Elektronische Bauelemente

MMDT3946-C

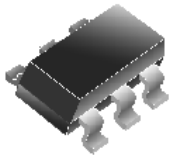
NPN：0.2A, 60V / PNP：-0.2A, -40V
Plastic-Encapsulate
Multi-Chip (NPN+PNP) Transistor

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

FEATURES

- Epoxy Meets UL 94 V-0 Flammability Rating
- For Switching and AF Amplifier Applications

SOT-363



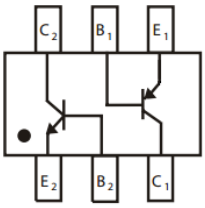
MARKING

46

K46

PACKAGING DIMENSION

Package	MPQ	Leader Size
SOT-363	3K	7 inch



ORDER INFORMATION

Part Number	Type
MMDT3946-C	Lead (Pb)-free and Halogen-free

ABSOLUTE MAXIMUM RATINGS (T_A=25°C unless otherwise specified)

Parameter	Symbol	Ratings		Unit
		NPN	PNP	
Collector-Base Voltage	V_{CBO}	60	-40	V
Collector-Emitter Voltage	V_{CEO}	40	-40	
Emitter-Base Voltage	V_{EBO}	5	-5	
Collector Current	I_C	200	-200	mA
Collector Power Dissipation	P_D	200		mW
Junction Temperature	T_J	150		°C
Storage Temperature	T_{STG}	-55~150		

NPN ELECTRICAL CHARACTERISTICS (T_A=25°C unless otherwise specified)

Characteristic	Symbol	Min.	Typ.	Max.	Unit	Test Condition
Collector-Base Breakdown Voltage	$V_{(BR)CBO}$	60	-	-	V	I_C=10μA, I_E=0
Collector-Emitter Breakdown Voltage	$V_{(BR)CEO}$	40	-	-		I_C=1mA, I_B=0
Emitter-Base Breakdown Voltage	$V_{(BR)EBO}$	5	-	-		I_E=10μA, I_C=0
Collector-Base Cut-off Current	I_{CBO}	-	-	50	nA	V_{CB}=30V, I_E=0
Collector-Emitter Cut-off Current	I_{CEO}	-	-	500		V_{CE}=30V, I_B=0
Emitter-Base Cut-off Current	I_{EBO}	-	-	50		V_{EB}=5V, I_C=0
DC Current Gain	h_{FE}	40	-	-		V_{CE}=1V, I_C=0.1mA
		70	-	-		V_{CE}=1V, I_C=1mA
		100	-	300		V_{CE}=1V, I_C=10mA
		60	-	-		V_{CE}=1V, I_C=50mA
		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		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		I_C=50mA, I_B=5mA
Output Capacitance	C_{ob}	-	4	-	pF	V_{CB}=5V, I_E=0, f=1MHz
Transition Frequency	f_T	-	300	-	MHz	V_{CE}=20V, I_C=20mA, f=100MHz
Noise Figure	NF	-	-	5	dB	V_{CE}=5V, I_C=0.1mA, f=1kHz R_G=1kΩ, Δf=200Hz
Delay Time	T_d	-	35	-	nS	V_{CC}=3V, V_{BE}=0.5V, I_C=10mA, I_{B1}= -I_{B2}=1mA
Rise Time	T_r	-	35	-		
Storage Time	T_s	-	200	-	nS	V_{CC}=3V, I_C=10mA, I_{B1}= -I_{B2}=1mA
Fall Time	T_f	-	50	-		

PNP ELECTRICAL CHARACTERISTICS (T_A=25°C unless otherwise specified)

