THE STANDARDIZED MILITARY DRAWING (SMD) PROGRAM

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This paper will outline the SMD program and the new direction this standardization program has taken. The SMD program evolved from the original DESC Drawing Program. The results of the program showed that the SMD was a viable alternative to Original Equipment Manufacturers' (OEM) unique component drawings. With the advent of two new general military specifications, MIL-I-38535 and MIL-H-38534, came the evolution of the one part - one part number system which takes the SMD one step further. As of 31 December 1991, 1,368 SMDs have been completed covering a total of 6,790 active part types.

INTRODUCTION

Standardization has been emphasized by the government for many years, but with declining budgets and the growing need to "Do more with Less", standardization has never been more important. In the Federal Supply Class for microcircuits there is a unique type of standardization document called the Standardized Military Drawing (SMD). These documents, which are prepared cooperatively by the Defense Electronics Supply Center (DESC), microcircuit device manufacturers, and Original Equipment Manufacturers (OEMs), provide standardization for the majority of microcircuit devices used in military applications. Each SMD specifies the detailed performance characteristics and quality assurance provisions for an individual or group of microcircuit device types. The SMD covers reliability levels

varying from off-the-shelf high reliability military (i.e., MIL-STD-883 compliant) devices to devices qualified for space requirements, including radiation hardness requirements.

All parties involved benefit from the application of SMDs. The OEM is relieved of the obligation to prepare and maintain component drawings through the life-cycle of the system. Because an SMD can cover varying levels of reliability, the OEM will have a greater opportunity at the time of production to receive the most reliable device at a reasonable cost. The device manufacturer will be able to provide all the levels of reliability which he offers to the same set of performance characteristics. This allows resources, normally dedicated to reviewing numerous customer generated component drawings, to be applied to more productive areas. The government gains in all facets of system acquisition, configuration management, and logistics, by having only one documentation system to control, not paying extra for the OEM originated component specifications, and reducing the fragmentation of a diverse market.

BACKGROUND OF THE SMD PROGRAM

The SMD program evolved from the original DESC Drawing program. The DESC Drawing program was initiated in 1976 for the F-16 program for interim procurement of electronic devices until Joint Army-Navy (JAN) military detail specification products were available. In October 1985, the OEMs and device manufacturers requested that DoD implement a single drawing program. As a result, the DESC

Drawing Pilot Study Program was initiated. The purpose of the pilot study was to determine if an OEM would be able to prepare his procurement document in such a format as to allow other OEMs to use it for their own systems in lieu of creating their own unique procurement documents.

The results of the program showed that the SMD was a viable alternative to unique OEM component drawings. Consequently, in June 1986, then Secretary of Defense Weinberger directed the SMD program for microcircuits be implemented. The appropriate documentation changes were made to DOD-D-1000, Drawing, Engineering and Associate Lists, and DOD-STD-100, Engineering Drawing Practices, in order to formally define and mandate the use of SMDs. DoD Federal Acquisition Regulation (DAC 88-5, part 234.005) further implements this requirement for major DoD system acquisition.

BACKGROUND OF THE ONE PART - ONE PART NUMBER SYSTEM

The SMD program was very successful in reducing the proliferation of OEM component drawings and enhancing the visibility, market potential and life cycle duration of devices documented on SMDs. However, the SMD only covered the MIL-STD-883 compliant, non-JAN devices, while the military detail specifications covered the JAN, MIL-M-38510 devices. Maintaining two separate part numbering and documentation systems was burdensome but still controllable. In 1989 two new microcircuit general specifications were released, MIL-H-38534 and MIL-I-38535; neither document contained a part numbering system. This unusual situation occurred because it was planned that the SMD would provide this system. It became apparent that a capability to easily transition from one device class to another was needed, and that this could be accomplished through use of the SMD part number itself. The four military requirements documents represent different device classes, and previously when a device manufacturer upgraded military product from one device class to another, the benefits of the upgraded product were unavailable to the OEM due to the

contracts and system constraints, (e.g., the parts list, the assembly drawings, the bill of materials). So a system was developed to combine all levels of reliability and requirements into one SMD utilizing a similar part number; this new SMD system is called the one part - one part number system.

THE ONE PART - ONE PART NUMBER SYSTEM

With the establishment of the one part system, the OEM will be able to procure to the highest class level available for a given generic device without modifying the original contract parts selection criteria. For example, with one substitution statement, the OEM can procure the class M level device (compliant to 1.2.1 of MIL-STD-883) for preproduction and procure the more reliable JAN or QML level device for production without changing the applicable documentation. This system benefits the device manufacturers also, by allowing them to standardize on their off-the-shelf, high reliability, military device, immediately and to eventually qualify to higher reliability levels, with little or no change to the document. This not only facilitates the qualification of higher reliability parts, it also allows the device manufacturer to sell to all device classes on a drawing. This will enable the device manufacturer to satisfy a variety of OEM system requirements.

In transitioning between device classes, the only character in the part number that would need to be changed is the device class designator. The device class designator will be a single letter identifying the product assurance level as depicted in figure 1.

The one part - one part number system was started in January 1990 and all new SMD's assigned after this time period will be written using this concept. SMDs assigned prior to January 1990 do not necessarily conform to the one part - one part number system, (i.e., provide all available product assurance levels). These SMDs will not be converted to the one part system unless necessary. When a

conversion is necessary a part number change is required because the old part number did not include a device class designator. The resulting part number substitution information is handled in each converted SMD as well as in MIL-STD-983, Substitution List for Microcircuits.

FIGURE 1.

