



General Purpose Amplifiers and Switches

Type No.	Case Style	V <sub>CB0</sub> (V) Min	V <sub>CE0</sub> (V) Min	V <sub>EBO</sub> (V) Min	I <sub>CB0</sub> (nA) @ (V) Min	h <sub>FE</sub> @ I <sub>C</sub> (mA) & V <sub>CE</sub> (V) Min Max	V <sub>CE(SAT)</sub> (V) & V <sub>BE(SAT)</sub> (V) Min Max	I <sub>C</sub> (mA) @ (mHz) Min Max	C <sub>ob</sub> (pF) Max	f <sub>T</sub> (MHz) Min Max	t <sub>off</sub> (ns) Max	NF (dB) Max	Test Conditions	Process No.
2N2712	TO-92 (94)	18	18	5	500	75 225 2 4.5		2	12	90 300				10
2N2714	TO-92 (94)	18	18	5	500	75 225 2 4.5	0.3 0.6 1.2 50							10
2N2923	TO-92 (94)	25	25	5	100	90 180 2 10 (1 kHz)			10					10
2N2924	TO-92 (94)	25	25	5	100	150 300 2 10 (1 kHz)			10					10
2N2925	TO-92 (94)	25	25	5	100	235 470 2 10 (1 kHz)			10					10
2N2926	TO-92 (94)	18	18	5	500	35 470 2 10 (1 kHz)			10					10
2N3390	TO-92 (94)	25	25	5	100	400 800 2 4.5			10					10
2N3391	TO-92 (94)	25	25	5	100	250 500 2 4.5			10			5 (Note 5)		10
2N3392	TO-92 (94)	25	25	5	100	150 300 2 4.5			10					10
2N3393	TO-92 (94)	25	25	5	100	90 180 2 4.5			10					10
2N3394	TO-92 (94)	25	25	5	100	55 110 2 4.5			10					10
2N3395	TO-92 (94)	25	25	5	100	150 500 2 4.5			10					10

T-29-01

General Purpose Amplifiers and Switches (Continued)

Type No.	Case Style	V <sub>CE0</sub> (V)		V <sub>BE0</sub> (V)		I <sub>CB0</sub> (nA) @ V <sub>CB</sub> (V)		h <sub>FE</sub> @ I <sub>C</sub> (mA) & V <sub>CE</sub> (V)		V <sub>CE(SAT)</sub> (V) & V <sub>BE(SAT)</sub> (V) @ I <sub>C</sub> (mA)		C <sub>ob</sub> (pF) Max	f <sub>T</sub> (MHz) @ I <sub>C</sub> (mA)		toff (ns) Max	NF (dB) Max	Test Conditions	Process No.
		Min	Max	Min	Max	Min	Max	Min	Max	Min	Max		Min	Max				
2N3396	TO-92 (94)	25	25	5	5	100	18	90	500	2	4.5	10						10
2N3397	TO-92 (94)	25	25	5	5	100	18	55	500	2	4.5	10						10
2N3398	TO-92 (94)	25	25	5	5	100	18	55	800	2	4.5	10						10
2N3414	TO-92 (94)	25	25	5	5	100	25	75	225	2	4.5	0.3	0.6	1.3	50			10
2N3415	TO-92 (94)	25	25	5	5	100	25	180	540	2	4.5	0.3	0.6	1.3	50			10
2N3416	TO-92 (94)	50	50	5	5	100	25	75	225	2	4.5	0.3	0.6	1.3	50			10
2N3417	TO-92 (94)	50	50	5	5	100	25	180	540	2	4.5	0.3	0.6	1.3	50			10
2N3641		Same as PN3641																
2N3642		Same as PN3642																
2N3643		Same as PN3643																
2N3693		Same as PN3693																
2N3694		Same as PN3694																
2N3721	TO-92 (94)	18	18	5	5	500	18	60	660	2	10	12						10
2N3859	TO-92 (94)	30	30	4	4	500	18	100	200	2	4.5	4	90	250	2			10
2N3860	TO-92 (94)	30	30	4	4	500	18	150	300	2	4.5	4	90	250	2			10
2N4140		Same as PN4140																
2N4141		Same as PN4141																
2N4424	TO-92 (94)	40	40	5	5	100	25	180	540	2	4.5	0.3	0.6	1.3	50			10
2N4969		Same as PN2221																

