Infineon HiRel

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Securing the supply of European Space Parts
New ESCC Qualified Components

ESCCON 2013

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Never stop thinking

Content

- HiRel Introduction — Infineon Space business
- Radiation Hard PowerMOS — ESCC Qualified!
- Micro Wave Transistors — ESCC Qualified!
- Technical Overview — Complete Product list

Never stop thinking

High Reliability (HiRel)
Semiconductor Solutions from Infineon

Some applications need a high level of reliability!

Infineon is an expert in handling special requirements and has an excellent reputation in the space community for over 40 years!

- HiRel devices are used in communication equipment and power supplies for Aerospace and Avionic Equipment
- Key to outstanding performance is assembly of qualified standard dies in hermetically sealed packages using HiRel assembly techniques
- The product range covers MW-Transistors, Diodes and PIN–Diodes as well as monolithic microwave integrated circuits (MMIC) and Radiation Hard Power MOS Transistor
- **Link to webpage: www.infineon.com/hirel**

High Reliability (HiRel)
Production Sites and HiRel support

HiRel Department: Building 12
Assembly & Screening

Technology Development: Villach, Regensburg & Campeon

Marketing, Quality: Building 6

Product Development: Building 6

Reliability: Building 10

Wafer Fab: Villach

Wafer Fab: Regensburg

Radiation Hard PowerMOS
New HiRel devices from Infineon

Target applications (drop in for existing products):

- Buck-Boost converters
- DC/DC or switch mode converters
- Motor Controls

Radiation-hardened:

- TID up to 100krad (300kRad on request)
- SEE up to LET 55@90µm (Xe) and LET38@279µm (Xe)
  NASA tested up to LET85@118µm (Au)

Datasheet available at:

WWW.Infineon.com/RadHardMOS

Devices also available as qualified bare die (chip) on request

Type	ESCC Reference	RDSon	IDC	Umax	Package
BUY25CS12J-01	5205/026	100mOhm	12A	250V	SMD0.5
BUY10CS12J-01	5205/028	100mOhm	12A	100V	SMD0.5
BUY25CS54A-01	5205/027	20mOhm	54A	250V	SMD2

Radiation Hard PowerMOS
ESA Qualification

european space agency
agence spatiale européenne

Certificate of Qualification No. 319

This is to certify that INFINEON Technologies AG, Neubiberg, Germany has been qualified by ESA for the supply of Transistors, Power, MOSFET, N-Channel, Based on Type BUY**CS*** for use in ESA space programmes, according to ESCC Generic Specification 5000 and associated Detail Specifications 5205/026, 5205/027 and 5205/028 as recommended by the Space Components Steering Board.

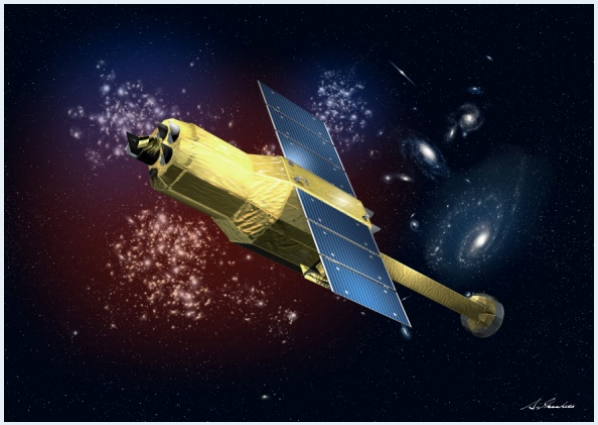
This certificate is valid until August 2014.

