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# STANDARDIZATION OF ENHANCED PLASTIC MICROCIRCUITS FOR MILITARY APPLICATIONS

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March 9, 2005



# MICROCIRCUIT PROGRAM HISTORY

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- MIL-M-38510 QPL PROGRAM
  - INACTIVATED 27 AUG 1993 – No Plastics devices
- MIL-PRF-38535 QML PROGRAM
  - CLASS N – FIRST ATTEMPT
  - EXTENDED TEMPERATURE, MILITARY TESTING TO COSTLY
- STANDARD MICROCIRCUIT DRAWINGS
  - STANDARD PROCUREMENT DOCUMENT FOR MIL-PRF-38535 DEVICES



# NOW WHAT?

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- REQUESTED BY USER COMMUNITY  
ELECTRONICS INDUSTRIES ALLIANCE (EIA)  
G-12 COMMITTEE
- 5 YEAR EFFORT TO GET AGREEMENT ON  
MINIMUM CHARACTERISTICS
- COVERS MANUFACTURERS ENHANCED  
PLASTIC DEVICES
- NOT APPROPRIATE FOR ALL APPLICATIONS



# **PROGRAM REQUIREMENTS**



- MINIMAL ADDITIONAL COST - USERS
- AVAILABLE QUALIFICATION AND RELIABILITY DATA – USERS
- CHANGE NOTIFICATION – USERS
- COMMERCIAL PLUS – USERS
- CONTROLLED BASELINE - USERS
- NO EXTRAS – VENDORS
- NO ADDITIONAL MARKING – VENDORS
- SINGLE P. O. C. – BOTH



# STANDARD PROCUREMENT DOCUMENT OPTIONS

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- SLASH SHEETS, STANDARD MICROCIRCUIT DRAWINGS
- TRADITIONAL DSCC DRAWINGS
- COMMERCIAL ITEM DESCRIPTIONS
- NON-GOVERNMENT STANDARDS
- VENDOR ITEM CONTROL DRAWINGS (VIDs)



# HOW DID WE GET HERE



**DSCC Matrix of Document Options**

<b>Document</b>	<b>Function</b>	<b>Controlling Document</b>	<b>Controlling PIN</b>	<b>Sources</b>
<b>Slash sheets, SMDs</b>	<b>Document military QPL/QML devices</b>	<b>Slash sheet, SMD</b>	<b>Military</b>	<b>QML/QPL</b>
<b>DSCC Drawing – Selected Item , Source Control</b>	<b>Documents military grade parts that are not qualified</b>	<b>Drawing</b>	<b>Drawing</b>	<b>Approved or Suggested</b>
<b>Commercial Item Descriptions (CID)</b>	<b>Documents commercial off-the-shelf parts.</b>	<b>CID</b>	<b>CID A-A-xxxxx</b>	<b>Open</b>
<b>Non-government Standards (NGS)</b>	<b>Documents parts developed under the consensus procedures of private sector standards organizations.</b>	<b>NGS</b>	<b>NGS</b>	<b>No QPL system for ICs</b>
<b>DSCC Vendor Item Drawing (VID)</b>	<b>Documents an off-the-shelf data sheet part</b>	<b>VID</b>	<b>Vendor</b>	<b>Suggested</b>



# HOW DID WE GET HERE



Document	Pros	Cons
Slash sheets, SMDs	Qualified part, standardization (part, document, qual), etc.	Covers military unique.
DSCC Drawing – Selected Item, Source Control	Standardization (part, document). Requirements can be added	IC Vendors not interested.
Commercial Item Descriptions (CID)	Standardization (part, document).	Off the shelf parts intended for commercial grade applications.
Non-government Standards (NGS)	Standardization (part, document). Represents industry consensus.	No source listing for ICs. NGS development time
DSCC Vendor Item Drawings	Standardization (part, document). Relies on the vendor part number. Flexible enough to cover enhanced plastics	Non-traditional PIN



