



#### 20V N-CHANNEL ENHANCEMENT MODE MOSFET

## **Product Summary**

V <sub>(BR)DSS</sub>	R <sub>DS(ON)</sub> max	I <sub>D</sub> max T <sub>A</sub> = +25°C
	45mΩ @ V <sub>GS</sub> = 4.5V	4.9 A
20V	65mΩ @ V <sub>GS</sub> = 2.5V	4.1 A

## **Features and Benefits**

- Low On-Resistance
- Low Input Capacitance
- Fast Switching Speed
- Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)
- Halogen and Antimony Free. "Green" Device (Note 3)
- Qualified to AEC-Q101 Standards for High Reliability
- PPAP Capable (Note 4)

### **Description and Applications**

This MOSFET is designed to meet the stringent requirements of automotive applications. It is qualified to AEC-Q101, supported by a PPAP and is ideal for use in:

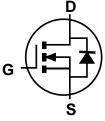
- LED Lighting
- Charging applications in portable equipment
- DC-DC Converters
- Motor Control

### **Mechanical Data**

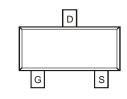
- Case: SOT23
- Case Material: Molded Plastic, "Green" Molding Compound.
  UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Finish —Matte Tin Annealed over Copper Leadframe.
  Solderable per MIL-STD-202, Method 208 (3)
- Terminals Connections: See Diagram Below
- Weight: 0.009 grams (Approximate)



Top View



Internal Schematic



Top View

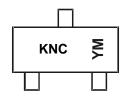
## Ordering Information (Note 5)

Part Number	Case	Packaging	
ZXMN2F30FHQTA	SOT23	3,000/Tape & Reel	

#### Notes:

- 1. No purposely added lead. Fully EU Directive 2002/95/EC (RoHS) & 2011/65/EU (RoHS 2) compliant.
- 2. See http://www.diodes.com/quality/lead\_free.html for more information about Diodes Incorporated's definitions of Halogen- and Antimony-free, "Green" and Lead-free.
- 3. Halogen- and Antimony-free "Green" products are defined as those which contain <900ppm bromine, <900ppm chlorine (<1500ppm total Br + Cl) and <1000ppm antimony compounds.
- 4. Automotive products are AEC-Q101 qualified and are PPAP capable. Refer to http://www.diodes.com/quality/product\_compliance\_definitions/.
- 5. For packaging details, go to our website at http://www.diodes.com/products/packages.html.

## **Marking Information**



 $\begin{array}{l} \text{KNC} = \text{Product Type Marking Code} \\ \text{YM} = \text{Date Code Marking} \\ \text{Y or } \overline{\text{Y}} = \text{Year (ex: D} = 2016) \\ \text{M} = \text{Month (ex: 9} = \text{September)} \end{array}$ 

Date Code Key

Year	2016		2017	2018		2019	2020		2021	2022		2023
Code	D		Е	F		G	Н		I	J		K
Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Code	1	2	3	4	5	6	7	8	9	0	N	D



# **Maximum Ratings** (@ $T_A = +25$ °C, unless otherwise specified.)

Characteristic		Symbol	Value	Units
Drain-Source Voltage		$V_{DSS}$	20	V
Gate-Source Voltage		$V_{GSS}$	±12	V
Continuous Drain Current (Note 7) $V_{GS} = 4.5V$ Steady $T_A = +25^{\circ}C$ State $T_A = +70^{\circ}C$		ΙD	4.9 4.0	Α
Maximum Continuous Body Diode Forward Curre	ent (Note 7)	I <sub>S</sub>	1.6	Α
Pulsed Drain Current (10µs pulse, duty cycle = 1	%)	I <sub>DM</sub>	22.6	Α

## **Thermal Characteristics**

Characteristic		Symbol	Value	Units
Total Power Dissipation (Note 6)		$P_{D}$	0.96	W
Thermal Resistance, Junction to Ambient (Note 6)	Steady State	$R_{\theta JA}$	131	°C/W
Total Power Dissipation (Note 7)		P <sub>D</sub>	1.4	W
Thermal Resistance, Junction to Ambient (Note 7)	Steady State	$R_{\theta JA}$	89	°C/W
Operating and Storage Temperature Range		T <sub>J</sub> , T <sub>STG</sub>	-55 to +150	°C