Characteristic	Symbol	Min.	Typ.	Max.	Unit	Test Condition
Collector-Base Breakdown Voltage	$V_{(BR)CBO}$	-40	-	-	V	I_C= -10μA, I_E=0
Collector-Emitter Breakdown Voltage	$V_{(BR)CEO}$	-40	-	-		I_C= -1mA, I_B=0
Emitter-Base Breakdown Voltage	$V_{(BR)EBO}$	-5	-	-		I_E= -10μA, I_C=0
Collector-Base Cut-off Current	I_{CBO}	-	-	-50	nA	V_{CB}= -30V, I_E=0
Emitter-Base Cut-off Current	I_{EBO}	-	-	-50		V_{EB}= -5V, I_C=0
DC Current Gain	h_{FE}	60	-	-		V_{CE}= -1V, I_C= -0.1mA
		80	-	-		V_{CE}= -1V, I_C= -1mA
		100	-	300		V_{CE}= -1V, I_C= -10mA
		60	-	-		V_{CE}= -1V, I_C= -50mA
		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		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		I_C= -50mA, I_B= -5mA
Transition Frequency	f_T	-	250	-	MHz	V_{CE}= -20V, I_C= -10mA, f=100MHz
Noise Figure	NF	-	-	4	dB	V_{CE}= -5V, I_C= -0.1mA, f=1kHz R_G=1kΩ
Delay Time	T_d	-	35	-	nS	V_{CC}= -3V, V_{BE}= -0.5V, I_C= -10mA, I_{B1}= -I_{B2}=1mA
Rise Time	T_r	-	35	-		
Storage Time	T_s	-	225	-	nS	V_{CC}= -3V, I_C= -10mA, I_{B1}= -I_{B2}= -1mA
Fall Time	T_f	-	75	-		

