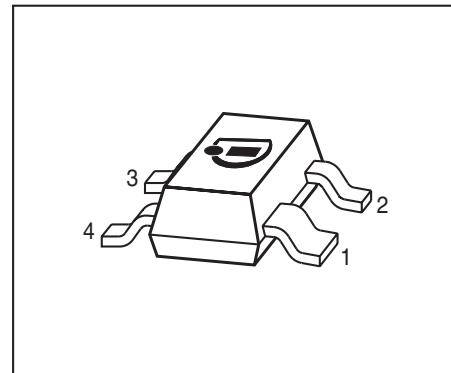


## Low Noise Silicon Bipolar RF Transistor

- 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!

Type	Marking	Pin Configuration						Package
BFP193	RCs	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	$V_{CEO}$	12	V
Collector-emitter voltage	$V_{CES}$	20	
Collector-base voltage	$V_{CBO}$	20	
Emitter-base voltage	$V_{EBO}$	2	
Collector current	$I_C$	80	mA
Base current	$I_B$	10	
Total power dissipation <sup>1)</sup>	$P_{tot}$	580	mW
$T_S \leq 72$ °C			°C
Junction temperature	$T_J$	150	
Storage temperature	$T_{Stg}$	-55 ... 150	

### Thermal Resistance

Parameter	Symbol	Value	Unit
Junction - soldering point <sup>2)</sup>	$R_{thJS}$	135	K/W

<sup>1</sup> $T_S$  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  $T_A = 25^\circ\text{C}$ , unless otherwise specified

Parameter	Symbol	Values			Unit
		min.	typ.	max.	
<b>DC Characteristics</b>					
Collector-emitter breakdown voltage $I_C = 1 \text{ mA}, I_B = 0$	$V_{(\text{BR})\text{CEO}}$	12	-	-	V
Collector-emitter cutoff current $V_{\text{CE}} = 20 \text{ V}, V_{\text{BE}} = 0$	$I_{\text{CES}}$	-	-	100	$\mu\text{A}$
Collector-base cutoff current $V_{\text{CB}} = 10 \text{ V}, I_E = 0$	$I_{\text{CBO}}$	-	-	100	nA
Emitter-base cutoff current $V_{\text{EB}} = 1 \text{ V}, I_C = 0$	$I_{\text{EBO}}$	-	-	1	$\mu\text{A}$
DC current gain $I_C = 30 \text{ mA}, V_{\text{CE}} = 8 \text{ V}$ , pulse measured	$h_{\text{FE}}$	70	100	140	-

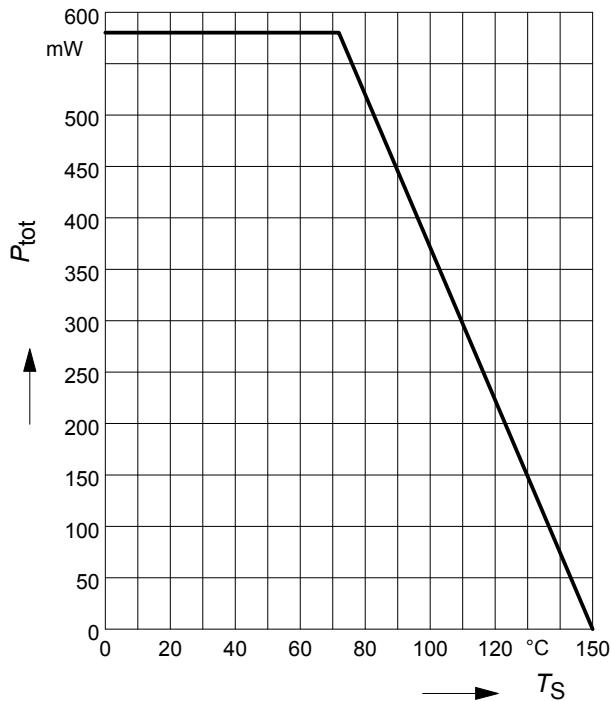
**Electrical Characteristics** at  $T_A = 25^\circ\text{C}$ , unless otherwise specified

