

JEDEC PUBLICATION

Part Model Package Guidelines for Electronic-Device Packages – XML Requirements

JEP30-P100D

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JEDEC SOLID STATE TECHNOLOGY ASSOCIATION



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PART MODEL PACKAGE GUIDELINE FOR ELECTRONIC-DEVICE PACKAGES - XML REQUIREMENTS

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PART MODEL PACKAGE GUIDELINE FOR ELECTRONIC-DEVICE PACKAGES - XML REQUIREMENTS

(From JEDEC Board Ballots JCB-17-48, JCB-23-10, JCB-23-27, JCB-23-33, and JCB-24-08 formulated under the cognizance of the JC-11 Committee on Mechanical Standardization.)

1 Scope

This standard establishes the requirements for exchanging part data between part manufacturers and their customers for electrical and electronic products. This standard applies to all forms of electronic parts. It forms part of the Part Model XML Schema, which covers the parental structure for the electrical, physical, thermal, assembly process classification data along with materials and substances that may be present in the supplied product or sub-products. This Guideline specifically focuses on the Package sub-section of the Part Model.

All releases of the *Package* sub-schema must be under the umbrella of the Part model Schema to ensure that the Part model schema is referencing the correct version of the *Package* sub-schema. In addition, this will enable the *Package* sub-schema to connect to the Manufacturer Part Number and the Manufacturer of the Part.

1.1 Purpose

This standard is intended to benefit part manufacturers and their customers by providing consistency and efficiency to the transfer of part data from part manufacturer to customers. This standard specifically covers data applicable to the package definition of the device.

2 Applicable Documents

The following documents form a part of this standard to the extent specified herein. The revision of the document in effect at the time of solicitation shall take precedence.

2.1 JEDEC (www.jedec.org)

JESD30L, *Descriptive Designation System for Electronic-device Packages*

JEP30, *Part Model Guidelines for Electronic-Device Packages – XML Requirements*

JEP95, *JEDEC Registered and Standard Outlines for Solid State Products*

JEP30-10, *Part Model Schema*

JEP30-P101, *Part Model Package Schema*

JEP30-D10, *Part Model Schema Types Dictionary* (Required to support the Part Model Schema and each of its sectional sub-schemas.)

SPP-010 Standard Procedures and Practices for Grid Array Terminal Position Numbering

2.2 IPC (www.ipc.org)

IPC-T-50, *Terms and Definitions for Interconnecting and Packaging Electronic Circuits*

2.3 JEDEC/IPC (www.jedec.org)

J-Std-609, *Marking, Symbols, and Labels of Leaded and Lead-Free Terminal Finished Materials Used in Electronic Assembly*

2.4 ASME (www.asme.org)

ASME Y14.5-2009 Dimensioning and Tolerancing

3 Requirements

The following terms and definitions are applicable to this XML Schema.

3.1 Terms and Definitions

All definitions and terms associated with the physical aspect of the part are in accordance with JESD30H or later versions. The physical details of the part are defined in the [PackageSection](#) of the XML Schema.

All common Terms and Definitions that are used by more than one sectional sub-schema, such as any of the Electrical, Package, Environmental, Assembly Process Classification, are defined in the “Part Model Schema Types Library”.

All other definitions and terms necessary to define the schema, are defined by this standard and included below.

Part Model: A Part Model is a data representation described in an XML file that conforms to the rules and structure of the Part Model XML Schema. Companies who use the Part Model XML Files and claim compliance to JEDEC, must ensure that their Part Model XML file conforms to the specific released version of the Part Model XML Schema released by JEDEC.

Section 4 will define the outline of the structure of the Package XML Schema. Specific components of the XML Schema and their hierarchy are specifically controlled by the JC-11 Standards Committee who retain the expertise for these structures.

The [PackageSection](#) of the schema forms part of the Part Model XML Schema and is not intended to act as a standalone schema. In addition, there is a “Part Model Schema Types Library” XML Schema, which is a common set of xml structures shared across the Part Model XML Schema and all its sub-section schemas.

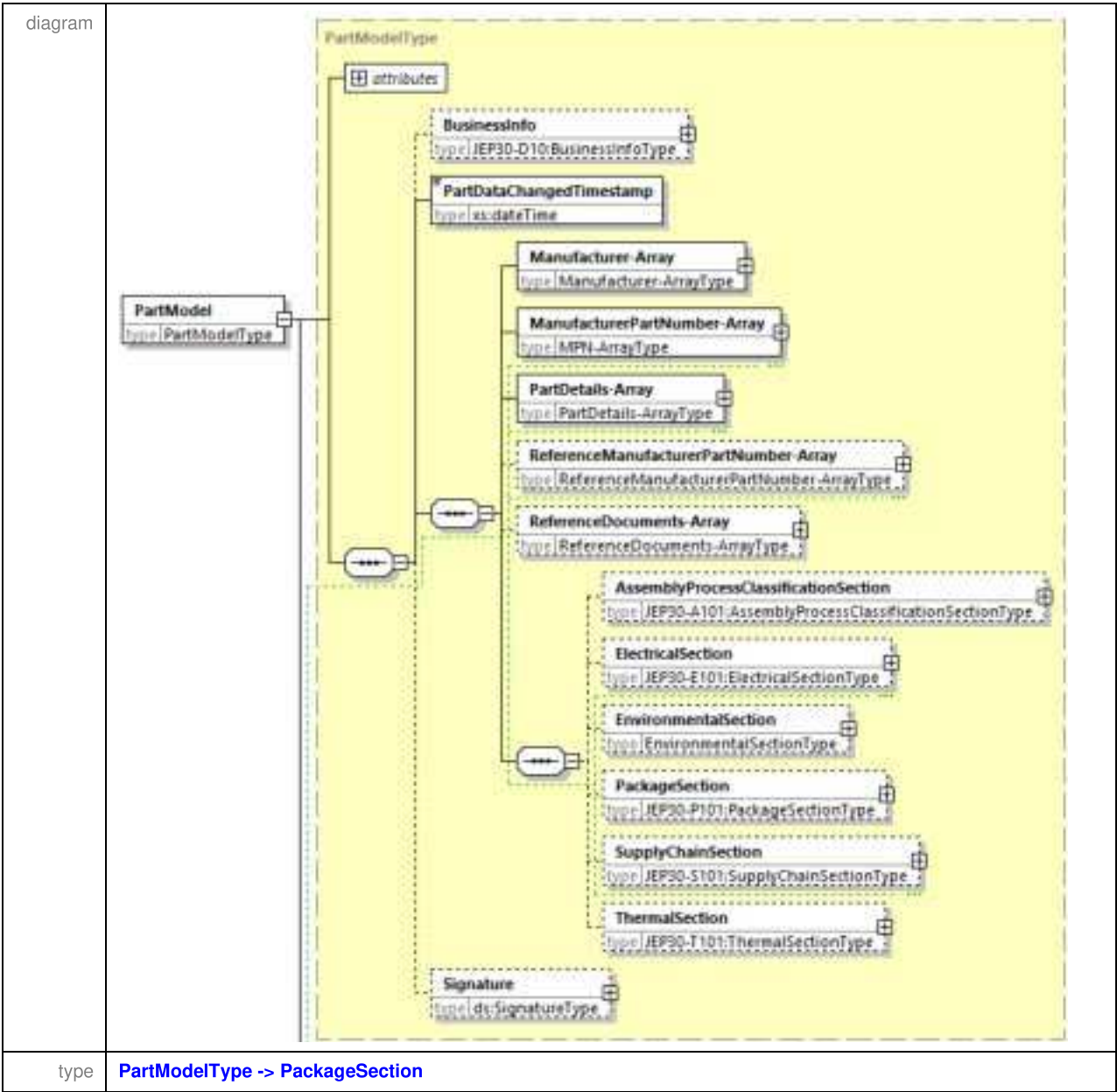
3.2 XML Schema Key Terms and Definitions

Reference JEP30 for details of the “XML Schema Key Terms and Definitions”.

4 Part Model Schema Definition

The following section describes the XML Schema structure.

4.1 Part Model - Package Section



The [PartModelType](#) belongs to the “Part Model XML Schema”. The [PackageSection](#) belongs to the “Part Model Package XML Schema”. The primary purpose of the Part Model Schema is to provide the structure for identifying unique parts (Manufacturer and MPN), and the structure to include the sub schemas which define the part details, as outlined in the JEP30 publication.

4.1 Part Model - Package Section (cont'd)

This document covers the [PackageSection](#), which is referenced from its parent's structure, the [PartModel](#). The contents under the [PackageSection](#) is tied to the Manufacturer's name and Manufacturer's part number.

The [ComplianceToPartModelSchemaVersion](#) indicates the version of the Schema to which the XML file is to be validated against. All new releases to this document or XML Schema is governed by the rules outlined in the JEPXX, and must be release in sync with the Part Model.

