

6367254 MOTOROLA SC (XSTRS/R F)

96D 82066 D

T-31-15

MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Collector-Emitter Voltage	V _{CEO}	20	Vdc
Collector-Base Voltage	V _{CBO}	20	Vdc
Emitter-Base Voltage	V _{EBO}	3.0	Vdc

THERMAL CHARACTERISTICS

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

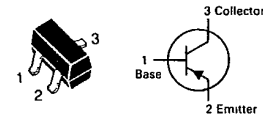
*FR-5 = 1.0 x 0.75 x 0.62 in.

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

DEVICE MARKING

MMBTH81 = 3D

MMBTH81

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

UHF/VHF TRANSISTOR

PNP SILICON

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

Characteristic	Symbol	Min	Typ	Max	Unit
OFF CHARACTERISTICS					
Collector-Emitter Breakdown Voltage (I _C = 1.0 mA _{dc} , I _B = 0)	V _{(BR)CEO}	20	—	—	Vdc
Collector-Base Breakdown Voltage (I _C = 10 μA _{dc} , I _E = 0)	V _{(BR)CBO}	20	—	—	Vdc
Emitter-Base Breakdown Voltage (I _E = 10 μA _{dc} , I _C = 0)	V _{(BR)EBO}	3.0	—	—	Vdc
Collector Cutoff Current (V _{CB} = 10 Vdc, I _E = 0)	I _{CBO}	—	—	100	nA _{dc}
Emitter Cutoff Current (V _{BE} = 2.0 Vdc, I _C = 0)	I _{EBO}	—	—	100	nA _{dc}
ON CHARACTERISTICS					
DC Current Gain (I _C = 5.0 mA _{dc} , V _{CE} = 10 Vdc)	h _{FE}	60	—	—	—
Collector-Emitter Saturation Voltage (I _C = 5.0 mA _{dc} , I _B = 0.5 mA _{dc})	V _{CE(sat)}	—	—	0.5	Vdc
Base-Emitter On Voltage (I _C = 5.0 mA _{dc} , V _{CE} = 10 Vdc)	V _{BE(on)}	—	—	0.9	Vdc
SMALL-SIGNAL CHARACTERISTICS					
Current-Gain — Bandwidth Product (I _C = 5.0 mA _{dc} , V _{CE} = 10 Vdc, f = 100 MHz)	f _T	600	—	—	MHz
Collector-Base Capacitance (V _{CB} = 10 Vdc, I _E = 0, f = 1.0 MHz)	C _{cb}	—	—	0.85	pF
Collector-Emitter Capacitance (I _B = 0, V _{CB} = 10 Vdc, f = 1.0 MHz)	C _{ce}	—	—	0.65	pF

MOTOROLA SMALL-SIGNAL SEMICONDUCTORS

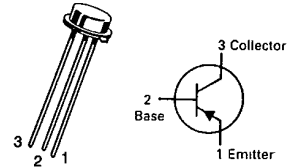
6367254 MOTOROLA SC (XSTRS/R F)

96D 82146 D

T-29-19

2N2945
2N2946

CASE 26-03, STYLE 1
TO-46 (TO-206AB)



TRANSISTOR

PNP SILICON

Refer to 2N2944A for graphs.

MAXIMUM RATINGS

Rating	Symbol	2N2945	2N2946	Unit
Emitter-Collector Voltage	V_{ECO}	20	35	Vdc
Collector-Base Voltage	V_{CBO}	25	40	Vdc
Emitter-Base Voltage	V_{EBO}	25	40	Vdc
Collector Current — Continuous	I_C	100		Adc
Total Device Dissipation @ $T_A = 25^\circ\text{C}$ Derate above 25°C	P_D	400	2.3	mW mW/°C
Total Device Dissipation @ $T_C = 25^\circ\text{C}$ Derate above 25°C	P_D	2.0	11.43	Watts mW/°C
Operating and Storage Junction Temperature Range	T_J, T_{stg}	-65 to +200		°C

THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Thermal Resistance, Junction to Case	$R_{\theta JC}$	87.5	°C/W
Thermal Resistance, Junction to Ambient	$R_{\theta JA}$	435	°C/W

