Data Sheet

B4N60D

N- Channel 600-V (D-S) MOSFET

TO-252 package

Version: A05

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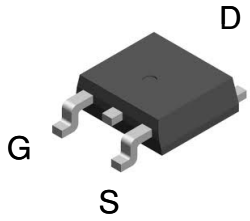
General Description:

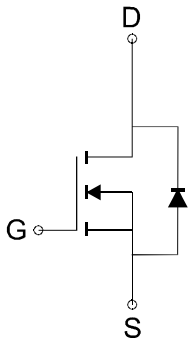
The B4N60D is the N-Channel logic enhancement mode power field effect transistors to provide excellent R_{DS}(on), low gate charge and low gate resistance. It's up to 600V operation voltage is well suited in switching mode power supply, SMPS, notebook computer power management and other battery powered circuits.

Pin layout



Features:

- $R_{DS(ON)}$=2.2 Ω@V_{GS}=10V (N-Ch)
- Super high cell density design for extremely low $R_{DS(ON)}$
- Exceptional on-resistance and maximum DC current



N-Channel MOSFET

Applications:

- Switching power supply, SMPS
- Battery Powered System
- DC/DC Converter
- DC/AC Converter
- Load Switch

Absolute Maximum Ratings (T_A=25℃ *Unless Otherwise Noted*)*:*

Parameter		Symbol	Maximum	Unit
Drain-Source Voltage		V_{DSS}	600	V
Gate-Source Voltage		V_{GSS}	±30	V
Continuous Drain Current(Tj=150℃)*	Tc=25℃	I_D	4	A
	Tc=70℃		2.6	
Pulsed Drain Current		I_{DM}	12	A
Single Pulsed Avalanche Energy		EAS	260	mJ
Maximum Power Dissipation		P_D	36	W
Operating Junction Temperature		T_J	-55 to 150	℃
Thermal Resistance-Junction to Case*		$R_{\theta JC}$	3.5	℃/W

*The device mounted on 1in2 FR4 board with 2 oz copper

Electrical Characteristics (T_A =25℃ Unless Otherwise Specified):

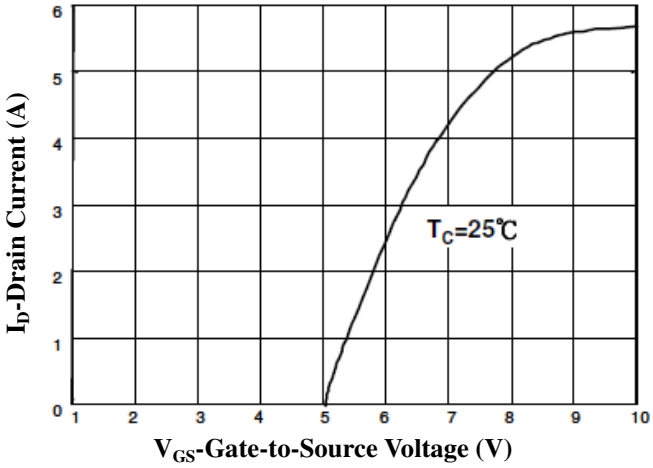
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
STATIC						
V_{DS}	Drain-Source Breakdown Voltage	V_{GS}=0V, I_D=250μA	600	650		V
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS}=V_{GS}, I_D=250μA	2.5	3.5	4.5	V
I_{GSS}	Gate Leakage Current	V_{DS}=0V, V_{GS}=±30V			±100	nA
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS}=480V, V_{GS}=0V			100	μA
$R_{DS(ON)}$	Drain-Source On-Resistance Note 1	V_{GS}=10V, I_D= 2A		2.2	2.5	Ω
V_{SD}	Diode Forward Voltage	I_S=3.2A		1.1	1.4	V
DYNAMIC						
Ciss	Input capacitance	V_{DS}=25V, V_{GS}=0V, f=1.0MHz, Note 2		500	650	pF
Coss	Output Capacitance			55	75	
Crss	Reverse Transfer Capacitance			8	11	
Qg	Total Gate Charge	V_{DS}=480V, V_{GS}=10V, I_D=3.2A, Note 2		14.5	19	nC
Qgs	Gate-Source Charge	V_{DS}=300V, V_{GS}=10V, I_D=4A, Note 2		3.4	5.1	
Qgd	Gate-Drain Charge			7	10	
td(on)	Turn-On Delay Time	VDD=300V, I_D=3.2A R_G=25Ω, Note 2		11	35	ns
tr	Turn-On Rise Time			20	30	
td(off)	Turn-Off Delay Time			30	55	
tf	Turn-Off Fall Time			20	65	

