BAR90-02EL

Single silicon RF PIN diode

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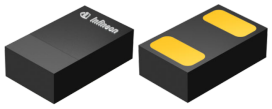
Product description

This Infineon RF PIN diode provides high-voltage handling capabilities and comes with low loss and low distortion levels. Its low forward resistance, low capacitance and low inductance simplify design and support designers in creating smaller and lighter end-solutions.



Feature list

- Very low capacitance C = 0.23 pF (typical) at voltage V_R = 0 V and frequency f = 1 GHz
- Low forward resistance R_F = 1.6 Ω (typical) at I_F = 3 mA and frequency f = 100 MHz
- Balanced ON / OFF harmonic distortion
- TSLP-2-19 package (1 mm x 0.6 mm x 0.31 mm) with a 0402 foot print
- Pb-free, RoHS compliant and halogen-free

Product validation

Qualified for industrial applications according to the relevant tests of JEDEC47/20/22.

Potential applications

Optimized for low bias current RF and high-speed interface switches in:

- Set-top boxes, digital media players
- Laptops and desktop PCs

Device information

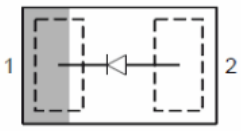


Table 1 Part information

Product name / Ordering code	Package	Pin configuration	Marking	Pieces / Reel
BAR90-02EL / BAR9002ELE6327XTMA1	TSLP-2-19	Single, leadless	X	15 k

Attention: ESD (Electrostatic discharge) sensitive device, observe handling precautions!

Table of contents

1 Absolute maximum ratings

Table 2 Absolute maximum ratings at T_A = 25 °C, unless otherwise specified

Parameter	Symbol	Values		Unit	Note or test condition
		Min.	Max.		
Diode reverse voltage	V_R	–	80	V	
Forward current	I_F	–	100	mA	
Total power dissipation	P_{TOT}	–	250	mW	$T_S \leq 133$ °C [1)]
Junction temperature	T_J	–	150	°C	
Operating temperature	T_{OP}	-55	125		
Storage temperature	T_{STG}	-55	150		

Attention: ***Stresses above the maximum values listed here may cause permanent damage to the device. Exposure to absolute maximum rating conditions for extended periods may affect device reliability. Exceeding only one of these values may cause irreversible damage to the component.***

1 T_S is the soldering point temperature.

2 Electrical performance in test fixture

2.1 DC characteristics

At T_A = 25 °C, unless otherwise specified

Table 3 DC characteristics

Parameter	Symbol	Values			Unit	Note or test condition
		Min.	Typ.	Max.		
Breakdown voltage	V_{BR}	80	–	–	V	I_{BR} = 5 µA
Reverse current	I_R	–	–	50	nA	V_R = 60 V
Forward voltage	V_F	0.75	0.79	0.87	V	I_F = 3 mA
		0.82	0.91	1		I_F = 100 mA
I-region width	W_I	–	20	–	µm	
Charge carrier lifetime	τ_{rr}	–	750	–	ns	I_F = 10 mA, I_R = 6 mA, measured at I_R = 3 mA, R_L = 100 Ω

