National Semiconductor

Saturated Switches

Type No.	Case Style	V_{CES}* V_{CBO} (V) Min	V_{CEO} (V) Min	V_{EBO} (V) Min	I_{CES}* I_{CBO} (nA) Max	@ V_{CB} (V)	h_{FE} Min	Max	@ I_C (mA)	& V_{CE} (V)	$V_{CE(SAT)}$ (V) Max	& $V_{BE(SAT)}$ (V) Min	Max	@ I_C (mA) ($I_B = \frac{I_C}{10}$)	C_{ob} (pF) Max	f_T (MHz) Min	Max	@ I_C (mA)	$t_{(off)}$ (ns) Max	Test Conditions	Process No.
2N2369	TO-18 (11)	40	15	4.5	400	20	20		100	2	0.25	0.7	0.85	10	4	500		10	18	(Note 1)	21
							40	120	10	1											
2N2369A also Avail. JAN/TX/V Versions	TO-18 (11)	40	15	4.5	400*	20	20	120	100	1	0.2	0.7	0.85	10	4	500		10	18	(Note 1)	21
							30	120	30	0.4	0.25		1.5	30							
							40	120	10	1											
							40	120	10	0.35	0.6		1.6	100							
2N3011	TO-18 (11)	30	12	5	400*	20	12		100	1	0.2	0.72	0.85	10	4	400		20	20	(Note 4)	21
							25		30	0.4	0.25		1.5	30							
							30	120	10	0.35	0.5		1.6	100							
2N3605	TO-92 (94)		14		500	18	30		10	1	0.25		0.85	10	6	300		10	45	(Note 2)	21
2N3606	TO-92 (94)		14		500	18	30		10	1	0.25		0.85	10	6	300		10	60	(Note 2)	21
2N3607	TO-92 (94)		14		500	18	30		10	1	0.25		0.85	10	6	300		10	70	(Note 2)	21
2N4274		Same as PN4274																			21
2N4275		Same as PN4275																			21
2N4294	TO-92 (94)	30	12	4.5	400	20	20		100	2	0.25	0.6	0.9	10	5	400		10	20	(Note 1)	21
							30	120	10	1											
2N4295	TO-92 (94)	40	15	5	100	20	20		100	2	0.25	0.6	0.9	10	4	500		10	15	(Note 1)	21
							40	120	10	1											
2N5030	TO-92 (94)	30	12	4	250	20	30		10	1	0.25	0.72	0.87	10	4	400		10	30	(Note 9)	21
2N5134		Same as PN5134																			21

T-35-01

Saturated Switches (Continued)

Type No.	Case Style	V_{CES}* V_{CBO} (V) Min	V_{CEO} (V) Min	V_{EBO} (V) Min	I_{CES}* I_{CBO} (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) ($I_B=\frac{I_C}{10}$)	C_{ob} (pF) Max	f_T (MHz) Min	f_T (MHz) Max	@ I_C (mA)	$t_{(off)}$ (ns) Max	Test Conditions	Process No.
2N5224	TO-92 (92)	25	12	5	500	15	15 40	100	100 10	1 1	0.35		0.9	10	4	250		10	60	(Note 11)	21
2N5769	TO-92 (92)	40	15	4.5	400	20	20 30 40	120	100 30 10	1 0.4 0.35	0.2 0.25 0.5	0.7	0.85 1.5 1.6	10 30 100	4	500		10	18	(Note 1)	21
2N5772	TO-92 (92)	40	15	5	500	20	15 25 30	120	300 100 30	1 0.5 0.4	0.2 0.28 0.5	0.75	0.95 1.2 1.7	30 100 300	5	350		30	28	(Note 3)	21
MPS706	TO-92 (92)	15	15	3	500	15	20		10	1	0.6		0.9	10	6	200		10	75	(Note 11)	21
MPS706A	TO-92 (92)	25	15	5	500	15	20 20	60	10 3	1 1	0.6		0.9	10	6	200		10	75	(Note 1)	21
MPS834	TO-92 (92)	40		5	500	20	26		10	1	0.25 0.4		0.9	10 50	4	350		10	30	(Note 2)	21
MPS2369	TO-92 (92)	40	15	4.5	400	20	20 40	120	100 10	2 1	0.25	0.7	0.85	10	4	500		10	18	(Note 7)	21
MPS2369A	TO-92 (92)	40	15	4.5	400	20	40 30 20	120	10 30 100	0.35 0.4 1	0.2 0.25 0.5		0.85	10	4	500		10	18	(Note 2)	21
MPS2713	TO-92 (92)	18	15	5	500	18	30	90	2	−4.5	0.3		1.3	50							21
MPS2714	TO-92 (92)	18	15	5	500	18	75	225	2	4.5	0.3	0.6	1.3	50							21
PN2369	TO-92 (92)	40*	15	4.5	400	20	20 40	120	100 10	2 1	0.25	0.7	0.85	10	4	500		10	18	(Note 1)	21
PN2369A	TO-92 (92)	40*	15	4.5	30	20	20 30 40 40	120	100 30 10 10	1 0.4 1 0.35	0.2 0.2 0.5	0.7	0.85 1.15 1.6	10 30 100	4	500		10	18	(Note 1)	21
PN4274	TO-92 (92)	30*	12	4.5	500	20	18 30 35	120	100 30 10	1 0.4 1	0.2 0.25 0.5	0.7	0.85 1.15 1.6	10 30 100	4	400		10	12	(Note 12)	21

