Industry Part Number	Motorola Direct Replacement	Motorola Similar Replacement	Page Number
BD390-2		MJE253	3-870
BD390-5		MJE253	3-870
BD390-8		MJE253	3-870
BD410	BD232		3-274
BD411		MJE3300	3-906
BD411-1		MJE3300	3-906
BD411-2		MJE3300	3-906
BD411-5		MJE3300	3-906
BD411-8		MJE3300	3-906
BD412		MJE3300	3-906
BD412-1		MJE3300	3-906
BD412-2		MJE3300	3-906
BD412-5		MJE3300	3-906
BD412-8		MJE3300	3-906
BD413		MJE3310	3-906
BD413-1		MJE3310	3-906
BD413-2		MJE3310	3-906
BD413-5		MJE3310	3-906
BD413-8		MJE3310	3-906
BD414		MJE3310	3-906
BD414-1		MJE3310	3-906
BD414-2		MJE3310	3-906
BD414-5		MJE3310	3-906
BD414-8		MJE3310	3-906
BD415		MJE181	3-862
BD415-1		MJE181	3-862
BD415-2		MJE181	3-862
BD415-8		MJE181	3-862
BD416		MJE171	3-862
BD416-1		MJE171	3-862
BD416-2		MJE171	3-862
BD416-5		MJE171	3-862
BD417		MJE182	3-862
BD417-1		MJE182	3-862
BD417-2		MJE182	3-862
BD417-5		MJE182	3-862
BD417-8		MJE182	3-862
BD418		MJE172	3-862
BD418-1		MJE172	3-862
BD418-2		MJE172	3-862
BD418-5		MJE172	3-862
BD418-8		MJE172	3-862
BD419		MJE243	3-870
BD419-1		MJE243	3-870
BD419-2		MJE243	3-870
BD419-8		MJE243	3-870
BD420		MJE253	3-870
BD420-1		MJE253	3-870
BD420-2		MJE253	3-870
BD420-5		MJE253	3-870
BD420-8		MJE253	3-870
BD424	BD791		3-308
BD429	MJE200		3-866
BD430	MJE210		3-866
BD433	BD437		3-292
BD434	BD438		3-295
BD435	BD437		3-292
BD436	BD438		3-295
BD437	BD437		3-292
BD438	BD438		3-295

Industry Part Number	Motorola Direct Replacement	Motorola Similar Replacement	Page Number
BD439	BD438		3-295
BD440	BD440		3-295
BD441	BD441		3-292
BD442	BD442		3-295
BD443	BD179		3-268
BD443A	BD179		3-268
BD466A		MJE3300	3-906
BD466B		MJE3300	3-906
BD477A		MJE3310	3-906
BD477B		MJE3310	3-906
BD505	MPS-U01		3-1040
BD506	MPS-U51		3-1058
BD507	MPS-U01		3-1040
BD508	MPS-U51		3-1058
BD509	MPS-U01A		3-1040
BD510	MPS-U51A		3-1058
BD515	MPS-U05		3-1048
BD516	MPS-U55		3-1062
BD517	MPS-U05		3-1048
BD518	MPS-U55		3-1062
BD519	MPS-U06		3-1048
BD520	MPS-U56		3-1062
BD529	MPS-U07		3-1050
BD530	MPS-U57		3-1064
BD533		2N6122	3-154
BD534		2N6125	3-154
BD535		2N6122	3-154
BD536		2N6125	3-154
BD537		2N6123	3-154
BD538		2N6125	3-154
BD539	BD243		3-286
BD539A	BD243A		3-286
BD539B	BD243B		3-286
BD539C	BD243C		3-286
BD540	BD244		3-286
BD540A	BD244A		3-286
BD540B	BD244B		3-286
BD540C	BD244C		3-286
BD543	BD805		3-316
BD543A	BD807		3-316
BD543B	BD809		3-316
BD544	BD806		3-318
BD544A	BD808		3-318
BD544B	BD810		3-318
BD546D	BD546D		—
BD561		BD787	3-304
BD575	BD241		3-282
BD576	BD242		3-282
BD577	BD241A		3-282
BD578	BD242A		3-282
BD579	BD241B		3-282
BD580	BD242B		3-282
BD581	BD241C		3-282
BD582	BD242C		3-282
BD585		2N6122	3-154
BD586		2N6125	3-154
BD587		2N6122	3-154
BD588		2N6125	3-154
BD589		2N6123	3-154
BD590		2N6125	3-154

*Consult Motorola if a direct replacement is necessary.

