

200V N-CHANNEL ENHANCEMENT MODE MOSFET

Product Summary

$V_{(BR)DSS}$	$R_{DS(on)}$	I_D $T_A = 25^\circ C$
200V	750m Ω @ $V_{GS} = 10V$	2.3A
	780m Ω @ $V_{GS} = 5V$	2.3A

Description and Applications

This MOSFET features low on-resistance, fast switching and a high avalanche withstand capability, making it ideal for high efficiency power management applications.

- SLIC line drivers for VoIP applications
- Transformer driving switch
- Power management functions
- Motor control
- Uninterrupted power supply

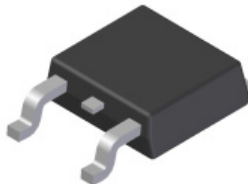
Features and Benefits

- 100% Unclamped Inductive Switch (UIS) test in production
- High avalanche energy pulse withstand capability
- Low gate drive voltage (Logic level capable)
- Low input capacitance
- Low on-resistance
- Fast switching speed
- “Green” Component and RoHS compliant (Note 1)
- Qualified to AEC-Q101 Standards for High Reliability

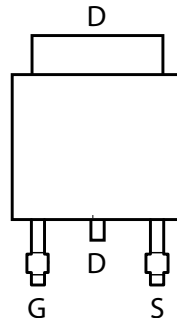
Mechanical Data

- Case: TO252-3L
- Case Material: Molded Plastic “Green” Molding Compound, UL Flammability Classification Rating 94V-0 (Note 1)
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminal Connections: See Diagram
- Terminals: Matte Tin Finish annealed over Copper leadframe. Solderable per MIL-STD-202, Method 208
- Weight: 0.33 grams (approximate)

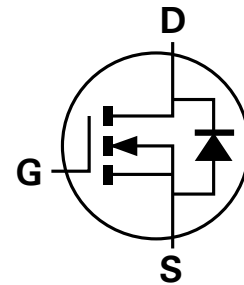
TO252-3L



Top View



Pin Out – Top View



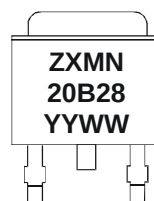
Equivalent Circuit

Ordering Information (Note 1)

Product	Marking	Reel size (inches)	Tape width (mm)	Quantity per reel
ZXMN20B28KTC	See below	13	16	2,500

Note: 1. Diodes, Inc. defines “Green” products as those which are Eu RoHS compliant and contain no halogens or antimony compounds; further information about Diodes Inc.’s “Green” Policy can be found on our website. For packaging details, go to our website.

Marking Information



ZXMN = Product Type Marking Code, Line 1
20B28 = Product Type Marking Code, Line 2
YYWW = Date Code Marking
YY = Year (ex: 09 = 2009)
WW = Week (01-52)

