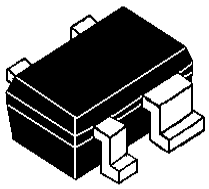
START450

NPN Silicon RF Transistor

- COMPRESSION POINT P1dB=19dBm @ 1.8GHz
- TRANSITION FREQUENCY 42GHz
- HIGH LINEARITY
- ULTRA MINIATURE SOT343(SC70) PACKAGE



SOT343 (SC70)

ORDER CODE	BRANDING
START450TR	450

DESCRIPTION

The START450 is a member of the START family that provide the state of the art of RF silicon process to the market. Manufacturated in the third generation of ST proprietary bipolar process, it offers the best mix of gain and NF for given breakdown voltage(BVceo).
It offers performance level only archived with GaAs products before.

APPLICATIONS

- LNA FOR GSM/DCS, DECT, PCS, PCN, CDMA, W-CDMA
- PREDRIVER FOR DECT
- GENERAL PURPOSE 500MHz-5GHz

Obsolete Product(s) - Obsolete Product(s)

ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
V_{ceo}	Collector emitter voltage	4.5	V
V_{cbo}	Collector base voltage	15	V
V_{ebo}	Emitter base voltage	1.5	V
I_c	Collector current	100	mA
I_b	Base current	10	mA
P_{tot}	Total dissipation, T_s = TBD	450	mW
T_{stg}	Storage temperature	-65 to 150	^oC
T_j	Max. operating junction temperature	150	^oC

ABSOLUTE MAXIMUM RATINGS

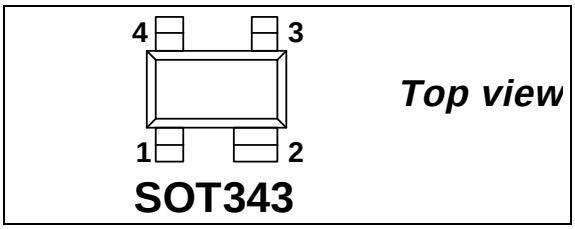
R_{thjs}	Thermal Resistance Junction soldering point	MAX	≤ 120	$^oC/W$

ELECTRICAL CHARACTERISTICS (T_j=25 ^{o}C,unless otherwise specified)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
I_{cbo}	Collector cutoff current	Vcb = 5V, Ie = 0A			150	nA
I_{ebo}	Emitter-base cutoff current	Veb = 1.5V, Ic = 0A			15	µA
Hfe	DC current gain	Ic = 50mA, Vce = 4V		160		
NFmin	Minimim noise figure	Ic = 10mA, Vce = 2V, f = 1.8GHz, $Z_S = Z_S$opt		1.2		dB
Ga	NFmin associated gain	Ic = 10mA, Vce = 2V, f = 1.8GHz		13		dB
$\|S21\|^2$	Insertion power gain	Ic = 50mA, Vce = 2V, f = 1.8GHz		13.7		dB
Gms (1)	Maximum stable gain	Ic = 50mA, Vce = 2V, f = 1.8GHz		19.1		dB
P_{-1dB}	1dB compression point	Ic = 50mA,Vce = 3V, f = 1.8GHz		19		dBm
OIP3	Ouput third order intercept point	Ic = 50mA,Vce = 3V, f = 1.8GHz		29		dBm

Note(1): Gms = | S_{21} / S_{12} |

PINOUT



PIN CONNECTION

Pin No.	Description
1	BASE
3	COLLECTOR
2,4	EMITTER

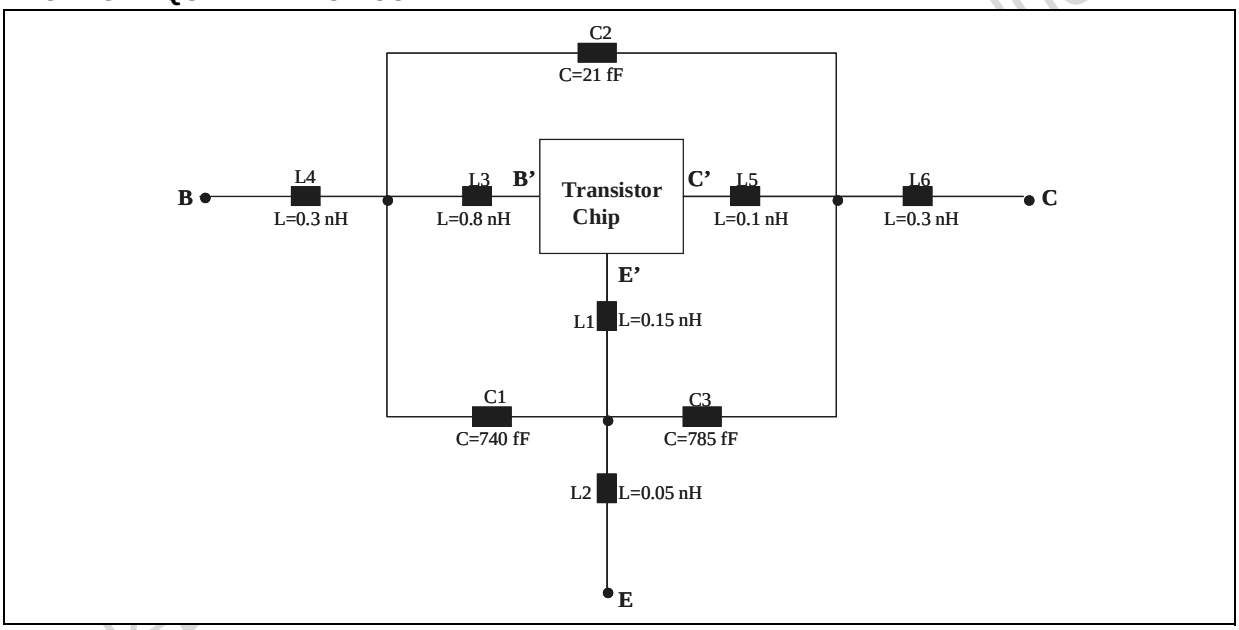
Obsolete Product(s) - Obsolete Product(s)

