

B438-VB Datasheet N-Channel 30-V (D-S) MOSFET

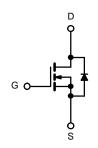
PRODUCT SUMMARY					
V _{DS} (V)	$R_{DS(on)}(\Omega)$	I _D (A) ^{a, e}	Q _g (Typ)		
30	$0.0024 \text{ at V}_{GS} = 10 \text{ V}$	98	82 nC		
	0.0027 at $V_{GS} = 4.5 \text{ V}$	98	02 HC		

FEATURES

- Trench Power MOSFET
- 100 % R_g and UIS Tested
 Compliant to RoHS Directive 2011/65/EU







N-Channel MOSFET

APPLICATIONS

- OR-ing
- Server
- DC/DC

Parameter	Symbol	Limit	Unit	
Drain-Source Voltage		V _{DS}	30	
Gate-Source Voltage		V _{GS}	± 20	V
	T _C = 25 °C		98 ^{a, e}	
Continuous Proin Current /T = 175 °C)	T _C = 70 °C	_	98 ^e	
Continuous Drain Current (T _J = 175 °C)	T _A = 25 °C	I _D	28.8 ^{b, c}	A
	T _A = 70 °C		27 ^{b, c}	^
Pulsed Drain Current	I _{DM} 30	300		
Avalanche Current Pulse		I _{AS}	36	
Single Pulse Avalanche Energy	L = 0.1 mH	E _{AS}	64.8	V
Continuous Source-Drain Diode Current	T _C = 25 °C	I.	90 ^{a, e}	A
Continuous Source-Diam Diode Current	T _A = 25 °C	l _S —	3.13 ^{b, c}	
	T _C = 25 °C		250 ^a	
Mariana Bana Birahati	T _C = 70 °C	В	175	
Maximum Power Dissipation	T _A = 25 °C	P _D	3.75 ^{b, c}	W
	T _A = 70 °C		2.63 ^{b, c}	
Operating Junction and Storage Temperature Ra	T _J , T _{stg}	- 55 to 175	°C	

THERMAL RESISTANCE RATINGS						
Parameter		Symbol	Тур.	Max.	Unit	
Maximum Junction-to-Ambient ^{b, d}	t ≤ 10 sec	R _{thJA}	32	40	°C/W	
Maximum Junction-to-Case	Steady State	R _{thJC}	0.5	0.6	J/VV	

Notes:

- a. Based on T_C = 25 °C.
 b. Surface mounted on 1" x 1" FR4 board.

- b. Surface motified of 1. X.1.1144 board.
 c. t = 10 sec.
 d. Maximum under steady state conditions is 90 °C/W.
 e. Calculated based on maximum junction temperature. Package limitation current is 90 A.



