



NPN / PNP Small Signal Surface Mount Transistors

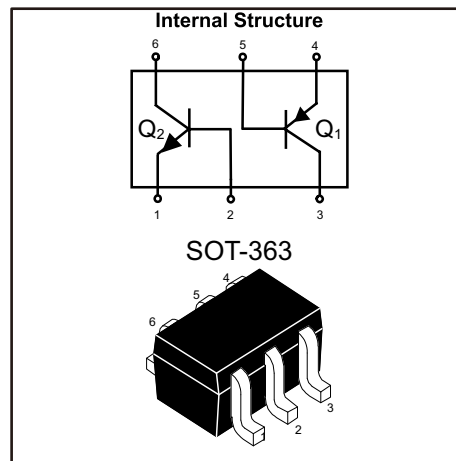
These transistors are designed for general purpose amplifier applications. They are housed in the SOT-363 which is designed for low power surface mount applications.

FEATURES

- Ideally suited for automatic insertion
- For switching and AF amplifier applications
- Complementary Pair: MMBT3904 Type NPN / MMBT3906 Type PNP

PINNING

PIN	DESCRIPTION
1 / 4	EMITTER
2 / 5	BASE
3 / 6	COLLECTOR



NPN MAXIMUM RATINGS (Ta=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}	6	V
Collector Current — Continuous	I_C	200	mA

PNP MAXIMUM RATINGS (Ta=25°C unless otherwise noted)

Parameter	Symbol	Value	Unit
Collector-Base Voltage	V_{CBO}	-40	V
Collector-Emitter Voltage	V_{CEO}	-40	V
Emitter-Base Voltage	V_{EBO}	-5	V
Collector Current — Continuous	I_C	-0.2	A

THERMAL CHARACTERISTICS

Parameter	Symbol	Value	Unit
Collector Power Dissipation Board 25°C	PD	200	mW
Thermal Resistance, Junction to Ambient	$R_{\theta JA}$	625	mW/°C
Operation Junction and Storage Temperature Range	T_J, T_{stg}	-55~ +150	°C



NPN ELECTRICAL CHARACTERISTICS (TA = 25°C unless otherwise noted.)

