

NPN Transistors

6501130 NATL SEMICOND. (DISCRETE)

28C 35395
T-29-01 D

LOW LEVEL AMPS



Type No.	Case Style	VCBO (V) Min	VCEO (V) Min	VEBO (V) Min	ICBO (mA) Max	V _{CB} (V)	h _{FE} Min	h _{FE} Max	IC @ (mA) & VCE (V)	VCE(SAT) (V) Max	VBE(SAT) (V) Min	IC @ (mA) Max	Cob (pF) Max	f _T (MHz) Min	f _T (MHz) Max	NF (dB) Max	Test Conditions	Process No.
2N760	TO-18	45	45	8	200	30	76	300	5	1.0	0.6	10	8	50	1.0			07
2N760A	TO-18	60	60	8	100	30	76	333	5	1.0	1.1	10	8	50	1.0			07
2N929	TO-18	45	45	5	10	45	60	350	5	1.0	0.6	10	8	30	0.5	4	1	07
2N929A	TO-18	60	45	6	2	45	40	120	5	0.5	0.7	10	6	45	0.5	4		07
2N930	TO-18	45	45	5	10	45	600	10	5	1.0	0.6	10	8	30	0.5	3	1	07
2N2484	TO-18	60	60	6	10	45	250	1	5	0.35		1	10	15	0.05	3	1	07
2N2509	TO-18	125	80	7	5	100	40	10	5	1.0	0.9	5	6	45	5	7	1	07
2N2510	TO-18	100	65	7	5	80	150	10	5	1.0	0.9	5	6	45	5	4	2	07
2N2511	TO-18	80	60	7	5	60	240	10	5	1.0	0.9	5	6	45	5	4	2	07
2N2586	TO-18	60	45	6	2	45	600	10	5	0.5	0.7	10	7	45	0.5	3.5	2	07
2N3117	TO-18	60	60	6	10	45	400	1	5	0.35		1	4.5	60	0.5	1	2	07
2N3246	TO-18	60	40	10	1	40	800	10	5	0.5	0.7	5	5	60	180	2	1	07

6501130 NATL SEMICOND, (DISCRETE)

28C 35396

T-29-01

LOW LEVEL AMPS (Continued)

Type No.	Case Style	V _{CEO} (V) Min	V _{CE0} (V) Min	V _{EB0} (V) Min	I _{CBO} (nA) Max	V _{CB} (V)	hFE Min	I _C & V _{CE} (mA) & (V)	V _{CE(SAT)} (V) Max	V _{BE(SAT)} (V) Min	I _C (mA) @	C _{cb} (pF) Max	f _T (MHz) Min	I _C (mA) @	NF (dB) Max	Test Conditions	Process No.
2N3565	TO-92 (92)	30	30	6	100	20	100	400	1.0	10	100	5				1	07
2N3707	TO-92 (94)	30	30	6	100	20	45	660	1.0	10	10						07
2N3708	TO-92 (94)	30	30	6	100	20	45	165	1.0	10	10						07
2N3709	TO-92 (94)	30	30	6	100	20	90	330	1.0	10	10						07
2N3710	TO-92 (94)	30	30	6	100	20	180	660	1.0	10	10						07
2N3858A	TO-92 (94)	60	60	6	500	18	60	120			10	4	90	250	2		07
2N3859A	TO-92 (94)	60	60	6	500	18	100	200			10	4	90	250	2		07
2N3877	TO-92 (94)	70	70	4	500	70	20	250	4.5	0.5	0.9	10					07
2N3877A	TO-92 (94)	85	85	4	500	70	20	250	4.5	0.5	0.9	10					07
2N3900A	TO-92 (94)	18	18	5	100	18	250	500	4.5			12				5	4
2N3901	TO-92 (94)	18	18	5	100	15	350	700	4.5							5	4
2N4286	TO-92 (94)	30	25	6	50	25	150	600	0.35	0.8	1	6	40	1			07
2N4287	TO-92 (94)	45	45	7	10	30	150	600	0.35	0.8	1	6	40	1	5	1	07
2N4384	TO-18	40	30	5	10	30	150	10	0.2	0.65	0.8	8	30	120	0.5	2	1
2N4386	TO-18	40	30	5	10	30	120	1	0.2	0.65	0.8	8	30	120	0.5	3	1
2N4409	TO-92 (92)	80	50	5	10	60	60	400	0.2	0.8	1	12	60	300	10		07

TEST CONDITIONS: (1) I_C = 10 μA, V_{CE} = 5V, f = 10 Hz-15.7 kHz. (2) I_C = 10 μA, V_{CE} = 5V, f = 1 kHz. (3) I_C = 5 μA, V_{CE} = 5V, f = 1 kHz. (4) I_C = 100 μA, V_{CE} = 5V, f = 10 Hz-15.7 kHz. (5) I_C = 10 μA, V_{CE} = 5V, f = 10 kHz. (6) I_C = 100 μA, V_{CE} = 5V, f = 5 kHz.