Parameter	Symbol	Test Conditions	Min.	Тур.	Max.	Unit
Static						
Drain-Source Breakdown Voltage	V _{DS}	$V_{GS} = 0 \text{ V}, I_D = 250 \mu\text{A}$	30			V
V _{DS} Temperature Coefficient	$\Delta V_{DS}/T_{J}$	Т		35		>//00
V _{GS(th)} Temperature Coefficient	$\Delta V_{GS(th)}/T_J$	$I_D = 250 \mu A$		- 7.5		mV/°C
Gate-Source Threshold Voltage	V _{GS(th)}	$V_{DS} = V_{GS}, I_{D} = 250 \mu A$	1.5		2.5	V
Gate-Source Leakage	I _{GSS}	$V_{DS} = 0 \text{ V}, V_{GS} = \pm 20 \text{ V}$			± 100	nA
Zana Oata Valtana Basis Oursest		$V_{DS} = 30 \text{ V}, V_{GS} = 0 \text{ V}$			1	
Zero Gate Voltage Drain Current	IDSS	$V_{DS} = 30 \text{ V}, V_{GS} = 0 \text{ V}, T_{J} = 55 ^{\circ}\text{C}$			10	μA
On-State Drain Current ^a	I _{D(on)}	$V_{DS} \ge 5 \text{ V}, V_{GS} = 10 \text{ V}$	90			Α
		$V_{GS} = 10 \text{ V}, I_D = 28.8 \text{ A}$		0.0024		
Drain-Source On-State Resistance ^a	R _{DS(on)}	$V_{GS} = 4.5 \text{ V}, I_D = 27 \text{ A}$		0.0027		Ω
Forward Transconductance ^a	9 _{fs}	$V_{DS} = 15 \text{ V}, I_{D} = 28.8 \text{ A}$		160		S
Dynamic ^b				•		
Input Capacitance	C _{iss}			12065		
Output Capacitance	C _{oss}	$V_{DS} = 15 \text{ V}, V_{GS} = 0 \text{ V}, f = 1 \text{ MHz}$		1725		pF
Reverse Transfer Capacitance	C _{rss}			970		
Total Cata Charge	0	$V_{DS} = 15 \text{ V}, V_{GS} = 10 \text{ V}, I_D = 28.8 \text{ A}$		171	257	
Total Gate Charge	Q_g			81.5	123	nC
Gate-Source Charge	Q _{gs}	$V_{DS} = 15 \text{ V}, V_{GS} = 4.5 \text{ V}, I_{D} = 28.8 \text{ A}$		34		
Gate-Drain Charge	Q_{gd}			29		
Gate Resistance	R _g	f = 1 MHz		1.4	2.1	Ω
Turn-On Delay Time	t _{d(on)}			18	27	
Rise Time	t _r	V_{DD} = 15 V, R_L = 0.625 Ω		11	17	
Turn-Off Delay Time	t _{d(off)}	$I_D \cong 24 \text{ A}, V_{GEN} = 10 \text{ V}, R_g = 1 \Omega$		70	105	nc
Fall Time	t _f			10	15	
Turn-On Delay Time	t _{d(on)}			55	83	ns
Rise Time	t _r	V_{DD} = 15 V, R_L = 0.67 Ω		180	270	
Turn-Off Delay Time	t _{d(off)}	$I_D \cong 22.5 \text{ A}, V_{GEN} = 4.5 \text{ V}, R_g = 1 \Omega$		55	83	
Fall Time	t _f			12	18	
Drain-Source Body Diode Characteristic	cs					
Continuous Source-Drain Diode Current	I _S	$T_C = 25 ^{\circ}C$			90	Α
Pulse Diode Forward Current ^a	I _{SM}				90	
Body Diode Voltage	V _{SD}	I _S = 22 A		0.8	1.2	V
Body Diode Reverse Recovery Time	t _{rr}			52	78	ns
Body Diode Reverse Recovery Charge	Q _{rr}	I _F = 20 A, di/dt = 100 A/μs, T _J = 25 °C		70.2	105	nC
Reverse Recovery Fall Time	t _a	1F - 20 A, αι/αι = 100 A/μS, 1J = 25 °C		27		nc
Reverse Recovery Rise Time	t _b			25		ns

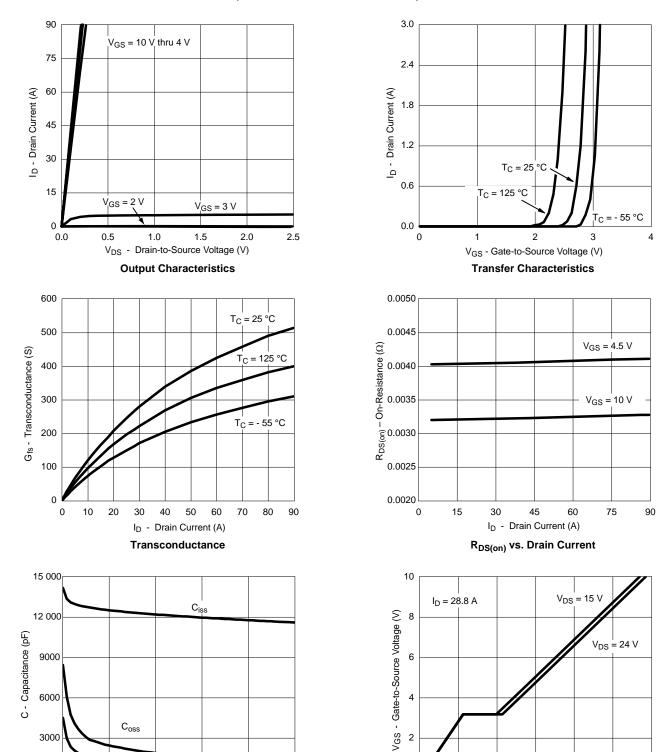
Notes:

- a. Pulse test; pulse width $\leq 300~\mu s,$ duty cycle $\leq 2~\%.$
- b. Guaranteed by design, not subject to production testing.

Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.



TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



2

30

60

90

Q_g - Total Gate Charge (nC)

Gate Charge

120

150

180

 C_{rss}

3000

0 0 $\mathsf{C}_{\mathsf{oss}}$

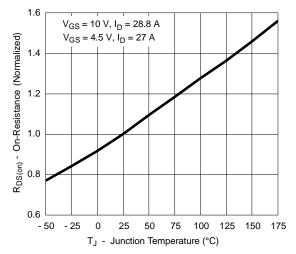
18

V_{DS} - Drain-to-Source Voltage (V) Capacitance

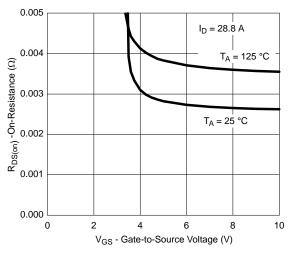
30



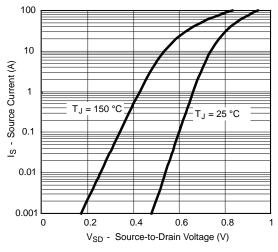
TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



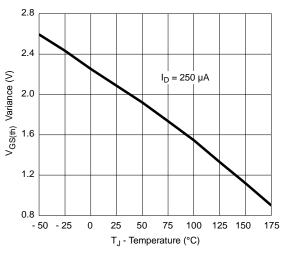
On-Resistance vs. Junction Temperature



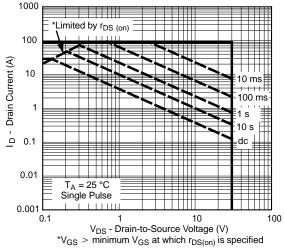
 $R_{DS(on)}$ vs. V_{GS} vs. Temperature



Forward Diode Voltage vs. Temperature



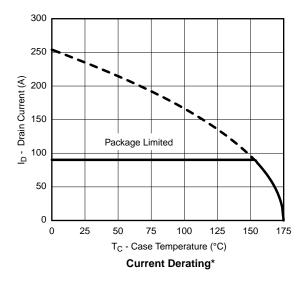
Threshold Voltage



Safe Operating Area, Junction-to-Ambient

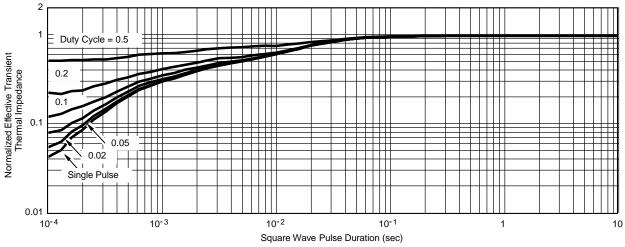


TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)





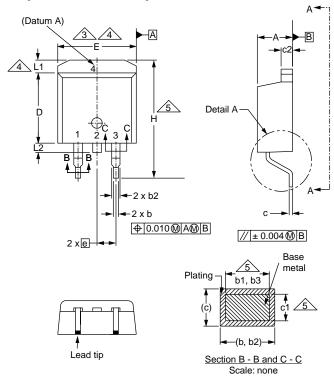
*The power dissipation P_D is based on $T_{J(max)}$ = 175 °C, using junction-to-case thermal resistance, and is more useful in settling the upper dissipation limit for cases where additional heatsinking is used. It is used to determine the current rating, when this rating falls below the package limit.

