

6367254 MOTOROLA SC (XSTRS/R F)

96D 81969 D
T-35-11

MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Collector-Emitter Voltage	V _{CEO}	40	Vdc
Collector-Base Voltage	V _{CBO}	75	Vdc
Emitter-Base Voltage	V _{EBO}	6.0	Vdc
Collector Current — Continuous	I _C	100	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
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
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.

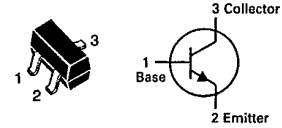
**Alumina = 0.4 x 0.3 x 0.024 in. 99.5% alumina.

DEVICE MARKING

BSS79B = CE; BSS79C = CF

**BSS79B
BSS79C**

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



GENERAL PURPOSE TRANSISTOR

NPN SILICON

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

Characteristic	Symbol	Min	Max	Unit
OFF CHARACTERISTICS				
Collector-Emitter Breakdown Voltage (I _C = 10 mAdc)	V _{(BR)CEO}	40	—	Vdc
Collector-Base Breakdown Voltage (I _C = 10 μAdc)	V _{(BR)CBO}	75	—	Vdc
Emitter-Base Breakdown Voltage (I _E = 10 μAdc)	V _{(BR)EBO}	6.0	—	Vdc
Collector Cutoff Current (V _{CB} = 60 Vdc) (V _{CB} = 60 Vdc, T _A = 150°C)	I _{CBO}	—	10 10	nAdc μAdc
Emitter Cutoff Current (V _{BE} = 3.0 Vdc)	I _{EBO}	—	10	nAdc
ON CHARACTERISTICS				
DC Current Gain (I _C = 150 mAdc, V _{CE} = 10 Vdc)	h _{FE}	40 100	120 300	—
Collector-Emitter Saturation Voltage (I _C = 150 mAdc, I _B = 15 mAdc) (I _C = 500 mAdc, I _B = 50 mAdc)	V _{CE(sat)}	—	0.3 1.0	Vdc
SMALL-SIGNAL CHARACTERISTICS				
Current-Gain — Bandwidth Product (V _{CE} = 20 Vdc, I _C = 20 mAdc, f = 100 MHz)	f _T	250	—	MHz
Output Capacitance (V _{CB} = 10 Vdc, f = 1.0 MHz)	C _{obo}	—	8.0	pF
SWITCHING CHARACTERISTICS				
Delay Time (V _{CC} = 30 Vdc, I _C = 150 mAdc) (I _{B1} = I _{B2} = 15 mAdc)	t _d	—	10	ns
Rise Time (V _{CC} = 30 Vdc, I _C = 150 mAdc) (I _{B1} = I _{B2} = 15 mAdc)	t _r	—	10	ns
Storage Time (V _{CC} = 30 Vdc, I _C = 150 mAdc) (I _{B1} = I _{B2} = 15 mAdc)	t _s	—	225	ns
Fall Time (V _{CC} = 30 Vdc, I _C = 150 mAdc) (I _{B1} = I _{B2} = 15 mAdc)	t _f	—	60	ns

MOTOROLA SMALL-SIGNAL SEMICONDUCTORS

6367254 MOTOROLA SC (XSTRS/R F)

96D 81971 D

T-35-19

MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Collector-Emitter Voltage	V _{CEO}	60	Vdc
Collector-Base Voltage	V _{CBO}	60	Vdc
Emitter-Base Voltage	V _{EBO}	5.0	Vdc

THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Total Device Dissipation FR-5 Board,* T _A = 25°C Derate above 25°C	P _D	225 1.8	mW 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 2.4	mW 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