"Each time that a Sub-schema gets updated, then the part model version also gets updated in order to release that Sub-schema under the umbrella of the Part model. This is because the Part Model must now reference the new version of Sub-schema, since all subschemas have their own version number. The parent schema includes them by referring to a precise version, so a version bump in the subschema requires a version bump in the parent only at the time of release of the Parent."

The [PartModelContentRevision](#) indicates the revision of the data for the Part that is submitted in the XML file. This enables the Component Manufacturer to provide a new XML file for a Part each time they wish to upgrade a new set of data for a part, in any of the sub-sections such as this [PackageSection](#).

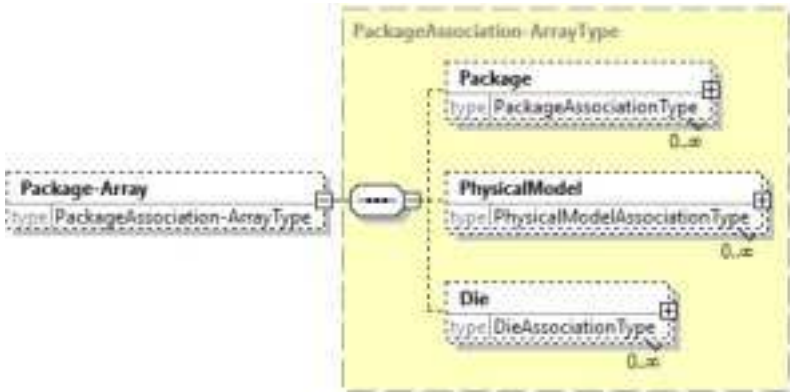
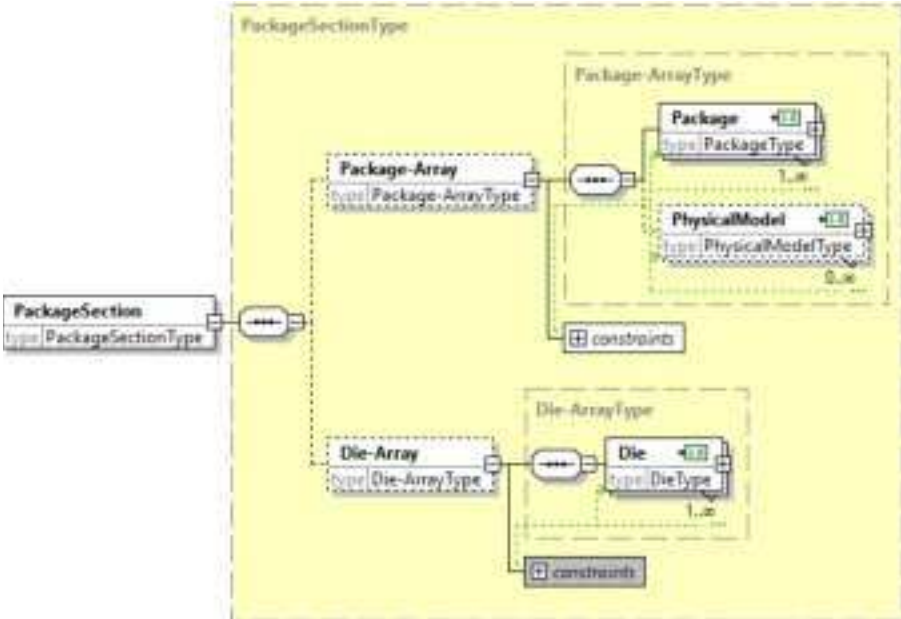
4.2 Manufacturer Part Number-Array

path	PartModel/ManufacturerPartNumber-Array.
diagram	
type	MPN-ArrayType , ManufacturerPartNumbersType , PartNumberType , OrderablePartNumber-ArrayType , JEP30-D10:SignatureDigestLinkType , ds:SignatureType .

The [ManufacturerPartNumber-Array](#) consists of a [ManufacturerPartNumbers](#) section that provide the definition of the part number, either via the [PartNumberSeries](#) or the [OrderablePartNumber](#). All Parts via their Part Number families or via their Orderable Part Numbers are connected to the details in the [PackageSection](#) via the [PartDetails-Array](#) section.

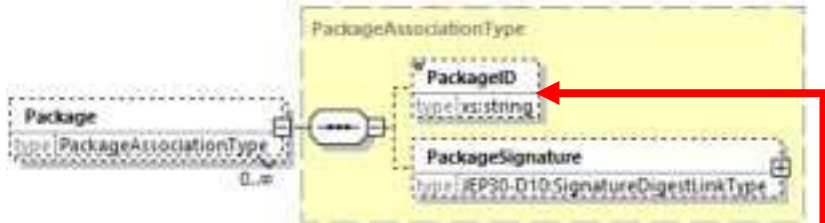
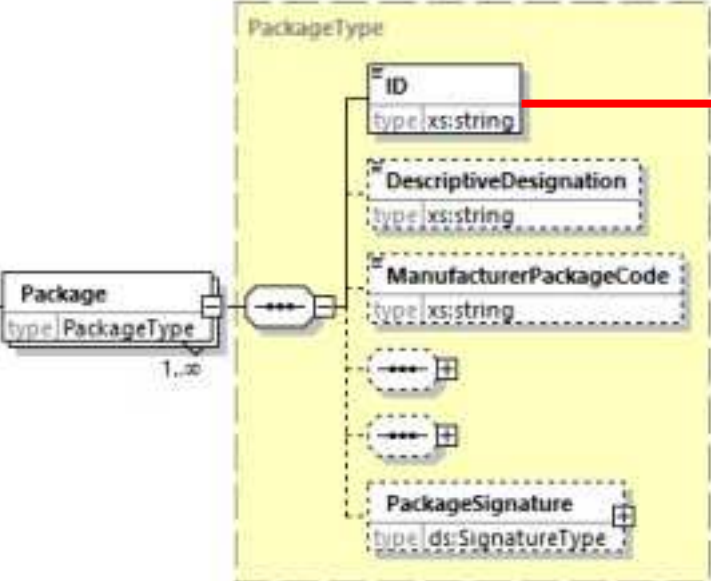
4.3 Linking the MPN to a specific Package Family Data set

The linking of the Parts to its technical data is done via the *PartDetails-Array* section as outline in the JEP30 - Part Model Guidelines for Electronic-Device Packages – XML Requirements. This consists of two sections called *PartsSelection-Array* and *Association-Array* which defines the relationship between identifying the specific set of parts and how they are associated with the supply chain content. Reference the JEP30 parent document for more details on this association.

path	PartModel/PartDetails-Array/PartDetails/Association-Array/Association/Package-Array
diagram at the Association level	
type	PackageAssociation-ArrayType, PackageAssociationType, PhysicalModelAssociationType, DieAssociationType.
diagram at the Package Section level	
type	PackageSectionType, Package-ArrayType, PackageType, PhysicalModelType, Die-ArrayType, DieType.

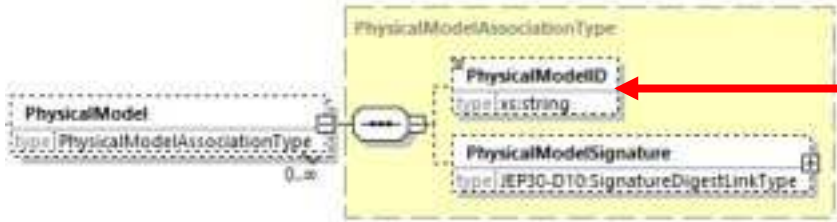
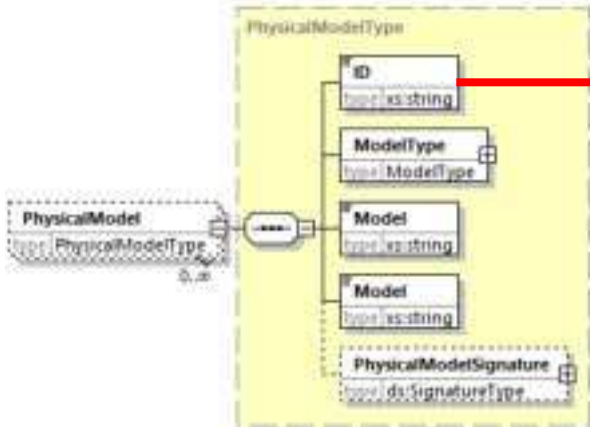
The *Package-Array* content is now sub-grouped into 2 major sections as shown in the diagram. This enables each section to be digitally signed independently of each other. The linkage between the 2 sections plus the *Die* is shown below.

