

**100V N-CHANNEL ENHANCEMENT MODE MOSFET**

**Product Summary**

$V_{(BR)DSS}$	$R_{DS(ON)}$	Package	Max $I_D$ $T_A = +25^\circ\text{C}$
100V	125m $\Omega$ @ $V_{GS} = 10\text{V}$	TO252 (DPAK)	6.4A
	150m $\Omega$ @ $V_{GS} = 6\text{V}$		5.8A

**Description**

This MOSFET has been designed to minimize the on-state resistance ( $R_{DS(on)}$ ) and yet maintain superior switching performance, making it ideal for high efficiency power management applications.

**Applications**

- DC-DC Converters
- Power Management Functions
- Disconnect Switches
- Motor Control

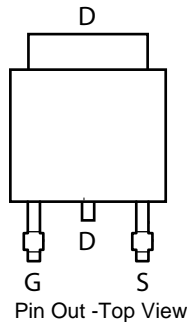
**Features**

- Low On-Resistance
- Fast Switching Speed
- Low Gate Drive
- **Lead-Free Finish; RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- **Qualified to AEC-Q101 Standards for High Reliability**

**Mechanical Data**

- Case: TO252 (DPAK)
- Case Material: Molded Plastic, "Green" Molding Compound. UL Flammability Classification Rating 94V-0 (Note 1)
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Matte Tin Finish annealed over Copper leadframe. Solderable per MIL-STD-202, Method 208
- Weight: 0.33 grams (approximate)

TO252



Top View

Pin Out -Top View

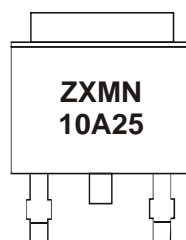
Equivalent Circuit

**Ordering Information (4 & 5)**

Part Number	Marking	Reel size (inches)	Tape width (mm)	Quantity per reel
ZXMN10A25KTC	ZXMN10A25	13	16	2,500

- Notes:
1. EU Directive 2002/95/EC (RoHS) & 2011/65/EU (RoHS 2) compliant. All applicable RoHS exemptions applied.
  2. See <http://www.diodes.com> 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. For Packaging Details, go to our website at <http://www.diodes.com>.
  5. Products with Q-suffix are automotive grade. Automotive products are electrical and thermal the same as the commercial, except where specified.