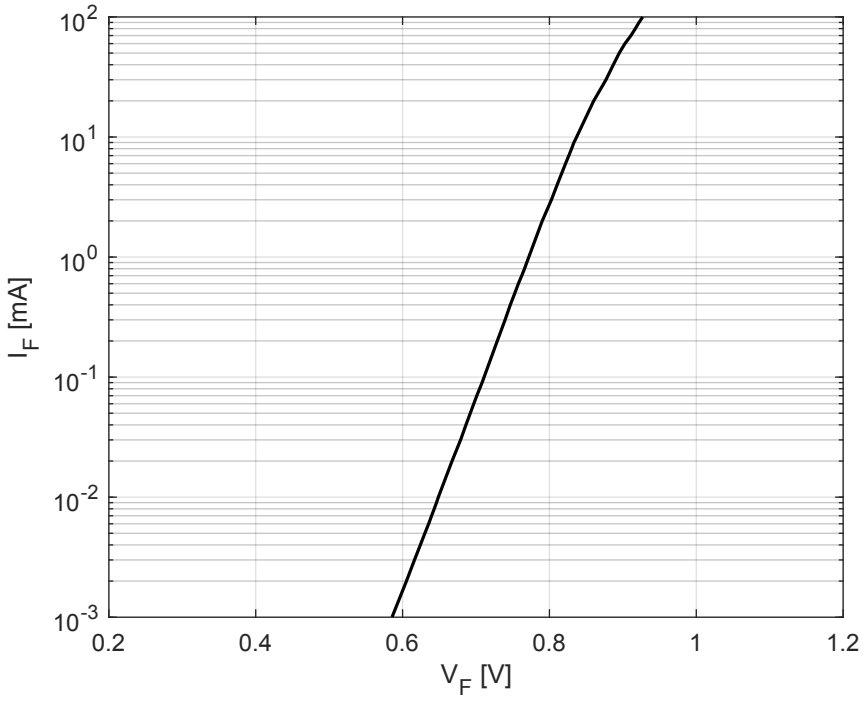


Figure 1 Forward current I_F vs. forward voltage V_F

2.2 AC characteristics

At T_A = 25 °C, unless otherwise specified

Table 4 Key parameter

Parameter	Symbol	Values			Unit	Note or test condition
		Min.	Typ.	Max.		
Capacitance	C	–	0.35	–	pF	V_R = 0 V, f = 1 MHz
		–	0.26	0.35		V_R = 1 V, f = 1 MHz
Forward resistance	R_F	–	2.3	–	Ω	I_F = 1 mA, f = 100 MHz
		–	1.6	2.3		I_F = 3 mA, f = 100 MHz
		–	1.1	–		I_F = 10 mA, f = 100 MHz
Inductance	L_s	–	0.4	–	nH	

Table 5 AC parameter at frequency *f* = 1 GHz

Parameter	Symbol	Values			Unit	Note or Test Condition
		Min.	Typ.	Max.		
Capacitance	C	–	0.23	–	pF	V_R = 0 V
Reverse parallel resistance	R_P	–	2.4	–	kΩ	V_R = 0 V
Forward resistance	R_F	–	2.4	–	Ω	I_F = 1 mA
		–	1.8	–		I_F = 3 mA
		–	1.4	–		I_F = 10 mA
Insertion loss	I_L	–	0.18	–	dB	I_F = 1 mA
		–	0.13	–		I_F = 3 mA
		–	0.1	–		I_F = 10 mA
Isolation	I_{SO}	–	16.9	–		V_R = 0 V

Table 6 AC parameter at frequency *f* = 1.8 GHz

Parameter	Symbol	Values			Unit	Note or Test Condition
		Min.	Typ.	Max.		
Capacitance	C	–	0.20	–	pF	V_R = 0 V
Reverse parallel resistance	R_P	–	1.8	–	kΩ	V_R = 0 V
Forward resistance	R_F	–	2.5	–	Ω	I_F = 1 mA
		–	1.9	–		I_F = 3 mA
		–	1.5	–		I_F = 10 mA
Insertion loss	I_L	–	0.19	–	dB	I_F = 1 mA
		–	0.14	–		I_F = 3 mA
		–	0.11	–		I_F = 10 mA
Isolation	I_{SO}	–	13	–		V_R = 0 V

Electrical performance in test fixture

Table 7 AC parameter at frequency *f* = 2.5 GHz

Parameter	Symbol	Values			Unit	Note or Test Condition
		Min.	Typ.	Max.		
Capacitance	C	–	0.20	–	pF	V_R = 0 V
Reverse parallel resistance	R_P	–	1.6	–	kΩ	V_R = 0 V
Forward resistance	R_F	–	2.7	–	Ω	I_F = 1 mA
		–	2.1	–		I_F = 3 mA
		–	1.7	–		I_F = 10 mA
Insertion loss	I_L	–	0.2	–	dB	I_F = 1 mA
		–	0.16	–		I_F = 3 mA
		–	0.12	–		I_F = 10 mA
Isolation	I_{SO}	–	10.8	–		V_R = 0 V

Table 8 AC parameter at frequency *f* = 5.5 GHz

Parameter	Symbol	Values			Unit	Note or Test Condition
		Min.	Typ.	Max.		
Insertion loss	I_L	–	0.27	–	dB	I_F = 1 mA
		–	0.23	–		I_F = 3 mA
		–	0.2	–		I_F = 10 mA
Isolation	I_{SO}	–	5.6	–		V_R = 0 V