4.3.1 Linking the Manufacturing Part Number to Package Content

path	PartModel/PartDetails-Array/PartDetails/Association-Array/Association/Package-Array/Package	
diagram at the Package Association level	 The diagram shows a PackageAssociationType container. Inside, there is a Package element (type PackageAssociationType) connected to a PackageID element (type xs:string) and a PackageSignature element (type JEP30-D10:SignatureDigestLinkType). A red arrow points from the PackageID element to the ID element in the PackageType diagram below.	
type	PackageAssociationType, JEP30-D10:SignatureDigestLinkType.	
path	PartModel/PackageSection/Package-Array/Package	
diagram at the Package level	 The diagram shows a PackageType container. Inside, there is an ID element (type xs:string), a DescriptiveDesignation element (type xs:string), a ManufacturerPackageCode element (type xs:string), and a PackageSignature element (type ds:SignatureType). A red arrow points from the ID element to the PackageID element in the PackageAssociationType diagram above.	
type	PackageType, ds:SignatureType, ...	

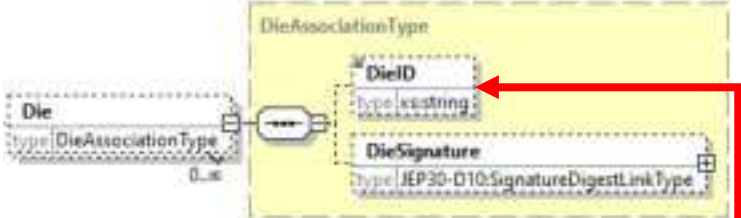
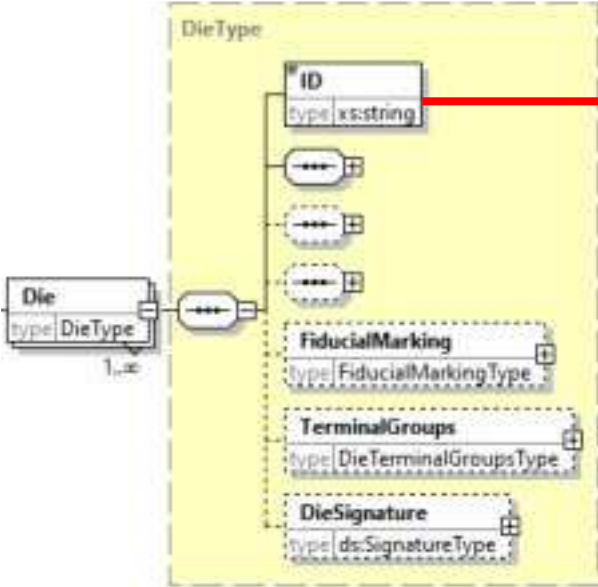
The *PackageID* references the *Package/ID* under the *PackageSection/Package-Array*. This is enforced by the key named as *PackageKey* that is assigned to the *Package/ID* element, which is referenced by the *PackageID* which has a KeyRef that refers to the *JEP30-P101:PackageKey*.

4.3.2 Linking the Manufacturing Part Number to Physical Model Content

path	PartModel/PartDetails-Array/PartDetails/Association-Array/Association/Package-Array/PhysicalModel	
diagram at the Physical Model Association level	 A diagram showing the structure of PhysicalModelAssociationType. It includes a PhysicalModel element (type PhysicalModelAssociationType, 0..∞) connected to a container. Inside the container are PhysicalModelID (type xs:string) and PhysicalModelSignature (type JEP30-D10:SignatureDigestLinkType, 1). A red arrow points from PhysicalModelID to the PhysicalModelID element in the diagram below.	
type	PhysicalModelAssociationType, JEP30-D10:SignatureDigestLinkType.	
path	PartModel/PackageSection/Package-Array/PhysicalModel	
diagram at the Physical Model level	 A diagram showing the structure of PhysicalModelType. It includes a PhysicalModel element (type PhysicalModelType, 0..∞) connected to a container. Inside the container are ID (type xs:string), ModelType (type ModelType, 1), two Model elements (type xs:string), and PhysicalModelSignature (type ds:SignatureType, 1). A red arrow points from PhysicalModelID in the diagram above to the ID element in this diagram.	
type	PhysicalModelType, ModelType, ds:SignatureType.	

The *PhysicalModelID* references the *PhysicalModel/ID* under the *PackageSection/Package-Array*. This is enforced by the key named as *PhysicalModelKey* that is assigned to the *PhysicalModel/ID* element, which is referenced by the *PhysicalModelID* which has a KeyRef that refers to the *JEP30-P101:PhysicalModelKey*.

4.3.3 Linking the Manufacturing Part Number to Die Content

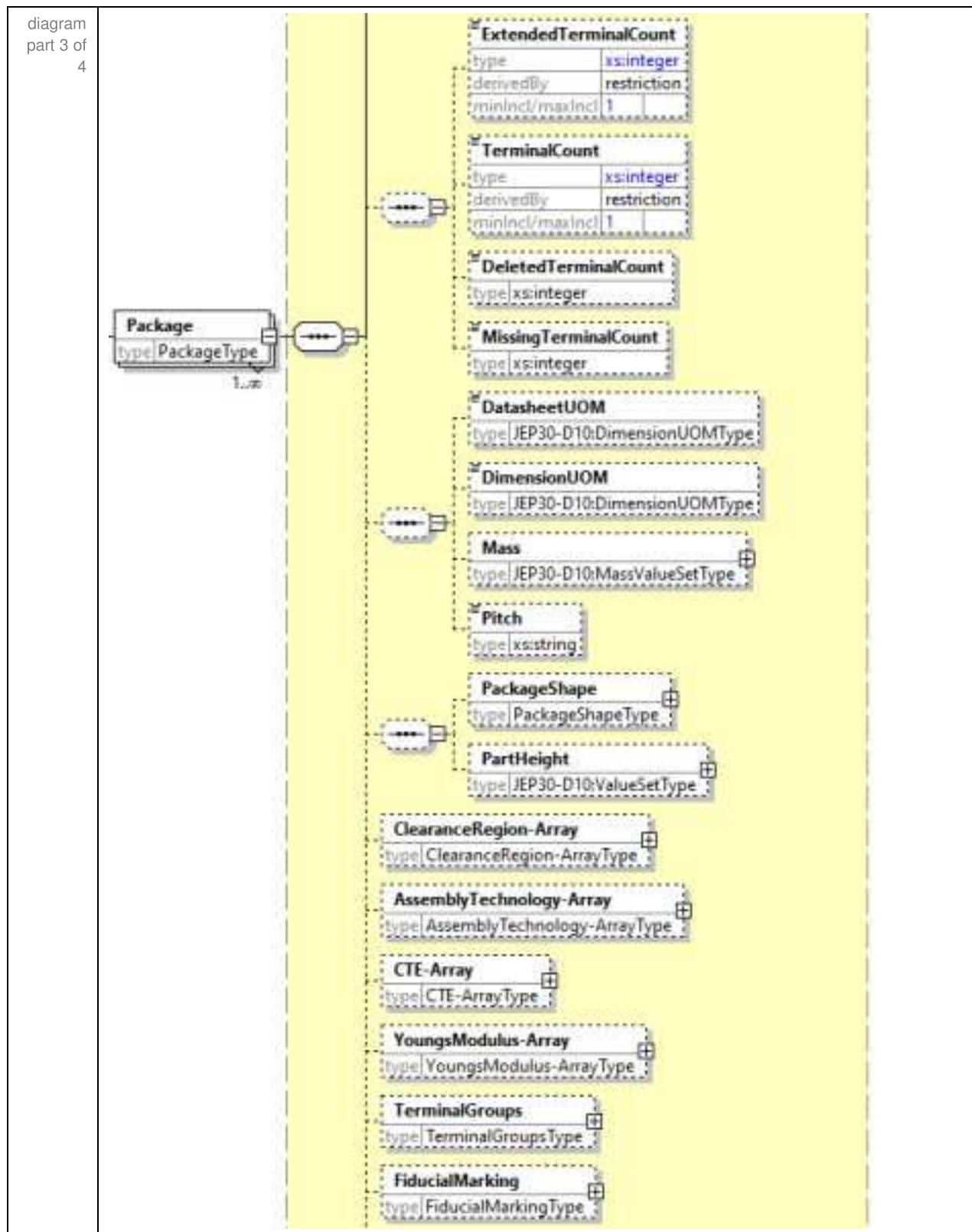
path	PartModel/PartDetails-Array/PartDetails/Association-Array/Association/Package-Array/Die	
diagram at the Physical Model Association level		
type	DieAssociationType, JEP30-D10:SignatureDigestLinkType.	
path	PartModel/PackageSection/Die-Array/Die	
diagram at the Physical Model level		
type	DieType, FiducialMarkingType, DieTerminalGroupsType, ds:SignatureType.	

The *DieID* references the *Die/ID* under the *PackageSection/Die-Array*. This is enforced by the key named as *DieKey* that is assigned to the *Die/ID* element, which is referenced by the *DieID* which has a KeyRef that refers to the *JEP30-P101:DieKey*.