Parameter	Symbol	Values			Unit
		min.	typ.	max.	
<b>AC Characteristics</b> (verified by random sampling)					
Transition frequency $I_C = 50 \text{ mA}, V_{CE} = 8 \text{ V}, f = 500 \text{ MHz}$	$f_T$	6	8	-	GHz
Collector-base capacitance $V_{CB} = 10 \text{ V}, f = 1 \text{ MHz}, V_{BE} = 0 \text{ V}$ , emitter grounded	$C_{cb}$	-	0.59	0.9	pF
Collector emitter capacitance $V_{CE} = 10 \text{ V}, f = 1 \text{ MHz}, V_{BE} = 0 \text{ V}$ , base grounded	$C_{ce}$	-	0.28	-	
Emitter-base capacitance $V_{EB} = 0.5 \text{ V}, f = 1 \text{ MHz}, V_{CB} = 0 \text{ V}$ , collector grounded	$C_{eb}$	-	2.25	-	
Minimum noise figure $I_C = 10 \text{ mA}, V_{CE} = 8 \text{ V}, Z_S = Z_{\text{Sopt}}$ , $f = 900 \text{ MHz}$ $f = 1.8 \text{ GHz}$	$NF_{\text{min}}$	-	1	-	dB
-	-	-	1.6	-	
Power gain, maximum available <sup>1)</sup> $I_C = 30 \text{ mA}, V_{CE} = 8 \text{ V}, Z_S = Z_{\text{Sopt}}, Z_L = Z_{\text{Lopt}}$ , $f = 900 \text{ MHz}$ $f = 1.8 \text{ GHz}$	$G_{\text{ma}}$	-	18	-	
-	-	-	12	-	
Transducer gain $I_C = 30 \text{ mA}, V_{CE} = 8 \text{ V}, Z_S = Z_L = 50\Omega$ , $f = 900 \text{ MHz}$ $f = 1.8 \text{ GHz}$	$ S_{21\text{el}} ^2$	-	14.5	-	dB
-	-	-	8.5	-	
Third order intercept point at output <sup>2)</sup> $I_C = 30 \text{ mA}, V_{CE} = 8 \text{ V}, Z_S = Z_L = 50 \Omega$ , $f = 900 \text{ MHz}$	$IP_3$	-	29.5	-	dBm
1dB Compression point $I_C = 30 \text{ mA}, V_{CE} = 8 \text{ V}, Z_S = Z_L = 50 \Omega$ , $f = 900 \text{ MHz}$	$P_{-1\text{dB}}$	-	13	-	

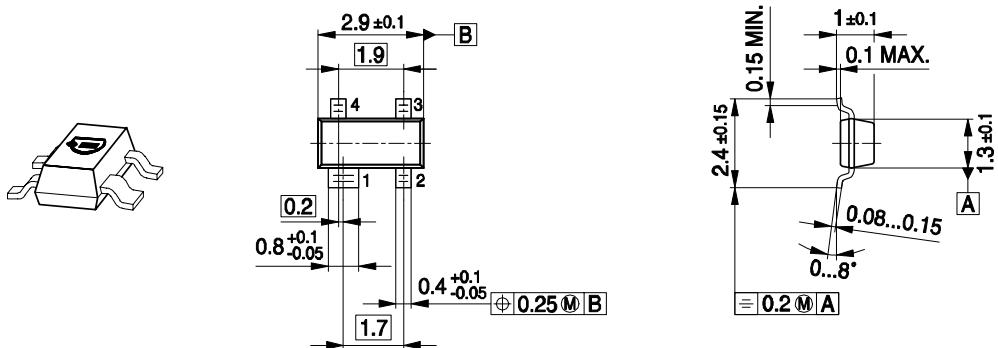
<sup>1)</sup> $G_{\text{ma}} = |S_{21}| / S_{12}| (k - (k^2 - 1)^{1/2})$ 
<sup>2)</sup>IP3 value depends on termination of all intermodulation frequency components.

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

**Total power dissipation  $P_{\text{tot}} = f(T_S)$**



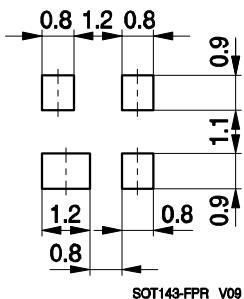
## Package Outline



Note: Mold flash, protrusions or gate burrs of 0.2 mm max. per side are not included

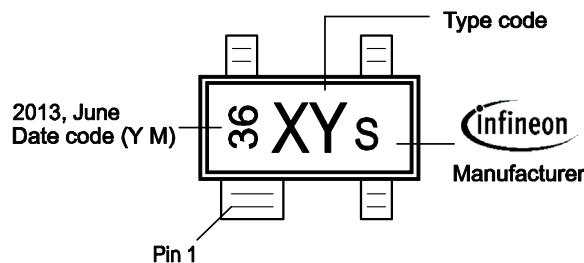
SOT143-PO V09

## Foot Print



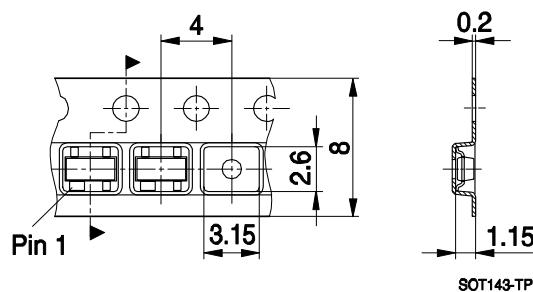
SOT143-FPR V09

## Marking Layout (Example)



## Standard Packing

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



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