GENERAL PURPOSE AMPS AND SWITCHES (Continued)

Type No.	Case Style	V_{CBO} (V) Min	V_{CEO} (V) Min	V_{EBO} (V) Min	I_{CBO} (nA) @ V_{CB} (V) Max		h_{FE} Min	h_{FE} Max	@ I_C (mA)	& V_{CE} (V)	$V_{CE(SAT)}$ (V) Max	& $V_{BE(SAT)}$ (V) Min	Max	@ I_C (mA)	C_{ob} (pF) Max	f_T (MHz) Min	Max	@ I_C (mA)	t_{off} (ns) Max	NF (dB) Max	Test Conditions	Process No.
2N2219	TO-5	60	30	5	10	50	30		500	10	0.4		1.3	150	8	250		20				19
							50		150	1												
							100	300	150	10	1.6		2.6	500								
							75		10	10												
							50		1	10												
							35		100 μA	10												
2N2219A	TO-5	75	40	6	10	60	40		500	10		0.6	1.2	150	8	300		20	285		2	19
							50		150	1			2	500								
							100	300	150	10												
							75		10	10												
							50		1	10												
							35		100 μA	10												
2N2221	TO-18	60	30	5	10	50	20		500	10	0.4		1.3	150	8	250		20				19
							20		150	1												
							40	120	150	10	1.6		2.6	500								
							35		10	10												
							25		1	10												
							20		100 μA	10												
2N2221A	TO-18	75	40	6	10	60	25		500	10	0.3	0.6	1.2	150	8	250		20	285		2	19
							40	120	150	10												
							35		10	10	1.0		2.0	500								
							25		1	10												
							20		100 μA	10												
2N2222	TO-18	60	30	5	10	50	30		500	10	0.4		1.3	150	8	250		20				19
							50		150	1												
							100	300	150	10	1.6		2.6	500								
							75		10	10												
							50		1	10												
							35		100 μA	10												
2N2222A	TO-18	75	40	6	10	60	40		500	10	0.3	0.6	1.2	150	8	250		20	285	4	2/3	19
							50		150	1												
							100	300	150	10	1		2	500								
							75		10	10												
							50		1	10												
							35		100 μA	10												
2N2897	TO-18	60		7	50	60	35		1	10	1		1.3	150	15							19
							50	200	150	10												

TEST CONDITIONS:

(1) I_C = 300 μA, V_{CE} = 10V, f = 1 kHz. **(2)** I_C = 150 mA, V_{CC} = 30V, I_{B1} = I_{B2} = 15 mA. **(3)** I_C = 100 μA, V_{CE} = 10V, f = 1 kHz. **(4)** I_C = 300 mA, V_{CC} = 25V, I_{B1} = I_{B2} = 30 mA. **(5)** I_C = 100 μA, V_{CE} = 4.5V, f = 15.7 kHz. **(6)** I_C = 10 mA, V_{CC} = 3V, I_{B1} = I_{B2} = 1 mA. **(7)** I_C = 100 μA, V_{CE} = 5V, f = 15.7 kHz. **(8)** I_C = 250 μA, V_{CE} = 5V, f = 10 Hz–15.7 kHz. **(9)** I_C = 3 mA, V_{CE} = 10V, f = 1 MHz. **(10)** I_C = 10 μA, V_{CE} = 5V, f = 15.7 kHz.

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 @ $T_A = 25°C$. These transistors provide electrical performance and reliability equivalent to their metal can versions in most applications where T_J does not exceed 150°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 @ $T_A = 25°C$.