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APPLICATION NOTE 5756

How to Replace a DS1216 SmartSocket with an Equivalent-Density Phantom Clock Module

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Abstract: With the diminishing availability of plastic dual-in-line package (PDIP) static random access memory (SRAMs), the DS1216 SmartWatch products are rapidly approaching end-of-life. Most of the SmartWatch products can be replaced using a pin-compatible, equivalent-density 5V Phantom clock module. This replacement module provides the customer with a drop-in, one-piece solution with an expected data retention life of at least 10 years.

With the diminishing availability of plastic dual-in-line package (PDIP) static random access memory (SRAMs), the [DS1216](#) SmartWatch products are rapidly approaching end-of-life. Populating new sockets with low-power memory devices has already become a procurement challenge that can be easily avoided.

As shown in **Table 1**, most of the SmartWatch products can be replaced using a pin-compatible, equivalent-density 5V Phantom clock module. This provides the customer with a drop-in, one-piece solution that is guaranteed to at least 10 years of data retention life.¹

In existing applications, a DS1216 SmartWatch and some version of a customer-procured SRAM provide the nonvolatile memory functionality for data storage in the absence of external power. The SRAM is the load that eventually consumes the internal battery's charge capacity. Without knowing how much current that SRAM is actually consuming, when you arbitrarily move that SRAM to the new socket, the life expectancy of that new socket becomes unknown. The dead battery in the old DS1216 socket was merely a symptom of the problem, but the root cause (SRAM) is now transferred to a new socket to fail again in time.

The SRAM specification is a good reference for identification of the memory density, as well as the memory performance-based information to determine which speed grade of module to purchase. The customer should initially research the presently installed memory component and refer to Table 1 to select an appropriate replacement. ROM-based products (DS1216E and DS1216F) have no known replacements.

Table 1. SmartWatch Replacement Products		
SmartWatch	SRAM Density/Configuration	Drop-In Replacement Phantom Clock Module
DS1216B	16kb/2k x 8	Not available
	64kb/8k x 8	DS1243Y-120+
DS1216C	64kb/8k x 8	DS1243Y-120+
	256kb/32k x 8	DS1244Y-70+
DS1216D	256kb/32k x 8	DS1244Y-70+
	1Mb/128k x 8	DS1248Y-70+
DS1216H	1Mb/128k x 8	DS1248Y-70+
	4Mb/512k x 8	DS1251Y-70+

DS1216 SmartWatch components are rated for 0°C to +70°C operation, which is matched by the DS12xx-family of commercial-temperature products. If desired, industrial temperature range (-40°C to +85°C) module products, designated as “IND”, are also available in any Phantom clock module density. Refer to the ordering information for that specific module product.

DS1216 SmartWatch products are manufactured using TinLead solder (SnPb 63/37) to attach the internal components. If desired, Pb-free/RoHS-compliant (100% Matte Tin) module products, designated by a plus sign (“+”), are also available in every memory density except 16kb. Refer to the ordering information for that specific module product.

Due to the internal battery, neither the DS1216 SmartWatch, nor any listed DS12xx-family of Phantom clock modules can tolerate convection reflow soldering. Wave or hand soldering is acceptable. Or, alternatively, install the module component into a socket.

For additional technical literature see [Maxim's SmartWatch or Phantom Clock Module products](#).

Notes:

1. DS1216 t_{DR} (Timekeeping and Memory Data Retention Life) may achieve up to 10 years *if the customer's SRAM load is below 0.5μA*

DS1243Y-120+ t_{DR} (Timekeeping and Memory Data Retention Life) will achieve at least 10 years.

Related Parts

[DS1216](#) SmartWatch RAM DS1216B/C/D/H
SmartWatch ROM DS1216E/F

DS1243	64K NV SRAM with Phantom Clock	Free Samples
DS1244	256k NV SRAM with Phantom Clock	Free Samples
DS1248	1024K NV SRAM with Phantom Clock	Free Samples
DS1251	4096K NV SRAM with Phantom Clock	Free Samples

More Information

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