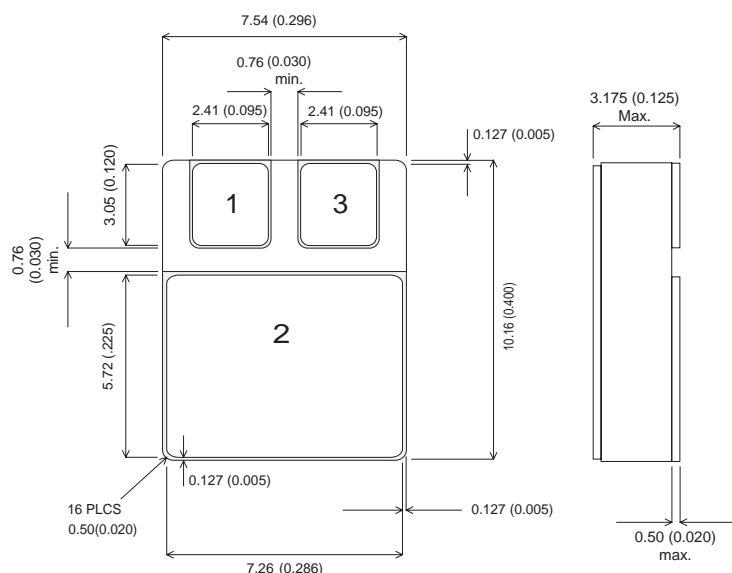


MECHANICAL DATA

Dimensions in mm (inches)



SMD05 (TO-276AA)

IRF9130SMD05

PAD1 = GATE PAD 2 DRAIN PAD3 = SOURCE

IRFNJ9130

PAD1 = SOURCE PAD 2 = DRAIN PAD3 = GATE

**P-CHANNEL
POWER MOSFET
FOR HI-REL
APPLICATIONS**

V_{DSS} -100V
 $I_{D(cont)}$ -11A
 $R_{DS(on)}$ 0.30Ω

FEATURES

- HERMETICALLY SEALED
- SIMPLE DRIVE REQUIREMENTS
- LIGHTWEIGHT
- SCREENING OPTIONS AVAILABLE
- ALL LEADS ISOLATED FROM CASE

ABSOLUTE MAXIMUM RATINGS ($T_{case} = 25^{\circ}C$ unless otherwise stated)

V_{GS}	Gate – Source Voltage	±20V
I_D	Continuous Drain Current @ $T_{case} = 25^{\circ}C$	-11A
I_D	Continuous Drain Current @ $T_{case} = 100^{\circ}C$	-7A
I_{DM}	Pulsed Drain Current	-50A
P_D	Power Dissipation @ $T_{case} = 25^{\circ}C$	45W
	Linear Derating Factor	0.36W/°C
T_J, T_{stg}	Operating and Storage Temperature Range	-55 to 150°C
$R_{\theta JC}$	Thermal Resistance Junction to Case	2.8°C/W max.

Semelab Plc reserves the right to change test conditions, parameter limits and package dimensions without notice. Information furnished by Semelab is believed to be both accurate and reliable at the time of going to press. However Semelab assumes no responsibility for any errors or omissions discovered in its use. Semelab encourages customers to verify that datasheets are current before placing orders.

ELECTRICAL CHARACTERISTICS ($T_C = 25^\circ\text{C}$ unless otherwise stated)

Parameter	Test Conditions	Min.	Typ.	Max.	Unit
STATIC ELECTRICAL RATINGS					
BV_{DSS}	Drain – Source Breakdown Voltage	$V_{GS} = 0$	$I_D = -1\text{mA}$	-100	V
$\frac{\Delta BV_{DSS}}{\Delta T_J}$	Temperature Coefficient of Breakdown Voltage	Reference to 25°C $I_D = -1\text{mA}$		-0.1	$\text{V}/^\circ\text{C}$
$R_{DS(on)}$	Static Drain – Source On–State Resistance	$V_{GS} = -10\text{V}$	$I_D = -7\text{A}$		0.30
		$V_{GS} = -10\text{V}$	$I_D = -11\text{A}$		0.35
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS} = V_{GS}$	$I_D = -250\mu\text{A}$	-2	-4
g_{fs}	Forward Transconductance	$V_{DS} \geq -15\text{V}$	$I_{DS} = -7\text{A}$	3	$S(\bar{r}_s)$
I_{DSS}	Zero Gate Voltage Drain Current	$V_{GS} = 0$	$V_{DS} = -80\text{V}$		-25
			$T_J = 125^\circ\text{C}$		-250
I_{GSS}	Forward Gate – Source Leakage	$V_{GS} = -20\text{V}$			-100
I_{GSS}	Reverse Gate – Source Leakage	$V_{GS} = 20\text{V}$			100
DYNAMIC CHARACTERISTICS					
C_{iss}	Input Capacitance	$V_{GS} = 0$		860	pF
C_{oss}	Output Capacitance	$V_{DS} = 25\text{V}$		350	
C_{rss}	Reverse Transfer Capacitance	$f = 1\text{MHz}$		125	
Q_g	Total Gate Charge	$V_{GS} = -10\text{V}$			29
Q_{gs}	Gate – Source Charge	$V_{DS} = -50\text{V}$			7.1
Q_{gd}	Gate – Drain (“Miller”) Charge	$I_D = -11\text{A}$			21
$t_{d(on)}$	Turn–On Delay Time	$V_{DD} = -50\text{V}$			60
t_r	Rise Time	$I_D = -11\text{A}$			140
$t_{d(off)}$	Turn–Off Delay Time	$R_G = 7.5\Omega$			140
t_f	Fall Time				140
SOURCE – DRAIN DIODE CHARACTERISTICS					
I_S	Continuous Source Current				-11
I_{SM}	Pulse Source Current				-50
V_{SD}	Diode Forward Voltage	$I_S = -11\text{A}$	$T_J = 25^\circ\text{C}$		-4.7
		$V_{GS} = 0$			
t_{rr}	Reverse Recovery Time	$I_S = -11\text{A}$	$T_J = 25^\circ\text{C}$		250
Q_{rr}	Reverse Recovery Charge	$d_i / d_t \leq -100\text{A}/\mu\text{s}$		$V_{DD} \leq 150\text{V}$	3

HIGH RELIABILITY and SCREENING OPTIONS

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1. Introduction

Experience and Innovation In Semiconductor Technology

At SEMELAB, we research, design, manufacture and distribute an innovative range of semiconductor products throughout the world.

Our R&D teams have an excellent track record for developing imaginative electronic solutions. Our design engineers have created a wealth of high performance products. Our manufacturing divisions have ensured supreme quality and reliability. And our sales teams and distribution partners have opened international markets to some of the best electronics solutions available.

We hold all the necessary Qualification Approvals needed to serve the Military and Hi-Rel Industries now including **QML** Approval for a series of **Linear Integrated Circuits** and **QML** Approval for our laboratory test house capabilities. The test facilities are available to qualify and screen third party products, including Hybrid products not made by the Group. We have the ability and considerable experience of most test methods currently demanded.

We specialise in the fabrication of very high quality products especially intended for use in high reliability applications. We have supplied many millions of discrete and linear integrated circuits into all forms of high reliability equipment such as:

- Space
 - Satellite Vehicles
 - Launchers
 - Support & defence
- Aircraft
 - Military
 - Civil
 - Air Traffic Control
- Communications
 - Secure Communication Links
 - Military links
 - Naval Links
 - Broadcast Transmitters
 - Underwater Repeaters
- Defence
 - Guided weapons
 - Electronic Counter Measures
 - Command & Control
 - Radar
- Transportation
 - Railway Signalling Systems
 - Traction Systems
 - Automatic Signalling Systems
- Harsh Environment
 - Oil Rig Installations
 - Drill Head Sensors
 - Atomic Event Detectors

--- everywhere when there is a need for cost effective ultra reliable products.

This is SEMELAB: design innovation, backed by numerous approvals and manufacturing strength and **led by a total commitment to quality.**

2. Quality Approvals

SCHEME	Description	SML Facilities Approval (Y/N)	SEMELAB Approval No	SML Devices Types Approved	Remarks
Current Schemes					
BS9000	British Standards for Linear ICs and Discrete Semiconductors	Y detailed approval for many products	1360/M	Linear ICs and Discrete Semiconductors	Replaced in many areas by CECC or DSCC. Approved suppliers and products listed in PD9002
BS EN ISO 9001:2000	International Standard for Quality Assurance management of all phases in the provision of goods and services. Replaces most of the old "national" systems.	Y	FM36235	refers to all product types	The whole Semelab facility and all products conform with these norms.
CECC 50000	European Military Quality Approval system for Discrete Semiconductors	Y detailed approval for many products	M/0103/CECC/UK-1181M	Small signal discretes, Power discretes	European QPL. Generally in decline
CECC 90000	European Military Quality Approval system for ICs.	Y detailed approval for many products	M/0103/CECC/UK-1181M	Linear ICs.	European QPL. Generally in decline
DSCC QPL approval	US Manufacturing approval accepted everywhere	Y detailed approval for large range of linear ICs.	Cage NO. U3158	Linear ICs	Detailed product approval by DSCC - e.g. commonly called MIL/883B for linear ICs
DSCC QML approval	US Manufacturing approval accepted everywhere	Y	DSCC -VQ-03-003050 & DSCC-VQ-03-003049	Linear ICs (level Q certification) & Laboratory Suitability	Will generally replace many of the older approval systems on International Military Systems.
ESA - ESCC 5000, SCC 9000	European Space Agency	Y	QPL No 253	2N2880 - more to follow	Product built & supplied in accordance with generic ESCC specifications
STANAG 4093	General reciprocal listing arrangement	Y		All product types	Reciprocal QPL listing between Europe and North America
Schemes being phased out					
AQAP-1	Applies in UK and related areas. Replaced Defence Standard 05/21	Y	MOD Registration No.2M8S02		Being superseded by BS/EN/ISO 9001
GAMT1	French Military approved products list	Y detailed approval for many products		A large number	French Market - should be replaced by BS/EN/ISO9001
MUAHAG	European - Military users and Harmonisation Advisory Group	Y detailed approval for many products		Discrete products - volume 9. Linears - volume 7	Components generally for European Military equipment makers - should be replaced by BS/EN/ISO9001
NATO	NATO system applies to NATO systems	Y listed for many products	Manufacturer Code 3158	Several hundred discrete products	Tending towards being a legacy system now
Legacy Schemes					
CV	Very early UK approvals system for Military and GPO types	Y some parts replaced by BS types, CECC or CVxxxx-0 parts			Legacy system - generally replaced by BS or CECC types
DEF Specs	Precursor of Defence Standard Specifications	Many types - all built to order.			Replaced by Defence Standard Specifications. Generally already phased out.
Defence Standards (many)	Relate to materials, components and processes for UK Military use	Y for many products but under AQAP1 and ISO9001		Discrete products	Legacy system little used now. The most common DEF Stan relating to Semiconductors is DEF STAN 05/21 - replaced by AQAP1
RRE, RSRE P & SRDE Specifications	Specifications drawn up in support of MOD projects	Y for many types		Discrete products	Legacy system little used now.

