

**Features**

- Halogen Free Available Upon Request By Adding Suffix "-HF"
- 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

**NPN Transistor**

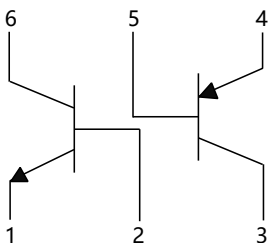
Parameter	Symbol	Rating	Unit
Collector-Base Voltage	$V_{CBO}$	180	V
Collector-Emitter Voltage	$V_{CEO}$	160	V
Emitter-Base Voltage	$V_{EBO}$	6	V
Continuous Collector Current	$I_C$	200	mA
Power Dissipation	$P_D$	200	mW
Thermal Resistance Junction to Ambient	$R_{\theta JA}$	625	°C/W

**PNP Transistor**

Parameter	Symbol	Rating	Unit
Collector-Base Voltage	$V_{CBO}$	-160	V
Collector-Emitter Voltage	$V_{CEO}$	-150	V
Emitter-Base Voltage	$V_{EBO}$	-5	V
Continuous Collector Current	$I_C$	-200	mA
Power Dissipation	$P_D$	200	mW
Thermal Resistance Junction to Ambient	$R_{\theta JA}$	625	°C/W

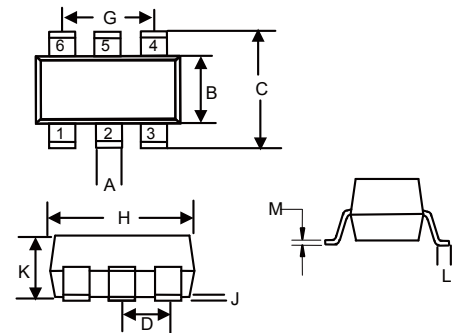
**Marking: KNM**

**Internal Structure**



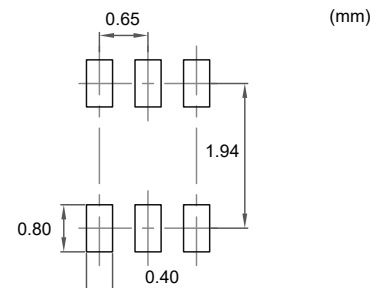
**NPN/PNP  
Plastic-Encapsulate  
Transistors**

**SOT-363**



DIM	DIMENSIONS				NOTE
	INCHES		MM		
	MIN	MAX	MIN	MAX	
A	0.006	0.014	0.15	0.35	
B	0.045	0.053	1.15	1.35	
C	0.079	0.096	2.00	2.45	
D	0.026		0.65		TYP.
G	0.047	0.055	1.20	1.40	
H	0.071	0.087	1.80	2.20	
J	-----	0.004	-----	0.10	
K	0.031	0.043	0.80	1.10	
L	0.010	0.018	0.26	0.46	
M	0.003	0.006	0.08	0.15	

**Suggested Solder Pad Layout**



**Electrical Characteristics @ T<sub>A</sub>=25°C Unless Otherwise Specified**

**NPN Transistor**

Parameter	Symbol	Min	Typ	Max	Units	Conditions
Collector-Base Breakdown Voltage	V <sub>(BR)CBO</sub>	180			V	I <sub>C</sub> =100μA, I <sub>E</sub> =0
Collector-Emitter Breakdown Voltage	V <sub>(BR)CEO</sub>	160			V	I <sub>C</sub> =1mA, I <sub>B</sub> =0
Emitter-Base Breakdown Voltage	V <sub>(BR)EBO</sub>	6			V	I <sub>E</sub> =10μA, I <sub>C</sub> =0
Collector Cutoff Current	I <sub>CBO</sub>			50	nA	V <sub>CB</sub> =120V, I <sub>E</sub> =0
Emitter Cutoff Current	I <sub>EBO</sub>			50	nA	V <sub>EB</sub> =4V, I <sub>C</sub> =0
DC Current Gain	h <sub>FE(1)</sub>	80				V <sub>CE</sub> =5V, I <sub>C</sub> =1mA
	h <sub>FE(2)</sub>	100		300		V <sub>CE</sub> =5V, I <sub>C</sub> =10mA
	h <sub>FE(3)</sub>	30				V <sub>CE</sub> =5V, I <sub>C</sub> =50mA
Collector-Emitter Saturation Voltage	V <sub>CE(sat)</sub>			0.15	V	I <sub>C</sub> =10mA, I <sub>B</sub> =1mA
				0.20	V	I <sub>C</sub> =50mA, I <sub>B</sub> =5mA
Base-Emitter Saturation Voltage	V <sub>BE(sat)</sub>			1.00	V	I <sub>C</sub> =10mA, I <sub>B</sub> =1mA
				1.00	V	I <sub>C</sub> =50mA, I <sub>B</sub> =5mA
Transition Frequency	f <sub>T</sub>	100		300	MHz	V <sub>CE</sub> =10V, I <sub>C</sub> =10mA, f=100MHz
Output Capacitance	C <sub>obo</sub>			6	pF	V <sub>CB</sub> =10V, I <sub>E</sub> =0, f=1MHz
Noise Figure	N <sub>F</sub>			8	dB	V <sub>CE</sub> =5V, I <sub>C</sub> =0.2mA, f=1KHz, R <sub>s</sub> =1KΩ

