

Features

- Complementary Pair: NPN(3904), PNP(3906)
- Ideal for Low Power Amplification and Switching
- Epitaxial Planar Die Construction
- 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

NPN Transistor

Parameter	Symbol	Rating	Unit
Collector-Base Voltage	V_{CBO}	60	V
Collector-Emitter Voltage	V_{CEO}	40	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

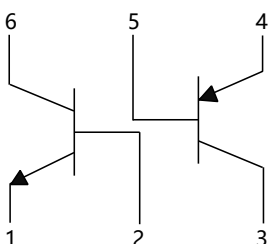
PNP Transistor

Parameter	Symbol	Rating	Unit
Collector-Base Voltage	V_{CBO}	-40	V
Collector-Emitter Voltage	V_{CEO}	-40	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

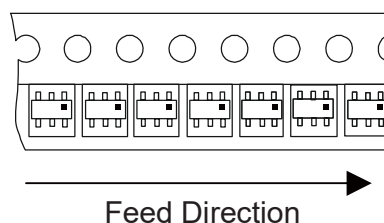
Note: 1. Halogen free "Green" products are defined as those which contain <900ppm bromine, <900ppm chlorine (<1500ppm total Br + Cl) and <1000ppm antimony compounds.

Marking: K46

Internal Structure

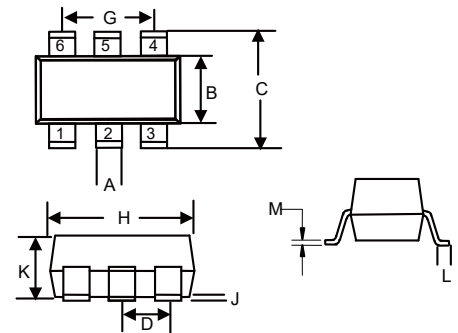


Special packing as below



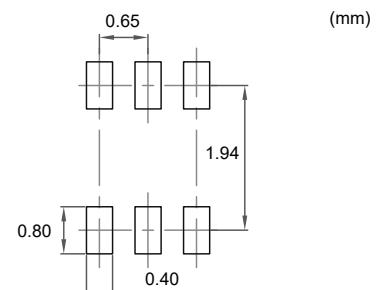
**NPN/PNP
Small Signal Surface
Mount Transistors**

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_A=25°C Unless Otherwise Specified
NPN Transistor

Parameter	Symbol	Min	Typ	Max	Units	Conditions
Collector-Base Breakdown Voltage	V _{(BR)CBO}	60			V	I _C =10μA, I _E =0
Collector-Emitter Breakdown Voltage	V _{(BR)CEO}	40			V	I _C =1mA, I _B =0
Emitter-Base Breakdown Voltage	V _{(BR)EBO}	6			V	I _E =10μA, I _C =0
Collector Cutoff Current	I _{CBO}			50	nA	V _{CB} =30V, I _E =0
Collector Cutoff Current	I _{CEO}			500	nA	V _{CE} =30V, I _B =0
Emitter Cutoff Current	I _{EBO}			50	nA	V _{EB} =5V, I _C =0
DC Current Gain	h _{FE(1)}	40				V _{CE} =1V, I _C =0.1mA
	h _{FE(2)}	70				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 =100mA
Collector-Emitter Saturation Voltage	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	V _{BE(sat)}	0.65		0.85	V	I _C =10mA, I _B =1mA
				0.95	V	I _C =50mA, I _B =5mA
Transition Frequency	f _T	300			MHz	V _{CE} =20V, I _C =20mA, f=100MHz
Delay Time	t _d			35	ns	V _{CC} =3V, I _C =10mA, V _{BE} =0.5V, I _{B1} =1mA
Rise Time	t _r			35	ns	
Storage Time	t _s			200	ns	V _{CC} =3V, I _C =10mA, I _{B1} =I _{B2} =1mA
Fall Time	t _f			50	ns	
Output Capacitance	C _{ob}			4	pF	V _{CB} =5V, I _E =0, f=1MHz
Noise Figure	N _F			5	dB	V _{CE} =5V, I _C =0.1mA, f=1KHz, R _s =1KΩ

