

# BAR64-05

Low signal distortion, surface mount RF PIN diode, common cathode pair

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## Product description

This Infineon cost optimized RF PIN diode is designed for low distortion switches that require to hold off large RF voltages, and is best suited for frequencies as high as 3 GHz. Its nominal 50  $\mu\text{m}$  I-region width, combined with the typical 1.55  $\mu\text{s}$  carrier lifetime, result in a diode with low forward resistance and low distortion characteristics.



## Feature list

- Low signal distortion, charge carrier lifetime  $t_{rr} = 1.55 \mu\text{s}$  (typical)
- Very low capacitance  $C = 0.22 \text{ pF}$  (typical) at voltage  $V_R = 0$  and frequencies  $f \geq 1 \text{ GHz}$
- Low forward resistance  $R_F = 2.3 \Omega$  (typical) at forward current  $I_F = 10 \text{ mA}$  and frequency  $f = 100 \text{ MHz}$
- Industry standard SOT23-3 package (2.9 mm x 2.4 mm x 1 mm)
- Pb-free, RoHS compliant and halogen-free

## Product validation

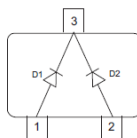
Qualified for industrial applications according to the relevant tests of JEDEC47/20/22.

## Potential applications

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

- Wireless communication
- High speed data networks

## Device information



**Table 1** Part information

Product name / Ordering code	Package	Pin configuration	Marking	Pieces / Reel
BAR64-05 / BAR6405E6327HTSA1	SOT23-3	Common cathode pair	PRs	3 k

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

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## 1 Absolute maximum ratings

**Table 2** Absolute maximum ratings at  $T_A = 25\text{ °C}$ , unless otherwise specified

Parameter	Symbol	Values		Unit	Note or test condition
		Min.	Max.		
Diode reverse voltage	$V_R$	–	150	V	
Forward current	$I_F$	–	100	mA	
Total power dissipation	$P_{TOT}$	–	250	mW	$T_S \leq 126\text{ °C}$ <sup>1)</sup>
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.

<sup>1</sup>  $T_S$  is the soldering point temperature.

## Electrical performance in test fixture

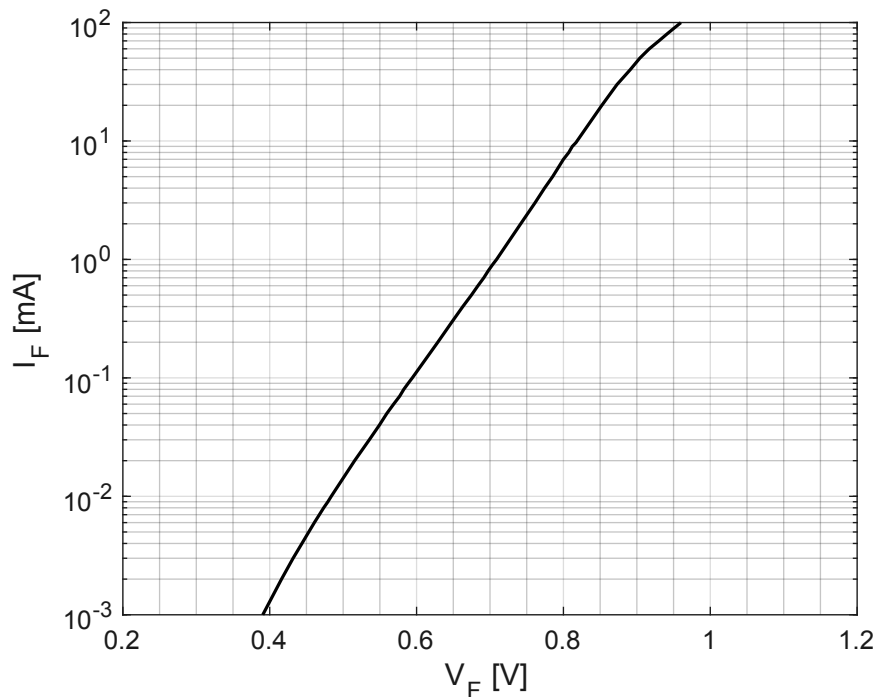
## 2 Electrical performance in test fixture

### 2.1 DC characteristics

At  $T_A = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified

**Table 3** DC characteristics

Parameter	Symbol	Values			Unit	Note or test condition
		Min.	Typ.	Max.		
Breakdown voltage	$V_{BR}$	150	–	–	V	$I_R = 5\text{ }\mu\text{A}$
Reverse current	$I_R$	–	–	20	nA	$V_R = 20\text{ V}$
Forward voltage	$V_F$	–	0.82	–	V	$I_F = 10\text{ mA}$
		–	0.9	–		$I_F = 50\text{ mA}$
		–	0.95	1.1		$I_F = 100\text{ mA}$
I-region width	$W_I$	–	50	–	$\mu\text{m}$	