Maximum Ratings @T_A = 25°C unless otherwise specified

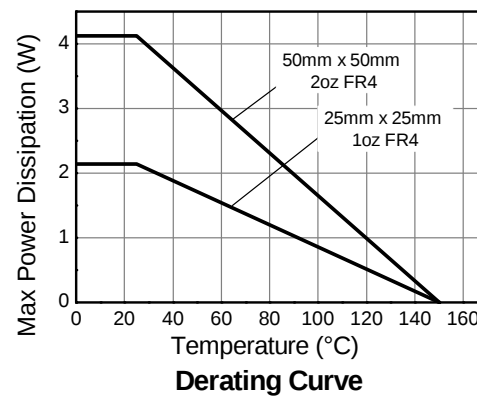
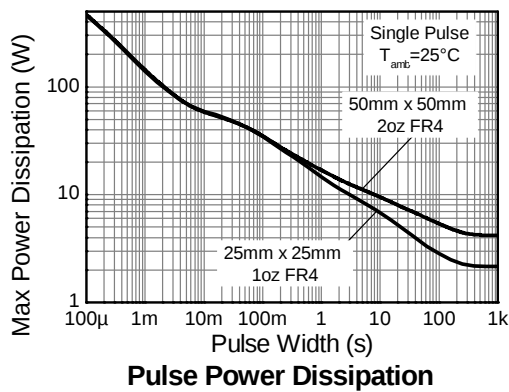
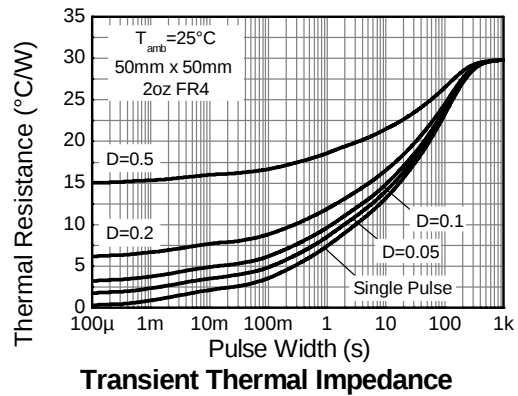
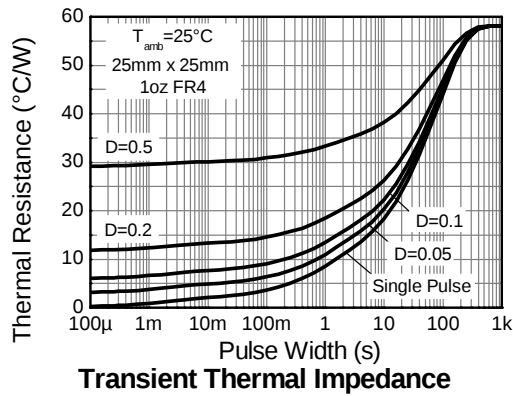
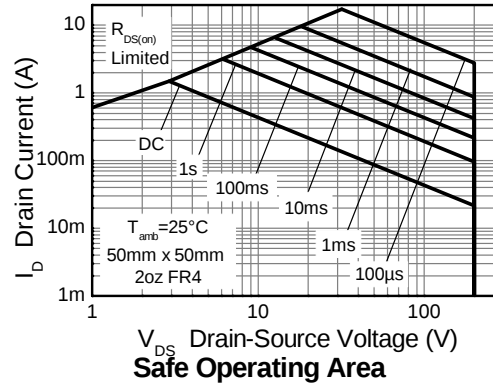
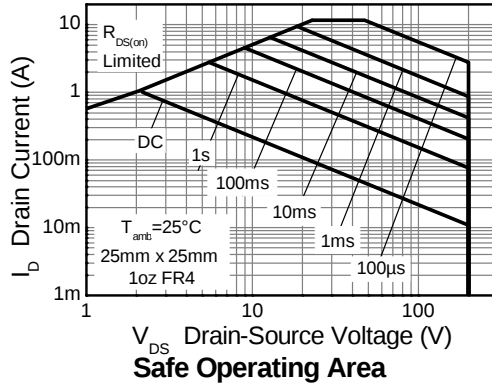
Characteristic		Symbol	Value	Unit
Drain-Source voltage		V _{DSS}	200	V
Gate-Source voltage		V _{GS}	±20	V
Single Pulsed Avalanche Energy	(Note 7)	E _{AS}	73	mJ
Single Pulsed Avalanche Current	(Note 7)	I _{AS}	5.5	A
Repetitive Avalanche Energy	(Note 4)	E _{AR}	4.5	mJ
Repetitive Avalanche Current	(Note 4)	I _{AR}	5.5	A
Continuous Drain current	V _{GS} = 10V	I _D	(Note 3)	A
			T _A = 70°C (Note 3)	
			(Note 2)	
Pulsed Drain current	V _{GS} = 10V	I _{DM}	17.3	A
Continuous Source current (Body diode)	(Note 2)	I _S	5.7	A
Pulsed Source current (Body diode)	(Note 4)	I _{SM}	17.3	A