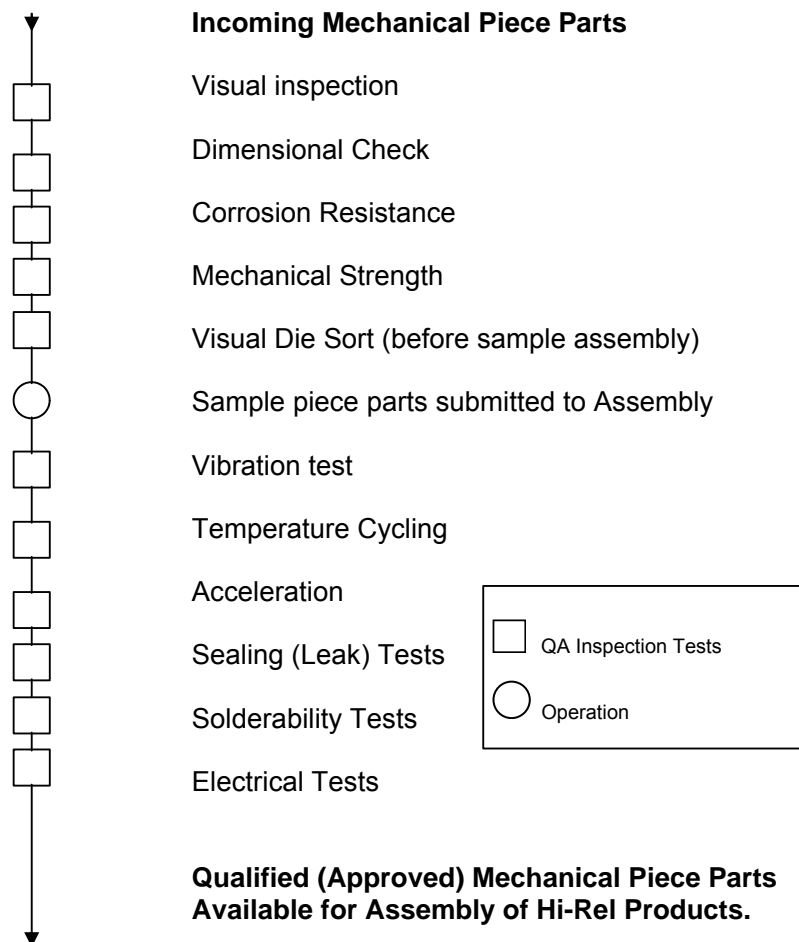
2. Material Screening

Piece Part – Qualification and pre-assembly approval process flow.

Before contemplating the assembly of any qualified semiconductor product, it is essential that all the materials used in the construction of the parts be obtained from fully qualified and trustworthy suppliers - those with a long continuous and successful supply history. Little used or untried or suspect materials are thoroughly checked and qualified as being suitable for their intended application before use.

In this case, mechanical piece parts are subject to an exhaustive series of tests culminating in sample assemblies being built to establish lack of flaws and lack of unwanted difficulties during assembly.

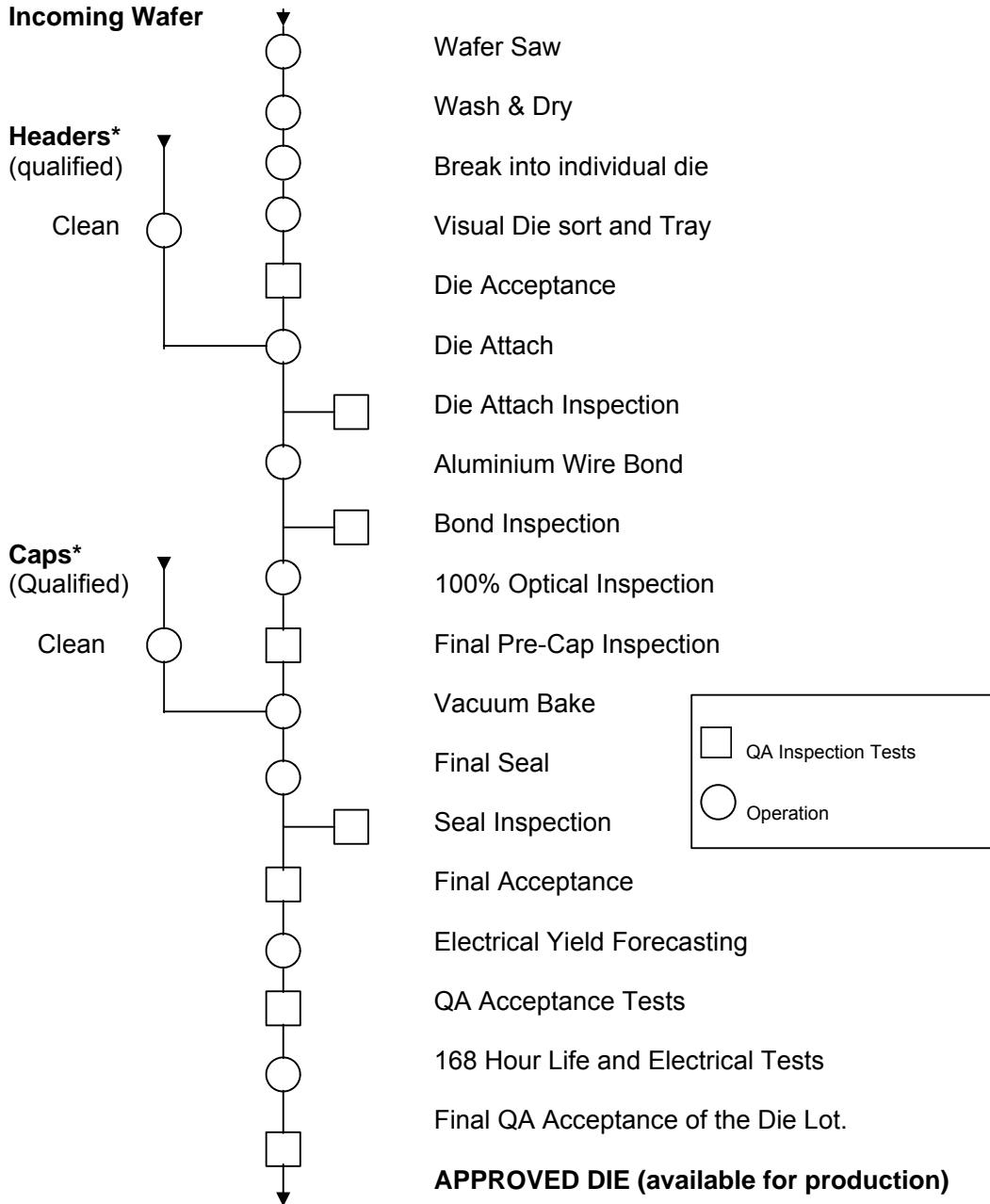
3.1 Header / Cap / Wire Approval Procedures



Notes: Approval procedures are performed on samples to approve each single lot of material.

Each batch of assembled piece parts carries its own unique “date” code. Traceability to each incoming batch of materials (all mechanical batches and die lots) is guaranteed from this unique number.

3.2 Die Approval Procedure



Each batch of assembled piece parts carries its own unique “date” code. Traceability to each incoming batch of materials (all mechanical batches and die lots) is guaranteed from this unique number.

The die qualification can include a 1000-hour electrical endurance test. One of the major objectives is to ensure that the die lot’s performance stabilises rapidly during the initial portion of this period and then remain unchanged throughout the remainder of the test (and life).

Die and mechanical piece parts intended for use in Ultra-Reliable applications e.g. Space Vehicles are subject to more rigorous evaluation.

4. CECC (Discrete Devices)

Registration: M/0103/CECC/UK

SEMELAB offers one of the largest ranges of CECC approved products in Europe, including small signal and power devices. These devices have undergone approval for use in new applications as well as providing continuing support for existing applications.

All piece parts used in the manufacture of CECC released products undergo stringent qualification procedures before they can be used. For further details contact our Quality Manager (qa@semelab.co.uk).

Full forward and backward traceability is maintained on all CECC released devices

All CECC fully assessed devices are subject to groups A, B and C inspection carried out in the Quality Assurance Department in Lutterworth. Assessment is available to levels E, F & L.

Ordering Information (example):-

BDS18CECC full assessment level (without additional screening)
 BDS18CECC-B CECC full assessment level + sequence B screen

4.1 Inspection Levels for CECC Fully Assessed Devices

Group A - Lot by lot inspection

IL = inspection levels
 AQL = Acceptable Quality Level (%)

Examination or test	Levels of Quality Assessment					
	Level E			Level F & Level L		
	IL	AQL	Observations	IL	AQL	Notes
SUB-GROUP A1 Visual Inspection	I	0.65		I	0.65	
SUB-GROUP A2a Non operatives	II	0.15		II	0.15	
SUB-GROUP A2b Electrical Measurements	II	0.40	primary dc characteristics	II	0.65 1.0	if < 4 tests if ≥ 4 tests
SUB-GROUP A3 Electrical Measurements	II	0.65	other dc characteristics	I I	2.5 4	if < 4 tests if ≥ 4 tests
SUB-GROUP A4 Electrical Measurements	S4	1	ac characteristics	S4 S4	4 6.5	if < 4 tests if ≥ 4 tests

CECC (Discrete Devices)

(continued)

Group B - Lot by lot inspection

IL = inspection level amb = ambient rated case = case rated
AQL in % c = acceptance criterion n = sample size

Examination or test	Levels of Quality Assessment					
	Level E	Level F		Level L		Notes
	n/c	IL	AQL	IL	AQL	
SUB-GROUP B1 Dimensions	15/0 or 25/1	S2	2.5	S2	2.5	
SUB-GROUP B2c Verification of ratings	15/0 or 25/1	S4	4	na	na	see C2c
SUB-GROUP B3 Lead bending if applicable	15/0 or 25/1	S3	2.5	S2	4	
SUB-GROUP B4 Solderability	22/0 or 38/1	S4	2.5	S4	2.5	
SUB-GROUP B5 Change of temp followed by acc. Damp heat or sealing	15/0 or 25/1	S4	2.5	na	na	see C5
SUB-GROUP B8 Electrical endurance	38/1 or 52/2	S4	1.5	na	na	see C8
SUB-GROUP CTR	Unless otherwise stated in detail specification: attributes information for B3, B4, B5, B8					

