

High-current testing of SOT78 and SOT404

Automotive Power MOSFET applications

Increased automotive power requirements have driven the need for improved current-handling capabilities. Recent process technology advances have addressed this requirement and extensive testing by NXP has shown that, under certain circumstances, the maximum current for its SOT78 (TO-220AB) and SOT404 (D²PAK) packages can be as high as 100 A.

Key features and benefits

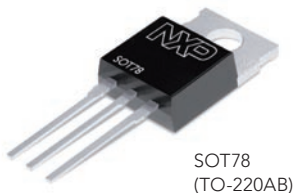
- ▶ Improved current handling
- ▶ Industry standard packages
- ▶ Fewer devices needed to handle high currents reducing overall system costs
- ▶ Enables use of standard mounting techniques reducing assembly costs

Key applications

- ▶ High power automotive systems such as
 - ISA (Integrated Starter Alternator)
 - EPAS (Electronic Power Assisted Steering)
 - Electric oil and water pump
 - HEA (High Efficiency Alternator)

When first released, NXP's automotive power devices housed in the SOT78 and SOT404 packages were limited to maximum current ratings up to 75 A. At the time this was not a constraint, as the high $R_{DS(on)}$ values of available components meant the junction temperature would exceed the allowed 175 °C at lower currents.

Recent advances in semiconductor technology have pushed down on-state resistances so far that many NXP products, such as the Automotive MOSFET family, can now handle currents in excess of this 75 A limit. At the same time power requirements in automotive systems are constantly increasing and the conduction of these higher currents is becoming necessary.



SOT78
(TO-220AB)



SOT404
(D²PAK)

NXP therefore has re-assessed the current ratings for all its automotive PowerMOS devices in SOT78 and SOT404. Extensive life testing has shown that with a minimum of three 350 µm source bond-wires and provided sufficient heat sinking is implemented to keep all individual elements of the device below 175 °C, it is possible to extend the 75 A

limit to a continuous maximum of 100 A. For example, the die inside a BUK752R7-30B HPA MOSFET can conduct 240 A at 25 °C. When encased in a SOT78 package and using three 350 µm aluminium bond-wires to connect the source pad to the source T-post, the device can handle a continuous current of 100 A with the required heat-sinking.

V _{DS} (V)	R _{DS(on)} (mΩ)	@V _{GS} (V)	I _{D(DC)} Max @ 25°C (A)	SOT78 (TO220AB)	SOT404 (D ² PAK)
30	1.8	10	100	-	BUK761R8-30C
	2.0	10	100	BUK752R0-30C	-
	2.7	10	100	BUK752R7-30B	BUK762R7-30B
	2.8	5	100	BUK952R8-30B	BUK962R8-30B
40	2.0	10	100	-	BUK762R0-40C
	2.2	5	100	-	BUK962R2-40C
	2.3	10	100	BUK752R3-40C	-
	2.4	5	100	BUK952R4-40C	-
	3.1	10	100	BUK753R1-40B	BUK763R1-40B
	3.1	5	100	BUK953R2-40B	BUK963R2-40B
55	3.0	10	100	BUK753R0-55C	BUK763R0-55C
	3.2	5	100	BUK953R2-55C	BUK963R2-55C
	4.0	10	100	BUK754R0-55B	BUK764R0-55B
	4.2	5	100	BUK954R2-55B	BUK964R2-55B
75	4.0	10	100	-	BUK764R0-75C
	4.3	10	100	BUK754R3-75C	-
	6.0	10	100	BUK7506-75B	BUK7606-75B
	6.0	5	100	BUK9506-75B	BUK9606-75B

Types highlighted in red are in development.
Please contact local sales team for details.

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