

# Small Signal Transistors

## TO-39 Case (Continued)



| TYPE NO. | DESCRIPTION      | V <sub>CBO</sub><br>(V) | V <sub>CEO</sub><br>(V) | V <sub>EBO</sub><br>(V) | I <sub>CBO</sub> @<br>(μA)                                                             | V <sub>CB</sub><br>(V) | h <sub>FE</sub> |     | @ I <sub>C</sub><br>(mA) | @ V <sub>CE</sub><br>(V) | V <sub>CE(SAT)</sub> @ I <sub>C</sub><br>(V) | f <sub>T</sub><br>(MHz) | C <sub>ob</sub><br>(pF) | t <sub>on</sub><br>(ns) | t <sub>off</sub><br>(ns) | NF<br>(dB) |
|----------|------------------|-------------------------|-------------------------|-------------------------|----------------------------------------------------------------------------------------|------------------------|-----------------|-----|--------------------------|--------------------------|----------------------------------------------|-------------------------|-------------------------|-------------------------|--------------------------|------------|
|          |                  |                         | *V <sub>CER</sub>       |                         | *I <sub>CEO</sub><br>**I <sub>CES</sub><br>***I <sub>CEV</sub><br>****I <sub>CER</sub> |                        |                 |     |                          |                          |                                              | *TYP                    | *TYP                    | *TYP                    | *TYP                     | *TYP       |
|          |                  | MIN                     | MIN                     | MIN                     |                                                                                        |                        | MIN             | MAX |                          |                          | MAX                                          | MIN                     | MAX                     | MAX                     | MAX                      | MAX        |
| BSY52    | NPN AMPL/SWITCH  | 60                      | 25                      | 5.0                     | 0.10                                                                                   | 30                     | 100             | 300 | 150                      | 10                       | 0.80                                         | 150                     | 130*                    | 10                      | --                       | --         |
| BSY53    | NPN AMPL/SWITCH  | 75                      | 30                      | 7.0                     | 0.01                                                                                   | 60                     | 40              | 120 | 150                      | 10                       | 0.60                                         | 150                     | 100*                    | 10                      | --                       | --         |
| BSY54    | NPN AMPL/SWITCH  | 75                      | 30                      | 7.0                     | 0.01                                                                                   | 60                     | 100             | 300 | 150                      | 10                       | 0.60                                         | 150                     | 145*                    | 10                      | --                       | --         |
| BSY55    | NPN AMPL/SWITCH  | 120                     | 80                      | 7.0                     | 0.01                                                                                   | 90                     | 40              | 120 | 150                      | 10                       | 0.60                                         | 150                     | 100*                    | 10                      | --                       | --         |
| BSY56    | NPN AMPL/SWITCH  | 120                     | 80                      | 7.0                     | 0.01                                                                                   | 90                     | 100             | 300 | 150                      | 10                       | 0.60                                         | 150                     | 145*                    | 10                      | --                       | --         |
| BSY88    | NPN AMPL/SWITCH  | 100                     | 60                      | 7.0                     | 0.01                                                                                   | 75                     | 100             | 300 | 150                      | 10                       | 0.60                                         | 150                     | --                      | --                      | --                       | --         |
| BUY47    | NPN HIGH CURRENT | 150                     | 120                     | 6.0                     | 10                                                                                     | 80                     | 15              | --  | 5,000                    | 5.0                      | 1.00                                         | 5,000                   | 90*                     | 80                      | 1,000                    | 2,000      |
| BUY48    | NPN HIGH CURRENT | 200                     | 170                     | 6.0                     | 10                                                                                     | 100                    | 15              | --  | 5,000                    | 5.0                      | 1.00                                         | 5,000                   | 90*                     | 80                      | 1,000                    | 2,000      |
| BUY49S   | NPN HIGH VOLTAGE | 250                     | 200                     | 6.0                     | 0.10                                                                                   | 200                    | 40              | --  | 500                      | 5.0                      | 0.20                                         | 500                     | 50                      | 30                      | 300                      | 1,000      |
| BUY68    | NPN HIGH CURRENT | 100                     | 60                      | 6.0                     | 1.00                                                                                   | 60                     | 40              | 250 | 1,000                    | 1.0                      | 1.00                                         | 5,000                   | 50                      | 80                      | 350                      | 750        |
| MJ 420   | NPN HIGH VOLTAGE | 275                     | 250                     | 6.0                     | 100                                                                                    | 275                    | 25              | 250 | 30                       | 20                       | 5.00                                         | 30                      | 15                      | 12                      | --                       | --         |