# VID CRITERIA

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- CONTROLLED BASELINE
- CHANGE NOTIFICATION
- EXTENDED TEMPERATURE
- ACCESS TO QUALITY AND RELIABILITY DATA
- DMS NOTIFICATION AND SUPPORT



# TI and National APPROACH

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- SINGLE FAB, ASSEMBLY TEST SITE
- ENHANCED PRODUCT CHANGE NOTIFICATION OF PROCESS, MATERIALS, ELECTRICAL PERFORMANCE, LEAD FINISH, MOLDING COMPOUNDS AND MANUFACTURING LOCATIONS
- EXTENDED TEMPERATURE PERFORMANCE
- ENHANCED PEDIGREE – RELIABILITY AND ELECTRO MIGRATION CHECKS, ELECTRICAL CHARACTERIZATION OVER TEMPERATURE AND CONFIRMATION OF PACKAGE PERFORMANCE OVER TEMPERATURE
- ENHANCED OBSOLESCENCE MANAGEMENT



# MICROCIRCUIT COMPARISON

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## COMMERCIAL

- 0°C to 70°C
- No reliability data readily available
- No Traceability – Multiple sites
- Limited DMS Support
- Limited Change Notification

## ENHANCED

- -40°C to 85°C, -55°C to 125°C
- Quality/Reliability Data
- Controlled fab/assembly site(s)
- DMS Support and Notification
- Change Notification and Revision control

## FULL MILITARY COMPLIANT DEVICES

- -55°C to 125°C
- Military Qual/Reliability Data
- Full Wafer/Assembly Traceability
- Required DMS Notification
- DSCC Configuration Management
- Required Change Notification



# CURRENT SUPPLIERS

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- TEXAS INSTRUMENTS
- NATIONAL SEMICONDUCTOR
- FREESCALE (MOTOROLA) - Pursuing
- INTERNATIONAL RECTIFIER - Pursuing



# OTHER INTERESTED PARTIES

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- ZYLINX
- ANALOG DEVICES
- CYPRESS
- INTEL
- IDT



# VID PROGRAM BENEFITS

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- STANDARD PROCUREMENT DOCUMENT
- REVISION CONTROL
- LOWER COST THAN TRADITIONAL MILITARY PARTS
- IMPROVED RELIABILITY AND CONTROL COMPARED TO TRADITIONAL COMMERCIAL PARTS
- NEWER TECHNOLOGIES AVAILABLE



# PROGRAM STATISTICS

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- CURRENTLY 204 VIDS
- 357 UNIQUE DEVICE TYPES
- 402 PART TYPES
- 17 IN PROCESS
- 177 AWAITING DATA
- VIDS CAN BE DOWNLOADED FROM:  
<http://www.dscc.dla.mil/programs/milspec/>



# OTHER ACTIVITY

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- AEROSPACE QUALIFIED ELECTRONIC COMPONENT DOCUMENT (AQEC)
  - BASELINE SET OF USER REQUIREMENTS
  - BEING DEVELOPED BY A CONSORTIUM OF MILITARY USERS AND COMMERCIAL AEROSPACE USERS.
- GEIA-STD-0002-1 DRAFT REVISION D
- POINT OF CONTACT JOE CHAPMAN,  
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(432) 697-9970



# FUTURE PLANS

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- CONTINUE TO DEVELOP NEW SOURCES
- EXPAND PRODUCT OFFERINGS OF ENHANCED DEVICES
- POSSIBLE REFERENCE OF AQEC DOCUMENT
- CLOSE AVAILABILITY GAP BETWEEN STATE OF THE ART COMMERCIALY AVAILABLE AND HIGH RELIABILITY MILITARY PARTS
- CONTINUED EVOLUTION OF VIDS TO MEET USER NEEDS



# SUMMARY

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- **STANDARDIZATION OF ENHANCED PLASTIC A CHALLENGE**
- **VARIOUS DOCUMENTS TYPES WERE CONSIDERED**
- **DSCC VID CONCEPT BEST MEETS USER NEEDS**
- **STRONG INDUSTRY SUPPORT OF PROGRAM**
- **MAJOR SUCCESS**