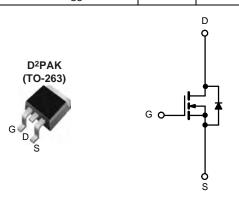


# PHB55N03LT-VB Datasheet N-Channel 30-V (D-S) MOSFET

PRODUCT SUMMARY						
V <sub>DS</sub> (V)	$R_{DS(on)}(\Omega)$	I <sub>D</sub> (A) <sup>a, e</sup>	Q <sub>g</sub> (Typ)			
30	0.012 at V <sub>GS</sub> = 10 V	50	25 nC			
30	0.018 at V <sub>GS</sub> = 4.5 V	45	23 110			



#### N-Channel MOSFET

#### **FEATURES**

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



#### **APPLICATIONS**

- OR-ing
- Server
- DC/DC

Parameter		Symbol	Limit	Unit	
Drain-Source Voltage	V <sub>DS</sub>	30	V		
Gate-Source Voltage	V <sub>GS</sub> ± 20	± 20			
	T <sub>C</sub> = 25 °C		50		
Continuous Drain Current (T <sub>.I</sub> = 175 °C)	T <sub>C</sub> = 70 °C		46		
Continuous Diam Current (1 j = 173 °C)	T <sub>A</sub> = 25 °C	I <sub>D</sub>	27 <sup>b, c</sup>	A	
	T <sub>A</sub> = 70 °C		21 <sup>b, c</sup>	_ ^	
Pulsed Drain Current	I <sub>DM</sub>	210			
Avalanche Current Pulse	1 04 mH	I <sub>AS</sub>	39		
Single Pulse Avalanche Energy L = 0.1 mH		E <sub>AS</sub>	94.8	mJ	
Continuous Source-Drain Diode Current	T <sub>C</sub> = 25 °C	1	50 <sup>a, e</sup>		
Continuous Source-Drain Diode Current	T <sub>A</sub> = 25 °C	I <sub>S</sub>	3.13 <sup>b, c</sup>	A	
	T <sub>C</sub> = 25 °C		120 <sup>a</sup>		
Manifestor Brown Birata affair	T <sub>C</sub> = 70 °C	В	85		
Maximum Power Dissipation	T <sub>A</sub> = 25 °C	P <sub>D</sub>	3.75 <sup>b, c</sup>	W	
	T <sub>A</sub> = 70 °C		2.63 <sup>b, c</sup>		
Operating Junction and Storage Temperature Ra	T <sub>J</sub> , T <sub>stg</sub>	- 55 to 175	°C		

THERMAL RESISTANCE RATINGS						
Parameter		Symbol	Тур.	Max.	Unit	
Maximum Junction-to-Ambient <sup>b, d</sup>	t ≤ 10 sec	R <sub>thJA</sub>	32	40	°C/W	
Maximum Junction-to-Case	Steady State	R <sub>thJC</sub>	0.5	0.6	]	

#### Notes:

- a. Based on T<sub>C</sub> = 25 °C.
  b. Surface mounted on 1" x 1" FR4 board.

- b. Surface in the first policy.