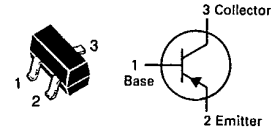
BSS82B = CH; BSS82C = CM

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

Characteristic	Symbol	Min	Max	Unit
OFF CHARACTERISTICS				
Collector-Emitter Breakdown Voltage (I _C = 10 mA)	V _{(BR)CEO}	60	—	Vdc
Collector-Base Breakdown Voltage (I _C = 10 μA)	V _{(BR)CBO}	60	—	Vdc
Emitter-Base Breakdown Voltage (I _E = 10 μA)	V _{(BR)EBO}	5.0	—	Vdc
Collector Cutoff Current (V _{CB} = 50 V) (V _{CB} = 50 V, T _A = 150°C)	I _{CBO}	—	10 10	nA μA
Emitter Cutoff Current (V _{EB} = 3.0 V)	I _{EBO}	—	10	nA
ON CHARACTERISTICS				
DC Current Gain (I _C = 150 mA, V _{CE} = 10 V)	h _{FE}	40 100	120 300	—
Collector-Emitter Saturation Voltage (I _C = 150 mA, I _B = 15 mA) (I _C = 500 mA, I _B = 50 mA)	V _{CE(sat)}	—	0.4 1.6	Vdc
SMALL-SIGNAL CHARACTERISTICS				
Current-Gain — Bandwidth Product (I _C = 50 mA, V _{CE} = 20 V, f = 200 MHz)	f _T	100	—	MHz

**BSS82B
BSS82C**

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



GENERAL PURPOSE TRANSISTOR

PNP SILICON



6367254 MOTOROLA SC (XSTRS/R F)

96D 81973 D
7-35-13

MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Drain-Source Voltage	V _{DSS}	100	Vdc
Gate-Source Voltage	V _{GS}	±35	Vdc
Drain Current Continuous (1)	I _D	0.17	Adc
Pulsed (2)	I _{DM}	0.68	

THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Total Device Dissipation FR-5 Board,* T _A = 25°C Derate above 25°C	P _D	225	mW
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
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

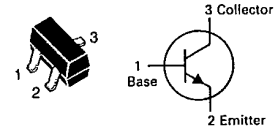
BSV52 = B2

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

Characteristic	Symbol	Min	Max	Unit
OFF CHARACTERISTICS				
Collector-Emitter Breakdown Voltage (I _C = 1.0 mA _{dc})	V _{(BR)CEO}	12	—	Vdc
Collector Cutoff Current (V _{CB} = 10 Vdc, I _E = 0) (V _{CB} = 10 Vdc, I _E = 0, T _A = 125°C)	I _{CBO}	—	100 5.0	nAdc μAdc
ON CHARACTERISTICS				
DC Current Gain (I _C = 1.0 mA _{dc} , V _{CE} = 1.0 Vdc) (I _C = 10 mA _{dc} , V _{CE} = 1.0 Vdc) (I _C = 50 mA _{dc} , V _{CE} = 1.0 Vdc)	h _{FE}	25 40 25	— 120 —	—
Collector-Emitter Saturation Voltage (I _C = 10 mA _{dc} , I _B = 300 μAdc) (I _C = 10 mA _{dc} , I _B = 1.0 mA _{dc}) (I _C = 50 mA _{dc} , I _B = 5.0 mA _{dc})	V _{CE(sat)}	—	300 250 400	mVdc
Base-Emitter Saturation Voltage (I _C = 10 mA _{dc} , I _B = 1.0 mA _{dc}) (I _C = 50 mA _{dc} , I _B = 5.0 mA _{dc})	V _{BE(sat)}	700	850 1200	mVdc
SMALL-SIGNAL CHARACTERISTICS				
Current-Gain --- Bandwidth Product (I _C = 10 mA _{dc} , V _{CE} = 10 Vdc)	f _T	400	—	MHz
Output Capacitance (V _{CB} = 5.0 Vdc, I _E = 0, f = 1.0 MHz)	C _{obo}	—	4.0	pF
Input Capacitance (V _{EB} = 1.0 Vdc, I _C = 0)	C _{ibo}	—	4.5	pF
SWITCHING CHARACTERISTICS				
Storage Time (I _C = I _B = I _{BM} = 10 mA _{dc})	t _s	—	13	ns
Turn-On Time (V _{BE} = 1.5 Vdc, I _C = 10 mA _{dc} , I _B = 3.0 mA _{dc})	t _{on}	—	12	ns
Turn-Off Time (I _C = 10 mA _{dc} , I _B = 3.0 mA _{dc})	t _{off}	—	18	ns

BSV52

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



SWITCHING TRANSISTOR

NPN SILICON

6367254 MOTOROLA SC (XSTRS/R F)

96D 81985 D

T-29-15

MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Collector-Emitter Voltage	V _{CEO}	45	Vdc
Collector-Base Voltage	V _{CBO}	50	Vdc
Emitter-Base Voltage	V _{EBO}	5.0	Vdc
Collector Current — Continuous	I _C	50	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
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
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.

