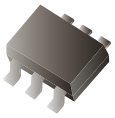
Dual Transistor

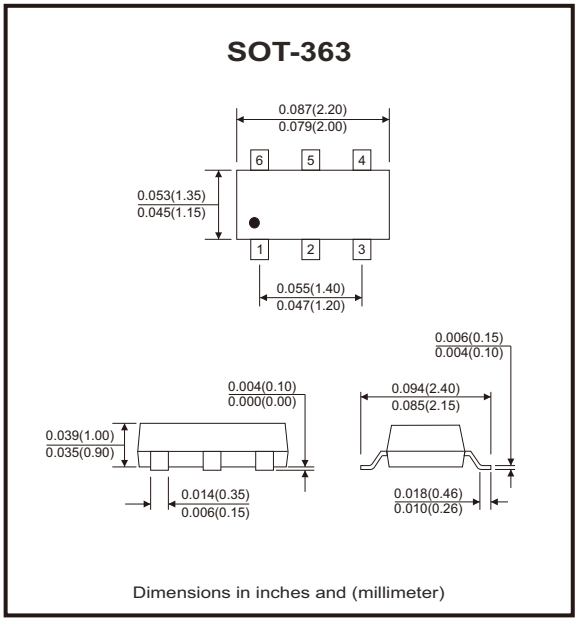
MMDT3904-HF (NPN+NPN)

RoHS Device
Halogen Free



Features

- Epitaxial planar die construction.
- Ideal for low power amplification and switching.
- High stability and high reliability.

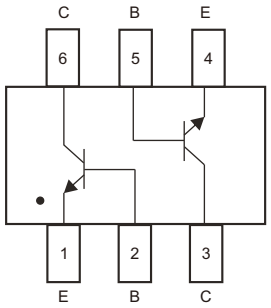


Mechanical data

- Case: SOT-363 small outline plastic package.
- Epoxy UL: 94V-0.
- Mounting position: Any.

Circuit Diagram

- 1,4 : Emitter
- 2,5 : Base
- 3,6 : Collector



Maximum Ratings (at T_A=25°C unless otherwise noted)

Parameter	Symbol	Value	Unit
Collector-base voltage	V_{CBO}	60	V
Collector-emitter voltage	V_{CEO}	40	V
Emitter-base voltage	V_{EBO}	5	V
Collector current-continuous	I_C	200	mA
Collector power dissipation	P_C	200	mW
Thermal resistance from junction to ambient	$R_{\theta JA}$	625	°C/W
Junction temperature	T_J	150	°C
Storage temperature range	T_{STG}	-55 to +150	°C

Electrical Characteristics (at T_A=25°C unless otherwise noted)

Parameter	Conditions	Symbol	Min	Max	Unit
Collector-base breakdown voltage	I_C = 10μA, I_E = 0	$V_{(BR)CBO}$	60		V
Collector-emitter breakdown voltage	I_C = 1mA, I_B = 0	$V_{(BR)CEO}$	40		V
Emitter-base breakdown voltage	I_E = 10μA, I_C = 0	$V_{(BR)EBO}$	5		V
Collector cut-off current	V_{CE} = 30V, $V_{EB(off)}$ = 3V	I_{CEX}		50	nA
Collector cut-off current	V_{CB} = 30V, I_E = 0	I_{CBO}		50	nA
Emitter cut-off current	V_{EB} = 5V, I_C = 0	I_{EBO}		50	nA
DC current gain	V_{CE} = 1V, I_C = 0.1mA	$h_{FE(1)}$	40		
	V_{CE} = 1V, I_C = 1mA	$h_{FE(2)}$	70		
	V_{CE} = 1V, I_C = 10mA	$h_{FE(3)}$	100	300	
	V_{CE} = 1V, I_C = 50mA	$h_{FE(4)}$	60		
	V_{CE} = 1V, I_C = 100mA	$h_{FE(5)}$	30		
Collector-emitter saturation voltage	I_C = 10mA, I_B = 1mA	$V_{CE(sat)1}$		0.20	V
	I_C = 50mA, I_B = 5mA	$V_{CE(sat)2}$		0.30	V
Base-emitter saturation voltage	I_C = 10mA, I_B = 1mA	$V_{BE(sat)1}$	0.65	0.85	V
	I_C = 50mA, I_B = 5mA	$V_{BE(sat)2}$		0.95	V
Transition frequency	V_{CE} = 20V, I_C = 10mA, f = 100MHz	f_T	300		MHz
Collector output capacitance	V_{CB} = 5V, I_E = 0, f = 1MHz	C_{ob}		4	pF
Noise figure	V_{CE} = 5V, I_C = 0.1mA, f = 1KHz, R_S = 1KΩ	NF		5	dB
Delay time	V_{CC} = 3V, $V_{BE(off)}$ = -0.5V I_C = 10mA, I_{B1} = 1mA	t_d		35	nS
Rise time		t_r		35	nS
Storage time	V_{CC} = 3V, I_C = 10mA I_{B1} = I_{B2} = 1mA	t_s		200	nS
Fall time		t_f		50	nS

