

NP109N04PUJ-E2B-AY-VB Datasheet

N-Channel 40 V (D-S) MOSFET

PRODUCT SUMMARY				
V _{DS} (V)	$R_{DS(on)}(\Omega)$	I _D (A) ^{a, c}	Q _g (Typ.)	
40	0.0017 at V _{GS} = 10 V	150	120 nC	
	0.0025 at V _{GS} = 4.5 V	135	120110	

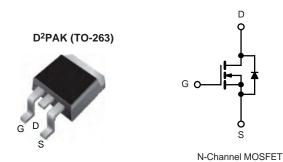
FEATURES

- Trench Power MOSFET
- 100 % R_g and UIS Tested



APPLICATIONS

- Synchronous Rectification
- Power Supplies



ABSOLUTE MAXIMUM RATINGS Parameter	Symbol	Limit	Unit		
Drain-Source Voltage	V _{DS}	40	V		
Gate-Source Voltage	V _{GS}	± 25			
	T _C = 25 °C		150 ^{a, c}		
Continuous Drain Current (T _J = 175 °C)	T _C = 70 °C		120 ^c		
	T _A = 25 °C	I _D	29 ^b		
	T _A = 70 °C		23 ^b	A	
Pulsed Drain Current		I _{DM}	380	7	
Avalanche Current Pulse	L = 0.1 mH	I _{AS}	80		
Single Pulse Avalanche Energy	L = 0.1 mn	E _{AS}	320	mJ	
Continuous Source-Drain Diode Current	T _C = 25 °C	I.	110 ^{a, c}	Δ.	
Continuous Source-Drain Diode Current	T _A = 25 °C	I _S	2.6 ^b	A	
	T _C = 25 °C		312 ^a		
Mariana Davia Diaria tian	T _C = 70 °C		200	14/	
Maximum Power Dissipation	T _A = 25 °C	P _D	3.13 ^b	W	
	T _A = 70 °C		2.0 ^b		
Operating Junction and Storage Temperature R	T _J , T _{stg}	- 55 to 150	°C		

THERMAL RESISTANCE RATINGS							
Parameter	Symbol	Typical	Maximum	Unit			
Maximum Junction-to-Ambient ^b	Steady State	R _{thJA}	32	40	°C/W		
Maximum Junction-to-Case	Steady State	R_{thJC}	0.33	0.4]		

Notes:

- a. Based on $T_C = 25$ °C.
- b. Surface Mounted on 1" x 1" FR4 board.
- c. Calculated based on maximum junction temperature. Package limitation current is 110 $\,\mathrm{A.}$