Notes:

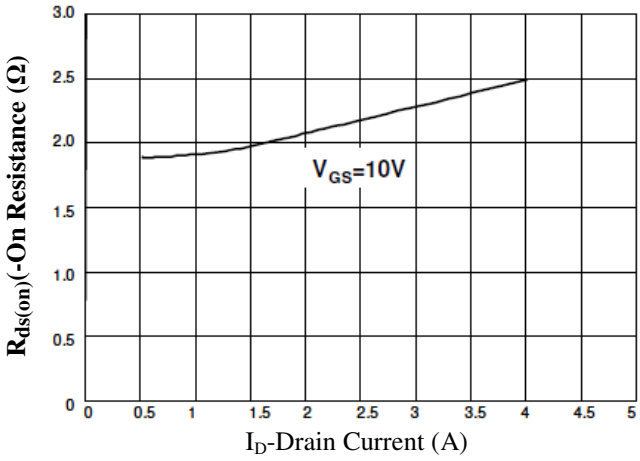
1. Pulse test; pulse width ≦ 300us, duty cycle≦ 2%
2. Guaranteed by design

Typical Characteristics (TJ =25℃ Noted):

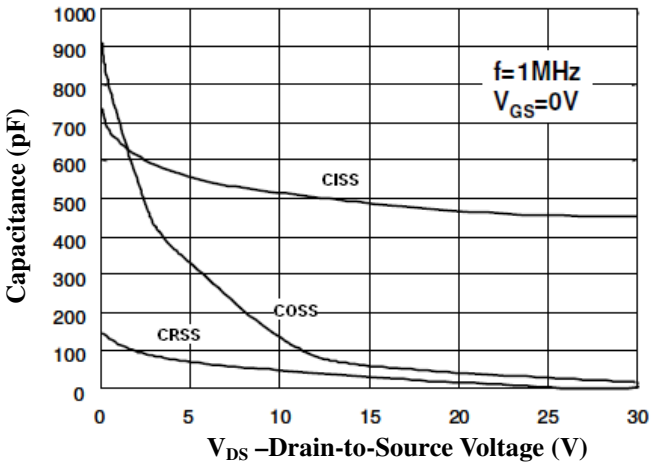
Transfer Characteristics



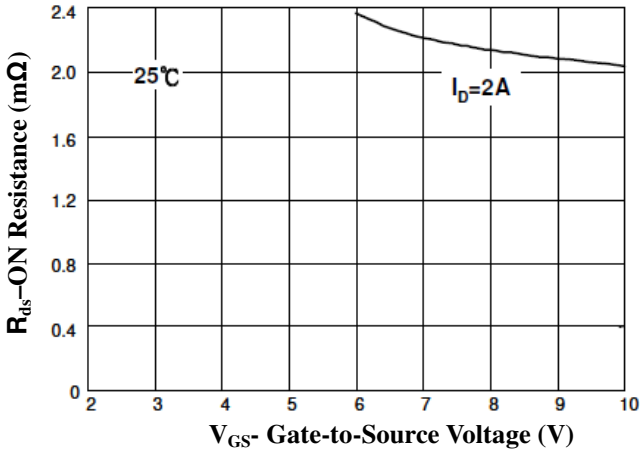
On-Resistance vs. Drain Current



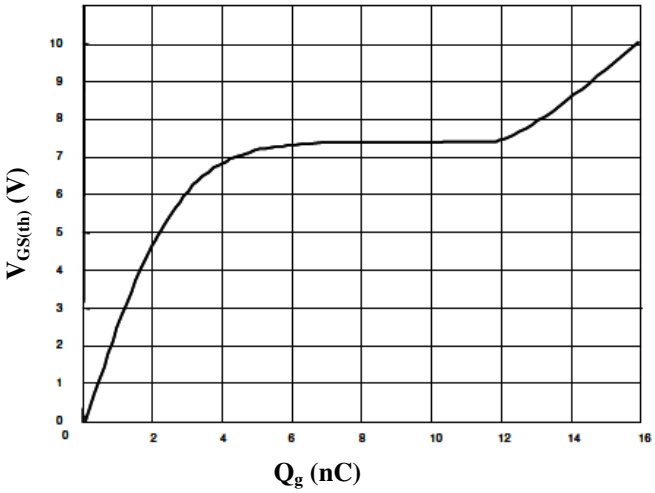
Capacitance