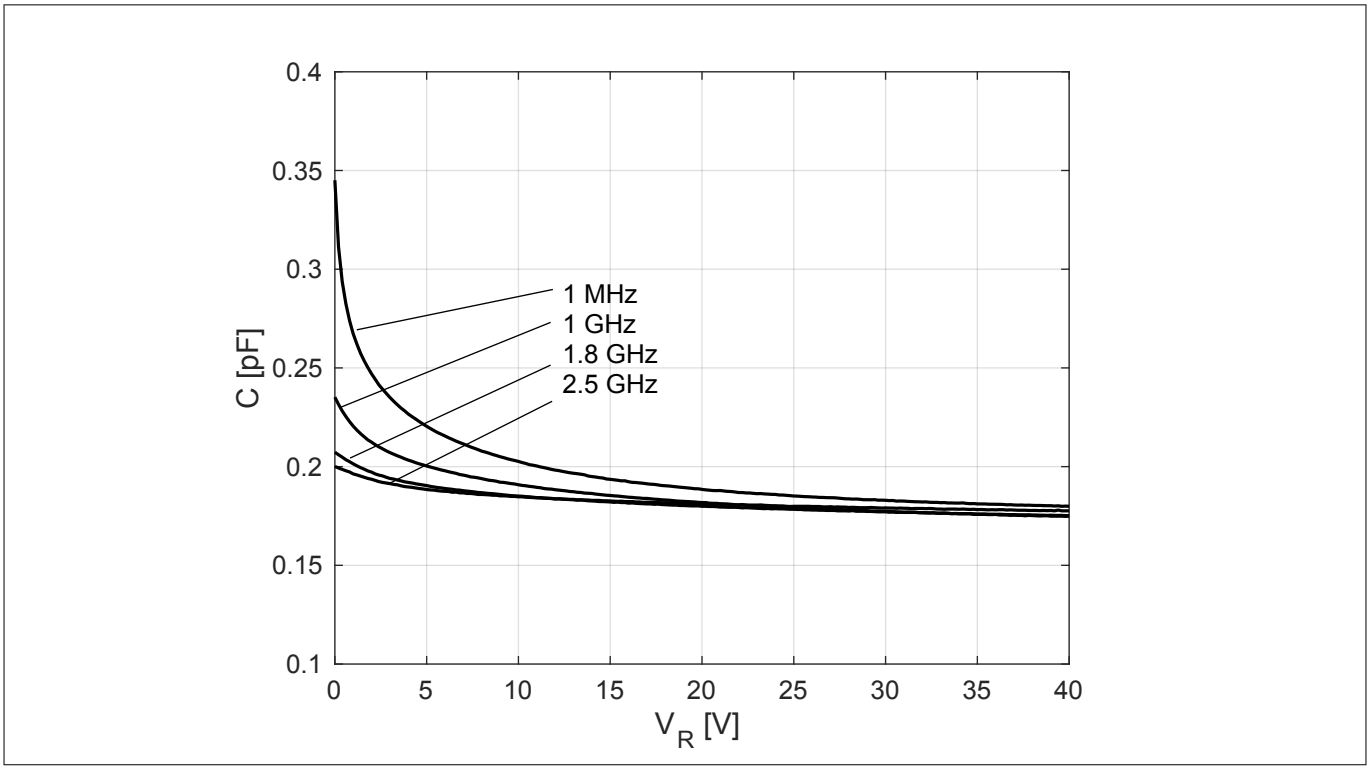


Figure 2 Capacitance *C* vs. reverse voltage V_R at different frequencies

Electrical performance in test fixture

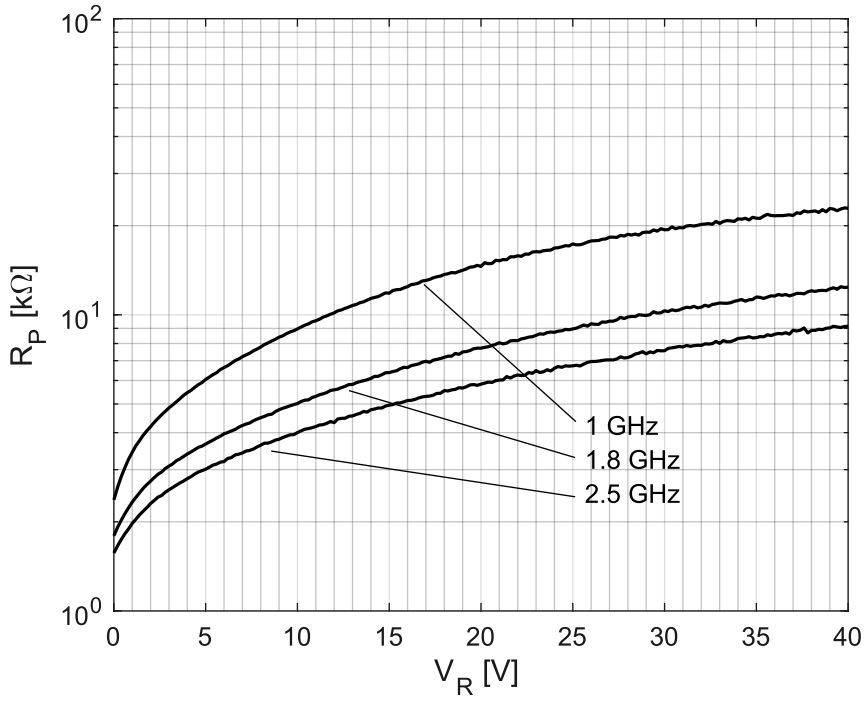


Figure 3 **Reverse parallel resistance R_P vs. reverse voltage V_R at different frequencies**

