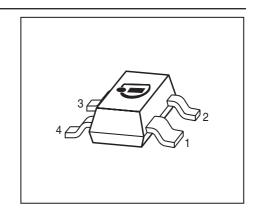


### Low Noise Silicon Bipolar RF Transistor

- For low noise, high-gain amplifiers up to 2 GHz
- For linear broadband amplifiers
- $f_T$  = 8 GHz,  $NF_{min}$  = 1 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	
BFP193	RCs	1 = C	2 = E	3 <b>=</b> B	4 = E	-	-	SOT143

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

Parameter	Symbol	Value	Unit
Collector-emitter voltage	$V_{CEO}$	12	V
Collector-emitter voltage	V <sub>CES</sub>	20	
Collector-base voltage	$V_{\mathrm{CBO}}$	20	
Emitter-base voltage	$V_{EBO}$	2	
Collector current	I <sub>C</sub>	80	mA
Base current	I <sub>B</sub>	10	
Total power dissipation <sup>1)</sup>	P <sub>tot</sub>	580	mW
<i>T</i> <sub>S</sub> ≤ 72°C			
Junction temperature	TJ	150	°C
Storage temperature	$T_{Stq}$	-55 150	

### **Thermal Resistance**

Parameter	Symbol	Value	Unit
Junction - soldering point <sup>2)</sup>	R <sub>thJS</sub>	135	K/W

1

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

 $<sup>^2</sup>$ 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
$V_{\text{EB}} = 1 \text{ V}, I_{\text{C}} = 0$					
DC current gain	h <sub>FE</sub>	70	100	140	-
$I_{\rm C}$ = 30 mA, $V_{\rm CE}$ = 8 V, pulse measured					

2



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

Parameter	Symbol	Values			Unit	
		min.	typ.	max.		
AC Characteristics (verified by random sampling)						
Transition frequency	$f_{T}$	6	8	-	GHz	
$I_{\rm C}$ = 50 mA, $V_{\rm CE}$ = 8 V, $f$ = 500 MHz						
Collector-base capacitance	C <sub>cb</sub>	-	0.59	0.9	pF	
$V_{\text{CB}} = 10 \text{ V}, f = 1 \text{ MHz}, V_{\text{BE}} = 0$ ,						
emitter grounded						
Collector emitter capacitance	C <sub>ce</sub>	-	0.28	-		
$V_{CE} = 10 \text{ V}, f = 1 \text{ MHz}, V_{BE} = 0$ ,						
base grounded						
Emitter-base capacitance	C <sub>eb</sub>	-	2.25	-		
$V_{\text{EB}} = 0.5 \text{ V}, f = 1 \text{ MHz}, V_{\text{CB}} = 0$ ,						
collector grounded						
Minimum noise figure	<i>NF</i> <sub>min</sub>				dB	
$I_{\rm C}$ = 10 mA, $V_{\rm CE}$ = 8 V, $Z_{\rm S}$ = $Z_{\rm Sopt}$ ,						
f = 900 MHz		-	1	-		
f = 1.8 GHz		-	1.6	-		
Power gain, maximum available <sup>1)</sup>	G <sub>ma</sub>					
$I_{\rm C}$ = 30 mA, $V_{\rm CE}$ = 8 V, $Z_{\rm S}$ = $Z_{\rm Sopt,}$ $Z_{\rm L}$ = $Z_{\rm Lopt}$ ,						
f = 900 MHz		-	18	-		
f = 1.8 GHz		-	12	-		
Transducer gain	$ S_{21e} ^2$				dB	
$I_{\rm C}$ = 30 mA, $V_{\rm CE}$ = 8 V, $Z_{\rm S}$ = $Z_{\rm L}$ = 50 $\Omega$ ,						
f = 900 MHz		-	14.5	-		
f = 1.8 GHz			8.5	-		
Third order intercept point at output <sup>2)</sup>	IP <sub>3</sub>	-	29.5	-	dBm	
$I_{\rm C}$ = 30 mA, $V_{\rm CE}$ = 8 V, $Z_{\rm S}$ = $Z_{\rm L}$ = 50 $\Omega$ ,						
f = 900 MHz						
1dB Compression point	P <sub>-1dB</sub>	_	13	-		
$I_{\rm C}$ = 30 mA, $V_{\rm CE}$ = 8 V, $Z_{\rm S}$ = $Z_{\rm L}$ = 50 $\Omega$ ,						
f = 900 MHz						

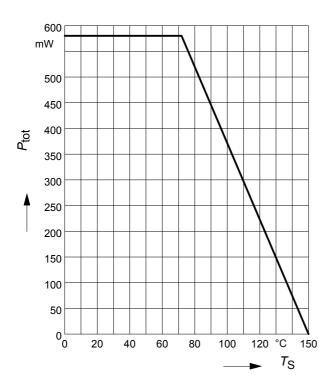
 $<sup>{}^{1}</sup>G_{\text{ma}} = |S_{21} / S_{12}| (k-(k^{2}-1)^{1/2})$ 

<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

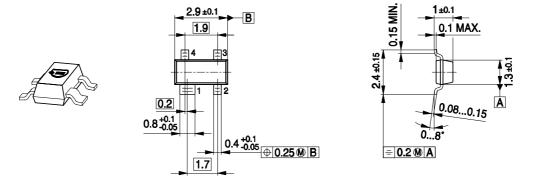


# Total power dissipation $P_{tot} = f(T_S)$





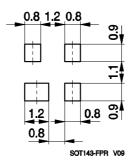
# Package Outline



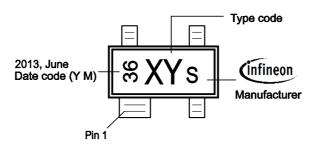
Note: Mold flash, protrusions or gate burrs of 0,2 mm max. per side are not included

SOT143-PO V09

#### **Foot Print**

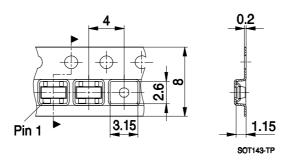


# Marking Layout (Example)



## Standard Packing

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





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