T-29-01

NPN Transistors

3

NPN Transistors

General Purpose Amplifiers and Switches (Continued)

Type No.	Case Style	V <sub>CB0</sub> (V)		V <sub>CE0</sub> (V)		V <sub>EB0</sub> (V)		I <sub>CBO</sub> (mA)		I <sub>CE</sub> (mA)		h <sub>FE</sub>		V <sub>CE(SAT)</sub> (V)		V <sub>BE(SAT)</sub> (V)		I <sub>C</sub> (mA)		C <sub>ob</sub> (pF)		f <sub>T</sub> (MHz)		t <sub>off</sub> (ns)		NF (dB) Max	Test Conditions	Process No.	
		Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max				
2N4970	TO-92 (92)	50	30	5																								10	
2N5127		Same as PN5127																								10			
2N5128		Same as PN5128																								10			
2N5129		Same as PN5129																								10			
2N5131		Same as PN5131																								10			
2N5132		Same as PN5132																								10			
2N5135		Same as PN5135																								10			
2N5136		Same as PN5136																								10			
2N5137		Same as PN5137																								10			
2N5172	TO-92 (94)	25	25	5	100	25	100	500	10	10	0.25	10	10	10	10	10	10	10	10	10	4	150	10					10	
2N5219	TO-92 (94)	20	15	3	100	10	100	500	2	10	0.4	1.0	10	4	150	10												10	
2N5223	TO-92 (92)	25	20	3	100	10	100	500	2	10	0.7	1.2	10	4	150	10												10	
MPQ100	TO-116 (39)	75	45	6	50	60	80	0.1	1	1	0.2	0.85	10	4.5	250	20												10	
							100	450	10	1	0.4	1.0	200																
							100	350	150	1																			
MPQ2222	TO-116 (39)	60	40	5	50	50	75	10	10	10	0.4	1.3	150	8	200	20												10	
							100	150	10	10	1.6	2.6	300																
							30	300	10	10																			
MPS2923	TO-92 (92)	25	25	5	500	25	90	180	2	10				12														10	
MPS2924	TO-92 (92)	25	25	5	500	25	150	300	2	10				12															10
MPS2925	TO-92 (92)	25	25	5	500	25	235	470	2	10				12															10

T-29-01

General Purpose Amplifiers 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> (mA) Min	V <sub>CB</sub> (V) @ I <sub>C</sub>	h <sub>FE</sub> @ I <sub>C</sub> (mA)		V <sub>CE</sub> (V)	V <sub>CE(SAT)</sub> (V) & V <sub>BE(SAT)</sub> (V)		I <sub>C</sub> (mA)	C <sub>ob</sub> (pF) Max	f <sub>T</sub> (MHz)		t <sub>off</sub> (ns) Max	NF (dB) Max	Test Conditions	Process No.	
							Min	Max		Min	Max			Min	Max					Min
MPS2926	TO-92 (92)	25	25	5	500	18	35	470	2	10			12						10	
MPS3392	TO-92 (92)	25	25	5	100	18	150	300	2	4.5			10						10	
MPS3393	TO-92 (92)		25		100	18	90	180	2	4.5			10						10	
MPS3394	TO-92 (92)		25		100	18	55	110	2	4.5			10						10	
MPS3395	TO-92 (92)		25		100	18	150	500	2	4.5			10						10	
MPS3396	TO-92 (92)		25		100	18	90	500	2	4.5			10						10	
MPS3397	TO-92 (92)		25		100	18	55	500	2	4.5			10						10	
MPS3398	TO-92 (92)		25		100	18	55	800	2	4.5			10						10	
MPS3693	TO-92 (92)	45	45	4	50	35	40	160	10	10			10	200	10			(Note 9)	10	
MPS3694	TO-92 (92)	45	45	4	50	35	100	400	10	10			10	200	10			(Note 9)	10	
MPS3903	TO-92 (92)	60	40	6			20	0.1	1	1	0.2	0.65	0.85	10	4	200	10		(Note 8)	10
MPS3904	TO-92 (92)	60	40	6			35	1	1	1										10
							100	300	10	1										
							60	50	1	1										
							10	100	1	1	0.3	1.0	50							
							40	0.1	1	1	0.2	0.65	0.85	10	4	200	10		(Note 8)	10
							70	1	1	1										
							100	300	10	1										
							60	50	1	1										
							10	100	1	1	0.3	1.0	50							
MPS5172	TO-92 (92)	25	25	5	100	25	100	500	10	10	0.25		10	10						10

