

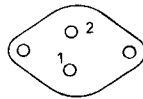
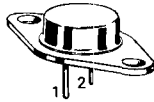
# ALPHANUMERIC INDEX — CROSS-REFERENCE

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 num-

ber 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	Industry Part Number	Motorola Direct Replacement	Motorola Similar Replacement	Page Number
1S110A-100		MJ16018	3-782	2N3441	2N3441		3-13
2N1487		2N5877	3-120	2N3442	2N3442		3-15
2N1488		2N5878	3-120	2N3445	2N3447		3-18
2N1489		2N5877	3-120	2N3446	2N3448		3-18
2N1490		2N5878	3-120	2N3447	2N3447		3-18
2N1702		2N5877	3-120	2N3448	2N3448		3-18
2N3016		2N5337	3-97	2N3583	2N3583		3-20
2N3021		2N3789	3-56	2N3584	2N3584		3-20
2N3022		2N3789	3-56	2N3585	2N3585		3-20
2N3023		2N3789	3-56	2N3667		2N5881	3-123
2N3024		2N3791	3-56	2N3713		2N5881	3-123
2N3025		2N3791	3-56	2N3714	2N3714		3-26
2N3026		2N3791	3-56	2N3715	2N3715		3-26
2N3054	2N3054		3-2	2N3715JAN	2N3715JAN		3-26
2N3054A	2N3054A		3-2	2N3715JTX	2N3715JTX		3-26
2N3055	2N3055		3-6	2N3715JTXV	2N3715JTXV		3-26
2N3055A	2N3055A		3-9	2N3716	2N3716		3-26
2N3055H		2N3055A	3-9	2N3716JAN	2N3716JAN		3-26
2N3055H		2N5302JAN	3-93	2N3716JTX	2N3716JTX		3-26
2N3055JAN		2N3055A	3-9	2N3716JTXV	2N3716JTXV		3-26
2N3055SD							
2N3055SUB		2N3055A	3-9	2N3719	2N3719		3-32
2N3076		2N6249	3-164	2N3720	2N3720		3-32
2N3079		2N6308	3-181	2N3738	2N3738		3-37
2N3080		2N6543	3-215	2N3739	2N3739		3-37
2N3171		2N3789	3-56	2N3739JAN	2N3739JAN		3-37
2N3172		2N3789	3-56	2N3739JTX	2N3739JTX		3-37
2N3173		2N3790	3-56	2N3739JTXV	2N3739JTXV		3-37
2N3174		MJ15016	3-9	2N3740	2N3740		3-41
2N3183		2N3789	3-56	2N3740A		2N3740	3-41
2N3184		2N3789	3-56	2N3740JAN	2N3740JAN		3-41
2N3185		2N3790	3-56	2N3740JTX	2N3740JTX		3-41
2N3186		MJ15016	3-9	2N3740JTXV	2N3740JTXV		3-41
2N3195		2N3789	3-56	2N3741	2N3741		3-41
2N3196		2N3790	3-56	2N3741A	2N3741A		3-41
2N3198		MJ15016	3-9	2N3741JAN	2N3741JAN		3-41
2N3202		2N3719	3-32	2N3741JTX	2N3741JTX		3-41
2N3203		2N3720	3-32	2N3741JTXV	2N3741JTXV		3-41
2N3204		2N6303	3-32	2N3766	2N3766		3-44
2N3232		2N5877	3-120	2N3766JAN	2N3766JAN		3-44
2N3233		2N5882	3-123	2N3766JTX	2N3766JTX		3-44
2N3234		2N5760	3-116	2N3766JTXV	2N3766JTXV		3-44
2N3235		2N3055	3-6	2N3767	2N3767		3-44
2N3236		2N5882	3-123	2N3767JAN	2N3767JAN		3-44
2N3237		2N5302	3-93	2N3767JTX	2N3767JTX		3-44
2N3238		2N5882	3-123	2N3767JTXV	2N3767JTXV		3-44
2N3239		2N5882	3-123	2N3771	2N3771		3-48
2N3240		2N5882	3-123	2N3772	2N3772		3-48
2N3419		2N5336	3-97	2N3773	2N3773		3-52
2N3420		2N5336	3-97	2N3788		2N6543	3-215
2N3421		2N5336	3-97	2N3789	2N3789		3-56