**Marking Information**



ZXMN10A25 = Product Type Marking Code

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

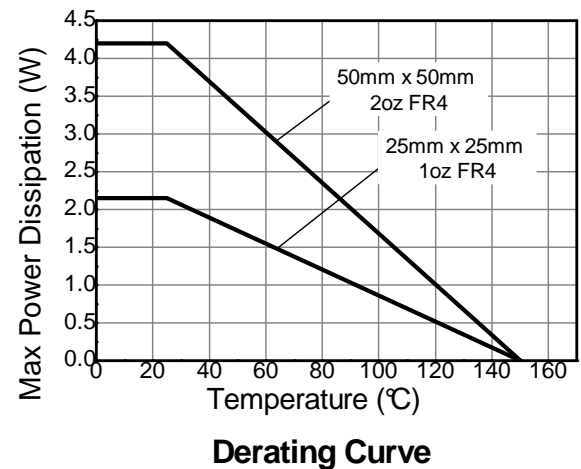
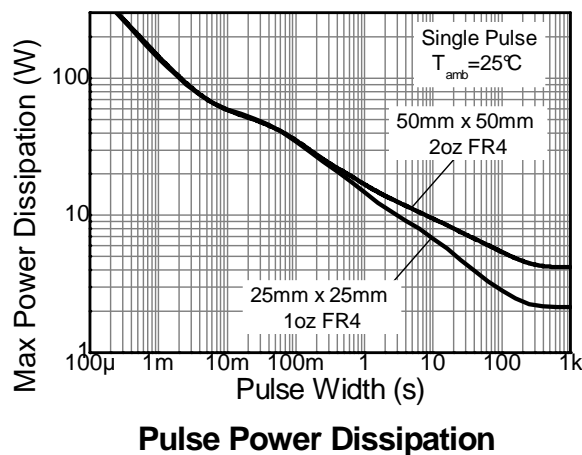
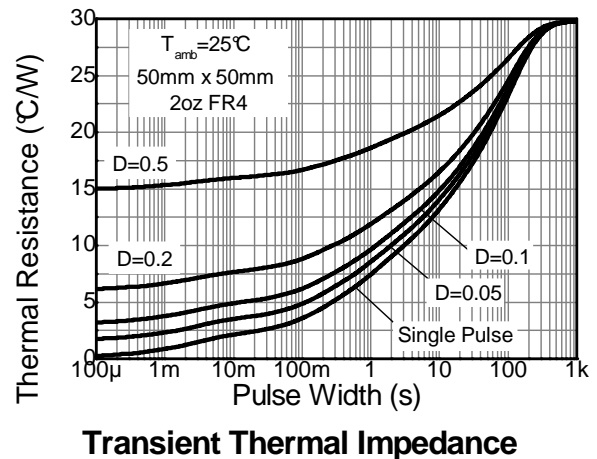
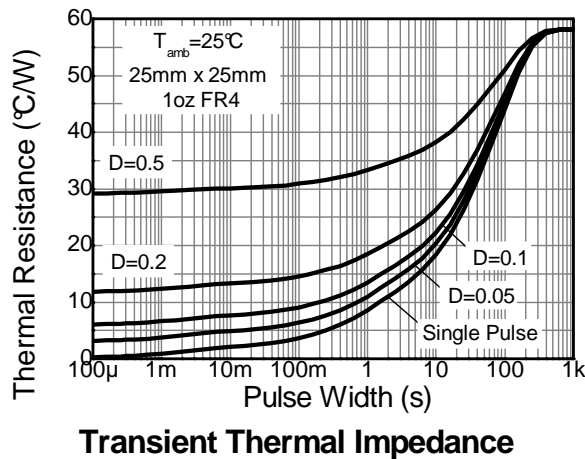
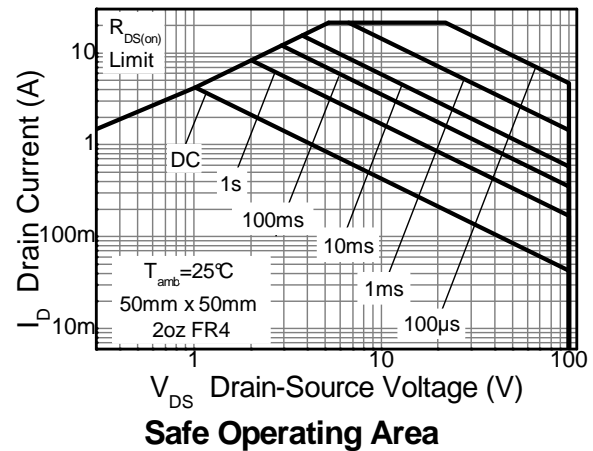
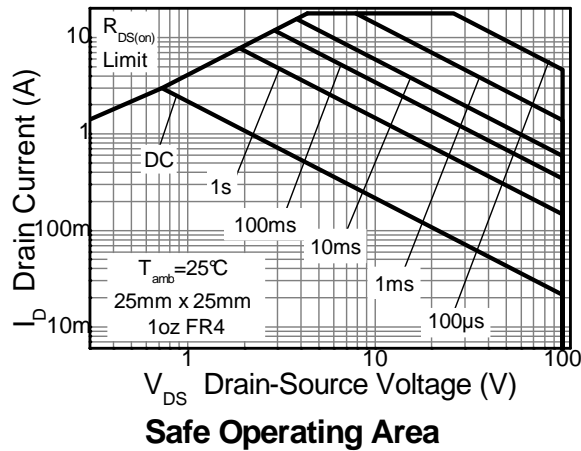
Characteristic			Symbol	Value	Unit
Drain-Source voltage			V <sub>DSS</sub>	100	V
Gate-Source voltage			V <sub>GS</sub>	±20	V
Continuous Drain current	V <sub>GS</sub> = 10V	(Note 7)	I <sub>D</sub>	6.4	A
		T <sub>A</sub> = +70°C (Note 7)		5	
		(Note 6)		4.2	
Pulsed Drain current		(Note 8)	I <sub>DM</sub>	21	A
Continuous Source current (Body diode)		(Note 7)	I <sub>S</sub>	10	A
Pulsed Source current (Body diode)		(Note 8)	I <sub>SM</sub>	21	A

