

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,* $T_A = 25^\circ\text{C}$ Derate above 25°C	P_D	225	mW
Thermal Resistance Junction to Ambient	$R_{\theta JA}$	556	$^\circ\text{C/mW}$
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	$^\circ\text{C/mW}$
Junction and Storage Temperature	T_J, T_{stg}	150	$^\circ\text{C}$

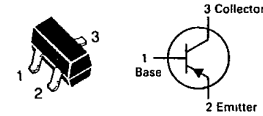
*FR-5 = 1.0 x 0.75 x 0.62 in.

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

DEVICE MARKING

MMBTH81 = 3D

MMBTH81

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

UHF/VHF TRANSISTOR

PNP SILICON

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

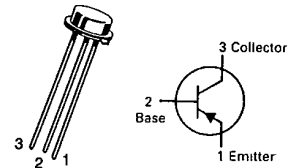
Characteristic	Symbol	Min	Typ	Max	Unit
OFF CHARACTERISTICS					
Collector-Emitter Breakdown Voltage ($I_C = 1.0 \text{ mA}$, $I_E = 0$)	$V_{(BR)CEO}$	20	—	—	Vdc
Collector-Base Breakdown Voltage ($I_C = 10 \mu\text{A}$, $I_E = 0$)	$V_{(BR)CBO}$	20	—	—	Vdc
Emitter-Base Breakdown Voltage ($I_E = 10 \mu\text{A}$, $I_C = 0$)	$V_{(BR)EBO}$	3.0	—	—	Vdc
Collector Cutoff Current ($V_{CB} = 10 \text{ Vdc}$, $I_E = 0$)	I_{CBO}	—	—	100	nA
Emitter Cutoff Current ($V_{BE} = 2.0 \text{ Vdc}$, $I_C = 0$)	I_{EBO}	—	—	100	nA
ON CHARACTERISTICS					
DC Current Gain ($I_C = 5.0 \text{ mA}$, $V_{CE} = 10 \text{ Vdc}$)	h_{FE}	60	—	—	—
Collector-Emitter Saturation Voltage ($I_C = 5.0 \text{ mA}$, $I_E = 0.5 \text{ mA}$)	$V_{CE(sat)}$	—	—	0.5	Vdc
Base-Emitter On Voltage ($I_C = 5.0 \text{ mA}$, $V_{CE} = 10 \text{ Vdc}$)	$V_{BE(on)}$	—	—	0.9	Vdc
SMALL-SIGNAL CHARACTERISTICS					
Current-Gain — Bandwidth Product ($I_C = 5.0 \text{ mA}$, $V_{CE} = 10 \text{ Vdc}$, $f = 100 \text{ MHz}$)	f_T	600	—	—	MHz
Collector-Base Capacitance ($V_{CB} = 10 \text{ Vdc}$, $I_E = 0$, $f = 1.0 \text{ MHz}$)	C_{cb}	—	—	0.85	pF
Collector-Emitter Capacitance ($I_B = 0$, $V_{CB} = 10 \text{ Vdc}$, $f = 1.0 \text{ MHz}$)	C_{ce}	—	—	0.65	pF

6367254 MOTOROLA SC (XSTRS/R F)

96D 82146 D

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) ($I_B = 200\text{ }\mu\text{Adc}, V_{EC} = 0.5\text{ Vdc}$)	$h_{FE(inv)}$	4.0 3.0	17 15	— —	—
Offset Voltage ($I_B = 200\text{ }\mu\text{Adc}, I_E = 0$)	$V_{EC(ofs)}$	— —	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 ($I_B = 1.0\text{ mAdc}, I_E = 0, I_C = 100\text{ }\mu\text{Arms}, f = 1.0\text{ kHz}$)	r_{ec}	— —	4.5 5.0	35 45	Ohms

*Indicates Data in addition to JEDEC Requirements.

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96D 82220

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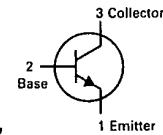
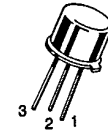
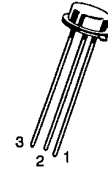
T-35-17

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 = 25°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	$R_{\theta JC}$	0.044	0.088	°C/mW
Thermal Resistance, Junction to Ambient	$R_{\theta JA}$	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 ($T_A = 25^\circ\text{C}$ unless otherwise noted.)

Characteristic	Symbol	Min	Max	Unit
OFF CHARACTERISTICS				
Collector-Emitter Breakdown Voltage(1) ($I_C = 10\text{ mAdc}, I_B = 0$)	$V_{(BR)CEO}$	30 50	—	Vdc
Collector-Base Breakdown Voltage ($I_C = 10\text{ }\mu\text{Adc}, I_E = 0$)	$V_{(BR)CBO}$	50 75	—	Vdc
Emitter-Base Breakdown Voltage ($I_E = 10\text{ }\mu\text{Adc}, I_C = 0$)	$V_{(BR)EBO}$	5.0	—	Vdc
Collector Cutoff Current ($V_{CE} = 25\text{ Vdc}, V_{EB} = 2\text{ Vdc}$) ($V_{CE} = 25\text{ Vdc}, V_{EB} = 2\text{ Vdc}, T_A = 100^\circ\text{C}$) ($V_{CE} = 40\text{ Vdc}, V_{EB} = 2\text{ Vdc}$) ($V_{CE} = 40\text{ Vdc}, V_{EB} = 2\text{ Vdc}, T_A = 100^\circ\text{C}$)	I_{CEX}	— — — —	0.20 20 0.20 20	μAdc
Base Cutoff Current ($V_{CE} = 25\text{ Vdc}, V_{EB} = 2\text{ Vdc}$) ($V_{CE} = 40\text{ Vdc}, V_{EB} = 2\text{ Vdc}$)	I_{BL}	— —	0.3 0.3	μAdc
ON CHARACTERISTICS				
DC Current Gain(1) ($I_C = 10\text{ mAdc}, V_{CE} = 1\text{ Vdc}$) ($I_C = 150\text{ mAdc}, V_{CE} = 1\text{ Vdc}$) ($I_C = 500\text{ mAdc}, V_{CE} = 1\text{ Vdc}$) ($I_C = 1\text{ Adc}, V_{CE} = 1.5\text{ Vdc}$) ($I_C = 1.5\text{ Adc}, V_{CE} = 5\text{ Vdc}$)	h_{FE}	35 40 35 30 20 30 20	— — — 120 80 — —	—
Collector-Emitter Saturation Voltage(1) ($I_C = 10\text{ mAdc}, I_B = 1\text{ mAdc}$) ($I_C = 150\text{ mAdc}, I_B = 15\text{ mAdc}$) ($I_C = 500\text{ mAdc}, I_B = 50\text{ mAdc}$) ($I_C = 1\text{ Adc}, I_B = 100\text{ mAdc}$)	$V_{CE(sat)}$	— — — —	0.2 0.3 0.5 0.9	Vdc
Base-Emitter Saturation Voltage(1) ($I_C = 10\text{ mAdc}, I_B = 1\text{ mAdc}$) ($I_C = 150\text{ mAdc}, I_B = 15\text{ mAdc}$) ($I_C = 500\text{ mAdc}, I_B = 50\text{ mAdc}$) ($I_C = 1\text{ Adc}, I_B = 100\text{ mAdc}$)	$V_{BE(sat)}$	— — — 0.9	0.8 1.0 1.2 1.4	Vdc

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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 $\leq 300\text{ }\mu\text{s}$, Duty Cycle $\leq 2.0\%$.