Electrical Characteristics @ T_A=25°C Unless Otherwise Specified
PNP Transistor

Parameter	Symbol	Min	Typ	Max	Units	Conditions
Collector-Base Breakdown Voltage	V _{(BR)CBO}	-40			V	I _C =-10μA, I _E =0
Collector-Emitter Breakdown Voltage	V _{(BR)CEO}	-40			V	I _C =-1mA, I _B =0
Emitter-Base Breakdown Voltage	V _{(BR)EBO}	-5			V	I _E =-10μA, I _C =0
Collector Cutoff Current	I _{CBO}			-50	nA	V _{CB} =-30V, I _E =0
Emitter Cutoff Current	I _{EBO}			-50	nA	V _{EB} =-5V, I _C =0
DC Current Gain	h _{FE(1)}	40				V _{CE} =-1V, I _C =-0.1mA
	h _{FE(2)}	70				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 =-100mA
Collector-Emitter Saturation Voltage	V _{CE(sat)}			-0.25	V	I _C =-10mA, I _B =-1mA
				-0.4	V	I _C =-50mA, I _B =-5mA
Base-Emitter Saturation Voltage	V _{BE(sat)}	-0.65		-0.85	V	I _C =-10mA, I _B =-1mA
				-0.95	V	I _C =-50mA, I _B =-5mA
Transition Frequency	f _T	250			MHz	V _{CE} =-20V, I _C =-10mA, f=100MHz
Delay Time	t _d			35	ns	V _{CC} =-3V, I _C =-10mA, V _{BE} =-0.5V, I _{B1} =-I _{B2} =-1mA
Rise Time	t _r			35	ns	
Storage Time	t _s			225	ns	V _{CC} =-3V, I _C =-10mA, I _{B1} =-I _{B2} =-1mA
Fall Time	t _f			75	ns	
Output Capacitance	C _{ob}			4.5	pF	V _{CB} =-5V, I _E =0, f=1MHz
Noise Figure	N _F			4	dB	V _{CE} =-5V, I _C =-0.1mA, f=1KHz, R _s =1KΩ

Curve Characteristics(NPN)