TABLE 7 — PLASTIC TO-225 Type (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
3	45		BD176	40/250	0.15				3	30
			BD176.6	40/100	0.15				3	30
			BD176.10	63/160	0.15				3	30
			BD176.16	100/250	0.15				3	30
	60	MJE181	MJE171	50/250	0.1	0.6 typ	0.12 typ	0.1	50	12.5
	80	BD179	BD180	40/250	0.15				3	30
		BD179.6	BD180.6	40/100	0.15				3	30
		BD179.10	BD180.10	63/160	0.15				3	30
		BD179.16	BD180.16	100/250	0.15				3	30
		MJE182	MJE172	50/250	0.1	0.6 typ	0.12 typ	0.1	50	12.5
	200	BUY49P		30 min	0.5				25	20
4	30	BD185		15 min	2				20	40
	40	2N5190	2N5193	25/100	1.5	0.4 typ	0.4 typ	1.5	2	40
		MJE521	MJE371	40 min	1					40
		2N6037##	2N6034##	750/18k	2	1.7 typ	1.2 typ	2	25	40
	45	BD437	BD438	40 min	2				3	36
		BD675##	BD676##	750 min	1.5					40
		BD675A##	BD676A##	750 min	2					40
		BD785	BD786	20 min	2				50	15
			BD776##	750 min	2				20	15
	60	BD189		15 min	2				20	40
			BD440	25 min	2				3	36
		BD677##	BD678##	750 min	1.5					40
		BD677A##	BD678A##	750 min	2					40
		BD787	BD788	20 min	2				50	15
		BD777##	BD778##	750 min	2				20	15
		2N5191	2N5194	25/100	1.5	0.4 typ	0.4 typ	1.5	2	40
		MJE800##	MJE700##	750 min	1.5				1#	40
		MJE801##	MJE701##	750 min	2				1#	40
		2N6038##	2N6035##	750/18k	2	1.7 typ	1.2 typ	2	25	40
	80	2N5192	2N5195	25/100	1.5	0.4 typ	0.4 typ	1.5	2	40
		BD441	BD442	15 min	2				3	36
		BD679##	BD680##	750 min	1.5					40
		BD679A##	BD680A##	750 min	2					40
		BD789	BD790	10 min	2				40	15
		BD779##	BD780##	750 min	2				20	15
		MJE240	MJE250	40/200	0.2	0.15 typ	0.07 typ	2	40	15
		MJE241	MJE251	40/120	0.2	0.15 typ	0.07 typ	2	40	15
		MJE802##	MJE702##	750 min	1.5				1#	40
		MJE803##	MJE703##	750 min	2				1#	40
		2N6039##	2N6036##	750/18k	2	1.7 typ	1.2 typ	2	25	40
	100	BD681##	BD682##	750 min	1.5					40
		BD791	BD792	10 min	2				40	15
		MJE243	MJE253	40/120	0.2	0.15 typ	0.07 typ	2	40	15
		MJE244	MJE254	25 min	0.2	0.15 typ	0.07 typ	2	40	15
5	25	MJE200	MJE210	45/180	2	0.13 typ	0.035 typ	2	65	15

• Case 77 (Style 3), # $|h_{fe}|$ @ 1 MHz, ## Darlington

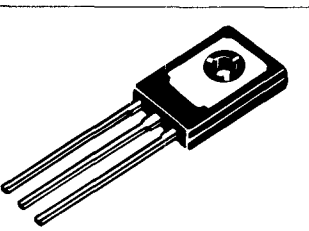
MOTOROLA
SEMICONDUCTOR
TECHNICAL DATA

BD438, BD440
BD442

PLASTIC MEDIUM POWER SILICON
PNP TRANSISTOR

. . . for amplifier and switching applications Complementary types: BD433/435/437/439/441.

