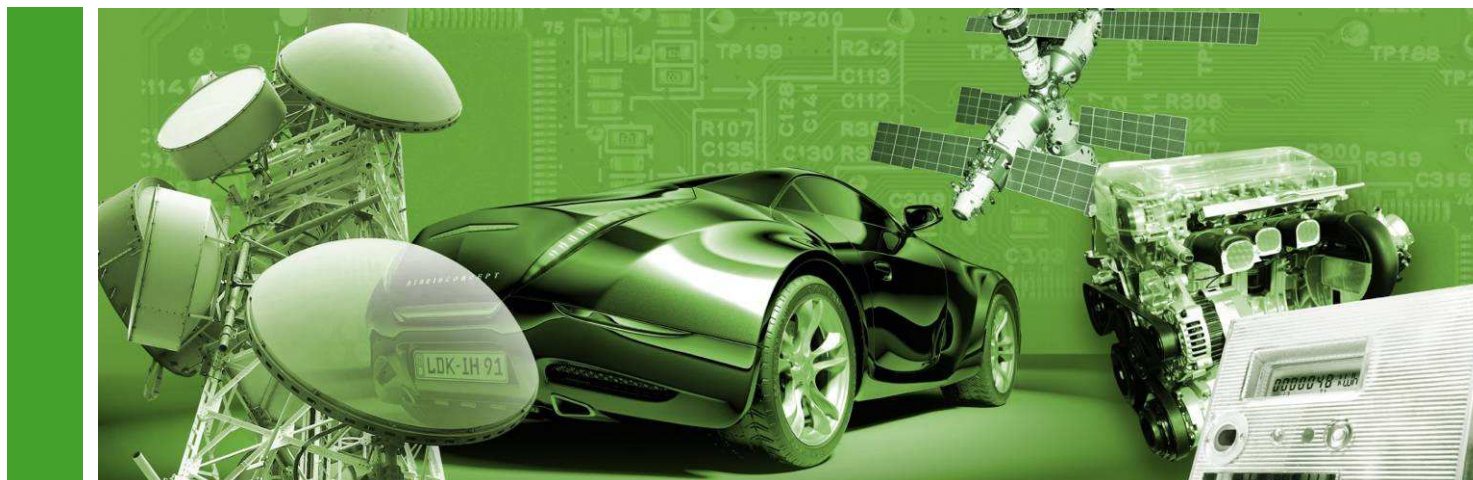


(Almost Hi-rel) Mass production SMD resistor components for NewSpace applications

ACCEDE
COTS2019

SEVILLE - SPAIN | 11-14 NOVEMBER



ISA-SPACE @ ACCEDE COTS 2019

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Contacts

ISABELLENHÜTTE HEUSLER GMBH & CO. KG

Isabellenhütte Heusler GmbH & Co. KG

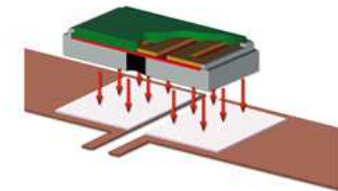
- First company documentary mention in 1482
- Today leading manufacturer for precision alloys, precision and power resistors and precision measurement devices
- Family-owned in the 9th generation
- Company turnover (2018): 170.2 Mil. EUR
- Employees (2018): 950
- 3 international subsidiaries (USA, China, Japan)
- ISO DIN 9001
- IATF 16949
- ISO 14001



Headquarters in Dillenburg, Germany

ESCC Detail Specification 4001/027

Variant	01/02/03	04/05/06
Rated power	up to 3.0W	up to 3.0W
Size(s)	2010/2512/2817	2010/2512/2817
Resistance values	0.01Ω - 2.0Ω	0.005Ω - 0.009Ω
Tolerance	0.5%; 1.0%	0.5%; 1.0%



TC-Specification:

DERIVED FROM AUTOMOTIVE COMPONENTS

Part numbers:

Acc. to ESCC ESCC400102701R10F

Isabellenhütte SMP-R100-1.0-PW

ESCC Detail Specification 4001/028

Variant	02
Rated power	SMV-PW / 3.0W
Size	4723
Resistance values	0.0022Ω - 1.0Ω
Tolerance	0.5%; 1.0%



TC-Specification:

-55°C to +22°C

+22°C to +140°C

+22°C to +60°C

**DERIVED FROM AUTOMOTIVE
COMPONENTS**

-110 ±0 ppm/K

±60 ppm/K

±50 ppm/K (R < 0.01Ω); ±30 ppm/K (R ≥ 0.01Ω)

