

Leading-edge Automotive Power MOSFETs

Next Generation MOSFETs for a wide range of Automotive Applications



Low on-resistance MOSFETS for a wide range of automotive applications

Intermediate level gate drive N-channel enhancement mode Field-Effect Transistors (FETs) in industry-standard packages using advanced TrenchMOS technology. This wide range of devices has been designed and qualified to the appropriate AEC Q101 standard for use in high performance automotive applications.

Features and benefits

- AEC Q101 compliant
- Low conduction losses due to very low on-state resistance
- Suitable for logic and standard level gate drive sources
- Suitable for thermally demanding environments due to 175 °C rating

Applications

- 12 V Automotive systems
- Start-Stop micro-hybrid applications
- Electric and electro-hydraulic power steering
- Motors, lamps and solenoids
- Transmission control





 $I_{\rm D(max)}$ up to 90A



 $I_{D(max)}$ up to 120A



I_{D(max)} up to 180A



I_{D(max)} up to 120A

I_{D(max)} up to 120A

Applications

Each automotive application is different so specific MOSFET requirements will vary. The notes below give general guidelines and device suggestions. NXP would be pleased to advise on specific application cases.

Electric Power Steering



Application	Circuit topology	Load	Key MOSFET features	Suggested types
Electric Power Steering	3Φ bridge	3Φ BrushLess DC motor	30 or 40 V, Low Rdson, high surge current capability	BUK761R9-30C, BUK762R0-40C, BUK661R8-30C, BUK661R6-30C

ISG/ISA



Application	Circuit topology	Load	Key MOSFET features	Suggested types
Integrated Starter Generator	3Φ bridge	3Φ BrushLess Machine	High Current Capability, low thermal resistance, good switching characteristics	BUK761R9-30C, BUK661R8-30C, BUK661R6-30C

DC DC Converter bypass for Stop-Start



Application	Circuit topology	Load	Key MOSFET features	Suggested types	
DCDC Converters	Various converter topologies	Inductor / transformer	Good switching performance, high volt capability (for step up converters)	BUK6215-75C, BUK6211-75C	

High Efficiency Alternator



Application	Circuit topology	Load	Key MOSFET features	Suggested types
High efficiency alternator	3Φ bridge	Vehicle supply network	High current capability, low thermal resistance, good switching characteristics	BUK661R6-30C, BUK661R8-30C

Glow Plug Drive



Application	Circuit topology	Load	Key MOSFET features	Suggested types		
Diesel engine starting aid	High side switch	Low side resistive heaters	Low $R_{\scriptscriptstyle DSon}$ small size	BUK625R0-40C, BUK6207-55C		

Reverse Battery Protection



Application	Circuit topology	Load	Key MOSFET features	Suggested types
Reverse Polarity Protection	LS reversed MOSFET	System to be protected	Vds > Vbatt (30 V is usually enough). R _{DSon} as appropriate for system load.	BUK724R2-30C, BUK663R5-30C

Load Switch / Freewheel / Reverse Polarity Protection



Application	Circuit topology	Load	Key MOSFET features	Suggested types
Fan control	High-side drive and active freewheel path	Low-side brushed DC Motor	Small size, low R _{DSon} Low Rthj-mb	High side MOSFET BUK625R0- 40C Reverse Protection MOSFET BUK663R5-30C

Product Range

30 V N-channel Automotive TrenchMOS

R _{DSon} R _{DSon} [max] [max] @ 10 V @ 5 V [mΩ] [mΩ]		I _⊳ [max] @ 25 °C [A]		TO-220 (SOT78A)	I²PAK (SOT226)	D²PAK-7 (SOT427)	D²PAK (SOT404)	DPAK (SOT428)
			'⊳ [max] @ 25 ℃ [A]	C [K/W]	T	TTT		Jab
			15.5 x 10.0 x 4.3		11.0 x 10.0 x 4.3	11.0 x 10.0 x 4.3	11.0 x 10.0 x 4.3	6.0 x 6.6 x 2.3
1		180				BUK6C1R0-30C		
1.2		180				BUK6C1R2-30C		
1.6	2.5	120	0.49				BUK661R6-30C	
1.8		120	0.45				BUK761R8-30C	
1.9	2.8	120	0.57				BUK661R8-30C	
2.2	3	120	0.45	BUK652R0-30C	BUK6E2R0-30C			
2.4	3	120	0.59	BUK652R1-30C				
2.8	3.9	100	0.74				BUK662R5-30C	
3.3	4.4	100	0.74	BUK652R7-30C				
3.5	5.1	100	0.95				BUK663R5-30C	
3.8	5.6	100	0.95	BUK653R7-30C				
4.5	6	90	0.95					BUK624R5-30C
4.5		75	0.95					BUK724R5-30C
5.2	7.5	81	1.17					BUK6207-30C
9.8	15	46	1.87					BUK6209-30C
14	22	33	2.52					BUK6213-30C