NPN Transistors

1

6501130 NATL SEMICOND. (DISCRETE)

28C 35397 D

NPN Transistors

LOW LEVEL AMPS (Continued)



Type No.	Case Style	V _{CB0} (V) Min	V _{CE0} (V) Min	V _{EB0} (V) Min	I _{CB0} (mA) Max	V _{CB} (V)	h _{FE} Min	I _C @ (mA) Max	V _{CE} & (V)	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.
2N4410	TO-92 (92)	120	80	5	10	100	60	400	1	0.2	0.8	1	12	60	10			07
2N4966	TO-92 (92)	50	40	6	25	25	40	200	5	0.4		10	6	40	1			07
2N4967	TO-92 (92)	50	40	6	25	25	100	600	5	0.4		10	6	40	1			07
2N4968	TO-92 (92)	30	25	6	50	25	40	200	5	0.4		10	6					07
2N5088	TO-92 (92)	35	30		50	20	300	10	5	0.5		10	4			3	3	07
2N5089	TO-92 (92)	30	25		50	15	350	1	5	0.5		10	4			2	3	07
2N5133	TO-92 (92)	20	18	3	50	15	400	1200	5	0.4		1	5					07
2N5209	TO-92 (92)	50	50		50	35	150	10	5	0.7		10	4	30	0.5	4	5	07
2N5210	TO-92 (92)	50	50		50	35	100	300	5	0.7		10	4	30	0.5	3	4	07
2N5232	TO-92 (94)		50		30	50	250	10	5	0.125		10	4					07
2N5232A	TO-92 (94)		50		30	50	250	500	5	0.125		10	4			5	2	07
MPS3707	TO-92 (92)		30		100	20	100	400	5	1.0		10				5	4	07
MPS3708	TO-92 (92)		30		100	20	45	660	5	1.0		10						07
MPS3709	TO-92 (92)		30		100	20	45	165	5	1.0		10						07
MPS3710	TO-92 (92)		30		100	20	90	330	5	1.0		10						07
MPS3711	TO-92 (92)		30		100	20	180	660	5	1.0		10						07
MPS6571	TO-92 (92)	25	20	3	50	20	250	1000	5	0.5		10	4.5	50	0.5			07
MPSA09	TO-92 (92)	50	50		100	25	100	600	5	0.9		10	5	600	0.5			07

T-29-01

6501130 NATL SEMICOND, (DISCRETE)

28C 35398

D

LOW LEVEL AMPS (Continued)

Type No.	Case Style	V _{CB0} (V) Min	V _{CE0} (V) Min	V _{EB0} (V) Min	I _{CB0} (mA) Max	V _{CB} (V) @ I _C & V _{CE}	h _{FE} @ I _C & V _{CE}		V _{CE(SAT)} (V) Max	V _{BE(SAT)} (V) @ I _C		I _C (mA) @ I _C	C _{ob} (pF) Max	f _T (MHz) @ I _C		NF (dB) Max	Test Conditions	Process No.
							Min	Max		Min	Max			Min	Max			
PE4010	TO-92 (92)	30	25	6	200	5	1000	1	10	0.35	1	1	4	20	60	0.05		07
PN930	TO-92 (92)	45	45	5	10	45	600	10	5	1.0	0.6	1.0	8	30	30	0.5	3	07
PN2484	TO-92 (92)	60	60	6	10	45	800	10	5	0.35	10	10	6					07
PN3565	TO-92 (92)	30	25	6	50	25	150	600	10	0.35	1	1	4	40	240	1		07
PN5133	TO-92 (92)	20	18	3	50	15	60	1000	5	0.4	1	1	5	40	240	1		07

TEST CONDITIONS:

(1) I_C = 10 μA, V_{CE} = 5V, f = 10 Hz-15.7 kHz. (2) I_C = 10 μA, V_{CE} = 5V, f = 1 kHz. (3) I_C = 5 μA, V_{CE} = 5V, f = 1 kHz. (4) I_C = 100 μA, V_{CE} = 5V, f = 10 Hz-15.7 kHz. (5) I_C = 10 μA, V_{CE} = 5V, f = 10 kHz. (6) I_C = 100 μA, V_{CE} = 5V, f = 5 kHz.

T-29-01

GENERAL PURPOSE AMPS AND SWITCHES

Type No.	Case Style	V _{CB0} (V) Min	V _{CE0} (V) Min	V _{EB0} (V) Min	I _{CB0} (mA) Max	V _{CB} (V) @ I _C & V _{CE}	h _{FE} @ I _C & V _{CE}		V _{CE(SAT)} (V) Max	V _{BE(SAT)} (V) @ I _C		I _C (mA) @ I _C	C _{ob} (pF) Max	f _T (MHz) @ I _C		t _{off} (ns) Max	NF (dB) Max	Test Conditions	Process No.
							Min	Max		Min	Max			Min	Max				
MPS3903	TO-92 (92)	60	40	6			20	0.1	1	0.2	0.65	0.85	4	200	10		5	8	02
							35	1	1										
							50	150	1										
							30	50	1										
							15	100	1	0.3	1.0	50							

TEST CONDITIONS:

(1) I_C = 300 μA, V_{CE} = 10V, f = 1 kHz. (2) I_C = 150 mA, V_{CE} = 30V, I_B¹ = I_B² = 15 mA. (3) I_C = 100 μA, V_{CE} = 10V, f = 1 kHz. (4) I_C = 300 mA, V_{CE} = 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_{CE} = 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.