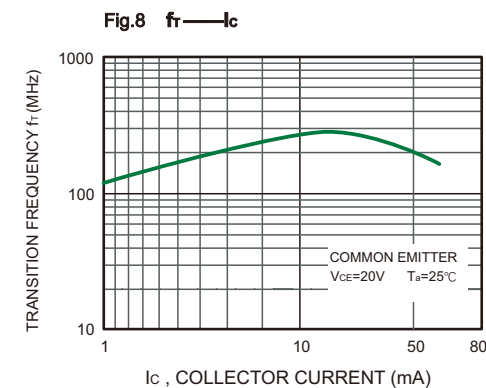
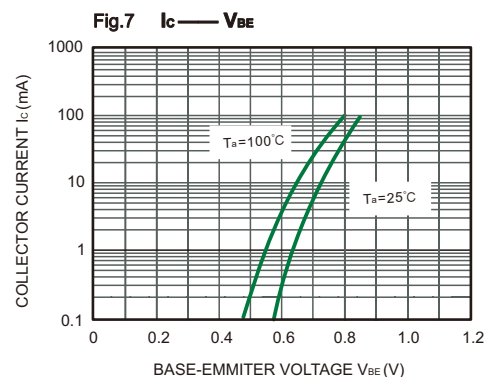
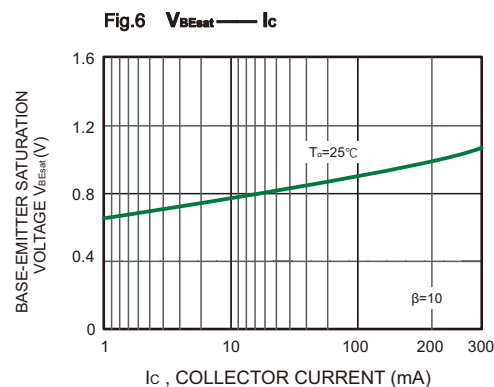
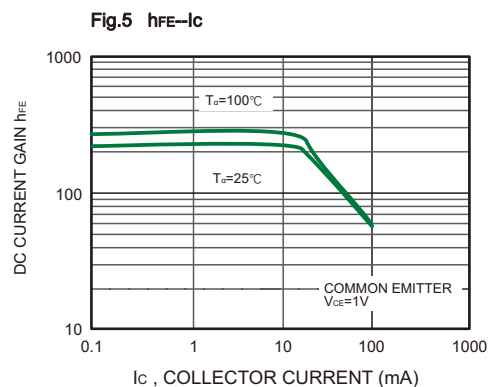
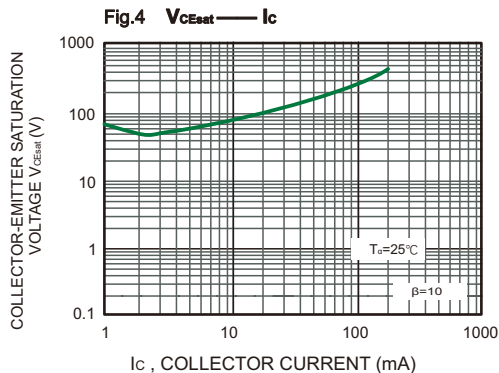
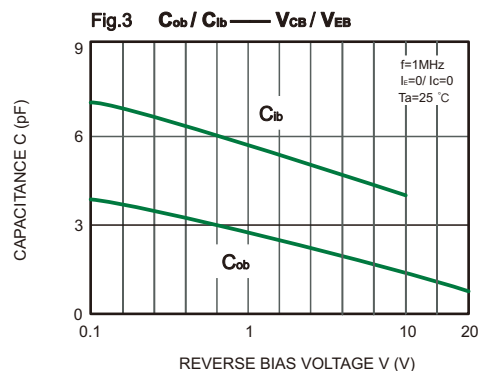
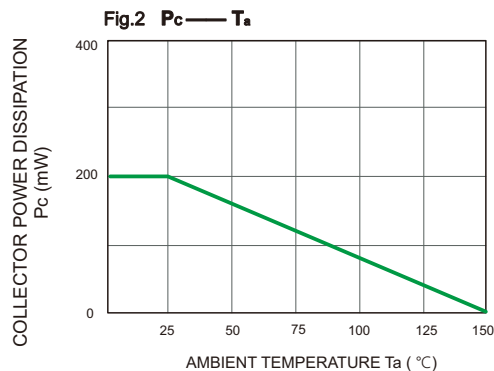
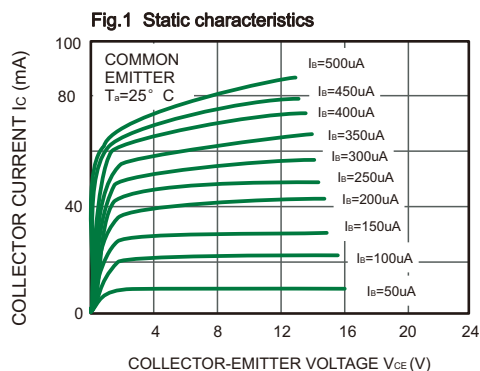
Parameter	Symbol	Test conditions	Min	Typ	Max	Unit
Collector-base breakdown voltage	$V_{(BR)CBO}$	$I_C = 10\mu A, I_E = 0$	60			V
Collector-emitter breakdown voltage	$V_{(BR)CEO}$	$I_C = 1\text{ mA}, I_B = 0$	40			V
Emitter-base breakdown voltage	$V_{(BR)EBO}$	$I_E = 10\mu A, I_C = 0$	6			V
Collector cut-off current	I_{CEX}	$V_{CE} = 30V, V_{BE(off)} = 3V$			50	nA
Collector cut-off current	I_{CBO}	$V_{CB} = 60V, I_E = 0$			100	nA
Emitter cut-off current	I_{EBO}	$V_{EB} = 5V, I_C = 0$			50	nA
DC current gain	h_{FE1}	$V_{CE} = 1V, I_C = 10mA$	100		300	
	h_{FE2}	$V_{CE} = 1V, I_C = 50mA$	60			
	h_{FE3}	$V_{CE} = 1V, I_C = 100mA$	30			
Collector-emitter saturation voltage	$V_{CE(sat)}$	$I_C = 50mA, I_B = 5mA$			0.3	V
Base-emitter saturation voltage	$V_{BE(sat)}$	$I_C = 50mA, I_B = 5mA$			0.95	V
Transition frequency	f_T	$V_{CE} = 20V, I_C = 10mA, f = 100MHz$	300			MHZ
Delay time	t_d	$V_{CC} = 3V, V_{BE(off)} = -0.5V, I_C = 10mA, I_{B1} = 1mA$			35	ns
Rise time	t_r				35	ns
Storage time	t_s	$V_{CC} = 3V, I_C = 10mA, I_{B1} = I_{B2} = 1mA$			200	ns
Fall time	t_f				50	ns