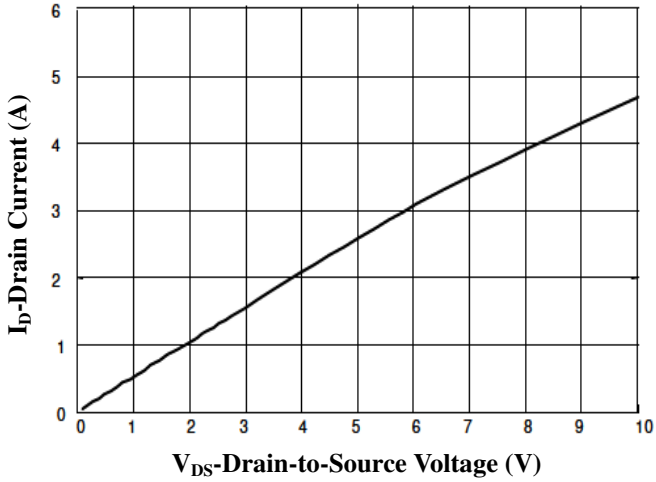
On-Resistance vs. Gate-to-Source Voltage



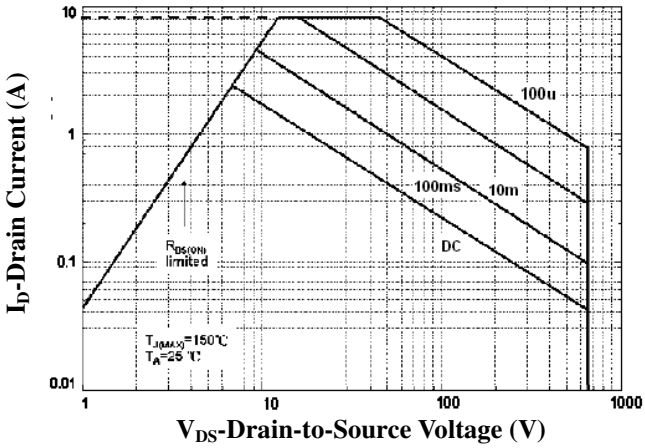
Gate Charge Characteristics



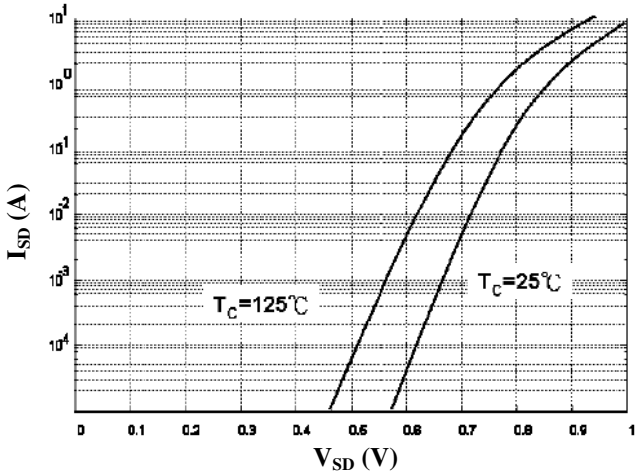
On Region Characteristics



Maximum forward biased safe operating area



Body diode characteristics



Soldering Information

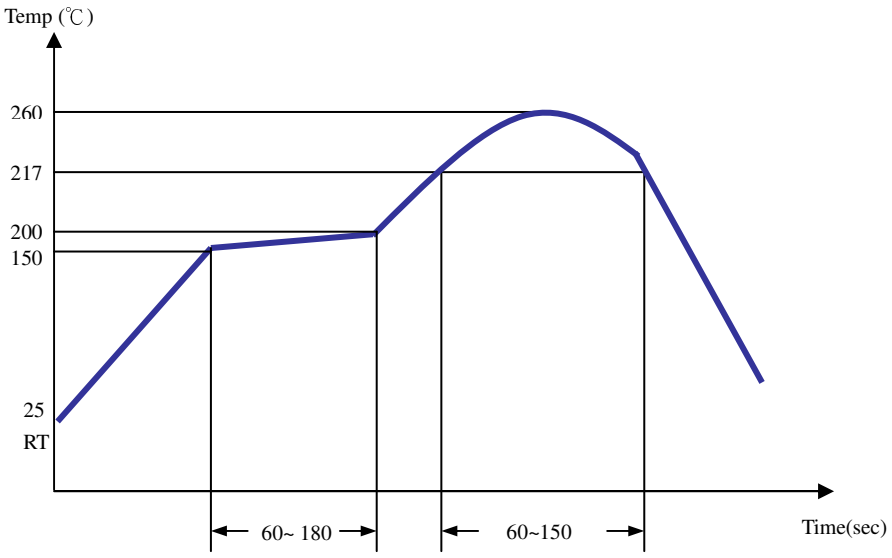
Reflow Soldering:

The choice of heating method may be influenced by plastic QFP package). If infrared or vapor phase heating is used and the package is not absolutely dry (less than 0.1% moisture content by weight), vaporization of the small amount of moisture in them can cause cracking of the plastic body. Preheating is necessary to dry the paste and evaporate the binding agent. Preheating duration: 45 minutes at 45 ℃.

Reflow soldering requires solder paste (a suspension of fine solder particles, flux and binding agent) to be applied to the printed-circuit board by screen printing, stenciling or pressure-syringe dispensing before package placement. Several methods exist for reflowing; for example, convection or convection/infrared heating in a conveyor type oven. Throughput times (preheating, soldering and cooling) vary between 100 and 200 seconds depending on heating method.

Typical reflow peak temperatures range from 215 to 270 ℃ depending on solder paste material. The top-surface temperature of the packages should preferable be kept below 245 ℃ for thick/large packages (packages with a thickness ≧ 2.5 mm or with a volume ≧ 350 mm^3 so called thick/large packages). The top-surface temperature of the packages should preferable be kept below 260 ℃ for thin/small packages (packages with a thickness < 2.5 mm and a volume < 350 mm^3 so called thin/small packages).

Stage	Condition	Duration
1'st Ram Up Rate	max3.0+/-2℃/sec	-
Preheat	150℃~200℃	60~180 sec
2'nd Ram Up	max3.0+/-2℃/sec	-
Solder Joint	217℃ above	60~150 sec
Peak Temp	260 +0/-5℃	20~40 sec
Ram Down rate	6℃/sec max	-



Wave Soldering:

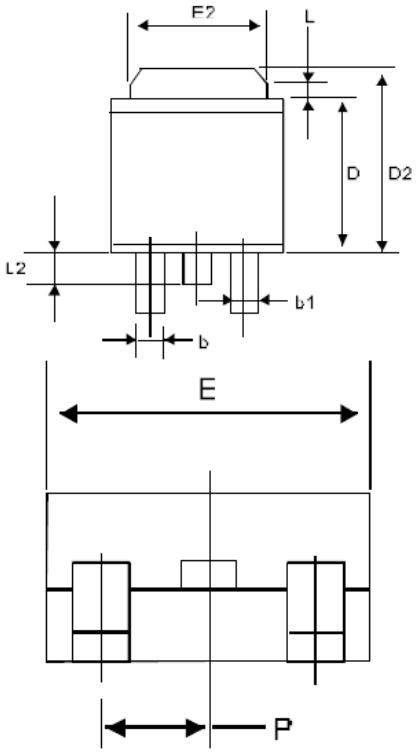
Conventional single wave soldering is not recommended for surface mount devices (SMDs) or printed-circuit boards with a high component density, as solder bridging and non-wetting can present major problems.

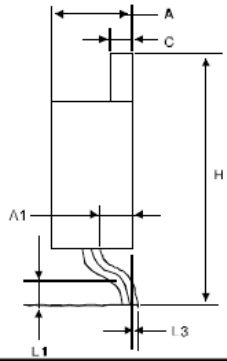
Manual Soldering:

Fix the component by first soldering two diagonally-opposite end leads. Use a low voltage (24 V or less) soldering iron applied to the flat part of the lead. Contact time must be limited to 10 seconds at up to 300 ℃. When using a dedicated tool, all other leads can be soldered in one operation within 2 to 5 seconds between 270 and 320 ℃.