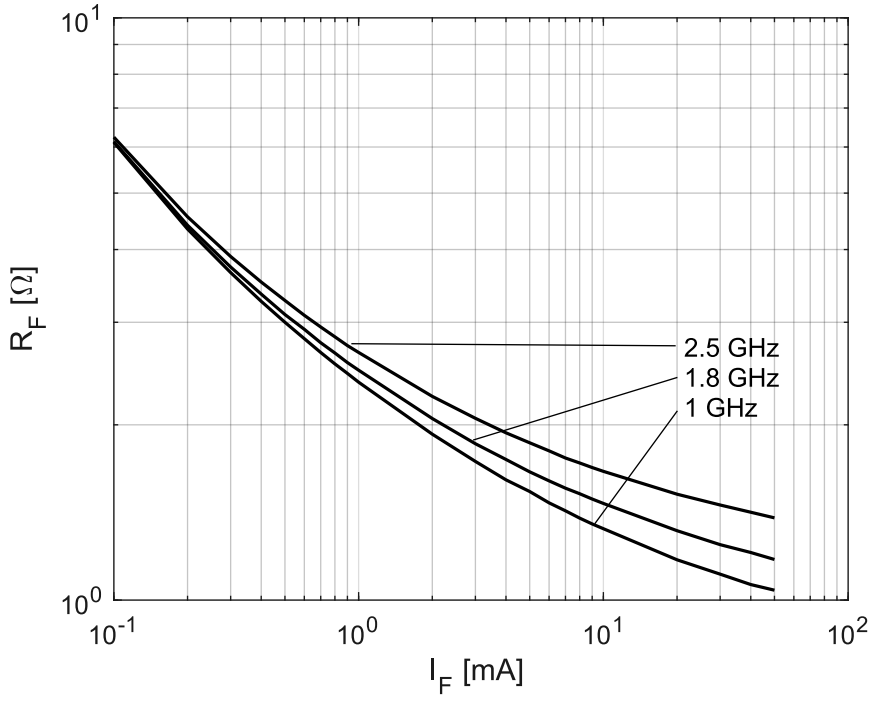


Figure 4 **Forward resistance R_F vs. forward current I_F at different frequencies**

