

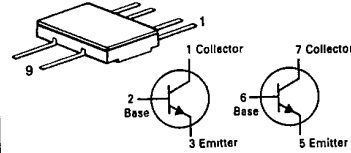
6367254 MOTOROLA SC (XSTRS/R F)

96D 82391 D

T-29-27

2N3043
thru
2N3045
2N3048

CASE 610A-04, STYLE 1



DUAL
AMPLIFIER TRANSISTOR

NPN SILICON

MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Collector-Emitter Voltage	V_{CEO}	45	Vdc
Collector-Base Voltage	V_{CBO}	45	Vdc
Emitter-Base Voltage	V_{EBO}	5.0	Vdc
Collector Current — Continuous	I_C	30	mAdc
		One Die	Both Die
Total Device Dissipation @ $T_A = 25^\circ\text{C}$ Derate above 25°C	P_D	250 1.67	350 2.33 mW mW/°C
Total Device Dissipation @ $T_C = 25^\circ\text{C}$ Derate above 25°C	P_D	0.7 4.67	1.4 9.33 Watts mW/°C
Operating and Storage Junction Temperature Range	T_J, T_{stg}	-65 to +200	°C

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

Characteristic	Symbol	Min	Max	Unit
OFF CHARACTERISTICS				
Collector-Emitter Breakdown Voltage(1) ($I_C = 10 \text{ mAdc}, I_B = 0$)	$V_{(BR)CEO}$	45	—	Vdc
Emitter-Base Breakdown Voltage ($I_E = 10 \text{ mAdc}, I_C = 0$)	$V_{(BR)EBO}$	5.0	—	Vdc
Collector Cutoff Current ($V_{CB} = 45 \text{ Vdc}, I_E = 0$) ($V_{CB} = 45 \text{ Vdc}, I_E = 0, T_A = +150^\circ\text{C}$)	I_{CBO}	—	0.010 10	μA
Emitter Cutoff Current ($V_{EB} = 4.0 \text{ Vdc}, I_C = 0$)	I_{EBO}	—	0.010	μA
ON CHARACTERISTICS				
DC Current Gain(1) ($I_C = 10 \text{ mAdc}, V_{CE} = 5.0 \text{ Vdc}$)	h_{FE}	100 50	300 200	—
($I_C = 1.0 \text{ mAdc}, V_{CE} = 5.0 \text{ Vdc}$)		130 65	—	
Collector-Emitter Saturation Voltage ($I_C = 10 \text{ mAdc}, I_B = 0.5 \text{ mAdc}$)	$V_{CE(sat)}$	—	1.0	Vdc
Base-Emitter On Voltage ($I_C = 10 \text{ mAdc}, V_{CE} = 5.0 \text{ Vdc}$)	V_{BE}	0.6	0.8	Vdc
SMALL-SIGNAL CHARACTERISTICS				
Current-Gain — Bandwidth Product ($I_C = 1.0 \text{ mAdc}, V_{CE} = 5.0 \text{ Vdc}, f = 20 \text{ MHz}$)	f_T	30	—	MHz
Output Capacitance ($V_{CB} = 5.0 \text{ Vdc}, I_E = 0, f = 1.0 \text{ MHz}$)	C_{obo}	—	8.0	pF
Input Impedance ($I_C = 1.0 \text{ mAdc}, V_{CE} = 5.0 \text{ Vdc}, f = 1.0 \text{ kHz}$)	h_{ie}	3.2k 1.6k	19k 13k	Ohms
Small-Signal Current Gain ($I_C = 1.0 \text{ mAdc}, V_{CE} = 5.0 \text{ Vdc}, f = 1.0 \text{ kHz}$)	h_{fe}	130 65	600 400	—
Output Admittance ($I_C = 1.0 \text{ mAdc}, V_{CE} = 5.0 \text{ Vdc}, f = 1.0 \text{ kHz}$)	h_{oe}	—	100 70	μmhos
Noise Figure ($I_C = 10 \text{ mAdc}, V_{CE} = 5.0 \text{ Vdc}, R_S = 10 \text{ kohms}$, Bandwidth = 10 Hz to 15.7 kHz)	NF	—	5.0	dB