Note: Pulse width ≤ 300μs, duty cycle ≤ 2.0%.

Typical Rating and Characteristic Curves (MMDT3904-HF)

Fig.1 - Static Characteristic

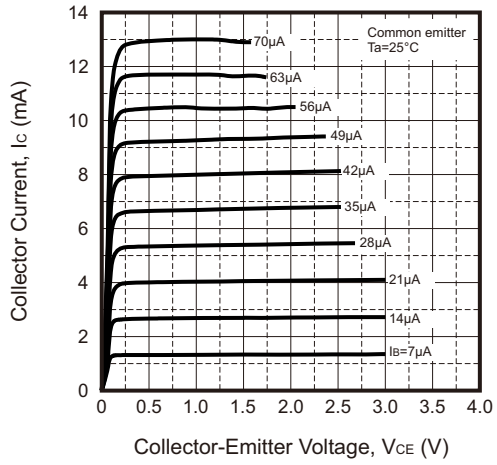


Fig.2 - h_{FE} — I_C

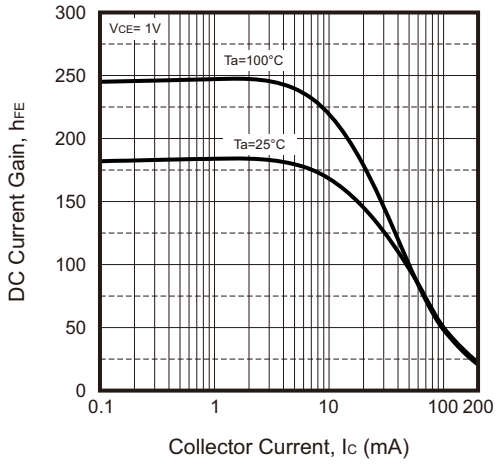


Fig.3 - V_{BEsat} — I_C