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

Characteristic	Symbol	Min	Typ	Max	Unit
OFF CHARACTERISTICS					
Collector Cutoff Current ($V_{CB} = 25 \text{ Vdc}, I_E = 0$) ($V_{CB} = 40 \text{ Vdc}, I_E = 0$)	I_{CBO}	—	—	0.2 0.5	nAdc
Emitter Cutoff Current ($V_{EB} = 25 \text{ Vdc}, I_C = 0$) ($V_{EB} = 40 \text{ Vdc}, I_C = 0$)	I_{EBO}	—	—	0.2 0.5	nAdc
ON CHARACTERISTICS					
DC Current Gain ($I_C = 1.0 \text{ mAdc}, V_{CE} = 0.5 \text{ Vdc}$)	h_{FE}	40 30	160 130	—	—
*DC Current Gain (Inverted Connection) ($I_B = 200 \mu\text{Adc}, V_{EC} = 0.5 \text{ Vdc}$)	$h_{FE(inv)}$	4.0 3.0	17 15	—	—
Offset Voltage ($I_B = 200 \mu\text{Adc}, I_E = 0$)	$V_{EC(ofs)}$	—	0.23 0.27	0.5 0.8	mVdc
($I_B = 1.0 \text{ mAdc}, I_E = 0$)		—	0.5 0.6	1.0 2.0	
($I_B = 2.0 \text{ mAdc}, I_E = 0$)		—	0.9 1.0	1.6 2.5	
SMALL-SIGNAL CHARACTERISTICS					
Current-Gain — Bandwidth Product ($I_C = 1.0 \text{ mAdc}, V_{CE} = 6.0 \text{ Vdc}, f = 1.0 \text{ MHz}$)	f_T	5.0 3.0	13 12	—	MHz
Output Capacitance ($V_{CB} = 6.0 \text{ Vdc}, I_E = 0, f = 500 \text{ kHz}$)	C_{obo}	—	3.2	10	pF
Input Capacitance ($V_{EB} = 6.0 \text{ Vdc}, I_C = 0, f = 500 \text{ kHz}$)	C_{ibo}	—	1.9	6.0	pF
"ON" Series Resistance ($I_B = 1.0 \text{ mAdc}, I_E = 0, I_C = 100 \mu\text{Arms}, f = 1.0 \text{ kHz}$)	r_{ec}	—	4.5 5.0	35 45	Ohms

*Indicates Data in addition to JEDEC Requirements.



6367254 MOTOROLA SC (XSTRS/R F)

96D 82220 D
T-35-17

MAXIMUM RATINGS

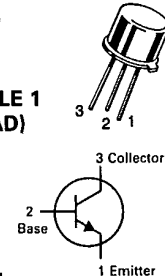
Rating	Symbol	2N3734	2N3735 2N3737	Unit
Collector-Emitter Voltage	V _{CEO}	30	50	V _{dc}
Collector-Base Voltage	V _{CBO}	50	75	V _{dc}
Emitter-Base Voltage	V _{EBO}	5.0		V _{dc}
Collector Current — Continuous	I _C	1.5		A _{dc}
		TO-39 2N3734 2N3735	TO-46 2N3737	
Total Device Dissipation @ T _A = 25°C Derate above 25°C	P _D	1.0 5.71	0.5 2.86	Watt mW/°C
Total Device Dissipation @ T _C = 26°C Derate above 25°C	P _D	4.0 22.8	2.0 11.4	Watts mW/°C
Operating and Storage Junction Temperature Range	T _J , T _{stg}	-65 to +200		°C

THERMAL CHARACTERISTICS

Characteristic	Symbol	2N3734	2N3735 2N3737	Unit
Thermal Resistance, Junction to Case	R _{θJC}	0.044	0.088	°C/mW
Thermal Resistance, Junction to Ambient	R _{θJA}	0.175	0.35	°C/mW

2N3734
2N3735

CASE 79-02, STYLE 1
TO-39 (TO-205AD)

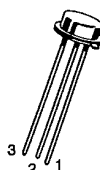


2N3737

CASE 26-03, STYLE 1
TO-46 (TO-206AD)

GENERAL PURPOSE
TRANSISTOR

NPN SILICON



Refer to 2N3725 for graphs.

