ALPHANUMERIC INDEX — CROSS-REFERENCE

The following table represents an index and cross-reference guide for all low-frequency power transistors which are either manufactured directly by Motorola or for which Motorola manufactures a suitable equivalent. Where the Motorola part number differs from the industry part number, the Motorola device is a "form, fit and function" replacement for the industry type number — however, subtle differences in characteristics and/or specifications may exist.

Industry Part Number	Motorola Direct Replacement	Motorola Similar Replacement	Page Number
1SI10A-100		MJ16018	3-782
2N1487		2N5877	3-120
2N1488		2N5878	3-120
2N1489		2N5877	3-120
2N1490		2N5878	3-120
2N1702		2N5877	3-120
2N3016		2N5337	3-97
2N3021		2N3789	3-56
2N3022		2N3789	3-56
2N3023		2N3789	3-56
2N3024		2N3791	3-56
2N3025		2N3791	3-56
2N3026		2N3791	3-56
2N3054	2N3054		3-2
2N3054A	2N3054A		3-2
2N3055	2N3055		3-6
2N3055A	2N3055A		3-9
2N3055H		2N3055A	3-9
2N3055JAN		2N5302JAN	3-93
2N3055SD		2N3055A	3-9
2N3055UB		2N3055A	3-9
2N3076		2N6249	3-164
2N3079		2N6308	3-181
2N3080		2N6543	3-215
2N3171		2N3789	3-56
2N3172		2N3789	3-56
2N3173		2N3790	3-56
2N3174		MJ15016	3-9
2N3183		2N3789	3-56
2N3184		2N3789	3-56
2N3185		2N3790	3-56
2N3186		MJ15016	3-9
2N3195		2N3789	3-56
2N3196		2N3790	3-56
2N3198		MJ15016	3-9
2N3202		2N3719	3-32
2N3203		2N3720	3-32
2N3204		2N6303	3-32
2N3232		2N5877	3-120
2N3233		2N5882	3-123
2N3234		2N5760	3-116
2N3235		2N3055	3-6
2N3236		2N5882	3-123
2N3237		2N5302	3-93
2N3238		2N5882	3-123
2N3239		2N5882	3-123
2N3240		2N5882	3-123
2N3419		2N5336	3-97
2N3420		2N5336	3-97
2N3421		2N5336	3-97

Industry Part Number	Motorola Direct Replacement	Motorola Similar Replacement	Page Number
2N3441	2N3441		3-13
2N3442	2N3442		3-15
2N3445	2N3447		3-18
2N3446	2N3448		3-18
2N3447	2N3447		3-18
2N3448	2N3448		3-18
2N3583	2N3583		3-20
2N3584	2N3584		3-20
2N3585	2N3585		3-20
2N3667		2N5881	3-123
2N3713		2N5881	3-123
2N3714	2N3714		3-26
2N3715	2N3715		3-26
2N3715JAN	2N3715JAN		3-26
2N3715JTX	2N3715JTX		3-26
2N3715JTXV	2N3715JTXV		3-26
2N3716	2N3716		3-26
2N3716JAN	2N3716JAN		3-26
2N3716JTX	2N3716JTX		3-26
2N3716JTXV	2N3716JTXV		3-26
2N3719	2N3719		3-32
2N3720	2N3720		3-32
2N3738	2N3738		3-37
2N3739	2N3739		3-37
2N3739JAN	2N3739JAN		3-37
2N3739JTX	2N3739JTX		3-37
2N3739JTXV	2N3739JTXV		3-37
2N3740	2N3740		3-41
2N3740A		2N3740	3-41
2N3740JAN	2N3740JAN		3-41
2N3740JTX	2N3740JTX		3-41
2N3740JTXV	2N3740JTXV		3-41
2N3741	2N3741		3-41
2N3741A	2N3741A		3-41
2N3741JAN	2N3741JAN		3-41
2N3741JTX	2N3741JTX		3-41
2N3741JTXV	2N3741JTXV		3-41
2N3766	2N3766		3-44
2N3766JAN	2N3766JAN		3-44
2N3766JTX	2N3766JTX		3-44
2N3766JTXV	2N3766JTXV		3-44
2N3767	2N3767		3-44
2N3767JAN	2N3767JAN		3-44
2N3767JTX	2N3767JTX		3-44
2N3767JTXV	2N3767JTXV		3-44
2N3771	2N3771		3-48
2N3772	2N3772		3-48
2N3773	2N3773		3-52
2N3788		2N6543	3-215
2N3789	2N3789		3-56

TABLE 1 — METAL TO-204, TO-204AE (continued)

