Teledyne e2v Space Flows Comparison Chart

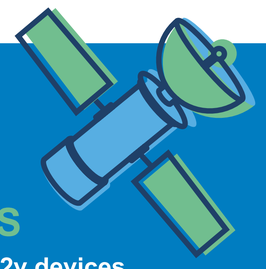
Overview and comparison chart of globally recognised and Teledyne e2v's own space flows, including military, industrial and commercial flows, to help our customers find the most suitable quality grade.

For an overview of space devices and individual flows, visit e2v.com/Semis/Space

TELEDYNE e2v
Everywhereyoulook™

WE DELIVER

Over 5,000 space grade ADC, DAC and Processor flight models and over 30,000 avionics flight models delivered.



ZERO FAULTS

Teledyne e2v devices have never failed in-orbit since delivering the first space grade flight parts over 20 years ago.

GLOBAL STANDARDS

Our Semiconductor manufacturing site has been awarded the highest quality certifications, including EN9100 and QML Q, V and Y.

CLASSIFICATIONS

ESCC 9000	European standard for ceramic, hermetically sealed microcircuits for space applications.
QML-V	A quality standard for hermetically sealed microcircuits.
QML-Q	DLA class for hermetically sealed devices for military aeronautic applications.
Enhanced B/T	Teledyne e2v standard close to space class.
Enhanced D/T	Teledyne e2v standard following MIL-STD-883, class B.
Standard C,V,M	Teledyne e2v standard for Commercial (C), Industrial (V) and Military (M).
QML-Y	DLA class for non-hermetic ceramic devices for space applications.
NASA Levels	A NASA quality standard for Plastic Encapsulated Microcircuits (PEM).
ECSS Class	A class standard from the European Cooperation for Space Standardization.
EP	Enhanced Product, packaged devices offered with extended temperature range with additional qualification and characterization.

KEY TERMS

C-SAM	Confocal – Scanning Acoustic Microscopy
SMD	Standard Microcircuit Drawing
PIND	Particle Impact Noise Detection
PDA	Percentage Defect Allowed
LAT	Lot Acceptance Test
DPA	Destructive Physical Analysis
HTOL	High Temperature Operating Life
QM	Quality management
EQM	Engineering & Qualification Model
EM	Engineering Model