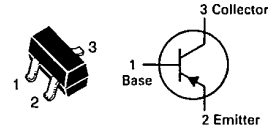
**Alumina = 0.4 x 0.3 x 0.024 in. 99.5% alumina.

DEVICE MARKING

MMBA811C5 = C5; MMBA811C6 = C6; MMBA811C7 = C7; MMBA811C8 = C8

MMBA811C5,6,7,8

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



AMPLIFIER TRANSISTOR

PNP SILICON

Refer to 2N5086 for graphs.

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

Characteristic	Symbol	Min	Max	Unit
OFF CHARACTERISTICS				
Collector-Emitter Breakdown Voltage (I _C = 1.0 mAdc)	V _{(BR)CEO}	45	—	Vdc
Collector-Base Breakdown Voltage (I _C = 100 μAdc)	V _{(BR)CBO}	50	—	Vdc
Emitter-Base Breakdown Voltage (I _C = 10 μAdc)	V _{(BR)EBO}	5.0	—	Vdc
Collector Cutoff Current (V _{CB} = 40 Vdc)	I _{CBO}	—	50	nAdc
Emitter Cutoff Current (V _{EB} = 5.0 Vdc)	I _{EBO}	—	50	nAdc
ON CHARACTERISTICS				
DC Current Gain (I _C = 0.1 mAdc, V _{CE} = 3.0 Vdc) (I _C = 0.5 mAdc, V _{CE} = 3.0 Vdc) (For Reference Only) (I _C = 0.5 mAdc, V _{CE} = 3.0 Vdc)	h _{FE}	150 135 — 135	— 900 — 270	—
		200 300 450	400 600 900	
	MMBA811C5	135	270	
	MMBA811C6	200	400	
	MMBA811C7	300	600	
	MMBA811C8	450	900	
Collector-Emitter Saturation Voltage (I _C = 20 mAdc, I _B = 2.0 mAdc)	V _{CE(sat)}	—	0.3	Vdc
Base-Emitter On Voltage (I _C = 0.5 mAdc, V _{CE} = 3.0 Vdc)	V _{BE(on)}	0.5	0.65	Vdc
SMALL SIGNAL CHARACTERISTICS				
Current-Gain — Bandwidth Product (I _C = 1.0 mAdc, V _{CE} = 6.0 Vdc, f = 100 MHz)	f _T	75	—	MHz

6367254 MOTOROLA SC (XSTRS/R F)

96D 81986 D

MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Collector-Emitter Voltage	V _{CEO}	40	V _{dc}
Collector-Base Voltage	V _{CBO}	50	V _{dc}
Emitter-Base Voltage	V _{EBO}	5.0	V _{dc}
Collector Current — Continuous	I _C	100	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
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
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

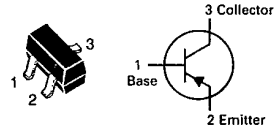
MMBA812M3 = M3; MMBA812M4 = M4; MMBA812M5 = M5;
MMBA812M6 = M6; MMBA812M7 = M7

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

Characteristic	Symbol	Min	Max	Unit
OFF CHARACTERISTICS				
Collector Cutoff Current (V _{CB} = 40 V _{dc} , I _E = 0)	I _{CBO}	—	0.1	μAdc
Emitter Cutoff Current (V _{EB} = 5.0 V _{dc} , I _C = 0)	I _{EBO}	—	0.1	μAdc
ON CHARACTERISTICS				
DC Current Gain (V _{CE} = 6.0 V _{dc} , I _C = 1.0 mAdc)	h _{FE}			—
		60	120	
		90	180	
		135	270	
		200	400	
		300	600	
Collector-Emitter Saturation Voltage (I _C = 30 mAdc, I _B = 3.0 mAdc)	V _{CE(sat)}	—	0.5	V _{dc}
Base-Emitter On Voltage (V _{CE} = 6.0 V _{dc} , I _C = 1.0 mAdc)	V _{BE(on)}	—	0.8	V _{dc}

MMBA812M3,4,5,6,7

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



GENERAL PURPOSE TRANSISTOR

PNP SILICON

Refer to 2N5086 for graphs.