Thermal Characteristics

Characteristic		Symbol	Value	Unit
Power dissipation Linear derating factor	(Note 2)	P _D	4.3	W mW/°C
			34.4	
	(Note 3)		10.2	
	(Note 6)		76.0	
Thermal Resistance, Junction to Ambient	(Note 2)	R _{θJA}	2.2	°C/W
	(Note 3)		17.4	
	(Note 6)		29.1	
Thermal Resistance, Junction to Lead	(Note 5)	R _{θJL}	12.3	°C/W
Operating and storage temperature range	(Note 5)	T _J , T _{STG}	57.3	°C

- Notes:
2. 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.
 3. Same as note 2, except the device is measured at t ≤ 10 sec.
 4. Same as note 2, except the device is operating in a repetitive state with pulse width and duty cycle limited by maximum junction temperature.
 5. Thermal resistance from junction to solder-point (at the end of the drain lead).
 6. For a device surface mounted on 25mm x 25mm x 1.6mm FR4 PCB with the high coverage single sided 1oz copper, in still air conditions; the device is measured when operating in a steady-state condition.
 7. UIS in production with L = 4.83mH, I_{AS} = 5.5A, R_G = 25Ω, V_{DD} = 100V, starting T_J = 25°C.

Thermal Characteristics

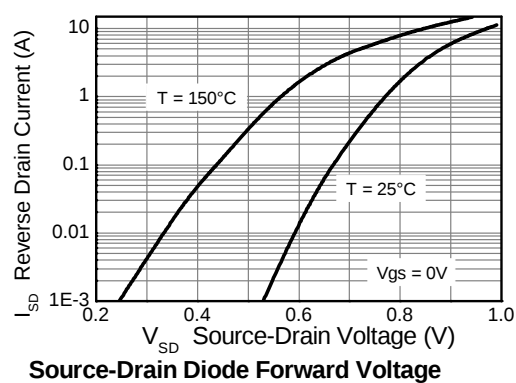
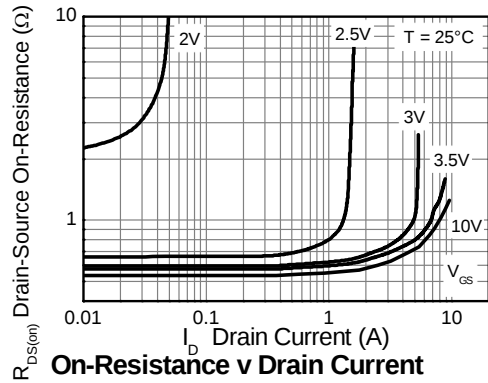
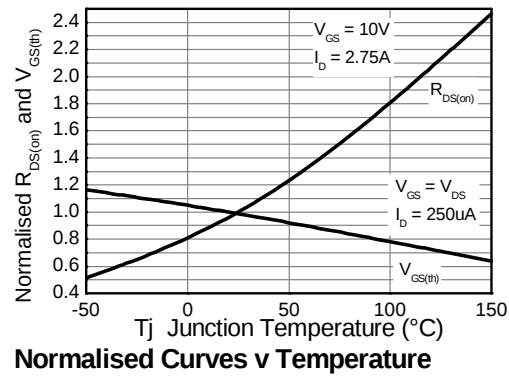
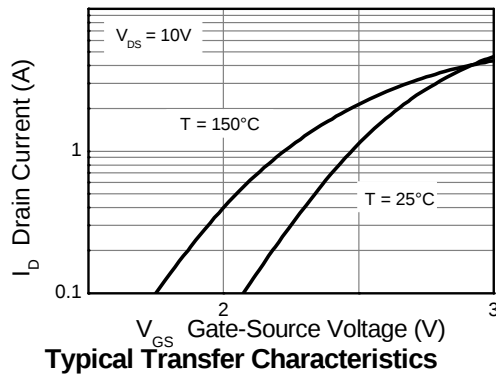
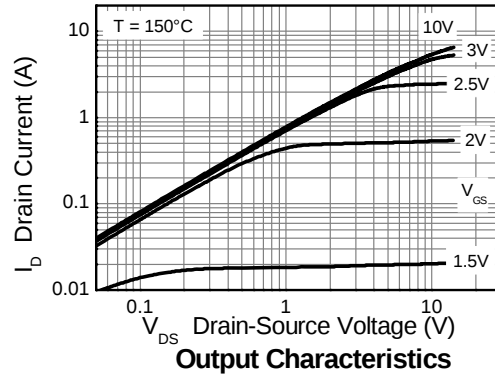
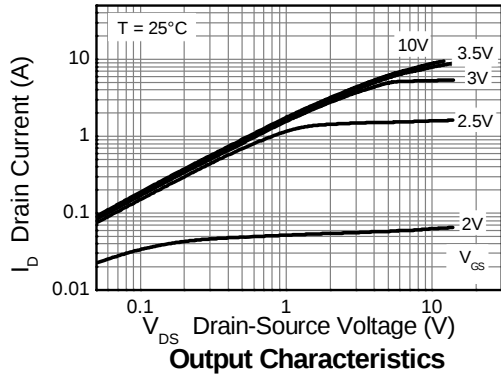


