Data Sheet

B20N15D

N- Channel 150-V (D-S) MOSFET

Version: A06

Please read the notice stated in this preamble carefully before accessing any contents of the document attached. Admission of BiTEK's statement therein is presumed once the document is released to the receiver.

Notice:

Firstly, the information furnished by Beyond Innovation Technology Co. Ltd. (BiTEK) in this document is believed to be accurate and reliable and subject to BiTEK's amendment without prior notice. And the aforesaid information does not form any part or parts of any quotation or contract between BiTEK and the information receiver.

Further, no responsibility is assumed for the usage of the aforesaid information. BiTEK makes no representation that the interconnect of its circuits as described herein will not infringe on exiting or future patent rights, nor do the descriptions contained herein imply the granting of licenses to make, use or sell equipment constructed in accordance therewith.

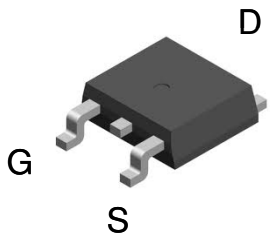
Besides, the product in this document is not designed for use in life support appliances, devices, or systems where malfunction of this product can reasonably be expected to result in personal injury. BiTEK customers' using or selling this product for use in such applications shall do so at their own risk and agree to fully indemnify BiTEK for any damage resulting from such improper use or sale.

At last, the information furnished in this document is the property of BiTEK and shall be treated as highly confidentiality; any kind of distribution, disclosure, copying, transformation or use of whole or parts of this document without duly authorization from BiTEK by prior written consent is strictly prohibited. The receiver shall fully compensate BiTEK without any reservation for any losses thereof due to its violation of BiTEK's confidential request. The receiver is deemed to agree on BiTEK's confidential request therein suppose that said receiver receives this document without making any expressly opposition. In the condition that aforesaid opposition is made, the receiver shall return this document to BiTEK immediately without any delay. -Version A4

General Description:

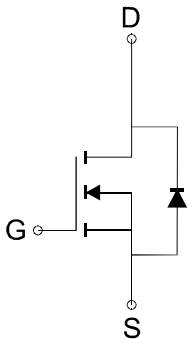
The B20N15D is the N-Channel logic enhancement mode power field effect transistors to provide excellent $R_{DS(on)}$, low gate charge and low gate resistance. It's up to 150V operation voltage is well suited in switching mode power supply, SMPS, notebook computer power management and other battery powered circuits.

Pin layout



Features:

- $R_{DS(ON)}$=95mΩ@V_{GS}=10V
- 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
- Telecom Power System
- DC/DC Converter
- LED Backlighting
- Load Switch

Absolute maximum ratings (T_A=25℃ unless otherwise noted):

Parameter	Symbol	Maximum	Unit
Drain-source voltage	V_{DS}	150	V
Gate source voltage	V_{GS}	±30	V
Continuous drain current (T_J=150℃, T_C=25℃)(2)	I_D	20	A
Pulsed drain current	I_{DM}	40	A
Maximum power dissipation (T_J=150℃ ,T_C=25℃)	P_D	65	W
Repetitive Avalanche Energy(4)	E_{AR}	10	mJ
Avalanche Current	I_{AS}	28.8	A
Single Pulse Avalanche Energy(1)	E_{AS}	51.8	mJ
Peak Diode Recovery dv/dt	dv/dt	5	V/ns
Operating junction temperature	T_J	-55 to 150	℃
Thermal resistance-junction to case(2)	$R_{\theta JC}$	1.9	℃/W
Thermal resistance-junction to ambient(2), (3)	$R_{\theta JA}$	56.3	

(1) VDD=30V, L=0.1mH, I_{AS}=28.8A, R_g=25Ω, Starting T_J =25℃

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

(3) The value of $R_{\theta JA}$ is measured with the device in a still air environment with T_A =25°C

