0	– Chip Address Input
A1	– Chip Address Input
A2	– Chip Address Input
V_{DD}	– Power Supply Voltage

exceeds a user-defined temperature TH. The output remains active until the temperature drops below user defined temperature TL, allowing for any hysteresis necessary.

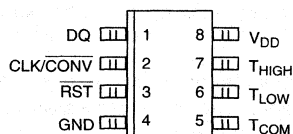
FEATURES

- Requires no external components
- Supply voltage range covers from 2.7V to 5.5V
- Measures temperatures from -55°C to $+125^{\circ}\text{C}$ in 0.5°C increments. Fahrenheit equivalent is -67°F to $+257^{\circ}\text{F}$ in 0.9°F increments
- Temperature is read as a 9-bit value
- Converts temperature to digital word in 1 second (max)
- Thermostatic settings are user-definable and non-volatile
- Data is read from/written via a 3-wire serial interface (CLK, DQ, RST)
- Applications include thermostatic controls, industrial systems, consumer products, thermometers, or any thermally sensitive system
- 8-pin DIP or SOIC (208 mil) packages

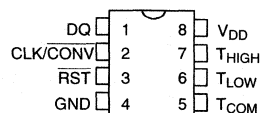
DESCRIPTION

The DS1623 Digital Thermometer and Thermostat provides 9-bit temperature readings which indicate the temperature of the device. With three thermal alarm outputs, the DS1623 can also act as a thermostat. T_{HIGH} is driven high if the DS1623's temperature is greater than or equal to a user-defined temperature TH. T_{LOW} is driven high if the DS1623's temperature is less than or equal to a user-defined temperature TL. T_{COM} is driven high when the temperature exceeds TH and stays high until the temperature falls below that of TL.

PIN ASSIGNMENT



DS1623S 8-PIN SOIC (208 MIL)
See Mech Drawings Section



DS1623 8-PIN PDIP (300 MIL)
See Mech Drawings Section

PIN DESCRIPTION

DQ	– 3-Wire Input/Output
CLK/CONV	– 3-Wire Clock Input and Stand-alone Convert Input
RST	– 3-Wire Reset Input
GND	– Ground
T_{HIGH}	– High Temperature Trigger
T_{LOW}	– Low Temperature Trigger
T_{COM}	– High/Low Combination Trigger
V_{DD}	– Power Supply Voltage (3V – 5V)

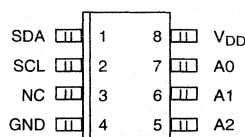
User-defined temperature settings are stored in non-volatile memory, so parts can be programmed prior to insertion in a system, as well as used in stand-alone applications without a CPU. Temperature settings and temperature readings are all communicated to/from the DS1623 over a simple 3-wire interface.

User defined temperature settings are stored in non-volatile memory, so parts may be programmed prior to insertion in a system. Temperature settings, and temperature readings are all communicated to/from the DS1621 over a simple 2-wire serial interface.

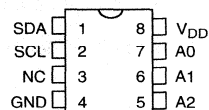
FEATURES

- Temperature measurements require no external components
- Measures temperatures from -55°C to $+125^{\circ}\text{C}$ in 0.03125°C increments. Fahrenheit equivalent is -67°F to $+257^{\circ}\text{F}$ in 0.05625°F increments
- Temperature is read as a 13-bit value (two byte transfer)
- Converts temperature to digital word in 1 second (MAX)
- 256 bytes of E^2 memory on board for storing information such as frequency compensation coefficients
- Data is read/written via a 2-wire serial interface (open drain I/O lines)
- Applications include temperature-compensated crystal oscillators for test equipment and radio systems
- 8-pin DIP or SOIC package

PIN ASSIGNMENT



DS1624S
8-PIN SOIC (208 MIL)
See Mech. Drawings
Section



DS1624
8-PIN DIP (300 MIL)
See Mech. Drawings
Section

PIN DESCRIPTION

SDA	– 2-Wire Serial Data Input/Output
SCL	– 2-Wire Serial Clock
GND	– Ground
A0	– Chip Address Input
A1	– Chip Address Input
A2	– Chip Address Input
V _{DD}	– Digital Power Supply (+3V – +5V)
NC	– No Connection

DESCRIPTION

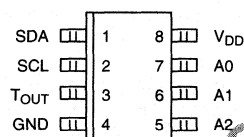
The DS1624 consists of a digital thermometer and 256 bytes of E^2 memory. The thermometer provides 13-bit temperature readings which indicate the temperature of the device. The E^2 memory allows a user to store fre-

quency compensation coefficients for digital correction of crystal frequency due to temperature. Any other type of information may also reside in this user space.

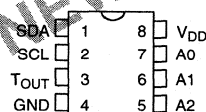
FEATURES

- Temperature measurements require no external components
- Measures temperatures from -55°C to $+125^{\circ}\text{C}$ in 0.5°C increments. Fahrenheit equivalent is -67°F to 257°F in 0.9°F increments
- Temperature is read as a 9-bit value (two byte transfer)
- Converts temperature to digital word in 500 ms (MAX)
- Thermostatic settings are user definable and nonvolatile
- Data is read from/written via a 2-wire serial interface (open drain I/O lines)
- Applications include thermostatic controls, industrial systems, consumer products, thermometers, or any thermal sensitive system
- 8-pin DIP or SOIC package

PIN ASSIGNMENT



DS1625S
8-PIN SOIC (208 MIL)
See Mech. Drawings
Section



DS1625
8-PIN DIP (300 MIL)
See Mech. Drawings
Section

PIN DESCRIPTION

SDA	– 2-Wire Serial Data Input/Output
SCL	– 2-Wire Serial Clock
GND	– Ground
T _{OUT}	– Thermostat Output Signal
A0	– Chip Address Input
A1	– Chip Address Input
A2	– Chip Address Input
V _{DD}	– Power Supply Voltage (+5V)

DESCRIPTION

The DS1625 digital thermometer and thermostat provides 9-bit temperature readings which indicate the temperature of the device. The thermal alarm output, T_{OUT}, is active when the temperature of the device exceeds a user-defined temperature TH. The output remains active until the temperature drops below user

defined temperature TL, allowing for any hysteresis necessary.

***DS1621 WILL REPLACE DS1625**

DALLAS SEMICONDUCTOR

DS1820 1-Wire™ Digital Thermometer

FEATURES

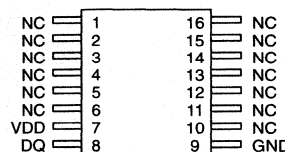
- Unique 1-Wire™ interface requires only one port pin for communication
- Multidrop capability simplifies distributed temperature sensing applications
- Requires no external components
- Can be powered from data line
- Zero standby power required
- Measures temperatures from -55°C to $+125^{\circ}\text{C}$ in 0.5°C increments. Fahrenheit equivalent is -67°F to $+257^{\circ}\text{F}$ in 0.9°F increments
- Temperature is read as a 9-bit digital value
- Converts temperature to digital word in 200 ms (typ.)
- User-definable, nonvolatile temperature alarm settings
- Alarm search command identifies and addresses devices whose temperature is outside of programmed limits (temperature alarm condition)
- Applications include thermostatic controls, industrial systems, consumer products, thermometers, or any thermally sensitive system

DESCRIPTION

The DS1820 Digital Thermometer provides 9-bit temperature readings which indicate the temperature of the device.

Information is sent to/from the DS1820 over a 1-Wire interface, so that only one wire (and ground) needs to be connected from a central microprocessor to a DS1820. Power for reading, writing, and performing temperature conversions can be derived from the data line itself with no need for an external power source.

PIN ASSIGNMENT



DS1820
PR35 PACKAGE
See Mech. Drawings
Section

DS1820S
16-PIN SSOP
See Mech. Drawings
Section

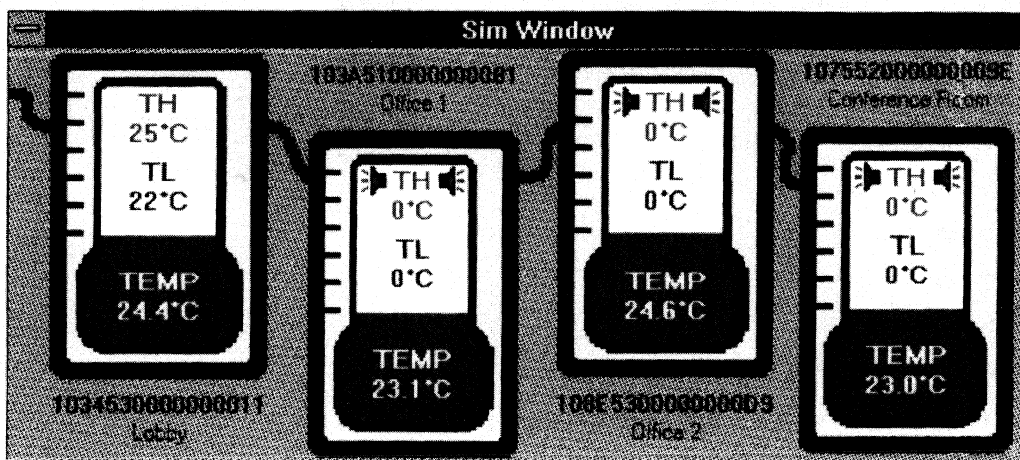
PIN DESCRIPTION

GND	–	Ground
DQ	–	Data In/Out
V _{DD}	–	Optional V _{DD}
NC	–	No Connect

User defined temperature settings are stored in non-volatile memory, so parts may be programmed prior to insertion in a system. Temperature settings, and temperature readings are all communicated to/from the DS1820 over a simple 2-wire serial interface.

DALLAS SEMICONDUCTOR

DS1820K 1-Wire™ Digital Thermometer Demonstration Kit



The DS1820K demonstration kit allows a potential user of the DS1820 to observe the operation of the DS1820 in an actual, multipoint temperature measurement application.

The DS1820K consists of a connector that attaches to the parallel port of a PC, and two cables with small PC boards attached. These PC boards carry a DS1820 and connector which allows these assemblies to be connected in parallel, so that several DS1820s can be connected to the PC parallel port. The demonstration kit “steals” power from the PC’s parallel port, so no additional power supplies are needed.

Each DS1820 contains a unique, 64-bit serial number. The DS1820K software identifies each DS1820 connected to it, and displays the serial number. The user can then assign any name to any device, which can describe what that device corresponds to; for example, “Lobby” or “Office”.

In the Simulation window, all devices connected to the PC are shown, along with the current measured temperature. Each DS1820 can also store thermostatic limits; a high limit (TH) and a low limit (TL). These values are displayed for each device. These thermostatic limits can be used to identify to the host which devices are outside their limits, and a corresponding “alarm condition” exists. The Simulation window shows devices in this condition with “alarm icons”.

In the “Bus Experimentation” window, the user has full access to all of the registers in the DS1820. Each device which is attached has its ROM code (64-bit serial number) displayed. As more devices are added, the user can learn their ROM code by performing a “Search ROM”. Double-clicking on the ROM code brings up a dialog box which allows the user to enter the name of the device.

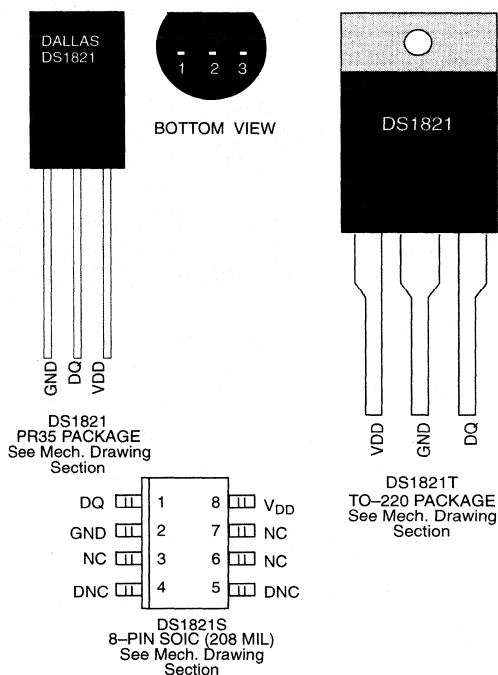
DALLAS SEMICONDUCTOR

DS1821 Programmable Digital Thermostat

FEATURES

- Requires no external components
- Measures temperatures from -55°C to $+125^{\circ}\text{C}$ in 1°C increments. Fahrenheit equivalent is -67°F to $+257^{\circ}\text{F}$ in 1.8°F increments
- Converts temperature to digital word in 1 second (max.)
- Thermostatic settings are user definable and nonvolatile
- Available in 3-pin PR35, TO-220, and 8-pin SOIC packages
- Applications include thermostatic controls, industrial systems, consumer products, thermometers, or any thermally sensitive system

PIN ASSIGNMENT



PIN DESCRIPTION

GND	– Ground
DQ	– Data In/Out
V _{DD}	– Power Supply Voltage +5V
NC	– No Connect
DNC	– Do Not Connect

DESCRIPTION

The DS1821 Programmable Digital Thermostat provides a thermal alarm logic output when the temperature of the device exceeds a user-defined temperature TH. The output remains active until the temperature drops below user defined temperature TL, allowing for any hysteresis necessary.

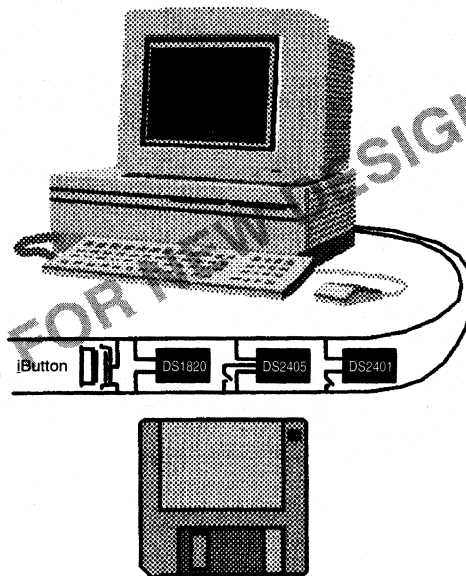
User-defined temperature settings are stored in non-volatile memory, so parts can be programmed prior to insertion in a system. Communication to/from the DS1821 is accomplished through the DQ pin in a programming mode; this same pin is used in operation as the thermostat output.

DALLAS SEMICONDUCTOR

DS9091K 1-Wire™ MicroLAN™ Evaluation Kit

FEATURES

- Evaluation kit for 1-Wire MicroLAN networking through the serial port of an IBM PC-compatible computer
- 5 experiments of different complexity demonstrate typical MicroLAN applications such as window/door monitor, temperature monitor, burglar alarm system with integrated room temperature control
- Easy to understand manual explains experiments, communications protocol, MicroLAN components, theory of operation, interfacing and network optimization
- Featured MicroLAN components: DS2401, DS2405, DS1820, DS1990A, DS1993 and DS9097 Serial Port adapter
- 3¹/₂" disk with evaluation software for Windows including C++ source code listings
- Book of DS19xx iButton Standards
- Automatic Identification Data Book
- Touch Connections Catalog



DESCRIPTION

The DS9091K MicroLAN Evaluation Kit provides hardware, software and documentation for evaluation of Dallas Semiconductor's 1-Wire MicroLAN technology using integrated circuits and iButtons. The software included in the kit runs under Windows on a PC-compatible DOS computer. It consists of 5 modules demonstrating 1) window/door monitor with DS2401, 2) Window/door monitor with DS2405, 3) Temperature logger with DS1820, 4) simulated room temperature control with DS1820 and DS2405 and 5) burglar alarm system with simulated room temperature control. Each experiment can be expanded by simply adding more components available from Dallas Semiconductor.

The kit includes all special electrical and mechanical components required for the experiments. Not included are unshielded twisted pair cable, mechanical switches and a battery (4.5 or 6V). Experiments 4 and 5 allow controlling an electric heater and air conditioner. The relays for power switching are not included. For demonstration and electrical safety, these appliances are replaced by battery-operated LEDs.

Windows is a trademark of Microsoft Corporation.



TIMEKEEPING

DALLAS SEMICONDUCTOR

DS1202, DS1202S Serial Timekeeping Chip

FEATURES

- Real time clock counts seconds, minutes, hours, date of the month, month, day of the week, and year with leap year compensation valid up to 2100
- 24 x 8 RAM for scratchpad data storage
- Serial I/O for minimum pin count
- 2.0–5.5 volt full operation
- Uses less than 300 nA at 2 volts
- Single-byte or multiple-byte (burst mode) data transfer for read or write of clock or RAM data
- 8-pin DIP or optional 16-pin SOIC for surface mount
- Simple 3-wire interface
- TTL-compatible ($V_{CC} = 5V$)
- Optional industrial temperature range $-40^{\circ}C$ to $+85^{\circ}C$ (IND)

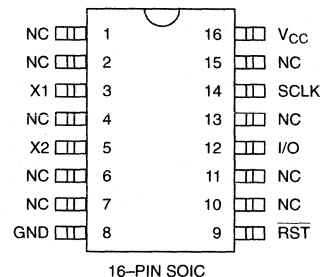
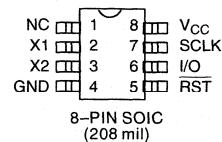
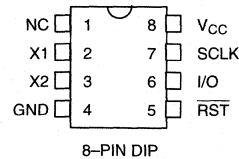
ORDERING INFORMATION

DS1202	8-pin DIP
DS1202S	16-pin SOIC
DS1202S-8	8-pin SOIC
DS1202N	8-pin DIP (IND)
DS1202SN	16-pin SOIC (IND)
DS1202SN-8	8-pin SOIC (IND)

DESCRIPTION

The DS1202 Serial Timekeeping Chip contains a real time clock/calendar and 24 bytes of static RAM. It communicates with a microprocessor via a simple serial interface. The real time clock/calendar provides seconds, minutes, hours, day, date, month, and year information. The end of the month date is automatically adjusted for months with less than 31 days, including corrections for leap year. The clock operates in either the 24-hour or 12-hour format with an AM/PM indicator. Interfacing the

PIN ASSIGNMENT



PIN DESCRIPTION

NC	– No Connection
X1, X2	– 32.768 KHz Crystal Input
GND	– Ground
\overline{RST}	– Reset
I/O	– Data Input/Output
SCLK	– Serial Clock
V_{CC}	– Power Supply Pin

DS1202 with a microprocessor is simplified by using synchronous serial communication. Only three wires are required to communicate with the clock/RAM: (1) \overline{RST} (Reset), (2) I/O (Data line), and (3) SCLK (Serial clock). Data can be transferred to and from the clock/RAM one byte at a time or in a burst of up to 24 bytes. The DS1202 is designed to operate on very low power and retain data and clock information on less than 1 micro-watt.

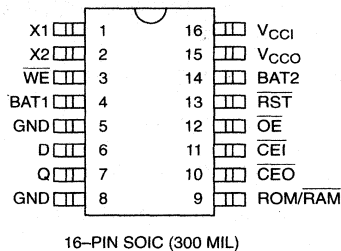
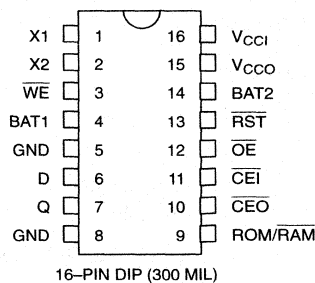
FEATURES

- Keeps track of hundredths of seconds, seconds, minutes, hours, days, date of the month, months, and years
- Adjusts for months with fewer than 31 days
- Leap year automatically corrected up to 2100
- No address space required
- Provides nonvolatile controller functions for battery backup of RAM
- Supports redundant batteries for high-reliability applications
- Uses a 32.768 KHz watch crystal
- Full $\pm 10\%$ operating range
- Operating temperature range 0°C to 70°C
- Space-saving, 16-pin DIP package and SOIC
- Optional industrial temperature range -40°C to $+85^{\circ}\text{C}$ (IND)

DESCRIPTION

The DS1215 Phantom Time Chip is a combination of a CMOS timekeeper and a nonvolatile memory controller. In the absence of power, an external battery maintains the timekeeping operation and provides power for a CMOS static RAM. The watch keeps track of hundredths of seconds, seconds, minutes, hours, day, date, month, and year information. The last day of the month is automatically adjusted for months with less than 31 days, including correction for leap year every four years. The watch operates in one of two formats: a 12-hour mode with an AM/PM indicator or a 24-hour mode. The nonvolatile controller supplies all the necessary support circuitry to convert a CMOS RAM to a nonvolatile memory. The DS1215 can be interfaced with either RAM or ROM without leaving gaps in memory.

