

## Features

- Epitaxial Planar Die Construction
- Complementary NPN Type Available MMST3904
- Halogen Free. "Green" Device (Note 1)
- Moisture Sensitivity Level 1
- Epoxy Meets UL 94 V-0 Flammability Rating
- Lead Free Finish/RoHS Compliant ("P" Suffix Designates RoHS Compliant. See Ordering Information)

## Maximum Ratings @ 25°C Unless Otherwise Specified

- Operating Junction Temperature Range: -55°C to +150°C
- Storage Temperature Range: -55°C to +150°C

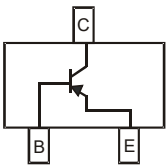
Parameter	Symbol	Rating	Unit
Collector-Base Voltage	$V_{CBO}$	-10	V
Collector-Emitter Voltage	$V_{CEO}$	-10	V
Emitter-Base Voltage	$V_{EBO}$	-5	V
Collector Current <sup>(2)</sup>	$I_C$	-100	mA
Collector Power Dissipation <sup>(2)</sup>	$P_C$	200	mW

Note: 1. Halogen free "Green" products are defined as those which contain <900ppm bromine, <900ppm chlorine (<1500ppm total Br + Cl) and <1000ppm antimony compounds.

2. Valid provided that terminals are kept at ambient temperature.

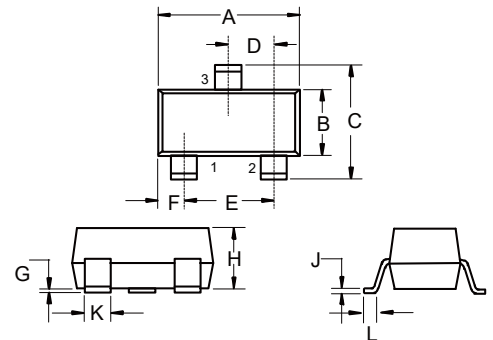
**Marking: K5N**

## Internal Structure



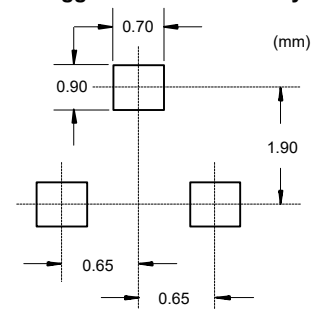
# PNP Small Signal Transistors

## SOT-323



DIM	INCHES		MM		NOTE
	MIN	MAX	MIN	MAX	
A	0.071	0.087	1.80	2.20	
B	0.045	0.053	1.15	1.35	
C	0.083	0.096	2.10	2.45	
D	0.026		0.65		TYP.
E	0.047	0.055	1.20	1.40	
F	0.012	0.016	0.30	0.40	
G	0.000	0.004	0.00	0.10	
H	0.035	0.044	0.90	1.10	
J	0.002	0.010	0.05	0.25	
K	0.006	0.016	0.15	0.40	
L	0.010	0.018	0.26	0.46	

