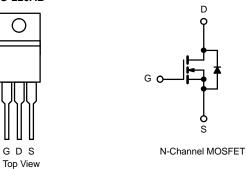


## NTP4302-VB Datasheet N-Channel 30-V (D-S) MOSFET

PRODUCT SUMMARY	
V <sub>DS</sub> (V)	30
$R_{DS(on)} (\Omega)$ at $V_{GS} = 10 V$	0. 003
$R_{DS(on)} (\Omega)$ at $V_{GS} = 4.5 V$	0. 004
I <sub>D</sub> (A)	120
Configuration	Single

#### TO-220AB



## **FEATURES**

- Trench Power MOSFET
  100 % R<sub>g</sub> and UIS Tested
- Compliant to RoHS Directive 2011/65/EU

#### **APPLICATIONS**

- OR-ing
- Server ٠
- DC/DC

Parameter		Symbol	Limit	Unit	
Drain-Source Voltage		V <sub>DS</sub>	30	v	
Gate-Source Voltage		V <sub>GS</sub>	± 20	v	
	T <sub>C</sub> = 25 °C		120	A	
Continuous Drain Current (T <sub>.1</sub> = 175 °C)	T <sub>C</sub> = 70 °C	60	60 <sup>e</sup>		
Continuous Drain Current $(1_j = 175^{\circ} C)$	T <sub>A</sub> = 25 °C	I <sub>D</sub>	28.8 <sup>b, c</sup>		
	T <sub>A</sub> = 70 °C		19 <sup>b, c</sup>	A	
Pulsed Drain Current		I <sub>DM</sub>	380		
Avalanche Current Pulse	L = 0.1 mH	I <sub>AS</sub>	36		
Single Pulse Avalanche Energy	L = 0.1 mm	E <sub>AS</sub>	64.8	V	
Continuous Source-Drain Diode Current	T <sub>C</sub> = 25 °C	90 <sup>a, e</sup>	90 <sup>a, e</sup>	A	
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		250 <sup>a</sup>		
Mauiaum Daura Diasia atian	T <sub>C</sub> = 70 °C	P <sub>D</sub>	175	147	
Maximum Power Dissipation	T <sub>A</sub> = 25 °C	٢D	3.75 <sup>b, c</sup>	W	
	T <sub>A</sub> = 70 °C		2.63 <sup>b, c</sup>		
Operating Junction and Storage Temperature R	ange	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>	$t \le 10 \text{ sec}$	R <sub>thJA</sub>	32	40	°C/W
Maximum Junction-to-Case	Steady State	R <sub>thJC</sub>	0.5	0.6	0,00

Notes:

a. Based on  $T_C = 25 \text{ °C}$ . b. Surface mounted on 1" x 1" FR4 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	$\Delta V_{DS}/T_{J}$	I <sub>D</sub> = 250 μA		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>	$V_{DS} = V_{GS}, I_D = 250 \ \mu A$	1.0		2.5	V
Gate-Source Leakage	I <sub>GSS</sub>	$V_{DS} = 0 V, V_{GS} = \pm 20 V$			± 100	nA
Zana Oata Malla na Daria Oanaat		$V_{DS} = 30 \text{ V}, \text{ V}_{GS} = 0 \text{ V}$			1	
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	$V_{DS} = 30 \text{ V}, \text{ V}_{GS} = 0 \text{ V}, \text{ T}_{J} = 55 \text{ °C}$			10	μA
On-State Drain Current <sup>a</sup>	I <sub>D(on)</sub>	$V_{DS} \ge 5 \text{ V}, \text{ V}_{GS} = 10 \text{ V}$	90			А
		V <sub>GS</sub> = 10 V, I <sub>D</sub> = 28.8 A		0.003		0
Drain-Source On-State Resistance <sup>a</sup>	R <sub>DS(on)</sub>	$V_{GS} = 4.5 \text{ V}, \text{ I}_{D} = 27 \text{ A}$		0.004		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>						•
Input Capacitance	C <sub>iss</sub>			3100		
Output Capacitance	C <sub>oss</sub>	$V_{DS}$ = 15 V, $V_{GS}$ = 0 V, f = 1 MHz		725		pF
Reverse Transfer Capacitance	C <sub>rss</sub>			370		
Tatal Cata Charma	0	$V_{DS}$ = 15 V, $V_{GS}$ = 10 V, $I_{D}$ = 28.8 A		171	257	
Total Gate Charge	Qg			81.5	123	~
Gate-Source Charge	Q <sub>gs</sub>	$V_{\text{DS}}$ = 15 V, $V_{\text{GS}}$ = 4.5 V, $I_{\text{D}}$ = 28.8 A		34		nC
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>	V <sub>DD</sub> = 15 V, R <sub>L</sub> = 0.625 Ω		18	27	
Rise Time	t <sub>r</sub>	$V_{DD}$ = 15 V, $R_L$ = 0.625 $\Omega$		11	17	
Turn-Off Delay Time	t <sub>d(off)</sub>	$I_D \cong$ 24 A, $V_{GEN}$ = 10 V, $R_g$ = 1 $\Omega$		70	105	
Fall Time	t <sub>f</sub>	55 -		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>	$\rm I_D\cong$ 22.5 A, $\rm V_{GEN}$ = 4.5 V, $\rm R_g$ = 1 $\Omega$		55	83	
Fall Time	t <sub>f</sub>			12	18	
Drain-Source Body Diode Characteristic	s					
Continuous Source-Drain Diode Current	۱ <sub>S</sub>	$T_{C} = 25 \ ^{\circ}C$			90	۸
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>	L = 20.4  di/dt = 100.4/sp		70.2	105	nC
Reverse Recovery Fall Time	t <sub>a</sub>	I <sub>F</sub> = 20 A, di/dt = 100 A/μs, T <sub>J</sub> = 25 °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 %.