## **Electrical Characteristics** (@T<sub>A</sub> = +25°C, unless otherwise specified.)

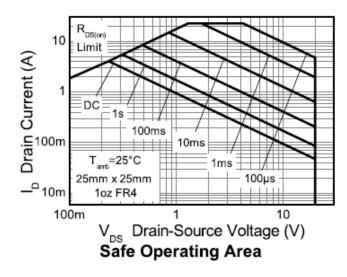
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Characteristic	Symbol	Min	Тур	Max	Unit	Test Condition
OFF CHARACTERISTICS (Note 8)						
Drain-Source Breakdown Voltage	$BV_{DSS}$	20	-	-	V	$V_{GS} = 0V, I_D = 250\mu A$
Zero Gate Voltage Drain Current T <sub>J</sub> = +25°C	I <sub>DSS</sub>	-	-	1	μA	$V_{DS} = 20V, V_{GS} = 0V$
Gate-Source Leakage	I <sub>GSS</sub>	-	-	±100	nA	$V_{GS} = \pm 12V, V_{DS} = 0V$
ON CHARACTERISTICS (Note 8)						
Gate Threshold Voltage	$V_{GS(TH)}$	0.6	0.9	1.5	V	$V_{DS} = V_{GS}, I_{D} = 250 \mu A$
Static Drain-Source On-Resistance		_	-	45	mΩ	$V_{GS} = 4.5V, I_D = 2.5A$
Static Drain-Source On-Nesistance	R <sub>DS(ON)</sub>	-	-	65	11122	$V_{GS} = 2.5V, I_D = 2.0A$
Diode Forward Voltage	$V_{SD}$	-	0.75	1.2	V	$V_{GS} = 0V, I_{S} = 1.25A$
DYNAMIC CHARACTERISTICS (Note 9)						
Input Capacitance	C <sub>iss</sub>	-	452	-	pF	101/11/
Output Capacitance	Coss	-	102	-	pF	$V_{DS} = 10V, V_{GS} = 0V$ - f = 1.0MHz
Reverse Transfer Capacitance	C <sub>rss</sub>	-	58	-	pF	1 = 1.0WH IZ
Total Gate Charge	$Q_g$	-	4.8	-	nC	
Gate-Source Charge	$Q_{gs}$	-	1	-	nC	$V_{DS} = 10V$ , $V_{GS} = 4.5V$ , $I_{D} = 3.5A$
Gate-Drain Charge	$Q_{gd}$	-	1.2	-	nC	
Turn-On Delay Time	t <sub>D(ON)</sub>	-	2.9	-	ns	
Turn-On Rise Time	t <sub>R</sub>	-	5.6	-	ns	$V_{DS} = 10V, V_{GS} = 4.5V,$
Turn-Off Delay Time	t <sub>D(OFF)</sub>	-	19.4	-	ns	$R_G = 6\Omega$ , $I_D = 1A$
Turn-Off Fall Time	t <sub>F</sub>	-	10.2	-	ns	

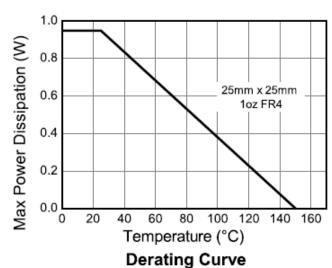
Notes:

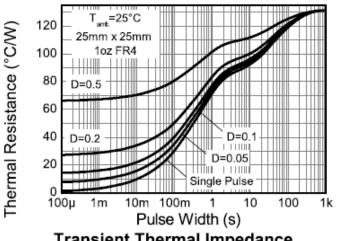
- Device mounted on FR-4 PCB, with minimum recommended pad layout.
  Device mounted on 1" x 1" FR-4 PCB with high coverage 2oz. Copper, single sided.
  Short duration pulse test used to minimize self-heating effect.
- 9. Guaranteed by design. Not subject to product testing.