Electrical performance in test fixture

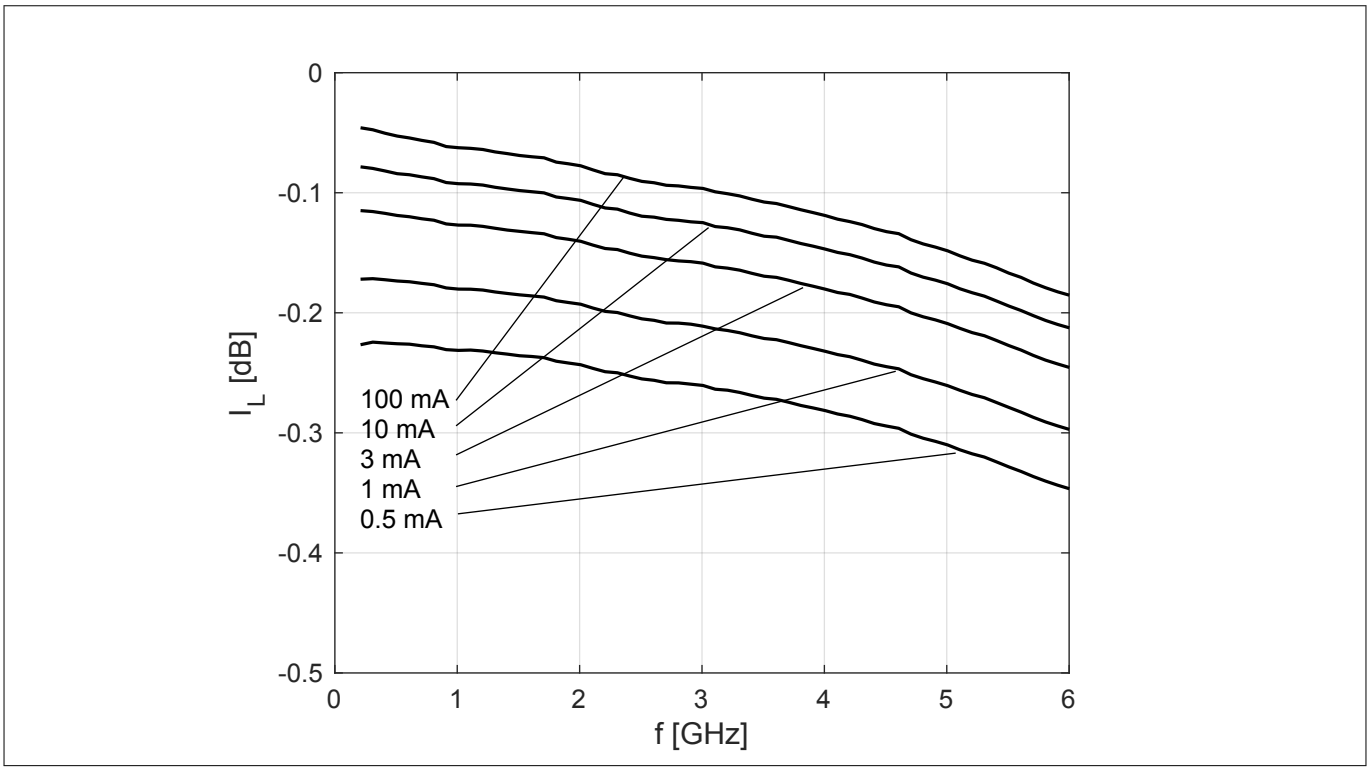


Figure 5 **Insertion loss I_L vs. frequency f at different currents**

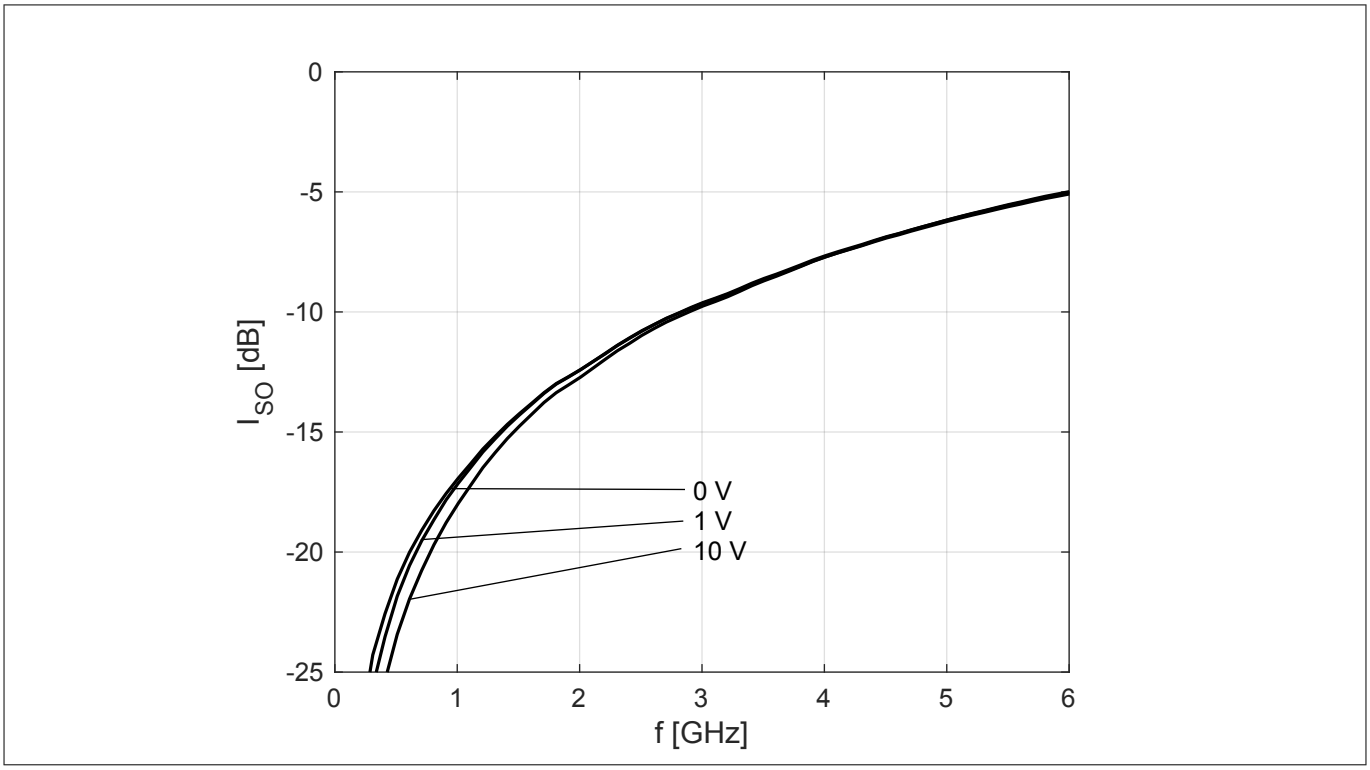


Figure 6 **Isolation I_{SO} vs. frequency f at different reverse voltages**

Note: The curves shown in this chapter have been generated using typical devices but shall not be understood as a guarantee that all devices have identical characteristic curves.