4.0 AMPERES
POWER TRANSISTOR
PNP SILICON

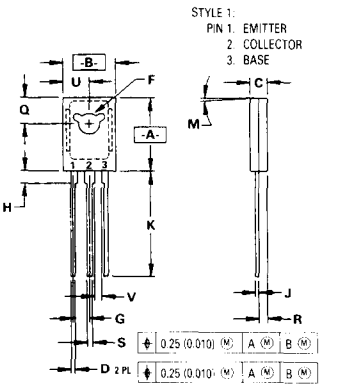


MAXIMUM RATINGS

Rating		Symbol	Value	Unit
Collector-Emitter Voltage	BD438 BD440 BD442	V_{CEO}	45 60 80	Vdc
Collector-Base Voltage	BD438 BD440 BD442	V_{CBO}	45 60 80	Vdc
Emitter-Base Voltage		V_{EBO}	5.0	Vdc
Collector Current		I_C	4.0	Adc
Base Current		I_B	1.0	Adc
Total Device Dissipation @ T_C = 25°C Derate above 25°C		P_D	36 288	Watts W/°C
Operating and Storage Junction Temperature Range		T_J, T_{stg}	−55 to +150	°C

THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Thermal Resistance, Junction to Case	θ_{JC}	3.5	°C/W



NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.

DIM	MILLIMETERS MIN	MILLIMETERS MAX	INCHES MIN	INCHES MAX
A	10.80	11.04	0.425	0.435
B	7.50	7.74	0.295	0.305
C	2.42	2.66	0.095	0.105
D	0.51	0.66	0.020	0.026
F	2.93	3.17	0.115	0.125
G	2.39 BSC		0.094 BSC	
H	1.27	2.41	0.050	0.095
J	0.39	0.63	0.015	0.025
K	14.61	16.63	0.575	0.655
M	3° TYP		3° TYP	
Q	3.76	4.01	0.148	0.158
R	1.15	1.39	0.045	0.055
S	0.64	0.88	0.025	0.035
U	3.69	3.93	0.145	0.155
V	1.02	—	0.040	—

CASE 77-06
TO-225AA TYPE

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

Characteristic		Symbol	Min	Typ	Max	Unit
Collector-Emitter Breakdown Voltage		$V_{(BR)CEO}$				Vdc
(I_C = 100 mA, I_B = 0)	BD438		45	—	—	
	BD440		60	—	—	
	BD442		80	—	—	
Collector-Base Breakdown Voltage		$V_{(BR)CBO}$				Vdc
(I_C = 100 μA, I_B = 0)	BD438		45	—	—	
	BD440		60	—	—	
	BD442		80	—	—	
Emitter-Base Breakdown Voltage		$V_{(BR)EBO}$	5.0	—	—	Vdc
(I_E = 100 μA, I_C = 0)						
Collector Cutoff Current		I_{CBO}				mAdc
(V_{CB} = 45 V, I_E = 0)	BD438		—	—	0.1	
(V_{CB} = 60 V, I_E = 0)	BD440		—	—	0.1	
(V_{CB} = 80 V, I_E = 0)	BD442		—	—	0.1	
Emitter Cutoff Current		I_{EBO}	—	—	1.0	mAdc
(V_{EB} = 5.0 V)						
DC Current Gain		h_{FE}				
(I_C = 10 mA, V_{CE} = 5.0 V)	BD438		30	—	—	
	BD440		20	—	—	
	BD442		15	—	—	
DC Current Gain		h_{FE}				
(I_C = 500 mA, V_{CE} = 1.0 V)	BD438		85	—	375	
	BD440		40	—	475	
	BD442		40	—	475	
DC Current Gain		h_{FE}				
(I_C = 2.0 A, V_{CE} = 1.0 V)	BD438		40	—	—	
	BD440		25	—	—	
	BD442		15	—	—	
Collector Saturation Voltage		$V_{CE(sat)}$				Vdc
(I_C = 3.0 A, I_B = 0.3 A)	BD438		—	—	0.7	
	BD440		—	—	0.8	
	BD442		—	—	0.8	
Base-Emitter On Voltage	BD438	$V_{BE(ON)}$	—	—	1.1	Vdc
(I_C = 2.0 A, V_{CE} = 1.0 V)	BD440/442		—	—	1.5	
Current-Gain — Bandwidth Product		f_T	3.0	—	—	MHz
(V_{CE} = 1.0 V, I_C = 250 mA, f = 1.0 MHz)						

