

## Features

- Halogen Free. "Green" Device (Note 1)
- AEC-Q101 Qualified
- 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)

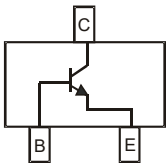
## Maximum Ratings

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

Parameter	Symbol	Rating	Unit
Collector-Base Voltage	$V_{CBO}$	40	V
Collector-Emitter Voltage	$V_{CEO}$	25	V
Emitter-Base Voltage	$V_{EBO}$	5	V
Collector Current	$I_C$	500	mA
Collector Power Dissipation	$P_C$	300	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.

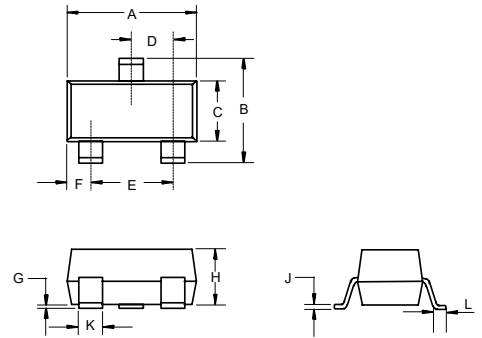
## Internal Structure



Marking: J3

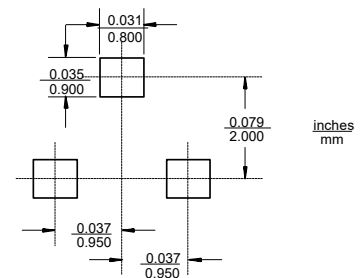
# NPN Silicon Plastic-Encapsulate Transistor

## SOT-23



DIM	INCHES		MM		NOTE
	MIN	MAX	MIN	MAX	
A	0.110	0.120	2.80	3.04	
B	0.083	0.104	2.10	2.64	
C	0.047	0.055	1.20	1.40	
D	0.034	0.041	0.85	1.05	
E	0.067	0.083	1.70	2.10	
F	0.018	0.024	0.45	0.60	
G	0.0004	0.006	0.01	0.15	
H	0.035	0.043	0.90	1.10	
J	0.003	0.007	0.08	0.18	
K	0.012	0.020	0.30	0.51	
L	0.007	0.020	0.20	0.50	

## Suggested Solder Pad Layout



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

Parameter	Symbol	Min	Typ	Max	Units	Conditions
Collector-Base Breakdown Voltage	$V_{(BR)CBO}$	40			V	$I_C=100\mu A, I_E=0$
Collector-Emitter Breakdown Voltage	$V_{(BR)CEO}$	25			V	$I_C=0.1mA, I_B=0$
Emitter-Base Breakdown Voltage	$V_{(BR)EBO}$	5			V	$I_E=100\mu A, I_C=0$
Collector Cutoff Current	$I_{CBO}$			100	nA	$V_{CB}=40V, I_E=0$
Collector Cutoff Current	$I_{CEO}$			100	nA	$V_{CE}=20V, I_B=0$
Emitter-Base Cutoff Current	$I_{EBO}$			100	nA	$V_{EB}=5V, I_C=0$
DC Current Gain	$h_{FE1}$	120		350		$V_{CE}=1V, I_C=50mA$
	$h_{FE2}$	40				$V_{CE}=1V, I_C=500mA$
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$			0.6	V	$I_C=500mA, I_B=50mA$
Base-Emitter Saturation Voltage	$V_{BE(sat)}$			1.2	V	$I_C=500mA, I_B=50mA$
Base- Emitter Voltage	$V_{EB}$			1.4	V	$I_E=100mA$
Transition Frequency	$f_T$	150			MHZ	$V_{CE}=6V, I_C=20mA, f=30MHz$

