

6367254 MOTOROLA SC (XSTRS/R F)

96D 82027 D
T-37-23

MAXIMUM RATINGS

Rating	Symbol	Value		Unit
		404	404A	
Collector-Emitter Voltage	V _{CEO}	24	35	V _{dc}
Collector-Base Voltage	V _{CBO}	25	40	V _{dc}
Emitter-Base Voltage	V _{EBO}	12	25	V _{dc}
Collector Current — Continuous	I _C	150		mAdc

THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Total Device Dissipation FR-5 Board,* T _A = 25°C Derate above 25°C	P _D	225	mW
		1.8	mW/°C
Thermal Resistance Junction to Ambient	R _{θJA}	556	°C/mW
Total Device Dissipation Alumina Substrate,** T _A = 25°C Derate above 25°C	P _D	300	mW
		2.4	mW/°C
Thermal Resistance Junction to Ambient	R _{θJA}	417	°C/mW
Junction and Storage Temperature	T _J , T _{stg}	150	°C

*FR-5 = 1.0 x 0.75 x 0.62 in.

**Alumina = 0.4 x 0.3 x 0.024 in. 99.5% alumina.

DEVICE MARKING

MMBT404 = 2M; MMBT404A = 2N

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

Characteristic	Symbol	Min	Typ	Max	Unit
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OFF CHARACTERISTICS

Collector-Emitter Breakdown Voltage (I _C = 10 mAdc, I _B = 0)	MMBT404 MMBT404A	V _{(BR)CEO}	24 35	—	—	V _{dc}
Collector-Base Breakdown Voltage (I _C = 10 μAdc, I _E = 0)	MMBT404 MMBT404A	V _{(BR)CBO}	25 40	—	—	V _{dc}
Emitter-Base Breakdown Voltage (I _E = 10 μAdc, I _C = 0)	MMBT404 MMBT404A	V _{(BR)EBO}	12 25	—	—	V _{dc}
Collector Cutoff Current (V _{CB} = 10 Vdc, I _E = 0)		I _{CBO}	—	—	100	nAdc
Emitter Cutoff Current (V _{BE} = 10 Vdc, I _C = 0)		I _{EBO}	—	—	100	nAdc

ON CHARACTERISTICS

DC Current Gain (I _C = 12 mAdc, V _{CE} = 0.15 Vdc)		h _{FE}	30	—	400	—
Collector-Emitter Saturation Voltage (I _C = 12 mAdc, I _B = 0.4 mAdc) (I _C = 24 mAdc, I _B = 1.0 mAdc)		V _{CE(sat)}	—	—	0.15 0.20	V _{dc}
Base-Emitter Saturation Voltage (I _C = 12 mAdc, I _B = 0.4 mAdc) (I _C = 24 mAdc, I _B = 1.0 mAdc)		V _{BE(sat)}	—	—	0.85 1.0	V _{dc}

SMALL-SIGNAL CHARACTERISTICS

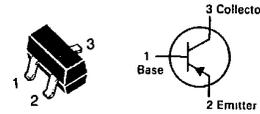
Output Capacitance (V _{CB} = 6.0 Vdc, I _E = 0)		C _{obo}	—	—	20	pF
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SWITCHING CHARACTERISTICS

Delay Time (V _{CC} = 10 Vdc, I _C = 10 mAdc) (Figure 1)		t _d	—	43	—	ns
Rise Time (I _{B1} = 1.0 mAdc, V _{BE(off)} = 14 Vdc)		t _r	—	180	—	ns
Storage Time (V _{CC} = 10 Vdc, I _C = 10 mAdc)		t _s	—	675	—	ns
Fall Time (I _{B1} = I _{B2} = 1.0 mAdc) (Figure 1)		t _f	—	160	—	ns

**MMBT404
MMBT404A**

CASE 318-02/03, STYLE 6
SOT-23 (TO-236AA/AB)



CHOPPER TRANSISTOR

PNP SILICON

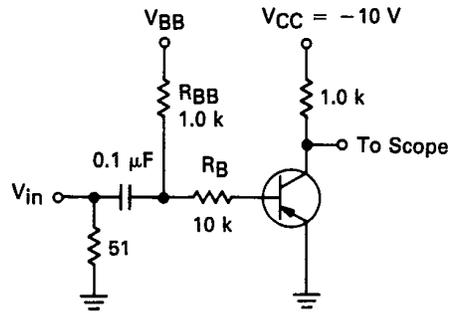
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96D 82028 D

MMBT404A

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FIGURE 1 — SWITCHING TIME TEST CIRCUIT



	V _{in} (Volts)	V _{BB} (Volts)
t _{on} , t _d , t _r	- 12	+ 1.4
t _{off} , t _s and t _f	+ 20.6	- 11.6

Voltages and resistor values shown are for I_C = 10 mA, I_C/I_B = 10 and I_{B1} = I_{B2}