

NTB13N10G-VB Datasheet

N-Channel 100-V (D-S) MOSFET

PRODUCT SUMMARY

$V_{(BR)DSS}$ (V)	$R_{DS(on)}$ (Ω)	I_D (A)
100	0.100 at $V_{GS} = 10$ V	20

FEATURES

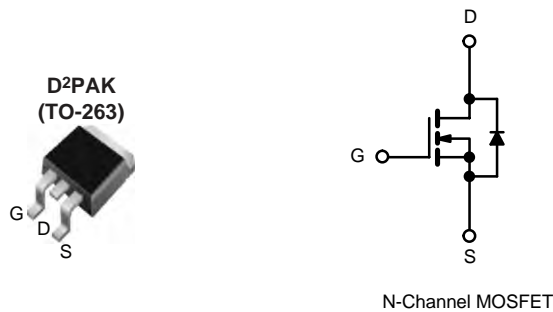
- Trench Power MOSFET
- 175 °C Junction Temperature
- Low Thermal Resistance Package
- 100 % R_g Tested



RoHS
COMPLIANT

APPLICATIONS

- Isolated DC/DC Converters



ABSOLUTE MAXIMUM RATINGS $T_C = 25$ °C, unless otherwise noted				
Parameter		Symbol	Limit	Unit
Drain-Source Voltage		V_{DS}	100	V
Gate-Source Voltage		V_{GS}	± 20	
Continuous Drain Current ($T_J = 175$ °C)	$T_C = 25$ °C	I_D	20	A
	$T_C = 125$ °C		16	
Pulsed Drain Current		I_{DM}	70	
Avalanche Current		I_{AS}	20	mJ
Single Pulse Avalanche Energy ^b		E_{AS}	200	
Maximum Power Dissipation ^b	$T_C = 25$ °C	P_D	105	W
	$T_A = 25$ °C ^d		3.75	
Operating Junction and Storage Temperature Range		T_J, T_{stg}	- 55 to 175	°C

THERMAL RESISTANCE RATINGS

Parameter		Symbol	Limit	Unit
Junction-to-Ambient	PCB Mount (TO-263) ^d	R_{thJA}	40	°C/W
Junction-to-Case (Drain)		R_{thJC}	0.4	

Notes:

- Package limited.
- Duty cycle ≤ 1 %.
- See SOA curve for voltage derating.
- When Mounted on 1" square PCB (FR-4 material).

SPECIFICATIONS $T_J = 25\text{ }^{\circ}\text{C}$, unless otherwise noted						
Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Static						
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	$V_{DS} = 0\text{ V}, I_D = 250\text{ }\mu\text{A}$	100			V
Gate-Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = 250\text{ }\mu\text{A}$	1		3	
Gate-Body Leakage	I_{GSS}	$V_{DS} = 0\text{ V}, V_{GS} = \pm 20\text{ V}$			± 100	nA
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS} = 100\text{ V}, V_{GS} = 0\text{ V}$			1	μA
		$V_{DS} = 100\text{ V}, V_{GS} = 0\text{ V}, T_J = 125\text{ }^{\circ}\text{C}$			50	
		$V_{DS} = 100\text{ V}, V_{GS} = 0\text{ V}, T_J = 175\text{ }^{\circ}\text{C}$			250	
On-State Drain Current ^a	$I_{D(on)}$	$V_{DS} \geq 5\text{ V}, V_{GS} = 10\text{ V}$	120			A
Drain-Source On-State Resistance ^a	$r_{DS(on)}$	$V_{GS} = 10\text{ V}, I_D = 20\text{ A}$		0.100		Ω
		$V_{GS} = 10\text{ V}, I_D = 20\text{ A}, T_J = 125\text{ }^{\circ}\text{C}$		0.110		
		$V_{GS} = 10\text{ V}, I_D = 20\text{ A}, T_J = 175\text{ }^{\circ}\text{C}$		0.120		
Forward Transconductance ^a	g_{fs}	$V_{DS} = 15\text{ V}, I_D = 20\text{ A}$	25			S
Dynamic ^b						
Input Capacitance	C_{iss}	$V_{GS} = 0\text{ V}, V_{DS} = 25\text{ V}, f = 1\text{ MHz}$		950		pF
Output Capacitance	C_{oss}			280		
Reverse Transfer Capacitance	C_{rss}			110		
Total Gate Charge ^c	Q_g	$V_{DS} = 100\text{ V}, V_{GS} = 10\text{ V}, I_D = 65\text{ A}$			28	nC
Gate-Source Charge ^c	Q_{gs}				4.8	
Gate-Drain Charge ^c	Q_{gd}				15	
Gate Resistance	R_g		0.5	1.7	3.3	Ω
Turn-On Delay Time ^c	$t_{d(on)}$	$V_{DD} = 100\text{ V}, R_L = 1.5\text{ }\Omega$ $I_D \cong 65\text{ A}, V_{GEN} = 10\text{ V}, R_g = 2.5\text{ }\Omega$		8		ns
Rise Time ^c	t_r			120		
Turn-Off Delay Time ^c	$t_{d(off)}$			25		
Fall Time ^c	t_f			50		
Source-Drain Diode Ratings and Characteristics $T_C = 25\text{ }^{\circ}\text{C}^b$						
Continuous Current	I_S				65	A
Pulsed Current	I_{SM}				140	
Forward Voltage ^a	V_{SD}	$I_F = 65\text{ A}, V_{GS} = 0\text{ V}$		1.0	1.5	V
Reverse Recovery Time	t_{rr}	$I_F = 50\text{ A}, di/dt = 100\text{ A}/\mu\text{s}$		130	200	ns
Peak Reverse Recovery Current	$I_{RM(REC)}$			8	12	A
Reverse Recovery Charge	Q_{rr}			0.52	1.2	μC