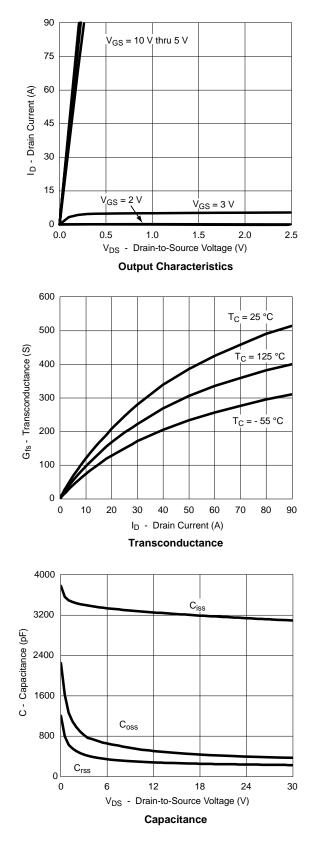
b. Guaranteed by design, not subject to production testing.

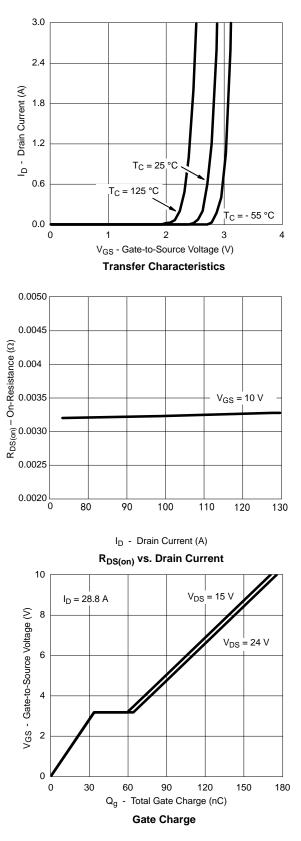
Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure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

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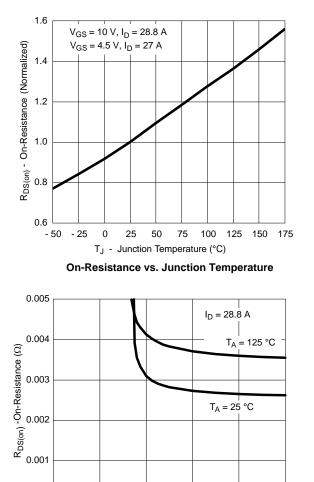


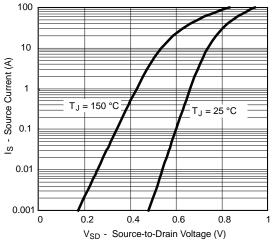


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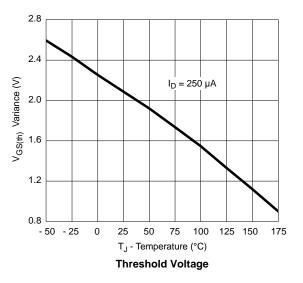