6367254 MOTOROLA SC (XSTRS/R F)

96D 81987 D

T-31-15

MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Collector-Emitter Voltage	V _{CEO}	25	Vdc
Collector-Base Voltage	V _{CBO}	50	Vdc
Emitter-Base Voltage	V _{EBO}	5.0	Vdc
Collector Current — Continuous	I _C	50	mA _{dc}

THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Total Device Dissipation FR-5 Board,* T _A = 25°C Derate above 25°C	P _D	225	mW
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
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

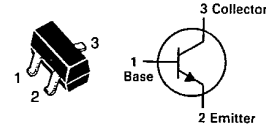
MMBC1009F1 = F1; MMBC1009F3 = F3

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

Characteristic	Symbol	Min	Typ	Max	Unit
OFF CHARACTERISTICS					
Collector Cutoff Current (V _{CB} = 15 Vdc, I _E = 0)	I _{CBO}	—	—	0.1	μA _{dc}
ON CHARACTERISTICS					
DC Current Gain (I _C = 0.5 mA _{dc} , V _{CE} = 3.0 Vdc)	h _{FE}	30 60	—	60 120	
Collector-Emitter Saturation Voltage (I _C = 10 mA _{dc} , I _B = 1.0 mA _{dc})	V _{CE(sat)}	—	—	0.3	Vdc
SMALL-SIGNAL CHARACTERISTICS					
Current-Gain Bandwidth Product (I _C = 1.0 mA _{dc} , V _{CE} = 6.0 Vdc, f = 100 MHz)	f _T	150	—	—	MHz
Output Capacitance (V _{CB} = 6.0 V, I _E = 0, f = 1.0 MHz)	C _{obo}	—	2.0	—	pF
Noise Figure (I _C = 0.5 mA _{dc} , V _{CE} = 6.0 Vdc, f = 1.0 MHz, R _G = 500 Ω)	NF	—	2.5	—	dB

MMBC1009F1
MMBC1009F3

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



AM/FM RF AMPLIFIER
TRANSISTOR

NPN SILICON

6367254 MOTOROLA SC (XSTRS/R F)

96D 81989 - D

T-29-15

MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Collector-Emitter Voltage	V_{CE0}	35	Vdc
Collector-Base Voltage	V_{CB0}	40	Vdc
Emitter-Base Voltage	V_{EB0}	5.0	Vdc
Collector Current — Continuous	I_C	100	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
		1.8	mW/ $^\circ\text{C}$
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
		2.4	mW/ $^\circ\text{C}$
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.

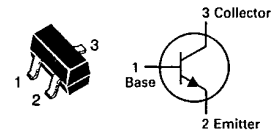
**Alumina = 0.4 x 0.3 x 0.024 in. 99.5% alumina.

DEVICE MARKING

MMBC1622D6 = D6; MMBC1622D7 = D7

MMBC1622D6

MMBC1622D7

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

AMPLIFIER TRANSISTOR

NPN SILICON

Refer to MPS3904 for graphs.

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

Characteristic	Symbol	Min	Max	Unit
OFF CHARACTERISTICS				
Collector Cutoff Current ($V_{CB} = 25\text{ Vdc}, I_E = 0$)	I_{CBO}	—	50	nAdc
Emitter Cutoff Current ($V_{EB} = 5.0\text{ Vdc}, I_C = 0$)	I_{EBO}	—	50	nAdc
ON CHARACTERISTICS				
DC Current Gain ($V_{CE} = 3.0\text{ Vdc}, I_C = 0.1\text{ mAdc}$) ($V_{CE} = 3.0\text{ Vdc}, I_C = 0.5\text{ mAdc}$)	All MMBC1622D6 MMBC1622D7	150 200 300	— 400 600	—
Collector-Emitter Saturation Voltage ($I_C = 100\text{ mAdc}, I_B = 10\text{ mAdc}$)	$V_{CE(sat)}$	—	0.3	Vdc
Base-Emitter On Voltage ($V_{CE} = 3.0\text{ Vdc}, I_C = 0.5\text{ mAdc}$)	$V_{BE(on)}$	0.55	0.65	Vdc
SMALL-SIGNAL CHARACTERISTICS				
Current-Gain — Bandwidth Product ($V_{CE} = 6.0\text{ Vdc}, I_E = 1.0\text{ mAdc}, f = 100\text{ Mhz}$)	f_T	100	—	MHz