SPICE PARAMETERS (Gummel-Poon Model, Berkley-SPICE 2G.6 Syntax)

TRANSISTOR CHIP DATA

Symbol	Value	Symbol	Value	Symbol	Value
TMEAS	27.0	FC	0.8	XJBC	0.3
IS	1.9E-16	EG	1.12	XTI	4.51
ISE	1.9E-12	NF	1	BF	295
NR	1	NE	2.658	VAF	40
ISC	3.19E-15	BR	13.7	VAR	2.5
IKF	{1.448*((T(^{0}C)+273.15)/ 300.15)^(-1.6)}	NC	1.5	TF	3.1E-12
TR	7E-10	PTF	35	VTF	27
XTF	20	ITF	4.8	MJE	0.44
RB	2.7	RBM	0.64	MJC	0.31
RC	1.38	RE	0.15	MJS	0.281
CJE	1462E-15	VJE	1.1	IKR	43.5E-3
CJC	660E-15	VJC	0.84	XTB	-0.32
CJS	425E-15	VJS	0.453		

PACKAGE EQUIVALENT CIRCUIT



In order to avoid high complexity of the package equivalent circuit, the two emitter leads of SOT-343 package are combined in one electrical connection.

FOR MORE ACCURACY SIMULATION IN SATURATION REGION :

Adding the 5 Spice parameters showed in Table A and using **ST Spice Library** (available on request) you can achieve a more accuracy simulation in the saturation region. ST Spice library is compatible with following simulators: ELDO MENTOR (any version), SPECTRE CADENCE (any version), ADS (version 2001 only).

Table A (Spice Parameters extracted in saturation region)

RW	Vjj	ENP	VRP	RP
2.594	0.769	2.45	{4.64*((TEMPER+273.15)/300.15)^(1.5)}	1.00E-6

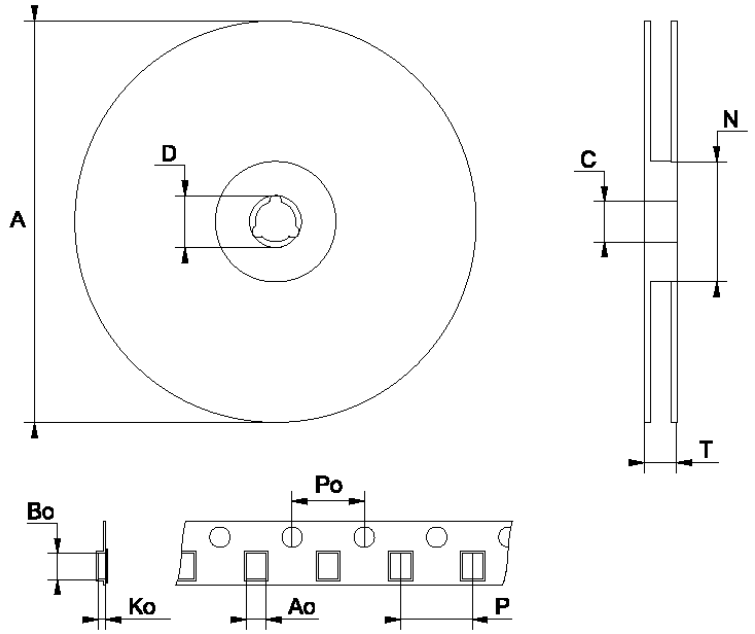
COMMON EMITTER S-PARAMETERS (V_{CE} = 2V, I_C = 50mA)