**Figure 1** Forward current  $I_F$  vs. forward voltage  $V_F$

## Electrical performance in test fixture

## 2.2 AC characteristics

At  $T_A = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified

Table 4 Key parameter

Parameter	Symbol	Values			Unit	Note or test condition
		Min.	Typ.	Max.		
Capacitance	C	–	0.6	–	pF	$V_R = 0\text{ V}, f = 1\text{ MHz}$
		–	0.23	0.35		$V_R = 20\text{ V}, f = 1\text{ MHz}$
Forward resistance	$R_F$	–	11	20		$I_F = 1\text{ mA}, f = 100\text{ MHz}$
		–	4.6	–		$I_F = 3\text{ mA}, f = 100\text{ MHz}$
		–	3.3	–		$I_F = 5\text{ mA}, f = 100\text{ MHz}$
		–	2.3	2.8		$I_F = 10\text{ mA}, f = 100\text{ MHz}$
		–	–	1.35		$I_F = 100\text{ mA}, f = 100\text{ MHz}$
Inductance	$L_S$	–	1.8	–	nH	
Charge carrier lifetime	$\tau_{rr}$	–	1550	–	ns	$I_F = 10\text{ mA}, I_R = 6\text{ mA}$ , measured at $I_R = 3\text{ mA}$ , $R_L = 100\text{ }\Omega$

Table 5 AC parameter at  $f = 1\text{ GHz}$ 

Parameter	Symbol	Values			Unit	Note or test condition
		Min.	Typ.	Max.		
Capacitance	C	–	0.22	–	pF	$V_R = 0\text{ V}$
Reverse parallel resistance	$R_P$	–	3.3	–	k $\Omega$	$V_R = 0\text{ V}$
Forward resistance	$R_F$	–	10	–	$\Omega$	$I_F = 1\text{ mA}$
		–	4.7	–		$I_F = 3\text{ mA}$
		–	3.4	–		$I_F = 5\text{ mA}$
		–	2.4	–		$I_F = 10\text{ mA}$
Insertion loss	$I_L$	–	0.86	–	dB	$I_F = 1\text{ mA}$
		–	0.42	–		$I_F = 3\text{ mA}$
		–	0.32	–		$I_F = 5\text{ mA}$
		–	0.24	–		$I_F = 10\text{ mA}$
Isolation	$I_{SO}$	–	17	–		$V_R = 0\text{ V}$

Table 6 AC parameter at  $f = 1.8\text{ GHz}$ 

Parameter	Symbol	Values			Unit	Note or test condition
		Min.	Typ.	Max.		
Capacitance	C	–	0.22	–	pF	$V_R = 0\text{ V}$
Reverse parallel resistance	$R_P$	–	2.6	–	k $\Omega$	$V_R = 0\text{ V}$

## Electrical performance in test fixture

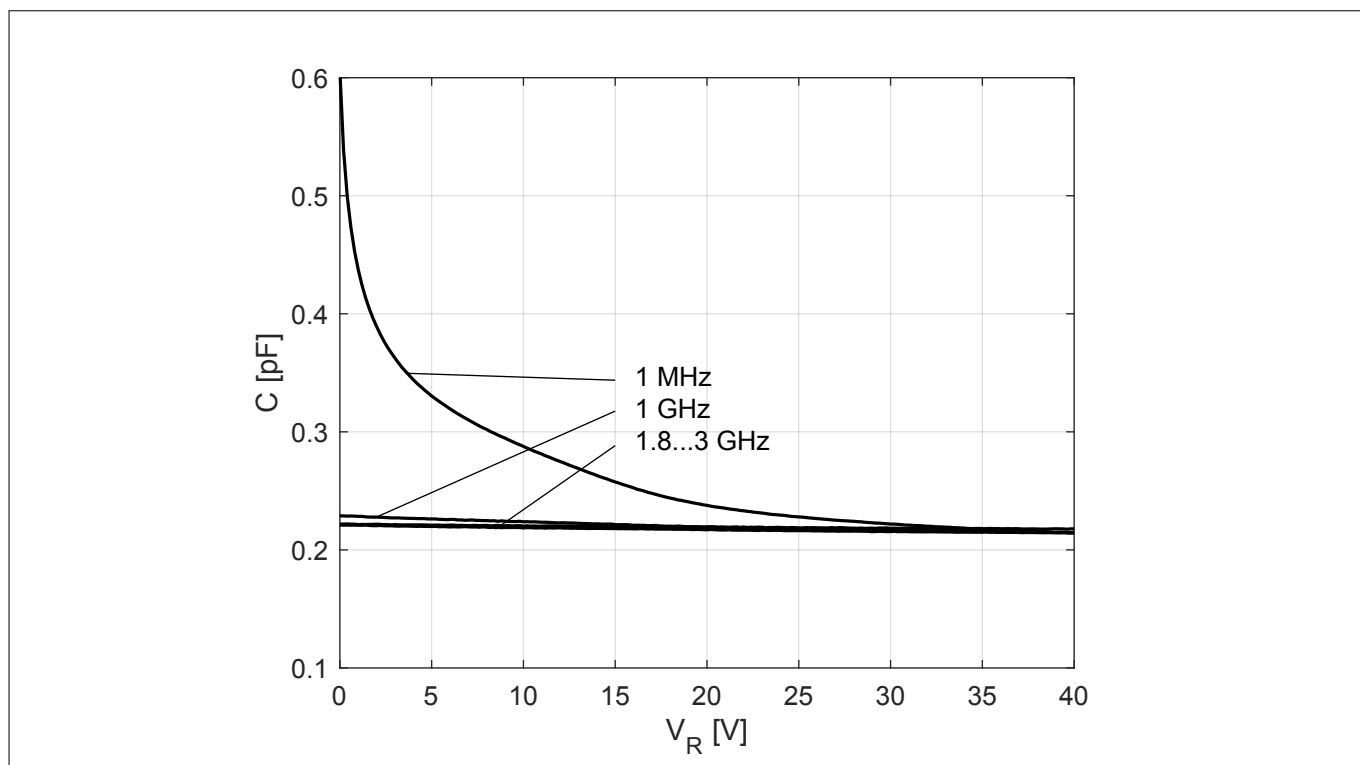
Table 6 AC parameter at  $f = 1.8$  GHz (continued)