Notes:

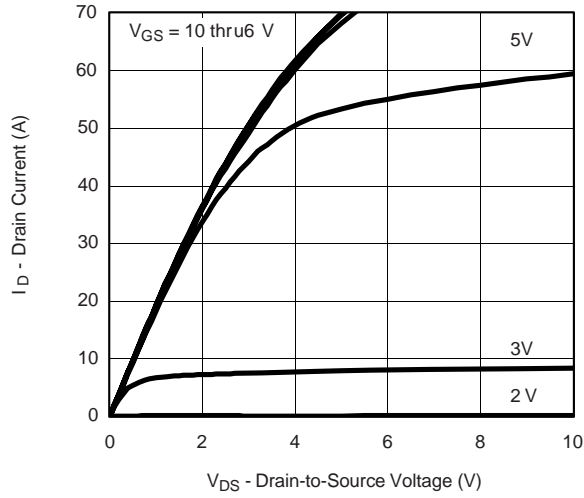
a. Pulse test; pulse width $\leq 300\text{ }\mu\text{s}$, duty cycle $\leq 2\%$.

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

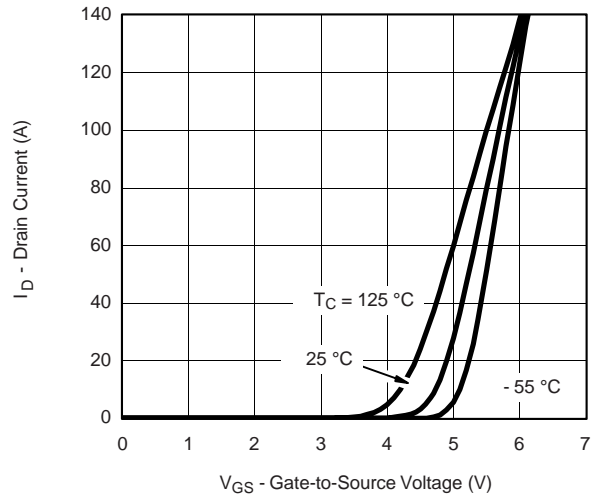
c. Independent of operating temperature.