PIN ASSIGNMENT



PIN DESCRIPTION

X1, X2	– 32.768 KHz Crystal Connections
WE	– Write Enable
BAT1	– Battery 1 Input
GND	– Ground
D	– Data In
Q	– Data Out
ROM/RAM	– ROM/RAM Select
CEO	– Chip Enable Out
CEI	– Chip Enable Input
OE	– Output Enable
RST	– Reset
BAT2	– Battery 2 Input
VCC0	– Switched Supply Output
VCC1	– +5 VDC Input

NOTE: Both pins 5 and 8 must be grounded.

ORDERING INFORMATION

DS1215	16-pin DIP
DS1215S	16-pin SOIC
DS1215N	16-pin DIP (IND)
DS1215SN	16-pin SOIC (IND)

DALLAS

SEMICONDUCTOR

DS1243Y

64K NV SRAM with Phantom Clock

FEATURES

- Real time clock keeps track of hundredths of seconds, seconds, minutes, hours, days, date of the month, months, and years
- 8K x 8 NV SRAM directly replaces volatile static RAM or EEPROM
- Embedded lithium energy cell maintains calendar operation and retains RAM data
- Watch function is transparent to RAM operation
- Month and year determine the number of days in each month; valid up to 2100
- Standard 28-pin JEDEC pinout
- Full $\pm 10\%$ operating range
- Operating temperature range 0°C to 70°C
- Accuracy is better than ± 1 minute/month @ 25°C
- Over 10 years of data retention in the absence of power
- Available in 120, 150 and 200 ns access time

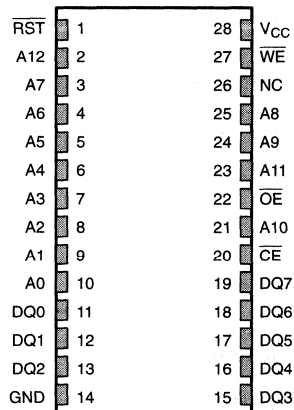
ORDERING INFORMATION

DS1243Y-XXX		
	└─>	-120 120 ns access
		-150 150 ns access
DS1243Y		200 ns access

DESCRIPTION

The DS1243Y 64K NV SRAM with Phantom Clock is a fully static nonvolatile RAM (organized as 8192 words by 8 bits) with a built-in real time clock. The DS1243Y has a self-contained lithium energy source and control circuitry which constantly monitors V_{CC} for an out-of-tolerance condition. When such a condition occurs, the lithium energy source is automatically switched on and write protection is unconditionally enabled to prevent corrupted data in both the memory and real time clock.

PIN ASSIGNMENT



28-PIN ENCAPSULATED PACKAGE
720 MIL EXTENDED

PIN DESCRIPTION

A_0 - A_{12}	- Address Inputs
\overline{CE}	- Chip Enable
GND	- Ground
DQ_0 - DQ_7	- Data In/Data Out
V_{CC}	- Power (+5V)
\overline{WE}	- Write Enable
\overline{OE}	- Output Enable
NC	- No Connect
\overline{RST}	- Reset

The Phantom Clock provides timekeeping information including hundredths of seconds, seconds, minutes, hours, day, date, month, and year information. The date at the end of the month is automatically adjusted for months with less than 31 days, including correction for leap years. The Phantom Clock operates in either 24-hour or 12-hour format with an AM/PM indicator.

FEATURES

- Real time clock keeps track of hundredths of seconds, minutes, hours, days, date of the month, months, and years
- 32K x 8 NV SRAM directly replaces volatile static RAM or EEPROM
- Embedded lithium energy cell maintains calendar operation and retains RAM data
- Watch function is transparent to RAM operation
- Month and year determine the number of days in each month; valid up to 1200
- Standard 28-pin JEDEC pinout
- Full 10% operating range
- Operating temperature range 0°C to 70°C
- Accuracy is better than ± 1 minute/month @ 25°C
- Over 10 years of data retention in the absence of power
- Available in 120, 150 and 200 ns access time

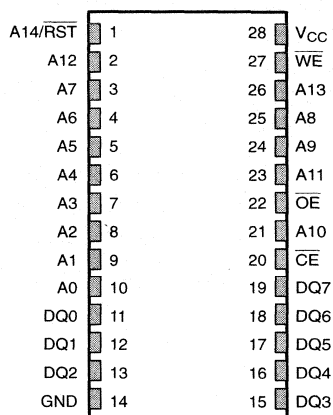
ORDERING INFORMATION

DS1244Y-XXX		
	↙	
	-120	120 ns access
	-150	150 ns access
DS1244Y		200 ns access

DESCRIPTION

The DS1244Y 256K NV SRAM with Phantom Clock is a fully static nonvolatile RAM (organized as 32,768 words by 8 bits) with a built-in real time clock. The DS1244Y has a self-contained lithium energy source and control circuitry which constantly monitors V_{CC} for an out-of-tolerance condition. When such a condition occurs, the lithium energy source is automatically switched on and write protection is unconditionally enabled to prevent garbled data in both the memory and real time clock.

PIN ASSIGNMENT



28-PIN ENCAPSULATED PACKAGE
740 MIL EXTENDED

PIN DESCRIPTION

A_0 - A_{14}	- Address Inputs
\overline{CE}	- Chip Enable
GND	- Ground
DQ ₀ , DQ ₇	- Data In/Data Out
V_{CC}	- Power (+5V)
\overline{WE}	- Write Enable
\overline{OE}	- Output Enable
NC	- No Connect
RST	- Reset

The Phantom Clock provides timekeeping information including hundredths of seconds, seconds, minutes, hours, day, date, month, and year information. The date at the end of the month is automatically adjusted for months with less than 31 days, including correction for leap years. The Phantom Clock operates in either 24-hour or 12-hour format with an AM/PM indicator.

DALLAS SEMICONDUCTOR

DS1248Y 1024K NV SRAM with Phantom Clock

FEATURES

- Real time clock keeps track of hundredths of seconds, minutes, hours, days, date of the month, months, and years
- 128K x 8 NV SRAM directly replaces volatile static RAM or EEPROM
- Embedded lithium energy cell maintains calendar operation and retains RAM data
- Watch function is transparent to RAM operation
- Month and year determine the number of days in each month; valid up to 2100
- Standard 28-pin JEDEC pinout
- Full 10% operating range
- Operating temperature range 0°C to 70°C
- Accuracy is better than ± 1 minute/month @ 25°C
- Over 10 years of data retention in the absence of power
- Available in 120, 150 and 200 ns access time

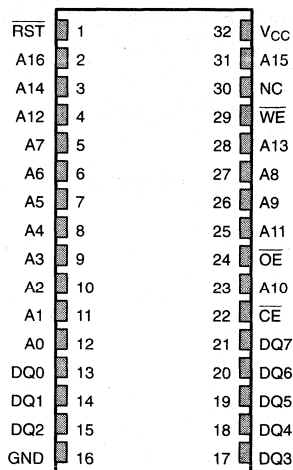
ORDERING INFORMATION

DS1248Y-XXX		
	→ -120	120 ns access
	-150	150 ns access
	-200	200 ns access

DESCRIPTION

The DS1248Y 1024K NV SRAM with Phantom Clock is a fully static nonvolatile RAM (organized as 128K words by 8 bits) with a built-in real time clock. The DS1248Y has a self-contained lithium energy source and control circuitry which constantly monitors V_{CC} for an out-of-tolerance condition. When such a condition occurs, the lithium energy source is automatically switched on and write protection is unconditionally enabled to prevent garbled data in both the memory and real time clock.

PIN ASSIGNMENT



32-PIN ENCAPSULATED PACKAGE
740 MIL FLUSH

PIN DESCRIPTION

A_0 - A_{16}	- Address Inputs
\overline{CE}	- Chip Enable
GND	- Ground
DQ_0 - DQ_7	- Data In/Data Out
V_{CC}	- Power (+5V)
\overline{WE}	- Write Enable
\overline{OE}	- Output Enable
NC	- No Connect
\overline{RST}	- Reset

The Phantom Clock provides timekeeping information including hundredths of seconds, seconds, minutes, hours, day, date, month, and year information. The date at the end of the month is automatically adjusted for months with less than 31 days, including correction for leap years. The Phantom Clock operates in either 24-hour or 12-hour format with an AM/PM indicator.

FEATURES

- Real time clock keeps track of hundredths of seconds, minutes, hours, days, date of the month, months, and years
- 512K x 8 NV SRAM directly replaces volatile static RAM or EEPROM
- Embedded lithium energy cell maintains calendar operation and retains RAM data
- Watch function is transparent to RAM operation
- Month and year determine the number of days in each month; valid up to 2100
- Standard 32-pin JEDEC pinout
- Full 10% operating range
- Operating temperature range 0°C to 70°C
- Accuracy is better than ± 1 minute/month @ 25°C
- Over 10 years of data retention in the absence of power
- Available in 120 ns and 150 ns access time

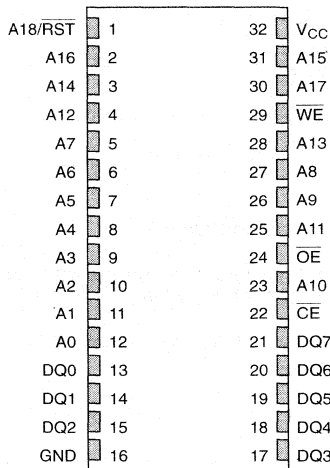
ORDERING INFORMATION

DS1251Y-120	120 ns access
DS1251Y-150	150 ns access

DESCRIPTION

The DS1251Y 4096K NV SRAM with Phantom Clock is a fully static nonvolatile RAM (organized as 512K words by 8 bits) with a built-in real time clock. The DS1251Y has a self-contained lithium energy source and control circuitry which constantly monitors V_{CC} for an out-of-tolerance condition. When such a condition occurs, the lithium energy source is automatically switched on and write protection is unconditionally enabled to prevent garbled data in both the memory and real time clock.

PIN ASSIGNMENT



32-PIN ENCAPSULATED PACKAGE
740 MIL FLUSH

PIN DESCRIPTION

A_0 – A_{18}	– Address Inputs
\overline{CE}	– Chip Enable
GND	– Ground
DQ_0 – DQ_7	– Data In/Data Out
V_{CC}	– Power (+5V)
\overline{WE}	– Write Enable
\overline{OE}	– Output Enable
\overline{RST}	– Reset

The Phantom Clock provides timekeeping information including hundredths of seconds, seconds, minutes, hours, day, date, month, and year information. The date at the end of the month is automatically adjusted for months with less than 31 days, including correction for leap years. The Phantom Clock operates in either 24-hour or 12-hour format with an AM/PM indicator.

DALLAS

SEMICONDUCTOR

DS1283

Watchdog Timekeeper Chip

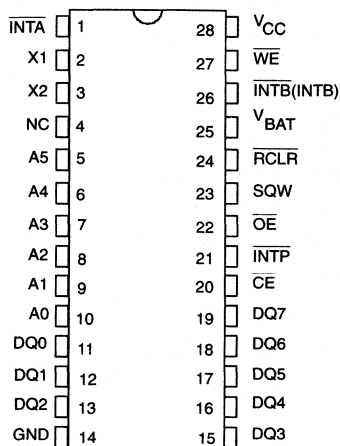
FEATURES

- Keeps track of hundredths of seconds, seconds, minutes, hours, days, date of the month, months, and years; valid leap year compensation up to 2100
- Watchdog timer restarts an out-of-control processor
- Alarm function provides notice of real time related occurrences
- Designed for battery operation
- Programmable interrupts and square wave outputs maintain 28-pin JEDEC footprint
- All registers are individually addressable via the address and data bus
- Accuracy is better than ± 2 minutes/month at 25°C
- 50 bytes of user nonvolatile RAM
- Optional 28-pin SOIC surface mount package
- Low-power CMOS circuitry is maintained on less than 1 μA in standby mode
- Optional industrial temperature range -40°C to +85°C

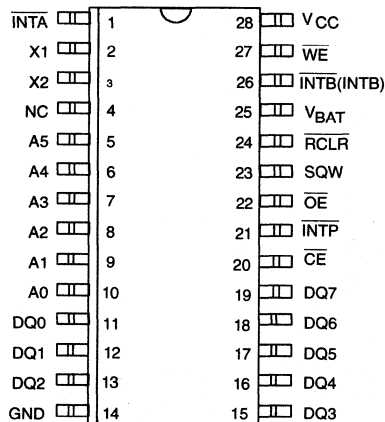
DESCRIPTION

The DS1283 Watchdog Timekeeper Chip is a self-contained real time clock, alarm, watchdog timer, and interval timer in a 28-pin JEDEC DIP or 28-pin SOIC surface mount package. The DS1283 is specifically designed to maintain internal operations from a single low voltage supply. In fact, the only two external components required by the DS1283 are a battery and crystal. For a complete description of operating conditions, electrical characteristics, bus timing, and pin descriptions other than X1, X2, V_{BAT} , V_{CC} , $\overline{\text{RCLR}}$, $\overline{\text{INTB}}$, and $\overline{\text{INTP}}$ see the DS1286 Watchdog Timekeeper data sheet.

PIN ASSIGNMENT



DS1283
28-PIN DIP (600 MIL)



DS1283S
28-PIN SOIC (330 MIL)

NOTE: Pin 4 must be left disconnected.

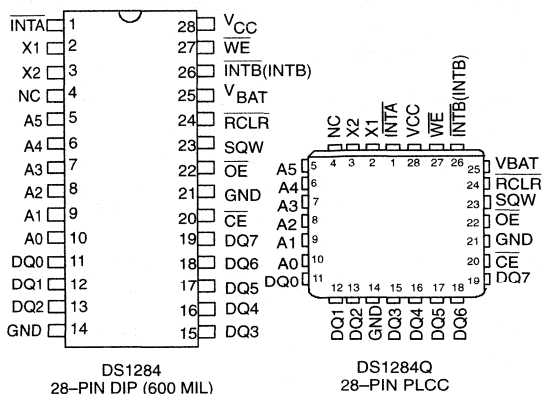
FEATURES

- Keeps track of hundredths of seconds, seconds, minutes, hours, days, date of the month, months, and years; valid leap year compensation up to 2100
- Watchdog timer restarts an out-of-control processor
- Alarm function schedules real-time related activities
- Programmable interrupts and square wave outputs maintain 28-pin JEDEC footprint
- All registers are individually addressable via the address and data bus
- Accuracy is better than ± 2 minute/month at 25°C
- 50 bytes of user NV RAM
- Optional 28-pin PLCC surface mount package
- Low-power CMOS circuitry is maintained on less than 0.5 μ A when power is supplied from battery input
- Optional industrial temperature range available on 28-pin PLCC (-40°C to +85°C)

DESCRIPTION

The DS1284 Watchdog Timekeeper Chip is a self-contained real-time clock, alarm, watchdog timer, and interval timer in a 28-pin JEDEC DIP package or a 28-pin PLCC surface mount package. An external crystal and battery are the only components required to maintain

PIN ASSIGNMENT



PIN DESCRIPTION

$\overline{\text{INTA}}$	– Interrupt Output A (open drain)
$\overline{\text{INTB}}(\text{INTB})$	– Interrupt Output B (open drain)
A0–A5	– Address Inputs
DQ0–DQ7	– Data Input/Output
$\overline{\text{CE}}$	– Chip Enable
$\overline{\text{OE}}$	– Output Enable
$\overline{\text{WE}}$	– Write Enable
V _{CC}	– +5 Volts
GND	– Ground
NC	– No Connection
SQW	– Square Wave Output
X1,X2	– 32.768 KHz Crystal Connections
V _{BAT}	– +3 Volt Battery Input
$\overline{\text{RCLR}}$	– RAM Clear

time-of-day and memory status in the absence of power. For a complete description of operating conditions, electrical characteristics, bus timing, and pin descriptions other than X1, X2, V_{BAT}, and RCLR, see the DS1286 Watchdog Timekeeper data sheet.

DALLAS

SEMICONDUCTOR

DS1286

Watchdog Timekeeper

FEATURES

- Keeps track of hundredths of seconds, seconds, minutes, hours, days, date of the month, months, and years; valid leap year compensation up to 2100
- Watchdog timer restarts an out-of-control processor
- Alarm function schedules real time-related activities
- Embedded lithium energy cell maintains time, watchdog, user RAM, and alarm information
- Programmable interrupts and square wave outputs maintain 28-pin JEDEC footprint
- All registers are individually addressable via the address and data bus
- Accuracy is better than ± 1 minute/month at 25°C
- Greater than 10 years of timekeeping in the absence of V_{CC}
- 50 bytes of user NV RAM

PIN ASSIGNMENT

INTA	1	28	V_{CC}
NC	2	27	\overline{WE}
NC	3	26	\overline{INTB} (INTB)
NC	4	25	NC
A5	5	24	NC
A4	6	23	SQW
A3	7	22	\overline{OE}
A2	8	21	NC
A1	9	20	\overline{CE}
A0	10	19	DQ7
DQ0	11	18	DQ6
DQ1	12	17	DQ5
DQ2	13	16	DQ4
GND	14	15	DQ3

28-PIN ENCAPSULATED PACKAGE
(720 MIL FLUSH)

PIN DESCRIPTION

\overline{INTA}	– Interrupt Output A (open drain)
\overline{INTB} (INTB)	– Interrupt Output B (open drain)
A0–A5	– Address Inputs
DQ0–DQ7	– Data Input/Output
\overline{CE}	– Chip Enable
\overline{OE}	– Output Enable
\overline{WE}	– Write Enable
V_{CC}	– +5 Volts
GND	– Ground
NC	– No Connection
SQW	– Square Wave Output

DESCRIPTION

The DS1286 Watchdog Timekeeper is a self-contained real time clock, alarm, watchdog timer, and interval timer in a 28-pin JEDEC DIP package. The DS1286 contains an embedded lithium energy source and a quartz crystal which eliminates the need for any external circuitry. Data contained within 64 eight-bit registers can be read or written in the same manner as byte-wide static

RAM. Data is maintained in the Watchdog Timekeeper by intelligent control circuitry which detects the status of V_{CC} and write protects memory when V_{CC} is out of tolerance. The lithium energy source can maintain data and real time for over ten years in the absence of V_{CC} .