NPN Transistors

3

NPN Transistors

General Purpose Amplifiers 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) Min	I <sub>CB0</sub> (nA) @ (V) Min	h <sub>FE</sub> Min	h <sub>FE</sub> Max	I <sub>C</sub> (mA) @ (V) Min	I <sub>C</sub> (mA) @ (V) Max	V <sub>CE(SAT)</sub> (V) Max	V <sub>BE(SAT)</sub> (V) Min	V <sub>BE(SAT)</sub> (V) Max	I <sub>C</sub> (mA) @ (V) Min	I <sub>C</sub> (mA) @ (V) Max	C <sub>ob</sub> (pF) Max	f <sub>T</sub> (MHz) Min	f <sub>T</sub> (MHz) Max	t <sub>off</sub> (ns) Max	NF (dB) Max	Test Conditions	Process No.	
MPS6520	TO-92 (92)		25	4	50	30	200	400	2	10	0.5			50	50	4					3	(Note 10)	10
MPS6521	TO-92 (92)		25	4	50	30	200	600	2	10	0.5			50	50	4					3	(Note 10)	10
MPS6566	TO-92 (92)	60	45	4	100	30	100	400	2	10	0.4			10	10	4	200	10					10
MPS6573	TO-92 (92)		35		100	35	100	100	100	5	0.5			10	10	12	100	300	10				10
MPS6574	TO-92 (92)		35		100	35	100	300	1	5	0.5			10	10	12	100	300	10				10
MPS6575	TO-92 (92)		45		100	45	100	100	100	5	0.5			10	10	12	100	300	10				10
MPS6576	TO-92 (92)		45		100	45	100	300	1	5	0.5			10	10	12	100	300	10				10
MPS8098	TO-92 (92)	60	60	6	100	60	100	300	1	5	0.3			100	100	6	150	10					10
MPS8099	TO-92 (92)	80	80	6	100	60	100	300	1	5	0.3			100	100	6	150	10					10
MPSA10	TO-92 (92)		40	4	100	30	40	400	5	10						4	50	5					10
MPSA20	TO-92 (92)		40	4	100	30	40	400	5	10						4	125	5					10
PN100	TO-92 (92)	75	45	6	50	60	80	450	0.1	1	0.2			10	10	4.5	250	20			4	(Note 12)	10
PN100A	TO-92 (92)	75	45	6	50	60	300	600	10	1	0.2			10	10	4.5	250	20			4	(Note 12)	10

T-29-01

General Purpose Amplifiers 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	V <sub>CB0</sub> (nA) @ (V) Min	I <sub>CB0</sub> (nA) @ (V) Min	h <sub>FE</sub> Min	I <sub>C</sub> @ (mA) Min	V <sub>CE(SAT)</sub> (V) Max	V <sub>BE(SAT)</sub> (V) Min	I <sub>C</sub> @ (mA) Min	C <sub>ob</sub> (pF) Max	f <sub>T</sub> (MHz) Min	t <sub>off</sub> (ns) Max	NF (dB) Max	Test Conditions	Process No.
PN101	TO-92 (92)		65	6		50						4	150				10
PN2221	TO-92 (92)	60	30	5	10	50	20	500	0.4	1.3	150	8	250	285		(Note 2)	10
PN2221A	TO-92 (92)	75	40	6	10	60	25	500	0.3	0.6	150	8	250	285		(Note 2)	10
PN2222	TO-92 (92)	60	30	5	10	50	30	500	0.4	1.3	150	8	250				10
PN3641	TO-92 (92)	60	30	5	50*	50	15	500	0.22		150	8	250				10
PN3642	TO-92 (92)	60	45	5	50*	50	15	500	0.22		150	8	250				10
PN3643	TO-92 (92)	60	30	5	50*	50	20	500	0.22		150	8	250				10
PN3694	TO-92 (92)	45	45	4	50	30	100	400			10	6	200				10
PN4140	TO-92 (92)	60	30	5			20	500	0.4	1.3	150	8	250	310		(Note 2)	10

T-29-01

PN Transistors

NPN Transistor

General Purpose Amps and Switches (Continued)