(4) L=0.05mH, Duty=2%, T_J (max)=150°C

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=250uA	150			V
$V_{GS(th)}$	Gate threshold voltage	V_{DS}=V_{GS}, I_D=250uA	2.0	3.5	4.5	V
I_{GSS}	Gate leakage current	V_{DS}=0V, V_{GS}=±20V			±100	nA
I_{DSS}	Zero gate voltage drain current	V_{DS}=150V, V_{GS}=0V			10	uA
$R_{DS(ON)}$	Drain-source on-resistance Note 1	V_{GS}=10V, I_D= 10A Note 1		75	95	mΩ
V_{SD}	Diode forward voltage	I_S=1A		0.7	1	V
DYNAMIC						
Ciss	Input capacitance	V_{DS}=25V, V_{GS}=0V, f=1.0MHz, Note 2		1250		pF
Coss	Output capacitance			140		
Crss	Reverse transfer capacitance			80		
Qg	Total gate charge	V_{DS}=120V, V_{GS}=10V, I_D=10A, Note 2		28		nC
Qgs	Gate-source charge			10		
Qgd	Gate-drain charge			8.3		
$t_{d(on)}$	Turn-on delay time	V_{DS}=75V, I_D=10A V_{GS}=10V R_G =10Ω Note 2		18		ns
tr	Turn-on rise time			8		
$t_{d(off)}$	Turn-off delay time			33		
tf	Turn-off fall time			9		

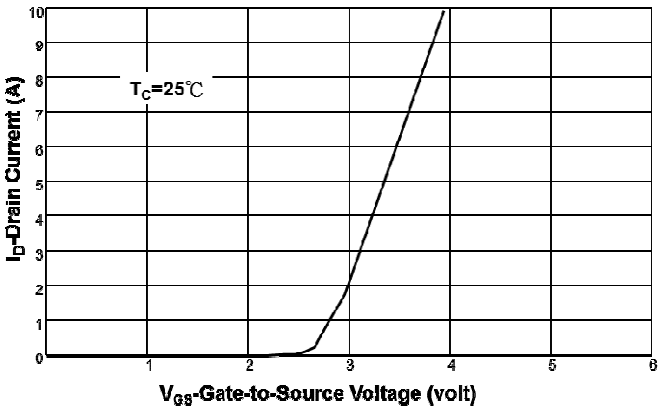
Notes:

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

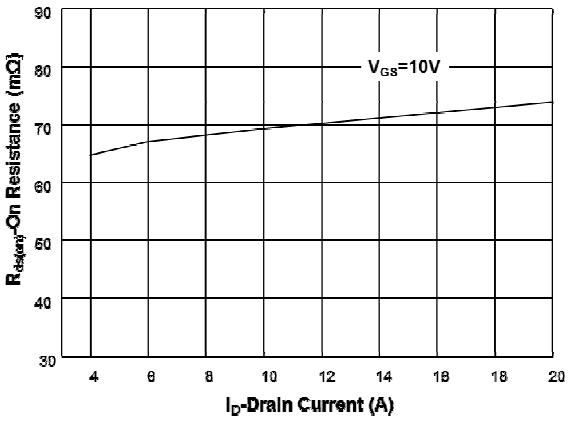
2. Guaranteed by design.

Typical Characteristics (T_A =25℃ unless otherwise specified):