NPN Transistors



6501130 NATL SEMICOND, (DISCRETE)

28C 35400

D

GENERAL PURPOSE AMPS AND SWITCHES (Continued)

Type No.	Case Style	V _{CEO} (V) Min	V _{CEO} (V) Min	V _{CE0} (V) Min	V _{CB0} (nA) Max	V _{CB} (V)	h _{FE} Min	h _{FE} Max	I _C (mA)	V _{CE} (V)	V _{CE(SAT)} (V) Max	V _{BE(SAT)} (V) Min	V _{BE(SAT)} (V) Max	I _C (mA) @ V _{BE(SAT)} Min	I _C (mA) @ V _{BE(SAT)} Max	C _{ob} (pF) Max	f _T (MHz) Min	f _T (MHz) Max	t _{off} (ns) Max	NF (dB) Max	Test Conditions	Process No.	
2N3398	TO-92 (94)	25	25	5	100	18	55	800	2	4.5						10						04	
2N3415	TO-92 (94)	25	25	5	100	25	180	540	2	4.5	0.3	0.6	1.3	50								04	
2N3416	TO-92 (94)	50	50	5	100	25	75	225	2	4.5	0.3	0.6	1.3	50								04	
2N3417	TO-92 (94)	50	50	5	100	25	180	540	2	4.5	0.3	0.6	1.3	50								04	
2N3900	TO-92 (94)	18	18	5	100	18	250	500	2	4.5							12					04	
2N4424	TO-92 (94)	40	40	5	100	25	180	540	2	4.5	0.3	0.6	1.3	50								04	
2N5172	TO-92 (94)	25	25	5	100	25	100	500	10	10	0.25			10								04	
MPS3392	TO-92 (92)	25	25	5	100	18	150	300	2	4.5						10						04	
MPS3393	TO-92 (92)		25		100	18	90	180	2	4.5						3.5						04	
MPS3394	TO-92 (92)		25		100	18	55	110	2	4.5						3.5						04	
MPS3395	TO-92 (92)		25		100	18	150	500	2	4.5						3.5						04	
MPS3396	TO-92 (92)		25		100	18	90	500	2	4.5						3.5						04	
MPS3397	TO-92 (92)		25		100	18	55	500	2	4.5						3.5						04	
MPS3398	TO-92 (92)		25		100	18	55	800	2	4.5						3.5						04	
MPS5172	TO-92 (92)	25	25	5	100	25	100	500	10	10	0.25			10								04	
MPS6520	TO-92 (92)		25	4	50	30	200	400	2	10	0.5			50							3	10	04
MPS6521	TO-92 (92)		25	4	50	30	200	600	2	10	0.5			50							3	10	04
T1S97	TO-92 (97)		40		10	40	250	700	0.1	5											3	7	04

T-29-01

TEST CONDITIONS:
 (1) I_C = 300 μA, V_{CE} = 10V, f = 1 kHz. (2) I_C = 150 mA, V_{CE} = 30V, I_B¹ = I_B² = 15 mA. (3) I_C = 100 μA, V_{CE} = 10V, f = 1 kHz. (4) I_C = 300 mA, V_{CE} = 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_{CE} = 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.

NPN Transistors

1

6501130 NATL SEMICOND, (DISCRETE)

28C 35401 D

NPN Transistors

GENERAL PURPOSE AMPS AND SWITCHES (Continued)

Type No.	Case Style	V _{CEO} (V) Min	V _{CEO} (V) Max	V _{BE0} (V) Min	V _{BE0} (V) Max	I _{CEO} (mA) Max	V _{CB} (V)	h _{FE} Min	h _{FE} Max	I _C (mA) e	I _C (mA) Max	V _{CE(SAT)} (V) Max	V _{BE(SAT)} (V) Min	V _{BE(SAT)} (V) Max	I _C (mA) e	C _{ob} (pF) Max	f _T (MHz) Min	f _T (MHz) Max	I _C (mA) e	I _C (mA) Max	t _{off} (ns) Max	NF (dB) Max	Test Conditions	Process No.
2N3704	TO-92 (94)	50	30	5	20	100	20	100	300	50	2	0.6			100	12	100	100	50					13
2N3705	TO-92 (94)	50	30	5	20	100	20	50	150	50	2	0.8			100	12	100	100	50					13
2N3706	TO-92 (94)	40	20	5	20	100	20	30	600	50	2	1.0			100	12	100	100	50					13
2N3794	TO-92 (94)	40	20	5	15	500	10	100	600	10	10	0.4			100	10	100	600	10					13
2N4400	TO-92 (92)	60	40	6				20	500	2	2	0.4	0.75	0.95	150	6.5	200	20	255			2		13
2N4401	TO-92 (92)	60	40	6				40	500	2	2	0.4	0.75	0.95	150	6.5	250	20	255			2		13
2N4944	TO-92 (92)	80	40	5	40	50	40	40	120	150	1	0.25			150		60	900	50					13
2N4946	TO-92 (92)	80	40	5	40	50	40	100	300	150	1	0.25			150		60	900	50					13
2N4951	TO-92 (94)	60	30	5	40	50	40	60	200	150	10	0.3			150	8	250	20	400			2		13
2N4952	TO-92 (94)	60	30	5	40	50	40	100	300	150	10	0.3			150	8	250	20	400			2		13
2N4953	TO-92 (94)	60	30	5	40	50	40	200	600	150	10	0.3			150	8	250	20	400			2		13
2N4954	TO-92 (94)	40	30	5	30	50	30	60	600	150	10	0.3			150	8	250	20	400			2		13
2N5220	TO-92 (92)	15	15	3	10	100	10	30	600	50	10	0.5	1.1	1.50	20	10	100	20						13
2N5225	TO-92 (92)	25	25	4	15	300	15	30	600	50	10	0.8	1.0	1.00	20	20	50	20						13
MPS3704	TO-92 (92)	50	30	5	20	100	20	100	300	50	2	0.6			100	12	100	50						13