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



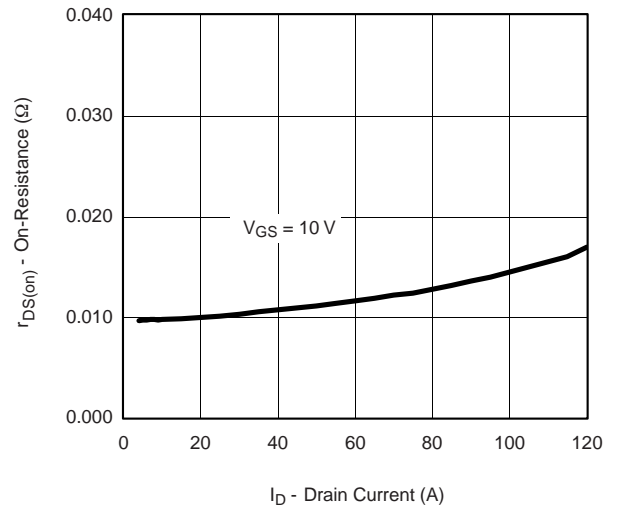
Output Characteristics



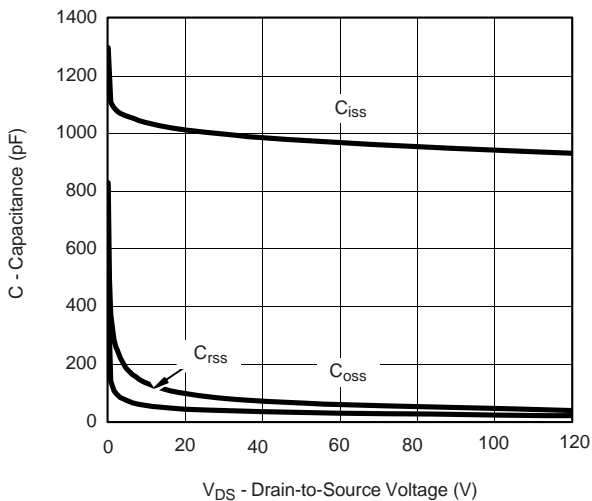
Transfer Characteristics



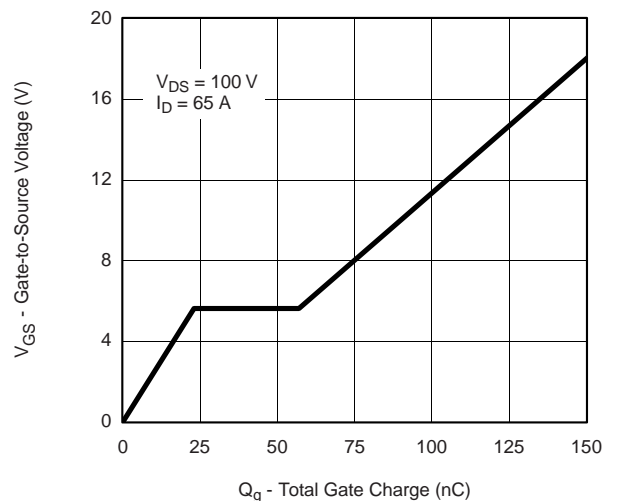
Transconductance



On-Resistance vs. Drain Current



Capacitance



Gate Charge

TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



On-Resistance vs. Junction Temperature



Source-Drain Diode Forward Voltage



Avalanche Current vs. Time



Drain Source Breakdown vs. Junction Temperature

THERMAL RATINGS



Technical drawing of a lead tip assembly, showing front, side, and detail views with dimensions and tolerances.

Front View: Shows the lead tip assembly with dimensions E , D , H , $L1$, $L2$, $L3$, $L4$, $b1$, $b2$, $b3$, $c1$, $c2$, c , A , B , $A1$, $A2$, $A3$, $A4$, $A5$, $A6$, $A7$, $A8$, $A9$, $A10$, $A11$, $A12$, $A13$, $A14$, $A15$, $A16$, $A17$, $A18$, $A19$, $A20$, $A21$, $A22$, $A23$, $A24$, $A25$, $A26$, $A27$, $A28$, $A29$, $A30$, $A31$, $A32$, $A33$, $A34$, $A35$, $A36$, $A37$, $A38$, $A39$, $A40$, $A41$, $A42$, $A43$, $A44$, $A45$, $A46$, $A47$, $A48$, $A49$, $A50$, $A51$, $A52$, $A53$, $A54$, $A55$, $A56$, $A57$, $A58$, $A59$, $A60$, $A61$, $A62$, $A63$, $A64$, $A65$, $A66$, $A67$, $A68$, $A69$, $A70$, $A71$, $A72$, $A73$, $A74$, $A75$, $A76$, $A77$, $A78$, $A79$, $A80$, $A81$, $A82$, $A83$, $A84$, $A85$, $A86$, $A87$, $A88$, $A89$, $A90$, $A91$, $A92$, $A93$, $A94$, $A95$, $A96$, $A97$, $A98$, $A99$, $A100$. Tolerances: ± 0.010 (A), ± 0.004 (B).

