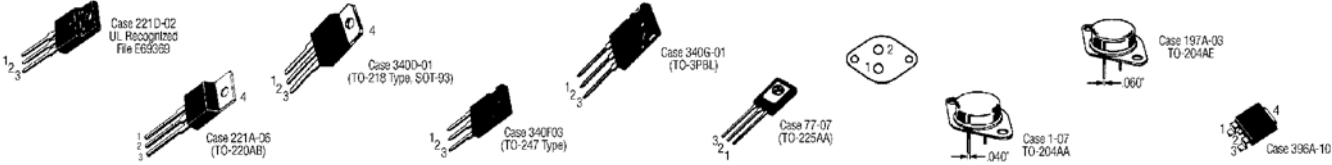


Bipolar Power Transistors



Plastic (Isolated TO-220 Type)

Pin: 1 — Base, 2 — Collector, 3 — Emitter (Style 2, Case 221D-02)

Mfr.'s Type		I _C (A)	V _{CE(ON)} (V)	V _{CE} (V)	f _{re}	Resistive Switching			f _r	P _o (Case)	
NPN	PNP	Max.	(Min.)	(Min.)	Min./Max.	@ I _C	t _s	t _f	@ I _C	Watts	
			(V)	(V)			(μs)	(μs)		@ 25°C	
							Max.	Max.			
MJF122 ²	MJF127 ²	5	100	—	2000 Min.	3.0	1.5 Typ.	1.50 Typ.	3.0	4 ¹	28
MJF44311	MJF35411	10	80	—	40/100	4.0	0.5 Typ.	0.14 Typ.	5.0	40 ¹	35
MJF6388 ²	MJF6688 ²	10	100	—	30 K/20 K	4.0	1.5 Typ.	1.50 Typ.	5.0	20 ¹	40

¹I_{HEL} @ MHz. ²Darlington. ³Switching tests performed with special application simulator circuit. See data sheet for details.

Plastic TO-220

Pin: 1 — Base, 2 — Collector, 3 — Emitter, 4 — Collector (Style 1, Case 221A-06)

Mr.'s Type		IcCont (A) Max.	Vce0(sat) ¹ (V) Min.	hfe Min./Max.	@ Ic	Resistive Switching				fr (MHz) Min.	Po (Case) Watts @ 25°C
						ts (µs) Max.	tr (µs) Max.	@ Ic			
NPN	PNP										
TIP29B	—	1	80	15/75	1.0	0.6 Typ.	0.30 Typ.	1.0	3.0		30
TIP29C	TIP30C	1	100	15/75	1.0	0.6 Typ.	0.30 Typ.	1.0	3.0		30
TIP47	—	1	250	30/150	0.3	2.0 Typ.	0.18 Typ.	0.3	10.0		40
TIP48	—	1	300	30/150	0.3	2.0 Typ.	0.18 Typ.	0.3	10.0		40
—	MJE5731	1	350	30/150	0.3	2.0 Typ.	0.18 Typ.	0.3	10.0		40
TIP50	—	1	400	30/150	0.3	2.0 Typ.	0.18 Typ.	0.3	10.0		40
TIP110 ¹	TIP115 ¹	2	60	500 Min.	2.0	1.7 Typ.	1.30 Typ.	2.0	25.0 ¹		50
—	—	2	80	500 Min.	2.0	1.7 Typ.	1.30 Typ.	2.0	25.0 ¹		50
TIP112 ^{1,4}	TIP117 ^{1,4}	3	100	500 Min.	3.5	0.1	1.40	1.0	4.0		50
BUX85	—	2	450/1000	30	1.0	4.0 Typ.	0.80 Typ.	1.0	—		80
MJE1320	—	2	900/1800	3 Min.	1.0	4.0 Typ.	0.80 Typ.	1.0	—		80
TIP31A	TIP32A	3	60	25 Min.	1.0	0.6 Typ.	0.30 Typ.	1.0	3.0		40
—	TIP32B	3	80	25 Min.	1.0	0.6 Typ.	0.30 Typ.	1.0	3.0		40
TIP31C ¹	TIP32C ¹	3	100	25 Min.	1.0	0.6 Typ.	0.30 Typ.	1.0	3.0		40
MJE1300S	—	4	400/700	6/30	3.0	3.0	0.70	3.0	4.0		60
TIP120 ¹	TIP125 ¹	5	60	1 K Min.	3.0	1.5 Typ.	1.50 Typ.	3.0	4.0 ¹		65
TIP121 ¹	TIP126 ¹	5	80	1 K Min.	3.0	1.5 Typ.	1.50 Typ.	3.0	4.0 ¹		65
TIP122 ¹	TIP127 ¹	5	1 K Min.	1 K Min.	3.0	1.5 Typ.	1.50 Typ.	3.0	4.0 ¹		75
MJE18204	—	5	450/1000	14/36	1.0	3.0	0.50	2.5	12.0		100
—	TIP42A	6	60	15/75	3.0	0.4 Typ.	0.15 Typ.	3.0	3.0		65
TIP41C	TIP42C	6	100	15/75	3.0	0.4 Typ.	0.15 Typ.	3.0	3.0		65
—	2N6109	7	50	30/150	2.5	0.4 Typ.	0.15 Typ.	3.0	4.0		40
2N6292	2N6107	7	70	30/150	2.5	0.4 Typ.	0.15 Typ.	3.0	4.0		40
2N6043 ¹	2N6040 ¹	8	80	1 K/10 K	4.0	1.5 Typ.	1.50 Typ.	3.0	4.0 ¹		75
TIP100 ¹	TIP105 ¹	8	60	1 K/20 K	3.0	1.5 Typ.	1.50 Typ.	3.0	4.0 ¹		80
TIP101 ¹	TIP106 ¹	8	80	1 K/20 K	3.0	1.5 Typ.	1.50 Typ.	3.0	4.0 ¹		75
2N6045 ¹	2N6042 ¹	8	80	1 K/10 K	3.0	1.5 Typ.	1.50 Typ.	3.0	4.0 ¹		75
TIP102 ¹	—	8	100	1 K/20 K	3.0	1.5 Typ.	1.50 Typ.	3.0	4.0 ¹		80
MJE15028	MJE15029	8	120	20 Min.	4.0	—	—	30.0	50		50
MJE15030	MJE15031	8	150	20 Min.	4.0	—	—	30.0	50		50
MJE5740 ¹	—	8	300/600	200 Min.	4.0	8.0 Typ.	2.00 Typ.	6.0	4.0		80
—	MJE5850	8	300/600	15 Min.	2.0	2.0	0.50	4.0	—		80
—	MJE5851	8	350	15 Min.	2.0	2.0	0.50	4.0	—		80
MJE5742 ¹	—	8	400/700	200 Min.	4.0	8.0 Typ.	2.00 Typ.	6.0	12.0 Typ.		80
MJE13007 ¹	—	8	400/700	5/30	5.0	3.0	0.70	5.0	12.0 Typ.		80
—	MJE5852 ¹	8	400/700	15 Min.	2.0	2.0	0.50	4.0	12.0 Typ.		80
D44H8	D45H8	10	60	15 Min.	4.0	—	—	—	—		50