**PNP Transistor**

Parameter	Symbol	Min	Typ	Max	Units	Conditions
Collector-Base Breakdown Voltage	V <sub>(BR)CBO</sub>	-160			V	I <sub>C</sub> =-100μA, I <sub>E</sub> =0
Collector-Emitter Breakdown Voltage	V <sub>(BR)CEO</sub>	-150			V	I <sub>C</sub> =-1mA, I <sub>B</sub> =0
Emitter-Base Breakdown Voltage	V <sub>(BR)EBO</sub>	-5			V	I <sub>E</sub> =-10μA, I <sub>C</sub> =0
Collector Cutoff Current	I <sub>CBO</sub>			-50	nA	V <sub>CB</sub> =-120V, I <sub>E</sub> =0
Emitter Cutoff Current	I <sub>EBO</sub>			-50	nA	V <sub>EB</sub> =-3V, I <sub>C</sub> =0
DC Current Gain	h <sub>FE(1)</sub>	50				V <sub>CE</sub> =-5V, I <sub>C</sub> =-1mA
	h <sub>FE(2)</sub>	100		300		V <sub>CE</sub> =-5V, I <sub>C</sub> =-10mA
	h <sub>FE(3)</sub>	50				V <sub>CE</sub> =-5V, I <sub>C</sub> =-50mA
Collector-Emitter Saturation Voltage	V <sub>CE(sat)</sub>			-0.20	V	I <sub>C</sub> =-10mA, I <sub>B</sub> =-1mA
				-0.50	V	I <sub>C</sub> =-50mA, I <sub>B</sub> =-5mA
Base-Emitter Saturation Voltage	V <sub>BE(sat)</sub>			-1.00	V	I <sub>C</sub> =-10mA, I <sub>B</sub> =-1mA
				-1.00	V	I <sub>C</sub> =-50mA, I <sub>B</sub> =-5mA
Transition Frequency	f <sub>T</sub>	100		300.0	MHz	V <sub>CE</sub> =-10V, I <sub>C</sub> =-10mA, f=100MHz
Output Capacitance	C <sub>obo</sub>			6	pF	V <sub>CB</sub> =-10V, I <sub>E</sub> =0, f=1MHz
Noise Figure	N <sub>F</sub>			8	dB	V <sub>CE</sub> =-5V, I <sub>C</sub> =-0.2mA, f=1KHz, R <sub>s</sub> =10Ω