MOTOROLA SMALL-SIGNAL SEMICONDUCTORS

6367254 MOTOROLA SC (XSTRS/R F)

96D 82392 D

2N3043 thru 2N3045, 2N3048

T-29-27

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

Characteristic	Symbol	Min	Max	Unit
MATCHING CHARACTERISTICS				
DC Current Gain Ratio(2) ($I_C = 10\ \mu\text{A}$, $V_{CE} = 5.0\ \text{Vdc}$)	h_{FE1}/h_{FE2}	0.9 0.8	1.0 1.0	—
Base-Emitter Voltage Differential ($I_C = 10\ \mu\text{A}$, $V_{CE} = 5.0\ \text{Vdc}$)	$ V_{BE1} - V_{BE2} $	— —	5.0 10	mVdc
Base-Emitter Voltage Differential Temperature Gradient ($I_C = 10\ \mu\text{A}$, $V_{CE} = 5.0\ \text{Vdc}$, $T_A = -55$ to $+125^\circ\text{C}$)	$\frac{\Delta(V_{BE1} - V_{BE2})}{\Delta T_A}$	— —	10 20	$\mu\text{V}/^\circ\text{C}$

(1) Pulse Test: Pulse Width $\leq 300\ \mu\text{s}$, Duty Cycle $\leq 2.0\%$.(2) The lowest h_{FE} reading is taken as h_{FE1} for this test.

6367254 MOTOROLA SC (XSTRS/R F)

96D 82412 D

T-43-25

MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Collector-Emitter Voltage	V_{CEO}	60	Vdc
Collector-Base Voltage	V_{CB}	60	Vdc
Emitter-Base Voltage	V_{EB}	5.0	Vdc
Collector Current — Continuous	I_C	600	mA
		Each Transistor	Total Device
M558-01 Total Power Dissipation @ $T_A = 25^\circ\text{C}$ Derate above 25°C	P_D	0.525 3.0	1.5 8.57 Watts mW/°C
M558-02 Total Power Dissipation @ $T_A = 25^\circ\text{C}$ Derate above 25°C	P_D	0.14 0.8	0.4 2.29 Watts mW/°C
Operating and Storage Junction Temperature Range	T_J, T_{stg}	-65 to +200	°C

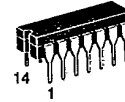
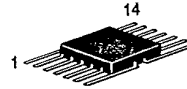
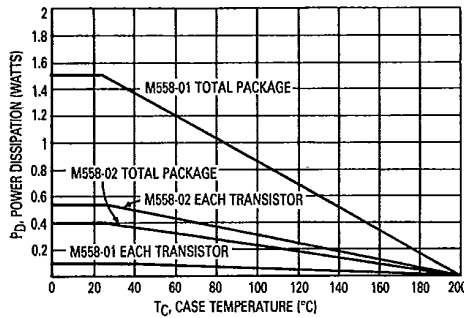
M558-01
M558-02M558-01
CERAMIC
CASE 632-02
STYLE 1M558-02
CERAMIC
CASE 607-04
STYLE 1QUAD
TRANSISTORS
PNP SILICON

Figure 1. Power Temperature Derating Curve

Table 1. Product Classifications

JAN — Controlled Lot with Sample Environmental and Life Testing
 JTX — 100% Processing Plus Sample Environmental and Life Testing
 JTXV — Same as JTX Plus 100% Internal Visual Inspection

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

Characteristic	Symbol	Min	Max	Unit
OFF CHARACTERISTICS				
Collector-Emitter Breakdown Voltage(1) ($I_C = 10\text{ mA}$, $I_E = 0$)	$V_{(BR)CEO}$	60	—	Vdc
Collector-Base Breakdown Voltage ($I_C = 10\text{ }\mu\text{A}$, $I_E = 0$)	$V_{(BR)CBO}$	60	—	Vdc
Emitter-Base Breakdown Voltage ($I_E = 10\text{ }\mu\text{A}$, $I_C = 0$)	$V_{(BR)EBO}$	5.0	—	Vdc
Collector Cutoff Current ($I_E = 0$, $V_{CB} = 60\text{ Vdc}$) ($I_E = 0$, $V_{CB} = 60\text{ V}$, $T_A = 150^\circ\text{C}$)	I_{CBO}	—	10 10	nA μA
Emitter Cutoff Current ($I_C = 0$, $V_{CB} = 4.0\text{ Vdc}$)	I_{EBO}	—	10	nA
ON CHARACTERISTICS				
DC Current Gain(1) ($I_C = 0.1\text{ mA}$, $V_{CE} = 10\text{ Vdc}$) ($I_C = 1.0\text{ mA}$, $V_{CE} = 10\text{ Vdc}$) ($I_C = 10\text{ mA}$, $V_{CE} = 10\text{ Vdc}$) ($I_C = 150\text{ mA}$, $V_{CE} = 10\text{ Vdc}$) ($I_C = 500\text{ mA}$, $V_{CE} = 10\text{ Vdc}$) ($I_C = 10\text{ mA}$, $V_{CE} = 10\text{ V}$, $T_A = -55^\circ\text{C}$)	h_{FE}	75 100 100 100 50 50	— — — 300 — —	
Collector-Emitter Saturation Voltage ($I_C = 150\text{ mA}$, $I_B = 15\text{ mA}$) ($I_C = 500\text{ mA}$, $I_B = 50\text{ mA}$)	$V_{CE(sat)}$	— —	0.4 1.6	Vdc
Base-Emitter Saturation Voltage ($I_C = 150\text{ mA}$, $I_B = 15\text{ mA}$) ($I_C = 500\text{ mA}$, $I_B = 50\text{ mA}$)	$V_{BE(sat)}$	0.6 —	1.3 2.6	Vdc
DYNAMIC CHARACTERISTICS				
Current-Gain — Bandwidth Product(1) ($I_C = 50\text{ mA}$, $V_{CE} = 20\text{ Vdc}$, $f = 100\text{ MHz}$)	f_T	250	800	MHz
Output Capacitance ($V_{CB} = 10\text{ Vdc}$, $I_E = 0$, $f = 1.0\text{ MHz}$)	C_{obo}	—	8.0	pF
Input Capacitance ($V_{BE} = 0.5\text{ Vdc}$, $I_C = 0$, $f = 1.0\text{ MHz}$)	C_{ibo}	—	30	pF

