

RoHS

COMPLIANT

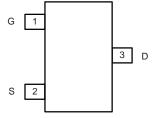
HALOGEN

FREE

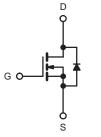
## MTNK2N3-VB Datasheet N-Channel 60-V (D-S) MOSFET

PRODUCT SUMMARY				
V <sub>DS</sub> (V)	R <sub>DS(on)</sub> (Ω)	I <sub>D</sub> (mA)		
60	2.8 at V <sub>GS</sub> = 10 V	250		









N-Channel MOSFET

#### **FEATURES**

- Halogen-free According to IEC 61249-2-21
  Definition
- Low Threshold: 2 V (typ.)
- Low Input Capacitance: 25 pF
- Fast Switching Speed: 25 ns
- Low Input and Output Leakage
- Trench Power MOSFET
- Compliant to RoHS Directive 2002/95/EC

#### BENEFITS

- Low Offset Voltage
- Low-Voltage Operation
- · Easily Driven Without Buffer
- High-Speed Circuits
- Low Error Voltage

#### **APPLICATIONS**

- Direct Logic-Level Interface: TTL/CMOS
- Drivers: Relays, Solenoids, Lamps, Hammers, Display, Memories, Transistors, etc.
- Battery Operated Systems
- Solid-State Relays

<b>ABSOLUTE MAXIMUM RATINGS</b> $T_A = 25 \text{ °C}$ , unless otherwise noted					
Parameter	Symbol	Limit	Unit		
Drain-Source Voltage		V <sub>DS</sub>	60	V	
Gate-Source Voltage	V <sub>GS</sub>	± 20			
Continuous Drain Current (T <sub>.I</sub> = 150 °C) <sup>b</sup>	T <sub>A</sub> = 25 °C	I <sub>D</sub>	250	mA	
Continuous Drain Current $(T_J = 150 \text{ °C})^2$	T <sub>A</sub> = 100 °C		150		
Pulsed Drain Current <sup>a</sup>	I <sub>DM</sub>	800			
	T <sub>A</sub> = 25 °C	D	0.30	14/	
Power Dissipation <sup>b</sup>	T <sub>A</sub> = 100 °C	PD	0.13	W	
Maximum Junction-to-Ambient <sup>b</sup>		R <sub>thJA</sub>	350	°C/W	
Operating Junction and Storage Temperature Range		T <sub>J,</sub> T <sub>stg</sub>	- 55 to 150	°C	

Notes:

a. Pulse width limited by maximum junction temperature.

b. Surface Mounted on FR4 board.

\* Pb containing terminations are not RoHS compliant, exemptions may apply.

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			Limits				
Parameter	Symbol	Test Conditions	Min.	Typ. <sup>a</sup>	Max.	Max. Unit	
Static			•	•	•		
Drain-Source Breakdown Voltage	V <sub>DS</sub>	$V_{GS} = 0 V$ , $I_{D} = 10 \mu A$	60			v	
Gate-Threshold Voltage	V <sub>GS(th)</sub>	$V_{DS} = V_{GS}$ , $I_D = 250 \ \mu A$	1		2.5	v	
		$V_{DS} = 0 V, V_{GS} = \pm 20 V$			± 10		
		$V_{DS} = 0 V, V_{GS} = \pm 15 V$			1	μA	
Gate-Body Leakage	I <sub>GSS</sub>	$V_{DS} = 0 V, V_{GS} = \pm 10 V$			± 150	nA	
		$V_{DS} = 0 V, V_{GS} = \pm 10 V, T_{J} = 85 °C$			± 1000		
		$V_{DS} = 0 V, V_{GS} = \pm 5 V$			± 100		
Zana Osta Malta en Dasia Osmanl		$V_{DS} = 60 \text{ V}, V_{GS} = 0 \text{ V}$			1		
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	$V_{DS} = 60 \text{ V}, \text{ V}_{GS} = 0 \text{ V}, \text{ T}_{J} = 125 ^{\circ}\text{C}$			500	μA	
On-State Drain Current <sup>a</sup>	I <sub>D(on)</sub>	$V_{GS}$ = 10 V, $V_{DS}$ = 7.5 V	500				
		$V_{GS}$ = 4.5 V, $V_{DS}$ = 10 V	300			mA	
	R <sub>DS(on)</sub>	V <sub>GS</sub> = 10 V, I <sub>D</sub> = 200 mA		2.8			
Drain-Source On-Resistance <sup>a</sup>		V <sub>GS</sub> = 4.5 V, I <sub>D</sub> = 150 mA		3.1		Ω	
Forward Transconductance <sup>a</sup>	9 <sub>fs</sub>	V <sub>DS</sub> = 10 V, I <sub>D</sub> = 100 mA	100			mS	
Diode Forward Voltage	V <sub>SD</sub>	I <sub>S</sub> = 100 mA, V <sub>GS</sub> = 0 V			1.3	V	
Dynamic <sup>a</sup>			•		•		
Total Gate Charge	Qg	$V_{DS} = 10 \text{ V}, V_{GS} = 4.5 \text{ V}$ $I_{D} \cong 150 \text{ mA}$		0.4	0.6	nC	
Input Capacitance	C <sub>iss</sub>			25			
Output Capacitance	C <sub>oss</sub>	$V_{DS} = 25 V, V_{GS} = 0 V$		5		pF	
Reverse Transfer Capacitance	C <sub>rss</sub>	f = 1 MHz		2.0		1	
Switching <sup>a, b, c</sup>							
Turn-On Time	t <sub>d(on)</sub>	$V_{DD}$ = 30 V, $R_{L}$ = 150 $\Omega$			20		
Turn-Off Time	t <sub>d(off)</sub>	$I_D \cong 200 \text{ mA}, \text{ V}_{\text{GEN}} = 10 \text{ V}, \text{ R}_{\text{G}} = 10 \Omega$		1	30	ns	

