Texas Instruments General Quality Guidelines
Aerospace and Defense Supplement

1   SCOPE

The Texas Instruments General Quality Guidelines (GQG) apply to the provision of quality assurance with respect to materials, products, services, manufacturing processes, tests, controls, handling, storage and transport measures, as well as the management processes used and/or applied by TI so that products will comply with TI published and/or specifically agreed specifications.

This Aerospace and Defense A&D Supplement (A&D Supplement) to the GQG addresses supplemental purchase order requests, known as quality notes, quality clauses, Q-notes or Q-clauses, typically requested by TI customers offering end items to the aerospace and defense marketplace.

TI will endeavor to comply with the GQG and this A&D supplement; however, nothing in either the GQG or this document shall be construed to create, expand or in any way alter any warranties or remedies, if any, as set forth in TI's applicable terms of sale. Customer quality clauses and/or quality notes will only apply if TI and the customer have mutually agreed in writing to the application of such quality clauses and quality notes to the applicable TI products. If a TI customer intends to use TI products and/or services in the performance of a U.S. government contract or subcontract where the Federal Acquisition Regulation (FAR), Defense Federal Acquisition Regulation Supplement (DFARS), or other applicable government procurement rules or regulations (collectively, "Government Procurement Regulations) apply, such government procurement regulations will only apply if TI agrees in a separate written document specifically addressing such Government Procurement Regulations.

The paragraph headings below reference the applicable section in the TI GQG.

2   QUALITY MANAGEMENT SYSTEM

In addition to International Organization for Standardization (ISO) 9001 and International Automotive Task Force (IATF) 16949, TI is certified to MIL-PRF-38535, General Specification for Integrated Circuits (Microcircuits) Manufacturing, by the United States Defense Logistics Agency (DLA) Land and Maritime Sourcing and Qualifications Division (VQ) and listed on the DLA Qualified Manufacturer's List (QML).

TI does not audit to, or claim compliance with, the Society of Automotive Engineers (SAE) and European Association of Aerospace Industries AS9100, Quality Management Systems – Requirements for Aviation, Space and Defense Organizations; MIL-STD-1535, Supplier Quality Assurance Program Requirements; or other similar specifications.

3   MANAGEMENT RESPONSIBILITY

No A&D specific additions to the TI GQG.

4   INTERESTED PARTIES

No A&D specific additions to the TI GQG.

5   AUDITS

TI does not support customer or government source inspection such as process surveillance, pre-encapsulation (precap) inspection and test witnesses. Under certain circumstances, TI does allow facility surveys and agreed-

upon audits by our customer, our customer's customer, and regulatory authorities with adequate notification and proper nondisclosure agreements.

TI adheres to several important industry standards and is audited against those standards. Applicable standards can be found in the TI GQG. TI will allow surveys and audits to other industry standard such as AS9100. However, TI may not meet all requirements of such standards. TI will work to address your concerns resulting from such an audit or survey.

6   PURCHASING AND SUPPLIER MANAGEMENT

TI microcircuits offered in accordance with MIL-PRF-38535 are fabricated, assembled and tested in TI facilities and subcontractors audited and approved by the DLA Land and Maritime VQ. In addition, facilities manufacturing QML Space products are also approved by the United States NASA Jet Propulsion Laboratory and the United States Air Force (as represented by The Aerospace Corp.). DLA-approved third-party laboratories are also used for testing TI QML products.

Other than as specifically stated above, TI does not support customer approval of TI suppliers, sub-tier suppliers, laboratories, manufacturers, special processes or franchised/authorized distributors. TI does not require National Aerospace and Defense Contractors Accreditation Program (NADCAP) certification.

Any TI-accepted customer flow-down requirements to TI factories or subcontractors will be in the form of formal specifications/work instructions.

7   INFORMATION TECHNOLOGY CYBERSECURITY

No A&D specific additions to the TI GQG.