Part numbers:

Acc. to ESCC ESCC400102802R005F

Isabellenhütte SMV-R005-1.0-PW

ESCC vs. AEC-Q200

- EEE-components are validated periodically in 24/12-months sequences (LVT acc. to Chart F4); each production lot of an individual EEE-component is tested for compliance of critical properties during the course of the EEE-conversion process (LAT acc. to Chart F3)
- AEC-Q200 qualified components resp. the qualified part's series are validated periodically in a 24-months sequence. Due to reasons for cost and approval efficiency these qualification are limited to a few values representing the whole part's series.

So what is the true „Space“-capability of Isabellenhütte SMD components?

ESCC vs. AEC-Q200 – Comparison of the qualifications

EEE-components IH			AEC-Q200		
LVT	LVT1	Test	Test#	Standard	IH
(Environmental / Mechanical sub-group; 2 years)					
Rapid change of temperature		30min T _{max} 30min T _{min} 10 cycles	S4 Temp. cycling	<30min -55°C <30min 125°C 1000 cycles	30min -55°C 30min +150°C 2000 cycles
Vibration		10....2000Hz Ampl. 1.5mm / 200 m/s ² 10 cycles XYZ	S14	10....2000Hz Ampl. 50 m/s ² 4 cycles XYZ	10....2000Hz Ampl. 200 m/s ² 12 cycles XYZ
Resistance to soldering heat		+260°C / 5s	S15A	+260°C / 10s	8h steam aging +260°C / 10s
Climatic sequence					
Dry Heat	2h T _{max} , 4h Auskühlen		(S3 high temp. Storage)	2000h / 125°C	2000h / 170°C
Damp Heat1	24h bei 40°C		x		
Cold Test	1h T _{min} , 45min Nennlast, 4h acclimatising		(S5 low temp. Storage)	25h / -65°C	25h / -65°C
Damp Heat2	5 x 24h bei 40°C		x		

ESCC vs. AEC-Q200 – Comparison of the qualifications

EEE-components IH			AEC-Q200		
LVT	LVT2	Test	Test#	Standard	IH
(Endurance sub-group; annually)					
Operating Life		1.5h rat. power 0.5h no load 2000h	S8	rat. power max. T _{amb} 2000h	rat. power max. T _{terminal} 2000h
LVT	LVT3	Test	Test#	Standard	IH
(Assembly Capability sub-group; annually)					
Solderability		2s / +235°C Solder bath methode	S18b	2s / +235°C Solder bath methode	5 – 7s / 215 – 260°C Solder bath methode

ESCC vs. AEC-Q200 – Comparison of the qualifications

EEE-components IH		AEC-Q200		
LAT	Test	Test#	Standard	IH
(each prod. lot, during EEE-conversion)		(2 years, related to part's series)		
Overload	5s / 5-times rat. power	x		
Burn-in	1.5h rat. power 0.5h no load max. T _{terminal} 168h	(S3) (S8)		2000h / 170°C rat. power max. T _{terminal} 2000h
Temperature coefficient rating	TCR22...170 TCR22...-55 TCR22...60	S19		TCR20...60
Resistance value @ room temp.		S1		100% automated
Visual inspection		S9 ext. Visual S10 dimension		100% automated