I_C Cont Amps Max	$V_{CEO(sus)}$ Volts Min	Device Type NPN	Device Type PNP	h_{FE} Min/Max	@ I_C Amp	Resistive Switching t_s μs Max	Resistive Switching t_f μs Max	Resistive Switching @ I_C Amp	f_T MHz Min	P_D (Case) Watts @ 25°C
15		MJ16012		7 min	15	0.9 typ	0.15 typ	10		175
		2N6836		10/30	10	3	0.35	10	10	175
	500	MJ16010A		5 min	15	3	0.4	10		175
	850*	MJ12022		5 min	15		0.1 typ	10		175
16	100		BD318	25 min	5				1	200
		2N5629	2N6029	25/100	8	1.2 typ	1.2 typ	8	1	200
	120	2N5630	2N6030	20/80	8	1.2 typ	1.2 typ	8	1	200
	140	2N3773	2N6609	15/60	8	1.1 typ	1.5 typ	8	4	150
		2N5631	2N6031	15/60	8	1.2 typ	1.2 typ	8	1	200
	200	MJ15022	MJ15023	15/60	8				5	250
	250	MJ15024	MJ15025	15/60	8				5	250
18	160	BUX41N		8 min	12	1.2	0.25	12	8	120
20	60	2N3772		15/60	10				2	150
		2N6282##	2N6285##	750/18k	10	2.5 typ	2.5 typ	10	4#	160
	75	2N5039		20/100	10	1.5	0.5	10	60	140
	80	2N5303	2N5745	15/60	10	2	1	10	2	200
		2N6283##	2N6286##	750/18k	10	2.5 typ	2.5 typ	10	4#	160
	90	2N5038		20/100	12	1.5	0.5	12	60	140
	100	2N6284##	2N6287##	750/18k	10	2.5 typ	2.5 typ	10	4#	160
	125	BUX40		8 min	15	1	0.25	15	8	120
	140	MJ15003	MJ15004	25/150	5				2	250
	160	BUV11N		10 min	15	1.2	0.25	15	8	150
	200	BUV11		10 min	12	1.8	0.4	12	8	150
		MJ13330		8/40	10	3.5	0.7	10	5 to 40	175
	250	BUV12		10 min	10	1.5	0.5	10	8	150
		MJ13331		8/40	10	3.5	0.7	10	5 to 40	175
	350	MJ10000##		40/400	10	3	1.8	10	10#	175
		MJ10004##		40/400	10	1.5	0.5	10	10#	175
	400	MJ10001##		40/400	10	3	1.8	10	10#	175
		MJ10005##		40/400	10	1.5	0.5	10	10#	175
		MJ13333		10/60	5	4	0.7	10		175
	450	MJ10008##		30/300	10	2	0.6	10	8#	175
		MJ16014		5 min	20	2.7	0.35	20		250
		MJ16016		7 min	20	2.2	0.25	20		250
		2N6837		10/30	15	2.5	0.25	15		250
	500	MJ10009##		30/300	10	2	0.6	10	8#	175
		MJ13335		10/60	5	4	0.7	10		175
	700	BUT15##		15 min	12	2.5	0.8	12		175
	750	MJ10024##		50/600	20	5	1.8	10		250
	850	MJ10025##		50/600	20	5	1.8	10		250

* $V_{(BR)CEX}$, # $|h_{fe}|$ @ 1 MHz, ## Darlington

(continued)

JAN, JTX, JTXV Available

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MOTOROLA
SEMICONDUCTOR
TECHNICAL DATA

NPN
2N3773
PNP
2N6609

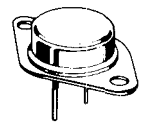
COMPLEMENTARY SILICON POWER TRANSISTORS

The 2N3773 and 2N6609 are PowerBase power transistors designed for high power audio, disk head positioners and other linear applications. These devices can also be used in power switching circuits such as relay or solenoid drivers, dc to dc converters or inverters.