  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 <sub>DS</sub>	$V_{GS} = 0 \text{ V}, I_D = 250 \mu\text{A}$	30			V	
V <sub>DS</sub> Temperature Coefficient	$\Delta V_{DS}/T_{J}$	I <sub>D</sub> = 250 μA		35		mV/°C	
V <sub>GS(th)</sub> Temperature Coefficient	$\Delta V_{GS(th)}/T_{J}$	ι <sub>D</sub> = 230 μΑ		- 7.5		mv/°C	
Gate-Source Threshold Voltage	V <sub>GS(th)</sub>	$V_{DS} = V_{GS}, I_{D} = 250 \mu A$	1.0		3.0	V	
Gate-Source Leakage	I <sub>GSS</sub>	$V_{DS} = 0 \text{ V}, V_{GS} = \pm 20 \text{ V}$			± 100	nA	
Zana Cata Valta na Dunia Comuni		$V_{DS} = 30 \text{ V}, V_{GS} = 0 \text{ V}$			1		
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	V <sub>DS</sub> = 30 V, V <sub>GS</sub> = 0 V, T <sub>J</sub> = 55 °C			10	μA	
On-State Drain Current <sup>a</sup>	I <sub>D(on)</sub>	$V_{DS} \ge 5 \text{ V}, V_{GS} = 10 \text{ V}$	90			Α	
	В	V <sub>GS</sub> = 10 V, I <sub>D</sub> = 28.8 A		0.012		Ω	
Drain-Source On-State Resistance <sup>a</sup>	R <sub>DS(on)</sub>	$V_{GS} = 4.5 \text{ V}, I_D = 37 \text{ A}$		0.018			
Forward Transconductance <sup>a</sup>				160		S	
Dynamic <sup>b</sup>							
Input Capacitance	C <sub>iss</sub>			1201			
Output Capacitance	C <sub>oss</sub>	$V_{DS} = 15 \text{ V}, V_{GS} = 0 \text{ V}, f = 1 \text{ MHz}$		255		pF	
Reverse Transfer Capacitance	C <sub>rss</sub>			170			
Total Gate Charge	Qg	$V_{DS} = 15 \text{ V}, V_{GS} = 10 \text{ V}, I_D = 28.8 \text{ A}$		35		nC	
				25			
Gate-Source Charge	Q <sub>gs</sub>	$V_{DS} = 15 \text{ V}, V_{GS} = 4.5 \text{ V}, I_{D} = 28.8 \text{ A}$		15			
Gate-Drain Charge	Q <sub>gd</sub>			20			
Gate Resistance	R <sub>g</sub>	f = 1 MHz			2.1	Ω	
Turn-On Delay Time	t <sub>d(on)</sub>			18	27		
Rise Time	t <sub>r</sub>	$t_r$ $V_{DD} = 15 \text{ V}, R_L = 0.625 \Omega$		11	17	1	
Turn-Off Delay Time	t <sub>d(off)</sub>	$I_D\cong 24$ A, $V_{GEN}$ = 10 V, $R_g$ = 1 $\Omega$		70	105	1	
Fall Time	t <sub>f</sub>			10	15		
Turn-On Delay Time	t <sub>d(on)</sub>			55	83	ns -	
Rise Time	t <sub>r</sub>	$V_{DD}$ = 15 V, $R_L$ = 0.67 $\Omega$		180	270		
Turn-Off Delay Time	t <sub>d(off)</sub>	$I_D\cong 22.5~A,~V_{GEN}$ = 4.5 V, $R_g$ = 1 $\Omega$		55	83		
Fall Time	t <sub>f</sub>			12	18		
<b>Drain-Source Body Diode Characteristic</b>	s						
Continuous Source-Drain Diode Current	I <sub>S</sub>	T <sub>C</sub> = 25 °C			120	۸	
Pulse Diode Forward Current <sup>a</sup>	I <sub>SM</sub>				120	Α	
Body Diode Voltage	V <sub>SD</sub>	I <sub>S</sub> = 22 A		0.8	1.2	V	
Body Diode Reverse Recovery Time	t <sub>rr</sub>			52	78	ns	
Body Diode Reverse Recovery Charge	Q <sub>rr</sub>	1 00 A di/d+ 100 A/ T 05 00		70.2	105	nC	
Reverse Recovery Fall Time	t <sub>a</sub>	$I_F = 20 \text{ A}, \text{ di/dt} = 100 \text{ A/}\mu\text{s}, T_J = 25 ^{\circ}\text{C}$		27			
Reverse Recovery Rise Time	t <sub>b</sub>			25		ns	

#### Notes:

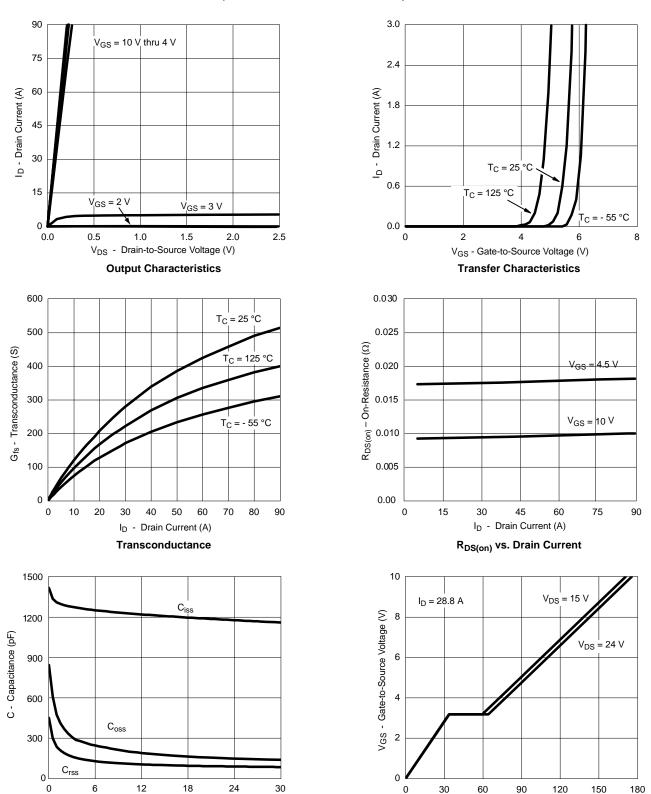
- a. Pulse test; pulse width  $\leq 300~\mu s,$  duty cycle  $\leq 2~\%.$
- b. Guaranteed by design, not subject to production testing.

