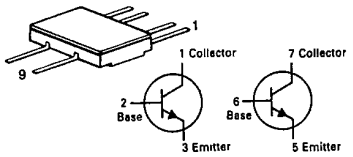
T-29-27

2N3043 thru 2N3045 2N3048

CASE 610A-04, STYLE 1



DUAL AMPLIFIER TRANSISTOR

NPN SILICON

5

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°C Derate above 25°C	P_D	250 1.67	350 2.33	mW mW/°C
Total Device Dissipation @ T_C = 25°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°C unless otherwise noted.)

Characteristic		Symbol	Min	Max	Unit
OFF CHARACTERISTICS					
Collector-Emitter Breakdown Voltage(1) (I_C = 10 mAdc, I_B = 0)		$V_{(BR)CEO}$	45	—	Vdc
Emitter-Base Breakdown Voltage (I_E = 10 μAdc, I_C = 0)		$V_{(BR)EBO}$	5.0	—	Vdc
Collector Cutoff Current (V_{CB} = 45 Vdc, I_E = 0) (V_{CB} = 45 Vdc, I_E = 0, T_A = +150°C)		I_{CBO}	— —	0.010 10	μAdc
Emitter Cutoff Current (V_{EB} = 4.0 Vdc, I_C = 0)		I_{EBO}	—	0.010	μAdc
ON CHARACTERISTICS					
DC Current Gain(1) (I_C = 10 μAdc, V_{CE} = 5.0 Vdc)	2N3043, 2N3044, 2N3045 2N3048	h_{FE}	100 50	300 200	—
(I_C = 1.0 mAdc, V_{CE} = 5.0 Vdc)	2N3043, 2N3044, 2N3045 2N3048		130 65	— —	
Collector-Emitter Saturation Voltage (I_C = 10 mAdc, I_B = 0.5 mAdc)		$V_{CE(sat)}$	—	1.0	Vdc
Base-Emitter On Voltage (I_C = 10 mAdc, V_{CE} = 5.0 Vdc)		V_{BE}	0.6	0.8	Vdc
SMALL-SIGNAL CHARACTERISTICS					
Current-Gain — Bandwidth Product (I_C = 1.0 mAdc, V_{CE} = 5.0 Vdc, f = 20 MHz)		f_T	30	—	MHz
Output Capacitance (V_{CB} = 5.0 Vdc, I_E = 0, f = 1.0 MHz)		C_{obo}	—	8.0	pF
Input Impedance (I_C = 1.0 mAdc, V_{CE} = 5.0 Vdc, f = 1.0 kHz)	2N3043, 2N3044, 2N3045 2N3048	h_{ie}	3.2k 1.6k	19k 13k	Ohms
Small-Signal Current Gain (I_C = 1.0 mAdc, V_{CE} = 5.0 Vdc, f = 1.0 kHz)	2N3043, 2N3044, 2N3045 2N3048	h_{fe}	130 65	600 400	—
Output Admittance (I_C = 1.0 mAdc, V_{CE} = 5.0 Vdc, f = 1.0 kHz)		h_{oe}	— —	100 70	μmhos
Noise Figure (I_C = 10 μAdc, V_{CE} = 5.0 Vdc, R_S = 10 kohms, Bandwidth = 10 Hz to 15.7 kHz)		NF	—	5.0	dB

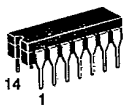
ELECTRICAL CHARACTERISTICS (continued) (T_A = 25°C unless otherwise noted.)

Characteristic		Symbol	Min	Max	Unit
MATCHING CHARACTERISTICS					
DC Current Gain Ratio(2) (I_C = 10 μAdc, V_{CE} = 5.0 Vdc)	2N3043	h_{FE1}/h_{FE2}	0.9	1.0	—
	2N3044		0.8	1.0	
Base-Emitter Voltage Differential (I_C = 10 μAdc, V_{CE} = 5.0 Vdc)	2N3043	$\lvert V_{BE1}-V_{BE2}\rvert$	—	5.0	mVdc
	2N3044		—	10	
Base-Emitter Voltage Differential Temperature Gradient (I_C = 10 μAdc, V_{CE} = 5.0 Vdc, T_A = −55 to +125°C)	2N3043	$\frac{\Delta(V_{BE1}-V_{BE2})}{\Delta T_A}$	—	10	μV/°C
	2N3044		—	20	

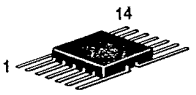
(1) Pulse Test: Pulse Width ≤ 300 μs, Duty Cycle ≤ 2.0%.
(2) The lowest h_{FE} reading is taken as h_{FE1} for this test.

