

PHD38N02LT-VB Datasheet

N-Channel 20-V (D-S)175 °C MOSFET

PRODUCT SUMMARY		
V_{DS} (V)	$r_{DS(on)}$ (Ω)	I_D (A) ^a
20	0.0045 @ $V_{GS} = 4.5$ V	100
	0.006 @ $V_{GS} = 2.5$ V	90

FEATURES

- Trench Power MOSFET
- 175°C Maximum Junction Temperature
- 100% R_g Tested



Drain Connected to Tab



N-Channel MOSFET

ABSOLUTE MAXIMUM RATINGS ($T_A = 25^\circ\text{C}$ UNLESS OTHERWISE NOTED)

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	V_{DS}	20	V
Gate-Source Voltage	V_{GS}	± 15	
Continuous Drain Current ^a	I_D	$T_C = 25^\circ\text{C}$ 100	A
		$T_C = 100^\circ\text{C}$ 80	
Pulsed Drain Current	I_{DM}	200	
Continuous Source Current (Diode Conduction) ^a	I_S	65	
Maximum Power Dissipation	P_D	$T_C = 25^\circ\text{C}$ 71	W
		$T_A = 25^\circ\text{C}$ 8.3 ^{b, c}	
Operating Junction and Storage Temperature Range	T_J, T_{stg}	-55 to 175	$^\circ\text{C}$

THERMAL RESISTANCE RATINGS

Parameter	Symbol	Typical	Maximum	Unit
Maximum Junction-to-Ambient ^b	R_{thJA}	$t \leq 10$ sec. 15	18	$^\circ\text{C/W}$
		Steady State 40	50	
Maximum Junction-to-Case	R_{thJC}	1.75	2.1	

Notes

- a. Package Limited
b. Surface Mounted on 1" x 1" FR4 Board
c. $t \leq 10$ sec

SPECIFICATIONS (T _J = 25 °C UNLESS OTHERWISE NOTED)						
Parameter	Symbol	Test Condition	Min	Typ ^a	Max	Unit
Static						
Drain-Source Breakdown Voltage	V _{(BR)DSS}	V _{GS} = 0 V, I _D = 250 μA	20			V
Gate Threshold Voltage	V _{GS(th)}	V _{DS} = V _{GS} , I _D = 250 μA	0.5		1.5	
Gate-Body Leakage	I _{GSS}	V _{DS} = 0 V, V _{GS} = ± 12 V			± 100	nA
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} = 20 V, V _{GS} = 0 V			1	μA
		V _{DS} = 20 V, V _{GS} = 0 V, T _J = 125 °C			50	
On-State Drain Current ^b	I _{D(on)}	V _{DS} = 5 V, V _{GS} = 4.5 V	100			A
Drain-Source On-State Resistance ^b	r _{DS(on)}	V _{GS} = 4.5 V, I _D = 20 A		0.0045		Ω
		V _{GS} = 4.5 V, I _D = 20 A, T _J = 125 °C		0.0055		
		V _{GS} = 2.5 V, I _D = 20 A		0.006		
Forward Transconductance ^b	g _{fs}	V _{DS} = 5 V, I _D = 40 A	20			S
Dynamic ^a						
Input Capacitance	C _{iss}	V _{GS} = 0 V, V _{DS} = 20 V, f = 1 MHz		3660		pF
Output Capacitance	C _{oss}			730		
Reverse Transfer Capacitance	C _{rss}			375		
Total Gate Charge ^c	Q _g	V _{DS} = 10 V, V _{GS} = 4.5 V, I _D = 40 A		26	35	nC
Gate-Source Charge ^c	Q _{gs}			5		
Gate-Drain Charge ^c	Q _{gd}			7		
Gate Resistance	R _g		1		3.7	Ω
Turn-On Delay Time ^c	t _{d(on)}	V _{DD} = 10 V, R _L = 0.25 Ω I _D ≅ 40 A, V _{GEN} = 4.5 V, R _G = 2.5 Ω		20	35	ns
Rise Time ^c	t _r			120	190	
Turn-Off Delay Time ^c	t _{d(off)}			45	70	
Fall Time ^c	t _f			20	35	
Source-Drain Diode Ratings and Characteristic (T _C = 25 °C)						
Pulsed Current	I _{SM}				100	A
Diode Forward Voltage ^b	V _{SD}	I _F = 100 A, V _{GS} = 0 V		1.2	1.5	V
Source-Drain Reverse Recovery Time	t _{rr}	I _F = 40 A, di/dt = 100 A/μs		35	70	ns

Notes

- a. Guaranteed by design, not subject to production testing.
 b. Pulse test; pulse width ≤ 300 μs, duty cycle ≤ 2%.
 c. Independent of operating temperature.

TYPICAL CHARACTERISTICS (25°C UNLESS NOTED)



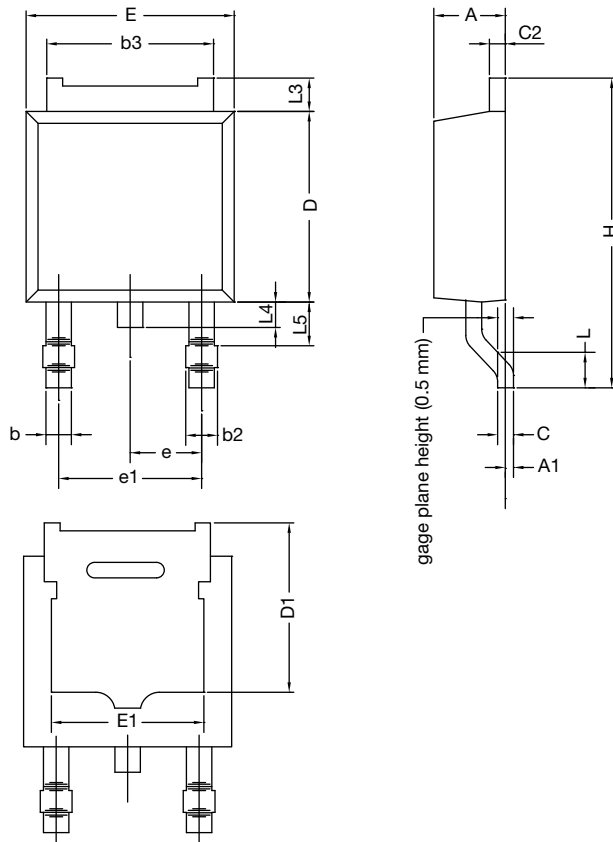
TYPICAL CHARACTERISTICS (25 °C UNLESS NOTED)



THERMAL RATINGS



TO-252AA CASE OUTLINE



DIM.	MILLIMETERS		INCHES	
	MIN.	MAX.	MIN.	MAX.
A	2.18	2.38	0.086	0.094
A1	-	0.127	-	0.005
b	0.64	0.88	0.025	0.035
b2	0.76	1.14	0.030	0.045
b3	4.95	5.46	0.195	0.215
C	0.46	0.61	0.018	0.024
C2	0.46	0.89	0.018	0.035
D	5.97	6.22	0.235	0.245
D1	5.21	-	0.205	-
E	6.35	6.73	0.250	0.265
E1	4.32	-	0.170	-
H	9.40	10.41	0.370	0.410
e	2.28 BSC		0.090 BSC	
e1	4.56 BSC		0.180 BSC	
L	1.40	1.78	0.055	0.070
L3	0.89	1.27	0.035	0.050
L4	-	1.02	-	0.040
L5	1.14	1.52	0.045	0.060
ECN: X12-0247-Rev. M, 24-Dec-12 DWG: 5347				

Note

- Dimension L3 is for reference only.

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