Parameter	Symbol	Values			Unit	Note or test condition
		Min.	Typ.	Max.		
Forward resistance	$R_F$	–	10	–	$\Omega$	$I_F = 1$ mA
		–	4.7	–		$I_F = 3$ mA
		–	3.5	–		$I_F = 5$ mA
		–	2.5	–		$I_F = 10$ mA
Insertion loss	$I_L$	–	0.92	–	dB	$I_F = 1$ mA
		–	0.48	–		$I_F = 3$ mA
		–	0.38	–		$I_F = 5$ mA
		–	0.3	–		$I_F = 10$ mA
Isolation	$I_{SO}$	–	12.4	–		$V_R = 0$ V

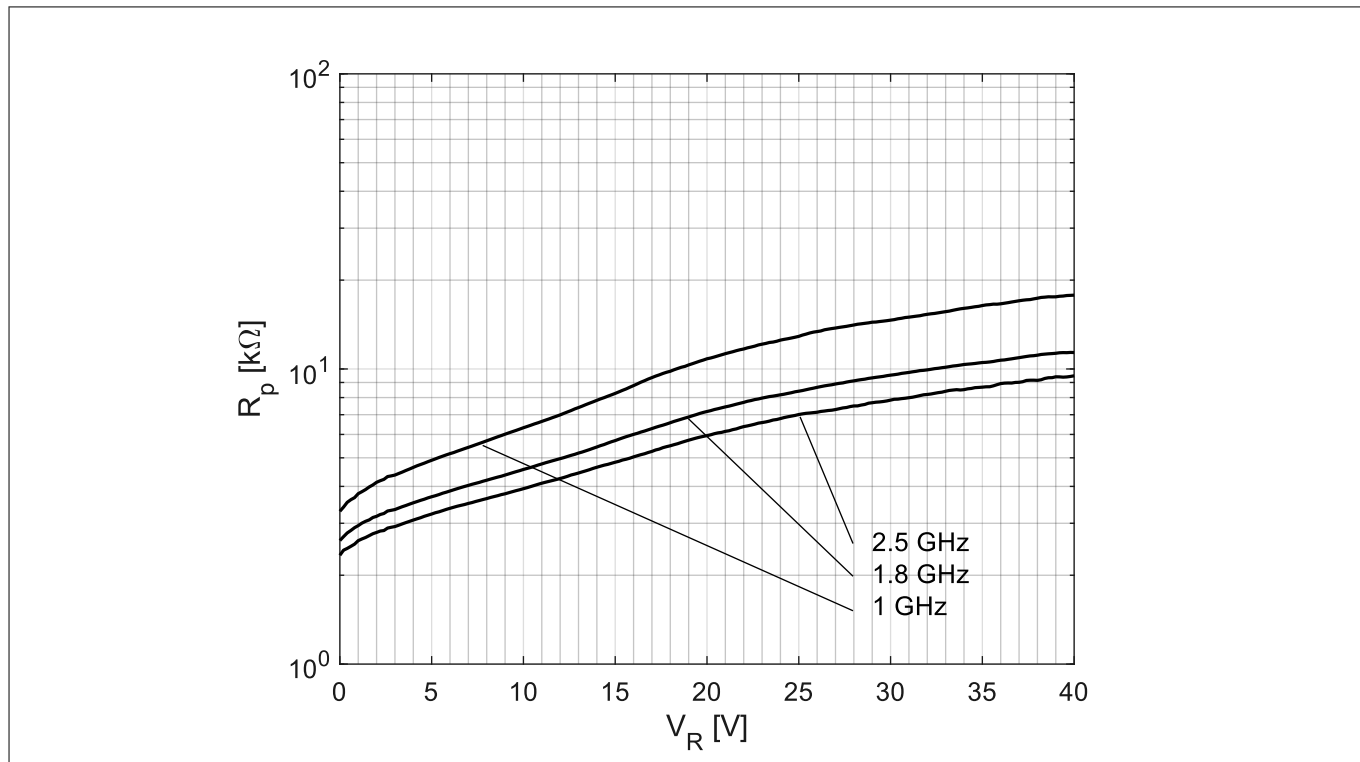
Table 7 AC parameter at  $f = 2.5$  GHz

Parameter	Symbol	Values			Unit	Note or test condition
		Min.	Typ.	Max.		
Capacitance	$C$	–	0.22	–	pF	$V_R = 0$ V
Reverse parallel resistance	$R_P$	–	2.3	–	k $\Omega$	$V_R = 0$ V
Forward resistance	$R_F$	–	10	–	$\Omega$	$I_F = 1$ mA
		–	5	–		$I_F = 3$ mA
		–	3.7	–		$I_F = 5$ mA
		–	2.7	–		$I_F = 10$ mA
Insertion loss	$I_L$	–	0.98	–	dB	$I_F = 1$ mA
		–	0.55	–		$I_F = 3$ mA
		–	0.45	–		$I_F = 5$ mA
		–	0.37	–		$I_F = 10$ mA
Isolation	$I_{SO}$	–	10	–		$V_R = 0$ V