DALLAS

SEMICONDUCTOR

DS12885, DS12885Q, DS12885T

Real Time Clock

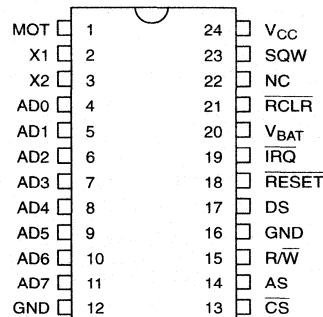
FEATURES

- Drop-in replacement for IBM AT computer clock/calendar
- Pin configuration closely matches MC146818B and DS1285
- Counts seconds, minutes, hours, days, day of the week, date, month, and year with leap year compensation valid up to 2100
- Binary or BCD representation of time, calendar, and alarm
- 12- or 24-hour clock with AM and PM in 12-hour mode
- Daylight Savings Time option
- Selectable between Motorola and Intel bus timing
- Multiplex bus for pin efficiency
- Interfaced with software as 128 RAM locations
 - 14 bytes of clock and control registers
 - 114 bytes of general purpose RAM
- Programmable square wave output signal
- Bus compatible interrupt signals (IRQ)
- Three interrupts are separately software-maskable and testable
 - Time-of-day alarm once/second to once/day
 - Periodic rates from 122 μ s to 500 ms
 - End of clock update cycle
- Optional 28-pin PLCC surface mount package or 32-pin TQFP
- Optional industrial temperature range available

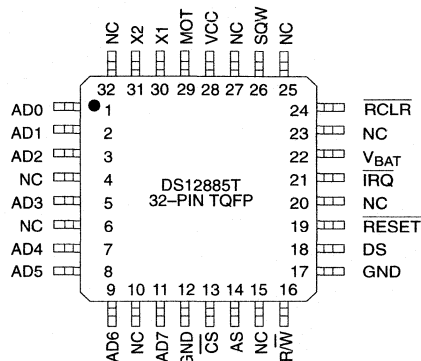
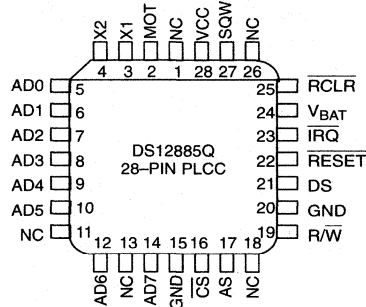
DESCRIPTION

The DS12885 Real Time Clock plus RAM is designed to be a direct replacement for the DS1285. The DS12885 is identical in form, fit, and function to the DS1285, and has an additional 64 bytes of general purpose RAM. Access to this additional RAM space is determined by the logic level presented on AD6 during the address portion of an access cycle. An external crystal and battery are the only components required to maintain time-of-day and memory status in the absence of power. For a complete description of operating conditions, electrical characteristics, bus timing, and pin descriptions other than X1, X2, V_{BAT}, and RCLR, see the DS12887 data sheet.

PIN ASSIGNMENT



DS12885 24-PIN DIP
DS12885S 24-PIN SOIC



DALLAS

SEMICONDUCTOR

DS12887

Real Time Clock

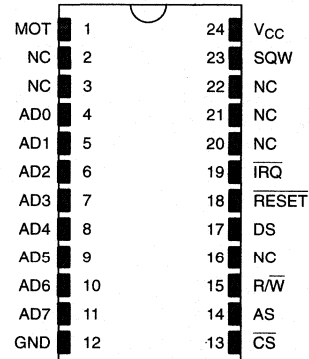
FEATURES

- Drop-in replacement for IBM AT computer clock/calendar
- Pin compatible with the MC146818B and DS1287
- Totally nonvolatile with over 10 years of operation in the absence of power
- Self-contained subsystem includes lithium, quartz, and support circuitry
- Counts seconds, minutes, hours, days, day of the week, date, month, and year with leap year compensation valid up to 2100
- Binary or BCD representation of time, calendar, and alarm
- 12- or 24-hour clock with AM and PM in 12-hour mode
- Daylight Savings Time option
- Selectable between Motorola and Intel bus timing
- Multiplex bus for pin efficiency
- Interfaced with software as 128 RAM locations
 - 14 bytes of clock and control registers
 - 114 bytes of general purpose RAM
- Programmable square wave output signal
- Bus-compatible interrupt signals ($\overline{\text{IRQ}}$)
- Three interrupts are separately software-maskable and testable
 - Time-of-day alarm once/second to once/day
 - Periodic rates from 122 μs to 500 ms
 - End of clock update cycle

DESCRIPTION

The DS12887 Real Time Clock plus RAM is designed to be a direct replacement for the DS1287. The DS12887 is identical in form, fit, and function to the DS1287, and has an additional 64 bytes of general purpose RAM. Access to this additional RAM space is determined by the logic level presented on AD6 during the address portion of an access cycle. A lithium energy source, quartz crystal, and write-protection circuitry are contained within a 24-pin dual in-line package. As such, the

PIN ASSIGNMENT



24 PIN ENCAPSULATED PACKAGE

PIN DESCRIPTION

AD0–AD7	– Multiplexed Address/Data Bus
NC	– No Connection
MOT	– Bus Type Selection
$\overline{\text{CS}}$	– Chip Select
AS	– Address Strobe
R/W	– Read/Write Input
DS	– Data Strobe
$\overline{\text{RESET}}$	– Reset Input
$\overline{\text{IRQ}}$	– Interrupt Request Output
SQW	– Square Wave Output
V _{CC}	– +5 Volt Supply
GND	– Ground

DS12887 is a complete subsystem replacing 16 components in a typical application. The functions include a nonvolatile time-of-day clock, an alarm, a one-hundred-year calendar, programmable interrupt, square wave generator, and 114 bytes of nonvolatile static RAM. The real time clock is distinctive in that time-of-day and memory are maintained even in the absence of power.

DALLAS

SEMICONDUCTOR

DS12887A

Real Time Clock

FEATURES

- Drop-in replacement for IBM AT computer clock/calendar
- Pin compatible with the MC146818B and DS1287A
- Totally nonvolatile with over 10 years of operation in the absence of power
- Self-contained subsystem includes lithium, quartz, and support circuitry
- Counts seconds, minutes, hours, days, day of the week, date, month, and year with leap year compensation valid up to 2100
- Binary or BCD representation of time, calendar, and alarm
- 12- or 24-hour clock with AM and PM in 12-hour mode
- Daylight Savings Time option
- Selectable between Motorola and Intel bus timing
- Multiplex bus for pin efficiency
- Interfaced with software as 128 RAM locations
 - 14 bytes of clock and control registers
 - 114 bytes of general purpose RAM
- Programmable square wave output signal
- Bus-compatible interrupt signals ($\overline{\text{IRQ}}$)
- Three interrupts are separately software-maskable and testable
 - Time-of-day alarm once/second to once/day
 - Periodic rates from 122 μs to 500 ms
 - End of clock update cycle

PIN ASSIGNMENT

MOT	1	24	V_{CC}
NC	2	23	SQW
NC	3	22	NC
AD0	4	21	$\overline{\text{RCLR}}$
AD1	5	20	NC
AD2	6	19	$\overline{\text{IRQ}}$
AD3	7	18	$\overline{\text{RESET}}$
AD4	8	17	DS
AD5	9	16	NC
AD6	10	15	R/W
AD7	11	14	AS
GND	12	13	$\overline{\text{CS}}$

24 PIN ENCAPSULATED PACKAGE

PIN DESCRIPTION

AD0-AD7	- Multiplexed Address/Data Bus
NC	- No Connection
MOT	- Bus Type Selection
$\overline{\text{CS}}$	- Chip Select
AS	- Address Strobe
R/W	- Read/Write Input
DS	- Data Strobe
$\overline{\text{RESET}}$	- Reset Input
$\overline{\text{IRQ}}$	- Interrupt Request Output
SQW	- Square Wave Output
V_{CC}	- +5 Volt Supply
$\overline{\text{RCLR}}$	- RAM Clear
GND	- Ground

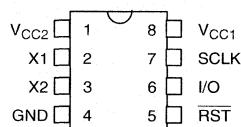
FEATURES

- Real time clock counts seconds, minutes, hours, date of the month, month, day of the week, and year with leap year compensation valid up to 2100
- 31 x 8 RAM for scratchpad data storage
- Serial I/O for minimum pin count
- 2.5–5.5 volt full operation
 - Optional 2.0–5.5 volt full operation also available
- Uses less than 300 nA at 2.5 volts
- Single-byte or multiple-byte (burst mode) data transfer for read or write of clock or RAM data
- 8-pin DIP or optional 8-pin SOIC's for surface mount
- Simple 3-wire interface
- TTL-compatible ($V_{CC} = 5V$)
- Optional industrial temperature range $-40^{\circ}C$ to $+85^{\circ}C$
- DS1202 compatible
- Added features over DS1202
 - Optional trickle charge capability to V_{CC1}
 - Dual power supply pins for primary and backup power supplies
 - Backup power supply pin can be used for battery or super cap input
 - Additional scratchpad memory (7 bytes)

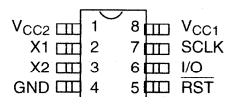
DESCRIPTION

The DS1302 Trickle Charge Timekeeping Chip contains a real time clock/calendar and 31 bytes of static RAM. It communicates with a microprocessor via a simple serial interface. The real time clock/calendar provides seconds, minutes, hours, day, date, month, and year information. The end of the month date is automatically adjusted for months with less than 31 days, including corrections for leap year. The clock operates in either the 24-hour or 12-hour format with an AM/PM indicator.

PIN ASSIGNMENT



DS1302
8-PIN DIP (300 MIL)



DS1302S 8-PIN SOIC (200 MIL)
DS1302Z 8-PIN SOIC (150 MIL)

PIN DESCRIPTION

X1, X2	– 32.768 kHz Crystal Pins
GND	– Ground
RST	– Reset
I/O	– Data Input/Output
SCLK	– Serial Clock
V_{CC1} , V_{CC2}	– Power Supply Pins

ORDERING INFORMATION

PART #	DESCRIPTION
DS1302	Serial Timekeeping Chip; 8-pin DIP
DS1302S	Serial Timekeeping Chip; 8-pin SOIC (200 mil)
DS1302Z	Serial Timekeeping Chip; 8-pin SOIC (150 mil)

Interfacing the DS1302 with a microprocessor is simplified by using synchronous serial communication. Only three wires are required to communicate with the clock/RAM: (1) RST (Reset), (2) I/O (Data line), and (3) SCLK (Serial clock). Data can be transferred to and from the clock/RAM one byte at a time or in a burst of up to 31 bytes. The DS1302 is designed to operate on very low power and retain data and clock information on less than 1 microwatt.

FEATURES

- Real time clock counts seconds, minutes, hours, date of the month, month, day of the week, and year with leap year compensation valid up to 2100
- 96–byte nonvolatile RAM for data storage
- Two Time of Day Alarms – programmable on combination of seconds, minutes, hours, and day of the week
- Serial interface supports Motorola Serial Peripheral Interface (SPI) serial data ports or standard 3–wire interface
- Burst Mode for reading/writing successive addresses in clock/RAM
- Dual power supply pins for primary and backup power supplies
- Optional trickle charge output to backup supply
- 2.5 – 5.5 volt operation
- Optional 2.0 – 5.5 volt full operation also available
- Optional industrial temperature range –40°C to +85°C
- Available in space–efficient 20–pin TSSOP package

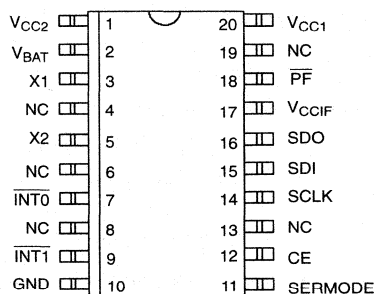
ORDERING INFORMATION

DS1305	16–Pin DIP
DS1305N	16–Pin DIP (Industrial)
DS1305E	20–Pin TSSOP
DS1305EN	20–Pin TSSOP (Industrial)

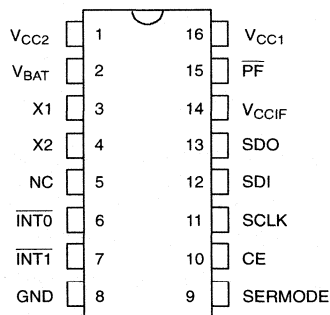
DESCRIPTION

The DS1305 Serial Alarm Real Time Clock provides a full BCD clock calendar which is accessed via a simple serial interface. The clock/calendar provides seconds, minutes, hours, day, date, month, and year information. The end of the month date is automatically adjusted for months with less than 31 days, including corrections for leap year. The clock operates in either the 24–hour or 12–hour format with AM/PM indicator. In addition 96 bytes of nonvolatile RAM are provided for data storage.

PIN ASSIGNMENT



DS1305 20–PIN TSSOP (173 MIL)



DS1305 16–PIN DIP (300 MIL)

PIN DESCRIPTION

V _{CC1}	– Primary Power Supply
V _{CC2}	– Backup Power Supply
V _{BAT}	– +3 Volt Battery Input
V _{CCIF}	– Interface Logic Power Supply Input
GND	– Ground
X1, X2	– 32,768 Hz Crystal Connection
INT ₀	– Interrupt 0 Output
INT ₁	– Interrupt 1 Output
SDI	– Serial Data In
SDO	– Serial Data Out
CE	– Chip Enable
SCLK	– Serial Clock
SERMODE	– Serial Interface Mode
PF	– Power Fail Output

DALLAS SEMICONDUCTOR

DS1306 Serial Alarm Real Time Clock (RTC)

FEATURES

- Real time clock counts seconds, minutes, hours, date of the month, month, day of the week, and year with leap year compensation valid up to 2100
- 96 byte nonvolatile RAM for data storage
- Two Time of Day Alarms – programmable on combination of seconds, minutes, hours, and day of the week
- 1 Hz and 32.768 KHz clock outputs
- Serial interface supports Motorola Serial Peripheral Interface (SPI) serial data ports or standard 3-wire interface
- Burst Mode for reading/writing successive addresses in clock/RAM
- Dual power supply pins for primary and backup power supplies
- Optional trickle charge output to backup supply
- 2.5 – 5.5 volt operation
- Optional 2.0 – 5.5 volt full operation also available
- Optional industrial temperature range –40°C to +85°C
- Available in space-efficient 20-pin TSSOP package

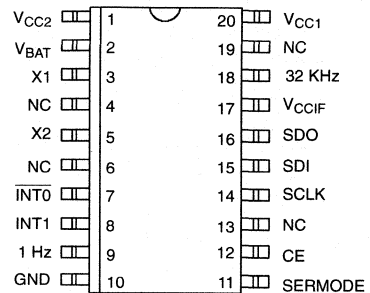
ORDERING INFORMATION

DS1306	16-Pin DIP
DS1306N	16-Pin DIP (Industrial)
DS1306E	20-Pin TSSOP
DS1306EN	20-Pin TSSOP (Industrial)

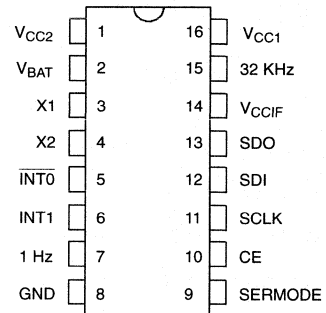
DESCRIPTION

The DS1306 Serial Alarm Real Time Clock provides a full BCD clock calendar which is accessed via a simple serial interface. The clock/calendar provides seconds, minutes, hours, day, date, month, and year information. The end of the month date is automatically adjusted for months with less than 31 days, including corrections for leap year. The clock operates in either the 24-hour or 12-hour format with AM/PM indicator. In addition 96 bytes of nonvolatile RAM are provided for data storage.

PIN ASSIGNMENT



DS1306 20-PIN TSSOP (173 MIL)



DS1306 16-PIN DIP (300 MIL)

PIN DESCRIPTION

V _{CC1}	– Primary Power Supply
V _{CC2}	– Backup Power Supply
V _{BAT}	– +3 Volt Battery Input
V _{CCIF}	– Interface Logic Power Supply Input
GND	– Ground
X1, X2	– 32,768 Hz Crystal Connection
INT0	– Interrupt 0 Output
INT1	– Interrupt 1 Output
SDI	– Serial Data In
SDO	– Serial Data Out
CE	– Chip Enable
SCLK	– Serial Clock
SERMODE	– Serial Interface Mode
1 Hz	– 1 Hz Output
32 KHz	– 32.768 KHz Output

FEATURES

- Real time clock counts seconds, minutes, hours, date of the month, month, day of the week, and year with leap year compensation valid up to 2100
- 56 byte nonvolatile RAM for data storage
- 2-wire serial interface
- Programmable squarewave output signal
- Automatic power fail detect and switch circuitry
- Consumes less than 500 nA in battery backup mode at 25°C
- Optional industrial temperature range -40°C to +85°C (IND)
- Available in 8-pin DIP or SOIC

ORDERING INFORMATION

DS1307	Serial Timekeeping Chip; 8-pin DIP
DS1307Z	Serial Timekeeping Chip; 8-pin SOIC (150 mil)
DS1307N	8-pin DIP (IND)
DS1307ZN	8-pin SOIC (IND)

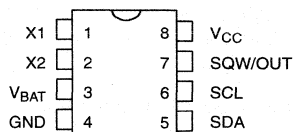
DESCRIPTION

The DS1307 Serial Real Time Clock is a low power full BCD clock calendar plus 56 bytes of nonvolatile SRAM. Address and data are transferred serially via a 2-wire bi-directional bus. The clock/calendar provides seconds, minutes, hours, day, date, month, and year information. The end of the month date is automatically adjusted for months with less than 31 days, including corrections for leap year. The clock operates in either the 24-hour or 12-hour format with AM/PM indicator. The DS1307 has a built-in power sense circuit which detects power failures and automatically switches to the battery supply.

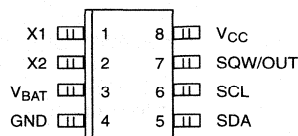
OPERATION

The DS1307 operates as a slave device on the serial bus. Access is obtained by implementing a START condition

PIN ASSIGNMENT



DS1307 8-PIN DIP (300 MIL)



DS1307Z 8-PIN SOIC (150 MIL)

PIN DESCRIPTION

V_{CC}	- Primary Power Supply
X1, X2	- 32.768 KHz Crystal Connection
V_{BAT}	- +3 Volt Battery Input
GND	- Ground
SDA	- Serial Data
SCL	- Serial Clock
SQW/OUT	- Square wave/Output Driver

and providing a device identification code followed by a register address. Subsequent registers can be accessed sequentially until a STOP condition is executed. When V_{CC} falls below $1.25 \times V_{BAT}$ the device terminates an access in progress and resets the device address counter. Inputs to the device will not be recognized at this time to prevent erroneous data from being written to the device from an out of tolerance system. When V_{CC} falls below V_{BAT} the device switches into a low current battery backup mode. Upon power up, the device switches from battery to V_{CC} when V_{CC} is greater than $V_{BAT} + 0.2V$ and recognizes inputs when V_{CC} is greater than $1.25 \times V_{BAT}$. The block diagram in Figure 1 shows the main elements of the Serial Real Time Clock. The following paragraphs describe the function of each pin.