5 Package Section - Package

path	PartModel/PackageSection
diagram part 1 of 4	The diagram illustrates the PackageSectionType hierarchy. PackageSectionType (type: JEP30-P1001-PackageSectionType) is the base class. It has three subclasses: PackageArrayType (type: PackageArrayType), DieArrayType (type: DieArrayType), and PackageType (type: PackageType). PackageArrayType is further specialized into PackageType (type: PackageType) and PhysicalModelType (type: PhysicalModelType). The PackageType class has several attributes: ID (type: xs:string), DescriptiveDesignation (type: xs:string), ManufacturerPackageCode (type: xs:string), Package-specificFeatures (type: Package-specificFeaturesType), Package-bodyMaterial (type: Package-bodyMaterialType), PackageTerminalPosition (type: PackageTerminalPositionType), PackageOutlineStyle (type: PackageOutlineType), PackageTerminalCode (type: PackageTerminalCodeType), PackageMountingPreparation (type: PackageMountingPreparationType), PackageBodyDirection (type: PackageBodyDirectionType), and PartAccessDirection (type: PartAccessDirectionType).
type	PackageSectionType, Package-ArrayType, PackageType, PhysicalModelType, Die-ArrayType.
path	PartModel/PackageSection/Package-Array/Package
diagram part 2 of 4	The diagram illustrates the PackageType hierarchy. PackageType (type: PackageType) is the base class. It has several subclasses: ID (type: xs:string), DescriptiveDesignation (type: xs:string), ManufacturerPackageCode (type: xs:string), Package-specificFeatures (type: Package-specificFeaturesType), Package-bodyMaterial (type: Package-bodyMaterialType), PackageTerminalPosition (type: PackageTerminalPositionType), PackageOutlineStyle (type: PackageOutlineType), PackageTerminalCode (type: PackageTerminalCodeType), PackageMountingPreparation (type: PackageMountingPreparationType), PackageBodyDirection (type: PackageBodyDirectionType), and PartAccessDirection (type: PartAccessDirectionType).

5 Package Section – Package (cont'd)



5 Package Section – Package (cont'd)

diagram part 4 of 4	
type	PackageType , Package-specificFeaturesType , Package-bodyMaterialType , PackageTerminalPositionType , PackageOutlineType , PackageTerminalCodeType , PackageMountingPreparationType , PackageBodyDirectionType , PartAccessDirectionType , JEP30-D10:DimensionUOMType , JEP30-D10:MassValueSetType , PackageShapeType , JEP30-D10:ValueSetType , ClearanceRegion-ArrayType , KeepoutRegion-ArrayType , AssemblyTechnologyType , CTE-ArrayType , YoungsModulus-ArrayType , TerminalGroupsType , FiducialMarkingType , JEP30-D10:GDAndTType , GDandTDatum-to-ElementMapType , RecommendedFootprint-ArrayType , ds:SignatureType .

The [DescriptiveDesignation](#) is described in JESD30, “Descriptive designation system for electronic-device packages”. The [ManufacturerPackageCode](#) is a non-standardized package Code that is assigned to the Package by the component manufacturer. The definitions of the [ExtendedTerminalCount](#), [TerminalCount](#), [DeletedTerminalCount](#), [MissingTerminalCount](#) and [Package/Pitch](#) are also described in the JESD30 document.

The enumerate values of the [JEP30-D10:DimensionUOMType](#) are [nm](#), [um](#), [mm](#), [m](#), [in](#) and [mil](#).

The enumerate values of the above lists of [Package-specificFeatures](#), [Package-bodyMaterial](#), and [PartAccessDirection](#), are contained in JESD30, as indicated in Table 1.

Table 1 - JESD30 Table and Section References for Package Elements

Enumerated Value List	JESD30 Tables / Section
Package-specific Features	Codes for package-specific features table
Package-body Material Type	Prefixes for predominant package-body material table
Part Access Direction	Part access Direction section

5.1 Package Terminal Position

path	PartModel/PackageSection/Package-Array/Package/PackageTerminalPosition.
diagram	<pre> classDiagram class PackageTerminalPositionType { Axial Bottom Dual End Diagonal Internal MixedPosition Quad Radial Single Triple Upper ZigZag } class PackageTerminalPosition { type PackageTerminalPositionType } PackageTerminalPositionType < -- Axial PackageTerminalPositionType < -- Bottom PackageTerminalPositionType < -- Dual PackageTerminalPositionType < -- End PackageTerminalPositionType < -- Diagonal PackageTerminalPositionType < -- Internal PackageTerminalPositionType < -- MixedPosition PackageTerminalPositionType < -- Quad PackageTerminalPositionType < -- Radial PackageTerminalPositionType < -- Single PackageTerminalPositionType < -- Triple PackageTerminalPositionType < -- Upper PackageTerminalPositionType < -- ZigZag PackageTerminalPosition --> PackageTerminalPositionType : type </pre> The diagram illustrates the hierarchy of package terminal positions. The PackageTerminalPositionType class is the base for 13 subclasses: Axial, Bottom, Dual, End, Diagonal, Internal, MixedPosition, Quad, Radial, Single, Triple, Upper, and ZigZag. Each subclass has a 'type' attribute pointing to a specific JEDEC standard or configuration type. For example, Bottom points to BottomUpperPositionConfigurationType, Dual points to DualPositionConfigurationType, Diagonal points to DiagonalCornerConfigurationType, Quad points to QuadPositionConfigurationType, Radial points to RadialPositionConfigurationType, Single points to SinglePositionConfigurationType, Triple points to TriplePositionConfigurationType, and Upper points to BottomUpperPositionConfigurationType. The PackageTerminalPosition class is a dashed box containing a reference to PackageTerminalPositionType.
type	PackageTerminalPositionType , JEP30-D10:EmptyType , BottomUpperPositionConfigurationType , DualPositionConfigurationType , DiagonalCornerConfigurationType , QuadPositionConfigurationType , RadialPositionConfigurationType , SinglePositionConfigurationType , TriplePositionConfigurationType .

5.1 Package Terminal Position (cont'd)

The definition of the above *PackageTerminalPosition* data elements can be found in JESD30, under the “Terminal position Prefix” section which *includes* the “Prefixes for terminal position” table, plus three sections in Annex A, namely

- Terminal position with additional definition,
- Relationship concepts between the Terminal Contact Area and the Body outline, and
- Position Images.

NOTE As a result of the *TerminalGroup/TerminalPosition* (as defined in section 4.16 Terminal Position below), the rollup of the *TerminalPosition* values for all *TerminalGroup-Array/TerminalGroups* into the *PackageTerminalPosition*, may be different than the value at the *PackageTerminalPosition* level. This is described in detail in JESD30, “Terminal-position prefix”.

5.1.1 Bottom

path	PartModel/PackageSection/Package-Array/Package/PackageTerminalPosition/Bottom.
diagram	
type	BottomUpperPositionConfigurationType, JEP30-D10:EmptyType, BottomDiagonalType, MatrixType, MatrixAlterationType.

5.1.2 Dual

path	PartModel/PackageSection/Package-Array/Package/PackageTerminalPosition/Dual.
diagram	<pre> classDiagram class DualPositionConfigurationType { +DualSidePositionRelationshipType Left-to-Right +DualSidePositionRelationshipType Back-to-Front +DualSidePositionRelationshipType Bottom-to-Upper +DualCornerConfigurationType Left +DualCornerConfigurationType Back +DualCornerConfigurationType Right +DualCornerConfigurationType Front +DualCornerConfigurationType Left-to-RightTop +DualCornerConfigurationType Left-to-RightBottom +DualCornerConfigurationType Back-to-FrontLeft +DualCornerConfigurationType Back-to-FrontRight } class DualSidePositionRelationshipType { +DualSidePositionRelationshipType Left-to-Right +DualSidePositionRelationshipType Back-to-Front +DualSidePositionRelationshipType Bottom-to-Upper } class DualCornerConfigurationType { +DualCornerConfigurationType Left +DualCornerConfigurationType Back +DualCornerConfigurationType Right +DualCornerConfigurationType Front +DualCornerConfigurationType Left-to-RightTop +DualCornerConfigurationType Left-to-RightBottom +DualCornerConfigurationType Back-to-FrontLeft +DualCornerConfigurationType Back-to-FrontRight } DualPositionConfigurationType "0..1" -- "0..1" DualSidePositionRelationshipType DualPositionConfigurationType "0..1" -- "0..1" DualCornerConfigurationType </pre>
type	DualPositionConfigurationType , DualSidePositionRelationshipType , Bottom-to-UpperDualPositionRelationshipType , DualCornerConfigurationType , SideCornerPositionRelationshipType , DifferentSidePositionRelationshipType .