Saturated Switches (Continued)

Type No.	Case Style	V_{CES}* V_{CBO} (V) Min	V_{CEO} (V) Min	V_{EBO} (V) Min	I_{CES}* I_{CBO} (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) ($I_B = \frac{I_C}{10}$)	C_{ob} (pF) Max	f_T (MHz) Min	f_T (MHz) Max	@ I_C (mA)	$t_{(off)}$ (ns) Max	Test Conditions	Process No.
PN4275	TO-92 (92)	40*	15	4.5	500	20	18		100	1	0.2	0.72	0.85	10	4	400		10	12	(Note 12)	21
							30		30	0.4	0.25		1.15	30							
							35	120	10	1	0.5		1.6	100							
PN5134	TO-92 (92)	20*	10	3.5	100	15	15		30	0.4	0.25	0.7	0.9	10	4	250		10	18	(Note 12)	21
							20	150	10	1											
2N3009	TO-52	40	15	4	500*	20	15		300	1	0.18	0.75	0.95	30	5	350		30	25	(Note 3)	22
							25		100	0.5	0.28		1.2	100							
							30	120	30	0.4	0.5		1.7	300							
2N3013	TO-52	40	15	5	300*	20	15		300	1	0.18	0.75	0.95	30	5	350		30	25	(Note 3)	22
							25		100	0.5	0.28		1.2	100							
							30	120	30	0.4	0.5		1.7	300							
2N3014	TO-18	40	20	5	300*	20	30	120	30	0.4	0.18		0.8	10	5	350		30	25	(Note 4)	22
							25		10	0.4	0.18		0.95	30							
							25		100	1.0	0.35		1.2	100							
2N3646		Same as PN3646																			22
MPS3646		Same as PN3646																			22
PN3646	TO-92 (92)	40*	15	5	500*	20	15		300	1	0.2	0.75	0.95	30	5	350		30	28	(Note 3)	22
							20		100	0.5	0.28		1.2	100							
							30	120	30	0.4	0.5		1.7	300							
2N3252	TO-39	60	30	5	500	40	25		1A	5	0.3		1.0	150	12	200		50	70	(Note 7)	25
							30	90	500	1	0.5	0.7	1.3	500							
							30		150	1	1.0		1.8	1A							
2N3253	TO-39	75	40	5	500	60	20		750	5	0.35		1.0	150	12	175		50	70	(Note 7)	25
							25	75	375	1	0.6	0.7	1.3	500							
							25		150	1	1.2		1.8	1A							

Saturated Switches (Continued)

Type No.	Case Style	V_{CES}* V_{CBO} (V) Min	V_{CEO} (V) Min	V_{EBO} (V) Min	I_{CES}* I_{CBO} @ V_{CB} (nA) Max (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) ($I_B = \frac{I_C}{10}$)	C_{ob} (pF) Max	f_T (MHz) Min	f_T (MHz) Max	@ I_C (mA)	$t_{(off)}$ (ns) Max	Test Conditions	Process No.
2N3724	TO-39	50	30	6	1.7 μA 40	30		1A	5	0.32		1.1	300		300		50	60	(Note 7)	25
						25		800	2				500	12						
						35		500	1	0.42	0.9	1.2								
						40		300	1	0.65		1.5	800							
						60	150	100	1											
						30		10	1	0.75		1.7	1A							
2N3724A	TO-39	50	30	6	500 40	25		1.5A	5	0.32		1.1	300	12	300		50	50	(Note 8)	25
						30		1A	5				500							
						30		800	2	0.42		1.2								
						35		500	1											
						40		300	1	0.65		1.3	800					60	(Note 7)	
						60	150	100	1											
						30		10	1	0.75		1.4	1A							
2N3725	TO-39	80	50	6	1.7 μA 60	25		1A	5	0.4		1.1	300	10	300		50	60	(Note 7)	25
						20		800	2	0.52	0.9	1.2	500							
						35		500	1											
						40		300	1	0.8		1.5	800							
						60	150	100	1				1A							
						30		10	1	0.95		1.7								
2N3725A	TO-39	80	50	6	500 60	20		1.5A	5	0.4		1.1	300	10			50	50	(Note 8)	25
						25		1A	5											
						25		800	2	0.52		1.2	500							
						35		500	1	0.8		1.3	800							
						40		300	1											
						60	150	100	1	0.9		1.4	1A					60	(Note 7)	
						30		10	1											
2N4047	TO-39	80	50	6	1.7 μA 60	15		1A	5	0.4		1.1	300	10	250		50	60	(Note 7)	25
						15		800	2											
						20		500	1	0.52	0.9	1.2	500							
						30		300	1	0.8		1.5	800							
						40	150	100	1											
						20		10	1	0.95		1.7	1A							

