

# MTB75N03HDLT4G-VB Datasheet N-Channel 30-V (D-S) MOSFET

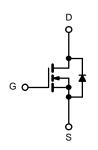
PRODUCT SUMMARY					
V <sub>DS</sub> (V)	$R_{DS(on)}(\Omega)$	I <sub>D</sub> (A) <sup>a, e</sup>	Q <sub>g</sub> (Typ)		
30	0.0024 at V <sub>GS</sub> = 10 V	98	82 nC		
	0.0027 at V <sub>GS</sub> = 4.5 V	98	02 HC		

#### **FEATURES**

- Trench Power MOSFET
- 100 % R<sub>g</sub> 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 <sub>DS</sub>	30	.,	
Gate-Source Voltage	V <sub>GS</sub>	± 20	V		
	T <sub>C</sub> = 25 °C		98 <sup>a, e</sup>	A	
Continuous Drain Current (T. – 175 °C)	T <sub>C</sub> = 70 °C		98 <sup>e</sup>		
Continuous Drain Current (T <sub>J</sub> = 175 °C)	T <sub>A</sub> = 25 °C	I <sub>D</sub>	28.8 <sup>b, c</sup>		
	T <sub>A</sub> = 70 °C		27 <sup>b, c</sup>		
Pulsed Drain Current	I <sub>DM</sub>	300			
Avalanche Current Pulse	L = 0.1 mH	I <sub>AS</sub>	36		
Single Pulse Avalanche Energy	L = 0.1 IIII	E <sub>AS</sub>	64.8	V	
Continuous Source-Drain Diode Current	T <sub>C</sub> = 25 °C	L	90 <sup>a, e</sup>	Α	
Continuous Source-Diam Diode Current	T <sub>A</sub> = 25 °C	I <sub>S</sub>	3.13 <sup>b, c</sup>		
	T <sub>C</sub> = 25 °C		250 <sup>a</sup>		
Maximum Daylar Dissipation	T <sub>C</sub> = 70 °C	P <sub>D</sub>	175	w	
Maximum Power Dissipation	T <sub>A</sub> = 25 °C	' D	3.75 <sup>b, c</sup>		
	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	J/VV	