5.1.2.1 Dual Left-to-Right and Back-to-Front

path	1. PartModel/PackageSection/Package-Array/Package/PackageTerminalPosition/Dual/Left-to-Right 2. PartModel/PackageSection/Package-Array/Package/PackageTerminalPosition/Dual/Back-to-Front
diagram	
type	DualSidePositionRelationshipType, JEP30-D10:EmptyType, SpanPositionRelationshipType.

5.1.2.2 Dual Bottom-to-Upper

path	PartModel/PackageSection/Package-Array/Package/PackageTerminalPosition/Dual/Bottom-to-Upper
diagram	
type	Bottom-to-UpperDualPositionRelationshipType, JEP30-D10:EmptyType, Bottom-to-UpperSpanPositionRelationshipType

5.1.2.3 Dual Corners

path	PartModel/PackageSection/Package-Array/Package/PackageTerminalPosition/Dual/Corners
diagram	
type	DualCornerConfigurationType , SideCornerPositionRelationshipType , DifferentSidePositionRelationshipType , JEP30-D10:EmptyType .

5.1.3 Diagonal

path	PartModel/PackageSection/Package-Array/Package/PackageTerminalPosition/Diagonal
diagram	<pre>classDiagram class DiagonalCornerConfigurationType { type: DiagonalCornerConfigurationType } class InternalCornerPositionRelationshipType { type: InternalCornerPositionRelationshipType } class DifferentSidePositionRelationshipType { type: DifferentSidePositionRelationshipType } class SouthwestToNortheast { type: InternalCornerPositionRelationshipType } class NorthwestToSoutheast { type: InternalCornerPositionRelationshipType } class BackLeftToFrontRight { type: DifferentSidePositionRelationshipType } class FrontLeftToBackRight { type: DifferentSidePositionRelationshipType } class LeftBottomToRightTop { type: DifferentSidePositionRelationshipType } class LeftTopToRightBottom { type: DifferentSidePositionRelationshipType } class Overlap { type: JEP30-D10-EmptyType } class EdgeIn { type: JEP30-D10-EmptyType } class Inside { type: JEP30-D10-EmptyType } class EdgeOut { type: JEP30-D10-EmptyType } class Overlap2 { type: JEP30-D10-EmptyType } DiagonalCornerConfigurationType < -- InternalCornerPositionRelationshipType DiagonalCornerConfigurationType < -- DifferentSidePositionRelationshipType InternalCornerPositionRelationshipType < -- SouthwestToNortheast InternalCornerPositionRelationshipType < -- NorthwestToSoutheast DifferentSidePositionRelationshipType < -- BackLeftToFrontRight DifferentSidePositionRelationshipType < -- FrontLeftToBackRight DifferentSidePositionRelationshipType < -- LeftBottomToRightTop DifferentSidePositionRelationshipType < -- LeftTopToRightBottom BackLeftToFrontRight < -- Overlap BackLeftToFrontRight < -- EdgeIn BackLeftToFrontRight < -- Inside FrontLeftToBackRight < -- EdgeOut FrontLeftToBackRight < -- Overlap2 LeftBottomToRightTop < -- EdgeOut LeftBottomToRightTop < -- Overlap2 LeftTopToRightBottom < -- EdgeOut LeftTopToRightBottom < -- Overlap2</pre>
type	DiagonalCornerConfigurationType, InternalCornerPositionRelationshipType, JEP30-D10:EmptyType, DifferentSidePositionRelationshipType.

5.1.4 Quad

path	PartModel/PackageSection/Package-Array/Package/PackageTerminalPosition/Quad.
diagram	The diagram illustrates the structure of the QuadPositionConfigurationType and its associated subtypes. It is organized into three main sections within a yellow background: QuadPositionConfigurationType: The root class, which is a specialization of <code>Quad</code> (type: <code>QuadPositionConfigurationType</code>). It contains a <code>Span</code> attribute (type: <code>SpanPositionRelationshipType</code>) and a <code>Corner</code> attribute (type: <code>QuadCornerConfigurationType</code>). SpanPositionRelationshipType: A class that defines the relationship between spans. It includes attributes: <code>Outside</code> (type: <code>JEP30-D10:EmptyType</code>), <code>Edge Out</code> (type: <code>JEP30-D10:EmptyType</code>), <code>Overlap</code> (type: <code>JEP30-D10:EmptyType</code>), <code>Edge In</code> (type: <code>JEP30-D10:EmptyType</code>), and <code>Inside</code> (type: <code>JEP30-D10:EmptyType</code>). QuadCornerConfigurationType: A class that defines the configuration for corners. It includes attributes: <code>Overlap</code> (type: <code>JEP30-D10:EmptyType</code>), <code>Edge In</code> (type: <code>JEP30-D10:EmptyType</code>), <code>Inside</code> (type: <code>JEP30-D10:EmptyType</code>), <code>Left to Right</code> (type: <code>DifferentSidePositionRelationshipType</code>), and <code>Back to Front</code> (type: <code>DifferentSidePositionRelationshipType</code>). Relationships are indicated by solid lines with open circles at the ends, and dashed lines with open circles at the ends. The <code>Quad</code> class is connected to <code>Span</code> and <code>Corner</code>. <code>Span</code> is connected to <code>SpanPositionRelationshipType</code>. <code>Corner</code> is connected to <code>QuadCornerConfigurationType</code>.
type	QuadPositionConfigurationType, JEP30-D10:EmptyType, SpanPositionRelationshipType, QuadCornerConfigurationType, DifferentSidePositionRelationshipType.

5.1.5 Radial

path	PartModel/PackageSection/Package-Array/Package/PackageTerminalPosition/Radial
diagram	
type	RadialPositionConfigurationType, JEP30-D10:EmptyType, RadialCornerpositionRelationshipType.

5.1.6 Single

path	PartModel/PackageSection/Package-Array/Package/PackageTerminalPosition/Single.
diagram	
type	SinglePositionConfigurationType , SingleSidePositionRelationshipType , SingleCornerConfigurationType , InternalCornerPositionRelationshipType , DifferentSidePositionRelationshipType .

5.1.6.1 Single Side

path	1. PartModel/PackageSection/Package-Array/Package/PackageTerminalPosition/Single/Left 2. PartModel/PackageSection/Package-Array/Package/PackageTerminalPosition/Single/Back 3. PartModel/PackageSection/Package-Array/Package/PackageTerminalPosition/Single/Right 4. PartModel/PackageSection/Package-Array/Package/PackageTerminalPosition/Single/Front
diagram	
type	SingleSidePositionRelationshipType , JEP30-D10:EmptyType .

5.1.6.2 Corner - Internal

path	1. PartModel/PackageSection/Package-Array/Package/PackageTerminalPosition/Single/Corner/Southwest 2. PartModel/PackageSection/Package-Array/Package/PackageTerminalPosition/Single/Corner/Southeast 3. PartModel/PackageSection/Package-Array/Package/PackageTerminalPosition/Single/Corner/Northeast 4. PartModel/PackageSection/Package-Array/Package/PackageTerminalPosition/Single/Corner/Northwest
diagram	
type	InternalCornerPositionRelationshipType , JEP30-D10:EmptyType .

5.1.6.3 Corner - External

path	1. PartModel/PackageSection/Package-Array/Package/PackageTerminalPosition/Single/Corner/Back-left 2. PartModel/PackageSection/Package-Array/Package/PackageTerminalPosition/Single/Corner/Back-right 3. PartModel/PackageSection/Package-Array/Package/PackageTerminalPosition/Single/Corner/Front-right 4. PartModel/PackageSection/Package-Array/Package/PackageTerminalPosition/Single/Corner/Front-left 5. PartModel/PackageSection/Package-Array/Package/PackageTerminalPosition/Single/Corner/Left-bottom 6. PartModel/PackageSection/Package-Array/Package/PackageTerminalPosition/Single/Corner/Right-bottom 7. PartModel/PackageSection/Package-Array/Package/PackageTerminalPosition/Single/Corner/Right-top 8. PartModel/PackageSection/Package-Array/Package/PackageTerminalPosition/Single/Corner/Left-top
diagram	The diagram illustrates the relationship between the 'Back-left' position and the 'DifferentSidePositionRelationshipType' hierarchy. The 'Back-left' class is shown with its type as 'DifferentSidePositionRelationshipType'. It is connected to a central 'DifferentSidePositionRelationshipType' class, which in turn has three subclasses: 'Outside', 'Edge-Out', and 'Overlap'. Each of these subclasses also has the type 'JEP30-D10-EmptyType'.
type	DifferentSidePositionRelationshipType, JEP30-D10:EmptyType.

5.1.7 Triple

path	PartModel/PackageSection/Package-Array/Package/PackageTerminalPosition/Triple
diagram	
type	TriplePositionConfigurationType, MultiSidePositionRelationshipType, TripleCornerConfigurationType, InternalCornerPositionRelationshipType, DifferentSidePositionRelationshipType.