## Thermal Characteristics

Characteristic		Symbol	Value	Unit
Power dissipation Linear derating factor	(Note 6)	P <sub>D</sub>	4.25	W mW/°C
			34	
	(Note 7)		9.85	
			78.7	
Thermal Resistance, Junction to Ambient	(Note 9)	R <sub>θJA</sub>	2.11	°C/W
			16.8	
	(Note 6)		29.4	
	(Note 7)		12.7	
Thermal Resistance, Junction to Lead	(Note 9)	R <sub>θJL</sub>	59.1	°C/W
	(Note 10)		1.43	
Operating and storage temperature range		T <sub>J</sub> , T <sub>STG</sub>	-55 to 150	°C

- Notes:
6. For a device surface mounted on 50mm x 50mm x 1.6mm FR4 PCB with high coverage of single sided 2oz copper, in still air conditions; the device is measured when operating in a steady-state condition.
  7. For a device surface mounted on FR4 PCB measured at t ≤ 10 sec.
  8. Repetitive rating 50mm x 50mm x 1.6mm FR4 PCB, D = 0.02 and pulse width 300μs. The pulse current is limited by the maximum junction temperature.
  9. For a device surface mounted on 25mm x 25mm x 1.6mm FR4 PCB with high coverage of single sided 1oz copper, in still air conditions; the device is measured when operating in a steady-state condition.
  10. Thermal resistance from junction to solder-point (at the end of the drain lead).