Fig. 1 - Static Characteristics

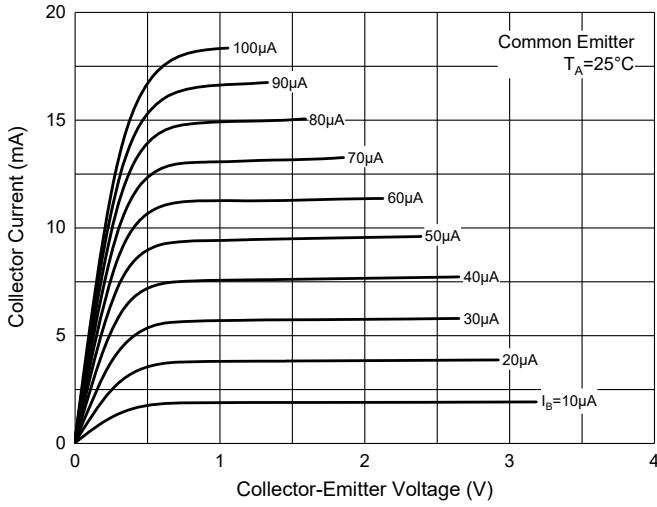


Fig. 2 - DC Current Gain Characteristics

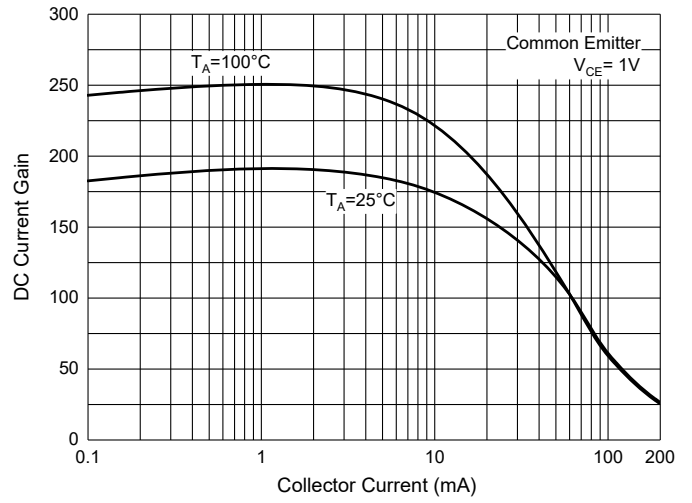


Fig. 3 - Collector-Emitter Saturation Voltage Characteristics

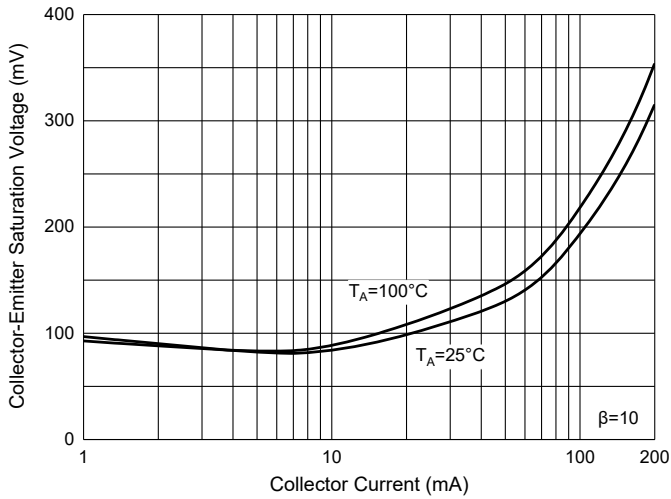


Fig. 4 - Base-Emitter Saturation Voltage Characteristics

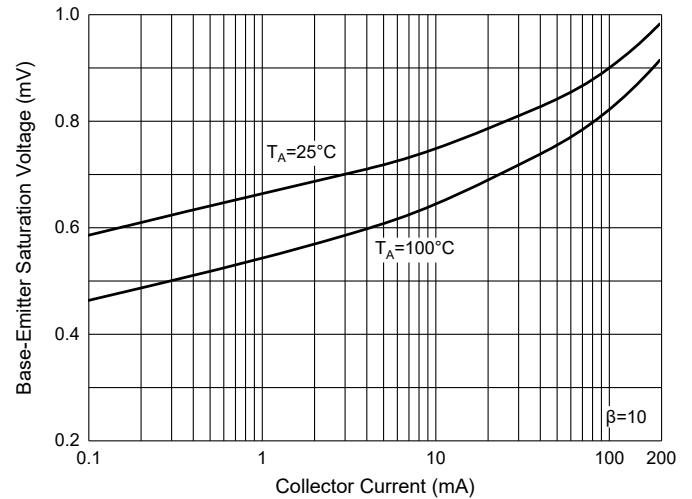


Fig. 5 - Base-Emitter Voltage Characteristics

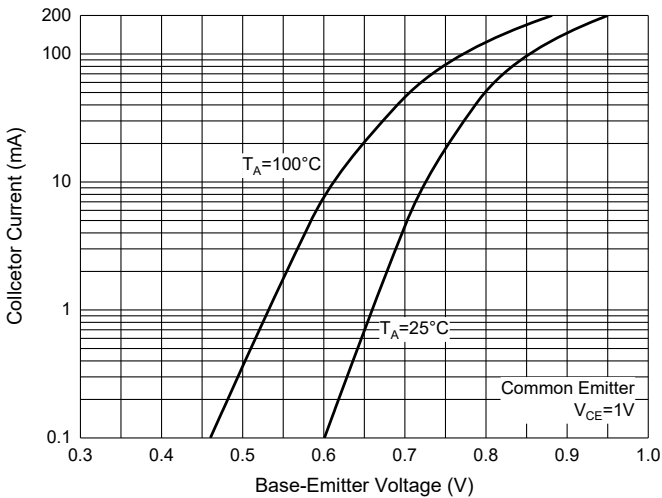
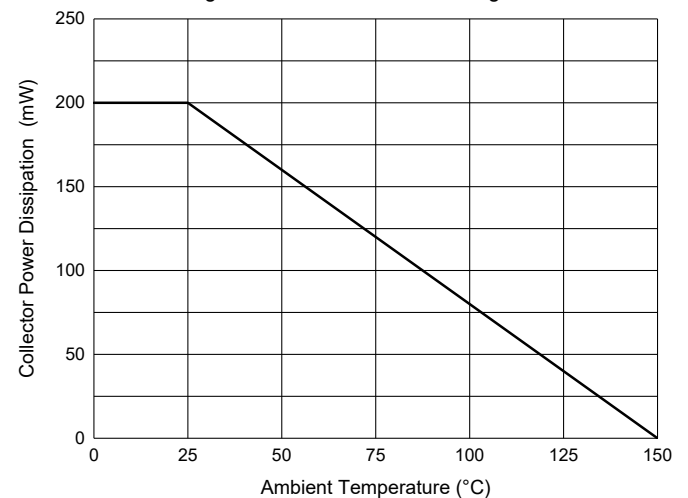