Electrical Characteristics @T_A = 25°C unless otherwise specified

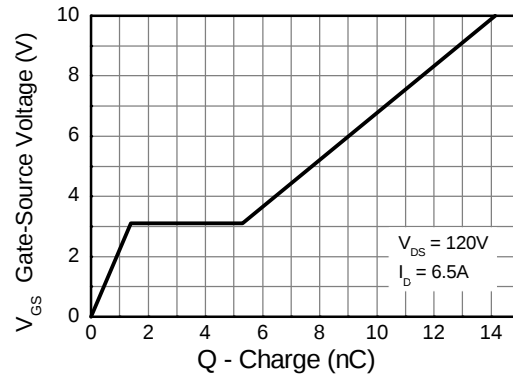
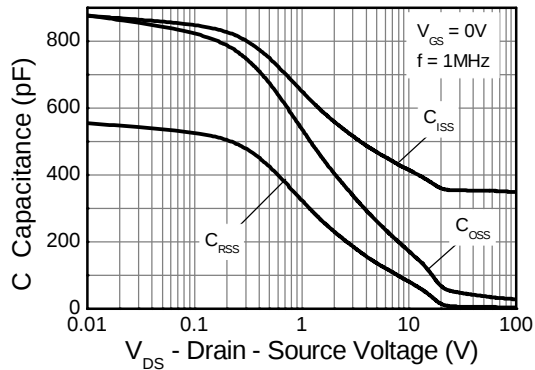
Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
OFF CHARACTERISTICS						
Drain-Source Breakdown Voltage	BV _{DSS}	200	—	—	V	I _D = 250μA, V _{GS} = 0V
Zero Gate Voltage Drain Current	I _{DSS}	—	—	500	nA	V _{DS} = 200V, V _{GS} = 0V
Gate-Source Leakage	I _{GSS}	—	—	±100	nA	V _{GS} = ±20V, V _{DS} = 0V
ON CHARACTERISTICS						
Gate Threshold Voltage	V _{GS(th)}	1	1.6	2.5	V	I _D = 250μA, V _{DS} = V _{GS}
Static Drain-Source On-Resistance (Note 8)	R _{DS(on)}	—	0.650	0.750	Ω	V _{GS} = 10V, I _D = 2.75A
			0.670	0.780		V _{GS} = 5V, I _D = 2.75A
Forward Transconductance (Notes 8 & 9)	g _{fs}	—	6.13	—	S	V _{DS} = 30V, I _D = 2.75A
Diode Forward Voltage (Note 8)	V _{SD}	—	0.860	0.950	V	I _S = 5.5A, V _{GS} = 0V
Reverse recovery time (Note 9)	t _{rr}	—	177	—	ns	I _S = 6.5A, V _{GS} = 0V,
Reverse recovery charge (Note 9)	Q _{rr}	—	1.4	—	μC	di/dt = 100A/μs
DYNAMIC CHARACTERISTICS (Note 9)						
Input Capacitance	C _{iss}	—	358	—	pF	V _{DS} = 25V, V _{GS} = 0V f = 1MHz
Output Capacitance	C _{oss}	—	50	—	pF	
Reverse Transfer Capacitance	C _{rss}	—	6.1	—	pF	
Total Gate Charge	Q _g	—	8.1	—	nC	V _{DS} = 120V, V _{GS} = 5V I _D = 6.5A
Gate-Source Charge	Q _{gs}	—	1.4	—	nC	
Gate-Drain Charge	Q _{gd}	—	3.9	—	nC	
Turn-On Delay Time (Note 10)	t _{D(on)}	—	17.8	—	ns	V _{DD} = 100V, V _{GS} = 5V I _D = 6.5A, R _G ≅ 25Ω
Turn-On Rise Time (Note 10)	t _r	—	76.9	—	ns	
Turn-Off Delay Time (Note 10)	t _{D(off)}	—	44.7	—	ns	
Turn-Off Fall Time (Note 10)	t _f	—	57.1	—	ns	

