

6367254 MOTOROLA SC (XSTRS/R F)

96D 82012 D

7-31-25

MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Drain-Source Voltage	V_{DS}	25	Vdc
Gate-Source Voltage	V_{GS}	25	Vdc
Gate Current	I_G	10	mAdc

THERMAL CHARACTERISTICS

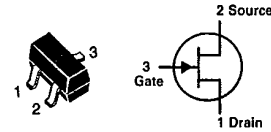
Characteristic	Symbol	Max	Unit
Total Device Dissipation FR-5 Board,* $T_A = 25^\circ\text{C}$ Derate above 25°C	P_D	225	mW
Thermal Resistance Junction to Ambient	$R_{\theta JA}$	556	$^\circ\text{C}/\text{mW}$
Total Device Dissipation Alumina Substrate,** $T_A = 25^\circ\text{C}$ Derate above 25°C	P_D	300	mW
Thermal Resistance Junction to Ambient	$R_{\theta JA}$	417	$^\circ\text{C}/\text{mW}$
Junction and Storage Temperature	T_J, T_{stg}	150	$^\circ\text{C}$

*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

MMBFJ310 = 6T

MMBFJ310CASE 318-02/03, STYLE 10
SOT-23 (TO-236AA/AB)**JFET
VHF/UHF AMPLIFIER
TRANSISTOR**

N-CHANNEL

ELECTRICAL CHARACTERISTICS ($T_A = 25^\circ\text{C}$ unless otherwise noted.)

Characteristic	Symbol	Min	Typ	Max	Unit
OFF CHARACTERISTICS					
Gate-Source Breakdown Voltage ($I_G = -1.0 \mu\text{Adc}, V_{DS} = 0$)	$V_{(BR)GSS}$	-25	—	—	Vdc
Gate Reverse Current ($V_{GS} = -15 \text{ V}$) ($V_{GS} = -15 \text{ V}, T_A = 125^\circ\text{C}$)	I_{GSS}	—	—	-1.0 -1.0	nAdc μAdc
Gate Source Cutoff Voltage ($V_{DS} = 10 \text{ Vdc}, I_D = 1.0 \text{ nAdc}$)	$V_{GS(off)}$	-2.0	—	-6.5	Vdc
ON CHARACTERISTICS					
Zero-Gate-Voltage Drain ($V_{DS} = 10 \text{ Vdc}, V_{GS} = 0$)	I_{DSS}	24	—	60	mAdc
Gate-Source Forward Voltage ($I_G = 1.0 \text{ mAdc}, V_{DS} = 0$)	$V_{GS(f)}$	—	—	1.0	Vdc
SMALL-SIGNAL CHARACTERISTICS					
Forward Transfer Admittance ($V_{DS} = 10 \text{ Vdc}, I_D = 10 \text{ mAdc}, f = 1.0 \text{ kHz}$)	$ Y_{fs} $	8.0	—	18	mmhos
Output Admittance ($V_{DS} = 10 \text{ Vdc}, I_D = 10 \text{ mAdc}, f = 1.0 \text{ kHz}$)	$ Y_{os} $	—	—	200	μmhos
Input Capacitance ($V_{GS} = -10 \text{ Vdc}, V_{DS} = 0 \text{ Vdc}, f = 1.0 \text{ MHz}$)	C_{iss}	—	—	5.0	pF
Reverse Transfer Capacitance ($V_{GS} = -10 \text{ Vdc}, V_{DS} = 0 \text{ Vdc}, f = 1.0 \text{ MHz}$)	C_{rss}	—	—	2.5	pF
Equivalent Short-Circuit Input Noise Voltage ($V_{DS} = 10 \text{ Vdc}, I_D = 10 \text{ mAdc}, f = 100 \text{ Hz}$)	\bar{e}_n	—	10	—	nV/ $\sqrt{\text{Hz}}$

MOTOROLA SMALL-SIGNAL SEMICONDUCTORS

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

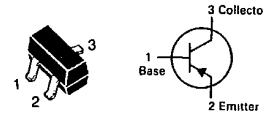
Output Capacitance (V _{CB} = 6.0 Vdc, I _E = 0)		C _{obo}	—	—	20	pF
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SWITCHING CHARACTERISTICS

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

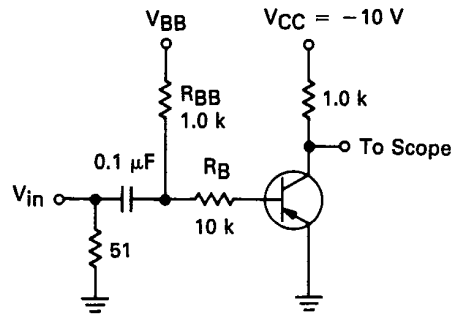
6367254 MOTOROLA SC (XSTRS/R F)

96D 82028 D

MMBT404A

T-37-23

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}

6367254 MOTOROLA SC (XSTRS/R F)

96D 82029 D

T-31-15

MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Collector-Emitter Voltage	V_{CE0}	15	Vdc
Collector-Base Voltage	V_{CB0}	30	Vdc
Emitter-Base Voltage	V_{EB0}	3.0	Vdc
Collector Current — Continuous	I_C	350	mAdc