Type No.	Case Style	V <sub>CB0</sub> (V) Min	V <sub>CEO</sub> (V) Min	V <sub>EB0</sub> (V) Min	I <sub>CB0</sub> (nA) @ (V) Min	I <sub>CB</sub> (nA) @ (V) Min	h <sub>FE</sub> Min	h <sub>FE</sub> Max	I <sub>C</sub> (mA) @ (V) Min	V <sub>CE</sub> (V) Max	V <sub>BE(SAT)</sub> (V) Max	V <sub>BE(SAT)</sub> (V) Min	I <sub>C</sub> (mA) @ (V) Min	I <sub>C</sub> (mA) Max	C <sub>ob</sub> (pF) Max	f <sub>T</sub> (MHz) Min	f <sub>T</sub> (MHz) Max	I <sub>C</sub> (mA) Max	t <sub>off</sub> (ns) Max	NF (dB) Max	Test Conditions	Process No.	
PN4141	TO-92 (92)	60	30	5			30	500	10	0.4	1.3	150	150	20	8	250	20	310			(Note 2)	10	
PN5127	TO-92 (92)	20	12	3	50	10	15	300	2	0.3	1.0	10	10	2	4	150	2					10	
PN5128	TO-92 (92)	15	12	3	50	10	35	350	50	0.25	1.1	150	150	50	10	200	800					10	
PN5129	TO-92 (92)	15	12	3	50	10	35	350	50	0.25	1.1	150	150	50	10	200	800					10	
PN5131	TO-92 (92)	20	15	3	50	10	35	500	10	1.0		10	10	10	6	100	10					10	
PN5132	TO-92 (92)	20	20	3	50	10	30	400	10	2.0	0.9	10	10	10	4	200	10					10	
PN5135	TO-92 (92)	30	25	4	300	15	50	60*	10	1.0	1.0	100	100	30	25	40	500					10	
PN5136	TO-92 (92)	30	20	3	100	20	20	400	150	0.25	1.1	150	150	50	35	40	400					10	
PN5137	TO-92 (92)	30	20	3	100	20	20	400	150	0.25	1.1	150	150	50	35	40	400					10	
TIS90	TO-92 (94)	40	40	5	100	20	100	300	50	0.25	0.6	1	50										10
TIS92	TO-92 (97)	40	40	5	100	20	100	300	50	0.25	0.6	1	50										10
TIS97	TO-92 (97)		40		10	40	250	700	0.1											3	(Note 7)	10	
TIS98	TO-92 (97)		60		10	40	100	300	1	0.5			100	10		2	10					10	
TIS99	TO-92 (97)		65		10	40	55	300	100	0.5			100	10		2	10					10	

T-29-01

General Purpose Amplifiers 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) Min	V <sub>CB</sub> (V) @ I <sub>C</sub>	h <sub>FE</sub> Min	I <sub>C</sub> (mA) @ 100 μA	V <sub>CE(SAT)</sub> (V) Max	V <sub>BE(SAT)</sub> (V) Min	I <sub>C</sub> (mA) Max	C <sub>ob</sub> (pF) Max	f <sub>T</sub> (MHz) Min	I <sub>C</sub> (mA) Max	t <sub>off</sub> (ns) Max	NF (dB) Max	Test Conditions	Process No.
TN2218A	TO-237 (91)	75	40	6	10	60	25	500	0.3	0.6	1.2	8	250	20	285		(Note 2)	10
TN2219	TO-237 (91)	60	30	5	10	50	30	500	0.4	1.3	150	8	250	20				10
TN2219A	TO-237 (91)	75	40	6	10	60	40	500	0.3	0.6	1.2	8	250	20		4	(Note 3)	10
2N3704	TO-92 (94)	50	30	5	100	20	100	300	0.6		100	12	100	50				13
2N3705	TO-92 (94)	50	30	5	100	20	50	150	0.8		100	12	100	50				13
2N3706	TO-92 (94)	40	20	5	100	20	30	600	1.0		100	12	100	50				13
2N3794	TO-92 (94)	40	20	5	500	15	100	100	0.4		10	10	100	600				13
2N4400	TO-92 (92)	60	40	6			20	500	0.4	0.75	0.95	6.5	200	20	255		(Note 2)	13

PNP Transistors





NPN Transistors

General Purpose Amplifiers and Switches (Continued)