**Curve Characteristics(NPN)**

Fig. 1 - Static Characteristics

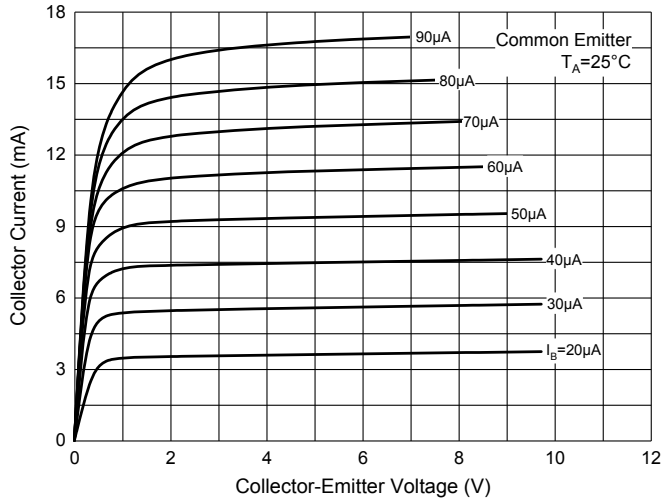


Fig. 2 - DC Current Gain Characteristics

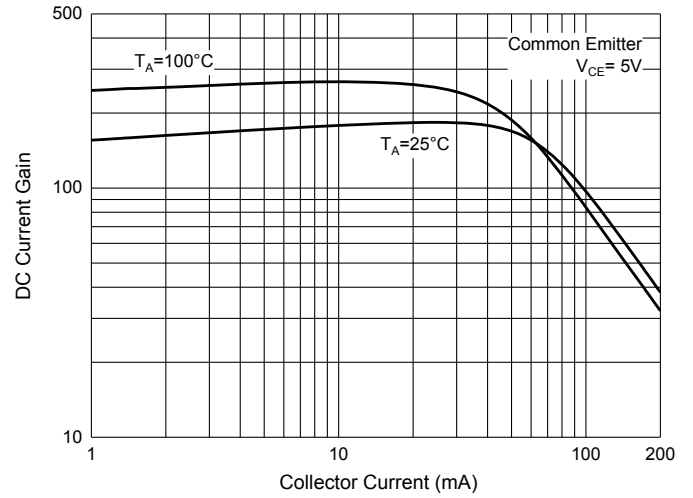


Fig. H- Collector-Emitter Saturation Voltage Characteristics

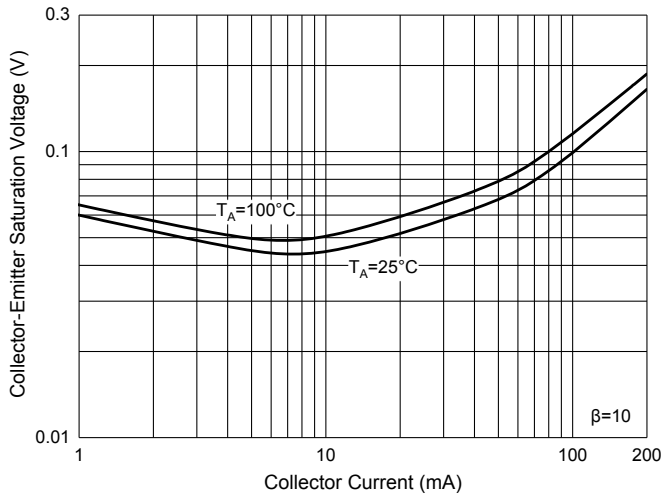


Fig. 4 - Base-Emitter Saturation Voltage Characteristics

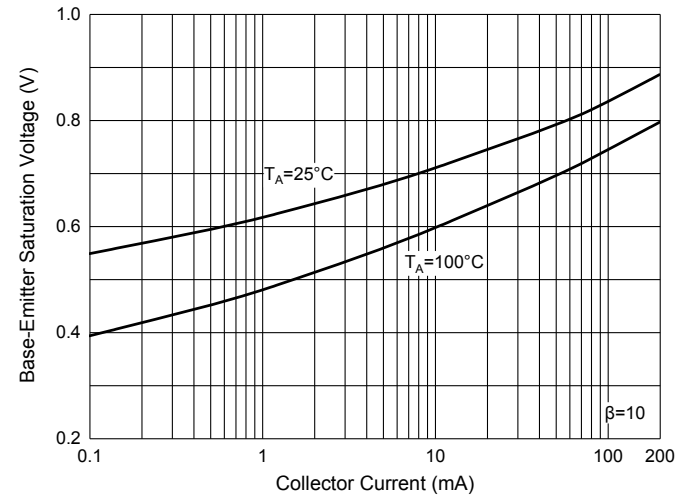


Fig. 5 - Base-Emitter Voltage Characteristics

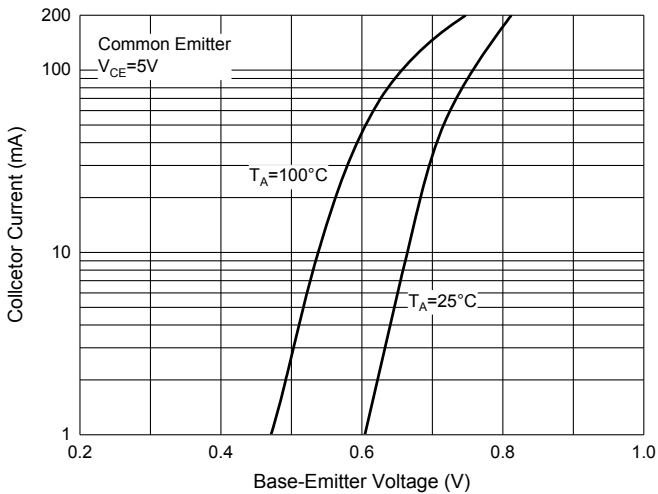
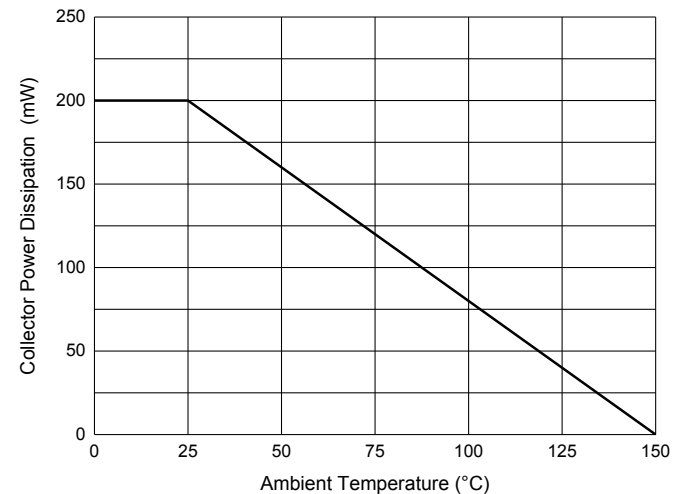