MOTOROLA SMALL-SIGNAL SEMICONDUCTORS

6367254 MOTOROLA SC (XSTRS/R F)

96D 82413 D

M558-01, M558-02

T-43-25

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

Characteristic	Symbol	Min	Max	Unit
SWITCHING CHARACTERISTICS				
Turn-On Time ($V_{CC} = 30\text{ Vdc}$, $V_{BE}(\text{off}) = 0.5\text{ Vdc}$, $I_C = 150\text{ mAdc}$, $I_{B1} = 15\text{ mAdc}$) (Figure 2)	t_{on}	—	45	ns
Turn-Off Time ($V_{CC} = 30\text{ Vdc}$, $I_C = 150\text{ mAdc}$, $I_{B1} = I_{B2} = 15\text{ mAdc}$) (Figure 3)	t_{off}	—	300	ns

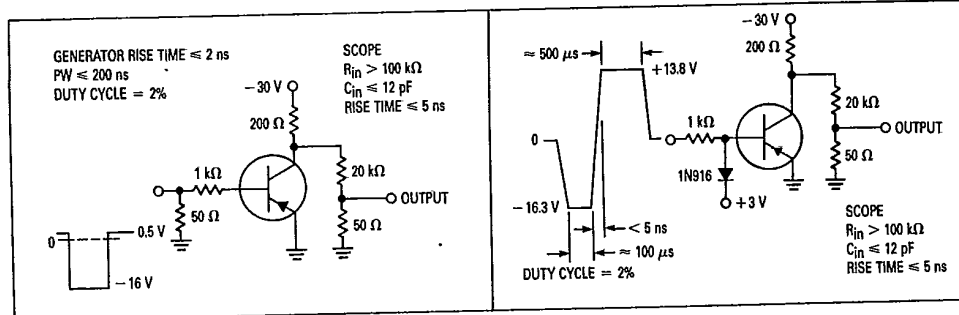
(1) Pulse Test: Pulse Width $\leq 300\text{ }\mu\text{s}$, Duty Cycle = 2.0%.Figure 2. t_{on} Test CircuitFigure 3. t_{off} Test Circuit

Table 2. JTX, JTXV 100% Processing Steps

	JTX	JTXV
Internal Visual (Mil-Std-750, Method 2072)	—	100%
High Temperature Storage (Mil-Std-750, Method 1032)	100%	100%
Thermal Shock (Mil-Std-750, Method 1051 Cond. F*)	100%	100%
Constant Acceleration (Mil-Std-750, Method 2006, 20 KG ² , Y ₁)	100%	100%
Hermetic Seal (Fine + Gross Leak) (Mil-Std-750, Method 1071, Cond. G or H)**	100%	100%
READ Electrical Parameters (Group A)	100%	100%
High Temperature Reverse Bias (Mil-Std-750, Method 1039, Cond. A)	100%	100%
READ Electrical Parameters (Group A)	100%	100%
Power Burn-In (Mil-Std-750, Method 1039, Cond. B)	100%	100%
READ Electrical Parameters (Group A)	100%	100%

*T(LOW) = -55°C **Cond. G, Fine Leak = 1×10^{-7} ATM. CC/sec.

Table 3. Simplified Hi-Rel Product Flow

JAN	JTX	JTXV
Commercial Product ↓ Group A, B, C Sample Test ↓ Ship	Commercial Product ↓ 100% Test ↓ Group A, B, C Sample Test ↓ Ship	100% Pre Cap Visual ↓ 100% Test ↓ Group A, B, C Sample Test ↓ Ship

MOTOROLA SMALL-SIGNAL SEMICONDUCTORS