Group C - Periodic Inspection

P = periodicity (months) na= not applied

Examination or test	Levels of Quality Assessment						
	E (p = 3 months)		F (p = 3 months)		L		Notes
	n/c	notes	n/c	notes	P	n/c	
SUB-GROUP C1 Dimensions	8/0 or 13/1		8/1		3	8/1	
SUB-GROUP C2a Electrical Measurements	15/0 or 25/1		13/1		3	13/1	
SUB-GROUP C2b Complementary characteristics	32/0 or 55/1 15/0 or 25/1	versus T versus I,V	18/1		3	18/1	
SUB-GROUP C2c Verification of ratings	15/0 or 25/1		13/1	when not in B2c	3	8/1	
SUB-GROUP C3 Tensile / Torque (if applicable)	15/0 or 25/1		8/1		6	8/1	
SUB-GROUP C4 Soldering heat	22/0 or 38/1		18/1		na	na	
SUB-GROUP C5 Change of temp followed by acc. Damp heat or sealing	na	see B5	na	see B5	3	13/1	
SUB-GROUP C6 Shock acceleration vibration	15/0 or 25/1		8/1		6	8/1	
SUB-GROUP C7 Damp heat (if applicable)	15/0 or 25/1		18/1		na	na	
SUB-GROUP C8 Electrical endurance	38/1 or 52/1		43/3 34/2	amb case	3 3	32/3 25/2	amb case
SUB-GROUP C9 Storage at high temp	38/1 or 52/2		43/3 34/2	amb case	na	na	
SUB-GROUP CTR	Unless otherwise stated in detail specification: attributes information for C3, C5, C6, C9. Measurement information before and after C8						

CECC (Discrete Devices)

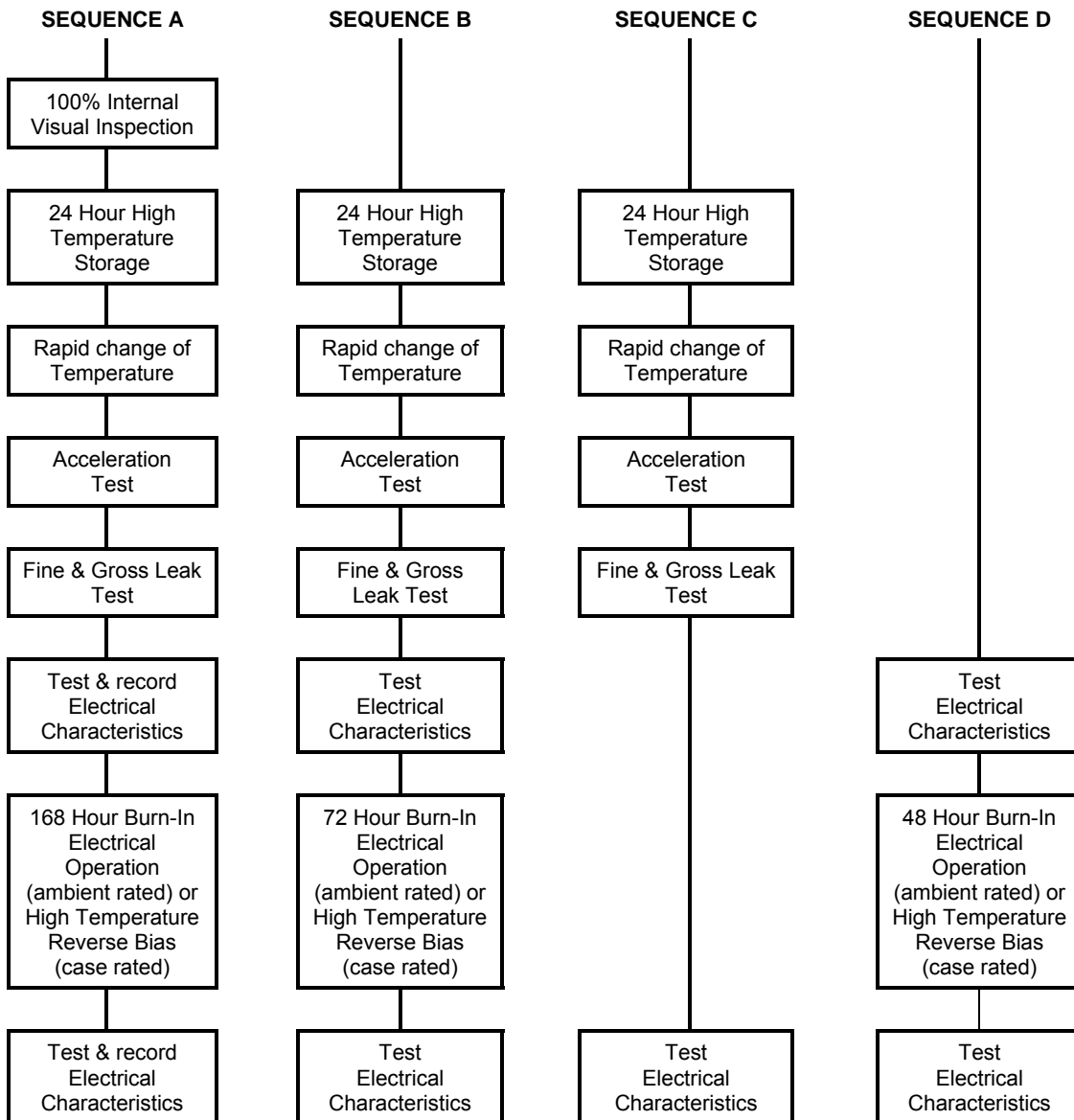
(continued)

4.2 CECC Screening Options

All CECC approved devices can be supplied as a standard full assessment level part or with additional 100% screening to any of the four levels (A, B, C, D) in accordance to CECC 50000 Appendix VI

In addition, SEMELAB can supply screening on products where the full device approval does not exist or is not held. Screening is again carried out in accordance with any of the four levels within CECC 50000 Appendix VI and is carried out at our factory in Lutterworth.

Screening sequences are as laid out below:-



5. BS (Linear IC's)

Registration 1360/M.

SEMELAB offers a range of BS approved Linear IC's including Voltage regulators, PWM's and Control IC's. These families of devices have undergone approval for use in new applications in addition to providing continuing support for existing applications.

Full forward and backward traceability is maintained on all BS released devices

All BS fully assessed devices are subject to groups A,B,C and D inspection carried out in the Quality Assurance Department in Lutterworth. Screening is available to any of the four levels defined in BS9400 (S1, S2, S3, S4)

The generic specifications for these devices are as follows:

- BS9400** IC's - Generic Data & Methods of Test
- BS9430** Linear Voltage Regulators
- BS9493** PWM and Control IC's

Ordering Information (example):-

IP117K-BSS2 BS full assessment level + category S2 screening

5.1 Inspection Levels for BS Fully Assessed Devices

Group A - Lot by lot inspection

IL = inspection levels
AQL = Acceptable Quality Level (%)

Examination or test	Levels of Quality Assessment			
	IL	AQL	BS9400	Observations
SUB-GROUP A1 Visual Inspection	I	1.5	1.2.2	
SUB-GROUP A2 Non operatives	II	0.15		
SUB-GROUP A3a Electrical Measurements	II	1.5		Static Characteristics Tamb=25°C
SUB-GROUP A3b Electrical Measurements	II	1.5		Static Characteristics Tamb = Tmax
SUB-GROUP A3c Electrical Measurements	II	1.5		Static Characteristics Tamb = Tmin
SUB-GROUP A4a Electrical Measurements	S4	4%		Dynamic Characteristics Tamb = 25°C

BS (Linear IC's)

(continued)

Group B - Lot by lot inspection

IL = inspection levels
AQL = Acceptable Quality Level (%)

Examination or test	Levels of Quality Assessment			
	IL	AQL	BS 9400	Observations
SUB-GROUP B1 Dimensions	S2	6.5	1.2.3	
SUB-GROUP B2a Solderability	S4	4.0	1.2.6.15.1	
SUB-GROUP B2b Change of temp followed by sealing	S4	4.0	1.2.6.13 1.2.6.14.1/2	
SUB-GROUP B3 Lead bending	S3	6.5	1.2.6.16.2	
SUB-GROUP B6 Acceleration steady state	S4	4.0	1.2.6.9	
SUB-GROUP B7 Electrical Endurance	S4	1.5	1.2.7.2.2	
SUB-GROUP B8 CTR Information			Unless otherwise stated in detail specification: attributes information for B2a, B2b, B6, B7	

Group C - Periodic inspection

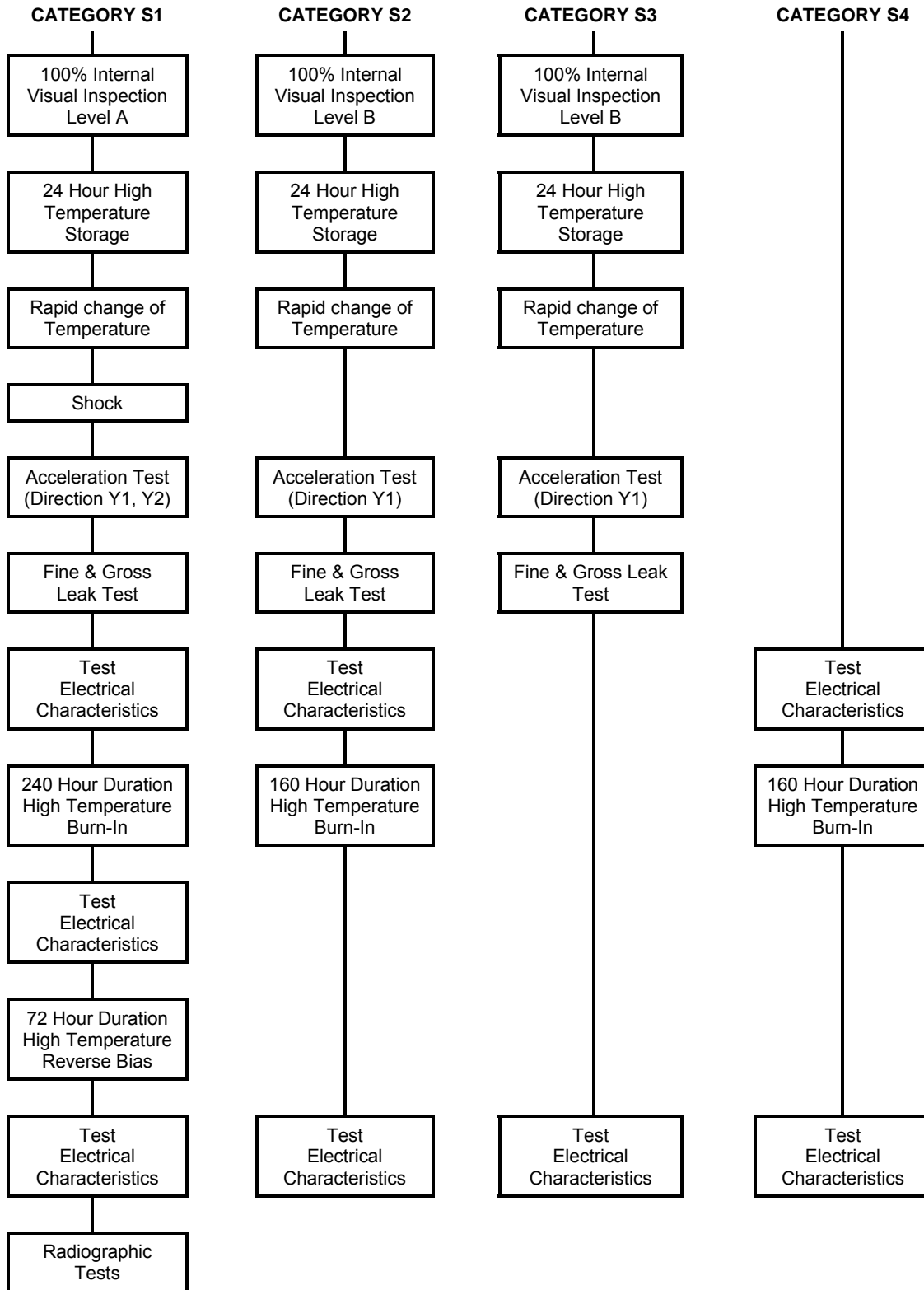
IL = inspection levels
AQL = Acceptable Quality Level (%)