#### Notes:

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

- b. Striate informed on 1 X 1 114 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 <sub>DS</sub>	$V_{GS} = 0 \text{ V}, I_{D} = 250 \mu\text{A}$	30			V
V <sub>DS</sub> Temperature Coefficient	$\Delta V_{DS}/T_{J}$	1 2504		35		
V <sub>GS(th)</sub> Temperature Coefficient	$\Delta V_{GS(th)}/T_{J}$	$I_{D} = 250  \mu A$		- 7.5		mV/°C
Gate-Source Threshold Voltage	V <sub>GS(th)</sub>	$V_{DS} = V_{GS}, I_D = 250 \mu A$	1.5		2.5	V
Gate-Source Leakage	I <sub>GSS</sub>	$V_{DS} = 0 \text{ V}, V_{GS} = \pm 20 \text{ V}$			± 100	nA
7 0 0 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	1.	$V_{DS} = 30 \text{ V}, V_{GS} = 0 \text{ V}$			1	μA
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	$V_{DS} = 30 \text{ V}, V_{GS} = 0 \text{ V}, T_{J} = 55 ^{\circ}\text{C}$			10	
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
		V <sub>GS</sub> = 10 V, I <sub>D</sub> = 28.8 A		0.0024		
Drain-Source On-State Resistance <sup>a</sup>	R <sub>DS(on)</sub>	V <sub>GS</sub> = 4.5 V, I <sub>D</sub> = 27 A		0.0027		Ω
Forward Transconductance <sup>a</sup>	9 <sub>fs</sub>	V <sub>DS</sub> = 15 V, I <sub>D</sub> = 28.8 A		160		S
Dynamic <sup>b</sup>			L	L		
Input Capacitance	C <sub>iss</sub>			12065		
Output Capacitance	C <sub>oss</sub>	$V_{DS} = 15 \text{ V}, V_{GS} = 0 \text{ V}, f = 1 \text{ MHz}$		1725		pF
Reverse Transfer Capacitance	C <sub>rss</sub>			970		
Total Gate Charge	Qg	V <sub>DS</sub> = 15 V, V <sub>GS</sub> = 10 V, I <sub>D</sub> = 28.8 A		171	257	nC
				81.5	123	
Gate-Source Charge	Q <sub>gs</sub>	$V_{DS} = 15 \text{ V}, V_{GS} = 4.5 \text{ V}, I_{D} = 28.8 \text{ A}$		34		
Gate-Drain Charge	Q <sub>gd</sub>			29		
Gate Resistance	R <sub>g</sub>	f = 1 MHz		1.4	2.1	Ω
Turn-On Delay Time	t <sub>d(on)</sub>			18	27	
Rise Time	t <sub>r</sub>	$V_{DD} = 15 \text{ V}, R_{I} = 0.625 \Omega$		11	17	
Turn-Off Delay Time	t <sub>d(off)</sub>	$I_D \cong 24 \text{ A}, V_{GEN} = 10 \text{ V}, R_g = 1 \Omega$		70	105	
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>	$V_{DD} = 15 \text{ V}, R_1 = 0.67 \Omega$		180	270	
Turn-Off Delay Time	t <sub>d(off)</sub>	$I_D \cong 22.5 \text{ A}, V_{GEN} = 4.5 \text{ V}, R_g = 1 \Omega$		55	83	
Fall Time	t <sub>f</sub>	Ş		12	18	
Drain-Source Body Diode Characteristic	T T					l
Continuous Source-Drain Diode Current	I <sub>S</sub>	T <sub>C</sub> = 25 °C			90	_
Pulse Diode Forward Current <sup>a</sup>	I <sub>SM</sub>				90	- A
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>			70.2	105	nC
Reverse Recovery Fall Time	t <sub>a</sub>	$I_F = 20 \text{ A}, \text{ di/dt} = 100 \text{ A/µs}, T_J = 25 °C$		27		ns
Reverse Recovery Rise Time	t <sub>b</sub>			25		

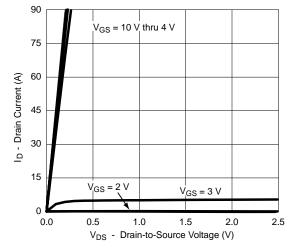
#### Notes:

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

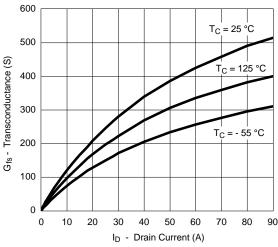
Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure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



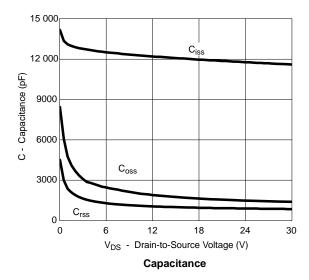
# TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)