T-29-01

6501130 NATL SEMICOND, (DISCRETE)

28C 3540Z

GENERAL PURPOSE AMPS AND SWITCHES (Continued)

Type No.	Case Style	VCBO (V) Min	VCEO (V) Min	VEBO (V) Min	ICBO (mA) Max	VCB (V)	hFE @ IC & VCE (V)		VCE(SAT) VBE(SAT) & (V)		IC (mA) Max	Cob (pF) Max	fT (MHz) Min	fT (MHz) Max	IC (mA)	toff (ns) Max	NF (dB) Max	Test Conditions	Process No.
							Min	Max	Min	Max									
MPS3705	TO-92 (92)	50	30	5	100	20	50	150	2	0.8	100	12	100	50					13
MPS3706	TO-92 (92)	40	20	5	100	20	30	600	2	1.0	100	12	100	50					13
MPS6522	TO-92 (92)		25	4	50	20	100	400	10	0.5	50	4							13
MPS6530	TO-92 (92)	60	40	5	50	40	25	500	10	0.5	100	5							13
MPS6531	TO-92 (92)	60	40	5	50	40	90	270	10	0.3	100	5							13
MPS6532	TO-92 (92)	50	30	5	100	30	30	100	1	0.5	100	5							13
NCBT13	TO-92 (92)	80	40	4	100	30	40	20	1	0.15	100	6	150	20					13
PN3566	TO-92 (92)	40	30	5	50	20	80	600	10	1	100	25	40	700	30				13
PN3567	TO-92 (92)	80	40	5	50	40	40	120	1	0.25	150	20	60	900	50				13
PN3569	TO-92 (92)	80	40	5	50	40	100	300	1	0.25	150		60	900	50				13
PN3449	TO-92 (92)	50	30	5	100	20	100	300	2	0.6	100		100	50					13
PN3816	TO-92 (92)	50	40	5	100	25	100	200	2	0.75	500		100	50					13
2N5550	TO-92 (92)	160	140	6	100	100	20	50	5	0.15	10	6	100	300	10			10	16
2N5551	TO-92 (92)	180	160	6	50	120	30	50	5	0.25	50	6	100	300	10			8	16
2N5530	TO-92 (92)	120	100	5	50	100	80	500	5	0.15	1		100	500	10				16

T-29-01

TEST CONDITIONS:

(1) IC = 300 μ A, VCE = 10V, f = 1 kHz. (2) IC = 150 mA, VCC = 30V, IB¹ = IB² = 15 mA. (3) IC = 100 μ A, VCE = 10V, f = 1 kHz. (4) IC = 300 mA, VCC = 25V, IB¹ = IB² = 30 mA. (5) IC = 100 μ A, VCE = 4.5V, f = 15.7 kHz. (6) IC = 10 mA, VCC = 3V, IB¹ = IB² = 1 mA. (7) IC = 100 μ A, VCE = 5V, f = 15.7 kHz. (8) IC = 250 μ A, VCE = 5V, f = 10 Hz-15.7 kHz. (9) IC = 3 mA, VCE = 10V, f = 1 MHz. (10) IC = 10 μ A, VCE = 5V, f = 15.7 kHz.

NPN Transistors

1

6501130 NATL SEMICOND, (DISCRETE)

28C 35403 D

NPN Transistors

GENERAL PURPOSE AMPS AND SWITCHES (Continued)