Notes: 8. Measured under pulsed conditions. Pulse width ≤ 300μs; duty cycle ≤ 2%
9. For design aid only, not subject to production testing.
10. Switching characteristics are independent of operating junction temperatures.

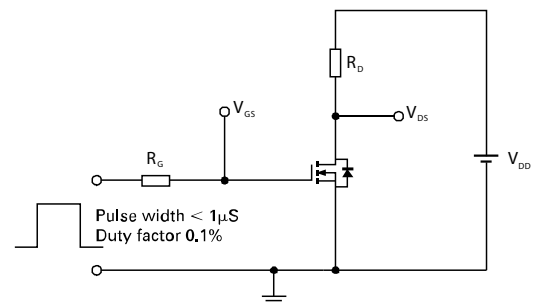
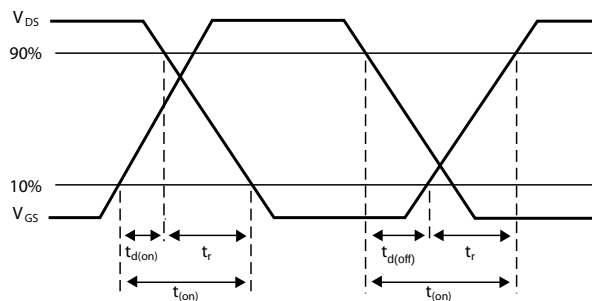
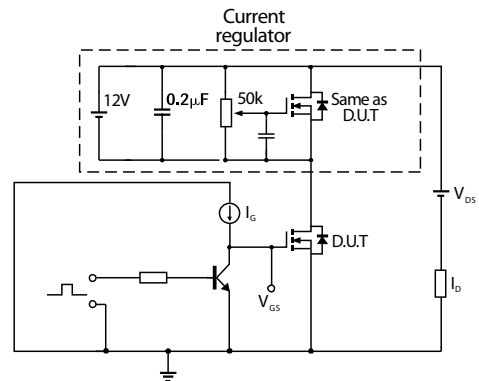
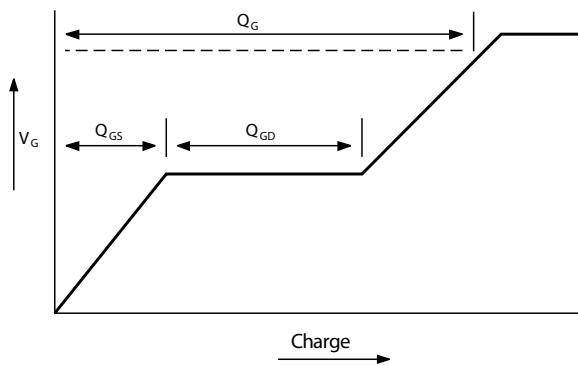
Typical Characteristics