Head of the Product Assurance
and Safety Department

Date
21 August 2012

SPONSORED BY: DLR SPONSORED BY:

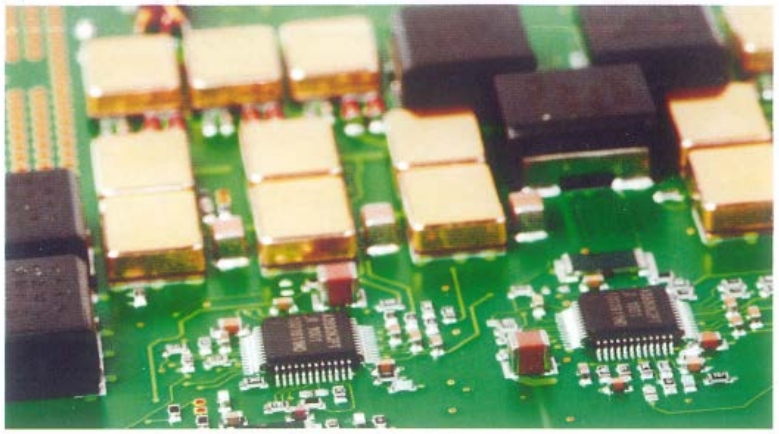
Radiation Hard PowerMOS
Design in's



Satellite ASTRO-H launch in 2013

Satellite Hayabusa II launch in 2014

PowerMOS included in Mobil Asteroid Surface Scout (Mascot)



MOSFET:
development of power transistors for space applications

The printed circuit board equipped with MOSFET power transistors (Metal-Oxide Semiconductor Field Effect Transistors) shown at the ILA is a component of the Mobile Asteroid Surface Scout. This is part of a small lander package on board the Japanese craft Hayabusa II, which is scheduled to take off for the asteroid 1993 JU3 at end of 2014.

DLR has successfully qualified power transistors made in Germany for use in space. A particularly critical item was optimising their resistance to cosmic radiation and its disruptive effects. Until now, these components had to be procured from the USA at some expense. This will be changed in the near future by the DLR quality and product assurance department in collaboration with the chip manufacturer Infineon.

Halle 4, Stand 4301, Exponat Nr. *Hall 4, Booth No. 4301, Exhibit No.* 05

Radiation Hard PowerMOS

Comparison of Infineon 250V types with competition 250V and 200V types

BUY25CS12J – SMD05

	IR R5	IR R6	IR R5	IR R6	Infineon
	2N7487U3	IRHNJ67234	2N7486U3	IRHNJ67230	BUY25CS12J
B_{VDSS} (V) @25°C	250	250	200	200	250
$R_{DS(on)}$ (mOhm) max@25°C	**400**	**210**	**220**	**130**	**130**
$R_{DS(on)}$ (mOhm) @125°C	750		462		300
Q_G (nC)	28	40	35	42	42
$R_{DS(on)}$ *Q_G (Ohm*nC)	11,2	8,4	7,7	5,46	5,46
I_D(A) @25°C	10	12.	12	16	12
I_{DM} (A)	40	49.7	48	64	50
P_D (W)	75	75	75	75	75
SOA (A) @10ms, 80%V	ca. 0.25	ca. 0.22	ca. 0.3	ca. 0.25	ca. 0.25
E_{AS} (mJ)	58	56	60	60	60

BUY25CS54A – SMD2

	IR R5	IR R6	IR R5	IR R6	Infineon
	IRHNA57264 (2N7474U2)	IRHNA67264	IRHNA57260 (2N7473U2)	IRHNA67260	BUY25CS54A
B_{VDSS} (V) @25°C	250	250	200	200	250
$R_{DS(on)}$ (mOhm) max@25°C	**60**	**40**	38	28	**30**
$R_{DS(on)}$ (mOhm) @125°C	126		80		70
Q_G (nC)	165	220	155	240	180
$R_{DS(on)}$ *Q_G (Ohm*nC)	9,9	8,8	5,89	6,72	5,4
I_D(A) @25°C	45	50	53.3	56	54
I_{DM} (A)	180	200	214	224	214
P_D (W)	250	250	250	250	250
SOA (A) @10ms, 80%V	ca. 0.5	ca. 0.35	ca. 0.7	ca. 0.6	ca. 0.5
E_{AS} (mJ)	222	240	380	268	380

Infineon 250V type clearly outperforms competition 250V types!
Infineon 250V type can cope with the competition 200V types!