## Suggested Solder Pad Layout



**Electrical Characteristics @ 25°C Unless Otherwise Specified**

Parameter	Symbol	Min	Typ	Max	Units	Conditions
Collector-Base Breakdown Voltage <sup>(3)</sup>	$V_{(BR)CBO}$	-40			V	$I_C = -10\mu A, I_E = 0$
Collector-Emitter Breakdown Voltage <sup>(3)</sup>	$V_{(BR)CEO}$	-40			V	$I_C = -1mA, I_B = 0$
Emitter-Base Breakdown Voltage <sup>(3)</sup>	$V_{(BR)EBO}$	-5			V	$I_E = -10\mu A, I_C = 0$
Collector Cutoff Current <sup>(3)</sup>	$I_{CEX}$			-50	nA	$V_{CE} = -30V, V_{EB(OFF)} = -3V$
Base Cutoff Current <sup>(3)</sup>	$I_{BL}$			-50	nA	$V_{CE} = -30V, V_{EB(OFF)} = -3V$
DC Current Gain <sup>(3)</sup>	$h_{FE(1)}$	60				$V_{CE} = -1V, I_C = -0.1mA$
	$h_{FE(2)}$	80				$V_{CE} = -1V, I_C = -1mA$
	$h_{FE(3)}$	100		300		$V_{CE} = -1V, I_C = -10mA$
	$h_{FE(4)}$	60				$V_{CE} = -1V, I_C = -50mA$
	$h_{FE(5)}$	30				$V_{CE} = -1V, I_C = -500mA$
Collector-Emitter Saturation Voltage <sup>(3)</sup>	$V_{CE(sat)}$			-0.2	V	$I_C = -10mA, I_B = -1mA$
				-0.3	V	$I_C = -50mA, I_B = -5mA$
Base-Emitter Saturation Voltage <sup>(3)</sup>	$V_{BE(sat)}$	-0.65		-0.85	V	$I_C = -10mA, I_B = -1mA$
				-0.95	V	$I_C = -50mA, I_B = -5mA$
Output Capacitance	$C_{cbo}$			4.5	pF	$V_{CB} = -5V, I_E = 0, f = 1MHz$
Input Capacitance	$C_{ibo}$			10	pF	$V_{EB} = -0.5V, I_C = 0, f = 1MHz$
Input Impedance	$h_{ie}$	2		12	K $\Omega$	$V_{CE} = -10V, I_C = -1mA, f = 1KHz$
Voltage Feedback Ratio	$h_{re}$	0.1		10	$\times 10^4$	
Small Signal Current Gain	$h_{fe}$	100		400		
Output Admittance	$h_{oe}$	3		60	$\mu S$	
Transition Frequency	$f_T$	300			MHz	$V_{CE} = -20V, I_C = -10mA, f = 100MHz$
Noise Figure	NF			4	dB	$V_{CE} = -5V, I_C = -0.1mA$ $R_S = 1K\Omega, f = 1KHz$
Delay Time	$t_d$			35	ns	$V_{CC} = -3V, I_C = -10mA$
Rise Time	$t_r$			35	ns	$V_{BE(OFF)} = -0.5V, I_{B1} = -1mA$
Storage Time	$t_s$			225	ns	$V_{CC} = -3V, I_C = -10mA$
Fall Time	$t_f$			75	ns	$I_{B1} = I_{B2} = -1mA$