## Electrical performance in test fixture

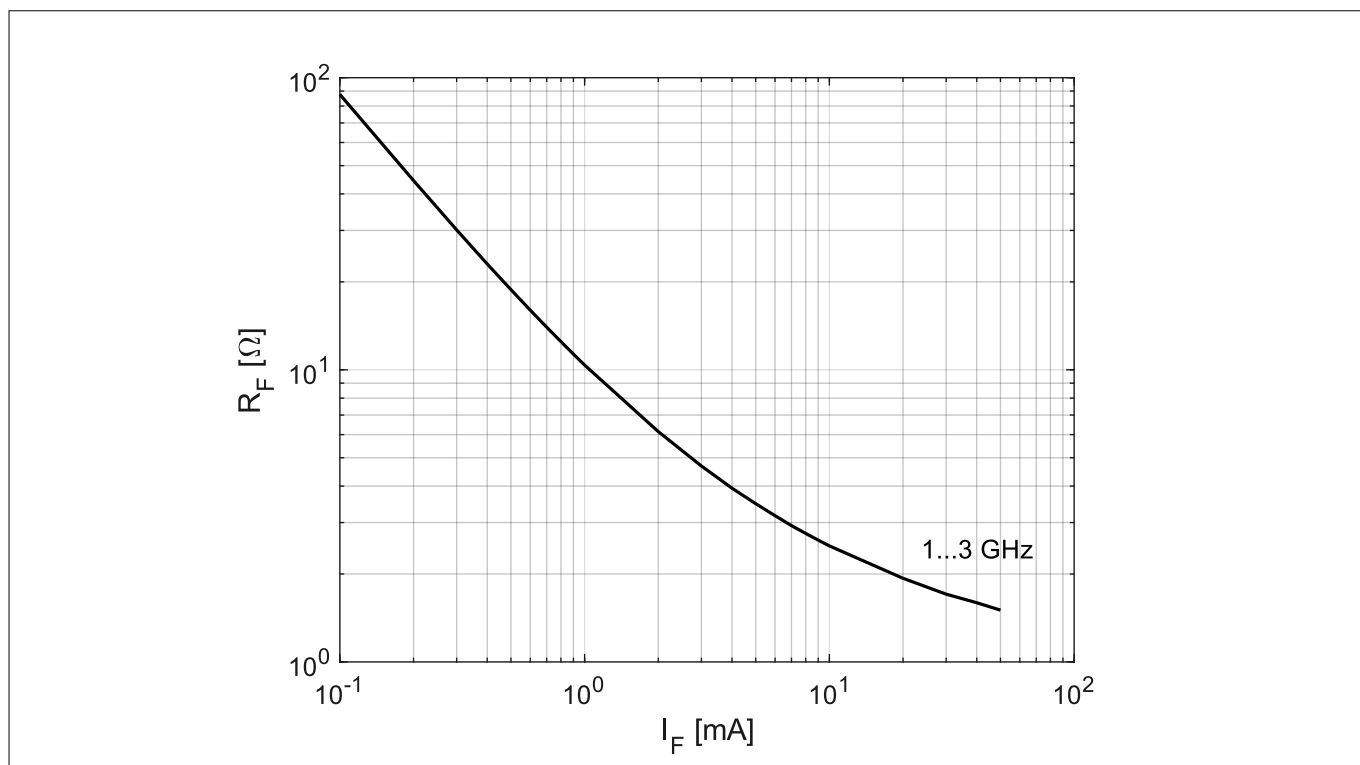
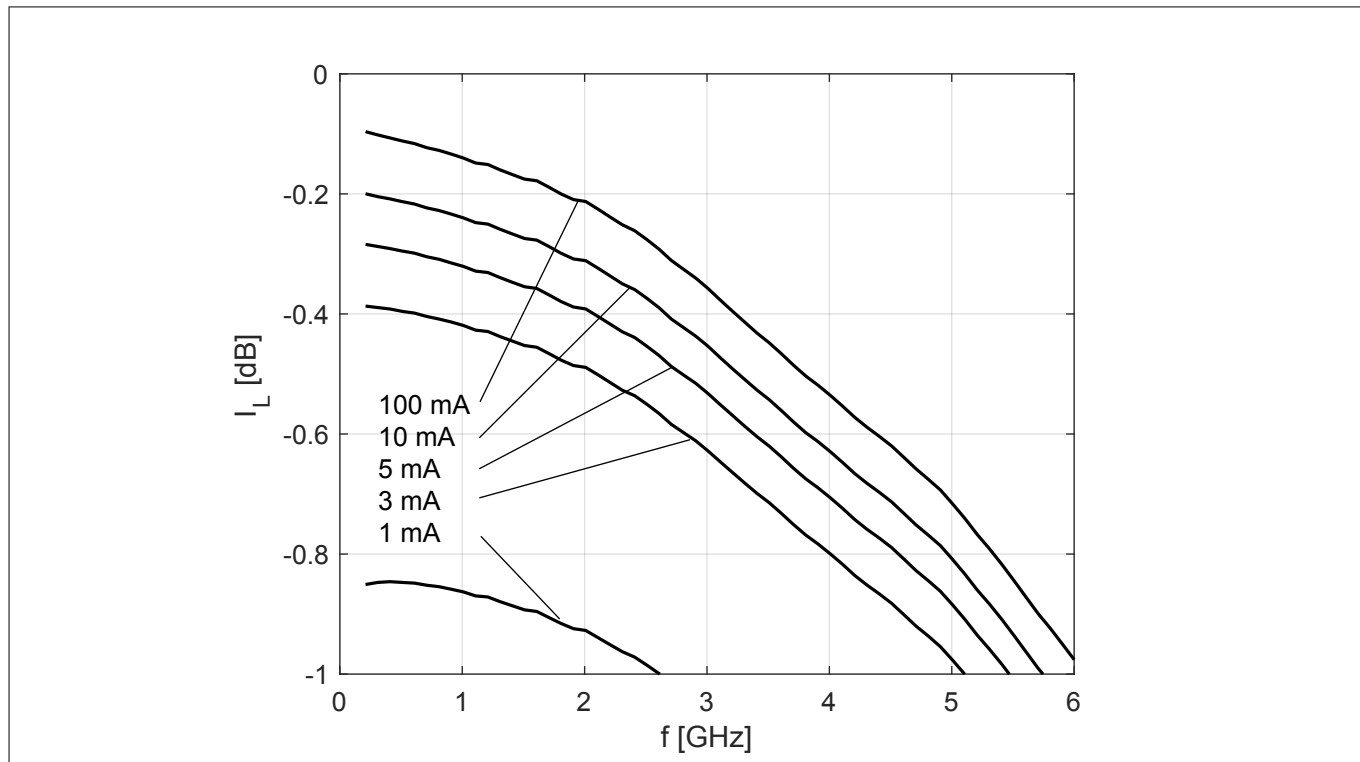