Type No.	Case Style	V _{CE0} (V) Min	V _{CE0} (V) Max	V _{BE0} (V) Min	V _{BE0} (V) Max	I _{CB0} (nA) Max	V _{CB} (V)	h _{FE} @ I _C & V _{CE}		V _{CE(SAT)} & V _{BE(SAT)}		I _C (mA) Max	C _{ob} (pF) Max	f _T (MHz)		I _C (mA) Max	t _{off} (ns) Max	NF (dB) Max	Test Conditions	Process No.
								Min	Max	Min	Max			Min	Max					
MPSL01	TO-92 (92)	140	140	6	40	1 μA	40	50	300	10	5	0.2	0.2	1.2	10	8	60	10		16
MPS8098	TO-92 (92)	60	60	6	60	100	60	100	300	1	5	0.3	0.3		100	6	150	10		18
MPS8099	TO-92 (92)	80	80	6	60	100	60	100	300	1	5	0.3	0.3		100	6	150	10		18
TI598	TO-92 (97)		60		40	10	40	100	300	1	5	0.5	0.5		100		2	10		18
TI599	TO-92 (97)		65		40	10	40	55	300	100	5	0.5	0.5		100		2	10		18
2N696	TO-5	60	60	5	30	1 μA	30	20	60	150	10	1.5	1.5	1.3	150	20	40	50		19
2N697	TO-5	60	60	5	30	1 μA	30	40	120	150	10	1.5	1.5	1.3	150	35	50	50		19
2N718	TO-18	60	60	5	30	1 μA	30	40	120	150	10	1.5	1.5	1.3	150	35	50	15		19
2N718A	TO-18	75	75	7	60	10	60	20	500	10	10	1.5	1.5	1.3	150	25	60	50	12	19
								35	120	150	10									
								10	100	100	10									
2N956	TO-18	75	75	7	60	10	60	40	500	10	10	1.5	1.5	1.3	150	25	70	50	8	19
								100	300	150	10									
								75	10	10	10									
2N1420	TO-5	60	60	5	30	1 μA	30	100	300	150	10	1.5	1.5	1.3	150	35	50	50		19
2N1566	TO-5	80	80	5	40	1 μA	40	80	200	5	5	1.0	1.0		10	10	60	5		19
2N2218	TO-5	60	60	5	50	10	50	20	500	10	10	0.4	0.4	1.3	150	8	250	20		19
								40	120	150	10	1.6	1.6	2.6	500					
								35	10	10	10									
								25	1	10	10									
								20	20	100 μA	10									
2N2218A	TO-5	75	75	6	60	10	60	25	500	10	10	0.3	0.3	0.6	1.2	8	250	20	285	19
								20	150	1	1									2
								40	120	150	10									
								35	10	10	10									
								25	25	1	10									
								20	100 μA	10	10									

T-29-01

6501130 NATL SEMICOND, (DISCRETE)

28C 35404

D

GENERAL PURPOSE AMPS AND SWITCHES (Continued)

Type No.	Case Style	V _{CEO} (V) Min	V _{CE0} (V) Min	V _{BE0} (V) Min	I _{CBO} (nA) Max	V _{CB} (V)	h _{FE} @ I _C & V _{CE} (V) Min Max	I _C (mA) Min Max	V _{BE(SAT)} (V) Min Max	I _C (mA) Min Max	C _{ob} (pF) Max	f _T (MHz) Min Max	I _C (mA) Min Max	t _{off} (ns) Max	NF (dB) Max	Test Conditions	Process No.
2N2219	TO-5	60	30	5	10	50	30 50 100 300 75 50 35	500 150 100 150 10 10 10 10	0.4 1.6	1.3 2.6 500	8	250	20				19
2N2219A	TO-5	75	40	6	10	60	40 50 100 300 75 50 35	500 150 100 150 10 10 10 10	0.6 2	1.2 500	8	300	20	285		2	19
2N2221	TO-18	60	30	5	10	50	20 20 40 120 35 25 20	500 150 100 150 10 10 10 10	0.4 1.6	1.3 2.6 500	8	250	20				19
2N2221A	TO-18	75	40	6	10	60	25 40 120 150 35 25 20	500 150 100 150 10 10 10 10	0.3 1.0	1.2 2.0 500	8	250	20	285		2	19
2N2222	TO-18	60	30	5	10	50	30 50 100 300 75 50 35	500 150 100 150 10 10 10 10	0.4 1.6	1.3 2.6 500	8	250	20				19
2N2222A	TO-18	75	40	6	10	60	40 50 100 300 75 50 35	500 150 100 150 10 10 10 10	0.3 1	1.2 2	8	250	20	285	4	2/3	19
2N2897	TO-18	60		7	50	60	35 50	1 150	1 1.3	150 500	15						19

T-29-01

TEST CONDITIONS:
 (1) I_C = 300 μA, V_{CE} = 10V, f = 1 kHz. (2) I_C = 150 mA, V_{CE} = 30V, I_B¹ = I_B² = 15 mA. (3) I_C = 100 μA, V_{CE} = 10V, f = 1 kHz. (4) I_C = 300 mA, V_{CE} = 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_{CE} = 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.

NPN Transistors

1

6501130 NATL SEMICOND, (DISCRETE)

28C 35405 D

T-29-01

NPN Transistors

GENERAL PURPOSE AMPS AND SWITCHES (Continued)