| MJ 420S  | NPN HIGH VOLTAGE | 275                     | 250                     | 6.0                     | 100                                                                                    | 275                    | 25              | 250 | 30                       | 20                       | 5.00                                         | 30                      | 150                     | 12                      | --                       | --         |
| MJ 421   | NPN HIGH VOLTAGE | 350                     | 325                     | 6.0                     | 100                                                                                    | 350                    | 25              | 250 | 30                       | 20                       | 5.00                                         | 30                      | 15                      | 12                      | --                       | --         |
| MJ 421S  | NPN HIGH VOLTAGE | 350                     | 325                     | 6.0                     | 100                                                                                    | 350                    | 25              | 250 | 30                       | 20                       | 5.00                                         | 30                      | 15                      | 12                      | --                       | --         |
| MM 420   | NPN HIGH VOLTAGE | 275                     | 250                     | 6.0                     | 100                                                                                    | 275                    | 25              | 250 | 30                       | 20                       | 5.00                                         | 30                      | 15                      | 12                      | --                       | --         |
| MM 421   | NPN HIGH VOLTAGE | 350                     | 325                     | 6.0                     | 100                                                                                    | 350                    | 25              | 250 | 30                       | 20                       | 5.00                                         | 30                      | 15                      | 12                      | --                       | --         |
| MM3000   | NPN HIGH VOLTAGE | 100                     | 100                     | 5.0                     | 1.00                                                                                   | 50                     | 20              | --  | 10                       | 10                       | --                                           | --                      | 150                     | 7.0                     | --                       | --         |
| MM3001   | NPN HIGH VOLTAGE | 150                     | 150                     | 5.0                     | 1.00                                                                                   | 75                     | 20              | --  | 10                       | 10                       | --                                           | --                      | 150                     | 7.0                     | --                       | --         |
| MM3002   | NPN HIGH VOLTAGE | 200                     | 200                     | 5.0                     | 5.00                                                                                   | 100                    | 20              | --  | 10                       | 10                       | --                                           | --                      | 150                     | 15                      | --                       | --         |
| MM3003   | NPN HIGH VOLTAGE | 250                     | 250                     | 5.0                     | 5.00                                                                                   | 100                    | 20              | --  | 10                       | 10                       | --                                           | --                      | 150                     | 15                      | --                       | --         |
| MM3005   | NPN AMPL/SWITCH  | 80                      | 60                      | 5.0                     | 100                                                                                    | 60                     | 50              | 250 | 150                      | 1.0                      | 0.35                                         | 150                     | 50                      | 15                      | --                       | --         |
| MM3006   | NPN AMPL/SWITCH  | 100                     | 80                      | 5.0                     | 100                                                                                    | 80                     | 50              | 250 | 200                      | 1.0                      | 0.35                                         | 150                     | 50                      | 15                      | --                       | --         |
| MM3007   | NPN AMPL/SWITCH  | 120                     | 100                     | 5.0                     | 100                                                                                    | 100                    | 50              | 250 | 250                      | 1.0                      | 0.35                                         | 150                     | 50                      | 15                      | --                       | --         |
| MM3008   | NPN HIGH VOLTAGE | 120                     | 120                     | 6.0                     | 0.10                                                                                   | 120                    | 30              | --  | 1.0                      | 10                       | --                                           | --                      | 50                      | 3.0                     | --                       | --         |
| MM3009   | NPN HIGH VOLTAGE | 180                     | 180                     | 6.0                     | 0.10                                                                                   | 180                    | 30              | --  | 1.0                      | 10                       | --                                           | --                      | 50                      | 3.0                     | --                       | --         |