**Plastic TO-218 Type Pin: 1 — Base, 2 — Collector, 3 — Emitter, 4 — Collector
(Style 1, Case 340D-01 (TO-218 Type, SOT-93))**

TIP140 ¹	TIP145 ¹	10	60	500 Min.	10.0	2.5 Typ.	2.50 Typ.	5.0	4.0 ¹	125
TIP141 ¹	TIP146 ¹	10	80	500 Min.	10.0	2.5 Typ.	2.50 Typ.	5.0	4.0 ¹	125
TIP142 ¹		10	100	500 Min.	10.0	2.5 Typ.	2.50 Typ.	5.0	4.0 ¹	125
TIP143 ¹	TIP2955	15	80	500 Min.	10.0	—	—	—	3.0 ¹	80
MJH11020 ²		15	200	400/15 K	10.0	—	—	—	3.0 ¹	150
MJH11022 ²	MJH11021 ²	15	250	400/15 K	10.0	—	—	—	3.0 ¹	150
BUV48A		15	450	8 Min.	8.0	2.0	0.40	10.0	1.0	150
BUV48B		15	100	8 Min.	8.0	1.2 Typ.	1.20 Typ.	8.0	1.0	125
MJH6283 ²		20	100	750/18 K	10.0	—	—	—	4.0 ¹	125
MJH6284 ²	MJH6287 ²	20	100	750/18 K	10.0	—	—	—	4.0 ¹	125
TIP35C		25	100	10/75	15.0	0.6 Typ.	0.30 Typ.	10.0	3.0	125

¹1Inel @ MHz. ²Darlington. ³Switching tests performed with special application simulator circuit. See data sheet for details. ⁴Available as preferred chip. ⁵When 2 voltages are given, the format is $V_{CE0(sus)}/V_{CES}$.

