

ALPHANUMERIC INDEX — CROSS-REFERENCE (Continued)

Industry Part Number	Motorola Direct Replacement	Motorola Similar Replacement	Page Number	Industry Part Number	Motorola Direct Replacement	Motorola Similar Replacement	Page Number
MJ13090	MJ13090		3-688	MJ2802		2N5881	3-123
MJ13091		MJ16010	3-758	MJ2840		2N5877	3-120
MJ13100		MJ16016	3-774	MJ2841		2N5878	3-120
MJ13101		MJ16016	3-774	MJ2901		MJ15016	3-9
MJ13330	MJ13330		3-694	MJ2940		2N5875	3-120
MJ13331	MJ13331		3-694	MJ2955	MJ2955		3-6
MJ13332		MJ13333	3-700	MJ2955A	MJ2955A		3-9
MJ13333	MJ13333		3-700	MJ3000	MJ3000		3-530
MJ13334		MJ13335	3-700	MJ3001	MJ3001		3-530
MJ13335	MJ13335		3-700	MJ3029	MJ3029		3-532
MJ14000	MJ14000		3-706	MJ3030	2N6545		3-221
MJ14001	MJ14001		3-706	MJ3040	MJ3041		3-534
MJ14002	MJ14002		3-706	MJ3041	MJ3041		3-534
MJ14003	MJ14003		3-706	MJ3042	MJ3042		3-534
MJ15001	MJ15001		3-710	MJ3055	2N3055		3-6
MJ15002	MJ15002		3-710	MJ3055A	2N3055A		3-9
MJ15003	MJ15003		3-713	MJ3237	MJE15031		3-972
MJ15004	MJ15004		3-713	MJ3238	MJE15031		3-972
MJ15011	MJ15011		3-716	MJ3247	MJE15030		3-972
MJ15012	MJ15012		3-716	MJ3248	MJE15030		3-972
MJ15015	MJ15015		3-9	MJ400		2N3739	3-37
MJ15016	MJ15016		3-9	MJ4030	2N6285		3-172
MJ15018	MJ15018		3-718	MJ4031	2N6286		3-172
MJ15019	MJ15019		3-718	MJ4032	2N6287		3-172
MJ15020	MJ15020		3-718	MJ4033	2N6282		3-172
MJ15021	MJ15021		3-718	MJ4034	2N6283		3-172
MJ15022	MJ15022		3-720	MJ4035	2N6284		3-172
MJ15023	MJ15023		3-723	MJ410	MJ410		3-522
MJ15024	MJ15024		3-720	MJ411	MJ411		3-522
MJ15025	MJ15025		3-723	MJ413	MJ413		3-524
MJ15026		MJ15024	3-720	MJ423	MJ423		3-524
MJ15027		MJ15025	3-723	MJ4237		MJ15012	3-716
MJ16002	MJ16002		3-726	MJ4238		MJ15012	3-716
MJ16002A	MJ16002A		3-734	MJ424		2N6308	3-181
MJ16004	MJ16004		3-726	MJ4247		MJ15011	3-716
MJ16006	MJ16006		3-742	MJ4248		MJ15011	3-716
MJ16006A	MJ16006A		3-750	MJ425		2N6545	3-221
MJ16008	MJ16008		3-742	MJ431	MJ431		3-524
MJ16010	MJ16010		3-758	MJ4360		MJE130C2	3-938
MJ16010A	MJ16010A		3-766	MJ4361		MJE130C3	3-938
MJ16012	MJ16012		3-758	MJ4380		MJE130C4	3-944
MJ16014	MJ16014		3-774	MJ4381		MJE130C5	3-944
MJ16016	MJ16016		3-774	MJ4400		MJE130C4	3-944
MJ16018	MJ16018		3-782	MJ4401		MJE130C5	3-944
MJ16020	MJ16020		—	MJ450		2N4398	3-68
MJ16022	MJ16022		—	MJ4502	MJ4502		3-536
MJ205		MJ12003	3-642	MJ4645	MJ4646		3-538
MJ2249		2N3766	3-44	MJ4646	MJ4646		3-538
MJ2250		2N3767	3-44	MJ4647	MJ4647		3-538
MJ2251		2N3738	3-37	MJ480		2N3055	3-6
MJ2252		2N3739	3-37	MJ481		2N3055	3-6
MJ2253		2N3740	3-41	MJ490		2N3789	3-56
MJ2254		2N3741	3-41	MJ491		2N3789	3-56
MJ2267		MJ15016	3-9	MJ6502	MJ6503		3-540
MJ2268		MJ2955	3-6	MJ6503	MJ6503		3-540
MJ2300		MJE270	3-874	MJ6700		2N6193	3-158
MJ2305		MJE271	3-874	MJ701		MJ12002	3-637
MJ2500	MJ2500		3-530	MJ702		MJ12002	3-637
MJ2501	MJ2501		3-530	MJ704		MJ12002	3-637
MJ2801		2N3055	3-6	MJ721		MJ12002	3-637

*Consult Motorola if a direct replacement is necessary.

