

NPN Transistors


**National
Semiconductor**

Low Level Amplifiers

Type No.	Case Style	V _{CB0} (V) Min	V _{CE0} (V) Min	V _{BE0} (V) Min	I _{CB0} V _{CB} (nA) @ (V) Max	I _{FE} @ I _C & V _{CE} (mA) Min Max	V _{CE(SAT)} (V) & V _{BE(SAT)} (V) Max Min	I _C (mA) Max	C _{ob} (pF) Max	f _T (MHz) Min Max	I _C (mA) Max	NF (dB) Max	Test Conditions	Process No.	
2N929	TO-18	45	45	5	10 45	350 10 5 60 500 μA 5 40 120 10 μA 5	1.0 0.6 1.0	10	8	30	0.5	4	(Note 1)	07	
2N929A	TO-18	60	45	6	2 45	350 10 5 60 500 μA 5 40 120 10 μA 5 25 1 μA 5	0.5 0.7 0.9	10	6	45	0.5	4		07	
2N930 Avail. JAN/TX/V Versions	TO-18	45	45	5	10 45	600 10 5 150 500 μA 5 100 300 10 μA 5	1.0 0.6 1.0	10	8	30	0.5	3	(Note 1)	07	
2N2484	TO-18	60	60	6	10 45	250 1 5 200 500 μA 5 175 100 μA 5 100 500 10 μA 5 30 1 μA 5	0.35	1	10	15	0.05	3	(Note 1)	07	
2N3117	TO-18	60	60	6	10 45	400 1 5 300 100 μA 5 250 10 μA 5 100 1 μA 5	0.35	1	4.5	60	0.5	1.5	(Note 2)	07	
2N3246	TO-18	60	40	10	1 40	800 10 5 400 1 5 350 500 μA 5 300 100 μA 5 200 10 μA 5 150 1 μA 5	0.5 0.7 0.9	5	5	60 180	1	2	(Note 1)	07	
2N3565		Same as PN3565													11
2N3707	TO-92 (94)	30	30	6	100 20	100 400 100 μA	1.0	10				5	(Note 1)	11	
2N3708	TO-92 (94)	30	30	6	100 20	45 660 1	1.0	10						11	

Low Level Amplifiers (Continued)

Type No.	Case Style	V _{CE0} (V) Min	V _{BE0} (V) Min	I _{CB0} (mA) Max	h _{FE} Min	I _C @ (mA) Max	V _{CE(SAT)} (V) Max	V _{BE(SAT)} (V) Min	I _C @ (mA) Max	C _{ob} (pF) Max	f _T (MHz) Min	I _C @ (mA) Max	NF (dB) Max	Test Conditions	Process No.
2N3709	TO-92 (94)	30	30	100	45	165	1.0	10	10						11
2N3710	TO-92 (94)	30	30	100	90	330	1.0	10	10						11
2N3711	TO-92 (94)	30	30	100	180	660	1.0	10	10						11
2N3858A	TO-92 (94)	60	60	500	60	120				4	90	250	2		11
2N3859A	TO-92 (94)	60	60	500	100	200				4	90	250	2		11
2N3877	TO-92 (94)	70	70	500	20	250	0.5	0.9	10						11
2N3877A	TO-92 (94)	85	85	500	20	250	0.5	0.9	10						11
2N3900A	TO-92 (94)	18	18	100	250	500				12			5	(Note 4)	11
2N3901	TO-92 (94)	18	18	100	350	700							5	(Note 4)	11
2N4286	TO-92 (94)	30	25	50	150	600	0.35	0.8	1	6	40	1			11*
2N4287	TO-92 (94)	45	45	10	150	600	0.35	0.8	1	6	40	1	5	(Note 1)	11
2N4409	TO-92 (92)	80	50	10	60	400	0.2	0.8	1	12	60	300	10		11
2N4410	TO-92 (92)	120	80	10	60	400	0.2	0.8	1	12	60	300	10		11
2N4966	TO-92 (92)	50	40	25	40	200	0.4	10	1	6	40	1			11
2N4967	TO-92 (92)	50	40	25	100	600	0.4	10	1	6	40	1			11
2N4968	TO-92 (92)	30	25	50	40	200	0.4	10	1	6					11