**TABLE 3 — METAL TO-213 (Formerly TO-66)**



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

**CASE 80-02 (TO-213AA)**

I <sub>C</sub> Cont Amps Max	V <sub>CE0</sub> (sus) Volts Min	Device Type		hFE Min/Max	@ I <sub>C</sub> Amp	Resistive Switching			f <sub>T</sub> MHz Min	P <sub>D</sub> (Case) Watts @ 25°C
		NPN	PNP			t <sub>s</sub> μs Max	t <sub>f</sub> μs Max	@ I <sub>C</sub> Amp		
1	80	2N4912		20/100	0.5	0.6 typ	0.3 typ	0.5	3	25
	175	2N3583	2N6420	40/200	0.5	2 typ	0.23 typ	0.5	10	35
	225	2N3738		40/200	0.1	3 typ	0.3 typ	0.1	10	20
	300	2N3739		40/200	0.1	3 typ	0.3 typ	0.1	10	20
2	225		2N6211	10/100	1	2.5	0.6	1	20	35
	250	2N3584	2N6421	25/100	1	4	3	1	10	35
	300	2N3585 2N4240	2N6212	10/100	1	2.5	0.6	1	20	35
			2N6422	25/100	1	4	3	1	10	35
350		2N6213	30/150	0.75	6	3	0.75	15	35	
3	140	2N3441		25/100	0.5				0.2	25
4	60	2N3054.A 2N3766 2N6294##	2N3740	30/100	0.25	1.3 typ	0.27 typ	0.25	4	25
				25/100	0.5	1 typ	0.3 typ	0.5	3	75
				40/160	0.5	0.9 typ	0.09 typ	0.5	10	20
				750/18k	2	0.9 typ	0.7 typ	2	4#	50
	80	2N3767 2N6295##	2N3741	30/100	0.25	1.3 typ	0.27 typ	0.25	4	25
				40/160	0.5	0.9 typ	0.09 typ	0.5	10	20
		2N6297##	750/18k	2	0.9 typ	0.7 typ	2	4	50	
5	80	2N4233A		25/100	1.5	0.5 typ	0.2 typ	1.5	4	75
7	60		2N6317	20/100	2.5	1	0.8	2.5	4	90
	80	2N5428		60/240	2	2	0.2	2	30	40
			2N6318	20/100	2.5	1	0.8	2.5	4	90
	100	2N5429 2N5430		30/120 60/240	2 2	2 2	0.2 0.2	2 2	30 30	40 40
8	60	2N6300##	2N6298##	750/18k	4	1.5 typ	1.5 typ	4	4#	75
	80	2N6301##	2N6299##	750/18k	4	1.5 typ	1.5 typ	4	4#	75

# |h<sub>FE</sub>| @ 1 MHz, ## Darlington

JAN, JTX, JTXV Available

2

**2N3441**

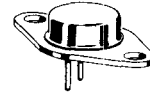
**NPN SILICON POWER TRANSISTOR**

The 2N3441 transistor is designed for use in general-purpose switching and linear amplifier applications requiring high breakdown voltages. It is characterized for use as:

- Driver for High Power Outputs
- Series and Shunt Regulators
- Audio and Servo Amplifiers
- Solenoid and Relay Drivers
- Power Switching Circuits

**3 AMPERES**  
**NPN SILICON**  
**POWER TRANSISTOR**

**140 VOLTS**  
**25 WATTS**

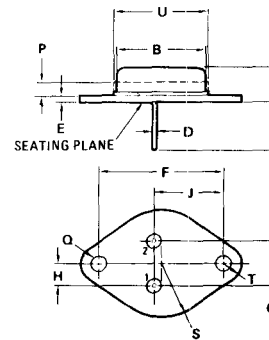


**MAXIMUM RATINGS**

Rating	Symbol	Value	Unit
Collector-Emitter Voltage	$V_{CEO}$	140	Vdc
Collector-Base Voltage	$V_{CBO}$	160	Vdc
Emitter-Base Voltage	$V_{EBO}$	7	Vdc
Collector Current - Continuous	$I_C$	3	Adc
Base Current - Continuous	$I_B$	2	Adc
Total Power Dissipation @ $T_C = 25^\circ\text{C}$ Derate above $25^\circ\text{C}$	$P_D$	25 0.142	Watts W/ $^\circ\text{C}$
Operating and Storage Junction Temperature Range	$T_J, T_{stg}$	-65 to +200	$^\circ\text{C}$