NPN TYPICAL CHARACTERISTICS

Fig. 1 - Static Characteristics

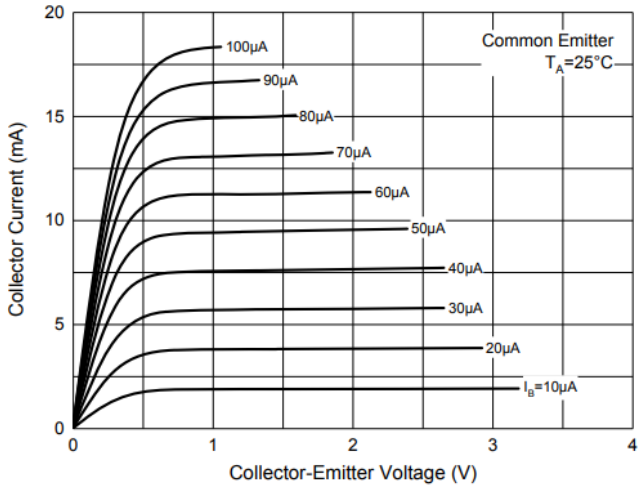


Fig. 2 - DC Current Gain Characteristics

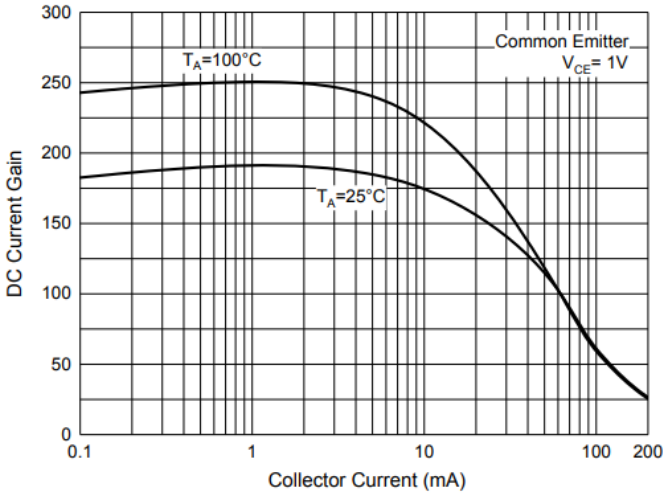


Fig. 3 - Collector-Emitter Saturation Voltage Characteristics

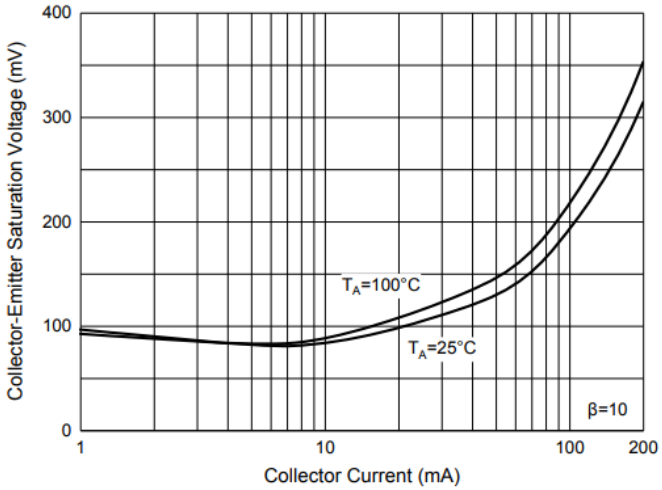


Fig. 4 - Base-Emitter Saturation Voltage Characteristics

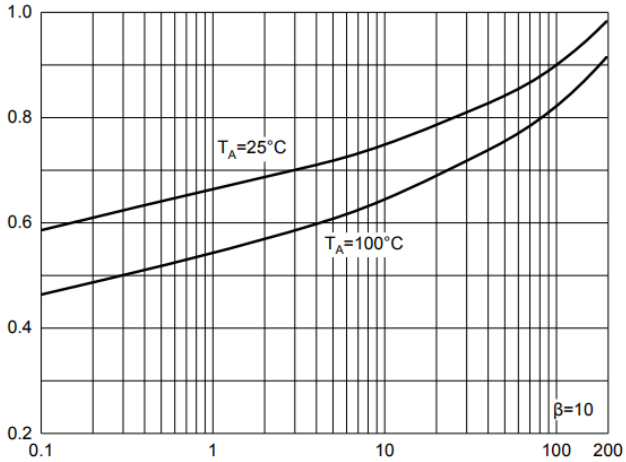


Fig. 5 - Base-Emitter Voltage Characteristics

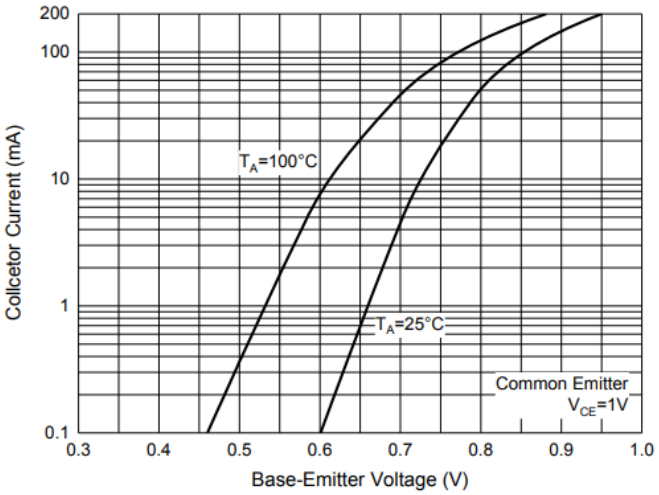
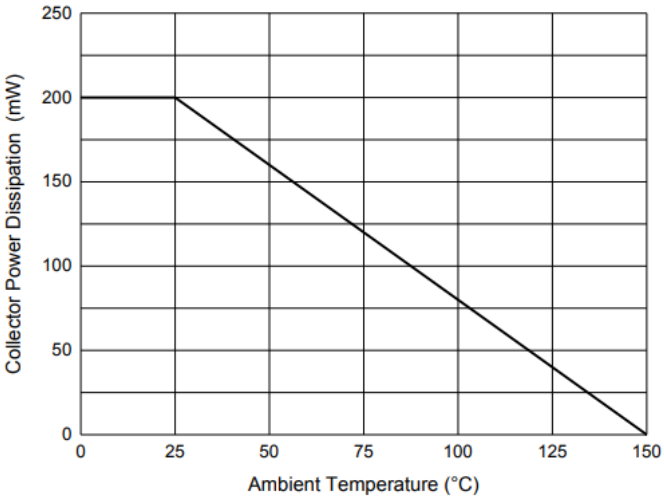