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Parameter	Symbol	Test Conditions	Min.	Тур.	Max.	Unit	
Static				•			
Drain-Source Breakdown Voltage	V _{DS}	$V_{GS} = 0 \text{ V}, I_D = 250 \mu\text{A}$	45			V	
V _{DS} Temperature Coefficient	$\Delta V_{DS}/T_{J}$	I _D = 250 μA		41		mV/°C	
V _{GS(th)} Temperature Coefficient	$\Delta V_{GS(th)}/T_J$	ι _D = 230 μΑ		- 8			
Gate-Source Threshold Voltage	V _{GS(th)}	$V_{DS} = V_{GS}, I_{D} = 250 \mu A$	1.2		2.5	V	
Gate-Source 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} = 40 V, V _{GS} = 0 V			1		
		$V_{DS} = 40 \text{ V}, V_{GS} = 0 \text{ V}, T_{J} = 55 \text{ °C}$			10	μA	
On-State Drain Current ^a	I _{D(on)}	$V_{DS} \ge 5 \text{ V}, V_{GS} = 10 \text{ V}$	120			Α	
Drain-Source On-State Resistance ^a	R _{DS(on)}	$V_{GS} = 10 \text{ V}, I_D = 30 \text{ A}$		0.0017			
		$V_{GS} = 4.5 \text{ V}, I_D = 20 \text{ A}$		0.0025		Ω	
Forward Transconductance ^a	9 _{fs}	V _{DS} = 15 V, I _D = 30 A		180		S	
Dynamic ^b							
Input Capacitance	C _{iss}			9000		pF	
Output Capacitance	C _{oss}	$V_{DS} = 20 \text{ V}, V_{GS} = 0 \text{ V}, f = 1 \text{ MHz}$		650			
Reverse Transfer Capacitance	C _{rss}			450			
Total Gate Charge	Q_g			120	180	nC	
Gate-Source Charge	Q_{gs}	$V_{DS} = 20 \text{ V}, V_{GS} = 10 \text{ V}, I_{D} = 20 \text{ A}$		30			
Gate-Drain Charge	Q_{gd}			16			
Gate Resistance	R_g	f = 1 MHz		0.85	1.3	Ω	
Turn-On Delay Time	t _{d(on)}			20	30		
Rise Time	t _r	$V_{DD} = 20 \text{ V}, R_{L} = 1.0 \Omega$		11	17		
Turn-Off Delay Time	t _{d(off)}	$I_D \cong 20 \text{ A}, V_{GEN} = 10 \text{ V}, R_g = 1 \Omega$		77	115		
Fall Time	t _f			10	15		
Turn-On Delay Time	t _{d(on)}			102	155	ns	
Rise Time	t _r	$V_{DD} = 20 \text{ V}, R_{L} = 1.0 \Omega$		62	95		
Turn-Off Delay Time	t _{d(off)}	$I_D\cong 20$ A, $V_{GEN}=4.5$ V, $R_g=1$ Ω		180	270		
Fall Time	t _f			60	90		
Drain-Source Body Diode Characteristic	s						
Continuous Source-Drain Diode Current	I _S	T _C = 25 °C			110	A	
Pulse Diode Forward Current ^a	I _{SM}				200	A	
Body Diode Voltage	V_{SD}	I _S = 20 A		0.8	1.2	V	
Body Diode Reverse Recovery Time	t _{rr}			50	75	ns	
Body Diode Reverse Recovery Charge	Q _{rr}			70	105	nC	
Reverse Recovery Fall Time	ta			30			
Reverse Recovery Rise Time	t _b			20		ns	

Notes:

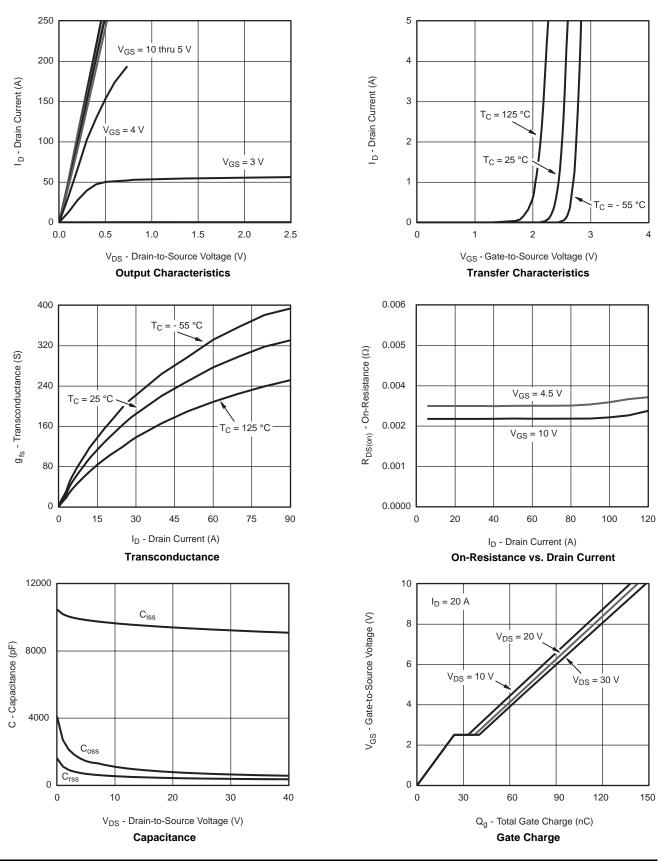
- a. Pulse test; pulse width $\leq 300~\mu s,$ duty cycle $\leq 2~\%.$
- b. Guaranteed by design, not subject to production testing.