PNP ELECTRICAL CHARACTERISTICS (TA = 25°C unless otherwise noted.)

Parameter	Symbol	Test conditions	Min	Max	Unit
Collector-base breakdown voltage	$V_{(BR)CBO}$	$I_C = -10\mu A, I_E = 0$	-40		V
Collector-emitter breakdown voltage	$V_{(BR)CEO}$	$I_C = -1\text{ mA}, I_B = 0$	-40		V
Emitter-base breakdown voltage	$V_{(BR)EBO}$	$I_E = -10\mu A, I_C = 0$	-5		V
Collector cut-off current	I_{CBO}	$V_{CB} = -40V, I_E = 0$		-50	nA
Collector cut-off current	I_{CEX}	$V_{CE} = -30V, V_{CE} = -3V$		-50	nA
Emitter cut-off current	I_{EBO}	$V_{EB} = -5V, I_C = 0$		-50	nA
DC current gain	h_{FE1}	$V_{CE} = -1V, I_C = -10mA$	100	300	
	h_{FE2}	$V_{CE} = -1V, I_C = -50mA$	60		
	h_{FE3}	$V_{CE} = -2V, I_C = -100mA$	30		
Collector-emitter saturation voltage	$V_{CE(sat)}$	$I_C = -50mA, I_B = -5mA$		-0.3	V
Base-emitter saturation voltage	$V_{BE(sat)}$	$I_C = -50mA, I_B = -5mA$		-0.95	V
Transition frequency	f_T	$V_{CE} = -20V, I_C = -10mA, f = 100MHz$	300		MHZ
Delay time	t_d	$V_{CC} = -3V, V_{BE} = -0.5V, I_C = -10mA, I_{B1} = I_{B2} = -1mA$		35	ns
Rise time	t_r			35	ns
Storage time	t_s	$V_{CC} = -3V, I_C = -10mA, I_{B1} = I_{B2} = -1mA$		225	ns
Fall time	t_f			75	ns