Type No.	Case Style	V <sub>CB0</sub> (V) Min	V <sub>CE0</sub> (V) Min	V <sub>EBO</sub> (V) Min	I <sub>CB0</sub> (mA) @ V <sub>CB</sub> (V) Min	h <sub>FE</sub> Min	I <sub>C</sub> (mA) @ V <sub>CE</sub> (V) Min	V <sub>CE(SAT)</sub> (V) Max	V <sub>BE(SAT)</sub> (V) Min	I <sub>C</sub> (mA) @ V <sub>CE(SAT)</sub> (V) Max	C <sub>ob</sub> (pF) Max	f <sub>T</sub> (MHz) Min	I <sub>C</sub> (mA) @ f <sub>T</sub> (MHz) Max	t <sub>off</sub> (ns) Max	NF (dB) Max	Test Conditions	Process No.
2N4401	TO-92 (92)	60	40	6		40	500	0.4	0.75	150	6.5	250	20	255		(Note 2)	13
2N4944	TO-92 (92)	80	40	5	50	40	150	0.25		150		60	900	50			13
2N4946	TO-92 (92)	80	40	5	50	100	150	0.25		150		60	900	50			13
2N4951	TO-92 (94)	60	30	5	50	60	150	0.3	1.3	150	8	250	20	400		(Note 2)	13
2N4952	TO-92 (94)	60	30	5	50	100	150	0.3	1.3	150	8	250	20	400		(Note 2)	13
2N4953	TO-92 (94)	60	30	5	50	200	150	0.3	1.3	150	8	250	20	400		(Note 2)	13
2N4954	TO-92 (94)	40	30	5	50	60	150	0.3	1.3	150	8	250	20	400		(Note 2)	13
2N5220	TO-92 (92)	15	15	3	100	30	60	0.5	1.1	150	10	100	20				13
2N5225	TO-92 (92)	25	25	4	300	30	60	0.8	1.0	100	20	50	20				13
MPS3704	TO-92 (92)	50	30	5	100	100	300	0.6		100	12	100	50				13
MPS3705	TO-92 (92)	50	30	5	100	50	150	0.8		100	12		50				13
MPS3706	TO-92 (92)	40	20	5	100	30	60	1.0		100	12	100	50				13
MPS6522	TO-92 (92)		25	4	50	100	400	0.5		50	4						13

T-29-01

General Purpose Amplifiers and Switches (Continued)

Type No.	Case Style	V <sub>CE0</sub> (V) Min	V <sub>CE0</sub> (V) Max	V <sub>BE0</sub> (V) Min	V <sub>BE0</sub> (V) Max	I <sub>CBO</sub> (mA) @ V <sub>CE0</sub> Min	I <sub>CBO</sub> (mA) @ V <sub>CE0</sub> Max	I <sub>FE</sub> Min	I <sub>FE</sub> Max	I <sub>C</sub> @ V <sub>CE</sub> Min	I <sub>C</sub> @ V <sub>CE</sub> Max	V <sub>CE(SAT)</sub> & V <sub>BE(SAT)</sub> (V)		C <sub>ob</sub> (pF) Max	f <sub>T</sub> (MHz) Min	f <sub>T</sub> (MHz) Max	I <sub>C</sub> (mA) Max	t <sub>off</sub> (ns) Max	NF (dB) Max	Test Conditions	Process No.	
												Max	Min									
MPS6530	TO-92 (92)	60	40	5	40	50	40	25	40	500	10	0.5	1.0	5								13
MPS6531	TO-92 (92)	60	40	5	40	50	40	50	90	500	10	0.3	1.0	5								13
MPS6532	TO-92 (92)	50	30	5	30	100	30	30	100	100	1	0.5	1.2	5								13
PN5449	TO-92 (92)	50	30	5	30	100	20	100	300	50	2	0.6			100	50						13
PN5816	TO-92 (92)	50	40	5	40	100	25	100	200	2	2	0.75	1.2		100	50						13
2N5550	TO-92 (92)	160	140	6	100	100	100	20	60	50	5	0.15	1.0	6	100	300	10			10	(Note 8)	16
2N5551	TO-92 (92)	180	160	6	50	50	120	30	80	50	5	0.15	1.0	6	100	300	10			8	(Note 8)	16
2N5830	TO-92 (92)	120	100	5	50	100	100	60	80	10	5	0.15	0.8		100	500	10					16
2N5831	TO-92 (92)	160	140	5	50	50	120	60	80	10	5	0.15	1.0	4	100	500	10					16
2N5833	TO-92 (92)	200	180	6	10	160	160	50	50	1	5	0.15	0.8		100	500	10					16
MPSL01	TO-92 (92)	140	120	6	1 μA	40	40	50	300	10	5	0.2	1.2	8	60	10						16
PN5965	TO-92 (92)	200	180	5	50	160	160	50	50	1	5	0.15	0.8	4								16
2N696	TO-5	60		5	1 μA	30	30	20	60	150	10	1.5	1.3	20	40	50						19