Examination or test	Levels of Quality Assessment			
	IL	AQL	BS 9400	Observations
SUB-GROUP C1 Dimensions	S2	6.5	1.2.3	
SUB-GROUP C3 Vibration followed by Shock followed by Damp Heat Cycle	S2	6.5	1.2.6.8.1 1.2.6.6 1.2.6.5	
SUB-GROUP C5 Electrical Endurance	S3	4.0	1.2.7.2.2	Duration = 2000 hrs
SUB-GROUP C6 CTR Information	S3	6.5	1.1.11	Unless otherwise stated in detail spec: attributes information for C3 & C5

BS (Linear IC's)

(continued)

5.2 BS Screening Options (Linear IC's)



(Accept / reject criteria at every stage strictly as defined by the BS Specifications).

6. DSCC / 883B (Linear IC's)

Built on Semelab's QML Qualified Production Lines.

Cage Number U3158

SEMELAB offers a range of DSCC SMD listed and 883B processed voltage regulators, PWM's and Control IC's. All manufacturing is carried out on our QML qualified lines in our Lutterworth factory to the appropriate MIL-STD-883 specifications (5005 - Processing and 5004 - Screening).

6.1 Inspection Levels for DSCC SMD Listed Devices

Method 5005: Table I Group A electrical tests for class level B

Examination or test	Quality/accept	Observations
SUB-GROUP 1 Static Tests	116/0	Tamb = 25°C
SUB-GROUP 2 Static Tests	116/0	Tamb = Tmax
SUB-GROUP 3 Static Tests	116/0	Tamb = Tmin
SUB-GROUP 4 Dynamic Tests	116/0	Tamb = 25°C
SUB-GROUP 5 Dynamic Tests	116/0	Tamb = Tmax
SUB-GROUP 6 Dynamic Tests	116/0	Tamb = Tmin
SUB-GROUP 7 Functional Tests	116/0	Tamb = 25°C
SUB-GROUP 8a Functional Tests	116/0	Tamb = Tmax
SUB-GROUP 8b Functional Tests	116/0	Tamb = Tmin
SUB-GROUP9 Switching tests	116/0	Tamb = 25°C
SUB-GROUP10 Switching tests	116/0	Tamb = Tmax
SUB-GROUP11 Switching tests	116/0	Tamb = Tmin

- 1) The specific parameters to be included for tests in each subgroup shall be as specified in the applicable acquisition document. Where no parameters have been identified in a particular subgroup or tests within a subgroup, no group A testing is required for that subgroup or test to satisfy group A requirements.
- 2) When the (sub)lot size is less than the required sample size, each and every device in the (sub)lot shall be inspected and all failed devices removed from the (sub)lot for final acceptance of that test, subgroup, or set of tests/subgroups.

Method 5005: Table IIb Group B tests for class level B

Test	note	MIL-STD-883 method	Condition	Quantity/accept or sample size/accept
Subgroup 2 Resistant to solvents	(3)	2015		3/0
Subgroup 2 Solderability	(4)	20 03	temp 245°C ± 5°C soldering	sample size number = 22, c = 0
Subgroup 3 Bond strength 1) Thermo-compression 2) Ultrasonic / Wedge 3) Flip-chip 4) Beam lead	(5)	2011	1) Test Condition C or D 2) Test Condition C or D 3) Test Condition F 4) Test Condition H	sample size number = 15, c = 0

- 3) Resistance to solvents testing required only on devices using inks or paints as the marking or contrast.
- 4) Devices submitted for solderability shall be in the same lead finish as shipped product and must have been through the temp/time exposure of burn in except for devices which have been hot solder dipped or have lead-tin fusing after burn-in.
- 5) Unless otherwise specified the sample size number for condition C or D is the number of bond pulls selected from a minimum number of 4 devices and for condition F or H is the number of dice (not bonds).

DSCC / 883B (Linear IC's)

(continued)

Method 5005: Table III Group C (Die related tests) for class level B

Test	MIL-STD-883 method	Condition	Quantity/accept or sample size/accept
Subgroup 1 a) Steady-state life test b) End-point electrical parameters	1005	Test condition to be specified (1000 hours at 125°C or equivalent in accordance with table 1) As specified in the applicable device specification	sample size number = 45, c = 0

Method 5005: Table IV Group D (package related tests) for class level B

Test (1)	MIL-STD-883 method	Condition	Quantity/accept or sample size/accept
Subgroup 1 (2) Physical Dimensions	2016		sample size number = 15, c = 0
Subgroup 2 a) Lead Integrity (3) b) Seal - Fine & Gross leak (5)	2004 1014	Test Condition B (lead fatigue) As applicable	sample size number = 45, c = 0
Subgroup 3 (4) a) Thermal Shock b) Temp Cycle c) Moisture resistance d) Visual Examination e) Seal - Fine & Gross leak f) End Point Electricals	1011 1010 1004 1014	Test cond B as a min. 15 cycles min Test Condition C. 100 cycles min In accordance with visual criteria method 1004 and 1010 As applicable As specified in the applicable device specification	sample size number = 15, c = 0
Subgroup 4 (4) a) Mechanical Shock b) Vibration, variable frequency c) Constant Acceleration d) Seal - Fine & Gross leak e) Visual examination f) End point Electricals (6)	2002 2007 2001 1014	Test condition B minimum Test condition A minimum Test condition E minimum (Y1 only) In accordance with meth 1010 or 1101 As specified in applicable device specification	sample size number = 15, c = 0
Subgroup 5 (2) a) Salt Atmosphere b) Visual Examination c) Seal - Fine & Gross leak	1009 1014	Test condition A minimum In accordance with method 1009	sample size number = 15, c = 0
Subgroup 6 (2) a) Internal water-vapour content	1018	5000ppm max water content at 100°C	3/0 or 5/1
Subgroup 7 (2) a) Adhesion of Lead finish (12)	2025		sample size number = 15, c = 0
Subgroup 8 (2) a) Lid Torque	2024		5/0

- 1) In line monitor data may be substituted for subgroups D1,D2,D6,D7 and D8 upon approval by the qualifying activity. The monitors shall be performed by package type and to the specified subgroup test method.
- 2) Electrical reject devices from the same inspection lot may be used for samples.
- 3) The sample size number of 45, C=0 for lead integrity shall be based on the number of leads or terminals tested and shall be taken from a minimum of 3 devices.
- 4) Seal tests need only be performed on packages having leads exiting through a glass seal.
- 5) Devices used in subgroup 3 can be used in subgroup 4.
- 6) End point electrical parameters may be performed after moisture resistance and prior to seal test.
- 7) Sample size based on number of leads.

6.2 Screening Sequence for DSCC SMD listed devices

Method 5004: Table 1 Class level B screening

Screen	MIL-STD-883 method	Condition	Requirement
Internal Visual (1)	2010	Test Condition B	100%
Stabilisation Bake	1008	24hrs @ condition C minimum	100%
Temperature Cycling (2)	1010	Test Condition C	100%
Constant Acceleration	2001	Test condition E minimum Y1 orientation only	100%
Visual Inspection			100%
Initial (pre-burn-in) (3) electrical Parameters		In accordance with applicable device specification	100%
Burn-In Test	1015	160 hours at 125°C minimum	100%
Interim (Post Burn-In) Electrical Parameters		In accordance with applicable device specification	100%
Percentage Defect Allowable			5% all lots
Final Electrical Test			
a) Static tests		In accordance with applicable device specification	
1) 25°C subgroup 1 table 1 5005			100%
2) Maximum and Minimum rated operating temperature subgroup 2,3 table 1 5005			100%
b) Dynamic or functional tests			100%
1) 25°C subgroup 4,7 table 1 5005			100%
2) Minimum and Maximum rated operating temperature subgroup 5,6,8 table 1 5005			100%
c) Switching tests at 25°C subgroup 9 table 1 5005			
Seal (4) a) Fine b) Gross	1014		100%
Qualification or quality (5) conformance inspection test sample selection	5005	In accordance with applicable device specification	sample
External Visual	2009		100%

1) Test samples for group B, bond strength may be selected prior to or following internal visual, prior to sealing provided all other specification requirements are satisfied. Test method 2010 applies in full except when method 5004, alt 1 or 2 is in effect.

2) This may be replaced with thermal shock method 1111, test condition A, minimum.

3) When specified in the applicable device specification, 100% of devices shall be tested for parameters requiring deltas.