Plastic TO-247 Type

Pin: 1 — Base, 2 — Collector, 3 — Emitter, 4 — Collector (Case 340F-03)

Mr.'s Type	IcCont (A) Max.	Vce(sat) (V) Min.	Vces (V) Min.	hfe Min./Max.	@ Ic (A)	Resistive Switching			fr (MHz) Min.	Po (Case) Watts @ 25°C
NPN						tc (µs) Max.	tb (µs) Max.	@ Ic (A)		
MJW16018	10	800	1500	4 Min.	5.0	4.50 Typ.	0.20 Typ.	5.0	3.0 Typ.	150
MJW16206	12	500	1200	5/13	10.0	2.25	0.25	6.5	3.0 Typ.	150

Plastic TO-3PBL

Pin: 1 — Base, 2 — Collector, 3 — Emitter, 4 — Collector (Style 2, Case 340G-01)

Mfr.'s Type		IcCont (A)	Vcc(Open) ² (V)	I _{FE} Min./Max.	α Ic	Resistive Switching			f _r (MHz)	P _D (Case)
NPV	PNP	Max.	Min.			t _{ps} (μs) Max.	t _{ps} (μs) Max.	α (A)	Min.	Watts @ 25°C
MJL3281A	MJL1302A	15.0	200	60/175	7.00	—	—	—	30.0 Typ.	200.0
MJL21194	MJL21193	16.0	250	25/75	8.00	—	—	—	4.0 Min.	200.0

Plastic T0-225 Type (Formerly T0-126 Type)

Pin: 1 — Emitter, 2 — Collector, 3 — Base (Style 1, Case 77-07 (TO-225AA))

Pin: 1 — Base, 2 — Collector, 3 — Emitter (Style 3, Case 77-07 (TO-225AA))

MJ3439	—	0.3	350	40/160	0.02	—	—	—	15.0	15.0
MJ3444	—	0.5	200	30/300	0.05	—	—	—	15.0	20.8
MJ3430 ^a	MJE350 ^b	0.5	300	30/240	0.05	—	—	—	—	20.8
2N4921	2N4918	1.0	40	20/100	0.50	0.60 Tpy.	0.300 Tpy.	0.5	3.0	30.0
2N4922	2N4919	1.0	60	20/100	0.50	0.60 Tpy.	0.300 Tpy.	0.5	3.0	30.0
2N4923	2N4920	1.0	80	20/100	0.50	0.60 Tpy.	0.300 Tpy.	0.5	3.0	30.0
MJE181	MJE171	3.0	60	0.10	0.50	0.60 Tpy.	0.120 Tpy.	0.1	50.0	40.0
MJE182 ^c	MJE172 ^c	3.0	60	30/250	0.10	0.60 Tpy.	0.120 Tpy.	0.1	50.0	12.5
—	MJE371	4.0	40	40 Min.	1.00	—	—	—	—	40.0
2N5191	2N5194	4.0	60	75/100	1.50	0.40 Tpy.	0.400 Tpy.	0.5	2.0	40.0
MJE800 ^d	MJE700 ^d	4.0	60	750 Min.	1.50	—	—	—	1.0 ^e	40.0
2N6038 ^f	2N6035 ^f	4.0	60	750/18 K	2.00	1.70 Tpy.	1.200 Tpy.	2.0	25.0	40.0
2N5192	2N5195	4.0	80	25/100	1.50	0.40 Tpy.	0.400 Tpy.	1.5	2.0	40.0
—	MJE702 ^e	4.0	80	750 Min.	1.50	—	—	—	1.0 ^e	40.0
MJE803 ^g	—	4.0	80	750 Min.	2.00	—	—	—	1.0 ^e	40.0
2N6039 ^h	2N6036 ^h	4.0	80	750/18 K	2.00	1.70 Tpy.	1.200 Tpy.	2.0	25.0	40.0
MJE243	MJE253	4.0	100	40/120	0.20	0.15 Tpy.	0.070 Tpy.	2.0	40.0	15.0
MJE200 ⁱ	MJE210 ⁱ	5.0	25	45/180	2.00	0.13 Tpy.	0.035 Tpy.	2.0	65.0	15.0

DPAK — Surface Mount Power Package

Pin: 1 — Base, 2 — Collector, 3 — Emitter, 4 — Collector (Style 1, Case 39A-10⁷)

MJD112 ²	—	2.0	100	1000 Min.	2.00	1.70	1.300	2.0	25.0 ¹	20.0
MJD31C	—	3.0	100	10 Min.	1.00	0.60	0.300	1.0	3.0	15.0
—	MJD45H11	8.0	80	40 Min.	4.00	0.50	0.140	5.0	50.0 Typ.	20.0

Metal TO-204 (Formerly TO-3), TO-204AE

Pin: 1 — Base, 2 — Emitter, 3 — Collector (Style 1, TO-204AA Case 1-07, TO-204AE)

Case 197A-03)