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FIGURE 1 – COLLECTOR SATURATION REGION

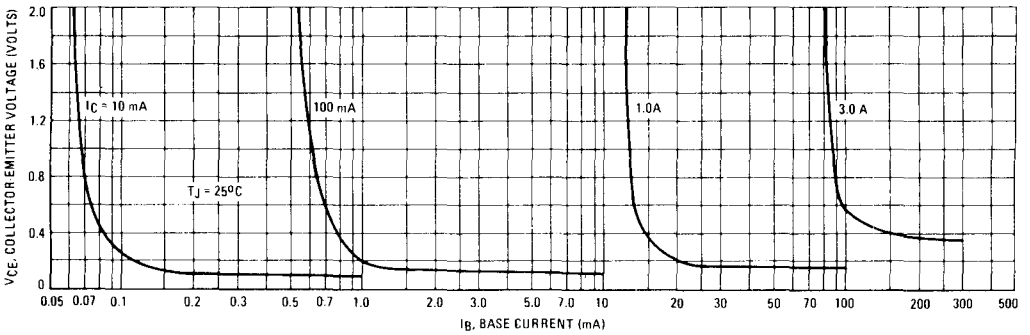


FIGURE 2 – CURRENT GAIN

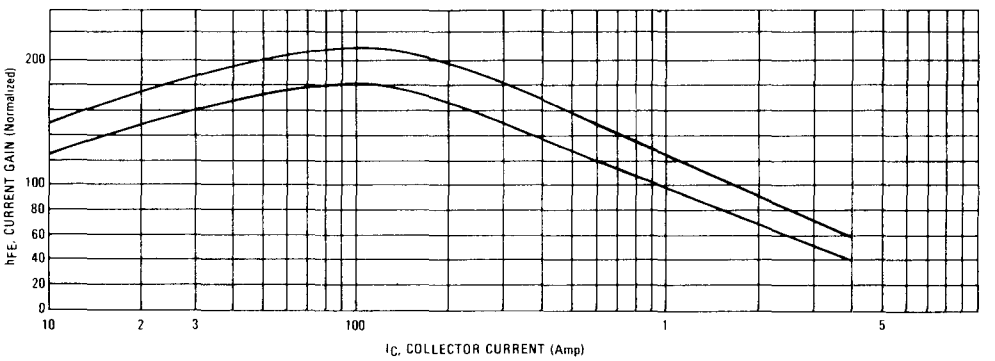


FIGURE 3 – "ON" VOLTAGE

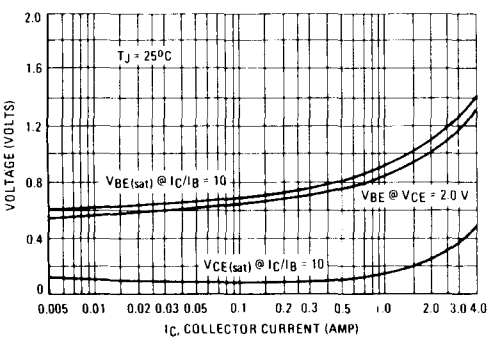
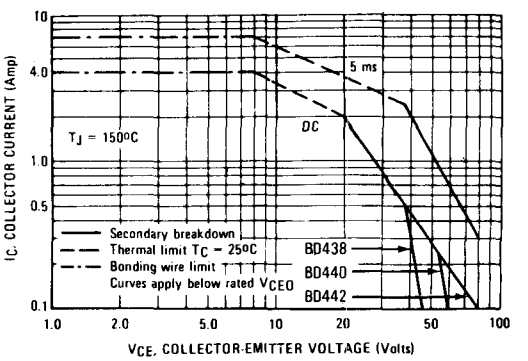


FIGURE 4 – ACTIVE REGION SAFE OPERATING AREA



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