**CLASSIFICATION OF  $h_{FE}$  (1)**

Rank	MMS9013HE3-L	MMS9013HE3-H
Range	120-200	200-350

**Curve Characteristics**

Fig. 1 - Static Characteristics

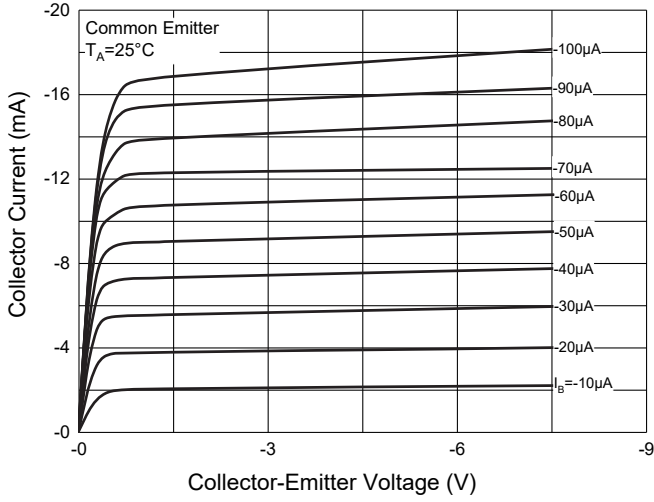


Fig. 2 - DC Current Gain Characteristics

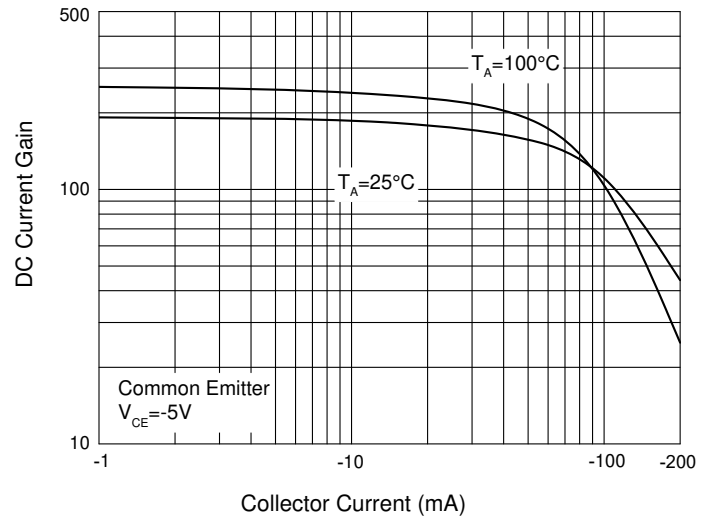


Fig. 3 - Base-Emitter Saturation Voltage Characteristics

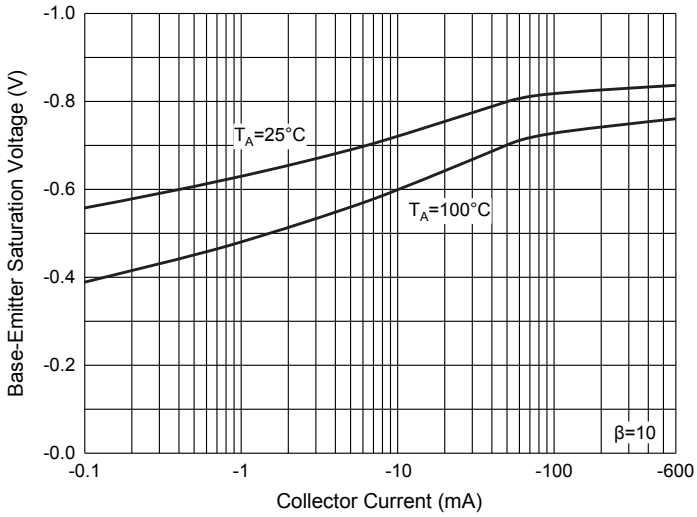