Type No.	Case Style	V _{CEO} (V)	V _{CE0} (V)	V _{ES0} (V)	I _{CEO} (mA)	V _{CB} (V)	h _{FE}	I _C (mA)	V _{CE(SAT)} (V)	I _C (mA)	C _{ob} (pF)	f _T (MHz)		t _{off} (ns)	NF (dB)	Test Conditions	Process No.
												Min	Max				
2N3115	TO-18	60	20	5	25	50	40	120	0.5	150	8	250	20	500		2	19
2N3116	TO-18	60	20	5	25	50	100	300	0.5	150	8	250	20	500		2	19
2N3299	TO-5	60	30	5	10*	50	20	500	0.22	150	8	250	50	150		4	19
							40	120	0.6	500							
							35	10									
							25	1									
							20	100 μA									
2N3300	TO-5	60	30	5	10*	50	50	500	0.22	150	8	250	50	150		4	19
							50	150									
							100	300	0.6	500							
							75	10									
							50	1									
							35	100 μA									
2N3301	TO-18	60	30	5	10*	50	20	500	0.22	150	8	250	50	150		4	19
							20	150									
							40	120	0.6	500							
							35	10									
							25	1									
							20	100 μA									
2N3302	TO-18	60	30	5	10*	50	50	500	0.22	150	8	250	50	150		4	19
							50	150									
							100	300	0.6	500							
							75	10									
							50	1									
							35	100 μA									
2N3414	TO-92 (94)	25	25	5	100	25	75	225	0.3	0.6	1.3						19
2N3641	TO-92 (92)	Same as PN3641, see page 1-22 for explanation															
2N3642	TO-92 (92)	Same as PN3642, see page 1-22 for explanation															
2N3643	TO-92 (92)	Same as PN3643, see page 1-22 for explanation															
2N3678	TO-5	75	55	6	10	60	25	500	0.4	0.6	1.2			250		2	19
							20	150	1.0	2.0							
							40	120									
							35	10									
							25	1									
							20	100 μA									
2N4140	TO-92 (92)	Same as PN4140, see page 1-22 for explanation															

6501130 NATL SEMICOND, (DISCRETE)

28C 35406

D

T-29-01



GENERAL PURPOSE AMPS AND SWITCHES (Continued)

Type No.	Case Style	V _{CEO} (V)		V _{BE(SAT)} (V)		I _{CEO} (mA)		h _{FE}		V _{CE(SAT)} (V)		I _C (mA)		C _{ob} (pF)	f _T (MHz)		I _C (mA)	t _{off} (ns)	NF (dB)	Test Conditions	Process No.
		Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max		Min	Max					
2N4141	TO-92 (92)	Same as PN4141, see page 1-22 for explanation																			19
2N4969	TO-92 (92)	Same as PN2221, see below for explanation																			19
2N4970	TO-92 (92)	50	30	5		100	350	150	10	0.4	0.6	1.2	150	8	200	20					19
2N5128	TO-92 (92)	Same as PN5128, see page 1-22 for explanation																			19
2N5129	TO-92 (92)	Same as PN5129, see page 1-22 for explanation																			19
2N5135	TO-92 (92)	Same as PN5135, see page 1-22 for explanation																			19
2N5136	TO-92 (92)	Same as PN5136, see page 1-22 for explanation																			19
2N5137	TO-92 (92)	Same as PN5137, see page 1-22 for explanation																			19
PN2221	TO-92 (92)	60	30	5	10	50	20	500	10	0.4	1.3	150	8	250	20						19
PN2221A	TO-92 (92)	75	40	6	10	60	25	500	10	0.3	0.6	1.2	150	8	250	20	285			2	19
PN2222	TO-92 (92)	60	30	5	10	50	30	500	10	0.4	1.3	150	8	250	20						19

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.

NPN Transistors

1

NPN Transistors

6501130 NATL SEMICOND, (DISCRETE)

28C 35407 D

T-29-01

GENERAL PURPOSE AMPS AND SWITCHES (Continued)



Type No.	Case Style	V _{CB0} (V) Min	V _{CE0} (V) Min	V _{EB0} (V) Min	I _{CB0} (mA) Max	V _{CB} (V) @ I _C & V _{CE}	h _{FE}		I _C (mA) @ 100 μA	V _{CE(SAT)} (V) Max	V _{BE(SAT)} (V) Min		I _C (mA) @ V _{BE(SAT)}	C _{ob} (pF) Max	f _T (MHz)		I _C (mA) @ f _T	τ _{off} (ns) Max	NF (dB) Max	Test Conditions	Process No.
							Min	Max			Min	Max			Min	Max					
PN2222A	TO-92 (92)	75	40	6	10	60	40	500	10	0.3	0.6	1.2	150	8	300	20	285		2	19	
PN3641	TO-92 (92)	60*	30	5	50*	50	15	500	10	0.22			150	8	250	50				19	
PN3642	TO-92 (92)	60	45	5	50*	50	15	500	10	0.22			150	8	250	50				19	
PN3643	TO-92 (92)	60	30	5	50*	50	20	500	10	0.22			150	8	250	50				19	
PN4140	TO-92 (92)	60	30	5			20	500	10	0.4	1.3	150	8	250	20	310				19	
PN4141	TO-92 (92)	60	30	5			30	500	10	0.4	1.3	150	8	250	20	310				19	
PN5128	TO-92 (92)	15	12	3	50	10	35	350	10	0.25	1.1	150	10	200	800	50				19	
PN5129	TO-92 (92)	15	12	3	50	10	35	350	10	0.25	1.1	150	10	200	800	50				19	
PN5135	TO-92 (92)	30	25	4	300	15	50	60*	10	1.0	1.0	100	25	40	500	30				19	
PN5136	TO-92 (92)	30	20	3	100	20	20	400	150	0.25	1.1	150	35	40	400	50				19	
PN5137	TO-92 (92)	30	20	3	100	20	20	400	150	0.25	1.1	150	35	40	400	50				19	
TN2218A	TO-237 (91)	75	40	6	10	60	25	500	10	0.3	0.6	1.2	150	8	250	20	285		2	19	