## Thermal Characteristics

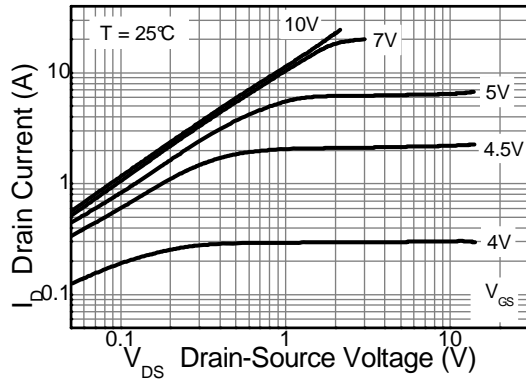


**Electrical Characteristics** (@T<sub>A</sub> = +25°C, unless otherwise specified.)

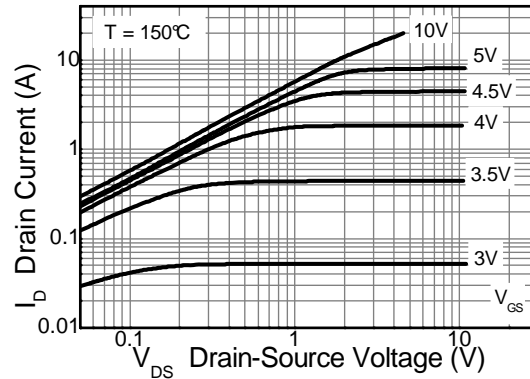
Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
<b>OFF CHARACTERISTICS</b>						
Drain-Source Breakdown Voltage	BV <sub>DSS</sub>	100	—	—	V	I <sub>D</sub> = 250μA, V <sub>GS</sub> = 0V
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	—	—	0.5	μA	V <sub>DS</sub> = 100V, V <sub>GS</sub> = 0V
Gate-Source Leakage	I <sub>GSS</sub>	—	—	±100	nA	V <sub>GS</sub> = ±20V, V <sub>DS</sub> = 0V
<b>ON CHARACTERISTICS</b>						
Gate Threshold Voltage	V <sub>GS(th)</sub>	2.0	—	4.0	V	I <sub>D</sub> = 250μA, V <sub>DS</sub> = V <sub>GS</sub>
Static Drain-Source On-Resistance (Note 11)	R <sub>DS(on)</sub>	—	—	125	mΩ	V <sub>GS</sub> = 10V, I <sub>D</sub> = 3.2A
				150		V <sub>GS</sub> = 6V, I <sub>D</sub> = 2.6A
Forward Transconductance (Notes 11 & 12)	g <sub>fs</sub>	—	7.3	—	S	V <sub>DS</sub> = 15V, I <sub>D</sub> = 2.9A
Diode Forward Voltage (Note 11)	V <sub>SD</sub>	—	0.85	0.95	V	I <sub>S</sub> = 3.2A, V <sub>GS</sub> = 0V, T <sub>J</sub> = +25°C
Reverse recovery time (Note 12)	t <sub>rr</sub>	—	40.5	—	ns	I <sub>S</sub> = 2.9A, di/dt = 100A/μs
Reverse recovery charge (Note 12)	Q <sub>rr</sub>	—	62	—	nC	T <sub>J</sub> = +25°C
<b>DYNAMIC CHARACTERISTICS (Note 12)</b>						
Input Capacitance	C <sub>iss</sub>	—	859	—	pF	V <sub>DS</sub> = 50V, V <sub>GS</sub> = 0V f = 1MHz
Output Capacitance	C <sub>oss</sub>	—	57.3	—	pF	
Reverse Transfer Capacitance	C <sub>rss</sub>	—	33	—	pF	
Total Gate Charge (Note 13)	Q <sub>g</sub>	—	9.6	—	nC	V <sub>GS</sub> = 5V
Total Gate Charge (Note 13)	Q <sub>g</sub>	—	17.16	—	nC	V <sub>GS</sub> = 10V
Gate-Source Charge (Note 13)	Q <sub>gs</sub>	—	3.77	—	nC	
Gate-Drain Charge (Note 13)	Q <sub>gd</sub>	—	5.36	—	nC	
Turn-On Delay Time (Note 13)	t <sub>D(on)</sub>	—	4.9	—	ns	V <sub>DD</sub> = 50V, V <sub>GS</sub> = 10V I <sub>D</sub> = 1A, R <sub>G</sub> ≅ 6.0Ω
Turn-On Rise Time (Note 13)	t <sub>r</sub>	—	3.7	—	ns	
Turn-Off Delay Time (Note 13)	t <sub>D(off)</sub>	—	17.7	—	ns	
Turn-Off Fall Time (Note 13)	t <sub>f</sub>	—	9.4	—	ns	

Notes: 11. Measured under pulsed conditions. Pulse width ≤ 300μs; duty cycle ≤ 2%  
12. For design aid only, not subject to production testing.  
13. Switching characteristics are independent of operating junction temperatures.