DALLAS

SEMICONDUCTOR

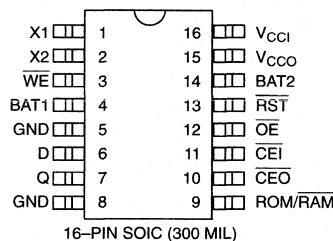
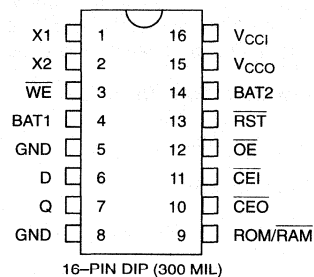
DS1315

Phantom Time Chip

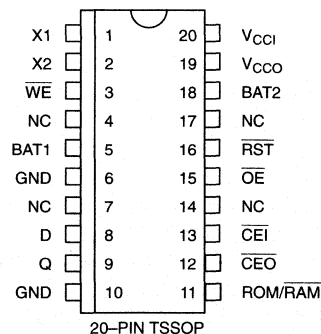
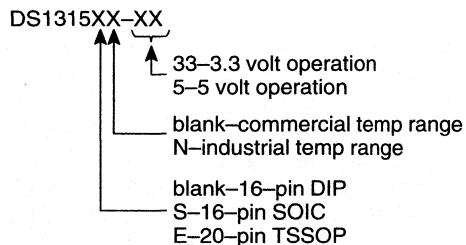
FEATURES

- Real time clock keeps track of hundredths of seconds, seconds, minutes, hours, days, date of the month, months, and years
- Adjusts for months with fewer than 31 days
- Automatic leap year correction valid up to 2100
- No address space required to communicate with RTC
- Provides nonvolatile controller functions for battery backup of SRAM
- Supports redundant battery attachment for high-reliability applications
- Full $\pm 10\%$ V_{CC} operating range
- +3.3 volt or +5 volt operation
- Industrial (-45°C to $+85^{\circ}\text{C}$) operating temperature ranges available
- Drop in replacement for DS1215

PIN ASSIGNMENT



ORDERING INFORMATION



FEATURES

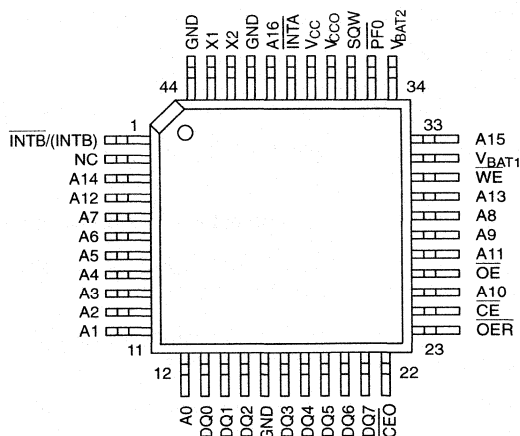
- Keeps track of hundredths of seconds, seconds, minutes, hours, days, date of the month, months, and years with leap year compensation valid up to 2100
- Watchdog timer restarts an out-of-control processor
- Alarm function schedules real-time related activities
- Programmable interrupts and square wave outputs
- Byte-wide RAM-like access
- 50 bytes of on board user RAM
- Greater than 10 years timekeeping and data retention in the absence of power with small lithium coin cells
- Supports up to 128K x 8 of external static RAM
- All timekeeping registers and on board RAM are individually addressable via the address and data bus

ORDERING INFORMATION

DS1384FP-XXX 44 pin quad flat pack

→ -120 120 ns access
-150 150 ns access

PIN ASSIGNMENT



PIN DESCRIPTION

$\overline{\text{INTA}}$	- Interrupt Output A (open drain)
$\overline{\text{INTB}}(\text{INTB})$	- Interrupt Output B (open drain)
A0-A16	- Address Inputs
DQ0-DQ7	- Data Input/Output
$\overline{\text{CE}}$	- Chip Enable
$\overline{\text{OE}}$	- Output Enable
$\overline{\text{WE}}$	- Write Enable
V _{CC}	- +5 Volt Input
GND	- Ground
NC	- No Connection
SQW	- Square Wave Output
X1, X2	- 32.768 kHz Crystal Connections
PFO	- Power Fail Output
$\overline{\text{CEO}}$	- Chip Enable RAM
$\overline{\text{OER}}$	- Output Enable RAM
V _{CCO}	- Voltage Out
V _{BAT1}	- +3 Volt Battery Input
V _{BAT2}	- +3 Volt Battery Input

FEATURES

- 8K or 32K bytes of user NV RAM
- Real time quartz clock/calendar keeps track of hundredths of seconds, seconds, minutes, hours, days, date of the month, months, and years; valid up to 2100
- Will operate in 28-pin JEDEC footprint when lower justified
- Watchdog timer restarts an out-of-control processor
- Alarm function schedules real-time related activities such as system wakeup
- Embedded lithium energy cell maintains time, watchdog, user RAM, and alarm information
- Programmable interrupts and square wave output
- All registers are individually addressable via the address and data bus
- Accuracy is better than ± 1 minute/month at 25°C
- Greater than 10 years of timekeeping in the absence of V_{CC}
- Interrupt signals are active in power-down mode

ORDERING INFORMATION

DS1386	XX-XXX	RTC and NVSRAM; 32 pin DIP
	→	-150 150 ns access
	→	-120 120 ns access
	→	08 8K x 8 NVSRAM
	→	32 32K x 8 NVSRAM

DESCRIPTION

The DS1386 RAMified Watchdog Timekeeper is a self-contained real time clock (RTC), alarm, watchdog timer, and interval timer in a 32-pin JEDEC DIP package. The DS1386 contains an embedded lithium energy source and a quartz crystal which eliminates the need for any external circuitry. Data contained within 8K or 32K by 8-bit memory and the timekeeping registers can be

PIN ASSIGNMENT

INTA	1	32	V _{CC}	INTA	1	32	V _{CC}
INTB	2	31	SQW	INTB	2	31	SQW
NC	3	30	V _{CC}	A14	3	30	V _{CC}
A12	4	29	WE	A12	4	29	WE
A7	5	28	NC	A7	5	28	A13
A6	6	27	A8	A6	6	27	A8
A5	7	26	A9	A5	7	26	A9
A4	8	25	A11	A4	8	25	A11
A3	9	24	OE	A3	9	24	OE
A2	10	23	A10	A2	10	23	A10
A1	11	22	CE	A1	11	22	CE
A0	12	21	DQ7	A0	12	21	DQ7
DQ0	13	20	DQ6	DQ0	13	20	DQ6
DQ1	14	19	DQ5	DQ1	14	19	DQ5
DQ2	15	18	DQ4	DQ2	15	18	DQ4
GND	16	17	DQ3	GND	16	17	DQ3

DS1386 8K x 8
32-PIN ENCAPSULATED
PACKAGE

DS1386 32K x 8
32-PIN ENCAPSULATED
PACKAGE

PIN DESCRIPTION

INTA	– Interrupt Output A (open drain)
INTB(INTB)	– Interrupt Output B (open drain)
A0–A14	– Address Inputs
DQ0–DQ7	– Data Input/Output
CE	– Chip Enable
OE	– Output Enable
WE	– Write Enable
V _{CC}	– +5 Volts
GND	– Ground
SQW	– Square Wave Output
NC	– No Connection

read or written in the same manner as bitwise static RAM. The timekeeping registers are located in the first 14 bytes of memory space. Data is maintained in the RAMified Timekeeper by intelligent control circuitry which detects the status of V_{CC} and write protects memory when V_{CC} is out of tolerance.

DALLAS

SEMICONDUCTOR

DS14285/DS14287

Real Time Clock with NV RAM Control

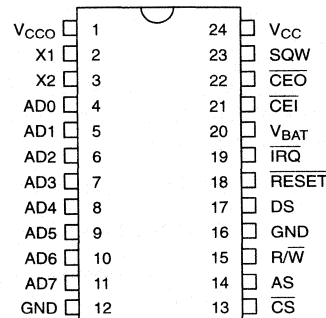
FEATURES

- Direct replacement for IBM AT computer clock/calendar
- Functionally compatible with the DS1285/DS1287
- Available as chip (DS14285, DS14285S, or DS14285Q) or stand-alone module with embedded lithium battery and crystal (DS14287)
- Automatic backup supply and write protection to make external SRAM nonvolatile
- Counts seconds, minutes, hours, days, day of the week, date, month, and year with leap year compensation valid up to 2100
- Binary or BCD representation of time, calendar, and alarm
- 12- or 24-hour clock with AM and PM in 12-hour mode
- Daylight Savings Time option
- Multiplex bus for pin efficiency
- Interfaced with software as 128 RAM locations
 - 14 bytes of clock and control registers
 - 114 bytes of general purpose RAM
- Programmable square wave output signal
- Bus-compatible interrupt signals ($\overline{\text{IRQ}}$)
- Three interrupts are separately software-maskable and testable
 - Time-of-day alarm once/second to once/day
 - Periodic rates from 122 μs to 500 ms
 - End of clock update cycle
- Optional industrial temperature version available
DS14285 DIP, SOIC, and PLCC

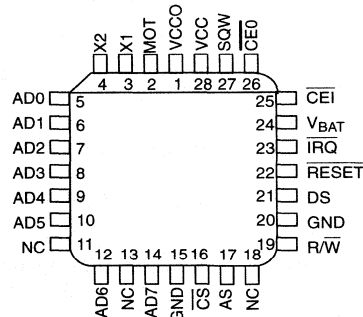
ORDERING INFORMATION

DS14285	RTC Chip; 24-pin DIP
DS14285S	RTC Chip; 24-pin SOIC
DS14285Q	RTC Chip; 28-pin PLCC
DS14287	RTC Module; 24-pin DIP

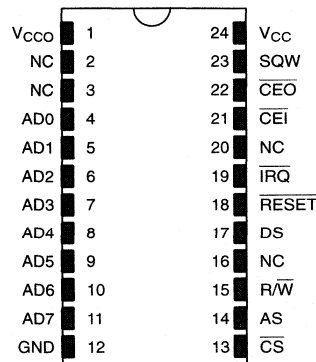
PIN ASSIGNMENT



DS14285 24-PIN DIP
DS14285S 24-PIN SOIC



DS14285Q 28-PIN PLCC



DS14287 24-PIN ENCAPSULATED PACKAGE

DALLAS
SEMICONDUCTOR

DS1486 RAMified Watchdog Timekeeper

FEATURES

- 128K bytes of user NV RAM
- Real time quartz clock/calendar keeps track of hundredths of seconds, seconds, minutes, hours, days, date of the month, months, and years with leap year compensation valid up to 2100
- Will operate in 32-pin JEDEC footprint
- Watchdog timer restarts an out-of-control processor
- Alarm function schedules real-time related activities such as system wakeup
- Embedded lithium energy cell maintains time, watchdog, user RAM, and alarm information
- Programmable interrupts and square wave outputs
- All registers are individually addressable via the address and data bus
- Accuracy is better than ± 1 minute/month at 25°C
- Greater than 10 years of timekeeping in the absence of V_{CC} @ 25°C
- Interrupt signals active in power-down mode

ORDERING INFORMATION

DS1486-XXX	RTC and 128K x 8 NVSRAM
	-120 120 ns access
	-150 150 ns access

DESCRIPTION

The DS1486 RAMified Timekeeper is a self-contained real time clock (RTC), alarm, watchdog timer, and interval timer in a 32-pin JEDEC DIP package. The DS1486 contains an embedded lithium energy source and a quartz crystal which eliminates the need for any external circuitry. Data contained within 128K by 8-bit memory and the timekeeping registers can be read or written in the same manner as bitwise static RAM. The timekeeping registers are located in the first 14 bytes of memory space. Data is maintained in the RAMified

PIN ASSIGNMENT

INTB	1	32	VCC
A16	2	31	A15
A14	3	30	INTA/SQW
A12	4	29	WE
A7	5	28	A13
A6	6	27	A8
A5	7	26	A9
A4	8	25	A11
A3	9	24	OE
A2	10	23	A10
A1	11	22	CE
A0	12	21	DQ7
DQ0	13	20	DQ6
DQ1	14	19	DQ5
DQ2	15	18	DQ4
GND	16	17	DQ3

DS1486 128K x 8
32-PIN ENCAPSULATED
PACKAGE

PIN DESCRIPTION

INTB(INTB)	- Interrupt Output B (open drain)
A0-A16	- Address Inputs
DQ0-DQ7	- Data Input/Output
CE	- Chip Enable
OE	- Output Enable
WE	- Write Enable
VCC	- +5 Volts
GND	- Ground
INTA/SQW	- Interrupt Output A/Square Wave Output (INTA is open drain)

Timekeeper by intelligent control circuitry which detects the status of V_{CC} and write protects memory when V_{CC} is out of tolerance. The lithium energy source can maintain data and real time for over ten years in the absence of V_{CC} . Timekeeper information includes hundredths of seconds, seconds, minutes, hours, day, date, month, and year. The date at the end of the month is automatically adjusted for months with less than 31 days, including correction for leap year.

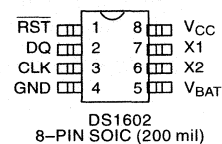
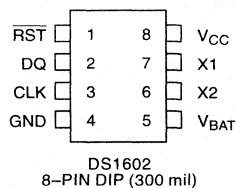
FEATURES

- Two 32-bit counters keep track of real time and elapsed time
- Counters keep track of seconds for over 125 years
- Battery powered counter counts seconds from the time battery is attached until V_{BAT} is less than 2.5 volts
- V_{CC} powered counter counts seconds while V_{CC} is above 4.25 volts and retains the count in the absence of V_{CC} under battery backup power
- Clear function resets selected counter to zero
- Read/Write serial port affords low pin count
- Maximum current drain of less than 1 μA from V_{BAT} pin when serial port is disabled
- One byte protocol defines read/write, counter address and software clear function
- 8-pin DIP or optional 8-pin SOIC
- Operating temperature range of $-40^{\circ}C$ to $+85^{\circ}C$
- Reduced performance operation down to $V_{CC} = 2.5V$

DESCRIPTION

The DS1602 is a real time clock/elapsed time counter designed to count seconds when V_{CC} power is applied and continually count seconds under battery backup power with an additional counter regardless of the condition of V_{CC} . The continuous counter can be used to derive time of day, week, month, and year by using a software algorithm. The V_{CC} powered counter will automatically record the amount of time that V_{CC} power is applied. This function is particularly useful in determining the operational time of equipment in which the

PIN ASSIGNMENT



PIN DESCRIPTION

\overline{RST}	– Reset
CLK	– Clock
DQ	– Data input/output
GND	– Ground
X1, X2	– Crystal inputs
V_{BAT}	– + Battery input
V_{CC}	– +5 volts

DS1602 is used. Alternatively, this counter can also be used under software control to record real time events. Communication to and from the DS1602 takes place via a 3-wire serial port. A one byte protocol selects read/write functions, counter clear functions and oscillator trim. A low cost 32.768 KHz crystal attaches directly to the X1 and X2 pins. If battery powered only operation is desired, the V_{BAT} pin must be grounded and the V_{CC} pin must be connected to the battery.

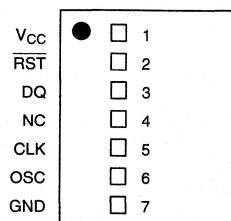
FEATURES

- Two 32-bit counters keep track of real time and elapsed time
- Counters keep track of seconds for over 125 years
- Battery powered counter counts seconds from the time battery is attached until V_{BAT} is less than 2.5 volts
- V_{CC} powered counter counts seconds while V_{CC} is above 4.25 volts and retains the count in the absence of V_{CC} under battery backup power
- Clear function resets selected counter to zero
- Read/Write serial port affords low pin count
- Powered internally by a lithium energy cell that provides over 10 years of operation
- One byte protocol defines read/write, counter address and software clear function
- Self contained crystal provides an accuracy of ± 2 min per month
- Operating temperature range of 0°C to 70°C
- Low profile SIP module

DESCRIPTION

The DS1603 is a real time clock/elapsed time counter designed to count seconds when V_{CC} power is applied and continually count seconds under battery backup power with an additional counter regardless of the condition of V_{CC} . The continuous counter can be used to derive time of day, week, month, and year by using a software algorithm. The V_{CC} powered counter will automatically record the amount of time that V_{CC} power is applied. This function is particularly useful in determining the operational time of equipment in which the

PIN ASSIGNMENT



PIN DESCRIPTION

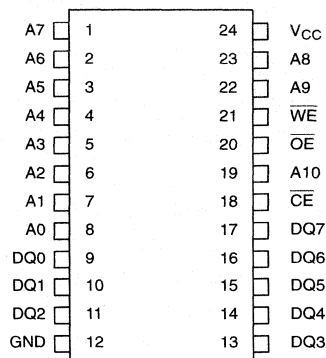
$\overline{\text{RST}}$	– Reset
CLK	– Clock
DQ	– Data Input/Output
GND	– Ground
V_{CC}	– +5 Volts
OSC	– 1 Hz Oscillator Output
NC	– No Connection

DS1603 is used. Alternatively, this counter can also be used under software control to record real time events. Communication to and from the DS1603 takes place via a 3-wire serial port. A one byte protocol selects read/write functions, counter clear functions and oscillator trim. The device contains a 32.768 KHz crystal which will keep track of time to within ± 2 min/mo. An internal lithium energy source contains enough energy to power the continuous seconds counter for over 10 years.

FEATURES

- Form, fit, and function compatible with the MK48T02 Timekeeping RAM
- Integrated NV SRAM, real time clock, crystal, power fail control circuit and lithium energy source
- Standard JEDEC bytewise 2K x 8 static RAM pinout
- Clock registers are accessed identical to the static RAM. These registers are resident in the eight top RAM locations.
- Totally nonvolatile with over 10 years of operation in the absence of power
- Access times of 120 ns and 150 ns
- Quartz accuracy ± 1 minute a month @ 25°C, factory calibrated
- BCD coded year, month, date, day, hours, minutes, and seconds with leap year compensation valid up to 2100
- Power fail write protection allows for $\pm 10\%$ V_{CC} power supply tolerance

PIN ASSIGNMENT



PIN DESCRIPTION

A0–A10	– Address Input
\overline{CE}	– Chip Enable
\overline{OE}	– Output Enable
\overline{WE}	– Write Enable
V _{CC}	– +5 Volts
GND	– Ground
DQ0–DQ7	– Data Input/Output

DESCRIPTION

The DS1642 is an 2K x 8 nonvolatile static RAM with a full function real time clock which are both accessible in a bytewise format. The nonvolatile time keeping RAM is pin and function equivalent to any JEDEC standard 2K x 8 SRAM. The device can also be easily substituted in ROM, EPROM and EEPROM sockets providing read/write nonvolatility and the addition of the real time clock function. The real time clock information resides in the eight uppermost RAM locations. The RTC registers contain year, month, date, day, hours, minutes, and seconds data in 24 hour BCD format. Corrections for the

day of the month and leap year are made automatically. The RTC clock registers are double buffered to avoid access of incorrect data that can occur during clock update cycles. The double buffered system also prevents time loss as the timekeeping countdown continues unabated by access to time register data. The DS1642 also contains its own power fail circuitry which deselects the device when the V_{CC} supply is in an out of tolerance condition. This feature prevents loss of data from unpredictable system operation brought on by low V_{CC} as errant access and update cycles are avoided.

FEATURES

- Form, fit, and function compatible with the MK48T08 Timekeeping RAM
- Integrated NV SRAM, real time clock, crystal, power-fail control circuit and lithium energy source
- Standard JEDEC bytewise 8K x 8 static RAM pinout
- Clock registers are accessed identical to the static RAM. These registers are resident in the eight top RAM locations.
- Totally nonvolatile with over 10 years of operation in the absence of power
- Access times of 120 ns and 150 ns
- Quartz accuracy ± 1 minute a month @ 25°C, factory calibrated
- BCD coded year, month, date, day, hours, minutes, and seconds with leap year compensation valid up to 2100
- Power-fail write protection allows for $\pm 10\%$ V_{CC} power supply tolerance

ORDERING INFORMATION

DS1643-XXX 28-pin DIP module

↪ -120 120 ns access
 -150 150 ns access

DESCRIPTION

The DS1643 is an 8K x 8 nonvolatile static RAM with a full function real time clock which are both accessible in a bytewise format. The nonvolatile time keeping RAM is pin and function equivalent to any JEDEC standard 8K x 8 SRAM. The device can also be easily substituted in ROM, EPROM and EEPROM sockets providing read/write nonvolatility and the addition of the real time clock function. The real time clock information resides in the eight uppermost RAM locations. The RTC registers contain year, month, date, day, hours, minutes, and seconds data in 24 hour BCD format. Corrections for the

PIN ASSIGNMENT

NC	1	28	VCC
A12	2	27	\overline{WE}
A7	3	26	CE2
A6	4	25	A8
A5	5	24	A9
A4	6	23	A11
A3	7	22	\overline{OE}
A2	8	21	A10
A1	9	20	\overline{CE}
A0	10	19	DQ7
DQ0	11	18	DQ6
DQ1	12	17	DQ5
DQ2	13	16	DQ4
GND	14	15	DQ3

28-PIN ENCAPSULATED PACKAGE
(700 MIL EXTENDED)

day of the month and leap year are made automatically. The RTC clock registers are double buffered to avoid access of incorrect data that can occur during clock update cycles. The double buffered system also prevents time loss as the timekeeping countdown continues unabated by access to time register data. The DS1643 also contains its own power-fail circuitry which deselects the device when the V_{CC} supply is in an out of tolerance condition. This feature prevents loss of data from unpredictable system operation brought on by low V_{CC} as errant access and update cycles are avoided.