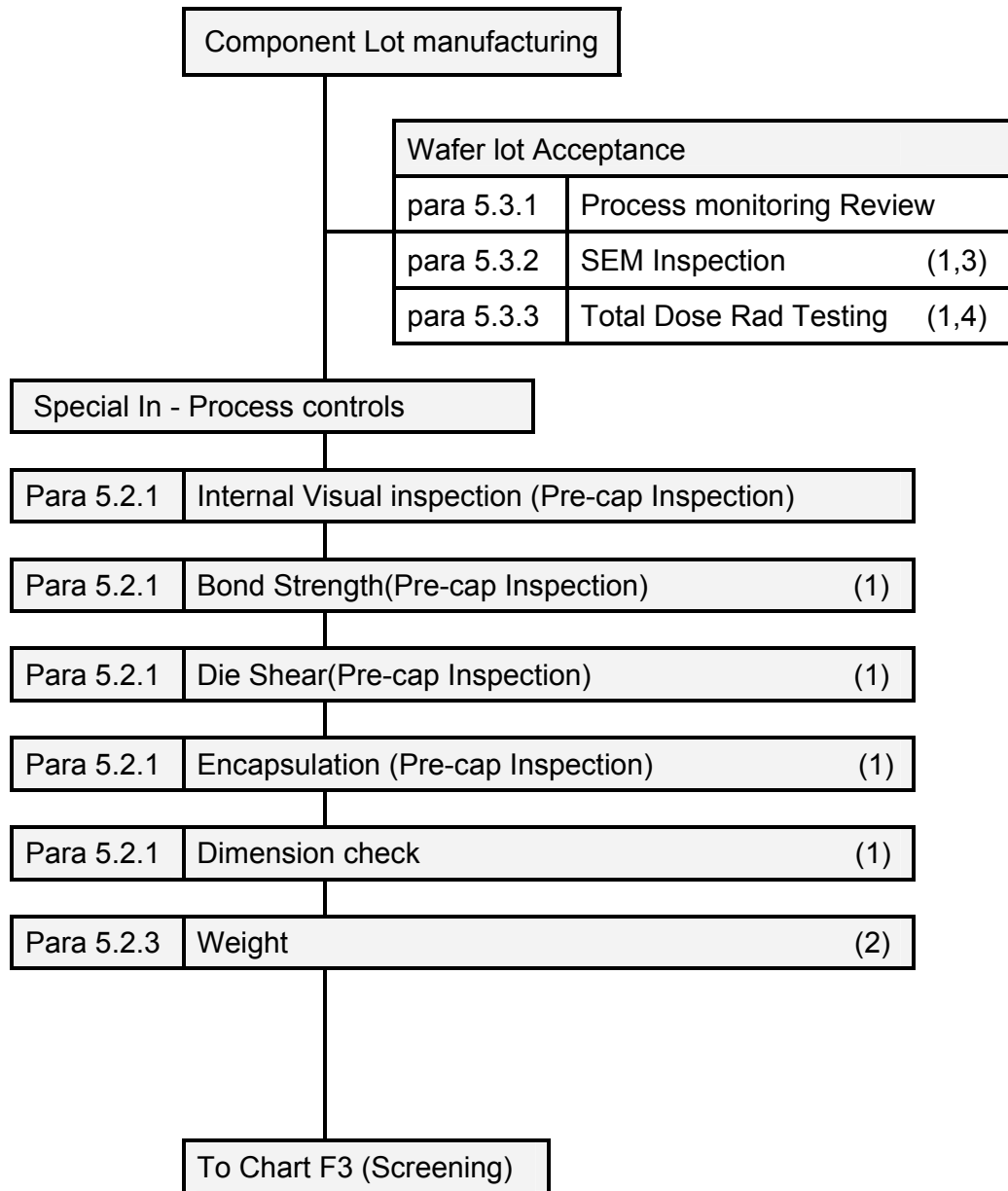
4) Fine & Gross leak tests shall be performed separately or together between constant acceleration and external visual. All device lots having any physical processing steps performed following seal shall be retested for hermeticity and visual defects.

5) Samples shall be selected for testing in accordance with the specific device class and lot requirement of method 5005.

7. ESA/ESCC - Space Level Product

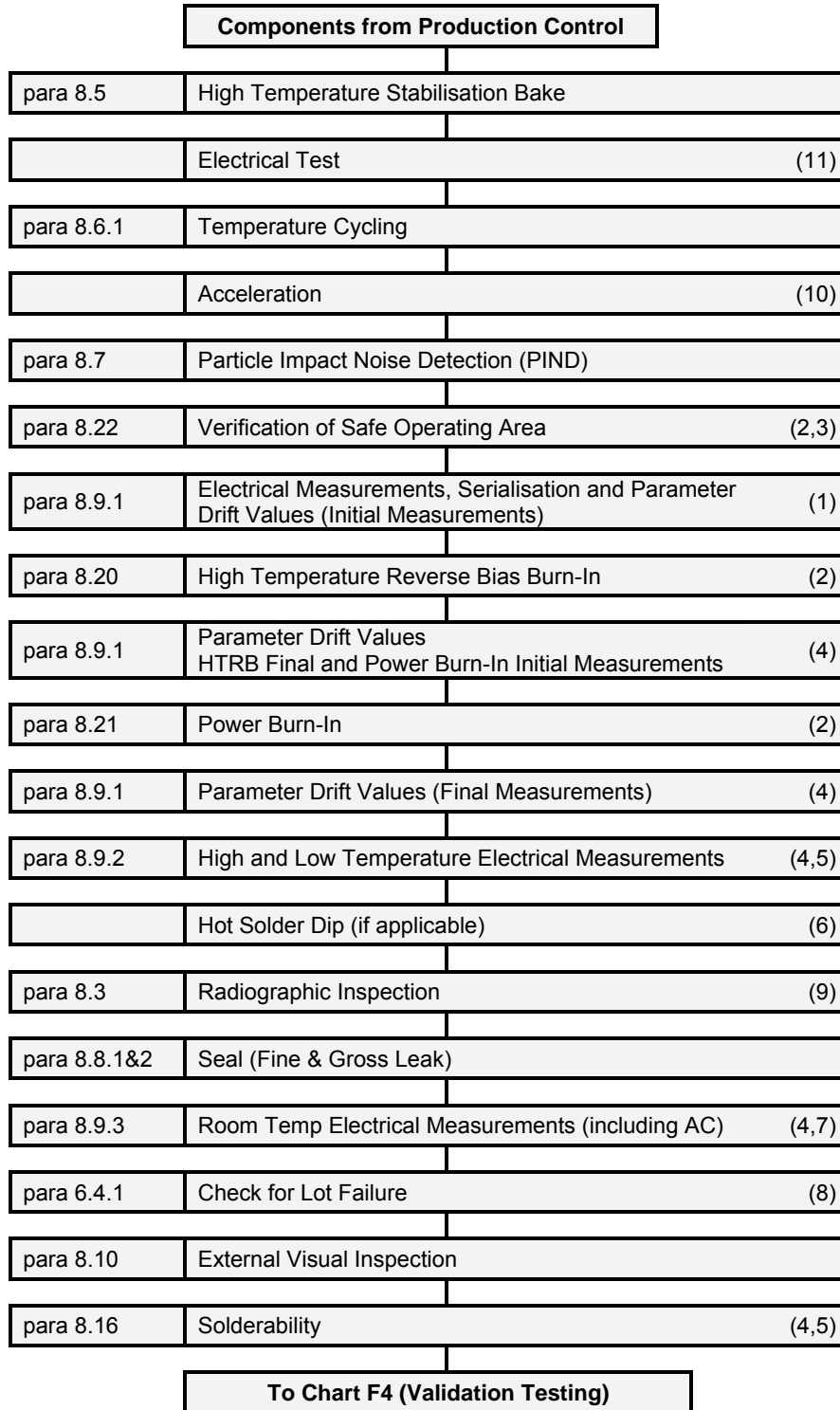
Semelab's **Space Quality Level Products** are based on the testing procedures specified in the generic **ESCC 5000 issue 3** and in the corresponding **Detail Specifications**.

7.1 Chart F2 - Production Control (ESCC 5000 issue 3)



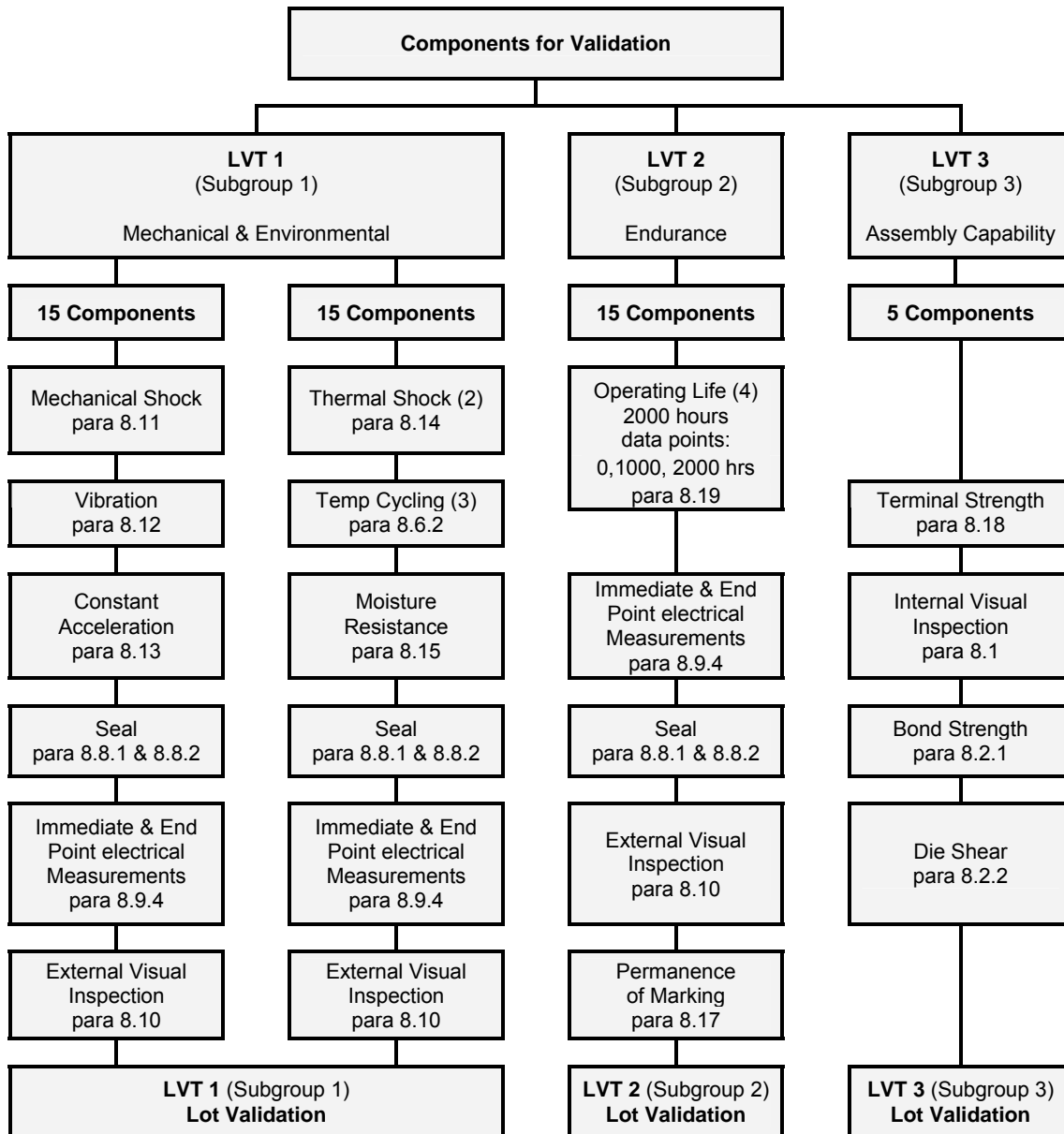
- Notes:**
- 1) Performed on a sample basis.
 - 2) Guaranteed but not tested.
 - 3) If specified in the detail specification.
 - 4) If specified in the detail specification and required in the Purchase Order.

