

RoHS Compliant Product
A suffix of "-C" specifies halogen and lead free

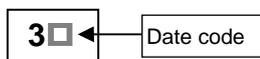
FEATURES

- Collector current capability $I_C = -200\text{mA}$
- Collector-emitter voltage $V_{CE0} = -40\text{V}$.

APPLICATION

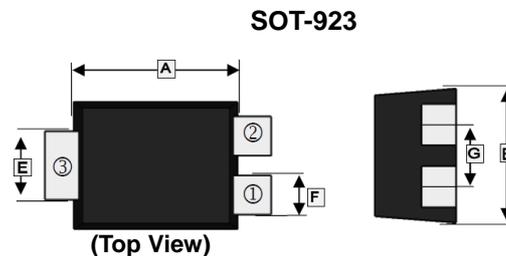
- General switching and amplification.

MARKING

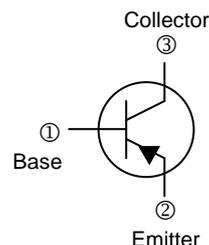


PACKAGING DIMENSION

Package	MPQ	Leader Size
SOT-923	8K	7 inch



REF.	Millimeter		REF.	Millimeter	
	Min.	Max.		Min.	Max.
A	0.75	0.85	E	0.15	0.25
B	0.55	0.65	F	0.1	0.2
C	0.07	0.17	G	0.35 REF.	
D	0.34	0.40	H	0.95	1.05



ABSOLUTE MAXIMUM RATINGS ($T_A = 25^\circ\text{C}$ unless otherwise noted)

Parameters	Symbol	Rating	Unit
Collector - Emitter Voltage	V_{CE0}	-40	Vdc
Collector - Base Voltage	V_{CB0}	-40	Vdc
Emitter - Base Voltage	V_{EB0}	-5	Vdc
Collector Current - Continuous	I_C	-200	mAdc
Total Device Dissipation ¹	P_D	$T_A = 25^\circ\text{C}$	290
		De-rate above 25°C	2.3
Thermal Resistance, Junction to Ambient ¹	$R_{\theta JA}$	432	$^\circ\text{C} / \text{W}$
Total Device Dissipation ²	P_D	$T_A = 25^\circ\text{C}$	347
		De-rate above 25°C	2.8
Thermal Resistance, Junction to Ambient ²	$R_{\theta JA}$	360	$^\circ\text{C} / \text{W}$
Thermal Resistance, Junction to Lead3 ²	$R_{\theta JL}$	143	$^\circ\text{C} / \text{W}$
Junction, Storage Temperature	T_J, T_{STG}	-55 ~ +150	$^\circ\text{C}$

NOTE:

1. 100 mm² 1 oz, copper traces
2. 500 mm² 1 oz, copper traces.

ELECTRICAL CHARACTERISTICS ($T_A=25^\circ\text{C}$ unless otherwise noted)(Continued)

Parameters	Symbol	MIN.	MAX.	Unit	TEST CONDITIONS
OFF CHARACTERISTICS					
Collector-Emitter Breakdown Voltage ¹	$V_{(BR)CEO}$	-40	-	Vdc	$I_C=1\text{mA}, I_B=0$
Collector-Base Breakdown Voltage	$V_{(BR)CBO}$	-40	-	Vdc	$I_C=10\mu\text{A}, I_E=0$
Emitter-Base Breakdown Voltage	$V_{(BR)EBO}$	-5	-	Vdc	$I_E=10\mu\text{A}, I_C=0$
Collector Cut-Off Current	I_{CEX}	-	-50	nA	$V_{CE}=30\text{Vdc}, V_{EB}=3\text{Vdc}$
ON CHARACTERISTICS ¹					
DC Current Gain	$h_{FE(1)}$	60	-		$I_C = -0.1\text{mA}, V_{CE} = -1\text{Vdc}$
	$h_{FE(2)}$	80	-		$I_C = -1\text{mA}, V_{CE} = -1\text{Vdc}$
	$h_{FE(3)}$	100	300		$I_C = -10\text{mA}, V_{CE} = -1\text{Vdc}$
	$h_{FE(4)}$	60	-		$I_C = -50\text{mA}, V_{CE} = -1\text{Vdc}$
	$h_{FE(5)}$	30	-		$I_C = -100\text{mA}, V_{CE} = -1\text{Vdc}$
Collector-Emitter Saturation Voltage ³	$V_{CE(sat)}$	-	-0.25	Vdc	$I_C = -10\text{mA}, I_B = -1\text{mA}$
		-	-0.4		$I_C = -50\text{mA}, I_B = -5\text{mA}$
Base-Emitter Saturation Voltage ³	$V_{BE(sat)}$	-0.65	-0.85	Vdc	$I_C = -10\text{mA}, I_B = -1\text{mA}$
		-	-0.95		$I_C = -50\text{mA}, I_B = -5\text{mA}$
SMALL-SIGNAL CHARACTERISTICS					
Current-Gain-Bandwidth Product	f_T	250	-	MHz	$I_C = 10\text{mA}, V_{CE} = 20\text{Vdc}, f=100\text{MHz}$
Output Capacitance	C_{obo}	-	4.5	pF	$V_{CB} = -5\text{Vdc}, I_E=0, f=1.0\text{MHz}$
Input Capacitance	C_{ibo}	-	10	pF	$V_{EB} = -0.5\text{Vdc}, I_E=0, f=1.0\text{MHz}$
Noise Figure	NF	-	4	dB	$V_{CE} = -5\text{Vdc}, I_C = -100\mu\text{A}, R_S=1\text{K}\Omega, f=1.0\text{kHz}$
SWITCHING CHARACTERISTICS					
Delay Time	t_d	-	35	nS	$V_{CC} = -3\text{Vdc}, V_{BE} = 0.5\text{Vdc}$
Rise Time	t_r	-	35	nS	$I_C = -10\text{mA}, I_{B1} = -1\text{mA}$
Storage Time	t_s	-	250	nS	$V_{CC} = -3\text{Vdc}, I_C = -10\text{mA}$
Fall Time	t_f	-	50	nS	$I_{B1}=I_{B2} = -1\text{mA}$