FEATURES

- Functionally compatible with the MK48T08 Time-keeping RAM
- Integrated NV SRAM, real time clock, crystal, power-fail control circuit and lithium energy source
- Clock registers are accessed identical to the static RAM. These registers are resident in the eight top RAM locations.
- Totally nonvolatile with over 10 years of operation in the absence of power
- Access times of 120 ns and 150 ns
- Quartz accuracy ± 1 minute a month @ 25°C, factory calibrated
- BCD coded year, month, date, day, hours, minutes, and seconds with leap year compensation valid up to 2100
- Power-fail write protection allows for $\pm 10\%$ V_{CC} power supply tolerance
- Low Profile socketable module
 - 255 mil package height

ORDERING INFORMATION

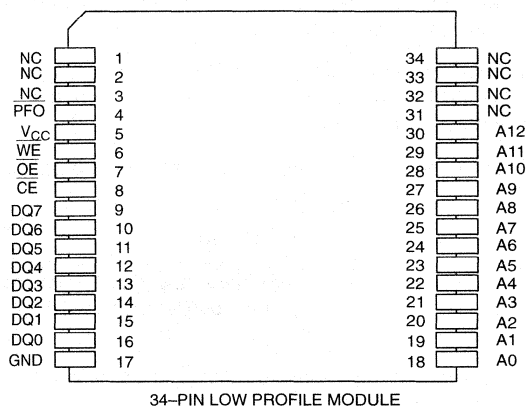
DS1643AL-XX 34-pin low profile module

↘ -12 = 120 ns access
 ↘ -15 = 150 ns access

DESCRIPTION

The DS1643AL is an 8K x 8 nonvolatile static RAM with a full function real time clock which are both accessible in a byte-wide format. The nonvolatile time keeping RAM is functionally equivalent to any JEDEC standard 8K x 8 SRAM. The DS1643AL is a Low Profile Module that requires a PLCC surface mountable socket and, except for the additional Power Fail Output (\overline{PFO}) signal, is functionally equivalent to the DS1643. The Real Time Clock (RTC) information resides in the eight uppermost RAM locations. The RTC registers contain year, month, date, day, hours, minutes, and seconds data in 24 hour BCD format. Corrections for the day of the month and

PIN ASSIGNMENT



leap year are made automatically. The RTC clock registers are double buffered to avoid access of incorrect data that can occur during clock update cycles. The double buffered system also prevents time loss as the timekeeping countdown continues unabated by access to time register data. The DS1643AL also contains its own power-fail circuitry which deselected the device when the V_{CC} supply is in an out of tolerance condition. This feature prevents loss of data from unpredictable system operation brought on by low V_{CC} as errant access and update cycles are avoided.

DALLAS

SEMICONDUCTOR

DS1644/DS1644P

Nonvolatile Timekeeping RAM

FEATURES

- Integrated NV SRAM, real time clock, crystal, power-fail control circuit and lithium energy source
- Clock registers are accessed identical to the static RAM. These registers are resident in the eight top RAM locations.
- Totally nonvolatile with over 10 years of operation in the absence of power
- Access time of 120 ns and 150 ns
- BCD coded year, month, date, day, hours, minutes, and seconds with leap year compensation valid up to 2100
- Power-fail write protection allows for $\pm 10\%$ V_{CC} power supply tolerance
- DS1644 only (DIP Module)
 - Upward compatible with the DS1643 Timekeeping RAM to achieve higher RAM density
 - Standard JEDEC Byte-wide 32K x 8 static RAM pinout
- DS1644P only (PowerCap Module Board)
 - Surface mountable package for direct connection to PowerCap containing battery and crystal
 - Replaceable battery (PowerCap)
 - Power-fail Output
 - Pin for pin compatible with other densities of DS164XP Timekeeping RAM

ORDERING INFORMATION

DS1644-XXX 28-pin DIP module

↘ -120 120 ns access
 ↘ -150 150 ns access

*DS1644P-XXX 34-pin PowerCap Module Board

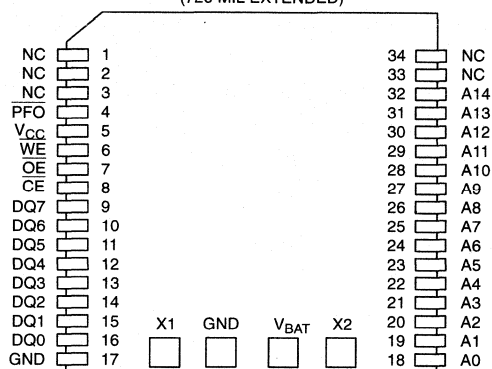
↘ -120 120 ns access
 ↘ -150 150 ns access

*DS9034PCX (Power Cap) Required; must be ordered separately

PIN ASSIGNMENT

A14	1	28	VCC
A12	2	27	\overline{WE}
A7	3	26	A13
A6	4	25	A8
A5	5	24	A9
A4	6	23	A11
A3	7	22	\overline{OE}
A2	8	21	A10
A1	9	20	\overline{CE}
A0	10	19	DQ7
DQ0	11	18	DQ6
DQ1	12	17	DQ5
DQ2	13	16	DQ4
GND	14	15	DQ3

28-PIN ENCAPSULATED PACKAGE
(720 MIL EXTENDED)



34-PIN POWERCAP MODULE BOARD
(USES DS9034PCX POWERCAP)

PIN DESCRIPTION

A0-A14	– Address Input
\overline{CE}	– Chip Enable
\overline{OE}	– Output Enable
\overline{WE}	– Write Enable
V_{CC}	– +5 Volts
GND	– Ground
DQ0-DQ7	– Data Input/Output
NC	– No Connection
PFO	– Power-fail Output (DS1644P only)
X1, X2	– Crystal Connection
V_{BAT}	– Battery Connection

FEATURES

- Upward compatible with the DS1643AL Timekeeping RAM to achieve higher RAM density
- Integrated NV SRAM, real time clock, crystal, power-fail control circuit and lithium energy source
- Low profile socketable module
 - 255 mil package height
- Clock registers are accessed identical to the static RAM. These registers are resident in the eight top RAM locations.
- Totally nonvolatile with over 10 years of operation in the absence of power
- Access time of 120 ns and 150 ns
- Quartz accuracy ± 1 minute a month @ 25°C, factory calibrated
- BCD coded year, month, date, day, hours, minutes, and seconds with leap year compensation valid up to 2100
- Power-fail write protection allows for $\pm 10\%$ V_{CC} power supply tolerance

ORDERING INFORMATION

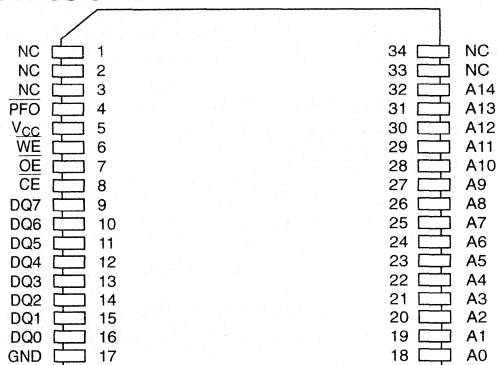
DS1644L-XXX Low Profile Module

→	-120	120 ns access
	-150	150 ns access

DESCRIPTION

The DS1644L is a low profile module that requires a PLCC surface mountable socket and is functionally equivalent to the DS1644. The DS1644L is a 32K x 8 nonvolatile static RAM with a full function real time clock which are both accessible in a Byte-wide format. The real time clock information resides in the eight uppermost RAM locations. The RTC registers contain year, month, date, day, hours, minutes, and seconds data in 24 hour BCD format. Corrections for the day of the month and leap year are made automatically. The RTC

PIN ASSIGNMENT



34-PIN LOW PROFILE MODULE

PIN DESCRIPTION

A0-A14	– Address Input
\overline{CE}	– Chip Enable
\overline{OE}	– Output Enable
\overline{WE}	– Write Enable
V_{CC}	– +5 Volts
GND	– Ground
DQ0-DQ7	– Data Input/Output
NC	– No Connection
PFO	– Power Fail Output

clock registers are double buffered to avoid access of incorrect data that can occur during clock update cycles. The double buffered system also prevents time loss as the timekeeping countdown continues unabated by access to time register data. The DS1644L also contains its own power-fail circuitry which deselects the device when the V_{CC} supply is in an out-of-tolerance condition. This feature prevents loss of data from unpredictable system operation brought on by low V_{CC} as errant access and update cycles are avoided.

DALLAS

SEMICONDUCTOR

DS1646/DS1646P

Nonvolatile Timekeeping RAM

FEATURES

- Integrated NV SRAM, real time clock, crystal, power-fail control circuit and lithium energy source
- Clock registers are accessed identical to the static RAM. These registers are resident in the eight top RAM locations.
- Totally nonvolatile with over 10 years of operation in the absence of power
- Access times of 120 ns and 150 ns
- BCD coded year, month, date, day, hours, minutes, and seconds with leap year compensation valid up to 2100
- Power-fail write protection allows for $\pm 10\%$ V_{CC} power supply tolerance
- DS1646 only (DIP Module)
 - Standard JEDEC Byte-wide 128K x 8 RAM pin-out
- DS1646P only (PowerCap Module Board)
 - Surface mountable package for direct connection to PowerCap containing battery and crystal
 - Replaceable battery (PowerCap)
 - Power-fail output
 - Pin-for-pin compatible with other densities of DS164XP Timekeeping RAM

ORDERING INFORMATION

DS1646-XXX 32-pin DIP module

→ -120 120 ns access
-150 150 ns access

*DS1646P-XXX 34-pin PowerCap Module Board

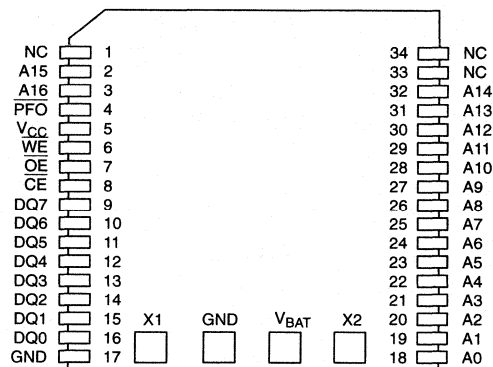
→ -120 120 ns access
-150 150 ns access

*DS9034PCX (PowerCap) Required; must be ordered separately

PIN ASSIGNMENT

NC	1	32	V_{CC}
A16	2	31	A15
A14	3	30	NC
A12	4	29	\overline{WE}
A7	5	28	A13
A6	6	27	A8
A5	7	26	A9
A4	8	25	A11
A3	9	24	\overline{OE}
A2	10	23	A10
A1	11	22	\overline{CE}
A0	12	21	DQ7
DQ0	13	20	DQ6
DQ1	14	19	DQ5
DQ2	15	18	DQ4
GND	16	17	DQ3

32-PIN ENCAPSULATED PACKAGE



34-PIN POWERCAP MODULE BOARD
(USES DS9034PCX POWERCAP)

PIN DESCRIPTION

A0–A16	– Address Input
\overline{CE}	– Chip Enable
\overline{OE}	– Output Enable
\overline{WE}	– Write Enable
V_{CC}	– +5 Volts
GND	– Ground
DQ0–DQ7	– Data Input/Output
NC	– No Connect
\overline{PFO}	– Power-Fail Output (DS1646P only)
X1, X2	– Crystal Connection
V_{BAT}	– Battery Connection

FEATURES

- Low profile socketable module
 - 250 mil package height
- Integrated NV SRAM, real time clock, crystal, power-fail control circuit and lithium energy source
- Clock registers are accessed identical to the static RAM. These registers are resident in the eight top RAM locations.
- Totally nonvolatile with over 10 years of operation in the absence of power
- Access times of 120 ns and 150 ns
- Quartz accuracy ± 1 minute a month @ 25°C, factory calibrated
- BCD coded year, month, date, day, hours, minutes, and seconds with leap year compensation valid up to 2100
- Power-fail write protection allows for $\pm 10\%$ V_{CC} power supply tolerance

ORDERING INFORMATION

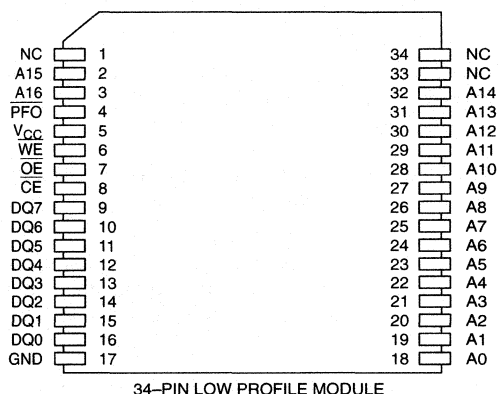
DS1646L-XXX 32-pin DIP module

↗ -120 120 ns access
 ↘ -150 150 ns access

DESCRIPTION

The DS1646LPM is a low profile module that requires a PLCC surface mountable socket and is functionally equivalent to the DS1646. The DS1646L is a 128K x 8 nonvolatile static RAM with a full function real time clock which are both accessible in a Byte-wide format. The real time clock information resides in the eight uppermost RAM locations. The RTC registers contain year, month, date, day, hours, minutes, and seconds data in 24 hour BCD format. Corrections for the day of the month and leap year are made automatically. The RTC

PIN ASSIGNMENT



PIN DESCRIPTION

A0–A16	– Address Input
\overline{CE}	– Chip Enable
\overline{OE}	– Output Enable
\overline{WE}	– Write Enable
V_{CC}	– +5 Volts
GND	– Ground
DQ0–DQ7	– Data Input/Output
NC	– No Connect
PFO	– Power-fail Output

clock registers are double buffered to avoid access of incorrect data that can occur during clock update cycles. The double buffered system also prevents time loss as the timekeeping countdown continues unabated by access to time register data. The DS1646L also contains its own power-fail circuitry which deselected the device when the V_{CC} supply is in an out of tolerance condition. This feature prevents loss of data from unpredictable system operation brought on by low V_{CC} as errant access and update cycles are avoided.

DALLAS SEMICONDUCTOR

DS1647/DS1647P Nonvolatile Timekeeping RAM

FEATURES

- Integrated NV SRAM, real time clock, crystal, power-fail control circuit and lithium energy source
- Clock registers are accessed identical to the static RAM. These registers are resident in the eight top RAM locations.
- Totally nonvolatile with over 10 years of operation in the absence of power
- Access times of 120 ns and 150 ns
- BCD coded year, month, data, day, hours, minutes, and seconds with leap year compensation valid up to 2100
- Power-fail write protection allows for $\pm 10\%$ V_{CC} power supply tolerance
- DS1647 only (DIP Module)
 - Upward compatible with the DS1646 Timekeeping RAM
 - Standard JEDEC Byte-wide 512K x 8 static RAM pinout
- DS1647P only (PowerCap Module Board)
 - Surface mountable package for direct connection to PowerCap containing battery and crystal
 - Replaceable battery (PowerCap)
 - Power-fail Output
 - Pin for pin compatible with other densities of DS164XP Timekeeping RAM

ORDERING INFORMATION

DS1647-XXX (28-pin DIP module)

↳ -120 120 ns access
 ↳ -150 150 ns access

*DS1647P-XXX (34-pin PowerCap Module Board)

↳ -120 120 ns access
 ↳ -150 150 ns access

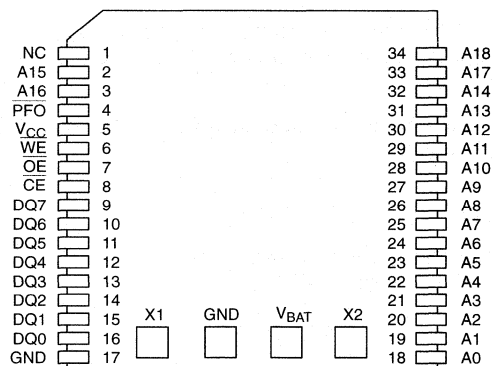
*DS9034PCX (PowerCap) Required; must be ordered separately

PIN ASSIGNMENT

A18	1	32	V_{CC}
A16	2	31	A15
A14	3	30	A17
A12	4	29	\overline{WE}
A7	5	28	A13
A6	6	27	A8
A5	7	26	A9
A4	8	25	A11
A3	9	24	\overline{OE}
A2	10	23	A10
A1	11	22	\overline{CE}
A0	12	21	DQ7
DQ0	13	20	DQ6
DQ1	14	19	DQ5
DQ2	15	18	DQ4
GND	16	17	DQ3

512K X 8

32-PIN ENCAPSULATED PACKAGE



34-POWERCAP MODULE BOARD
(USES DS9034PCX POWERCAP)

PIN DESCRIPTION

A0-A18	– Address Input
\overline{CE}	– Chip Enable
\overline{OE}	– Output Enable
\overline{WE}	– Write Enable
V_{CC}	– +5 Volts
GND	– Ground
DQ0-DQ7	– Data Input/Output
NC	– No Connection
\overline{PFO}	– Power-Fail Output (DS1647P only)
X1, X2	– Crystal Connection
V_{BAT}	– Battery Connection

FEATURES

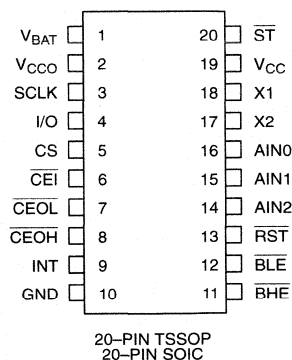
- Provides real time clock:
 - Counts seconds, minutes, hours, date of the month, month, day of the week, and year with leap year compensation valid up to 2100
 - Power control circuitry supports system power on from day/time alarm
- Microprocessor monitor:
 - Halts microprocessor during power fail
 - Automatically restarts microprocessor after power failure
 - Monitors pushbutton for external override
 - Halts and resets an out of control microprocessor
- NVRAM control:
 - Automatic battery backup and write protection to external SRAM
- 3-channel, 8-bit analog-to-digital converter
- Simple three-wire interface
- 3.3 volt operation

DESCRIPTION

The Portable System Controller is a circuit which incorporates many of the functions necessary for low power portable products integrated into one chip. The DS1670 provides a Real Time Clock, NVRAM controller, microprocessor monitor, and a 3-channel 8-bit analog-to-digital converter. Communication with the DS1670 is established through a simple 3-wire interface.

The Real Time Clock (RTC) provides seconds, minutes, hours, day, date, month, and year information with leap year compensation. The RTC also provides an alarm interrupt. This interrupt works when the DS1670 is powered by the system power supply or when in battery backup operation so the alarm can be used to wake up a system that is powered down.

PIN ASSIGNMENT



Automatic backup and write protection of external SRAM is provided through the V_{CCO}, CEOL, and CEOH pins. The backup energy source used to power the RTC is also used to retain RAM data in the absence of V_{CC} through the V_{CCO} pin. The chip enable outputs to RAM (CEOL and CEOH) are controlled during power transients to prevent data corruption.

The microprocessor monitor circuitry of the DS1670 provides three basic functions. First, a precision temperature-compensated reference and comparator circuit monitors the status of V_{CC}. When an out-of-tolerance condition occurs, an internal power fail signal is generated which forces the reset to the active state.

DALLAS

SEMICONDUCTOR

DS1673

Portable System Controller

FEATURES

- Provides Real Time Clock:
 - Counts seconds, minutes, hours, date of the month, month, day of the week, and year with leap year compensation valid up to 2100
 - Power control circuitry supports system power on from day/time alarm
- Microprocessor monitor:
 - Halts microprocessor during power-fail
 - Automatically restarts microprocessor after power failure
 - Monitors push-button for external override
 - Halts and resets an out of control microprocessor
- NV RAM control:
 - Automatic battery backup and write protection to external SRAM
- 3-channel, 8-bit analog-to-digital converter
- Simple three-wire interface
- +3.0 or +5.0 volt operation

ORDERING INFORMATION

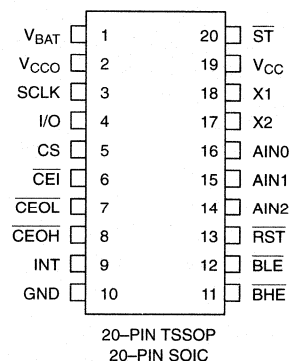
DS1673E – X 20-Pin TSSOP
 DS1673S – X 20-Pin SOIC
 ↳ 3 +3 volt operation
 5 +5 volt operation

DESCRIPTION

The Portable System Controller is a circuit which incorporates many of the functions necessary for low power portable products integrated into one chip. The DS1673 provides a Real Time Clock, NV RAM controller, microprocessor monitor, and a 3-channel 8-bit analog-to-digital converter. Communication with the DS1673 is established through a simple 3-wire interface.