3 Thermal characteristics

Table 9 Thermal resistance

Parameter	Symbol	Values			Unit	Note or test condition
		Min.	Typ.	Max.		
Thermal resistance (junction - soldering point)	R_{thJS}	–	65	–	K/W	T_S = 133 ° C [1)]

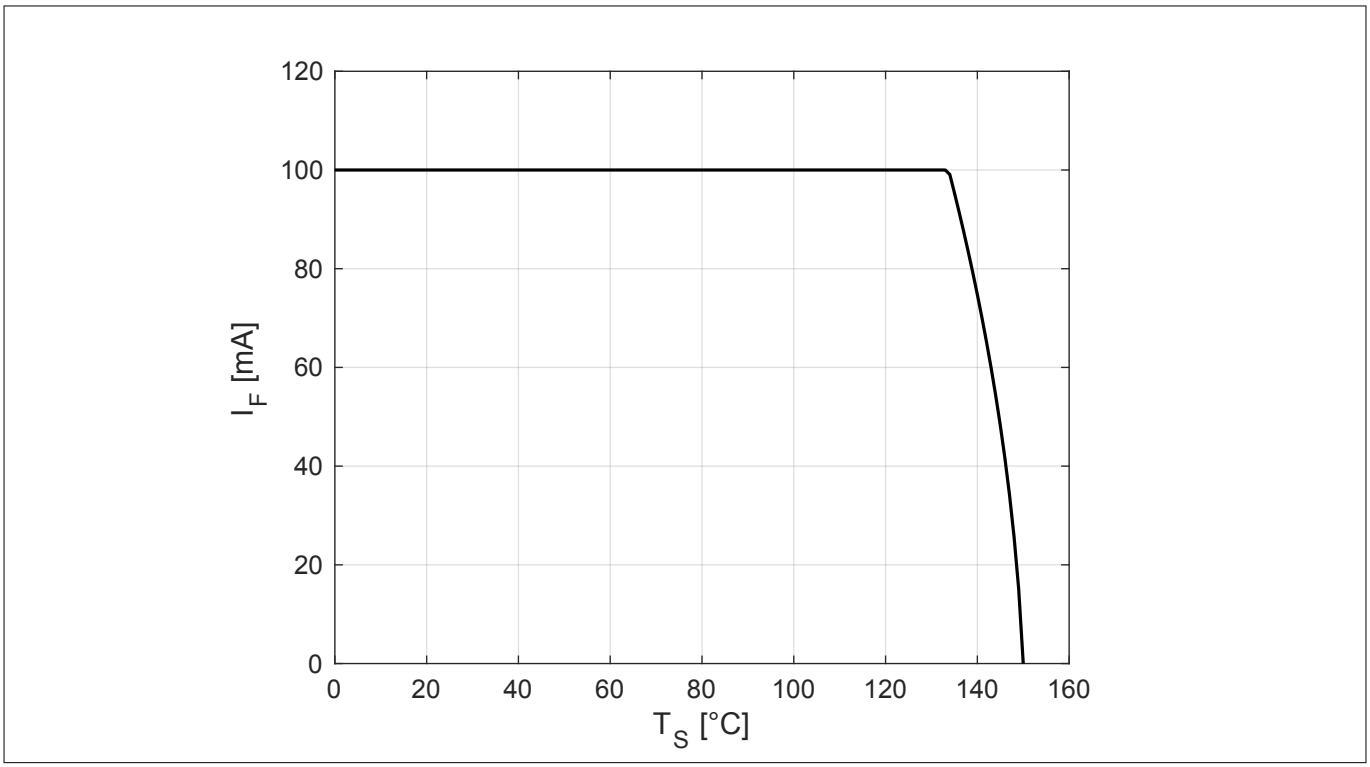


Figure 7 Permissible forward current I_F in DC operation

1 For R_{thJS} in other conditions refer to the curves in this chapter.

Thermal characteristics

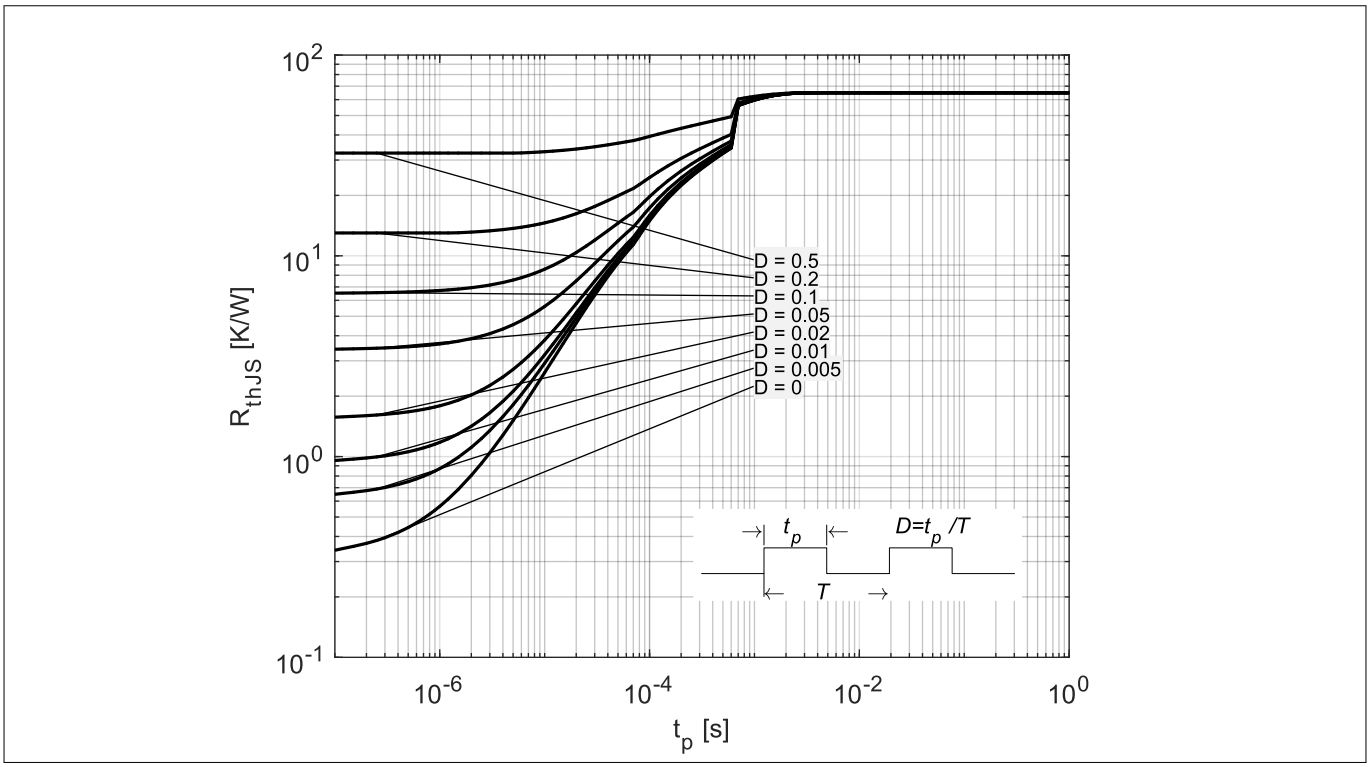


Figure 8 **Thermal resistance R_{thJS} in pulse operation**

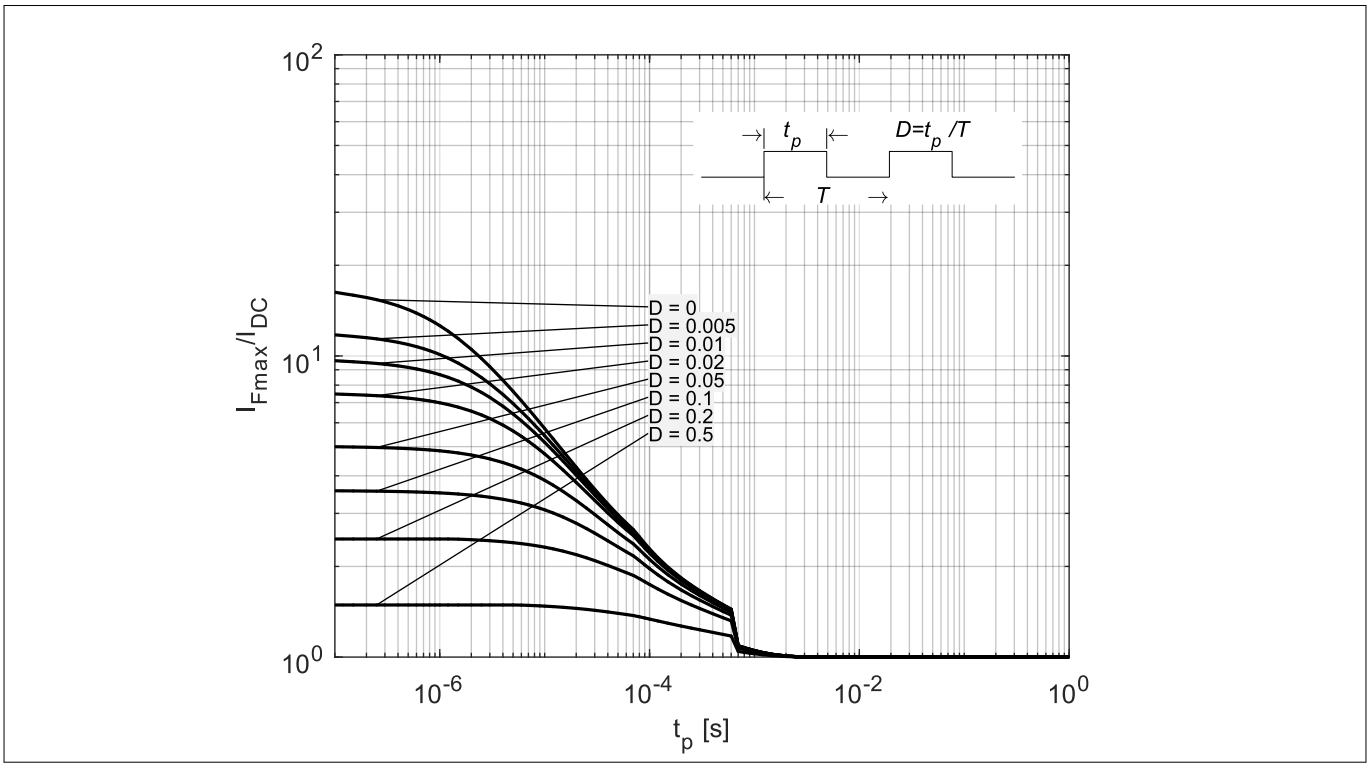


Figure 9 **Permissible forward current ratio I_{Fmax}/I_{DC} in pulse operation**