Advance Information

**COMPLEMENTARY SILICON
POWER TRANSISTORS**

... designed for use as high frequency drivers in Audio Amplifiers.

- High Gain Complementary Silicon Power Transistors
- Safe Operating Area 100% Tested
50 V, 3.0 A, 1.0 Sec.
- Excellent Frequency Response — $f_T = 20$ MHz min.

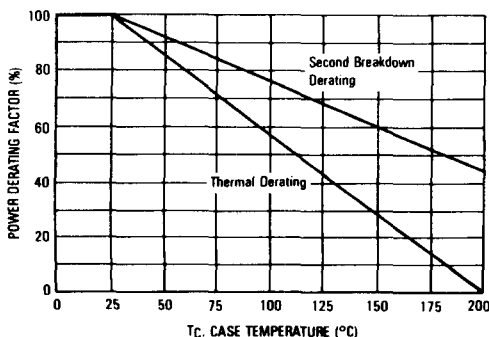
MAXIMUM RATINGS

Rating	Symbol	MJ15018 MJ15019	MJ15020 MJ15021	Unit
Collector-Emitter Voltage	V_{CEO}	200	250	Vdc
Collector-Base Voltage	V_{CBO}	200	250	Vdc
Emitter-Base Voltage	V_{EBO}	7.0		Vdc
Collector Current — Continuous	I_C	4.0		Adc
Base Current — Continuous	I_B	2.0		Adc
Emitter Current — Continuous	I_E	6.0		Adc
Total Power Dissipation @ $T_C = 25^\circ\text{C}$ Derate above 25°C	P_D	150 0.86		Watts W/°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	$R_{\theta JC}$	1.17	°C/W

FIGURE 1 — POWER DERATING



This document contains information on a new product. Specifications and information herein are subject to change without notice.

NPN

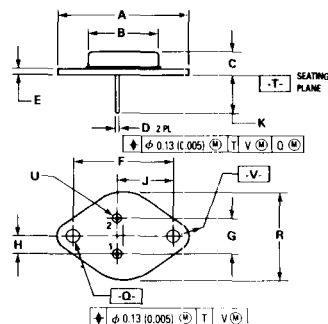
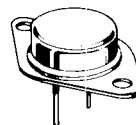
PNP

MJ15018 MJ15019
MJ15020 MJ15021

4.0 AMPERES

**COMPLEMENTARY SILICON
POWER TRANSISTORS**

200 AND 250 VOLTS
150 WATTS



NOTES:

1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. ALL RULES AND NOTES ASSOCIATED WITH REFERENCED TO-204AA OUTLINE SHALL APPLY.

DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	—	39.37	—	1.550
B	—	21.08	—	0.830
C	6.35	8.25	0.250	0.325
D	0.97	1.09	0.038	0.043
E	1.40	1.77	0.055	0.070
F	30.15 BSC		1.187 BSC	
G	10.92 BSC		0.430 BSC	
H	5.46 BSC		0.215 BSC	
J	16.89 BSC		0.665 BSC	
K	11.18	12.19	0.440	0.480
Q	3.84	4.19	0.151	0.165
R	26.67		1.050	
U	4.83	5.33	0.190	0.210
V	3.84	4.19	0.151	0.165

STYLE 1:
 PIN 1: BASE
 2: EMITTER
 CASE: COLLECTOR

**CASE 1-06
TO-204AA
(TO-3)**

MJ15018, MJ15020 NPN MJ15019, MJ15021 PNP

ELECTRICAL CHARACTERISTICS (T_C = 25°C unless otherwise noted)

Characteristics	Symbol	Min	Max	Unit
OFF CHARACTERISTICS				
Collector-Emitter Sustaining Voltage (1) (I _C = 100 mAdc, I _B = 0)	V _{CEO(sus)}	200 250	— —	Vdc
Collector Cutoff Current (V _{CE} = 150 Vdc, I _B = 0) (V _{CE} = 200 Vdc, I _B = 0)	I _{CEO}	— —	500 500	μAdc
Emitter Cutoff Current (V _{EB} = 7.0 Vdc, I _C = 0)	I _{EBO}	—	500	μAdc
SECOND BREAKDOWN				
Second Breakdown Collector Current with Base Forward-Biased (V _{CE} = 50 Vdc, t = 0.5 s (non-repetitive))	I _{S/b}	3.0	—	Adc
ON CHARACTERISTICS (1)				
DC Current Gain (I _C = 1.0 Adc, V _{CE} = 4.0 V) (I _C = 3.0 Adc, V _{CE} = 4.0 V)	h _{FE}	30 10	— —	
Collector-Emitter Saturation Voltage (I _C = 1.0 Adc, I _B = 0.1 Adc)	V _{CE(sat)}	—	1.0	Vdc
Base-Emitter on Voltage (I _C = 1.0 Adc, V _{CE} = 4.0 Vdc)	V _{BE(on)}	—	2.0	Vdc
DYNAMIC CHARACTERISTICS				
Current-Gain — Bandwidth Product (I _C = 0.5 Adc, V _{CE} = 10 Vdc, f _{test} = 1.0 MHz)	f _T	20	—	MHz
Output Capacitance (V _{CB} = 10 Vdc, I _E = 0, f _{test} = 1.0 MHz)	C _{ob}	—	500	pF