NOTE:

1. Pulse Test: Pulse Width $\leq 300\mu\text{s}$, Duty Cycle $\leq 2.0\%$

TYPICAL TRANSIENT CHARACTERISTIC CURVES

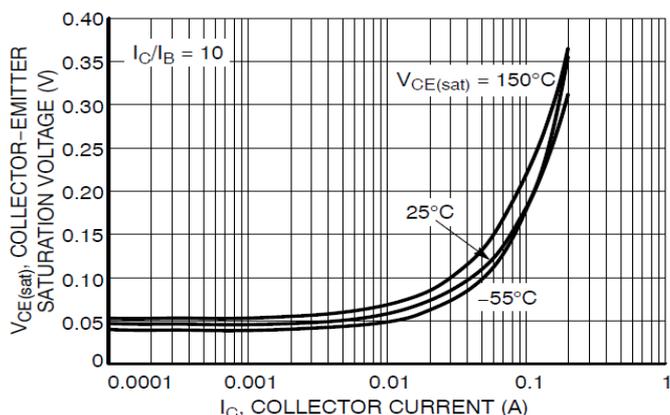


Figure 1. Collector Emitter Saturation Voltage vs. Collector Current

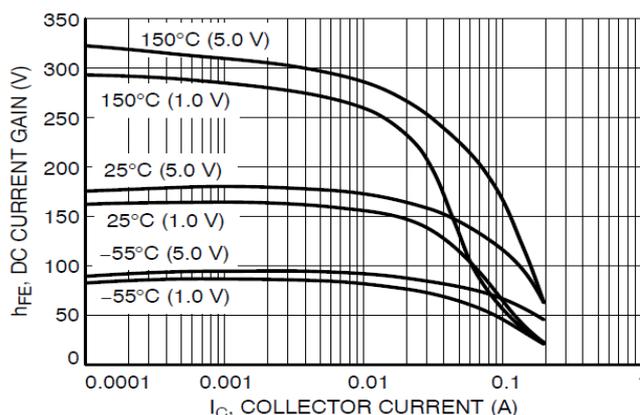


Figure 2. DC Current Gain vs. Collector Current

TYPICAL TRANSIENT CHARACTERISTIC CURVES

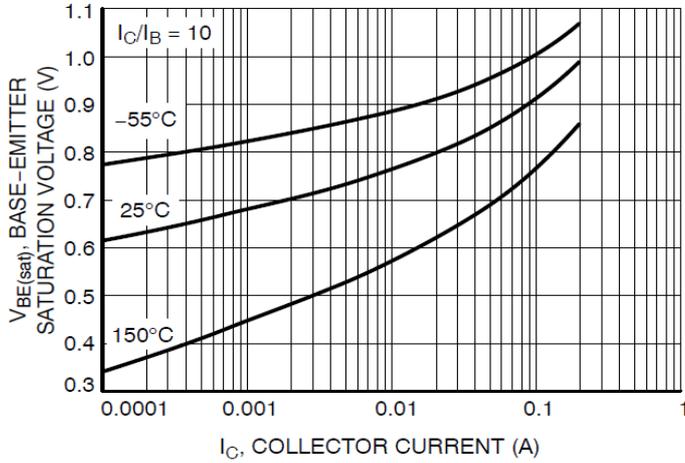