SMD PREPARATION

The generation of SMDs is quite simple. An OEM, device manufacturer, or DESC can prepare the SMD in electronic format using the electronic boilerplate which can be downloaded from DESC's electronic bulletin board system. Regardless of who initiates the SMD the final product is processed by DESC using the wordprocessing software WordPerfect. WordPerfect is currently the easiest format for DESC to handle. DESC can convert a Multimate or ASCII file, however, this may result in a longer completion time.

The intent of the SMD program is for OEMs to prepare SMDs in lieu of preparing their own component drawings. This enables the OEM to ensure that the content of the drawing satisfies their system needs. Many device manufacturers, however, prepare SMDs on new products regardless of OEM interest in order to promote its use. Once the preliminary draft has been completed and submitted to DESC the total preparation time has averaged 4 months. Since its inception in 1986, there have been 1,368 SMDs produced. The current

status of the SMD program is shown in figure 2. Figure 3 depicts the number of sources available for each device class.

Another important facet of the SMD program is the maintenance and configuration management provided by DESC. Any revision to an SMD is coordinated with all the device manufacturers involved with the drawing and the registered users of the drawing. A registered user is an OEM or military activity who registers with DESC each individual drawing they are using in their systems. This mechanism allows DESC to limit change coordination to anyone who might be affected by a change to a specific drawing, resulting in an efficient revision procedure.

STANDARDIZED MILITARY DRAWING PROGRAM (FSC 5962)	
TOTAL SMD DOCUMENTS	1368
TOTAL GENERIC DEVICES	2783
TOTAL SMD PART TYPES (includes package variations)	6790
TOTAL APPROVED SOURCES	80
TOTAL REGISTERED USERS	120
CURRENT AVG COMPLETION TIME	3.7 months
Status as of 31 DEC 91.	

FIGURE 2.

MILITARY STANDARDIZATION PROGRAM NUMBER OF SOURCES BY DEVICE CLASS		
DEVICE CLASS	EXISTING SOURCES	POTENTIAL NEW SOURCES
B	20	----
Q	2	6
H	20	7
M	60	10
Status as of 31 DEC 91.		

FIGURE 3.

OTHER RELATED DOCUMENTS

There are a number of documents that are either directly related to the SMDs or reference them. MIL-BUL-103, List of Standardized Military Drawings (SMD's), is the bulletin which lists all the SMDs written to date and their respective

approved sources of supply. In the past source information was contained on each individual SMD; MIL-BUL-103 supersedes the source information on these old drawings. MIL-HDBK-780, Standardized Military Drawings, provides guidance in the preparation of SMDs, as well as other information concerning SMDs. Specifications and Drawings in Progress, Microcircuits, is a list of new specifications and drawings, and only those revisions which add new device types, that are currently being worked on at DESC. This unofficial schedule is updated monthly, and helps a prospective user to plan accordingly. MIL-STD-983, Substitution List for Microcircuits, reflects the OEMs' and the Department of Defense's determination of substitutability. This document is a list of standard part numbers which should be considered for substitution with corresponding OEM part numbers. It also lists the part number cross reference information for the standard part numbers which have been converted to the one part - one part number system. MIL-STD-983 allows this substitution to occur on production contracts, follow-on contracts, production modifications, logistics support, etc. after applicable parts control procedures have been followed. MIL-STD-1562, Lists of Standard Microcircuits, lists standard microcircuit devices in categories relative to their suitability for use. SMDs are included in this document which often forms a contractual basis for the selection of microcircuits in system applications.

SMD ELECTRONIC BULLETIN BOARD SYSTEM

The bulletin board is an IBM compatible system available 24 hours a day/7 days a week. All files are compressed and are self-extractable. Logon instructions are provided at initial bulletin board access. Parameter settings include: no parity, 8 bit data word, 1 stop bit, with 2 available BAUD rates. The 2400 BAUD rate phone number is (513)296-6046, and the 9600 BAUD rate phone number is (513)296-8875. Only one, 45 minute maximum, logon is permitted each day. The files available on the bulletin board include:

1. MIL-M-38510, MIL-I-38535, and MIL-H-38534 general specifications.
2. QPL-38510, QML-38535, and QML-38534.
3. SMD boilerplates.
4. MIL-STD-1562, Lists of Standard Microcircuits.
5. MIL-BUL-103, List of Standardized Military Drawings.
6. Specifications and Drawings in Progress.
7. MIL-M-38510 Supplement.
8. MIL-STD-883 notices, MIL-M-38510 amendments.
9. Other information as needed.

COMMERCIAL APPLICATION

The use of SMDs is not restricted to the U.S. military and its customers. In fact, there are several overseas concerns that utilize the SMD as a procurement vehicle. In applications where the performance of the SMD exceeds the performance requirements, SMDs are often still the more cost effective alternative because the cost of documentation and characterization for that unique application are avoided.

THE FUTURE

The SMD program is moving forward. Now that DESC has converted to the one part - one part number system the program will begin to take on some new challenges. Some of the new undertakings at DESC include: actively pursuing radiation hardness assured (RHA) sources for the SMDs; plastic packaged devices will be documented under MIL-I-38535 requirements; VHDL Hardware Description Language (VHDL) requirements will be included; and totally custom Application Specific Integrated Circuits (ASICs) will be covered.

CONCLUSION

The SMD is an effective tool which provides a standard format for documenting a specific device. Although the title might indicate otherwise, the U.S. military is not the only organization using this program. The program was created with the intent to benefit DoD, but standardization benefits everyone.

Any questions on this program can be directed to Ms. Poelking at (513)296-8525, autovon 986-8525.

References

1. Beechey, R., "Standardized Military Drawing Program (SMDP)", 1988 Proceedings, Government Microcircuit Applications Conference, November 1988.
2. Poelking, M. and Johnson, W. J., "The One Part - One Part Number - One Drawing Standardization System", RAC Quarterly, pp. 8-9, Volume 1, Issue 1, Winter 1991.