6501130 NATL SEMICOND, (DISCRETE)

28C 35408

GENERAL PURPOSE AMPS AND SWITCHES (Continued)

Type No.	Case Style	VCBO (V) Min	VCEO (V) Min	VEBO (V) Min	ICBO (nA) Max	VCB @ IC (V)	hFE @ IC & VCE		VCE(SAT) (V) & VBE(SAT) (V)		IC @ (mA)	Cob (pF) Max	fT (MHz)		toff (ns) Max	NF (dB) Max	Test Conditions	Process No.	
							Min	Max	Min	Max			Min	Max					Min
TN2219	TO-237 (91)	60	30	5	10	50	30	500	10	0.4	1.3	150	8	50				19	
TN2219A	TO-237 (91)	75	40	6	10	60	40	500	10	0.3	0.6	1.2	8	60		4	3	19	
TI590	TO-92 (94)	40	40	5	100	20	100	300	2	0.25	0.6	1						19	
TI592	TO-92 (97)	40	40	5	100	20	100	300	2	0.25	0.6	1						19	
2N915	TO-18	70	50	5	10	60	50	200	5	1.0	0.9	10	3.5	250				23	
2N916	TO-18	45	25	5	10	30	50	200	1	0.5	0.9	10	6	300				23	
2N3691	TO-92 (92)	Same as PN3691, see page 1-25 for explanation																	
2N3692	TO-92 (92)	Same as PN3692, see page 1-25 for explanation																	
2N3903	TO-92 (92)	60	40	6			15	100	1	0.2	0.6	0.85	4	250		6	6/7	23	
							30	50	1										
							50	150	1	0.3	0.95	50							
							35	1	1										
							20	100 μA	1										
2N3904	TO-92 (92)	60	40	6	30	30	30	100	1	0.2	0.65	0.85	4	300		5	6/7	23	
							60	50	1										
							100	300	1	0.3	0.95	50							
							70	1	1										
							40	100 μA	1										
2N3946	TO-18	60	40	6			20	50	1	0.2	0.6	0.9	4	250		5	6/7	23	
							50	150	1										
							45	1	1	0.3	1.0	50							
							30	100 μA	1										

T-29-01

TEST CONDITIONS: (1) IC = 300 μA, VCE = 10V, f = 1 kHz. (2) IC = 150 mA, VCE = 30V, IB¹ = IB² = 15 mA. (3) IC = 100 μA, VCE = 10V, f = 1 kHz. (4) IC = 300 mA, VCC = 25V, IB¹ = IB² = 30 mA. (5) IC = 100 μA, VCE = 4.5V, f = 15.7 kHz. (6) IC = 10 mA, VCC = 3V, IB¹ = IB² = 1 mA. (7) IC = 100 μA, VCE = 5V, f = 15.7 kHz. (8) IC = 250 μA, VCE = 5V, f = 10 Hz-15.7 kHz. (9) IC = 3 mA, VCE = 10V, f = 1 MHz. (10) IC = 10 μA, VCE = 5V, f = 15.7 kHz.

D NPN Transistors



6501130 NATL SEMICOND, (DISCRETE)

28C 35409 D

T-29-01

NPN Transistors



GENERAL PURPOSE AMPS AND SWITCHES (Continued)

Type No.	Case Style	VCBO (V) Min	VCEO (V) Min	VEBO (V) Min	ICBO (nA) Max	V _{CB} (V) Max	h _{FE}		IC (mA) & VCE (V)	V _{CE(SAT)} (V) & V _{BE(SAT)} (V)		IC (mA) Max	C _{ob} (pF) Max	f _T (MHz)		I _C (mA) Max	t _{off} (ns) Max	NF (dB) Max	Test Conditions	Process No.
							Min	Max		Min	Max			Min	Max					
2N3947	TO-18	60	40	6			40 100	50 300	1 1	0.2 0.3	0.9 1.0	10 50	4	300	10	450	5	6/7	23	
2N4123	TO-92 (92)	40	30	5	50	20	25 50	50 150	1 2	0.3	0.95	50	4	250	10		6	7	23	
2N4124	TO-92 (92)	30	25	5	50	20	60 120	50 360	1 2	0.3	0.95	50	4	300	10		5	7	23	
MPS2711	TO-92 (92)	18	18	5	500	18	30	90	2	4.5			4						23	
MPS2712	TO-92 (92)	18	18	5	500	18	75	225	2	4.5			4						23	
MPS2716	TO-92 (92)	18	18	5	500	18	75	225	2	4.5			3.5						23	
MPS2923	TO-92 (92)	25	25	5	500	25	90	180	2	10			12						23	
MPS2924	TO-92 (92)	25	25	5	500	25	150	300	2	10			12						23	
MPS2925	TO-92 (92)	25	25	5	500	25	235	470	2	10			12						23	
MPS2926	TO-92 (92)	25	25	5	500	18	35	470	2	10			3.5						23	
MPS3642	TO-92 (92)	Same as PN3642, see page 1-22 for explanation																		
MPS3721	TO-92 (92)				500	18	60	660	2	10			3.5							23
MPS3826	TO-92 (92)	60	45	4	100	30	40	160	10	10			3.5	200	800	10				23
MPS3827	TO-92 (92)	60	45	4	100	30	100	400	10	10			3.5	200	800	10				23
MPS6512	TO-92 (92)	40	30	4	50	30	30	100	10	10	0.5	50	3.5							23
MPS6513	TO-92 (92)	40	30	4	50	30	50	100	2	10	0.5	50	3.5							23
MPS6514	TO-92 (92)	40	25	4	50	30	90	100	10	10	0.5	50	3.5							23
MPS6515	TO-92 (92)	40	25	4	50	30	150	300	2	10	0.5	50	3.5							23