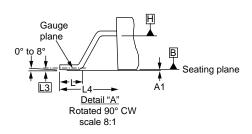


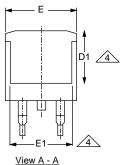
Normalized Thermal Transient Impedance, Junction-to-Case



TO-263AB (HIGH VOLTAGE)







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	MILLIMETERS		INC	HES
DIM.	MIN.	MAX.	MIN.	MAX.
Α	4.06	4.83	0.160	0.190
A1	0.00	0.25	0.000	0.010
b	0.51	0.99	0.020	0.039
b1	0.51	0.89	0.020	0.035
b2	1.14	1.78	0.045	0.070
b3	1.14	1.73	0.045	0.068
С	0.38	0.74	0.015	0.029
c1	0.38	0.58	0.015	0.023
c2	1.14	1.65	0.045	0.065
D	8.38	9.65	0.330	0.380

DIM. MIN. MAX. MIN. MAX. D1 6.86 - 0.270 - E 9.65 10.67 0.380 0.420 E1 6.22 - 0.245 - e 2.54 BSC 0.100 BSC H 14.61 15.88 0.575 0.625 L 1.78 2.79 0.070 0.110 L1 - 1.65 - 0.066 L2 - 1.78 - 0.070 L3 0.25 BSC 0.010 BSC		MILLIMETERS		INC	HES
E 9.65 10.67 0.380 0.420 E1 6.22 - 0.245 - e 2.54 BSC 0.100 BSC H 14.61 15.88 0.575 0.625 L 1.78 2.79 0.070 0.110 L1 - 1.65 - 0.066 L2 - 1.78 - 0.070	DIM.	MIN.	MAX.	MIN.	MAX.
E1 6.22 - 0.245 - e 2.54 BSC 0.100 BSC H 14.61 15.88 0.575 0.625 L 1.78 2.79 0.070 0.110 L1 - 1.65 - 0.066 L2 - 1.78 - 0.070	D1	6.86	-	0.270	-
e 2.54 BSC 0.100 BSC H 14.61 15.88 0.575 0.625 L 1.78 2.79 0.070 0.110 L1 - 1.65 - 0.066 L2 - 1.78 - 0.070	E	9.65	10.67	0.380	0.420
H 14.61 15.88 0.575 0.625 L 1.78 2.79 0.070 0.110 L1 - 1.65 - 0.066 L2 - 1.78 - 0.070	E1	6.22	-	0.245	-
L 1.78 2.79 0.070 0.110 L1 - 1.65 - 0.066 L2 - 1.78 - 0.070	е	2.54 BSC		0.100 BSC	
L1 - 1.65 - 0.066 L2 - 1.78 - 0.070	Н	14.61	15.88	0.575	0.625
L2 - 1.78 - 0.070	L	1.78	2.79	0.070	0.110
	L1	-	1.65	-	0.066
L3 0.25 BSC 0.010 BSC	L2	-	1.78	-	0.070
	L3	0.25 BSC		0.010	BSC
L4 4.78 5.28 0.188 0.208	L4	4.78	5.28	0.188	0.208

ECN: S-82110-Rev. A, 15-Sep-08

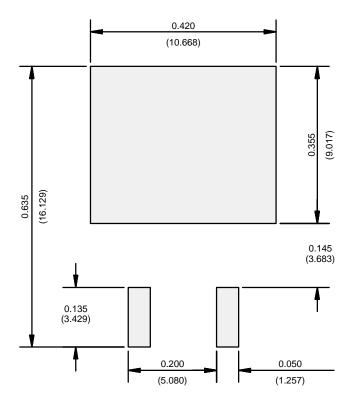
DWG: 5970

Notes

- 1. Dimensioning and tolerancing per ASME Y14.5M-1994.
- 2. Dimensions are shown in millimeters (inches).
- 3. Dimension D and E do not include mold flash. Mold flash shall not exceed 0.127 mm (0.005") per side. These dimensions are measured at the outmost extremes of the plastic body at datum A.
- 4. Thermal PAD contour optional within dimension E, L1, D1 and E1.
- 5. Dimension b1 and c1 apply to base metal only.
- 6. Datum A and B to be determined at datum plane H.
- 7. Outline conforms to JEDEC outline to TO-263AB.



RECOMMENDED MINIMUM PADS FOR D²PAK: 3-Lead



Recommended Minimum Pads Dimensions in Inches/(mm)



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