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.

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# TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



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Q<sub>g</sub> - Total Gate Charge (nC)

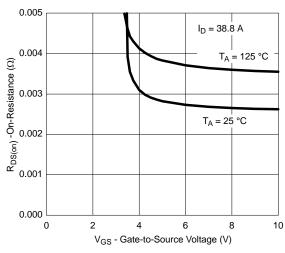
**Gate Charge** 



### TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



On-Resistance vs. Junction Temperature



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



Forward Diode Voltage vs. Temperature



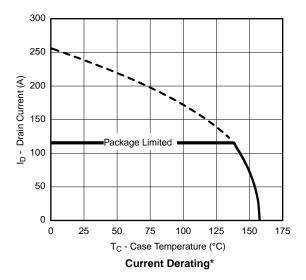
Threshold Voltage

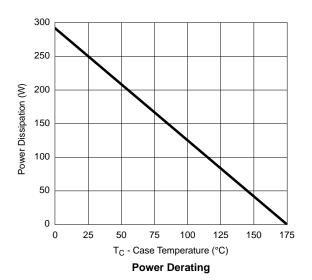


Safe Operating Area, Junction-to-Ambient



# 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.

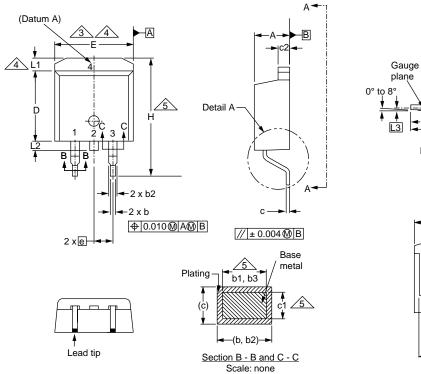


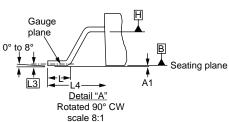
Normalized Thermal Transient Impedance, Junction-to-Case

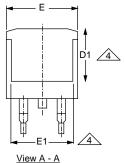
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### **TO-263AB (HIGH VOLTAGE)**







	MILLIN	METERS	INCHES		
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	

	MILLIMETERS		INC	HES
DIM.	MIN.	MAX.	MIN.	MAX.
D1	6.86	-	0.270	-
E	9.65	10.67	0.380	0.420
E1	6.22	-	0.245	-
е	2.54 BSC		0.100 BSC	
Н	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
L4	4.78	5.28	0.188	0.208

# DWG: 5970

- 1. Dimensioning and tolerancing per ASME Y14.5M-1994.
- 2. Dimensions are shown in millimeters (inches).

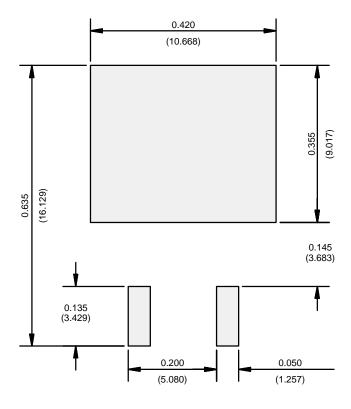
ECN: S-82110-Rev. A, 15-Sep-08

- 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.

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# RECOMMENDED MINIMUM PADS FOR D<sup>2</sup>PAK: 3-Lead



Recommended Minimum Pads Dimensions in Inches/(mm)

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