8   ANTI-COUNTERFEITING

TI's Counterfeit Electronics Control Plan is consistent with recognized industry standards for semiconductor manufacturers and complies with DFARS 252.246-7007 ("Contractor Counterfeit Electronic Part Detection and Avoidance System"); Customer approval is not required. TI does not claim compliance with, nor audit to, SAE aerospace standards AS5553 and AS6174.

9   EXTERNAL CALIBRATION LABORATORIES

No A&D specific additions to the TI GQG.

10   PRODUCT DEVELOPMENT

No A&D specific additions to the TI GQG.

11   RISK MANAGEMENT

No A&D specific additions to the TI GQG.

12   QUALIFICATION/RELIABILITY

Estimated defective parts per million (DPPM), failures in time (FIT), mean time between failures (MTBF), and results of TI qualification testing and ongoing reliability monitors are available online for most TI commercial devices. You may request specific information about Enhanced Products, Space-Enhanced Products and QML products from Texas Instruments support.

Because of the numerous device types and shipping volumes, TI does not support first article inspection (for example, per SAE Aerospace Standard AS9102, Aerospace First Article Inspection) or destructive physical analysis (for example, per MIL-STD-1580, Department of Defense Test Method Standard: Destructive Physical Analysis [DPA] For Electronic, Electromagnetic and Electromechanical [EEE] Parts). Instead, customers may purchase sufficient units at the time of order entry to facilitate performing customer internal testing or testing at a third party.

TI performs radiation lot acceptance testing (RLAT), also specified as Group E per MIL-STD-883, Test Method Standard for Microcircuits, Method 1019, only for those devices designated by TI as radiation hardness assured (RHA) and only to the exposure levels specified by TI in the product data sheet and/or DLA standard microcircuit drawing (SMD).

With respect to TI products used by customers in commercial or general aviation aircraft end applications, TI offers products that help our customers meet industry functional safety standards, such as ISO 26262 and International Electrotechnical Commission (IEC) 61508 for their end products. TI does not certify products as meeting other specifications, including Radio Technical Commission for Aeronautics (RTCA) DO-254, Design Assurance Guidance for Airborne Electronic Hardware; RTCA DO-178B, Software Considerations in Airborne Systems and Equipment Certification; or other specifications from the United States Federal Aviation Administration (FAA) or European Union Aviation Safety Agency (EASA).

From time to time, TI receives questions about the use of TI products in end-use applications related to manned spaceflight. It is the customer's responsibility to determine if the purchased material is suitable for use in the customer's intended application.

13   PROCESS MONITORING/PRODUCT ASSURANCE

TI uses process measurement and monitoring for manufacturing process control, with statistical process control (SPC) in all phases of manufacturing. For TI QML products, see "QML Flow, Its Importance, and Obtaining Lot Information" and "DLA Approved Optimizations for QML Products" TI performs quality conformance inspection (QCI) in accordance with MIL-PRF-38535 and MIL-STD-883 on QML qualified components. Lot-specific reports for QML qualified components are defined in "QML Flow, Its Importance, and Obtaining Lot Information". TI does not make QCI physical samples available to customers.

TI does not support advanced submission and customer approval of TI factory/quality assurance acceptance test procedures, including but not limited to test plans, test software, test hardware, schematics and SPC plans.

TI will not supply customers with actual test reports, including variables (read and record) data or attributes (used/pass) data, or copies of lot assembly/test travelers. A customer may review SPC and process monitor charts in the factory, but TI will not supply SPC certification or copies of SPC data with the devices.

Under MIL-PRF-38535, a QML-certified manufacturer is permitted to modify, substitute or delete tests that do not improve the quality and/or reliability of the finished device as defined by the applicable device specification. TI QML flows and optimizations are approved as appropriate by DLA, NASA and The Aerospace Corp. in accordance with MIL-PRF-38535. For details on process optimizations, see "DLA Approved Optimizations for QML Products" . Please note that TI does not support customer requirements for a non-optimized flow on catalog QML products.

TI performs solderability testing weekly on hermetic packages by assembly site and package family, as specified by Group B per MIL-STD-883, Method 5005. TI does not support a by-lot solderability test and solderability certification.