The Real Time Clock (RTC) provides seconds, minutes, hours, day, date, month, and year information with leap year compensation. The RTC also provides an alarm

PIN ASSIGNMENT



interrupt. This interrupt works when the DS1673 is powered by the system power supply or when in battery backup operation so the alarm can be used to wake up a system that is powered down.

Automatic backup and write protection of external SRAM is provided through the V_{CCO}, CEOL, and CEOH pins. The backup energy source used to power the RTC is also used to retain RAM data in the absence of V_{CC} through the V_{CCO} pin.

DALLAS SEMICONDUCTOR

DS1685/DS1687 3 Volt/5 Volt Real Time Clock

FEATURES

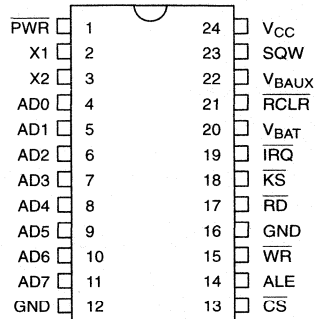
Incorporates industry standard DS1287 PC clock plus enhanced features:

- +3 or +5 volt operation
- 64-bit silicon serial number
- Power control circuitry supports system power on from date/time alarm or key closure
- 32 KHz output for power management
- Crystal select bit allows RTC to operate with 6 pF or 12.5 pF crystal
- SMI Recovery Stack
- 242 bytes user NVRAM
- Auxiliary battery input
- RAM clear input
- Century register
- Date alarm register
- Compatible with existing BIOS for original DS1287 functions
- Available as chip (DS1685) or standalone module with embedded battery and crystal (DS1687)

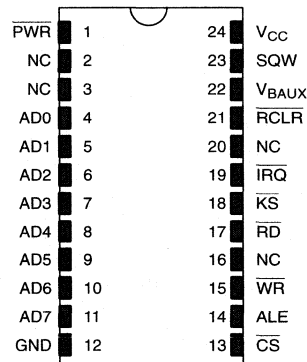
ORDERING INFORMATION

PART #	DESCRIPTION
DS1685-X	RTC Chip; 24-pin DIP
DS1685E-X	RTC Chip; 24-pin TSSOP
DS1685S-X	RTC Chip; 24-pin SOIC
DS1685Q-X	RTC Chip; 28-pin PLCC
DS1687-X	RTC Module; 24-pin DIP
	→ -3 +3 volt device
	→ -5 +5 volt device

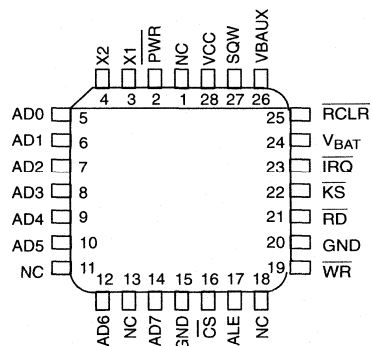
PIN ASSIGNMENT



DS1685 24-PIN DIP
DS1685S 24-PIN SOIC
DS1685E 24-PIN TSSOP



DS1687 24-PIN ENCAPSULATED PACKAGE



DS1685Q 28-PIN PLCC

DALLAS

SEMICONDUCTOR

DS1688/DS1691

3 Volt/5 Volt Serialized Real Time Clock with NV RAM Control

FEATURES

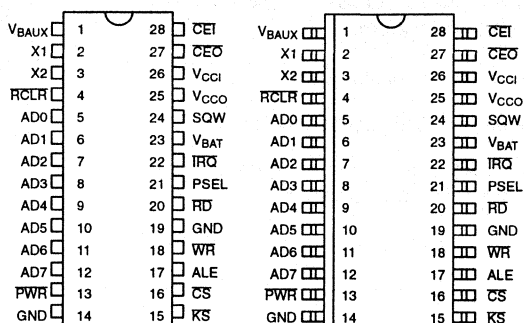
Incorporates industry standard DS1287 PC clock plus enhanced features:

- +3 or +5 volt operation
- 64-bit Silicon serial number
- 64-bit customer specific ROM or additional serial number available
- Power control circuitry supports system power on from date/time alarm or key closure
- Automatic battery backup and write protection to external SRAM
- Crystal select bit allows RTC to operate with 6 pF or 12.5 pF crystal
- 114 bytes user NVRAM
- Auxiliary battery input
- RAM clear input
- Century register
- 32 KHz output for power management
- 32-bit V_{CC} powered elapsed time counter
- 32-bit V_{BAT} powered elapsed time counter
- 16-bit power cycle counter
- Compatible with existing BIOS for original DS1287 functions
- Available as chip (DS1688) or stand-alone module with embedded battery and crystal (DS1691)
- Timekeeping algorithm includes leap year compensation valid up to 2100

ORDERING INFORMATION

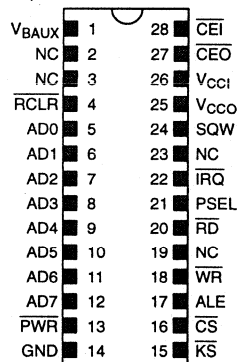
PART #	DESCRIPTION
DS1688	RTC Chip, 28-pin DIP
DS1688S	RTC Chip, 28-pin SOIC
DS1691	RTC Module; 28-pin DIP

PIN ASSIGNMENT



DS1688 28-PIN DIP
(600 MIL)

DS1688S 28-PIN SOIC
(330 MIL)



DS1691 28-PIN ENCAPSULATED PACKAGE (740 MIL)

PIN DESCRIPTION

X1	– Crystal Input
X2	– Crystal Output
RCLR	– RAM Clear Input
AD0-AD7	– Mux'ed Address/Data Bus
PWR	– Power-on Interrupt Output
KS	– Kickstart Input
CS	– RTC Chip Select Input
ALE	– RTC Address Strobe
WR	– RTC Write Data Strobe
RD	– RTC Read Data Strobe
VCCO	– RAM Power Supply Output

DALLAS SEMICONDUCTOR

DS1689/DS1693 3 Volt/5 Volt Serialized Real Time Clock with NV RAM Control

FEATURES

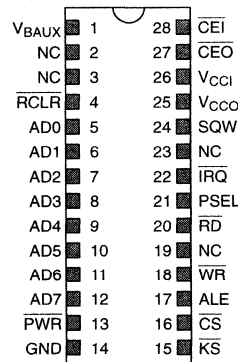
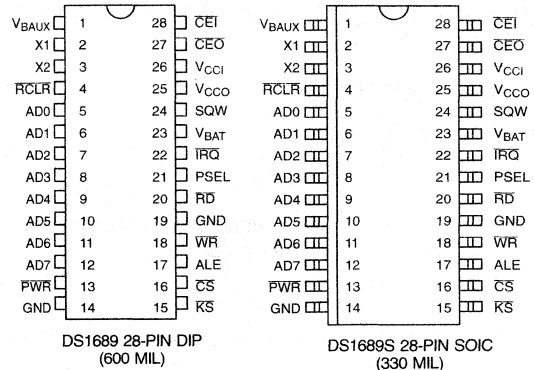
Incorporates industry standard DS1287 PC clock plus enhanced features:

- +3 or +5 volt operation
- 64-bit Silicon serial number
- 64-bit customer specific ROM or additional serial number available
- Power control circuitry supports system power on from date/time alarm or key closure
- Automatic battery backup and write protection to external SRAM
- Crystal select bit allows RTC to operate with 6 pF or 12.5 pF crystal
- 114 bytes user NVRAM
- Auxiliary battery input
- RAM clear input
- Century register
- 32 KHz output for power management
- 32-bit V_{CC} powered elapsed time counter
- 32-bit V_{BAT} powered elapsed time counter
- 16-bit power cycle counter
- Compatible with existing BIOS for original DS1287 functions
- Available as chip (DS1689) or standalone module with embedded battery and crystal (DS1693)
- Chips are available in industrial temperature version
- Timekeeping algorithm includes leap year compensation valid up to 2100

ORDERING INFORMATION

PART #	DESCRIPTION
DS1689	RTC Chip, 28-pin DIP
DS1689S	RTC Chip, 28-pin SOIC
DS1693	RTC Module; 28-pin DIP

PIN ASSIGNMENT



PIN DESCRIPTION

X1	–	Crystal Input
X2	–	Crystal Output
RCLR	–	RAM Clear Input
AD0-AD7	–	Mux'ed Address/Data Bus
PWR	–	Power-on Interrupt Output (open drain)
KS	–	Kickstart Input
CS	–	RTC Chip Select Input
ALE	–	RTC Address Strobe
WR	–	RTC Write Data Strobe
RD	–	RTC Read Data Strobe
V _{CC0}	–	RAM Power Supply Output

DALLAS SEMICONDUCTOR

DS17285/DS17287 3 Volt/5 Volt Real Time Clock



FEATURES

Incorporates industry standard DS1287 PC clock plus enhanced features:

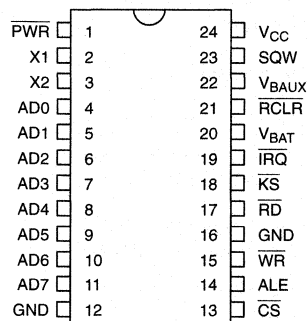
- +3 or +5 volt operation
- SMI recovery stack
- 64-bit silicon serial number
- Power control circuitry supports system power on from date/time alarm or key closure
- 32 KHz output on power-up
- Crystal select bit allows RTC to operate with 6 pF or 12.5 pF crystal
- 114 bytes user NVRAM
- 2K bytes of additional NVRAM
- Auxiliary battery input
- RAM clear input
- Century register
- Date alarm register
- Compatible with existing BIOS for original DS1287 functions
- Available as chip (DS17285) or standalone module with embedded battery and crystal (DS17287)

ORDERING INFORMATION

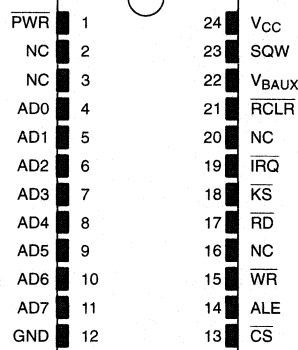
PART #	DESCRIPTION
DS17285-X	RTC Chip; 24-pin DIP
DS17285S-X	RTC Chip; 24-pin SOIC
DS17285E-X	RTC Chip; 28-pin TSOP
DS17287-X	RTC Module; 24-pin DIP

 -3 +3 volt device
 -5 +5 volt device

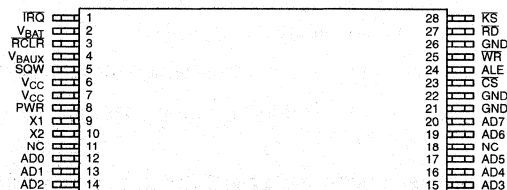
PIN ASSIGNMENT



DS17285 24-PIN DIP
DS17285S 24-PIN SOIC



DS17287 24-PIN ENCAPSULATED PACKAGE



DS17285E 28-PIN TSOP

DALLAS SEMICONDUCTOR

DS17485/DS17487 3 Volt/5 Volt Real Time Clock


FEATURES

Incorporates industry standard DS1287 PC clock plus enhanced features:

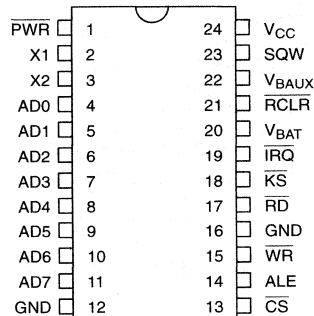
- +3 or +5 volt operation
- SMI recovery stack
- 64-bit silicon serial number
- Power control circuitry supports system power on from date/time alarm or key closure
- 32 KHz output on power-up
- Crystal select bit allows RTC to operate with 6 pF or 12.5 pF crystal
- 114 bytes user NVRAM
- Auxiliary battery input
- 4K bytes additional NVRAM
- RAM clear input
- Century register
- Date alarm register
- Compatible with existing BIOS for original DS1287 functions
- Available as chip (DS17485) or standalone module with embedded battery and crystal (DS17487)

ORDERING INFORMATION

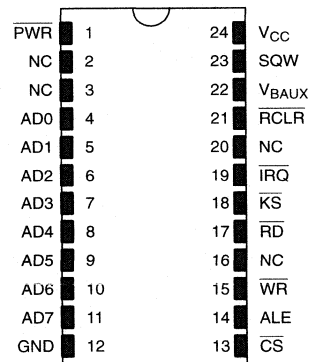
PART #	DESCRIPTION
DS17485-X	RTC Chip; 24-pin DIP
DS17485S-X	RTC Chip; 24-pin SOIC
DS17485E-X	RTC Chip; 28-pin TSOP
DS17487-X	RTC Module; 24-pin DIP


 -3 +3 volt device
 -5 +5 volt device

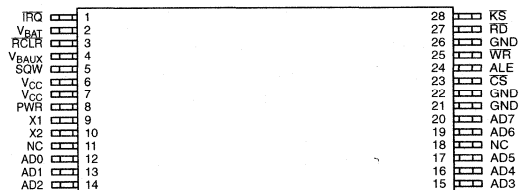
PIN ASSIGNMENT



DS17485 24-PIN DIP
DS17485S 24-PIN SOIC



DS17487 24-PIN ENCAPSULATED PACKAGE



DS17485E 28-PIN TSOP

DALLAS SEMICONDUCTOR

DS17885/DS17887 3 Volt/5 Volt Real Time Clock



FEATURES

Incorporates industry standard DS1287 PC clock plus enhanced features:

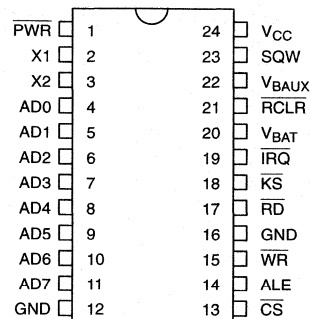
- +3 or +5 volt operation
- SMI recovery stack
- 64-bit silicon serial number
- Power control circuitry supports system power on from date/time alarm or key closure
- 32 KHz output on power-up
- Crystal select bit allows RTC to operate with 6 pF or 12.5 pF crystal
- 114 bytes user NVRAM
- Auxiliary battery input
- 8K bytes additional NVRAM
- RAM clear input
- Century register
- Date alarm register
- Compatible with existing BIOS for original DS1287 functions
- Available as chip (DS17885) or standalone module with embedded battery and crystal (DS17887)

ORDERING INFORMATION

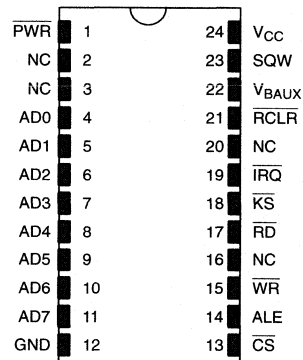
PART #	DESCRIPTION
DS17885-X	RTC Chip; 24-pin DIP
DS17885E-X	RTC Chip; 28-pin TSOP
DS17885S-X	RTC Chip; 24-pin SOIC
DS17887-X	RTC Module; 24-pin DIP

 -3 +3 volt device
 -5 +5 volt device

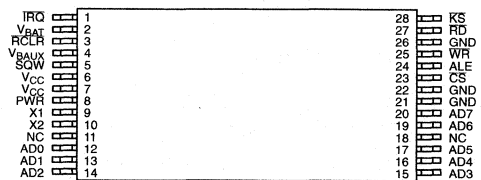
PIN ASSIGNMENT



DS17885 24-PIN DIP
DS17885S 24-PIN SOIC



DS17887 24-PIN ENCAPSULATED PACKAGE



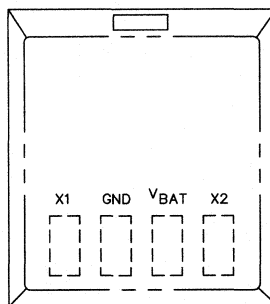
DS17885E 28-PIN TSOP

DALLAS SEMICONDUCTOR

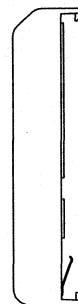
DS9034PCX PowerCap with Crystal

FEATURES

- Provides 10 years of battery backup power for Non-volatile Timekeeping RAM's in the PowerCap Module package (PCM)
- Snaps directly onto surface-mounted PowerCap Module Boards
- Detachment feature allows easy removal
- Compatible with these 34-pin PowerCap Modules:
 - DS1644P-xxx
 - DS1646P-xxx
 - DS1647P-xxx



TOP VIEW



SIDE VIEW

PIN DESCRIPTION

V _{BAT}	– +3 Volt Battery Output
GND	– Ground
X1, X2	– 32.768 KHz Crystal Connections

ABSOLUTE MAXIMUM RATINGS*

Operating Temperature	0°C to 70°C
Storage Temperature	–20°C to +70°C

CRYSTAL CHARACTERISTICS

Nominal Frequency	32.768 KHz
Load Capacitance	6 pF

BATTERY CHARACTERISTICS

Nominal Voltage	3V
Nominal Capacity	130 mAh
Chemistry	Li (CF)x
Data Retention Life	10 Years (25°C)

* This is a stress rating only and functional operation of the device at these or any other conditions above those indicated in the operation sections of this specification is not implied. Exposure to absolute maximum rating conditions for extended periods of time may affect reliability.

DESCRIPTION

The DS9034PCX PowerCap is designed to be a snap-on lithium power source for Nonvolatile Timekeeping RAMs in Dallas Semiconductor's directly surface-mountable PowerCap Module (PCM) package. After a PowerCap Module Board has been soldered in place and cleaned, the DS9034PCX PowerCap is snapped on top of the PCM Board to form a complete PowerCap Module package. The PowerCap is keyed to prevent incorrect attachment. The DS9034PCX can be easily removed by inserting a regular screwdriver into a detachment feature and prying gently outward and upward to release the PowerCap from the PowerCap Module Board.

DALLAS

SEMICONDUCTOR

DS1216B

SmartWatch/RAM 16K/64K

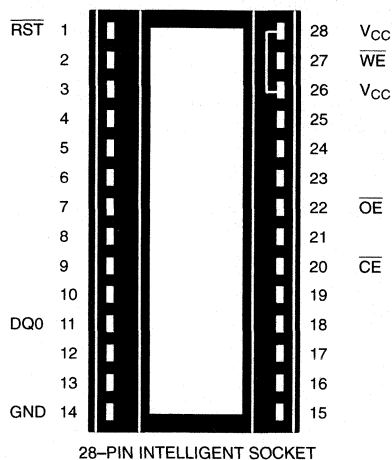
FEATURES

- Keeps track of hundredths of seconds, seconds, minutes, hours, days, date of the month, months, and years
- Converts standard 2K x 8 and 8K x 8 CMOS static RAMs into nonvolatile memory
- Embedded lithium energy cell maintains watch information and retains RAM data
- Watch function is transparent to RAM operation
- Month and year determine the number of days in each month; leap year compensation valid up to 2100
- Proven gas-tight socket contacts
- Full $\pm 10\%$ operating range
- Operating temperature range 0°C to 70°C
- Accuracy is better than ± 1 min./month @ 25°C

DESCRIPTION

The DS1216B SmartWatch/RAM 16/64K is a 28-pin, 600 MIL wide DIP socket with a built-in CMOS watch function, a nonvolatile RAM controller circuit, and an embedded lithium energy source. It accepts either 24-pin 2K x 8 or 28-pin 8K x 8 JEDEC bytewise CMOS static RAM. When the socket is mated with a CMOS SRAM, it provides a complete solution to problems associated with memory volatility and uses a common energy source to maintain time and date. A key feature of the SmartWatch is that the watch function remains transparent to the RAM. The SmartWatch monitors V_{CC}

PIN ASSIGNMENT



PIN DESCRIPTION

All Pins Pass Through Except 20, 26, 28

Pin 1	\overline{RST}	– Reset
Pin 11	DQ0	– Data Input/Output 0
Pin 14	GND	– Ground
Pin 20	\overline{OE}	– Conditioned Chip Enable
Pin 22	\overline{OE}	– Output Enable
Pin 26	V_{CC}	– Switched V_{CC} for 24 Pin RAM
Pin 27	\overline{WE}	– Write Enable
Pin 28	V_{CC}	– Switched V_{CC} for 28 Pin RAM

for an out-of-tolerance condition. When such a condition occurs, an internal lithium energy source is automatically switched on and write protection is unconditionally enabled to prevent loss of watch and RAM data.