T-29-01

NPN Transistors



NPN Transistors

General Purpose Amplifiers 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) Min	h <sub>FE</sub> Min	I <sub>C</sub> @ (mA) & V <sub>CE</sub> (V)	V <sub>CE(SAT)</sub> (V) & V <sub>BE(SAT)</sub> (V) Min	I <sub>C</sub> (mA) Max	C <sub>ob</sub> (pF) Max	f <sub>T</sub> (MHz)		t <sub>off</sub> (ns) Max	NF (dB) Max	Test Conditions	Process No.
											Min	Max				
2N697	TO-5	60	45	5	1 μA	40	150	1.5	1.3	35	50	50				19
2N718	TO-18	60	30	5	1 μA	40	150	1.5	1.3	35	50	15			(Note 1)	19
2N718A	TO-18	75		7	10	20	500	1.5	1.3	25	60	50		12		19
2N956	TO-18	75	35	7	10	40	500	1.5	1.3	25	70	50		8	(Note 1)	19
2N1420	TO-5	60	30	5	1 μA	100	300	1.5	1.3	35	50	50				19
2N1566	TO-5	80	60	5	1 μA	80	200	1.0	10	10	60	5				19
2N2218	TO-5	60	30	5	10	20	500	0.4	1.3	8	250	20			(Note 2)	19
2N2218A	TO-5	75	40	6	10	25	500	0.3	0.6	8	250	20	285		(Note 2)	19
2N2219	TO-5	60	30	5	10	30	500	0.4	1.3	8	250	20				19
						50	150	1.6	2.6							
						100	300									
						75	10									
						50	10									
						35	100 μA									

T-29-01

General Purpose Amplifiers and Switches (Continued)

Type No.	Case Style	V <sub>CE0</sub> (V) Min	V <sub>CE0</sub> (V) Min	V <sub>CE0</sub> (V) Min	I <sub>CB0</sub> (mA) Min	V <sub>CB</sub> (V)	h <sub>FE</sub> Min	h <sub>FE</sub> Max	I <sub>C</sub> @ (mA)	V <sub>CE</sub> & (V)	V <sub>CE(SAT)</sub> (V) & (V)		I <sub>C</sub> @ (mA)	C <sub>ob</sub> (pF) Max	f <sub>T</sub> (MHz) Min	f <sub>T</sub> (MHz) Max	t <sub>off</sub> (ns) Max	NF (dB) Max	Test Conditions	Process No.
											Max	Min								
2N2219A also Avail. JAN/TX/V Versions	TO-5	75	40	6	10	60	40	500	10	10	0.6	1.2	150	8	300	20			(Note 2)	19
2N2221	TO-18	60	30	5	10	50	20	500	10	0.4	1.3	150	8	250	20					19
2N2221A	TO-18	75	40	6	10	60	25	500	10	0.3	0.6	1.2	150	8	250	20	285		(Note 2)	19
2N2222	TO-18	60	30	5	10	50	30	500	10	0.4	1.3	150	8	250	20					19
2N2222A also Avail. JAN/TX/V Versions	TO-18	75	40	6	10	60	40	500	10	0.3	0.6	1.2	150	8	250	20	285	4	(Notes 2 & 3)	9
2N3299	TO-5	60	30	5	10*	50	20	500	10	0.22	1.1	150	8	250	50				(Note 4)	19