MW Transistor
HiRel devices for communication BFY640/650B

- BFY640 Micro-Wave high-end **low noise** transistor with space heritage.
- BFY650B Micro-Wave high-end **power** transistor
- Generated out of Infineon standard device which are widely used eg. in smart phones
- Package MicroX
- Devices also available as FM qualified bare dies

Technical Features BFY640:

- Maximum stable gain: > 24dB @ 1,8 GHz
- Very low noise figure: < 0,8dB @ 1,8 GHz
- fT typ: > 40 GHz

Technical Features BFY650B:

- IC max: 150mA
- fT typ: > 42 GHz

MW Transistor
HiRel devices for communication BFY740B

- Micro-Wave high-end low noise transistors
- Generated out of Infineon standard transistor which are widely used eg. in Smartphones
- Using Infineon's latest SiGe:C technology
- Package MicroX
- Devices also available as FM qualified bare dies

Technical Features:

- Maximum stable gain: > 17 dB @ 6,0 GHz
- Very low noise figure: < 1,15 dB @ 6,0 GHz
- fT typ: > 42GHz

MW Transistors
ESA Qualification

european space agency
agence spatiale européenne

Certificate of Qualification No. 322

This is to certify that Infineon Technologies AG, Neubiberg, Germany has been qualified by ESA for the supply of Transistors, Microwave, Small Signal, Bipolar, based on Type BFY 740B for use in ESA space programmes, according to ESCC Generic Specification 5010 and associated Detail Specification 5611/011 as recommended by the Space Components Steering Board.

This certificate is valid until September 2014.

Head of the Product Assurance
and Safety Department

Date
25 September 2012

SPONSORED BY: DLR SPONSORED BY:

Infineon HiRel RH Roadmap
RadHard PowerMOS

250V,
54 & 12A
SMD2 &05

Leaded Packages
TO254AA & TO257AA

250V,
45A & 12A
TO254 & 257

80V Technology

150V Technology

P-Channel 150V

600V Technology

Small Chip

2012 | 2013 | 2014 | 2015 | 2016

available | in development | new idea

Infineon HiRel Products
Technical overview

HiRel Rad-Hard PowerMOS Transistors

Product Type	Package	V DS (max)	RDS(ON) (typ)	QG	ID (max)	Idpuls (max)	Ptot (max)	VGS (max)	ESA QPL
BUY25CS54A-01 (ql)	SMD2	250V	25mOhm	180nC	54A	210.0A	250 W	+/- 20 V	Yes
BUY25CS12J-01 (ql)	SMD0.5	250V	100mOhm	42nC	12,4A	50.0A	75 W	+/- 20 V	Yes
BUY10CS12J-01 (ql)	SMD0.5	100V	100mOhm	42nC	12,4A	50 A	75 W	+/- 20 V	Yes

HiRel GaAs Microwave Devices

Product Type	Package	VDS (min)	IDS (max)	NF(typ)@12GHz	ESA QPL
CFY67-08 (ql)	Micro-X	3.5 V	60.0 mA	0.7 dB	Yes
CFY67-08P (ql)	Micro-X	3.5 V	60.0 mA	0.7 dB	Yes
CFY67-10 (ql)	Micro-X	3.5 V	60.0 mA	0.9 dB	Yes
CFY67-10P (ql)	Micro-X	3.5 V	60.0 mA	0.9 dB	Yes
CGY41 (ql)	Micro-X	5.5 V	60.0 mA	-	No
T405C (ql)	Chip for (CGY41)	-	-	-	No
T409C (ql)	Chip for (CFY67)	-	-	-	n.a.