**Figure 2** Capacitance  $C$  vs. reverse voltage  $V_R$  at different frequencies

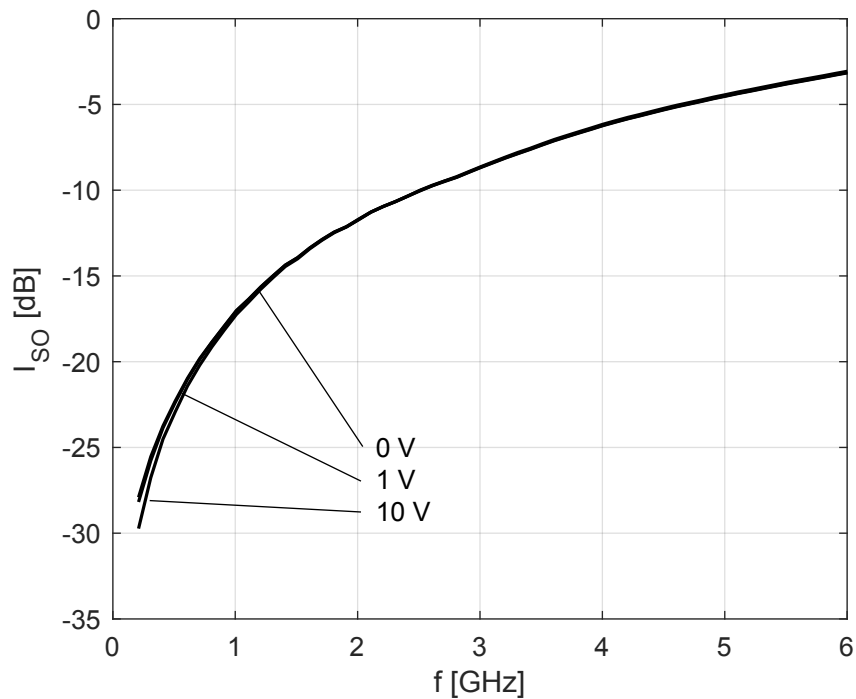


**Figure 3** Reverse parallel resistance  $R_p$  vs. reverse voltage  $V_R$  at different frequencies

## Electrical performance in test fixture

**Figure 4** Forward resistance  $R_F$  vs. forward current  $I_F$  at different frequencies**Figure 5** Insertion loss  $I_L$  vs. frequency  $f$  at different forward currents