TI has an established foreign particle control program in accordance with applicable industry standards. QML products also meet the requirements of MIL-PRF-38535. TI does not claim compliance with, nor audit to, Aerospace Industries Association NAS412, Foreign Object Damage (FOD) Prevention Guidance Document. 100% particle impact noise detection (PIND) testing is performed on QML Class V (space hermetic) products only in accordance with MIL-STD-883, Method 2020. TI does not supply PIND test used/pass (yield) data.

Customer approval is not required for software, device test software or test platform changes.

14 MEASUREMENT SYSTEM ANALYSIS (MSA)

TI meets the requirements of ISO 9001, MIL-PRF-38535, and IATF 16949. TI does not claim compliance with, nor audits to, other standards such as MIL-I-45208, Inspection System Requirements; or MIL-STD-45662, Calibration System Requirements.

15 PRODUCTION PART APPROVAL PROCESS (PPAP)

No A&D specific additions to the TI GQG.

16 ELECTROSTATIC DISCHARGE (ESD)

TI is compliant with Joint Electron Device Engineering Council (JEDEC) JESD625, Requirements for Handling Electrostatic-Discharge-Sensitive (ESDS) Devices. TI does not audit to other standards, such as MIL-STD-1686, Electrostatic Discharge Control Program for Protection of Electrical and Electronic Parts, Assemblies and Equipment (Including Electrically Initiated Explosive Devices).

17 SOFTWARE QUALITY ASSURANCE

TI's Software Quality Assurance program meets the requirements of ISO9001, IATF 16949, and, for QML components, MIL-PRF-38535. TI does not claim compliance with, nor audit to, other standards such as MIL-STD-498, Software Development and Documentation; DOD-STD-2168, Defense System Software Quality Program; or SAE AS9006, Deliverable Aerospace Software Supplement for AS9100.

18 CONTINUAL IMPROVEMENT

No A&D specific additions to the TI GQG.

19 NONCONFORMING PRODUCTS

TI participates in the United States Government-Industry Data Exchange Program (GIDEP). In the event that TI ships a nonconforming or failing QML-compliant product, TI will generate the appropriate submission to GIDEP (GIDEP Alert, GIDEP Safe-Alert or GIDEP Problem Advisory). In the event that TI is notified by the GIDEP Program Office of a GIDEP submission by a third party involving a TI product, TI will respond appropriately. TI does not review the GIDEP database in conjunction with new customer purchase orders or previous purchase histories.

TI maintains an outlier control program in accordance with industry-recognized SPC programs and, when applicable, MIL-PRF-38535. TI does not support customer-defined yield/failure/discrepancy thresholds or yield percent defect allowable.

20 CORRECTIVE AND PREVENTIVE ACTIONS

No A&D specific additions to the TI GQG.

21 CUSTOMER RETURNS

No A&D specific additions to the TI GQG.

22 CHANGE MANAGEMENT

TI complies with the requirements in Joint JEDEC/Electronic Components Industry Association/Institute of Printed Circuits (IPC) Standard J-STD-046, Customer Notification Standard for Product/Process Changes by Electronic Product Suppliers; or, for MIL-SPEC-compliant products, the requirements in MIL-PRF-38535, and will notify customers of major changes that affect the form, fit or function, or adversely affect the quality or reliability of the product. TI does not support customer notification and approval of all changes classified otherwise, nor does TI notify customers of all minor changes.

23 PRODUCT WITHDRAWAL/DISCONTINUANCE

No A&D specific additions to the TI GQG.

24 BUSINESS CONTINUITY PROGRAM

No A&D specific additions to the TI GQG.

25 IDENTIFICATION AND TRACEABILITY

QML Class Q and Class V products use a lot date code in conjunction with the full device part number for traceability. Per MIL-PRF-38535, the lot date code is formatted as a four-character year-year-week-week (YYWW) plus an optional suffix (YYWWAA) to indicate multiple lots of the same device assembled in the same week or a sub-lot split; for example, 2010A, 2010B or 2010BA .