Fig. 6 - Collector Power Derating Curve



PNP TYPICAL CHARACTERISTICS

Fig. 7 - Static Characteristics

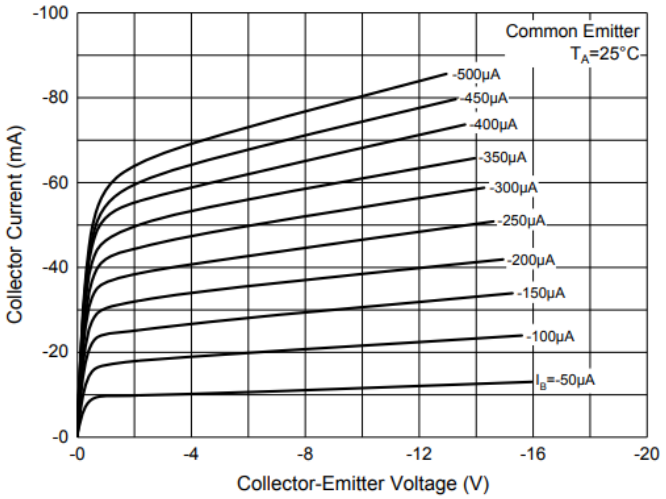


Fig. 8 - DC Current Gain Characteristics

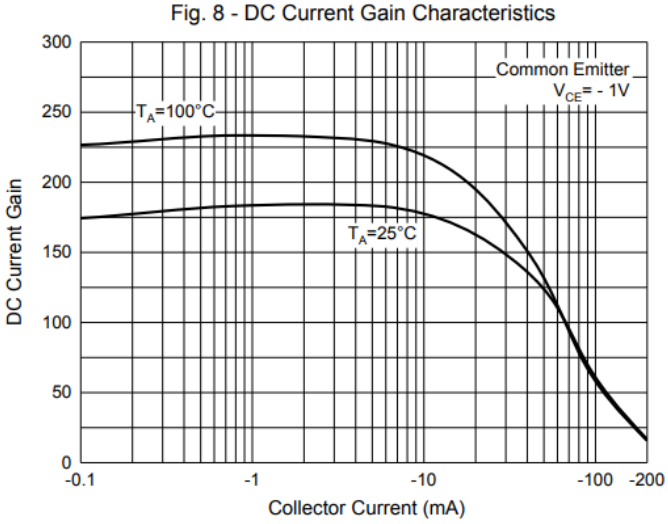


Fig. 9 - Collector-Emitter Saturation Voltage Characteristics

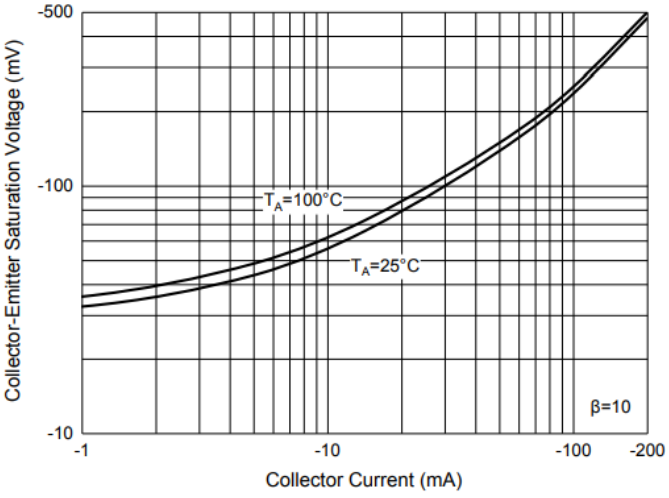


Fig. 10 - Base-Emitter Saturation Voltage Characteristics

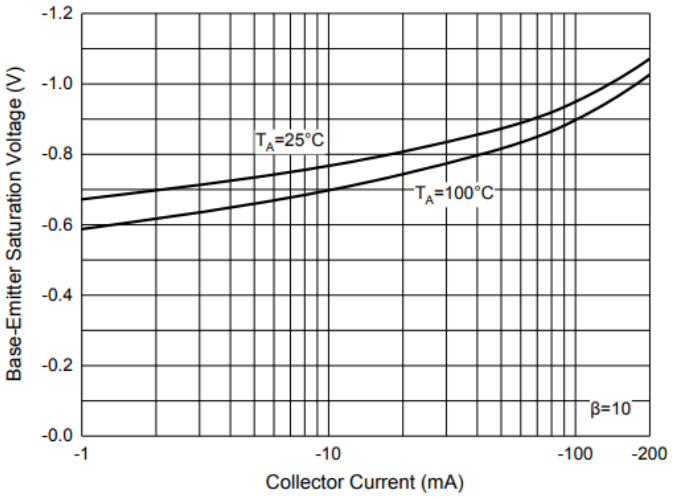


Fig. 11 - Base-Emitter Voltage Characteristics