THERMAL CHARACTERISTICS

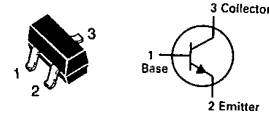
Characteristic	Symbol	Max	Unit
Total Device Dissipation FR-5 Board,* $T_A = 25^\circ\text{C}$ Derate above 25°C	P_D	225	mW
Thermal Resistance Junction to Ambient	$R_{\theta JA}$	1.8	$^\circ\text{C}/\text{mW}$
Total Device Dissipation Alumina Substrate,** $T_A = 25^\circ\text{C}$ Derate above 25°C	P_D	300	mW
Thermal Resistance Junction to Ambient	$R_{\theta JA}$	2.4	$^\circ\text{C}/\text{mW}$
Junction and Storage Temperature	T_J, T_{stg}	150	$^\circ\text{C}$

*FR-5 = $1.0 \times 0.75 \times 0.62$ in.**Alumina = $0.4 \times 0.3 \times 0.024$ in. 99.5% alumina.

DEVICE MARKING

MMBT918 = 3B

MMBT918

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

VHF/UHF TRANSISTOR

NPN SILICON

ELECTRICAL CHARACTERISTICS ($T_A = 25^\circ\text{C}$ unless otherwise noted.)

Characteristic	Symbol	Min	Max	Unit
OFF CHARACTERISTICS				
Collector-Emitter Breakdown Voltage ($I_C = 3.0$ mAdc, $I_B = 0$)	$V_{(BR)CEO}$	15	—	Vdc
Collector-Base Breakdown Voltage ($I_C = 1.0$ μ Adc, $I_E = 0$)	$V_{(BR)CBO}$	30	—	Vdc
Emitter-Base Breakdown Voltage ($I_E = 10$ μ Adc, $I_C = 0$)	$V_{(BR)EBO}$	3.0	—	Vdc
Collector Cutoff Current ($V_{CB} = 15$ Vdc, $I_E = 0$)	I_{CBO}	—	50	nAdc
ON CHARACTERISTICS				
DC Current Gain ($I_C = 3.0$ mAdc, $V_{CE} = 1.0$ Vdc)	h_{FE}	20	—	—
Collector-Emitter Saturation Voltage ($I_C = 10$ mAdc, $I_B = 1.0$ mAdc)	$V_{CE(sat)}$	—	0.4	Vdc
Base-Emitter Saturation Voltage ($I_C = 10$ mAdc, $I_B = 1.0$ mAdc)	$V_{BE(sat)}$	—	1.0	Vdc
SMALL-SIGNAL CHARACTERISTICS				
Current-Gain — Bandwidth Product ($I_C = 4.0$ mAdc, $V_{CE} = 10$ Vdc, $f = 100$ MHz)	f_T	600	—	MHz
Output Capacitance ($V_{CB} = 0$ Vdc, $I_E = 0$, $f = 1.0$ MHz) ($V_{CB} = 10$ Vdc, $I_E = 0$, $f = 1.0$ MHz)	C_{obo}	—	3.0 1.7	pF
Input Capacitance ($V_{EB} = 0.5$ Vdc, $I_C = 0$, $f = 1.0$ MHz)	C_{ibo}	—	2.0	pF
Noise Figure ($I_C = 1.0$ mAdc, $V_{CE} = 6.0$ Vdc, $R_S = 50$ Ω , $f = 60$ MHz) (Figure 1)	NF	—	6.0	dB
Power Output ($I_C = 8.0$ mAdc, $V_{CB} = 15$ Vdc, $f = 500$ MHz)	P_{out}	30	—	mW
Common-Emitter Amplifier Power Gain ($I_C = 6.0$ mAdc, $V_{CB} = 12$ Vdc, $f = 200$ MHz)	G_{pe}	11	—	dB

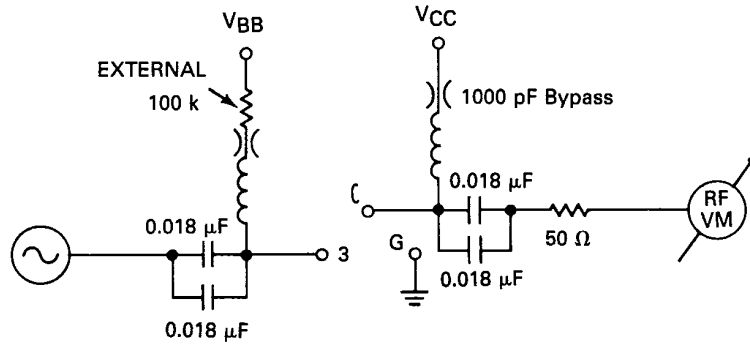
MOTOROLA SMALL-SIGNAL SEMICONDUCTORS

6367254 MOTOROLA SC (XSTRS/R F)
MMBT918

96D 82030 D

T-31-15

FIGURE 1 — NF, G_{pe} MEASUREMENT CIRCUIT 20-200



NF Test Conditions

- I_C = 1.0 Amp
- V_{CE} = 6.0 Volts
- R_S = 50 Ω
- f = 60 MHz

G_{pe} Test Conditions

- I_C = 6.0 mA
- V_{CE} = 12 Volts
- f = 200 MHz