| MM4000   | PNP HIGH VOLTAGE | 100                     | 100                     | 4.0                     | 1.00                                                                                   | 50                     | 20              | --  | 10                       | 10                       | 0.60                                         | 10                      | --                      | 6.0                     | --                       | --         |
| MM4001   | PNP HIGH VOLTAGE | 150                     | 150                     | 4.0                     | 1.00                                                                                   | 75                     | 20              | --  | 10                       | 10                       | 0.60                                         | 10                      | --                      | 10                      | --                       | --         |
| MM4002   | PNP HIGH VOLTAGE | 200                     | 200                     | 4.0                     | 5.00                                                                                   | 150                    | 20              | --  | 10                       | 10                       | 5.00                                         | 10                      | --                      | 20                      | --                       | --         |
| MM4003   | PNP HIGH VOLTAGE | 250                     | 250                     | 4.0                     | 5.00                                                                                   | 150                    | 20              | --  | 10                       | 10                       | 5.00                                         | 10                      | --                      | 20                      | --                       | --         |
| MM5415   | PNP HIGH VOLTAGE | 200                     | 200                     | 4.0                     | 50                                                                                     | 175                    | 30              | 150 | 50                       | 10                       | 2.50                                         | 50                      | 15                      | 25                      | --                       | --         |
| MM5416   | PNP HIGH VOLTAGE | 350                     | 300                     | 7.0                     | 50                                                                                     | 280                    | 30              | 120 | 50                       | 10                       | 2.50                                         | 50                      | 15                      | 25                      | --                       | --         |
| SE7001   | NPN HIGH VOLTAGE | 150                     | 150                     | 5.0                     | 0.10                                                                                   | 75                     | 30              | --  | 30                       | 10                       | 2.00                                         | 50                      | 40                      | 9.0                     | --                       | --         |
| SE7002   | NPN HIGH VOLTAGE | 120                     | 120                     | 5.0                     | 0.10                                                                                   | 75                     | 30              | --  | 30                       | 10                       | 0.90                                         | 50                      | 40                      | 3.5                     | --                       | --         |
| SE7056   | NPN HIGH VOLTAGE | 300                     | 300                     | 7.0                     | 0.10                                                                                   | 200                    | 40              | 100 | 30                       | 10                       | 1.00                                         | 20                      | 40                      | 3.0                     | --                       | --         |
| 40327    | NPN HIGH VOLTAGE | 300                     | 300*                    | 5.0                     | 0.10                                                                                   | 150                    | 40              | 250 | 20                       | 10                       | --                                           | --                      | --                      | --                      | --                       | --         |
| 40347    | NPN AMPL/SWITCH  | 60                      | 40                      | 7.0                     | 1.00****                                                                               | 30                     | 20              | 80  | 450                      | 4.0                      | 1.00                                         | 450                     | --                      | --                      | --                       | --         |
| 40348    | NPN AMPL/SWITCH  | 90                      | 65                      | 7.0                     | 1.00****                                                                               | 60                     | 30              | 100 | 300                      | 4.0                      | 0.75                                         | 300                     | --                      | --                      | --                       | --         |
| 40406    | PNP AMPL/SWITCH  | 50                      | 50                      | 4.0                     | --                                                                                     | --                     | 30              | 200 | 0.1                      | 10                       | --                                           | --                      | 100*                    | --                      | --                       | --         |
| 40408    | NPN AMPL/SWITCH  | 50                      | 90                      | 4.0                     | --                                                                                     | --                     | 40              | 200 | 10                       | 4.0                      | 1.40                                         | 150                     | 100*                    | --                      | --                       | --         |
| 40412    | NPN HIGH VOLTAGE | 250                     | 250*                    | 4.0                     | 2.00***                                                                                | 150                    | 40              | --  | 30                       | 20                       | 0.50                                         | 10                      | 10                      | 10                      | --                       | --         |