

# NPN Transistors



# Datasheet.Live

## GENERAL PURPOSE AMPS AND SWITCHES (Continued)

Type No.	Case Style	V <sub>CB0</sub> (V) Min	V <sub>CE0</sub> (V) Min	V <sub>EB0</sub> (V) Min	I <sub>CB0</sub> (nA) @ V <sub>CB</sub> (V) Max	h <sub>FE</sub> @ I <sub>C</sub> (mA) & V <sub>CE</sub> (V)				V <sub>CE</sub> (SAT) (V) & V <sub>BE</sub> (SAT) (V) @ I <sub>C</sub> (mA)			C <sub>ob</sub> (pF) Max	f <sub>T</sub> (MHz) @ I <sub>C</sub> (mA)		t <sub>off</sub> (ns) Max	NF (dB) Max	Test Conditions	Process No.	
						Min	Max	Min	Max	Min	Max	Min		Max	Min					Max
2N3115	TO-18	60	20	5	25 50	40	120	150	10	0.5	1.3	150	8	250	20	500		2	19	
2N3116	TO-18	60	20	5	25 50	100	300	150	10	0.5	1.3	150	8	250	20	500		2	19	
2N3299	TO-5	60	30	5	10* 50	20		500	10	0.22	1.1	150	8	250	50	150		4	19	
						20		150	1											
						40	120	150	10											
						35		10	10											
						25		1	10											
20		100 μA	10																	
2N3300	TO-5	60	30	5	10* 50	50		500	10	0.22	1.1	150	8	250	50	150		4	19	
						50		150	1											
						100	300	150	10											
						75		10	10											
						50		1	10											
35		100 μA	10																	
2N3301	TO-18	60	30	5	10* 50	20		500	10	0.22	1.1	150	8	250	50	150		4	19	
						20		150	1											
						40	120	150	10											
						35		10	10											
						25		1	10											
20		100 μA	10																	
2N3302	TO-18	60	30	5	10* 50	50		500	10	0.22	1.1	150	8	250	50	150		4	19	
						50		150	1											
						100	300	150	10											
						75		10	10											
						50		1	10											
35		100 μA	10																	
2N3414	TO-92 (94)	25	25	5	100 25	75	225	2	4.5	0.3	0.6	1.3	50						19	
2N3641	TO-92 (92)	Same as PN3641, see page 1-22 for explanation																	19	
2N3642	TO-92 (92)	Same as PN3642, see page 1-22 for explanation																	19	
2N3643	TO-92 (92)	Same as PN3643, see page 1-22 for explanation																	19	
2N3678	TO-5	75	55	6	10 60	25		500	10	0.4	0.6	1.2	150				250		2	19
						20		150	1											
						40	120	150	10											
						35		10	10											
						25		1	10											
20		100 μA	10																	
2N4140	TO-92 (92)	Same as PN4140, see page 1-22 for explanation																	19	

## Conversion of Bipolar Metal Can to Plastic

Metal P/N	Plastic Equivalent	Electrical Equivalency*	Process	Metal P/N	Plastic Equivalent	Electrical Equivalency*	Process
2N697	2N4400	A	13	2N2905	TN2905	E	63
2N706	MPS706	E	21	2N2905A	TN2905A	E	63
2N708	PN3646	N	22	2N2906	PN2906	E	63
2N718	2N4400	A	13	2N2906A	PN2906A	E	63
2N722	PN2906	N	63	2N2907	PN2907	E	63
2N744	PN2369	N	21	2N2907A	PN2907A	E	63
2N753	PN2369	N	21	2N3009	PN3646	N	22
2N760A	2N4409	N	07	2N3011	PN2369	N	21
2N834	MPS834	E	21	2N3012	PN3640	A	65
2N869A	PN3640	A	65	2N3013	PN3646	E	22
2N915	MPS6565	A	27	2N3019	TN3019	E	12
2N917	PN3563	E	43	2N3020	TN3020	E	12
2N918	PN918	E	43	2N3053	2N3053	E	12
2N929	2N4409	N	07	2N3117	2N5210	N	07
2N930	PN930	E	07	2N3133	MPS3703	N	63
2N956	PN2222A	N	19	2N3134	PN3645	N	63
2N995A	PN3640	A	65	2N3135	MPS3703	N	63
2N1132	PN2906	N	63	2N3136	PN3645	N	63
2N1613	PN2221A	N	19	2N3250	2N3905	A	66
2N1711	PN2222A	N	19	2N3251	2N3906	A	66
2N2218	TN2218	E	19	2N3300	2N4401	A	13
2N2218A	TN2218A	E	19	2N3301	2N4400	A	13
2N2219	TN2219	E	19	2N3302	2N4401	A	13
2N2219A	TN2219A	E	19	2N3304	PN3639	A	65
2N2221	PN2221	E	19	2N3440	TN3440	E	36
2N2221A	PN2221A	E	19	2N3724	TN3724	E	25
2N2222	PN2222	E	19	2N3725	TN3725	E	25
2N2222A	PN2222A	E	19	2N3944	2N3903	N	23
2N2369	PN2369	E	21	2N3947	2N3904	N	23
2N2369A	PN2369A	E	21	2N3962	2N5086	N	62
2N2483	2N5209	N	07	2N3964	2N5087	N	62
2N2484	2N5210	N	07	2N3965	2N5087	N	62
2N2604	2N5086	N	62	2N4033	TN4033	E	67
2N2605	2N5086	N	62	2N4036	TN4036	E	67
2N2894	PN3640	A	65	2N4037	TN4037	E	67
2N2894A	PN3639	A	65	2N4208	PN3640	N	65
2N2904	TN2904	E	63	2N4209	PN3640	N	65
2N2904A	TN2904A	E	63				

\* E = Exact electrical equivalent

N = Near electrical equivalent

A = Approximate electrical equivalent

Note: On "N" and "A" categories please refer to device specification section for deviation from metal can specifications.

This list is for use when an alternative to a metal can transistor is needed.

To facilitate conversions on the most popular types National is offering the "PN" series, TO-92 devices that use the same die type and are screened to same electrical specifications. The TO-92 transistors produced by National Semiconductor are the most advanced Plastic Transistors ever manufactured. They utilize epoxy B encapsulation and a copper lead frame to give a power dissipation of up to 625 mW @  $T_A = 25^\circ\text{C}$ . These transistors provide electrical performance and reliability equivalent to their metal can versions in most applications where  $T_J$  does not exceed  $150^\circ\text{C}$ .

The same situation is applicable to the "TN" series, except that the National-originated TO-237 (TO-92 + ) case outline is used, which permits power dissipation of up to 1.0W @  $T_A = 25^\circ\text{C}$ .