Notes:

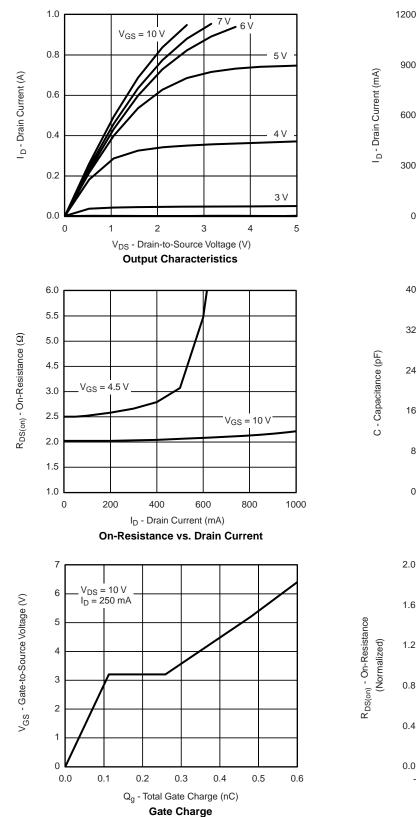
a. For DESIGN AID ONLY, not subject to production testing.

b. Pulse test: PW  $\leq$  300  $\mu s$  duty cycle  $\leq$  2 %.

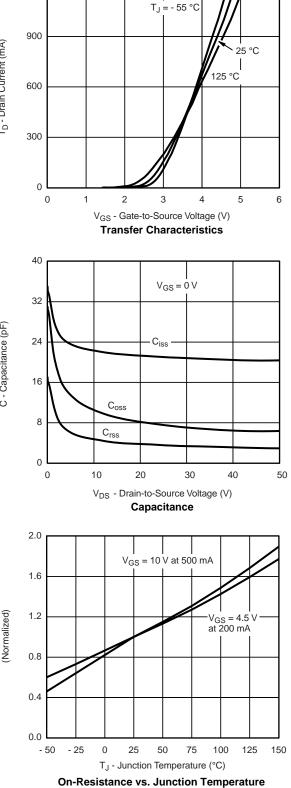
c. Switching time is essentially independent of operating temperature.

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.