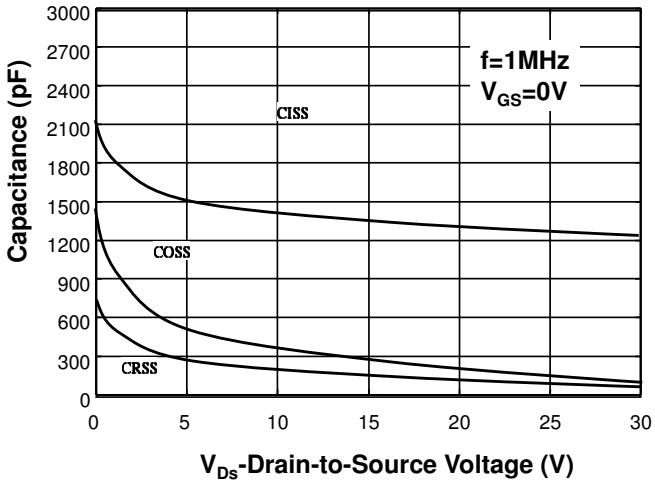
Transfer characteristics



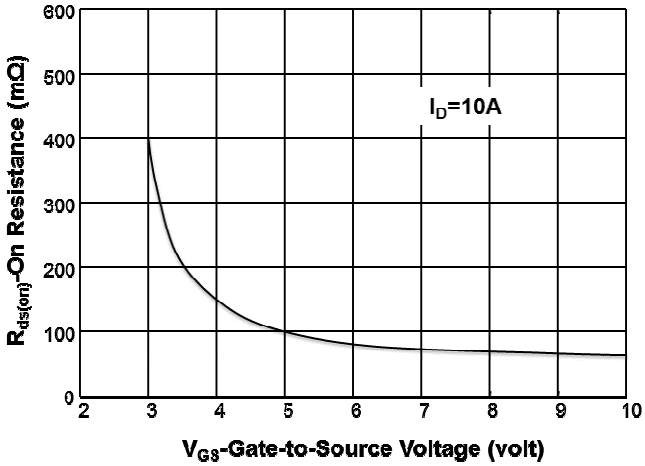
On-resistance vs. Drain current



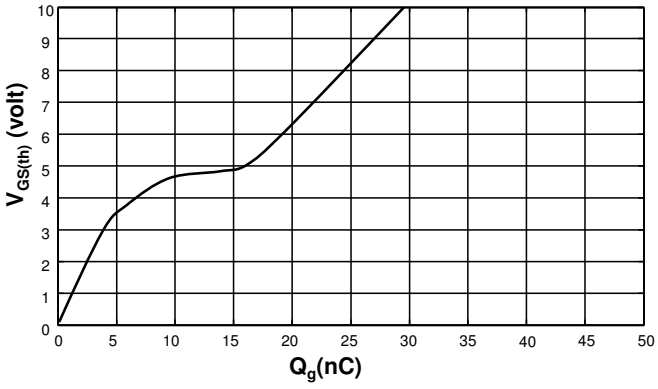
Capacitance



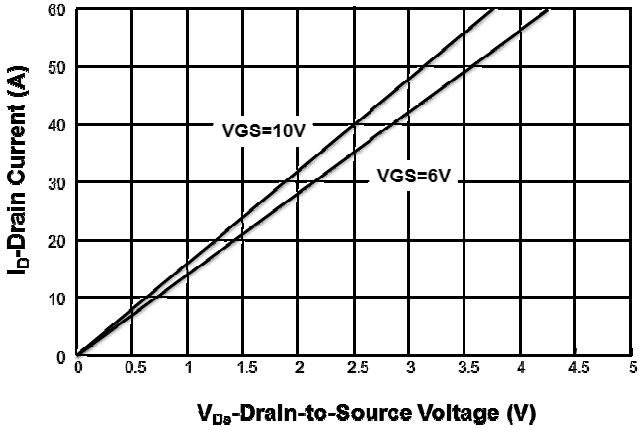
On-resistance vs. Gate-to-Source Voltage