**THERMAL CHARACTERISTICS**

Characteristic	Symbol	Max	Unit
Thermal Resistance, Junction to Case	$R_{\theta JC}$	7	$^\circ\text{C/W}$



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

DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
B	11.94	12.70	0.470	0.500
C	6.35	6.64	0.250	0.340
D	0.71	0.86	0.028	0.034
E	1.27	1.91	0.050	0.075
F	24.33	24.43	0.958	0.962
G	4.83	5.33	0.190	0.210
H	2.41	2.67	0.095	0.105
J	14.48	14.99	0.570	0.590
K	9.14	-	0.360	-
P	-	1.27	-	0.050
Q	3.61	3.86	0.142	0.152
S	-	8.89	-	0.350
T	-	3.68	-	0.145
U	-	15.75	-	0.620

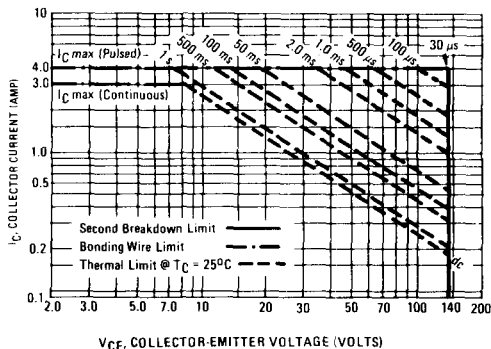
All JEDEC Dimensions and Notes Apply.  
**CASE 80-02**  
**TO-213AA**  
**(TO-66)**

**3**

**ELECTRICAL CHARACTERISTICS** ( $T_C = 25^\circ\text{C}$  unless otherwise noted)

Characteristic	Symbol	Min	Max	Unit
<b>OFF CHARACTERISTICS</b>				
Collector-Emitter Sustaining Voltage (1) ( $I_C = 100\text{ mA}$ , $I_B = 0$ )	$V_{CE(sus)}$	140	—	Vdc
Collector Cutoff Current ( $V_{CE} = 140\text{ Vdc}$ , $I_B = 0$ )	$I_{CEO}$	—	100	mA
Collector Cutoff Current ( $V_{CE} = 140\text{ Vdc}$ , $V_{BE(off)} = 1.5\text{ V}$ ) ( $V_{CE} = 140\text{ Vdc}$ , $V_{BE(off)} = 1.5\text{ V @ } 150^\circ\text{C}$ )	$I_{CEX}$	—	5.0 6.0	mA
Emitter Cutoff Current ( $V_{BE} = 7.0\text{ Vdc}$ , $I_C = 0$ )	$I_{EBO}$	—	1.0	mA
<b>ON CHARACTERISTICS</b>				
DC Current Gain (1) ( $I_C = 0.5\text{ Adc}$ , $V_{CE} = 4.0\text{ V}$ ) ( $I_C = 2.7\text{ Adc}$ , $V_{CE} = 4.0\text{ V}$ )	$h_{FE}$	25 5.0	100 —	—
Collector-Emitter Saturation Voltage (1) ( $I_C = 2.7\text{ Adc}$ , $I_B = 0.9\text{ Adc}$ )	$V_{CE(sat)}$	—	6.0	Vdc
Base-Emitter On Voltage (1) ( $I_C = 2.7\text{ Adc}$ , $V_{CE} = 4.0\text{ Vdc}$ )	$V_{BE(on)}$	—	6.7	Vdc
<b>DYNAMIC CHARACTERISTICS</b>				
Small-Signal Current Gain ( $I_C = 0.5\text{ Adc}$ , $V_{CE} = 4.0\text{ Vdc}$ , $f_{test} = 1\text{ kHz}$ )	$h_{fe}$	15	75	—
Small-Signal Current Gain ( $I_C = 0.5\text{ Adc}$ , $V_{CE} = 4.0\text{ Vdc}$ , $f_{test} = 0.4\text{ MHz}$ )	$ h_{fe} $	5.0	—	—

**FIGURE 1 – ACTIVE-REGION SAFE OPERATING AREA**



There are two limitations on the power-handling 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 1 is based on  $T_{J(pk)} = 200^\circ\text{C}$ ;  $T_C$  is variable depending on conditions. At high case temperatures, thermal limitations will reduce the power that can be handled to values less than the limitations imposed by second breakdown.