## Electrical performance in test fixture



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

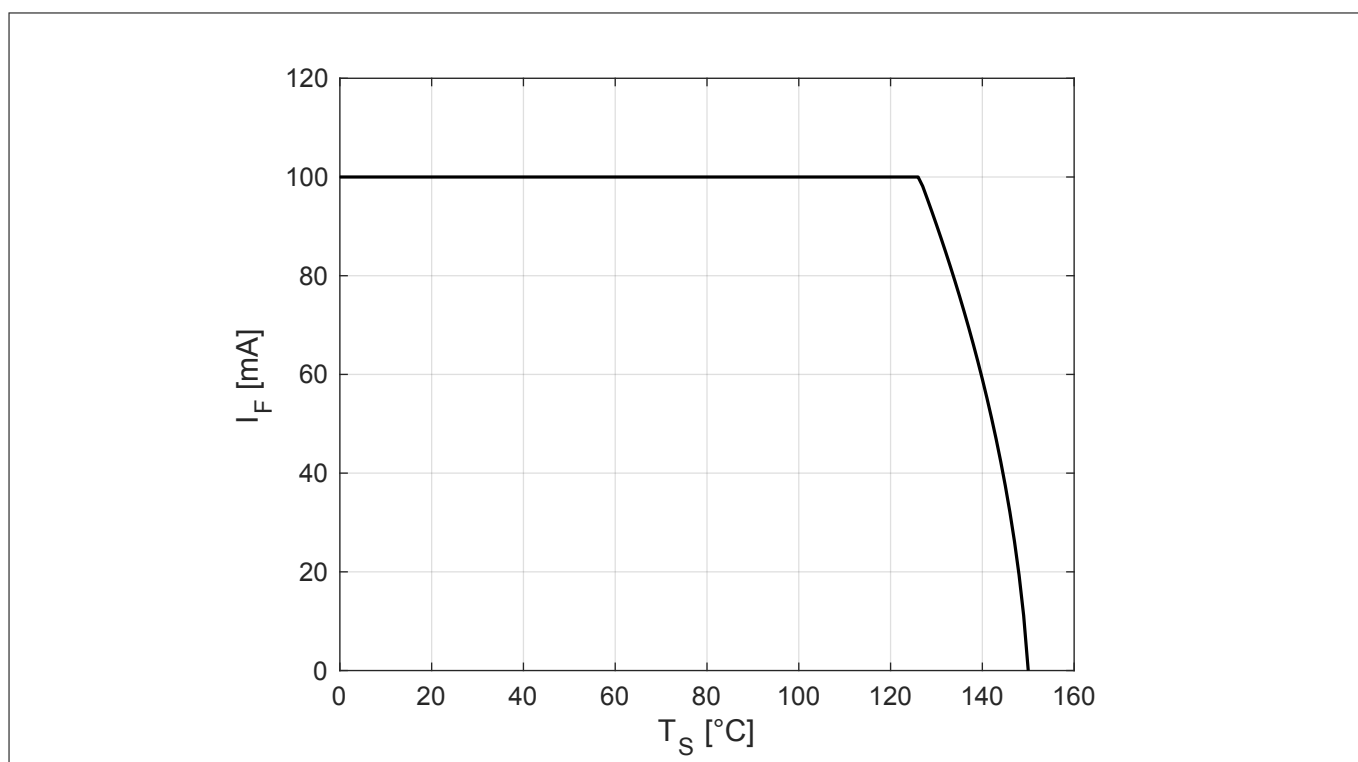
*Note:* The curves shown in this chapter have been generated using typical devices but shall not be understood as a guarantee that all devices have identical characteristic curves.

## Thermal characteristics

### 3 Thermal characteristics

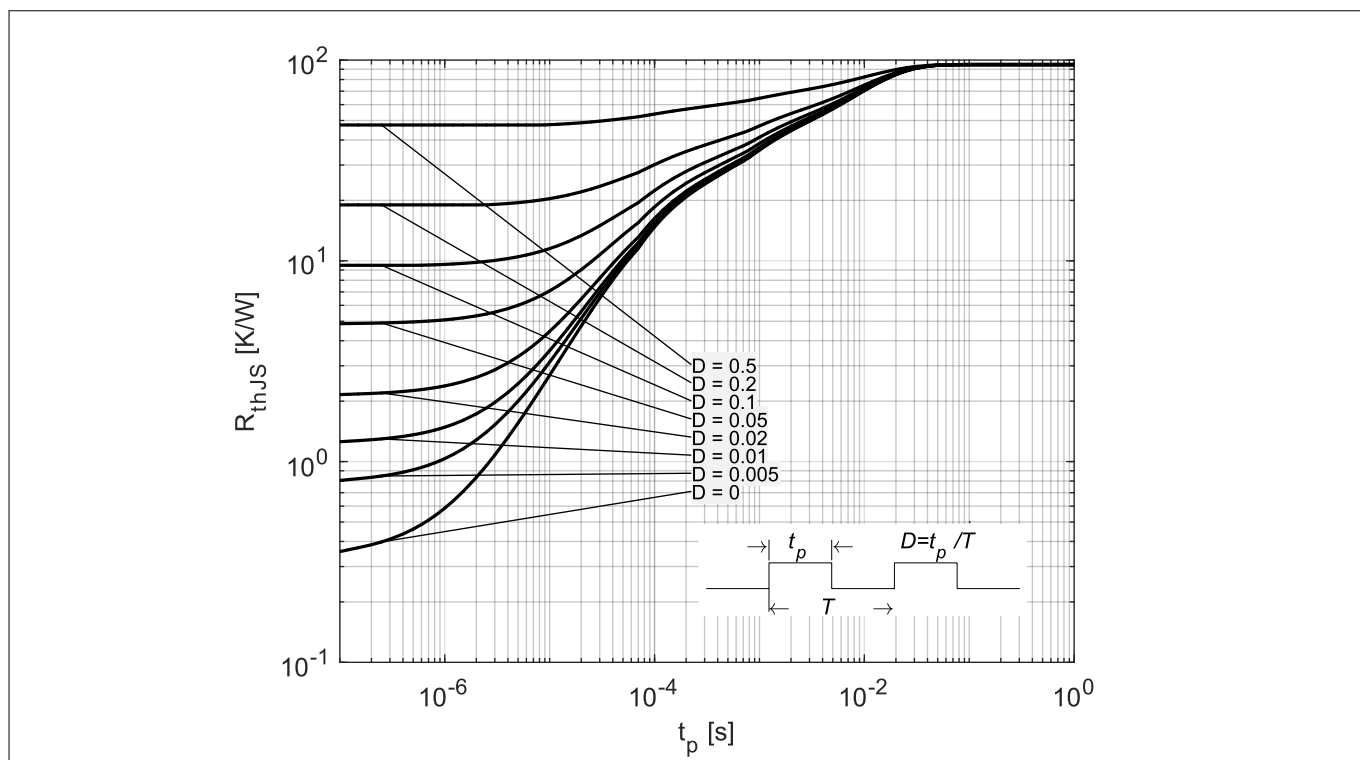
Table 8 Thermal resistance

Parameter	Sym bol	Values			Unit	Note or test condition
		Min.	Typ.	Max.		
Thermal resistance (junction - soldering point)	$R_{thJS}$	–	95	–	K/W	$T_S = 126\text{ °C}$ <sup>2)</sup>