Fig. 1̂ - Collector Power Derating Curve



**Curve Characteristics(PNP)**

Fig. 7 - Static Characteristics

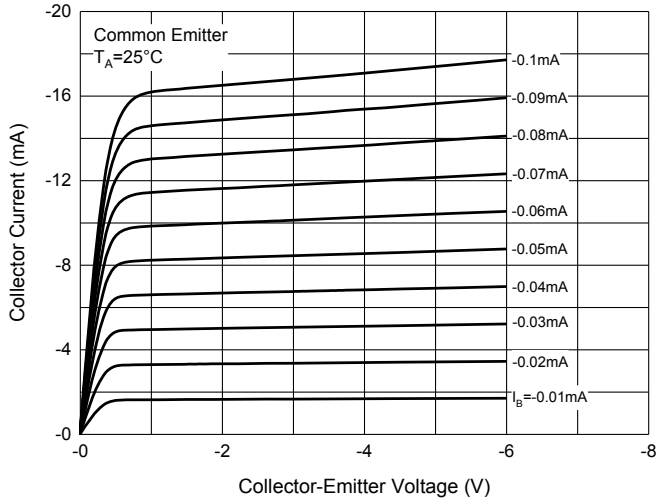


Fig. 8 - DC Current Gain Characteristics

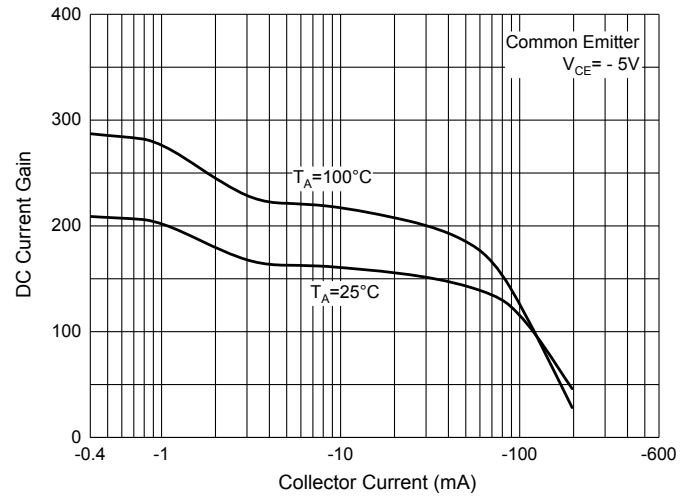


Fig. 9 - Collector-Emitter Saturation Voltage Characteristics

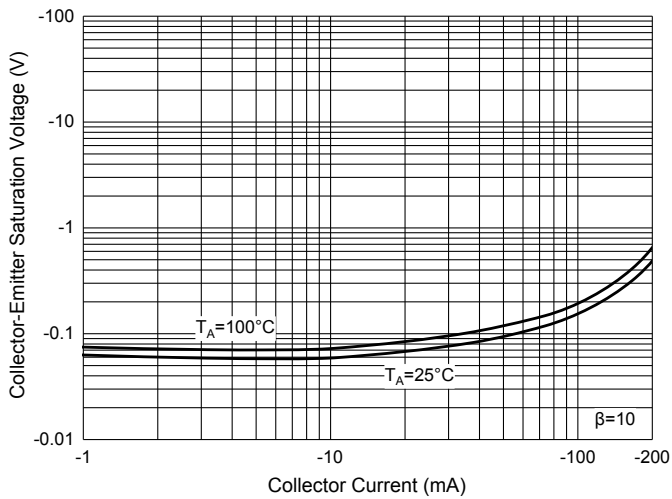


Fig. 10 - Base-Emitter Saturation Voltage Characteristics