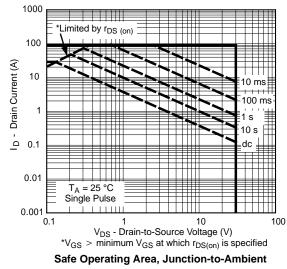
## TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)





Forward Diode Voltage vs. Temperature





0.000

0

2

4

6

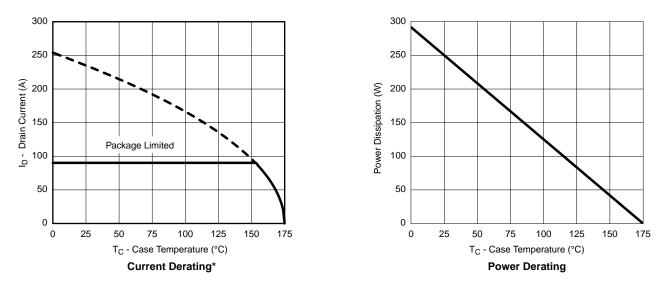
 $V_{GS}$  - Gate-to-Source Voltage (V)

R<sub>DS(on)</sub> vs. V<sub>GS</sub> vs. Temperature

8

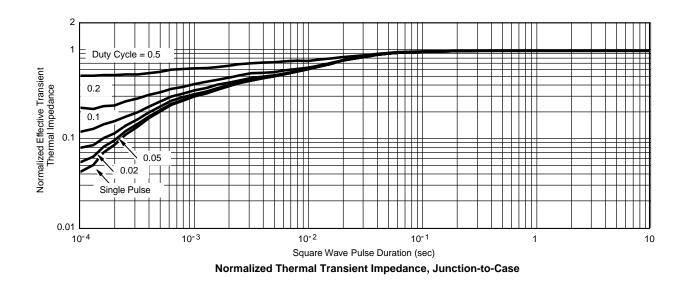
10





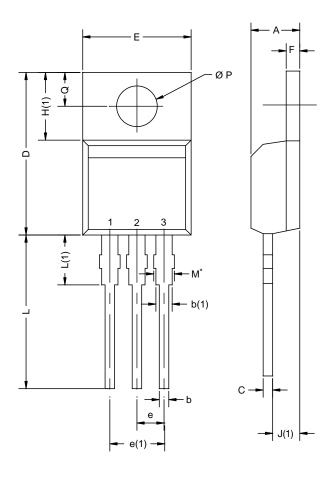
#### TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)

\*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.





## **TO-220AB**



MAX.        4.65        1.01        1.73        0.61        15.49        10.51        2.67        5.28        1.40        6.48	MIN.        0.167        0.027        0.047        0.585        0.395        0.095        0.192        0.045	MAX. 0.183 0.040 0.068 0.024 0.610 0.414 0.105 0.208 0.055
1.01        1.73        0.61        15.49        10.51        2.67        5.28        1.40	0.027 0.047 0.014 0.585 0.395 0.095 0.192 0.045	0.040 0.068 0.024 0.610 0.414 0.105 0.208
1.73        0.61        15.49        10.51        2.67        5.28        1.40	0.047 0.014 0.585 0.395 0.095 0.192 0.045	0.068 0.024 0.610 0.414 0.105 0.208
0.61 15.49 10.51 2.67 5.28 1.40	0.014 0.585 0.395 0.095 0.192 0.045	0.024 0.610 0.414 0.105 0.208
15.49 10.51 2.67 5.28 1.40	0.585 0.395 0.095 0.192 0.045	0.610 0.414 0.105 0.208
10.51 2.67 5.28 1.40	0.395 0.095 0.192 0.045	0.414 0.105 0.208
2.67 5.28 1.40	0.095 0.192 0.045	0.105
5.28 1.40	0.192 0.045	0.208
1.40	0.045	
		0.055
6.48	0.040	
	0.240	0.255
2.92	0.095	0.115
14.02	0.526	0.552
3.82	0.131	0.150
3.94	0.139	0.155
3.00	0.102	0.118
	3.82 3.94	3.82      0.131        3.94      0.139        3.00      0.102

#### Notes

\* M = 1.32 mm to 1.62 mm (dimension including protrusion) Heatsink hole for HVM



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