FLOW CHARTS

		CERAMIC								PLASTIC							
		HERMETIC							NON-HERMETIC								
Main Process Flow Steps	**Method / Condition**	**ESCC 9000**	**QML-V**		**QML-Q**	**Enhanced**		**Standard**	**QML-Y**	**"-Nx" NASA level**			**"-Ex" ECSS Class**			**Enhanced**	**Standard**
		(wired)	(wired)	(Flip Chip)	(wired)	B/T	D/T	M, V, C	(Flip Chip)	Level 1	Level 2	Level 3	Class 1	Class 2	Class 3	-EP	M, V, C
	Specification reference	ESCC 9000	MIL-PRF-38535		MIL-PRF-38535	INTERNAL PROCEDURE		INTERNAL PROCEDURE	MIL-PRF-38535	EEE-INST-002 / PEM-INST-001			ECSS-Q-ST-60-13C			INTERNAL PROCEDURE	INTERNAL PROCEDURE
Wafer Lot Acceptance	MIL-STD-883 TM5007 / QM Plan	✓	✓	✓	✓	if appl.	if appl.	if appl.	✓								
Die Sawing / Select	Internal proced. / MIL-STD-883 TM2010 / ESCC 20400	Cond A	Cond A	Cond A	Cond B	Cond B	Cond B	Cond B	Cond A								
Die attach / cure	Internal or Subcontractor procedure	✓	✓		✓	✓	✓	✓									
Internal Visual Inspection	MIL-STD-883 TM2010 / ESCC 20400			✓					✓								
T-e2v Precap (flip chip)	MIL-STD-883 TM2010 / ESCC 20400			✓					✓								
Flip Chip die attach / cure	Internal or Subcontractor procedure			✓					✓								
Wire bonding	Internal or Subcontractor procedure	✓	✓		✓	✓	✓	✓									
Underfill dispense / cure / C-SAM	Internal procedure / MIL-STD-883 TM 2030			✓					✓								
SMD report / reflow	Internal procedure			if appl.					if appl.								
Molding / Dam & Fill / Cure	Internal or Subcontractor procedure																
Solder balls report / reflow	Internal or Subcontractor procedure			if appl.					if appl.								
Internal Visual Inspection	MIL-STD-883 TM2010 / ESCC 20400	✓	✓	✓	✓	✓	✓	✓	✓								
T-e2v Precap	MIL-STD-883 TM2010 / ESCC 20400	✓	✓	✓					✓								
Heat sink attach	Internal Procedure								if appl.								
Lid report / Sealing	Internal Procedure	✓	✓	✓	✓	✓	✓	✓									
Stabilization	MIL-STD-883 TM1008	✓	✓														
PIND test	MIL-STD-883 TM2020 / A	✓	✓	✓					if appl.								
Constant acceleration	MIL-STD-883 TM2001 / E / Y1 orientation	if appl.	if appl.	if appl.	if appl.												
Incoming inspection	Internal Procedure									if appl.	if appl.	if appl.	if appl.	if appl.	if appl.	if appl.	if appl.
Marking	Internal or Subcontractor procedure	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Serialization Marking	Internal procedure	✓	✓	✓					✓	✓	✓	✓	✓	✓			
Temperature Cycling	MIL-STD-883 TM1010 Cond B / +125°C / -55°C									20cy	20cy	20cy	10cy	10cy			
Temperature Cycling	MIL-STD-883 TM1010 Cond C / +150°C / -65°C	10cy	10cy	10cy	10cy	10cy			10cy							10cy	
Xray inspection	MIL-STD-883 TM 2012		✓	✓					if appl.	✓	✓	✓	✓				
C-SAM	Internal procedure / 1 view per interface			if appl.					if appl.	✓	✓	✓					
Pre-ambient electrical	Per Device Specification (25°C)	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓
Dynamic Burn-In	MIL-STD-883, TM1015 cond. D (125°C)	240Hrs	240Hrs	240Hrs	160Hrs	160Hrs	160Hrs		240Hrs	240Hrs	160Hrs	160Hrs	240Hrs	160Hrs		160Hrs	
Intermediate-ambient Elect.	Per Device Specification / +25°C	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓		✓	
Static Burn-in	MIL-STD-883 TM1015 cond. A or B or C (125°C)		144Hrs	144Hrs					144Hrs	120Hrs							
Post-Burn-In Electrical	Per Device Specification / +25°C		✓	✓					✓	✓							
Drift calculation	Internal procedure / per Device Spec.	✓	✓	✓					✓	✓							
PDA	PDA (amb temp post Dyn.)	5%	5%	5%	5%	5%			5%	5%	10%	10%	5%	5%	5%	5%	
PDA	3% functional parameters (amb temp post Dyn.)		✓	✓					✓								
Extreme temp. Electrical	Per Device Specification (-55°C / +125°C)	✓	✓	✓					✓	✓	✓	✓	✓	✓	✓	✓	
Termination report	Internal or Subcontractor procedure	if appl.	if appl.	if appl.	if appl.	if appl.	if appl.	if appl.	if appl.							if appl.	if appl.
Fine & Gross leaks test	MIL-STD-883, TM1014 / A / C	✓	✓	✓	✓	✓	✓	✓									
Final Electrical	Per Device Specification / +25°C	✓	✓	✓	✓	✓	✓	✓	if appl.							✓	✓
Extreme temp. Electrical	Per Device Specification			if appl.	✓	✓	✓	if appl.	if appl.							✓	if appl.
Physical dimension control	Per Device Specification	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
External Visual	MIL-STD-883 TM2009	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Final source inspection	MIL-STD-883 TM2009 / A	✓	✓	✓					✓								
Bake	J-STD-033 / 125°C								✓	✓	✓	✓	✓	✓	✓	✓	✓
Packing	J-STD-033 / Internal procedure	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Certificate of Compliance	MIL-PRF-38535	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