Fig. 6 - Collector Power Derating Curve



Curve Characteristics(PNP)

Fig. 7 - Static Characteristics

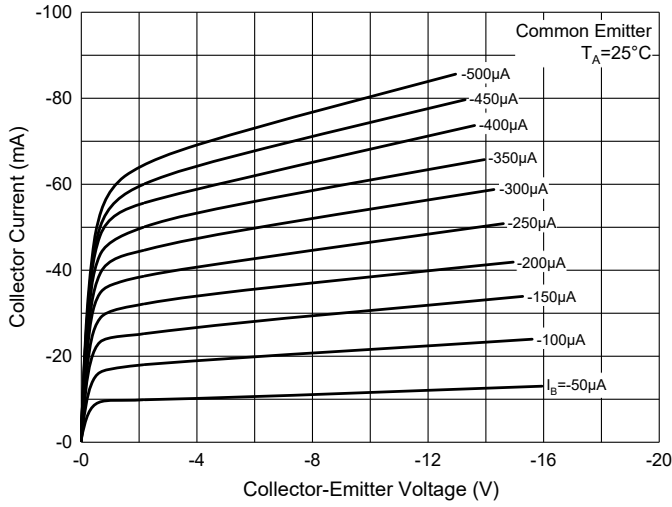


Fig. 8 - DC Current Gain Characteristics

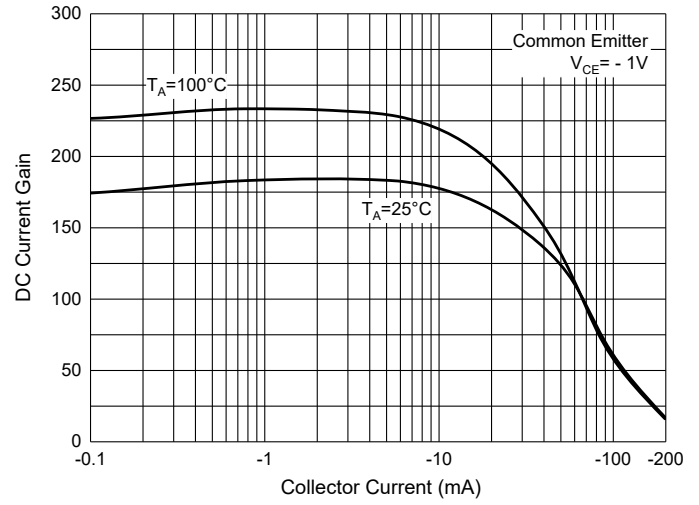


Fig. 9 - Collector-Emitter Saturation Voltage Characteristics

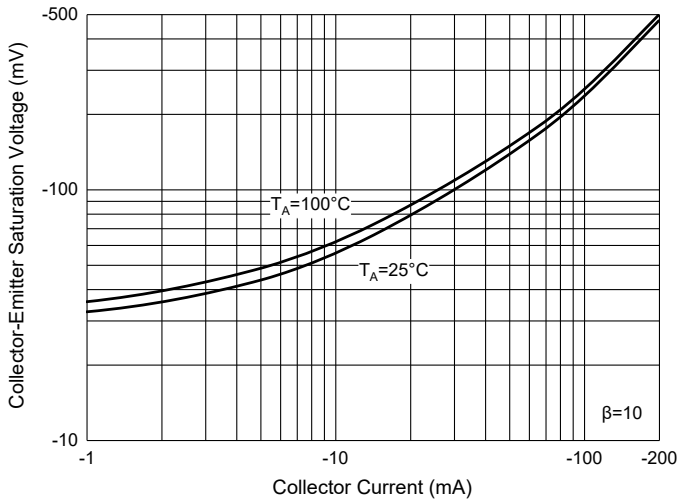


Fig. 10 - Base-Emitter Saturation Voltage Characteristics