7.2 ESA/ESCC - Chart F3 Screening (ESCC 5000 issue 3)



- Notes:**
- 1) All components shall be serialised prior to Initial Electrical Measurement.
 - 2) If specified in detail spec.
 - 3) Can be performed at any time prior to initial measurements of Parametric Drift values.
 - 4) The Lot Failure criteria of paragraph 6.4 applies to this test.
 - 5) Performed on a sample basis.
 - 6) Can be performed at any time prior to Room Temp Electrical Measurements during screening (prior to Seal test).
 - 7) Measurements of parametric Drift Values need not be repeated in Room Temperature Electrical measurements.
 - 8) Check for Lot Failure shall take into account all electrical parameter failures that may occur during screening tests in accordance with paragraph 8.9.1, 8.9.2, 8.9.3 subsequent to HTRB Burn-In.
 - 9) Radiographic Inspection may be performed at any point during Screening Tests.
 - 10) Not specified in ESCC 5000 iss 3, but performed by Semelab to MIL-STD-750 method 2006.
 - 11) Not specified in ESCC 5000 iss 3, but performed by Semelab as a process monitor.

7.3 Chart F4 - Validation Testing (ESCC Generic Specification 5000 issue 3)



Notes:

- 1) ESCC 5000 iss 3 table F4 - Qualification & Periodic Testing becomes 'Validation Testing' for non qualified parts.
- 2) Only applicable to axial diodes.
- 3) Not applicable to axial lead glass diodes.
- 4) Variance in Test method based on product type.

Ordering Information:

- 1) Order for Subgroup 1 (includes subgroups 2 & 3) requires order for 50 (30+15+5) destructive samples.
- 2) Order for Subgroup 2 (includes subgroup 3) requires order for 20 (15+5) destructive samples.
- 3) Order for Subgroup 3 requires order for 5 destructive samples.
- 4) Other Ordering Options are available - please contact Semelab Sales.

8. SEMELAB IN-HOUSE processing options

In addition to the numerous qualifications held by SEMELAB, there are also other processing options available. These are based on SEMELAB's own in house specifications that have been written around a range of existing generic specifications.

These specifications enable SEMELAB to supply products processed to the requirements of original manufacturers' data sheets and military or space specifications (ie BS, CV, CECC, MIL-PRF-19500 all levels, ESA, 883B)

Before assembly of any qualified semiconductor product is started, it is essential that all the materials used in the construction of the parts be of known and proven high quality. They may be obtained from fully qualified and trusted suppliers - those with a long continuous and successful supply history. Little used or untried or suspect materials are thoroughly checked and qualified as being suitable for their intended application before assembly is allowed to start.

All products processed in this way are released in accordance with the company's Defence Standard Approvals.

8.1 CECC Processed Devices

QR208: Conformance to the requirements of CECC 50000

QR209: Screening to the requirements of CECC 50000 App VI

QR208 and QR209 are based entirely on CECC 50000 quality conformance inspection requirements and screening options.

By working to these specifications SEMELAB are able to supply full CECC "look alike" products, but released under the company's ISO9001/AQAP1 approval. Standard processing is done in accordance with Group A (electrical) and Group B (environmental) tests to full assessment level F. Group C tests and level E assessment levels are optional and are available on customer request.

Part numbers for products processed to QR208 and QR209 have -QR added (and a letter corresponding to the screening level if required). The marking for the device has the suffix '-O' added (and a letter corresponding to the screening level if screened).

Semelab are also able to process devices to existing CECC specifications where we have not undergone an approval exercise. This is particularly useful when Semelab want to supply products in a smaller volume that does not justify the cost of the full approval exercise.

Part numbers for parts processed to detailed specifications will have the suffix '-O' added to the original part number (and a letter corresponding to the screening level if required). The marking for the device has the suffix '-O' added (and a letter corresponding to the screening level if screened).

Ordering Information (when no CECC specification exists):-

Part Number	Description	Marking (*)
2N5153-QR	QR208 gps A, B level F Processed to CECC full assessment level F, Groups A, B	2N5153-O
2N5153-QR-B	QR208 gps A, B level F + QR209 sequence B Processed to CECC full assessment level F, Groups A, B with screening in accordance with CECC 50000 App VI seq B	2N5153-O/B
2N5153-QR-EB	QR208 gps A, B level E + QR209 sequence B Processed to CECC full assessment level E, Groups A, B with screening in accordance with CECC 50000 App VI seq B	2N5153-O/B
2N5153-QR-EBC	QR208 gps A, B, C level E + QR209 sequence B Processed to CECC full assessment level E, Groups A, B, C with screening in accordance with CECC 50000 App VI seq B	2N5153-O/B

* Where space permits

8.2 BS and CV Processed Devices (Bipolar)

Semelab can also provide look alike devices against BS specifications. This can be carried out against any of the BS detail device specifications, including those where the original manufacturer has ceased production. Semelab can also supply old type CV devices which have been converted into the BS system.

Product is processed to the requirements of Group A (electrical) and Group B (mechanical and environmental) tests of BS detail device specifications. Parts processed in accordance with these specifications are marked with the suffix '-O' added to the original part number.

Screening can also be carried out against the BS sequences A,B,C,D if required

Ordering Information (example):

Part Number	Description	Marking (*)
BFT69-O	Requirements of BS9365-F005 Groups A & B	BFT69-O
BFT69-O-B	Requirements of BS9365-F005 Groups A & B with screening in accordance with BS sequence B	BFT69-O/B
CV7xxx-0	Requirements of BS 9300 Cxxx Groups A,B	CVxxx-O

* Where space permits

8.3 MIL-PRF-19500 Processed Discrete Semiconductors

QR205: 'Mil Processed' Full Quality Conformance Inspection (MIL-PRF-19500)

QR204: 'Mil Processed' Discrete Component Screening (MIL-PRF-19500)

SEMELAB's QR205 and QR204 processing specifications, in conjunction with the company's AQAP1 / ISO 9001 approval present a viable alternative to the American MIL approved parts from a European manufacturer.

Semelab QR205 (quality conformance) is based on the quality conformance inspection requirements of MIL-PRF-19500 groups A (table V), B (table VIb), C (table VII).

Semelab QR204 (screening options) is based on the screening options and requirements of MIL-PRF-19500 (table IV).

Full details of Semelab QR205 and QR204 are included in the following pages, showing sample sizes and test methods used.

All manufacture and processing is carried out on our approved High-Rel assembly line in our Lutterworth factory and product is released under the company's AQAP1 defence standard approval.

The table below shows part number examples and corresponding processing options and marking. The device marking will also contain the SEMELAB identifier (SML) plus the date code where space permits.

Ordering Information: (examples)

Part Number	Description	Marking (*)
2N2369-JQR	QR205 groups A,B	2N2369-JQR
2N2369-JQRB	QR205 groups A,B Screening to QR204 level B	2N2369-JQRB
2N2369-JQRA	QR205 groups A,B Screening to QR204 level A	2N2369-JQRA
2N2369-JQRS	Space Level – see section 8.4 (QR216 & QR217) QR217 groups A,B Screening to QR216	2N2369-JQRS

* Where space permits

MIL-PRF-19500 processed Discrete Semiconductors (continued)

8.3.1 'Mil Processed' Full Quality Conformance Inspection (ref: MIL-PRF-19500)

QR205: Group A - Electrical Tests

* small lot conformance

Subgroup	Description	LTPD	Sample*	Reject
1	Visual + mechanical Inspection	5	45	0
2	DC electrical tests at 25°C	5	45	0
3	DC electrical tests at maximum and minimum rated operating temperature	30	8	0
4	AC electrical tests at 25°C	30	8	0
5	Safe Operating Area (Power Transistors) a) DC b) Clamped Inductive c) Unclamped Inductive Endpoint electrical measurements	30	8	0

The specified parameters to be included in each subgroup shall be as per the detail specification. Where no parameters have been specified in a particular subgroup or test within a subgroup, no Group A testing is required for that subgroup or test to satisfy Group A requirements. A single sample may be used for all subgroup testing. These tests are considered non-destructive.

QR205: Group B - Short term Environmental & Endurance Tests * small lot conformance

Test	Note	MIL-STD-750 method	Condition	Sample*	Reject
Subgroup 1 Solderability Resistant to solvents	(1) (3)	2026 1022	Separate samples can be used for each test	4 leads 3 devices	1
Subgroup 2 Thermal shock (temperature cycling) hermetic seal (a) Fine Leak (b) Gross leak Electrical Measurements		1051 1071	No dwell is required at 25°C. Test condition C1 (25 cycles), temp extreme, ≥10 mins Test condition G or H. Max leak = 5×10^{-8} atm cc/s, (5×10^{-7} atm cc/s for <0.3cc)	6	0
Subgroup 3 Steady-state operation life or Intermittent operation life or Blocking life Electrical Measurements	(4)	1027 1037 -	340hrs at specified bias conditions As specified	12	0
Subgroup 4 Internal visual design verification	(5)	2075	Visual criteria in accordance with qualified design.	1	0
Subgroup 5 Thermal resistance		QA1023	As specified ref SEMELAB SPEC	6	0
Subgroup 6 High temperature life (non operating) Electrical Measurements		1032	340hrs high temperature storage As specified	12	0

MIL-PRF-19500 processed Discrete Semiconductors (continued)

QR205: Group C - Periodic Inspection (chargeable option on request) * small lot conformance