FREQ (MHz)	$IS_{11}I$	$S_{11}\angle\Phi$	$IS_{21}I$	$S_{21}\angle\Phi$	$IS_{12}I$	$S_{12}\angle\Phi$	$IS_{22}I$	$S_{22}\angle\Phi$
0.1	0.572	-112	61.291	137	0.017	50	0.723	-75
0.5	0.740	-167	17.769	111	0.022	60	0.545	-149
0.9	0.747	-178	9.937	113	0.026	93	0.539	-163
1	0.744	179	8.736	114	0.025	103	0.534	-166
1.5	0.726	172	5.913	125	0.059	146	0.526	-171
1.8	0.715	167	4.893	128	0.060	157	0.520	-173
2	0.699	165	4.484	131	0.086	163	0.510	-175
2.5	0.646	158	3.661	139	0.128	172	0.481	-174
3	0.582	153	2.879	146	0.145	177	0.452	-173
3.5	0.523	150	2.195	154	0.189	170	0.449	-173
4	0.441	153	1.733	175	0.211	151	0.381	-178

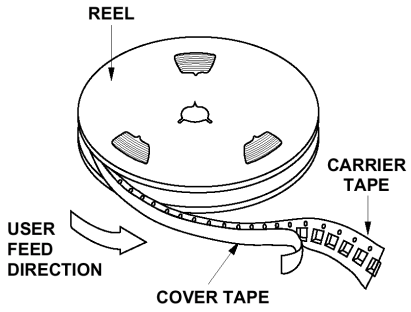
Obsolete Product(s) - Obsolete Product(s)

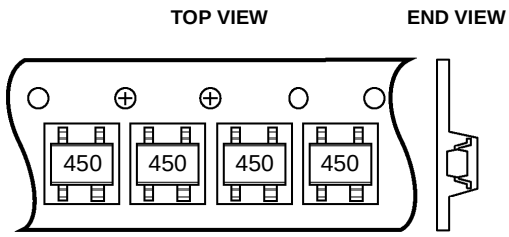
TAPE & REEL DIMENSIONS

	mm		
	MIN.	**TYP.**	**MAX**
A	178.5	179	179.5
C	12.8	13.0	13.5
D	20.2		
N	54.5	55	55.5
T			14.4
Ao		2.25	
Bo		2.7	
Ko		1.2	
Po	3.8 (cumulative 10 Po)	4.0	4.2 (cumulative 10 Po)
P		4.0	



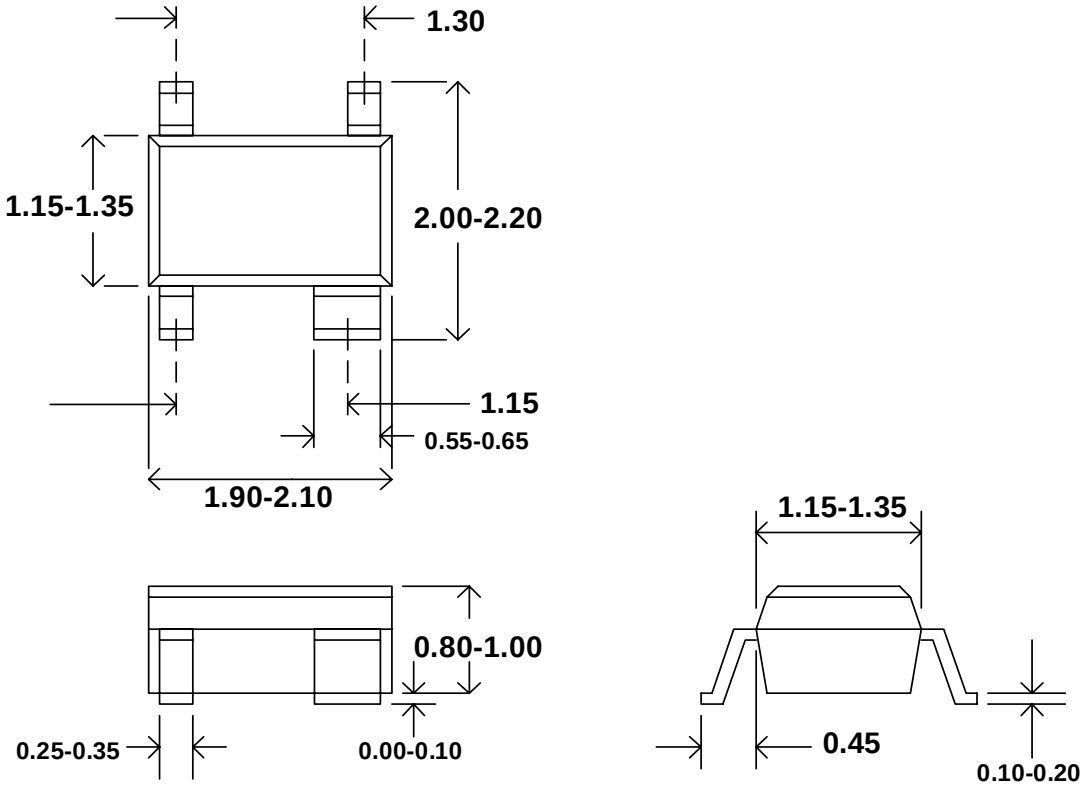
DEVICE ORIENTATION





Complete Product(s)

PACKAGE DIMENSIONS SOT343 (SC-70 4 leads)



Obsolete Product(s) - O

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