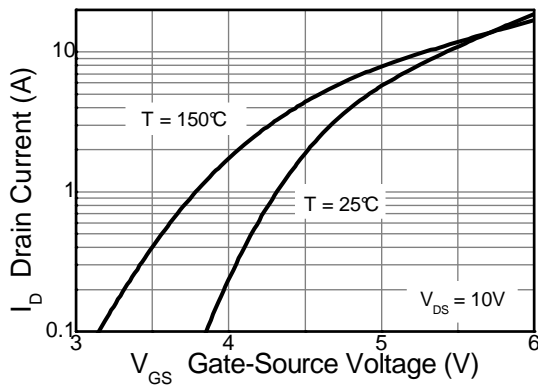
## Typical Characteristics



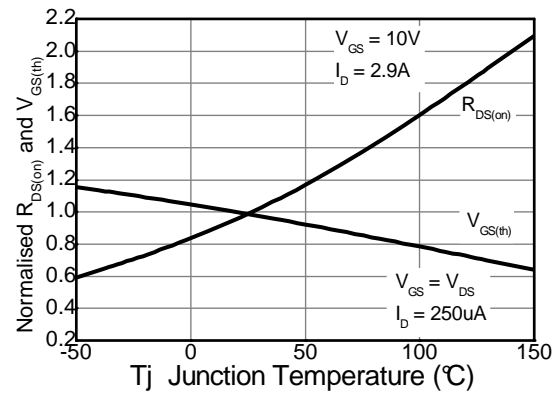
**Output Characteristics**



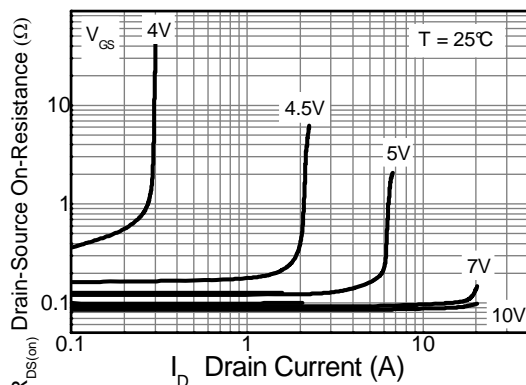
**Output Characteristics**



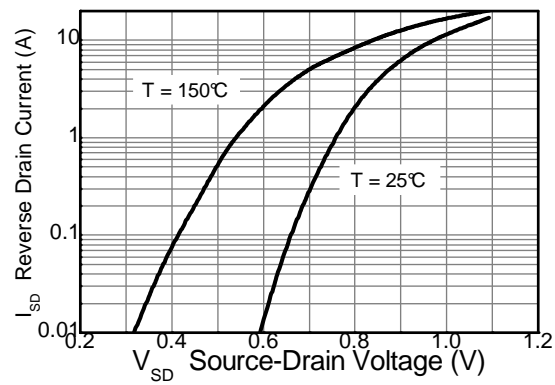
**Typical Transfer Characteristics**



**Normalised Curves v Temperature**

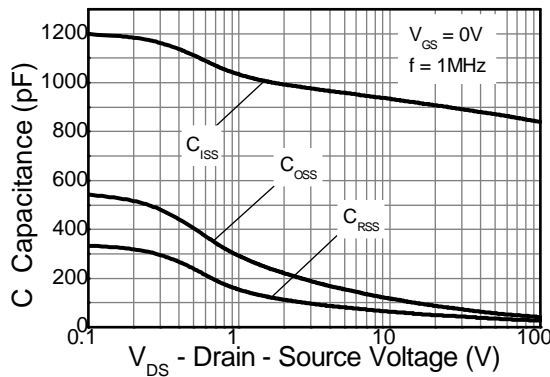


**On-Resistance v Drain Current**

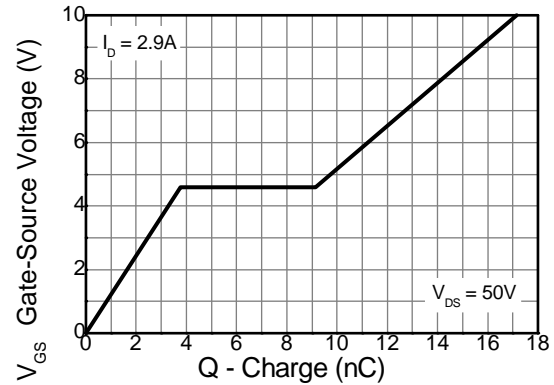


**Source-Drain Diode Forward Voltage**

## Typical Characteristics (cont.)

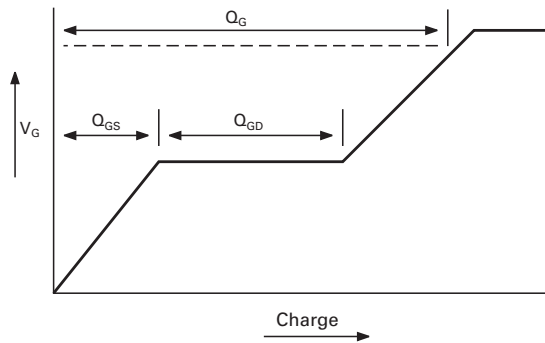


Capacitance v Drain-Source Voltage

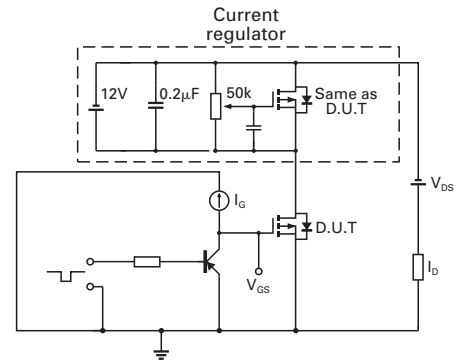


Gate-Source Voltage v Gate Charge

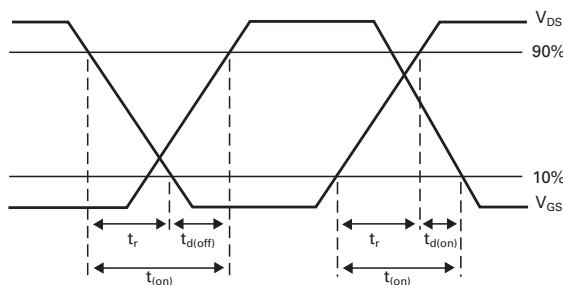
## Test Circuits



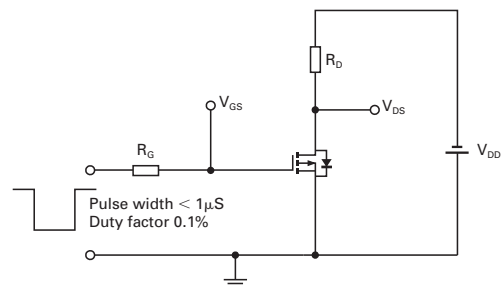