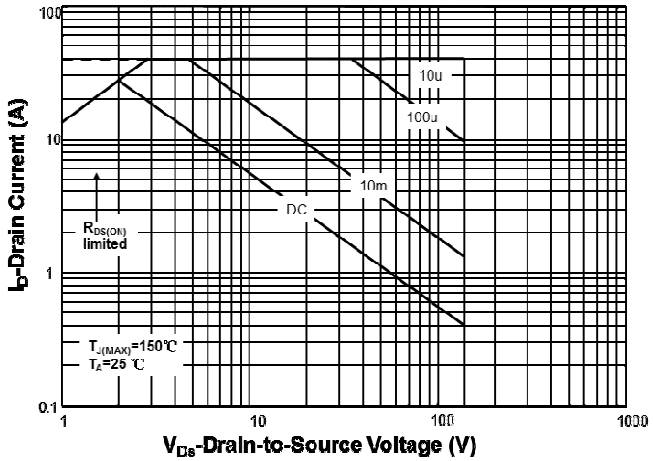
Gate Charge Characteristics



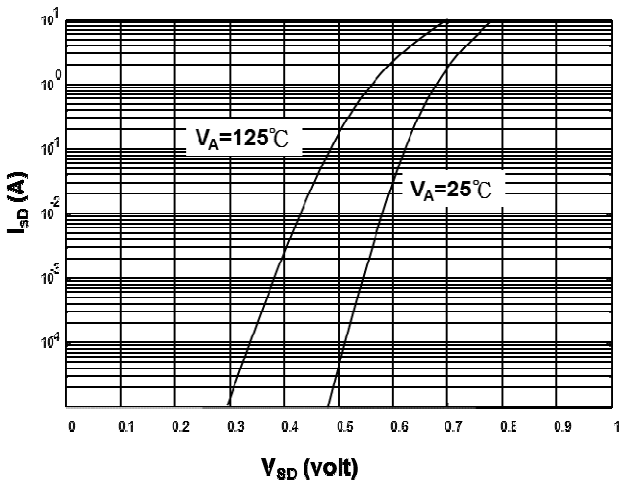
On region characteristics



Maximum Forward Biased Safe Operating Area



Body diode characteristics



Soldering information

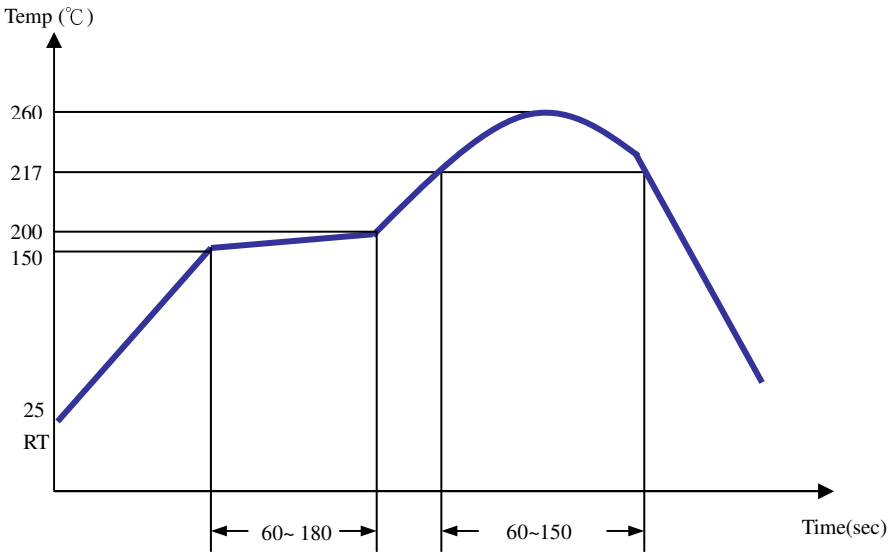
Reflow soldering:

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	-



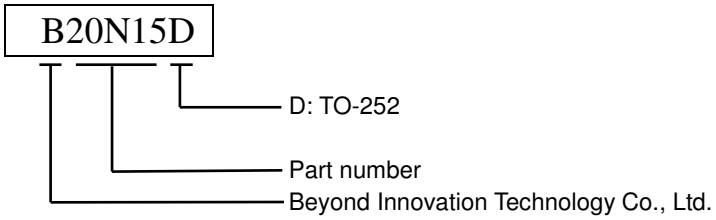
Wave soldering:

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 ℃.

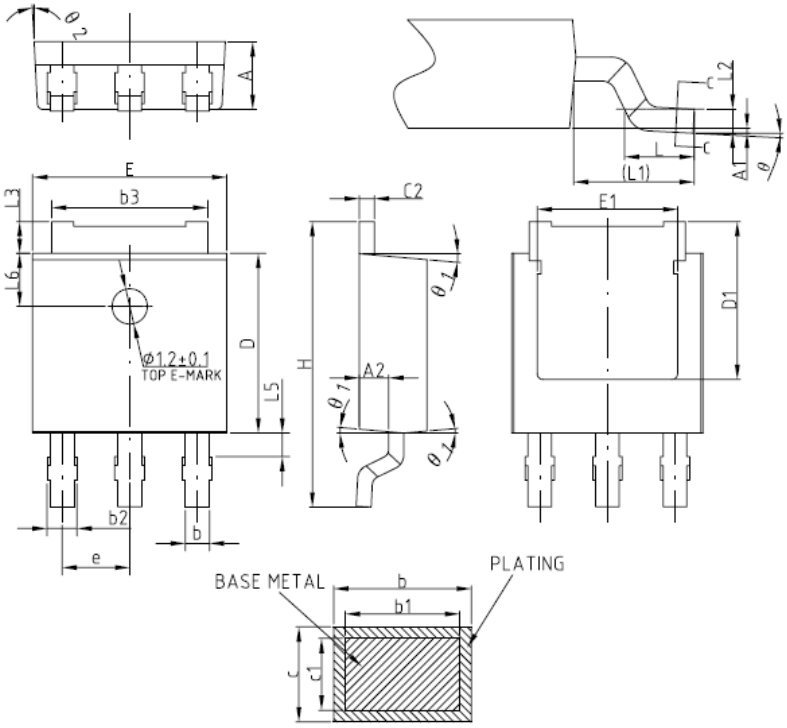
Order information:



P/N	package	MOQ	SPQ
B20N15D	TO-252	2,500	2,500/Reel

Package information :

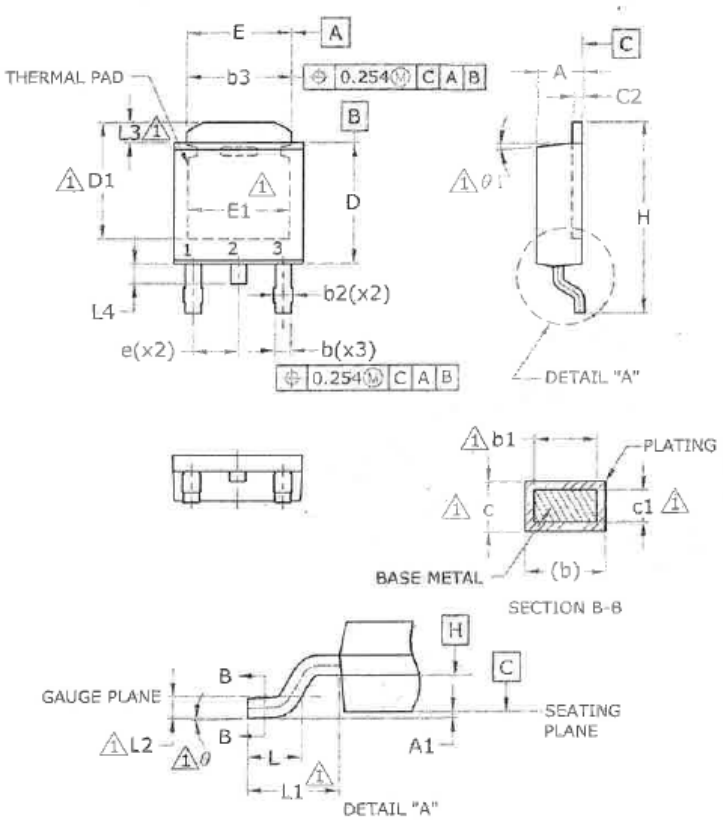
TO-252 Package Type I



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°

TO-252 Package Type II



	SYMBOL	MILLIMETERS		INCHES	
		MIN	MAX	MIN	MAX
	A	2.210	2.387	0.087	0.094
	A1	0.010	0.127	0.0004	0.005
	b	0.814	0.889	0.032	0.035
1	b1	0.762	0.787	0.030	0.031
	b2	0.864	1.092	0.034	0.043
	b3	5.232	5.436	0.206	0.214
1	C	0.509	0.559	0.020	0.022
1	C1	0.457	0.533	0.018	0.021
	C2	0.483	0.584	0.019	0.023
	D	6.000	6.200	0.236	0.244
1	D1	5.415	5.515	0.213	0.217
	E	6.400	6.604	0.252	0.260
1	E1	4.902	5.004	0.193	0.197
	e	2.290	BSC	0.090	BSC
	H	9.601	10.210	0.378	0.402
	L	1.397	1.651	0.055	0.065
1	L1	2.743	REF	0.108	REF
1	L2	0.508	REF	0.020	REF
1	L3	1.100	REF	0.043	REF
	L4	0.660	0.940	0.026	0.037
1	θ	0°	8°	0°	8°
1	θ1	7°	REF	7°	REF