5.1.7.1 Triple – Multi Side position

path	1. PartModel/PackageSection/Package-Array/Package/PackageTerminalPosition/Triple/NotLeft 2. PartModel/PackageSection/Package-Array/Package/PackageTerminalPosition/Triple/NotBack 3. PartModel/PackageSection/Package-Array/Package/PackageTerminalPosition/Triple/NotRight 4. PartModel/PackageSection/Package-Array/Package/PackageTerminalPosition/Triple/NotFront
diagram	
type	MultiSidePositionRelationshipType, JEP30-D10:EmptyType, SpanPositionRelationshipType.

5.1.8 Upper

path	PartModel/PackageSection/Package-Array/Package/PackageTerminalPosition/Upper.
diagram	
type	BottomUpperPositionConfigurationType, JEP30-D10:EmptyType, BottomUpperDiagonalType, MatrixType, MatrixAlterationType.

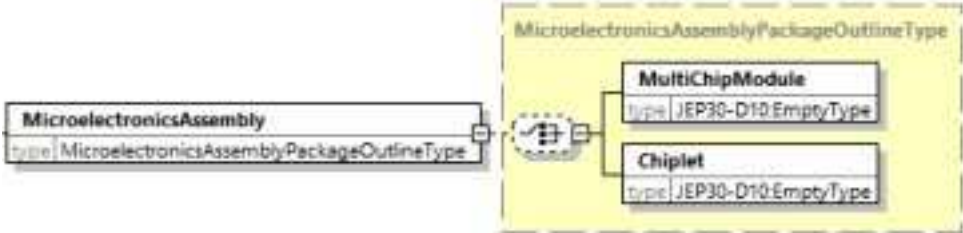
5.2 Package Outline Style

path	PartModel/PackageSection/Package-Array/Package/PackageOutlineStyle.
diagram	
type	PackageOutlineType, JEP30-D10:EmptyType, MicroelectronicsAssemblyPackageOutlineType, PostMountPackageOutlineType

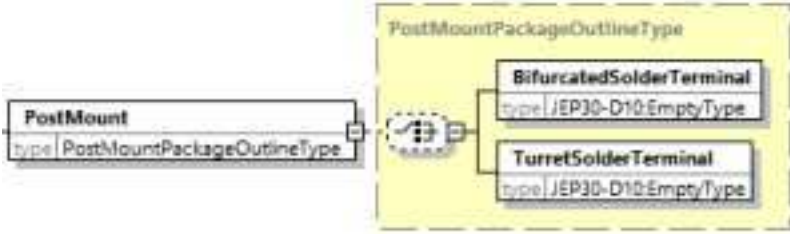
5.2 Package Outline Style (cont'd)

The definition of the above *PackageOutlineStyle* data elements can be found in the JESD30 publication, under the “Package-outline style codes” section which includes a table with the definitions of each of the above data elements. In addition, in JESD30, there is an “Illustrations of Package Outline Styles” in Annex A.

5.2.1 Microelectronics Assembly

path	PartModel/PackageSection/Package-Array/Package/PackageOutlineStyle/MicroelectronicsAssembly
diagram	
type	MicroelectronicsAssemblyPackageOutlineType

5.2.2 Post Mount

path	PartModel/PackageSection/Package-Array/Package/PackageOutlineStyle/PostMount.
diagram	
type	PostMountPackageOutlineType

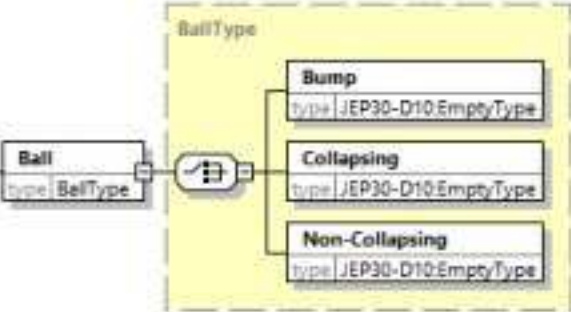
5.3 Package Terminal Code

path	PartModel/PackageSection/Package-Array/Package/PackageTerminalCode
diagram	
type	PackageTerminalCodeType, BallType, LugType, FlatType, Gull-wingType, PostTerminalType, L-BendType, ColumnType, SurfaceTerminalType, PressfitType, PinType, WraparoundType, S-BendType, Through-HoleType, WireType, ScrewType.

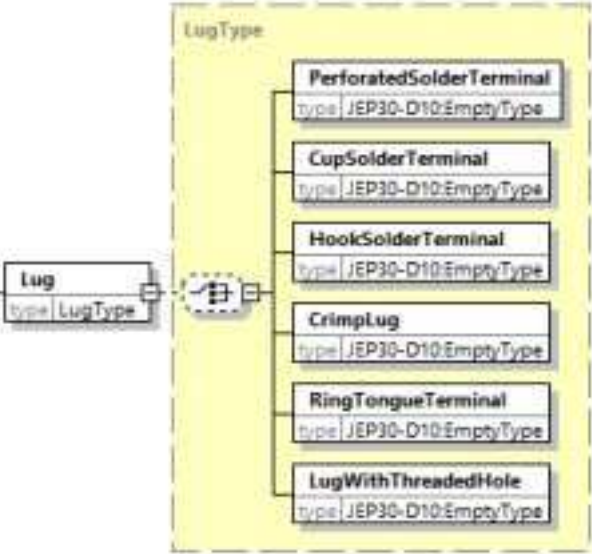
The definition of the above [PackageTerminalCode](#) data elements and their following sub-structures can be found in JESD30, under the “Terminal Shape Suffix” section which *includes* the “Suffixes for terminal shape” table, and two sections in Annex A, namely “Suffixes for terminal shape with additional definition”, and “Illustrations of terminal shape”.

NOTE As a result of the [TerminalGroup/Terminal](#) (as defined in 4.18), the rollup of the [Terminal](#) values for all [TerminalGroup-Array/TerminalGroups](#) into the [PackageTerminalCode](#), may be different than the value at the [PackageTerminalCode](#) level. This is described in detail in JESD30, “Terminal Shape Suffix”.

5.3.1 Ball

path	PartModel/PackageSection/Package-Array/Package/PackageTerminalCode/Ball
diagram	
type	BallType, JEP30-D10:EmptyType

5.3.2 Lug

path	PartModel/PackageSection/Package-Array/Package/PackageTerminalCode/Lug
diagram	
type	LugType, JEP30-D10:EmptyType

5.3.3 Flat

path	PartModel/PackageSection/Package-Array/Package/PackageTerminalCode/Flat
diagram	
type	FlatType, JEP30-D10:EmptyType

5.3.4 Gull-wing

path	PartModel/PackageSection/Package-Array/Package/PackageTerminalCode/Gull-wing
diagram	
type	Gull-wingType, JEP30-D10:EmptyType

5.3.5 Post Terminal

path	PartModel/PackageSection/Package-Array/Package/PackageTerminalCode/PostTerminal
diagram	
type	PostTerminalType, JEP30-D10:EmptyType

5.3.6 L-bend

path	PartModel/PackageSection/Package-Array/Package/PackageTerminalCode/L-Bend
diagram	
type	L-BendType, JEP30-D10:EmptyType

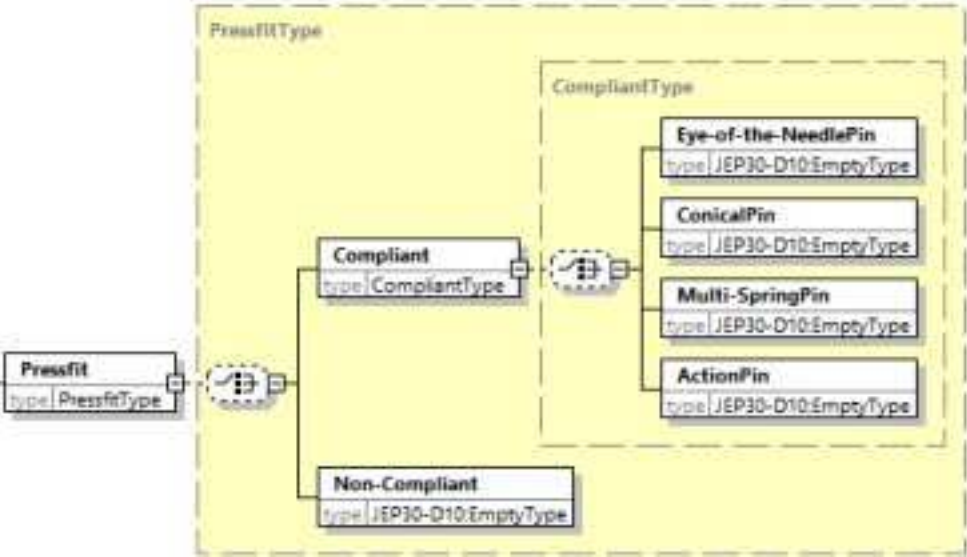
5.3.7 Column

path	PartModel/PackageSection/Package-Array/Package/PackageTerminalCode/ Column
diagram	
type	ColumnType, JEP30-D10:EmptyType