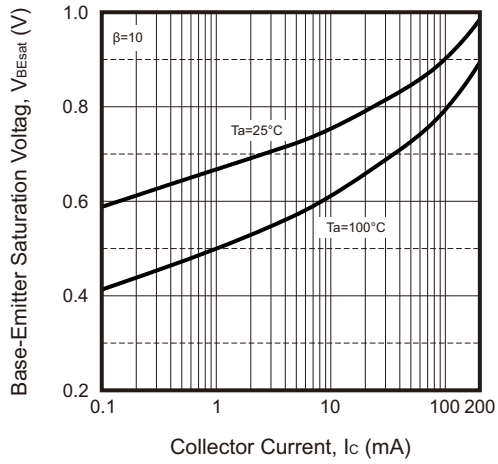


Fig.4 - V_{CEsat} — I_C

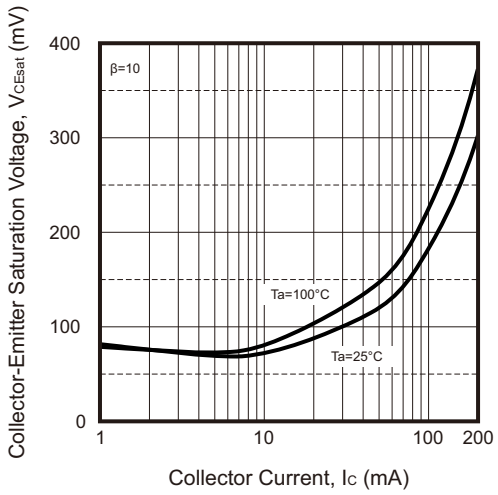


Fig.5 - I_C — V_{BE}

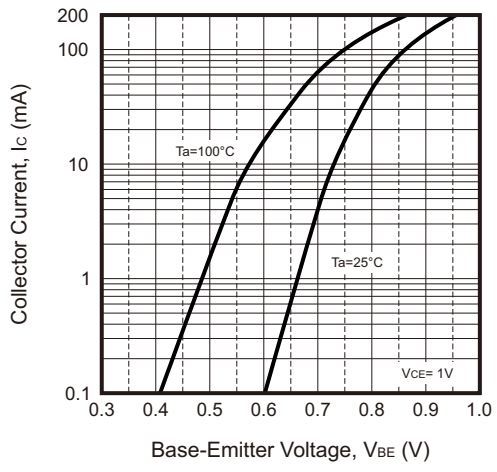
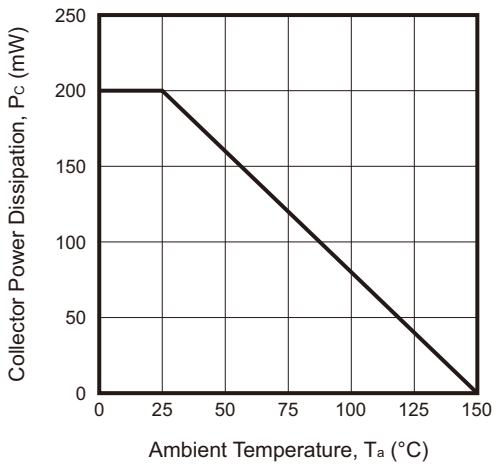
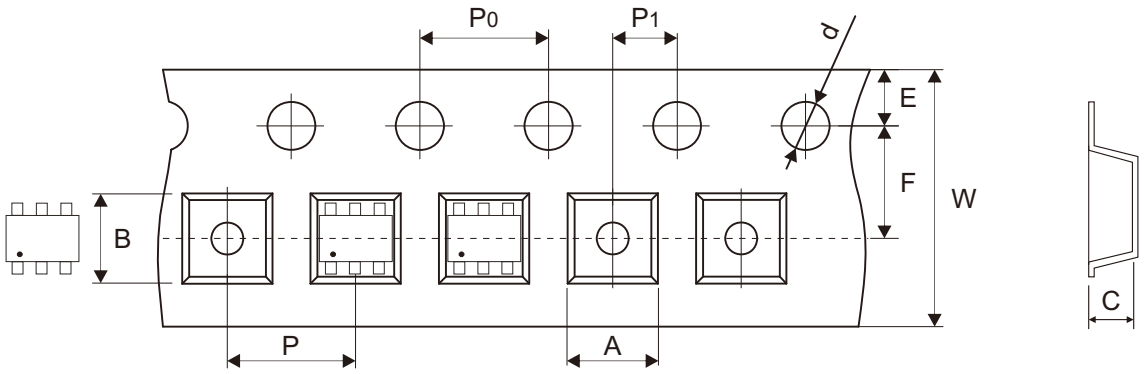
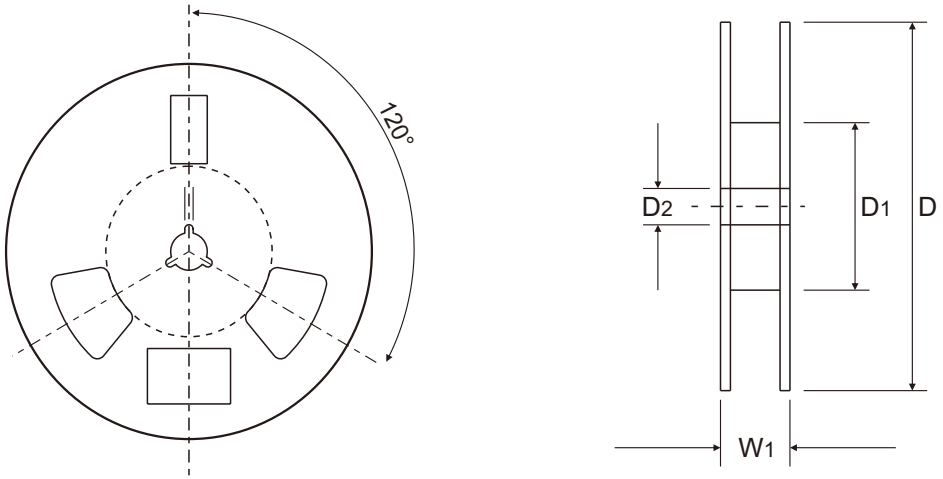