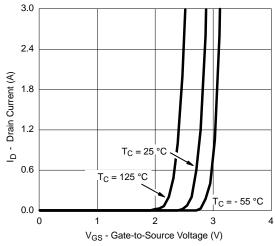


#### **Output Characteristics**

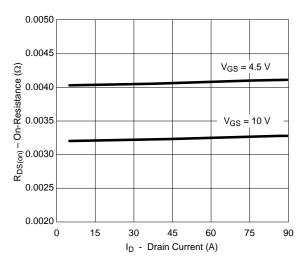


Transconductance

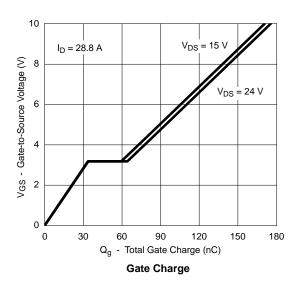




Transfer Characteristics

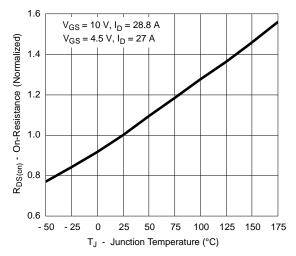


R<sub>DS(on)</sub> vs. Drain Current

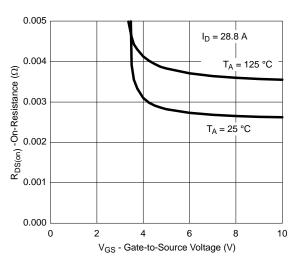




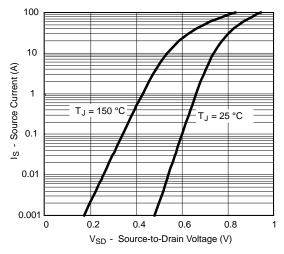
## TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



On-Resistance vs. Junction Temperature



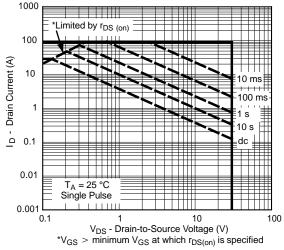
 $R_{DS(on)}$  vs.  $V_{GS}$  vs. Temperature



Forward Diode Voltage vs. Temperature



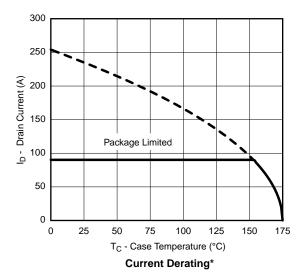
Threshold Voltage



Safe Operating Area, Junction-to-Ambient



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





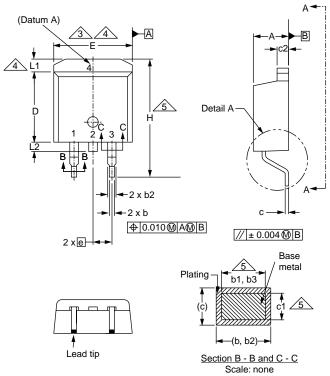
\*The power dissipation  $P_D$  is based on  $T_{J(max)}$  = 175 °C, using junction-to-case thermal resistance, and is more useful in settling the upper dissipation limit for cases where additional heatsinking is used. It is used to determine the current rating, when this rating falls below the package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

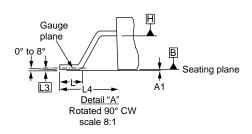


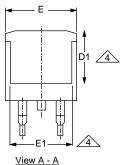
Normalized Thermal Transient Impedance, Junction-to-Case



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







	MILLIN	METERS	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

MILLIMETERS		INC	HES
MIN.	MAX.	MIN.	MAX.
6.86	-	0.270	-
9.65	10.67	0.380	0.420
6.22	-	0.245	i
2.54 BSC		0.100 BSC	
14.61	15.88	0.575	0.625
1.78	2.79	0.070	0.110
-	1.65	-	0.066
-	1.78	-	0.070
0.25 BSC		0.010	BSC
4.78	5.28	0.188	0.208
	MIN. 6.86 9.65 6.22 2.54 14.61 1.78 - 0.25	MIN. MAX. 6.86 - 9.65 10.67 6.22 - 2.54 BSC 14.61 15.88 1.78 2.79 - 1.65 - 1.78 0.25 BSC	MIN.         MAX.         MIN.           6.86         -         0.270           9.65         10.67         0.380           6.22         -         0.245           2.54 BSC         0.100           14.61         15.88         0.575           1.78         2.79         0.070           -         1.65         -           -         1.78         -           0.25 BSC         0.010

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

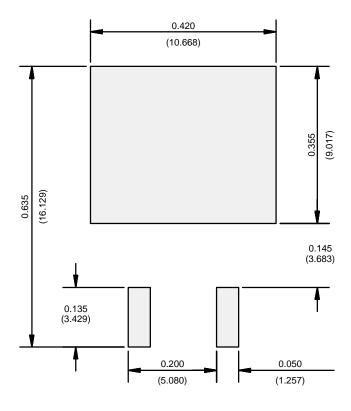
DWG: 5970

#### 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 D<sup>2</sup>PAK: 3-Lead



Recommended Minimum Pads Dimensions in Inches/(mm)



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