

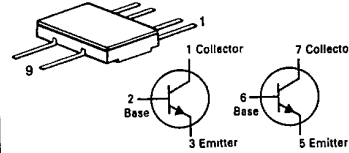
6367254 MOTOROLA SC (XSTRS/R F)

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 <sub>CEO</sub>	45	Vdc
Collector-Base Voltage	V <sub>CBO</sub>	45	Vdc
Emitter-Base Voltage	V <sub>EBO</sub>	5.0	Vdc
Collector Current — Continuous	I <sub>C</sub>	30	mAdc
		One Die	Both Die
Total Device Dissipation @ T <sub>A</sub> = 25°C Derate above 25°C	P <sub>D</sub>	250 1.67	350 2.33 mW mW/°C
Total Device Dissipation @ T <sub>C</sub> = 25°C Derate above 25°C	P <sub>D</sub>	0.7 4.67	1.4 9.33 Watts mW/°C
Operating and Storage Junction Temperature Range	T <sub>J</sub> , T <sub>stg</sub>	-65 to +200	°C

**ELECTRICAL CHARACTERISTICS** (T<sub>A</sub> = 25°C unless otherwise noted.)

Characteristic	Symbol	Min	Max	Unit
<b>OFF CHARACTERISTICS</b>				
Collector-Emitter Breakdown Voltage(1) (I <sub>C</sub> = 10 mAdc, I <sub>B</sub> = 0)	V <sub>(BR)CEO</sub>	45	—	Vdc
Emitter-Base Breakdown Voltage (I <sub>E</sub> = 10 μAdc, I <sub>C</sub> = 0)	V <sub>(BR)EBO</sub>	5.0	—	Vdc
Collector Cutoff Current (V <sub>CB</sub> = 45 Vdc, I <sub>E</sub> = 0) (V <sub>CB</sub> = 45 Vdc, I <sub>E</sub> = 0, T <sub>A</sub> = +150°C)	I <sub>CBO</sub>	—	0.010 10	μAdc
Emitter Cutoff Current (V <sub>EB</sub> = 4.0 Vdc, I <sub>C</sub> = 0)	I <sub>EBO</sub>	—	0.010	μAdc
<b>ON CHARACTERISTICS</b>				
DC Current Gain(1) (I <sub>C</sub> = 10 μAdc, V <sub>CE</sub> = 5.0 Vdc)	h <sub>FE</sub>	100 50	300 200	—
(I <sub>C</sub> = 1.0 mAdc, V <sub>CE</sub> = 5.0 Vdc)		2N3043, 2N3044, 2N3045 2N3048	130 65	—
Collector-Emitter Saturation Voltage (I <sub>C</sub> = 10 mAdc, I <sub>B</sub> = 0.5 mAdc)	V <sub>CE(sat)</sub>	—	1.0	Vdc
Base-Emitter On Voltage (I <sub>C</sub> = 10 mAdc, V <sub>CE</sub> = 5.0 Vdc)	V <sub>BE</sub>	0.6	0.8	Vdc
<b>SMALL-SIGNAL CHARACTERISTICS</b>				
Current-Gain — Bandwidth Product (I <sub>C</sub> = 1.0 mAdc, V <sub>CE</sub> = 5.0 Vdc, f = 20 MHz)	f <sub>T</sub>	30	—	MHz
Output Capacitance (V <sub>CB</sub> = 5.0 Vdc, I <sub>E</sub> = 0, f = 1.0 MHz)	C <sub>obo</sub>	—	8.0	pF
Input Impedance (I <sub>C</sub> = 1.0 mAdc, V <sub>CE</sub> = 5.0 Vdc, f = 1.0 kHz)	h <sub>ie</sub>	2N3043, 2N3044, 2N3045 2N3048	3.2k 1.6k	19k 13k Ohms
Small-Signal Current Gain (I <sub>C</sub> = 1.0 mAdc, V <sub>CE</sub> = 5.0 Vdc, f = 1.0 kHz)	h <sub>fe</sub>	2N3043, 2N3044, 2N3045 2N3048	130 65	600 400 —
Output Admittance (I <sub>C</sub> = 1.0 mAdc, V <sub>CE</sub> = 5.0 Vdc, f = 1.0 kHz)	h <sub>oe</sub>	—	100 70	μmhos
Noise Figure (I <sub>C</sub> = 10 μAdc, V <sub>CE</sub> = 5.0 Vdc, R <sub>S</sub> = 10 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
<b>MATCHING CHARACTERISTICS</b>				
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.