MJ3442	—	10.0	140	2070	4.00	—	—	—	117.0
MJ15011	—	10.0	250	20/100	2.00	—	—	—	200.0
MJ423	—	10.0	325	30/90	1.00	—	—	2.5	125.0
MJ10012 ²	—	10.0	400	100/2 K	6.00	15.00	15.000	6.0	175.0
2N6058 ¹	—	12.0	80	750/18 K	6.00	1.60 Typ.	1.500 Typ.	6.0	4.0 ¹ 150.0
2N6059 ¹	2N6052 ²	12.0	100	750/18 K	6.00	1.60 Typ.	1.500 Typ.	6.0	4.0 ¹ 150.0
2N6055 ¹	—	15.0	60	20/70	4.00	0.70 Typ.	0.300 Typ.	4.0	2.5 115.0
2N6056A	—	15.0	60	40/70	4.00	—	—	—	0.8 115.0
MJ15015 ¹	MJ15016	15.0	120	20/70	4.00	0.70 Typ.	0.300 Typ.	4.0	1.0 180.0
MJ15001	MJ15002	15.0	140	25/150	4.00	—	—	—	2.0 200.0
—	MJ1021 ¹	15.0	300	6/30	10.00	4.00	0.700	10.0	6.0-24 175.0
2N6547	—	15.0	400/850	6/30	10.00	4.00	0.700	10.0	6.0-24 175.0
MJ16010	—	15.0	450/850	5 Min.	15.00	1.20 Typ.	0.200 Typ.	10.0	— 175.0
MJ16012	—	15.0	450/850	7 Min.	15.00	0.90 Typ.	0.150 Typ.	10.0	— 175.0
2K377 ³	2N6069	16.0	150	15/60	1.00	1.50	1.500	12.0	60.0 160.0
—	2N6031 ¹	16.0	140	15/60	8.00	1.20 Typ.	1.200 Typ.	8.0	1.0 200.0
MJ15022	MJ15023	16.0	200	15/60	8.00	—	—	—	5.0 250.0
MJ15024	MJ15025	16.0	250	15/60	8.00	—	—	—	5.0 250.0
2K3772	—	20.0	60	15/60	10.00	—	—	—	5.0 250.0
2N6282 ¹	—	20.0	60	750/18 K	10.00	2.50 Typ.	2.500 Typ.	10.0	4.0 ¹ 160.0
—	2N6286 ²	20.0	80	750/18 K	10.00	2.50 Typ.	2.500 Typ.	10.0	4.0 ¹ 160.0
2N5038 ¹	—	20.0	100	22/20	1.00	1.50	1.500	12.0	60.0 160.0
2N6284 ³	2N6287 ³	20.0	100	750/18 K	10.00	2.50 Typ.	2.500 Typ.	10.0	4.0 ¹ 160.0
MJ15003 ³	MJ15004 ⁴	20.0	140	25/150	5.00	—	—	2.0	2.0 250.0
MJ10005 ⁵	—	20.0	400	40/400	10.00	1.50	0.500	10.0	10.0 ¹ 175.0
MJ13333	—	20.0	400	10/60	5.00	4.00	0.700	10.0	— 175.0
MJ10009 ⁹	—	20.0	500	30/300	10.00	2.00	0.600	10.0	8.0 ¹ 175.0
2N5895	—	25.0	60	20/100	10.00	1.00	0.800	10.0	4.0 200.0
2N5896	2N5884 ⁴	25.0	80	20/100	1.00	1.00	0.900	10.0	4.0 200.0
2N6341	—	25.0	150	30/120	10.00	0.250	1.000	40.0	20.0 200.0
2K3771	—	30.0	40	15/60	15.00	—	—	—	2.0 150.0
MJ11012 ²	MJ4502	30.0	60	1 K Min.	20.00	—	—	—	2.0 200.0
MJ802	—	30.0	100	25/100	7.50	—	—	—	2.0 200.0
MJ11016 ⁶	MJ11015 ⁵	30.0	120	1 K Min.	20.00	—	—	—	4.0 ¹ 200.0
MJ10023 ³	—	40.0	40	50/600	10.00	2.50	0.900	20.0	250.0
2N5686	2N5684 ⁷	50.0	90	35.50	0.50 Typ.	0.300 Typ.	0.300 Typ.	25.0	2.0 300.0
MJ11039 ⁹	—	50.0	40	400 Min.	50.00	—	—	—	— 300.0
MJ11032 ²	MJ11033 ³	50.0	120	400 Min.	50.00	—	—	—	— 300.0
MJ10016 ⁶	—	50.0	500	10 Min.	40.00	2.50	1.000	20.0	— 300.0
MJ14002 ²	MJ14003 ³	60.0	80	15/100	50.00	—	—	—	30.0 300.0
MJ10021 ¹	—	60.0	250	75 Min.	15.00	3.50	0.500	30.0	— 250.0

¹I_{HL} @ MHz. ²Darlington. ³Available as preferred chip. ⁴Case 77, (Style 3). ⁵When 2 voltages are given, the format is V_{CE(sus)}/V_{CES}. ⁶Case 369A-10 may be ordered tape and reeled by adding a "T4" suffix; 2500 units/reel. ⁷Case 197A-03 (TO-204AE).