T-29-01

NPN Transistors

3

NPN Transistors

General Purpose Amplifiers and Switches (Continued)																							
Type No.	Case Style	V <sub>CB0</sub> (V)		V <sub>CE0</sub> (V)		V <sub>EB0</sub> (V)		I <sub>CB0</sub> (nA) @ (V)		h <sub>FE</sub> @ (mA)		V <sub>CE(SAT)</sub> (V) & V <sub>BE(SAT)</sub> (V)		I <sub>C</sub> (mA)		C <sub>ob</sub> (pF) Max	f <sub>r</sub> (MHz) @ (mA)		t <sub>off</sub> (ns) Max	NF (dB) Max	Test Conditions	Process No.	
		Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max		Min	Max					
2N3300	TO-5	60	30	5	5	10*	50	50	500	10	0.22	1.1	150	8	250	50	150			(Note 4)	19		
2N3301	TO-18	60	30	5	5	10*	50	20	500	10	0.22	1.1	150	8	250	50	150			(Note 4)	19		
2N3302	TO-18	60	30	5	5	10*	50	50	500	10	0.22	1.1	150	8	250	50	150			(Note 4)	19		
PN2222A	TO-92 (92)	75	40	6	6	10	60	40	500	10	0.3	0.6	1.2	150	8	300	20	285			(Note 2)	19	
2N915	TO-18	70	50	5	5	10	60	50	200	10	1.0	0.9	10	3.5	250	10					23		
2N916	TO-18	45	25	5	5	10	30	50	200	10	0.5	0.9	10	6	300	10					23		
2N3691		Same as PN3691																				23	
2N3692		Same as PN3692																				23	

T-29-01

General Purpose Amplifiers 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) Min	h <sub>FE</sub> Min	I <sub>C</sub> (mA) @ (V) Min	V <sub>CE(SAT)</sub> (V) Max	V <sub>BE(SAT)</sub> (V) Min	I <sub>C</sub> (mA) @ (V) Min	C <sub>ob</sub> (pF) Max	f <sub>T</sub> (MHz) Min	I <sub>C</sub> (mA) @ (V) Min	t <sub>off</sub> (ns) Max	NF (dB) Max	Test Conditions	Process No.
2N3903	TO-92 (92)	60	40	6		15	100	0.2	0.6	10	4	250	10	225	6	(Notes 6 & 7)	23
						30	50	0.3	0.95	50							
						35	1	1	1	1							
2N3904	TO-92 (92)	60	40	6	30	20	100 μA	0.2	0.65	10	4	300	10	250	5	(Notes 6 & 7)	23
						60	50	0.3	0.95	50							
						70	1	1	1	1							
2N3946	TO-18	60	40	6		20	50	0.2	0.6	10	4	250	10	375	5	(Notes 6 & 7)	23
						50	10	0.3	1.0	50							
						45	1	1	1	1							
2N3947	TO-18	60	40	6		30	100 μA	0.2	0.6	10	4	300	10	450	5	(Notes 6 & 7)	23
						40	50	0.3	0.95	50							
						100	10	0.3	1.0	50							
2N4123	TO-92 (92)	40	30	5	50	25	50	0.3	0.95	50	4	250	10		6	(Note 7)	23
						50	2	1									
2N4124	TO-92 (92)	30	25	5	50	60	50	0.3	0.95	50	4	300	10		5	(Note 7)	23
						120	360	2	1								
MPQ3904	TO-116 (39)	60	40	6	50	30	0.1	0.2	0.85	10	4	250	10			T-29-01	23
						50	1	1	1	1							
						75	10	1									
MPQ6700	TO-116 (39)	40	40	5	50	30	0.1	0.25	0.1	10	4.5	200	10			T-29-01	23/66
						50	1	1	1	1							
						70	10	1									
MPS2711	TO-92 (92)	18	18	5	500	30	2	4.5			4					23	
						90	2	4.5									
MPS2712	TO-92 (92)	18	18	5	500	75	225	2	4.5		4					23	

NPN Transistors



NPN Transistors

General Purpose Amplifiers and Switches (Continued)