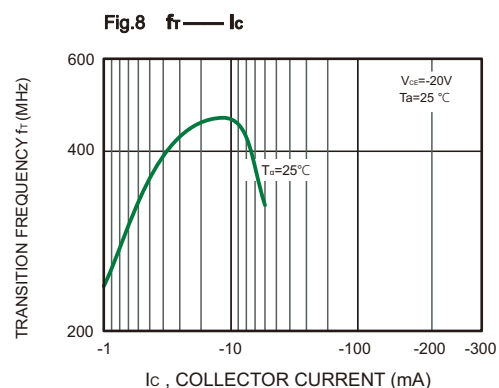
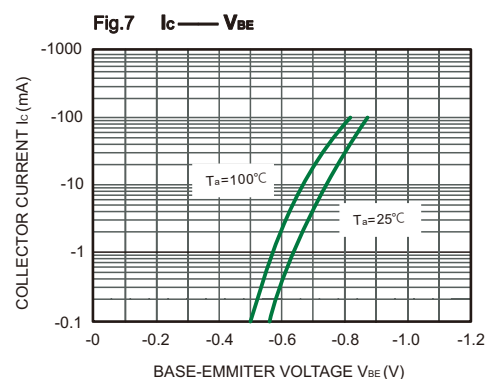
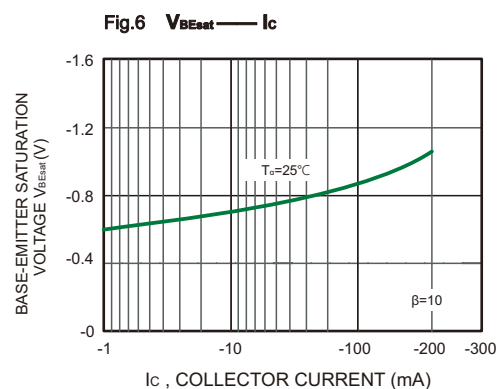
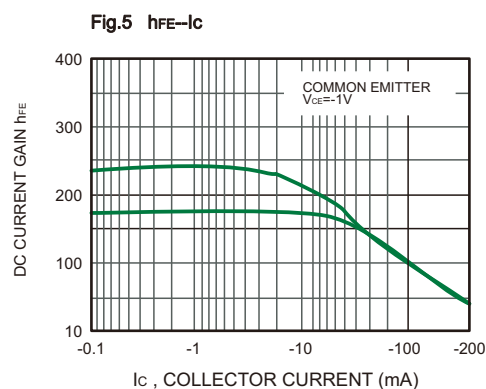
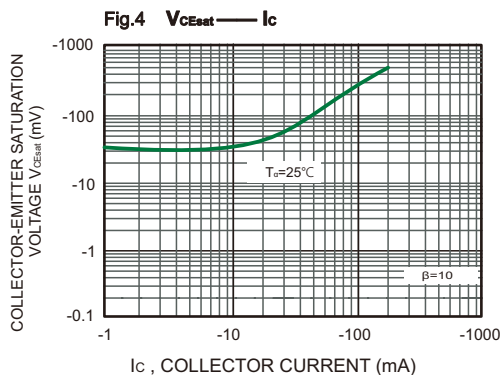
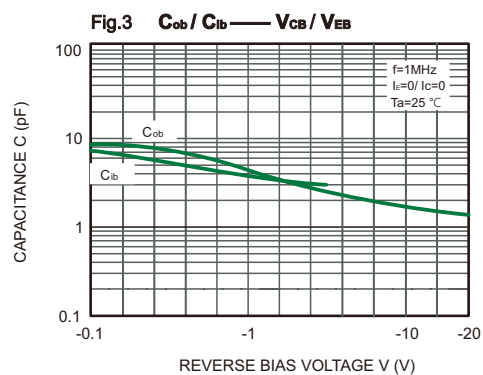
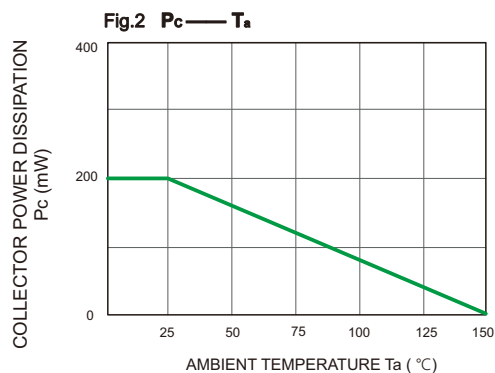
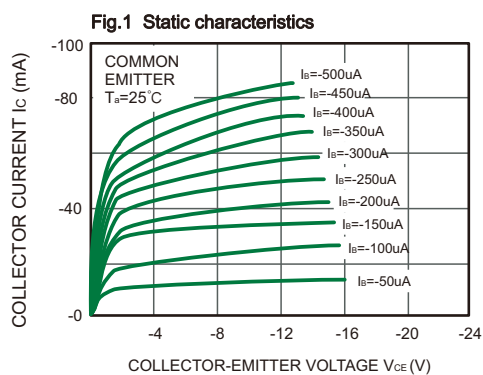