Fig. 4 - Collector-Emitter Saturation Voltage Characteristics

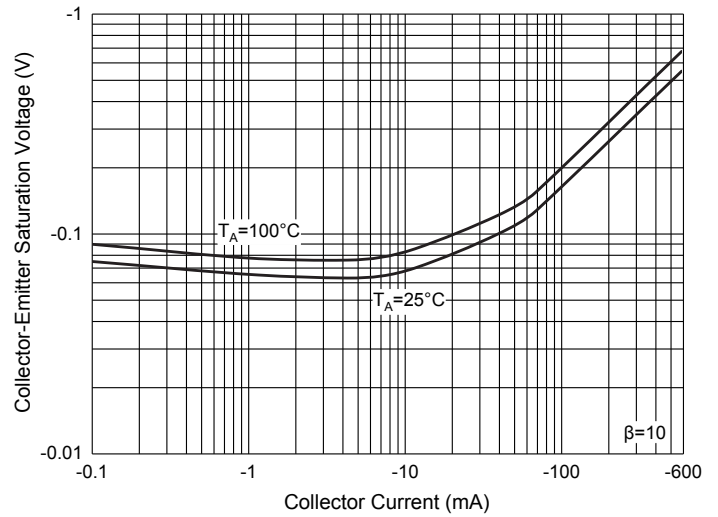


Fig. 5 - Base-Emitter Voltage Characteristics

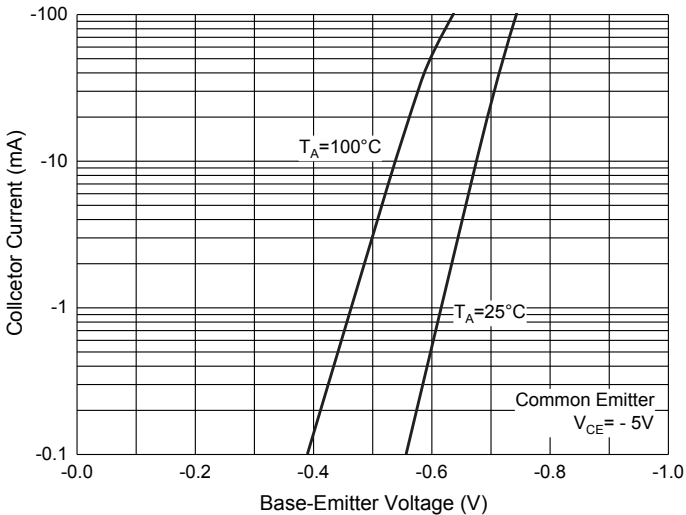
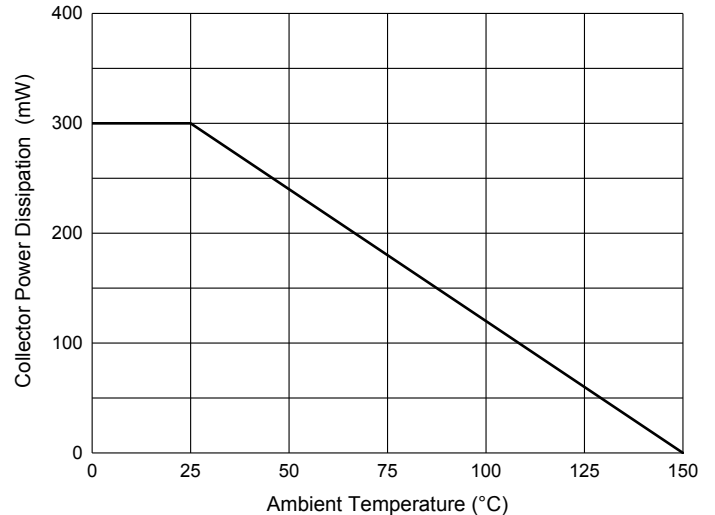


Fig. 6 - Collector Power Derating Curve



## Ordering Information

Device	Packing
Part Number-TP	Tape&Reel: 3Kpcs/Reel

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