Figure 3. Base Emitter Saturation Voltage vs. Collector Current

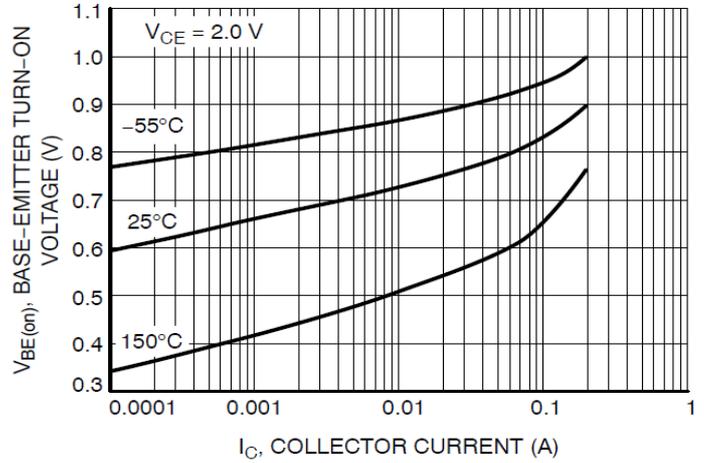


Figure 4. Base Emitter Turn-On Voltage vs. Collector Current

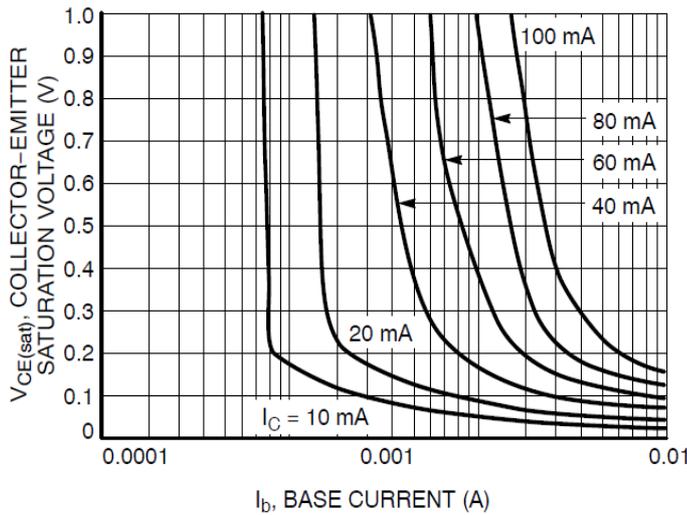


Figure 5. Saturation Region

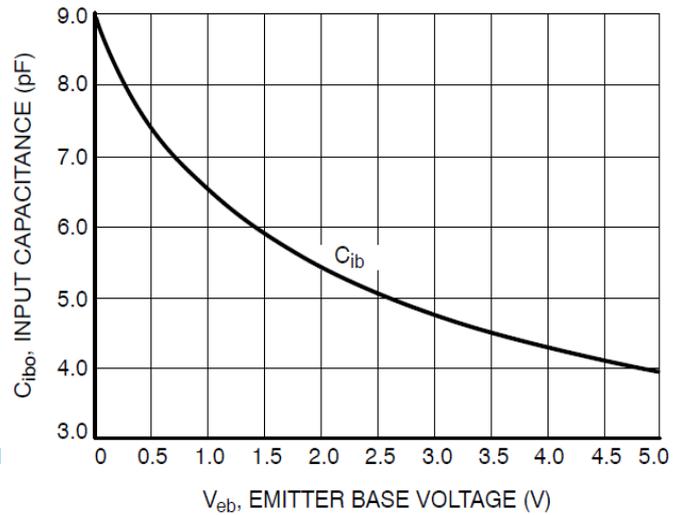


Figure 6. Input Capacitance

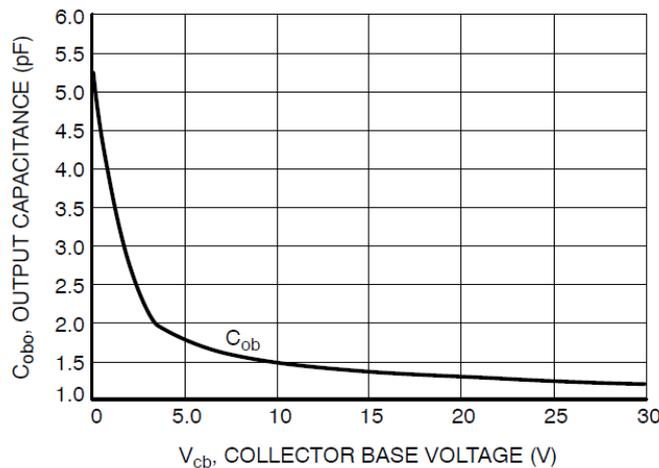


Figure 7. Output Capacitance