 Note: 3. Pulse Width  $\leq 300\mu s$ , Duty Cycle  $\leq 2.0\%$

**Curve Characteristics**

Fig. 1 - Static Characteristics

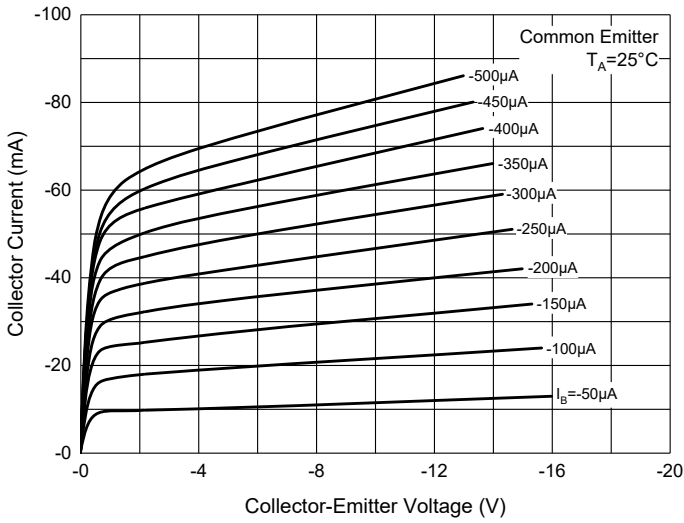


Fig. 2 - DC Current Gain Characteristics

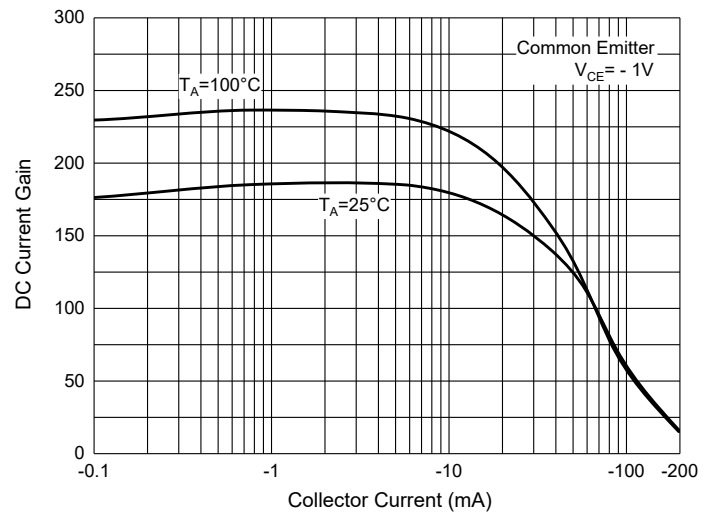


Fig. 3 - Collector-Emitter Saturation Voltage Characteristics

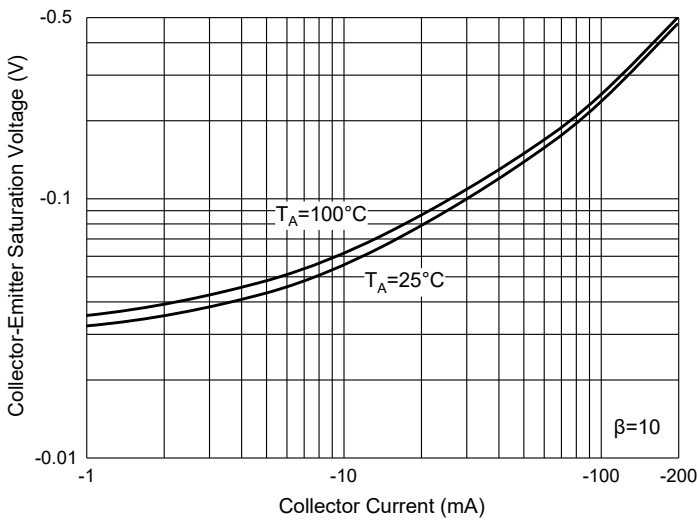


Fig. 4 - Base-Emitter Saturation Voltage Characteristics

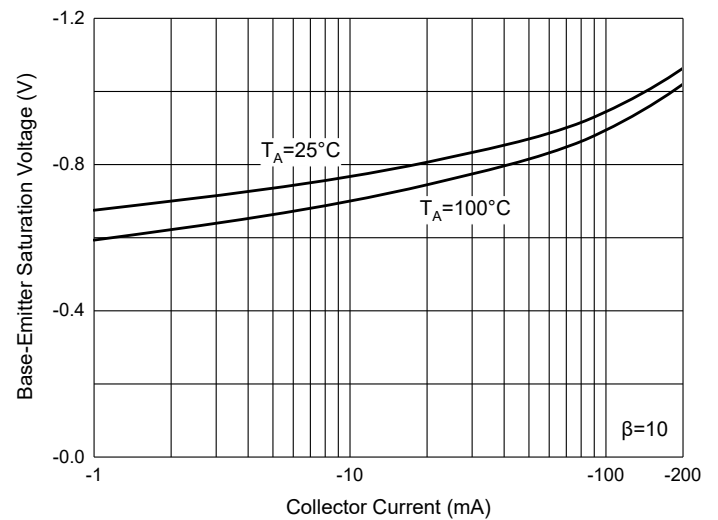


Fig. 5 - Base-Emitter Voltage Characteristics

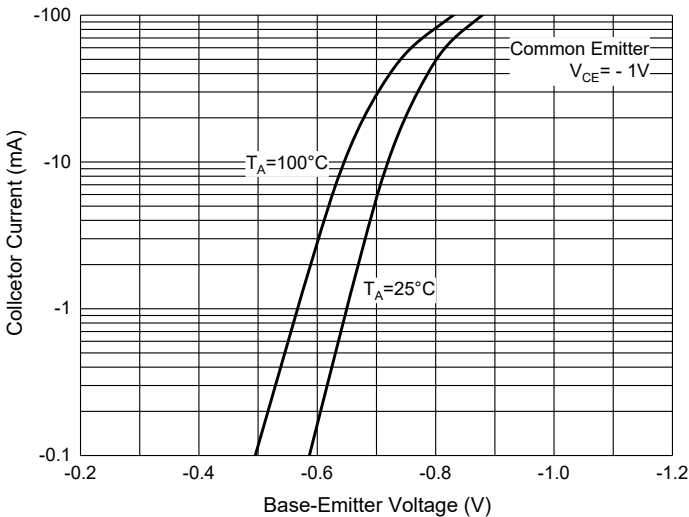


Fig. 6 - Collector Power Derating Curve