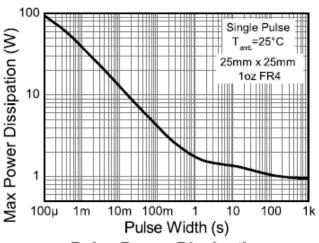


## Thermal characteristics







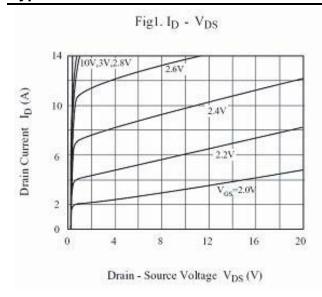


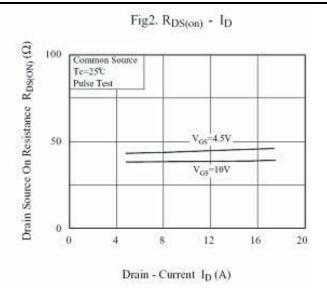
Transient Thermal Impedance

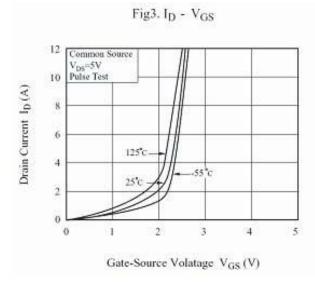
**Pulse Power Dissipation** 

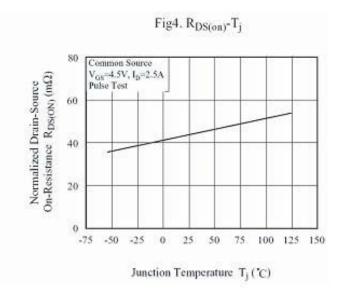


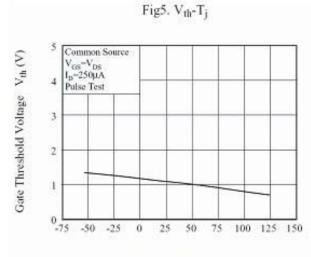
# **Typical Characteristics**

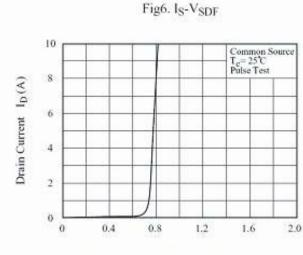












Junction Temperature Ti (C)

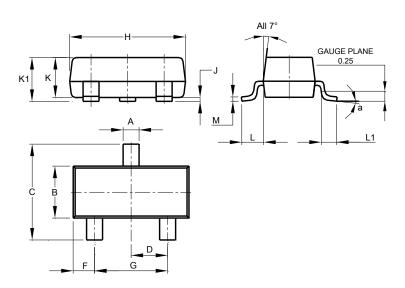
Source - Drain Forward Voltage V<sub>SDF</sub> (V)



# **Package Outline Dimensions**

Please see http://www.diodes.com/package-outlines.html for the latest version.

#### SOT23

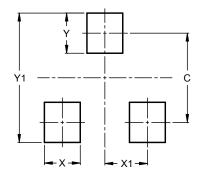


SOT23								
Dim	Min	Max	Тур					
Α	0.37	0.51	0.40					
В	1.20	1.40	1.30					
С	2.30	2.50	2.40					
D	0.89	1.03	0.915					
F	0.45	0.60	0.535					
G	1.78	2.05	1.83					
Н	2.80	3.00	2.90					
J	0.013	0.10	0.05					
K	0.890	1.00	0.975					
K1	0.903	1.10	1.025					
L	0.45	0.61	0.55					
L1	0.25	0.55	0.40					
М	0.085	0.150	0.110					
а	0°	8°						
All Dimensions in mm								

# **Suggested Pad Layout**

Please see http://www.diodes.com/package-outlines.html for the latest version.

### SOT23



Dimensions	Value (in mm)			
С	2.0			
Х	0.8			
X1	1.35			
Υ	0.9			
Y1	2.9			



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