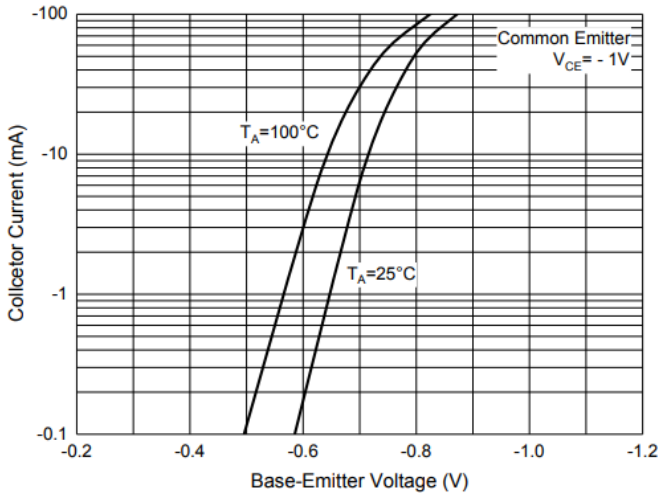
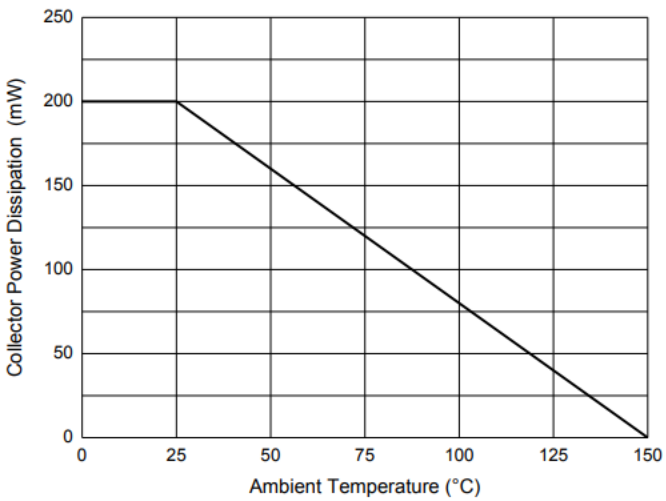


Fig. 12 - Collector Power Derating Curve



PACKAGE OUTLINE DIMENSIONS

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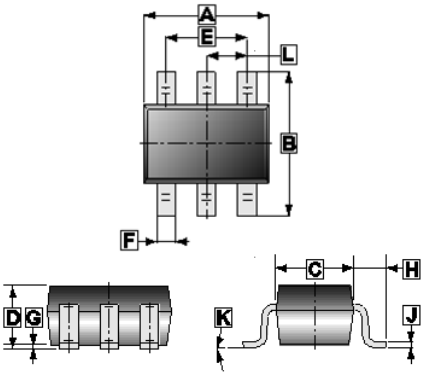
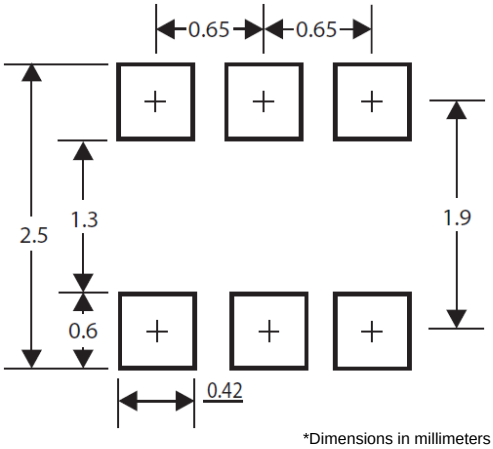


REF.	Millimeter	
	Min.	Max.
A	1.80	2.20
B	1.80	2.45
C	1.15	1.35
D	0.70	1.10
E	1.30 REF.	
F	0.10	0.35
G	0.10 REF.	
H	0.525 REF.	
J	0.05	0.25
K	8°	
L	0.65 TYP.	

MOUNTING PAD LAYOUT

SOT-363



*Dimensions in millimeters