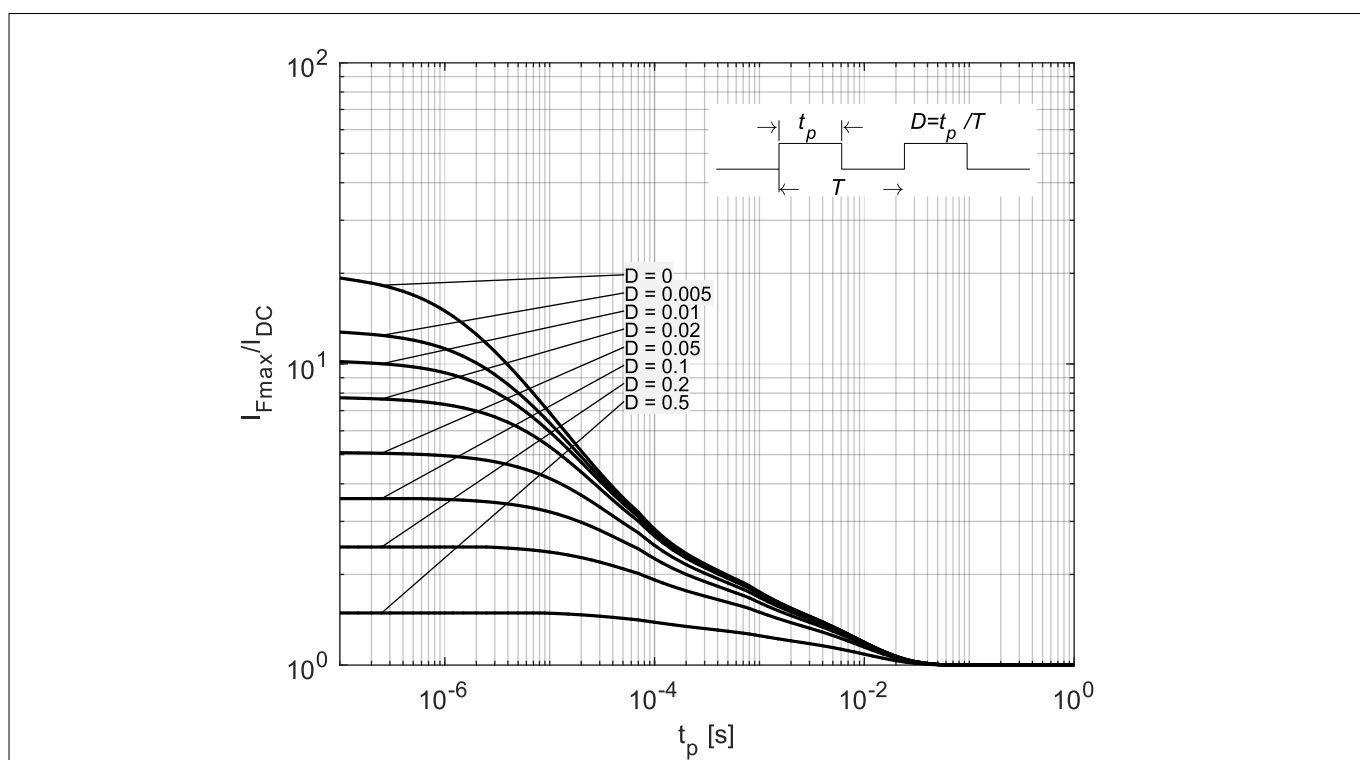
Figure 7 Permissible forward current  $I_F$  in DC operation

<sup>2</sup> For  $R_{thJS}$  in other conditions refer to the curves in this chapter.