HiRel Silicon Diodes

Product Type	Package	VBR (min)	IF (max)	rF (typ)	τ (typ)	CT (max)	ESA QPL
BAS40-T1 (ql)	T1	40.0 V	120 mA	10.0 Ohm	-	5.0 pF	Yes
BAS70-T1 (ql)	T1	70.0 V	120 mA	9.0 Ohm	-	1.5 pF	Yes
BAY6642 (ql)	HSL2	100.0 V	500 mA	-	3.7 ns	2.5 pF	Yes
BXY42-T1 (ql)	T1	50.0 V	5000 mA	1.0 Ohm	50 ns	0.24 pF	Yes
BXY43-T1 (ql)	T1	150.0 V	400 mA	0.9 Ohm	600 ns	0.3 pF	Yes
BXY43-T1 (ql)	T1	150.0 V	400 mA	0.9 Ohm	900 ns	0.3 pF	Yes
D309 (ql)	Chip for (BXY42)	-	-	-	-	-	n.a.

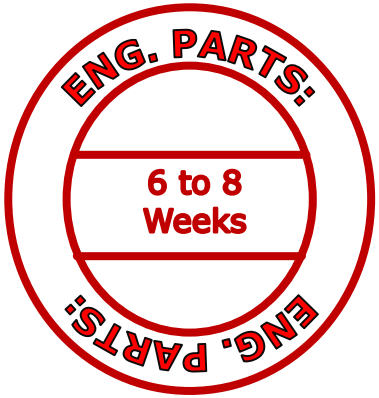
Infineon HiRel Products
Technical overview

HiRel Silicon Bipolar Transistors

Product Type	Package	VCEO (max)	IC (max)	Ptot (max)	fT (typ)	NF (typ) [dB]	ESA QPL
BFY181 (ql)	Micro-X	12.0 V	20.0 mA	175.0 mW	8.0 GHz	2.5 @ 2.0 GHz	Yes
BFY182 (ql)	Micro-X	12.0 V	35.0 mA	250.0 mW	8.0 GHz	2.5 @ 2.0 GHz	Yes
BFY183 (ql)	Micro-X	12.0 V	65.0 mA	450.0 mW	8.0 GHz	2.5 @ 2.0 GHz	Yes
BFY193C (ql)	Micro-X	12.0 V	80.0 mA	580.0 mW	8.0 GHz	2.5 @ 2.0 GHz	Yes
BFY196 (ql)	Micro-X	12.0 V	100.0 mA	700.0 mW	6.5 GHz	3.2 @ 2.0 GHz	Yes
BFY405 (ql)	Micro-X	4.5 V	12.0 mA	55.0 mW	22 GHz	1.2 @ 1.8 Ghz	Yes
BFY420 (ql)	Micro-X	4.5 V	35.0 mA	160.0 mW	22 GHz	1.2 @ 1.8 Ghz	Yes
BFY450 (ql)	Micro-X	4.5 V	100.0 mA	450.0 mW	22 GHz	1.4 @ 1.8 Ghz	Yes
BFY640-04 (ql)	Micro-X	4.0 V	50.0 mA	200.0 mW	40 GHz	0.7 @ 1.8 Ghz	Yes
BFY650B-11 (ql)	Micro-X	4.0 V	150.mA	600.0 mW	40 GHz	0.9 @ 1.8 Ghz	Yes
BFY740B-01 (ql)	Micro-X	4.0 V	30.0 mA	120.0 mW	42 GHz	0.9 @ 6.0 Ghz	Yes
T359C (ql)	Chip for (BFY193C)	-	-	-	-	-	n.a.
T395 (ql)	Chip for (BFY196)	-	-	-	-	-	n.a.
T502 (ql)	Chip for (BFY420)	-	-	-	-	-	n.a.
T503 (ql)	Chip for (BFY450)	-	-	-	-	-	n.a.

ql = quality levels

Standard lead-times:



Infineon HiRel Products
Experience with Agency funded Projects

In every Project there are ups and downs!

But as a Team we can manage!

To secure the supply of European Space Parts!

ENERGY EFFICIENCY
MOBILITY
SECURITY

Innovative semiconductor solutions for energy efficiency, mobility and security.