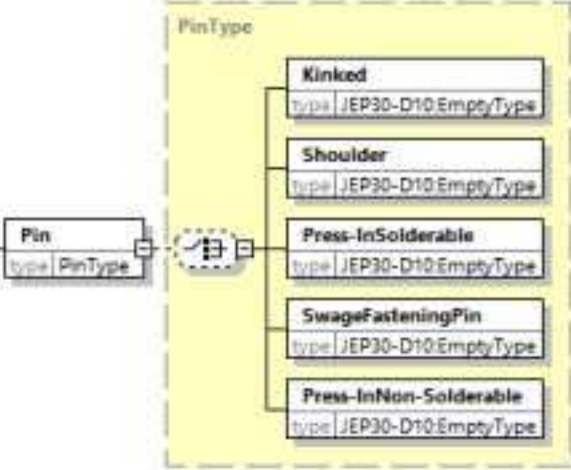
5.3.8 Surface Terminal

path	PartModel/PackageSection/Package-Array/Package/PackageTerminalCode/SurfaceTerminal
diagram	The diagram illustrates the hierarchy of the <code>SurfaceTerminalType</code> class. It is a generalization hierarchy where <code>SurfaceTerminalType</code> is the base class, and several other classes inherit from it. The inheritance is indicated by solid lines with hollow triangle heads pointing to the superclass. <code>SurfaceTerminalType</code> (Base Class) <code>D-Shape</code> (Inherits from <code>SurfaceTerminalType</code>) <code>WettableFlank</code> (Inherits from <code>D-Shape</code>) <code>D-Shape</code> (Inherits from <code>D-Shape</code>) <code>Pullback</code> (Inherits from <code>D-Shape</code>) <code>Castellated</code> (Inherits from <code>SurfaceTerminalType</code>) <code>CastellatedType</code> (Inherits from <code>Castellated</code>) <code>Hole</code> (Inherits from <code>SurfaceTerminalType</code>) <code>With-opening</code> (Inherits from <code>SurfaceTerminalType</code>) <code>Open-Ring</code> (Inherits from <code>SurfaceTerminalType</code>) <code>RingType</code> (Inherits from <code>Open-Ring</code>) <code>RingCastellatedType</code> (Inherits from <code>Open-Ring</code>) The diagram uses dashed boxes to group related classes: <code>D-Shape</code> and its subclasses, <code>Castellated</code> and <code>CastellatedType</code>, <code>Hole</code> and <code>With-opening</code>, and <code>Open-Ring</code> and its subclasses.
type	SurfaceTerminalType, JEP30-D10:EmptyType, CastellatedType, RingType, RingCastellatedType.

5.3.9 Pressfit

path	PartModel/PackageSection/Package-Array/Package/PackageTerminalCode/Pressfit
diagram	 The diagram illustrates the hierarchy of the PressfitType. A central box labeled 'Pressfit' with 'type: PressfitType' is connected to a dashed-line container labeled 'PressfitType'. Inside this container, there are two main branches: 'Compliant' (type: CompliantType) and 'Non-Compliant' (type: JEP30-D10:EmptyType). The 'Compliant' branch further connects to a dashed-line container labeled 'CompliantType'. Inside 'CompliantType', there are four sub-types: 'Eye-of-the-NeedlePin' (type: JEP30-D10:EmptyType), 'ConicalPin' (type: JEP30-D10:EmptyType), 'Multi-SpringPin' (type: JEP30-D10:EmptyType), and 'ActionPin' (type: JEP30-D10:EmptyType).
type	PressfitType, CompliantType, JEP30-D10:EmptyType

5.3.10 Pin

path	PartModel/PackageSection/Package-Array/Package/PackageTerminalCode/Pin
diagram	 The diagram illustrates the hierarchy of the PinType. A central box labeled 'Pin' with 'type: PinType' is connected to a dashed-line container labeled 'PinType'. Inside this container, there are five sub-types listed vertically: 'Kinked' (type: JEP30-D10:EmptyType), 'Shoulder' (type: JEP30-D10:EmptyType), 'Press-InSolderable' (type: JEP30-D10:EmptyType), 'SwageFasteningPin' (type: JEP30-D10:EmptyType), and 'Press-InNon-Solderable' (type: JEP30-D10:EmptyType).
type	PinType, JEP30-D10:EmptyType

5.3.11 Wraparound

path	PartModel/PackageSection/Package-Array/Package/PackageTerminalCode/Wraparound
diagram	The diagram illustrates the class hierarchy for the 'Wraparound' package terminal code. It features a central 'Wraparound' class (type: WraparoundType) which is a specialization of 'WraparoundType'. This class is associated with several subclasses, each represented by a dashed box: D-Shape (type: JEP30-D10EmptyType): A direct specialization. Castellated (type: WraparoundCastellatedType): A specialization that includes a 'WettableFlank' (type: JEP30-D10EmptyType) and a 'D-Shape' (type: JEP30-D10EmptyType). Ring (type: RingType): A specialization that includes a 'Castellated' (type: RingCastellatedType) and a 'WettableFlank' (type: JEP30-D10EmptyType). Open-Ring (type: RingType): A specialization that includes a 'Castellated' (type: RingCastellatedType) and a 'WettableFlank' (type: JEP30-D10EmptyType). Nibble (type: JEP30-D10EmptyType): A direct specialization. ConvexE (type: JEP30-D10EmptyType): A direct specialization. ConvexS (type: JEP30-D10EmptyType): A direct specialization. Relationships are indicated by solid lines with hollow triangle heads (generalization) and dashed lines with hollow circle heads (association).
type	WraparoundType, JEP30-D10:EmptyType, WraparoundCastellatedType, RingType, RingCastellatedType.

5.3.12 S-Bend

path	PartModel/PackageSection/Package-Array/Package/PackageTerminalCode/S-Bend
diagram	
type	S-BendType, JEP30-D10:EmptyType

5.3.13 Through-Hole

path	PartModel/PackageSection/Package-Array/Package/PackageTerminalCode/Through-Hole
diagram	
type	Through-HoleType, JEP30-D10:EmptyType

5.3.14 Terminal Wire

path	PartModel/PackageSection/Package-Array/Package/PackageTerminalCode/TerminalWire
diagram	
type	TerminalWireType, JEP30-D10:EmptyType

5.3.15 Screw

path	PartModel/PackageSection/Package-Array/Package/PackageTerminalCode/Screw
diagram	
type	ScrewType, JEP30-D10:EmptyType

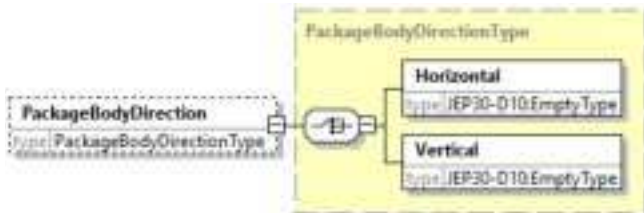
5.4 Package Mounting Preparation

path	PartModel/PackageSection/Package-Array/Package/PackageMountingPreparation
diagram	
type	PackageMountingPreparationType, JEP30-D10:EmptyType.