NPN TYPICAL CHARACTERISTICS



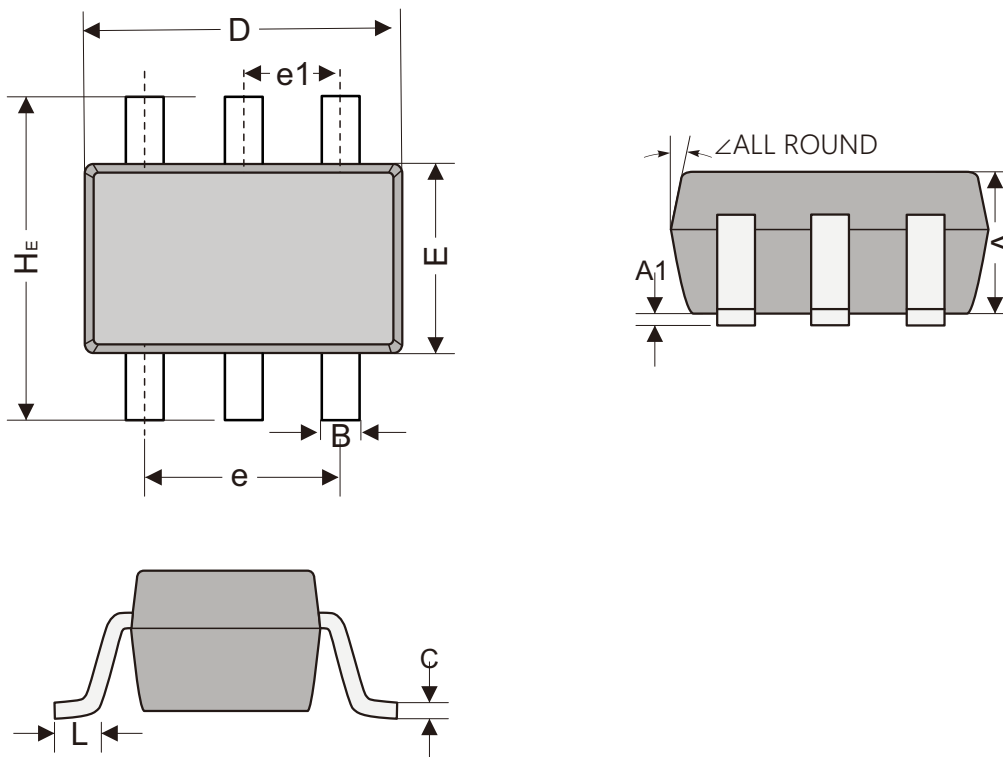


PNP TYPICAL CHARACTERISTICS





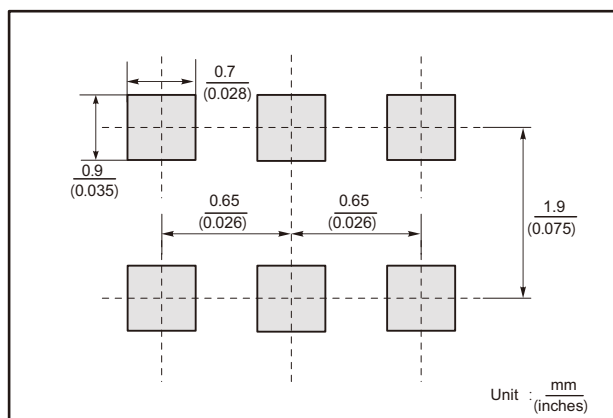
SOT-363 Package Outline Dimensions



SOT-363 mechanical data

UNIT		A	A1	B	C	D	E	e	e1	L	HE
mm	max	1.00	0.10	0.30	0.25	2.20	1.35	1.40	0.65 (BSC)	0.320 REF	2.40
	min	0.80	0.00	0.20	0.10	1.80	1.15	1.20			2.00
mil	max	39.37	3.94	11.81	9.84	86.61	53.15	55.12	25.59 (BSC)	12.56 REF	86.61
	min	31.50	0.00	7.87	3.94	70.87	45.28	47.24			78.74

The recommended mounting pad size Marking



Marking

Type number	Marking code
MMBT3946WH	P46



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