Type No.	Case Style	V <sub>CEO</sub> (V) Min	V <sub>CE0</sub> (V) Min	V <sub>BE0</sub> (V) Min	I <sub>CBO</sub> (mA) Min	V <sub>CB</sub> (V) Min	I <sub>CBO</sub> (mA) Min	h <sub>FE</sub> Min	I <sub>C</sub> (mA) Max	V <sub>CE</sub> (V) Max	V <sub>CE(SAT)</sub> (V) Max	V <sub>BE(SAT)</sub> (V) Min	I <sub>C</sub> (mA) Max	C <sub>ob</sub> (pF) Max	f <sub>T</sub> (MHz) Min	f <sub>T</sub> (MHz) Max	t <sub>off</sub> (ns) Max	NF (dB) Max	Test Conditions	Process No.
MPS2716	TO-92 (92)	18	18	5	500	18	500	75	225	2	4.5			3.5						23
MPS3721	TO-92 (92)				500	18	500	60	660	2	10			3.5						23
MPS3826	TO-92 (92)	60	45	4	100	30	100	40	160	10	10			3.5	200	800	10			23
MPS3827	TO-92 (92)	60	45	4	100	30	100	100	400	10	10			3.5	200	800	10			23
MPS6512	TO-92 (92)	40	30	4	50	30	50	30	100	10	10	0.5	50	3.5						23
MPS6513	TO-92 (92)	40	30	4	50	30	50	60	100	10	10	0.5	50	3.5						23
MPS6514	TO-92 (92)	40	25	4	50	30	50	90	180	2	10	0.5	50	3.5						23
MPS6515	TO-92 (92)	40	25	4	50	30	50	150	300	2	10	0.5	50	3.5						23
MPS6564	TO-92 (92)		45	5	500	40	500	25	10	5	5	0.5	10	4						23*
MPS6565	TO-92 (92)	60	45	4	100	30	100	40	160	10	10	0.4	10	3.5						23

T-29-01

T-29-01

NPN Transistors

General Purpose Amplifiers and Switches (Continued)

Type No.	Case Style	V <sub>CE0</sub> (V) Min	V <sub>BE0</sub> (V) Min	I <sub>CB0</sub> (nA) @ V <sub>CB</sub> (V) Min	h <sub>FE</sub> @ I <sub>C</sub> & V <sub>CE</sub> (V)		V <sub>CE(SAT)</sub> (V) & V <sub>BE(SAT)</sub> (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				
NS3903	TO-18	60	40	5		15	100	0.2	0.65	4	250	225		(Note 6)	23
						30	50								
						50	150	0.3	0.95						
						35	1								
NS3904	TO-18	60	40	6		30	100	0.2	0.65	4	300	250		(Note 6)	23
						60	50								
						100	300	0.3	0.95						
						70	1								
PN3691	TO-92 (92)	35	20	4	50	40	160	0.7	0.9	3.5	200	500			23
						40	100								
PN3692	TO-92 (92)	35	20	4	50	100	400	0.7	0.9	3.5	200	500			23
						60	300								
ST3904	TO-92 (92)	60	40	6		40	0.1	0.2	0.65	4	300	285	8	(Notes 6, 7)	23
						70	1								
						100	300								
						60	50								
						30	100	0.3	0.95						

TEST CONDITIONS:

Note 1: I<sub>C</sub> = 300 μA, V<sub>CE</sub> = 10V, f = 1 kHz.  
 Note 2: I<sub>C</sub> = 150 mA, V<sub>CC</sub> = 30V, I<sub>B</sub> = I<sub>E</sub><sup>2</sup> = 15 mA.  
 Note 3: I<sub>C</sub> = 100 μA, V<sub>CE</sub> = 10V, f = 1 kHz.  
 Note 4: I<sub>C</sub> = 300 mA, V<sub>CC</sub> = 25V, I<sub>B</sub> = I<sub>E</sub><sup>2</sup> = 30 mA.

Note 5: I<sub>C</sub> = 100 μA, V<sub>CE</sub> = 4.5V, f = 15.7 kHz.  
 Note 6: I<sub>C</sub> = 10 mA, V<sub>CC</sub> = 3V, I<sub>B</sub> = I<sub>E</sub><sup>2</sup> = 1 mA.  
 Note 7: I<sub>C</sub> = 100 μA, V<sub>CE</sub> = 5V, f = 15.7 kHz.  
 Note 8: I<sub>C</sub> = 250 μA, V<sub>CE</sub> = 5V, f = 10 Hz - 15.7 kHz.

Note 9: I<sub>C</sub> = 3 mA, V<sub>CE</sub> = 10V, f = 1 MHz.  
 Note 10: I<sub>C</sub> = 10 μA, V<sub>CE</sub> = 5V, f = 15.7 kHz.  
 Note 11: I<sub>C</sub>/I<sub>B</sub> = 20.  
 Note 12: I<sub>C</sub> = 200 μA, V<sub>CE</sub> = 5V, f = 1 MHz.

3