Typical Characteristics - continued

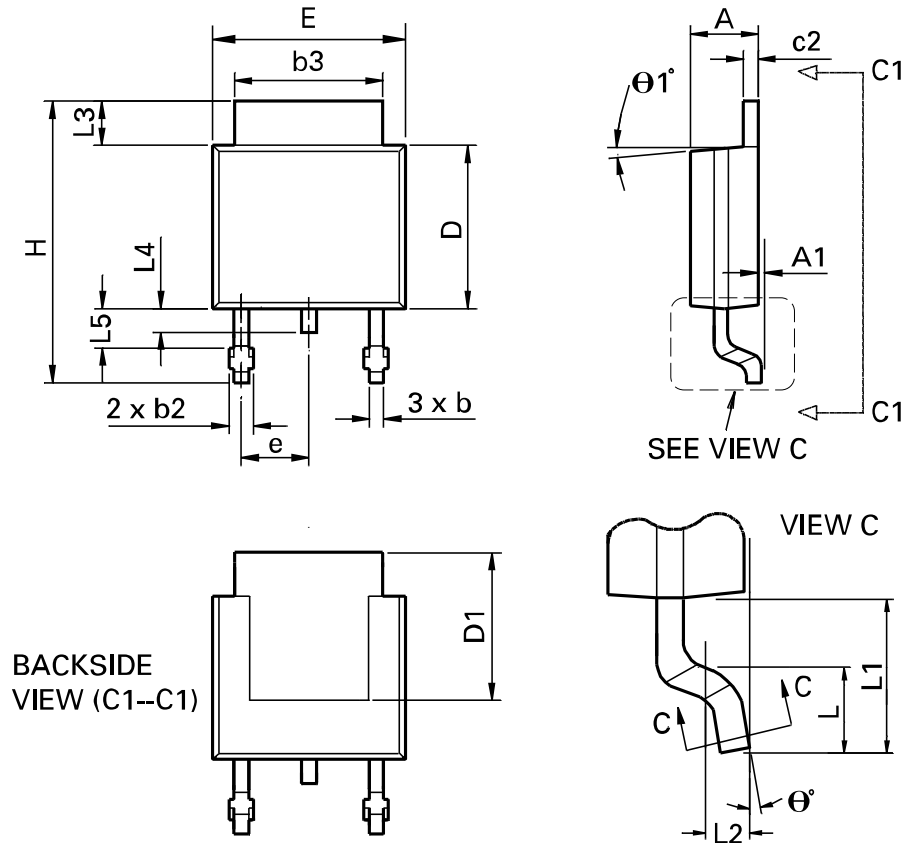


Test Circuits



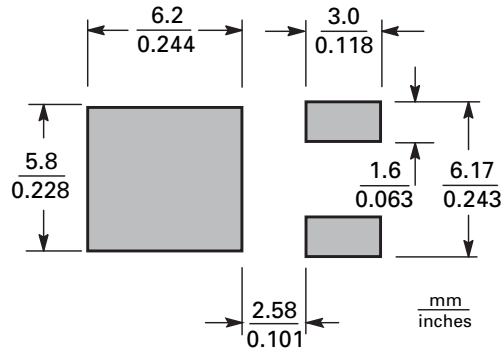
ZXMN20B28K

Package Outline Dimensions



DIM	Inches		Millimeters		DIM	Inches		Millimeters	
	Min	Max	Min	Max		Min	Max	Min	Max
A	0.086	0.094	2.18	2.39	e	0.090 BSC		2.29 BSC	
A1	-	0.005	-	0.127	H	0.370	0.410	9.40	10.41
b	0.020	0.035	0.508	0.89	L	0.055	0.070	1.40	1.78
b2	0.030	0.045	0.762	1.14	L1	0.108 REF		2.74 REF	
b3	0.205	0.215	5.21	5.46	L2	0.020 BSC		0.508 BSC	
c	0.018	0.024	0.457	0.61	L3	0.035	0.065	0.89	1.65
c2	0.018	0.023	0.457	0.584	L4	0.025	0.040	0.635	1.016
D	0.213	0.245	5.41	6.22	L5	0.045	0.060	1.14	1.52
D1	0.205	-	5.21	-	θ_1°	0°	10°	0°	10°
E	0.250	0.265	6.35	6.73	θ°	0°	15°	0°	15°
E1	0.170	-	4.32	-	-	-	-	-	-

Suggested Pad Layout



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