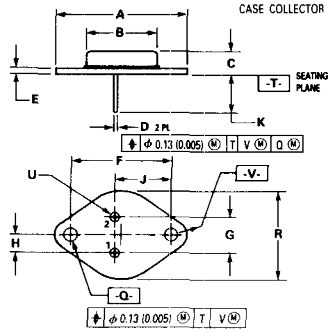
- High Safe Operating Area (100% Tested)
  150 W @ 100 V
- Completely Characterized for Linear Operation
- High DC Current Gain and Low Saturation Voltage
  h_{FE} = 15 (Min) @ 8 A, 4 V
  $V_{CE(sat)}$ = 1.4 V (Max) @ I_C = 8 A, I_B = 0.8 A
- For Low Distortion Complementary Designs

16 AMPERE COMPLEMENTARY POWER TRANSISTORS

140 VOLTS
150 WATTS



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



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

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

*MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Collector Emitter Voltage	V_{CEO}	140	Vdc
Collector-Emitter Voltage	V_{CEX}	160	Vdc
Collector-Base Voltage	V_{CBO}	160	Vdc
Emitter-Base Voltage	V_{EBO}	7	Vdc
Collector Current — Continuous — Peak (1)	I_C	16 30	Adc
Base Current — Continuous — Peak (1)	I_B	4 15	Adc
Total Power Dissipation @ T_C = 25°C Derate above 25°C	P_D	150 0.855	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

*Indicates JEDEC Registered Data
(1) Pulse Test: Pulse Width = 5 ms, Duty Cycle ≤ 10%.

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

Characteristic	Symbol	Min	Max	Unit
OFF CHARACTERISTICS (1)				
*Collector-Emitter Breakdown Voltage (I_C = 0.2 Adc, I_B = 0)	$V_{CEO(sus)}$	140	–	Vdc
*Collector-Emitter Sustaining Voltage (I_C = 0.1 Adc, $V_{BE(off)}$ = 1.5 Vdc, R_{BE} = 100 Ohms)	$V_{CEX(sus)}$	160	–	Vdc
Collector-Emitter Sustaining Voltage (I_C = 0.2 Adc, R_{BE} = 100 Ohms)	$V_{CER(sus)}$	150	–	Vdc
*Collector Cutoff Current (V_{CE} = 120 Vdc, I_B = 0)	I_{CEO}	–	10	mAdc
*Collector Cutoff Current (V_{CE} = 140 Vdc, $V_{BE(off)}$ = 1.5 Vdc) (V_{CE} = 140 Vdc, $V_{BE(off)}$ = 1.5 Vdc, T_C = 150°C)	I_{CEX}	– –	2 10	mAdc
Collector Cutoff Current (V_{CB} = 140 Vdc, I_E = 0)	I_{CBO}	–	2	mAdc
*Emitter Cutoff Current (V_{BE} = 7 Vdc, I_C = 0)	I_{EBO}	–	5	mAdc
ON CHARACTERISTICS (1)				
DC Current Gain *(I_C = 8 Adc, V_{CE} = 4 Vdc) (I_C = 16 Adc, V_{CE} = 4 Vdc)	h_{FE}	 15 5	 60 	–
Collector-Emitter Saturation Voltage *(I_C = 8 Adc, I_B = 800 mAdc) (I_C = 16 Adc, I_B = 3.2 Adc)	$V_{CE(sat)}$	 – –	 1.4 4	Vdc
*Base-Emitter On Voltage (I_C = 8 Adc, V_{CE} = 4 Vdc)	$V_{BE(on)}$	–	2.2	Vdc
DYNAMIC CHARACTERISTICS				
Magnitude of Common-Emitter Small-Signal, Short-Circuit, Forward Current Transfer Ratio (I_C = 1 A, f = 50 kHz)	$\|h_{fe}\|$	4	–	–
*Small-Signal Current Gain (I_C = 1 Adc, V_{CE} = 4 Vdc, f = 1 kHz)	h_{fe}	40	–	–
SECOND BREAKDOWN CHARACTERISTICS				
Second Breakdown Collector Current with Base Forward Biased t = 1 s (non-repetitive), V_{CE} = 100 V, See Figure 12	$I_{S/b}$	1.5	–	Adc