Commercial-grade plastic products, Enhanced Products, Space-Enhanced Products or QML Class N (military plastic), QMLP and QMLY products are marked with a TI-defined lot trace code. The associated date code is for inventory age control only and does not support traceability to an individual lot. QML P and QML Y are marked in accordance with "DLA Approved Optimizations for QML Products" and documented in the SMD/datasheet.

TI lot numbers are system-assigned. TI does not support customer pre-assigned lot control number marking.

QML product marking is defined by MIL-PRF-38535. TI defines product marking for non-QML products. TI does not support marking with an item unique identification (UID) per MIL-STD-130, Department of Defense Standard Practice Identification Marking of U.S. Military Property.

TI supplies a certificate of conformance (CoC) in accordance with MIL-PRF-38535 with all QML-compliant devices. In addition, QML compliant devices are accompanied by additional lot documents as defined in "QML Flow, Its Importance, and Obtaining Lot Information." Class V products shipped after the first quarter of 2012 also include traceability to the wafer level. TI is unable to support electronic data submissions.

For non-QML products, shipping documents are provided in accordance with TI standard practices.

TI manufactures products to the revision of the applicable TI and QML specifications in effect at the time of manufacture. TI is unable to include the revision level of the device or the military specification drawing number and revision. Specifications for shipped devices are available on the TI website and/or the DLA website.

26 PACKING

Packing for products shipped to customers conforms to IPC/JEDEC-STD-033, Handling, Packing, Shipping and Use of Moisture/ Reflow Sensitive Surface-Mount Devices. TI does not support customer pre-approval of packing.

Anti-static pink polyethylene foam, sheets or bubble wrap may be used in addition to electrostatic discharge shielding bags or boxes. The pink polyethylene material will not come into direct contact with the device leads.

27 MANUFACTURING DATE CODE

Per MIL-PRF-38535, hermetically sealed devices are not restricted for shelf life, nor is lot reacceptance testing required. See "Datecode Selectivity and Shelf Life of Hermetic Packages." Customer-specified lot formation, lot segregation and/or date-code restrictions may be available for QML products; however, they must be specified as a separate line item on the purchase order and are subject to a surcharge.

28 LOT COMBINATION

TI manufactures QML- compliant products in homogenous lots (one wafer lot and one assembly/test lot).

29 CUSTOMER LABELING

No A&D specific additions to the TI GQG.

30 RECORD RETENTION

For QML products, record retention period and scope of documents retained are in accordance with MIL-PRF-38535. For all other records, see the TI GQG. TI does not seek customer approval before the destruction of records at the end of the specified period and does not provide copies of the TI records to customers.

31 RESTRICTED CHEMICALS AND MATERIALS

Texas Instruments integrated circuit products are expressly exempt from DFARS 252.225-7009, Restriction on Acquisition of Certain Articles Containing Specialty Metals. Note that certain other TI products may not be considered exempt.

Matte-Sn or other high-tin-content termination finishes such as silver-tin-copper (SAC) may be used on commercial-grade plastic- encapsulated or hermetic packages. The customer should reference the TI Material Content Database before purchasing. TI will deliver products per the ordered part number and will not provide a separate device certification for material content, including termination finish.

TI does not intentionally use mercury in the production of its products. Mercury content is below the industry threshold level of detection (1,000 ppm of homogeneous material). TI does not certify for zero levels of mercury.

32 CONFLICT MINERALS

No A&D specific additions to the TI GQG.

33 ENVIRONMENTAL SAFETY AND HEALTH

No A&D specific additions to the TI GQG.

34 RESPONSIBLE BUSINESS ALLIANCE

No A&D specific additions to the TI GQG.

36 RECORD OF CHANGES

Revision	Reason for change	Paragraphs modified	Date
0	Initial release	Initial release	06/24/2020
1	Updated terms of sales links and changed section 7 from "CYBERSECURITY" to "INFORMATION TECHNOLOGY CYBERSECURITY"	1,7 and disclaimer	10/12/2023
2	Simplified from specific QML classes to just QML devices, updated link to process optimizations	2,6,8,13,14,25,26,27,28,31	4/16/2025

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