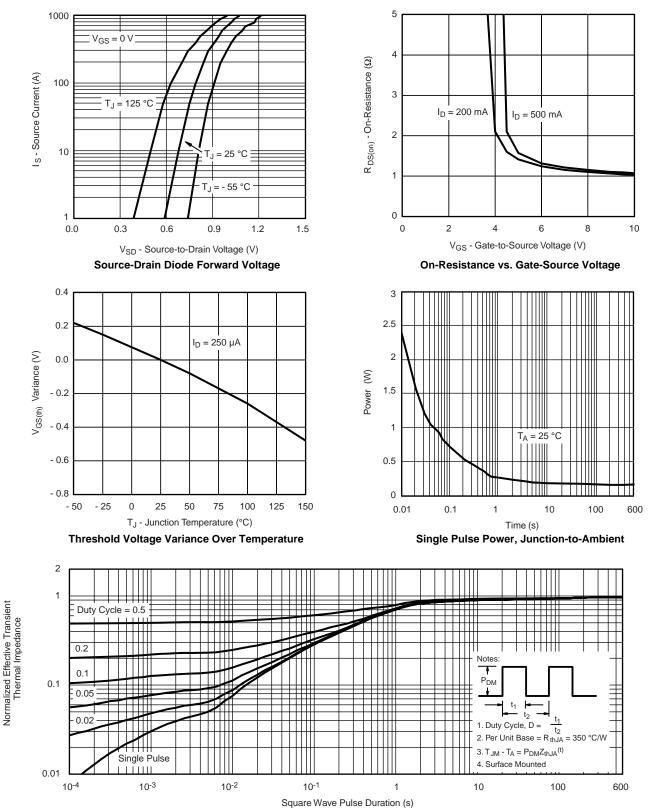


#### TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



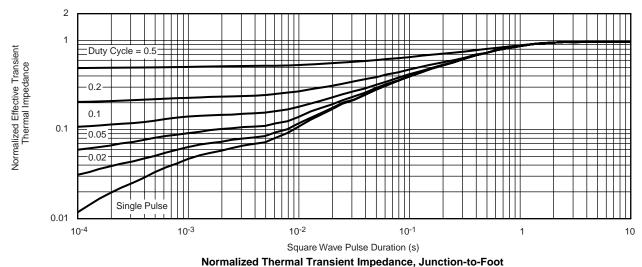


#### TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



Normalized Thermal Transient Impedance, Junction-to-Ambient





#### **THERMAL RATINGS** ( $T_A$ = 25 °C, unless otherwise noted)

#### Note

The characteristics shown in the two graphs

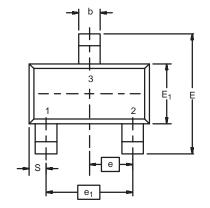
- Normalized Transient Thermal Impedance Junction-to-Ambient (25 °C)

- Normalized Transient Thermal Impedance Junction-to-Foot (25 C)

are given for general guidelines only to enable the user to get a "ball park" indication of part capabilities. The data are extracted from single pulse transient thermal impedance characteristics which are developed from empirical measurements. The latter is valid for the part mounted on printed circuit board - FR4, size 1" x 1" x 0.062", double sided with 2 oz. copper, 100 % on both sides. The part capabilities can widely vary depending on actual application parameters and operating conditions.



### SOT-23 (TO-236): 3-LEAD



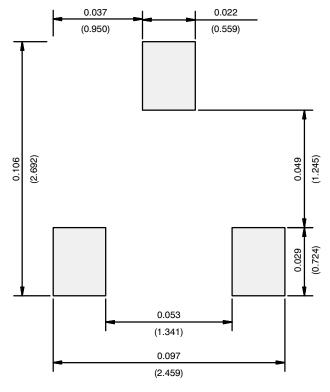




Dim	MILLIMETERS		INCHES		
	Min	Max	Min	Max	
Α	0.89	1.12	0.035	0.044	
A <sub>1</sub>	0.01	0.10	0.0004	0.004	
A <sub>2</sub>	0.88	1.02	0.0346	0.040	
b	0.35	0.50	0.014	0.020	
С	0.085	0.18	0.003	0.007	
D	2.80	3.04	0.110	0.120	
E	2.10	2.64	0.083	0.104	
E <sub>1</sub>	1.20	1.40	0.047	0.055	
е	0.95 BSC		0.0374 Ref		
e <sub>1</sub>	1.90 BSC		0.0748 Ref		
L	0.40	0.60	0.016	0.024	
L <sub>1</sub>	0.64 Ref		0.025 Ref		
S	0.50 Ref		0.020 Ref		
q	3°	8°	3°	8°	
<b>q</b> ECN: S-03946-Rev. K, 09- DWG: 5479	÷	8°	3°	8°	



#### **RECOMMENDED MINIMUM PADS FOR SOT-23**



Recommended Minimum Pads Dimensions in Inches/(mm)



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