5.4 Package Mounting Preparation (cont'd)

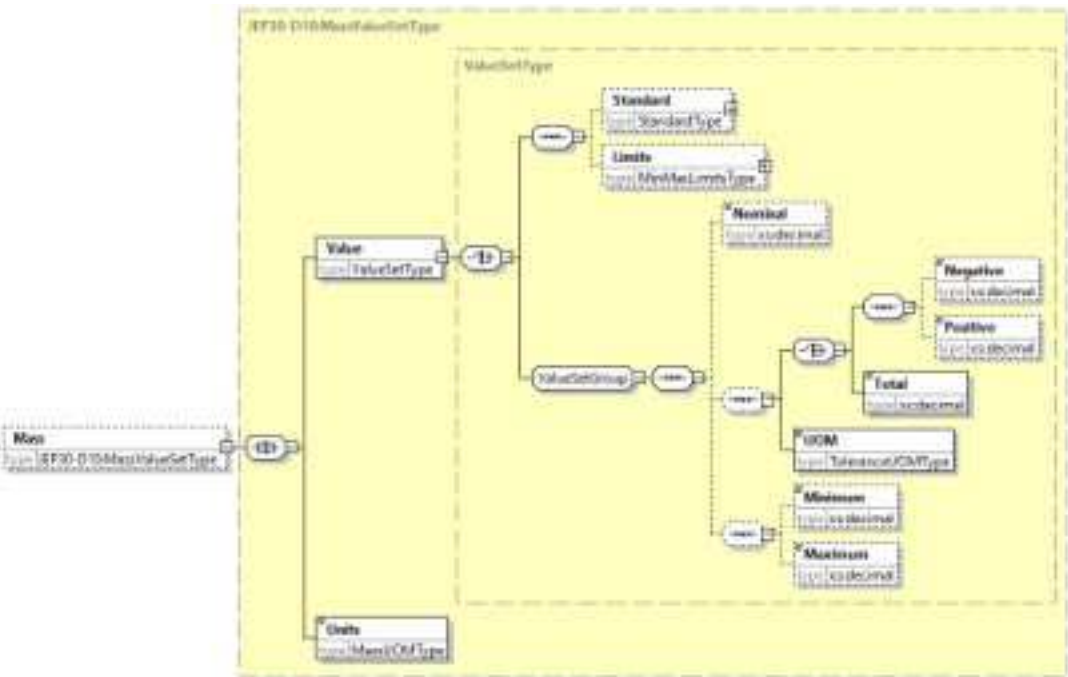
[PackageMountingPreparation](#) definition can be found in JESD30, under the “Mounting Preparation” section which includes some graphical images to describe the values.

5.5 Package Body Direction

path	PartModel/PackageSection/Package-Array/Package/PackageBodyDirection
diagram	 The diagram shows a dashed box labeled PackageBodyDirection with a type of PackageBodyDirectionType. This box is connected to a solid box labeled PackageBodyDirectionType. Inside this solid box, there are two options: Horizontal and Vertical, both of type JEP30-D10:EmptyType.
type	PackageBodyDirectionType , JEP30-D10:EmptyType .

[PackageBodyDirection](#) definition can be found in the JESD30, under the “Body Direction” section which includes some graphical images to describe the values.

5.6 Mass

path	PartModel/PackageSection/Package-Array/Package/Mass
diagram	 The diagram shows a dashed box labeled JEP30-D10:MassValueSetType. Inside this box, there is a solid box labeled Mass with a type of JEP30-D10:MassValueSetType. This box is connected to a solid box labeled ValueSetType. Inside ValueSetType, there are several options: Value (type ValueSetType), Units (type UnitsSetType), Standard (type StandardType), Limits (type LimitsSetType), Nominal (type NominalSetType), Negative (type NegativeSetType), Positive (type PositiveSetType), Total (type TotalSetType), UOM (type UOMSetType), Minimum (type MinimumSetType), and Maximum (type MaximumSetType).
type	JEP30-D10:MassValueSetType ,

The Mass [Units](#) of Measure are as follows; however, the standard preference is metric in grams.

- | | |
|-------------------|------------------|
| 1) Microgram (ug) | 4) Kilogram (kg) |
| 2) Miligram (mg) | 5) Ounce (oz) |
| 3) Gram (g) | 6) Pound (lb) |

5.7 Package Shape

path	PartModel/PackageSection/Package-Array/Package/PackageShape.
diagram	
type	PackageShapeType, ReferenceRectangleType, ReferenceRectangleConcaveType, ReferenceRoundedRectangleType, ReferenceRoundedRectangleWithTabType, PackageReferenceModifiedRectangleType, ModifiedReferenceRectangleWithTabType, ReferenceCircleType, ReferenceCircleWithTabType, ReferenceD-ShapeType, ReferenceDouble-DType, ReferenceRegularPolygonType, ReferenceSegmentType, ReferencePara-truncatedCircleType, ReferenceRoundedDiamondType, ReferenceRoundedChamferedDiamondType, ReferenceIsoscelesTrapezoidType, ContourShapeType, JEP30-D10:PointXYType, PackageVerticalDimensionType.

4.7 Package Shape (cont'd)

Table 2 shows an array of dimensions that are captured below each shape listed under [PackageShape](#).

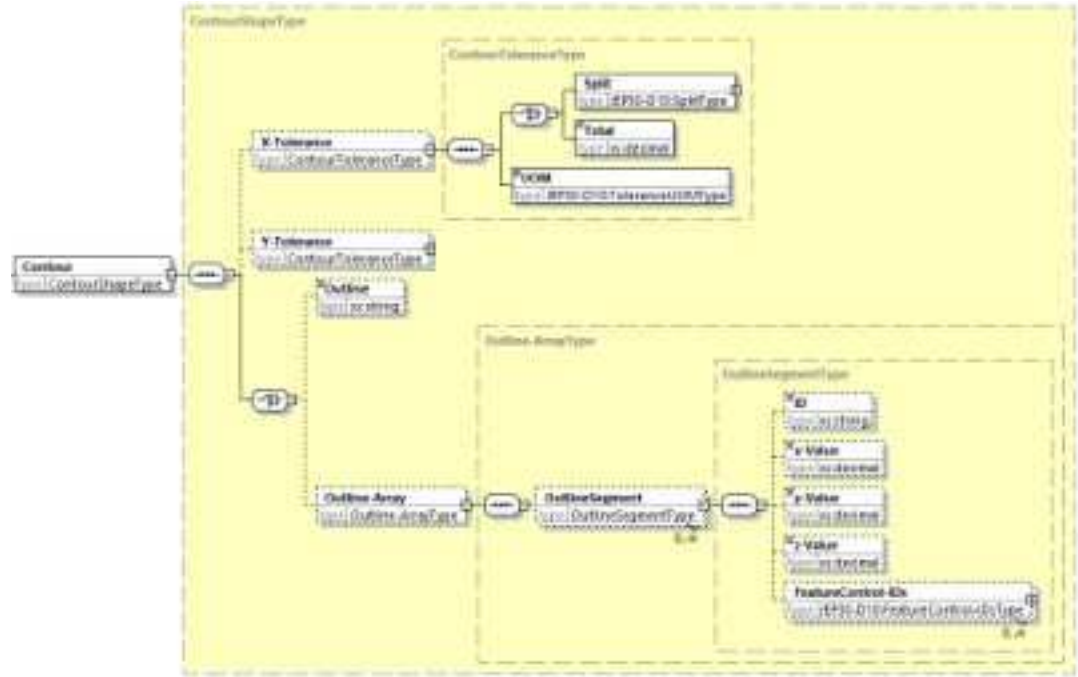
Table 2 - Package Shape versus Dimensions

Package Shape	Dimension 1	Dimension 2	Dimension 3	Diameter	Radius	Angle	No. of Sides	Inner/Outer	Tab Length	Tab Width	Tab Orientation	Impacted Corner
Rectangle	Y	Y				Y						
Rectangle Concave	Y	Y			Y	Y						
Rounded Rectangle	Y	Y			Y	Y						
Rounded Rectangle with Tab	Y	Y			Y	Y			Y	Y	Y	
Modified Rectangle	Y	Y				Y						Y
Modified Rectangle with Tab	Y	Y				Y			Y	Y	Y	Y
Circle				Y								
Circle with Tab				Y					Y	Y	Y	
D-Shape	Y	Y				Y						
Double-D	Y	Y				Y						
Regular Polygon				Y		Y	Y	Y				
Segment	Y			Y		Y						
Para-truncated Circle	Y			Y		Y						
Rounded Diamond	Y			Y	Y	Y						
Rounded Chamfered Diamond	Y	Y		Y		Y						
Isosceles Trapezoid	Y	Y	Y			Y						

The Shape Center and the Package Vertical Dimensions are applicable to all shapes. The definition of each shape including Contour is outlined in Annex A (informative) Shape

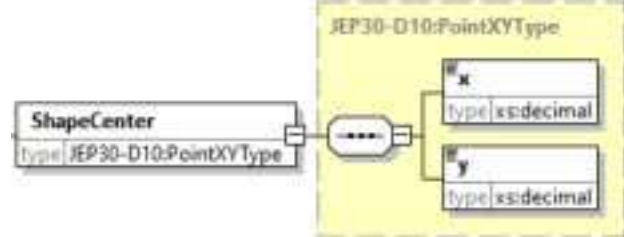
Dimensions.

5.7.1 Contour

path	PartModel/PackageSection/Package-Array/Package/PackageShape/Contour
diagram	
type	ContourShapeType, ContourToleranceType, JEP30-D10:SplitType, JEP30-D10:ToleranceUOMType, JEP30-D10:ToleranceGroup, Outline-ArrayType, OutlineSegmentType, JEP30-D10:FeatureControl-IDsType.

The addition of the *Outline-Array* enables the GD&T to be assigned to any segment of the contour outline.

5.7.2 Shape Center

path	PartModel/PackageSection/Package-Array/Package/PackageShape/ShapeCenter
diagram	
type	JEP30-D10:PointXYType