ESCC vs. AEC-Q200 – Provisional results

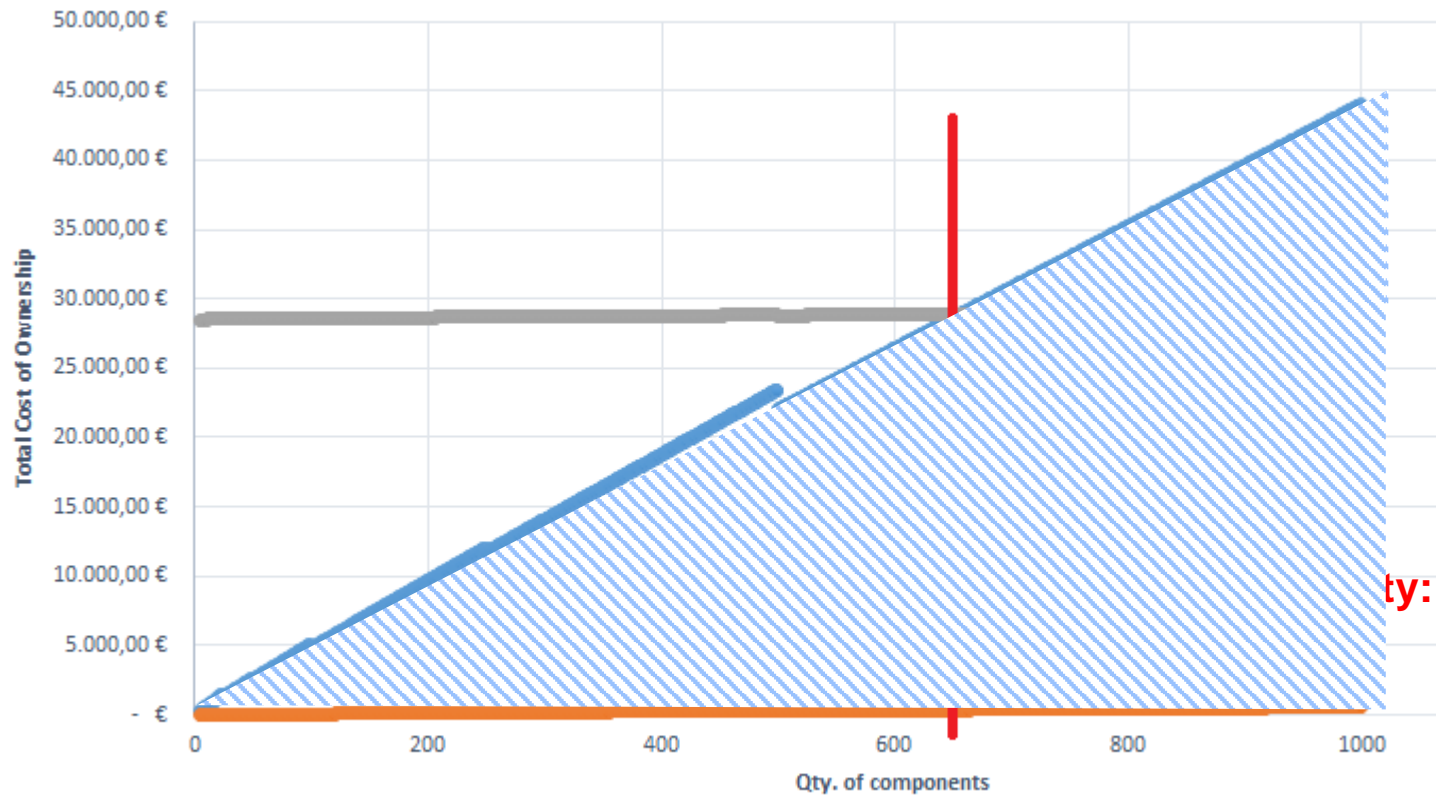
- Standard-components (AEC-Q200) of Isabellenhütte do not have an inferior standing compared to the EEE-components in regards to the 24-months-requalification
- Some of the AEC-Q200 tests are performed at more demanding requirements
- Application-critical properties are checked with every single production lot of an EEE-component (LAT) → main distinctive feature (along with the SnPb-plated terminals) to the standard-components

Missing resp. updated qualification data of the AEC-Q200 components, as well as LAT data applied to individual production lots can be provided on demand!

Up-to-date AEC-Q200 qualification data of standard Isabellenhütte components can be made available at no cost!

ESCC vs. AEC-Q200 – TCO example

- TCO comparison of an EEE-component (ESCC400102702R01F) versus its Automotive „brother“ SMS-R010-1.0 with up-screening support (+LAT, +LVT2)



ty:

ESCC vs. AEC-Q200 – Final results

- Standard-components (AEC-Q200) of Isabellenhütte do not have an inferior standing compared to the EEE-components in regards to the 24-months-requalification
- Some of the AEC-Q200 tests are performed at more demanding requirements
- Application-critical properties are checked with every single production lot of an EEE-component (LAT) → main distinctive feature (along with the SnPb-plated terminals) to the standard-components
- Standard-components with up-screening will become more cost-effective as of a certain volume. High cost-saving potential on component level for higher quantities, e.g. > 70% @ 2500 pcs
- Up-screening for risk mitigation can be done on the full Isabellenhütte portfolio of mass-production components

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Thanks for your attention!

ISABELLENHÜTTE HEUSLER GMBH & CO. KG