

### Low Noise Silicon Bipolar RF Transistor

- For low noise, low distortion broadband amplifiers in antenna and telecommunications systems up to 1.5 GHz at collector currents from 20 mA to 80 mA
- 3 4 1
- Power amplifier for DECT and PCN systems
- $f_T$  = 7.5 GHz,  $NF_{min}$  = 1.3 dB at 900 MHz
- Pb-free (RoHS compliant) package
- Qualification report according to AEC-Q101 available



#### ESD (Electrostatic discharge) sensitive device, observe handling precaution!

Туре	Marking	Pin Configuration			Package			
BFP196	RIs	1 = C	2 = E	3 = B	4 = E	-	-	SOT143

## **Maximum Ratings** at $T_A$ = 25 °C, unless otherwise specified

Parameter	Symbol	Value	Unit
Collector-emitter voltage	$V_{\sf CEO}$	12	V
Collector-emitter voltage	$V_{CES}$	20	
Collector-base voltage	$V_{CBO}$	20	
Emitter-base voltage	$V_{EBO}$	2	
Collector current	I <sub>C</sub>	150	mA
Base current	I <sub>B</sub>	15	
Total power dissipation <sup>1)</sup>	P <sub>tot</sub>	700	mW
<i>T</i> <sub>S</sub> ≤ 77°C			
Junction temperature	$T_{J}$	150	°C
Ambient temperature	T <sub>A</sub>	-65 150	
Storage temperature	$T_{ m Stq}$	-65 150	

## **Thermal Resistance**

Parameter	Symbol	Value	Unit
Junction - soldering point <sup>2)</sup>	R <sub>thJS</sub>	105	K/W

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 $<sup>{}^{1}</sup>T_{\rm S}$  is measured on the collector lead at the soldering point to the pcb

<sup>&</sup>lt;sup>2</sup>For the definition of  $R_{thJS}$  please refer to Application Note AN077 (Thermal Resistance Calculation)



**Electrical Characteristics** at  $T_A$  = 25 °C, unless otherwise specified

Parameter	Symbol	Values			Unit
		min.	typ.	max.	
DC Characteristics	•			•	
Collector-emitter breakdown voltage	V <sub>(BR)CEO</sub>	12	-	-	V
$I_{\rm C}$ = 1 mA, $I_{\rm B}$ = 0	, ,				
Collector-emitter cutoff current	I <sub>CES</sub>	-	-	100	μΑ
$V_{CE} = 20 \text{ V}, V_{BE} = 0$					
Collector-base cutoff current	I <sub>CBO</sub>	-	-	100	nA
$V_{\rm CB} = 10 \text{ V}, I_{\rm E} = 0$					
Emitter-base cutoff current	I <sub>EBO</sub>	-	_	1	μΑ
$V_{\rm EB} = 1 \text{ V}, I_{\rm C} = 0$					
DC current gain	h <sub>FE</sub>	70	100	140	_
$I_{\rm C}$ = 50 mA, $V_{\rm CE}$ = 8 V, pulse measured					

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**Electrical Characteristics** at  $T_A$  = 25 °C, unless otherwise specified

Electrical Characteristics at $T_A$ = 25 °C, unless Parameter	Symbol		Values			
		min.	typ.	max.	Unit	
AC Characteristics (verified by random sampling)						
Transition frequency	$f_{T}$	5	7.5	-	GHz	
$I_{\rm C}$ = 70 mA, $V_{\rm CE}$ = 8 V, $f$ = 500 MHz						
Collector-base capacitance	C <sub>cb</sub>	-	0.83	1.3	pF	
$V_{CB} = 10 \text{ V}, f = 1 \text{ MHz}, V_{BE} = 0$ ,						
emitter grounded						
Collector emitter capacitance	C <sub>ce</sub>	-	0.35	-		
$V_{CE} = 10 \text{ V}, f = 1 \text{ MHz}, V_{BE} = 0$ ,						
base grounded						
Emitter-base capacitance	C <sub>eb</sub>	-	3.9	-		
$V_{\text{EB}} = 0.5 \text{ V}, f = 1 \text{ MHz}, V_{\text{CB}} = 0$ ,						
collector grounded						
Minimum noise figure	NF <sub>min</sub>				dB	
$I_{\rm C}$ = 20 mA, $V_{\rm CE}$ = 8 V, $Z_{\rm S}$ = $Z_{\rm Sopt}$ ,						
f = 900 MHz		-	1.3	-		
f = 1.8 GHz		-	2.3	-		
Power gain, maximum available <sup>1)</sup>	G <sub>ma</sub>					
$I_{\rm C}$ = 50 mA, $V_{\rm CE}$ = 8 V, $Z_{\rm S}$ = $Z_{\rm Sopt}$ , $Z_{\rm L}$ = $Z_{\rm Lopt}$ ,						
f = 900 MHz		-	16.5	-		
f = 1.8 GHz		-	10.5	-		
Transducer gain	S <sub>21e</sub>   <sup>2</sup>				dB	
$I_{\rm C}$ = 50 mA, $V_{\rm CE}$ = 8 V, $Z_{\rm S}$ = $Z_{\rm L}$ = 50 $\Omega$ ,						
f = 900 MHz		-	13	-		
f = 1.8 GHz		-	7	-		
Third order intercept point at output <sup>2)</sup>	IP <sub>3</sub>	-	32	-	dBm	
$I_{\rm C}$ = 50 mA, $V_{\rm CE}$ = 8 V, $Z_{\rm S}$ = $Z_{\rm L}$ = 50 $\Omega$ ,						
f = 0.9 GHz						
1dB Compression point	P <sub>-1dB</sub>	-	19	-	1	
$I_{\rm C}$ = 50 mA, $V_{\rm CE}$ = 8 V, $Z_{\rm S}$ = $Z_{\rm L}$ = 50 $\Omega$ ,						
f = 0.9 GHz						
f = 0.9 GHz						