Side View: Shows the lead tip assembly with dimensions E , D , H , $L1$, $L2$, $L3$, $L4$, $b1$, $b2$, $b3$, $c1$, $c2$, c , A , B , $A1$, $A2$, $A3$, $A4$, $A5$, $A6$, $A7$, $A8$, $A9$, $A10$, $A11$, $A12$, $A13$, $A14$, $A15$, $A16$, $A17$, $A18$, $A19$, $A20$, $A21$, $A22$, $A23$, $A24$, $A25$, $A26$, $A27$, $A28$, $A29$, $A30$, $A31$, $A32$, $A33$, $A34$, $A35$, $A36$, $A37$, $A38$, $A39$, $A40$, $A41$, $A42$, $A43$, $A44$, $A45$, $A46$, $A47$, $A48$, $A49$, $A50$, $A51$, $A52$, $A53$, $A54$, $A55$, $A56$, $A57$, $A58$, $A59$, $A60$, $A61$, $A62$, $A63$, $A64$, $A65$, $A66$, $A67$, $A68$, $A69$, $A70$, $A71$, $A72$, $A73$, $A74$, $A75$, $A76$, $A77$, $A78$, $A79$, $A80$, $A81$, $A82$, $A83$, $A84$, $A85$, $A86$, $A87$, $A88$, $A89$, $A90$, $A91$, $A92$, $A93$, $A94$, $A95$, $A96$, $A97$, $A98$, $A99$, $A100$. Tolerances: ± 0.010 (A), ± 0.004 (B).

Detail A: Shows the lead tip assembly with dimensions E , D , H , $L1$, $L2$, $L3$, $L4$, $b1$, $b2$, $b3$, $c1$, $c2$, c , A , B , $A1$, $A2$, $A3$, $A4$, $A5$, $A6$, $A7$, $A8$, $A9$, $A10$, $A11$, $A12$, $A13$, $A14$, $A15$, $A16$, $A17$, $A18$, $A19$, $A20$, $A21$, $A22$, $A23$, $A24$, $A25$, $A26$, $A27$, $A28$, $A29$, $A30$, $A31$, $A32$, $A33$, $A34$, $A35$, $A36$, $A37$, $A38$, $A39$, $A40$, $A41$, $A42$, $A43$, $A44$, $A45$, $A46$, $A47$, $A48$, $A49$, $A50$, $A51$, $A52$, $A53$, $A54$, $A55$, $A56$, $A57$, $A58$, $A59$, $A60$, $A61$, $A62$, $A63$, $A64$, $A65$, $A66$, $A67$, $A68$, $A69$, $A70$, $A71$, $A72$, $A73$, $A74$, $A75$, $A76$, $A77$, $A78$, $A79$, $A80$, $A81$, $A82$, $A83$, $A84$, $A85$, $A86$, $A87$, $A88$, $A89$, $A90$, $A91$, $A92$, $A93$, $A94$, $A95$, $A96$, $A97$, $A98$, $A99$, $A100$. Tolerances: ± 0.010 (A), ± 0.004 (B).

Section B - B and C - C: Shows the lead tip assembly with dimensions E , D , H , $L1$, $L2$, $L3$, $L4$, $b1$, $b2$, $b3$, $c1$, $c2$, c , A , B , $A1$, $A2$, $A3$, $A4$, $A5$, $A6$, $A7$, $A8$, $A9$, $A10$, $A11$, $A12$, $A13$, $A14$, $A15$, $A16$, $A17$, $A18$, $A19$, $A20$, $A21$, $A22$, $A23$, $A24$, $A25$, $A26$, $A27$, $A28$, $A29$, $A30$, $A31$, $A32$, $A33$, $A34$, $A35$, $A36$, $A37$, $A38$, $A39$, $A40$, $A41$, $A42$, $A43$, $A44$, $A45$, $A46$, $A47$, $A48$, $A49$, $A50$, $A51$, $A52$, $A53$, $A54$, $A55$, $A56$, $A57$, $A58$, $A59$, $A60$, $A61$, $A62$, $A63$, $A64$, $A65$, $A66$, $A67$, $A68$, $A69$, $A70$, $A71$, $A72$, $A73$, $A74$, $A75$, $A76$, $A77$, $A78$, $A79$, $A80$, $A81$, $A82$, $A83$, $A84$, $A85$, $A86$, $A87$, $A88$, $A89$, $A90$, $A91$, $A92$, $A93$, $A94$, $A95$, $A96$, $A97$, $A98$, $A99$, $A100$. Tolerances: ± 0.010 (A), ± 0.004 (B).

View A - A: Shows the lead tip assembly with dimensions E , D , H , $L1$, $L2$, $L3$, $L4$, $b1$, $b2$, $b3$, $c1$, $c2$, c , A , B , $A1$, $A2$, $A3$, $A4$, $A5$, $A6$, $A7$, $A8$, $A9$, $A10$, $A11$, $A12$, $A13$, $A14$, $A15$, $A16$, $A17$, $A18$, <

	MILLIMETERS		INCHES	
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	
L4	4.78	5.28	0.188	0.208

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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