Test	note	MIL-STD-750 method	Condition	Sample *	Reject
Subgroup 1 Physical dimensions		2066	Dimensions per case outline specified	6	0
Subgroup 2 Thermal shock (glass strain) Terminal strength Hermetic seal (a) Fine Leak (b) Gross leak Moisture resistance Electrical Measurements		1056 2036 1071 1071 1021	Test condition A, except for devices > 10W at T=25 which is condition B As specified a) Test condition H. Max leak rate = 5×10^{-8} atm cc/s, (5×10^{-7} atm cc/s for internal cavity < 0.3cc) b) Test condition C Omit initial conditioning As specified	6	0
Subgroup 3 Shock Vibration (variable frequency) Constant acceleration Electrical Measurements	(4)	2016 2056 2006	Non-operating, 1500G, 0.5ms, 5 blows in each orientation, X1, Y1, Z1 1 minute min. in each orientation, X1, Y1, Z1 at 20000G min except at 10000G min if device $\geq 15W$ at $T_c=25^\circ C$ As specified	6	0
Subgroup 4 Salt atmosphere (corrosion)	(1)	1041		6	0
Subgroup 5 Thermal Resistance		3131 3161 3101,4081	As specified: Bipolar transistors MOSFETS Diodes	6	0
Subgroup 6 Steady-state operation life or Intermittent operation life or Blocking life Electrical Measurements		1026 1036	1000hrs at max operating junction temp As specified	12	0

- 1) Electrical reject devices from the same inspection lot may be used for all subgroups when electrical end point measurements are not required.
- 2) Post burn-in electrical rejects may be used.
- 3) The LTPD for solderability test applies to the number of leads inspected except in no case shall less than three devices be used to provide the number of leads required.
- 4) If a given inspection lot undergoing Group B inspection has been selected to satisfy Group C inspection requirements, the 340 hour life test may be continued to 1000 hours in order to satisfy the Group C life test requirements. In such cases, either the 340 hour end point measurements must be made as a basis for Group B lot acceptance or the 1000 hour end point measurement shall be used as the basis for both Group B and Group C acceptance.
- 5) Subgroup 4 may be omitted if the devices have been manufactured by Semelab as sample pre-cap visual inspection will have been performed.

MIL-PRF-19500 processed Discrete Semiconductors (continued)

8.3.2 'Mil Processed' Discrete Component Screening (ref: MIL-PRF-19500)

QR204: Discrete Component Screening (with reference to MIL-STD-750)

	Description	MIL-STD-750 method	Conditions	JQR-A	JQR-B
1	Internal Visual (Precap) Inspection	2069 2070 2072		100%	n/a
2	High temperature stabilisation bake	1032	24 hrs min at rated maximum storage temperature	100%	100%
3	Temperature Cycling	1051	20 cycles at -55°C to +175°C or max storage temp (whichever is lower) with minimum 10 minutes dwell time	100%	100%
4	Constant acceleration	2006	20,000G force in Y1axis for 1 min duration (see note 2)	100%	100%
5	Particle Impact Noise Detection (PIND)	2052			
6	Hermeticity				
	a) Fine	1071	Test condition H. Max leak rate = 5×10^{-8} atm cc/s, (5×10^{-7} atm cc/s for internal cavity <0.3cc)	100%	100%
	b) Gross	1071	Condition C	100%	100%
7	Device Serialisation				
8	Interim electrical			100%	100%
10	High temperature reverse bias				
	a) Bipolar	1039	Test Condition A		
	b) Power MOSFET	1042	Test Condition B	100%	100%
	c) Diodes	1038	Test Condition A		
11	Interim electrical		Group A (read & record)	100%	100%
12	Power burn-in				
	a) Bipolar	1039	Test Condition B - 160 hrs min		
	b) Power MOSFET	1042	Test Condition A - 160 hrs min		
	c) Diodes	1038	Test Condition B - 96 hrs min	100%	100%
	d) Case mounted Rectifiers	1038	Test Condition A - 48 hrs min		
13	Final electrical		Group A Read & Record +Drift check (1)	100%	100%
14	Radiographic tests (X-Ray)	2076			

Notes:

- 1) Group A end point tests are DC functional / parametric at 25°C (subgroup 2) of QR205.
- 2) 10000G force for devices with power rating >10 watts at T_c=25°C.
- 3) PDA (percentage defects allowable) is 10% between steps 9 & 11 and 11 & 13.

8.4 'Space Level Processed' Discrete Semiconductors.

QR217: 'Space Level' Full Quality Conformance Inspection.

QR216: 'Space Level' Discrete Component Screening

SEMELAB's QR217 and QR216 processing specifications, in conjunction with the company's AQAP1 / ISO 9001 approval present a viable alternative to American MIL-PRF-19500 space level parts supplied from a European manufacturer and ESA / ESCC 5000 space level parts.

QR217 (quality conformance) is based on the quality conformance inspection requirements of MIL-PRF-19500 groups A (table V), B (table VIa), C (table VII) and ESA / ESCC 5000 (chart F4) lot validation tests.

QR216 (screening) is based on the screening requirements of MIL-PRF-19500 (table IV) and ESA /ESCC 5000 (chart F3)

Details of QR217 and QR216 are included in the following pages.

All manufacture and processing is carried out on our approved High-Rel assembly line in our Lutterworth factory and product is released under our AQAP1 defence standard approval.

The 'standard' JQRS part is processed to the Semelab data sheet, screened to QR216 and has conformance testing to Q217 groups A and B. Additional options are available as shown below. These are chargeable and must be specified at order stage. The extensions on the Semelab part numbers used reflect these additional items.

Additional options available:

- | | |
|---------------------------------------|------------|
| 1) Customer Pre-Cap visual Inspection | (suffix P) |
| 2) Data Pack supplied | (suffix D) |
| 3) Group C tests | (suffix C) |

Ordering Information: (examples)

Part Number	Description	Marking (*)
2N2369-JQRS	QR217 groups A,B Screening to QR216	2N2369-JQRS
2N2369-JQRS-C	QR217 groups A,B and group C . Screening to QR216	2N2369-JQRS
2N2369-JQRS-CD	QR217 groups A,B and group C . Screening to QR216 with Data Pack	2N2369-JQRS
2N2369-JQRS-PCD	QR217 groups A,B and group C . Screening to QR216 with Customer Pre-cap Visual Inspection & Data Pack	2N2369-JQRS

* Where space permits

Notes:

- 1) 'Additional Options' (Customer Pre-Cap Visual Inspection, Group C's, Datapack) are chargeable and must be specified at order stage.
- 2) 'Additional Options' are reflected in the Semelab Part Number, but do not affect device marking.

'Space Level Processed' Discrete Semiconductors (continued)

8.4.1 QR217 'Space Level' Full Quality Conformance Inspection.

QR217: Group A - Electrical Tests

* small lot conformance

Subgroup	Description	Sample*	Reject
1	Visual + mechanical Inspection	20	0
2	DC electrical tests at 25°C	20	0
3	DC electrical tests at maximum and minimum rated operating temperature	8	0
4	AC electrical tests at 25°C	8	0
5	Safe Operating Area (Power Transistors) Endpoint electrical measurements	8	0

The specified parameters to be included in each subgroup shall be as per the Semelab Data Sheet. Where no parameters have been specified in a particular subgroup or test within a subgroup, no Group A testing is required for that subgroup or test to satisfy Group A requirements. A single sample may be used for all subgroup testing. These tests are considered non-destructive.

QR217: Group B - Short term Environmental & Endurance Tests * small lot conformance

Test	note	MIL-STD-750 method	Condition	Sample*	Reject
Subgroup 1 Physical Dimensions		2066	As per specification	8	0
Subgroup 2 Solderability Resistant to solvents	(3) (3)	2026 1022	Separate samples can be used for each test	6 devices	0
Subgroup 3 Thermal shock (temperature cycling) hermetic seal (a) Fine Leak (b) Gross leak Electrical Measurements		1051 1071	No dwell is required at 25°C. Test condition C1 (25 cycles), temp extreme, ≥10 mins (100 cycles covered by MIL883 group D programme) Test condition G or H. Max leak =5x10 ⁻⁸ atm cc/s, (5x10 ⁻⁷ atm cc/s for <0.3cc)	6	0
Subgroup 4 Steady-state operation life or Intermittent operation life or Blocking life Electrical Measurements Internal visual design verification bond strength	(4)	1027 1037 - 2075 2037	340hrs at specified bias conditions As specified Visual criteria in accordance with qualified design.	12 5 11 wires	0 0 0
Subgroup 5 Thermal resistance		QA1023	As specified - SEMELAB SPEC	6	0
Subgroup 6 High temperature life (non operating) Electrical Measurements		1032	340hrs high temperature storage As specified	12	0

See notes at bottom of group C table.

'Space Level Processed' Discrete Semiconductors (continued)

QR217: Group C - Periodic Inspection (chargeable option on request) * small lot conformance

Test	note	MIL-STD-750 method	Condition	Sample *	Reject
Subgroup 1 Physical dimensions		2066	Dimensions per case outline specified	6	0
Subgroup 2 & 3 Thermal shock (glass strain) Shock Vibration (variable frequency) Constant acceleration Hermetic seal (a) Fine Leak (b) Gross leak Moisture resistance Terminal strength Electrical Measurements		1056 2016 2056 2006 1071 1071 1021	Test condition A, except for devices > 10W at T=25 which is condition B Non-operating, 1500G, 0.5ms, 5 blows in each orientation, X1, Y1, Z1 1 minute min. in each orientation Y1 at 20000G min except at 10000G min if device $\geq 15W$ at $T_c=25^\circ C$ a) Test condition H. Max leak rate $=5 \times 10^{-8}$ atm cc/s, (5×10^{-7} atm cc/s for internal cavity <0.3cc) b) Test condition C Omit initial conditioning As specified As specified	6	0
Subgroup 4 Salt atmosphere (corrosion)	(2)	1041	Covered by MIL883 ongoing group D programme	6	0
Subgroup 5 Thermal Resistance		3131 3161 3101,4081	As specified: Bipolar transistors MOSFETS Diodes	6	0
Subgroup 6 Steady-state op lifen life or Intermittent operation life or Blocking life Electrical Measurements	(4)	1026 1036	1000hrs at max operating junction temp As specified	12	0
Subgroup 7 Internal Water Vapour	(2)		Covered by MIL883B ongoing Group D programme	3	0

- 1) Individual subgroups may be performed on representative parts from the same package family.
- 2) Electrical reject devices from the same inspection lot may be used for all subgroups when electrical end point measurements are not required.
- 3) Post burn-in electrical rejects may be used.
- 4) If a given inspection lot undergoing Group B inspection has been selected to satisfy Group C inspection requirements, the 340 hour life test may be continued to 1000 hours in order to satisfy the Group C life test requirements. In such cases, either the 340 hour end point measurements must be made as a basis for Group B lot acceptance or the 1000 hour end point measurement shall be used as the basis for both Group B and Group C acceptance.