40 V N-channel Automotive TrenchMOS

				TO-220 (SOT78A)	I²PAK (SOT226)	D²PAK-7 (SOT427)	D²PAK (SOT404)	DPAK (SOT428)					
κ _{pson} [max] @ 10 V [mΩ]	κ _{pson} [max] @ 5 V [mΩ]	'₀ [max] @ 25 °C [A]	ı _⊳ [max] @ 25 ℃ [A]	'₀ [max] @ 25 ℃ [A]	'₀ [max] @ 25 °C [A]	ı _⊳ [max] @ 25 ℃ [A]	ı _⊳ [max] @ 25 ℃ [A]	R _{th(j-mb)} [max] [K/W]	M	T	ALL THE	fall	K
				15.5 x 10.0 x 4.3	11.0 x 10.0 x 4.3	11.0 x 10.0 x 4.3	11.0 x 10.0 x 4.3	6.0 x 6.6 x 2.3					
1.3		180				BUK6C1R3-40C							
1.5		180				BUK6C1R5-40C							
1.9	2.6	120	0.45				BUK661R9-40C						
2		100	0.45				BUK762R0-40C						
2.3	3.1	120	0.45	BUK652R3-40C	BUK6E2R3-40C								
2.3		120	0.45	BUK752R3-40C	BUK7E2R3-40C								
2.3	3.2	120	0.59				BUK662R4-40C						
2.7	3.6	120	0.59	BUK652R6-40C									
3.2	4.8	100	0.74				BUK663R2-40C						
3.6	5.3	100	0.74	BUK653R4-40C	BUK6E3R4-40C								
3.6		100	0.74				BUK763R6-40C						
4		100	0.74	BUK754R0-40C									
4.6	6.1	80	0.95				BUK664R6-40C						
4.8	6.5	88	0.95	BUK654R8-40C									
5	6.9	87	0.95					BUK625R0-40C					
5		75	0.95					BUK725R0-40C					
6.2	8.8	70	1.17					BUK6208-40C					
12	16.3	41	1.87					BUK6212-40C					
18	23	42	2.52					BUK6218-40C					

55 V N-channel Automotive TrenchMOS

D	B			TO-220 (SOT78A)	I²PAK (SOT226)	D²PAK-7 (SOT427)	D²PAK (SOT404)	DPAK (SOT428)
^κ _{Dson} [max] @ 10 V [mΩ]	^{DSon} ^κ _{DSon} nax] [max] 10 V @ 5 V @ nΩ] [mΩ]		R _{th(j-mb)} [max] [K/W]	T	T	STITUTE STATE	Gab	R
				15.5 x 10.0 x 4.3	11.0 x 10.0 x 4.3	11.0 x 10.0 x 4.3	11.0 x 10.0 x 4.3	6.0 x 6.6 x 2.3
1.8		180				BUK6C1R8-55C		
2.1		180				BUK6C2R1-55C		
2.7	3.8	120	0.45				BUK662R7-55C	
3.2	4.2	120	0.45	BUK653R2-55C	BUK6E3R2-55C			
3.9	4.9	120	0.59	BUK653R5-55C			BUK663R5-55C	
4.9	6.6	97	0.74				BUK664R4-55C	
5.4	7	92.6	0.74	BUK654R6-55C				
6.5	8.7	72	0.95				BUK6607-55C	
7	9	72	0.95	BUK6507-55C				
7.8	10	90	0.95					BUK6207-55C
9.6	13.2	55	1.17					BUK6210-55C
19	24.5	31	1.87					BUK6217-55C
29	38	22	2.52					BUK6228-55C

75 V N-channel Automotive TrenchMOS

P	P			TO-220AB (SOT78A)	I²PAK (SOT226)	D²PAK-7 (SOT427)	D²PAK (SOT404)	DPAK (SOT428)
κ _{pson} [max] @ 10 V [mΩ]	R _{DSon} R _{DSon} [max] [max] @ 10 V @ 5 V [mΩ] [mΩ]		R _{th(j-mb)} [max] [K/W]	T	T		Jab	K
				15.5 x 10.0 x 4.3	11.0 x 10.0 x 4.3	11.0 x 10.0 x 4.3	11.0 x 10.0 x 4.3	6.0 x 6.6 x 2.3
2.8		180				BUK6C2R8-75C		
3.3		180				BUK6C3R3-75C		
4	5.3	120	0.45				BUK663R7-75C	
4		100	0.45				BUK764R0-75C	
4.2	5.3	120	0.45	BUK654R0-75C	BUK6E4R0-75C			
4.3		100	0.45	BUK754R3-75C	BUK7E4R3-75C			
5	6.3	120	0.59				BUK664R8-75C	
5.3	6.5	98	0.59	BUK655R0-75C				
7.6	9.1	72	0.74	BUK6507-75C			BUK6607-75C	
10.4	12.4	54	0.95	BUK6510-75C			BUK6610-75C	
11	13.2	52	0.95					BUK6211-75C
15	18	57	1.17					BUK6215-75C
29	35	23	1.87					BUK6226-75C
46	56	16	2.52					BUK6240-75C

Types in **bold red** represent new products Types in <u>**bold red italic underline**</u> represent products in development

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Automotive TrenchMOS part numbering

B	<u>U</u>	K	<u>6</u>	<u>6</u>	<u>1</u>	R	<u>8</u>	Ξ		<u>3</u>	<u>0</u>	<u>C</u>
MOSFET Brand name		Gate threshold voltage level	Package type	MOSFET on- resistance R _{DSon}		-	MOSFET voltage BV _{DSS}		Trench Generation			
			6 = Intermediate Level	2 = DPAK SOT428	1R8 = 1.8mΩ		-	30 = 30 V		Blank = Generation 1		
			7 = Standard Level	5 = TO220 SOT78	12 = 12mΩ		-	40 = 40 V		A= Generation 2		
		9 = Logic Level	6 = D ² PAK SOT404	150 = 150mΩ		-	55 = 55 V		B = Generation 3			
A	NXP Automotiv MOSFET	e		8 = SOT223				-		75 = 75 V		C = Generation 4
				C = 7 Pin D ² PAK SOT427				-	1	00 = 100	V	
				E = I ² PAK SOT226				-	150 = 150 V			
				Y =LFPAK SOT669				-				

Notes	

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