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

Characteristic	Symbol	Min	Max	Unit
OFF CHARACTERISTICS				
Collector-Emitter Breakdown Voltage(1) (I _C = 10 mA _{dc} , I _B = 0)	V _{(BR)CEO}	30 50	—	V _{dc}
Collector-Base Breakdown Voltage (I _C = 10 μA _{dc} , I _E = 0)	V _{(BR)CBO}	50 75	—	V _{dc}
Emitter-Base Breakdown Voltage (I _E = 10 μA _{dc} , I _C = 0)	V _{(BR)EBO}	5.0	—	V _{dc}
Collector Cutoff Current (V _{CE} = 25 V _{dc} , V _{EB} = 2 V _{dc}) (V _{CE} = 25 V _{dc} , V _{EB} = 2 V _{dc} , T _A = 100°C) (V _{CE} = 40 V _{dc} , V _{EB} = 2 V _{dc}) (V _{CE} = 40 V _{dc} , V _{EB} = 2 V _{dc} , T _A = 100°C)	I _{CEX}	—	0.20 20 0.20 20	μA _{dc}
Base Cutoff Current (V _{CE} = 25 V _{dc} , V _{EB} = 2 V _{dc}) (V _{CE} = 40 V _{dc} , V _{EB} = 2 V _{dc})	I _{BL}	—	0.3 0.3	μA _{dc}
ON CHARACTERISTICS				
DC Current Gain(1) (I _C = 10 mA _{dc} , V _{CE} = 1 V _{dc}) (I _C = 150 mA _{dc} , V _{CE} = 1 V _{dc}) (I _C = 500 mA _{dc} , V _{CE} = 1 V _{dc}) (I _C = 1 A _{dc} , V _{CE} = 1.5 V _{dc}) (I _C = 1.5 A _{dc} , V _{CE} = 5 V _{dc})	h _{FE}	35 40 35 30 20	— — — 120 80	—
Collector-Emitter Saturation Voltage(1) (I _C = 10 mA _{dc} , I _B = 1 mA _{dc}) (I _C = 150 mA _{dc} , I _B = 15 mA _{dc}) (I _C = 500 mA _{dc} , I _B = 50 mA _{dc}) (I _C = 1 A _{dc} , I _B = 100 mA _{dc})	V _{CE(sat)}	—	0.2 0.3 0.5 0.9	V _{dc}
Base-Emitter Saturation Voltage(1) (I _C = 10 mA _{dc} , I _B = 1 mA _{dc}) (I _C = 150 mA _{dc} , I _B = 15 mA _{dc}) (I _C = 500 mA _{dc} , I _B = 50 mA _{dc}) (I _C = 1 A _{dc} , I _B = 100 mA _{dc})	V _{BE(sat)}	—	0.8 1.0 1.2 1.4	V _{dc}

4

6367254 MOTOROLA SC (XSTRS/R F)

96D 82221 D

2N3737

T-35-17

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

Characteristic	Symbol	Min	Max	Unit
SMALL-SIGNAL CHARACTERISTICS				
Output Capacitance ($V_{CB} = 10\text{ Vdc}$, $I_E = 0$, $f = 100\text{ kHz}$)	C_{obo}	—	9.0	pF
Input Capacitance ($V_{BE} = 0.5\text{ Vdc}$, $I_C = 0$, $f = 100\text{ kHz}$)	C_{ibo}	—	80	pF
Small-Signal Current Gain ($I_C = 50\text{ mAdc}$, $V_{CE} = 10\text{ Vdc}$, $f = 100\text{ MHz}$)	h_{fe}	2.5	—	—
SWITCHING CHARACTERISTICS				
Turn-On Time ($V_{CC} = 30\text{ V}$, $V_{BE(off)} = 2.0\text{ V}$, $I_C = 1.0\text{ Amp}$, $I_{B1} = 100\text{ mA}$)	t_{on}	—	40	ns
Turn-Off Time ($V_{CC} = 30\text{ V}$, $V_{BE(off)} = 2.0\text{ V}$, $I_C = 1.0\text{ Amp}$, $I_{B1} = 100\text{ mA}$)	t_{off}	—	60	ns
Total Control Charge ($I_C = 1\text{ Amp}$, $I_B = 100\text{ mA}$, $V_{CC} = 30\text{ V}$)	Q_T	—	10	NC

(1) Pulse Test: Pulse Width $\leq 300\ \mu\text{s}$, Duty Cycle $\leq 2.0\%$.

MOTOROLA SMALL-SIGNAL SEMICONDUCTORS

4-131