Basic gate charge waveform



Gate charge test circuit



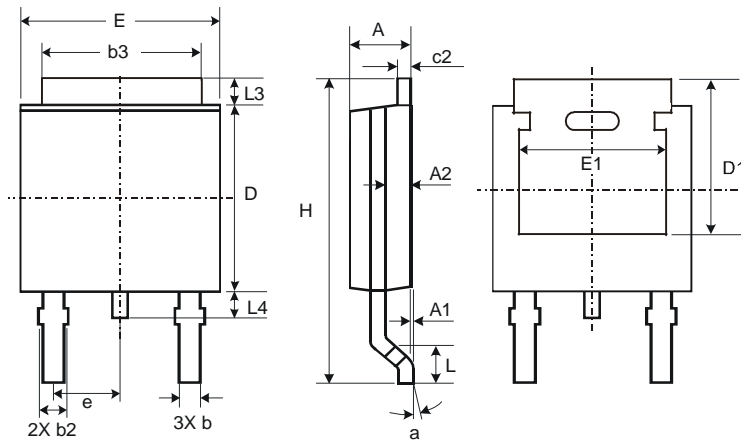
Switching time waveforms



Switching time test circuit

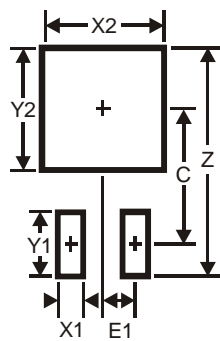
**ZXMN10A25K**

## Package Outline Dimensions



TO252			
Dim	Min	Max	Typ
A	2.19	2.39	2.29
A1	0.00	0.13	0.08
A2	0.97	1.17	1.07
b	0.64	0.88	0.783
b2	0.76	1.14	0.95
b3	5.21	5.46	5.33
c2	0.45	0.58	0.531
D	6.00	6.20	6.10
D1	5.21	—	—
e	—	—	2.286
E	6.45	6.70	6.58
E1	4.32	—	—
H	9.40	10.41	9.91
L	1.40	1.78	1.59
L3	0.88	1.27	1.08
L4	0.64	1.02	0.83
a	0°	10°	—
All Dimensions in mm			

## Suggested Pad Layout



Dimensions	Value (in mm)
Z	11.6
X1	1.5
X2	7.0
Y1	2.5
Y2	7.0
C	6.9
E1	2.3

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