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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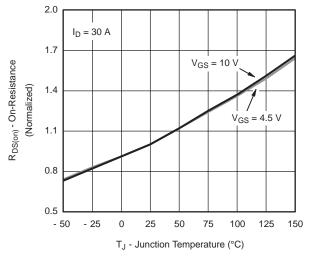


TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted

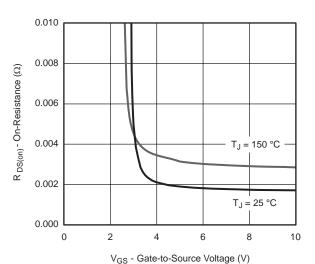




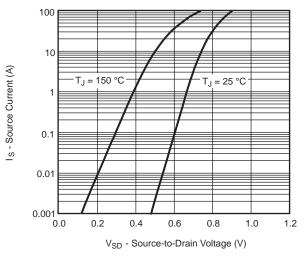
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On-Resistance vs. Junction Temperature



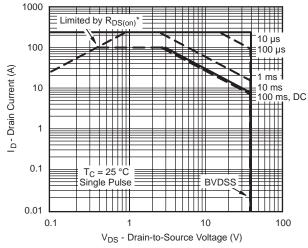
On-Resistance vs. Gate-to-Source Voltage



Forward Diode Voltage vs. Temperature



Threshold Voltage

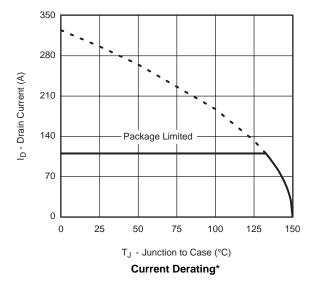


* V_{GS} > minimum V_{GS} at which $R_{DS(on)}$ is specified

Safe Operating Area, Junction-to-Ambient

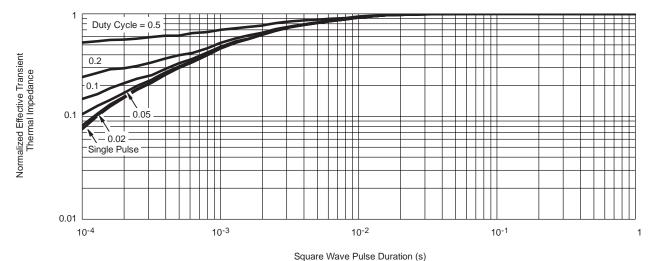


TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted





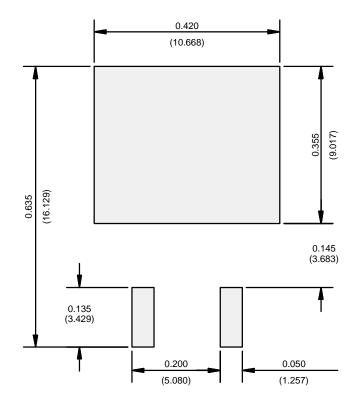
* The power dissipation P_D is based on $T_{J(max)}$ = 150 °C, using junction-to-case thermal resistance, and is more useful in settling the upper dissipation limit for cases where additional heatsinking is used. It is used to determine the current rating, when this rating falls below the package limit.



Normalized Thermal Transient Impedance, Junction-to-Case



RECOMMENDED MINIMUM PADS FOR D²PAK: 3-Lead



Recommended Minimum Pads Dimensions in Inches/(mm)

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