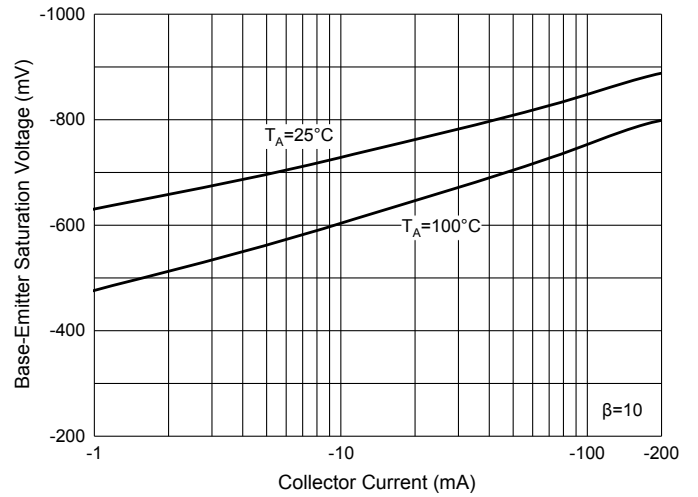


Fig. 11 - Base-Emitter Voltage Characteristics

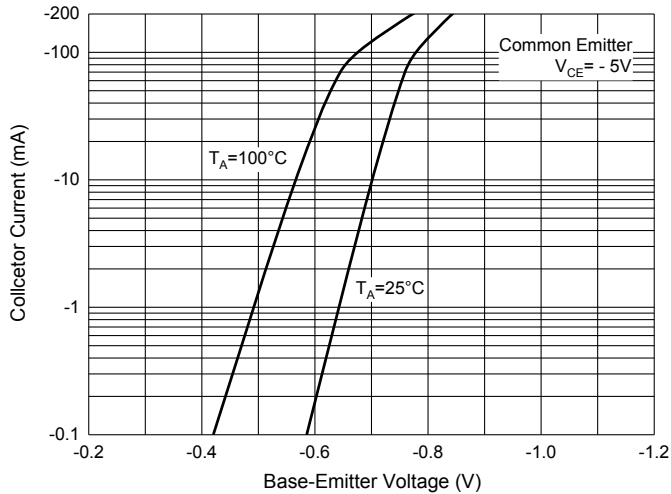
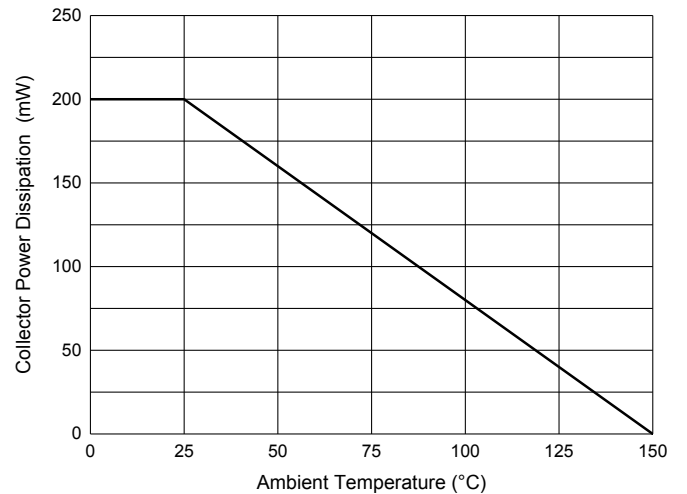


Fig. 12 - Collector Power Derating Curve



## Ordering Information

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

Note : Adding "-HF" Suffix for Halogen Free, eg. Part Number-TP-HF

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