 $<sup>{}^{1}</sup>G_{\text{ma}} = |S_{21} / S_{12}| (k-(k^{2}-1)^{1/2})$ 

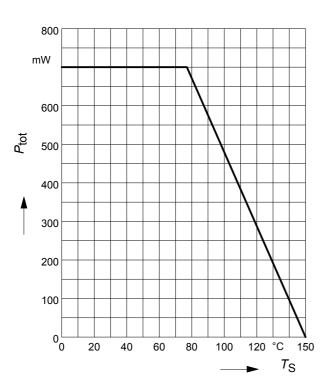
<sup>&</sup>lt;sup>2</sup>IP3 value depends on termination of all intermodulation frequency components.

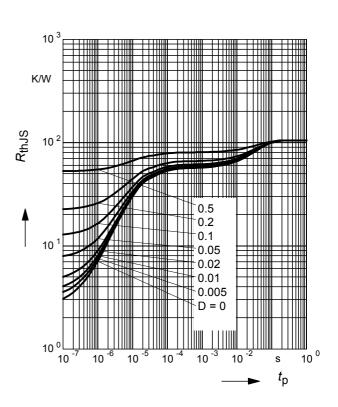
Termination used for this measurement is  $50\Omega$  from 0.2 MHz to 12 GHz



# Total power dissipation $P_{\text{tot}} = f(T_{\text{S}})$

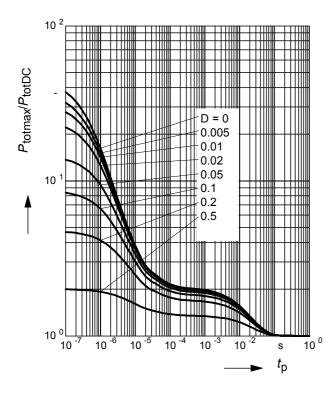
# Permissible Pulse Load $R_{thJS} = f(t_p)$





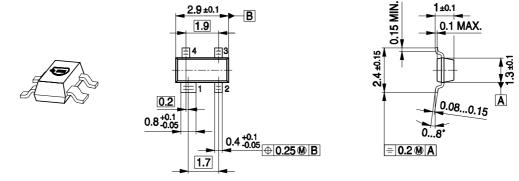
### **Permissible Pulse Load**

$$P_{\text{totmax}}/P_{\text{totDC}} = f(t_{p})$$





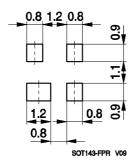
# Package Outline



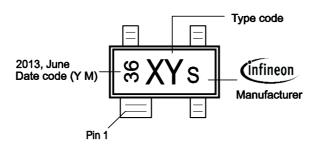
Note: Mold flash, protrusions or gate burrs of 0,2 mm max. per side are not included

SOT143-PO V09

#### **Foot Print**

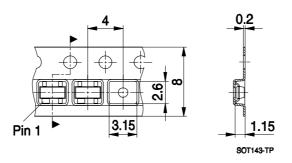


# Marking Layout (Example)



## Standard Packing

Reel ø180 mm = 3.000 Pieces/Reel Reel ø330 mm = 10.000 Pieces/Reel





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