## Thermal characteristics

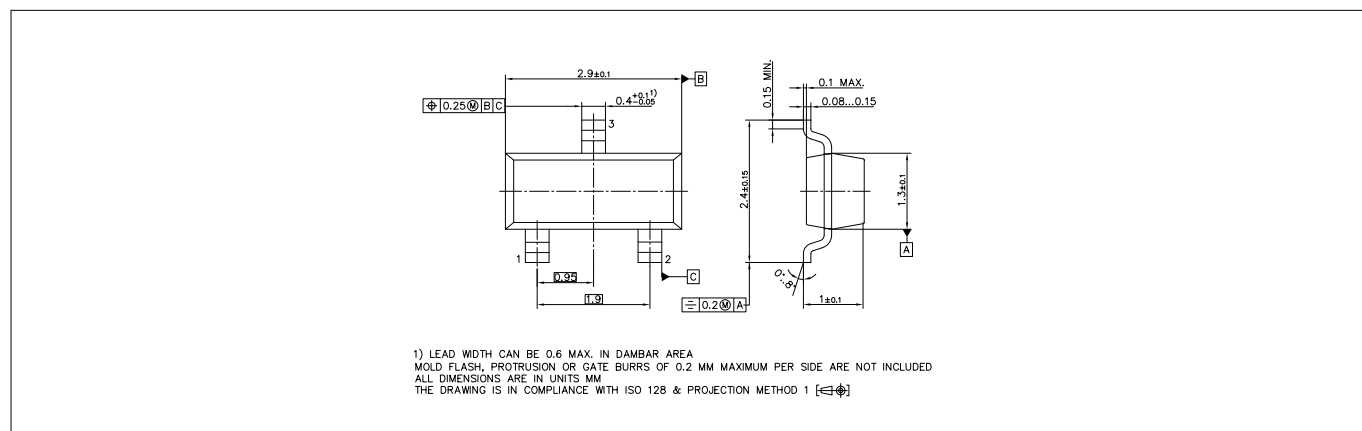


**Figure 8** Thermal resistance  $R_{thJS}$  in pulse operation

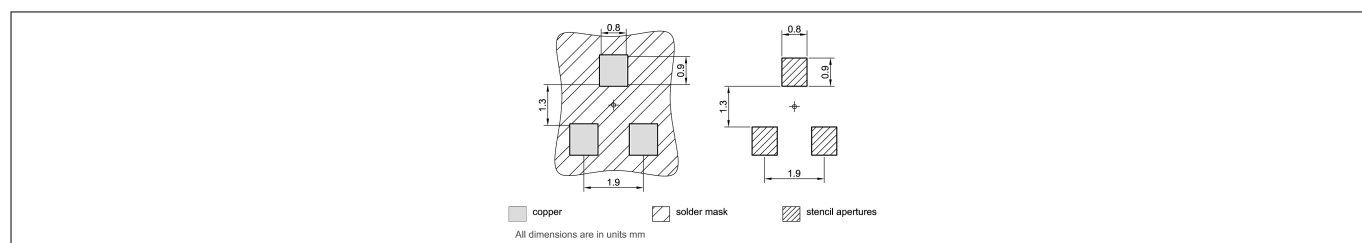


**Figure 9** Permissible forward current ratio  $I_{Fmax}/I_{DC}$  in pulse operation

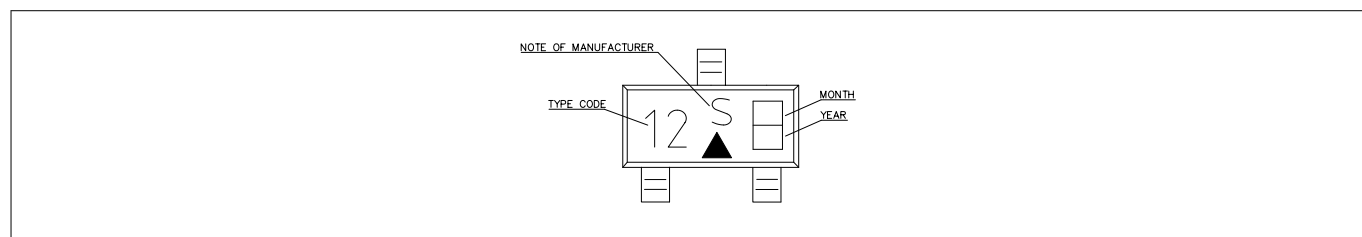
## 4 Package information SOT23-3



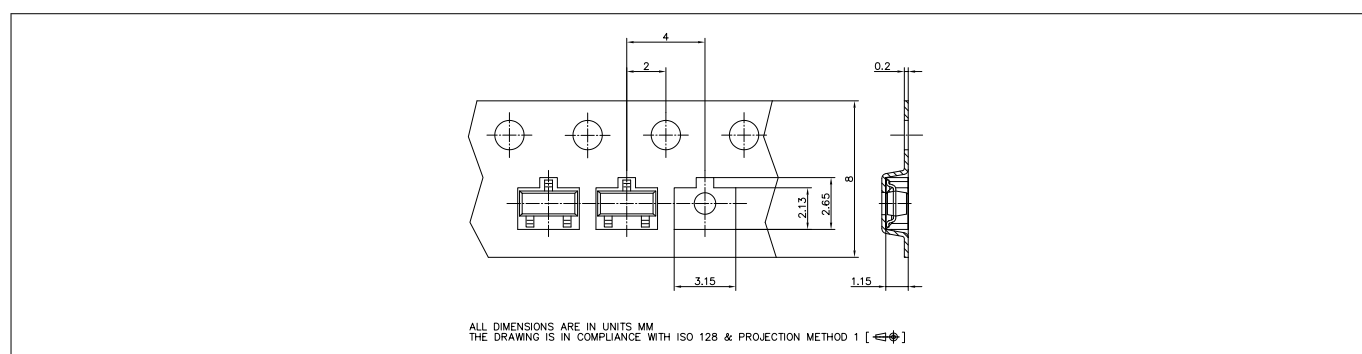
**Figure 10** Package outline



**Figure 11** Foot print



**Figure 12** Marking layout example



**Figure 13** Tape dimensions

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**Revision history****Revision history**

Document version	Date of release	Description of changes
1.0	2018-09-07	<ul style="list-style-type: none"><li>• Change from series datasheet to individual one</li><li>• Initial release of datasheet</li><li>• Typical values and curves updated to the values of the production (No product or process change behind)</li><li>• Maximum/typical values added</li><li>• Typical curves/values removed</li></ul>
1.1	2019-01-21	Product description, feature list and potential application section reworked

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**Edition 2018-06-30**

**Published by**  
**Infineon Technologies AG**  
**81726 Munich, Germany**

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