5

M558-01
M558-02



M558-01
CERAMIC
CASE 632-02
STYLE 1



M558-02
CERAMIC
CASE 607-04
STYLE 1

QUAD
TRANSISTORS
PNP SILICON

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		mAdc
		Each Transistor	Total Device	
M558-01 Total Power Dissipation @ T_A = 25°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°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

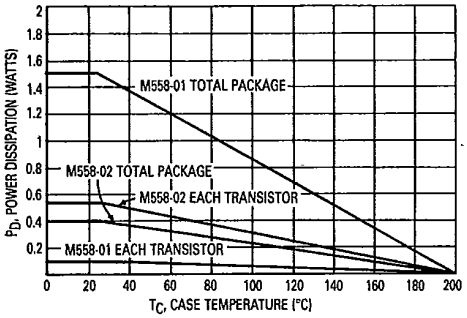


Figure 1. Power Temperature Derating Curve

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°C unless otherwise noted)

Characteristic	Symbol	Min	Max	Unit
OFF CHARACTERISTICS				
Collector-Emitter Breakdown Voltage(1) (I_C = 10 mAdc, I_B = 0)	$V_{(BR)CEO}$	60	—	Vdc
Collector-Base Breakdown Voltage (I_C = 10 μAdc, I_E = 0)	$V_{(BR)CBO}$	60	—	Vdc
Emitter-Base Breakdown Voltage (I_E = 10 μAdc, I_C = 0)	$V_{(BR)EBO}$	5.0	—	Vdc
Collector Cutoff Current (I_E = 0, V_{CB} = 60 Vdc) (I_E = 0, V_{CB} = 60 V, T_A = 150°C)	I_{CBO}	 — —	 10 10	 nAdc μA
Emitter Cutoff Current (I_C = 0, V_{CB} = 4.0 Vdc)	I_{EBO}	—	10	nAdc
ON CHARACTERISTICS				
DC Current Gain(1) (I_C = 0.1 mA, V_{CE} = 10 Vdc) (I_C = 1.0 mA, V_{CE} = 10 Vdc) (I_C = 10 mAdc, V_{CE} = 10 Vdc) (I_C = 150 mAdc, V_{CE} = 10 Vdc) (I_C = 500 mAdc, V_{CE} = 10 Vdc) (I_C = 10 mA, V_{CE} = 10 V, T_A = −55°C)	h_{FE}	 75 100 100 100 50 50	 — 450 — 300 — —	
Collector-Emitter Saturation Voltage (I_C = 150 mAdc, I_B = 15 mAdc) (I_C = 500 mAdc, I_B = 50 mAdc)	$V_{CE(sat)}$	 — —	 0.4 1.6	Vdc
Base-Emitter Saturation Voltage (I_C = 150 mAdc, I_B = 15 mAdc) (I_C = 500 mAdc, I_B = 50 mAdc)	$V_{BE(sat)}$	 0.6 —	 1.3 2.6	Vdc
DYNAMIC CHARACTERISTICS				
Current-Gain — Bandwidth Product(1) (I_C = 50 mAdc, V_{CE} = 20 Vdc, f = 100 MHz)	f_T	250	800	MHz
Output Capacitance (V_{CB} = 10 Vdc, I_E = 0, f = 1.0 MHz)	C_{obo}	—	8.0	pF
Input Capacitance (V_{BE} = 0.5 Vdc, I_C = 0, f = 1.0 MHz)	C_{ibo}	—	30	pF

T-43-25

M558-01, M558-02

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

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

(1) Pulse Test: Pulse Width ≤ 300 μs, Duty Cycle = 2.0%.

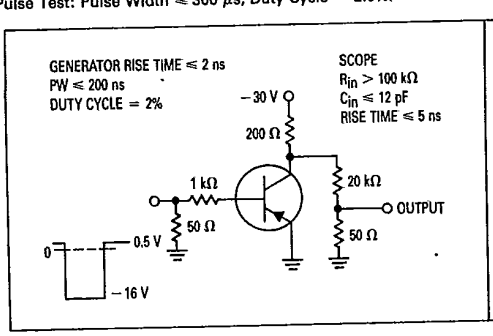


Figure 2. t_{on} Test Circuit

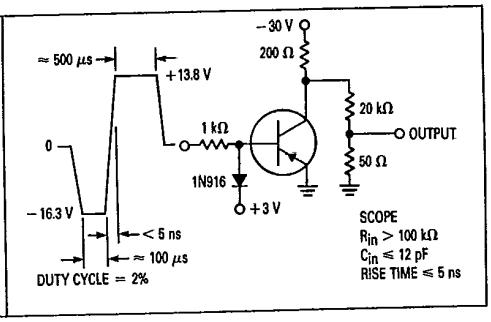


Figure 3. t_{off} Test Circuit

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^6, 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 x 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