Package Information :

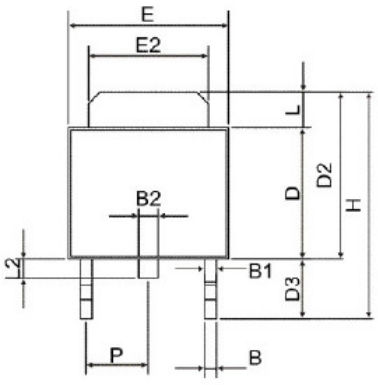
TO-252 Package Type I

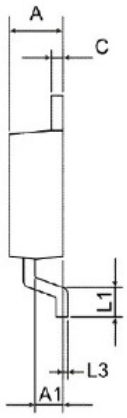




SYMBOL	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	2.250	2.350	0.089	0.093
A1	0.950	1.050	0.037	0.041
C	0.490	0.530	0.019	0.021
E	6.400	6.600	0.252	0.260
E2	5.300	5.450	0.209	0.215
D	6.000	6.200	0.236	0.244
D2	7.100	7.300	0.280	0.287
H	9.700	10.100	0.382	0.398
L	0.600	Ref	0.024	Ref
L1	1.425	1.625	0.056	0.064
L2	0.650	0.850	0.026	0.033
L3	0.020	0.120	0.001	0.005
b	0.770	0.850	0.030	0.033
b1	0.840	0.940	0.033	0.037
P	2.290	BSC	0.090	BSC

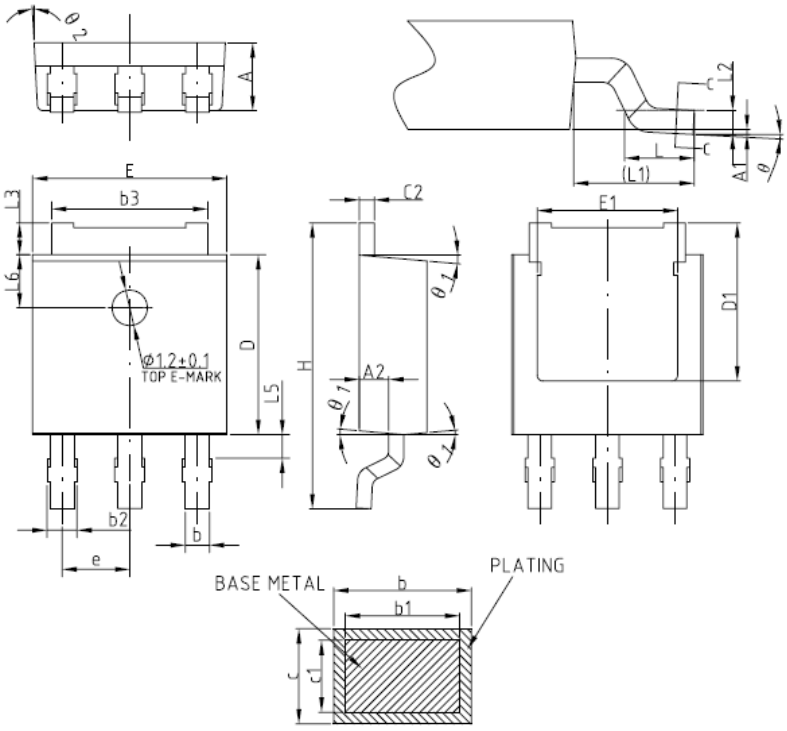
TO-252 Package Type II





SYMBOL	MILLIMETERS (mm)	
	MIN	MAX
A	2.00	2.50
A1	0.90	1.30
B	0.50	0.85
B1	0.50	0.80
B2	0.50	1.00
C	0.40	0.60
D	5.20	5.70
D2	6.50	7.30
D3	2.20	3.00
H	9.50	10.50
E	6.30	6.80
E2	4.50	5.50
L	1.30	1.70
L1	0.90	1.70
L2	0.50	1.10
L3	0	0.30
P	2.00	2.80

TO-252 Package Type III



COMMON DIMENSIONS
(UNITS OF MEASURE=MILLIMETER)

SYMBOL	MIN	NOM	MAX
A	2.20	2.30	2.38
A1	0	–	0.10
A2	0.90	1.00	1.10
b	0.77	–	0.89
b1	0.76	0.81	0.86
b2	0.77	–	1.10
b3	5.23	5.33	5.43
c	0.47	–	0.60
c1	0.46	0.51	0.56
c2	0.47	–	0.60
D	6.00	6.10	6.20
D1	5.25	–	–
E	6.50	6.60	6.70
E1	4.70	–	–
e		2.28BSC	
H	9.80	10.10	10.40
L	1.40	1.50	1.70
L1		2.90REF	
L2		0.51BSC	
L3	0.90	–	1.25
L5	0.90	–	1.50
L6		1.80REF	
θ	0°	–	8°
θ1	3°	5°	7°
θ2	1°	3°	5°