Using the SmartWatch saves PC board space since the combination of SmartWatch and the mated RAM take up no more area than the memory alone. The SmartWatch uses pins 28, 27, 26, 22, 20, 11, and 1 for RAM and watch control. All other pins are passed straight through to the socket receptacle.

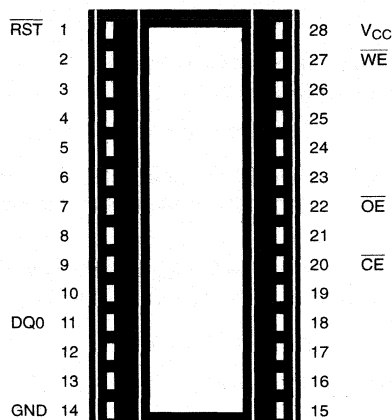
DALLAS SEMICONDUCTOR

DS1216C SmartWatch/RAM 64K/256K

FEATURES

- Keeps track of hundredths of seconds, seconds, minutes, hours, days, date of the month, months, and years
- Converts standard 8K x 8 and 32K x 8 CMOS static RAMs into nonvolatile memory
- Embedded lithium energy cell maintains watch information and retains RAM data
- Watch function is transparent to RAM operation
- Month and year determine the number of days in each month; leap year compensation valid up to 2100
- Proven gas-tight socket contacts
- Full $\pm 10\%$ operating range
- Operating temperature range 0°C to 70°C
- Accuracy is better than ± 1 min./month @ 25°C

PIN ASSIGNMENT



28-PIN INTELLIGENT SOCKET

PIN DESCRIPTION

All pins pass through except 20, 28.

Pin 1	\overline{RST}	– RESET
Pin 11	DQ0	– Data Input/Output 0
Pin 14	GND	– Ground
Pin 20	\overline{CE}	– Conditioned Chip Enable
Pin 22	\overline{OE}	– Output Enable
Pin 27	\overline{WE}	– Write Enable
Pin 28	V _{CC}	– Switched V _{CC}

DESCRIPTION

The DS1216C SmartWatch/RAM is a 28-pin, 600 MIL wide DIP socket with a built-in CMOS watch function, a nonvolatile RAM controller circuit, and an embedded lithium energy source. It accepts either an 8K x 8 or a 32K x 8 JEDEC bytewise CMOS static RAM. When the socket is mated with a CMOS SRAM, it provides a complete solution to problems associated with memory vol-

atility and uses a common energy source to maintain time and date. A key feature of the SmartWatch is that the watch function remains transparent to the RAM.

See the DS1216B SmartWatch/RAM 16/64K data sheet for technical details.

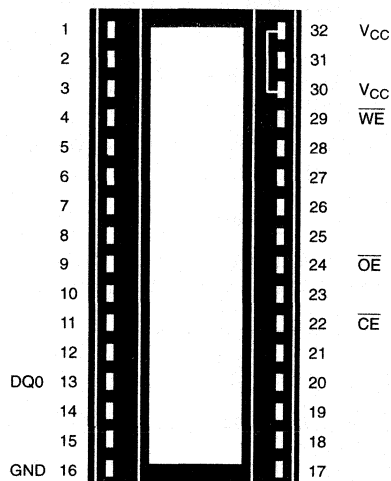
DALLAS SEMICONDUCTOR

DS1216D SmartWatch/RAM 256K/1M

FEATURES

- Converts standard 8K x 8, 32K x 8, 128K x 8, and 512K x 8 CMOS static RAMs into nonvolatile memory
- Embedded lithium energy cell maintains watch information and retains RAM data
- Watch function is transparent to RAM operation
- Keeps track of hundredths of seconds, seconds, minutes, hours, days, date of the month, months, and years
- Month and year determine the number of days in each month; leap year compensation valid up to 2100
- Proven gas-tight socket contacts
- Full $\pm 10\%$ operating range
- Operating temperature range 0°C to 70°C
- Accuracy is better than ± 1 min./month @ 25°C

PIN ASSIGNMENT



32-PIN INTELLIGENT SOCKET

PIN DESCRIPTION

All pins pass through except 22, 30 and 32.

Pin 1	\overline{RST}	– RESET
Pin 13	DQ0	– Data Input/Output 0
Pin 16	GND	– Ground
Pin 22	\overline{CE}	– Conditioned Chip Enable
Pin 24	\overline{OE}	– Output Enable
Pin 29	\overline{WE}	– Write Enable
Pin 30	V _{CC}	– Switched V _{CC} for 28-pin RAM
Pin 32	V _{CC}	– Switched V _{CC} for 32-pin RAM

DESCRIPTION

The DS1216D SmartWatch/RAM 256K/1M is a 32-pin, 600 MIL wide DIP socket with a built-in CMOS watch function, a nonvolatile RAM controller circuit, and an embedded lithium energy source. It accepts either an 8K x 8, 32K x 8, 128K x 8, or 512K x 8 JEDEC byte-wide CMOS static RAM. When the socket is mated with a CMOS SRAM, it provides a complete solution to prob-

lems associated with memory volatility and uses a common energy source to maintain time and date. A key feature of the SmartWatch is that the watch function remains transparent to the RAM.

See the DS1216B SmartWatch/RAM 16/64K data sheet for technical details.

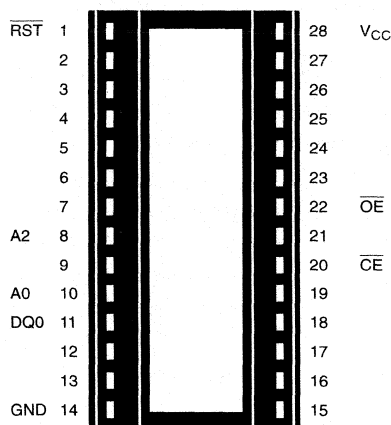
FEATURES

- Keeps track of hundredths of seconds, seconds, minutes, hours, days, date of month, months, and years
- Adds timekeeping to any 28-pin JEDEC byte-wide memory location
- Embedded lithium energy cell maintains calendar time for more than 10 years in the absence of power
- Timekeeping function is transparent to memory operation
- Month and year determine the number of days in each month; leap year compensation valid up to 2100
- Proven gas-tight socket contacts
- Full $\pm 10\%$ V_{CC} operating range
- Operating temperature range 0°C to 70°C
- Accurate to within ± 1 minute/month @ 25°C

DESCRIPTION

The DS1216E SmartWatch/ROM 64/256K is a 28-pin, 600 mil-wide DIP socket with a built-in CMOS timekeeper function and an embedded lithium energy source to maintain time and date. It accepts any 28-pin byte-wide ROM or volatile RAM. A key feature of the SmartWatch is that the timekeeper function remains transparent to the memory device placed above. The SmartWatch monitors V_{CC} for an out-of-tolerance condition. When such a condition occurs, an internal lithium energy source is automatically switched on to prevent loss of watch data.

PIN ASSIGNMENT



28-PIN INTELLIGENT SOCKET

PIN DESCRIPTION

Pin 1	$\overline{\text{RST}}$	– Reset
Pin 8	A2	– Address Bit 2 ($\overline{\text{READ}}/\overline{\text{WRITE}}$)
Pin 10	A0	– Address Bit 0 (Data Input)
Pin 11	DQ0	– I/O ₀ (Data Output)
Pin 14	GND	– Ground
Pin 20	$\overline{\text{CE}}$	– Conditioned Chip Enable
Pin 22	$\overline{\text{OE}}$	– Output Enable
Pin 28	V_{CC}	– +5 VDC to the Socket

All pins pass through to the socket except 20.

Using the SmartWatch saves PC board space since the combination of the SmartWatch and the mated memory device takes up no more area than the memory alone. The SmartWatch uses pins 1, 8, 10, 11, 20, and 22 for timekeeper control. All pins pass through to the socket receptacle except for pin 20 ($\overline{\text{CE}}$), which is inhibited during the transfer of time information.

The SmartWatch provides timekeeping information including hundredths of seconds, seconds, minutes, hours, days, date, month, and year information.

DALLAS

SEMICONDUCTOR

DS1216F

SmartWatch/ROM 64K/256K/1M

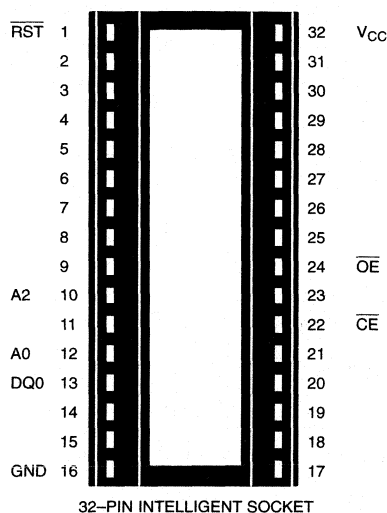
FEATURES

- Adds timekeeping to any 32-pin JEDEC bytewise memory location
- Embedded lithium energy cell maintains calendar time for more than 10 years in the absence of power
- Timekeeping function is transparent to memory operation
- Keeps track of hundredths of seconds, seconds, minutes, hours, days, date of the month, months, and years
- Month and year determine the number of days in each month; leap year compensation valid up to 2100
- Proven gas-tight socket contacts
- Full $\pm 10\%$ V_{CC} operating range
- Operating temperature range 0°C to 70°C
- Accuracy is better than ± 1 minute/month @ 25°C

DESCRIPTION

The DS1216F SmartWatch/ROM is a 32-pin, 600 mil-wide DIP socket with a built-in CMOS timekeeper and an embedded lithium energy source to maintain time and date. It accepts any 32-pin bytewise ROM or volatile RAM. A key feature of the SmartWatch is that the timekeeping function remains transparent to the memory device placed above. The SmartWatch monitors V_{CC} for an out-of-tolerance condition. When such a condition occurs, an internal lithium energy source automatically switches on to prevent loss of time and calendar data.

PIN ASSIGNMENT



PIN DESCRIPTION

- Pin 1 $\overline{\text{RST}}$ – RESET
 Pin 10 A2 – Address Bit 2 (READ/ $\overline{\text{WRITE}}$)
 Pin 12 A0 – Address Bit 0 (Data Input)
 Pin 13 DQ0 – I/O₀ (Data Output)
 Pin 16 GND – Ground
 Pin 22 $\overline{\text{CE}}$ – Conditioned Chip Enable
 Pin 24 $\overline{\text{OE}}$ – Output Enable
 Pin 32 V_{CC} – +5 VDC to the Socket
 All pins pass through to the socket except 22.

Using the SmartWatch saves PC board space since the combination of SmartWatch and the mated memory device takes up no more area than the memory alone. The SmartWatch uses pins 1, 10, 12, 13, 22, and 24 for timekeeper control. All pins pass through to the socket receptacle except for pin 22 ($\overline{\text{CE}}$), which is inhibited during the transfer of time information.

See the DS1216E SmartWatch/ROM/64/256K data sheet for technical details.

I'm Interested. Who Do I Call?

For technical product information, call (972) 371-4448 or fax us at (972) 371-3715. If calling from overseas, dial (972) 371-4351. We can mail a data book and product literature immediately, or we can have you talk to an applications engineer.

You can order any Dallas Semiconductor product for next-day shipment with a Visa, MasterCard, or American Express card. Call our Credit Card Sales service at (800) 336-6933 (in the U.S.) or (972) 371-4000 (outside the U.S.) or send e-mail to credit.card@dalsemi.com

You can also contact our nearest distributor, representative, or sales office.

Literature & Technical Support.....	(972) 371-4448
Sales & Customer Service.....	(972) 371-4969
Automatic Data Sheet Faxback.....	(972) 371-4441
Corporate FTP Site.....	ftp://ftp.dalsemi.com
Dallas Semiconductor Web Site.....	http://www.dalsemi.com
iButton Web Site.....	www.iButton.com
E-mail Address Format.....	firstname.lastname@dalsemi.com
Sales Site.....	sales@dalsemi.com

HEADQUARTERS & SALES OFFICES

4401 S. Dallas Parkway, Dallas TX 75244.....	Tel: (972) 371-4448 Fax: (972) 371-3715
New England.....	Chelmsford, MA (508) 256-4995
Northeastern U.S./Eastern Canada.....	Toronto, Ontario (416) 465-6210
Mid Atlantic.....	Marlton, NJ (609) 596-1919
Southeast/Florida.....	St. Petersburg, FL (813) 527-6454
South Central.....	Dallas, TX (972) 788-2197
North Central.....	Hoffman Estates, IL (847) 490-5378
Great Lakes Area.....	Akron, OH (330) 865-8282
Western Area.....	Sunnyvale, CA (408) 733-8400
Southwest.....	Irvine, CA (714) 724-0790

EUROPEAN SALES OFFICE

Birmingham, England.....	44-121-782-2959
--------------------------	-----------------

PACIFIC RIM SALES OFFICES

Dallas, TX.....	(972) 371-4944
Taipei, Taiwan.....	886-2-698-3940

SOUTH AMERICAN SALES OFFICE

Marlton, NJ.....	(609) 596-1919
------------------	----------------

NORTH AMERICAN SALES REPRESENTATIVES

Alabama

Glen White & Assoc.	Huntsville, AL (205) 882-6751
--------------------------	-------------------------------

Arizona

System Sales of AZ.....	Mesa, AZ (602) 464-9989
-------------------------	-------------------------

Arkansas

Bonser-Philhower.....	Richardson, TX (972) 234-8438
-----------------------	-------------------------------

California

Harvey King, Inc.	San Diego, CA (619) 695-9300
------------------------	------------------------------

<i>R.S.V.P. Associates</i>	San Jose, CA (408) 467-1200
<i>S C Cubed</i>	Tustin, CA (714) 731-9206
<i>SC Cubed</i>	Westlake Village, CA (818) 865-6222
Canada	
<i>InTELaTech Inc.</i>	Mississauga, Ontario (905) 629-0082
<i>InTELaTech Inc.</i>	Kanata, Ontario (613) 599-7330
<i>InTELaTech Inc.</i>	D.D.O., Quebec (514) 421-5833
<i>Microwe Electronics</i>	De Winton, Alberta (403) 254-4180
<i>Microwe Electronics</i>	Langley, British Columbia (604) 882-4667
Colorado	
<i>Waugaman Associates</i>	Wheat Ridge, CO (303) 423-1020
Connecticut	
<i>Technology Sales Inc.</i>	Wallingford, CT (203) 269-8853
Delaware	
<i>Trinkle Sales Inc.</i>	Cherry Hill, NJ (609) 795-4200
Florida	
<i>Naltron, Inc.</i>	Davie, FL (954) 370-9363
<i>Naltron, Inc.</i>	Indialantic, FL (407) 777-3399
<i>Naltron, Inc.</i>	Tampa, FL (813) 287-1433
<i>Naltron, Inc.</i>	Plantation, FL (954) 236-3580
<i>Naltron, Inc.</i>	Winter Park, FL (407) 657-7003
Georgia	
<i>Glen White & Assoc.</i>	Duluth, GA (770) 418-1500
<i>Glen White & Assoc.</i>	Norcross, GA (770) 448-0577
Idaho	
<i>E/S Chase</i>	Tigard, OR (503) 684-8500
Illinois	
<i>Sumer Inc.</i>	Rolling Meadows, IL (847) 991-8500
<i>Gibb Technology Sales</i>	St. Louis, MO (314) 890-0443
Indiana	
<i>Valentine Associates</i>	Carmel, IN (317) 846-0008
Iowa	
<i>Gibb Technology Sales</i>	Overland Park, KS (913) 492-3971
Kansas	
<i>Gibb Technology Sales</i>	Overland Park, KS (913) 492-3971
Kentucky	
<i>Millennium Tech Sales</i>	Kettering, OH (513) 435-8650
Louisiana	
<i>Bonser-Philhower</i>	Austin, TX (512) 346-9186
<i>Bonser-Philhower</i>	Houston, TX (713) 782-4144
<i>Bonser-Philhower</i>	Richardson, TX (972) 234-8438
Maine	
<i>Mill-Bern Associates</i>	Woburn, MA (617) 932-3311
Maryland	
<i>S-J Chesapeake</i>	Falls Church, VA (703) 533-2233
Massachusetts	
<i>Mill-Bern Associates</i>	Woburn, MA (617) 932-3311
Michigan	
<i>Trilogy Marketing</i>	Auburn Hills, MI (810) 377-4900
Minnesota	
<i>Cahill, Schmitz & Cahill</i>	St. Paul, MN (612) 646-7217
Mississippi	
<i>Glen White & Assoc.</i>	Huntsville, AL (205) 882-6751
Missouri	
<i>Gibb Technology Sales</i>	St. Louis, MO (314) 434-4220
Montana	

<i>Waugaman Associates</i>	Wheat Ridge, CO (303) 423-1020
Nebraska	
<i>Gibb Technology Sales</i>	Overland Park, KS (913) 492-3971
<i>Waugaman Associates</i>	Wheat Ridge, CO (303) 423-1020
Nevada	
<i>R.S.V.P. Associates</i>	San Jose, CA (408) 467-1200
<i>System Sales of AZ</i>	Mesa, AZ (602) 464-9989
New Hampshire	
<i>Mill-Bern Associates</i>	Woburn, MA (617) 932-3311
New Jersey	
<i>Trinkle Sales Inc.</i>	Cherry Hill, NJ (609) 795-4200
<i>S-J Associates</i>	Rockville Center, NY (516) 536-4242
New Mexico	
<i>System Sales of AZ</i>	Albuquerque, NM (505) 889-2901
New York	
<i>S-J Associates</i>	Rockville Center, NY (516) 536-4242
<i>Technology Sales, Inc.</i>	Fairport, NY (716) 223-7500
North Carolina	
<i>Glen White & Assoc.</i>	Huntersville, NC (704) 875-3777
<i>Glen White & Assoc.</i>	Raleigh, NC (919) 848-1931
North Dakota	
<i>Cahill, Schmitz & Cahill</i>	St. Paul, MN (612) 646-7217
Ohio	
<i>Millennium Tech Sales</i>	Dublin, OH (614) 793-9545
<i>Millennium Tech Sales</i>	Solon, OH (216) 349-6600
Oklahoma	
<i>Bonser-Philhower</i>	Richardson, TX (972) 234-8438
Oregon	
<i>ES/Chase</i>	Tigard, OR (503) 684-8500
Pennsylvania	
<i>Millennium Tech Sales</i>	Imperial, PA (412) 695-7661
<i>Trinkle Sales Inc.</i>	Cherry Hill, NJ (609) 795-4200
Puerto Rico	
<i>Atland</i>	Carolina, PR (809) 752-2160
Rhode Island	
<i>Mill-Bern Associates</i>	Woburn, MA (617) 932-3311
South Carolina	
<i>Glen White & Assoc.</i>	Huntersville, NC (704) 875-3777
South Dakota	
<i>Cahill, Schmitz & Cahill</i>	St. Paul, MN (612) 646-7217
Tennessee	
<i>Glen White & Assoc.</i>	Huntsville, AL (205) 882-6751
Texas	
<i>Bonser-Philhower</i>	Austin, TX (512) 346-9186
<i>Bonser-Philhower</i>	Houston, TX (713) 782-4144
<i>Bonser-Philhower</i>	Richardson, TX (972) 234-8438
<i>System Sales of Arizona</i>	El Paso, TX (915) 771-9445
Utah	
<i>Compass Marketing</i>	Salt Lake City, UT (801) 322-0391
Vermont	
<i>Mill-Bern Associates</i>	Woburn, MA (617) 932-3311
Virginia	
<i>S-J Chesapeake</i>	Falls Church, VA (703) 533-2233
Washington	
<i>ES/Chase</i>	Kirkland, WA (206) 823-9535
West Virginia	