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Type No.	Case Style	V _{CE} (V) Min	V _{CE} (V) Min	V _{EB} (V) Min	I _{CEO} (nA) @ Max	V _{CB} (V) Max	I _{FE} Min	I _C @ (mA) & V _{CE} (V) Max	V _{CE} (SAT) (V) & V _{BE} (SAT) (V) Max	I _C @ (mA) Max	C _{ob} (pF) Max	f _T (MHz) @ Min	I _C (mA) Max	NF (dB) Max	Test Conditions	Process No.	
2N5088	TO-92 (92)	35	30		50	20	300 350 300	10 1 100 μA	5 5 5	0.5	10	4		3	(Note 3)	11	
2N5089	TO-92 (92)	30	25		50	15	400 450 400	10 1 100 μA	5 5 5	0.5	10	4		2	(Note 3)	11	
2N5133		Same as PN5133														11	
2N5209	TO-92 (92)	50	50		50	35	150 150 100	10 1 300	5 5 5	0.7	10	4	30	0.5	4	(Note 5)	11
2N5210	TO-92 (92)	50	50		50	35	250 250 200	10 1 600	5 5 5	0.7	10	4	30	0.5	3	(Note 4)	11
2N5232	TO-92 (94)		50		30	50	250 500	2 2	5 5	0.125	10	4					11
2N5961	TO-92 (92)	60	60	8	2	45	100 120 135	0.01 0.1 1	5 5 5	0.2	10	4	100	10	6	(Notes 7 & 11)	11
2N5962	TO-92 (92)	45	45	8	2	30	450 500 550	0.01 0.1 1	5 5 5	0.2	10	4	100	10	6 4 8	(Note 7) (Note 8) (Note 9)	11
2N5232A	TO-92 (94)		50		30	50	250 500	2 2	5 5	0.125	10	4		5	3 3	(Note 10) (Note 12)	11
MPS3707	TO-92 (92)		30		100	20	100 400	100 μA	5	1.0	10			5	(Note 2)	11	
MPS3708	TO-92 (92)		30		100	20	45 660	1	5	1.0	10				(Note 4)	11	
MPS3709	TO-92 (92)		30		100	20	45 165	1	5	1.0	10					11	
MPS3710	TO-92 (92)		30		100	20	90 330	1	5	1.0	10					11	

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Type No.	Case Style	V _{CEO} (V) Min	V _{CE0} (V) Min	V _{EB0} (V) Min	I _{CBO} (nA) Max	I _{CB0} (V) Max	h _{FE} Min Max	I _C & V _{CE} (mA) (V)	V _{CE(SAT)} (V) Max	V _{BE(SAT)} (V) Min Max	I _C (mA) Max	C _{ob} (pF) Max	f _T (MHz) Min Max	I _C (mA) Max	NF (dB) Max	Test Conditions	Process No.
MPS3711	TO-92 (92)		30			100	20	180 660 1 5	1.0		10						11
MPS6571	TO-92 (92)	25	20	3	50	50	20	250 1000 100 μA 5	0.5		10	4.5	50	0.5			11
MPSA09	TO-92 (92)	50	50		100	25	100	600 100 μA 5	0.9		10	5	600	0.5			11
MPSA18	TO-92 (92)	45	45	6.5	50	30	400 500 500 1500 0.01 0.1 1 5 5	0.3			50	3	100	1	1.5	(Note 4)	11
PE4020	TO-92 (92)	60	60	8	2	45	150 950 10 5 135 1 5 120 0.1 5 100 0.01 5	0.3			50	4	100 800 10		6 3 3	(Note 9) (Note 7) (Note 10)	11
PN930	TO-92 (92)	45	45	5	10	45	600 10 5 150 500 μA 5 100 300 10 μA 5	1.0 0.6 1.0 10			10	8	30	0.5	3	(Note 1)	11
PN2484	TO-92 (92)	60	60	6	10	45	600 10 5 250 1 5 200 500 μA 5 175 100 μA 5 100 500 10 μA 5 30 1 μA 5	0.35			10	6			3	1	11
PN3565	TO-92 (92)	30	25	6	50	25	150 600 1 10	0.35			1	4	40 240 1				11
PN5133	TO-92 (92)	20	18	3	50	15	60 1000 1 5	0.4			1	5	40 240 1				11

TEST CONDITIONS:

Note 1: I_C = 10 μA, V_{CE} = 5V, f = 10 Hz - 15.7 kHz.
 Note 2: I_C = 10 μA, V_{CE} = 5V, f = 1 kHz.
 Note 3: I_C = 5 μA, V_{CE} = 5V, f = 1 kHz.
 Note 4: I_C = 100 μA, V_{CE} = 5V, f = 10 Hz - 15.7 kHz.

Note 5: I_C = 10 μA, V_{CE} = 5V, f = 10 kHz.
 Note 6: I_C = 100 μA, V_{CE} = 5V, f = 5 kHz.
 Note 7: I_C = 100 μA, V_{CE} = 5V, f = 1 kHz, R_S = 1 kΩ.
 Note 8: I_C = 100 μA, V_{CE} = 5V, f = 1 kHz, R_S = 10 kΩ.

Note 9: I_C = 100 μA, V_{CE} = 5V, f = 1 kHz, R_S = 100 kΩ.
 Note 10: I_C = 10 μA, V_{CE} = 5V, f = 1 kHz, R_S = 10 kΩ.
 Note 11: I_C/I_B = 20.
 Note 12: I_C = 10 μA, V_{CE} = 5V, f = 10 Hz - 10 kHz, R_S = 10 kΩ.

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