QUALITY NOTES

		CERAMIC								PLASTIC							
		HERMETIC							NON-HERMETIC								
Tests	**Method / Condition**	**ESCC 9000**	**QML-V**		**QML-Q**	**Enhanced**		**Standard**	**QML-Y**	**"-Nx" NASA level**			**"-Ex" ECSS Class**			**Enhanced**	**Standard**
		(wired)	(wired)	(Flip Chip)	(wired)	B/T	D/T	C, V, M	(Flip Chip)	Level 1	Level 2	Level 3	Class 1	Class 2	Class 3	-EP	M, V, C
	Specification reference	ESCC 9000	MIL-PRF-38535		MIL-PRF-38535	INTERNAL PROCEDURE		INTERNAL PROCEDURE	MIL-PRF-38535	EEE-INST-002 / PEM-INST-001			ECSS-Q-ST-60-13C			INTERNAL PROCEDURE	INTERNAL PROCEDURE
Teledyne-e2v program benefits:																	
Single Fab, assembly and test sites		✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	
Single dice diffusion lot	Per delivery	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	
Single bill of material	Per delivery	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	
Change Notification Process	JESD46	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Lot traceability report	Main production steps	✓	✓	✓					✓	✓	✓	✓	✓	✓	✓		
Electrical datalog	For delivered parts	✓	✓	✓					✓	✓	✓	✓	✓	✓	✓		
Qualification report	Available for customer on request	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Lot Acceptance Test (ESCC)	**LAT report delivered with parts**																
LAT1 – Environmental	ESCC 9000 - Chart F4 / on 15 parts	✓															
LAT1 – Mechanical	ESCC 9000 - Chart F4 / on 15 parts	✓															
LAT2 – Endurance	ESCC 9000 - Chart F4 / on 15 parts	✓															
LAT3 – Capability	ESCC 9000 - Chart F4 / on 5 parts	✓															
Quality Conformance Insp. (MIL)	**QCI report delivered with parts**																
Group A – Amb. temp. Elect. Test	MIL-PRF-38535 / delivered parts		✓	✓	✓				✓								
Group A – Extreme temp. Elect. Test	MIL-PRF-38535 / delivered parts		✓	✓	✓				✓								
Group B – Assembly Capability	MIL-PRF-38535		✓	✓	✓				✓								
Group C – Steady-state life test	MIL-PRF-38535		✓	✓	✓				✓								
Group D – Thermal & Mechanical	MIL-PRF-38535		✓	✓	✓				✓								
Group E – RHA	MIL-PRF-38535		if appl.	if appl.					if appl.								
Wafer acceptance lot	QM plan		✓	✓	✓				✓								
Qualification Lot (NASA)	**Qualification report delivered with parts**																
Radiation Verification Tests	TID and SEE									if appl.	if appl.	if appl.					
C-SAM	PEM-INST-001									22 #	22 #						
Preconditioning	Moisture soak / Reflow simulation									32 parts	32 parts	17 parts					
Subgroup 1a – Life testing	MIL-STD-883 TM1005 / D / 125°C									1500H / 22 #	1000H / 22 #	500H / 10 #					
Subgroup 1b – Temp cycling	MIL-STD-883 TM 1010 / B + DPA									500cy / 22 #	200cy / 22 #	100cy / 10 #					
Subgroup 1b – C-SAM	PEM-INST-001									22 #	22 #						
Subgroup 1b – DPA/FA	EEE-INST-002 / on 5 parts									✓	✓						
Subgroup 2 – Biased HAST	JESD22-A110 / 96 hours / +130°C / 85% RH									on 10 #							
Subgroup 2 – Unbiased HAST	JESD22-A118 / A / 96 hours / +130°C / 85% RH										on 10 #	on 7 #					
Lot Acceptance Test (ECSS)	**LAT report delivered with parts**																
Construction analysis	ESCC 21400												✓	✓	✓		
Precond + Biased HAST or THB	JESD22-A110 96H / +130°C / 85%RH or JESD22-A101												on 10 #	on 10 #	on 10 #		
Precond / Temp.Cycling / C-SAM	MIL-STD-883 TM 1010 / B / 100cy / -55°C to 125°C												on 10 #	on 10 #	on 10 #		
HTOL	MIL-STD-883 TM 1005 / D / / 125°C / per diffusion lot												2000H / 15 #	1000H / 15 #	1000H / 15 #		
Radiation Verification Tests	ECSS-Q-ST-60-15 / per diffusion lot												if appl.	if appl.	if appl.		