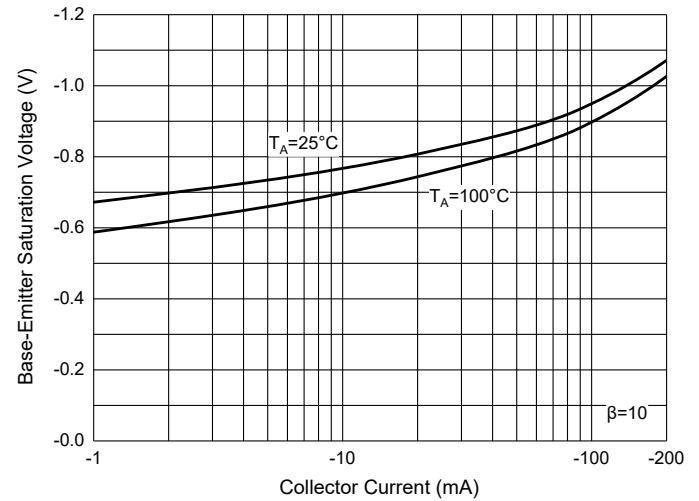


Fig. 11 - Base-Emitter Voltage Characteristics

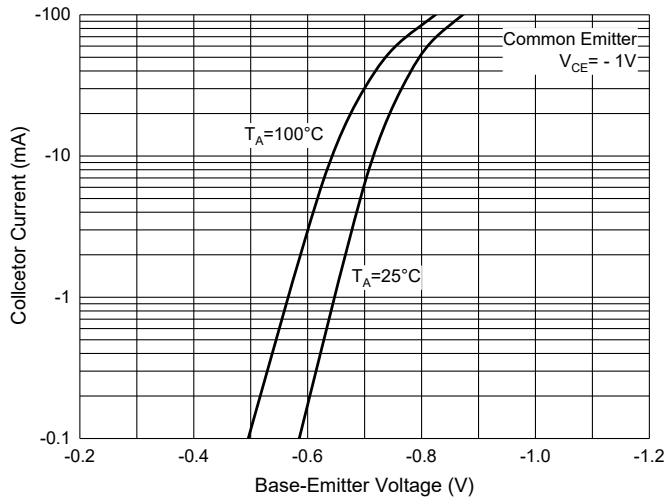
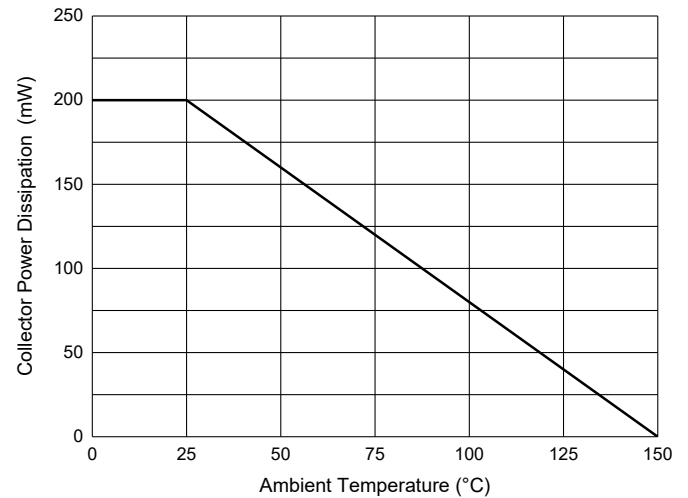


Fig. 12 - Collector Power Derating Curve



Ordering Information

Device	Packing
MMDT3946-TPQ2	Tape&Reel: 3Kpcs/Reel

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