'Space Level Processed' Discrete Semiconductors (continued)

8.4.2 QR216: 'Space Level' Discrete Component Screening

QR216: Discrete Component Screening (with reference to MIL-STD-750)

	Description	MIL-STD-750 method	Conditions	JQR-S
1	Internal Visual (Pre-cap) Inspection	2069, 2070 2072		100%
2	Customer Pre Cap Visual Inspection	2069, 2070 2072	Customer specified option (chargeable)	100%
3	High temperature stabilisation bake	1032	24 hrs min at rated maximum storage temperature	100%
4	Temperature Cycling	1051	20 cycles at -55°C to +175°C or max storage temp (whichever is lower) with minimum 10 minutes dwell time	100%
5	Constant acceleration	2006	20,000G force in Y1axis for 1 min duration (see note 2)	100%
6	Particle Impact Noise Detection (PIND)	2052	(full yielded quantity)	100%
7	Device Serialisation			
8	Interim electrical		Read & Record	100%
9	High temperature reverse bias			100%
	a) Bipolar	1039	Test Condition A	
	b) Power MOSFET	1042	Test Condition B	
	c) Diodes	1038	Test Condition A	
10	Interim electrical (note 3)		Read & Record, Drift Check	100%
11	Power burn-in			100%
	a) Bipolar	1039	Test Condition B - 240 hrs min	
	b) Power MOSFET	1042	Test Condition A - 240 hrs min	
	c) Diodes	1038	Test Condition B - 240 hrs min	
12	Final electricals (note 3)		Read & Record, Drift check (1)	100%
13	a) Hermeticity - Fine	1071	Test condition H. Max leak rate = 5×10^{-8} atm cc/s, (5×10^{-7} atm cc/s for internal cavity <0.3cc)	100%
	b) Hermeticity - Gross	1071	Condition C	100%
14	Radiographic tests (X-Ray)	2076	(May be performed at any time after serialization)	100%
15	External Visual Inspection	2071		

Notes:

- 1) Group A end point tests are DC functional / parametric at 25°C (subgroup 2) of QR217.
- 2) 10000G force for devices with power rating >10 watts at T_c=25°C.
- 3) PDA (percentage defects allowable) is 10% between steps 8 & 10 and 10 & 12.

'Space Level Processed' Discrete Semiconductors (continued)

8.4.3 Comparison of Space Level die lot approval procedures.

The table below shows a comparison of operations carried out for die approval within the generic approval systems (MIL-PRF-19500 space level and ESA / ESCC 5000. It must be noted that SEM and RHA total dose evaluation are options only available within MIL-PRF-19500 and ESA / ESCC 5000. SEM and RHA total dose evaluation are not available within the Semelab JQR-S processing options. If SEM and/or RHA total dose evaluation are required then the ESE / ESCC 5000 procedures must be followed – see section 7 – ESA / ESCC Space level products.

Space Level/ Die Lot Acceptance Table

Die Lot Acceptance	GENERIC		SML
	ESCC	JANS	JQR-S
Selected Wafer	●	●	●
Probe Test (100%)	●	●	●
Glassivation / Metalisation Inspection	●	●	●
Visual Inspection (100%)	●	●	●
Sample Assembly (10 pcs)	●	●	●
Stabilization	●	●	●
Temperature Cycling	●	●	●
Electrical Test (read/record)	●	●	●
HTRB	●	●	●
Electrical Test (read/record)	●	●	●
Steady State Life (1000 hrs)	●	●	●
Electrical Test (read/record)	●	●	●
Wire Bond Evaluation	●	●	●
Die Shear Evaluation	●	●	●
SEM	OPT	OPT	-
RHA Total Dose Evaluation	OPT	OPT	-

Die Lot Acceptance Table

8.5 'MIL883B Processed' Integrated Circuits

QR215: 'MIL Processed /883B' Full Quality Conformance Inspection for Linear Integrated Circuits A and B, C and D optional)

QR214: 'MIL Processed /883B' Linear Integrated Circuit Component Screening

Semelab's QR214 and QR215 are based on MIL-STD-883E, METHOD 5005 quality conformance, inspection requirements and METHOD 5004 screening methods.

Semelab QR215 (quality conformance) covers the control procedures for group A (electrical), group B (environmental), group C (die related) and group D (package related) tests. It is based on METHOD 5005 conformance procedures and MIL-STD-883E test methods

Semelab QR214 (screening) is based on METHOD 5004 screening procedures and MIL-STD-883E test methods.

Ordering Information:

Devices screened in accordance with Semelab QR214 and QR215 are identified using the standard product part number with the addition of the suffix "-8QRB".

Example: LM117H built and screened to the MIL883B flows Method 5005 and Method 5004 in accordance with QR214 and QR215 is: LM117H-8QRB

Device Marking:-

xxx-8QRB for products equivalent to MIL883B parts - e.g. LM117H-8QRB + SML + DC

8.6 Customer Specifications

SEMELAB is also able to offer release on all parts manufactured in accordance with customers own 'in-house' or national specifications. Both lot acceptance and screening options can be met. Manufacturing is carried out to many customers' special requirements for the UK, Europe, USA and elsewhere.

Ordering Information:-

Customer part number and specification

8.7 Data Sheets

Many products can be processed in accordance with the original manufacturer's data sheets (JEDEC or PRO-ELETRON registered). Product can be supplied with fully traceable Certificate of Conformity under SEMELAB's company AQAP1 / ISO 9001 approval. This can be also be done in cases where the original supplier has ceased production.

Ordering Information:-

2N5000 with AQAP1 / ISO 9001 release ordered as follows: 2N5000.MOD

9. Comparison of Screening Options (Discrete Devices)

9.1 Comparison of High-Rel Screening Options (Discrete Devices)

The table below shows the comparison of screening options available within the CECC, BS and MIL approvals. Comparison is also shown with Semelab's in-house QR204 options.

	CECC / QR209				BS 9300				QR204		MIL	
	A	B	C	D	A	B	C	D	JQRA	JQRB	JAN* TXV	JAN* TX
Pre-cap Visual	●				●	●			●		●	
High Temp Storage	●	●	●		●	●	●		●	●	●	●
Temperature Cycle	5 cycles	5 cycles	5 cycles		10 cycles	10 cycles	10 cycles		20 cycles	20 cycles	20 cycles	20 cycles
Constant Acceleration	●	●	●		●	●	●		●	●	●	●
Particle impact noise detection (PIND)												
Fine Leak test	●	●	●		●	●	●		●	●	●	●
Gross Leak Test	●	●	●		●	●	●		●	●	●	●
Device Serialisation												
Variables Electrical test	●				●				±	±	±	±
Attributes Electrical tests		●		●		●	●	●	●	●	●	●
Burn-In (HTRB)	168 hrs*	72 hrs*		48 hrs*	160 hrs*	72 hrs*	48 hrs*	48 hrs*	○	○	○	○
Variables Electrical test									±	±	±	±
Attributes Electrical tests									●	●	●	●
Burn-In (Power)	168 hrs*	72 hrs*		48 hrs*	160 hrs*	72 hrs*	48 hrs*	48 hrs*	160 hrs	160 hrs	160 hrs	160 hrs
Variables Electrical test	●				●				±	±	±	±
Attributes Electrical tests		●	●	●		●	●	●	●	●	●	●
Radiographic tests					●							

- Test Performed
- ± Test Performed if required by device detail specification
- 24 hours for PNP devices. 48 hours for NPN devices
- * High Temp Reverse Bias for Case rated devices
Power Burn-in for Ambient rated Devices

CECC / QR209 : Screening carried out in accordance with CECC 50000 Appendix 6
 BS : Screening carried out in accordance with BS9300 section 1.2.10
 QR216 : Screening carried out in accordance with Semelab QR216
 QR204 : Screening carried out in accordance with Semelab QR204
 MIL : Screening carried out in accordance with MIL-PRF-19500 (Table 2)

* full JANTX, JANTXV not available from Semelab

Comparison of Screening Options (Discrete Devices) (continued)

9.2 Comparison of Space Level Screening Options

Space Level Flow Comparison Table Screening	GENERIC		QR216
	ESCC	JANS*	JQRS
Pre-cap Visual	●	●	●
Customer pre-cap Visual	OPT	OPT	OPT
High Temp Storage (Stabilization Bake)	24 hrs	24 hrs	24hrs
Temperature cycling	20 cycles	20 cycles	20 cycles
Thermal impedance	OPT	○	-
Constant Acceleration	■	●	●
PIND	●	●	●
Fine/Gross Leak	●	●	●
Serialization	●	●	●
Interim Electrical Measurements	-	-	-
Interim Electrical Measurements (Read and Record / Drift)	●	●	●
HTRB	●	●	●
Electrical Measurements	-	-	-
Parametric Drift measurements (Read and Record / Drift)	●	●	●
Burn-In	min 168 hrs max 264 hrs	240 hrs	240hrs
Electrical Measurements	-	-	-
Parameter Drift Measurements (Read and Record)	●	●	●
PDA Calculations	●	●	●
Read and Record Test Data	●	●	●
Other Electrical Parameters (Temp, Dynamic)	●	●	●
Fine/Gross Leak	●	●	●
Radiography	●	●	●
External Visual Inspection	●	●	●

*JANS part not available from Semelab.

- Notes:**
- if specified in detail specification.
 - not specified in ESCC 5000 iss 3, but performed by Semelab.

Part number search for devices beginning "IRF9130SMD05DSG"

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Fet Devices

PRODUCT	Status	Screening options available	Polarity	Package	V _{DSS} (V)	I _{D(cont)} (A)	P _D (W)	R _{DSS} (Ω)	C _{ISS} (pF)	Q _G (nC)
IRF9130SMD05DSG		✓	P-Channel	SMD0.5 (TO276AA)	100V	11A	45W	0.3Ω	860pF	29nC

SCREENING OPTIONS AVAILABILITY

(including CECC, MIL-PRF-19500, BS)

 symbol indicates that screening options are available for this device.
 For device-specific screening options and order information, click the relevant  symbol.
 For more information on Screening options, [visit the Screening Homepage](#).

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Part number search for devices beginning "IRF9130SMD05"

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Fet Devices

PRODUCT	Status	Screening options available	Polarity	Package	V _{DSS} (V)	I _{D(cont)} (A)	P _D (W)	R _{DSS} (Ω)	C _{ISS} (pF)	Q _G (nC)
IRF9130SMD05		✓	P-Channel	SMD0.5 (TO276AA)	100V	11A	45W	0.3Ω	860pF	29nC
IRF9130SMD05DGS		✓	P-Channel	SMD0.5 (TO276AA)	100V	11A	45W	0.3Ω	860pF	29nC
IRF9130SMD05DSG		✓	P-Channel	SMD0.5 (TO276AA)	100V	11A	45W	0.3Ω	860pF	29nC

SCREENING OPTIONS AVAILABILITY

(including CECC, MIL-PRF-19500, BS)

 symbol indicates that screening options are available for this device.
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