<i>Millennium Tech Sales</i>	Solon, OH (216) 349-6600
Wisconsin	
<i>Sumer, Inc.</i>	Brookfield, WI (414) 784-6641
Wyoming	
<i>Waugaman Associates</i>	Wheat Ridge, CO (303) 423-1020

NORTH AMERICAN DISTRIBUTORS

FUTURE ELECTRONICS

Alabama	Huntsville, AL (205) 971-2010
Arizona	Phoenix, AZ (602) 968-7140
California	
.....	Agoura Hills, CA (818) 865-0040
.....	El Segundo, CA (310) 727-1754
.....	Irvine, CA (714) 453-1515
.....	San Diego, CA (619) 625-2800
.....	San Jose, CA (408) 434-1122
Canada	
.....	Calgary, Alberta (403) 250-5550
.....	Edmonton, Alberta (403) 438-2858
.....	Mississauga, Ontario (905) 612-9200
.....	Ottawa, Ontario (613) 820-8313
.....	Pointe Claire, Quebec (514) 694-7710
.....	Quebec City, Quebec (418) 877-6666
.....	Vancouver, BC (604) 294-1166
.....	Winnipeg, Manitoba (204) 944-1446
Colorado	Lakewood, CO (303) 232-2008
Connecticut	Cheshire, CT (203) 250-0083
Florida	
.....	Altamonte Springs, FL (407) 865-7900
.....	Deerfield Beach, FL (954) 426-4043
.....	Largo, FL (813) 530-1222
Georgia	Norcross, GA (770) 441-7676
Illinois	Hoffman Estates, IL (847) 882-1255
Indiana	Indianapolis, IN (317) 469-0447
Kansas	Overland Park, KS (913) 458-1531
Maryland	Columbia, MD (410) 290-0600
Massachusetts	Bolton, MI (508) 779-3000
Michigan	
.....	Grand Rapids, MI (616) 698-6800
.....	Livonia, MI (313) 261-5270
Minnesota	Eden Prairie, MN (612) 944-2200
Missouri	St. Louis, MO (314) 469-6805
New Jersey	
.....	Marlton, NJ (609) 596-4080
.....	Parsippany, NJ (201) 299-0400
New York	
.....	Hauppauge, NY (516) 234-4000
.....	N. Syracuse, NY (315) 451-2371
.....	Rochester, NY (716) 387-9550
North Carolina	
.....	Charlotte, NC (704) 547-1107
.....	Raleigh, NC (919) 790-7111
Ohio	
.....	Beavercreek, OH (513) 426-0090

..... Mayfield Heights, OH (216) 449-6996
Oregon Beaverton, OR (503) 645-6454
Pennsylvania Wexford, PA (412) 935-1113
Texas
..... Austin, TX (512) 502-0991
..... Houston, TX (713) 785-1155
..... Richardson, TX (972) 437-2437
Utah Salt Lake City, UT (801) 467-4448
Washington Bothell, WA (206) 489-3400
Wisconsin Brookfield, WI (414) 879-0244

HAMILTON-HALLMARK

Alabama Huntsville, AL (205) 837-8700
Arizona Phoenix, AZ (602) 437-1200
California
..... Irvine, CA (714) 789-4100
..... Rocklin, CA (916) 624-9781
..... San Diego, CA (619) 571-7540
..... San Jose, CA (408) 435-3500
..... Woodland Hills, CA (818) 594-0404
Colorado
..... Colorado Springs, CO (719) 637-0055
..... Englewood, CO (303) 790-1662
Connecticut Cheshire, CT (203) 271-2844
Florida
..... Ft. Lauderdale, FL (305) 484-4582
..... Largo, FL (813) 547-5000
..... Winter Park, FL (407) 657-3300
Georgia Duluth, GA (770) 623-4400
Illinois Arlington Heights, IL (847) 797-7367
Indiana Carmel, IN (317) 575-3500
Kansas Overland Park, KS (913) 663-7900
Kentucky Lexington, KY (800) 235-6039
Maryland Columbia, MD (410) 720-3400
Massachusetts Peabody, MA (508) 532-9808
Michigan Plymouth, MI (313) 416-5800
Minnesota Bloomington, MN (612) 881-2600
Missouri Earth City, MO (314) 770-6303
New Jersey
..... Mt. Laurel, NJ (609) 222-6400
..... Parsippany, NJ (201) 515-3000
New York
..... Hauppauge, NY (516) 434-7400
..... Rochester, NY (716) 475-9130
North Carolina Raleigh, NC (919) 872-0712
Ohio
..... Dayton, OH (513) 439-6735
..... Solon, OH (216) 498-1100
..... Worthington, OH (614) 888-3313
Oklahoma Tulsa, OK (918) 254-6110
Oregon Beaverton, OR (503) 526-6200
Texas
..... Austin, TX (512) 258-8848
..... Dallas, TX (214) 553-4300
..... Houston, TX (713) 781-6100
Utah Salt Lake City, UT (801) 266-2022

Wisconsin New Berlin, WI (414) 797-7844

INSIGHT ELECTRONICS

Alabama Huntsville, AL (205) 830-1222
Arizona Tempe, AZ (602) 829-1800
California Irvine, CA (714) 727-3291
..... San Diego, CA (619) 587-1100
..... San Jose, CA (408) 526-2100
..... Westlake Village, CA (818) 707-2101
Canada Calgary, Alberta (405) 250-8822
..... Etobicoke, Ontario (416) 622-7006
..... Ottawa, Ontario (613) 233-1799
..... Pointe Claire, Quebec (514) 428-0060
..... Richmond, BC (604) 270-3232
Colorado Englewood, CO (303) 649-1800
Florida Altamonte Springs, FL (407) 834-6310
..... Boca Raton, FL (561) 997-2540
..... Clearwater, FL (813) 524-8850
Georgia Duluth, GA (770) 717-8566
Illinois Schaumburg, IL (847) 885-9700
Kansas Lenexa, KS (913) 492-0408
Maryland Columbia, MD (410) 381-3131
Massachusetts Burlington, MA (617) 270-9700
Michigan Brighton, MI (810) 229-7710
..... Stevensville, MI (616) 429-1410
Minnesota St. Louis Park, MN (612) 525-9999
Missouri St. Louis, MO (314) 822-0801
New Jersey Marlton, NJ (609) 985-5556
..... Mountain Lakes, NJ (201) 361-6040
New York Bohemia, NY (516) 244-1640
North Carolina Indian Trail, NC (704) 882-8364
..... Raleigh, NC (919) 873-9922
Ohio Dayton, OH (513) 253-7501
..... Valley View, OH (216) 520-4333
Oklahoma Tulsa, OK (918) 665-4664
Oregon Beaverton, OR (503) 644-3300
Pennsylvania Cranberry Township, PA (412) 779-0060
Texas Austin, TX (512) 719-3090
..... Houston, TX (713) 448-0800
..... Richardson, TX (972) 783-0800
Utah Salt Lake City, UT (801) 288-9001
Washington Kirkland, WA (206) 820-8100
Wisconsin Wauwatosa, WI (414) 258-5338

INTERFACE ELECTRONICS

Massachusetts Hopkinton, MA (508) 435-6858
New Jersey Marlton, NJ (609) 988-5448
North Carolina Raleigh, NC (919) 797-8744

MILGRAY ELECTRONICS

Alabama	Madison, AL (205) 464-8646
Arizona	Phoenix, AZ (602) 914-4240
California	
.....	Irvine, CA (714) 753-1282
.....	San Diego, CA (619) 457-7545
.....	San Jose, CA (408) 456-0900
.....	Thousand Oaks, CA (805) 371-9399
Canada	
.....	Burnaby, BC (604) 291-0044
.....	Mississauga, Ontario (905) 678-0958
.....	Pointe Claire, Quebec (514) 426-5900
Colorado	Westminster, CO (303) 657-2750
Connecticut	Milford, CT (203) 878-5538
Florida	Lake Mary, FL (407) 321-2555
Georgia	Norcross, GA (770) 446-9777
Illinois	Palatine, IL (847) 202-1900
Indiana	Indianapolis, IN (317) 781-9997
Kansas	Overland Park, KS (913) 236-8800
Maryland	Columbia, MD (410) 730-6119
Massachusetts	Wilmington, MA (508) 657-5900
New Jersey	
.....	Mt. Laurel, NJ (609) 778-1300
.....	Parsippany, NJ (201) 335-1766
New York	
.....	Farmingdale, NY (516) 391-3000
.....	Pittsford, NY (716) 381-9700
North Carolina	Raleigh, NC (919) 790-8094
Ohio	Cleveland, OH (216) 447-1520
Oregon	Beaverton, OR (503) 626-4040
Texas	
.....	Austin, TX (512) 331-9961
.....	Dallas, TX (972) 248-1603
.....	Houston, TX (281) 870-8101
Utah	Murray, UT (801) 261-2999

NEWARK ELECTRONICS

Illinois	Chicago, IL 1-800-4NEWARK
----------	---------------------------

STERLING ELECTRONICS

Arizona	Phoenix, AZ (602) 437-5565
California	
.....	Irvine, CA (714) 453-7660
.....	San Diego, CA (619) 560-8097
.....	San Jose, CA (408) 435-0835
.....	Westlake Village, CA (818) 865-2333
Colorado	Englewood, CO (303) 792-3939
Connecticut	Wallingford, CT (203) 265-9535
Florida	Altamonte Springs, FL (407) 260-8558
Georgia	Norcross, GA (770) 441-0449
Illinois	Schaumburg, IL (847) 303-9900
Kansas	Lenexa, KS (913) 492-5406
Maryland	Columbia, MD (410) 290-3800
Massachusetts	Woburn, MA (617) 938-6200
Minnesota	Eden Prairie, MN (612) 946-8888
New Jersey	

.....	Mt. Laurel, NJ (609) 273-6420
.....	Parsippany, NJ (201) 331-0999
New Mexico	Albuquerque, NM (505) 884-1900
North Carolina	Raleigh, NC (919) 790-8634
Ohio	Solon, OH (216) 248-1122
Oklahoma	Tulsa, OK (918) 663-2410
Texas	
.....	Austin, TX (512) 836-1341
.....	Grapevine, TX (817) 949-1600
.....	Houston, TX (713) 627-9800
Utah	Salt Lake City, UT (801) 972-5444
Virginia	Richmond, VA (804) 323-5510
Washington	Kirkland, WA (206) 823-9770

INTERNATIONAL REPRESENTATIVES & DISTRIBUTORS

Albania	HT-Eurep d.o.o. 385-1-6129610
Argentina	Semak S.A. 54-1-381-2108
Australia	
.....	Dallas Identification 61-3-9720-5344
.....	Fagan Microelectronics Ltd. 61-3-9699-9899
.....	Veltek Pty. Ltd. 61-3-9574-9300
.....	Veltek Pty. Ltd. 61-2-9745-1400
.....	Veltek Pty. Ltd. 61-8-8232-3922
.....	Veltek Pty. Ltd. 61-8-472-3855
.....	Veltek Pty. Ltd. 61-7-3216-0770
Austria	Eurodis Electronics 43-1-610620
Belgium	
.....	Alcom Electronics 32-3458-3033
.....	ACAL NV.SA 32-2-720-5983
Brazil	Uniao Digital Comercio e Representacoes Ltda. 55-11-5514-335 ext. 235
Bulgaria	Isomatic Lab Ltd. 359-2-77-4596
China	
.....	CET Limited, Hong Kong 852-2485-3899
.....	CET Limited, Beijing 86-10-62184786
.....	Memec Ltd. Hong Kong 852-2410-2780
.....	Memec Ltd. Beijing 86-10-62535475
.....	Memec Ltd. Chengdu 86-28-3399629
.....	Memec Ltd. Shanghai 86-21-62582582 x2362
.....	Memec Ltd. Shenzhen 86-755-3241548
.....	Waslin (H.K.) Limited 852-2-693-6811
.....	Waslin, Beijing 86-10-68516873
.....	Waslin, Shanghai 86-21-64956485
.....	Waslin, Zhuhai 86-756-8880036
Croatia/Bosnia-Herzegovina	HT-Eurep d.o.o. 385-1-6129610
Czech Republic	HT-Eurep Elec. spol.sr.o. 420-2-663-13053
Denmark	Micronor 45-86-81-65-22
Finland	Memec Finland Oy 358-9836-2600
France	
.....	Avnet EMG SA. 33-1-49-65-26-37
.....	SCAIB S.A. 33-1-69-19-89-00
.....	SBM France (Representative) 33-1-46-32-39-00
Germany	
.....	Atlantik Elektronik 49-89-89505-0
.....	Future Electronics 49-899-57270
.....	Intercomp 49-8151-16044

Great Britain	Azzurri 44-1628-826826
	D.T. Electronics Ltd. 44-1203-466500
	Future Electronics Ltd. 44-1753-763000
	Joseph Electronics 44-121-643-6999
	Silver Birch Marketing 44-1480-812806
Greece	Drogeta Engineering 30-1-881-0948
Hong Kong	CET Limited 852-2485-3899
	MEMEC (Asia Pacific) Ltd. 852-2410-2780
	Waslin (H.K.) Limited 852-2-693-6811
Hungary	HT-Eurep Elec. Kft. 36-1-270-1002
India	Hynetic Electronics 91-80-620-852
Ireland	SEI-Bloomer Electronics 44-1762-339818
Israel	STG International 972-3-696-5231
Italy	Comprel, S.P.A. 39-3-625-781
	Sitel S.p. 39-362-366027
Japan	Microtek Inc. 81-3-5300-5535
	Tokyo Electron Ltd. 81-3-5561-7216
Korea	Amerix Corporation 82-2-423-9623
	Memec Asia Pacific Ltd. 82-2-786-8180
Lithuania, Latvia & Estonia	DanBalt Electronics 45-8684 6172
Malaysia	Dynamar 60-4-228-1860
Mexico	
Representatives:	
	Bonser-Philhower Mexico 528-378-1615
Juarez and Chihuahua only	System Sales of Arizona (915) 771-9445
Distributors:	
	Future Electronics S.A. de C.V. 523-122-0043
	Insight de Mexico 528-399-0056
	Insight de Mexico 523-678-9242
	Insight de Mexico 525-488-0119
Moldavia	HT-Eurep Elec.sp.zo.o. 48-22-621-7704
The Netherlands	Alcom Electronics BV 31-10-451-9533
New Zealand	Arrow Components NZ Ltd. 64-3-366-2000
	Dallas Identification 64-9-415-9499
Norway	BIT Elektronikk A.S. 47-66-77-6500
Philippines	Dynamar 63-2-8275154
Poland	HT-Eurep Elec.sp.zo.o. 48-22-621-7704
Portugal	Comelta S.A. 351-1941-6507
Romania	HT-Eurep Elec. Kft. 36-1-270-1002
Russia	Software Security, Belarus 375-17245-3161
Serbia/Montenegro	HT-Eurep d.o.o. 385-1-6129610
Singapore	Dynamar 65-542-1878
Slovakia	HT-Eurep Electronic s.r.o 421-844-222592
Slovenia & Croatia	Cadix d.o.o. 386-61-1590-512
South Africa	Tarsus Technology Pty. Ltd. 27-11-886-3165
	Integrated Circuit Technologies 27-11-444-3386
Spain	
	Comelta, S.A. Barcelona 34-3-582-1991
	Comelta S.A. Madrid 34-1657-2770
Sweden	Dipcom Electronics AB 46-87-522-480
Switzerland	

.....	Computer Controls AG Zurich 41-1-308-6666
.....	Yverdon Les Bains 41-24-423-8200
Taiwan	Landcol Enterprises 886-2-698-3328
Thailand	Dynamar 66-2-376-0132
Turkey	Politeknik Elektronik 90-232-232-7432
The Ukraine	HT-Eurep Elec.sp.zo.o. 48-22-621-7704

Running the CD-ROM

For your convenience, we have designed this CD to run with virtually no installation. Here's how you open it up.

Microsoft Windows 95

If the autorun feature is turned on, the CD will automatically open when placed into the CD-ROM drive. If it does not automatically open after a few seconds, follow the instructions below.

1. Put CD into CD-ROM drive.
2. Open Windows Explorer.
3. Go to the CD-ROM drive containing the CD and double click on the Dalsemi.hlp file.

Microsoft Windows 3.0 or 3.1 Only (for V3.11 see "Other Platforms" below)

1. Put CD into CD-ROM drive.
2. Open File Manager.
3. Go to the CD-ROM drive containing the CD and double click on the Dalsemi.hlp file.

Microsoft Windows NT

1. Put CD into CD-ROM drive.
2. Open Windows Explorer.
3. Go to the CD-ROM drive containing the CD and double click on the Dalsemi.hlp file.

Other Platforms

You will need to have a Web browser installed on your machine in order to view the documents on this CD. An Internet connection is not required.

1. Put CD into CD-ROM drive.
2. Open your HTML Web browser.
3. In your browser's menu, execute File→Open File.
4. Open the drive in which the CD is located and double-click the contents.htm file.

Troubleshooting

"This is not a Windows Help File"

You are probably running Windows 3.11. The help file is not compatible with this version of Windows. To verify the version of Windows, drag down Help->About on the Windows menu bar and the version number will be displayed. If you are running Windows 3.11, follow the directions for running the CD on "Other Platforms."

"Cannot find or run the file or program"

You probably don't have the Adobe Acrobat Reader installed. Install the reader from this CD and try accessing the file again.

"When using CD via the Web browser, PDF files do not open in Adobe Acrobat"

You need to make sure that your Web browser has been set up to handle PDF file extensions. Follow the instructions below to check your settings.

Netscape Navigator:

1. Open the Web browser and execute Options->General Preferences; click on the Helpers tab.
2. In the File Type window, find the entry application/pdf and click it once. If there is no application/pdf in the File Type window, then click the Create New Type button. In the Mime Type field enter "application" and for Mime Sub Type enter "pdf". Click OK. Make sure that the entry in the File Extension or Suffix box shows pdf (all lower case).
3. Make sure the Action is set to Launch the Application and the path is set to the Acrobat Reader (example: C:\Acrobat3\Reader\AcroRd32.exe).

Microsoft Internet Explorer:

1. Open the Web browser and execute View->Options; click on the Programs tab.
2. Click on the File Types button to view the settings. Find the Adobe Acrobat Document listing and click on it once. If you do not find the listing for Adobe Acrobat Document, then click on the New Type button. In the Description of Type field, type "Adobe Acrobat Document;" in the Associated Extension field enter "pdf," in the Content Type (MIME) field, enter "application/pdf". The Default Extension for Content Type should be .pdf. Click on the New button and enter Opens in the Action field; then enter the path to the Acrobat reader in the Application used to perform action field (example: C:\Acrobat3\Reader\AcroRd32.exe). Click OK and then Close.
3. The box under the listing should show something similar to the following:

File type details	
Extension:	PDF
Content Type (MIME):	application/pdf
Opens with:	ACRORD32

Technical Support

Still having troubles? Email or call us.

Email: CDROM.Support@dalsemi.com

Phone: (972) 371-6648



DALLAS SEMICONDUCTOR

4401 South Beltwood Parkway
Dallas, Texas 75244-3292
Tel: 972-371-4448
Fax: 972-371-3715

Literature & Technical Support:
972-371-4167

Sales & Customer Service:
972-371-4969

Automatic Data Sheet Faxback:
972-371-4441

Corporate FTP Site:
<ftp://ftp.dalsemi.com>

Worldwide Web Site:
<http://www.dalsemi.com>

E-Mail Communication:
firstname.lastname@dalsemi.com

Sales Site:
sales@dalsemi.com