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6367254 MOTOROLA SC (XSTRS/R F)

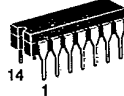
96D 82412

D  
T-43-25

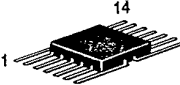
**MAXIMUM RATINGS**

Rating	Symbol	Value	Unit	
Collector-Emitter Voltage	$V_{CE0}$	60	Vdc	
Collector-Base Voltage	$V_{CB}$	60	Vdc	
Emitter-Base Voltage	$V_{EB}$	5.0	Vdc	
Collector Current — Continuous	$I_C$	600	mAdc	
		Each Transistor	Total Device	
M558-01 Total Power Dissipation @ $T_A = 25^\circ\text{C}$ Derate above $25^\circ\text{C}$	$P_D$	0.525 3.0	1.5 8.57	Watts mW/°C
M558-02 Total Power Dissipation @ $T_A = 25^\circ\text{C}$ Derate above $25^\circ\text{C}$	$P_D$	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**  
**M558-02**



M558-01  
CERAMIC  
CASE 632-02  
STYLE 1



M558-02  
CERAMIC  
CASE 607-04  
STYLE 1

**QUAD TRANSISTORS**  
PNP SILICON

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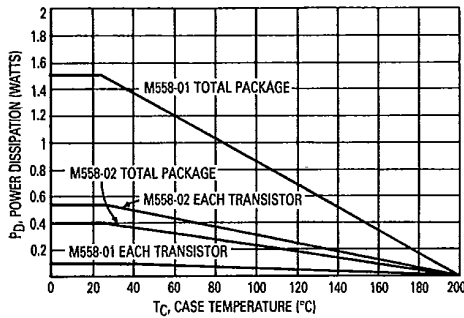


Figure 1. Power Temperature Derating Curve

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
<b>OFF CHARACTERISTICS</b>				
Collector-Emitter Breakdown Voltage(1) ( $I_C = 10 \text{ mAdc}, I_E = 0$ )	$V_{(BR)CEO}$	60	—	Vdc
Collector-Base Breakdown Voltage ( $I_C = 10 \mu\text{Adc}, I_E = 0$ )	$V_{(BR)CBO}$	60	—	Vdc
Emitter-Base Breakdown Voltage ( $I_E = 10 \mu\text{Adc}, I_C = 0$ )	$V_{(BR)EBO}$	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	nAdc $\mu\text{A}$
Emitter Cutoff Current ( $I_C = 0, V_{CB} = 4.0 \text{ Vdc}$ )	$I_{EBO}$	—	10	nAdc
<b>ON CHARACTERISTICS</b>				
DC Current Gain(1) ( $I_C = 0.1 \text{ mA}, V_{CE} = 10 \text{ Vdc}$ ) ( $I_C = 1.0 \text{ mA}, V_{CE} = 10 \text{ Vdc}$ ) ( $I_C = 10 \text{ mAdc}, V_{CE} = 10 \text{ Vdc}$ ) ( $I_C = 150 \text{ mAdc}, V_{CE} = 10 \text{ Vdc}$ ) ( $I_C = 500 \text{ mAdc}, V_{CE} = 10 \text{ Vdc}$ ) ( $I_C = 10 \text{ mA}, V_{CE} = 10 \text{ V}, T_A = -55^\circ\text{C}$ )	$h_{FE}$	75 100 100 100 50 50	— 450 — 300 — —	
Collector-Emitter Saturation Voltage ( $I_C = 150 \text{ mAdc}, I_B = 15 \text{ mAdc}$ ) ( $I_C = 500 \text{ mAdc}, I_B = 50 \text{ mAdc}$ )	$V_{CE(sat)}$	— —	0.4 1.6	Vdc
Base-Emitter Saturation Voltage ( $I_C = 150 \text{ mAdc}, I_B = 15 \text{ mAdc}$ ) ( $I_C = 500 \text{ mAdc}, I_B = 50 \text{ mAdc}$ )	$V_{BE(sat)}$	0.6 —	1.3 2.6	Vdc
<b>DYNAMIC CHARACTERISTICS</b>				
Current-Gain — Bandwidth Product(1) ( $I_C = 50 \text{ mAdc}, V_{CE} = 20 \text{ Vdc}, f = 100 \text{ MHz}$ )	$f_T$	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

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M558-01, M558-02

T-43-25

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

Characteristic	Symbol	Min	Max	Unit
<b>SWITCHING CHARACTERISTICS</b>				
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  $\leq 300\ \mu\text{s}$ , Duty Cycle = 2.0%.

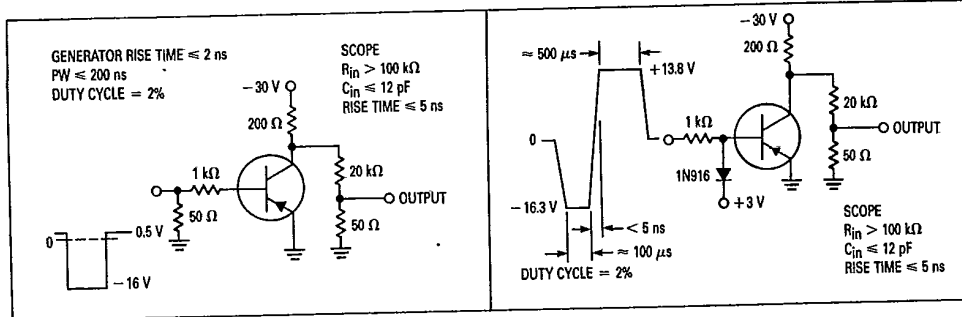


Figure 2.  $t_{on}$  Test Circuit

Figure 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 <sup>2</sup> , Y <sub>1</sub> )	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) =  $-55^\circ\text{C}$

\*\*Cond. G, Fine Leak =  $1 \times 10^{-7}$  ATM. CC/sec.

Table 3. Simplified Hi-Rel Product Flow