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

*Indicates JEDEC Registered Data

3

NPN

PNP

FIGURE 1 – DC CURRENT GAIN

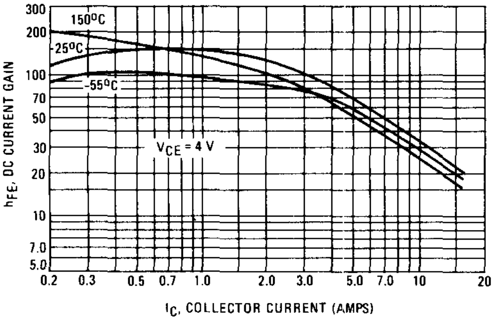


FIGURE 2 – DC CURRENT GAIN

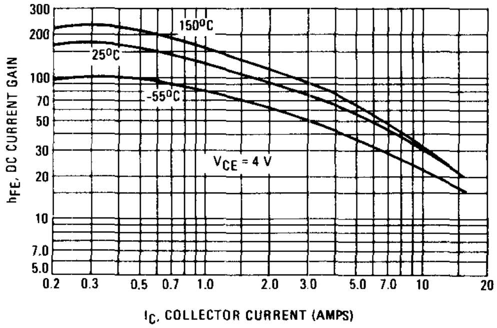


FIGURE 3 – COLLECTOR SATURATION REGION

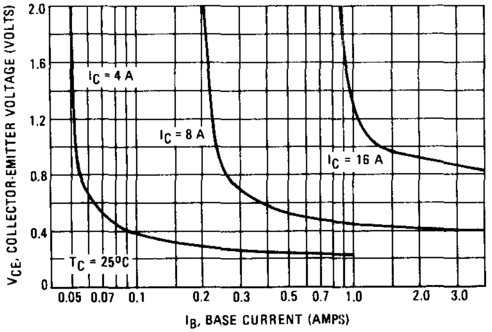


FIGURE 4 – COLLECTOR SATURATION REGION

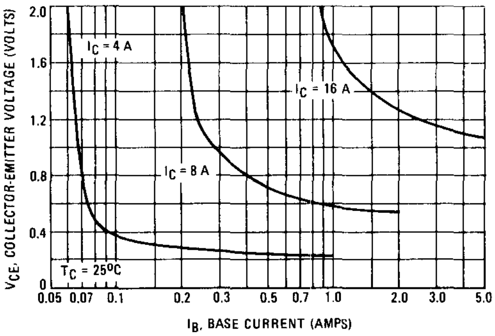


FIGURE 5 – "ON" VOLTAGE

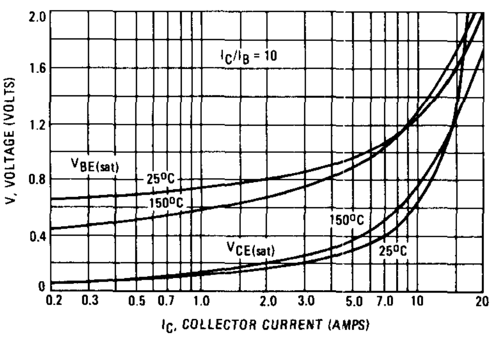
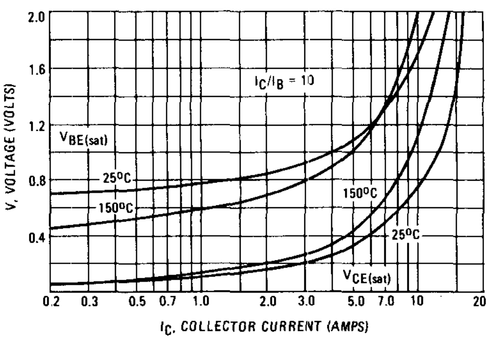
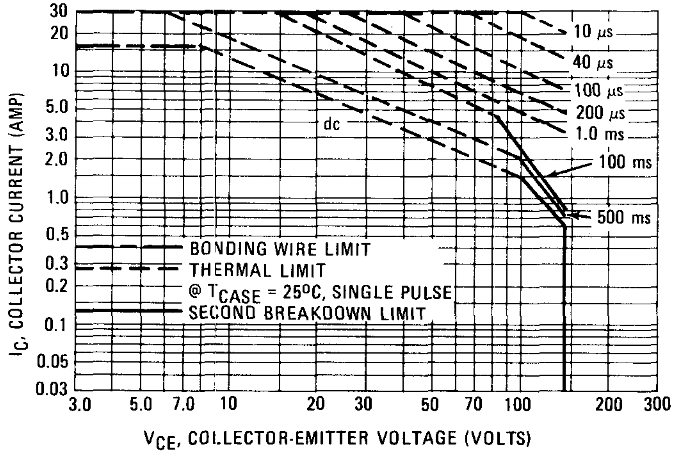


FIGURE 6 – "ON" VOLTAGE



3

FIGURE 7 – FORWARD BIAS SAFE OPERATING AREA



There are two limitations on the powerhandling ability of a transistor: average junction temperature and second breakdown. Safe operating area curves indicate $I_C - V_{CE}$ limits of the transistor that must be observed for reliable operation: i.e., the transistor must not be subjected to greater dissipation than the curves indicate.

The data of Figure 7 is based on $T_{J(pk)} = 200^\circ C$; T_C is variable depending on conditions. Second breakdown pulse limits are valid for duty cycles to 10% provided $T_{J(pk)} < 200^\circ C$. At high case temperatures, thermal limitations will reduce the power that can be handled to values less than the limitations imposed by second breakdown.

3

FIGURE 8 – POWER DERATING