Saturated Switches (Continued)

Type No.	Case Style	V_{CES}* V_{CBO} (V) Min	V_{CEO} (V) Min	V_{EBO} (V) Min	I_{CES}* I_{CBO} @ (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) ($I_B = \frac{I_C}{10}$)	C_{ob} (pF) Max	f_T (MHz) Min	f_T (MHz) Max	@ I_C (mA)	$t_{(off)}$ (ns) Max	Test Conditions	Process No.
2N6737	TO-237 (91)	80	45	6	1.7 μA	60	35		500	1	0.52	0.8	1.1	500	10	300		50	60	(Note 7)	25
MPQ3724	TO-116 (39)	50*	36	6	1.7 μA	40	30		1A	5	0.75		1.7	500	12	300		50	60	(Note 7)	25
							35		500	1											
							60	150	100	1	0.45		1.2	1A							
MPQ3725	TO-116 (39)	80*	50	6	1.7 μA	60	25		1A	5	0.95		1.7	500	10	250		50	60	(Note 7)	25
							35		500	1											
							60	150	100	1	0.52		1.2	1A							
TN3724	TO-237 (91)	50	30	6	1.7 μA	40	30		1A	5	0.25		0.76	10	12	300		50	60	(Note 7)	25
							25		800	2	0.2		0.86	100							
							35		500	1	0.32		1.1	300							
							40		300	1	0.42	0.9	1.2	500							
							60	150	100	1	0.65		1.5	800							
							30		10	1	0.75		1.7	1A							
TN3725	TO-237 (91)	80	50	6	1.7 μA	60	25		1A	5	0.25		0.76	10	10	300		50	60	(Note 7)	25
							20		800	2	0.26		0.86	100							
							35		500	1	0.4		1.1	300							
							40		300	1	0.25	0.9	1.2	500							
							60	150	100	1	0.8		1.5	800							
							30		10	1	0.9		1.7	1A							

TEST CONDITIONS:

Note 1: $V_{CC} = 3V$, $I_C = 10$ mA, $I_B{}^1 = 3$ mA, $I_B{}^2 = 1.5$ mA.
Note 2: $V_{CC} = 3V$, $I_C = 10$ mA, $I_B{}^1 = 3$ mA, $I_B{}^2 = 1$ mA.
Note 3: $V_{CC} = 10V$, $I_C = 300$ mA, $I_B{}^1 = I_B{}^2 = 30$ mA.
Note 4: $V_{CC} = 2V$, $I_C = 30$ mA, $I_B{}^1 = I_B{}^2 = 3$ mA.
Note 5: $V_{CC} = 25V$, $I_C = 300$ mA, $I_B{}^1 = I_B{}^2 = 30$ mA.
Note 6: $V_{CC} = 25V$, $I_C = 500$ mA, $I_B{}^1 = I_B{}^2 = 50$ mA.
Note 7: $V_{CC} = 30V$, $I_C = 500$ mA, $I_B{}^1 = I_B{}^2 = 50$ mA.
Note 8: $V_{CC} = 30V$, $I_C = 1A$, $I_B{}^1 = I_B{}^2 = 100$ mA.
Note 9: $V_{CC} = 3V$, $I_C = 10$ mA, $I_B{}^1 = I_B{}^2 = 1$ mA.
Note 10: $V_{CC} = 10.7V$, $I_C = 1A$, $I_B{}^1 = I_B{}^2 = 100$ mA.
Note 11: $V_{CC} = 3V$, $I_C = 10$ mA, $I_B{}^1 = I_B{}^2 = 3$ mA.
Note 12: $V_{CC} = 3V$, $I_C = 10$ mA, $I_B{}^1 = I_B{}^2 = 3.3$ mA.

T-35-01