4 Package information TSLP-2-19

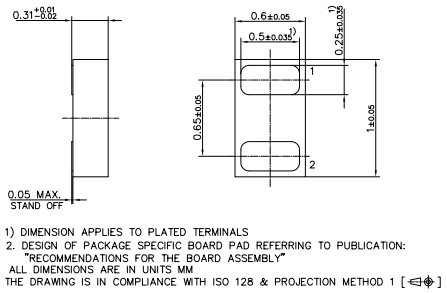


Figure 10 Package outline

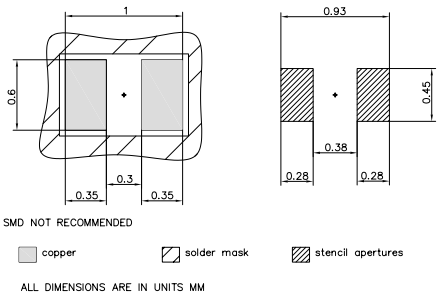


Figure 11 Foot print

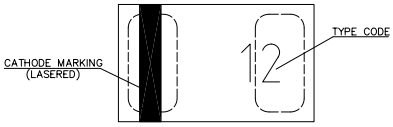


Figure 12 Marking layout example

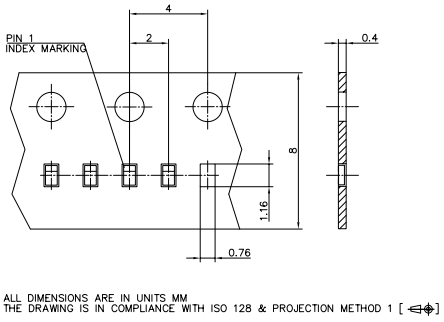


Figure 13 Tape dimensions

*Note: See our **Recommendations for Printed Circuit Board Assembly of TSLP/TSSLP/TSNP Packages** .*
The marking layout is an example. For the real marking code refer to the device information on the first page. The number of characters shown in the layout example is not necessarily the real one. The marking layout can consist of less characters.

5 References

[1]	Infineon AG - ***Recommendations for Printed Circuit Board Assembly of Infineon TSLP/TSSLP/TSNP Packages***

Revision history

Document version	Date of release	Description of changes
1.0	2018-09-07	• Change from series datasheet to individual one • Initial release of datasheet • Typical values and curves updated to the values of the production (No product or process change behind) • Minimum/typical values added • Typical curves/values removed

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