(1) Pulse Test: Pulse Width ≤ 300 μs, Duty Cycle ≤ 2%

TYPICAL DYNAMIC CHARACTERISTICS

FIGURE 2 — DC CURRENT GAIN

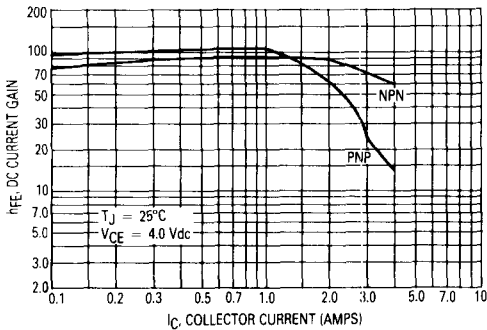
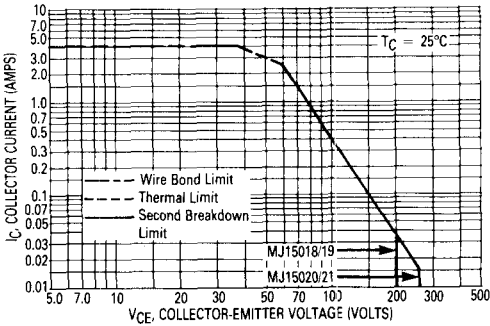
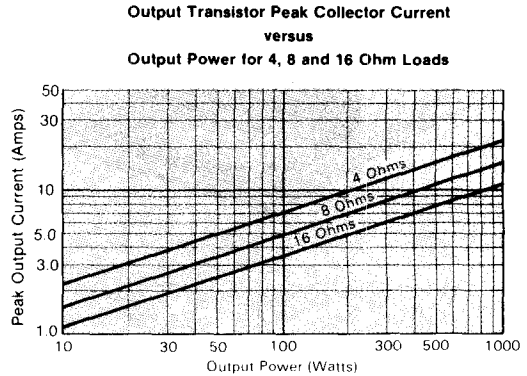
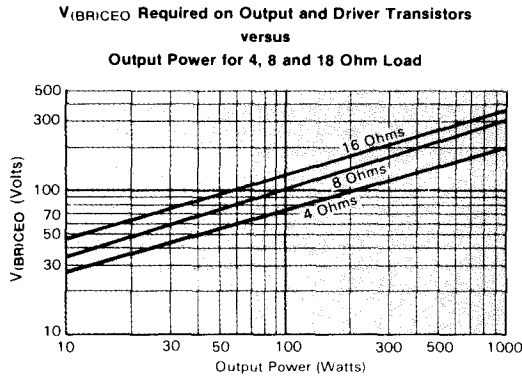


FIGURE 3 — MAXIMUM RATED FORWARD BIASED SAFE OPERATING AREA



Audio

GENERAL DESIGN CURVES FOR POWER AUDIO OUTPUT STAGES



Another important parameter that must be considered before selecting the output transistors is the safe-operating area these devices must withstand. For a complete discussion on these see Application Notes AN484A and AN485.

TABLE 1 — RECOMMENDED POWER TRANSISTORS FOR AUDIO/SERVO LOADS

RMS Power Output	NPN	PNP	Case	P _D Watts @ 25°C	V _{CEO}	h _{FE} α Min/Max	I _C Amps	f _T MHz Typ	ISB Volts/Amps
To 25W	MJE15030	MJE15031	TO-220	50W	150 V	20 min	4A	70	14/3.6
25 to 50W	2N3055A MJ15001	MJ2955A MJ15002	TO-204	120W	120 V	20/70	4A	3	60/2
			TO-204	200W	140 V	25/150	4A	3	40/5
50 to 100W	MJ15015 MJ15003 MJ15018 MJ15020	MJ15016 MJ15004 MJ15019 MJ15020	TO-204	180W	120 V	20/70	4A	3	60/3
			TO-204	250W	140 V	25/150	5A	3	100/1
			TO-204	150W	200	30 min	1A	20	50/3
			TO-204	150W	250	30 min	1A	20	50/3
Over 100W	MJ15024	MJ15025	TO-204	250W	250 V	15/60	8A	8	80/2.2

The Power Transistors shown are provided for reference only and show device capability. The final choice of the Power Transistors used is left to the circuit designer and depends upon the particular safe-operating area required and the mounting and heat sinking configuration used.