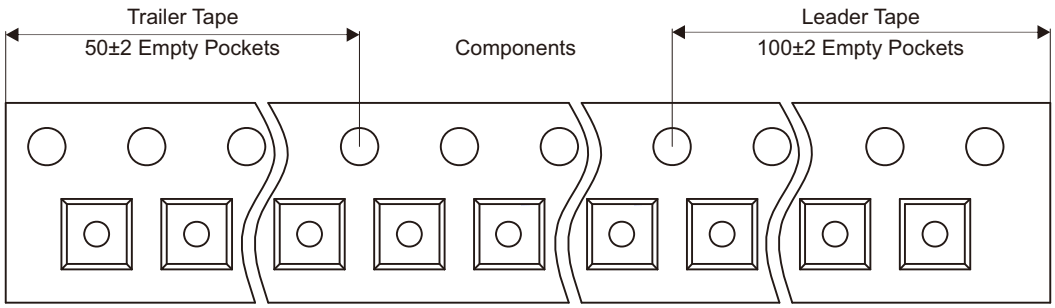
Fig.6 - P_C — T_a



Reel Taping Specification





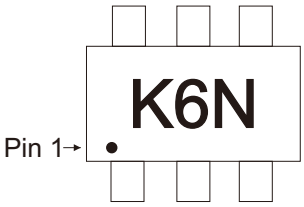


	SYMBOL	A	B	C	d	D	D_1	D_2
SOT-363	(mm)	2.25 ± 0.10	2.55 ± 0.10	1.20 ± 0.10	1.50 + 1.00 − 0.00	178.00 ± 2.00	54.40 ± 1.00	13.00 ± 1.00
	(inch)	0.089 ± 0.004	0.100 ± 0.004	0.047 ± 0.004	0.059 + 0.039 − 0.000	7.008 ± 0.079	2.142 ± 0.039	0.512 ± 0.039

	SYMBOL	E	F	P	P_0	P_1	W	W_1
SOT-363	(mm)	1.75 ± 0.10	3.50 ± 0.05	4.00 ± 0.10	4.00 ± 0.10	2.00 ± 0.05	8.00 + 0.30 − 0.10	12.30 ± 1.00
	(inch)	0.069 ± 0.004	0.138 ± 0.002	0.157 ± 0.004	0.157 ± 0.004	0.079 ± 0.002	0.315 + 0.012 − 0.004	0.484 ± 0.039

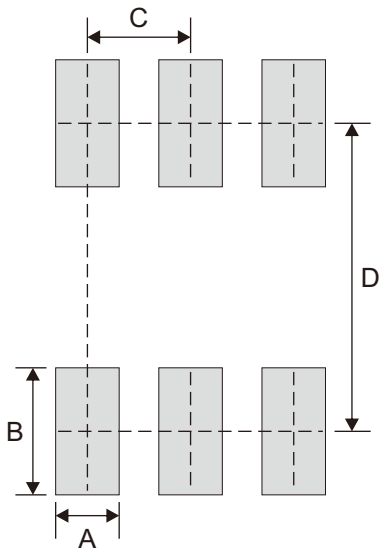
Marking Code

Part Number	Marking Code
MMDT3904-HF	K6N



Suggested P.C.B. PAD Layout

SIZE	SOT-363	
	(mm)	(inch)
A	0.40	0.016
B	0.80	0.031
C	0.65	0.026
D	1.94	0.076



Standard Packaging

Case Type	REEL PACK	
	REEL (pcs)	Reel Size (inch)
SOT-363	3,000	7