6501130 NATL SEMICOND, (DISCRETE)

28C 35410

GENERAL PURPOSE AMPS AND SWITCHES (Continued)

Type No.	Case Style	V _{CSO} (V) Min	V _{CEO} (V) Min	V _{EB0} (V) Min	I _{CS0} (mA) Max	V _{CB} (V)	h _{FE} @ I _C & V _{CE} Min Max	V _{BE(SAT)} (V) & V _{CE} (V)		I _C (mA)	C _{ob} (pF) Max	f _T (MHz)		I _C (mA)	t _{off} (ns) Max	NF (dB) Max	Test Conditions	Process No.	
								Max	Min			Min	Max						Min
NS3903	TO-18	60	40	6			15	0.2	0.65	10	4	250	10	225			6	23	
							30	0.3	50										
NS3904	TO-18	60	40	6			20	0.2	0.65	10	4	300	10	250			6	23	
							30	0.3	50										
PN3691	TO-92 (92)	35	20	4	50	15	40	0.7	0.9	10	3.5	200	500	10				23	
PN3692	TO-92 (92)	35	20	4	50	15	100	0.7	0.9	10	3.5	200	500	10				23	
ST3904	TO-92 (92)	60	40	6			40	0.2	0.65	10	4	300	10	8			7	23	
							70	0.3	50										
2N2712	TO-92 (94)	18	18	5	500	18	75	0.3	0.95	50	12	80	300	2				27	
2N2714	TO-92 (94)	18	18	5	500	18	75	0.3	0.6	1.2	50							27	
2N3394	TO-92 (94)	25	25	5	100	18	55				10							27	
2N3693	TO-92 (92)	Same as MPS3693, see page 1-26 for explanation																	
2N3694	TO-92 (92)	Same as PN3694, see page 1-26 for explanation																	
2N3721	TO-92 (94)	18	18	5	500	18	60				12							27	
2N3827	TO-92 (94)	60	45	4	100	30	100				3.5	200	800	10				27	
2N3858	TO-92 (94)	30	30	4	500	18	60				4	90	250	2				27	

T-29-01

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.

1 JPN Transistors

6501130 NATL SEMICOND, (DISCRETE)

28C 35411

NPN Transistors

GENERAL PURPOSE AMPS AND SWITCHES (Continued)

Type No.	Case Style	V _{CEO} (V) Min	V _{CE0} (V) Min	V _{EB0} (V) Min	I _{CBO} (nA) Max	V _{CB} (V) Max	h _{FE} @ I _C & V _{CE} (V)		V _{CE(SAT)} V _{BE(SAT)} (V) & (V)		I _C (mA) Max	C _{ob} (pF) Max	f _T (MHz)		t _{off} (ns) Max	NF (dB) Max	Test Conditions	Process No.
							Min	Max	Min	Max			Min	Max				
2N3859	TO-92 (94)	30	30	4	500	18	100	200	2	4.5	2	4	90	250	2			27
2N3860	TO-92 (94)	30	30	4	500	18	150	300	2	4.5	2	4	90	250	2			27
2N5127	TO-92 (92)	Same as PN5127, see below for explanation																
2N5131	TO-92 (92)	Same as PN5131, see below for explanation																
2N5132	TO-92 (92)	Same as PN5132, see below for explanation																
2N5219	TO-92 (92)	20	15	3	100	10	35	500	2	10	10	4	150	10	10			27
2N5223	TO-92 (92)	25	20	3	100	10	50	800	2	10	10	4	150	10	10			27
MPS3693	TO-92 (92)	45	45	4	50	35	40	160	10	10	10	3.5	200	10	10	4	9	27
MPS3694	TO-92 (92)	45	45	4	50	35	100	400	10	10	10	3.5	200	10	10	4	9	27
MPS6564	TO-92 (92)		45	5	500	40	25	10	5	10	10	4						27
MPS6565	TO-92 (92)	60	45	4	100	30	40	160	10	10	10	3.5						27
MPS6566	TO-92 (92)	60	45	4	100	30	100	400	10	10	10	3.5	200	10	10			27
MPSA10	TO-92 (92)		40	4	100	30	40	400	5	10	10	4	50	5	5			27
PN3694	TO-92 (92)	45	45	4	50	30	100	400	10	1	10	6	200	10	10			27
PN5127	TO-92 (92)	20	12	3	50	10	15	300	2	10	10	3.5	150	2	2			27
PN5131	TO-92 (92)	20	15	3	50	10	35	500	10	1	10	6	100	10	10			27
PN5132	TO-92 (92)	20	20	3	50	10	30	400	10	10	10	3.5	200	10	10			27

T-29-01

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.